T.O. No. 1F-86F-2
(Formerly AN 01-60JLD-2)

HANDBOOK
MAINTENANCE INSTRUCTIONS

USAF SERIES
F-86F
AIRCRAFT

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INTRODUCTION

This handbook contains instructions for the accomplishment of organizational maintenance on the F-86F airframe, J47-GE-27 engine, and associated accessory equipment. Supplementary information on the operation, repair, inspection, and parts listing may be found in the following publications:

AN 01-60JLD-1	Flight Handbook
AN 01-60JL-3	Handbook of Structural Repair
AN 01-60JLD-4	Parts Catalog
AN 01-60JLB-6	Handbook of Inspection Requirements

Section I of this handbook contains general descriptive and dimensional data, instructions for ground handling and servicing, lubrication information, and a list of special airframe tools and equipment.

Sections II through IX include explicit information relative to description, trouble shooting, installation and removal, adjustment, and testing of each system and/or component. Information on hydraulically or electrically operated equipment is included in the paragraphs covering the individual systems affected. For example, all descriptive hydraulic or electrical information relative to the operation of landing gear, wing flap, or surface control systems is included in the paragraphs covering these systems. The hydraulic and electrical system paragraphs contain information on the basic power systems only.

Following is a list of the major components and systems of the airplane and the sections in which they are described:

Section II	Airframe Group
Section III	Hydraulic System
Section IV	Utility Systems
Section V	Power Plant and Related Systems
Section VI	Instruments
Section VII	Electrical System
Section VIII	Radio and Radar
Section IX	Armament

Section X contains a simplified schematic of the entire electrical system, as well as detailed electrical and electronic circuit diagrams and isometric diagrams for each individual circuit. These diagrams are arranged in essentially the same order as the systems to which they pertain are covered in the preceding sections of the handbook. The section also includes a symbol chart, a list of items of equipment covered in the wiring diagrams, and an alphabetical index of all wiring diagrams. Relay location and circuit-breaker location diagrams are also provided. For easier reference, Section X may be detached and inserted in a separate cover.

A general table of contents, listing main paragraph headings, will be found on page i. At the beginning of each section is a detailed table of contents, listing the main and secondary paragraph headings of the section. The complete alphabetical index at the end of the handbook lists the page numbers of all subjects and illustrations.

Figure 1-1. View of Airplane

Section I
GENERAL INFORMATION

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1-1. GENERAL DESCRIPTION.

1-2. The North American F-86F Series Airplanes are single-place, low-wing, high-performance fighters, powered by a single J47 series axial-flow turbojet engine. The airplane has conventional tricycle landing gear and a bubble canopy. A swept-back wing and empennage distinguish its design. F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes do not have wing slats. The pilot's cockpit contains a canopy ejection device and a catapult ejection seat. Six .50-caliber machine guns are mounted in the sides of the forward fuselage. In addition to the machine guns, bombs or rockets may be carried under the wings. The airplane is equipped with a radar set, a radio compass, and a command radio set. F-86F-1 Airplanes have 120-gallon droppable fuel tanks, while F-86F-5 and subsequent airplanes may use either 120- or 200-gallon droppable fuel tanks. F-86F-25 and subsequent airplanes may use either two 120-gallon droppable fuel tanks on each wing or one 120- and one 200-gallon droppable fuel tank on each wing.

1-3. VARIATIONS OF AIRPLANE CODING.

1-4. Eight versions of the F-86F are in operation. The variations of Air Force serial coding are given in the following chart:

BLOCK NUMBER	AF SERIAL NUMBER
F-86F-1	AF51-2850 through -2927
F-86F-5	AF51-2928 through -2943
F-86F-10	AF51-12936 through -12969
F-86F-15	AF51-12970 through -12976
F-86F-20	AF51-13070 through -13169
F-86F-25	AF51-13170 through -13510
	AF52-5272 through -5530
F-86F-30	AF52-4305 through -5015
	AF52-5017 through -5163
F-86F-35	AF52-5164 through -5271
	AF53-1072 through -1227

1-5. PRINCIPAL DIMENSIONS.

(Airplane supported on landing gear at normal weight, less pilot, and specified tire inflation and strut extension. See figure 1-2.)

General

Span	37.1 ft
Length (over-all)	37.5 ft
Height	14.7 ft

Design gross weight—F-86F-1 Airplanes (approximately)	14,600 lb
Maximum alternate gross weight—F-86F-1 Airplanes (approximately)	16,650 lb
Design gross weight—F-86F-5 through F-86F-20 Airplanes (approximately)	14,650 lb
Maximum alternate gross weight—F-86F-5 through F-86F-20 Airplanes (approximately)	17,600 lb
Design gross weight—F-86F-25 and subsequent airplanes (approximately)	14,850 lb
Maximum alternate gross weight—F-86F-25 and subsequent airplanes (approximately)	20,000 lb

Note

The preceding weight figures are approximate. For specific weight information on a particular airplane, refer to Weight and Balance Data Handbook furnished with each airplane.

Wing

Type	Low-wing
Airfoil section designation	
Root	NACA-0012-64
Tip	NACA-0011-64
Chord at root—F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4504	10.3 ft
Chord at root—F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes	10.8 ft
Chord at tip—F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4504	5.3 ft
Chord at tip—F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes	5.5 ft
Incidence at root	+1 deg
Incidence at tip	−1 deg
Dihedral	3 deg
Sweepback (25% chord line)	35 deg
Aspect ratio	4.8

Horizontal Stabilizer

Span	12.8 ft
Chord at root	3.8 ft
Chord at tip	1.7 ft
Incidence	6 deg up, 10 deg down
Dihedral	10 deg

Vertical Stabilizer

Height (from fuselage reference line)	7.5 ft
Chord at root	6.4 ft
Chord at tip	2.3 ft

Fuselage

Width (maximum)	5.0 ft
Height (fuselage bottom to top of canopy)	6.6 ft
Length (without empennage)	35.9 ft

Areas

Wing (including ailerons, flaps, and slats)—F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4504	287.9 sq ft
Wing (including ailerons, flaps, and leading edges)—F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes	302.3 sq ft
Ailerons (each)	16.4 sq ft
Flaps (both)	32.5 sq ft
Slats (both)	35.4 sq ft
Horizontal stabilizer (including area covered by vertical tail)	34.9 sq ft
Elevators (each)	4.1 sq ft
Fin (including area blanketed by fuselage)	25.3 sq ft
Rudder (including tab)	8.1 sq ft
Rudder trim tab	.9 sq ft
Speed brakes (effective frontal area)	8.6 sq ft

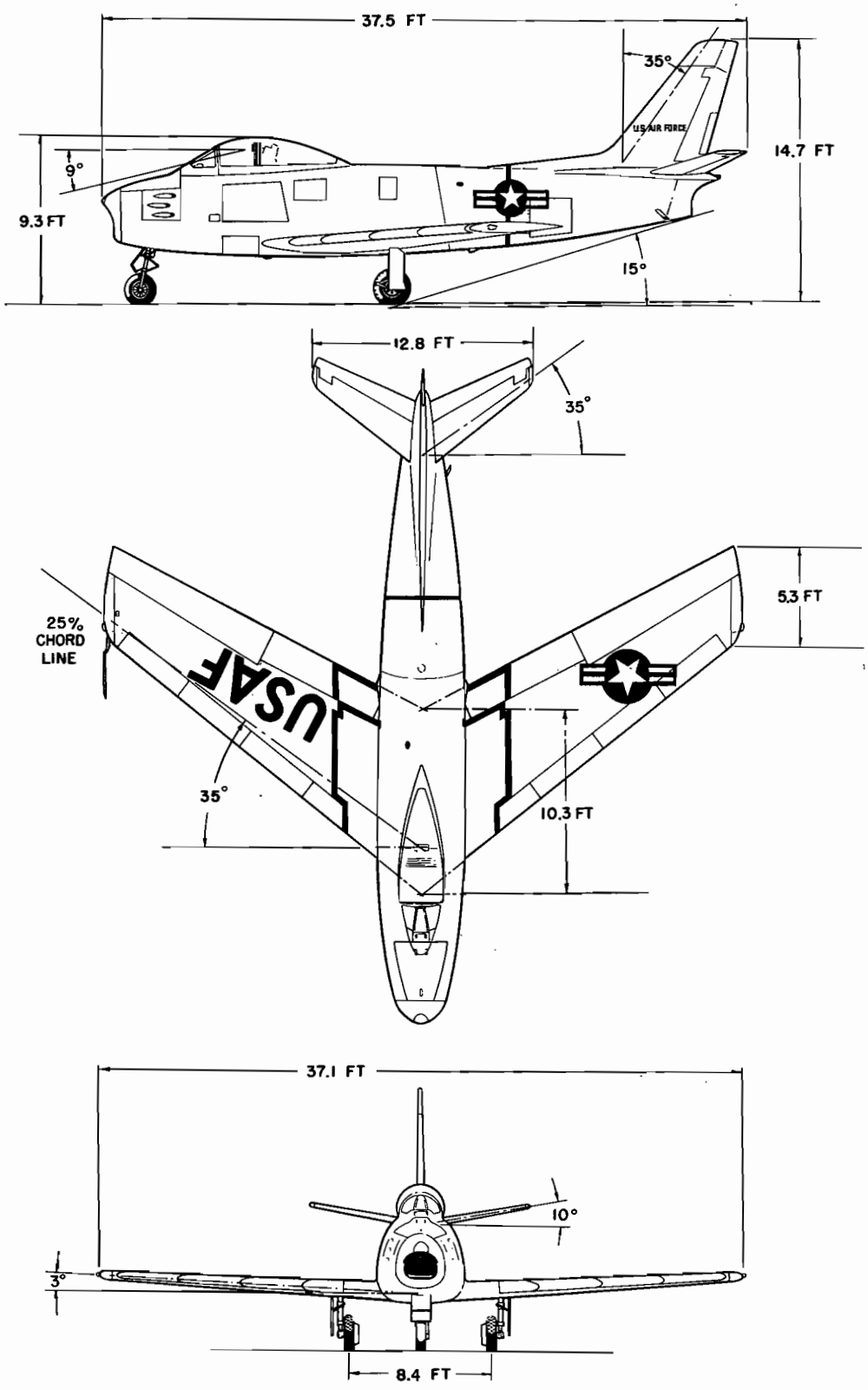


Figure 1-2. Airplane Dimensions

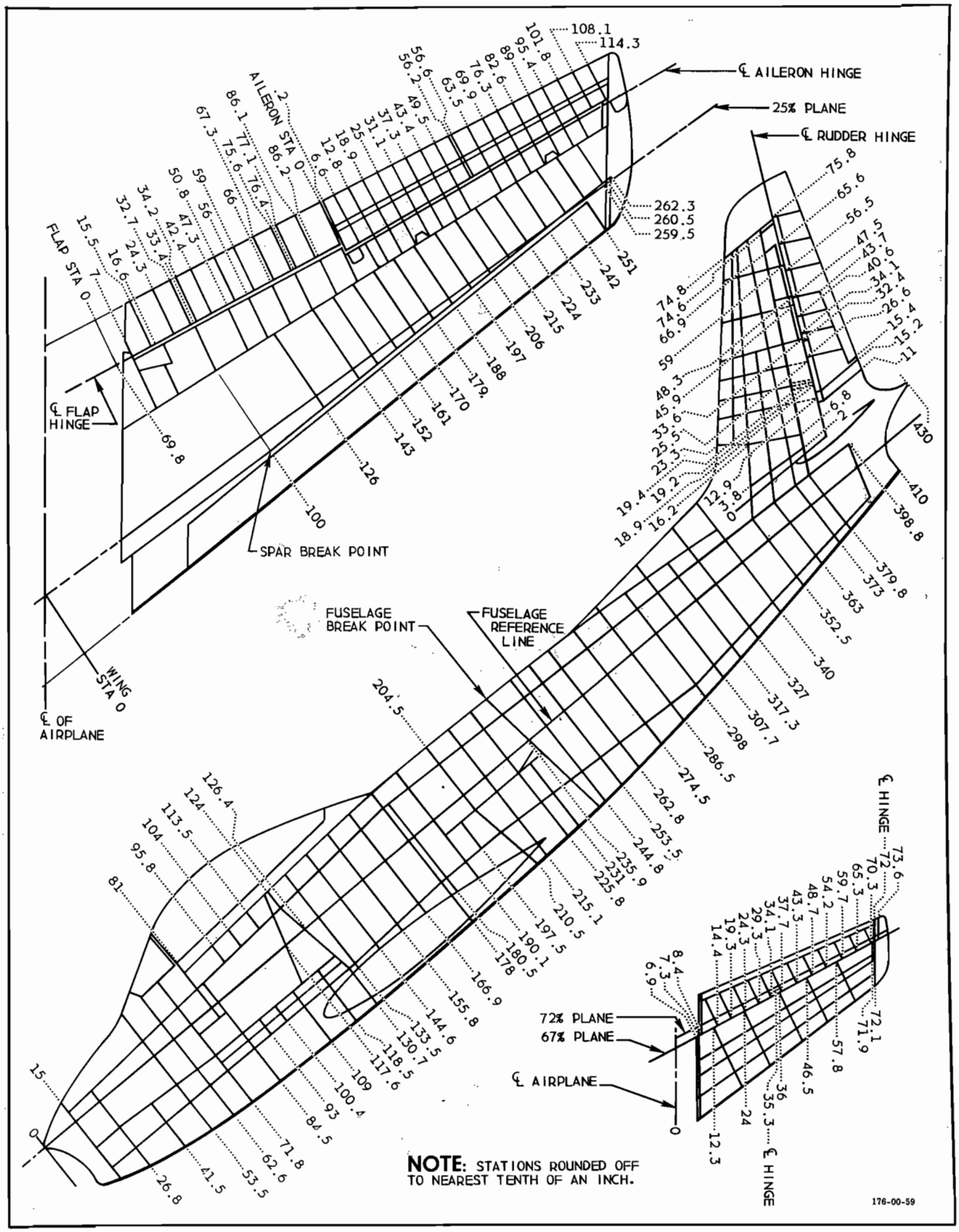
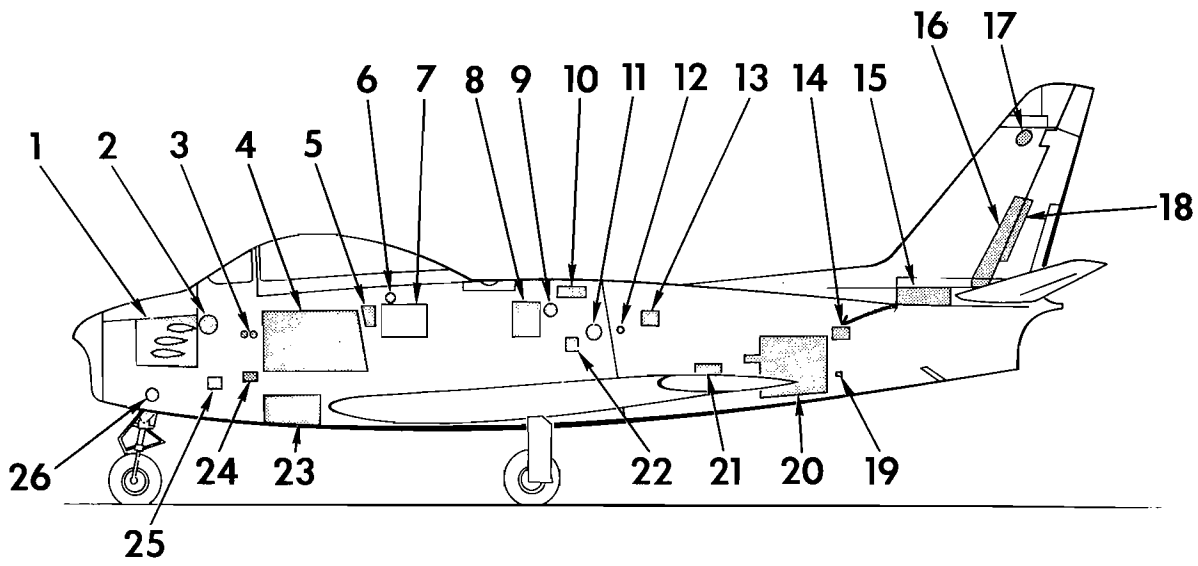


Figure 1-3. Airplane Stations



1 ELECTRICAL, OXYGEN, AND PITOT LINES

2 HYDRAULIC BRAKE CYLINDER

3 CANOPY CONTROL SWITCHES

4 GUNS
AMMUNITION LOADING HOOK

5 HORIZONTAL STABILIZER TORQUE TUBE

6 EMERGENCY CANOPY RELEASE

7 FUEL LEVEL CONTROL VALVE
RADIO

8 ENGINE ACCESSORIES
FUEL FILTER ALCOHOL TANK FILLER*

9 FUEL AND OIL PRESSURE TRANSMITTERS

10 SURFACE CONTROL ADJUSTMENT
HYDRAULIC DISCONNECT COUPLING
MANUAL CHANGE-OVER DISCONNECT
FUEL LEVEL TRANSMITTER

11 FUEL FILTER

12 FUEL VENT

13 SPARK PLUG
FUEL VENT CONNECTION

14 SURFACE CONTROL ALTERNATE
HYDRAULIC SYSTEM COMPENSATOR

15 HORIZONTAL STABILIZER CONTROL MECHANISM

16 HORIZONTAL STABILIZER ACTUATOR

17 ANTENNA DISCONNECT PLUG

18 RUDDER TRIM TAB ACTUATOR

19 SURFACE CONTROL ALTERNATE
HYDRAULIC SYSTEM COMPENSATOR
FLUID LEVEL INDICATOR

20 SURFACE CONTROL ALTERNATE HYD RESERVOIR
SPEED BRAKE MECHANISM

21 DATA CASE
SURFACE CONTROL ALTERNATE HYD SYSTEM
PUMP
GROUND FIRE FIGHTING
ENGINE REMOVAL DISCONNECTS

22 EXTERNAL POWER CONNECTION

23 AMMUNITION (LOWER DOOR FOR STEP)
GUN CHARGER

24 KICK STEP

25 REMOTE GYROSYN COMPASS AMPLIFIER †

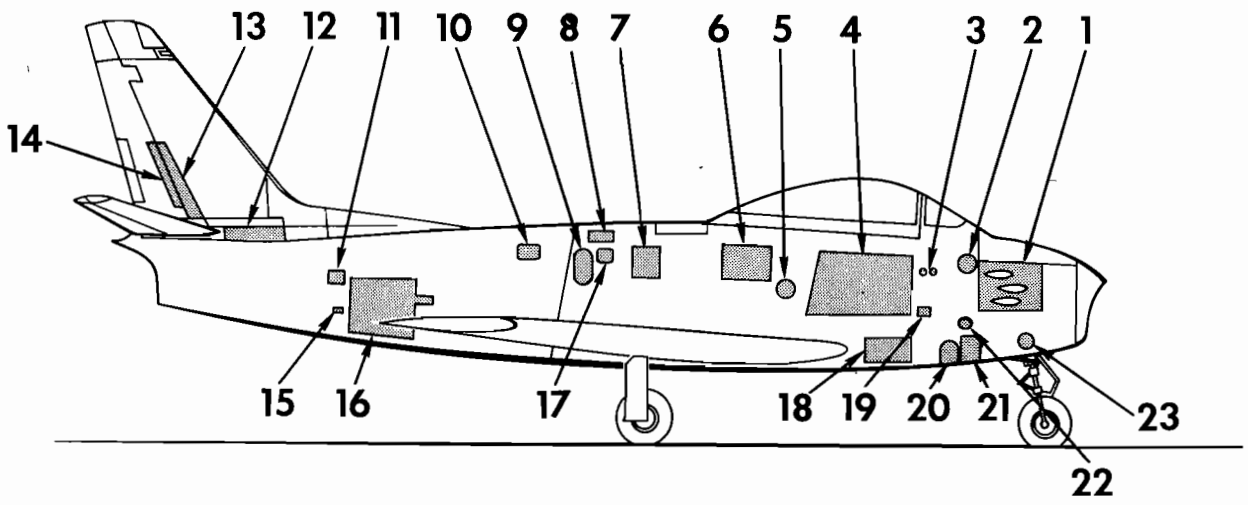
26 NOSE GEAR TRUNNION PIN

* F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

† F-86F-35 AIRPLANES AF53-1172 THRU -1227

F-86F-2-00-3

Figure 1-4. Access and Inspection Provisions (Sheet 1 of 4)



1 ELECTRICAL, OXYGEN, AND PITOT LINES

2 HYDRAULIC BRAKE CYLINDER

3 CANOPY CONTROL SWITCHES

4 GUNS
AMMUNITION LOADING HOOK
BORE-SIGHT FIXTURE
CABIN PRESSURE

5 FUEL FILLER

6 HYDRAULIC RESERVOIR
GYROSYN COMPASS AMPLIFIER †
FUEL LEVEL TRANSMITTER
FIRE DETECTOR RELAY
GYROSYN COMPASS CONTROL GYRO

7 ENGINE ACCESSORIES
OIL SYSTEM TANK

8 SURFACE CONTROL ADJUSTMENT

9 HYDRAULIC TEST STAND CONNECTIONS

10 SPARK PLUG
ENGINE DUCT DISCONNECT

11 SURFACE CONTROL NORMAL HYDRAULIC SYSTEM COMPENSATOR

12 STABILIZER CONTROL MECHANISM

13 HORIZONTAL STABILIZER ACTUATOR TRIM AND ARTIFICIAL FEEL BUNGEE

14 RUDDER TRIM TAB ACTUATOR

15 SURFACE CONTROL NORMAL HYDRAULIC SYSTEM COMPENSATOR FLUID LEVEL INDICATOR

16 SURFACE CONTROL ALTERNATE HYDRAULIC SYSTEM ACCUMULATOR
SPEED BRAKE MECHANISM

17 ENGINE OIL FILLER

18 AMMUNITION (LOWER DOOR FOR STEP)
GUN CHARGER

19 KICK STEP

20 GUN CHARGER AIR BOTTLE DRAIN*

21 GUN CHARGER AIR COMPRESSOR*
EMERGENCY NOSE GEAR SELECTOR RESET
OXYGEN CHECK VALVE AND FILLER LINE

22 OXYGEN FILLER VALVE

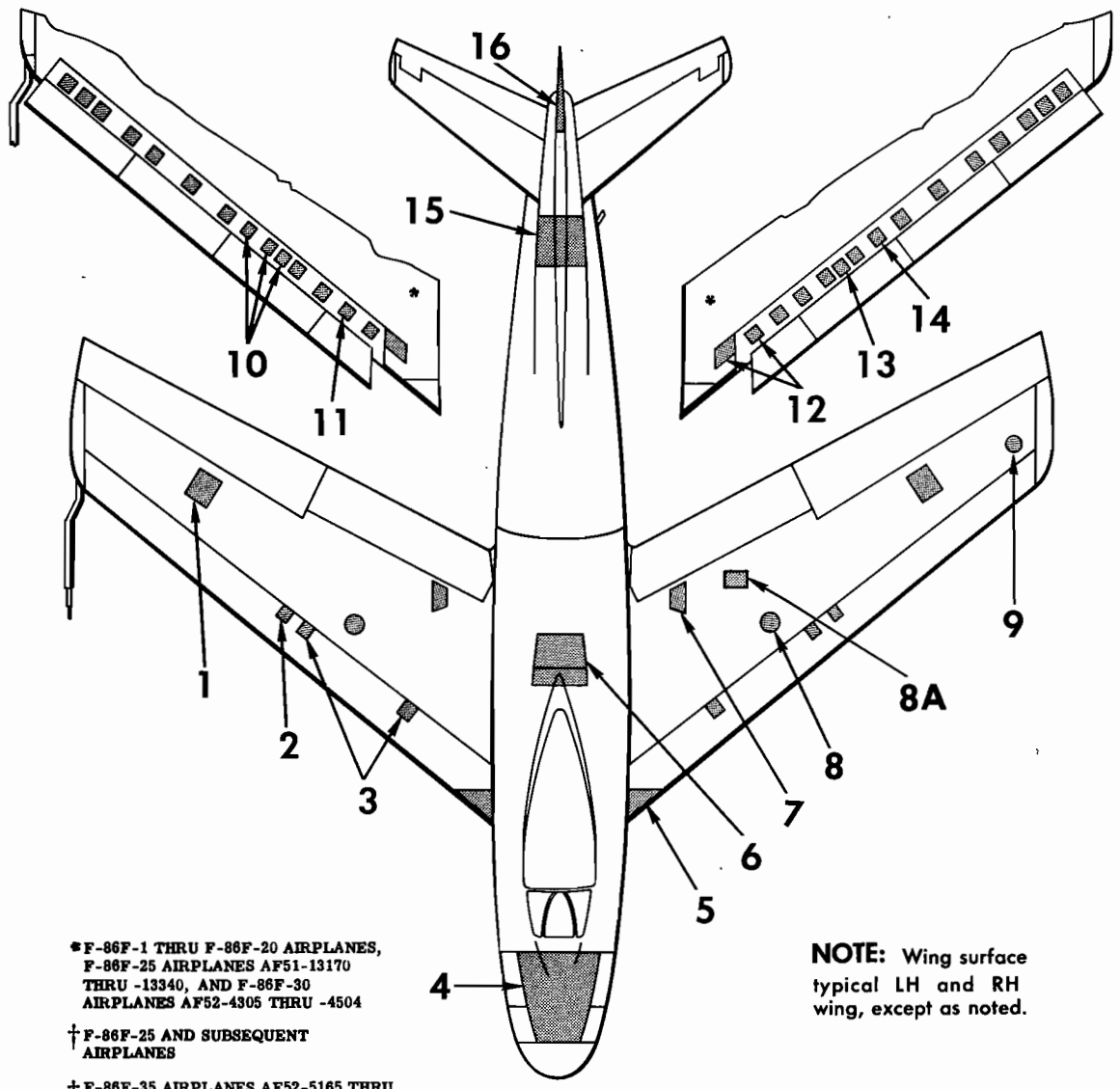
23 NOSE GEAR TRUNNION PIN

* F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5277, -5279 THRU -5290, -5292, -5294 THRU -5298, -5300 THRU -5302, AND -5304, AND F-86F-30 AIRPLANES AF52-4305 THRU -4963

† F-86F-1 THRU F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU -5271 AND AF53-1072 THRU -1172

F-86F-2-00-2

Figure 1-4. Access and Inspection Provisions (Sheet 2 of 4)



*F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13340, AND F-86F-30 AIRPLANES AF52-4305 THRU -4504

†F-86F-25 AND SUBSEQUENT AIRPLANES

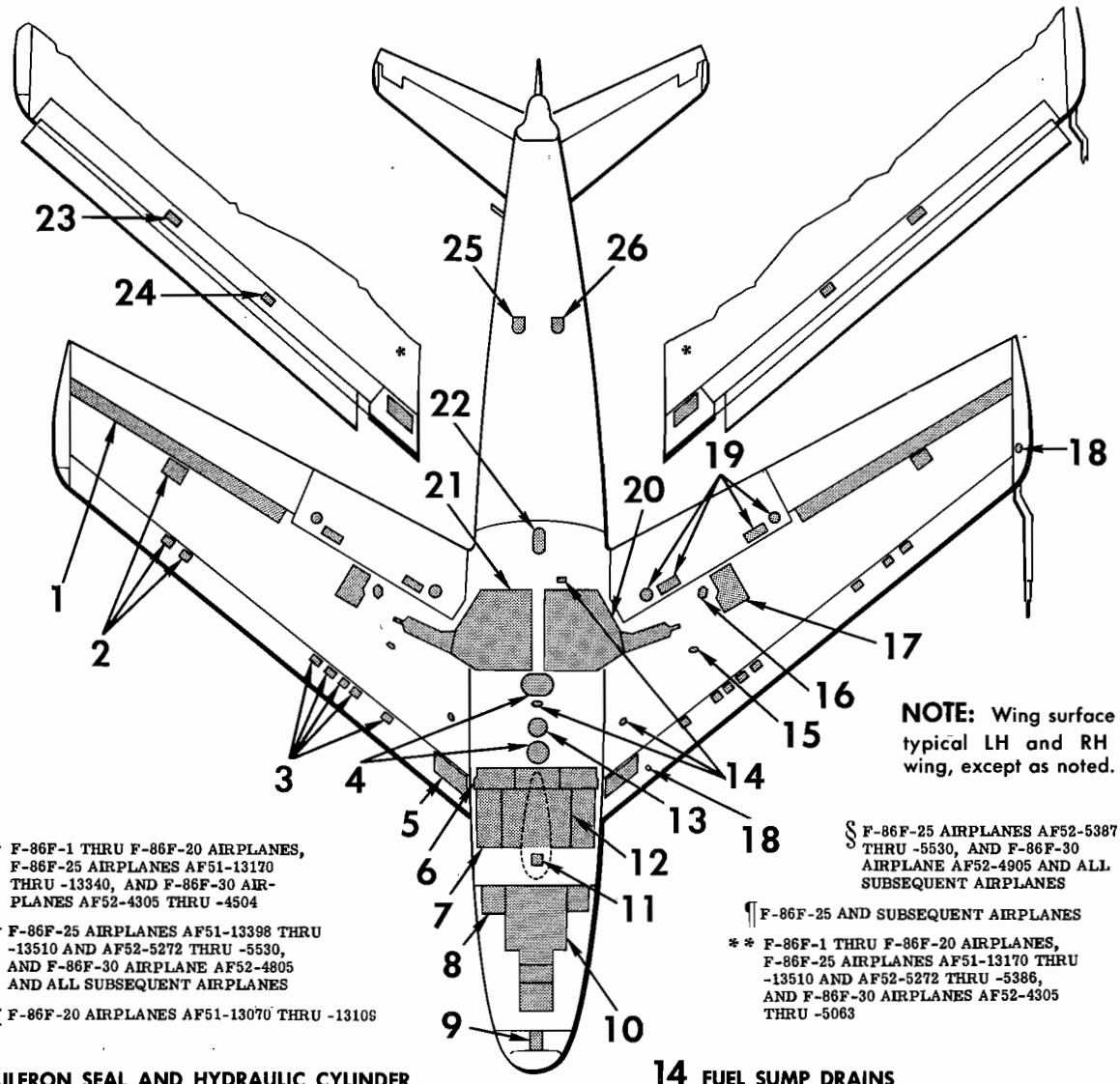
‡F-86F-35 AIRPLANES AF52-5165 THRU -5271 AND AF53-1072 THRU -1228

NOTE: Wing surface typical LH and RH wing, except as noted.

1 AILERON CONTROL ACTUATOR
2 DROP TANK MECHANICAL RELEASE
3 FUEL LINE
4 RADAR, BATTERY, AND GUN SIGHT
5 LE REMOVABLE SECTION
6 CABIN COOLING UNIT
7 MAIN GEAR TRUNNION PINS
8 FUEL FILLER
8A JETTISON AND DISARMING CABLE ADJUSTMENT ‡
9 REMOTE COMPASS TRANSMITTER (LH WING ONLY)
10 ROCKET RELEASE MECHANISM
11 DROP TANK CONNECTION †
12 INSPECTION PLATES (9 PLACES EACH WING)
13 FUEL LEVEL TRANSMITTER
14 DROP TANK CONNECTION (ALL AIRPLANES)
15 SURFACE CONTROL CONNECTIONS
16 ANTENNA

F-86F-2-00-1

Figure 1-4. Access and Inspection Provisions (Sheet 3 of 4)



* F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13340, AND F-86F-30 AIRPLANES AF52-4305 THRU -4504

† F-86F-25 AIRPLANES AF51-13398 THRU -13510 AND AF52-5272 THRU -5530, AND F-86F-30 AIRPLANE AF52-4805 AND ALL SUBSEQUENT AIRPLANES

‡ F-86F-20 AIRPLANES AF51-13070 THRU -13109

§ F-86F-25 AIRPLANES AF52-5387 THRU -5530, AND F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

¶ F-86F-25 AND SUBSEQUENT AIRPLANES

** F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

1 AILERON SEAL AND HYDRAULIC CYLINDER
2 AILERON HYDRAULIC LINES (4 PLACES RH WING)
3 FUEL LINE
4 FUEL BOOSTER PUMP
5 DROP TANK FUEL LINE DRAINS
6 AILERON CONTROLS
7 EXPENDED AMMUNITION (L & R SIDE, ALL AIRPLANES)
8 EXPENDED AMMUNITION† (L & R SIDE)
9 GUN CAMERA
10 EMERGENCY HYD NOSE GEAR ACCUMULATOR AIR FILLER
EXPENDED AMMUNITION
EXTERNAL LIGHT FLASHER
LEVELING LUGS
OXYGEN CYLINDER CHECK VALVE
FUEL FLOWMETER AMPLIFIER‡
11 P-2 STRIKE CAMERA§
12 COMMAND RADIO
AILERON TRIM ACTUATOR
13 ANTENNA
14 FUEL SUMP DRAINS
15 FUEL CELL TENSION COMPRESSION POST
16 BOMB ELECTRICAL CONNECTION¶
17 FLAP ACTUATOR
18 PITOT-STATIC LINE DRAINS (2 PLACES RH WING)
19 FLAP AND FLAP ROLLERS
20 OIL SYSTEM DRAIN
ENGINE ACCESSORIES
SPEED BRAKE HYD SYSTEM ACCUMULATOR AIR FILLER**
FUEL LEVEL TRANSMITTER
21 FUEL FILTER
ENGINE ACCESSORIES
SURFACE CONTROL NORMAL HYD SYSTEM ACCUMULATOR AIR FILLER
22 FUEL TRANSFER PUMP
23 AILERON HYDRAULIC LINE*
24 BOMB RACK ELECTRICAL DISCONNECT*
25 SURFACE CONTROL ALTERNATE HYD SYSTEM FILLER
26 SURFACE CONTROL NORMAL HYD SYSTEM FILLER

176-00-70

Figure 1-4. Access and Inspection Provisions (Sheet 4 of 4)

1-6. ACCESS AND INSPECTION PROVISIONS.

1-7. Access and inspection provisions are shown in figure 1-4. Access to the engine plumbing is gained through the covers provided in each main landing gear well and through fuselage access doors on each side of the fuselage. The cockpit may be entered from either side of the airplane, where canopy controls and steps are installed. The ammunition doors, when opened, serve as lower steps. On F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes, the ammunition doors cannot be opened without the forward inboard corner of the wing leading edge first being removed. (Refer to paragraph 2-16 for removal procedure.) A kick step is located just forward of each gun bay door. There is a ground door control switch in the left main landing gear shock strut well for ground

operation of the main gear doors when external power is connected to the airplane. The switch has two positions: "OPEN" and "CLOSED." On F-86F-15 and F-86F-20 Airplanes, F-86F-25 Airplane AF51-13190, and all subsequent airplanes, the only safe method for getting the landing gear doors open for ground maintenance is by operation of the landing gear door ground control switch. The exception to this is when, because of an absence of hydraulic pressure, the doors do not open after the ground door open switch has been operated to "OPEN." The doors are then opened by pulling the landing gear emergency release handle, with the switch remaining in "OPEN" position. If the emergency release handle is used, the emergency control valve must be reset in accordance with paragraph 2-230 before the next flight. A safety guard is provided to hold the switch in the "OPEN" position on F-86F-5 and subsequent airplanes. The switch must be moved to the "CLOSED" position prior to take-off.

1-8. GROUND HANDLING.

1-9. GROUND HANDLING DOLLIES.

1-10. A cradle is used for ground handling the rear fuselage section, and a dolly is provided for ground handling the engine. (See figure 1-5.)

1-11. HOISTING PROVISIONS.

1-12. Four hoisting slings are provided to lift the engine, aft fuselage, wing outer panel, and complete airplane. Details of how the slings are attached and the approximate weight of the complete airplane and various portions of the airplane are shown in figure 1-6.

1-13. JACKING PROVISIONS.

1-14. Jacking fittings, except those provided as integral parts of the landing gear struts, are contained in the jacking, mooring, and leveling kit. (See figure 1-19.) Jacking restrictions and jack point locations are shown in figure 1-7. The wing and forward fuselage jack points are clearly marked on the airplane. After the fairing plugs are removed, the jack pads are snapped into place and are retained by spring-loaded ball retainers. When a wing panel is to be removed, the rear fuselage jack point on the side of the wing panel to be removed must be used in combination with the forward fuselage jack point and the opposite wing jack point. For removal of both wing panels, the forward fuselage jack point is used in combination with both rear fuselage jack points. Jacking points are provided

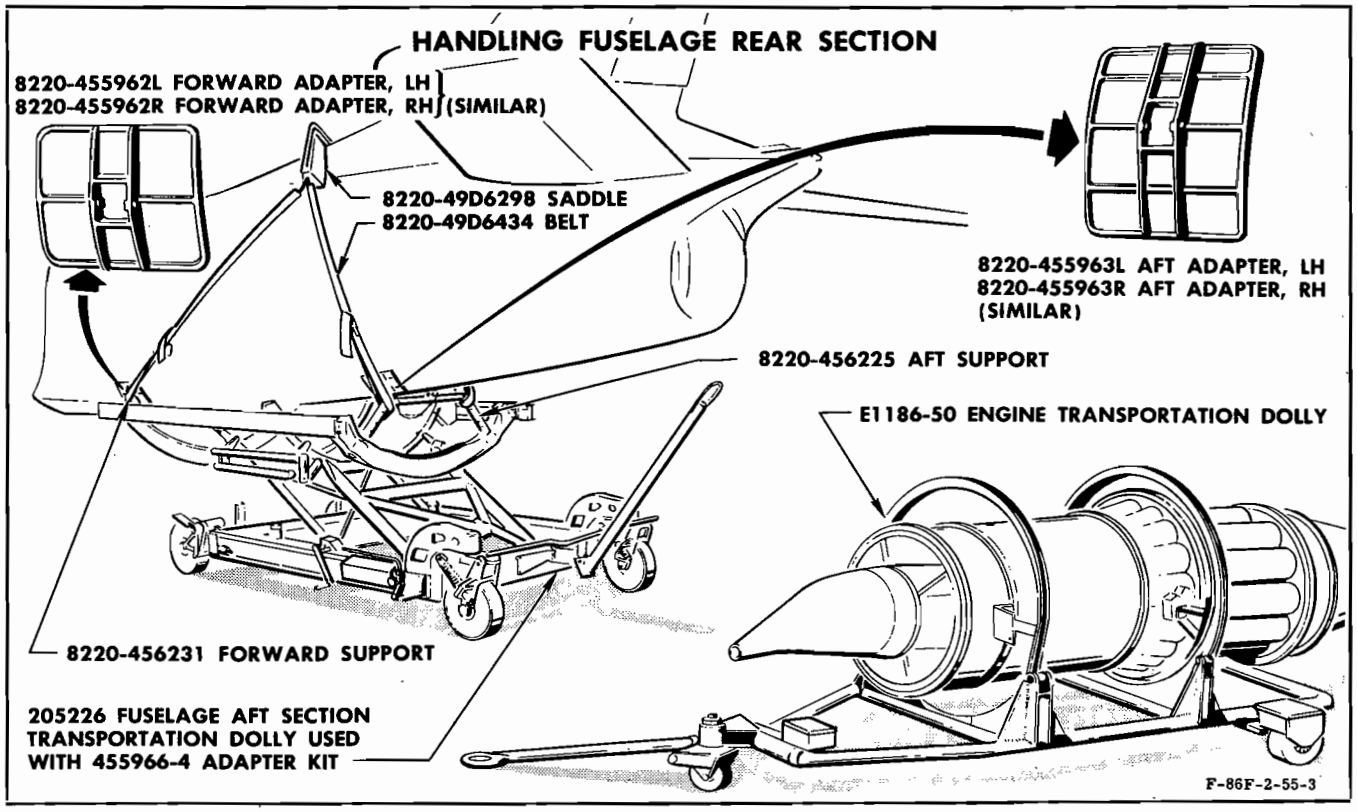


Figure 1-5. Ground Handling Equipment

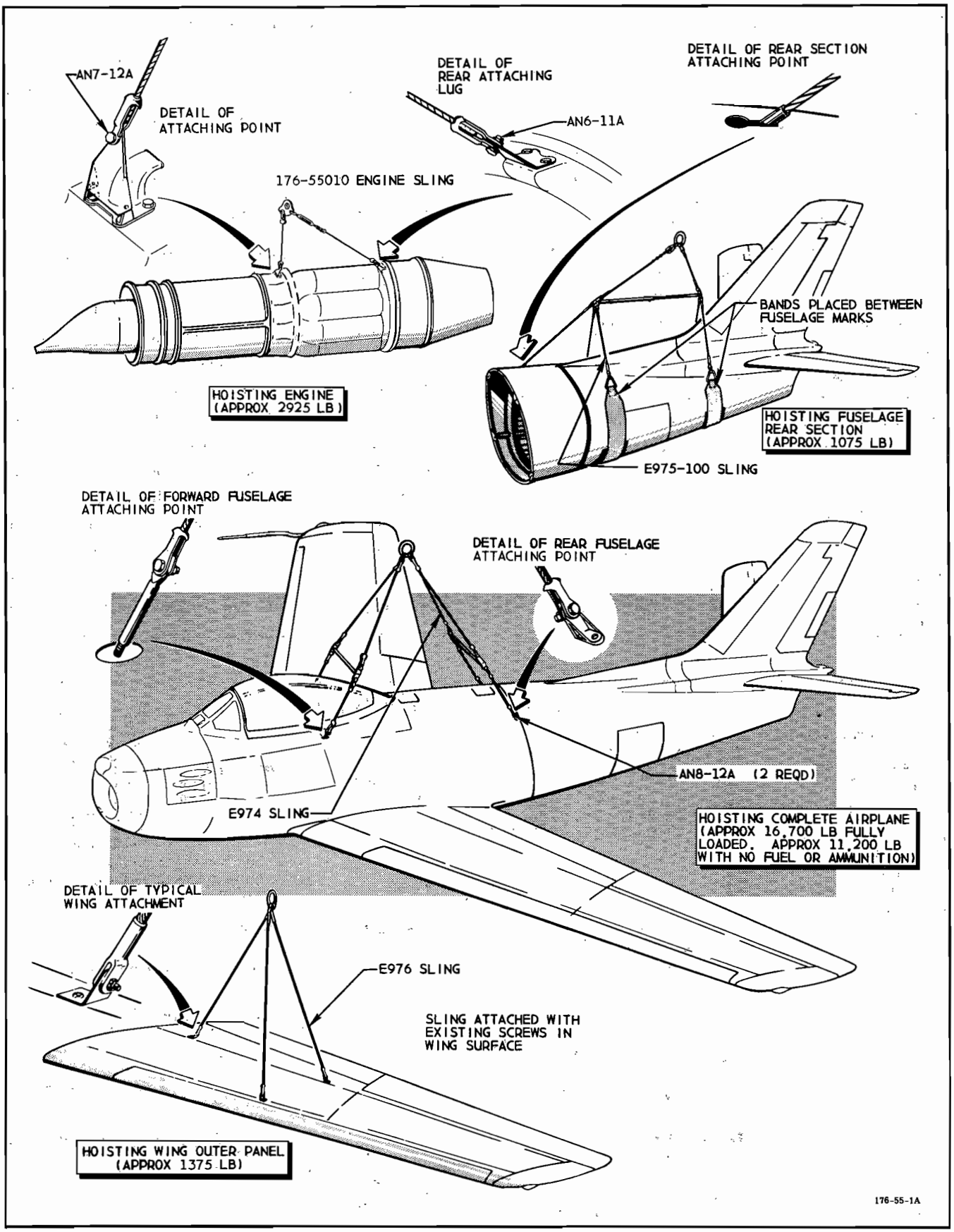


Figure 1-6. Hoisting Slings

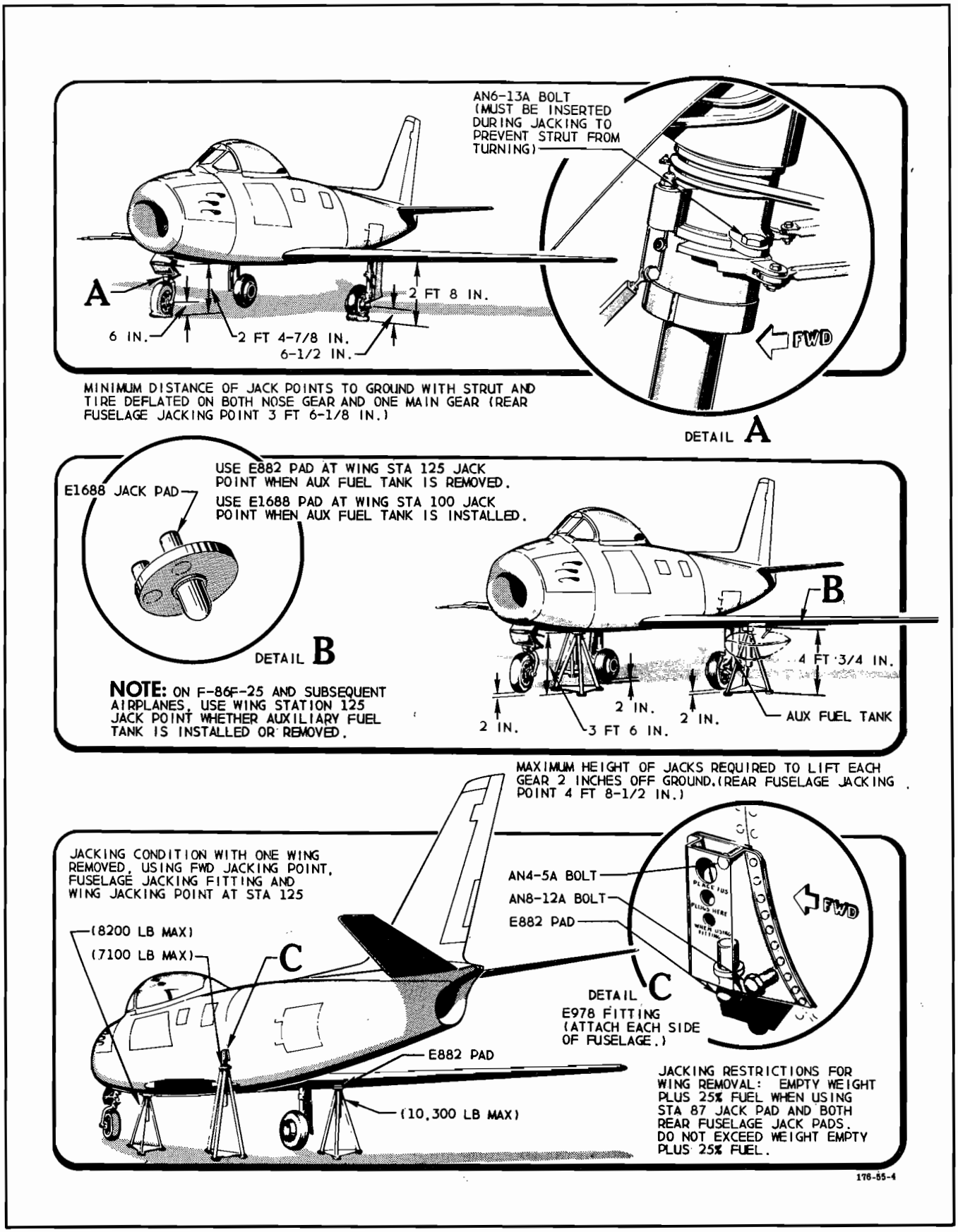


Figure 1-7. Jacking Provisions

at wing stations 100 for use when auxiliary fuel tanks are installed. On F-86F-25 and subsequent airplanes, wing station 125 jack points are used whether auxiliary fuel tanks are installed or removed.

CAUTION

- To avoid overloading at either the wing or nose jacking points, jacking should be done simultaneously at all three points.
- Do not remove fuselage fuel cell access door if airplane is to be put on jacks.

1-15. LEVELING PROVISIONS.

1-16. Lateral leveling lugs are mounted on the nose wheel aft bulkhead. Longitudinal leveling lugs are provided on the nose wheel left web. A bubble level may be placed on these points for lateral or longitudinal leveling of the airplane. (See figure 1-8.) There are two reference line markers on the left side of the fuselage (at stations 63 and 226) for transit leveling of the airplane. The reference line markers consist of screws with a red circle painted around each screw. There are two plumb bob positions on the bottom of the fuselage: one beside the nose gear strut well, and the other aft of the main wheel wells for use with screw assemblies provided in the mooring and jacking kit.

1-17. MOORING PROVISIONS.

1-18. Use the following procedure to moor the airplane for extreme-weather conditions:

a. Head airplane into wind.

b. Lock rudder control. (Refer to paragraph 1-21.)

c. Chock wheels, front and back. Secure each pair of chocks with ropes or wood cleats to prevent slipping of chocks.

Note

Wood block chocks, AF drawing No. 42D6594-2 (locally manufactured), should be used. In ice or snow, use metal collapsible ice grip wheel chocks, AF drawing No. 50D6602.

d. Retract wing flaps and close speed brakes.

e. Install ground safety locks. (Refer to paragraph 1-23.)

f. Neutralize all flight surface controls.

g. Install mooring eyes in the "MOOR" point forward on the lower surface of each wing. The forward fuselage mooring eye screws into the station 87 mooring point on the bottom fuselage. The rear fuselage mooring eye screws into fitting at station 379, bottom fuselage.

Note

Reinstall plugs in wing, forward fuselage, and rear fuselage mooring eye holes before flight.

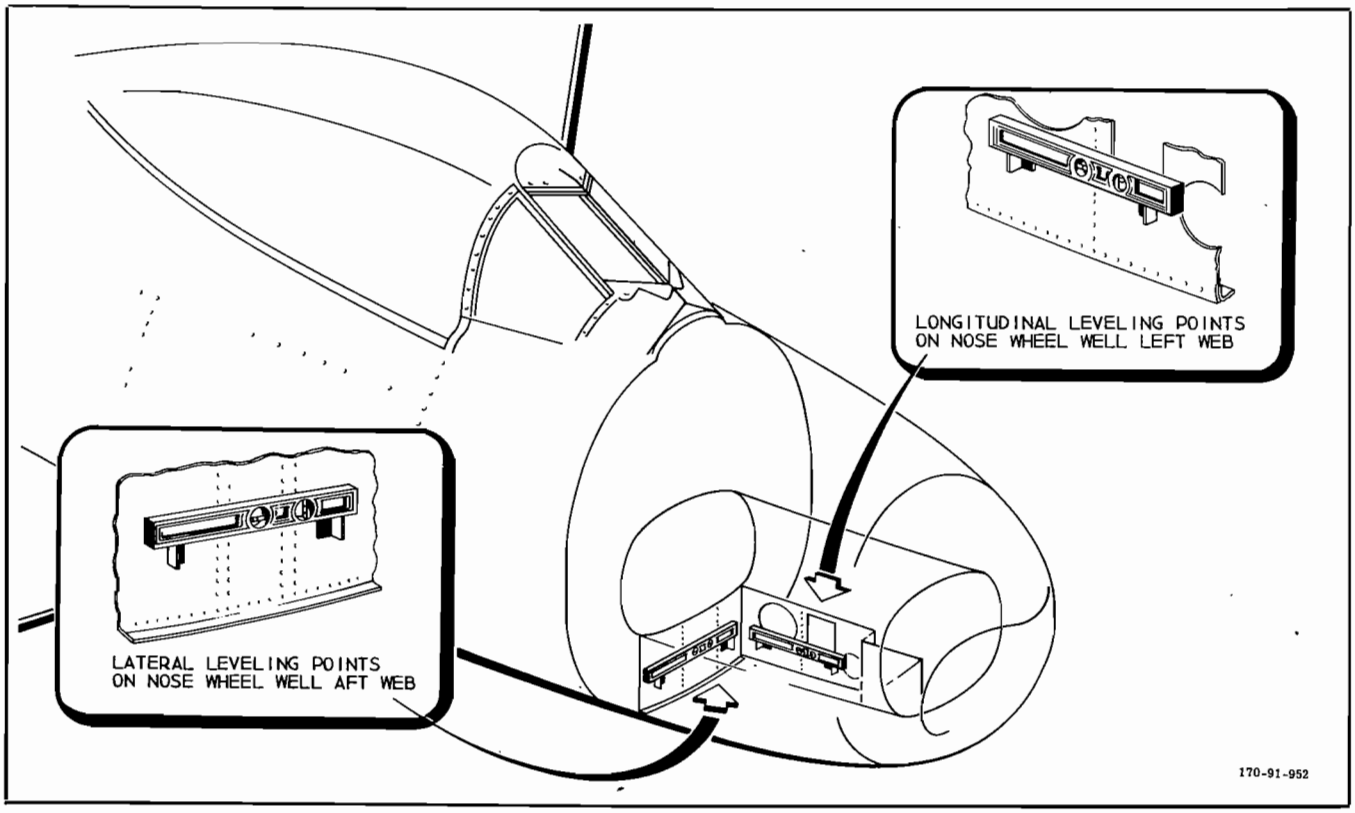


Figure 1-8. Leveling Airplane

h. Tie mooring ropes or cables to mooring eyes and to ground anchors as shown in figure 1-10.

Note

- Airplanes parked on hard-surfaced areas will utilize as many of the ground mooring points shown in figure 1-10 as possible, dependent upon the tie-down rings available.
- In the event tie-down rings are not available on hard-surfaced areas, airplanes requiring extended parking will be moved to an area where anchor kits, Part No. AN8015-2 (figure 1-10A), can be used. (Refer to paragraph 1-18A.)
- When kits, Part No. AN8015-2, are not available, metal stakes or "dead-man" type anchors may be used, providing they sustain a minimum pull of 3000 pounds without failure.
- Slip knots will not be used in tying mooring ropes. Antislip knots, such as square or bowline, will be used. (See figure 1-10A.)

i. Spoilers are generally not needed on this airplane unless wind of very high velocity (exceeding approximately 100 knots) is expected. When spoilers are installed, install them on upper wing surfaces. The spoilers should extend approximately 75 percent of wing span, starting at wing root, and should be located approximately 10 to 15 percent of average chord aft of and parallel to leading edge of wing. Spoilers may be of the fabric bag type filled with sand, or wood type consisting of 2 x 4's with 2 inch dimension parallel to and lying flat on wing surfaces. The 2 x 4 type spoiler should be tied or taped securely in place to prevent possible damage to wing surfaces.

CAUTION

When beach sand is used to fill sandbags, wing surfaces should be cleaned immediately after use or corrosion may occur.

j. Install air intake duct shield and exhaust duct cover or shield.

WARNING

Allow engine to cool before installing air intake duct shield and exhaust duct cover or shield. Warm air contains more ice-forming moisture than the same volume of cooler air.

k. Install cockpit cover, wing covers, pitot tube cover, and horizontal stabilizer covers.

Note

For installation of ground heating equipment during extremely cold conditions, refer to paragraph 1-25.

1-18A. INSTALLING MOORING KIT (PART NO. AN8015-2). To use the mooring kit, Part No. AN8015-2 (figure 1-10A), screw the anchor rod into the arrow; then slip the driving rod over the anchor rod and into the socket of the arrow. The cam on the driving rod must be turned so that the prongs of the arrow will not be spread during driving. The surface should be broken first by using the ground breaking pin, if the ground is hard. Care must be taken to align the rod with the point of attachment on the airplane. The arrow should be driven into the ground until the driving rod handle is within 3 inches of the ground and then rotated 90 degrees, and the driving rod given a sharp blow to spread the prongs of the arrow. The driving rod is then returned to the driving position and withdrawn. The squared socket of the eye assembly will then be aligned with the squared end of the anchor rod, fitted into place, and the knurled nut screwed down tight. The mooring rope will then be attached to the eye assembly and given an upward pull to set the arrow prongs. To withdraw the anchor rods, the mooring ropes are detached and the anchor rods unscrewed by turning the ring of the eye assemblies counterclockwise, leaving the arrows in the ground.

1-18B. INSPECTION OF MOORED AIRPLANE. All exterior coverings, chocks, mooring ropes, rods, and eyes on moored airplanes will be inspected at least once every 30 days. In addition, when airplane has been subjected to high-velocity winds exceeding 40 knots, they will be inspected immediately. Pulled rods or deteriorated exterior coverings will be replaced, mooring ropes will be retied, and chocks will be repositioned when necessary.

1-19. PARKING.

a. Apply parking brake. (Refer to paragraph 1-20.)

b. Chock wheels, front and back.

c. (Deleted)

d. Lock rudder control. (Refer to paragraph 1-21.)

e. Install pitot tube cover, air intake duct shield, and exhaust duct cover.

f. Install ground safety locks on nose landing gear and nose gear door. (Refer to paragraph 1-23.)

1-20. PARKING BRAKE OPERATION. The parking brake handle is located on the left side of the cockpit, above and outboard of the landing gear control. Operate parking brakes as follows:

a. Press hard on toe of rudder pedals and then (while maintaining this pedal pressure) pull parking brake handle slowly out to fully extended position. While holding handle all the way out, release pedals; then release handle.

b. Parking brakes are released by exerting pressure on the toe of the rudder pedals. If brakes do not release easily, press hard on toe of rudder pedals and push parking brake handle all the way in.

1-21. LOCKING SURFACE CONTROLS. The aileron and horizontal stabilizer move only when power is on, because of hydraulic fluid being locked in the actuators; therefore, no lock is required to hold these surfaces when power is off. The rudder control lock is located on the top of the center pedestal in the cockpit. (See figure 1-9.) Operate rudder control lock as follows:

a. Pull out on rudder control lock handle, when rudder pedals are neutralized, until lock catches.

b. To release, lift up on lock and let it slide into pedestal.

Note

To reduce the probability of a take-off being made with the rudder locked, the nose wheel steering system is also locked when the rudder control lock is engaged.

1-22. INSTALLING GROUND SAFETY LOCKS.

1-23. A ground safety lock is provided for the nose

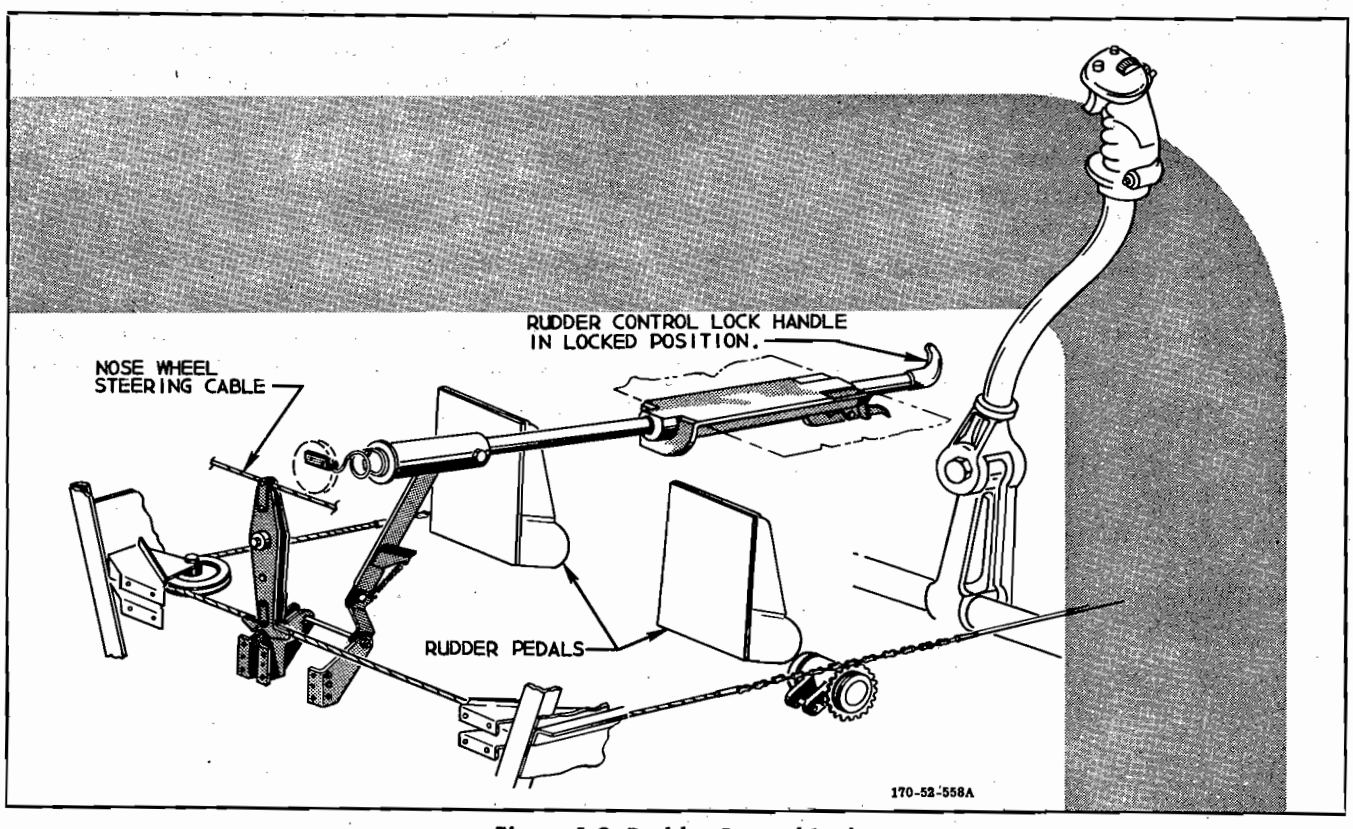


Figure 1-9. Rudder Control Lock

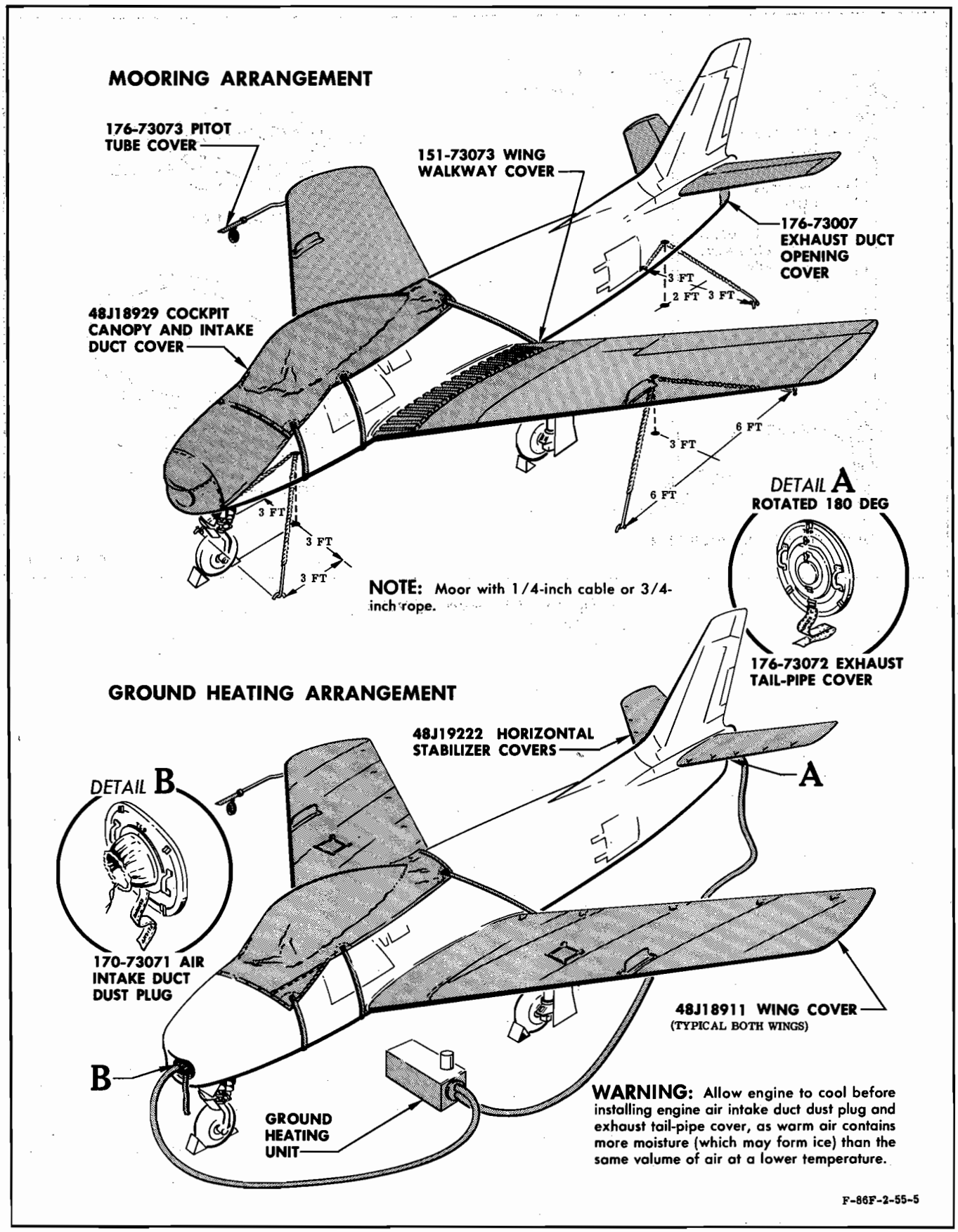


Figure 1-10. Protective Covers, Ground Heating Attachments, and Mooring Diagram

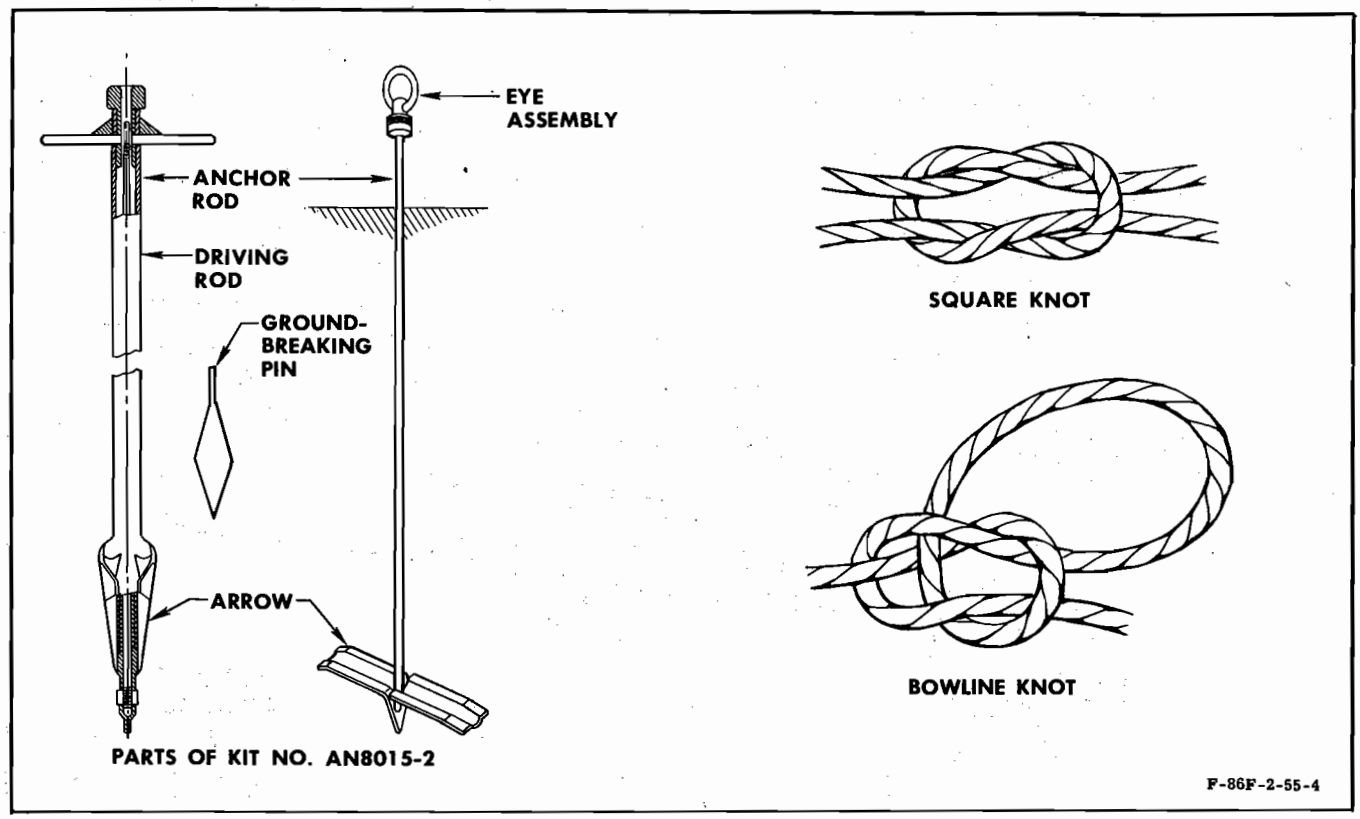


Figure 1-10A. Mooring Details

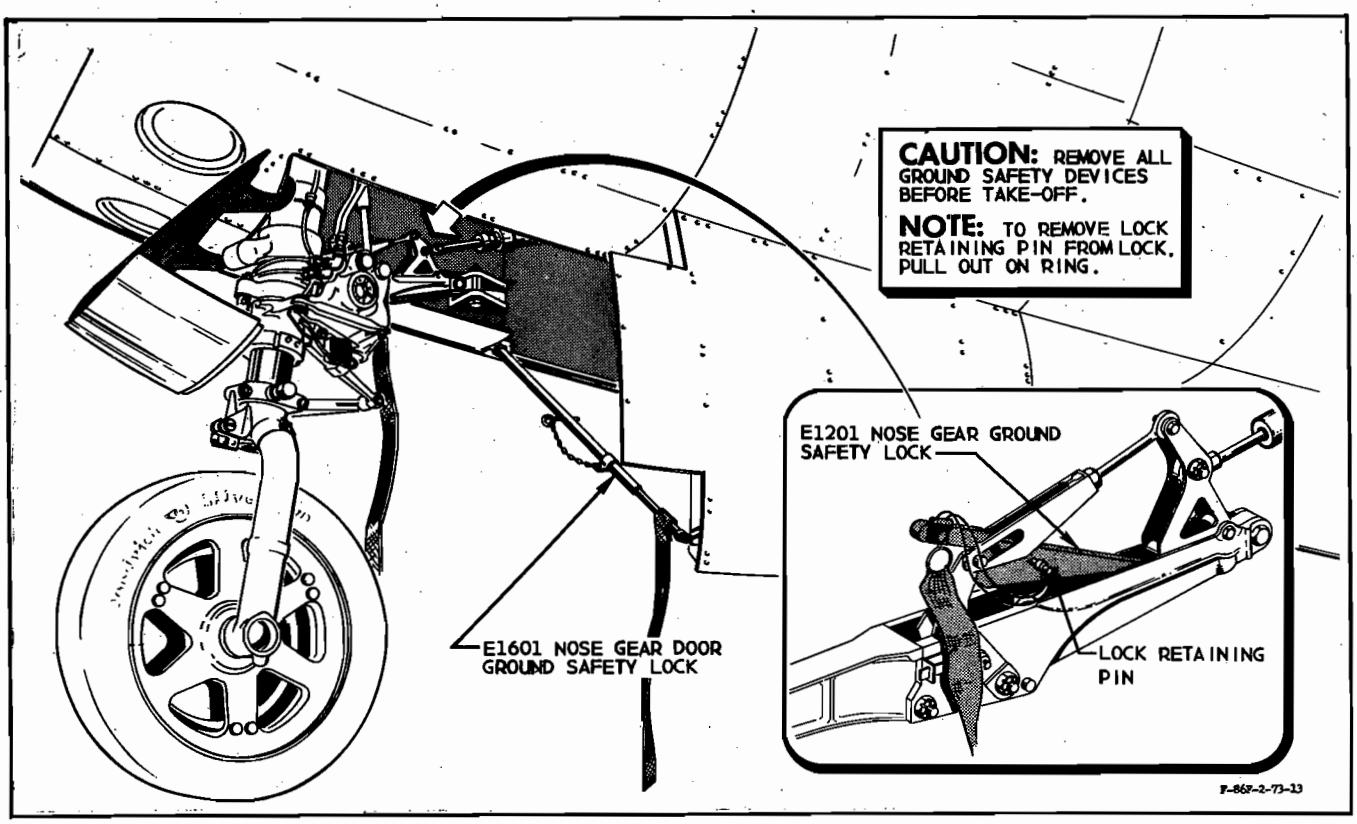


Figure 1-11. Ground Safety Devices

landing gear. Another ground safety lock is supplied to prevent the nose gear door from closing while ground work is being done. Figure 1-11 shows how the ground safety locks are installed.

CAUTION

All ground safety locks must be removed just before flight.

1-24. INSTALLING GROUND HEATING EQUIPMENT.

1-25. The airplane may be ground heated by hot-air ducts attached from a portable ground heating unit to the air intake duct shield and to the adapter on the jet-engine exhaust duct shield assembly. (See figure 1-10.)

1-26. TOWING PROVISIONS.

CAUTION

- The airplane must not be towed without the wedge being installed in the nose gear declutching pin.
- Do not tow or steer airplane when nose wheel strut is fully extended.

1-27. A towing fitting is mounted on the forward face of the nose gear shock strut for attachment of a tow bar. (See figure 1-12.) A spring-loaded steering release pin is located on the side of the shock strut below the torque arms. When disengaged, the release pin allows the nose gear fork to free-swivel. A wedge holds the declutching release pin safely open. Provisions are made for fastening the wedge to one of the towing lugs when it is not in use. Without the use of the wedge, the pin may slip back into the nose gear cylinder while the airplane is being towed, and may seriously damage the steering mechanism. The airplane may be towed and steered over concrete or macadam surfaces by means of the tow bar only. For towing on rough ground, muddy areas, or snow-covered surfaces, towing cables must be attached to the tow lugs on the shock struts. A qualified man should be in the cockpit when the airplane is being towed, in order to maintain control by use of the brakes. Towing speeds must be slow, without sudden starts or stops.

CAUTION

After airplane has been towed, make sure that nose gear steering pin is engaged and that safety cap and wedge have been installed in their respective positions before airplane is flown.

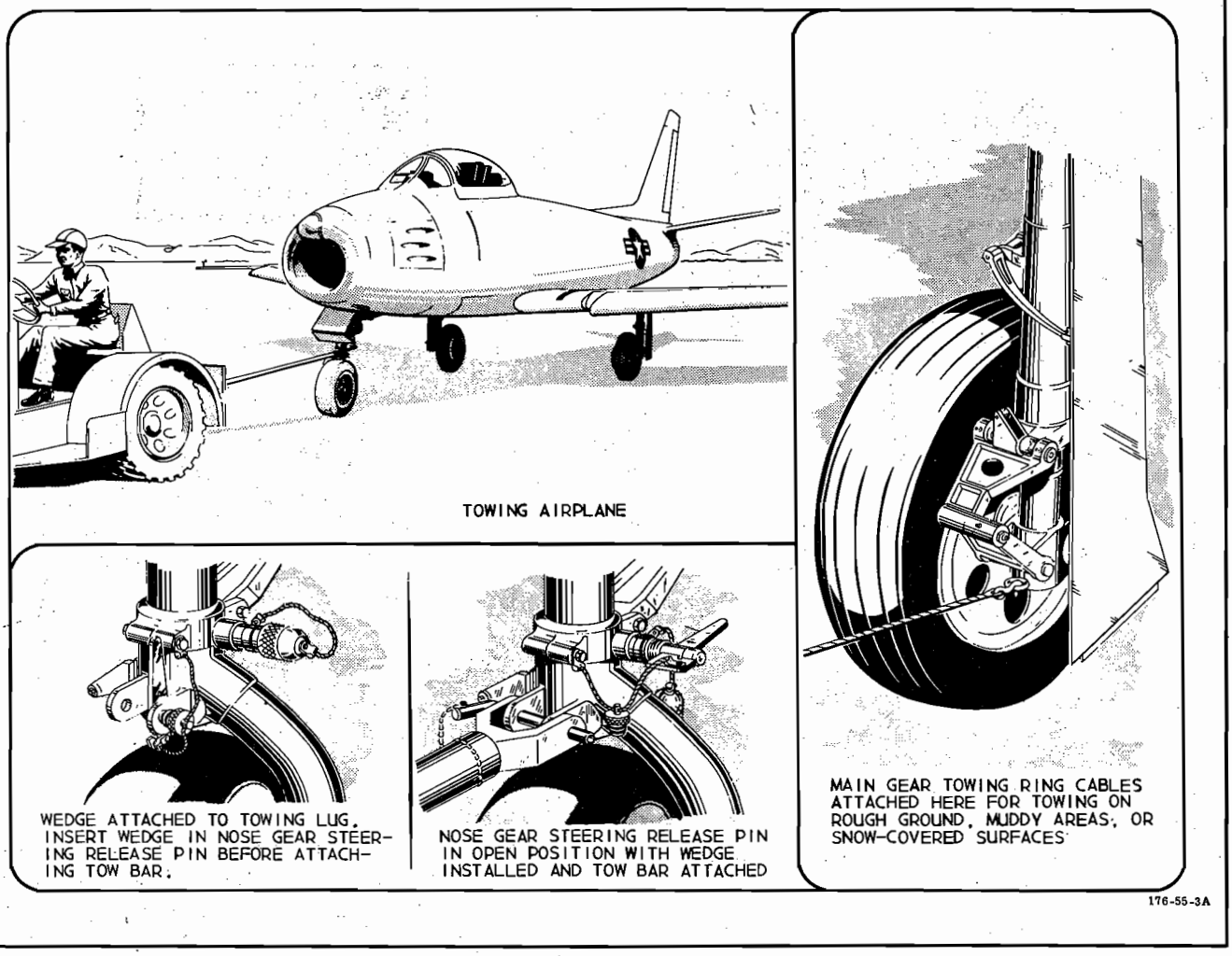


Figure 1-12. Towing Airplane

1-28. SERVICING.

1-29. SERVICING FUEL SUPPLY SYSTEM.

1-30. For tank capacities and type of fuel used to service airplane, see figure 1-13. The type of fuel for servicing this airplane is also indicated in a marking on the exterior fuselage, immediately below existing data which gives the airplane serial number. Location of filler caps is shown in figure 1-14.

WARNING

Insofar as possible, fill and drain fuel cells and tanks out of doors, and take care to avoid spillage. Smoking is prohibited within 50 feet of the airplane, and other sources of possible ignition (such as hobnail boots striking against concrete) must be avoided. When fuel trucks are employed, equip them with suitable static chains in contact with the ground or pavement. As an additional safety precaution, if the static chain has become fouled and has not recently touched the ground, dissipate any possible static charge which might have accumulated on the truck or trailer. An electrical charge is imparted to metal articles within the immediate vicinity of radar or high-frequency radio equipment in operation. This constitutes an extremely hazardous condition, since personnel involved may not be aware of the accumulation of the electrical charge from such sources. Do not handle fuel within a radius of 75 feet of such equipment except during the shutdown period. If an emergency requires handling of fuel during an operating period, request radar operating personnel to remove plate voltage from all radar transmitting equipment within a radius of 75 feet. Do not service airplane with fuel when the radio or radar transmitting equipment of the airplane is in operation.

SERVICING DATA

FUEL .... MIL-F-5624, JP-4; Alternate MIL-F-5624, JP-3; MIL-F-5616, JP-1; or MIL-F-5572 (Lowest grade available)
.....Below -29°C (-20°F) outside ground temperatures, do not use MIL-F-5616, JP-1.

TANKS	US. GAL	IMP. GAL	LITERS
OUTER WING (2)	67 (each)	55.8 (each)	253.6 (each)
SUMP CAPACITY	1.0 (each)	.8 (each)	3.8 (each)
WING CENTER SECTION (1)	73	60.8	276.3
FRONT FUSELAGE (1)	123	102.4	465.5
WING CENTER SECTION & FRONT FUSELAGE SUMP CAPACITY	2.0	1.7	7.6
REAR FUSELAGE (1)	105	87.4	393.6
SUMP CAPACITY	1.4	1.2	5.3
TOTAL FUEL CAPACITY CARRIED INTERNALLY	435	362.4	1646.5
EXPANSION VOLUME (COMPLETE INTERNAL FUEL SYSTEM)	17	14.2	64.3
DROPPABLE TANKS	120 (each)	99.9 (each)	454.2 (each)
DROPPABLE TANKS	200 (each)	166.6 (each)	757 (each)

OIL .....MIL-O-6081, Grade 1005

	US. QT	US. GAL	IMP. GAL	LITERS
TANK NORMAL CAPACITY	12.0	3.0	2.5	11.3
EXPANSION SPACE	4	1.0	.8	3.8
OIL SYSTEM TOTAL CAPACITY	18	4.5	3.7	17

HYDRAULIC FLUID. . . SPECIFICATION MIL-O-5606

	US. QT	US. GAL	IMP. GAL	LITERS
UTILITY SYSTEM RESERVOIR	8.4	2.1	1.7	7.9
COMPLETE UTILITY SYSTEM	27	6.75	5.4	25.5
ALTERNATE SURFACE CONTROL SYSTEM	8	2.0	1.7	7.6
NORMAL SURFACE CONTROL SYSTEM	8	2.0	1.7	7.6

ALCOHOL.....SPECIFICATION MIL-F-5566	US. GAL	IMP. GAL	LITERS
FUEL FILTER DEICING FLUID TANK (F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063)	1.0	.8	3.8

OXYGEN CYLINDERS

NO.	TYPE	PRESSURE PSI
4	TYPE D-2, Low-pressure	425 MAX

F-86F-2-93-7

Figure 1-13. Servicing Data

1-31. ENSURING PURITY OF FUEL. The use of filters in funnels is usually unnecessary when the airplane is being serviced. If, however, presence of dirt in the fuel indicates that emergency filtering is required, use a chamois skin for this purpose. To eliminate the fire hazard that is involved when volatile, flammable liquid is filtered through chamois, observe the following precautions:

a. Attach chamois securely to funnel.

b. Keep funnel in contact with metal of tank or other receptacle to provide a good electrical ground at all times during filtering. In addition, bond delivery hose to airplane or tank.

c. Never tie chamois over end of discharge nozzle, and never use it in any manner that will cause fuel to pass through chamois under pressure.

1-32. BONDING FUEL HOSE NOZZLE TO AIRPLANE. Permanently attach one end of a flexible bonding wire of suitable length to discharge nozzle of fuel delivery hose. On the other end, install a plug and a standard test clip for attachment to airplane before delivery of any fuel to airplane fuel cell. Insert plug into receptacle installed on airplane for grounding purposes, or attach standard test clip to an uninsulated metallic part of airplane to ensure an electrical bond between cell and delivery hose. Do not attach bonding wire to filler neck of cell, but to bare metal of airplane. This electrical bond must always be effected before the filler cap is removed and must be left connected until the filler cap has been replaced.

CAUTION

- Do not overflow fuel cells when servicing airplane.
- Do not utilize fuel to clean airplane. Only solvents which do not contain petroleum derivatives should be used for cleaning purposes.

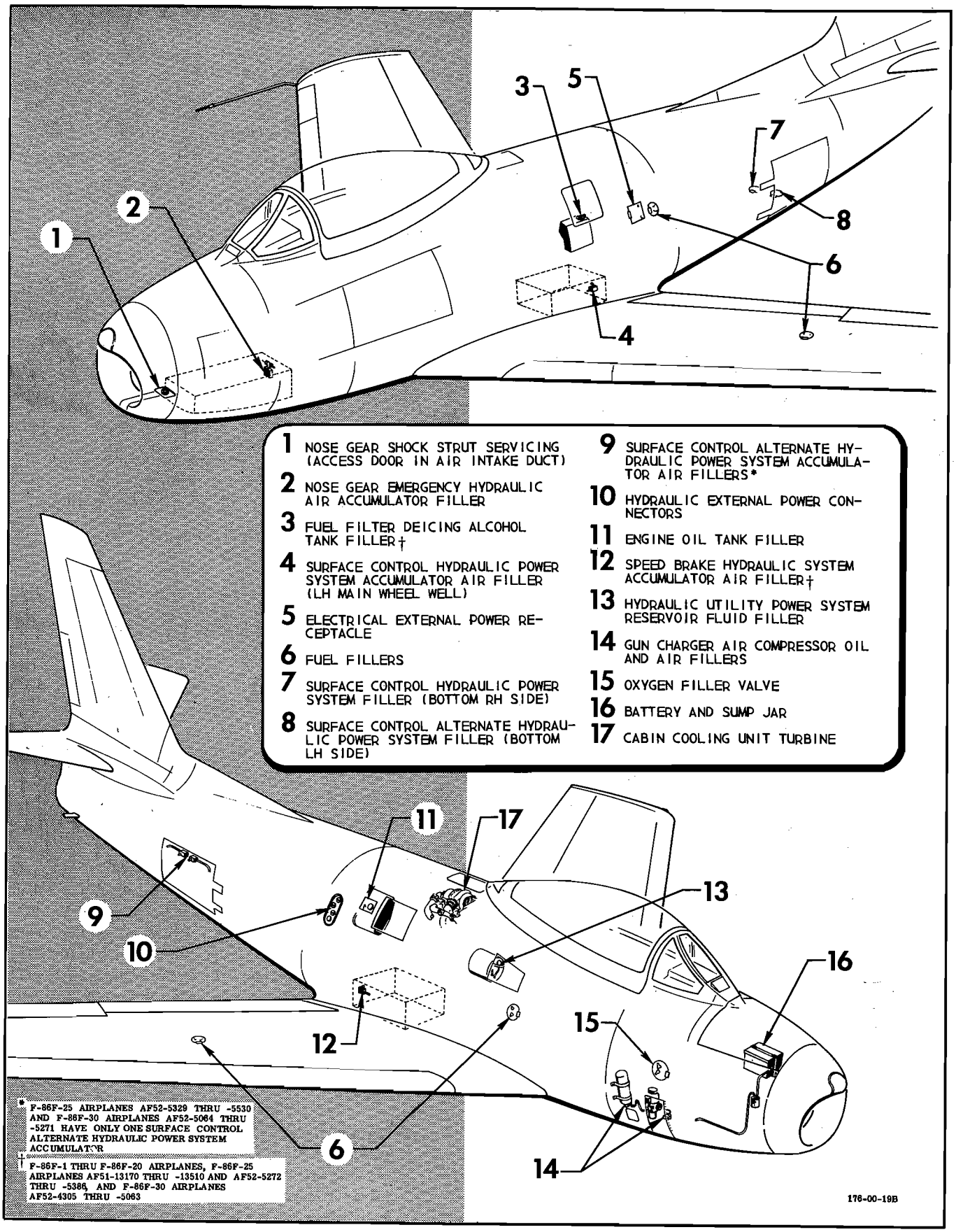


Figure 1-14. Servicing Diagram

1-33. FILLING WING AND FUSELAGE FUEL CELLS. Before filling wing and fuselage cells, ground fuel nozzle to airplane as described in paragraph 1-32, and observe precautions in paragraphs 1-30 and 1-31. Because of the interconnection and check-valve design of the fuel cells within the airplane, it is essential to use the following procedure when filling the fuel system, in order to obtain complete capacity:

a. Fill fuselage forward and center wing cells.

b. Fill outer wing cells.

c. Fill fuselage aft cell.

d. Replace all fuel filler caps after fueling procedure.

e. After filling all cells, position liquidensitometer switch, on right forward console, to "IN" to give pounds of fuel aboard airplane. On F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109, move fuel totalizer indicator reset knob to pounds of fuel aboard the airplane as noted on fuel quantity indicator.

CAUTION

When refueling outer wing cells, use care to prevent fuel hose nozzle striking bottom of cell. On some refueling units, the hose nozzle may be longer than the depth of the cell.

1-34. FILLING DROPPABLE FUEL TANKS. Before filling droppable fuel tanks, ground fuel nozzle as described in paragraph 1-32, and observe precautions of paragraph 1-30. The 120-gallon and 200-gallon droppable fuel tanks are filled through the filler cap aft on each tank. Drain a small amount of fuel from the drain at bottom of tanks both before and after filling, to eliminate any water present. On F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109, obtain a density reading of the external fuel. Then convert known gallons of external fuel to pounds. Reset pounds-remaining counter of fuel flow totalizer to add known weight of external fuel to known weight of internal fuel.

1-35. DRAINING FUEL SYSTEM. Observe precautions of paragraph 1-30 before beginning drainage procedure. Fuel drainage provisions are shown in figure 1-15. When only small quantities of fuel remain in the cells, draining may be accomplished by opening sump drains for the respective cells. When cells are nearly full, disconnect fuel outlet line at fuel filter and connect a line from defueling unit to fuel filter fuel outlet fitting. Then move engine master switch, on right console in the cockpit, to "ON," which opens shutoff valve, and move throttle outboard from "OFF" to start booster pumps. Open sump and line drains to ensure complete draining.

1-36. DRAINING DROPPABLE FUEL TANKS. Follow precautions of paragraph 1-30 before draining droppable tanks. Both the 120-gallon and the 200-gallon droppable tanks are drained by removal of either the small or the large plug at the bottom of the tank. The large plug retains the strainer.

1-37. SERVICING FUEL FILTER DEICING SYSTEM.

1-38. The fuel filter deicing system alcohol tank on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063 is accessible through the left engine accessory door. (See figure 1-14.) Service tank with alcohol (Specification MIL-F-5566). For tank fluid capacity, see figure 1-13.

1-39. DRAINING FUEL FILTER DEICING SYSTEM ALCOHOL TANK. The fuel filter deicing system alcohol tank has no drain petcock. To drain the tank, open fuel filter drain petcock and start fuel filter deicing system alcohol pump.

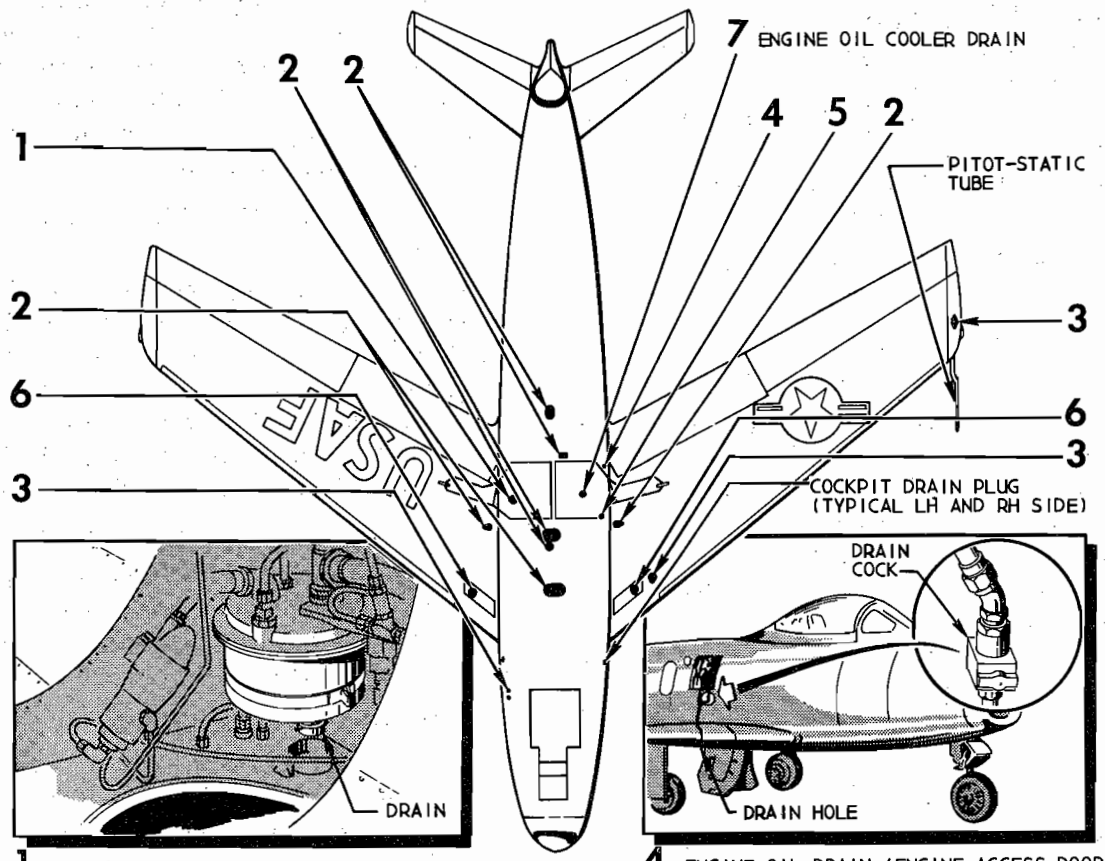
1-40. DRAINING FUEL FILTER.

1-41. The fuel filter is located below the deicing system alcohol tank and is reached through the engine access door in the left main wheel well. (See figure 1-15.) To drain fuel filter, open petcock on bottom of filter and allow fluid to drain through a line leading out of bottom of fuselage.

1-42. SERVICING ENGINE OIL SYSTEM.

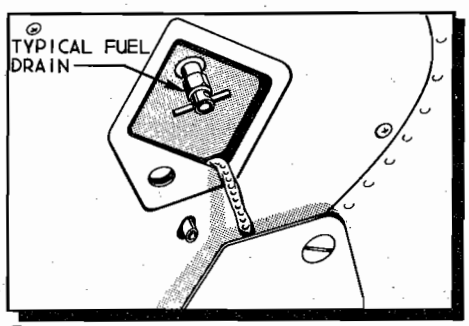
1-43. For tank capacities and the type of oil used to service the airplane, see figure 1-13. The oil filler is reached through a small access door, near the fuselage split on the right side of the airplane. (See figure 1-14.) Always service oil system supply tank within a short period after engine shutdown. When tank is filled after engine has been idle for several hours (during which time a portion of the oil drains from the tank into the engine sump), the system will be overfull. Subsequent engine operation will cause the excess oil supply to be thrown out the tank vent over the side of the fuselage, and possibly to be blown back through the cooling-air intake into the engine compartment. If airplane has been idle and need for servicing is questionable, start and run engine at idle for a short time before filling tank.

1-44. FILLING OIL SYSTEM SUPPLY TANK. Open filler access door on right side of airplane, forward of fuselage split, and remove filler cap from oil tank. Fill to lip of filler overflow drain. Wipe up any spilled oil and replace filler cap. The oil tank has a dip stick, which is marked to indicate 1-, 2-, and 3-gallon levels.

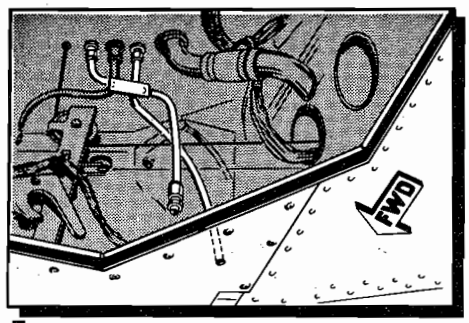


1 FUEL FILTER DRAIN

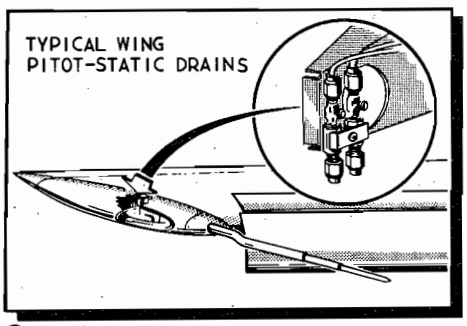
4 ENGINE OIL DRAIN (ENGINE ACCESS DOOR IN RH MAIN WHEEL WELL)



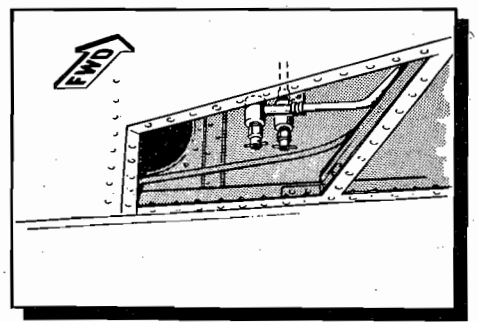
2 FUEL DRAIN (7 LOCATIONS LOWER FUSELAGE AND WING SURFACES)



5 MAIN HYDRAULIC SYSTEM RESERVOIR DRAIN (RH MAIN WHEEL WELL)



3 PITOT-STATIC DRAINS



6 WING DROPPABLE FUEL TRANSFER AND AIR PRESSURE LINES DRAIN (TYPICAL FORWARD INBOARD EACH WING)

176-00 18B

Figure 1-15. Draining Provisions

WARNING

- The oil tank dip stick must be installed and locked in the "CLOSED" position after servicing, as the oil tank is pressurized.
- After filling, when the oil system has been completely empty or when a new engine has been installed, the oil drain valve should be opened, permitting ½ gallon of oil to drain out. Then the drain should be closed and the oil tank refilled. This removes the possibility of air pockets in the oil lines, which may give an erroneous reading of a full oil tank.

1-45. DRAINING OIL SYSTEM SUPPLY TANK. With a suitable container handy to catch the oil, remove access cover from inside the right wheel well, and open drain valve in main supply line. Then open oil tank sump drain to drain residual oil. The oil tank drain is shown in figure 1-15.

1-46. DRAINING ENGINE OIL SYSTEM OIL COOLER. The drain for the engine oil cooler is reached through the right wheel well. (See figure 1-15.) The drain consists of a hose with a petcock attached to the end of it. Use the following procedure for draining the oil cooler:

a. Remove drain hose from clip and extend hose out engine access door in wheel well.

b. With a suitable container to catch oil, open drain petcock.

c. After draining oil cooler, close drain petcock and replace hose in clip.

1-47. SERVICING PNEUMATIC GUN CHARGER AIR COMPRESSOR AND AIR BOTTLE.

1-48. The pneumatic gun charger air compressor and air bottle on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510, AF52-5272 through -5277, -5279 through -5290, -5292, -5294 through -5298, -5300 through -5302, and -5304, and F-86F-30 Airplanes AF52-4305 through -4963, are serviced through access doors forward of the ammunition boxes on the right side of the airplane. (See figure 1-14.)

1-49. SERVICING GUN CHARGER AIR COMPRESSOR WITH OIL. The oil level in the cup on the bottom of the compressor should be checked before every flight. Oil should be changed every 25 hours. Service with Specification MIL-L-6085 oil, as follows:

a. Remove bottom lubricant cup by first unscrewing lower fastener and then unscrewing cup.

b. Fill lower portion of cup with oil.

CAUTION

Do not fill above lower step in cup.

c. Screw on cup and fasten securely with bottom fastener to finger-tightness.

CAUTION

Excessive tightening will strip threads in the bottom screw fastener.

1-50. FILLING GUN CHARGER AIR BOTTLE. The filler valve for the gun charger air bottle is located forward in the compressor compartment. Service as follows:

a. Remove filler cap.

b. Charge to 1700 (±50) psi with compressed air or nitrogen.

Note

Normal operating air pressure of gun charger compressor is approximately 1500 psi; however, when ground-filling air bottle, do not exceed 1700 (±50) psi.

c. Replace filler cap.

1-51. DRAINING GUN CHARGER AIR BOTTLE. The drain for the gun charger air bottle is reached through an access door just aft of the gun charger air compressor. Loosen drain valve on bottom of air bottle to remove moisture.

1-52. FILLING AND BLEEDING BRAKE SYSTEM.

1-53. The brake system is serviced from the utility hydraulic system fluid reservoir. For information on servicing the reservoir, refer to paragraph 1-65. With reservoir full of fluid and a bleeder hose and container available, bleed and fill the brake system as follows:

a. Remove dust screw from bleeder fitting on top of left brake. Attach bleeder hose, and place hose end in a container partly filled with fluid.

b. Make provisions for keeping reservoir full of clean fluid. Do not allow reservoir to be less than half-full of fluid at any time.

c. Back off bleeder fitting, but leave sufficient restriction to actuate brake cylinder.

d. While holding parking brake handle halfway out, push on left brake pedal and hold; at the same time, pump fluid through bleed with right brake pedal. Continue pumping until air bubbles cease and not less than ½ pint of fluid has been bled.

e. Release parking brake handle, and again pump left brake pedal until there are no air bubbles and until not

less than ½ pint of fluid has been bled. Then close bleeder fitting, remove hose, and replace dust screw.

f. Repeat steps a. through e. on right brake, pumping right pedal and holding left pedal.

g. After bleeding brakes, replenish reservoir.

1-54. SERVICING LANDING GEAR SHOCK STRUTS.

WARNING

Because of the relatively high pressure and the small quantity of air in the shock strut, caution must be used in releasing air from strut for servicing. Make sure that personnel are clear of the airplane, to prevent the possibility of injury due to landing gear scissors action or too sudden collapse of strut. Also make sure that no jacks or obstructions are under the wings or fuselage which might cause damage when airplane is lowered.

1-55. FILLING MAIN AND NOSE LANDING GEAR SHOCK STRUTS. Fill landing gear shock struts with hydraulic fluid (Specification MIL-O-5606) as follows:

a. Deflate strut. (Refer to paragraph 1-61.)

b. After strut is fully compressed, remove filler plug.

c. Fill strut to overflowing with fluid.

d. Replace filler plug and tighten it securely.

1-56. INFLATING MAIN AND NOSE LANDING GEAR SHOCK STRUTS. With airplane fully loaded and resting on landing gear, inflate struts to obtain the following dimensions (figure 1-16): nose gear strut, 4 5/16 inches between center of torque link bolts; main gear struts, 4 7/8 inches between center of torque link bolts. As landing gear struts employ AN6287-1 high-pressure air valve assemblies, the procedure outlined in paragraph 1-59 must be followed when the struts are inflated with dehydrated high-pressure air or nitrogen.

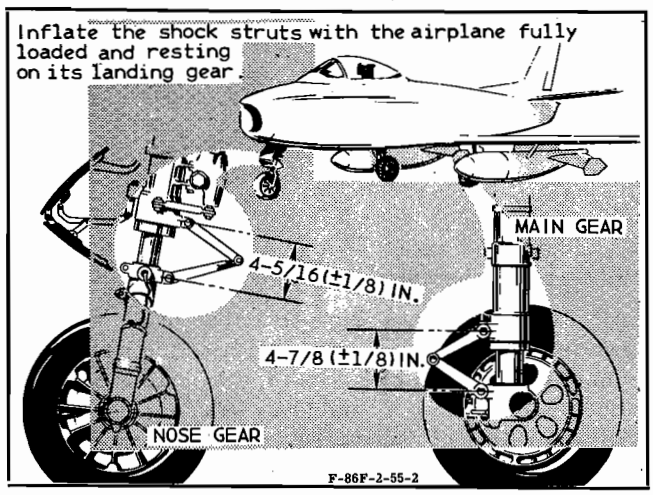


Figure 1-16. Measuring Landing Gear Strut Extension

WARNING

Do not use bottled gases such as hydrogen, acetylene, or oxygen, etc, as serious accidents and possibly loss of life might result.

Note

Under extreme cold-weather operating conditions, it will be necessary to recheck the strut inflation after the air has had sufficient time to contract, because of the low outside temperature.

1-57. DEFLATING MAIN AND NOSE LANDING GEAR SHOCK STRUTS. As the landing gear shock struts employ AN6287-1 high-pressure air valve assemblies, the procedure outlined in paragraph 1-61 must be followed when the landing gear shock struts are deflated.

1-58. PRESSURIZING UNITS THROUGH AN6287-1 HIGH-PRESSURE AIR VALVES.

1-59. Use the following procedure for filling units that have AN6287-1 high-pressure air valves:

a. Unscrew valve cap.

b. Attach air filling chuck to valve stem threads.

c. Loosen 5/8-inch hex swivel nut a maximum of three-fourths of a complete turn. Turn nut to the left (counterclockwise) to loosen.

CAUTION

- Excessive loosening will result in the stem assembly dropping into the unit to which the valve is attached.
- Do not loosen ¾-inch hexagon valve body. This should remain tight against the unit at all times.

d. Charge unit to proper air pressure.

e. Tighten 5/8-inch hexagon swivel nut to 50-70 inch-pounds torque. Turn nut to the right (clockwise) to tighten.

f. Remove air filling chuck from valve, and replace and tighten valve cap to extreme finger-tightness.

1-60. EXHAUSTING AIR PRESSURE THROUGH AN6287-1 HIGH-PRESSURE AIR VALVES.

1-61. Use the following procedure for exhausting air pressure from units having AN6287-1 high-pressure air valves:

a. Unscrew valve cap.

b. Loosen 5/8-inch hexagon swivel nut. The amount the swivel nut is loosened (up to one complete turn only) will govern the rate of air discharge.

c. (Deleted)

WARNING

Do not loosen or remove air valve core from valve body to exhaust pressure. Unless all pressure is released before removal of the valve core and/or the valve body, they may be blown out with the force of a bullet and can cause serious injury or death.

d. Retighten 5/8-inch hexagon swivel nut to 50-70 inch-pounds torque.

e. Replace and tighten valve cap to extreme finger-tightness.

1-61A. An alternate method for releasing air from units using AN6287-1 high-pressure air valves is as follows:

a. Remove valve cap.

b. Loosen 5/8-inch hexagon swivel nut approximately one full turn.

c. Depress valve core, using a match stick or comparable item, until amount of air to be released has been reached.

WARNING

Do not use finger to depress valve core as injury to the finger may result.

d. Retighten 5/8-inch hexagon swivel nut to 50-70 inch-pounds torque.

e. Replace and tighten valve cap to extreme finger-tightness.

1-62. SERVICING MAIN AND NOSE WHEEL TIRES.

1-63. Main and nose gear tire inflation pressures are dependent on the airplane gross take-off weight. Tire inflation pressures are shown in figure 1-17.

1-64. SERVICING HYDRAULIC SYSTEMS.

1-65. For servicing provisions, see figure 1-14. The capacities of the hydraulic reservoirs and system are given in figure 1-13. Service hydraulic systems with Specification MIL-O-5606 fluid.

Note

As all air accumulators are equipped with AN6287-1 high-pressure air valve assemblies, follow the procedure described in paragraphs 1-59 and 1-61 for filling or exhausting air pressure.

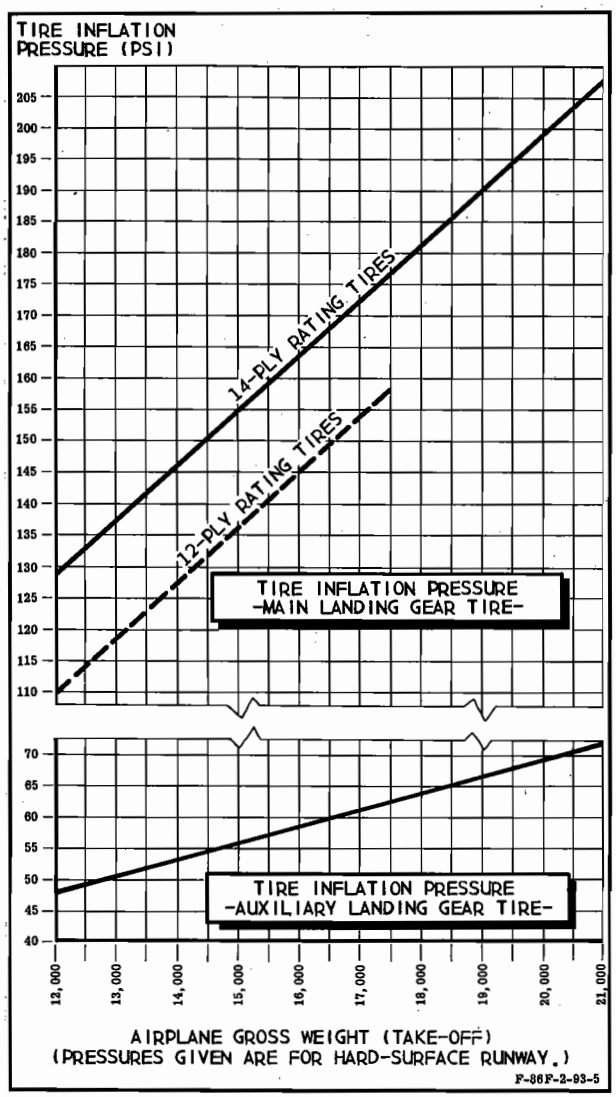


Figure 1-17. Tire Inflation Graph

1-66. REPLENISHING UTILITY HYDRAULIC POWER SYSTEM RESERVOIR. The reservoir filler opening is reached through the right radio compartment door. With landing gear down, landing gear doors closed, speed brakes closed, and accumulators discharged of hydraulic system pressure, but with full charge of air pressure, remove filler cap and fill reservoir until fluid is at full mark on sight gage. Wait 2 minutes and repeat filling procedure. Replace and tighten cap.

1-67. FILLING AND PURGING UTILITY HYDRAULIC POWER SYSTEM WITH A GROUND TEST STAND. Place airplane on jacks to permit operation of landing gear; then fill and purge system as follows:

a. Connect test stand lines to quick-disconnect couplings, just forward of fuselage break on right side of fuselage.

CAUTION

- Before filling, exhaust hydraulic pressure in speed brake accumulator on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063.
- Fluid level in reservoir should never be allowed to exceed the full mark on the sight gage with system pressure exhausted.

b. Leave reservoir cap tight.

c. Thoroughly circulate fluid through system; then operate each unit several times to purge system of air.

d. Disconnect hydraulic test stand. Make sure landing gear is down and locked before lowering airplane from jacks.

1-68. FILLING SPEED BRAKE HYDRAULIC ACCUMULATOR WITH AIR. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063, the filler valve for the speed brake accumulator is situated in the right main wheel well. Before filling, exhaust all speed brake accumulator hydraulic pressure by opening and closing speed brakes until all pressure is exhausted. With all pressure relieved, charge speed brake accumulator with air to 1200 (±50) psi.

1-69. FILLING NOSE GEAR EMERGENCY HYDRAULIC ACCUMULATOR WITH AIR. The air filler valve for the nose gear emergency hydraulic accumulator is located on the aft wall of the nose wheel well. Before and while filling, open the dump valve to exhaust all hydraulic pressure. Fill with air to 1200 (±50) psi.

1-70. FILLING SURFACE CONTROL NORMAL HYDRAULIC SYSTEM ACCUMULATOR WITH AIR. The filler cap for the surface control normal hydraulic system accumulator is located in the left main wheel well. Use the following procedure for filling:

a. Operate surface controls to relieve hydraulic fluid on pressure side of accumulator while filling with air.

b. Charge accumulator with air to 600 (+50/—0) psi.

c. Close valve and replace valve cap.

1-71. EXHAUSTING SURFACE CONTROL NORMAL HYDRAULIC SYSTEM ACCUMULATOR. With no electrical power on airplane, operate surface controls until pressure is bled off normal system.

1-72. FILLING SURFACE CONTROL ALTERNATE HYDRAULIC SYSTEM ACCUMULATORS WITH AIR.

Note

F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes have only one surface control alternate hydraulic power system accumulator.

The air filler valves for both surface control alternate hydraulic accumulators are located in the right speed brake well. To dump hydraulic pressure before or during addition of air, pull "EMERG. HYD. CONTROL" and "ALT. EMERG. HYD. CONT." circuit breakers and push manual button on alternate system transfer valve halfway in. (The "EMERG. HYD. CONTROL" circuit breaker is in the compartment forward of the left speed brake well, and the "ALT. EMERG. HYD. CONT." circuit breaker is on the left circuit-breaker panel in the cockpit.) Fill surface control alternate system accumulator with air to 600 (+50, —0) psi.

1-73. EXHAUSTING SURFACE CONTROL ALTERNATE SYSTEM ACCUMULATORS. The surface control alternate hydraulic system accumulators are located in the right speed brake well. To exhaust accumulators, pull "EMERG. HYD. CONTROL" and "ALT. EMERG. HYD. CONT." circuit breakers and then push manual button on solenoid transfer valve halfway in, until pressure is relieved through valve. (The "EMERG. HYD. CONTROL" circuit breaker is in the compartment forward of the left speed brake well, and the "ALT. EMERG. HYD. CONT." circuit breaker is on the left circuit-breaker panel in the cockpit.)

1-74. FILLING SURFACE CONTROL NORMAL HYDRAULIC SYSTEM. If the surface control normal hydraulic system compensator rod protrudes less than ¼ inch, it indicates that the system needs filling. The surface control normal system compensator rod is checked through an inspection hole on the right side of the fuselage, aft of the speed brake well. The surface control normal hydraulic system filler is on the bottom right side of the fuselage, aft of the speed brakes. (See figure 1-14.) To fill system, remove cap from disconnect coupling and attach flexible hose from pump. (A hydraulic test stand may be used for filling the surface control normal system. If test stand is not available, the furnished hand-pump may be used.)

1-75. FILLING SURFACE CONTROL ALTERNATE HYDRAULIC SYSTEM. If the surface control alternate hydraulic system compensator rod protrudes less than ¼ inch, it indicates that the system needs filling. The

surface control alternate system compensator rod is checked through an inspection hole on the left side of the fuselage, aft of the speed brake well. The surface control alternate hydraulic system is serviced through an access door on the bottom left side of the fuselage. (See figure 1-14.) Fluid is added to the system in the following manner:

a. Attach hydraulic hand-pump (172-58631) to bottom fuselage between filler access doors.

b. Remove cap from disconnect coupling and attach flexible hose from pump.

c. Operate hand-pump until compensator rod protrudes a maximum of 1¼ inches.

d. With external power available, start alternate power system electric hydraulic pump and keep adding fluid with hand-pump.

e. Operate hand-pump until no bubbles appear in reservoir sight gage in left speed brake well.

f. Remove flexible hose and cap disconnects.

1-76. DRAINING HYDRAULIC SYSTEM. With a container ready to catch the fluid, remove plug from drain line in right wheel well. This will drain approximately all of the reservoir fluid. To drain fluid from system lines, disconnect lines at several low points in system.

1-77. SERVICING COCKPIT AIR HEATING AND COOLING SYSTEM COOLING UNIT.

1-78. The cockpit air heating and cooling system cooling unit is reached through an access door located on top of the fuselage, aft of the canopy. (See figure 1-14.) The oil-pack turbine on the AiResearch cooling unit, used on F-86F-1 through F-86F-15 Airplanes, and F-86F-30 and subsequent airplanes, does not require frequent lubrication. The Stratos cooling turbine unit, installed on F-86F-20 and F-86F-25 Airplanes, incorporates an oil level sight gage for servicing purposes. Service with oil (Specification MIL-L-15016) in accordance with Navy symbol 3042.

Use the following procedure to service the Stratos turbine unit:

a. Open cooling unit access door and remove filler plug above sight gage on turbine.

b. Using an oil can, fill to full mark on sight gage with oil (Specification MIL-L-15016, Navy symbol 3042). Unit holds 85 cc of oil.

c. Reinstall filler plug. Wipe up any spilled oil with a cloth and install access door.

1-79. SERVICING BATTERY.

1-80. The battery is accessible through the radar compartment door (figure 1-14) and is provided with a conventional cover and quick-disconnect terminal block. To service battery, remove cover and take hydrometer reading of electrolyte in each cell to determine condition of battery. Specific gravity of 1.275 to 1.300 indicates full charge. If readings are 1.240 or below, the battery must be replaced or recharged. (Temperature corrections must be made to ensure accurate readings.)

Note

During cold weather, the battery must be kept as near full charge as possible; otherwise, the electrolyte will freeze. The battery should be removed and stored in a warm place when the airplane is to be parked for more than 4 hours at temperatures below –29°C (–20°F) or for any extended period.

If specific gravity is satisfactory, add distilled water to each cell as necessary, being careful not to overfill. Avoid spilling any electrolyte on airplane structure or equipment. If this occurs, immediately neutralize affected area with a water solution of sodium bicarbonate.

1-81. SERVICING BATTERY SUMP JAR. The battery sump jar is located on the forward right side of the radar and battery compartment. To prevent return flow to the top of the battery during inverted flight, remove any excess liquid within the jar. When new sump jar pads are inserted, they should be saturated with a solution of sodium bicarbonate. The solution should be made of approximately one pound of sodium bicarbonate to one gallon of water. One saturation of the sump jar pads is sufficient.

1-82. SERVICING OXYGEN SYSTEM.

1-83. A single filler valve for servicing the oxygen system is located on the right side of the forward fuselage, below the hydraulic brake cylinder access door. (See figure 1-14.) Cylinder capacities are shown in figure 1-13. Normal operating pressure is 400 psi.

1-84. FILLING OXYGEN SYSTEM. Fill the oxygen system as follows:

a. After opening access door, remove filler valve plug by turning handle about one-eighth turn.

b. Turn supply equipment regulator adjustment screw counterclockwise until it turns freely.

c. Open valves on supply cylinders very slowly, one at a time. Note supply pressure.

d. Turn pressure adjusting screw on regulator clockwise until delivery pressure gage registers 150 psi.

e. Open charging valve at end of hose to blow out any dirt that may have collected in adapter. Then close charging valve.

f. Insert adapter into filler valve and make sure that it is locked in position.

g. Open charging valve and, as oxygen flows into cylinders in airplane, gradually increase delivery pressure until cockpit pressure indicates 425 psi.

Note

Charging the cylinders generates heat. After servicing, cylinders will cool, and the resulting drop in pressure will bring the operating pressure down to approximately the required 400 psi.

h. After pressure in airplane system reaches 425 psi, as indicated by pressure gage in cockpit, close charging valve, release adapter, recap filler valve, and replace access door.

1-85. EXHAUSTING OXYGEN SYSTEM (F-86F-1 THROUGH F-86F-15 AIRPLANES). Turn diluter control handle, on Type A-14 pressure breather regulator in cockpit, to "100% OXYGEN." Then turn regulator dial to "ABOVE 45M"; oxygen will exhaust from end of regulator-to-mask connection tube. The mask-to-regulator hose must be free from obstruction; otherwise, the regulator diaphragm will rupture. Before leaving airplane, be sure that dial is moved back to "NORMAL" and diluter handle "NORMAL OXYGEN."

WARNING

Make certain there are no flammable materials in the vicinity, as combustion may result, particularly if there is an open flame or sparks nearby.

1-86. EXHAUSTING OXYGEN SYSTEM (F-86F-20 AND SUBSEQUENT AIRPLANES). Turn oxygen supply lever on Type D-1 or Type D-2 pressure breather regulator, located on left console in cockpit, to "ON" position. Then flip emergency switch to either the left or the right side to discharge. Oxygen will be exhausted from end of regulator-to-mask connection tube. The mask-to-regulator hose must be free from obstruction; otherwise, the regulator diaphragm will be ruptured. Before leaving airplane, be sure that emergency lever is closed and diluter handle is at "NORMAL OXYGEN."

1-87. DRAINING PITOT-STATIC SYSTEM.

1-88. Water-collecting sumps are provided in the pitot-static system drain lines, as shown in figure 1-15. Remove sump caps and plugs to drain pitot-static system.

CAUTION

Use fingers to start tightening drain sump caps. Then, apply wrench and torque 60 to 80 inch-pounds.

1-89. DRAINING COCKPIT DRAIN LINES.

1-90. The cockpit drain lines should be emptied before each flight. The drain plugs are located on each side of the fuselage, below the kick step. To ensure complete drainage, the airplane should be level during the draining operation. If copper drain plugs, used on some airplanes, have a tendency to stick, apply graphite petrolatum antiseize compound (Specification MIL-C-5544). (See figure 1-15.) To drain lines, remove plugs with a ¼-inch Allen wrench. After draining, install drain plugs.

1-90A. TORQUE TABLE.

1-90B. The torque values for tightening standard nuts on bolts, studs, and screws are shown in figure 1-17A.

1-91. EXTINGUISHING GROUND FIRES.

1-92. EXTINGUISHING FIRES WITHIN ENGINE OR TAIL PIPE.

1-93. With external power attached to the airplane, use the following procedure to extinguish a fire within the engine or tail pipe.

a. Move throttle to "OFF."

b. Turn engine master switch "ON," on F-86F-5 through F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13080 through -13169, and F-86F-25 and subsequent airplanes. On F-86F-1 and F-86F-20 Airplanes AF51-13070 through -13079, turn engine master switch "OFF."

c. Keep engine turning with starter until fire is extinguished.

WARNING

If fire does not extinguish, push stop-starter button, turn battery-starter switch "OFF," and quickly leave airplane.

1-94. EXTINGUISHING FIRE WITHIN ENGINE OR TAIL PIPE WHEN EXTERNAL POWER IS NOT AVAILABLE. If external power is not available, introduce CO_2 into air intake duct and a dry chemical extinguishing agent or CO_2 through engine tail pipe. Use CO_2 as sparingly as possible, to prevent engine damage as a result of abrupt contraction of metal due to the cooling effect of CO_2.

CAUTION

Do not introduce a dry chemical fire-extinguishing agent into the engine air intake duct.

1-95. EXTINGUISHING FIRES IN AFT FUSELAGE.

1-96. In case of fires outside the tail pipe, do not attempt to extinguish fire by turning engine. Introduce a dry chemical fire-extinguishing agent or CO_2 into aft fuselage through fire-fighting door, located on left forward side of aft fuselage. Direct extinguishing agent into compartment *around* the engine. Try not to allow CO_2 to spray directly on engine turbine housing, as excessive metal contraction causing engine damage will result.

1-97. POSTFIRE PROCEDURE.

1-98. To prevent serious corrosion after fires are put out with dry chemical fire-fighting extinguishing agent, the agent must be removed from structure by the following procedure:

a. Blow off excess agent with compressed air.

b. Wash structure with large quantities of water.

Note

All dry chemical agent must be removed from the engine area. If excessive amounts have penetrated the engine or engine components, the engine or components should be thoroughly cleaned; this may require overhaul.

1-99. LUBRICATION REQUIREMENTS.

1-100. Parts requiring periodic lubrication are shown in figure 1-18. Remove all foreign matter from joints, fittings, or bearing surfaces immediately before application of lubricant. Use a clean rag saturated with cleaning solvent (Federal Specification P-S-661). Apply lubricants sparingly to prevent accumulation of contaminants. When applying lubricants through pressure-type fittings, make certain that lubricant has emerged around bushing, and then wipe off excess. Exposed piston rods of hydraulic actuating cylinders and shock struts should be wiped off daily with hydraulic fluid (Specification MIL-O-5606). A flexible hose should be used on the zerk gun to lubricate hard-to-reach lubrication fittings such as that on the main landing gear downlock fitting. The oil holes for the felt wipers in the ends of the various hydraulic cylinders and actuators should be lubricated with a few drops of oil (Specification MIL-L-7870).

CAUTION

Specification MIL-G-3278 grease contains special synthetic compounds that may soften paint, natural rubber, neoprene, and electrical material. If any of this lubricant spills on any of these materials, wipe it off thoroughly with a clean cloth.

BOLT, STUD, OR SCREW SIZE		TORQUE VALUES IN INCH-POUNDS (1) FOR TIGHTENING NUTS (2 AND 3)		
		ON STANDARD BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 125,000-140,000 PSI		ON HIGH-STRENGH BOLTS, STUDS, AND SCREWS HAVING A TENSILE STRENGTH OF 160,000 PSI AND OVER
		SHEAR-TYPE NUTS (4 AND 5) (AN320, AN364, OR EQUIVALENT)	TENSION-TYPE NUTS AND THREADED MACHINE PARTS (AN310, AN365, OR EQUIVALENT)	ANY NUT (5) EXCEPT SHEAR-TYPE
8-32	8-36	7-9	12-15	15-18
10-24	10-32	12-15	20-25	25-35
1/4-20		25-30	40-50	50-68
	1/4-28	30-40	50-70	70-90
5/16-18		48-55	80-90	90-144
	5/16-24	60-85	100-140	140-203
3/8-16		95-110	160-185	185-248
	3/8-24	95-110	160-190	190-351
7/16-14		140-155	235-255	255-428
	7/16-20	270-300	450-500	500-756
1/2-13		240-290	400-480	480-792
	1/2-20	290-410	480-690	690-990
9/16-12		300-420	500-700	700-990
	9/16-18	480-600	800-1,000	1,000-1,440
5/8-11		420-540	700-900	900-1,350
	5/8-18	660-780	1,100-1,300	1,300-2,160
3/4-10		700-950	1,150-1,600	1,600-2,250
	3/4-16	1,300-1,500	2,300-2,500	2,500-4,500
7/8-9		1,300-1,800	2,200-3,000	3,000-4,140
	7/8-14	1,500-1,800	2,500-3,000	3,000-6,300
1-8		2,200-3,000	3,700-5,000	5,000-6,840
	1-14	2,200-3,300	3,700-5,500	5,500-9,000
1-1/8-8		3,300-4,000	5,500-6,500	6,500-10,800
	1-1/8-12	3,000-4,200	5,000-7,000	7,000-13,500
1-1/4-8		4,000-5,000	6,500-8,000	8,000-14,000
	1-1/4-12	5,400-6,600	9,000-11,000	11,000-22,500

NOTE:

1 To obtain values in foot-pounds, divide inch-pound values by 12.

2 When nuts are to be secured to fasteners with cotter pins or lockwire, tighten nuts to low side of selected torque range unless otherwise shown on drawing and, if necessary, continue tightening until next slot aligns with hole. Nuts must not be loosened to obtain alignment.

3 When it is necessary to tighten fasteners from head side, high side of selected torque range should be approached whenever possible, but in no case should maximum torque exceed 10 percent above high side of selected torque listed in table unless otherwise shown on drawing.

4 For corrosion-resistant steel nuts, use torque values given for shear-type nuts.

5 Use of shear-type nuts on either standard or high-strength bolts and screws requires use of torque values given for shear-type nuts.

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Figure 1-17A. Torque Table

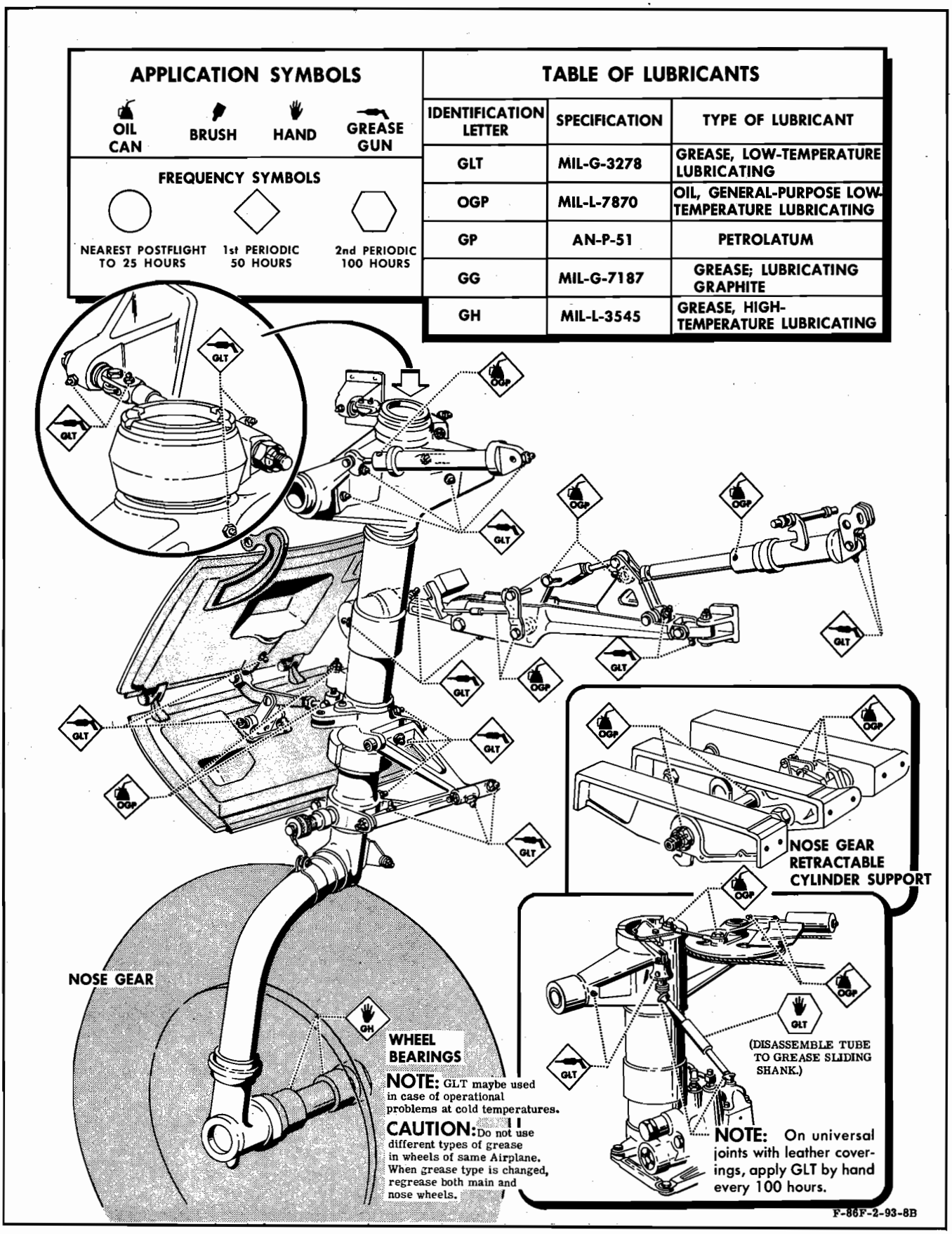


Figure 1-18. Lubrication Chart (Sheet 1 of 9)

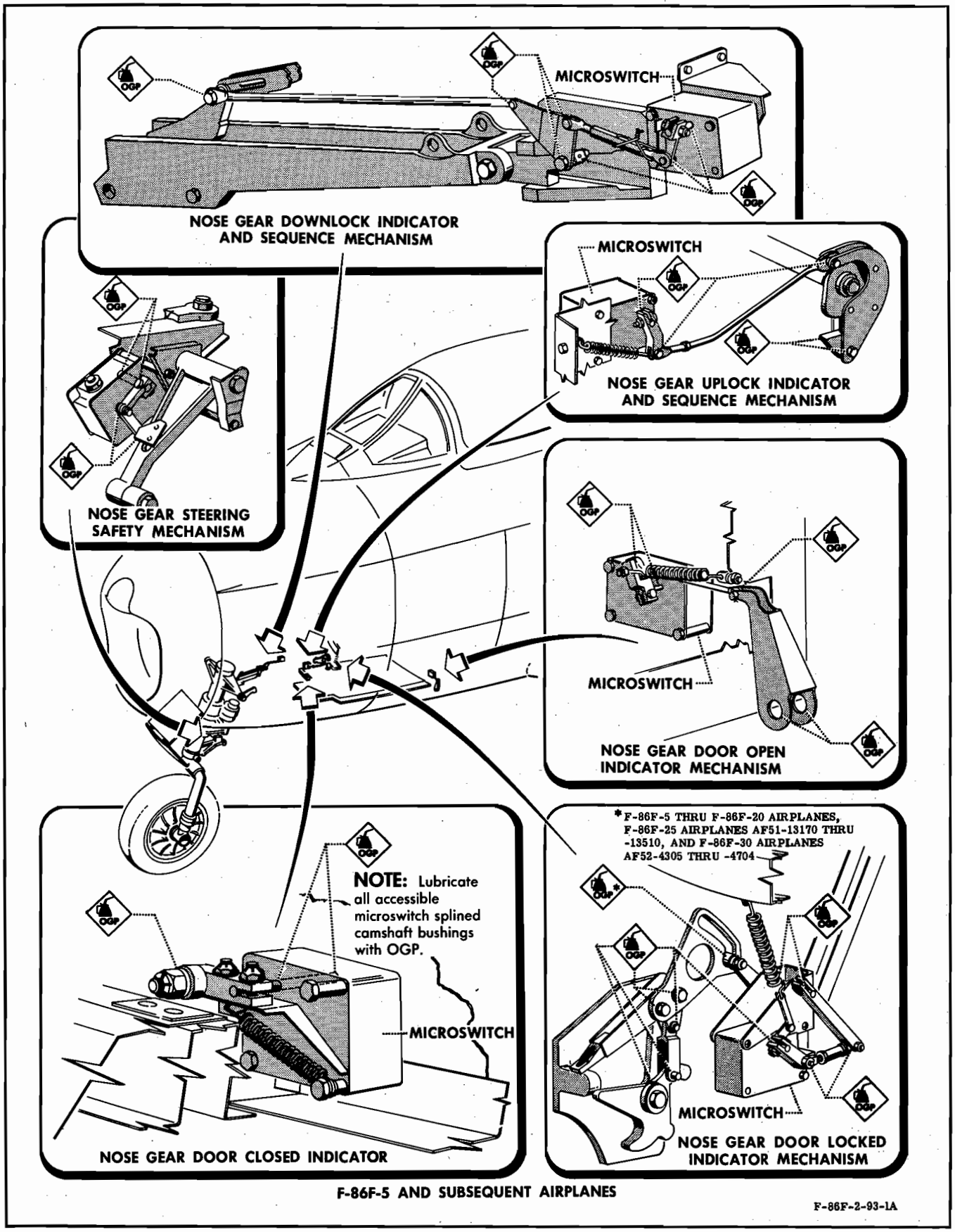


Figure 1-18. Lubrication Chart (Sheet 2 of 9)

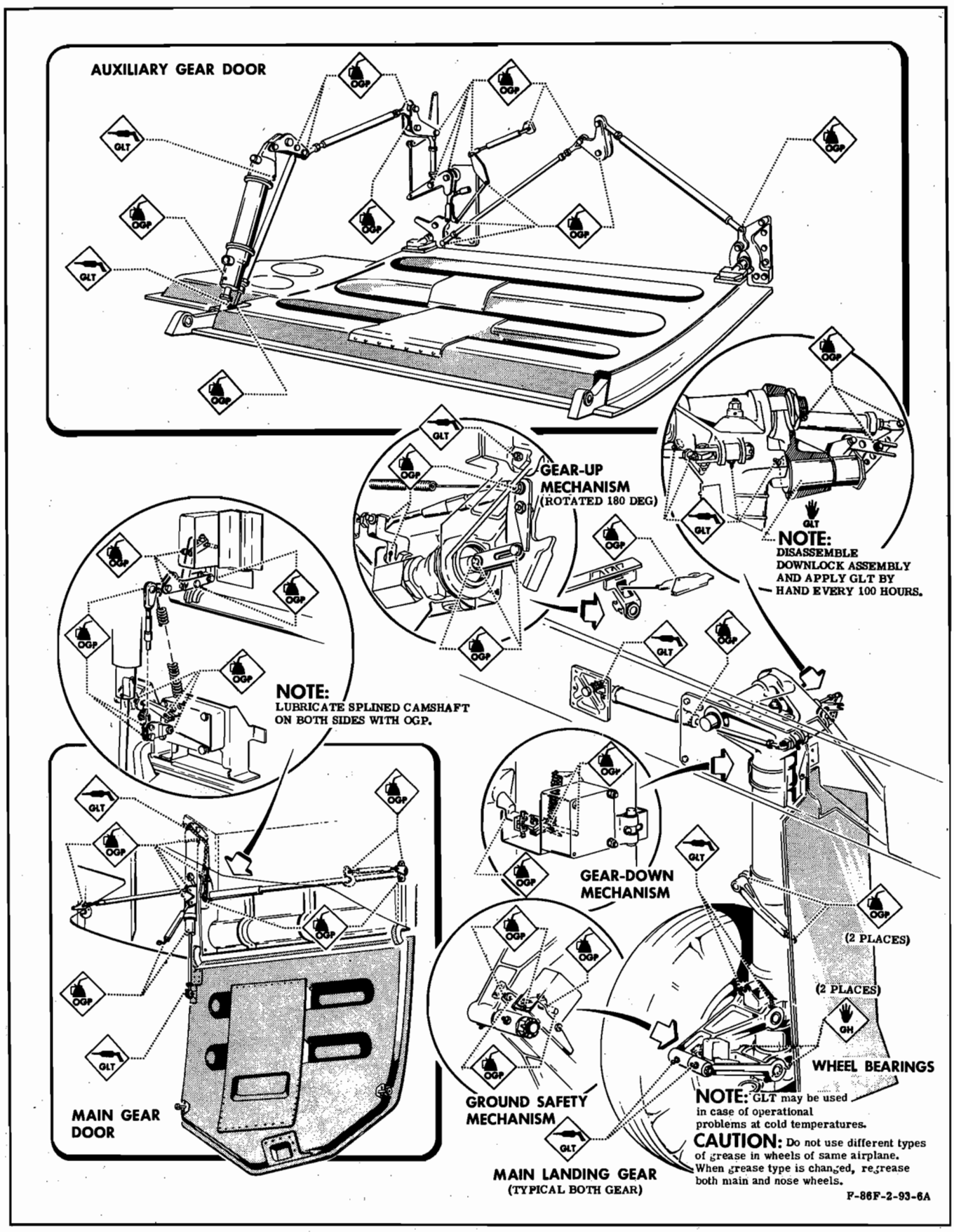


Figure 1-18. Lubrication Chart (Sheet 3 of 9)

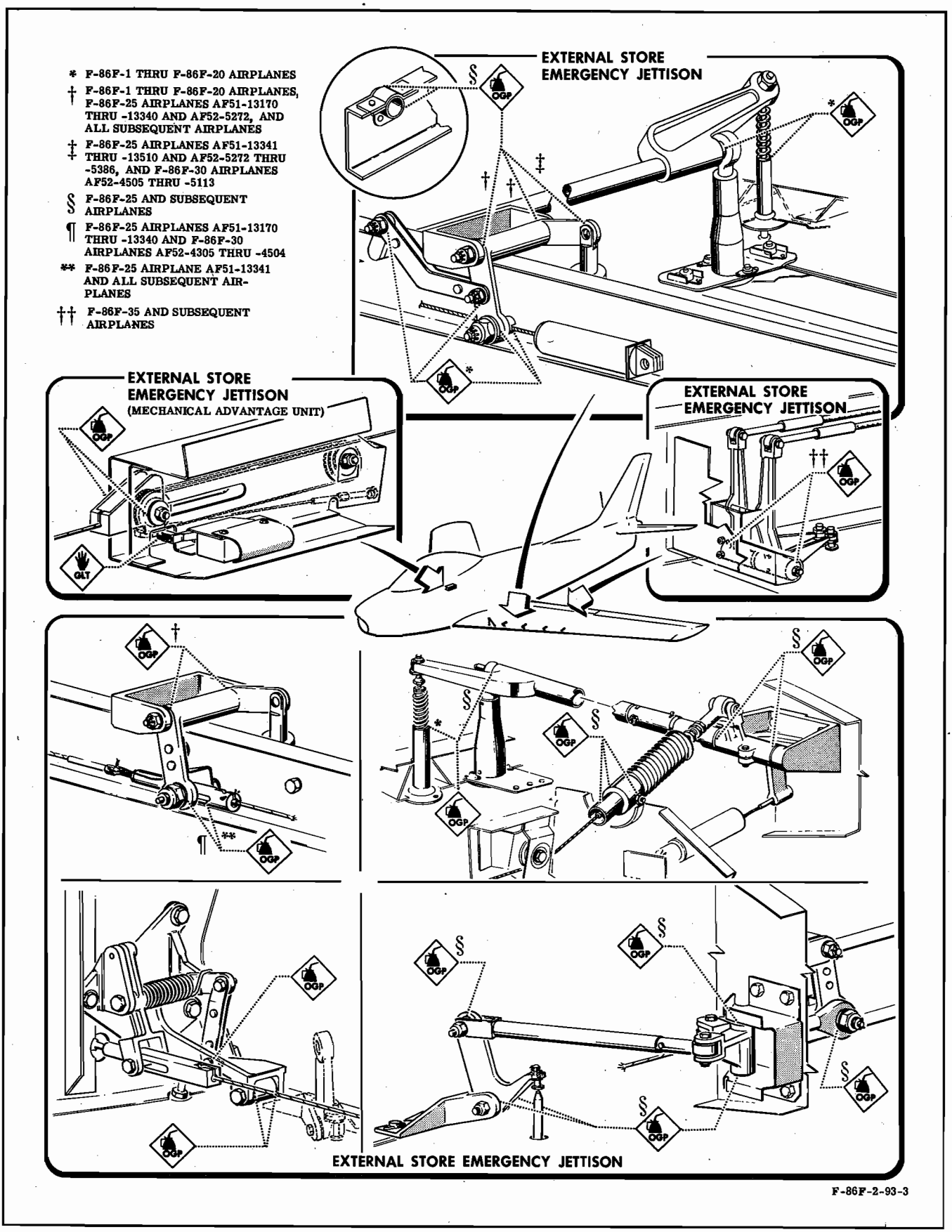


Figure 1-18. Lubrication Chart (Sheet 4 of 9)

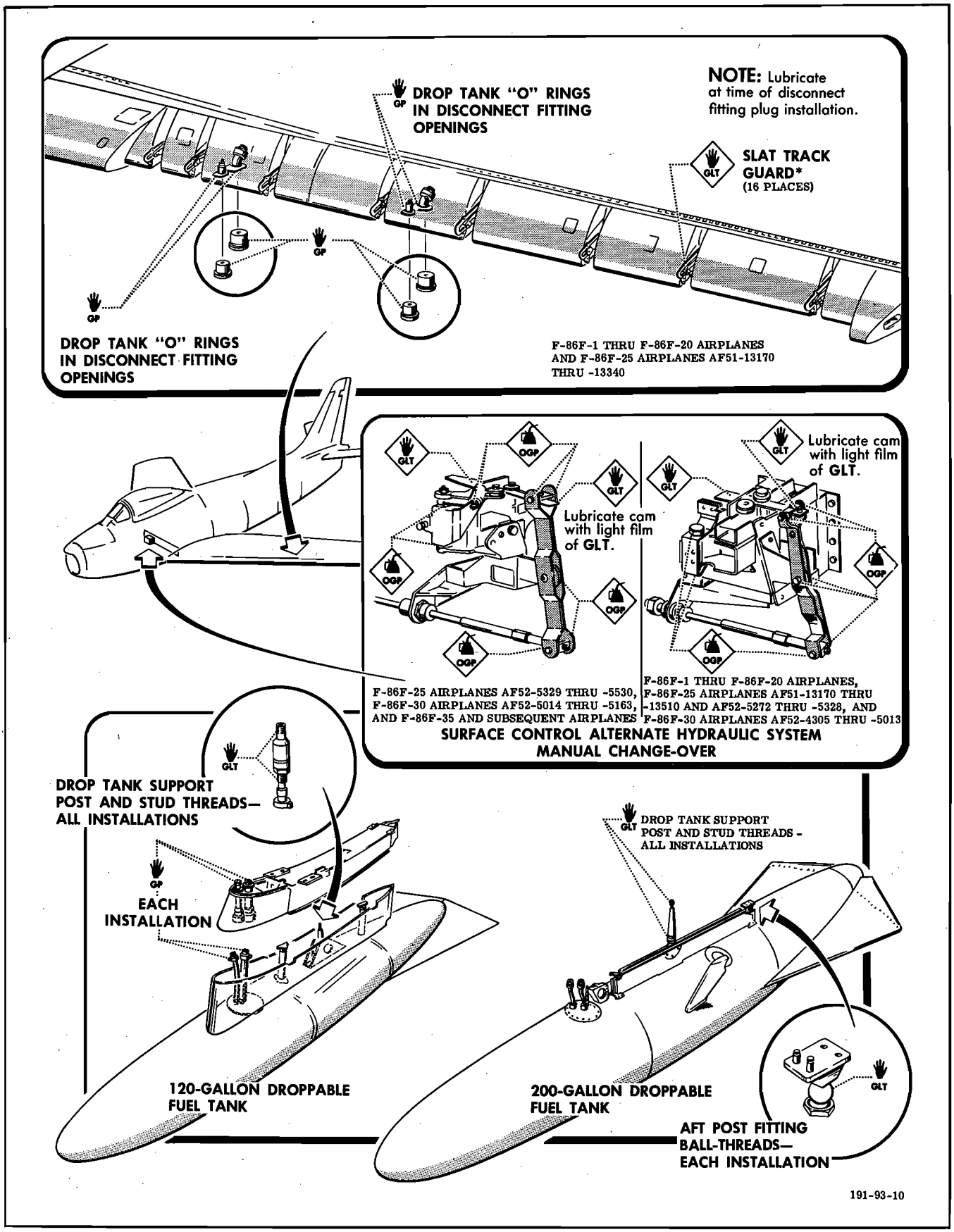


Figure 1-18. Lubrication Chart (Sheet 5 of 9)

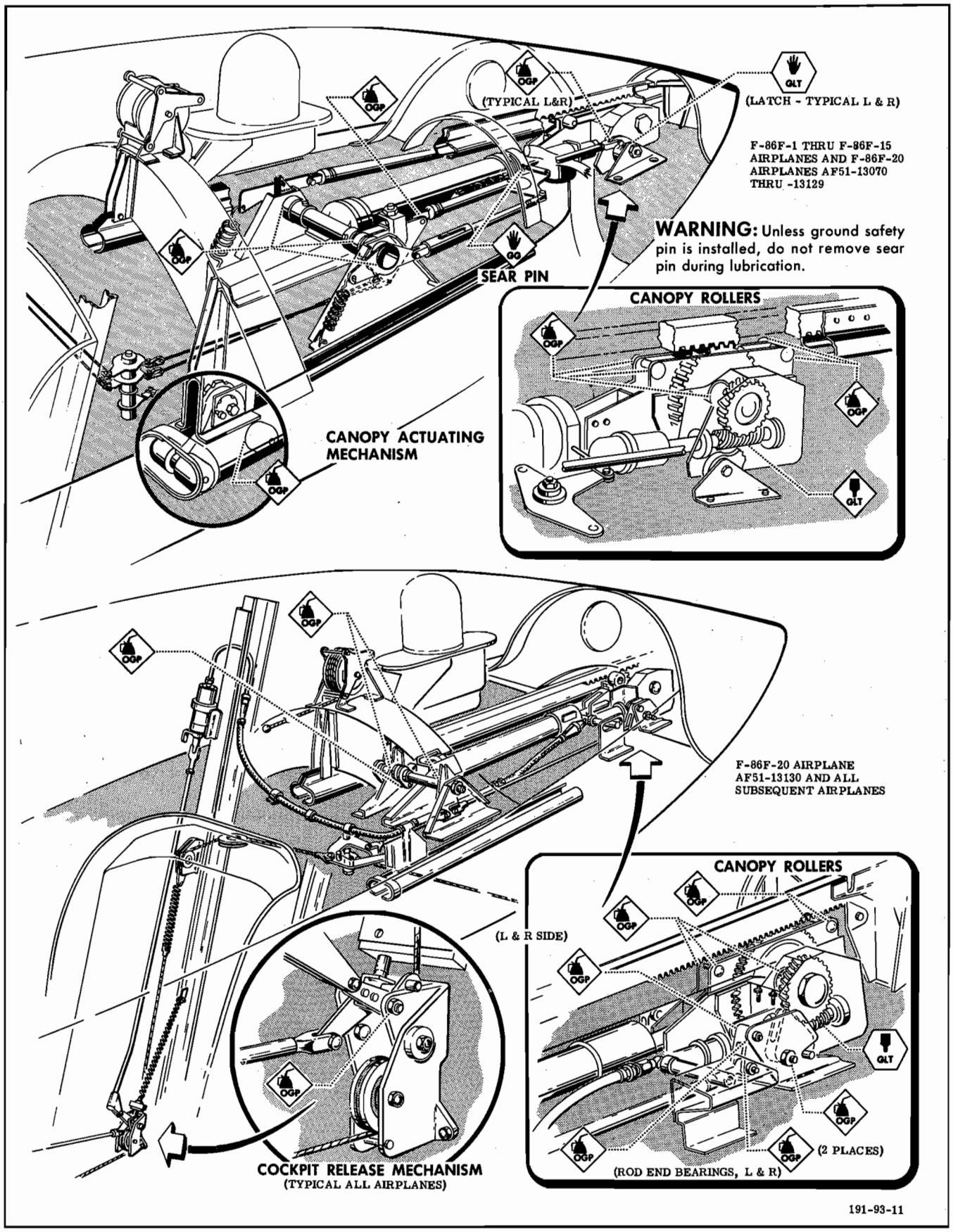


Figure 1-18. Lubrication Chart (Sheet 6 of 9)

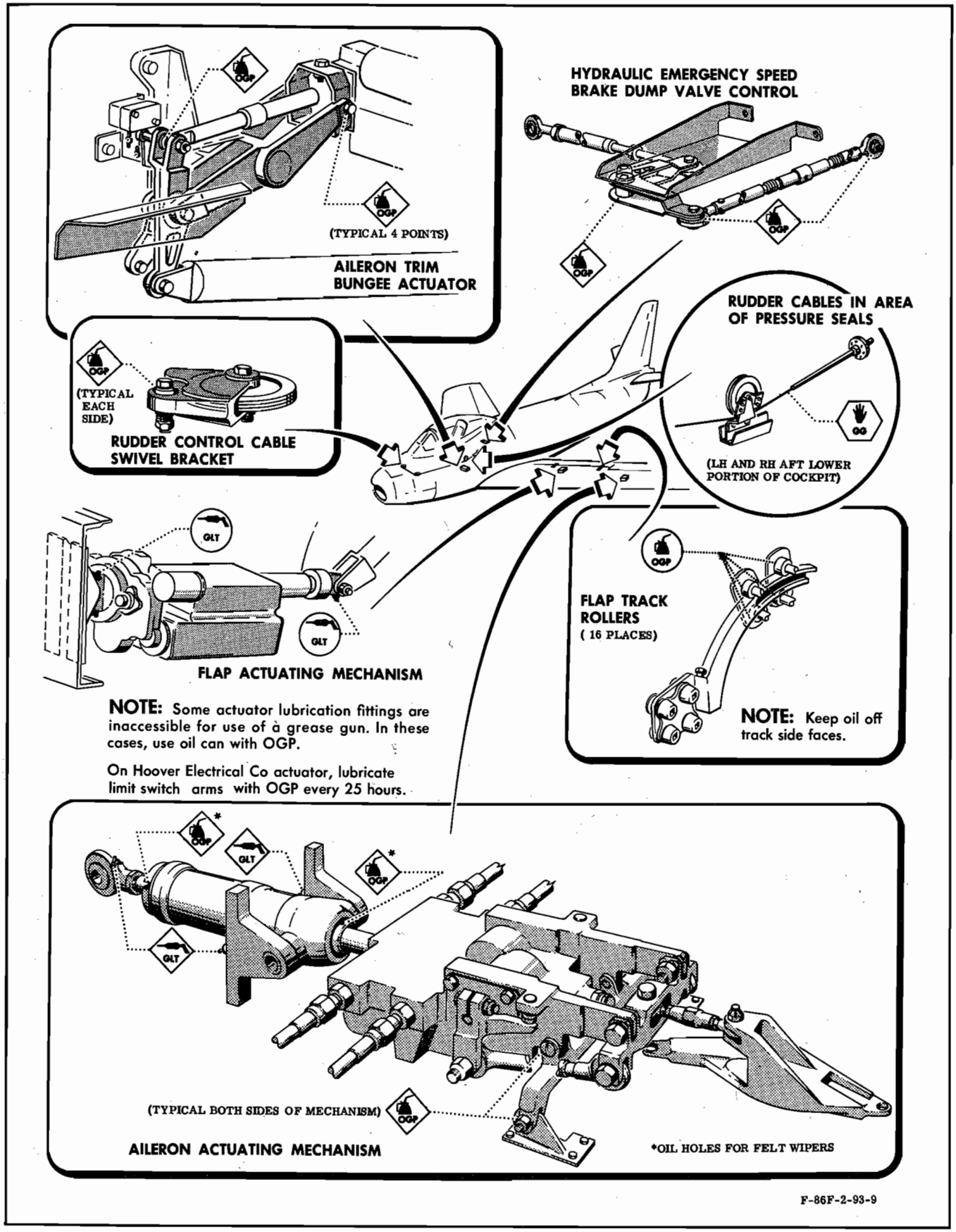


Figure 1-18. Lubrication Chart (Sheet 7 of 9)

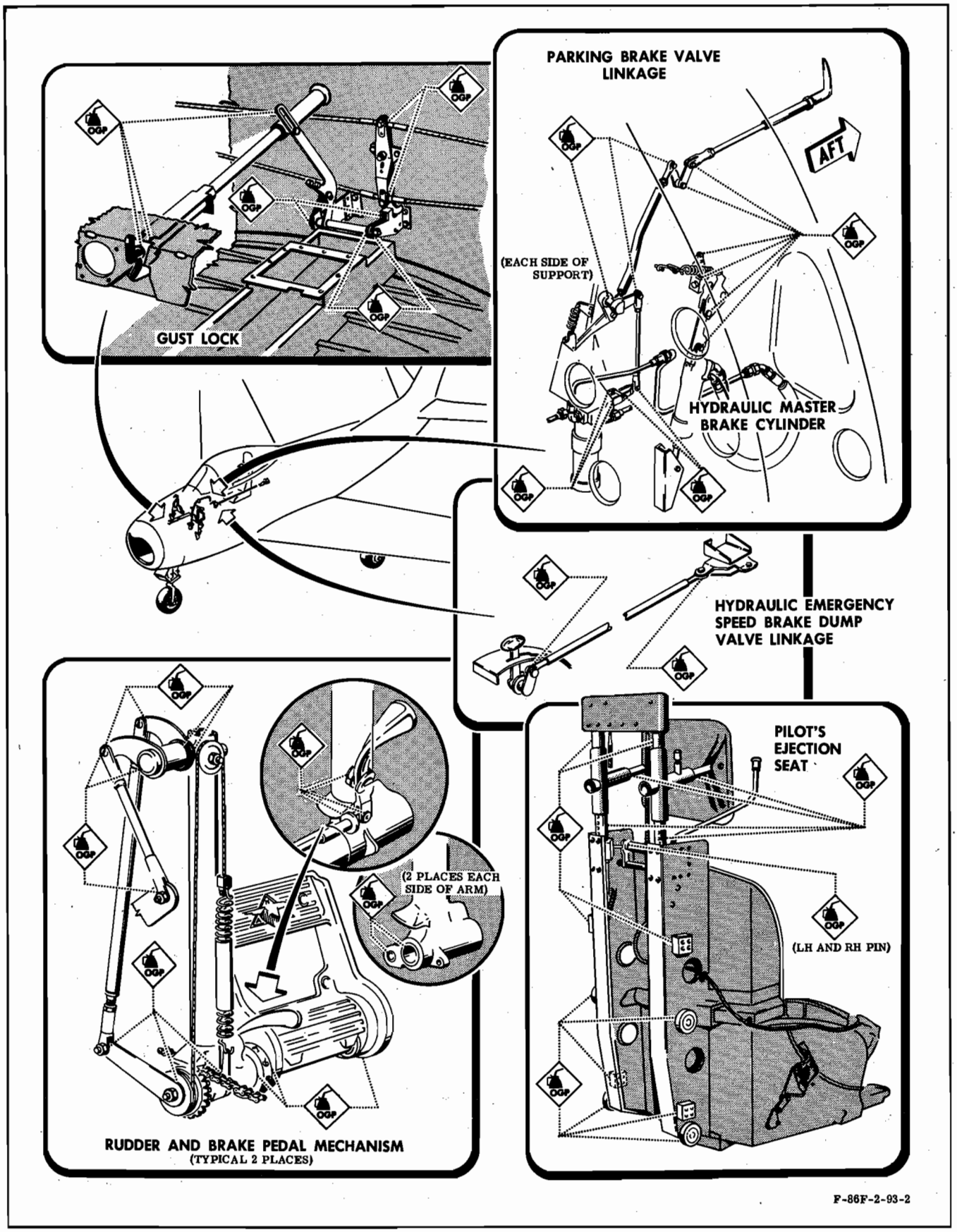


Figure 1-18. Lubrication Chart (Sheet 8 of 9)

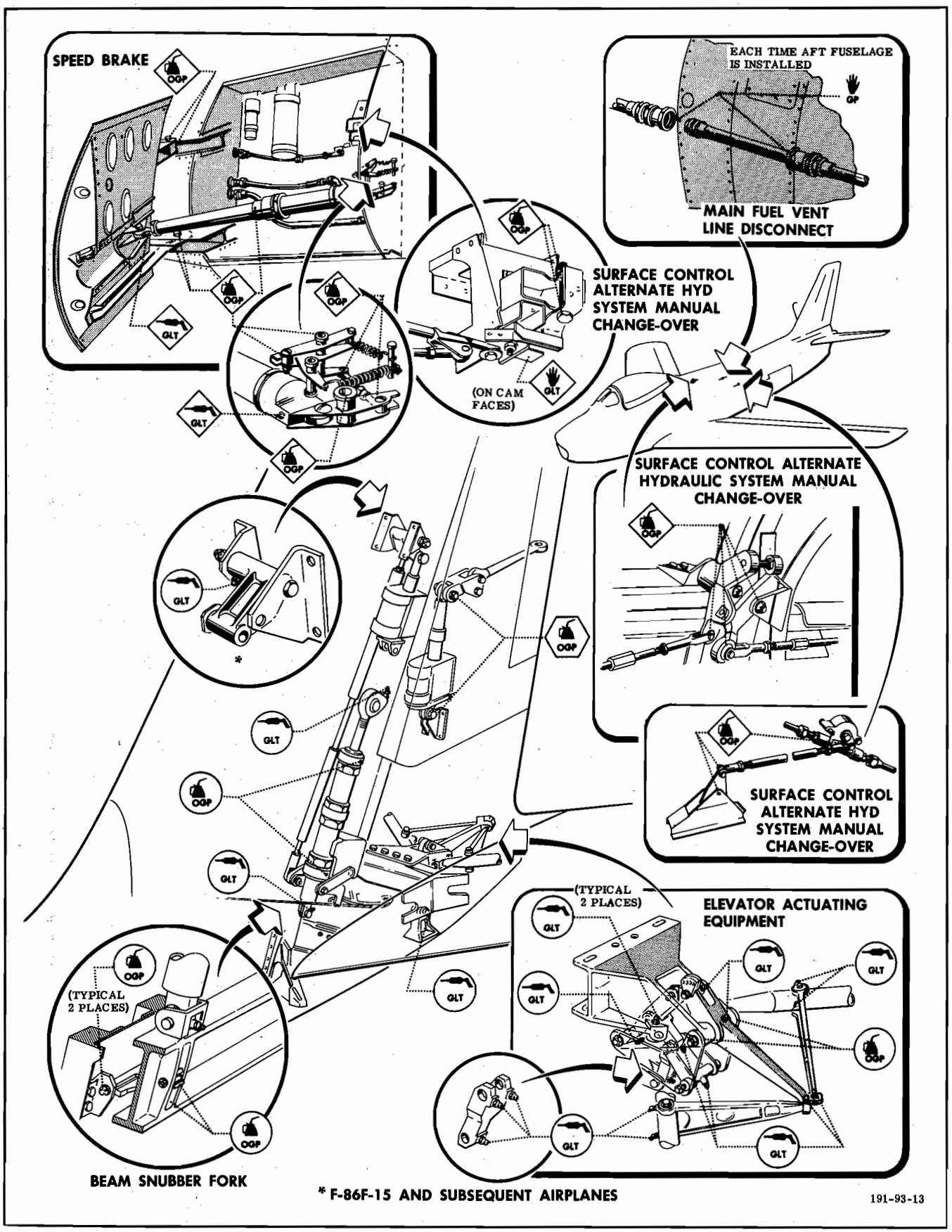
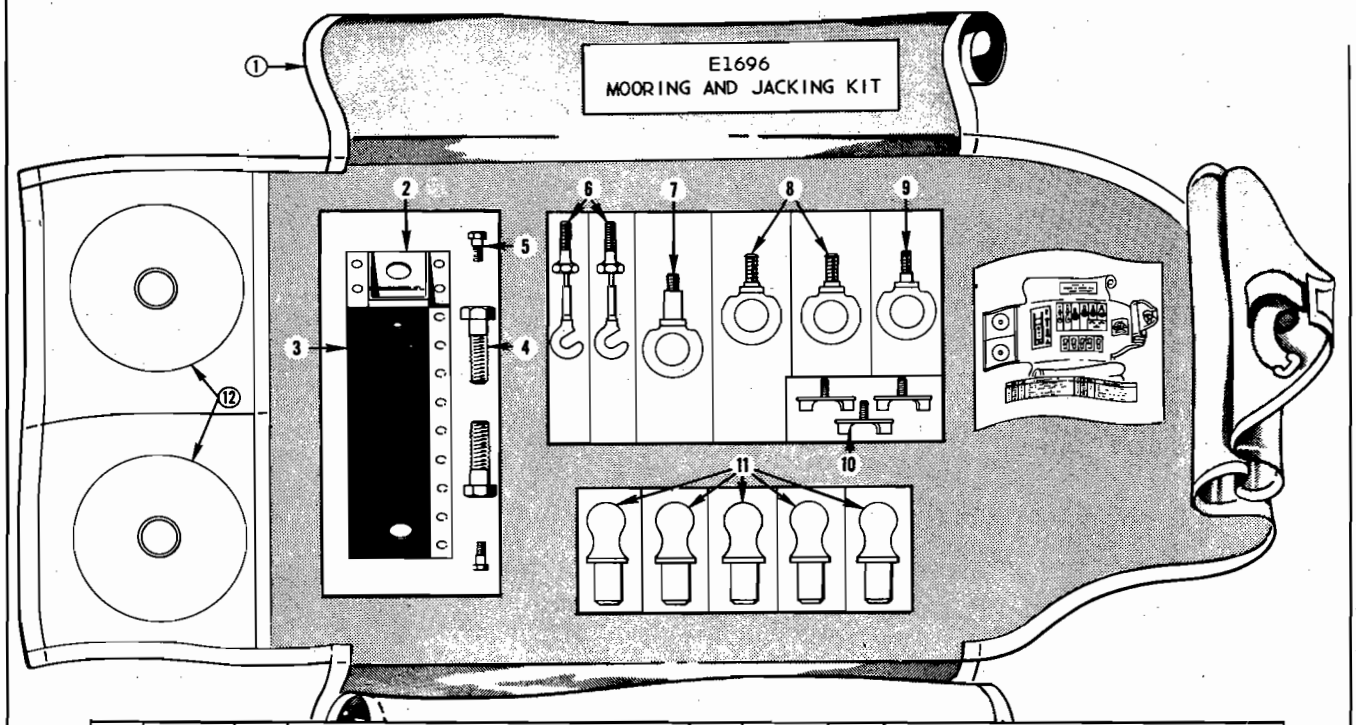


Figure 1-18. Lubrication Chart (Sheet 9 of 9)

1-101. SPECIAL TOOLS AND EQUIPMENT.

1-102. The following tools are used for the general maintenance and overhaul of the airplane:

PART NO.	NOMENCLATURE	FIGURE NO.	PROCURING SERVICE STOCK NO.
151-73073	Wing walkway cover assembly	1-10	2000-884010
170-73071	Jet-engine air intake duct shield assembly	1-10	2000-800666
170-73073	Pitot tube cover assembly	1-10	
172-55010	AN/APG-30 radar and A-1CM sight maintenance test bench		7CAC-172-55010
176-55010	Engine hoisting sling assembly	1-6	8220-609235
176-73007	Jet-engine exhaust duct cover assembly	1-10	2000-232533
176-73072	Jet-engine exhaust duct shield assembly	1-10	2000-800680
176-73073	Pitot tube automatic-releasing cover assembly	1-10	2000-270171
455966-4	Cradle adapter kit, consisting of the following: 49D6434 belt 49D6298 saddle 455963R aft adapter 455963L aft adapter 455962R forward adapter 455962L forward adapter 456225 aft support 456231 forward support		8220-032425

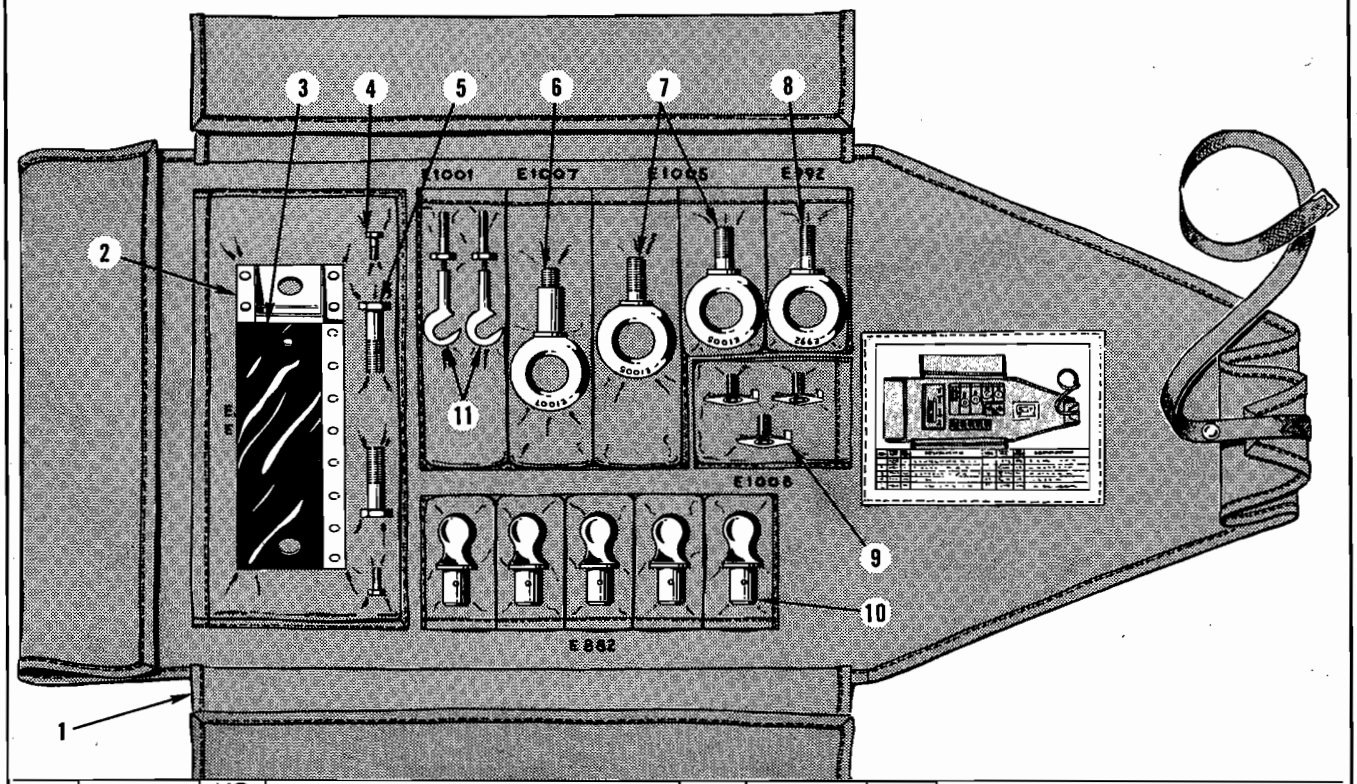


ITEM	TOOL NO.	NO. REQD	DESCRIPTION	ITEM	TOOL NO.	NO. REQD	DESCRIPTION
1	E1697	1	BAG	8	E1005	2	EYE-WING MOORING
2	E978-1	1	SUPPORT LH	9	E992	1	EYE-FUS MOORING STA 379
3	E978-2	1	SUPPORT RH	10	E1008	3	SCREW-LEVELING & TARGET ALIGNING
4	AN8-12A	2	BOLT	11	E882	5	PAD-WING AND FUS JACKING
5	AN4-10A	2	BOLT-FUS JACK PAD SUPPORT	12	E1688	2	PAD-WING OUTER PANEL AUX JACKING
6	E1001	2	HOOK-OUTER WING BOMB HOIST ATTACH				
7	E1007	1	EYE-FUS MOORING STA 87				

F-86F-2-55-1

Figure 1-19. Jacking, Mooring, and Leveling Kit—F-86F-1 Through F-86F-20 Airplanes

PART NO.	NOMENCLATURE	FIGURE NO.	PROCURING SERVICE STOCK NO.
48J18911L	Wing cover assembly	1-10	2000-283935
48J18911R	Wing cover assembly	1-10	2000-283985
48J18929-1	Nose waterproof cover assembly	1-10	2000-268871
48J18929-2	Canopy cockpit enclosure cover assembly	1-10	2000-246088
48J18929-3	Nose and canopy cover forward strap	1-10	2000-870110
48J18929-4	Canopy cover aft strap	1-10	2000-869810
48J19222L	Horizontal stabilizer cover assembly	1-10	2000-272841
48J19222R	Horizontal stabilizer cover assembly	1-10	2000-272886
BH112F5	Jet-engine thermocouple tester	6-10A	7CAA-BH112F5
BH360-5	Jet-engine thermocouple tester harness	6-10A	7CAA-360-5
E974	Complete airplane sling assembly	1-6	8220-601900
E975-100	Fuselage rear section hoisting sling assembly	1-6	8220-611710
E976	Wing outer panel hoisting sling assembly	1-6	8220-624100
E1186-50	Engine transportation dolly assembly	1-5	8200-750550
E1201	Auxiliary landing gear drag brace ground lock assembly	1-11	8200-625053-2
E1561	Fuselage station 235.8 aligner		9BNA-E1561



ITEM	TOOL NO.	NO. REQD	DESCRIPTION	ITEM	TOOL NO.	NO. REQD	DESCRIPTION
1	E1697	1	BAG	7	E1005	2	EYE—WING MOORING
2	E978-1	1	SUPPORT—LH	8	E992	1	EYE—FUS MOORING STA 379
3	E978-2	1	SUPPORT—RH	9	E1008	3	SCREW—LEVELING TARGET ALIGNING
4	AN8-12A	2	BOLT—FUS JACK PAD SUPPORT	10	E882	5	PAD—WING AND FUS JACKING
5	AN4-10A	2	BOLT—FUS JACK PAD SUPPORT	11	E1001	2	HOOK—OUTER WING BOMB
6	E1007	1	EYE—FUS MOORING STA 87				HOIST ATTACH 191-55-1

Figure 1-20. Jacking, Mooring, and Leveling Kit—F-86F-25 and Subsequent Airplanes

PART NO.	NOMENCLATURE	FIGURE NO.	PROCURING SERVICE STOCK NO.
E1601-19	Nose gear door-open position ground safety lock assembly	1-11	8200-825050-2
E1693	Slat ground retaining strap assembly		
E1696	Jacking, mooring, and leveling kit	1-19	8200-418715
E1696-10	Jacking, mooring, and leveling kit	1-20	8200-418717
E1698-1	Engine installation guide assembly (LH)	5-2	8220-382400
E1698-2	Engine installation guide assembly (RH)	5-2	8220-382500
T49B	Adjustment spanner wrench set		
T71	Surface control checking protractor assembly		9BNA-T71
T224	Rear gun mount vertical adjustment wrench		9BNA-T224
T268	Fuselage-to-wing attachment aligning pin	1-31	9BNA-T268
T300	Cockpit canopy inflatable seal attaching tool set, consisting of the following: T301 cable assembly T302-1 clamp (LH) T302-2 clamp (RH) T304-1 block (LH) T304-2 block (RH) T305 block T306 clamp		9BNA-T300
T307	Wing hinge pin installation and removing tool set, consisting of the following: T308 pin puller T309 handle T310 driving tool T311 container	2-3	9BNA-T307
T321	Wing joint attach bolt wrench adapter	2-1	9BNA-T321
T365-5	Drop fuel tank support post torque check wrench		9BNA-T365-5
T375	Main landing gear trunnion pin remover	2-68	9BNA-T375
T441	Nose gear aligning tool	2-76	9BNA-T441
T482	Wing installation and removal kit, consisting of the following: T321 adapter T472 adapter T476 wrench T477 wrench T481 container	2-1	9BNA-T482
T485-10	Bore-sighting and target aligning fixture kit, consisting of the following: T229 ring sight T266 peep sight T480 box T497 wrench	9-4	9CNA-T485-10
T494	Spanner wrench assembly		9BNA-T494

Section II
AIRFRAME GROUP

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2-1. WING.

2-2. The wing is of all-metal, flush-riveted, full-cantilever construction. It has a sweepback of 35 degrees (at 25 percent of chord) and a dihedral of 3 degrees. The wing comprises a center section, two outer panels (with removable tips and leading edge sections), wing flaps, and ailerons. Leading edge slats are incorporated in the leading edge sections on F-86F-1 Airplanes (with some exceptions, which have extended leading edges), and on F-86F-5 through F-86F-20 Airplanes, F-86F-25

Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4504. On F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes, the leading edge section is wider and has no slats. The center section is of the single-cell box type, made up of front and rear spars and upper and lower skin panels. The skin panels are of sandwich-type construction (skin on both sides of the stringers). A self-sealing fuel cell is installed in the wing center section. The wing outer panels, of two-spar stressed-skin construction, are removable at the wing joint adjacent to the fuselage. A removable leading edge is provided to permit access to hydraulic lines, electrical wiring, and aileron valve control cables. A self-sealing fuel cell is installed in the inboard end of each outer panel. The wing outer panels incorporate the main landing gear and wing flaps. A remote compass transmitter is in-

stalled in the left wing outer panel. The right wing outer panel incorporates an airspeed boom at the tip. Provisions are incorporated for mounting bomb racks, rockets, and auxiliary droppable fuel tanks on the undersurface of the wing outer panels. A center section fairing (figure 2-2) provides access to the fuel cell booster pumps and to the wing outer panel to center section lower attaching bolts.

2-3. SEPARATING WING AND FUSELAGE.

2-4. Refer to paragraph 2-153.

2-5. JOINING WING AND FUSELAGE.

2-6. See figure 2-31.

2-7. REMOVING WING OUTER PANEL.

2-8. The parts and components referred to in the following procedure are identified in figure 2-1. Remove the wing outer panel as follows:

Note

It is not necessary to remove the flap when removing the wing outer panel; however, if the flap is to be removed subsequently, it will facilitate the removal of the outer panel to remove the flaps first. (Refer to paragraph 2-44.)

CAUTION

Drain fuel system before removing wing outer panel.

a. Remove center section fairing. (Refer to paragraph 2-12.)

b. Remove wing attaching bolt cover at top of inboard end of wing outer panel.

c. Disconnect and cap hydraulic lines at front spar wing attaching joint.

d. Disconnect static and pressure lines at front spar attaching joint (right wing only).

e. Disconnect aileron control rod at front spar wing attaching joint.

f. Disconnect and cap fuel lines at front spar wing attaching joint.

g. Disconnect electrical connector at front spar attaching joint.

h. Disconnect emergency jettison cable at turnbuckle.

i. Disconnect turnbuckle that connects outer panel trailing edge to fuselage.

j. Disconnect flap interconnecting flexible shaft and supporting clips at wheel well.

k. Disconnect hydraulic reservoir overflow line (left wheel well only).

l. Disconnect landing gear emergency uplock release cables (two in right wheel well, one in left wheel well).

m. Disconnect and cap fuel lines in wheel well.

n. Disconnect electrical wiring in wheel well.

o. Disconnect and cap brake and hydraulic lines in wheel well.

p. Remove fore and aft fuel booster pumps in wing center section fuel cell. (Refer to paragraph 5-188.)

q. Through fuel pump opening in wing center section, disconnect fuel cell fore and aft interconnectors.

qA. Remove wing-to-fuselage corner fillet.

r. Support fuselage with jacks, sling, or cradle. Then remove bolts that attach outer panel to center section, and remove wing outer panel. The panel weighs approximately 1375 pounds. (For hoisting or jacking procedure, refer to paragraph 1-12 or 1-14.)

2-9. INSTALLING WING OUTER PANEL.

2-10. See figure 2-1.

2-11. REMOVING WING CENTER SECTION FAIRING.

2-12. The parts and components referred to in the following procedure are shown in figure 2-2. Remove the fairing as follows:

a. Remove antenna.

b. Remove screws that attach fairing to wing center section.

c. Lower fairing enough to gain access to identification light wiring; then disconnect wiring.

d. Remove fairing.

2-13. INSTALLING WING CENTER SECTION FAIRING.

2-14. See figure 2-2.

2-15. WING TIP AND OUTER PANEL LEADING EDGE.

2-16. The wing tip, of stainless steel contruction, is secured to the outer panel by nonmagnetic screws to minimize magnetic interference with the remote compass transmitter. Each wing tip incorporates a navigation light. The all-metal outer panel leading edge sections are attached to the outer panels by a continuous-type hinge and hinge pins. On airplanes without slats, the forward inboard corner of the leading edge is removable. To remove this section, insert screwdriver in access hole in leading edge to release a Camloc fastener, and then slide section outboard.

2-17. REMOVING WING TIP. The parts and components referred to in the following procedure are identified in figure 2-4. Remove the wing tip as follows:

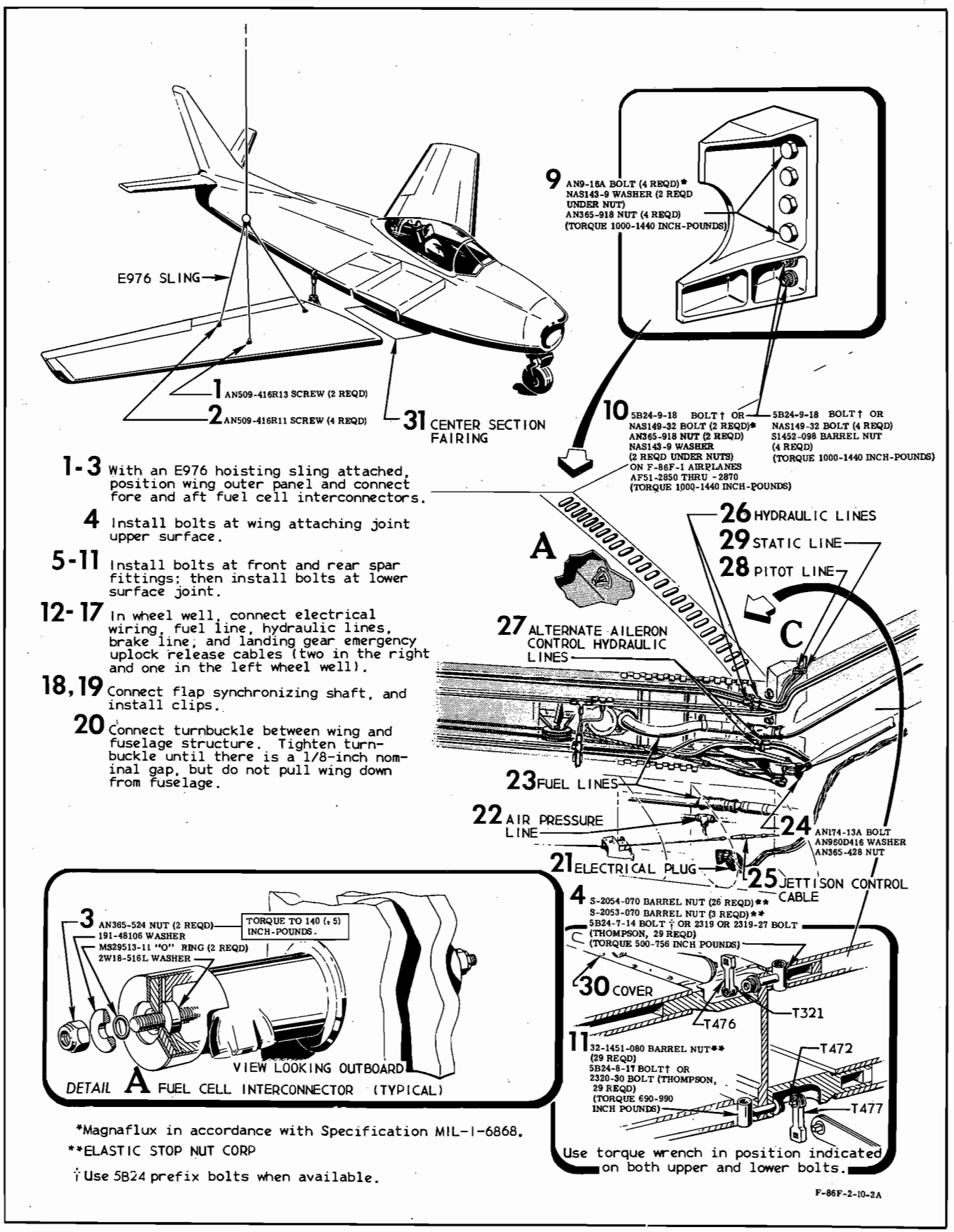
a. Remove screws that attach wing tip to wing outer panel.

b. Move wing tip outboard far enough to allow access to navigation light wiring; then disconnect wiring and remove tip.

Note

Wing tip must be removed before wing leading edge can be removed.

2-18. REMOVING OUTER PANEL LEADING EDGE. The parts and components referred to in the following

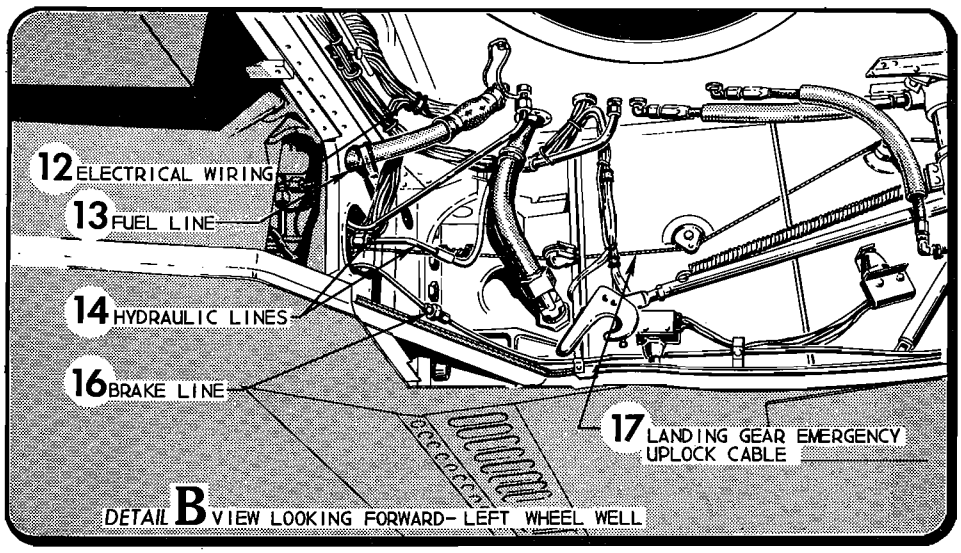


*Magnaflux in accordance with Specification MIL-I-6868.

**ELASTIC STOP NUT CORP

† Use 5B24 prefix bolts when available.

Figure 2-1. Installing Outer Wing Panel (Sheet 1 of 2)

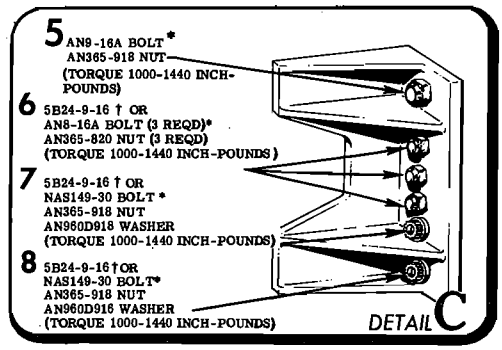


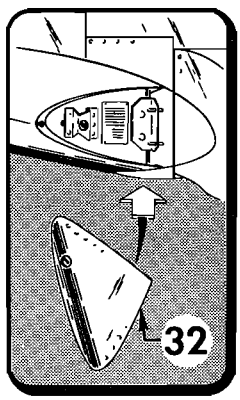
21-29 At front spar, connect electrical plug, air pressure line, fuel lines, aileron control push-pull rod, emergency jettison control cable, and hydraulic lines; in right wing only, connect pitot and static lines.

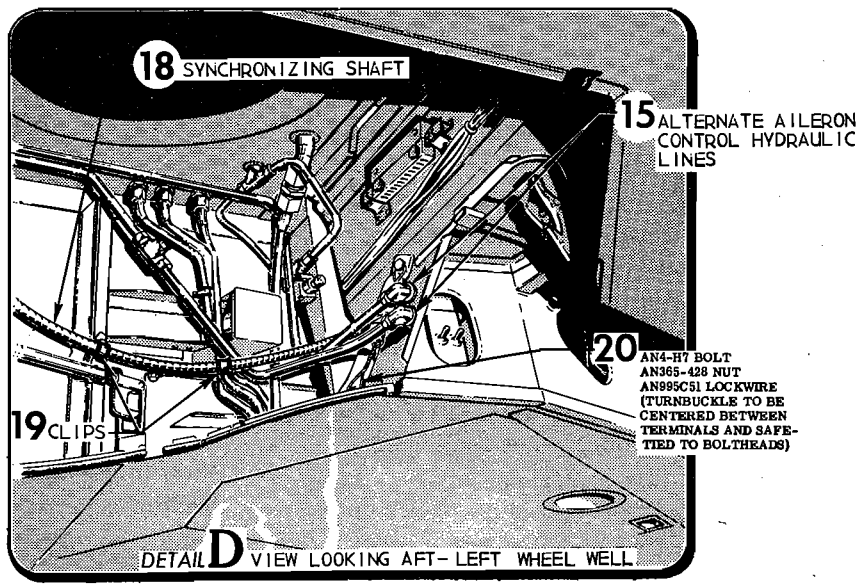
30 Seal aft, outboard, and forward edge of attaching bolt cover with sealing compound (Specification MIL-S-7502) and apply a thin coat of petrolatum to the mating surface; then install cover.

31 Install center section fairing. (Refer to index for page number of applicable procedure.)

32 Install wing-to-fuselage corner fillet on airplanes having extended wing leading edge.







F-66F-2-10-1A

Figure 2-1. Installing Outer Wing Panel (Sheet 2 of 2)

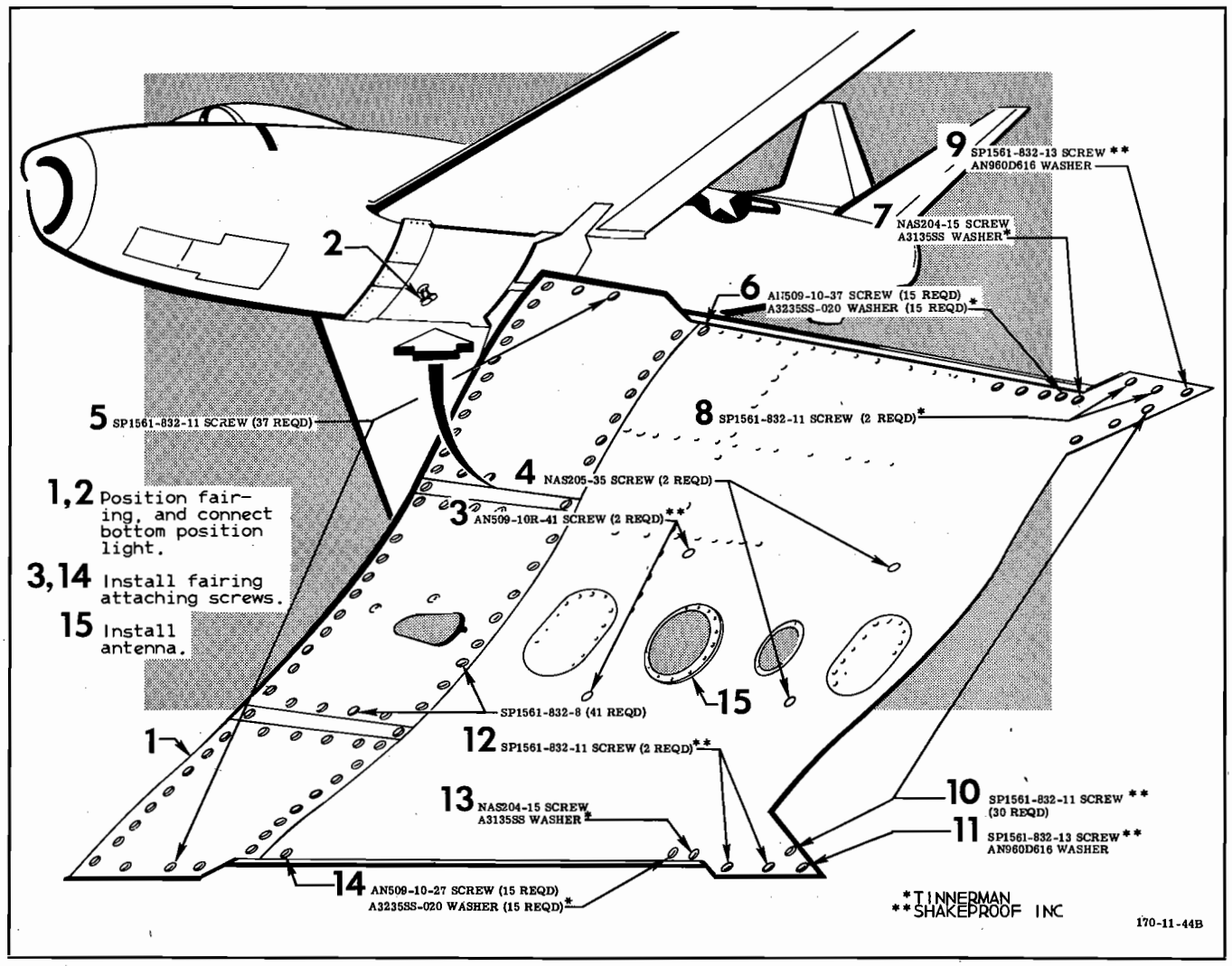


Figure 2-2. Installing Wing Center Section Fairing

procedure are identified in figure 2-4. Remove the wing leading edge as follows:

a. On right wing only, remove pitot-static boom. (Refer to paragraph 6-135.)

b. Disconnect drop tank fuel and air pressure lines at inboard end of wing outer panel leading edge.

c. Disconnect and remove fuel and pressure drain lines at inboard end of leading edge.

d. Disconnect electrical wiring at inboard end of wing outer panel leading edge.

e. Disconnect remote compass transmitter wiring at inboard end of left wing outer panel leading edge.

eA. Disconnect jettison control cable.

f. Support wing outer panel leading edge section at four points. Remove plates covering ends of hinge pins; then remove hinge pins. Use a T307 hinge pin driver and extractor tool to remove hinge pins. (See figure 2-3.) Remove leading edge by lowering it ½ inch, then moving it forward. The wing leading edge weighs approximately 140 pounds.

CAUTION

Leading edge must not be rotated about either upper or lower hinges.

2-19. INSTALLING OUTER PANEL LEADING EDGE AND WING TIP. See figure 2-4.

2-20. AILERONS.

2-21. The all-metal, statically and aerodynamically balanced ailerons are attached to the wing outer panels by three hinges each. A fabric seal is installed between the leading edge of the aileron and the aft spar of the wing outer panel to increase the aileron effectiveness. The ailerons are controlled hydraulically with cable-controlled valves.

2-22. REMOVING AILERONS. The parts and components referred to in the following procedure are

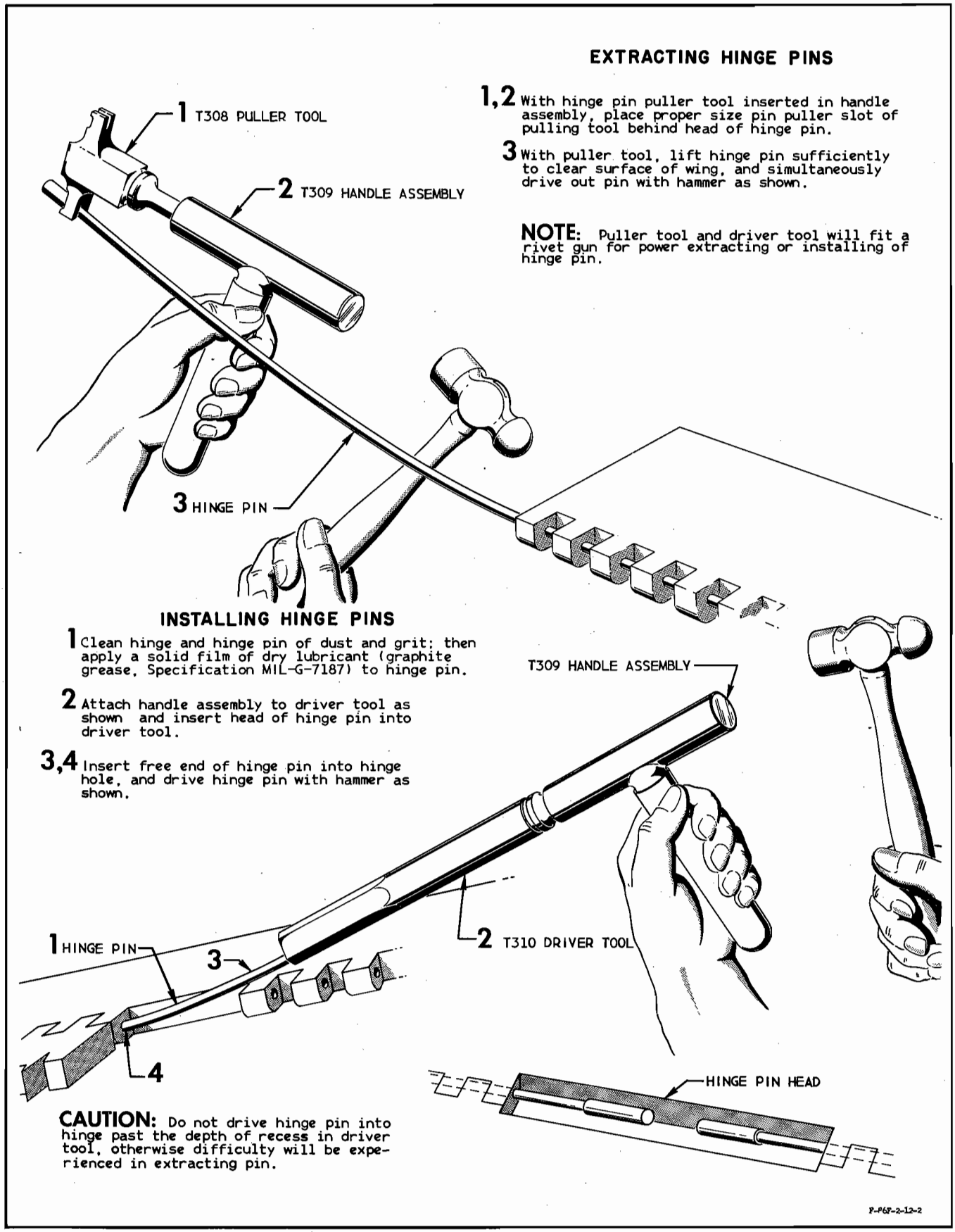
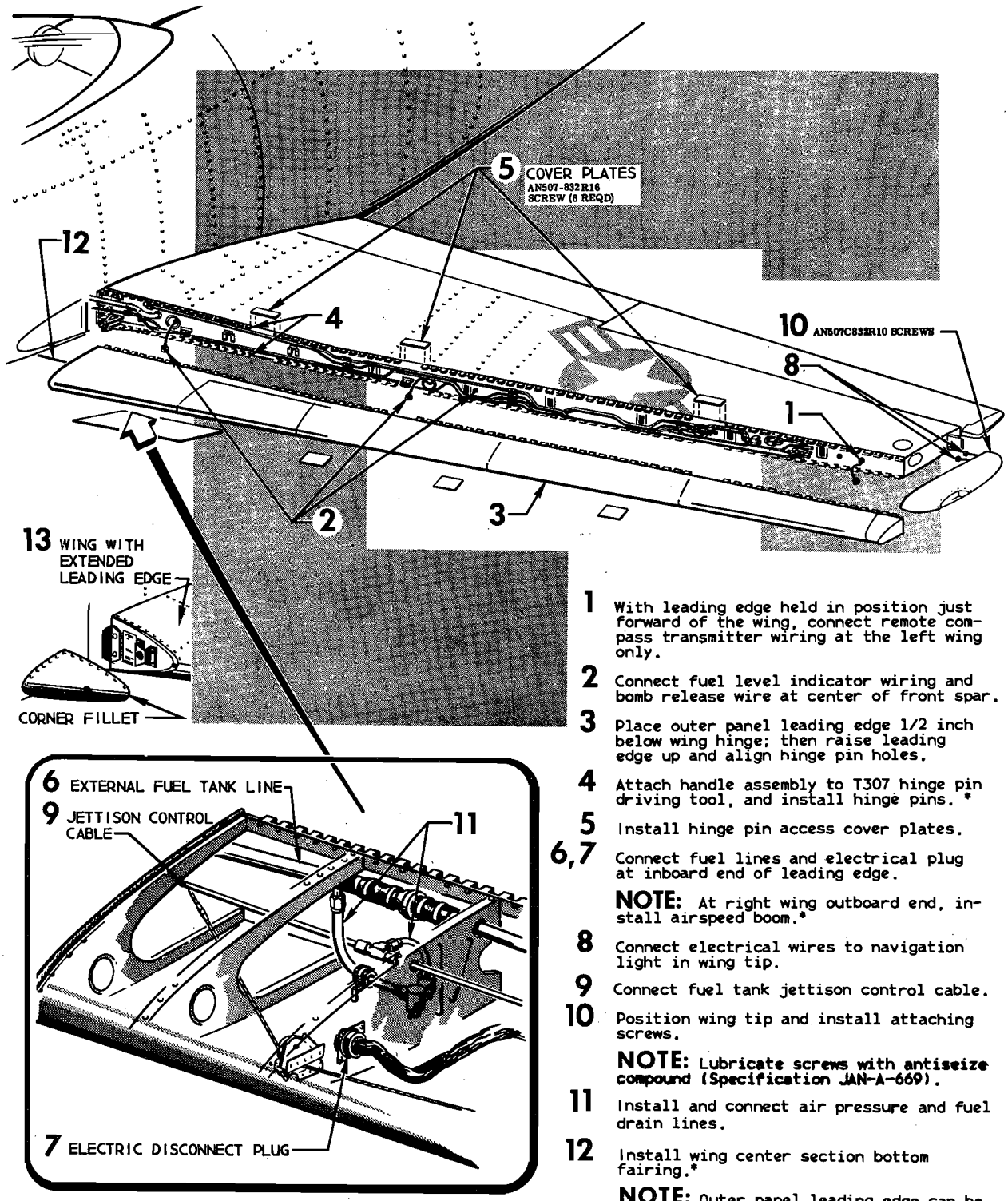


Figure 2-3. Installing and Extracting Hinge Pin



1 With leading edge held in position just forward of the wing, connect remote compass transmitter wiring at the left wing only.

2 Connect fuel level indicator wiring and bomb release wire at center of front spar.

3 Place outer panel leading edge 1/2 inch below wing hinge; then raise leading edge up and align hinge pin holes.

4 Attach handle assembly to T307 hinge pin driving tool, and install hinge pins. *

5 Install hinge pin access cover plates.

6,7 Connect fuel lines and electrical plug at inboard end of leading edge.

NOTE: At right wing outboard end, install airspeed boom.*

8 Connect electrical wires to navigation light in wing tip.

9 Connect fuel tank jettison control cable.

10 Position wing tip and install attaching screws.

NOTE: Lubricate screws with antiseize compound (Specification JAN-A-669).

11 Install and connect air pressure and fuel drain lines.

12 Install wing center section bottom fairing.*

NOTE: Outer panel leading edge can be installed with or without wing slats installed, but must contain slat tracks.

13 On airplanes with extended leading edge, install wing to fuselage corner fillet.

*Refer to index for page number of applicable procedure.

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Figure 2-4. Installing Wing Outer Panel Leading Edge and Wing Tip

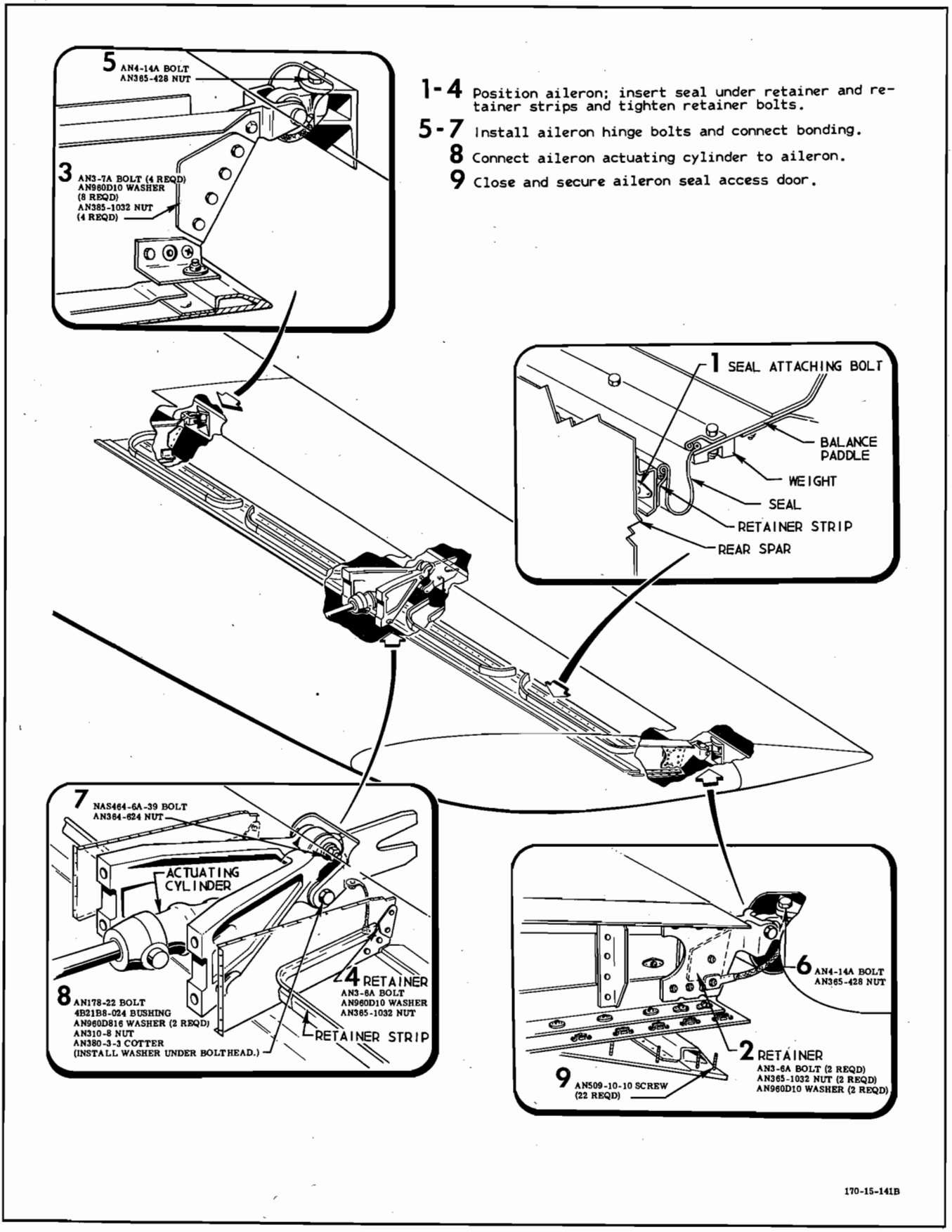


Figure 2-5. Installing Aileron

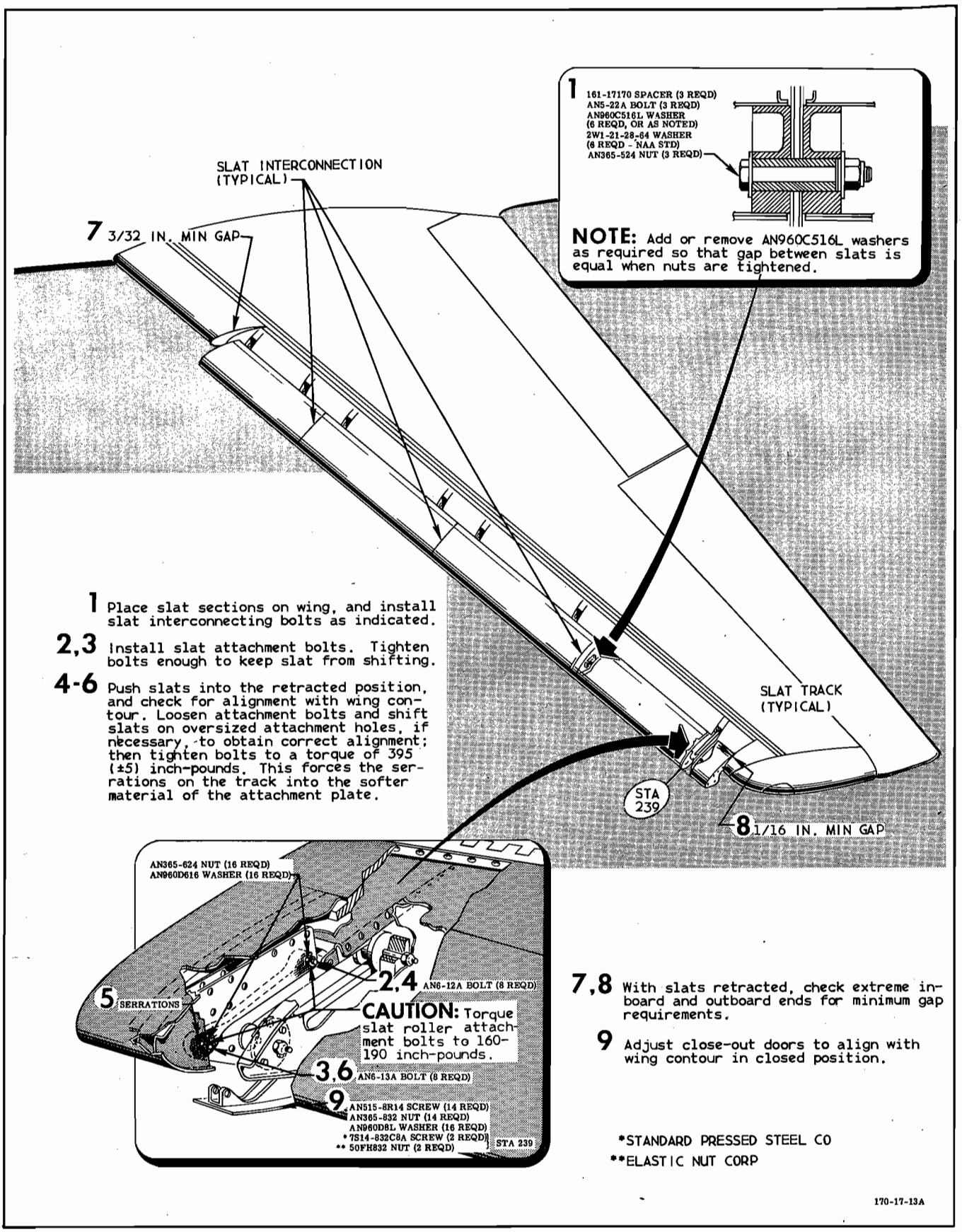


Figure 2-6. Installing and Adjusting Wing Slats—F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13340, and F-86F-30 Airplanes AF52-4305 Through -4504

shown in figure 2-5. The ailerons can be removed without disturbing the adjustment of the aileron control system. Remove the ailerons as follows:

a. Open aileron seal access door on bottom surface of wing, forward of leading edge.

b. Loosen aileron seal retainer bolts on rear spar of wing outer panel sufficiently to detach seal from seal retainer.

c. Disconnect aileron actuator at center hinge.

d. Disconnect aileron hinge bolts and remove aileron. Aileron weighs approximately 65 pounds.

2-23. INSTALLING AILERONS. See figure 2-5.

2-24. WING SLATS.

2-25. Four leading edge wing slats are installed on each outer wing panel on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4504. (See figure 2-6.) The slats are designed to extend and retract automatically depending upon aerodynamic forces. A bolt and spacer through a fitting at the ends of each slat connect the slats together.

2-26. REMOVING WING SLATS. The parts and components referred to in the following procedure are shown in figure 2-6. Remove the wing slats as follows:

a. Remove slat interconnecting bolts and spacers at end of each slat.

b. Remove attachment bolts that secure slats to slat tracks. Remove slat as respective attachment bolts are removed. The slat sections weigh approximately 22 pounds each.

2-27. INSTALLING AND ADJUSTING WING SLATS. See figure 2-6.

2-28. WING FLAP SYSTEM.

2-29. The wing flap system (figure 2-7) consists essentially of all-metal, slotted-type wing flaps; electric actuators; and an electric control circuit. The flaps are attached to the wing outer panel and extend spanwise from the fuselage to the aileron. A track and rollers near each end of the flap provide means of attachment and permit aft movement of the flaps during lowering. An electrically reversible actuator is attached to the center of each flap panel. The two actuators are mechanically interconnected by a flexible shaft to synchronize flap travel. The flap control handle is located adjacent to the engine power control handle on the pilot's left console. On F-86F-1 through F-86F-15 Airplanes, the four flap control switches are clustered about a cam and pulley in the floor of the radio compartment. (See figure 2-8.) They are controlled by cables between the control handle and the pulley. On F-86F-20 and subsequent airplanes (figure 2-9), the flap control switches are located on the throttle quadrant and are actuated by direct contact with the flap control handle.

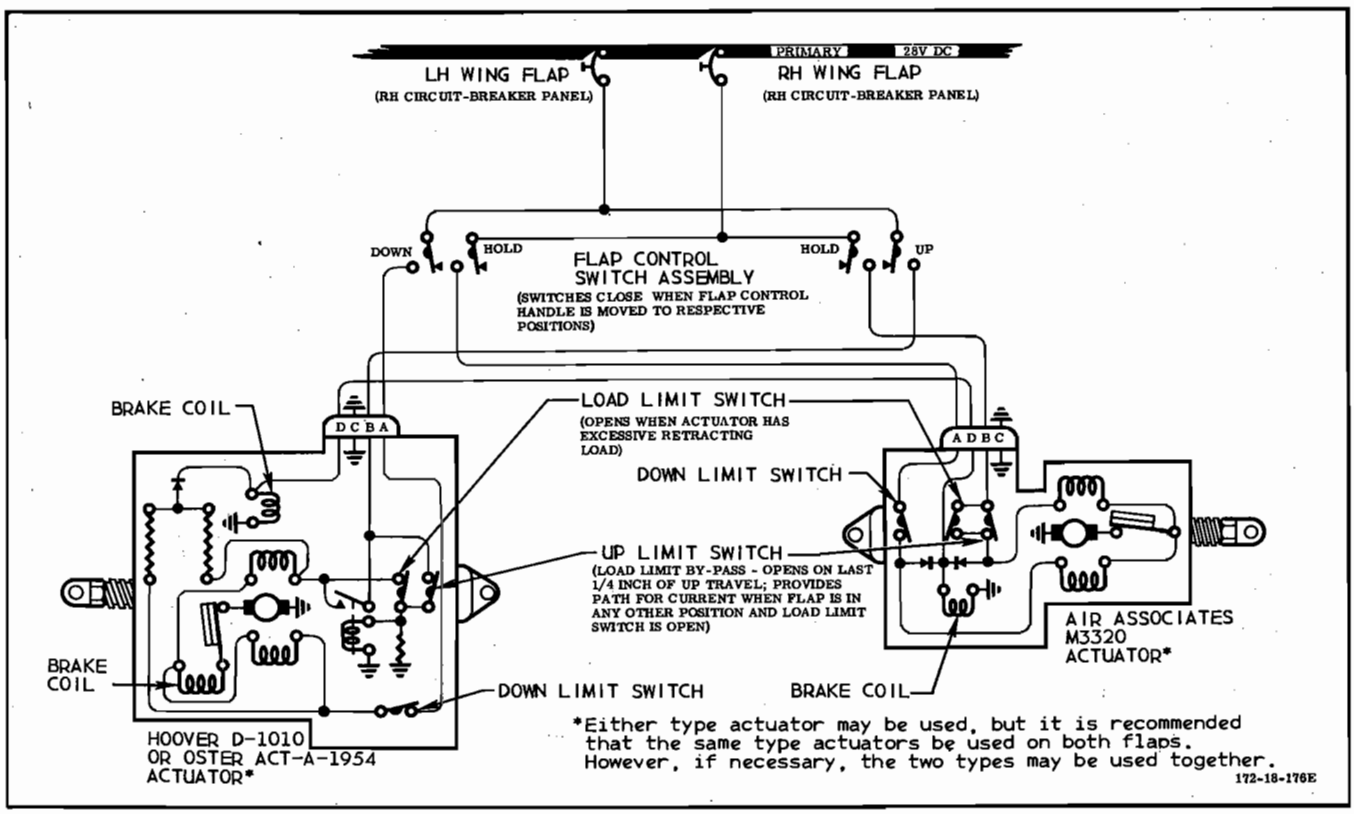


Figure 2-7. Wing Flap Control System

2-30. FUNCTION OF WING FLAP SYSTEM.

2-31. Movement of the flap control handle from "HOLD" to "DOWN" closes the extend switches, and power from the primary bus energizes the extend field of each actuator. (See figure 2-7.) The actuators extend, lowering the flaps. When the flaps reach the full down position of 38 (±1) degrees, the down limit switch in each actuator breaks the extend field winding circuit, stopping the actuator. Moving the flap control handle to "UP" closes the retract switches, energizing the retract field of each actuator. The actuator retracts, raising the flaps. When the actuator reaches ¼ inch from full retracted position, the load limit switch opens. As the flaps reach the mechanical up-stops, a tension load builds up, opening the load limit switch. This causes the actuator to stop, leaving the flaps in a preloaded streamlined position. Flap operating time for ground operation with no load, up or down, is from 7 to 11 seconds.

2-32. TROUBLE SHOOTING WING FLAP SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Flaps not synchronized.	Synchronizing shaft improperly connected or broken.	Adjust synchronizing shaft or replace shaft.
Flaps inoperative.	Open circuits to one or both actuators.	Check circuit breakers. Check wiring for breaks or disconnections.

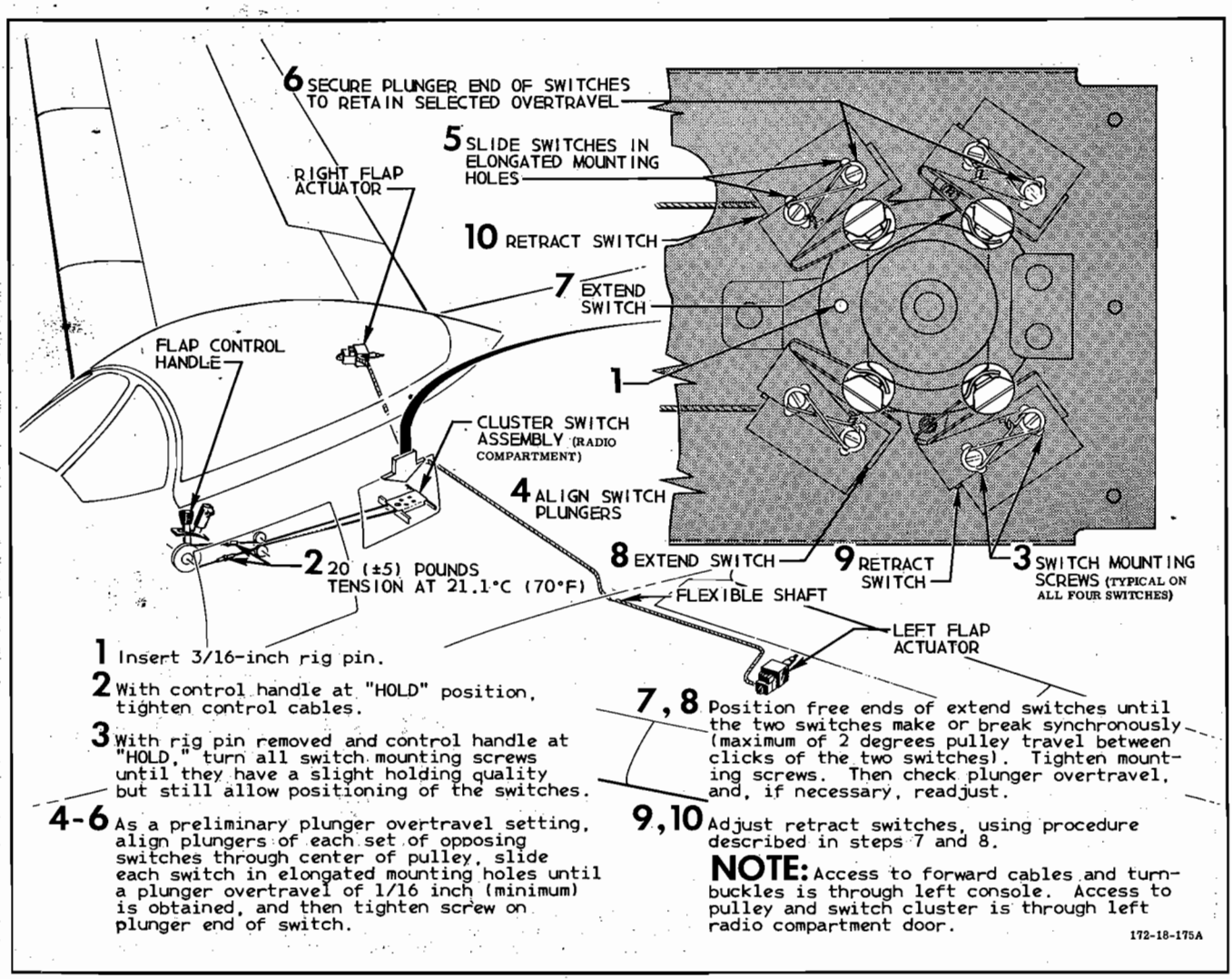


Figure 2-8. Adjusting Wing Flap System Control Switches—F-86F-1 Through F-86F-15, and F-86F-20 Airplanes AF51-13070 Through -13109

TROUBLE	PROBABLE CAUSE	REMEDY
Flaps inoperative when one circuit breaker is opened.	Open circuit in "D" lead between actuators.	
Full down travel unobtainable.	Down limit switch improperly adjusted.	Adjust.
Flaps do not operate at full speed.	One actuator inoperative. One circuit breaker open.	Replace actuator.

TROUBLE	PROBABLE CAUSE	REMEDY
Flaps not preloaded against up-stops.	Actuator end fitting improperly adjusted. Flap improperly adjusted. Actuators not synchronized.	 Adjust flap tracks. Adjust synchronizing shaft.
Actuator (Air Associates) operates but output shaft does not rotate.	Faulty slip clutch. Internal shaft broken.	Replace actuator, or readjust clutch.
Actuator does not operate.	Electrical power not available at unit. Open circuit in actuator.	Check power supply and circuit breakers. Replace actuator.
Actuator operates in only one direction or not to full travel of screw jack.	Open circuit in one of the field windings. Faulty limit switch. Faulty limit switch adjustment.	Replace actuator. Replace switch.

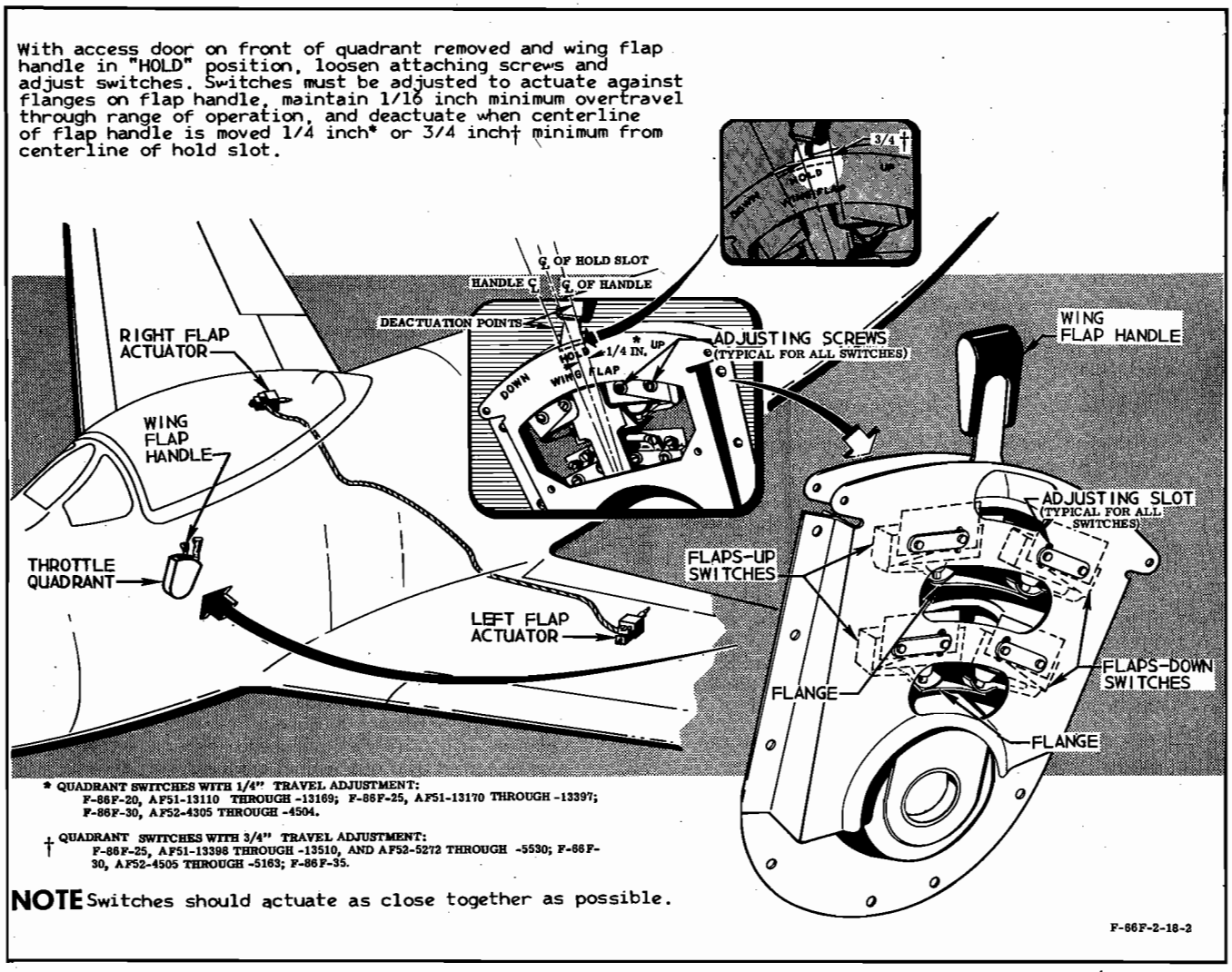
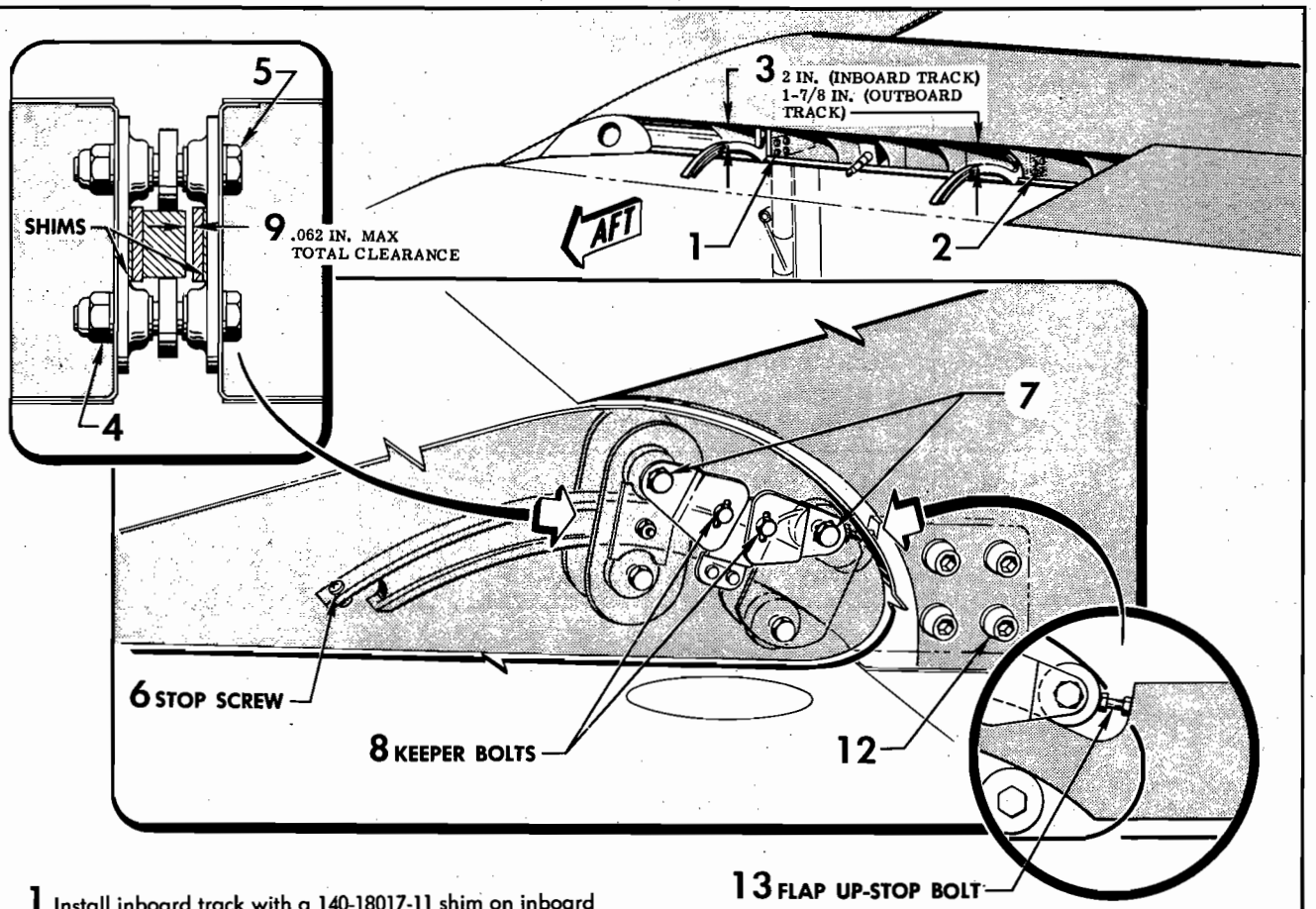


Figure 2-9. Adjusting Wing Flap System Control Switches—F-86F-20 Airplanes AF51-13110 Through -13169, and F-86F-25 Through F-86F-35 Airplanes



1 Install inboard track with a 140-18017-11 shim on inboard side and a 140-18017-9 shim on outboard side. Initially tighten bolts to 275-325 inch-pounds.

2 Install outboard track with two shims (one 140-18017-11 and one 140-18017-7) on inboard side and one 140-18017-9 shim on outboard side. Initially tighten bolts to 275-325 inch-pounds.

3 Set tracks, aft as far as possible and in positions shown.

4 With flap off tracks, check bolts through lower rollers for 160 to 190 inch-pounds torque.

5 Tighten eccentric bolts through upper rollers to 160-190 inch-pounds torque, with rollers set at maximum opening.

6 Place flap on tracks, and install stop screws at aft end of tracks to prevent accidental dropping of flap.

7 Rotate upper roller eccentric bolts in clockwise direction until a .005-inch feeler gage cannot be rolled between track and respective roller. After adjusting each upper roller, move flap to be sure roller is not tight enough at any point of travel to bind on track.

8 After rollers are adjusted, install keepers and tighten keeper bolts.

9 Adjust rub strips at outboard track with shims, if necessary to prevent binding of rub strips on tracks. If rub strips bind on inboard track as flap is moved to the up position and adjusting rub strips at outboard track will not relieve this condition, the 1/16 x 1/16-inch chamfer on rub strip at inboard track may be extended by filing to provide clearance, chamfer not to exceed 1/16 x 3/8 inch. With one rub strip contacting outboard track, clearance between opposite rub strip and track should not exceed .062 inch.

10,11 With flap up-stop bolts screwed in as far as possible, raise flap to up position and check for alignment and for specified clearances. With trailing edge of flap in up position, upper surface of flap leading edge should not deflect wing trailing edge and maximum clearance should not exceed 1/16 inch.

12 Loosen track bolts and shift tracks as necessary to gain correct alignment, taking care that no more than 275 to 325 inch-pounds of torque is applied to bolts during this "cut and try" procedure. Determine that there is no racking or binding of flaps on tracks when flap is moved full up and down; then tighten track attachment bolts to 1100 inch-pounds.

NOTE: Each time flap tracks are adjusted, the plates on each side of tracks must have a fresh surface for the serrations on the flap track to bite into. Therefore, a plate may be turned over and re-used one time only, once it has been torqued to the 1100-inch-pound final value.

13 Adjust up-stop bolts to stop flap at full up position ± 1/8 inch as determined by contour fixture. Check that track rollers bear on both stops with equal pressure, by placing pieces of masking tape on head of each bolt and then manually raising flap.

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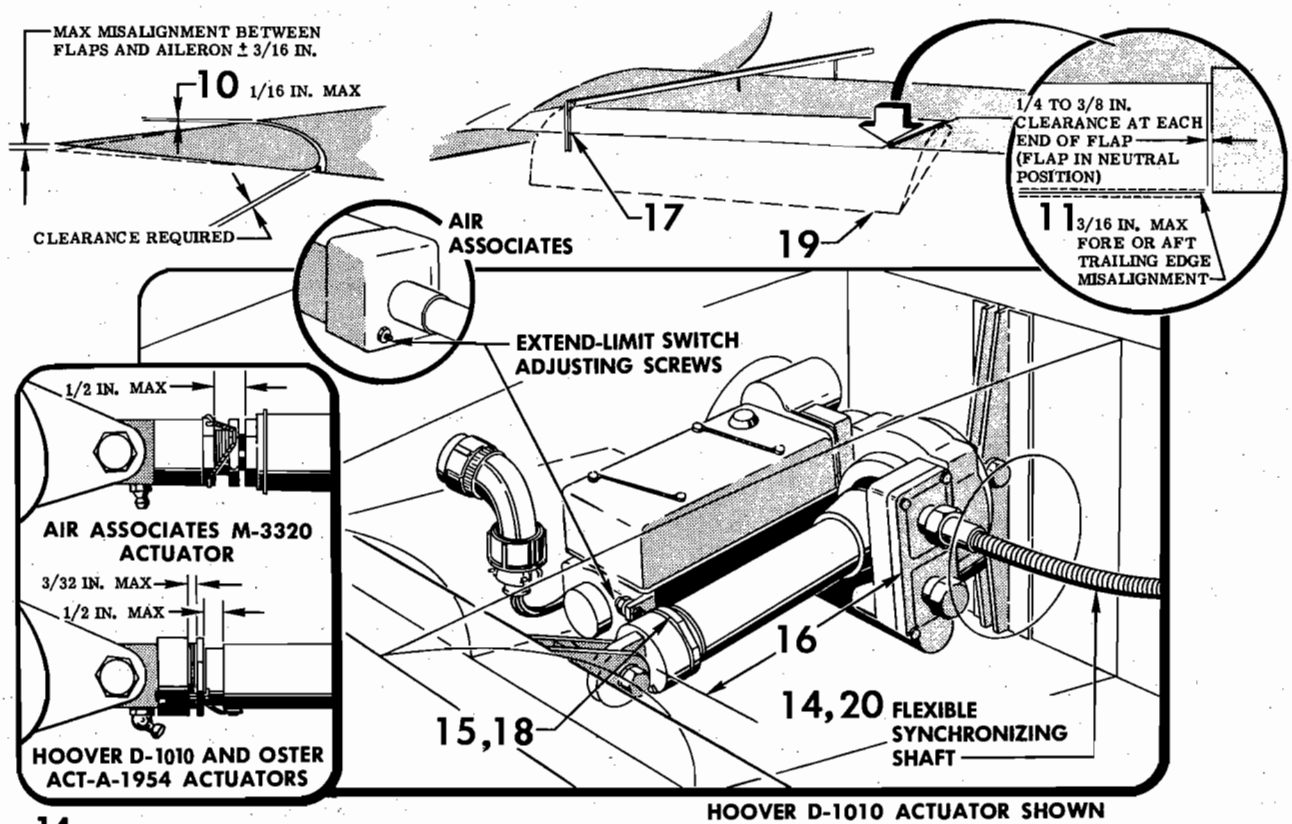
Figure 2-10. Installing and Adjusting Wing Flaps (Sheet 1 of 2)



HOOVER D-1010 ACTUATOR SHOWN

14 Make sure that synchronizing shaft is disconnected at some point between the two actuators; also, that the circuit breaker to the flap opposite the one being adjusted is disconnected. Manually bottom screw jack in retracted position.

15 With actuator firmly bottomed, adjust end fitting until a bolt can just be inserted through end fitting and flap clevis, when flap is held up against up-stops. Remove bolt and shorten end fitting approximately 3/32 inch. On Hoover and Oster actuators, line up keyways and install key.

16 Measure distance of end fitting from some fixed point on actuator housing for future reference. This dimension represents a fully bottomed condition.

17 Extend actuator until it can be connected to flap. Retract flap until actuator stops running. Check that trailing edge of flap is within ⅛ inch of theoretical trailing edge full up position as determined by contour fixture. Readjust track up-stop bolts if necessary.

18 Check to make sure that actuator is not bottomed when flap is full up. This can be determined by checking the screw-jack length against the length measured in the fully bottomed condition. If it has bottomed, disconnect end fitting from flap, manually retract actuator until it bottoms, and then adjust end fitting to shorten screw jack 1/16 inch. Measure new bottomed length of screw jack; then repeat steps 17 and 18. With flap retracted against up-stops, measured length of screw jack should equal bottomed length of screw jack plus 1/16 inch minimum, 3/32 inch maximum.

19 Energize flap to full down position, using momentary pulses in order to minimize impact shock should mechanical stop be engaged, and check down travel. The full down position is 38 (± 1) degrees from full up, or the position at which the actuator is within one-half turn from bottoming, whichever is the least. If necessary, adjust actuator extend-limit switch to maintain one-half turn, and reseal.

CAUTION: On the Air Associates actuator, the nut on the extend-limit switch adjusting screw is not intended to be used as a jam nut. Its purpose is to seal the opening between the screw and case. When adjusting extend-limit switch, back off nut one turn while holding screw; then make necessary adjustment with screw while allowing nut to rotate with screw. Then tighten one turn *only* with wrench and reseal with suitable compound.

Accomplish steps 1 through 19 on opposite flap. If down position of the two flaps differs by more than one degree, readjust extend-limit switch to decrease travel of most fully extended flap to within ± ½ degree of shorter-travel flap.

20 Electrically actuate both flaps to full up position and connect synchronizing flexible shaft. Do not overtighten retaining nuts on flexible shaft. Excessive tightening can break the nut.

NOTE: The Hoover and Oster actuators have both a clockwise and a counterclockwise rotating flap drive shaft. When any combination of Hoover and/or Oster units is used, the flex shafts must be connected to the upper fittings of both actuators or to the lower fittings of both actuators. When one Air Associates actuator is used with one of the alternates, the rotation of the Air Associates shaft will govern. No selection of shafts, couplings, etc, is necessary when Air Associates actuators are used together.

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Figure 2-10. Installing and Adjusting Wing Flaps (Sheet 2 of 2)

2-33. ADJUSTING WING FLAP SYSTEM CONTROL SWITCHES.

2-34. See figure 2-8 or 2-9.

2-35. CHECKING WING FLAP SYSTEM.

2-36. Proper functioning of wing flap system can be verified as follows:

a. With flaps in full up position, disengage synchronizing shaft at wheel well coupling. Close right flap circuit breaker and open left circuit breaker. Position control handle to check for full travel of right flap from full up position to 38 (±1) degrees down (verified with a protractor). Return flap to full up to verify proper operation of actuator and preloading of flap against up-stop.

b. Open right circuit breaker and close left circuit breaker. Position control handle, as in step a., to check proper operation of left actuator. If both actuators operate properly, proceed with step c.

c. Make sure both actuators are in full up position. Connect synchronizing shaft and, with right flap circuit breaker open, operate flaps with left actuator. Then open left flap circuit breaker, close right flap circuit breaker, and operate flaps through right actuator. If flaps are moved satisfactorily in each direction by each actuator, it may be assumed that all parts are functioning properly.

d. If, in step c., one of the actuators moves the flaps in one direction but fails in the other direction, a failure has occurred which may be in either actuator. To determine which actuator is faulty, disconnect synchronizing shaft at center of airplane, close both circuit breakers, and operate actuators in either direction. Observe each actuator and follow steps e. through g. to determine where trouble is located.

e. If one actuator fails in one direction only and the other actuator operates normally, the cause can be one of the following: faulty or maladjusted control switch, faulty supply wire in one direction, or defective rectifier (paragraph 2-38) in either actuator.

f. If one actuator will not operate in either direction and the other actuator operates normally, the cause can be one of the following: circuit breaker open, faulty wiring, or defective rectifier (paragraph 2-38) in either actuator. Isolate the defective rectifier by individual operaton with the synchronizing shaft still disconnected.

g. If neither actuator will operate, but one moves slightly, winding the synchronizing shaft, the trouble is caused by one of the following: locked motor brake on the inoperative actuator (checked by brake coil voltage test, paragraph 2-40); jammed screw jack on inoperative actuator (checked by disconnecting actuator from flap and manually turning screw jack one full stroke); or no continuity in pin D connecting wire.

2-37. CHECKING WING FLAP SYSTEM ACTUATOR RECTIFIER.

2-38. To check actuator rectifier, disconnect electrical power (by pulling circuit breaker) and connect an ohmmeter to pin D terminal in wheel well (positive lead to pin D terminal, negative lead to structure). If all wiring is connected, resistance should be from 25 to 40 ohms. When only one actuator is checked with electrical connector disconnected, resistance should be from 65 to 80 ohms. If system checks too low, disconnect pin D lead at wheel well and check each lead individually. A low resistance indicates a bad rectifier or faulty wiring.

2-39. CHECKING WING FLAP SYSTEM ACTUATOR BRAKE COIL VOLTAGE.

2-40. When system is operating normally on both actuators, voltage on pin D should be approximately 2 volts less than supply voltage. When system is operating on only one actuator, brake coil voltage should be approximately 4 volts less than supply voltage. A voltage lower than this indicates either faulty wiring, defective brake coil, or a faulty rectifier. Any of these conditions would overload rectifier system, causing excessive voltage drop.

2-41. WING FLAP SYSTEM ACTUATORS.

2-42. The electrically controlled wing flap actuators (Air Associates M3320, Hoover D-1010, or Oster ACT-A-1954) are mechanically interconnected by a flexible shaft to synchronize flap travel. Each actuator is capable of driving the opposite flap through the synchronizing shaft, as well as the flap to which it is attached. Electrical or mechanical failure in one of the actuators (resulting in a "frozen" actuator) renders both actuators immobile. Each flap actuator contains a down limit switch, an up limit switch, and a load limit switch. The down limit switch stops downward movement of the flaps when they reach 38 (±1) degrees. The up limit switch remains closed through all flap operation except the last ¼ inch of actuator travel. This switch provides a current by-pass if sudden air loads open the load limit switch during flap operation. The relay in the Hoover actuator is wired so that it will remain energized until the by-pass switch and the load limit switches are open, at which time the actuator stops.

2-43. REMOVING WING FLAPS.

2-44. The parts and components referred to in the following procedure are identified in figure 2-10. Remove the individual flap panels as follows:

Note

If the same flap is reinstalled, the original adjustment of the wing flap system may be left intact if the setting of the tracks, arrangement of track shims, actuator adjustments, and end fitting position are not disturbed.

a. With flaps partially lowered, disconnect actuator at flap, being careful not to rotate actuator end fitting.

Note

If removing left flap, disconnect hydraulic drain tube at flap.

b. With flap supported, remove roller stop screw at end of each respective track; then guide flap off track. Each flap panel weighs approximately 30 pounds.

2-45. INSTALLING AND ADJUSTING WING FLAPS.

2-46. See figure 2-10.

2-47. EMPENNAGE.

2-48. The empennage comprises the vertical stabilizer, rudder, horizontal stabilizer, and two elevators. The 35-degree swept-back vertical stabilizer is of all-metal construction, with the exception of part of the tip, which is plastic. The metal part of the tip is a combination uhf-vhf antenna. The rudder is statically and dynamically balanced and is controlled by a conventional cable system. It incorporates an all-metal, controllable trim tab at the trailing edge. The horizontal stabilizer consists of a left and a right half, permanently interconnected by two crossbeams. It has a 35-degree sweepback, and a 10-degree dihedral, and is actuated hydraulically to provide longitudinal control of the airplane. The elevators are statically and dynamically balanced and are controlled by a linkage arrangement from the horizontal stabilizer. They depend upon the movement of the hydraulically operated horizontal stabilizer for motive power. The linkage mechanism for actuating the elevators is attached to the stabilizer rear crossbeams. The elevators can be removed or installed without disturbing the adjustment of the elevator system. Fairings are used to streamline the vertical and horizontal stabilizers with the fuselage.

2-49. REMOVING VERTICAL STABILIZER.

2-50. The parts and components referred to in the following procedure are identified in figure 2-11. Remove the vertical stabilizer as follows:

Note

It is not necessary to remove the rudder when removing vertical stabilizer; however, if the rudder is to be removed subsequently, it would facilitate removal of vertical stabilizer to remove rudder first.

a. Exhaust hydraulic system. (Refer to paragraphs 1-71 and 1-73.)

b. Remove fuselage rear section. (Refer to paragraph 2-149.)

c. Remove fairings from base of vertical stabilizer.

d. Uncouple antenna cable connector plug at leading edge of vertical stabilizer.

e. Disconnect rudder trim tab wiring clips at rudder quadrant and deck (left side).

f. Disconnect electrical wiring at rudder quadrant for rudder trim actuator and at navigation light.

g. On F-86F-15 and subsequent airplanes, disconnect electrical wiring at horizontal stabilizer trim bungee actuator.

h. Disconnect and remove hydraulic lines that run through front and rear spar fittings of vertical stabilizer.

i. Remove bolts that attach fairing formers and dust shields to vertical stabilizer.

j. Disconnect rudder control cables at rudder quadrant, and unstring cables from pulleys in vertical stabilizer.

k. Disconnect horizontal stabilizer control valve control cables at quadrant, and unstring cables from front spar of vertical stabilizer.

l. Remove bolt that connects top of horizontal stabilizer actuator to aft spar of vertical stabilizer.

m. Remove rudder. (Refer to paragraph 2-54.)

n. Remove the four bolts that attach vertical stabilizer spars to fuselage deck.

o. Remove stabilizer by raising and guiding snubber out of horizontal stabilizer front crossbeam. Stabilizer weighs approximately 100 pounds.

2-51. INSTALLING VERTICAL STABILIZER.

2-52. See figure 2-11.

2-53. REMOVING RUDDER.

2-54. The parts and components referred to in the following procedure are identified in figure 2-11. Remove rudder as follows:

a. Disconnect electrical plug at bottom of torque tube.

b. Remove the two bolts that hold torque tube to quadrant.

c. Remove hinge bracket bolts at upper and lower rudder hinges, and remove rudder. Rudder weighs approximately 45 pounds.

2-55. REMOVING RUDDER TRIM TAB.

2-56. The parts and components referred to in the following procedure are identified in figure 2-11. Remove rudder trim tab as follows:

a. Remove bolt that connects actuator push-pull rod to trim tab horn.

b. Deflect trim tab to extreme right; then remove cotter pin that secures hinge pin.

c. Extract hinge pin; then remove trim tab.

2-57. INSTALLING RUDDER AND RUDDER TRIM TAB.

2-58. See figure 2-11.

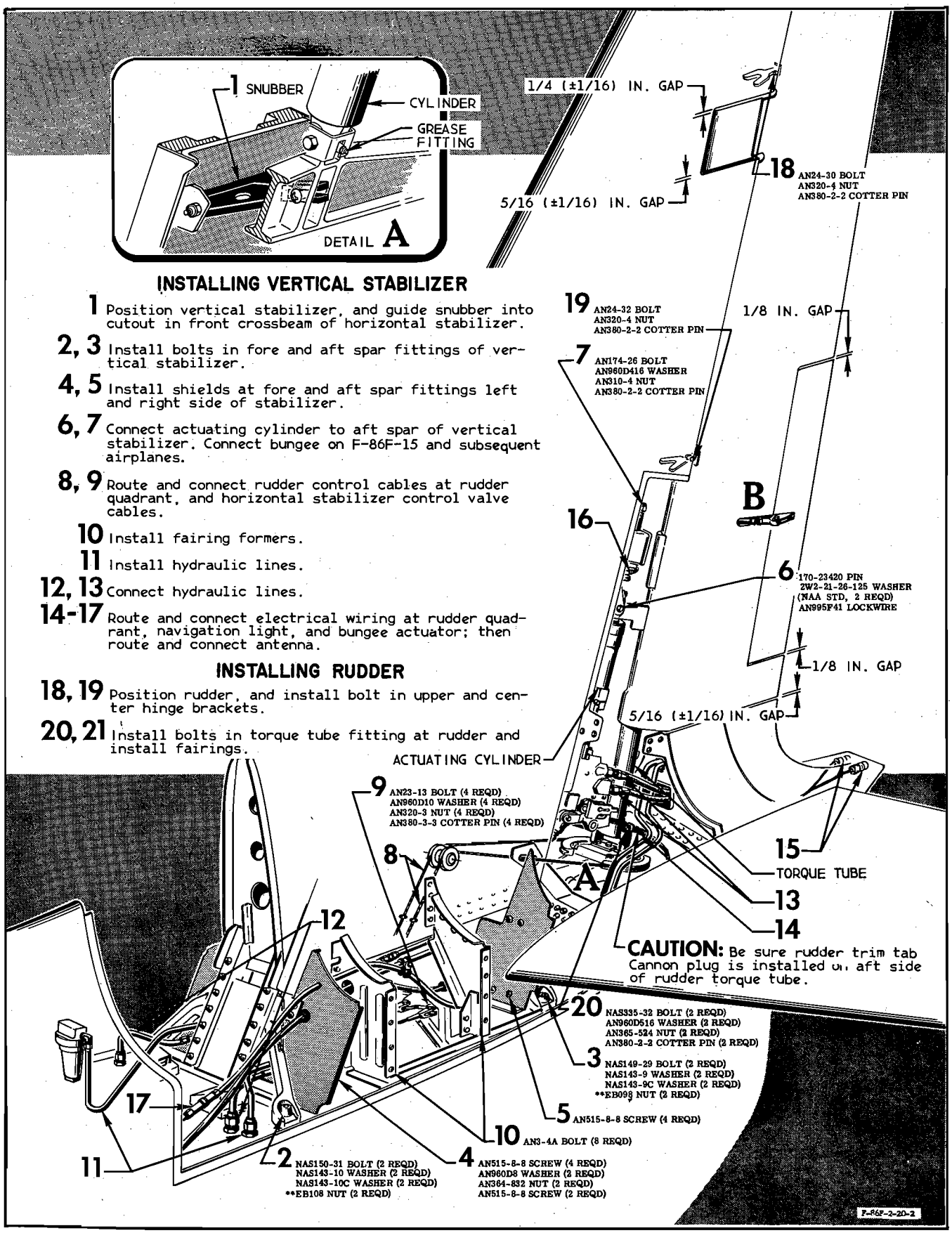

Figure 2-11. Installing Vertical Stabilizer, Rudder, and Rudder Trim Tab (Sheet 1 of 2)

2-59. REMOVING HORIZONTAL STABILIZER.

2-60. The parts and components referred to in the following procedure are identified in figure 2-12. Remove horizontal stabilizer as follows:

Note

Horizontal stabilizer can be removed with or without elevators installed.

a. Exhaust hydraulic system. (Refer to paragraphs 1-71 and 1-73.)

b. Remove all empennage fairings.

c. Remove rudder. (Refer to paragraph 2-54.)

d. Disconnect electrical wiring and attaching clips at aft fairing former.

e. Disconnect and cap hydraulic lines at connections forward of rear crossbeam.

f. Disconnect and cap hydraulic flex lines at actuating cylinder control valve.

g. Disconnect aft fairing former at fuselage deck and remove former.

h. Remove bolt at bottom of actuator valve linkage.

i. Disconnect and remove horizontal stabilizer actuating cylinder assembly.

Note

If same horizontal stabilizer is being reinstalled, it is not necessary to perform foregoing steps f. and i., but actuator must be disconnected at top only and removed as a unit with horizontal stabilizer.

j. With horizontal stabilizer supported, remove rotation bolts at aft crossbeam attaching brackets.

k. Lift horizontal stabilizer and simultaneously guide snubber out of cutout in front of crossbeam. The horizontal stabilizer weighs approximately 95 pounds.

2-61. INSTALLING HORIZONTAL STABILIZER.

2-62. See figure 2-12.

2-63. REMOVING ELEVATORS.

2-64. The parts and components referred to in the following procedure are identified in figure 2-12. Remove elevators as follows:

a. Remove bolt that attaches elevator horn to torque tube.

b. With elevator supported, remove elevator hinge fitting bolt at outboard hinge, then at inboard hinge.

c. Remove nut at inboard end of torque tube and remove respective elevator. Each elevator weighs approximately 25 pounds.

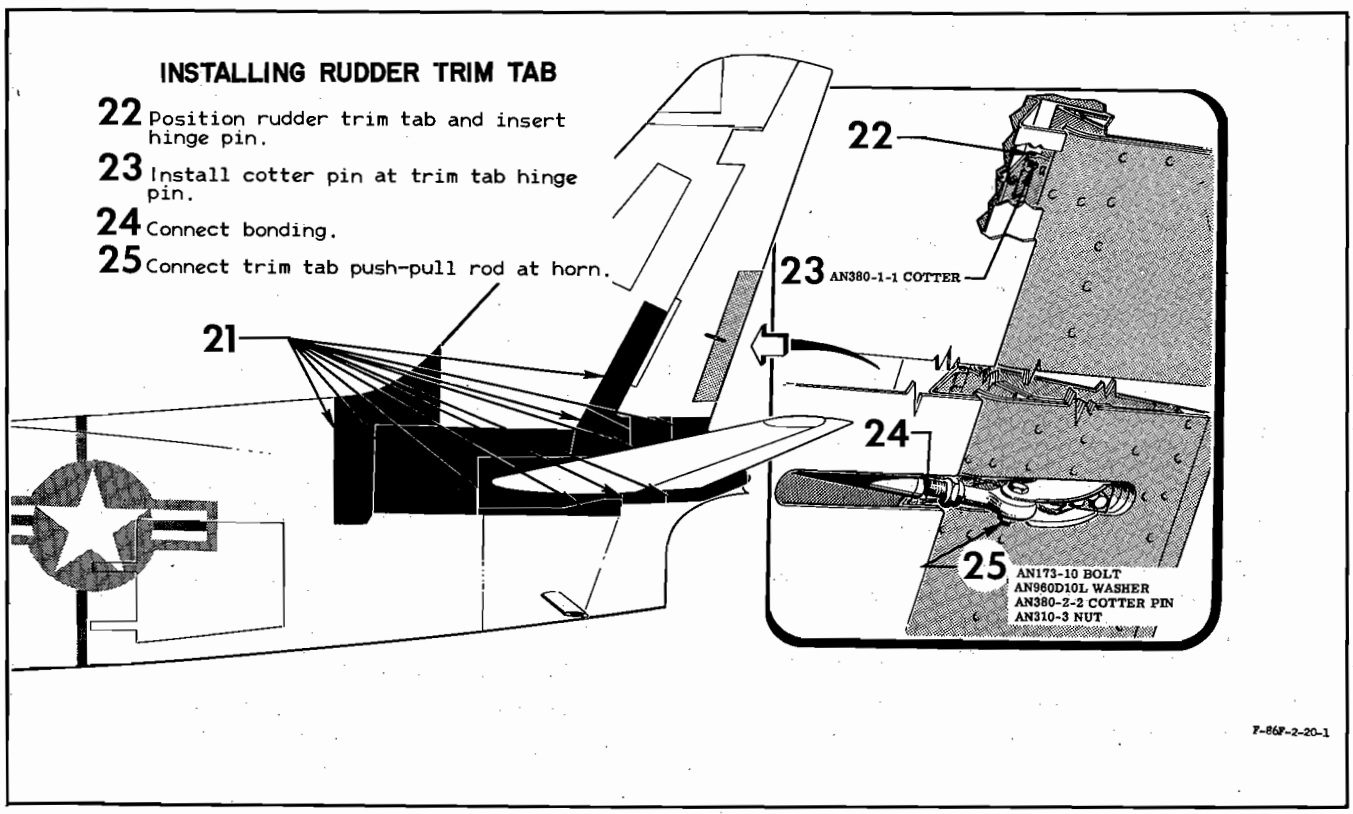

Figure 2-11. Installing Vertical Stabilizer, Rudder, and Rudder Trim Tab (Sheet 2 of 2)

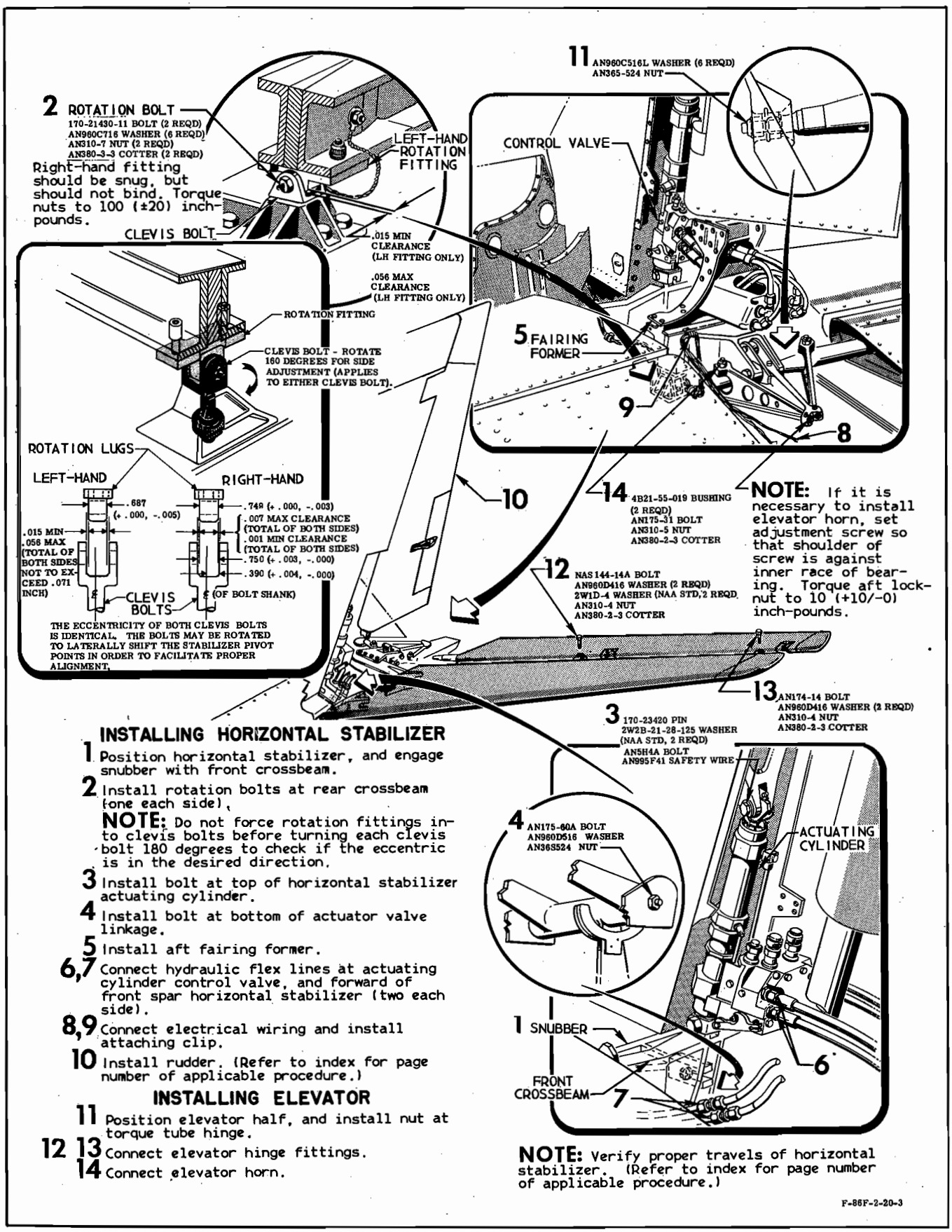

Figure 2-12. Installing Horizontal Stabilizer and Elevator

2-65. INSTALLING ELEVATORS.

2-66. See figure 2-12.

2-67. CHECKING ELEVATORS.

2-68. To ensure firm attachment of the elevators to the elevator control system, proceed as follows:

a. Stand in back of the airplane and face elevators. Grasp one elevator trailing edge with left hand and the other with right hand. Force one elevator up and the other down and then reverse the procedure. If any movement between elevators can be detected, the cause must be determined prior to further flight.

Note

If the movement results from an accumulation of inherent bearing-race tolerances of the top and bottom elevator horn to torque tube fitting bearings and does not exceed 1/16 inch (measured at the trailing edge of the elevators), the airplane can remain in service.

b. In all cases where movement is found to be the result of defective, worn, or loose parts, correct the condition prior to flight.

c. With stabilizer at neutral, free play at trailing edge of elevator should not exceed 3/32 inch.

2-69. SURFACE CONTROL SYSTEMS.

2-70. The surface controls consist of a conventional rudder system for directional control and a hydraulically operated horizontal stabilizer and aileron system for longitudinal and lateral control. The horizontal stabilizer consists of two sections. (Refer to paragraph 2-83.) Normal and alternate hydraulic power is provided for the actuation of the ailerons and horizontal stabilizer. (Refer to paragraph 2-97.) Movement of the control stick positions a dual control valve, which directs hydraulic pressure to the cylinder to move the surface. When control movement is stopped, a hydraulic lock is maintained in the cylinders. This lock prevents external forces from moving the control surfaces. Since the controls are irreversible, external forces on the surfaces are not transmitted to the pilot's control stick. For this reason, artificial feel is provided. Aileron and horizontal stabilizer system stick loads are simulated by bungees, which load the stick in proportion to surface deflection. An electrically actuated trim tab installed on the rudder provides directional trim. There are no trim tabs on the horizontal stabilizer or ailerons. To trim control stick forces in the aileron and horizontal stabilizer systems, the feel bungee no-load (neutral) position is changed to correspond to that of the control stick, removing the stick load. A rudder control lock is provided to mechanically lock the rudder in neutral. (Refer to paragraph 1-21.) The ailerons and horizontal stabilizer, being irreversible, do not require a mechanical lock.

WARNING

Serious injury can result from failure to exhaust system pressure. Before performing any maintenance on aileron or horizontal stabilizer control system, exhaust normal and alternate hydraulic accumulators. (Refer to paragraphs 1-71 and 1-73.)

2-71. TROUBLE SHOOTING SURFACE CONTROL SYSTEMS.

TROUBLE	PROBABLE CAUSE	REMEDY
Binding or rubbing control cables.	Pulley bracket out of line.	Check system. Straighten or replace pulley bracket.
	Insufficient lubrication.	
	Cables incorrectly routed.	
	Equipment interfering.	Adjust equipment to provide clearances.
	Cable off pulley.	Check system; replace pulley if worn. Check alignment of pulley. Check cable guards.
	Deficient or dry ball bearing.	Replace bearing.
Obstructed full movement.	Control surface or control stick stops incorrectly set. Interference from ice or other objects.	Adjust stops or rig power cylinders correctly into system. Check system and inspect openings between fixed and movable surfaces.
Rudder travel in excess of limits.	Control stops set incorrectly.	
Surface travel incorrect.	Actuating cylinder length incorrectly set.	

TROUBLE	PROBABLE CAUSE	REMEDY
Hydraulic power system "chatter."	Air in system. Faulty control valves. Relief valves functioning improperly or restricted with foreign matter.	Purge air from system.
Hydraulic power system pressure less than required.	Relief valves faulty. Pumps faulty. Pressure switches faulty (alternate system only).	
Surfaces do not move.	Cable off pulley. Insufficient lubrication. Deficient or dry ball bearing. Incorrect rigging. Equipment interfering. Icing conditions.	Check system and replace pulley if worn. Check alignment of pulley. Check cable guard. Replace or lubricate bearing.
Aileron, elevator, or rudder flutter.	Play in system. Incorrect rigging. Excessive play caused by worn or undersize bolts as surface. Worn bushings at surface.	Check and replace faulty unit. Replace undersize bolts.
Rudder trim tab flutter.	Worn hinges. Worn parts in actuator. Check for irregularities in airfoil forward of unit.	Replace tab. Replace worn parts or actuator.

2-72. SURFACE CONTROL RIGGING FIXTURE.

2-73. A locally fabricated fixture may be utilized during adjustment of the surface control systems to determine the neutral (streamline) position of the respective surfaces. This fixture can also be used for rigging the wing flap system. Dimension and details necessary for construction of the fixture are shown in figure 2-14.

2-74. CONTROL CABLE TENSION.

2-75. Correct cable tension for the temperatures existing during adjustment of the respective control systems are given in the tension versus temperature chart (figure 2-15). Before rigging the systems, observe the following precautions:

a. For best results, airplane should be rigged in hangar or in shade. (If in hangar, be sure to shield airplane from drafts and hot air blast from heaters.)

b. Allow airplane to remain in a constant temperature area as long as possible before rigging in order for temperature within structure to stabilize.

c. Take temperature readings inside nose wheel well.

d. Do not adjust cable tension to an extreme of tolerance but always as close to center of tolerance as possible.

e. If necessary to rig airplane in sun, point airplane either directly into or directly away from sun. (This is to allow wings and sides of fuselage to heat evenly from solar radiation.) In addition, adjust cable to a tension equivalent to a 5-degree increase in temperature from wheel well readings to compensate for solar radiation.

f. Place control systems in neutral or close to neutral before taking a tensiometer reading.

g. Do not take readings with tensiometer clamped to cable within 6 inches of a turnbuckle, quick-disconnect, or any end fitting.

h. Take several readings at same point at same time, especially in blind spots where it is necessary to depend on friction lock of tensiometer to hold reading.

2-76. AILERON CONTROL SYSTEM.

2-77. The ailerons are controlled by push-pull tubes, sectors, cables, dual control valves, and tandem actuating cylinders. (See figure 2-16.) Two independent hydraulic power systems, normal and alternate, position

SETTINGS AND RANGES OF MOVEMENT OF CONTROL SURFACES					
	DEGREES	INCHES	REFERENCE POINT	DEGREES TOLERANCE	INCHES
AILERON—UP	15	5-15/16	TE AT INBD END	±1/2	±3/16
AILERON—DOWN	15	5-15/16	TE AT INBD END	±1/2	±3/16
ELEVATOR—UP (FROM STREAMLINE WITH STABILIZER)	21	3-29/32	TE AT INBD END	±2	±3/8
ELEVATOR—DOWN (FROM STREAMLINE WITH STABILIZER)	2°50'	17/32	TE AT INBD END	±1/2	±3/32
RUDDER—RIGHT & LEFT	25°30'	8-17/32	TE AT LOWER END	+0,-1/2	+0,-5/32
STABILIZER—UP [FROM FUSELAGE REFERENCE LINE (0 DEG)]	6	7-9/32	INDEX HOLES	±1/2	±11/64
STABILIZER—DOWN [FROM FUSELAGE REFERENCE LINE (0 DEG)]	10	1-3/4	INDEX HOLES	+1/2,-0	+11/64,-0
RUDDER TRIM TAB—RIGHT & LEFT	15	1-1/8	TE AT BOTTOM OF CUTOUT	±1	±1/16

CONTROL SURFACE FREE PLAY	
AILERON	*3/32 INCH AT TE
ELEVATOR	*3/32 INCH AT TE (at neutral)
RUDDER	*3/32 INCH AT TE
*MAXIMUM ALLOWABLE	

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Figure 2-13. Surface Control Settings and Ranges of Movement

the ailerons. Movement of the control stick positions the control valve arm. As the actuating cylinder and control valve move, the control valve arm is repositioned, shutting off flow of hydraulic fluid when the desired position of the aileron is reached. (Refer to paragraph 2-97.) The actuating cylinders, located aft of the wing front spar in the middle of each aileron, limit the degree of aileron travel. An electrically controlled trim system is provided. (Refer to paragraph 2-79.) An artificial feel bungee, located in the wing center section, is used to produce simulated stick forces.

2-78. AILERON CONTROL SYSTEM FEEL AND TRIM SYSTEM.

2-79. The aileron artificial feel and trim system (figure 2-17) consists of a bungee, an actuator, trim switches, and a neutral indicating light. A normal-operation switch is incorporated in the Type B-8 stick grip. A switch on the left console is used as an alternate in case of failure in the control stick grip switch. The electric actuator is mounted on the wing front spar. The actuator is protected by a circuit breaker on the left circuit-breaker panel. Mechanically operated switches, incorporated in the actuator, limit the amount of trim available. A light on the pilot's instrument panel (labeled "TAKE-OFF POS. IND. LATERAL-DIRECT LONG'T.") is used to indicate aileron neutral trim position when the trim control switch is operated. The light switch is mounted on the trim actuator supporting casting. When energized, the electrical actuator positions the feel bungee to a new no-load (neutral) position.

2-80. ADJUSTING AILERON CONTROL SYSTEM AND AILERON FEEL AND TRIM SYSTEM. See figure 2-16.

2-81. CHECKING AILERON CONTROL SYSTEM AND AILERON FEEL AND TRIM SYSTEM. With the aileron control system and aileron feel and trim system properly rigged, conduct the following check:

a. Connect external power source to airplane and turn on surface control alternate hydraulic system.

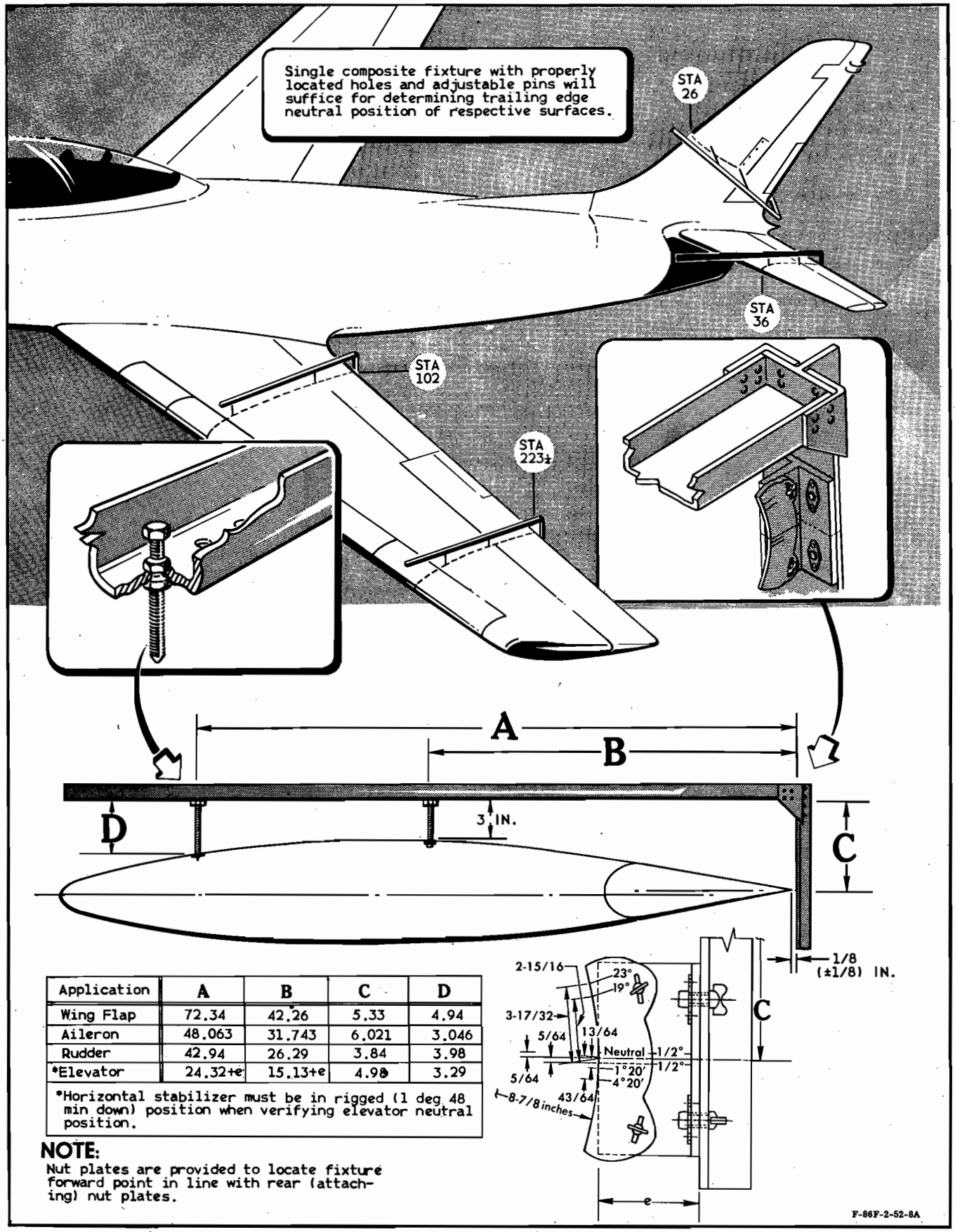
b. Run trim actuator to extreme travel each side of neutral; surface should move 5 (±1) degrees.

Note

Neutral light should illuminate at aileron neutral ±1 degree.

c. Break-out force required to produce ¼ degree travel at trailing edge should be 2¼ (±1) pounds. (Load is applied at first notch below trigger on stick grip.)

d. With stick trimmed at neutral, the force required to move stick to produce 13½ degree surface deflection should be 13½ (±2½) pounds.



Application	A	B	C	D
Wing Flap	72.34	42.26	5.33	4.94
Aileron	48.063	31.743	6.021	3.046
Rudder	42.94	26.29	3.84	3.98
*Elevator	24.32+e	15.13+e	4.98	3.29

*Horizontal stabilizer must be in rigged (1 deg 48 min down) position when verifying elevator neutral position.

NOTE:
Nut plates are provided to locate fixture forward point in line with rear (attaching) nut plates.

Figure 2-14. Surface Control Rigging Fixture

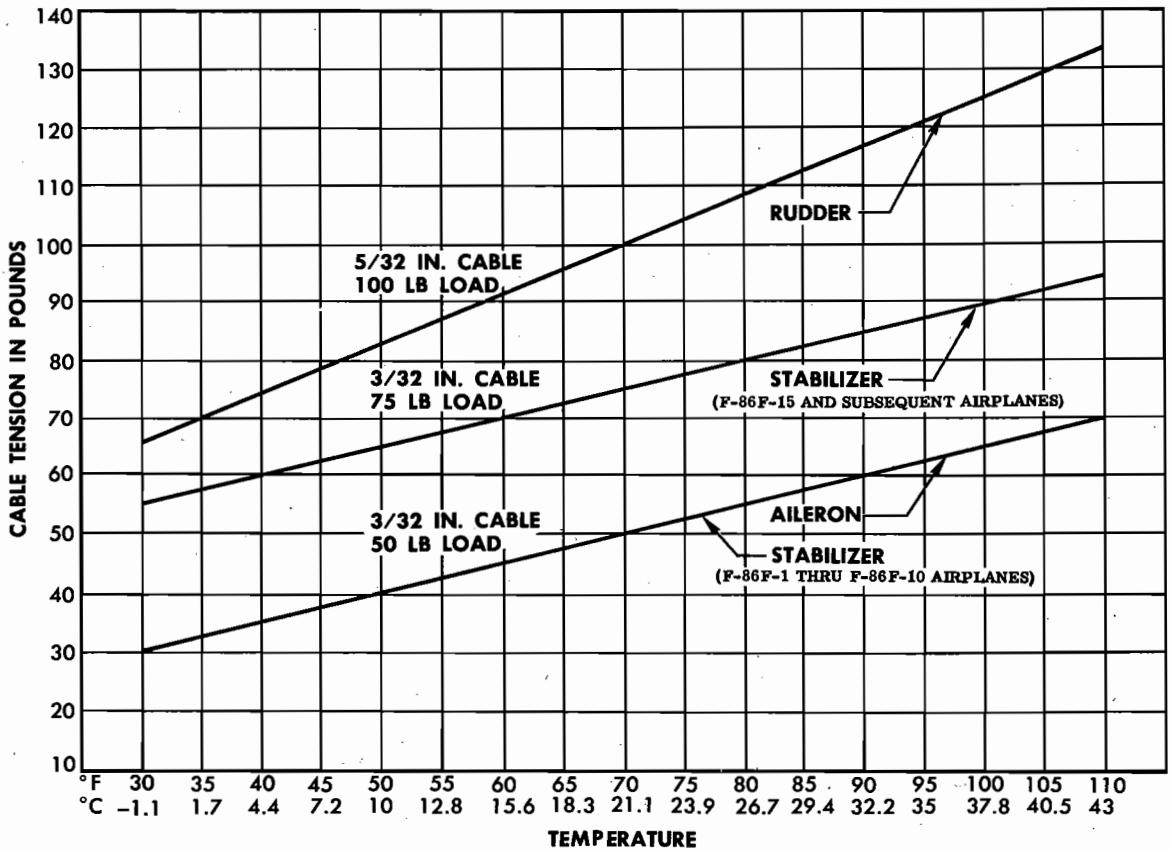


Figure 2-15. Cable Tension Variation With Temperature

e. Upon release of the control stick, the return of the ailerons from either extreme to neutral may be rough. If operation is smooth after a 25-pound load is applied to the surface, the condition is considered satisfactory.

f. Move stick to position surface 5 degrees from neutral at trailing edge. Release stick; aileron must return to neutral within ¼ degree. Repeat in opposite direction.

2-82. HORIZONTAL STABILIZER CONTROL SYSTEM.

2-83. The horizontal stabilizer is controlled by push-pull tubes, sectors, cables, a dual control valve, and tandem actuating cylinder. Two independent hydraulic power systems, normal and alternate, are provided to supply power to the stabilizer actuator. (Refer to paragraph 2-97.) Movement of the control stick positions the control valve arm. Then, as the actuating cylinder and control valve move, the control valve arm is repositioned, shutting off flow of hydraulic fluid when the desired position of the stabilizer is reached. The entire horizontal tail surface is used as a control surface and consists essentially of two sections, the forward stabilizer section and the rear elevator section. The stabilizer is pivoted at the rear spar and positioned by the hydraulic actuator attached at the front spar. The elevator is geared to the stabilizer to obtain increased elevator deflection at large angle of stabilizer nose-down travel. The stabilizer and elevator move essentially as a unit for stabilizer nose-up travel. An artificial feel and electrically operated trim system is provided. (Refer to paragraph 2-85.)

2-84. HORIZONTAL STABILIZER CONTROL SYSTEM FEEL AND TRIM SYSTEM.

2-85. The horizontal stabilizer trim system (figures 2-19 and 2-21) consists of a trim actuator, a feel bungee, trim switches, and relays. On F-86F-1 through F-86F-10

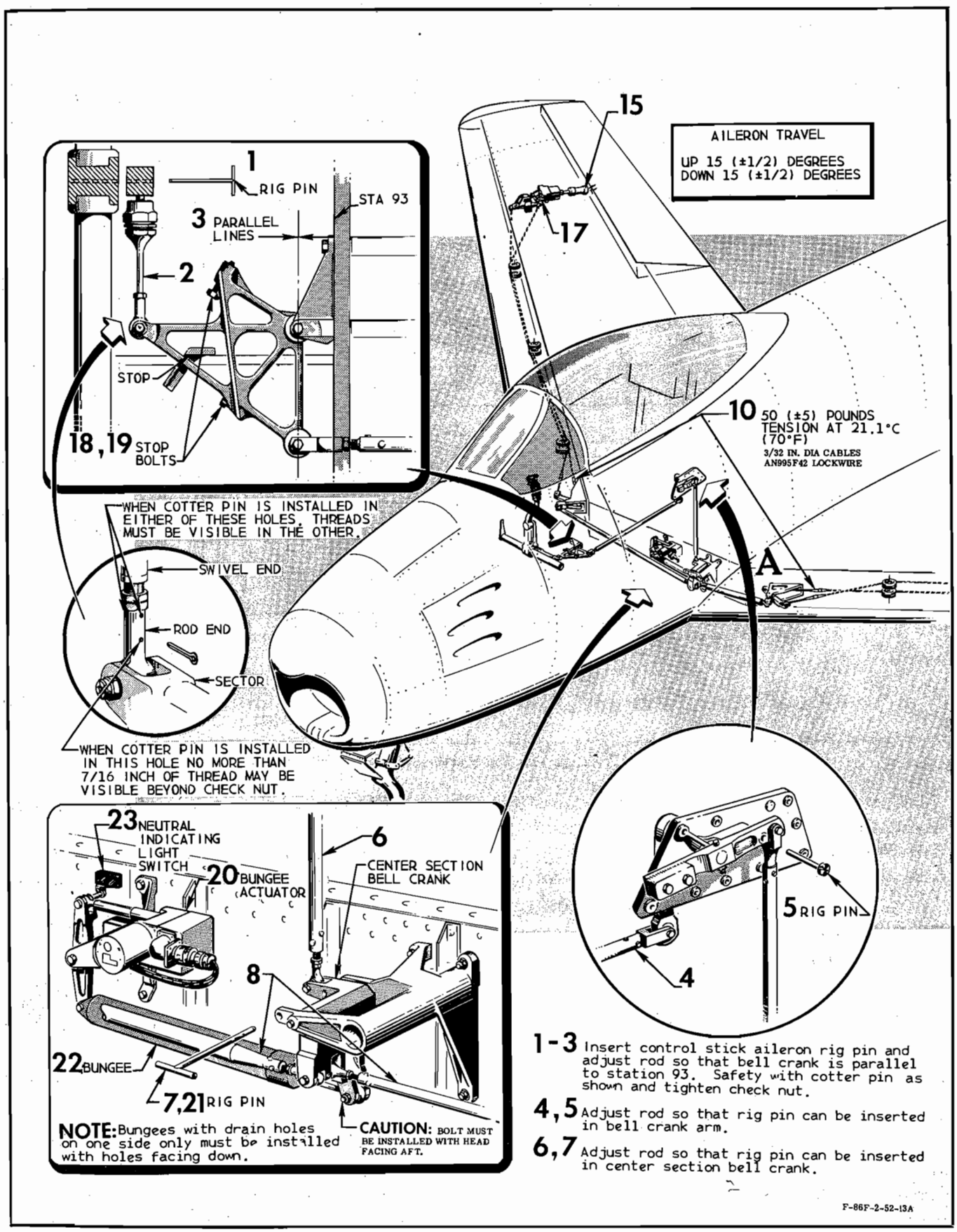
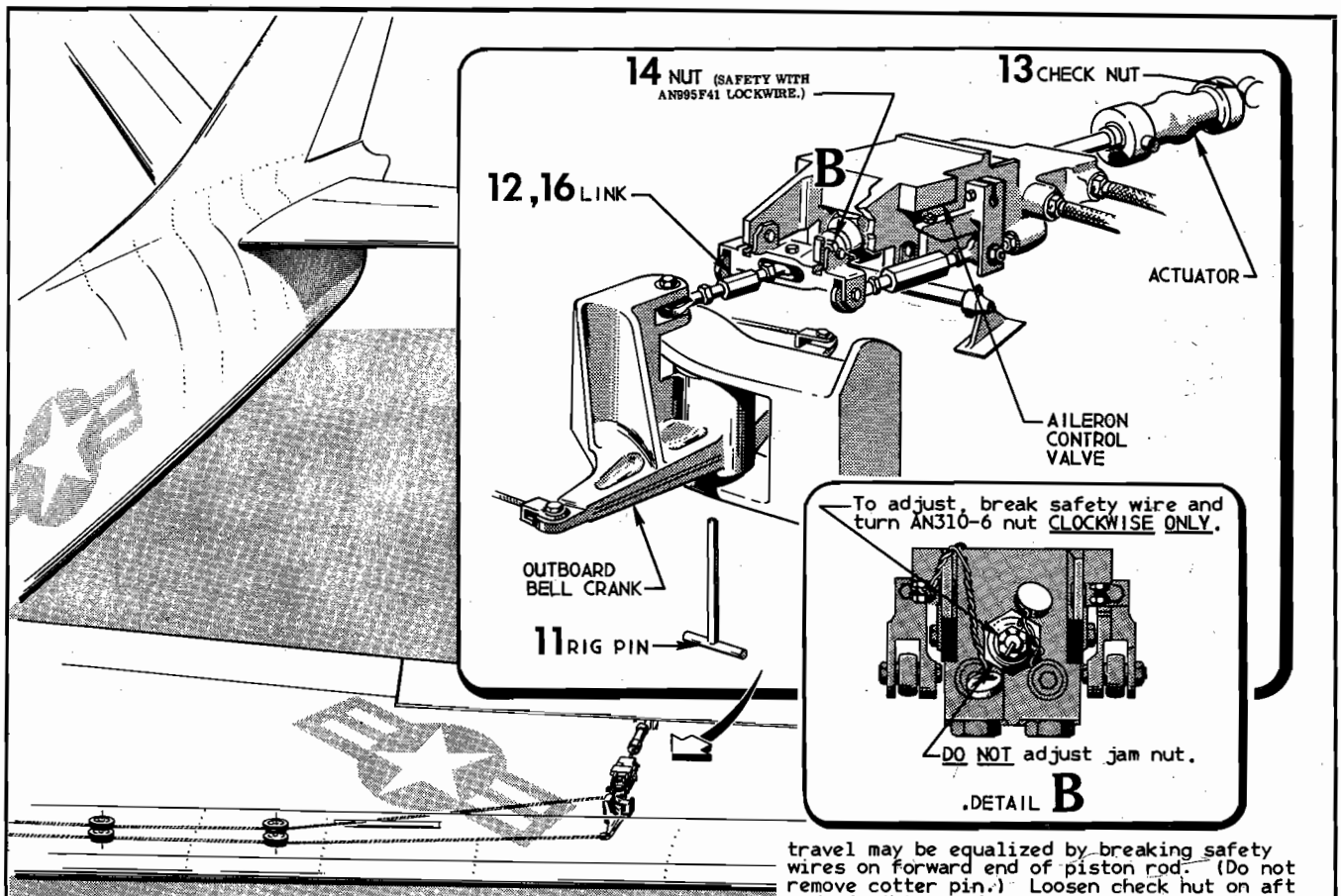
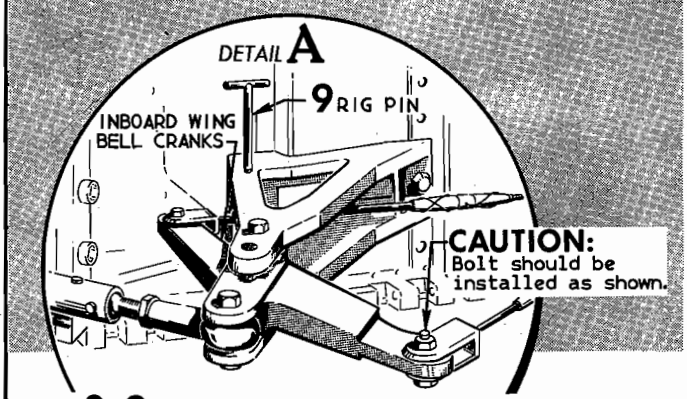


Figure 2-16. Adjusting Aileron Control System and Aileron Feel and Trim System (Sheet 1 of 2)





8,9 Adjust rods so that rig pins can be installed in inboard wing bell cranks.

10,11 Adjust turnbuckles so that rig pins can be inserted in outboard bell cranks with cable tension as specified. Then safety turnbuckles with lockwire.

12 Disconnect link between outboard bell crank and aileron control valve.

13,14 With test stand connected to normal system and regulated to 4.5 gpm, move control valve arm to run left aileron up until the piston of the actuator bottoms. Should the total piston travel give more or less aileron travel than required, divide the difference evenly between up and down travel. Piston travel may be equalized by breaking safety wires on forward end of piston rod. (Do not remove cotter pin.) Loosen check nut on aft end of piston rod and rotate piston rod in a clockwise direction as viewed from end being turned. (To shorten, turn forward end of piston rod. To lengthen, turn aft end of piston rod.) Safety nut with lockwire. Secure check nut with tab washer.

NOTE: With one aileron cylinder bottomed, the opposite cylinder must be within 1 deg aileron travel of bottoming.

15 Repeat steps 13 and 14 on right aileron.

16,17 Connect and adjust control valve links to position ailerons in neutral.

NOTE: Remove all seven rig pins and with electrical power available, reduce test stand pressure to 500 psi; controls should be automatically switched to the alternate system with no more than 1/2-degree movement of ailerons. Should this tolerance be exceeded, replace aileron control valve or valves.

18 With emergency hydraulic power available, apply a load of 30 pounds (measured at center of the stick grip) on the control stick, deflecting stick to the left; adjust stop bolt so that there is 1/32 (±1/64) inch clearance between stop bolt and stop.

19 Repeat step 18, deflecting control stick to the right.

20-22 Operate aileron bungee trim actuator to mid-position (halfway between extreme travels) and insert rig pin. Adjust bungee to fit with no load on bungee.

23 With bungee actuator in mid-position, adjust cockpit neutral indicating light switch so that cockpit indicating light illuminates.

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Figure 2-16. Adjusting Aileron Control System and Aileron Feel and Trim System (Sheet 2 of 2)

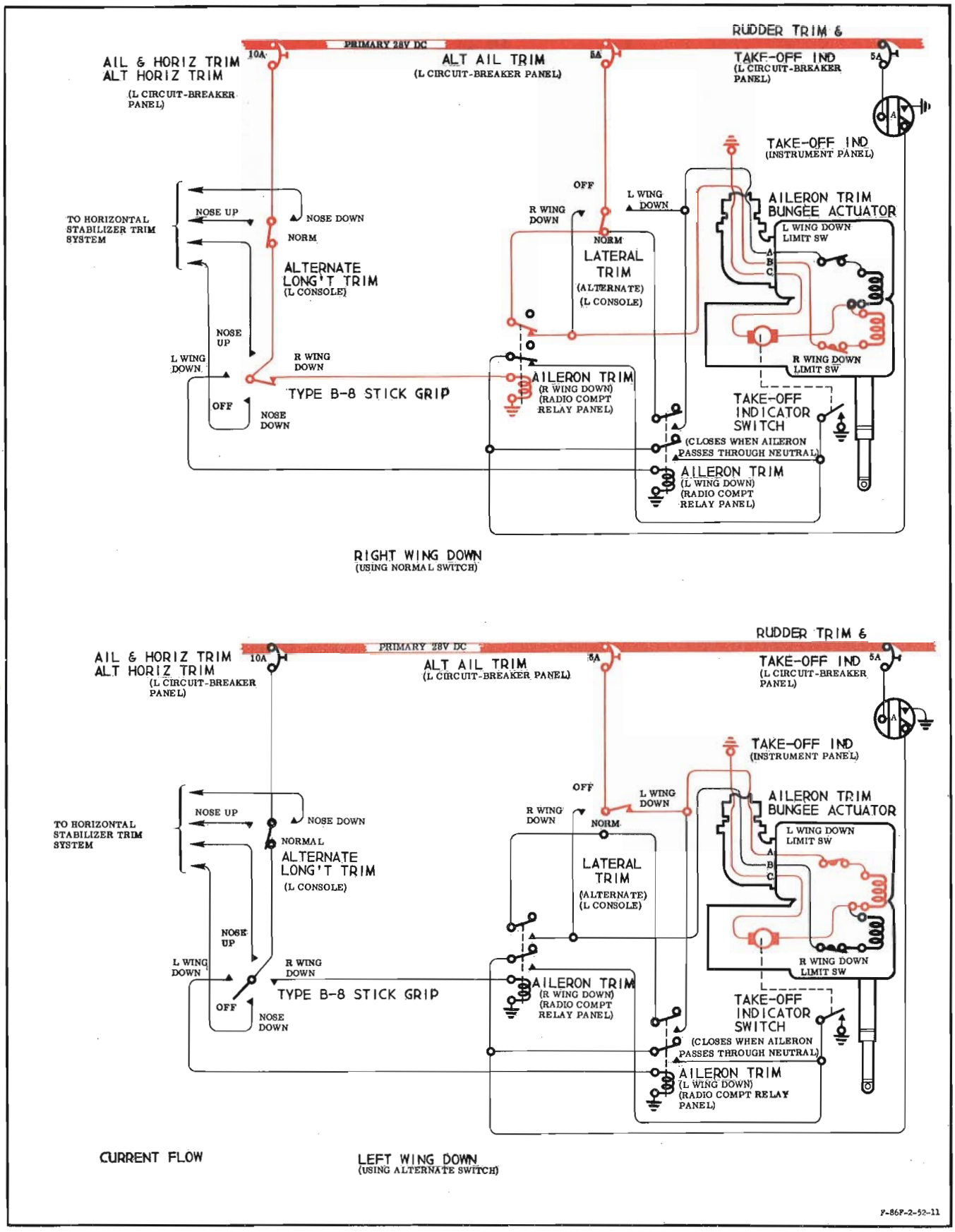


Figure 2-17. Aileron Trim Control System

Airplanes, the actuator (located on the left side of the fuselage, just aft of the cockpit) repositions a feel torsion bar. On F-86F-15 and subsequent airplanes, the actuator (located on the vertical stabilizer rear spar) repositions the feel bungee. Two switches are incorporated, one on the control stick and an alternate on the left console. When either trim switch is operated, current is directed through the trim control relays to the trim actuator. This action positions the feel torsion bar or bungee to a new no-load (neutral) position. The system is protected by a circuit breaker on the left circuit-breaker panel. On F-86F-1 through F-86F-10 Airplanes, a light on the pilot's instrument panel indicates horizontal stabilizer take-off trim position (4 degrees leading edge down) when the trim switch is operated. On F-86F-15 and subsequent airplanes, a light on the instrument panel indicates full stabilizer leading edge down (7 $\pm$½ degrees).

2-86. ADJUSTING HORIZONTAL STABILIZER CONTROL SYSTEM AND FEEL AND TRIM SYSTEM. See figures 2-18 and 2-20.

2-87. CHECKING HORIZONTAL STABILIZER CONTROL SYSTEM AND FEEL AND TRIM SYSTEM. With the horizontal stabilizer control system and feel and trim system rigged properly, proceed as follows:

a. Connect external power source to the airplane and turn on surface control alternate hydraulic system.

b. With stick switch, check trim travel as 2 ($\pm$½) degrees up and 7 ($\pm$½) degrees down from streamline.

ADJUSTING HORIZONTAL STABILIZER AND ELEVATOR CONTROL SYSTEM

1-4 Install aileron and horizontal stabilizer rig pins and adjust rod so that a rig pin can be inserted in the torque tube bell crank.

5,6 Adjust cable to specified tension so that the aft sector rig pin can be installed; safety quick-disconnects.

7,8 Adjust rod so that a rig pin can be inserted; then safety rod.

9 Disconnect volve arm rod and perform friction check. (Refer to "Checking Horizontal Stabilizer Control System for Friction.")

10-12 With hydraulic power available, actuate control valve arm to run stabilizer down until cylinder bottoms. Adjust length of actuating cylinder to obtain specified distance between index holes. (Refer to chart.*)

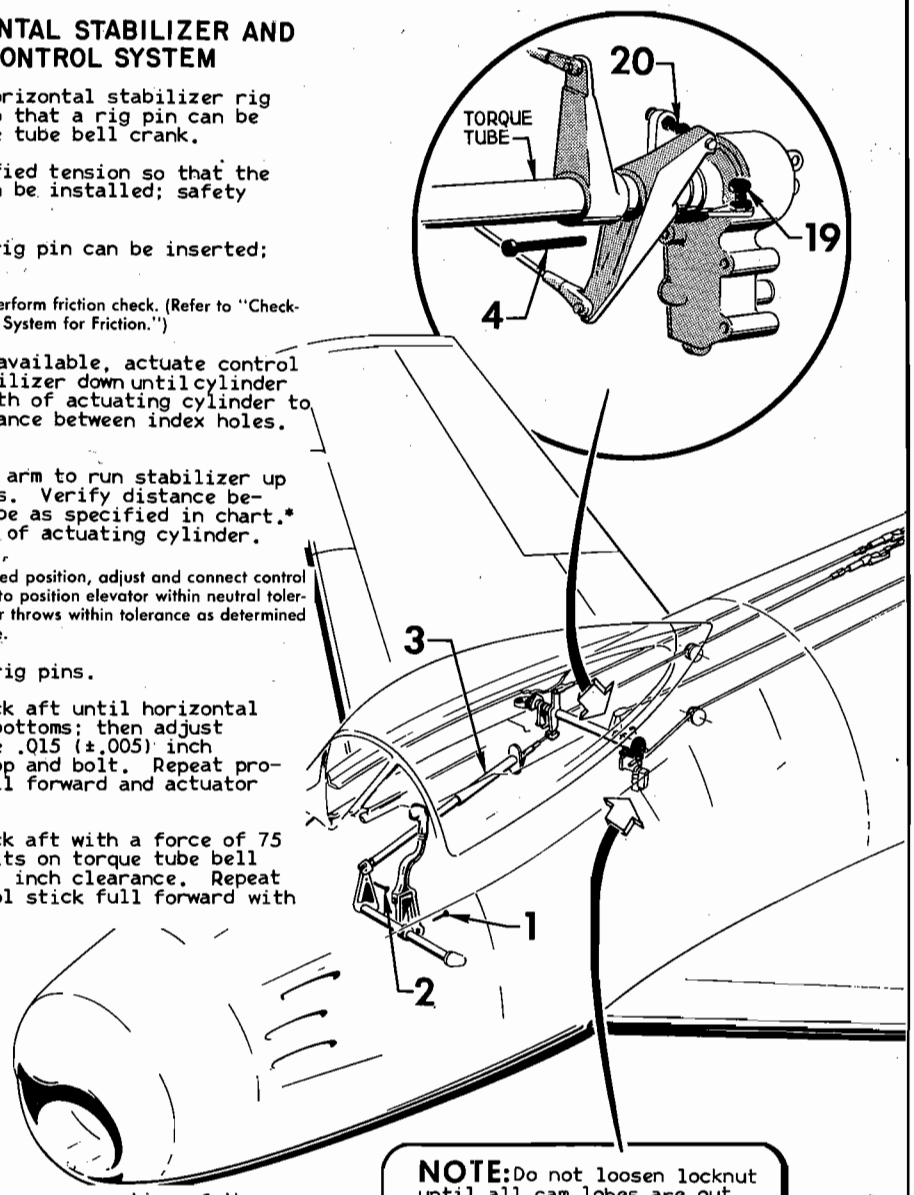
13-15 Actuate control valve arm to run stabilizer up until cylinder bottoms. Verify distance between index holes to be as specified in chart.* If not, adjust length of actuating cylinder.

16,17 With actuating cylinder in rigged position, adjust and connect control valve rod. Adjust elevator link to position elevator within neutral tolerance while maintoining elevator throws within tolerance as determined by the use of the contour fixture.

NOTE: Remove all rig pins.

18 Position control stick aft until horizontal stabilizer actuator bottoms; then adjust stop bolts to provide .015 (±.005) inch clearance between stop and bolt. Repeat procedure with stick full forward and actuator bottomed.

19,20 Position control stick aft with a force of 75 pounds. Set stop bolts on torque tube bell crank to 1/32 (±1/64) inch clearance. Repeat procedure with control stick full forward with a force of 65 pounds.



NOTE: To verify proper operation of the feel system, place the control stick in the neutral (rigged) position. The force required to move the control stick to full deflection within 1/16 inch of full surface travel (measured at center of stick grip) should be between 43 and 55 pounds full forward and between 55 and 67 pounds full aft.

ADJUSTING TAKE-OFF POSITION INDICATOR LIGHT

21,22 With the stick trim switch, actuate stabilizer to 4 degrees down from fuselage reference line (0 degrees) and adjust take-off position light by loosening nut one-fourth turn and rotating cam to actuate microswitch.

NOTE: Check synchronization of normal and alternate systems by changing from one to the other. Stabilizer should not move more than 1/32 inch at leading edge.

NOTE: Do not loosen locknut until all cam lobes are out of contact with switches. Rotate cam counterclockwise to approach setting.

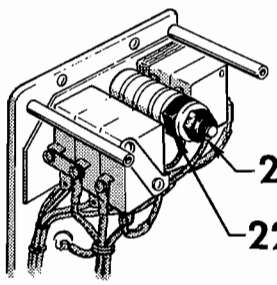


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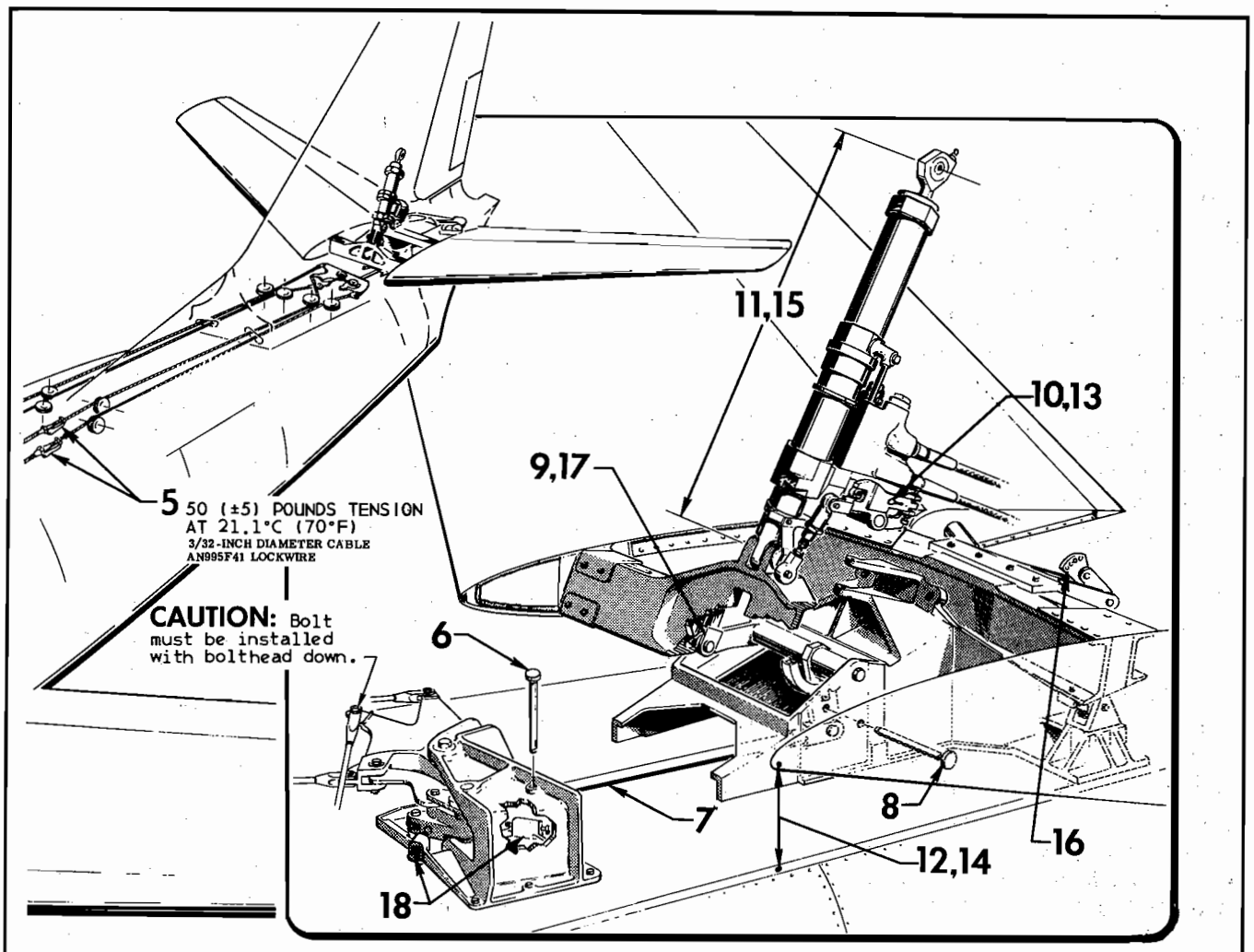
Figure 2-18. Adjusting Horizontal Stabilizer Control System and Feel and Trim System—F-86F-1 Through F-86F-10 Airplanes (Sheet 1 of 2)



*HORIZONTAL STABILIZER AND ELEVATOR TRAVEL POSITION

POSITION	ACTUATING CYLINDER LENGTH (REF)	TRUE DISTANCE BETWEEN INDEX HOLES	HORIZONTAL STABILIZER POSITION	ELEVATOR POSITION
NEUTRAL STICK POSITION	22.076 IN.	4.612 (±.088) IN.	1 DEG 48 MIN (+1/4 DEG) DOWN	2 DEG 45 MIN (±1/2 DEG) DOWN
FULL DOWN STABILIZER AND FULL UP ELEVATOR	23.929 (+.090/ -.000) IN.	1.768 (+.164/-0) IN.	10(+1/2/-0) DEG DOWN	21(±2) DEG UP
FULL UP STABILIZER AND FULL DOWN ELEVATOR	20.323 (+000/ -.090) IN.	7.316(±.174) IN.	6 (±1/2) DEG UP	2 DEG 50 MIN (±1-1/2 DEG) DOWN
STABILIZER TRIM DOWN		2.760 (±.170) IN.	7 (±1/2) DEG DOWN	
STABILIZER TRIM UP		5.895 (±.170) IN.	2 (±1/2) DEG UP	

Horizontal stabilizer positions are with respect to fuselage reference line (0 degrees). Elevator positions are with respect to horizontal stabilizer.

Stabilizer positions may be checked by placing scale in bottom of hole (located on fairing retainer channel) and measuring to center of hole on stabilizer leading edge.

F-86F-2-52-6A

Figure 2-18. Adjusting Horizontal Stabilizer Control System and Feel and Trim System—F-86F-1 Through F-86F-10 Airplanes (Sheet 2 of 2)

(See figure 2-18 or 2-20.) Take-off light should illuminate at 4 degrees down on F-86F-1 through F-86F-10 Airplanes and at 7 degrees down on F-86F-15 and subsequent airplanes.

c. With stick in neutral position, check for the following loads. On F-86F-1 through F-86F-10 Airplanes, the force required to move the control stick forward to within 1/16 inch of full surface travel should be between 43 and 55 pounds. (Loads are applied at first notch below trigger on stick grip.) The force required to move the stick aft to within 1/16 inch of full surface deflection should be between 55 and 67 pounds. On F-86F-15, F-86F-20, and F-86F-25 Airplanes and F-86F-30 Airplanes AF52-4305 through -4780, the force required to move the stick fore or aft until the surface is within 1/16 inch of full travel should be 52 (±5) pounds. On F-86F-30 Airplane AF52-4781 and all subsequent airplanes, the force required to move the control stick fore and aft to within 1/16 inch of full surface travel should be 51 (±5) pounds.

d. On F-86F-15, F-86F-20, and F-86F-25 Airplanes and F-86F-30 Airplanes AF52-4305 through -4780, the breakout force required at the stick grip to move the surface 1/8 inch up or down should be 6 (±1) pounds. On F-86F Airplane AF52-4781 and all subsequent airplanes, breakout force required to produce 1/8 inch travel at leading edge of stabilizer should be 5 (+1, −2) pounds. Breakout forces fore and aft should be the same. On F-86F-1 through F-86F-10 Airplanes, breakout forces should be between 1 and 6 pounds at stick.

2-88. CHECKING HORIZONTAL STABILIZER CONTROL SYSTEM FOR FRICTION. After horizontal stabilizer system is checked, if forces are not as outlined in adjustment procedure, a further friction check should be made. With valve rod disconnected and using a precision-type scale (Hunter), measure friction at first notch below trigger on stick. Friction must not exceed 2½ pounds maximum. This value allows a 5-pound friction band. Friction band is determined by measuring forces required to move stick through a specific position while slowly approaching that position from either direction. The measurement should be taken at one-inch increments of stick travel, and any position within ½ inch of extreme travel should be ignored. Starting at ½ inch from full forward travel, check through full travel aft; then, starting at ½ inch from full aft, check through full travel forward. Record all forward forces applied with the scale as "+" and all aft forces applied as "−," regardless of direction of stick movement. For positions where force for one direction is "+" and for the other direction "−," add forces and divide by 2. For positions where both forces are "+" or both forces are "−," subtract smaller from larger and divide by 2. The result is the system friction force. An example is given in the following table:

STICK POSITION (INCHES)	FORCE— MOVING AFT (POUNDS)	FORCE— MOVING FWD (POUNDS)	SUM OR DIFFERENCE (POUNDS)	FRICTION FORCE (POUNDS)
1	+3.2	+5.9	2.7	1.35
2	−4.2	−0.3	3.9	1.95
3	−3.5	+0.6	4.1	2.05

If system conforms to this check, friction in system from stick to control valve rod may be considered acceptable.

2-88A. REMOVING HORIZONTAL STABILIZER ELECTRIC TRIM ACTUATOR (F-86F-1 THROUGH F-86F-10 AIRPLANES). To remove the electric trim actuator, proceed as follows:

a. Remove left aft radio compartment access door and trim actuator access door.

b. Disconnect actuator Cannon plug.

c. Remove three mounting bolts and washers and disengage actuator female spline from male spline of support assembly. Remove actuator from airplane.

2-88B. INSTALLING HORIZONTAL STABILIZER ELECTRIC TRIM ACTUATOR (F-86F-1 THROUGH F-86F-10 AIRPLANES). See figure 2-18A.

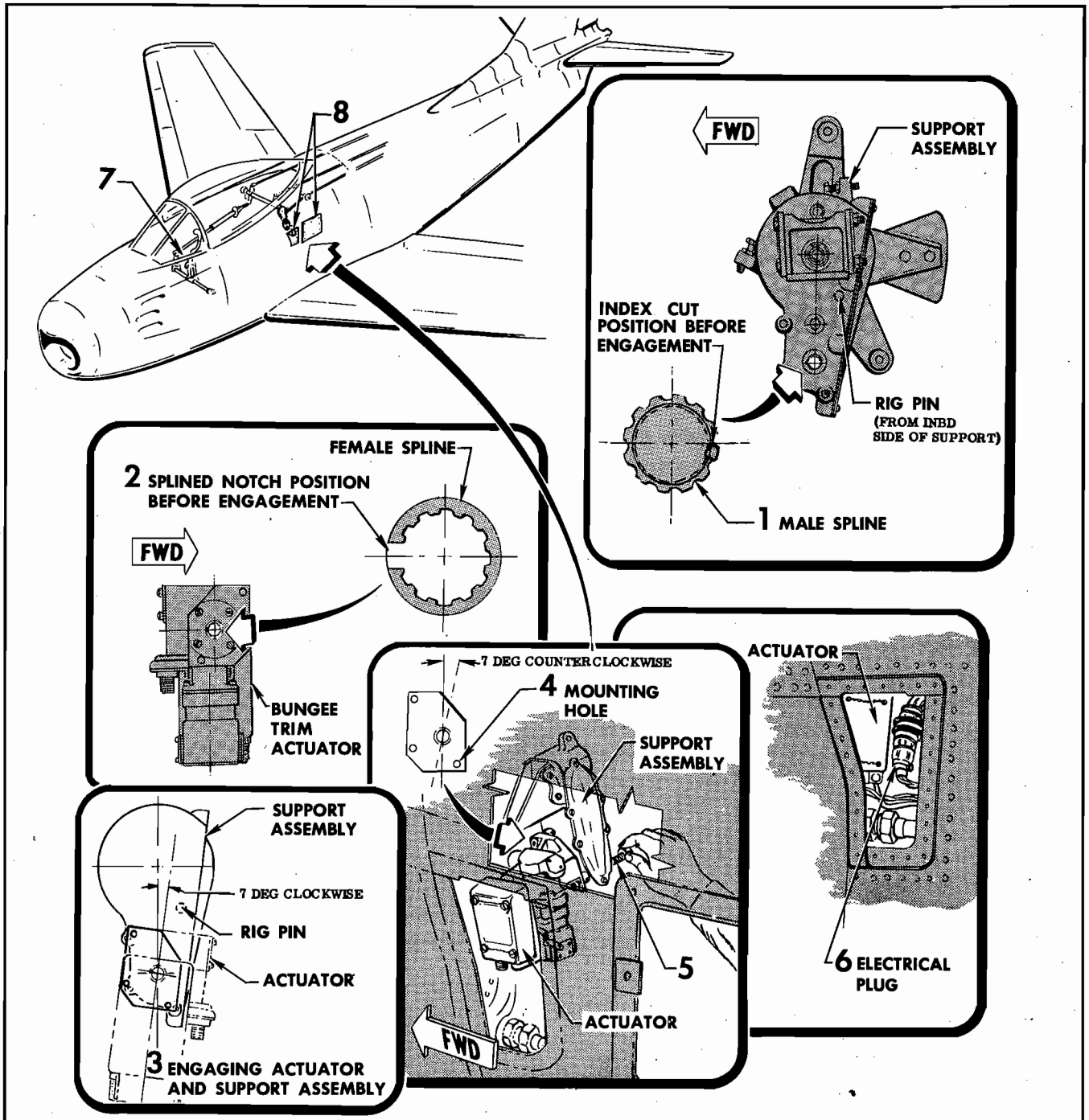
2-89. RUDDER CONTROL SYSTEM.

2-90. The rudder is controlled in a conventional manner by pedals that actuate 5/32-inch diameter cables and position the sector attached directly to the rudder. The rudder pedal positions can be adjusted by the pilot for leg length. An electrically controlled and actuated trim tab is incorporated on the rudder. (Refer to paragraph 2-93.) A rudder control lock is provided to lock the rudder in neutral. (Refer to paragraph 1-21.)

2-91. ADJUSTING RUDDER CONTROL SYSTEM. See figure 2-22.

2-92. RUDDER TRIM TAB CONTROL SYSTEM.

2-93. The electrically actuated rudder trim tab control system is remotely controlled from the pilot's compartment. (See figure 2-23.) The rudder trim tab control switch, located on the pilot's left console, is wired directly to the actuator, which is located inside the rudder. The actuator circuit is protected by a circuit breaker on the left circuit-breaker panel. A mechanical linkage arrangement is provided to transmit motion from the actuator to the trim tab. The trim tab actuator is an electric-motor-driven jackscrew assembly that incorporates mechanically actuated switches to limit extreme travel of the tab. Intermediate tab positions are determined only by operation of the control switch. A trim take-off position indicator light, which also serves for



1 Rotate male spline in support assembly until rig pin can be inserted.

2 Check that notch in actuator female spline is on horizontal centerline.

3 Rotate actuator approximately 7 degrees clockwise and engage splines. Remove rig pin.

4 Rotate actuator approximately 7 degrees counterclockwise so that mounting holes are aligned.

5 Install three mounting bolts and washers.

6 Connect actuator electrical plug.

7 With stick trim switch, energize actuator and check for proper operation. Distance between stabilizer index holes should be 5.895 (±0.17) inches for maximum stabilizer leading edge up trim and 2.76 (±0.17) inches for maximum stabilizer leading edge down trim if stabilizer system is rigged properly.

8 Replace access doors.

F-86F-2-52-1A

Figure 2-18A. Installing Horizontal Stabilizer Electric Trim Actuator—F-86F-1 Through F-86F-10 Airplanes

lateral and longitudinal trim, is located on the pilot's instrument panel and is wired directly to a switch on the actuator.

2-94. ADJUSTING RUDDER TRIM TAB CONTROL SYSTEM. See figure 2-24.

2-95. CHECKING RUDDER TRIM TAB CONTROL SYSTEM. Check rudder trim tab control system as follows:

a. Connect external power source to airplane.

b. With rudder in neutral, actuate trim switch. Trim tab travel should be 15 (±1) degrees each side of neutral.

2-96. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEMS.

2-97. The surface control normal and alternate hydraulic power systems are pressure-type (closed-center) systems. Included in the systems are reservoirs, pumps, accumulator, compensators, relief valves, transfer valves, pressure switches, pressure transmitters, check valves, filters, and restrictors. (See figure 2-25.) Change-over from the normal system to the alternate system is effected automatically by means of the system pressure switches and two solenoid-operated transfer valves. Change-over can also be accomplished manually by means of a switch in the cockpit. As an emergency means, a manually controlled flexible cable is also provided for positioning the transfer valves to the alternate system and connecting the alternate system pump directly to the battery. A gage in the cockpit indicates system pressures in the normal, alternate, and utility hydraulic systems. Readings for each system are controlled by a three-way toggle switch.

2-98. FUNCTION OF SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEMS. During normal operation, fluid is supplied by means of an engine-driven, variable-displacement pump. (See figure 2-26.) Fluid from this pump is directed to the accumulator, then through a filter to a pressure transmitter, pressure switch, and solenoid-operated transfer valve to the respective control valves. A relief valve is provided to limit the system pressure to 3450 (±50) psi if the pump fails to cut off. During alternate operation, pressure is supplied by means of an electrically driven, constant-displacement pump. Operating pressure is maintained in the alternate system accumulator at all times by pressure switches. These switches energize the alternate pump when the alternate system pressure drops below 2750 (±175) psi and de-energize the pump when the pressure in the accumulator reaches 2950 (±175) psi, with a minimum of 200 psi differential between energizing and de-energizing of pump. Change-over from normal system to alternate system is effected by means of pressure switches and two solenoid-operated transfer valves, which automatically become energized when the normal system pressure drops below 650 psi. These transfer valves, when energized, by-pass normal system pressure and open the alternate system pressure line.

2-99. FILLING NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEMS. Refer to paragraphs 1-74 and 1-75.

2-100. CHECKING NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEMS. Conduct the functional check of the normal and alternate hydraulic power systems as follows:

a. Verify that compensator rods are extended a minimum of ¼ inch up to a maximum of 1¼ inches and that accumulators have an air charge of 600 (+50, –0) psi at 21.1°C to 43°C (70°F to 110°F).

b. Connect test stand to airplane with flow regulated to 4.5 gpm and relief valve set to 3000 psi.

c. Connect external power source and momentarily position flight control switch to "RESET."

d. To check operation of normal system, move control stick to full deflection to actuate both aileron and stabilizer systems. Reading on cockpit hydraulic pressure gage should drop while surface is being moved and should read 3000 psi when surfaces are stationary.

e. To check operation of alternate system, decrease test stand relief valve setting to 800 psi and repeat step d. with cockpit pressure gage switched to "ALTERNATE." System should automatically change over to alternate system with initial rapid control movement and remain on alternate until manually switched back to normal.

Note

While on alternate system with no movement of controls, electric pump should remain off a minimum of 4 seconds while cycling. An interval of less than 4 seconds indicates a leak in system or a faulty pressure switch.

2-101. CHECKING ALTERNATE HYDRAULIC SYSTEM ELECTRICAL CIRCUITS. Conduct functional check of electrical circuit as follows:

Note

Steps a. through f. make up the check for alternate pump control pressure switches.

a. With external electric power off, battery switch "OFF," all circuit breakers in, and hydraulic test stand off, alternate system pump should not cycle.

b. Place nose wheel steering safety switch in its "in-flight" position. Alternate pump should cycle and maintain alternate system pressure of 2750 (±175) to 2950 (±175) psi, with a minimum of 200 psi differential between starting and stopping of pump.

c. With external power on and nose wheel steering safety switch in its "ground" position, disconnect plug

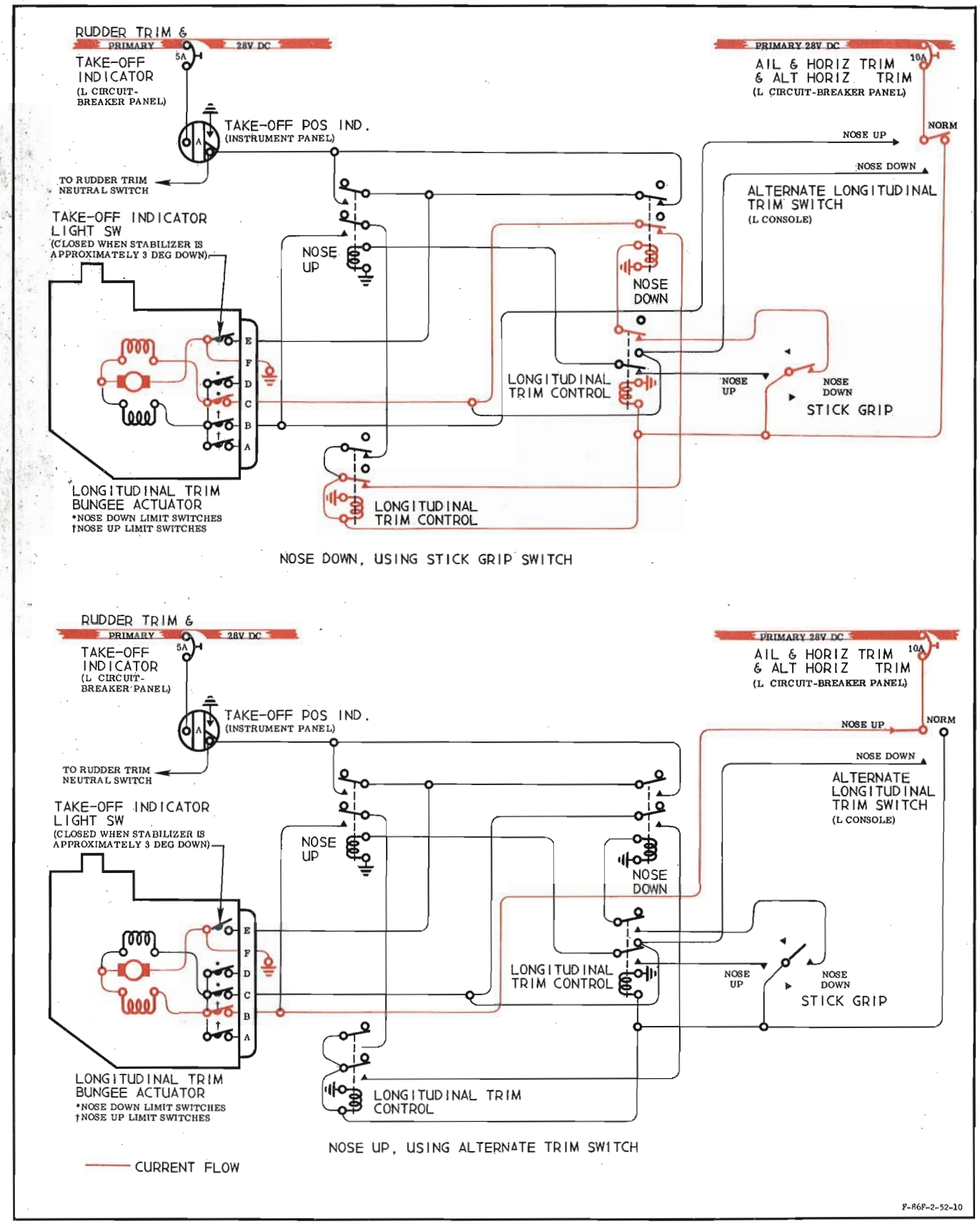


Figure 2-19. Horizontal Stabilizer Trim Control System—F-86F-1 Through F-86F-10 Airplanes

1-4 Install aileron and horizontal stabilizer rig pins and adjust rod so that a rig pin can be inserted in the torque tube bell crank.

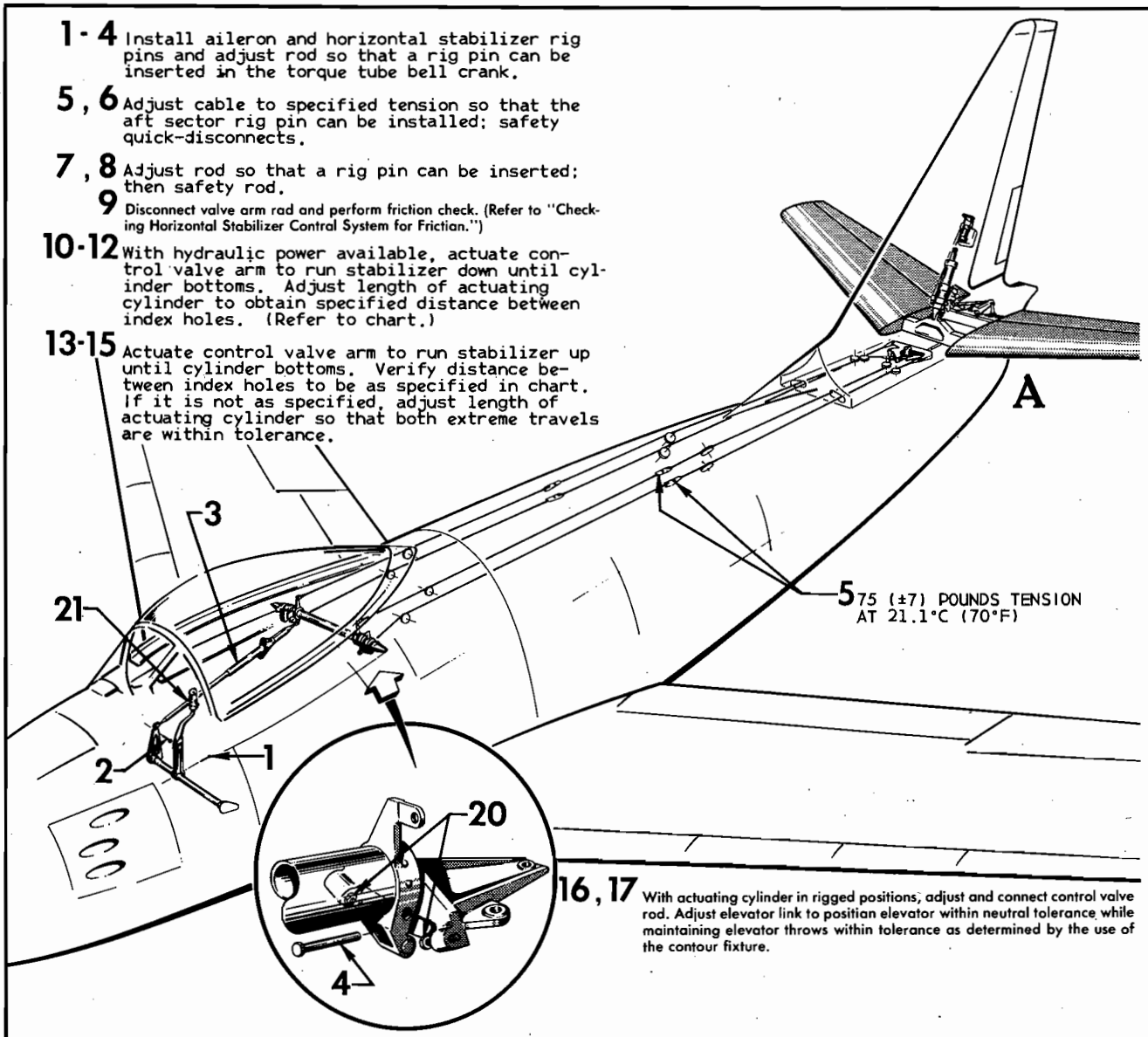
5, 6 Adjust cable to specified tension so that the aft sector rig pin can be installed; safety quick-disconnects.

7, 8 Adjust rod so that a rig pin can be inserted; then safety rod.

9 Disconnect valve arm rod and perform friction check. (Refer to "Checking Horizontal Stabilizer Control System for Friction.")

10-12 With hydraulic power available, actuate control valve arm to run stabilizer down until cylinder bottoms. Adjust length of actuating cylinder to obtain specified distance between index holes. (Refer to chart.)

13-15 Actuate control valve arm to run stabilizer up until cylinder bottoms. Verify distance between index holes to be as specified in chart. If it is not as specified, adjust length of actuating cylinder so that both extreme travels are within tolerance.



16, 17 With actuating cylinder in rigged positions, adjust and connect control valve rod. Adjust elevator link to positian elevator within neutral tolerance while maintaining elevator throws within tolerance as determined by the use of the contour fixture.

HORIZONTAL STABILIZER AND ELEVATOR TRAVEL POSITION

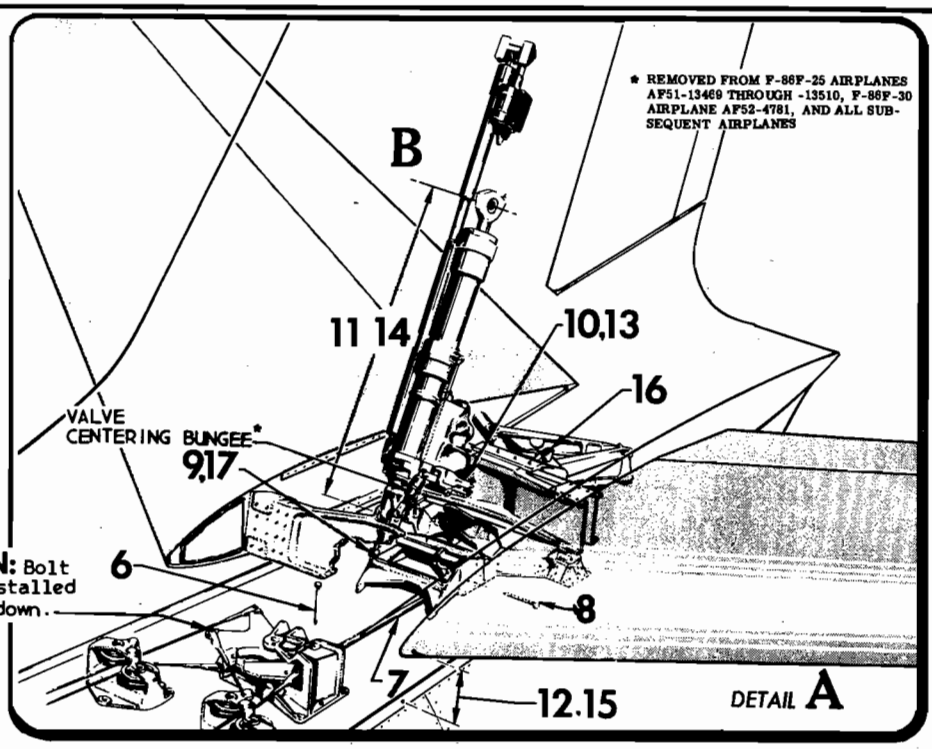
POSITION	ACTUATING CYLINDER LENGTH (REF)	TRUE DISTANCE BETWEEN INDEX HOLES	HORIZONTAL STABILIZER POSITION	ELEVATOR POSITION
NEUTRAL STICK POSITION	22.076 IN.	4.612 (±.088) IN.	1 DEG 48 MIN (+1/4 DEG) DOWN	2 DEG 45 MIN (±1/2 DEG) DOWN
FULL DOWN STABILIZER AND FULL UP ELEVATOR	23.929 (+.090, -.000) IN.	1.768 (+.164,-0) IN.	10 (+1/2,-0) DEG DOWN	21 (±2) DEG UP
FULL UP STABILIZER AND FULL DOWN ELEVATOR	20.323 (+.000, -.090) IN.	7.316 (±.174) IN.	6 (±1/2) DEG UP	2 DEG 50 MIN (± 1-1/2 DEG) DOWN
STABILIZER TRIM DOWN		2.760 (±.170) IN.	7 (±1/2) DEG DOWN	
STABILIZER TRIM UP		5.895 (±.170) IN.	2 (±1/2 DEG UP	

Horizontal stabilizer positions are with respect to fuselage reference line (0 degrees). Elevator positions are with respect to horizontal stabilizer.

Stabilizer positions may be checked by placing scale in bottom of hole (located on fairing retainer channel) and measuring to center of hole on stabilizer leading edge.

F-86F-2-52-5A

Figure 2-20. Adjusting Horizontal Stabilizer Control System and Feel and Trim System—F-86F-15 and Subsequent Airplanes (Sheet 1 of 2)



18 Run trim actuator so that rig pin can be installed in bell crank.

19 Adjust free length of bungee and install. Bungee part No.176-52220 may be adjusted on either end. Bungee part No. 191-52220 may be adjusted on lower end only. Remove all rig pins.

20 Push stick aft with load of 60 (±5) pounds, then adjust stop on torque tube bell crank to have 1/32 (±1/64) inch clearance. Repeat pushing stick forward.

21 With stabilizer trimmed to rig position the force required to move stabilizer leading edge 1/8 inch up or down should be 6 (+1,-2) pounds. The stick force to move the stabilizer up or down to within 1/16 inch of full deflection should be 52 (±5) pounds. Stick force is applied tangentially at first notch below trigger of stick grip).

22 Operate trim actuator to both extremes of travel, checking surface travel at each position. Travel should
23 be 2 (±1/2) degrees up and -7 (±1/2) degrees down. Divide any overtravel or undertravel equally between the two positions by adjusting bungee. Secure jam nuts. Safety rod ends as shown. After this step, the rig pin hole in trim actuator bell crank need not align when stabilizer is in rigged position.

NOTE: As a final check the stabilizer leading edge should not move more than 1/32 of an inch when hydraulic system is switched from normal to alternate and back to normal. The take-off light should flash at full down trim [7(±1/2) degrees] with stick trim switch actuated.

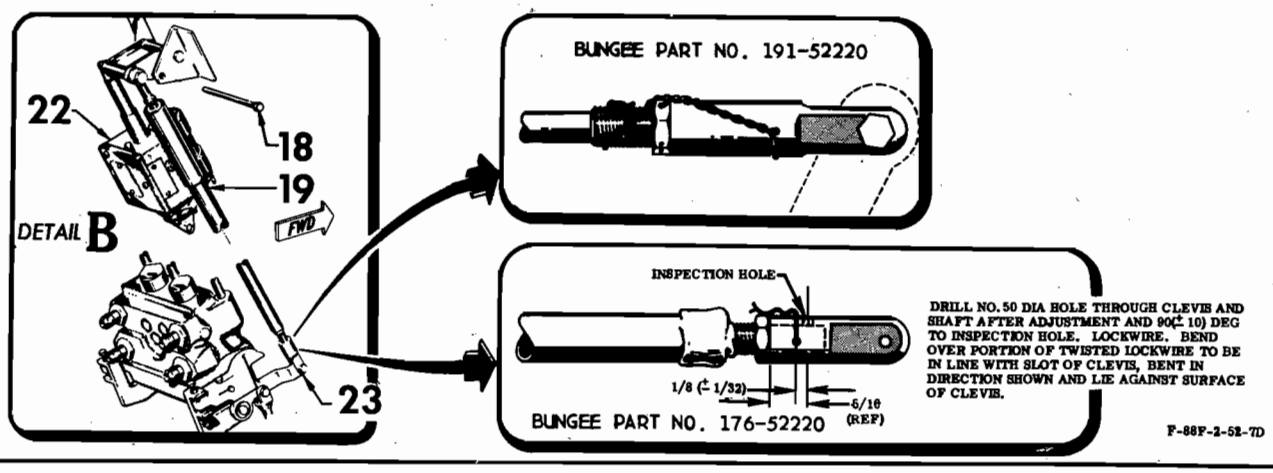


Figure 2-20. Adjusting Horizontal Stabilizer Control System and Feel and Trim System—F-86F-15 and Subsequent Airplanes (Sheet 2 of 2)

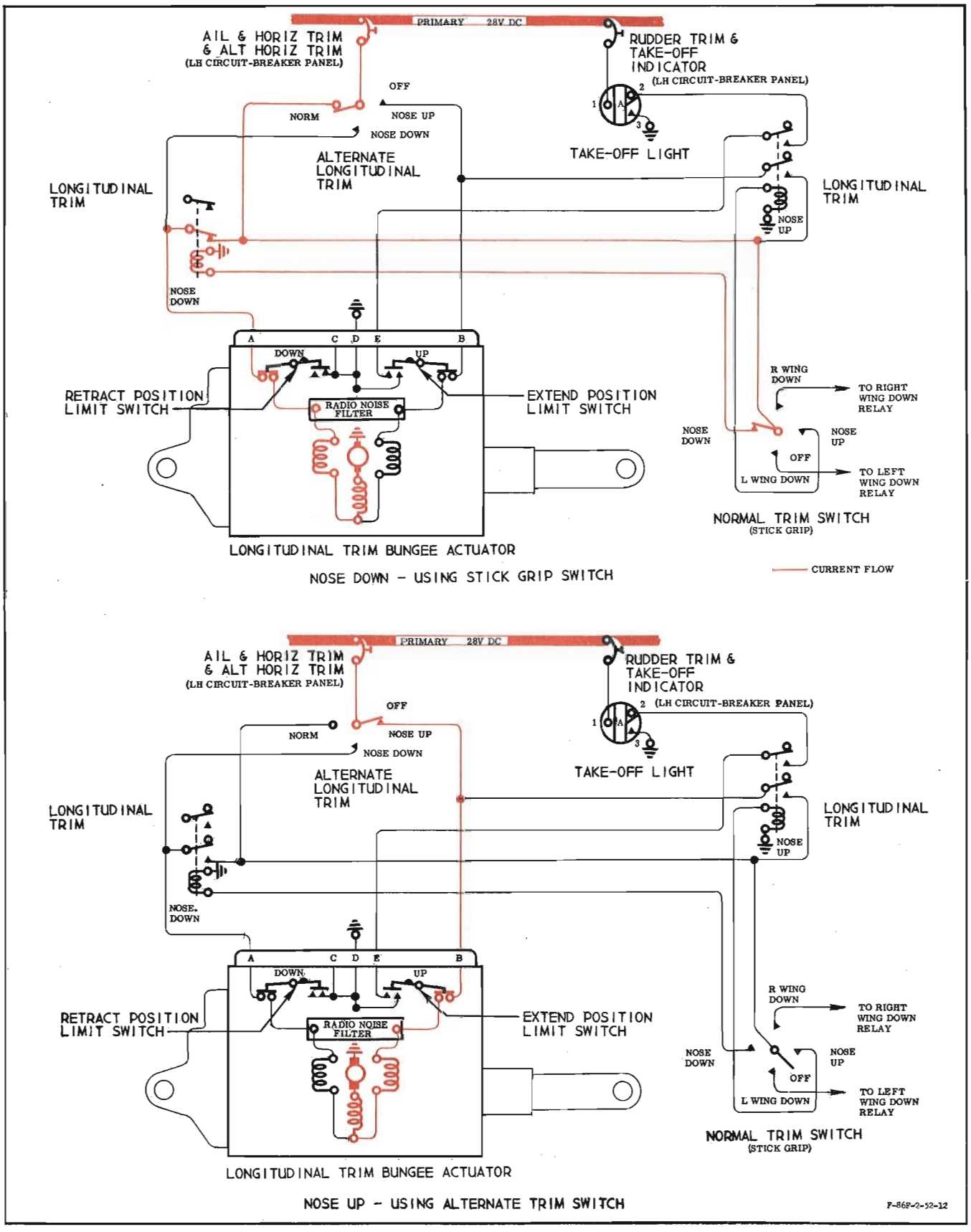
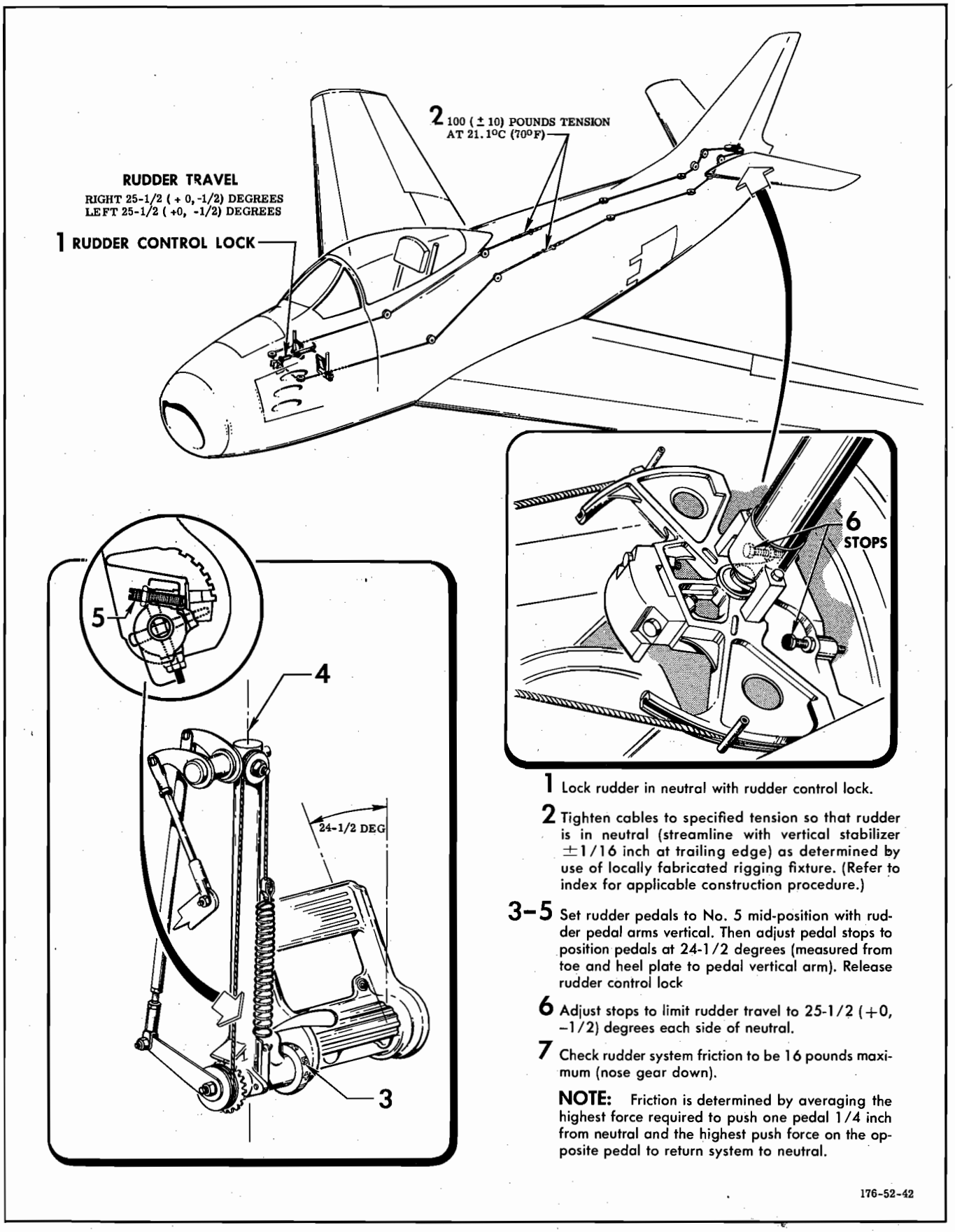


Figure 2-21. Horizontal Stabilizer Trim Control System—F-86F-15 and Subsequent Airplanes



1 Lock rudder in neutral with rudder control lock.

2 Tighten cables to specified tension so that rudder is in neutral (streamline with vertical stabilizer ±1/16 inch at trailing edge) as determined by use of locally fabricated rigging fixture. (Refer to index for applicable construction procedure.)

3–5 Set rudder pedals to No. 5 mid-position with rudder pedal arms vertical. Then adjust pedal stops to position pedals at 24-1/2 degrees (measured from toe and heel plate to pedal vertical arm). Release rudder control lock

6 Adjust stops to limit rudder travel to 25-1/2 (+0, −1/2) degrees each side of neutral.

7 Check rudder system friction to be 16 pounds maximum (nose gear down).

NOTE: Friction is determined by averaging the highest force required to push one pedal 1/4 inch from neutral and the highest push force on the opposite pedal to return system to neutral.

Figure 2-22. Adjusting Rudder Control System

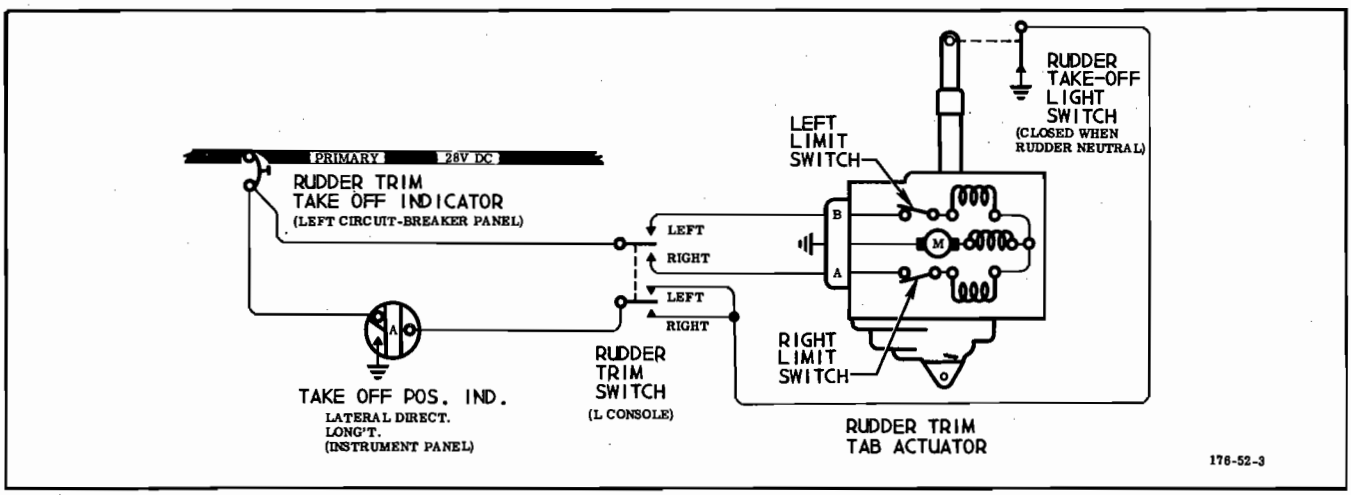


Figure 2-23. Rudder Trim Tab Control System

from alternate pump control pressure switch in left speed brake well. The alternate pump should continue to cycle.

d. Disconnect plug from alternate pump control pressure switch in right speed brake well. The alternate system pump should stop.

e. Connect plug to alternate pump control pressure switch in left speed brake well. Alternate pump should cycle.

f. Connect plug to alternate pump control pressure switch in right speed brake well. Alternate pump should continue to cycle.

Note

Steps g. through k. make up the check for automatic-return-to-normal-system pressure switches.

g. With hydraulic test stand turned on and regulated to 4.5 gpm flow, operate cockpit switch to check change-over to normal and back to alternate. Cockpit indicator light should be on when alternate system is operating.

h. With alternate system operating, disconnect plugs from both alternate pump control pressure switches (one in each speed brake well) and from automatic-return-to-normal-system pressure switch in left speed brake well. Operate control stick to bleed system pressure to 650 psi. At approximately this pressure, the control should automatically transfer to the normal system.

i. Connect alternate pump control pressure switch in right speed brake well and automatic-return-to-normal-system pressure switch in left speed brake well. Allow alternate system pressure to build up to 3000 psi. Control should return to alternate system.

j. Disconnect both pressure switches in right speed brake well and bleed system by operating controls. Automatic transfer to normal system should occur at approximately 650 psi system pressure.

k. Connect pressure switches in both speed brake wells. Pressure should build up and control should return to alternate system. Safety pressure switches.

Note

Steps l. through n. make up the check of normal system pressure switches.

l. Disconnect right normal system pressure switch located at wing front spar. Verify proper operation of both normal and alternate systems by operating cockpit control switch.

m. With normal system operating, turn off test stand. Move controls to bleed normal system. Automatic transfer to alternate system should occur when normal system pressure reaches approximately 650 psi.

n. Start test stand and reset controls to normal system. Connect right normal system pressure switch and disconnect left normal system pressure switch located at wing front spar. Repeat steps l. and n.; then connect and safety pressure switches.

Note

The following step makes up the check for the alternate pump motor power supply.

o. On F-86F-1 Airplanes, with external power on, all circuit breakers in, battery switch "OFF," hydraulic test stand off, nose wheel steering safety switch in "in-flight" position, and alternate system operating, pull circuit breaker at aft fuselage. Alternate pump should stop. Close circuit breaker. On F-86F-5 and subsequent airplanes, make the same check. The pump should continue to operate. Close circuit breaker.

Note

The following step makes up the check for the manual emergency change-over system.

p. With battery switch "OFF," external electric power off, and test stand off, pull manual change-over handle. Alternate pump should operate continuously at approximately 3500 psi with control stick not in motion, but may go as high as 4000 psi without necessarily indicating a malfunction. This is due to a possible accumulation of near maximum tolerances in the alternate system relief valve settings and pressure indicating system. Move control stick to verify operation of transfer

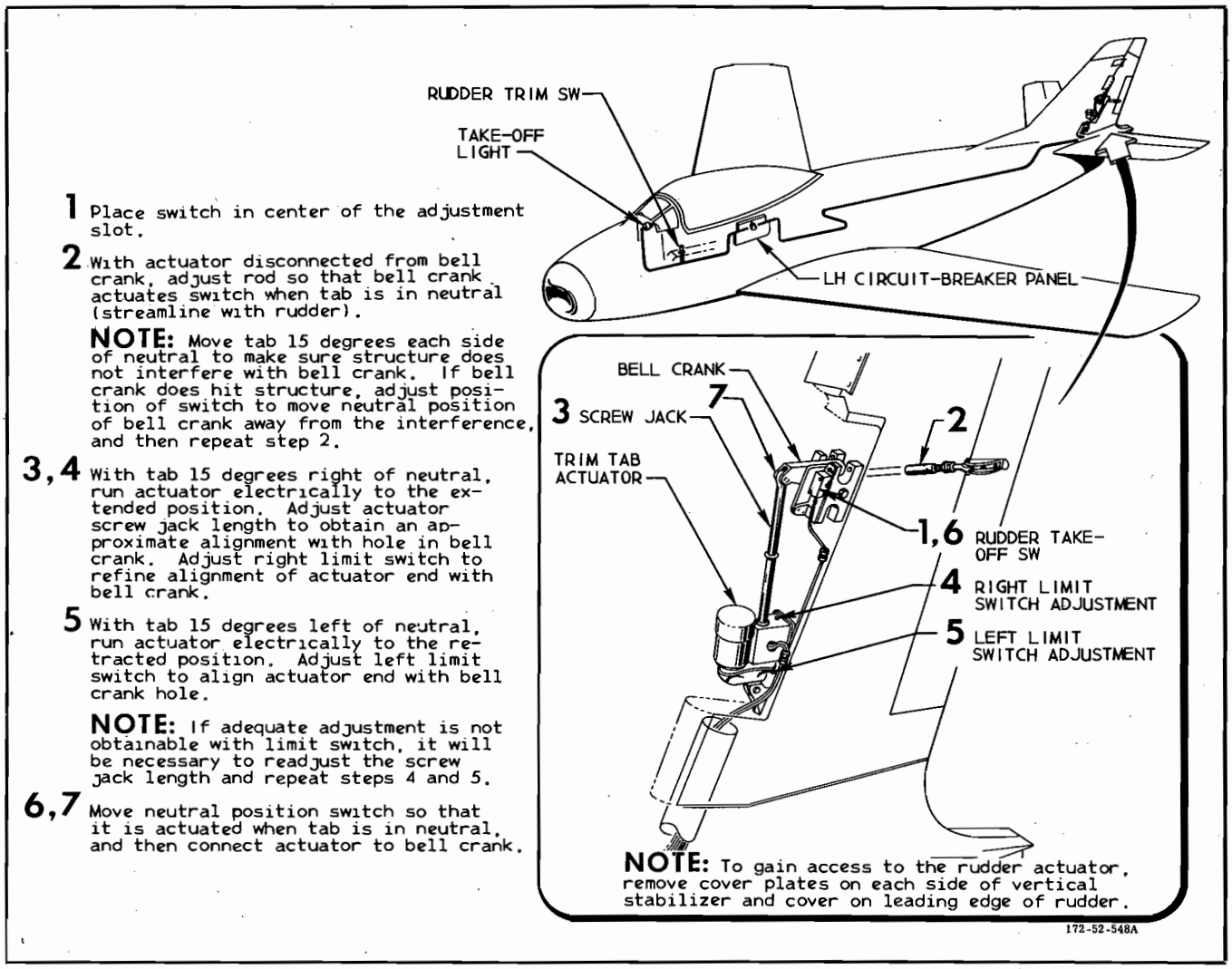


Figure 2-24. Adjusting Rudder Trim Tab Control System

valves. Return handle to its normal position; the pump should stop.

CAUTION

Hold duration of this test to a minimum because of high drain on airplane battery.

2-102. SURFACE CONTROL ALTERNATE HYDRAULIC MANUAL CHANGE-OVER SYSTEM.

2-103. The manually actuated hydraulic change-over system consists of an actuating handle, six telescopic units, a switch assembly, and two flexible (teleflex) cables. When the handle (located in the cockpit, forward of the right console) is actuated, it pulls the flexible cables. This action closes the normal system transfer valves, opens the alternate system transfer valve, and actuates the switch to connect the alternate system pump directly to the battery.

CAUTION

Extreme care should be exercised to prevent denting and/or kinking the flexible cable tubing, as dents or kinks would cause the cable to bind in the tubing. Bend radius of the tubing, preferably 5 inches, should never be less than 3 inches.

2-104. ADJUSTING ALTERNATE HYDRAULIC MANUAL CHANGE-OVER SYSTEM. See figure 2-28.

2-105. SURFACE CONTROL NORMAL HYDRAULIC POWER SYSTEM PUMP.

2-106. The variable-displacement, engine-driven hydraulic pump is used to supply pressure to the normal

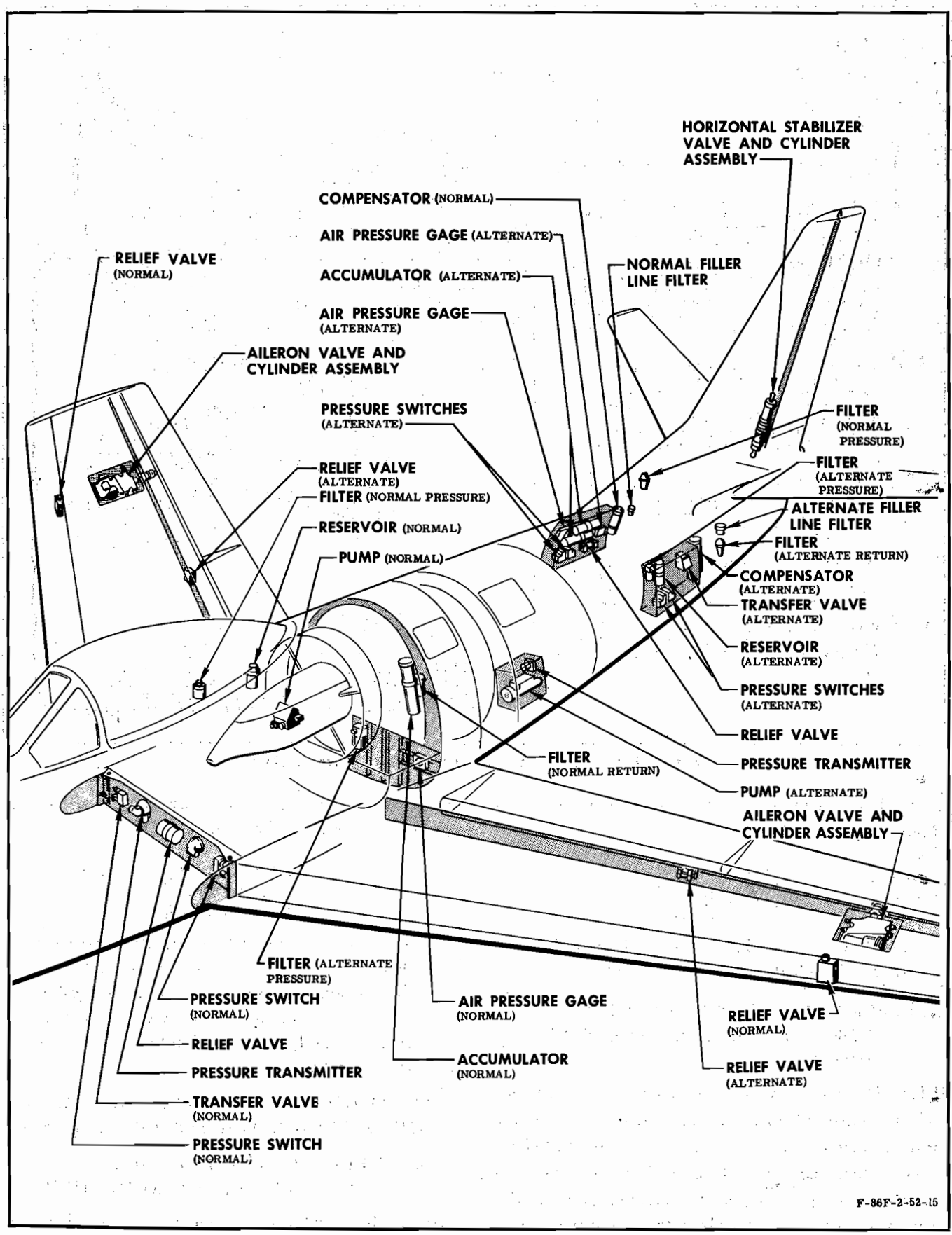


Figure 2-25. Surface Control Hydraulic Power System Unit Location

system. The pump, mounted on the accessory drive section of the engine, is a nine-piston rotary type with a maximum output of 5.65 gpm up to a pressure of 2700 psi. A spring-loaded control unit is incorporated in the pump housing to control pump output. In operation, the swivel yoke allows the cylinder assembly to change angle, causing the pistons to move back and forth within the respective cylinder bores. When the top of the pressure range is reached, the cylinder assembly straightens and reduces the volume of fluid delivered to the system. As the pressure diminishes, the swivel yoke is permitted to return to its normal position and the cylinder assembly resumes delivering fluid in sufficient volume to build up the required pressure once more.

2-107. REMOVING SURFACE CONTROL NORMAL HYDRAULIC POWER SYSTEM PUMP. Refer to paragraph 3-15.

2-108. INSTALLING SURFACE CONTROL NORMAL HYDRAULIC POWER SYSTEM PUMP. Refer to paragraph 3-16.

2-109. SURFACE CONTROL ALTERNATE HYDRAULIC POWER SYSTEM PUMP.

2-110. The alternate pump assembly consists of a continuous-duty electric motor and a constant-displacement pump. The pump is a piston type with an output of ½ gpm at 3000 psi. The assembly is located on the left side of the aft fuselage and is accessible through the data case access door.

2-111. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM RESERVOIRS.

2-112. There are two reservoirs in the surface control hydraulic power system, one for the normal system and one for the alternate system. The two reservoirs are identical; each has a 50-cubic-inch capacity. A relief valve is mounted on top of each reservoir and "cracks" at 60 (+5, −0) psi. The alternate system reservoir is located in the left speed brake well, and the normal system reservoir is accessible through the right engine access door.

2-113. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM ACCUMULATORS.

2-114. Three identical self-displacing accumulators are used in the surface control hydraulic power system. The two for the alternate system are located in the right speed brake well, and the one for the normal system is located in the left wheel well. On F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064 and all subsequent airplanes, only one accumulator is used in the alternate system. The accumulators are precharged with air to 600 (+50, −0) psi. Incorporated with each accumulator is a pressure gage and an air filling valve. The accumulators have three separate sections: one for air pressure, one for fluid pressure, and one for return fluid. As fluid leaves the pressure section of the accumulator, the air pressure forces the accumulator piston down, allowing fluid to enter the return section.

2-115. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM TRANSFER VALVES.

2-116. Two electrically energized and hydraulically actuated transfer valves are used in the surface control hydraulic power systems. The normal transfer valve is located on the right side of the wing center section front spar. This valve is normally open. During alternate operation, the valve shuts off the normal pressure but allows the cylinder side of the system to by-pass to return. The alternate transfer valve is located in the left speed brake well. This valve is normally closed, holding the alternate system accumulators pressurized, but bypassing all alternate system lines to the control valves. During alternate operation, this valve opens, allowing pressure to be directed to the control valves.

2-117. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM PRESSURE SWITCHES.

2-118. There are six pressure switches in the surface control hydraulic power systems. Four switches are in the alternate system, two located in each speed brake well, and two switches are in the normal system, located on the front spar of the wing center section. Two of the alternate pressure switches energize the alternate system pump when the pressure drops below 2750 (±175) psi. The other two switches de-energize both transfer valves when alternate system pressure drops to 650 (±75) psi. This automatically returns the controls to the normal system. The two normal switches energize both transfer valves when the normal system pressure drops below 650 (±75) psi.

2-119. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM COMPENSATORS.

2-120. Two compensators, one located in each side of the fuselage just aft of the speed brakes, are accessible through small access doors. They are used to take care of any pressure surges and to pressurize the return lines of both the normal and alternate system. Each pressurizing unit rod should be extended a minimum of ¼ inch to a maximum of 1¼ inches.

2-121. SURFACE CONTROL NORMAL AND ALTERNATE HYDRAULIC POWER SYSTEM PRESSURE TRANSMITTERS AND INDICATOR.

2-122. Two pressure transmitters are provided, one for each system. These transmitters are electrically connected to the pressure indicator, located on the instrument panel. A switch located next to the indicator

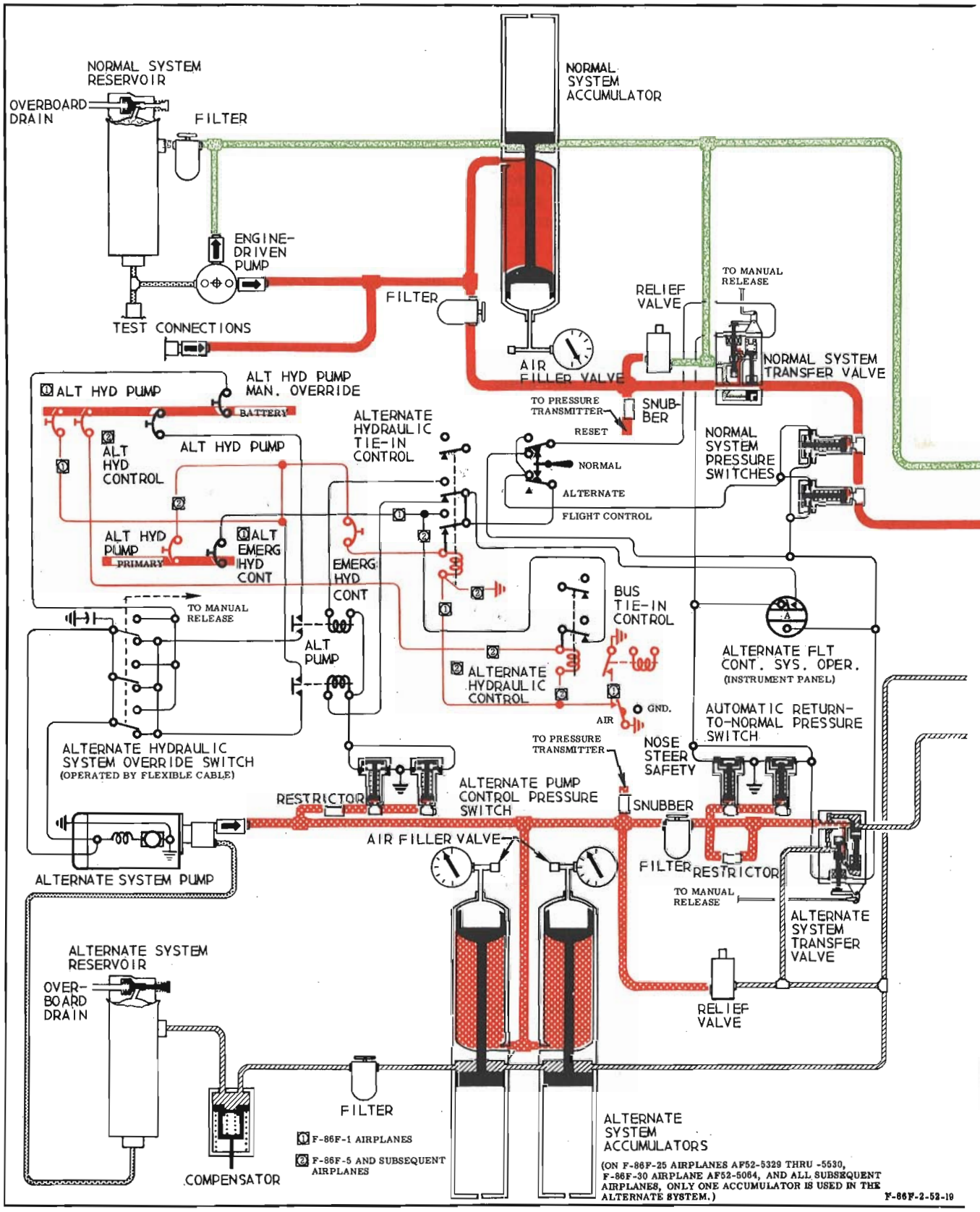


Figure 2-26. Surface Control Hydraulic Power System—Normal Operation (Sheet 1 of 2)

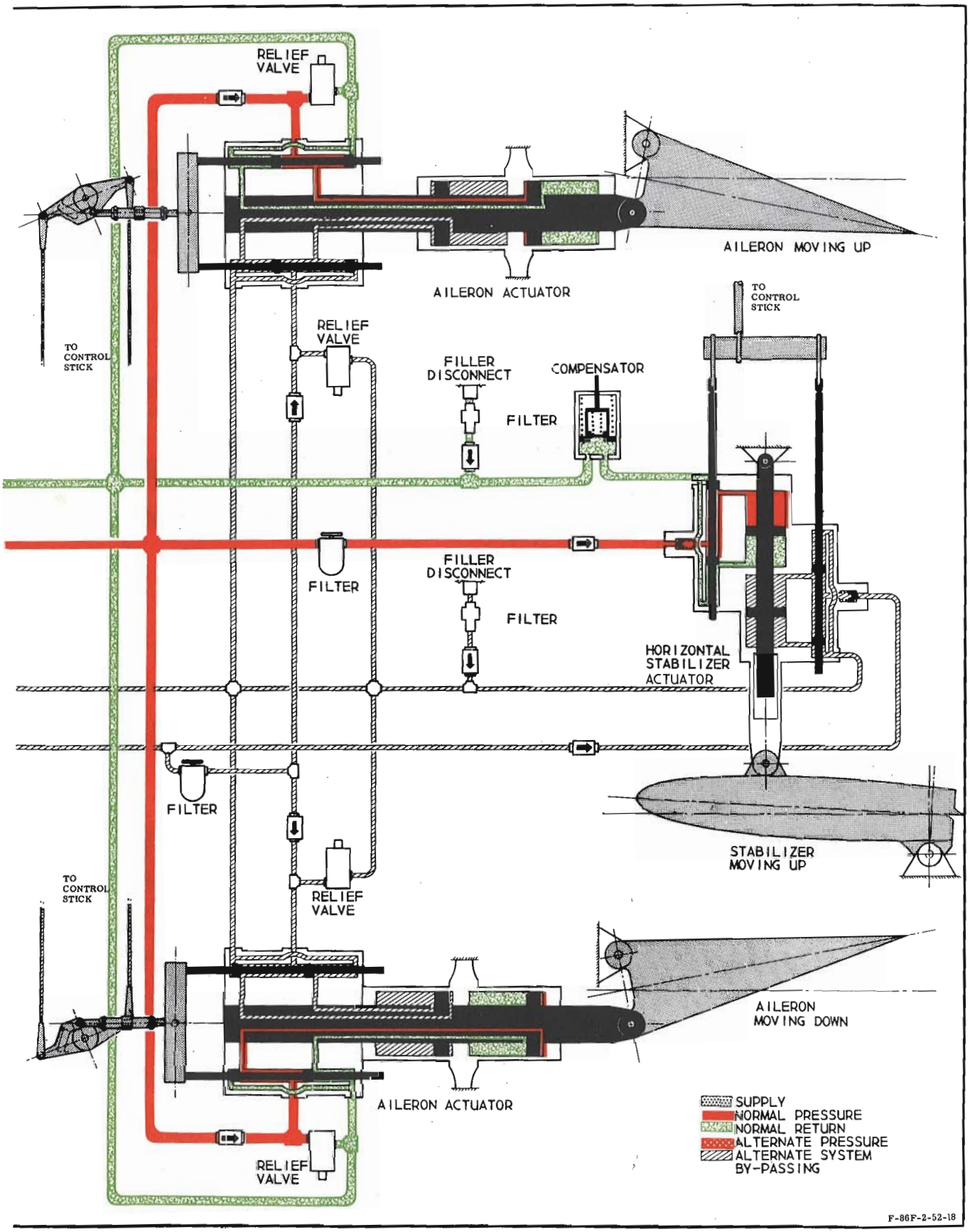


Figure 2-26. Surface Control Hydraulic Power System—Normal Operation (Sheet 2 of 2)

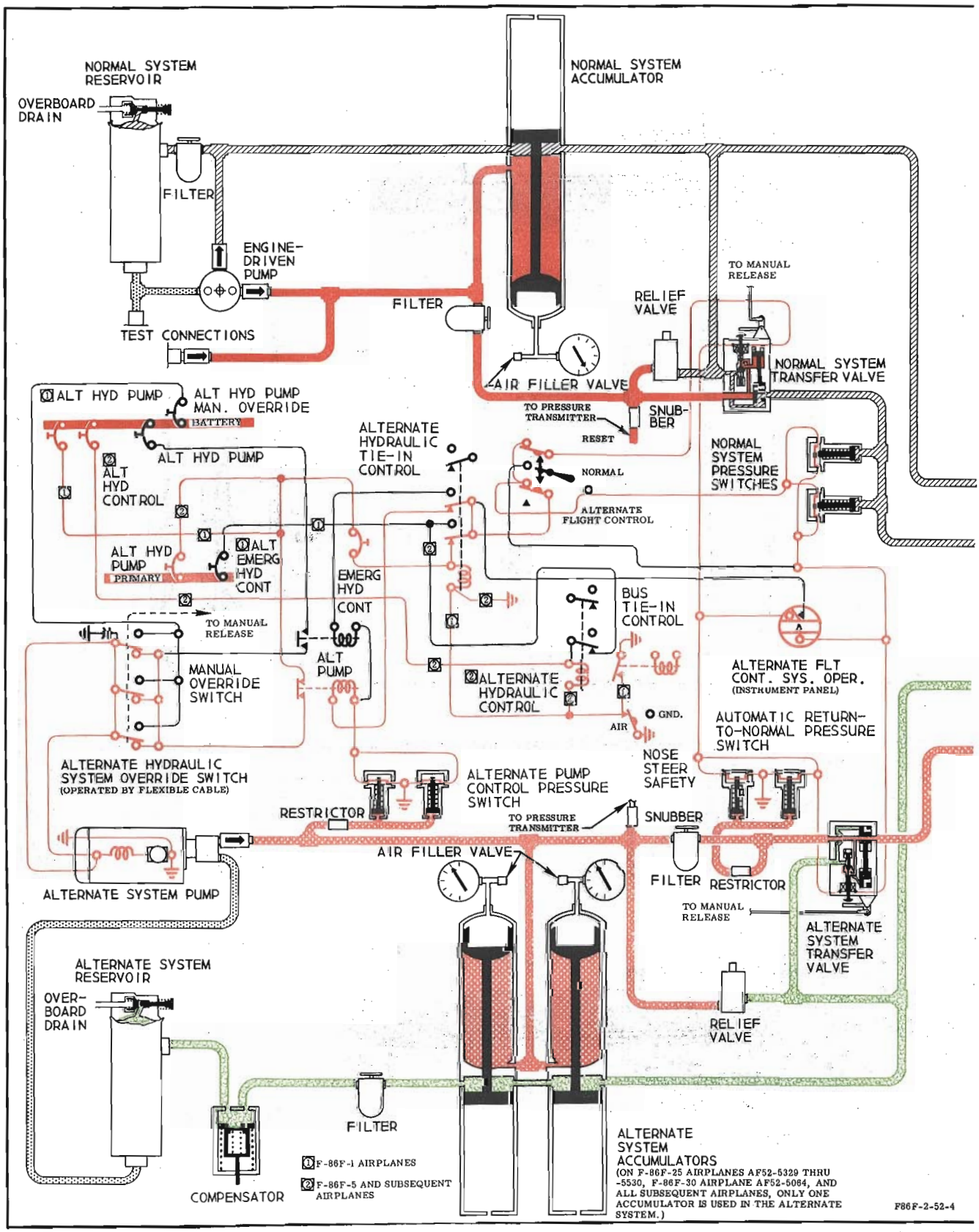


Figure 2-27. Surface Control Hydraulic Power System—Alternate Operation (Sheet 1 of 2)

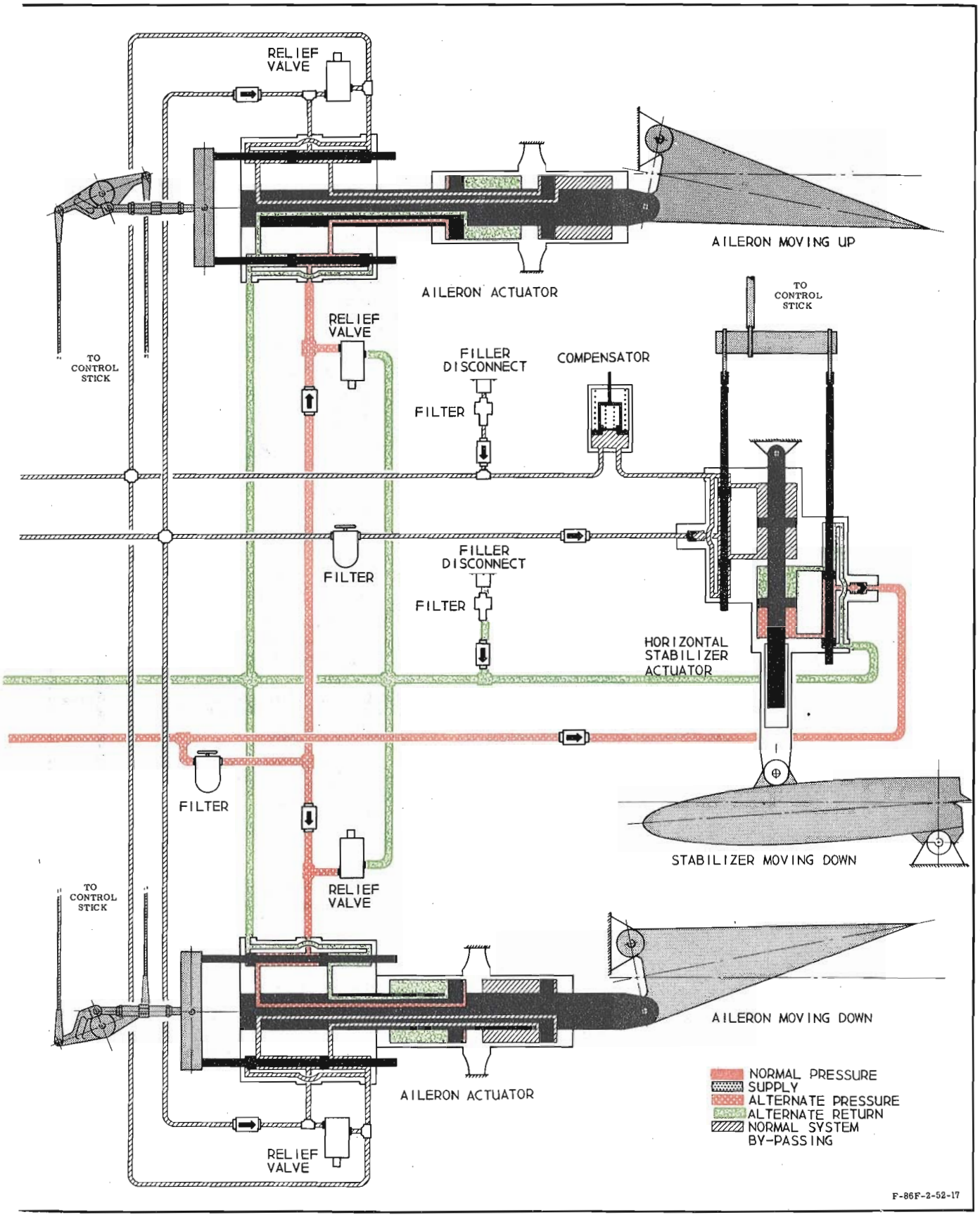
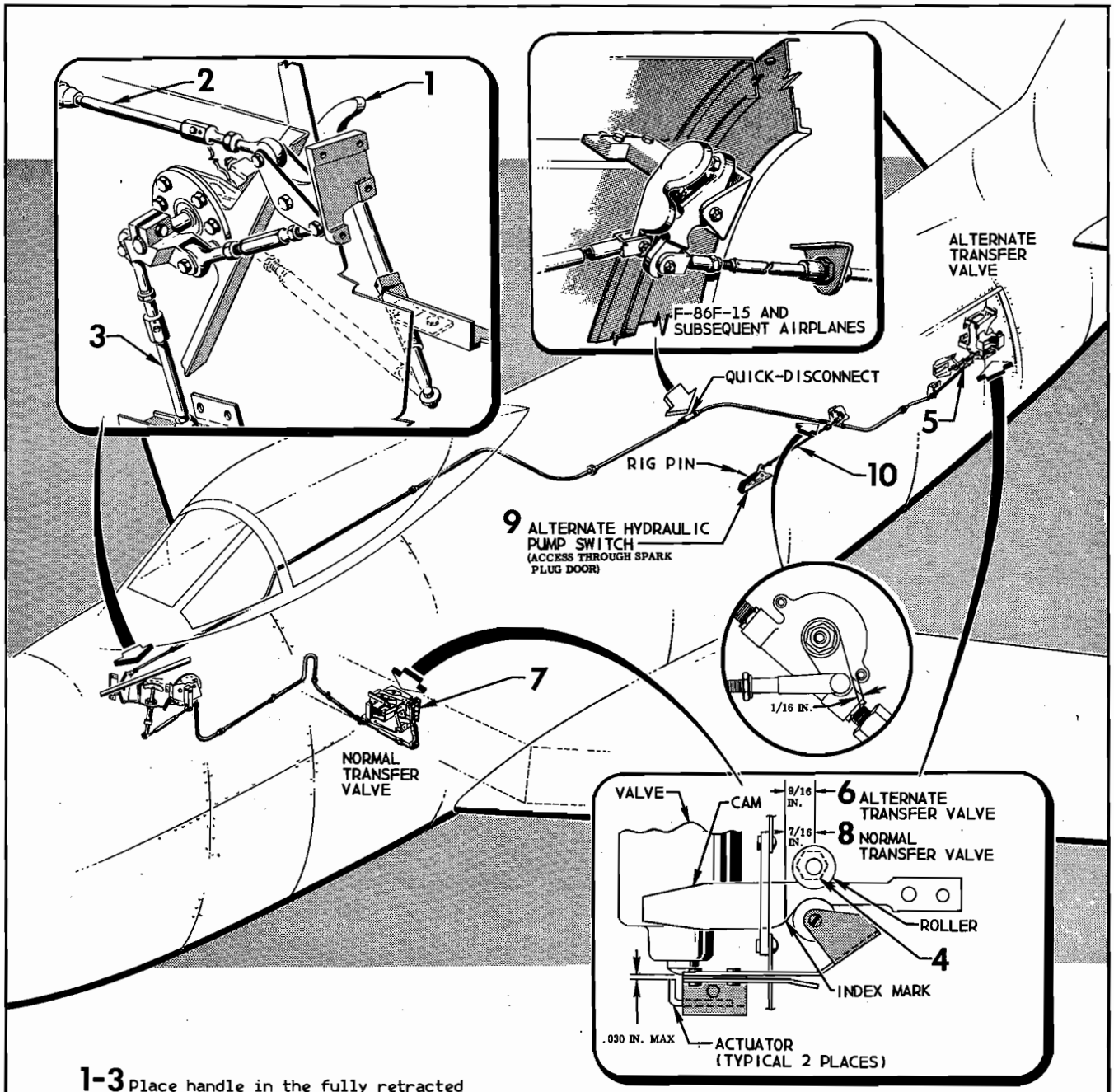


Figure 2-27. Surface Control Hydraulic Power System—Alternate Operation (Sheet 2 of 2)



1-3 Place handle in the fully retracted (pushed in) position and adjust telescopic units so that they do not extend beyond the inspection hole in the extended position nor bottom in the retracted position.

4 Adjust eccentric roller to position cam so that a maximum .030-inch clearance exists between actuator and valve plunger.

5, 6 Adjust telescopic rod of alternate transfer valve to position cam as shown.

7, 8 Adjust telescopic rod of normal transfer valve to position cam as shown.

NOTE: Disconnect electrical plug at pump. (Pump can be reached through data case access door.)

9, 10 Pull handle out and insert rig pin to position electrical switch to the on position. Adjust rod if necessary.

11 Remove rig pin, push handle in, and connect plug at pump. Pull handle out and verify that the valves and switches operate. The alternate pump should run continuously. Push handle in and trip reset switch to return valves and pressure switches to normal position. Repeat operation several times to verify that transition always occurs. Operating load on the handle should not exceed 55 pounds.

F86F-2-52-3

Figure 2-28. Adjusting Surface Control Alternate Hydraulic Manual Change-over System

permits selection of either normal or alternate system. This selector switch is also used to read utility hydraulic pressure.

2-123. SURFACE CONTROL HYDRAULIC SYSTEM ACTUATORS.

2-124. Each of the three actuating cylinders is actuated by two separate hydraulic systems, one normal and one alternate. The two systems are separated within the actuating cylinders to prevent loss of fluid from both systems if one system fails. A dual control valve is mounted on each actuating cylinder. When the control valve of the system being used is in the neutral position, it blocks both ports of the cylinder to lock fluid in the cylinder and prevent the surface from moving.

Note

Maintenance of this unit is limited to installation, removal, and linkage adjustment. Actuators must be replaced if they show evidence of leakage at any joint or boss. However, where there is motion through an external packing, a leakage not to exceed one drop in 25 cycles is allowed. Under no circumstances should the actuating cylinders and control valves be separated or disassembled.

2-124A. FLIGHT CONTROL POWER SYSTEM FILTERS.

2-124B. Eight filters are provided in the flight control power system; two in the normal system and two in the alternate system pressure lines, one in each system's return lines and one in each system's ground filler line. All of the filters, except the ones in the filler lines, incorporate a by-pass relief valve, which opens at 50 psi to by-pass the filter, should it become clogged. Each of the filters in both systems has a replaceable element, the changing and cleaning of which is covered in paragraphs 2-124D through 2-124F.

2-124C. For name, location, element No., and part No. of each flight control power filter in the airplane, refer to the following chart:

FLIGHT CONTROL POWER SYSTEM FILTERS

NAME OF FILTER	PART NO.	ELEMENT NO.	LOCATION	ACCESS
Alternate flight control return filter	AN6234-2	AN6235-2A	Aft of alternate control compensator, forward left-hand side of bulkhead fuselage station 340.	Alternate surface control hydraulic system compensator access, aft of upper aft corner of left-hand speed brake well.
Aft alternate flight control pressure filter	MS28720-6	AN6235-2A	Upper forward corner of left-hand speed brake well.	
Forward alternate flight control pressure filter	MS28720-6	AN6235-2A	Aft inboard corner of left-hand wheel well.	
Alternate flight control line filter	38390	27468	Above alternate control return filter and aft of alternate flight control compensator, forward left-hand side of fuselage station 340.	Alternate surface control hydraulic system compensator access, aft of upper aft corner of left-hand speed brake.
Normal flight control filler line filter	38390	27468	Above and aft of normal control hydraulic compensator, forward right-hand side of fuselage station 340.	Surface control normal hydraulic system compensator access, aft of upper aft corner of right-hand speed brake well.
Aft normal flight control pressure filter	MS28720-6	AN6235-2A	On aft surface of fuselage station 340, under saddle fillet.	Remove saddle fillet (removable fairing at aft end of dorsal fin).
Forward normal flight control pressure filter	31590 or MS28720-8	AN6235-3A	Right side of fuselage, below aft end of canopy. Station 156, lowest and most forward of a group of three filters.	Utility hydraulic reservoir access.

FLIGHT CONTROL POWER SYSTEM FILTERS (CONTINUED)

NAME OF FILTER	PART NO.	ELEMENT NO.	LOCATION	ACCESS
Normal flight control return filter	AN6234-3	AN6235-3A	Forward outboard side of left-hand engine compartment.	Left-hand wheel well, above dish pan.

2-124D. REMOVING FILTER ELEMENTS. To remove filter elements, either for cleaning or replacement, gain access to the filter and proceed as follows:

a. Remove all electrical and hydraulic power from airplane.

b. Operate stick until it freezes, thereby indicating the normal system discharged.

c. Pull flight control emergency (override) handle to its full extension.

d. Move stick as before until alternate system is exhausted (stick freezes).

Note

At the completion of steps a. through d., both systems are completely depressurized.

e. Have container to catch residual fluid.

f. Break safety wire and unscrew filter case.

g. Remove filter element from case by gently rocking it back and forth while exerting a pulling tension. Do not try to remove element by twisting.

2-124E. CLEANING FILTER ELEMENT. If a replacement is not available or the removed element does not warrant replacing, the filter element may be cleaned by observing the following procedure:

a. Use a solution of 50 percent benzine and 50 percent dope, or 100 percent chloroform.

b. With a soft-bristle brush and mild air blast, clean exterior of element convolutions.

WARNING

Do not breathe the fumes of cleaning solution or use near fire of any kind (no smoking). The solution is extremely volatile and should be used in a well-ventilated area.

2-124F. ASSEMBLING FILTER UNIT. If a filter element is found to be unsuitable for further use, discard the element and install replacement with new "O" rings as follows:

a. Position element in filter case and screw case into filter head.

b. Insert safety wire through lock bosses and secure wire.

2-125. PREPARING HYDRAULIC TUBING FOR INSTALLATION.

2-126. Refer to paragraph 3-39.

2-127. INSTALLING HYDRAULIC TUBING.

2-128. Refer to paragraph 3-41.

2-129. SPEED BRAKE SYSTEM.

2-130. The speed brake system (figure 2-29) employs two hydraulically actuated panels, one on each side of the aft fuselage. The speed brakes are electrically controlled by a switch on the throttle handle. The speed brake system operates on hydraulic pressure from the utility hydraulic power system. Two hydraulic restrictors, located in the left engine bay, are used to slow down closing of the speed brake panels. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063, a hydraulic accumulator provides pressure for approximately one cycle of emergency speed brake operation.

On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -5063, a speed brake dump valve and two quantity measuring fuses are installed. The dump valve, which is controlled by a lever on the left console, relieves hydraulic fluid from the actuating cylinders. This allows air loads to close the speed brake panels. The quantity measuring fuses, located in the left engine bay, prevent loss of fluid if a break occurs in the speed brake system hydraulic lines.

2-131. FUNCTION OF SPEED BRAKE SYSTEM.

2-132. When the speed brake switch is pushed to "OUT," electric current energizes one of the solenoids in the hydraulic control valve. The valve is positioned to allow hydraulic fluid, from the utility hydraulic power system, to enter the extend side of each actuating cylinder. Return fluid passes back through the control valve into the utility hydraulic system. The first opening movement of each actuating cylinder operates a linkage that releases the speed brake locking roller and holds it in the cocked position. When the speed brakes reach the desired position, the speed brake switch should be pushed back to neutral. This de-energizes the solenoid, allowing spring action to slide the valve back to neutral. This action causes a hydraulic lock, holding the speed brakes in position. When the speed brake switch is pushed to "IN," the other solenoid in the control valve is energized. The valve is positioned to direct fluid to the retract side of the actuating cylinders. Return fluid passes back through the control valve into the utility hydraulic system return line. When the speed brakes reach the desired position, the speed brake switch should be returned to neutral to hydraulically lock the speed brake panels in place. When the speed brake panels are closed, a latch on each panel releases the cocked roller, and the final action of the actuating cylinder seats the roller firmly. With the speed brake switch in neutral, positioning the emergency control lever to "EMERG. CLOSED" mechanically opens the dump valve. Fluid trapped in the actuating cylinders escapes through the dump valve into the utility hydraulic system return line. This allows air loads to close the speed brake panels.

2-133. TROUBLE SHOOTING SPEED BRAKE SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Speed brakes do not operate.	Control valve inoperative.	Check wiring. Replace valve.
Emergency close system does not operate.	Improper adjustment of linkage between emergency control handle and dump valve.	

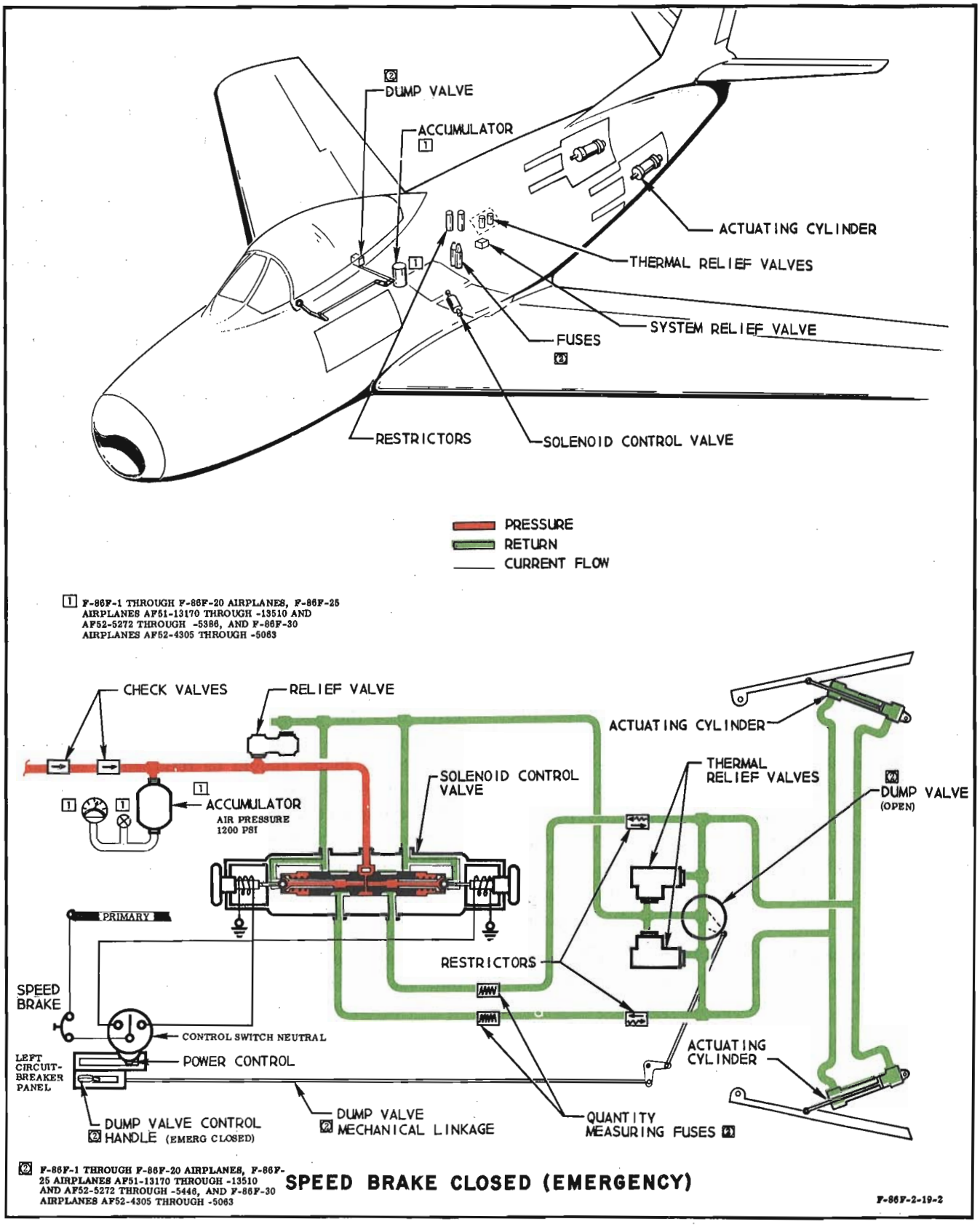


Figure 2-29. Speed Brake System (Sheet 1 of 2)

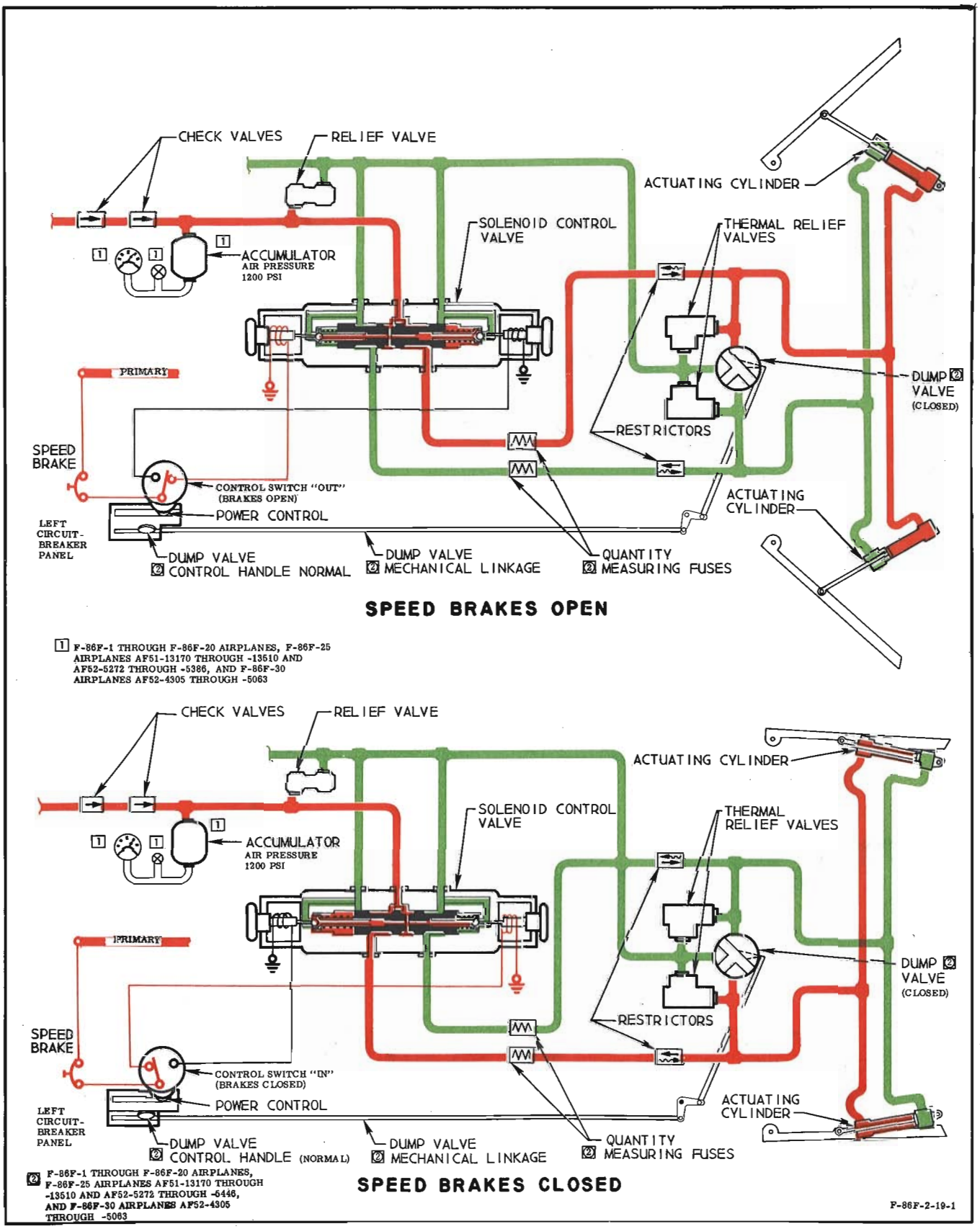


Figure 2-29. Speed Brake System (Sheet 2 of 2)

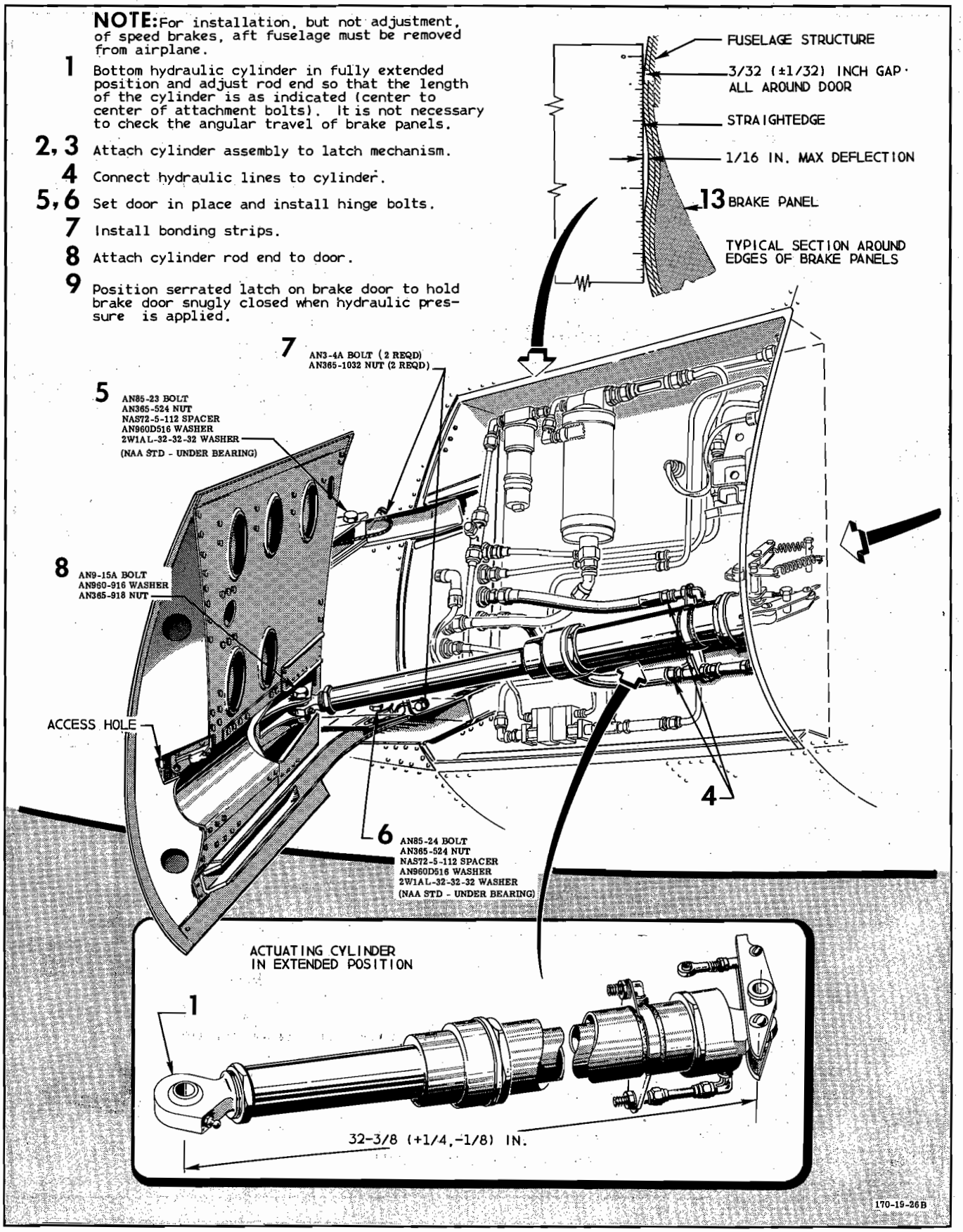
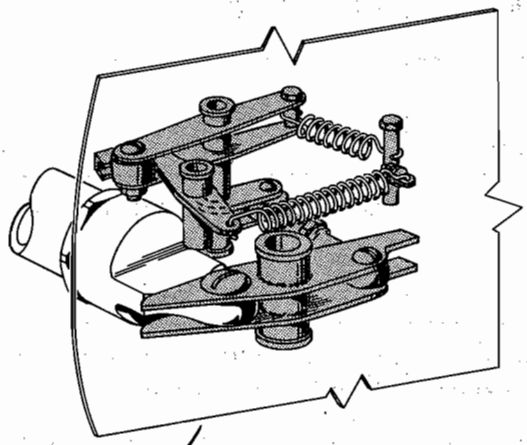


Figure 2-30. Installing and Adjusting Speed Brakes (Sheet 1 of 2)

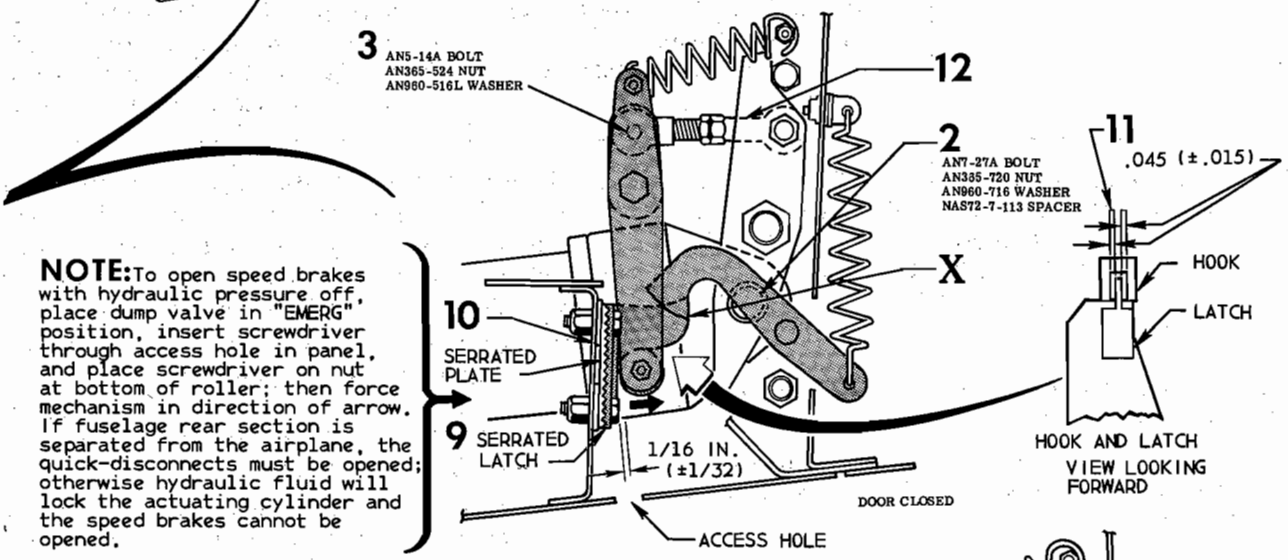


10,11 Adjust serrated plate laterally to give a .045 (±.015) inch gap between latch and hook when speed brake panel is closed.

NOTE: If necessary, shim latch and plate with washers to line up edge of latch with hook at point "X"; then repeat step 8.

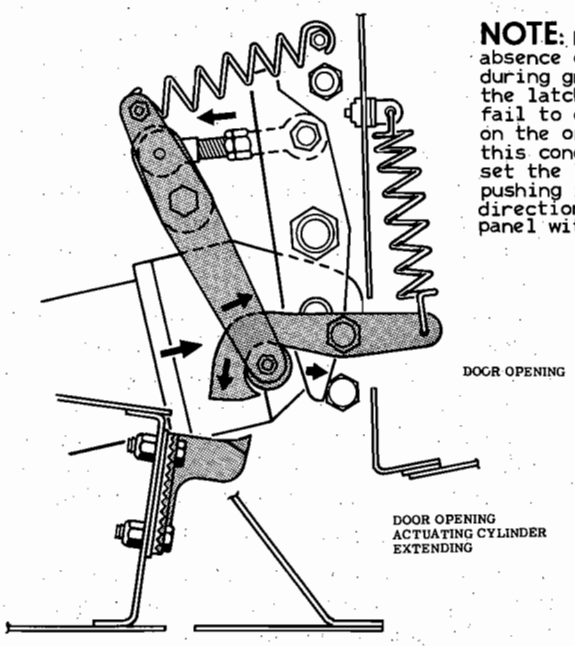
12 Adjust link to provide 1/16 (±1/32) inch clearance between roller and latch as shown, with hydraulic pressure off. Roller clearance may be checked by applying a coating of thick grease or putty on the latch and closing speed brake panel, then opening panel and measuring the thickness of grease at roller indent in grease.

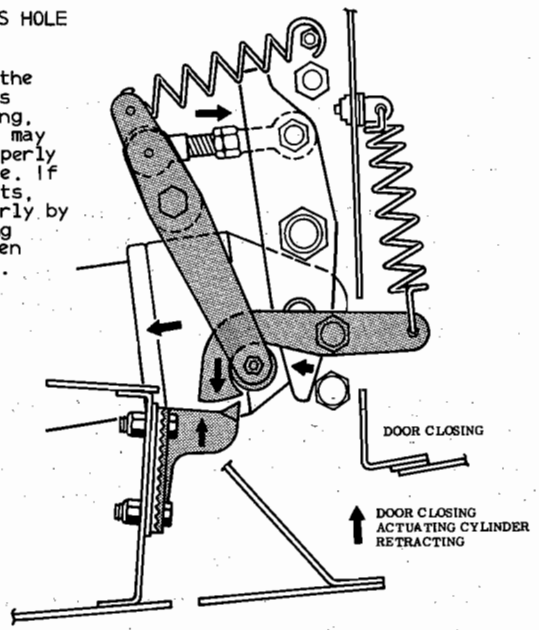
13 Check deflection of speed brake panel in the closed position with 3000 psi hydraulic pressure on actuating cylinder. Deflection of 1/16 inch, as shown in detail, is permissible.



NOTE: To open speed brakes with hydraulic pressure off, place dump valve in "EMERG" position, insert screwdriver through access hole in panel, and place screwdriver on nut at bottom of roller; then force mechanism in direction of arrow. If fuselage rear section is separated from the airplane, the quick-disconnects must be opened; otherwise hydraulic fluid will lock the actuating cylinder and the speed brakes cannot be opened.

NOTE: Because of the absence of air loads during ground testing, the latch mechanism may fail to operate properly on the opening cycle. If this condition exists, set the latch properly by pushing in a closing direction on the open panel with the hand.





170-19-27 B

Figure 2-30. Installing and Adjusting Speed Brakes (Sheet 2 of 2)

TROUBLE	PROBABLE CAUSE	REMEDY
Hydraulic pressure fluctuates with speed brakes open.	Dump valve partially open.	Adjust linkage.
Actuating cylinder rod end failure.	Reversed installation of restrictor in closing line. Improper retract port fitting.	
Movement of speed brakes restricted (brakes do not go full open or full closed).	Quantity measuring fuse damaged or dirty. Wrong quantity measuring fuse installed.	Replace quantity measuring fuse.
Speed brake panels do not open and close together.	Unequal deflection of panels (on airplanes that do not have speed brake accumulator). Unequal length of speed brake actuating cylinders. Speed brake locking latches improperly adjusted.	Decrease deflection of panel that locks slower. (See figure 2-30.) Check lengths of cylinders and make necessary adjustment. (See figure 2-30.) Check adjustment of latches and make necessary adjustment. (See figure 2-30.)

2-134. CHECKING SPEED BRAKE SYSTEM (F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5386, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -5063).

2-135. To check speed brake system for proper operation, proceed as follows:

a. Open and close speed brakes several times. See that locks function properly, and that brake panels open and close together.

Note

The speed brake panels should close in 2 to 4 seconds in flight and in 4½ to 5½ seconds on ground.

b. To check control valve for sticking, open speed brakes halfway. Wait 3 minutes; then check brake creep through the next 3 additional minutes. Sum of the creep of both brake cylinders should not be over ½ inch with brakes in "open" position for the 3-minute period.

c. Open speed brakes; then close them halfway. Wait 3 minutes; then check for brake cylinder creep for next 3 minutes. Sum of the creep of both brake cylinders should not be over one inch for the 3-minute period.

Note

When checking airplanes in which the speed brake dump valve is installed, perform steps d. and e.

d. Open speed brakes, set speed brake control switch in neutral position, and then position emergency control lever to "EMERG. CLOSED." Manual pressure against the sides of the speed brake panels should close them.

e. Return emergency control lever to "NORMAL," and safety with .015-inch brass lockwire (Federal Specification QQ-W-321, Grade A, annealed soft).

2-135A. CHECKING SPEED BRAKE SYSTEM (F-86F-25 AIRPLANES AF52-5387 THROUGH -5530, F-86F-30 AIRPLANES AF52-5064 THROUGH -5163, AND F-86F-35 AIRPLANES).

2-135B. Speed brake systems not using an accumulator sometimes vary in operation from those using an accumulator. For these airplanes, the rigging instructions must be altered from those given in figure 2-30. The speed brake doors shall be rigged to unlock with a hydraulic pressure of 100 to 200 psi and a maximum differential hydraulic pressure of 75 psi. To check the speed brake system, proceed as follows:

a. Connect hydraulic test stand to airplane.

b. Operate test stand and note pressure at which first door opens. This pressure must be within 100 to 200 psi range.

c. Continue test stand operation until second door opens. Note pressure at which door opened. Pressure must be within 100 to 200 psi range and also within 75 psi of the pressure noted when the first door opened.

d. Adjust latches, if necessary, to accomplish speed brake door opening within the ranges prescribed in steps b. and c., and then recheck operation.

2-136. REMOVING SPEED BRAKES.

2-137. The parts and components referred to in the following procedure are identified in figure 2-30. Remove the speed brakes as follows:

a. Make sure speed brake panels are open; then remove fuselage rear section. (Refer to paragraph 2-149.)

b. Disconnect hydraulic lines from actuating cylinder.

c. Disconnect actuating cylinder rod end from speed brake panel.

d. Provide support for actuating cylinder and complete removal of cylinder by disconnecting it from latch mechanism.

e. Disconnect speed brake panel bonding strips from fuselage.

f. Provide support for speed brake panel, remove panel hinge bolts, and remove panel from fuselage.

2-138. INSTALLING AND ADJUSTING SPEED BRAKES.

2-139. See figure 2-30.

2-140. SPEED BRAKE SYSTEM CONTROL VALVE.

2-141. The speed brake system control valve (figure 2-29), located in the left engine bay, controls the speed brake hydraulic system. The valve contains two separately energized solenoids and a sliding spool. When either solenoid is energized (speed brake switch in "IN" or "OUT" position), the valve opens an adjacent ball check at the end of the spool, releasing hydraulic pressure to the return line. Pressure on the unreleased end slides the spool, directing pressure to one of the actuating cylinder lines ("in" or "out"), and opening the other actuating cylinder line to the return line. When neither solenoid is energized (switch in neutral), the spool is centered by springs and balanced hydraulic pressure. Lines to the actuating cylinders are closed. The valve may be controlled by hand when the electrical system is off, by pushing either of the two knobs at the ends of the valve.

2-142. SPEED BRAKE SYSTEM DUMP VALVE.

2-143. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -5063, a speed brake dump valve is installed. The dump valve, located at the forward end of the radio bay, provides an emergency means of closing the speed brakes when no hydraulic pressure is available. The valve is mechanically positioned by

means of a two-position ("EMERG. CLOSED" and "NORMAL") emergency control lever. This lever is adjacent to the engine power control lever on the left console. Moving the emergency control lever to "EMERG. OPEN," positions the valve and connects the open line of the actuating cylinders with the utility hydraulic system return line. Release of the hydraulic pressure allows the speed brake panels to close under air loads.

2-144. SPEED BRAKE SYSTEM HYDRAULIC ACCUMULATOR.

2-145. A speed brake accumulator, with an air filler valve and air gage, is installed on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063. It is located in the right engine bay, above the wheel well. The piston-type accumulator is precharged with air at a pressure of 1200 (±50) psi before the hydraulic system is pressurized. The accumulator helps maintain normal system pressure when the speed brakes are being operated. It also supplies hydraulic fluid under pressure to operate the speed brakes for approximately one cycle in event of hydraulic failure.

2-146. FUSELAGE.

2-147. The fuselage is constructed in two main sections to facilitate installation and removal of the engine. The two sections are joined by four special bolts located at quarter points around the fuselage. Quick-disconnects make it possible to easily separate the wiring, control cables, hydraulic lines, and fuel lines at the joint. The forward main section incorporates the cockpit, the engine air intake duct, the engine mounts, the radio and radar equipment, and two fuel cells. The engine and engine tail pipe are enclosed by the aft main section, which also incorporates the speed brakes. The cockpit is sealed, so that it can be pressurized. An electrically operated canopy (paragraph 2-166) and a windshield enclose the cockpit. The windshield consists of two tempered laminated plate glass side panels and an armor glass center panel. (See figure 2-33.) Pressure-sealing is employed around the edges of the panels and at all metal joints. A radar equipment and battery access door is located on the top side of the fuselage, forward of the windshield. The door is aligned by pins and secured by two mechanically locked handles.

2-148. REMOVING FUSELAGE REAR SECTION.

2-149. The parts and components referred to in the following procedure are identified in figure 2-32. Remove the fuselage rear section as follows:

Note

Use E975 sling or Type A-3 cradle to support rear fuselage during removal. (See figure 1-6.)

CAUTION

Relieve air pressure from accumulator before removing fuselage rear section.

a. Disconnect hydraulic lines, and install short piece of hydraulic line to connect pressure and return lines so that fluid will circulate, preventing damage to system. Then disconnect rudder control cables, horizontal stabilizer valve control cables, teleflex cable, electrical wiring, and antenna cable through access doors on upper side of fuselage.

b. Disconnect mid-frame air leakage line through right-hand spark-plug door.

c. Disconnect fuel drain lines through fire extinguisher door.

d. Remove rear fuselage attaching bolts and move rear fuselage off over tail pipe.

e. If rear fuselage is not to be reinstalled within a short time, disconnect latch and place fuel vent line in retracted (stored) position.

2-150. INSTALLING FUSELAGE REAR SECTION.

2-151. See figure 2-32.

2-152. SEPARATING FUSELAGE AND WING.

2-153. The parts and components referred to in the following procedure are identified in figure 2-31. Separate the fuselage from the wing as follows:

Note

- Before removing fuselage, drain fuel and hydraulic lines and remove battery.
- Use E974 sling to support fuselage, and support wing at jack points during removal. (See figures 1-6 and 1-7.)

a. Disconnect rocket launcher electrical cables at connector. (Access door is located on underside of wing leading edge.)

b. Remove wing center section fairing. (Refer to paragraph 2-12.)

c. Remove bottom fairing forward attaching panel.

d. Disconnect bungee rod to left aileron sector.

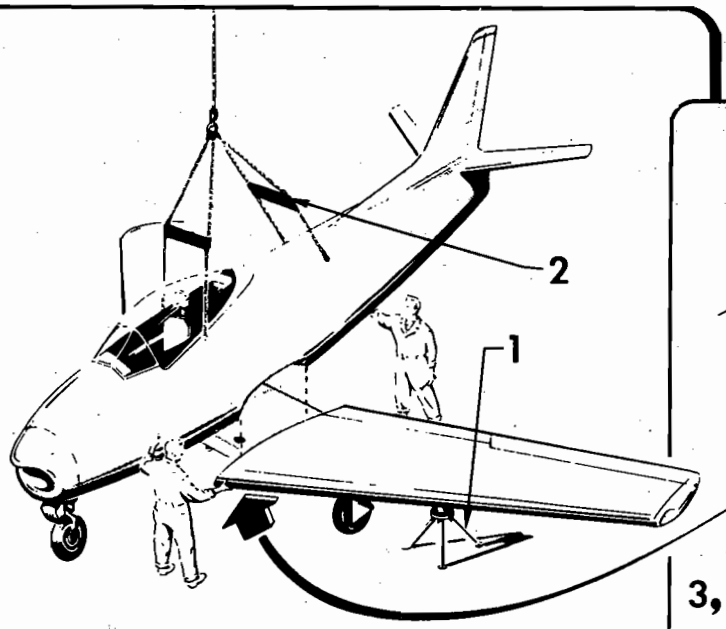
e. Remove hydraulic line from flow regulator to "T" fitting.

f. Disconnect electrical wiring at terminal strip in left wheel well, and disconnect clips.

g. Drain fuel system.

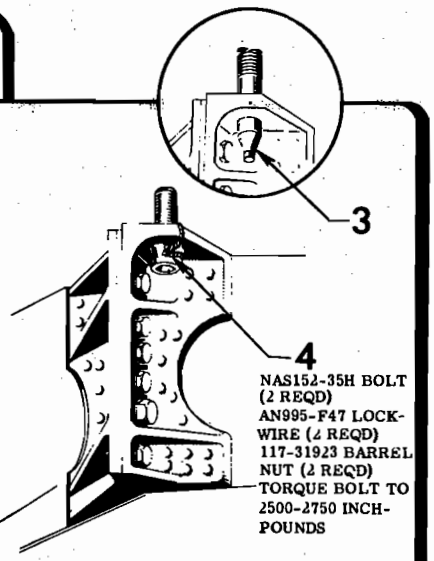
h. Remove fuel-air pressure line, and left and right fuel lines at wing front spar.

i. Remove center wing cell fuel booster pumps (paragraph 5-188), and through access openings, dis-

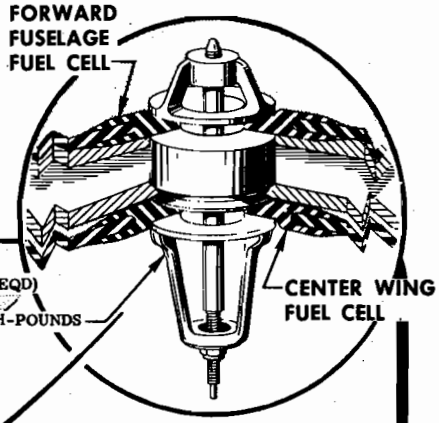


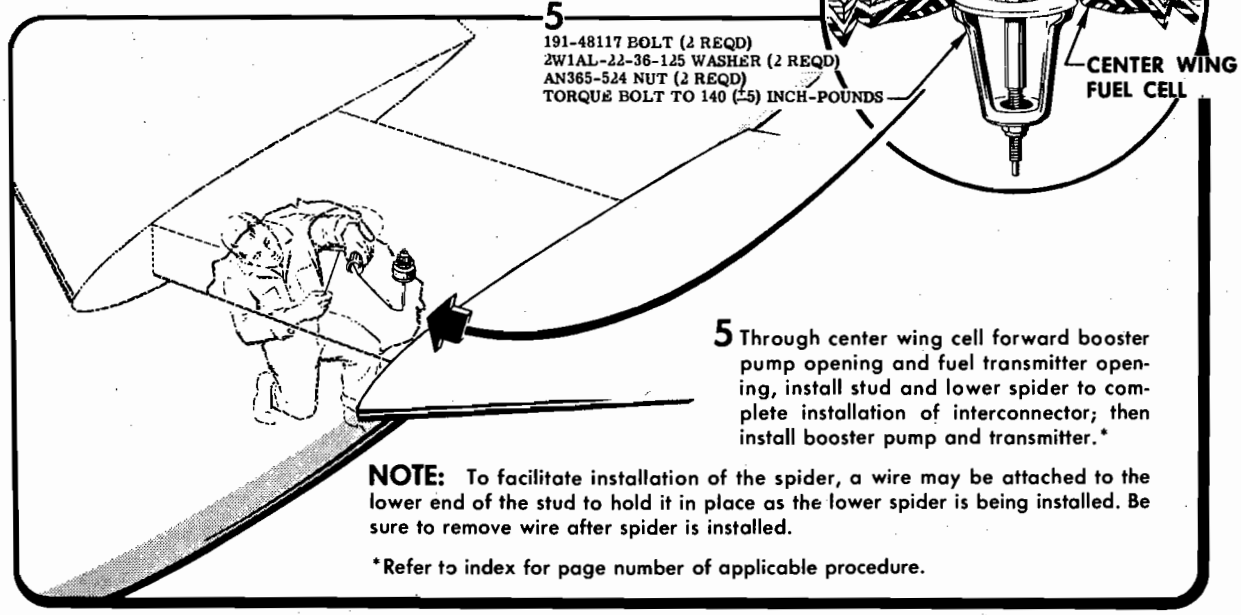
1, 2 With wing supported on jacks, move fuselage into position, using E974 hoisting sling adjusted so that forward part of fuselage will be lowered first. Carefully lower fuselage, using T268 aligning pins in forward center-wing-to-fuselage attaching bolt holes to facilitate proper alignment.

CAUTION: When lowering fuselage, use care to prevent damaging structure, loose wires, and cables.



3, 4 Remove aligning pins one at a time and replace with attaching bolts. Torque bolts; then safety.





5 Through center wing cell forward booster pump opening and fuel transmitter opening, install stud and lower spider to complete installation of interconnector; then install booster pump and transmitter.*

NOTE: To facilitate installation of the spider, a wire may be attached to the lower end of the stud to hold it in place as the lower spider is being installed. Be sure to remove wire after spider is installed.

*Refer to index for page number of applicable procedure.

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Figure 2-31. Joining Fuselage and Wing (Sheet 1 of 3)

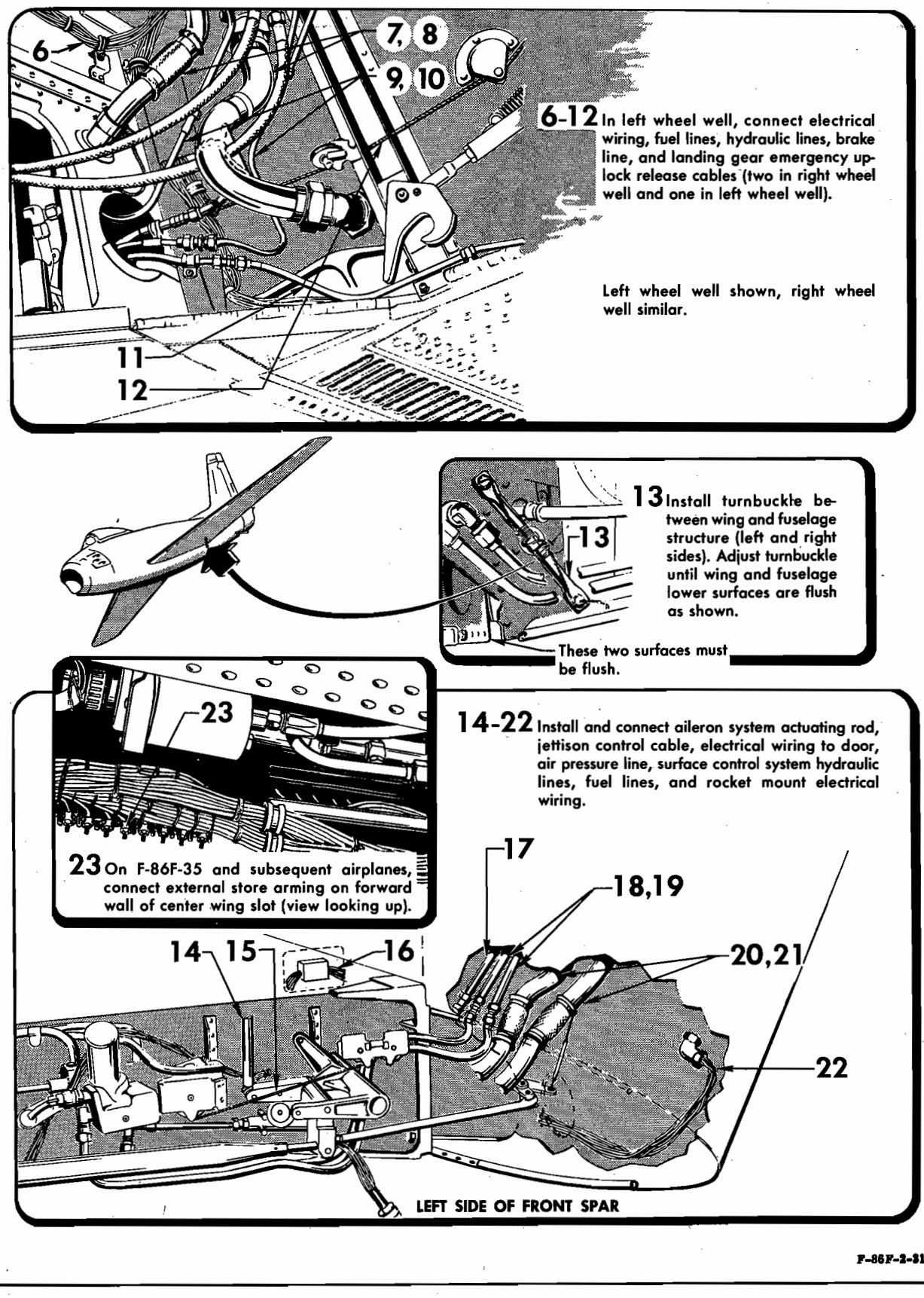


Figure 2-31. Joining Fuselage and Wing (Sheet 2 of 3)

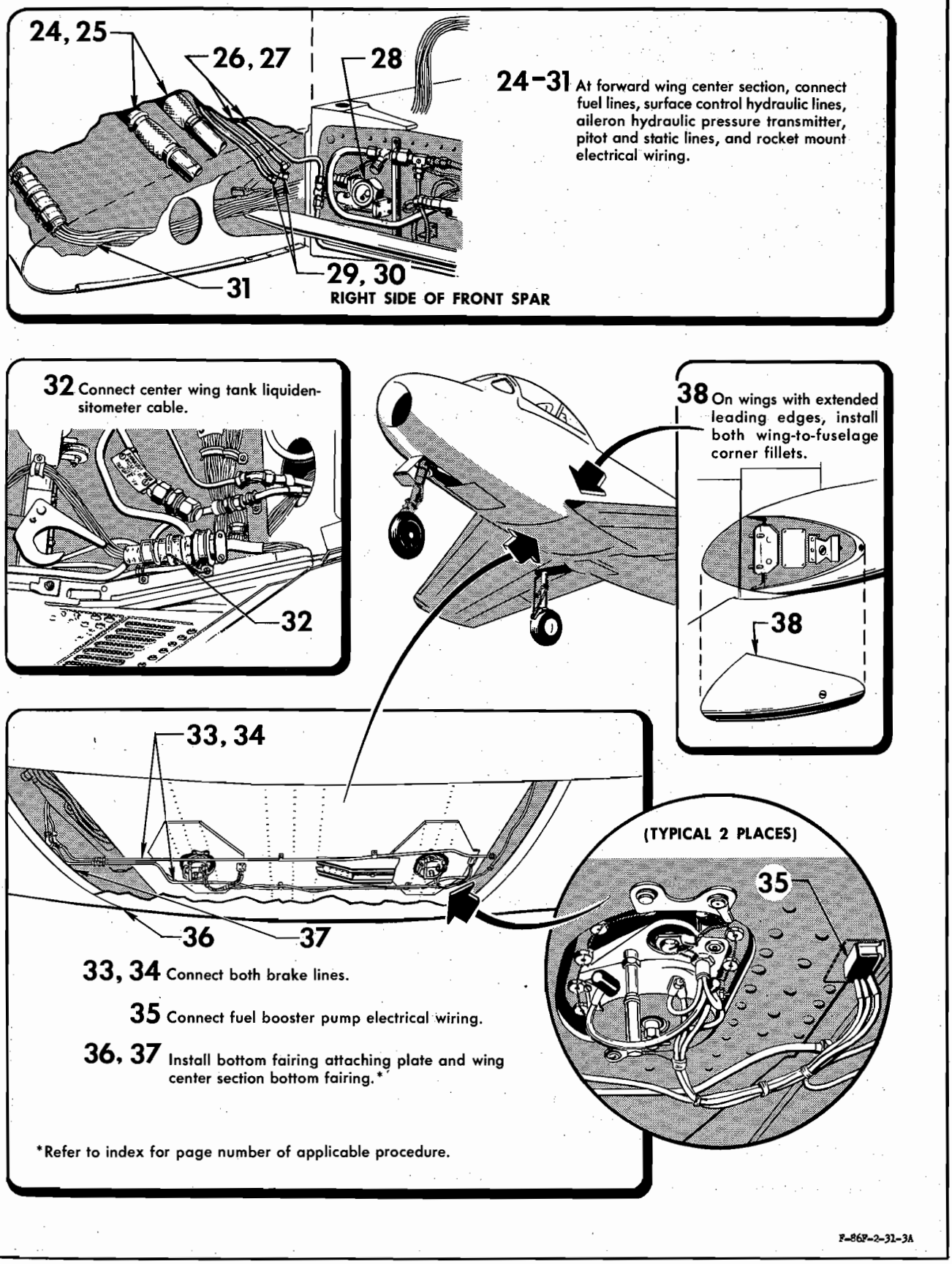


Figure 2-31. Joining Fuselage and Wing (Sheet 3 of 3)

connect both interconnectors that join forward fuselage cell to center wing cell.

j. Remove brake hydraulic lines under wing center section. At front spar, rotate lines down to clear wing front spar; at rear spar, push fittings through fuselage bulkhead to clear rear spar.

k. Disconnect left and right wing fuel cell vent lines.

l. Disconnect center wing cell vent line.

m. Remove turnbuckles in wheel wells.

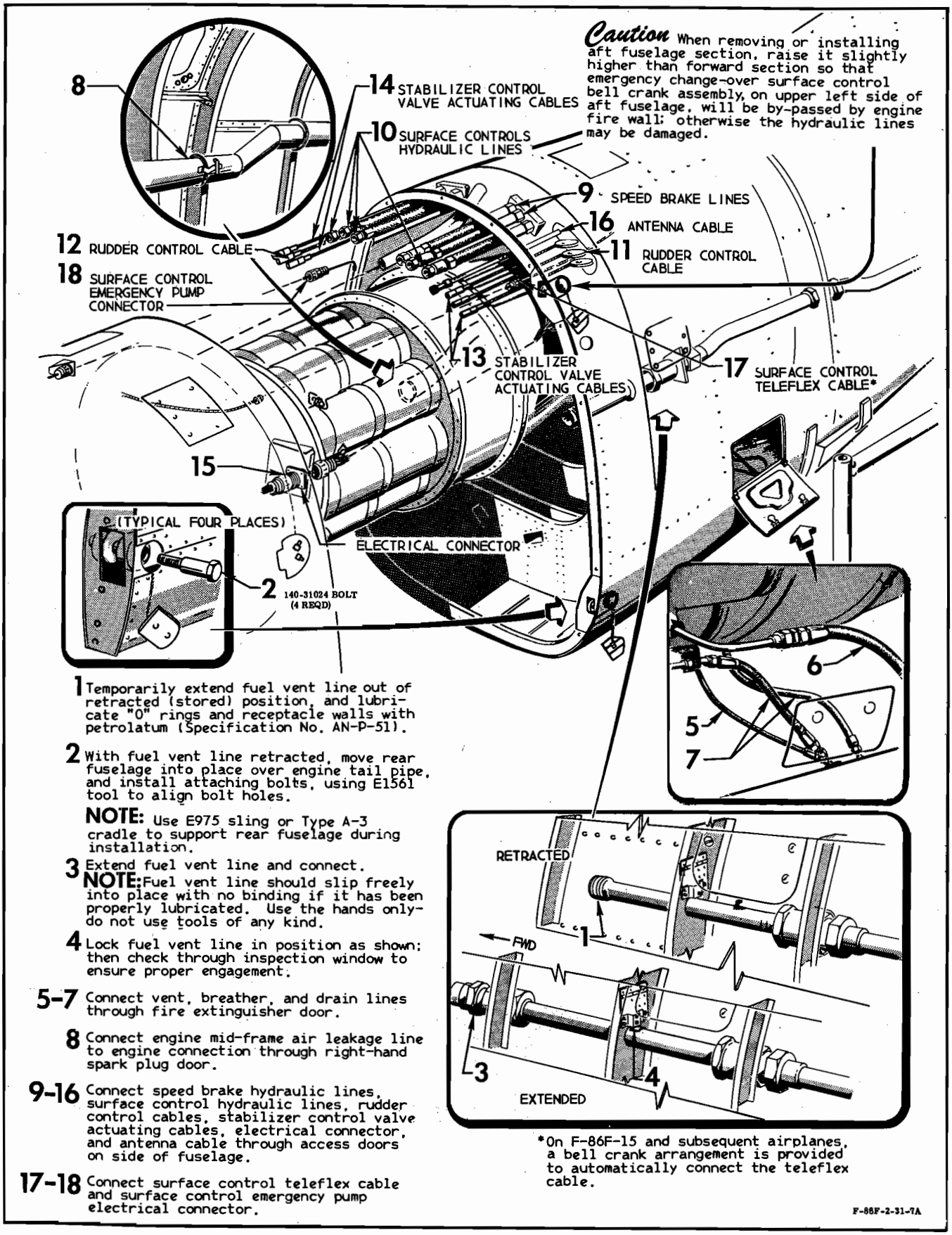
n. Disconnect landing gear emergency uplock release cables in left and right wheel wells.

o. Disconnect wires at left and right electrical wiring terminal block.

p. Disconnect liquidensitometer electrical plug, vent line, and elbow.

q. Disconnect landing gear and brake hydraulic lines.

r. Remove attaching bolts, and hoist fuselage clear of wing.



1 Temporarily extend fuel vent line out of retracted (stored) position, and lubricate "O" rings and receptacle walls with petrolatum (Specification No. AN-P-51).

2 With fuel vent line retracted, move rear fuselage into place over engine tail pipe, and install attaching bolts, using E1561 tool to align bolt holes.

NOTE: Use E975 sling or Type A-3 cradle to support rear fuselage during installation.

3 Extend fuel vent line and connect.

NOTE: Fuel vent line should slip freely into place with no binding if it has been properly lubricated. Use the hands only-do not use tools of any kind.

4 Lock fuel vent line in position as shown; then check through inspection window to ensure proper engagement.

5-7 Connect vent, breather, and drain lines through fire extinguisher door.

8 Connect engine mid-frame air leakage line to engine connection through right-hand spark plug door.

9-16 Connect speed brake hydraulic lines, surface control hydraulic lines, rudder control cables, stabilizer control valve actuating cables, electrical connector, and antenna cable through access doors on side of fuselage.

17-18 Connect surface control teleflex cable and surface control emergency pump electrical connector.

*On F-86F-15 and subsequent airplanes, a bell crank arrangement is provided to automatically connect the teleflex cable.

F-86F-2-31-7A

Figure 2-32. Installing Fuselage Rear Section

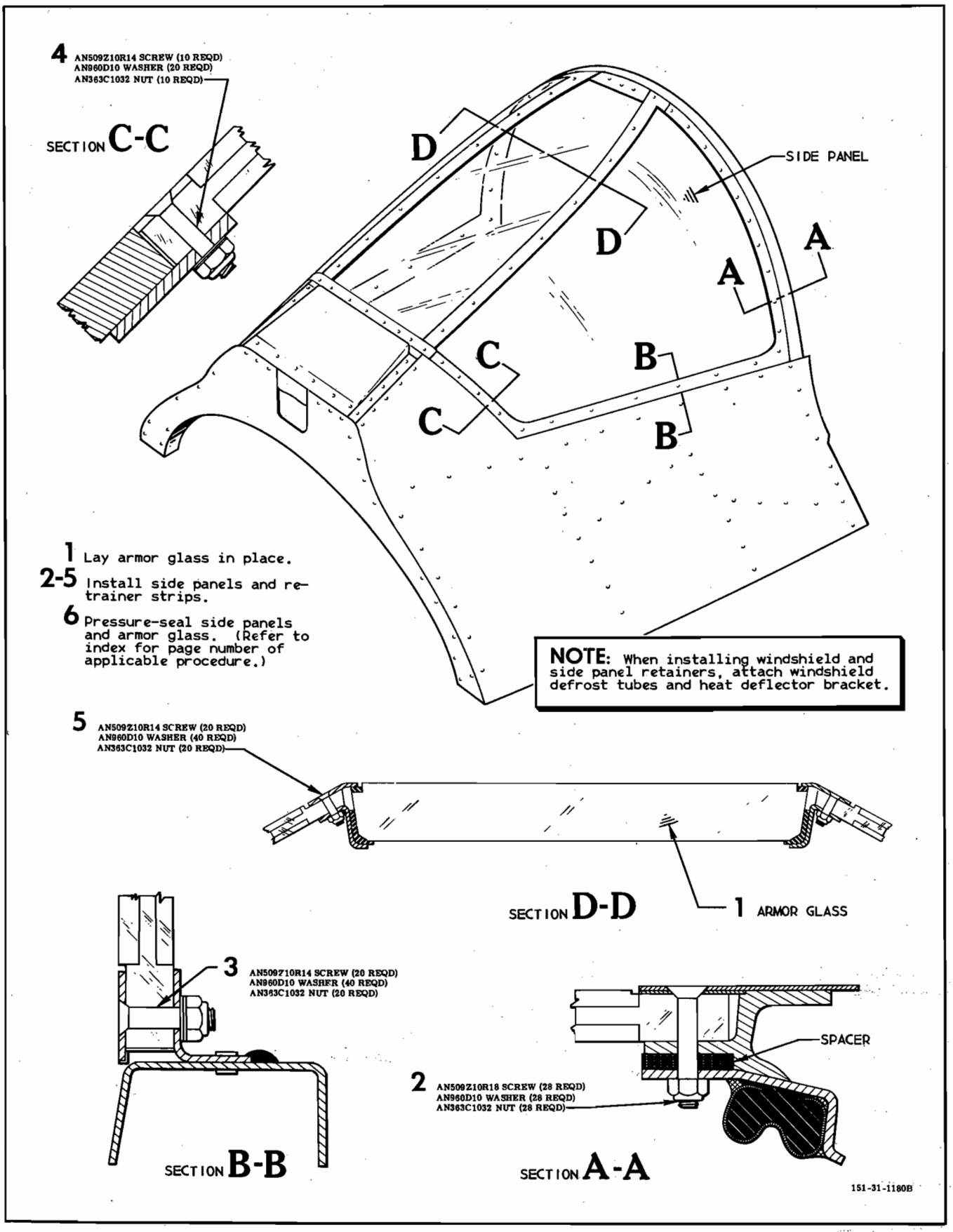


Figure 2-33. Installing Windshield

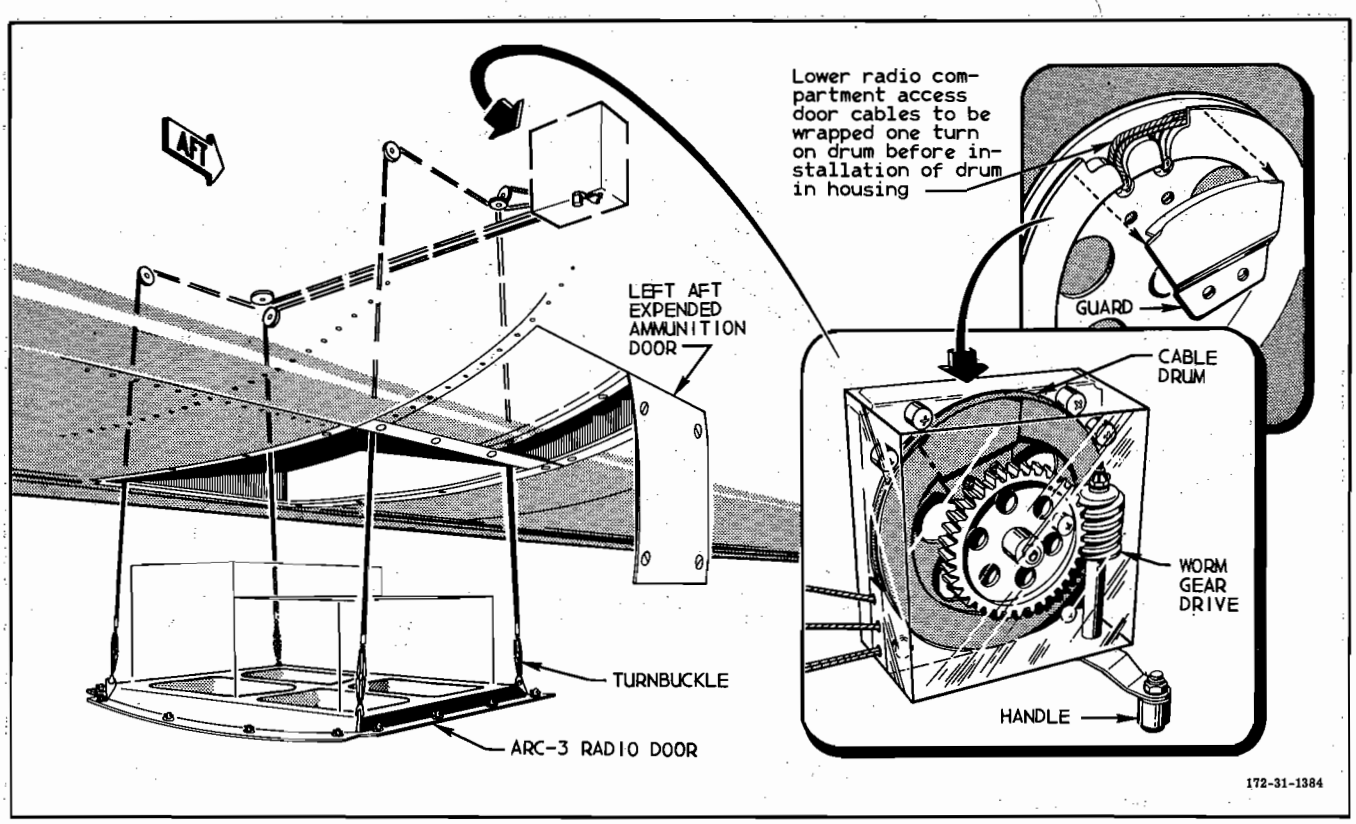


Figure 2-34. Lower Radio Compartment Access Door—F-86F-1 Through F-86F-20 Airplanes

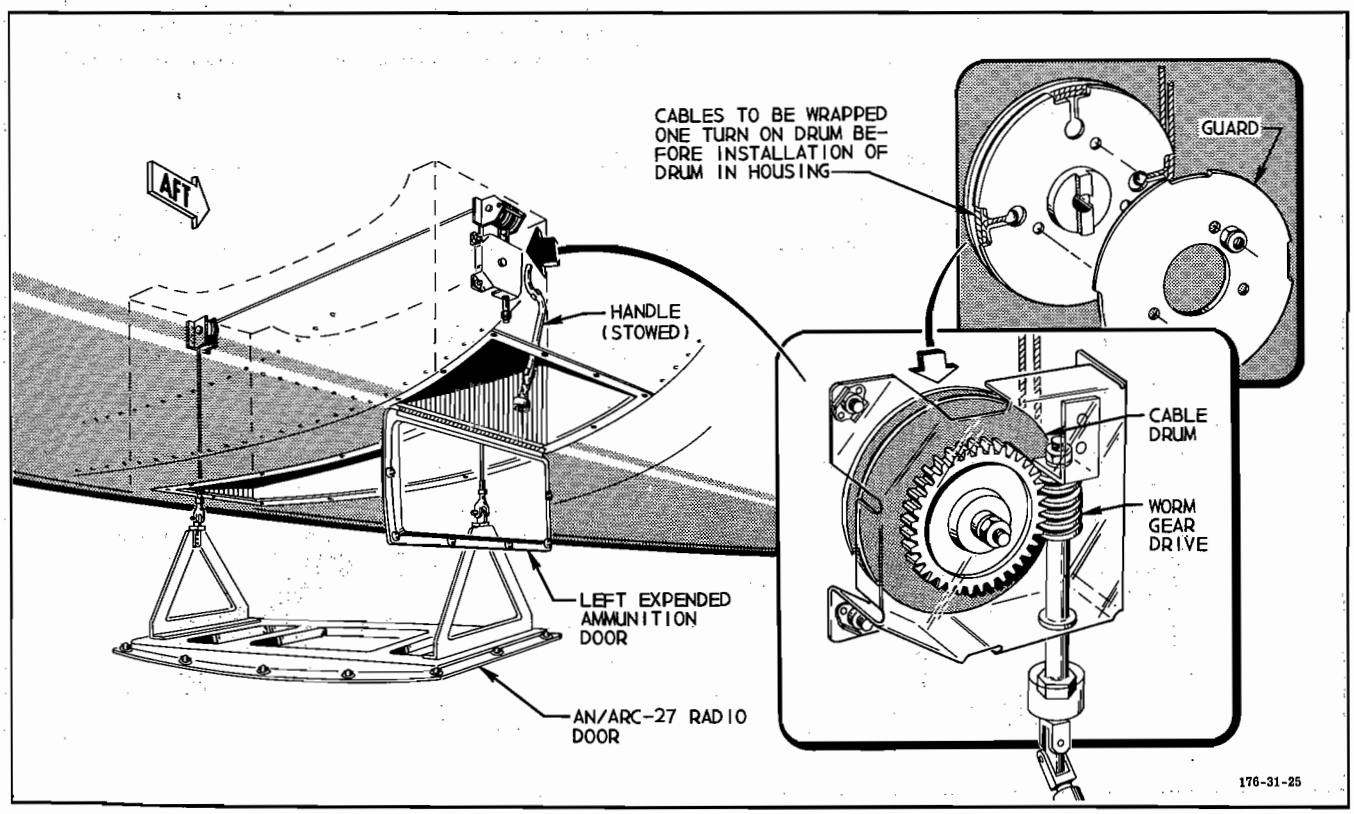


Figure 2-35. Lower Radio Compartment Access Door—F-86F-25 and Subsequent Airplanes

CAUTION

- After fuselage is just clear of wing, it must be pushed as far aft as possible without binding equipment on wing front spar, to make it possible for fuselage bulkhead at wing rear spar to clear the fuel level transmitter for the center wing cell.
- During hoisting of fuselage, clearance of all remaining components must be carefully observed in each wheel well and along wing front spar.

2-154. JOINING FUSELAGE AND WING.

2-155. See figure 2-31.

2-156. REMOVING WINDSHIELD.

2-157. The parts and components referred to in the following procedure are identified in figure 2-33. Remove the windshield at follows:

a. Cut away pressure-sealing compound.

b. Remove bolts around base of windshield frame and remove windshield.

2-158. INSTALLING WINDSHIELD.

2-159. See figure 2-33.

2-160. LOWER RADIO COMPARTMENT ACCESS DOOR.

2-161. To permit easy access to the radio (AN/ARC-3 in F-86F-1 through F-86F-20 Airplanes, or AN/ARC-27 in F-86F-25 and subsequent airplanes), the lower radio compartment access door is provided with a manually operated hoist. (See figure 2-34 or 2-35.) When the door is being raised with the hoist, movement of the door should not be assisted in any way. If the door is raised manually and tension removed from the cables, while the hoist is being operated, the cables may become fouled or come off the pulleys. If any excessive binding

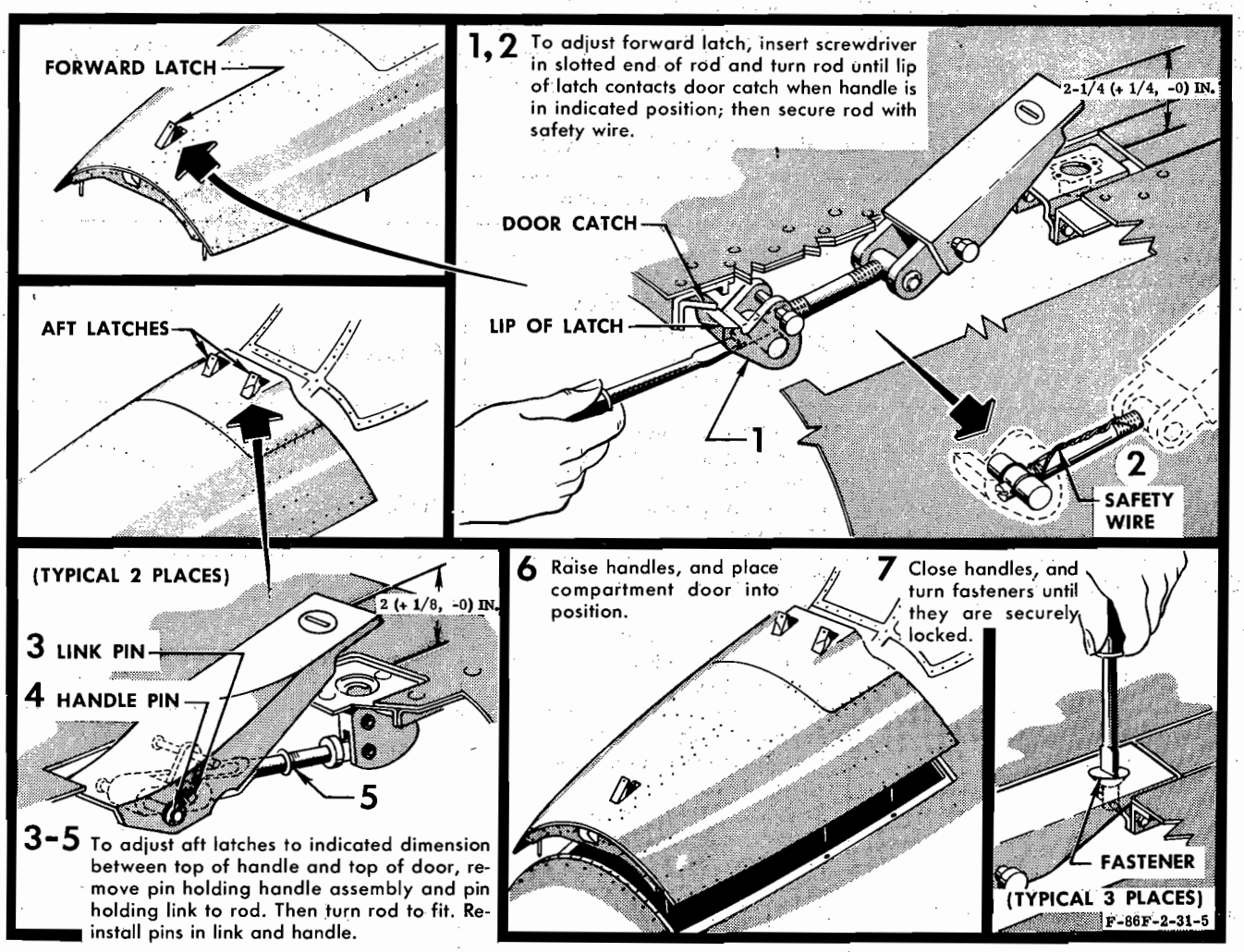


Figure 2-36. Adjusting Radar Equipment and Battery Access Door

is apparent, an investigation should be made immediately; otherwise, the hoist may be damaged.

2-162. RADAR EQUIPMENT AND BATTERY ACCESS DOOR.

2-163. The radar equipment and battery access door is located on the top side of the fuselage, forward of the windshield. It is aligned by pins and secured in place by mechanically locked handles.

2-164. ADJUSTING RADAR EQUIPMENT AND BATTERY ACCESS DOOR. See figure 2-36.

2-165. COCKPIT CANOPY SYSTEM.

2-166. The cockpit canopy system (figure 2-37) consists essentially of a clear plastic canopy, an electric actuator, and electric controls. Provisions for manual operation of the canopy (paragraph 2-206) and for emergency ejection of the canopy (paragraph 2-187) are also incorporated. The electric actuator is mounted below the canopy deck. It may be operated from inside the cockpit by a three-position switch located near the left end of the windshield bow. Push-button type switches are provided for external operation of the canopy. The switches (canopy "OPEN" and "CLOSE") are located on each side of the fuselage just below the windshield bow.

2-167. FUNCTION OF COCKPIT CANOPY SYSTEM.

2-168. With the "COCKPIT CANOPY" and "CANOPY CONTROL" circuit breakers depressed, power is available for the control switches and the actuator. When the canopy control switch is positioned to "OPEN" or when one of the canopy external "OPEN" push-button switches is depressed, the canopy-open relay is energized. This directs current from the "COCKPIT CANOPY" circuit breaker to the actuator. The actuator turns the gears in a gear box above the canopy deck, sliding the canopy aft. When the canopy reaches full open position, it opens the canopy limit switch, shutting off the actuator. The canopy becomes mechanically locked in full open position by a rotary latch mechanism. When the canopy control switch is positioned to "CLOSE" or when one of the canopy external "CLOSE" push-button switches is depressed, the canopy-close relay is energized. This directs current to the actuator, moving the canopy forward. A torque limiter inside the actuator slips, disengaging the actuator, when the canopy has exerted a force of approximately 300 pounds against the windshield bow. Release of the switch de-energizes the actuator.

2-169. TROUBLE SHOOTING COCKPIT CANOPY SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Actuator inoperative when one of the control switches is actuated.	Circuit breaker open. Faulty wiring. Unsatisfactory ground on actuator or relays. Faulty actuator. Broken switch.	Replace actuator.
Canopy fails to open.	Circuit breaker open. Canopy-open control relay improperly wired. Faulty canopy-open control relay.	Replace relay.
Canopy fails to close.	Canopy-close control relay improperly wired. Circuit breaker open. Faulty canopy-close control relay.	Replace relay.
Actuator operates in reverse of switch selection.	Reversed leads between two of the external canopy control switches. Reversed actuator leads. Leads to canopy control relays reversed.	
Actuator fails to stop when canopy reaches full open position.	Faulty limit switch.	Replace switch.

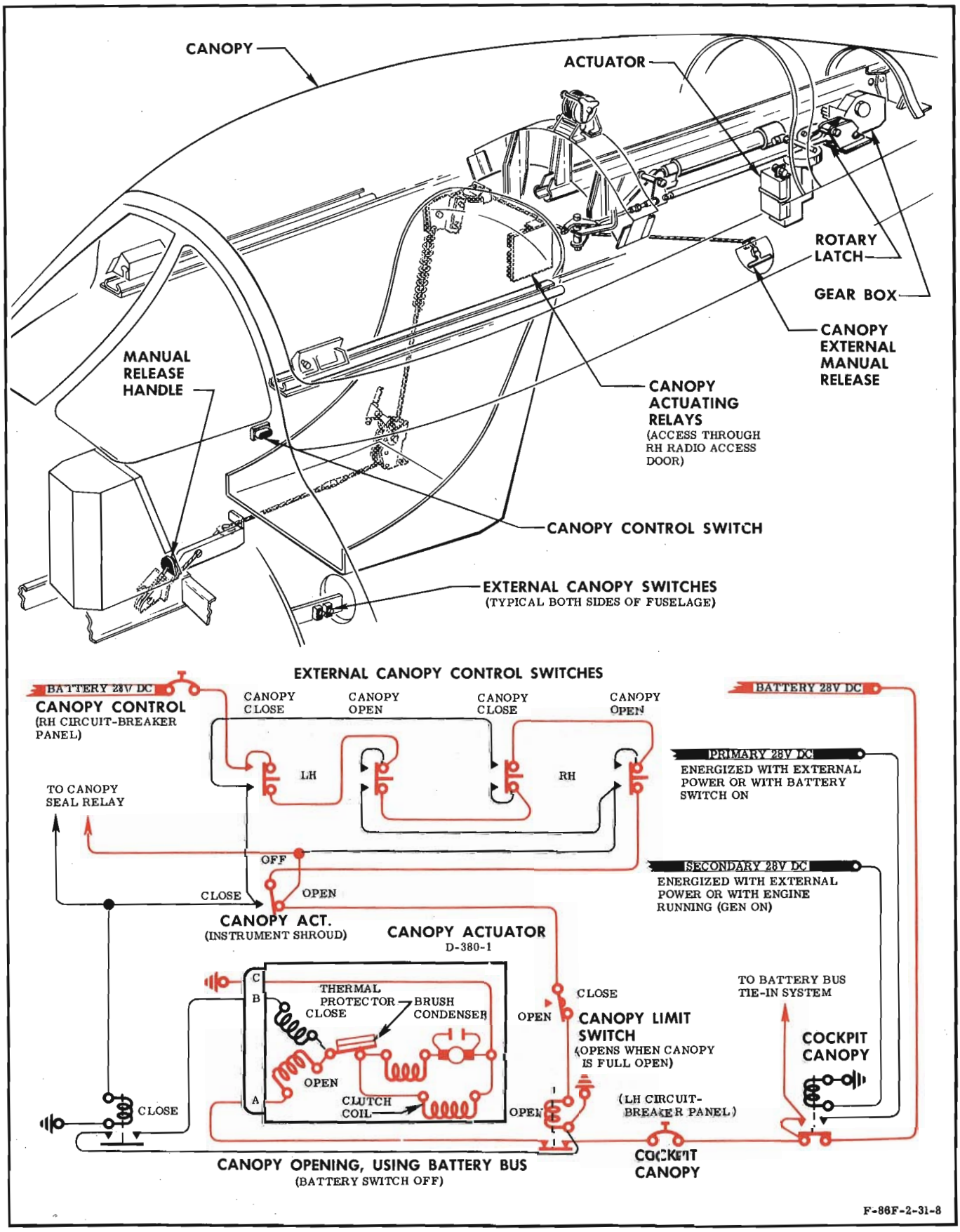


Figure 2-37. Cockpit Canopy System

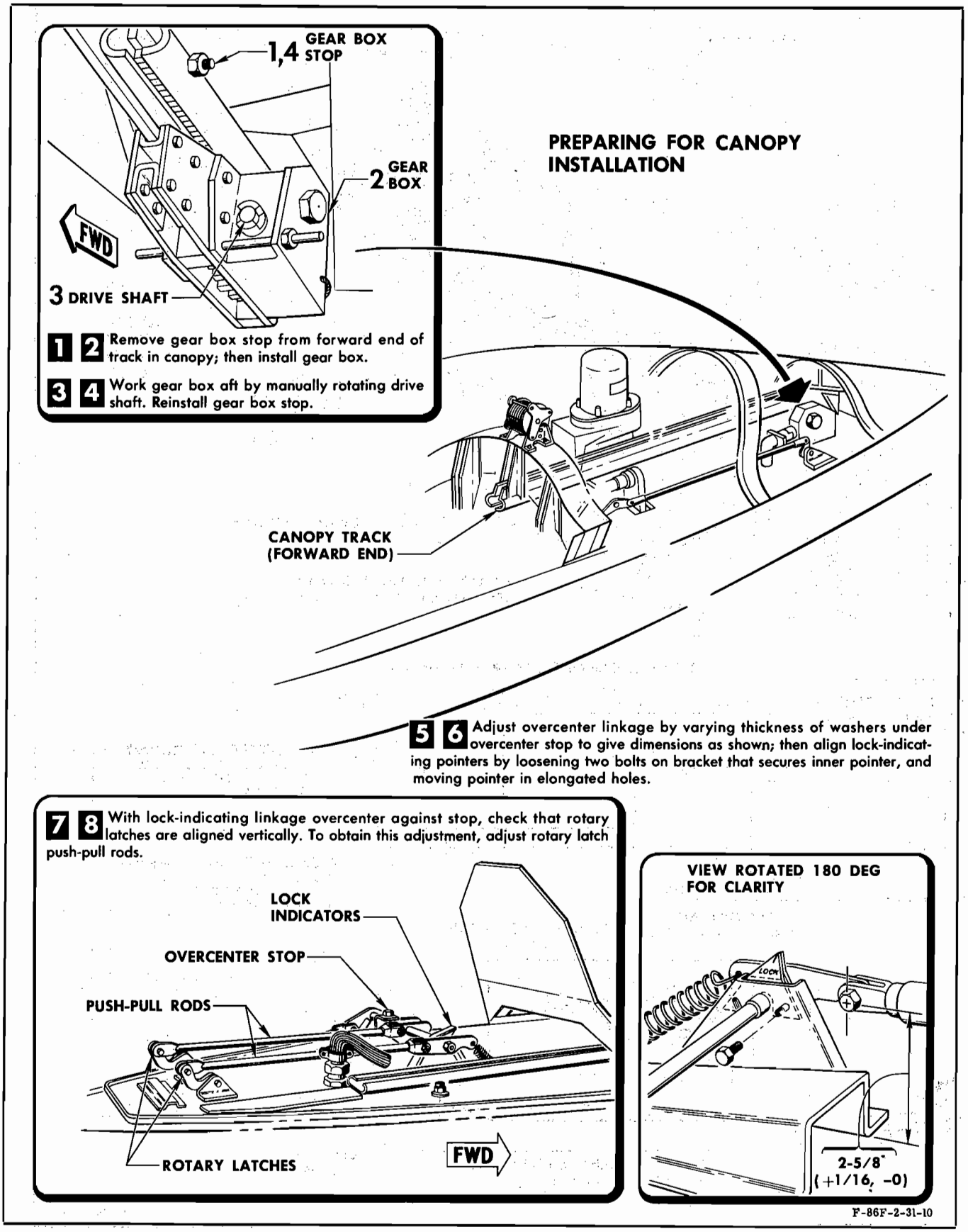


Figure 2-38. Installing and Adjusting Cockpit Canopy—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129 (Sheet 1 of 3)

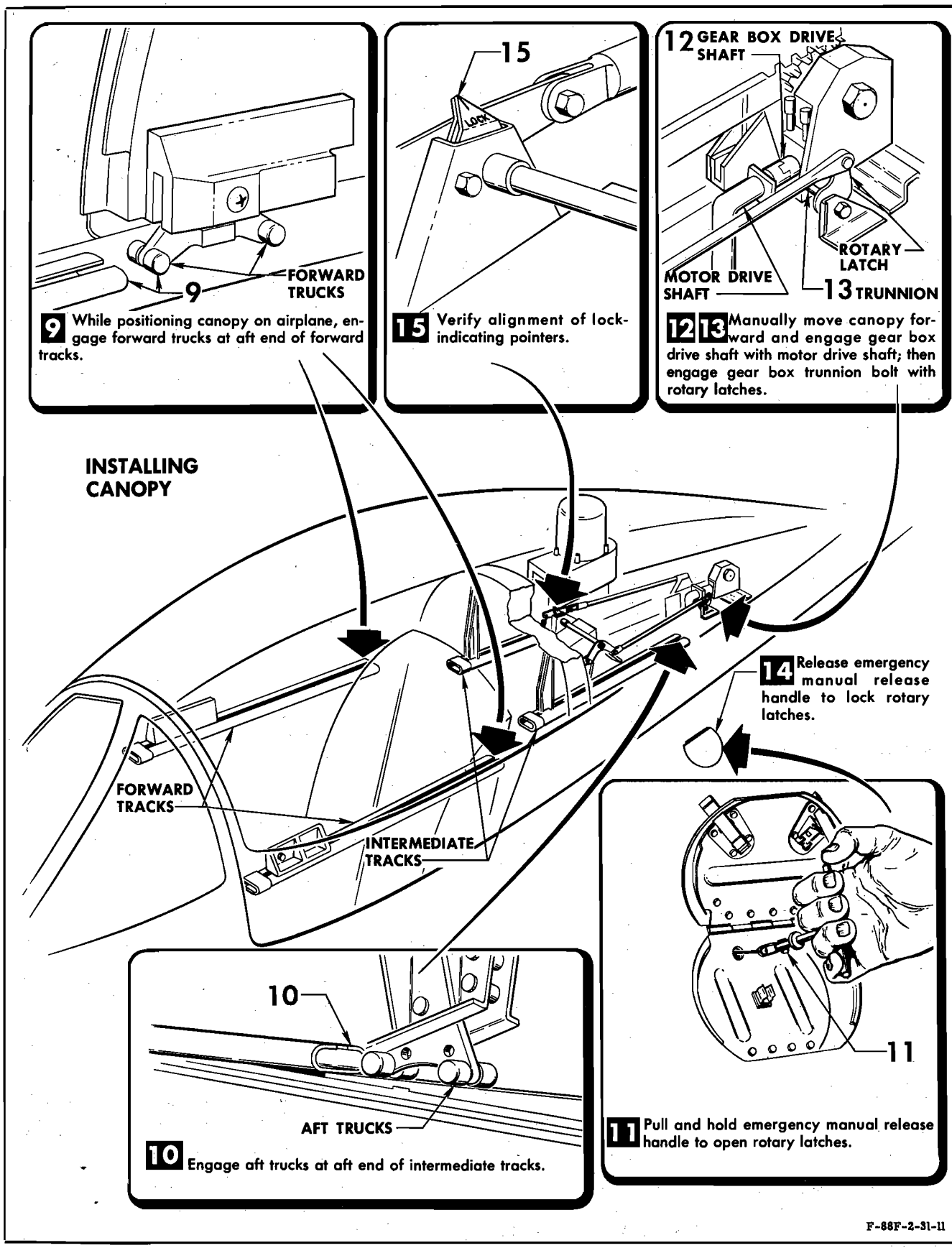
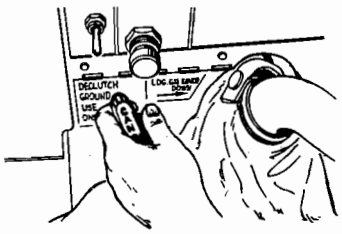


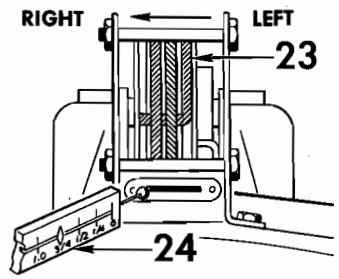
Figure 2-38. Installing and Adjusting Cockpit Canopy—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129 (Sheet 2 of 3)



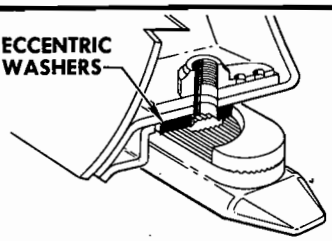
21 From inside cockpit, close canopy, pull manual release, and check for free movement of canopy along tracks.

NOTE Be sure canopy is clear of inflatable seal. If canopy does not move freely, repeat steps 16 through 21 as necessary.

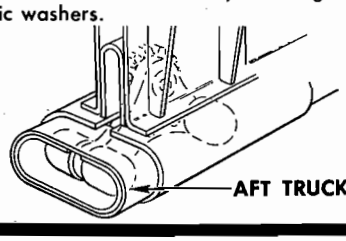
22 Pressure-seal boltheads in deck where gear box support and rotary latch brackets are attached; then check cockpit for pressurization. (Refer to index for page number of applicable procedure.) If pressurization cannot be maintained, repeat steps 11 through 18 and 20 and 21 as necessary.

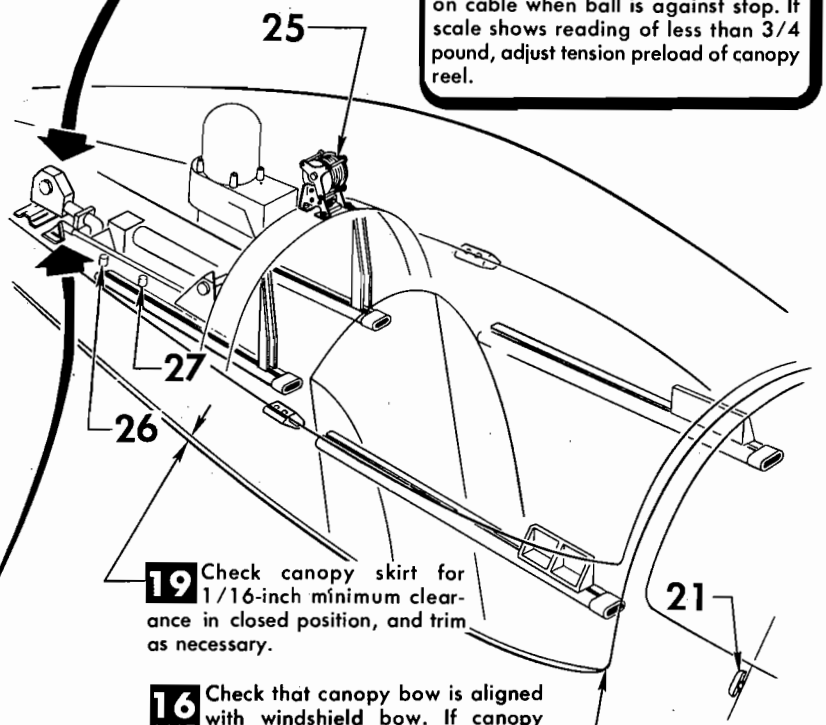


23 24 Check that cable winds from right to left, looking aft from cockpit. Then, with scale, check that 3/4-pound minimum preload tension is on cable when ball is against stop. If scale shows reading of less than 3/4 pound, adjust tension preload of canopy reel.



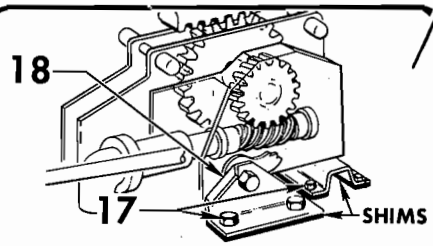
20 Adjust aft trucks to move freely on intermediate tracks by rotating eccentric washers.





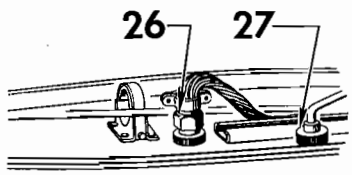
19 Check canopy skirt for 1/16-inch minimum clearance in closed position, and trim as necessary.

16 Check that canopy bow is aligned with windshield bow. If canopy bow is out of alignment, loosen bolts and slide shoes on serrations; then tighten bolts to prevent shoes from slipping.

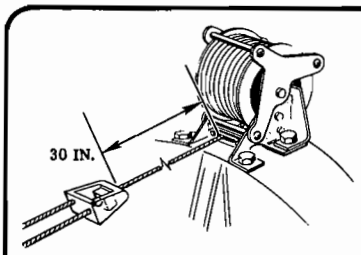


17 Check that gear box drive shaft is aligned with motor drive shaft and that minimum free play exists at aft end of canopy. Vertical adjustment of drive shaft is accomplished by inserting or removing shims to provide proper support of gear box. Fore-and-aft adjustment is accomplished by loosening the gear box hold-down bolts and sliding gear box to obtain proper adjustment as shown.

18 Adjust rotary latch brackets so that they align with gear box trunnions, by inserting or removing shims.



26 27 Connect canopy electrical wiring connector, and plug in antenna connector.



25 Check that cable can be pulled 30 inches (minimum) and reel does not bottom; then engage canopy reel cable in quick-disconnect.

ADJUSTING NEW OR DIFFERENT CANOPY; CHECKING CANOPY OPERATION & MAKING FINAL CONNECTIONS

F-86F-2-31-12

Figure 2-38. Installing and Adjusting Cockpit Canopy—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129 (Sheet 3 of 3)

2-170. CHECKING COCKPIT CANOPY SYSTEM.

2-171. With engine off and no external power connected to airplane, close the "COCKPIT CANOPY" and "CANOPY CONTROL" circuit breakers. Then proceed as follows:

a. Hold canopy control switch, at left side of windshield, on "CLOSE" until canopy closes snugly against the windshield and actuator begins to slip. This verifies proper functioning of actuator and the canopy-close circuit.

b. Move canopy control switch to "OPEN." Canopy should slide open. When canopy reaches full open position, actuator should stop, to verify proper functioning of canopy-open circuit.

c. At left side (outside) of airplane, depress forward ("CLOSED") canopy control button. Canopy should close.

d. Depress aft ("OPEN") canopy control button. Canopy should open.

e. Repeat steps c. and d. on right side of airplane.

f. With external power connected to airplane or with engine running (generator switch "ON"), repeat steps a. through e.

2-172. COCKPIT CANOPY.

2-173. The cockpit canopy (figure 2-37) consists essentially of an acrylic plastic shell permanently mounted in an all-metal structure. The plastic shell provides the cockpit with a clear-vision enclosure and contains an antenna embedded along the top. The metal structure supports the canopy shell and provides a more durable surface for handling and operating the canopy. The canopy contains four adjustable trucks which roll in four separate tracks. A truck is on each side at the forward end of the canopy, and on each side at the middle of the canopy. A fifth track, mounted in the center of the canopy structure, contains a strip of geared teeth. A gear box meshed with the gear strip, is suspended from the track by rollers and is connected to the actuator drive shaft. The actuator operates the gear box, which exerts force against the gear strip and moves the canopy. The track, moving with the canopy, keeps the gear box aligned with the gear strip. Also mounted in the canopy structure, and moving with it, are the radio loop antenna, the cabin pressure regulator, and the upward identification light. At each side of the canopy, a folded handle is installed flush with the skin. The handle may be extended for manual positioning of the canopy.

2-174. REMOVING COCKPIT CANOPY. The parts and components referred to are identified in figures 2-38 and 2-39. Remove the canopy as follows:

a. Move canopy back to maximum aft position.

b. With manual release handle held out, support rear of canopy and move canopy aft, disengaging trucks from tracks. Lift canopy a maximum of 8 inches at aft end to gain access to electrical and antenna disconnects.

c. Disconnect electrical and antenna connectors.

d. Disconnect seat catapult sear safety pin cable at quick-disconnect fitting.

WARNING

- Do not remove seat catapult sear safety pin.
- Do not pull canopy ejection handle.

e. Lift canopy up and away from airplane. The canopy weighs approximately 115 pounds.

CAUTION

- Use extreme care when handling canopy. Do not scratch or otherwise damage plastic and do not damage pressure seals.
- On F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4455, and all subsequent airplanes, care must be exercised to prevent damaging or misaligning the extended canopy defrost tubes during canopy removal.

2-175. INSTALLING AND ADJUSTING COCKPIT CANOPY. See figure 2-38 or 2-39.

2-175A. CARE OF COCKPIT CANOPY. Extreme care should be exercised in the daily maintenance of the cockpit canopy. The acrylic plastic is easily scratched by hard objects, deteriorated by improper cleaning or polishing compounds, or distorted by excessive heat. When handling canopy, avoid contact with plastic surface. When airplane is parked in sun in hot weather, leave canopy open for free circulation of air. When surrounding air temperature is between 38°C (100°F) and 49°C (120°F), canopy should be uncovered. If protection is needed against blowing sand or grit, a light-colored cover should be used. In temperatures above 49°C (120°F), canopy should be opened and shaded from the direct rays of the sun.

2-175A-1. CLEANING AND POLISHING COCKPIT CANOPY. Improper cleaning and polishing of a cockpit canopy can cause considerable damage such as scratching, distortion or crazing. Use of cleaning fluids or compounds which contain solvents for acrylic plastic should be avoided. The crazing action of a solvent or its fumes is often delayed for as long as several weeks, therefore it is not always possible to ascertain immediately whether a cleaner will be injurious or not. To clean a cockpit canopy, proceed as follows:

a. Remove loose dust with compressed air, if available.

b. Flush canopy with plenty of clean water, using the bare hand gently to feel and dislodge any dirt, salt, and mud.

c. Wash canopy gently with soap and water only. Make certain water is free of grit. Go over surface with bare hand only, so any grit or dirt can be detected and removed before it scratches the plastic surface.

d. Dry canopy with a clean *damp* chamois.

e. Remove oil and grease by rubbing canopy lightly with a *soft,* clean, grit-free cloth dampened with aliphatic naphtha (Federal Specification TT-N-95).

CAUTION

- Do not use aromatic naphtha or other dry-cleaning solvents which are definitely harmful to acrylic plastic.
- Aliphatic naphtha (Federal Specification TT-N-95) is flammable, therefore all precautions regarding the use of flammable liquids must be observed.

f. If, after removing dirt and grease, the plastic surface is marred by scratches, restore the surface by hand polishing with polish (Specification MIL-C-5547); then wax the plastic with wax (Specification C-71). Wax should be applied in a thin even coat and brought to a high polish by rubbing lightly with a soft, dry, lint-free cloth.

Note

Cloths used to apply cleaners, polishes, and waxes should be soft and clean. Canton or outing flannel, flannelette, and diaper cloth are satisfactory. Cloths should be set aside for use only on acrylic plastic surfaces and kept in closed containers or in protected rolls to keep them clean and dirt-free.

g. Dust the interior plastic surface lightly with a clean, soft, lint-free cloth.

Note

Do not *wipe* surface with a *dry* cloth.

h. Wipe surface carefully with a soft, *damp* cloth or sponge. Keep cloth or sponge clean and free from grit by rinsing it frequently in clean water.

i. Apply wax as described in step f.

CAUTION

Use care when washing or polishing canopy with the hands, to prevent marring or scratching plastic with rings or other jewelry.

2-175B. INSTALLING PLASTIC BUBBLE IN COCKPIT CANOPY FRAME. With plastic bubble of cockpit canopy removed from canopy frame, check that retaining channels along side and in bow are clean. Be sure old plastic, cork-rubber tape, and sealing compound are removed. The new plastic bubble must be installed with the protective masking material still in place. Edges of masking material may be peeled back slightly and trimmed off where necessary. With plastic bubble and canopy frame prepared, proceed as follows:

a. Apply a strip of adhesive cork-rubber tape (1/8 x 3/8 x 22 1/8 inches) to aft edge of aft supporting ledge. Apply another strip (1/8 x 5/8 x 22 inches) to surface of aft supporting ledge.

b. Apply a strip of adhesive cork-rubber tape (1/32 x 5/16 x 48 inches) to inboard (lower) surface of canopy bow retaining channel.

c. Mount plastic bubble onto frame. Make sure loop of nylon webbing along each side of bubble is worked down through slot at bottom of retaining channel into cylindrical retaining channel.

d. At front of canopy, on one side, insert steel rod (Specification MIL-T-8504) into nylon loop which has extended down through slot. Work rod through loop until rod is flush with forward end of hole.

e. Repeat step d. on other side of canopy.

f. With sides of plastic bubble secured to frame by means of the nylon loops, make sure bubble is pushed extremely aft so that aft edge of bubble is pushing against cork-rubber tape on aft edge of aft supporting ledge.

g. Mount canopy bow in place, insert mounting bolts, and partially tighten each nut.

h. Mount aft retaining strip in place. Insert mounting bolts and install a washer and nut on each bolt. Partially tighten each nut.

i. With all bolts installed in bow and retaining strip, tighten each nut to a firm fit; then back off each nut one turn.

j. Cement a strip of natural rubber (1/32 x 1 3/4 x 71 inches) over inside seam (between plastic and frame) along each side of plastic bubble. Use EC-226 cement.

k. Cement a strip of natural rubber (1/32 x 1 3/4 x 23 1/2 inches) over inside seam across aft end of plastic bubble. Use EC-226 cement.

l. Apply A-56B protective coating over the strips of rubber.

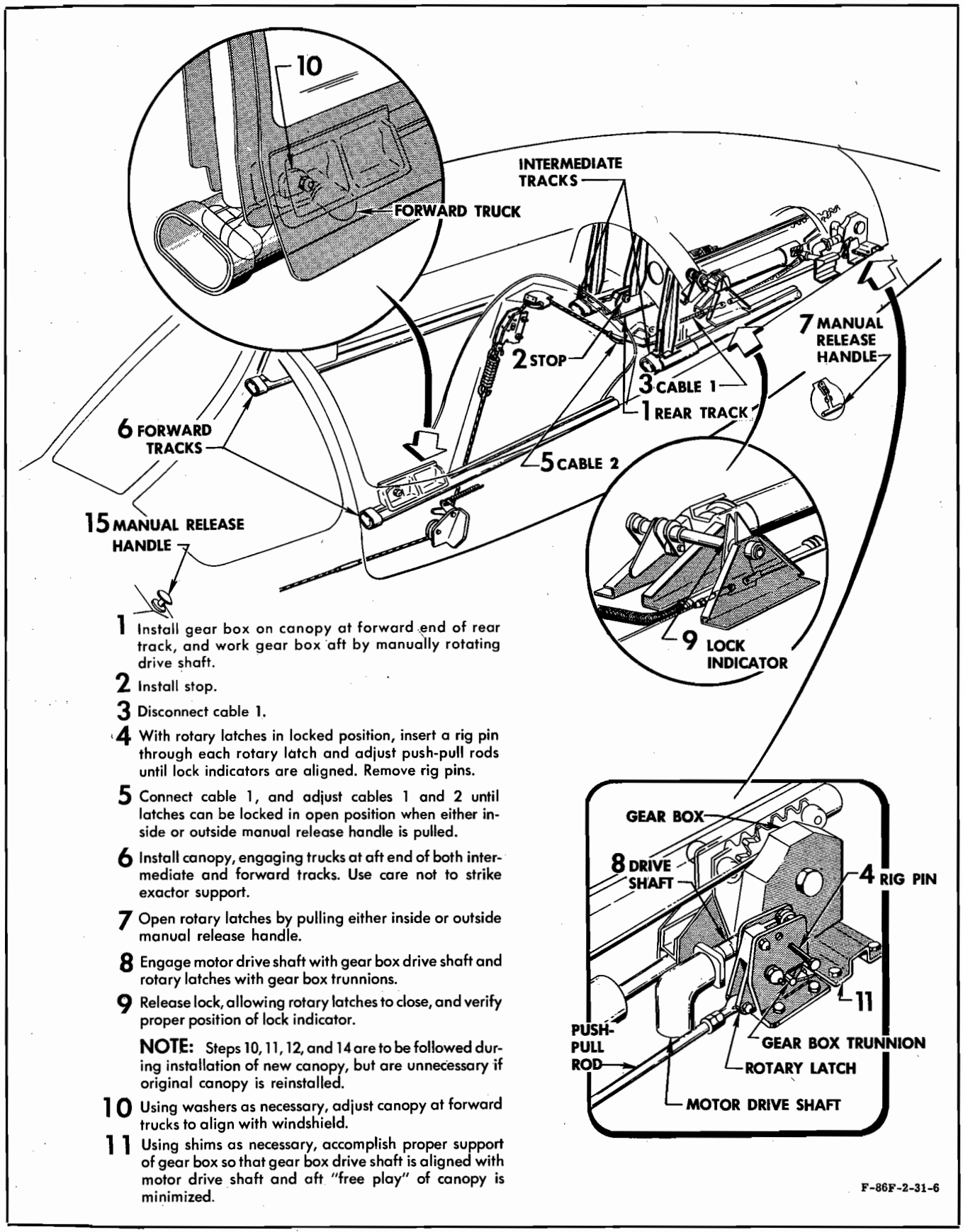
m. Apply a continuous bead of sealing compound (Specification MIL-S-7502) to outside seam around plastic bubble.

2-176. MISCELLANEOUS EQUIPMENT.

2-177. See figure 2-40.

2-178. SEAT.

2-179. The bucket-type seat is supported between two nearly vertical rails and is vertically adjustable to a height of 4 inches. During the vertical adjustment, the seat moves aft one inch. Rollers guide the seat in the rails, which tilt slightly aft. Bungee springs aid the pilot in making seat adjustment. Locking pins, actuated by a handle located near the pilot's right shoulder, maintain seat adjustment. An adjustable headrest slides on two tubes to provide a forward adjustment of 3 inches. Two latch pins lock the headrest in place. The seat is designed to accommodate a Type C-2A life raft and a ribbon-type parachute. Lightweight blocks are provided to take up seat space when the life raft or the ribbon-type parachute are not used. Fixed footrests, armrests, and personal-lead disconnects are incorporated in the seat. The left handgrip, hinged to the armrest, actuates the mechanism that locks the inertia reel.



1 Install gear box on canopy at forward end of rear track, and work gear box aft by manually rotating drive shaft.

2 Install stop.

3 Disconnect cable 1.

4 With rotary latches in locked position, insert a rig pin through each rotary latch and adjust push-pull rods until lock indicators are aligned. Remove rig pins.

5 Connect cable 1, and adjust cables 1 and 2 until latches can be locked in open position when either inside or outside manual release handle is pulled.

6 Install canopy, engaging trucks at aft end of both intermediate and forward tracks. Use care not to strike exactor support.

7 Open rotary latches by pulling either inside or outside manual release handle.

8 Engage motor drive shaft with gear box drive shaft and rotary latches with gear box trunnions.

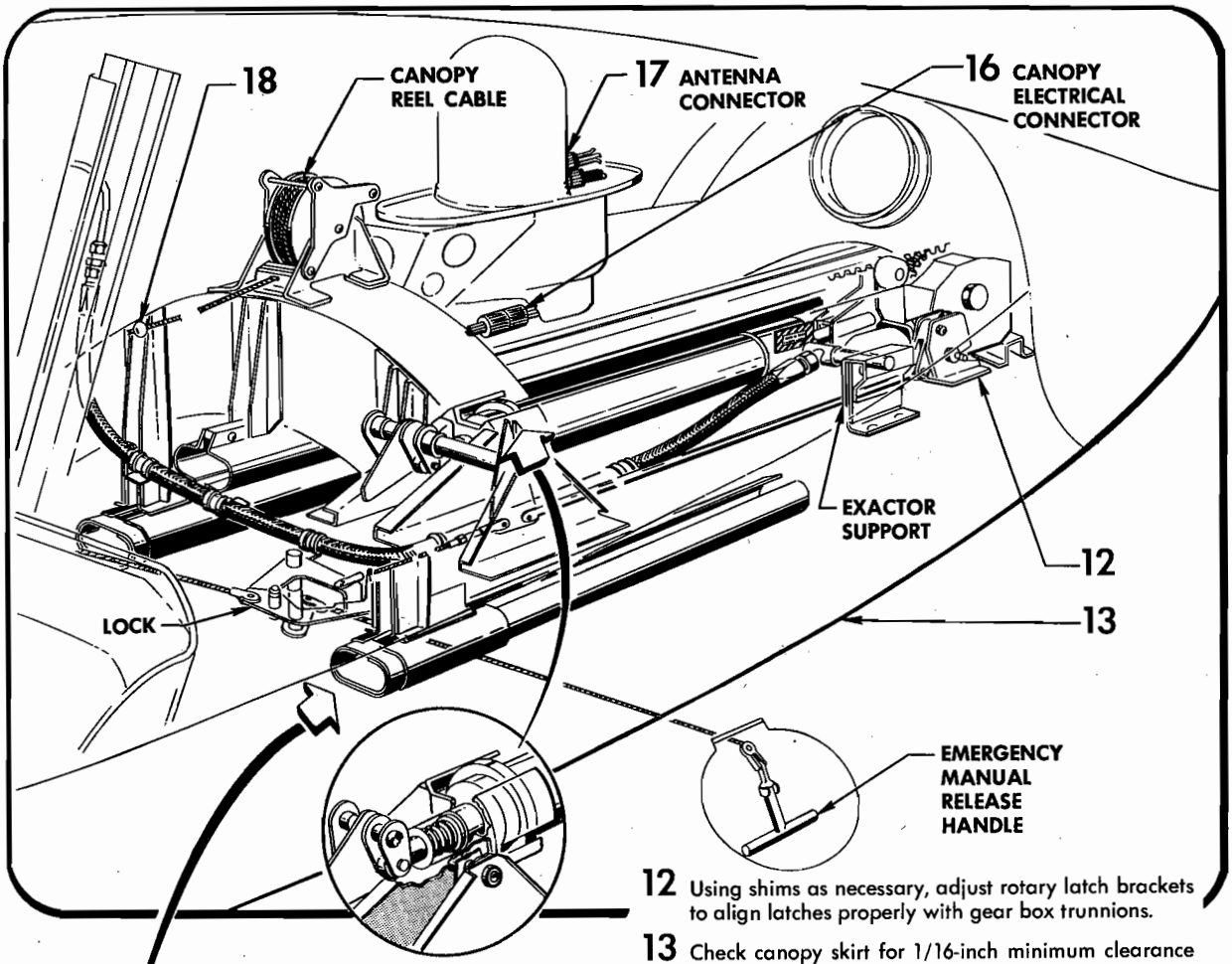
9 Release lock, allowing rotary latches to close, and verify proper position of lock indicator.

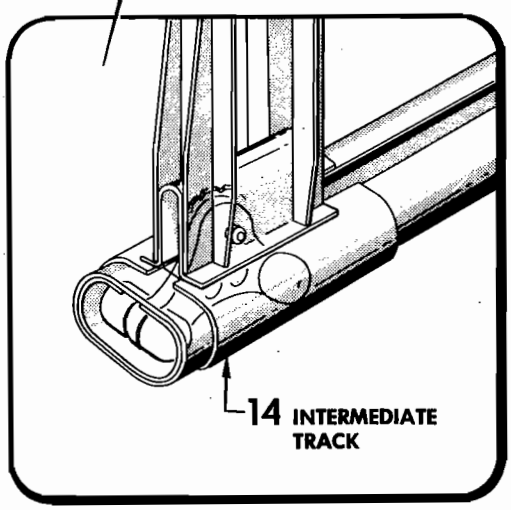
NOTE: Steps 10, 11, 12, and 14 are to be followed during installation of new canopy, but are unnecessary if original canopy is reinstalled.

10 Using washers as necessary, adjust canopy at forward trucks to align with windshield.

11 Using shims as necessary, accomplish proper support of gear box so that gear box drive shaft is aligned with motor drive shaft and aft "free play" of canopy is minimized.

Figure 2-39. Installing and Adjusting Cockpit Canopy—F-86F-20 Airplane AF51-13130 and All Subsequent Airplanes (Sheet 1 of 2)





12 Using shims as necessary, adjust rotary latch brackets to align latches properly with gear box trunnions.

13 Check canopy skirt for 1/16-inch minimum clearance in closed position.

14 With eccentric washer, adjust trucks at intermediate track to move freely within track.

15 Close canopy, pull inside manual release, and, from inside airplane, manually check for free movement of canopy along tracks, observing that canopy is clear of inflatable seal. If canopy movement is difficult, repeat steps 11 through 15 as necessary.

NOTE: Pressure-seal bolt heads in deck where gear box support and rotary latch brackets are attached; then check cockpit pressurization. (Refer to index for page number of applicable procedure.) If proper pressurization cannot be maintained, repeat steps 10, 11, 12, 14, and 15.

16,17 Connect canopy electrical wiring connector, and plug in antenna connector.

NOTE: Phenolic lug must face outboard when reinstalled, and cap nut must be securely tightened to prevent lug from turning.

18 Engage canopy reel cable in quick-disconnect fitting.

NOTE: Reel must not be bottomed when cable is pulled out 30 inches from reel stop and must have a tension of 3/4 pound when ball is against reel stop.

F-86F-2-31-9

Figure 2-39. Installing and Adjusting Cockpit Canopy—F-86F-20 Airplane AF51-13130 and All Subsequent Airplanes (Sheet 2 of 2)

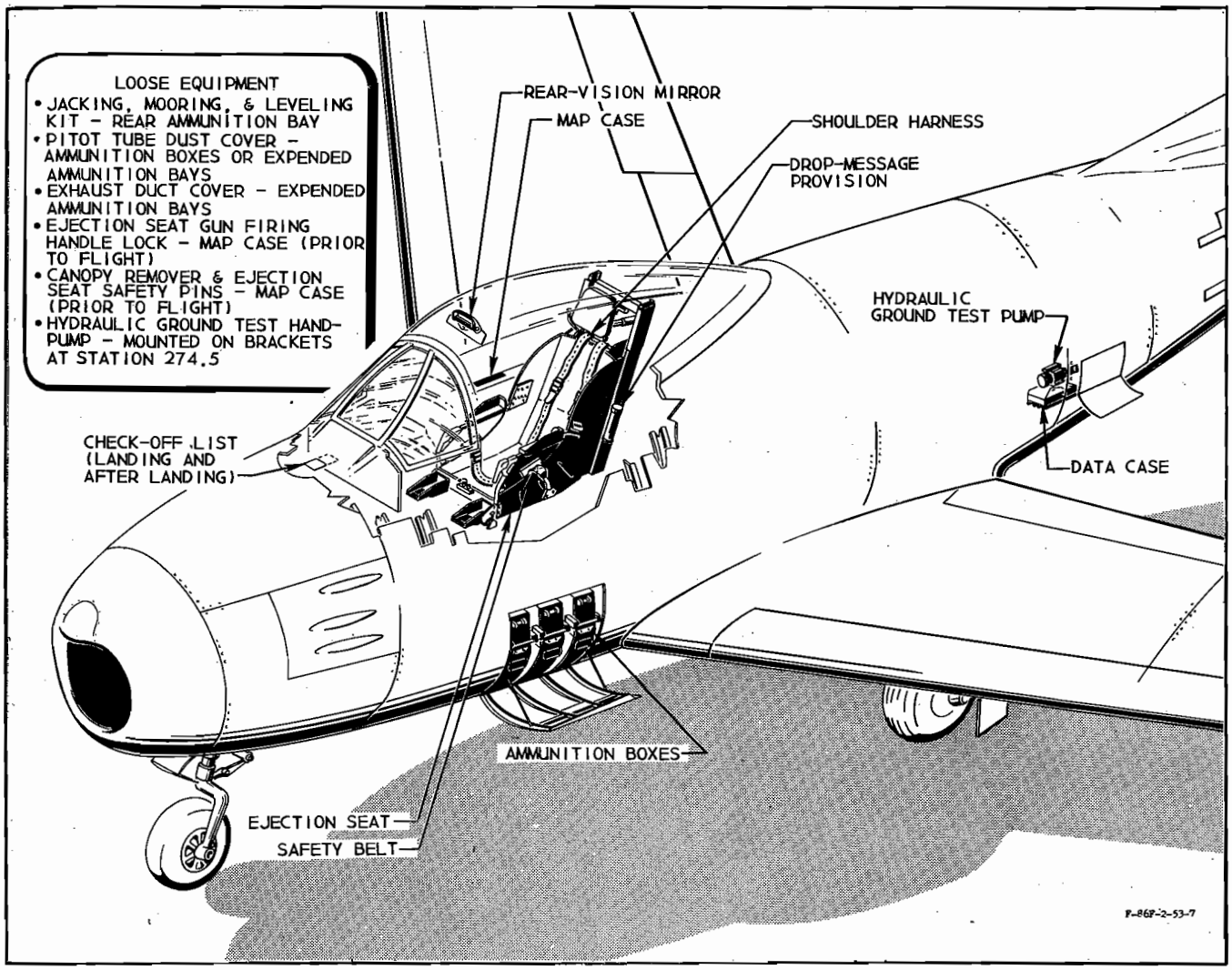


Figure 2-40. Miscellaneous Equipment

The right handgrip incorporates a trigger for firing the seat catapult. Ground safety pins prevent the handgrip being raised inadvertently. For detailed information regarding the seat ejection system and its components, refer to paragraph 2-208.

2-180. REMOVING SEAT. Refer to paragraph 2-209 or 2-210.

2-181. INSTALLING SEAT. Refer to paragraph 2-213 or 2-214.

2-182. SHOULDER-HARNESS INERTIA REEL.

2-183. A shoulder-harness inertia reel is located on the back of the seat. A two-position (locked and unlocked) shoulder-harness inertia reel lock control is located on the left side of the seat. A latch is provided for positively retaining the control handle at either position of the quadrant. When the top of the control handle is pressed down, the latch is released and the control handle may then be moved freely from one position to another. When the control is in the locked position, the reel harness cable is manually locked so that the pilot is prevented from bending forward. When the control is in the unlocked position, the reel harness cable will extend to allow the pilot to lean forward in the cockpit. However, the harness reel cable will automatically lock when an impact force of 2 to 3 G is encountered. When the reel is locked in this manner, it will remain locked until the control handle is moved to the locked position, control handle is returned to the unlocked position, and tension is removed from the shoulder harness.

2-184. EMERGENCY ESCAPE PROVISIONS.

2-185. To facilitate emergency escape from the airplane, a canopy emergency release system, a seat ejection system, and external and internal manual canopy

releases for use on the ground have been provided. (See figure 2-41 or 2-42.)

2-186. CANOPY EMERGENCY RELEASE SYSTEM.

2-187. The canopy emergency release system uses a Type M-1 canopy remover to forcibly eject the canopy to the rear and away from the airplane. (See figure 2-43 or 2-44.) On F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13129, when the right handgrip is raised to the locked position, mechanical linkage is actuated to pull the canopy remover sear pin, thereby firing the canopy remover. On F-86F-20 Airplanes AF51-13130 through -13169, F-86F-25 and F-86F-30 Airplanes, and F-86F-35 Airplanes AF52-5164 through -5271, when the right handgrip is raised to the locked position, an initiator is fired, thereby releasing gas pressure to the canopy remover exactor. On F-86F-35 Airplanes AF53-1072 through -1228, when either right or left handgrip is raised to the locked position, an initiator is fired, releasing gas pressure to the canopy remover exactor. The gas pressure is the means by which the remover sear pin is withdrawn and the remover is fired.

2-188. ADJUSTING CANOPY EMERGENCY RELEASE SYSTEM. See figure 2-43 or 2-44.

2-189. CHECKING CANOPY EMERGENCY RELEASING SYSTEM (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). Check proper operation of canopy emergency release system in the following manner:

WARNING

Only the canopy sear pin or ground safety pin prevents the canopy remover from firing. While either pin (safety or sear) is removed, DO NOT remove remaining pin; possible injury or death may result.

a. With both ground safety pin and catapult sear safety pin installed in seat ejection catapult and with ground safety pin installed in canopy remover, remove canopy as described in paragraph 2-174.

b. Make sure that canopy remover sear pin is completely engaged; then remove ground safety pin and replace it with 1/16-inch diameter drill rod approximately 4 inches in length.

WARNING

If 1/16-inch diameter drill rod is not available, 1/16-inch diameter welding rod may be substituted. DO NOT use soft wire.

c. With 1/16-inch diameter drill rod in canopy remover ground safety pin hole (both ends of rod should project from hole), raise right handgrip on ejection seat to locked position. The canopy emergency release mechanism should pull canopy remover sear pin completely clear of remover. The load required at handgrip to pull canopy remover sear pin should not exceed 45 pounds.

d. Examine canopy remover sear pin for evidence of galling or binding. If sear pin is galled, bent, or otherwise damaged, replace with a new sear pin.

e. Unlock and lower right handgrip on ejection seat.

f. Before reinstalling canopy remover sear pin, install a tapered pin, No. 44 drill rod (approximately 4 inches long), in sear pin hole and then replace 1/16-inch diameter drill rod in ground safety pin hole with ground safety pin. The canopy remover sear pin should then be reinstalled.

WARNING

To prevent canopy remover from firing, an approved pin must be in either sear pin hole or ground safety pin hole at all times.

g. Safety-wire seat catapult trigger with .015-inch brass safety wire and install ground safety pins in both armrests.

h. Install canopy. (See figure 2-38.)

2-190. CHECKING CANOPY EMERGENCY RELEASE SYSTEM (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES). Check proper operation of canopy emergency release system in the following manner:

WARNING

Do not remove safety pins from canopy initiator or seat catapult at any time during checking procedure.

a. Ensure that ground safety pin is in canopy initiator and seat is in full down position.

b. Disconnect initiator control rod at initiator by removing clevis pin.

c. Attach a scale to initiator end of control rod and exert a pull of 30 pounds.

d. Attach another scale to canopy release handgrip and exert a pull of not more than 30 pounds.

e. Check to see that initiator control rod moved at least 1 1/8 inches (measurement to be taken from center of clevis pin hole to center of hole on initiator sear pin).

f. Unlock and lower right handgrip to down position.

g. Connect initiator control rod to initiator sear pin and safety clevis pin.

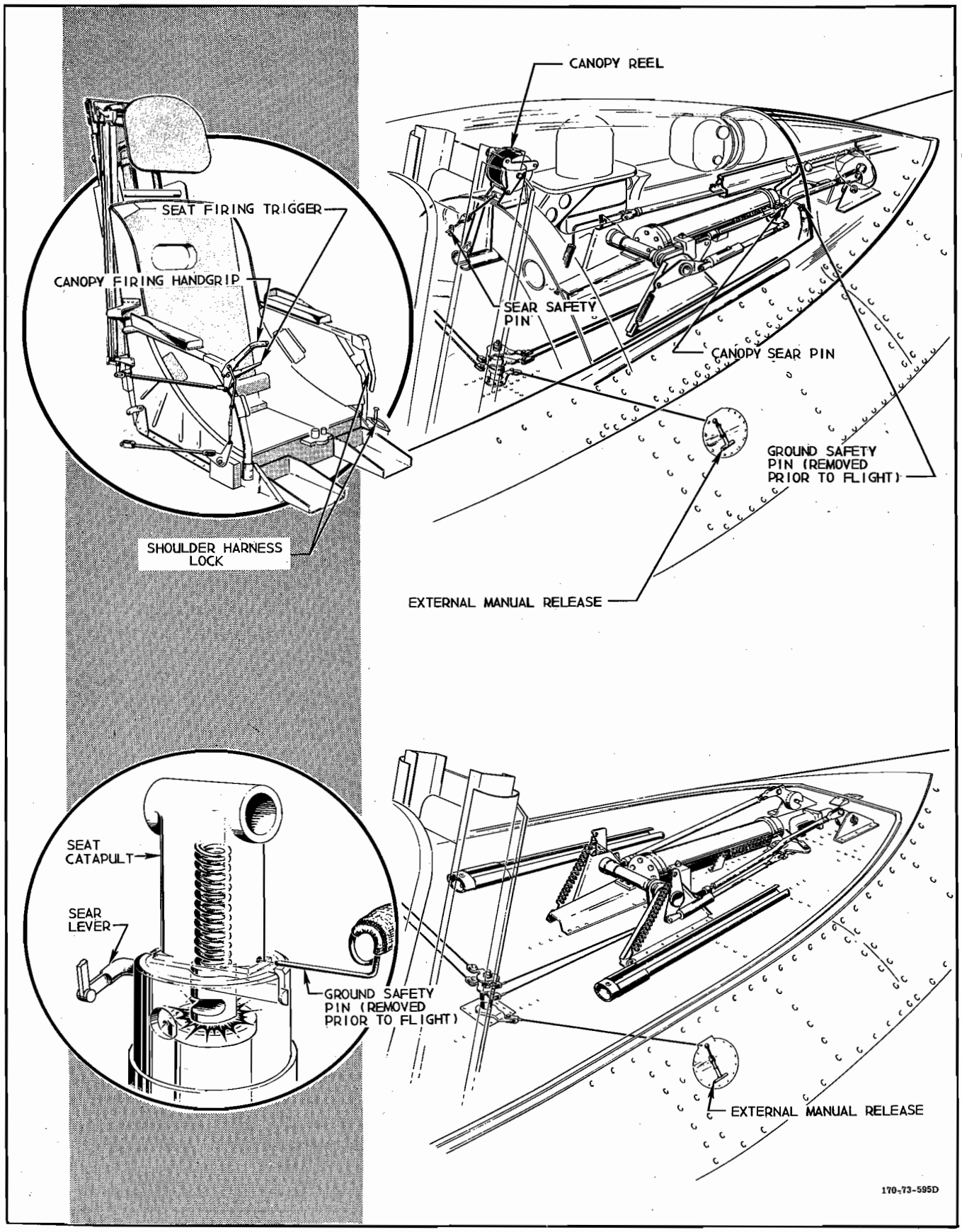


Figure 2-41. Emergency Escape Provisions—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129

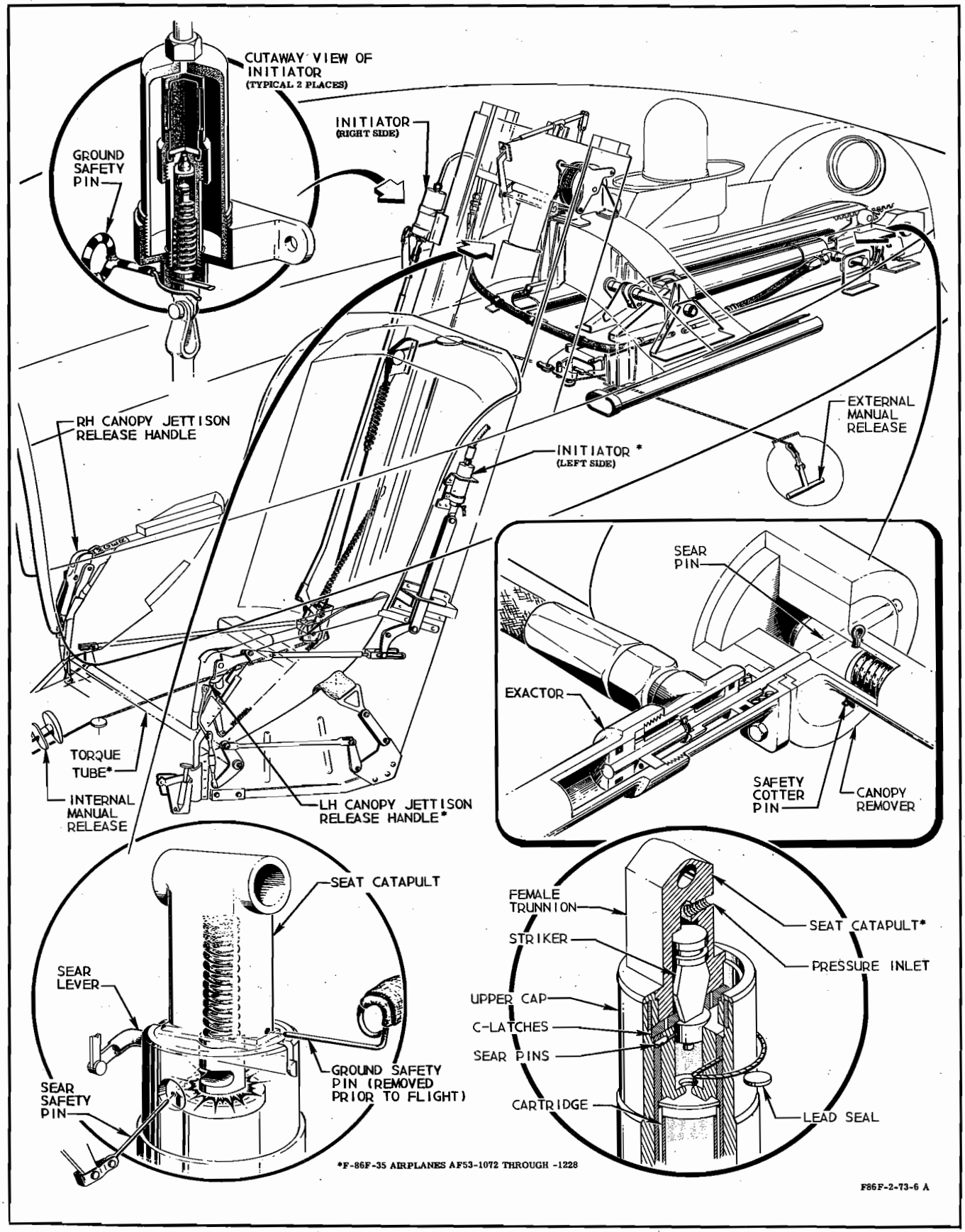


Figure 2-42. Emergency Escape Provisions—F-86F-20 Airplanes AF51-13130 Through -13169, and F-86F-25 and Subsequent Airplanes

h. Safety-wire seat catapult trigger with .015-inch brass safety wire and install ground safety pin in right armrest.

i. Perform steps a. through g. on left handgrip on F-86F-35 Airplanes AF53-1072 through -1228.

2-191. CANOPY EMERGENCY RELEASE SYSTEM CANOPY REMOVER (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129).

2-192. The Type M-1 canopy remover is a three-tube telescoping ejector, consisting of an outer tube, an intermediate tube, an inner tube, and an explosive cartridge with its firing mechanism. The remover is mounted on the deck, pointing to the rear, with the firing mechanism inserted in a socket in the canopy actuator gear box. When the right handgrip is raised, the sear pin in the remover is pulled. This, in turn, releases a firing pin which fires the cartridge.

WARNING

Only the sear pin or ground safety pin prevents the canopy remover from firing, and both pins should be kept in place at all times when airplane is on ground.

The only safety device provided is a ground safety pin which passes through the firing pin, holding the firing pin in place. The ground safety pin is removed just before flight and installed immediately after landing. A red streamer, attached to the ground safety pin, provides a ready means of determining its presence.

WARNING

Mere presence of the red streamer is not sufficient evidence that the ground safety pin is properly installed. Keep body clear of canopy jettison path until visual examination shows that ground safety pin is properly installed and can be seen protruding through both sides of canopy remover.

2-193. REMOVING CANOPY REMOVER (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For identification of parts and components, see figure 2-43. Remove canopy remover from airplane as follows:

WARNING

The canopy remover should be handled as an ordnance item and stored as ammunition. Installation or removal must be accomplished in the open, away from any building or hangar.

a. Release and raise aft end of canopy.

WARNING

Be sure ground safety pin or approved pin is in remover neck.

b. Disconnect bell crank link from canopy remover sear pin.

c. Remove "U" clamp from around canopy remover.

d. Lift out canopy remover.

2-194. PREINSTALLATION CHECK OF CANOPY REMOVER (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). The following inspections *must* be made and the precautionary measures adhered to before installation of canopy remover.

a. See that lead seal and safety wire are in place to ensure against tampering with remover.

WARNING

DO NOT remove cotter pin or equivalent safety pin which passes through striker.

b. Inspect base and upper collar of remover for proper staking to outer tube.

Note

Any canopy remover minus a lead seal attached by safety wire *must* be returned to the USAF Ordnance Department for disposition.

c. See that external walls of remover are not dented or crushed.

d. Determine that sear pin is correctly installed in canopy remover.

WARNING

ALWAYS HANDLE REMOVER WITH EXTREME CARE.

2-195. INSTALLING CANOPY REMOVER (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For identification of parts and components, see figure 2-43. Install canopy remover as follows:

a. Place base of canopy remover in socket on canopy deck, with body of remover resting in bottom half of "U" clamp fitting.

b. Position body of remover so that sear pin is facing left side of airplane and is parallel with canopy deck.

c. Install upper half of "U" clamp fitting and tighten bolt. Check to see that canopy remover is secure.

d. Adjust canopy emergency jettison system. (See figure 2-43.)

e. Install and latch canopy in place.

2-196. CANOPY EMERGENCY RELEASE SYSTEM CANOPY REMOVER (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES).

2-197. The Type M1A1 remover is a three-tube telescoping ejector consisting of an outer tube, an intermediate tube, an inner tube, an explosive solid-propellant cartridge, and the firing head. Attached to the remover is an M-1 exactor, which contains the sear pin that controls operation of the firing head. The canopy remover is mounted on the canopy deck in a horizontal position, with the firing head to the rear of the airplane. The ram end of the remover enters a socket in the canopy gear box when the canopy is in the closed position. There is no safety provision on the remover itself after it is installed. The only safety device is the ground safety pin inserted in the initiator on the seat ejection rail on the right side of the cockpit. A cover is installed on the base of the ram end of the remover to prevent insertion of a safety pin in an installed remover.

WARNING

Use care not to drop, strike, or jar a remover, as it may discharge, causing serious personal injury or death.

2-198. REMOVING CANOPY REMOVER (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES). For identification of parts and components, see figure 2-44. Remove canopy remover from airplane as follows:

WARNING

NEVER REMOVE EXACTOR FROM REMOVER.

a. Ensure that ground safety pin is installed in initiator.

b. Unlatch and raise aft end of canopy.

c. Disconnect gas tube at exactor and cover openings on tube end and exactor inlet fitting.

d. Remove "U" clamp from around canopy remover.

e. Lift out canopy remover.

WARNING

The canopy remover should be handled as an ordnance item and stored as ammunition. Installation or removal must be accomplished in the open, away from any building or hangar.

2-199. PREINSTALLATION CHECK OF CANOPY REMOVER (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES). The following inspections *must* be made and precautionary measures adhered to before installation of canopy remover with exactor.

a. Ensure that safety pin is in initiator.

b. Determine that tip of exactor sear pin extends to within 5/16 inch or less from end of hole in remover opposite exactor body.

c. Be sure that exactor attaching screws are properly safetied with safety wire.

d. See that external walls of remover and exactor are not dented or crushed.

e. See that lead seal and safety wire are in place to ensure against tampering with remover.

f. Inspect base and upper collar of remover for proper staking to outer tube.

g. Make sure that Vinylite seal on end of exactor is not ruptured or missing.

2-200. INSTALLING CANOPY REMOVER (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES). For identification of parts and components, see figure 2-44. Install canopy remover as follows:

WARNING

- Always handle canopy remover with extreme care.
- Keep out of canopy remover line of fire at all times.
- See that safety pin is in canopy remover initiator.

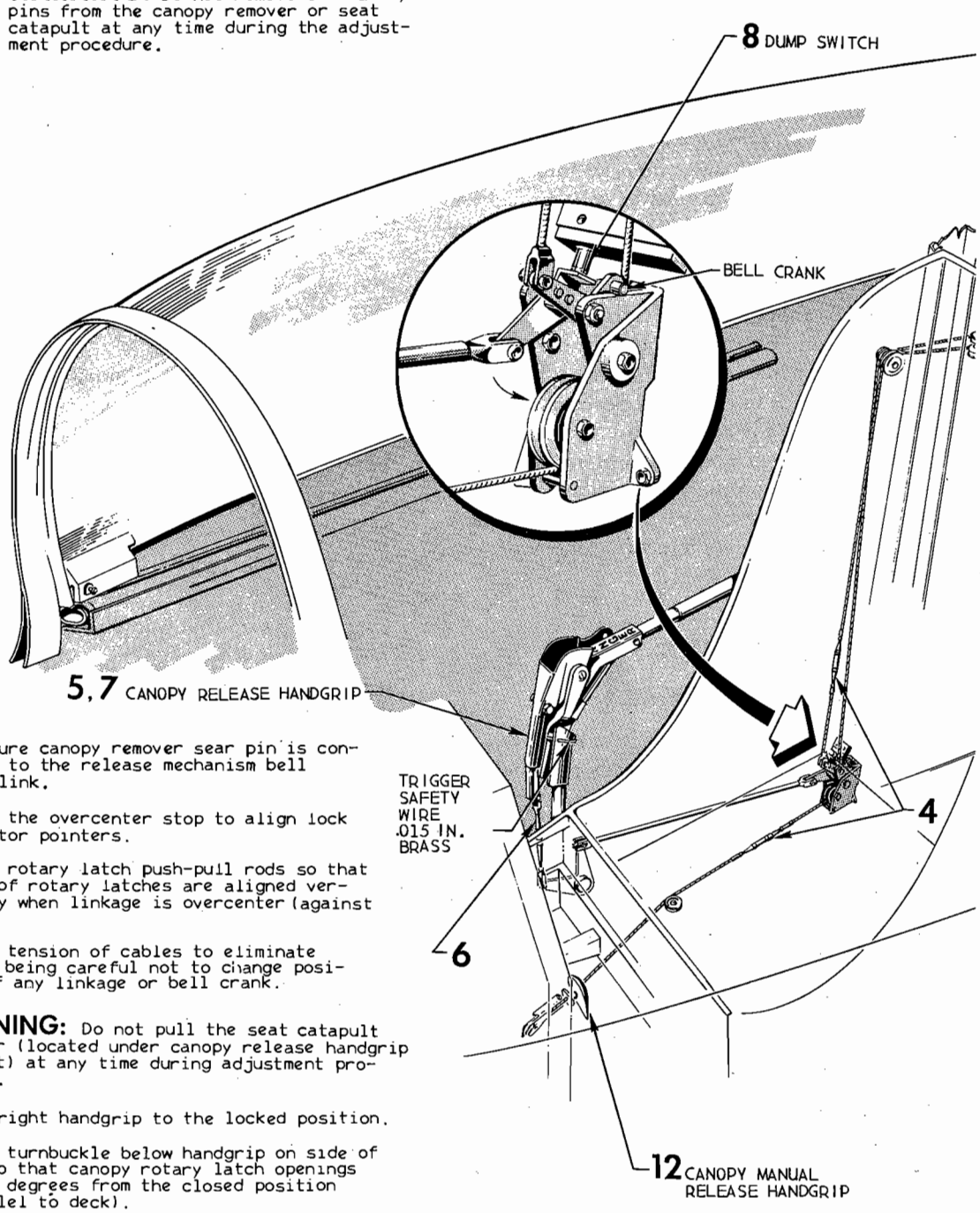
a. Place base of canopy remover in socket on canopy deck, with body of remover resting in place in bottom half of "U" clamp fitting and with end of exactor body through slot in exactor bracket.

b. Install upper half of "U" clamp fitting and tighten bolt; check to see that canopy remover body is secure.

c. Check canopy emergency release system (paragraph 2-190) and adjust if necessary. (See figure 2-44.)

d. Remove coverings from end of initiator hose and inlet fitting of canopy exactor and connect gas tube to

WARNING: Do not remove the safety pins from the canopy remover or seat catapult at any time during the adjustment procedure.



1 Make sure canopy remover sear pin is connected to the release mechanism bell crank link.

2 Adjust the overcenter stop to align lock indicator pointers.

3 Adjust rotary latch push-pull rods so that slots of rotary latches are aligned vertically when linkage is overcenter (against stop).

4 Adjust tension of cables to eliminate slack, being careful not to change position of any linkage or bell crank.

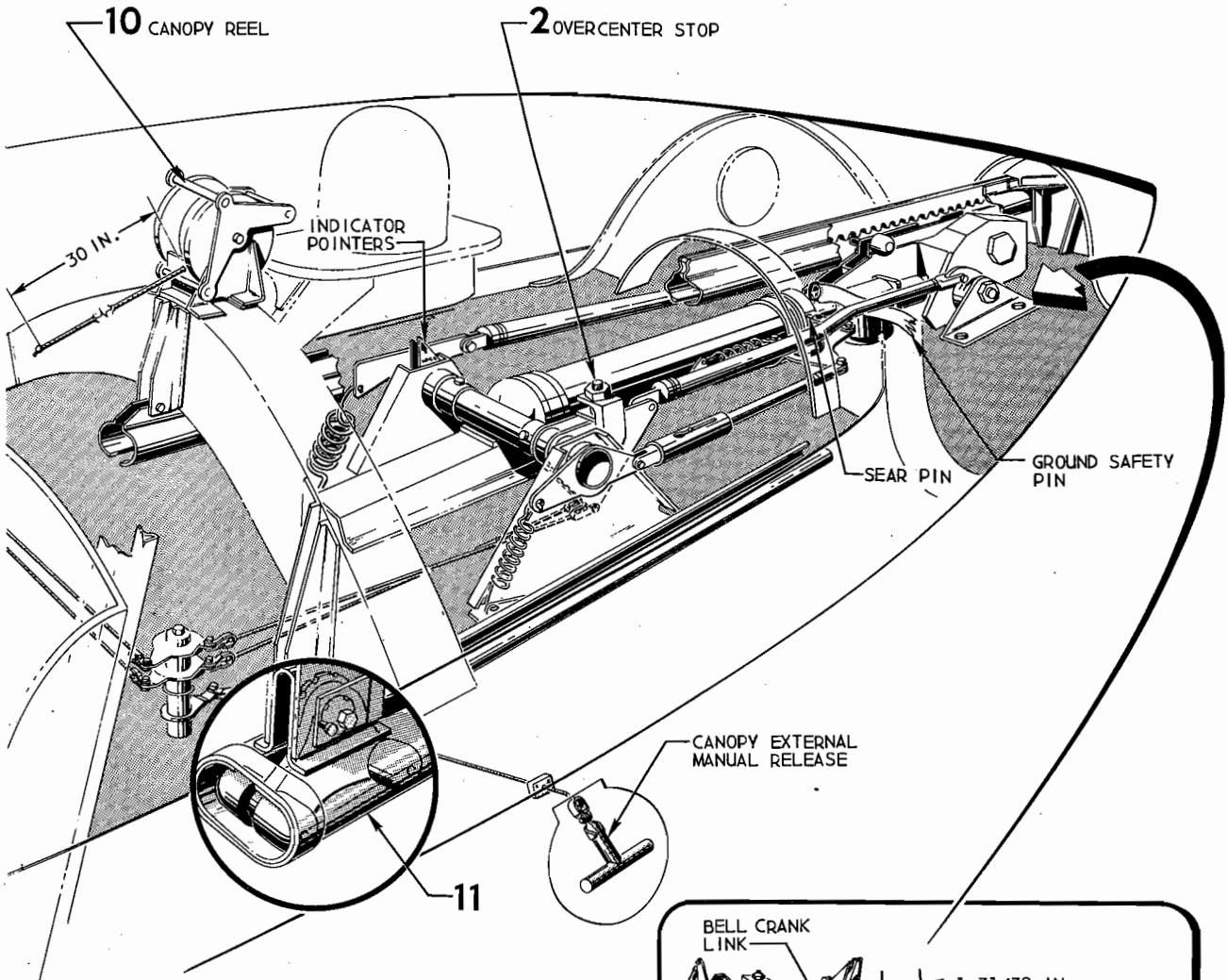
WARNING: Do not pull the seat catapult trigger (located under canopy release handgrip on seat) at any time during adjustment procedure.

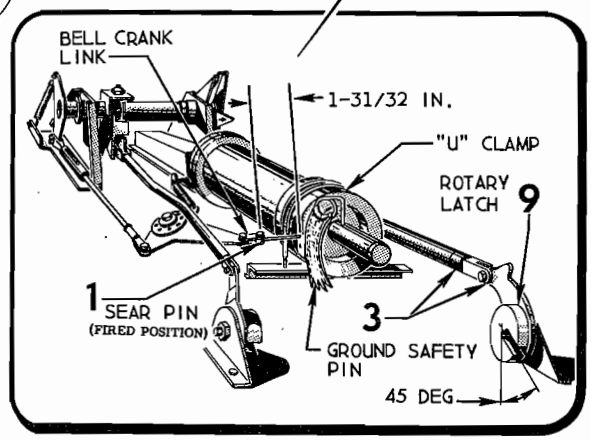
5 Raise right handgrip to the locked position.

6 Adjust turnbuckle below handgrip on side of seat so that canopy rotary latch openings are 90 degrees from the closed position (parallel to deck).

7 Return right handgrip to the stowed position.

Figure 2-43. Adjusting Canopy Emergency Release System—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129 (Sheet 1 of 2)





8 Adjust canopy seal emergency dump switch to allow approximately 1/16-inch travel before plunger bottoms when bell crank is in full up position.

9 Check that rotary latches rotate at least 45 degrees before the sear pin removal is sufficient to fire the canopy remover (1-31/32 inches).

10 Adjust tension preload of canopy reel to 3/4 pound (minimum) when ball is against stop; then determine that 30 inches of cable is obtainable (measured from the stop) before reel bottoms.

CAUTION: Looking aft from cockpit, be sure cable is threaded to wind from right to left.

11 Check trucks at intermediate track to see that movement is not restricted within the track.

12 With canopy closed, pull canopy manual release handgrip from inside airplane to make sure movement of canopy is free on tracks and latching mechanisms function properly.

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Figure 2-43. Adjusting Canopy Emergency Release System—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129 (Sheet 2 of 2)

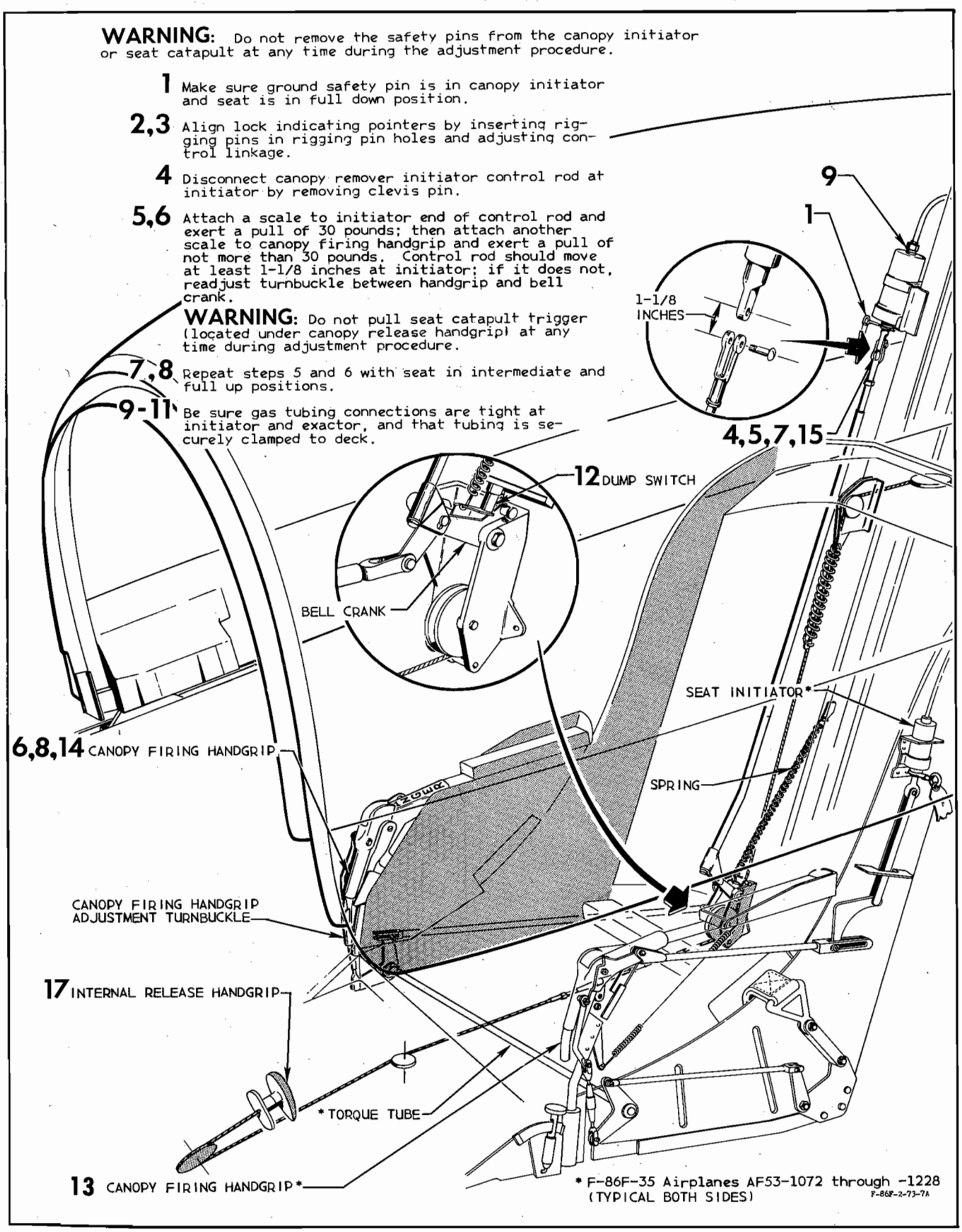
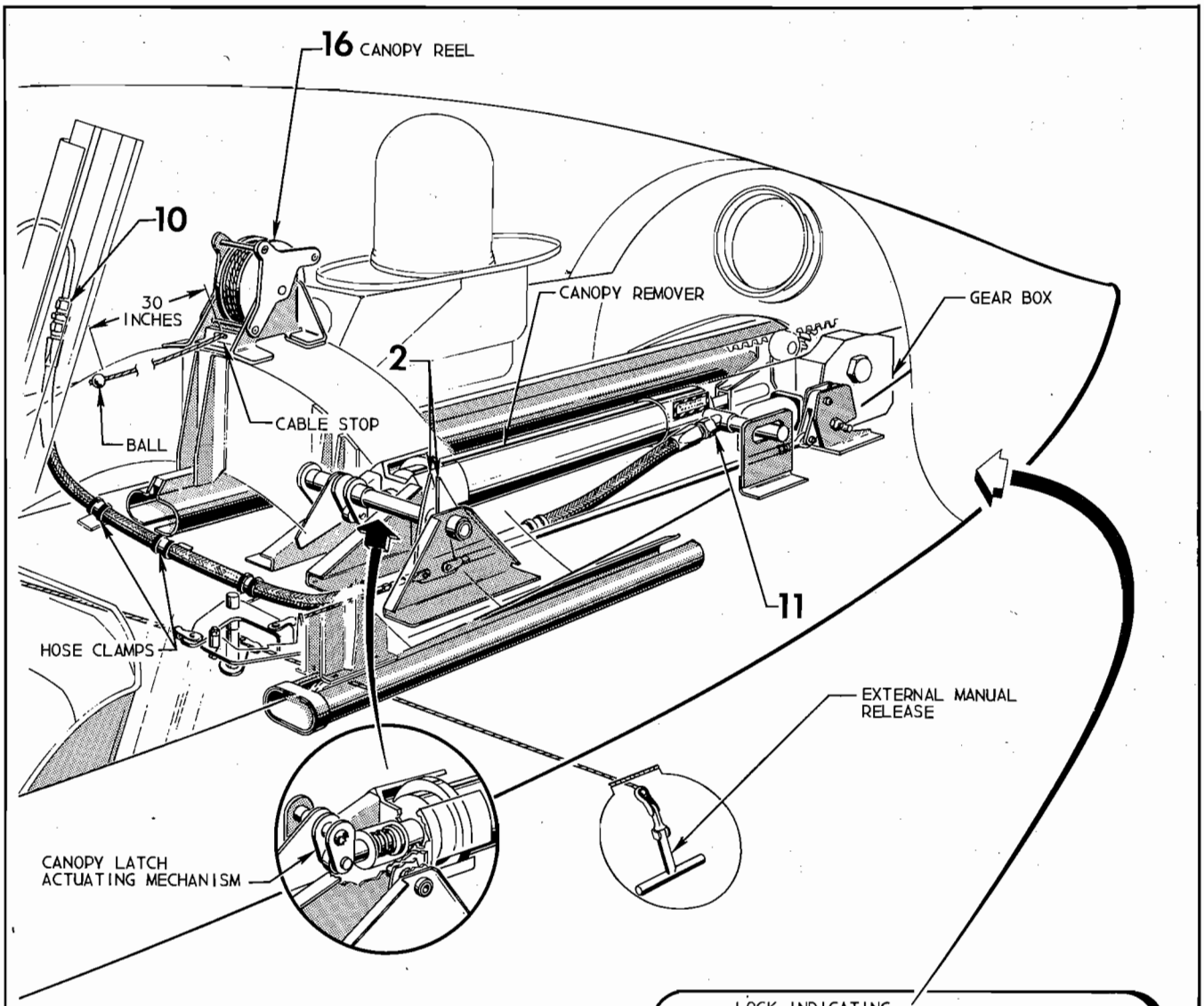
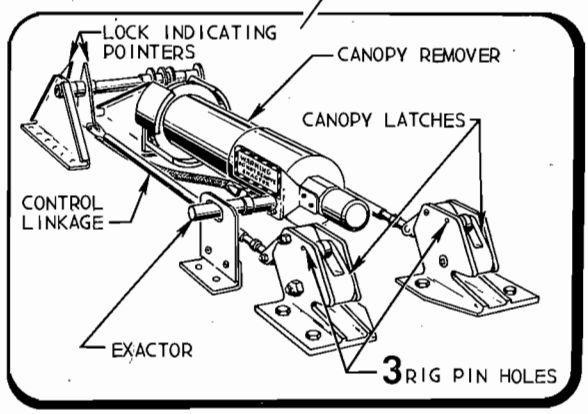


Figure 2-44. Adjusting Canopy Emergency Release System—F-86F-20 Airplanes AF51-13130 Through -13169, and F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)





12 Adjust canopy seal dump switch to allow approximately 1/16-inch travel before plunger bottoms when bell crank is in full up position; then adjust canopy initiator control rod so that top of elongated hole is resting on clevis bolt at bell crank.

13 On F-86F-35 Airplanes AF53-1072 through -1228, repeat steps 4 through 8 on right and left handgrips.

14,15 Lower handgrip(s); then connect initiator control rod at initiator and safety clevis pin with a cotter pin.

16 Adjust tension preload of canopy reel to 3/4 pound (maximum) when ball is against stop; then determine that 30 inches of cable is obtainable (measured from the stop) before reel bottoms.

CAUTION: Looking aft from cockpit, be sure cable is threaded to wind from right to left.

17 With canopy closed, pull manual release from inside airplane to make sure movement of canopy is free on tracks and latching mechanisms function properly.

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Figure 2-44. Adjusting Canopy Emergency Release System—F-86F-20 Airplanes AF51-13130 Through -13169, and F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

exactor. Ensure that gas tube is not twisted and that connections are not overtightened.

e. Install and latch canopy in place.

2-201. CANOPY EMERGENCY RELEASE SYSTEM CANOPY REMOVER INITIATOR (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES).

2-202. The M-3 initiator is a small cylinder (figure 2-42) containing a hermetically sealed cartridge capable of producing an initial maximum pressure of 5200 psi at the initiator outlet. To fire the cartridge, the sear pin is pulled axially from the initiator breech. Prior to actuation, the striker is locked in position by three ⅛-inch diameter steel balls which fit into the grooved shank of the sear pin. This sear pin is released from the striker when pulled through a distance of approximately ⅜ inch against the compression force of a spring, which then drives the striker forward to fire the cartridge. The initiator is assembled as a sealed unit containing the cartridge. The initiator body is secured to the top outer surface of the seat ejection seat rail by two bolts. Identification of a loaded initiator is the properly affixed ordnance decal, the staking of the cap to the cylindrical portion of the initiator, and the safety pin inserted through the cap neck and sear pin.

WARNING

- The initiator is to be handled as an ordnance item.
- The initiator sear pin is the trigger for firing the initiator. No safetying device exists in a completed installation other than the safety pin in the initiator itself.

2-203. CANOPY EMERGENCY RELEASE SYSTEM CANOPY REMOVER EXACTOR (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, AND F-86F-25 AND SUBSEQUENT AIRPLANES).

2-204. The M-1 exactor is a small piston and cylinder assembly incorporating two mounting lugs for attachment to the canopy remover. (See figure 2-42.) Upon actuation by pneumatic pressure (caused by gases when the initiator is fired), the exactor fires the remover by withdrawing an integral sear pin from the remover body. Used in conjunction with the initiator, the exactor is provided with a pressure inlet and threaded fitting for attachment of hose or tubing routed from the initiator. A relief outlet in the flat end of the exactor prevents air compression in the cylinder during the working stroke of the piston, but the outlet is sealed sufficiently to exclude moisture or foreign matter. The piston sear pin of the exactor cannot be removed more than ¼ inch by hand. Prior to operation, it is locked in position by three 1/16-inch diameter steel balls which are confined in a groove of the sear pin by a spring-loaded retainer. The retainer is pushed from position by gas pressure. This allows the balls to escape radially outward and frees the sear pin and piston so that they can move in a direction away from the remover.

2-205. CANOPY EMERGENCY RELEASE SYSTEM EXTERNAL AND INTERNAL MANUAL RELEASES.

2-206. Two manual canopy releases, an external and an internal, are provided in the event of an emergency on the ground. The external release handle can be reached through an access door on the left side of the fuselage, below the canopy frame. The internal release, known as the canopy declutch handle, is mounted on the bottom of the center pedestal in the cockpit. Pulling either canopy release handle disengages the canopy from the drive mechanism, allowing the canopy to be moved aft manually. (See figure 2-43 or 2-44.)

2-207. SEAT EJECTION SYSTEM (F-86F-1 THROUGH F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271).

2-208. The seat ejection system uses a Type M-1 or M1A1 aircraft personnel catapult and mechanical actuating linkage. The ejection system provides a means of quickly and safely separating the pilot from a crippled airplane. In an emergency, the pilot can fire the catapult to eject the seat safely upward in a path that will clear all airplane structure. The canopy is ejected from the airplane when the right handgrip is raised. As the canopy is ejected, it clears the way for the pilot and extracts the seat catapult sear safety pin. On F-86F-20 Airplanes AF51-13130 through -13169, and F-86F-25 and subsequent airplanes, if the canopy fails to leave the airplane, the pilot may eject himself through the canopy. The seat on these airplanes is provided with mechanical linkage connected to the seat catapult sear safety pin and to the left handgrip. Rotating the left handgrip removes the catapult sear safety pin, thereby permitting the seat catapult to be fired whenever the trigger is squeezed. To prevent inadvertent use of the left handgrip and to maintain the correct sequence of operation during ejection procedure, an overcenter mechanism installed on the left side of the seat prevents the left handgrip from being raised until the right handgrip has been rotated up and locked in the canopy-fired position. Conversely, the left handle must be lowered first and then the right; otherwise, the seat linkage forks become bent. For details of parts and components of each system, see figure 2-45 or 2-46.

2-209. REMOVING SEAT (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For location and identification of ejection seat components, see figure 2-45. Remove ejection seat from airplane as follows:

WARNING

The ground safety pins must be installed in the seat catapult, the canopy remover, and the right handgrip, and must remain in at all times.

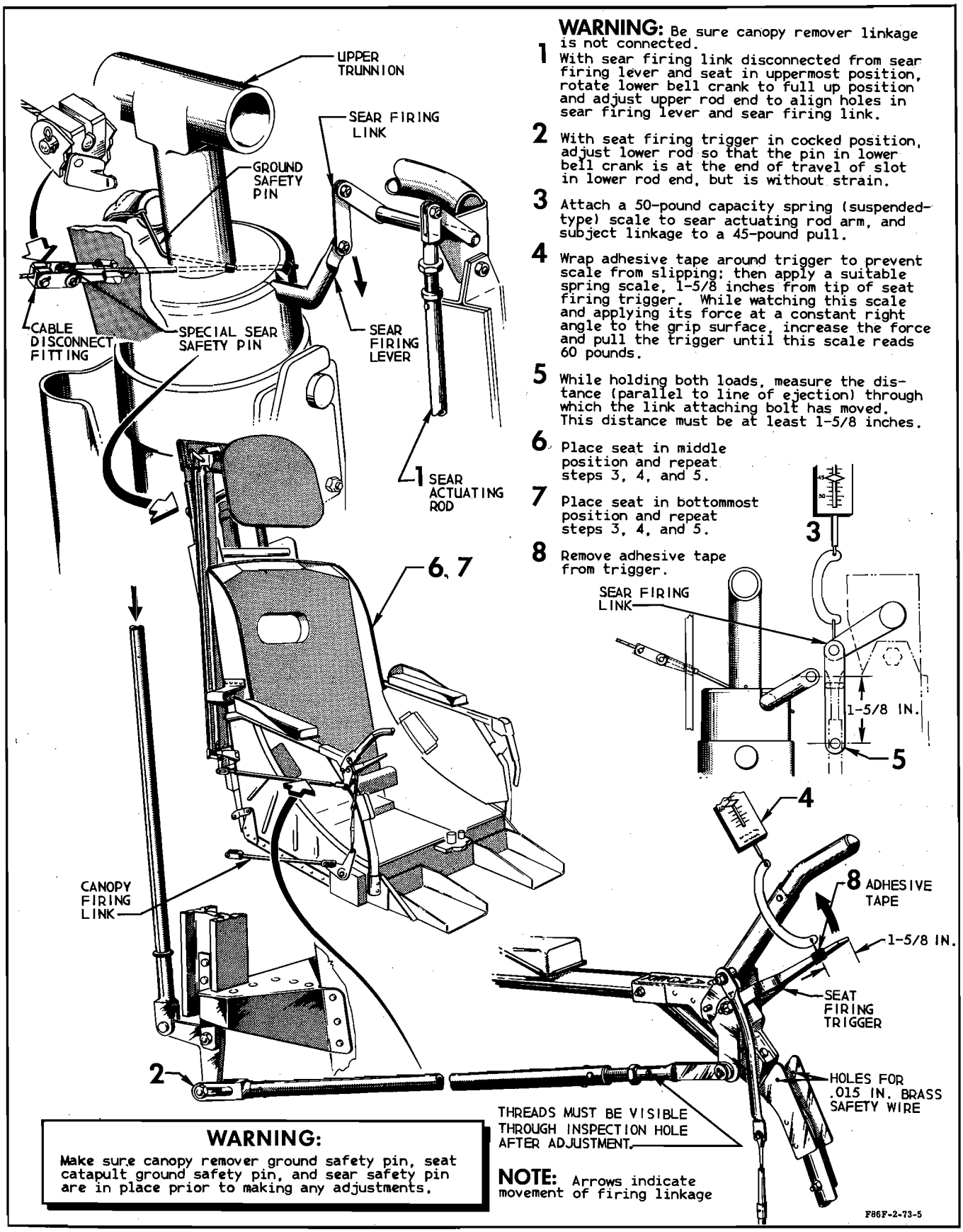


Figure 2-45. Adjusting Seat Ejection System—F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13129

a. Disconnect sear firing link from catapult sear firing lever.

b. Disconnect linkage from canopy sear pin.

c. Disconnect seat from catapult at upper trunnion.

d. Disconnect personal leads at front of seat, and mask openings on both halves of block with tape.

e. Partially raise seat; remove safety wire from end of canopy rod clevis at seat bell crank.

f. Raise and remove seat with care.

2-210. REMOVING SEAT (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271). For location and identification of ejection seat components, see figure 2-46. Remove ejection seat from airplane as follows:

WARNING

The ground safety pins must be in place in the right handgrip, the canopy initiator, and the catapult at all times when the airplane is on the ground.

a. Disconnect sear firing link from catapult sear firing lever.

b. Disconnect sear safety pin from sear safety pin extractor arm.

c. Disconnect canopy reel cable from canopy sear pin extractor arm link.

d. Disconnect seat from catapult at upper trunnion.

e. Disconnect personal leads at disconnect block on front of seat, and mask openings on both halves of block with masking tape.

f. Partially raise seat; remove safety wire from end of canopy rod clevis at seat bell crank.

g. Raise and remove seat with care.

2-211. PREINSTALLATION CHECK OF SEAT (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). Before installing ejection seat in airplane, check the following:

a. Ensure that seat has been properly adjusted. (See figure 2-45.)

b. Check all linkage, bell cranks, track rollers, catapult trigger, and both handgrips for smooth and free movement.

c. Check to see that all bolts are tight and that all pivot point pins are free and properly safetied with cotter pin.

d. Check that height adjustment lever is free from binding and that seat will adjust to each position.

e. Ensure that shoulder-harness inertia reel locks when left handgrip is raised, is free to extend when handgrip is lowered, and locks when control handle is in locked position.

f. Check that personal-lead disconnects are not damaged or loose on seat.

g. Check that seat headrest is easily adjustable to all positions.

CAUTION

When both seat handles are raised, the left handle must be lowered first; otherwise the seat linkage forks become bent.

h. Ensure that both left and right handgrips lock when raised to full up position.

2-212. PREINSTALLATION CHECK OF SEAT (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271). Before installing ejection seat in airplane, check the following:

a. Ensure that seat has been properly adjusted. (See figure 2-46.)

b. Check all linkage, bell cranks, track rollers, catapult trigger, and both handgrips for smooth and free movement.

c. Check to see that all bolts are tight and that all pivot pins are free and properly safetied with cotter pin.

d. Ensure that both left and right handgrips lock when raised to full up position.

e. Ensure that left handgrip cannot be raised until right handgrip is full up and locked.

f. Check that height adjustment lever is free from binding and that seat will adjust to each position.

g. Ensure that shoulder-harness inertia reel locks when left handgrip is raised, is free to extend when handgrip is lowered, and locks when control handle is in locked position.

h. Check that seat headrest is easily adjustable to all positions.

i. Check that personal-lead disconnects are not damaged or loose on seat.

2-213. INSTALLING SEAT (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For location and identification of ejection seat components, see figure 2-45. Install ejection seat as follows:

WARNING

The ejection seat catapult and canopy remover are loaded with explosive charges and must be properly safetied with ground safety pins at all times while the airplane is on the ground.

1 Disconnect initiator firing link from initiator plunger.

2-4 With sear firing link disconnected from sear firing lever, handgrip up, trigger in cocked position, and seat in uppermost position, rotate lower bell crank to full aft position in slot of lower rod and adjust upper rod end to align holes in sear firing lever and sear firing link.

5-7 Make sure sear firing link is disconnected from sear firing lever; then attach a 50-pound capacity spring (suspended-type) scale to sear actuating rod arm, and subject linkage to a 45-pound pull. Wrap adhesive tape around trigger to prevent scale from slipping; then apply a suitable spring scale, 1-5/8 inches from tip of seat firing trigger. While watching this scale and applying its force at a constant right angle to the grip surface, increase the force and pull the trigger until this scale reads 60 pounds. Then, while holding both loads, measure the distance (parallel to line of ejection) through which the link attaching bolt has moved. This distance must be at least 1-5/8 inches. Adjust lower rod if necessary.

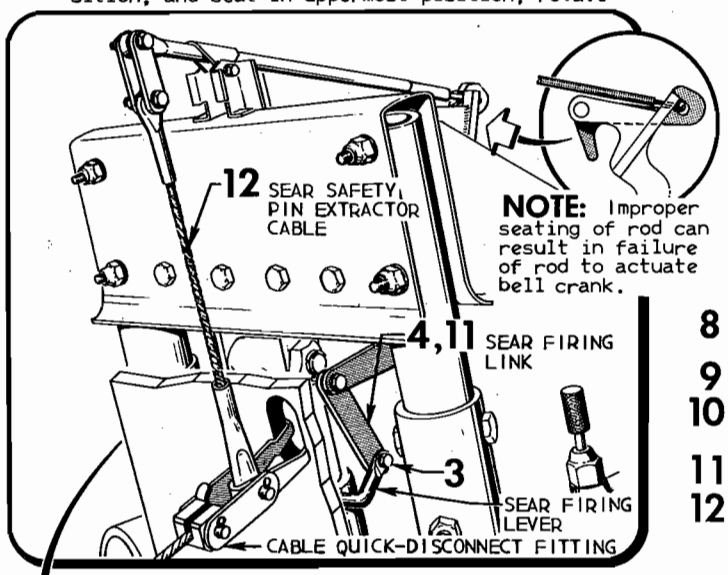
8 Repeat steps 5, 6, and 7 with seat in middle position and then in bottommost position.

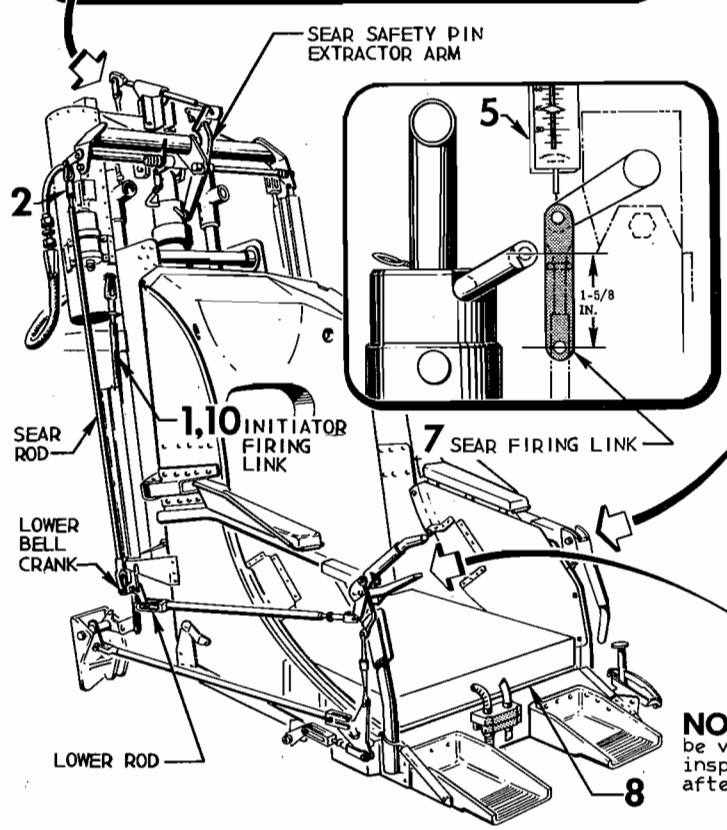
9 Remove adhesive tape from trigger.

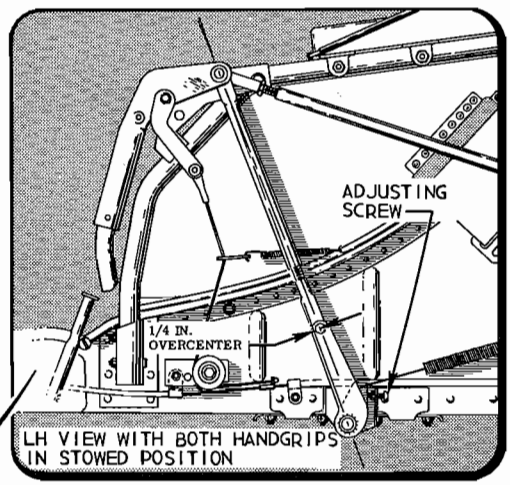
10 Lower handgrip and trigger; then connect initiator firing link at initiator plunger.

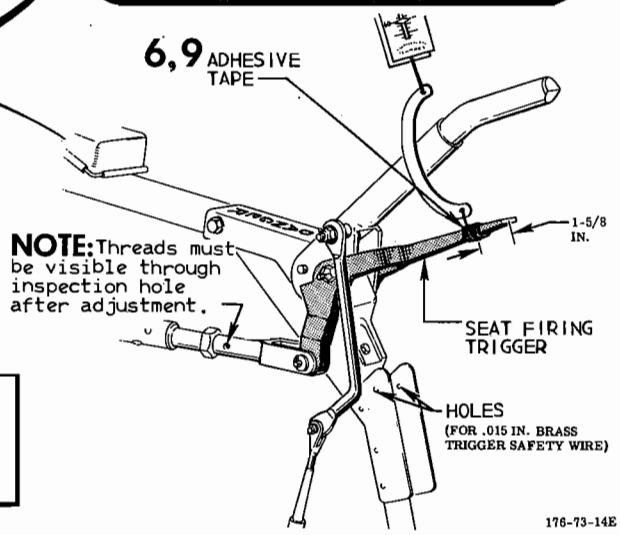
11 Connect sear firing link to sear firing lever.

12 Connect sear safety pin extractor cable to back of armor plate at canopy reel cable attachment point.









WARNING

Make sure canopy remover initiator ground safety pin, seat catapult ground safety pin, and sear safety pin are in place prior to making any adjustments.

Figure 2-46. Adjusting Seat Ejection System—F-86F-20 Airplanes AF51-13130 Through -13169, F-86F-25 and F-86F-30 Airplanes, and F-86F-35 Airplanes AF52-5164 Through -5271

a. Ensure that canopy seal emergency dump switch has been properly adjusted. (See figure 2-43.)

b. Lower seat on tracks with care; ensure that sufficient clearance exists between seat and catapult and between seat and fuselage. Guide slotted end of canopy firing link onto trunnions of seat bell crank and safety-wire with AN 995F32-10 safety wire.

c. Connect seat and catapult at upper trunnion.

d. Connect sear firing link to sear firing lever.

e. Connect catapult sear safety pin to canopy release cable.

f. Connect personal leads at front of seat.

g. Safety-wire trigger in place with .015-inch brass safety wire.

h. Install ground safety pins in both handgrips.

2-214. INSTALLING SEAT (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271). For location and identification of ejection seat components, see figure 2-46. Install ejection seat as follows:

WARNING

The ejection seat catapult and canopy remover initiator must be properly safetied with ground safety pins at all times the airplane is on the ground.

a. Ensure that canopy seal emergency dump switch has been properly adjusted. (See figure 2-44.)

b. Lower seat on tracks with care; ensure that sufficient clearance exists between seat and catapult and between seat and fuselage. Guide slotted end of canopy initiator lower firing link onto trunnions of bell crank and safety-wire with AN 995F32-10 safety wire.

c. Connect seat and catapult at upper trunnion.

d. Connect sear firing link to sear firing lever and install safety pin in right handgrip.

e. Connect canopy cable to catapult sear safety pin extractor link.

f. Connect catapult sear safety pin extractor bell crank to sear safety pin.

g. Connect personal leads at front of seat.

h. Safety-wire trigger in place with .015-inch brass safety wire.

i. Install ground safety pin in right handgrip.

2-215. ADJUSTING SEAT EJECTION SYSTEM. See figure 2-45 or 2-46.

2-216. SEAT EJECTION CATAPULT (F-86F-1 THROUGH F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271).

2-217. The Type M-1 or M1A1 catapult which is used to propel the seat away from the airplane, is a three-tube, telescoping ejector. The catapult consists of an outer tube, an intermediate tube, an inner tube, and a cartridge with its firing mechanism. The upper end of the inner tube incorporates the cartridge, its firing mechanism, and a trunnion which is attached to the upper framework of the ejection seat. The upper end of the outer tube has a trunnion attached to the structure of the airplane. When the catapult is fired, the outer and intermediate tubes stay with the airplane; the inner tube goes out with the seat. The catapult is assembled with the cartridge contained in the catapult as a sealed unit. Two safety devices are provided: the catapult sear safety pin, which prevents rotation of the sear; and a ground safety pin that passes through the firing pin, locking the firing pin in place. The catapult sear safety pin is inserted diagonally through the inner tube, trunnion, firing pin, and sear, and protrudes from the outer tube. A spring clip is installed in the cable system from the canopy reel to the catapult sear safety pin to prevent a strain being imposed on the sear safety pin when the canopy is operated. This clip is installed in a hole through the armor plate and is connected to the canopy reel cable by a quick-disconnect fitting. (See figure 2-45 or 2-46.) The catapult sear safety pin is pulled out of the catapult by the cable on the canopy reel when the canopy leaves the airplane. The ground safety pin is strictly a ground safety device which is removed just before take-off and installed immediately after landing.

WARNING

All catapults should be considered loaded and dangerous, and should be handled with extreme caution.

2-218. REMOVING CATAPULT (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For identification of components, see figure 2-45. Remove ejection seat catapult from airplane as follows:

WARNING

Removal must be accomplished in the open, away from any building or hangar.

a. Ensure that ground safety pins are installed in catapult, canopy remover, and both seat handgrips.

b. Remove canopy from airplane. (Refer to paragraph 2-174.)

c. Remove catapult sear safety pin from catapult through hole in rear of armor plate; then replace sear safety pin from front of catapult and safety-wire in place.

d. Remove ejection seat. (Refer to paragraph 2-209.)

e. Remove screw from armor plate retaining stop and rotate armor plate to rest on canopy deck. Do not drop armor plate on canopy emergency release mechanism.

f. Remove forward bolts and loosen rear bolts in catapult retaining hooks; then rotate hooks to open position.

g. Lift out catapult and store in approved manner.

2-219. REMOVING CATAPULT (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271). For identification of components, see figure 2-46. Remove ejection seat catapult as follows:

WARNING

Removal must be accomplished in the open, away from any building or hangar.

a. Ensure that ground safety pins are installed in catapult, canopy initiator, and right handgrip.

b. Remove canopy from airplane. (Refer to paragraph 2-174.)

c. Disconnect catapult sear safety pin from extractor arm and then safety-wire sear safety pin to catapult.

d. Remove seat. (Refer to paragraph 2-210.)

e. Remove screw from armor plate retaining stop and rotate plate to rest on canopy deck. Do not drop armor plate on canopy emergency release mechanism.

f. Remove forward bolts and loosen rear bolts in catapult retaining hooks, then rotate hooks to open position.

g. Lift out catapult and store in approved manner.

2-220. PREINSTALLATION CHECK OF LOADED CATAPULT. Certain inspections and precautionary measures must be followed before installation of the seat ejection catapult.

WARNING

Do not drop, bump, or jar catapult.

a. Ensure that lead seal and safety wire are affixed to catapult.

b. Check that upper and lower caps are staked to, and aligned with, catapult body.

c. Check that catapult walls are not dented, crushed, or otherwise materially damaged.

d. Ensure that sear safety pin is installed and safety-wired in place.

e. Ensure that cotter safety pin is in place.

Note

If any of these conditions do not exist, catapult should be tagged and turned over to the local ordnance office for disposition.

WARNING

Only those persons familiar with the approved handling procedures of the seat catapult should be permitted to enter a cockpit where the seat catapult is installed.

2-221. INSTALLING CATAPULT (F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13129). For identification of components, see figure 2-45. Install catapult as follows:

WARNING

Installation must be accomplished in the open, away from any building or hangar.

a. Place catapult in position on trunnion mountings.

b. Rotate trunnion hooks forward over bosses on catapult.

c. Install forward bolts; then tighten both forward and rear bolts in catapult trunnion hooks.

d. Rotate armor plate up in position, and secure armor plate by installing screw in strap.

e. Remove safety wire and sear safety pin from front of catapult; then reinstall sear safety pin through hole in armor plate into aft side of catapult. Safety-wire forward end of sear safety pin with .015-inch brass safety wire.

f. Remove cotter safety pin from neck of catapult and install flagged ground safety pin.

g. Install seat. (Refer to paragraph 2-213.)

h. Install canopy. (See figure 2-38.)

2-222. INSTALLING CATAPULT (F-86F-20 AIRPLANES AF51-13130 THROUGH -13169, F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271). For identification of components, see figure 2-46. Install catapult as follows:

WARNING

Installation must be accomplished in the open, away from any building or hangar.

a. Place catapult in position on trunnion mountings.

b. Rotate trunnion hooks forward over bosses on catapult.

c. Install forward bolts, and then tighten both forward and rear bolts in catapult trunnion hooks.

d. Rotate armor plate up in position and secure by installing screw in strap.

e. Remove cotter safety pin from neck of catapult and install flagged safety pin.

f. Remove safety wire from sear safety pin.

g. Install seat. (Refer to paragraph 2-214.)

h. Install canopy. (See figures 2-38 and 2-39.)

2-222A. SEAT EJECTION SYSTEM (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228).

2-222B. The seat ejection system uses a Type M-5 or T4E4 aircraft personnel catapult and Type M-3 initiator. The ejection system provides a means of quickly and safely separating the pilot from a crippled airplane. In an emergency, the pilot can fire the catapult to eject the seat safely upward in a path that will clear all airplane structure. The canopy is ejected from the airplane when either the right or the left handgrip is raised to the locked position. If the canopy fails to leave the airplane, the pilot may eject himself through the canopy. Raising either the right or the left handgrip to the up-and-locked position also mechanically raises the seat ejection trigger to the operating position on the side on which the handgrip has been raised and locks the shoulder-harness reel. Rotating the seat ejection trigger fires an initiator, which discharges the catapult to eject the seat and occupant from the airplane. For details of parts and components of the system, see figure 2-46A.

WARNING

The approved initiator safety pins must be in all initiators at all times when the airplane is on the ground.

2-222C. REMOVING SEAT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). For location and identification of ejection seat components, see figure 2-46A. Remove ejection seat from airplane as follows:

WARNING

The seat ejection catapult is loaded with an explosive charge. Be sure the approved ground safety pins are in all three initiators before attempting to remove seat.

a. Unlatch spring clips holding personal-lead disconnect fittings together, and mask openings.

b. Disconnect seat from catapult at upper trunnion.

c. Disconnect hose from inlet fitting on catapult, and cap hose.

d. Remove inlet fitting from catapult, and store in pouch behind seat.

e. Install pipe plug in inlet hole in catapult to prevent entry of foreign matter and to protect threads from damage.

f. Partially raise seat; remove safety wire from canopy initiator firing rod clevis at bell crank.

g. Carefully raise and remove seat.

2-222D. PREINSTALLATION CHECK OF SEAT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). Before installing ejection seat in airplane, check the following:

a. Ensure that seat has been properly adjusted. (See figure 2-46A.)

b. Check all linkage, bell cranks, track rollers, handgrips, and catapult triggers for smooth and free movement.

c. Check to see that initiators are secure on seat and that clevis pins are properly safetied with cotter pins.

d. Ensure that both left and right handgrips lock when rotated to the full up position and that triggers latch properly when in full down position.

e. Check that all hose connections are tight and that hoses are secure in clamps and free from damage.

f. Check that height adjustment lever is free from binding and that seat will adjust to all positions.

g. Ensure that shoulder-harness inertia reel locks when either handgrip is raised, is free to extend when either handgrip is lowered, and locks when control handle is in locked position.

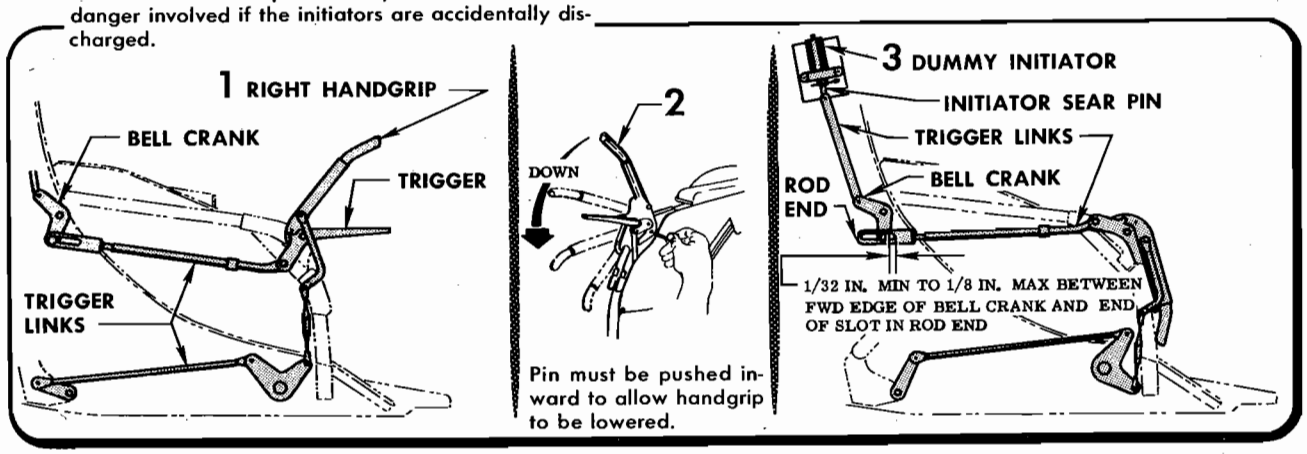
h. Check that seat headrest is easily adjustable to all positions.

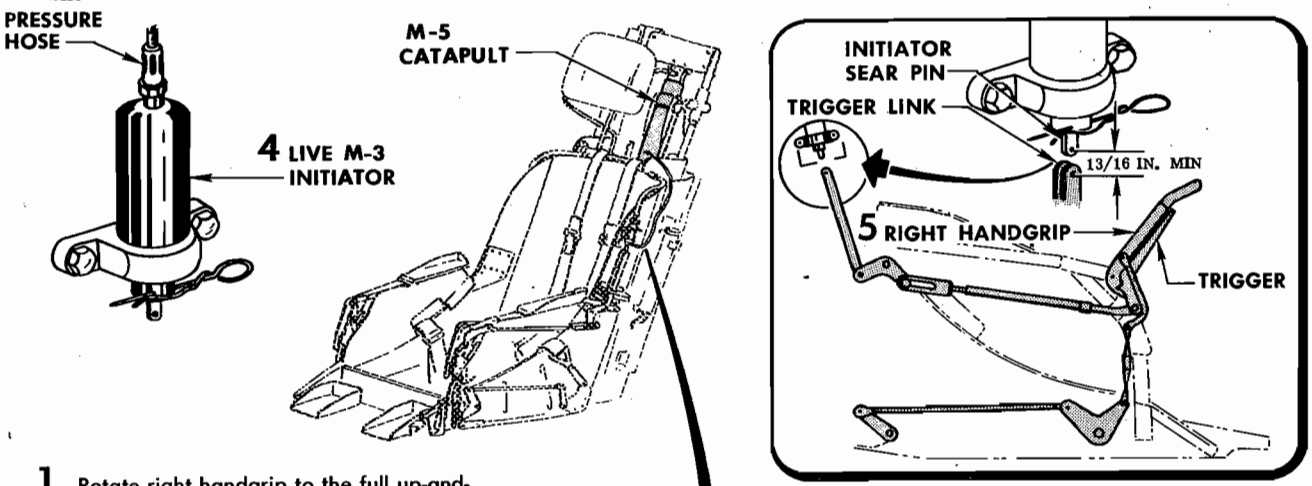
i. Check that personal-lead disconnects are not damaged or loose on seat.

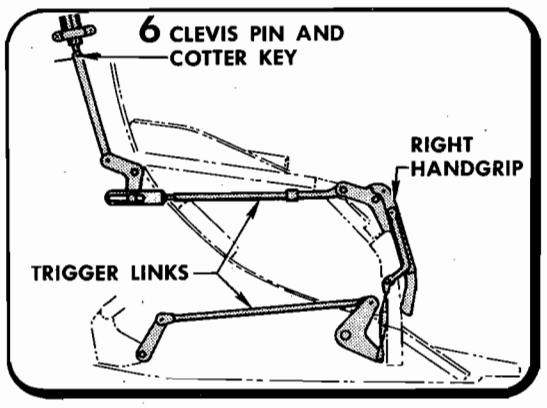
2-222E. INSTALLING SEAT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). For location and identification of ejection seat components, see figure 2-46A. Install ejection seat as follows:

WARNING: Do not remove GFP safety pins from initiators at any time (except when streamer-type pins are to be used as replacements) because of extreme danger involved if the initiators are accidentally discharged.

NOTE: Initiators must be installed on seat and adjusted before seat is placed in airplane.







1 Rotate right handgrip to the full up-and-locked position. Check that handgrip, trigger, and attached links may be moved freely without binding.

2 Lower right trigger and handgrip to the full down-and-locked position.

3 Attach an M-3 dummy initiator to right side of seat, sear pin downward. Then connect link to initiator and adjust rod end at bell crank so that free motion is 1/32 to 1/8 inch between forward end of slot and bell crank face.

4 Replace dummy initiator with live M-3 initiator and firmly connect pressure hose to initiator outlet. Do not attach link to initiator.

5 Rotate right handgrip to full up-and-locked position; then align hole in trigger link with hole in initiator sear pin and pull trigger through its full stroke. Ensure that link moves not less than 13/16 inch.

6 Lower right handgrip and trigger to the full down-and-locked position; then connect trigger links to initiator sear pin with clevis pin, and safety with cotter key. Repeat steps 1 through 6 on left handgrip and trigger.

7 Replace GFP safety pins with streamer-type safety pins before installation of seat in airplane.

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Figure 2-46A. Adjusting Seat Ejection System—F-86F-35 Airplanes AF53-1072 Through -1228

WARNING

The approved ground safety pins must be in all three initiators at all times while the airplane is on the ground.

a. Ensure that canopy seal emergency dump switch has been properly adjusted. (See figure 2-44.)

b. Remove masking tape from both halves of personal-lead disconnect block openings.

c. Lower seat on tracks with care; ensure that sufficient clearance exists between seat and catapult and between seat and fuselage. Guide slotted end of canopy initiator firing rod end onto trunnions of seat bell crank, and safety-wire rod end with AN995F32-10 safety wire.

d. Lower seat further until seat yoke and catapult upper fittings align.

e. Mate halves of personal-lead disconnect block, and snap latches into place.

f. Connect catapult to seat yoke.

g. Remove plug from pressure inlet of catapult and remove covering from hose connection of initiator pressure line.

h. Inspect catapult hose fitting for condition of threads and then install fitting snugly into place.

i. Attach gas pressure hose from seat initiators to catapult inlet fitting, taking care not to twist hose or overtighten connections.

j. Install streamer-type ground safety pins in catapult initiators.

2-222F. ADJUSTING SEAT EJECTION SYSTEM (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). See figure 2-46A.

2-222G. SEAT EJECTION CATAPULT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228).

2-222H. The Type M-5 or T4E4 catapult, which is used to propel the seat away from the airplane, is a three-tube telescoping ejector consisting of an inner, an intermediate, and an outer tube. The upper end of the inner tube contains the explosive solid-propellant cartridge, the firing mechanism, the pressure inlet, and a female trunnion which attaches to the ejection seat. The upper end of the outer tube incorporates a male trunnion by which the catapult is attached to the airplane structure. The seat catapult firing mechanism is operated by gas pressure from an initiator on the side of the ejection seat. The gaseous pressure enters the head inlet and builds up sufficient pressure to shear the striker pins, thereby driving the striker downward to fire the cartridge.

WARNING

Be careful not to drop, strike, or jar seat catapult, as the unit does not use a safety pin and it may discharge, causing serious personal injury or death.

2-222J. REMOVING SEAT EJECTION CATAPULT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). To remove the seat catapult, proceed as follows:

a. Remove canopy. (Refer to paragraph 2-174.)

WARNING

- Removal of the catapult must be accomplished in the open, away from any hangar or buildings.
- Be sure streamer-type ground safety pins are in all three initiators while airplane is on ground. Do not raise handgrips.

b. Detach pressure hose from seat catapult inlet fitting, and cap hose. Remove inlet fitting from catapult and install pipe plug in opening.

c. Unlatch spring clips holding halves of personal-lead disconnect fitting together, and mask openings.

d. Disconnect seat from catapult at upper trunnion.

e. Partially raise seat, and remove safety wire from canopy initiator firing rod clevis at bell crank.

f. Remove seat with care, avoiding use of handgrips in process.

g. Remove top bolts on catapult trunnion hooks and loosen lower bolts.

h. Rotate hooks from catapult trunnions and carefully remove catapult.

i. Place catapult in shipping container for storage in a dry place.

2-222K. PREINSTALLATION CHECK OF LOADED CATAPULT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). Certain inspections and precautionary measures must be followed before installation of the seat ejection catapult.

WARNING

Do not drop, bump, or jar catapult.

a. Make sure that seat catapult initiators on seat have approved-type safety pins installed.

b. See that pipe plug in pressure inlet of catapult is secure against entry of foreign matter.

c. Handle catapult with care. If lead seal or safety wire attached to seal is broken or missing, if upper or lower cap staking marks are obliterated or misaligned, or if catapult walls are dented or otherwise materially damaged, tag catapult and turn it over to local ordnance office for disposition.

WARNING

Only persons familiar with the approved handling procedures of the seat catapult should be permitted to enter a cockpit where the seat catapult is installed.

2-222L. INSTALLING SEAT EJECTION CATAPULT (F-86F-35 AIRPLANES AF53-1072 THROUGH -1228). To install seat ejection catapult, proceed as follows:

WARNING

Installation must be accomplished in the open, away from any building or hangar.

a. Place catapult in position on trunnion mounts on airplane structure.

b. Close catapult trunnion hooks over bosses on catapult.

c. Install top bolts and tighten lower bolts in catapult trunnion hooks.

d. Rotate armor plate forward into position and install screw in strap that holds head armor plate against rails.

2-222M. SEAT EJECTION SYSTEM AUTOMATIC LAP BELT RELEASE SYSTEM (F-86F-35 AIRPLANES AF53-1097 THROUGH -1228).

2-222N. Incorporated with the seat ejection system is an automatic lap belt release system consisting of lap belt release mechanism, M-4 time-delay initiator, bell crank, initiator actuating arm, and link. The system is dependent upon the seat catapult for actuation but can be released manually, if desired, by the pilot. The lap belt release mechanism is actuated by gas pressure derived from a time-delay initiator fired by the initial movement of the seat catapult when ejecting the seat. The time-delay initiator, actuating arm, and link are mounted on the upper left corner of the seat frame. Behind the seat and adjacent to the catapult is mounted a spring-loaded bell crank. The bell crank engages the top surface of the catapult by means of a roller and is held against the surface with a torque spring. Movement of the ejected portion of the catapult actuates the bell crank which in turn strikes the initiator actuating arm, thereby producing approximately 1¼ inch travel of the initiator sear pin through the connecting link. Firing of the time-delay initiator is thereby accomplished after approximately 2 inches of upward movement of seat and inner portion of the catapult. The actual belt release mechanism is attached to the top surface of the left-hand web belt section and mates with the right-hand section of the belt when in the locked position. The shoulder-harness loops and cables from the bail-out oxygen bottle and parachute can also be tied into the mechanism for automatic operation. Automatic features of the release do not affect the normal operation of the bail-out bottle or parachute. However, a special key must be inserted in the lap belt release mechanism after the two sections of the lap belt are engaged before the unit can be locked closed. If the unit fails to lock closed after insertion of the key, then the mechanism has been fired or is damaged internally and the lap belt and mechanism must be replaced as a unit. The mechanism must be returned to ordnance after being fired, for rearming and inspection.

2-222P. SEAT EJECTION SYSTEM AUTOMATIC LAP BELT RELEASE INITIATOR.

2-222Q. The automatic lap belt initiator is mounted on the upper left corner of the seat frame, adjacent to the top of the seat catapult. The initiator provides gas pressure for operation of the automatic lap belt release mechanism after the seat has been ejected from the airplane. The initiator is fired by action of the catapult in ejecting the seat. A delayed action fuse within the initiator allows 2 seconds from the time the initiator sear pin is pulled before the initiator is fired. The M-4 time-delay-type initiator is approximately one inch longer than the M-3 initiators used to operate the seat catapult and are *not* interchangeable in use. The unit

1 With canopy remaved from airplane, reploce streamer-type maintenance safety pin with GFP shipping pin in automatic lap belt release initiator. Then check to see that safety pins are in the canopy and seat ejection system initiators.

2 Disconnect personal-lead block at frant of seat, and mask openings on both halves with tape to exclude foreign matter.

3 Disconnect high-pressure hose at seat catapult, and cap openings to exclude fareign matter.

4 Remove forward bolts from trunnion hooks and rotate hooks back far enough to clear trunnions.

5 Partially raise seat and remove safety wire fram end of canopy rod clevis at seat bell crank.

6 Remove clevis pin from initiator actuating link and sear pin.

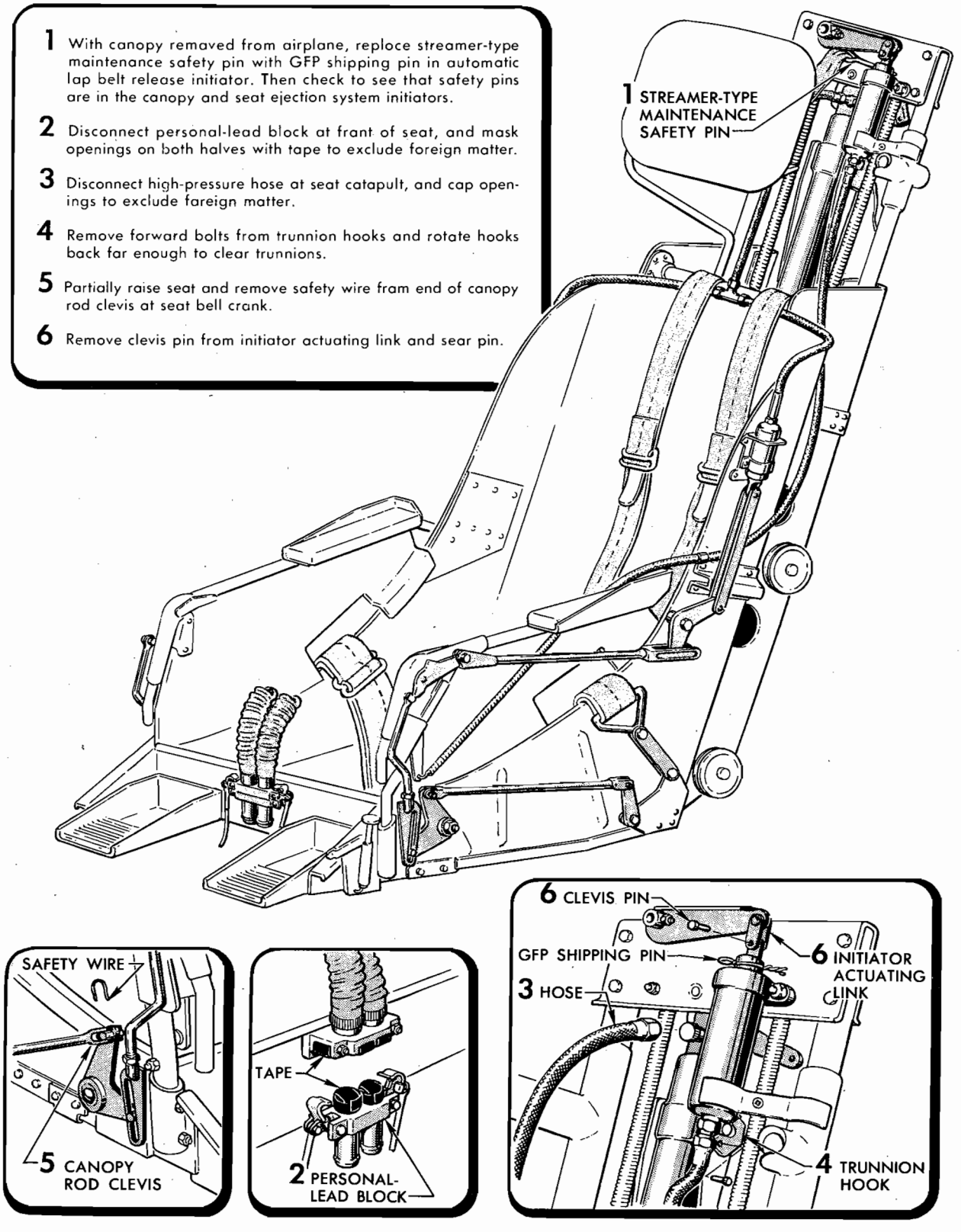


Figure 2-46B. Checking Automatic Lap Belt Release System—F-86F-35 Airplanes AF53-1097 Through -1228 (Sheet 1 of 2)

7 With catapult held parallel to armor plate, raise seat until aft initiator actuating bell crank is at drop-off point on roller bell crank.

8 Measure distance between hole centers of initiator link and sear pin to determine if link has traveled minimum distance required to fire initiator.

9 Lower seat until canopy rod clevis can be installed on seat bell crank and safety-wired; then remove covering from personal-lead disconnect fitting and join sections together with snap springs.

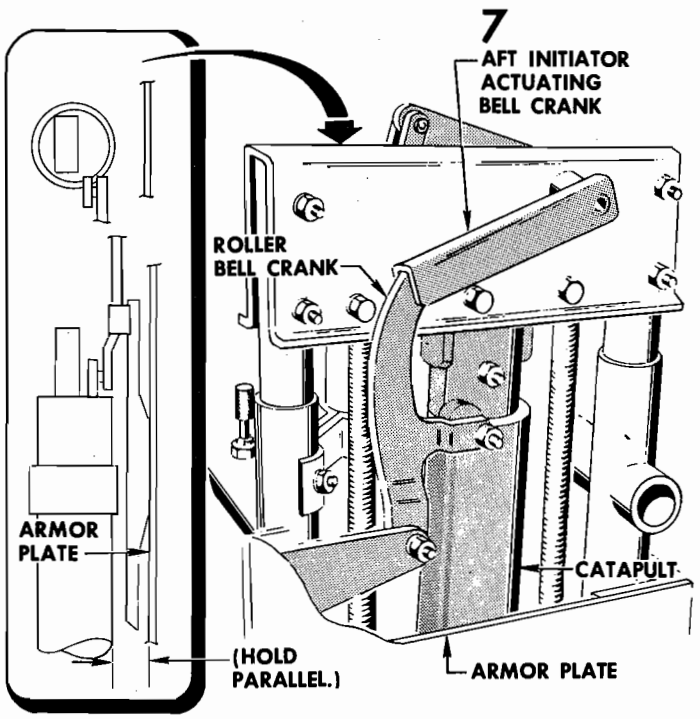
10 Fully lower seat until catapult trunnions are seated in mounts; then rotate hooks to closed position and install bolts.

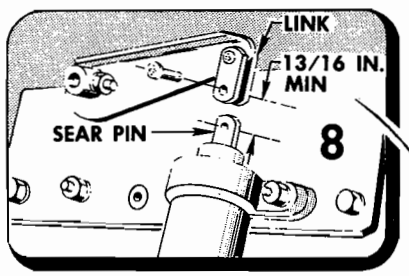
11 Check to see that bell crank roller is firmly seated against top surface of catapult.

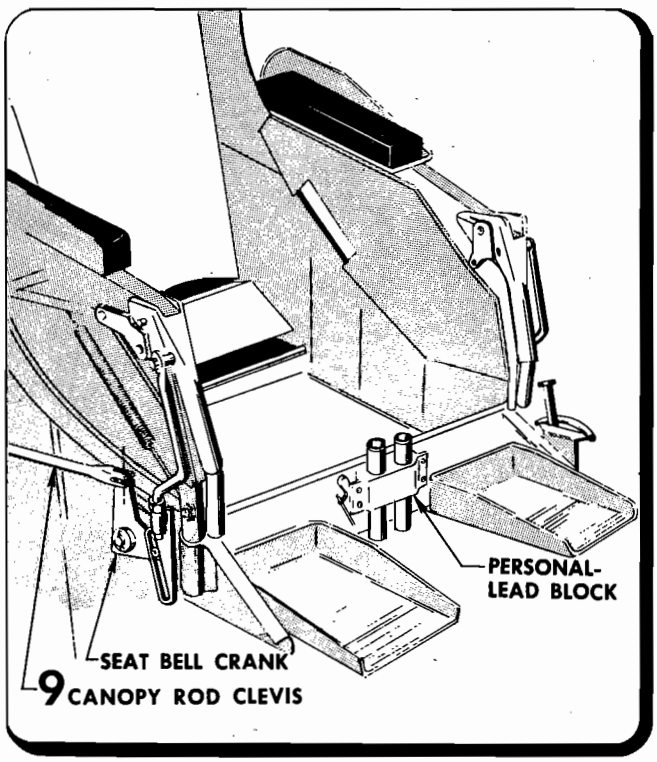
12 Align initiator actuating link and sear pin; then install and safety clevis pin.

13 Remove coverings from high-pressure hose and catapult fittings; then connect hose to catapult, using care not to twist hose or overtighten fittings.

14 When further seat maintenance is anticipated, replace Government-furnished shipping pin in automatic lap belt release initiator with streamer-type ground safety pin.







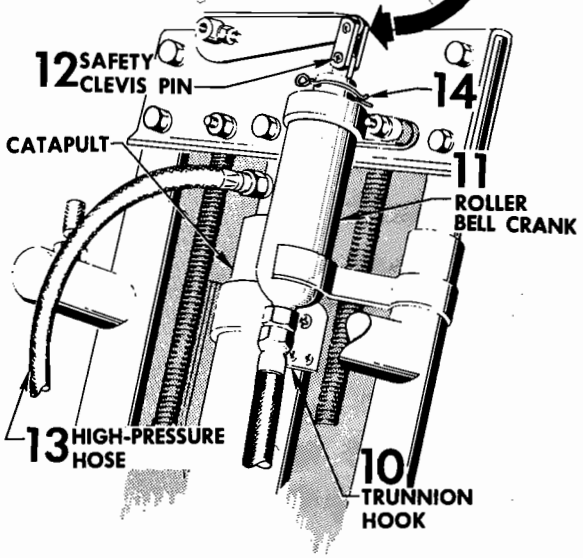


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Figure 2-46B. Checking Automatic Lap Belt Release System—F-86F-35 Airplanes AF53-1097 Through -1228 (Sheet 2 of 2)

contains a hermetically sealed cartridge capable of producing an initial maximum pressure of 3500 psi at the initiator outlet. The cartridge has a special primer that retards firing the cartridge until an elapse of approximately 2 seconds from the time the sear pin is pulled axially from the initiator breech. The gas produced by the time-delay initiator is routed to the lap belt release mechanism through a high-pressure hose. Identification of a loaded initiator is the properly affixed ordnance decal, the staking of the cap to the cylinder, and the safety pin inserted through the cap neck and sear pin.

WARNING

The initiator is to be handled as an ordnance item. The initiator sear pin is the trigger for firing the initiator. No safetying device exists in a completed installation other than the safety pin in the initiator itself.

2-222R. REMOVING AUTOMATIC LAP BELT RELEASE SYSTEM. The automatic lap belt release system (figure 2-46B) is removed as follows:

WARNING

Initiator safety pins must be in all initiators before installation, adjustment, or removal of emergency escape equipment.

a. Disconnect hose from outlet end of delay initiator, and cap both hose and outlet fitting to prevent entry of foreign matter.

b. Disconnect initiator link at initiator sear pin by removing clevis pin.

c. Remove delay initiator by removing two bolts through initiator mounting lugs, and store initiator as ordnance item.

d. Remove automatic lap belt release and automatic lap belt from seat by disconnecting bolts holding belt to seat on each side.

2-222S. PREINSTALLATION CHECK OF AUTOMATIC LAP BELT RELEASE SYSTEM. The following precautionary measures and inspections must be adhered to before installation of the automatic lap belt release system:

a. Make sure that a safety pin is properly installed in delay initiator.

b. Inspect high-pressure hose to see that hose is free of abrasions and that threaded fittings on each end are perfect and are properly attached to hose. Ensure that caps are replaced on each end of hose after inspections.

c. Inspect delay initiator to see that initiator cap is staked to initiator cylinder and that stake marks are not misaligned or obliterated.

WARNING

The initiator sear pin is the trigger for the delay initiator. No safetying exists in a completed installation other than the safety pin in the initiator itself.

d. Inspect delay initiator to be sure sear pin is completely bottomed in initiator and that safety pin is through body of main initiator case and sear pin.

e. Inspect automatic lap belt release mechanism and web belt for visual damage. Be sure to check metal attachment fittings on ends of belt for defects.

f. Check to see that belt will release manually and can be re-engaged and locked with key.

Note

Failure of belt to lock with key is definite indication of a fired lap belt release, or of damage to the internal release mechanism. Any automatic lap belt indicating or suspected of such malfunction must be replaced in its entirety.

2-222T. CHECKING AUTOMATIC LAP BELT RELEASE SYSTEM (F-86F-35 AIRPLANES AF53-1097 THROUGH -1228). See figure 2-46B.

2-223. LANDING GEAR SYSTEM.

2-224. The landing gear system is of the tricycle type and is retractable. The system consists of three landing gear assemblies incorporating air-oil shock struts, wheel doors and fairings, a landing gear hydraulic system, a position indicating and warning system, and an emergency extension system. (See figure 2-47.) The landing gear shock struts reduce shock on landing. When the gear is in the retracted position, they are completely faired within the airplane outer surfaces by the wheel doors and fairings. The landing gear hydraulic system uses pressure from the utility hydraulic power system to extend and retract the landing gear and wheel doors. The uplock and downlock cylinders are also actuated by pressure from the same source. The pressure to the "up" or "down" side of the gear actuating cylinders is controlled by positioning the pilot's control handle on the left side of the instrument panel. The positioning of the landing gear control handle to either "UP" or "DOWN" electrically controls the valves that direct pressure to the gear actuating cylinders. An electric sequencing system properly sequences the gear and door operation after a gear-up or gear-down selection has been made. The position indicating system gives visual indication of the gear in up, down, or intermediate positions. The warning system consists of a horn and a

red light in the gear handle. The horn sounds when the throttle is retarded and the gear is in an unsafe condition, and the red light comes on when the gear is unsafe or in travel. An emergency means for extending the gear, in case of an electrical or hydraulic failure, is operated by a landing gear emergency extension handle on the center pedestal. A safety switch on the left main gear prevents gear retraction when the weight of the airplane is on the gear, unless the emergency retraction button above the landing gear control handle is depressed. A ground door control switch, in the left strut well, facilitates opening the wheel doors to gain access to the wheel wells when the airplane is on the ground and external power is connected.

WARNING

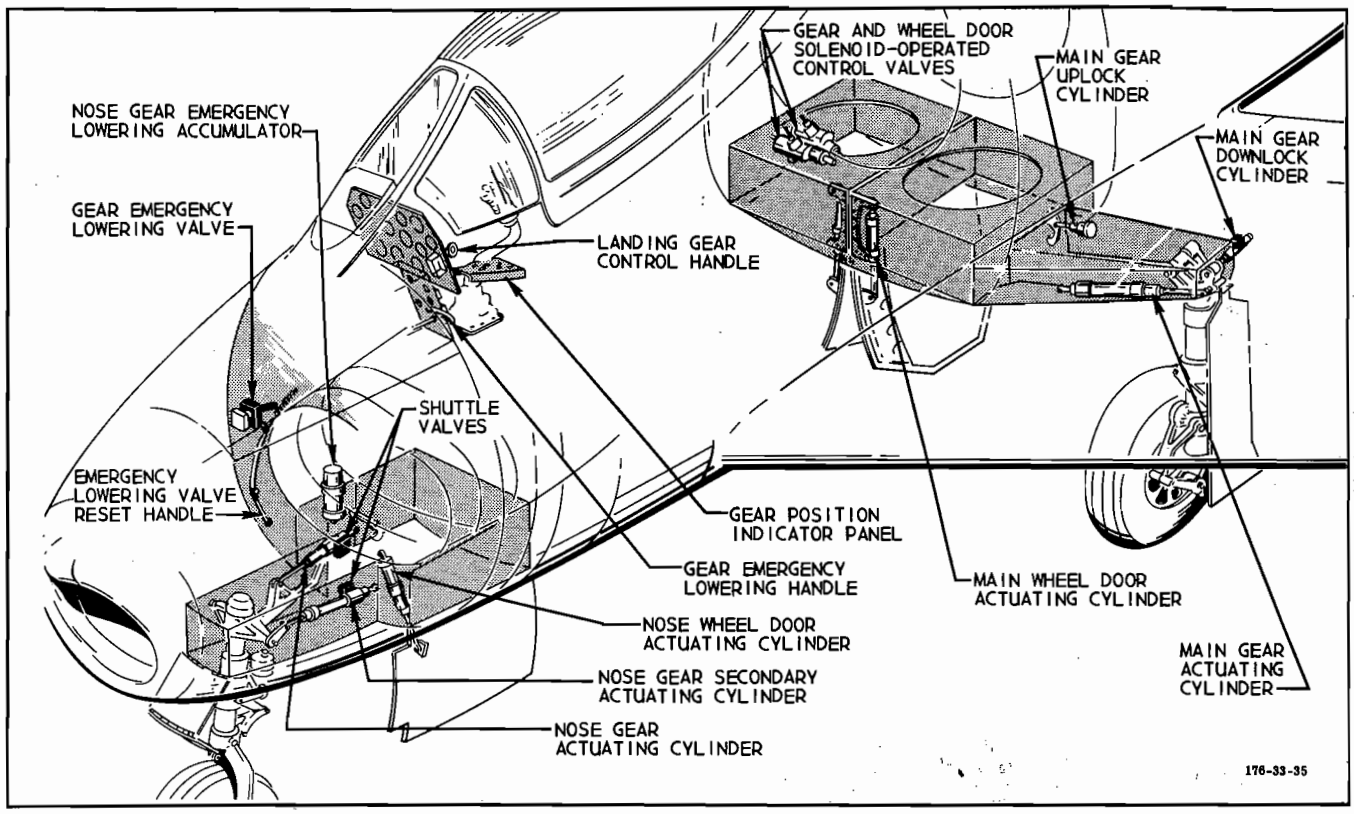
Before working in wheel wells, even though the landing gear doors are already open, check to see that the ground door control switch is operated to "OPEN" position, to ensure that doors will not inadvertently close.

2-225. FUNCTION OF LANDING GEAR SYSTEM (NORMAL RETRACTION CYCLE).

2-226. When the landing gear control handle is moved to the "UP" position to retract the gear, the electric switch, actuated by the control handle, is positioned to direct the current into the sequencing system. (See figures 2-49 through 2-52 or figures 2-56 through 2-59.) With the gear in the downlocked position and wheel doors closed, the sequence switches are in a position to direct current to the door-open solenoid on the door control valve. As the door-open solenoid is energized, the control valve is positioned to direct hydraulic pressure to the open side of the door actuating cylinders. Initial movement of the wheel door actuating cylinders unlocks the door uplocks, and continuing pressure opens the wheel doors. When each door reaches the full open position, a gear sequence switch in the gear-up circuit is actuated (closed). When all doors are full open and the weight of the airplane is off the gear, so that the safety switches are making contact, the circuit is completed to energize the gear-up solenoid on the gear control valve. This causes the valve to shift and direct pressure to the gear-up side of the nose gear actuating cylinders and to the unlock side of the main gear downlock cylinders. As soon as the main gear downlocks are unlocked, pressure is allowed to pass through the downlock cylinders to the gear-up side of the main gear actuating cylinders and the main gear uplock actuating cylinders. As each gear reaches the uplocked position, it contacts a wheel door sequence switch. When all three of the door sequence switches are closed, an electrical circuit is completed, which energizes the door-closed solenoid and de-energizes the door-open solenoid on the wheel door control valve. This causes the valve to shift and direct pressure to the door-closed side of the door actuating cylinders. As wheel doors move from the full open position, the electrical circuit that energized the gear-up solenoid on the gear control valve is broken, and the valve shifts to neutral. When the gear control valve is in neutral, the pressure is stopped at the valve and all lines to the gear actuating units are open to return. When all doors reach the closed-and-locked position, the electrical circuit that energized the door-closed solenoid on the wheel door control valve is broken, the solenoid is de-energized, and the valve shifts to neutral. When the door control valve is in neutral, the pressure is stopped at the valve and all lines to the door actuating cylinders are open to return.

2-227. FUNCTION OF LANDING GEAR SYSTEM (NORMAL EXTENSION CYCLE).

2-228. When the landing gear control handle is moved to the "DOWN" position to extend the gear, the electric switch actuated by the control handle is positioned to direct current into the sequencing system. (See figures 2-48, 2-53, and 2-54 or figures 2-55, 2-60, and 2-61.) With the gear in the uplocked position and wheel doors closed,



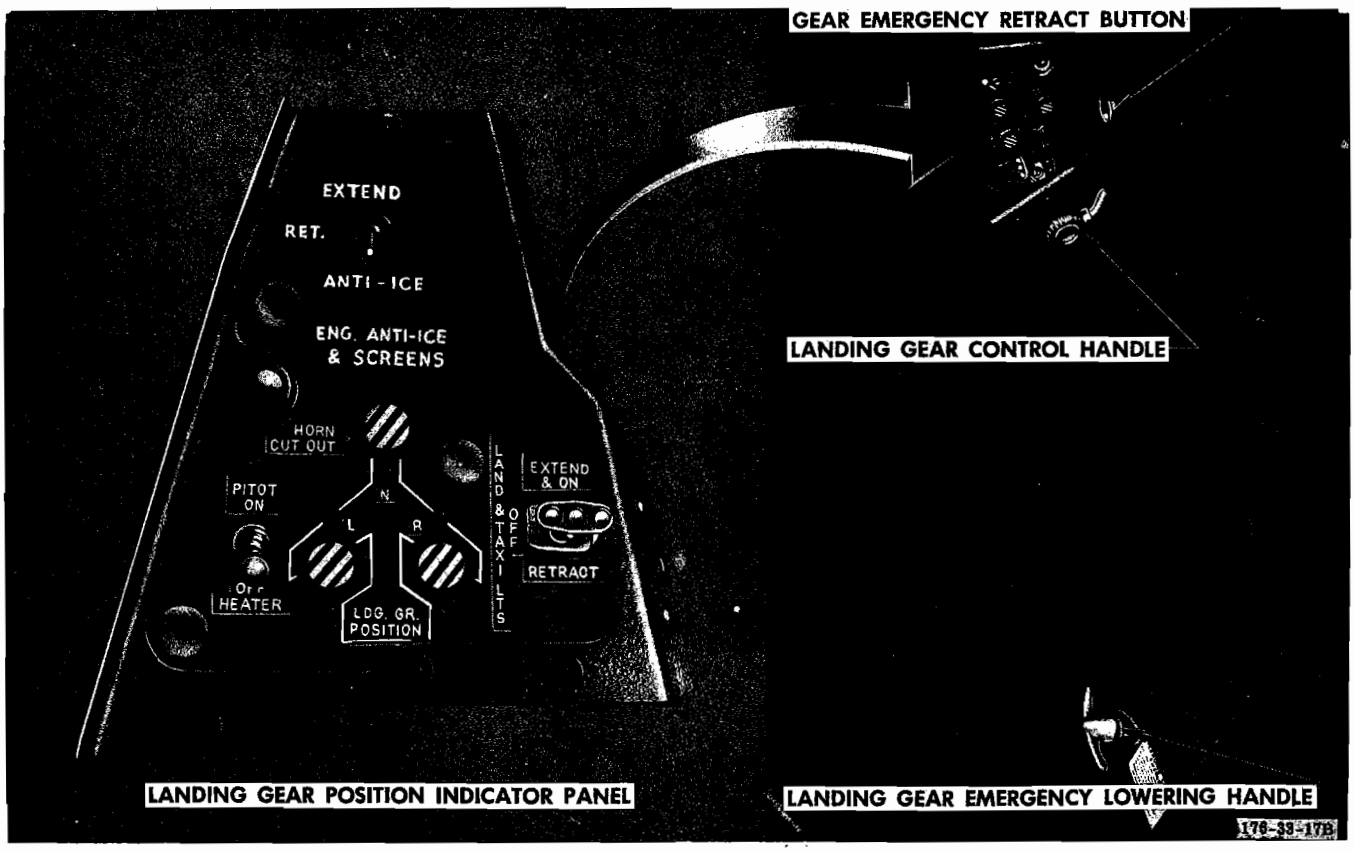


Figure 2-47. Landing Gear System

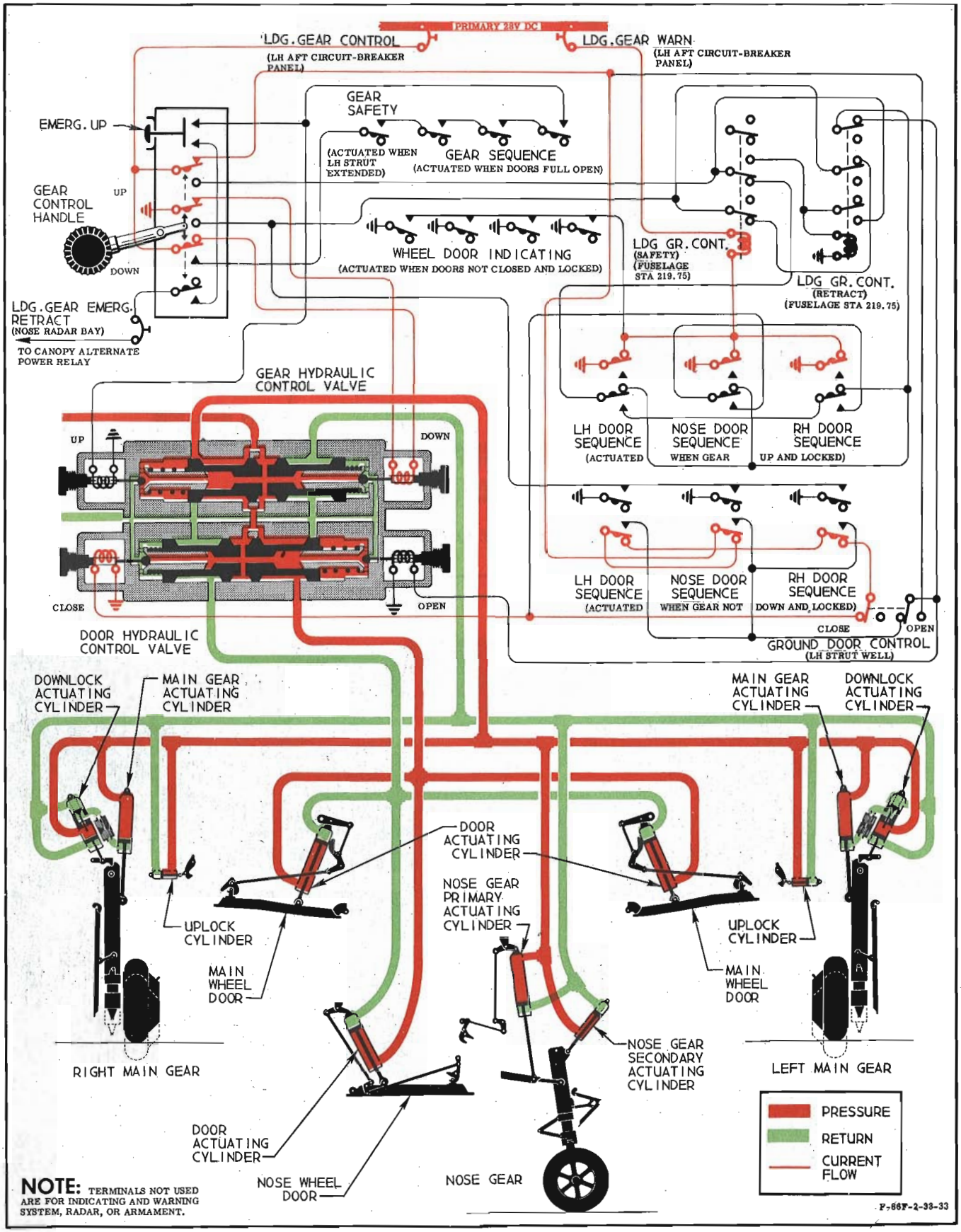


Figure 2-48. Landing Gear System—Control Handle "DOWN," Gear Down, Doors Closed—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

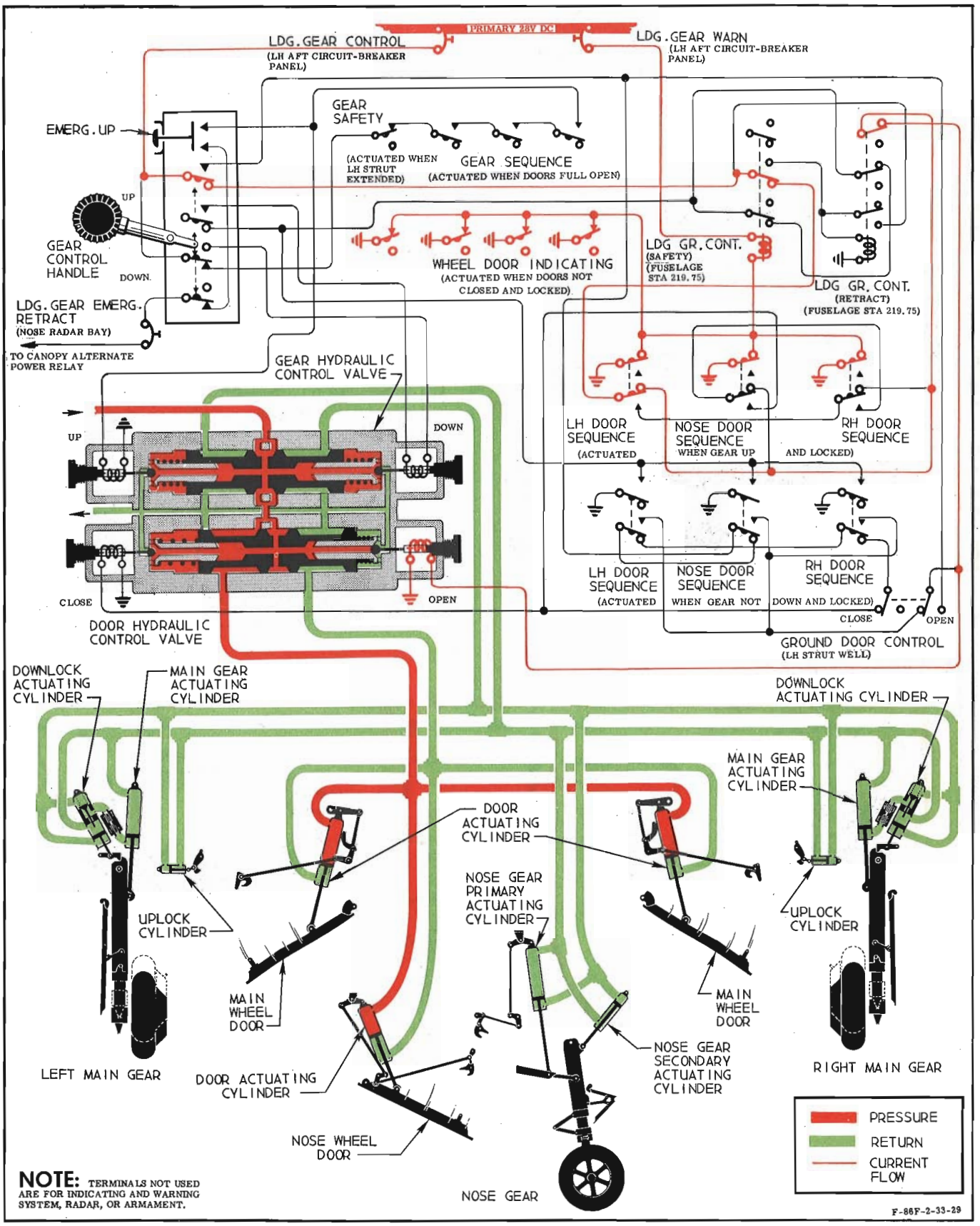


Figure 2-49. Landing Gear System—Control Handle "UP," Gear Down, Doors Opening—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

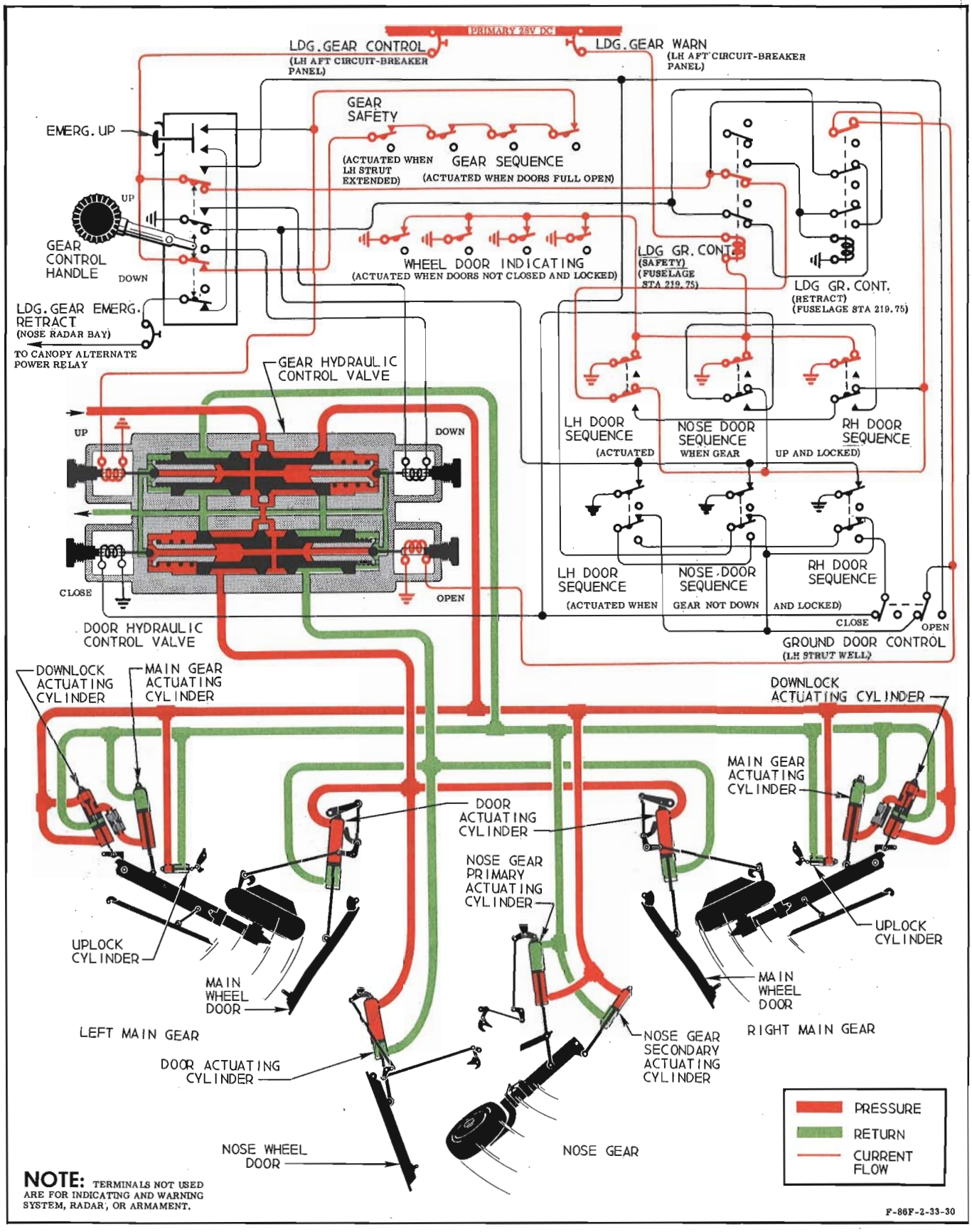


Figure 2-50. Landing Gear System—Control Handle "UP," Doors Open, Gear Retracting—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

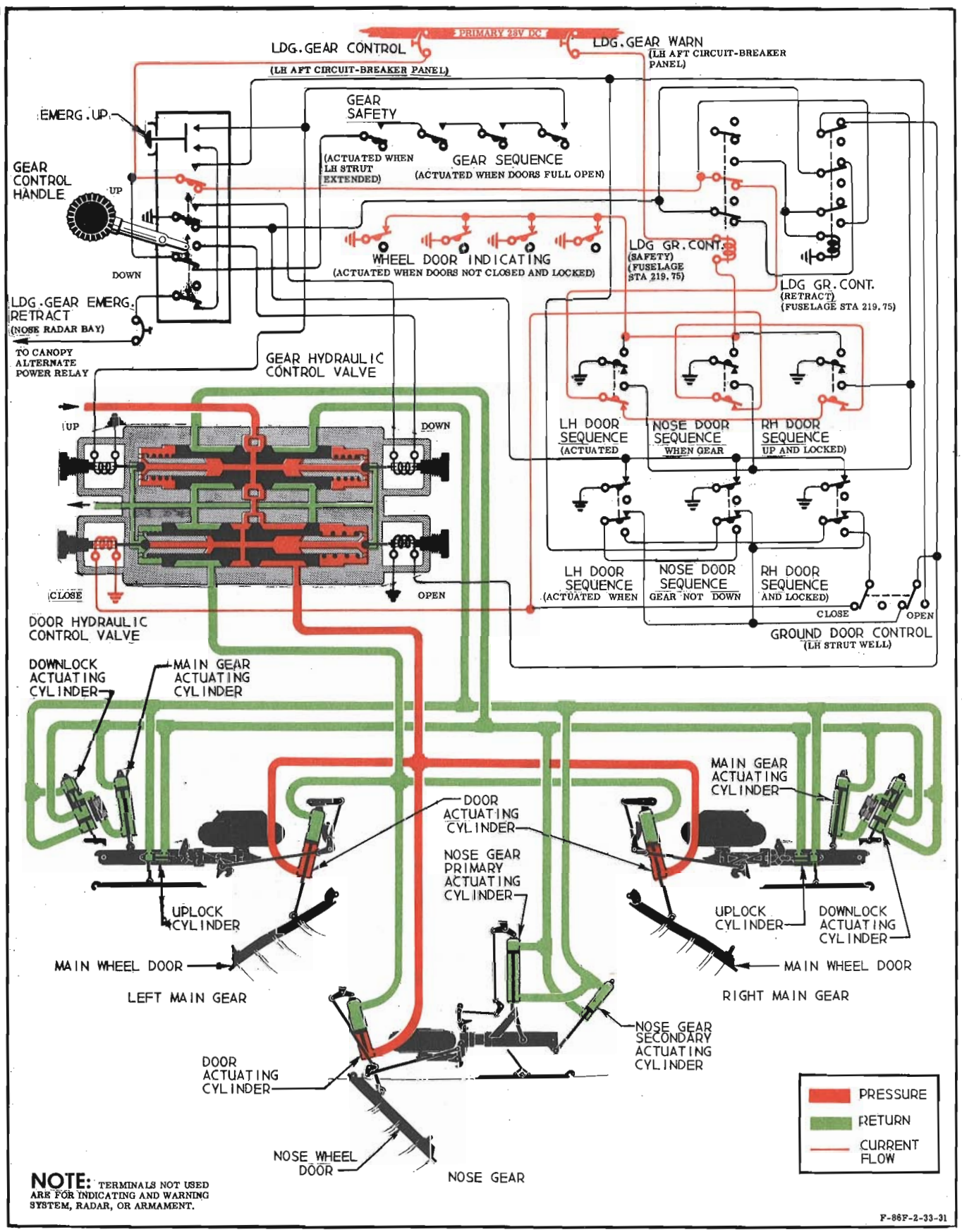


Figure 2-51. Landing Gear System—Control Handle "UP," Gear Up, Doors Closing—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

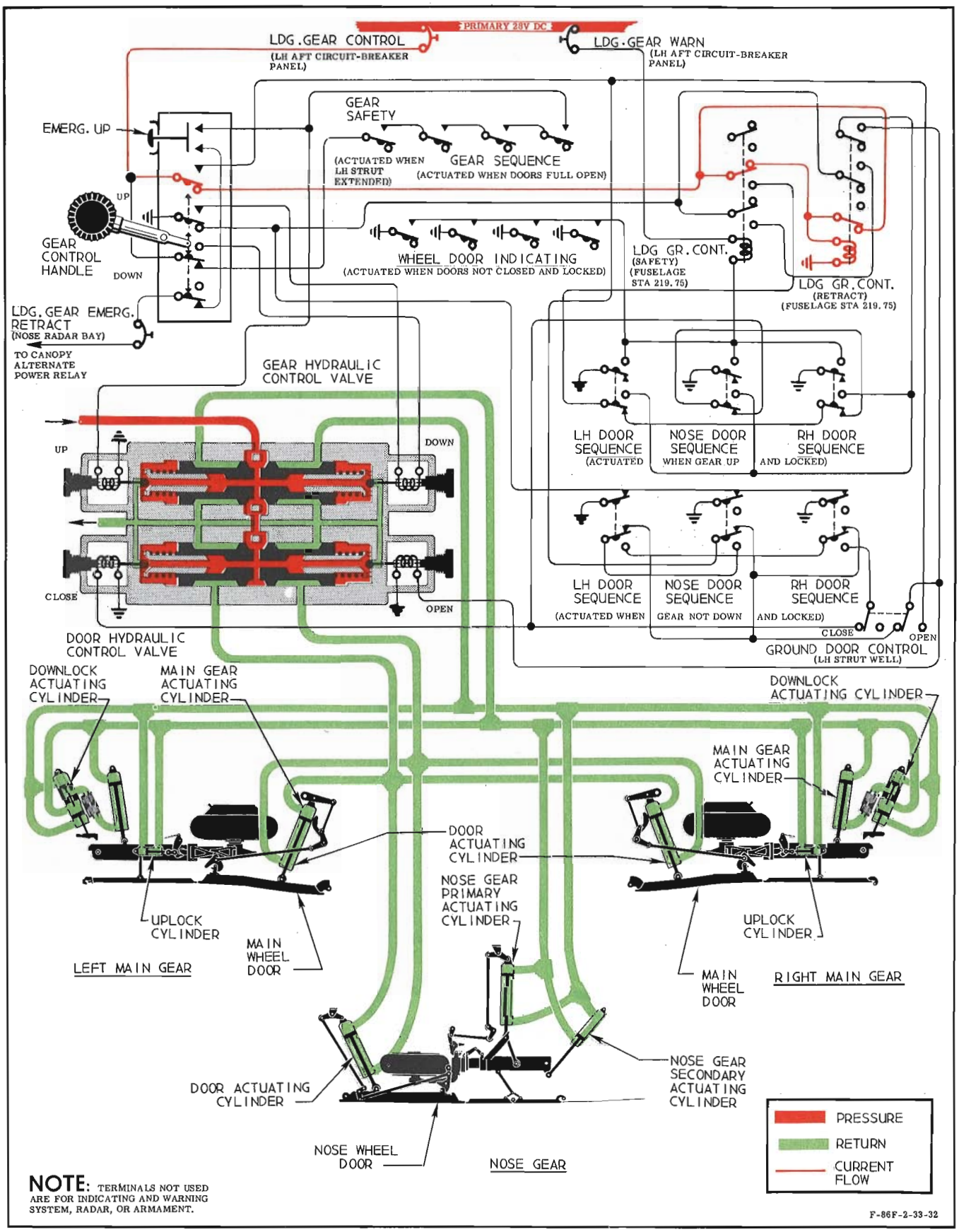


Figure 2-52. Landing Gear System—Control Handle "UP," Gear Up, Doors Closed—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

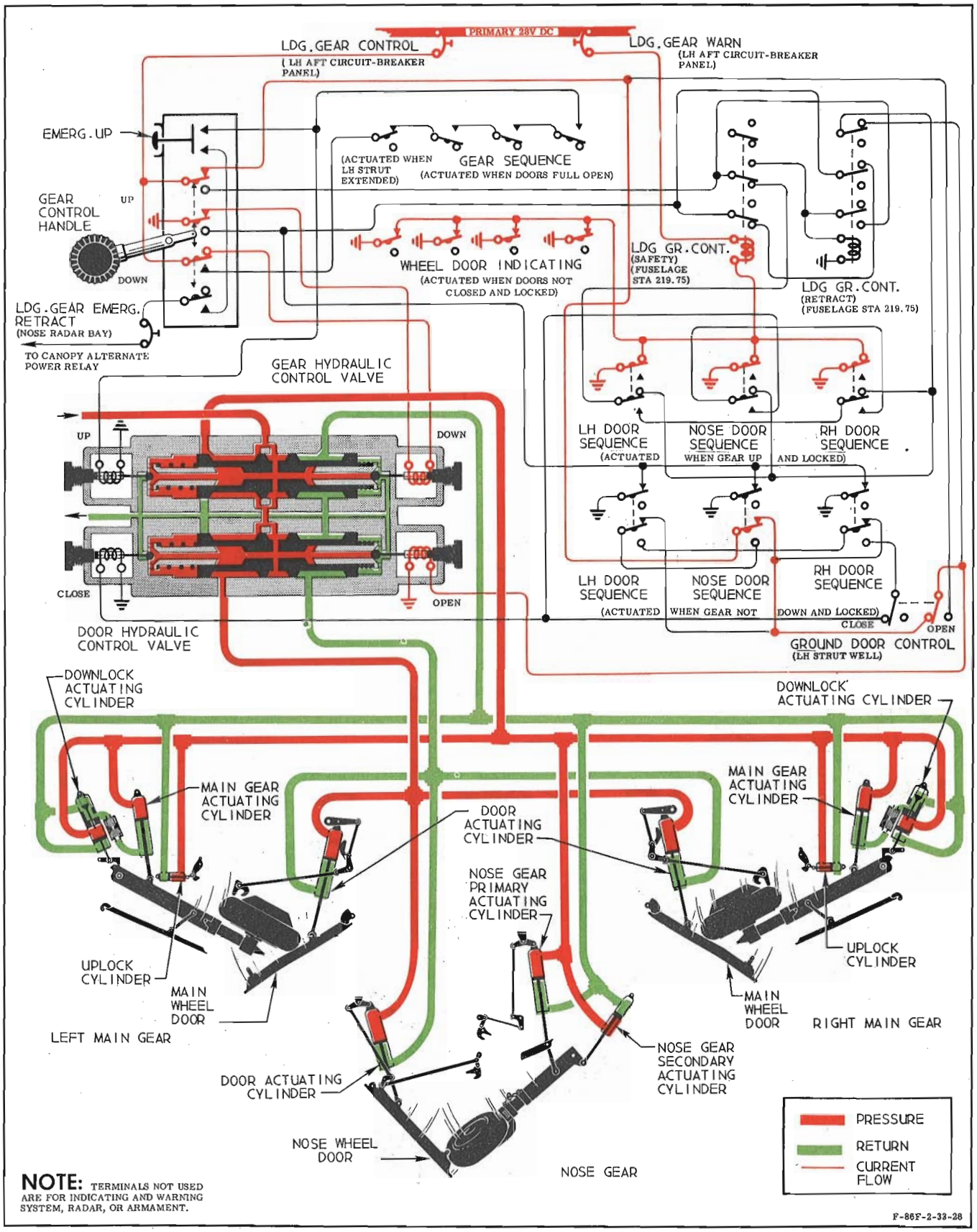


Figure 2-53. Landing Gear System—Control Handle "DOWN," Doors Opening, Gear Extending—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

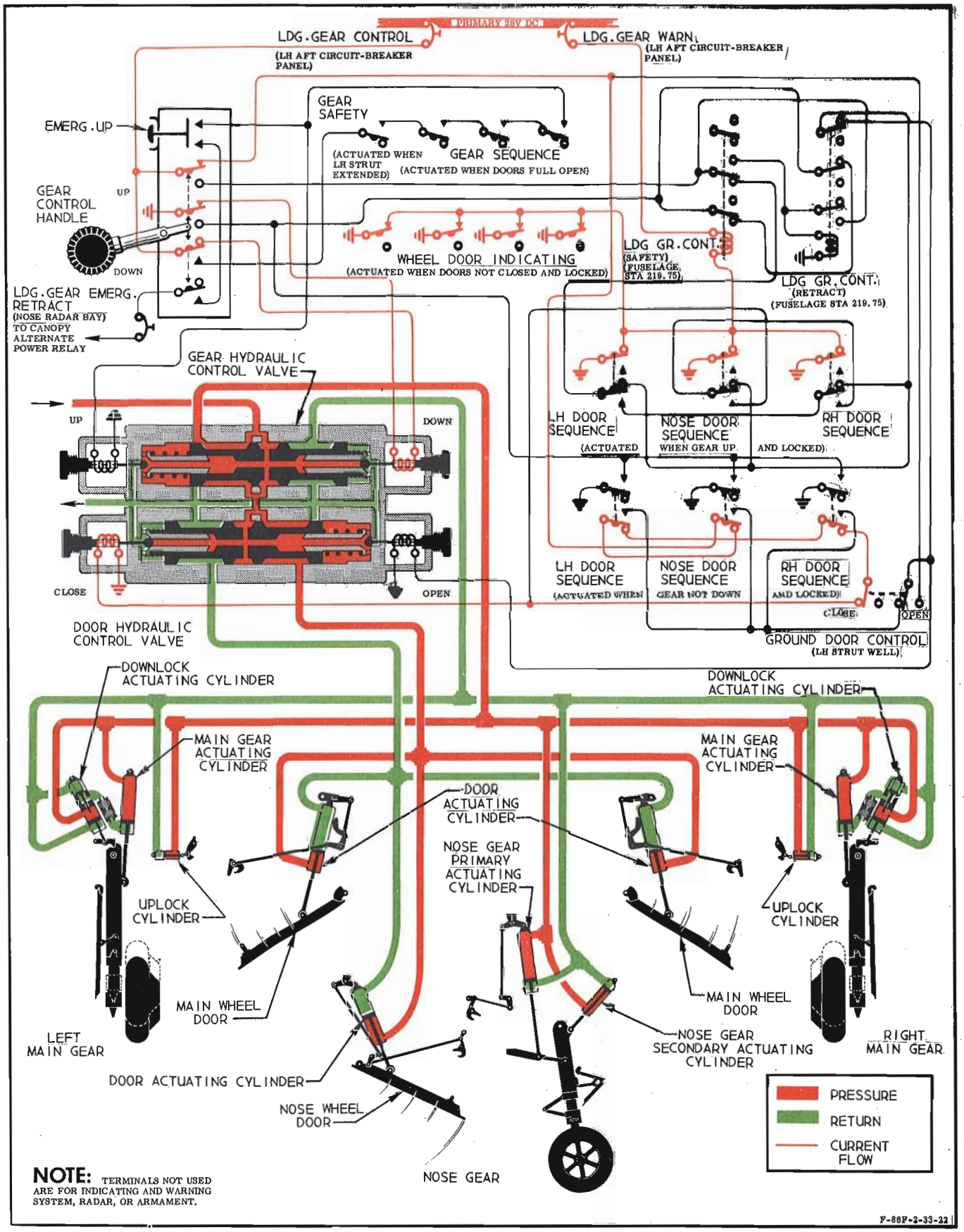


Figure 2-54. Landing Gear System—Control Handle "DOWN," Gear Down, Doors Closing—F-86F-5 and F-86F-10 Airplanes, and F-86F-20 Airplanes AF51-13070 Through -13089

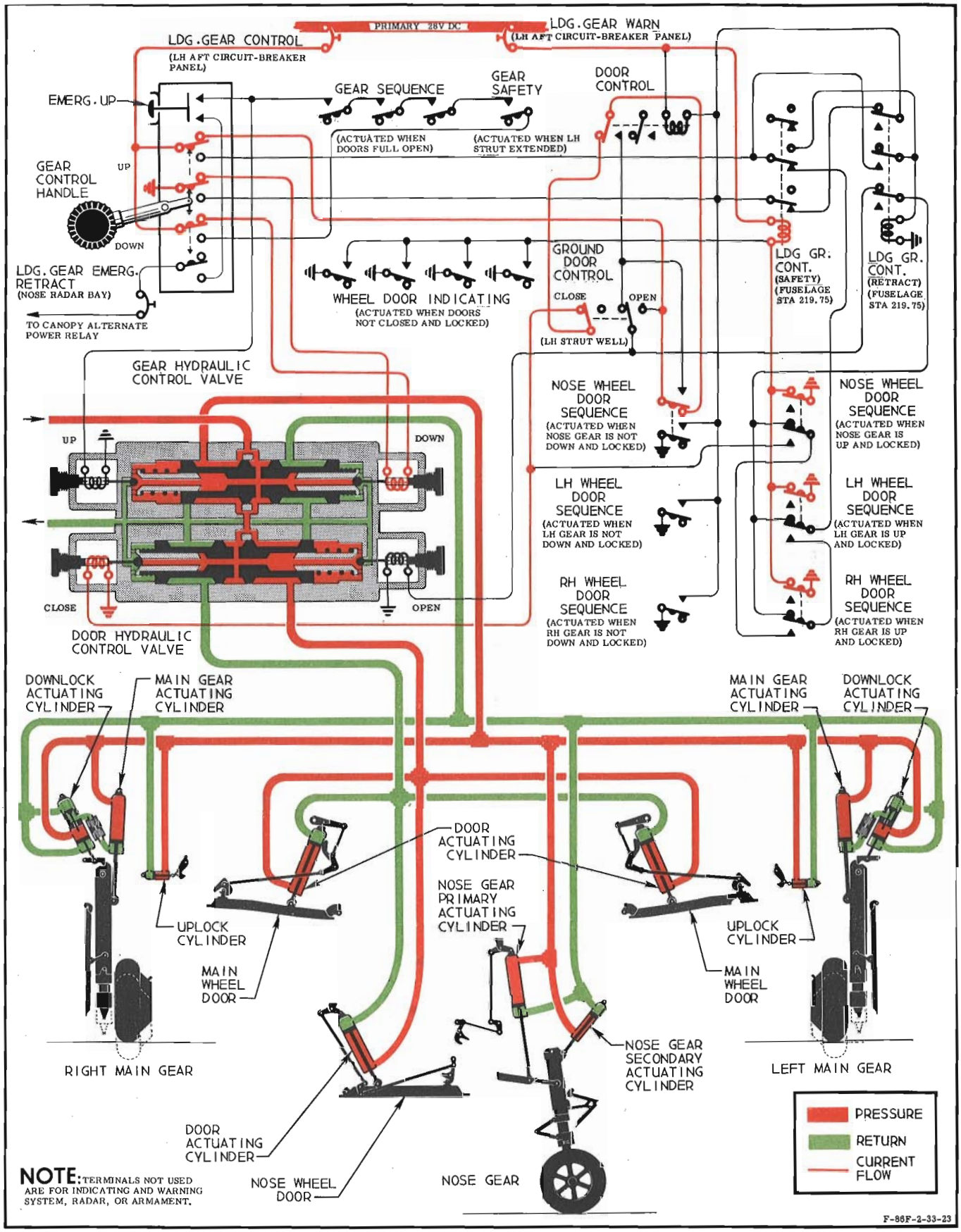


Figure 2-55. Landing Gear System—Control Handle "DOWN," Gear Down, Doors Closed—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

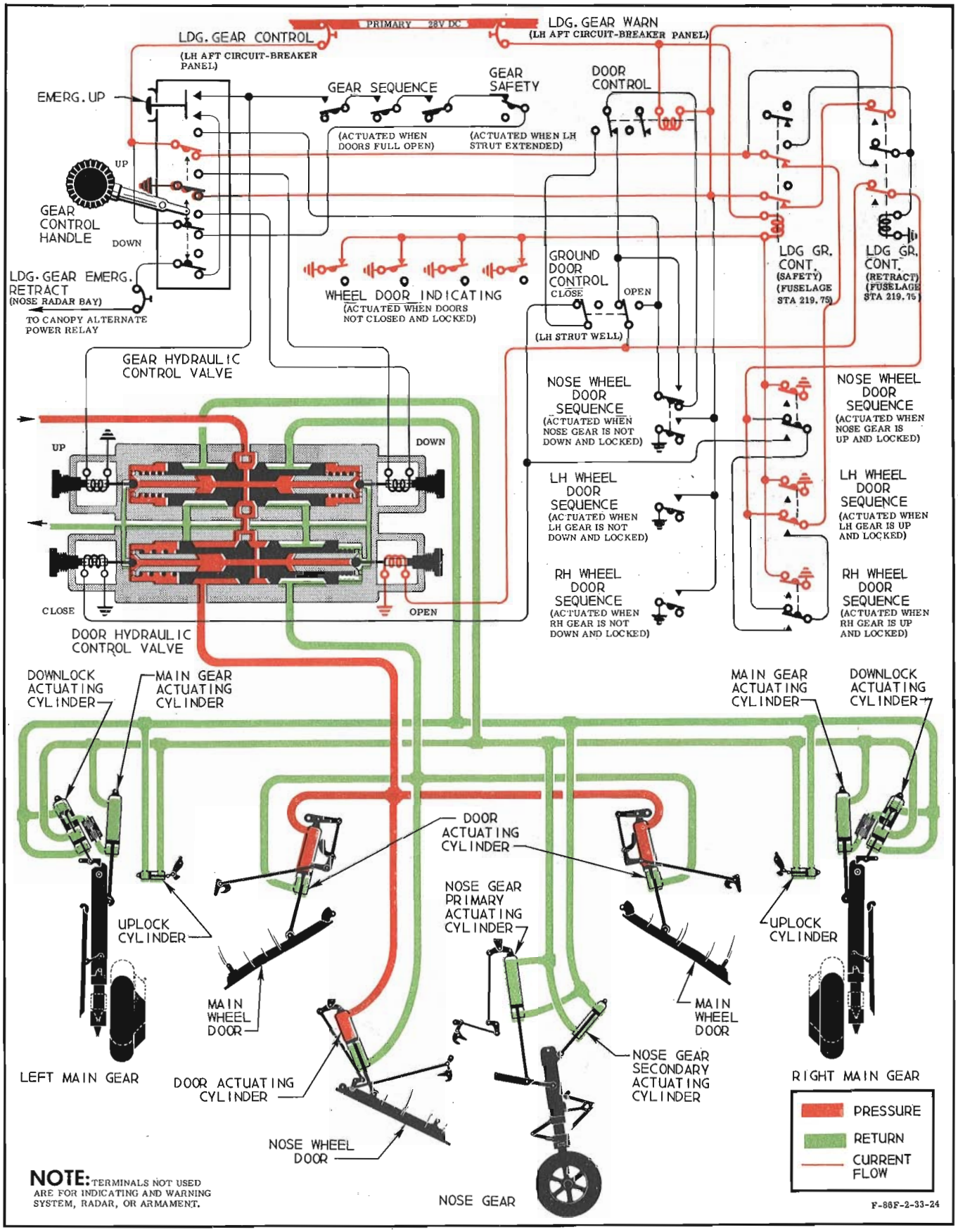


Figure 2-56. Landing Gear System—Control Handle "UP," Gear Down, Doors Opening—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

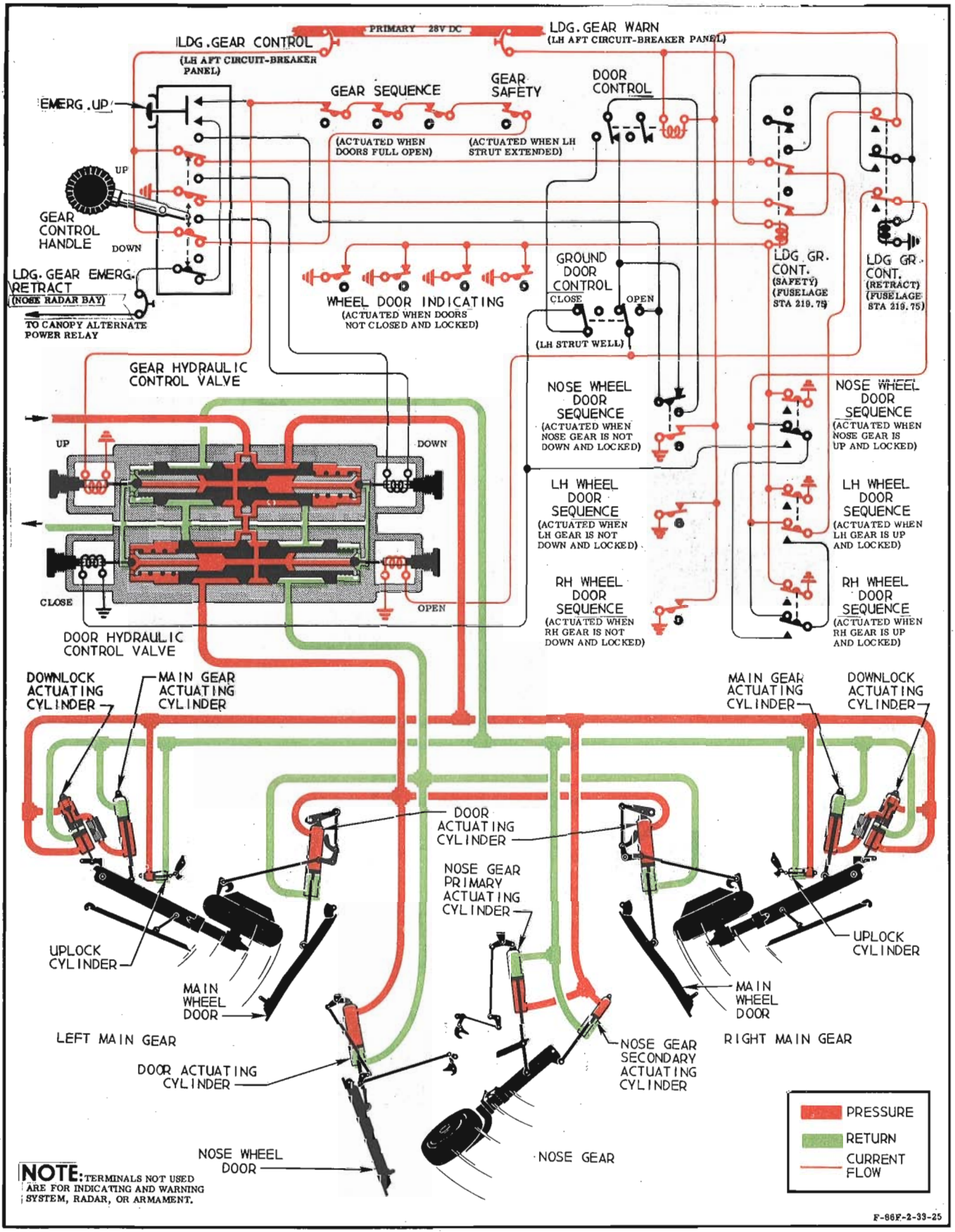


Figure 2-57. Landing Gear System—Control Handle "UP," Doors Open, Gear Retracting—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

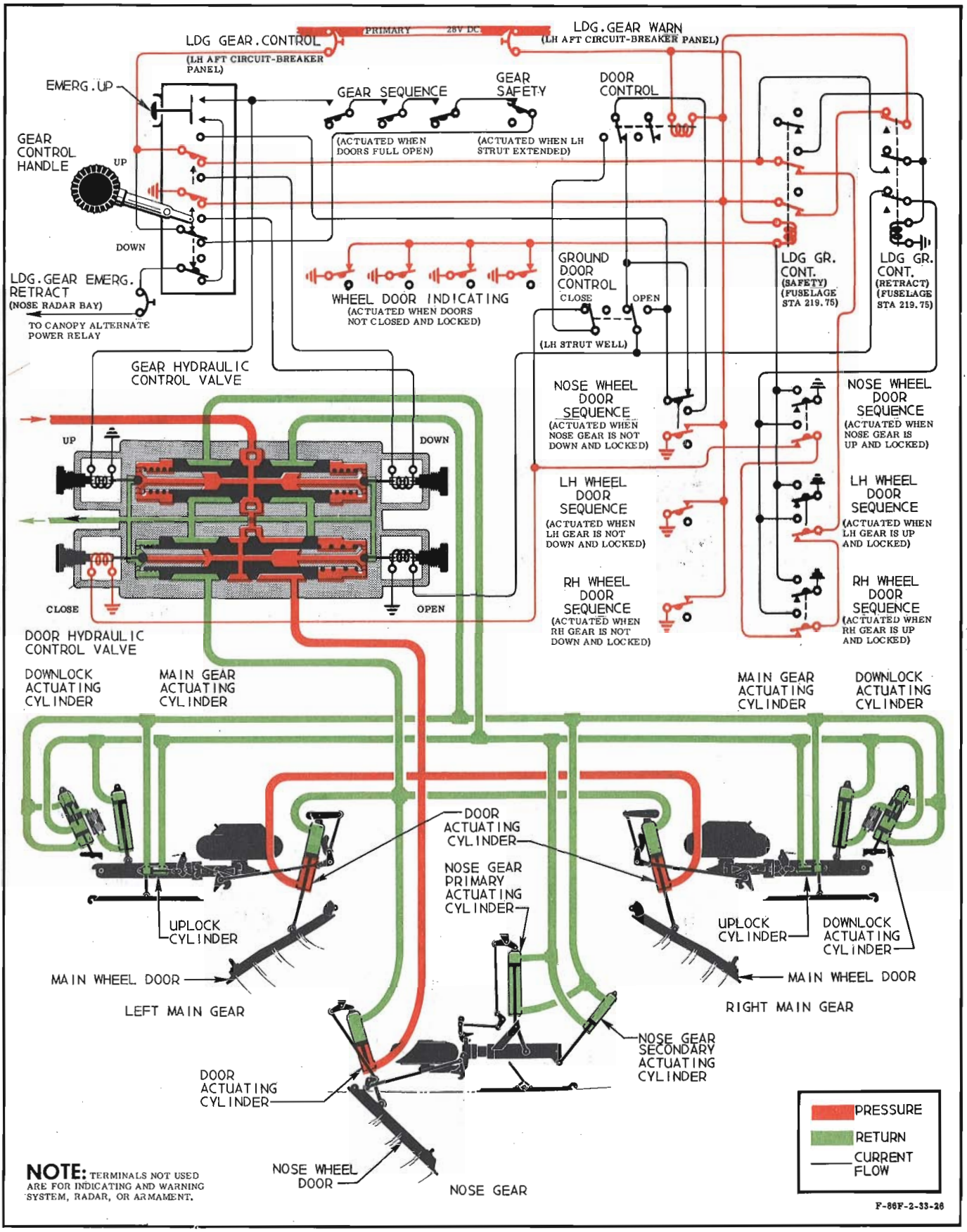


Figure 2-58. Landing Gear System—Control Handle "UP," Gear Up, Doors Closing—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

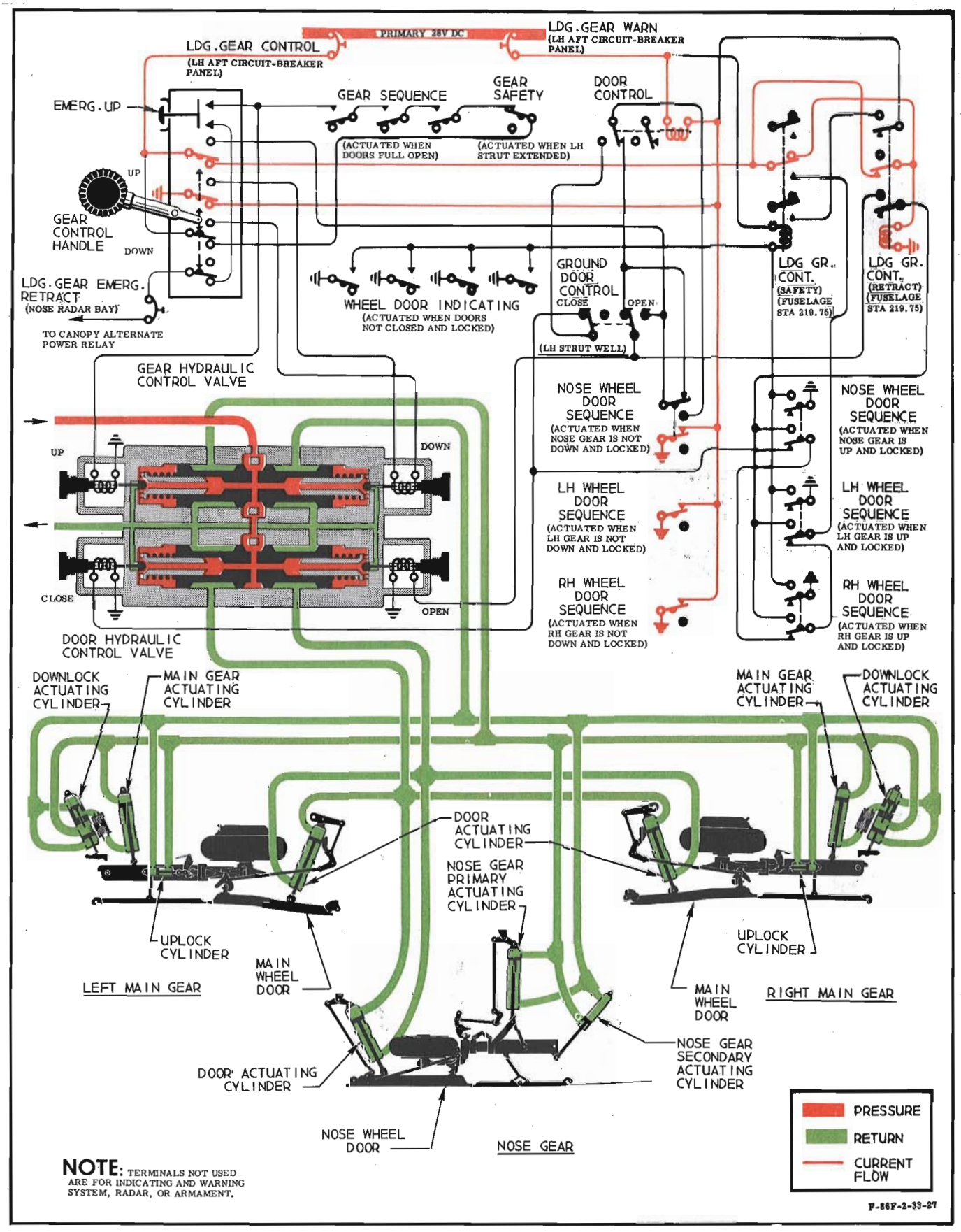


Figure 2-59. Landing Gear System—Control Handle "UP," Gear Up, Doors Closed—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

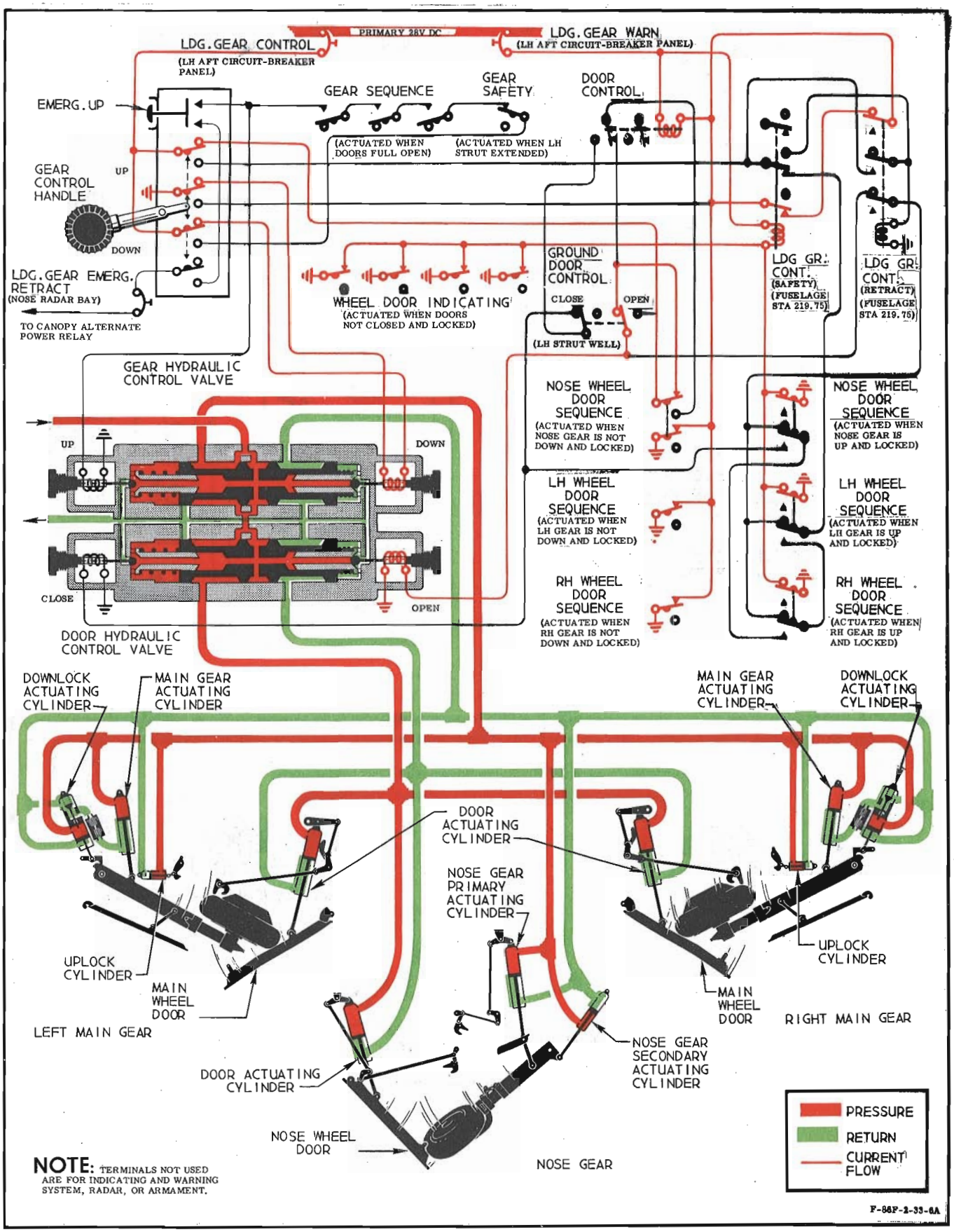


Figure 2-60. Landing Gear System—Control Handle "DOWN," Doors Opening, Gear Extending—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

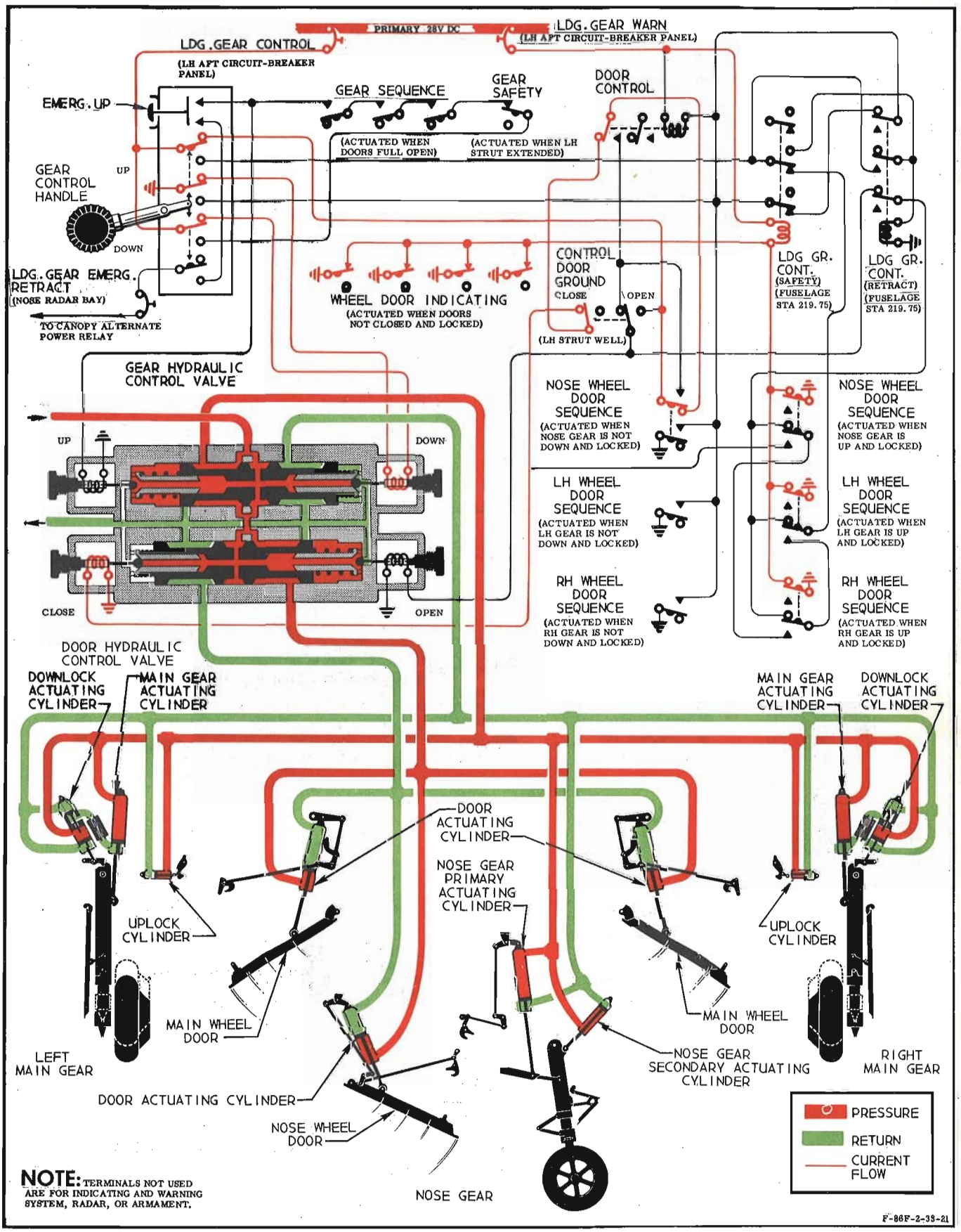


Figure 2-61. Landing Gear System—Control Handle "DOWN," Gear Down, Doors Closing—F-86F-1 and F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169, and F-86F-25 and Subsequent Airplanes

the sequence switches are in a position to direct current flow to the door-open solenoid on the door control valve and to the gear-down solenoid on the gear control valve. As the solenoids are energized, the respective control valves are shifted to direct pressure to the open side of the door actuating cylinders, to the down side of the gear actuating cylinders, to the unlock side of the gear uplocks, and to the locked side of the gear downlocks. As each gear reaches the downlocked position, it contacts a door-closed sequence switch. When all three gear sequence switches are actuated, the electrical circuit that energized the door-open solenoid is broken and a circuit is completed that energizes the door-closed solenoid. This shifts the control valve so that pressure is supplied to the door-closed side of the door actuating cylinders to close the doors. Pressure is supplied to the gear-down side of the gear actuating cylinders, to the gear downlocks, and to the door-closed side of the door actuating cylinders as long as the gear control handle is in the gear-down position and the utility power system is pressurized.

2-229. FUNCTION OF LANDING GEAR SYSTEM (EMERGENCY EXTENSION CYCLE).

2-230. When the landing gear emergency extension handle is pulled, cable linkage unlocks all the wheel door locks and the main gear uplocks, and also positions the nose gear emergency extension pressure control valve. When positioned, the valve admits emergency accumulator pressure to the nose gear actuating cylinders and at the same time depresses the valve actuating buttons on the gear and door control valves. If there is an electrical failure and utility hydraulic pressure is still available, actuation of the buttons on the control valves will shift the valves and direct the normal pressure to open the doors and extend the gear. If normal utility pressure is not available, the main gear will fall to the downlocked position by gravity pull, and the emergency extension pressure will unlock the nose gear uplock and extend the nose gear to the downlocked position. (See figure 2-62.)

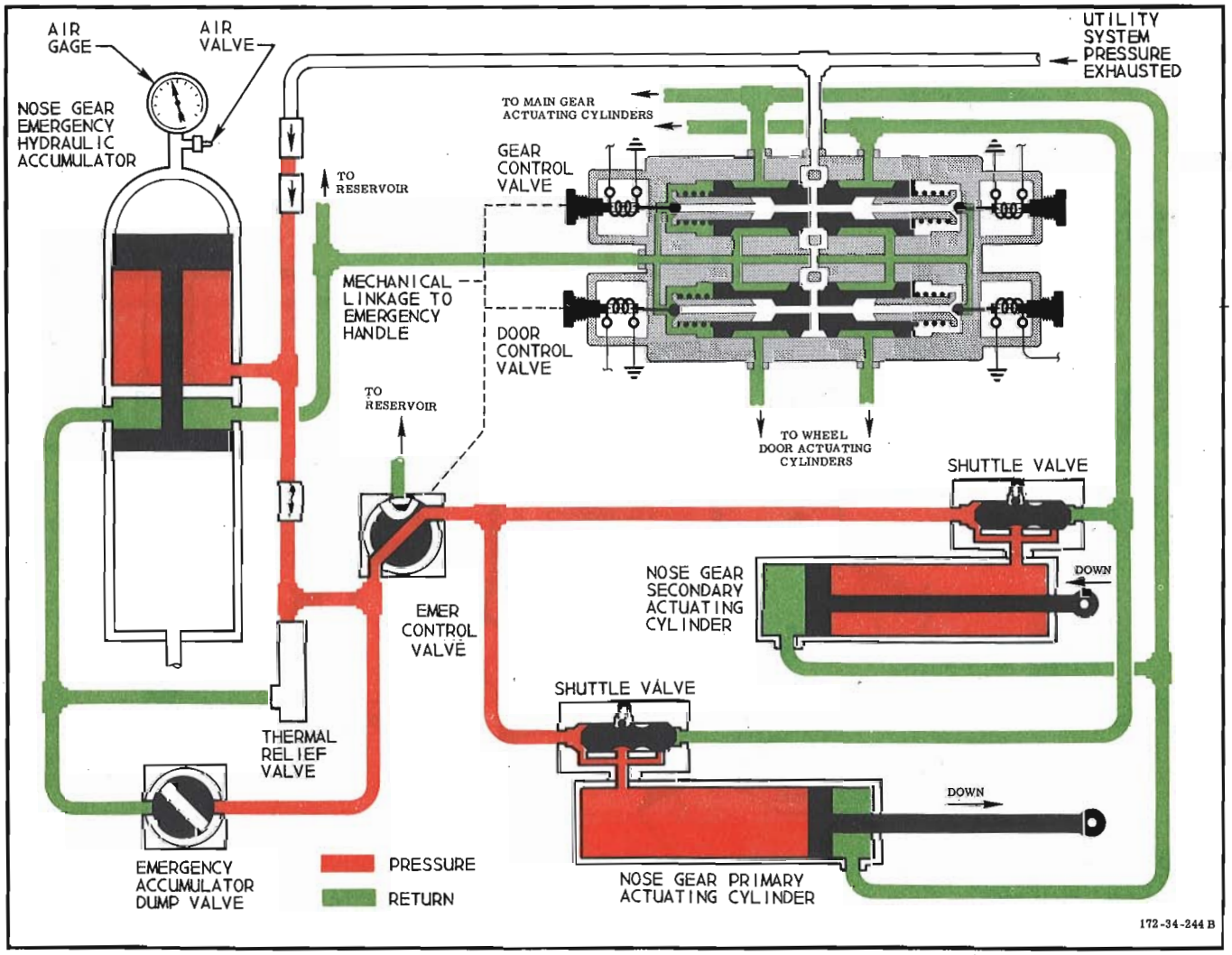


Figure 2-62. Landing Gear Emergency Hydraulic System

Note

When the gear emergency extension system has been used, it is necessary to manually reset the emergency extension pressure control valve when the airplane is on the ground. The reset button is located on the lower right side of the nose section. To reset the valve, pull the reset handle to its full extension and release. The handle will automatically return to the "in" position.

A dump valve for exhausting the emergency extension accumulator is located in the aft right corner of the nose wheel well, just above the accumulator pressure gage. To release the hydraulic pressure in the accumulator, it is necessary to pull the spring-loaded handle to "DUMP" and hold it there until hydraulic pressure is exhausted.

2-231. TROUBLE SHOOTING LANDING GEAR SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Gear and doors not in proper sequence.	Maladjustment of linkage which operates sequence switches, or switches not operating properly.	
Main gear does not indicate a full downlocked position.	Maladjustment of linkage between cylinder and lockpin.	
Main gear uplocks do not lock.	Gear up-stop improperly adjusted.	
Main gear does not downlock in emergency extension.	Pivot bolts too tight, or too many shims.	Loosen bolts enough to permit movement.
Nose gear will not lock in down position.	Dirt in actuating linkage. Operating linkage improperly adjusted.	
Nose wheel door fails to lock with gear up.	Gear retracting linkage out of adjustment. Wheel door locks out of adjustment.	

2-232. CHECKING LANDING GEAR SYSTEM.

a. Operate gear at a minimum pressure and flow.

b. Move landing gear control handle to "UP" position; door locks should release and wheel doors should open. When all doors have reached the full open position, gear should retract. (Any one door not in the full down position should prevent gear from retracting.) When all gears have reached the uplocked position, doors should close. (Any one gear not in the uplocked position should prevent doors from closing.)

c. Move landing gear control handle to "DOWN" position; door and gear locks should release, doors should open, and gear should extend. When all gears have reached the downlocked position, doors should close. (Any one gear not in downlocked position should prevent doors from closing.)

d. Increase test stand flow to approximately 5.7 gpm. At full pressure, retract gear. The complete cycle of gear and door operation should not exceed 8 seconds.

e. Operate test stand at 4.2 gpm. At full pressure, extend gear; the complete cycle of gear and door operation should not exceed 10 seconds.

f. After normal operation of gear, check emergency extension system. First retract gear; then cut off electric power. With hydraulic power on, pull the landing gear emergency extension handle. The doors should open and the gear should extend by hydraulic pressure.

g. Again retract gear with normal system; then exhaust hydraulic pressure and cut off electric power.

h. Pull emergency extension handle. Main gear and all door locks should release, doors should open, and main gear should extend to the downlocked position by gravity pull. (A 25-pound pull at the axle is permissible to lock the main gear down.) The nose gear emergency extension pressure control valve should position to direct accumulator pressure to extend the nose gear to full downlocked position.

i. Reset emergency extension pressure control valve. (Refer to paragraph 2-230.)

2-233. ASSEMBLING AND ADJUSTING LANDING GEAR SYSTEM HERMETICALLY SEALED MICROSWITCHES.

2-234. See figure 2-63.

2-235. ADJUSTING LANDING GEAR SYSTEM SEQUENCE SWITCHES.

2-236. See figure 2-64.

2-237. ADJUSTING LANDING GEAR SYSTEM EMERGENCY EXTENSION SYSTEM.

2-238. See figure 2-73.

2-239. LANDING GEAR SYSTEM POSITION INDICATING AND WARNING SYSTEM.

2-240. The landing gear position indicator, adjacent to the gear control handle in the cockpit, consists of three round windows in which symbols are displayed to visually inform the pilot of the gear position. (See figures 2-65, 2-66, and 2-67.) Each window displays a small gear and wheel when its respective gear is downlocked. Each window displays the word "UP" when its respective gear is uplocked. Each window displays red and white stripes whenever its respective gear is neither downlocked nor uplocked. The landing gear warning light (a red light in the landing gear control handle) illuminates whenever the gear is in an unlocked position, whenever any wheel door is not locked closed with gear uplocked, or whenever the gear is not extended and the power control is retarded. On F-86F-25 and subsequent airplanes, a warning light dimming switch is provided. This switch is operated by the primary instrument light rheostat. The gear warning horn will blow whenever the throttle is retarded and whenever any gear is not downlocked. The horn may be cut off by depressing the warning horn cutoff button, or the warning horn circuit can be reset by advancing the throttle. The position indicating system and the red warning light are controlled by microswitches on the gear uplocks and downlocks. The red warning light is also controlled by microswitches on the door uplocks when the gear is uplocked. The warning horn system is controlled by gear downlock microswitches.

2-241. ADJUSTING POSITION INDICATING AND WARNING SWITCHES. See figure 2-64.

2-242. MAIN LANDING GEAR ASSEMBLIES.

2-243. Two main landing gear assemblies are mounted in the wing section. Each main gear assembly consists principally of a shock-absorbing strut. The shock strut is mounted on a cantilever trunnion support attached to the wing structure. Mounted on the main gear assemblies are 26-inch wheels with extra-high-pressure tires and rotary multiple-disk hydraulic brakes. The gear is retracted into the fuselage, just aft of the wing center section, by a hydraulic cylinder attached to the upper part of the shock strut. The gear is downlocked by a lockpin, which engages a lug on the shock strut. This lockpin is mounted in the aft face of the trunnion support. The lockpin extends and retracts by a hydraulic cylinder, and is spring-loaded to locked position. The gear is uplocked by a spring-loaded, hydraulically actuated hook that engages a roller on the strut.

2-244. REMOVING MAIN LANDING GEAR ASSEMBLIES. To remove main landing gear assembly, proceed as follows:

a. Place airplane on jacks.

b. Remove shock strut fairing.

c. Disconnect main gear actuating cylinder end.

d. Disconnect and cap hydraulic brake lines.

e. With strut supported to take the weight off trunnion pin, remove trunnion pin and main gear assembly. (See figure 2-68.)

2-245. INSTALLING AND ADJUSTING MAIN LANDING GEAR ASSEMBLIES. See figure 2-69.

2-246. ADJUSTING MAIN LANDING GEAR UPLOCKS. See figure 2-69.

2-246A. REMOVING MAIN LANDING GEAR DOWNLOCK ASSEMBLIES. To remove main landing gear downlock assemblies, proceed as follows:

a. Place airplane on jacks.

b. Unlock main landing gear.

c. Disconnect cylinder actuating link from downlock shaft.

d. Remove downlock retaining nut and downlock sleeve assembly.

e. Remove downlock guide screw.

f. With gear raised approximately 45 degrees, remove downlock assembly.

2-246B. INSTALLING AND ADJUSTING MAIN LANDING GEAR DOWNLOCK ASSEMBLIES. To install and adjust main landing gear downlock assemblies, proceed as follows:

CAUTION

Make certain that right-hand and left-hand downlock assemblies are installed in their proper position. Correctly installed assemblies, right-hand or left-hand, will have the lubrication hole in the housing above the guide screw, and point of bevel on lockpin will point up and inboard. When assembling the gear downlock pin to the trunnion fitting housing, proper alignment of both units is required. If this alignment is not maintained, the screw can hang up when partially installed. If this happens, the screwhead will shear off when high torque is applied during installation.

a. Adjust downlock pin by rotating actuating shaft so that pin protrudes 1 1/16 (±1/32) inches from inner housing. (See figure 2-69.)

b. With gear raised approximately 45 degrees, install downlock assembly.

c. Align downlock pin, sleeve assembly, and housing; then install downlock guide screw and torque to 150-190 inch-pounds.

d. Install downlock sleeve retaining nut and tighten.

e. Safety-wire retaining nut to downlock guide screw.

f. Connect downlock cylinder actuating link to downlock shaft.

Note

Downlock cylinder piston rod must be properly adjusted before connecting actuating link to downlock shaft. (See figure 2-69.)

g. Check downlocks for proper operation.

h. Remove jacks.

2-247. INSTALLING AND ADJUSTING MAIN LANDING GEAR SHOCK STRUT FAIRING. See figure 2-69.

2-247A. LANDING GEAR SHOCK STRUTS.

2-247B. The landing gear shock struts are composed of two telescoping cylinders which are filled with specific amounts of hydraulic fluid and compressed air. The air in the upper chamber carries the static loads and acts to extend the strut when the weight of the airplane is off the gear. Impact loads are absorbed by the hydraulic fluid in the inner cylinder as well as the air in the upper chamber. During compression of the strut, oil is forced through an orifice, the rate of flow being controlled by a graduated metering rod. At the same time, the air in the upper chamber is compressed. The correct proportion of air and hydraulic fluid must be maintained at all times.

2-247C. CHECKING LANDING GEAR SHOCK STRUTS. To check struts for internal damage on all Cleveland Pneumatic struts up to Model 9153, Serial No. C879, proceed as follows:

a. Release all air from strut assembly, permitting strut to collapse.

b. With strut in bottomed position, make a mark on the piston. Mark should be in line with the bottom of outer cylinder packing nut.

c. Inflate strut to fullest extended position and measure the distance between the mark on piston and bottom of outer cylinder packing nut. (Do not exceed 1150 psi.)

d. If strut extension does not measure 9 (±1/16) inches, replace strut with serviceable unit in accordance with figure 2-69 and check gear for proper operation.

2-248. MAIN LANDING GEAR WHEEL DOORS.

2-249. The two main landing gear wheel doors are hinged at the inboard edges to the fuselage center web. Hydraulic actuating cylinders are attached to the forward inboard corners of each door. The initial movement of the actuating cylinders opens the uplock hooks. The hooks are self-locking as the doors close. (A slip on the forward hook is contacted by the door uplock roller. This action closes the hooks.) Movement of the doors is controlled by sequence switches, which are mechanically actuated by the main landing gear.

2-250. REMOVING MAIN LANDING GEAR WHEEL DOORS. To remove main landing gear wheel door, proceed as follows:

a. Disconnect actuating cylinder from door.

b. Remove hinge bolts and door.

2-251. INSTALLING AND ADJUSTING MAIN LANDING GEAR WHEEL DOORS. See figure 2-71.

2-252. MAIN LANDING GEAR WHEELS.

2-253. The main gear wheels are 26 x 6.6-inch magnesium castings and carry 26 x 6.6-inch extra-high-pressure tires. Either 12- or 14-ply rating tires may be used on F-86F-1 through F-86F-20 Airplanes. Only 14-ply rating tires should be used on F-86F-25 through F-86F-35 Airplanes, which have provisions for external stores. The use of 12-ply rating tires is limited to gross weights not exceeding 17,500 pounds. When a gross weight of 17,500 pounds is exceeded, 14-ply rating tires must be used. Each wheel has a removable rim with a split-ring retainer.

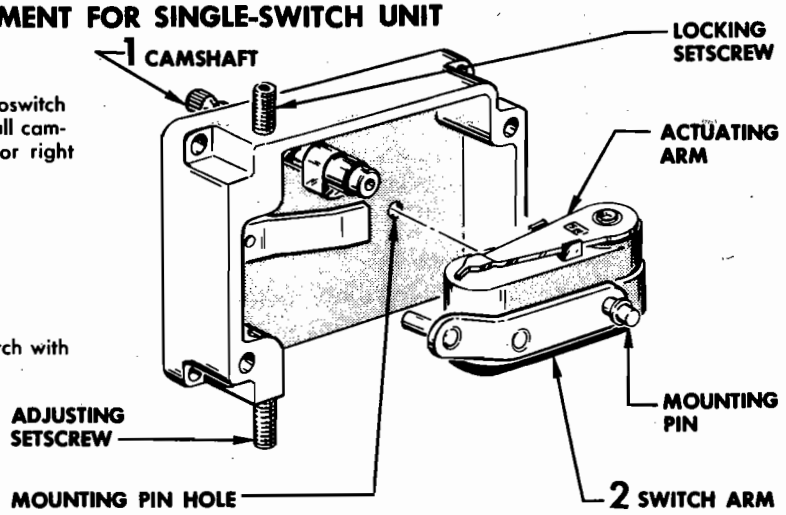
WARNING

Do not use 14-ply recap tires on aircraft exceeding 20,000 pounds take-off weight and take-off speed of 140 knots.

2-254. REMOVING MAIN LANDING GEAR WHEELS. To remove main landing gear wheels, proceed as follows:

a. Disconnect hydraulic fitting.

BENCH ADJUSTMENT FOR SINGLE-SWITCH UNIT

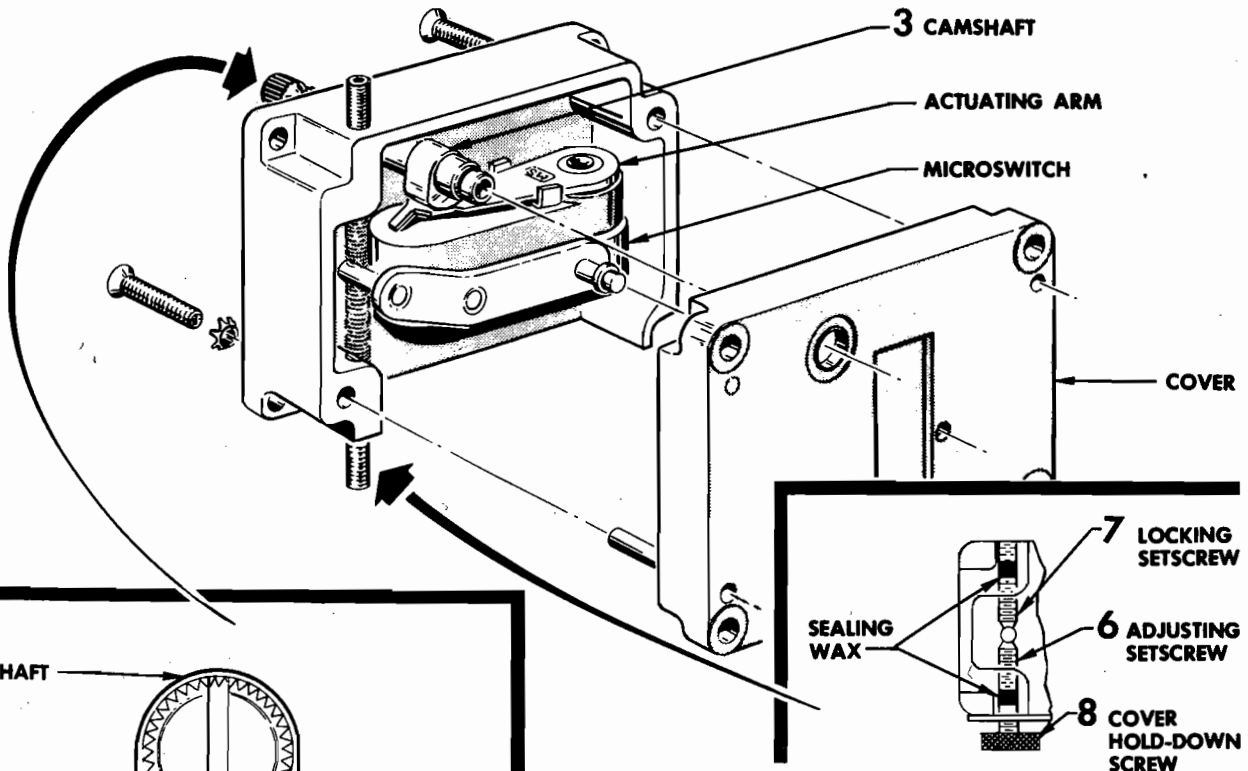


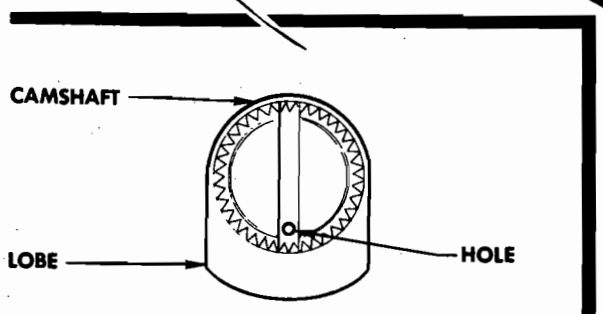
1 With switch case held in position shown and microswitch locking and adjusting setscrews backed out, install camshaft with splined end on side of case desired for left or right part.

2 Install switch arm and mounting pin on microswitch with switch arm turned up toward actuating arm.

3 Slide microswitch into place, with mounting pin mating with hole in rear cover and with actuating arm up in a position to contact camshaft.

4 Hold microswitch assembly in place, slide front cover over camshaft and mounting pin, and install screws in cover.





5 Turn camshaft so that lobe of cam is toward and perpendicular to microswitch actuating arm. The hole in the end of the camshaft indicates the center of the lobe of the cam.

6 Move adjusting setscrew in slowly until switch actuates; then continue one-half turn past point of actuation.

NOTE A continuity light may be used to set switch adjustment. Connect electrical leads to proper terminals on microswitch, and slowly rotate splined shaft until switch is actuated (clicks) and light comes on.

7 **8** Tighten locking setscrew securely and plug setscrew holes with sealing wax, leaving enough room to receive bottom cover.

F-86F-2-33-19

Figure 2-63. Assembling and Adjusting Hermetically Sealed Microswitches (Sheet 1 of 2)

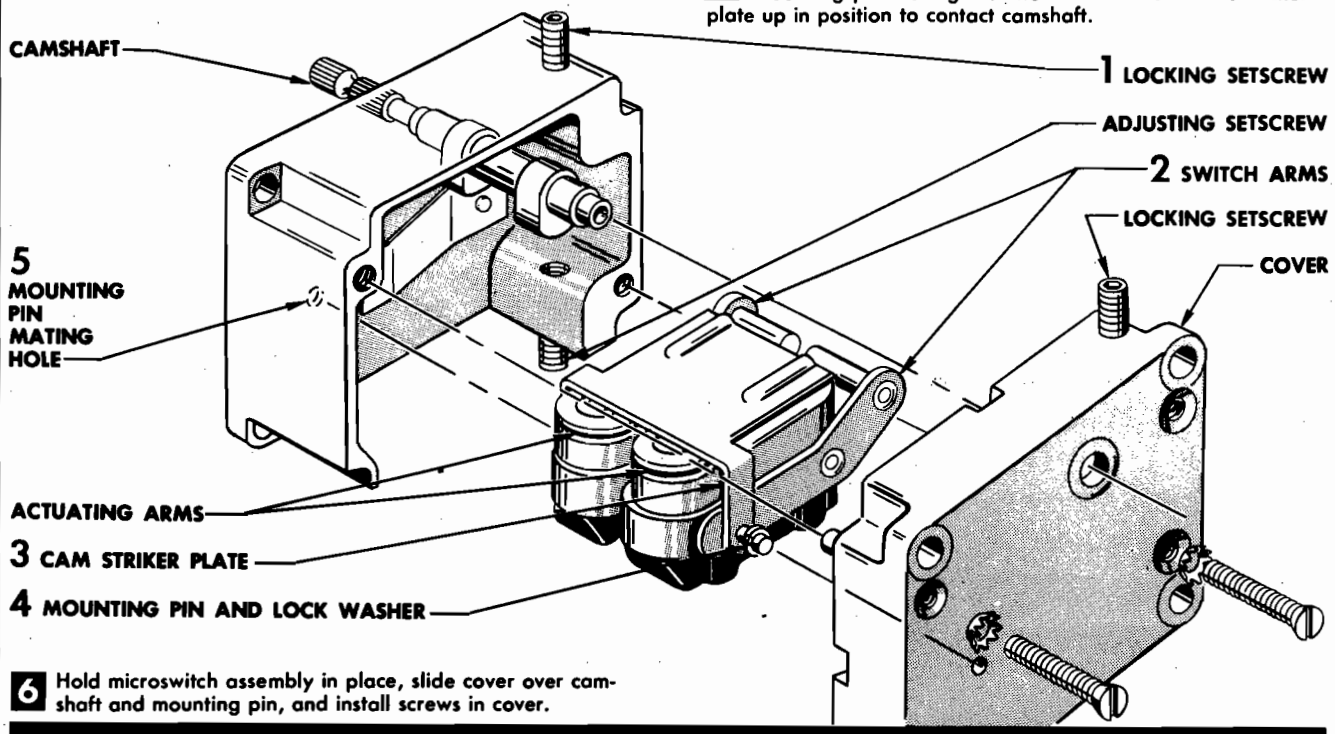
BENCH ADJUSTMENT FOR MULTIPLE-SWITCH UNIT

1 With switch case held in position shown and microswitch locking and adjusting setscrews backed out, install camshaft with splined end on side of case desired for left or right part.

2 Install a right switch arm to one microswitch and a left arm to the other, with actuating arms up to contact camshaft.

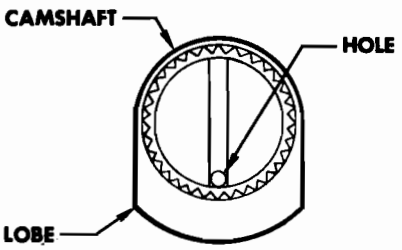
3 **4** Hold both microswitches together, switch arm pins facing each other; then slide cam striker plate over both switches, and install mounting pin through striker plate pivot arms and microswitches. Install lock washer on mounting pin.

5 Slide double microswitch assembly into switch case with mounting pin mating with hole in rear cover and striker plate up in position to contact camshaft.



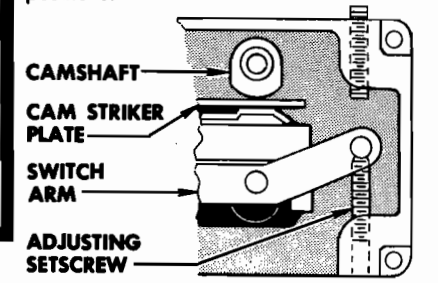
6 Hold microswitch assembly in place, slide cover over camshaft and mounting pin, and install screws in cover.

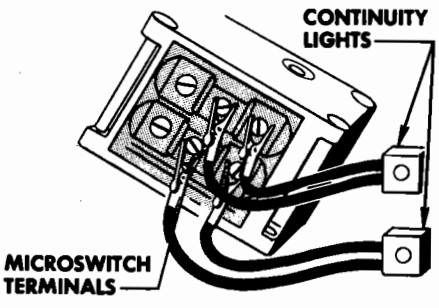
7 Turn camshaft so that lobe of cam is toward and perpendicular to microswitch striker plate. The hole in the end of the camshaft indicates the center of the lobe of the cam.



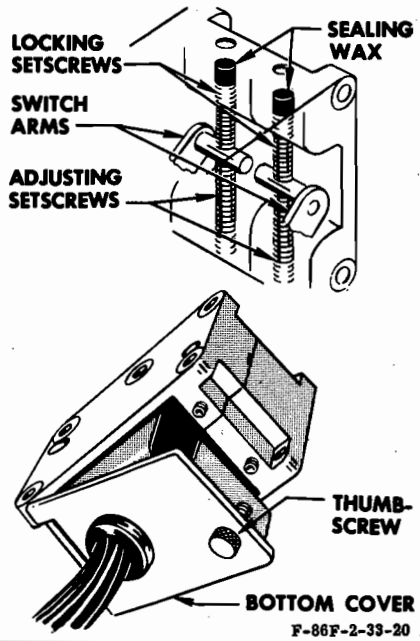
NOTE A continuity light may be used to set switch adjustment. Connect electrical leads to proper terminals on microswitch, and rotate splined shaft until switch is actuated (clicks) and light comes on. To check that double microswitch units operate within one degree of each other, connect electrical leads of two continuity lights to proper terminals of microswitches (one set of leads to each microswitch). Slowly rotate splined shaft until switches are actuated (click) and lights come on. If lights do not come on at the same instant, readjust switches.

8 Turn adjusting setscrew of one microswitch in slowly until switch actuates; then continue one-half turn past point of actuation. Repeat for second microswitch. Adjust microswitches to operate within one degree of each other in both operating positions.



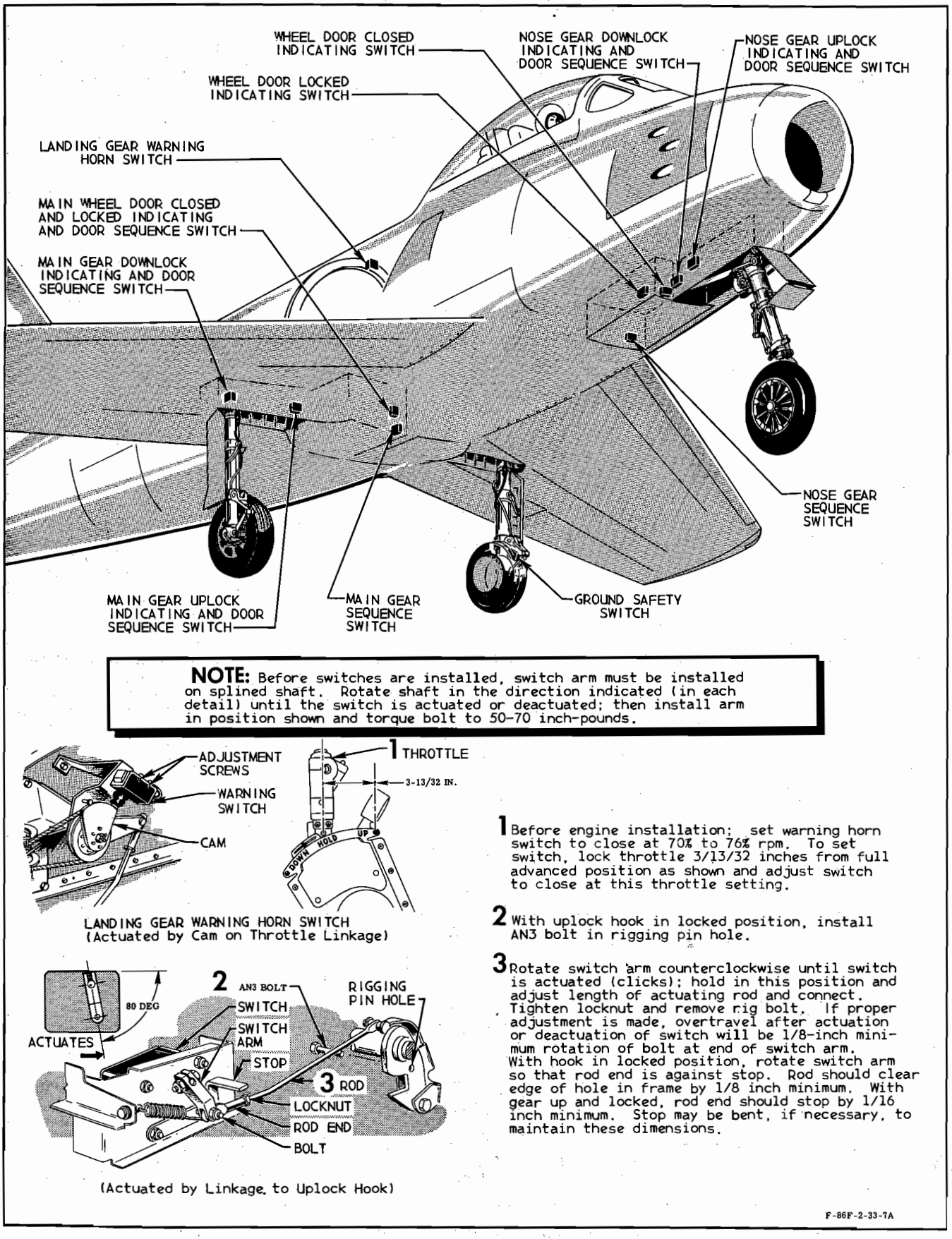


9 Tighten locking setscrews securely and plug setscrew holes with sealing wax, leaving enough room to receive bottom cover hold-down screw. Then install bottom cover assembly.



F-86F-2-33-20

Figure 2-63. Assembling and Adjusting Hermetically Sealed Microswitches (Sheet 2 of 2)



NOTE: Before switches are installed, switch arm must be installed on splined shaft. Rotate shaft in the direction indicated (in each detail) until the switch is actuated or deactuated; then install arm in position shown and torque bolt to 50-70 inch-pounds.

LANDING GEAR WARNING HORN SWITCH
(Actuated by Cam on Throttle Linkage)

(Actuated by Linkage to Uplock Hook)

1 Before engine installation; set warning horn switch to close at 70% to 76% rpm. To set switch, lock throttle 3/13/32 inches from full advanced position as shown and adjust switch to close at this throttle setting.

2 With uplock hook in locked position, install AN3 bolt in rigging pin hole.

3 Rotate switch arm counterclockwise until switch is actuated (clicks); hold in this position and adjust length of actuating rod and connect. Tighten locknut and remove rig bolt. If proper adjustment is made, overtravel after actuation or deactuation of switch will be 1/8-inch minimum rotation of bolt at end of switch arm. With hook in locked position, rotate switch arm so that rod end is against stop. Rod should clear edge of hole in frame by 1/8 inch minimum. With gear up and locked, rod end should stop by 1/16 inch minimum. Stop may be bent, if necessary, to maintain these dimensions.

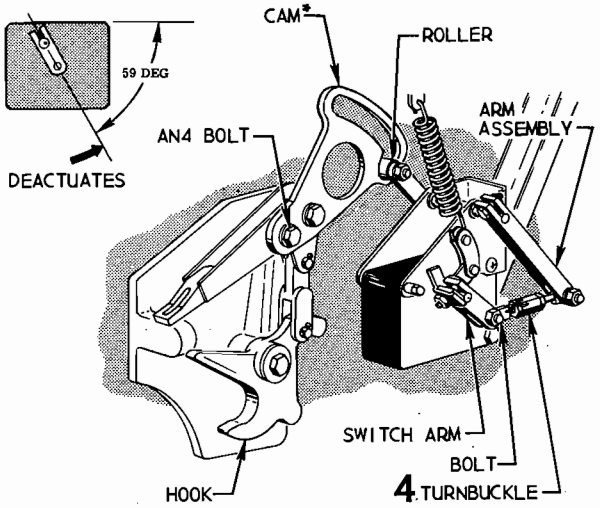
F-86F-2-33-7A

Figure 2-64. Adjusting Landing Gear Sequence and Position Indicating Switches (Sheet 1 of 4)

NOTE: Before switches are installed, switch arm must be installed on splined shaft. Rotate shaft in the direction indicated (in each detail) until the switch is actuated or deactuated; then install arm in position shown and torque bolt to 50-70 inch-pounds.

NOSE WHEEL DOOR LOCKED INDICATING SWITCH
(Actuated by Nose Wheel Door)

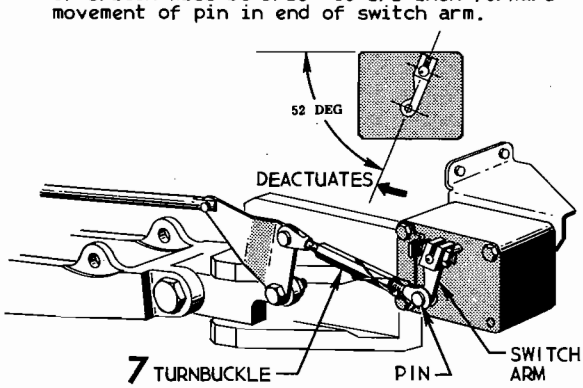
4 With hook in fully locked position and cam adjusted so that roller is in cam as shown, tighten AN4 bolt to 50-70 inch-pounds torque. Full width of cam should engage roller. Lengthen turnbuckle until switch is deactuated (clicks). Then shorten arm assembly by 2-1/2 turns of turnbuckle, tighten locknuts, and safety with lockwire. If proper adjustment is made, overtravel after actuation of switch will be 5/16-inch minimum forward movement of bolt at end of switch arm. Overtravel after deactuation will be 3/32-inch minimum aft movement of bolt.



*New cam and stop on F-86F-30 Airplane AF52-4405 and all subsequent airplanes

NOSE GEAR DOWNLOCK INDICATING AND DOOR SEQUENCE SWITCH
(Actuated by Drag Brace Lock Mechanism)

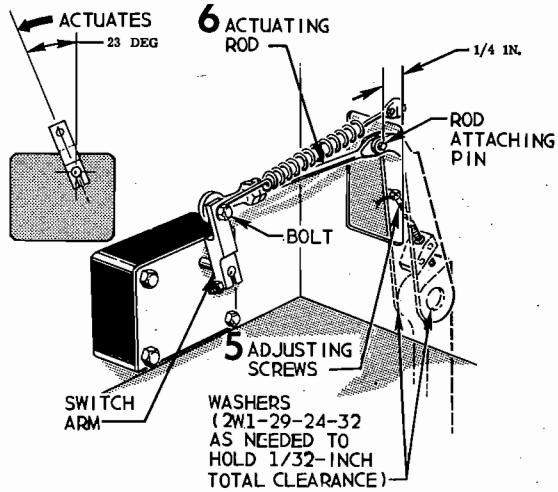
7 With gear down and locked and turnbuckle extended, shorten turnbuckle until switch is deactuated (clicks). Shorten turnbuckle 3-1/2 more turns and safety with lockwire. If proper adjustment is made, overtravel after deactuation of switch will be 5/16- to 1/8-inch forward movement of pin in end of switch arm.



NOSE GEAR SEQUENCE SWITCH
(Actuated by Linkage to Nose Wheel Door)

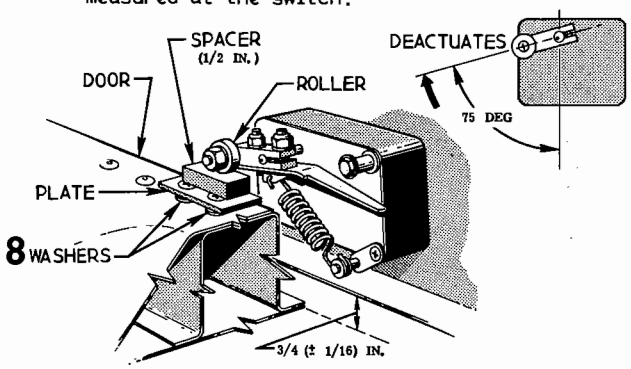
5 Move door to full open position and turn adjusting screw until center of actuating rod attaching pin is 1/4 (±1/32) inch from the web of the structure as shown. Lock adjusting screw in place.

6 Adjust actuating rod to a length of approximately 5-3/4 inches and install. Lengthen rod so that switch is actuated before bottom edge of door is one inch from full open. As door closes, switch should be deactuated before bottom edge of door is 2-1/2 inches from full open. If proper adjustment is made, overtravel after actuation (click) of switch (inboard movement of bolt at end of switch arm) will be 1/8 inch minimum. Overtravel after deactuation (click) of switch (outboard movement of bolt) will be 1/2 inch minimum.



NOSE WHEEL DOOR CLOSED INDICATING SWITCH
(Actuated by Nose Gear Door)

8 Place a 1/2-inch spacer on top of switch actuating plate on door. Adjust position of plate by adding or removing washers so that switch is deactuated (clicks) when door is closing and is 3/4 (±1/16) inch from full closed position, measured at the switch.



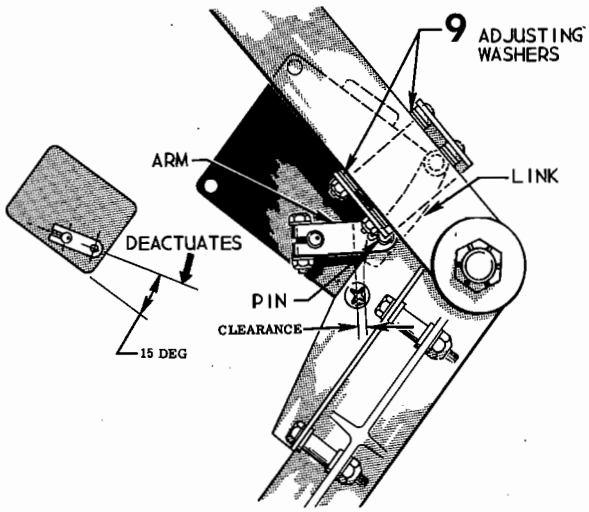
F-88F-2-33-4A

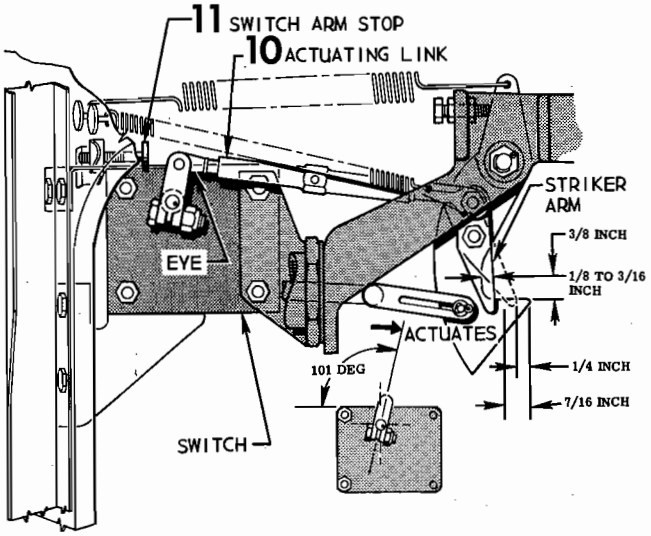
Figure 2-64. Adjusting Landing Gear Sequence and Position Indicating Switches (Sheet 2 of 4)

NOTE: Before switches are installed, switch arm must be installed on splined shaft. Rotate shaft in the direction indicated (in each detail) until the switch is actuated or deactuated; then install arm in position shown and torque bolt to 50-70 inch-pounds.

GEAR GROUND SAFETY SWITCH
(Actuated by Strut Torque Links)

9 Place airplane on jacks so that left main gear shock strut is fully extended. Place jack under left gear and slowly raise gear. The switch should be deactuated (click) before the strut is compressed 1-3/4 inches. Allow gear to extend; switch should be actuated (click) before gear is 1/2 inch from fully extended position. With gear fully extended, end of link should clear bottom of slot in switch arm. To obtain these conditions, it may be necessary to reposition adjusting washers.

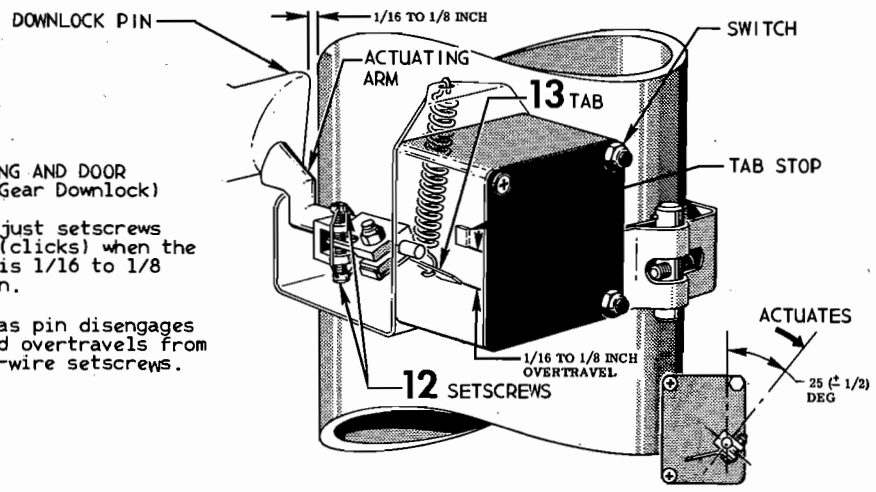




MAIN GEAR UPLOCK INDICATING AND DOOR SEQUENCE SWITCH (Actuated by Uplock Roller)

10 Adjust length of actuating link so that the switch will be actuated (click) when the switch arm is in position shown in inset, and face of striker arm is 1/8 to 3/16 inch from face of hook, measured 3/8 (±1/32) inch above hook surface.

11 Adjust switch arm stop so that tip of striker arm is 1/4 (±1/32) inch from tip of hook. (If switch is not deactuated (does not click) before tip of striker arm is 7/16 inch from tip of hook, recheck adjustments.) Eye must clear switch arm stop by 1/16 inch minimum.



MAIN GEAR DOWNLOCKED INDICATING AND DOOR SEQUENCE SWITCH (Actuated by Gear Downlock)

12 With gear down and locked, adjust setscrews so that switch is deactuated (clicks) when the downlock pin is engaging and is 1/16 to 1/8 inch from full locked position.

13 Bend spring tab against stop as pin disengages so that switch is actuated and overtravels from 1/16 to 1/8 inch; then safety-wire setscrews.

F-86F-2-33-13

Figure 2-64. Adjusting Landing Gear Sequence and Position Indicating Switches (Sheet 3 of 4)

NOTE: Before switches are installed, switch arm must be installed on splined shaft. Rotate shaft in the direction indicated (in each detail) until the switch is actuated or deactuated; then install arm in position shown and torque bolt to 50-70 inch-pounds.

MAIN WHEEL DOOR LOCKED INDICATING AND DOOR SEQUENCE SWITCH (Actuated When Doors Locked Closed)

14 With door open, disconnect door retract cylinder and place door hooks in full locked position. Move actuator yoke inboard or outboard until roller is resting completely in recess of cam; then tighten bolt to 50-70 inch-pounds torque.

15 Lift door striker; after switch is deactuated (clicks), striker should move at least 7/32 inch before cam roller starts to lift. Shims may be added under cam if necessary to obtain the 7/32-inch movement.

16 Place a 3/32-inch spacer on door, under striker and adjust turnbuckle until switch is deactuated (clicks) just before door roller contacts bottom of closed hook. Replace 3/32-inch shim with 1/32-inch shim. Switch should not be deactuated (should not click) when door roller is raised to contact bottom of hook. If these conditions are not obtained, recheck adjustments. Reconnect door retract cylinder.

MAIN GEAR SEQUENCE SWITCH (Actuated When Main Wheel Door Open)

17 Adjust bolt so that switch is actuated (clicks) when the outermost edge of door is 2 (±1/4) inches from its maximum opened position. If proper adjustment is made, overtravel after actuation of switch should be 5/32-inch minimum rotation of switch arm tip in upward direction. Overtravel after deactuation should be 5/32-inch minimum rotation of switch arm tip in downward direction.

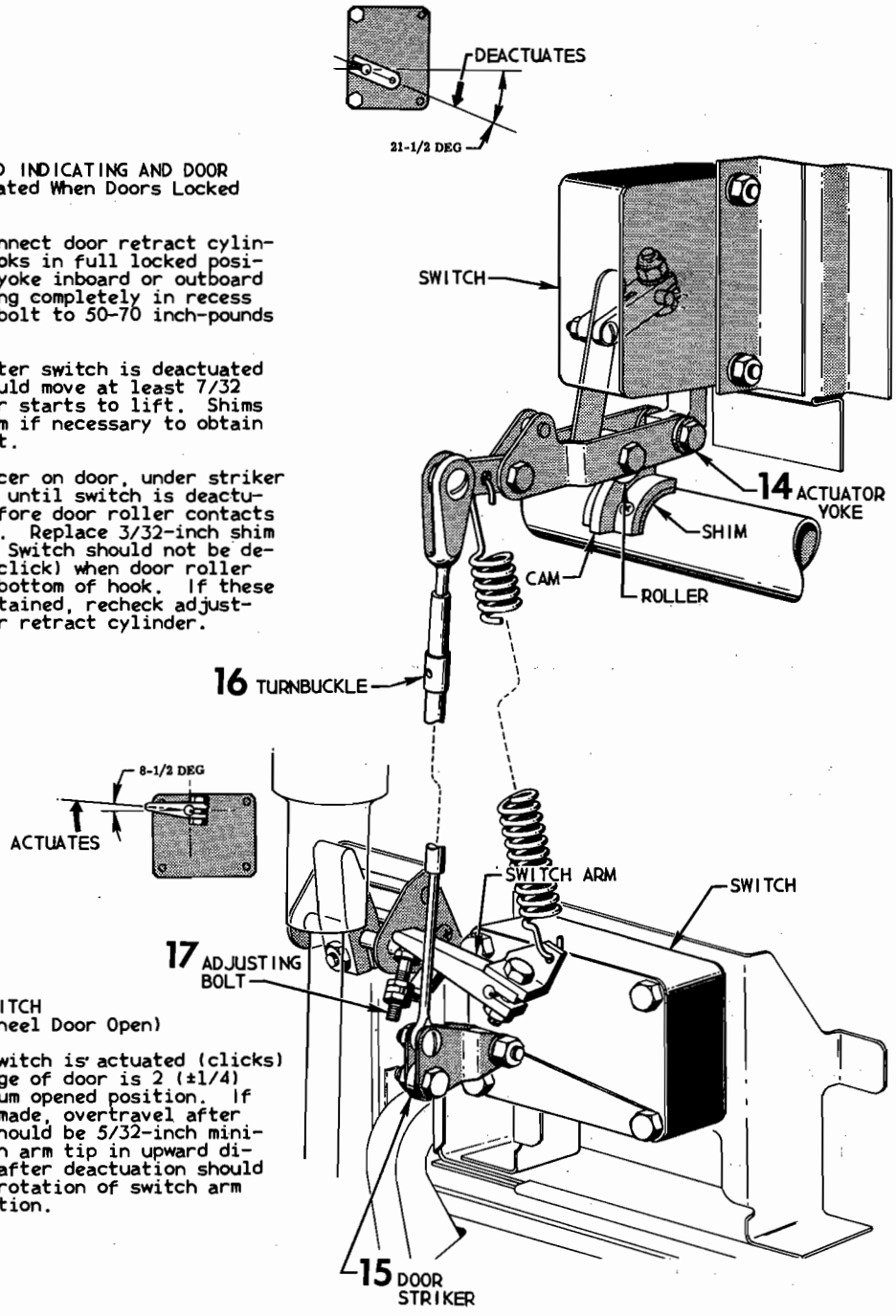


Figure 2-64. Adjusting Landing Gear Sequence and Position Indicating Switches (Sheet 4 of 4)

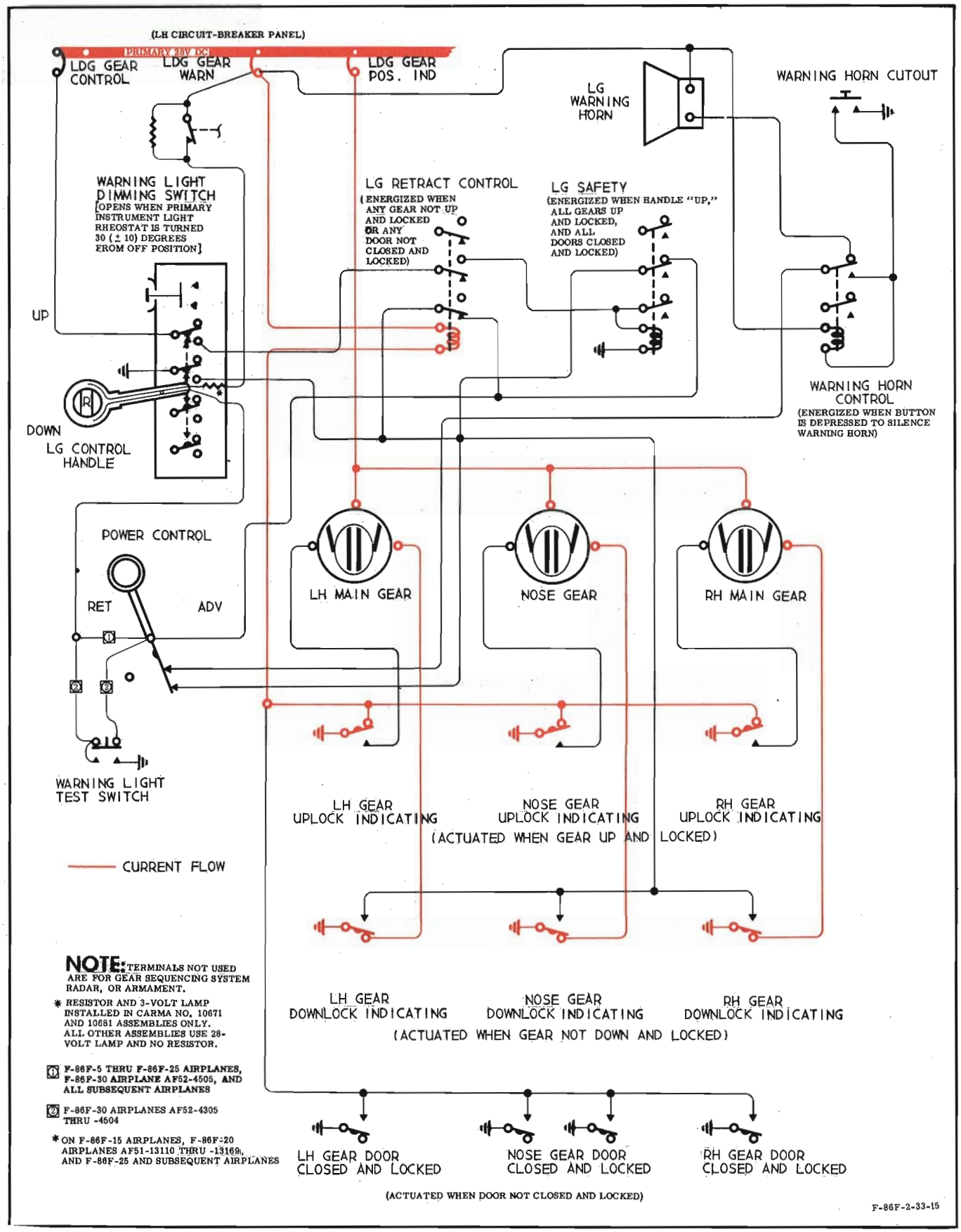


Figure 2-65. Landing Gear Indicating and Warning System—Control Handle "DOWN," Gear Down, Doors Closed, Power Control Retarded

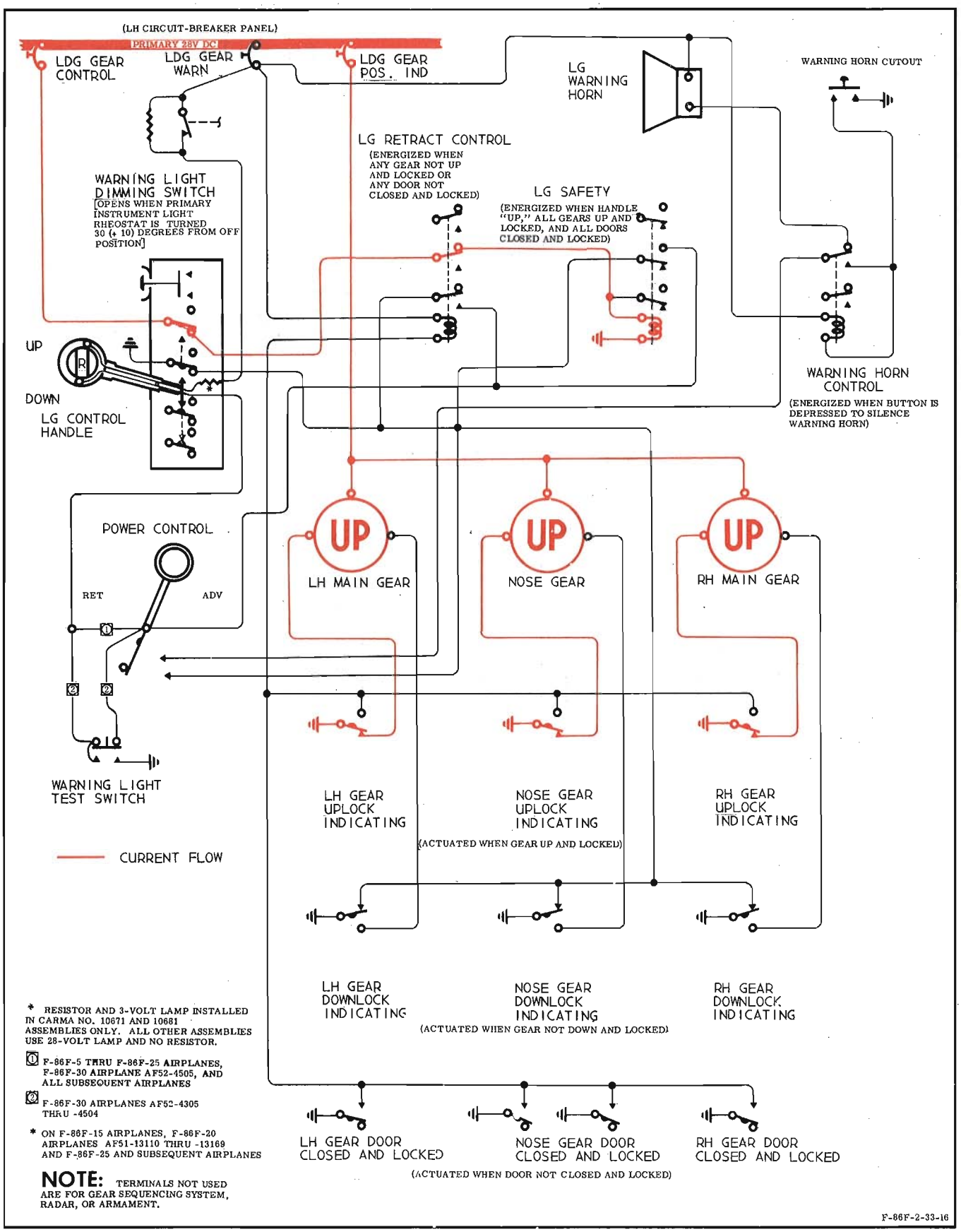


Figure 2-66. Landing Gear Indicating and Warning System—Control Handle "UP," Gear Up, Doors Closed, Power Control Advanced

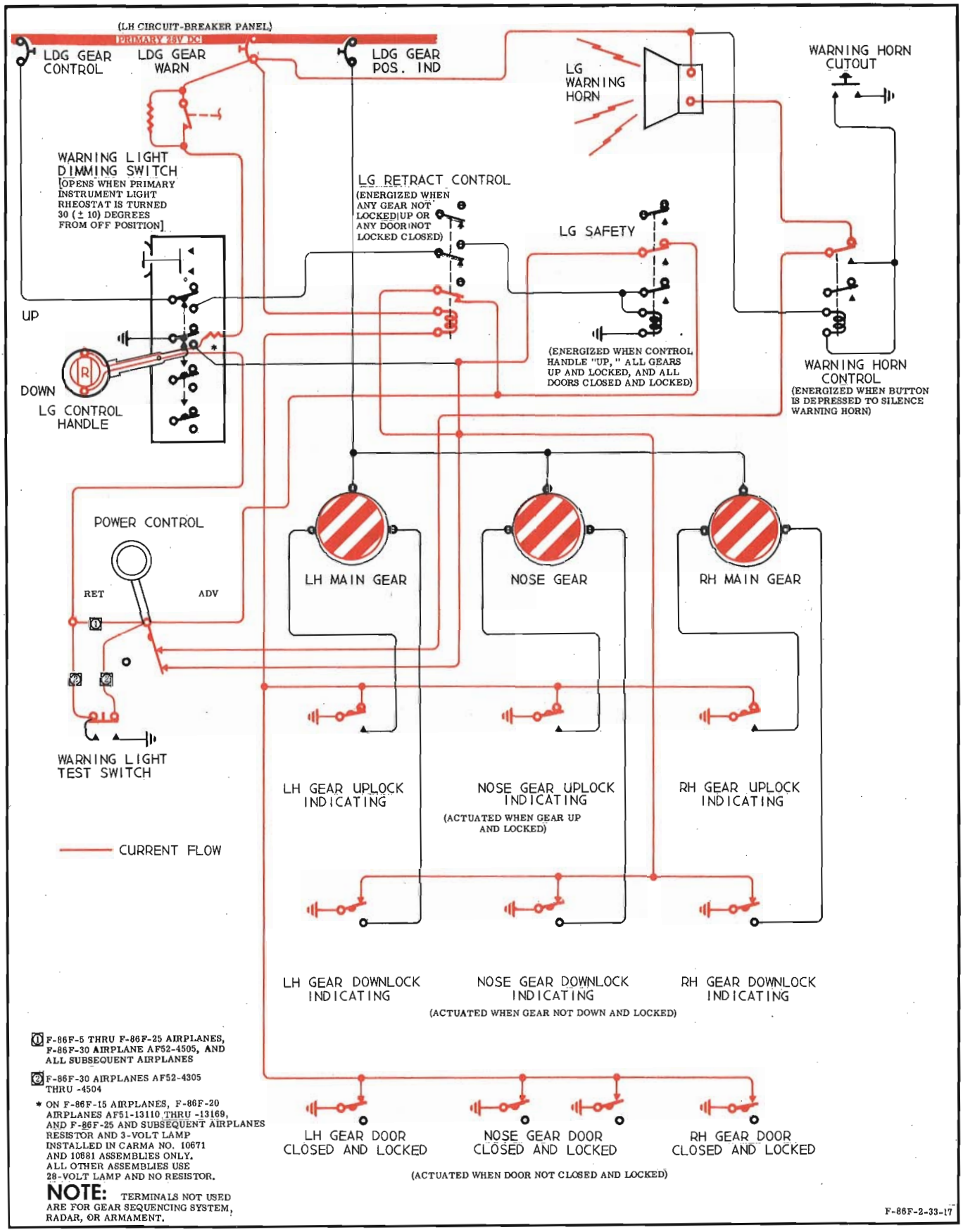


Figure 2-67. Landing Gear Indicating and Warning System—Control Handle "DOWN," Power Control Retarded, Doors Opening, Gear Extending

b. Remove cotter pin from retaining nut.

c. Unscrew retaining nut.

d. Slide brake and then wheel from axle.

2-255. INSTALLING WHEELS. See figure 2-83.

2-256. MAINTENANCE OF CASINGS AND TUBES.

2-257. If brakes, cuts, large blisters, or other visible damage appears, or if the tread pattern has completely disappeared from one or more sections of the casing, the casing must be removed from service. Weather checking on the casing surface is not considered a hazardous condition. However, if the checking has penetrated to the cord, deterioration may occur and the tire should be removed from service. A blister on the side wall of a recently mounted casing is frequently the result of trapped air between the inner tube and casing. This blister can be prevented during the mounting operation by inflating, deflating, and reinflating the tire immediately after mounting. When a casing shows excessive evidence of cupping or uneven wear from camber or toe-in condition, the casing should be removed and reversed on the same wheel and the wheel condition checked and corrected. When there is visible evidence of wheel rim rust or corrosion, the rim should be thoroughly buffed, refinished with a protective coating, and allowed to dry before the tube and casing are remounted. Surface oil and grease should be removed by washing with a mild soap solution or wiping with a cloth moistened in naphtha or solvent. Nylon casings will stretch upon initial inflation. Stretching is usually taken up within 24 hours. New nylon casings should be mounted and inflated as long as possible prior to installation, to prevent this condition. In the event a low spot occurs after installation, the airplane should be moved until the low spot is at the top of the casing, and normal air pressure should be increased 50 percent for 30 minutes. If the condition still exists after deflation back to normal pressure, the operation should be repeated. If an airplane is to remain idle for a period exceeding 3 days, it should be moved or blocked to sufficient height to change the area of contact of the casings with the supporting surface.

2-258. NOSE LANDING GEAR ASSEMBLY.

2-259. The nose gear assembly is attached to the fuselage nose structure. The assembly consists principally of a shock-absorbing strut. Mounted on the nose gear strut is a 22-inch wheel with a low-profile tire. A hydraulically operated steer-damp unit is attached to the aft side of the shock strut outer cylinder. The shock strut pivots on two trunnion supports, mounted in the nose structure. The gear assembly is retracted into the fuselage nose by two hydraulic cylinders. During retraction, the strut spindle rotates 90 degrees in the strut housing so that the nose wheel is horizontal when in the retracted position.

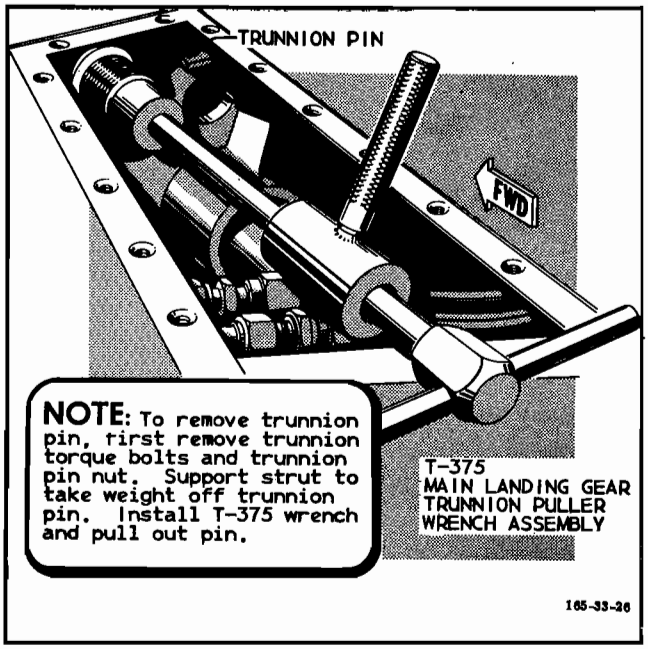


Figure 2-68. Main Landing Gear Trunnion Puller Wrench

2-260. REMOVING NOSE LANDING GEAR ASSEMBLY. To remove the nose landing gear assembly, proceed as follows:

a. Place airplane on jacks.

b. Remove shock strut fairing.

c. Disconnect strut drag brace.

d. With strut supported to take weight off trunnion pin, remove trunnion nuts and torque bolts, and pull trunnion pins.

2-261. INSTALLING AND ADJUSTING NOSE LANDING GEAR ASSEMBLY. See figure 2-70.

2-262. ADJUSTING NOSE LANDING GEAR UPLOCKS. See figure 2-70.

2-263. NOSE LANDING GEAR WHEEL DOOR.

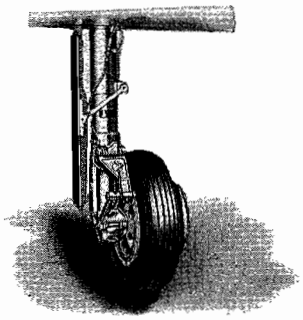
2-264. The nose gear is completely faired, when in the retracted position, by the shock strut fairing and wheel door. The strut fairing is hinged to the fuselage forward of the gear and is opened and closed by the movement of the nose gear assembly to which it is linked. The wheel door is hinged to the left side of the wheel well and is opened and closed by a hydraulic cylinder. The hydraulic cylinder is controlled by a hydraulic valve, which in turn is controlled by sequence switches attached to, and mechanically operated by, the gear.

2-265. REMOVING NOSE LANDING GEAR WHEEL DOOR. To remove the nose wheel door, proceed as follows:

a. Disconnect hydraulic actuating cylinder from door.

b. Disconnect safety link from door.

c. Remove hinge bolts and door.



1 Make sure trunnion pin and bearings are clean and downlock pin retracted. Move gear into position and insert trunnion pin. (Use T232 or T375 wrench on trunnion pin.)

2 Use steel shims to hold fore and aft play to between .004 and .015 inch.

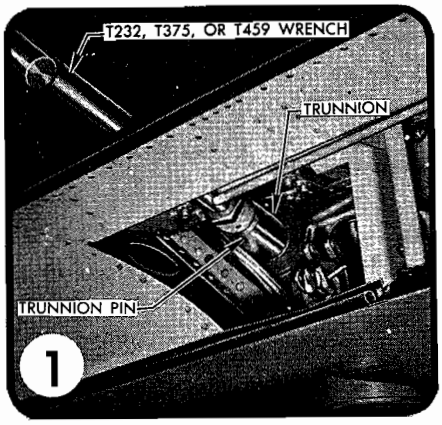
3 Install trunnion pin torque bolt, using the T232 or T375 wrench to help align bolt holes.

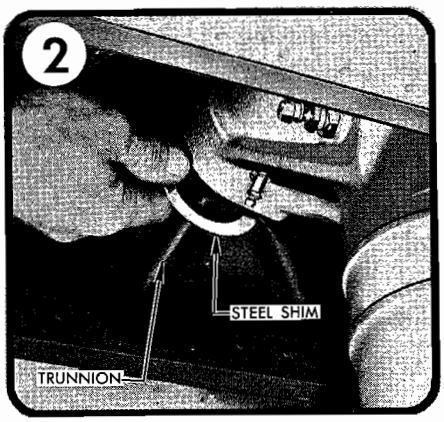
NOTE: Check torque bolt prior to installation to see whether bolt is damaged or worn.

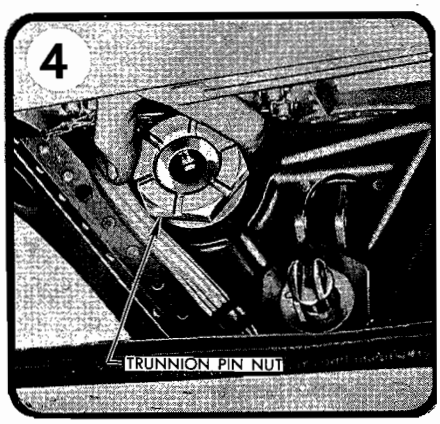
4, 5 Install trunnion pin nut snugly, but without high torque, as the gear should swing freely without binding. Back the trunnion pin nut off so nearest slot is aligned with bolt holes in the trunnion pin, and install trunnion pin nut retaining bolt.

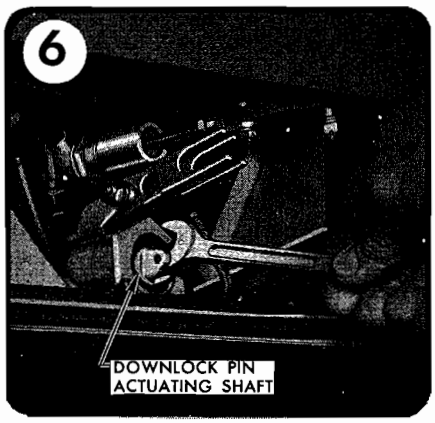
6, 7 Adjust gear downlock pin by rotating actuating shaft so that pin protrudes 1-1/16 inches from inner housing.

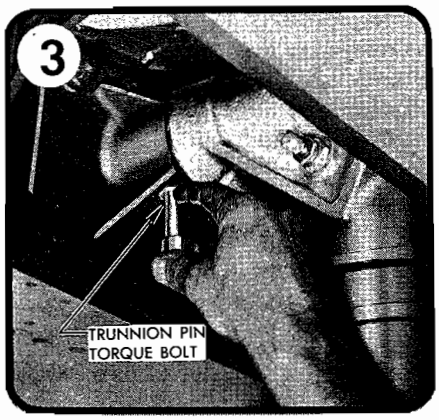
8 Install gear down-stop, using shims to obtain a clearance of from .001 to .007 inch between downlock pin and gear downlocking lug (see illustration 7). Install down-stop retaining bolt. (Use T494 wrench on gear down-stop.)

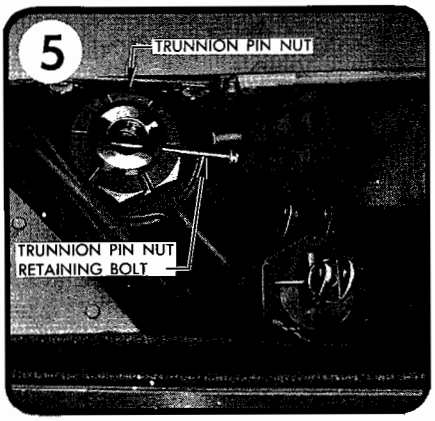


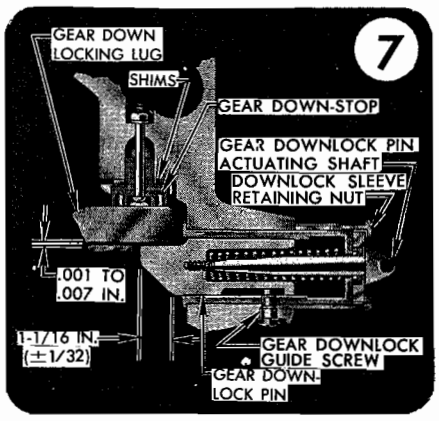








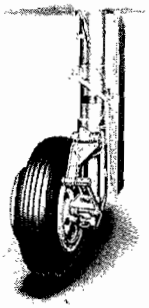




F-86F-2-33-14

Figure 2-69. Installing and Adjusting Main Landing Gear (Sheet 1 of 2)

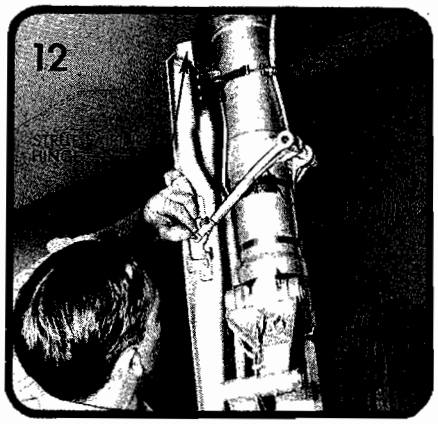
9 Retract downlock pin until inner end is retracted 1/32 inch (±1/64) into the inner housing. Maintain the pin in this position by inserting a small block 1-3/32 inches long between the downlock pin head and the outer housing.



10 Bottom the downlock pin hydraulic cylinder and adjust piston rod to fit; then shorten by one-half turn of the fitting and attach.

11 With gear down and locked, fully extend gear actuating cylinder piston rod and adjust end fitting for 1/8- to 3/16-inch overtravel. Attach cylinder rod end to strut and torque castellated nut on attaching bolt to 50 inch-pounds maximum. Overtravel may be checked by removing attaching bolt from cylinder at wing structure fitting and measuring amount of overstroke remaining before cylinder bottoms at fully extended position.

12 Move strut fairing into position and install hinge bolt. Attach strut to fairing links and adjust links so that retracted gear will hold the fairing tightly closed without distortion. If fore and aft adjustment of the fairing is required, change washers at hinge bolt and fairing links as necessary.



13,14 Adjust the uplock hook-stop so the roller clears the face of the hook by 1/16 inch with the gear up and locked; adjust stop by adding or removing shims until gear just touches stop (maximum clearance 1/16 inch) with gear roller resting on hook. Latch actuating cylinder may be adjusted back into bushing a maximum of three threads.

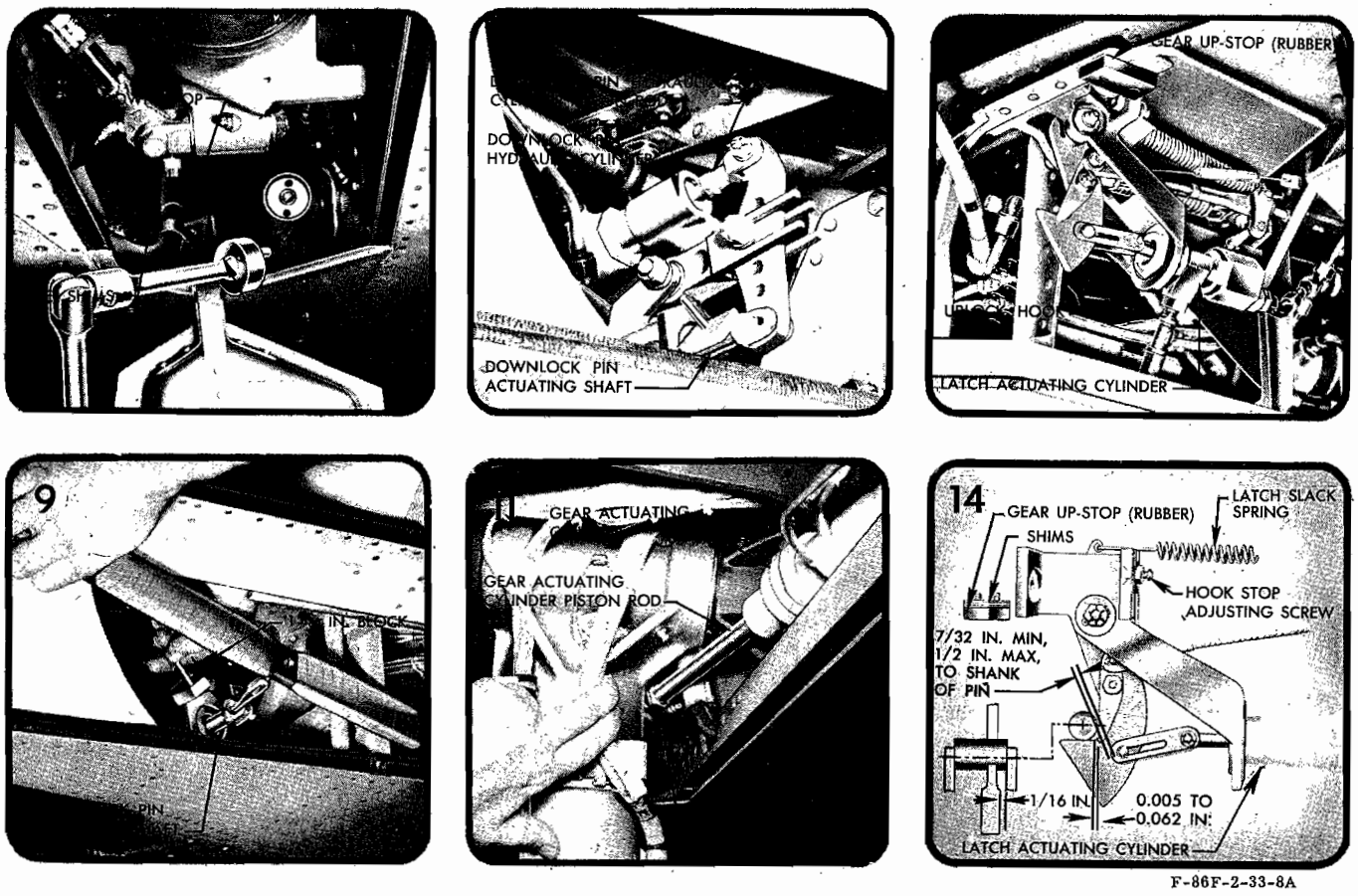


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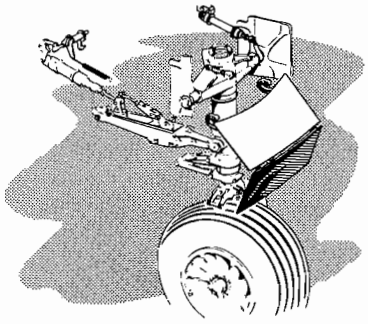
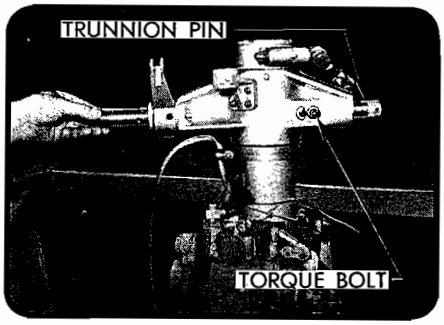
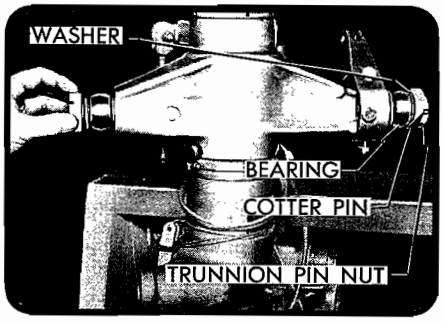
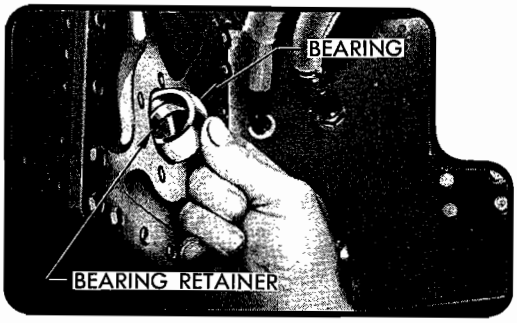
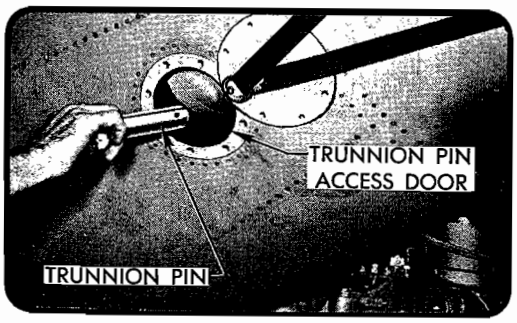
Figure 2-69. Installing and Adjusting Main Landing Gear (Sheet 2 of 2)











1 Before installing nose gear, make sure trunnion pins are clean and insert them as indicated. Inspect torque bolts for damage; then install bolts.

2 Install trunnion bearings, washers, and nuts. Draw trunnion nuts up snug, but not tight enough to hinder free rotation of bearings. Use washers as necessary to align cotter pin holes and still maintain a snug fit.

NOTE: Trunnion pins, bearings, washers, and nuts are preinstalled and adjusted before nose gear is moved into position because of the limited space available to work in, once the gear is installed.

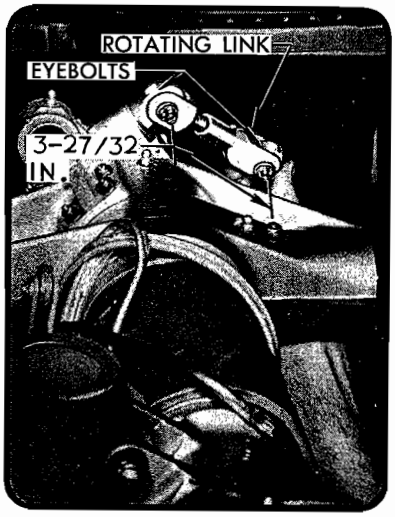
3 Remove torque bolts and trunnion pins, leaving trunnion pin nut installed. Separate bearings and place in bearing retainers.

4 Move gear into position for installation. Align trunnion pin holes in nose gear with corresponding holes in fuselage structure. Install trunnion pins through trunnion pin access doors. Make sure that cotter pin heads are in the same position as in step 2, so that torque bolt holes will be aligned. Install and tighten torque bolts.

5 Adjust strut-rotating link to a length of 3-27/32 inches between attachment centers. This will cause the wheel to be horizontal when retracted. Adjust eyebolts so that they are free to rotate.

6 To attach drag link, install bearing pin and secure with retaining bolt; then install torque bolts.

7 With drag link hinge shoulders tight together, shim lock stop so that hook fits firmly without binding. With hinged actuating arm down against stop, adjust link rod so that hook attachment bolt is against end of link rod slot.



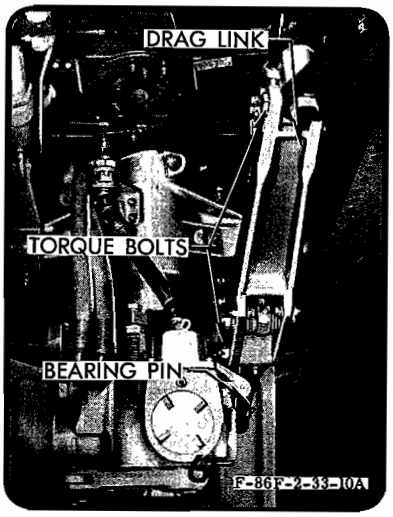


Figure 2-70. Installing and Adjusting Nose Landing Gear (Sheet 1 of 2)

8 Turn uplock hook adjustment stop to position face of hook 5-5/16 (±1/16) inches aft of frame. Adjust up-latch roller by moving it in on serrated base so that face of uplock hook touches roller when gear is locked up. Then torque bolts to 30-40 inch-pounds.

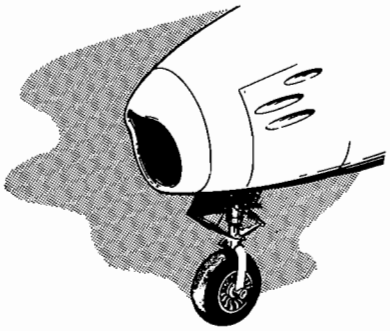
9 Disconnect uplock spring and hold primary actuating cylinder aft so that cam stop pin is in bottom of cam slot. Extend primary actuating cylinder piston rod until piston is bottomed against cylinder end, and adjust rod to fit attaching point; then lengthen rod by two full turns of rod adjustment fitting and attach.

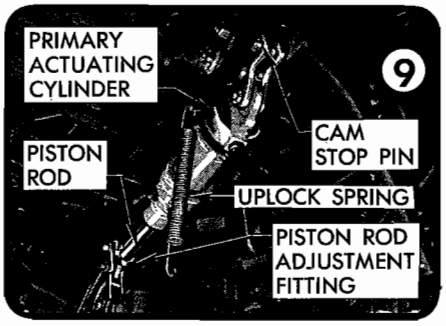
10 With gear full down and secondary actuating cylinder piston bottomed in the retracted position, adjust length of piston rod to fit; then shorten two full turns. Make sure grease fitting on rod end faces down; then attach rod to nose gear fitting.

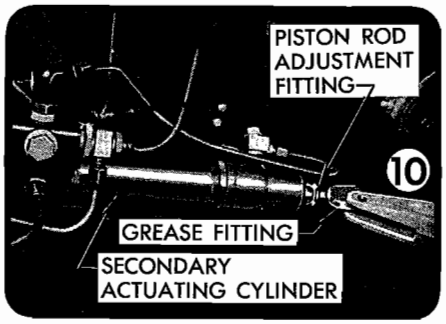
11 Position shock strut fairing and install hinge bolts.

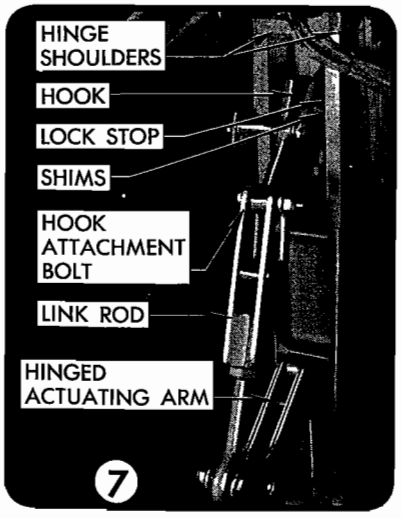
12 Adjust shock strut fairing so that lower edge clears strut inner cylinder by 2-1/16 inches. Connect link rod to strut and adjust so that fairing will close firmly, but without distortion when gear is locked up.

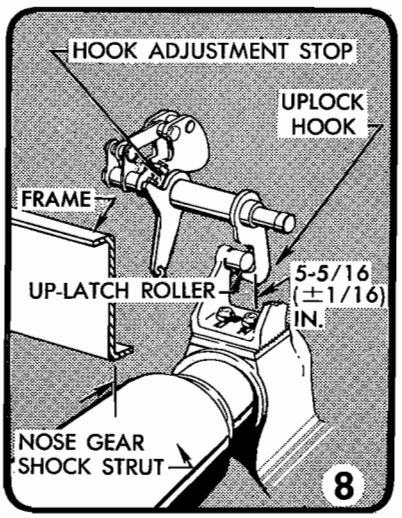
NOTE: With gear installed and all adjustments made, total permissible fore and aft play at centerline of wheel axle is 5/16 inch. Total permissible free rotational play about the strut centerline is 3/16 inch measured at a point on the tire periphery at the extreme fore or aft centerline of the tire.











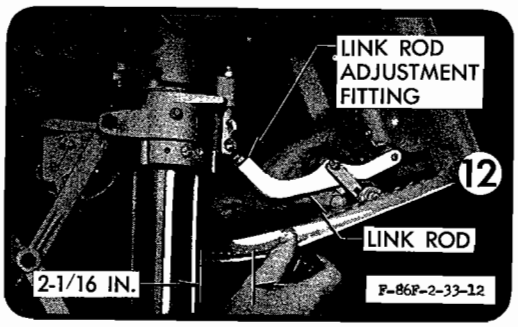
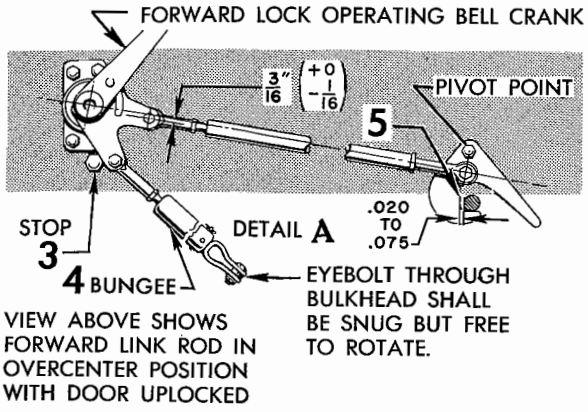
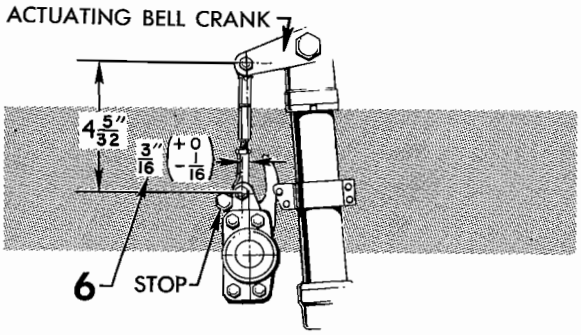


Figure 2-70. Installing and Adjusting Nose Landing Gear (Sheet 2 of 2)





1,2 Position wheel door and install hinge bolts. Use an AN4-20A bolt in forward hinge and an AN4-17A bolt in the aft hinge (magnetic inspection required).

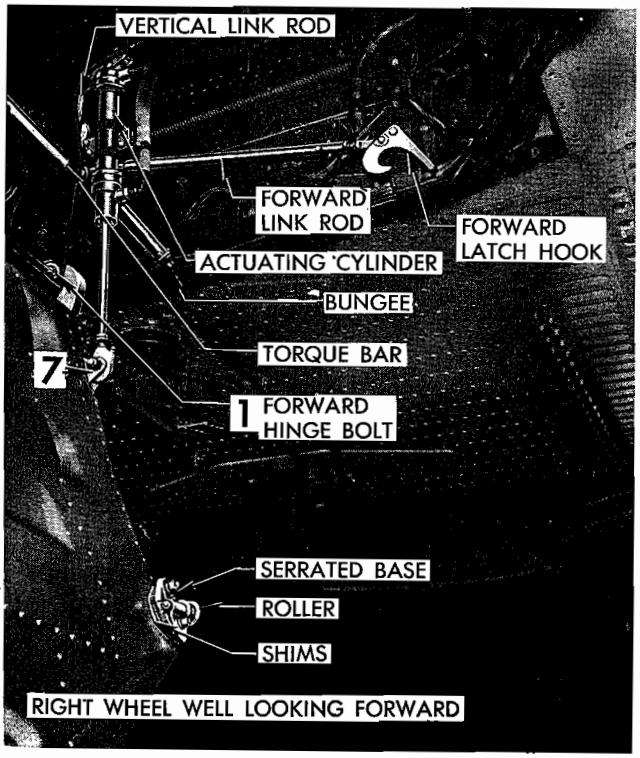
3 Install forward link rod with 16-15/16 inches between attachment centers, and install aft link rod with 17-17/32 inches between attachment centers. Set forward lock operating bell crank against stop as shown in detail A and check overcenter dimension. If necessary, replace spacer on stop with one of different outside diameter to make bell crank overcenter by 3/16 (+0, —1/16) inch.

4 With door open and locks unlocked, install bungee to fit; then lengthen bungee two full turns and tighten locknut. Connect bungee to bell crank.

5 Close wheel door, and adjust rollers so that they rest in latch hook with .020- to .075-inch clearance between roller and back face of hook. Make this adjustment by loosening attachment bolts and moving roller mounts on serrated bases. Adjust rollers vertically by adding or removing shims so that wheel door will be held tightly closed without distortion of door skin.

6 Set actuating bell crank against stop, and install vertical link rod with 4-5/32 inches between attachment centers. Make certain bell crank remains overcenter by 3/16 (+0, —1/16) inch, adjusting vertical link rod if necessary. (See detail B.)

7 With the piston bottomed in the retracted position, and the door in the uplocked position, adjust the piston rod end to align with attaching point; then shorten three full turns and attach.



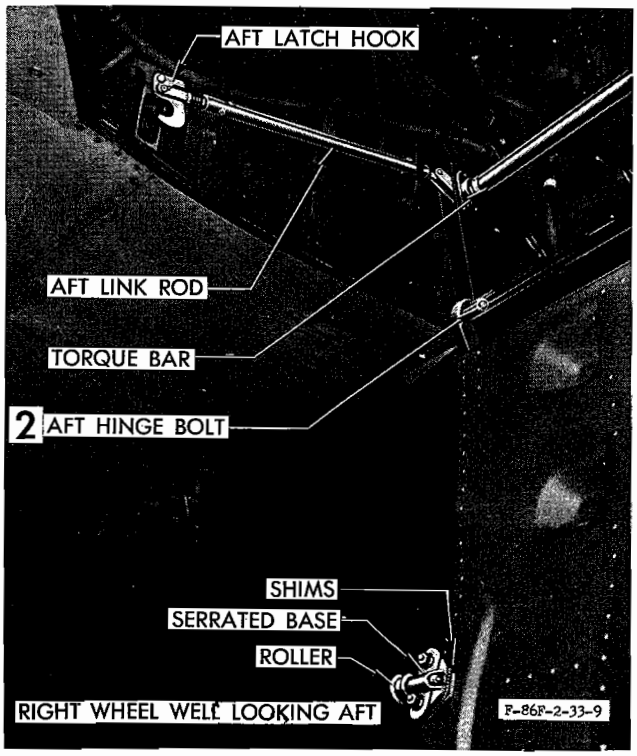


Figure 2-71. Installing and Adjusting Main Landing Gear Wheel Doors

1 Position door on fuselage, and install hinge bolts.

2 Set stops in forward latch linkage so that linkage is positioned as in detail A.

3 With latch hooks closed, install and adjust the forward link rod so that line between pivot point and aft link rod attachment point on the bell crank is vertical.

4 Install and adjust aft link rod so that tip of aft hook is flush with edge of attachment plate as in detail B.

5 Install vertical link rod with 3-9/32 inches between attachment centers.

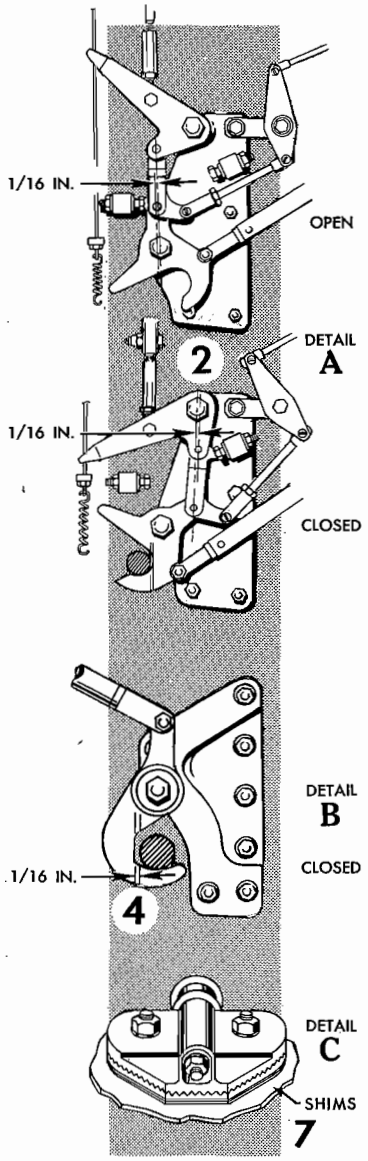
6 Install horizontal link rod with 11-1/16 inches between attachment centers.

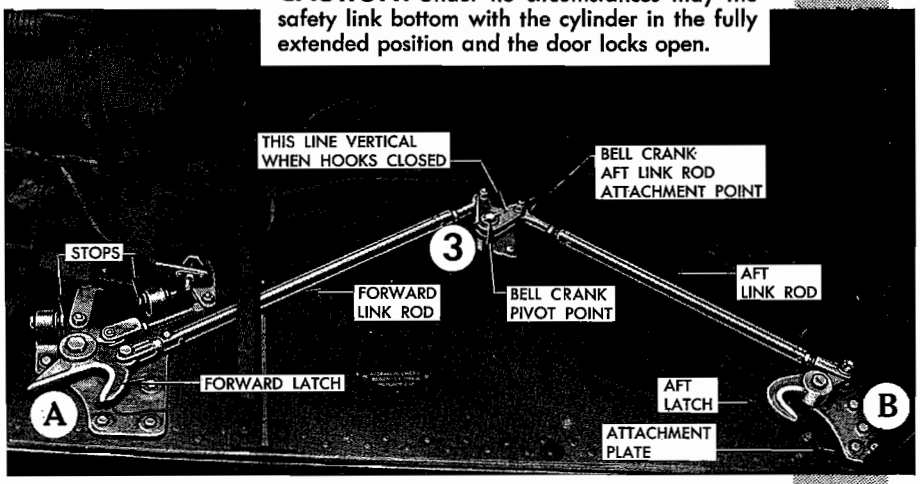
7 Place door in up-locked position, and add or subtract shims under the rollers (detail C) until hooks hold door tightly to fuselage without binding. At the same time adjust rollers longitudinally until they clear face of hooks by 1/16 inch as in detail B.

8 With door up-locked, and actuating cylinder bottomed in retracted position, adjust piston rod to fit; then shorten rod by three turns of fitting and attach.

9 Unlock and open door until the cylinder is fully extended. With the cylinder bottomed, adjust the safety link to fully extended position; then lengthen it by one full turn of the adjusting nut. (If this adjustment cannot be made, the horizontal link may be extended to a length of 11½ inches maximum.)

CAUTION: Under no circumstances may the safety link bottom with the cylinder in the fully extended position and the door locks open.





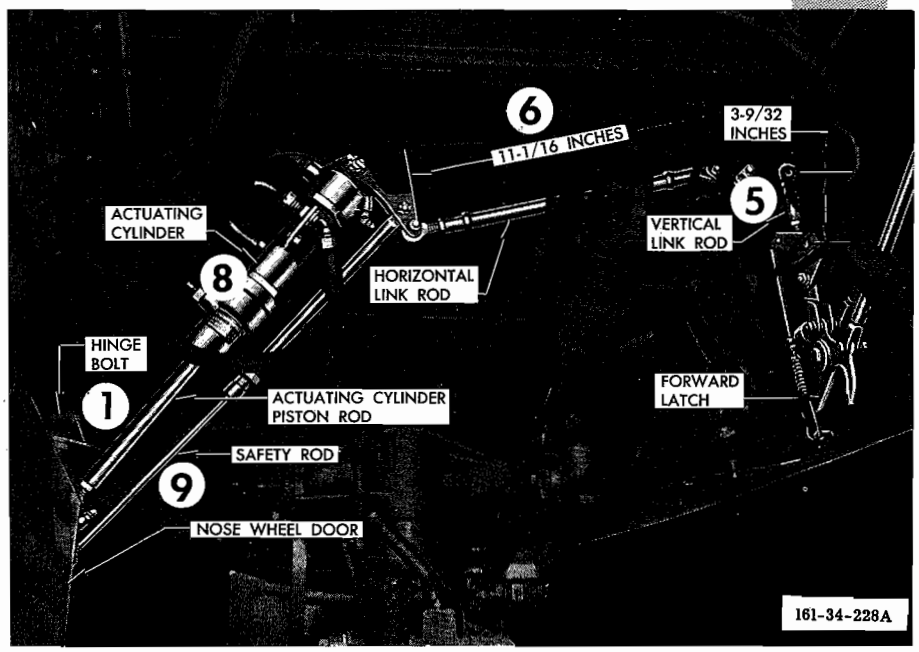


Figure 2-72. Installing and Adjusting Nose Wheel Door

1 Tighten main gear turnbuckle (aft of rear pressure bulkhead on the right side of the airplane) so that cables are at approximately 20 pounds tension. This will automatically tension nose gear system cable to 10 pounds.

2 Check to see that one of the levers has 1/64 to 1/32 inch clearance as shown. It is not necessary to hold this dimension on both levers provided that normal door and emergency operations are not affected by the deviation. If clearance is not correct, slightly alter cable tension.

3, 4 Make sure levers controlling main gear up-latches are barely contacting stops and are not restricting locking of hooks.

5 Set adjustment bolt on each side of arm to obtain 1/16 (±1/32) inch clearance. (If one side touches, other side must have 1/16 inch minimum clearance.)

NOTE: Be sure cable stops are loose before starting adjustment.

6 With cam hook over spacer on arm, position cable stop as shown and tighten to 50-80 inch-pounds torque.

7 With nose wheel door lock linkage against stop and emergency gear down handle in, adjust nut to obtain 1/32 (±1/64) inch clearance.

8 Pull emergency gear down handle out until bell crank hits stop. Place valve arm in open position (in detent). Position cable stop against arm; then tighten and torque cable stop to 50-80 inch-pounds.

9 Check system by retracting landing gear and wheel doors; then pull emergency gear-down handle. The nose and main wheel doors will open, and the main gear will extend. The nose gear will release and extend by emergency pressure. With gear extended and doors closed, pull emergency gear-down handle; doors will unlock and partly open.

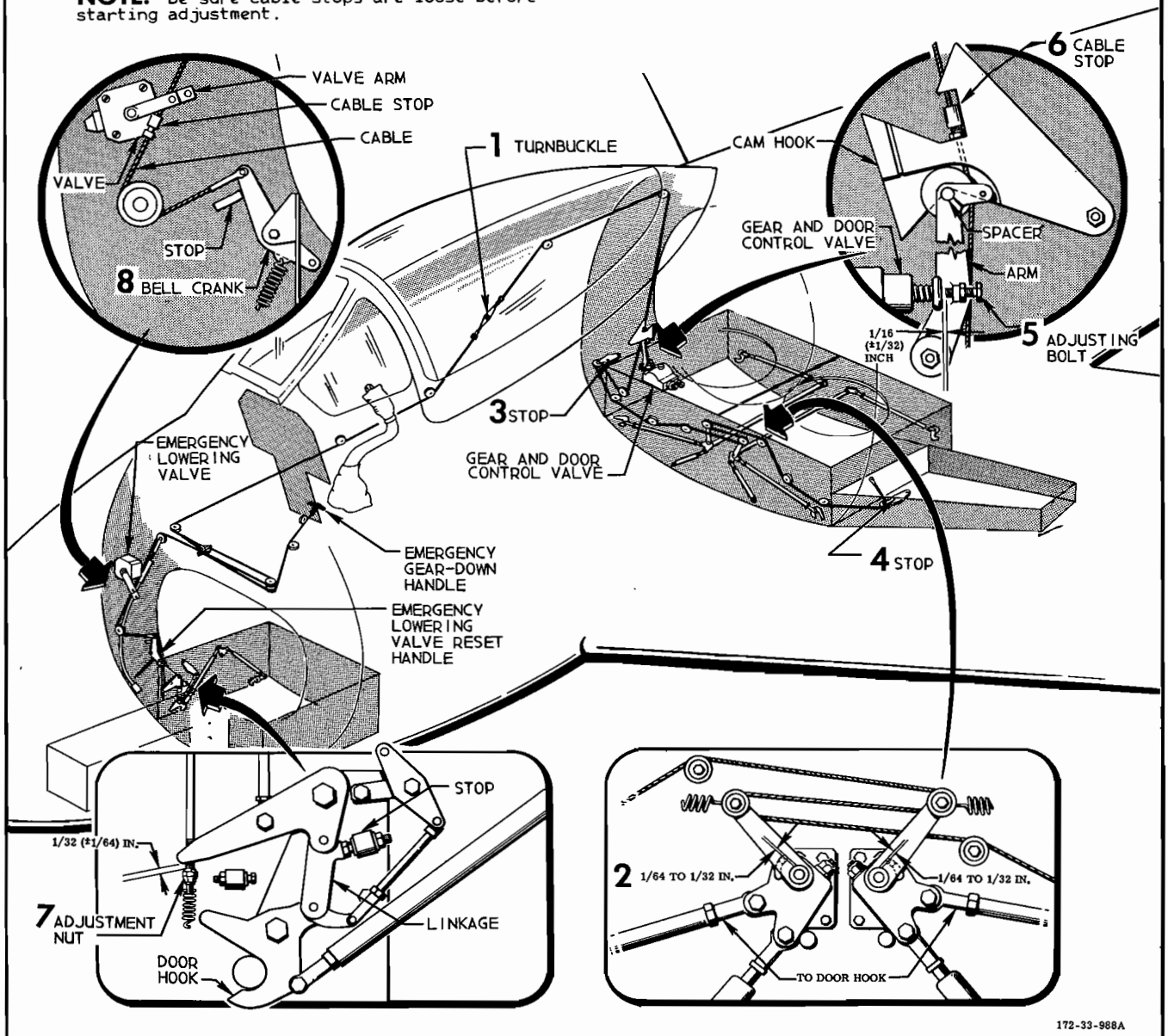


Figure 2-73. Adjusting Landing Gear Emergency Extension System

2-266. INSTALLING AND ADJUSTING NOSE LANDING GEAR WHEEL DOOR. See figure 2-72.

2-267. NOSE LANDING GEAR WHEEL.

2-268. The nose wheel is a 22 x 7.25-11.50-inch cast-magnesium wheel, which carries a 22 x 7.25-11.50-inch, six-ply or eight-ply rating tire with the same size tube. The wheel is cast in two sections to facilitate tire mounting.

2-269. REMOVING NOSE LANDING GEAR WHEEL. To remove the nose wheel, proceed as follows:

a. Remove dust cover.

b. Remove cotter pin from retaining nut.

c. Remove retaining nut and pull wheel.

2-270. INSTALLING NOSE LANDING GEAR WHEEL. To install the nose wheel, proceed as follows:

a. With bearing properly greased and installed in wheel, slide wheel onto axle.

b. Install washer and retaining nut. With wheel spinning, tighten retaining nut until wheel binds. Loosen nut until it clears washer; then tighten slowly until sharp drag is felt on the nut. Continue tightening until next safety hole is aligned; then install cotter pin. Spin wheel for drag.

c. Install dust cover.

2-271. LANDING GEAR AND WHEEL DOOR HYDRAULIC CONTROL VALVE.

2-272. The landing gear and wheel door control valve consists of two identical solenoid valves bolted together as a single unit with common pressure and return ports. The valve assembly is located on the aft side of the engine compartment fire wall, just above the "dishpan" in the top of the right wheel well. Each valve consists of a housing, sliding piston assembly, springs, and solenoids for piston control. Electrically controlled and hydraulically operated, the valves direct utility pressure to their respective systems when energized by the landing gear electrical sequence system. Utility pressure entering the valve at the pressure port is directed through a drilled passage in the sliding piston to a pressure chamber in the valve housing at each end of the piston. This pressure being equal at either end, together with equal spring tension, positions the piston to a centered, or neutral condition. Selection of a control setting in the cockpit energizes the solenoid, unseating the ball assembly in the chamber. Pressure in the chamber is then allowed to drain past the unseated ball to the return lines. The sliding piston, being in an unbalanced condition, is positioned by the remaining pressure in the opposite chamber. Utility pressure, entering the valve through the pressure port, is then connected with an operating port to the system selected for operation, by an annular groove on the outside diameter of the piston. The valve will remain in the operating position until de-energized.

2-273. MAIN LANDING GEAR DOWNLOCK ACTUATING CYLINDERS.

2-274. Main gear downlock actuating cylinders are of the double-acting type. Each cylinder consists of a cylinder, a body, a piston assembly, a plunger, a poppet, "O" rings, backup rings, a retainer, and a wiper ring. The actuating cylinder is positioned to the locked or unlocked condition by utility system pressure from the landing gear control valve. In the gear-up cycle, the piston assembly is actuated to the unlocked (retracted) condition to mechanically position the plunger and poppet. This allows pressure to retract the gear after the downlocks have been released.

2-275. NOSE LANDING GEAR EMERGENCY EXTENSION HYDRAULIC PRESSURE CONTROL VALVE.

2-276. The emergency pressure control valve is located in the gun charger air compressor compartment on the lower right side of the nose section. The valve is a two-position rotary type using shear seals. The purpose of the valve is to admit emergency gear extension accumulator pressure to the down side of the nose gear actuating cylinders when the landing gear emergency extension handle is pulled. The valve also vents the emergency pressure line to return when in the normal position. The emergency pressure line is located between the shuttle and control valves. (See figure 2-62.) Repositioning the control valve back to normal position after emergency operation must be accomplished when the airplane is on the ground.

2-277. REMOVING CONTROL VALVE. To remove the emergency control valve, proceed as follows:

a. Remove gun charger air compressor.

b. Remove retaining pins which hold cables in valve arm.

c. Disconnect hydraulic lines from valve.

d. Remove attaching bolts that hold valve mounting bracket; then remove valve and bracket.

2-278. INSTALLING CONTROL VALVE. To install the emergency control valve, proceed as follows:

a. With bracket and arm attached to valve, place valve bracket into position and install attaching bolts.

b. Connect hydraulic lines to valve.

c. Insert cables into proper slots in valve arm; then install and safety retaining pins.

d. Install gun charger air compressor.

2-279. NOSE WHEEL STEERING SYSTEM.

2-280. The nose wheel steering system consists of a steer-damp unit, a solenoid-operated shutoff valve, a filter unit, a pressure-reducing valve, a steering button, and a nose wheel steering safety switch. (See figures 2-74 and 2-75.) The nose wheel steering system is used for directional control of the airplane on the ground

when the weight of the airplane has compressed the nose wheel strut. When the steering system is not energized, as during landings or take-offs, the steering system is converted to act as a shimmy damping device. Pressure to operate the steer-damp control unit is derived from the utility hydraulic system. A solenoid-operated shutoff valve, a pressure-reducing valve, and a filter are in the pressure line to the steer-damp unit, and a switch control and safety switch are in the pressure control circuit. The steer-damp unit is operated directionally through cables and linkage from the rudder pedals.

2-281. FUNCTION OF NOSE WHEEL STEERING SYSTEM.

2-282. Depressing the steering button on the pilot's control stick when the safety switch on the nose gear shock strut is closed activates the solenoid of the shutoff valve and directs utility system hydraulic pressure into the nose wheel steering system. Utility pressure of 3000 psi is reduced to between 800 and 1100 psi by the pressure-reducing valve, and the hydraulic fluid is transmitted through a special filtering unit to the steer-damp unit. When the system is pressurized, movement of the rudder pedals is transmitted from the cable sector through cable linkage to the steer-damp unit. Here the internal clutch in the steer-damp unit is engaged and fluid under the reduced pressure is ported to the selected side of the power cylinder chamber. This pressurization moves the power cylinder piston which is connected through linkage to the torque links. As the torque links control the steering angle of the nose wheel, subsequent movement of the power piston effectively steers the airplane. Releasing the steering button on the pilot's control stick de-energizes the solenoid in the shutoff valve. This closes the valve, preventing further pressure from the utility system from entering the nose wheel steering system, and opening the steering system input line to return. With the steering system inoperative, static fluid in the steer-damp unit is displaced from one side of the power cylinder to the other through the restrictor valves, producing a shimmy damper effect upon the nose wheel.

Note

When the weight of the airplane is not on the nose wheel and the shock strut is fully extended, the safety switch is open, preventing electrical current from energizing the solenoid of the shutoff valve and rendering the selective steering mechanism inoperative.

2-283. TROUBLE SHOOTING NOSE WHEEL STEERING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Steering system is not engaged when steering button on pilot's control stick is depressed.	Safety switch on shock strut not closed.	Adjust safety switch.
	Shutoff valve solenoid inoperative.	Replace shutoff valve.
	Circuit breaker on main panel open.	
	Electrical system otherwise inoperative.	
	Faulty shutoff valve.	
	Faulty pressure-reducing valve.	
	Faulty or clogged filter.	
	Clutch not engaging.	Replace steer-damp unit.
Once engaged, the steering mechanism tends to steer the airplane to one side (with the rudder pedals in neutral position).	Drive shaft has been preloaded and improperly attached to spline of damper.	Disconnect drive shaft from damper spline and realign.
	Power piston binding.	Check clearance between lower attach lugs.
Once engaged and moved in either direction, the steering mechanism tends to continue operation in the same direction beyond the point corresponding to rudder position.	Sticking or binding of spool in sleeve, or dirt in valve of damper unit.	Replace steer-damp unit.
	Follow-up mechanism is binding.	Replace steer-damp unit.

TROUBLE	PROBABLE CAUSE	REMEDY
Steering system operates in one direction only, then locks.	Dirt in restrictor valve orifice.	Replace steer-damp unit.
Distinct lag between original energizing of shutoff valve solenoid and operation of steering mechanism.	Primer pressure in damper has been lost because of valve leak.	Replace steer-damp unit.
Nose wheel cannot be turned far enough in one direction.	Drive shaft and damper input shaft not correctly aligned. Steering system improperly adjusted.	Realign drive shaft and input shaft in direction required one spline at a time, until condition is corrected. Readjust steering system.
Damper clutch will not engage, or engagement is not consistent.	Malfunctioning pressure-reducing valve.	Replace pressure-reducing valve.
Damper locked and will not turn.	Return line plugged. Power piston seized in steer-damp unit. Internal damage in steer-damp unit.	Remove block in return line. Check for specified clearance between lower attach lugs. Replace steer-damp unit.

TROUBLE	PROBABLE CAUSE	REMEDY
Nose wheel cannot be turned far enough in one direction.	Output shaft follow-up lever mislocated on spline of damper unit.	Replace steer-damp unit.
Play in steering system.	Bungee unit is loose.	Take up slack in bungee unit.
Clutch does not release (in damper unit).	Dirt in clutch or severe distortion of balls.	Replace steer-damp unit.

2-284. CHECKING NOSE WHEEL STEERING SYSTEM.

2-285. To check the operation of the nose wheel steering system, install tow wedge and 3/8-inch rigging pin. Set nose wheel protractor (figure 2-76) to zero; then remove rigging pin. (Disconnect safety switch if airplane is on jacks, and rotate switch arm into actuated position.) With external sources of hydraulic and electrical power connected, one man in cockpit to operate controls, and another on ground to observe results, proceed in the following manner:

a. Depress nose wheel steering switch to energize solenoid of the shutoff valve. This allows hydraulic pressure to flow into the steer-damp unit. Check operation of clutch in steer-damp unit. Clutch should engage and disengage promptly when steering button is pressed and released.

b. With steering button on control stick depressed, move rudder surface slowly to either side and observe the results. When the rudder surface is in full throw position, the torque links should turn in the same direction a maximum of 29 (+0, −10) degrees. Make sure that torque links will steer satisfactorily in both directions. Return rudder surface to neutral.

c. Apply either right or left rudder and check operation of follow-up system in steer-damp unit. When torque links reach a position corresponding to that of the rudder pedals, the follow-up mechanism within the steer-damp unit should return the control valve to neutral, cut off the hydraulic pressure supply to the power output arm, and stop the torque links. Return controls to neutral.

d. Check synchronization between torque links and rudder, by applying right rudder very slowly and stopping when torque links begin to move. Measure amount of rudder deflection. Return controls to neutral and repeat check on left rudder, again measuring amount of rudder deflection. The right and left deflection of the rudder must coincide within one inch.

e. Return controls to neutral, and disconnect external sources of hydraulic and electrical power.

CAUTION

- Do not attempt to adjust stroke or centering of valve itself. Such adjustment can only be made on a hydraulic test bench, with proper testing and measuring equipment and then by qualified overhaul personnel only.
- Do not attempt to repair a "frozen" unit by cleaning dirt, paint, etc, from the valve, internal mechanism, or internal restricting orifices. Presence of dirt in such locations shows a probability that there is other internal dirt. In such cases, replace unit and carefully inspect airplane filters.
- The unit must be completely masked if any painting, steam cleaning, or similar spraying operation is to be done in its vicinity. Malfunction can be caused by heat or penetration of paint, steam, or other sprays into the valve or internal mechanism.

f. Remove tow wedge and protractor.

2-286. INSTALLING AND ADJUSTING NOSE WHEEL STEERING SYSTEM.

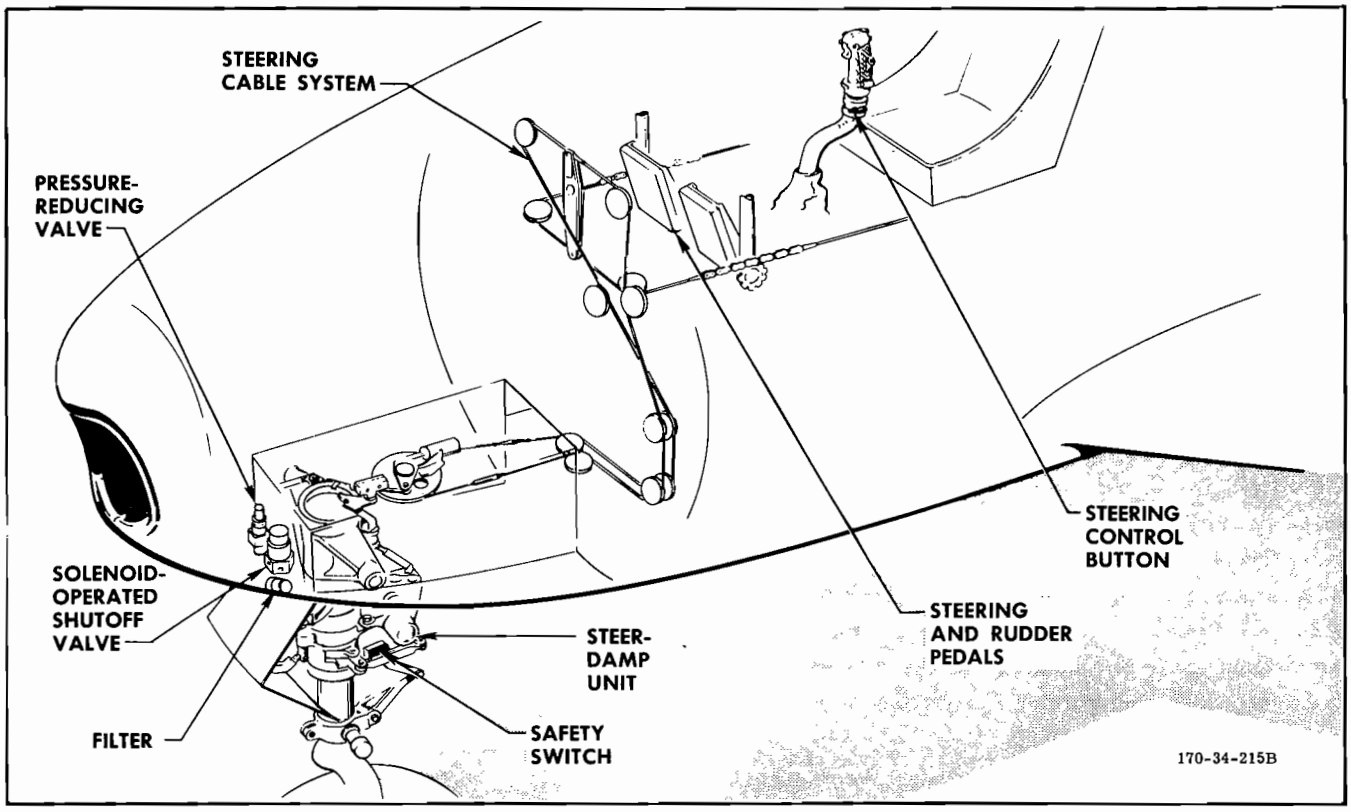
2-287. See figure 2-76.

2-288. ADJUSTING NOSE WHEEL STEERING SYSTEM SAFETY SWITCH.

2-289. See figure 2-77.

2-290. NOSE WHEEL STEERING SYSTEM STEER-DAMP UNIT.

2-291. The steer-damp unit, mounted on the nose gear shock strut, incorporates the following internal components: a steering control valve, a clutch, a follow-up mechanism, a piston, two flow restrictor valves, two anticavitation valves, and a spring-loaded compensator valve. Under steering pressure of 800 to 1100 psi, the steer-damp clutch is engaged. By cable linkage from the rudder cable sector, the steer-damp clutch positions the steering control valve during the first stage of the follow-up operation. The hydraulic pressure is directed to the desired side of the power piston by the steering control valve. This pressure actuates the power output



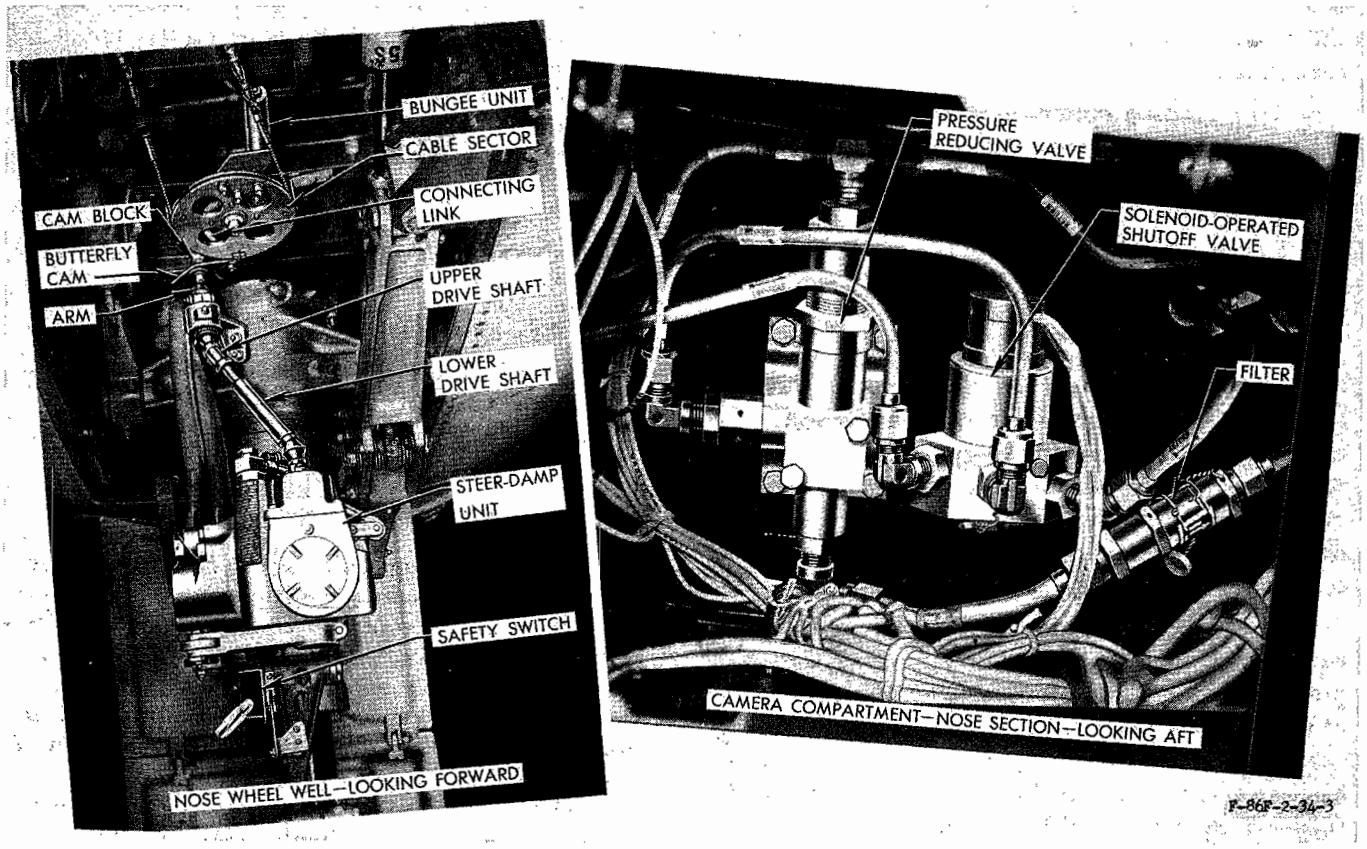


Figure 2-74. Nose Wheel Steering System

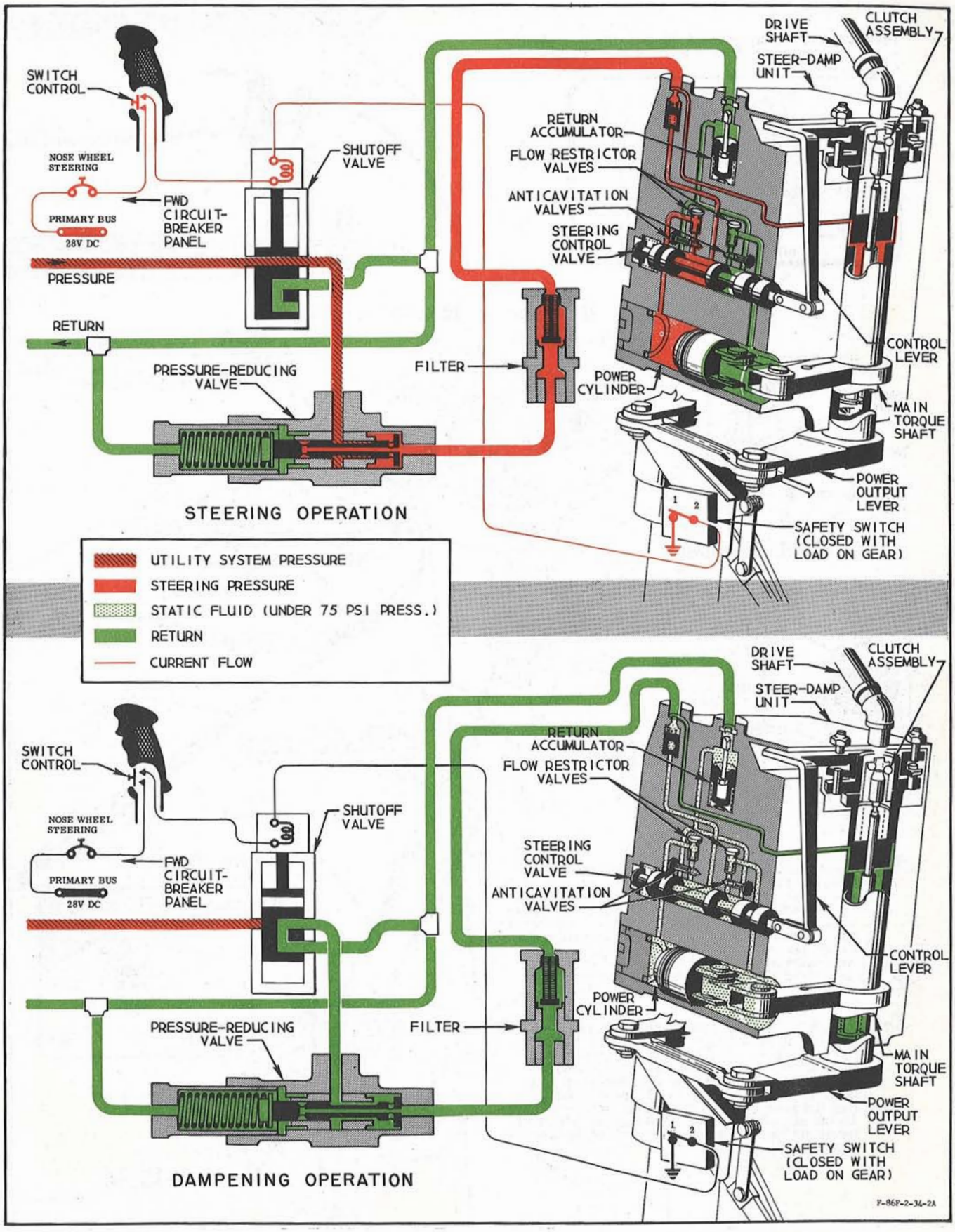


Figure 2-75. Nose Wheel Steering System Schematic

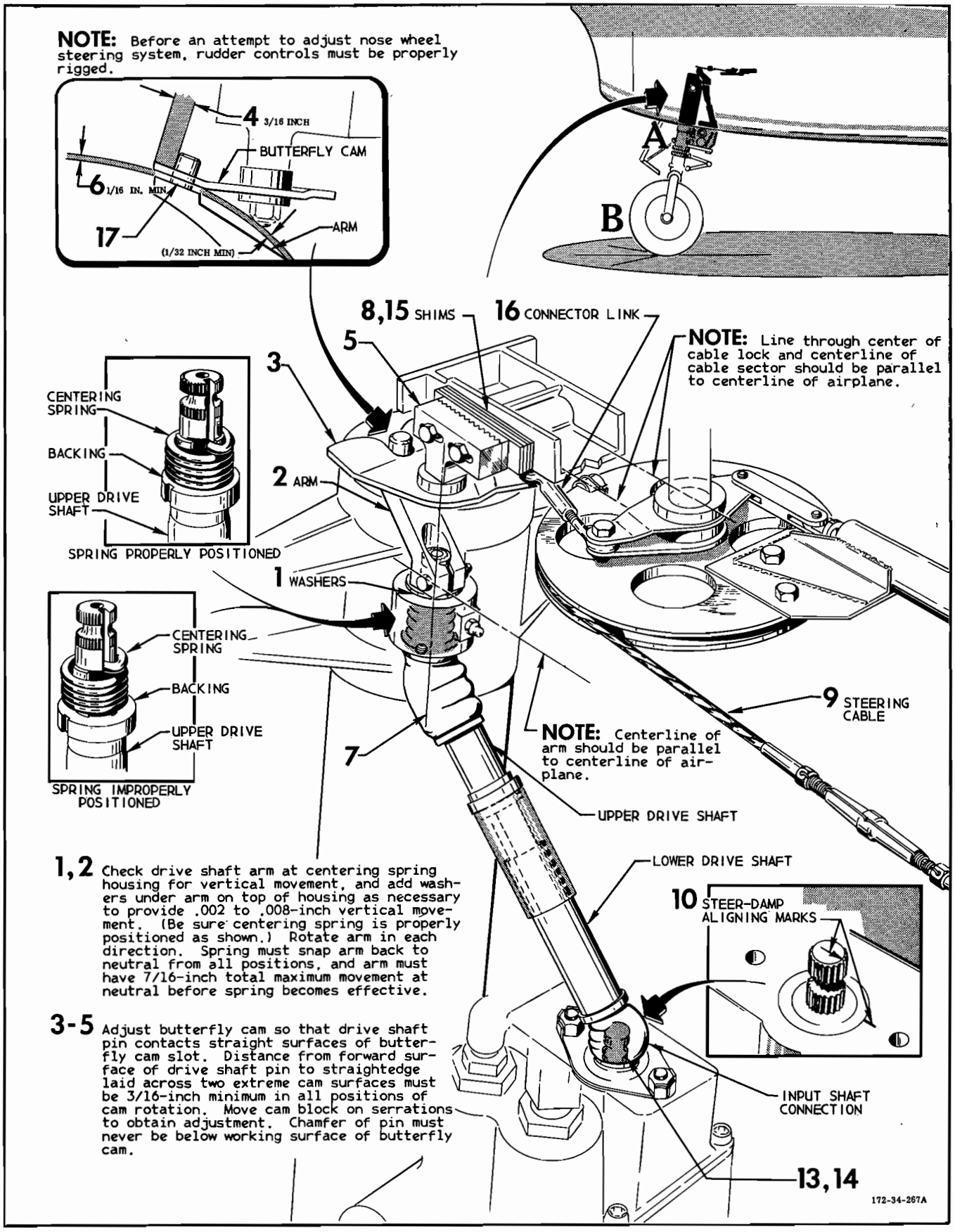


Figure 2-76. Installing and Adjusting Nose Wheel Steering System (Sheet 1 of 2)

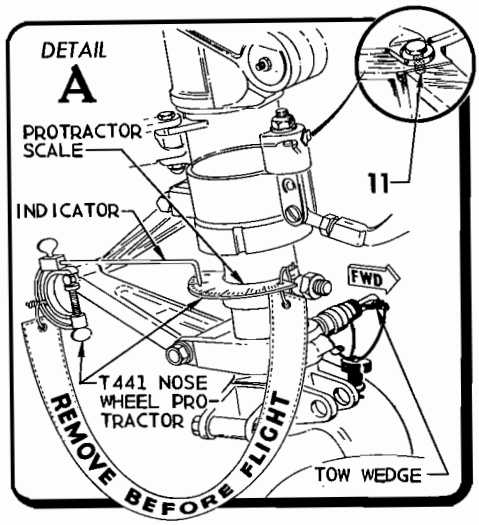
6 While gear is being retracted, check that clearance between butterfly cam and steering arm is 1/16 inch minimum (with butterfly cam in any position). If necessary, add or remove washers to obtain clearance.

7,8 Adjust butterfly cam laterally by adding or removing shims until centerline of pivot bolt lines up with centerline of drive shaft. If shims are removed, add equal thickness of washers under boltheads.

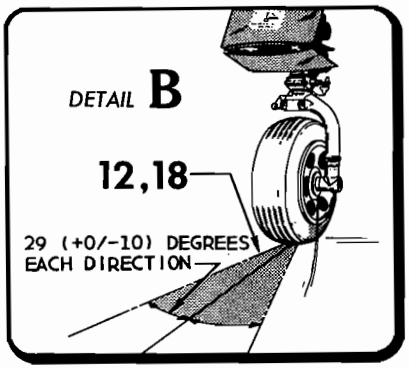
9 Partially retract nose gear to disengage butterfly cam; then, with rudder pedals locked in neutral and with steering sector positioned so that a line through center of cable lock and center of cable sector is parallel to centerline of airplane, adjust steering cable to 50 (±5) pounds tension. Safety cable lock to pulley.

10 Align steer-damp indexing marks on top of shimmy damper.

11 Install 3/8-inch bolt in the nose wheel centering holes; then set protractor to zero. Remove rig pin bolt. If airplane is on jacks, disconnect safety switch and rotate switch arm to actuated position.



12-14 With tow wedge in place, depress button on control stick; then operate rudder to obtain full travel in both directions. Full nose wheel throw must be 29 (+0, −10) degrees; maximum right throw and left throw must be within 5 degrees of each other. If full-throw differential is more than 10 degrees, remove shaft from steering damper spline and rotate shaft one serration (10 degrees) in direction of largest throw. If total free movement of drive shaft measured at pin exceeds 1/8 inch, rotation should be with no preload between pin and butterfly. If free movement is less than 1/8 inch, then 1/16 inch preload is permissible. If preload exists, install shaft with bottom serration where it was;



then remove arm and rotate shaft one serration (10 degrees) in direction of least throw.

15,16 With rudder centered, apply pressure to steering unit and rotate nose wheel by hand until steering unit prevents further movement. Travel on each side of neutral should be equal, within approximately 2 degrees. If travel is not equal, it may be equalized by moving butterfly cam support laterally. To move support, install or remove shims (one shim equals approximately 1 degree 35 minutes) or adjust connector link (one turn on link equals approximately 1 degree 13 minutes). Lengthening increases throw to left.

17 Retract nose gear while applying full rudder; then apply opposite rudder 15 degrees beyond center and manually lower gear. Pin of drive shaft arm should engage slot of butterfly cam. Repeat this procedure in opposite direction.

18 Move trailing edge of rudder 3 inches (9 degrees 5 minutes) either side of center and record travel of nose wheel. Nose wheel movement should be at least one degree each way, and two readings must be within 2 degrees of each other. Check maximum throw, which must be 29 (+0/-10) degrees; maximum right throw and left throw must be within 5 degrees of each other.

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Figure 2-76. Installing and Adjusting Nose Wheel Steering System (Sheet 2 of 2)

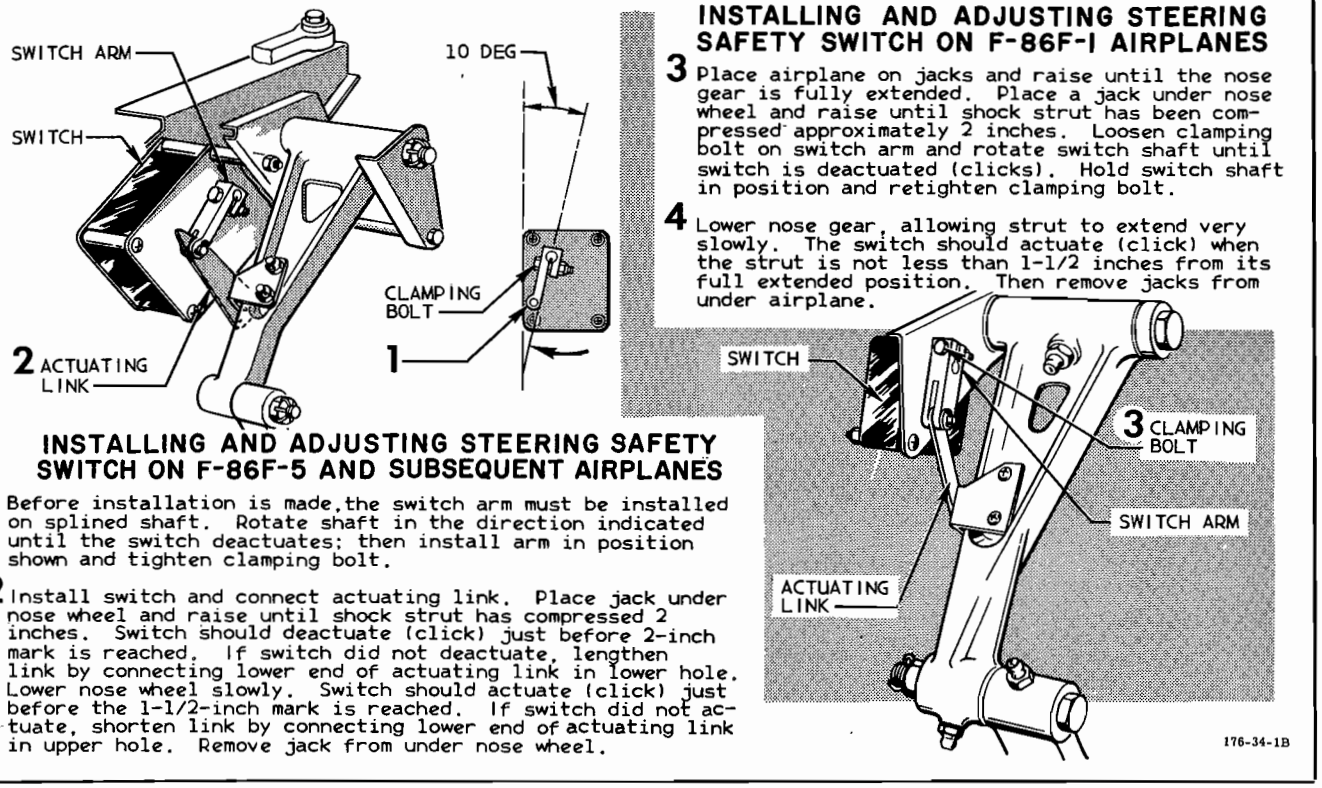


Figure 2-77. Adjusting Nose Wheel Steering System Safety Switch

lever arm, which is connected to the follow-up mechanism. This action of the lever arm accomplishes the second stage of the follow-up operation by repositioning the steering control valve to neutral. Minimum inlet pressure required to engage the clutch is 600 psi. At lower pressures, the selective steering mechanism is inoperative, and the steer-damp unit acts as an effective shimmy damper by means of two flow restrictor valves operating in the return flow lines on both sides of the power piston. Fluid is retained in the damper unit, at a pressure of 75 psi, by a spring-loaded compensator valve. The valve ensures adequate priming of the damper unit at all times, compensating for thermal expansion of the hydraulic fluid and preventing air-oil separation at high altitudes and low temperatures.

2-292. REMOVING STEER-DAMP UNIT. To remove steer-damp unit, proceed as follows:

a. Disconnect upper and lower drive shafts.

b. Disconnect and plug lines.

c. Disconnect power output arm.

d. Loosen bolts.

e. Remove assembly.

CAUTION

The steer-damp unit is filled with hydraulic fluid under 75 psi pressure at all times. Do not depress either of the two check valves which are part of the steer-damp unit.

2-293. INSTALLING STEER-DAMP UNIT. See figure 2-77A.

2-293A. CHECKING STEER-DAMP UNIT. If steering system is not operating properly, the following trouble shooting procedure should be followed:

a. Check rigging of steering system for conformity to figure 2-76.

b. Connect hydraulic and electrical power to airplane.

c. Install tow wedge to permit swivel of torque links.

d. Operate steer-damp unit through approximately 20 cycles to remove all air from steer-damp unit. (Refer to paragraph 2-285.)

e. Remove drive shaft from splined input shaft at damper after parts have been indexed.

f. Use lower half of drive shaft to rotate splined input shaft with damper energized. Input shaft torque should not exceed 30 inch-pounds maximum. Check rotation of shaft in both directions.

g. Check to see that output arm does not continue to rotate (motor) after rotational torque on input shaft is stopped.

h. While applying an upward load to follow-up mechanism, sharply rotate input shaft to right. Release

input shaft and slowly release up-load on follow-up mechanism. Output arm movement should stop immediately with release of load on follow-up arm. Repeat step with input shaft rotated to left direction.

i. Repeat step h. with load on follow-up mechanism in downward direction.

j. Rotate input shaft from one extreme position to the other. Unit should rotate from extreme right to left positions, or vice versa, in 3 to 5 seconds with load.

k. Check to see that no more than 4 degrees of input shaft rotation is required to change direction of output arm movement (3/8 inch on 5-inch arm).

l. Check to see that output shaft does not stop operating before landing gear strut hits external rotational stops. When this check is made using rudder pedals to operate input shaft, the landing gear strut will not hit the external rotational stops because of lost motion in the steering system to the input shaft.

m. Check movement of input shaft for response. If more than 2 degrees (3/16 inch on a 5-inch arm) of input shaft rotation is required before the output shaft moves, the steer-damp unit is defective.

2-294. NOSE WHEEL STEERING SYSTEM FILTER.

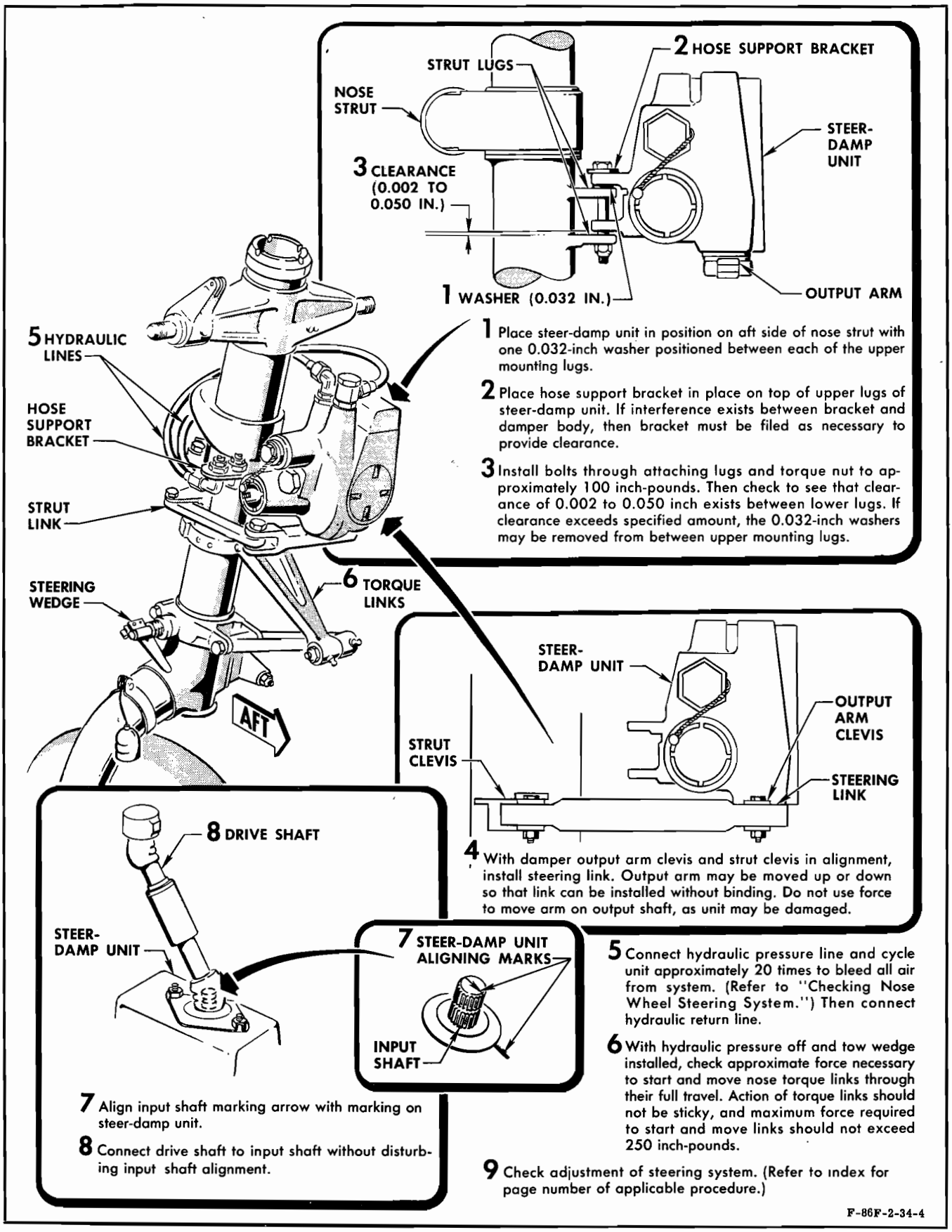
2-295. The nose wheel steering system filter is provided to protect the steer-damp unit from particles of dirt and foreign matter. It is installed in the pressure line between the pressure-reducing valve and the steer-damp unit, and is located in the nose section, just below the air intake duct. When the filter element becomes dirty, it must be cleaned or replaced. (Refer to paragraphs 2-296 through 2-297A.)

2-296. REMOVING FILTER ELEMENT. To remove filter element (figure 2-74), gain access to filter through gun camera compartment door (at lower edge of intake duct) and proceed as follows:

a. Depressurize hydraulic system.

b. Prepare to catch residual fluid in container.

c. Loosen fittings, disconnect lines, and remove filter from airplane.



1 Place steer-damp unit in position on aft side of nose strut with one 0.032-inch washer positioned between each of the upper mounting lugs.

2 Place hose support bracket in place on top of upper lugs of steer-damp unit. If interference exists between bracket and damper body, then bracket must be filed as necessary to provide clearance.

3 Install bolts through attaching lugs and torque nut to approximately 100 inch-pounds. Then check to see that clearance of 0.002 to 0.050 inch exists between lower lugs. If clearance exceeds specified amount, the 0.032-inch washers may be removed from between upper mounting lugs.

4 With damper output arm clevis and strut clevis in alignment, install steering link. Output arm may be moved up or down so that link can be installed without binding. Do not use force to move arm on output shaft, as unit may be damaged.

5 Connect hydraulic pressure line and cycle unit approximately 20 times to bleed all air from system. (Refer to "Checking Nose Wheel Steering System.") Then connect hydraulic return line.

6 With hydraulic pressure off and tow wedge installed, check approximate force necessary to start and move nose torque links through their full travel. Action of torque links should not be sticky, and maximum force required to start and move links should not exceed 250 inch-pounds.

7 Align input shaft marking arrow with marking on steer-damp unit.

8 Connect drive shaft to input shaft without disturbing input shaft alignment.

9 Check adjustment of steering system. (Refer to index for page number of applicable procedure.)

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Figure 2-77A. Installing Steer-Damp Unit

d. Break safety wire and unscrew filter head from case.

e. Remove filter element from case by gently rocking back and forth while exerting a pulling tension. Do not try to remove element by twisting.

2-297. CLEANING FILTER ELEMENT. Refer to paragraph 3-33B.

2-297A. ASSEMBLING FILTER UNIT. If filter element is found to be unsuitable for further use, discard element and install replacement element (Purolator 36837). For reassembly, proceed as follows:

a. Use new "O" ring in case-head seal junction.

b. Position element in case and screw case into filter head.

c. Insert safety wire through holes provided and secure wire.

d. Install filter in airplane (note direction of flow arrows on hydraulic line and on filter case) and tighten fittings.

e. Pressurize system and check for leaks.

2-298. NOSE WHEEL STEERING SYSTEM SOLENOID-OPERATED SHUTOFF VALVE.

2-299. The two-position solenoid-operated shutoff valve is located in the nose section, below the air intake duct. The valve, spring-loaded in the closed or off position, prevents utility hydraulic pressure from entering the nose wheel steering system. Depressing the steering button on the pilot's control stick activates the solenoid when the safety switch on the landing strut is in closed position. This action opens the valve and makes pressure from the utility system available for selective steering operation. In the de-energized condition, the shutoff valve completely shuts utility pressure off from the nose wheel steering system and opens the steering system input line to return.

2-300. REMOVING SOLENOID-OPERATED SHUTOFF VALVE. To remove solenoid-operated shutoff valve (figure 2-74), proceed as follows:

a. Remove access plate in bottom of air intake duct nose section.

b. Disconnect solenoid lead wires.

c. Disconnect and plug hydraulic lines at valve. Loosen bolts. Remove valve assembly.

2-301. INSTALLING SOLENOID-OPERATED SHUTOFF VALVE. To install solenoid-operated shutoff valve (figure 2-74), proceed as follows:

a. Bolt shutoff valve to bulkhead.

b. Connect solenoid lead wires.

c. Unplug and connect hydaulic lines at valve.

d. Install access plate in bottom of air intake duct nose section.

2-302. NOSE WHEEL STEERING SYSTEM PRESSURE-REDUCING VALVE.

2-303. The pressure-reducing valve reduces the 3000 psi pressure of the utility pressure system to 1100 (±50) psi, at which pressure the steer-damp unit was designed to operate. The valve is located in the nose section, just below the jet air intake duct. If pressure builds up to more than 1300 psi maximum, the valve opens to relieve the excess fluid.

2-304. REMOVING PRESSURE-REDUCING VALVE. To remove pressure-reducing valve (figure 2-74), proceed as follows:

a. Remove access plate in bottom of air intake duct nose section.

b. Disconnect and plug hydraulic lines at valve.

c. Loosen bolts and remove valve.

2-305. INSTALLING PRESSURE-REDUCING VALVE. To install pressure-reducing valve (figure 2-74), proceed as follows:

a. Bolt pressure-reducing valve to bulkhead.

b. Unplug and connect hydraulic lines at valve.

c. Install access plate in bottom of air intake duct nose section.

2-306. WHEEL BRAKE SYSTEM.

2-307. The wheel brake system (figure 2-78) consists of the boost-type master brake cylinders, a parking brake valve, brake units, and disconnect couplings. The rotor-disk brakes are mounted on each main axle. The brakes are actuated by application of pressure to the top of the brake pedals. The master brake cylinders (paragraph 2-325) are supplied with fluid from the utility system reservoir, and brake boost pressure is supplied from the utility power system.

2-308. FUNCTION OF WHEEL BRAKE SYSTEM.

2-309. When brake pedal load is applied, the master cylinder piston directs pressure to the brake unit at the wheel. This load, through linkage between the pedal and the cylinder, also exerts an upward pull on a lever assembly. The lever, being offset, tends to straighten itself with the upward pull. When the brake pedal load reaches approximately 20 pounds, a spring on the lever depresses the boost valve shaft. This mechanical action meters the boost pressure from the main hydraulic system to assist the pilot in the actuation of the master brake piston. The greater the load applied at the brake pedal, the more pull there is to straighten the lever; therefore, the spring exerts more force on the end of the boost valve shaft and increases the amount of boost pressure. (See figure 2-79.)

2-310. TROUBLE SHOOTING WHEEL BRAKE SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Uneven brake action with equal pedal pressure.	Oil on linings. Brakes not adjusted evenly. Linings worn excessively. Scored, pitted, or galled rotors. Brake control valve out of adjustment.	Wash or replace linings. Equalize adjustment of return springs. Replace linings. Replace rotors. Adjust brake control valve.
Grabbing of brakes.	Stator plates warped. Rotors warped, scored or galled. Grease- or oil-soaked linings.	Replace stator assembly. Replace rotors. Drag brakes to burn off grease or oil; wash or replace linings.
Insufficient braking.	Hydraulic pressure too low. Boost control valve sticking in master cylinder. Arm of master cylinder binding. Friction in rudder pedal rigging. Insufficient pedal travel. Glazed linings. Sticking automatic brake adjusters. (Running clearance should be between .030 and .060 inch.)	Check hydraulic system, including brake control valve. Repair or replace valve. Correct if possible; if arm is bent, replace. Check for binding and correct to proper clearances. Adjust pedals for full travel. Replace linings. Correct or replace automatic adjusters.
Violent braking or locking of wheels.	Damp linings. Corroded rotors. Loose bolts attaching brake to torque flange. Dust, grit, or sand in brake.	Dry linings by dragging brakes. Taxi slowly with light brake applications, or replace rotors. Tighten bolts. Disassemble and clean.
Screeching brakes.	Cracked carrier or loose bolts. Loose or broken brake blocks.	Replace carrier or tighten bolts. Tighten or replace brake blocks.
Brake drag or overheating.	Insufficient brake clearance. Dished or warped stators. Dished or warped rotors. Brake return springs exert insufficient force. Automatic adjuster slippage. Slight warpage or swelling of new lining. Erratic adjuster action.	Adjust clearance or automatic adjusters. Replace stators. Replace rotors. Replace defective springs. Reset friction load of adjuster clamps near high limit. Wear in lining with light-energy stops. Check pins and blocks for corrosion, presence of excessive cadmium plate, or scoring. Check pins for taper or bend. Replace or adjust unserviceable parts.

TROUBLE	PROBABLE CAUSE	REMEDY
Brake assembly hydraulic leakage.	Damaged piston cup. Dirty hydraulic fluid. Scored cylinder walls.	Replace piston cup. Drain, flush, and refill hydraulic system. Replace assembly.

2-311. CHECKING WHEEL BRAKE SYSTEM.

2-312. With brakes properly bled and a pressure gage in each brake line, make the following brake check:

a. With main hydraulic system pressurized, gradually push on brake pedals; the boost pressure should cut in at approximately 20 pounds pedal load. Increase load to 65-75 pounds; the brake pressure at the wheel should be a minimum of 325 psi.

b. With hydraulic system pressure exhausted (without boost), apply brakes at 100 pounds pedal load. The brake pressure at the wheel should not be less than 130 psi. Brakes should release immediately with or without the boost.

Note

Apply equal loads to both right and left pedal. The brake pressure at one wheel should be within 50 psi of the other.

c. With boost pressure operating, set parking brakes by pressing hard on pedals (approximately 60 pounds minimum); then, while maintaining this pedal pressure, pull parking brake handle slowly out to fully extended position. While holding handle all the way out, release pedals; then release handle. Release parking brake by depressing pedals. Parking brake valve should reseat in the off position without any necessity for pushing the handle. If valve does not reseat, check linkage for binding.

d. Set parking brakes again; then exhaust system boost pressure and check to see that brakes can be released by just pushing parking handle.

e. Again set parking brakes; brakes should hold for a minimum of one hour.

Note

The parking brake compensator is inoperative at brake pressure below 170 psi; therefore, when parking airplane, exert sufficient pedal loads to displace compensator to at least half its normal travel (approximately 300 psi brake pressure). It is unnecessary to check this pressure with a gage. If, on initial check, brakes do not hold, repeat check at a higher pedal load.

2-313. FILLING AND BLEEDING WHEEL BRAKE SYSTEM.

2-314. Refer to paragraph 1-53.

2-315. ADJUSTING WHEEL BRAKE SYSTEM CONTROL LINKAGE.

2-316. See figure 2-81.

2-317. WHEEL BRAKE ASSEMBLIES.

2-318. A segmented rotor-type brake assembly is mounted on each main landing gear wheel axle. Each assembly consists of a carrier, a pressure plate, stator plates, rotor disks, a backing plate, automatic adjusters, a piston, a piston seal, and a compensating shim. Utility power pressure, metered to each brake assembly by its respective master brake cylinder, forces the piston outward from the carrier assembly. The piston then forces the pressure plate in contact with the auxiliary stator plate, which in turn is forced against the rotating rotor disks. The pressure plate is prevented from rotating by the stator torque sleeves. The brake block linings attached to the auxiliary stator plate push against the first rotor disk. The disk in turn moves the next stator plate into contact with the second rotating rotor disk. When stationary brake linings have been forced into contact with rotating rotor segments, the energy created by the moving airplane is converted into heat and dissipated. Multiple brake blocks increase the rate of this heat dissipation and prevent brake seizures if rotor disks warp because of high brake temperatures.

Note

If field conditions are exceptionally dusty or wet, wheel brake dust covers (provided with each airplane) should be installed.

2-319. REMOVING WHEEL BRAKE ASSEMBLIES. To remove the brake assembly, proceed as follows:

a. Raise wheel off ground.

b. Disconnect hydraulic fitting.

c. Remove cotter pin from retaining nut.

d. Unscrew retaining nut and pull brake assembly from axle.

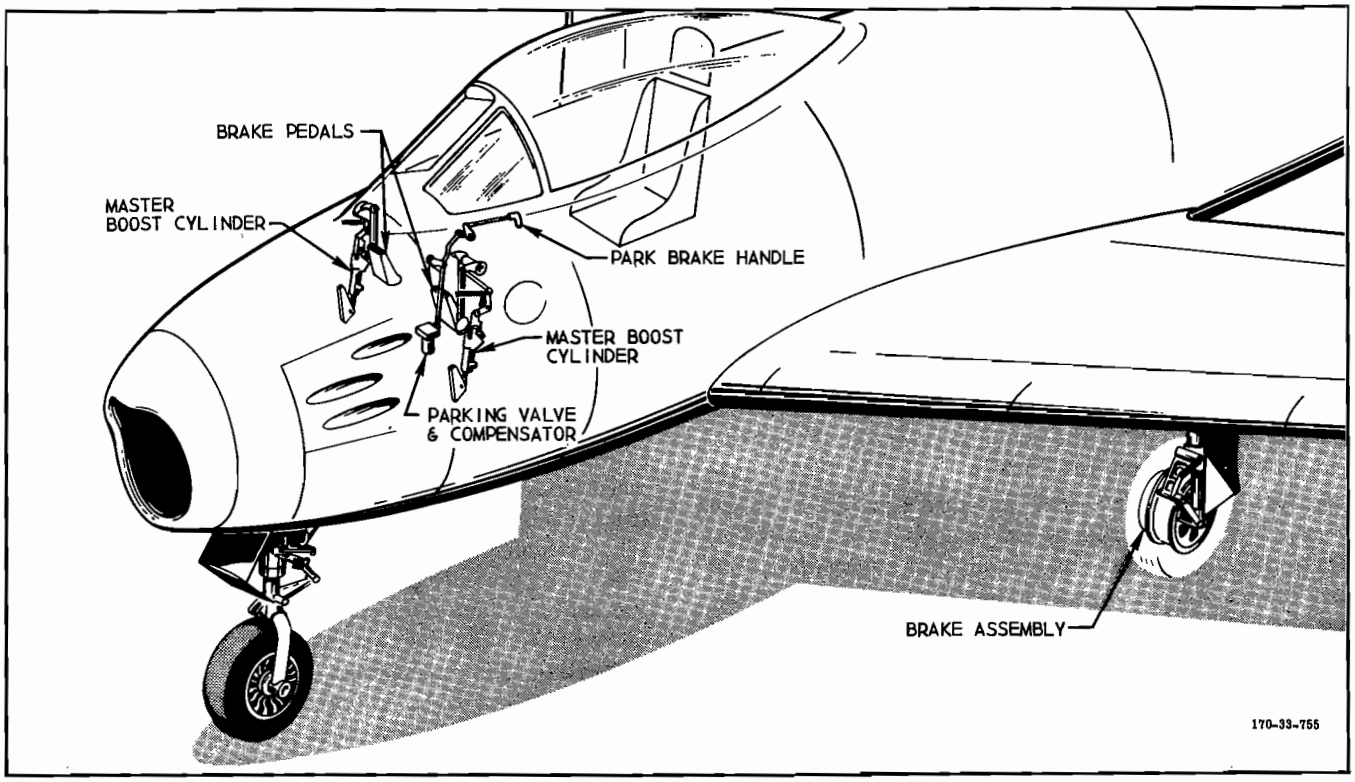
2-320. DISASSEMBLING WHEEL BRAKE ASSEMBLIES. Brake may be removed as a unit from the airplane and disassembled, or it may be disassembled while still mounted to the strut torque flange. Care should be exercised in either event to keep dirt out of the piston grooves in the carrier. The brake assembly should be disassembled as follows:

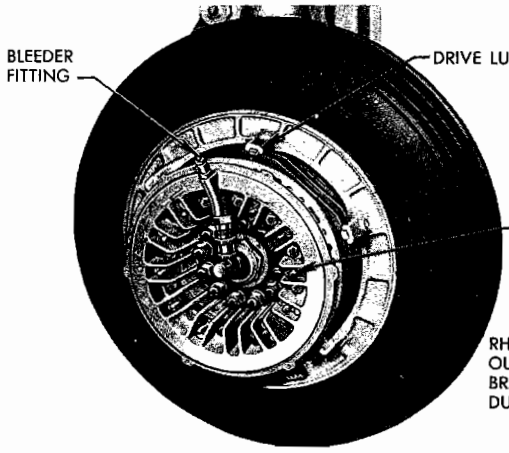
a. Remove torque sleeve bolt and nuts, and lift off washers.

b. Lift off backing plate.

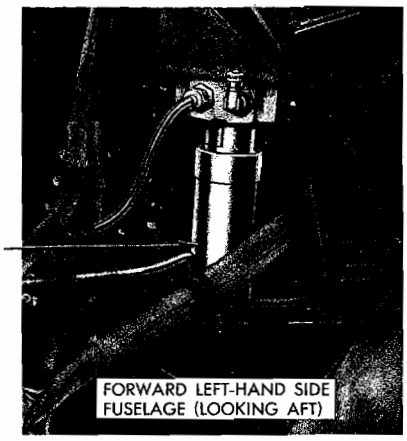
c. Lift off compensating shim.

d. Lift out complete rotor disk, consisting of rotor segments and links. Keep complete rotor disk as a unit. Do not intermix segments among different rotor disks.





RH WHEEL (LOOKING OUTBOARD, SHOWING BRAKE UNIT WITH DUST COVER REMOVED)



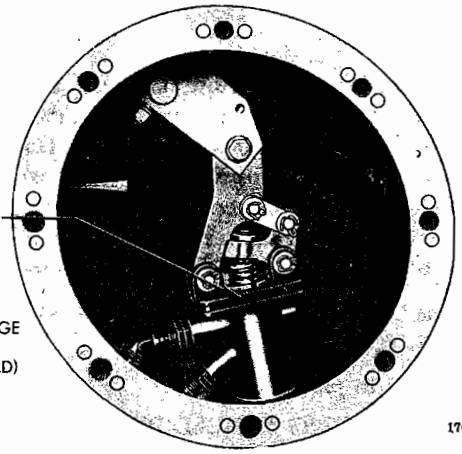


Figure 2-78. Wheel Brake System

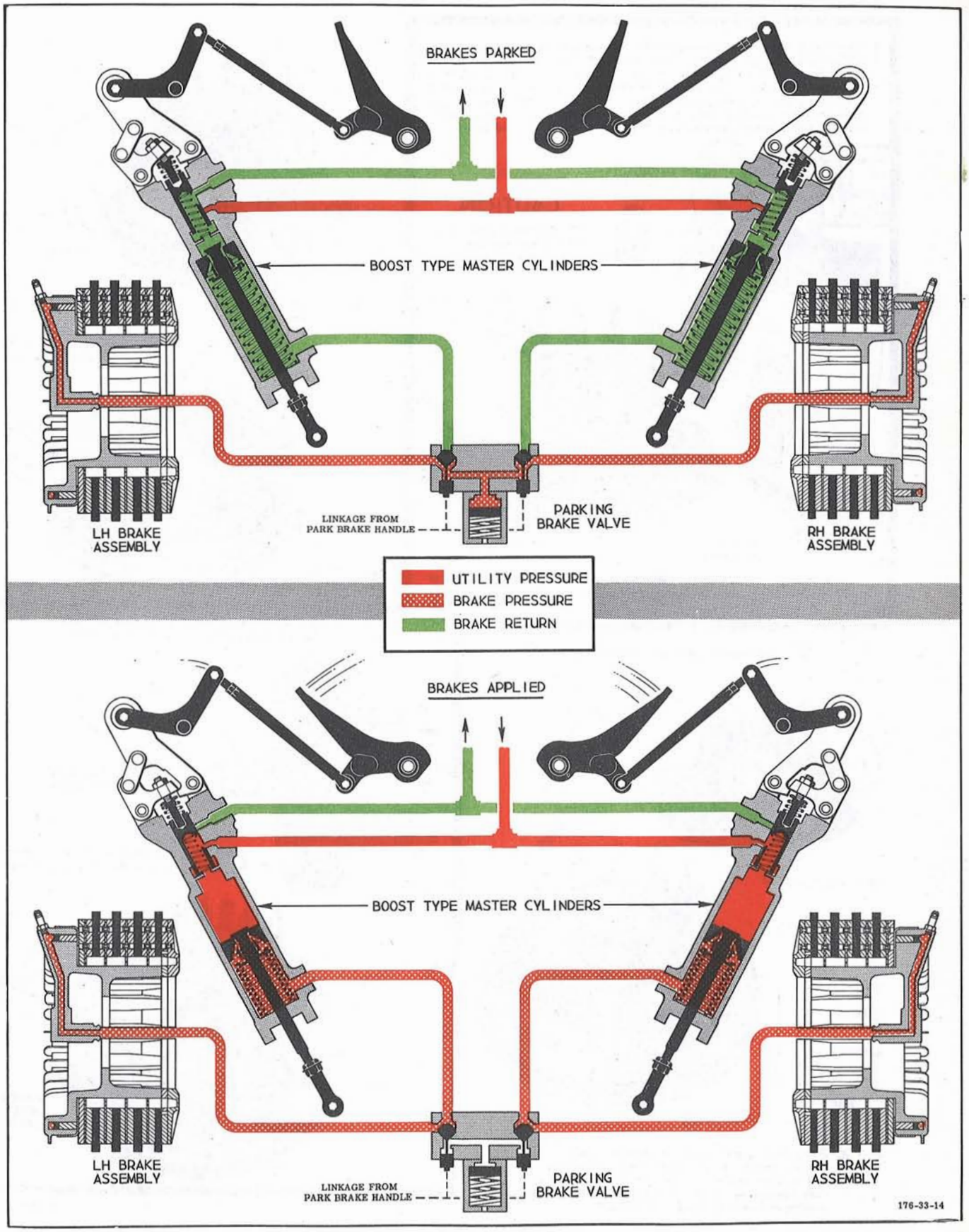
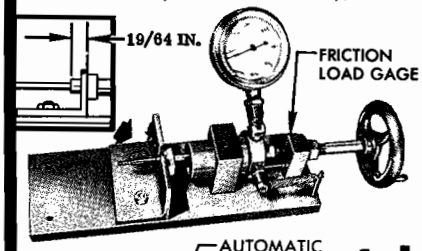


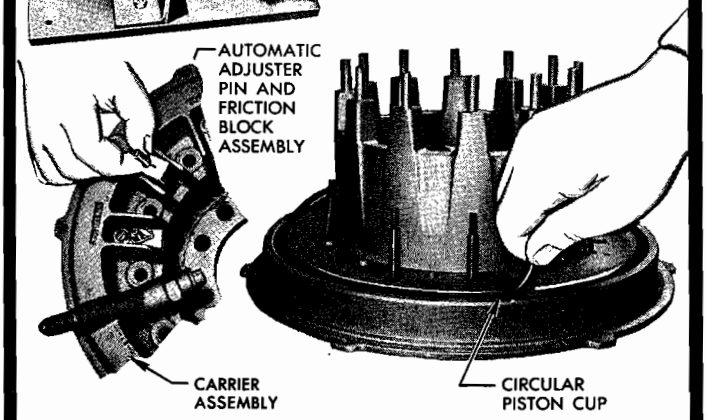
Figure 2-79. Wheel Brake System Operation

1 Check each adjuster pin assembly in the friction load gage (Bendix Part No. AXE8798) to see that the friction load required to move adjuster pin through friction block is 65 to 85 pounds. Also use gage to set the friction block face a distance of 19/64 inch from shoulder on the adjuster pin. When placed in position in the carrier assembly, shoulder on pin will be flush with inside of carrier assembly. After checking and positioning of friction blocks, install each friction block assembly into carrier assembly; then secure with screw, and safety.

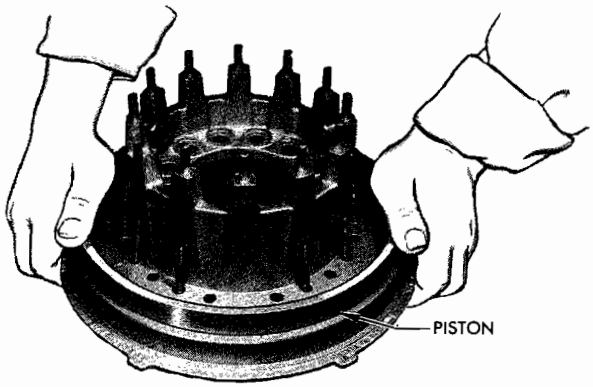


CAUTION

While inserting piston cup, exercise extreme care so as not to damage featheredge.

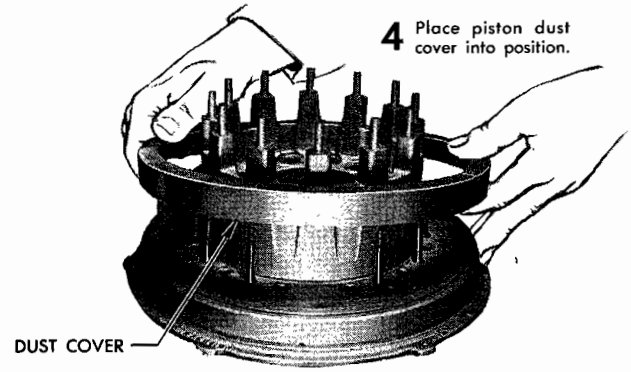


2 With piston groove and circular piston lubricated with petrolatum or hydraulic fluid, carefully insert piston cup into groove in carrier assembly.

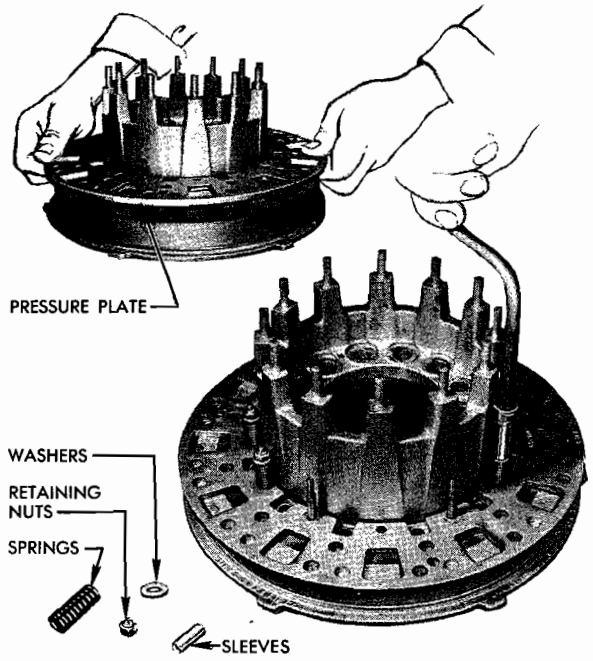


3 Carefully insert piston into piston groove.

4 Place piston dust cover into position.

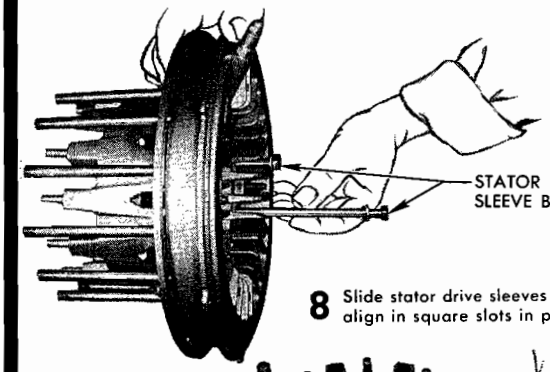


5 Install pressure plate on carrier assembly.



6 Place sleeves, springs, and washers over adjuster pins. Secure assemblies with adjuster nuts, and tighten until nut bottoms on sleeve. After nut, pin, and sleeve are fully compressed, back off nut three turns to obtain running clearance of 0.030 to 0.060 inch.

7 Place a washer on each stator drive sleeve bolt and insert bolts in holes provided in carrier assembly.



8 Slide stator drive sleeves over bolt and align in square slots in pressure plate.

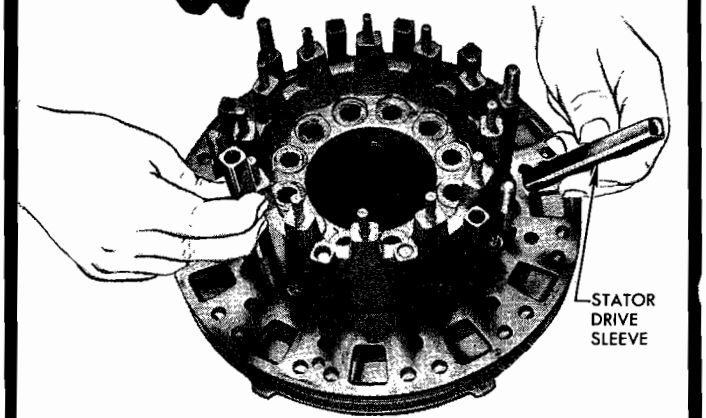


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Figure 2-80. Assembling Wheel Brake Assemblies (Sheet 1 of 2)

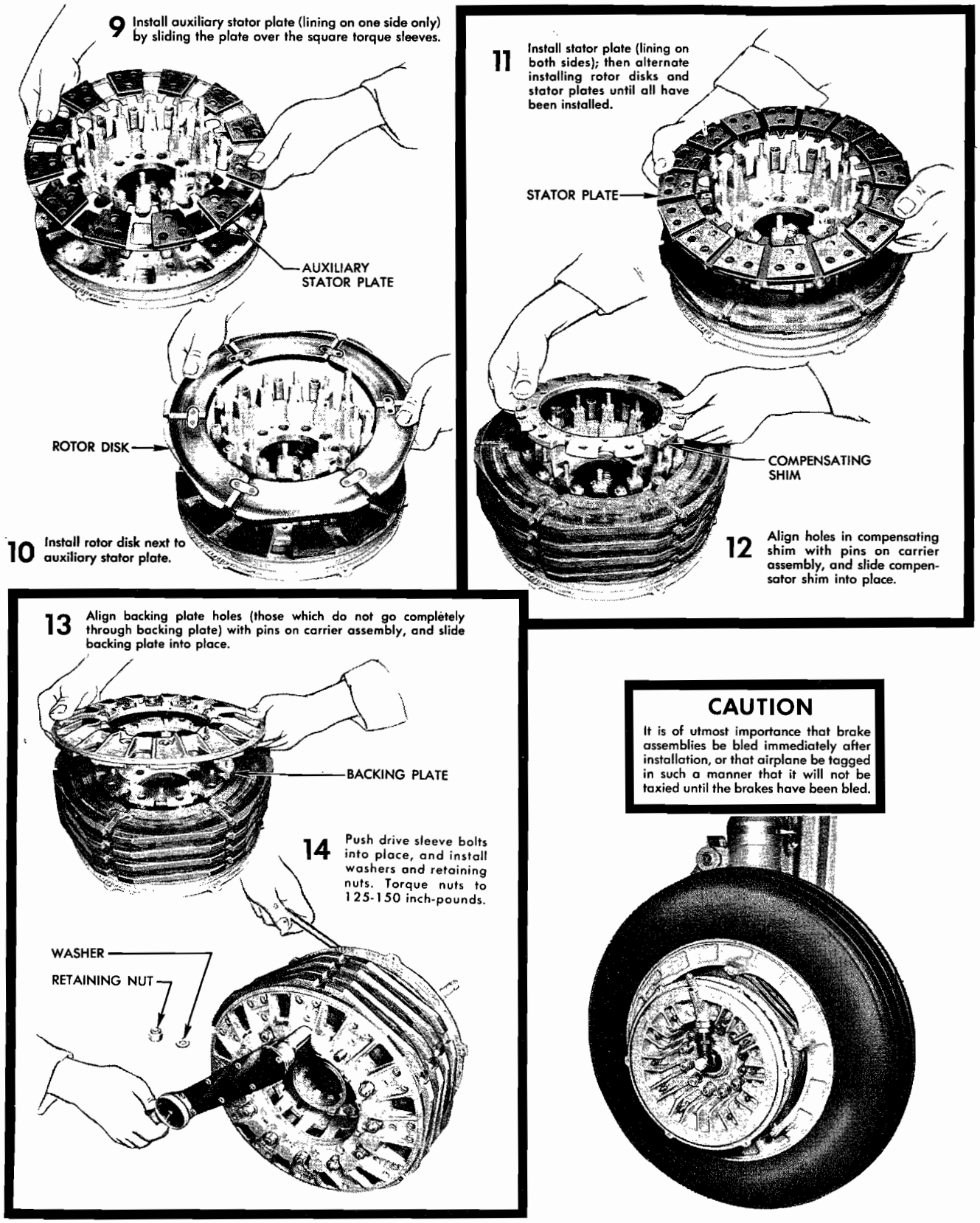


Figure 2-80. Assembling Wheel Brake Assemblies (Sheet 2 of 2)

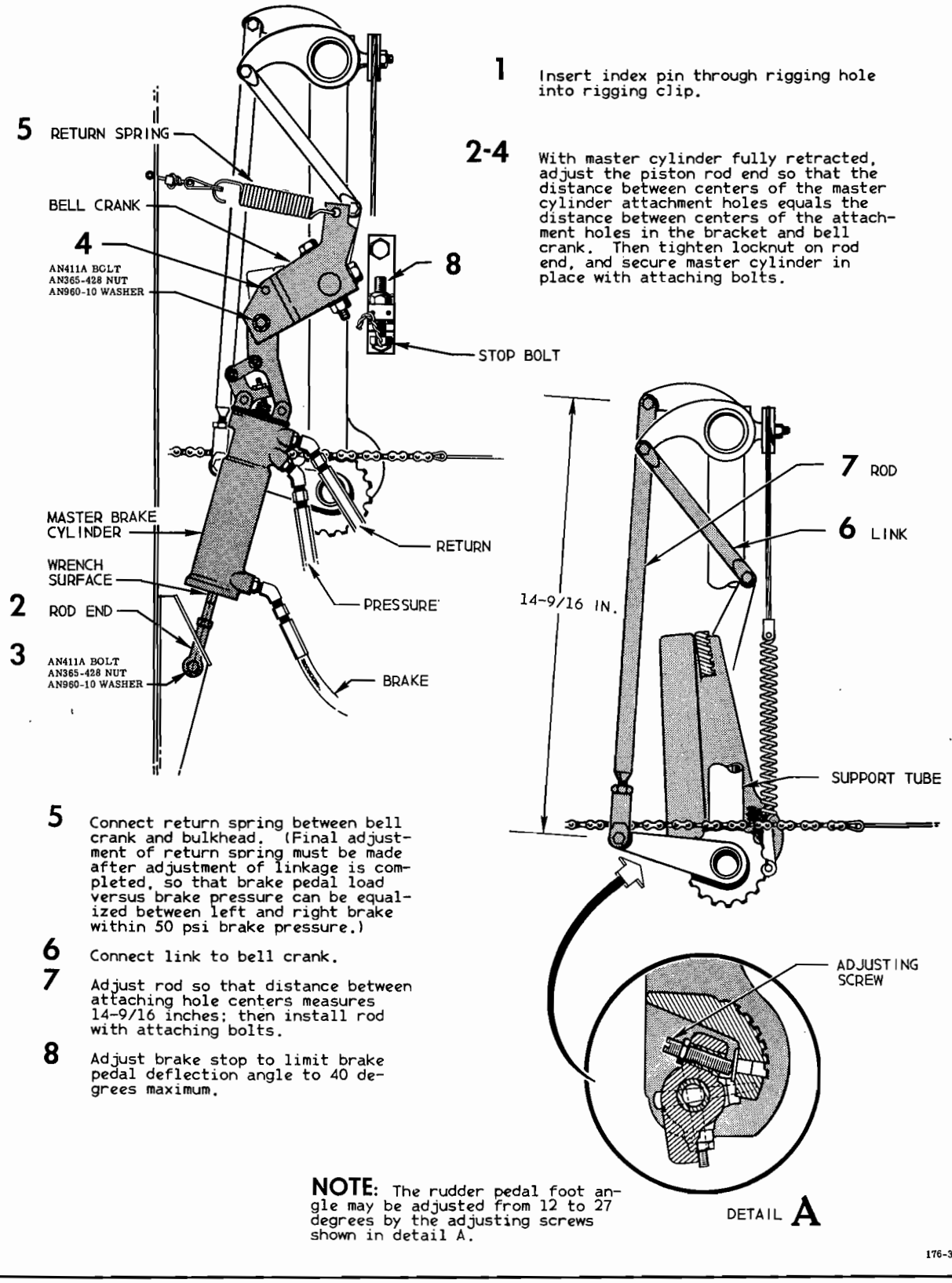


Figure 2-81. Adjusting Wheel Brake System Control Linkage

CHECKING BRAKE WEAR

With new brake lining, adjuster rods should extend approximately 25/32 inch from friction block. To determine amount of lining wear, check this dimension. If lining is worn so that adjuster rods extend only 3/8 to 1/8 inch, remove brake wear compensating shim and reset adjuster rods. In resetting adjuster rods, a friction load gage (Bendix Part No. AXE8798) must be utilized.
When checking brake wear after removal of compensating shim, measure adjuster rods. If they extend only 3/8 to 1/8 inch, brakes must be relined.

CAUTION: Do not operate brakes either before or after compensating shim removal if extension of adjuster rod is 3/8 to 1/8 inch or less, as brake assembly may be damaged.

CHECKING BRAKE CLEARANCE

Using three feeler gages spaced 120 degrees apart, check new brake assemblies for 0.048-inch minimum to 0.060-inch maximum total clearance between rotor and stator plates. Used or "burned-in" brake assemblies should have a total clearance of 0.030-inch minimum to 0.060-inch maximum.

RELINING BRAKES

To reline brakes with brake assembly removed from axle, remove backing plate and pull out stator plates and rotor disks. Reset adjuster rods by use of a friction load gage. Inspect rotor segments for cracks. (Refer to index for page number of applicable procedure.) Install newly lined stator plates together with rotor disks and backing plate. With stator plates and rotor disks in proper position, reinstall compensating shim. (Refer to index for page number of assembling procedure.)

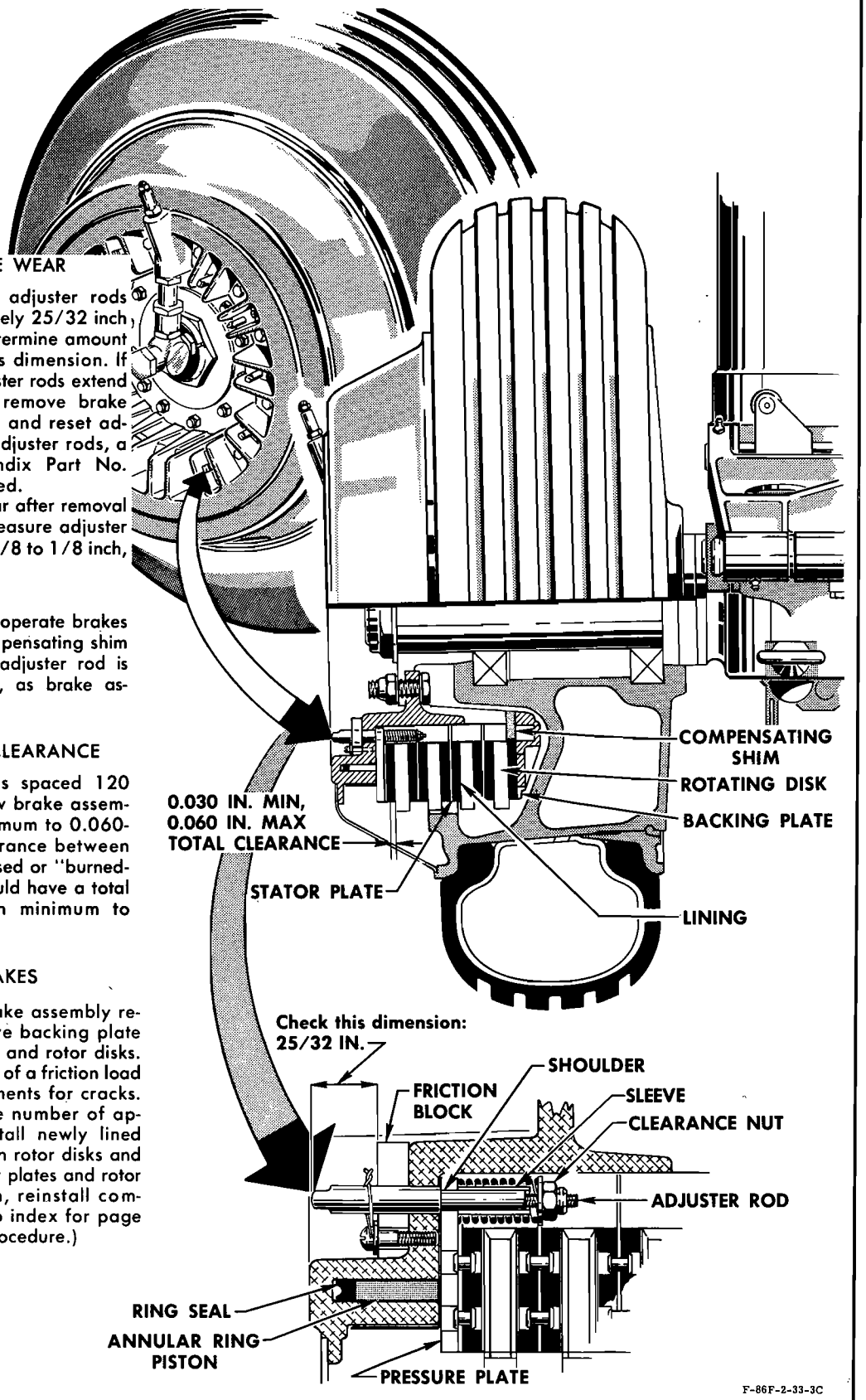
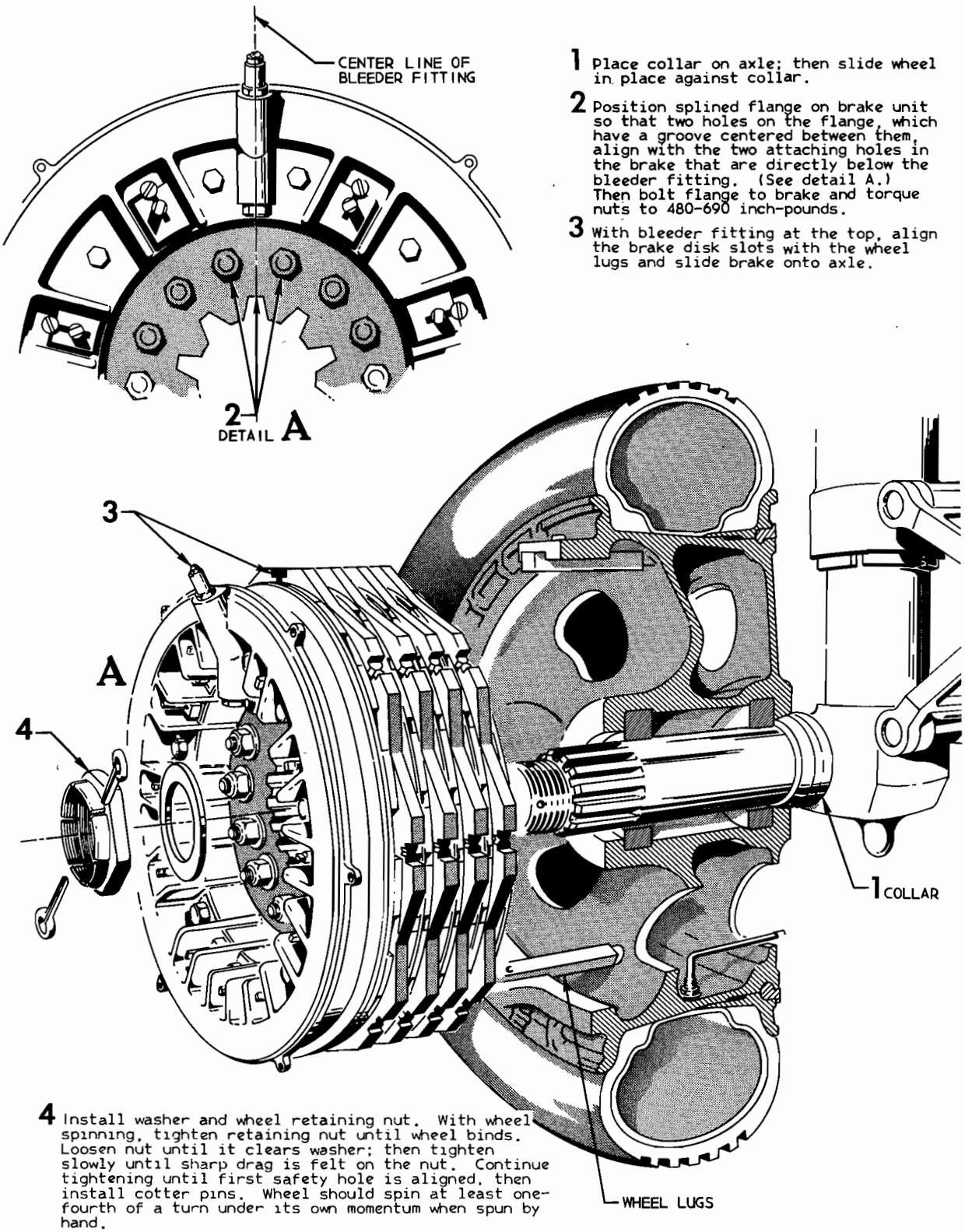


Figure 2-82. Relining and Resetting Wheel Brakes



1 Place collar on axle; then slide wheel in place against collar.

2 Position splined flange on brake unit so that two holes on the flange, which have a groove centered between them, align with the two attaching holes in the brake that are directly below the bleeder fitting. (See detail A.) Then bolt flange to brake and torque nuts to 480-690 inch-pounds.

3 With bleeder fitting at the top, align the brake disk slots with the wheel lugs and slide brake onto axle.

4 Install washer and wheel retaining nut. With wheel spinning, tighten retaining nut until wheel binds. Loosen nut until it clears washer; then tighten slowly until sharp drag is felt on the nut. Continue tightening until first safety hole is aligned, then install cotter pins. Wheel should spin at least one-fourth of a turn under its own momentum when spun by hand.

5 Install dust cover (if required by field conditions) and connect hydraulic lines.

6 Bleed brake system. (Refer to index.)

F-GGF-2-33-18

Figure 2-83. Installing Wheels and Brakes

e. Use a fiber or brass drive punch to gently tap out torque sleeve bolts and lift out stator torque sleeves.

f. Lift all stator plates and rotor disks out of carrier.

g. Remove automatic adjuster assemblies.

h. Lift out pressure plate.

i. Remove dust shield.

j. Place 10-32 screws in holes provided in pistons, and remove pistons from groove.

k. Apply a short burst of air pressure into inlet adapter in carrier to remove piston cups from grooves.

l. If dust covers are attached, remove screws that hold dust covers to carrier, and remove dust shield screws and dust shield.

2-321. ASSEMBLING WHEEL BRAKE ASSEMBLIES. See figure 2-80.

2-322. RELINING AND RESETTING WHEEL BRAKES. See figure 2-82.

2-322A. CHECKING ROTOR SEGMENTS FOR CRACKS. See figure 2-84.

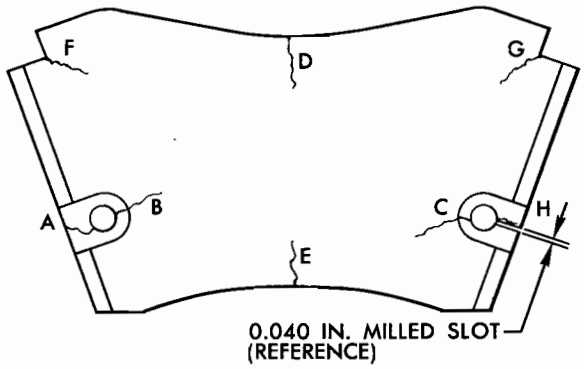
2-323. INSTALLING WHEELS AND BRAKES. See figure 2-83.

2-324. WHEEL BRAKE SYSTEM MASTER BRAKE CYLINDERS.

2-325. Two boost-type master cylinders are used in the brake system. They are located forward and above the rudder pedals on either side, and are attached to the pedals by linkage. Access to the cylinders may be gained through doors located just below the forward part of the canopy on both sides of the airplane. The cylinders convert pedal force on a moving piston to hydraulic pressure in the brake lines. System pressure is metered by an internal valve for added boost.

2-326. WHEEL BRAKE SYSTEM PARKING BRAKE VALVE AND COMPENSATOR.

2-327. The parking brake valve and compensator is mounted just forward of the master brake cylinder on the left side of the airplane. To operate the valve, it is necessary to apply a pedal load to the brake pedals and then pull the parking brake handle in the cockpit. This handle, through cable linkage, moves a lever on the valve and shifts the poppet to lock the fluid under pressure in the brake. This locked-in pressure will keep the brakes applied after the pedals are released. The parking brake valve incorporates a compensator, to provide a small storage space for locked fluid under pressure when the brakes are "parked," and to provide relief for thermal expansion.



The rotor segments of the brake unit must be checked for cracks whenever the brake unit is disassembled and the stator plates are relined. Heat checks (not shown) are small hairline surface cracks that may appear on one or both sides of the segments. These surface checks are not detrimental to the operation of the brake. Cracks at "A" are permissible when rotor segments have been reworked (with 0.040-inch milled slot through centerline of hole as at "H.") Cracks at "B," "C," "D," or "E" (but not at both "D" and "E") are permissible, unless they have progressed to a length of 0.380-inch maximum. If a rotor segment develops a crack at either "F" or "G," regardless of length, the rotor segment assembly is to be replaced.

F-86F-2-33-1

Figure 2-84. Checking Rotor Segments for Cracks

Section III
HYDRAULIC SYSTEM

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3-1. UTILITY HYDRAULIC POWER SYSTEM.

Note

Paragraphs 3-2 through 3-41 include only the information pertaining to the utility hydraulic power system. The subsystems (landing gear, nose wheel steering, speed brakes, and wheel brakes) that receive their pressure supply from the utility hydraulic power system are covered in their respective paragraphs. The surface control hydraulic power systems, two completely separate systems, are also covered in their respective paragraphs.

3-2. The utility hydraulic power system (figure 3-1) is a closed-center type system, utilizing an operating pressure of 3000 psi. Included in the system are the engine-driven pump, fluid reservoir, air storage tank, air pressure regulator, air filter, relief valve, fluid filters, check valves, pressure transmitter, and pressure gage. On F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13510, an air purge valve is used in the system. Fluid from the reservoir, which is under air pressure from the air storage tank, is routed to the variable-displacement pump. The pump supplies the fluid and controls the pressure at 3000 psi to the subsystems. It also regulates the fluid output according to the requirements of the system. Return fluid from an operating system is routed through a filter before entering the reservoir. A small amount circulates through the pump for cooling and lubrication and is routed back to the reservoir through a separate return line. The system relief valve, connected between the power system pressure line and return line, prevents pressure in excess of 3800 psi. On airplanes with the New York Air Brake pump (paragraphs 3-14 and 3-37), an air purge valve is used to bleed air from the pressure and supply line to the return line when the system is operating under very low pressure. (See figures 3-2 and 3-3 for system schematic.)

3-3. TROUBLE SHOOTING UTILITY HYDRAULIC POWER SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
System will not build up pressure.	Faulty engine-driven pump. Insufficient fluid in reservoir. External or internal leakage in system.	

TROUBLE	PROBABLE CAUSE	REMEDY
System does not indicate correct pressure.	Faulty pressure transmitter. Faulty pressure gage.	
System will build up correct pressure.	Faulty relief valve. Air in engine-driven pump. Control unit in engine-driven pump not operating properly.	Bleed pump. Replace pump.
Overheating of engine-driven pump.	Air in engine-driven pump. By-pass line from engine-driven pump clogged.	Bleed pump. Replace line.
Excessive dirt in system.	Clogged filters. System filled with improperly filtered fluid.	Remove and replace filter element. Drain and flush system, and replenish with proper fluid.
Engine-driven pump cavitation.	Faulty filling of pump on installation. Improper pressurization of fluid reservoir.	Bleed pump. Replace air pressure regulator.
Improper fluid reservoir pressurization.	Faulty air pressure regulator.	Remove and replace regulator.
Fluid draining out of engine pump case drain.	Leaky pump seal.	

3-4. UTILITY HYDRAULIC POWER SYSTEM GROUND TEST PANEL.

3-5. External test equipment connectors are provided for ground-testing the hydraulic system. The connectors are located on a panel on the right side of the engine compartment and can be reached through an access door on the right side of the fuselage. If the proper external test equipment is not available, it is possible to supply pressure to the utility power system by use of the ground-test hand-pump. (Refer to paragraph 3-5B for operation of hand-pump.) An air fitting located on the ground-test panel is also provided for pressurizing the utility hydraulic system reservoir. When the reservoir is used for test stand operation, 12 to 150 psi pressure should be applied at the air fitting.

3-5A. GROUND-TEST HAND-PUMP.

3-5B. The ground-test hand-pump is a manually operated unit used for supplying pressure to the utility system for test purposes when external power is not available. The hand-pump is also utilized for filling both the normal and the alternate surface control systems. (Refer to paragraph 1-67.) Fluid displacement of the pump is approximately 0.75 cubic inch per stroke. A hydraulic fluid filter is incorporated into the suction side of the pump body. To change filter cartridge, break filter safety wire, unscrew filter head, remove cartridge, and follow cleaning instructions in paragraph 3-33B if cleaning is to be accomplished. If cartridge is to be replaced, use Purolator 27468 cartridge replacement. In reassembly, install new "O" ring. The hand-pump is detachable from the airplane and is stored in the data case on the left center side of the fuselage. Operation of the pump is accomplished as follows:

a. Remove access cover to external test connection panel.

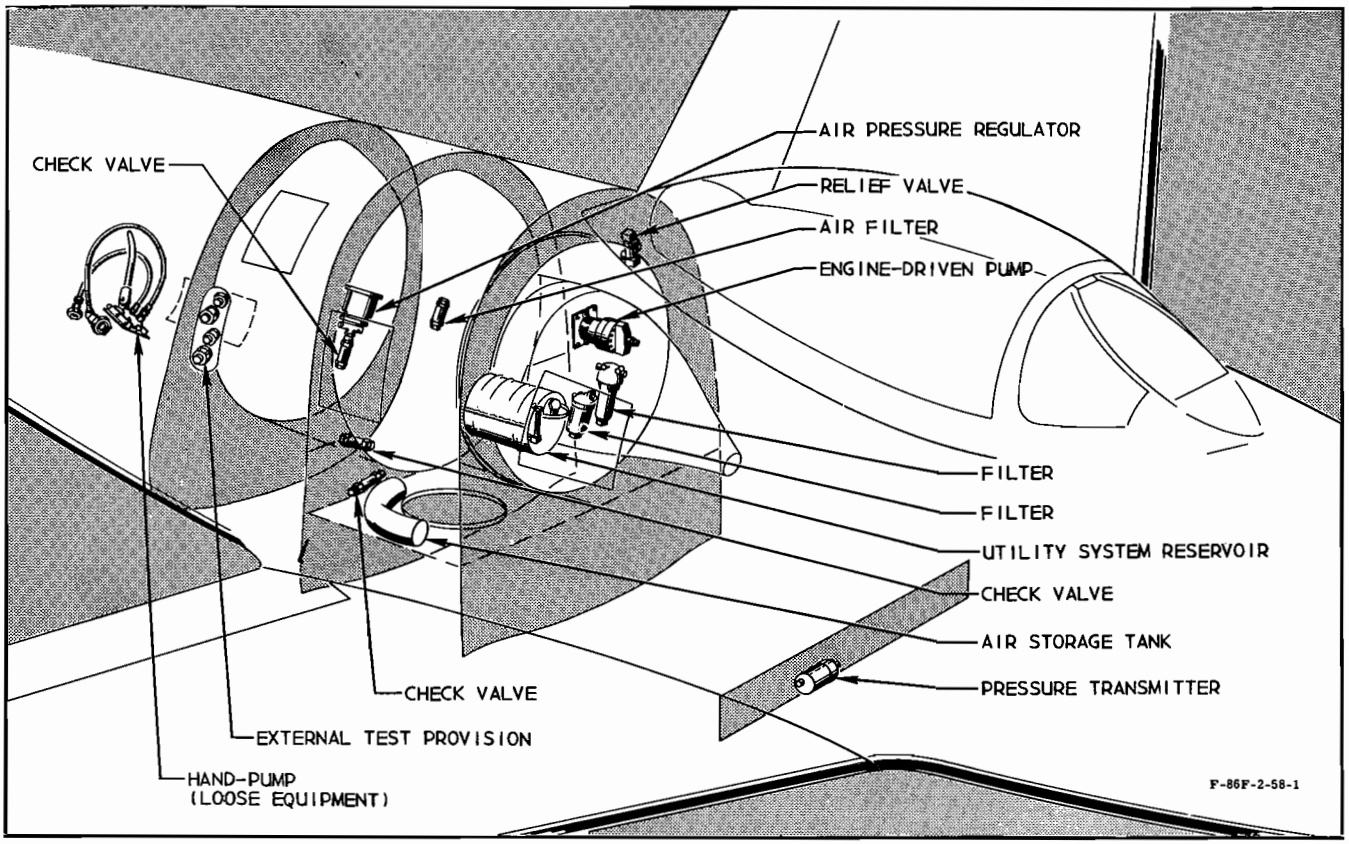
b. With attaching fasteners, mount pump on fuselage in appropriate location next to test panel.

c. Connect pump pressure line to utility pressure inlet and pump suction line to utility suction connection.

d. Operate hand-pump until sufficient pressure is indicated on utility system gage in cockpit to test components or system.

3-6. FILLING UTILITY HYDRAULIC POWER SYSTEM.

3-7. Refer to paragraphs 1-65 and 1-66.



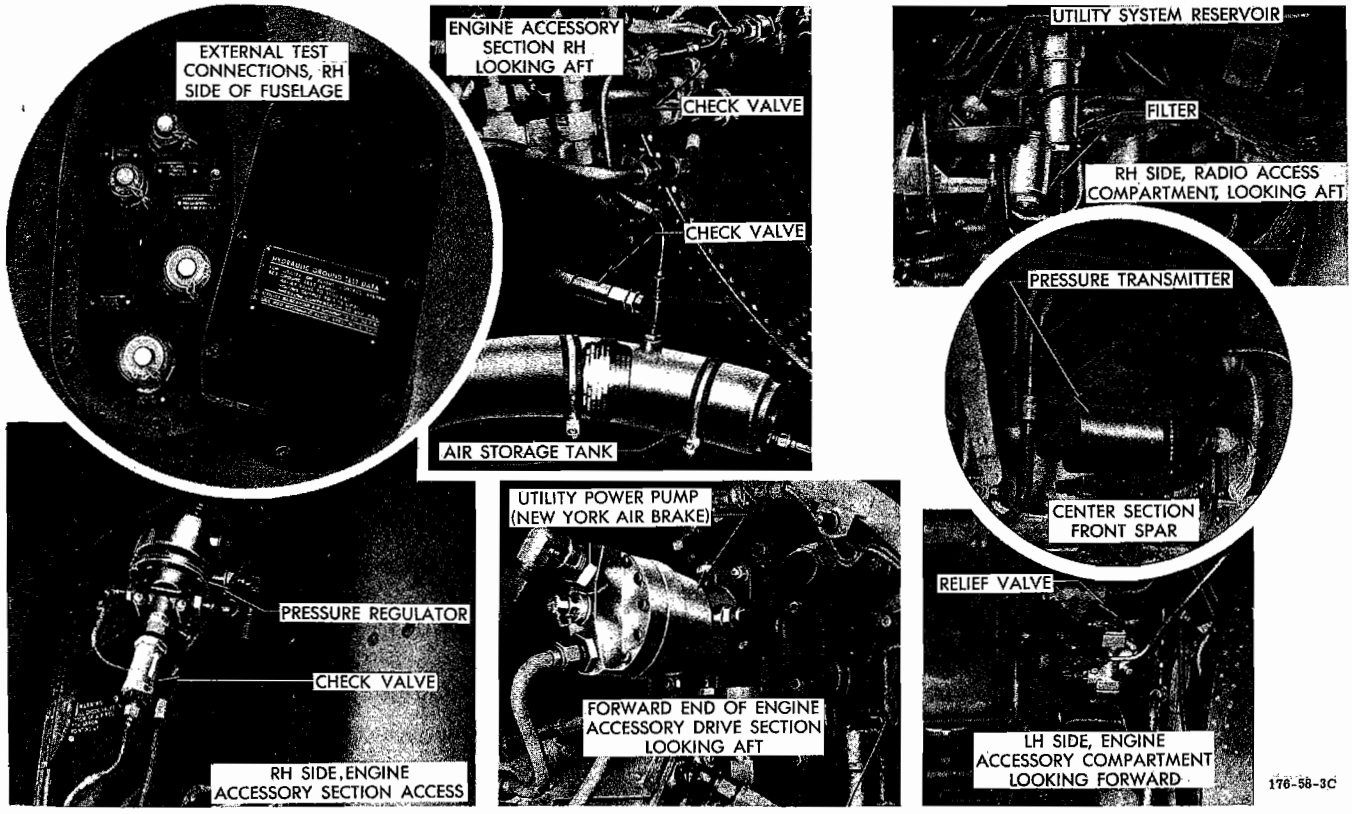


Figure 3-1. Utility Hydraulic Power System

3-8. CHECKING UTILITY HYDRAULIC POWER SYSTEM.

3-9. Accomplish the following after the system has been filled, bled of air, and adjusted, and when the engine can be run so that utility pressure can be supplied by the engine-driven pump. The entire system, except the landing gear, should be operated for at least 15 minutes, and each subsystem should be operated 10 times in order to ensure filtration of all hydraulic fluid and to circulate air from the system into the air separator of the reservoir. With the pump operating, the pressure (as indicated on the hydraulic pressure gage) should read 3000 (±100) psi when no system is operating. During operation of a system, the pressure drops off; however, it should build up immediately after the system completes the operation. If the systems do not function properly and it is necessary to make readjustments other than those given in paragraph 3-3, refer to the paragraph on the particular system involved.

3-10. UTILITY HYDRAULIC POWER SYSTEM RESERVOIR AIR PRESSURIZATION SYSTEM.

3-11. The fluid reservoir air pressurization system provides a constant pressure in the fluid reservoir. This ensures a steady flow of fluid to the pump and eliminates the possibility of pump cavitation. Air from an engine compressor bleed is directed through a filter and a check valve to the storage tank. Stored air is supplied to the regulator, which maintains a continuous pressure in the hydraulic reservoir. (Refer to paragraph 3-29.) The air storage tank may also be charged through a fitting on the ground-test panel.

3-12. CHECKING RESERVOIR AIR PRESSURIZATION SYSTEM. To check reservoir pressurization system for leaks, proceed as follows:

a. Connect external air pressure gage to drain line of air storage tank.

b. Charge system to 40 psi through ground-test connection.

c. Let stand for ½ hour; then recheck air pressure. There should be a minimum of 28 psi.

3-13. UTILITY HYDRAULIC POWER SYSTEM PUMP (F-86F-1 THROUGH F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510).

3-14. The engine-driven, variable-displacement pump (New York Air Brake 67WA200) is mounted on the engine accessory drive section. The pump is a nine-piston rotary type, with an engine-to-pump ratio of 1 to .473 and a maximum output of 5.25 gpm up to a pressure of 2700 psi. A spring-loaded control unit, incorporated in the pump housing to control pump output when system pressure is above 2700 psi, regulates maximum pressure at 3000 psi. When utility power system pressure reaches 2700 psi, the spring pressure against the control unit is overcome and the control unit starts moving. As the control unit moves against spring pressure, it reduces the effective output stroke of the pistons. Consequently, the higher the pressure above 2700 psi, the shorter the effective output stroke. When 3000 psi pressure is reached, the pump output is 0 gpm. A small by-pass line from the pump housing to the system reservoir prevents pressure build-up in the housing and allows a small amount of fluid to circulate through the housing for cooling and lubricating.

3-15. REMOVING PUMP. The utility hydraulic pump may be removed through the engine air intake duct as follows:

Note

Before removing utility hydraulic pump, be sure to exhaust reservoir air pressure by loosening reservoir filler cap. Drain utility reservoir.

a. Remove engine accessory cover.

b. Remove pump hold-down bolts.

c. Pull pump out of auxiliary accessory section gear case far enough to free splined shaft.

d. Disconnect and cap hydraulic lines at pump.

e. Complete removal of pump from engine.

3-16. INSTALLING PUMP. The utility hydraulic pump is installed as follows:

a. Fill pump with hydraulic fluid.

b. Place pump in position on auxiliary accessory gear case (accomplished through engine air intake duct) and install hold-down bolts, settling pump so that splined shaft engages freely.

c. Connect utility hydraulic lines.

d. Refill utility hydraulic reservoir.

e. Run up engine and check pump for leaks.

f. Replace engine auxiliary accessory cover.

3-17. BLEEDING PUMP. To bleed pump, proceed as follows:

a. With both pump suction and pressure lines connected in normal manner and case drain line disconnected at quick-disconnect fitting, depress check valve in quick-disconnect fitting. (Press in on annular ring between outer body and center plug.)

b. Turn engine over slowly with starter until bubble-free fluid flows from case drain line.

c. Reconnect case drain line and check reservoir for proper fluid level.

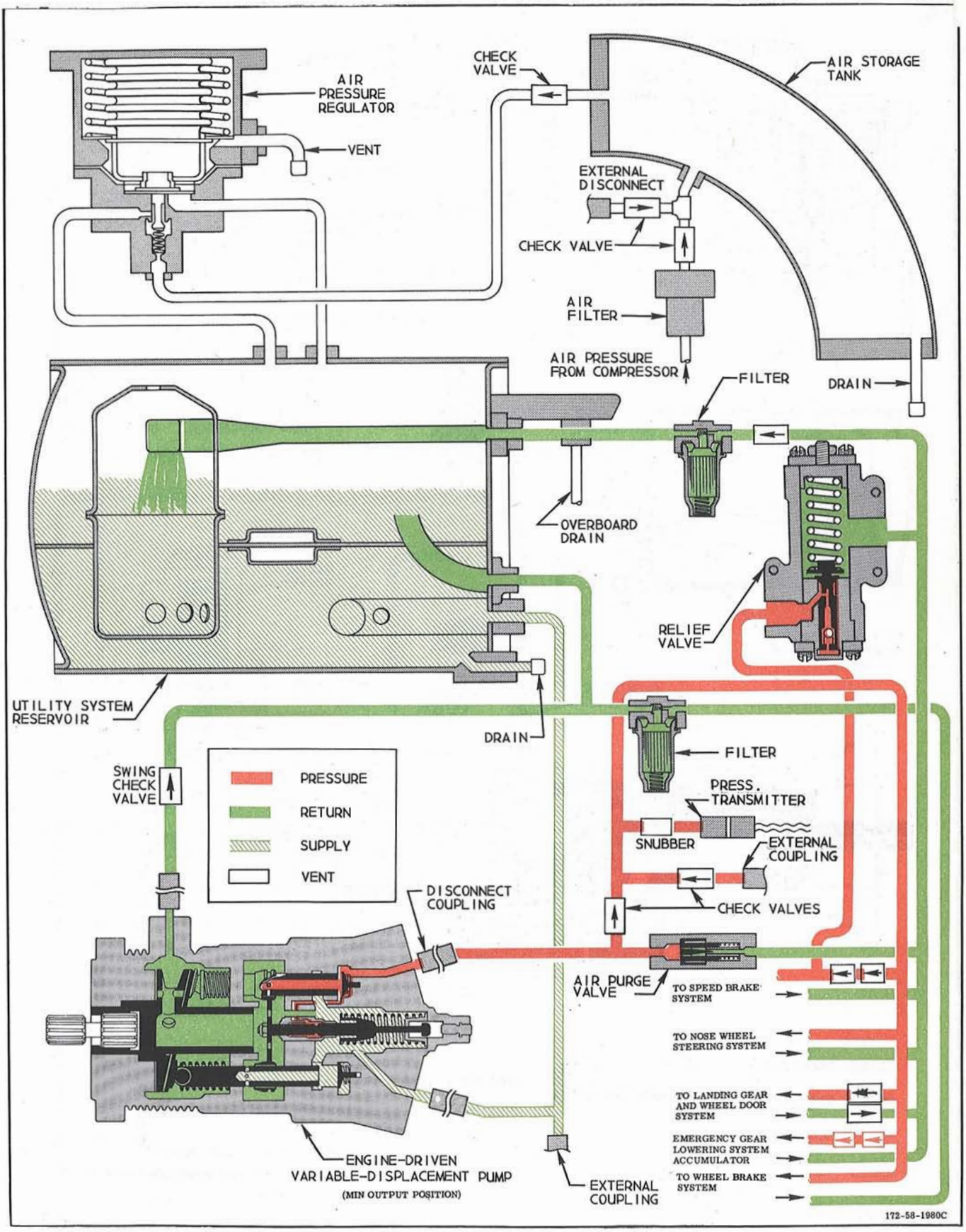


Figure 3-2. Utility Hydraulic Power System—F-86F-1 Through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 Through -13510

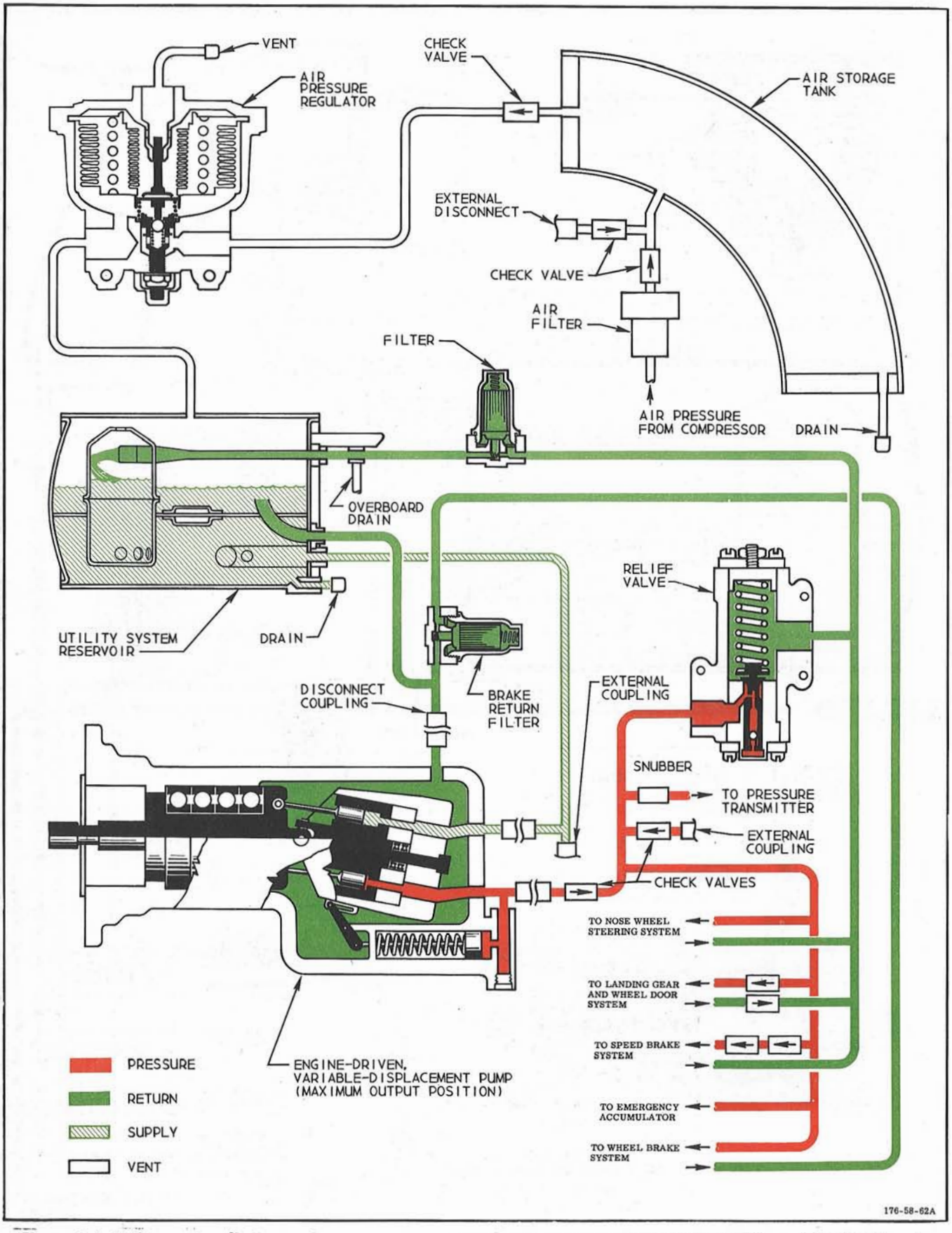


Figure 3-3. Utility Hydraulic Power System—F-86F-25 Airplanes AF52-5272 Through -5530, and F-86F-30 and Subsequent Airplanes

3-18. UTILITY HYDRAULIC POWER SYSTEM PUMP (F-86F-25 AIRPLANES AF52-5272 THROUGH -5530, AND F-86F-30 AND SUBSEQUENT AIRPLANES).

3-19. The engine-driven, variable-displacement hydraulic pump (Vickers AA32516-L-2) is used to supply pressure to the utility system. The pump, mounted on the accessory drive section of the engine, is a nine-piston rotary type with a maximum output of 5.75 gpm up to a pressure of 2700 psi. A spring-loaded control unit is incorporated in the pump housing to control pump output. In operation, the swivel yoke allows the cylinder assembly to change angle, causing the pistons to move back and forth within the respective cylinder bores. When the top of the pressure range is reached, the cylinder assembly straightens, reducing the volume of fluid delivered to the system. As the pressure diminishes, the swivel yoke is permitted to return to its normal position, and the cylinder assembly resumes delivering fluid in sufficient volume to build up the required pressure once more. A small by-pass line from the pump housing to the system reservoir connecting to the brake return line prevents pressure build-up in the pump housing and allows a small amount of fluid to circulate through the housing for cooling and lubricating.

WARNING

Before operating hydraulic pump, make sure that by-pass line is open and not blocked or restricted.

3-20. REMOVING PUMP. Refer to paragraph 3-15.

3-21. INSTALLING PUMP. Refer to paragraph 3-16.

3-22. UTILITY HYDRAULIC POWER SYSTEM FLUID RESERVOIR.

3-23. The utility power system fluid reservoir is located in the radio compartment on the right side just aft of the access door. Incorporated in the reservoir are an air separator, fluid level gage, filler cap, and ports for pump supply, system return, pressurizing and ventilating, and drain. The reservoir fluid capacity is approximately 2 US. gallons.

3-24. REMOVING FLUID RESERVOIR. The utility reservoir may be removed as follows:

a. Release air pressure in reservoir by loosening filler cap.

b. Drain reservoir through drain cock located in right main wheel well.

c. Loosen fire-warning control box from shock-mounted support and move control box to one side as far as electric cables will allow.

d. Remove brake return line between filter and reservoir.

e. Remove brake return line filter.

f. Remove utility return line between filter and reservoir.

g. Remove utility return line between filter and nearest "T" fitting, including check valve.

h. Remove utility return line filter.

i. Disconnect suction and drain lines at front of reservoir.

j. Disconnect scupper drain line at reservoir.

k. Disconnect vent and air pressure lines on top of reservoir.

l. Loosen reservoir hold-down strap bolts.

m. Remove reservoir from airplane.

3-25. INSTALLING FLUID RESERVOIR. The utility reservoir is installed as follows:

a. Place reservoir in position in airplane, making sure that hold-down straps and buffer straps are correctly installed.

b. Connect and tighten reservoir hold-down straps.

c. Connect air pressure and vent lines on top of reservoir.

d. Connect suction and drain lines on front of reservoir.

e. Connect scupper drain line.

f. Install utility return line filter.

g. Install utility return line between filter and reservoir.

h. Install utility return line, including check valve, between filter and nearest "T" fitting.

i. Install brake return line filter.

j. Install brake return line between filter and reservoir.

k. Install fire-warning control box on shock-mounted support.

l. Fill reservoir with specified hydraulic fluid. (Refer to paragraphs 1-65 and 1-66.)

m. Pressurize reservoir through air pressure fitting, and check reservoir and fittings for leaks.

3-26. UTILITY HYDRAULIC POWER SYSTEM AIR STORAGE TANK.

3-27. The air pressure storage tank is located in the equipment compartment above the right wheel well. The purpose of the tank is to store a volume of air under pressure. This air is received from the engine compressor for pressurization of the utility reservoir and is under approximately 135 psi. The air is filtered before entering the storage tank. A drain plug is provided in one end of the tank for draining fluid which might collect.

3-28. UTILITY HYDRAULIC POWER SYSTEM AIR PRESSURE REGULATOR.

3-29. The air pressure regulator (Gladden 312022 on F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13510; Leonard 113050-2 on F-86F-25 Airplanes AF52-5272 through -5530, and F-86F-30 and subsequent airplanes) is located on the right side of the fuselage, just aft of the utility reservoir. The pressure regulator controls the air pressure going into the reservoir and expels any excessive air pressure built up in the reservoir. The Gladden regulator controls the air pressure at 6.8 to 11.8 psi at sea level. The Leonard regulator controls the air pressure at 10.3 to 15.3 psi at sea level. In the event of air pressure failure, the regulator allows atmospheric air to enter the reservoir when reservoir pressure drops to —0.1 to —0.25 psi.

3-30. UTILITY HYDRAULIC POWER SYSTEM PRESSURE RELIEF VALVE.

3-31. The pressure relief valve is located on the left side of the fuselage, in the engine accessory compartment. The valve is incorporated in the system between the power system pressure supply line and the return line to relieve excessive pressure in the system due to thermal expansion, surges, or failure of the pump to control pressure. The valve is adjusted to open (cracking pressure) when the system pressure reaches 3450 (±50) psi.

3-31A. HYDRAULIC QUICK-DISCONNECT COUPLINGS.

3-31B. Hydraulic quick-disconnect couplings of the self-sealing type (Aeroquip series) are used where frequent uncoupling of hydraulic lines is required. Each unit coupling consists of two self-sealing halves which make possible the separation and reconnection of lines without loss of fluid or introduction of air into the system. Disconnecting or connecting the halves of a coupling can be performed in a few seconds by hand. When connected, these couplings are held in place by a union nut and lock spring. The union nut has a quick-lead thread which allows for separation or connection of the coupling by one complete turn of the nut. The only function of the nut is to hold the halves together. One half of the unit is normally installed through a bulkhead with a bulkhead fitting; however, it also has a flange plate for other mountings.

3-31C. CONNECTING AND TIGHTENING HYDRAULIC QUICK-DISCONNECT COUPLINGS. The two halves of the coupling may be connected by placing the head of the tubular valve within the protruding nose of the mating half and rotating the nut in the clockwise direction. The union nut must then be tightened until its teeth fully engage the lockspring assembly and the nut is fully rotated. A properly tightened coupling will have compressed the lock ring assembly until a 1/16-inch minimum gap exists between the inside lip of the spring retainer fingers and spring plate. When completely tightened, the outside nut may easily be moved with thumb and forefinger. (See figure 3-3A.)

Note

Do not use a wrench to couple or uncouple hydraulic quick-disconnect fittings that incorporate an unmodified union nut. Modified union nuts are identified with a letter "C" preceding the part number of the nut. On these union nuts, a wrench may be used to assist in tightening the coupling.

3-32. UTILITY HYDRAULIC POWER SYSTEM FILTERS.

3-33. Two fluid filters are provided in the utility system return lines just upstream of the reservoir. An AN6234-2 filter is utilized for the brake return line, and an AN6234-3 filter is provided in the utility return. The purpose of the filters is to filter and clean all fluid returning to the reservoir from the hydraulic components supplied by the utility power system. Both filters are located next to the utility reservoir and are accessible through the right radio access door. Incorporated in each of the filters is a by-pass relief valve which opens at 50 (±5) psi to by-pass the filter, should it become clogged. In addition to the fluid filters, an air filter is positioned between the swing check valve on the air storage tank and the air compressor. Air supplied into the utility reservoir is subsequently filtered, and contamination of the hydraulic fluid is prevented. Each of the filters has a replaceable element, the changing and cleaning of which is covered in paragraphs 3-33A through 3-33C.

3-33A. REMOVING FILTER ELEMENT. To remove the filter element, either for cleaning or replacement, gain access to the filter and proceed as follows:

a. Depressurize utility hydraulic reservoir (actuate depressurizer valve).

b. If filter is of the fluid type, prepare to catch residual fluid in container.

c. Break safety wire and unscrew filter case.

d. Remove filter element from case by gently rocking it back and forth while exerting a pulling tension. Do not try to remove element by twisting.

3-33B. CLEANING FILTER ELEMENT. If a replacement element is not available or the removed element does not warrant replacing, the filter element may be cleaned by observing the following procedure:

a. Use a solution of 50 percent benzine and 50 percent lacquer thinner, 50 percent toluene and 50 percent dope, or 100 percent chloroform.

b. With a soft-bristle brush and mild air blast, clean exterior of element convolutions.

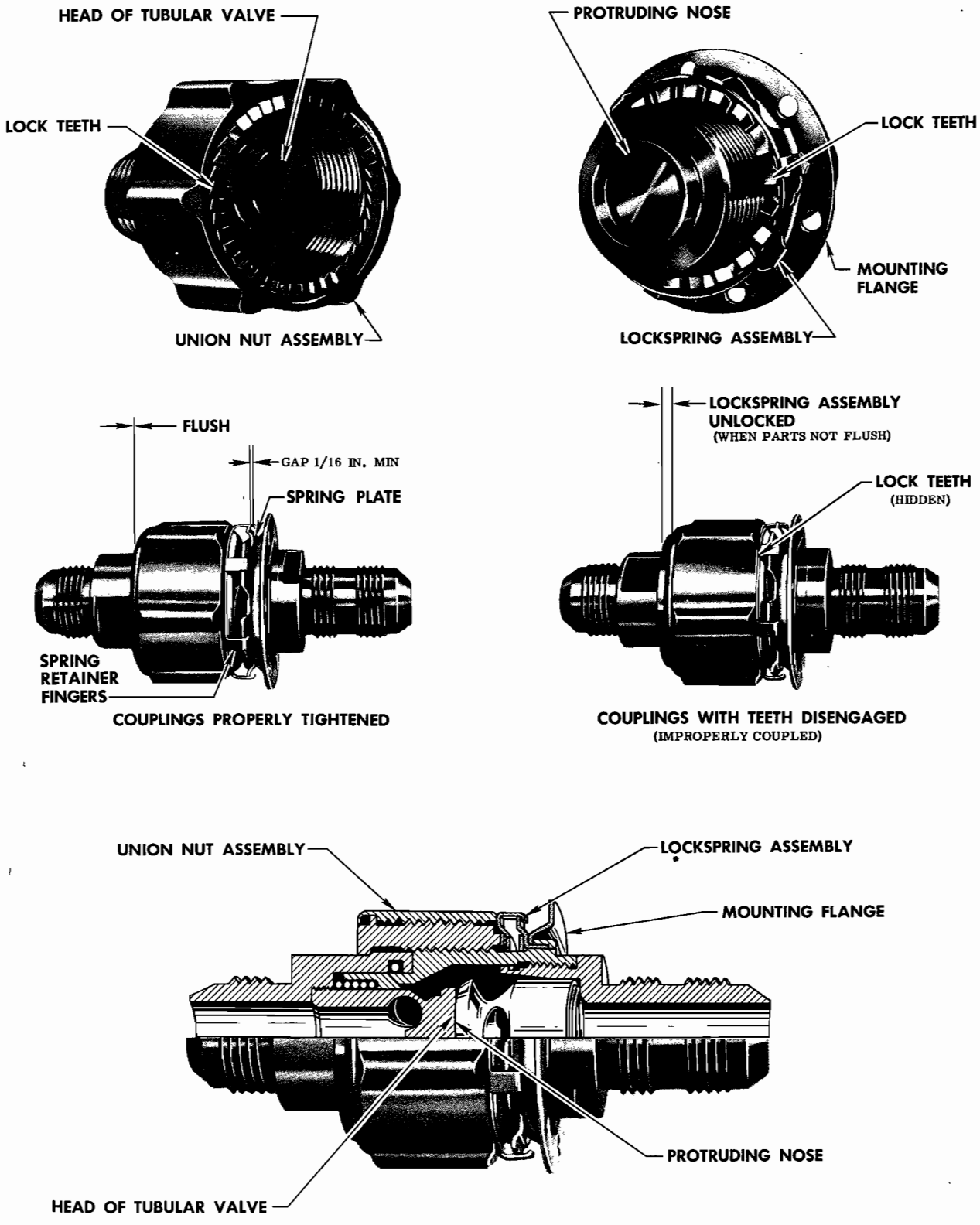


Figure 3-3A. Hydraulic Quick-disconnect Couplings

WARNING

Do not breathe the fumes of cleaning solution or use near fire of any kind (no smoking). The cleaning solution is extremely volatile and should be used in a well-ventilated area.

3-33C. ASSEMBLING FILTER UNIT. If a filter element is found to be unsuitable for further use, discard the element and install suitable replacement. The replacement element for the brake return line filter (AN6234-2) is element AN6235-2A, and the replacement element for the utility return line filter (AN6234-3) is element AN6235-3A. The air filter replacement element is Purolator 37820. To assemble filter, use new "O" ring in case-head seal and proceed as follows:

a. Position element in filter case and screw case into filter head.

b. Insert safety wire through lock bosses and secure wire.

3-34. UTILITY HYDRAULIC POWER SYSTEM PRESSURE INDICATING SYSTEM.

3-35. The pressure indicating system consists of a pressure transmitter, a pressure gage, a snubber, and a selector switch. The pressure transmitter, located on the wing center section front spar, is electrically connected to the pressure gage, located on the pilot's instrument panel. The selector switch, located next to the gage, permits selection of any hydraulic system.

3-36. UTILITY HYDRAULIC POWER SYSTEM AIR PURGE VALVE.

3-37. On F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13510, an air purge valve is installed between the pump pressure line and the utility return line. The valve purges the pump pressure and supply lines of air and aids the pump in priming itself when operating at low pressures. Normally open, the valve by-passes fluid from the pressure line to the return line until the pump builds up sufficient pressure to close the valve.

3-38. PREPARING UTILITY HYDRAULIC POWER SYSTEM TUBING FOR INSTALLATION.

3-39. Before installing tubing, observe the following precautions:

a. Make sure all hydraulic tubing assemblies have correct identification markings, including color banding and part number.

b. Before assembly, inspect tube flares for cracks, burrs, and sharp edges, and for concentricity with sleeves. Flare thickness on new tubing must be at least 82 percent of original wall thickness. Tight sleeves should not be cause for rejection. Nuts, however, should turn freely on sleeves.

c. Make sure that tip of sleeve and outer edge of tube flare are not separated by more than .060 inch or less than .045 inch.

d. Blow out all dirt inside tubing assembly with clean, dry compressed air.

e. Before installation, lubricate outside of sleeves at shoulder with a small quantity of petrolatum.

f. Use steel fittings and nuts with steel lines in ¼- and ⅜-inch sizes. Use aluminum alloy fittings and nuts with aluminum lines and with steel lines larger than ⅜ inch.

3-40. INSTALLING UTILITY HYDRAULIC POWER SYSTEM TUBING.

3-41. Observe the following precautions when installing hydraulic tubing:

CAUTION

During installation, it is *absolutely necessary* that open ends of tubing and all fittings on units remain capped until the time they are connected into the system. If they are disconnected at any time, they should be capped at once. Many expensive units will be permanently damaged by dirt and chips if this is not done.

a. Immediately before installation, lubricate first two male threads of fittings by rubbing on a thin coating of petrolatum. Do not allow this material to coat inside of tube.

b. Place tube in position, making certain that it is not scratched during installation, and see that tube flares or tube ends meet fittings squarely and fully. *Never use nut to draw tube flare to fitting, as flare might be easily spun off or damaged.*

c. Using fingers only, start nuts on fittings and turn until flares or sleeves are firmly seated. Never use a wrench until nut is finger-tight.

d. After nut is firmly in place, tighten nut with a torque wrench, using minimum standard torque. Use a wrench on hexagon of body to counteract torque of torque wrench on nut.

e. If fitting leaks, tighten nut to maximum standard torque. If it still leaks, correct defects, if possible, or replace if necessary.

f. When installing bulkhead fittings of -6 size or smaller, use 1/16-inch thick AN960 washer between flange of fitting and bulkhead. Use 3/32-inch thick washer for fittings larger than -6. Washer is unnecessary where fitting has hexagonal shape.

Section IV
UTILITY SYSTEMS

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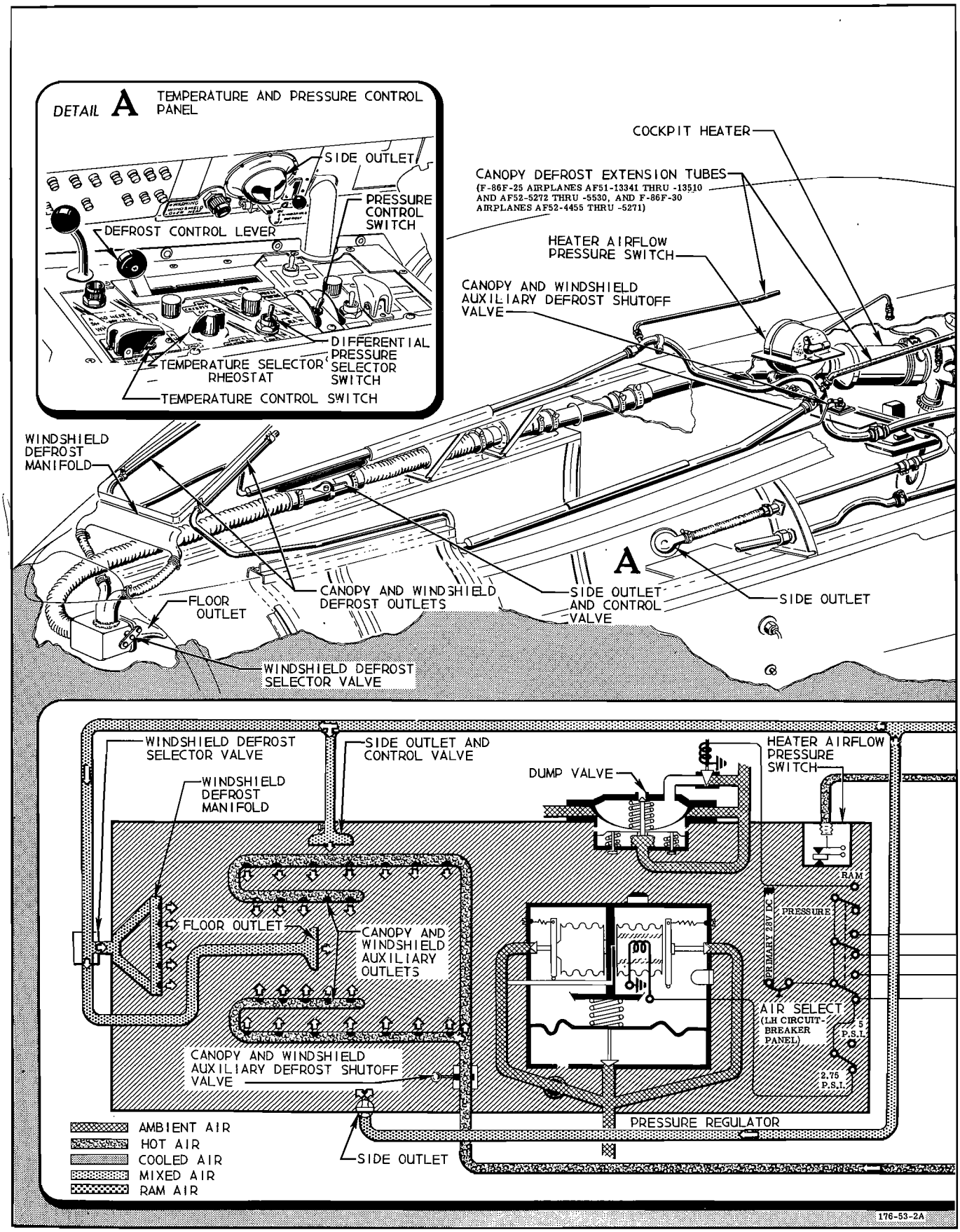


Figure 4-1. Cockpit Air Conditioning and Pressurizing Systems (Sheet 1 of 2)

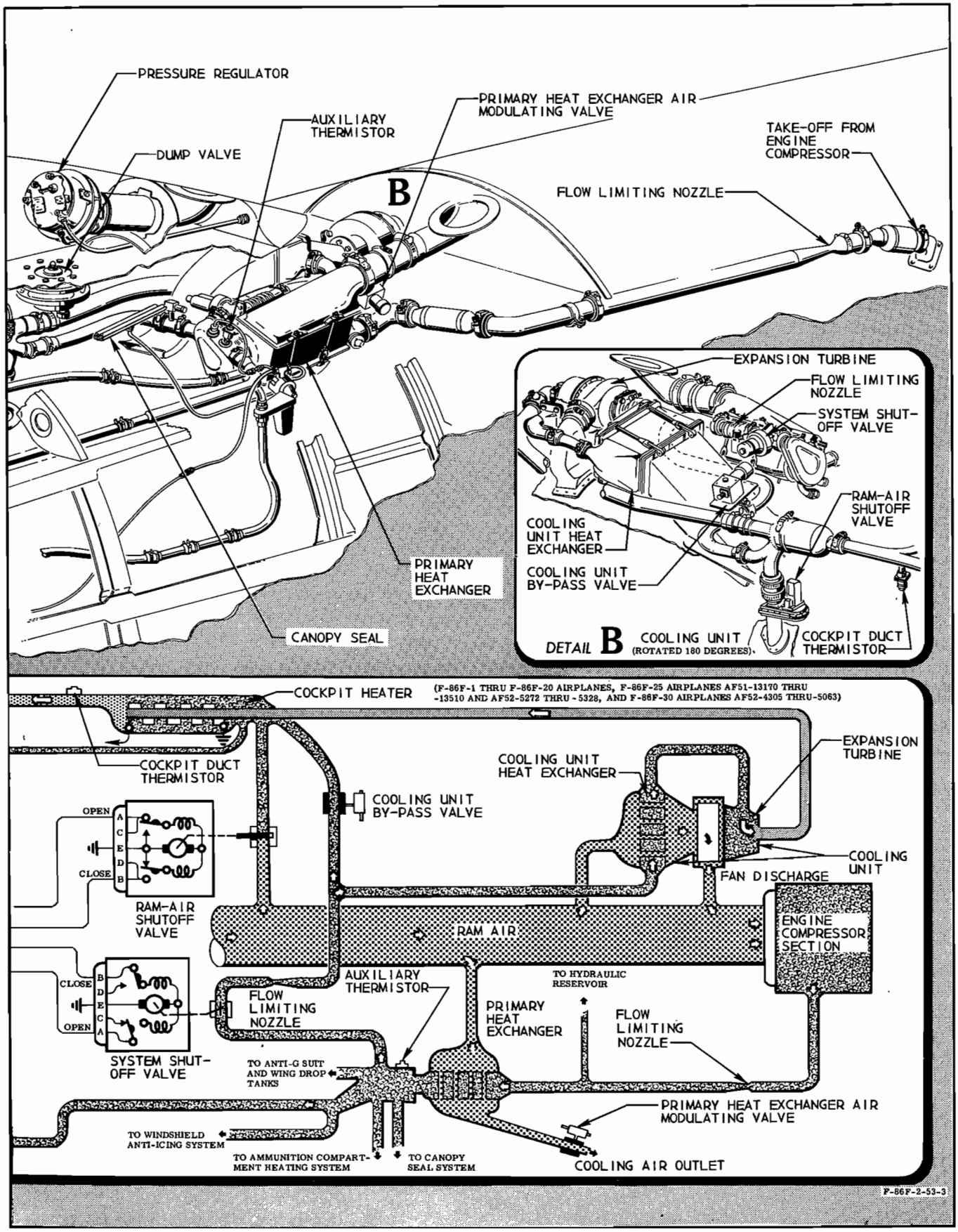


Figure 4-1. Cockpit Air Conditioning and Pressurizing Systems (Sheet 2 of 2)

4-1. COCKPIT AIR CONDITIONING AND PRESSURIZING SYSTEMS.

4-2. The air conditioning and pressurizing systems provide temperature-controlled air for cockpit air conditioning and for canopy windshield auxiliary defrosting, and pressurization for the cockpit and canopy seal. Pressurized air is also supplied to the anti-G suit (paragraph 4-114), drop tanks (paragraph 5-237), utility hydraulic power system fluid reservoir (paragraph 3-23), windshield anti-icing system (paragraph 4-87), strike camera window (paragraph 4-72), and ammunition compartment heating system (paragraph 4-101). Air supply is obtained in the form of hot pressurized air from the final stage of the engine compressor. A primary heat exchanger provides initial cooling of this hot-air supply. A cooling unit, consisting of a second heat exchanger and an expansion turbine, provides further cooling of the air supply when necessary. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5328, and F-86F-30 Airplanes AF52-4305 through -5063, a heater is installed in the duct system. This heater is used to increase the temperature of air going to the cockpit. A temperature control system governs the operation of the primary heat exchanger, the cooling unit, and the heater. A cockpit air pressure regulator is installed inside the canopy. This regulator controls air pressure within the sealed cockpit. An alternate air supply also is available to the air conditioning and pressurizing system. This supply is obtained in the form of cool ram air from the engine air inlet duct. Selection of either engine compressor air supply or ram-air supply is made by means of a switch in the cockpit. This switch operates a system shutoff valve and a ram-air shutoff valve. While ram-air supply is being used, the primary heat exchanger, the cooling unit, and the cockpit air pressure regulator are not being used. The already cool ram air passes directly through the heater and into the cockpit. A dump valve installed in the cockpit maintains proper cockpit air pressure while ram air is being used. An emergency flow-limiting nozzle is installed downstream of the engine compressor air extraction port to restrict airflow in the event a line ruptures. A second flow-limiting nozzle is installed downstream of the system shutoff valve, to limit system airflow when the by-pass valve is open during hot operation. The turbine nozzle limits airflow during cold operation. (See figure 4-1.) Air for windshield and canopy auxiliary defrosting is extracted directly from the primary heat exchanger and is not affected by the system shutoff or the ram-air shutoff valve. Air temperature for the defrosting, anti-icing, and ammunition heating systems is automatically controlled by an auxiliary temperature regulator when any or all of these systems are operating. The auxiliary temperature regulator controls positioning of the primary heat exchanger modulating valve. The cockpit temperature regulator then controls only the positioning of the cooling unit by-pass valve.

4-3. TROUBLE SHOOTING COCKPIT AIR CONDITIONING AND PRESSURIZING SYSTEMS.

TROUBLE	PROBABLE CAUSE	REMEDY
Supply air not available for cockpit air conditioning.	Defective system shutoff valve.	Check electrical circuit. Replace valve.
Cooled air not available for cockpit air conditioning.	Primary heat exchanger cooling-air modulating valve stuck in closed position.	Check electrical circuit. Replace valve.
	Cooling unit by-pass valve stuck in open position.	Check electrical circuit. Replace valve.
	Cooling unit inoperative.	Check position of system shutoff valve to ensure full flow through cooling unit. Replace cooling unit.
Heated air not available for cockpit air conditioning.	Primary heat exchanger cooling-air modulating valve stuck in open position.	Check electrical circuit. Replace valve.
	Cooling unit by-pass valve stuck in closed position.	Check electrical circuit. Replace valve.
Cockpit ram air not available.	Ram-air shutoff valve inoperative. Ram-air duct clogged.	Check electrical circuit. Place cockpit pressure switch at "RAM" to ensure proper operation of valve, and check for duct obstruction.

TROUBLE	PROBABLE CAUSE	REMEDY
Cockpit temperature fluctuates.	Cockpit duct thermistor damaged or cockpit air temperature regulator not functioning properly.	Check electrical circuit by positioning cockpit air temperature selector rheostat to "HOT" and then to "COLD" and observing operation of primary heat exchanger of cooling-air modulating valve. If the modulating valve operates, inspect cockpit duct thermistor for correct resistance values. If resistance values are correct, replace cockpit temperature regulator.
Cockpit fails to pressurize.	Ram-air shutoff valve open or partially open because of defective valve or motor.	Replace valve.
Cockpit air dump system inoperative.	Dump valve solenoid damaged or inoperative. Dump valve diaphragm damaged or inoperative.	Check electrical circuit. Replace dump valve. Check freedom of dump valve by manually depressing diaphragm.
Cockpit air pressure differential cannot be changed.	Cockpit air pressure regulator inoperative. Cockpit pressure selector switch defective.	Replace regulator. Check electrical circuit. Replace switch.
Cockpit air pressure (altitude) not maintained.	Leaks in cabin pressure sealing. Canopy seal inoperative. Cockpit air pressure regulator inoperative. Dump valve in dump position because of faulty electrical continuity. Dump valve defective.	Locate leaks and repair. Check out electrical circuit and settings of pertinent limit switches. Replace check valve. Replace canopy seal pressure regulator. Replace pressure regulator. Check out electrical circuit. Replace cockpit pressure control switch. Replace valve.
Canopy seal inoperative.	Seal ruptured. Canopy seal air pressure regulator defective. Dump and canopy seal limit switches defective or adjusted incorrectly.	Replace seal. Replace pressure regulator. Check out electrical circuit. Replace switches.

4-4. TESTING COCKPIT AIR CONDITIONING AND PRESSURIZING SYSTEMS.

4-5. With engine operating at not less than 70% rpm and canopy closed, test cockpit air conditioning and pressurizing systems as follows:

Note

Do not accomplish steps b., m., and n. for F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes.

a. Position windshield anti-icing control at "OFF."

b. Pull ammunition compartment heat shutoff valve control knob to full up position. (The valve controlled by this knob is to be reset to the open position after completion of test.)

c. Position air outlet selector handle at "BOTH."

d. Position cockpit pressure selector switch at "2.75 P.S.I." or "5 P.S.I."

e. Place cockpit pressure control switch at "PRESS"

f. Position cockpit air temperature control switch at "AUTO."

g. Place cockpit air temperature selector rheostat at "COLD."

gA. Place gun heater switch at "OFF."

h. With preceding control settings, start engine and set it at not less than 70% engine rpm.

i. Rotate cockpit air temperature selector rheostat knob between "COLD" and "HOT." This should cause the primary heat exchanger cooling-air modulating valve and the air cooling unit by-pass valve to supply air at an increased or decreased temperature. Note temperature change by feeling outlet air being discharged to cockpit.

j. Change air outlet selector handle from "BOTH" to "DEFROST" and then to "FLOOR," and feel amount of air issuing from various air outlets.

k. Move canopy auxiliary defrost control to "ON." Cockpit air cooling by-pass valve should operate in proportion to movement of cockpit air temperature selector rheostat, and primary heat exchanger cooling-air modulating valve should operate separately. Check flow of air from canopy and windshield defrosting duct outlets by feeling along outlets.

l. Turn cockpit air temperature selector rheostat to "HOT & HEATER ON." Cockpit heater should go on if heater duct temperature is below 102°C (215°F). Fluctuation of ammeter indicates heater operation.

m. Move canopy auxiliary defrost control to "OFF" and cockpit air temperature selector rheostat to "COLD." Cockpit heater should go off.

n. Repeat step l.; then move windshield anti-icing control to "ON." Windshield anti-icing heater should go on, and cockpit heater should be cut off.

4-5A. LUBRICATING COCKPIT AIR CONDITIONING AND PRESSURIZING SYSTEM THREADED FITTINGS.

4-5B. During installation of air conditioning and pressurizing system duct components, lubricate all threaded fittings with antiseize compound (Specification JAN-A-669). Do not apply lubricant to the first two threads of the fitting. Do not allow lubricant to enter the tubing.

4-6. COCKPIT AIR DUCT SYSTEM.

4-7. The cockpit air duct system consists of two ducts which distribute air through side and floor outlets. The outlet at the left side of the pilot can be manually adjusted to direct air in any direction from the face of the outlet, or it can be shut off. The outlet at the right side of the pilot is not adjustable, but it incorporates a shutoff valve and directs air to the canopy for partial defrosting. The floor outlet is directed downward to the pilot's feet. Airflow through the floor outlet may be entirely or partially diverted to the windshield defrosting manifold. A manual control in the control panel on the left console operates a valve by push-pull control to divert the forward air duct supply into the windshield defrosting manifold supply ducts.

4-8. TESTING COCKPIT AIR DUCT SYSTEM. See figure 4-2.

4-9. COCKPIT AIR DUCT SYSTEM SHUTOFF VALVE.

4-10. The system shutoff valve is attached to the downstream side of the primary heat exchanger outlet in the cockpit air conditioning duct. The valve may be reached through the aft radio equipment compartment left-hand access door. The valve can shut off air for cockpit air conditioning without interrupting the flow of air to the anti-icing, defrosting, ammunition heating, anti-G suit, and canopy seal systems. The butterfly-type system shutoff valve is actuated by a 28-volt d-c electric motor. When the cockpit pressure control switch is placed at "RAM," the valve closes; when the switch is moved to "PRESS," the valve opens. This permits the use of all the auxiliary heating systems during ram-air operation.

TESTING DUCT PRESSURE

1 Insert a solid .032-inch metal disc in flange connection between engine compression supply manifold and primary heat exchanger.

2 Place gun heater switch at "OFF" to close ammunition compartment heat shutoff valve.

3 Place canopy defrost control handle at "OFF" to close canopy auxiliary defrost valve.

4 Place windshield anti-ice control handle at "OFF" to close windshield anti-ice valve.

5,6 Disconnect anti-G suit and canopy seal pressure supply lines, and plug outlets.

7 Disconnect hydraulic reservoir air pressure supply line and connect external pressure line. Pressurize ducts to 115 P.S.I. Check for leaks in ducting and make necessary repairs.

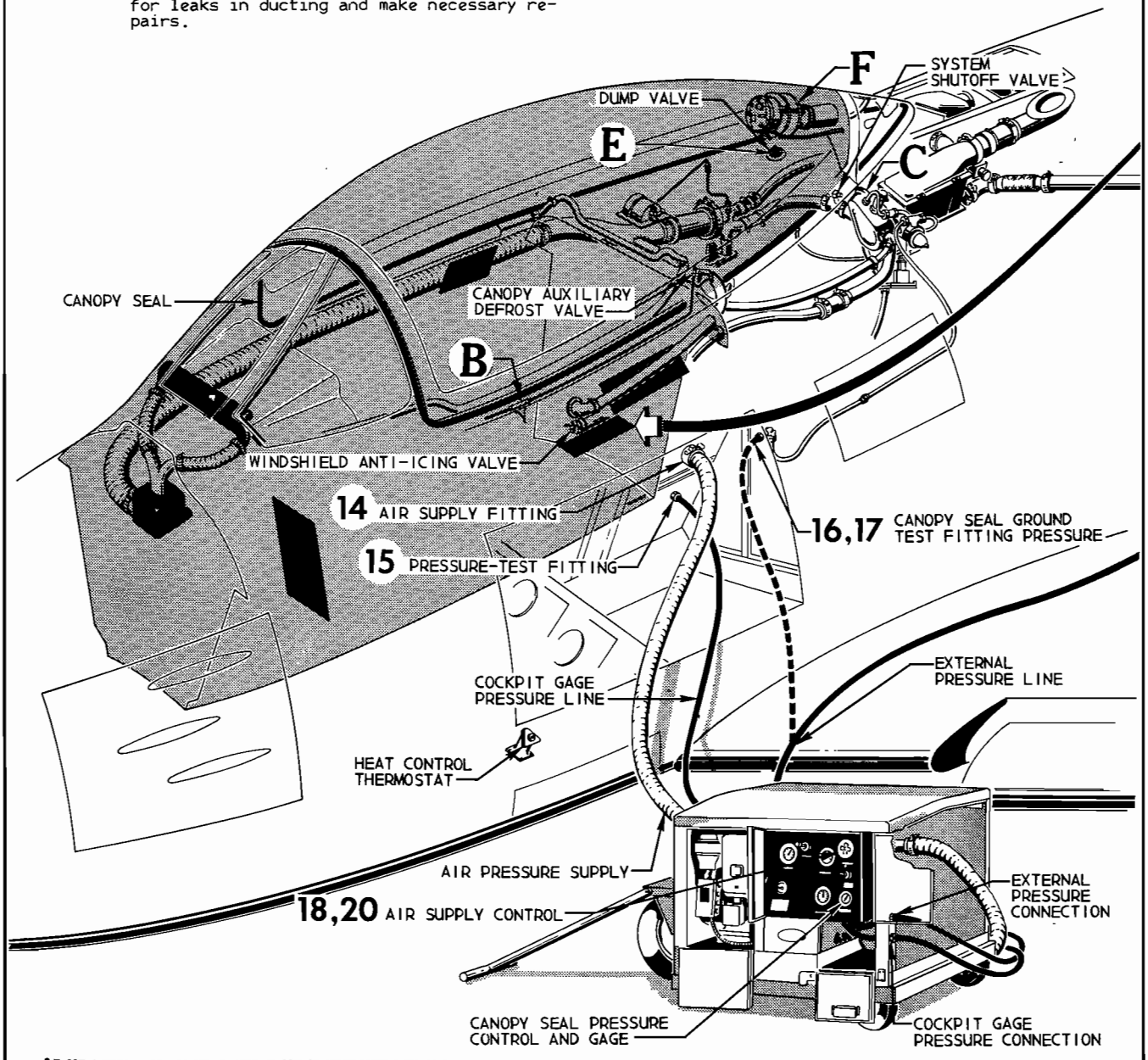
8 Remove plug from anti-G suit and canopy seal supply lines and reconnect lines to ducts.

9 Disconnect external pressure line from hydraulic air pressure supply line take off in duct. Re-connect hydraulic air pressure supply line to duct.

TESTING COCKPIT PRESSURE

10 Place canopy defrost handle at "OFF" to close canopy auxiliary defrost valve.

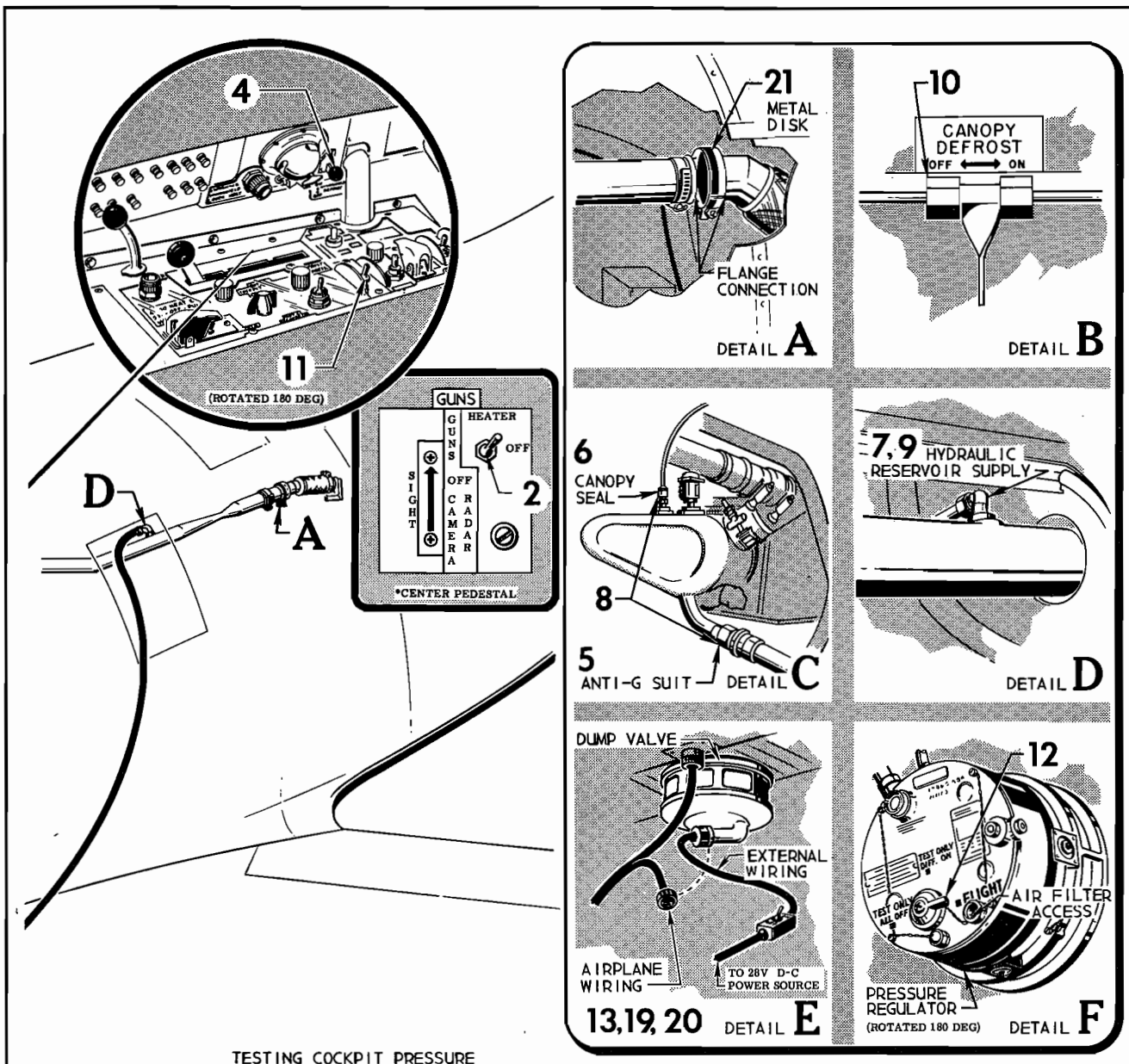
11 Place cockpit pressure control switch at "PRESS" to close dump valve and open system shutoff valve.



* F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

F-86F-2-53-6

Figure 4-2. Testing Cockpit and Duct Pressure (Sheet 1 of 2)



TESTING COCKPIT PRESSURE

12 Place selector handle on pressure regulator at "TEST ONLY - ALL OFF".

13 Disconnect airplane wiring from solenoid dump valve and connect external wiring to valve so that cockpit pressure can be dumped from outside of airplane.

14 Connect air supply line to cockpit pressure test fitting.

15 Connect cockpit pressure gage line to pressure test fitting.

16 Connect pressure line to canopy seal ground test fitting.

17 Close canopy and apply at least 25 psi air pressure at canopy ground pressure test fitting. Canopy seal should inflate.

18 Slowly open air pressure supply control until cockpit pressure gage reads 5 P.S.I. Maximum allowable leakage is 57 C.F.M. on new airplanes. On airplanes in service maximum allowable leakage before repairs are necessary is 91 C.F.M.

19 Dump pressure from cockpit by closing on-off switch in external wiring to open solenoid dump valve.

20 Close dump valve with on-off switch at "OFF" and increase pressure in cockpit to 10.5 to 11.3 in. Hg. to check operation of pressure relief valve. Do not exceed 5.75 P.S.I. cockpit differential pressure during this check.

21 Remove metal disc from engine compressor supply line and reconnect line to primary heat exchanger.

F-86F-2-53-2A

Figure 4-2. Testing Cockpit and Duct Pressure (Sheet 2 of 2)

4-11. REMOVING SYSTEM SHUTOFF VALVE. To remove system shutoff valve, detach electrical plug and disconnect clamp at upstream side of valve. Then remove bolts from flange at downstream end.

4-12. INSTALLING SYSTEM SHUTOFF VALVE. To install system shutoff valve, insert bolts in flange at downstream end of valve, attach a clamp, and then install electrical plug.

4-13. TESTING SYSTEM SHUTOFF VALVE. To test the system shutoff valve, place cockpit pressure control switch at "RAM" and observe that valve closes. Then place switch at "PRESS" and check for proper opening.

4-14. COCKPIT AIR DUCT SYSTEM RAM-AIR SHUTOFF VALVE.

4-15. The ram-air shutoff valve (figure 4-1) is accessible through the aft radio equipment compartment right-hand access door. When the ram-air shutoff valve is open, the ram-air intake duct introduces air from the engine air inlet duct into the main cockpit supply duct. The electrically actuated shutoff valve is controlled from the cockpit by the cockpit pressure control switch.

4-16. REMOVING RAM-AIR SHUTOFF VALVE. To remove ram-air shutoff valve, proceed as follows:

a. Remove aft radio equipment access door on fuselage right side.

b. Remove gyrosyn compass amplifier and slaved gyro.

c. Disconnect electrical receptable from valve motor.

d. Remove shutoff valve upper and lower mounting bolts from duct flanges and remove valve.

4-17. INSTALLING RAM-AIR SHUTOFF VALVE. To install ram-air shutoff valve, proceed as follows:

a. Position valve between duct flanges (motor forward) and install mounting bolts.

b. Connect electrical receptacle to valve motor.

c. Install gyrosyn compass amplifier and slaved gyro.

d. Install aft radio equipment access door.

4-18. COCKPIT AIR HEATING AND COOLING SYSTEM.

4-19. The cockpit supply air leaves the extraction port at the engine compressor at a relatively high temperature. For initial cooling, it is routed through a primary heat exchanger. The cooling unit by-pass valve then diverts the flow of air either directly to the cockpit (through the cockpit heater duct) or through a cooling unit, depending on demands of the cockpit temperature regulator. When the cockpit pressure control switch is in the "RAM" position, the system shutoff valve is closed and the ram-air shutoff valve is open. Air is extracted from the engine air inlet duct and routed directly to the cockpit through the cockpit heater duct. When the cockpit pressure control switch is in the "RAM" position and the cockpit temperature selector rheostat is turned to "HOT & HEATER ON" ("HOT" position on F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes), the cockpit heater is energized, provided the heater duct temperature is below 102°C (215°F). When ram air is used, power is disconnected from the cockpit temperature control switch, so that cockpit temperature control (both manual and automatic) is cut off. With the cockpit pressure control switch in the "RAM" position, the dump valve solenoid is energized and cockpit air is vented directly to atmospheric pressure.

4-20. COCKPIT AIR HEATING AND COOLING SYSTEM HEATER.

4-21. On all airplanes except F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes, an auxiliary electrical resistance-type heater of 4-kilowatt input capacity is installed in the ducting system between the cockpit and the junction between the hot- and cold-air ducts. (See figure 4-1.) The heater may be reached through the aft radio equipment compartment left-hand access door. This heater adds heat to the system whenever the system air temperature is insufficient to satisfy the heating requirements of the cockpit. Since this heater is installed downstream of the ram-air inlet, it will supply heat to the cockpit during ram-air operation if required.

4-22. REMOVING HEATER. To remove cockpit heater, proceed as follows:

a. Remove aft radio equipment access doors from both sides of fuselage.

b. Remove gyrosyn compass amplifier and slaved gyro through right access door.

c. Remove electronic equipment through left access door.

d. Remove phenolic cover from left side of heater and disconnect wiring.

e. Loosen hose clamps and remove section of ducting immediately behind heater.

f. Remove clamp from forward end of heater and remove heater.

4-23. INSTALLING HEATER. To install cockpit heater, proceed as follows:

a. Support heater in position and install clamp at forward end; then install section of ducting behind heater.

b. Connect electrical wiring to heater and install phenolic cover.

c. Install electronic equipment, gyrosyn compass amplifier, and slaved gyro.

d. Install aft radio equipment access doors to both sides of fuselage.

4-24. COCKPIT AIR HEATING AND COOLING SYSTEM PRIMARY HEAT EXCHANGER.

4-25. The primary heat exchanger (figure 4-1) is located within the fuselage area just aft of the canopy. It con-

tains hot-air inlet and outlet ports connected internally by a coiled tube. A cooling-air inlet is attached to engine air intake duct. A cooling-air exhaust duct, attached to the aft end of the heat exchanger, exhausts cooling air overboard. As cooling air flows across the coils, it reduces the temperature of the hot air passing through the coils from the engine compressor. The heat exchanger modulating valve regulates the amount of cooling air flowing through the heat exchanger. The temperature control system automatically controls the modulating valve to maintain desired temperatures. On F-86F-20 and F-86F-25 Airplanes, a Stratos 16805 primary heat exchanger is used. On all airplanes except F-86F-20 and F-86F-25 Airplanes, an AiResearch 80151 primary heat exchanger is used.

Note

A Stratos primary heat exchanger must be used when the airplane contains a Stratos cooling unit. Likewise, an AiResearch primary heat exchanger must be used when the airplane contains an AiResearch cooling unit.

4-26. REMOVING PRIMARY HEAT EXCHANGER. To remove primary heat exchanger, proceed as follows:

a. Remove primary heat exchanger access door.

b. Remove three duct clamps at each end of heat exchanger.

c. Loosen toggle nuts and remove four toggles from cooling-air inlet duct.

d. Remove heat exchanger.

4-27. INSTALLING PRIMARY HEAT EXCHANGER. To install primary heat exchanger, proceed as follows:

a. Install four toggles and nuts to cooling-air inlet duct.

b. Install clamps to ducts at each end of heat exchanger.

c. Install primary heat exchanger access door.

4-28. COCKPIT AIR HEATING AND COOLING SYSTEM COOLING UNIT.

4-29. The cooling unit (figure 4-1) is located within the fuselage area just aft of the canopy. It consists of an air-to-air heat exchanger and an air-driven expansion turbine. When the cooling unit by-pass valve is closed, heated air from the primary heat exchanger is routed through the coils of the cooling unit. Cooling air from the engine air intake duct flowing across the coils of the cooling unit reduces the temperature of the cockpit air. As the cockpit air leaves the coils of the cooling unit, it is forced through the expansion turbine, where the temperature is further reduced. The turbine consists of a vaned rotor-type turbine and a fan connected by a common shaft. The fan extends into the chamber of the cooling unit heat exchanger just upstream of the cooling-air outlet. As air from the coils is forced through the turbine, it causes the vaned rotor turbine to rotate. Since the turbine and fan are mounted on a common shaft, the fan rotates at the same speed as the turbine. As the fan rotates, it draws more cooling air across the coils of the cooling unit and then exhausts the air back into the engine air intake duct. Cockpit air temperature is greatly reduced as more cooling air is drawn across the coils of the cooling unit. A Stratos 16801 turbine unit is installed on F-86F-20 and F-86F-25 Airplanes. This unit incorporates an oil-level sight gage, which must be checked for proper level after each 100 hours of airplane flying time. On all airplanes except F-86F-20 and F-86F-25 Airplanes, an AiResearch 57120 turbine unit is used. Replacement of turbine units must be made with like units. On F-86F-20 and F-86F-25 Airplanes, a Stratos 16804 heat exchanger and a Stratos 16801 expansion turbine are used. On all airplanes except F-86F-20 and F-86F-25 Airplanes, an AiResearch 80150 heat exchanger and an AiResearch 57120 expansion turbine are used.

Note

Do not use a Stratos heat exchanger in conjunction with an AiResearch turbine. Likewise, do not use an AiResearch heat exchanger in conjunction with a Stratos turbine. If necessary to replace a Stratos unit with an AiResearch unit, or to replace an AiResearch unit with a Stratos unit, make the same change on both units of the cooling unit and also on the primary heat exchanger. Do not have a mixed group in any one airplane.

4-30. REMOVING COOLING UNIT HEAT EXCHANGER. To remove cooling unit heat exchanger, proceed as follows:

a. Remove cooling unit heat exchanger access door.

b. Loosen toggle nuts from heat exchanger flanges.

c. Remove heat exchanger inlet duct.

d. Remove duct clamps from each end of heat exchanger at duct connections.

e. Remove heat exchanger.

4-31. INSTALLING COOLING UNIT HEAT EXCHANGER. To install cooling unit heat exchanger, proceed as follows:

a. Insert heat exchanger between heat exchanger flanges and attach toggle nuts.

b. Connect air conditioning ducts to outlets at each end of exchanger and tighten clamps.

c. Install cooling unit heat exchanger access door.

4-32. REMOVING COOLING UNIT EXPANSION TURBINE. To remove cooling unit expansion turbine, proceed as follows:

a. Remove turbine access door.

b. Remove 10 bolts from air conditioning air intake duct attachment fitting.

c. Disconnect wire clamps from cooling-air outlet duct connection.

d. Remove clamp from air conditioning air outlet at downstream side of turbine and fan inlet side of turbine.

e. Remove turbine.

4-33. INSTALLING COOLING UNIT EXPANSION TURBINE. To install cooling unit turbine, proceed as follows:

a. Connect cooling-air intake duct to inlet side of turbine and install clamp.

b. Connect cockpit air conditioning duct to attachment fitting on turbine and install 10 bolts.

c. Attach cooling-air outlet connection and install wire clamp.

d. Connect cockpit air conditioning duct to downstream turbine outlet and install clamp.

e. Install turbine access door.

4-34. COCKPIT AIR TEMPERATURE CONTROL SYSTEM.

4-35. The cockpit air temperature control system (figures 4-3 through 4-6) consists of a temperature control master switch, a temperature selector rheostat, a cockpit air temperature control regulator, and a cockpit air duct thermistor. The system also includes an auxiliary air temperature regulator, a thermistor for monitoring the temperature of the anti-icing and defrosting air, an air cooling unit by-pass valve, and a cooling-air modulating valve. The temperature control system regulates supply air temperature for the cockpit, for windshield, canopy, and strike camera window defrosting, for windshield anti-icing, and (on all airplanes except F-86F-25 AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and subsequent airplanes) for ammunition compartment heating. During normal operation, with anti-icing, defrosting, and ammunition compartment heating systems turned off, cockpit air temperature is regulated automatically by the cockpit temperature regulator at any temperature between –6.7°C (20°F) and 116°C (240°F) as selected by the pilot with the selector rheostat. Automatic regulation is achieved through use of a resistance-type bridge circuit. In the bridge circuit, the cockpit temperature selector rheostat forms one leg of the bridge and a thermistor in the air duct forms the second leg. Changes from a balanced bridge condition (duct air temperature change affecting thermistor resistance or cockpit temperature selector rheostat repositioned) are sensed in the air temperature regulator. The regulator in turn controls the operation of the cooling-air modulating valve or the cooling unit by-pass valve as required. When any one, or all, of the defrosting, anti-icing, and ammunition compartment heating systems are operating, the auxiliary temperature regulator and thermistor control the cooling-air modulating valve, and the cockpit air temperature regulator and duct thermistor control the cooling unit by-pass valve. In event of a normal system malfunction, the cockpit air temperature master switch can be used as a manual override control to select heated or cooled air as desired.

4-36. FUNCTON OF COCKPIT TEMPERATURE CONTROL SYSTEM. When the cockpit air temperature control switch is "OFF" or the cockpit pressure control switch is at "RAM," air enters the cockpit at the prevailing supply air temperature. When the cockpit air temperature control switch is at "AUTO" and the canopy auxiliary defrost, ammunition heat, and windshield anti-icing controls are "OFF," the cockpit air temperature regulator and the cockpit duct thermistor automatically control the flow of hot and/or cool air to the cockpit by properly positioning the air cooling unit by-pass valve and the primary heat exchanger cooling-air modulating valve. (Refer to paragraph 4-38 for function of the cockpit air temperature regulator.) When the cockpit air temperature control switch is placed at "COLD," the primary heat exchanger cooling-air modulating valve turns to full open position and the air cooling unit by-pass valve closes. This routes all air to the cockpit through the cooling unit, bypassing the automatic temperature regulator and cockpit duct thermistor. When the cockpit temperature control switch is placed at "HOT," the air cooling unit by-pass valve turns to full open position and the primary heat exchanger cooling-air modulating valve closes, thereby by-passing the automatic temperature control units and sending the hottest air possible to the cockpit. On all airplanes except F-86F-25 Airplanes AF52-5329 through AF52-5530, F-86F-30 Airplane AF52-5064, and subsequent airplanes, when the cockpit air temperature selector rheostat is turned to "HOT & HEATER ON," the cockpit heater is energized whenever the system demands hot air in either manual or automatic operation if the heater duct temperature is below 102°C (215°F). When the canopy auxiliary defrost control is "ON," air extracted from the primary heat exchanger high-pressure outlet manifold is ducted directly to the windshield and canopy auxiliary defrost outlets, and a microswitch is actuated which de-energizes the cockpit air control relay. When the cockpit air control relay is de-energized, cockpit air temperature with system in either manual or automatic operation is controlled by the air cooling unit by-pass valve only.

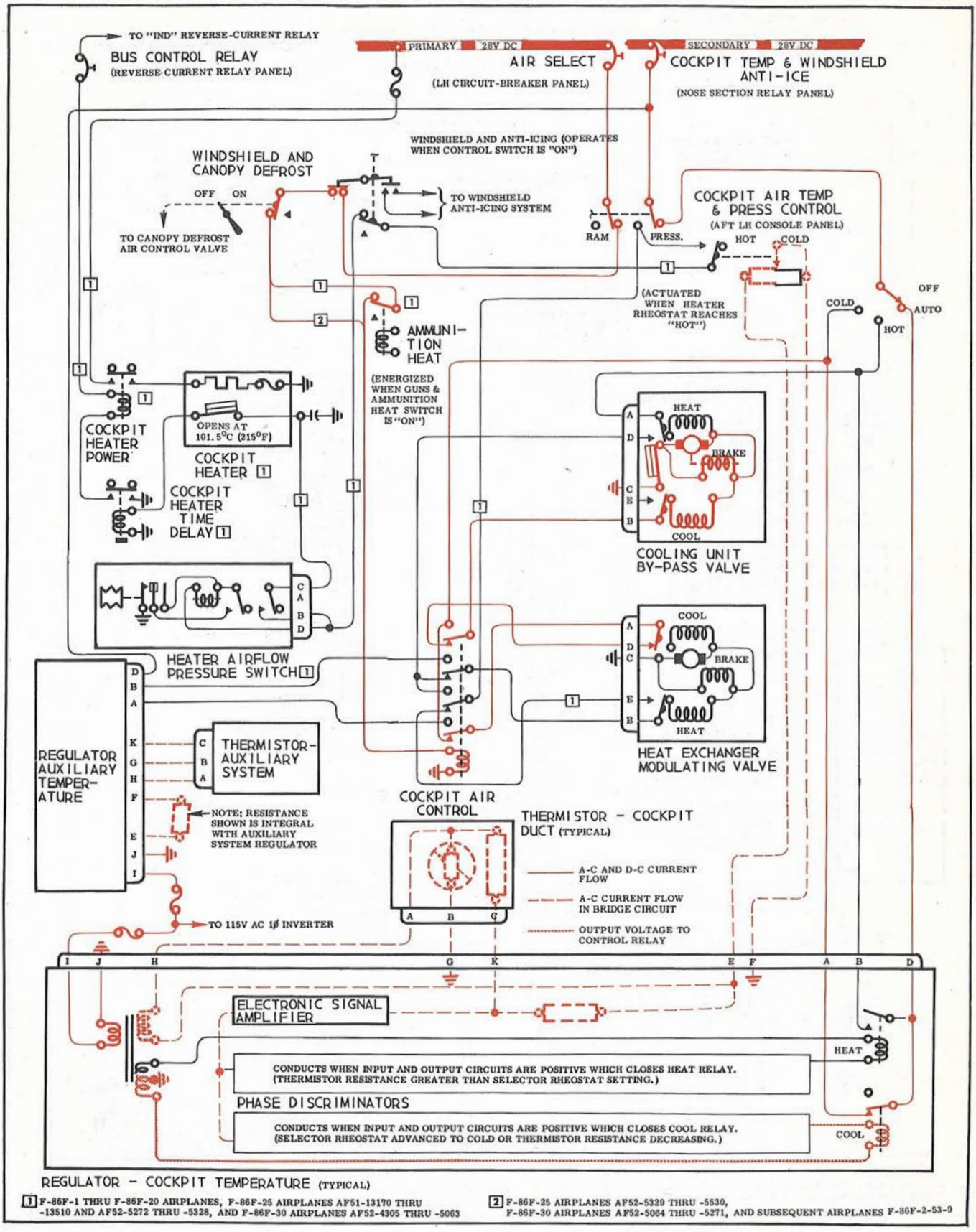


Figure 4-3. Cockpit Air Conditioning Temperature Control—System Demanding Cool Air—Canopy Auxiliary Defrost Control "OFF"

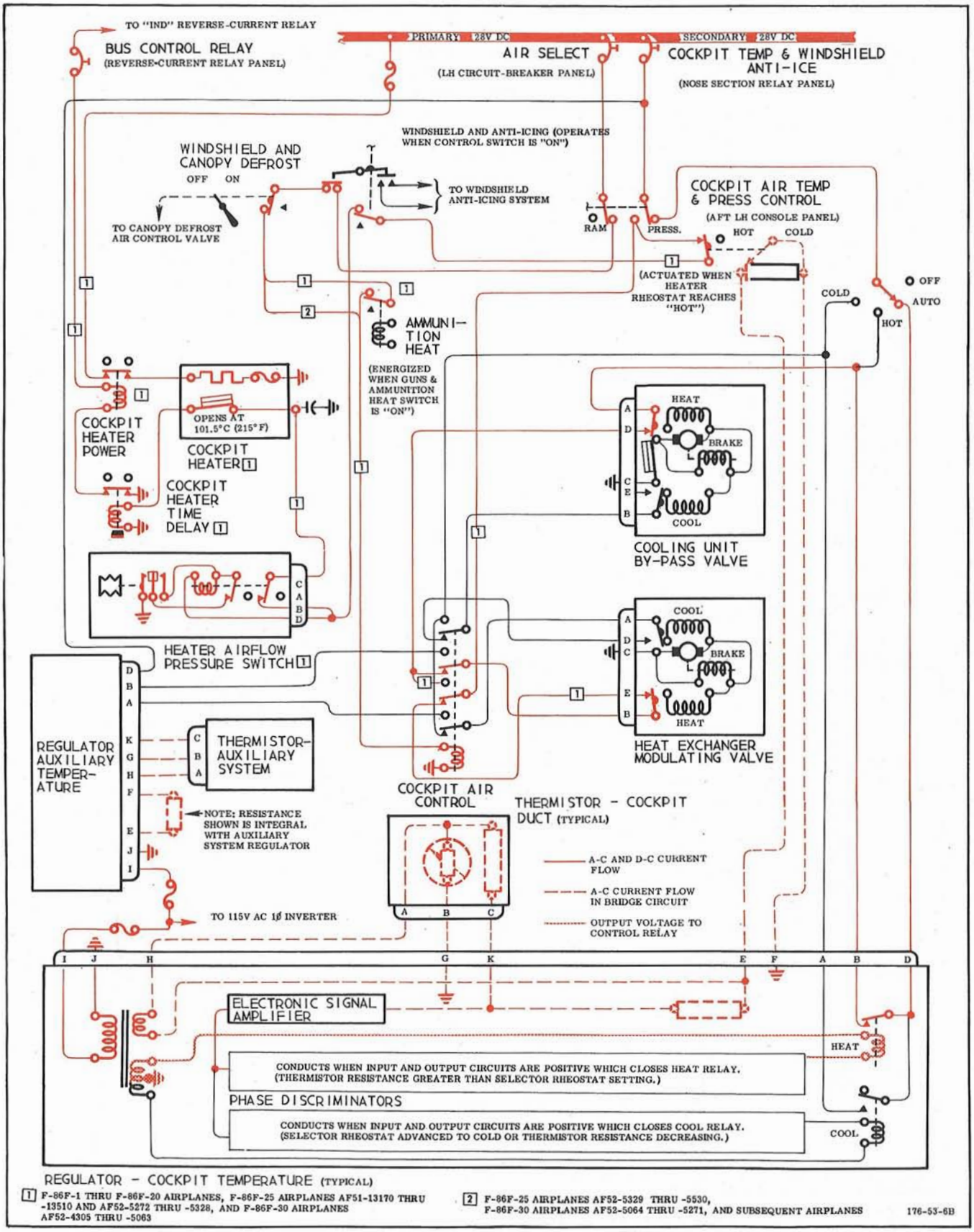


Figure 4-4. Cockpit Air Conditioning Temperature Control—System Demanding Hot Air—Canopy Auxiliary Defrost Control "OFF"

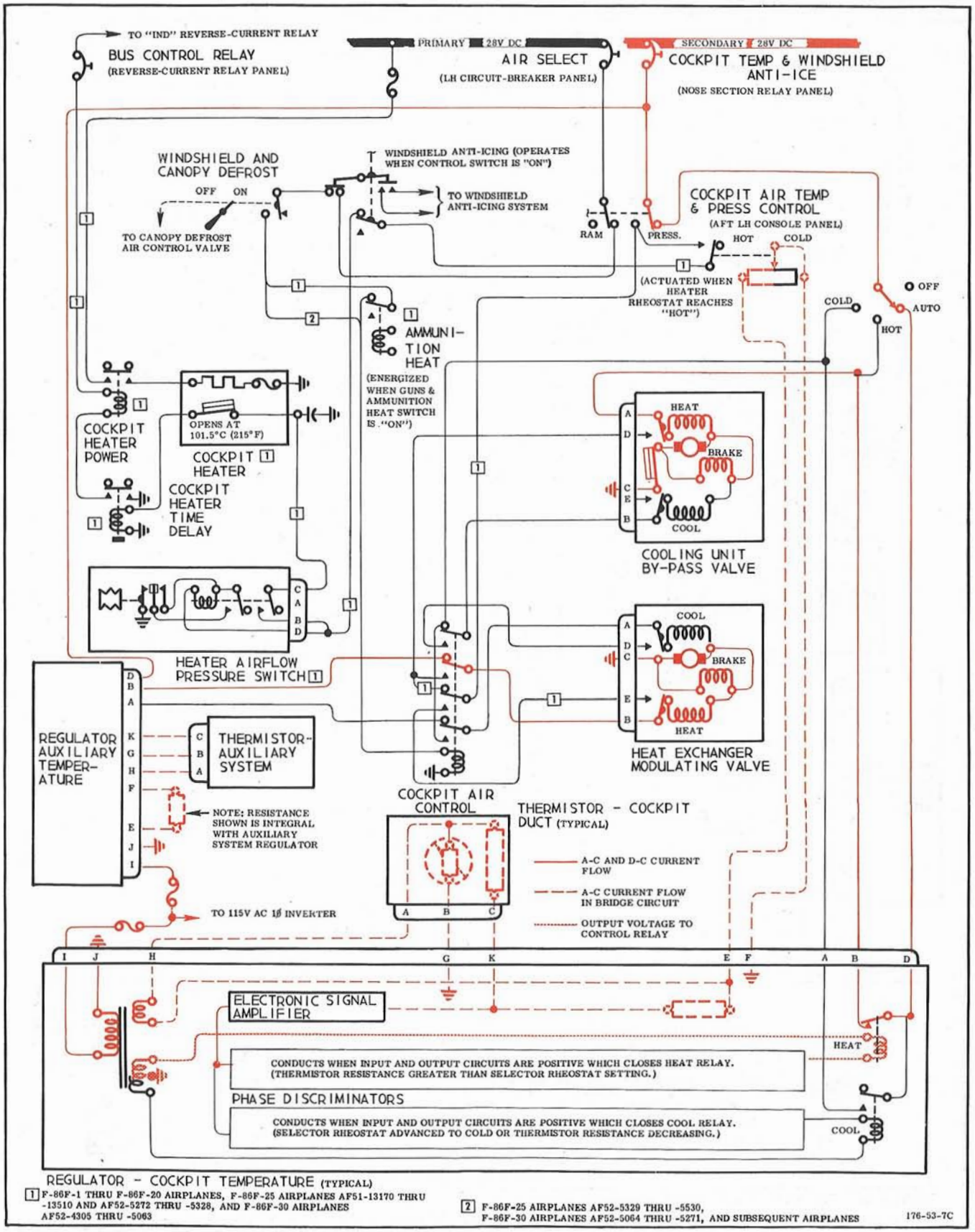


Figure 4-5. Cockpit Air Conditioning Temperature Control—System Demanding Hot Air—Canopy Auxiliary Defrost Control "ON"

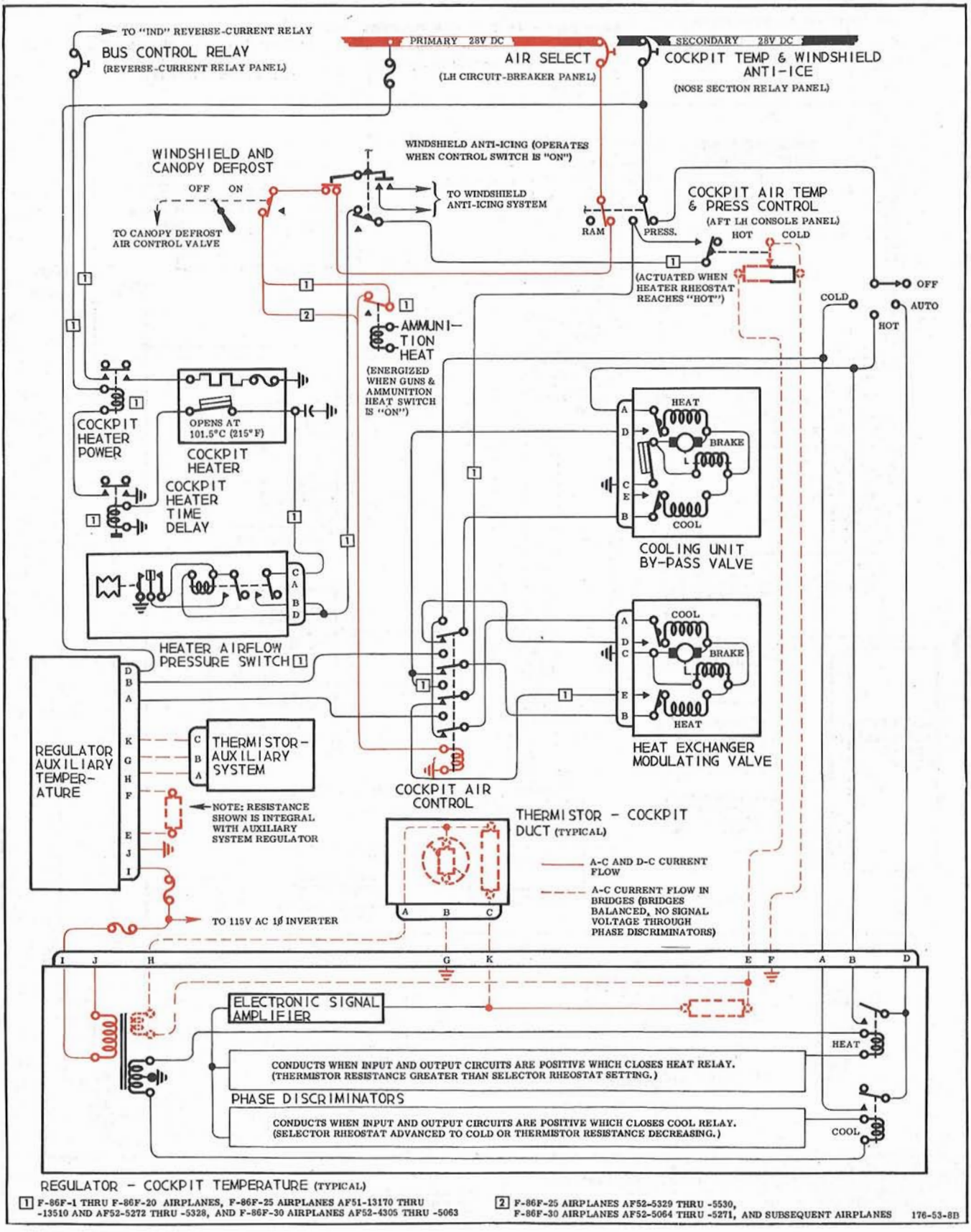


Figure 4-6. Cockpit Air Conditioning Temperature Control—System Balanced—Canopy Auxiliary Defrost Control "OFF"

The auxiliary temperature regulator and auxiliary system thermistor automatically control the temperature of the air for windshield and canopy auxiliary defrosting by properly positioning the primary heat exchanger air modulating valve. (See figures 4-3 through 4-6.)

4-37. COCKPIT AIR TEMPERATURE CONTROL SYSTEM REGULATOR.

4-38. The cockpit air temperature regulator is located in the right radio compartment just forward of the access door. The temperature regulator is an electronic unit which provides automatic control of cockpit air temperature by opening or closing the cooling unit by-pass valve and the primary heat exchanger modulating valve. (See figures 4-3 through 4-6.) It contains a bridge circuit; a transformer; rectifier, amplifier, and phase discriminator tubes; and a-c actuated heat and cool relays. This unit functions as follows: With selector rheostat in fixed position and air duct temperature falling, the thermistor resistance increases and unbalances the bridge circuit. The resistance to ground is then higher in the bridge leg containing the thermistor than in the bridge leg containing the cockpit temperature selector rheostat. Since the a-c voltages utilized for the bridge and regulator circuits are obtained from the same transformer, the two circuits are mutually phased. Also, since the amplitude of the voltage is greater in the bridge leg containing the higher resistance to ground, the regulator output circuit is able to sense the unbalance in the bridge and also to determine in which leg of the bridge circuit the unbalance exists. The regulator then causes the cooling-air by-pass valve and the cooling-air modulating valve to open or close as required until duct temperature changes thermistor resistance to where the bridge is again balanced. (See figures 4-2 through 4-6.) Regulators requiring adjustment should be replaced with serviceable units.

4-39. COCKPIT AIR TEMPERATURE CONTROL SYSTEM AUXILIARY REGULATOR.

4-40. The auxiliary temperature control regulator is located next to the cockpit temperature regulator in the right radio compartment. It is of the same type and description as the cockpit air temperature control regulator. (Refer to paragraph 4-38.) This regulator controls the cooling-air modulating valve when the anti-icing, defrosting, or ammunition compartment heating system is in use.

4-41. COCKPIT AIR TEMPERATURE CONTROL SYSTEM COOLING UNIT BY-PASS VALVE.

4-42. The cooling unit by-pass valve is installed in the cockpit air duct between the take-off to the cooling unit and the cockpit ducting. (See figure 4-1.) The by-pass valve may be reached through the aft radio equipment compartment right-hand access door. Its purpose is to supplement the action of the primary heat exchanger cooling-air modulating valve in conditioning the cockpit supply air to meet the temperature demands of the cockpit air duct thermistor. When the thermistor senses the need for hot air, the by-pass valve opens and the cooling-air modulating valve closes. When cold air is demanded, the by-pass valve closes and the modulating valve opens. When anti-icing, defrosting, or ammunition compartment heating system is in use, the by-pass valve provides the sole means of controlling cooling or heating of cockpit supply air. The by-pass valve routes supply air through the cooling unit, by-passes the cooling unit, or (on all airplanes except F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes) routes air through the electrical heater as required. The valve is powered by a 28-volt d-c actuator and has an opening and closing time of 5 to 10 seconds.

4-43. COCKPIT AIR TEMPERATURE CONTROL SYSTEM PRIMARY HEAT EXCHANGER COOLING-AIR MODULATING VALVE.

4-44. The cooling-air modulating valve, located at the primary heat exchanger cooling-air exhaust duct, regulates the amount of cooling air that passes through the heat exchanger. The modulating valve may be reached through the aft radio equipment compartment right-hand access door. When anti-icing, defrosting, and ammunition compartment heating systems are off, the modulating valve works in conjunction with the cooling unit by-pass valve on signals from the cockpit air temperature regulator. When any of these systems is on, the modulating valve is controlled by the auxiliary air temperature regulator and thermistor. The valve is powered by a 28-volt d-c actuator and has an opening and closing time of 7 to 10 seconds.

4-45. COCKPIT AIR PRESSURE REGULATOR.

4-46. The cockpit pressure regulator (figure 4-1) is located in the aft end of the canopy. It regulates cockpit air pressure by controlling outflow of pressurized air from the cockpit. The regulator consists of an outflow valve section and a control section. The outflow valve section consists of the outflow valve and cover. The outflow valve housing forms a passage for discharge of cockpit air to atmospheric pressure. Air discharge is controlled by the outflow valve. The valve is suspended from the actuator diaphragm. Movement of the diaphragm opens or closes the valve. A diaphragm backing spring in the control chamber tends to hold the valve closed when differential pressure is not exerted across the diaphragm. Cockpit pressure is vented into the area between the outflow valve cover and the balanced diaphragm. The actuator diaphragm and the valve cover have control chamber pressure applied to one side and cockpit pressure applied to the other. The balance diaphragm has atmospheric pressure applied to one side

and cockpit pressure to the other. Because of this arrangement, a slight change of pressure on the diaphragm immediately affects position of the valve. The control section contains the isobaric control system and the dual differential control system. A repressurization rate control valve is mounted externally on the unit. It is connected to the control chamber and selector valve by hoses. The isobaric control section consists of an evacuated bellows, a metering valve, a metering valve spring, a valve seat, a rocker arm, a tension spring, and a spring adjusting screw. The dual differential control system consists of a diaphragm, a high-pressure differential compression spring and adjustment screw, a solenoid, a metering valve, a valve seat, and a low-differential tension spring with linkage and adjusting screw. The repressurization rate control system consists of a metering valve and valve seat, a diaphragm and diaphragm backing spring, and a chamber containing a needle valve orifice and a needle valve. Cockpit air is bled into control chambers of the outflow valve, the control section, and the repressurization rate control through a filter. The filter is located in a cross fitting. (See figure 4-2.) A three-way selector valve is also located on the regulator. This selector is normally safetied in the "FLIGHT" position. When cockpit pressurization is checked, the selector is placed at "TEST ONLY—ALL OFF." When differential pressure is checked, the selector is placed at "DIFFERENTIAL ON." The four adjustment screws on forward end of the regulator are set at the factory. They should not be adjusted while the regulator is in the airplane.

4-47. FUNCTION OF COCKPIT AIR PRESSURE REGULATOR. When the test valve handle is in the "FLIGHT" position, the pressure regulator is in normal operation. During normal operation, the pressure regulator controls cockpit pressure through five stages of operation: unpressurized, isobaric, low-differential, high-differential, and pressure change-over. In the unpressurized range of operatiton, cockpit pressure is substantially the same as atmospheric pressure up to 12,500 feet, regardless of the position of the cockpit pressure selector switch. In the isobaric range, with the cockpit pressure selector switch in the "2.75 P.S.I." position, cockpit pressure is maintained at a 12,500-foot altitude from 12,500 feet to 21,200 feet. In this range, with the pressure selector switch at "5 P.S.I.," cockpit pressure is maintained at a 12,500-foot altitude from 12,500 feet to 31,000 feet. In the low-differential range, with the cockpit pressure selector switch in the "2.75 P.S.I." position, the differential between cockpit air pressure and atmospheric pressure is maintained at 2.75 psi at all altitudes above 21,200 feet. In the high-differential range, with the cockpit pressure selector switch in the "5 P.S.I." position, the differential between cockpit air pressure and atmospheric pressure is maintained at 5.00 psi at all altitudes above 31,000 feet. During a change from low- to high-differential operation with the airplane in level flight, the rate of cockpit pressure increase is a maximum of 2.00 in. Hg per minute. (See figures 4-1 and 4-2.)

4-48. REMOVING AIR PRESSURE REGULATOR. To remove pressure regulator, disconnect atmosphere connection at "T" on forward side of regulator body and remove clamp that attaches regulator to outflow duct.

4-49. INSTALLING AIR PRESSURE REGULATOR. To install pressure regulator, attach regulator body to front end of outflow duct, tighten attaching clamp, and then connect atmosphere line to "T" on front of regulator body.

4-50. CLEANING AIR PRESSURE REGULATOR FILTER. Remove filter assembly by cutting lockwire and removing screw cap that holds filter in place. Wash filter assembly in trichlorethylene (Specification MIL-T-7003) and dry with compressed air. Do not remove copper ribbon. After cleaning, position filter assembly, replace cap, and safety. (See figure 4-2.)

4-51. CLEANING AIR PRESSURE REGULATOR OUTFLOW VALVE FACE AND SEAT. The outflow valve face and seat can be cleaned with a soft, clean cloth if inspection shows the presence of dirt or foreign material. Do not use compressed air.

4-52. COCKPIT AIR PRESSURE DUMP VALVE.

4-53. Cockpit pressure relief, vacuum (or negative pressure) relief, and pressure dumping are provided by one unit, the dump air pressure valve. Vacuum relief is automatic and consists of the pressure actuation of a poppet-type diaphragm valve, which opens to equalize the internal-external cockpit pressures. The positive-pressure relief valve is set to operate at a differential of not more than 11.3 in. Hg or less than 10.5 in. Hg between cockpit air pressure and atmospheric pressure, and the vacuum (or negative-pressure) relief valve setting is 0.5 in. Hg (maximum). Positive-pressure relief is required if the cockpit air pressure regulator fails, and negative-pressure relief is required during a rapid descent of the airplane whenever the pressure regulator fails to provide the necessary reduction rate in pressure differential change. The valve instantaneously dumps all cockpit air pressure whenever the cockpit pressure control switch is moved to the "RAM" position. This control, located in the control panel on the left console in the cockpit, dumps the pressure by energizing a solenoid valve in the air outlet line of the dump valve. (See figure 4-1.)

4-54. REMOVING DUMP VALVE. To remove dump valve, proceed as follows:

a. Remove aft radio equipment access door from fuselage left side and remove electronic equipment.

b. Disconnect electrical plug from dump valve solenoid.

c. Raise back end of canopy and remove valve mounting bolts (above canopy deck); then remove dump valve.

4-55. INSTALLING DUMP VALVE. To install dump valve, proceed as follows:

a. Place valve on bottom side of canopy deck under mounting holes, raise back end of canopy, and insert bolts through deck and valve flange. Install nuts, and torque to 10 inch-pounds.

b. Connect electrical plug to dump valve solenoid.

c. Install electronic equipment, and close aft radio equipment access door.

4-56. TESTING DUMP VALVE PRESSURE RELIEF. For checking pressure relief feature of dump valve, see figure 4-2.

4-57. COCKPIT PRESSURE-SEALING.

4-58. As the cockpit is pressurized, care must be taken to maintain a seal at all possible points of air leakage. (See figure 4-7.) Three methods of sealing are ordinarily used: rubber seals at all points where frequent breaking of the seal is necessary (such as canopy and access doors); sealing compounds at points where no breaking of the seal is expected except for structural maintenance or part replacement (such as lap and butt joints, and drill or other holes); and special seals for passing cables, tubing, mechanical linkages, and wiring out of the pressurized area. The wires and tubing are passed through the pressure bulkheads by the use of bulkhead fittings, which are sealed to the bulkhead and to which the wires and tubes are fastened from each side. The flight controls are passed through the bulkheads by three different methods: cable seals are used for the rudder, torque tube bearing seals are used for the aileron, and push-rod seals are used for the elevator. All seals of moving components are subject to wear; therefore, they should be carefully installed and should be checked regularly.

4-59. TESTING COCKPIT PRESSURE-SEALING. See figure 4-2.

4-60. LOCATING LEAKS UNDER PRESSURE. With cockpit pressurized, locate leaks on outside of airplane with a soap solution. Isolate leaks on inside by running a piece of rubber hose or a stethoscope along seams in leakage area, listening for a change in sound when tube is passed over a leak.

WARNING

- With personnel inside, the cockpit may *never* be pressurized to a pressure higher than has been previously established with the cockpit empty.
- Anyone who has recently had a cold, sinusitis, or nasal congestion should not work in the cockpit when it is pressurized.
- An experienced operator should be present at the pressurization equipment control panel at all times while the cockpit is pressurized.
- While the cockpit is under pressure, all personnel should stay clear of the canopy.
- While the cockpit is being pressurized, pressure change should *never* exceed 1000 feet per minute altitude change as indicated on a rate-of-climb indicator.

4-61. CLEANING SURFACES TO BE SEALED. All surfaces to be sealed must first be cleaned to ensure maximum adhesion between the sealing compound and the surface. Clean area to be sealed as follows:

a. Using a vacuum hose, thoroughly clean surface of all loose dirt.

b. Moisten a clean rag with trichlorethylene (Specification MIL-T-7003) or solvent (Federal Specification P-S-661) and clean area around spot to be sealed.

c. Repeat step b. as often as necessary to clean thoroughly. Never use a dirty rag, and discard any rag as soon as it becomes soiled.

4-62. APPLYING SEALING COMPOUNDS. Application of sealing compounds must always be on the pressure side. A second coat of sealing compound may be applied after the first coat has been allowed to cure completely. If applicator guns are used to apply the sealant, they should be cleaned as soon as possible with cleaning solvents; otherwise, any sealant that cures inside the gun must be cleaned out manually. Sealing compound should not be picked up if fingers are covered with water, soapy water, or protective hand cream, because a film of any of these will cause poor adhesion of the compound.

4-63. REPAIRING LEAKS UNDER PRESSURE. Leaks can be repaired from inside while the cockpit is pressurized. Repairing under pressure is recommended, because it is faster and the results can be checked immediately. Use sealing compound (Specification MIL-S-7502) as follows:

a. Seal holes and gaps up to 1/16 inch in width with a fillet of sealing compound. No backing strip is necessary.

b. Seal holes and gaps from 1/16 inch to 3/16 inch in width with a backing strip of pressure-sensitive tape (Specification JAN-P-127, Type 2, Grade B) applied over the opening on the pressure side and a fillet of sealing compound applied over the tape.

c. Plug holes and gaps larger than 3/16 inch in width by first plugging with balsa wood, metal, caps, plugs, etc, on the pressure side of the area, and then applying the pressure-sensitive tape and sealing compound as in step b. Sealing compound is best applied to the leaking area with a spatula or metal strip.

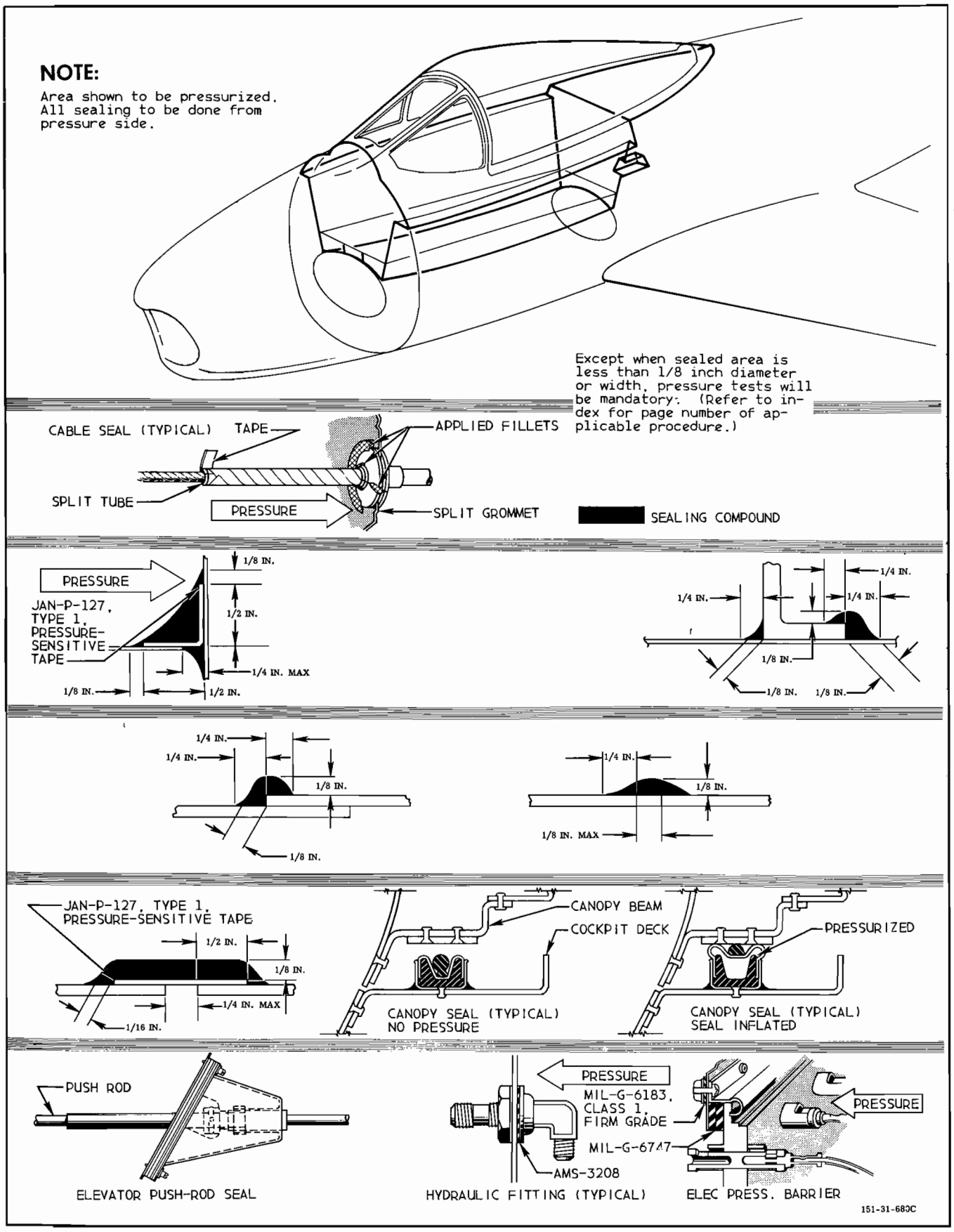


Figure 4-7. Pressure-sealing Cockpit

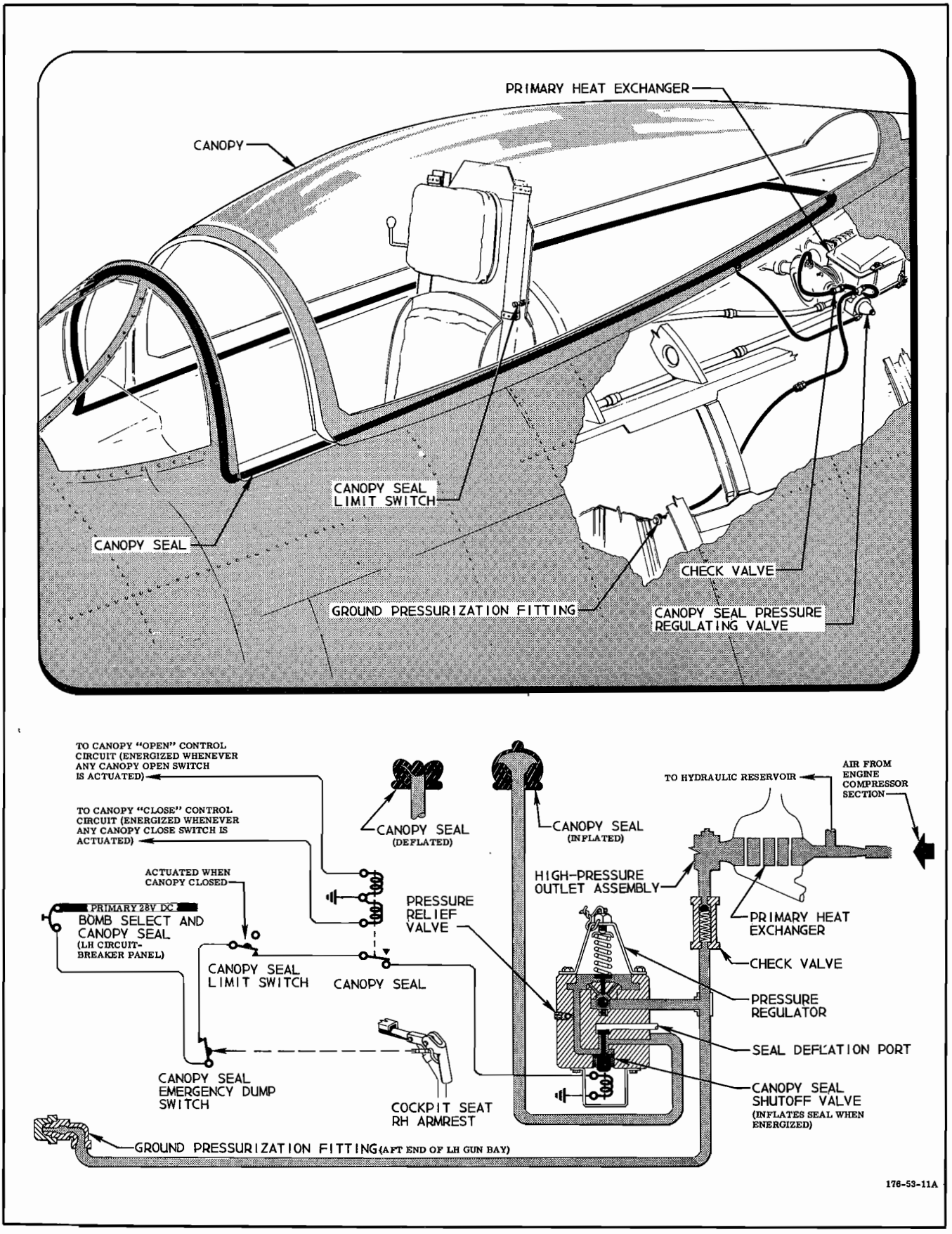


Figure 4-8. Canopy Seal

d. After the repairs under pressure have been completed, depressurize the cockpit at a rate not to exceed 1000 feet per minute.

4-64. CLEANING EQUIPMENT USED IN COCKPIT PRESSURE-SEALING. Within one hour after use, equipment should be cleaned by use of toluene or trichlorethylene (Specification MIL-T-7003). If the cleaning is not done within one hour (unless compound and equipment are held at subzero temperatures), the compound will set and can be removed only by mechanical means. It is recommended that gloves be worn by personnel coming in continual contact with the cleaning compounds, as repeated contact of the hands with these cleaners can cause dermatitis.

4-65. CANOPY SEAL SYSTEM.

4-66. To make the seal between the canopy and fuselage as nearly perfect as possible, an inflatable canopy seal is installed to fit under the entire perimeter of the canopy. (See figure 4-8.) Air pressure for inflating the seal is taken from the primary heat exchanger high-pressure outlet assembly in the main air conditioning supply line. An air pressure regulator maintains the proper air pressure within the seal by combining the functions of a pressure regulator, relief valve, and shutoff valve. A spring-loaded ball check valve is installed in the line between the high-pressure outlet assembly and the pressure regulator. This valve prevents pressure from escaping into the main air conditioning supply duct during ground testing of the canopy seal system. The valve also traps air in canopy seal system to maintain seal pressure if engine pressure falls below seal pressure. A ground pressurizing fitting, installed in the left gun bay, is provided for pressurizing the canopy seal on the ground. See figures 4-2 and 4-8 for location of equipment in the airplane and a schematic diagram of the system.

4-67. FUNCTION OF CANOPY SEAL SYSTEM. Power for operation of the pressure regulator is taken from the primary bus. From there, it is routed through the canopy seal emergency dump switch (located on the outboard side of the pilot's right seat rail), the canopy seal limit switch (located on the left aft side of the pilot's seat back), and the canopy seal relay (located in the left gun bay). An interruption of the electrical circuit to the canopy seal pressure regulator valve solenoid by actuation of any canopy "OPEN" or "CLOSE" switch or button, by emergency canopy ejection, or by electrical circuit failure de-energizes the pressure regulator solenoid. This shuts off all flow of air to the canopy seal and dumps all existing air pressure in the seal to permit opening the canopy. Emergency depressurizing of the canopy seal is accomplished by a microswitch on the ejection seat rails. When the right handgrip on the ejection seat is actuated (to the open position) by the canopy ejection linkage, de-energizing the canopy seal pressure regulator solenoid. (See figure 4-8.)

4-67A. CHECKING CANOPY SEAL. The inflatable canopy seal should be firmly cemented to the canopy deck to prevent damage to the seal when the canopy is operated and to prevent the possibility of the seal fouling the canopy or the pilot and his gear during emergency ejection. The inflatable canopy seal should be checked as follows:

a. With canopy removed and seal deflated, use a smooth table knife, spatula, or other comparable instrument, and visually inspect to see if canopy seal is firmly cemented to canopy deck.

Note

If canopy seal is not firmly cemented to canopy deck, clean the bottom and side surfaces of the loose portions of the seal, using a rag moistened with toluene cleaner (Federal Specification TT-T-548). Allow cleaner to dry for a minimum of 10 minutes. After cleaner has dried for 10 minutes, brush the bottom and side surfaces with a thin uniform coat of Vulcabond V-36 cement, and allow to dry for at least 30 minutes. Apply a thin uniform coat of EC-801 sealing compound on the bottom and inner side surfaces of the seal retainer; then press the seal firmly into place.

b. Clean the section of seal that passes through aft retainer channel in the opening between seal and inner side surfaces of seal retainer, using a rag moistened with toluene (Federal Specification TT-T-548).

c. Allow seal to dry for a minimum of 10 minutes.

d. Brush cleaned surfaces of seal with a thin uniform coat of Vulcabond V-36 cement.

e. Allow cement to dry for a minimum of 10 minutes.

f. Apply a bead of EC-801 sealing compound on both sides of seal in aft seal retainer. The bead should fill the space between the seal and retainer but should not protrude above the seal in the deflated condition.

CAUTION

Extreme care should be taken to prevent the sealing compound from extending over the outer envelope of the seal into the space between the envelope and the central tube.

4-68. ADJUSTING CANOPY SEAL SWITCHES. For adjustment of the switch, slotted holes are provided in the mounting bracket to which the canopy closed limit switch is attached. Adjust the switch to be actuated when the canopy is ¼ (+⅛, −0) inch from the full closed position. (See figure 4-8.) For adjustment of the canopy seal emergency dump switch, see figure 2-43.

4-69. WEATHERPROOFING CANOPY SEAL. To prolong the life of the canopy inflatable seal, a protective coat of weather-coating compound (B. F. Goodrich Co A56B) is applied to the surface of the seal. Whenever a section of the seal requires resurfacing, the defective area must first be cleaned with solvent (Federal Specification P-S-661); then the weathering compound is applied by brush.

4-70. TESTING CANOPY SEAL. See figure 4-2. With the canopy closed and electrical power on, test the canopy seal as follows:

a. Connect a pressure gage and air pressure supply to canopy seal ground-test fitting. Pressurize to 25 psi; then cut off pressure supply.

b. Allow canopy seal to be pressurized for 15 minutes. Maximum pressure decrease should be 1.0 psi.

4-70A. CANOPY SEAL PRESSURE REGULATOR.

4-70B. The canopy seal pressure regulator (figure 4-8) is located in the left fuselage just forward of the primary heat exchanger. The regulator maintains air pressure at 20 psi to the canopy seal. The regulator contains a regulating valve, a diaphragm, a compression spring, a pressure relief valve, and a solenoid-operated canopy seal shutoff valve. When there is no pressure in the system, the compression spring forces the diaphragm and regulating valve downward. This causes the regulating valve to move away from the valve seat, thus providing a passage between the pressure chamber and the control chamber. The instant that high-pressure air is applied to the system, it passes through the pressure chamber and into the control chamber through the open passage. Since the incoming air is at a high pressure, it forces the diaphragm upward. This compresses the spring and lifts the regulating valve up and against the valve seat. The high-pressure air within the control chamber causes the pressure relief valve to open, exhausting excessive pressure overboard. With the regulator valve raised against the valve seat, air bleeds around the valve and into the control chamber. When the canopy, the canopy seal switch, and the canopy seal limit switch are closed, the solenoid is energized. When the solenoid is energized, the canopy seal shutoff valve is pulled down. This opens the air outlet port of the regulator and allows air to enter the canopy seal. When the canopy, the canopy seal switch, and/or the canopy seal limit switch is opened, the solenoid is de-energized. This allows the canopy seal shutoff valve to move upward. The shutoff valve closes off the air outlet port of the regulator and opens the seal deflation port. Air pressure in the seal is then exhausted overboard.

4-71. WINDSHIELD, CANOPY, AND STRIKE CAMERA WINDOW DEFROSTING SYSTEMS.

4-72. Perforated tubes alongside the canopy tracks and windshield direct air across the canopy and under the windshield for defrosting. These tubes are connected to the primary heat exchanger high-pressure outlet assembly through a manual shutoff valve. On F-86F-25 Airplane AF51-13341 and all subsequent airplanes, the canopy defrosting air tubes have been extended farther aft along both sides of the canopy. (See figure 4-1.) This arrangement permits defrosting more of the canopy glass area, thus improving rearward visibility. A manual control on the left side of the cockpit is mechanically linked to the canopy and windshield auxiliary defrost control valve. Air pressure for the canopy and windshield defrosting system is available at the control valve during either normal or ram-air operation. Temperature in the defrosting system is varied by action of the primary heat exchanger cooling-air modulating valve, which controls the amount of cooling air that passes through the heat exchanger. The auxiliary system thermistor in the high-pressure outlet assembly senses the rate of air temperature change and controls the modulating valve through action of the auxiliary temperature regulator (paragraph 4-39), thereby cooling or heating the supply air being routed to the defrosting system. (See figure 4-1.) The auxiliary canopy defrost control operates the auxiliary defrost control valve by a mechanical linkage. (See figure 4-9.) Operation of the valve diverts air from the forward air supply duct into the windshield defrosting manifold supply duct. From the duct, the air may be directed through a floor outlet or it may be partially or entirely diverted to the windshield by means of the auxiliary defrost control. On F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes, an automatic defrosting and defogging system maintains a clear window for the P-2 strike camera. Power for the strike camera window defrosting system is supplied from the panel vibrator and GSAP camera circuit breaker.

4-73. TROUBLE SHOOTING WINDSHIELD, CANOPY, AND STRIKE CAMERA WINDOW DEFROSTING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Air not available for camera window defrosting or defogging.	Shutoff valve inoperative. P-2 camera heat control box defective. Thermostat broken.	Check electrical circuit. Replace valve. Replace control box. Replace thermostat.
Heated air for canopy defrosting or windshield defrosting, or floor heated air not distributed according to control settings.	Improper rigging of control.	

4-74. WINDSHIELD DEFROSTING SYSTEM WINDSHIELD DEFROST VALVE.

4-75. The windshield defrost valve is a manually operated valve, which permits air to be directed either to the cockpit floor outlet, the windshield, or both. The windshield defrost valve is located in the cockpit and is attached to the forward pressure bulkhead.

4-76. ADJUSTING WINDSHIELD DEFROST VALVE. See figure 4-9.

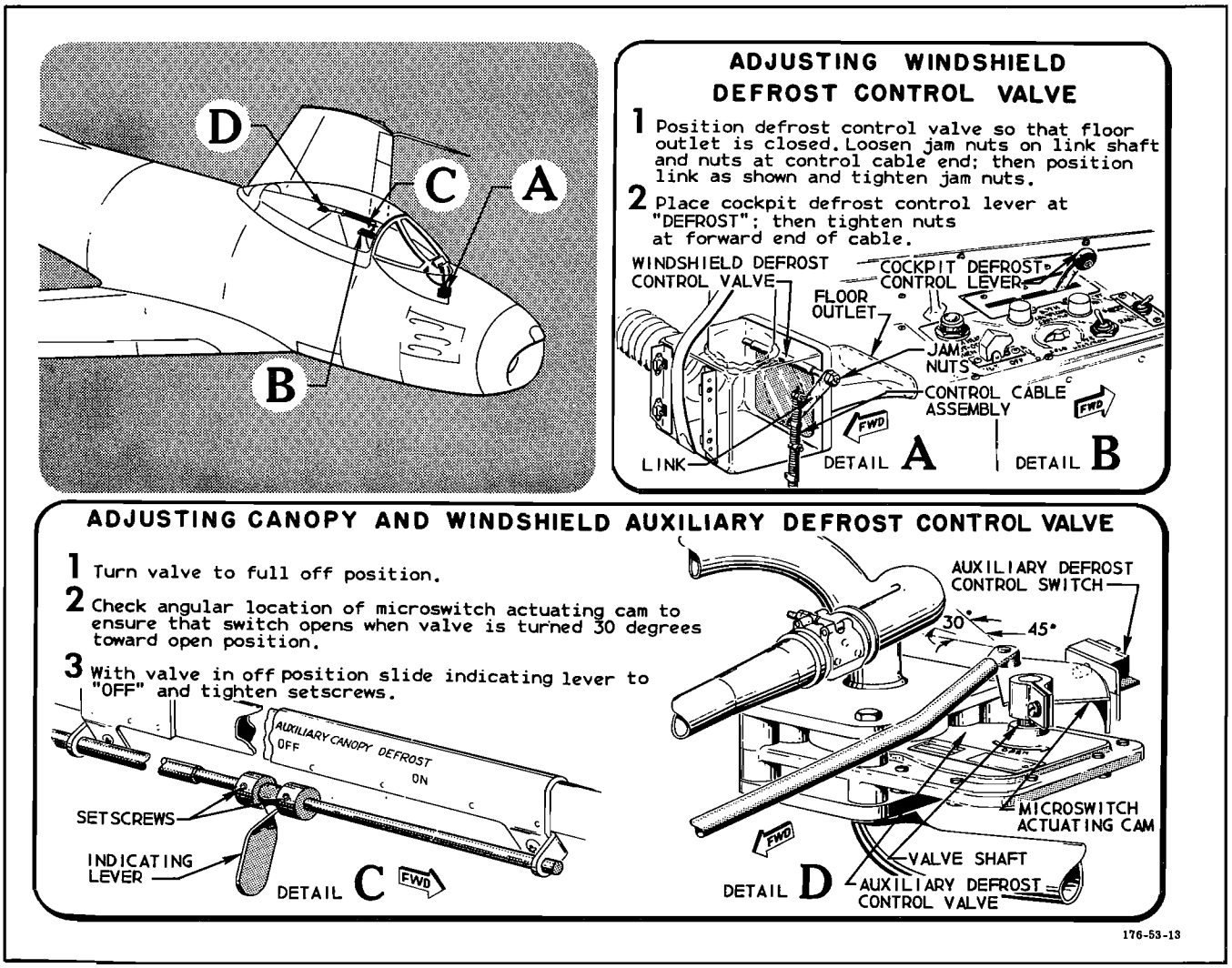


Figure 4-9. Adjusting Windshield and Canopy Defrost Control Valves

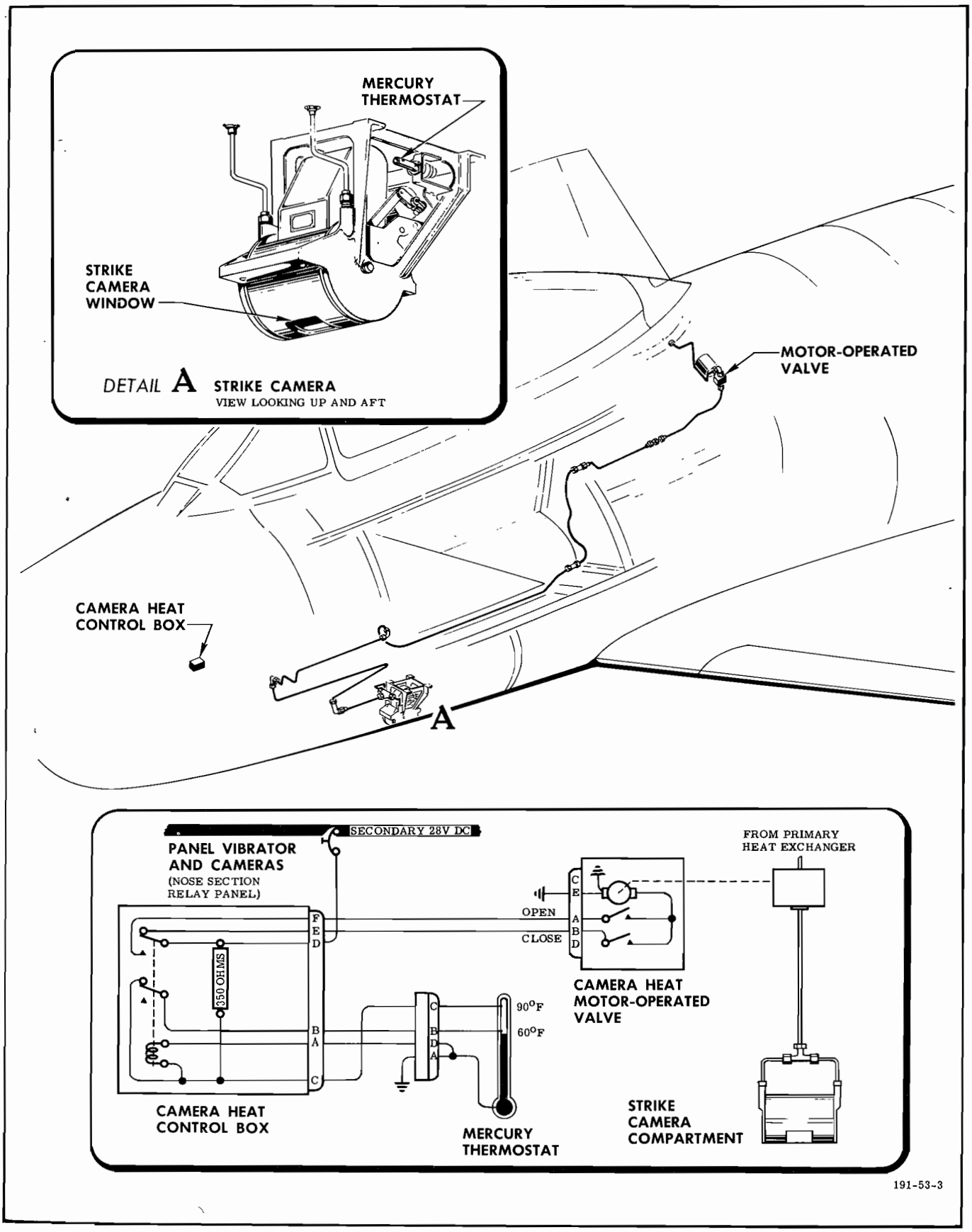


Figure 4-10. Strike Camera Window Defrosting System—F-86F-25 Airplanes AF52-5387 Through -5530, F-86F-30 Airplane AF52-5064, and All Subsequent Airplanes

4-77. WINDSHIELD AND CANOPY DEFROSTING SYSTEM AUXILIARY DEFROST CONTROL VALVE.

4-78. The auxiliary defrost control valve is located in the radio compartment on the right side of the fuselage. The valve is manually operated by the auxiliary canopy control in the cockpit. The valve diverts air from the forward air supply duct into the windshield defrosting manifold supply duct.

4-79. ADJUSTING AUXILIARY DEFROST CONTROL VALVE. See figure 4-9.

4-80. STRIKE CAMERA WINDOW DEFROSTING SYSTEM.

4-81. The strike camera (Type P-2) window defrosting system (figure 4-10) is installed in F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes. The system consists of a motor-actuated shutoff valve located in the radio compartment on the right side of the fuselage, a control box, and a mercury thermostat located in the strike camera bay. Air is supplied to the system from the cockpit air conditioning and pressurizing system through a take-off downstream of the primary heat exchanger. The system is fully automatic in its operation through the action of the mercury thermostat. The thermostat causes the valve to maintain air temperature to the camera window at between 15.6°C (60°F) and 32.2°C (90°F).

4-82. STRIKE CAMERA WINDOW DEFROSTING SYSTEM SHUTOFF VALVE.

4-83. The system shutoff valve is located in the radio compartment. It is a motor-driven, barrel-type valve that operates on 28-volt direct current. Power is supplied to the "OPEN" or "CLOSE" terminal by the P-2 strike camera heat control box (paragraph 4-84). The valve turns on or shuts off the heated air as required for defrosting and defogging the camera window.

4-84. STRIKE CAMERA WINDOW DEFROSTING SYSTEM CONTROL BOX.

4-85. The strike camera heat control box is located in the external light flasher bay on the left side of forward fuselage. It is accessible through the flasher access door on left side of nose wheel well. The control box in conjunction with the mercury thermostat, controls the motor-operated strike camera window defrosting system shutoff valve. The control consists of a relay and a 350-ohm resistor connected in series with the relay coil and the 28-volt d-c power supply. (See figure 4-10.) Since the relay is of the sensitive type (low current requirements), sufficient voltage is passed by the resistor to energize the relay. The relay conducts 28-volt direct current through its closed contact to the "open" side of the motor-operated valve. When camera head reaches 32.2°C (90°F), the mercury column (which is at ground potential) contacts the 90°F pick-off point in the thermostat. (See figure 4-10.) This places the junction point between the resistor and the relay coil at ground potential. Therefore, the relay is de-energized, directing 28-volt direct current to the "close" side of the motor-operated valve. When the relay is de-energized, ground potential is maintained to the relay coil through the 60°F pick-off point on the thermostat. When the temperature falls below 15.6°C (60°F), the preceding series of operations is repeated. This maintains temperature at the strike camera between 15.6° (60°F) and 32.2°C (90°F).

4-85A. LUBRICATING WINDSHIELD, CANOPY, AND STRIKE CAMERA WINDOW DEFROSTING SYSTEM THREADED FITTINGS.

4-85B. During installation of defrosting system duct components, lubricate all threaded fittings with anti-seize compound (Specification JAN-A-669). Do not apply lubricant to the first two threads of the fitting. Do not allow lubricant to enter the tubing.

4-86. WINDSHIELD ANTI-ICING SYSTEM.

4-87. For windshield anti-icing, a boundary layer of heated air is passed over the outside surface of the windshield. Air for the windshield anti-icing system is extracted from the cockpit air conditioning and pressurizing system (paragraph 4-2) through a take-off in the primary heat exchanger high-pressure outlet assembly. (See figure 4-11.) The air then passes through a manually operated windshield anti-icing control valve and an electric heater (electric heater is not used on F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes) to a fan-shaped outlet at the outside base of the windshield. A water drain line, incorporating a check valve and a drain sump, provides an outlet for moisture condensation. An overheat thermostat, located in the air outlet duct, operates an overheat warning light that indicates temperatures in excess of 135°C (275°F). (See figure 4-11.) Should the overheat warning light illuminate during ground operation of the windshield anti-icing system, the system is to be turned off immediately.

CAUTION

To prevent cracking the windshield, ground operation of the windshield anti-icing system should not exceed 30 seconds duration.

4-88. FUNCTION OF WINDSHIELD ANTI-ICING SYSTEM.

4-89. When the windshield anti-icing control is "ON," hot air extracted from the primary heat exchanger outlet is ducted through the windshield anti-icing heater to the windshield anti-icing outlet. On F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes, hot air is ducted directly from the primary heat exchanger to the windshield anti-icing outlet. (See figure 4-11A.) When the control valve handle is placed at "ON," switches on the valve are actuated, de-energizing the cockpit air control relay. When the cockpit air control relay is de-energized, the auxiliary temperature regulator controls the primary heat exchanger cooling-air modulating valve. (See figure 4-5.) The temperature of

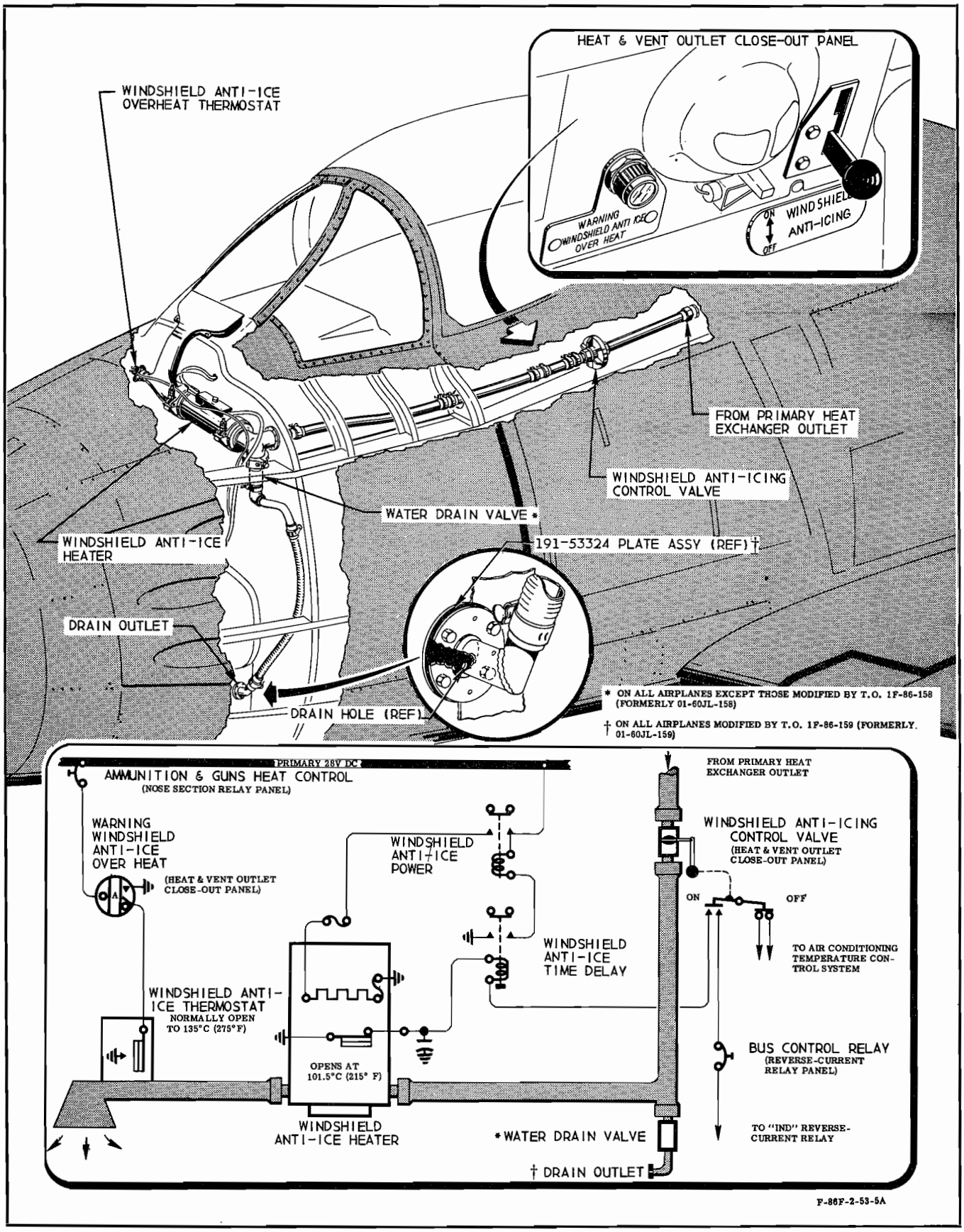


Figure 4-11. Windshield Anti-icing System—F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5328, and F-86F-30 Airplanes AF52-4305 Through -5063

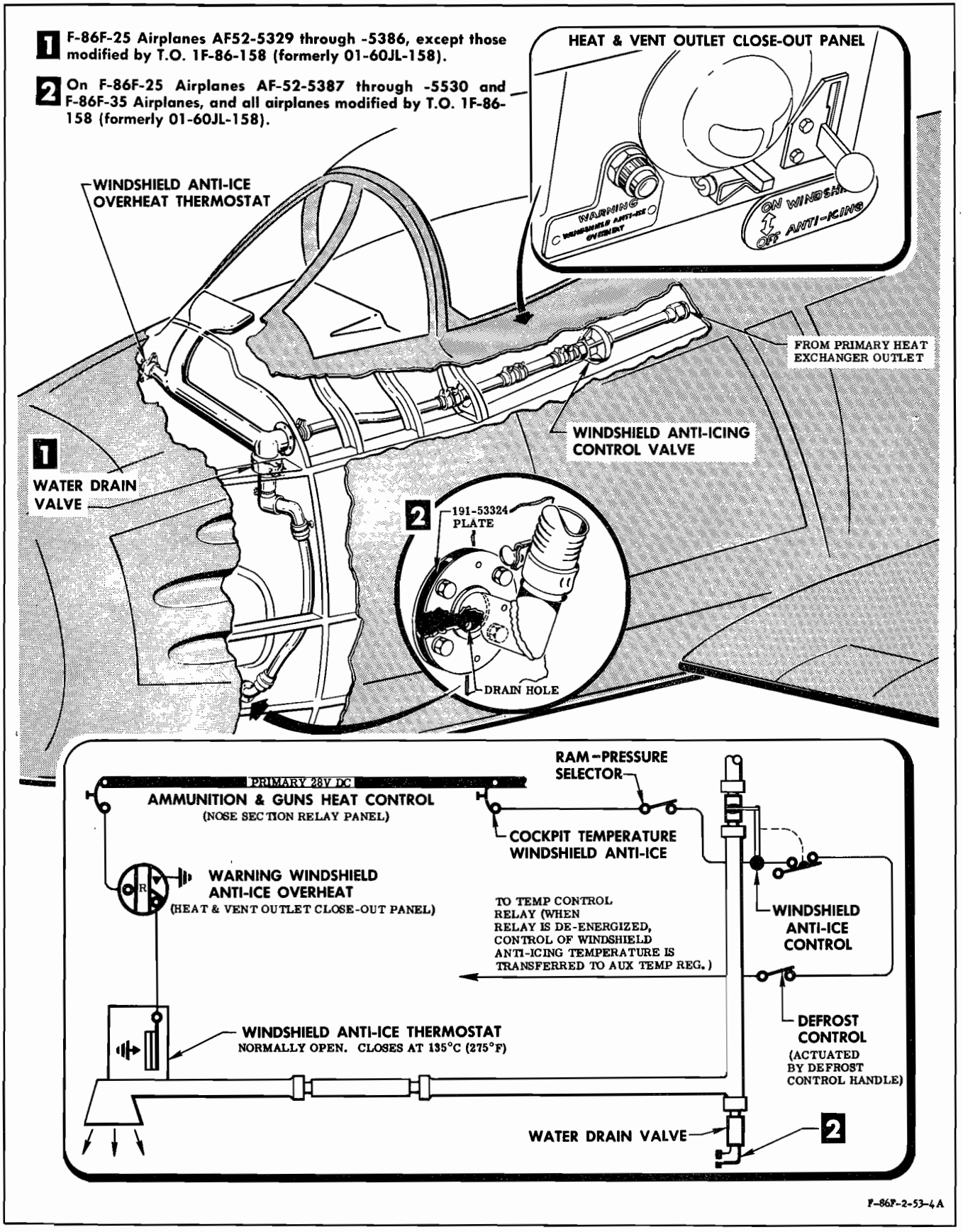


Figure 4-11A. Windshield Anti-icing System—F-86F-25 Airplanes AF52-5329 Through -5530, F-86F-30 Airplane AF52-5064, and All Subsequent Airplanes

the supply air is then controlled in the same manner as for windshield and canopy auxiliary defrosting. (Refer to paragraph 4-36.) The windshield anti-icing heater is energized and continues to operate until a thermostat in the heater outlet cuts off heater power when the temperature exceeds 102°C (215°F). On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063, except airplanes modified by T. O. 1F-86-158 (formerly T. O. 01-60JL-158), a spring-loaded check valve in the drain line (spring-loaded to open position) is forced closed by pressure when the system is in operation. (See figure 4-11.) F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes use a fixed drain valve for the windshield anti-icing system.

4-90. TROUBLE SHOOTING WINDSHIELD ANTI-ICING SYSTEM.

4-91. Refer to paragraph 4-3.

4-92. WINDSHIELD ANTI-ICING SYSTEM CONTROL VALVE.

4-93. The windshield anti-icing system control valve

is located at the left side of the cockpit. The valve is manually operated by the windshield anti-icing control, located in the side panel above the left console in the cockpit. Two switches on the valve are actuated when the control handle is placed at "ON." This places the auxiliary temperature regulator in control of heated air for windshield anti-icing.

4-94. REMOVING CONTROL VALVE. To remove the valve, proceed as follows:

a. Remove left forward circuit-breaker panel.

b. Disconnect defrosting duct and remove cockpit air side outlet.

c. Disconnect duct at rear of anti-icing valve.

d. Remove both mounting bolts.

e. Partially remove valve to facilitate removal of duct (at front of valve), and disconnect wiring to incorporated switch; then remove valve.

4-95. INSTALLING CONTROL VALVE. The valve is installed as follows:

a. Connect wiring to switch incorporated on valve.

b. Connect duct to front of valve and bolt valve to mounting bracket.

c. Connect duct at rear of valve; then connect defrosting duct to cockpit air side outlet.

d. Install cockpit air side outlet and left forward circuit-breaker panel.

4-96. WINDSHIELD ANTI-ICING SYSTEM HEATER.

4-97. The windshield anti-icing heater (figure 4-11) is installed on all airplanes except F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes. The heater, located in the radar compartment, is an electrical-resistance type duct heater of 2-kilowatt input capacity. It provides an auxiliary means for increasing the temperature of the air if the supply air temperature is below requirements for efficient anti-icing.

4-98. REMOVING HEATER. To remove the heater, proceed as follows:

a. Remove radar equipment compartment access door.

b. (Deleted)

c. Remove phenolic cover and disconnect electrical wiring at heater.

d. Remove heater after disconnecting hose clamps at both ends.

4-99. INSTALLING HEATER. To install heater, proceed as follows:

a. Connect hose clamps, which engage with support bracket, at both ends.

b. Connect electrical wiring to heater and install phenolic cover.

c. Install radar equipment compartment access door.

4-99A. LUBRICATING WINDSHIELD ANTI-ICING SYSTEM THREADED FITTINGS.

4-99B. During installation of windshield anti-icing system components, lubricate all threaded fittings with antiseize compound (Specification JAN-A-669). Do not apply lubricant to the first two threads of the fitting. Do not allow lubricant to enter the tubing.

4-100. AMMUNITION COMPARTMENT HEATING SYSTEM.

4-101. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5328, and F-86F-30 Airplanes AF52-4305 through -5063, air for heating the ammunition compartments is taken from the primary heat exchanger high-pressure outlet in the main air-conditioning supply duct. The gun heater switch, on the armament control panel in the cockpit, turns on the system in normal operation. A low-temperature control thermostat in the left-hand ammunition compartment automatically controls the temperature of the air in the ammunition compartments. A warning system, consisting of an overheat warning thermostat and a warning light, is provided to indicate an unsafe overheat condition in the ammunition compartments. A manually operated emergency shutoff valve control handle, located adjacent to the warning light, operates an emergency shutoff valve that cuts off the flow of hot air to the compartments. Supply air temperature is controlled by the auxiliary temperature control system. (Refer to paragraphs 4-36 and 4-40 and see figure 4-12.)

4-102. FUNCTION OF AMMUNITION COMPARTMENT HEATING SYSTEM.

4-103. When the gun heater control switch is in the "HEATER" position, the coil of the ammunition heat control relay is energized if the low-temperature control thermostat is closed. This action closes the circuit to the open side of the system shutoff valve actuator and causes the shutoff valve to open and allow hot air to enter the ammunition compartments. (At the same time, the coil of the gun heater relay is energized, closing the circuit to six electrical resistance-type gun heaters.) Hot air is then routed through the ammunition compartment heating system shutoff valve and the emergency system shutoff valve to the ammunition compartment heat outlets, which are located directly above the ammunition boxes. The low-temperature control thermostat, located in the left-hand ammunition compartment, then modulates the heating system shutoff valve. When the compartment outgoing air temperature reaches 7.2°C (45°F), the low-temperature control thermostat breaks the circuit to the coil of the ammunition heat control relay. This action causes the valve to move toward the closed position, restricting the flow of air

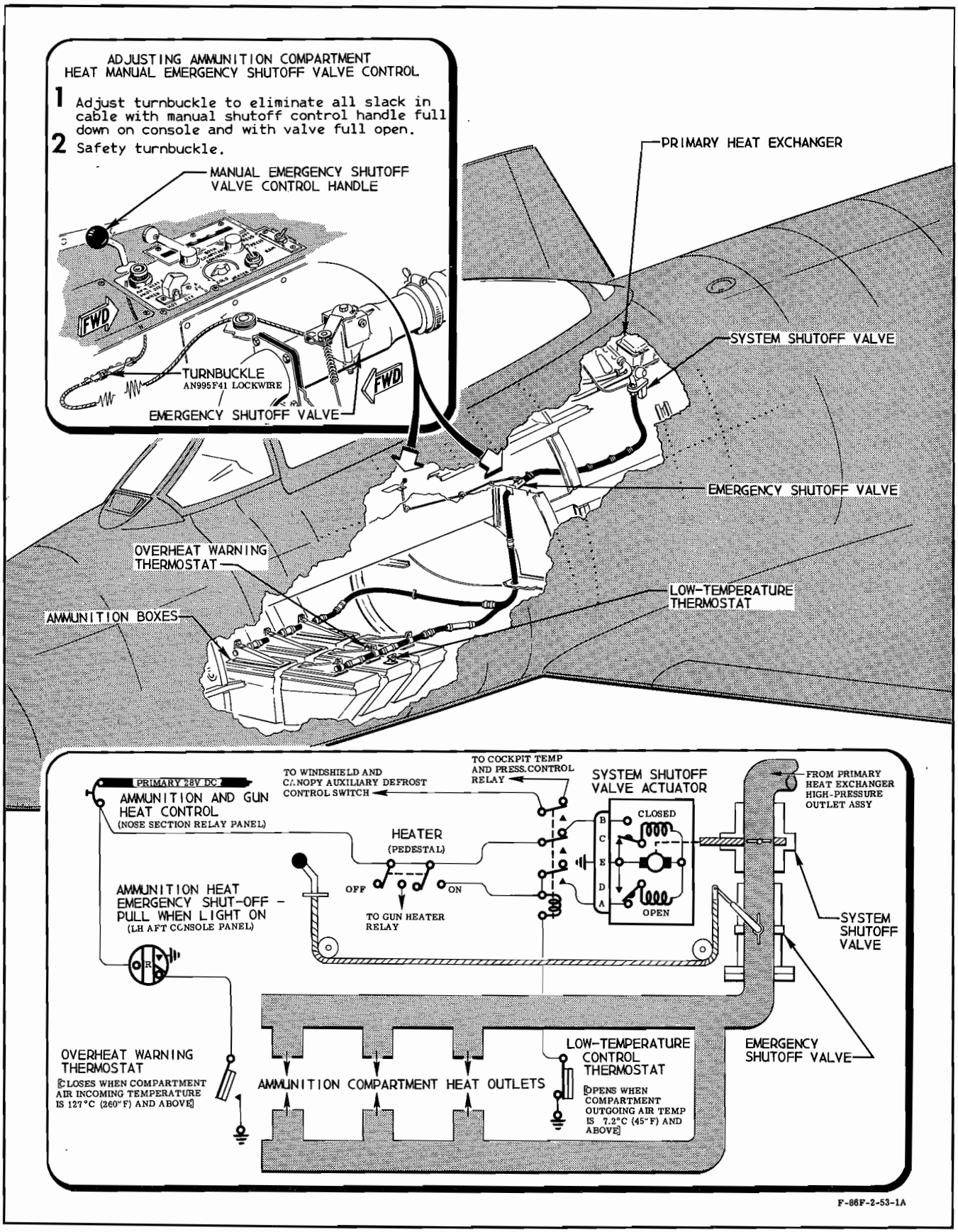


Figure 4-12. Ammunition Compartment Heating System—F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5328, and F-86F-30 Airplanes AF52-4305 Through -5063

to the ammunition compartments. When the ammunition compartment heat is on, the temperature of the supply air is controlled by the auxiliary temperature control system in the same manner as auxiliary canopy defrosting. (Refer to paragraphs 4-36 and 4-40.)

4-104. TROUBLE SHOOTING AMMUNITION COMPARTMENT HEATING SYSTEM.

4-105. Refer to paragraph 4-3.

4-106. AMMUNITION COMPARTMENT HEATING SYSTEM SHUTOFF VALVE.

4-107. A thermostatically controlled, motorized shutoff valve is located in the ammunition compartment heating system air supply duct. (See figure 4-12.) The valve has open and closed positions and is modulated to provide the required amount of heated air to maintain a minimum ammunition powder temperature of 1.7°C (35°F). When the system is in operation, the valve electrical circuit is controlled by a low-temperature control thermostat in the outbound air duct of the ammunition compartment.

4-108. AMMUNITION COMPARTMENT HEATING SYSTEM EMERGENCY SHUTOFF VALVE CONTROL.

4-109. The ammunition compartment heating system emergency shutoff valve is located in the supply duct, downstream of the motorized shutoff valve. A handle on the left console in the cockpit is used to manually operate the emergency shutoff valve. The valve is spring-loaded to the open position, so that it remains open unless actuated by the cockpit control. In the closed position, a spring-loaded dog engages the valve actuating lever and prevents the valve from opening until the dog is manually disengaged. The valve mechanism is not accessible from the cockpit; therefore, when the valve is closed by the cockpit manual emergency control in flight, it cannot be opened again until the airplane is on the ground.

4-110. ADJUSTING EMERGENCY SHUTOFF VALVE CONTROL. See figure 4-12.

4-111. AMMUNITION COMPARTMENT HEATING SYSTEM THERMOSTATS.

4-112. A low-temperature control thermostat is located in the ammunition compartment outbound air duct. This thermostat acts as a cycling switch and completes the circuit to the control relay when the compartment temperature falls below 7.2°C (±3°C) [45°F (±5°F)]. When the temperature control thermostat switch is open, the shutoff valve relay is de-energized, completing the circuit to the closed side of the shutoff valve. The overheat thermostat located in the compartment air supply duct outlet closes a circuit to the warning light on the armament control panel in the cockpit when the air supply temperature exceeds 127°C (±6°C) [260°F (±10°F)], thus indicating an unsafe condition in the compartment. This thermostat does not, however, turn off the ammunition compartment heating system, but merely indicates an unsafe condition; the pilot must pull the manual emergency shutoff valve control handle if the warning light remains illuminated.

4-113. ANTI-G SUIT SYSTEM.

4-114. The anti-G suit system (figure 4-13) consists of a system pressure-regulating valve, a suit attachment fitting, a connecting hose, and a quick-disconnect block on the pilot's seat. The quick-disconnect is installed to facilitate seat removal during emergency ejection. The anti-G suit system operating air pressure is supplied from the cockpit air conditioning and pressurizing system through a take-off downstream of the primary heat exchanger. The system serves to protect the pilot from uncomfortable G-loads during maneuvers.

4-115. ANTI-G SUIT SYSTEM PRESSURE-REGULATING VALVE.

4-116. The anti-G suit system pressure-regulating valve (AN 6538-1), located to the left of the pilot's seat, regulates the pressurized air received from the primary heat exchanger to provide the proper pressure for operation of the anti-G suit. Its function begins at a predetermined number of G, depending upon the setting of the valve cap, which is marked "HI" and "LO." When the valve cap is set at "LO," the valve opens at approximately 1.8 G and subsequently allows one psi of air pressure to pass to the suit for each increment of one G over and above the original setting. For example, at 3 G, the valve delivers 1.2 psi of air pressure to the suit. When the valve cap is set at "HI," the valve opens at approximately 1.6 G but delivers 1.5 psi of air pressure to the suit for each increment of one G over and above the original setting. For example, at 3 G, the valve allows 2.1 psi of air pressure to pass to the suit. When the accelerations decrease below 1.6 G, the valve closes and exhausts the suit pressure into the cabin atmosphere, allowing the suit to deflate. The valve assembly contains a filter, which ensures a clean air supply to the valve body; a limit valve that acts as a safety device by limiting suit pressure to 10 psi in case of valve failure; a manual cap to facilitate inspection of the valve operation; and two connection fittings, one marked "IN," the other marked "OUT." (The connection fitting marked "IN," on the filter side of the valve, receives the inlet air pressure from the engine compressor section; the fitting marked "OUT," on the limit valve side, delivers outlet pressure to the anti-G suit.) There are three additional screened openings in the valve that do not serve as connection points. They are the discharge outlet, the suit vent, and the limit valve opening. It is necessary that the air from these openings be discharged into the cockpit atmosphere in order to

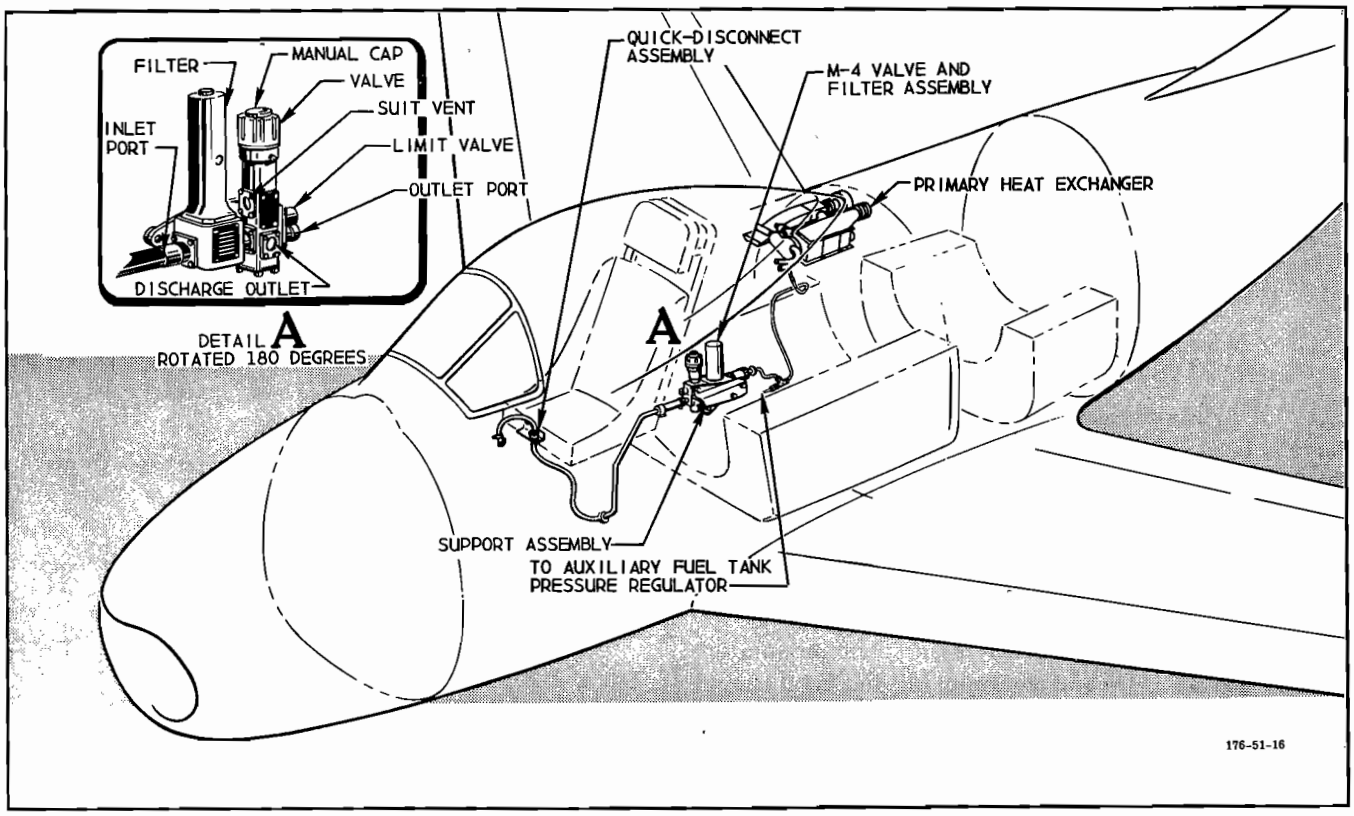


Figure 4-13. Anti-G Suit System

maintain proper differential pressures in the suit. The valve requires no maintenance, and no repairs can be made. A defective valve assembly should be replaced with a new unit.

4-117. REMOVING PRESSURE-REGULATING VALVE. To remove pressure-regulating valve, proceed as follows:

a. Remove left console panel.

b. Loosen clamps and hose at inlet connection on filter side of valve.

c. Loosen clamp and hose on outlet connection.

d. Remove nuts from support assembly.

e. Lift valve assembly off support bolts.

4-118. PREINSTALLATION CHECK OF PRESSURE-REGULATING VALVE. Before the pressure-regulating valve is installed, it should be given the following tests to ensure its satisfactory performance in the airplane.

a. Turn valve cap to "LO" setting.

b. Give valve a sudden, severe, downward shake while holding it in vertical position. Piston and lower weight should drop and return to their original position. (This movement can easily be felt and heard.)

c. Turn valve cap to "HI" setting.

d. Repeat downward shake. Piston, lower weight, upper weight, and manual cap should drop. (Manual cap can be seen to move downward and upward.)

4-119. INSTALLING PRESSURE-REGULATING VALVE. To install pressure-regulating valve, proceed as follows:

a. Be sure valve is functioning properly. (Refer to paragraph 4-118.)

b. Fit valve and bracket assembly to valve support assembly, and secure with nuts.

c. Attach hose to outlet connection, and clamp into place.

d. Connect tubing hose to inlet opening, and secure with clamps.

e. Install console panel.

4-120. TESTING PRESSURE-REGULATING VALVE. To test valve for operation with engine running, remove plug from disconnect assembly and press manual button on top of valve. Volume and pressure of air delivered through disconnect should be substantial and in proportion to pressure on manual test button. Flow should stop when manual test button is released.

4-121. ANTI-G SUIT SYSTEM PRESSURE-REGULATING VALVE FILTER.

4-122. To prevent foreign matter, dust, and abrasives from being blown through the pressure-regulating

valve and into the anti-G suit, a filter element is installed in the filter housing. When the filter element becomes clogged or dirty, it must be replaced.

4-123. REMOVING PRESSURE-REGULATING VALVE FILTER. To remove filter, proceed as follows:

a. Remove safety wire that secures filter housing to filter cap.

b. Uncrew filter housing and remove rubber "O" ring and filter.

4-124. INSTALLING PRESSURE-REGULATING VALVE FILTER. To install filter, proceed as follows:

a. Replace filter in filter cap, and replace rubber "O" ring on filter housing.

b. Replace filter housing and screw it down tightly, using hands only.

CAUTION

Do not use a wrench to tighten filter housing into filter cap.

c. Safety filter housing to filter cap with safety wire.

4-125. OXYGEN SYSTEM.

4-126. The oxygen system (figures 4-14 and 4-15) is of the low-pressure demand type and is charged to 400 psi pressure. The system consists of an oxygen regulator, a blinker-type flow indicator, a pressure gage, and (on F-86F-20 and subsequent airplanes) an oxygen warning light, located on the instrument shroud. These units are separate installations on F-86F-1 through F-86F-15 Airplanes (figure 4-14) and are combined on F-86F-20 and subsequent airplanes (figure 4-15). The system includes four oxygen cylinders, an external system filler valve, and the necessary filler lines, distribution lines, and check valves.

4-127. TROUBLE SHOOTING OXYGEN SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Oxygen pressure drop.	After filling, a normal loss of approximately 25 psi because of system cooling. Leak in system.	Fill system to 25 psi in excess of desired pressure.
No pressure reading.	Leak in system. Pressure gage defective. Lines clogged. Leak in system plumbing.	Replace pressure gage.
Cylinders not warm during filling.	Restriction in lines. One or more check valves sticking.	Examine and replace check valves if necessary.
Leaks around oxygen fittings.	Broken flares on tubing. Irregular fitting.	
Regulator fails to deliver oxygen.	Clogged screens. Failure of demand valve to operate. Dirt in oxygen inlet orifice.	Replace regulator. Replace regulator. Replace regulator.
Regulator delivers only pure oxygen or improper mixture.	Broken aneroid assembly. Maladjustment of aneroid and throttling plate assembly.	Replace regulator.

4-128. MAINTAINING OXYGEN SYSTEM.

4-129. Keep all fittings tight, since loose connections waste oxygen. Use only approved combination antiseize and sealing compound (Specification MIL-T-5542). Keep all oxygen equipment and lines free from grease, dirt, oil, and leaks. Use anti-icing fluid (Specification MIL-F-5566) for external cleaning of metal parts, and use a mild soap solution to clean rubber parts.

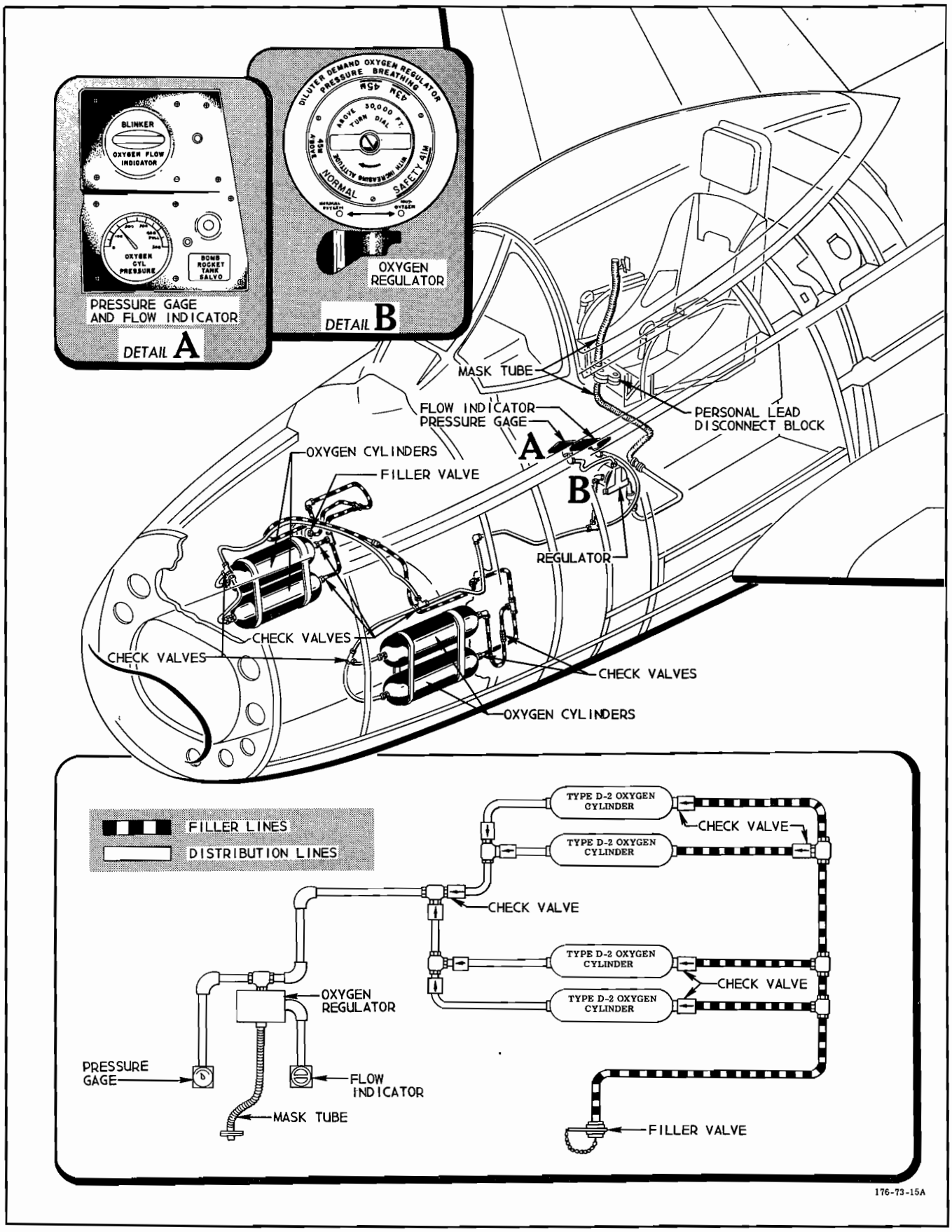


Figure 4-14. Oxygen System—F-86F-1 Through F-86F-15 Airplanes

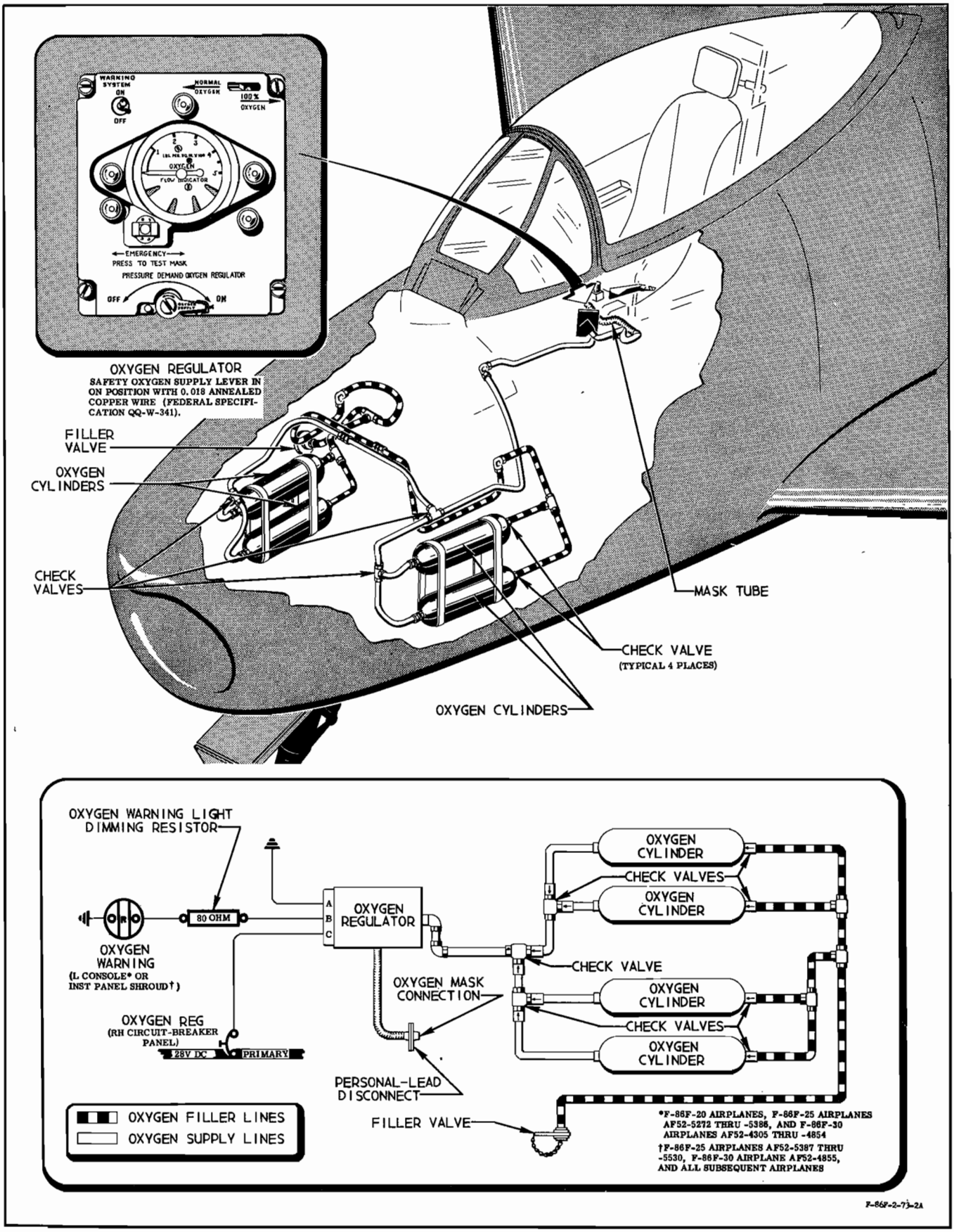


Figure 4-15. Oxygen System—F-86F-20 and Subsequent Airplanes

WARNING

- Apply sealing compound to only the first three threads of the male joint of connections having pipe threads. Apply sparingly to prevent any compound from running over the end of the fitting where it may get inside the oxygen system and injure equipment. Do not use sealing compound on straight threads (threads on flared-tube fittings) unless experience shows that the threads are seizing. Never apply the compound on the flare to prevent leakage. Do not permit pressure in the oxygen system to drop below 50 psi while the airplane is on the ground or in storage, as water may accumulate in the system and freeze when the airplane is again flown at high altitude, thus plugging the oxygen lines and valves.
- Improper treatment of oxygen equipment can result in a serious explosion, because spontaneous combustion results when oxygen under pressure comes in contact with oil or grease. Handle oxygen equipment carefully.

4-130. TESTING OXYGEN SYSTEM FOR LEAKS.

4-131. Servicing procedure for the oxygen system is given in paragraph 1-83. After filling oxygen system, allow system to cool for one hour or until it reaches outside air temperature; then proceed as follows:

a. Make sure oxygen regulator is functioning properly and does not leak. (Refer to paragraph 4-143 or 4-146.)

b. Record oxygen gage pressure reading by drawing a line on cover glass over gage pointer with a grease pencil.

c. Record outside air temperature.

d. *Wait 24 hours.*

e. Read gage pressure again and subtract second reading from first reading. This gives 24-hour gage drop on scale A. (See figure 4-16.)

f. Read temperature again, and note whether it has gone up (+) or down (—) and how much. This gives 24-hour change in temperature on scale B.

g. Lay a straightedge so that it intersects 24-hour gage drop on scale A and 24-hour change in temperature on scale B.

h. Read 24-hour leak on scale C.

i. If 24-hour leak is 25 psi or more, airplane should not be cleared for flights above 10,000 feet until leak has been corrected and oxygen system recharged to 400 psi. If 24-hour leak is within permissible limits, system should nevertheless be recharged to 400 psi.

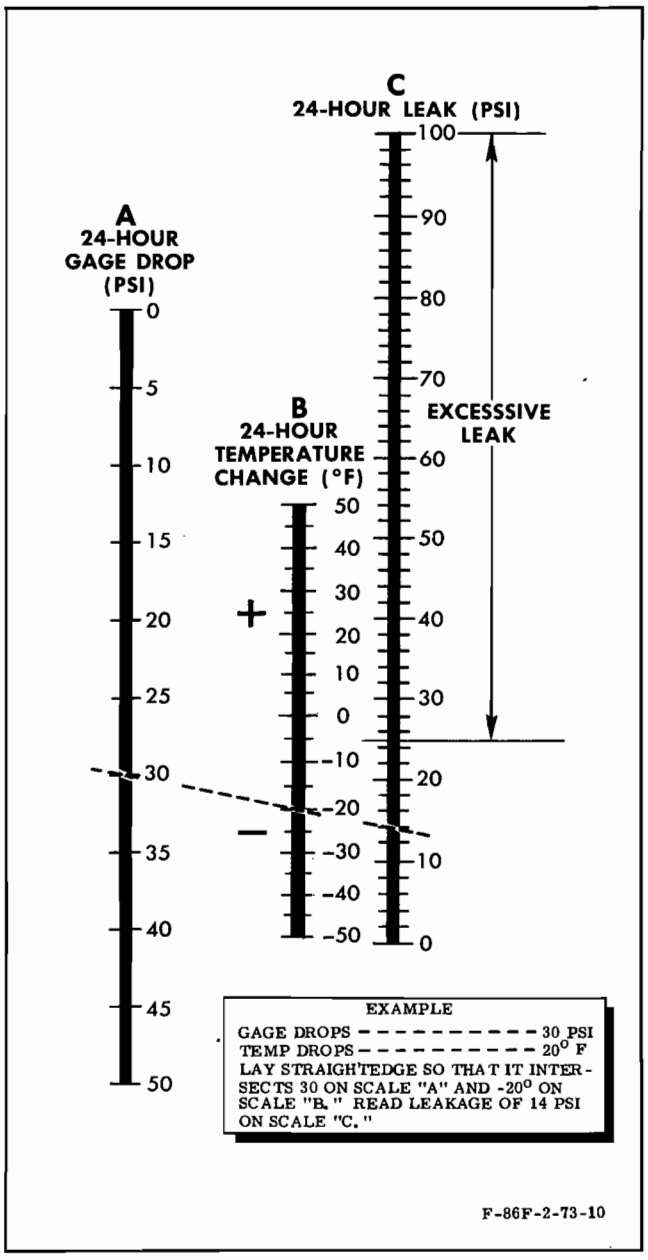


Figure 4-16. Oxygen System Leak Chart

j. A shorter interval may be used in increments of 6 hours, if desired. If a shorter interval is used for system leak test, multiply observed gage pressure drop by 24/H, where H is number of hours between readings. This gives 24-hour gage drop on scale A. Then follow steps f. through i.

k. To locate a leak, make a solution of soap and water, using a mild soap (preferably castile), and paint all connections. Immediately after test, take special precautions to wipe all parts clean and dry.

Note

Double-lap flaring is used on oxygen tubing connections. Normal torque on new connections is 100 to 125 inch-pounds. When leaky connections are being tightened, torque up to 200 inch-pounds is permissible; however, increase torque only in increments of 25 inch-pounds at a time, to permit further tightening if a leak should develop later.

4-132. FILLING OXYGEN SYSTEM.

4-133. Refer to paragraph 1-84.

4-134. OXYGEN CYLINDERS.

4-135. The four Type D-2 oxygen cylinders have approximately 2000 cubic inches total capacity and are installed within the nose section, two on each side of the air intake duct below the gun-muzzle door panels. The filler-line system is routed from the filler valve to the oxygen cylinders on one side of the airplane and then to the cylinders on the other side of the airplane. A single supply line from all four cylinders leads to the oxygen regulator.

4-136. REMOVING OXYGEN CYLINDERS. Do not remove oxygen cylinders unless they are damaged or believed to be contaminated. If check valves or fittings in spuds can be easily removed from damaged cylinders, they should be removed and re-used if they are not damaged or contaminated. Cap all lines left open by removal of any cylinder and close cylinder openings with AN913-2 plugs. Handle cylinders with great care, because even a small dent will weaken a cylinder. The parts and components referred to in the following procedure are identified in figure 4-17. Remove oxygen cylinders as follows:

WARNING

Do not remove any cylinder unless you are certain that the oxygen system has been exhausted. (Refer to paragraph 1-85 or 1-86.)

a. Remove radar equipment and battery access door. Loosen straps, disconnect wiring, and remove range power unit and outboard support. Remove gun blast panels (paragraph 9-137) and two lower panel supports from door area. Remove guns (paragraph 9-113) and blast tubes. Disconnect or remove oxygen, instrument, air, and hydraulic lines that interfere with removal of cylinders.

b. Loosen terminal strip from right side of airplane and relay panel from left side of airplane; then loosen clips holding wire bundles and secure wire bundles as far out of way as possible.

c. Disconnect supply line from top left cylinder. Through external access hole above and aft of left cylinders, disconnect top filler line. Loosen top strap turnbuckles and lift out top left cylinder.

d. Through access hole in nose wheel well (figure 4-17), disconnect filler line from bottom left cylinder. Through external access hole, disconnect bottom supply line. Unbolt support and rotate enough to disconnect bottom left cylinder from support.

e. Remove support and bottom left cylinder.

f. Through external access hole on the right side of airplane, disconnect filler line from both cylinders. Disconnect supply line from top right cylinder, loosen top strap turnbuckles, and lift out cylinder.

g. Through forward external access hole on right side of airplane, disconnect supply line from bottom right cylinder. Unbolt support and rotate enough to disconnect bottom right cylinder from support.

h. Remove support and bottom right cylinder.

4-137. PREINSTALLATION CHECK OF OXYGEN CYLINDERS. Check cylinders for cleanness. Clean spuds with a stiff dry brush. Examine cylinders for chipped, scarred, or corroded areas. If necessary, refinish with zinc chromate primer (Specification MIL-P-6889). If oxygen cylinder supports are replaced or repadded in service, be sure that padding is fireproof and chemically clean.

4-138. INSTALLING OXYGEN CYLINDERS. See figure 4-17.

4-139. OXYGEN SYSTEM CHECK VALVES.

4-140. Check valves are installed at each oxygen cylinder in the filler line and in the supply line near the oxygen regulator to prevent excessive or total loss of oxygen if any cylinder is ruptured or any length of tubing is punctured. Each check valve permits a rapid flow of oxygen in one direction only, as indicated by an arrow on the valve casing. The check valves will allow a slow backflow under slight pressure differential; however, a large and sudden fall of pressure on the upstream side will seat the valves. Always connect the oxygen lines to each check valve with the arrow pointing in the direction of normal oxygen flow. (See figures 4-14 and 4-15.)

4-141. OXYGEN SYSTEM REGULATOR (F-86F-1 THROUGH F-86F-15 AIRPLANES).

4-142. The oxygen system employs a Type A-14 regulator. There are two manual controls on the regulator, a diluter lever and a pressure dial. When the diluter lever is set at "NORMAL OXYGEN" and the pressure dial is set at "NORMAL," an aneroid controls the mixture of oxygen and air automatically. The percentage of oxygen delivered increases with increasing altitude, becoming 100 percent at approximately 34,000 feet. Below 34,000 feet, 100 percent oxygen may be obtained by moving

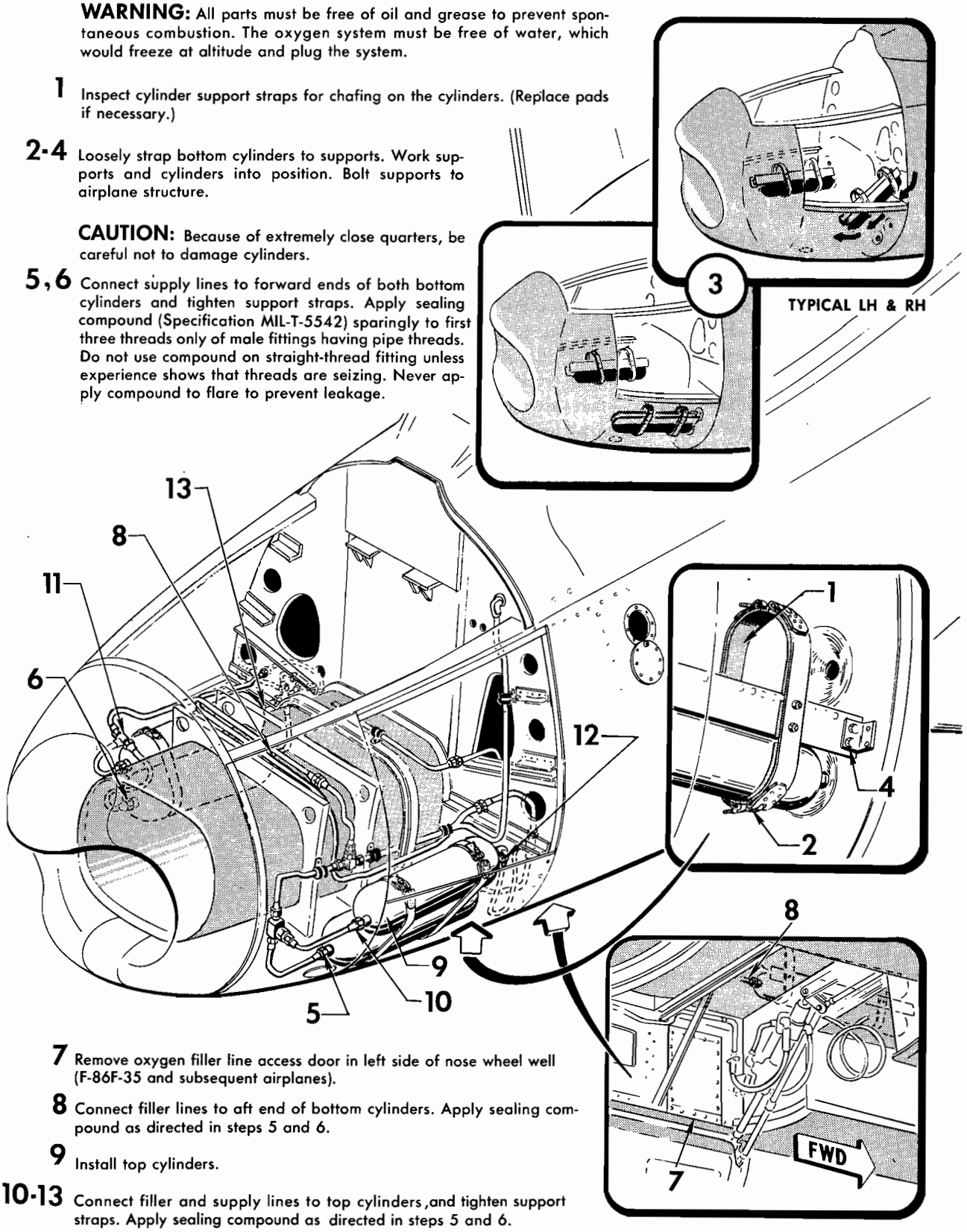
WARNING: All parts must be free of oil and grease to prevent spontaneous combustion. The oxygen system must be free of water, which would freeze at altitude and plug the system.

1 Inspect cylinder support straps for chafing on the cylinders. (Replace pads if necessary.)

2-4 Loosely strap bottom cylinders to supports. Work supports and cylinders into position. Bolt supports to airplane structure.

CAUTION: Because of extremely close quarters, be careful not to damage cylinders.

5,6 Connect supply lines to forward ends of both bottom cylinders and tighten support straps. Apply sealing compound (Specification MIL-T-5542) sparingly to first three threads only of male fittings having pipe threads. Do not use compound on straight-thread fitting unless experience shows that threads are seizing. Never apply compound to flare to prevent leakage.



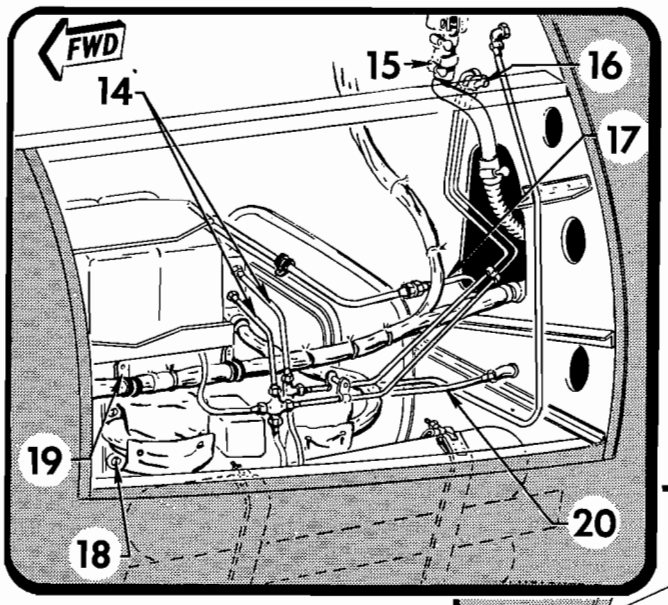
7 Remove oxygen filler line access door in left side of nose wheel well (F-86F-35 and subsequent airplanes).

8 Connect filler lines to aft end of bottom cylinders. Apply sealing compound as directed in steps 5 and 6.

9 Install top cylinders.

10-13 Connect filler and supply lines to top cylinders, and tighten support straps. Apply sealing compound as directed in steps 5 and 6.

Figure 4-17. Installing Oxygen Cylinders (Sheet 1 of 2)

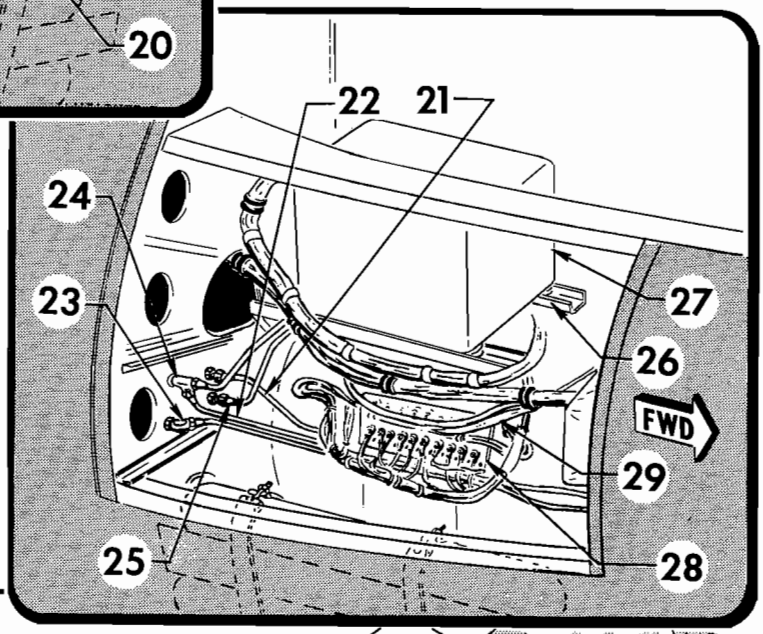


14 - 20 On left side, install and connect instrument lines, windshield anti-ice heater drain line, oxygen line, and air pressure line. Apply sealing compound to oxygen line as directed in steps 5 and 6. Install relay panel. Secure wire bundles as shown.

21 - 25 On right side, install and connect utility hydraulic system return and pressure lines and oxygen line. Apply sealing compound to oxygen line as directed in steps 5 and 6. Connect air pressure line.

26, 27 Install range power unit support and power unit.*

28, 29 Install terminal strips; then secure wire bundles as shown.



30 Install guns* and gun blast tubes.*

31 Install gun blast panel supports.

NOTE: All support bolts are installed with the boltheads up, with the following exceptions:

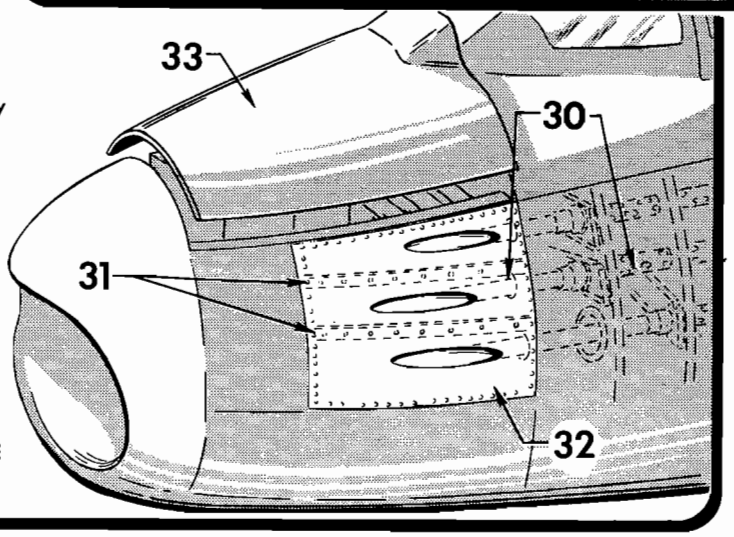
Top left support aft inboard bolt and forward outboard bolt

Lower left support forward outboard bolt

Top and bottom right support forward outboard bolts

32 Install gun blast panels.*

33 Install radar equipment* and battery access door.



*Refer to index for page number of applicable procedure.

TYPICAL BOTH SIDES OF AIRPLANE

F-86F-2-73-9A

Figure 4-17. Installing Oxygen Cylinders (Sheet 2 of 2)

the diluter lever to "100% OXYGEN" setting. If for any reason the supply of oxygen becomes inadequate because of restrictions or a faulty dilution mechanism, clockwise rotation of the pressure-breathing knob will open the valve. This allows a free flow of oxygen until sufficient pressure is built up to raise the diaphragm and close the valve. Any position of the pressure-breathing knob other than normal causes the diluter mechanism to become inoperative and allows 100 percent oxygen to flow under pressure. Keep the regulator clean and fixed firmly in position. Fittings and connecting tubing must be maintained tight and secure. Replace any damaged or inoperative regulator. Handle it carefully, as the regulator is a delicate instrument.

WARNING

In storage, oxygen regulators normally have plugs at the elbow to keep out dust and foreign matter. Before installing a new regulator, be sure to remove this dust plug; otherwise, the user will get no oxygen.

4-143. TESTING TYPE A-14 OXYGEN REGULATOR. The oxygen regulator may be tested for operation and leaks while installed in the airplane as follows:

WARNING

All parts of the oxygen system and test equipment must be free of oil, grease, or any material not approved for use near oxygen.

a. Charge oxygen system (paragraph 1-84) to 400 (±25) psi.

b. Set pressure control to "NORMAL" and diluter lever to "100% OXYGEN."

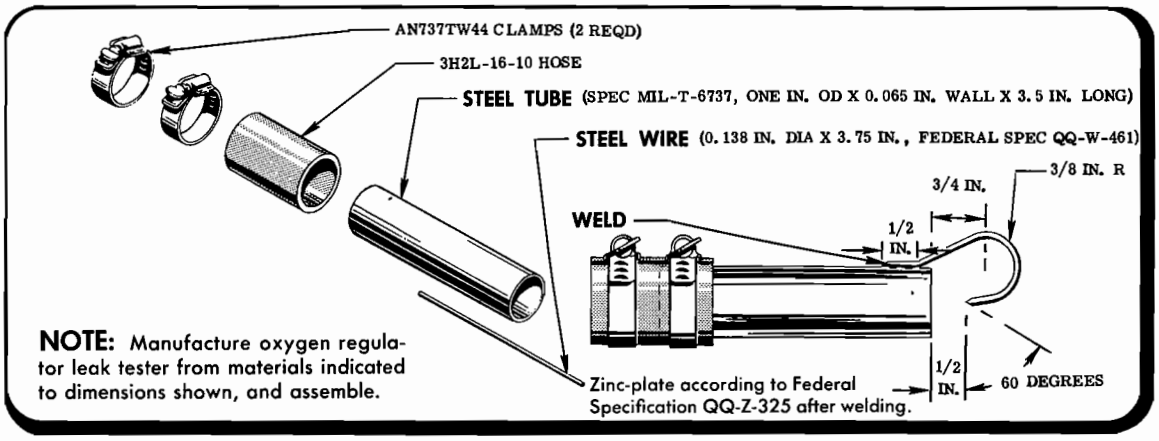
c. Breathe normally from regulator-to-mask line. Flow indicator should function freely with each breath.

d. Gradually turn pressure control from "NORMAL" to "ABOVE 45M" and back to "NORMAL." Oxygen should start to flow under pressure when pressure control reaches "SAFETY" position. Oxygen will continue to flow for a short time after pressure control is returned to "NORMAL."

e. After checking regulator for operation (steps a. through d.), see figure 4-17A for leak check procedure.

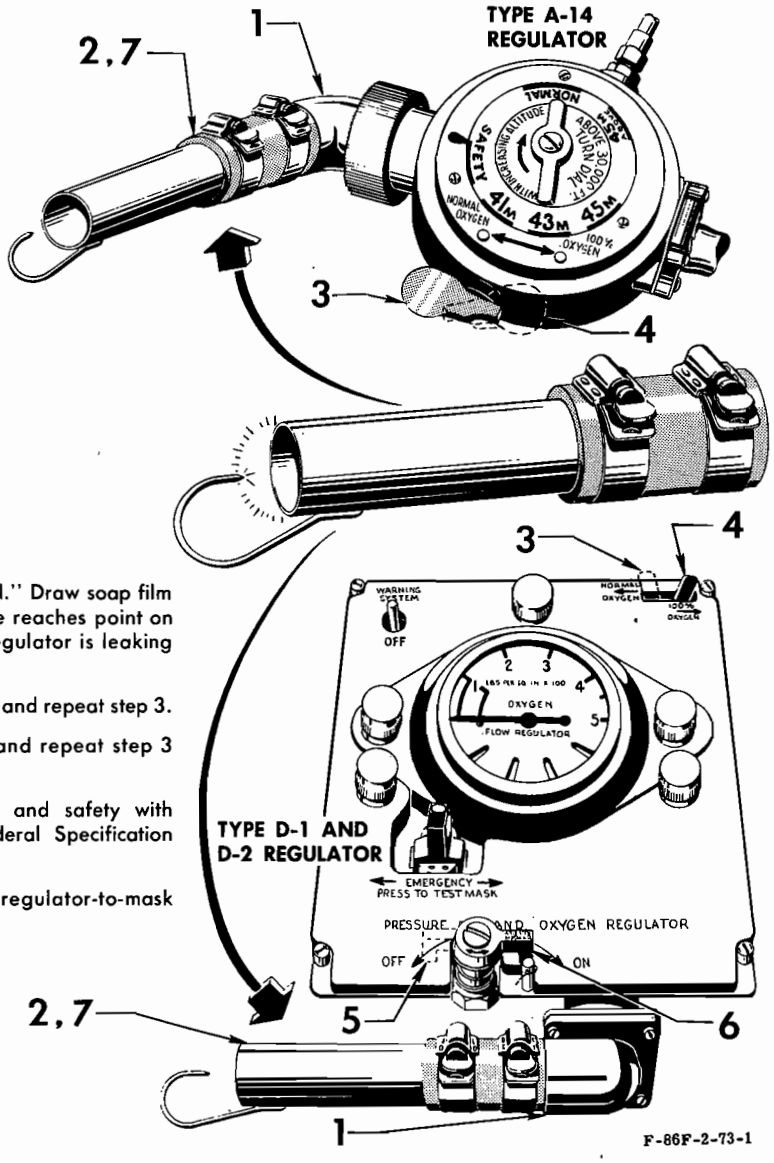
4-144. OXYGEN SYSTEM REGULATOR (F-86F-20 AND SUBSEQUENT AIRPLANES).

4-145. A Type D-1 or a Type D-2 pressure-demand oxygen regulator is mounted on the left console. The Type D-2 regulator is installed in F-86F-25 Airplanes AF52-5447 through -5530, F-86F-30 Airplane AF52-5014, and all subsequent airplanes. Both regulators are basically the same. The regulator automatically supplies a proper mixture of oxygen and air at all altitudes and at high altitudes provides positive oxygen pressure breathing. A diluter lever is provided on the regulator to enable the pilot to select "NORMAL OXYGEN" for all normal use or "100% OXYGEN" for emergency use. An oxygen supply valve lever, located at the bottom of the regulator panel, is used to start and stop the flow of oxygen. This lever must be safetied in the "ON" position at all times. The regulator emergency toggle lever supplies pressure oxygen for emergency operation when moved from the center position. The lever should be in the center position at all times except in case of emergency. A time delay relay, actuated by the flow of oxygen through the regulator, controls the oxygen warning light. (See figure 4-15.) A two-position ("ON" and "OFF") warning system toggle switch, located on the upper left side of



NOTE: Manufacture oxygen regulator leak tester from materials indicated to dimensions shown, and assemble.

WARNING: All parts and equipment must be free of oil and grease, to avoid fire from spontaneous combustion.



1 Remove left side panel, and disconnect regulator-to-mask line at regulator elbow.

2 Install regulator leak tester on regulator elbow.

3 Set diluter lever to "NORMAL OXYGEN." Draw soap film across leak tester outlet. If soap bubble reaches point on tester and bursts within 10 seconds, regulator is leaking excessively and should be replaced.

4 Move diluter lever to "100% OXYGEN" and repeat step 3.

5 Move oxygen supply lever to "OFF" and repeat step 3 (Types D-1 and D-2 only).

6 Move oxygen supply lever to "ON" and safety with 0.018-inch annealed copper wire (Federal Specification QQ-W-341).

7 Remove regulator leak tester, connect regulator-to-mask line, and install left side panel.

Figure 4-17A. Testing Oxygen Regulators for Leaks

the regulator, turns the warning system on and off. During normal breathing operation, the light glows dimly; however, if oxygen flow ceases or is continuous (as is the case if the oxygen mask becomes disconnected), the warning light illuminates brightly. The light will glow brightly for a short time when the switch is initially moved to "ON." The regulator also incorporates the oxygen system pressure gage and flow indicator.

4-146. TESTING TYPE D-1 AND D-2 OXYGEN REGULATORS. The oxygen regulator may be tested for operation and leaks while installed in the airplane as follows:

WARNING

All parts of the oxygen system and test equipment must be free of oil, grease, and any other material not approved for use near oxygen.

a. Charge oxygen system (paragraph 1-84) to 400 (±25) psi.

b. With oxygen supply lever "ON," move diluter lever to "100% OXYGEN" and oxygen warning light switch to "ON." (Light will glow brightly.)

c. Breathe normally from regulator-to-mask line. Flow indicator should function freely with each breath and oxygen warning light should dim. Light should glow brightly when oxygen breathing is stopped.

d. Move emergency oxygen button gently to left or right, or press in. An appreciable amount of oxygen should be released, and the warning light should dim at once but glow brightly again within 40 seconds.

e. Return emergency oxygen lever to neutral position, turn "OFF" warning light switch, and move diluter lever to "NORMAL OXYGEN."

f. After checking regulator for operation (steps a. through e.), see figure 4-17A for leak check procedure.

4-147. OXYGEN SYSTEM FILLER VALVE.

4-148. The oxygen filler valve is located to the rear of the cylinders on the right side of the airplane aft of the gun blast panel. It is protected by a cover plate marked "OXYGEN FILLER INSIDE." Keep the filler valve clean. When it is not in use, always keep it covered with the valve cap to prevent foreign matter from entering the valve. Except when replacing the handle or the cap, replace a faulty filler valve as a complete unit.

4-149. OXYGEN SYSTEM PRESSURE GAGE (F-86F-1 THROUGH F-86F-15 AIRPLANES).

4-150. The low-pressure oxygen pressure gage, installed on the left forward console, indicates system pressure. The gage is of the Bourdon-tube type and is calibrated in 50-pound increments from "0" to "500." No maintenance of the pressure gage is required. If the instrument becomes inoperative, replace it as a unit.

WARNING

Use no oil on the oxygen pressure gage.

4-151. OXYGEN SYSTEM BLINKER FLOW INDICATOR (F-86F-1 THROUGH F-86F-15 AIRPLANES).

4-152. A blinker-type oxygen-flow indicator is mounted on the left forward console and is connected to the oxygen regulator. Oxygen under pressure is admitted to a bellows and body assembly through a threaded connection in the rear of the indicator each time the user of the mask breathes, and a shutter in the indicator face opens and closes to show that oxygen is flowing through the regulator. No maintenance is required for the flow indicator. Check operation of the shutters by inserting the eraser end of a pencil through the large threaded hole in the back of the indicator; press gently against bellows and release. Failure of the shutters to open or close indicates a weak or broken spring, a defective shutter assembly, or a friction jam. If the instrument is faulty in its operation, replace the entire unit.

WARNING

Never use oil or grease on any part of the indicator that will come in contact with oxygen under pressure. An explosion may result.

4-153. PREINSTALLATION CHECK OF BLINKER FLOW INDICATOR. Before installing a new or different blinker flow indicator, make sure that it is the correct type and is approved for use. To test for leakage, connect the indicator to an oxygen supply line, raise pressure to 10 psi, and shut off supply. If, after 10 minutes, the shutters have not begun to close, there is no leakage. Replace a leaking instrument; *do not* attempt field repair.

4-154. OXYGEN SYSTEM PRESSURE GAGE AND OXYGEN FLOW INDICATOR (F-86F-20 AND SUBSEQUENT AIRPLANES).

4-155. A low-pressure oxygen gage is incorporated in the top of the oxygen regulator to indicate system pressure as long as the supply lines are intact. Normally the pressure in all oxygen cylinders is the same; however, if one cylinder is punctured, the check valves will isolate this cylinder and will leave the pressure gage reading practically the same as before, although the oxygen

supply will be greatly reduced. The dial of the pressure gage is calibrated from 0 to 5 (times 100). The flow indicator is also incorporated in the top of the regulator. It consists of a diaphragm which is linked to a blinker plate. Oxygen pressure in the flow indicator channel causes the diaphragm to move outward. With each breath of the mask wearer, a linkage is actuated and causes the blinker plate to move and expose four fluorescent painted segments in four tear-shaped windows in the face of the oxygen pressure and flow indicator dial.

4-156. ENGINE SECTION FIRE DETECTOR SYSTEM. The engine section fire detector system (figure 4-18) consists of a forward and an aft fire detector circuit, a fire detector relay unit (panel assembly), and a fire-warning circuit. The two fire detector circuits, which are separated by a transverse fire wall at the engine compressor rear frame, consist of a closed loop of thermocouples through which no battery current flows. The thermocouples are the rate-of-rise type and are connected in series. A sealed box in the right-hand radio compartment contains the fire detector relay unit, consisting of a sensitive relay, a slave relay, and a thermal test unit for each fire detector circuit. The fire-warning circuit consists of a forward and an aft warning light and a system test switch, all located on the right side of the instrument panel. The fire-warning circuit receives d-c power from the primary bus of the airplane and is controlled by the slave relays which, in turn, are controlled by the sensitive relays energized by the thermocouples. The wiring for the system can be tested by energizing both thermal test units with the system test switch. Several combinations of thermocouples and detector circuit resistances for various F-86F Airplanes are shown in the chart (figure 4-18).

4-158. FUNCTION OF ENGINE SECTION FIRE DETECTOR SYSTEM.

4-159. When a thermocouple in a detector circuit is exposed to a rapid temperature rise (as in the case of fire), an electromotive force is generated. This electromotive force energizes a sensitive polarized relay. (See figure 4-18.) The energized sensitive relay closes a circuit to the slave relay. When the slave relay is energized, an electrical circuit is completed between the primary bus of the airplane and the respective red fire-warning light in the cockpit. The light illuminates to indicate to the pilot the presence of extreme heat or fire. When the fire is extinguished, the thermocouple no longer generates electromotive force of sufficient intensity to keep the sensitive relay energized. The de-energized sensitive relay opens the circuit to the slave relay. The de-energized slave relay in turn opens the circuit to the fire-warning light, which is extinguished. The fire detector thermocouples are not destroyed by a fire of short duration; therefore, the lights will again be illuminated if a subsequent fire occurs. When the system test switch is closed (figure 4-18), electrical power of the primary bus of the airplane is connected to the heating elements of both thermal test units. This electrical power heats a thermocouple in each test unit, thus energizing the fire detector circuit the same way any other thermocouple subjected to a rapid temperature rise would energize it during an actual fire. If the fire detector circuits are not defective, both fire-warning lights will illuminate when the test switch is closed.

4-160. TROUBLE SHOOTING ENGINE SECTION FIRE DETECTOR SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Fire detector indicating lights fail to illuminate during light or continuity check.	Power supply off.	
	Grounded detector circuit wire or terminal.	
	Loose or broken detector circuit wire.	
	Defective thermocouple.	Replace thermocouple. (Refer to paragraph 4-168.)
	Battery low.	
	Loose or broken warning signal circuit wire.	
	Defective warning light bulb.	
	Defective fire detector relay unit.	

TROUBLE	PROBABLE CAUSE	REMEDY
	Defective thermal test unit.	Replace fire detector relay unit. (Refer to paragraph 4-165.)
	Defective test switch circuit.	
	Defective sensitive relay.	Replace fire detector relay unit. (Refer to paragraph 4-165.)
Spasmodic false fire warnings.	Defective sensitive relay.	Replace fire detector relay unit. (Refer to paragraph 4-165.)
	Defective test switch.	
	Defective warning signal circuit wire insulation.	
	Defective relay panel.	
False fire warning during starts.	Defective sensitive relay.	Replace fire detector relay unit. (Refer to paragraph 4-165.)

4-161. TESTING ENGINE SECTION FIRE DETECTOR SYSTEM.

4-162. Before testing system, check fire-warning lights for bulb illumination by pushing press-to-test lights on right side of instrument panel or shroud. Test system as follows:

Note

The following test is a *continuity* test only. It does *not* test for correct polarity wiring of the individual detector thermocouples nor does it check for correct resistance.

a. Make sure system is connected to electrical power supply.

b. Press fire system "TEST" switch for 10 seconds.

c. If either light does not illuminate within 10 seconds, fire detector system circuits and components must be tested. When making circuit and component tests (paragraphs 4-163 and 4-166), it is desirable to use an Edison Model 140-9 (Stock No. 780-808125) fire detector test set. If Edison Model 140-9 test set is not available, use a Simpson Model 260-volt-ohmmeter or an equivalent meter.

4-163. TESTING DETECTOR CIRCUITS. If system test (paragraph 4-162) indicates an inoperative system, remove detector circuit plug (figure 4-18) from fire detector relay panel. Using a test probe, short contacts "A" and "B" together (for an inoperative forward system) or contacts "C" and "D" (for an inoperative aft system) in relay unit detector circuit receptacle. If warning lights now illuminate when fire system "TEST" switch is pressed, detector circuit is defective portion of system and must be tested as follows:

a. Disengage fire detector circuit plug from relay unit receptacle.

b. Connect one lead of an ohmmeter to ground (airframe).

c. Insert a detachable pin into socket "A" of detector circuit plug; then connect other lead of ohmmeter to detachable pin and measure resistance.

CAUTION

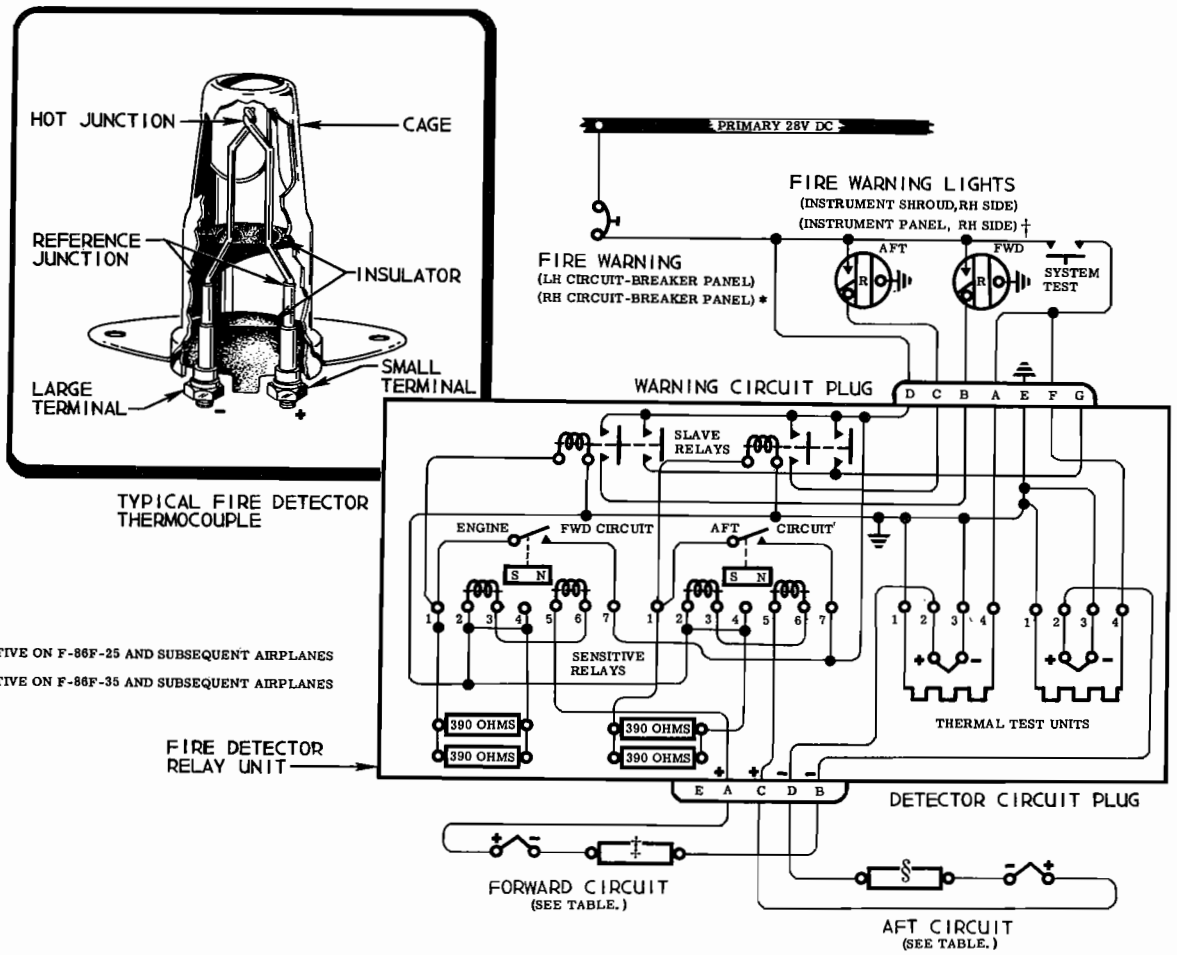
To prevent the possibility of the sockets within the detector circuit plug being excessively spread by off-size test probes, remove pins from a salvaged plug; then place detachable pins in detector plug inserts as required.

d. Transfer detachable pin from socket "A" to socket "C" and measure resistance. If less than 5000 ohms resistance to ground is measured during check at "A" socket, forward detector circuit is considered grounded. If less than 5000 ohms resistance to ground is measured at "C" socket, aft detector circuit is considered grounded. A grounded condition is due to a short in wiring or in detector thermocouples and must be eliminated.

e. When circuit shows no grounds, measure resistance across detachable pins "A" and "B," and "C" and "D" with bridge-type ohmmeter sensitive to 0.2 ohms. Resistance values for various thermocouples and resistor configurations should read as shown on chart (figure 4-18).

Note

The fire detector system may not function if the resistance exceeds designated values. Excessive resistance can be reduced only by a thermocouple-to-thermocouple check for loose or corroded connections, faulty thermocouples, or improper wiring. All electrical connections must be tight and clean.



FIRE DETECTOR EFFECTIVITY AND REQUIREMENTS TABLE

FORWARD CIRCUIT	NUMBER OF DETECTORS	5 (NO RESISTANCE PAD)	5 (NO RESISTANCE PAD)	5 (NO RESISTANCE PAD)	9 (‡1-OHM RESISTANCE PAD)
	ALLOWABLE RESISTANCE (CHECK ACROSS PINS A-B)	0.6-1.0 OHM	0.6-1.0 OHM	0.6-1.0 OHM	2.0-2.4 OHM
AFT CIRCUIT	NUMBER OF DETECTORS	13 (NO RESISTANCE PAD)	13 (§2-OHM RESISTANCE PAD)	9 (§3-OHM RESISTANCE PAD)	9 (§3-OHM RESISTANCE PAD)
	ALLOWABLE RESISTANCE (CHECK ACROSS PINS C-D)	1.4-2.0 OHM	3.4-4.0 OHM	4.4-4.8 OHM	4.4-4.8 OHM
AIRCRAFT EFFECTIVITY		F-86F-1 AF51-2850 THRU -2900 F-86F-20 AF51-13070 THRU -13130	F-86F-1 AF51-2901 THRU -2927 F-86F-5 F-86F-10 F-86F-15 F-86F-20 AF51-13131 THRU -13149 F-86F-30 AF52-4305 THRU -4404	F-86F-20 AF51-13150 THRU -13169 F-86F-25 AF51-13170 THRU -13283 F-86F-30 AF52-4405 THRU -4604	F-86F-25 AF51-13284 THRU -13510 AND AF52-5272 THRU -5530 F-86F-30 AF52-4605 AND ALL SUBSEQUENT AIRPLANES

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Figure 4-18. Engine Section Fire Detector System

4-164. ENGINE SECTION FIRE DETECTOR SYSTEM RELAY UNIT.

4-165. The relay unit, mounted on vibration insulators in the right-hand radio compartment, houses a sensitive relay, a slave relay, and a thermal test unit for each detector circuit. Each sensitive relay is an entirely enclosed unit with a seven-pin base for plug-in mounting in the relay unit to facilitate overhaul. Since the load-carrying ability of the sensitive relay is necessarily limited, a slave relay is employed. Each thermal test unit consists of a thermocouple and a heating coil; the coil, adjacent to the hot junction, is sealed within a glass bulb. To facilitate overhaul, each unit is provided with a four-pin base for plug-in mounting in the relay unit.

4-166. TESTING RELAY UNIT. If detector circuit test (paragraph 4-163) indicates an inoperative relay unit, the relay unit should be tested as follows:

a. Disengage detector circuit plug from relay unit receptacle.

b. With bridge-type ohmmeter sensitive to 0.2 ohms, measure resistance across pins "A" and "B" (forward circuit) and across pins "C" and "D" (aft circuit) of receptacle on relay unit.

CAUTION

Do not use ohmmeter applying more than 1.5 volts, as sensitive relay in relay unit will be damaged.

Note

Resistances across pins "A" and "B" or "C" and "D" must be between 3.2 and 3.9 ohms.

c. If resistance exceeds 3.9 ohms, remove relay unit cover; then remove plug-in thermal test units and sensitive relays.

d. Brighten pins and sockets with crocus cloth, and remove all grease and dirt; then replace test units and relays.

e. Repeat resistance check. If resistance is still out of limits, relay unit is defective and must be replaced.

4-167. ENGINE SECTION FIRE DETECTOR SYSTEM THERMOCOUPLES.

4-168. The fire detector thermocouples contain two wires of dissimilar metals with their outer ends twisted and welded together. The thermocouple wires are mounted in a heat-resistant insulator and are surrounded by a stainless steel cage. (See figure 4-18.) The cage is provided with openings to permit heat to reach the exposed hot junction with minimum interference, while furnishing maximum mechanical protection. The reference junctions, or points where the thermocouple wires are attached to the terminal studs, lie within the heat-resistant insulator. Two different-size terminal studs are used to lessen the possibility of accidental reversal of thermocouple polarity during replacement. Output from reversed thermocouples not only will fail to energize the circuit, but will tend to counteract the output of the other thermocouples. The fire detector thermocouples of the forward circuit are located in the engine accessory section, aft of the top compressor leakage air duct, and on the fuselage structure around the forward section of the engine. The fire detectors of the aft circuit are located in the engine aft compartment and are mounted on the fuselage structure around the aft portion of the engine and the exhaust tail pipe. Each group of thermocouples is connected in a series with a thermal test unit and the coils of a sensitive relay. When a thermocouple is exposed to a critical temperature, the hot junction of the thermocouple is heated suddenly, while the reference (cold) junction, being insulated, remains somewhat cooler than the hot junction. This sudden rise in temperature at the hot junction causes an abnormal temperature differential between the two junctions, and sufficient electromotive force is generated to energize the sensitive relay.

Note

- All F-86F Airplanes have one fire detector thermocouple installed on the forward side of the engine auxiliary gear case. Refer to paragraph 5-36 for removal of auxiliary accessory drive section cover to gain access to this thermocouple.
- The aft fuselage must be removed (paragraph 2-149) for access to the aft engine section fire detector thermocouples.

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5-1. POWER PLANT AND RELATED SYSTEMS.

5-2. The power plant and related systems include a turbojet engine, an engine control system, an engine oil system, an engine ignition system, an engine starter system, an engine fuel system, a fuel supply system, an auxiliary fuel supply system, a fuel filter deicing system installed on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063 only, and a fuel quantity indicating system. The fuel supply systems deliver fuel from the fuel cells and tanks to the engine fuel pump. The engine fuel system delivers and meters the fuel from the engine fuel pump to the engine combustion chambers.

5-3. TROUBLE SHOOTING POWER PLANT AND RELATED SYSTEMS.

TROUBLE	PROBABLE CAUSE	REMEDY
Insufficient or no rpm when an attempt is made to start engine.	If electrical power from external source is satisfactory (28 to 29 volts dc, capable of delivering 500 to 1000 amperes continuously), yet starter motor is straining to turn engine rotor, trouble is mechanical and probably caused by: a. Icing in engine compressor. b. Engine shroud ring seizure.	Direct hot air into compressor inlet. Allow engine to cool, provided seizure was caused by a too-sudden shutdown of engine at previous operation. When testing after cooling, turn turbine with wooden pole or with an external air pressure source through compressor.

TROUBLE	PROBABLE CAUSE	REMEDY
		If shroud ring still rubs, replace shroud ring, after making sure that any recently replaced bucket is not too long.
	c. Engine air-oil seal rub.	If cooling engine does not relieve trouble, replace engine.
	d. Engine compressor or other type of seizure, including starter-generator.	Make an extensive investigation; replace engine if necessary unless starter-generator is at fault. In which case, replace starter-generator.
	If engine compressor rotor turns freely by hand, trouble can be assumed to be electrical, as follows:	
	a. Starter-generator leads loose.	
	b. Open circuit breakers in electrical system.	
	c. Faulty external power source or connections.	
	d. Worn or defective starter-generator brushes or commutator.	Repair or replace starter-generator. (Refer to paragraphs 5-123 and 5-124.)
	e. Starter controller not functioning properly.	Repair or replace defective electrical equipment.
Combustion does not occur during an attempted start.	If fuel pressure is normal (15 to 25 psi) and no firing of spark plugs can be heard, ignition trouble is indicated, probably caused by the following:	
	a. Engine start ignition control relay not functioning properly.	Try start with emergency ignition switch "ON." If spark plugs fire, replace relay.
	b. Incorrect voltage at electrical junction box (24 volts).	
	c. Faulty cable leading to engine ignition system units.	
	d. Failure within ignition unit.	Replace ignition unit
	e. Grounded or broken high-voltage cable.	Replace cable.
	f. Faulty spark plugs.	Check for broken or cracked porcelain. Length from bottom surface of mounting flange to electrode tip should be $4\frac{9}{32}$ to $4\frac{11}{32}$ inches. Replace spark plugs having severe electrode tip erosion.
	g. Faulty or improperly adjusted throttle-actuated ignition switch.	Replace and/or adjust switch. (See figure 5-17A for adjustment.)
	If fuel pressure is normal at 6% rpm and ignition system is in order, probable cause is:	
	a. Improper start procedure.	

TROUBLE	PROBABLE CAUSE	REMEDY
	b. Improper fuel nozzle spray pattern.	Install a replacement set of fuel nozzles in chambers No. 3 and 7 to determine whether spray pattern is faulty.
	If fuel pressure is low and spark plugs can be heard firing, trouble is in the fuel system. If start was attempted on both main and emergency systems, trouble must be common to both systems, as follows:	
	a. Fuel supply inadequate.	
	b. Fuel supply system booster pumps not functioning properly.	Ground-check pumps. (Refer to paragraph 5-187.) If booster pumps are faulty, refer to fuel supply system booster pump malfunctions in TROUBLE column.
	c. Fuel supply system shutoff valve not fully open.	Replace shutoff valve if defective.
	d. Fuel supply system filter dirty or clogged.	Clean filter element. (Refer to paragraph 5-184.)
	e. Engine fuel system fuel stopcock stuck.	Check by disconnecting fuel line at oil cooler and turning engine to 3% to 4% rpm with starter. If no fuel appears, check linkage to stopcock or replace stopcock. (See figure 5-21, and refer to paragraphs 5-142 and 5-143.)
	f. Engine fuel system fuel flow divider improperly adjusted or stuck open.	Disconnect secondary (large-slot) hose from flow divider, and cap both hose and divider outlet. If engine now starts, replace flow divider.
	g. Engine fuel system drip valve clogged and stuck open, and fuel pressure over 5 psi.	Cap discharge line from drip valve. If engine starts, replace drip valve. Note that if fuel is pouring from overboard drain, drip valve must be stuck open.
	If start was attempted on engine main fuel system alone, trouble is in that system and probably from the following causes:	Attempt a start on the emergency system. If start is accomplished, trouble is in main fuel system. Attempting start will also correct unprimed condition of main fuel regulator.
	a. Emergency check valve in check and restrictor valve stuck open.	
	b. Linkage to main fuel regulator disconnected or jammed.	Check adjustment. (See figure 5-21.)
	c. Main fuel regulator or engine fuel system control valve not functioning properly.	Check by inserting gage in variable control oil pressure line. Attempt start. If pressure is below 23 psi, fuel regulator is faulty; if pressure is above 23 psi, fuel control valve must be replaced. Regulator may need priming with oil in cases where a replacement regulator has been installed. (Refer to paragraph 5-145.)

TROUBLE	PROBABLE CAUSE	REMEDY
	d. Variable control oil pressure and regulator-oil-to-gear-case lines crossed. e. Engine fuel system dual fuel pump not functioning properly. f. (Deleted)	Replace pump.
Engine fails to accelerate or tends to "overtemperature" during a start.	Improper start procedure. Defective fuel control valve. Defective main fuel regulator. Starter drops out before engine reaches approximately 20% rpm, because of: a. External electrical power supply failure. b. Starter controller failure.	Replace control valve. Replace regulator. (Refer to paragraphs 5-142 and 5-143.) Replace starter controller.
Excessive leakage at accessory seal drain outlet at left side of fuselage rear section.	Defective fuel flow divider, fuel pump, stopcock, or emergency fuel regulator.	Disconnect drain line from unit suspected of leakage until source of leak is located. Then replace defective unit.
Throttle sticks on deceleration.	Stopcock arm loose on shaft.	Check for damaged or worn serrations on shaft and arm. Replace stopcock and arm.
Engine unable to reach 100% rpm with full throttle setting.	Alternately run engine on both main and emergency fuel systems. If same trouble persists in both systems, the trouble is probably one of the following, common to both systems: a. Tachometer indicator reading faulty.	

TROUBLE	PROBABLE CAUSE	REMEDY
	b. Inadequate fuel supply.	
	c. Engine fuel system fuel flow divider not functioning properly.	Replace fuel flow divider.
	d. Engine fuel system fuel stopcock not functioning properly.	Adjust linkage or replace stopcock. (See figure 5-21 and refer to paragraphs 5-142 and 5-143.)
	e. Engine control system improperly adjusted.	Adjust engine control system. (Refer to paragraph 5-66.)
	f. Partially clogged fuel nozzle or manifolds. (This cause is indicated by a high fuel pressure.)	Clean or replace clogged units.
	Run engine on main fuel system alone (emergency fuel system switch "OFF"); if rpm is slightly less than 100%, trouble is probably in the following:	
	a. High rpm stop incorrectly set.	Reset high rpm stop. (Refer to paragraph 5-66.)
	b. Engine control system improperly adjusted.	Adjust control system. (Refer to paragraph 5-66.)
	c. Main fuel regulator linkage improperly adjusted.	Adjust main fuel regulator linkage. (See figure 5-21.)
	d. Engine fuel system fuel filter clogged.	Clean or replace filter. (Refer to paragraph 5-150 or 5-151.)
	If rpm is considerably less than 100% rpm during operation on main fuel system, trouble is probably in the following:	
	a. Leak in variable control oil pressure line.	Replace line.
	b. Engine fuel system main fuel regulator or control valve not functioning properly.	Insert a gage in variable control oil line. Attempt to reach top speed. Variable control oil pressure should equal approximately one-third of fuel pressure plus 15 psi. If pressure is high, replace fuel control valve; when pressure is low, replace regulator only. (Refer to paragraphs 5-142 and 5-143.)
	c. Engine fuel system filter clogged.	Clean or replace filter. (Refer to paragraph 5-150 or 5-151.)
	d. Engine fuel system dual fuel pump not operating properly.	Replace pump.
	e. Faulty main fuel regulator solenoid valve.	Replace valve.
	f. Faulty main fuel regulator solenoid valve air hoses between island No. 4 and rear of compressor.	Check by disconnecting air hose at island No. 4. With engine running on emergency fuel system, a strong pressure should be felt (approximately 80 psi).

TROUBLE	PROBABLE CAUSE	REMEDY
	g. Loose, ruptured, or clogged air hose island No. 4 to main fuel regulator.	
	h. Main fuel regulator oil orifice and filter clogged.	Clean or replace filter. (Refer to paragraph 5-150 or 5-151.)
	If engine is running on emergency fuel system alone (emergency fuel system switch at "TEST") and speed is lower than it should be according to the outside air temperature, the trouble is in the following:	
	a. Engine fuel system emergency fuel regulator linkage not properly adjusted.	Adjust linkage. (See figure 5-23.)
	b. Emergency fuel regulator not functioning properly.	Replace regulator.
	c. Engine fuel system dual fuel pump not functioning properly.	Replace pump.
Engine exceeds 100% rpm at full throttle position.	This could be caused by the engine emergency fuel system overriding the main fuel system. Check to see whether trouble is in emergency fuel system by turning switch "OFF." If speed drops to normal, the overspeed is probably caused by:	
	a. Emergency fuel regulator linkage not properly adjusted.	Adjust linkage. (See figure 5-23.)
	b. Emergency fuel regulator not functioning properly.	Replace regulator.
	c. Fuel pressure sensing line broken or disconnected.	
	d. Outside air temperature is above 37.8°C (100°F).	Operate on main fuel system only or retard throttle lever.
	If main fuel system alone is overspeeding, the engine trouble can be attributed to:	
	a. Faulty rpm indication.	Check tachometer indicator and tachometer generator; replace if necessary.
	b. High rpm stop adjusted incorrectly.	Reset high-speed screw on island No. 4. (Refer to paragraph 5-66.)
	c. Faulty main fuel regulator.	Replace regulator. (Refer to paragraphs 5-142 and 5-143.)
Excessive fuel pressure accompanied by inability of engine to reach top speed.	Partially clogged engine fuel system fuel nozzles or manifolds.	Replace fuel nozzles or fuel manifolds. (Refer to paragraphs 5-46 and 5-49.)
	Faulty engine fuel system fuel flow divider.	Replace flow divider.

TROUBLE	PROBABLE CAUSE	REMEDY
Engine surges or hunts with fixed throttle setting.	Alternately run engine on main and emergency fuel systems. If surge continues:	
	a. Fuel supply system booster pumps not functioning properly.	Ground-check pumps. (Refer to paragraph 5-187.) If booster pumps are faulty, refer to malfunctions of fuel supply system booster pumps in TROUBLE column.
	b. Fuel supply system filter clogged.	Clean filter element. (Refer to paragraph 5-184.)
	c. Faulty engine fuel system fuel flow divider.	Replace flow divider.
	d. Faulty fuel nozzles.	Replace fuel nozzles. (Refer to paragraphs 5-46 and 5-49.)
	If surging occurs when main fuel system alone is running the engine, the trouble is in:	
	a. Main fuel regulator.	Prime and/or replace fuel regulator. (Refer to paragraphs 5-145, 5-142, and 5-143.)
	b. Engine fuel system fuel control valve.	Replace control valve.
	c. Main element of engine fuel system dual fuel pump.	Replace fuel pump.
	d. Main fuel system fuel filter clogged.	Clean filter. (Refer to paragraph 5-150 or 5-151.)
	If surging occurs when emergency fuel system alone is running engine, the trouble is in:	
	a. Engine fuel system emergency fuel regulator.	Replace emergency fuel regulator.
	b. Emergency element of engine fuel system dual fuel pump.	Replace fuel pump.
Exhaust gas temperatures over maximum.	Jet nozzle area too small.	Remove restrictor segments as required. (Refer to paragraph 5-60.)
	Gage or thermocouple at fault.	Check by calibrating gage and measuring thermocouple resistance. (See figure 6-10.)
	Clogged compressor inlet.	Remove obstruction from compressor inlet.
	Faulty engine fuel system fuel nozzle.	A completely clogged nozzle is indicated by dark streaks on exhaust cone. A partially clogged nozzle or one with a faulty spray pattern will cause light streaks on exhaust cone. To detect either condition, look into tail pipe from a safe distance (200 feet) during engine operation.

TROUBLE	PROBABLE CAUSE	REMEDY
	Worn combustion chamber liners.	Replace liners. Refer to paragraphs 5-46, 5-47, and 5-49.)
	Shroud ring clearance excessive or shroud ring rubbing on turbine wheel.	Replace shroud ring. (Refer to paragraphs 5-54 and 5-56.)
	Nozzle diaphragm area too large (blade ballooned).	Replace engine. (Refer to paragraphs 5-12 through 5-17.)
	Damaged transition liners.	Replace engine. (Refer to paragraphs 5-12 through 5-17.)
Low exhaust temperatures.	Large jet nozzle area.	Add restrictor segments as required. (Refer to paragraph 5-60.)
	Gage or thermocouple at fault.	Check by calibrating gage and measuring thermocouple resistance. (See figure 6-10.)
Fuel mixing with lubricating oil.	Ruptured diaphragm in fuel control valve.	Check by disconnecting oil return line at fuel control valve and turning on booster pump. If necessary, replace valve.
	Internal break in oil cooler.	Check by removing drain plug and looking for fuel, turning on booster pump to give some fuel flow. If necessary, replace oil cooler.
	Excessive fuel from fuel pump getting into gear case, possibly because of back pressure in drain system.	Check by breaking fuel drain lines at island No. 3 and measuring for excessive leakage with engine running. Also look for restrictions in drainage system. Lines reversed on fuel flow divider result in abnormal drainage from overboard drain.
Low or no lubricating oil pressure.	Air lock in lines.	Loosen oil line at "out" side of filter, and motor engine.
	Empty oil tank.	
	Clogged oil filters.	
	Clogged or broken oil lines.	
	Oil pressure gage reading incorrect.	Calibrate gage. If necessary, replace gage.
	Engine oil system lubricating and scavenge pump failure.	Replace pump. (Refer to paragraphs 5-81 and 5-82.)
	Engine oil system aft-bearing scavenge pump failure.	Replace pump if trouble is failure of scavenge pump. (Refer to paragraphs 5-85 and 5-86.) If any of the scavenge lines are at fault, the oil system supply tank will quickly empty and oil will pour out at aft-frame vents.
	If tachometer indicator is registering zero with engine running, trouble is inoperative engine oil system lubricating and scavenge pump.	Replace pump. (Refer to paragraphs 5-81 and 5-82.)
	Improperly installed oil inlet line quick-disconnect coupling (F-86F-25 Airplane AF51-13398 and all subsequent airplanes).	Disconnect coupling and check for proper butting of valve stems.

TROUBLE	PROBABLE CAUSE	REMEDY
	Faulty engine oil system aft-bearing filter.	Check and clean filter. (Refer to paragraph 5-91 or 5-92.)
	Clogged screen filter in turbine frame line to scavenge pump.	Clean filter. (Refer to paragraph 5-99.)
	Missing "O" ring in oil line from rear frame to No. 2, 3, and 4 bearing oil jets.	
	Improperly functioning oil pressure relief valve.	Replace pressure relief valve.
Low oil pressure at altitude.	Clogged oil pressure transmitter vent.	
	Defective oil tank barometric valve.	Replace valve.
Excessive oil pressure.	No. 4 bearing oil supply line contacting bearing race.	Replace engine. (Refer to paragraphs 5-12 through 5-17.)
	Restrictions, pieces of rubber, crimped jets, or excess weld metal aft of oil pressure gage tap.	Make positive check by attaching air line containing a pressure gage just aft of engine oil filter. With 25 psi air pressure maintained at air line, cockpit oil pressure gage should show 8 psi.
Unusual noises detected while engine is coasting after shutdown or during a dry run.	Light clicking in vicinity of damper or aft bearings. (Shifting of rollers and retainer in bearings, or the normal and acceptable turbine-bucket looseness.)	No adjustment or repair necessary.
	Scraping sounds.	Adjust turbine shroud ring; then, if necessary, investigate further.
	Harsh clicking, rattling, or thumping caused by dry, misaligned, or faulty bearings.	Replace engine. (Refer to paragraphs 5-12 through 5-17.)
	Faulty starter-generator bearings.	Replace starter-generator. (Refer to paragraphs 5-123 and 5-124.)
	Fuel pump squeals as engine stops.	Acceptable.
Retractable air inlet screen operates with high current consumption.	Interference on or in screen section being operated by screw jacks.	Check for interference.
	Screw jack(s) not in line with screen.	
	Actuator motor brake dragging.	Replace actuator motor.
Retractable air inlet screen fails to operate.	Burned-out actuator motor.	Replace actuator motor.
	Broken actuator motor limit switch.	
	Actuator motor jammed.	Replace actuator motor.
	Loose, disconnected, or broken flexible drive shafts.	Check and replace where necessary.

TROUBLE	PROBABLE CAUSE	REMEDY
	Actuator motor lead loose or defective. Actuator motor receptacle wired to wrong leads.	Repair or replace.
Improper longitudinal travel of retractable air inlet screen screw jacks.	Wrong setting of actuator motor limit switches.	Reset limit switches. (See figure 5-6.)
Fuel leakage around fuel cell access door and unit attachments.	Fuel cell fittings or connections loose. Overtorque or undertorque of cell attaching bolts. Fuel cell inner liner cracked at corners and around openings. Separation of fuel cell laminations. Fuel cells deteriorated from long use.	 Replace fuel cell. Replace fuel cell. Replace fuel cells.
Blisters on interior on fuel cells.	Defects in lining, or separation of lining from body of cell. (Possible if cell is left empty for prolonged period.)	Puncture blisters and apply patches, or replace cell if necessary.
Swollen or soft areas in fuel cell.	Fuel penetrating to sealant layer through cracks in cell.	Replace fuel cell.
Black or grayish-white particles on fuel supply system filter element.	Defective fuel cells.	Replace filter element (paragraphs 5-183 through 5-185), and inspect and replace fuel cells if necessary.
Fuel supply system booster or transfer pumps fail to operate.	Pump brushes worn out. Wiring not properly connected. Loose electrical connections or high resistance in connections. Booster or transfer pump burned out. Maladjusted or broken transfer pump float switch. Defective throttle-actuated ignition switch or throttle relay.	Replace pump. Clean and tighten all connections. Replace pump. Adjust or replace switch. (Refer to paragraph 5-196 or 5-197.) Replace switch or relay.
Fuel supply system booster or transfer pumps continue to operate when throttle has been retarded to "OFF."	Faulty or improperly adjusted throttle-actuated ignition switch. Faulty throttle relay.	Replace and/or adjust switch. (See figure 5-17A for adjustment.) Replace relay.
Fuel supply system booster or transfer pump pressure too low.	Low voltage. Worn pump brushes. Pump brushes not seated properly. Pump wired incorrectly. Pump armature shaft binding. Fuel in pump motor, indicating possible bearing failure.	Replace pump. Run pump under load until pressure reaches normal. Wire pump for specified duty. Replace pump. Check for leakage at vent plug. If leakage is noted, replace pump.

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel supply system booster or transfer pump pressure is unsteady or erratic.	Loose electrical connections.	
	Voltage variations.	
	Pump screen clogged.	Remove pump and clean screen. (Refer to paragraphs 5-188 and 5-189, or 5-193 and 5-194.)
	Seizing pump bearings.	Replace pump.
	Poor pump commutation.	Replace pump.
Fuel supply system booster or transfer pumps noisy.	Pump mounted loosely.	Tighten pump mounting bolts.
	Worn pump bearings.	Replace pump.
Fuel leaking from fuel supply system booster or transfer pump seal drain.	Failure of seal or dirt on seal.	Replace pump.
Fuel leaking from fuel supply system booster or transfer pump motor vent.	Fuel leaking into motor through motor cover gasket.	Replace pump.
Fuel fails to transfer from auxiliary fuel system tank or tanks. (See figures 5-34 and 5-35.	Air pressure shutoff valve closed.*	
	Clogged air pressure filter.*	Remove and clean screen. (Refer to paragraph 5-228.)
	Restriction or loose connection in air pressure lines.	Pressure-check system. Refer to paragraphs 5-223 or 5-225.)
	Air pressure line drain valves open.	Close drain valves.
	Tank dive vent valve stuck open.	Clean or replace valve.
	Faulty air pressure relief valve.	Pressure-check system. (Refer to paragraph 5-223 or 5-225.)
	Faulty fuel level control valve.	Replace valve.
	Air leak in auxiliary tank.	Pressure-check tank. (See figures 5-37, 5-38, 5-40, and 5-42.)
	Faulty connection at fuel or air line wing pullaway fittings.	Check "O" ring seals in wing receptacles and check for proper engagement of pullaway fittings into wing receptacles.
	Faulty switch.†	
	Loose connection in electrical circuit.†	
	Faulty solenoid valves(s).†	
	Faulty or clogged air pressure regulator.†	Clean or replace regulator.
	No air pressure.	Check air pressure source.
Auxiliary fuel supply system air pressure shutoff valves inoperative.†	Loose electrical connections.	
	Faulty valve(s).	Replace valve(s).

TROUBLE	PROBABLE CAUSE	REMEDY
Outboard-drop-tank-empty light fails to illuminate.†	Faulty bulb. Loose electrical connections. Faulty switch.	
Auxiliary fuel transfers from one tank to another.†	Faulty auxiliary fuel supply system check valve(s).	Replace check valve(s).
Fuel filter deicing system alcohol not entering filter.	Alcohol tank empty. Restriction in alcohol pump. Alcohol check valve reversed. Improperly functioning alcohol shutoff valve. Improperly functioning alcohol pump.	Replace pump. Replace valve. Replace pump.
Fuel filter deicing system alcohol pump inoperative.‡	Faulty deicer switch. No electrical power. Open electrical circuit. Pump motor failure (burned out).	Replace pump.
Fuel filter deicing system warning light inoperative.‡	Faulty bulb. Open electrical circuit. Inoperative fuel filter differential pressure switch.	Replace switch.
Fuel filter deicing system warning light goes on too soon, lights intermittently, or does not go off.‡	Fuel filter differential pressure switch improperly adjusted. Restriction in fuel filter element. Fuel filter differential pressure sensing line restrictor missing.	Replace switch. Inspect and clean filter element. (Refer to paragraph 5-184.) Install restrictor.
Fuel filter deicing system alcohol shutoff valve inoperative.†	Faulty deicer switch. No electrical power. Open electrical circuit. Solenoid burned out.	Replace shutoff valve.
Fuel filter deicing system differential pressure switch too sensitive or not sensitive enough.‡	Switch improperly adjusted.	Replace switch.
Fuel quantity indicating system gives erroneous reading.	Sticking fuel quantity transmitter fulcrum. Bent fuel quantity transmitter float arm. Faulty indicator. Improperly adjusted system. Improperly adjusted transmitter resistance.	Replace transmitter. (Refer to paragraphs 5-282 and 5-285.) Replace float arm. Check system adjustment. Refer to paragraph 5-273.) Check transmitter resistance. (Refer to paragraph 5-284.)

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel quantity indicator pointer remains at center of indicator scale.	Electrical connection improperly crimped.	Properly secure connecting lugs.
	Rivets securing fuel quantity transmitter resistance strips are shorting to case in transmitter head.	Replace transmitter. (Refer to paragraphs 5-282 and 5-285.)
Fuel quantity indicator gives erratic reading.	Rivets securing fuel quantity transmitter resistance strips are shorting to case in transmitter head.	Replace transmitter. Refer to paragraphs 5-282 and 5-285.)
	Loose connections in wiring from transmitter to indicator.	
	Sticking fuel quantity transmitter float.	Where possible, remove filler cap and move float with suitable object. Otherwise, remove transmitter and free float. (Refer to paragraph 5-282.)
	Transmitter cover gasket not correctly installed, resulting in dirty resistance strips.	Clean transmitter and install new gasket.
	Moisture in transmitter because of overtorqued transmitter cover screws, resulting in cracked or distorted cover.	Replace cover if necessary. Replace gasket and tighten screws finger-tight, not to exceed 3 inch-pounds torque.
	Moisture in transmitter because of overtorqued transmitter cover screws, resulting in poor gasket seal.	Clean transmitter, replace gasket, and tighten screws finger-tight (2½ to 3 inch-pounds torque).
Fuel quantity indicator has constant empty-scale reading.	Fuel quantity transmitter shorted out in "B" to "C" circuit.	Locate and replace defective transmitter. (Refer to paragraphs 5-282 and 5-285.)
Fuel quantity transmitter adjustment arm sticking at low position and fuel supply system transfer pump energized, causing fuel to spew from fuel vent line.	Improper setting of fuel transfer pump switch.	Adjust transfer pump switch. Refer to paragraph 5-196 or 5-197.)
Fuel quantity indicator has full-scale or empty-scale fluctuation.	Open circuit between "A" and "D" or "B" and "C" pins of indicator circuit.	Locate and tighten loose connections.
Fuel quantity indicator has constant full-scale reading.	Fuel quantity transmitter shorted out in "A" to "D" circuit.	Locate and replace defective transmitter. (Refer to paragraphs 5-282 and 5-285.)

*F-86F-1 through F-86F-20 Airplanes
†F-86F-25 and subsequent airplanes
‡F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063

5-4. COMPONENTS AND ACCESSORIES OF POWER PLANT AND RELATED SYSTEMS.

5-5. The following is a listing of power plant and related system components and accessories. For further information about a component or accessory, refer to applicable paragraph.

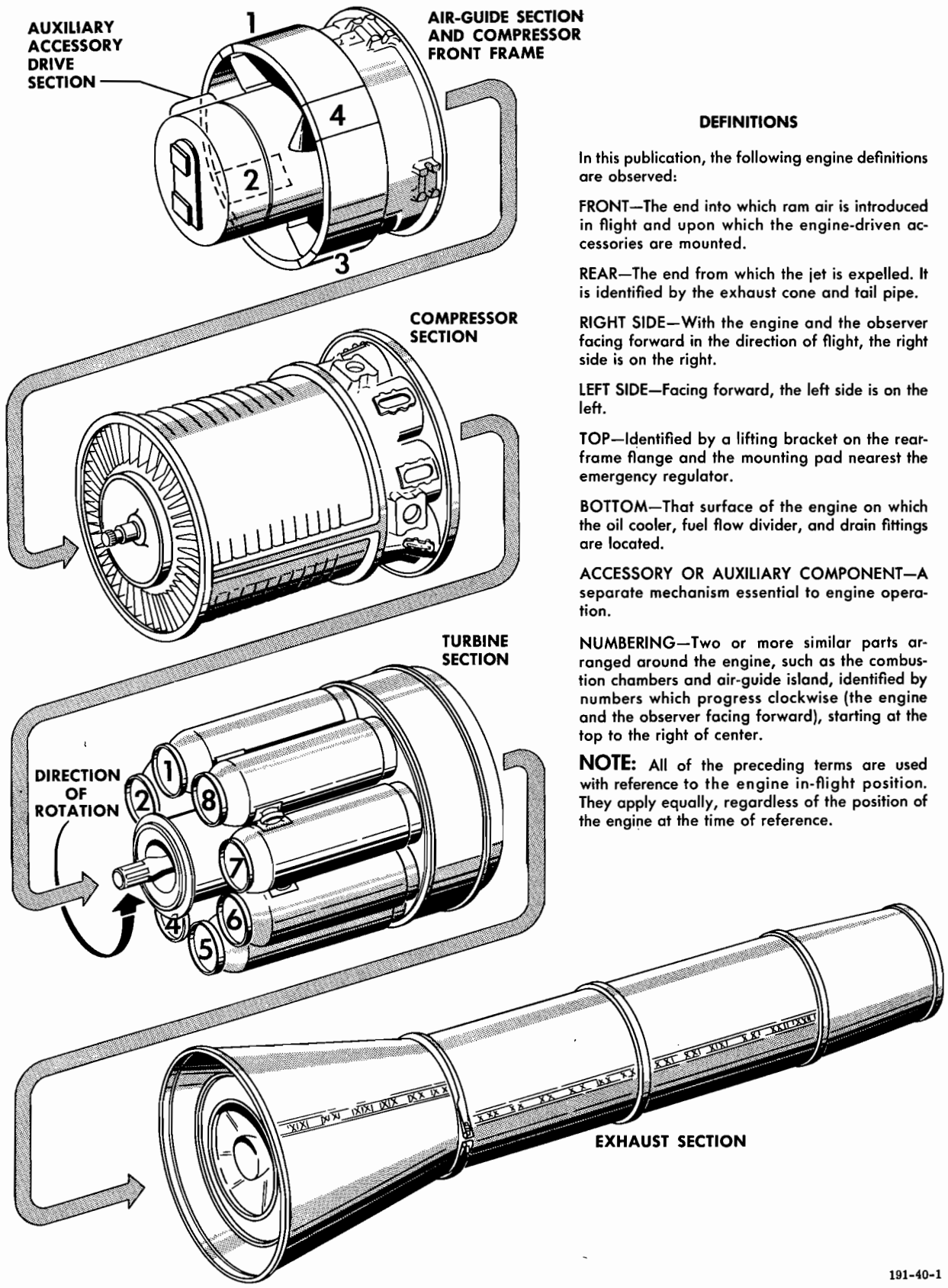
COMPONENT OR ACCESSORY	MODEL OR DWG NO.	MFR	PARAGRAPH NO.
Engine	J47-GE-27	G.E.	5-7
Engine anti-icing air valve	100023	Whittaker	5-29
Air inlet screen screw jacks	568C	Lear	5-31
	31560	AiResearch	
Air inlet screen actuator motor	31558	AiResearch	5-31
	150-H	Lear	
Engine oil system lubricating and scavenge pump.	GC523	Nichols and Son	5-80
Engine oil system aft-bearing scavenge pump	NC193-1F	Nichols and Son	5-84
Engine oil system auxiliary gear case scavenge pump.	GB693	Nichols and Son	5-88
Engine oil system aft-bearing filter	C15575K	Air Maze	5-90
	3690	Hydro-Aire	
Engine oil system oil cooler and temperature regulator valve	57200-1	Clifford Mfg	5-94
	U-7500-1	United Aircraft	
Engine ignition system vibrator unit	979121163	G.E.	5-107
Engine ignition system transformer coils	9791917G1	G.E.	5-109
Engine ignition system spark plugs	F14-8	Champion	5-111
	A7746	B.G.	
Engine starter system starter-generator	2CM77D3	G.E.	5-122
Engine starter system starter controller	AN3391-1		5-126
Engine fuel system main fuel regulator solenoid valve	V5-5350	Skinner Chuck	5-130
Engine fuel system dual fuel pump	021077-070-01	Pesco	5-138
	021077-070-02	Marvel-Schebler Carburetor	
Engine fuel system main fuel regulator	VS2-14250A1	Chandler-Evans	5-140
Engine fuel system control valve	021098-030-01	Pesco	5-147
Engine fuel system fuel filter	03S12166D	Air Maze	5-149
	3638A	Hydro-Aire	
Engine fuel system main fuel regulator oil orifice and filter	3856	Hydro-Aire	5-153
	0S12223G	Air Maze	
Engine fuel system emergency fuel regulator	EC2-14150A1	Chandler-Evans	5-155
Engine fuel system check and restrictor valve	K-1317-12	Koehler	5-158
Engine fuel system fuel stopcock	122D148	G.E.	5-160
Engine fuel system fuel flow divider	326C308	G.E.	5-164
Engine fuel system fuel nozzles	8482535	G.E.	5-166
Fuel supply system shutoff valve	3224	Hydro-Aire	5-180
	WE-451-2D	Whittaker	
Fuel supply system filter	6756	Hydro-Aire	5-182
	42105	Koehler	
Fuel supply system booster pump	TF31400-3	Thompson Products	5-187
Fuel supply system transfer pump	TF31400-3	Thompson Products	5-192
Auxiliary fuel supply system air pressure shutoff valve*	W-6100-¼D	Whittaker	5-213
	32222	Koehler	
Auxiliary fuel supply system solenoid shutoff valve†	AV-2B-1354	General Controls	5-214

COMPONENT OR ACCESSORY	MODEL OR DWG NO.	MFR	PARAGRAPH NO.
Auxiliary fuel supply system outboard-drop-tank-empty light switch (valve fuel-air indicator)†	F-7097	Revere	5-214
Auxiliary fuel supply system air pressure regulator†	1354-526177	Parker Appliance	5-231
Auxiliary fuel supply system fuel level control valve	K-1880D	Koehler	5-233
Fuel filter deicing system shutoff valve‡	4OR855B	General Controls	5-249
Fuel filter deicing system pump‡	20386-9	Adel	5-261
Fuel filter deicing system differential pressure switch‡	G-20A11	Minneapolis-Honeywell	5-263
Fuel filter deicing system thermal relief valve‡	2-2850-76	Parker Appliance	5-266
Fuel quantity indicating system indicator	EA721G-1A	Liquidometer	5-275
Fuel quantity indicating system liquidensitometer	EA909C-1	Liquidometer	5-277
Fuel quantity indicating system transmitters:			5-281
Center wing	EA379AC-547A	Liquidometer	
Outer wing (outboard)	EA378A-545	Liquidometer	
Outer wing (inboard)	EA378A-546	Liquidometer	
Forward fuselage	EA380-548A*	Liquidometer	
	EA380C-548A¶	Liquidometer	
	EA380C-548AB**	Liquidometer	
Aft fuselage	EA381-549A	Liquidometer	
Fuel quantity indicating system adjustment panel	AC134A5-5A	Liquidometer	5-287

***F-86F-1 through F-86F-20 Airplanes**
†F-86F-25 and subsequent airplanes
‡F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063
¶F86F-25 Airplanes AF51-13170 through -13499 and F-86F-30 Airplanes AF52-4305 through -4831, except those modified by T. O. 1F-86F-48 (formerly 01-60JLD-54)
****F-86F-25 Airplanes AF51-13170 through -13499 modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), AF51-13500 through -13510, and AF52-5272 through -5530; F-86F-30 Airplanes AF52-4305 through -4831 modified by T. O. 1F-86F-48 (formerly 01-60JLD-54) and AF52-4832 through -5163; and F-86F-35 and subsequent airplanes**

5-6. ENGINE.

5-7. The airplane is powered by an axial-flow turbojet engine. (Refer to paragraph 5-5 for specific data.) The engine incorporates a 12-stage, axial-flow compressor; eight direct-flow type combustion chambers; and a single-stage turbine coupled directly to the compressor rotor. Provision for anti-icing (paragraph 5-27) is made to allow all-weather operation. No provision is made for engine thrust augmentation. The engine is divided into the following major sections (figure 5-1): auxiliary accessory drive section (paragraph 5-35), air-guide section and compressor front frame (paragraph 5-41), compressor section (paragraph 5-43), turbine section (paragraph 5-45), and exhaust section (paragraph 5-53). Engine mounting in the airplane is accomplished by an adjustable three-point suspension system. For further information on engine mounting, refer to paragraph 5-25. Doors in the sides of the fuselage and wheel wells provide access to the engine plumbing islands and other portions of the engine for servicing, inspection, and maintenance. For complete access to the aft portion of the engine (turbine and exhaust sections), the fuselage rear section must be removed. A transverse bulkhead, which serves as a forward fire wall, separates the engine compartment from the cockpit and the forward fuselage fuel cell. A transverse fire wall mounted on the engine compressor rear frame divides the engine compartment into two compartments: the relatively cool forward compartment and the hot aft compartment. This prevents leaking combustible liquids or fumes from coming in contact with the hot aft portions of the engine or in direct contact with exhaust gases. To reduce heat radiation, the tail pipe and exhaust cone are wrapped with heat insulation blankets. To further protect the fuselage structures by maintaining safe structural temperatures, each compartment has a separate ventilating airflow



DEFINITIONS

In this publication, the following engine definitions are observed:

FRONT—The end into which ram air is introduced in flight and upon which the engine-driven accessories are mounted.

REAR—The end from which the jet is expelled. It is identified by the exhaust cone and tail pipe.

RIGHT SIDE—With the engine and the observer facing forward in the direction of flight, the right side is on the right.

LEFT SIDE—Facing forward, the left side is on the left.

TOP—Identified by a lifting bracket on the rear-frame flange and the mounting pad nearest the emergency regulator.

BOTTOM—That surface of the engine on which the oil cooler, fuel flow divider, and drain fittings are located.

ACCESSORY OR AUXILIARY COMPONENT—A separate mechanism essential to engine operation.

NUMBERING—Two or more similar parts arranged around the engine, such as the combustion chambers and air-guide island, identified by numbers which progress clockwise (the engine and the observer facing forward), starting at the top to the right of center.

NOTE: All of the preceding terms are used with reference to the engine in-flight position. They apply equally, regardless of the position of the engine at the time of reference.

Figure 5-1. Engine Terminology and Major Sections

system. The forward compartment is cooled during flight by air that enters through 12 holes in the engine air inlet duct. This air circulates through the forward compartment. It is expelled overboard through two outlet ducts in the bottom of the fuselage at the fire wall, two outlets near the engine trunnion mounts, and by the aspirator action of the compressor seal leakage air, through a duct at the top of the fuselage. During ground operation, the reverse condition exists in that the cooling air enters the compartment through the normal outlets and is drawn through the 12 holes in the inlet duct into the engine compressor. The aft compartment is cooled by air entering two inlet ducts (one duct is located on each lower side of the fuselage) just forward of the speed brakes. This cooling air circulates through the aft compartment and is expelled overboard, by the aspirator action of the exhaust jet stream, through the annular venturi-like opening formed by the exhaust tail-pipe nozzle and the rear of the fuselage.

5-8. ENGINE DATA.

5-9. The following chart and figure 5-1 contain data and general information concerning the engine.

Static military thrust
(sea level at 7950 rpm)....Approximately 6100 pounds
Engine speed (100%).....7950 rpm
Engine weight
(before build-up).....Approximately 2735 pounds
Engine length
(less tail pipe).....147.57 inches cold
148.47 inches hot
Engine width
(across trunnion pads)....32.0 inches cold
32.25 inches hot
Engine largest diameter
(at screen actuators).....39.25 inches
Engine oil consumption..0 to 2.5 pounds per hour

5-10. TROUBLE SHOOTING ENGINE.

5-11. Refer to paragraph 5-3.

5-12. REMOVING ENGINE.

5-13. See figure 5-2 for location and identification of the various disconnects. To remove engine, proceed as follows:

a. Make sure all switches are "OFF"; then remove access panels in fuselage and main landing gear wheel well covers.

b. Remove fuselage rear section. (Refer to paragraph 2-149.)

c. On F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13397, drain oil system supply tank. (Refer to paragraph 1-45.)

d. Make following disconnects, identified and located in figure 5-2.

CAUTION

Secure with cord all disconnected and hanging lines, hoses, ducting, control rods, and electrical wiring to prevent damage or interference during engine removal. Install aluminum caps on all open fittings.

Note

All disconnects are identified by international orange color marking.

Through left fuselage access door:
Engine control rod at engine.
Fuel and oil pressure hoses at transmitters.
Hydraulic hose (one) at quick-disconnect.
Through left wheel well:
Fuel inlet hose at island No. 3.
Hydraulic hoses (three) at quick-disconnects.
Through right wheel well:
Engine oil-in hose.
Hydraulic hoses (three) at quick-disconnects.
Through right fuselage access door:
Engine electrical disconnect.
Exhaust thermocouple disconnect.

Note

Pull wire bundles and plugs out through right access door and allow to hang down side of fuselage to ensure that engine does not come in contact with wire bundles and plugs during removal.

Engine oil return at quick-disconnect.
Engine front support mount by removing safety pin and retaining pin.

Note

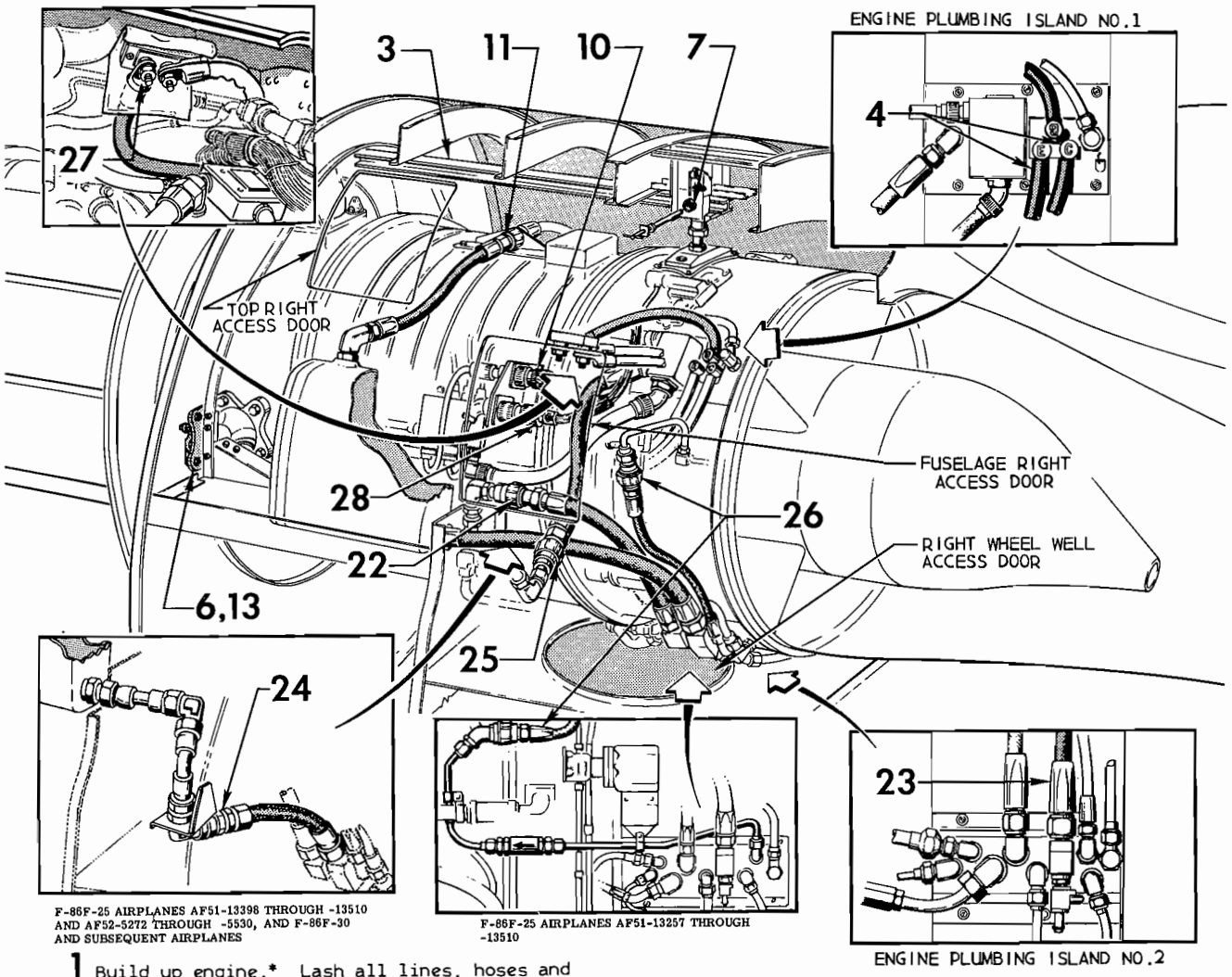
Jiggling aft end of tail pipe will facilitate removal of retaining pin.

At fuselage rear section attachment point:
Heat and vent air extraction flexible duct.
Engine drain.

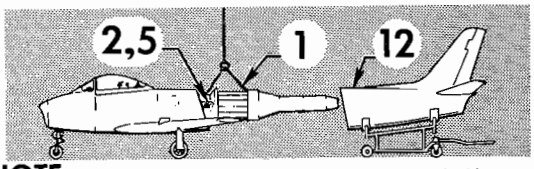
e. Connect engine hoist sling (176-55010) to engine fittings and relieve weight of engine from airplane.

f. Loosen and open engine main trunnion mounts.

g. Make sure that all listed engine-to-fuselage disconnects have been accomplished and are clear; then carefully roll fuselage front section away from engine, or engine from fuselage. When engine plumbing island No. 1 is opposite right-hand fuselage access door, disconnect "E" and "C" starter-generator leads at engine and disconnect "B" lead at fuselage. Lower engine into transportation dolly (E1186-50) or suitable shipping container mounting. If engine is to be sent to overhaul, remove all engine-to-airplane adapting parts for reinstallation.



1 Build up engine.* Lash all lines, hoses and wiring to engine to prevent interference during engine installation; then attach engine sling (176-55010), and lift and align engine with fuselage.



NOTE: Pull wire bundles and plugs out through right access door, and allow them to hang down side of fuselage to ensure that engine does not come into contact with wire bundles and plugs during installation.

2 Install engine installation guides (E1698-1 and E1698-2) in fuselage right and left trunnion clamps.

3 Roll fuselage back or move engine forward, engaging steady-support rollers in fuselage guide track.

4,5 When engine plumbing island No. 1 is opposite right fuselage access door, connect starter-generator leads "E" and "C" and remove engine installation guides.

6 Secure engine main trunnion mounts. Torque mount clamps to 160-190 inch-pounds and safety.

7 Lock forward steady-support with lock pin and safety pin; then remove engine sling.

NOTE: To aid lockpin installation, have a man jiggle the aft end of the tail pipe up and down.

8 Connect engine front frame drain line to fuselage.

9 Connect two halves of compressor discharge air supply duct.

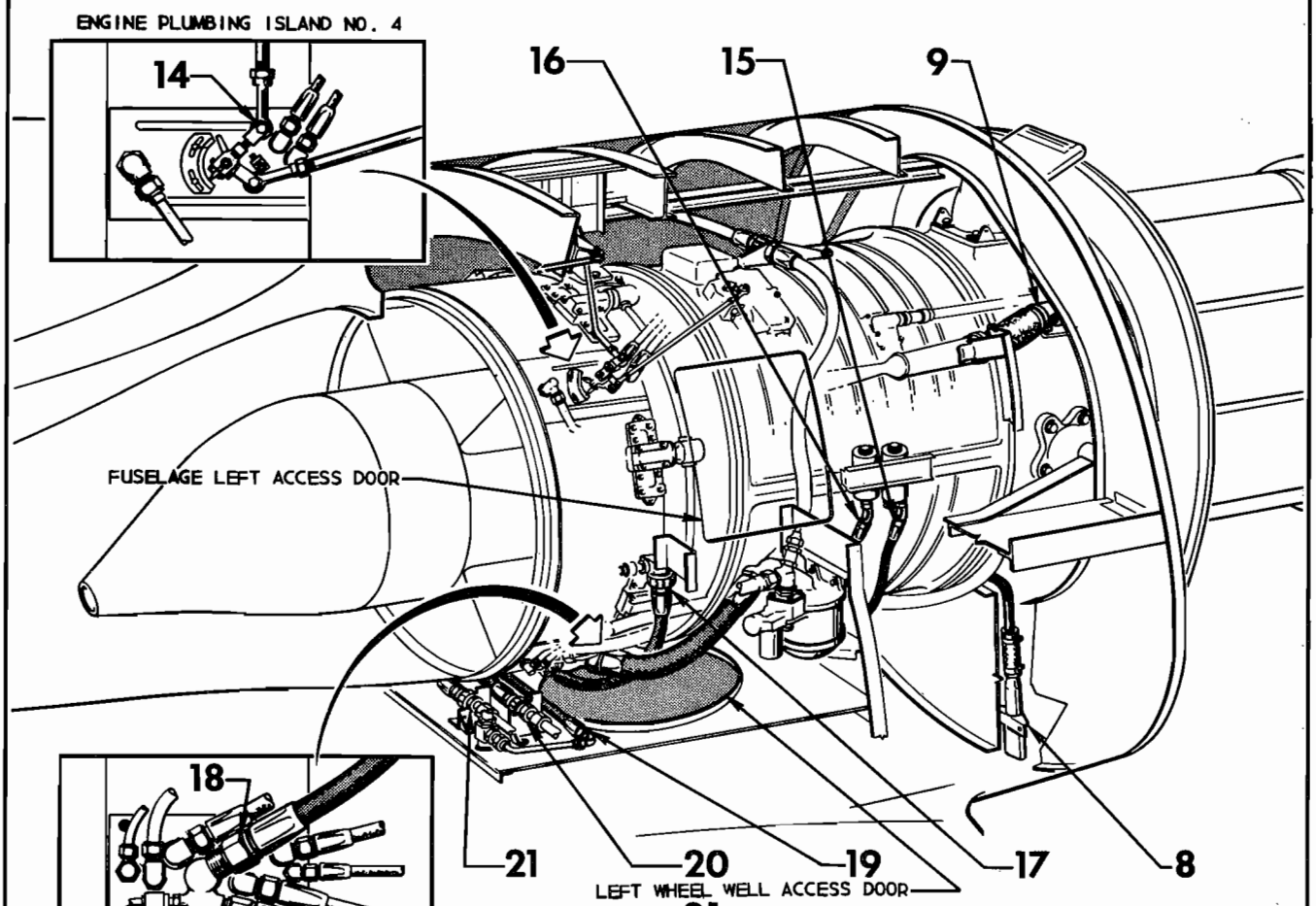
10 Connect exhaust thermocouple plug to jumper receptacle and safety; then adjust engine exhaust temperature indicating system.*

11 Connect oil return hose to quick-disconnect at top of engine compressor case through top right access door.

12 Install fuselage rear section,* leaving hoses, cables, and electrical disconnects loose until after engine alignment.

176-42-4D

Figure 5-2. Installing Engine (Sheet 1 of 2)



13 Align engine to fuselage.*

NOTE: Accomplish steps 14 through 17 through fuselage left access door.

14 Attach engine control rod to control arm on No. 4 island. Adjust engine controls.*

15 Connect fuel pressure hose to transmitter (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).

16 Connect oil pressure hose to transmitter.

17 Connect surface control hydraulic pump case drain hose at fuselage quick-disconnect.

NOTE: Accomplish steps 18 through 21 through left wheel well access door.

18 Connect fuel inlet hose to engine island fitting.

19 Connect hydraulic pump seal drain hose to fuselage line.

20 Connect utility hydraulic pump pressure hose at fuselage quick-disconnect.

21 Connect flight control (surface control) hydraulic pump pressure hose at fuselage quick-disconnect.

NOTE: Accomplish steps 22 through 25 through right wheel well access door.

22 Connect hydraulic utility pump suction hose at fuselage quick-disconnect.

23 Connect oil inlet hose to engine fitting on No. 2 island (F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13397).

24 Connect oil inlet hose at fuselage quick-disconnect (F-86F-25 Airplanes AF51-13398 through -13510 and AF52-5272 through -5530, and F-86F-30 and subsequent airplanes).

25 Connect flight control (surface control) hydraulic pump suction hose at fuselage quick-disconnect.

NOTE: Accomplish steps 26 and 27 through fuselage right access door.

26 Connect utility hydraulic pump case drain hose at quick-disconnect.

27 Connect starter-generator "B" lead at fuselage.

28 Connect main engine electrical plug to jumper receptacle, and safety.

29 Perform preoperational test* and initial engine run-up.*

*Refer to index for page number of applicable procedure.

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Figure 5-2. Installing Engine (Sheet 2 of 2)

Note

To remove starter-generator leads from island, pull outboard and hold spring-loaded collar at lead quick-disconnect, then pull lead from post.

5-14. ENGINE BUILD-UP.

5-15. Numerous adapting items must be installed on the engine prior to its installation in the airplane. The additions and changes are listed and shown in figure 5-3.

CAUTION

To prevent bursting hydraulic pump casings, *do not* motor engine unless quick-disconnect fittings of all hydraulic pump hoses are opened or connected to hydraulic source.

5-16. INSTALLING ENGINE.

5-17. Before installing engine, make sure landing gear warning horn switch is adjusted. (See figure 2-64.) See figure 5-2 for engine installation procedure.

CAUTION

- Make sure that engines with utility hydraulic power system pump N. Y. Air Brake 67WA200 are installed in F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13510. F-86F-25 Airplanes AF52-5272 through -5530 and F-86F-30 and subsequent airplanes require engines with Vickers AA32507-L-2 utility hydraulic power system pumps installed.
- Make sure that engines with fuel flow transmitter 9106-12A1, 9106-12A1A, or 9106-12B1A are installed in F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109.
- Make sure that engines with fuel flow transmitter 9105-12-A1A are installed in F-86F-20 Airplanes AF51-13110 through -13169, and F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446.
- On F-86F-30 Airplanes AF52-4305 through -4904, if a 6200-B12A-9-A5 fuel flow indicator is installed, a 9105-12-A1A fuel flow transmitter must be installed on the engine. If a 6200-B12C-1-A3 fuel flow indicator is installed, a 9104-12-A6A fuel flow transmitter must be installed on the engine.
- Make sure that engines with fuel flow transmitter 9115-16-A1A are installed in F-86F-25 Airplanes AF52-5447 through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes.

Note

For easy identification of the engine removal and installation disconnect points, make sure that all such points are painted with a band of international orange paint not more than one inch wide.

5-18. ALIGNING ENGINE.

5-19. Engine-to-fuselage alignment is accomplished by adjustment of the right trunnion mount and the top steady-support. Five keyways on the trunnion mount permit adjustment of the eccentric trunnion ball for proper lateral alignment of the engine to the fuselage. For vertical alignment of the engine, the top steady-support is adjusted. The engine-to-fuselage alignment procedure (figure 5-4) is normally accomplished during engine installation. (See figure 5-2.)

WARNING

If the engine alignment is changed after the engine control system is adjusted, the control system between the control quadrant and the engine control shaft on engine island No. 4 must be rechecked for proper adjustment. (Refer to paragraph 5-66.)

5-20. PREOPERATIONAL TEST OF NEWLY INSTALLED ENGINE.

5-21. After installing a new or overhauled engine and before attempting operation, test the engine as follows:

a. Fill fuel, oil, and hydraulic systems. (Refer to paragraphs 1-30, 1-43, 1-66, and 1-67.)

b. Check air intake duct for loose screws, loose rivets, or foreign materials.

Note

Since all duct surfaces are not visible from the entrance, it is necessary to crawl up the duct to make this check.

c. Check engine alignment. (Refer to paragraph 5-19.)

d. Place all switches and throttle lever in off positions.

dA. Move engine anti-ice and screen switch to "EXTEND." Engine air inlet screens should be extended during all engine ground runs.

e. Check fire detector system. (Refer to paragraph 4-162.)

f. Connect external electrical power supply [28.25 (+0.0, —4.0) volts dc, capable of delivering 500 to 1000 amperes continuously with 1500 amperes surge power for 30 seconds (+0.0, —10.0 volt tolerance allowable during surge)].

Note

The following external electrical power supply carts, if in good repair, are known to be adequate for starting all F-86F Airplanes: Types A-4, V-1, A-3, C-22, and C-26.

g. Check ignition system operation by placing engine master switch at "ON" and then closing ignition switch by moving throttle outboard but *not* forward (forward movement opens fuel stopcock). Open spark plug access doors and listen for arcing; then close throttle, move emergency ignition switch to "ON," and listen for arcing within combustion chamber. If arcing is audible, ignition is functioning properly.

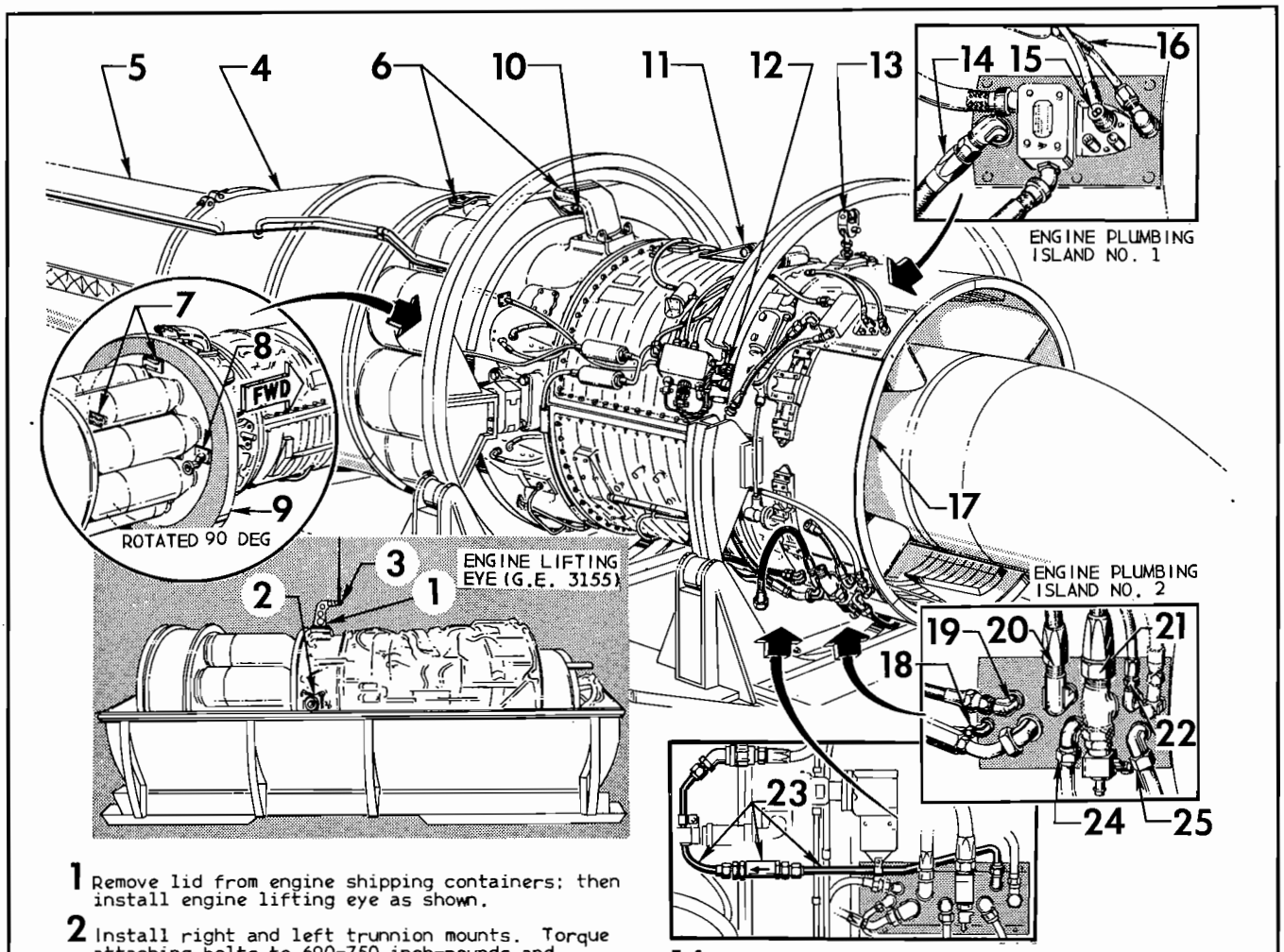
h. Pull out ignition circuit breaker in cockpit to prevent ignition during subsequent checks.

CAUTION

The foregoing is necessary, as subsequent checks will cause raw fuel to be sprayed into the combustion chambers, and this fuel must not be ignited.

i. Place engine master switch at "ON."

j. Hold battery-starter switch momentarily at "STARTER" position; then move switch to "BATTERY."



1 Remove lid from engine shipping containers; then install engine lifting eye as shown.

2 Install right and left trunnion mounts. Torque attaching bolts to 690-750 inch-pounds and safety.

3 Attach hoist to lifting eye; then lift engine and install in dolly.

4 Uncrate exhaust cone and install on engine.*

5 Install exhaust tail pipe and insulating blankets;* then install exhaust temperature thermocouples.*

6 Install compressor leakage duct and forward and rear hoist brackets. Torque bracket bolts to 690-750 inch-pounds and safety.

7 Install compressor rear frame top and left side cover plates.

8 Install compressor rear frame overboard duct.

9 Install fire wall.

10 Install fire detector and lead on fire wall.

11 Install oil return hose support bracket and quick-disconnect fitting.

12 Install engine electrical jumper and bracket near island No.1; then connect jumper to junction box.

13 Install engine steady-support mount. Torque attaching bolts to 690-750 inch-pounds and safety.

14 Install flight control (surface control) hydraulic suction hose.

15 Install starter-generator "B" lead wire.

16 Install chafing shield on hot-air line.

17 Install forward engine seal plates (4).

18 Install hydraulic pump seal drain line.

19 Install surface control hydraulic pump case drain hose.

20 Install utility hydraulic suction hose.

21 Install oil hose (F-86F-25 Airplanes AF51-13398 through -13510 and AF52-5272 through -5530, and F-86F-30 and subsequent airplanes).

22 Install utility hydraulic pump case drain hose (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13256 and AF52-5272 through -5530, and F-86F-30 and subsequent airplanes).

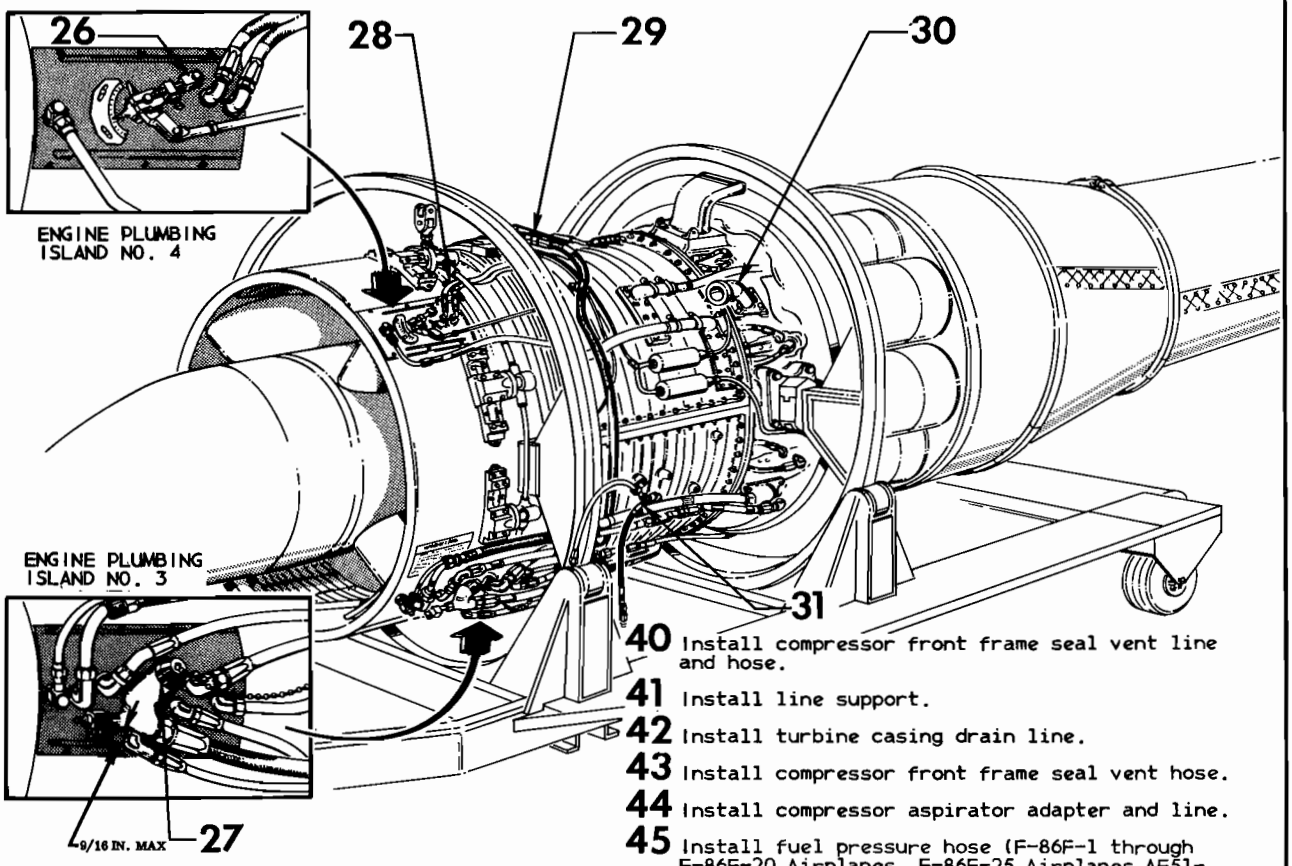
23 Install utility hydraulic pump case drain lines (2) and check valve (F-86F-25 Airplanes AF51-13257 through -13510).

24 Install utility hydraulic pressure line.

25 Install flight control (surface control) hydraulic pressure line.

176-42-13D

Figure 5-3. Engine Build-up (Sheet 1 of 3)



26 Install engine control arm.*

27 Install fuel inlet fitting cap.

28 Install chafing pad on hot-air line.

29 Install oil return hose.

30 Install compressor discharge air supply duct.

31 Install oil pressure hose.

32 Install utility and flight control (surface control) hoses.

33 Install hydraulic pump seal drain hose and check valve.

34 Install fuel drain hose.

35 Install fuel flow divider drain hose.

36 Install aspirator unit and hose.

37 Install compressor to aspirator line.

38 Install drain line bracket.

39 Install fuel drain line and hose.

40 Install compressor front frame seal vent line and hose.

41 Install line support.

42 Install turbine casing drain line.

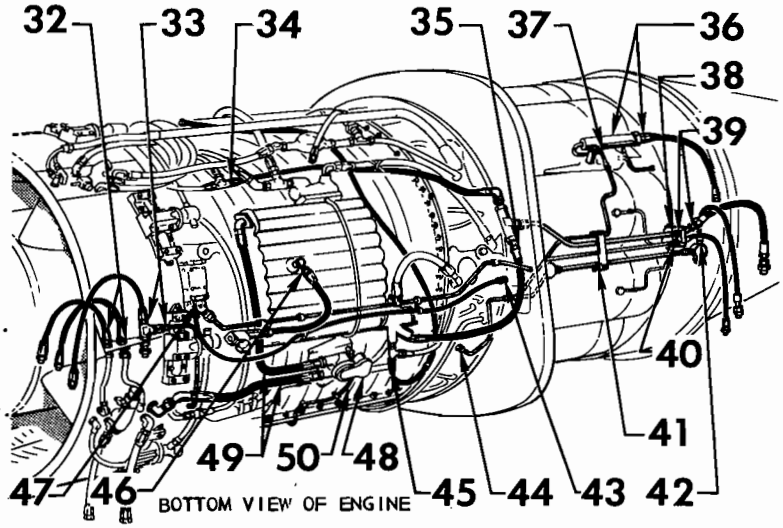
43 Install compressor front frame seal vent hose.

44 Install compressor aspirator adapter and line.

45 Install fuel pressure hose (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).

46 Install oil cooler drain hose and drain cock.

47 Install accessory section drain line and bracket.



48-50 Install fuel flow transmitter and mounting bracket; then install transmitter hoses (2) and connect electrical lead (F-86F-25 Airplanes AF52-5447 through -5530, F-86F-30 Airplanes AF52-4905 through -5163, and F-86F-35 and subsequent airplanes).

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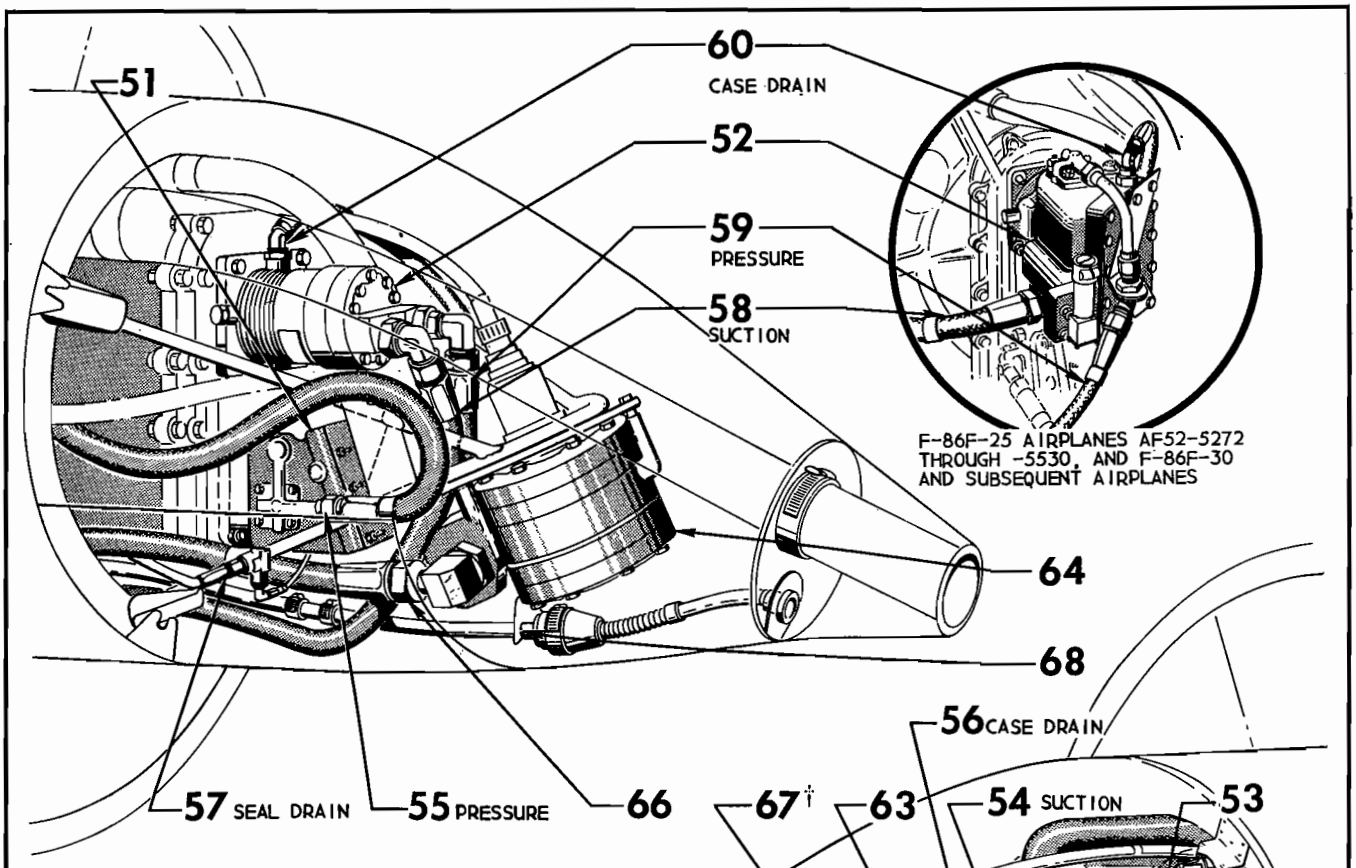
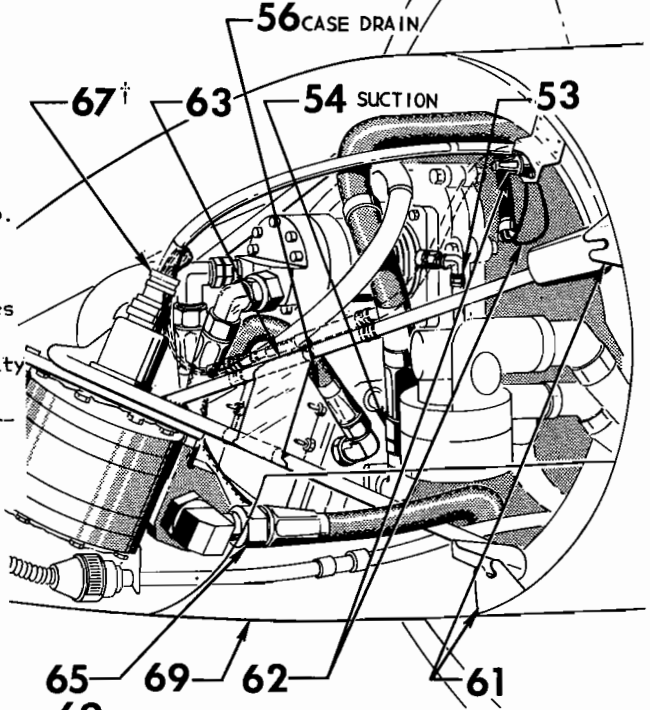
Figure 5-3. Engine Build-up (Sheet 2 of 3)





51 Install surface control system hydraulic pump.

52 Install utility system hydraulic pump.

CAUTION: Use N.Y. Air Brake 67WA200 utility power hydraulic system pump on engines to be installed in F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13510. Use Vickers AA32507-L-2 utility power hydraulic system pump on engines to be installed in F-86F-25 Airplanes AF52-5272 through -5530, and F-86F-30 and subsequent airplanes.

53 Install seal drain line between utility and surface control hydraulic pumps.

54-57 Hook up flight control (surface control) hydraulic pump suction, pressure, case drain, and seal drain hose.

58-60 Hook up utility hydraulic pump suction, pressure, and case drain hose.

61 Install auxiliary accessory cover attaching brackets (right and left side).

62 Install fire detector and detector leads.

63 Install fuel flow transmitter support.‡

64 Install fuel flow transmitter.‡

65-67 Connect hoses (2) and electrical lead to fuel flow transmitter.‡

68 Install deicer line bracket and adapter.

† ELECTRICAL LEAD ROUTING ON F-86F-20 AIRPLANES AF51-13110 THROUGH -13169, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5446, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4904 SHOWN BY DOTTED LINES

‡ F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5446, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4904

69 Install auxiliary accessory cover.*

CAUTION: After engine build-up is complete, check all lines and hoses for security and clearance. If there is a possibility of hose rubbing a rough-edged unit, install a leather chafing pad on the hose. Hoses may be spot-tied together or to a smooth-edged unit with leather thong to prevent chafing.

*Refer to index for page number of applicable procedure.

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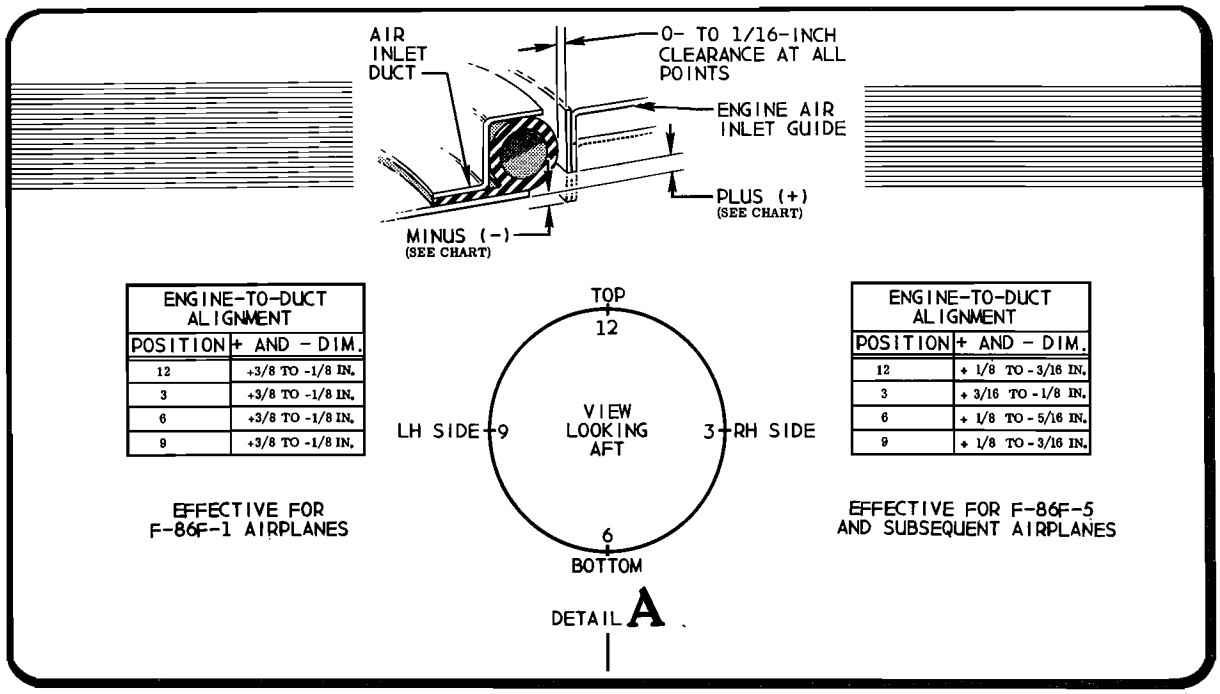
Figure 5-3. Engine Build-up (Sheet 3 of 3)



ENGINE-TO-DUCT ALIGNMENT	
POSITION	+ AND - DIM.
12	+3/8 TO -1/8 IN.
3	+3/8 TO -1/8 IN.
6	+3/8 TO -1/8 IN.
9	+3/8 TO -1/8 IN.

EFFECTIVE FOR F-86F-1 AIRPLANES

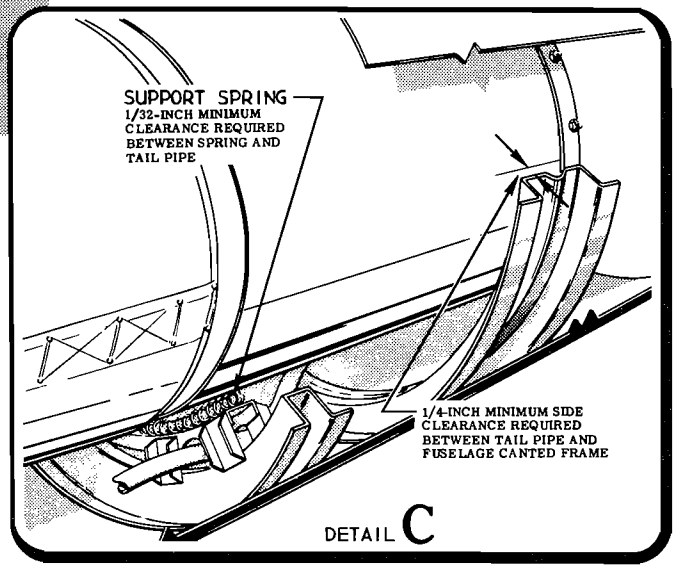
ENGINE-TO-DUCT ALIGNMENT	
POSITION	+ AND - DIM.
12	+ 1/8 TO - 3/16 IN.
3	+ 3/16 TO - 1/8 IN.
6	+ 1/8 TO - 5/16 IN.
9	+ 1/8 TO - 3/16 IN.

EFFECTIVE FOR F-86F-5 AND SUBSEQUENT AIRPLANES

The engine must be aligned with the fuselage to obtain proper fit and clearances after the fuselage rear section is attached and before the system connections are accomplished. The engine must be aligned at the following: air inlet guide to air inlet duct (detail A); top rear-frame air leakage duct to fuselage overboard duct (detail B); exhaust tail pipe to fuselage rear section (detail C); engine fire wall seal to fuselage frame (detail D); and air inlet guide to fuselage safety stop (detail G).

CAUTION: Always recheck throttle rigging after readjusting forward steady-support to prevent possible hot starts due to faulty stopcock rigging.

NOTE: Engine must be aligned when cold, as clearances shown provide for expansion after engine becomes hot. To obtain the required clearances and alignment, adjust forward steady-support (detail E), or remove engine and relocate eccentric trunnion ball on right side of engine (detail F), or do both. If relocating eccentric trunnion ball will not provide sufficient adjustment, remove trunnion mount and reinstall mount so that keyways are on bottom of mount.



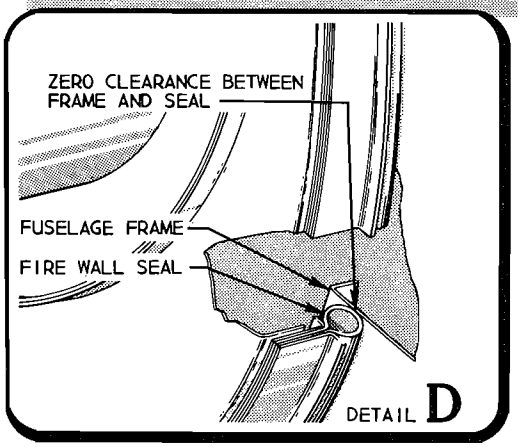


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Figure 5-4. Aligning Engine (Sheet 1 of 2)

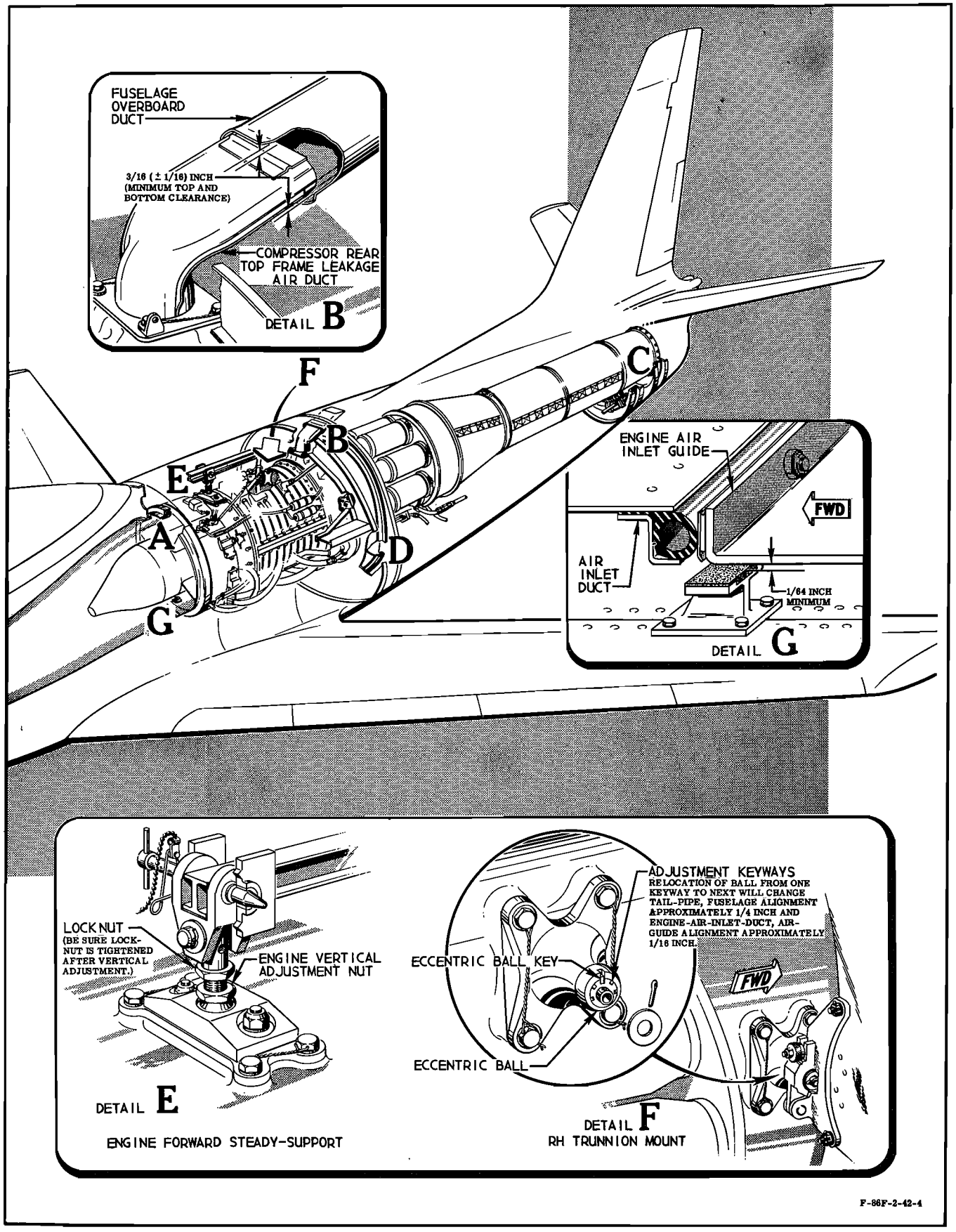


Figure 5-4. Aligning Engine (Sheet 2 of 2)

k. When approximately 6% rpm is reached, open throttle about halfway. If positive fuel flow indication is not obtained within 20 seconds or by time approximately 9% rpm is reached, whichever occurs first, move throttle to "OFF" and depress "PUSH TO STOP STARTER" button.

Note

One or more "dry runs" or "false starts" may be required to prime the engine fuel system on a newly installed engine.

CAUTION

In order to prevent starter-generator overheating, a 3-minute cooling period must be allowed between each minute of operation. Not more than three one-minute starts should be made in any 30-minute period.

l. After fuel flow is obtained, moved throttle to "OFF" and depress "PUSH TO STOP STARTER" button; then note that fuel flow immediately drops to zero.

WARNING

If fuel flow does not immediately drop to zero, the stopcock is not shutting off the fuel flow and the engine is not safe to start.

CAUTION

During the time the throttle is open, raw fuel is being sprayed into the combustion chambers. This fuel should drain from the combustion chambers within 3 minutes after throttle lever is closed. Therefore, always wait a minimum of 3 minutes before attempting to operate the engine; otherwise, excessive exhaust temperatures (hot start) may result, with serious consequences to the engine.

m. During period that engine is being turned over with starter, investigate any unusual noises in engine and take appropriate action.

mA. Check entire engine carefully for fuel and oil leaks, particularly in accessory section. Make sure all fuel and oil drains are open and are draining properly.

n. After checks have been made, make sure throttle is closed and disconnect external electrical power source. Move battery-starter switch to "OFF" and push in ignition circuit breaker.

o. Check fluid level of oil and hydraulic systems; refill if necessary.

5-22. INITIAL OPERATIONAL CHECK OF NEWLY INSTALLED ENGINE.

5-23. Make preoperational test (paragraph 5-21); then open aft engine compartment fire-fighting access door and have fire-fighting equipment available. Proceed as follows:

CAUTION

During preoperational test (paragraph 5-21), raw fuel is sprayed into combustion chambers. Always wait a minimum of 3 minutes for this fuel to drain before attempting to start engine. Airplane must be in normal ground attitude to ensure complete fuel drainage.

Note

Make sure main fuel regulator has been primed before starting engine. (Refer to paragraph 5-145.)

a. Start engine.

WARNING

- Do not approach closer than 12 feet to engine air intake, and carefully avoid wide area of about 200 feet behind exhaust outlet during engine run.
- If engine should catch fire externally during starting procedure, immediately move throttle lever to "OFF" and turn off all switches. If fire does not go out, combat fire as explained in paragraphs 1-93 and 1-94.

b. After engine start, idle engine at 34% to 38% rpm for approximately 10 minutes and check the following:

Vibration: If vibration engine rpm frequency as measured at front and rear flanges of turbine case exceeds .005-inch peak-to-peak displacement, it is not safe to continue engine operation. However, occasional momentary vibration peaks of up to .008 inch are permissible.

Note

Engine vibration should be measured with an instrument equivalent in accuracy to the Consolidated Engineering Corporation engine vibration meter Type 1-110BM or General Electric gas turbine vibration amplifier 9076913G1.

Fuel flow divider drip valves: At idle speed, little or no leakage should occur.

Exhaust gas temperature: 626°C (1159°F) maximum.

Fuel pressure: 40 to 100 psi (on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).
Fuel flow: 1000 to 1300 pounds per hour.
Oil pressure: 2 to 40 psi.
Engine: Free of fuel, oil, and exhaust leaks.
Idle stop adjustment: See figure 5-15.

c. When engine has stabilized and operation appears normal at 34% to 38% rpm, accelerate slowly to 70% to 75% rpm for approximately 5 minutes and check the following:

Exhaust gas temperature: 400°C to 450°C (752°F to 842°F).
Vibration: Refer to step b.
Fuel pressure: 100 to 150 psi (on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).
Fuel flow: 2000 to 2600 pounds per hour.
Oil pressure: 5 to 50 psi.
Hydraulic system: Check for proper operation and leaks.

d. After completion of operational checks at 70% to 75% rpm, slowly advance throttle to full forward position or until 100.5% rpm is reached. Do not allow engine to exceed 100.5% rpm. Check and adjust the following:

CAUTION

Overspeed operation exceeding 104% rpm requires that engine be removed and sent to overhaul base.

Note

- During the 100% rpm check, the engine high rpm stop and the exhaust nozzle area should be checked and, if necessary, adjusted. Since improper adjustment of either the stop or the nozzle area can result in overspeed and/or overtemperature, care must be exercised during this check. If the high rpm stop is set too low, as evidenced by the inability of the engine to obtain 100% rpm, the stop must be reset before the test can proceed. If the stop is too high, as evidenced by 100% engine rpm being obtained with the throttle short of the high rpm stop, the stop can be reset *after* the check is made.
- It is characteristic of this engine for the exhaust temperature to stabilize at different values the first several times that the engine is run at full power. Before any attempt is made to adjust the exhaust nozzle area to obtain the given temperature limits, the engine must be run a sufficient number of times at full power to ensure that on repeated runs the same stabilized temperature will be obtained.
- For the 100% rpm check, a 5-minute run must be made to stabilize the engine speed at 100% rpm. Throughout this run, the throttle must be manipulated to maintain engine speed as near as possible to 100% rpm without allowing the exhaust temperature to rise above 690°C (1274°F).

Engine rpm: 99.5% to 100.5% rpm. (See figure 5-15 for high rpm adjustment.)
Exhaust gas temperature: 675°C to 690°C (1247°F to 1274°F). (Refer to paragraph 5-60 for temperature adjustment.)
Vibration: Refer to step b.
Fuel pressure: 300 to 450 psi (on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).
Fuel flow: 5500 to 6100 pounds per hour.

Note

Some fluctuations in fuel pressure and/or fuel flow may be present. These conditions are acceptable, with the following provisions: (1) fuel pressure fluctuations must be steady and must not exceed a total spread of 40 psi, except for occasional peaks not to exceed 100 psi; (2) when fuel pressure fluctuations are accompanied by fluctuations in fuel flow, the indicated flow fluctuations must not exceed 600 pounds per hour; (3) if a fuel flow fluctuation is indicated without any indication of fuel pressure fluctuation, the indicated fuel flow fluctuation must not exceed 150 pounds per hour; (4) the fuel pressure fluctuation and/or fuel flow fluctuations must not be accompanied by a noticeable synchronized fluctuation in engine rpm, tail-pipe temperature, or thrust.

Oil pressure: 5 to 50 psi (10 to 25 psi desired).

Note

Any sudden rise in oil pressure of 5 psi or more is cause for investigation.

e. After completion of 100% rpm checks, make main fuel regulator acceleration checks. (Refer to paragraph 5-141.)

f. Check emergency fuel system operation. (Refer to paragraph 5-156.)

g. Check that landing gear warning horn switch is actuated at 57% to 63% rpm. (See figure 2-64.)

h. Check cockpit ventilating air supply from engine. Air should show no presence of fumes.

i. Stop engine. Carefully check entire engine installation for leaks, looseness, or existence of other undesirable conditions; then install access doors and panels.

Note

If turbine noises are heard on shutdown, refer to trouble shooting chart (paragraph 5-3.)

5-24. ENGINE MOUNTING PROVISION.

5-25. The engine is supported by a three-point suspension consisting of two horizontal trunnion-type mounts near the engine mid-point and a steady-support that connects the top forward mounting point of the engine front frame and the fuselage structure. The support rolls in a guide rail at the top of the fuselage when the engine is being removed or installed. Engine loads are transmitted to the fuselage by the two side mounts. The mounts incorporate spherical balls, which are held by hinged clamps on the fuselage, to support the engine. The ball on the right trunnion is eccentric and keyed to the trunnion shaft. Five keyways on the trunnion permit lateral alignment of the engine and fuselage. The top steady-support (figure 5-4A) is adjustable and provides vertical alignment of the engine and fuselage. Refer to paragraph 5-19 for information regarding engine mounting adjustments.

5-26. ENGINE ANTI-ICING PROVISION.

5-27. The engine island fairings, front frame struts, inlet guide vanes, and the auxiliary accessory drive section cover, all of which are in the direct blast of the inlet air stream, are completely anti-iced by hot compressor air. The inlet air screen (paragraph 5-30) can be retracted from the inlet air stream to prevent ice formation. The front frame struts and the inlet guide vanes are continuously anti-iced by the use of twelfth-stage air extracted from the compressor at two pads located on opposite sides of the compressor case. (See figure 5-5.) Anti-icing air for the island fairings and the accessory cover is extracted from a pad on the compressor rear frame and brought forward through the anti-icing air valve to a manifold encircling the front frame. From the manifold, air is piped to each island and to the accessory cover through island No. 3. Anti-icing air for the fairings and the accessory cover can be turned on or off from the cockpit by the engine anti-ice and screen switch, which opens and closes the anti-icing air valve. A thermoswitch in the accessory cover senses inlet duct temperature and automatically closes the anti-icing air valve above 5.6°C (42°F). When the anti-ice and screen switch is at "RET." (flight position), the air inlet screen is retracted and the anti-icing air valve is closed. When closed, the valve cuts off hot air to the fairings and accessory cover. When the switch is at "EXTEND" (ground position), the air inlet screen is extended into the air stream and the anti-icing air valve remains closed. When the switch is at "ANTI-ICE," the screen is retracted and the anti-icing air valve opens [if accessory cover surface temperature is below 4.4°C (40°F)]. This allows hot anti-icing air to flow to the island fairings and accessory cover. (See figure 5-5.)

5-28. ENGINE ANTI-ICING AIR VALVE.

5-29. The anti-icing valve, mounted on the left front side of the compressor case, controls the hot air for island fairing and accessory cover anti-icing. (Refer to paragraph 5-5 for specific data.) The valve assembly consists of a butterfly-type shutoff valve actuated by a high-speed motor. The valve is spring-loaded to the open position, so that anti-icing air is available in the event of an electrical failure. A mechanical slip clutch prevents motor stalling. When the valve is closed, it is adequately sealed to prevent leakage from the high-pressure side. The valve is remotely controlled from the cockpit by the engine anti-ice and screen switch. During anti-icing, an engine anti-ice thermoswitch automatically regulates the position of the valve. Whenever electrical power is applied to the actuating motor, the valve closes. When the actuating motor is de-energized, the valve opens. The valve is accessible through the left wheel well and the left engine access door.

5-30. ENGINE RETRACTABLE AIR INLET SCREEN.

5-31. The air inlet screen is of the retractable type and is contained in the air-guide section. The screen is divided into eight sections that extend or retract simultaneously into or out of the engine inlet air stream. The air screen is remotely controlled (figure 5-5) from the cockpit. In the extended position, the screen stops foreign material from entering the engine. During icing conditions, the screen may be retracted to prevent ice from forming. The retracting mechanism consists of eight screw jacks (paragraph 5-5) connected in series by a flexible shaft. A 28-volt d-c motor (paragraph 5-5), mounted on the upper right side of the compressor front frame, drives the flexible shaft that completely encircles the engine. Each screw jack incorporates a friction clutch, so that if any one screen section fails to operate, the other sections will retract.

5-32. REMOVING RETRACTABLE AIR INLET SCREEN. With the engine removed (paragraph 5-13), the screen can be removed if it is first placed in a retracted position. See figure 5-6 for location and identification of various components and proceed as follows:

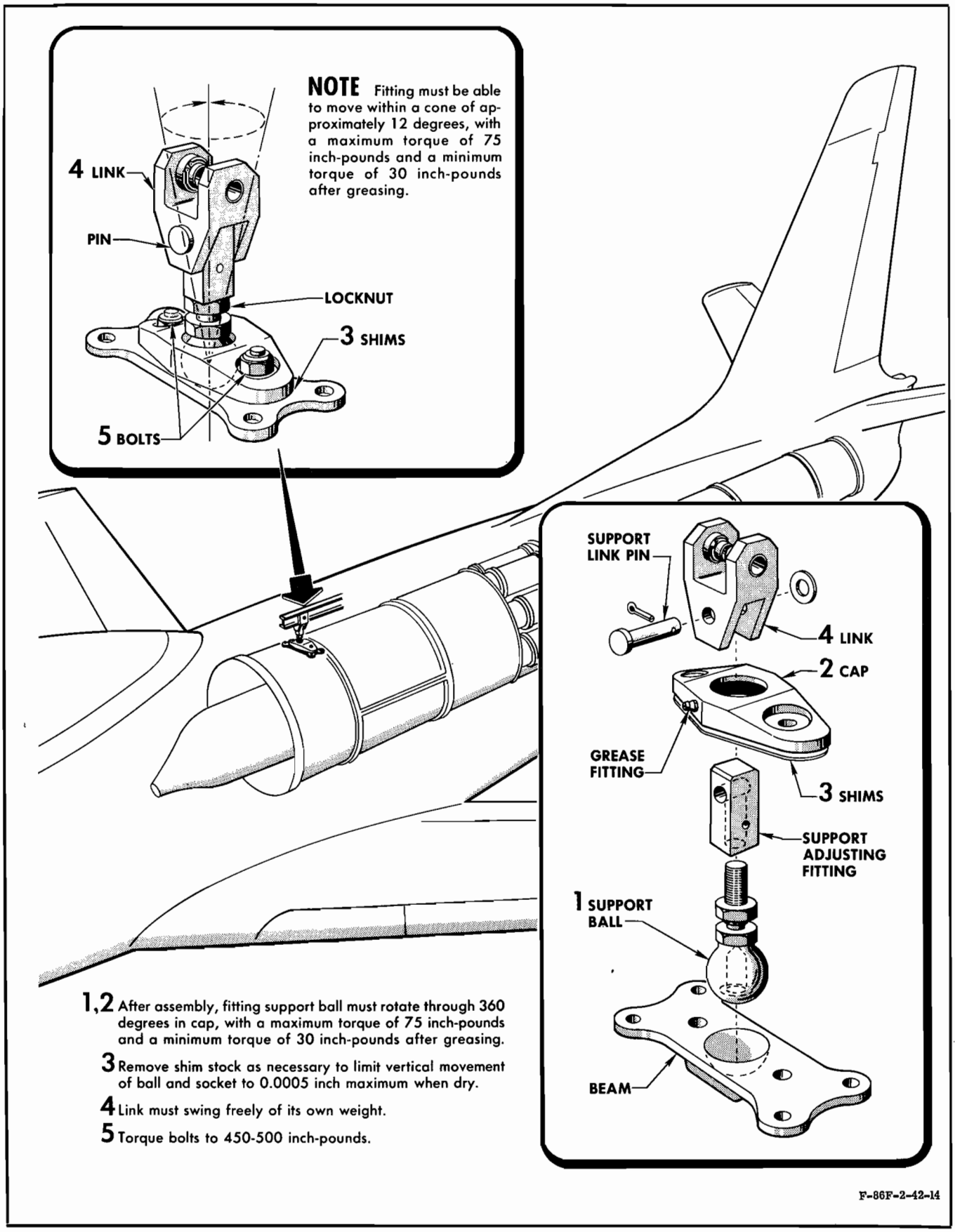
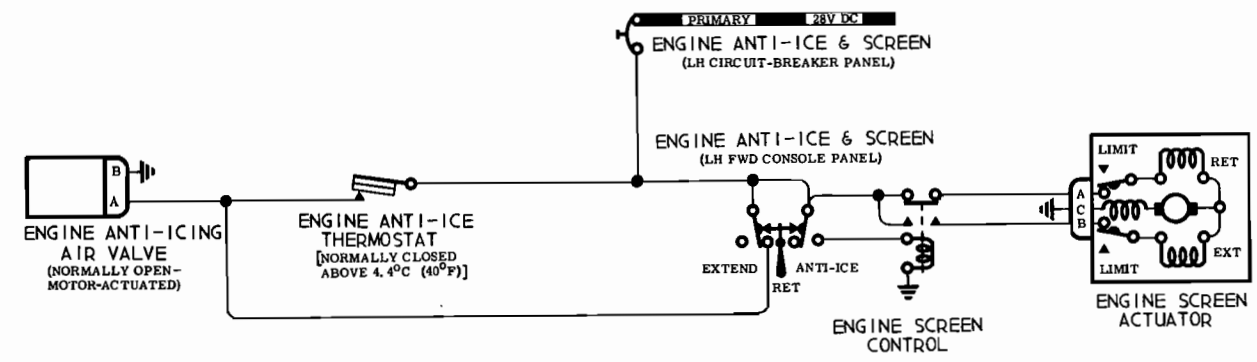
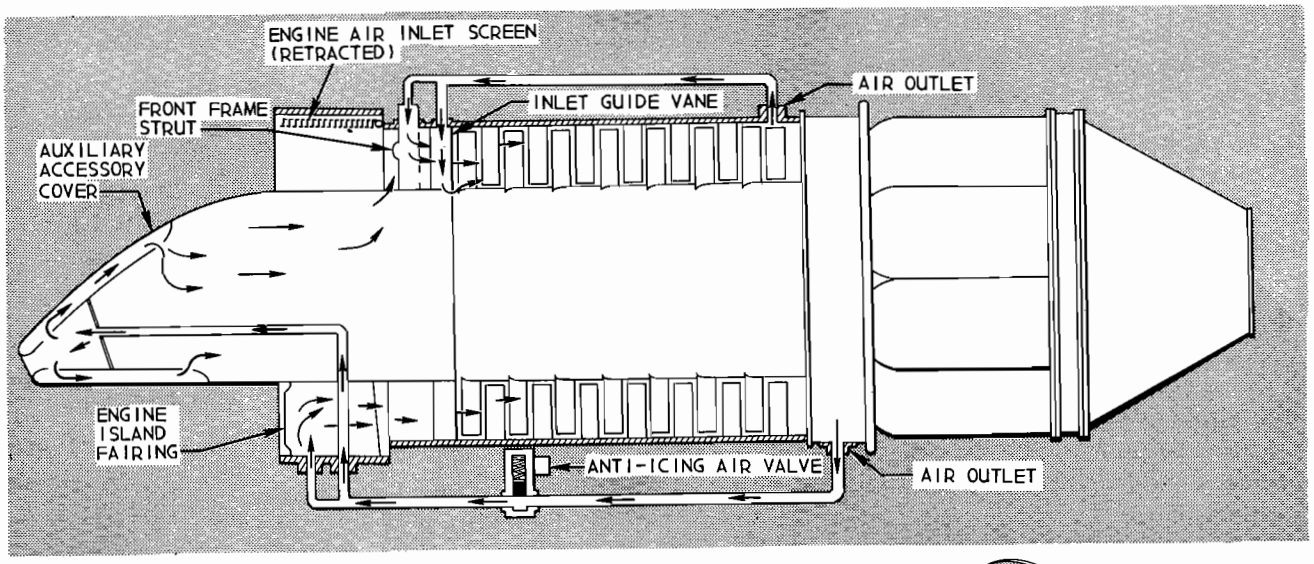


Figure 5-4A. Forward Steady-support





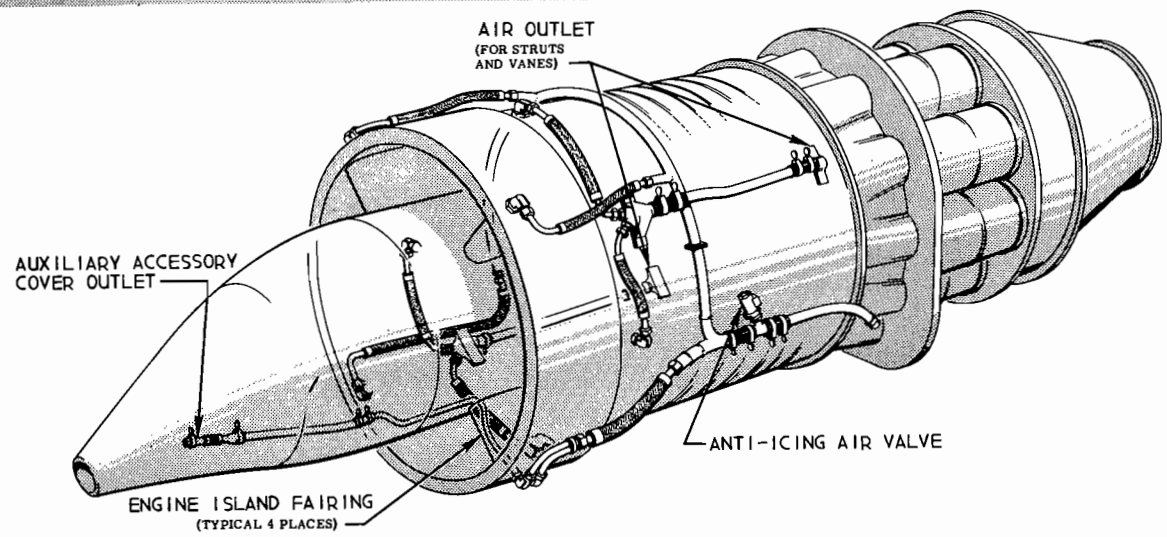


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Figure 5-5. Engine Anti-icing

Note

- If screen is damaged so that it cannot be retracted, remove screen screw jack by disconnecting flexible shafts, removing screw jack mounting screws, and disengaging jack hook from screen or remove the complete island sector incorporating the affected screen.
- If engine is not installed in airplane, retract the screen by connecting 26-volt d-c power to screen actuator motor receptacle pins A and C.

a. Remove the four screws and washers that secure right and left screen baffles to island sector, and remove baffles.

b. Remove four bearing mounting bolts and washers; then disengage screen from screw jack.

c. Remove screen bearing shims if used.

5-33. INSTALLING AND ADJUSTING RETRACTABLE AIR INLET SCREEN. See figure 5-6.

5-34. ENGINE AUXILIARY ACCESSORY DRIVE SECTION.

5-35. The auxiliary accessory drive section consists of the auxiliary drive gear case, auxiliary drive gears, auxiliary gear case support, and auxiliary accessory cover. The front face of the gear case has two pads for mounting two engine-driven hydraulic pumps. On the rear face is mounted the auxiliary gear case oil scavenge pump. Power is supplied to the auxiliary drive gears through a drive shaft directly coupled to the main gear case. Completly enclosing the space occupied by the engine-driven accessories, mounted on the main gear case, is the auxiliary gear case support. This support forms the inner shell of the inlet air guide and supports the auxiliary drive gear case. The auxiliary drive gear case is streamlined by a two-piece auxiliary accessory cover. The cover incorporates a starter-generator cooling duct, an anti-icing hot-air line, and an anti-icing thermoswitch. The cover is made of two doweled pieces of sheet metal and is supported by lugs on the front face of the auxiliary gear case. The two-piece construction permits removal of the cover through the air intake duct. Removal of the cover provides access to the hydraulic pumps, fuel flow transmitter (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904), and accessory section fire detector units.

5-36. REMOVING AUXILIARY ACCESSORY DRIVE SECTION COVER. To remove cover, proceed as follows:

a. If engine is installed in airplane, enter at front of air intake duct and crawl back to accessory cover.

b. Unfasten and remove top portion of cover.

Note

Do not remove cover retaining bolts. It is only necessary to loosen cover bolts slightly to free cover from brackets.

c. Disconnect anti-icing thermoswitch wires at disconnect and loosen anti-icing line hose clamp.

d. Unfasten and remove lower portion of cover.

5-37. INSTALLING AUXILIARY ACCESSORY DRIVE SECTION COVER. To install cover, proceed as follows:

a. If engine is installed in airplane, insert portions of cover into front of air duct.

b. Fasten lower portion of cover to auxiliary gear case.

c. Connect and safety anti-icing thermoswitch wires at disconnect and tighten anti-icing line hose clamp.

d. Fasten top portion of cover in place, being sure to engage starter-generator air duct and anti-icing line properly. Tighten cover retainer bolts to 35-50 inch-pounds torque.

5-38. REMOVING AUXILIARY ACCESSORY DRIVE SECTION GEAR CASE. For access to the engine-driven accessories, remove the auxiliary gear case. The gear case can be removed from inside the air duct, with the engine installed. Gear case removal is exactly the same with the engine in or out of the fuselage. To remove gear case, proceed as follows:

a. Remove auxiliary accessory cover. (Refer to paragraph 5-36.)

b. Disconnect electrical lead and fuel hoses at flow transmitter (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).

c. Disconnect hydraulic hoses (pressure, suction, and drain) at pumps.

d. Disconnect fire detector electrical plug.

e. Disconnect ¼-inch oil-in hose at front of gear case; then disconnect ¼-inch oil-out hose at scavenge pump mounted on rear of gear case.

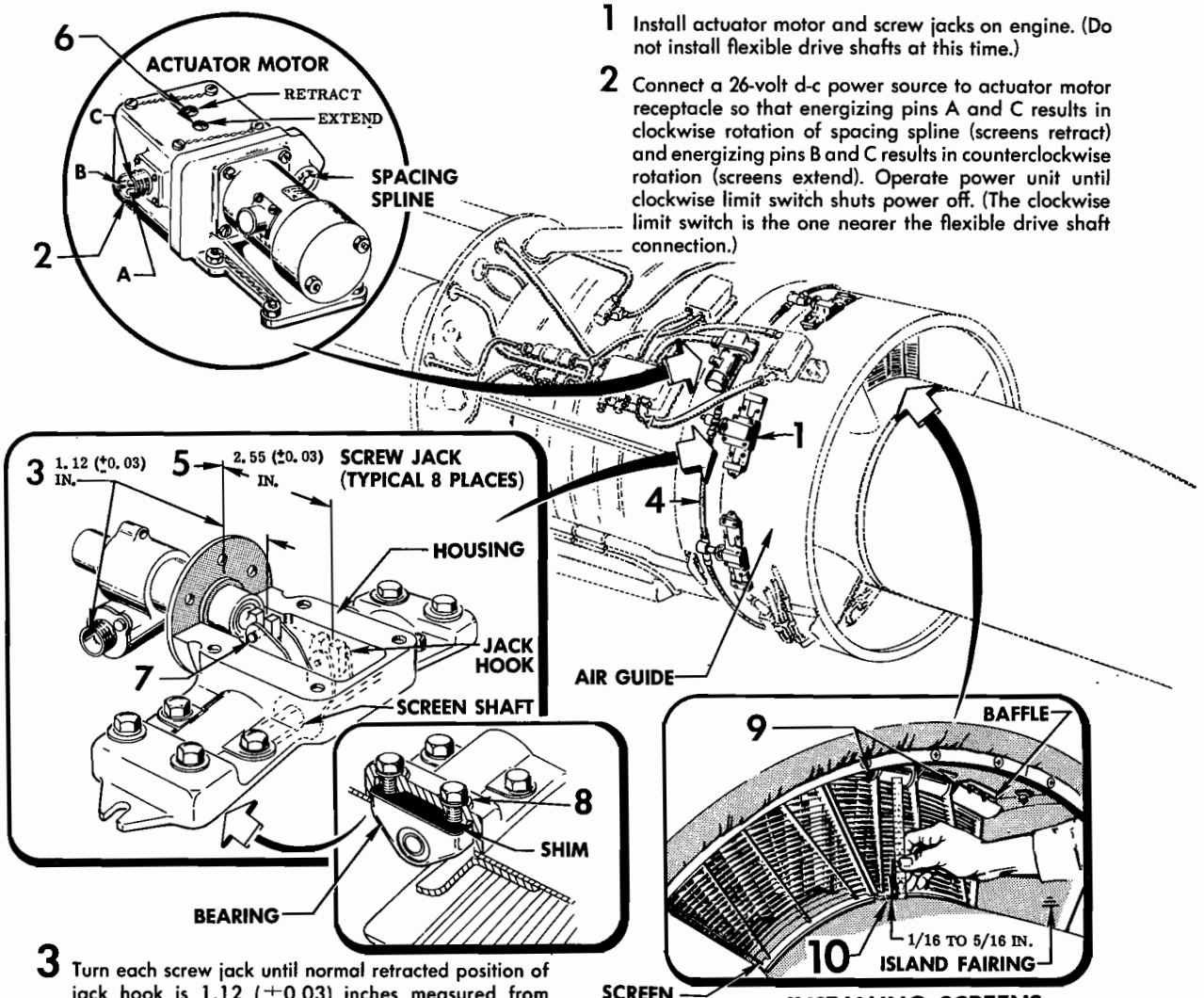
f. Disconnect main fuel regulator oil filter-orifice and bracket from gear case.

g. Disconnect fuel filter from bracket on front of gear case.

h. Disconnect fuel control valve from gear case by removing two bolts from front face of gear case.

i. Remove nine lock rings and Allen-head bolts that secure gear case to gear case support.

j. Remove gear case by slapping case with palm of hand or soft rubber mallet until case is disengaged



1 Install actuator motor and screw jacks on engine. (Do not install flexible drive shafts at this time.)

2 Connect a 26-volt d-c power source to actuator motor receptacle so that energizing pins A and C results in clockwise rotation of spacing spline (screens retract) and energizing pins B and C results in counterclockwise rotation (screens extend). Operate power unit until clockwise limit switch shuts power off. (The clockwise limit switch is the one nearer the flexible drive shaft connection.)

3 Turn each screw jack until normal retracted position of jack hook is 1.12 (±0.03) inches measured from centerline of slot in jack hook to face of mounting flange. Minimum retracted length allowable is 0.99 (±0.03) inch.

NOTE: Screw jacks can be installed in extended position, and actuator motor can be set on counterclockwise switch.

4 Install eight flexible drive shafts.

5 Operate system until counterclockwise limit switch shuts power off. The extended position of the jacks should be approximately 2.55 inches measured from centerline of slot in jack hook to face of mounting plate.

6 Length of jack hook normal stroke should be 1.43 (±0.03) inches. Should adjustment be necessary, turn adjustment screws to obtain desired stroke length. Maximum stroke allowable is 1.69 (±0.03) inches.

CAUTION: If maximum allowable stroke of jack hook is exceeded, the screw may turn out of the screw jack. If the minimum retracted length is exceeded, the actuator motor clutch may burn up or the screw jack may jam.

INSTALLING SCREENS

7 Insert screen shaft into jack hook. (This may be accomplished more easily by removing upper half of jack housing.)

8 Insert two bearings in place and secure with bolts and washers. Shim bearings to allow a working clearance between screen shaft and air guide. Maximum side-to-side movement of screens between bearings is 0.0150 inch. Use 0.032- or 0.016-inch washers as spacers on screen shafts to limit side-to-side movement.

9 Install left and right baffles; then install island fairings. Minimum clearance between screens and island fairings should be 0.080 inch with screens in any position.

10 Actuate screens to extended position. Screens should clear gear case by at least 1/16 inch at closest point and maximum of 5/16 inch at furthest point.

NOTE: Clearance should be checked while screen is being pushed in by hand.

11 Actuate screens to retracted position. Screens should have a minimum of 1/16-inch clearance from air guide.

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Figure 5-6. Installing and Adjusting Retractable Air Inlet Screens

from dowels. Remove gear case slowly and evenly to prevent binding and damaging lines in housing. When case is disengaged from dowels, look between case and support to determine that drive shaft will remain in shaft housing and will not fall on floor or ground when case is removed; then remove gear case.

Note

For ease of reinstallation, observe and note routing of hoses through gear case before case is removed.

k. Disconnect and remove anti-icing fitting from each island air guide.

l. Retract air inlet screens; then remove the four island fairings.

CAUTION

Use extreme caution to prevent foreign materials or objects from entering compressor while screens are retracted and air-guide fairings are removed.

m. Remove the nine lock rings and Allen-head bolts that secure gear case support; then remove support, first slapping it with palm of hand to disengage dowels.

CAUTION

Pull support straight forward to prevent damage to accessories, wiring, or lines.

5-39. INSTALLING AUXILIARY ACCESSORY DRIVE SECTION GEAR CASE. To install auxiliary gear case, proceed as follows:

a. Inspect all engine components, lines, and electrical leads for proper installation, security, and safeties; then carefully install gear case support in place, engaging dowels and being sure to align cutout in support with starter-generator air outlet.

b. Secure support to main gear case with nine Allen-head bolts. Tighten each bolt to 60-95 inch-pounds torque.

c. Install the nine lock rings in their grooves.

CAUTION

Make certain that lock rings are seated properly and that there is no danger of the rings falling out during engine operation.

d. Install four island fairings; then extend air inlet screen.

e. Install anti-icing fitting at each island air guide.

f. Inspect auxiliary gear case drive shaft for possible defects and uncleanness; then insert shaft into shaft housing and engage shaft in accessory gear case female spline. Pull shaft forward approximately ½ inch, while still retaining shaft and spline engagement. This will permit manual engagement of shaft with auxiliary gear case before gear case engages dowels on support.

g. Raise gear case into position; then pass lines, flexible conduit, electrical leads, and fuel and oil filters through gear case casting holes, as noted during gear case removal.

h. Move gear case aft. If gear case and drive shaft splines do not align, retract air inlet screen and carefully reach in and turn the compressor rotor by hand until alignment occurs. When alignment is accomplished, push gear case into engagement with support dowels.

i. Secure gear case to support with nine Allen-head bolts. Tighten bolts to 60-95 inch-pounds torque.

j. Install nine lock rings in their grooves.

CAUTION

Make certain that lock rings are seated properly and that there is no danger of the rings falling out during engine operation.

k. Connect gear case oil hoses.

l. Secure oil filter-orifice, fuel control valve, and fuel filter to gear case.

m. Connect fire detector electrical plug. If removed, install surface control hydraulic pump on bottom mounting pad of gear case and utility hydraulic pump on top mounting pad; then install fuel flow transmitter and support on front of gear case (F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904).

n. Connect hydraulic hoses to respective pumps.

o. Connect fuel flow transmitter hoses and electrical lead to flow transmitter installed in step m.

p. After checking all hoses for security, tightness, and correct routing, install auxiliary accessory cover. (Refer to paragraph 5-37.)

q. Remove the two lower inlet screen actuator case covers and check for foreign objects, which might have fallen from accessory section and become lodged in actuator.

r. Install and safety actuator case covers.

5-40. ENGINE AIR-GUIDE SECTION AND COMPRESSOR FRONT FRAME.

5-41. The air-guide section consists of island covers, island fairings, air-guide sectors, and the retractable air inlet screen. (Refer to paragraph 5-31.) This section

guides air into the compressor inlet. The islands are used as junction points for fuel, oil, anti-icing air, throttle linkage, and electrical connections. Connecting lines are brought across the inlet air stream through the removable streamlined fairings. The four island sectors are located between the island covers to form the outer shell of the inlet air guide. The compressor front frame includes the accessory drive mechanism, support for the No. 1 bearing, inlet guide vanes, and balance piston chamber. The frame consists of an inner and an outer section, connected by eight streamlined struts to form an annular passage for the air inlet. Support for the drive gears, shaft housing, No. 1 bearing housing, and allied parts is provided by the inner section. The inlet guide vanes, made up of hollow blades mounted between two concentric rings, are attached to the rear side of the frame inner section, along with an oil and air seal. An air seal is located along the edge of the first-stage wheel of the compressor rotor, and another seal is at the hub of the compressor rotor. The area between these two seals forms the balance piston chamber, which is supplied with twelfth-stage air through the hollow inlet guide vanes. This air, acting against the forward end of the compressor rotor, counteracts some of the forward thrust of the rotor. The compressor front frame contains four engine mount pads, two on the horizontal and two on the vertical.

5-42. ENGINE COMPRESSOR SECTION.

5-43. This section is composed of the compressor rotor, stator, and rear frame. The compressor is a 12-stage, axial-flow type and discharges air compressed to approximately five atmospheres. The compressor rotor consists of 12 wheels shrunk onto a shaft, each wheel having compressor blades dovetailed into its outer ring. The compressor stator is a split cylindrical casing into which 13 rows of blades are dovetailed. The outside of the casing provides a mount for some of the engine accessories. The compressor rear frame supports the stator at its forward face, the combustion chambers at its rear face, and the No. 2 bearing at its center. Equally spaced around the rear frame shell are the eight diffuser passages through which air from the compressor flows to the combustion chambers. Eight duplex fuel nozzles are mounted circumferentially around the rear frame and extend directly into the diffuser passages, with their tips extending into the combustion chambers. The compressor rear frame contains four engine mount pads, two on the horizontal and two on the vertical.

5-44. ENGINE TURBINE SECTION.

5-45. The turbine section consists of eight combustion chambers, turbine frame, turbine casing, nozzle diaphragm, turbine wheel and shaft, and turbine shroud. The turbine section supports the No. 3 and No. 4 bearings inside the turbine frame housing. The combustion chambers are of the direct-flow type. Each chamber consists of a double-walled cylindrical assembly attached to the compressor rear frame and to the turbine frame by means of quick-disconnect clamps. Air from the compressor entering the combustion chamber passes into annular spaces between the outer casings and the inner liners, and from there through perforations into the inner liners. There, the air is mixed with fuel sprayed from the fuel nozzles and burned. The combustion chambers are interconnected by cross-firing tubes, making possible the starting of all burners with the use of spark plugs mounted in chambers No. 3 and 7 only. Each chamber incorporates a front and rear fuel drain line, so that excess fuel will drain overboard regardless of airplane attitude. The hot gases leaving the combustion chambers pass through transition liners and through the stationary nozzle diaphragms to impinge upon the turbine wheel buckets, where sufficient energy is extracted from the gases to drive the compressor and accessories.

5-46. REMOVING TURBINE SECTION COMBUSTION CHAMBERS AND FUEL NOZZLES. To remove the chambers and nozzles, remove engine (paragraph 5-13) and proceed as follows:

Note

Remove combustion chambers in the following order: No. 4, 3, 2, 1, 5, 6, 7, and 8. Disconnect and remove all attached tubing as chambers are removed.

a. Disconnect fuel manifold lines at fuel nozzles, cut lockwire, and remove bolts, fuel nozzles, and gaskets.

CAUTION

Each nozzle tip fits into a hole in the dome of the combustion chamber. Exercise care in working nozzle loose to prevent damage to nozzle tip.

b. Cap open ports and cover nozzle tips.

c. (Deleted)

d. Disconnect fuel drain lines at bottom of chamber.

Note

Access to fuel drain connections on No. 1, 2, 7, or 8 combustion chamber is possible when at least one of the lower chambers on the side involved is removed. Chambers No. 3, 4, 5, and 6 can be removed without interference.

e. Disconnect spark plug leads and remove spark plugs (chambers No. 3 and 7).

f. Remove clamps from cross-ignition tubes.

g. (Deleted)

h. Loosen and remove clamps at front and rear flanges of chamber.

i. Using chamber bellows compressing clamp (tool No. 3270), compress and remove chamber.

CAUTION

After each combustion chamber and fuel nozzle is removed, and before progressing to the succeeding one, cover the openings (left by removal of chamber and fuel nozzle) with suitable cover to prevent entry of foreign objects into the engine.

j. Remove inner chamber from outer chamber, and clean all chambers and cross-ignition tubes by scrubbing with stiff-bristled brush dipped in cleaning solvent (Federal Specification P-S-661).

5-47. TURBINE SECTION COMBUSTION CHAMBER CRACK AND DISTORTION LIMITS. To inspect combustion chambers, first remove chambers. (Refer to paragraph 5-46.) Outer chambers must be repaired or replaced if *any cracks* are apparent. For outer chamber dent limits, see figure 5-6A. For inner chamber limits, see figure 5-7.

5-48. TURBINE SECTION TRANSITION LINER CRACK LIMITS. To gain access for viewing the transition liners, remove the combustion chambers and fuel nozzles. (Refer to paragraph 5-46.) Liners having pieces broken out of the main body or cracks over 3 inches long must be returned to overhaul activity. Inspect transition liner for excessive cracks as shown in figure 5-8.

5-49. INSTALLING TURBINE SECTION COMBUSTION CHAMBERS AND FUEL NOZZLES. To install the chambers and nozzles, proceed as follows:

a. Install rear drain tubes on outer chambers. Secure inside chamber with washer and lug nut. Torque lug nut to 170-200 inch-pounds and double-lockwire lug nut to drain tube inside combustion chamber.

b. Install front drain tubes on outer chambers No. 1, 3, 4, 5, 6, and 8. Secure inside chamber with washer and lug nut. Torque lug nut to 170-200 inch-pounds and double-lockwire lug nut to drain tube inside chamber.

c. Install combustion chamber inner liners in their respective outer combustion chambers. Chambers No. 3 and 7 receive inner liners which have provision for spark plugs.

d. Place two cross-ignition tubes in each chamber and secure them to chamber with single lockwire. If cross-ignition tubes are of drop-in type (which do not have lugs for lockwire), make certain that both tubes are engaged in inner liner eyelets. Check these chambers again when they are installed on engine.

e. Install exit ring in aft end of each chamber.

f. Insert two bolts, lubricated with antiseize compound (Specification MIL-C-5544 or equivalent), through inner and outer chambers at aft end of chambers. Tighten bolts to 36-70 inch-pounds and double-lockwire bolts to bracket on outer chamber.

g. Install front combustion chamber drain manifold (with squeezed portion parallel to turbine frame breather) to manifold flared fitting on turbine frame.

h. Place chambers No. 1 and 8 on engine with tapered end forward. Chamber bellows compressing clamp (tool No. 3270) should be used for compressing bellows where it is difficult to position chambers.

i. Insert fuel nozzles with gaskets into position and secure with two bolts. Do not use the two forward bolt holes at this time.

Note

Do not use force to install fuel nozzle. When combustion chambers are properly aligned, nozzle will seat on mounting flange without force or strain.

j. Connect rear drain tubes to turbine frame and tighten finger-tight.

k. Assemble, connect, and torque to 110 inch-pounds the forward drain yoke to No. 1 and 8 chambers.

l. Align chambers to within 1/16 inch of compressor rear frame port flange and within 1/32 inch of turbine frame port flange. At same time, make sure that cross-ignition tube joint is together all the way around.

Note

If chambers No. 1 and 8 are not properly aligned, the last two chambers installed (No. 4 and 5) may not match correctly.

m. Install cross-ignition tube clamp between the two adjacent chambers and torque to 25-35 inch-pounds.

n. Install chamber clamp rings at front and rear ends of chamber. Do not tighten at this time.

o. Recheck alignment of the two chambers. (Refer to step 1.) Hold chambers in position while second man tightens rings at front and rear ends of chambers. Torque standard nuts (nuts and lockwire) to 50-60 inch-pounds. Torque self-locking nuts (inconel insert nuts and Esna silver-plated nuts) to 70-80 inch-pounds.

p. Tighten rear drain tubes to turbine drain fittings. Torque to 110 inch-pounds.

q. Repeat steps h., i., l., and m. for remaining chambers, in pairs, in the following order: No. 2 and 7, No. 3 and 6, and No. 4 and 5. When installing chambers No. 2 and 7, also repeat steps j. and p.

r. Install chamber clamp ring at front and rear ends of chambers No. 2, 3, 4, 5, 6, and 7. Recheck alignment of each chamber. (Refer to step 1.) Hold chamber in position while a second man tightens rings at front and rear ends of chamber.

s. Assemble and tighten front and rear drain tubes of chambers No. 3, 4, 5, and 6. Torque to 110 inch-pounds.

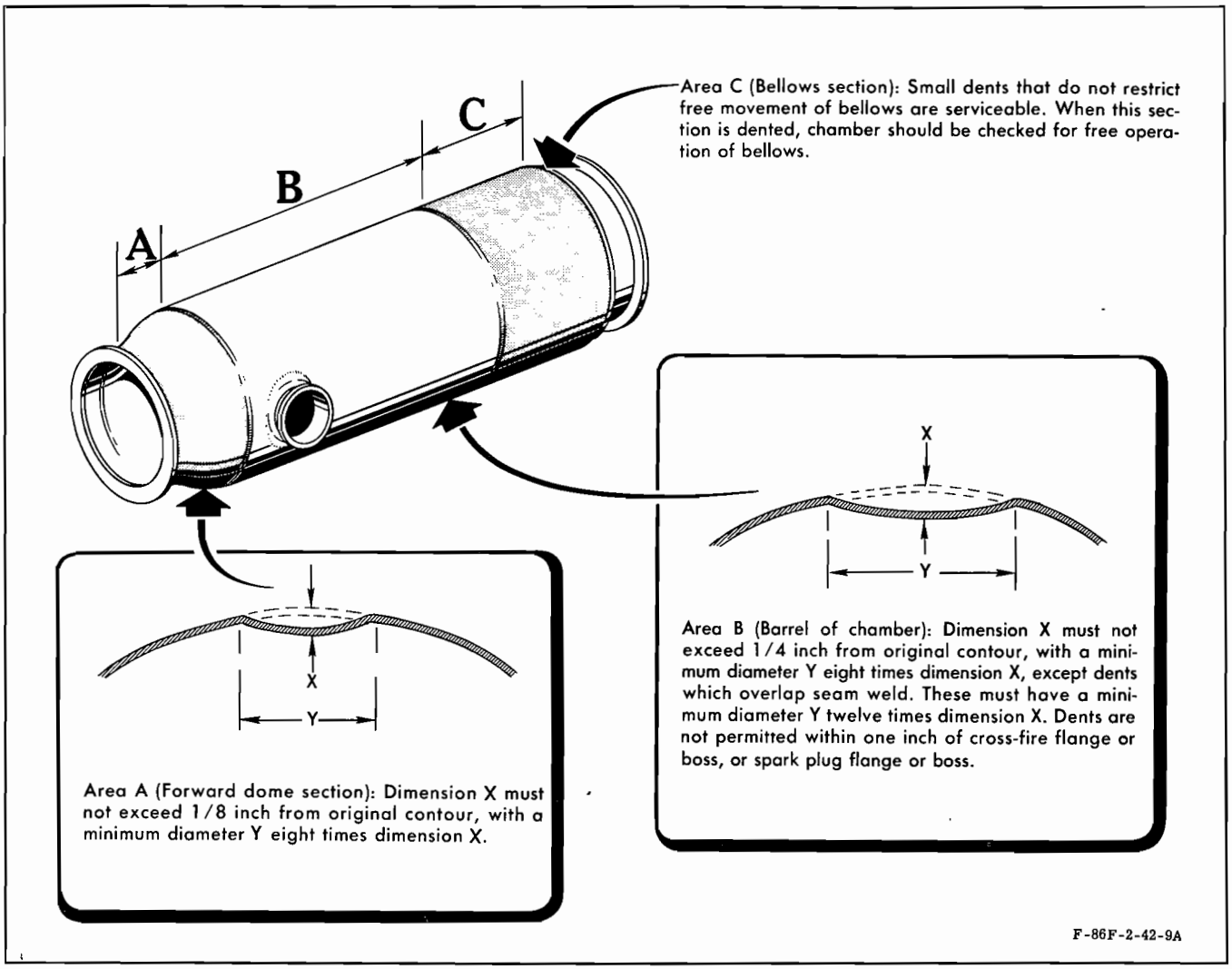


Figure 5-6A. Outer Combustion Chamber Dent Limits

t. Install spark plugs and gaskets in No. 3 and 7 chambers. Secure with Allen screws. (Torque to 60 inch-pounds.) Safety screws with twisted lockwire. Connect spark plug leads.

u. Attach fuel manifold with the two forward bolts on fuel nozzle plates. Torque all four bolts on fuel nozzle plate to 65 inch-pounds and safety with double lockwire.

v. Connect fuel manifold hoses to large- and small-slot fittings on fuel nozzles. Torque small-slot coupling nuts to 65 inch-pounds; torque large-slot hose coupling nuts to 125 inch-pounds.

w. After all chambers are installed and checked for security, install engine. (Refer to paragraph 5-17.)

5-50. TURBINE SECTION NOZZLE CRACK AND DISTORTION LIMITS. To inspect turbine nozzle blades for excessive cracks and distortion, remove fuselage rear section (paragraph 2-149) and exhaust cone (paragraph 5-54); then (while viewing nozzle blades between turbine wheel blades) inspect blades for excessive limits shown in figure 5-9.

5-51. TURBINE SECTION TURBINE WHEEL BLADE REPAIR LIMITS. To inspect turbine wheel blades, remove fuselage rear section (paragraph 2-149) and exhaust cone (paragraph 5-54). Then see figure 5-10 for repair limits.

5-52. ENGINE EXHAUST SECTION.

5-53. The exhaust section consists of a constant-area exhaust cone and an exhaust tail pipe. The exhaust cone consists of an inner and an outer cone; the inner cone is supported by four radial struts, which transmit the loads to the outer cone. The exhaust gases from the turbine wheel are collected in an annular space between the inner and outer cones and are directed into the tail pipe and then overboard. Air to cool the aft surface of the turbine wheel is bled from the compressor and piped through one of the cone struts to flow into a chamber formed by the turbine wheel and the forward

end of the inner exhaust cone. This cooling air flows across the rear face of the wheel and then is discharged into the exhaust gas stream. The exhaust tail pipe (figure 5-13) is clamped to the engine exhaust cone flange to form a cantilever structure and terminates just forward of the opening in the rear fuselage. The tail pipe, like the exhaust cone, is covered by insulating blankets. The aft end of the tail pipe is normally

INNER COMBUSTION CHAMBER LIMITS

Replace any chamber from which a piece has broken out or may break out.

Buckling in excess of 1/2 inch above or below the original contour, with more than four cracks 1/4 inch long, or buckling of 3/4 inch will render a combustion chamber unserviceable. No buckling is allowable if combustion gases will be directed through side of inner chamber.

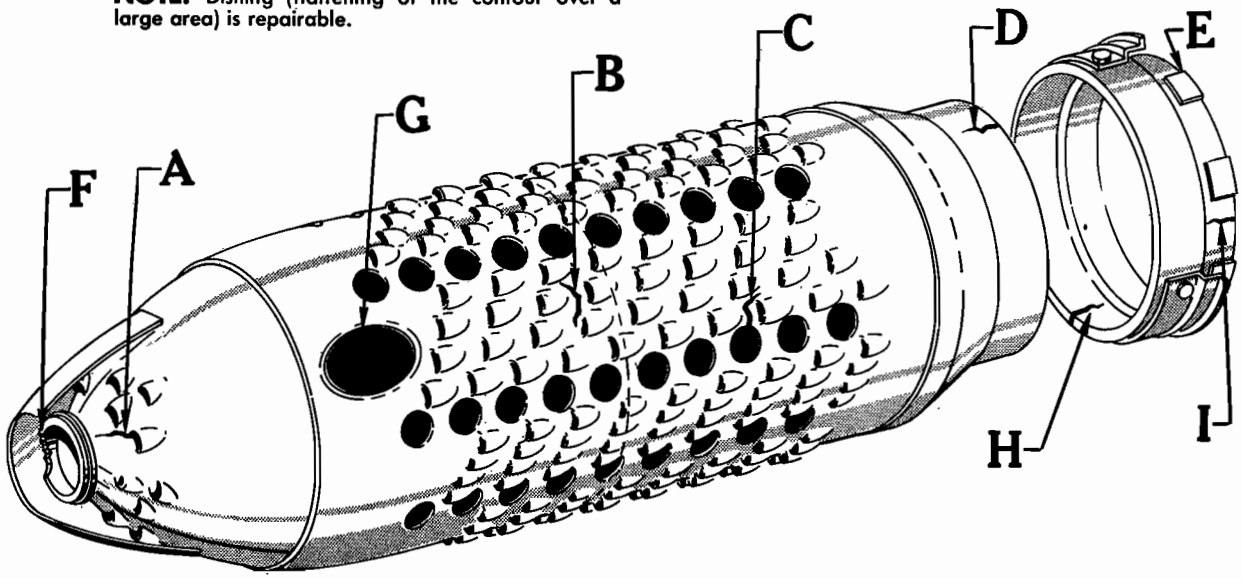
Dishing, severe blisters, and wrinkles are not allowable.

NOTE: Dishing (flattening of the contour over a large area) is repairable.

Replace inner chambers when strength of material or its original characteristics have been destroyed or reduced, or when the material has been reduced to less than 50 percent of original thickness by wear, burning, or erosion.

Inspect inner connector tubes for cracks and burning. Cracks are not allowable. If burning has caused reduction in thickness of metal, replace inner connector.

Inspect cross ignition tube clamps for distortion, spot-weld failures, and stripped bolts. Replace damaged clamps and stripped bolts.



ALLOWABLE CRACKS IN INNER CHAMBERS

DEFECT LOCATION	CRACKS	MAXIMUM NUMBER	LENGTH
A	None closer than 1/2 inch to another. Heat-check marks in any quantity are permissible unless open cracks are formed, in which case above limits apply.	8	1/4 in. max
B	None closer than one inch to another except that 1/8-inch cracks originating in adjacent louvers are allowable.	any number 4	3/8 in. max 3/8 in. to 1 in.
C	None closer than one inch to another except that 1/8-inch cracks originating in adjacent louvers are allowable.	any number 10	1/2 in. max 1/2 in. to 1-1/2 in.
D	None closer than one inch to another.	4	1/2 in. max
E	Wear Lugs—All must be in place, held securely with both spot welds; remaining thickness must be 0.020 inch maximum.		
F	Nozzle Opening in Dome—May be worn down to 0.015-inch metal thickness, or edge may be worn or broken to a maximum of 25 percent of its circumference.		
G	Elliptical Cross Ignition Eyelet—These cracks originate at lip of eyelet. No cracks in body of inner chamber are allowable within 1/2 inch of eyelet. Metal at lip of eyelet may be worn to 50 percent of original thickness.	any number	1/2 in. max
H	None closer than one inch to another.	4	3/8 in. max
I	None closer than one inch to another nor more than one crack within one inch of any wear lug.	4	5/8 in. max

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Figure 5-7. Inner Combustion Chamber Crack and Distortion Limits

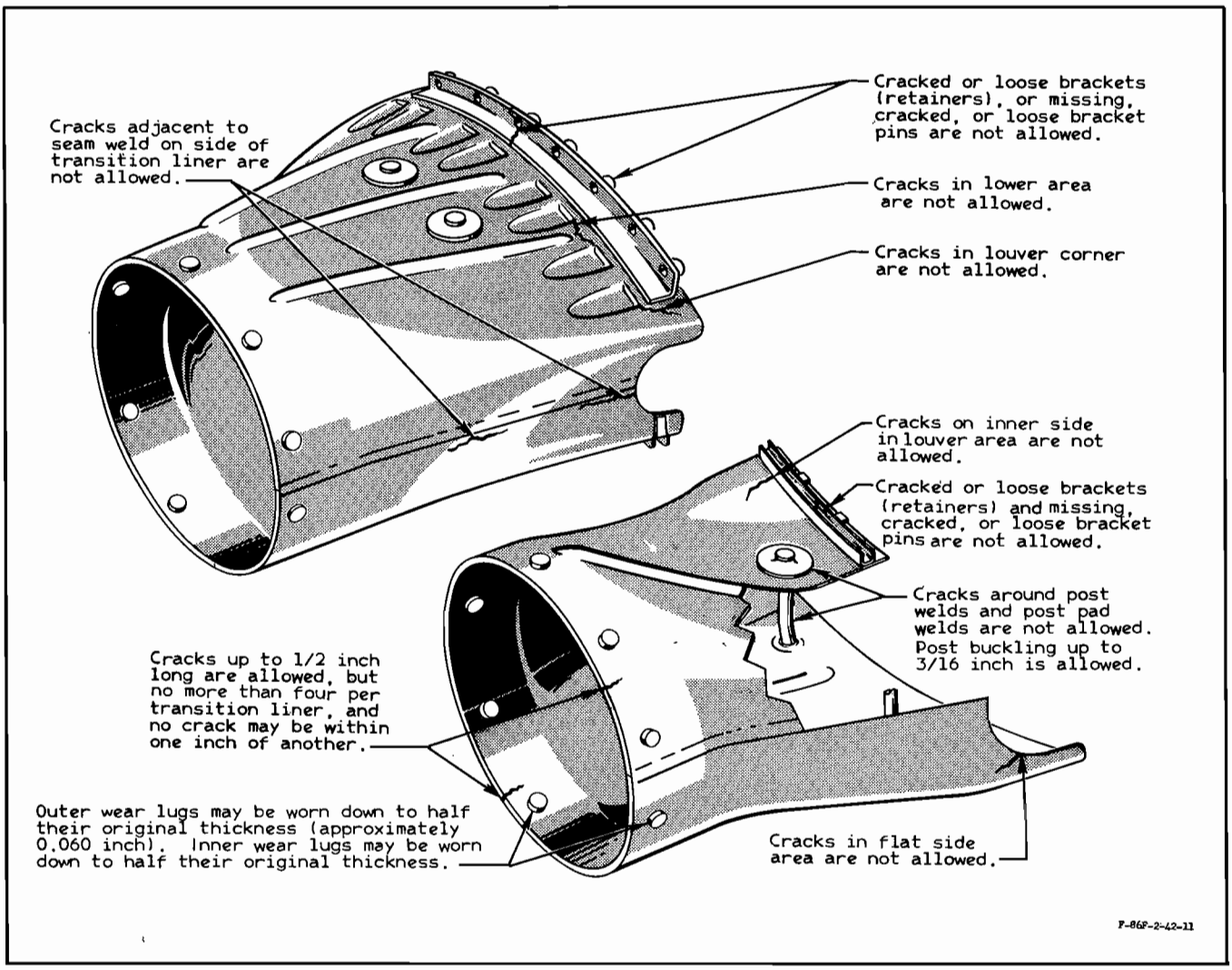


Figure 5-8. Transition Liner Crack Limits

unsupported; however, a coil spring incorporated in the fuselage, near the aft portion of the pipe, is provided to contact the pipe when the engine deflects under maximum G-load conditions. Removable restrictors are provided on the aft flange to obtain desired exhaust temperatures. Bosses are provided near the front of the tail pipe to accommodate the exhaust temperature thermocouples and harness. (Refer to paragraph 6-67.)

5-54. REMOVING EXHAUST SECTION CONE. To remove cone, remove fuselage rear section (paragraph 2-149) and proceed as follows:

a. Remove exhaust tail pipe. (Refer to paragraph 5-57.)

b. Disconnect and remove aft portion of turbine wheel cooling-air line.

c. Remove turbine housing shroud.

d. If exhaust cone is to be replaced, carefully remove insulating blankets.

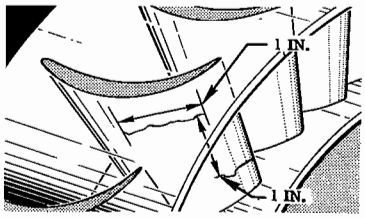
CAUTION

When handling and storing used tail cone blankets, exercise care to maintain the set shape of the blanket to avoid cracking.

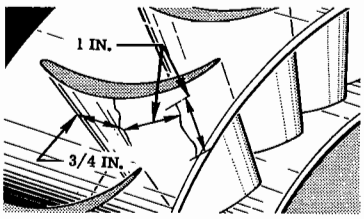
e. Support exhaust cone; then remove 80 retaining bolts and nuts. Carefully pull exhaust cone aft, being sure to hold turbine shroud ring against turbine housing. Carefully place exhaust cone on clean platform to prevent damaging mating flanges; then remove shroud ring.

5-55. EXHAUST SECTION CONE CRACK AND DISTORTION LIMITS. See figure 5-11.

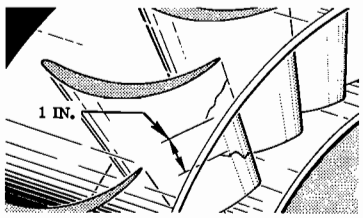
5-56. INSTALLING EXHAUST SECTION CONE. To install cone, first check turbine-wheel-to-exhaust-cone clearances by either of the two methods shown in figure 5-12; then proceed as follows:



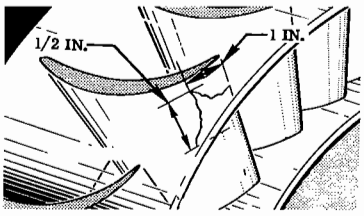
Blades with not more than two circumferential cracks up to one inch in length, which may or may not terminate at leading edge or trailing edge, are acceptable. Cracks which approach each other closer than one inch are cause for blade replacement.



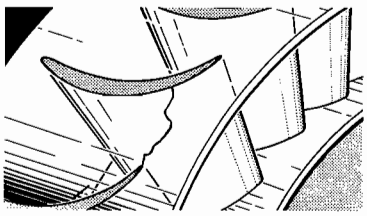
Blades with not more than two radial cracks, up to one inch in length, that are at least one inch apart are acceptable. A radial crack must not be located within 3/4 inch of blade leading edge. A radial crack may or may not terminate at blade inner or outer edge.



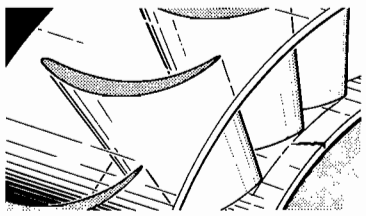
Blades with not more than two converging cracks are serviceable, provided they do not approach each other closer than one inch and there is no danger of a section breaking loose.



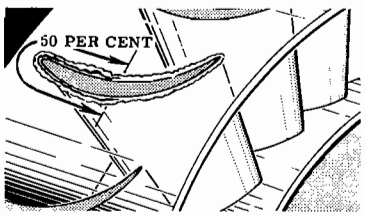
Combined radial and circumferential cracks are acceptable, provided circumferential crack does not exceed one inch and radial crack does not exceed 1/2 inch. No other cracks are permissible in blades having combined circumferential and radial cracks.



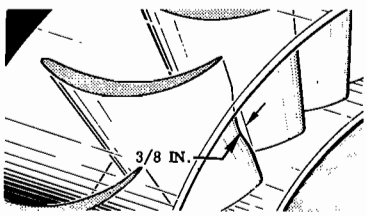
Nozzle band cracks from trailing edge of one slot to next blade slot are permissible, provided there is not more than one crack per section of eight blades.



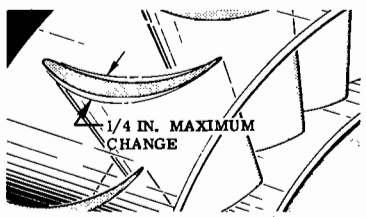
Inner band cracks are allowable for further service, provided they do not go beyond a line joining trailing edge of blade slots.



Cracks in blade welds are acceptable, provided such cracks do not exceed 50 percent of weld area around blade at either inner or outer end of blade.



Buckling of trailing edge is acceptable, provided displacement does not exceed 3/8 inch and not more than eight blades are damaged to maximum limit. A total of 24 damaged blades is acceptable with a maximum displacement of 1/8 inch.



An increase in blade thickness is limited to 1/4 inch maximum change with only one blade so affected in each section of eight blades. A total of 24 blades with a maximum increase of blade contour of 1/16 inch each is acceptable.

NOTES:

Heat-check cracks (surface cracks) on inner nozzle band are permissible.

A turbine nozzle that has all its blades heat-checked (surface cracks), even though surface cracks are not visible, must be replaced.

Nicks and dents in outer band are permissible, provided they have not started cracks longer than 3/32 inch.

Nicks and dents in inner band are acceptable, provided they do not exceed 1/16 inch displacement and have not started more than one crack per section of eight blades.

Dents in the blades are permissible, provided they do not exceed 1/16 inch depth.

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Figure 5-9. Turbine Nozzle Crack and Distortion Limits

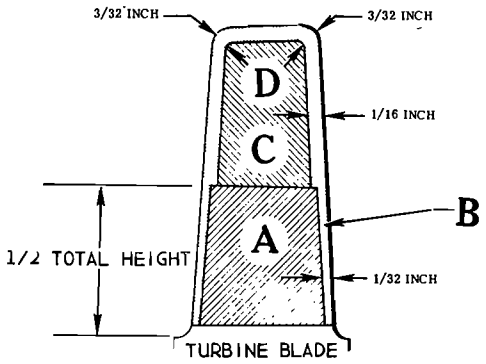
A Injuries in "B" areas of blades may be benched (stoned) and blended (burnished) out, provided a depth of 0.010 inch and a diameter of 1/8 inch are not exceeded.

B Injuries in "A" areas of blades may be benched (stoned) and blended (burnished) out, provided depth does not exceed shown limits with respect to blade edges and not more than 25 percent of the blades require repair.

C Injuries in "C" areas of blades may be benched (stoned) and blended (burnished) out, provided a depth of 0.020 inch and a diameter of 1/4 inch are not exceeded.

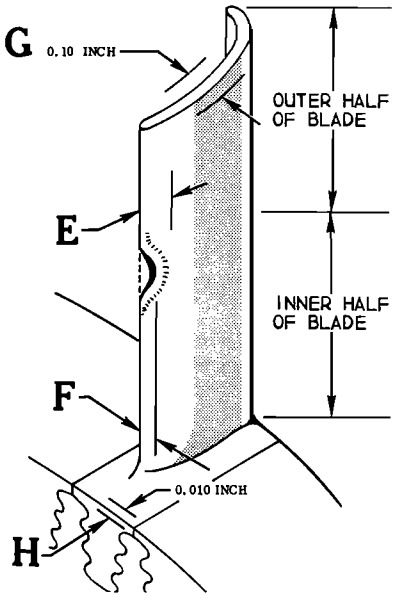
D Tip end burring resulting from shroud ring rubs may be removed. Curling on tip corners may be benched (stoned) off up to 3/32 inch.

NOTE: Repair of burring and curling may be done, provided such damage has not resulted from overtemperature operation of the engines.



N O T E S

- Any distinct break or crack in the surface of the blade or in the leading or trailing edge of blade is cause for blade replacement.
- No attempt should be made to straighten out any dent since this procedure may aggravate the injury.
- A nick is a sharp-edged gouge or furrow with V-shaped bottom and may be repaired within specified limits.
- In repairing injury other than dents, the entire injury must be removed and the surface smoothly blended. The number of repairs or dents per blade shall not exceed four. Repairs on opposite sides of a blade which may coincide so as to reduce the cross section by more than the maximum depth of one repair shall not be allowed.
- If more than 25 percent of the blades show grain separation (minute surface cracking) or compound "S" curvature, it may be assumed that the turbine wheel has been subjected to adverse operating conditions and should be cause for turbine wheel replacement.
- On completion of repairs, the turbine blade shall be fluorescent penetrant (Zyglo) inspected or binocular (Magnification) visually inspected to ensure removal of all trace of injury.



E Dents extending inward from leading or trailing edges shall not exceed limits shown in "B" areas of blades.

F Dents that displace the leading or trailing edge of blades shall not exceed 1/32 inch in inner half of blade or 1/16 inch in outer half of blade.

G Maximum circumferential tip movement (shake) is 0.125 inch. A minimum tip movement of zero is allowable.

H Maximum axial movement of the dovetail base in the wheel is 0.010 inch.

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Figure 5-10. Turbine Wheel Blade Repair Limits

Note

Exhaust-cone-to-turbine-wheel clearance check is necessary only when a new or a different cone is being installed.

a. Install turbine wheel shroud ring over turbine wheel, with tapered end facing aft. Align cooling-air line groove on outer edge of shroud ring with groove on turbine casing.

b. To guarantee required clearances after exhaust cone is installed, install shims between turbine wheel bucket blades and shroud ring. For a new shroud ring, an average clearance of .058 to .140 inch should be obtained in six to eight equally spaced positions around circumference of turbine wheel blades. If a used shroud ring is being installed, minimum clearance at any position is .045 inch, while maximum clearance is .090 inch.

Note

A "pinch fit" is not required during shroud ring assembly as long as proper clearances are maintained, since ring will tend to conform to contour of nozzle rabbet during engine operation. If ring is loose, operate engine for approximately 15 minutes and recheck clearances given in step b.; if they are within limits, allow engine to remain in service.

c. Install exhaust cone, and tighten a sufficient number of the 80 bolts and nuts to hold shroud ring and cone snugly in place. Then insert hand through open end of cone and remove shims. Check clearances between turbine wheel blades and shroud ring with gage to determine that radial clearance at all points is within limits.

d. If proper clearances cannot be obtained, rotate shroud ring to another position and check clearances again. If this does not give desired results, a new shroud ring should be installed.

e. After proper clearances have been obtained, torque all bolts to 65-70 inch-pounds. Tighten four boss plugs at rear of cone, and safety in pairs.

f. Install and secure insulating blankets.

g. Install turbine casing shroud, and connect cooling-air line.

h. Install exhaust tail pipe (figure 5-13), and connect exhaust thermocouple leads.

5-57. REMOVING EXHAUST SECTION TAIL PIPE. To remove tail pipe, first remove fuselage rear section (paragraph 2-149); then disconnect exhaust temperature thermocouple leads at tail pipe. Support tail pipe; then remove tail-pipe securing clamp (figure 5-13) and lower the tail pipe.

5-58. EXHAUST SECTION TAIL-PIPE CRACK AND DISTORTION LIMITS. The tail pipe may be inspected on its interior surface so that the tail-pipe insulating blankets need not be removed. Remove blankets only

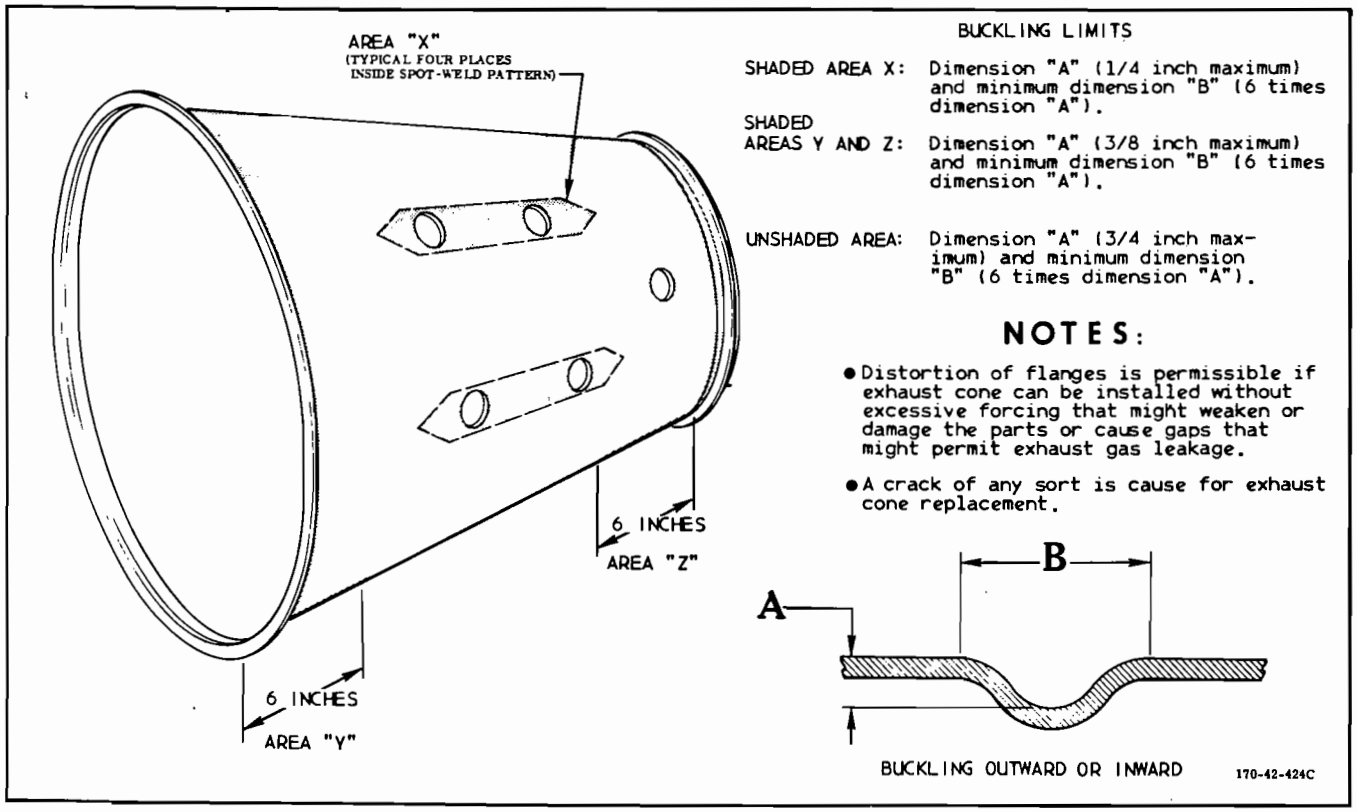
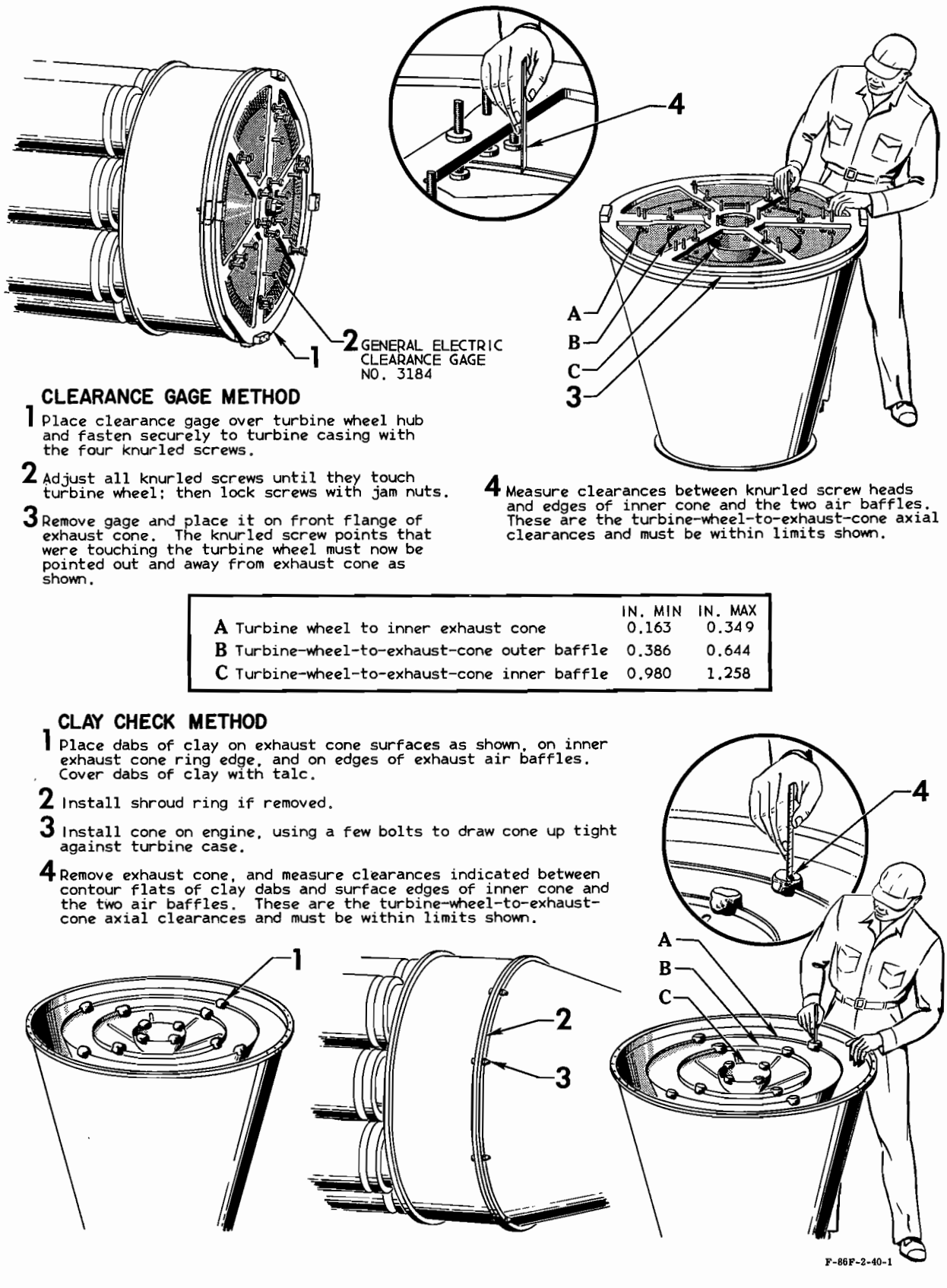


Figure 5-11. Exhaust Cone Crack and Distortion Limits



CLEARANCE GAGE METHOD

1 Place clearance gage over turbine wheel hub and fasten securely to turbine casing with the four knurled screws.

2 Adjust all knurled screws until they touch turbine wheel; then lock screws with jam nuts.

3 Remove gage and place it on front flange of exhaust cone. The knurled screw points that were touching the turbine wheel must now be pointed out and away from exhaust cone as shown.

4 Measure clearances between knurled screw heads and edges of inner cone and the two air baffles. These are the turbine-wheel-to-exhaust-cone axial clearances and must be within limits shown.

	IN. MIN	IN. MAX
A Turbine wheel to inner exhaust cone	0.163	0.349
B Turbine-wheel-to-exhaust-cone outer baffle	0.386	0.644
C Turbine-wheel-to-exhaust-cone inner baffle	0.980	1.258

CLAY CHECK METHOD

1 Place dabs of clay on exhaust cone surfaces as shown, on inner exhaust cone ring edge, and on edges of exhaust air baffles. Cover dabs of clay with talc.

2 Install shroud ring if removed.

3 Install cone on engine, using a few bolts to draw cone up tight against turbine case.

4 Remove exhaust cone, and measure clearances indicated between contour flats of clay dabs and surface edges of inner cone and the two air baffles. These are the turbine-wheel-to-exhaust-cone axial clearances and must be within limits shown.

Figure 5-12. Checking Turbine-wheel-to-exhaust-cone Clearance

if the internal inspection clearly indicates that an external check is necessary. Corrective measures for various extents of damage from cracks or distortion are given in the following steps.

a. Replace tail pipe if dents fall into any one of the following categories:

- A dent in which bottom straight line is more than 7 inches long.

Note

This type dent decreases the cross-sectional area of the pipe. For instance, a dent 7 inches long protrudes 5/8 inch into the exhaust stream.

- A dent shorter than 7 inches, but with sharp corners at ends.
- Two dents on same circumferential line, with ends less than 2 inches apart.
- Two dents not exactly on same circumferential line, but close enough to cause metal between ends of dents to be "pinched."
- A pattern of dents which occurs closely adjacent to a circumferential weld. This dent pattern reduces column strength of tail pipe and permits tail-pipe deflection at that point.

Note

A number of dents normally appear after the first few runs on every new tail pipe and remain relatively unchanged thereafter. These appear at random anywhere on the cylindrical surface of the tail pipe and are the result of a process in which the stresses resulting from fabrication are relieved. Unless the dents are large, or sharp in contour, they will have no effect on the service life of the tail pipe. Therefore, do not attempt to bump out such dents if they will not "can out" with a simple push.

b. Replace tail pipe if cracks fall into any one of the following categories:

- Any crack or puncture extending through tail-pipe skin.

Note

Repair of cracks is not permitted at organizational maintenance because of the extreme difficulties entailed in effecting a successful repair.

- Any thermocouple boss that is cracked or broken.

c. Replace tail pipe if a severely eroded area is found on inner surface. An eroded area can be identified by its acid-etched appearance.

Note

This condition is normally caused by overtemperature or overspeed operation. The surface is oxidized and the resulting scale blown away, leaving the surface with an acid-etched appearance. A severe case could cause the tail pipe to rupture. Removal of the insulating blanket will reveal evidence of the internal erosion in the form of a corresponding colored area on the outside of the tail pipe.

d. Inspect internal swirl pattern of soot in tail pipe for evidence of overheating and erosion. Replace tail pipe if erosion is severe.

Note

The swirl pattern will give evidence of improper fuel distribution, which can cause local overheating and erosion even though neither hot start nor overspeeding has been noted.

5-58A. TAIL CONE AND TAIL-PIPE INSULATING BLANKET REPLACEMENT CONDITIONS. Replace tail cone or tail-pipe insulating blankets for any of the following conditions:

a. Any cracks, punctures, or gouge marks in excess of 1/2 inch penetrating outer foil.

Note

Pin holes (1/16 inch in diameter or less), dents, or gouges on the outer surface are acceptable unless they form a pattern which would encourage cracking or failure of the foil.

b. More than two lacing hooks broken on same edge.

c. Two broken lacing hooks side by side.

d. Two broken lacing hooks in two end positions.

Note

- Lacing can be rearranged slightly to by-pass individual broken hooks.
- On blanket inner surface, pin holes and cracks are acceptable if cracks are less than 3 inches long and if adjacent edges of two cracks are more than 6 inches apart.
- Outer foil of blanket should present a shining surface. Scour any surface discoloration due to burned oil, etc.

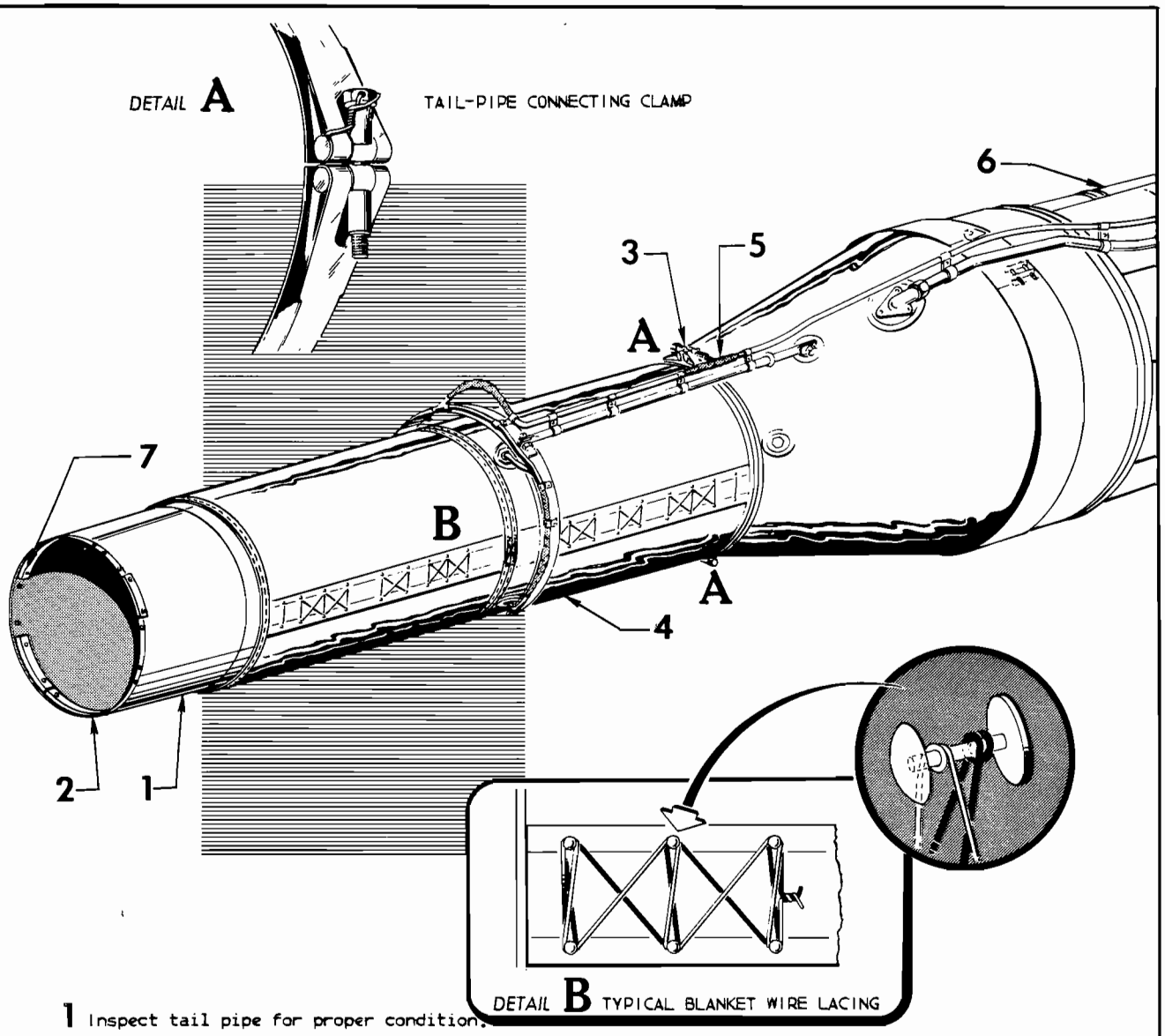
5-58B. REPAIRING TAIL CONE AND TAIL-PIPE INSULATING BLANKETS. The following repairs can be made to the inner surface of the blankets using a Hi Thompson 45-21144-110 welding kit or the equivalent:

a. Holes from 1/16 inch to 6 inches in diameter.

b. Slits from 1/8 inch to 18 inches in length.

Note

- Numerous separate repairs not exceeding 25 percent of the total blanket area can be made.



1 Inspect tail pipe for proper condition.

2 Raise tail pipe into position so that scupper drain at aft end of tail pipe is on bottom centerline.

CAUTION:
Exercise care to avoid damaging tail cone and tail-pipe mating surface.

3 Place clamp over exhaust cone and tail-pipe flanges. Make sure clamp is properly seated. Torque clamp bolt to 130 inch-pounds; then back off to slightly below 70 inch-pounds and retorque to 70-75 inch-pounds. Safety bolt with AN995N40 lockwire.

NOTE: Do not retighten clamp bolt after engine has been run. Normally, the torque will fall off to approximately zero inch-pounds after a few hours operation. However, the clamp will tighten sufficiently to provide a satisfactory joint during engine operation because of differential thermal expansion of the clamp exhaust cone and pipe. Constant retorquing would subject the clamp to repeated stretching and possible ultimate failure.

4 Cover tail pipe with insulating blankets.

5 Install thermocouple harness on tail pipe and connect thermocouple lead to engine.*

6 Install engine and/or install fuselage rear section.*

7 Install and adjust tail-pipe exhaust nozzle area restrictor segments.*

*Refer to index for page number of applicable procedure.

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Figure 5-13. Installing Exhaust Tail Pipe

- Repairs can be made to the outer surface of the blanket by removing the edge staples, opening the folded edge, and inserting patch material. This material is to be stapled to the skin and the blanket reassembled.

5-59. INSTALLING EXHAUST TAIL PIPE. See figure 5-13.

5-60. ADJUSTING EXHAUST SECTION TAIL PIPE TO OBTAIN MAXIMUM ENGINE OPERATING TEMPERATURE. The velocity of the exhaust gas stream leaving the tail-pipe nozzle is the actuating force that results in the reaction thrust; thus, the engine thrust will be affected by variations in the size of the nozzle area. The smaller the nozzle area, the higher the exhaust gas stream velocity, the exhaust gas temperature, and the engine reaction thrust. As is readily apparent, the limiting factor controlling the smallness of the nozzle area is the maximum exhaust temperature at which the engine is permitted to operate. As tail pipes are made with a nozzle area of a predetermined size and it is known that operating characteristics will vary between engines, seven removable segment-type nozzle restrictor segments are provided for temperature adjustment. The segments provide a means of varying the nozzle area to obtain maximum operating engine exhaust temperature and, therefore, maximum thrust on

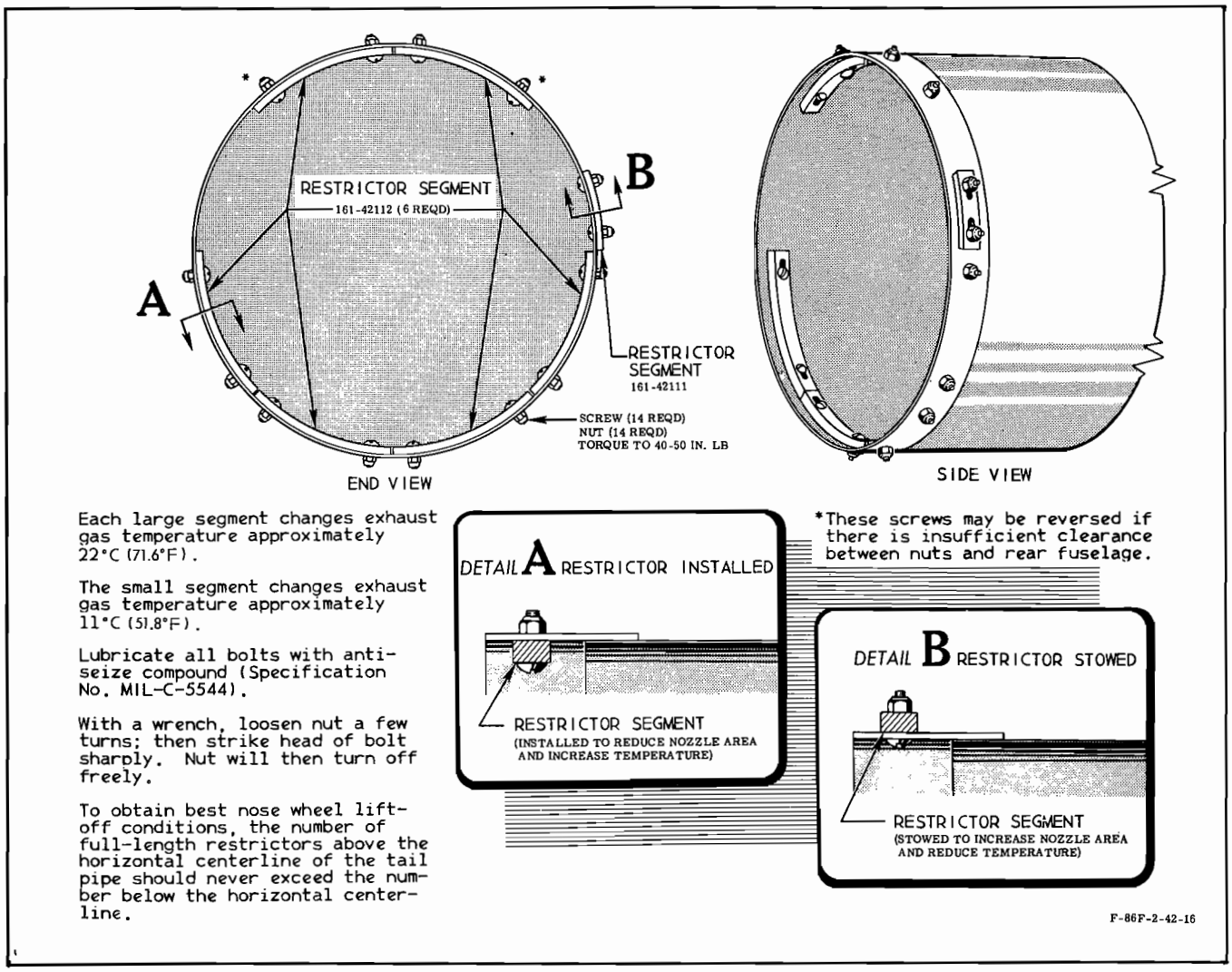


Figure 5-14. Adjusting Exhaust Nozzle Restrictor Segments

all like engine installations. To adjust segments, see figure 5-14 and proceed as follows:

Note

Engine run-up should be made with airplane headed into or at right angles to any ground wind, since ground wind blowing into tail-pipe nozzle may increase the actual exhaust temperature reading.

a. Run engine up to 100% rpm and allow engine to stabilize for at least 5 minutes; then note engine exhaust temperature reading. Exhaust temperature reading should be 675°C to 690°C (1247°F to 1274°F).

CAUTION

If maximum allowable exhaust gas temperature of 690°C (1274°F) is reached at engine speeds of less than 100% rpm, hold engine at these lower speeds until the temperature is stabilized to permit further increase in speed to 100% rpm without exceeding 690°C (1274°F). On some engines, this will require 5 to 10 minutes of operation between 96% to 100% rpm.

b. If exhaust temperature is not within operating limits, shut down engine. To increase temperature, install segments inside tail pipe, starting with bottom segments. To decrease temperature, remove segments, starting with top segments inside tail pipe. Install removed segments on outside of tail pipe as shown in figure 5-14. Again run engine and note temperature. Repeat procedure until temperature is established and stabilized within limits.

CAUTION

Before installing additional segments, make sure trouble is not in exhaust temperature indicating system. This condition is indicated by excessive fuel flow.

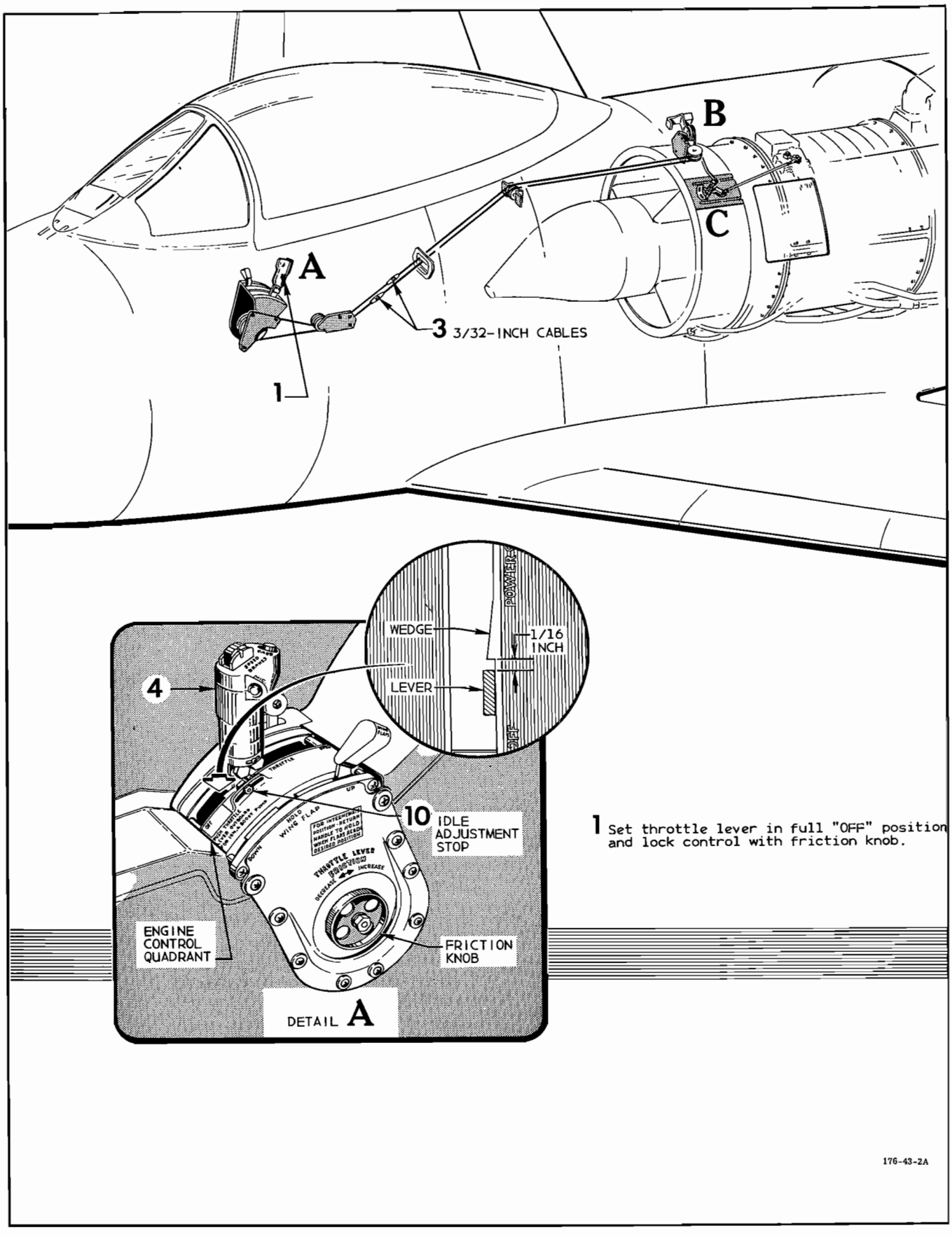
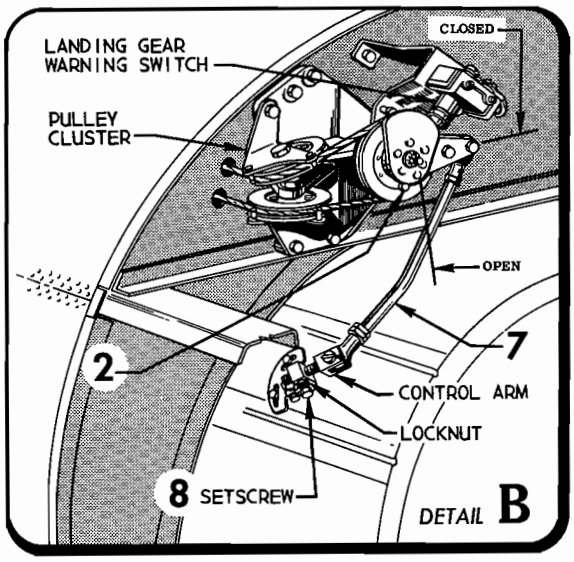


Figure 5-15. Adjusting Engine Control System (Sheet 1 of 2)



2 Through left engine access door, rotate control pulley to align pulley and bracket rigging holes, and insert rigging pin.

3 With turnbuckles in left console, adjust cables evenly to 45 (±5) pounds tension and until rigging pin can be removed and installed without binding.

4 Remove rigging pin; then move throttle lever forward to within 1/16 inch of rear face of lever wedge stop, and lock with friction control.

5 Rotate engine control shaft counterclockwise to full closed position; then install engine control arm on shaft in position shown.

6 Adjust control arm to length shown.

7 Adjust control rod to fit (approximately 9-1/4 inches) and connect to positioned control arm and pulley. Safety rod-end bearing bolt to control arm.

8 Loosen friction knob and operate throttle lever, checking for approximately 1/4 inch spring-back at both ends of lever travel and stop-to-stop travel at engine control shaft. Adjust control arm length to obtain desired results. Lengthen arm to increase throttle lever travel or shorten arm to decrease lever travel. Adjust arm length by disconnecting control rod, loosening setscrew, and turning arm in 180-degree increments in direction desired.

CAUTION: After adjustment is obtained, lock control arm by turning in setscrew until it is bearing on either of the two flat lands of control arm. Lock setscrew with locknut.

- If engine alignment is changed, engine control system rigging must be rechecked.

9 Start engine and adjust high rpm stop at engine control shaft to limit rpm at 100%.

NOTE: Each time high rpm stop is adjusted, it is necessary to check adjustment of the emergency fuel regulator linkage.* If stop has been turned within one turn of its limit of adjustment and proper rpm is still not obtained, adjust stopcock and main fuel regulator linkage and/or replace fuel regulator.

10 With engine running, adjust quadrant idle stop until a stabilized idle speed of 34% to 38% rpm can be obtained when the throttle lever is moved smoothly back against the idle stop from a stabilized speed of 55% to 65% rpm. Accomplish the lever movement within a period of approximately 1/2 second.

NOTE: If the idle stop is properly set, the engine idle speed should stabilize at 34% to 38% rpm when the throttle lever is retarded from 100% rpm to idle. Throttle lever should be retarded to idle position within approximately one or two seconds.

*Refer to index for page number of applicable procedure.

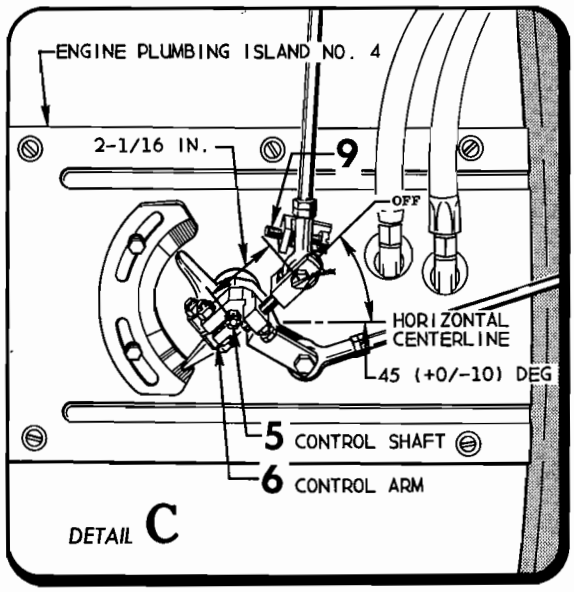


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Figure 5-15. Adjusting Engine Control System (Sheet 2 of 2)

5-61. ENGINE CONTROL SYSTEM.

5-62. Engine power is manually selected by a single throttle lever, mounted in the engine control quadrant on the left side of the cockpit. (See figure 5-15.) The throttle lever is interconnected to the engine control shaft at the No. 4 engine island by a cable and push-pull rod system. The engine control shaft is interconnected by linkage to the emergency fuel regulator (paragraph 5-155), the fuel stopcock (paragraph 5-160), and the main fuel regulator (paragraph 5-140). An adjustable stop (accessible through the fuselage left engine access door) is provided at the engine control shaft for adjustment of the high rpm setting. When the throttle is moved outboard from the "OFF" position, the lever actuates a switch in the quadrant. When actuated, the switch energizes the fuel booster pump circuit and sets up the engine ignition system to turn on when the starter is energized. Initial forward motion of the throttle opens the stopcock. Subsequent forward motion of the throttle actuates the linkage connected to the fuel regulator to select increasingly higher engine rpm. When the throttle is retarded from the "OPEN" position, a second switch (on the fuselage engine control pulley bracket) is actuated at a predetermined point of travel for the landing gear warning system. See figure 2-64 for landing gear warning switch adjustment procedure.

CAUTION

Unless specified for test purposes, rapid or "burst" throttle lever movements must be avoided if the following *combination* of conditions prevails: (1) outside air temperature is less than 10°C (50°F); (2) engine speed is below 70% rpm; and (3) altitude is less than 10,000 feet. If the afore-mentioned combination of conditions prevails and throttle is moved rapidly, compressor stall may occur, resulting in reduced engine life, engine failure, and damage to the airplane in extreme cases.

5-63. TROUBLE SHOOTING ENGINE CONTROL SYSTEM.

5-64. Refer to paragraph 5-3.

5-65. ADJUSTING ENGINE CONTROL SYSTEM.

5-66. Before attempting adjustments, carefully inspect the control quadrant, bell cranks, and pulleys throughout the system for free movement, proper alignment, and full travel. To adjust the engine controls between the engine control quadrant in the cockpit and the engine control shaft on island No. 4 of the engine, see figure 5-15. The procedure for adjusting the engine control linkage between the engine control shaft and the emergency fuel regulator, stopcock, and the main fuel regulator is shown in figures 5-21 and 5-23.

5-67. ENGINE CONTROL SYSTEM QUADRANT.

5-68. The control quadrant includes the engine throttle, flap control lever, throttle-actuated ignition switch, and gun sight manual range potentiometer. The throttle grip incorporates the microphone, gun sight caging, and speed brake switches. The grip portion of the lever rotates to drive the gun sight manual ranging control. A wedge-type friction lock is provided for the throttle lever to prevent creeping. Engine idling speed is set by an adjustable stop near the "OFF" position on the quadrant.

5-68A. REMOVING ENGINE CONTROL SYSTEM QUADRANT. To remove engine control system quadrant, proceed as follows:

a. Remove seat. (Refer to paragraph 2-210.)

b. Remove side panels from left console.

c. Disconnect throttle cable turnbuckles.

d. Disconnect flap control cable turnbuckles on F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109.

e. Remove control quadrant faceplate.

f. Disconnect electrical plug at quadrant.

g. Remove three quadrant retaining bolts.

h. Lift quadrant out far enough to disconnect throttle control cable ball retainer; then remove quadrant.

Note

If same quadrant is to be installed, do not remove throttle control cable from cockpit. If new quadrant is to be installed, remove fairlead to facilitate removing throttle cable from cockpit.

5-68B. INSTALLING ENGINE CONTROL SYSTEM QUADRANT. To install engine control system quadrant, proceed as follows:

a. Position quadrant and attach throttle cable ball retainer.

b. Secure quadrant and install three retaining bolts.

c. Connect electrical plug.

d. Adjust throttle-actuated ignition switch. (See figure 5-17A.)

e. Adjust flap switches on F-86F-20 Airplane AF51-13110 and all subsequent airplanes. (See figure 2-9.)

f. Connect throttle cable turnbuckles and rerig system. (See figure 5-15.)

g. Connect flap control cable turnbuckles on F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109. (See figure 2-8.)

h. Install quadrant faceplate.

i. Install console side panels.

j. Install seat. (Refer to paragraphs 2-211, 2-212, and 2-213.)

5-69. ENGINE OIL SYSTEM.

5-70. The engine oil system (figure 5-16) is of the dry-sump pressure type and supplies oil to all of the gears and bearing surfaces throughout the engine for lubrication and cooling. The oil system also supplies oil for the operation, lubrication, and cooling of the main fuel regulator (paragraph 5-140). The system consists of an oil supply tank, a three-element lubricating and scavenge pump, a dual-element aft-bearing scavenge pump, an auxiliary gear case scavenge pump, an aft-bearing oil filter, an oil cooler with a temperature-regulating valve, and the necessary check valves, relief valves, and plumbing. No provision is made for indicating oil temperature. An oil pressure indicating system (paragraph 6-89) is installed. Refer to paragraph 5-9 for information regarding engine oil consumption.

5-71. FUNCTION OF ENGINE OIL SYSTEM.

5-72. Oil from the supply tank enters the three-element lubricating and scavenge pump by gravity flow and pump suction. From the two lubricating elements of the pump, oil is supplied under pressure to all points needing lubrication and cooling. From the No. 1 lubricating element (figure 5-16), the oil is pumped through the main oil filter to the rear compressor bearing, the damper bearing, and the turbine bearing. Part of this oil is routed through a take-off located downstream of the filter to the oil pressure transmitter. A pressure relief valve at the outlet side of the pump by-passes excessive oil pressure to the accessory gear case. The oil, after lubricating the aft bearings, flows into the turbine frame and the compressor rear frame sump, where it is pressurized by the dual-element aft-bearing oil scavenge pump and directed to the oil temperature regulator. Depending on the temperature of the oil, the flow is either through or past the oil cooler, through a take-off on the forward side of the oil temperature regulator, and through the scavenge oil line to the supply tank. From the No. 2 element of the lubricating and scavenge pump (figure 5-16), the oil is routed to the accessory gear case, through a pressure relief valve, and then through five jets which direct the oil to the accessory drive gears and bearings and the front compressor bearing. Oil is also bled from this section to lubricate the auxiliary gear case bearings and gears and for operation of the main fuel regulator. The scavenge oil from the auxiliary gear case is pumped back to the accessory gear case by the auxiliary gear case scavenge pump. This oil, along with that of the accessory gear case, is picked up by the No. 3 element of the lubricating and scavenge pump and is pumped through the scavenge line at No. 3 engine plumbing island. This oil joins the oil from the aft-bearing scavenge pump and is returned to the oil supply tank.

Note

- To ensure proper oil scavenging from engine, the engine should be operated at approximately 65% rpm for at least one minute prior to shutdown after any engine operation at sustained high-power settings.
- On newly installed engines, the oil-out line at the No. 3 island should be "cracked" and the engine should be operated on the starter so that all air is bled from the line. This prevents entrapment of air which would cause scavenging of the three-element pump and subsequent low oil pressure.

5-73. TROUBLE SHOOTING ENGINE OIL SYSTEM.

5-74. Refer to paragraph 5-3.

5-75. ENGINE OIL SYSTEM SUPPLY TANK.

5-76. The engine oil system supply tank is mounted in the right side of the engine compartment above the level of the engine oil inlet. The tank consists of a hopper, baffles, overflow and sump drain lines, a tank filler and filler cap, a calibrated dip stick, oil inlet and outlet fittings, and a cleaning access door. The tank also includes a barometric-type vent valve. The hopper is used to deaerate the oil as it is returned by the engine oil scavenge pumps to the tank. The return oil enters the hopper tangentially, causing a spinning action which forces the air from the oil to the center of the hopper where it is vented overboard. Baffles in the tank are utilized to keep oil at the outlet fitting. The access door can be removed to clean the tank when necessary. The barometric vent valve is set to allow the tank to be vented to atmosphere until an airplane flight altitude of 10,000 feet is attained, after which the valve automatically closes. This allows the engine scavenge pumps to pressurize the tank to 3½ (±¼) psi to prevent engine oil pump cavitation at high altitudes. The valve opens if tank pressure exceeds 3½ (±¼) psi. Refer to paragraph 1-43 for maximum filling capacity.

5-77. REMOVING OIL SUPPLY TANK. To remove supply tank, proceed as follows:

a. Remove engine. (Refer to paragraph 5-13.)

b. Disconnect all oil, drain, and vent lines at oil tank.

c. Disconnect bonding braid from oil tank.

d. Disconnect support strap turnbuckles securing oil tank to fuselage.

e. Remove oil tank.

5-78. INSTALLING OIL SUPPLY TANK. To install supply tank, proceed as follows:

a. Position tank in cradle.

b. Connect support straps and check for proper alignment.

c. Tighten support strap turnbuckles until tank is secure; then safety turnbuckles.

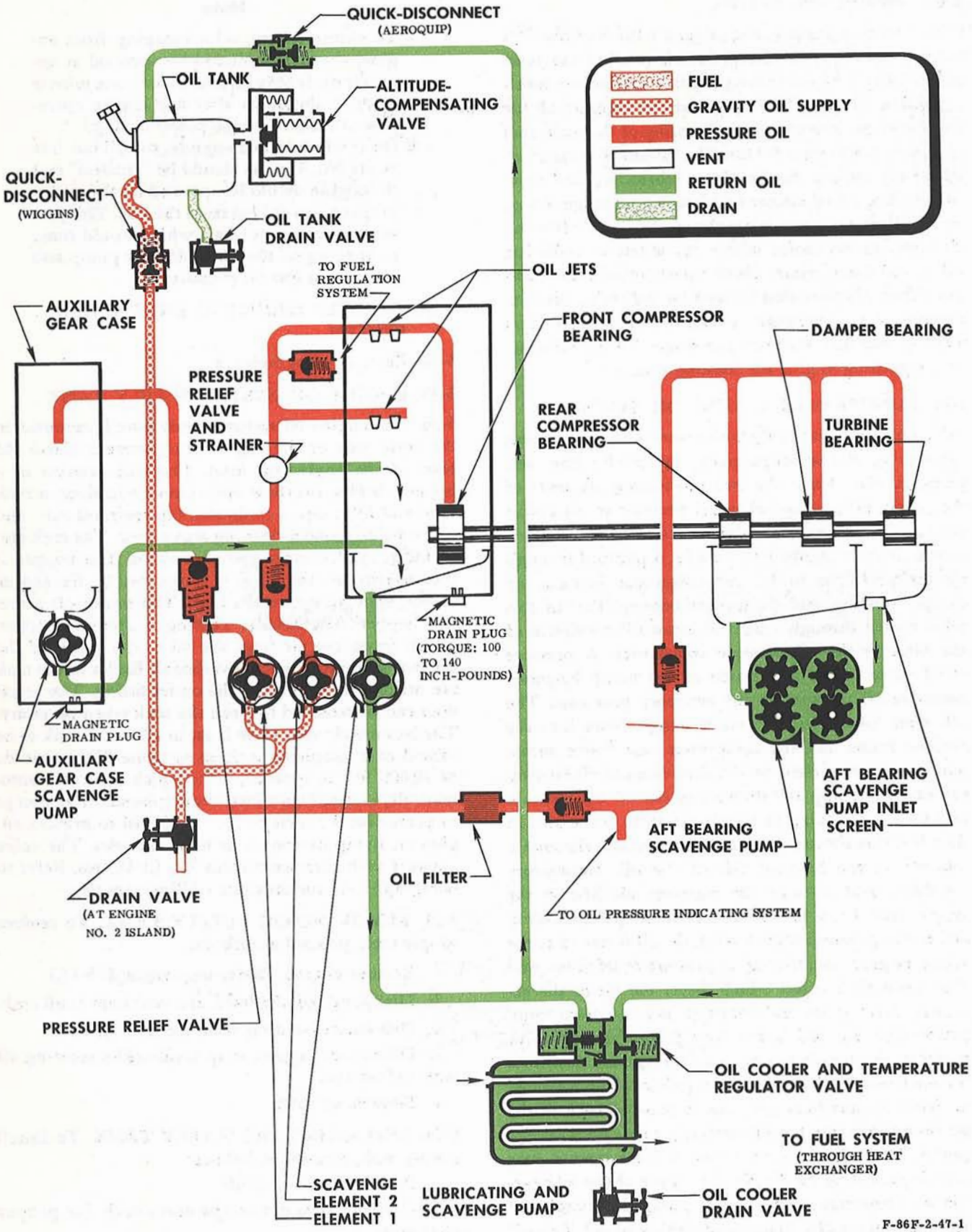
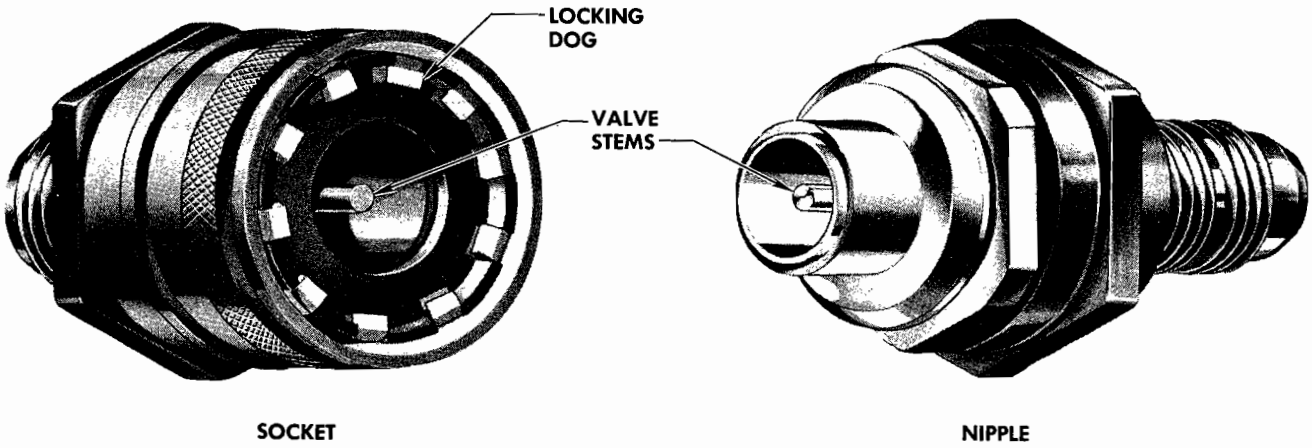
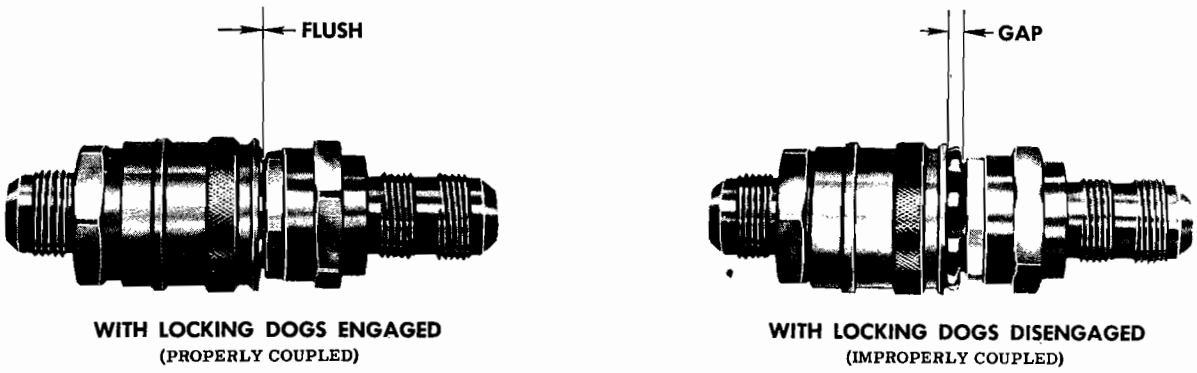


Figure 5-16. Engine Oil System





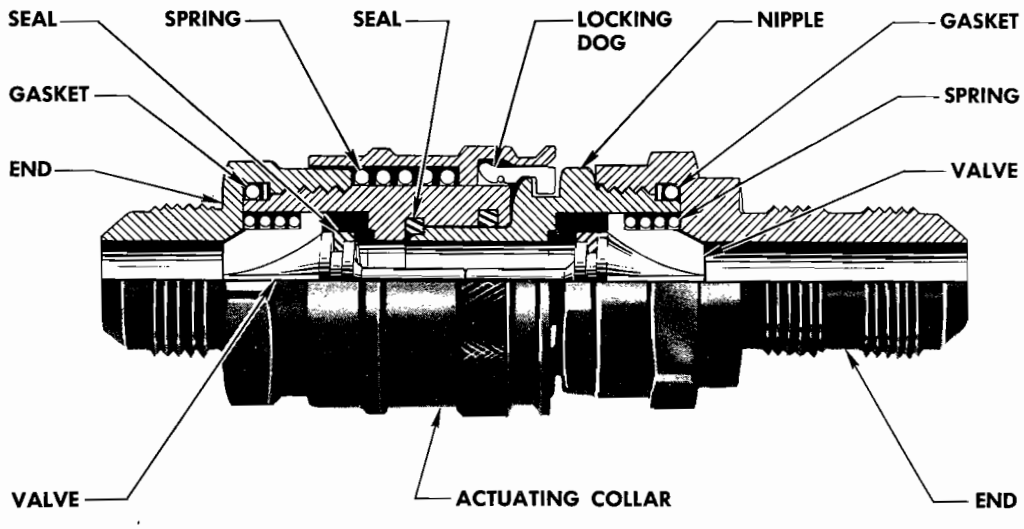


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Figure 5-16A. Quick-disconnect Coupling (Wiggins)

d. Connect bonding braid to oil tank.

e. Connect all oil, drain, and vent lines to oil tank.

f. Install engine. (Refer to paragraph 5-17.)

g. Service oil system. (Refer to paragraph 1-43.)

5-79. ENGINE OIL SYSTEM LUBRICATING AND SCAVENGE PUMP.

5-80. The engine oil system lubricating and scavenge pump is a three-element gerotor type, located on the lower part of the accessory gear case. (Refer to paragraph 5-5 for specific data.) The pump incorporates two pressure elements and one scavenge element. The pump, which is driven counterclockwise (looking at the pump drive shaft), is rated at 2.4 gpm for each pressure element and 6 gpm for the scavenge element, all at 4200 pump rpm. A mounting pad and two external bosses are provided beyond the face of the pad to mount a tachometer and facilitate installation of piping to the inlet and outlet ports of the No. 1 lubricating element. The inlet and outlet ports of the other elements are internal, located within the gear case. The No. 1 lubricating element supplies lubricating oil to the rear compressor bearing, the damper bearing, and the turbine bearing. The second pressure element supplies lubricating oil to the front compressor bearing, accessory gear case, and auxiliary gear section. It also supplies the main fuel regulator with cooling and control oil. Oil from the compressor front frame is returned to the tank by the scavenge element of the pump.

5-81. REMOVING LUBRICATING AND SCAVENGE OIL PUMP. To remove lubricating and scavenge oil pump, proceed as follows:

a. Remove engine auxiliary accessory drive section cover (paragraph 5-36) and engine auxiliary accessory drive section gear case (paragraph 5-38).

b. Disconnect electrical lead to tachometer generator and oil hoses at pump.

c. Remove the three nuts and washers that secure pump to gear case.

d. Remove pump.

e. Disassemble tachometer generator from pump for installation on replacement pump.

5-82. INSTALLING LUBRICATING AND SCAVENGE PUMP. To install lubricating and scavenge pump, proceed as follows:

a. Install tachometer generator on pump with four nuts and washers. Torque nuts to 60-95 inch-pounds.

b. Install pump on engine with three nuts and washers. Torque nuts to 80-130 inch-pounds.

Note

When installing pump, make sure that three silicone "O" rings are in good condition and correctly installed.

c. Connect electrical lead to tachometer generator and attach oil hoses to pump.

d. Install engine auxiliary accessory drive section gear case (paragraph 5-39) and engine auxiliary accessory drive section cover (paragraph 5-37).

5-83. ENGINE OIL SYSTEM AFT-BEARING SCAVENGE PUMP.

5-84. The engine oil system aft-bearing scavenge pump, located on the aft side of the compressor rear frame between combustion chambers No. 4 and 5, is a double-element gear-type pump. (Refer to paragraph 5-5 for specific data.) The pump has separate intake ports and a common discharge port. One intake port and the discharge port are flange-ported through the pump to compressor rear frame mounting pad. The other intake port, located on the aft side of the pump, is ported to an external scavenge fitting. The pump scavenges either the compressor aft frame sump oil or the turbine frame oil during an airplane climb or dive without losing prime. During level flight, both elements are functioning. The pump is driven counterclockwise (as viewed from the pump drive shaft) and is rated at 10 gpm at 3650 pump rpm.

5-85. REMOVING AFT-BEARING SCAVENGE PUMP. To remove aft-bearing scavenge pump, proceed as follows:

a. Remove No. 4 and 5 combustion chambers. (Refer to paragraph 5-46.)

b. Disconnect oil scavenge fitting from pump.

c. Cut safety wire and remove three bolts and washers that secure pump to compressor rear frame.

d. Remove pump and gasket.

5-86. INSTALLING AFT-BEARING SCAVENGE PUMP. To install aft-bearing scavenge pump, proceed as follows:

a. Install pump and gasket on compressor rear frame with three bolts and washers. Torque bolts to 105 inch-pounds and safety with lockwire.

CAUTION

- When installing pump (before final tightening of mounting bolts), turn compressor by hand to ensure proper mating of pump to pump drive gear.
- To prevent possible damage to pump, torque bolts evenly in stages, such as 30, 60, 90, and 105 inch-pounds.

b. Connect scavenge oil tube to pump and torque coupling nut to 125 inch-pounds.

c. Install combustion chambers. (Refer to paragraph 5-49.)

5-87. ENGINE OIL SYSTEM AUXILIARY GEAR CASE SCAVENGE PUMP.

5-88. The engine oil system auxiliary gear case scavenge pump is a single-element gerotor-type pump and

is located on the lower aft side of the auxiliary gear case. (Refer to paragraph 5-5 for specific data.) The pump is driven counterclockwise as viewed from the drive shaft and is rated at 0.5 gpm at 3800 rpm. The pump scavenges oil from the auxiliary gear case and returns it to the engine accessory gear case. Oil is pumped from the accessory gear case to the oil tank by the No. 3 element of the lubricating and scavenge pump.

CAUTION

When disconnecting both inlet and outlet lines on the auxiliary gear case scavenge pump, care must be exercised to ensure that lines are not crossed upon reconnection.

5-89. ENGINE OIL SYSTEM AFT-BEARING FILTER.

5-90. The multiple-screen type oil filter is located in the aft-bearing oil supply line on the left side of the engine compressor case. (Refer to paragraph 5-5 for specific data.) The oil filter filters the oil to the rear compressor bearing, the damper bearing, and the turbine bearing. A relief valve in the filter by-passes the oil flow if the filter becomes clogged. The relief valve is set to open between 15 and 20 psi differential pressure between the inside and outside of the filter screens at a 3 gpm flow.

5-91. CLEANING AFT-BEARING FILTER (AIR MAZE). To clean Air Maze oil filters, remove engine (paragraph 5-13) and proceed as follows:

a. Cut safety wire securing sleeve nut and remove sleeve nut; then remove "O" ring from sleeve nut.

b. Remove cover and gasket from filter body.

c. Unscrew seal nut and remove relief valve seat, relief valve, and relief valve spring.

d. Lift filter cartridge from body.

e. Dip all parts, except filter cartridge and gasket, in cleaning solvent (Federal Specification P-S-661). If necessary, in order to clean parts thoroughly, use a brush. Allow parts to drain; then dry parts with a lint-free cloth.

f. Blow through openings in body with dry compressed air.

g. Clean filter cartridge with a soft-hair brush dipped in cleaning solvent.

CAUTION

Do not use a wire brush on any part of filter.

h. Carefully blow through filter cartridge, from center outward, with dry compressed air.

i. Seat filter cartridge evenly in circular groove of filter body.

j. Place relief valve spring over stud; then place relief valve over stud with projecting collar down.

k. Place relief valve seat over relief valve, with recessed surface upward.

l. Place seal nut on stud so that projecting sleeve of seal nut fits into center opening of relief valve seat; then turn seal nut down until valve seat bears firmly on center section of filter cartridge. Torque seal nut to 25-30 inch-pounds.

m. Install gasket in filter body recess.

n. Place cover on body, replace "O" ring, and secure with sleeve nut.

Note

Replace any gaskets or "O" rings showing evidence of deterioration or wear.

o. Torque sleeve nut to 70-80 inch-pounds and safety with AN995N32 safety wire.

p. Install engine. (Refer to paragraph 5-17.)

5-92. CLEANING AFT-BEARING FILTER (HYDRO-AIRE). To clean Hydro-Aire oil filter, remove engine (paragraph 5-13) and proceed as follows:

a. Cut safety wire securing valve hexagon; then unscrew and remove filter group from filter body.

Note

Pull filter group straight out, to avoid dropping loose valve parts.

b. Catch shim, spring, and poppet.

c. Remove retaining ring farthest from valve hexagon, and successively remove baffle support, baffle, spacer, filter cartridge, collar, and retaining ring nearest valve hexagon.

d. Remove cover; then remove cover packing gasket and valve packing gasket.

e. Dip all parts, except filter cartridge and gaskets, in cleaning solvent (Federal Specification P-S-661). If necessary, in order to clean parts thoroughly, use a brush. Allow parts to drain; then dry parts with a lint-free cloth.

f. Blow through openings in body with dry compressed air.

g. Clean filter cartridge with a soft-hair brush dipped in cleaning solvent.

CAUTION

Do not use a wire brush on any part of the filter.

h. Carefully blow through filter cartridge, from center outward, with dry compressed air.

i. Install packing gasket on valve and packing gasket on cover; then place cover on valve.

Note

Replace any gasket showing evidence of deterioration or wear.

j. Install retaining ring nearest valve hexagon; then successively install collar, filter element, spacer, baffle, baffle support, and retaining ring farthest from valve hexagon.

k. Properly seat poppet in valve; then insert spring and shim in valve.

l. Place filter group evenly in filter body and screw valve hexagon to a torque of 90 to 110 inch-pounds; then safety valve hexagon to filter body with AN995N32 safety wire.

m. Install engine. (Refer to paragraph 5-17.)

5-92A. ENGINE OIL SYSTEM QUICK-DISCONNECT COUPLINGS.

5-92B. Two different types of quick-disconnect couplings are used where frequent uncoupling of the oil lines is required. Both types of couplings consist of two self-sealing halves which make possible the separation and connection of lines without loss of oil. The Aeroquip coupling (paragraph 3-31B and figure 3-3A) is used on the oil tank return line between the tank and the engine. The Wiggins coupling (figure 5-16A) is utilized between the oil tank output line and the engine. This coupling is engaged by simultaneously pushing the two coupling halves together and sliding the sleeve back. With both halves of the coupling in place, release of the sleeve causes it to slip forward locking the dogs on the nipple groove. A properly connected coupling should have the sleeve cover the locking dogs completely.

5-93. ENGINE OIL SYSTEM OIL COOLER AND TEMPERATURE REGULATOR VALVE.

5-94. The oil cooler is a tubular, oil-to-fuel, heat transfer unit, mounted on the bottom of the compressor case. (Refer to paragraph 5-5 for specific data.) The cooler consists of five passes of tube bundles and their headers, and a combination surge and temperature regulator valve. Oil from the aft-bearing scavenge pump enters the combination surge and temperature regulator valve unit. If the temperature of the oil is above 16°C (60°F), the oil is routed through the cooler and then to the oil supply tank. If the oil temperature is below 16°C (60°F), the oil by-passes the cooler and is directed to the oil supply tank. The oil flows between the tube bundles while engine fuel flows through the tubes. The heat is transferred from the oil to the fuel. The surge valve dampens any pressure surges greater than 120 psi. The cooler incorporates a drain valve to drain condensation or oil from the unit. The engine must be removed (paragraph 5-13) to gain access to the cooler.

5-95. ENGINE OIL SYSTEM MAGNETIC DRAIN PLUG.

5-96. The engine oil system magnetic drain plug is located at the lower side of the accessory gear case. The plug can be removed by cutting safety wire and unscrewing plug.

CAUTION

- Be careful to prevent spilled oil from entering engine compressor. Wipe off excessive oil.
- Upon reinstallation of magnetic plug, make sure that plug has been properly safety-wired to gear case.

5-97. ENGINE OIL SYSTEM ENGINE MAIN-BEARING AIR-OIL SEAL VENTS.

5-98. Each of the four main-bearing areas is vented to prevent loss of oil through the bearing air-oil seals. The front compressor bearing seal is vented through five screen vents situated around the compressor front frame. The forward seal for the rear compressor bearing is vented through two ports in the aft side of the compressor rear frame. The aft seal for the rear compressor bearing, both sides of the damper bearing, and the forward seal for the turbine bearing are vented through the turbine frame breather. The turbine frame breather utilizes an aspirator unit, installed on the breather outlet between No. 5 and 6 combustion chambers, which is operated by compressor discharge air. The aspirator maintains a slight negative pressure inside the engine turbine frame. This arrangement tends to retain all oil vapors between the aft side of the rear compressor bearing and the forward side of the turbine bearing, thus preventing oil vapor getting out through the seals. The seal for the aft side of the turbine bearing is vented through two sets of perforations located inboard of the aft end of the combustion chambers in the turbine frame.

CAUTION

- Care should be exercised to prevent damage to, or twisting of, the turbine frame breather line during engine installation and removal.
- Excessive oil consumption can sometimes be traced to clogged or dirty vents or to damaged or worn air-oil seals.

5-99. CLEANING ENGINE OIL SYSTEM AFT-BEARING SCAVENGE PUMP INLET FITTING SCREEN.

a. Remove No. 5 and 6 combustion chambers. (Refer to paragraph 5-46.)

b. Disconnect oil scavenge tube from scavenge pump.

c. Remove inlet fitting mounting flange bolts from turbine housing and lift off fitting.

d. Remove screen and clean with cleaning solvent.

e. Reinstall screen.

f. Install inlet fitting and mounting bolts.

g. Connect scavenge oil tube to scavenge pump and torque coupling nut to 125 inch-pounds.

h. Install No. 5 and 6 combustion chambers. (Refer to paragraph 5-49.)

5-100. ENGINE IGNITION SYSTEM.

5-101. The engine ignition system (figure 5-17) is of the d-c opposite-polarity type. The system consists of an ignition control relay, an ignition vibrator unit, two dual transformer coils, and four spark plugs. An air start switch is included in the system for emergency engine air starts. (Refer to paragraph 5-118.) Other units necessary for the operation of the ignition system are an engine master switch, a throttle relay, a starter controller, and a starter switch. The ignition system operates only during an engine start.

5-102. FUNCTION OF ENGINE IGNITION SYSTEM.

5-103. With an external power source connected to the airplane, and the engine master switch "ON," momentarily placing the battery-starter switch to "STARTER" directs power to the starter controller and the ignition control relay coil. (See figure 5-17.) The starter contactor in the starter controller is actuated to connect the starter-generator to the primary bus. This action causes the undercurrent relay in the starter controller to make contact, thus completing the lock-in circuit to hold the ignition control relay in its energized position. Advancing or moving the throttle lever outboard de-energizes the throttle relay and connects the primary bus through the ignition system circuit breaker to the ignition unit vibrators. The 28-volt direct current is changed to an interrupted direct current and is applied to the ignition transformer coils. Through transformer action, the low-voltage direct current is raised to high-voltage alternating current and is directed to the spark plugs. Spark occurs between electrodes of the two plugs in No. 3 and No. 7 combustion chambers. Ignition is continuous until the undercurrent relay is de-energized, opening the circuit to the ignition control relay. (See figure 5-17.) When

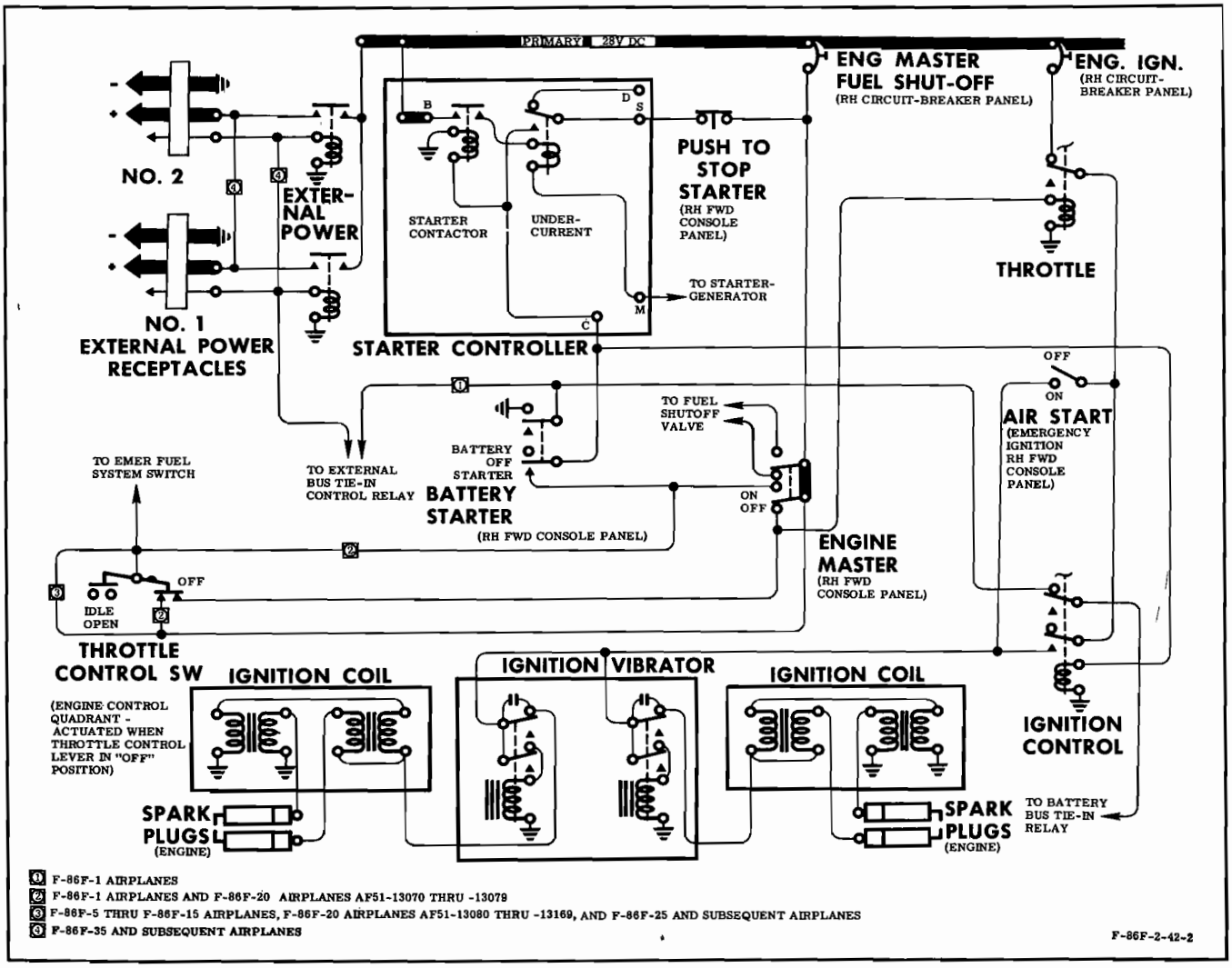


Figure 5-17. Engine Ignition System

the air start switch is moved to "ON," current for emergency ignition to make an air start following a flameout in flight is available from the primary bus to the ignition vibrator. After a successful air start, the air start switch must be returned to "OFF."

5-104. TROUBLE SHOOTING ENGINE IGNITION SYSTEM.

5-105. Refer to paragraph 5-3.

5-106. ENGINE IGNITION SYSTEM VIBRATOR UNIT.

5-107. The ignition system vibrator unit consists of dual vibrators in a single package which change the 28-volt direct current from the primary bus to interrupted direct current. (Refer to paragraph 5-5 for specific data.) The unit is mounted on top of the engine

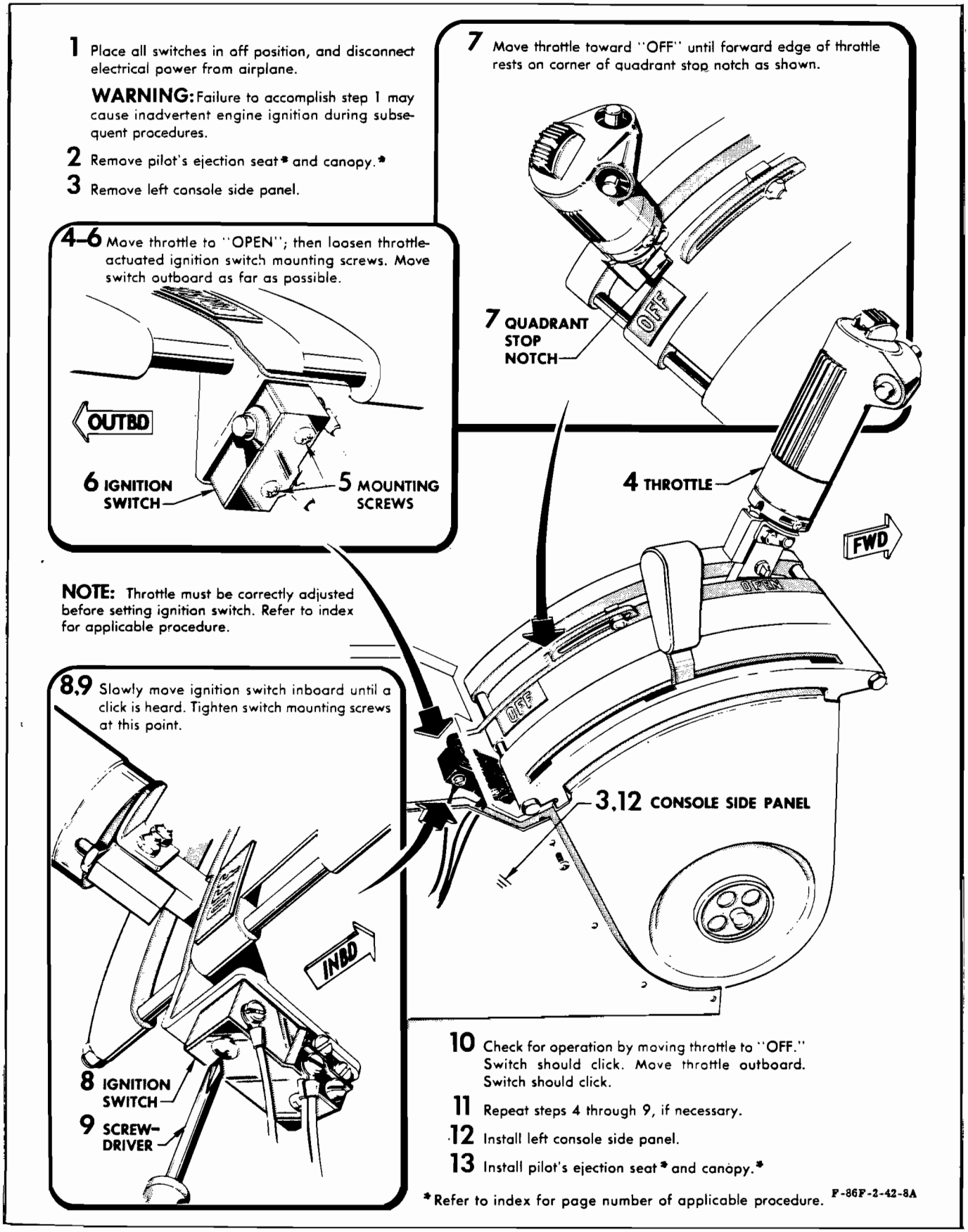


Figure 5-17A. Adjusting Throttle-actuated Ignition Switch

compressor case. Each vibrator serves one set of spark plugs. The vibrators operate over a voltage range of 14 to 30 volts direct current.

5-108. ENGINE IGNITION SYSTEM TRANSFORMER COILS.

5-109. The ignition system transformer coils are mounted on the left and right sides of the engine compressor case in pairs. (Refer to paragraph 5-5 for specific data.) These transformer coils receive a low interrupted voltage from the vibrator unit through shielded cables. By transformer action, they change the low interrupted voltage to high voltage, which is fed to each spark plug.

5-110. ENGINE IGNITION SYSTEM SPARK PLUGS.

5-111. The spark plugs are located in diametrically opposite chambers (No. 3 and 7), with two single electrode plugs in each combustion chamber. (Refer to paragraph 5-5 for specific data.) One of the plugs is at a positive potential above ground, and the other is at a negative potential with respect to ground, which gives a potential drop across the two electrodes. The normal spacing between the two electrodes is between ⅜ and ½ inch, thus providing a wide spark gap. This gap spacing is determined by the length of the spark plug electrodes. Each plug must measure from 4$\frac{9}{32}$ to 4$\frac{11}{32}$ inches from the lower side of the mounting flange to the tip of the electrode. If the length of the electrode is not within the prescribed measurement, the plug is to be replaced. The upper spark plugs in No. 3 and 7 combustion chambers are accessible through the spark plug access doors. The rear fuselage must be removed for access to the lower spark plugs.

5-112. ENGINE IGNITION SYSTEM THROTTLE-ACTUATED IGNITION SWITCH.

5-113. A switch is installed in the throttle quadrant to de-energize the throttle relay when the throttle is moved outboard or advanced. This allows the ignition circuit to be completed to the ignition vibrator unit when the starter controller is energized.

5-114. ADJUSTING THROTTLE-ACTUATED IGNITION SWITCH. See figure 5-17A.

5-115. ENGINE STARTER SYSTEM.

5-116. The engine starter system (figure 5-18) consists of a combination starter-generator, a starter controller unit, a battery-starter switch, a stop-starter switch, and the necessary wiring and equipment to supply electrical power to the starter system for ground engine starts. The starter system cannot be energized from the airplane battery. A 28-volt d-c external power source capable of delivering 500 to 1000 amperes continuous operating current (+0.0, —4.0 volts tolerance) and 1500 amperes surge current for 30 seconds (+0.0, —10.0 volts tolerance) should be used for engine ground starts. Starter operation is fully automatic, after the battery-starter switch has been momentarily positioned to "STARTER," through a holding circuit feature of the starter controller. The stop-starter switch is used to de-energize the holding circuit when an emergency necessitates aborting an attempted engine start. (See figure 5-18.)

Note

- The following external electrical power supply carts are known to be adequate for starting all F-86F Airplanes: Types A-4, V-1, A-3, C-22, and C-26.
- For operational information concerning the starter system, refer to paragraph 5-21.

CAUTION

- During an engine start, the engine speed must reach at least 23% rpm (starter drop-out speed) within 60 seconds. If too much time is required for engine speed to reach 23% rpm, the starter and the engine combustion chambers or cross-fire tubes can be extensively damaged. The excessive time required is usually the result of insufficient external electrical power supply.
- To avoid damage to the starter controller due to arcing, do not use the stop-starter switch except in an emergency.
- If for any reason the starter should become de-energized during an engine start before the engine reaches a speed of approximately 20% rpm, the throttle should be closed immediately. No attempt should be made to accelerate engine.
- During an engine dry-run motoring cycle, the starter can be de-energized by pulling the external power source plug.
- Do not operate starter in below freezing weather without first rotating compressor by hand.

An air start switch is incorporated in the engine ignition system (figure 5-17) for engine air starts.

5-117. FUNCTION OF ENGINE STARTER SYSTEM.

5-118. With an external electrical power source connected to the airplane, momentarily positioning the

battery-starter switch to "STARTER" while the engine master switch is "ON" directs current through the starter controller relay. This closes the relay contacts, connecting the external power source to the starter winding through the series coil of the undercurrent relay. (See figure 5-18.) The initial surge of power energizes the undercurrent relay, which is spring-loaded to the open position. The relay remains closed until the engine reaches approximately 23% rpm. The power required to turn the starter is then of insufficient strength to hold the undercurrent relay closed against the relay spring tension, and power is removed from the starter relay and starter winding. The starter-generator then operates as an engine-driven generator and attains rated output voltage at approximately 45% engine rpm. During an engine air start, with the engine master switch "ON" and the throttle advanced, placing the air start switch "ON" directs primary bus voltage to the ignition vibrators. This causes the burners to re-ignite while the engine is windmilling.

CAUTION

Do not keep power on starter longer than one minute during any start, as damage to starter may occur from overheating. Operation of the engine starter is limited to three runs of one minute maximum duration during any 30-minute period. There must be at least 3 minutes from the end of one start to the beginning of the next start.

5-119. TROUBLE SHOOTING ENGINE STARTER SYSTEM.

5-120. Refer to paragraph 5-3.

5-121. ENGINE STARTER SYSTEM STARTER-GENERATOR.

5-122. The starter-generator consists of a unit incorporating two separate windings and serving two functions. (Refer to paragraph 5-5 for specific data.) The

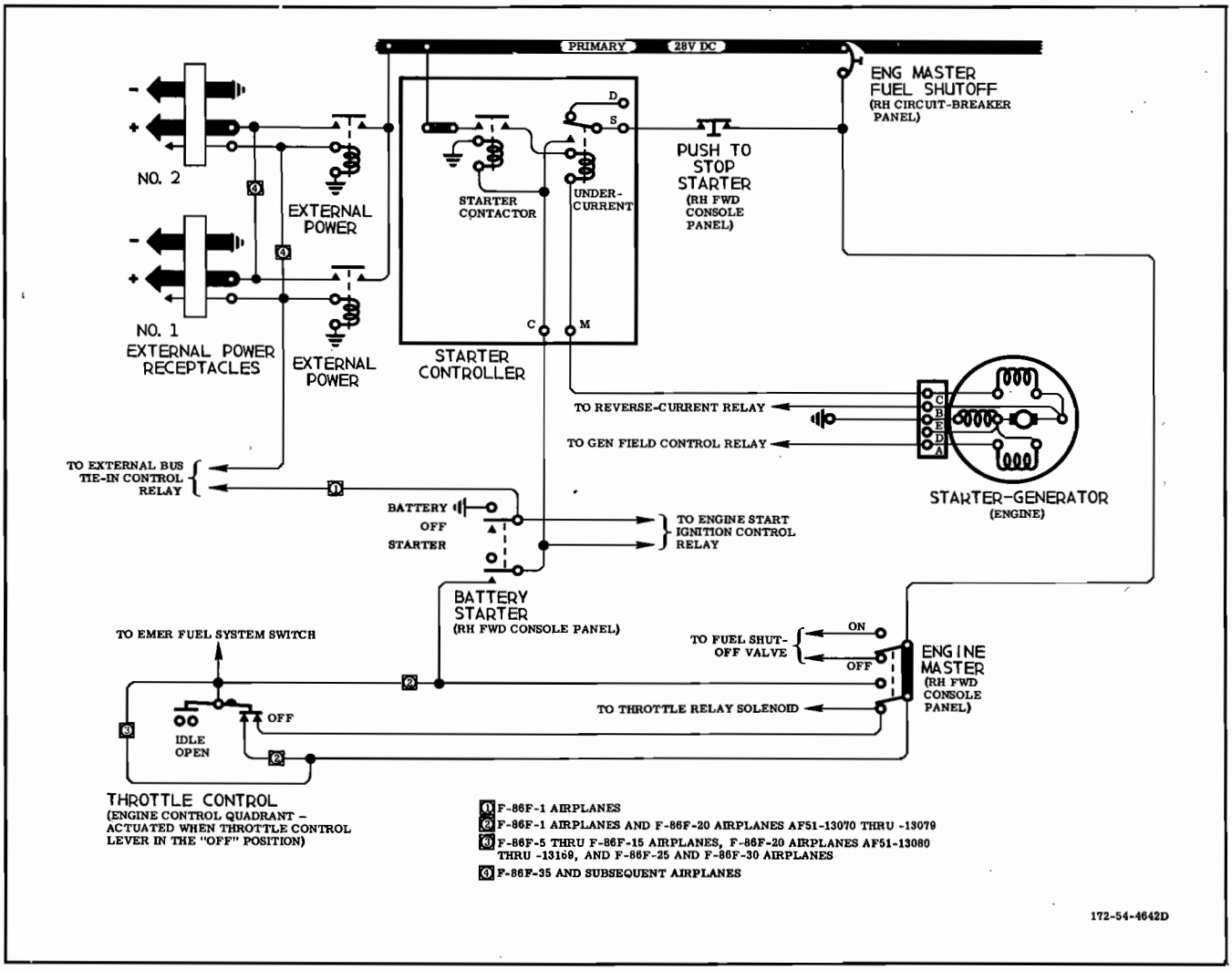


Figure 5-18. Engine Starter System

starter winding is energized by an external power source to crank the engine to starting speed. When the engine reaches approximately 23% rpm, the starter winding is de-energized (paragraph 5-118) and the generator part of the unit becomes effective. The generator attains rated output at about 45% engine rpm. The starter-generator is mounted on the front of the engine with a quick-disconnect type adapter. For additional information regarding the generator portion of the starter-generator, refer to paragraph 7-18.

5-123. REMOVING STARTER-GENERATOR. To remove starter-generator, proceed as follows:

a. Remove engine. (Refer to paragraph 5-13.)

b. Remove engine auxiliary accessory drive section cover for access to starter. (Refer to paragraph 5-36.)

c. Remove engine auxiliary drive section gear case and support. (Refer to paragraph 5-38.)

d. Disconnect electrical leads from starter.

e. Loosen starter mounting adapter cover band bolt.

f. Locate spring-loaded starter-to-mounting-adapter locking pin, and hold pin in forward position.

g. Rotate starter approximately 30 degrees to disengage unit from mounting adapter, and remove starter from engine.

CAUTION

Exercise care in handling starter, as unit weighs approximately 75 pounds.

h. If starter is to be replaced with a different unit, mounting adapter must also be replaced.

5-124. INSTALLING STARTER-GENERATOR. To install starter-generator, proceed as follows:

a. Position starter in place and rotate approximately 30 degrees or until starter-to-mounting-adapter locking pin engages.

Note

- Before electrical wiring is connected to starter-generator, make certain that attaching screws on starter-generator brush cover will be clear of cables and easily accessible. If necessary, rotate brush cover to provide this accessibility.
- When replacing starter-generator cable assembly on F-86F-1 Airplanes AF51-2850 through -2876, use improved assembly identified by a green dot on terminal lug and on quick-disconnect.
- Electrical leads are identified to correspond with correct starter-generator terminals by block letters stamped in the lead connecting lugs.

b. Connect and safety electrical leads to starter.

c. Install auxiliary accessory drive section gear case support and gear case. (Refer to paragraph 5-39.)

d. Install auxiliary accessory drive section cover. (Refer to paragraph 5-37.)

e. Install engine. (Refer to paragraph 5-17.)

5-125. ENGINE STARTER SYSTEM STARTER CONTROLLER.

5-126. The starter controller, mounted within the engine compartment, connects the electrical system to the starter for engine starting. (Refer to paragraph 5-5 for specific data.) The controller consists of two relays within one unit: a starter contactor relay and an undercurrent relay. The latter relay serves as a locking relay for the starter contactor during automatic starting of the engine. This type of starting eliminates the necessity of holding the starter switch closed during the cranking period. After the engine rpm reaches approximately 23%, the starter controller is de-energized and disconnected electrically from the starter.

5-127. REMOVING STARTER CONTROLLER. To remove the starter controller, proceed as follows:

a. Remove engine. (Refer to paragraph 5-13.)

b. Remove ½-inch utility hydraulic system return line, which is adjacent to inboard side of controller.

c. Remove ½-inch surface control normal hydraulic system pressure line, which is adjacent to inboard side of controller.

d. Disconnect electrical leads from starter controller.

Note

It is suggested that each wire be identified with masking tape to ensure proper routing of wires during reinstallation.

e. Remove four mounting screws and lift controller from panel.

5-128. INSTALLING STARTER CONTROLLER. To install starter controller, proceed as follows:

a. Position controller in place and install four mounting screws.

b. Connect electrical leads to controller.

c. Install utility hydraulic system return line.

d. Install surface control normal hydraulic system pressure line.

e. Install engine. (Refer to paragraph 5-17.)

5-129. ENGINE FUEL SYSTEMS.

5-130. The engine fuel systems (figure 5-19) regulate, distribute, and meter fuel to the engine from the fuel supply system. (Refer to paragraph 5-170.) They are controlled by the engine control system. (Refer to paragraph 5-62.) There are basically two fuel systems,

the main system and the emergency system. The main system consists of the main element of the dual fuel pump, a main fuel regulator, a fuel control valve, a fuel filter, a regulator oil orifice and filter, a check valve, and a main fuel regulator solenoid valve. The emergency system consists of the emergency element of the dual fuel pump, an emergency fuel regulator, a check and restrictor valve, and an emergency fuel selector switch. Common to both systems are a stopcock, a fuel flow transmitter, a fuel flow divider and drip valve assembly, fuel manifolds (primary and secondary), and eight fuel nozzles. Both the main and emergency systems are primarily by-passing systems; i. e., fuel not required for the particular engine operation is by-passed. Under normal conditions, all fuel to the engine is regulated by the main system. The amount of fuel metered to the engine by the main system is determined by throttle setting, engine rpm, and altitude. The emergency system is used to regulate fuel to the engine when the main system fails. The amount of fuel metered to the engine by the emergency system is determined only by throttle setting and altitude, since there is no engine rpm governing as in the main system. The emergency system maximum rpm varies from approximately 90% rpm on a −40°C (−40°F) day to approximately 99% rpm on a 38°C (100°F) day. On F-86F-1 through F-86F-30 Airplanes, and F-86F-35 Airplanes AF52-5164 through -5271 and AF53-1072 through -1196, except those on which T.O. No. 1F-86-110 has been accomplished, engine overspeed may occur with the emergency system in operation or in a stand-by status when the throttle lever is fully advanced and the air temperature is above 38°C (100°F). On F-86F-1 through F-86F-30 Airplanes, and F-86F-35 Airplanes AF52-5164 through -5271 and AF53-1072 through -1196, except those on which T.O. No. 1F-86-110 has been accomplished, the emergency fuel selector switch is a three-position switch used for turning the emergency system off, for placing the system in a stand-by status, or for testing the system. On F-86F-35 Airplane AF53-1197 and all subsequent airplanes and those on which T.O. No. 1F-86-110 has been accomplished, the emergency fuel selector switch is a two-position switch used for turning the emergency fuel system on or off. The fuel pressure indicating system (paragraph 6-83), installed on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904, is connected to the engine fuel system at the fuel flow divider case. The fuel flow transmitter is a part of the fuel flow indicating system. (Refer to paragraph 6-73.)

5-131. FUNCTION OF ENGINE MAIN FUEL SYSTEM.

5-132. Fuel under booster pump pressure from the fuel supply system (paragraph 5-170) is routed to the inlet of the dual fuel pump. The dual fuel pump main element discharges its output directly to the fuel filter. Then the fuel flow is divided into two parts. One part flows through the fuel control valve back into the dual fuel pump return port. The other part flows through the main check valve, stopcock, fuel flowmeter, and oil cooler and into the fuel flow divider. In the flow divider, the fuel is again separated. Part of the fuel goes to the primary manifold, and the rest goes to the secondary manifold. (During starting, the secondary manifold is not in operation until the fuel pressure in the flow divider exceeds 25 psi.) The fuel is then fed from the manifolds through the fuel nozzles into the combustion chambers. There it is mixed with air and burned. The fuel output from the dual fuel pump main element is constant for any given rpm; any fuel not required by the engine is by-passed through the fuel control valve to the dual fuel pump return port. The main fuel regulator controls the fuel control valve by means of variable control oil (VCO) pressure, which is varied according to throttle setting, compressor discharge air pressure (altitude), and engine rpm. When altitude decreases, the throttle is advanced, or engine rpm decreases without throttle change, the main fuel regulator automatically increases variable control oil pressure. The increased variable control oil pressure directs the fuel control valve toward the closed position, thereby restricting the flow of by-pass fuel. This restriction in turn results in increased fuel flow to the engine. Conversely, the regulator decreases variable control oil pressure when altitude increases, the throttle is retarded, or engine rpm increases without throttle change. A decrease in variable control oil pressure allows the control valve to move toward the open position and results in an increased flow of by-passed fuel and a decreased fuel flow to the engine.

5-133. FUNCTION OF ENGINE EMERGENCY FUEL SYSTEM (F-86F-1 THROUGH F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271 AND AF53-1072 THROUGH -1196, EXCEPT THOSE ON WHICH T.O. NO. 1F-86-110 HAS BEEN ACCOMPLISHED).

5-134. When the emergency fuel selector switch is at the "OFF" position, the emergency fuel regulator solenoid valve is energized, rendering the emergency system inoperative. With the emergency regulator solenoid valve energized, the total output of the dual fuel pump emergency element is continuously by-passed through the emergency regulator to the dual fuel pump return port. The "ON" position of the emergency fuel selector switch de-energizes the emergency regulator solenoid valve. This frees the emergency regulator to maintain a fuel pressure schedule below the main regulator schedule. If the main fuel system fails when the switch

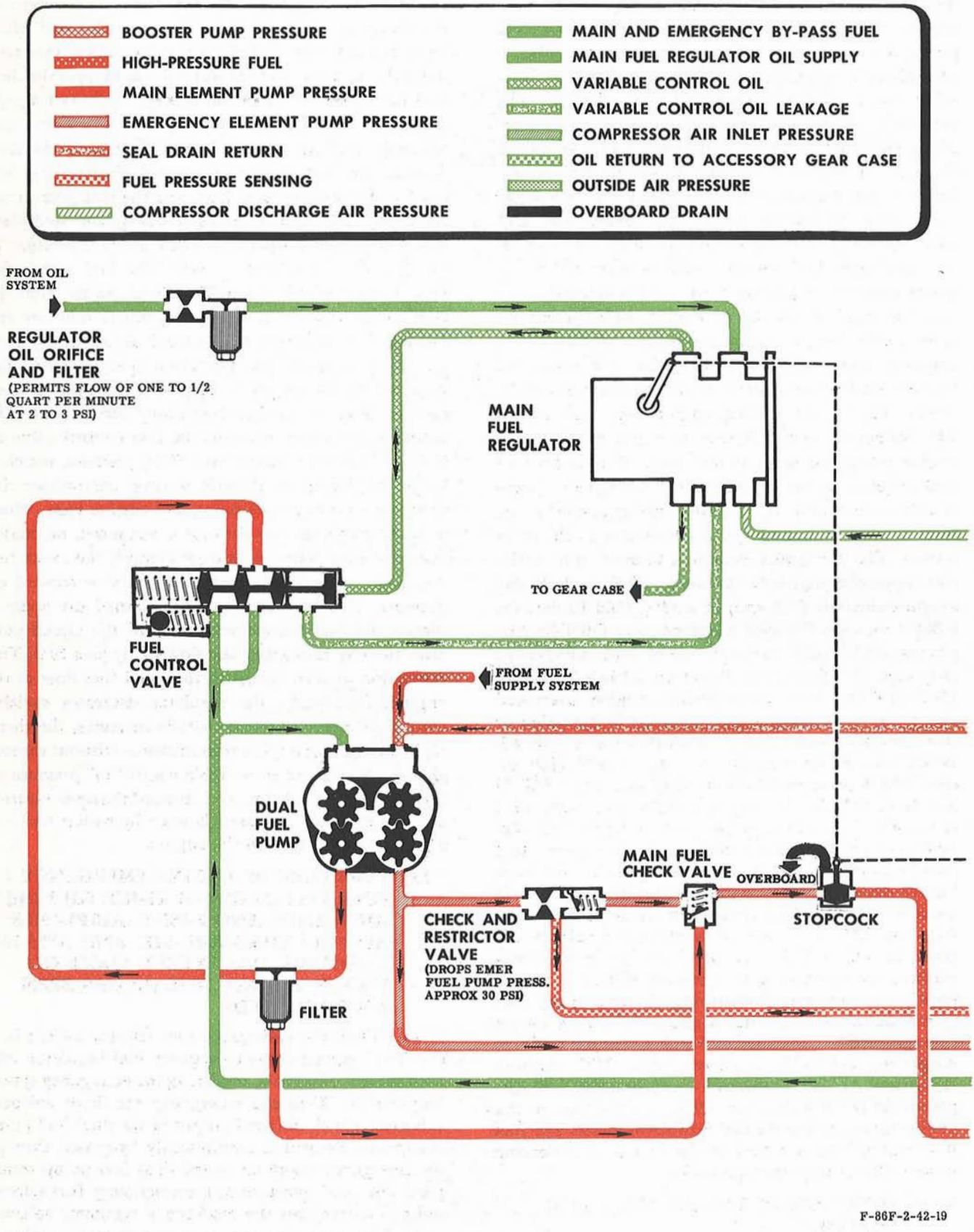


Figure 5-19. Engine Fuel System (Sheet 1 of 2)

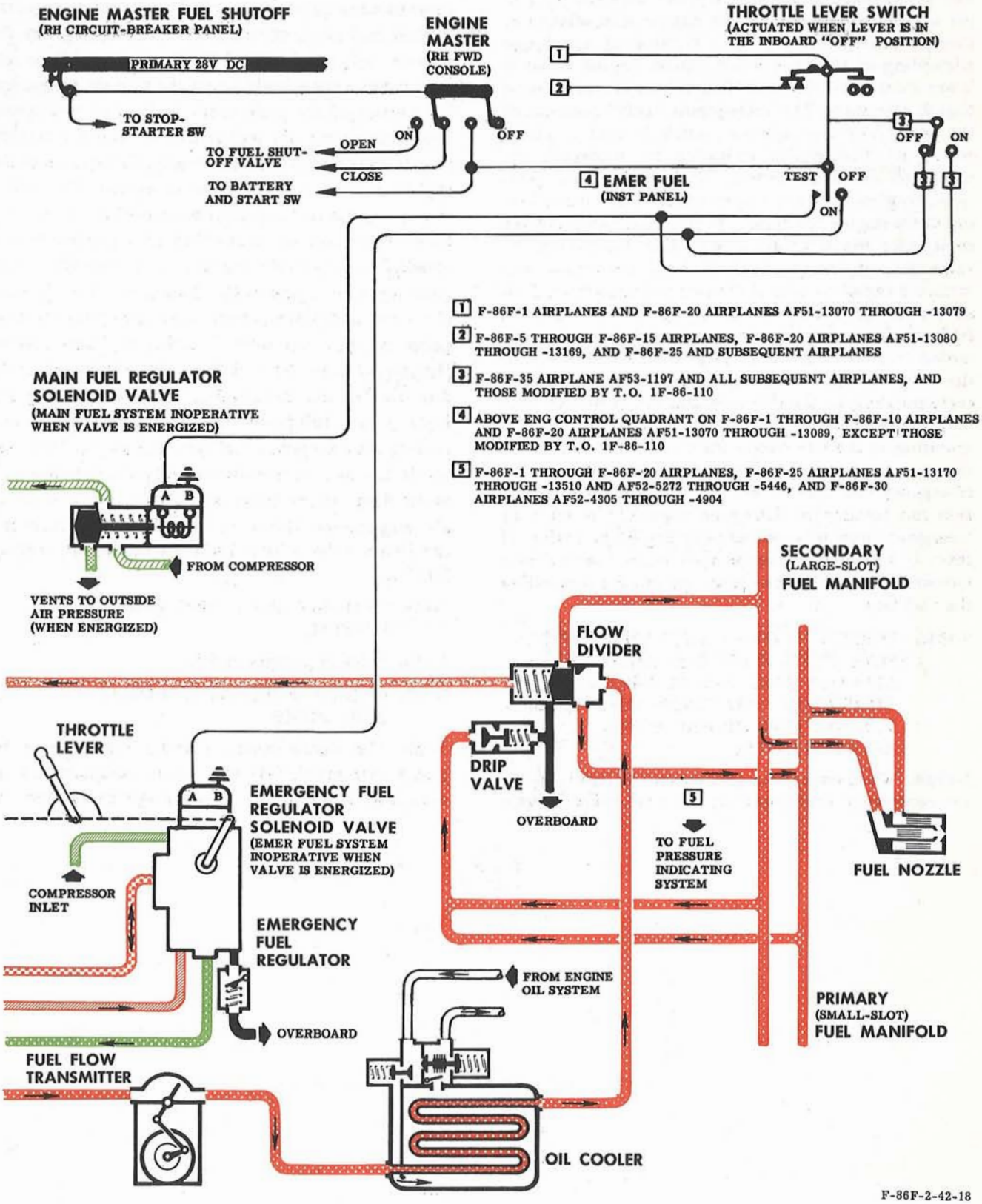


Figure 5-19. Engine Fuel System (Sheet 2 of 2)

is "ON," the main system pressure drops below emergency system pressure and the emergency system check valve opens while the main system check valve closes. The emergency system then supplies sufficient fuel to the engine to maintain proper engine rpm relative to throttle setting and altitude. Because of the lower scheduling of the emergency system, engine speed is lower than when the main fuel system is maintaining engine operation. The momentary "TEST" position of the emergency fuel selector switch is used to check emergency fuel system operation by rendering the main fuel system ineffective. The switch "TEST" position energizes a solenoid-operated air valve located on top of the engine compressor in the main fuel regulator compressor discharge air sensing line. Energizing the valve closes the compressor end of the sensing line and vents the regulator side of the line to atmosphere. This affects the altitude compensating portion of the main fuel regulator, causing the regulator to assume a retarded fuel flow condition. Engine rpm then drops to the value of the emergency fuel system engine rpm corresponding to the day temperature. However, rpm may momentarily drop to a value below that corresponding to the day temperature and then increase to the correct value. If the engine is operating with the emergency fuel selector switch "ON," the "OFF" position can be used to determine whether the main or emergency system is maintaining engine operation. If there is a change in engine rpm when the switch is moved to "OFF," the emergency system was controlling the fuel flow.

5-134A. FUNCTION OF ENGINE EMERGENCY FUEL SYSTEM (F-86F-35 AIRPLANE AF53-1197 AND ALL SUBSEQUENT AIRPLANES AND THOSE ON WHICH T.O. NO. 1F-86-110 HAS BEEN ACCOMPLISHED.

5-134B. When emergency fuel selector switch is "OFF," the emergency fuel regulator solenoid valve is energized, rendering the emergency system inoperative. With emergency regulator solenoid valve energized, total output of dual fuel pump emergency element is continuously by-passed through emergency regulator to dual fuel pump return port. When emergency fuel selector switch is "ON," the main fuel regulator solenoid valve is energized to vent the altitude compensating portion of the main fuel regulator to atmosphere. This causes the main fuel system to assume a retarded fuel flow condition. Simultaneously, the emergency fuel regulator solenoid valve is de-energized. This allows the emergency fuel regulator to control the engine fuel flow requirements, according to a predetermined schedule relative to throttle setting and outside air temperature. (See figure 5-23.) Emergency fuel pressure closes the main system check valve and opens the emergency system check valve directing fuel flow through the stop cock to the fuel flow transmitter, oil cooler, flow divider, and fuel nozzles. With the engine operating at or near full power on the main fuel system, positioning the emergency fuel system switch to "ON" may result in a momentary drop of engine rpm to a value lower than the prescribed setting according to outside air temperature. However, the rpm should recover to the desired value within 3 seconds. (Refer to paragraph 5-156A.)

5-135. TROUBLE SHOOTING ENGINE FUEL SYSTEMS.

5-136. Refer to paragraph 5-3.

5-137. ENGINE FUEL SYSTEM DUAL FUEL PUMP.

5-138. The dual-element, parallel tandem-type fuel pump (paragraph 5-5) is a positive-displacement hydraulic gear pump, driven by a single drive shaft with

a shear section. It is mounted on the auxiliary accessory drive section gear case and is driven at a .455:1 gear ratio. The pump supplies fuel for both the main and emergency fuel systems. The pump incorporates five ports: inlet, main outlet, emergency outlet, return, and seal drain. Rated flow is 48 gallons per minute at 3750 pump rpm and 600 psi discharge pressure. The fuel pump is accessible when the auxiliary accessory drive section cover and gear case are removed. (Refer to paragraphs 5-36 and 5-38.)

5-138A. REMOVING DUAL FUEL PUMP. To remove the dual fuel pump, proceed as follows:

a. Remove auxiliary accessory drive section cover and gear case. (Refer to paragraphs 5-36 and 5-38.)

b. Tag all hoses and fittings to facilitate reinstallation. Then disconnect all fuel inlet, outlet, and drain lines from pump.

c. Remove four pump retaining nuts; then remove fuel pump and gasket.

5-138B. INSTALLING DUAL FUEL PUMP. To install the dual fuel pump, proceed as follows:

a. Install new gasket on pump mounting flange and place pump in position with seal drain at lowest point.

b. Install and tighten retaining nuts.

Note

When replacement pump is installed, the drain fittings on the mounting flange should be located at the lowest point.

5-139. ENGINE FUEL SYSTEM MAIN FUEL REGULATOR.

5-140. The main fuel regulator (paragraph 5-5), mounted on the auxiliary accessory drive section gear case and driven at a .455:1 gear ratio, is the governing mechanism of the main fuel system. The regulator controls the fuel system control valve by a variable hydraulic pressure known as variable control oil (VCO) pressure. No fuel enters or passes through the main fuel regulator. The main fuel regulator controls the pressure of the variable control oil as a function of throttle setting, compressor discharge air (altitude, temperature, and ram), and engine rpm. The regulator comprises a closed case, containing a built-in oil pump and three combined governing components (manual, altitude, and rpm) to control the pressure of the variable control oil. The regulator is supplied with oil from the engine oil system. This oil passes through a filter and orifice assembly before entering the regulator case. The orifice restricts the oil flow to a low-pressure flow rate of one to 1½ quarts per minute at approximately 3 psi. The oil entering the fuel regulator serves two purposes: it supplies the regulator charging-oil pump, and it maintains an oil flow through the regulator as a cooling agent. The cooling oil leaving the regulator is returned to the bottom of the engine accessory gear case to again become a part of the engine oil system. The charging oil pump within the main fuel regulator boosts the low-pressure oil supply to a constant pressure of 260 psi, as controlled by a ball-type pressure relief valve on the outlet side of the pump. The boosted pressure oil (constant control oil pressure), as affected by a change in throttle setting, altitude, or engine rpm, upsets the balance of the main fuel regulator servo system. This causes a change in the pressure of the variable control oil controlling the fuel control valve. The fuel control valve in turn assumes a new position to by-pass less or more fuel to the fuel pump return port, allowing more or less fuel to be directed to the engine. When the variable control oil pressure is correct for maintaining proper operating condition, the regulator servo system balance is regained and maintained until again upset by a change in engine operating condition. The regulator effectively maintains steady rpm at sea level over the upper 30% of its speed range, with a high setting between 100.5% and 103% rpm. The high rpm setting of the regulator is the maximum safety setting made at the time of manufacture. The normal high rpm operating setting of the engine of 100% (±0.5%) is made by adjustment of the linkage high rpm stop on engine island No. 4. Maintenance of the regulator is limited to installation, removal, and linkage adjustment. If unit is defective, it should be replaced.

5-141. MAIN FUEL REGULATOR ACCELERATION TEST. When a new or newly overhauled engine is installed in the airplane or whenever a main fuel regulator is replaced, an acceleration check of the regulator must be made. Before making an acceleration test, check engine control system linkage adjustment (paragraph 5-66) and main fuel regulator and stopcock adjustment (figure 5-21). Make sure the main fuel regulator has been primed. (Refer to paragraph 5-145.) To make acceleration test, proceed as follows:

a. Start engine.

b. With emergency fuel selector switch at "OFF," stabilize engine at 75%, 70%, 65%, 60%, 55%, 50%, and idle rpm; and from each stabilized speed, advance throttle as rapidly as possible to full rpm position. Note exhaust gas temperature during each acceleration.

WARNING

If compressor stall (identifiable by severe rumble and rapid increase in exhaust temperature without appreciable change in rpm) or exhaust temperature over 870°C (1598°F) is encountered during acceleration, retard throttle immediately.

Note

Acceleration stall can be expected during acceleration checks made from 70% rpm (or lower) *when outside air temperature is below 10°C (50°F) and the airplane is below 10,000 feet altitude.* This condition can be considered normal, provided stall is controlled before damage to the engine occurs. To prevent damage, the throttle must be retarded as soon as possible when a compressor stall is encountered.

c. If compressor stall or excessive temperature was encountered in step b., disconnect emergency fuel regulator linkage and make sure that emergency regulator solenoid valve (figure 5-19) is energized when emergency fuel selector switch is at "OFF." Repeat step b. If compressor stall or excessive temperature is again encountered, the main fuel regulator must be replaced. If compressor stall or excessive temperature was not encountered with emergency regulator disconnected, the emergency regulator is at fault and must be replaced.

Note

If exhaust gas temperature exceeds 870°C (1598°F) during any one of the accelerations, record in the log book the duration of the excessive temperature and the maximum temperature noted.

d. With a stop watch, check acceleration time from idle to maximum engine rpm. See figure 5-20 for maximum allowable acceleration time.

e. If engine was unable to accelerate in less than maximum allowable time (figure 5-20) replace main fuel regulator.

Note

Once the engine has successfully passed the acceleration test, the test need not be repeated unless the main fuel regulator is replaced.

5-142. REMOVING MAIN FUEL REGULATOR AND STOPCOCK. To remove the main fuel regulator and stopcock, proceed as follows:

a. Remove auxiliary accessory drive section cover and gear case. (Refer to paragraphs 5-36 and 5-38.)

b. Remove control rods and clevis arm from regulator and stopcock.

c. Tag all hoses and fittings for aid in reinstallation of units. Then disconnect line from stopcock and main fuel regulator. Cap all openings as soon as lines are disconnected.

d. Remove regulator from gear case by removing the four self-locking nuts and washers. Remove gasket.

Note

Main fuel regulator weighs approximately 16 pounds when filled with oil.

e. Remove stopcock from regulator by removing bolts and washers. Remove and tag all regulator fittings for installation on replacement unit.

5-143. INSTALLING MAIN FUEL REGULATOR AND STOPCOCK. To install main fuel regulator and stopcock, proceed as follows:

a. Install fittings in regulator, and attach stopcock to regulator with two bolts and washers.

b. Install new gasket on regulator mounting pad.

c. Install regulator on gear case studs, and secure with four washers and self-locking nuts.

d. Connect fuel, oil, and air hoses to regulator and stopcock.

e. Install and adjust regulator and stopcock linkage. (See figure 5-21.)

f. Prime main fuel regulator. (Refer to paragraph 5-145.)

g. Install auxiliary accessory drive section gear case and cover. (Refer to paragraphs 5-39 and 5-37.)

h. If replacement regulator was installed, perform main fuel regulator acceleration test. (Refer to paragraph 5-141.)

5-144. ADJUSTING MAIN FUEL REGULATOR AND STOPCOCK LINKAGE. See figure 5-21.

5-145. PRIMING MAIN FUEL REGULATOR. The regulator must be primed before a newly installed engine is started. If the fuel control valve or the main fuel regulator has been replaced on an engine, the regulator must be primed before the engine is started. To prime the regulator, proceed as follows:

a. Remove auxiliary accessory drive section cover. (Refer to paragraph 5-36.)

b. Disconnect oil outlet hose from main fuel regulator oil orifice and filter.

c. Connect a clean supply of regular engine oil to oil outlet hose. Then pump 1½ quarts of oil, under a pressure of no more than 6 to 8 psi, into main fuel regulator.

d. Disconnect priming oil supply and reconnect hose to regulator oil orifice and filter.

e. Install auxiliary accessory drive section cover. (Refer to paragraph 5-37.)

5-146. ENGINE FUEL SYSTEM CONTROL VALVE.

5-147. The fuel system control valve (paragraph 5-5) is a variable by-pass valve controlled by the main fuel regulator by means of variable control oil pressure. (See figure 5-19.) The valve, located in the accessory section of the engine, is essentially a ported housing that contains a piston-type valve, a diaphragm, a pilot

valve, a spring, and a pressure relief valve. The fuel system control valve is designed to provide a scheduled fuel flow to the engine by maintaining a fuel pressure that is approximately three times variable control oil pressure. This ratio is approximate because of a spring force [15 (±2) pounds] acting on the fuel pressure side of valve. When the main fuel regulator calls for a greater fuel flow, variable control oil pressure is increased, which tends to close the fuel control valve and restrict the amount of by-pass fuel to the dual fuel pump return port. Thus, an increased portion of fuel pump output is directed to the fuel nozzles. When the regulator calls for less fuel, it decreases variable control oil pressure. This allows the fuel control valve to open to by-pass more fuel to the dual fuel pump return port. This results in a corresponding decrease in the amount of fuel reaching the engine nozzles. The fuel control valve will be stabilized whenever approximately 3:1 differential between fuel and variable control oil pressure is obtained. The fuel control valve has a pressure relief valve located between the high and low fuel pressure areas of the valve housing. The pressure relief valve, to prevent system surge, is set to relieve differential pressure areas of the valve housing. The pressure relief valve, to prevent system surge, is set to relieve differential pressure in excess of 650 to 700 psi. Variable control oil that leaks past the pilot valve loses pressure and is returned by an external line to the main fuel regulator case. The fuel control valve can be reached when the auxiliary accessory drive section cover and gear case are removed. (Refer to paragraphs 5-36 and 5-38.)

Note

If for any reason the variable control oil lines to the control valve have been disconnected, the main fuel regulator must be primed. (Refer to paragraph 5-145.)

5-148. ENGINE FUEL SYSTEM FUEL FILTER.

5-149. The fuel filter (paragraph 5-5) is a multiple-screen, full-flow, high-pressure type filter, mounted on

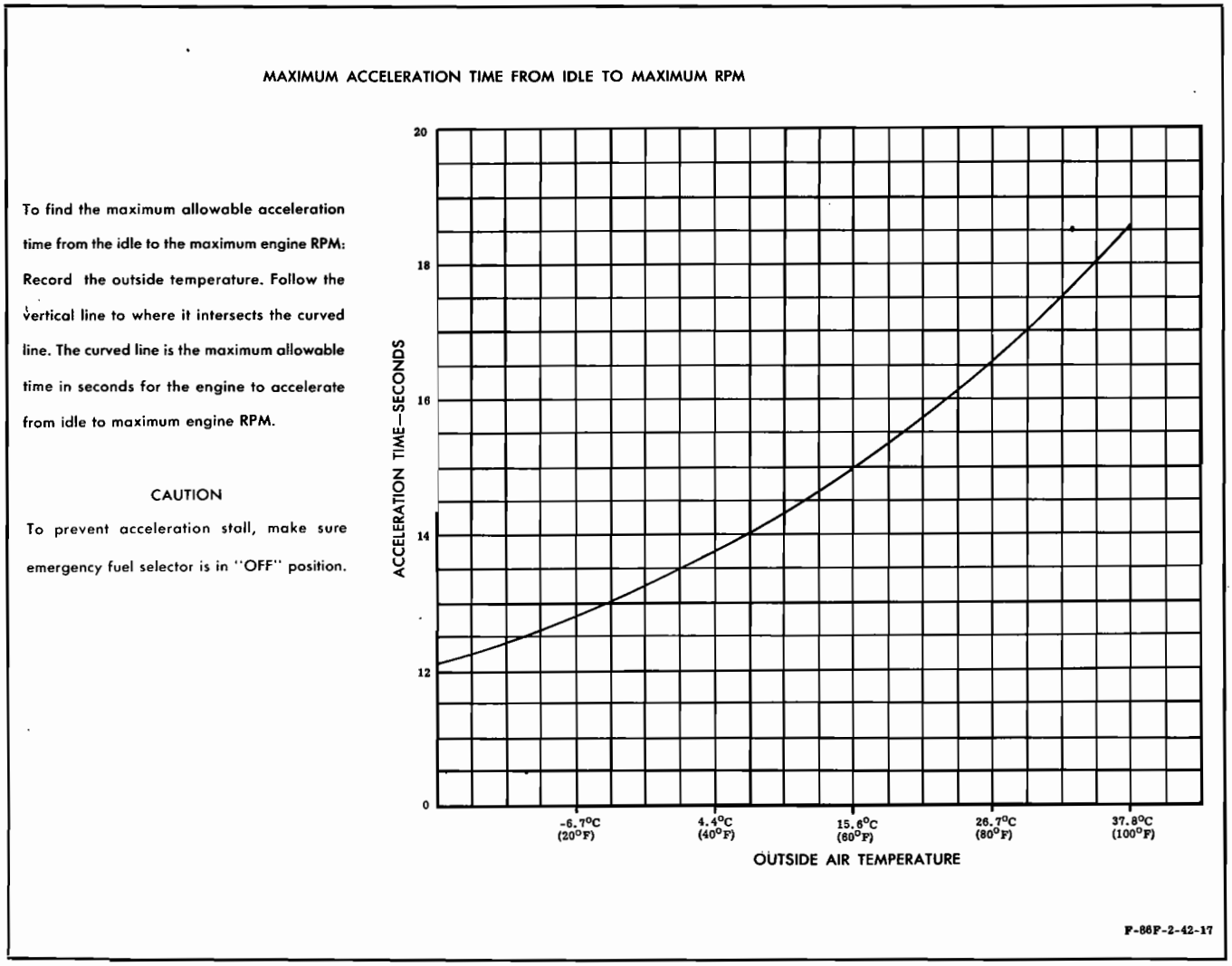
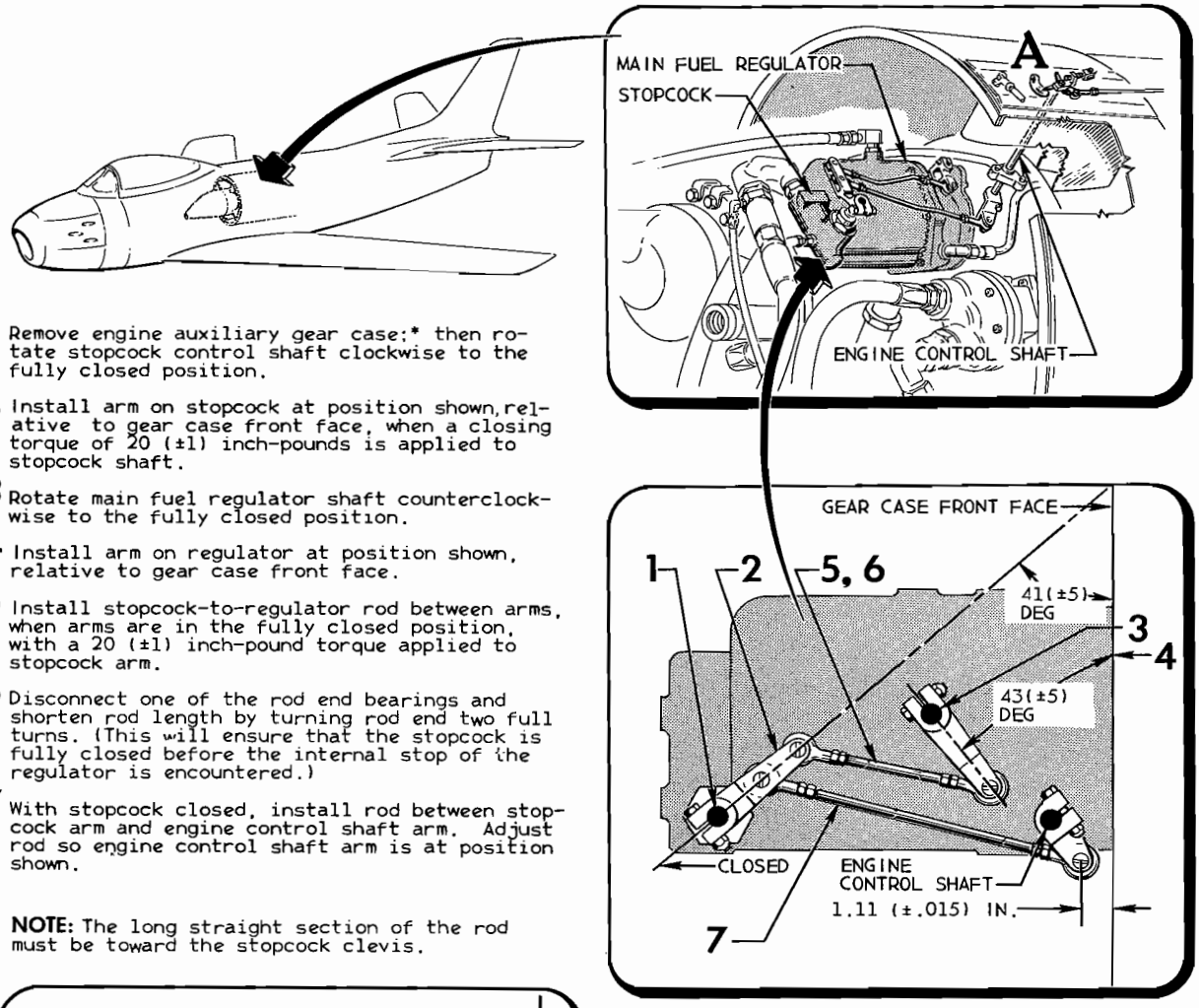


Figure 5-20. Main Fuel Regulator Maximum Acceleration Time Chart



1 Remove engine auxiliary gear case:* then rotate stopcock control shaft clockwise to the fully closed position.

2 Install arm on stopcock at position shown, relative to gear case front face, when a closing torque of 20 (±1) inch-pounds is applied to stopcock shaft.

3 Rotate main fuel regulator shaft counterclockwise to the fully closed position.

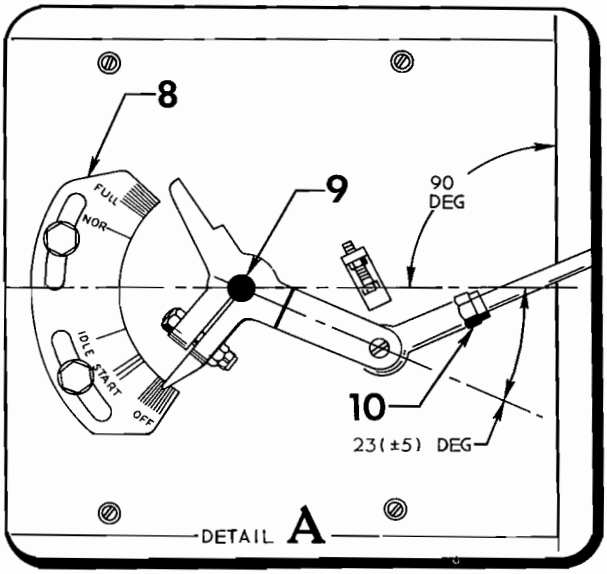
4 Install arm on regulator at position shown, relative to gear case front face.

5 Install stopcock-to-regulator rod between arms, when arms are in the fully closed position, with a 20 (±1) inch-pound torque applied to stopcock arm.

6 Disconnect one of the rod end bearings and shorten rod length by turning rod end two full turns. (This will ensure that the stopcock is fully closed before the internal stop of the regulator is encountered.)

7 With stopcock closed, install rod between stopcock arm and engine control shaft arm. Adjust rod so engine control shaft arm is at position shown.

NOTE: The long straight section of the rod must be toward the stopcock clevis.



8 On island cover, adjust graduated plate so that the two holding bolts are centrally located in plate slots.

9 Rotate control shaft counterclockwise to closed position. Control shaft island arm should be adjusted to position shown.

10 Adjust emergency fuel regulator linkage.* Tighten all rod locknuts and operate linkage. Linkage should move freely, and various connecting rods should show no evidence of binding.

*Refer to index for page number of applicable procedure.

176-42-17A

Figure 5-21. Adjusting Main Fuel Regulator and Stopcock Linkage

the front side of the auxiliary accessory drive section gear case. (See figure 5-19.) It is located in the discharge line of the dual fuel pump main system element so that all fuel from the main element of the pump is filtered. No filtering is provided for the emergency element of the pump. The filter has two outlet ports, one going through the main check valve to the stopcock and the other going to the fuel control valve. Incorporated in the filter is a pressure relief valve (set to relieve at 7 to 15 psi differential pressure) which permits the fuel to by-pass the filter element in case of excessive restriction.

5-150. CLEANING FUEL FILTER AND REGULATOR OIL ORIFICE AND FILTER (AIR MAZE). To clean either filter, see figure 5-22 and proceed as follows:

a. Remove auxiliary accessory drive section cover. (Refer to paragraph 5-36.)

b. Cut safety wire and unscrew filter sump from main body.

c. Unscrew filter element from body and remove "O" ring.

d. Remove nut and retainer cap from end of filter element; then remove filter packs and spacer(s).

e. Immerse all parts *except the filter packs* in cleaning solvent (Federal Specification P-S-661). If necessary, use a brush to clean parts thoroughly. Allow parts to drain; then dry parts with a lint-free cloth.

f. Clean filter packs with a soft-hair brush dipped in cleaning solvent (Federal Specification P-S-661).

CAUTION

Do not use a wire brush on any part of element.

Note

The use of compressed air on the filter element is not recommended.

g. Blow through ports in filter body and filter sump with dry compressed air.

h. Reassemble filter packs and spacers on element body; then secure them with retainer cup and nut.

i. Install "O" ring on filter body; then screw filter element into the body, and torque.

j. Apply lubricating grease (Specification MIL-L-6032) on fuel sump threads; then screw sump on filter body. Torque and safety sump.

k. Install auxiliary accessory drive section cover. (Refer to paragraph 5-37.)

5-151. CLEANING FUEL FILTER AND REGULATOR OIL ORIFICE AND FILTER (HYDRO-AIRE). To clean either filter, see figure 5-22 and proceed as follows:

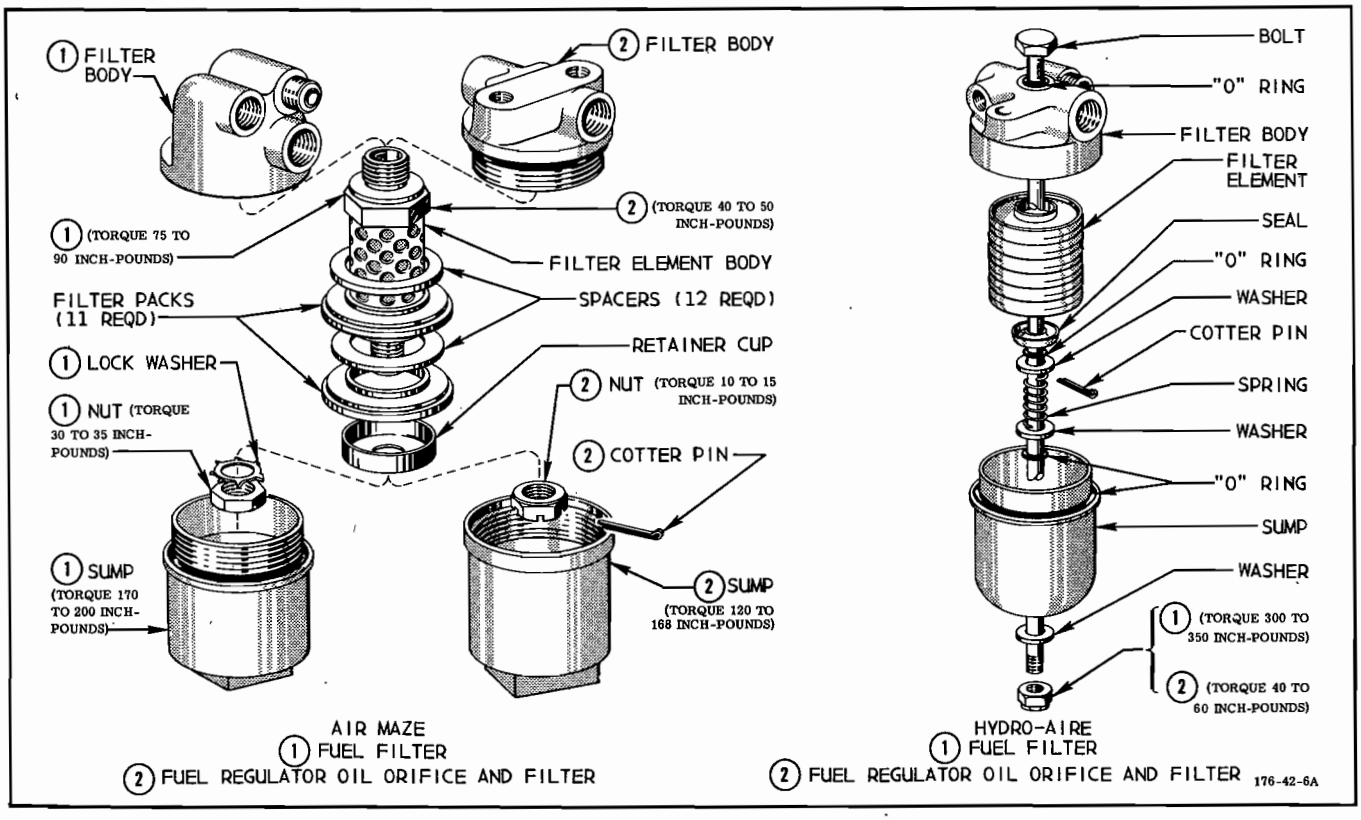


Figure 5-22. Fuel Filter and Regulator Oil Orifice and Filter

a. Remove auxiliary accessory drive section cover (paragraph 5-36) and, if necessary, auxiliary accessory drive section gear case (paragraph 5-38).

b. Disconnect oil hoses from filter body.

c. Remove nut and washer at bottom of filter; then remove filter sump.

d. Remove "O" ring, washer, and spring from filter sump.

e. Remove washers, "O" ring, seal, and filter element from bolt by removing cotter pin.

f. Remove bolt and "O" ring from filter body.

g. Immerse all parts *except filter element* in cleaning solvent (Federal Specification P-S-661). If necessary, use brush to clean parts thoroughly. Allow parts to drain; then dry parts with a lint-free cloth.

h. Clean filter element with a soft-hair brush dipped in cleaning solvent (Federal Specification P-S-661).

CAUTION

Do not use a wire brush on any part of element.

Note

Drying of the filter element with compressed air is not recommended.

i. Reassemble filter element to filter body by inserting a bolt and "O" ring through body and installing filter element, seal, "O" ring, and washer on bolt; then install cotter pin in bolt.

Note

Replace any "O" ring showing wear or deterioration.

j. Install spring, washer, and "O" ring on bolt.

k. Attach and torque sump to filter body, using washer and nut.

l. Install auxiliary accessory drive section gear case (paragraph 5-39), if removed, and install auxiliary accessory drive section cover (paragraph 5-37).

5-152. ENGINE FUEL SYSTEM MAIN FUEL REGULATOR OIL ORIFICE AND FILTER.

5-153. The oil orifice and filter (paragraph 5-5) is a multiple-screen, restricted-flow, low-pressure type filter, mounted on the auxiliary accessory drive section gear case. The orifice and filter meters and filters the oil supply to the main fuel regulator at the rate of one to 1½ quarts per minute. For cleaning instructions, refer to paragraphs 5-150 and 5-151.

5-154. ENGINE FUEL SYSTEM EMERGENCY FUEL REGULATOR.

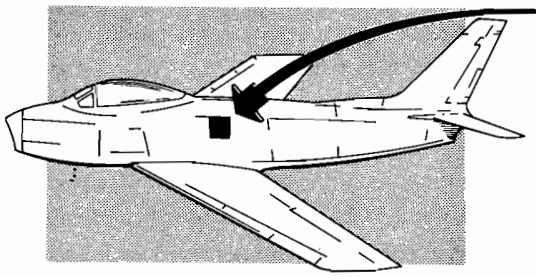
5-155. The emergency fuel regulator (paragraph 5-5), mounted on the upper left side of the compressor casing, performs the necessary functions of the main fuel regulator and fuel control valve if those units fail. (See figure 5-19.) The emergency regulator is basically a prescheduled, altitude-compensated, mechanically actuated by-pass valve. The emergency regulator consists of a housing containing a by-pass valve, a regulator disabling solenoid, an altitude bellows, a fuel pressure diaphragm, a fuel strainer, and necessary mechanical linkage. During engine operation when the emergency fuel selector switch is at "OFF" (engine operation maintained by main fuel regulator), the emergency fuel regulator by-passes the entire output of the emergency element of the dual fuel pump to the fuel pump return port. During emergency operation (emergency fuel selector switch "ON"), the emergency regulator varies the opening of its by-pass, or relief valve, thereby controlling the discharge pressure of the emergency element of the dual fuel pump. Two conditions control the emergency fuel regulator instead of the three that control the main fuel regulator. The two conditions are throttle position and compressor air inlet pressure (altitude). Throttle position is conveyed to the regulator by the engine control system. Compressor air inlet pressure is admitted at the air inlet port. With the proper linkage adjustments between the manual control shafts of the emergency and the main fuel regulators, the fuel pressure called for by the emergency regulator is less than that called for in the main fuel regulator schedules. As a result, small variations in the output of the main element of the dual fuel pump do not bring the emergency system into operation. The emergency regulator is accessible through the fuselage left access door.

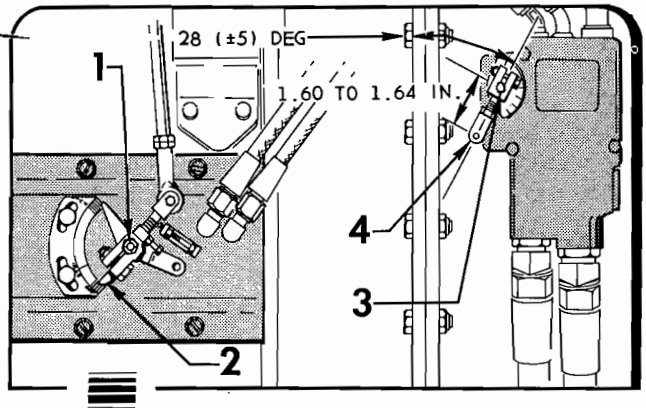
5-156. TESTING EMERGENCY FUEL REGULATOR OPERATION AND LINKAGE ADJUSTMENT (F-86F-1 THROUGH F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271 AND AF53-1072 THROUGH -1196, EXCEPT THOSE ON WHICH T.O. NO. 1F-86-110 HAS BEEN ACCOMPLISHED). To test emergency fuel regulator, first make sure that correct exhaust temperature has been obtained at full throttle during operation on the main system (paragraph 5-23); then proceed as follows:

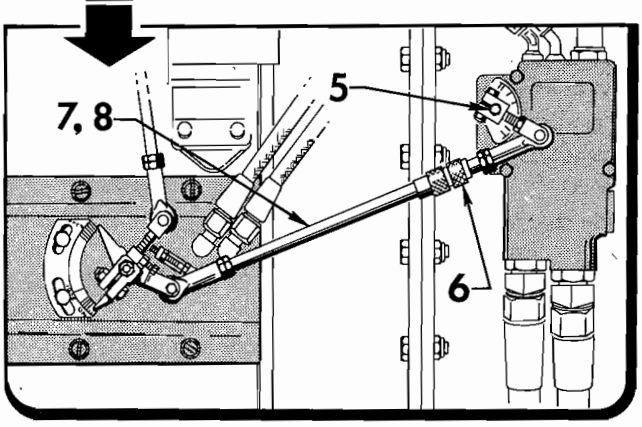
a. Run engine to 80% rpm and position emergency fuel selector switch to "ON"; then slowly advance throttle to full open. Be careful not to exceed 100% rpm.

a.A. Adjust linkage to give desired emergency operation according to outside air temperature. (See figure 5-23.)

b. After it has been determined that linkage adjustment is correct and desired rpm (relative to outside air temperature) can be obtained with emergency system,







NOTE: Before adjusting emergency regulator linkage, make sure engine fuel regulator and stopcock linkage is properly adjusted.*

1 Rotate engine control shaft counterclockwise to the full closed position.

2 Check that emergency control clevis arm pointer is approximately on center of the "OFF" sector on the graduated plate.

3 Rotate emergency regulator control shaft clockwise (against internal stop).

4 Check or reindex clevis arm on emergency regulator control shaft relative to engine front frame flange as shown. Adjust clevis arm to length shown.

5,6 Rotate emergency regulator control shaft counterclockwise against its internal stop; then adjust control rod to fit and install between clevis arms. Shorten rod by two full turns of rod end. Rod adjustment may be made at quick-disconnect incorporated in rod.

NOTE: Shortening rod allows fuel stopcock to close fully before emergency regulator internal stop is encountered.

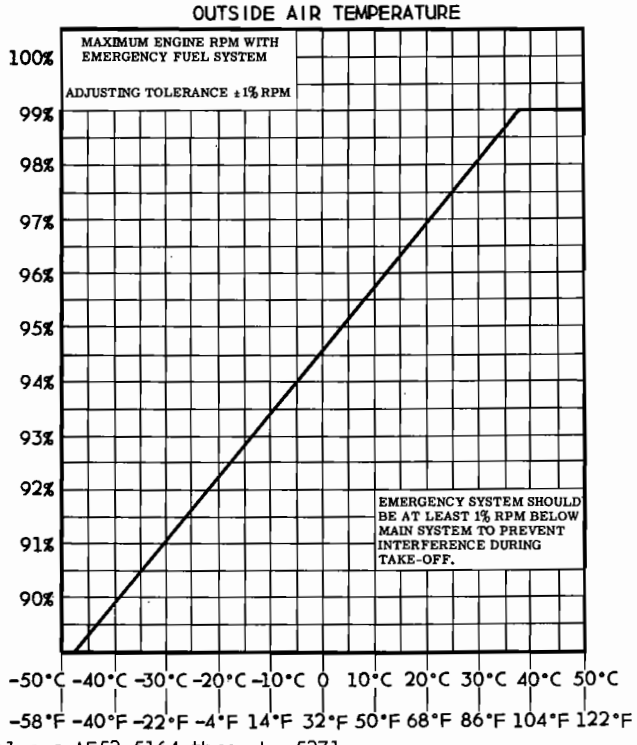
7 Operate linkage and check for full travel and freedom of movement. The linkage should move freely with no evidence of binding.

NOTE: Make sure engine control system is properly adjusted;* then start engine and, with the emergency fuel system switch in the "OFF" position, advance throttle lever to the top rated speed to ensure that 100% rpm is available when operating with the main system. Move the throttle lever to "IDLE"; then accelerate engine to 80% rpm. Hold emergency fuel system switch in the momentary "TEST" position,† slowly advance throttle lever to maximum stabilized rpm (not to exceed 100% rpm, high rpm stop), and record engine rpm obtained and outside air temperature.

WARNING: If acceleration is extreme, immediately move emergency fuel system switch to "OFF" and retard throttle lever to prevent engine overspeeding.

8 Shut down engine. If emergency regulator linkage is correctly adjusted, maximum rpm obtained (relative to outside air temperature) will be within 1% rpm of desired rpm listed on chart. If necessary, adjust control rod to obtain desired rpm. Lengthening rod by one full turn of rod end decreases engine speed by approximately 2%. If desired rpm cannot be obtained by adjusting rod, it is an indication that regulator may be at fault and should be replaced with one known to be correct.

*Refer to index for page number of applicable procedure.



†F-86F-1 through F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 through -5271 and AF53-1072 through -1196, except those on which T.O. NO. 1F-86-110 has been accomplished have "TEST" position marked on switch use "ON" position on all other airplanes.

F-86F-2-42-12

Figure 5-23. Adjusting and Testing Emergency Fuel Regulator Linkage

the emergency regulator can be time-lag-checked as follows:

Note

The time-lag check must be accomplished during the test run of a new or overhauled engine or when a new emergency fuel regulator has been installed.

c. (Deleted)

WARNING

If, for any reason, it becomes necessary to retard the throttle to a position that will result in less than 80% rpm, the emergency fuel selector switch must be returned to "OFF" before the throttle is readvanced. If the throttle is advanced with the emergency fuel selector switch "ON," the emergency system can override the main system, causing compressor stall.

d. Advance throttle to full open and allow rpm to stabilize at 100%.

e. Move emergency fuel selector switch to "TEST" without hesitating at "ON." Note minimum rpm during change, final stabilized emergency system rpm, and total time lapse from instant switch is positioned to "TEST" until emergency system rpm stabilizes at rpm obtained in step a.

f. Return emergency fuel selector switch to "OFF."

Note

- Make sure main fuel regulator solenoid valve (figure 5-19) is energized and operative when emergency fuel selector switch is at "TEST."
- If minimum rpm during switch from "OFF" to "TEST" is more than 2% rpm below final stabilized value, the total time lapse must not exceed 3 seconds.
- If minimum rpm during switch from "OFF" to "TEST" is less than 2% rpm below final stabilized value, the total time lapse must not exceed 5 seconds.
- If time-lag maximum was exceeded, repeat check several times to be sure that rpm drop (and/or recovery time) was not due to improperly primed regulator. If time lag is still exceeded, replace emergency fuel regulator bleed plug. (Refer to paragraph 5-156B.)

g. Repeat step e. three times. The maximum stabilized engine rpm after the switch is moved to "TEST" during any one of the three runs should not vary more than ±¾% rpm from the minimum stabilized rpm. Replace emergency regulators which do not perform within this tolerance.

h. Retard throttle to "IDLE" and move emergency fuel selector switch to "TEST." Check to ensure that engine speed is 27% to 38% rpm. If engine idle speed on emergency system is outside these limits, the emergency fuel regulator idle screw must be adjusted. Turn screw counterclockwise to lower and clockwise to raise idle speed.

Note

- Adjustment of the emergency idle speed will have some effect on the high-speed schedule. Therefore, whenever the emergency idle speed is adjusted, steps c. through e. in the foregoing procedure must be repeated and, if necessary, linkage readjusted as shown in figure 5-23. If linkage is readjusted, repeat idle check, step h.
- If the proper high speed cannot be secured when idle speed is correctly adjusted, the idle speed may be raised above the 38% rpm limit, but not above 45% rpm. If the emergency regulator cannot be rigged to obtain the desired high rpm when idle speed is adjusted for 45% rpm or below, the emergency regulator must be replaced.
- Any time maximum stabilized rpm (relative to ambient air temperature) varies from the value given on chart (figure 5-23) more than ±2% rpm, the emergency fuel regulator linkage must be readjusted or the regulator replaced.

5-156A. TESTING EMERGENCY FUEL REGULATOR OPERATION AND LINKAGE ADJUSTMENT (F-86F-35 AIRPLANE AF53-1197 AND ALL SUBSEQUENT AIRPLANES AND THOSE ON WHICH T.O. NO. 1F-86-110 HAS BEEN ACCOMPLISHED). To test the emergency fuel regulator, make sure that correct exhaust temperature has been obtained at full throttle during operation on the main system (figure 5-23) and proceed as follows:

a. Run engine to 80% rpm and position emergency fuel selector switch to "ON," and slowly advance throttle to full open. Be careful not to exceed 100% rpm.

b. Adjust linkage to give desired emergency operation according to outside air temperature. (See figure 5-23.)

CAUTION

If, for any reason it becomes necessary to retard the throttle to a position that will result in less than 80% rpm, the emergency fuel selector switch must be returned to "OFF" before the throttle is readvanced. Advancing the throttle with the emergency fuel selector switch "ON," can result in compressor stall.

c. After determining that linkage adjustment is correct and desired rpm can be obtained with emergency system, the emergency regulator can be time-lag checked as follows:

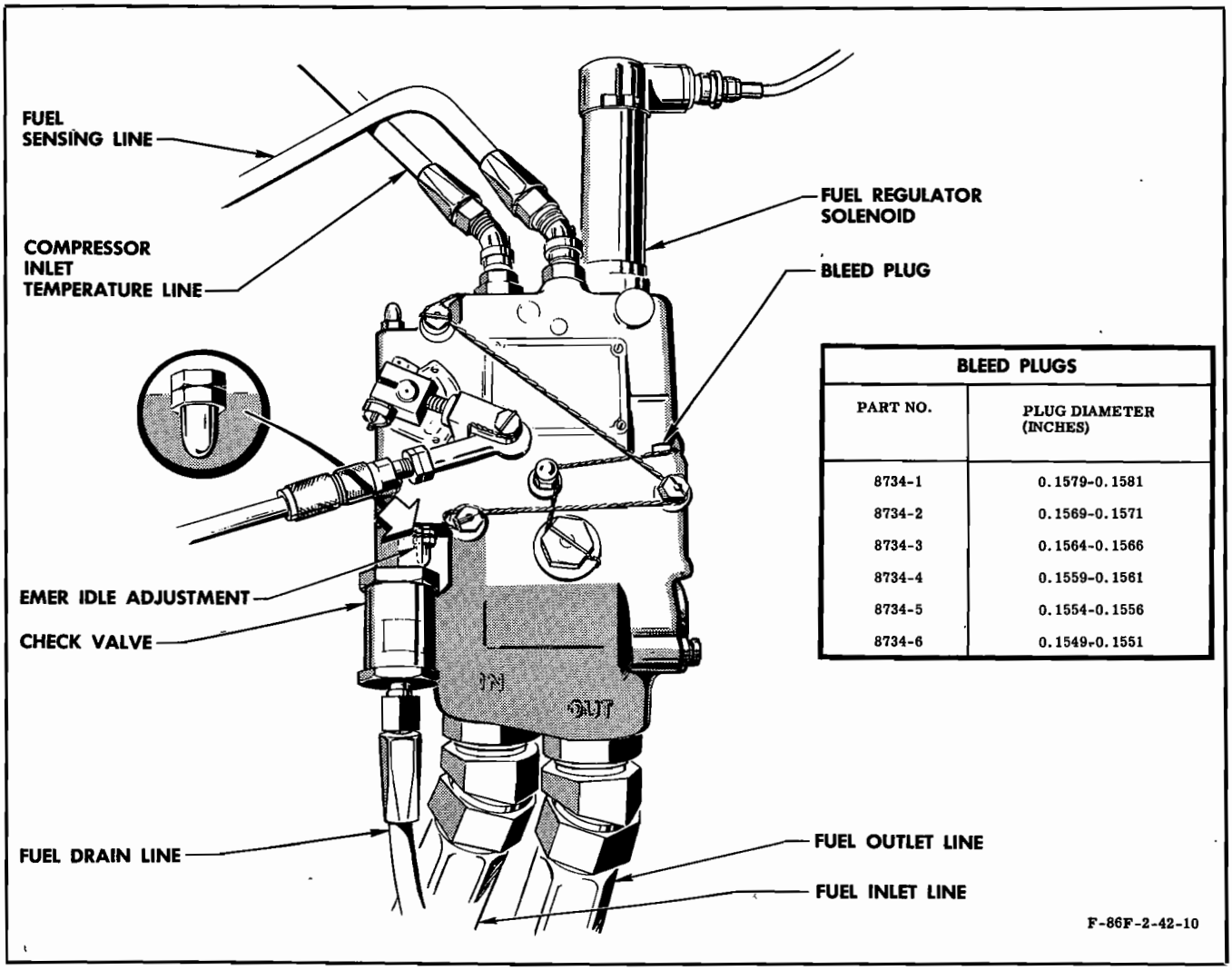
Note

The time-lag check must be accomplished during the test run of a new or overhauled engine or when a new or overhauled emergency fuel regulator has been installed.

d. Run engine to 100% rpm, allow to stabilize and then move emergency fuel selector switch to "ON." Note minimum rpm during change, final stabilized emergency system rpm, and total time lapse from instant switch is positioned to "ON" until emergency system rpm stabilizes at rpm obtained in step b.

Note

- If minimum rpm during switch from "OFF" to "ON" is more than 2% below final stabilized value, the total time lapse must not exceed 3 seconds.
- If minimum rpm during switch from "OFF" to "ON" is less than 2% below final stabilized value, the total time lapse must not exceed 5 seconds.



BLEED PLUGS	
PART NO.	PLUG DIAMETER (INCHES)
8734-1	0.1579-0.1581
8734-2	0.1569-0.1571
8734-3	0.1564-0.1566
8734-4	0.1559-0.1561
8734-5	0.1554-0.1556
8734-6	0.1549-0.1551

Figure 5-23A. Emergency Fuel Regulator

- Make sure main fuel regulator solenoid valve (figure 5-19) is energized and operative when emergency fuel selector switch is positioned to "ON."
- If time-lag maximum was exceeded, repeat check several times to be sure that rpm drop and recovery time was not due to improperly primed regulator. If time lag is still excessive replace emergency regulator bleed plug. (Refer to paragraph 5-156P.)

e. (Deleted)

f. Repeat step d. three times. Maximum stabilized engine rpm should not vary more than ¾% rpm from the minimum stabilized rpm. Replace emergency regulators which do not perform within this tolerance.

g. Retard throttle to "IDLE" and move emergency fuel selector switch to "ON." Check to ensure that engine idle speed is 27% to 38% rpm. If engine idle speed is outside these limits, recheck linkage for binding or looseness. If linkage is found to be satisfactory, adjust emergency regulator idle screw. (See figure 5-23A.) To adjust screw, proceed as follows:

h. Remove drain line and check valve from regulator.

i. Cut safety wire, remove safety cap and turn screw clockwise to raise, counterclockwise to lower idle speed.

j. Install safety cap and safety-wire screw and cap.

k. Install drain line and check valve.

Note

- Adjustment of the emergency idle speed will have some effect on the emergency high speed schedule. Therefore, whenever the emergency idle speed is adjusted, steps b. through g. must be repeated and, if necessary, linkage readjusted as shown in figure 5-23.
- If the proper emergency high speed cannot be secured when idle speed is correctly adjusted, raise idle speed above the 38% rpm

limit, but not over 45% rpm. If the emergency regulator cannot be rigged to obtain the desired high rpm when idle speed is adjusted for 45% rpm or below, replace emergency regulator.

- Any time maximum stabilized rpm (relative to ambient air temperature) varies from the value given on chart (figure 5-23) more than ±2% rpm, the emergency fuel regulator linkage must be readjusted or the regulator replaced.

5-156B. REPLACING EMERGENCY FUEL REGULATOR BLEED PLUG. The bleed plug should be replaced if emergency fuel system lapse time exceeds 3 seconds. (Refer to paragraph 5-156 and 5-156A.) A smaller bleed plug will decrease recovery time and a larger plug will increase recovery time. To replace the bleed plug, proceed as follows:

a. Cut safety wire and unscrew plug from housing. (See figure 5-23A.)

b. Install new "O" ring seal and new bleed plug in housing.

c. Tighten and safety bleed plug.

d. Recheck emergency fuel regulator operation. (Refer to paragraph 5-156 or 5-156A.)

Note

Too fast a recovery time can result in fuel pressure and fuel flow fluctuation. (See figure 5-23A for various bleed plugs.)

e. If recovery time is still not satisfactory, replace emergency fuel regulator.

5-157. ENGINE FUEL SYSTEM CHECK AND RESTRICTOR VALVE.

5-158. The check and restrictor valve (paragraph 5-5) is attached to the main fuel check valve in the emergency fuel line from the emergency regulator. The valve is a through-flow fitting with a spring-loaded orifice or restrictor plate. Downstream of this restrictor is a port for emergency system pressure sensing to the emergency regulator. When the engine is operating on the main system, the valve allows the emergency regulator to sense full static emergency pressure. When the main system fails (and emergency fuel selector switch is "ON"), the emergency system pressure will be higher, unseating the flapper check valve in the check and restrictor valve and seating the check valve in the main system. The drop in emergency pressure, downstream of the valve, unseats the restrictor plate, and the emergency system fuel flows through the valve with a 30 psi drop to produce approximately 98% engine thrust at the same flight conditions. The check and restrictor valve is accessible when the auxiliary accessory drive section cover and gear case are removed. (Refer to paragraphs 5-36 and 5-38.)

5-159. ENGINE FUEL SYSTEM FUEL STOPCOCK.

5-160. The stopcock (paragraph 5-5) is a manually operated fuel shutoff valve. It is mounted on the main fuel regulator in the main fuel line between the check valves and fuel flow divider. The stopcock is operated through linkage interconnecting the main fuel regulator, stopcock, and emergency fuel regulator to the throttle in the cockpit. The stopcock gives throttling effect from 0 to 15 degrees of throttle setting, and thereafter is fully open. An overboard drain from the stopcock prevents fuel leakage past the control shaft. The maximum allowable leakage past the shaft and out the drain is 5 cc per minute. The fuel stopcock is accessible when the auxiliary accessory drive section cover and gear case are removed. (Refer to paragraphs 5-36 and 5-38.)

5-161. REMOVING FUEL STOPCOCK. Refer to paragraph 5-142.

5-162. INSTALLING FUEL STOPCOCK. Refer to paragraph 5-143.

5-163. ENGINE FUEL SYSTEM FUEL FLOW DIVIDER AND DRIP VALVE ASSEMBLY.

5-164. The fuel flow divider (paragraph 5-5) consists of a spring-loaded piston that passes fuel to the secondary (large-slot) fuel manifold, which directs it to the fuel nozzles. The unit is flange-mounted to the oil cooler. While fuel pressure remains below approximately 25 psi, the flow divider is closed and the total amount of fuel passes directly to the primary (small-slot) manifold and from there to the fuel nozzles. Pressures above approximately 25 psi act against a spring-loaded piston to uncover a series of holes in the piston chamber, allowing fuel to flow to the large-slot manifold. When open, the fuel flow divider functions as a metering valve and establishes a definite fuel-flow, fuel-pressure ratio system. The flow through the flow divider ranges from 700-850 pounds per hour at 60 psi inlet pressure to 6600-7700 pounds per hour at 400 psi inlet pressure. The flow divider chamber is provided with an annular recess near the inner end; this allows leakage of high-pressure fuel to be collected and returned to the fuel pump inlet. Any fuel leakage past the end of the piston (caused by the differential between main fuel pump inlet pressure and atmospheric pressure) is drained overboard. Normally open spring-loaded drip valves (which close at a differential pressure of 3 to 5 psi) are provided on the flow divider

to drain the large- and small-slot manifolds overboard when fuel is shut off or small-slot fuel pressure falls to approximately 5 psi. This drainage prevents fuel from dripping into the combustion chamber where it would become ignited by the hot metal after shutdown. The valves are closed during engine operation by the force of fuel pressure. The engine must be removed (paragraph 5-13) to provide access to the flow divider and drip valves.

5-165. ENGINE FUEL SYSTEM FUEL NOZZLES.

5-166. The eight fuel nozzles (paragraph 5-5) are in the eight diffuser passages, with their tips projecting into the combustion chamber inner liner domes. Each nozzle is attached to a compressor rear-frame pad with a gasket and eight bolts and is connected to both the primary and secondary (small- and large-slot) manifolds. The spray tip of each nozzle forms the supporting member of the forward end of the combustion chamber inner liner. The spray nozzles filter and atomize the fuel for combustion and maintain a correct spray pattern throughout the entire fuel pressure range. The nozzles are duplex in design and contain both a large and a small passage or slot orifice. When fuel pressure is low (below approximately 25 psi), as in starting and at high altitudes, the fuel flow divider is closed and only the small slot feeds fuel to the combustion chamber. As fuel pressure increases and the flow divider opens, fuel is supplied to the large slot as well. The proper spray angle is maintained by the small slot at low flows and by both the small and large slots throughout the rest of operating range. The nozzle incorporates two filters, one for large-slot fuel and one for small-slot fuel.

5-167. REMOVING FUEL NOZZLES. Refer to paragraph 5-46.

5-168. INSTALLING FUEL NOZZLES. Refer to paragraph 5-49.

5-169. FUEL SUPPLY SYSTEM.

5-170. The fuel supply system (figure 5-24) consists of five fuel cells, two booster pumps, a transfer pump, a float-actuated transfer pump switch, a filter, a shutoff valve, check valves, and necessary fuel feed and vent lines. Normally, fuel from the outer wing cell and both fuselage cells flows by gravity to the center wing cell. In addition, fuel from the fuselage aft cell is automatically transferred by the transfer pump when the fuel in the center wing cell is reduced to a predetermined level. Check valves in the fuel cell interconnectors and transfer lines prevent back flow of fuel to the outer wing cell and fuselage aft cell. In case of transfer pump and/or booster pump failure, internal fuel is available by suction feed to maintain engine operation.

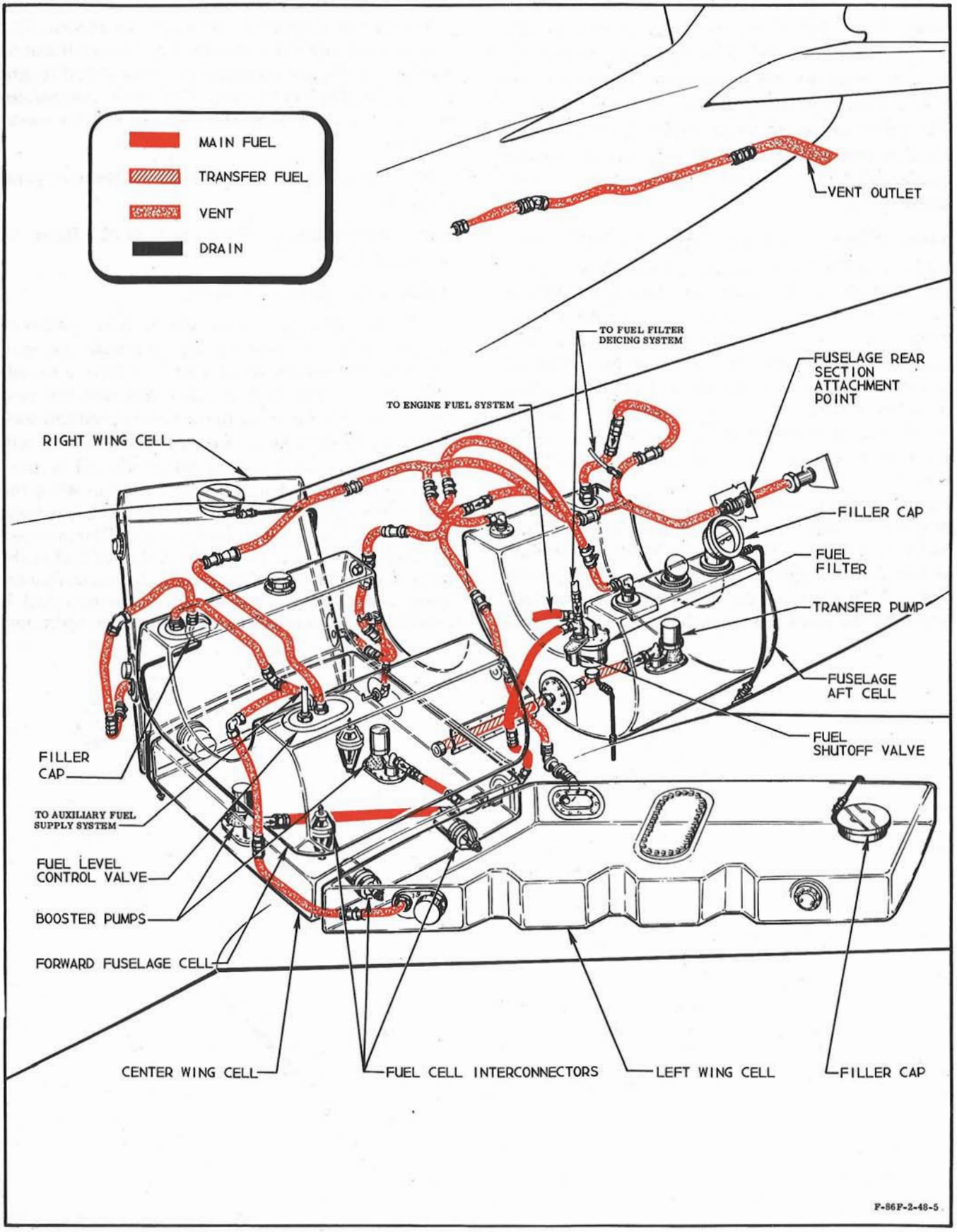


Figure 5-24. Fuel Supply System (Sheet 1 of 2)

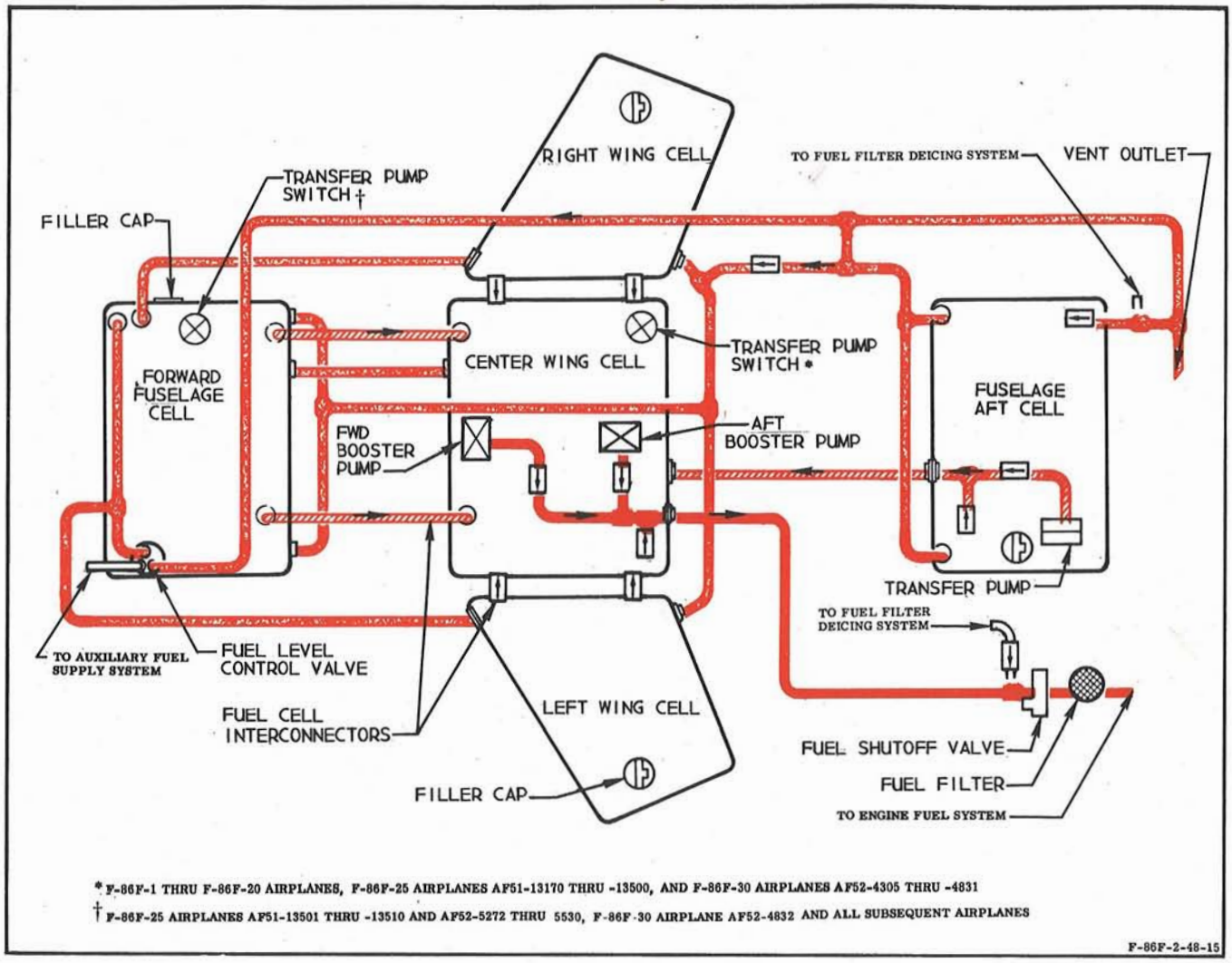


Figure 5-24. Fuel Supply System (Sheet 2 of 2)

All fuel cell bays are lined to protect the cells from chafing and to assist in proper cell support. Climb and dive vent lines, with a common vent outlet on the fuselage aft left side, maintain the proper cell internal pressure during flight. The fuel shutoff valve is motor-actuated and controlled by the engine master switch. The airplane has provisions for mounting external droppable metal fuel tanks to supplement the internal fuel supply. (Refer to paragraphs 5-213 through 5-215.) A totalizing fuel quantity indicating system (paragraph 5-268) and a fuel filter deicing system (paragraph 5-249) are also provided.

5-171. FUNCTION OF FUEL SUPPLY SYSTEM.

5-172. When the engine master switch is moved to the "ON" position, the fuel shutoff valve is opened. Initial movement of the throttle outboard actuates a switch (figure 5-17A) to energize the two booster pumps and the fuel quantity transmitter transfer pump switch. The two energized booster pumps supply fuel to the engine fuel systems (paragraph 5-130) through the fuel shutoff valve and filter. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13499, and F-86F-30 Airplanes AF52-4305 through -4831, except those modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), when the quantity of fuel in the center wing cell drops to approximately 56 gallons, the float-actuated transfer pump switch (located in the center wing cell transmitter) is closed, and the fuselage aft cell transfer pump is energized and transfers fuel into the center wing cell. If the fuel transfer rate exceeds the fuel consumption rate, the fuel quantity transmitter opens the transfer pump switch when the fuel reaches a predetermined level and de-energizes the transfer pump. On F-86F-25 Airplanes AF51-13500 through -13510 and AF52-5272 through -5530, F-86F-30 Airplanes AF52-4832 through -5113, except those modified by T. O. 1F-86F-208, and on airplanes modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), when 28

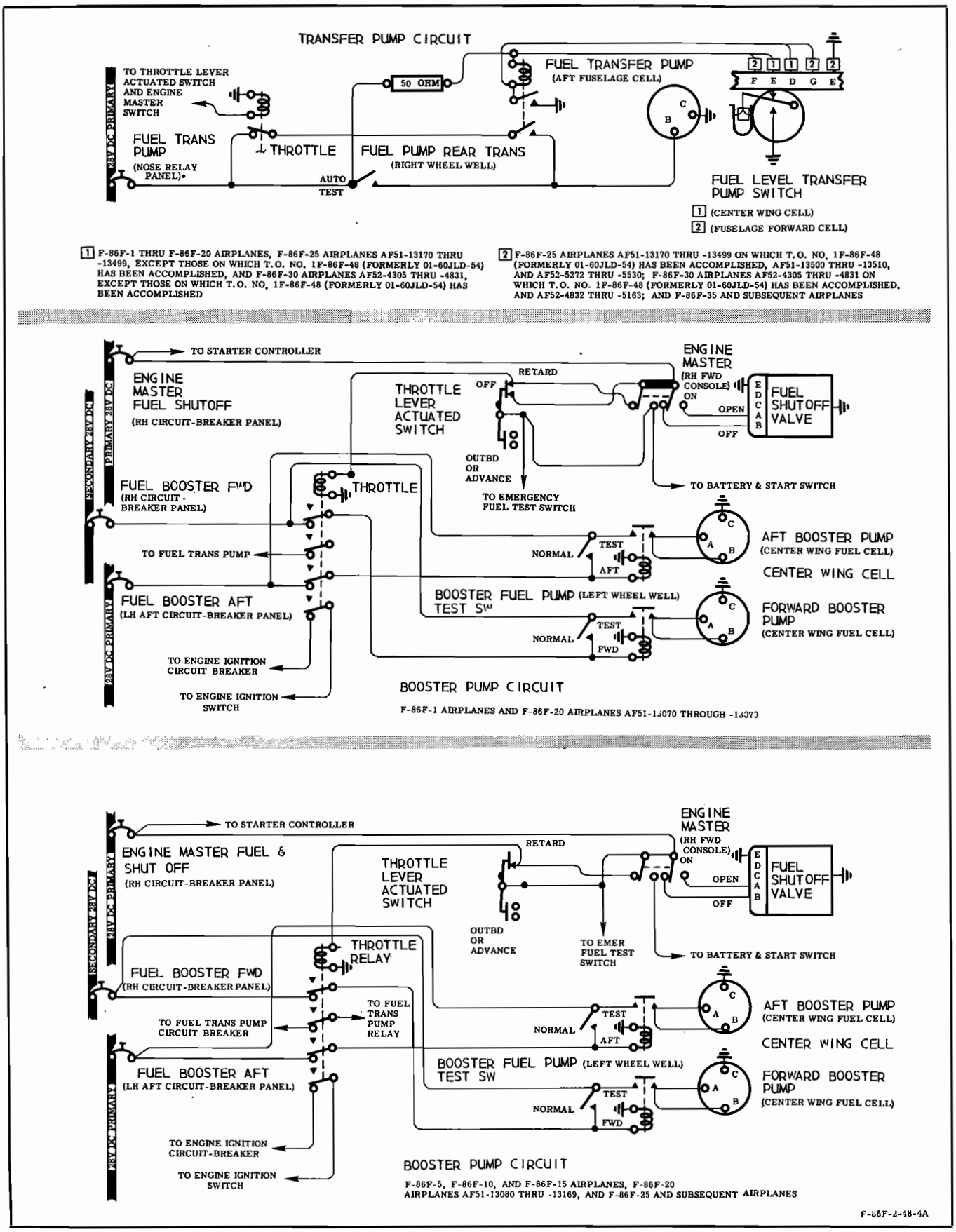


Figure 5-24A. Fuel Supply System Schematic

(+3, −2) gallons of fuel has been consumed from the fuselage forward cell, the float-actuated transfer pump switch (located in the fuselage forward cell transmitter) is closed, and the fuselage aft cell transfer pump is energized and transfers fuel into the center wing cell. If the fuel transfer rate exceeds the fuel consumption rate, the fuel quantity transmitter opens the transfer pump switch when the fuel in the fuselage forward cell has been raised to within 8 (+3, −2) gallons of the full level and de-energizes the transfer pump. On F-86F-1 through F-86F-25 Airplanes and F-86F-30 Airplanes AF52-4305 through -5113, except those modified by T. O. 1F-86F-48 (formerly 01-60JLD-54) and 1F-86F-208, if the fuel transfer rate is less than the fuel consumption rate, the transfer pump remains energized. On F-86F-30 Airplane AF52-5114 and all subsequent airplanes, and airplanes modified by T. O. 1F-86F-48 (formerly 01-60JLD-54) and 1F-86F-208, the transfer pump automatically shuts off when 83 (+3, −1) gallons of fuel has been consumed from the forward fuselage fuel cell. On all airplanes, when the throttle is retarded to the "OFF" position, the transfer pump switch and both booster pumps are de-energized. When the engine master switch is moved to "OFF," the fuel shutoff valve is energized to close.

5-173. TROUBLE SHOOTING FUEL SUPPLY SYSTEM.

5-174. Refer to paragraph 5-3.

5-175. TESTING FUEL SUPPLY SYSTEM.

5-176. To test the fuel supply system, apply power and proceed as follows:

a. De-energize engine ignition system by pulling "IGNITION" circuit breaker in cockpit.

b. With airplane in level ground position, open drain in center wing cell.

c. Check gravity-flow lines connecting center wing cell to outer wing cells and to fuselage aft cell, as described in steps d., e., and f.

d. Place 5 gallons of fuel in left wing cell. Approximately one gallon should drain from center wing cell.

e. Place 2 gallons of fuel in right wing cell. Approximately one gallon should drain from center wing cell.

f. Place 2 gallons of fuel in fuselage aft cell. Approximately ½ gallon should drain from center wing cell.

g. Close center wing cell drain.

h. Open drains in left and right wing cells and in fuselage aft cell, and drain cells.

i. Place 56 gallons of fuel in fuselage forward cell.

j. Allow a minimum of 3 minutes to permit check valves to seat. Then measure fuel flow from drain of each outer wing cell and fuselage aft cell. Fuel flow from the fuselage aft cell or from either outer wing cell should not exceed 6 ounces per minute.

k. Completely fill center wing and fuselage forward cells. Fuel flow from the fuselage aft cell or from either outer wing cell should not exceed 4 ounces per minute Close all drains.

l. Place airplane in 3¾-degree nose-up position.

m. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13499, and F-86F-30 Airplanes AF52-4305 through -4831, except those modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), place 6 gallons of fuel in fuselage aft cell, and adjust amount of fuel in center wing cell to 56 gallons.

n. On F-86F-25 Airplanes AF51-13500 through -13510 and AF52-5272 through -5530, F-86F-30 Airplanes AF52-4832, through -5113, except those modified by T. O. 1F-86F-208, and on airplanes modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), place 25 gallons of fuel in fuselage aft cell and remove 28 gallons of fuel from fuselage forward cell.

o. With engine master switch "ON," move throttle outboard. Booster pumps in center wing cell and transfer pump in fuselage aft cell should be energized.

p. If transfer pump in fuselage aft cell does not turn on, drain fuel from center wing cell until pump does turn on. Not more than 3 gallons should be drained before pump turns on. If pump does not turn on before 3 gallons drains, adjust transfer pump switch. (Refer to paragraphs 5-196 and 5-197.)

q. Permit fuel transfer pump in fuselage aft cell to operate until it automatically turns off.

r. Move throttle to "OFF" position.

s. Drain and measure fuel remaining in fuselage aft cell. This fuel should measure approximately 3 gallons.

5-177. OBSTRUCTION AND PRESSURE CHECK OF FUEL SUPPLY SYSTEM.

5-178. The following obstruction and pressure check of the fuel supply system should be performed whenever a fuel cell has been removed or replaced. Equipment necessary to accomplish the tests includes a source of dry air and a means of regulating the air pressure, suitable hoses and fittings to connect checking equipment to fuel system, a 0 to 5 psi pressure gage, and

miscellaneous plugs and caps for blocking off various lines and fittings. The check consists of a series of steps in which the same basic operation is repeated on each line of the fuel supply system. Air is forced into one end of a line, and a check is made to determine that it comes out the other end. On check valve tests, air pressure is applied against the normally closed side of each valve, and a check is made to determine that no air leaks past the valve. See figure 5-25 for locations given in the following steps, and proceed as follows:

Note

Air pressure can be turned on and off as desired during the required checks.

a. Connect air pressure source to vent outlet bayonet (point 13) and apply 3½ psi air pressure.

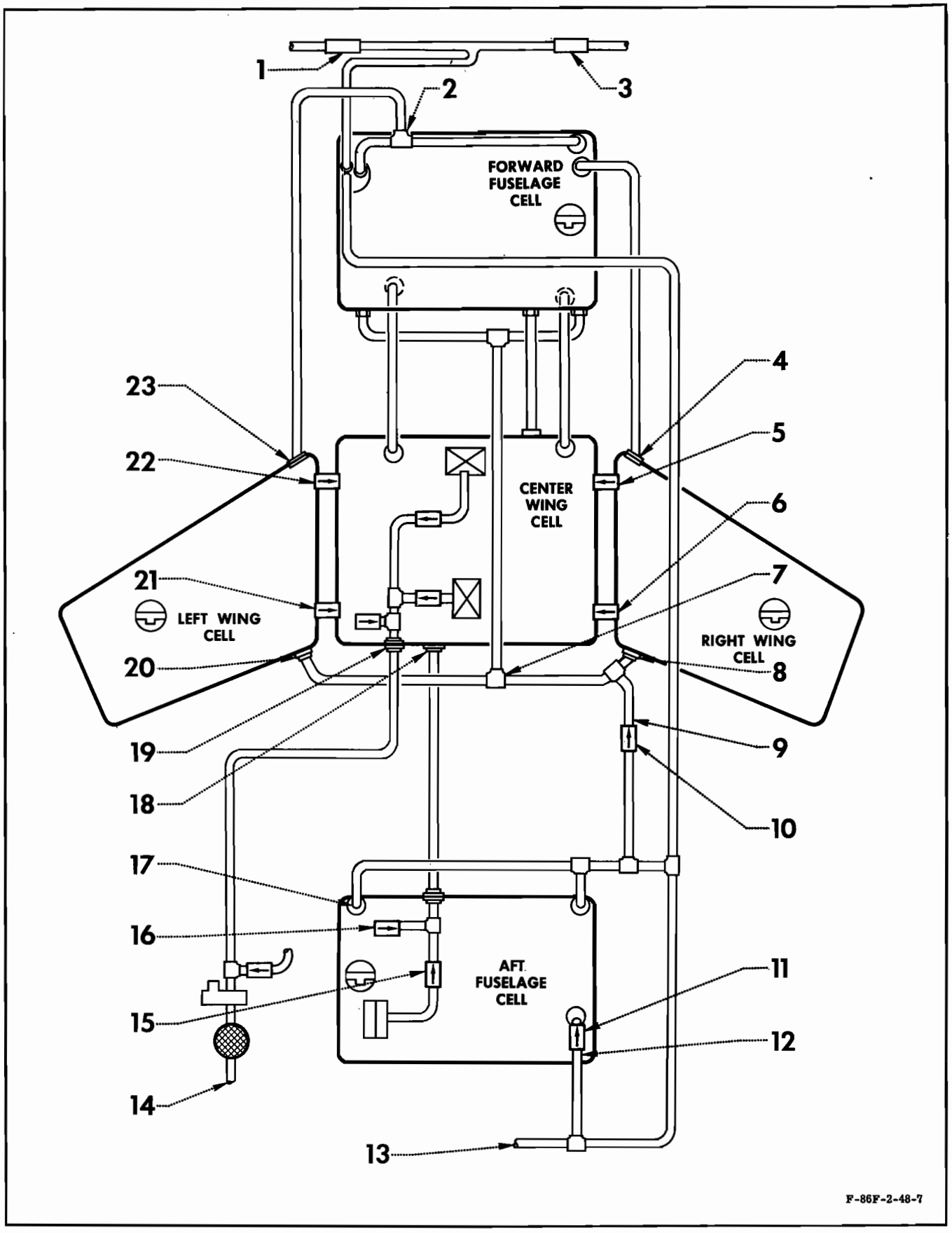
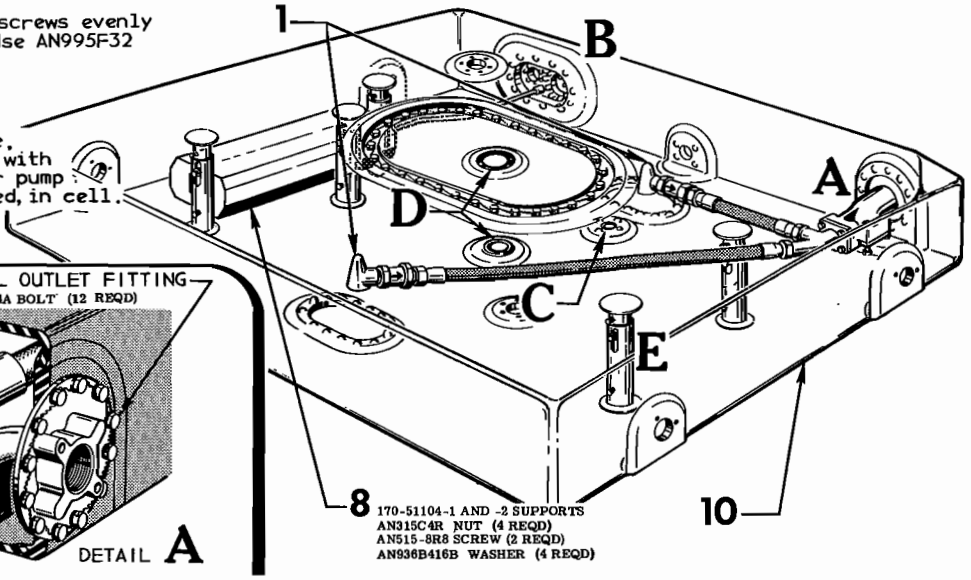
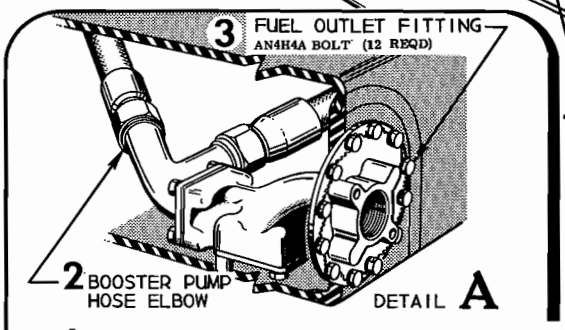


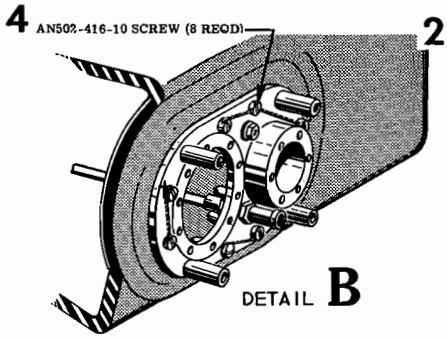
Figure 5-25. Obstruction and Pressure Check of Fuel Supply System

NOTE: Torque bolts and screws evenly to 35 (±5) inch-pounds. Use AN995F32 lockwire where necessary.



1 Through cell access hole, lay booster pump hoses, with check valves and booster pump outlet fittings installed, in cell.





2, 3 Through fuel outlet fitting access hole, pull out booster pump hose elbow and connect to fuel outlet fitting; then install fuel outlet fitting on cell.

4 Install adapter (fuel level transmitter and vent) on cell.

5 Install drain valve adapter on cell.

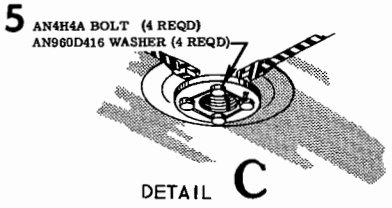
6 Install structural post adapters on cell and access door.

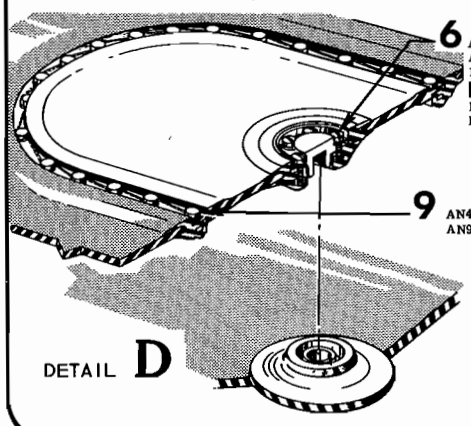
7 Be sure cell support posts are secured to adapters.

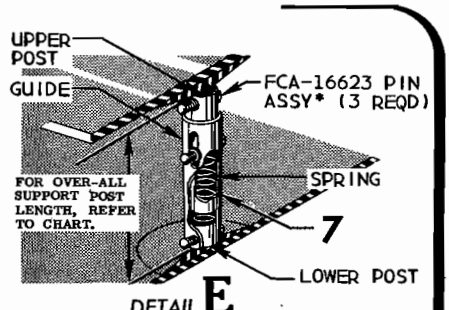
8 Through cell access hole, install liquidensitometer between support posts and connect electrical lead to adapter (fuel level transmitter and vent).

9 Install cell access door.

10 Cover entire cell with an ample quantity of talcum powder.







OVER-ALL POST LENGTH (COMPRESSED)	POST SPRING NO.	GUIDE	UPPER POST	LOWER POST
6-5/8 INCHES	172-48112-5	-31	-29	-27

* U.S. RUBBER CO

F-86F-2-48-19

Figure 5-26. Build-up of Center Wing Fuel Cell

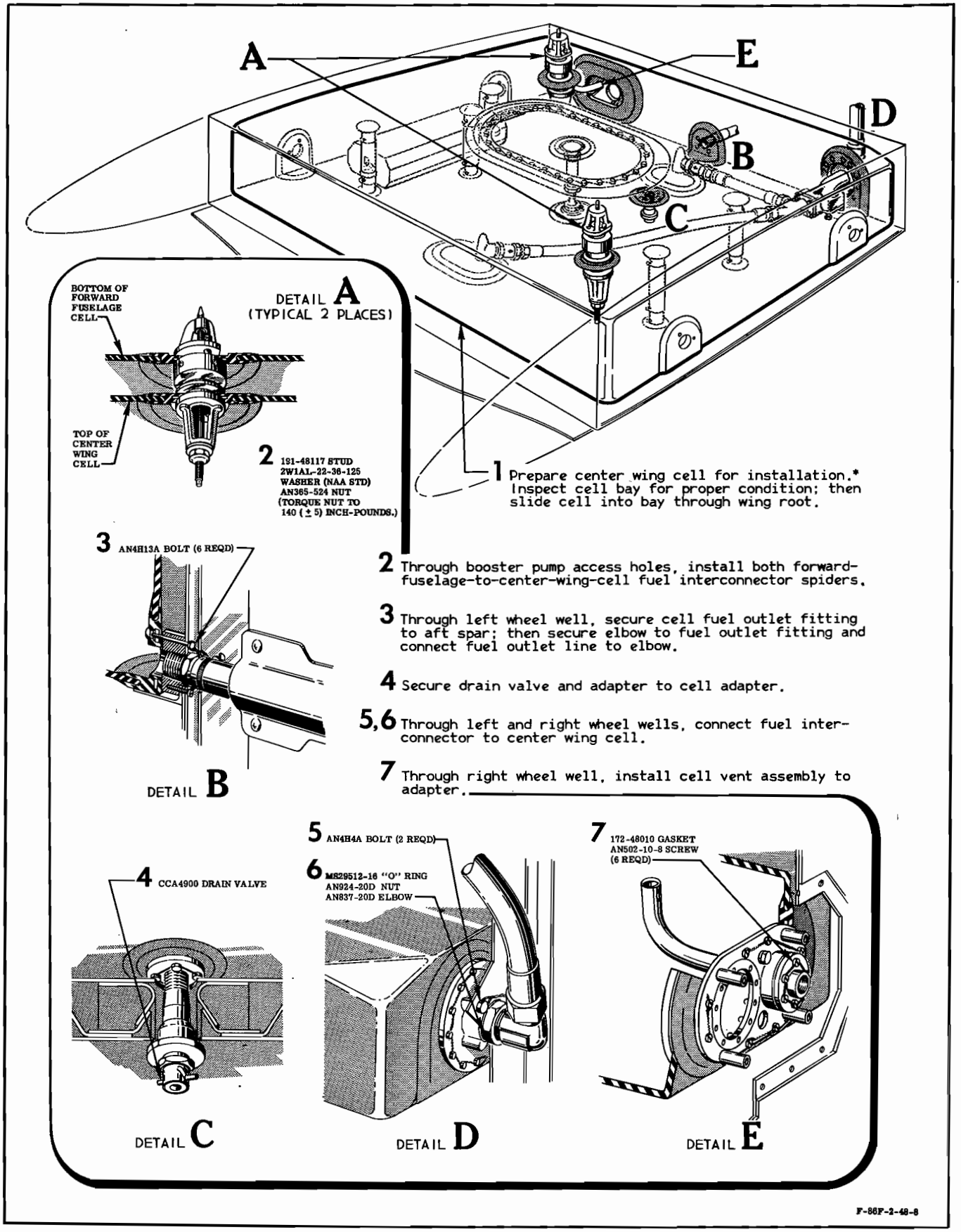


Figure 5-27. Installing Center Wing Fuel Cell (Sheet 1 of 2)

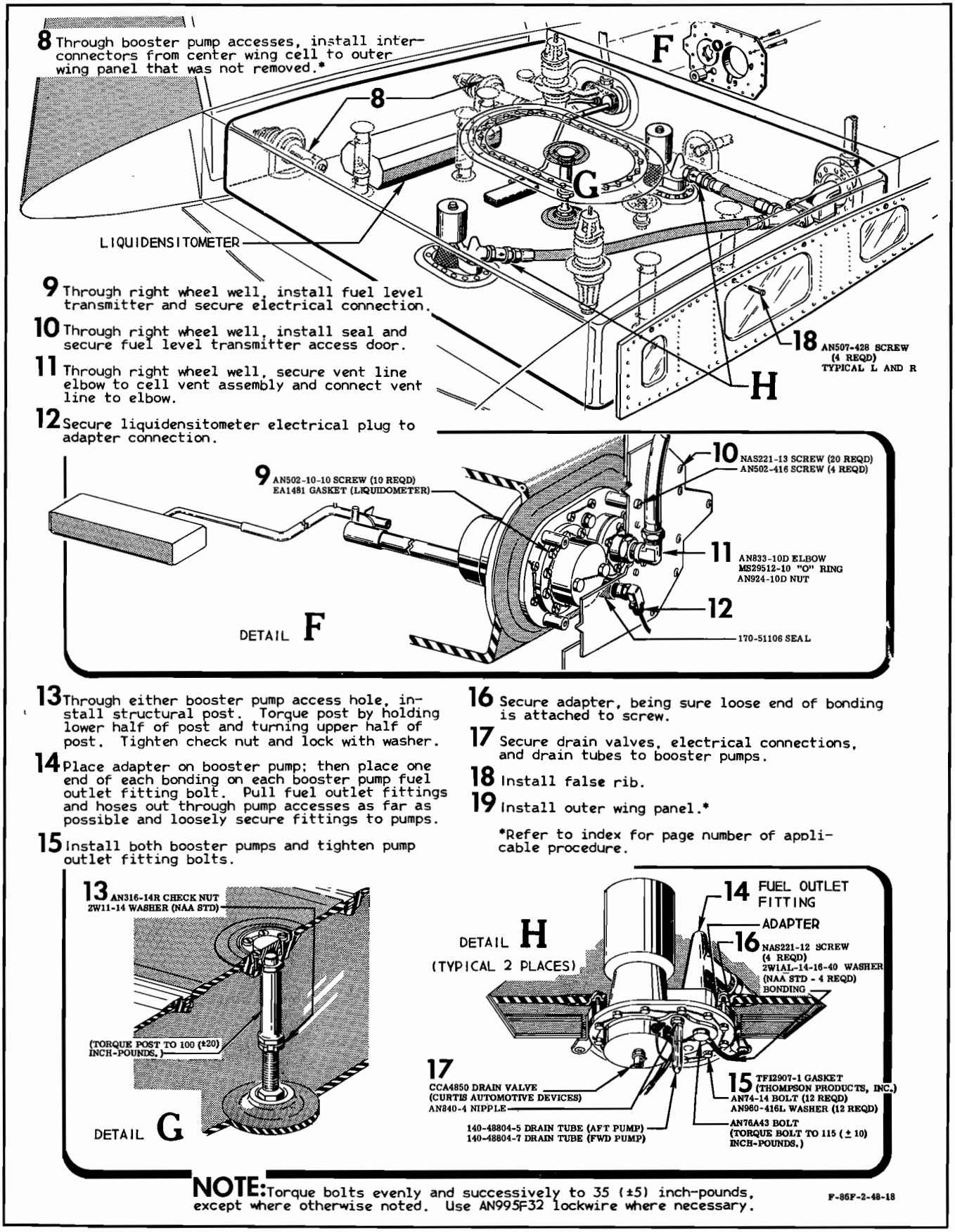


Figure 5-27. Installing Center Wing Fuel Cell (Sheet 2 of 2)

b. Disconnect fuselage aft cell vent line from bottom of check valve fitting at point 11. Check for required airflow from open ends of disconnected line. Airflow from these openings indicates that the dive vent line from the fuselage aft cell and check valve 12 are unobstructed. Cap disconnected line and check valve at point 11.

c. Disconnect vent line from fitting on left side of fuselage aft cell at point 17. Check for required airflow from cell fitting and from disconnected line. Airflow from these openings indicates that the climb vent lines from the left and right sides of the fuselage aft cell are unobstructed. Reconnect vent lines at points 11 and 17.

d. Disconnect fuselage forward cell vent line just forward of check valve (10) at point 9 and cap disconnected line. Check for required airflow from check valve (10). Airflow from the check valve indicates that the vent line from the check valve aft is unobstructed. Cap open end of check valve.

e. Disconnect vent line from rear left side of fuselage forward cell at point 7. Cap both fitting and disconnected line.

f. Remove cap from disconnected line at point 9. Check for required airflow from disconnected line. Airflow at this point indicates that the vent line to the forward left side of the fuselage forward cell, as well as the vent line from the right rear side of the fuselage forward cell, is unobstructed. Recap line at point 9.

g. Remove cap from disconnected line at point 7. Check for required airflow. Airflow from the open line at this point indicates that the dive vent line from the left rear side of the fuselage forward cell is unobstructed. After removing cap from fitting, reconnect vent line at point 7.

h. Successively disconnect and reconnect lines at points 20 and 8. While line is disconnected, check for required airflow. Airflow at these points indicates that the dive vent lines to both wing cells are unobstructed.

i. Disconnect crossover vent line of fuselage forward cell at point 2. Check for required airflow from open ends of disconnected line. Airflow from these openings indicates that the crossover vent line is unobstructed. Reconnect vent line at point 2.

j. Successively disconnect and reconnect vent lines from forward side of outer wing cells at points 23 and 4. Check for required airflow from open lines. Airflow from these openings indicates that the wing cell climb vent lines in the fuselage are unobstructed.

k. Disconnect air pressure source from vent outlet bayonet (point 13) and connect it to left drop tank fuel line at point 1. Cap vent outlet bayonet and apply 3½ psi air pressure.

l. Remove filler cap in fuselage forward cell. Check for required airflow from this opening. Airflow indicates that the fuselage section of the drop tank fuel line is unobstructed. Replace filler cap.

m. Disconnect right drop tank fuel line at point 3. Check for required airflow from open line. Airflow from this line indicates that the fuselage section of the right drop tank fuel line is unobstructed. Reconnect line at point 3.

n. Disconnect air pressure source from line at point 1 and connect to main fuel line at point 14. Open fuel system shutoff valve and apply 3½ psi air pressure. Check for required airflow from main fuel line where it connects to center wing cell at point 19. Airflow at this point indicates that the main fuel line is unobstructed.

o. Reconnect line at point 19 and close fuel shutoff valve. Remove cap from vent outlet bayonet (13), remove air pressure source from point 14, and reconnect line at that point.

p. Remove cap from fitting at point 9 and connect air pressure source. Apply 3½ psi pressure. Check to ensure that no air flows from open vent line outlet (13). Absence of airflow at this point indicates that the check valve (10) in the fuselage forward cell dive vent line does not leak. Reconnect line at point 9.

q. Disconnect line at point 11. Connect air pressure to open line. Apply 3½ psi pressure. Check to ensure that *no* air flows from open vent line outlet (point 13). Absence of airflow at this point indicates that the check valve (12) in the fuselage aft cell dive vent line does not leak.

r. Remove air pressure source from point 11. Disconnect line at point 18 and connect air pressure source to open line. Apply 3½ psi pressure. Check to ensure that *no* air flows from open vent line outlet (point 13). Absence of airflow at this point indicates that check valves 15 and 16 in the fuel transfer line from the fuselage aft cell do not leak.

s. Remove air pressure source from line at point 18 and attach it to fitting on center wing cell. Disconnect outer wing cell vent lines at point 4, 8, 20, and 23 and cap all lines at these points. Apply 3½ psi air pressure. Remove filler cap from left wing outer cell. *No* airflow indicates that check valves 21 and 22 do not leak. Remove filler cap from right wing outer cell. *No* airflow indicates that check valves 5 and 6 do not leak.

t. Reconnect all lines disconnected in foregoing steps; connect air pressure gage to vent outlet bayonet (point 13), and make sure filler caps are tightly closed and all other openings in the fuel supply system are sealed.

u. Close screened vents and seal drains of booster and transfer pump motor housings with suitable plugs.

Note

This is necessary because the pump seals, when dry, may allow some air leakage.

v. Apply 3½ psi air pressure to fuel supply system. Allow 5 minutes for air pressure to stabilize in cells.

w. Close air pressure valve and make sure that fuel supply system maintains the 3½ psi pressure without leakage for 15 minutes.

x. Remove all equipment used in foregoing steps.

Note

If any part of the fuel supply system is replaced or modified after the foregoing tests are completed, the affected portion of the system must be rechecked according to the applicable instructions in the particular paragraph.

5-179. FUEL SUPPLY SYSTEM SHUTOFF VALVE.

5-180. The motor-actuated shutoff valve is located in the left side of the forward engine compartment and is mounted on the fuel filter body. This valve is controlled entirely by the engine master switch. Moving the switch to "ON" opens the valve, and moving the switch to "OFF" closes the valve. A removable cover in the top of the left wheel well provides access to the shutoff valve.

5-181. FUEL SUPPLY SYSTEM FILTER.

5-182. The fuel filter (paragraph 5-5), located in the left side of the forward engine compartment, is accessible through the removable door in the left wheel well. The filter incorporates a relief valve set for 5 (±¼) psi to by-pass the filter element if the element becomes clogged. The 5 psi setting is provided to prevent interference with the ice-indicating pressure switch that operates on 3½ (±¼) psi pressure differential.

5-183. REMOVING FILTER ELEMENT. To remove filter element, release band from around filter bowl, and remove bolt from underside center of bowl to release bowl from mounting head.

5-184. CLEANING FILTER ELEMENT. Replace clogged or dirty element with a new unit when possible. In an emergency, the element may be cleaned for further service. To clean element, first plug or mask open ends of element to prevent entry of dirt. Using a soft-bristle brush, clean exterior of element with dry-cleaning solvent (Federal Specification P-S-661).

CAUTION

Do not use a wire brush or sharp-edged instrument, as the element may be damaged and its efficiency impaired, making further use impossible.

5-185. INSTALLING FILTER ELEMENT. Place filter element in bowl. Secure bowl to mounting head by torquing bolt (120 inch-pounds) at bottom center of bowl and then securing band around bowl.

5-186. FUEL SUPPLY SYSTEM BOOSTER PUMPS.

5-187. Two Type B-5C submerged booster pumps are installed, one forward and one aft, in the center wing cell. These pumps run continuously when the engine master switch is in the "ON" position and the throttle is advanced. Two single-pole, single-throw, momentary-type toggle switches, located in the left wheel well, are used to ground-check the pumps. The pumps are of the constant-speed centrifugal type, wired for intermediate-speed operation. During operation at sea level, the pumps provide 14 psi at approximately 9000 pounds per hour fuel flow (maximum engine demand) or 20 psi at no flow.

5-188. REMOVING BOOSTER PUMPS. To remove booster pump, proceed as follows:

a. Drain fuel system. (Refer to paragraph 1-35.)

b. Remove pump access cover.

c. Disconnect electrical leads.

d. Remove bolt securing fuel outlet fitting to pump base.

e. Remove bolts securing pump to cell mounting flange, and remove pump.

5-189. INSTALLING BOOSTER PUMPS. To install booster pump, proceed as follows:

a. Lift pump into place, and guide fuel outlet fitting inside cell to pump base. Secure bonding and fuel outlet with attaching bolt.

Note

Make sure check valve is installed with flow arrow pointing away from booster pump.

b. Install bolts securing pump to cell flange.

c. Connect electrical wiring.

Note

Do not cut off the electrical leads, but roll and tape them to the desired length.

d. Install pump access cover.

5-189A. CHECKING BOOSTER PUMP OPERATION. Make sure that fuel is in center wing fuel cell; then proceed as follows:

a. Connect external electrical power to airplane.

b. Pull out "ENG. IGN." circuit breaker on right-hand circuit-breaker panel.

c. Turn battery switch "ON."

d. Turn engine master switch "ON."

e. Move throttle outboard and slightly forward to open stopcock.

f. Close both booster pump circuit breakers. ("FUEL BOOST FWD" circuit breaker is on right-hand circuit-breaker panel; "FUEL BOOST AFT" circuit breaker is on left-hand aft circuit-breaker panel.) If pumps are operating correctly, fuel will be pumped overboard from the drip valve drain in the aft fuselage.

g. Pull out "FUEL BOOST FWD" circuit breaker. Fuel still should be pumped overboard from the drip valve drain in the aft fuselage. If fuel is not pumped overboard, aft pump is not functioning.

h. Close "FUEL BOOST FWD" circuit breaker and pull out "FUEL BOOST AFT" circuit breaker. Fuel should be pumped overboard from drain in aft fuselage. If fuel is not pumped overboard, forward pump is not functioning.

i. Move throttle to "OFF."

j. Turn engine master switch "OFF."

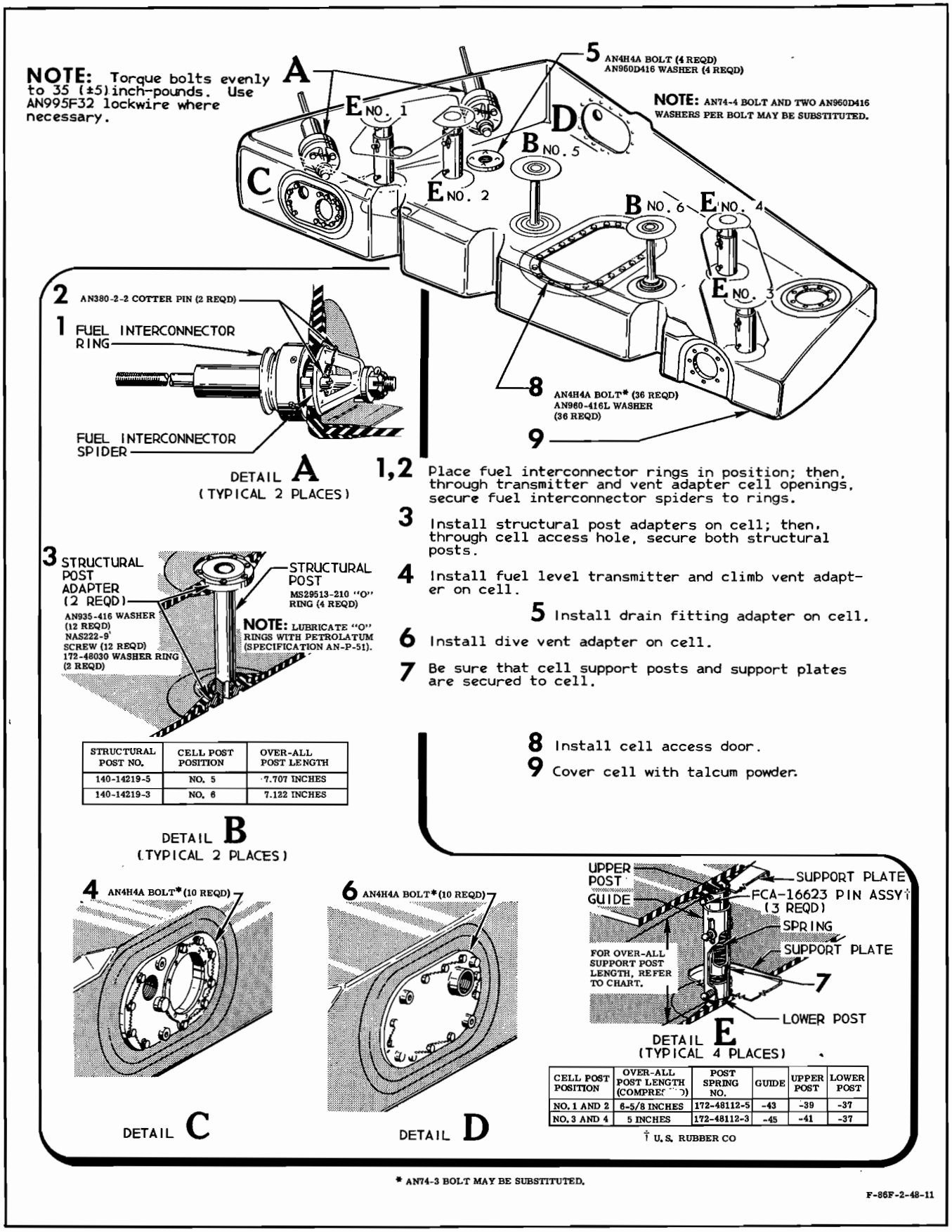
k. Turn battery switch "OFF."

l. Disconnect external electrical power from airplane.

5-190. INSPECTING BOOSTER PUMPS FOR SEAL LEAKAGE. Leakage from the pump seal drain line may indicate a worn or defective pump, or a pump seal that is "lifting off" because of dirt or foreign matter under the seal. If fuel leakage past the pump seal is 8 drops per minute or greater, the pump can be considered defective and must be replaced. If leakage is less than eight drops per minute, attempt to dislodge dirt or foreign matter from seal by operating pump for approximately one minute. After allowing sufficient time for previous leakage to dissipate, examine pump for seal leakage. If excessive leakage persists, replace pump.

5-191. FUEL SUPPLY SYSTEM TRANSFER PUMP.

5-192. A Type B-5C submerged fuel transfer pump is installed in the fuselage aft cell. The operation of the pump is entirely automatic and is controlled by a transfer pump switch. On F-86F-1 through F-86F-20



STRUCTURAL POST NO.	CELL POST POSITION	OVER-ALL POST LENGTH
140-14219-5	NO. 5	7.707 INCHES
140-14219-3	NO. 6	7.122 INCHES

CELL POST POSITION	OVER-ALL POST LENGTH (COMPRES[illegible])	POST SPRING NO.	GUIDE	UPPER POST	LOWER POST
NO. 1 AND 2	6-5/8 INCHES	172-48112-5	-43	-39	-37
NO. 3 AND 4	5 INCHES	172-48112-3	-45	-41	-37

Figure 5-28. Build-up of Outer Wing Fuel Cell

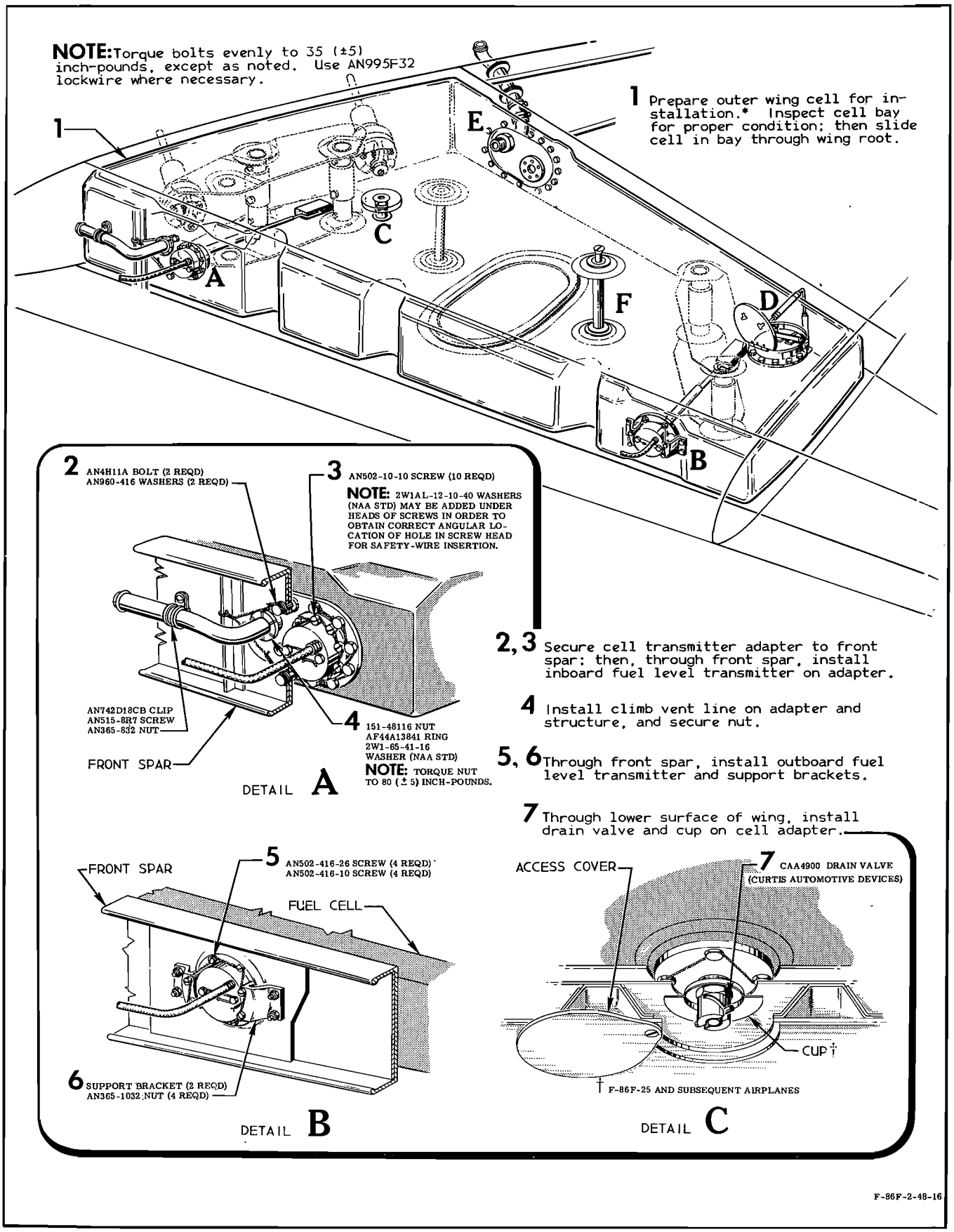
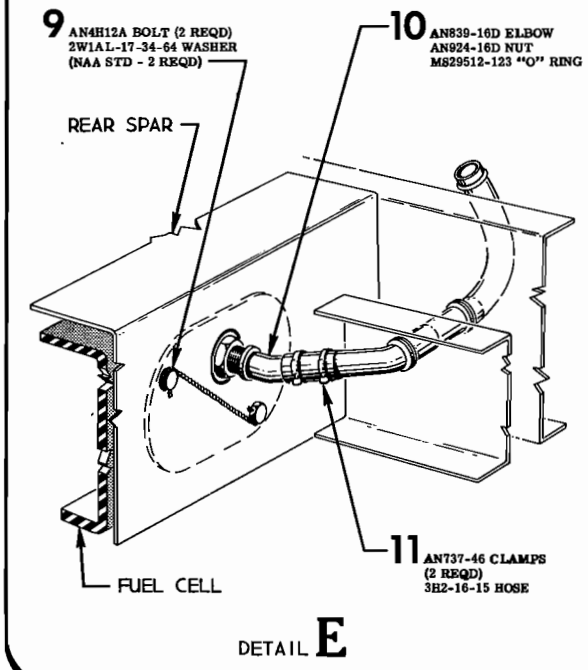


Figure 5-29. Installing Outer Wing Fuel Cell (Sheet 1 of 2)

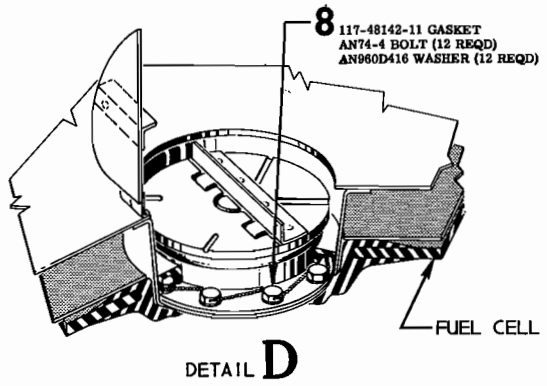
8 Through fuel filler access door, install fuel filler cap and adapter.

9-11 Through wheel well, secure cell vent adapter to rear spar; then install vent line elbow on adapter and connect dive vent line to elbow.

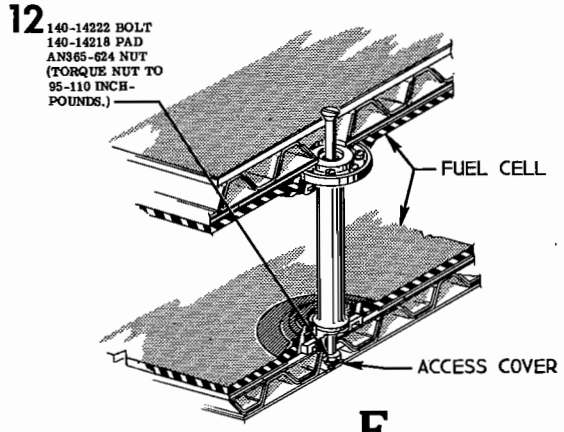
12 Install outboard structural post bolt.



DETAIL **E**



DETAIL **D**



DETAIL **F**

13 At front spar, install the three cups recessed into cell cavities.

14 Install outer wing panel. Install wing tip and leading edge on outer wing panel.*

*Refer to index for page number of applicable procedure.

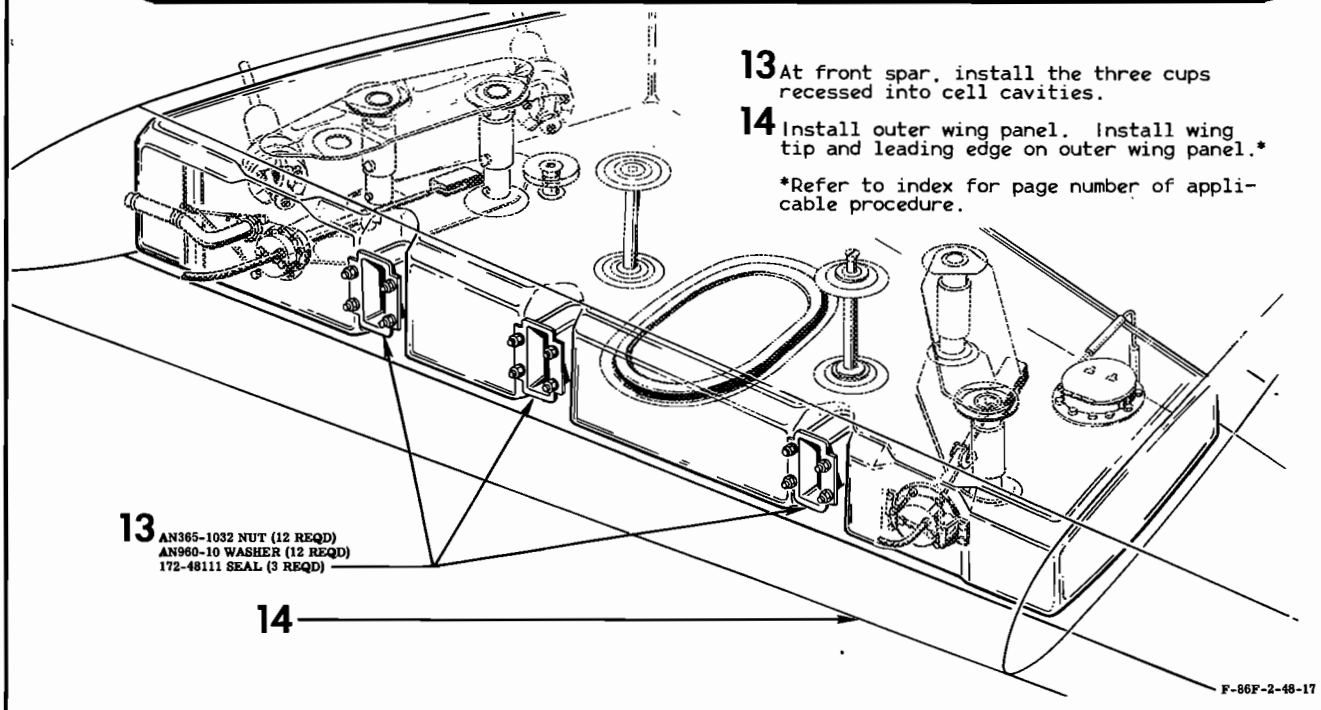


Figure 5-29. Installing Outer Wing Fuel Cell (Sheet 2 of 2)

planes, F-86F-25 Airplanes AF51-13170 through -13499, and F-86F-30 Airplanes AF52-4305 through -4831, except those modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), the transfer pump switch is in the fuel quantity transmitter of the center wing cell. On F-86F-25 Airplanes AF51-13500 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4832, and all subsequent airplanes, and airplanes modified by T. O. 1F-86F-48 (formerly 01-60JLD-54), the transfer pump switch is in the fuel quantity transmitter of the fuselage forward fuel cell. The transfer pump switch closes and energizes the pump when the fuel in the center wing cell and fuselage forward cell is reduced to a predetermined level. When the fuel level rises to another predetermined level, the switch opens and de-energizes the pump. A single-pole, single-throw, momentary-type toggle switch, located in the right wheel well, is used to ground-check the pump. The pump is of the constant-speed centrifugal type, wired for low-speed operation. At sea level, it delivers 5000 to 6000 pounds per hour fuel flow at 4 to 7 psi (13 psi at no flow) at the transfer pump outlet.

5-193. REMOVING TRANSFER PUMP. To remove transfer pump, proceed as follows:

a. Drain fuel system. (Refer to paragraph 1-35.)

b. Remove pump access cover.

c. Disconnect electrical leads.

d. Remove bolt securing fuel outlet fitting to pump base.

e. Remove bolts securing pump to cell mounting flange, and remove pump.

5-194. INSTALLING TRANSFER PUMP. To install transfer pump, proceed as follows:

a. Lift pump into place, and guide fuel outlet fitting inside cell to pump base. Secure bonding and fuel outlet with attaching bolt.

b. Install bolts securing pump to cell flange.

c. Connect electrical wiring.

d. Install pump access cover.

5-195. INSPECTING TRANSFER PUMP FOR SEAL LEAKAGE. Leakage from the pump seal drain line may indicate a worn or defective pump, or a pump seal that is "lifting off" because of dirt or foreign matter under the seal. If fuel leakage past the pump seal is eight drops per minute or greater, the pump can be considered defective and must be replaced. If leakage is less than eight drops per minute, attempt to dislodge dirt or foreign matter and seat seal by operating pump for approximately one minute. After allowing sufficient time for previous leakage to dissipate, examine pump for seal leakage. If excessive leakage persists, replace pump.

5-196. ADJUSTING TRANSFER PUMP SWITCH [F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13499, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4831, EXCEPT THOSE MODIFIED BY T. O. 1F-86F-48 (FORMERLY 01-60JLD-54)]. With the airplane in level position (fuselage reference line 0) and all transmitters in the "empty" position, accomplish the following:

a. Add 80 gallons of fuel through fuselage forward cell filler.

Note

If a new center wing fuel cell has been installed, wait one hour for fuel to settle sufficiently in cell before proceeding to next step.

b. Open both outer wing drains and fuselage aft cell drain, and collect all fuel that may have leaked through check valves.

c. Close all drains and add collected fuel to fuselage forward cell. There should now be approximately 80 gallons of fuel in the fuselage forward and center wing cells.

d. Tap center wing cell transmitter head; then remove transmitter head.

e. Check and record full A-B resistance of center wing cell transmitter. This resistance must be 28.6 (±.9) ohms. If adjustment is necessary, move shoe Y of outer resistance strip of transmitter to give proper reading. (See figure 5-45.)

f. Place airplane in normal cruise attitude of 3¾ degrees nose-up, transverse axis level. Slowly drain fuel from center wing cell until fuel remaining is 56 (+1/−3) gallons.

g. If necessary, adjust transfer pump switch in transmitter head by loosening switch contact segment adjusting screw (figure 5-45) and moving contact segment either right or left until switch contact arm indicates that pump is operating. Then tighten contact segment adjusting screw.

h. Add approximately 15 gallons of fuel to fuselage aft cell.

i. Disconnect Cannon plug at fuel supply system shutoff valve. (This will prevent the shutoff valve from opening.)

j. With 28-volt external power supply connected to airplane, pull both booster pump circuit breakers out (off) and move engine master switch to "ON" position.

k. Move and hold throttle outboard. (This de-energizes the throttle holding relay and energizes the transfer pump relay.)

l. Set transfer pump circuit breaker in (on); this starts the transfer pump operating. Operate transfer pump until transmitter transfer pump switch automatically turns pump off. Do not tap transmitter during this operation.

m. Pull fuel level circuit breaker out (off) and check A-B resistance of center wing cell transmitter in "OFF" position. This value must be at least 8 ohms less than the "full" A-B resistance value of 28.6 (±.9) ohms. If this adjustment is necessary, loosen transfer pump switch carriage adjustment lockscrew and move *only* transfer pump switch carriage adjustment arm (full) slightly to the right for correct value; then tighten transfer pump switch carriage adjustment lockscrew.

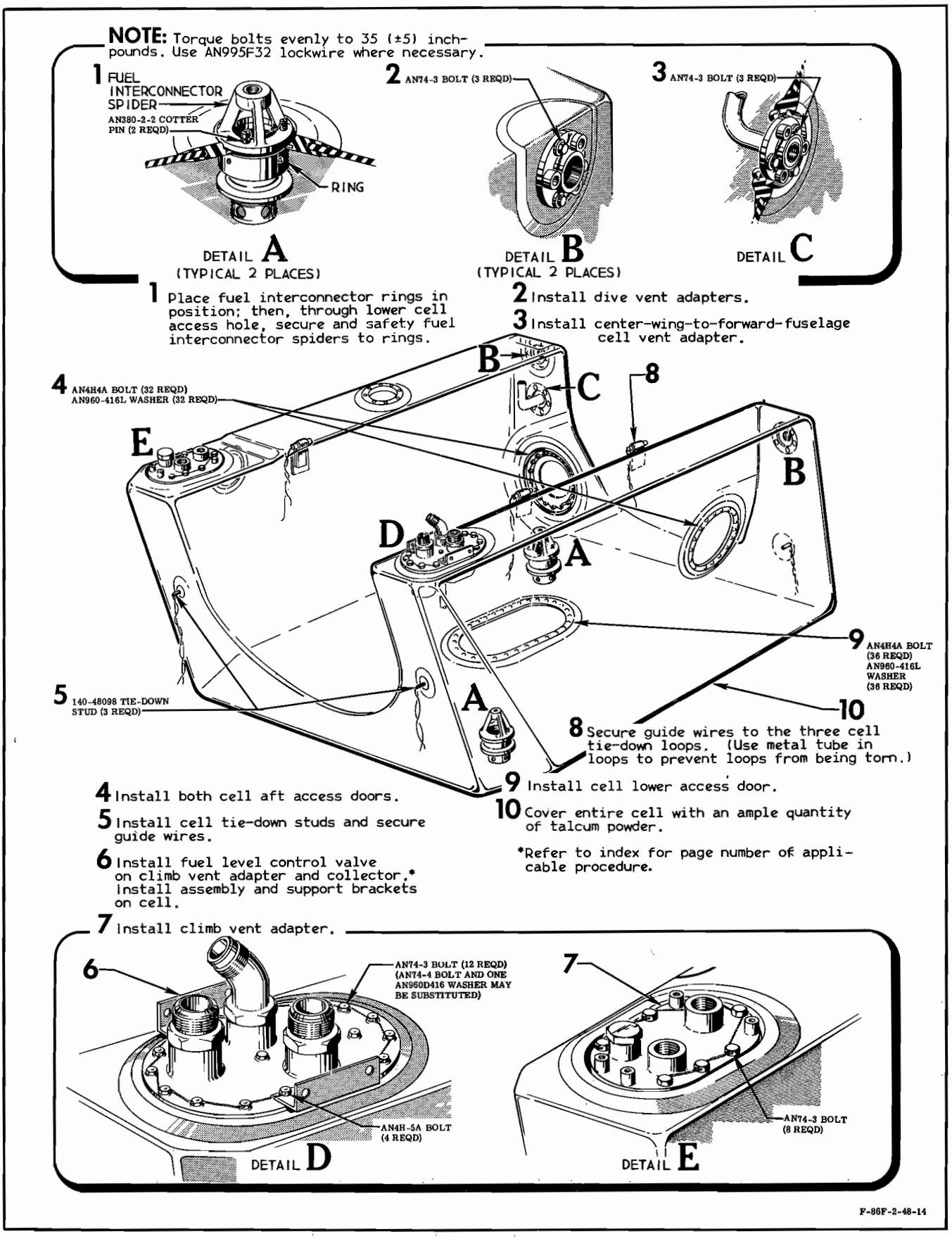
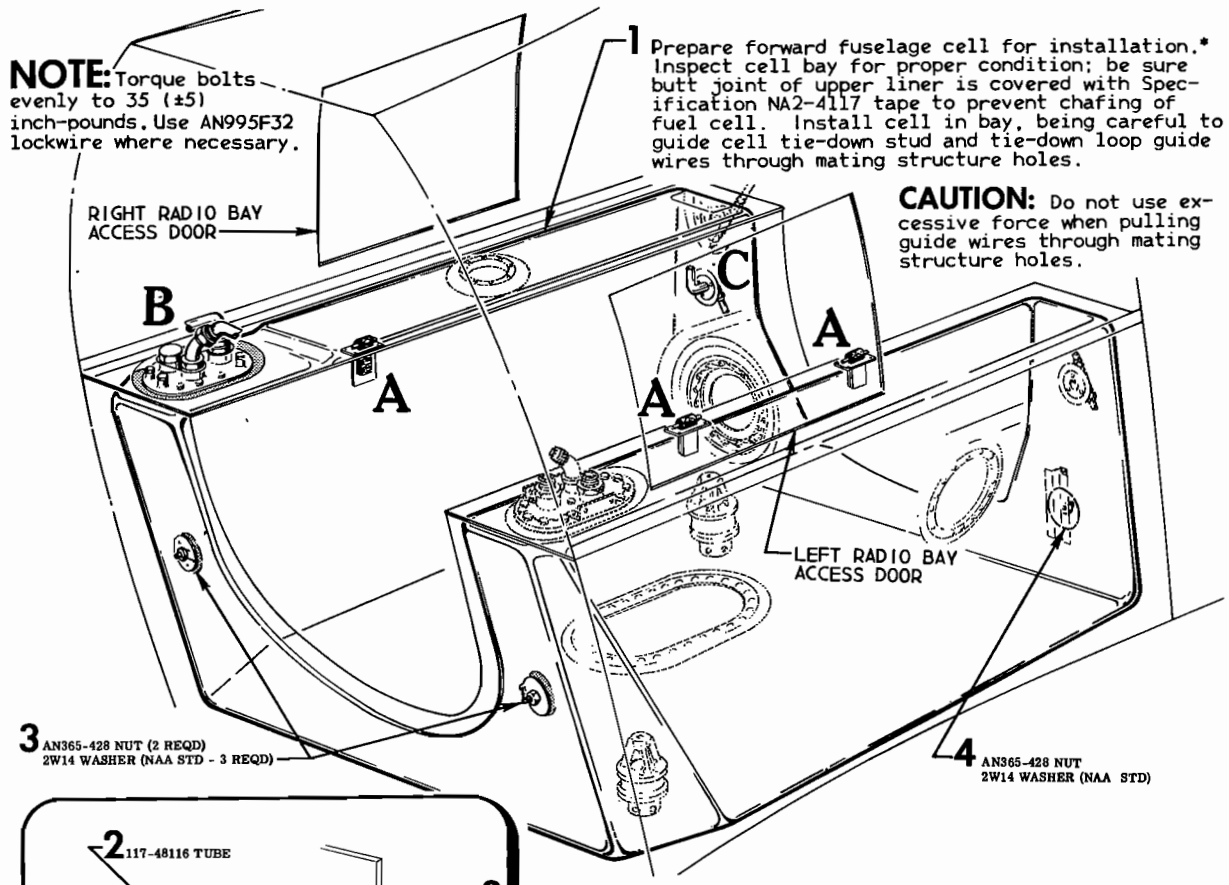
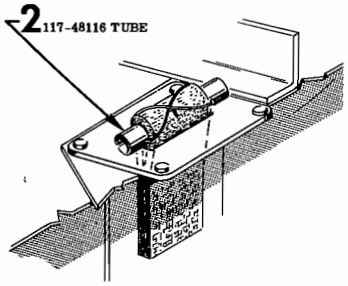


Figure 5-30. Build-up of Fuselage Forward Fuel Cell





DETAIL A
(TYPICAL 3 PLACES)

2 Through left and right radio bays, remove guide wires and secure tie-down loops. Clean area around tie-down loops and apply sealing compound (Specification MIL-S-7502) over connections.

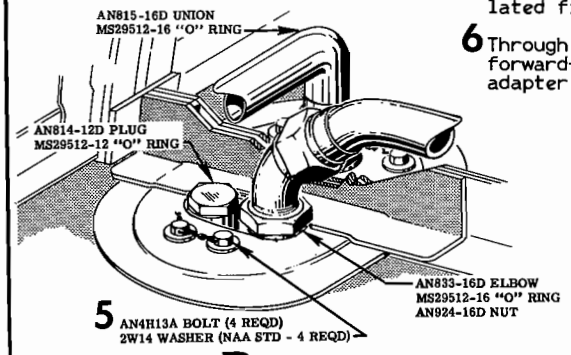
CAUTION: Use gloves as a preventive against dermatitis.

3 Through left and right gun bays, remove guide wires and secure both forward tie-down studs to structure; then install access doors.

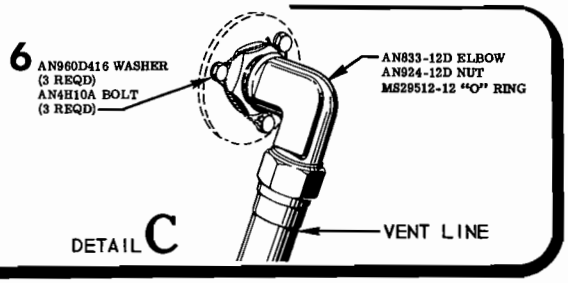
4 Through left wheel well, remove guide wire and secure aft tie-down stud to structure; then install access cover.

5 Through right radio bay, secure right-hand climb vent adapter to structure. Install union and climb vent elbow to related fittings and secure related vent lines to union and elbow.

6 Through aft end of forward fuselage, secure center-wing-to-forward-fuselage fuel vent adapter to structure. Install adapter elbow and secure vent line to elbow.



DETAIL B



DETAIL C

F-86F-2-48-20

Figure 5-31. Installing Fuselage Forward Fuel Cell (Sheet 1 of 2)

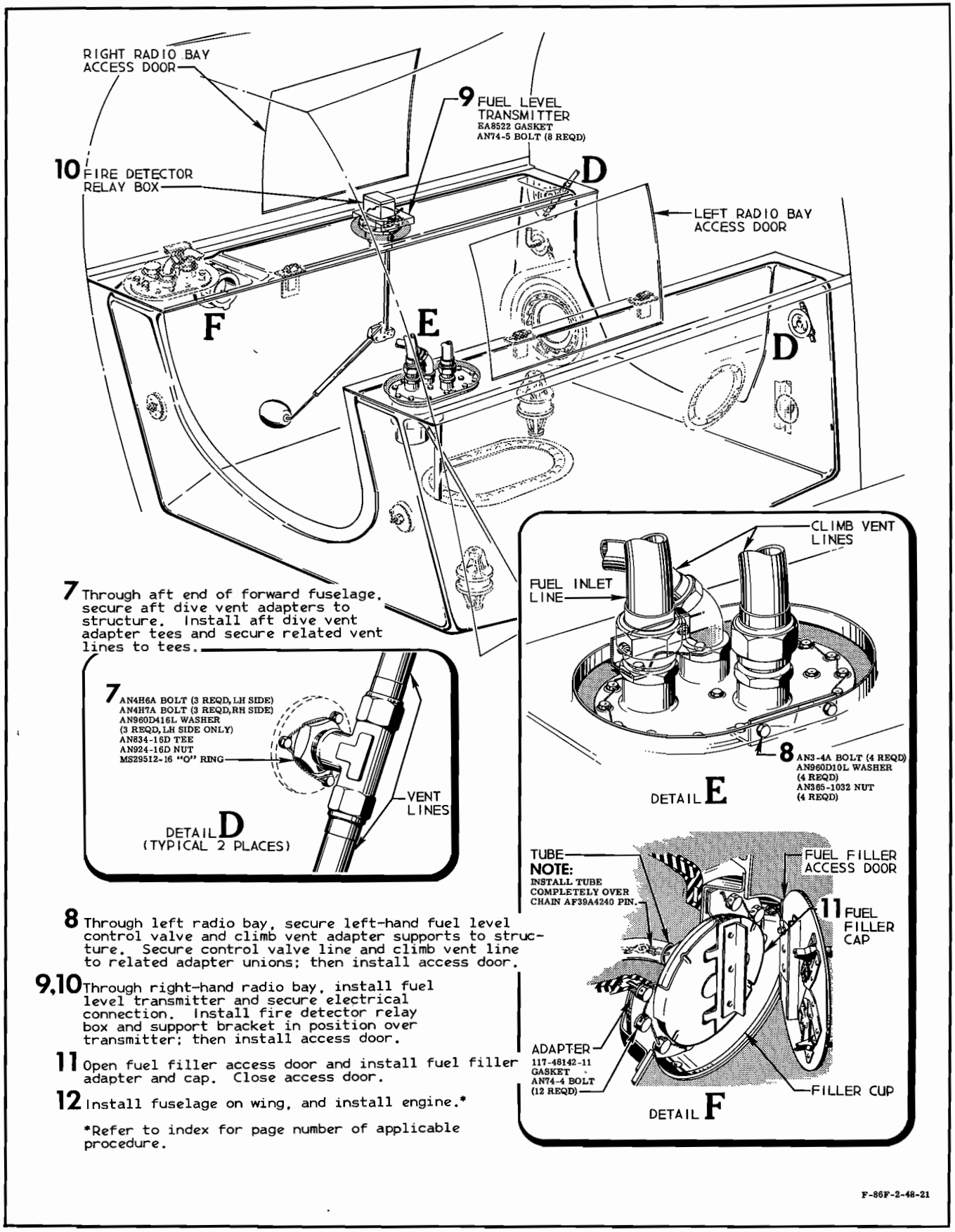


Figure 5-31. Installing Fuselage Forward Fuel Cell (Sheet 2 of 2)

When making this adjustment, be sure that transfer pump switch carriage adjustment arm (empty) does not vary from original position, since adjustment arm must be far enough from switch contact arm not to cause binding during operation.

n. Install transmitter head cover, tightening cover retainer screws no more than finger-tight. In no case should the screws be torqued to exceed 2½ inch-pounds; excessive torque may damage the internal parts.

CAUTION

Be sure all internal wiring is clear of both switch segments before installing center wing cell transmitter head cover.

Note

Conduct test in the least possible time, to prevent flapper valve leakage from exceeding the allowable tolerance specified for the 56-gallon setting.

o. After adjustment, return airplane to level position, retard throttle, place engine master switch at "OFF" and transfer pump circuit breaker out (off), and disconnect external electrical power supply.

p. Connect Cannon plug to fuel supply system fuel shutoff valve.

5-197. ADJUSTING TRANSFER PUMP SWITCH (F-86F-25 AIRPLANES AF51-13500 THROUGH -13510 AND AF52-5272 THROUGH -5530, AND F-86F-30 AIRPLANES AF52-4832 THROUGH -5113, EXCEPT THOSE MODIFIED BY T. O. 1F-86F-208). With the airplane in level position (fuselage reference line 0) and all transmitters in the "empty" position, accomplish the following:

a. Completely fill center wing and fuselage forward cells with fuel.

Note

If a new center wing or fuselage forward cell has been installed, wait one hour for fuel to settle sufficiently in cell before proceeding to next step.

b. Open both outer wing cell drains and fuselage aft cell drain, and collect all fuel that may have leaked through check valves.

c. Close all drains and add collected fuel to fuselage forward cell. The center wing and fuselage forward cells should be full.

d. Place airplane in normal cruise attitude of 3¾ degrees nose-up, transverse axis level. Slowly drain 28 (±3) gallons of fuel from center wing cell.

e. If necessary, adjust transfer pump switch in fuselage forward cell transmitter head by loosening switch contact segment adjusting screw (figure 5-45) and moving contact segment either right or left until switch contact arm indicates that pump is operating. Then tighten contact segment adjusting screw.

f. Add 25 gallons of fuel to fuselage aft cell.

g. Disconnect Cannon plug at fuel supply system shutoff valve. (This will prevent the shutoff valve from opening.)

h. With 28-volt external power supply connected to airplane, pull both booster pump circuit breakers out (off) and move engine master switch to "ON."

i. Move and hold throttle outboard. (This de-energizes the throttle holding relay and energizes the transfer pump relay.)

j. Set transfer pump circuit breaker in (on); this will start the transfer pump operating. Operate transfer pump until all fuel has been transferred from the fuselage aft cell.

jA. Retard throttle, and place engine master switch at "OFF" and transfer pump circuit breaker out (off).

k. Drain fuselage aft cell. Fuel collected should measure 4 (+3/−1) gallons.

l. Install transmitter head cover (if removed), tightening cover retaining screws no more than finger-tight. In no case should the screws be torqued to exceed 2½ inch-pounds; excessive torque may damage the internal parts.

CAUTION

Be sure all internal wiring is clear of both switch segments before installing fuselage forward cell transmitter head cover.

Note

Conduct test in the least possible time, to prevent flapper valve leakage from exceeding allowable tolerance specified for "full" setting.

m. After adjustment, return airplane to level position, and disconnect external electrical power supply.

n. Connect Cannon plug to fuel supply system fuel shutoff valve.

5-197A. ADJUSTING TRANSFER PUMP SWITCH [F-86F-30 AIRPLANE AF52-5114 AND ALL SUBSEQUENT AIRPLANES, AND AIRPLANES MODIFIED BY T. O. 1F-86F-48 (FORMERLY 01-60JLD-54) AND 1F-86F-208]. With the airplane in level position

(fuselage reference line 0) and all transmitters in the "empty" position, accomplish steps a. through k. of paragraph 5-197, and then proceed as follows:

a. Fill fuselage forward cell.

b. Drain 75 gallons of fuel from fuselage forward cell.

c. Move engine master switch to "ON," and move and hold throttle outboard.

d. Set transfer pump circuit breaker in (on); this will start the transfer pump operating.

e. Drain 8 (+3, −1) gallons of fuel from center wing cell. The pump should shut off.

f. If necessary, adjust transfer pump switch in fuselage forward cell transmitter head by loosening transfer pump switch contact segment adjusting screw (figure 5-45) and moving transfer pump switch contact segment either right or left until transfer pump switch contact arm indicates that transfer pump is operating. Then tighten contact segment adjusting screw.

g. Install transmitter head cover (if removed), tightening cover retaining screws no more than finger-tight. In no case should the screws be torqued to exceed 2½ inch-pounds; excessive torque may damage the internal parts.

CAUTION

- Be sure all internal wiring is clear of both switch segments before installing fuselage forward cell transmitter head cover.
- Conduct test in the least possible time, to prevent flapper valve leakage from exceeding allowable tolerance specified for "full" setting.

h. After adjustment, return airplane to level position, retard throttle, place engine master switch at "OFF" and transfer pump circuit breaker out (off), and disconnect external electrical power supply.

i. Connect Cannon plug to fuel supply system fuel shutoff valve.

5-198. FUEL SUPPLY SYSTEM FUEL CELLS.

5-199. All internal fuel cells are suitable for use with aromatic fuel. The cells are supported and held securely in place by the various cell fittings, posts, and tie-down fittings. The five fuel cells are installed in bays located in the fuselage, wing center section, and wing outer panels. On all airplanes, the center wing cell and both fuselage fuel cells are completely self-sealing. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13340, and F-86F-30 Airplanes AF52-4305 through -4604, the outer wing fuel cells are completely self-sealing. On F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4605, and all subsequent airplanes, the outer wing fuel cells have the lightweight top which is not self-sealing. The center wing cell, which contains the booster pumps, is connected to each of the other cells. Internal fuel feeds into the center wing cell by gravity, thus providing a single source of fuel to the engine. A transfer pump in the fuselage aft

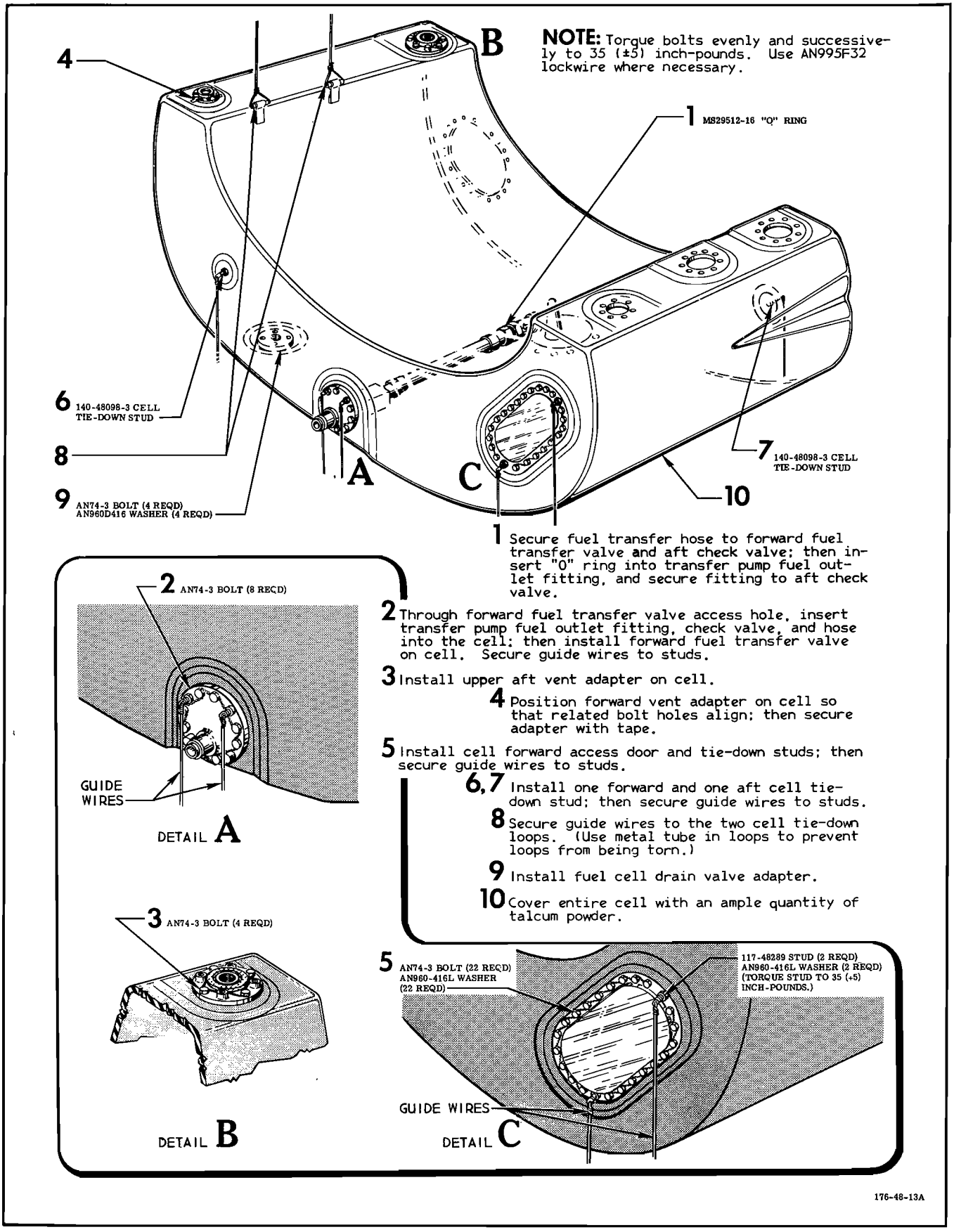
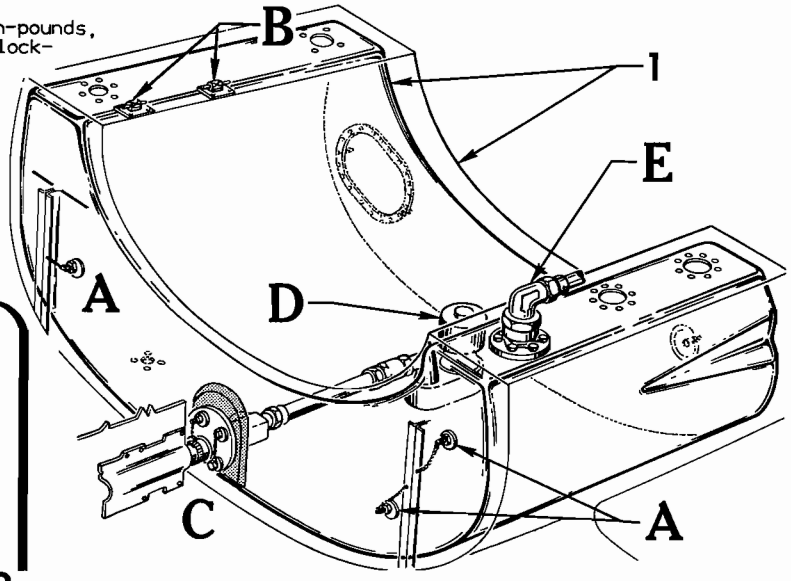


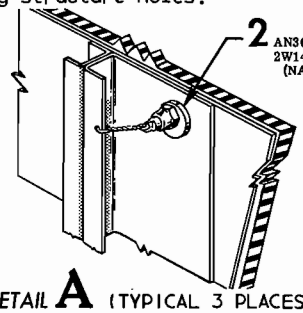
Figure 5-32. Build-up of Fuselage Aft Fuel Cell

NOTE: Torque bolts evenly to 35 (±5) inch-pounds, unless otherwise specified. Use AN995F32 lock-wire where necessary.



1 Prepare fuselage aft cell for installation.* Inspect cell bay for proper condition. Install cell in bay, being careful to guide cell tie-down stud and tie-down loop guide wires through mating structure holes.

CAUTION: Do not use excessive force when pulling guide wires through mating structure holes.



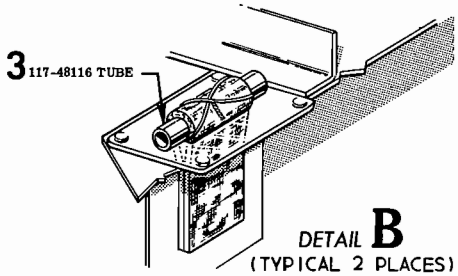
DETAIL **A** (TYPICAL 3 PLACES)

2 Through left and right wheel well, remove guide wires and secure forward tie-down studs to structure.

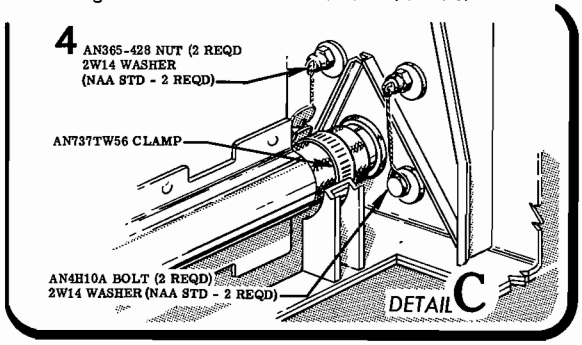
3 Through aft end of fuselage, remove guide wires and secure the two tie-down loops. Clean area and apply sealing compound (Specification MIL-S-7502) over tie-down loop connections

CAUTION: Use gloves as a preventive against dermatitis.

4 Through left and right wheel well, secure forward fuel transfer valve to structure: then connect center-wing-cell-to-fuselage-aft-cell hose at fuel transfer valve.



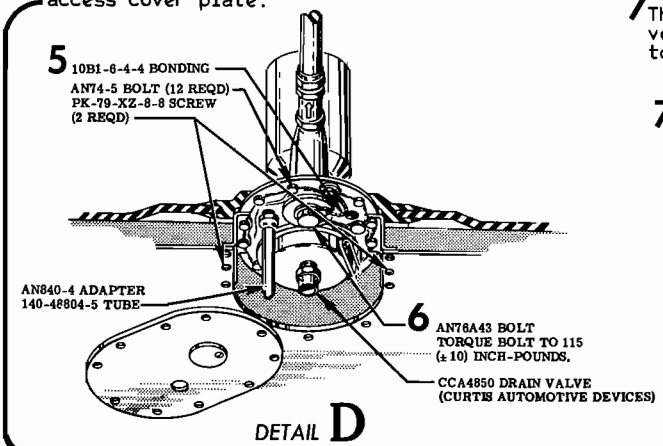
DETAIL **B** (TYPICAL 2 PLACES)



DETAIL **C**

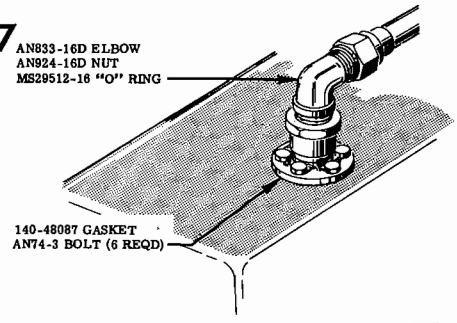
5 Through lower fuselage access hole, install transfer pump, one end of bonding, and support brackets; then secure electrical connections to pump.

6 Through cell aft access hole, align transfer pump fuel outlet fitting to transfer pump base; then, through lower fuselage transfer pump access hole, install fuel outlet fitting bolt and other end of bonding. Install transfer pump access cover plate.



DETAIL **D**

7 Through aft end of fuselage, install forward vent adapter and elbow; then secure vent line to elbow.



DETAIL **E**

F-86F-2-48-13

Figure 5-33. Installing Fuselage Aft Fuel Cell (Sheet 1 of 2)

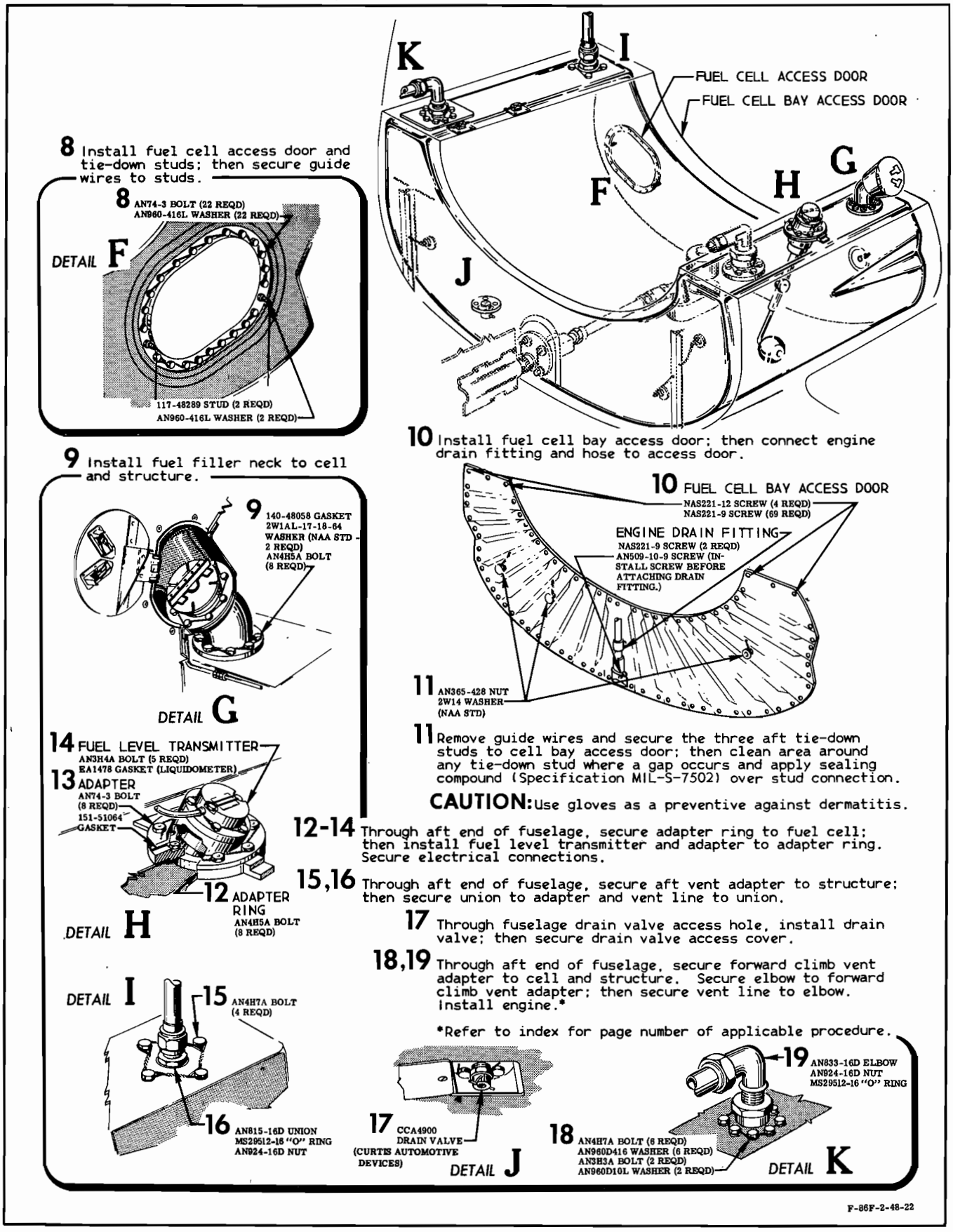


Figure 5-33. Installing Fuselage Aft Fuel Cell (Sheet 2 of 2)

cell is used to transfer the fuel to the fuselage forward cell when a predetermined amount of fuel has been consumed. Filler necks for the fuselage cells are accessible through the flush doors in the sides of the fuselage; those for the two outer wing cells can be reached through the top surface of the wings. The center wing cell is filled by gravity feed from the fuselage forward cell through the interconnectors. The filler cap and flush access door are designed to prevent complete closing of the door unless the cap is locked in place. Because of design features of the outer and center wing fuel cell interconnectors and check valves, and to ensure capacity filling of the outer wing fuel cells, it is essential that the airplane be filled in the proper sequence, as follows: The combined fuselage forward and center wing fuel cells must be filled first; the two outer wing fuel cells must be filled next; and the fuselage aft fuel cells must be filled last.

5-200. REMOVING CENTER WING FUEL CELL. The parts referred to in the following procedure are identified in figure 5-27. To remove fuel cell, drain fuel system (paragraph 1-35) and proceed as follows:

a. Remove lower center wing fairing.

b. Remove booster pumps. (Refer to paragraph 5-188.)

c. Disconnect fuel line to fuel outlet fitting elbow and remove elbow.

d. Disconnect vent line to fuel vent elbow, and remove elbow.

e. Remove transmitter access door.

f. Disconnect electrical connections and remove fuel quantity transmitter.

g. Remove fuel vent assembly.

h. Remove drain valve.

i. Remove fuselage-aft-cell to center-wing-cell interconnector from center wing cell.

j. Remove lower halves of fuselage-forward-cell to center-wing-cell interconnectors.

k. Remove structure post.

l. Remove wing outer panel. (Refer to paragraph 2-8.)

m. Remove cell from bay through wing root.

n. Remove adapting parts (figures 5-26 and 5-27) for installation on replacement cell.

5-201. BUILD-UP OF CENTER WING FUEL CELL. See figure 5-26.

5-202. INSTALLING CENTER WING FUEL CELL. See figure 5-27.

5-203. REMOVING OUTER WING FUEL CELL. The parts referred to in the following procedure are identified in figure 5-29. To remove fuel cell, drain fuel system (paragraph 1-35) and proceed as follows:

a. Remove wing outer panel. (Refer to paragraph 2-8.)

b. Remove forward leading edge of wing. (Refer to paragraph 2-18.)

c. Remove outboard structural post bolt.

d. Disconnect aft vent line and remove mating elbow; then remove both bolts securing adapter to rear spar.

e. Disconnect forward vent line and remove nut.

f. Remove fuel filler cap and adapter.

g. Remove drain valve.

h. Remove outboard fuel quantity transmitter support brackets; then remove transmitter.

i. Remove inboard fuel quantity transmitter.

j. From forward spar, remove the three spar cups recessed into cell cavities.

k. Remove cell from bay.

l. Remove adapting parts (figures 5-28 and 5-29) for installation on replacement cell.

5-204. BUILD-UP OF OUTER WING FUEL CELL. See figure 5-28.

5-205. INSTALLING OUTER WING FUEL CELL. See figure 5-29.

5-206. REMOVING FUSELAGE FORWARD FUEL CELL. The parts referred to in the following procedure are identified in figure 5-31. To remove fuel cell, drain fuel system (paragraph 1-35) and proceed as follows:

a. Remove engine. (Refer to paragraph 5-13.)

b. Remove fuselage from wing. (Refer to paragraph 2-153.)

c. Remove fuel cell lower access door.

d. Disconnect vent lines from left and right aft vent adapters.

e. Remove "T" fittings; then disconnect aft vent adapters from structure.

f. Remove fire detector relay box over transmitter; then disconnect electrical connection and remove fuel quantity transmitter.

g. Remove fuel filler cap and adapter.

h. Through cell lower access hole, remove fuel level control valve from bottom of fuel level control valve and vent adapter.

i. Disconnect fuel level control and vent lines from fuel level control valve and vent adapter.

j. Disconnect fuel level control valve and vent adapter from structure.

k. Disconnect vent lines from right vent adapter.

l. Disconnect right vent adapter from structure.

m. Disconnect aft and both forward tie-down studs.

n. Remove sealing compound and disconnect the three tie-down loops.

o. Remove cell from bay.

p. Remove adapting parts (figures 5-30 and 5-31) for installation on replacement cell.

5-207. BUILD-UP OF FUSELAGE FORWARD FUEL CELL. See figure 5-30.

5-208. INSTALLING FUSELAGE FORWARD FUEL CELL. See figure 5-31.

5-209. REMOVING FUSELAGE AFT FUEL CELL. The parts referred to in the following procedure are identified in figure 5-33. To remove fuel cell, drain fuel system (paragraph 1-35) and proceed as follows:

a. Remove engine. (Refer to paragraph 5-13.)

b. Remove aft vent line and union from related adapter.

c. Disconnect aft vent adapter from structure.

d. Disconnect electrical connections and remove fuel quantity transmitter.

e. Disconnect fuel quantity transmitter adapter from cell.

f. Disconnect fuel filler neck from cell.

g. Remove drain valve.

h. Disconnect cell bay access door tie-down studs. Remove engine drain fitting from fuel cell bay access door; then remove door.

i. Remove fuel cell aft access door.

j. Disconnect vent line from left forward vent adapter elbow; then remove elbow and vent adapter.

k. Remove transfer pump. (Refer to paragraph 5-193.)

l. Disconnect center-wing-cell to fuselage-aft-cell hose from forward fuel transfer valve.

m. Disconnect forward fuel transfer valve from structure.

n. Disconnect vent line from right forward vent adapter elbow; then remove elbow and vent adapter retaining bolts.

o. Remove sealing compound and disconnect tie-down loops.

p. Disconnect forward tie-down studs from structure.

q. Remove cell from bay.

r. Remove adapting parts (figures 5-32 and 5-33) for installation on replacement cell.

5-210. BUILD-UP OF FUSELAGE AFT FUEL CELL. See figure 5-32.

5-211. INSTALLING FUSELAGE AFT FUEL CELL. See figure 5-33.

5-211A. CARE OF FUEL CELLS. Accumulation of fuel in the fuel cell bay causes deterioration of the fuel cell. This results in a breakdown of the cell walls and subsequent leakage. To minimize this type of fuel cell failure, observe the following precautions:

a. Do not overflow fuel cells when servicing airplane.

b. Do not use fuel or any petroleum derivatives for cleaning airplane.

c. Do not carelessly jam fuel nozzle into filler opening with force. This could weaken the seal around the filler opening.

d. Conduct frequent investigations of cap and adapter seals to prevent leakage resulting from thermal expansion.

5-212. AUXILIARY FUEL SUPPLY SYSTEM.

5-213. In addition to the normal internal fuel supply, an auxiliary fuel system is provided. On F-86F-1 through F-86F-20 Airplanes, the system (figure 5-34) is comprised of the following major components: two droppable auxiliary fuel tanks, one mounted under each wing outer panel; an air pressure filter; a manual drop tank air pressure shutoff valve; a fuel level control valve; tank pressure and thermal expansion relief valves; and tubing to pressurize the tanks and transfer the fuel from the tanks to the normal fuel system. On F-86F-1 Airplanes, only the 120-gallon tanks can be used. On F-86F-5 through F-86F-20 Airplanes, the 120-gallon tanks or the 200-gallon tanks may be used. The tanks are pressurized by compressed air routed from the cockpit air conditioning and pressurizing systems. The air pressure into the tanks is limited by a restrictor. The pressure in each tank is maintained at approximately 4½ psi by the pressure relief valves. The airflow is controlled by the two-position manual air pressure shutoff valve, located on the left console of the cockpit. The tanks may be released simultaneously by use of the manual electrical bomb release system (paragraph 9-23) or the mechanical bomb release system (paragraph 9-6).

5-214. On F-86F-25 and subsequent airplanes, the system (figure 5-35) is comprised of the following major components: four droppable auxiliary fuel tanks, two mounted under each wing outer panel; two fuel tank ferry beam adapters, one mounted under each wing outer panel; a fuel level control valve; a check valve; an air pressure regulator, an individual air pressure solenoid shutoff valve for each auxiliary tank, and a fuel outboard-drop-tank-empty light switch (some airplanes have a temporary jumper line) in the leading edge of each wing outer panel; and tubing to pressurize the tanks and transfer the fuel from the tanks to the normal system. The 120-gallon tank may be carried at either the inboard or the outboard station. However, a straight pylon nose fairing is required on the tanks at the inboard station, and a cambered pylon nose fairing is required at the outboard station. When the tank is carried at the inboard station, the ferry beam must be installed. The 200-gallon tank can be carried only at the outboard station. The tanks are pressurized by compressed air from the cockpit air conditioning and pressurizing systems. The air pressure into the tanks is limited by a regulator and is maintained at approximately 8 psi in each tank. The airflow is controlled by solenoid valves which are actuated by an electrical switch located on the left console of the cockpit. The outboard tanks may be released separately from the inboard tanks, or they may all be released simultaneously by use of the manual electrical bomb release system

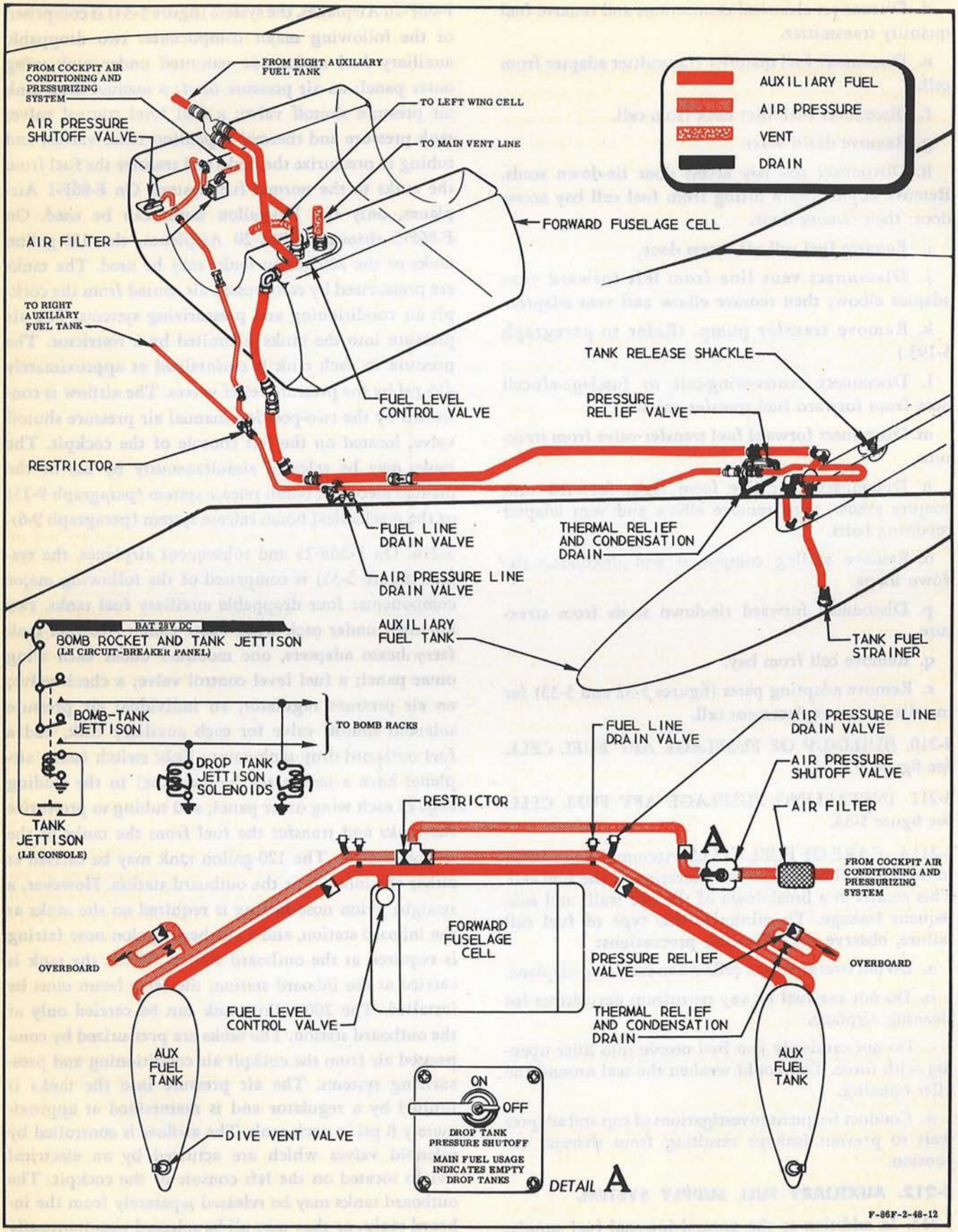


Figure 5-34. Auxiliary Fuel Supply System—F-86F-1 Through F-86F-20 Airplanes

(paragraph 9-23) or the mechanical bomb release system (paragraph 9-6).

5-215. On all airplanes, condensation drain valves are provided for the tank air pressure and fuel transfer lines. Fuel flow from the tanks to the normal fuel system is controlled automatically by the fuel level control valve, located in the upper forward left corner of the fuselage forward fuel cell. Each tank is supported by a tank shackle and a single sway brace.

5-216. FUNCTION OF AUXILIARY FUEL SUPPLY SYSTEM (F-86F-1 THROUGH F-86F-20 AIRPLANES).

5-217. With the engine operating and the drop tank air pressure shutoff valve "ON," both tanks are pressurized. When approximately 5 gallons of fuel is consumed from the fuselage forward cell, the fuel level control valve opens, allowing both pressurized tanks to feed into the fuselage forward cell simultaneously. When sufficient auxiliary fuel is transferred to refill the fuselage forward cell, the fuel level control valve closes, shutting off the incoming auxiliary fuel flow. The cycle is repeated until all auxiliary fuel is transferred to the normal fuel system.

5-218. FUNCTION OF AUXILIARY FUEL SUPPLY SYSTEM (F-86F-25 AND SUBSEQUENT AIRPLANES).

5-219. Normally, auxiliary fuel will not be carried at the inboard station only; therefore, with the engine operating and only the outboard tanks installed, the drop tank selector switch is positioned to "OUTBD ON" to pressurize the tanks. The sequence of fuel consumption is the same as that described in paragraph 5-217. When the fuel in the outboard tanks has been consumed, the outboard-drop-tank-empty light, located on the left console, illuminates. The switch is then turned to the "ALL TANKS OFF" position. If both inboard and outboard tanks are installed, fuel from the outboard tanks is used first. When the outboard-drop-tank-empty light illuminates, the switch should be turned to "INBOARD ON." The sequence of fuel consumption is the same as that described in paragraph 5-217. Main fuel usage will indicate empty inboard tanks. The switch must be left in the "ON" position to prevent collapse of the tanks.

5-220. TROUBLE SHOOTING AUXILIARY FUEL SUPPLY SYSTEM.

5-221. Refer to paragraph 5-3.

5-222. PRESSURE-CHECKING AUXILIARY FUEL SUPPLY SYSTEM (F-86F-1 THROUGH F-86F-20 AIRPLANES).

5-223. The system may be pressure-checked by use of an external dry-air supply or with the engine in operation as follows:

a. If an external air supply is used, disconnect cockpit air conditioning system air pressure line from filter, and connect an external 20 psi air pressure supply to the filter inlet.

b. Connect 0 to 25 psi air pressure gages to air outlet connections in bottom of wing outer panels.

c. If an external air supply is not used, start and operate engine at 60% (±5%) rpm.

d. Move manual drop tank air pressure shutoff valve to "ON." Both pressure gages at wing outlet connections should read 4½ (+2, −½) psi. Also note that air comes out of relief valve air discharge openings. Replace relief valve if necessary.

e. Close air pressure shutoff valve in cockpit.

f. If used, disconnect external air pressure source and connect engine compressor air supply line at air pressure filter.

g. Remove air pressure gages.

5-224. PRESSURE-CHECKING AUXILIARY FUEL SUPPLY SYSTEM (F-86F-25 AND SUBSEQUENT AIRPLANES).

5-225. The system may be pressure-checked by use of an external dry-air supply or with the engine in operation as follows:

a. If an external air supply is used, disconnect cockpit air conditioning system air pressure line at main solenoid shutoff valve and connect external 20 psi air pressure supply to valve inlet. Also connect external electrical power supply.

b. Remove plugs in wing panels and connect 0 to 25 psi air pressure gages to air outlet connections in bottom of wing outer panels.

c. If an external air supply is not used, start and operate engine at 65% (±5%) rpm.

d. Move drop tank selector switch to "INBOARD ON." Both pressure gages at wing outlet connections at inboard stations should read 8 (+1, −½) psi. Move switch to "OUTBD ON." Both pressure gages at wing outlet connections at outboard stations should read 8 (+1, −½) psi.

e. Move drop tank selector switch to "ALL TANKS OFF."

f. If used, disconnect external electrical power and air pressure sources and connect engine compressor air supply line to main solenoid shutoff valve at inlet.

g. Remove air pressure gages and replace plugs in wing panels.

5-226. AUXILIARY FUEL SUPPLY SYSTEM AIR PRESSURE FILTER (F-86F-1 THROUGH F-86F-20 AIRPLANES).

5-227. The air pressure filter (figure 5-34) is located in the left gun compartment. The filter consists of a single

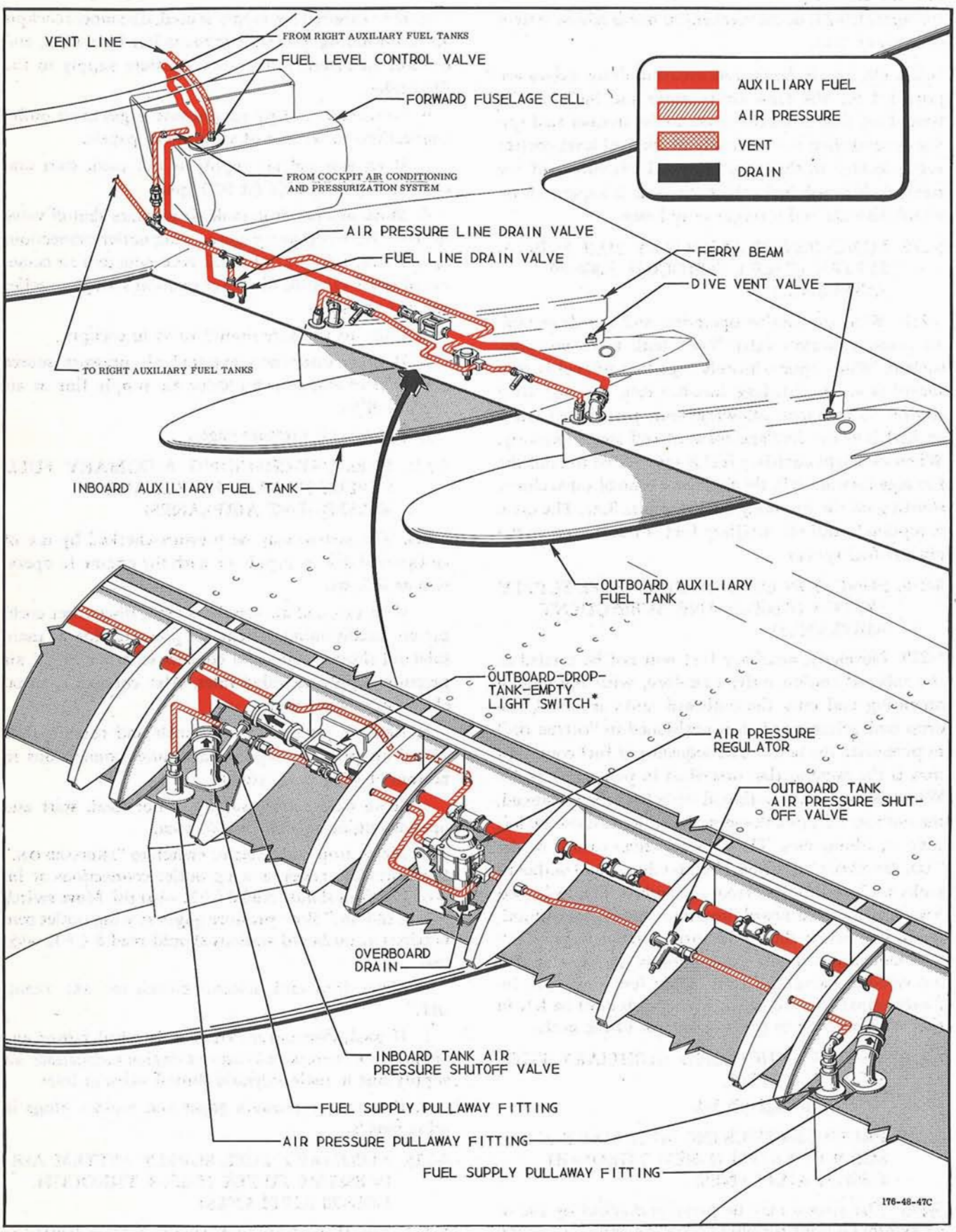


Figure 5-35. Auxiliary Fuel Supply System—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)

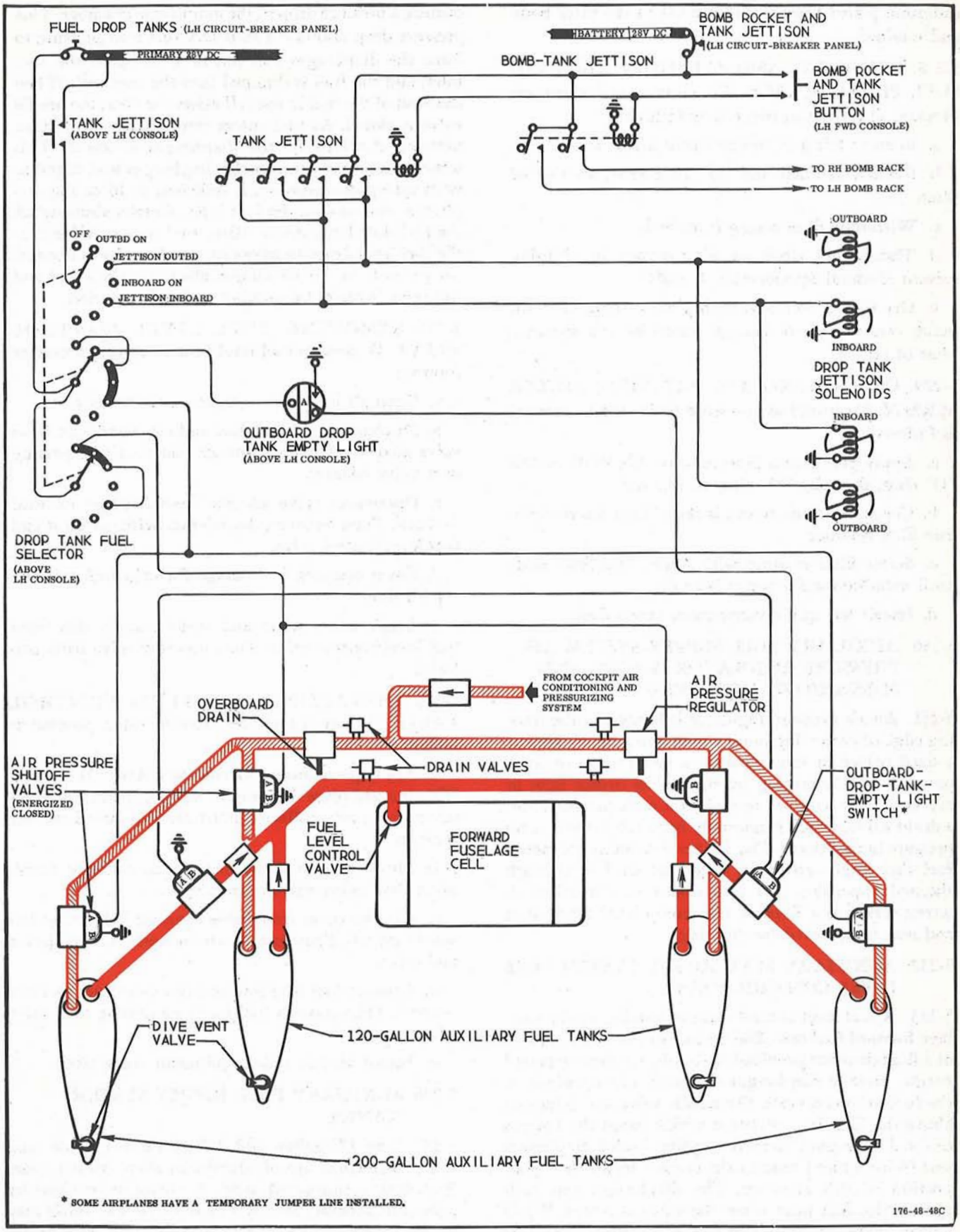


Figure 5-35. Auxiliary Fuel Supply System—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

cadmium-plated brass screen housed in the filter body and retainer.

5-228. REMOVING AND CLEANING AIR PRESSURE FILTER SCREEN. To remove and clean air pressure filter screen, proceed as follows:

a. Remove left gun compartment access door.

b. Remove retainer and "O" ring from aft side of filter.

c. Withdraw filter screen from body.

d. Thoroughly rinse air filter screen in cleaning solvent (Federal Specification P-S-661).

e. Dry filter screen thoroughly with compressed air, being careful not to damage screen by too strong a blast of air.

5-229. INSTALLING AIR PRESSURE FILTER SCREEN. To install air pressure filter screen, proceed as follows:

a. Apply petrolatum (Specification AN-P-51) to new "O" ring; then slip "O" ring on retainer.

b. Check to be sure screen is clean; then insert screen into filter retainer.

c. Screw filter retainer with screen into filter body until metal-to-metal contact is made.

d. Install left gun compartment access door.

5-230. AUXILIARY FUEL SUPPLY SYSTEM AIR PRESSURE REGULATOR (F-86F-25 AND SUBSEQUENT AIRPLANES).

5-231. An air pressure regulator is located in the leading edge of each wing outer panel. The unit consists of a fixed orifice to limit airflow, a relief valve to limit pressure by discharging overboard the orifice flow in excess of that required to maintain tank pressure, and a drain valve, which is normally open when there is no pressure in the system. The drain valve drains overboard fuel that might otherwise enter the air line through thermal expansion and also drains condensation. A screen serves as a filter at the unregulated air-in port and may be removed for cleaning.

5-232. AUXILIARY FUEL SUPPLY SYSTEM FUEL LEVEL CONTROL VALVE.

5-233. A fuel level control valve is installed in the fuselage forward fuel cell. The bottom of the valve consists of a float chamber provided with a float, a float-operated needle valve, a diaphragm chamber, and openings to the fuel in the fuel cell. The needle valve seat is located above the float in a partition which forms the bottom of the diaphragm chamber. A spring-loaded diaphragm seal (with a bleed hole in the center) forms the upper portion of this chamber. The diaphragm seal seats against the fuel inlet when the valve is closed. When approximately 5 gallons of fuel is consumed, the float is lowered sufficiently to unseat the needle valve, thereby causing a pressure drop in the diaphragm chamber. This pressure drop allows the auxiliary fuel feed pressure to force the diaphragm seal down. This opens the fuel inlet, and the fuel is dumped into the fuel cell. When the level of the fuel in the cell raises the float, the needle valve is closed. As fuel enters through the bleed hole, pressure develops in the diaphragm chamber. This larger pressure area under the diaphragm seal, together with spring compression, is sufficient to force the diaphragm seal against the fuel inlet, thereby shutting off the fuel flow from the auxiliary fuel system. Whenever the fuel level drops to where the needle valve is opened, the pressure in the diaphragm chamber is relieved and the valve is ready for another cycle of operation.

5-234. REMOVING FUEL LEVEL CONTROL VALVE. To remove fuel level control valve, proceed as follows:

a. Open aft left radio equipment access door.

b. Disconnect fuel feed line and two vent lines from valve adapter. Then disconnect fuel feed line passing over valve adapter.

c. Disconnect valve adapter from fuselage forward fuel cell. Then remove valve adapter with collector and fuel level control valve.

d. Cover opening to fuselage forward fuel cell and cap all lines.

e. Break safety wires and remove angle clip from fuel level control valve. Then unscrew valve from collector.

5-235. INSTALLING FUEL LEVEL CONTROL VALVE. To install fuel level control valve, proceed as follows:

a. Apply petrolatum (Specification AN-P-51) to new "O" ring and place "O" ring on valve inlet fitting. Then screw valve into collector until metal-to-metal contact is made.

b. Install clip on screw nearest the collector standpipe; then safety valve to standpipe.

c. Remove cover from valve opening in fuselage forward fuel cell. Then install valve adapter with collector and valve.

d. Connect fuel feed line and two vent lines to valve adapter. Then connect fuel feed line passing over valve adapter.

e. Install aft left radio equipment access door.

5-236 AUXILIARY FUEL SUPPLY SYSTEM TANKS.

5-237. The 120-gallon and 200-gallon droppable auxiliary fuel tanks are of aluminum alloy construction. Each tank is supported under the wing outer panel by a shackle assembly and by a sway brace. The tanks may be disassembled to facilitate storage. They may be interchanged between the left and right wing panels by

relocation of the sway braces and interchange of the pylon fairings, dive vent valves, and fuel and air outlet cover assemblies. Pylon fairings can be reworked to fit those airplanes that have extended leading edge in place of the slats. Three drain screws are located in the bottom of each tank. Each strainer retainer plug is also provided with a drain plug.

5-238. REMOVING AUXILIARY FUEL TANKS. Removal of the auxiliary fuel tanks may be accomplished by the manual electrical bomb release system or the mechanical bomb release system. On F-86F-1 through F-86F-20 Airplanes, the two tanks may be released simultaneously. On F-86F-25 and subsequent airplanes, either the inboard tanks or the outboard tanks may be released separately, or all four tanks may be removed simultaneously. Each tank may be removed individually by use of the individual tank shackle mechanical release arm, which is actuated by use of a screwdriver through the access opening in the outboard side of each tank fairing. To remove the tanks, proceed as follows:

WARNING

The auxiliary fuel tanks should always be removed *mechanically* except when the electrical release is being checked. Before any attempt is made to handle or remove a fuel tank, the following precautionary measures should be strictly observed to avoid any possible accidents:

- Tanks and airplane structure *must* be electrically and electrostatically connected together with an electrical lead or leads, and this circuit then connected to an earth contact.
- A suitable stand or pad *must* be used to support the tanks during release.
- All personnel must stand well clear of tanks during actual tank release.
- The electrical pullaway plug and the ground lead from the release shackle circuit *must not* be pulled out of the wing as a result of the tanks dropping too far.
- The salvo switch *must not* be held in closed position. It should be depressed and released quickly.
- The fuel and air lines should be capped and sealed before electrical lead and grounding jumper are disconnected.
- All electrical power must be disconnected if tanks are to be released mechanically.

a. Drain tanks by removing the three drain screws at bottom of each tank.

b. Remove tank nose fairings and release shackle access door.

c. Disconnect sway brace at wing fitting attachment.

d. Use a suitable stand or pad, *not personnel,* to support tanks when released.

e. Release both tanks simultaneously by actuating mechanical bomb release system, or release each tank individually by actuating tank shackle release arm.

f. After tanks are removed, install cover plugs in air pressure and fuel feed line connections under wing, and remove tank support post, outboard sway brace fitting, and post pad pins.

g. If required, disassemble tanks for more compact storage.

5-239. BUILD-UP OF 120-GALLON AUXILIARY FUEL TANKS (F-86F-1 THROUGH F-86F-20 AIRPLANES). See figure 5-36.

5-240. INSTALLING 120-GALLON AUXILIARY FUEL TANKS (F-86F-1 THROUGH F-86F-20 AIRPLANES). See figure 5-37.

Note

Some airplanes may be equipped with auxiliary tanks other than those shown in figure 5-37, 5-38, 5-40, and 5-42. However, they are installed in the same manner. On airplanes with extended leading edges, pylon fairings may have to be trimmed to fit. If so, remove weather stripping from top of fairing and trim metal. Taper trim from 3/8 inch at fairing leading edge to nothing at a point 7½ inches aft of leading edge of fairing. Replace weather stripping at top of fairing.

5-241. BUILD-UP OF 120-GALLON AUXILIARY FUEL TANKS—INBOARD STATION (F-86F-25 AND SUBSEQUENT AIRPLANES). See figure 5-36.

5-242. INSTALLING 120-GALLON AUXILIARY FUEL TANKS—INBOARD STATION (F-86F-25 AND SUBSEQUENT AIRPLANES). See figure 5-38. (Refer to note in paragraph 5-240.)

5-243. BUILD-UP OF 120-GALLON AUXILIARY FUEL TANKS—OUTBOARD STATION (F-86F-25 AND SUBSEQUENT AIRPLANES). See figure 5-39.

5-244. INSTALLING 120-GALLON AUXILIARY FUEL TANKS—OUTBOARD STATION (F-86F-25 AND SUBSEQUENT AIRPLANES). See figure 5-40. (Refer to note in paragraph 5-240.)

5-245. BUILD-UP OF 200-GALLON AUXILIARY FUEL TANKS (F-86F-5 AND SUBSEQUENT AIRPLANES). See figure 5-41.

5-246. INSTALLING 200-GALLON AUXILIARY FUEL TANKS (F-86F-5 AND SUBSEQUENT AIRPLANES). See figure 5-42. (Refer to note in paragraph 5-240.)

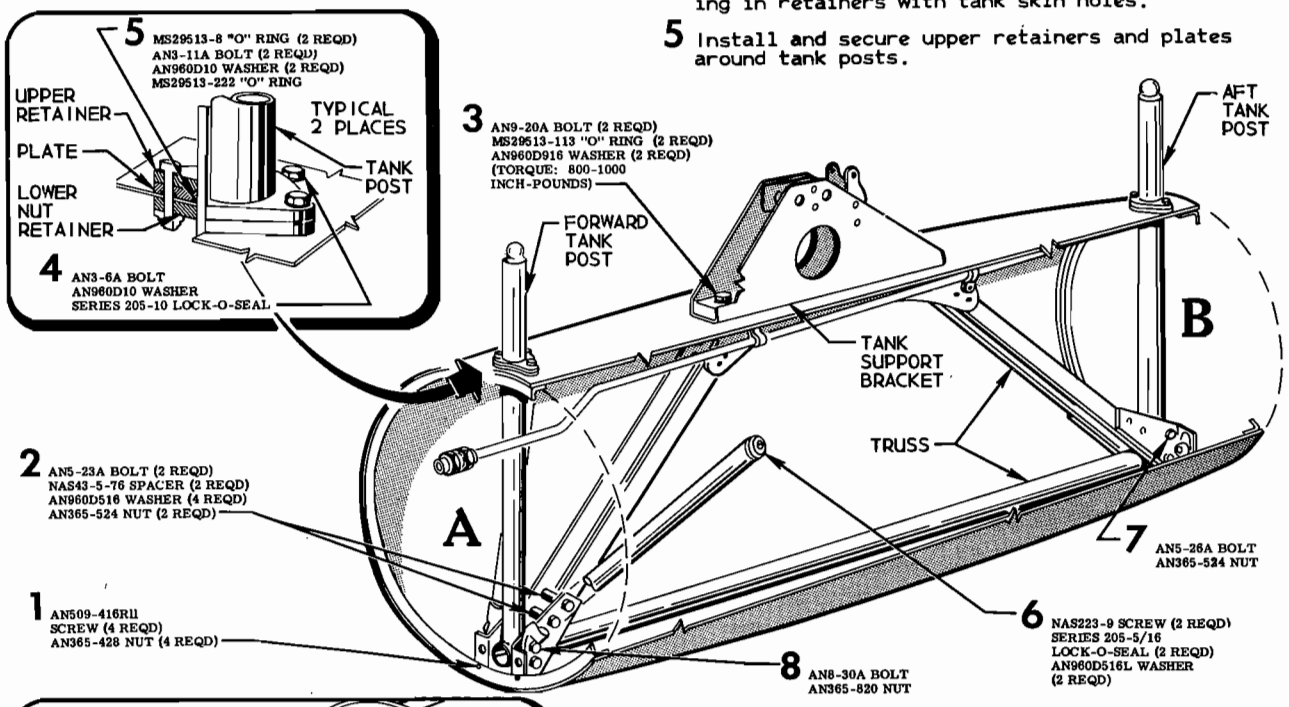
1 Install tank truss in intermediate tank section and screw both ends of truss to tank flanges. Make sure screws do not protrude more than .062 inch.

2 Secure upper and lower forward section of tank truss.

3 Install tank support bracket, bolting bracket through tank skin into tank truss. Place "O" rings between bracket and tank skin.

4 Place lower nut retainers on inside of tank and insert forward and aft posts through tank skin and retainer. Secure lower retainers to tank skin, making sure to align holes remaining in retainers with tank skin holes.

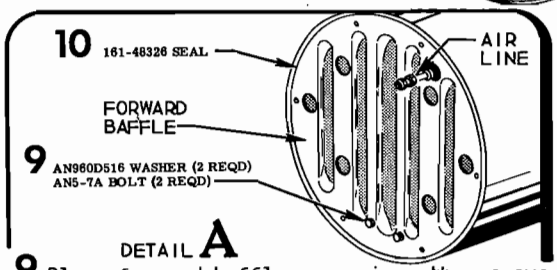
5 Install and secure upper retainers and plates around tank posts.



6 Secure sway brace struts to tank skin.

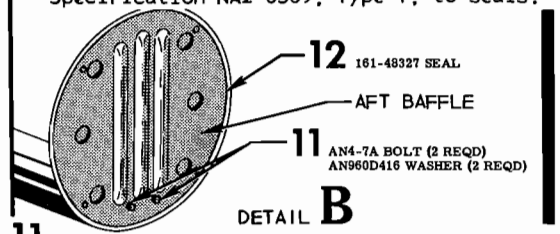
7 Secure aft post to tank truss.

8 Secure forward post and struts to tank truss.



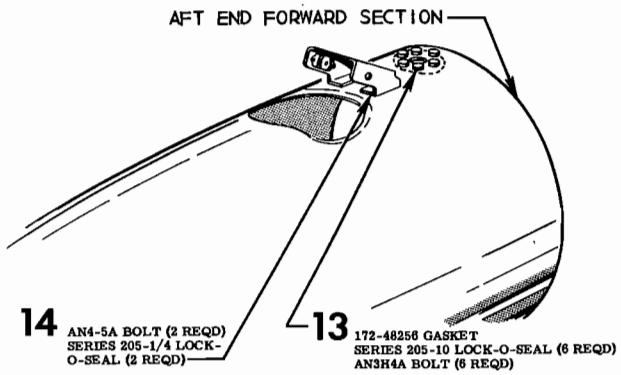
9 Place forward baffle over pins; then secure baffle to front of tank intermediate section. Secure air line to baffle clip.

10 Install seal between outer edge of baffle and tank skin. Apply thin layer of sealing compound, Specification NA2-0309, Type I, to seals.



11 Place aft baffle over pins; then secure baffle to rear of tank intermediate section.

12 Install seal between outer edge of baffle and tank skin.



13 Through aft end of forward tank section, position cover under tank opening; then secure to tank. Later tanks will not have a hole requiring a cover plate.

14 Properly position and secure fairing support bracket on forward tank section.

172-48-1306A

Figure 5-36. Build-up of 120-gallon Auxiliary Fuel Tanks—Single Station on F-86F-1 Through F-86F-20 Airplanes, and Inboard Station Only on F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)

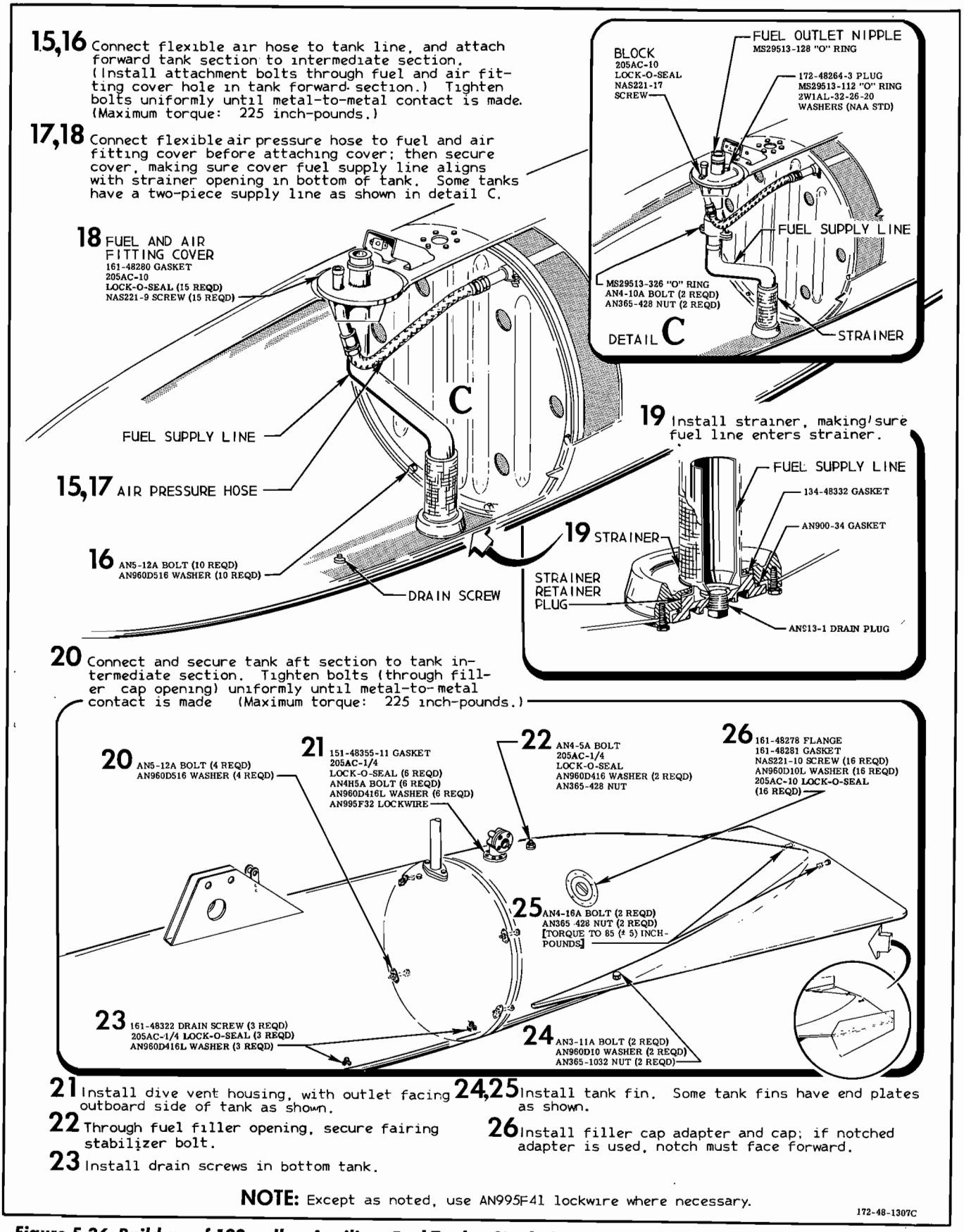


Figure 5-36. Build-up of 120-gallon Auxiliary Fuel Tanks—Single Station on F-86F-1 Through F-86F-20 Airplanes, and Inboard Station Only on F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

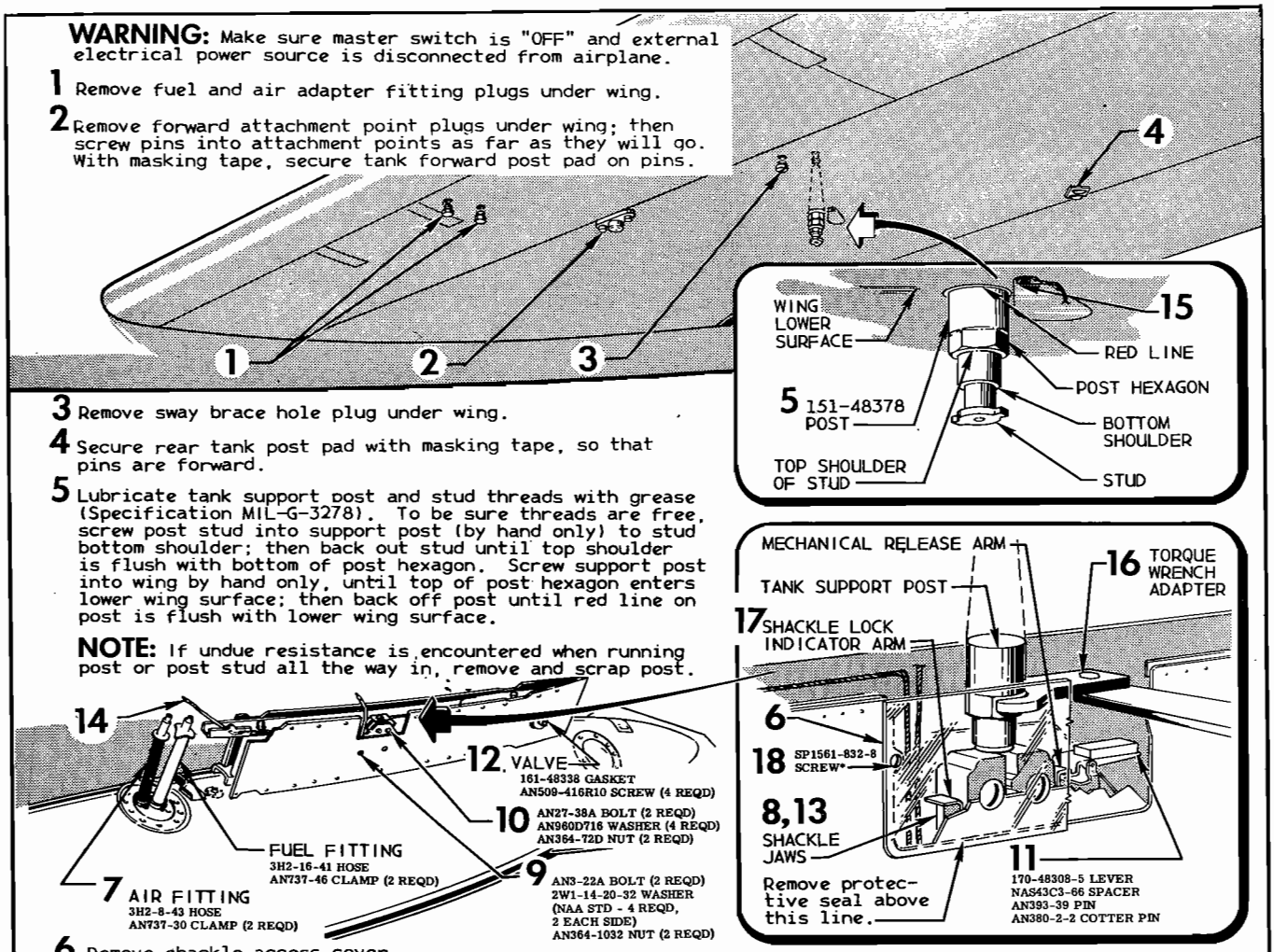
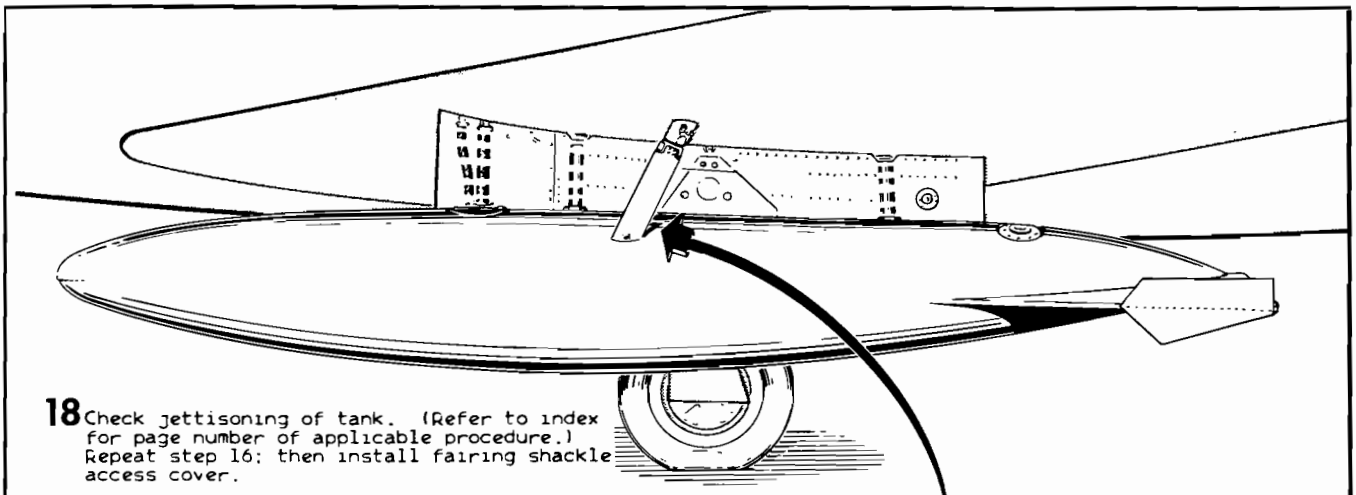


Figure 5-37. Installing 120-gallon Auxiliary Fuel Tanks—F-86F-1 Through F-86F-20 Airplanes (Sheet 1 of 2)



18 Check jettisoning of tank. (Refer to index for page number of applicable procedure.) Repeat step 16; then install fairing shackle access cover.

19 Remove tank internal strut screw, washer, and Lock-O-Seal (on outboard front of both wing tanks), and install sway brace on tank with 170-48311 washer under brace. Leave bolt loose.

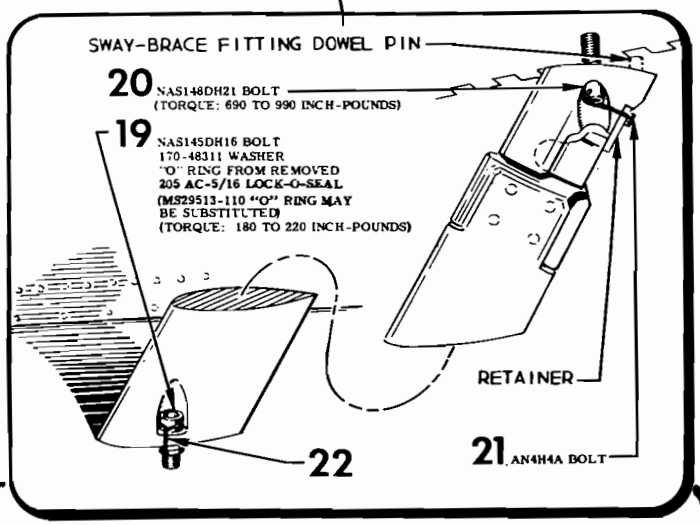
20 Locate tank sway-brace fitting by engaging dowel pin into lower wing skin; then tighten wing-fitting-internal-wrenching bolt.

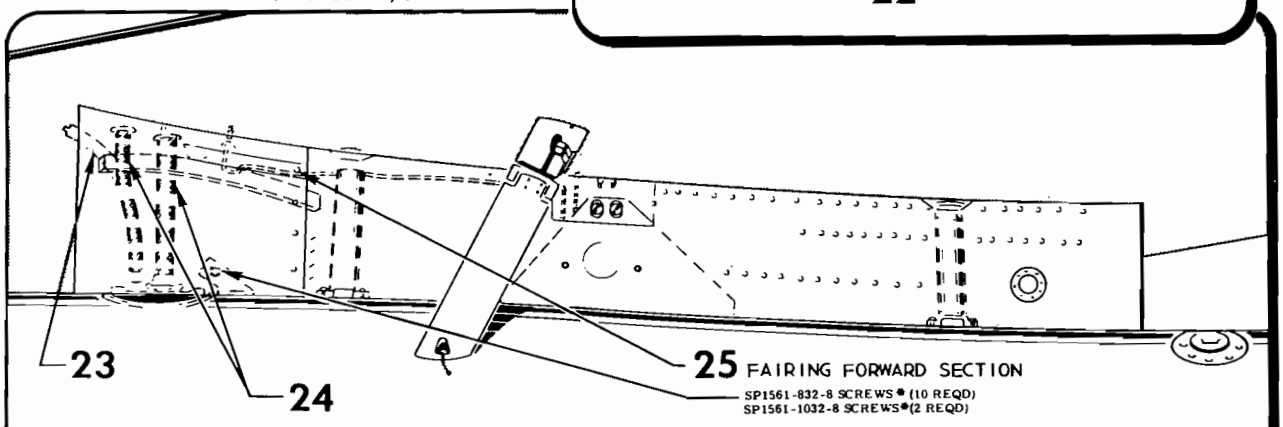
21 Engage sway brace into fitting. Tighten retainer bolt. Safety wing-fitting internal-wrenching bolt to retainer bolt.

CAUTION: Retainer must be installed so that ears of sway brace and retainer are engaged. If ears are not engaged, tank could be lost.

22 Tighten and safety sway brace to tank.

NOTE:
Use AN995F32 lockwire where necessary.





23 Close all tank openings and apply 8 psi air pressure to tank through air pressure inlet line. Check that no air leakage occurs by applying liquid soap over entire tank mating surfaces and connections.

24 Lubricate pullaway fittings with petrolatum (Specification AN-P-51); then connect fuel and air hoses and pullaway fittings to wing fittings. Make sure pullaway fittings enter fully into wing fittings. Make sure clamps will clear fairing when installed.

25 Install front section of tank fairing.

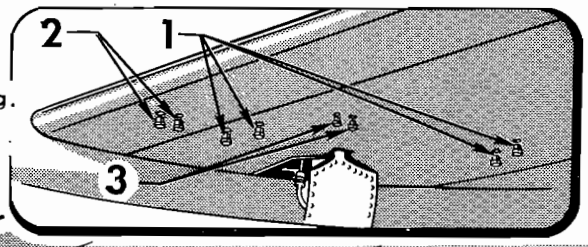
NOTE: Before tightening screws, be sure fairing nose aligns fore and aft with center part of fairing.

*Manufactured by Shakeproof, Inc

F-86F-2-48-6A

Figure 5-37. Installing 120-gallon Auxiliary Fuel Tanks—F-86F-1 Through F-86F-20 Airplanes (Sheet 2 of 2)

WARNING: Make sure master switch is "OFF" and external power source is disconnected from airplane.

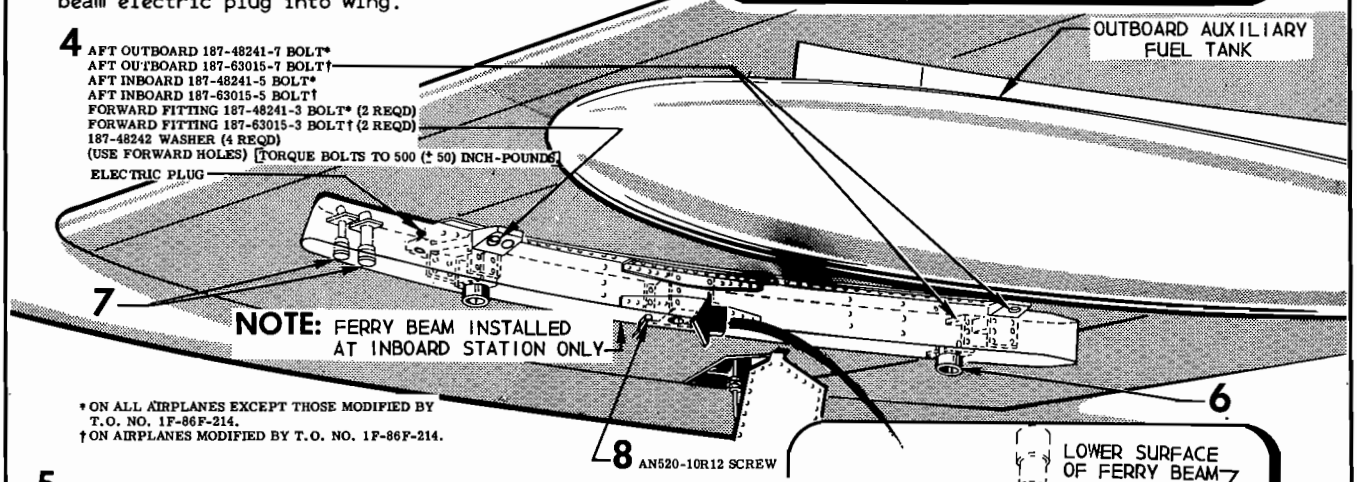


1 Remove ferry beam attachment point plugs (4) under wing.

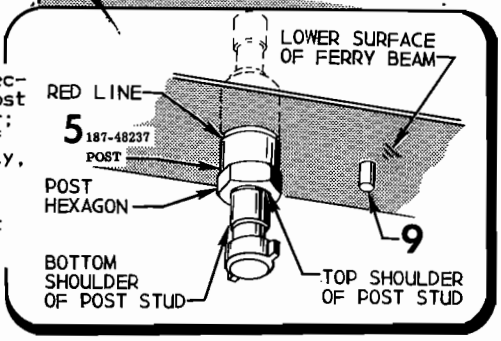
2 Remove fuel and air adapter fitting plugs under wing.

3 Remove sway brace hole plugs.

4 Install ferry beam; be sure to connect beam electric plug into wing.



*ON ALL AIRPLANES EXCEPT THOSE MODIFIED BY T.O. NO. 1F-86F-214.
†ON AIRPLANES MODIFIED BY T.O. NO. 1F-86F-214.



5 Lubricate tank support post and stud threads with grease (Specification MIL-G-3278). To be sure threads are free, screw post stud into support post (by hand only) to stud bottom shoulder; then back out stud until top shoulder is flush with bottom of post hexagon. Screw support post into ferry beam by hand only, until post hexagon enters lower surface; then back off post until red line on post is flush with lower surface.

NOTE: If undue resistance is encountered when running post or post stud all the way in, remove and scrap post.

6 Secure rear tank post pad in beam sockets with masking tape.

7 Install fuel and air fittings in ferry beam, lubricating surfaces with petrolatum (Specification AN-P-51) before installing.

8 On shackles equipped with ground wire, break splice and install loose end of wire under screw approximately 2 inches forward of post.

9 Be sure manual release plunger protrudes 3/4 inch from ferry beam when actuated and operates freely.

10 Remove fairing shackle access cover.

11 Install fuel and air hoses and fittings on tank.

NOTE: Some tanks will have a channel that extends over the hoses. In such case, the fittings are installed on the hoses after the hoses have been routed through the channel and installed on the tanks.

12 Install tank release shackle through front end of tank bracket so release solenoid is on left side of tank. Do not install shackle retainer bolts until fairing is installed.

CAUTION: Remove strippable protective seal from upper end of release mechanism. Route wire over top of fairing and through holes. Retain wire in clips at forward post.

13 Install tank fairing aft section.

14 Secure tank release shackle.

15 Install manual release arm under shackle mechanical release arm.

16 Install dive vent valve.

17 Open shackle by depressing manual release lever and spreading shackle jaws; then lift tank into position under wing, and lock tank support post in release shackle jaws.

NOTE: After installing but before torquing external fuel tanks, press the indicator arm (plunger), which protrudes from the top of the shackle opposite the manual release lever, to determine the locked position. If the plunger will bottom on the housing with finger pressure (5 pounds minimum), the mechanism is not locked. If only 1/8-inch travel is possible, the shackle jaws are safely locked.

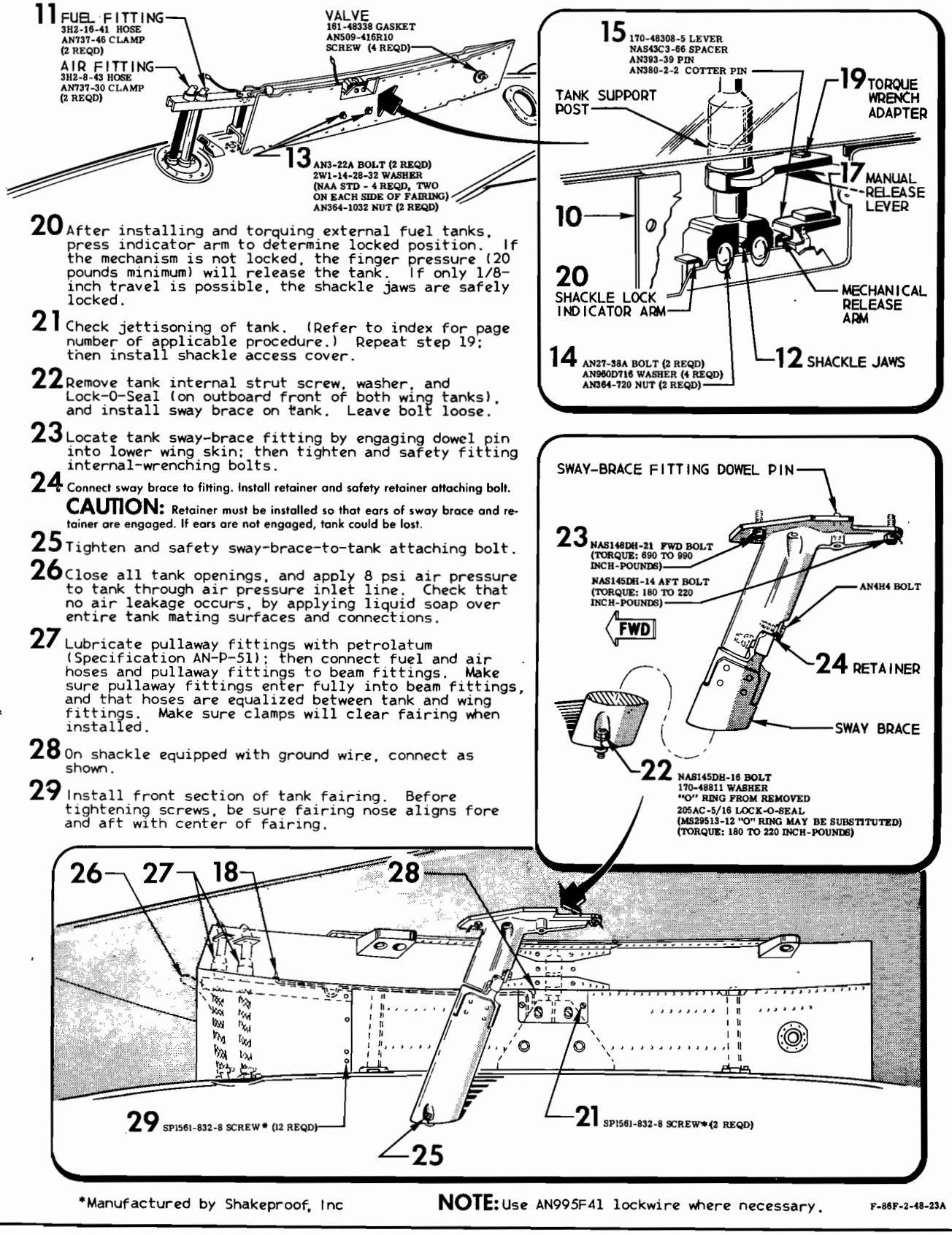
18 Connect tank release shackle electrical plug to ferry beam receptacle.

19 Using torque wrench adapter T365-5, tighten tank support post to a torque of 110 to 120 foot-pounds (1320 to 1440 inch-pounds), making sure tank posts engage pads on beam. Remove tape holding post pad on beam. Distribute sealing compound (Specification AN-C-128) around jaws, stud, and upper areas of the release mechanism to close all openings through which moisture might enter the mechanism.

NOTE: To obtain reading of actual torque applied to tank support post, the torque wrench adapter must be installed at right angles to the torque wrench shank. Any other relationship between adapter and wrench will give erroneous readings.

F-86F-2-48-24A

Figure 5-38. Installing 120-gallon Auxiliary Fuel Tanks, Inboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)



20 After installing and torquing external fuel tanks, press indicator arm to determine locked position. If the mechanism is not locked, the finger pressure (20 pounds minimum) will release the tank. If only 1/8-inch travel is possible, the shackle jaws are safely locked.

21 Check jettisoning of tank. (Refer to index for page number of applicable procedure.) Repeat step 19; then install shackle access cover.

22 Remove tank internal strut screw, washer, and Lock-O-Seal (on outboard front of both wing tanks), and install sway brace on tank. Leave bolt loose.

23 Locate tank sway-brace fitting by engaging dowel pin into lower wing skin; then tighten and safety fitting internal-wrenching bolts.

24 Connect sway brace to fitting. Install retainer and safety retainer attaching bolt.

CAUTION: Retainer must be installed so that ears of sway brace and retainer are engaged. If ears are not engaged, tank could be lost.

25 Tighten and safety sway-brace-to-tank attaching bolt.

26 Close all tank openings, and apply 8 psi air pressure to tank through air pressure inlet line. Check that no air leakage occurs, by applying liquid soap over entire tank mating surfaces and connections.

27 Lubricate pullaway fittings with petrolatum (Specification AN-P-51); then connect fuel and air hoses and pullaway fittings to beam fittings. Make sure pullaway fittings enter fully into beam fittings, and that hoses are equalized between tank and wing fittings. Make sure clamps will clear fairing when installed.

28 On shackle equipped with ground wire, connect as shown.

29 Install front section of tank fairing. Before tightening screws, be sure fairing nose aligns fore and aft with center of fairing.

Figure 5-38. Installing 120-gallon Auxiliary Fuel Tanks, Inboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

NOTE: Except as noted, use AN995F41 lockwire where necessary.

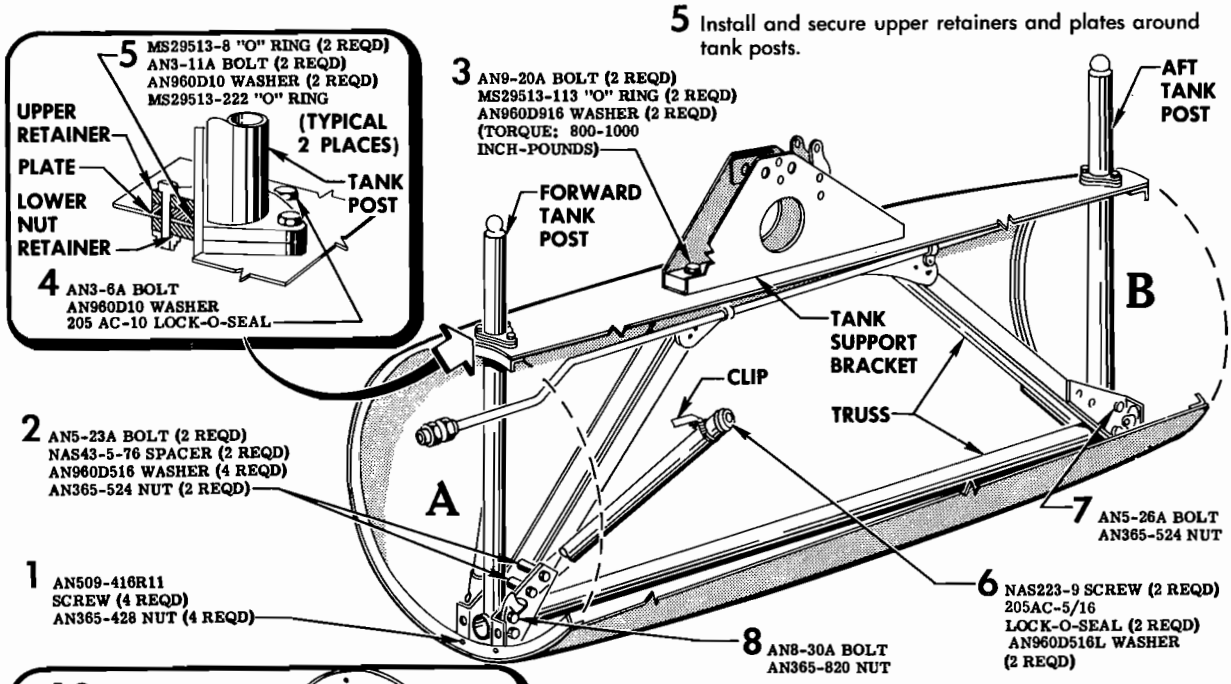
1 Install tank truss in intermediate tank section, and screw both ends of truss to tank flanges. Make sure screws do not protrude more than .062 inch.

2 Secure upper and lower forward section of tank truss.

3 Install tank support bracket, bolting bracket through tank skin into tank truss. Place "O" rings between bracket and tank skin.

4 Place lower nut retainers on inside of tank and insert forward and aft posts through tank skin and retainer. Secure lower retainers to tank skin, making sure to align holes remaining in retainers with tank skin holes.

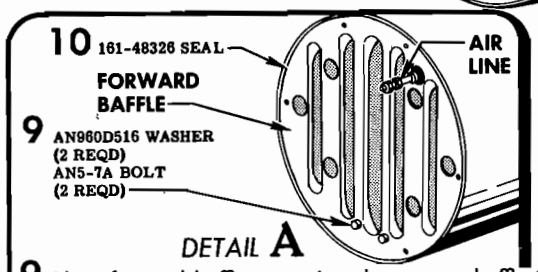
5 Install and secure upper retainers and plates around tank posts.



6 Secure and safety sway-brace struts to tank skin.

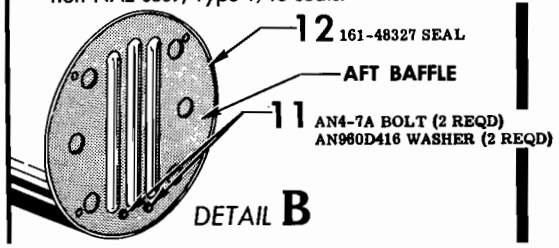
7 Secure aft post to tank truss.

8 Secure forward post and struts to tank truss.

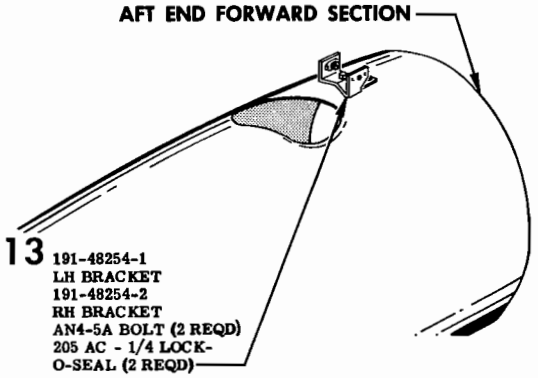


9 Place forward baffle over pins; then secure baffle to front of tank intermediate section. Secure air line to baffle clip.

10 Install seal between outer edge of baffle and tank skin. Apply thin layer of sealing compound (Specification NA2-0309, Type 1) to seals.



11 Place aft baffle over pins; then secure baffle to rear of tank intermediate section.



12 Install seal between outer edge of baffle and tank skin. Apply thin layer of sealing compound (Specification NA2-0309, Type 1) to seals.

13 Properly position and secure fairing support bracket on forward tank section.

191-48-8

Figure 5-39. Build-up of 120-gallon Auxiliary Fuel Tanks, Outboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)

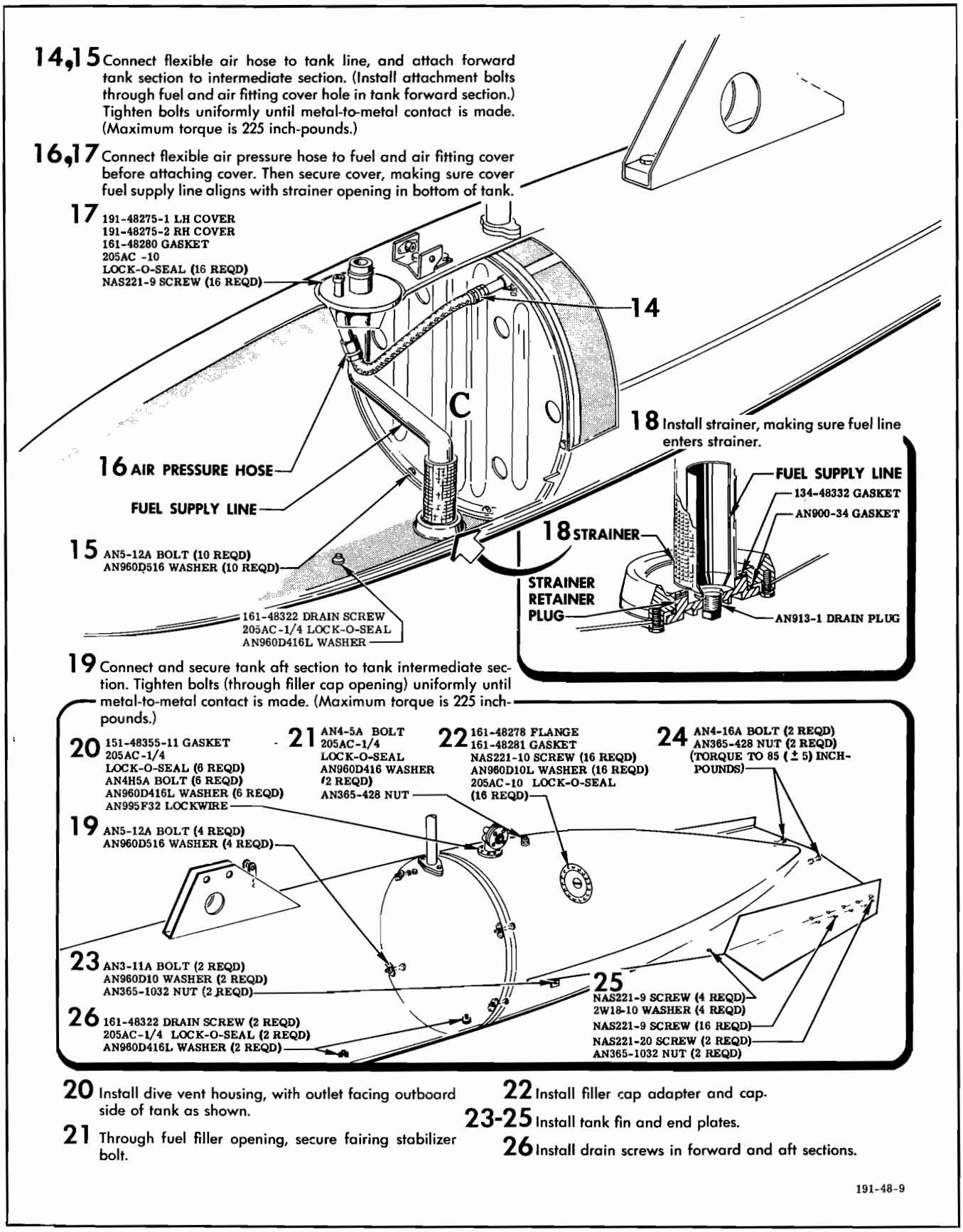


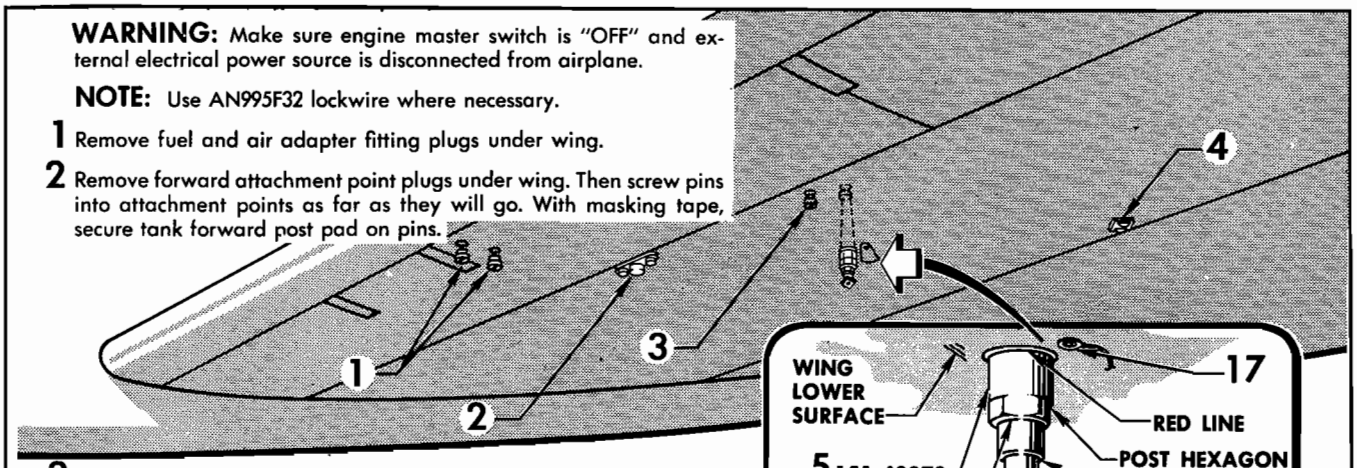
Figure 5-39. Build-up of 120-gallon Auxiliary Fuel Tanks, Outboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

WARNING: Make sure engine master switch is "OFF" and external electrical power source is disconnected from airplane.

NOTE: Use AN995F32 lockwire where necessary.

1 Remove fuel and air adapter fitting plugs under wing.

2 Remove forward attachment point plugs under wing. Then screw pins into attachment points as far as they will go. With masking tape, secure tank forward post pad on pins.



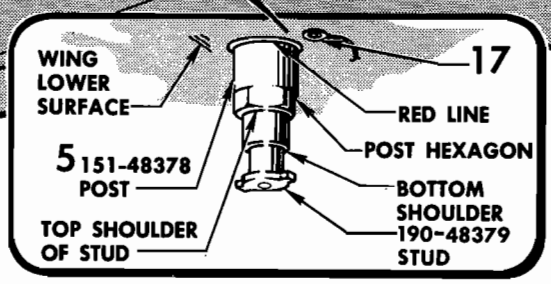
3 Remove sway-brace hole plug under wing.

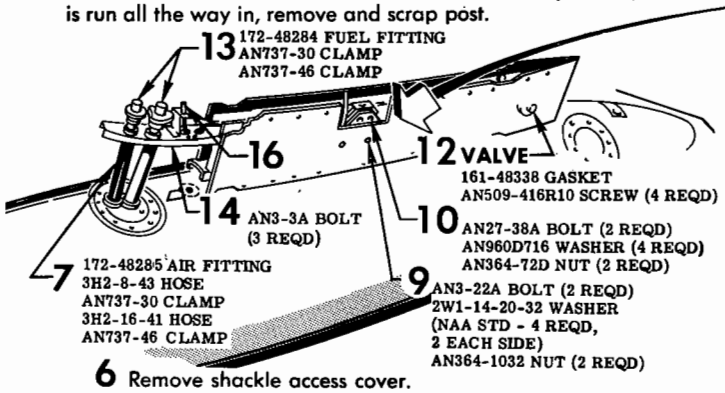
4 Secure rear tank post pad with masking tape, so that pins are forward.

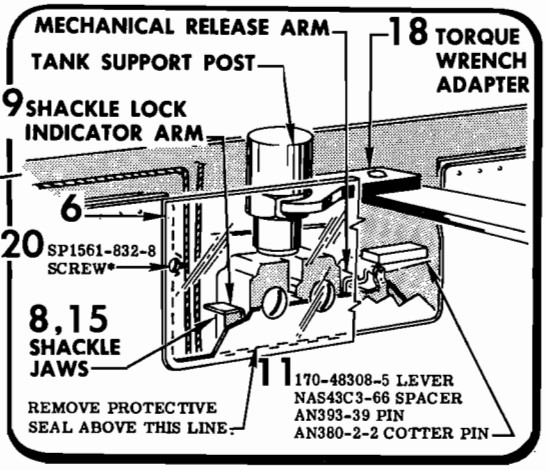
5 Lubricate tank support post and stud threads with grease (Specification MIL-G-3278). To be sure threads are free, screw post stud into support post (by hand only) to stud bottom shoulder. Then back out stud until top shoulder is flush with bottom of post hexagon. Screw support post into wing by hand only, until top of post hexagon enters lower wing surface. Then back off post until red line on post is flush with lower wing surface.

CAUTION: Be sure to use correct post.

NOTE: If undue resistance is encountered when post or post stud is run all the way in, remove and scrap post.







6 Remove shackle access cover.

7 Install fuel and air hoses on tank fittings.

8 Install tank release shackle through front end of tank bracket so that release solenoid is on left side of tank. Do not install shackle bolts until fairing is installed.

CAUTION: Remove strippable protective seal from upper end of release mechanism. Route wire over top of fairing and through holes. Retain wire in clips at forward post.

9 Install tank fairing aft section.

10 Secure tank release shackle.

11 Install manual release lever under shackle mechanical release arm.

12 Install dive vent valve.

13,14 Insert fuel and air hoses through front fairing channel and install fittings on hoses; then install channel.

15 Open shackle by depressing manual release lever and spreading shackle jaws. Then lift tank into position under wing, and lock tank support post in release shackle jaws.

NOTE: After installing but before torquing external fuel tanks, press indicator arm (plunger) which protrudes from top of shackle opposite manual release lever, to determine locked position. If plunger will bottom on housing with finger pressure (5 pounds minimum), the mechanism is not locked. If only 1/8 inch travel is possible, the shackle jaws are safely locked.

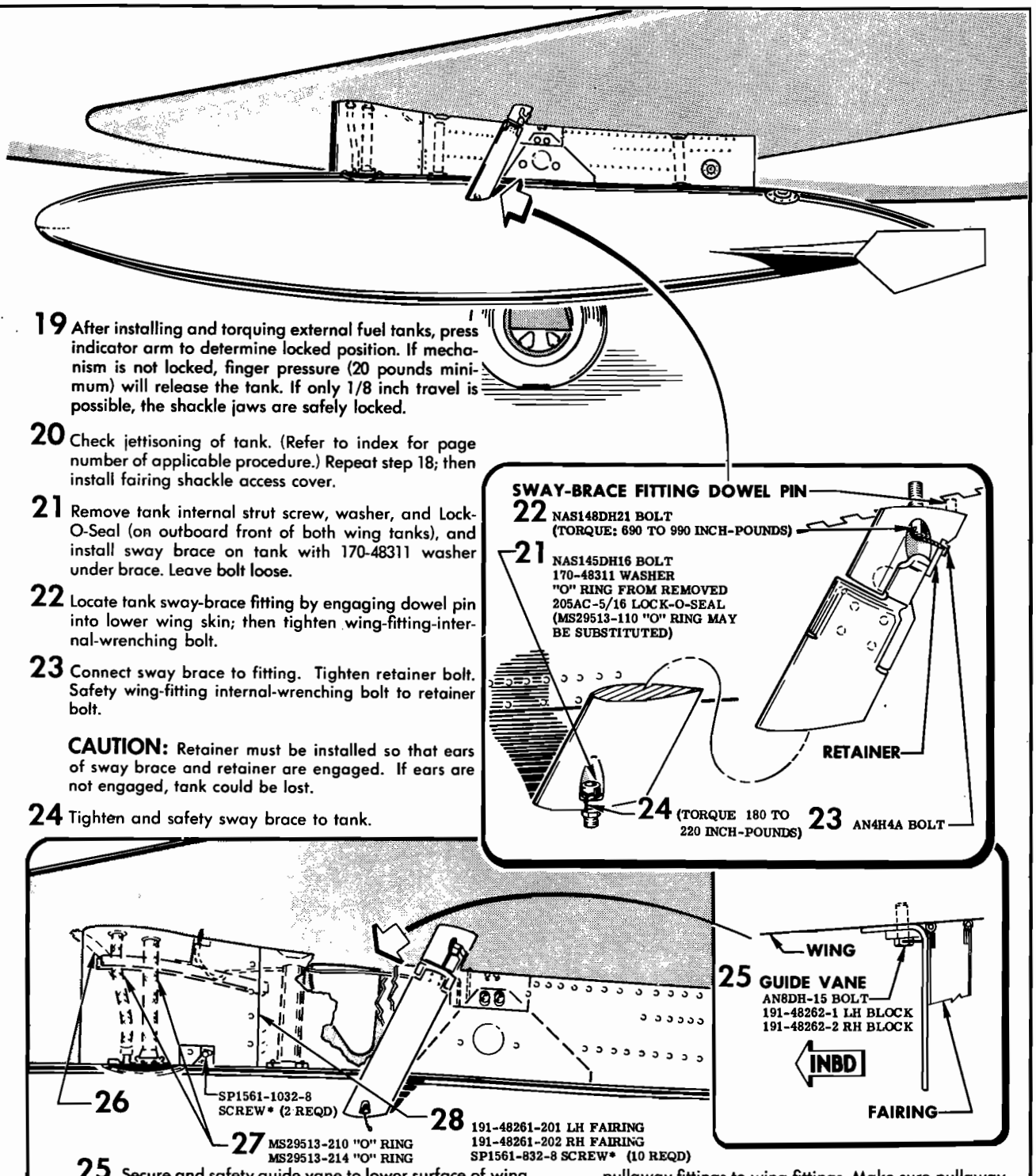
16,17 Connect tank release shackle electrical plug to wing receptacle. Secure ground wire under post cover screw.

18 Using torque wrench adapter T365-5, tighten tank support post to a torque of 110 to 120 foot-pounds (1320 to 1440 inch-pounds), making sure tank posts engage pads on wing. Remove tape holding post pads on wing. Distribute sealing compound (Specification AN-C-128) around jaws, stud, and upper areas of release mechanism to close all openings through which moisture might enter mechanism.

NOTE: To obtain reading of actual torque applied to tank support post, the torque wrench adapter must be installed at right angles to the torque wrench shank. Any other relationship between adapter and wrench will give erroneous readings.

F-86F-2-48-27

Figure 5-40. Installing 120-gallon Auxiliary Fuel Tanks, Outboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)



19 After installing and torquing external fuel tanks, press indicator arm to determine locked position. If mechanism is not locked, finger pressure (20 pounds minimum) will release the tank. If only 1/8 inch travel is possible, the shackle jaws are safely locked.

20 Check jettisoning of tank. (Refer to index for page number of applicable procedure.) Repeat step 18; then install fairing shackle access cover.

21 Remove tank internal strut screw, washer, and Lock-O-Seal (on outboard front of both wing tanks), and install sway brace on tank with 170-48311 washer under brace. Leave bolt loose.

22 Locate tank sway-brace fitting by engaging dowel pin into lower wing skin; then tighten wing-fitting-internal-wrenching bolt.

23 Connect sway brace to fitting. Tighten retainer bolt. Safety wing-fitting internal-wrenching bolt to retainer bolt.

CAUTION: Retainer must be installed so that ears of sway brace and retainer are engaged. If ears are not engaged, tank could be lost.

24 Tighten and safety sway brace to tank.

25 Secure and safety guide vane to lower surface of wing at inboard side of fairing.

26 Close all tank openings and apply 8 psi air pressure to tank through air pressure inlet line. Check that no air leakage occurs by applying liquid soap over entire tank mating surfaces and connections.

27 Lubricate pullaway fittings with petrolatum (Specification AN-P-51); then connect fuel and air hoses and pullaway fittings to wing fittings. Make sure pullaway fittings enter fully into wing fittings. Make sure clamps will clear fairing when installed.

28 Install front section of tank fairing.

NOTE: Before tightening screws, be sure fairing nose aligns fore and aft with center part of fairing.

*Manufactured by Shakeproof, Inc

F-86F-2-48-26

Figure 5-40. Installing 120-gallon Auxiliary Fuel Tanks, Outboard Station Only—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

1,2 Install drain screws in tank center section and tank forward section.

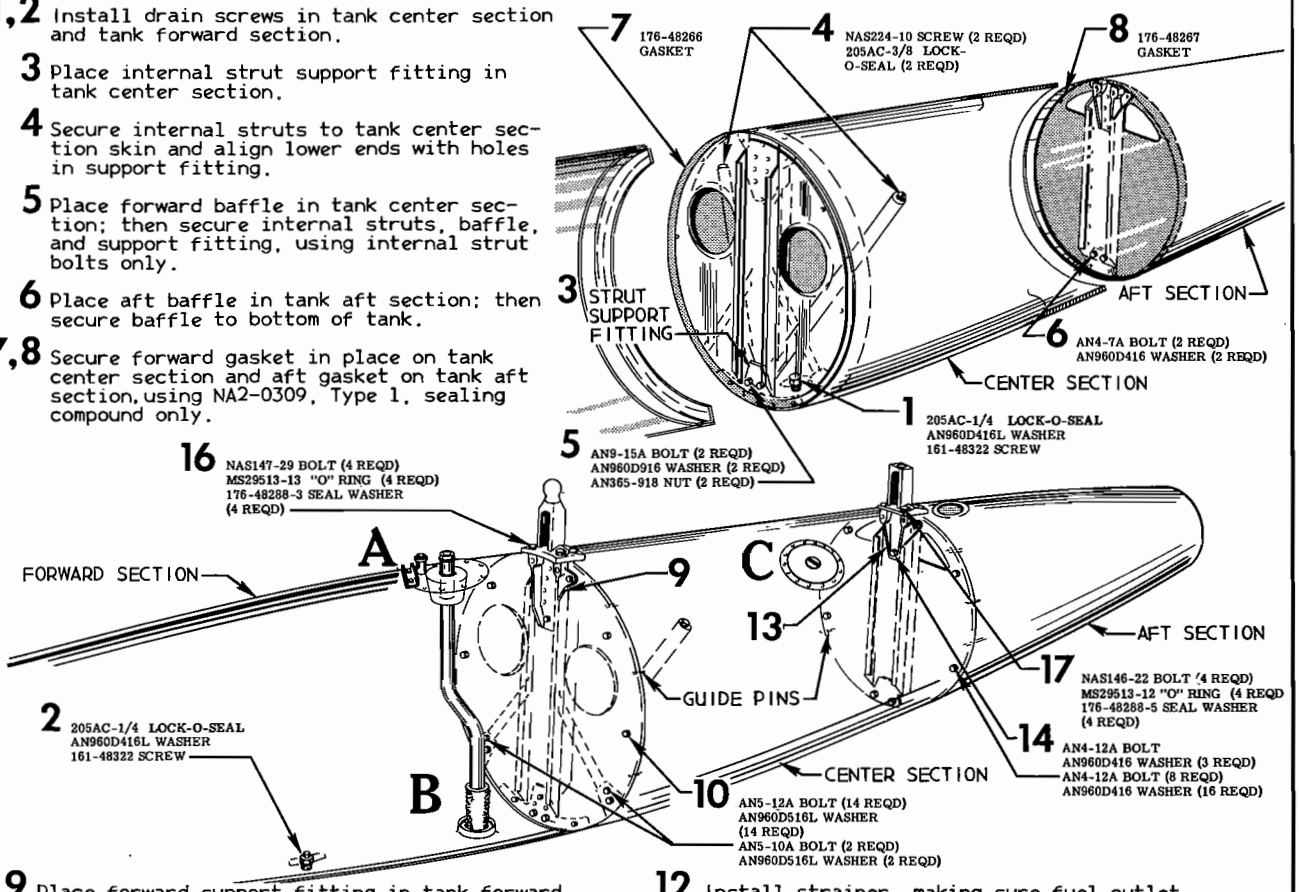
3 Place internal strut support fitting in tank center section.

4 Secure internal struts to tank center section skin and align lower ends with holes in support fitting.

5 Place forward baffle in tank center section; then secure internal struts, baffle, and support fitting, using internal strut bolts only.

6 Place aft baffle in tank aft section; then secure baffle to bottom of tank.

7,8 Secure forward gasket in place on tank center section and aft gasket on tank aft section, using NA2-0309, Type 1, sealing compound only.



9 Place forward support fitting in tank forward section, and bring tank forward section and center section together by guiding pins into their mating holes.

10 Through fuel and air fitting opening in tank forward section, secure tank forward section and forward support fitting to center section. Tighten bolts uniformly until metal-to-metal contact is made (maximum torque: 225 inch-pounds).

11 Install fuel and air fitting cover and channel, making sure fuel outlet line aligns with strainer opening in bottom of tank.

NOTE: 176-48330 channel used on F-86F-5 through F-86F-20 Airplanes only.

12 Install strainer, making sure fuel outlet line enters strainer.

13 Place rear support fitting in tank center section and bring tank center section and aft section together by guiding pins into their mating holes.

14 Through fuel filler hole in center section, secure fitting and center section to aft section. Tighten bolts uniformly until metal-to-metal contact is made (maximum torque: 100 inch-pounds).

15 Install fuel filler cap adapter and filler cap.

16,17 Attach forward and aft beam posts to tank center section, leaving bolts loose.

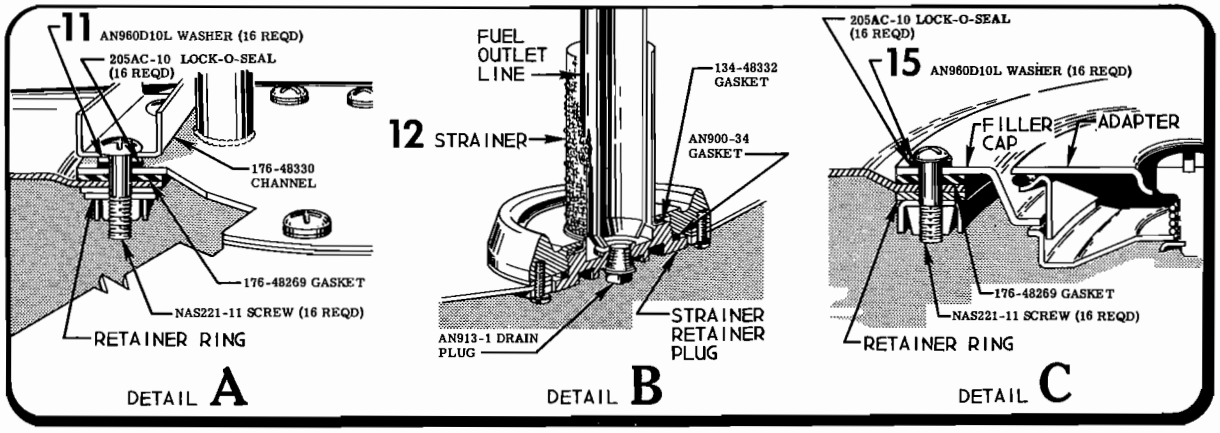


Figure 5-41. Build-up of 200-gallon Auxiliary Fuel Tanks—F-86F-5 and Subsequent Airplanes (Sheet 1 of 2)

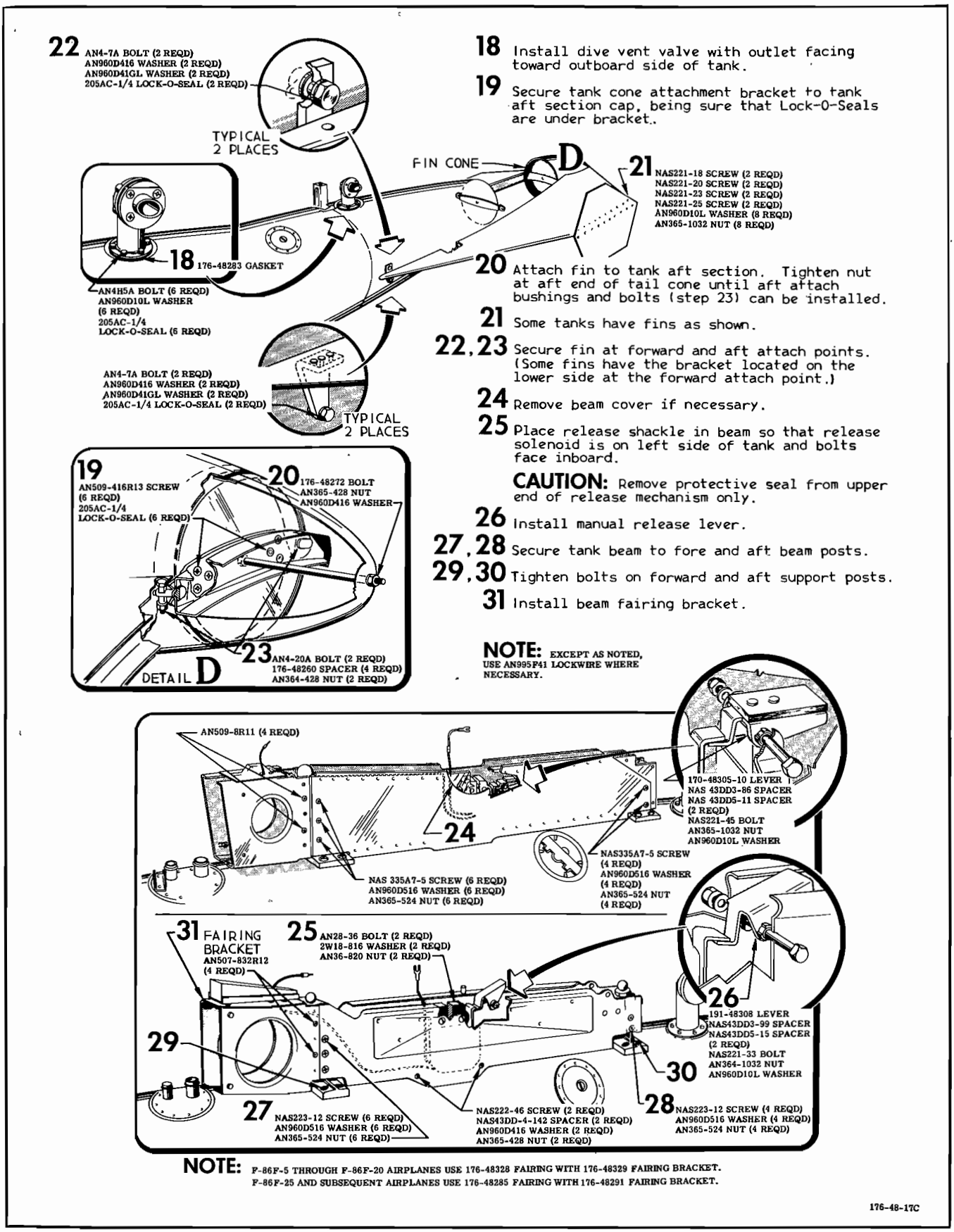
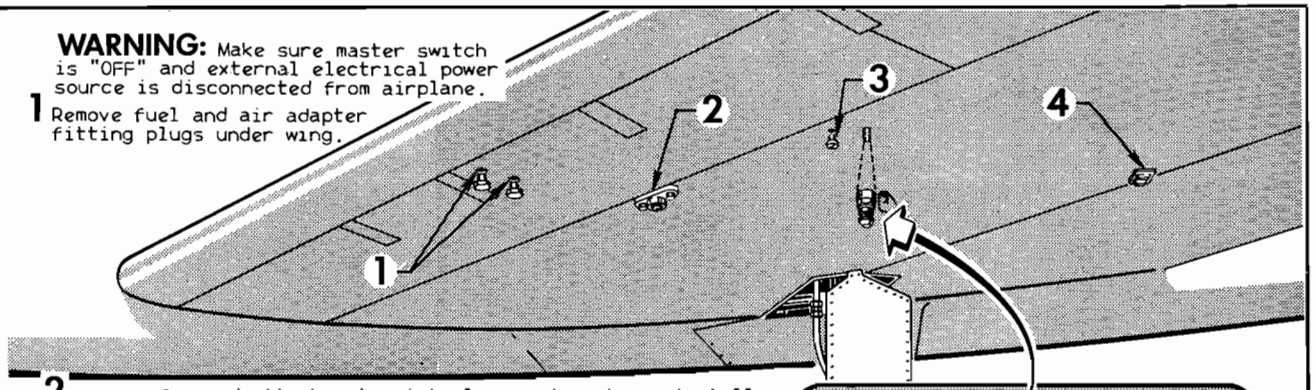


Figure 5-41. Build-up of 200-gallon Auxiliary Fuel Tanks—F-86F-5 and Subsequent Airplanes (Sheet 2 of 2)



WARNING: Make sure master switch is "OFF" and external electrical power source is disconnected from airplane.

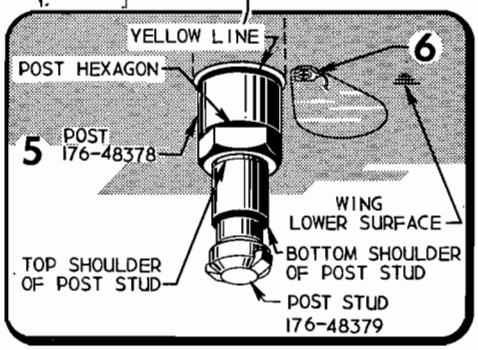
1 Remove fuel and air adapter fitting plugs under wing.

2 Remove forward attachment point plugs under wing. Install pins (176-48299) in attachment points, making sure pins extend 13/16 inch from wing. Secure forward post pad on pins with masking tape.

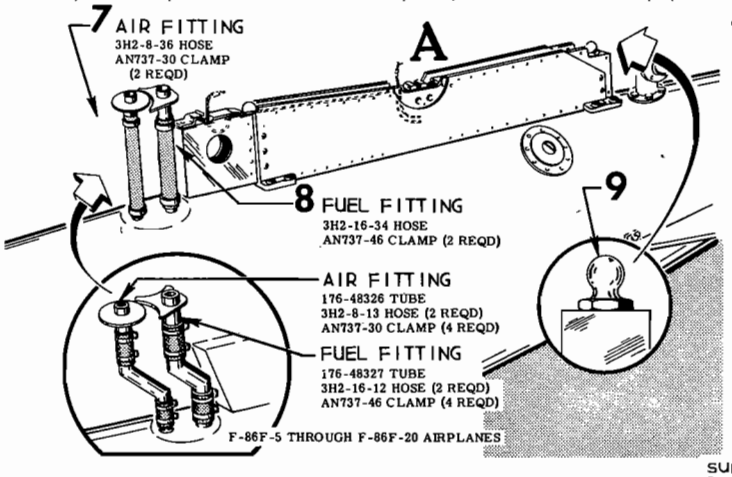
3 Remove sway-brace hole plug in wing.

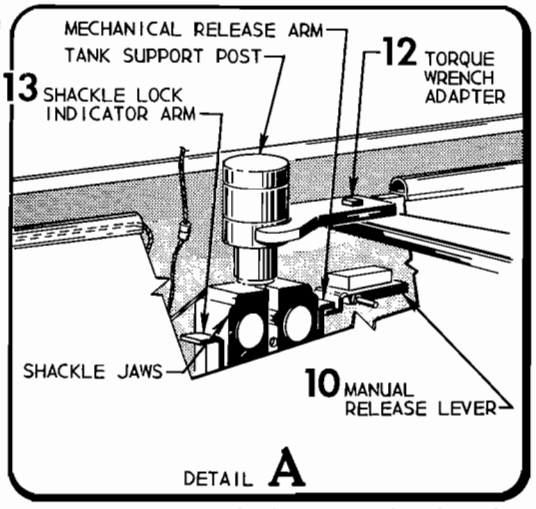
4 Extend rear tank pad support pin from wing 5/16 inch, and secure rear tank post pad in wing sockets with masking tape.

5 Lubricate tank support post and stud threads with grease (Specification MIL-G-3278). To be sure threads are free, screw post stud into support post, by hand only, to stud bottom shoulder; then back out stud until top shoulder is flush with bottom of post hexagon. Screw support post into wing, by hand only, until top of post hexagon enters lower surface, then back off post until yellow line on post is flush with lower surface.



NOTE: If undue resistance is encountered when running post or post stud all the way in, remove and scrap post.





6 On shackles equipped with ground wire, break splice and install loose end under post cover screw.

7,8 Install fuel and air hoses and fittings on tank fittings.

9 Install ball on tank aft beam post with lower surface of ball hexagon flush with top of post.

10 Open shackle by depressing manual release lever and spreading shackle jaws; then lift tank into position under wing, and lock tank support post in release shackle jaws.

NOTE: After installing but before torquing external fuel tanks, press the indicator arm (plunger), which protrudes from the top of the shackle opposite the manual lever, to determine the locked position. If the plunger will bottom on the housing with finger pressure (5 pounds minimum), the mechanism is not locked. If only 1/8-inch travel is possible, the shackle jaws are safely locked.

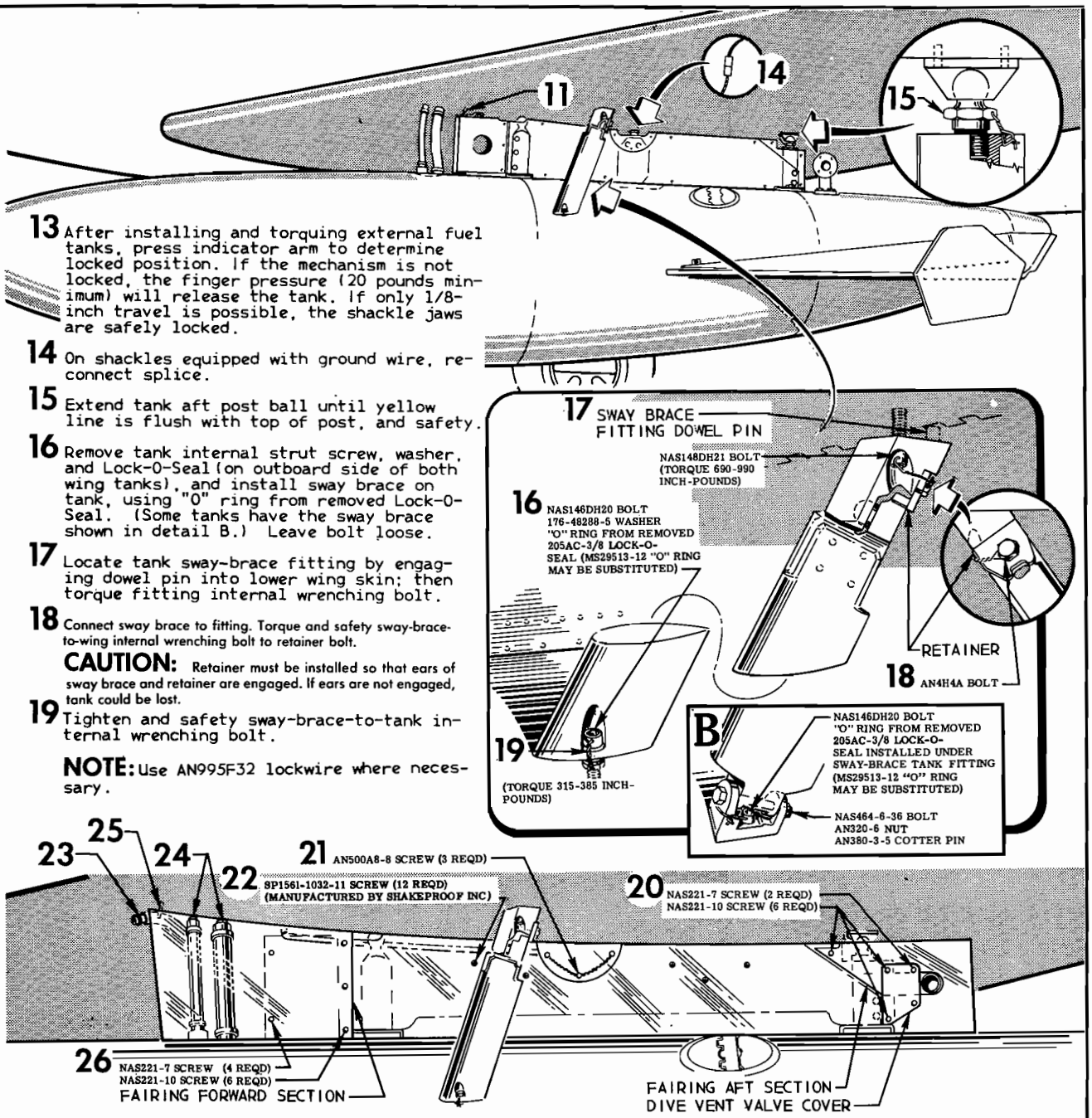
11 Connect tank release shackle electrical plug to wing receptacle.

12 Using torque wrench adapter T365-5, tighten tank support post to a torque of 135 to 145 foot-pounds (1620 to 1740 inch-pounds), making sure tank posts engage pads on wing. Remove tape holding post pads on wing. Distribute sealing compound (Specification AN-C-128) around jaws, stud, and upper areas of the release mechanism to close all openings through which moisture might enter the mechanism.

NOTE: To obtain reading of actual torque applied to tank support post, the torque wrench adapter must be installed at right angles to the torque wrench shank. Any other relationship between adapter and wrench will give erroneous torque readings.

F-86F-2-48-10A

Figure 5-42. Installing 200-gallon Auxiliary Fuel Tanks—F-86F-5 and Subsequent Airplanes (Sheet 1 of 2)



13 After installing and torquing external fuel tanks, press indicator arm to determine locked position. If the mechanism is not locked, the finger pressure (20 pounds minimum) will release the tank. If only 1/8-inch travel is possible, the shackle jaws are safely locked.

14 On shackles equipped with ground wire, reconnect splice.

15 Extend tank aft post ball until yellow line is flush with top of post, and safety.

16 Remove tank internal strut screw, washer, and Lock-O-Seal (on outboard side of both wing tanks), and install sway brace on tank, using "O" ring from removed Lock-O-Seal. (Some tanks have the sway brace shown in detail B.) Leave bolt loose.

17 Locate tank sway-brace fitting by engaging dowel pin into lower wing skin; then torque fitting internal wrenching bolt.

18 Connect sway brace to fitting. Torque and safety sway-brace-to-wing internal wrenching bolt to retainer bolt.

CAUTION: Retainer must be installed so that ears of sway brace and retainer are engaged. If ears are not engaged, tank could be lost.

19 Tighten and safety sway-brace-to-tank internal wrenching bolt.

NOTE: Use AN995F32 lockwire where necessary.

20 Install aft section of tank fairing; then install fairing dive vent valve cutout cover.

21, 22 On some airplanes install tank beam cover. On other airplanes install tank beam fairing.

23 Close all tank openings, and apply 8 psi air pressure to tank through air pressure inlet line. Check that no air leakage occurs, by applying liquid soap over entire tank mating surfaces and connections.

24 Lubricate pullaway fittings with petrolatum (Specification AN-P-51); then connect fuel and air hoses and pullaway fittings to wing fittings. Make sure that pullaway fittings enter fully into wing fittings and that hoses are equalized between tank and wing fittings. Make sure that clamps will clear fairing when installed.

25 Extend fairing forward support pin from wing 3/8 inch.

26 Install front section of tank fairing. (Use correct fairing.)

NOTE: F-86F-5 through F-86F-20 Airplanes use 176-48285 or 191-48285 fairing. Fairings 176-48328 and 176-48285 may be reworked to fit airplanes that have the extended leading edges.

F-86F-2-48-9A

Figure 5-42. Installing 200-gallon Auxiliary Fuel Tanks—F-86F-5 and Subsequent Airplanes (Sheet 2 of 2)

Note

On F-86F-5 through F-86F-20 Airplanes, the fuel and air fittings in the wing are adjustable and may be positioned to accommodate either the straight or cambered fairing, by 180-degree rotation of the cover plates.

5-247. AUXILIARY FUEL SUPPLY SYSTEM TANK RELEASE SHACKLE. The auxiliary fuel tank release shackle consists of a toggle-operated pair of jaws, with appropriate linkage, enclosed within a housing and released electrically by means of a rotary solenoid or by the manual release system. The shackle is mounted on the upper portion of the center section of the tank, between the side plates of the tank support bracket. A fairing completely encloses the shackle, leaving only the upper portion of the fuel tank release visible. The shackle is completely covered with a strippable protective seal, which should not be removed until the shackle is ready for use. If possible, during installation of the shackle on the tank, protective coating should be removed from bolt holes only. Never should more than 2 inches of the protective covering be removed from the top of the shackle, and no other protective coating should be removed. When a tank is removed, the shackle should immediately be protected, preferably by a covering of sealing compound (Specification AN-C-128). If it is necessary to remove or replace the 200-gallon tank release shackle, only the tank beam should be removed, so that the seal between the drop tank and the drop tank posts will not be damaged or broken. Posts should never be loosened or removed if only a shackle is being removed or replaced. (See figures 5-37, 5-38, 5-40, and 5-42 for shackle installation.)

5-248. FUEL FILTER DEICING SYSTEM.

5-249. On F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4305 through -5063 only, the fuel filter deicing system (figure 5-43) notifies the pilot of the presence of ice accumulation in the fuel supply system filter and warns him to inject alcohol into the filter inlet to dissipate the ice. The system consists of an alcohol tank, an electric alcohol pump, a differential pressure switch, a thermal relief valve, an alcohol solenoid shutoff valve, an amber ice-warning light, and a fuel filter deicer switch. The major components of the system are located in the left side of the fuselage, above and outboard of the left wheel well. The ice-warning light and deicer switch are located on the left side of the instrument shroud.

5-250. FUNCTION OF FUEL FILTER DEICING SYSTEM.

5-251. When ice forms within the fuel filter, a pressure differential is created across the filter element. When this pressure differential reaches a value of 3½ (±¼) psi, it is sensed by the differential pressure switch. The switch closes and illuminates the warning light in the cockpit, denoting the presence of ice in the fuel filter. The fuel filter deicer switch is then held closed. This simultaneously opens the alcohol shutoff valve and starts the alcohol pump. Alcohol is injected into the fuel filter inlet line at an approximate flow rate of one gallon per minute at 30 to 35 psi. When the ice formation is dissolved, the pressure differential across the filter falls below the set value of the pressure switch and the pressure switch opens the circuit to the warning light, causing the light to be extinguished. The extinguished light denotes that the ice has dissipated and flow of alcohol may be discontinued. The fuel filter deicer switch is released, simultaneously shutting off the alcohol pump and closing the alcohol shutoff valve.

5-252. TROUBLE SHOOTING FUEL FILTER DEICING SYSTEM.

5-253. Refer to paragraph 5-3.

5-254. TESTING FUEL FILTER DEICING SYSTEM.

5-255. A test of the system may be made with the fuel tanks full or empty. To test the system, proceed as follows:

a. Add one pint of alcohol to alcohol tank. (Refer to paragraph 1-38.)

b. Place a suitable container under fuel filter to catch the alcohol, or fuel and alcohol, when alcohol pump is started.

c. Open fuel filter drain valve.

d. Depress fuel filter deicer switch for approximately 10 seconds. This will simultaneously open alcohol shutoff valve and start alcohol pump. A 10-second period should be sufficient to transfer one pint of alcohol from tank to fuel filter.

e. Approximately one pint of alcohol should drain from filter if fuel system was drained prior to test. If fuel system was not drained, make sure that alcohol tank is empty by disconnecting feed line at bottom of alcohol tank.

5-256. FUEL FILTER DEICING SYSTEM ALCOHOL TANK.

5-257. The alcohol tank, supported by two straps in the left side of the fuselage, has a capacity of one US. gallon, all of which is usable. A filler at the top of the tank is accessible through the left engine access door. The tank is vented to the fuselage aft fuel cell vent line. No drain is provided for the tank; it is drained when the alcohol feed line at the bottom of the tank is disconnected. Access to the tank may be gained through the left engine access door and the left wheel well cover.

5-258. REMOVING ALCOHOL TANK. To remove tank, remove left engine access door and wheel well cover; then proceed as follows:

a. Disconnect engine oil "out" hose at fuselage.

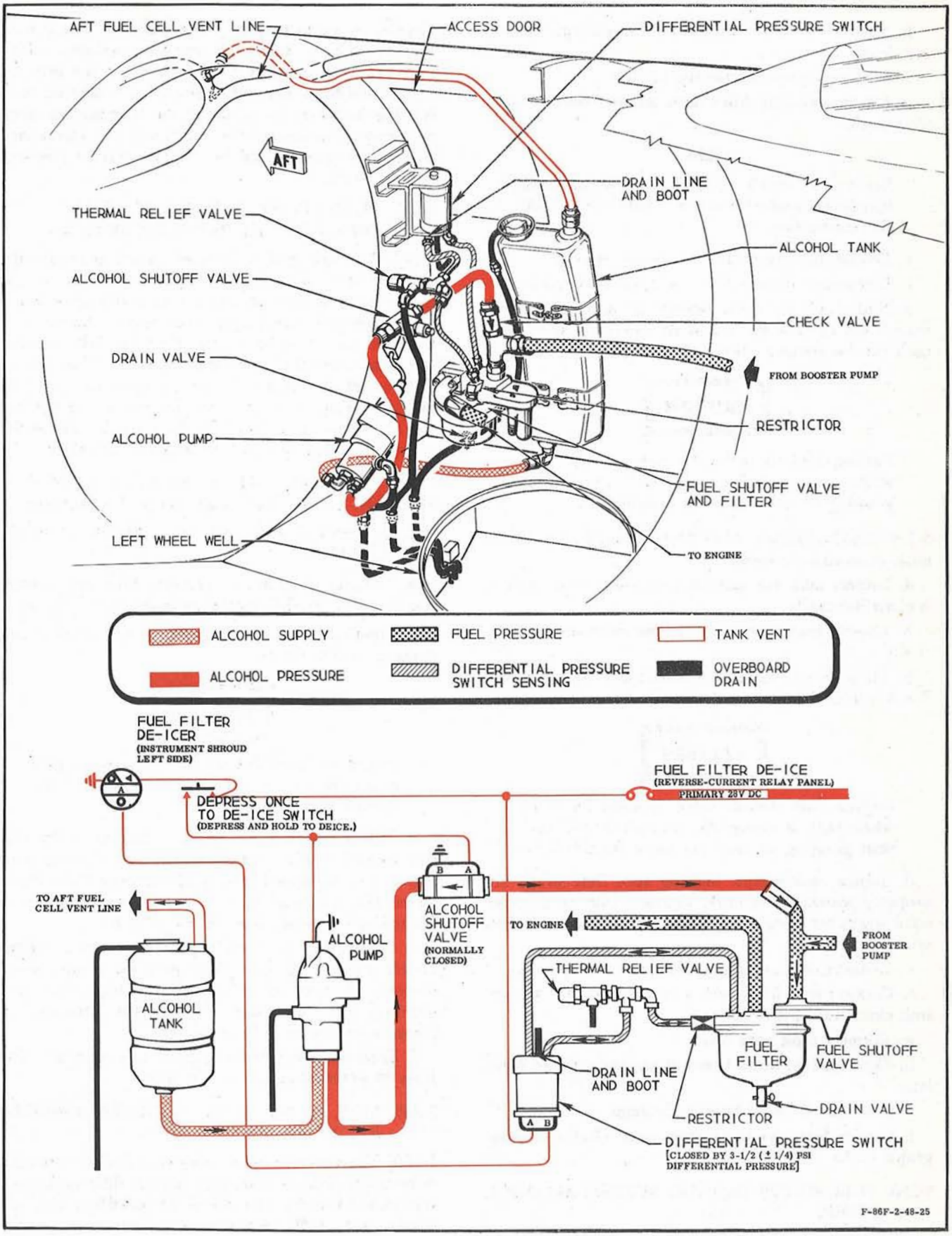


Figure 5-43. Fuel Filter Deicing System—F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5386, and F-86F-30 Airplanes AF52-4305 Through -5063

b. Disconnect fuel hoses (two) at emergency fuel regulator.

c. Disconnect vent line at top of tank.

d. Disconnect tank filler neck scupper drain line at filler neck.

Note

Removal of check valve at fuel shutoff valve may be necessary for access to filler neck drain line connection.

e. Disconnect alcohol line at bottom of tank.

f. Disconnect turnbuckles and open tank straps.

g. Slide tank up until bottom of tank clears fuel shutoff valve; then move tank inboard and down until tank can be removed through fuselage access door.

CAUTION

Pulling fuel shutoff valve inboard by hand while tank is being removed will prevent gouging of tank on some installations.

5-259. INSTALLING ALCOHOL TANK. To install tank, proceed as follows:

a. Inspect tank for general condition; make sure it is clean internally.

b. Inspect tank straps for proper condition and security.

c. Through fuselage access door, carefully work tank down into position.

CAUTION

Pulling fuel shutoff valve inboard by hand while tank is being slid into place will prevent gouging of tank on some installations.

d. Secure tank straps, making sure that straps are properly positioned on tank. Tighten strap turnbuckles until straps are snug and supporting tank firmly; then safety turnbuckles.

e. Connect alcohol line at bottom of tank.

f. Connect tank filler neck scupper drain line and install check valve, if removed.

g. Connect tank vent line.

h. Connect fuel hoses (two) at emergency fuel regulator.

i. Connect oil "out" hose at fuselage.

j. Service filter deicing system tank. (Refer to paragraph 1-38.)

5-260. FUEL FILTER DEICING SYSTEM ALCOHOL PUMP.

5-261. The electrically driven pump is mounted in the fuselage, above the left wheel well, and receives the alcohol by gravity from the tank. The pump forces alcohol under 30 to 35 psi pressure at an approximate flow rate of one gallon per minute into the inlet side of the fuel filter element. The pump is secured to the fuselage structure by a bracket and four screws. Access to the pump is through the left wheel well access cover. The pump is energized by the momentary push-type deicer switch.

5-262. FUEL FILTER DEICING SYSTEM DIFFERENTIAL PRESSURE SWITCH.

5-263. The differential pressure switch is mounted in the fuselage, above the fuel filter. The switch consists of two bellows that act upon a normally open switch. Two pressure-sensing lines interconnect the switch to the fuel filter. One line senses the filter inlet pressure; the other senses the filter outlet pressure. A fuel pressure differential of 3½ (±¼) psi between the inlet and outlet sides of the filter closes the switch to illuminate the amber warning light in the cockpit. The switch is accessible through the left engine access door.

5-264. TESTING DIFFERENTIAL PRESSURE SWITCH. To test the switch, proceed as follows:

a. At switch, disconnect the two differential pressure lines from filter.

b. Connect separate air pressure lines and pressure gages to the two differential pressure switch fittings.

c. Simultaneously apply air pressure of 20 psi to both pressure switch fittings.

CAUTION

Under no condition is the differential pressure switch to be subjected to a pressure differential greater than 8 psi.

d. While maintaining 20 psi at thermal relief valve side of differential pressure switch, slowly reduce air pressure to opposite fitting until warning light illuminates. The warning light should illuminate when the reduced air pressure is at 16½ (±¼) psi.

e. Continue to maintain 20 psi air pressure at thermal relief valve side of differential pressure switch. Slowly increase air pressure at opposite switch fitting until warning light goes out. When light goes out, air pressure should be 17½ (±¼) psi.

f. Disconnect air pressure lines and reconnect filter lines to differential pressure switch.

5-265. FUEL FILTER DEICING SYSTEM THERMAL RELIEF VALVE.

5-266. The thermal relief valve is installed in the fuel differential pressure line, between the differential pressure switch and the inlet side of the fuel filter. The valve is set to open at 50 (±5) psi and relieve excess pressure that would be detrimental to the differential pressure switch.

5-267. FUEL QUANTITY INDICATING SYSTEM.

5-268. The fuel quantity indicating system (figure 5-44) consists of an indicator, mounted on the instrument panel; a liquidensitometer, located in the center wing cell; seven float-operated transmitters (one in the fuselage forward cell, one in the fuselage aft cell, one in the center wing cell, and two in each outer wing cell); a liquidensitometer switch; and an adjustment panel, located in the right pressure barrier cover. The transmitters, connected in series, totalize the volume of the fuel in the cells. The liquidensitometer, which is connected in series with the transmitters, corrects readings to the indicator for indications in pounds of fuel. The normal "IN" position of the liquidensitometer switch causes the indicator to give a density-corrected reading in pounds of fuel. The "OUT" position of the switch causes the indicator to give an uncorrected reading in pounds of fuel.

5-269. FUNCTION OF FUEL QUANTITY INDICATING SYSTEM.

5-270. When the 28-volt bus is energized, direct current is applied across the seven fuel quantity transmitters and the density-sensitive liquidensitometer to the fuel quantity indicators. With the fuel cells full, the float-actuated mechanical linkage of each transmitter maintains the transmitter wiper arms at the extreme right on the two resistance strips. (See figure 5-44.) This causes the resistance value of the transmitter inner resistance strip to be less than that of the outer resistance strip. Thus, more current flows through the indicator "full" coil than through the "empty" coil, and the resultant electromagnetic force maintains the indicator pointer at the true full quantity indication. As the fuel is consumed, the transmitter outer and inner wiper arms are simultaneously moved to the left across the resistance strips by float action. When the fuel cell is half full, the current through the indicator full and empty coils is equalized to maintain the pointer of the indicator at the center of the dial. With all fuel consumed, the resistance value of the transmitter outer resistance strip is less than that of the inner resistance strip. Thus, more current flows through the indicator empty coil than through the full coil, and the resultant electromagnetic force moves the indicator pointer to the "empty" reading. When fuels of lower density are used or when the density of a given fuel is lowered because of higher temperatures, the correction is made by the nine liquidensitometer floats, which are adjusted to cut in individually as the fuel density gradually lowers. As the floats cut in one by one, they progressively increase the resistance of the circuit and prevent the indicator from giving an erroneous, too-high reading. Conversely, as the density increases, the floats are gradually cut out and the resistance of the circuit is progressively lowered to prevent the indicator from giving an erroneous, too-low reading. When the liquidensitometer switch is moved to the "OUT" position (used when the system is being adjusted), the liquidensitometer is completly cut out of the circuit so that the system responds only to volume with respect to the transmitter float position. When the switch is moved to the "IN" position (normal after tanks are filled), the liquidensitometer is cut in and system indication is corrected to include the density factor of the fuel.

5-271. TROUBLE SHOOTING FUEL QUANTITY INDICATING SYSTEM.

5-272. Refer to paragraph 5-3.

5-273. ADJUSTING FUEL QUANTITY INDICATING SYSTEM.

a. Drain fuel system. (Refer to paragraph 1-35.)

b. Make sure that liquidensitometer switch is at "IN" position.

c. Remove all transmitters (paragraph 5-282) except outer wing cell outboard transmitters and remove string access plugs.

d. Secure double string to each float arm loop, and thread string through string access hole.

e. Install transmitters (paragraph 5-285) and connect an external power source of 28 volts to airplane.

f. With all floats in full down position, check indicator to read empty.

Note

Always read indicator by sighting on same horizontal plane as indicator.

g. If indicator pointer calibration appears incorrect, remove cover from right pressure barrier for access to adjustment panel; then loosen locknut and turn "R+" adjustment screw either left or right until indicator reads empty. Tighten adjustment screw.

h. Place liquidensitometer switch in "OUT" position.

i. Raise all transmitter floats to top of their travel by pulling strings, and secure floats in this position. Check to see that indicator reads 3200 pounds. If indicator pointer calibration appears incorrect, loosen locknut and turn "R—" adjustment screw either left or right until indicator reads 3200 pounds. Tighten adjustment screw.

j. Cut and remove transmitter float strings; then install parts removed for access.

5-274. FUEL QUANTITY INDICATING SYSTEM INDICATOR.

5-275. The fuel quantity indicator (figure 5-44), located on the instrument panel, is basically of the ratiometer type (with a dial calibrated to indicate pounds of fuel) and is essentially independent of line voltage fluctuations. The indicator consists of a field coil, a moving element, and a core. The moving element consists of two

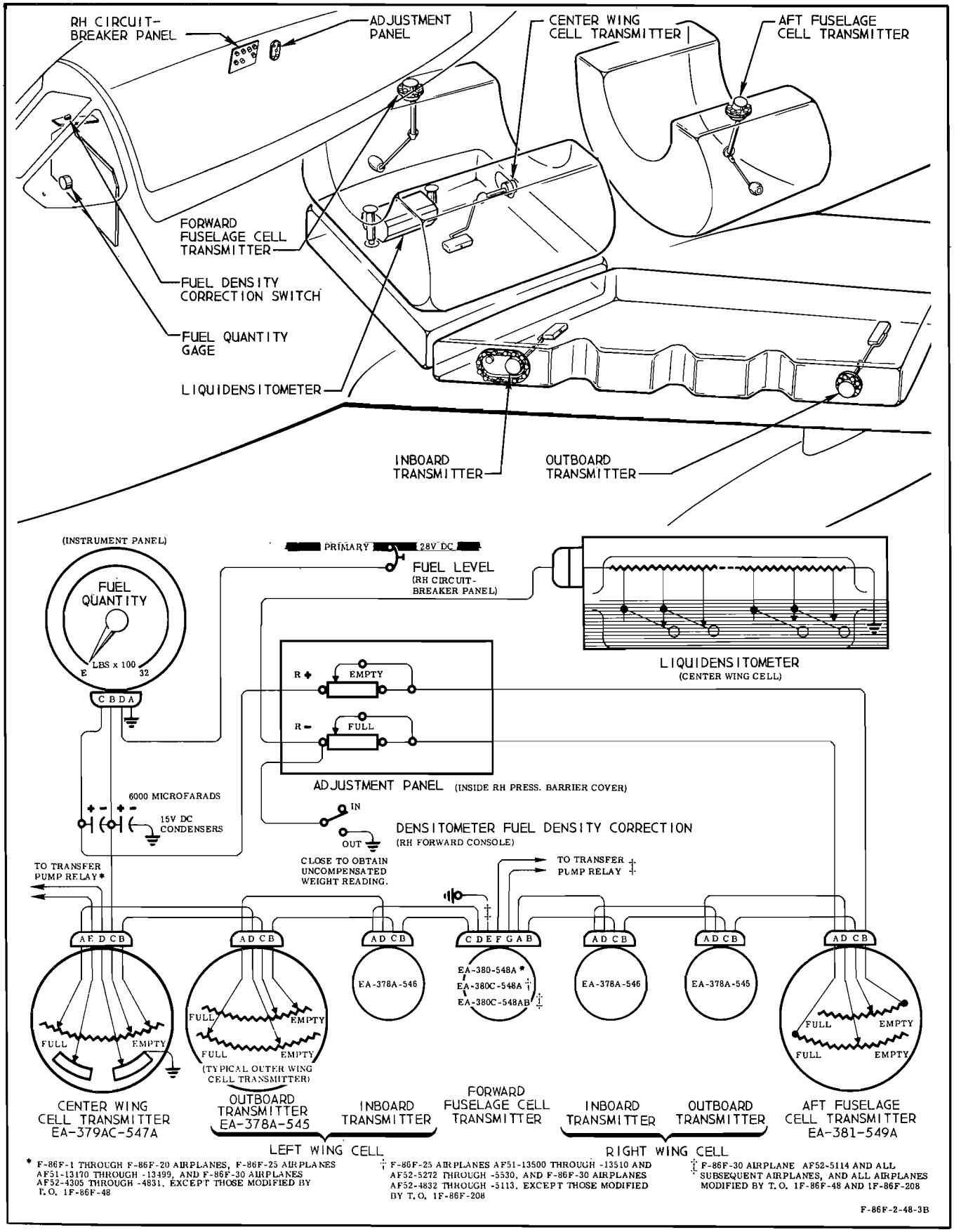


Figure 5-44. Fuel Quantity Indicating System

ratiometer coils, hairsprings, and the pointer. The position of the moving element depends entirely on the ratio of current in the two coils. As the variable resistance in the transmitters and liquidensitometer changes, the current flowing in the two coils is changed, causing the pointer to move across the indicator dial. The system has two 6000-microfarad condensers connected in parallel with the indicator ratiometer coils to reduce pointer oscillation due to fuel slosh. For indicator removal and installation procedures, refer to paragraph 6-9 and figure 6-3, respectively.

5-276. FUEL QUANTITY INDICATING SYSTEM LIQUIDENSITOMETER.

5-277. The fuel quantity liquidensitometer (figure 5-44), located in the center wing fuel cell, is essentially a density-sensitive rheostat and is connected in series with the float-actuated transmitters (potentiometers). The density-sensitive rheostat is composed of a series of resistance elements, each shunted by a float switch designed to be actuated at a specific predetermined fuel gravity. Nine floats, with accompanying float switches, are used to cover the range of fuel gravities likely to be encountered in service. The liquidensitometer is a sealed unit and not adjustable. A dry check can be made of the unit to determine whether it is functioning properly. The resistance with all floats down must be 65 to 70.2 ohms. With all floats up (unit inverted), the resistance must be 1.1 to 4.9 ohms.

5-278. REMOVING LIQUIDENSITOMETER. To remove the fuel quantity liquidensitometer, proceed as follows:

WARNING

Make sure engine master switch is "OFF" and external electrical power source is disconnected from airplane.

a. Drain fuel system. (Refer to paragraph 1-35.)

b. Remove center wing cell forward fuel booster pump. (Refer to paragraph 5-188.)

c. Through right wheel well, remove aft spar fuel quantity transmitter access door and disconnect electrical leads; then remove transmitter. (Refer to paragraph 5-282.)

d. Through transmitter access door and through booster pump access door, disconnect and remove liquidensitometer.

5-279. INSTALLING LIQUIDENSITOMETER. To install the fuel quantity liquidensitometer, proceed as follows:

a. Through transmitter access door, secure liquidensitometer to center wing cell posts and attaching supports. (See figure 5-26 for location and identification of attaching parts.)

b. Install transmitter and vent adapter on cell and connect liquidensitometer electrical leads to adapter. Install fuel quantity transmitter. (Refer to paragraph 5-285.)

c. Install fuel booster pump. (Refer to paragraph 5-189.)

5-280. FUEL QUANTITY INDICATING SYSTEM TRANSMITTERS.

5-281. The fuel quantity transmitter units (figure 5-44) are comprised of a float, connecting linkage, and a potentiometer connected in series with the liquidensitometer. The potentiometers of the units are sealed from the cell by a bellows to eliminate a fire hazard. Movements of the transmitter float are transmitted through the linkage to the contact arm, thus causing the wiper arms to move across the resistance strips. This changes the resistance ratio between the inner and outer resistance strips, which in turn changes the voltage ratio within the ratiometer coils and causes the indicator to give a different reading. An adjustable contact is located at each end of the resistance strip for making "empty" and "full" calibration adjustments.

5-282. REMOVING TRANSMITTERS. To remove fuel quantity transmitters, proceed as follows:

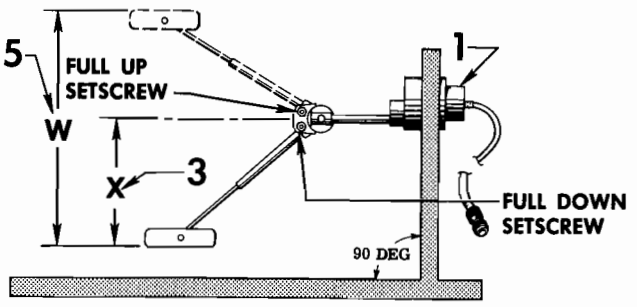
WARNING

Make sure engine master switch is "OFF" and external electrical power source is disconnected from airplane.

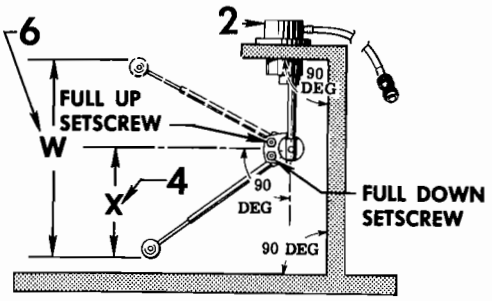
a. Drain fuel system. (Refer to paragraph 1-35.)

b. Gain access to fuel transmitters in the following manner:

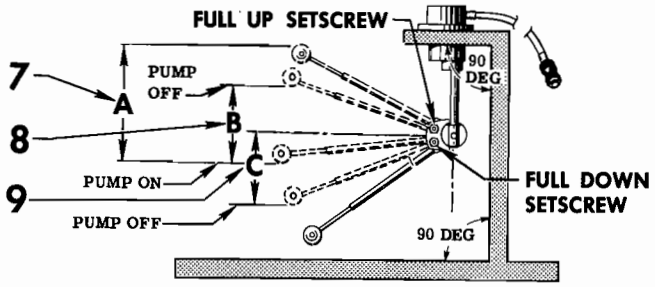
UNIT	ACCESSIBLE BY
Wing cell transmitters (two in each cell)	Removing wing leading edges. (Refer to paragraph 2-18 and see figure 5-29.) On airplanes equipped with extended leading edge, outboard transmitter can be removed through lower access cover after emergency jettison and aileron control valve cables are disconnected at wing root.
Center wing cell transmitter	Removing wing aft spar transmitter access door through right wheel well. (See figure 5-27.)



(TYPICAL FOR UNITS 1, 2, AND 3)



(TYPICAL FOR UNITS 4, 5, 6, AND 7)



A=8-1/2 IN.; B=4-7/16 IN.; C=9-7/16 IN.
(UNITS 5 AND 6)

1, 2 Secure respective fuel quantity transmitter unit in a suitable support so that vertical support is at a 90-degree true relationship to base as shown.

3, 4 Place transmitter float in full down position (dimension X) and adjust full down setscrew so that adjusting bracket will maintain applicable dimension (X) shown on reference chart.

5, 6 Place transmitter float in full up position (dimension W) and adjust full up setscrew so that adjusting bracket will maintain applicable dimension (W) shown on reference chart. Check and adjust transmitter resistance values designated on ohm resistance table. (Refer to index for page number of applicable procedure.)

7, 8 On F-86F-25 and subsequent airplanes, the fuselage forward cell transmitter must also be adjusted to dimensions A and B. These adjustments are necessary in order to energize or de-energize the transfer pump switch unit.

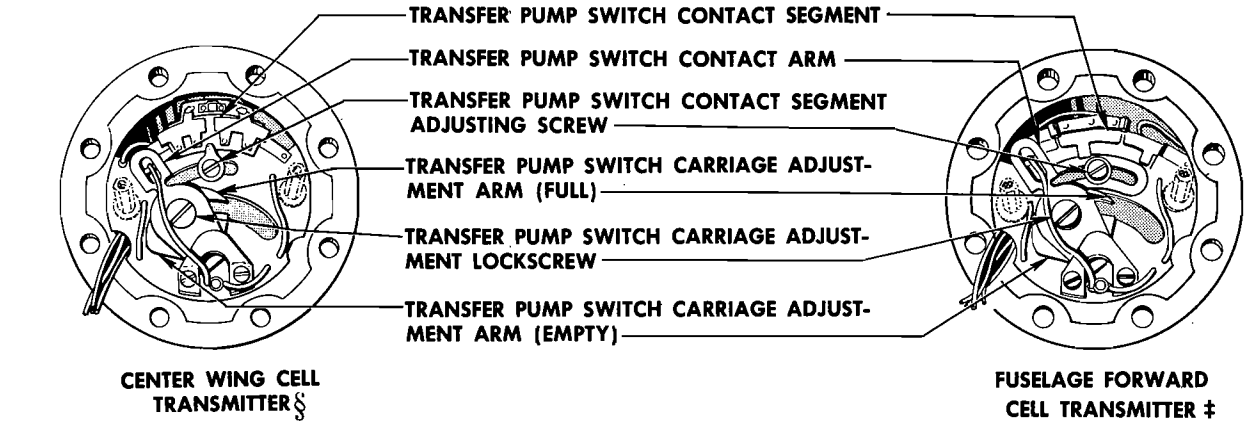
9 On F-86F-25 and F-86F-30 Airplanes and all subsquent airplanes equipped with EA-380C-548AB forward cell transmitters, dimension C adjustment must be made, too. This adjustment is necessary to de-energize the transfer pump switch unit when all fuel has been transferred from the aft cell.

REFERENCE CHART AND OHM RESISTANCE TABLE

	EMPTY–FULL DOWN			FULL–FULL UP				
	POSITION X INCHES	B-C OHM	A-D OHM	POSITION W INCHES	A-D OHM	A-C OHM	A-B OHM	B-C OHM
1 EA-379AC-547A	3-1/32	0-0.5		7-17/32		0-0.5	28.6 (±0.9)	
2 EA-378A-546	3-3/8	0-0.5	14.0 (±0.5)	7-5/16	0-0.5			14.0 (±0.5)
3 EA-378A-545	2-1/4	0-0.5	14.0 (±0.5)	6-3/16	0-0.5			14.0 (±0.5)
4 EA-380-548A	11-11/32	0-1.0	43.9 (±1.0)	18-3/8	0-1.0			43.9 (±0.5)
5 EA-380C-548A	11-11/32	0-1.0	43.9 (±1.0)	18-3/8	0-1.0			43.9 (±0.5)
6 EA-380C-548AB	11-11/32	0-1.0	43.9 (±1.0)	18-3/8	0-1.0			43.9 (±0.5)
7 EA-381-549A	11-7/16	0-1.0	45.1 (±1.0)	25-3/8	0-1.0			45.1 (±1.0)

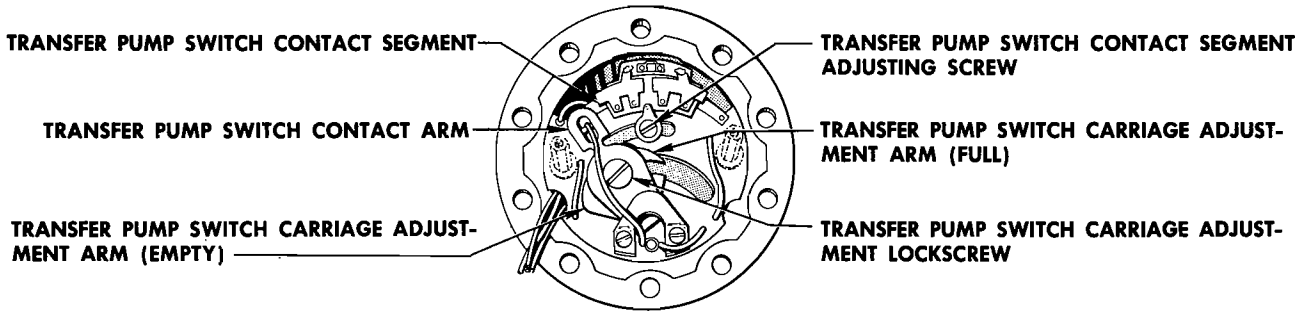
F-86F-2-48-1B

Figure 5-45. Adjusting Transmitters (Sheet 1 of 2)

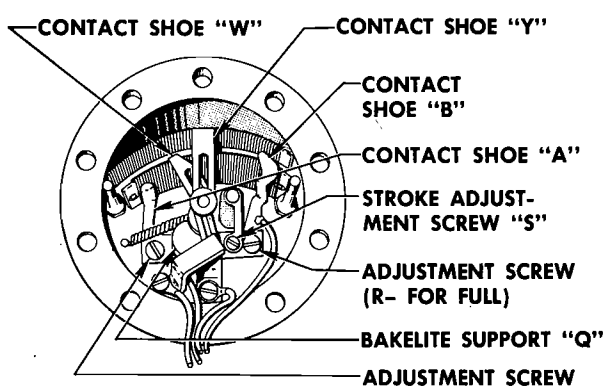


CENTER WING CELL TRANSMITTER§

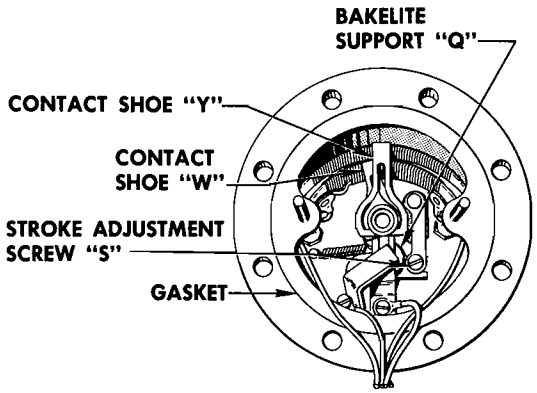
FUSELAGE FORWARD CELL TRANSMITTER ‡



FUSELAGE FORWARD CELL TRANSMITTER †



TYPICAL OUTER WING CELL TRANSMITTER



FUSELAGE AFT CELL TRANSMITTER

(FUSELAGE FWD CELL TRANSMITTER*)

*EA-380-548A
F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13499, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4831, EXCEPT THOSE MODIFIED BY T.O. 1F-86F-48 (FORMERLY 01-60JLD-54)

† EA-380C-548A
F-86F-25 AIRPLANES AF51-13500 THROUGH -13510 AND AF52-5272 THROUGH -5530, AND F-86F-30 AIRPLANES AF52-4832 THROUGH -5113, EXCEPT THOSE MODIFIED BY T.O. 1F-86F-208

‡ EA-380C-548AB
F-86F-30 AIRPLANE AF52-5114 AND ALL SUBSEQUENT AIRPLANES, AND THOSE MODIFIED BY T.O. 1F-86F-48 (FORMERLY 01-60JLD-54) AND 1F-86F-208

§ TRANSFER PUMP SWITCH OPERATIVE ONLY ON F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13499, EXCEPT THOSE MODIFIED BY T.O. 1F-86F-48 (FORMERLY 01-60JLD-54), AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4831, EXCEPT THOSE MODIFIED BY T.O. 1F-86F-48 (FORMERLY 01-60JLD-54)

F-86F-2-48-2C

Figure 5-45. Adjusting Transmitters (Sheet 2 of 2)

Fuselage aft cell transmitter	Removing engine. (Refer to paragraph 5-13 and see figure 5-33.)
Fuselage forward cell transmitter	Removing right radio and electrical compartment access door and fire detector relay panel. (See figure 5-31.)

c. Disconnect electrical lead to transmitter; then remove retaining bolts. Carefully remove unit from cell to prevent damage to float linkage.

5-283. ADJUSTING TRANSMITTERS. See figure 5-45. For transfer pump switch adjustment, refer to paragraphs 5-196, 5-197, and 5-197A.

5-284. CHECKING AND ADJUSTING TRANSMITTER RESISTANCE. The transmitters can be checked and adjusted on the airplane or on a bench. Before checking and adjusting transmitters on airplane, drain fuel system and disconnect transmitter electrical connectors. Remove transmitters (paragraph 5-282), except outboard transmitters in wing outer panel, and attach double string on float arm loop. Thread string through string access holes with plugs removed. (On fuselage cells, thread string through filler neck.) Install transmitters. (Refer to paragraph 5-285.)

Note

Outer wing outboard cell unit floats are raised by hand through the filler neck opening.

To check and adjust transmitters on the airplane or on the bench, remove transmitter head covers and proceed as follows:

Note

Fuselage transmitter adjustment is limited to step c.

a. With floats in full down position, check resistance between electrical receptacle pins for values as designated on resistance table of figure 5-45. If necessary, move shoe "W" of inner resistance strip in relation to support "Q" to obtain proper reading.

Note

All resistance measurements should be carefully taken, by means of an accurate ohmmeter or resistance bridge.

b. Raise floats to full up position and check resistances between receptacle pins as designated. If necessary, move shoe "Y" of outer resistance strip in relation to support "Q" to obtain proper reading.

c. Place floats alternately in full down and full up positions and check resistances between receptacle pins as designated. If resistance measured is greater than designated value, adjust screw "S" away from center of rotation of contact shoes "W" and "Y." If resistance measured is less than values designated, adjust screw "S" toward center of rotation of contact shoes "W" and "Y."

Note

After making the preceding adjustments, recheck resistance values as described in steps a. and b. Make slight adjustments as necessary.

If inaccuracy of transmitter is evident after transmitter resistance values are checked and adjusted, adjust transmitter linkage (figure 5-45) and repeat steps a. through c.

5-285. INSTALLING TRANSMITTERS. To install fuel level transmitters, proceed as follows:

a. Install outer wing fuel cell inboard and outboard fuel transmitters (figure 5-29); then install wing leading edge (figure 2-4).

b. Through right wheel well, install center wing cell fuel transmitter (figure 5-27); then connect electrical lead.

c. Install fuselage aft cell fuel transmitter (figure 5-33; then connect electrical lead. Install engine. (Refer to paragraph 5-17.)

d. Install fuselage forward cell transmitter (figure 5-31; then connect electrical lead. Install fire detector relay panel and right radio and electrical compartment access door.

5-286. FUEL QUANTITY INDICATING SYSTEM ADJUSTMENT PANEL.

5-287. The fuel quantity adjustment panel (figure 5-44), located in the right pressure barrier cover, is a closed unit containing an "empty" adjustment resistor and a "full" adjustment resistor. The adjustable resistors are provided to obtain the proper "full" and "empty" resistance values in the system circuit that will result in coordinated transmitter float travel and indicator pointer travel. This eliminates the need of adjusting the transmitter units individually after their total float travel has been determined and they are installed.

Note

To simplify making a resistance check of the transmitters, ohmmeter readings may be taken between the terminals of the wing disconnect plugs, between the left plug and the fuel indicator gage, and between the right plug and the fuel adjustment panel, all shown in figure 5-46. (Also see figure 5-45, and refer to Section X.)

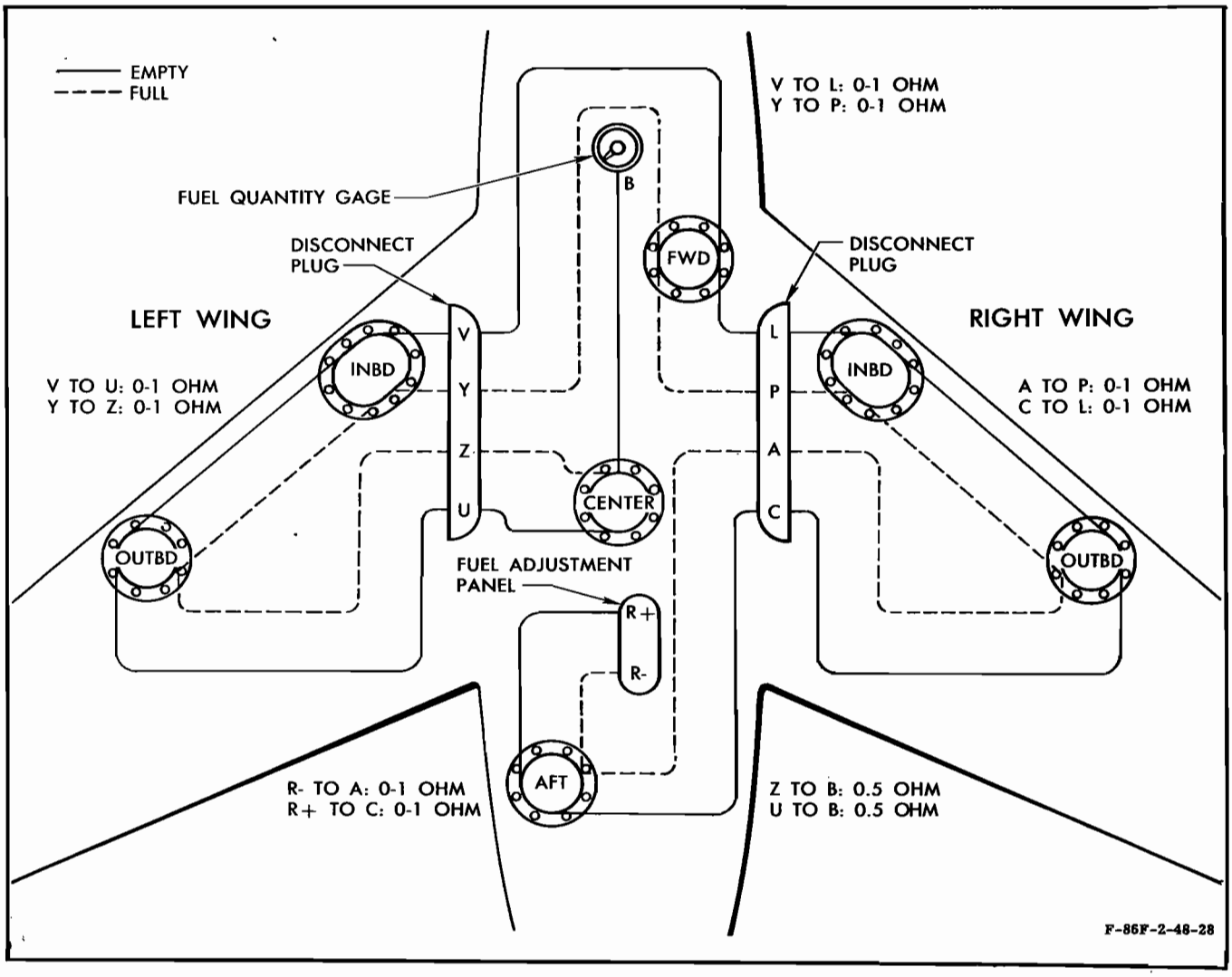


Figure 5-46. Simplified Transmitter Circuit

Section VI
INSTRUMENTS

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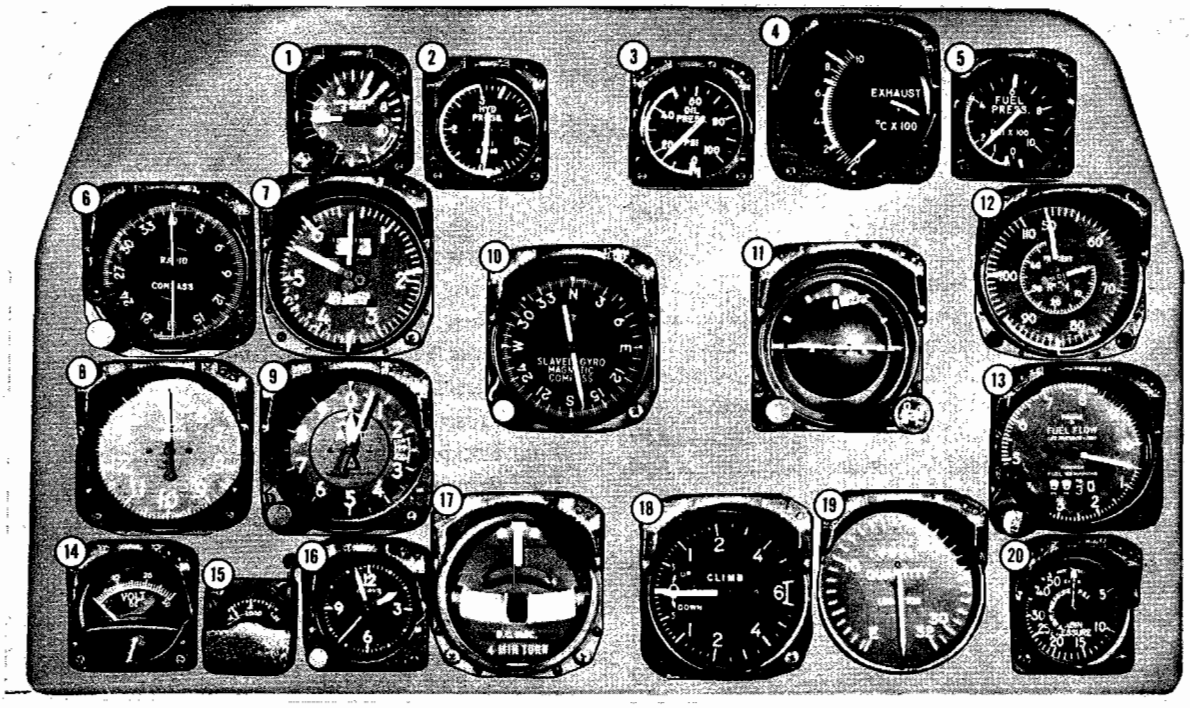
6-1. INSTRUMENTS.

6-2. The instruments (figure 6-1) are divided into five categories: flight, navigation, engine, hydraulic, and miscellaneous. Most of the instruments are located on the instrument panel. All instruments employ a clamp- or bezel-type front mounting. The following instruments are installed in the airplane:

INSTRUMENTS	TYPE NO.	GROUP	SOURCE OPERATING
Accelerometer	B-4 or B-6	Flight	
Airspeed indicator	L-6, L-7, or L-7A	Flight	A
Altimeter	AN5760T2A or AN5760T4B	Flight	A
Attitude gyro indicator	J-8	Flight	C



1. ACCELEROMETER INDICATOR
2. HYDRAULIC PRESSURE INDICATOR
3. OIL PRESSURE INDICATOR *
4. EXHAUST TEMPERATURE INDICATOR
5. FUEL PRESSURE INDICATOR †
6. RADIO COMPASS INDICATOR
7. AIRSPEED INDICATOR
8. MACHMETER INDICATOR
9. ALTIMETER INDICATOR
10. DIRECTIONAL COMPASS INDICATOR
11. ATTITUDE INDICATOR
12. TACHOMETER INDICATOR
13. FUEL FLOW INDICATOR
14. VOLTMETER
15. AMMETER
16. CLOCK
17. TURN-AND-BANK INDICATOR
18. RATE-OF-CLIMB INDICATOR
19. FUEL LEVEL INDICATOR
20. CABIN ALTIMETER

*F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5446, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4904

†OIL PRESSURE INDICATOR ON F-86F-25 AIRPLANES AF52-5447 THROUGH -5530 AND F-86F-30 AIRPLANES AF52-4905 THROUGH -5163

F-86F-2-51-4

Figure 6-1. Instrument Panel—F-86F-1 Through F-86F-30 Airplanes

INSTRUMENTS	TYPE NO.	GROUP	SOURCE OPERATING
Directional gyro indicator	V-3, V-8, or V-7A	Navigation	C, B
Machmeter indicator	A-2, A-2A, or A-2B	Flight	A
Radio compass indicator	ID-90A/ARN-6, ID-91A/ARN-6, or ID-91B/ARN-6	Navigation	B
Stand-by compass	AN5766T3	Navigation	E
Rate-of-climb indicator	AN5825T5 or AN5825-7	Flight	A
Turn-and-bank indicator	C-6	Flight	B
Exhaust temperature indicator	K-7§§ K-8¶¶	Engine	E
Fuel pressure indicator	C-34**	Engine	F
Fuel quantity indicator	EA721-G-1A	Engine	B
Fuel flow totalizer indicator	36700-1A-1-A3*	Engine	F
Fuel flowmeter	6200-B12A-9-A5†		F
Fuel flow indicator	A-20‡		F
Oil pressure indicator	B-20	Engine	F
Tachometer indicator	E-32†† E-34‡‡	Engine	E
Ammeter	J-1	Miscellaneous	B
Cabin pressure altimeter	MIL-I-5099	Flight	

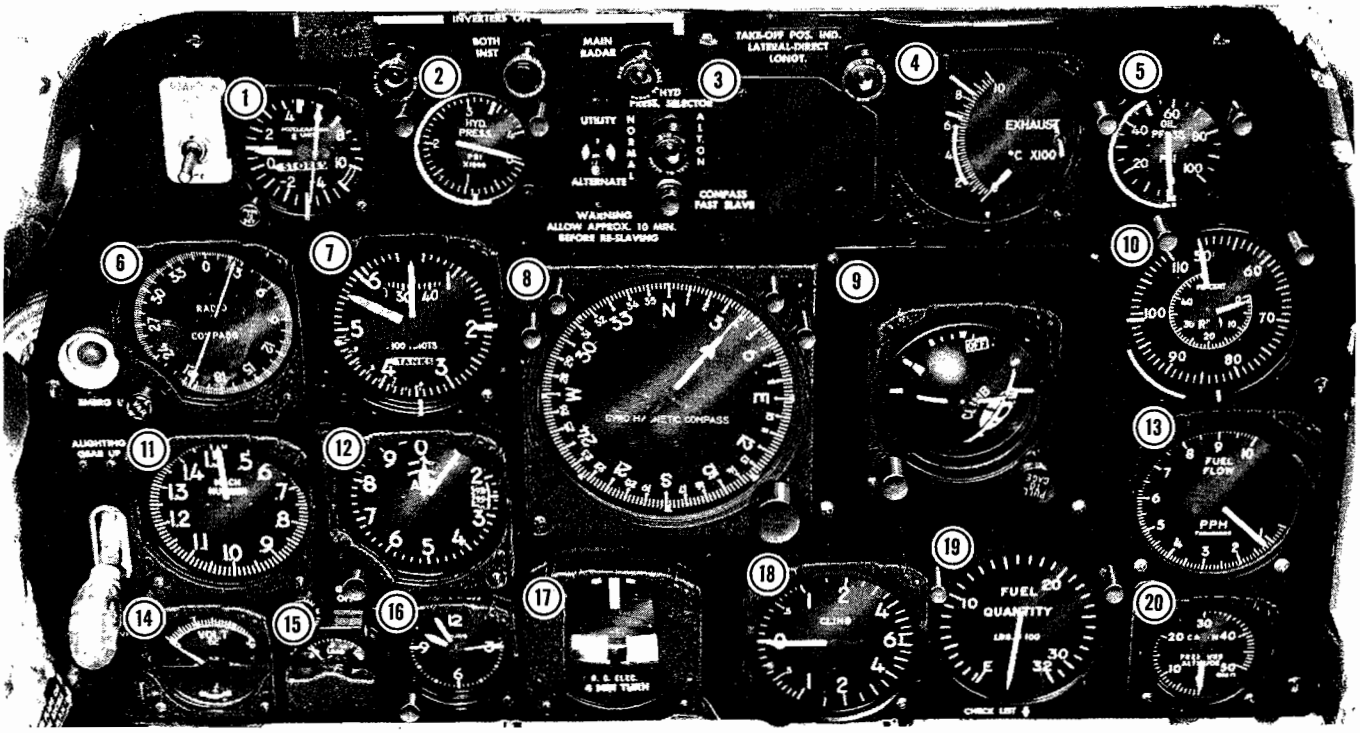
INSTRUMENTS	TYPE NO.	GROUP	SOURCE OPERATING
Clock	AN5743T1A§§ A-13A¶¶	Miscellaneous	
Hydraulic pressure indicator	E-1 or MS28010-5	Hydraulic	D
Voltmeter	AN3203V30	Miscellaneous	B
Oxygen pressure gage	AN6021-1A§ D-1 or D-2¶	Miscellaneous	E
Gun charger air compressor indicator	AN5771T4B	Miscellaneous	E

A—Pitot-static
B—28-volt dc
C—115-volt ac (three-phase)
D—Hydraulic
E—Self-generated
F—26-volt ac

*F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109
†F-86F-20 Airplanes AF51-13110 through -13169, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904
‡F-86F-25 Airplanes AF52-5447 through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes
§F-86F-1 through F-86F-15 Airplanes
¶F-86F-20 and subsequent airplanes
**F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904
††F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13460
‡‡F-86F-25 Airplanes AF51-13461 through -13510 and AF52-5272 through -5530, and F-86F-30 and subsequent airplanes
§§F-86F-1 through F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 through -5271
¶¶F-86F-35 Airplane AF53-1072 and all subsequent airplanes

6-3. TROUBLE SHOOTING INSTRUMENTS.

TROUBLE	PROBABLE CAUSE	REMEDY
ACCELEROMETER		
Indicating hand appears locked in place.	Vibration of instrument less than required minimum.	Examine instrument panel for restriction. Gently tap instrument.
Hand vibrates.	Excessive vibration.	Inspect instrument for worn mounting. If instrument is damaged, replace.
Scale error greater than allowable tolerance of ±0.2 G.	Loosened fit on main shaft. Mass string loosened. Dirt in bearings.	Replace instrument. Replace instrument. Replace instrument.
AIRSPEED INDICATOR		
Indicated airspeed hand fails to respond.	Pressure lines improperly connected. Pressure lines clogged.	
Maximum allowable airspeed hands fail to respond.	Static line not connected properly. Static lines clogged.	
Indicated airspeed hand indicates incorrectly.	Leak in pitot-pressure line. Leak in instrument.	Replace instrument.



1 ACCELEROMETER* (HYDRAULIC PRESSURE INDICATOR†)
2 HYDRAULIC PRESSURE INDICATOR*
3 ACCELEROMETER†
4 EXHAUST TEMPERATURE INDICATOR
5 OIL PRESSURE INDICATOR
6 RADIO COMPASS
7 AIRSPEED INDICATOR
8 GYRO MAGNETIC COMPASS
9 ATTITUDE INDICATOR
10 TACHOMETER INDICATOR
*F-86F-35 AIRPLANES AF52-5164 THROUGH -5271
11 MACHMETER
12 ALTIMETER
13 FUEL FLOW INDICATOR
14 VOLTMETER
15 AMMETER
16 CLOCK
17 BANK-AND-TURN INDICATOR
18 RATE-OF-CLIMB INDICATOR
19 FUEL QUANTITY INDICATOR
20 CABIN PRESSURE INDICATOR
†F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-51-9

Figure 6-1A. Instrument Panel—F-86F-35 Airplanes

TROUBLE	PROBABLE CAUSE	REMEDY
Maximum allowable airspeed hand indicates incorrectly.	Leak in static lines. Leak in instrument.	Replace instrument.
Indicated airspeed hand does not set on zero unless airplane is in motion.	Defective indicator.	
Pointers vibrate.	Excessive vibration of instrument panel.	Replace shock mounts if necessary.
Pointers oscillate.	Leak in lines. Leak in case.	Replace instrument.
Erratic movement of maximum allowable airspeed hand.	Friction within instrument.	Replace instrument.
ALTIMETER		
Hand fails to respond.	Static line clogged. Static line connections improperly made or loose.	

TROUBLE	PROBABLE CAUSE	REMEDY
Hand indicates incorrectly.	Loose hand. Shock which has shifted mechanism. Leaks in case or tubing.	Replace instrument. Attempt to correct by resetting barometric pressure scale. If readings cannot be corrected, replace instrument.
Incorrect barometric pressure reading.	Shock which has shifted mechanism parts.	Attempt to correct by resetting barometric pressure scale. If readings cannot be corrected, replace instrument.
Hand vibrates.	Excessive vibration of instrument panel. Excessive vibration of tubing.	Inspect instrument panel. If excessive vibration is apparent, correct by replacement of worn or deteriorated shock mounts or by other adjustments. If this does not remedy trouble, replace instrument. Make sure straps that secure tubing are in place and firmly secured.
Erratic movement of hands.	Friction. Broken jewels.	Replace instrument. Replace instrument.
AMMETER		
Pointer gives reverse reading.	Leads on back of ammeter reversed.	
Pointer fails to indicate.	Broken wire or loose connection.	
Jerky pointer action.	Dirt inside instrument.	Replace instrument.
Pointer does not return to zero.	Defective instrument.	
TURN-AND-BANK INDICATOR		
Indicator fails to operate or operates intermittently.	Poor electrical connections or broken wire. Internal mechanism damaged.	
Pointer deflection reversed; that is, the pointer moves to the left for a right turn and to the right for a left turn.	Lead reversal. Loose pointer. Indicator out of calibration.	Replace indicator. Replace indicator.
Pointer fails to respond.	Poor electrical connection. Operating voltage too low. Open circuit to instrument.	Replace instrument.
Deflection too short.	Operating voltage too low. Sensitive adjustment screw turned in too far.	Replace instrument.

TROUBLE	PROBABLE CAUSE	REMEDY
Deflection too long.	Sensitive adjustment screw not turned in far enough.	Replace instrument.
Excessive pointer oscillation.	Damper adjustment screw out of adjustment.	Replace instrument.
Vibrating pointer.	Excessive vibration of instrument panel.	
Pointer does not "zero." (Returns to same position each time gyro is stopped.)	Gyro assembly out of balance. Out-of-zero adjustment.	Replace instrument. Replace instrument.
CABIN PRESSURE ALTIMETER		
Instrument fails to operate.	Cabin pressure vent clogged.	
Incorrect indication.	Slow leak in diaphragm.	Replace instrument.
(Deleted)		
Erratic pointer movement.	Loose pointer. Sticky pointer. Defective instrument.	Replace indicator. Replace indicator.
EXHAUST TEMPERATURE INDICATOR		
No indication.	Broken lead. Loose or dirty connection. Faulty indicator.	
Variable reading.	Loose or dirty connection. Faulty indicator.	
Insufficient zero correction.	Faulty indicator.	
Friction.	Faulty indicator.	
Low reading.	Resistor set too high. Faulty indicator.	Adjust resistor.
Intermittent reading.	Poor connection. Short circuit in leads. Broken leads. Faulty indicator.	Replace leads.
FUEL QUANTITY INDICATOR		
No indication.	No power. Loose connection at indicator or cell unit. Open circuit in indicator. Binding in indicator. Open circuit in cell unit.	 Replace indicator. Replace indicator. Replace cell unit.

TROUBLE	PROBABLE CAUSE	REMEDY
Low or high reading.	Faulty junction head. Short circuit. Poor connection at cell unit or indicator. Binding indicator. Poor connection in tank unit.	Replace tank unit. Replace indicator.
(Deleted)		
STAND-BY COMPASS		
Discolored liquid.	Deterioration.	Replace instrument.
Fading or illegible card markings.	Deterioration of luminescent marking material.	Replace instrument.
Card does not rotate freely when airplane is in normal flying position. Sluggish.	Broken pivot; broken or cracked jewel.	Replace compass.
Compass is erratic or does not respond to compensation.	Magnets demagnetized or compensating gear magnets demagnetized.	Replace instrument.
Loss of liquid.	Filling screw gasket damaged. Window gasket damaged. Bowl cracked.	Replace compass. Replace compass. Replace compass.
(Deleted)		
RATE-OF-CLIMB INDICATOR		
Pointer fails to respond.	Obstruction in static line.	
Pointer indicates inaccurately.	Leak in static lines. Leak in instrument case.	Replace instrument.
Pointer oscillates.	Leak in static line.	
TACHOMETER INDICATOR		
Indicator does not register.	Faulty electrical connection. Defective indicator. Broken generator drive shaft. Generator rotor weak or demagnetized.	Replace generator. Replace generator.
Indicator oscillates.	Defective indicator.	
Engine running, indicator not operating.	Wiring or connections between tachometer generator and indicator defective or improperly connected.	

TROUBLE	PROBABLE CAUSE	REMEDY
	Faulty tachometer generator.	Replace generator.
	Connections to stator open or short-circuited.	Replace generator.
	Stator open or short-circuited.	Replace generator.
	Bent pinion, jammed gear, or broken jewel.	Replace generator.
Readings not accurate.	Indicator magnet partly demagnetized.	Replace indicator.
	Excessive friction in mechanism.	Replace indicator.
	Broken jewel.	Replace indicator.
	Bent hand.	Replace indicator.
	Broken hairspring.	Replace indicator.
	Bent pinion or gear and shaft assembly.	Replace indicator.
	Defective stator winding.	Replace indicator.
VOLTMETER		
No indication.	Loose connections.	Replace voltmeter.
	Broken lead.	Replace voltmeter.
	Loose or broken internal wiring.	Replace voltmeter.
	Internal defect.	Replace voltmeter.
	Dirt in unit.	Replace voltmeter.
ATTITUDE GYRO		
Gyro tumbles.	Faulty caging mechanism.	Replace instrument.
	Worn bearings.	Replace instrument.
Horizon bar vibrates.	Defective instrument.	Replace instrument.
Warning flag does not disappear when instrument power switch is turned on.	Open fuse.	Replace fuses.
	Open lead or bad connection.	Replace defective lead or repair bad connection.
	Low voltage.	Supply three-phase, 115-volt ac.
	Defective instrument.	Replace instrument.
DIRECTIONAL GYRO		
Gyro fails to start or come up to speed.	Failure in power supply.	Check for burned-out fuse, open lead, or faulty cable connection, and phase, frequency, and voltage of a-c power supply.
Gyro does not slave or level.	Defective tube in amplifier.	Replace tube.
	Defective amplifier.	Replace amplifier.
	Defective control gyro.	Replace control gyro.
Gyro does not fast slave when first started or when "COMPASS FAST SLAVE" switch is pressed.	Open circuit-breaker or open lead.	Close circuit-breaker or replace defective lead.
	Faulty "COMPASS FAST SLAVE" switch.	Replace switch.
	Defective amplifier.	Replace amplifier.

TROUBLE	PROBABLE CAUSE	REMEDY
Gyro slaving rate too fast. Gyro slaves faster in one direction than in the other.	High a-c voltage. Faulty relay in amplifier. Faulty amplifier. Unbalanced gyro.	Supply 115-volt ac. Replace amplifier. Replace amplifier. Replace control gyro.
Gyro slaving rate too slow.	Low a-c voltage. Defective tube in amplifier. Defective amplifier. Defective transmitter.	Supply 115-volt ac. Replace tube. Replace amplifier. Replace transmitter.
High errors in indication at both control gyro and indicator.	Low voltage. Faulty tube in amplifier. Defective transmitter. Defective control gyro.	Supply 115-volt ac. Replace tube. Replace transmitter. Replace control gyro.
Indicator pointer hunts.	Low voltage. Faulty wiring between units. Defective time-delay relay in amplifier.	Supply 115-volt ac. Replace defective wiring. Replace amplifier.
Indicator pointer or compass card in control gyro spins.	Faulty power supply. Gyro hitting stops.	Supply correct power. Replace control gyro.
Indicator pointer sticks or tracks erratically.	Defective indicator.	Replace indicator.
Indicator pointer does not agree with compass card in control gyro.	Faulty connections between compass units. Defective control gyro. Defective indicator.	Connect units correctly. Replace control gyro. Replace indicator.
AUTOSYN INSTRUMENTS (FUEL FLOW, FUEL PRESSURE, OIL PRESSURE, HYDRAULIC PRESSURE INDICATORS)		
Pointer sluggish.	No power on one rotor. Defective indicator. Low voltage.	Check continuity of "A" and "B" leads, and repair or replace faulty lead. Replace indicator. Supply 26-volt, 400-cycle ac.
Pointer 180 degrees in error.	No power on one rotor.	Check continuity of "A" and "B" leads.
Pointer swings back and forth across dial.	Open transmitter ground lead. Reversed power leads. Open indicator ground lead. Open stator lead.	Repair or replace transmitter "A" lead. Connect "A" and "B" leads correctly. Repair or replace indicator "A" lead. Check continuity of "C" and "D" leads.
Pointer swings and instrument squeals.	Power lead shorted to stator lead. Power lead and stator lead reversed. Defective indicator.	Check for short between "B," "C," or "D" leads. Connect "B," "C," and "D" leads correctly. Replace indicator.
Pointer rotates in reverse direction.	Reversed stator leads.	Connect "C" and "D" leads correctly.
Slight or no movement of pointer. Pointer spins.	Stator leads shorted. Defective indicator. Power and stator leads shorted or reversed. Intermittent contact.	Check for shorts between "C" and "D" leads. Replace indicator. Check connections and for shorting between "B," "C," or "D" leads. Check continuity of leads, and repair or replace defective lead.

6-4. INSTRUMENT PANEL.

6-5. The instrument panel is coated with a dull black no-glare substance. A shroud across the top of the instrument panel prevents glare on the instrument dials during day flying and glare from the instrument lights on the windshield during night flying. All instruments are individually lighted and front-mounted. The panel is attached to a shock-mounted instrument panel support by eight quick-disconnect type fasteners.

6-6. REMOVING INSTRUMENT PANEL. To remove instrument panel, position battery-starter switch in "OFF" position; then proceed as follows:

a. Unlatch the eight quick-disconnect type fasteners around outside of instrument panel and tilt panel aft.

b. Disconnect all instruments from power source.

c. Disconnect the two instrument panel forward electrical disconnects.

d. Remove the two hydraulic pressure switch mounting screws.

e. Cover all power source disconnects.

f. Carefully remove instrument panel from airplane.

CAUTION

When disconnected, all pressure lines, electrical connectors, and instrument receptacles must be covered with suitable covers to prevent entry of foreign materials, especially metal particles, that may render the instruments inoperative.

6-7. INSTALLING INSTRUMENT PANEL. To install instrument panel, position battery-switch in "OFF" position; then proceed as follows:

a. Place instrument panel on panel support.

b. Remove covers from all power source disconnects.

c. Connect instruments to power sources.

d. Connect instrument panel forward disconnects.

e. Install hydraulic pressure switch on panel.

f. Latch the eight quick-disconnect type fasteners.

6-8. REMOVING CLAMP-TYPE INSTRUMENTS.

a. through d. (Deleted)

e. Loosen lower right mounting screw.

f. Pull instrument from panel to expose power connections.

g. Disconnect instrument power source, and cover disconnects with suitable covers.

h. Remove instrument from panel.

6-9. REMOVING BEZEL-TYPE INSTRUMENTS.

a. Pull down upper hinged flange of light fixture.

b. Lift hinged bulbs to gain access to upper mounting screws.

c. Remove the four mounting screws from instrument bezel.

d. Pull instrument from panel to expose connections.

e. Disconnect instrument power sources.

f. Cover disconnects with suitable covers.

g. Remove instrument from panel.

6-10. INSTALLING CLAMP-TYPE AND BEZEL-TYPE INSTRUMENTS.

6-11. See figure 6-3.

6-12. REMOVING INSTRUMENT PANEL VIBRATOR.

a. Unlatch the eight quick-disconnect type fasteners around outside edge of instrument panel and tilt panel aft.

b. Disconnect vibrator power source.

c. Remove the two vibrator mounting screws; then remove vibrator.

6-13. INSTALLING INSTRUMENT PANEL VIBRATOR.

a. Align vibrator mounting holes with instrument panel mounting holes from forward side of panel.

b. Install the two vibrator mounting screws.

c. Connect vibrator power source.

d. Tilt instrument panel forward, and latch the eight quick-disconnect type fasteners.

6-14. FLIGHT INSTRUMENTS.

6-15. The flight instruments (figure 6-4), located on the instrument panel, consist of the following: accelerometer, airspeed indicator, altimeter, cabin pressure altimeter, turn-and-bank indicator, Machmeter indicator, and rate-of-climb indicator.

6-16. ACCELEROMETER.

6-17. The accelerometer, located on the instrument panel, indicates the load on the airframe in terms of gravitational (G) units. The accelerometer incorporates three pointers (one main and two auxiliary). The main pointer indicates existing acceleration. The two auxiliary pointers, until reset, indicate the maximum positive and negative G-load imposed on the airplane.

6-17A. CHECKING ACCELEROMETER. To check accelerometer, release auxiliary pointers. The instrument should indicate 1 ($\pm$0.25) G.

6-18. AIRSPEED INDICATOR.

6-19. The airspeed indicator, located on the instrument panel, incorporates two pointers. One pointer indicates the speed of the airplane. The other pointer is automatically positioned by any change in altitude to indicate maximum allowable airspeed at that altitude. The indicator scale is calibrated in knots per hour.

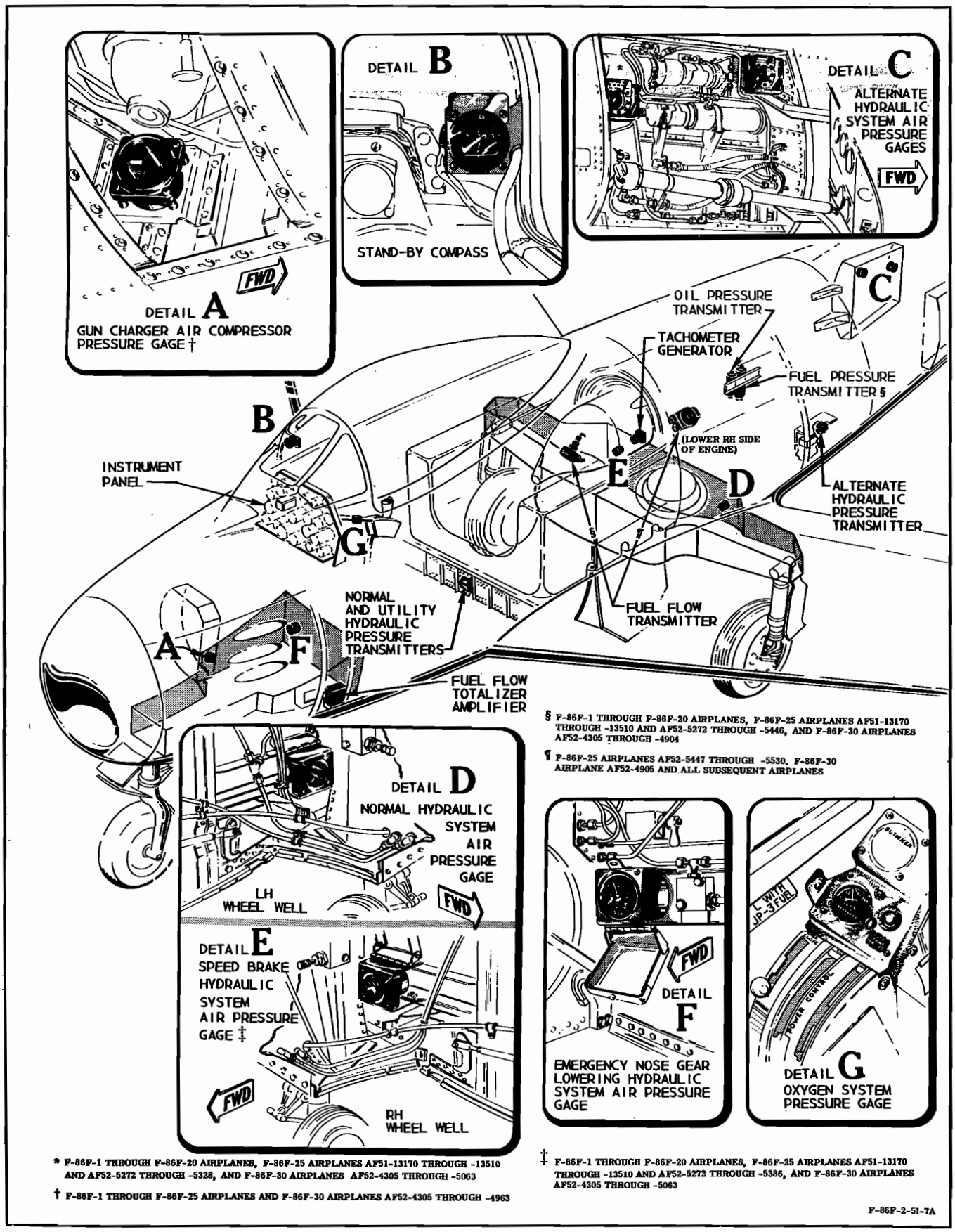


Figure 6-2. Instrument and Equipment Location

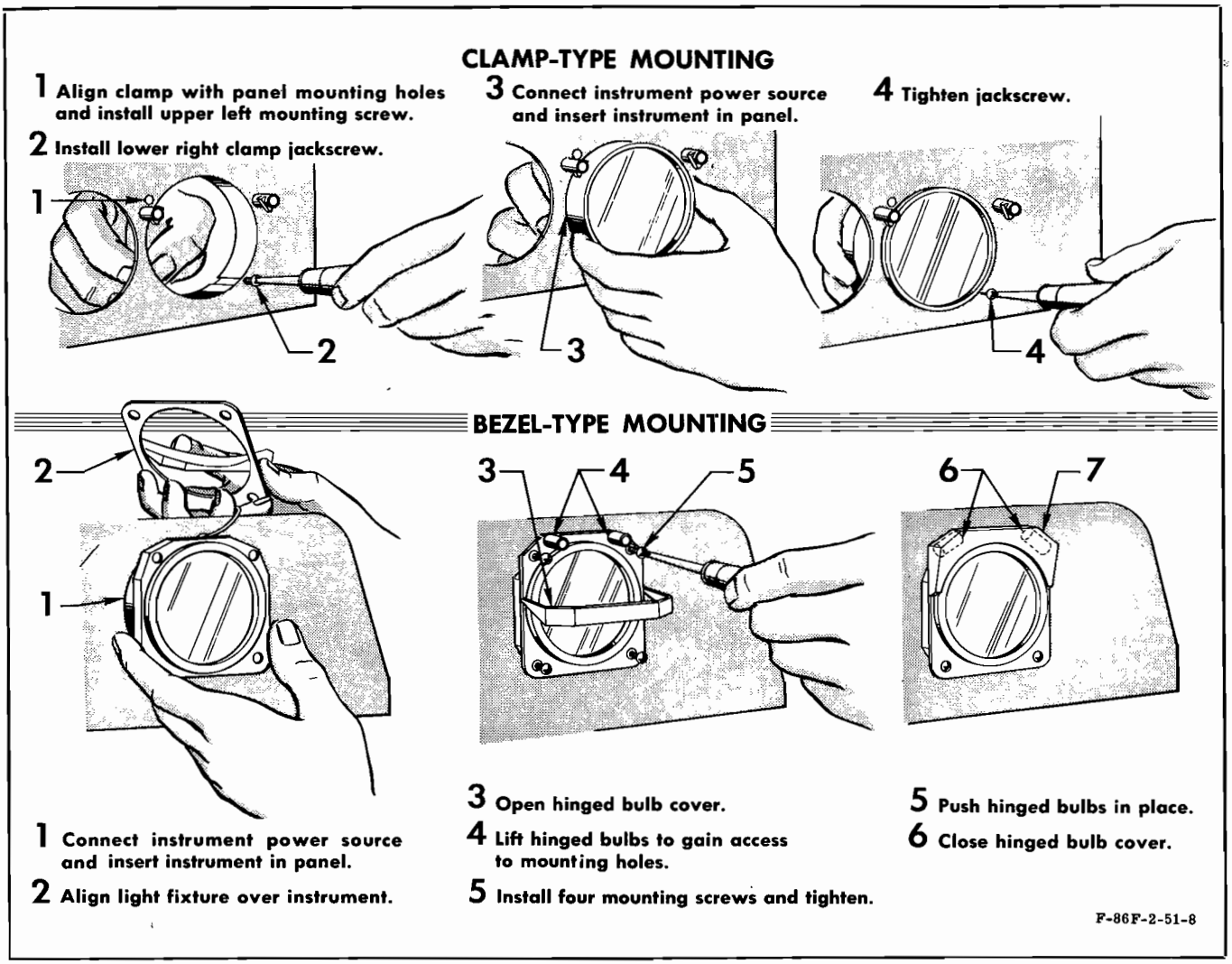


Figure 6-3. Installing Instruments

6-20. ALTIMETER.

6-21. The altimeter, located on the instrument panel, is an evacuated diaphragm-type instrument operated by barometric pressure. The altimeter scale is calibrated in feet to indicate the height of the airplane above sea level. The barometric pressure scale (inset in the altimeter scale) is calibrated in inches of mercury and is manually adjusted for the correct altitude by a knob located on the lower left front corner of the instrument case.

6-22. CABIN PRESSURE ALTIMETER.

6-23. The cabin pressure altimeter, located on the instrument panel, indicates an altitude in feet which is equivalent to cockpit air pressure. The instrument pointer is connected by mechanical linkage to a diaphragm which responds to cockpit air pressure.

6-24. TURN-AND-BANK INDICATOR.

6-25. The turn-and-bank indicator, located on the instrument panel, incorporates an inclinometer and an electrical gyro turn indicator to provide reference for the direction of turn and the angle of bank.

6-26. MACHMETER INDICATOR.

6-27. The Machmeter indicator, located on the instrument panel, operates on pitot-static pressure to indicate the ratio of true airspeed to the speed of sound. The indicator scale is calibrated in Mach numbers.

6-28. RATE-OF-CLIMB INDICATOR.

6-29. The rate-of-climb indicator, located on the instrument panel, operates on static pressure. The indicator measures the ascent or descent rate of change in altitude. The indicator scale is calibrated in feet per minute.

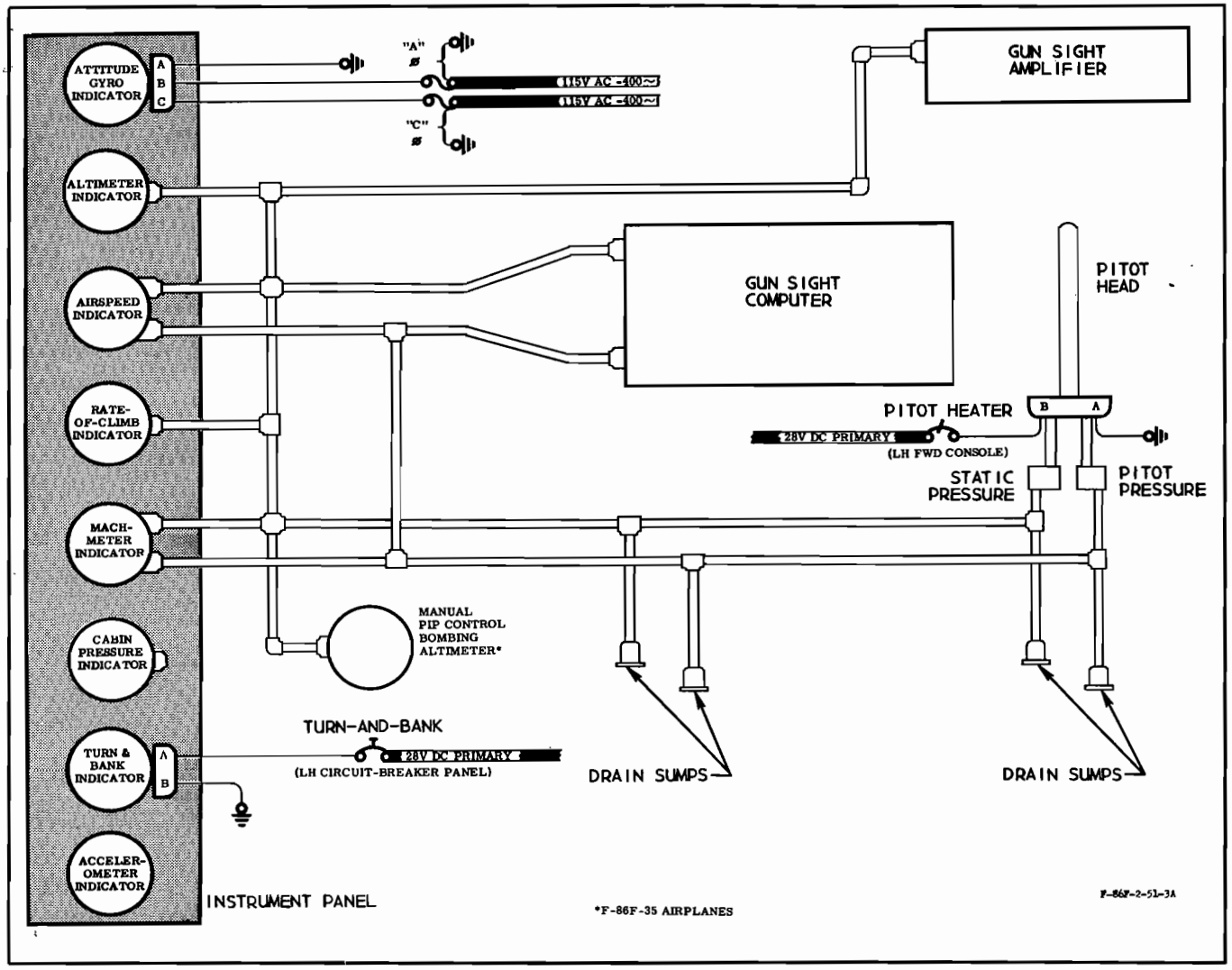


Figure 6-4. Flight Instruments

6-30. ATTITUDE GYRO INDICATOR.

6-31. The attitude gyro indicator, located on the instrument panel, operates electrically to provide a visual indication of flight attitude in pitch and roll maneuvers. On F-86F-35 Airplanes AF52-5164 and all subsequent airplanes, the attitude gyro is modified. A decalcomania that indicates the angle of dive is attached to the sphere of the instrument. The decal is used in conjunction with the manual pip control of the gunsight system during dive bombing maneuvers. (Refer to paragraph 9-283.) If the instrument is removed, replace it with a modified attitude gyro. Modified instruments are identified by a decal on the back of the case.

6-31A. CHECKING ATTITUDE GYRO INDICATOR. To check the attitude gyro, turn the instrument power switch on ("NORMAL" or "ALTERNATE"). The warning flag labeled "OFF" should disappear.

6-32. NAVIGATION INSTRUMENTS.

6-33. The navigation instruments (figure 6-5) consist of the following: directional gyro indicator, radio compass indicator, and stand-by compass. All navigation instruments are located on the instrument panel, with the exception of the stand-by compass, which is mounted on the lower right side of the windshield.

6-34. DIRECTIONAL GYRO SYSTEM.

6-35. The directional gyro system (figure 6-6) is composed of four principal units: a flux valve transmitter, an amplifier, a directional gyro control, and a repeater-type indicator. The system receives electrical power from a 400-cycle, three-phase, alternating-current inverter. The gyrosyn compass is basically a directional gyro that is automatically kept on a true magnetic north heading from a flux valve transmitter in the wing

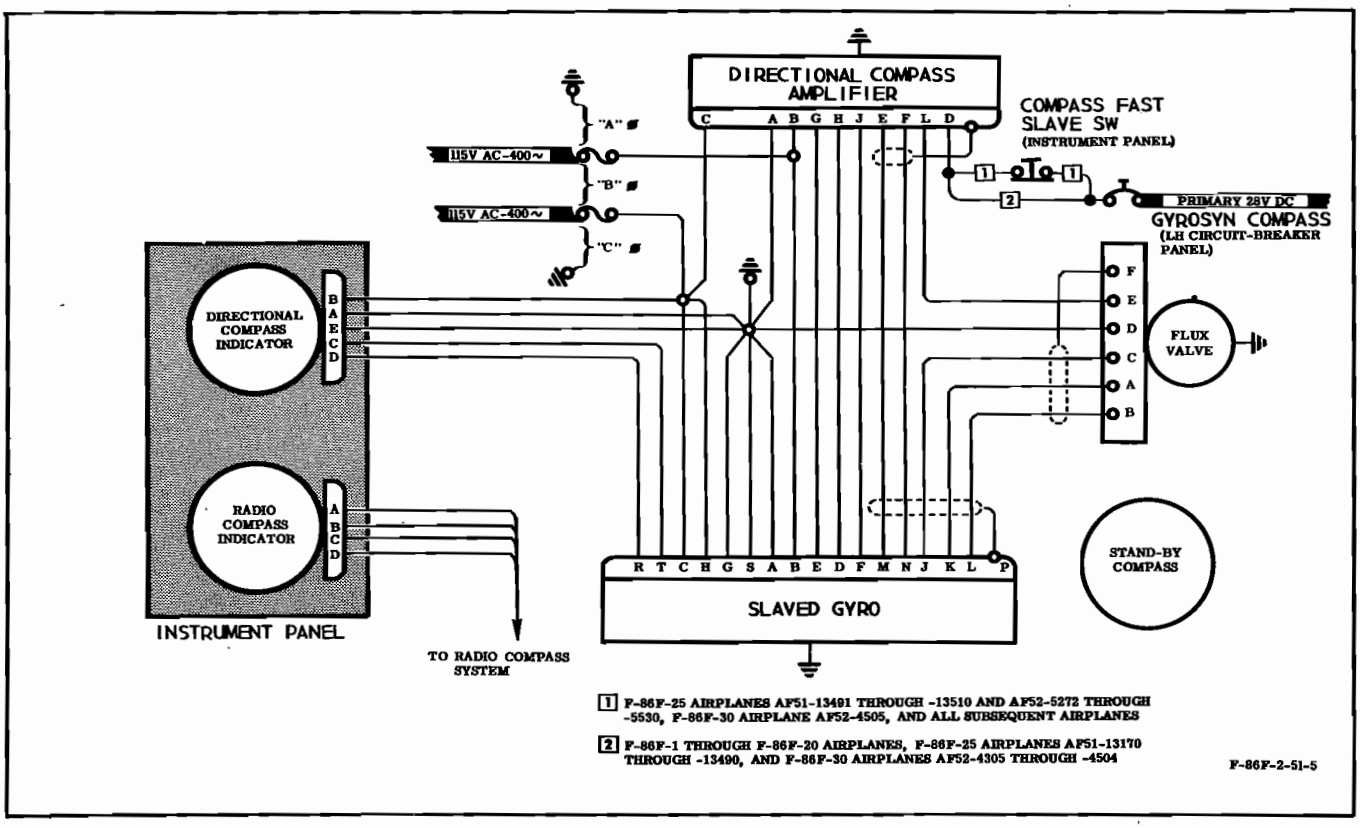


Figure 6-5. Navigation Instruments

outer panel of the airplane. The flux valve transmitter utilizes the south-north flow of the earth's magnetic flux over selsyn-type windings to electrically control the electromagnetic precessing coil in the gyro through the use of a signal transformer and electronic amplifier. On F-86F-25 Airplanes AF51-13491 through -13510 and AF52-5272 through -5530, F-86F-30 Airplane AF52-4505, and all subsequent airplanes, a compass push-type switch is installed on the instrument panel above and adjacent to the directional gyro. This switch permits the pilot to momentarily de-energize the slow-slaving cycle of the magnetic compass system. When this switch is released, fast slaving of the compass system will occur, thus providing a faster time for true heading recovery.

6-36. FUNCTION OF DIRECTIONAL GYRO SYSTEM. The gyro rotor is started when the battery-starter switch is placed on "BATTERY" and the instrument power switch is placed in either "NORMAL" or "ALTERNATE." In one to 2 minutes, the rotor will be up to normal speed. For the first 3 to 4 minutes, the gyro will precess at a rate of 60 to 90 degrees per minute, after which it will change to the slow slaving of 4 to 5 degrees per minute. The gyro should align with the magnetic heading while on the fast-slaving cycle.

6-37. DIRECTIONAL GYRO INDICATOR.

6-38. The directional gyro indicator shows the magnetic heading. Because the compass is gyro-synchronized to the earth's magnetic meridian, the magnetic heading indications are without northly turning error, oscillation, or swinging. The setting knob, identified as "SET COURSE," controls a course index, which can be rotated to a preselected heading. The indicator is free to operate within 85 degrees of climb or dive (from level flight) and within 85 degrees of right or left bank. If these operating limits are exceeded, the indications will be incorrect.

6-39. DIRECTIONAL GYRO SYSTEM FLUX VALVE TRANSMITTER.

6-40. The flux valve transmitter in the directional gyro system senses the magnetic north. The transmitter is mounted in the left wing. It is hemispherical in shape, has a mounting flange with calibrations, and has accessible lugs to which are fastened the indicator leads. The functioning element is pendulously mounted on a universal joint so that, within limits, it continuously responds to gravity; the element is immersed in damping fluid to prevent excessive swinging in flight.

6-41. DIRECTIONAL GYRO ERROR AND CORRECTION.

6-42. Compass error may result from either of two

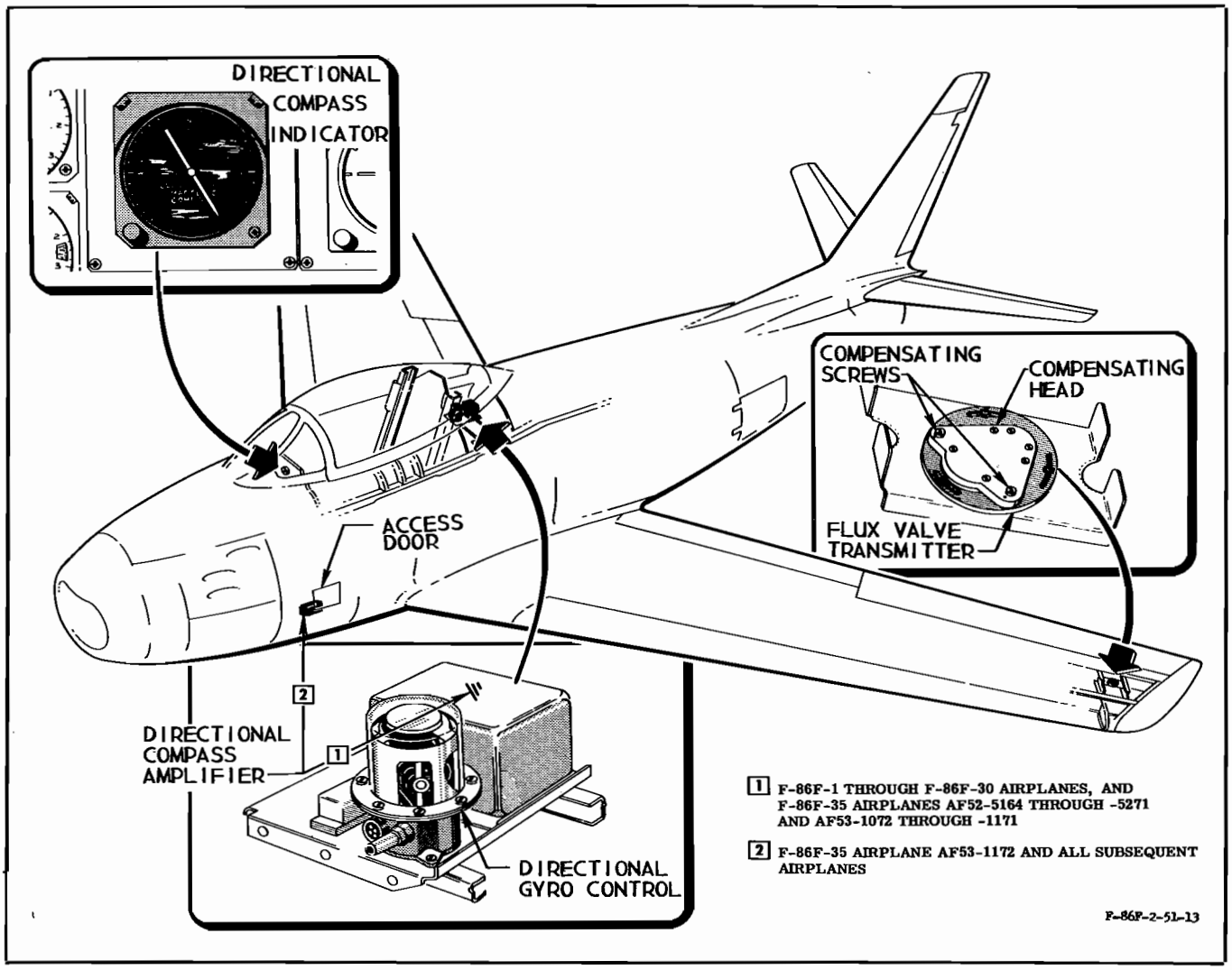


Figure 6-6. Directional Gyro System

causes: incorrect indexing of the flux valve transmitter to the airplane, or magnetic disturbance from some structural part or electrical unit of the airplane. The amount of index error or magnetic deviation is determined by swinging the compass. Index error is corrected by rotation of the flux valve in its calibrated mounting base. Deviation from magnetic disturbances is corrected by adjustment of the flux valve transmitter compensator head.

6-43. DIRECTIONAL GYRO SYSTEM COMPENSATOR HEAD.

6-44. When compass compensation is required, the compensator head can be used to correct the flux valve transmitter for excessive deviation. When compass compensation is required and the compensator head is not installed, the flux valve transmitter cover plate is removed and replaced with a compensator head. (Refer to paragraph 6-45.) The compensator head, located on the top of the flux valve transmitter (figure 6-6), contains two magnets that are positioned by the two adjusting shafts. The shafts are coded by the letters "NS" (to correct north and south error) and "EW" (to correct east and west error).

6-45. INSTALLING DIRECTIONAL GYRO COMPENSATOR HEAD. To install a directional gyro compensator head, proceed as follows:

a. Remove top cover plate on flux valve and replace with compensator head.

b. Align dots on compensator with EW and NS holes in mounting flange.

c. Secure compensator with six 4.40 x 5/16-inch binding-head brass screws. Set compensator to neutral by aligning dots on shaft with dots on cover.

6-46. DIRECTIONAL GYRO SYSTEM AMPLIFIER.

6-47. The directional gyro system amplifier amplifies the signal from the signal transformer selsyn and detects its direction before transmitting it to the precession coil of the gyro.

6-47A. CHECKING DIRECTIONAL GYRO SYSTEM.

a. Connect 28-volt d-c power to external power receptacle and turn instrument power switch to "NORMAL." The compass should fast slave to magnetic heading of airplane within 3 minutes.

b. Turn instrument power switch "OFF" on airplanes not equipped with a fast slave switch. (See figure 6-5.)

c. Turn airplane 180 degrees.

d. Turn instrument power switch to "NORMAL" or press fast slave switch on airplanes so equipped. Compass should slave to new heading within two minutes.

e. Turn instrument power switch "OFF" and disconnect external power.

6-48. STAND-BY COMPASS.

6-49. The direct-reading, vertically mounted type compass, called the stand-by compass since it is for emergency use only, is located on the lower right side of the windshield. It consists of a metal bowl filled with compass fluid and a semifloat-type card calibrated in 5-degree divisions. For correcting card deviations that result from magnetic disturbances, a permanent magnet compensator is attached to the compass. This type compass should be compensated every 100 hours, or at least once in each 3-month period, and at times when equipment likely to affect the instrument is changed. For compensating procedure, refer to paragraph 6-55.

6-50. COMPASS SWINGING (STAND-BY OR DIRECTIONAL).

6-51. The compass swinging procedure for either the stand-by compass or the directional gyro is essentially the same, except that the directional gyro procedure requires that the airplane electrical system be turned on. Compensating magnets are used to compensate the compass. The stand-by compass contains the magnets within the case, whereas the directional gyro contains the magnets in the compensator head. The swinging procedure consists of positioning the airplane to actual magnetic headings and comparing headings with compass readings. Differences, recorded on AF Form 57 (figure 6-7) for the stand-by compass only, are algebraically calculated to provide compensating values so that compass correction values entered on the form are at a minimum. Either of two methods, the sighting compass method or the compass rose method, may be used to determine actual magnetic headings.

6-52. COMPASS SWINGING—SIGHTING COMPASS METHOD. The sighting compass method requires the use of a standard aircraft compass that has had its compensating assembly removed and replaced by a swinging compass sight (Stock No. 7800-725200). To determine the magnetic heading of the airplane, stand at least 50 feet behind the airplane with the swinging compass in cupped hands and align the sight with the longitudinal axis of the airplane by reference to a suitable line or pair of objects on the airplane. When the sight hairline and the object sighted are aligned, the heading of the compass will indicate the magnetic heading of the airplane. If the reading is taken from in front of the airplane, obtain the magnetic heading by adding or subtracting 180 degrees.

6-53. COMPASS SWINGING—COMPASS ROSE METHOD. The compass rose is a circular area permanently marked off in degrees from magnetic north. The compass rose method of compensating consists of placing the airplane on the base with its longitudinal axis parallel to the radial line of the desired magnetic heading and subsequently swinging the airplane to parallel the other cardinal and quadrantal radial lines.

6-54. COMPASS PRESWINGING PREPARATIONS AND PRECAUTIONS. For accurate compensation, observe the following precautions:

a. The airplane must be at least 100 yards from automobiles, tractors, steel buildings, or other aircraft.

b. Tools used in compensating transmitter must be nonmagnetic.

c. Personnel who will be close to transmitter or sighting compass must remove from their person all articles made partly or wholly of iron or steel.

d. The airplane must be placed on an area free of ferrous material or magnetic influences such as underground pipes and electric transmission wires. The area can be tested if compass bearings are taken from different portions of the area; deviation should be less than one degree.

e. All equipment customarily with the airplane that may have magnetic influence must be secured in flight position.

f. If the sighting compass method is used (paragraph 6-52), the area should be reasonably level. Because of the pendulous mounting of the flux valve, it is not necessary to have the airplane level.

Note

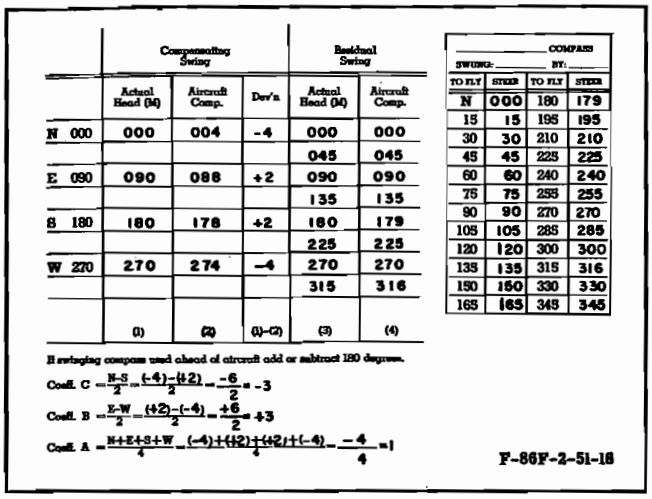
Flux valve compasses not needing compensation are more accurate without the compensator head.

6-55. COMPASS GROUND SWINGING AND COMPENSATING. This procedure is primarily applicable to a newly installed compass. When swinging compass at the 100- to 120-hour inspection period to check correct headings, follow only steps a. through e. unless compass headings are not in agreement with those shown on compass correction card (AF Form 57) in cockpit. If headings do not agree, the complete procedure must be accomplished as follows:

a. Select a relatively level area to park airplane or position airplane on compass rose.

aA. Neutralize compensating magnets in gyrosyn flux valve compensator head and in case of stand-by compass. Do this by aligning dots on compensator screws with dots on case.

b. Energize gyrosyn compass system by either turning battery switch to "BATTERY" or connecting 28-volt d-c external power, and by turning instrument power switch to "NORMAL." If an external power source is used, keep service unit as far as possible from left wing tip.



	Compensating Swing			Residual Swing	
	Actual Head (M)	Aircraft Comp.	Dev'n	Actual Head (M)	Aircraft Comp.
N 000	000	004	-4	000	000
				045	045
E 090	090	088	+2	090	090
				135	135
S 180	180	178	+2	180	179
				225	225
W 270	270	274	-4	270	270
				315	316
	(1)	(2)	(1)-(2)	(3)	(4)

If swinging compass used ahead of aircraft add or subtract 180 degrees.

Coeff. C $= \frac{N-S}{2} = \frac{(-4)-(+2)}{2} = \frac{-6}{2} = -3$

Coeff. B $= \frac{E-W}{2} = \frac{(+2)-(-4)}{2} = \frac{+6}{2} = +3$

Coeff. A $= \frac{N+E+S+W}{4} = \frac{(-4)+(+2)+(+2)+(-4)}{4} = \frac{-4}{4} = -1$

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_____ COMPASS SWING: _____ BY: _____			
TO FLY	STEER	TO FLY	STEER
N	000	180	179
15	15	195	195
30	30	210	210
45	45	225	225
60	60	240	240
75	75	255	255
90	90	270	270
105	105	285	285
120	120	300	300
135	135	315	316
150	150	330	330
165	165	345	345

Figure 6-7. Compass Correction Card

c. Wait 2 minutes for compass gyro rotors to reach normal speed, and then wait until direction hand on indicator stops moving, indicating that flux valve in wing has precessed gyro to the compass heading.

d. Note compass reading and start engine; if there is no change in the reading with engine running, compass swinging may be accomplished with engine not running.

e. Using either the sighting compass or compass rose method, head airplane to east, south, west, and magnetic north. Allow time for compass to precess at each heading. Enter actual magnetic headings and airplane compass readings in their respective columns under "Compensating Swing" on AF Form 57.

Note

To simplify this explanation, assume the readings obtained will be as recorded in figure 6-7.

f. Subtract airplane compass readings from corresponding magnetic readings, and record results in "Dev'n" column of card. (Example: Magnetic heading 000 minus compass reading of 004 equals deviation of −4.)

g. Using recorded deviations, calculate coefficients A, B, and C according to algebraic formula on bottom of card. (Refer to examples in paragraph 6-56.)

Note

If deviation is not greater than plus or minus one degree, omit steps h. and i. and continue compass swinging at j.

h. With airplane on magnetic north, add coefficient C *algebraically* to airplane compass reading on this heading to determine what the instrument should indicate when compensated. (Example: 004 plus −3 = 001.) Make compass indicate this compensated value by adjusting NS shaft on flux valve compensator head.

i. With airplane on east, add coefficient B algebraically to airplane compass reading on this heading to determine what the instrument should indicate when compensated. (Example: 088 plus +3 = 091.) Adjust EW shaft on flux valve compensator head to make compass indicate this compensated value.

j. With airplane on any heading (directional gyro only), add coefficient A algebraically to compass reading on that heading to determine what the instrument should read when compensated. (Example: 001 plus −1 = 000.) Make compass indicate this compensated value by loosening flux valve wing mounting and rotating valve in a direction opposite to the sign of the coefficient, using calibrated index scale on mounting. Then secure flux valve.

k. Position airplane on 24 magnetic headings, and record magnetic headings and corresponding compass readings in their proper columns on AF Form 57 (figure 6-7) under "Residual Swing" and "Steer." Then fill in blanks on back of card. Tear off compass card and place in compass card holder in cockpit. File remainder of card as a permanent record.

6-56. CALCULATING COMPASS SWINGING COEFFICIENTS. Calculate coefficients A, B, and C on bottom of AF Form 57 (figure 6-7) algebraically as follows:

a. Coefficient A: To add deviations having the same sign, all (+) or all (−), merely add the deviations and use the same sign. To add deviations having different signs, some (+) and some (−), add the deviations having the same signs and subtract the smaller total from the larger total; then use the sign of the larger total. Example:

$$(-4) + (+2) + (+2) + (-4) = (-8) - (+4) = -4$$

b. Coefficient B and C: To subtract deviations having the same or different signs, change the sign of the deviation to be subtracted, and then add as explained in step a.

Example: $B = (+2) - (-4) = (+2) + (+4) = +6$

$C = (-4) - (+2) = (-4) + (-2) = -6$

Note

Examples are calculated using assumed deviations from figure 6-7.

6-57. ALGEBRAIC TEST OF COMPASS COMPENSATION. Proper compensation of the compass can be checked algebraically if new coefficient C, B, and A are made up from deviations shown in either column "C to

M" or "M to C"; the result must not be more than 1. In this example:

$$C = \frac{N - S}{2} = \frac{(0) - (+1)}{2} = \frac{-1}{2} = -\frac{1}{2}$$

$$B = \frac{E - W}{2} = \frac{(0) - (0)}{2} = \frac{0}{2} = 0$$

$$A = \frac{N + E + S + W}{4} =$$

$$\frac{(0) + (0) + (+1) + (0)}{4} = \frac{+1}{4} = \frac{1}{4}$$

6-58. RADIO COMPASS SYSTEM.

6-59. Refer to paragraph 8-31 and 8-38.

6-60. ENGINE INSTRUMENTS.

6-61. The engine instruments (figure 6-8), located on the instrument panel, consist of the following: exhaust temperature indicator, fuel flow totalizer indicator, fuel pressure indicator, fuel quantity indicator, oil pressure indicator, and tachometer indicator.

6-62. ENGINE EXHAUST TEMPERATURE INDICATING SYSTEM.

6-63. The engine exhaust temperature indicating system consists of an indicator, a resistor, necessary chromel-alumel leads and cables, clamps, and four bayonet-type thermocouples. The four thermocouples are wired in parallel to indicate the mean exhaust temperature of the engine. The system resistance should be checked and adjusted if necessary each time a new or different engine, a new section of lead, or a different thermocouple is installed. The system measures temperature by converting heat energy into electrical energy and then measuring the electrical energy produced. Two wires of dissimilar metals (one of chromel, the other of alumel) formed into a cable are joined at one end to form the thermocouple which, when heated, generates an electromotive force that can be measured.

6-64. EXHAUST TEMPERATURE INDICATOR.

6-65. The exhaust temperature indicator is a thermocouple-type instrument located on the instrument panel. The indicator scale is calibrated in degrees centigrade to indicate the temperature of the engine. The indicator operates from the electrical energy generated when its related thermocouples are heated by the exhaust gases of the engine.

WARNING

Do not "zero" temperature indicator, except as outlined here. The pointer is normally suppressed below zero scale reading by spring tension. Replace indicator if any doubt exists of its accuracy.

6-65A. ZERO ADJUSTMENT OF EXHAUST TEMPERATURE INDICATOR. To "zero" exhaust temperature indicator, proceed as follows:

a. Unlatch fasteners that hold instrument panel to instrument panel frame, and tilt instrument panel aft into servicing position.

b. Disconnect thermocouple leads from rear of indicator case. Connect a piece of copper wire between positive and negative terminals. This short circuit will prevent excessive pointer swing while the indicator is being handled.

c. Remove indicator from panel and expose it to a constant temperature for one hour.

d. Connect a variable-millivolt supply to indicator and place 8 ohms resistance in series with negative lead. (See figure 6-7A.)

e. Determine temperature of air surrounding indicator and apply correct millivoltage. See chart.

TEMPERATURE		
°C	°F	MILLIVOLTAGE
5	41	28.94
10	50	28.74
15	59	28.54
20	68	28.34
25	77	28.14
30	86	27.94
35	95	27.74
40	104	27.53

Note

For intermediate temperatures, subtract 0.04 millivolt for each degree centigrade above next lowest temperature listed.

f. With correct millivoltage applied, set indicator pointer at 700°C by turning zero adjustment screw on face of instrument. Tap indicator lightly while making adjustment.

g. Check for 8 (±.05) ohms resistance in exhaust temperature system. (See step 11, figure 6-10.) If resistance is out of tolerance, adjust system resistance. (See figure 6-10.)

h. Install instrument in instrument panel and connect thermocouple leads to terminal binding posts. Secure alumel lead (green) to negative post and chromel lead (white) to positive post.

i. Latch instrument panel to instrument panel frame.

j. Make an operational check of system with Jetcal tester. (Refer to paragraph 6-71A.)

6-65B. CHECKING EXHAUST TEMPERATURE INDICATOR. To check exhaust temperature indicator, proceed as follows:

a. When engine is started and warmed up, exhaust temperature indication should increase rapidly until normal operating temperature is reached.

b. During flight, indicator pointer should not oscillate more than ±25°C.

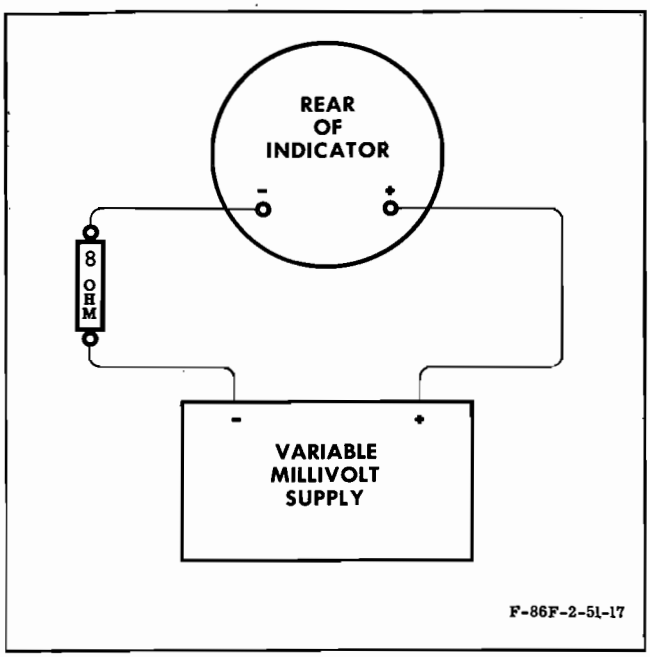


Figure 6-7A. Zero Adjustment of Exhaust Temperature Indicator

6-66. EXHAUST TEMPERATURE THERMOCOUPLES.

6-67. Each exhaust temperature thermocouple consists of two wires of dissimilar metal (one of chromel, the other of alumel) formed into leads and joined at one end. Four parallel-connected thermocouples are installed in the engine exhaust tail pipe. Exhaust gases heat the thermocouples to generate electrical energy, which is transmitted to the indicator.

6-68. REMOVING EXHAUST TEMPERATURE THERMOCOUPLES. To remove the exhaust temperature thermocouples, remove fuselage rear section (paragraph 2-149), and proceed as follows:

a. Remove safety wire from thermocouple mounting nuts, and remove nuts.

b. Remove wrapping from intermediate harness lead connection and disconnect thermocouple leads from harness leads.

c. Remove thermocouple from tail-pipe flange.

Note

This procedure does not apply on some engine thermocouple installations when the four thermocouple dual leads are silver-soldered to the engine harness ring leads as one unit. Therefore, in order to remove a thermocouple from these engines, the engine harness ring and thermocouples must be removed as one unit at the engine harness intermediate lead connection.

6-68A. REMOVING SWAGED MAGNESIUM OXIDE THERMOCOUPLE HARNESS (AIRPLANES MODIFIED BY T. O. 2J-J47-205). To remove thermocouple harness, remove fuselage aft section (paragraph 2-149) and proceed as follows:

a. Disconnect thermocouple harness from thermocouple lead "T" connector.

CAUTION

Excessive torque will damage harness insulation.

b. Disconnect the four thermocouple nuts from flanges on tail pipe.

c. Remove each half of thermocouple harness from tail pipe.

6-69. INSTALLING EXHAUST TEMPERATURE THERMOCOUPLES. See figure 6-9 and 6-9A.

6-70. ADJUSTING EXHAUST TEMPERATURE INDICATING SYSTEM.

6-71. See figure 6-10.

6-71A. OPERATIONAL CHECK-OUT AND TESTING OF EXHAUST TEMPERATURE INDICATING SYSTEM.

a. Connect 115-volt a-c, 50- to 400-cycle power to Jetcal tester.

b. Determine that all thermocouples in airplane work. Crawl inside tail pipe, and place a hot heater harness probe [about 500°C (932°F)] over thermocouples, one at a time. (See figure 6-10A.) Exhaust temperature indicator in cockpit should show a temperature rise as each thermocouple is checked.

c. Connect heater harness probes to all thermocouples, and lock firmly in place. Cover tail cone.

d. Adjust voltage regulator on Jetcal tester until potentiometer indicates and holds steady at 700°C (1292°F).

e. Check indication on exhaust temperature indicator in cockpit. Tap instrument lightly before making reading. Reading should not differ from test temperature indicated on Jetcal tester [700°C (1292°F)] by more than ±10°C (18°F).

f. If indication exceeds tolerance, refer to paragraph 6-71C.

6-71B. OPERATIONAL CHECK-OUT AND TESTING OF EXHAUST TEMPERATURE THERMOCOUPLES AND THERMOCOUPLE HARNESS.

6-71C. If the exhaust temperature indicator exceeds the allowed tolerance during the operational check-out

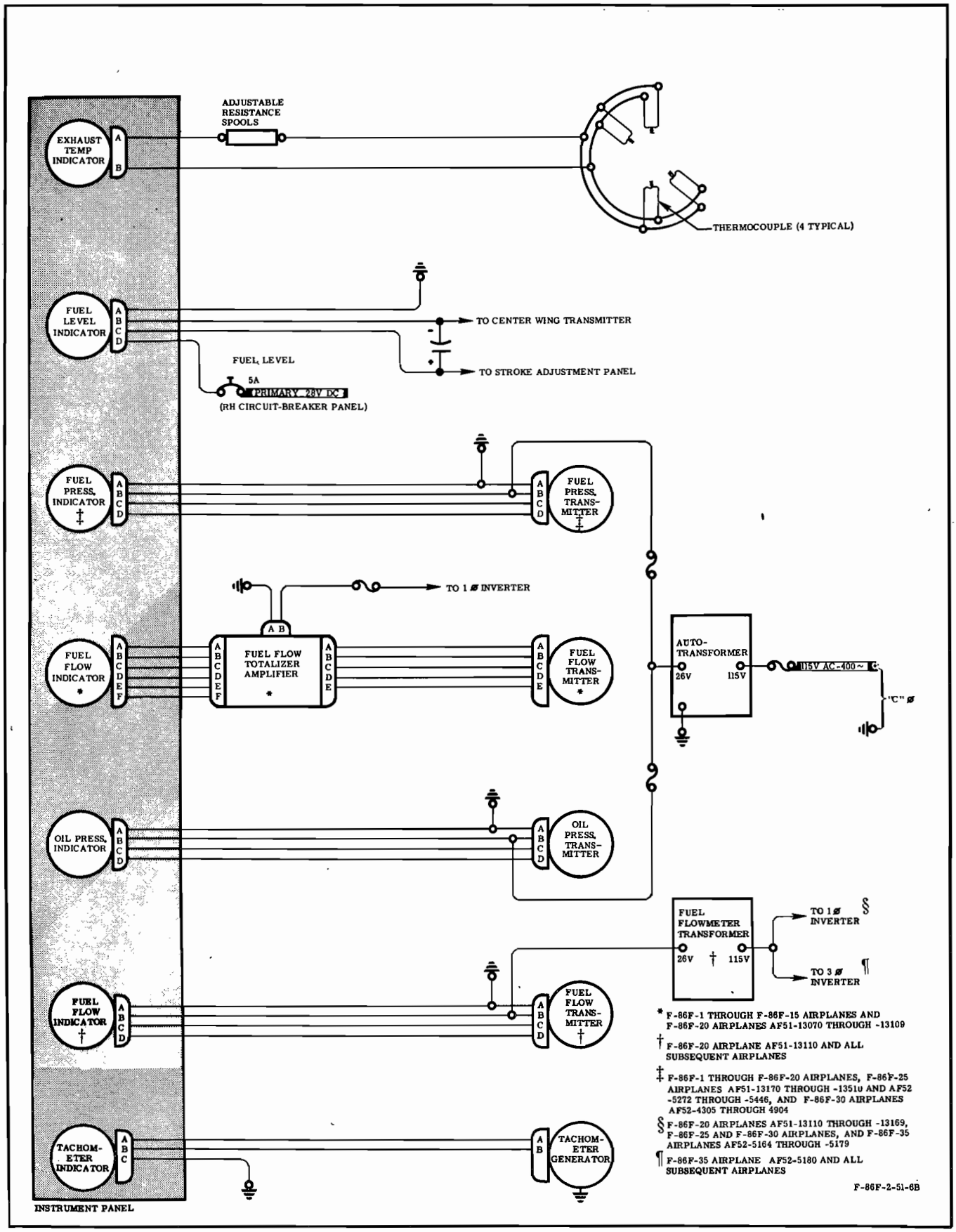
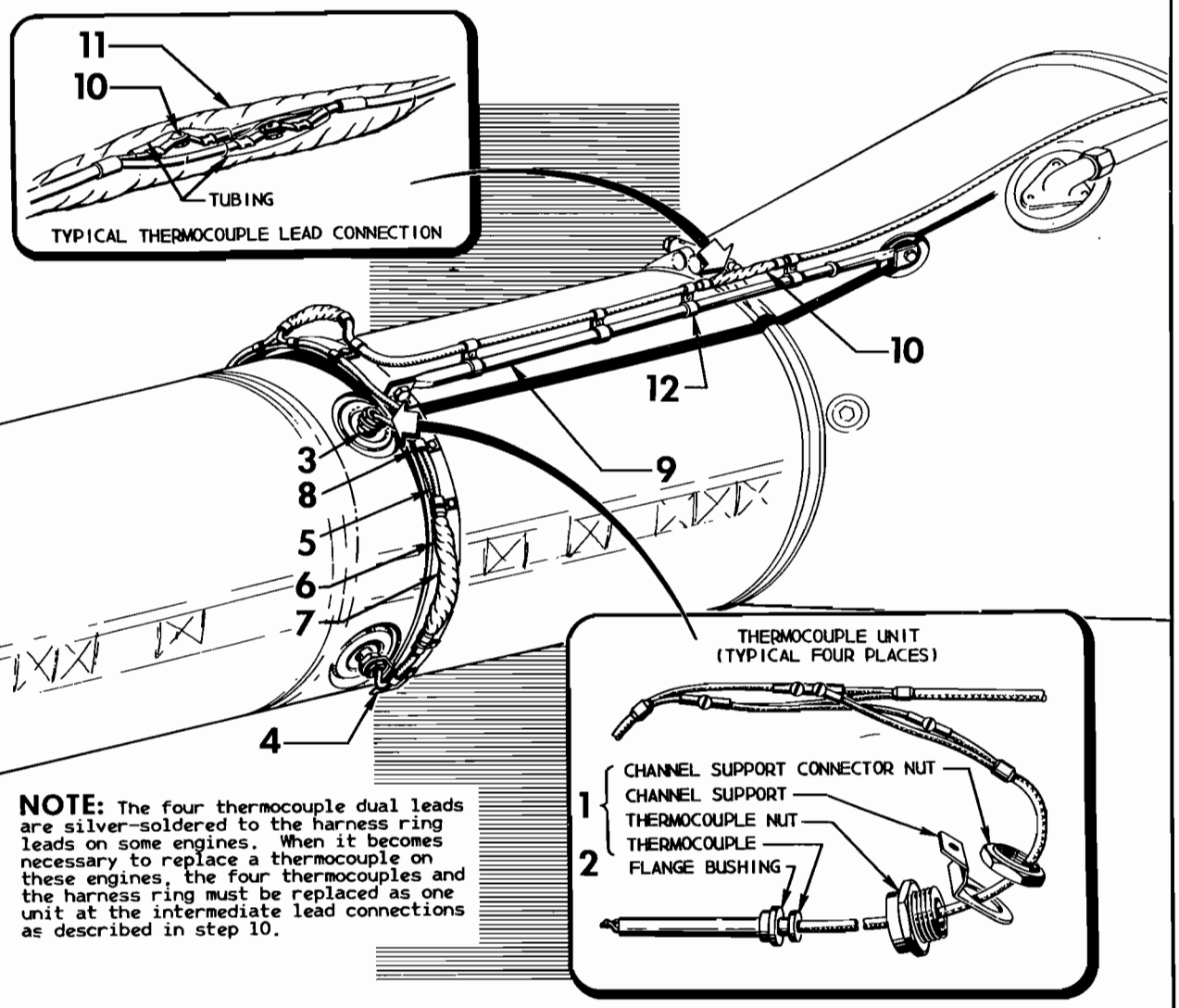


Figure 6-8. Engine Instruments



NOTE: The four thermocouple dual leads are silver-soldered to the harness ring leads on some engines. When it becomes necessary to replace a thermocouple on these engines, the four thermocouples and the harness ring must be replaced as one unit at the intermediate lead connections as described in step 10.

1 Install thermocouple nut, channel support, and channel support connector nut over each thermocouple as shown.

2 Slip thermocouple flange bushing over each thermocouple.

3 Insert thermocouples into tail-pipe flanges, and tighten thermocouple nuts. The channel supports must point forward.

4 Connect channel supports to harness ring with four AN3C5A bolts. Tighten the channel support connector nuts, and safety both nuts of each thermocouple unit to tail-pipe flange lug with AN995N32 lockwire.

5 Lay thermocouple harness over tail pipe with intermediate lead connection forward.

6 Connect leads of each thermocouple to harness connector leads. Use an AN93684 lock washer between lead connections.

7 Wrap connections with one layer of glass tape (Specification NA2-3014, Type II). Secure ends of wrapping with a knot made by splitting end of tape. Apply three heavy coats of silicon resin solution (G.E. No. 9980) to wrapping. Allow 10 minutes between coats.

8 Clamp thermocouple and harness leads harness ring. Use glass tape under clamps to ensure a tight fit. Coat tape as in step 7.

9 Install intermediate lead support tube between exhaust cone and harness ring clips.

10 Slip a 3-1/4-inch section of NA2/3036 tubing over one end of each harness lead. Connect intermediate lead to engine lead. Use an AN936B4 lock washer between lead connections.

11 Slide tubing over connections. Wrap connections together with two layers of leached glass fiber tape (0.750 X 0.005 inch. G.E. Specification A2L1B). Secure ends of wrapping with a knot made by splitting end of tape. Coat tape as described in step 7.

12 Clamp intermediate lead to support tube as shown.

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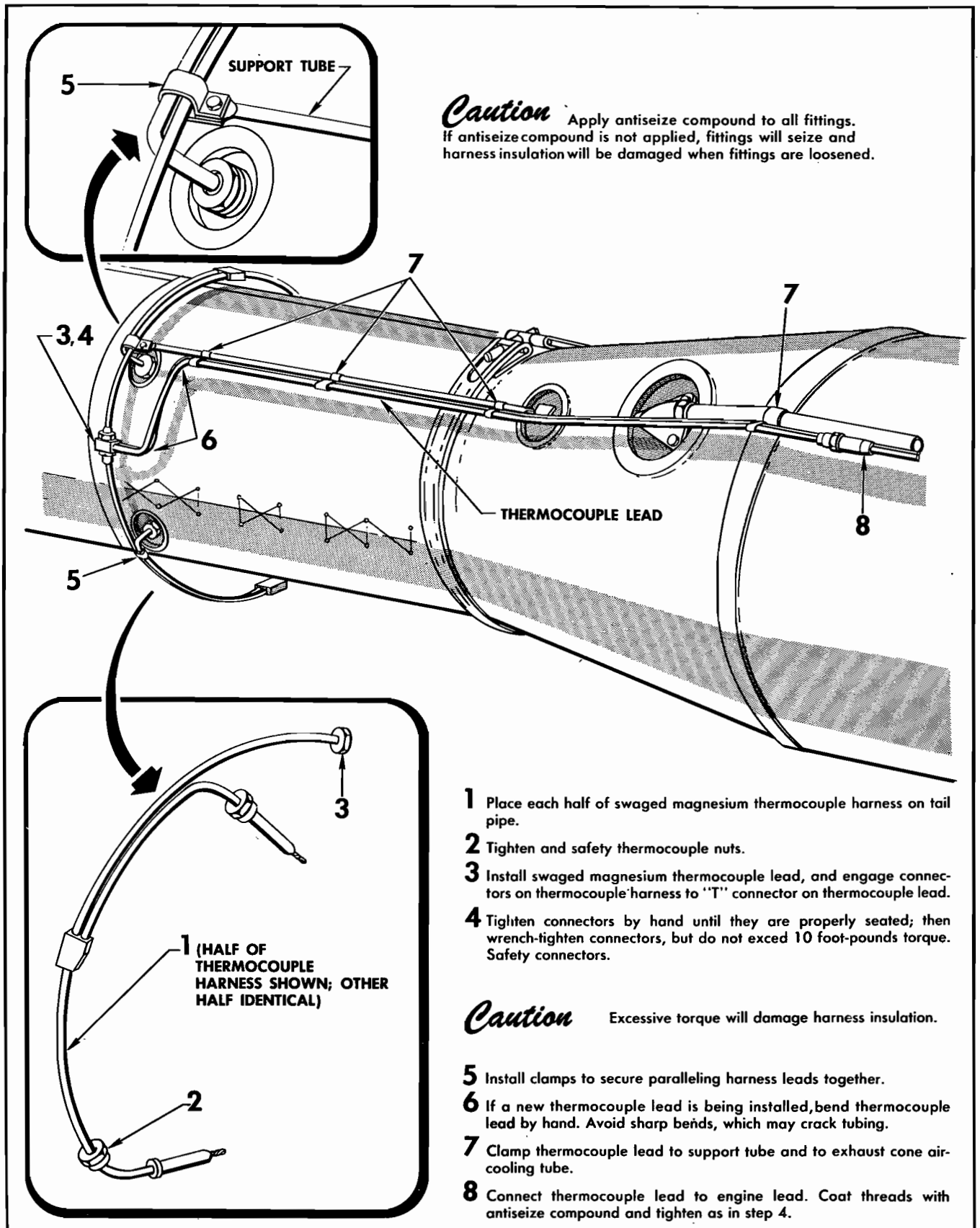
Figure 6-9. Installing Exhaust Temperature Thermocouples



Caution Apply antiseize compound to all fittings. If antiseize compound is not applied, fittings will seize and harness insulation will be damaged when fittings are loosened.

1 Place each half of swaged magnesium thermocouple harness on tail pipe.

2 Tighten and safety thermocouple nuts.

3 Install swaged magnesium thermocouple lead, and engage connectors on thermocouple harness to "T" connector on thermocouple lead.

4 Tighten connectors by hand until they are properly seated; then wrench-tighten connectors, but do not exced 10 foot-pounds torque. Safety connectors.

Caution Excessive torque will damage harness insulation.

5 Install clamps to secure paralleling harness leads together.

6 If a new thermocouple lead is being installed, bend thermocouple lead by hand. Avoid sharp bends, which may crack tubing.

7 Clamp thermocouple lead to support tube and to exhaust cone air-cooling tube.

8 Connect thermocouple lead to engine lead. Coat threads with antiseize compound and tighten as in step 4.

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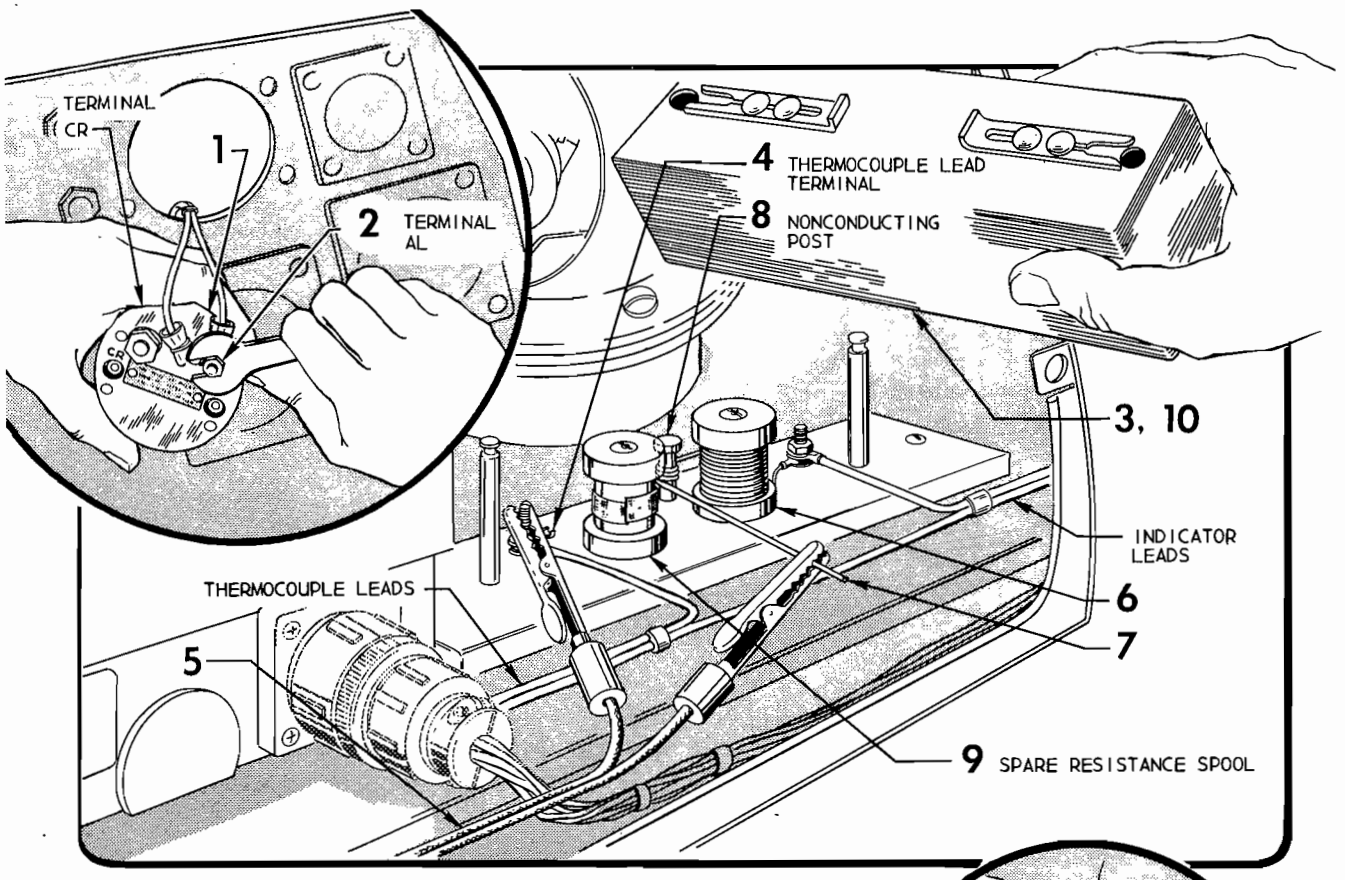
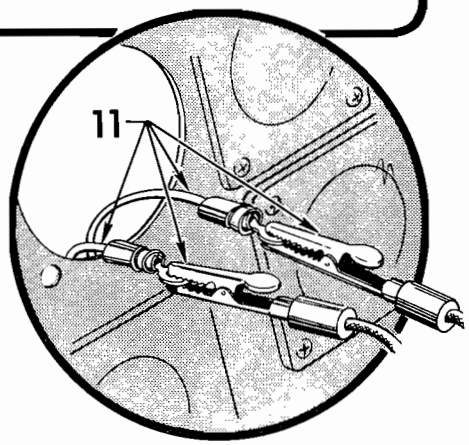
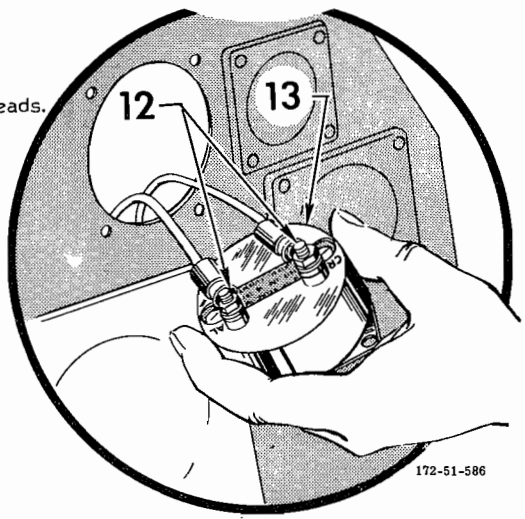
Figure 6-9A. Installing Swaged Magnesium Oxide Thermocouple Harness (Airplanes Modified by T. O. 2J-J47-205)







1 Remove exhaust temperature indicator. (Refer to index for page number of instrument removal procedure.)

2 Disconnect indicator lead from terminal CR and connect leads together on terminal AL.

3 Remove cover from adjustable resistance spools (AN5534-1) located in the right-hand aft equipment bay.

4 Unsolder resistance spool lead from thermocouple lead terminal.

5 Connect Wheatstone bridge leads between resistance spool lead and thermocouple lead, and measure resistance.

6 Unwind one coil of wire at a time from resistance spool measuring resistance as each turn is removed until resistance is slightly greater than 8 ohms.

CAUTION: If total resistance is reduced to less than 8 (±.05) ohms, the spool can no longer be used. A spare spool is provided in case this happens.

7 Remove short lengths of wire from spool to obtain total resistance of 8 (±.05) ohms; then remove Wheatstone bridge leads.

8 Wrap several turns of wire around nonconducting post provided for that purpose (to prevent unwinding); then solder resistance wire to thermocouple lead terminal.

9 If spare spool is used, use vinyl tape to secure resistance wire on unused spool.

10 Replace resistance spool cover and secure with safety wire.

11 Remove thermocouple leads from indicator; connect Wheatstone bridge between leads and check for correct resistance of 8 (±.05) ohms.

12 Reconnect thermocouple leads to indicator terminals.

13 Install exhaust temperature indicator. (Refer to index for page number of instrument installation procedure.)

Figure 6-10. Adjusting Exhaust Temperature Indicating System

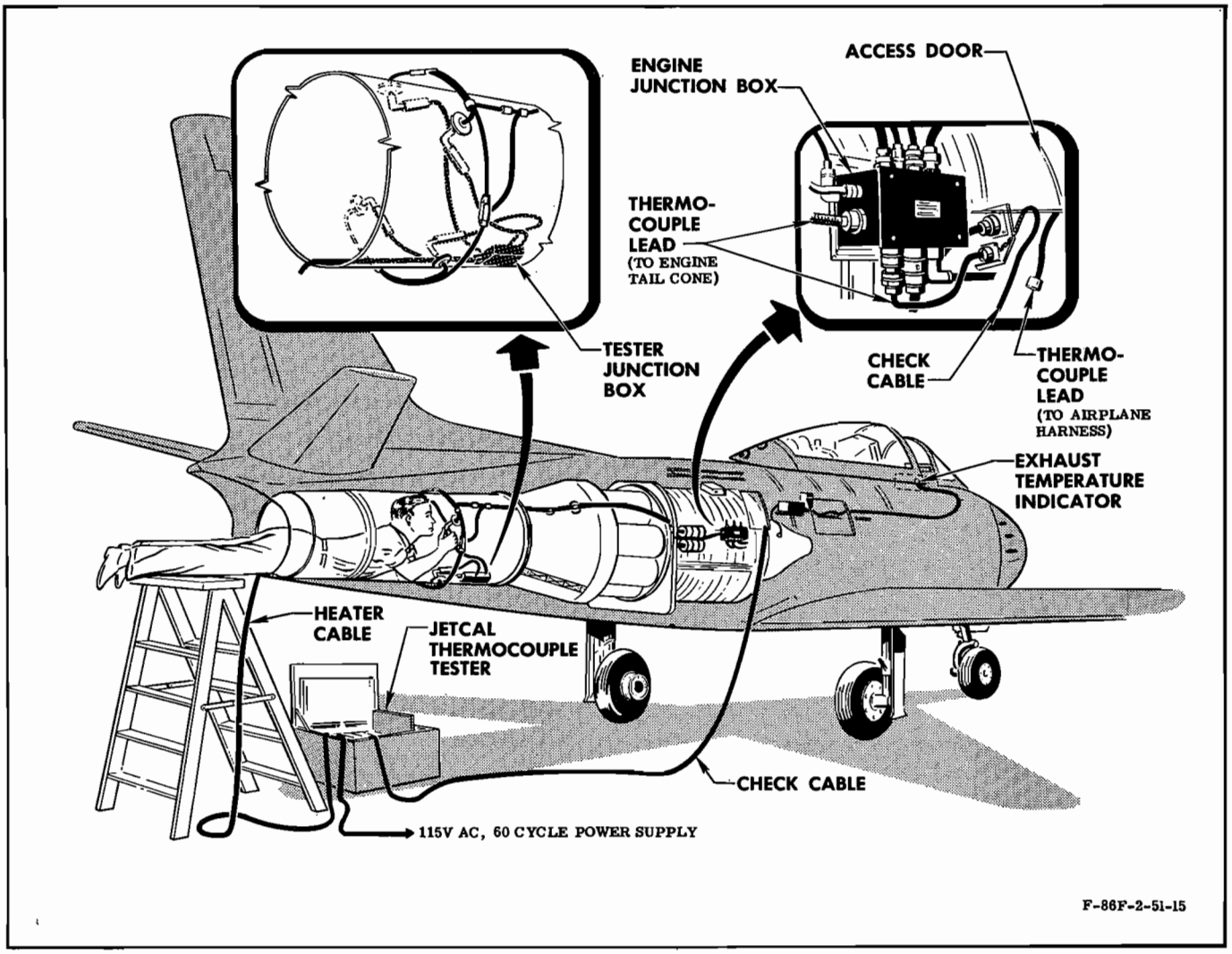


Figure 6-10A. Testing Exhaust Temperature Indicating System

and testing of the exhaust temperature indicating system, isolate the trouble by the following procedure:

a. Remove engine electrical disconnect access door from right side of fuselage. (See figure 6-10A.)

b. Disconnect exhaust temperature indicator lead from receptacle inboard of access door.

c. Connect Jetcal tester to exhaust temperature thermocouples by connecting check cable from Jetcal tester to thermocouple lead receptacle.

d. Connect Jetcal tester heater harness probes to thermocouples inside engine tail pipe.

e. Adjust Jetcal tester voltage regulator until potentiometer indicates and holds steady at 700°C (1292°F).

f. Check temperature of thermocouples in heater harness probes with normal-test switch in "NORMAL."

g. Check temperature of thermocouples in engine with normal-test switch in "TEST."

h. Compare temperature of thermocouples in harness probes with temperature of thermocouples in engine. If difference in temperature exceeds tolerance, circuit from thermocouples to electrical disconnect on engine is at fault. If temperature is within tolerance, either the indicator or the circuit from engine electrical disconnect to indicator is at fault.

6-72. FUEL FLOW INDICATING SYSTEM.

6-73. On F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109, the fuel flow indicating system consists of a fuel flow totalizer indicator (paragraph 6-75), a fuel flow totalizer transmitter (paragraph 6-77), and a fuel flow totalizer amplifier (paragraph 6-79), to indicate to the pilot the rate of fuel consumption and the quantity of fuel remaining. On F-86F-20 Airplane, AF51-13110 and all subsequent airplanes, the fuel flow totalizer amplifier has been removed, and an autotransformer has been installed, so the system will operate to record only rate of fuel flow. On F-86F-25 Airplanes AF52-5447

through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes, the fuel flow indicator incorporates an expanded scale in the lower range used for ground and air starts. This permits the pilot to accurately control the fuel flow by means of the power control during ground and air starts. Use of this indicator has removed the fuel pressure indicating system on this series of airplanes. On F-86F-1 through F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 through -5179, electrical power for operation of the fuel flow indicating system is supplied by the one-phase, 1500 volt-ampere, 115-volt, 400-cycle inverter, through the one-phase inverter circuit-breaker panel. A one-ampere capacity fuse protects the system. On F-86F-35 Airplane AF52-5180 and all subsequent airplanes, electrical power for operation of the fuel flow indicating system is supplied by the three-phase, 115-volt, 400-cycle instrument inverter.

6-73A. CHECKING FUEL FLOW INDICATING SYSTEM. To check fuel flow indicating system, proceed as follows:

a. Connect 28-volt d-c power to external power receptacle and turn instrument power switch to "NORMAL." Indicator pointer should indicate below first graduation on dial.

b. Check that indicator pointer moves smoothly over dial when engine is started.

6-74. FUEL FLOW TOTALIZER INDICATOR.

6-75. The fuel flow totalizer indicator, located on the lower right side of the instrument panel, gives an indication of the rate of fuel consumption and the quantity of fuel remaining. Numerals on the dial, reading from .5 to 10, multiplied by 1000, indicate fuel consumption in pounds per hour. An indicator, located in the lower center of the dial, records pounds of fuel remaining. Numerals on the indicator, from 0000 to 9990, may be set by pulling out on the "RESET" knob and turning, to show total pounds of fuel available. As fuel is consumed, it is automatically subtracted from the original setting, thus enabling the pilot to see at a glance the quantity of fuel remaining and the rate of fuel consumption.

6-76. FUEL FLOW TOTALIZER TRANSMITTER.

6-77. The fuel flow totalizer transmitter is composed basically of a metering mechanism and an autosyn unit. Fuel enters the inlet port of the totalizer transmitter and is directed against a hinged vane in the metering chamber. Impact of the fuel causes the vane to move against the restricting action of a calibrated spring. When the two forces balance each other, the vane stops moving. This position of the vane represents a measure of the rate at which fuel is passing through the metering chamber. The vane shaft is magnetically coupled to the autosyn rotor shaft. Any movement of the vane, therefore, will be matched by a corresponding movement of the autosyn rotor. The autosyn unit transmits the motion of the vane to the indicator.

6-78. FUEL FLOW TOTALIZER AMPLIFIER.

6-79. The fuel flow totalizer amplifier, located in the lower left side of the fuselage (figure 6-2), electronically amplifies the voltage supplied by the autosyn unit and transmits this voltage as a control signal to the indicator motor, which drives the indicator pointer and counters. To prevent malfunction as the result of fluids entering the amplifier when the guns are cleaned and oiled, a protective cover is installed over the amplifier.

6-80. FUEL QUANTITY INDICATING SYSTEM.

6-81. Refer to paragraph 5-268.

6-82. FUEL PRESSURE INDICATING SYSTEM.

6-83. The fuel pressure indicating system consists of a fuel pressure indicator and transmitter operating synchronously to indicate fuel system pressure. The system is used on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5446, and F-86F-30 Airplanes AF52-4305 through -4904. The fuel pressure indicating system power is furnished by the 26-volt a-c step-down transformer, which operates from the three-phase 115-volt a-c inverter.

6-83A. CHECKING FUEL PRESSURE INDICATING SYSTEM. To check fuel pressure indicating system, proceed as follows:

a. Check that error at zero indication is within ± 6.0 psi.

b. Check that indicator pointer has full freedom of movement and does not oscillate during engine run-up and flight.

6-84. FUEL PRESSURE INDICATOR.

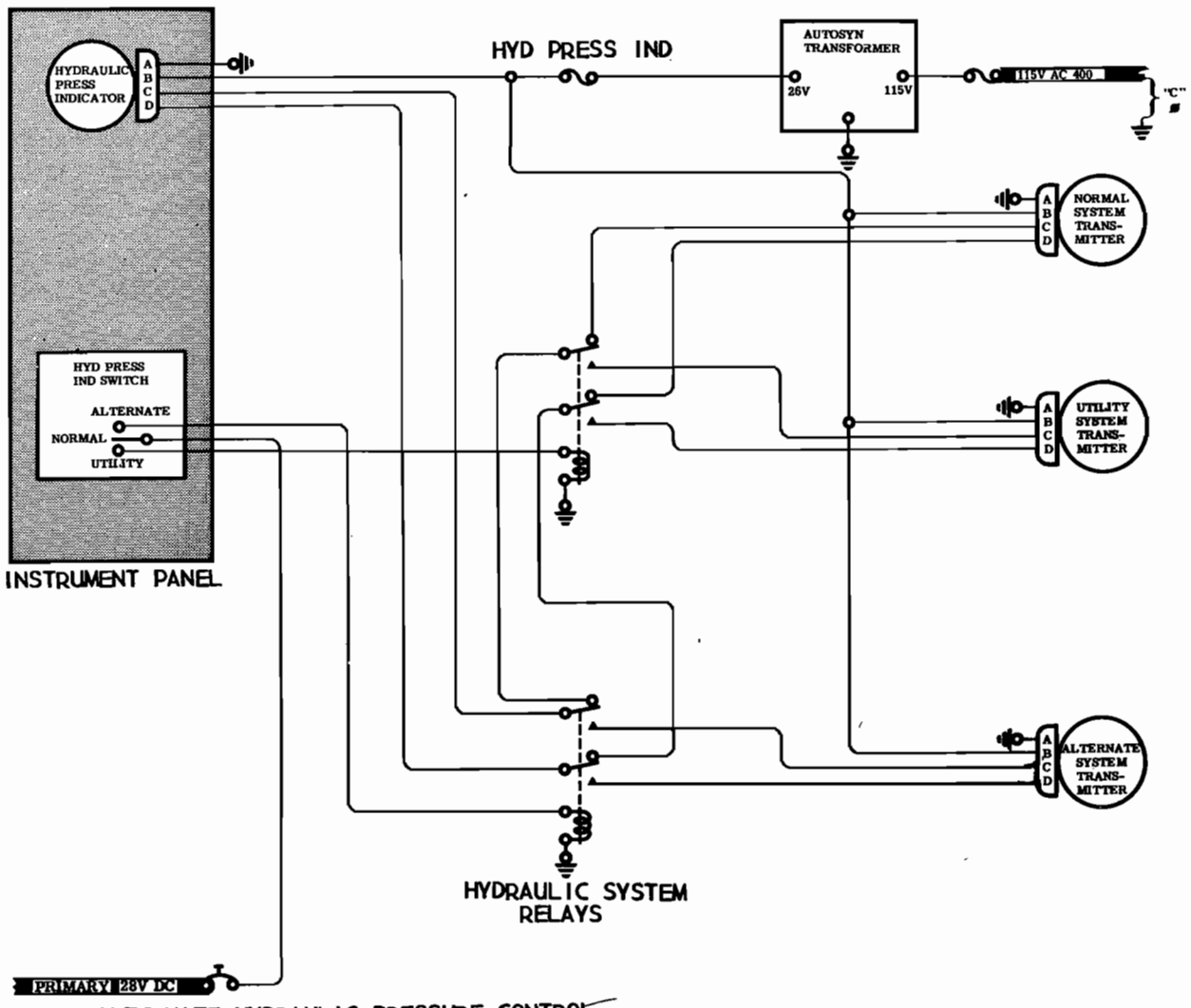
6-85. The fuel pressure indicator, located on the instrument panel, is an autosyn-type indicator with a motor-driven pointer. The indicator scale is calibrated in pounds per square inch.

6-86. FUEL PRESSURE TRANSMITTER.

6-87. The fuel pressure transmitter, located in the lower left aft section of the forward fuselage (figure 6-2), consists of a pressure chamber in which is mounted a pressure-operated diaphragm, connected through linkage to an autosyn shaft. Differential pressure moves the diaphragm. Each position of the diaphragm represents a quantity of pressure in the system. The diaphragm linkage operates the autosyn unit whose output voltage drives the motor-driven pointer of the indicator.

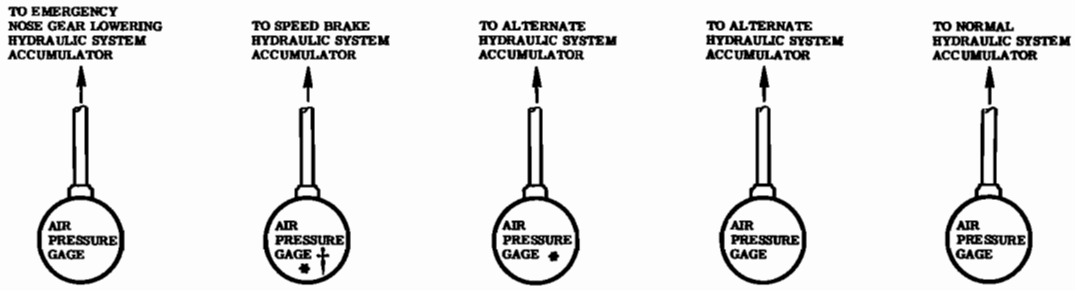
6-88. OIL PRESSURE INDICATING SYSTEM.

6-89. The oil pressure indicating system consists of an autosyn-type oil pressure indicator and transmitter. The



ALTERNATE HYDRAULIC PRESSURE CONTROL AND HYDRAULIC PRESSURE INDICATOR

HYDRAULIC PRESSURE INDICATING SYSTEM - F-86F-1 AIRPLANES AF51-2850 THROUGH -2877



*F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5328, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -5063

†F-86F-25 AIRPLANES AF52-5329 THROUGH -5386

F-86F-2-51-10

Figure 6-11. Hydraulic Pressure Instruments

system power is supplied by the 26-volt a-c step-down transformer, which operates from the three-phase, 115-volt a-c inverter.

6-89A. CHECKING OIL PRESSURE INDICATING SYSTEM. To check oil pressure indicating system, proceed as follows:

a. Check that error at zero indication is within ±3.5 psi.

b. Check that indicator pointer has full freedom of movement and does not oscillate during engine run-up and flight.

6-90. OIL PRESSURE INDICATOR.

6-91. The oil pressure indicator, located on the instrument panel, is an autosyn-type indicator, whose scale is calibrated in pounds per square inch.

6-92. OIL PRESSURE TRANSMITTER.

6-93. The oil pressure transmitter, located in the lower left aft section of the forward fuselage (figure 6-2), consists of a pressure chamber and a diaphragm connected to an autosyn unit shaft. Differential pressure causes the diaphragm to move. When this movement ceases, the position of the diaphragm represents a quantity of pressure in the system. The diaphragm operates the autosyn unit, whose output voltage is transmitted to the motor-driven indicator pointer.

6-94. TACHOMETER INDICATING SYSTEM.

6-95. The tachometer indicating system consists of a synchronous-type generator and indicator. The system primary power source is supplied by a geared-down mechanical outlet of the engine.

6-95A. CHECKING TACHOMETER INDICATING SYSTEM. To check tachometer indicating system, proceed as follows:

a. Check that error at zero indication is within ±1.25 percent on E-32 indicator and within ±40 rpm on E-34 indicator. (Refer to paragraph 6-2 for coding.) Tap indicator lightly before making reading.

b. Check that indicator operates smoothly when engine is running.

6-96. TACHOMETER INDICATOR.

6-97. The tachometer indicator, located on the instrument panel, is a synchronous-type indicator operated by the tachometer generator. The tachometer indicator motor revolves at a rate directly proportional to the engine speed. The indicator motor is magnetically coupled to the indicator pointer. The indicator scale is calibrated in percentage of the rated revolutions per minute of the engine.

6-98. TACHOMETER GENERATOR.

6-99. The tachometer generator is located in the engine accessory section (figure 6-2) and is connected mechanically to the engine. The tachometer generator produces an alternating current that is transmitted to the indicator motor.

6-100. HYDRAULIC PRESSURE INSTRUMENTS.

6-101. The hydraulic pressure instruments (figure 6-11) consist of the hydraulic pressure indicator and the hydraulic system accumulator air pressure indicators. See figure 6-2 for location.

6-102. HYDRAULIC PRESSURE INDICATING SYSTEM.

6-103. The hydraulic pressure indicating system (figures 6-11 and 6-11A) consists of a hydraulic pressure indicator, three hydraulic pressure transmitters, and five hydraulic system accumulator air pressure indicators. Pressure is selected separately from each transmitter by means of a selector switch located on the instrument panel.

6-103A. CHECKING HYDRAULIC PRESSURE INDICATING SYSTEM. To check hydraulic pressure indicating system, proceed as follows:

a. Check that error at zero indication is within ±100 psi.

b. Check that indicator pointer has full freedom of movement and does not oscillate during engine run-up and flight.

6-104. HYDRAULIC PRESSURE INDICATOR.

6-105. The hydraulic pressure indicator is an autosyn-type indicator located on the instrument panel. The indicator is operated by its related pressure transmitters. The indicator scale is calibrated in pounds per square inch.

6-106. HYDRAULIC PRESSURE TRANSMITTERS.

6-107. The hydraulic pressure transmitters are autosyn-type transmitters operating on 26-volt a-c power supplied by the instrument transformer. The utility hydraulic pressure transmitter and the surface control normal hydraulic pressure transmitter are located on the front spar of the wing center section. (See figure 6-2.) The surface control alternate hydraulic pressure transmitter is located in the lower left aft fuselage and is accessible through the data compartment access door.

6-108. HYDRAULIC SYSTEM ACCUMULATOR AIR PRESSURE INDICATORS.

6-109. The hydraulic system accumulator air pressure indicators (figure 6-2) are located throughout the airplane near each of the five accumulators to indicate pounds per square inch of air pressure in each accumulator.

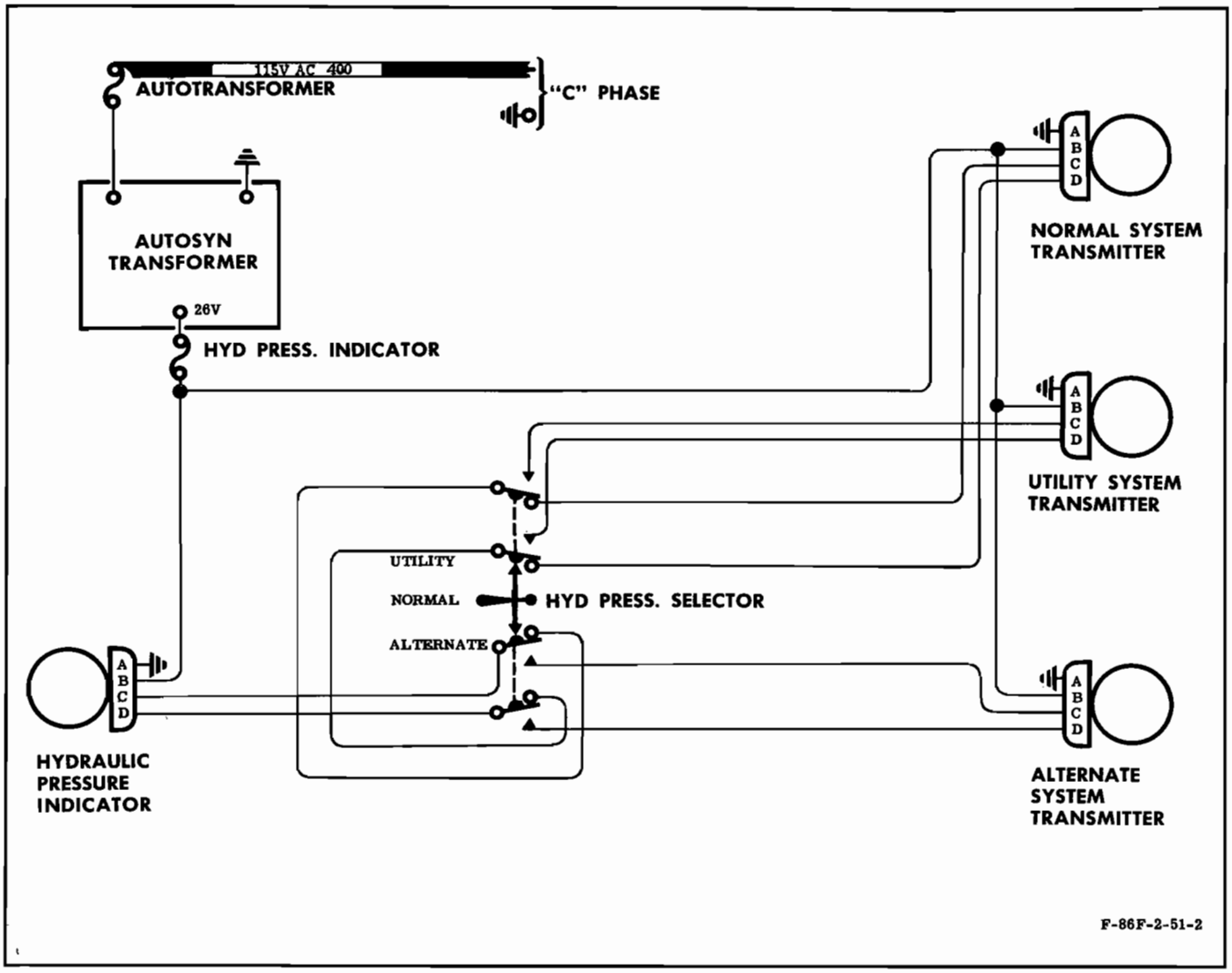


Figure 6-11A. Hydraulic Pressure Indicating System—F-86F-1 Airplane AF51-2878 and all Subsequent Airplanes

6-110. HYDRAULIC PRESSURE SYSTEM SELECTOR SWITCH.

6-111. The hydraulic pressure system selector switch is located near the hydraulic pressure indicator on the instrument panel. With the switch in normal position, the hydraulic pressure indicator shows the surface control normal hydraulic system pressure. Utility and surface control alternate hydraulic system switch positions are momentary.

6-112. MISCELLANEOUS INSTRUMENTS.

6-113. The miscellaneous instruments (figure 6-12) consist of the following: ammeter, clock, gun charger air compressor indicator, landing gear position indicator, and oxygen pressure gage. The miscellaneous instruments are located on the instrument panel, with the exception of the landing gear position indicator and the oxygen system pressure gage, which are located on separate panels on the left forward console.

6-114. AMMETER.

6-115. The ammeter, located on the instrument panel, automatically measures direct current in the electrical system of the airplane. The indicator scale is calibrated in amperes.

6-116. CLOCK.

6-117. The clock, located on the instrument panel, has an 8-day movement and a sweep second hand. A knob, located on the lower left front of the clock case, serves to wind and set the clock mechanism. The clock on F-86F-35 Airplane AF53-1072 and all subsequent airplanes, has a four day movement and an elapsed time mechanism that consists of a sweep second hand and a minute totalizer hand. A small knob on the upper right corner of the case controls the start, stop, and fly-back of both pointers of the elapsed time mechanism.

6-118. GUN CHARGER AIR COMPRESSOR INDICATOR.

6-119. The gun charger air compressor indicator location is shown in figure 6-2. It indicates the air pressure

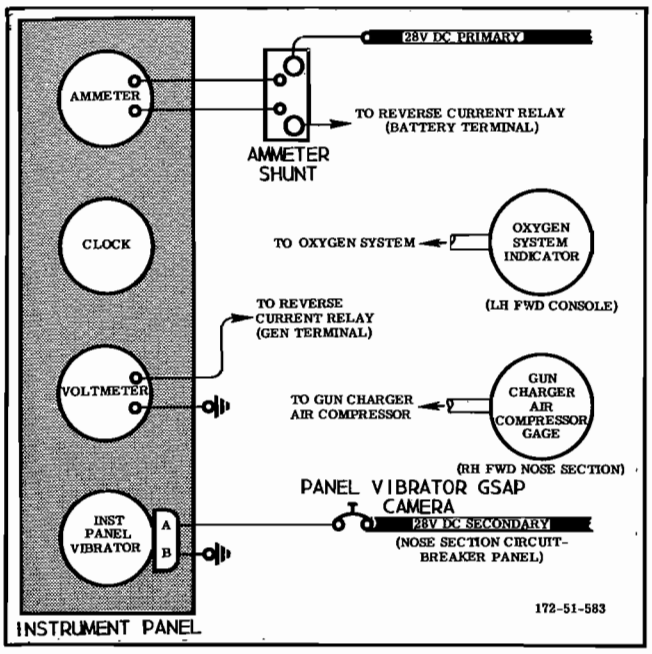


Figure 6-12. Miscellaneous Instruments

in the gun charger air compressor system. The indicator scale is calibrated in pounds per square inch.

6-120. LANDING GEAR POSITION INDICATING SYSTEM.

6-121. Refer to paragraph 2-240.

6-122. OXYGEN SYSTEM PRESSURE GAGE.

6-123. The oxygen system pressure gage is a direct-reading type gage calibrated in pounds per square inch. The pressure gage is located on the left forward console.

6-124. VOLTMETER.

6-125. The voltmeter, located on the instrument panel, indicates the regulated output of the engine-driven generator.

6-126. PITOT-STATIC SYSTEM.

6-127. The pitot-static system (figure 6-13) is composed of an electrically heated pitot-static head, a static-pressure manifold distribution block, three pitot-pressure line sump drains, three static-pressure line drains, and tubing leading to flight instruments and accessory gun sight equipment. The pitot-static head is installed in the forward end of a tubular boom, which is attached to the outboard rib of the right wing tip at the wing chord. A static-pressure line, as well as a pitot-pressure line, connects to the airspeed indicator, Machmeter, and gun sight radar computer. Static-pressure lines also connect to the rate-of-climb indicator, altimeter, manual pip control bombing altimeter, and sight amplifier. Pitot-pressure tubing is so installed that moisture will drain from the pitot-static head. Additional moisture in the pitot- or static-pressure tubing will drain into sumps located at the right wing tip, right wing front spar

approximately 2 feet from wing root, and left side of fuselage nose section under the gun port door forward of the armor plate bulkhead. The drain sump accesses are marked "AIR-SPEED LINES DRAIN." All tubing used in the system is identified by white tape labeled "PITOT" or "STATIC." To facilitate proper connection of the lines, the fittings on the rear of the instrument cases are stamped with the letters "S" (static) and "P" (pitot).

CAUTION

Always keep static-pressure and pitot-pressure openings clear of dirt and debris to ensure proper function of instruments affected. Cover these openings with automatic release cover when airplane is parked.

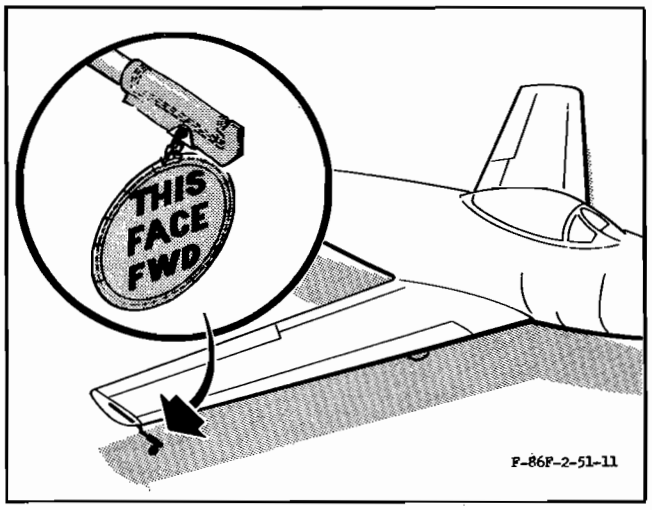


Figure 6-12A. Pitot Head Automatic Release Cover

6-128. TROUBLE SHOOTING PITOT-STATIC SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Pitot head does not heat or clear itself of ice with pitot heater switch "ON."	Circuit-breaker type switch defective. Break in wiring. Heating element in head burned out.	 Check for 24 volts at this point; the element is probably burned out and therefore must be replaced.
Pointers indicate incorrectly or oscillate undesirably on altimeter, airspeed indicator, and rate-of-climb indicator.	Leak in case of individual instrument. Leak in pitot- or static-pressure lines.	Make case leak test for this particular instrument. If it is found defective, replace it. Make static- or pitot-pressure line test. (Refer to paragraphs 6-129 and 6-130.)
Instrument pointer does not indicate at all.	Instrument improperly connected. Lines clogged. Instrument broken or stuck.	Check all connections and connect correctly. Refer to paragraph 6-131. Replace instrument.
Pointer indicates incorrectly.	Instrument improperly connected. Leak in case of instrument. Leak in pitot and/or static line. Airspeed tube bent or misaligned.	Check all connections and connect correctly. Replace instrument. Refer to paragraphs 6-129 and 6-130. Replace or realign.
Pointer does not indicate zero when airplane not in motion.	Line clogged. Defective instrument.	 Replace instrument.
Pitot-static lines break at pitot head.	Vibration and fatigue of lines as the result of loose pitot head mounting screws.	Replace broken tubing and tighten mounting screws periodically thereafter.

6-129. TESTING STATIC-PRESSURE LINES.

a. Seal static-pressure openings on each side of pitot-static head with masking tape.

b. Attach a source of suction to static drain sump at right wing tip.

c. Set altimeter pointer to "0."

d. Slowly apply suction within range of rate-of-climb indicator until altimeter reads 10,000 feet; then "pinch off" tube and secure it with a suitable clamp.

e. Tap altimeter to keep pointer swinging freely for one minute.

Note

The altimeter must not fall more than 900 feet in one minute.

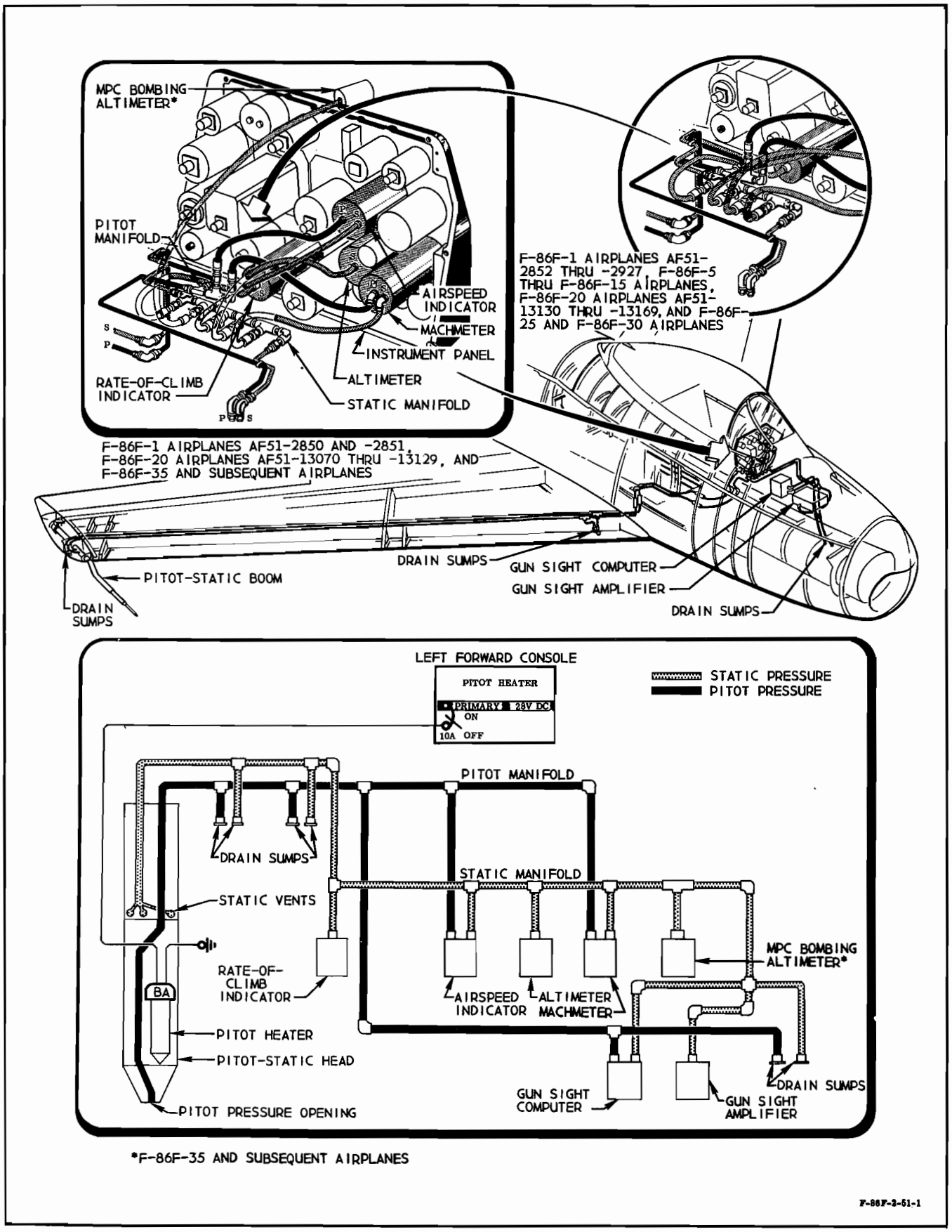


Figure 6-13. Pitot-Static System

f. If altimeter falls more than 900 feet, a line leak is indicated. Slowly remove source of suction, taking care to prevent rate of pressure drop from exceeding range of rate-of-climb indicator. Then disconnect static-line fittings from sight radar computer, sight amplifier, altimeter, rate-of-climb indicator, manual pip control bombing altimeter, Machmeter, and airspeed indicator. Attach a source of pressure to one tube of static system, and plug all other ends. Apply pressure and use a soap and water solution to locate leak. Tighten or repair faulty connection or replace damaged tubing; then retest. Remove line plugs and pressure source; then reconnect tubing to respective units.

CAUTION

Never apply pressure to static lines with instruments connected.

g. If altimeter does not fall 900 feet, negligible leakage is indicated. Slowly remove static-pressure source.

h. Remove masking tape from static-pressure openings.

6-130. TESTING PITOT-PRESSURE LINES.

a. Connect a source of pressure to opening in nose of pitot-static head. Seal drain hole with masking tape.

b. Apply pressure slowly until airspeed indicator reads three-fourths of full range; then "pinch off" source of pressure and secure with a suitable clamp.

c. Airspeed indication must not drop more than 5 knots after one minute. Tap indicator to keep pointer swinging freely.

d. If airspeed indicator drops more than 5 knots, locate line leak with soap and water solution and repair connection or replace tubing.

e. After test is completed, remove drain hole masking tape from pitot-static head.

CAUTION

Do not apply suction to pitot-pressure line.

6-131. CLEANING PITOT- AND STATIC-PRESSURE LINES.

a. Disconnect airspeed indicator, altimeter, rate-of-climb indicator, Machmeter, sight radar computer, manual pip control bombing altimeter, and sight amplifier at their respective case fittings and move disconnected lines out of line of fitting of instrument.

CAUTION

Be sure disconnected lines are moved out of line of instrument fittings; otherwise, air and/or dirt may be blown into instruments, with resulting damage to diaphragms.

b. Open moisture drain trap (or traps) in particular line that is clogged.

c. Using C-1 test set, connect pressure outlet to one of open moisture drain traps. Apply pressure up to 10 psi until reasonably certain all moisture has been driven from line.

Note

Make certain that test set is delivering dry air.

d. Remove C-1 test set, and seal moisture drain trap (or traps).

e. Connect airspeed indicator, altimeter, rate-of-climb indicator, Machmeter, sight radar computer, and sight amplifier.

f. Check lines for leaks. (Refer to paragraphs 6-129 and 6-130.)

6-132. PITOT-STATIC SYSTEM HEAD AND BOOM.

6-133. The pitot-static head (AN5816-2) provides both pitot- and static-pressure sources and contains a resistance-type anti-icing heater unit. It is installed on a boom so that its axis is inclined 5 degrees down with respect to the fuselage reference line. It furnishes the accurate value of impact (pitot) pressure caused by the motion of the airplane through the surrounding air. (The forward portion of the pitot-static head is open to receive the full force of impact pressure.) The pitot-static head is perforated on top and bottom to provide a source of quiet (static) air pressure, which varies only with the barometric pressure. The resistance-type heater installed in the forward end of the head prevents the formation of ice at the opening with consequent erroneous indications of airspeed. A toggle-type circuit-breaker switch, marked "PITOT HEATER," is located in the cockpit, on the left forward console.

CAUTION

To prevent heater element from burning out, keep pitot heater switch in "OFF" position when airplane is on ground.

6-134. REMOVING PITOT-STATIC HEAD. The parts referred to in the following procedure are identified in figure 6-14. To remove the pitot-static head, proceed as follows:

a. Remove the four screws and lock washers that secure pitot-static head to forward end of boom sleeve.

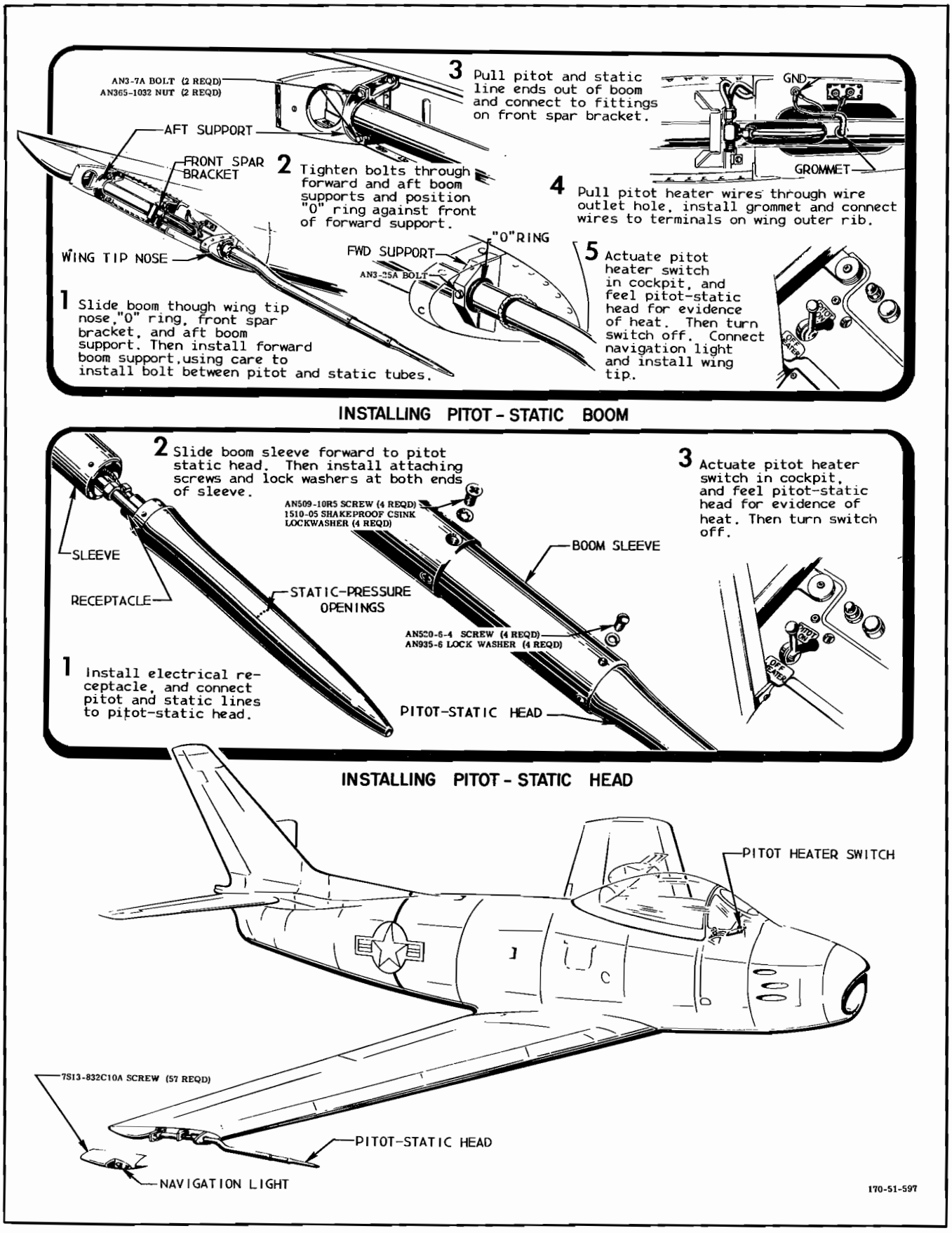


Figure 6-14. Installing Pitot-Static Head and Boom

b. Remove the four screws and lock washers that secure sleeve to boom.

c. Slide boom sleeve aft approximately 6 inches.

d. Disconnect pitot and static lines from pitot-static head.

Note

It is important that the forward coupling nut be held rigid to prevent shearing the forward airspeed line when the "B" nut is being loosened. This procedure must be adhered to when both lines are being disconnected.

e. Disconnect electrical receptacle and remove pitot-static head from boom.

6-135. REMOVING PITOT-STATIC BOOM. The pitot-static boom may be removed without prior removal of pitot-static head. The parts referred to in the following procedure are identified in figure 6-14. To remove the pitot-static boom, proceed as follows:

a. Remove right wing tip (disconnect wire to navigation light) for access to boom supports and pitot-static line connections.

b. Disconnect boom and pitot and static lines from "T" fittings on front spar bracket. (Press line ends into inside of boom.)

c. Disconnect pitot heater wires from wing tip outer rib connections.

d. Remove grommet and push wires into boom.

e. Loosen bolts through aft boom support.

f. Remove forward boom support bolt.

g. Slide boom forward and remove from wing.

6-136. INSTALLING PITOT-STATIC HEAD AND BOOM. See figure 6-14.

6-137. PITOT-STATIC SYSTEM HEATER.

6-138. The heating element (located in the forward end of the pitot-static head) consists of two heaters arranged in tandem to produce an efficient heat distribution during icing conditions. The heating element is of rugged design and will not burn out under normal operating conditions. Precautions should be taken, however, to see that pitot heater switch is "OFF" while the airplane is on the ground or when heat is not required, to prevent draining the battery and shortening the life of the heating elements.

Section VII

ELECTRICAL SYSTEMS

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7-1. D-C POWER SUPPLY SYSTEMS.

7-2. The d-c power supply system consists of the battery system and the generator system. The battery system (figure 7-5) powers the primary bus when a generator failure occurs or when power output from the generator is not available on the primary bus. The generator system (figure 7-2) supplies d-c power to the primary bus during normal engine operation. A generator overvoltage protection system protects the d-c electrical equipment from damage due to an overvoltage condition in the generator system. An external source of power may be connected through the external power receptacles to the primary and secondary busses for engine starting and for ground-checking equipment connected to these busses. Static charges, accumulated on the metallic structure of the airplane, are discharged through a grounding wire connected to the left main gear strut.

7-3. TROUBLE SHOOTING D-C POWER SUPPLY SYSTEMS.

WARNING

When trouble shooting of the complete electrical system is necessary, various plugs and terminal block covers must be removed to make circuits accessible. Extreme care must be taken when testing, as "hot" points are thus exposed. Whenever such testing is necessary, remove all power from equipment, make necessary circuit changes or meter connections, and then apply power.

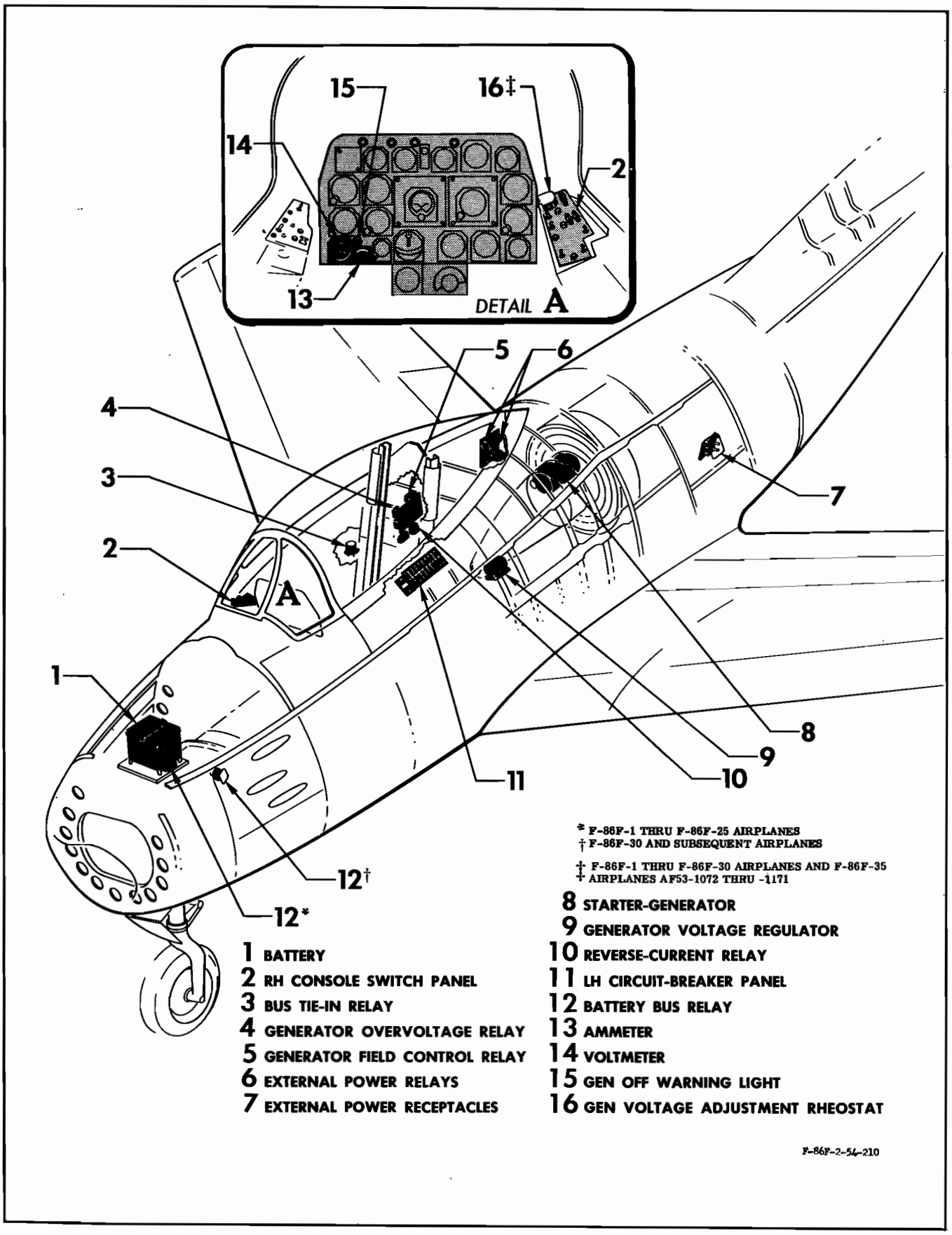

Figure 7-1. D-C Power Supply Equipment Location

Note

When trouble shooting, remove wires from unit affected. Using a voltmeter, check power lead for correct voltage. If there is power to this point, the trouble is in the unit, and an attempt should be made either to adjust or to replace the unit with one known to be serviceable. If there is no indication of power at unit, check wiring back to power source.

TROUBLE	PROBABLE CAUSE	REMEDY
	BATTERY	
Electrolyte consistently below top of plates.	Leakage due to break in battery case. Boiling over due to high generator voltage, high outside air temperatures, or both.	Replace battery. Adjust voltage regulator.
Electrolyte freezes.	Electrolyte specific gravity too low. Discharged battery. Outside air temperature too low.	Replace battery. Replace battery. Place battery in warm location and thaw.
Loss of capacity.	Overcharging for long periods. Discharged battery. Internal short circuits. Sulfated battery. Extended length of service. Broken cell partition.	Adjust or replace voltage regulator. Replace battery. Replace battery. Replace battery. Replace battery. Replace battery.
Battery discharged.	Loss of capacity. Incorrect adjustment of reverse-current relay. Load left on battery. External short circuit.	See preceding TROUBLE. Replace relay and battery. Replace battery. Locate and repair short circuit. Replace battery if necessary.
Corrosion inside battery case.	Electrolyte forced through vent cap breather hole because of excessive charging rate.	Replace battery. Adjust voltage regulator as necessary.
	GENERATOR	
Ammeter—no current; voltmeter—no voltage.	Broken inner shaft. Defective internal or external wiring.	Replace generator. Check wiring.
Ammeter—no current; voltmeter—no or low voltage.	Grease, dirt, or oil on brushes or commutator. Insufficient brush-spring tension. Loose connections at brush terminals or elsewhere inside the generator. Loss of residual magnetism. Grounded, shorted, or open shunt field or armature.	Clean as required. Replace defective brush spring or springs. Tighten brush terminal connections or replace generator. Flash field in proper direction. Replace generator.
Ammeter—rapidly fluctuating current; voltmeter—fluctuating voltage.	Incorrect brush seating, or an internal failure.	Reseat brushes. Replace generator if internal failure.

TROUBLE	PROBABLE CAUSE	REMEDY
Ammeter—abnormally different currents; voltmeter—normal or low voltage indicated.	Poor brush contact with commutator. Internal failure. Loose connections at brush-terminal screws.	Reseat brush on commutator. Replace generator. Tighten connections.
Overheating.	Dirty or clogged ventilating ducts.	Clean as required.
REVERSE-CURRENT RELAY		
Relay will not close at regulated voltage.	Generator voltage too low. Reversed generator polarity. Improperly adjusted relay. Defective relay.	Investigate cause and repair as necessary. Flash generator field in proper direction. Replace relay.
Relay will not open on reverse current.	Improperly adjusted relay.	Replace relay.
Reverse current, required to open relay, is too high.	Improperly adjusted relay.	Replace relay.
GENERATOR FIELD CONTROL RELAY		
Relay does not trip on overvoltage.	Open resistor in trip-coil circuit. Loose connection at pin G. Overvoltage relay contacts dirty or defective. Generator field control relay circuit breaker is open. Open trip coil.	Replace resistor. Replace overvoltage relay. Replace relay.
False tripping (under 31 volts).	Defective overvoltage relay.	Replace overvoltage relay.
Relay will not reset electrically.	Open reset coil. Loose connection at pin B. Generator field control relay circuit breaker is open.	Replace relay.
Relay will not reset manually.	Latching device is defective.	Replace relay.
OVERVOLTAGE RELAY		
Relay will not close on overvoltage condition.	Open or shorted coil.	Replace relay.
False tripping (under 31 volts).	Defective relay.	Replace relay.

7-4. ADJUSTING D-C POWER SUPPLY SYSTEMS.

Note

The generator and voltage regulator should be up to operating temperature before adjustments are made to the generator system. To avoid heavy fuel consumption, a close adjustment of the generator voltage regulator should be made while the engine is operating on the ground, and a fine adjustment should be made when the airplane has returned from a short air-borne operation.

a. Place all switches in "OFF" position.

b. Disconnect external power, if connected to airplane.

c. Move voltage regulator rheostat (located on voltage regulator assembly) to extreme counterclockwise position.

d. Connect positive lead of a portable precision voltmeter to "B" terminal on voltage regulator, and connect negative lead of voltmeter to metal structure of airplane.

Note

Precision voltmeters retained for checking aircraft instruments and aircraft electrical system voltages must be checked against an instrument of known accuracy every 90 days and/or whenever the instrument has been subjected to abuse.

WARNING

When components of the electrical system are adjusted or tested, it is necessary to remove terminal block covers to make circuits accessible. Extreme care must be taken during testing, as "hot" points are thus exposed. Whenever such testing is necessary, remove all power from equipment, make necessary circuit changes or meter connections, and then apply power.

e. Start engine.

f. Place generator switch in "ON" position.

g. Operate generator between 50% and 90% engine rpm.

Note

Because of heavy consumption of fuel while engine is operating on the ground, a close generator voltage regulator adjustment should be made on the ground prior to a short flight, and a fine adjustment should be made when the airplane returns to the ground after a short operational flight.

h. On F-86F-1 through F-86F-30 Airplanes and F-86F-35 Airplanes AF53-1072 through -1171, adjust remote rheostat (pilot's) on right console panel in cockpit area until d-c precision voltmeter indicates 28.0 volts. *Do not vary rheostat on voltage regulator assembly.*

hA. On F-86F-35 Airplane AF53-1172 and all subsequent airplanes, adjust rheostat on voltage regulator assembly until d-c precision voltmeter indicates 28.0 volts.

i. Place generator switch in "OFF" position.

j. Stop engine.

k. Disconnect precision voltmeter from "B" terminal on voltage regulator and metal structure of airplane.

l. Make operational check of generator system.

7-5. TESTING D-C POWER SUPPLY SYSTEMS.

a. Start engine and adjust speed to cruising rpm.

b. Place generator switch in "ON" position.

bA. Place battery-starter switch in "BATTERY" position.

c. Connect reasonable d-c load to generator system.

d. Observe generator off red warning light. Light should be extinguished to indicate generator supplying d-c power to load.

e. Observe ammeter. Ammeter should indicate percent of load imposed on generator system.

f. Slowly reduce engine speed to idling rpm while observing ammeter. Ammeter reading should gradually decrease toward zero.

g. When zero load is indicated on ammeter, observe generator off red warning light for illumination. Warning light should illuminate when reverse current flows from battery to generator through reverse-current relay.

Note

If the d-c power system fails to check out, as described in steps a. through g., shut down engine and investigate for cause of malfunction.

h. Speed up engine and pull circuit breakers to remove load from generator.

i. Stop engine.

7-6. BATTERY SYSTEM.

7-7. The battery system (figure 7-5) consists of the battery, battery bus, battery bus tie-in relay, battery-starter switch, engine start ignition control relay, and canopy power relay. The battery system powers equipment tied directly to the battery bus. During normal operation, the battery system is charged by d-c power from the generator system. The battery will automatically power the primary bus whenever the generator output voltage drops below the battery voltage or whenever a generator failure occurs.

Note

- On F-86F-1 Airplanes, the battery system is automatically connected to the external power source when the external source is plugged into the No. 1 external power receptacle.
- On F-86F-5 and subsequent airplanes, the battery-starter switch must be placed in the "BATTERY" position to permit battery charging when external power is connected to the airplane.

7-8. FUNCTION OF BATTERY SYSTEM. When the battery-starter switch is placed in the "BATTERY" position, the ground-return circuit for the battery bus tie-in relay coil is connected to ground (figure 7-5), and the relay is energized by battery bus power through a set of normally closed contacts on the canopy power relay. When energized, the battery bus tie-in relay connects battery power to the primary bus. On F-86F-1 Airplanes only, the ground return circuit for the battery bus tie-in control relay coil is automatically completed through a set of normally open contacts on the external bus tie-in

control relay, when external power is connected to No. 1 external power receptacle. On F-86F-1 Airplanes, the battery system is charged automatically when external power is connected to the No. 1 external power receptacle. On F-86F-5 and subsequent airplanes, the battery-starter switch must be placed in the "BATTERY" position to permit battery charging from an external power source. During normal operation, the battery system is charged by the generator system when the battery-starter switch is placed in the "BATTERY" position.

7-9. BATTERY.

7-10. The Type AN3150-A, 24-volt, 34-ampere-hour battery is located in the upper forward nose section, on the centerline, and is accessible through the radar-battery access door on the top side of the nose section. The battery is connected to the battery bus and the metallic structure of the airplane through a quick-disconnect type plug. The battery case is vented to the air through a rubber hose connecting the upper part of the battery case and a vent, located forward of the windshield. Any battery electrolyte overflow from the battery case is routed through a flexible rubber hose, connected between the battery case overflow vent and the battery sump jar. The sump jar is located in the extreme right forward portion of the nose section. The jar contains a neutralizing agent which effectively neutralizes the electrolyte. The sump jar outlet is connected to a vent located forward and outboard from the nose wheel well fairing door assembly on the underside of the airplane.

7-11. REMOVING BATTERY. To remove battery, proceed as follows:

a. Remove radar compartment access door.

aA. Place all switches in "OFF" position.

b. Remove quick-disconnect plug from battery.

CAUTION

- Before removing battery quick-disconnect plug from battery, make certain battery switch is in "OFF" position.
- Whenever the battery quick-disconnect plug is removed from the battery, the disconnect plug must be adequately insulated from the airplane metallic structure. Otherwise, when external power is connected to the airplane (F-86F-1 Airplanes only) or when the generator system is ground-checked, a heavy short circuit on the battery bus (d-c power distribution system) may result.
- When replacing battery quick-disconnect plug, be sure to replace fiber assembly washers on cap screws (inside the new plug) with appropriate brass washers. Failure to replace fiber washers will cause plug to overheat and subsequently fail, because of poor wiring contact inside plug.

c. Free tie-down rods from slots in battery cover.

d. Disconnect battery vent tubes.

e. Lift battery out of airplane.

7-12. INSTALLING BATTERY. To install battery, proceed as follows:

Note

Before installing battery, make certain that battery is fully charged and that there is a 3/16-inch-thick sponge rubber gasket between battery lid and battery.

a. Position battery on mounting bracket.

b. Connect battery vent tubes.

c. Position tie-down rods into battery cover slots, and snap down cam snaps. Check for tight fit of battery cover. If necessary, adjust for proper fit.

d. Install quick-disconnect battery plug.

CAUTION

When replacing battery quick-disconnect plug, be sure to replace fiber assembly washers on cap screws (inside new plug) with appropriate brass washers. Failure to replace fiber washers will cause plug to overheat and subsequently fail, because of poor wiring contact inside plug.

e. Make operational check of battery system.

f. Install radar compartment access door.

7-13. TESTING BATTERY BUS TIE-IN RELAY. To test the battery bus tie-in relay, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power from airplane, if connected.

c. Place battery-starter switch in "BATTERY" position.

d. Observe generator off red warning light for illumination. Light should illuminate to indicate proper function of battery bus tie-in relay.

Note

Bus tie-in control circuit breaker must be pushed in to permit the light to illuminate when battery power is available on the primary bus.

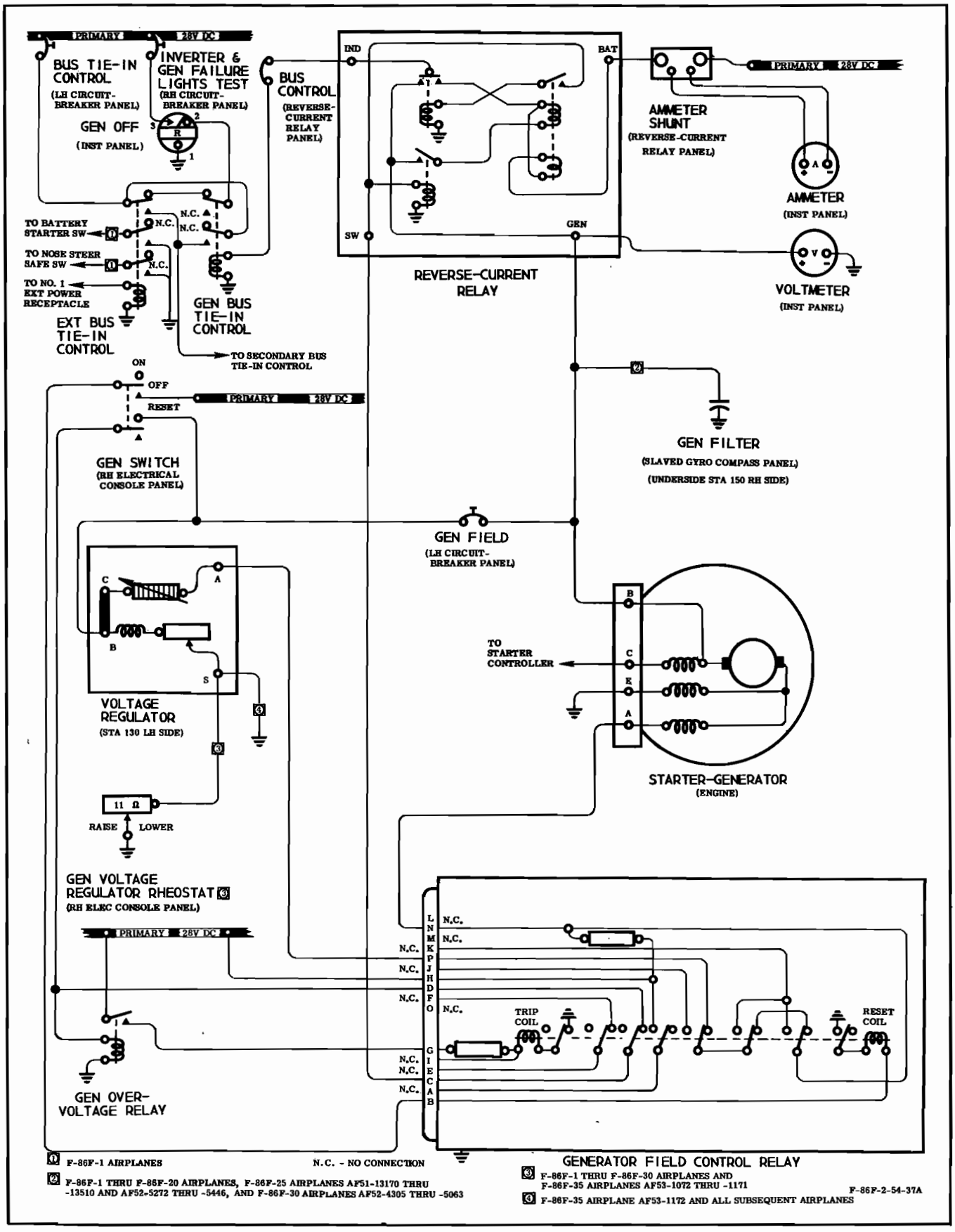

Figure 7-2. Generator System

e. Place battery-starter switch in "OFF" position.

f. Observe generator off red warning light. Light should be extinguished.

Note

An operational test on the battery bus tie-in relay should be performed at every 25-hour inspection. This is done to make sure that the battery bus is connected to the primary bus when the battery-starter switch is placed in the "BATTERY" position.

7-14. GENERATOR SYSTEM.

7-15. The generator system (figure 7-2) consists of a dual-purpose starter-generator, a voltage regulator, a reverse-current relay, a generator switch, a generator field control relay, a generator overvoltage relay, an ammeter, a voltmeter, and a generator off red warning light. The generator field control relay and generator overvoltage relay make up the generator overvoltage protection system. During normal operation, the generator is engine-driven and supplies d-c power to the primary bus and to the d-c power distribution system, provided the generator field circuit breaker is closed and the generator field control relay is in the normal (reset) position. The voltage regulator maintains the generator output voltage at 28.0 volts dc, regardless of normal variations in d-c load and engine rpm. The reverse-current relay connects the regulated generator output voltage to the primary bus when the generator voltage is of the correct polarity, when the generator voltage exceeds the primary bus (battery) voltage by at least .35 volt, and when a d-c load exists on the primary bus. The generator field control relay and the overvoltage relay automatically disable the generator system when a generator overvoltage condition occurs. The generator system can be restored to normal operation by proper manipulation of the generator switch, provided the overvoltage condition is only momentary in nature.

7-16. FUNCTION OF GENERATOR SYSTEM. The generator develops d-c power when driven by the engine, provided the generator field circuit breaker is closed and the generator field control relay is in the normal (reset) position. When the generator switch is placed in the "ON" position, generator voltage is connected to the "SW" terminal of the reverse-current relay through a set of normally closed contacts on the generator field control relay. Generator voltage (of the correct polarity and above 20 volts dc) on the "SW" terminal energizes the coil of the polarized voltage relay. When energized, the polarized voltage relay closes and connects the generator output to the "BAT" terminal of the reverse-current relay through the differential voltage coil and the reverse-current coil of the differential relay. Current will then flow from the generator system to the primary bus through the differential voltage coil and the reverse-current coil. This flow will occur provided the generator voltage exceeds the primary bus (battery) voltage by at least .35 volt and provided a suitable d-c load exists on the primary bus. Current flow through the coils of the differential relay closes the contacts of the relay, and thereby connects generator voltage (on the "SW" terminal) to the contactor relay coil. When energized, the contactor relay connects the generator output (on the "GEN" terminal) directly to the primary bus (on the "BAT" terminal) through only the reverse-current coil of the differential relay. Heavy d-c loads can then be connected to the d-c power distribution system, and the generator will power the load. A reverse-current flow of 20 to 35 amperes, from the primary bus to the generator system through the reverse-current coil, causes the differential relay contacts to open. This disconnects the voltage applied to the main contactor relay coil. When de-energized, the main contactor relay disconnects the generator from the primary bus. A reverse-current flow condition can result from a sudden drop in generator output voltage, caused by a generator failure or an overvoltage condition. If an overvoltage condition occurs, the overvoltage protection system operates to disable the generator system by reducing the generator output voltage to a low value.

7-17. STARTER-GENERATOR.

7-18. An engine-driven, 30-volt, 400-ampere starter-generator (paragraph 5-5) is installed on the accessory gear case on the front end of the engine. The starter-generator operates as a starter for cranking the engine until the engine attains approximately 22% rpm, and then the starter-generator begins to function as a generator. As a generator, the starter-generator develops rated output at approximately 51% engine rpm. The starter-generator serves as the primary source of d-c power for the d-c electrical system of the airplane during normal engine operation. The starter-generator is cooled by blast air entering the engine air intake duct and passing through the starter-generator housing into the engine accessory section. On F-86F-35 and subsequent airplanes, a plastic cover is installed over the starter-generator terminals to prevent adjacent electrical conduit from short-circuiting the output of the starter-generator. The cover is held in place by a circular retaining clamp that fits around the body of the starter-generator.

7-19. REMOVING STARTER-GENERATOR. Refer to paragraph 5-123.

7-20. INSTALLING STARTER-GENERATOR. Refer to paragraph 5-124.

7-21. CHECKING STARTER-GENERATOR BRUSHES. To check starter-generator brushes for wear and proper fit, proceed as follows:

a. Remove starter-generator. (Refer to paragraph 5-123.)

b. Remove brush inspection band and cooling cap.

c. Cut safety wire on brush terminal and loosen terminal screw.

d. Remove brush terminal.

e. Pull brush spring back far enough to permit removal of brush.

f. Remove brush from brush holder.

Note

Do not remove more than one brush at a time. Brushes must be returned to their respective brush holders, in the same manner as they were run in, to ensure proper fit to commutator.

g. Observe brush surface which comes in contact with commutator. At least 70 percent of this surface should show wear. (See figure 7-3.) Any brush with less than 70 percent contact surface should be replaced.

Note

Any starter-generator requiring a brush replacement should be removed from the airplane and replaced by a serviceable starter-generator.

h. Measure brush length. Brush should measure more than ⅛ inch minimum from rivets. Any brush measuring less than ⅛ inch should be replaced.

i. Return brush to brush holder (in its original position).

j. Return brush spring to its original position.

k. Secure brush terminal with terminal screw and safety-wire screw.

l. Repeat steps c. through k. for remaining brushes.

lA. Safety-wire all brush terminals.

m. Install brush inspection band and cooling cap.

n. Install starter-generator on engine accessory drive pad. (Refer to paragraph 5-124.)

7-22. TESTING STARTER-GENERATOR BRUSH-HOLDER SPRING TENSION. To check starter-generator brush-holder spring tension, proceed as follows:

a. Remove engine from fuselage. (Refer to paragraph 5-13.)

b. Remove brush inspection band.

c. Insert scale hook of spring-type hand scale under brush spring.

d. Lift hand scale until brush spring just leaves the brush.

e. Note scale reading. Scale should read approximately 25 ounces minimum for a worn brush or 50 ounces for a new brush.

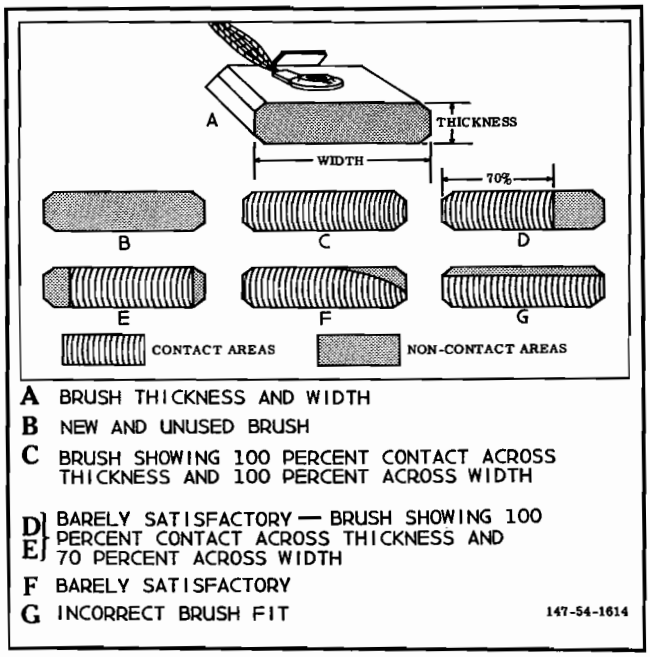

Figure 7-3. Correctly and Incorrectly Fitted Brush

Note

Any starter-generator that requires a brush-spring replacement should be removed from the airplane and replaced by a serviceable starter-generator.

f. Repeat steps c. through e. for remaining brush springs.

g. Safety-wire all brush terminals.

h. Install brush inspection band and cooling cap.

i. Install engine in fuselage. (Refer to pargraph 5-17.)

j. Make an operational check of starter-generator.

7-23. FLASHING STARTER-GENERATOR FIELD. To flash the starter-generator field, proceed as follows:

Note

When a starter-generator loses its residual magnetism, it will fail to build up to rated voltage output when driven by the engine. To restore residual magnetism to starter-generator pole pieces, momentarily flash field coil with a suitable source of d-c voltage.

WARNING

Do *not* flash starter-generator field by manually closing reverse-current relay contacts. Serious damage to the relay and the electrical system, and injury to the person closing the contacts may result from the heavy current drawn from the battery.

AN 01-60JLD-2

NO. REQD	EQUIPMENT	MAX AMP	MAX POWER, WATTS
	ARMAMENT		
6	Ammunition boost motors at 17.5 amperes	105.00	2940.00
6	Bolt chargers, release at 2.2 amperes	13.20	369.60
6	Bolt chargers, retract at 3.5 amperes	21.00	588.00
4	Bomb arming solenoids at 0.5 ampere	2.00	56.00
2	Bomb release solenoids at 6.0 amperes	12.00	336.00
4	Drop tank release solenoids at 8.4 amperes	33.60	940.80
2	GSAP cameras at 4.0 amperes	8.00	224.00
1	Gun charger compressor at 21.5 amperes	21.50	602.00
6	Chargers, gun-fire at 1.9 amperes	11.40	319.20
1	Gun-bomb-rocket sight at 41.0 amperes	41.00	1148.00
2	Parafragmentation bomb release solenoids at 15.5 amperes	31.00	868.00
16	Rocket arming solenoids at 0.35 ampere	5.60	156.80
8	Rocket jettison solenoids at 8.4 amperes	67.20	1881.60
1	Rocket projector release at 1.5 amperes	1.50	42.00
	DEICING AND ANTI-ICING		
1	Fuel filter deice pump at 8.5 amperes	8.50	238.00
1	Fuel filter deice valve at 0.63 ampere	0.63	17.64
1	Pitot heater at 5.35 amperes	5.35	149.80
1	Windshield anti-ice heater at 74.0 amperes	74.00	2072.00
	ENGINE INSTRUMENTS		
1	Fuel level indicating system at 0.8 ampere	0.80	22.40
	FLIGHT INSTRUMENTS		
1	Turn-and-bank indicator at 0.15 ampere	0.15	4.20
1	Gyrosyn compass amplifier at 0.6 ampere	0.60	16.80

NO. REQD	EQUIPMENT	MAX AMP	MAX POWER, WATTS
	FUEL AND OIL		
1	Emergency fuel system regulator valve at 1.0 ampere	1.00	28.00
1	Fuel shutoff valve at 1.5 amperes	1.50	42.00
1	Fuel transfer pump at 9.3 amperes	9.30	260.40
2	Main fuel booster pumps at 16.0 amperes	32.00	896.00
1	Main fuel system regulator valve at 1.0 ampere	1.00	28.00
	HEAT AND VENT		
1	Cockpit air shutoff valve at 2.5 amperes	2.50	70.00
1	Cockpit heater at 148.0 amperes	148.00	4144.00
1	Cockpit pressure regulator at 0.3 ampere	0.30	8.40
1	Dump valve at 0.25 ampere	0.25	7.00
1	Engine anti-ice motor valve at 0.8 ampere	0.80	22.40
6	Gun heaters at 3.7 amperes	22.20	621.60
1	Heat exchanger modulator valve at 1.0 ampere	1.00	28.00
1	Hot-air by-pass valve at 1.0 ampere	1.00	28.00
1	Ram-air shutoff valve at 1.5 amperes	1.50	42.00
	IGNITION		
1	Ignition vibrator at 7.4 amperes	7.40	207.20
	LANDING GEAR		
1	Fairing door solenoid valve at 0.9 ampere	0.90	25.20
1	Nose steering solenoid valve at 0.2 ampere	0.20	5.60
3	Position indicators at 0.03 ampere	0.03	0.84
1	Strut solenoid valve at 0.9 ampere	0.90	25.20

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Figure 7-4. D-C Loading Chart (Sheet 1 of 2)

NO. REQD	EQUIPMENT	MAX AMP	MAX POWER, WATTS
	LIGHTS		
2	Auxiliary instrument lights at 0.3 ampere	0.60	16.80
1	Cockpit utility light at 0.17 ampere	0.17	4.76
32	Console and pedestal lights at 0.04 ampere	1.28	35.84
2	Console floodlights at 0.17 ampere	0.34	9.52
2	Fuselage lights (bright) at 1.5 amperes	3.00	84.00
2	IFF destructor lights at 0.04 ampere	0.08	2.24
41	Instrument ring lights at 0.04 ampere	1.64	45.92
2	Landing and taxi lights at 8.9 amperes	17.80	498.40
1	Landing and taxi light motor at 2.14 amperes	2.14	59.92
1	Position light flasher at 0.6 ampere	0.60	16.80
1	Stand-by compass at 0.19 ampere	0.19	5.32
2	Tail position lights at 0.8 ampere	1.60	44.80
2	Wing position lights at 0.75 ampere	1.50	42.00
	MISCELLANEOUS		
1	Canopy actuator at 15.5 amperes	15.50	434.00
1	Canopy seal valve at 0.3 ampere	0.30	8.40
1	Fire detector relay at 1.55 amperes	1.55	43.40
1	Instrument panel vibrator at 0.3 ampere	0.30	8.40
65	Miscellaneous power and control relays at 0.2 ampere (average)	13.00	364.00
	POWER		
2	Instrument inverters at 7.9 amperes	15.80	442.40
1	Radar inverter at 72.7 amperes	72.70	2035.60

NO. REQD	EQUIPMENT	MAX AMP	MAX POWER, WATTS
	RADAR		
1	IFF set at 1.43 amperes	1.43	40.04
1	Radar set at 2.15 amperes	2.15	60.20
	RADIO		
1	Radio compass receiver at 4.5 amperes	4.50	126.00
1	VHF command set (receiving) at 16.5 amperes	16.50	462.00
1	VHF command set (transmitting) at 19.1 amperes	19.10	534.80
	SURFACE CONTROLS		
1	Surface control alternate system hydraulic pump at 48.5 amperes	48.50	1358.00
1	Surface control alternate system return and supply valve at 0.7 ampere	0.70	19.60
1	Engine screen actuator at 6.0 amperes	6.00	168.00
1	Lateral trim bungee actuator at 2.0 amperes	2.00	56.00
1	Longitudinal trim bungee actuator at 3.5 amperes	3.50	98.00
1	Normal system by-pass valve at 0.75 ampere	0.75	21.00
1	Rudder trim actuator at 3.5 amperes	3.50	98.00
1	Speed brake solenoid valve at 0.9 ampere	0.90	25.20
2	Wing flap actuators at 11.0 amperes	22.00	616.00
	WARNING DEVICES		
1	Landing gear warning horn at 1.0 ampere	1.00	28.00
14	Miscellaneous indicator lights at 0.17 ampere	2.38	66.64

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Figure 7-4. D-C Loading Chart (Sheet 2 of 2)

a. Place all switches in "OFF" position.

aA. Disconnect external power.

b. Unplug voltage regulator and stow temporarily.

c. Place battery-starter switch in "BATTERY" position.

d. With the aid of portable d-c voltmeter, locate nearest point (to voltage regulator base) from which battery voltage can be obtained (negative terminal of voltmeter connected to airplane structure).

e. Connect one (bare) end of suitable length of No. 18 (or larger) insulated cable to starter-generator "A" terminal lead at voltage regulator base.

f. Start engine and operate at normal cruising rpm.

g. Touch free (bare) end of flashing cable to battery power source (as located in step d.) for approximately one second.

h. With the aid of a portable d-c voltmeter, connected from starter-generator "B" terminal to ground, measure residual voltage. Voltage should measure between 4 to 6 volts dc.

Note

If a starter-generator residual voltage reading cannot be obtained after the field has been properly flashed, the starter-generator is defective and should be replaced with a serviceable item.

i. Shut down engine.

j. Place all switches in "OFF" position.

k. Remove temporary flashing cable connected to voltage regulator base.

l. Plug in voltage regulator.

m. Start engine.

n. Make operational check of generator system.

7-24. GENERATOR SYSTEM VOLTAGE REGULATOR.

7-25. The carbon-pile Type 17R21 voltage regulator is mounted on the left side of the radio compartment and is accessible through the radio compartment access door on the left side of the airplane. The starter-generator voltage regulator maintains a 28-volt, d-c generator system regardless of normal variations in generator speed and conditions of electrical load. The voltage regulator automatically maintains constant generator output voltage by varying the amount of resistance inserted into the shunt field circuit of the generator, to automatically maintain a 28-volt, direct-current electrical system. When the generator output drops below 28 volts, the carbon pile (on the regulator) is compressed (resistance decreased). This mechanical-electrical action increases the shunt field current and creates a corresponding increase in generator voltage. When the generator voltage rises above 28 volts, the carbon pile is decompressed (resistance increased). This decreases the shunt field current and consequently decreases the generator voltage.

7-26. REMOVING GENERATOR SYSTEM VOLTAGE REGULATOR. To remove the generator voltage regulator, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power if connected to airplane.

c. Remove left radio access door.

d. Locate voltage regulator, immediately outboard from AN/ARN-6 radio compass.

e. Unplug voltage regulator from regulator base.

f. Remove voltage regulator from airplane.

Note

After removing voltage regulator from regulator base, inspect base finger contacts for a possible short circuit caused by foreign metallic material lodged against contacts.

7-27. INSTALLING GENERATOR SYSTEM VOLTAGE REGULATOR. To install the generator voltage regulator, proceed as follows:

a. Locate voltage regulator base, immediately outboard from AN/ARN-6 radio compass.

Note

Before installing voltage regulator on regulator base, inspect base finger contacts for a possible short circuit caused by foreign metallic material lodged against contacts.

b. Plug voltage regulator into regulator base.

c. Install left radio access door.

d. Make an operational check of generator system.

7-28. ADJUSTING GENERATOR SYSTEM VOLTAGE REGULATOR. Refer to paragraph 7-4.

7-29. GENERATOR SYSTEM REVERSE-CURRENT RELAY.

7-30. The Type AN3025-2 reverse-current relay is located immediately forward of the directional gyro control. The relay is accessible through the directional gyro system access door, located below the aft end of the canopy, on the right side of the airplane. The reverse-current relay consists of a polarized voltage relay, a differential-voltage relay, and a contactor relay. All three relays are housed within one hermetically sealed unit, referred to as the reverse-current relay. The relay connects the generator system to the primary bus when the polarity and the voltage of the generator are correct and disconnects the generator system from the primary bus when a reverse-current flow occurs from the primary bus into the generator system.

Note

Reverse-current relays with an "M" stamped after the manufacturer's part number on the name plate have been modified by installation of a vented "SW" terminal to prevent collection of moisture inside relay housing.

On F-86F-35 Airplane AF53-1122 and all subsequent airplanes, a terminal cover is installed over the reverse-current relay contacts to prevent them from chafing the large bundle of wires that pass over the corner of the relay.

7-31. FUNCTION OF REVERSE-CURRENT RELAY. Refer to paragraph 7-16.

7-32. REMOVING GENERATOR SYSTEM REVERSE-CURRENT RELAY. To remove generator reverse-current relay, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power if connected to airplane.

c. Remove directional gyro system access door located on right side of airplane.

d. Remove single-channel amplifier.

e. Remove directional gyro control.

f. Remove both cockpit air temperature controls located immediately outboard from reverse-current relay.

g. Disconnect airplane wiring to reverse-current relay.

h. Remove the four bolts that secure reverse-current relay to airplane.

i. Remove relay from airplane.

7-33. INSTALLING GENERATOR SYSTEM REVERSE-CURRENT RELAY. To install generator reverse-current relay, proceed as follows:

a. Position relay on mounting bracket in airplane.

b. Secure relay to airplane with four bolts.

c. Connect airplane wiring to reverse-current relay terminals.

d. Install cockpit air temperature controls.

e. Install directional gyro control.

f. Install single-channel amplifier.

g. Install directional gyro system access door.

h. Make operational check of generator system.

7-33A. CHECKING GENERATOR SYSTEM REVERSE-CURRENT RELAY. To check generator reverse-current relay, proceed as follows:

a. With engine running, turn generator switch "ON" and battery switch to "BATTERY."

b. Slowly increase engine speed until a current reading is noted on load indicator.

c. Operate engine at cruising rpm for a few seconds. Turn on a load so that current equal to 20-30 percent of generator rating is flowing.

d. Slowly reduce engine rpm while watching load indicator. The indicator should decrease to zero, then indicate in reverse direction, and then return to zero.

e. Note indicator just before pointer returns to zero. The reading should not exceed -0.1 on load indicator.

f. If indicator pointer does not immediately return to zero, advance throttle until indicator shows a small output from generator and then turn generator switch "OFF." This indicates that reverse-current relay is incorrectly adjusted. It should be replaced with a serviceable relay.

7-34. GENERATOR OVERVOLTAGE PROTECTION SYSTEM.

7-35. The overvoltage protection system (figure 7-2) consists of a generator overvoltage relay, a generator field control relay, and a generator off red warning light. When an overvoltage condition (31 volts or more) occurs in the generator system, the overvoltage relay closes. This trips the generator field control relay. When tripped, the generator field control relay simultaneously de-energizes the reverse-current relay and inserts a 400-ohm resistor in series with the generator shunt field circuit. The addition of the 400-ohm series resistor maintains the generator output voltage at a low value (approximately 2 volts) to ensure proper generator output polarity (which might otherwise reverse if the field circuit were completely disconnected). When de-energized, the reverse-current relay disconnects the generator from the d-c distribution system and also de-energizes the generator bus tie-in control relay. When de-energized, the generator bus tie-in control relay completes the warning circuit through a set of normally closed contacts on the external bus tie-in control relay and through a set of normally closed contacts on the generator bus tie-in control relay. This action also illuminates the generator off red warning light. On F-86F-25 Airplanes AF52-5447 through -5530, F-86F-30 Airplane AF52-5014, and all subsequent airplanes, the generator overvoltage relay installation is rotated 90 degrees to correct false operation due to "G" forces during acrobatic maneuvers.

7-36. CHECKING GENERATOR OVERVOLTAGE PROTECTION SYSTEM. To check the overvoltage protection system, proceed as follows:

a. Place all switches in "OFF" position.

aA. Pull all push-pull circuit breakers.

b. Install temporary jumper between "A" and "B" terminals on voltage regulator.

c. Connect 0- to 50-volt d-c voltmeter of known accuracy between "B" terminal on voltage regulator and ground.

d. Start engine.

e. Remove external power source.

eA. Push in "GEN FIELD" and "BUS TIE-IN CONTROL" circuit breakers.

f. Place generator switch in "ON" position.

g. Place battery-starter switch in "BATTERY" position.

h. Gradually increase engine rpm while maintaining a continuous visual check of voltmeter indication.

i. Note voltage at which overvoltage relay disconnects generator from primary bus (31 to 33 volts).

Note

If voltage is in excess of the 33-volt limit or if system fails to operate, check units in overvoltage protection system and replace defective units as required.

CAUTION

Do *not* permit generator voltage to rise above 35 volts maximum. Shut off engine *immediately* if voltage exceeds this value.

j. Check generator off red warning light for proper operation.

k. Note voltage indicated by voltmeter on instrument panel. (Approximately 2 to 10 volts is normal.)

l. Shut off engine.

m. Place all switches in "OFF" position.

n. Remove jumper between "A" and "B" terminals on voltage regulator.

o. Disconnect 0- to 50-volt d-c voltmeter.

p. Start engine.

q. Make operational check of generator system (normal 28-volt operation).

7-36A. GENERATOR FIELD CONTROL RELAY.

7-36B. The Type M-2 generator field control relay is a multi-contact relay equipped with a trip coil and a reset coil. The relay is also equipped with a manual reset button for installations where manual resetting is practical. The relay normally remains in the reset position until the overvoltage relay closes and energizes the trip coil. When energized, the trip coil operates the relay to the tripped position, which inserts a 400-ohm resistor in series with the generator shunt field circuit. The resistor permits the shunt field to remain connected but reduces the generator output to a low value, thereby preventing reversal of generator polarity. The reset coil is energized when the generator switch is placed in the "RESET" position. When energized, the reset coil returns the generator field control relay contacts to the reset (normal) position, by-passing the 400-ohm resistor and thereby restoring the generator system to normal operation.

7-36C. REMOVING GENERATOR FIELD CONTROL RELAY. To remove generator field control relay, proceed as follows:

a. Place all switches in "OFF" position.

b. Pull all circuit breakers.

c. Disconnect external power.

d. Remove right-hand radio compartment access door.

e. Remove directional gyro system amplifier.

f. Unplug wiring plug from relay housing.

g. Remove the two mounting bolts that secure generator field control relay and fuel transfer pump circuit-breaker panel to airplane structure.

h. Remove the two bolts that secure relay to fuel transfer pump circuit-breaker panel.

i. Remove relay from airplane.

7-36D. INSTALLING GENERATOR FIELD CONTROL RELAY. To install generator field control relay, proceed as follows:

a. Secure relay to fuel transfer pump circuit-breaker panel with two mounting bolts.

b. Position combined assembly in position in airplane.

c. Secure circuit-breaker panel portion of combined assembly to airplane structure with two mounting bolts.

d. Secure generator field control relay to airplane structure with two mounting bolts.

e. Plug in airplane wiring plug into relay receptacle.

f. Install directional gyro system amplifier.

g. Install right-hand radio compartment access door.

h. Make an operational check of generator system.

7-36E. ADJUSTING GENERATOR FIELD CONTROL RELAY. Maintenance of the generator field control relay is limited to installation and removal. If unit is defective, it should be replaced with a serviceable item.

7-36F. GENERATOR OVERVOLTAGE RELAY.

7-36G. The Type E-2 overvoltage relay operates when the generator output voltage (applied to the coil of the relay) rises above 31 volts dc. Normal generator output voltage (regulated 28 volts dc) will not operate the relay. When an overvoltage condition occurs, the relay closes and connects primary bus power to the trip coil of the generator field control relay. The overvoltage relay will return to its normal position (open) as soon as the generator output voltage drops below 31 volts.

7-36H. REMOVING OVERVOLTAGE RELAY. To remove overvoltage relay, proceed as follows:

a. Place all switches in "OFF" position.

b. Pull all circuit breakers.

c. Disconnect external power.

d. Remove right-hand radio compartment access door.

e. Remove directional gyro system amplifier.

f. Disconnect airplane wiring to overvoltage relay.

g. Remove the three mounting bolts that secure relay to airplane.

h. Remove relay from airplane.

7-36J. INSTALLING OVERVOLTAGE RELAY. To install overvoltage relay, proceed as follows:

a. Position relay in airplane.

b. Secure relay to airplane with three mounting bolts.

c. Connect airplane wiring to relay.

d. Install directional gyro system amplifier.

e. Install right-hand radio compartment access door.

f. Make an operational check of the generator system.

7-36K. ADJUSTING OVERVOLTAGE RELAY. Maintenance of the overvoltage relay is limited to installation and removal. If unit is defective, it should be replaced with a serviceable item.

7-37. D-C POWER DISTRIBUTION SYSTEM.

7-38. D-C power is distributed through a divided bus system (figure 7-5) consisting of the battery, the primary and secondary busses, the battery bus tie-in relay, the secondary bus tie-in relay, the generator bus tie-in control relay, the external bus tie-in control relay, the engine start ignition control relay, two external power relays, and the battery-starter switch.

7-39. FUNCTION OF D-C POWER DISTRIBUTION SYSTEM.

7-40. The battery bus is supplied d-c power by the battery, which is connected directly to the bus. The battery bus tie-in relay is energized when the battery-starter switch is placed in the "BATTERY" position, connecting the battery bus to the primary bus. The secondary bus tie-in relay, controlled by either the external bus tie-in control or generator tie-in control relay, connects the secondary bus to the primary bus. The external bus tie-in control relay is energized by external power connected to the external power receptacle. (Refer to paragraph 7-49.) The generator bus tie-in control relay is energized by the generator system. (Refer to paragraph 7-16.) In either case, power from the primary bus energizes the secondary bus tie-in relay, which in turn connects the secondary bus to the primary bus. When there is no generator or external power available, a circuit is completed from the primary bus, through the two bus tie-in control relay contacts, to a red generator off warning light on the instrument panel. When there is no generator power available to operate the generator bus tie-in control relay, the warning light illuminates. When the generator bus tie-in control relay is de-energized, d-c power for the secondary bus tie-in relay is disconnected, thereby disconnecting the secondary bus from the primary bus.

7-41. D-C POWER DISTRIBUTION BUSSES.

7-42. BATTERY BUS.

7-43. The battery bus supplies power to the primary bus when no other source of power is available, and also provides power for operating the emergency systems in the event of generator failure.

CAUTION

To avoid injury to personnel and/or damage to the airplane, do not actuate emergency switches when battery is installed in airplane. Power for the operation of the emergency systems is available whenever the battery is attached to the battery bus.

The equipment powered by the battery bus is as follows:

BATTERY BUS POWERED

Alternate emergency hydraulic control and hydraulic pressure indicator (F-86F-5 through F-86F-15 Airplanes)

Alternate hydraulic power control

Auxiliary instrument lights and canopy control (F-86F-1 through F-86F-25 Airplanes)

AN/APX-6 destructor

24-volt battery

Bomb, rocket, and tank jettison

Canopy control (F-86F-25 Airplanes)

Cockpit canopy power

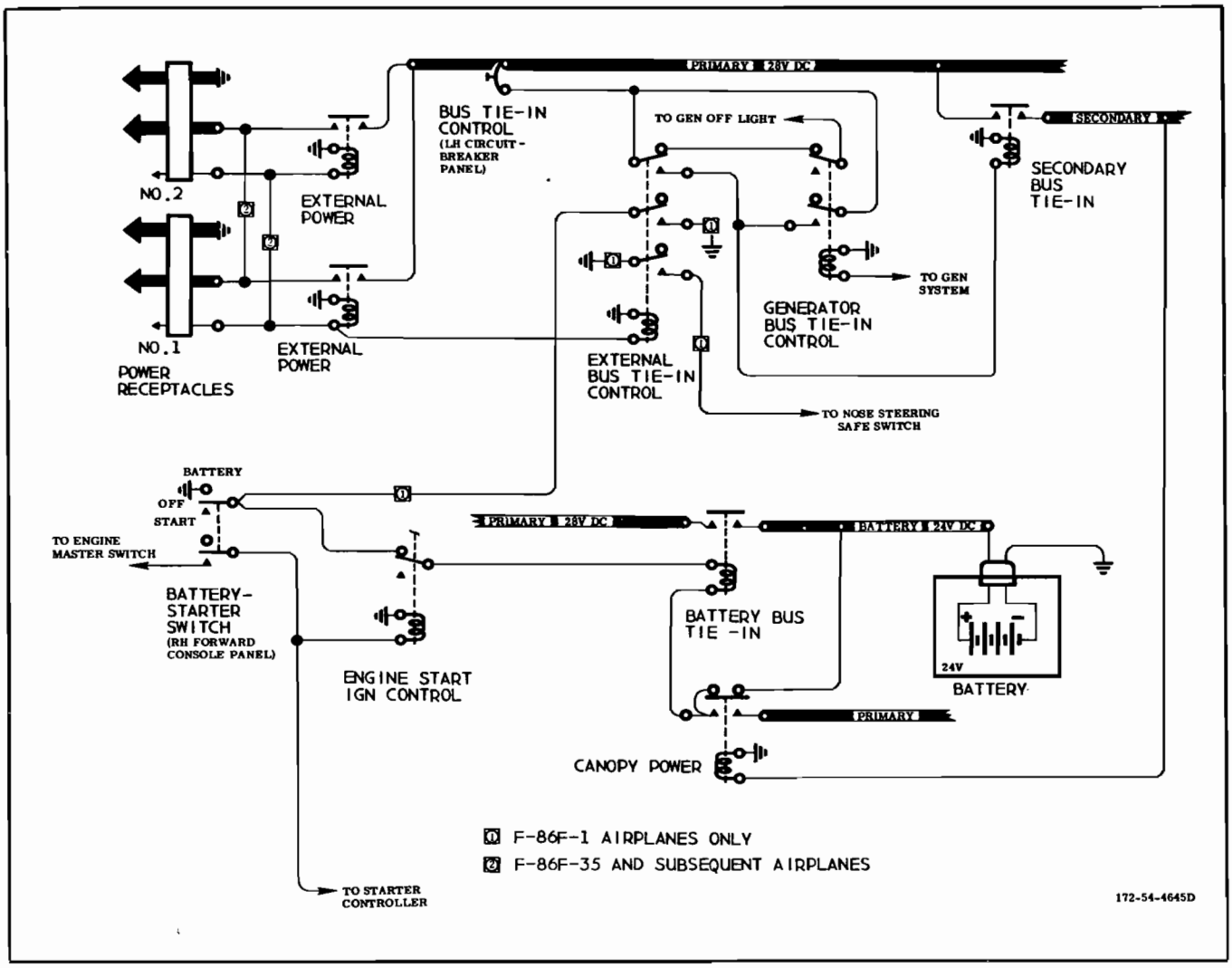

Figure 7-5. D-C Power Distribution System

Emergency hydraulic pump

Emergency hydraulic pump manual override

Emergency hydraulic pump relays (F-86F-1 Airplanes)

Special store jettison (F-86F-35 and subsequent airplanes)

7-44. PRIMARY BUS.

7-45. The primary bus, powered either by an external source or by the generator system, provides power for essential flight equipment. The equipment powered by the primary bus is as follows:

PRIMARY BUS POWERED

Aft fuel booster

Air selector

All-bombs release

Alternate hydraulic tie-in control (F-86F-1 Airplanes)

Alternate instrument inverter

Alternate lateral trim

Ammeter shunt

Automatic gun charger

AN/ARC-3 radio

AN/ARC-27 radio (F-86F-30 and subsequent airplanes)

AN/ARC-33 radio (F-86F-1 through F-86F-15 Airplanes)

AN/APX-6 IFF radar (F-86F-1 through F-86F-20 Airplanes)

Bomb release power

Bomb release selector and canopy seal

Bus tie-in control

Cockpit canopy alternate power

Cockpit heater power

Console, pedestal, and instrument lights

Drop tank fuel selector (F-86F-25 and subsequent airplanes)
Drop tank jettison (F-86F-25 and subsequent airplanes)
Emergency hydraulic pump
Engine anti-icing and screen
Engine ignition
Engine master and fuel shutoff
Fire warning
Fuel filter deicing
Fuel quantity indicator
Fuel transfer pump
Generator control (F-86F-30 and subsequent airplanes)
Generator field control relay (F-86F-30 and subsequent airplanes)
Generator overvoltage relay (F-86F-30 and subsequent airplanes)
Gunfire
Gun heater control
Directional gyro system
Alternate inverter
Inverter, generator light test, and auxiliary instrument lights (F-86F-30 and subsequent airplanes)
Three-phase inverter (F-86F-20 and subsequent airplanes)
Main instrument inverter
Single-phase inverter
Single-phase inverter failure light
Landing gear control
Landing gear position indicator
Landing gear warning
Landing lights
Landing light control
Lateral and longitudinal trim, and alternate longitudinal trim
Manual gun charger (F-86F-1 through F-86F-20 Airplanes; F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5277, -5279, -5290, -5292, -5294, -5295, -5297, -5298, -5300 through -5302, and -5304; and F-86F-30 Airplanes AF52-4305 through -4612)
Nose wheel steering, position and fuselage lights, and position light flasher
Oxygen regulator
Pitot heater
Rudder trim and take-off indicator
Sight and P-2 camera control (F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes)
Special store panel T-145 (F-86F-35 and subsequent airplanes)
Speed brake
Starter controller
Trigger and bomb switches
Turn-and-bank indicator
Windshield anti-icing power
Left wing flap
Right wing flap

7-46. SECONDARY BUS.

7-47. The secondary bus, when tied into the primary bus by the secondary bus tie-in relay, supplies power for the following equipment:

SECONDARY BUS POWERED

Ammunition boost motor (F-86F-20 and subsequent airplanes)
AN/APX-6 IFF radar (F-86F-25 and subsequent airplanes)
AN/ARN-6 radio compass
Cockpit canopy alternate power
Cockpit temperature and windshield anti-ice control power
Forward fuel booster
Gun charger air compressor (F-86F-1 through F-86F-20 Airplanes; F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5277, -5279, -5290, -5292, -5294, -5295, -5297, -5298, -5300 through -5302, and -5304; and F-86F-30 Airplanes AF52-4305 through -4612)
Gun heaters
Panel vibrator and GSAP camera (F-86F-1 through F-86F-20 Airplanes, and F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5386)
Panel vibrator and cameras (F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes)
Radar power
Sight a-c power
Sight computer (F-86F-10 Airplanes)
Sight head (F-86F-10 Airplanes)
Sight heaters
Sight power
T-23 test power (special store equipment) (F-86F-35 and subsequent airplanes)

7-48. D-C POWER DISTRIBUTION EXTERNAL POWER RECEPTACLES.

7-49. Two external power receptacles (No. 1 and 2) are installed on the left side of the fuselage, above the trailing edge of the wing. Each receptacle is equipped with

three contact pins, two large and one small. Each receptacle is connected to the primary bus through an external power relay. Each relay coil is connected to the small pin of its respective receptacle and is energized whenever an external power source is connected to the receptacle. On F-86F-1 through F-86F-30 Airplanes, the small-contact pin of the No. 1 receptacle is also connected directly to the external bus tie-in relay coil. When external power is connected to the No. 1 receptacle, the No. 1 external power and the external bus tie-in relays are energized. External power on the primary bus is then routed, through contacts on the external bus tie-in control relay, to the battery bus and the secondary bus relay coils. When energized, these relays connect the secondary bus (and battery bus on F-86F-1 Airplanes) to the primary bus. On F-86F-1 Airplanes, once external power is applied, all busses will remain electrically connected as long as an external power plug remains in the No. 1 receptacle, *regardless* of whether the external power unit fails or is intentionally turned off. Failure to remove the external power plug from the No. 1 receptacle provides a path for battery current to flow through the "+" jumper wire (inside the external power plug) to the external bus tie-in relay coil. Since the external bus tie-in relay remains energized, all busses remain electrically connected, because the secondary and battery bus tie-in relay coil holding circuits are wired through the contacts of the external bus tie-in relay. A d-c load existing on the bus system is placed entirely on the battery.

CAUTION

On F-86F-1 Airplanes, remove external power plug from No. 1 receptacle *before* turning off external power unit to prevent excessive battery discharge.

Note

On F-86F-5 through F-86F-30 Airplanes, the ground-return circuit for the battery bus tie-in relay is disconnected from the external bus tie-in relay contacts. This makes it unnecessary to remove the No. 1 external power plug before turning off external power unit. No connections are made between the No. 2 external power receptacle and the bus tie-in control system. External power should be applied to both receptacles for engine starting because of the heavy load required for this operation.

On F-86F-35 and subsequent airplanes, the small-contact pins of the No. 1 and No. 2 receptacles are wired in parallel, and the two power leads of the No. 1 and No. 2 receptacles are bussed together. This makes it possible to energize the external bus tie-in control relay from either the No. 1 or the No. 2 external power receptacle. This arrangement also allows the secondary bus tie-in relay to be energized from either the No. 1 or the No. 2 receptacle, thus connecting the secondary bus to the primary bus.

7-50. A-C POWER SUPPLY SYSTEMS.

7-51. The a-c power supply consists of a single-phase power system and a three-phase power system. The single-phase inverter system must be energized by d-c generator power during normal operation or from an external power source when a ground checkout of the system is made. The three-phase system can be energized by the battery in the airplane; however, generator power or external power should be used whenever possible, to conserve battery life.

7-52. TROUBLE SHOOTING A-C POWER SUPPLY SYSTEMS.

WARNING

When it is necessary to trouble shoot the electrical system, various plugs and terminal block covers must be removed to make circuits accessible. Extreme care must be taken in testing, as "hot" points are thus exposed. Whenever such testing is necessary, remove all power from equipment, making necessary circuit changes or meter connections, and then apply power.

TROUBLE	PROBABLE CAUSE	REMEDY
	SINGLE-PHASE RADAR INVERTER	
Inverter fails to start.	No voltage at terminals.	Make repairs as required.
	Starter contactor open or shorted.	Repair contactor.
	Open filter choke coil 7-1347.	Replace inverter.
	Open interpole winding or series field winding.	Replace inverter.
	Open armature.	Replace inverter.

TROUBLE	PROBABLE CAUSE	REMEDY
No voltage.	No d-c excitation to alternator rotor.	Replace thyratrons T-5, T-6, T-7, and T-8. Replace 6X4 rectifier T-9.
	Relay SW1-234 defective.	Replace inverter.
	Open resistor RES-284.	Replace inverter.
	Brushes worn.	Replace inverter.
	Starter contactor SW1-228 not closed properly.	Replace inverter.
	Open circuit from stator to 115-volt a-c terminal.	Replace inverter.
	Open filter choke coil 7-1346.	Replace inverter.
	Alternator stator open or grounded.	Replace inverter.
	Alternator rotor open or grounded.	Replace inverter.
	Stator output grounded externally.	Locate and remove ground.
Low voltage output.	Voltage regulator not adjusted properly.	
	Voltage regulator not operating properly.	Replace tubes T-2, T-5, T-6, T-7, T-8, T-9, and T-10.
	Defective regulator.	Replace inverter.
	Potentiometer RES-293 shorted.	Replace inverter.
	High-resistance rotor brush contact.	Replace brushes or springs where necessary.
	Grounded alternator rotor.	Replace inverter.
	High-resistance contacts.	Replace inverter.
	High-resistance short across filter capacitor.	Replace inverter.
	High-resistance ground connections.	Repair ground connections as required.
High-voltage output.	Voltage regulator not adjusted properly.	Adjust regulator.
	Defective voltage regulator.	Replace inverter.
	Defective regulator tubes.	Replace tubes T-2, T-5, T-6, T-7, T-8, T-9, and T-10.
	Inverter operating above rated speed.	Same as for high-frequency trouble.
	Alternator rotor grounded.	Replace inverter.
No voltage control.	Voltage adjustment potentiometer defective.	Replace inverter.
Low frequency.	Frequency regulator not adjusted properly.	
	Defective frequency regulator.	Replace tubes T-1, T-3, and T-4.
	Defective frequency control potentiometer.	Replace inverter.
	Shunt field resistors shorted or grounded.	Replace inverter.
High frequency.	Frequency regulator not adjusted properly.	Adjust regulator.
	Defective frequency regulator.	Replace inverter.
	Regulator not working.	Replace tubes T-1, T-3, and T-4.

TROUBLE	PROBABLE CAUSE	REMEDY
	Defective frequency control potentiometer.	Replace inverter.
	Motor control field shorted or grounded.	Replace inverter.
	Shunt field resistor open.	Replace inverter.
	D-C voltage input above specified limits.	Check power supply furnishing dc.
	Open connection between motor control field and alternator winding marked "C-G."	Repair connection if possible; otherwise, replace inverter.
	Shunt field resistors not grounded properly.	
	Frequency adjustment potentiometer defective.	Replace inverter.
Rotary unit hunts.	Loose d-c brush-holder bracket.	Tighten mounting screws.
	Brushes not seated 100 percent in the direction of rotation and 75 percent of the brush width.	Replace inverter, if a 4-hour "run-in" does not remedy trouble.
Machine draws excessive current while running.	Motor armature grounded.	Replace inverter.
	Motor shunt field grounded.	Replace inverter.
	Alternator rotor grounded.	Replace inverter.
	Alternator stator grounded.	Replace inverter.
Motor brushes sparking or arcing.	Worn or broken brushes.	
	Grounded motor armature.	Replace inverter.
	Raised bar on commutator.	Replace inverter.
	Brushes not seated properly.	Reseat brushes by running inverter unloaded for at least 4 hours.
	Brushes sticking.	Replace inverter.
Alternator brushes arcing.	Worn or broken brushes.	Replace brushes.
	Grounded alternator rotor.	Replace inverter.
	Sticking brushes.	Free brushes.
	Slip rings out of round.	Replace inverter.
Machine runs noisy or rough.	Bearing failure.	Replace inverter.
	Rotor unbalanced.	Replace inverter.
	Mechanical interference.	Replace inverter.
Radio noise level too high.	Filter failure.	Replace inverter.
	Brushes not seated properly.	Run-in brushes for at least 4 hours (no load).
	Parts of machine poorly bonded.	Replace inverter.
Overheating.	Fan rubbing.	Replace inverter.
	Shorted or grounded windings.	Replace inverter.
	Air intakes blocked with foreign matter.	Clear ventilation ducts.

7-53. SINGLE-PHASE POWER SYSTEM.

7-54. The single-phase power system (figure 7-7) consists of a single-phase, 115-volt, 400-cycle, 1500-volt-ampere radar inverter, a radar failure warning relay, a radar inverter off light, and associated circuit breakers. The single-phase radar inverter system supplies a-c power directly to the radar equipment, IFF equipment,

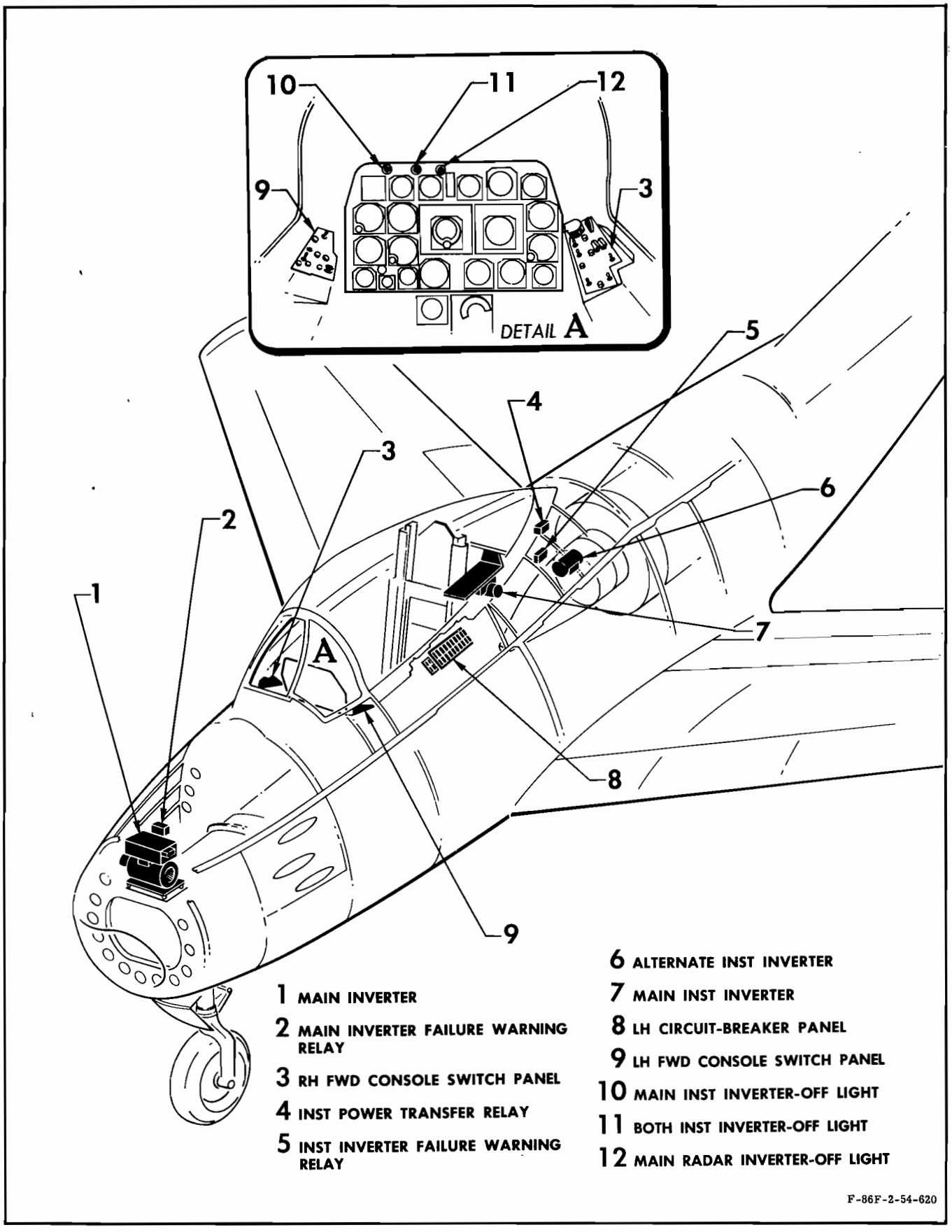

Figure 7-6. A-C Power Equipment Location

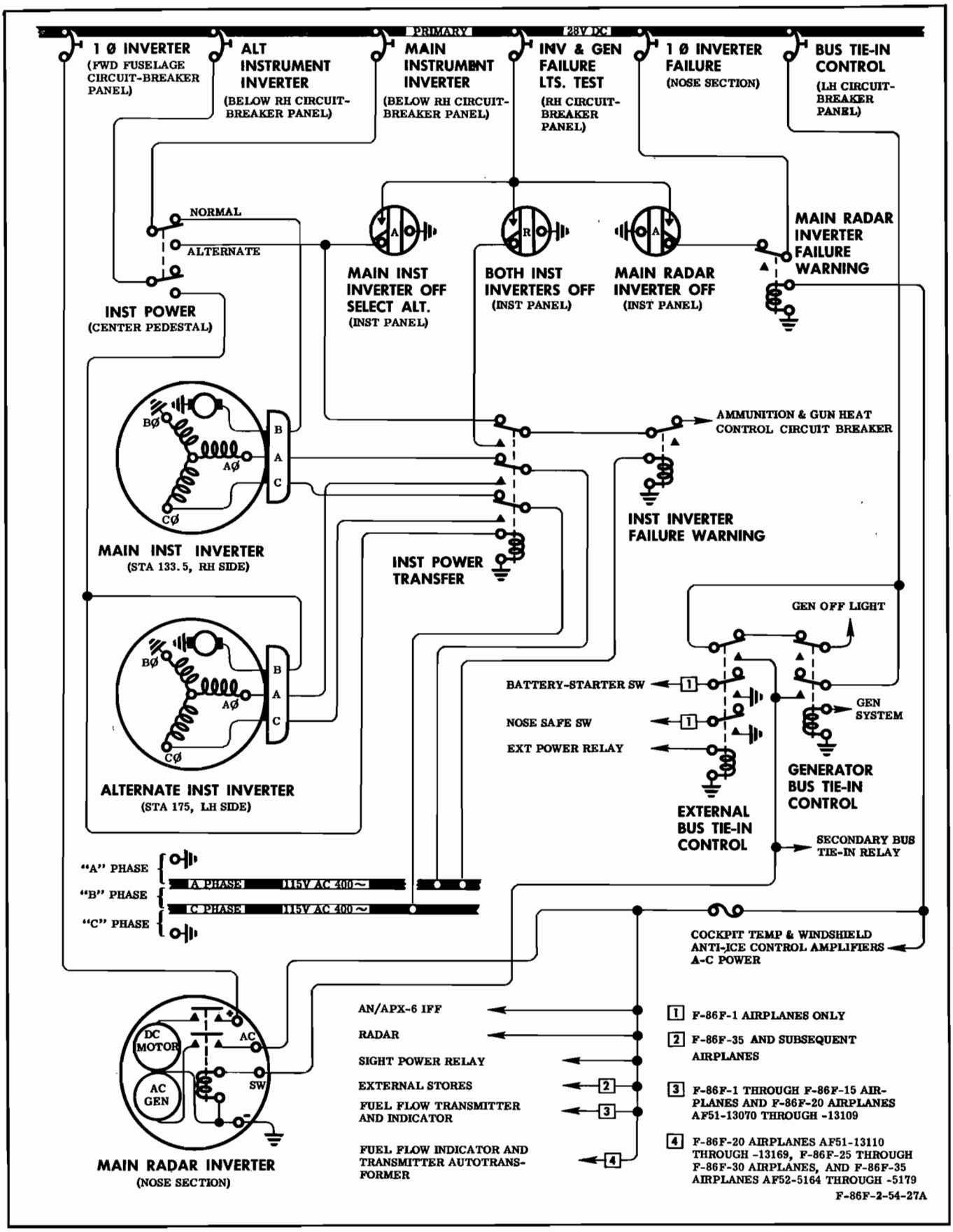

Figure 7-7. A-C Power Supply Systems

sight system, fuel flow totalizer indicator and transmitter, external store equipment, and cockpit air temperature and windshield anti-ice control amplifiers. The single-phase inverter operates continuously whenever power is available on the primary bus, provided the circuit breaker is properly closed. The main inverter failure warning relay coil is energized whenever single-phase inverter power is available. When energized, the failure warning relay disconnects d-c power to the radar inverter off light (amber), extinguishing the light to

indicate normal single-phase inverter operation. An inverter malfunction or failure de-energizes the failure warning relay. When de-energized, the failure warning relay completes the radar inverter off light circuit, illuminating the light to indicate a failure of the single-phase inverter.

7-54A. TESTING SINGLE-PHASE POWER SYSTEM. To test single-phase power system, proceed as follows:

Note

Precision voltmeters retained for checking airplane instruments and airplane electrical system voltages must be checked against an instrument of known accuracy every 90 days and/or whenever they have been subjected to abuse.

WARNING

When components of the electrical system are to be adjusted or tested, it is necessary to remove terminal block covers to make circuits accessible. Be extremely careful when testing components, as "hot" points are thus exposed. Whenever such testing is necessary, remove all power from equipment, make necessary circuit changes or meter connections, and then apply power.

a. Place all switches in "OFF" position.

b. Pull out all circuit breakers.

c. Remove radar access door for ventilation of inverter.

d. Connect d-c external power to airplane.

e. Push in "1 Ø INVERTER FAILURE" circuit breaker.

f. Observe "MAIN RADAR INVERTER OFF" light. Light should be illuminated at this time to indicate that the inverter is not working.

g. If light is not illuminated (step f.), disconnect external power and repair light circuit as required.

h. Push in "1 Ø INVERTER" circuit breaker and allow time for a-c voltage build-up.

i. Observe "MAIN RADAR INVERTER OFF" light. Light should be extinguished to indicate proper operation of the single-phase inverter.

j. If light is not extinguished (step i.), pull "1 Ø INVERTER" circuit breaker, disconnect external power source, and make a voltage and frequency check of the single-phase inverter as outlined in steps k. through w.

CAUTION

Insulated test prods must be used in conjunction with the a-c voltmeter and frequency meter, because the voltage and frequency checks must be made with the inverter in operation. Maintenance personnel are cautioned to keep fingers away from metal points of test prods, to avoid possible injury. Meter readings should be taken *after* the inverter has stabilized in speed and temperature.

k. Remove terminal block cover from inverter terminals.

l. Connect external power to airplane.

m. Push in "1 Ø INVERTER" circuit breaker.

n. Allow time for a-c voltage build-up and speed to stabilize.

o. Touch 0- to 150-volt a-c voltmeter test prods to inverter terminals marked "AC" and "—" (minus).

p. Observe a-c voltmeter reading. Voltmeter should indicate a normal 115 (±2) volt ac.

q. Touch 350-450 cycle a-c frequency meter test prods to inverter terminals marked "AC" and "—" (minus).

r. Observe a-c frequency meter reading. Frequency meter should indicate a normal 400 (±10) cycle frequency.

Note

- If inverter voltage or frequency values do not occur within the specified limits, the inverter d-c input voltage should be checked with an appropriate d-c voltmeter equipped with insulated test prods. Input voltage should be 28 (±0.5) volts dc.
- If inverter voltage or frequency values do not occur within the specified limits with proper d-c input voltage applied to inverter, the inverter should be replaced with a serviceable item.

s. Turn on radio and radar equipment to place a load on inverter.

t. Touch a-c voltmeter test prods to inverter terminals marked "AC" and "—" (minus).

u. Observe a-c voltmeter reading. Voltmeter should indicate 115 (±2) volts ac.

v. Touch frequency meter test prods to inverter terminals marked "AC" and "—" (minus).

w. Observe frequency meter reading. Frequency meter should indicate a normal 400 (±10) cycle frequency.

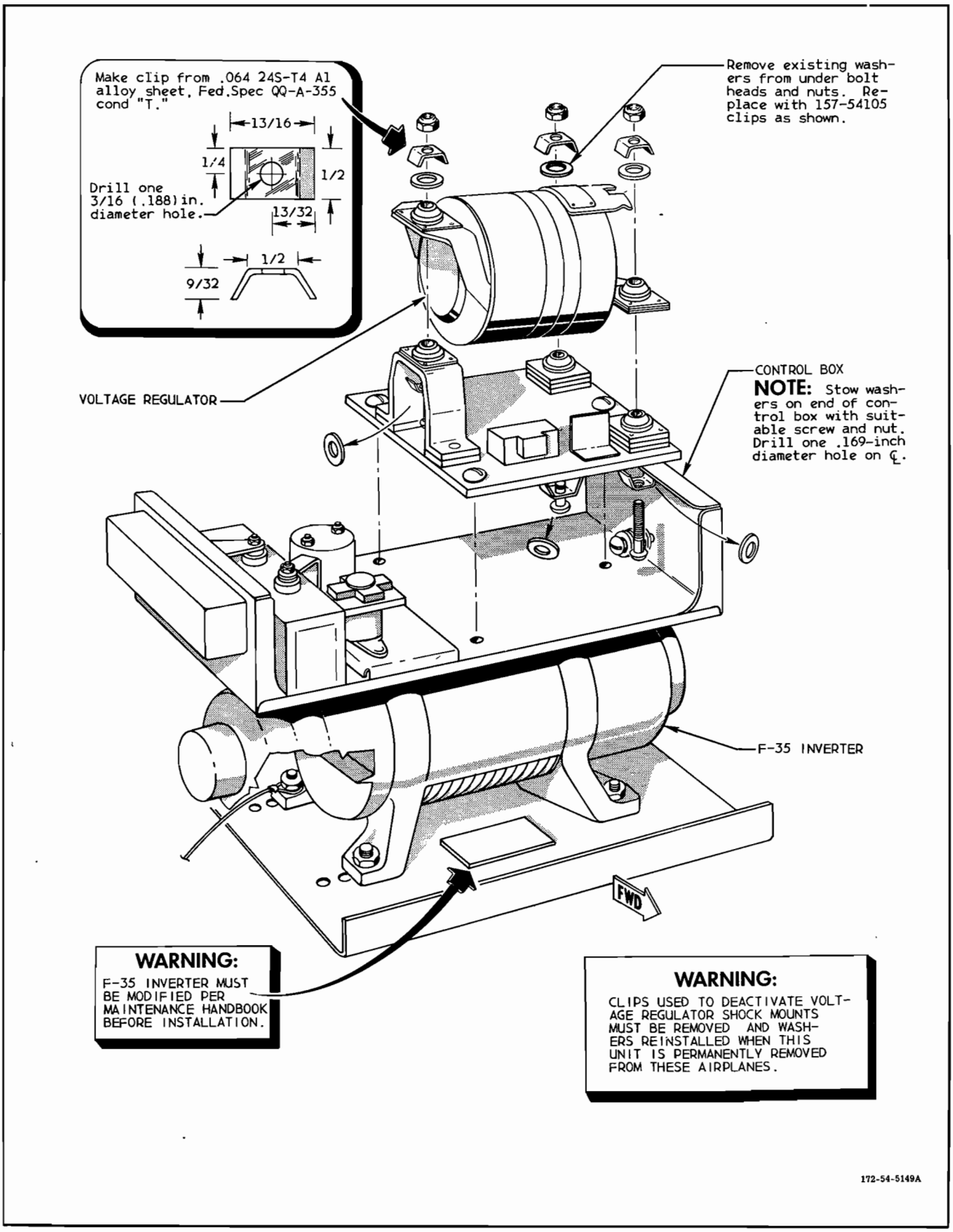

Figure 7-8. Jack & Heintz F-35 Inverter Modification

Note

If the inverter a-c output voltage or frequency drops below or rises above normal under load conditions (steps s. through w.), the inverter is defective and should be replaced with a serviceable item.

x. Turn off radio and radar equipment.

y. Pull out "1 Ø INVERTER" circuit breaker.

z. Disconnect external power.

aa. Install single-phase inverter terminal block cover.

ab. Install access door adjacent to inverter.

7-55. SINGLE-PHASE POWER SYSTEM RADAR INVERTER.

7-56. The single-phase, 115-volt, 400-cycle, 1500-volt-ampere radar inverter is located in the forward end of the nose section. It is accessible through the radar bay access door. The inverter a-c output voltage is regulated by an electronically operated carbon-pile voltage regulator which senses the a-c output voltage. The output frequency is regulated by a speed governor which mechanically controls a variable carbon resistor (carbon-pile type) to regulate the speed of the motor. A relay inside the inverter control housing completes the circuit connections for the d-c input and a-c output lines. The coil of this relay is connected to the primary bus. The relay coil becomes energized whenever generator or external power is present on the primary bus. During normal operation, the relay coil is energized through a set of normally open contacts on the generator bus tie-in control relay. When external power is used to power the primary bus for ground check-out operations, the relay coil is energized through a set of normally open contacts on the external bus tie-in control relay. To prolong inverter life, inverter AN3515-1 (Leland Electric Co), used on F-86F-1 Airplanes AF51-2850 through -2877, has been modified. This modification [T. O. 1F-86-166 (formerly 01-60JL-165)] consists of removing the control panel shock mounts and attaching the panel rigidly to the inverter. Installed AN3515-1 inverters can be replaced by the Jack & Heintz Type F-35 inverter, provided the F-35 inverter has been modified for gunfire vibration as shown in figure 7-8. Installed F-35 modified inverters can be replaced by AN3515-1 inverters or modified F-35 inverters. Installed Jack & Heintz Type F-137 (high-altitude) modified inverters can be replaced by AN3515-1 inverters, modified F-35 inverters, or an identical F-137 inverter that has been properly modified as shown in figure 7-8A. F-137 modified inverters cannot be installed on airplanes originally equipped with AN3515-1 inverters or F-35 modified inverters, because of the space limitations.

7-57. SINGLE-PHASE POWER SYSTEM RADAR INVERTER FAILURE WARNING RELAY.

7-58. The radar inverter failure warning relay is located on the nose section circuit-breaker panel, immediately forward of the PP-493/APG-30 radar equipment and outboard from the battery. The relay is accessible through the radar access door. The normally closed contacts of the relay connect primary bus voltage to the radar inverter off light. During normal operation (generator power available on the primary bus), the radar inverter failure warning relay is energized, and the amber warning light is extinguished. In the event of a radar inverter failure or malfunction, the relay is de-energized. It returns to its normal position to complete the amber failure warning light circuit and illuminate the light.

7-59. REMOVING SINGLE-PHASE RADAR INVERTER FAILURE WARNING RELAY. To remove the radar failure warning relay, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power if connected to airplane.

c. Remove radar access door.

d. Disconnect wave guide to AN/APG-30 antenna at quick-disconnect point and also loosen clamp midway down guide.

e. Remove right gun blast panel.

f. Remove the three bolts that secure nose section circuit-breaker panel to airplane.

g. Jockey circuit-breaker panel so that slack in wiring can be used to pull panel upward for removal of relay.

h. Remove terminal covers on each end of relay case and disconnect wiring.

i. Remove the two screws that secure relay to panel.

j. Remove relay from airplane.

7-60. INSTALLING SINGLE-PHASE RADAR INVERTER FAILURE WARNING RELAY. To install the radar failure warning relay, proceed as follows:

a. Position relay on nose section circuit-breaker panel.

b. Secure relay to panel with two star-head screws.

c. Connect relay wiring to terminals and install terminal covers.

d. Jockey panel downward into position. Carefully dress wiring in proper position.

e. Secure circuit-breaker panel to airplane with three bolts.

f. Install right gun blast panel.

g. Connect wave guide to AN/APG-30 antenna at quick-disconnect point and install clamp midway down wave guide.

h. Install radar access door.

i. Make operational check of main radar inverter single-phase system.

7-61. THREE-PHASE POWER SYSTEM.

7-62. The three-phase power system (figure 7-7) consists of the main and alternate instrument inverters, the

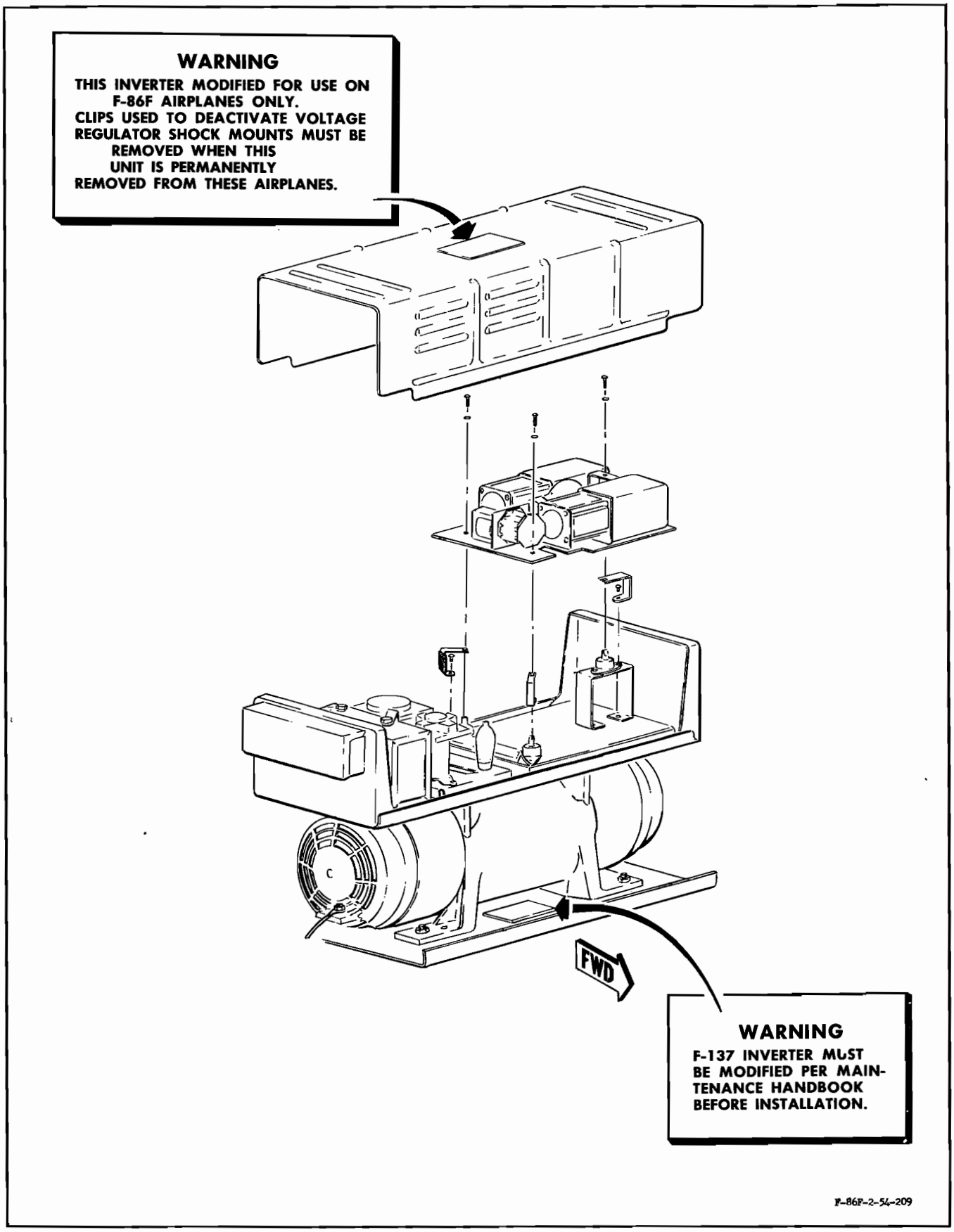

Figure 7-8A. Jack & Heintz F-137 Inverter Modification

instrument power transfer relay, the instrument power switch, the instrument inverter failure warning relay, the main instrument inverter off amber indicator light, the both instrument inverters off red indicator light, and associated circuit breakers. The three-phase system operates whenever d-c power is available on the primary bus, provided the associated circuit breakers are closed. Inverter selection is accomplished manually when the instrument power switch is placed in the "NORMAL" or "ALTERNATE" position. When placed in the "NORMAL" position, the instrument power switch selects the main instrument inverter, by connecting primary bus d-c power to the "B" terminal of the main instrument inverter. When selected, the main instrument inverter develops three-phase power, which is connected to the a-c distribution system through two sets of normally closed contacts on the instrument power transfer relay. Equipment connected to the a-c distribution system is then powered from the main instrument inverter. Placing the instrument power switch in the "ALTERNATE" position simultaneously connects primary bus d-c power to the "B" terminal of the alternate instrument inverter and to the coil of the instrument power transfer relay. When the relay is energized, it operates and connects the output of the alternate instrument inverter to the a-c distribution system. The instrument inverter failure warning relay coil is permanently connected between the "A" phase bus and ground, and is energized whenever a-c power is available on the a-c distribution system. When energized, the instrument inverter failure warning relay disconnects d-c power to either the main instrument inverter off amber light or the both instrument inverters off red indicator light, depending upon which indicator light is connected to the instrument inverter failure warning relay contacts. Indicator light selection is determined by the position of the instrument power transfer relay, which is controlled by the instrument power switch. When the instrument power switch is moved to "NORMAL," the main instrument inverter off light is connected to d-c power. When the instrument power switch is moved to "ALTERNATE," the both instrument inverters off red indicator light is connected to d-c power. (See figure 7-7.)

7-62A. TESTING THREE-PHASE POWER SYSTEM. To test three-phase power system, proceed as follows:

Note

Precision voltmeters retained for checking airplane instruments and airplane electrical system voltages must be checked against an instrument of known accuracy every 90 days and/or whenever they have been subjected to abuse.

WARNING

When components of the electrical system are to be adjusted or tested, it is necessary to remove terminal block covers to make circuits accessible. Be extremely careful when testing components, as "hot" points are thus exposed. Whenever such testing is necessary, remove all power from equipment, make necessary circuit changes or meter connections, and then apply power.

Note

On F-86F-25 Airplanes AF51-13455 through -13510 and AF52-5272 through -5386, establishment of a definite ground return is recommended as the first step to isolate an inverter failure. A main or alternate instrument inverter failure may result from a poor ground connection through the anodized surfaces of the mounting washers. When a poor ground is the cause of the trouble, replace existing washers with AN961-8 washers.

a. Place all switches in "OFF" position.

b. Pull out all circuit breakers.

c. Open left radio compartment access door for inverter ventilation.

d. Connect d-c external power source to airplane.

e. Place instrument power switch in "NORMAL" position.

f. Push in "AMMUNITION & GUN HEAT CONTROL" circuit breaker.

g. Observe "MAIN INST INVERTER OFF SELECT ALT." amber warning light. The light should be illuminated to indicate that no a-c power is available from the main instrument inverter.

h. If amber indicator light is not illuminated (step g.), pull out circuit breakers, disconnect external power, investigate warning circuit, and repair light circuit as required.

i. Push in "MAIN INSTRUMENT INVERTER" circuit breaker and allow time for a-c voltage build-up.

j. Observe "MAIN INST INVERTER OFF SELECT ALT." amber warning light. The light should be extinguished to indicate proper operation of the main instrument inverter.

k. If amber warning light remains illuminated (step j.), pull out circuit breakers, disconnect d-c external power source, and make a voltage and frequency check of the main instrument inverter as outlined in steps l. through v.

CAUTION

Insulated test prods must be used in conjunction with the a-c voltmeter and frequency meter, because the voltage and frequency checks must be made with the inverter in operation. Maintenance personnel are cautioned to keep fingers away from metal points of test prods, to avoid possible injury. Meter readings should be taken *after* the inverter has stabilized in speed and temperature.

l. Connect d-c external power source to airplane.

m. Push in "MAIN INSTRUMENT INVERTER" circuit breaker.

n. Allow time for a-c voltage build-up and speed to stabilize.

o. Touch 0- to 150-volt a-c voltmeter test prods to nearest exposed terminal which is connected to terminal "A" of main instrument inverter and ground.

Note

When using airplane structure as a conductor, place test prod on an exposed bare metal surface, such as a bolt or screwhead, to obtain a satisfactory ground. Never use anodized or zinc-chromate treated aluminum for a ground return connection.

p. Observe a-c voltmeter reading. Voltmeter should indicate a normal 115 (±2) volt ac.

q. Touch 350-450 cycle a-c frequency meter test prods to same test points used in step o.

r. Observe a-c frequency meter reading. Frequency meter should indicate a normal 400 (±10) cycle frequency.

Note

If inverter voltage or frequency values do not occur within specified limits, the inverter d-c input voltage should be checked with an appropriate d-c voltmeter equipped with insulated test prods. Input voltage should be 28 (±0.5) volts dc.

s. Using nearest exposed terminal connected to main inverter terminal "C," repeat steps o. through r.

t. Place test prods on nearest exposed terminals which are connected to terminals "A" and "C," and repeat steps o. through r. (Do not check against airplane structure for this test.)

u. Turn on a-c operated equipment.

v. Repeat steps s. and t. for a voltage and frequency check of main instrument inverter under load conditions.

Note

If inverter voltage or frequency values do not occur within specified limits, the inverter should be replaced with a serviceable item.

w. Pull out "MAIN INSTRUMENT INVERTER" circuit breaker.

x. Place instrument power switch in "ALTERNATE" position.

y. Push in "AMMUNITION & GUN HEAT CONTROL" circuit breaker.

z. Push in "MAIN INSTRUMENT INVERTER" circuit breaker.

aa. Observe "MAIN INST INVERTER OFF SELECT ALT." amber warning light. The light should be illuminated to indicate that no a-c power is available from the main instrument inverter.

ab. Unplug airplane wiring to alternate instrument inverter.

ac. Push in "ALT INSTRUMENT INVERTER" circuit breaker.

ad. Observe "BOTH INST INVERTERS OFF" red warning light. The light should be illuminated to indicate that no a-c power is available from the main or alternate instrument inverters.

ae. Pull out "ALT INSTRUMENT INVERTER" circuit breaker.

af. Insert airplane wiring plug into alternate instrument inverter.

ag. Push in "ALT INSTRUMENT INVERTER" circuit breaker.

ah. Observe "BOTH INST INVERTERS OFF" red warning light. The light should be extinguished to indicate proper operation of the alternate instrument inverter.

ai. If red warning light remains illuminated (step ah.), pull out circuit breakers, disconnect d-c external power source, and make a voltage and frequency check of the alternate instrument inverter as outlined in steps aj. through am.

CAUTION

Insulated test prods must be used in conjunction with the a-c voltmeter and frequency meter, because the voltage and frequency checks must be made with the inverter in operation. Maintenance personnel are cautioned to keep fingers away from metal points of test prods, to avoid possible injury. Meter readings should be taken *after* the inverter has stabilized in speed and temperature.

aj. Connect d-c external power source to airplane.

ak. Push in "ALT INSTRUMENT INVERTER" circuit breaker.

al. Allow time for a-c voltage build-up and speed to stabilize.

am. Repeat steps o. through v. for alternate inverter.

Note

If inverter voltage or frequency values do not occur within specified limits, the inverter should be replaced with a serviceable item.

an. Pull out all circuit breakers and return instrument power switch to "NORMAL" position.

ao. Install left radio compartment access door.

7-63. THREE-PHASE POWER SYSTEM INSTRUMENT INVERTERS.

7-64. The main and alternate instrument inverters are Type AN3499-1, three-phase, 115-volt, 400-cycle, 100-volt-ampere inverters. The inverters are located in the radio compartment aft of the cockpit. (See figure 7-6.) The inverters are accessible through the radio compartment access door, located on the left side of the airplane, aft of the cockpit area. The main instrument inverter is installed over the AN/ARC-27 channel selector on a mounting bracket. The bracket is secured to the upper portion of the airplane with two dzus fasteners on the aft end of the bracket, and a lip-to-slot arrangement on the forward end of the bracket. The alternate instrument inverter is installed on a mounting plate secured to a mounting bracket located on a shelf aft of the AN/ARC-27 channel selector.

7-65. REMOVING MAIN INSTRUMENT INVERTER. To remove main instrument inverter, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power if connected to airplane.

c. Remove left radio bay access door.

d. Disconnect wiring to main inverter, including grounding wire.

e. Locate and free dzus fasteners on aft end of mounting bracket.

f. Disengage forward lip edge of bracket from slot in airplane structure.

g. Remove inverter (complete with bracket) from airplane.

7-66. INSTALLING MAIN INSTRUMENT INVERTER. To install main instrument inverter, proceed as follows:

a. Locate forward slot in airplane structure for lip of mounting bracket.

b. Engage forward lip on bracket with slot in airplane structure.

c. Tighten dzus fasteners on aft end of bracket to secure bracket to airplane.

d. Connect wiring (including grounding strap) to main inverter.

e. Install radio access door.

f. Make an operational check of main instrument inverter.

7-67. REMOVING ALTERNATE INSTRUMENT INVERTER. To remove alternate instrument inverter, proceed as follows:

a. Place all switches in "OFF" position.

b. Disconnect external power if connected to airplane.

c. Remove left radio bay access door.

d. Remove main instrument inverter. (Refer to paragraph 7-65.)

e. Disconnect wiring to alternate instrument inverter.

f. Remove the two screws that secure mounting plate to mounting bracket.

g. Drag alternate instrument inverter slightly outboard to free slots, located on inboard edge of mounting plate, from lugs on bracket.

h. Move inverter forward to clear mounting bracket; then move inverter outboard over AN/ARC-27 channel selector.

i. Remove inverter from airplane.

7-68. INSTALLING ALTERNATE INSTRUMENT INVERTER. To install alternate instrument inverter, proceed as follows:

a. Place inverter (together with mounting plate) in doorway of radio bay access door.

b. Lift inverter over AN/ARC-27 channel selector, align inverter with mounting bracket, and move inverter aft onto mounting bracket.

c. Push inverter inboard to engage inboard slots on mounting plate with lugs on mounting bracket.

d. Install two screws in outboard edge of mounting plate to secure mounting plate to bracket.

e. Connect wiring to alternate instrument inverter.

f. Install main instrument inverter. (Refer to paragraph 7-66.)

g. Install radio bay access door.

h. Make operational check of main and alternate instrument inverters.

7-69. THREE-PHASE POWER SYSTEM INSTRUMENT INVERTER FAILURE WARNING RELAY.

7-70. The instrument inverter failure warning relay (figure 7-7) is located on a shelf in the radio bay, immediately aft of the AN/ARC-27 channel selector and outboard from the alternate instrument inverter. The coil of the relay is permanently connected to the "A" phase bus in the a-c distribution system. The coil is energized whenever three-phase power is available on the busses. A set of normally closed contacts on the relay connect d-c power to either the main instrument inverter off amber light or the both instrument inverters off red indicator light, depending upon the position of the instrument power transfer relay. During normal operation, the instrument inverter failure warning relay is energized and the indicator lights are extinguished. When a main inverter failure occurs, the instrument inverter failure warning relay is de-energized, and the normally closed contacts on the relay complete the main inverter off amber light circuit and illuminate the light. When an alternate instrument inverter failure occurs, a similar action takes place to light the both instrument inverters off red indicator light.

7-71. A-C POWER DISTRIBUTION SYSTEM.

7-72. The a-c power distribution system consists of the "A" and "C" phase busses, the instrument power transfer relay, and associated equipment. (See figure 7-10.) Three-phase instrument inverter power is distributed by the "A" and "C" phase busses through two sets of contacts on the instrument power transfer relay. During normal operation, the a-c bus distribution system is energized from the main instrument inverter. When the alternate instrument inverter is selected, the instrument power transfer relay coil is simultaneously energized, and the relay operates to connect the a-c distribution system to the alternate instrument inverter. The a-c distribution system is then powered from the alternate instrument inverter. Equipment powered by the a-c distribution system is as follows:

Attitude gyro
Directional gyro indicator
Instrument inverter failure warning relay coil
Instrument transformer
Directional gyro system
Fuel flow transmitter and indicator instrument transformer (F-86F-35 Airplane AF52-5180 and all subsequent airplanes)

NO. REQD	EQUIPMENT	VOLT-AMPERES	WATTS	POWER FACTOR	VOLT-AMPERES REACTIVE
	SINGLE-PHASE INVERTER				
1	Cockpit temperature control amplifier	6.70	6.40	.950	2.10
1	Fuel flow totalizer	28.00	22.40	.800	16.80
1	Gun sight (A-4)	152.00	121.50	.800	91.20
1	IFF transpondor (AN/APX-6)	250.00	220.00	.897	119.00
1	Inverter failure relay	5.63	2.87	.510	4.84
1	Radar set (AN/APG-30)	374.00	320.00	.896	192.50
1	Windshield anti-ice control amplifier	6.70	6.40	.950	2.10
	THREE-PHASE INVERTER				
1	Attitude gyro	34.00	17.00	.500	29.40
1	Fuel pressure indicator	3.21	0.60	.187	3.20
1	Fuel pressure transmitter	3.21	0.60	.187	3.20
1	Gyro magnetic compass equipment, compass indicator, slaved gyro amplifier, remote transmitter	32.00	22.40	.700	22.80
1	Hydraulic pressure indicator	3.21	0.60	.187	3.20
3	Hydraulic pressure transmitters	3.21	0.60	.187	3.20
1	Inverter failure relay	5.63	2.87	.510	4.84
1	Oil pressure indicator	3.21	0.60	.187	3.20
1	Oil pressure transmitter	3.21	0.60	.187	3.20

191-54-30

Figure 7-9. A-C Loading Chart

The instrument transformer is connected between the "C" phase bus and ground to obtain 115-volt, single-phase, 400-cycle power. The instrument transformer reduces the voltage from 115 to 26 volts ac for operation of certain instruments. (See figure 7-10.) There is another system provided for distributing single-phase main radar inverter power. A-C power, developed by this inverter, is connected either directly or through fuses to the equipment served. The equipment served by the single-phase main radar inverter is as follows:

Radar inverter failure warning relay coil

AN/APX-6 IFF radar

Cockpit temperature control amplifier

External stores (F-86F-35 and subsequent airplanes)

Fuel flow totalizer indicator and transmitter (F-86F-1 through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 through -13109)

Fuel flow totalizer transmitter and indicator instrument transformer (F-86F-20 Airplanes AF51-13110 through -13169, F-86F-25 and F-86F-30 Airplanes, and F-86F-35 Airplanes AF52-5164 through -5179)

Sight power relay

Windshield anti-ice control amplifier

7-73. EXTERIOR LIGHTING SYSTEM.

7-74. The exterior lighting system consists of two fuselage lights, four position lights, one landing and taxi light, one landing light, and a position light flasher. (See figure 7-11.) The flasher unit provides one flashing sequence for the wing lights and one taillight. The remaining taillight flashes in opposition to the original sequence. The flashing operation is controlled by two thermal switches. The switches are arranged to intermittently energize a relay inside the flasher. The relay connects the lights to the power source. One circuit is open when the other circuit is closed. Intensity of the position and fuselage lights is controlled by the dimmer switch, located on the right console. Placing the dimmer switch in the "BRIGHT" position shorts the dimming resistors. Placing this switch in the "DIM" position removes the short across the dimming resistors and dims the lights.

7-75. EXTERIOR LIGHTING FUSELAGE LIGHTS.

7-76. The large fuselage light assemblies are turned on when the dimmer switch is placed in the "BRIGHT" position. The small light assemblies are turned on when the switch is placed in the "DIM" position. The upper fuselage light assembly is located immediately aft of the canopy. The lower assembly is located on the underside of the fuselage, on the centerline below the cockpit area. The fuselage lights do not flash. They burn steadily when the position and fuselage light selector switch is in either "FLASH" or "STEADY" position. On F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes, the lower fuselage lights are located in the aft end of the P-2 strike camera fairing, when camera and fairing are installed.

7-77. EXTERIOR LIGHTING POSITION LIGHTS.

7-78. The position lights (figure 7-11) are controlled by the position and fuselage light selector switch, located on the right console. Placing this switch in the "FLASH" position operates the position light flasher, which transmits intermittent direct current to the dimmer switch. In the "BRIGHT" position, the dimmer switch shorts the dimming resistors. This permits maximum intermittent direct current to flow to the position lights and illuminates them to maximum brilliance. The white taillight and two wing-tip lights then flash in opposition to the yellow taillight. When the dimmer switch is placed in the "DIM" position, the short is removed across each dimming resistor, and the dimming resistors reduce the current flow to the position lights. (All position lights are dimmed simultaneously and cannot be individually controlled.) The position lights are then dimmed. When the position and fuselage light selector switch is placed in the "STEADY" position, power is routed directly to the dimmer switch and all lights burn steadily. All lights are off when the position and fuselage light selector switch is placed in the "OFF" position.

7-79. EXTERIOR LIGHTING LANDING AND TAXI LIGHTS.

Note

Operate retractable landing and taxi lights at least three times a week to prevent corrosion from forming on switch contacts.

7-80. Two retractable landing lights are mounted forward of the nose gear, on the underside of the fuselage. On F-86F-1 Airplanes AF51-2850 through -2877, the landing light left of the centerline is a Grimes G-4710 landing and taxi light assembly. On F-86F-1 Airplane AF51-2878 and all subsequent airplanes, this landing light is a Grimes G-4710A assembly. On F-86F-1 through F-86F-10 Airplanes and F-86F-20 Airplanes AF51-13070 through -13129, the landing light right of the centerline is an AN3095-7 light assembly. (See figure 7-11.) On F-86F-15 Airplanes, F-86F-20 Airplane AF51-13130, and all subsequent airplanes, the right landing light assembly is a Grimes D-5530 assembly. Both light assemblies are controlled by the landing and taxi light switch, located on the left forward console. In the "EXTEND & ON" position, the landing and taxi light switch connects power to the landing and taxi light relay coil and the landing light relay coil, energizing these two relays. These relays connect primary bus power to the landing lights, causing the landing lights to illuminate and extend to the landing position. On touchdown, the nose wheel steering safety switch

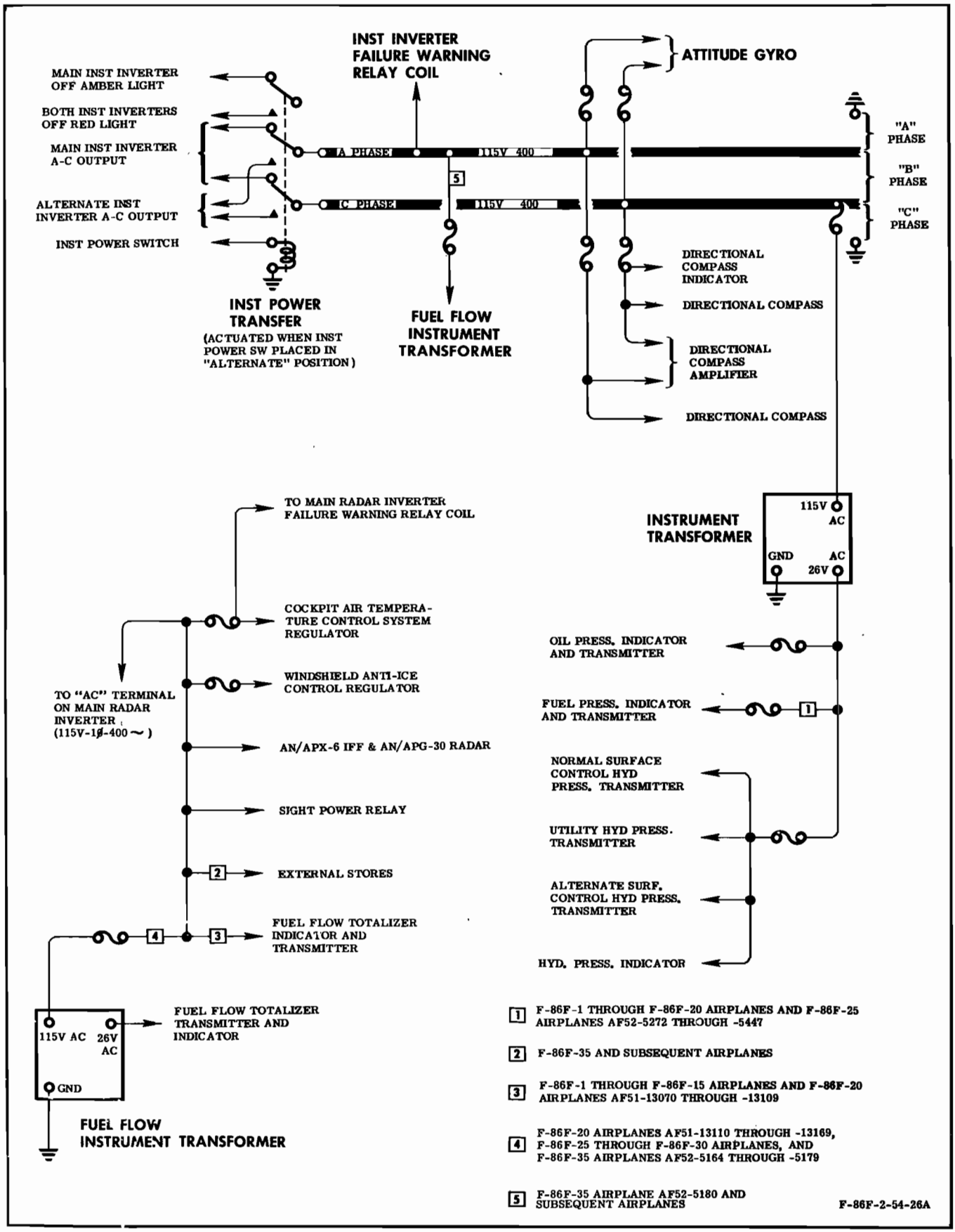

Figure 7-10. A-C Power Distribution System

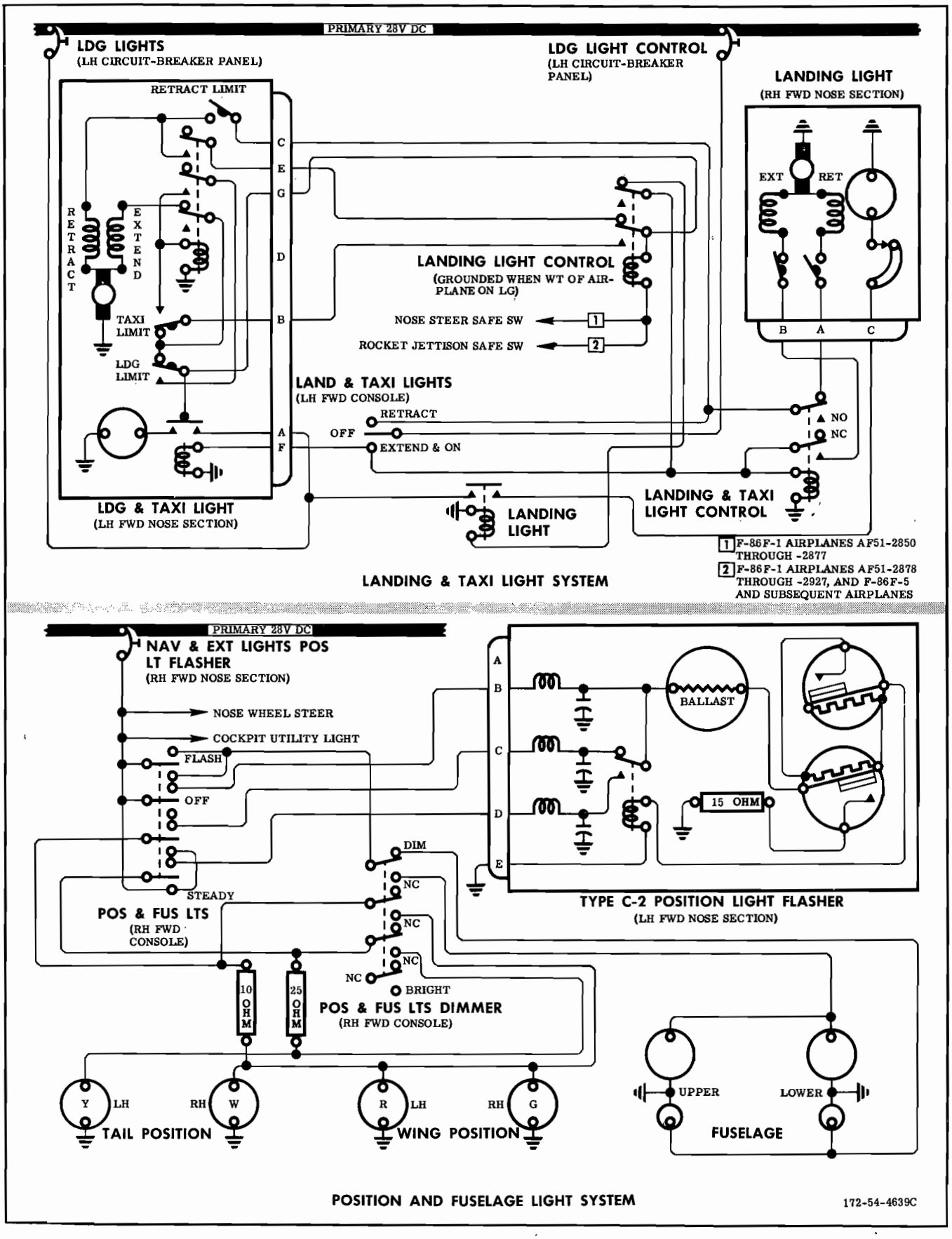

Figure 7-11. Exterior Lighting System

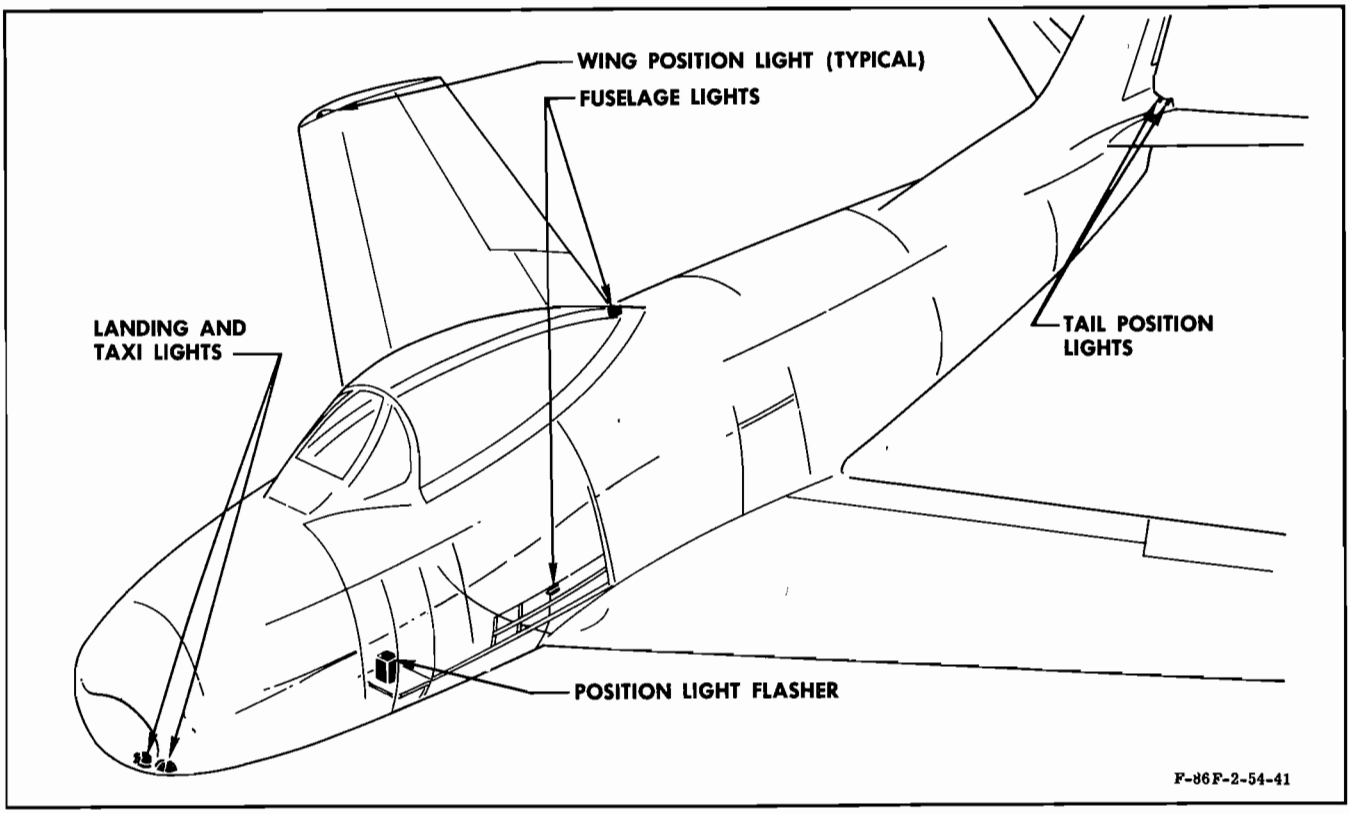

Figure 7-11A. Exterior Lighting Equipment Location

on F-86F-1 Airplanes AF51-2850 through -2877 is actuated by weight of the airplane on the nose gear, and completes the ground return circuit for the landing light control relay. On F-86F-1 Airplane AF51-2878 and all subsequent airplanes, the rocket jettison safety switch completes the ground return circuit. When the landing light control relay is energized, power is routed to the landing and taxi light, which extends to the taxi position. At the same time, the landing light control relay removes power from the right landing light assembly, extinguishing the light. Placing the landing and taxi light switch in the "RETRACT" position turns off the landing and taxi light by de-energizing the light relay, and retracts both landing light assemblies simultaneously. Limit switches, within each landing light assembly, control the extent of travel in either direction.

CAUTION

Landing and taxi light assemblies are sprayed with a protective plastic compound (Specification MIL-S-8141). This reduces the possibility of explosion resulting from arcing contacts in the presence of gas vapor. Therefore, lamp replacements must be sprayed prior to installation.

WARNING

Keep compound away from flame. It is highly flammable in the liquid state. Wear a mask while spraying, as compound is highly toxic.

7-81. REMOVING LANDING AND TAXI LIGHTS. To remove either the landing light or the landing and taxi light assembly, proceed as follows:

a. With light assembly in retracted position, remove the six screws securing fairing ring to nut-plate retainer ring.

b. Remove the five screws securing light assembly to nut-plate retainer ring.

c. Remove nut-plate retainer ring and rubber pad from light assembly bracket.

CAUTION

Weight of lamp assembly must be supported during removal of nut-plate retainer ring, to avoid possible damage to screen covering on motor drive mechanism.

d. Lower lamp assembly free of fuselage, break safety wiring on plug connector, and disconnect plug.

7-82. INSTALLING LANDING AND TAXI LIGHTS. To install the landing light or the landing and taxi light assembly, proceed as follows:

a. Connect wiring to lamp assembly and safety-wire plug.

b. Install nut-plate retainer ring and rubber pad on light assembly bracket.

c. Secure lamp assembly to nut-plate retainer ring.

d. Secure fairing ring to nut-plate retainer ring.

7-83. ADJUSTING LANDING AND TAXI LIGHT (GRIMES G-4710 OR G-4710A). To adjust landing light portion of Grimes G-4710 or G-4710A landing and taxi light assembly, proceed as follows:

a. Level airplane with nose wheel off ground (F-86F-1 Airplanes AF51-2850 through -2877) or left main gear off ground (F-86F-1 Airplane AF51-2878 and all subsequent airplanes).

b. Place target board 15 feet in front of left light assembly.

c. Place landing and taxi light switch in "EXTEND & ON" position.

d. Check position of light assembly in landing position. Assembly should extend to a position 69 degrees from the fully retracted position. Center of beam should strike target board at a point 63 inches below projected fuselage reference line and 8 inches to left of projected centerline of airplane.

Note

The only permissible adjustments when the landing and taxi light is installed, are lateral adjustments, which move the beam right or left. Avoid forcing light assembly against its mounting.

e. (Deleted)

f. Make operational check with gear positioned as explained in step a.

7-84. ADJUSTING LANDING LIGHT (AN3095-7 OR GRIMES D-5530). To adjust AN3095-7 or Grimes D-5530 landing light assembly, proceed as follows:

Note

On F-86F-1 Airplanes AF51-2850 through -2877, the landing light control relay ground return is made through the nose steering safety switch when the weight of the airplane is on the nose gear. On F-86F-1 Airplane AF51-2878 and all subsequent airplanes, the ground return is made through the rocket jettison safety switch when the weight of the airplane is on the right main gear.

a. Level airplane, with gear off ground.

b. Place target board 15 feet in front of right light assembly.

c. Place landing and taxi light switch in "EXTEND & ON" position.

d. Check landing light position. Light should extend to a position 69 degrees from the fully retracted position. Center of beam should strike target board at point 63 inches below projected fuselage reference line and 5 inches to right of projected centerline of airplane.

Note

The only permissible adjustments when the landing light is installed, are lateral adjustments, which move the beam right or left. Avoid forcing light assembly against its mounting.

e. (Deleted)

f. Make an operational check.

7-85. ADJUSTING TAXI LIGHT (GRIMES G-4710 OR G-4710A). To adjust taxi light portion of Grimes G-4710 or G-4710A landing and taxi light assembly, proceed as follows:

a. Level airplane with nose wheel gear *on* ground (F-86F-1 Airplanes AF51-2850 through -2877) or with right main gear *on* ground (F-86F-1 Airplane AF51-2878 and all subsequent airplanes).

b. Place target board 15 feet in front of taxi light (left light).

c. Place landing and taxi light switch in "EXTEND & ON" position.

d. Check position of taxi light. Light assembly should extend to a position 80 degrees from fully retracted position. Center of beam should strike target board at point 30 inches below projected fuselage reference line and 8 inches to left of projected centerline of airplane.

Note

The only permissible adjustments when the landing and taxi light is installed, are lateral adjustments, which move the beam right or left. Avoid forcing light assembly against its mounting.

e. (Deleted)

f. Make an operational check.

Note

Weight of the airplane must be on nose wheel during taxi light adjustments, or the nose steer safe switch must be held in the actuated position to energize the landing light control relay on F-86F-1 Airplanes AF51-2850 through -2877. Weight of the airplane must be on the right main gear during this adjustment on F-86F-1 Airplane AF51-2878 and all subsequent airplanes, or the rocket jettison safe switch must be held in the actuated position to energize the landing light control relay. (See figure 7-11.)

7-86. CLEANING LANDING OR TAXI LIGHT SWITCH POINTS. Clean switch points as follows:

a. Remove light cover assembly for access to switches.

b. Locate switch to be cleaned. (The upper switch controls the extend cycle; the lower switch, the retract cycle.)

c. Dress contact points with a burnishing tool. Be careful not to remove too much of point material.

d. Blow all foreign material from contacts and assembly.

e. Install cover and check lamp for operation.

7-87. INTERIOR LIGHTING SYSTEM.

7-88. The interior lighting system consists of the following: two auxiliary instrument panel floodlights; two console floodlights, one over each console; ring-type instrument lights; console and panel lights for edge illumination of the left console, pedestal, right console, and AN/ARN-6 control panels; two lights for the IFF destructor panel; an extension light; and a stand-by compass light.

7-89. INTERIOR LIGHTING EXTENSION LIGHT.

7-90. The Type C-4A extension light (figure 7-12) is stowed either over the right console or on the aft portion of the left console. A combination "ON-OFF" switch and rheostat within the light housing turns on the light and controls its brilliance.

7-91. INTERIOR LIGHTING PRIMARY INSTRUMENT LIGHTS.

7-92. There are ring-type primary instrument lights located in the instrument panel. On F-86F-1 through F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 through -13454, a 30-ohm instrument panel primary light control rheostat, located on the cockpit rheostat panel, turns on the insrument lights and controls their brilliance. On F-86F-25 Airplane AF51-13455 and all subsequent airplanes, a 25-ohm instrument panel primary light control rheostat turns on the instrument lights and controls their brilliance. On F-86F-25 Airplanes AF51-13355 through -13510, and F-86F-30 Airplanes AF52-4305 through -5063, a Grimes lighting fixture is installed for the turn-and-bank indicator. The light improves illumination of the ball race with minimum obstruction to visibility. Light is piped from the light source, located inside the fixture, to the ball race through two rectangular pieces of transparent plastic. The plastic material is mounted on the inside of the

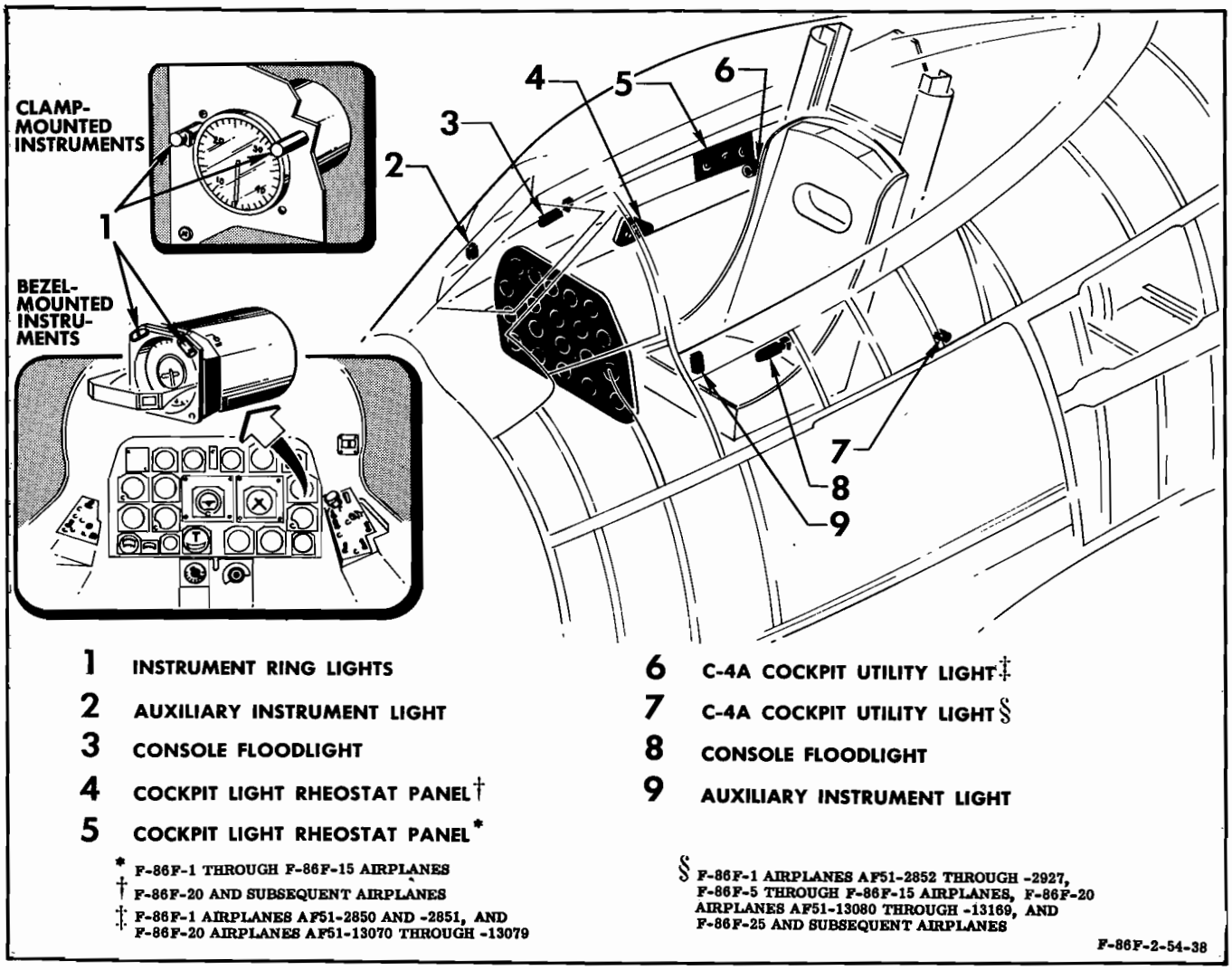

Figure 7-12. Interior Lighting Equipment Location

fixture, left and right of the turn-and-bank indicator face. The light source, consisting of two lights, is located in the upper inside portion of the fixture. One light is located over the end of each piece of plastic. The light is directed to the ball race by a "V" notch cut in the plastic opposite the race. On F-86F-30 Airplane AF52-5064 and all subsequent airplanes, and airplanes modified by T. O. 1F-86-144 (formerly 01-60JL-144), the turn-and-bank indicator is lighted by a fixture that directs the light from four lamps over the face of the instrument.

7-93. INTERIOR LIGHTING AUXILIARY INSTRUMENT LIGHTS.

7-94. Two auxiliary instrument floodlights are installed on the instrument shroud. (See figure 7-14.) A 100-ohm instrument panel auxiliary light control rheostat, located on the cockpit rheostat control panel, turns on the lights and controls their brilliance. The battery bus supplies power for the auxiliary instrument lights on F-86F-1 through F-86F-20 Airplanes and F-86F-30 Airplanes AF52-4305 through -4404. Therefore, the auxiliary instrument lights operate regardless of the position of the battery-starter switch. On F-86F-25 Airplanes, F-86F-30 Airplane AF52-4405, and all subsequent airplanes, the auxiliary instrument lights are supplied power by the primary bus.

7-95. INTERIOR LIGHTING CONSOLE AND PANEL LIGHTS.

7-96. The console and panel lighting system (figure 7-14) consists of the following: a control rheostat; two console floodlights over the right and left consoles; edge lights for illumination of the left console, pedestal, right console, and AN/ARN-6 control panels; and the IFF destructor panel. On F-86F-20 and subsequent airplanes, two additional lights have been provided for the AN/ARC-27 control panel. Six additional panel lights for the special store controls, located on the left vertical panel, are installed on F-86F-35 and subsequent airplanes.

7-97. INTERIOR LIGHTING CONSOLE AND PANEL LIGHT CONTROL RHEOSTATS.

7-98. With the installation of additional lights to the console and panel lighting systems, it was necessary to lower the resistance of the light control rheostats. This compensated for the added current drain in the circuit caused by these lights. On F-86F-1 through F-86F-15 Airplanes, a 100-ohm rheostat (figure 7-13) turns on the console and panel lights and controls their brilliance. This rheostat is mounted on a rectangular cockpit rheostat control panel, located above the right console. On

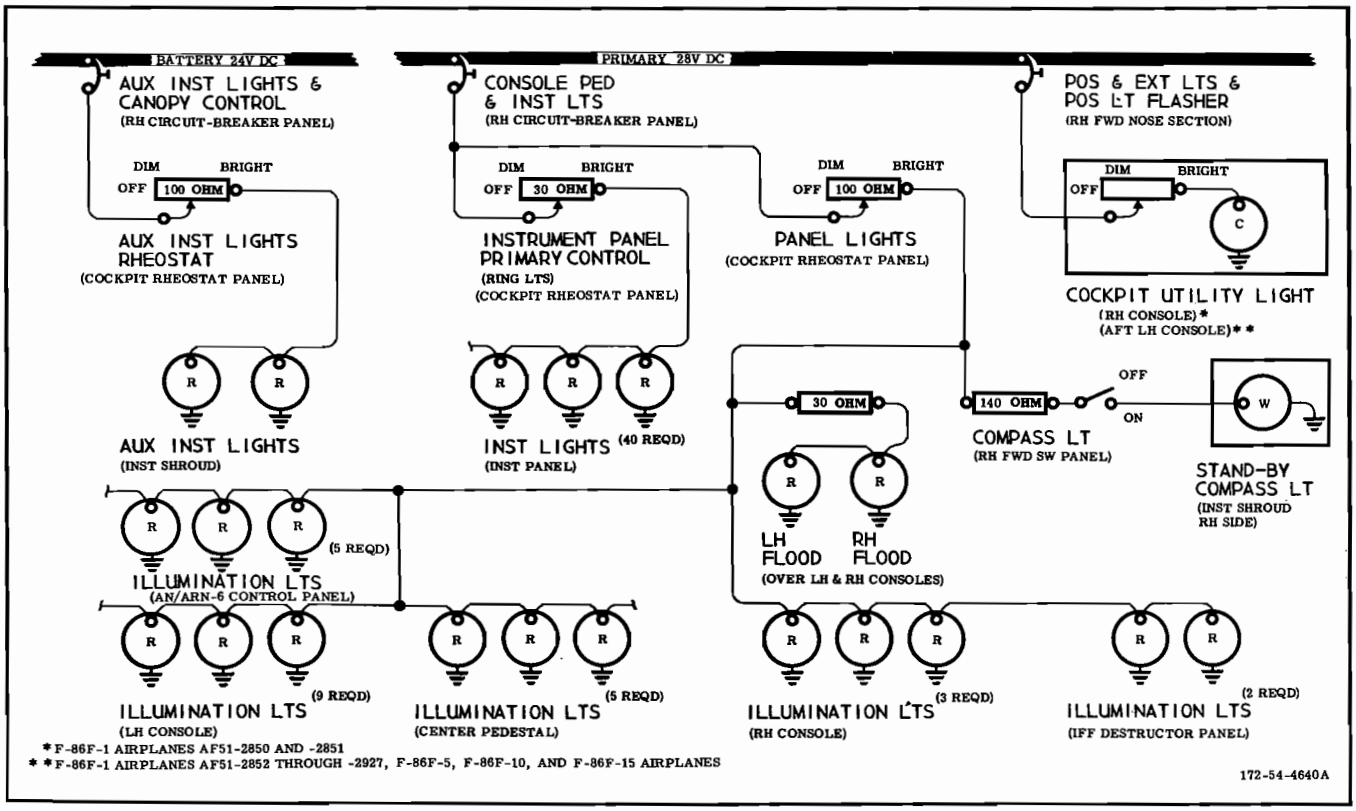

Figure 7-13. Interior Lighting System—F-86F-1 Through F-86F-15 Airplanes

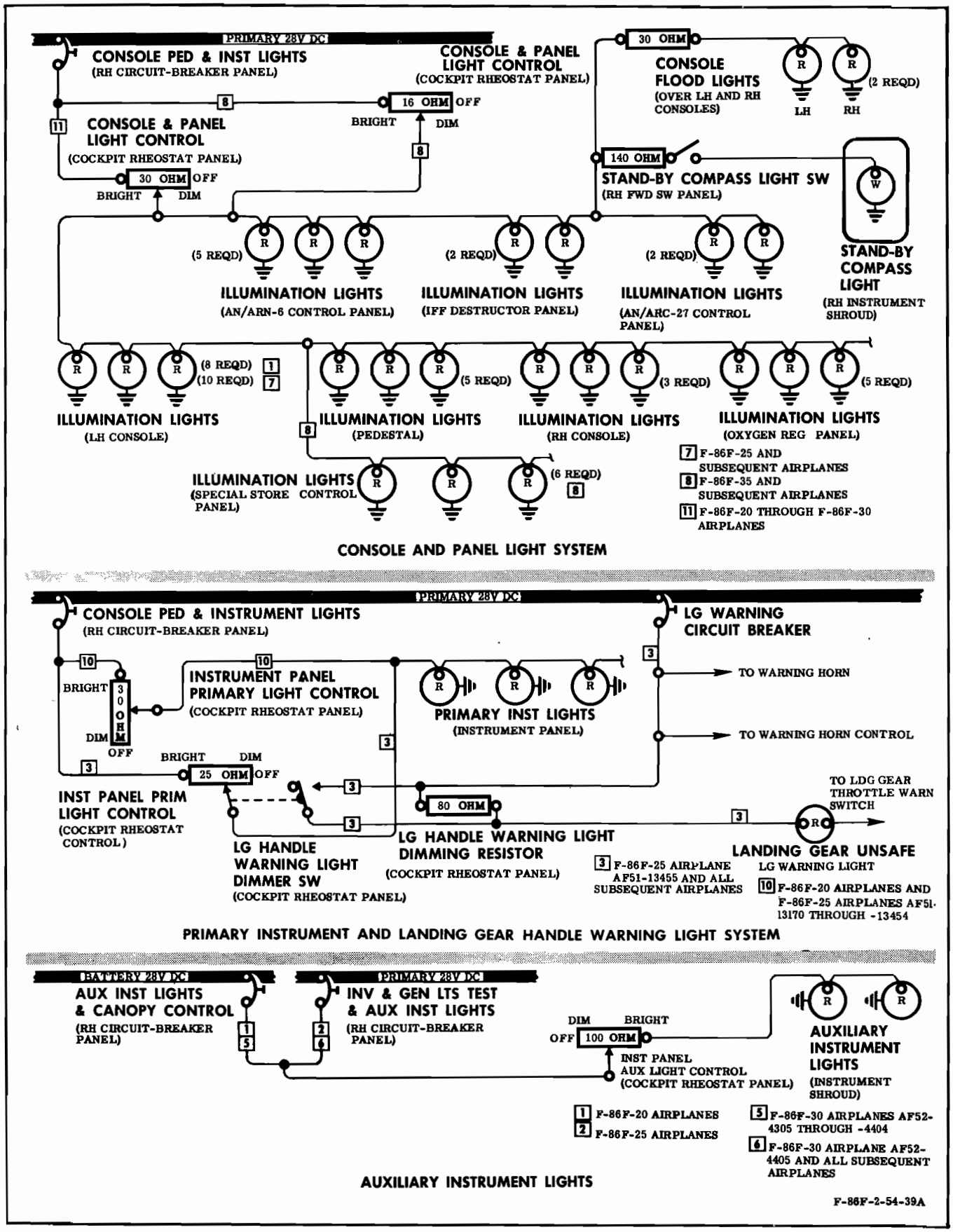

Figure 7-14. Interior Lighting System—F-86F-20 and Subsequent Airplanes

F-86F-20 through F-86F-30 Airplanes, a 30-ohm rheostat (figure 7-14) is mounted on a triangular cockpit rheostat control panel on the inboard side of the right console. This rheostat turns on the lights and controls their brilliance. On F-86F-35 and subsequent airplanes, a 16-ohm rheostat turns on the lights and controls their brilliance.

7-99. INTERIOR LIGHTING STAND-BY COMPASS LIGHT.

7-100. The stand-by compass light switch is located on the right forward switch panel. It turns on the light within the body of the stand-by compass, which is located on the instrument shroud. The brilliance of the stand-by compass light is controlled through the console and panel light control rheostat. (See figure 7-14.) This is done when the stand-by compass light switch is connected in series with the console and panel light circuit. When the panel light control rheostat is "OFF," the light will not illuminate.

7-101. INTERIOR LIGHTING LANDING GEAR HANDLE WARNING LIGHT DIMMING SWITCH.

7-102. On F-86F-25 Airplane AF51-13455 and all subsequent airplanes, a dimming switch and resistor are installed on the cockpit rheostat panel to control brilliance of the landing gear warning light. The light is located inside the plastic body of the landing gear control handle. The dimming switch is ganged to the control shaft of the instrument panel primary light control rheostat. (See figure 7-14.) When the rheostat is in the "OFF" position (daytime operation) and the dimming switch is closed, the dimming resistor is shorted. When the dimming resistor is shorted, the landing gear warning light illuminates at maximum brilliance. When the instrument panel primary light control rheostat is placed in the "DIM" or "BRIGHT" position, it opens the dimming switch, removes the short across the dimming resistor, and dims the landing gear handle warning light for night operations.

Section VIII
RADIO AND RADAR EQUIPMENT

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8-1. RADIO EQUIPMENT.

8-2. The radio equipment (figures 8-1 through 8-3) consists of the following:

EQUIPMENT	FUNCTION
AN/ARC-3 COMMAND SET* Transmitter (T-67/ARC-3) Receiver (R-77A/ARC-3) Power junction box (J-68/ARC-3) Dynamotor—receiver (DY-22/ARC-3) Dynamotor—transmitter (DY-21/ARC-3) Control panel (C-404A/A)	Airplane-to-airplane and airplane-to-ground-station communication.
AN/ARC-33 COMMAND SET† Receiver-transmitter (RT-173/ARC-33) Control panel (C-784/ARC-33) Antenna	Airplane-to-airplane and airplane-to-ground-station communication.
AN/ARN-6 RADIO COMPASS Compass receiver (R-101A/ARN-6) Loop antenna (AS-313B/ARN-6) Indicator (ID-90A/ARN-6) Remote-control panel (C-403A/A)	Orientation and direction finding.
AN/ARC-27 COMMAND SET‡ Receiver-transmitter (RT-178/ARC-27) Control box (C-626/ARC-27) Control panel (C-628/ARC-27) UHF antenna	

Note

For detailed information concerning each item of equipment, consult the handbooks for the equipment or components involved, as listed in the current issue of the AF Index of Technical Publications and Confidential Orders.

*F-86F-1 through F-86F-15 Airplanes
†F-86F-20 Airplanes
‡F-86F-25 and subsequent airplanes

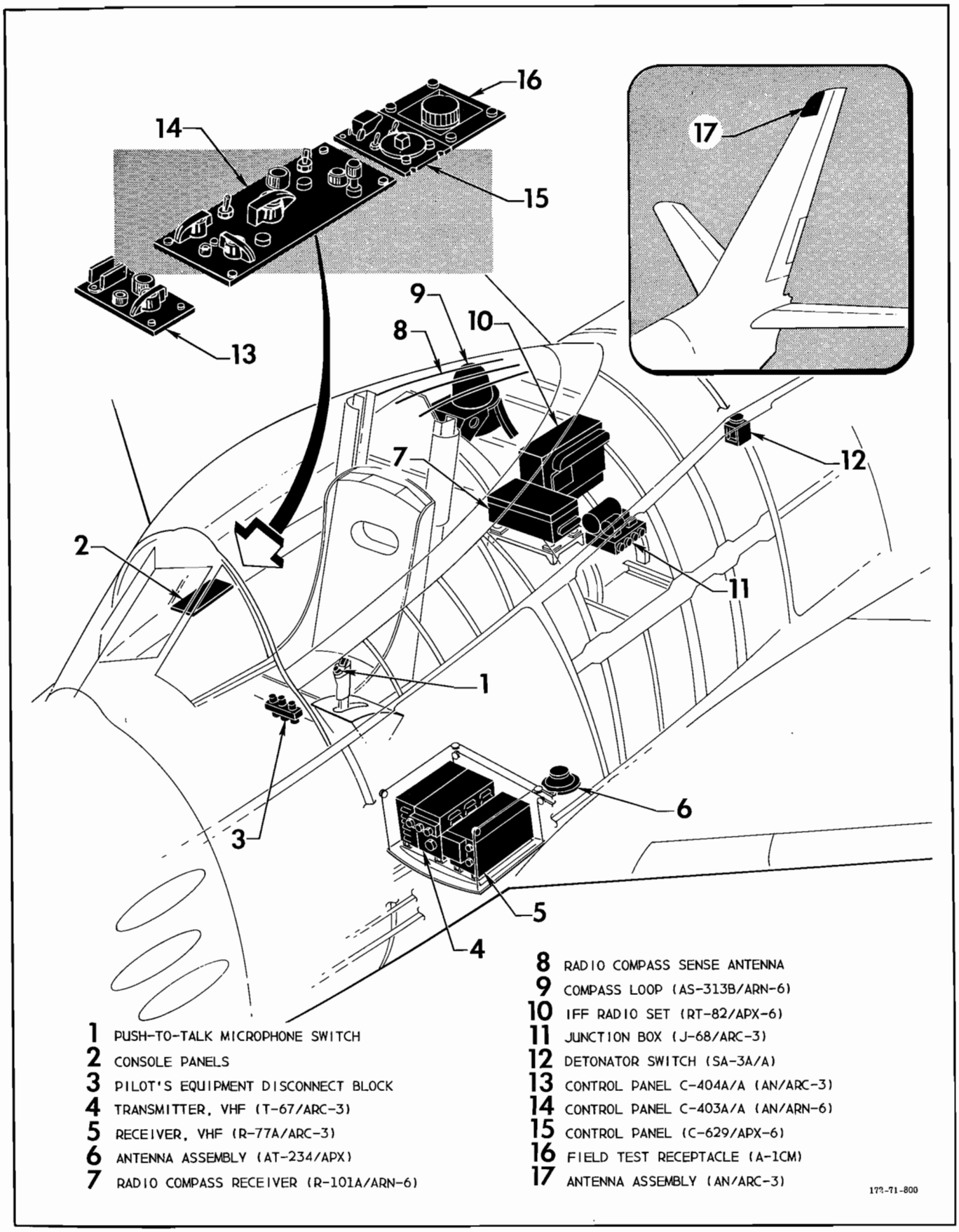

Figure 8-1. Electronic Equipment Location—F-86F-1 Through F-86F-15 Airplanes

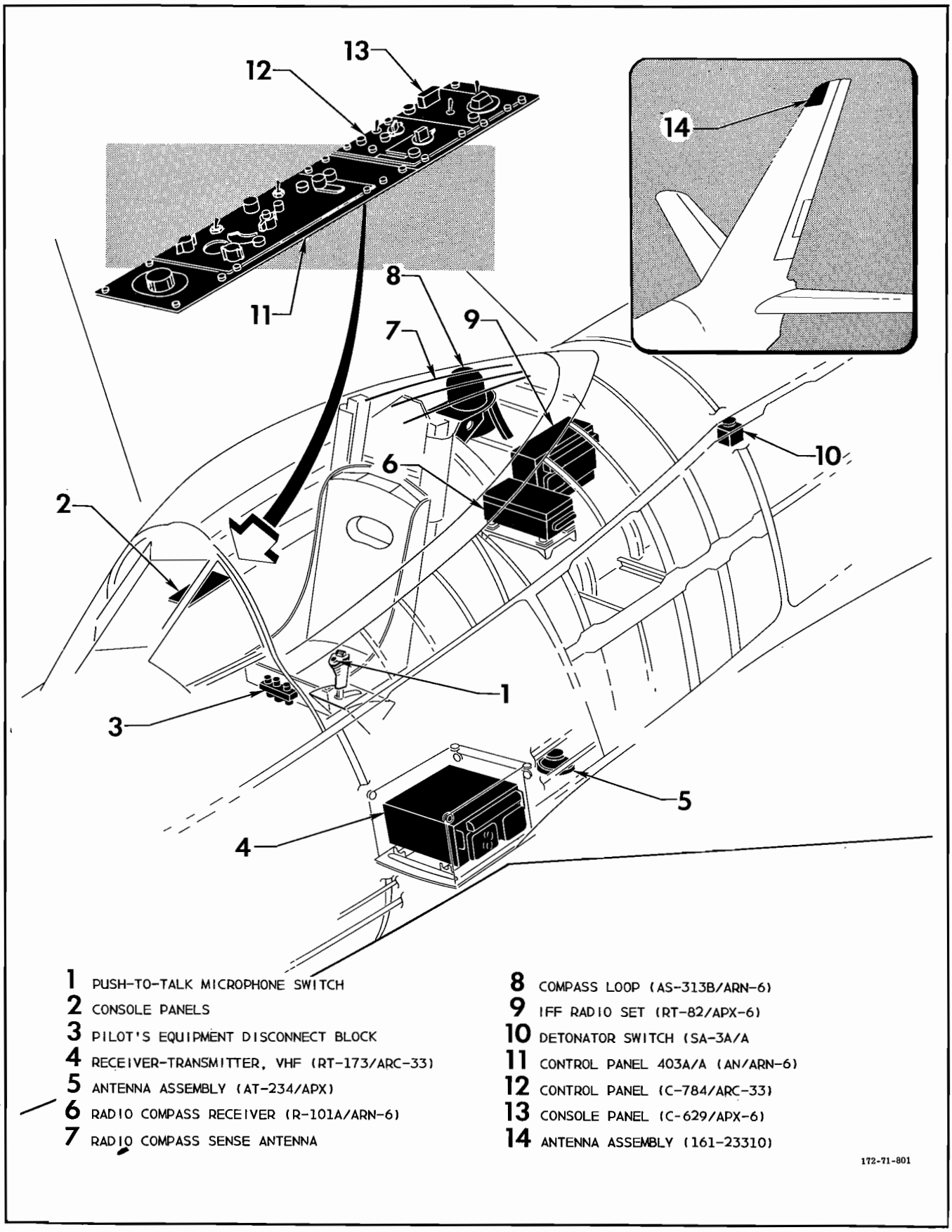

Figure 8-2. Electronic Equipment Location—F-86F-20 Airplanes

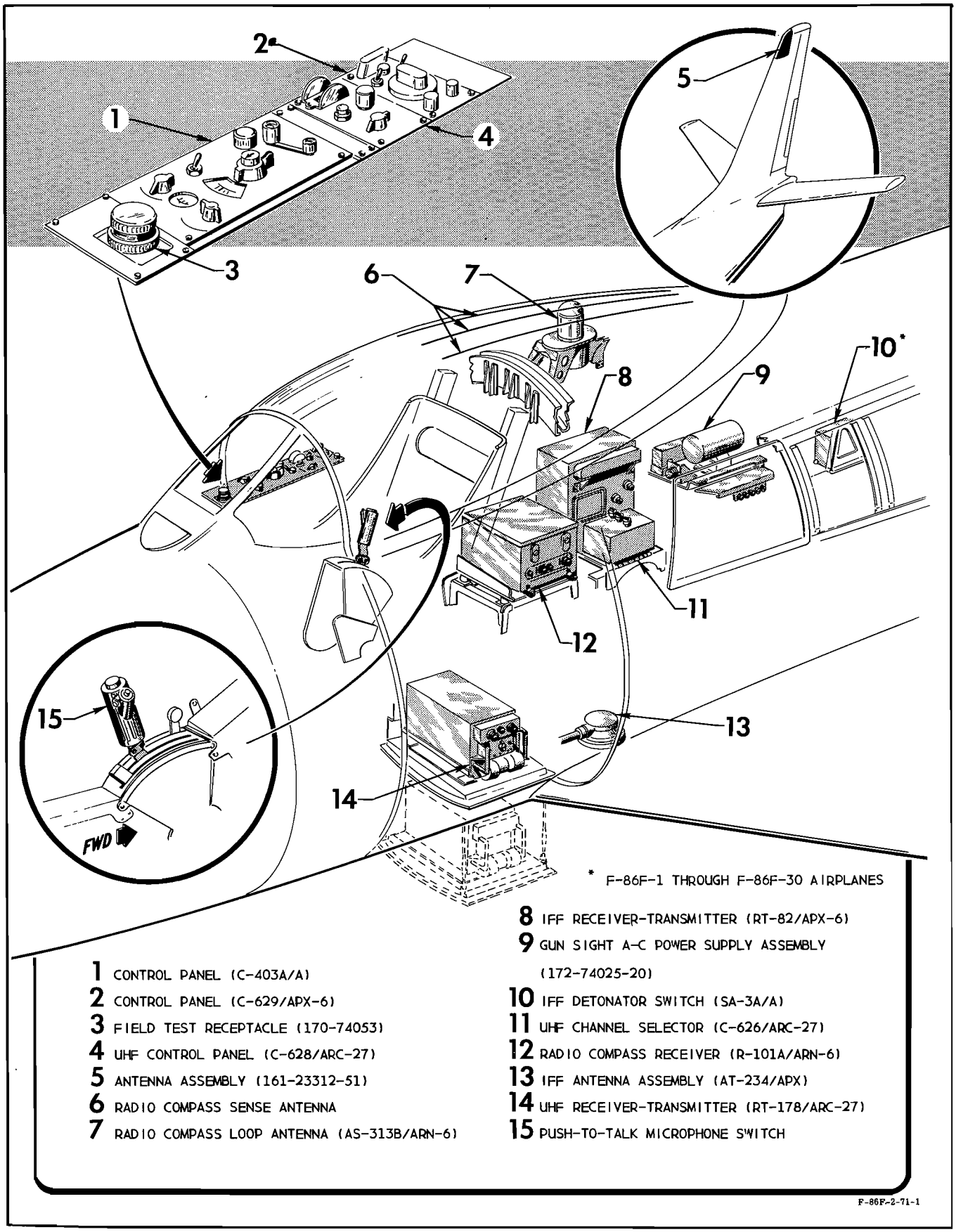

Figure 8-3. Electronic Equipment Location—F-86F-25 and Subsequent Airplanes

8-3. TROUBLE SHOOTING RADIO EQUIPMENT.

TROUBLE	PROBABLE CAUSE	REMEDY
T-67/ARC-3 TRANSMITTER		
	WARNING Always turn off all power before attempting to burnish relay contacts, as the high voltage can cause serious injury to personnel.	
Transmission but no side tone; tuning system stops at proper frequency.	Contacts on relay K-406 (in power junction box) dirty.	Clean contacts of relay.
No modulation or side tone; tuning system stops at proper frequency.	Defective V-106 or V-109 tube, or dirty contacts on relay K-106.	Replace defective tube, or clean contacts of relay.
No transmission or side tone; tuning system stops at high-frequency end of band.	Defective crystal, defective tube V-101, V-102, V-103, V-104, V-107, or V-108, or dirty contacts in crystal relay.	Replace crystal. Replace defective tube. Clean contacts of crystal relay for inoperative channel.
No transmission; motor does not stop.	Burned-out transmitter fuse in power junction box. Defective tube V-105. Dirty contacts on relay K-102. Dirty contacts on power junction box relays K-403 and K-404.	Replace transmitter fuse. If fuse continues to blow, battery polarity may be reversed. Replace tube. Clean contacts. Clean contacts.
No transmission; dynamotor does not stop.	Low battery or battery cart. Defective plug in relay K-103. Dirty contacts on relay K-104.	Charge battery. Replace plug. Clean contacts.
No transmission; dynamotor does not run.	Dirty contacts on relay K-106. Dirty contacts on relay K-104. Dirty contacts on power junction relay K-402.	Clean contacts. Clean contacts. Clean contacts of relay K-402 in power junction box.
No transmission; motor does not start. (If top cover is removed, button S-102, located at top of case at the front, must be pushed to make motor run.)	Circuit breakers open. Dirty circuit-breaker connections. Dirty crystal relay contacts. Dirty contacts on relays K-107 and K-108. Dirty contacts on relay K-104.	Check circuit breakers in airplane wiring. Check circuit-breaker connections. Clean all crystal relay contacts. Clean contacts. Clean contacts.
No reception; tuning system stops at proper frequency.	Defective tubes. Dirty contacts on relay K-406.	Replace tube V-208, V-209, V-210, V-211, V-212, V-213, V-214, V-215, V-216, or V-217. Clean contacts of relay K-406 in power junction box.
Receiver does not stop or goes to high end of band.	Low battery or battery cart.	Charge battery.

TROUBLE	PROBABLE CAUSE	REMEDY
No reception; tuning system stops at high-frequency end of band.	Defective crystal. Defective tube V-201, V-202, V-203, V-204, V-205, V-206, V-208, or V-209. Dirty contacts on crystal relay. Dirty contacts on relay K-204 or K-205.	Replace crystal. Replace defective tube. Clean contacts of crystal relay for inoperative channel. Clean contacts of K-204, K-205, and all crystal relays.
No reception; tuning system stops at wrong frequency.	Incorrect setting of thumbwheel for inoperative channel. Dirty crystal relay contacts (inoperative channel). Dirty contacts on K-204 or K-205 relay.	Check setting of thumbwheel for inoperative channel. Clean contacts of crystal relay for inoperative channel. Clean contacts of relays K-204, K-205, and all crystal relays.
No reception; motor will not stop.	Blown receiver fuse (on power junction box). Defective tube V-207 or V-210. Dirty contacts on relays K-404 and K-405 in power junction box. Defective plug in relay K-201. Dynamotor brushes worn.	Replace fuse. Replace tube. Clean contacts. Replace plug in relay K-201. Replace dynamotor brushes.
AN/APX-6 IFF SET		
If at any time the IFF equipment fails to operate, check for burned-out fuses on the receiver-transmitter and that all cable connections are tight. If trouble is not caused by power source failure or if fuses repeatedly burn out, isolate the trouble by replacing each IFF unit (including cables) until the defective unit is located.		
AN/APG-30 RADAR		
No power output.	No 115-volt a-c power (320-1760 cps). No regulated 115-volt a-c (380-420 cps). No B+ on modulator. Faulty trigger at thyratron, V-202, or trigger circuit, V-201. Open transformer T-103.	Check for 115-volt a-c at voltage test box in nose radar bay. If no voltage is there, check main inverter and a-c power distribution system. If voltage is present at test box, check fuse on radar fuse panel in nose bay and continuity of leads from a-c bus to voltage regulator and between radar units. Check fuse F-802 on front panel of range power supply. Make same check as in previous PROBABLE CAUSE and check fuse F-701 on front panel of voltage regulator (CN-112/APG-30). Replace frequency converter-transmitter and power supply range computer. Replace defective tube. Replace transmitter and range power supply.

TROUBLE	PROBABLE CAUSE	REMEDY
Low power output.	No or low magnetron current.	Replace transmitter and range power supply.
	Repetition rate low.	Replace transmitter and range power supply.
	Faulty trigger at thyratron, V-202, or defective oscillator-cathode follower, V-201.	Replace defective tube.
	Defective transformer T-103.	Replace transmitter and range power supply.
Magnetron current low.	Defective reactor L-101.	Replace transmitter and range power supply.
System fails at high altitudes.	Arcing and corona from components and leads at high potentials.	Replace transmitter and range power supply.
Transmitter starts to time in again after gun safety switch is placed in "SIGHT CAMERA RADAR."	Defective thyratron V-202.	Replace V-202.
No or incorrect crystal currents.	Defective sweep generator, V-405.	Replace defective tube.
	"AFC ADJ" potentiometer out of adjustment.	Refer to paragraph 8-51B.
	Defective crystals.	Replace transmitter and range power supply.
	Local oscillator or mixer out of tune.	Replace transmitter and range power supply.
Markers are skipped by range gate (low lock-on sensitivity).	Faulty tube V-603.	
	Faulty K-601, K-602, or K-603.	Replace transmitter and range power supply.
	High level if out of alignment.	Replace transmitter and range power supply.
Radar does not lock on target.	Faulty tube in range computer.	Replace defective tube.
	Defective capacitors C-620, C-621, C-625, or C-626.	Replace transmitter and range power supply.
	Incorrect adjustment of R-625, R-687, or R-848.	Replace transmitter and range power supply.
	Defective relays K-601 or K-602.	Replace transmitter and range power supply.
	Range voltage does not sweep.	Check cabling to controls.
		Replace transmitter and range power supply.
Limited range search.	Incorrect adjustment of range sweep potentiometer in cockpit.	Turn range sweep to maximum.
	"RANGE MIN" potentiometer out of adjustment.	Replace transmitter and range power supply.
	Faulty tube V-609.	Replace tube.
On-target lamp fails to light when radar is locked on target.	Defective lamp or open lead.	Replace lamp and check continuity of lead.
	Faulty range computer.	Replace transmitter and range power supply.

TROUBLE	PROBABLE CAUSE	REMEDY
On-target lamp blinks or remains on when no target is present.	Lock-on sensitivity out of adjustment. Gate balance controls out of adjustment.	Refer to paragraph 8-51A. Replace transmitter and range power supply.
Radar-out button on stick grip does not unlock radar from target.	Defective relay K-603. Defective switch or open lead.	Replace transmitter and range power supply. Replace defective switch and check continuity of leads from switch to power supply-range computer.
No or incorrect regulated d-c voltage.	Failure of a-c or d-c power supply. Faulty transformers, relays, capacitors, or tubes in power supply-range computer.	Check for 115-volt ac and 28-volt dc at voltage test box. Check continuity of power leads. Replace transmitter and range power supply.
Incorrect a-c regulated voltage.	Voltage regulator out of adjustment.	Adjust voltage regulator output to 115 ($\pm$1) volts ac.
No regulated a-c voltage.	Open fuse F-701. Faulty regulator.	Replace fuse. Replace regulator.

Note

Proper operation of electronic equipment is dependent upon keeping to a minimum the radio interference produced within the airplane. Therefore, if any electrical or electronic equipment is changed, care must be taken to ensure interference-free operation to the radio receiving equipment. If trouble is encountered, refer to applicable Technical Orders for information to remedy this situation.

8-4. MAINTAINING RADIO EQUIPMENT.

8-5. The only maintenance requirements are checking the battery voltage, testing the vacuum tubes, and checking the dynamotor brushes. Do not attempt to service any item of electronic equipment unless suitable shop and testing facilities are available.

8-6. TESTING VACUUM TUBES. The best check for a receiving or transmitting tube is to compare it, in its own socket under actual operating conditions, with a new tube of known quality. A visual filament check of individual glass tubes may be made by looking for failure of filaments to light or, in the case of metal tubes, feeling for failure to heat. As the filaments of some tubes are connected in series with several other tubes, all tubes in that group will be out. In order to find which tube is defective, replace the tubes in that group, one at a time, until defective tube is found. In glass tubes, the appearance of an abnormal blue haze on the inside of the glass envelope, a blue haze or white glowing spots between the tube elements, or red spots on the plate, is an indication of one of three things: a defective tube, abnormal circuit conditions, or overloading. If all tubes appear to operate normally during malfunction of the particular piece of equipment, refer to trouble shooting chart for further information.

CAUTION

Do not operate any set using miniature tubes on voltage higher than 28-volt direct current any longer than necessary, because such practice will shorten the life of the tubes.

8-7. MAINTAINING DYNAMOTOR. Any brush that has worn down to a length of less than 3/8 inch must be replaced with a new one. When installing new brushes, do any "sanding in" required with a strip of No. 000 sandpaper wrapped around the surface of the commutator with the sand surface out. Install new brush, and rotate armature back and forth until the full width of the brush face contacts the sandpaper, as indicated by sanding marks. If necessary, sand the sides of the brush for a free fit in the holder. Never apply oil or grease to brush holder or to commutator.

8-8. AN/ARC-3 COMMAND SET (F-86F-1 THROUGH F-86F-15 AIRPLANES).

8-9. The command set (figure 8-1) operates on eight crystal-controlled frequencies within the 100- to 156-megacycle range; no separate coils are necessary for either transmitter or receiver for frequency change. The

transmitter and receiver, mounted on an access door between the spent-ammunition compartments, are controlled from the radio console to the right of the pilot. The power output of the transmitter is approximately 8 watts. The power junction box, installed in the equipment compartment, consists of two dynamotor units powered by the 28-volt d-c system. The larger dynamotor supplies plate and screen voltages for the transmitter, and the smaller dynamotor provides plate and screen voltages for the receiver. Filament power for the series-parallel-wired filaments of receiver and transmitter is taken directly from the 28-volt system. The entire AN/ARC-3 equipment is protected by a circuit breaker on the right circuit-breaker panel.

8-10. REMOVING T-67/ARC-3 TRANSMITTER AND R-77A/ARC-3 RECEIVER. Remove the T-67/ARC-3 transmitter and R-77A/ARC-3 receiver as follows:

a. Release Airloc fasteners on access door located between spent-ammunition compartments.

b. Open left spent-ammunition compartment door and turn crank until receiver and transmitter on door reach a favorable position for detachment of cables.

c. Detach the four cables from door.

Note

The door with equipment installed is bulky and heavy; use extreme care during removal, to prevent dropping door.

8-11. INSTALLING T-67/ARC-3 TRANSMITTER AND R-77A/ARC-3 RECEIVER. Install the T-67/ARC-3 transmitter and R-77A/ARC-3 receiver as follows:

a. Place transmitter and receiver on mounting, and secure in place. If mounting and door were removed from airplane, attach four cables to access door.

b. Reach in through left spent-ammunition access door and turn crank. Assist crank by applying moderate pressure against access door.

CAUTION

Do not lift access door so there is slack in the cables. If the cables are slack, they will slide out of the pulley grooves, and the pulleys will break when a load is placed on the cables.

When access door is snug with fuselage, lock Airloc fasteners.

c. Close left spent-ammunition door.

8-12. OPERATIONAL CHECK OF AN/ARC-3 COMMAND SET. To check AN/ARC-3 command set, proceed as follows:

a. Turn battery-starter switch to "BATTERY" or connect an external source of power to airplane.

b. Insert headset and microphone into respective jacks.

c. Start equipment by selecting any one of the eight channels on C-404A/A control panel. This action turns on transmitter and receiver, which then automatically tune to the selected channel.

d. Allow 30 to 45 seconds for tubes in equipment to reach operating temperature. During the latter portion of this warm-up period, an audio tone will be heard in the headset. When this tone stops, the receiver and transmitter have been tuned to the selected channel; receiver output should be heard in the headset immediately afterward.

e. Push press-to-talk button "MIC" on engine power control quadrant and speak into microphone. Speech (side tone) which modulates the transmitter should be audible in headset. If none is heard, check to make sure a crystal has been inserted for that channel of transmitter. Release press-to-talk button to restore receiver operation.

f. Establish two-way radio communication with control tower on field as a final check on operation of equipment.

g. Adjust squelch control for desired background noise level consistent with operating conditions. (Refer to paragraph 8-13.)

h. Check "MCW" operation by pressing "D/F TONE" button on control panel.

i. Select each of the other set-up channels, and check operation of each as stated in procedures d. through h.

Note

The transmitter and receiver tune to the selected channel at the same time. Approximately 2 seconds is required to select channels. An audio tone will be heard in the headset while the equipment is tuning.

j. Turn equipment off by placing toggle switch, on control panel, to rear position.

Note

If either receiver or transmitter has tuned incorrectly, select any other channel, and then select desired channel again. Repeated mistuning indicates a defective crystal, incorrect setting of thumbwheels, or other defects in the equipment.

8-13. ADJUSTING AUDIO SQUELCH CONTROL. Background noise in receiver may be reduced effectively by the audio squelch control, which is adjustable. Access to screwdriver adjustment of squelch circuit control is provided by the sliding cover marked "SQUELCH," lo-

cated just to the right of the frequency indicating dial on front panel. Adjust squelch circuit as follows:

a. Rotate control shaft in a counterclockwise direction to increase squelch action. Increasing squelch action decreases background noise level and at the same time requires a stronger signal to "trip" squelch action and permit normal reception.

b. To decrease squelch action, rotate control shaft in a clockwise direction. Decreasing squelch action increases background noise level and also increases receiver sensitivity to weak signals.

Note

Increase squelch action no more than necessary to reduce background noise to a tolerable level, as a decided increase in squelch action prevents signal reception.

8-14. TESTING T-67/ARC-3 TRANSMITTER. To test transmitter, proceed as follows:

Note

When lid of transmitter is removed, depress motor control switch S-102 while selecting channels, to ensure proper operation.

a. Connect phantom transmitter antenna TS-78/U to the receptacle marked "ANTENNA" on front of transmitter.

b. Connect microphone T-17 to the proper jack.

c. Connect test unit TS-178/ARM-1 to receptacle marked "PL-152" on front of transmitter, and turn to "A+" position. The cable between the junction box (dynamotor unit) and receiver is not needed for this test.

d. Insert crystal units of the following frequencies in channels indicated.

CHANNEL	CRYSTAL FREQUENCY	TRANSMITTING FREQUENCY
A	7550 kc	135.90 mc
B	7010 kc	126.18 mc
C	7660 kc	137.88 mc
D	6750 kc	121.50 mc
G	7600 kc	136.80 mc
H	7450 kc	134.10 mc

e. Select channel A on control panel C-404A/A. If tuning motor does not stop after one minute, turn switch of test unit TS-178/ARM-1 to "B" position. If no voltage is indicated, check transmitter high-voltage fuse on power junction box J-68/ARC-3. If motor stops but no power output is obtained, as shown in lamps of phantom antenna TS-78/U, it will be necessary to check crystal unit and vacuum tubes. All tubes except the JAN-832-A may be replaced without realigning the set. Instructions for an alignment check after replacing a JAN-832-A tube are printed on the inside of the transmitter cover.

f. Check modulation of transmitter by noting an increase in brightness of lamps in phantom antenna TS-78/U when microphone is spoken into.

g. The readings as observed on test unit TS-178/ARM-1 should be within the following limits when push-to-talk button is depressed.

POSITION	LIMITS
Osc	More than 20
1	More than 25
2	More than 25
3	More than 25
4 Trans.	40 to 85

If readings on positions 1, 2, 3, and 4 Trans. are not within these limits, a change of tubes or realignment is indicated. Check to make sure power source is between 27 and 29 volts before replacing tubes or attempting to realign the set. A reading of 54 to 58 on the "A+" scale of test unit TS-178/ARM-1 indicates a satisfactory voltage.

h. Check channels B, C, and D. Check meter readings in positions indicated in procedure g. Check for power output on the remaining five channels. The antenna loading is adjusted at the factory for an average value that will give the best results regardless of the frequency used. This antenna loading adjustment should not be changed.

i. Remove test crystals and insert proper crystals for installation.

Note

Absence of power output on one or two channels is usually caused by defective crystal units or dirty relay contacts. The phantom antenna TS-78/U indicates only relative power output at a particular frequency. More or less light, as indicated by lamps of this phantom antenna, on another frequency does not necessarily mean a change in power output.

8-15. TESTING R-77A/ARC-3 RADIO RECEIVER. To test receiver, proceed as follows:

Note

When lid of receiver is removed, switch S-203 must be depressed during channel selection, to secure proper operation. Hold switch until tuning motor stops running.

a. Connect test unit TS-178/ARM-1 to socket PL-152, which is located under cover on right side of receiver, and set at "A+" position. Connect headphones to their proper receptacle.

b. Insert crystal units and set receiver thumbwheels on channels listed.

CHANNEL	CRYSTAL FREQUENCY	THUMBWHEEL
A	8200.00 kc	135.00
B	8155.71 kc	126.18
C	8392.00 kc	137.88
D	8423.08 kc	121.50
G	8320.00 kc	136.80
H	8140.00 kc	134.10

c. Set channels E and F on frequencies that will be used in airplane.

d. Select channel A on control panel C-404A/A. If motor does not stop in about one minute, turn switch of test unit TS-178/ARM-1 to "B" position. If no voltage is indicated, check transmitter high-voltage fuse on power junction box J-68/ARC-3. The frequency indicating dial at the extreme right of the receiver should stop at 135.00 megacycles plus or minus one percent. If the word "END" appears, select channel B and immediately return to channel A. Switch S-203 must be depressed during shifting operations. If the word "END" appears this time, the crystal unit and tubes should be checked. It is not necessary to make any alignment adjustments after replacing any of the receiver tubes.

e. The meter reading in switch position 1 of test unit TS-178/ARM-1 on channel A should be between 40 and 60.

f. Select channel B. Meter position 1 should read more than 8, and position 3 more than 25.

g. Select channel C. Meter position 1 should read more than 8, and position 2 more than 5.

h. Select channel D. Meter position 3 should read more than 30.

i. Remove test unit TS-178/ARM-1 and replace receiver cover. Check to see that squelch is full off.

j. Check intermediate frequency and audio stages by listening in phones for a hiss, which indicates that receiver is operating. The antenna connection may be tapped gently with a metallic object. A click should be heard in headset, indicating proper operation of receiver.

k. Check remaining four channels to make sure receiver tunes to frequency determined by crystal unit and proper setting of thumbwheel.

Note

If signal generator I-130A (part of test equipment IE-19A) is available, it can be used to compare a questionable receiver with one known to be in good operating condition. Crystal control of this signal generator, using a transmitter crystal, should be used. Entirely acceptable receivers may have a variation in sensitivity for a given frequency of 3 to 1 from receiver to receiver. This fact should be kept in mind to avoid rejecting usable receivers.

l. When questionable, burnish relay contacts with tool provided in radio test set AN/ARM-1. Never burnish relay contacts with an abrasive tool such as a file.

8-16. AN/ARC-33 COMMAND SET (F-86F-20 AIRPLANES).

8-17. The AN/ARC-33 uhf radio set (figure 8-2) is a remote-controlled receiver-transmitter designed to operate in the 225- to 399.9-megacycle band. A total of 1750 crystal-controlled receiving and transmitting channels are available and spaced in increments of 100 kilocycles within the tuning range of the set. Any 20 of these channels may be preset at the radio set control unit so as to be quickly available when desired. A guard channel receiver is included in the set to allow constant monitoring of the guard frequency when the "MAIN-BOTH-G-REL" switch is in the "BOTH" position. Operating range is essentially line-of-sight, with a practical maximum of 75 miles. The equipment operates from a dynamotor power supply, which operates from the 28-volt d-c power supply. Under receiving conditions, the receiver and transmitter will consume 12.5 to 15.5 amperes, respectively.

8-18. REMOVING RT-173/ARC-33 RECEIVER-TRANSMITTER. The RT-173/ARC-33 receiver-transmitter is removed in the same manner as the T-67/ARC-3 transmitter and R-77A/ARC-3 receiver. (Refer to paragraph 8-10.)

8-19. INSTALLING RT-173/ARC-33 RECEIVER-TRANSMITTER. Refer to paragraph 8-11.

8-20. OPERATIONAL CHECK OF RECEIVER SECTION OF AN/ARC-33 COMMAND SET. To check receiver section of AN/ARC-33 command equipment, proceed as follows:

a. Connect headset to headset plug.

b. Turn equipment on and wait one minute for equipment to warm up.

c. From console control panel, select channel 1 and place "MAIN-BOTH-G-REL" switch to "MAIN" position. When no signals are heard, a hiss that is characteristic of the receiver thermal noise should be heard if receiver is operating properly. In some cases it may be necessary to operate the squelch button. Make this check on each assigned channel.

d. Place "MAIN-BOTH-G-REL" switch to "G" position, and carry out the same test outlined in procedure c.

e. With engine operating at cruising speed, listen in on an assigned frequency. At the same time, adjust audio level control for a comfortable audio level with volume control on console control panel set at mid-position.

f. Adjust squelch control on receiver-transmitter unit to the point where average noise level of receiver does

not open squelch but where an incoming signal just slightly above noise level will open squelch.

Note

Occasional bursts of noise, caused by short openings of the squelch, are not considered objectionable.

g. Place "MAIN-BOTH-G-REL" switch on "G." Adjust "GUARD RF GAIN" control on receiver-transmitter until headset volume is about the same as volume on main receiver channels.

8-21. OPERATIONAL CHECK OF TRANSMITTER SECTION OF AN/ARC-33 COMMAND SET. Check out transmitter section of AN/ARC-33 command set in the following manner:

a. Turn equipment on and allow at least one minute for tube filaments to heat up.

b. Connect ME-11/U or TS-118/AP r-f wattmeter to the antenna connection through approximately 5 feet of RG-8/U cable.

c. Energize "MIC" switch after selection of each pretuned channel. The setup tone must be heard during channel changing.

d. Disconnect wattmeter from antenna connection, and connect regular antenna lead-in coaxial cable. Check operation of channel 5 with control tower on both "VOICE" and "TONE."

e. Turn equipment off.

8-22. AN/ARC-27 COMMAND SET (F-86F-25 AND SUBSEQUENT AIRPLANES).

8-23. The AN/ARC-27 command set (figure 8-3) is airborne uhf receiver-transmitter equipment designed to provide communication in the frequency range of 225 to 400 megacycles. The equipment is capable of covering 1750 frequency channels, of which 18 separate pretuned channels can be selected by remote control. The equipment transmits and receives on the same frequency and consists of a receiver-transmitter (RT-178/ARC-27) mounted on the access door between the spent-ammunition compartments, a control panel (C-628/ARC-27) on the right radio console, a control box on the right side of the radio equipment compartment aft of the pilot's seat, and an antenna installed in the vertical stabilizer tip. Under the following conditions, the equipment consumes the following d-c power:

Receiving	16.5 amperes
Transmitting	19.1 amperes
Channel switches	25.5 amperes
Starting surges	Up to 80 amperes

The equipment is protected by a 25-ampere circuit breaker on the right circuit-breaker panel. The receiver-transmitter is enclosed in a pressurized aluminum case. The case should be pressurized with clean, dry air to a pressure of 3 to 5 psi.

8-24. REMOVING RT-178/ARC-27 RECEIVER-TRANSMITTER. This equipment is removed in the same manner as the T-67/ARC-3 transmitter and R-77A/ARC-3 receiver. (Refer to paragraph 8-10.)

8-25. INSTALLING RT-178/ARC-27 RECEIVER-TRANSMITTER. Refer to paragraph 8-11.

8-26. OPERATIONAL CHECK OF AN/ARC-27 COMMAND SET. To operate the AN/ARC-27 command set, proceed as follows:

a. Turn battery-starter switch to "BATTERY" or connect an external source of power to airplane.

b. Insert headset and microphone into respective jacks.

c. Place "LOCAL-REMOTE" switch, on C-626/ARC-27 control box, in "LOCAL" position.

d. Place "TONE-VOICE" switch on C-626/ARC-27 control box to "VOICE" position.

CAUTION

After turning set on, wait at least 10 seconds before turning set off. After turning set off, wait approximately 15 seconds for dynamotor to stop before turning set on again. If these time limits are not observed, the fuse that protects the starting relay will "blow," necessitating equipment removal.

e. Place "GUARD-BOTH-COMD-T/R" switch on C-626/ARC-27 control box in "BOTH" position and "LOCAL CHANNEL SELECTOR" switch in position "M."

eA. Place "OFF-ON" switch on C-626/ARC-27 control box to "ON" position. Allow one minute warm-up period.

f. Rotate the three dials on C-626/ARC-27 control box to any desired frequency. The guard channel receiver will begin to operate, and reception will be provided simultaneously by the guard and main receivers. Transmission, however, is on the main receiver frequency only.

g. Place "GUARD-BOTH-COMD-T/R" switch in "COMD-T/R" position. Transmission and reception will be on the main receiver only.

h. Place "GUARD-BOTH-COMD-T/R" switch in "GUARD" position.

i. Place "LOCAL-REMOTE' switch, on C-626/ARC-27 control box, in "REMOTE" position. The equipment

will then be controllable from the C-628/ARC-27 control panel on the right control panel in cockpit.

Note

The equipment can be controlled from the C-628/ARC-27 control panel only when the "LOCAL-REMOTE" switch on the C-626/ARC-27 control box is placed in the "REMOTE" position.

j. Place channel selector switch in any one of the 18 pretuned frequencies.

k. Place function selector switch on C-628/ARC-27 control panel to "T/R" position. Transmission and reception will be on main receiver only.

kA. Place function selector switch on C-628/ARC-27 control panel to "TR + G REC" position. Reception will be available on both guard and main receivers. Transmission, however, is on the main receiver frequency only.

l. To transmit on any of the selected frequencies, press throttle "MIC" switch.

8-27. TESTING AN/ARC-27 COMMAND SET RECEIVER SECTION. To test receiver section, proceed as follows:

a. Connect a headset to headphone jack.

b. On C-626/ARC-27 control box, safety switches in the following positions: "ON-OFF" switch to "ON," "LOCAL-REMOTE" switch to "REMOTE," and "TONE-VOICE" switch to "VOICE."

c. Turn equipment on from cockpit control panel (C-628/ARC-27) and wait one minute for equipment to warm up.

d. From cockpit, set channel selector to channel "1" and "GUARD-BOTH-COMD-T/R" switch to "GUARD" position. If no signals are heard, a hissing sound characteristic of thermal noise should exist. If necessary, set

"SENS" controls in receiver to maximum to override squelch systems.

e. Make test outlined in step d. on each of the pretuned channels, with "GUARD-BOTH-COND-T/R" switch in "BOTH" and then "COMD-T/R" position.

8-28. TESTING AN/ARC-27 COMMAND SET TRANSMITTER SECTION. To test transmitter section, proceed as follows:

a. Connect a wattmeter (TS-118/AP) to "ANTENNA" receptacle on receiver-transmitter front panel.

aA. Connect a headset and microphone to jacks on front panel of receiver-transmitter.

aB. On C-626/ARC-27 control box, place "LOCAL-REMOTE" switch on "LOCAL," "GUARD-BOTH-COMD-T/R" switch on "COMD-T/R," and "ON-OFF" switch at "ON."

b. Operate transmitter on each pretuned channel frequency. The meter should indicate a minimum output of 10 watts.

c. If wattmeter indicates below minimum output requirement, connect a meter (TS-80U or ME-29U) to meter jack on receiver-transmitter front panel. Approximate location of trouble can be determined from meter readings obtained in each "METER" switch position.

d. Place channel selector switch to channels 1, 10, and 18. Observe meter readings with transmitter operating. Test meter readings should not be expected to read exactly as indicated in the chart, since many variable units in the equipment can affect these readings. Approximate meter readings for normal transmitter operation are as follows:

METER SW POSITION	MULTIPLIER	APPROX METER READINGS	APPROX VALUE
"EIN"	50 volts	0.54—0.56	27.5 volts
"IB" (guard off)	1000 ma	0.56—0.66	560—660 ma
"MOD" 1_k (Unmodulated)	200 ma	Not less than 0.25	Not less than 50 ma
(Modulated)	200 ma	Not less than 0.50	Not less than 100 ma
"DRIVER 1G"	50 ma	0.30—0.90	15—45 ma
"FINAL 1G"	50 ma	0.40—1.00	20—50 ma
"1 ANT"	25 watts	Not less than 0.30	10—25 watts

e. Check air pressure in transmitter-receiver case. Pressure should be 3 to 5 psi. If pressure is low, use an MK-20A/UP pressurizing unit or equivalent to obtain required pressure.

8-29. ADJUSTING SENSITIVITY OF AN/ARC-27 COMMAND SET RECEIVER SECTION. Adjust receiver sensitivity in the following manner:

a. Start engine.

b. Turn "SENS" adjustment control, on receiver-transmitter front panel, to a position where background noise just cuts off.

c. After adjustment, stop engine.

8-30. AN/ARN-6 RADIO COMPASS.

8-31. The AN/ARN-6 radio compass is an air-borne, automatic navigational instrument that indicates the direction of any desired transmitting station when the radio compass is set for compass operation. The receiver, in the radio compartment aft of the cockpit, covers four frequency bands: band one, 100 to 200 kilocycles; band two, 200 to 410 kilocycles; band three, 410 to 850 kilocycles; and band four, 850 to 1750 kilocycles. Primary power is supplied by the electrical system of the airplane, whereas a vibrator and filter circuit within the compass receiver supplies the high voltage to the receiver. The compass loop is installed in the aft portion of the canopy, and is automatic in its operation. The CG-555/APN-6 and CG-556/ARN-6 compass loop cables connect the loop antenna to the compass receiver when the canopy is in the forward position. This is accomplished through the contacts of two junction boxes, one mounted on the canopy beam and the other located on the canopy deck. The spring-loaded brushes on the canopy junction box make sliding contact with three mating contacts on the canopy deck junction box. These contacts maintain positive connection between loop antenna and compass receiver, even when the canopy is opened approximately 2⅜ inches. The sense antenna is attached inside the top portion of the canopy. A radio compass indicator is installed on the instrument panel. Controls are on the right radio console. The circuit breaker for the system is installed on the left circuit-breaker panel.

8-32. REMOVING R-101A/ARN-6 RECEIVER. When removing R-101A/ARN-6 receiver from airplane, proceed as follows:

a. Remove radio access door on left side and aft of pilot's compartment.

b. Disconnect cables from junction box J-68/ARC-3 and remove junction box from mounting.

c. Remove junction box mounting bracket MT-236C/ARC-3.

d. Remove D-2 converter.

e. Remove RT-82/APX-6 receiver-transmitter, after disconnecting control cables. (Refer to paragraph 8-45.)

f. Disconnect receiver tuning shaft, antenna transmission line, ground, and loop cable connector plugs.

g. Loosen locking knobs on mount MT-274A/ARN-6.

h. Remove receiver R-101A/ARN-6 by pulling it outboard toward access door until pins in mounting rack clear receiver, then tipping receiver and sliding it aft and out access door.

8-33. INSTALLING R-101A/ARN-6 RECEIVER. Install R-101A/ARN-6 receiver in the following manner:

a. Position receiver on mounting rack slightly outboard; then slide receiver inboard to engage pins on

mounting rack with corresponding holes at rear of receiver chassis.

b. Tighten locking knobs on mount MT-274A/ARN-6.

c. Connect receiver tuning shaft, antenna transmission line, ground, and loop cable connector plugs.

d. Install RT-82/APX-6 receiver-transmitter, and connect associated control cables. (Refer to paragraph 8-46.)

e. Replace D-2 converter plug.

f. Install junction box mounting bracket MT-236C/ARC-3.

g. Install junction box J-68/ARC-3 and connect associated cables.

h. Install radio access door.

8-34. OPERATIONAL CHECK OF AN/ARN-6 RADIO COMPASS. To check out system, proceed as follows:

a. Connect an external source of power to airplane or turn battery-starter switch to "BATTERY."

b. Turn function selector switch on control panel to "COMP."

c. Using headset, check operation of volume control to see that it properly controls headset volume.

d. While listening, jar radio compass receiver to check possible noise or intermittent reception.

e. Place function selector switch in "ANT" position and check operation of equipment on all four bands. Switch "CW VOICE" switch to "CW," and check operation of beat frequency oscillator.

f. Switch to "LOOP" and check reception on all bands. Check operation of "LOOP L-R" switch. The direction and speed of loop rotation, as indicated by the indicator pointers, are controlled by the direction and amount, respectively, of "LOOP L-R" switch rotation.

g. Park airplane in an area at least 200 feet away from metallic frame buildings, hills, power lines, railroads, or other large electrically conductive objects. Swing heading of airplane so that it points exactly toward a transmitting station. Turn function selector switch to "COMP," and tune equipment to this station. The indicator pointer should swing to the zero index within 2 degrees.

Note

The accuracy of this zero heading will depend upon the following:

- The accuracy with which fore-and-aft line of airplane was aligned with direction of transmitting station.
- The accuracy with which loop mounting base was aligned with fore-and-aft line of airplane.
- The amount of distortion in direction of arrival of radio waves caused by unsymmetrical location of loop in relation to physical make-up of the airplane and accessories. If an error of less than 5 degrees is detected, it can be corrected when radio compass quadrantal error correction is made to the compensator.

8-35. REMOVING MT-274A/ARN-6 RADIO COMPASS MOUNT. Remove the radio compass mount in the following manner:

a. Remove R-101A/ARN-6 receiver. (Refer to paragraph 8-32.)

b. Remove the four check nuts and lock washers from shock mount studs. Retain nuts and washers for reinstallation of tray.

c. Lift off tray; then remove shock mount assemblies if desired.

8-36. INSTALLING MT-274A/ARN-6 RADIO COMPASS MOUNT. Install the radio compass mount as follows:

a. Install shock mount assemblies.

b. Place tray on shock mount studs and install lock washers and check nuts.

c. Install R-101A/ARN-6 receiver. (Refer to paragraph 8-33.)

8-37. AN/ARN-14 RADIO COMPASS.

8-38. Space provisions only have been made for installation of AN/ARN-14 equipment, which replaces the AN/ARN-6 equipment.

8-39. ANTENNA SYSTEM.

8-40. The antenna system consists of five antennas installed as follows: the command set antenna installed in the vertical stabilizer tip; AN/APX-6 receiver-transmitter antenna on the underside of the fuselage; radio compass sense antenna on the inside top of the canopy; radio compass loop aft of the pilot's seat inside the canopy; and radar ranging antenna in the forward section of the airplane. All antennas are enclosed within the fuselage.

CAUTION

If the airplane is painted, finish the plastic area of the vertical stabilizer tip with paint conforming to Specification MIL-L-7178.

8-41. RADAR EQUIPMENT.

8-42. The radar equipment (figure 8-4) consists of the following:

Note

AN/APX-6 IFF equipment is shown installed in figures 8-1 through 8-3. The A-1CM and A-4 sights, associated with the AN/APG-30 radar set, are covered in paragraphs 9-192 through 9-286.

EQUIPMENT	FUNCTION
AN/APX-6 IFF RADAR	
Receiver-transmitter (RT-82/APX-6)	Aircraft identification.
Control panels (C-629/APX-6)	
Antenna (AT-234/APX)	
Inertia switch (SA-3/A)*	
Mount assembly (161-74045)	
Radar unsafe light and fuse panel (161-74049)†	
AN/APG-30 RADAR	
Receiver-transmitter (RT-181/APG-30)	Ranging.
Range power supply (PP-493/APG-30)	
Horn antenna (AT-223/APG-30)	
Voltage regulator (CN-112/APG-30)	
Voltage test box (151-74081)	

***F-86F-1 through F-86F-30 Airplanes**
†Radar unsafe light installed on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13480, and F-86F-30 Airplanes AF52-4305 through -4804 only

8-43. AN/APX-6 IFF RADAR.

8-44. AN/APX-6 IFF equipment is installed in the radio compartment aft of the cockpit. This equipment operates in conjunction with an inertia (detonator) switch installed on F-86F-1 through F-86F-30 Airplanes. This transpondor equipment identifies the airplane in which it is installed, when the airplane is correctly challenged by an interrogator-respondor associated with shore, shipboard, or air-borne radar equipment. The AN/APX-6 equipment receives challenges initiated by an interrogator-respondor and transmits replies back to the interrogator-respondor, where they are displayed on the radar indicators. When a radar target is accompanied by proper IFF reply, that target is considered friendly. The antenna (AT-234/APX) is located on the underside of the fuselage at station 152 on the centerline. The receiver-transmitter is equipped with three MK 2 Mod 0 destructors. These small explosive containers serve to destroy the vital parts of the unit, either when the IFF destructor switch on the console panel is "ON" or when the inertia switch is closed on impact. Two destructor unsafe lights are mounted below the receiver-transmitter on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13480, and F-86F-30 Airplanes AF52-4305 through -4804. These warning lights are wired in the destructor circuit and light whenever the inertia switch is closed. Destructors will explode if they are installed when the unsafe lights are lit.

8-45. REMOVING RT-82/APX-6 RECEIVER-TRANSMITTER. Remove the RT-82/APX-6 receiver-transmitter in the following manner:

a. Remove aft radio equipment access door on left side of fuselage. Remove power junction box J-68/ARC-3 and its mount, or remove channel selector and supporting brackets.

b. Remove a-c three-phase power supply sight converter assembly.

c. Disconnect cables from IFF receiver-transmitter.

d. Stow all radio cables and bundles out of the way.

e. Remove MK 2 Mod 0 destructors before removing receiver-transmitter.

f. Loosen knurled retaining nuts on mounting rack so that receiver-transmitter is free to slide from rack.

g. Slide unit forward and off rack; then tilt unit inboard to face-up position and draw unit outboard, rotating it where necessary to miss any obstructions.

h. Remove unit through access door.

8-46. INSTALLING RT-82/APX-6 RECEIVER-TRANSMITTER. Install receiver-transmitter in the following manner:

a. Before installing receiver-transmitter, check continuity of destructor circuit in receiver-transmitter. First, make sure that all three destructors are removed. Then, with an ohmmeter, check for continuity between center contact of "DESTRUCT" jack J-405 and center contacts of each of the three destructor receptacles. Check also that ohmmeter shows infinity between center contact of each destructor receptacle and ground.

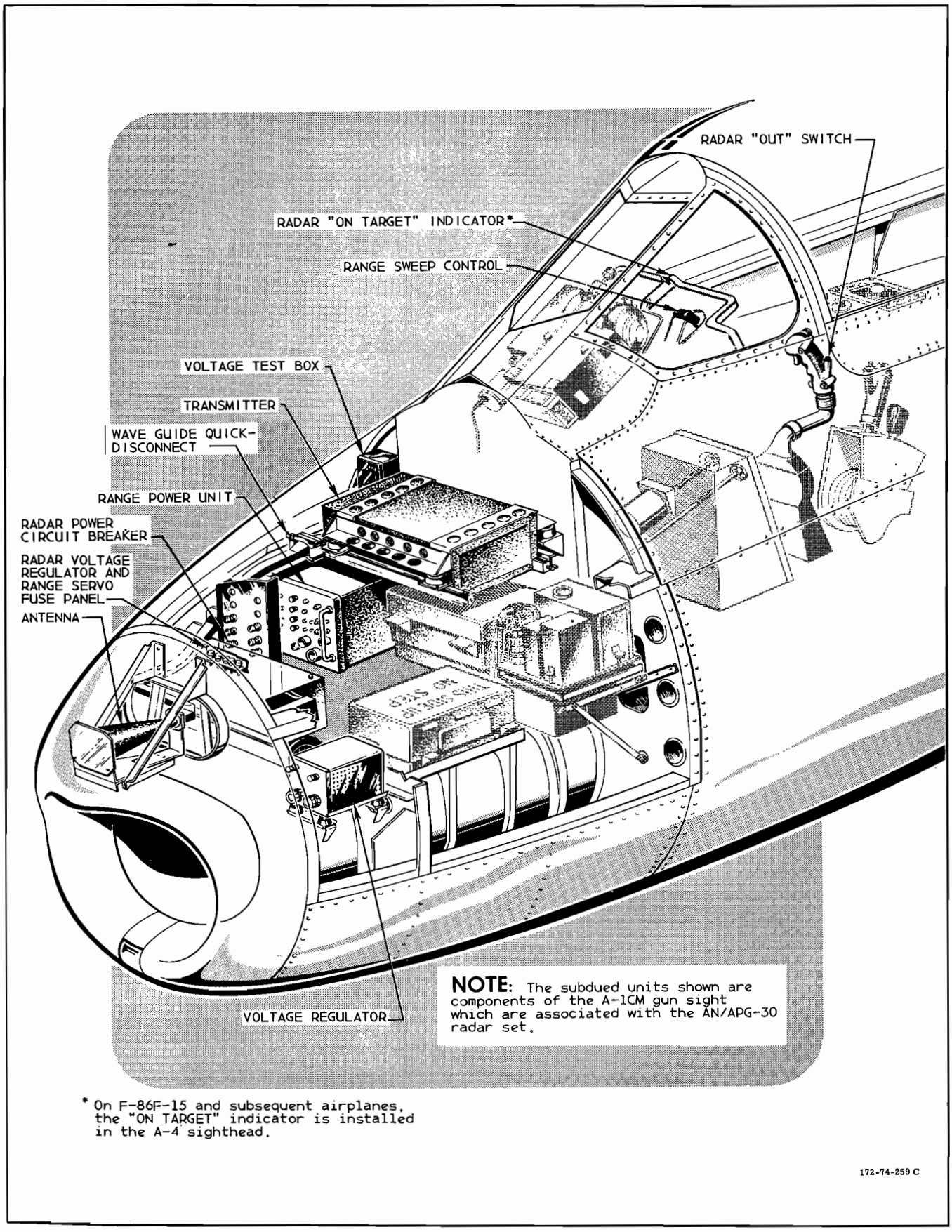

Figure 8-4. AN/APG-30 Radar System

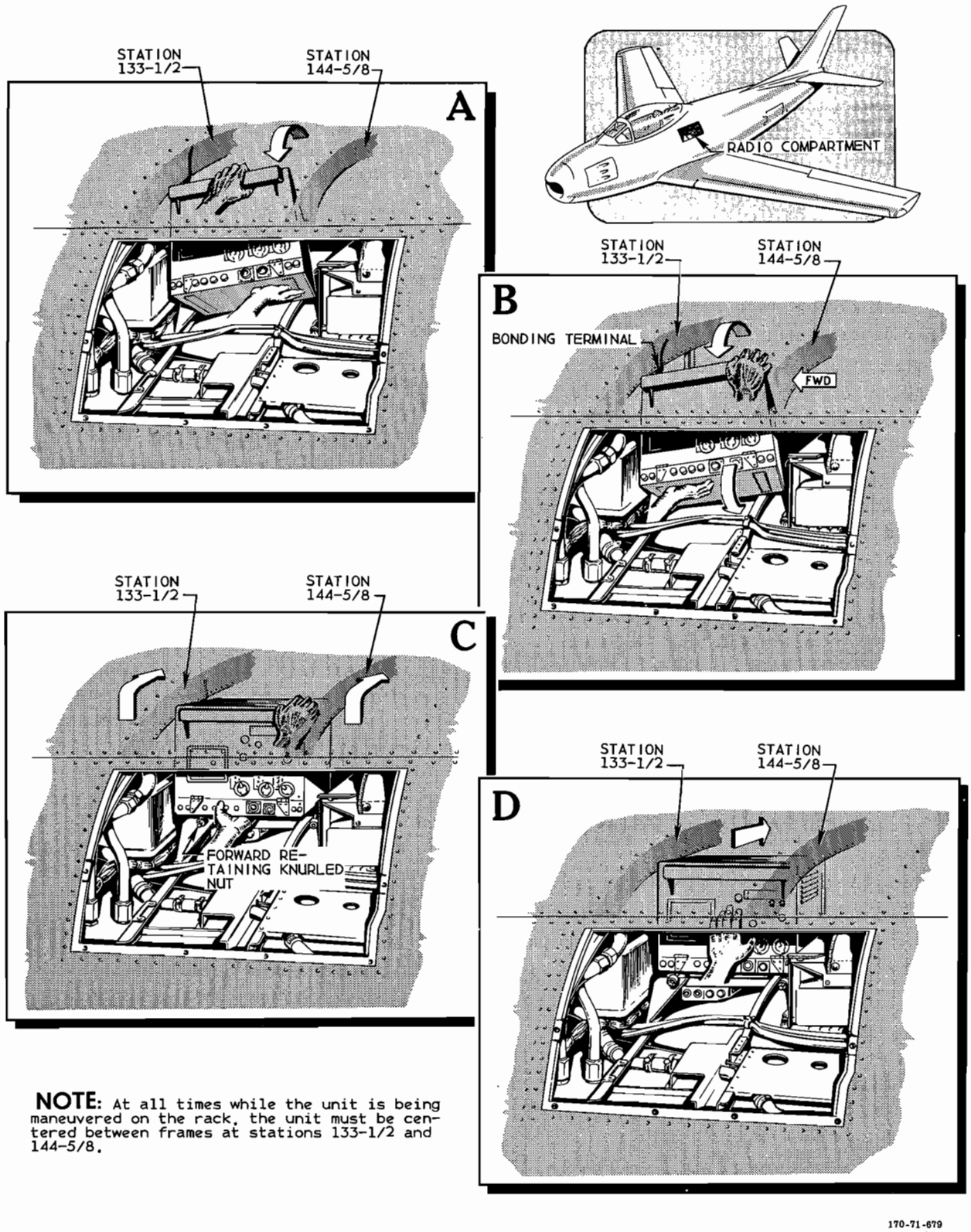

Figure 8-5. Installing RT-82/APX-6 Receiver-Transmitter

aA. Make sure all loose cables and wire bundles are clear of area where IFF unit must travel.

b. Screw out forward knurled retaining nut half the distance on screw.

bA. Inspect receiver-transmitter to ensure that all dust covers, wrap-around, and front panel are secure. These covers, if secure, contain the explosion of the destructors within the receiver-transmitter.

c. With unit in face-up position, slide it through access door onto mounting rack.

d. Draw unit outboard, forward, and off rack; then drop forward outboard end of unit slightly, so that upper aft corner of unit is forward of frame at station 144⅝. (See figure 8-5, detail A.)

e. Rotate unit so that upper forward corner of unit is forward and outboard of bonding terminal on frame at station 133½, and upper aft corner is still forward of frame station 144⅝. (See figure 8-5, detail B.)

f. With left hand under forward end of unit and right hand on upper end of unit, rotate unit to upright position and push lower edge of unit inboard, until it rests on forward knurled retaining nut on mounting rack. (See figure 8-5, detail C.)

g. Place both hands on face of unit and push unit onto rack over knurled nut. (See figure 8-5, detail D.)

Note

At all times while the unit is being maneuvered on the rack, the unit must remain centered between frames at stations 133½ and 144⅝.

h. Secure unit to mounting rack with knurled retaining nuts.

hA. Check destructor circuit. (Refer to paragraph 8-47.)

i. Install MK 2 Mod 0 destructors. (Refer to paragraph 8-48.)

Note

When the equipment is operated without the destructors, dummy plugs should be inserted in the destructor receptacles. These plugs shield the receiver-transmitter against the effects of radio interference or radiation.

j. Connect cables to receiver-transmitter.

k. Install a-c three-phase power supply sight converter assembly.

l. Install power junction box J-86/ARC-3 and its mount.

m. Replace and secure radio equipment access door.

8-47. CHECKING IFF DESTRUCTOR SYSTEM. To check out the IFF destructor system, proceed as follows:

CAUTION

Destructors will be fired if the IFF destructor switch is turned "ON" or the impact switch is tripped, regardless of the setting of the IFF master control selector.

a. Place the master switch on the IFF control panel in "OFF." The destructor firing circuit is independent of the rest of the radar circuit, but the master switch should be off when the radar is not in use.

b. Disconnect destructor circuit cable and plug P-405 from "DESTRUCT" jack on receiver-transmitter.

c. Remove the three destructors from destructor receptacles.

WARNING

The three destructor receptacles are wired in parallel. Therefore, if a single destructor is left in place, it will explode when voltage is applied to the firing circuit. All three destructors must be removed.

d. Raise IFF destructor switch guard on control console and place switch in "ON" position.

e. Using a suitable d-c voltmeter, measure voltage on center contact of plug P-405. This voltage should be within 0.5 volt of d-c supply voltage.

f. Place IFF destructor switch in "OFF" position.

g. Safety-wire IFF destructor switch guard in down position, using breakable safety wire.

h. Measure voltage on center contact of plug P-405. Voltage indication should be *zero*. Be sure that voltmeter test probe is making contact and that successively lower scales on voltmeter are used until lowest possible scale is used.

i. Connect destructor circuit cable and plug P-405 to "DESTRUCT" jack on receiver-transmitter.

j. Remove plastic cap on impact switch SA-3/A. (The impact switch is installed on F-86F-1 through F-86F-30 Airplanes only.)

k. Displace pendulum arm until a sharp snap is heard.

l. Measure voltage on center contact of destructor sockets. This voltage should be within .5 volt of d-c supply voltage.

m. Reset impact switch.

n. Measure voltage on center contact of destructor sockets. This voltage indication should be *zero*. Use successively more sensitive voltmeter ranges to be positive that no voltage is present.

o. Install and safety-wire plastic cap on impact switch.

p. Test impact switch for resistance to minor jars and vibration by slapping side of switch with hand.

q. Measure voltage on center contact of destructor sockets. Voltage indication will be *zero* if the impact switch did not trip. If voltage is present, refer to applicable Technical Orders for proper adjustment of impact switch SA-3/A and make adjustment.

8-48. INSTALLING MK 2 MOD 0 DESTRUCTORS. With IFF destructor switch in "OFF" position, plug P-405 disconnected from jack J-405, and destructor system checked out in accordance with paragraph 8-47, install destructors as follows:

Note

Destructors are installed just prior to take-off. If flight is canceled, remove destructors and return them to storage magazine.

a. Carry destructors to airplane in suitable closed metal box. Be careful not to expose destructors to high-intensity radio-frequency fields that are encountered around radar equipment.

b. Remove plastic dummy plugs from the three destructor receptacles.

c. Insert and screw a destructor into each receptacle.

CAUTION

It is mandatory that plug P-405 be disconnected from jack J-405 when destructors are being installed.

d. Be sure IFF destructor switch guard is in "OFF" position and secured with safety wire (breakable wire).

e. Check plug P-405, as instructed in paragraph 8-47, to be sure there is no voltage present before connecting plug P-405 to jack J-405.

f. Connect plug P-405 to jack J-405 designated "DESTRUCT."

8-49. AN/APG-30 RADAR.

8-50. The AN/APG-30 radar set is an air-borne, automatic, range-determining device for use with the A-1CM or A-4 gun-bomb-rocket sight. Two sources of power are required to operate the set: 110- to 120-volt, 400-cycle alternating current; and 24- to 28-volt direct current. The circuit breaker for the system is on the left circuit-breaker panel. All units installed in the radar nose compartment are easily accessible when the radar access door is removed. The components of the AN/APG-30 radar set are illustrated in figures 8-4 and 8-6. Use extreme caution when working on radar equipment because of the presence of high voltages in some circuits. Do not apply 115-volt alternating current for more than 5 minutes unless the internal blowers are running.

WARNING

Tubes V-105 (1B24A) and V-106 (1B35), used in the RT-181/APG-30 transmitter-receiver, may be sufficiently radioactive to be dangerous. These tubes should be removed and replaced with extreme caution to avoid breakage. In event of accidental breakage, the immediate area should be regarded as dangerous because of the possibility of inhaling radioactive gas. Do not handle glass particles or tube elements. In the event of tube breakage, the area should be cleared and decontamination procedures should be initiated.

8-51. OPERATIONAL CHECK OF AN/APG-30 RADAR. To check out AN/APG-30 radar set, proceed as follows:

a. Connect 28-volt d-c power to external power receptacle of airplane.

b. Place gun safety switch in "SIGHT CAMERA RADAR" and sight selector switch in "GUN" position. Both switches are on the center pedestal in the cockpit. Mechanically uncage sight.

c. Check for proper voltage at test box in nose radar bay. Voltage at 115-volt, a-c, one-phase jack should be 115 (±2.5) volts. Voltage at 28-volt d-c jack should be 27 (±3) volts.

d. About 4 minutes after the gun safety switch is placed in "SIGHT CAMERA RADAR," the radar will begin to feed range information to the sight system. Momentarily depress the radar-out button on the stick grip a number of times. The radar should range out on ground targets as indicated by the sight head range dial. The on-target indicator lamp should light when the radar locks on a target.

e. Place gun safety switch in "OFF" position. With a section of CG-801/U flexible wave guide as coupling, attach a TS-108/AP dummy load to directional coupler.

f. Return gun safety switch to "SIGHT CAMERA RADAR." Check that on-target light is off. The sight head range dial should read a clamp range of about 1200 feet. If on-target lamp is lit, adjust "LOCK-ON SENSITIVITY" control on power supply-range computer. (Refer to paragraph 8-51A.)

g. Place gun safety switch in "OFF." Remove dummy load and reconnect radar antenna.

h. Pressurize radar transmitter to 5 psi above atmospheric immediately before flight with MK-20/UP pressurizing kit.

i. Place gun safety switch in "SIGHT CAMERA RADAR." After 15 minutes of operation, check crystal currents at "PRE AMP" jack on frequency converter-transmitter and at "AFC XTAL CUR" jack on power supply-range computer. The milliammeters should indicate from 0.4 to 0.7 milliamperes. If the crystal currents fall outside these limits, adjust "AFC ADJ" potentiometer on power supply-range computer. (Refer to paragraph 8-51B.)

j. Turn gun safety switch "OFF," and remove external power.

8-51A. ADJUSTING "LOCK-ON SENSITIVITY" POTENTIOMETER. To adjust "LOCK-ON SENSITIVITY" potentiometer on the power supply-range computer, proceed as follows:

a. Disconnect flexible wave guide from directional coupler on frequency converter-transmitter. Attach a TS-108/AP dummy load to directional coupler. Use a section of CG-801/U flexible wave guide as a coupler.

Note

A very slight dent in the flexible wave guide will create false signals and an improper "LOCK-ON SENSITIVITY" setting. Inspect the wave guide thoroughly for dents and broken coils.

b. Connect 28-volt d-c power to external power receptacle of airplane.

c. Place gun safety switch in "SIGHT CAMERA RADAR."

d. Turn "LOCK-ON SENSITIVITY" potentiometer full clockwise. When radar times in, on-target lamp should light.

e. Slowly turn "LOCK-ON SENSITIVITY" potentiometer counterclockwise until on-target lamp just begins to flash.

f. Turn "LOCK-ON SENSITIVITY" potentiometer exactly one-quarter turn farther counterclockwise. This is the proper setting of the potentiometer.

g. Turn gun safety switch "OFF," disconnect external power, and disconnect dummy load.

h. Carefully inspect wave guide in airplane for damage, and then connect it to directional coupler.

8-51B. ADJUSTING "AFC ADJ" POTENTIOMETER. To adjust "AFC ADJ" potentiometer on power supply-range computer, proceed as follows:

a. Pressurize frequency converter-transmitter to 5 psi with dry air.

b. Connect milliammeters to jacks marked "PRE AMP" and "AFX XTAL CUR" on transmitter and range power supply.

c. Connect 28-volt d-c power to external power receptacle on airplane. Turn gun safety switch to "SIGHT CAMERA RADAR."

d. After radar has timed in, slowly turn "AFC ADJ" potentiometer clockwise while continuously switching "AFC MAN" switch between "AFC" and "MAN."

e. Carefully note exact position of "AFC ADJ" potentiometer when AFC dropout occurs. If dropout does not occur, note clockwise limit of "AFC ADJ" potentiometer. Mark position of "AFC ADJ" slot with pencil.

f. Slowly rotate "AFC ADJ" potentiometer counterclockwise while continuously switching between "AFC" and "MAN" positions.

g. Carefully note exact position of "AFC ADJ" when dropout occurs. If dropout does not occur, note counterclockwise limit of "AFC ADJ" potentiometer. Mark position of "AFC ADJ" slot with pencil.

h. The two pencil marks should be about one-half turn apart. Turn the "AFC ADJ" potentiometer so that it is *exactly* midway between the two pencil marks.

Note

This setting is about one-quarter turn clockwise from the position found in steps f. and g.

i. Leave "AFC MAN" switch in "AFC," and remove pencil marks.

j. Turn gun safety switch "OFF," and disconnect external power.

8-51C. ADJUSTING "REP RATE" POTENTIOMETER.

Note

Adjust "REP RATE" potentiometer only when radar is used with A-4 sight and only as outlined in this paragraph.

A-4 sight reticle jitter can occur when the radar pulse repetition frequency is twice (within 2 or 3 cps) the a-c primary power frequency [400 (±10) cps]. Reticle jitter, when it can be corrected by changing the rep rate, is always accompanied by a corresponding jitter in the magnetron current. To correct reticle jitter, rotate the "REP RATE" potentiometer on the frequency converter-transmitter clockwise the width of the screwdriver slot. This adjustment increases the repetition frequency about 10 cps and has the same result as lowering the a-c primary power frequency 5 cps.

8-51D. ADJUSTING RANGE ZERO AND SLOPE CALIBRATION. The radar units are adjusted for range zero and slope calibration before installation in the airplane. When the radar is installed in the airplane and adjustment is required, the adjustments are made by adjusting the "ZERO SET" and "SLOPE" controls in the adapter unit of the range servo. Adjustment should be made when the range error indicated by the range servo dial is greater than ±25 yards between 250 yards and 1800 yards.

a. Connect adapter UG-591/U to wave-guide fitting on TS-696/UPM-11. Connect r-f cable CG-92/U to adapter and to r-f receptacle on directional coupler.

b. Connect a 28-volt d-c power source to external power receptacle on airplane, and turn gun safety switch to "SIGHT CAMERA RADAR."

c. Connect TS-696/UPM-11 to a 115-volt a-c power source, and turn "OFF ON" switch "ON." Allow 10 minutes for instrument to reach operating temperatures.

d. If attenuator assembly is connected to TS-696/UPM-11, turn attenuator full counterclockwise (minimum attenuation).

e. Set controls on TS-696/UPM-11 as follows:

CONTROL	POSITION
"METER SELECTOR"	"AFC XTAL-1"
"AFC MANUAL"	"AFC"
"LO COARSE TUNING"	Three turns clockwise from full counterclockwise
"SWEEP LEVEL"	Adjust for maximum crystal current.

Note

The "AFC" crystal current will be sweeping and should have an amplitude of about 0.5 milliamperes. If this reading was not obtained by the settings in step e., adjust "LO ATTEN" to obtain proper reading.

f. Adjust range calibrator for "AFC" lock-in, which is indicated by a steady reading on volt-milliammeter, by the following method: turn "LO COARSE TUNING" very slowly clockwise while keeping "AFC" crystal current near maximum with "SWEEP LEVEL" control. "AFC" lock-in will occur when "LO COARSE TUNING" is about 3 to 3½ turns clockwise from full counterclockwise position.

g. When "AFC" lock-in occurs, carefully adjust "LO COARSE TUNING" for maximum "AFC" crystal current, indicated on volt-milliammeter.

h. Adjust "LO ATTEN" for a reading of 0.8 milliamperes on crystal that gives highest meter reading (not necessarily "AFC XTAL-1").

i. Calculate absolute range of each range marker of range calibrator as shown in the following example:

A = Amplifier delay = 12 yd (stamped on front panel of TS-696/UPM-11).

B = R-F test cable = $\frac{1.5 \times \text{length in feet}}{3}$ = 3 yd (for 6 ft R-F cable)

C = Quartz crystal delay = 304 yd (stamped on crystal inside TS-696/UPM-11).

1st marker = A + B + C = 12 + 3 + 304 = 319 yd (957 ft)

2nd marker = A + B + (3 × C) = 12 + 3 + 912 = 927 yd (2781 ft)

3rd marker = A + B + (5 × C) = 12 + 3 + 1520 = 1535 yd (4605 ft)

4th marker = A + B + (7 × C) =12 + 3 + 2128 = 2143 yd (6429 ft)

Note

Once the range of each marker has been found, record the information on a card and attach the card to the TS-696/UPM-11. This simplifies the use of the range calibrator.

j. Depress radar-out button on control stick grip a sufficient number of times to cause range gate to lock on first range marker.

Note

- In some instances it may be impossible to lock on the first range marker because of the action of the dunking circuit. In this case, use the second range marker instead of the first to make the range zero adjustment, and use the third range marker instead of the second to make the range slope adjustment.
- Should repeated difficulty be experienced in locking on a range marker in or near the dunking area, the trouble may be caused by electromechanical malfunction of the waveguide attenuator "L-401" in the "UPM-11" calibrator.

k. Adjust "ZERO SET" on range servo adapter until range servo dial indicates range of first marker (or second range marker if first range marker could not be locked on).

l. Depress radar-out button on the stick grip to cause range gate to move out to second range marker.

m. Adjust "SLOPE" on range servo adapter until range servo dial indicates range of second marker (or third range marker if first marker could not be locked on in step j.).

n. Repeat steps j. through m. until range of the two markers can be read on range servo dial without requiring adjustment of either "ZERO SET" or "SLOPE" adjustment.

o. If third range marker occurs at a range of less than 6000 feet, depress radar-out button on stick grip to cause range gate to lock on third marker. If the range of the third marker and the servo dial indication differ more than ±30 feet, readjust "ZERO SET" and "SLOPE" adjustments in range servo to distribute the error. It is better to have a small error at three check points than to have a large error at one check point.

8-52. REMOVING RT-181/APG-30 RECEIVER-TRANSMITTER. Remove the RT-181/APG-30 transmitter as follows:

a. Remove battery power from radar units.

b. Disconnect flexible wave guide from wave-guide coupler located on receiver-transmitter.

c. Disconnect power, trigger, and i-f cables from transmitter.

d. Remove securing bolt from top of each of the four shock mounts, or remove aft Airlocs and forward shock mount screws. After these have been removed, lift entire mount assembly and receiver-transmitter out of its mounting area.

8-53. REMOVING PP-493/APG-30 POWER SUPPLY. Before the PP-493/APG-30 power supply can be removed, the RT-181/APG-30 receiver-transmitter must first be removed. Then proceed as follows:

a. Remove transmitter lateral support channel by removing the two bolts located at each end of support channel. Disconnect all cables from PP-493/APG-30 power supply.

b. Cut safety wires from the two wing nuts which secure power supply to mount.

c. Remove quick-disconnect plug from battery.

CAUTION

Make certain that the battery switch is "OFF" before removing the battery quick-disconnect plug.

The disconnected plug must be well insulated from the metallic structure of the airplane. Otherwise, on F-86F-1 Airplanes, a heavy short can result when 28-volt power is connected to the external power receptacle on the airplane, or when the generator system is ground-checked. On F-86F-5 and subsequent airplanes, a heavy short can result if the battery switch is on "BATTERY" when external power is connected or when the generator is ground-checked.

d. Disconnect battery sump lines at battery, and loosen battery tie-down rods.

e. Tilt battery toward left side, and then lift and rotate radar power supply up and out of airplane.

8-54. REMOVING CN-112/APG-30 VOLTAGE REGULATOR. To remove the CN-112/APG-30 voltage regulator, proceed as follows:

a. Disconnect the two cables from unit. Cut safety wire from wing nut located on lower front of voltage regulator.

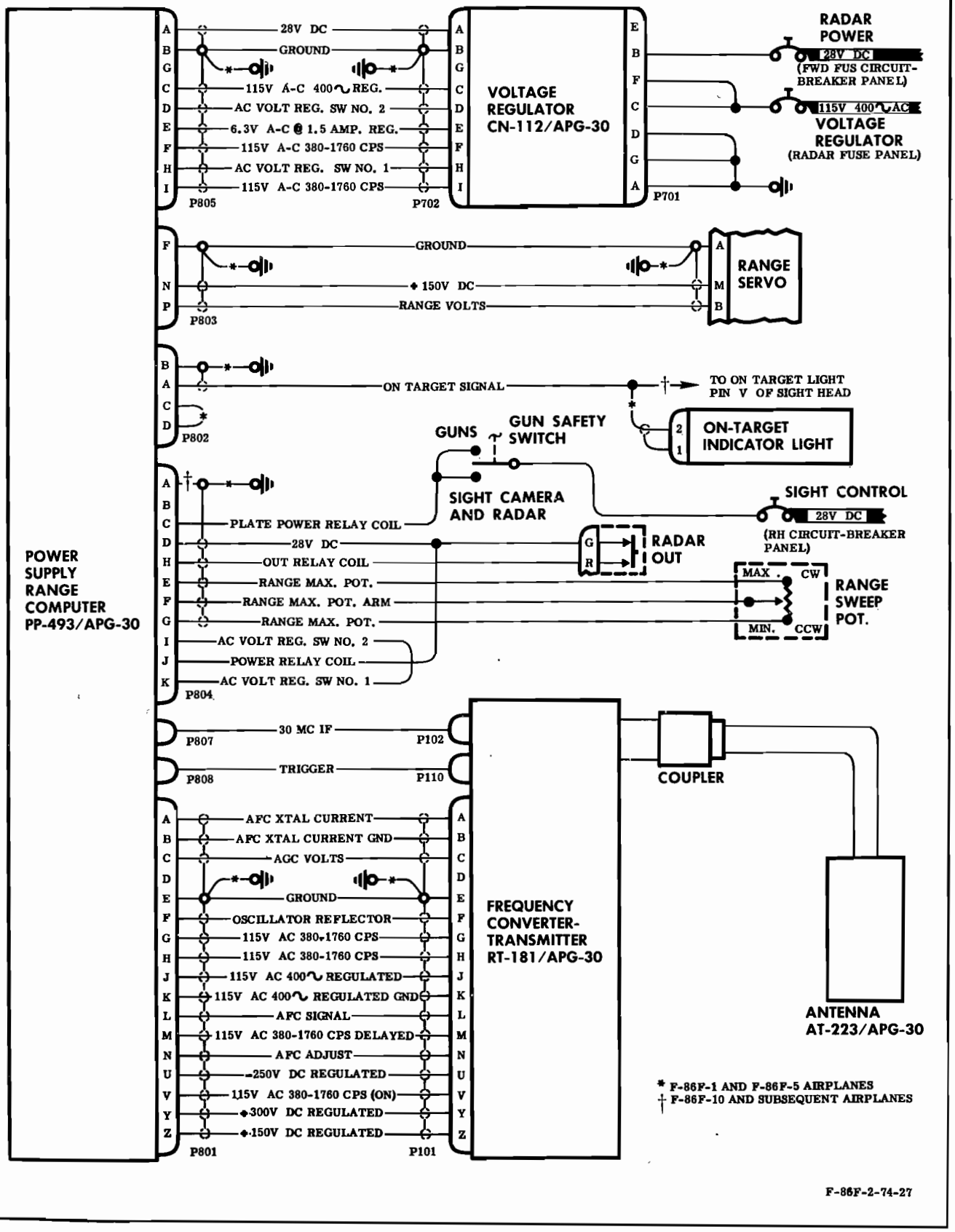

Figure 8-6. AN/APG-30 Radar

b. Loosen wing nut; then slide voltage regulator forward and lift it from its mount.

8-55. INSTALLING PP-493/APG-30 POWER SUPPLY. The PP-493/APG-30 power supply must be installed in the airplane before the RT-181/APG-30 transmitter is installed. To install the power supply, proceed as follows:

a. Place power supply in its mount, making certain that the two securing pins on rear of mount are fully engaged in power supply unit.

b. Tighten and safety-wire wing nuts. Connect electrical cables to unit.

8-56. INSTALLING RT-181/APG-30 RECEIVER-TRANSMITTER. Install the RT-181/APG-30 receiver-transmitter as follows:

a. Install receiver-transmitter lateral support channel by fastening the two mounting bolts at each end of support channel.

b. Place receiver-transmitter, along with its mount, in its mounting space. Install the four bolts through receiver-transmitter mount mounting holes and secure bolts in shock mounts. Make certain bonding straps on shock mounts are secured between receiver-transmitter mount and shock mount.

c. Connect electrical plugs to receiver-transmitter.

8-57. INSTALLING CN-112/APG-30 VOLTAGE REGULATOR. To install CN-112/APG-30 voltage regulator, place it in its mount. Tighten wing nut until unit is held securely in place. Safety-wire wing nut and connect the two electrical plugs to unit.

8-58. TESTING AN/APG-30 RADAR AFTER INSTALLATION. These tests should be made before the first flight, after a complete or replacement radar installation is made.

a. Check all plugs for security and all cables for proper routing.

b. Examine wave-guide couplings for proper support and check for cracks or broken solder joints. Inspect wave guide carefully, including undersurface, for dents or other defects. Replace wave guide if defects are found.

c. See that all units are free to move on their shock mounts and that fasteners are safetied.

d. Insert milliammeters in jacks marked "AFC XTAL CUR," "PRE AMP," and "MAGNETRON" on power supply-range computer and frequency converter-transmitter.

Note

Readings of crystal and magnetron currents are based on the use of meters with 100-ohm internal resistance. The meters should be calibrated to an accuracy of 3 percent at magnetron and crystal current readings.

e. Turn gun safety switch to "SIGHT CAMERA RADAR" and sight selector to "GUN." Connect 28-volt d-c power to external power receptacle on airplane.

f. Check time-out period of radar. (Time from application of power to radar to an indication of current on meter connected to "MAGNETRON" jack.) Time delay should be from 170 to 240 seconds.

g. Observe "PRE AMP" and "AFC XTAL CUR" currents with "AFC MAN" switch on power supply-range computer on "AFC." Currents should fluctuate during time-out period. When radar times in, currents should assume a steady value near 0.6 milliamperes.

h. Check d-c volt input at fuseholder on power supply-range computer. Voltage from external power source should be 27 ($\pm$3) volts.

i. With an IS-185 voltmeter, check a-c volt input at fuseholder on power supply-range computer. Voltage from main inverter should be 115 ($\pm$2.5) volts.

j. Check a-c regulated voltage at "VOLTS OUT" jack on voltage regulator (CN-112/APG-30) with an IS-185 voltmeter. Adjust voltage to 115 ($\pm$1) volts by turning controls marked "COARSE" and "FINE." Should a-c voltage fail to adjust properly, rotate coarse control very slowly through its entire range. In most cases, the regulator will lock in when this is done.

k. With a voltmeter of at least 3 percent accuracy at indicated readings, check d-c regulated voltages on power supply-range computer. Readings should be +300 ($\pm$12), +150 ($\pm$6), and –250 ($\pm$10) volts. If the readings do not fall within tolerance, do not attempt to adjust the voltages while the equipment is in the airplane. Return both the transmitter and range power supply to bench test for proper calibration.

l. Check current at "MAGNETRON" jack on frequency converter-transmitter. If current is not 1.25 to 2.00 milliamperes, return radar units to bench test.

m. Pressurize frequency converter-transmitter to 5 psi above atmospheric pressure with MK-20/UP pressurizing kit. Pressure should not be less than 4 psi after 30 minutes.

n. After 15 minutes of operation and with frequency converter-transmitter pressurized to 5 psi, check crystal currents. The "PRE AMP" and "AFC XTAL CUR" currents should be 0.4 to 0.7 milliamperes. If currents are outside these limits, refer to paragraph 8-51B. If currents cannot be brought within limits, return transmitter and range power supply to bench test.

o. Turn "RANGE MAX" potentiometer on instrument shroud full clockwise. With radar-out button on stick grip, range out on targets to about 6000 feet or greater.

p. Rotate "RANGE MAX" potentiometer full counterclockwise. Radar may unlock and then lock on targets of lesser range.

q. If radar does not unlock in step p., rotate "RANGE MAX" potentiometer full clockwise. Connect negative lead of a multimeter to ground, and positive lead to "RANGE VOLTS" jack on power supply-range computer.

r. With radar-out button on stick grip, range out on ground targets until meter reads 50-65 volts dc (6700-9000 feet).

s. Rotate "RANGE MAX" potentiometer full counterclockwise. Radar will unlock and lock on targets of lesser range. This is indicated by a decreased voltage reading at "RANGE VOLTS" test point.

t. Leave "RANGE MAX" potentiometer in full clockwise position.

Section IX
ARMAMENT

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9-1. ARMAMENT.

9-2. The armament complement of the airplane consists of the bombing system (paragraph 9-17), the rocket system (paragraph 9-80), the gunnery system (paragraph 9-103), the gun camera system (paragraph 9-140), the sight reticle camera system (paragraph 9-156), the sight reticle and strike camera system (paragraph 9-172), the A-1CM sight system (paragraph 9-193), and the A-4 sight system (paragraph 9-228). The bombing complement consists of an all-electrical bomb release system, and 5½-inch HVAR rockets are carried on the lower side of the right and left wings. The A-1CM and A-4 sight systems automatically compute leads and produce a visual sighting image, used as a reference during target tracking. The gunnery system consists of six forward-firing .50-caliber machine guns. The various gun camera systems, consisting of the camera in the engine air inlet duct and the sight reticle cameras on the sight head, provide a film record of gun and rocket hits. The strike camera mounted on the lower side of the fuselage provides a film record of bombing and rocket effectiveness on ground targets. Information concerning armor protection, bomb-rocket-tank mechanical release system, preparation of airplane for armament harmonization, and gun firing-in harmonization is contained in the paragraphs 9-3 through 9-15.

9-3. ARMOR PROTECTION.

9-4. The pilot and certain vital parts of the airplane (figure 9-1) are protected from the rear by steel armor plates. They are protected from the front by aluminum alloy armor and deflector plates, and a bullet-resistant glass plate. The windshield armor glass is 1¼-inch thick, flat, laminated, bullet-resistant glass plate. Forward of the cockpit is a 24S-T aluminum alloy armor plate, ⅞ inch thick at the top and ½ inch thick at the bottom. An upper forward deflector plate (in the upper cowling between the forward armor plate and the windshield armor glass) is of ⅜-inch thick 24S-T aluminum alloy. The upper rear armor (behind the pilot's head) is a ⅜-inch thick, face-hardened steel armor plate. The intermediate rear armor (protecting the pilot's shoulders) is a 5/16-inch thick, face-hardened steel armor plate. The lower rear armor (behind the seat) is a ¼-inch thick homogeneous steel armor plate. All deflector plate, armor plate, and armor glass is removable, with the exception of the deflector plate just forward of the windshield. The horizontal stabilizer flak protection plates are provided to prevent complete loss of the horizontal stabilizer normal and alternate hydraulic power systems. The armor plates are so arranged that the hydraulic systems are divided into two separate groups. With the exception of the upper portion of the armor plate aft of the pilot's seat and the horizontal stabilizer flak protection plates, all protective plates are required for flight, as they serve a definite structural purpose.

9-5. BOMB, ROCKET, AND FUEL TANK MECHANICAL RELEASE SYSTEM.

9-6. A mechanical release system (figures 9-2, 9-3, and 9-3A) allows the external stores to be jettisoned should the normal electrical emergency jettison circuit fail. Release of bombs, rockets, or auxiliary fuel tanks is accomplished by pulling the emergency release handle, located in the cockpit. An arming safety switch is located in the mechanical advantage unit in the left gun bay. Initial movement of the emergency release handle removes pressure from the safety switch actuating pin. This cuts power from all arming circuits; then all bombs and rockets may be dropped in a safe condition. On F-86F-25 Airplanes, two positions are provided for the emergency release handle. Pulling the handle to the first detent position releases the bombs and/or the auxiliary fuel tanks. On F-86F-25 Airplanes AF51-13170 through -13340 and AF52-5387 through -5530, F-86F-30 Airplanes AF52-4305 through -4504 and -5106 through -5163, and F-86F-35 and subsequent airplanes, pulling the handle to the second detent releases the rockets. The two actuation positions are provided so that the auxiliary fuel tanks can be dropped without the rockets being dropped. On F-86F-35 Airplane AF53-1072 and all subsequent airplanes, five stations on each wing are provided for rocket launchers; only four stations are provided on all other F-86F Airplanes. On F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4505 through -5105, the rocket release units in the wing have been removed; consequently, the rockets cannot be jettisoned manually.

9-7. TESTING BOMB, ROCKET, AND FUEL TANK MECHANICAL RELEASE SYSTEM. To test the mechanical release system before loading bombs, first make certain that demolition bomb release selector switch is

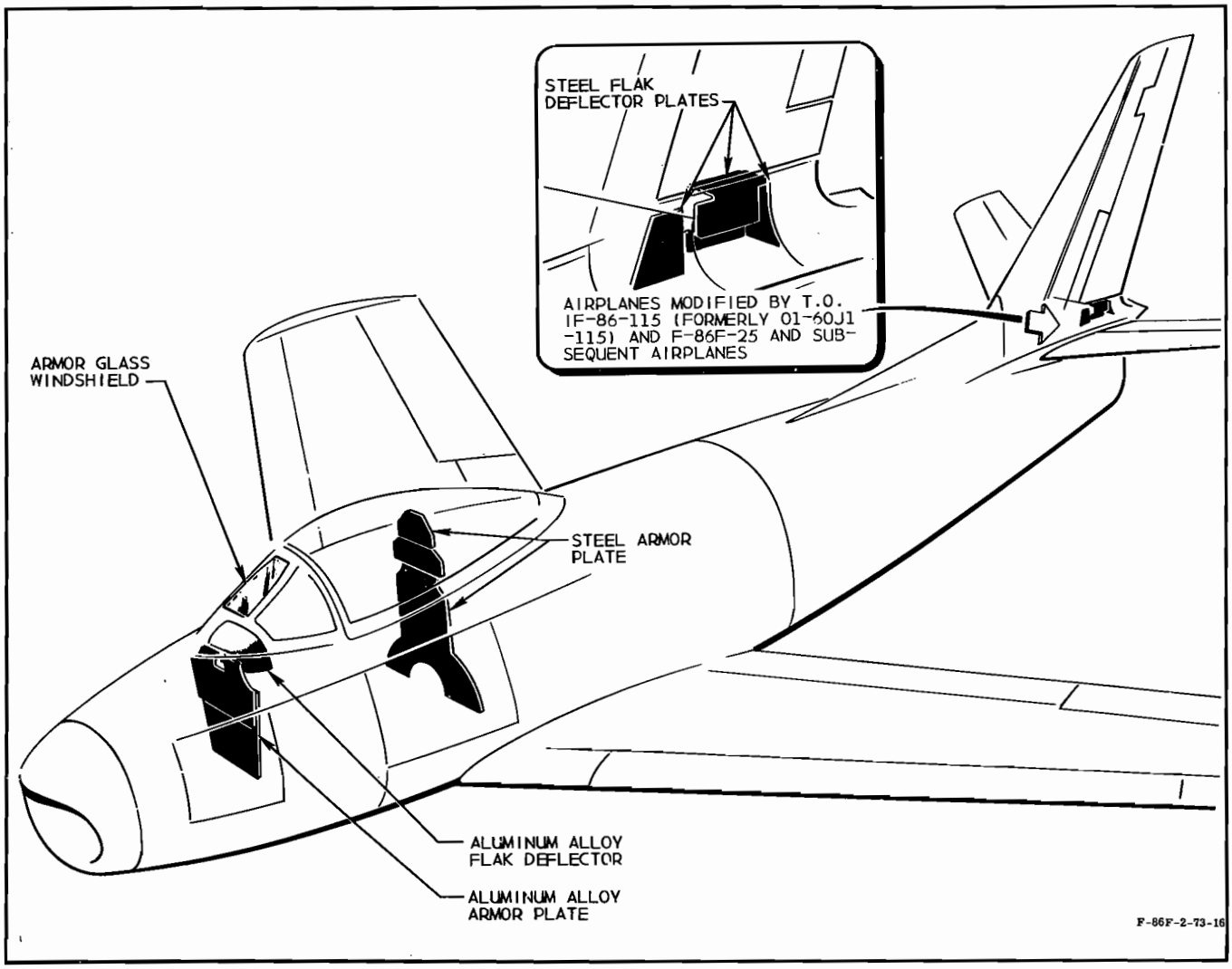


Figure 9-1. Armor Plate and Bullet-resistant Glass Installation

in "MANUAL RELEASE" position and cock the bomb racks. On F-86F-1 through F-86F-20 Airplanes, pull emergency release handle; both bomb racks (or auxiliary fuel tank release units) and all rocket jettison units should trip simultaneously. (See figure 9-2.) On F-86F-25 Airplanes, pull release handle to first detent position; both bomb racks and/or auxiliary fuel tanks should trip simultaneously. On F-86F-25 Airplanes AF51-13170 through -13340 and AF52-5387 through -5530, F-86F-30 Airplanes AF52-4305 through -4504 and -5114 through -5163, and F-86F-35 and subsequent airplanes, pull release handle to second detent; all rocket jettison units should trip simultaneously. (See figures 9-3 and 9-3A.)

9-8. ADJUSTING BOMB, ROCKET, AND FUEL TANK MECHANICAL RELEASE SYSTEM. See figures 9-2, 9-3, and 9-3A.

9-9. PREPARING AIRPLANE FOR ARMAMENT HARMONIZATION.

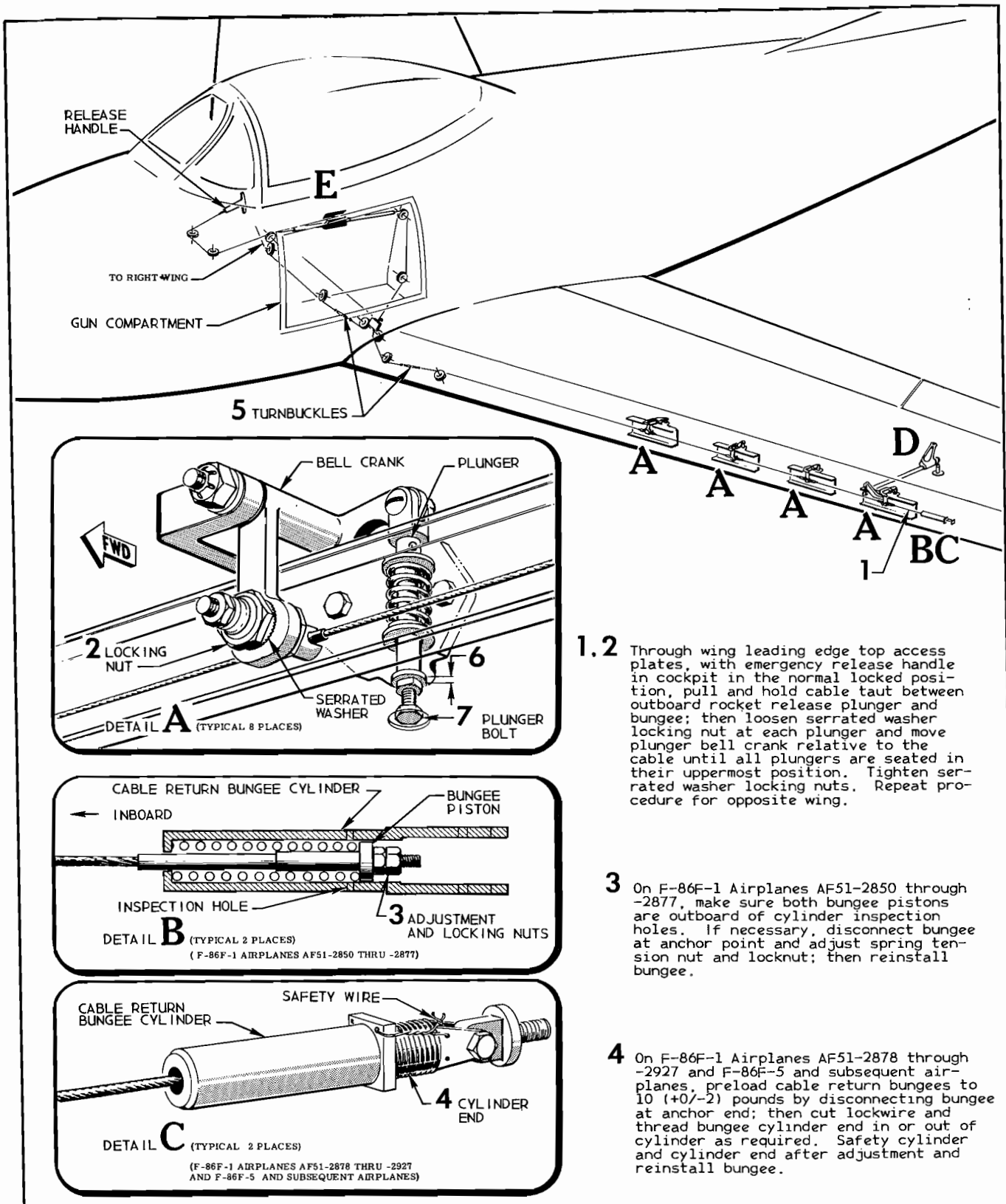
9-10. Harmonization charts (figure 9-4) contain information necessary for harmonization of the guns, rockets, cameras, and gun sights. The information includes bore-sight configuration and dimensions for local manufacture of a target board. The harmonization procedure is as follows:

a. Level airplane. (Refer to paragraph 1-16.)

b. Position bore-sight target board a distance of 77 feet 7½ inches directly in front of airplane. Measure from nose wheel axle centerline (airplane on jacks and nose gear strut fully extended) to obtain this dimension. This measurement represents the relative 1000-inch distance between the mean gun pivot point and the target board position.

c. Install forward and aft bore-sight tools and attach plumb bob lines. (See figure 9-4 for plumb bob attaching points.)

d. Sight from rear peep sight tool through forward cross-hair tool and through plumb bob lines to aligning marks on target board.



1, 2 Through wing leading edge top access plates, with emergency release handle in cockpit in the normal locked position, pull and hold cable taut between outboard rocket release plunger and bungee; then loosen serrated washer locking nut at each plunger and move plunger bell crank relative to the cable until all plungers are seated in their uppermost position. Tighten serrated washer locking nuts. Repeat procedure for opposite wing.

3 On F-86F-1 Airplanes AF51-2850 through -2877, make sure both bungee pistons are outboard of cylinder inspection holes. If necessary, disconnect bungee at anchor point and adjust spring tension nut and locknut; then reinstall bungee.

4 On F-86F-1 Airplanes AF51-2878 through -2927 and F-86F-5 and subsequent airplanes, preload cable return bungees to 10 (+0/-2) pounds by disconnecting bungee at anchor end; then cut lockwire and thread bungee cylinder end in or out of cylinder as required. Safety cylinder and cylinder end after adjustment and reinstall bungee.

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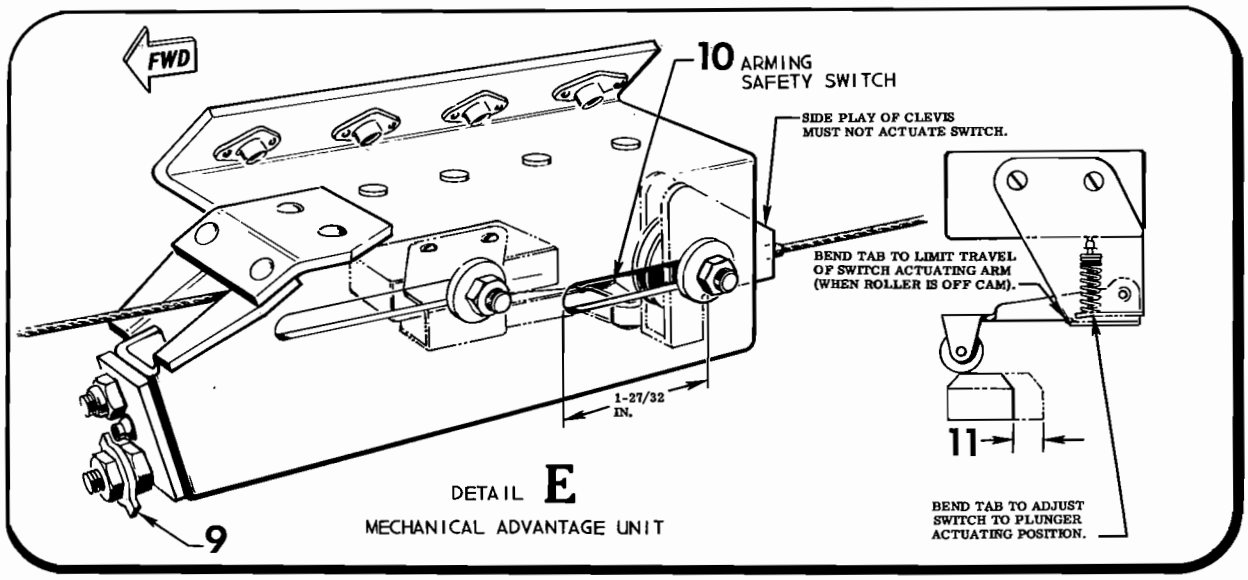
Figure 9-2. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-1 Through F-86F-20 Airplanes (Sheet 1 of 2)



5,6 In wing root areas, tighten cable turnbuckles to take up bungee preload until all rocket plungers are between 1/32 and 1/16 inch from uppermost position.

7 Adjust each rocket plunger bolt so that contact surface is flush with bottom surface of wing or not more than 1/16 inch inside bottom surface of wing.

8 Adjust plunger contact bolt to obtain dimension shown between torque tube arm contact plug and fuel tank release plunger contact bolt.

9 Adjust cable, at mechanical advantage unit, until pulley is positioned as shown. This will provide a handle cable tension of 5 (±1-1/2) pounds.

10, 11 Adjust arming safety switch to actuate with first 5/32 to 1/4 inch of linkage travel as shown.

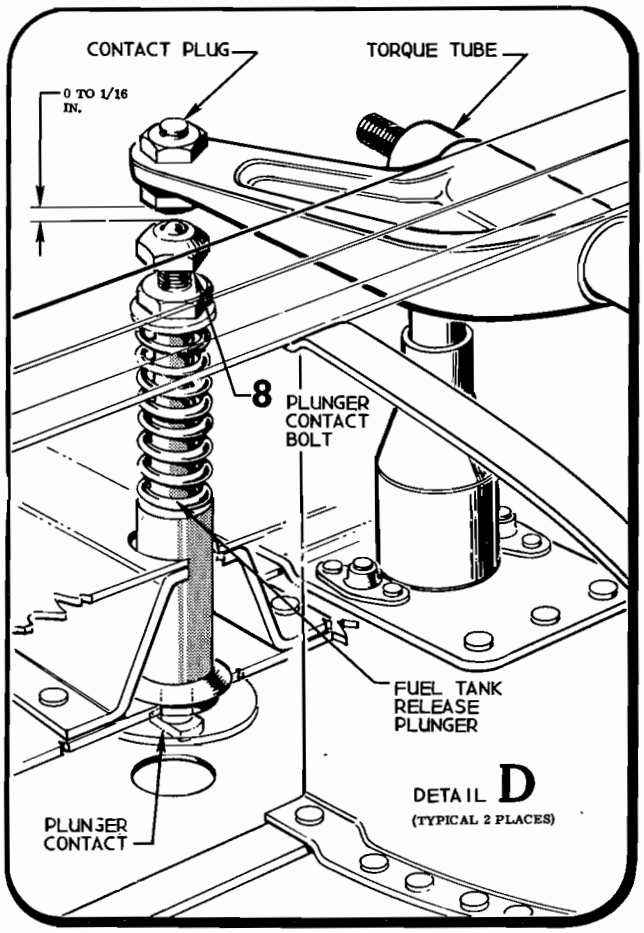


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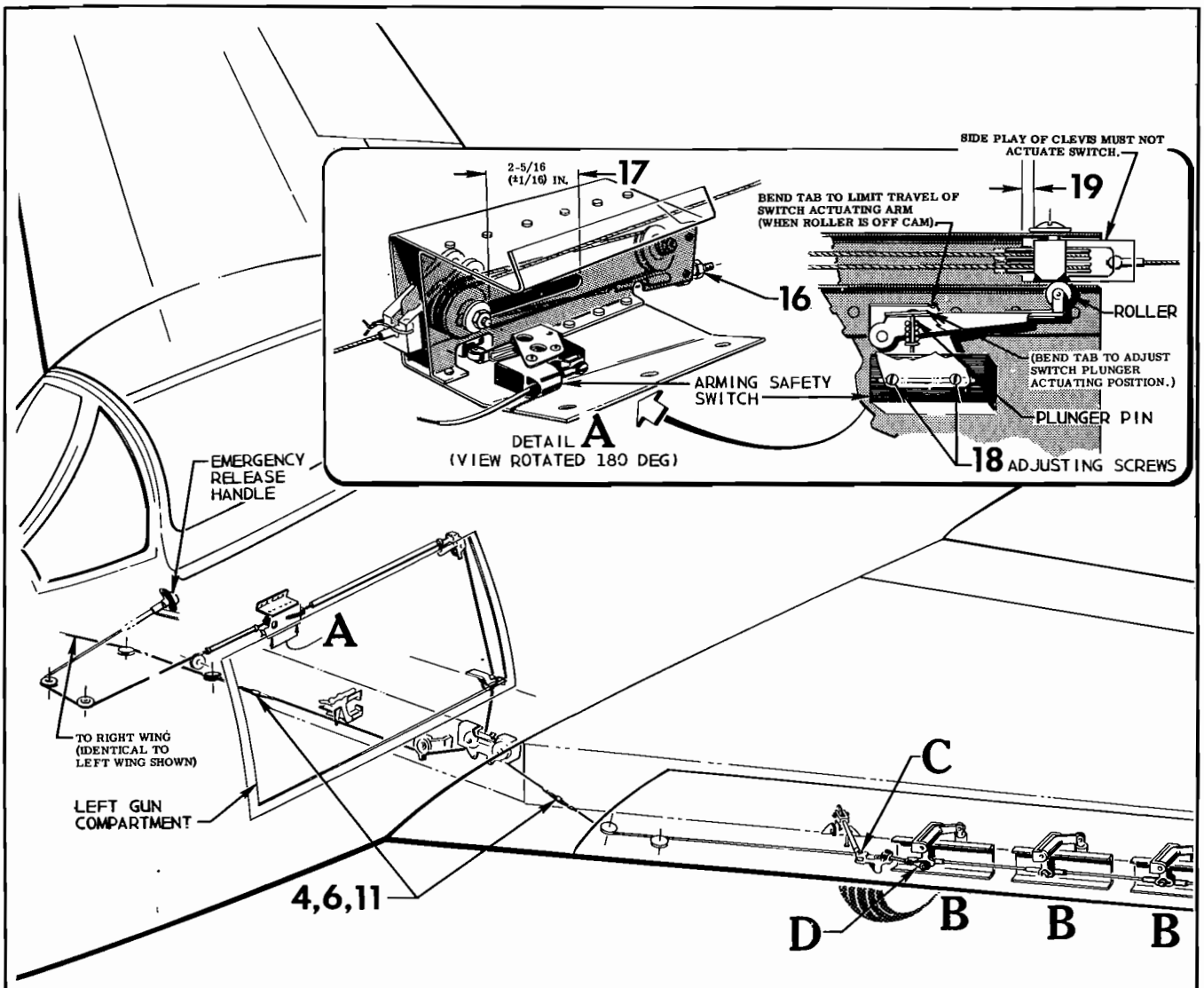
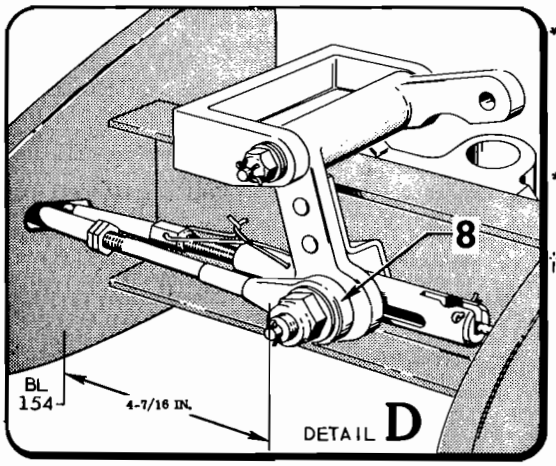
Figure 9-2. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-1 Through F-86F-20 Airplanes (Sheet 2 of 2)





*1,2 With emergency release handle in cockpit in the normal locked position, pull and hold cable taut at inboard end of override bungee; then adjust each cable turnbuckle until all rocket release plungers are seated in uppermost position.

*3-5 Adjust override bungee rod end until bungee bell crank is set to dimension shown when cable is taut. At wing center section, check that cable tension is from 11 to 16 pounds. (If cable tension exceeds 16 pounds, eliminate excessive cable binding or reduce preload of return bungee by disconnecting bungee from system and turning bungee cylinder out of cylinder end.)

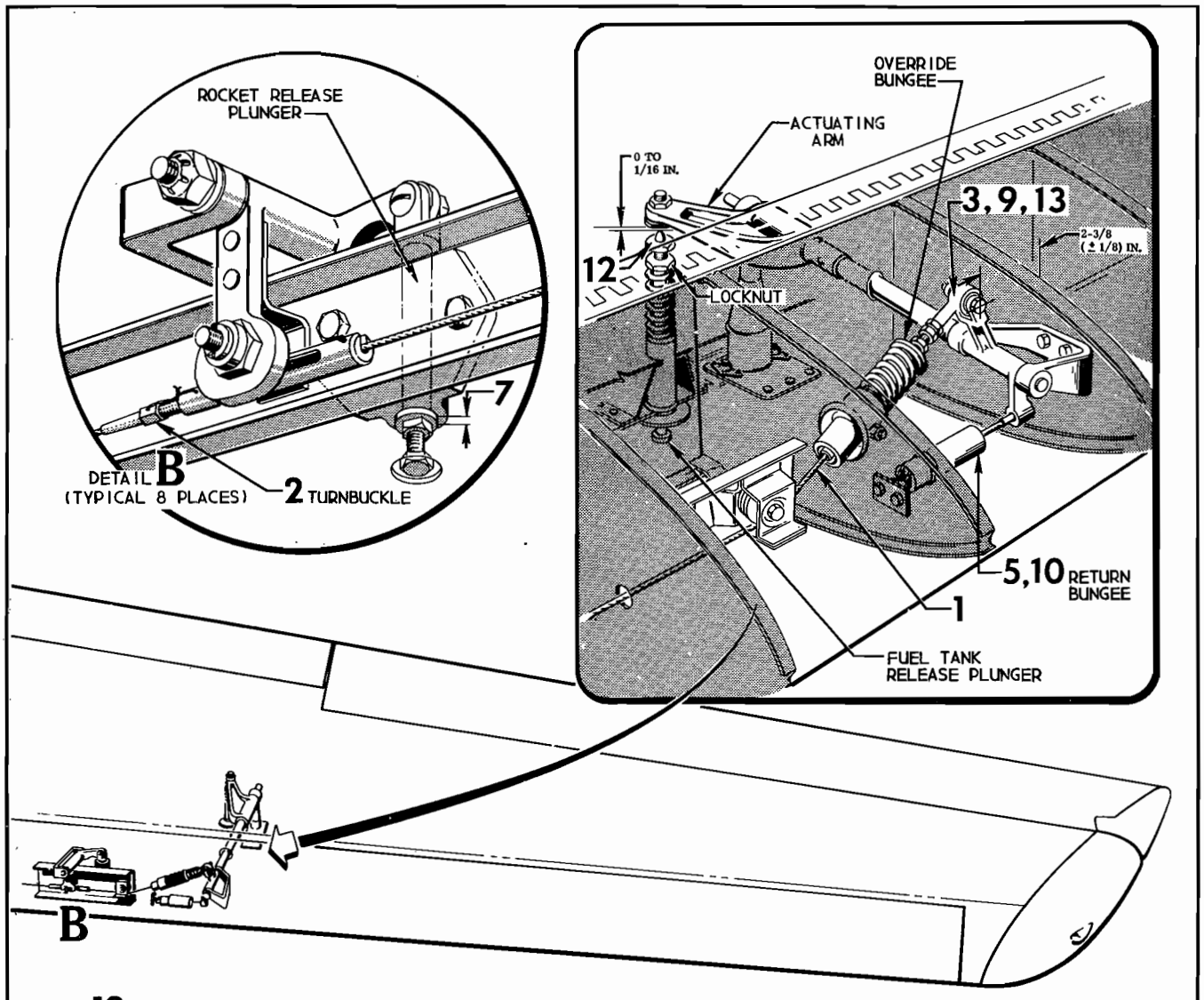
*6,7 Tighten turnbuckles at center section to take up return bungee preload and until all rocket plungers are from .015 to .064 inch from uppermost position.

†8-10 By coordinated adjustment of bomb and fuel tank actuator rod end and override bungee rod end, obtain dimensions shown when cable is pulled taut outboard. Check cable for 11 to 16 pounds tension. (If cable tension exceeds 16 pounds, eliminate excessive cable binding, or reduce preload of return bungee by disconnecting bungee from system and turning bungee cylinder out of cylinder end.)

†11 Tighten turnbuckle at center section to take up return bungee preload.

F-86F-2-61-2A

Figure 9-3. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-25 and F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 Through -5271 (Sheet 1 of 2)



12 Remove fuel tank release plunger and adjust plunger bolt to obtain an over-all length of approximately 4-7/16 inches. Reinstall plunger.

13 Adjust override bungee rod end to obtain dimension shown between fuel tank release plunger and actuating arm.

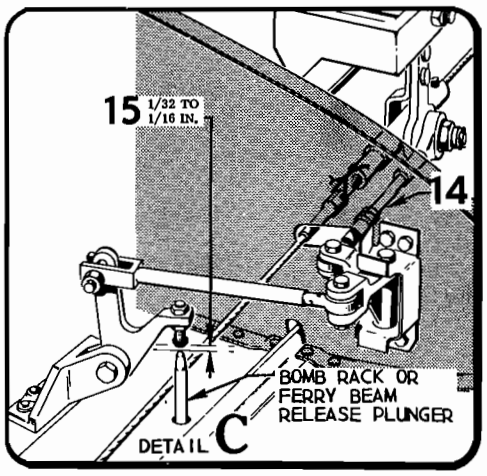
14,15 With bomb rack or ferry beam installed, adjust rod end and/or plunger bolt to obtain dimension shown between actuating screw and bomb rack release plunger. Minimum travel of plunger must be 7/8 inch when in actuated position.

16,17 Adjust cable on mechanical advantage unit until center of pulley bolt is positioned as shown. Cable tension at release handle should be 3 to 7 pounds with handle seated.

18,19 Adjust arming safety switch to actuate with first 5/32 to 1/4 inch of linkage travel as shown.

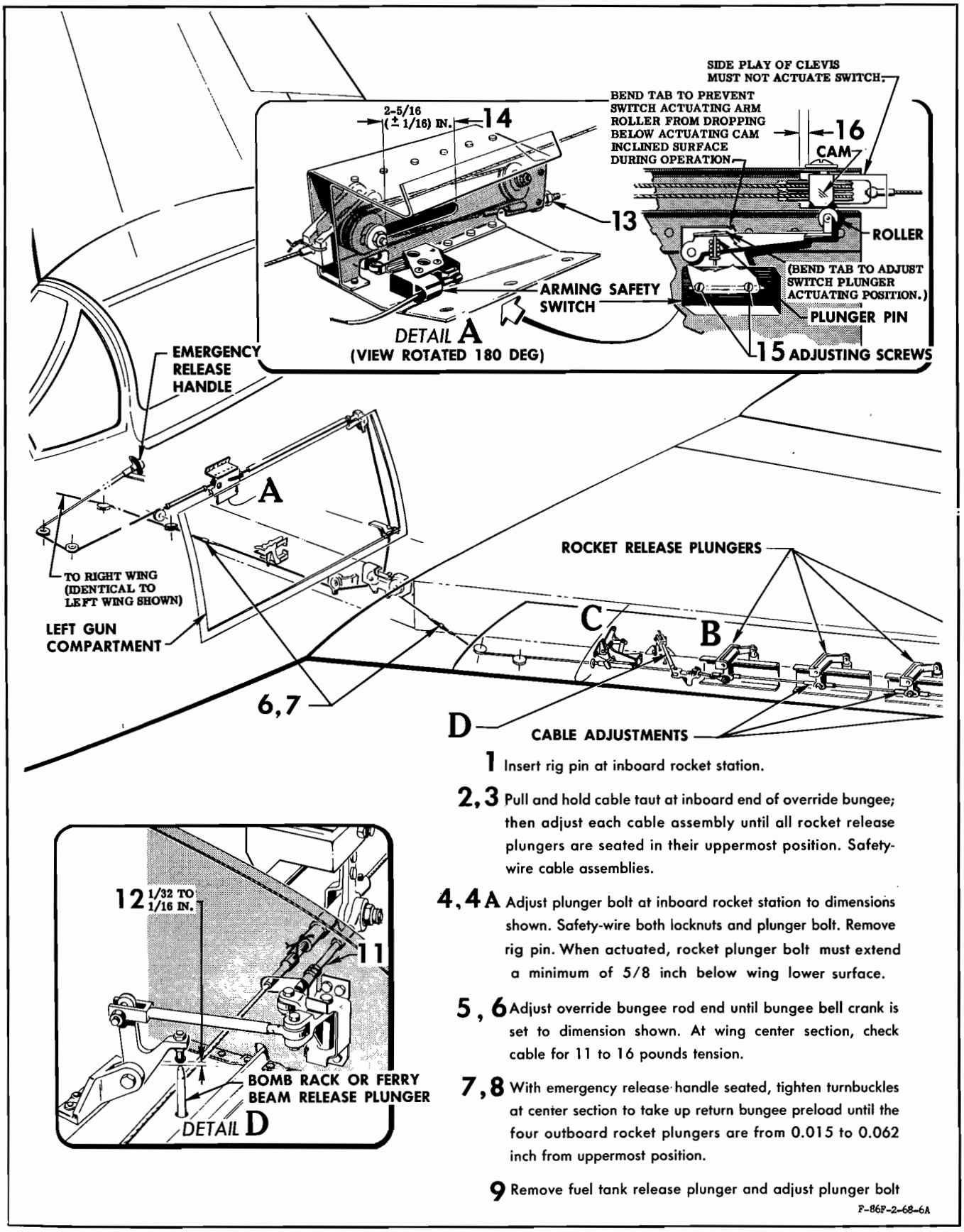
* F-86F-25 Airplanes AF51-13170 thru -13340 and AF52-5387 thru -5530, F-86F-30 Airplanes AF52-4305 thru -4504 and -5106 thru -5163, and F-86F-35 Airplanes AF52-5164 thru -5271

† F-86F-25 Airplanes AF51-13341 through -13510 and AF52-5272 through -5386, and F-86F-30 Airplanes AF52-4505 through -5105 have provisions for bomb and fuel tank mechanical release only.



F-86F-2-68-1

Figure 9-3. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-25 and F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 Through -5271 (Sheet 2 of 2)



1 Insert rig pin at inboard rocket station.

2,3 Pull and hold cable taut at inboard end of override bungee; then adjust each cable assembly until all rocket release plungers are seated in their uppermost position. Safety-wire cable assemblies.

4,4A Adjust plunger bolt at inboard rocket station to dimensions shown. Safety-wire both locknuts and plunger bolt. Remove rig pin. When actuated, rocket plunger bolt must extend a minimum of 5/8 inch below wing lower surface.

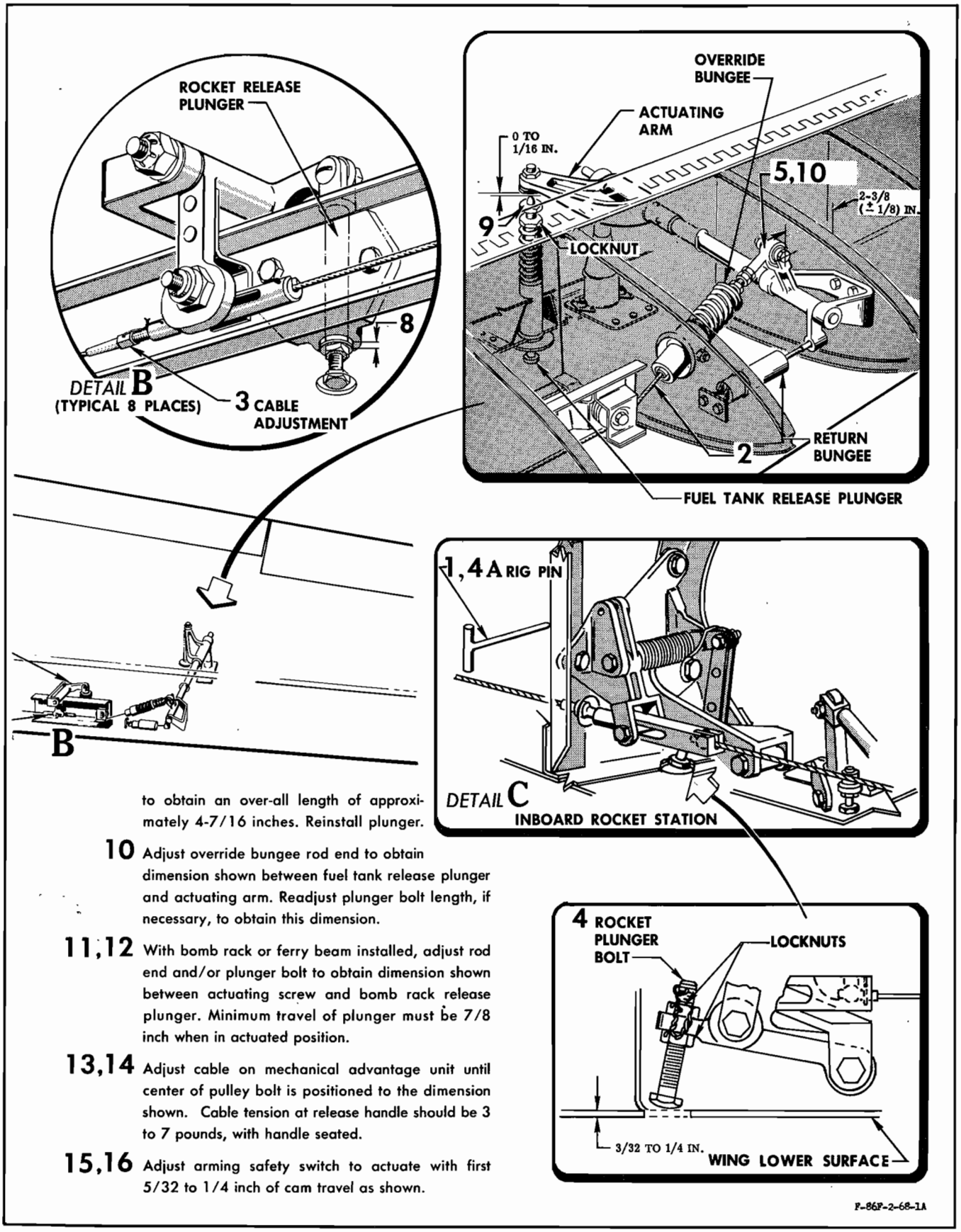
5, 6 Adjust override bungee rod end until bungee bell crank is set to dimension shown. At wing center section, check cable for 11 to 16 pounds tension.

7,8 With emergency release handle seated, tighten turnbuckles at center section to take up return bungee preload until the four outboard rocket plungers are from 0.015 to 0.062 inch from uppermost position.

9 Remove fuel tank release plunger and adjust plunger bolt

F-86F-2-68-6A

Figure 9-3A. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-35 Airplane AF53-1072 and All Subsequent Airplanes (Sheet 1 of 2)



to obtain an over-all length of approximately 4-7/16 inches. Reinstall plunger.

10 Adjust override bungee rod end to obtain dimension shown between fuel tank release plunger and actuating arm. Readjust plunger bolt length, if necessary, to obtain this dimension.

11,12 With bomb rack or ferry beam installed, adjust rod end and/or plunger bolt to obtain dimension shown between actuating screw and bomb rack release plunger. Minimum travel of plunger must be 7/8 inch when in actuated position.

13,14 Adjust cable on mechanical advantage unit until center of pulley bolt is positioned to the dimension shown. Cable tension at release handle should be 3 to 7 pounds, with handle seated.

15,16 Adjust arming safety switch to actuate with first 5/32 to 1/4 inch of cam travel as shown.

Figure 9-3A. Adjusting Bomb, Rocket, and Fuel Tank Mechanical Release System—F-86F-35 Airplane AF53-1072 and All Subsequent Airplanes (Sheet 2 of 2)

- Guns are bore sighted parallel to the fuselage reference line and centerline.
- The gun sight line is bore sighted down to intersect the mean gun bore at 750 yards for gun firing.
- The A-1 sight with the rocket setting unit provides a gun sight depression angle of 3 degrees 53 minutes from the fuselage reference line for rocket firing. Rocket bore sighting is accomplished by setting the rocket setting unit to "5" HVAR—N." Depress and hold electrical caging button while adjusting cam follower (inside rocket setting unit) to give a line of sight of 47½ mils below fuselage reference line (16½ inches on target board).
- The A-4 sight with a fixed sight selector also provides a gun sight depression angle of 3 degrees 53 minutes from the fuselage reference line for rocket firing. Rocket bore sighting is accomplished by setting the fixed sight selector unit to "ROCKET" and "5" HVAR—N." Depress and hold electrical caging button while adjusting bore-sight adjustment ("B. S. ADJ.") screw on face of fixed sight selector to give a line of sight 47½ mils below fuselage reference line (16½ inches on target board).
- The A-4 sight with a variable sight selector provides a gun sight depression angle of 2 degrees 12 minutes from the fuselage reference line for rocket firing. Rocket bore sighting is accomplished by setting the variable sight selector unit to "ROCKET" and the rocket depression angle pointer to 17 mils. Depress and hold electrical caging button while adjusting bore-sight adjustment ("B. S. ADJ.") screw on face of sight selector to give a sight line of 34½ mils below fuselage reference line (3-13/16 inches on target board).
- Gun sight computer is installed level (±½ degree) to fuselage reference line.

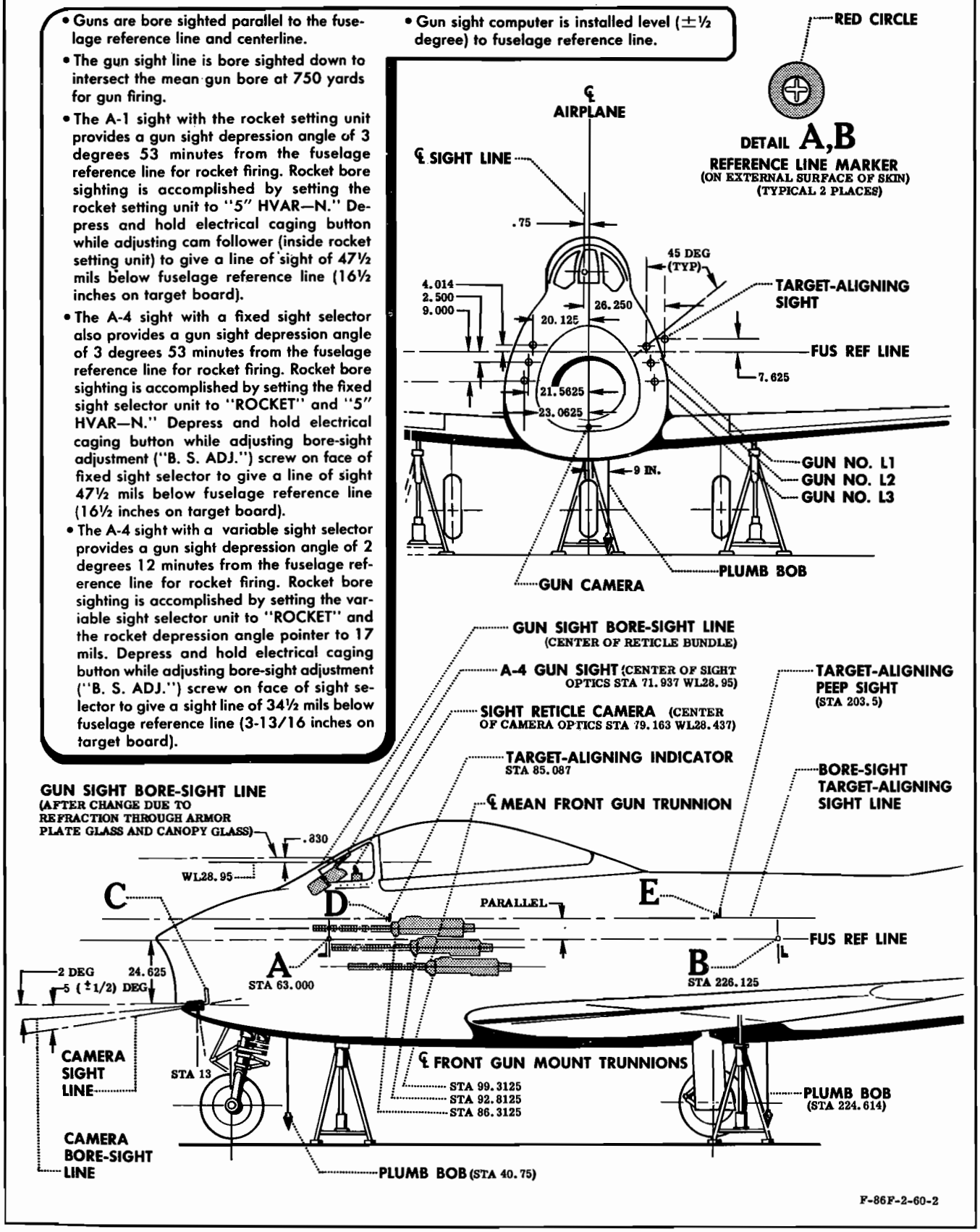
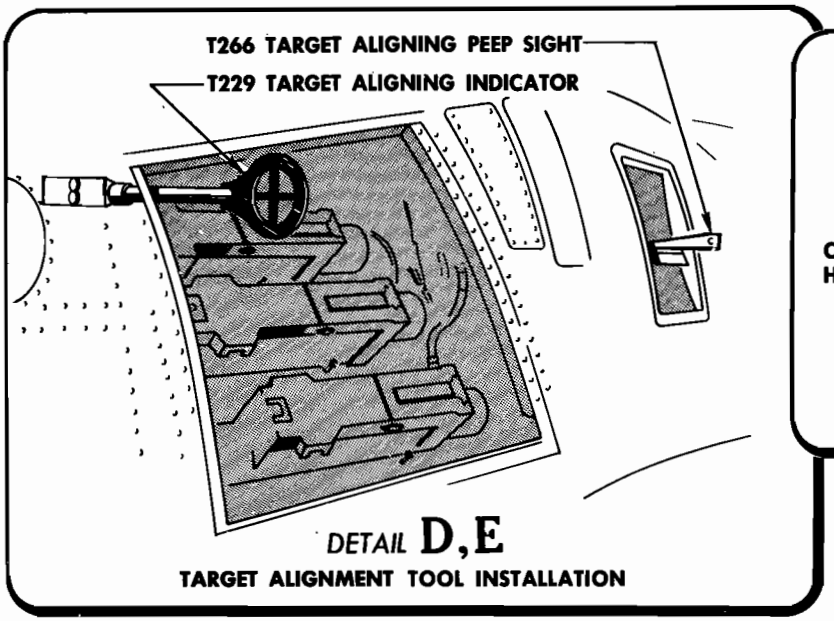
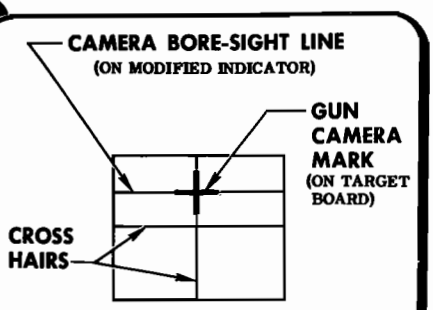


Figure 9-4. Harmonization Charts (Sheet 1 of 2)



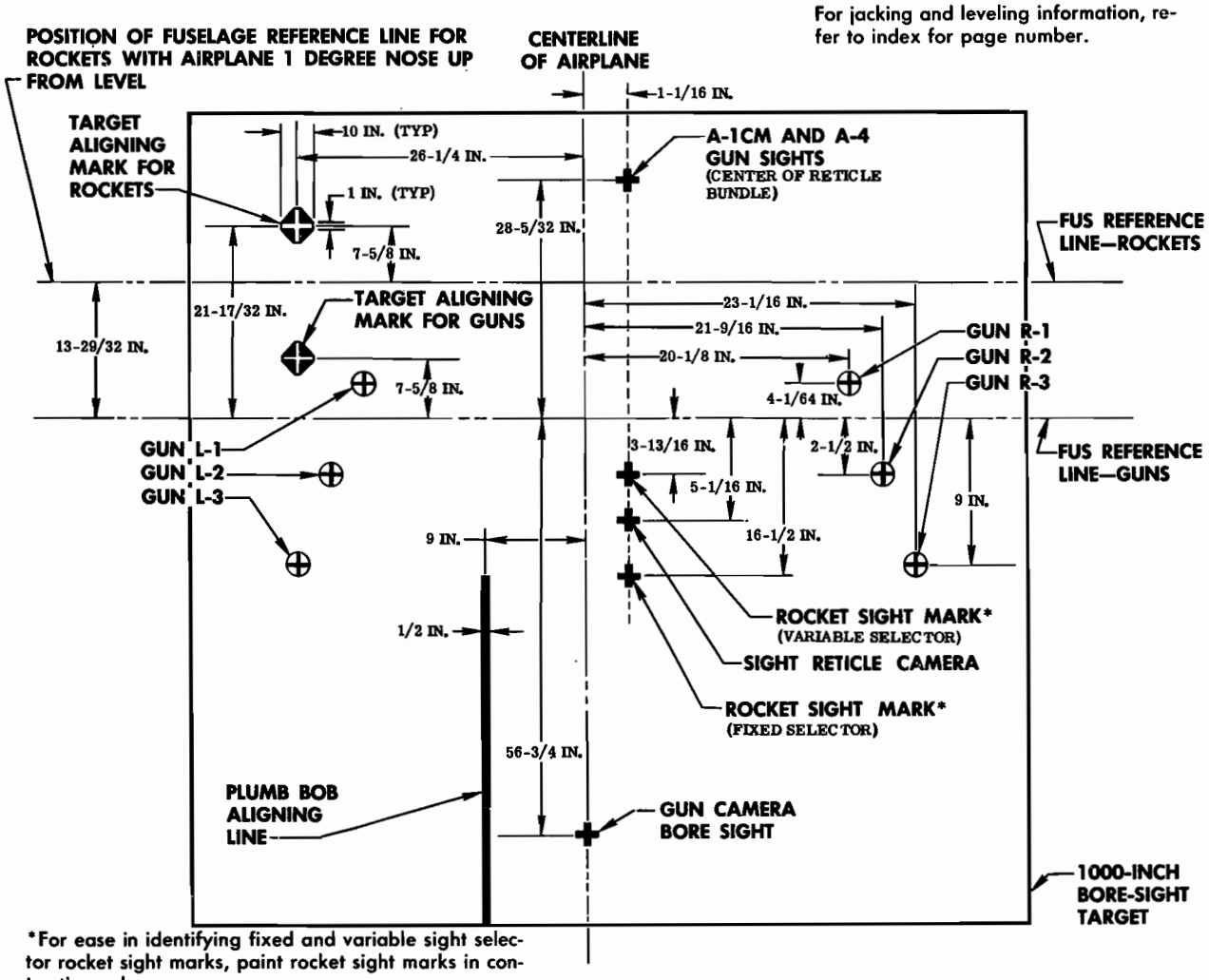
DETAIL D,E
TARGET ALIGNMENT TOOL INSTALLATION



DETAIL C
VIEW LOOKING THROUGH CAMERA ALIGNING INDICATOR

NOTE To obtain 1000-inch target board position, place target board 77 feet 7-1/2 inches in front of airplane, measured from centerline of nose wheel axle, with strut fully extended.

For jacking and leveling information, refer to index for page number.



*For ease in identifying fixed and variable sight selector rocket sight marks, paint rocket sight marks in contrasting colors.

F-86F-2-60-1A

Figure 9-4. Harmonization Charts (Sheet 2 of 2)

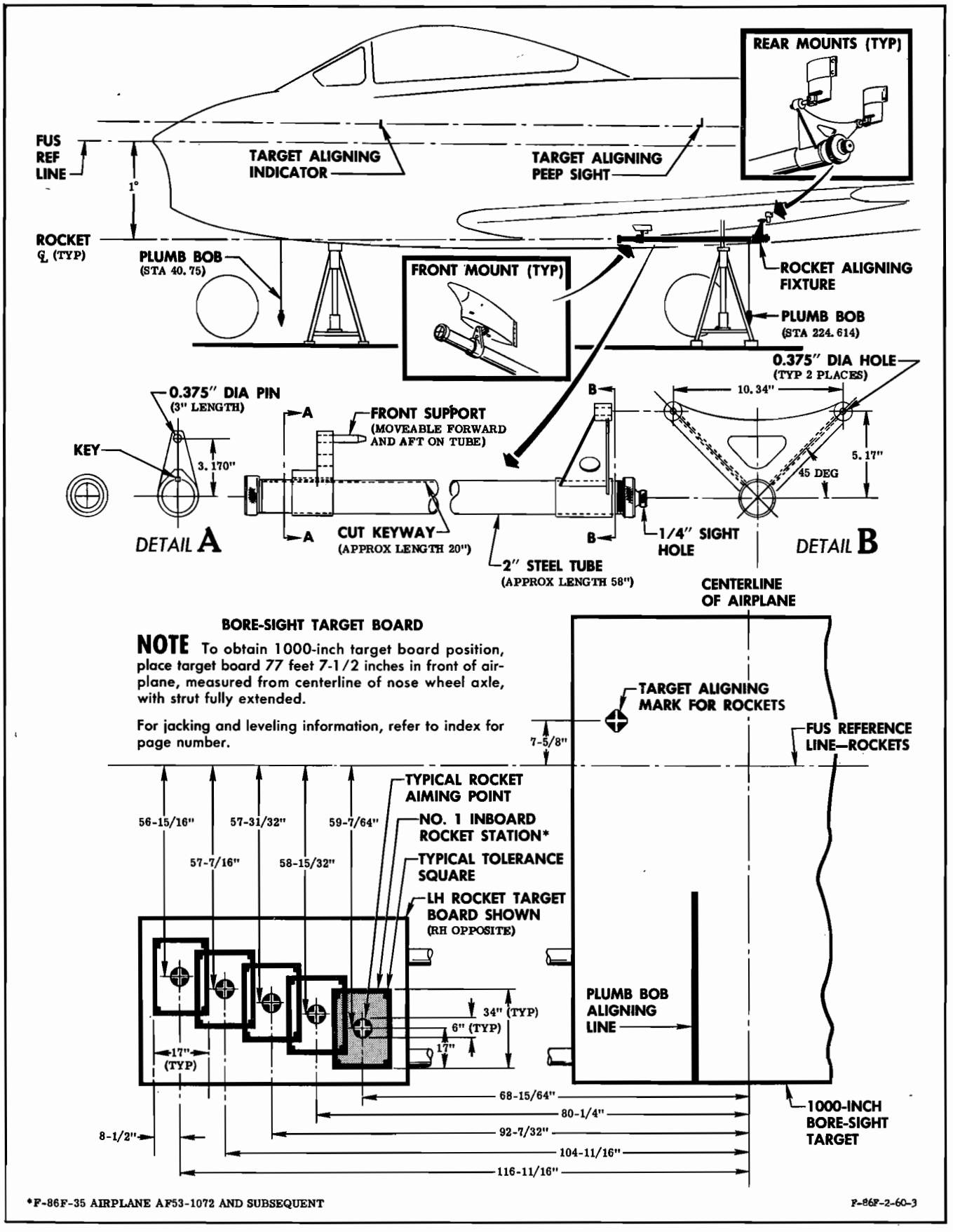
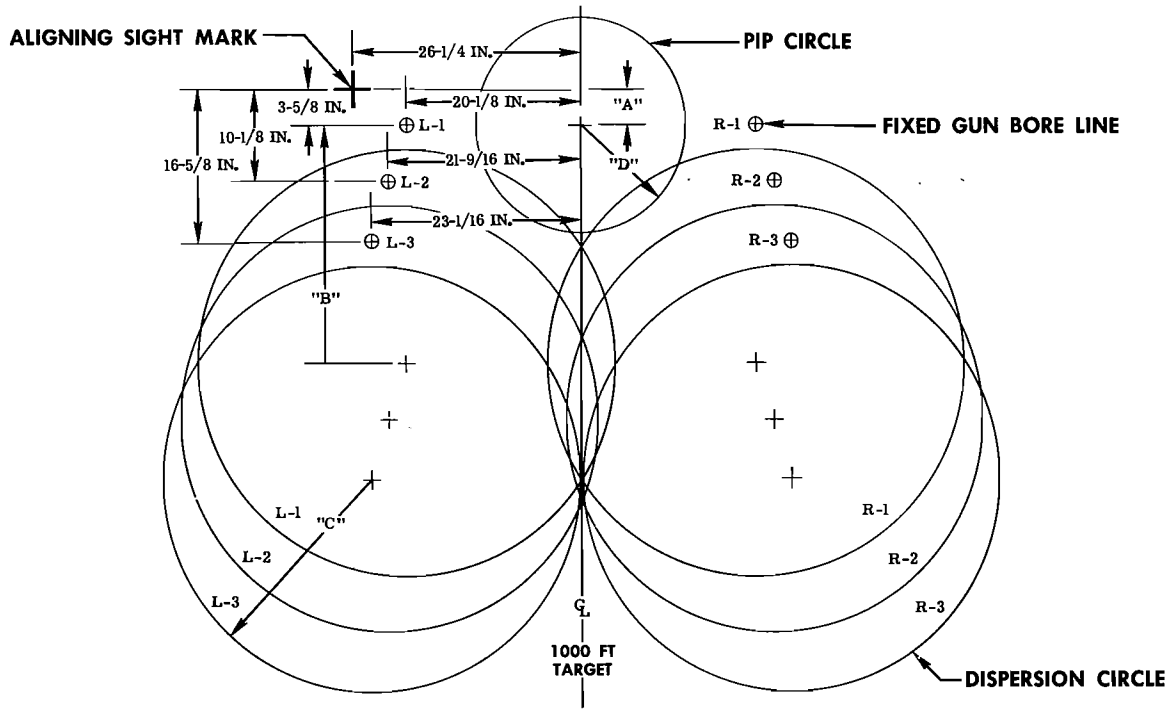


Figure 9-4A. Rocket Harmonization Chart



NOTE: 1 ALL DIMENSIONS ARE POSITIVE AS SHOWN.

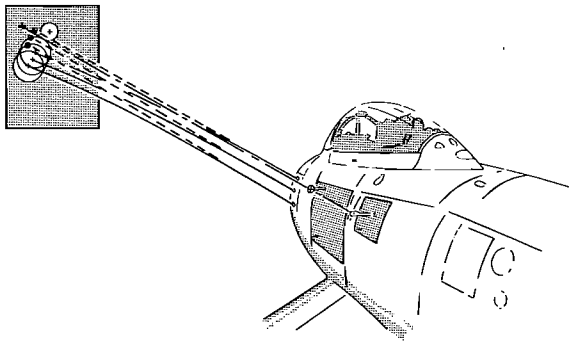
2 DIMENSION "A" POSITIONS PIP CIRCLE.

3 DIMENSION "B" POSITIONS DISPERSION CIRCLE.

4 DIMENSION "C" GIVES RADIUS OF DISPERSION CIRCLE.

5 DIMENSION "D" GIVES RADIUS OF PIP CIRCLE.

⊕ DENOTES GUN BORE
+ DENOTES CENTER OF DISPERSION CIRCLES



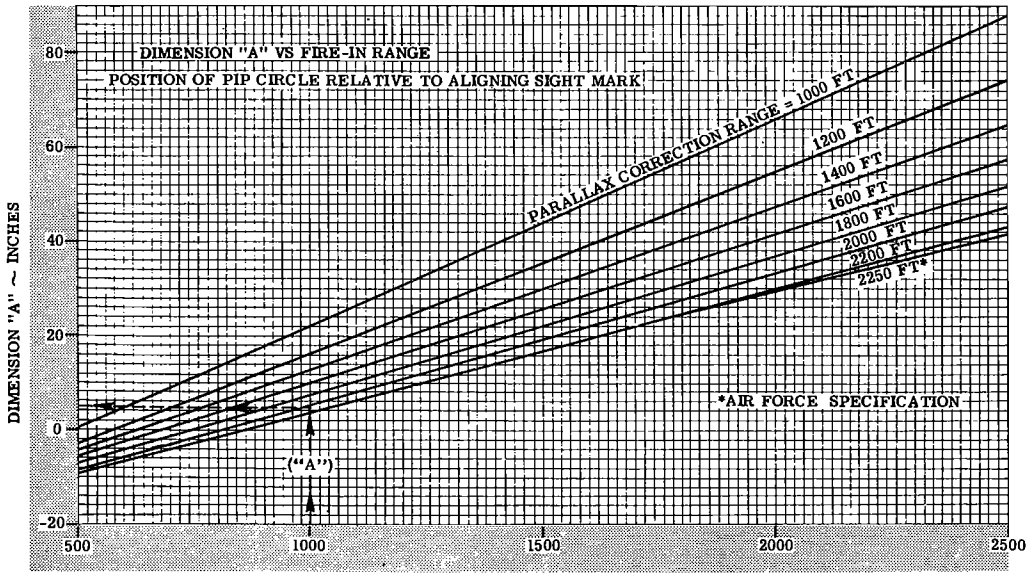


Figure 9-5. Parallel Guns Firing-in Target and Construction Charts (Sheet 1 of 2)

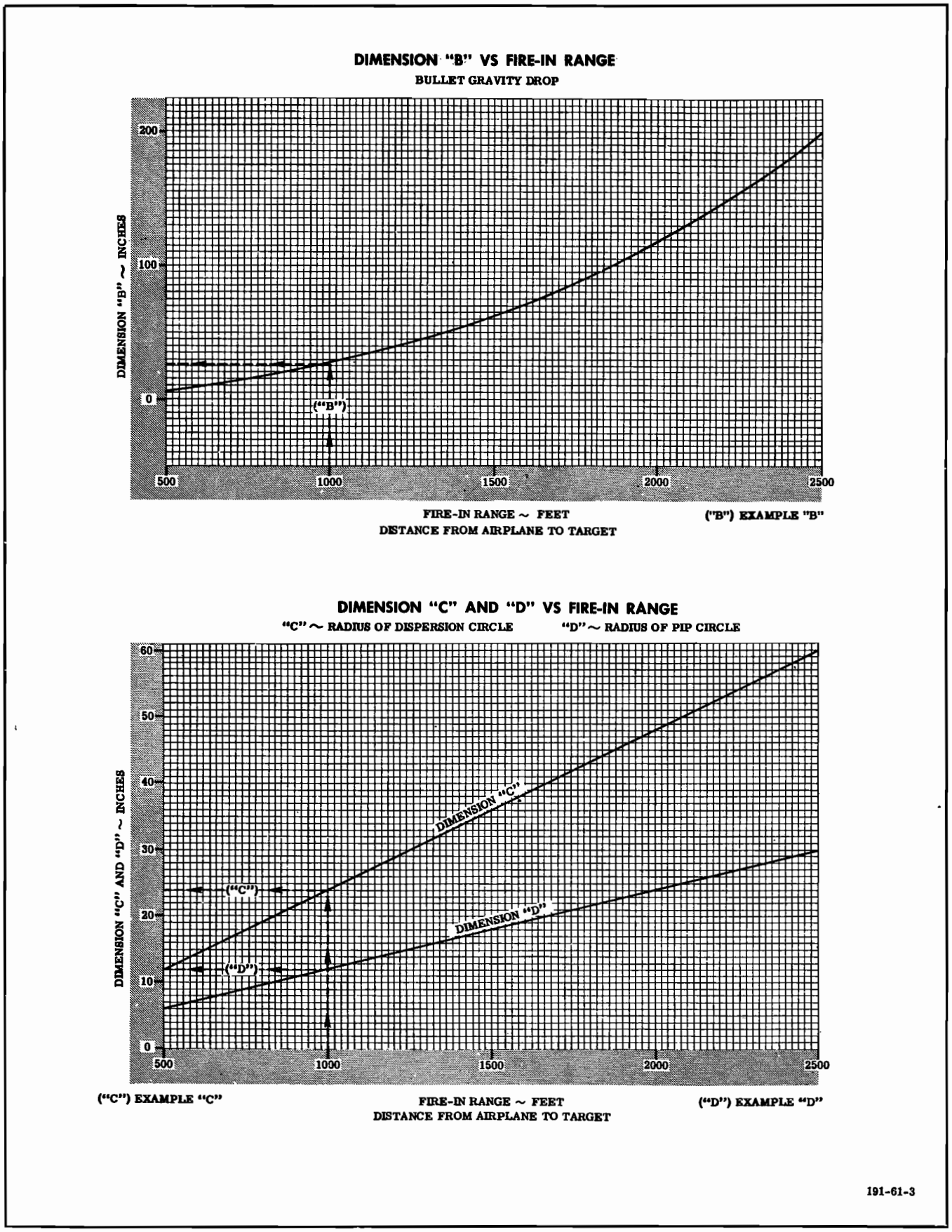


Figure 9-5. Parallel Guns Firing-in Target and Construction Charts (Sheet 2 of 2)

Note

If strong wind prevails, immerse plumb bobs in containers filled with oil to steady plumb lines.

e. Move target board horizontally or vertically until forward bore-sight tool cross hair is superimposed on target board aligning mark. A white border of equal width must appear around the forward bore-sight tool (cross hair) for proper alignment of the target board, and both plumb bob lines must align vertically with the target board plumb bob reference mark.

Note

Do not use bore-sight tools for handholds or steps. Misalignment of the bore-sight tools or mounting fixtures makes them ineffective for target board alignment.

f. Bore sight rocket system. (Refer to paragraph 9-99.)

g. Bore sight gunnery system. (Refer to paragraph 9-115.)

h. Bore sight gun camera system. (Refer to paragraph 9-148.)

i. Bore sight the sight reticle camera system. (Refer to paragraph 9-164.)

j. Bore sight the sight reticle and strike camera system. (Refer to paragraph 9-180.)

k. Bore sight A-1CM sight system. (Refer to paragraphs 9-210 and 9-211.)

l. Bore sight A-4 sight system. (Refer to paragraph 9-261.)

9-11. GUN FIRING-IN HARMONIZATION.

9-12. Gun firing-in is a method of harmonization whereby the fixed guns, the computer unit, and the electrically caged sight line are properly aligned to establish a zero-lead sight line. When this zero-lead sight line is established, the sight pip will always indicate to the pilot the correct path to fly to obtain hits on a target. Since both the A-1CM and A-4 sights already compute for the effects of gravity drop, velocity jump, and target motion, the only correction that can be accounted for by harmonization parallax. Parallax error is caused by the sight being mounted in the airplane approximately 32 inches above the middle guns. Without a correction, the sight will always aim 32 inches higher than the mean gun line on F-86F Airplanes. To correct this, the sight pip is tilted down to intersect the guns, since the guns are fixed except for a ¼-degree adjustment provided for gun tolerances. Parallax error is zero at the range where intersection of the sight line and mean gun bore occurs. A range of 2250 feet is recommended for zero parallax, although other ranges can be used. The attitude of the computer with reference to the airplane centerline (within reasonable limits) has very little effect on the computation of the elevation component of lead angle. However, the attitude does affect the cross-roll correction, which keeps the pip on the target when the airplane rolls while tracking. This cross-roll correction is changed when the computer case is tilted, which changes the deflection gyro mounting axis relative to the gun bore and sight lines. The correct mounting of this gyro relative to the gun bore line is obtained when the computer case is parallel to the gun bore line. This is true on F-86F Airplanes, since the guns are fixed and the sight line is adjustable. The guns may be set for convergence if desired. However, this is not recommended, since the guns on the F-86F Airplanes are closely spaced both vertically and horizontally, resulting in a very slight difference in the bullet pattern between converging and parallel guns. The parallel guns have the advantage of covering a larger target area, resulting in more hits with little decrease in pattern density.

9-13. SELECTING DISTANCE FOR POSITIONING FIRING-IN TARGET. Usually the selection of a distance from target to airplane for gun firing-in is fixed, either because the available range facility is already fixed or because the space available for building one is limited. If this is not the case, several factors must be considered before a firing-in range distance is selected. As the firing-in distance increases, the size of the target must also be increased because of a larger bullet gravity drop and a larger bullet dispersion pattern. For example, if 80 percent of the bullets fall within a 4-foot circle at 1000 feet, a target circle of 8 feet will be required for a 2000-foot range. Since it is desirable to locate all hits (even those outside the dispersion circle), this would require a target at least twice as big as the bullet dispersion circle. Such a target would be large and unwieldly for a very long range. However, if a relatively short range is used, the smaller target is easier to build and adjust when the target is lined up with the airplane. By use of ranges from 500 to 1000 feet, adequate accuracy can be obtained without precision, either in painting the target or locating the bullet holes. Ranges shorter than 500 feet are not recommended, as it is more difficult to determine the correct gun position because of the greater precision required in locating hits.

9-14. GUN FIRING-IN HARMONIZATION TARGET CONSTRUCTION AND USE OF CHARTS. To construct a firing-in target (figures 9-5 and 9-6), proceed as follows:

a. Lay out a straight line down center of target board to represent airplane centerline.

b. Locate and draw aligning sight mark. This mark should be placed well above the center of the target board and is 26¼ inches left of the target centerline.

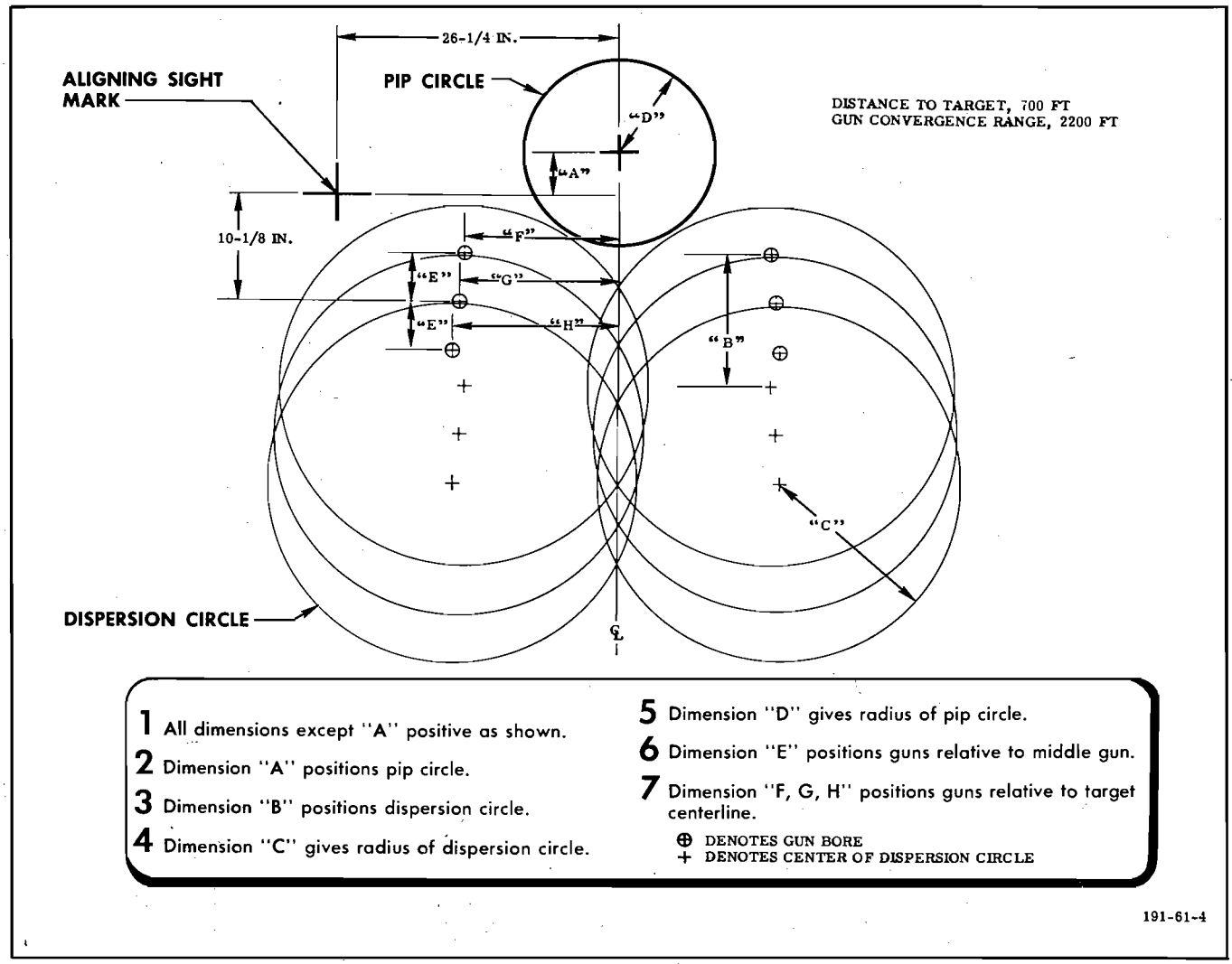


Figure 9-6. Converging Guns Firing-in Target

Make certain that the two lines which make up the aligning sight mark are parallel and square, respectively, with plane of centerline.

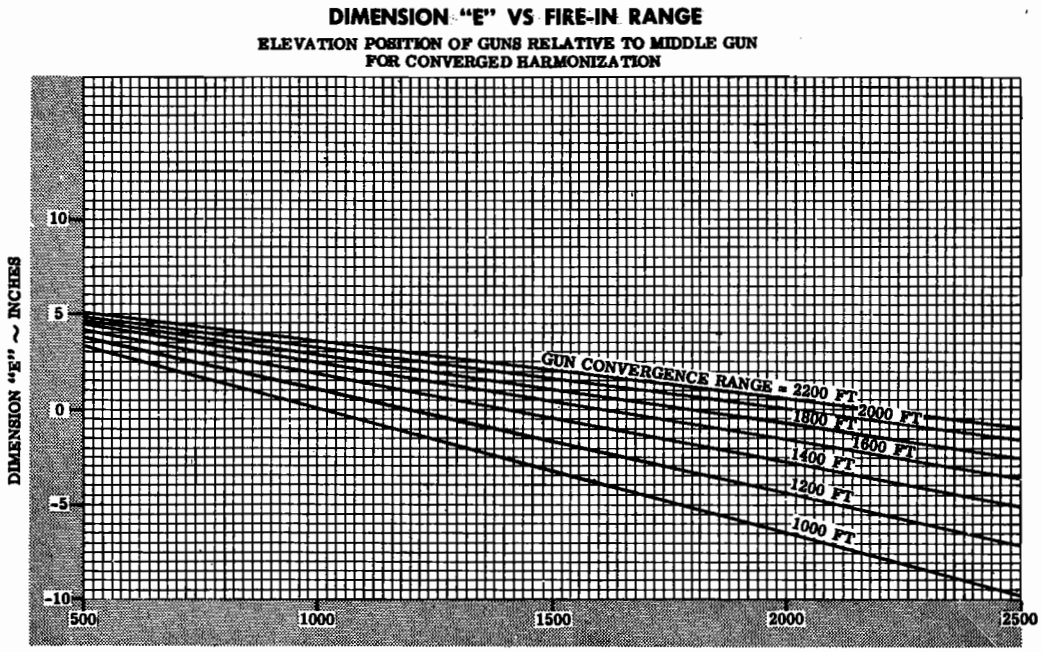
Note

Paint all target lines at least 2 inches wide. This is required because of increased viewing distance from airplane to target board.

c. Locate center of pip circle by dimension "A" in figure 9-5. This dimension locates the pip circle center in relation to the aligning sight mark. A positive value places the center of the pip circle below the aligning sight mark. A negative value places it above the aligning sight mark. Although the sight line is offset 1⅛ inches from the centerline of the airplane for the A-1CM sight and ¾ inch for the A-4 sight, this is considered negligible and the sight mark is shown on the centerline of the target. To obtain dimension "A" from chart (figure 9-5), enter chart at fire-in range line at distance selected for target positioning. Follow this line up until it intersects parallel correction line (2250 feet recommended). Obtain value of "A" from scale on left of chart at point where fire-in range line intersects parallel correction line. (See figure 9-5, example "A.")

d. Draw pip circle, the radius of which is given by dimension "D." (See figure 9-5, example "D.")

e. Location of the bullet dispersion circles will vary somewhat, depending on whether parallel (recommended) or converging harmonization is used. For parallel harmonization, find vertical location of a given dispersion circle by adding dimension of "B" (figure 9-5, example "B") to fixed vertical dimension of gun bore relative to aligning sight mark. The lateral distance from the centerline is fixed at the values given in figure 9-5. Repeat for each gun. For converging harmonization, first find vertical position of dispersion circle of center guns by adding dimension "B" (figure 9-5) to the fixed gun dimension shown in figure 9-6. The vertical position of the dispersion circles, for the other two guns on each side of the airplane, are located



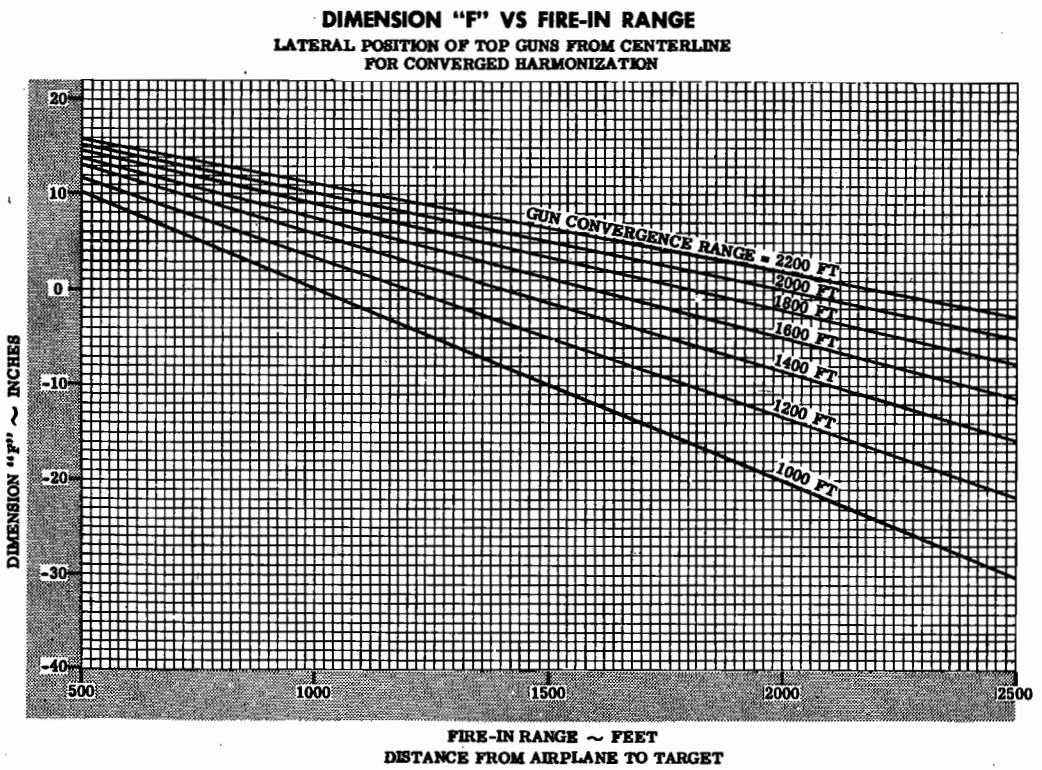


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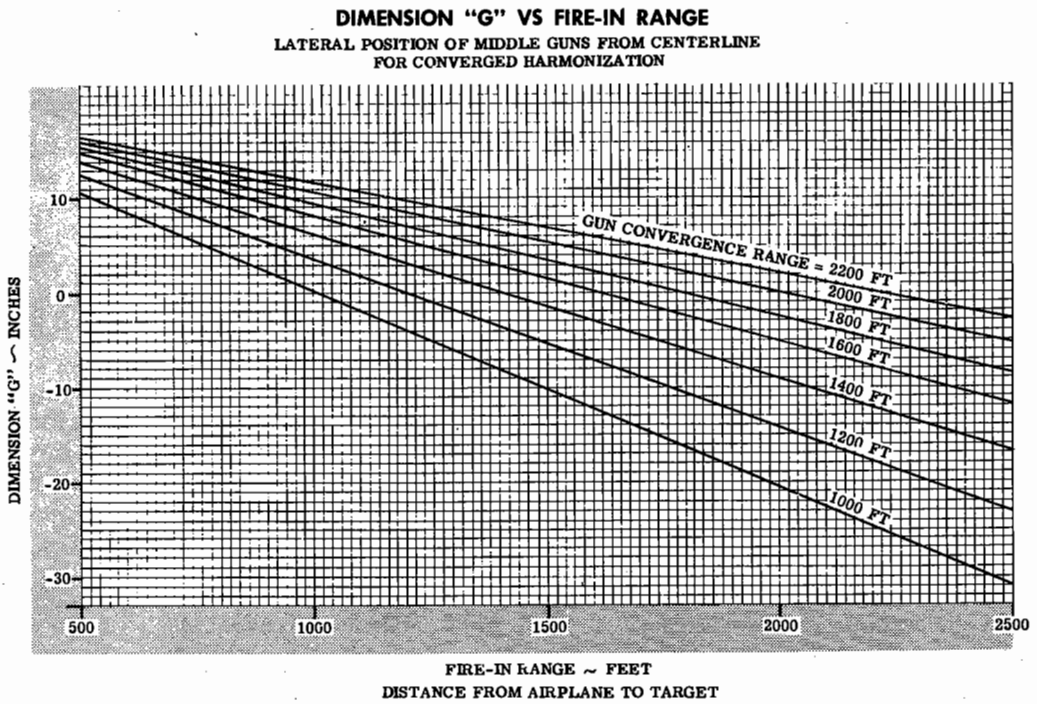
Figure 9-7. Converging Guns Firing-in Target and Construction Charts (Sheet 1 of 2)



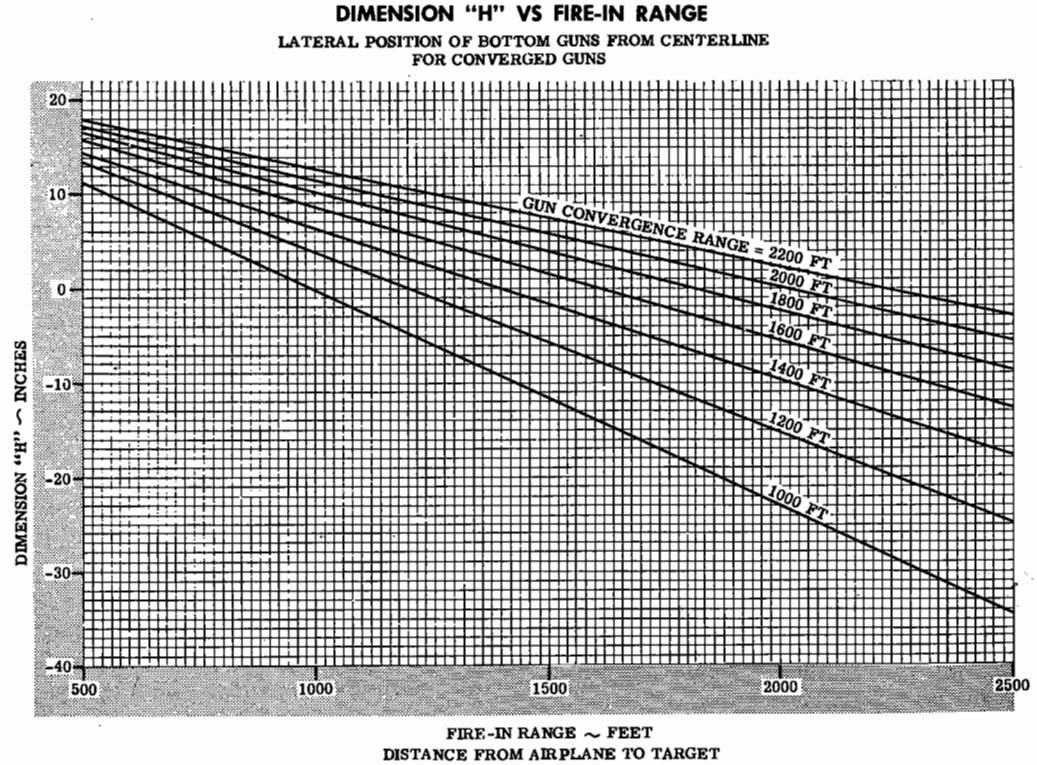


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Figure 9-7. Converging Guns Firing-in Target and Construction Charts (Sheet 2 of 2)

one above and one below the middle gun dispersion circle by dimension "E" (figure 9-7). The lateral positions of the dispersion circles, relative to the centerline, are given by dimensions "F," "G," and "H" (figure 9-7).

f. Obtain radius of dispersion circles from dimension "C." (See figure 9-5, example "C.")

9-15. GUN FIRING-IN HARMONIZATION PROCEDURE. To check firing-in harmonization of the guns, proceed as follows:

a. Level airplane laterally and longitudinally. (Refer to paragraph 1-16.)

CAUTION

When jacking airplane, make certain that one leg of each jack tripod is placed to the rear. This prevents backward movement of the airplane when the guns are fired. It is advisable to weight the nose of the airplane with sandbags placed in the entrance of the engine air intake duct. This aids in stabilizing the airplane against the gun recoil when the guns are fired separately. However, the airplane must be tied down when all guns are to be fired simultaneously.

b. Level computer case.

c. Align target to airplane. (Refer to paragraph 9-10.)

WARNING

Before loading guns for firing-in harmonization, make sure that bore of barrel is clean, dry, and free from obstructions. Load only one gun at a time, leaving gun covers open on all other guns to prevent possible inadvertent gun firing. Disconnect electrical plug on all guns except the one being fired-in. Make certain that personnel are not allowed to walk in front of airplane when guns are loaded. To load guns, refer to paragraph 9-108.

d. Alternately fire and adjust each gun until individual dispersion pattern is centered in proper circle; 60 to 80 percent of the bullets fired should fall within the dispersion circle. For a reliable dispersion pattern, at least 10 rounds should be fired per burst.

WARNING

Open gun covers or unload guns before permitting personnel to walk in front of airplane to check target.

e. Adjust sight until electrically caged pip falls in pip circle on target. Sight adjustments must be made with the sight mechanically caged. To adjust sight, see figure 9-46.

Note

- Do not attempt to harmonize guns with sight system computing for an arbitrary range, even if pip circle on target has been changed to suit this range.
- It is desirable that all harmonization procedures be performed following a single airplane leveling operation. It is not possible to harmonize the gun camera, sight reticle camera, and rockets on the same target utilized for firing-in harmonization of the guns. Therefore, the use of the 1000-inch bore-sight harmonization procedure as outlined in paragraph 9-10 is recommended for harmonizing the gun camera, sight reticle camera, and rockets.

9-16. BOMBING SYSTEM.

9-17. The all-electric bombing system (figure 9-8) accommodates under each wing, either a single 250- to 1000-pound bomb, a 750-pound napalm tank, a 540-pound fragmentation bomb consisting of a rack and 18 individual bombs, or (on F-86F-1 through F-86F-20 Airplanes) a chemical tank. The system features manual release, automatic release, and electrical external stores jettison systems. The system consists of a detachable bomb rack under each wing, as well as fairing, sway braces, struts, and mechanical linkage. Controls for the operation of the system (figure 9-8) are as follows: bomb release selector, bomb-rocket-tank salvo (jettison), bomb arming, chemical release (on F-86F-1 through F-86F-20 Airplanes), and fragmentation bomb selector switches, and bomb-rocket release button. The bomb-rocket-tank salvo (jettison) switch is located on the console just forward of the engine power control. The arming circuit is automatically interrupted when bombs are jettisoned. The release of chemicals (on F-86F-1 through F-86F-20 Airplanes) is controlled by the chemical tank selector switch, which selects either the left or the right chemical tank to be ignited when the bomb-rocket release button is pressed. Chemical tank igniter and ground terminals are provided in each wing, near the bomb rack fairing. The chemical tanks are jettisoned in the same manner as bombs. All electrical components of the system operate exclusively on 28-volt d-c power. The normal bombs may be armed and released singly or simultaneously (salvo), either manually or automatically. They all may be jettisoned by the external stores jettisoning handle. For information concerning mechanical external stores jettisoning, refer to paragraph 9-6. The airplane sight system (paragraphs 9-193 and 9-228) provides bomb aiming and triggering impulse for automatic bomb release. Ground

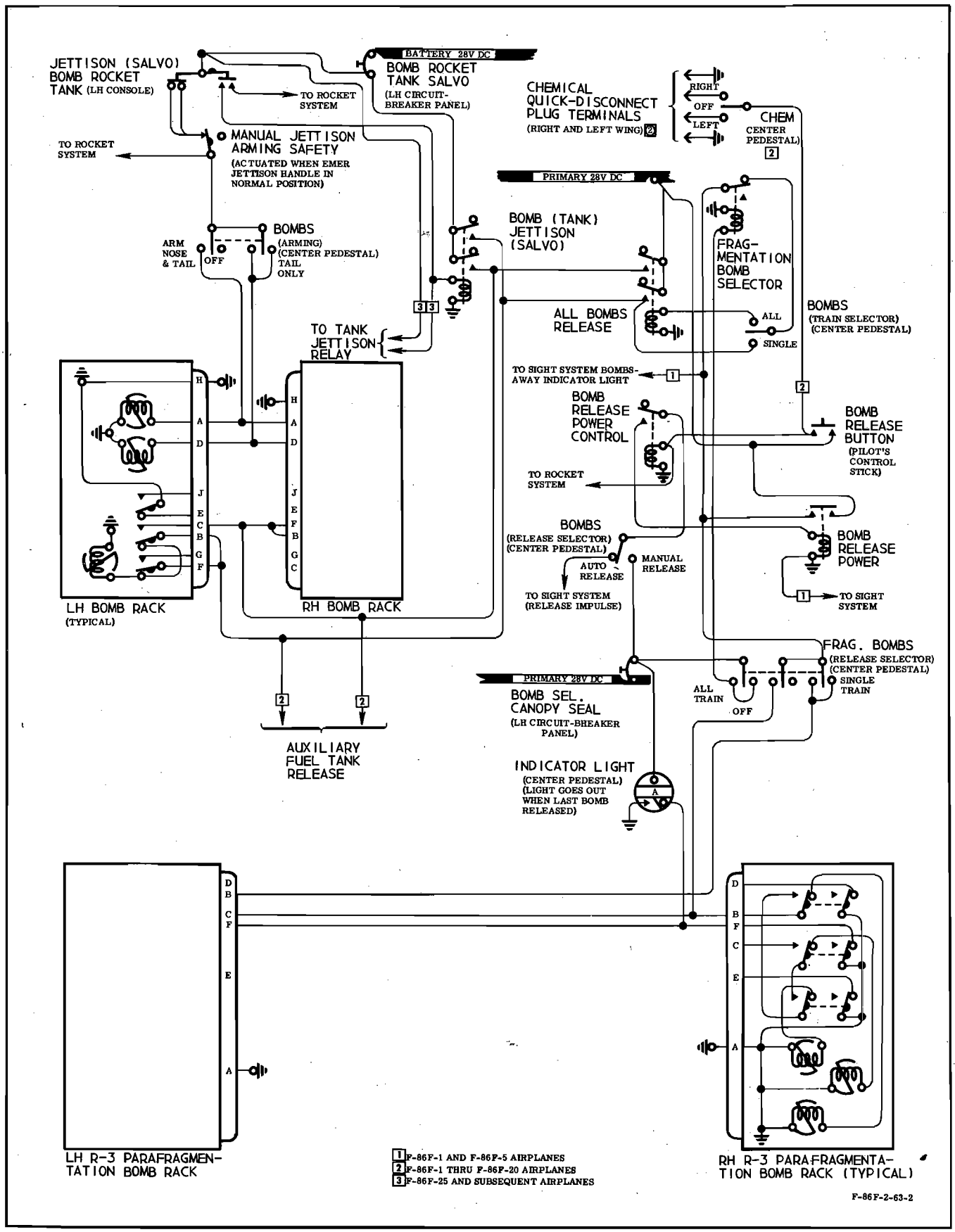


Figure 9-8. Bombing System

operation of the bombing system (during checking operation) is the same as in flight, except that no automatic sight operation is used.

9-18. FUNCTION OF BOMBING SYSTEM—MANUAL RELEASE.

9-19. Prior to manual release of bombs, the bomb release selector switch is positioned to "MANUAL RELEASE." The armament selector switch (figure 9-8) is positioned to "SINGLE" or "ALL"; with the selector switch is either position, power is routed to the bomb arming switch. Selecting "SINGLE" readies the system for individual bomb release. Selecting "ALL" readies the system for simultaneous release of all bombs. To arm the bombs, the bomb arming switch is positioned either to "ARM NOSE & TAIL" or to "TAIL ONLY." With "ARM NOSE & TAIL" selected, both arming solenoids of each bomb rack are energized to hold the nose and tail wire arming loops so that both arming pins are ready to be pulled at bomb departure. With "TAIL ONLY" selected, the nose arming solenoids are not energized; therefore, the nose wire arming loops are retained by the bombs at bomb departure. To release bombs, the bomb button is depressed, routing power to the previously selected contact of the armament selector switch. With "ALL" selected, the bomb salvo relay is energized and power is routed to both bomb racks. This energizes the bomb release solenoids to simultaneously drop both bomb loads (armed as previously selected). With "SINGLE" selected, power is routed to the left bomb rack, energizing the release solenoid to drop one single bomb load (armed as previously selected). When the left wing bomb load is dropped, a triggering action readies a switch in the left bomb rack to by-pass power to the right bomb rack, provided the bomb button is depressed a second time.

9-20. FUNCTION OF BOMBING SYSTEM—AUTOMATIC RELEASE.

9-21. Prior to automatic release of bombs, the bomb release selector switch is positioned to "AUTO RELEASE." The armament selector switch is positioned to "SINGLE" or "ALL"; with the selector switch in either position, power is routed to the bomb arming switch. Selecting "SINGLE" readies the system for release of the left bomb load on the first bomb run and the right bomb load on the second bomb run. Selecting "ALL" readies the system for simultaneous release on the first bomb run. The bomb arming switch is positioned to either "ARM NOSE & TAIL" or "TAIL ONLY." With "ARM NOSE & TAIL" selected, both arming solenoids of each bomb rack are energized to hold the nose and tail arming wire loops so that both arming pins are ready to be pulled at bomb departure. To drop bombs automatically, the bomb button is depressed and held until bomb release is completed. Depressing the bomb button routes power to the previously selected contact of the armament selector switch. With "ALL" selected, the bomb salvo relay is energized. When an impulse from the sight system energizes the bomb release relay, power is routed to each bomb rack, energizing the bomb release solenoids to simultaneously drop both bomb loads (armed as previously selected). With "SINGLE" selected, the bomb train relay is energized. When an impulse from the sight system energizes the bomb release relay, power is routed to the left bomb rack, energizing the release solenoid to drop a single bomb load (armed as previously selected). As the first bomb rack is triggered, a transfer circuit is readied to trigger the right bomb rack on the next bomb run when the bomb button is again depressed, repeating the same cycle of events.

9-22. FUNCTION OF BOMBING SYSTEM—ELECTRICAL JETTISON RELEASE.

9-23. The electrical emergency jettison system, energized by the closing of the bomb-rocket-tank salvo (jettison) switch, breaks the bomb arming circuit and jettisons all external loads (bombs, rockets, or auxiliary fuel tanks). Bomb release is accomplished when the salvo (jettison) switch is closed. This routes current from the battery bus to energize the bomb-rocket-tank salvo relay. The closing of this relay allows power to flow from the battery bus to the right and left racks, tripping the racks. (See figure 9-8.)

9-24. FUNCTION OF BOMBING SYSTEM—FRAGMENTATION BOMB RELEASE.

WARNING

The bomb train selector switch must remain in "OFF" position both on the ground and in the air to prevent inadvertent release of one or both bomb racks, provided the fragmentation bomb selector switch is in the "OFF" position and the bomb release button is depressed. This circuit is used in the normal bomb release system.

9-25. Fragmentation bombs are carried on a Type R-3 fragmentation bomb rack, which is attached to the normal bomb rack. Each rack holds three channels. There are six fragmentation bombs in each channel and these bombs are released in train. Release of the fragmentation bomb channels (figure 9-8) may be accomplished singly, one channel from the right and left sides simultaneously, singly in train, or simultaneously in train from the right and left sides. Prior to the release of the fragmentation bombs, the bomb release selector is positioned to "MANUAL RELEASE." The fragmentation bomb selector switch is positioned to "SINGLE TRAIN" or "ALL TRAIN"; with the switch in either position, power is

routed to the fragmentation bomb selector relay, making it impossible to mistakenly release the Type R-3 bomb rack. Selecting "SINGLE TRAIN" readies the system for either individual channel release or release of the channels singly in train. Selecting "ALL TRAIN" readies the system for either simultaneous release of one channel from the right and left sides, or simultaneously in train from the right and left sides. There are no provisions for safetying individual fragmentation bombs. To release the bombs, the bomb button is depressed and held, routing power to the previously selected contact of the fragmentation bomb release selector. With "SINGLE TRAIN" selected, power is routed to the left fragmentation bomb rack, energizing the release solenoid to trip the three fragmentation bomb channels in a train release. Then the current is routed to the right fragmentation bomb rack to trip the three bomb channels in subsequent train release. Momentarily depressing the bomb button will release one channel; depressing the button for 1½ seconds will release the second channel; and depressing the button for approximately 3½ seconds will release the third channel. With "ALL TRAIN" selected, power is routed to both fragmentation bomb racks, energizing the release solenoids to trip the three fragmentation bomb channels on the right and left sides simultaneously in a train release. Momentarily depressing the bomb button will release one channel from both the right and left sides; depressing the button for 1½ seconds will release the second channel on the right and left sides; and depressing the button for approximately 3½ seconds will release the third channel on the right and left sides. Emergency jettisoning of the fragmentation bombs is accomplished in the same manner as the jettisoning of the normal bomb load. The entire fragmentation bomb rack is dropped when the normal bomb rack release solenoids are energized.

9-26. TROUBLE SHOOTING BOMBING SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Bomb rack mechanism does not lock.	Dirty or defective rack.	
Bomb-carrying hooks fail to open, or open sluggishly when bomb rack is released electrically with bomb installed.	Internal friction caused by dirt or grit.	
Bomb-carrying hooks fail to open when rack is released without bomb weight installed.	Internal friction caused by dirt or grit.	When hooks do not open without help of weight or other assistance, the rack is not necessarily defective; however, this condition may indicate excessive friction or dirt. The bomb rack should be disassembled, cleaned, and inspected.
Bomb racks do not release when a manual all-release is attempted.	Bomb train selector switch in the "OFF" position. Bomb release selector switch in the "AUTO RELEASE" position. No power on circuit. Defective bomb-rocket release button. Bomb release control relay stuck open or defective. Defective bomb release power relay. Defective bomb train selector switch. "ALL" bomb release relay defective. Low or no voltage at rack, causing faulty operation of release solenoid.	Move bomb train selector switch to "ALL." Move bomb release selector switch to "MANUAL RELEASE." Check circuit. Locate defective wiring; repair or replace as required.

TROUBLE	PROBABLE CAUSE	REMEDY
Only one rack releases when bomb train selector switch is placed on "ALL" and bomb-rocket release button is pressed.	Defective wiring between bomb train selector switch and inoperable bomb rack. Defective bomb rack wiring or release solenoid. Defective wiring in jettison circuit. Defective bomb rack.	
Bomb racks do not release when bomb-rocket-tank salvo (jettison) switch is actuated.	No power. Defective bomb-rocket-tank salvo (jettison) switch or relay.	
With arming switch at either of the on positions, respective arming wire is not held when bomb rack is tripped.	No voltage at rack. Low voltage at rack causing faulty operation of arming solenoids. Arming solenoid inoperative.	Correct voltage supply. Make sure there are no poor terminal connections, defective wiring, etc. Replace rack.
With arming switch off and bomb rack locked, arming wire is held.	Wire retaining slide held in up position by dirt or grit.	
Fragmentation bombs are not tripped when system is set at a manual-train fragmentation bomb release and bomb-rocket release button is pressed.	No power. Defective bomb release control, bomb release power, and fragmentation bomb selector relays. Defective fragmentation bomb selector switch.	Check power source and correct.
Fragmentation bombs release from left rack only when system is set for a manual-train fragmentation bomb release and bomb-rocket release button is pressed.	Defective fragmentation bomb rack. Defective wiring between left and right racks.	
Fragmentation bombs release from left rack only when system is set for an all-train release and bomb-rocket release button is pressed.	Defective wiring between fragmentation bomb selector switch and bomb rack. Defective bomb rack.	

9-27. TESTING BOMBING SYSTEM.

9-28. To test the bomb release system (before loading bombs), first check the bomb rack installation for security of attachments and safetying; make sure the bomb release selector switch is in "MANUAL RELEASE" position; then proceed as follows:

a. Cock bomb racks.

b. Connect an external electrical power source.

c. Place arming wire loop in each arming unit; position arming switch at "ARM NOSE & TAIL." Arming loops should be held firmly by arming solenoids. Actuate bomb-rocket-tank salvo (jettison) switch; both bomb racks should trip simultaneously and all arming loops should release.

d. Cock racks and place bomb arming wire loops in each arming unit (if not already installed). Place bomb train selector switch on "ALL" and arming switch at "ARM NOSE & TAIL," and press bomb-rocket release button; both bomb racks should trip, and nose and tail arming wires should be retained.

e. Cock bomb racks and place bomb arming wire loops in each arming unit. Place bomb train selector switch on "SINGLE" and arming switch on "OFF." Press bomb-rocket release button; the left bomb rack will trip and drop the arming wires. Pressing the bomb-rocket release button once more will trip the right bomb rack and drop its arming wires.

f. Load bomb racks with dummy bombs or weights of not less than 25 pounds each. Place bomb train selector in "OFF" position. Repeatedly press bomb-rocket release button; the bomb racks should not trip.

g. Repeat steps c. through f. with dummy bombs or weights in the carrying hooks. (It is not necessary to install arming wires.)

h. If fragmentation bomb racks are to be used, install racks as described in paragraph 9-44.

i. Place fragmentation bomb selector switch in "SINGLE TRAIN."

j. Load fragmentation racks with dummy bombs.

k. Hold down bomb-rocket release button; the first, second, and third channels of the left fragmentation bomb rack should be tripped successively, and then the circuit should be automatically transferred to the right fragmentation bomb rack with subsequent release of all three channels in right rack.

Note

The bomb-rocket release button must be depressed until the fragmentation bomb indicator light is extinguished, indicating that the last bomb has been released.

l. Again load fragmentation bomb racks with dummy bombs.

m. Move fragmentation bomb selector switch to "ALL TRAIN."

n. Depress bomb-rocket release button; left and right fragmentation racks should simultaneously release their channels of bombs in rapid succession.

o. At completion of this test, turn all switches to "OFF."

p. Test mechanical release system. (Refer to paragraph 9-7.)

9-29. LOADING BOMBING SYSTEM.

9-30. See figures 9-11 and 9-12 for the method of bomb hoisting and sway bracing and for a complete list of bombs carried. Before loading the bomb racks, test bombing system thoroughly (paragraph 9-28) and proceed as follows:

a. Hoist bomb or tank in place under a released bomb rack. In most cases, upward pressure of bomb lugs against bomb hook tangs automatically cocks bomb rack. F-86F-35 Airplane AF53-1172 and all subsequent airplanes carry bomb racks equipped with an external cocking ring attached to the rack cocking strap by means of a cable. The cocking ring is accessible through a small access door on the forward end of the front bomb rack fairing. Pulling forward on the ring cocks the bomb rack. (See figure 9-10.)

Note

Make certain cocking ring is properly stowed and ring access door is replaced before flight.

b. If bomb is equipped with undersized lugs, apply force on hook tangs by means of a screwdriver (on top side of lugs) to cock rack.

c. Make certain that rack is completely cocked by observing that link stop engages tumbler and that tumbler engages toggle. Two inspection holes are provided for this purpose. (See figure 9-9.) However, because of the manner in which the fairing is installed, only the hole showing the engagement of the tumbler and toggle is visible.

d. Adjust bomb sway braces (a decal is provided with sway-brace adjustment instructions on the left side of each bomb rack intermediate fairing) as follows for F-86F-25 and subsequent airplanes: Adjust inboard pads evenly by turning lower hexagon until bomb hangs parallel to rack. Adjust outboard pads by turning lower hexagon until pad fits contour of bomb or tank. Tighten forward outboard lower hexagon 2¾ turns (approximately 125 inch-pounds torque). Then tighten upper check nuts.

e. Insert bomb arming wire loops into their respective arming solenoids. (See figures 9-9 and 9-10.) Arming wire loops should push arming slides up and automatically seat in place, and then arming slides should fall in the correct position.

f. Check arming wire loops to make certain that they are fully inserted above cupped section of arming slides, and that arming slides have fallen in place as far down as possible when observed relative to external slots. (See figures 9-9 and 9-10.)

g. If one or both arming slides are held partly up, push arming wire loops farther up so that it seats properly and permits slides to fall freely into correct position.

h. In some instances, insertion of arming wire loops can be facilitated if they are put into place before the bomb is hoisted into the rack. In such cases, the rack should be uncocked with the arming slides in the "up" position. Therefore, to insert arming wire loops in bomb rack, hold loops in position until an assistant energizes the arming solenoids by actuating the switches in the cockpit.

i. Install bomb in rack as explained in steps a. through d.

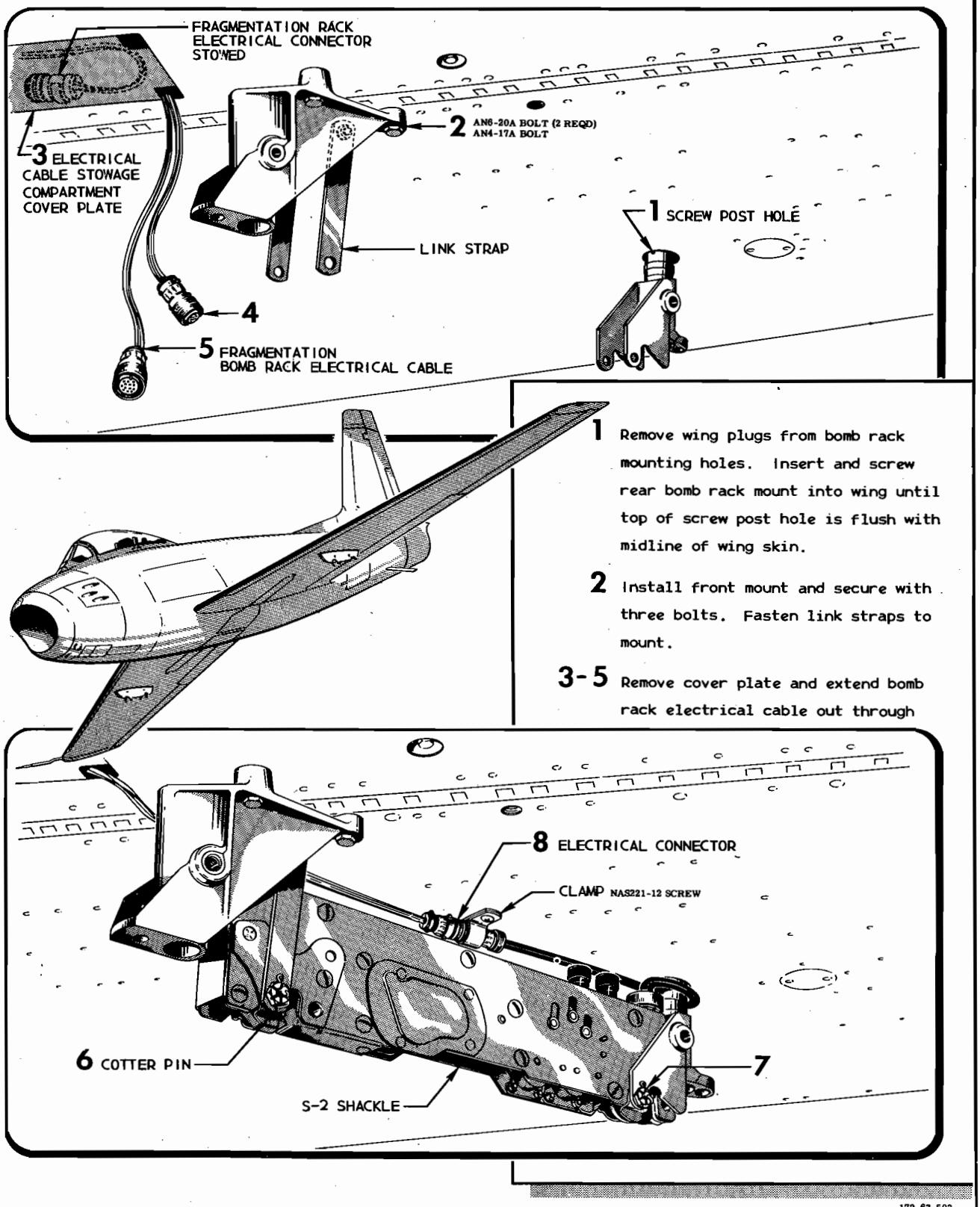
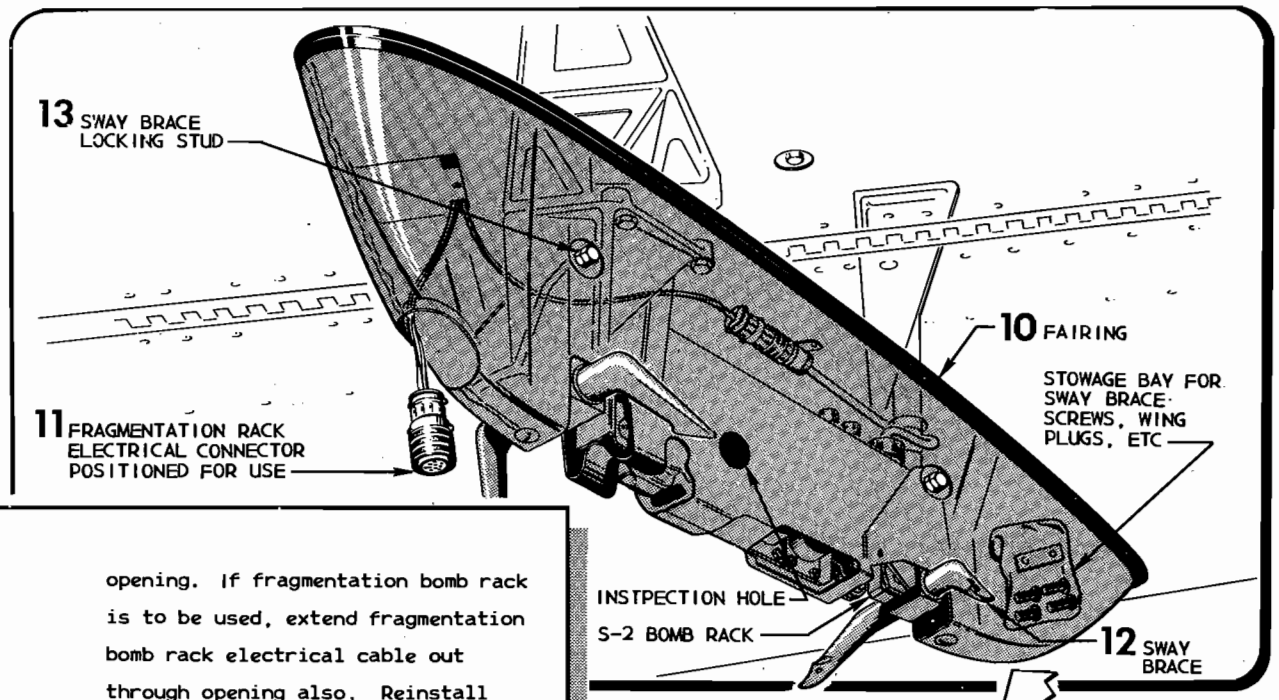


Figure 9-9. Installing Bomb Racks—F-86F-1 Through F-86F-20 Airplanes (Sheet 1 of 2)



opening. If fragmentation bomb rack is to be used, extend fragmentation bomb rack electrical cable out through opening also. Reinstall cover plate as shown.

6,7 Install S-2 shackle and secure with bolts, washers, and nuts. Insert cotter pins as shown.

8 Connect electrical connector. Note routing of cable around rear mount. Secure connectors to wing with clamps.

9 If mechanical release system is incorporated on airplane, install rod lever assembly and jettison rod. Screw rod in or out of jettison fitting as required to obtain indicated distance between wing skin and lever.

10,11 Install fairing on shackle. If fragmentation bomb is to be used, insert electrical connector as shown.

12,13 Install sway braces as shown. Tighten sway brace locking studs to hold sway braces in place.

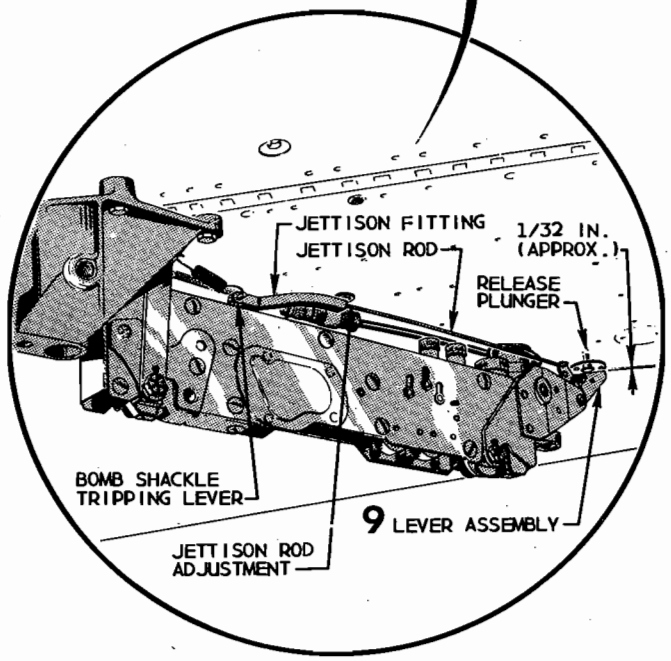


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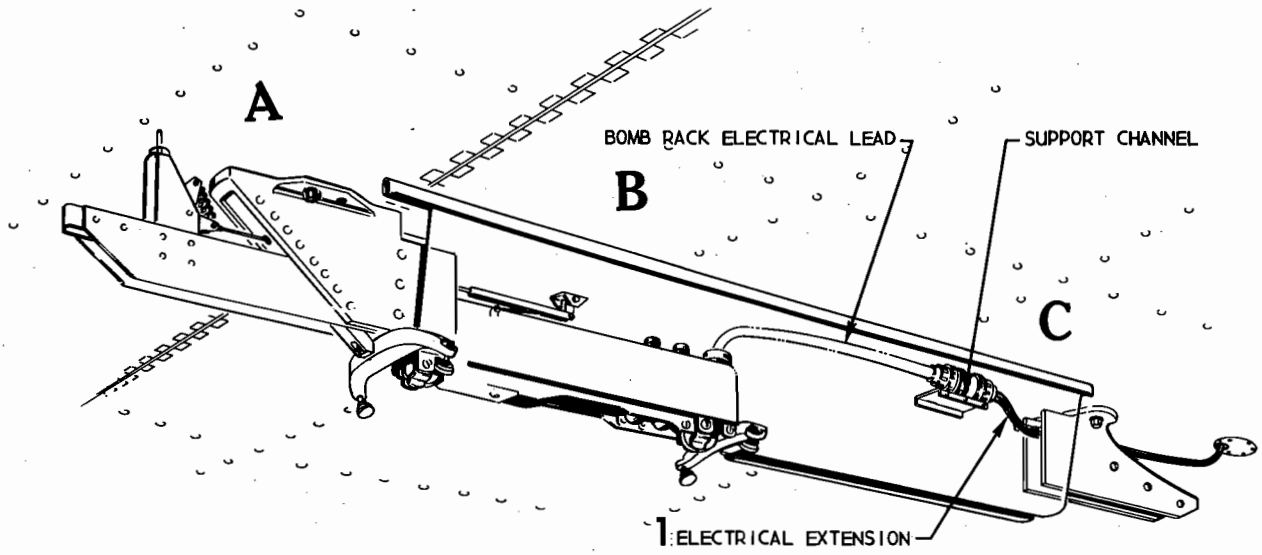
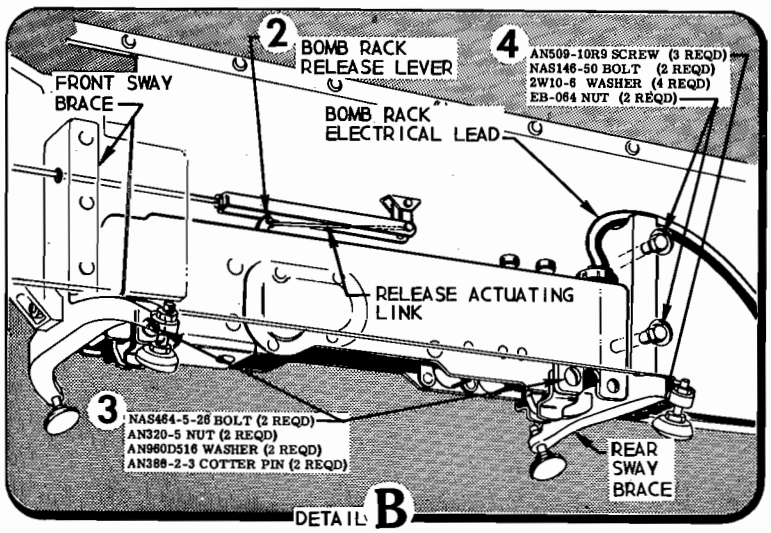
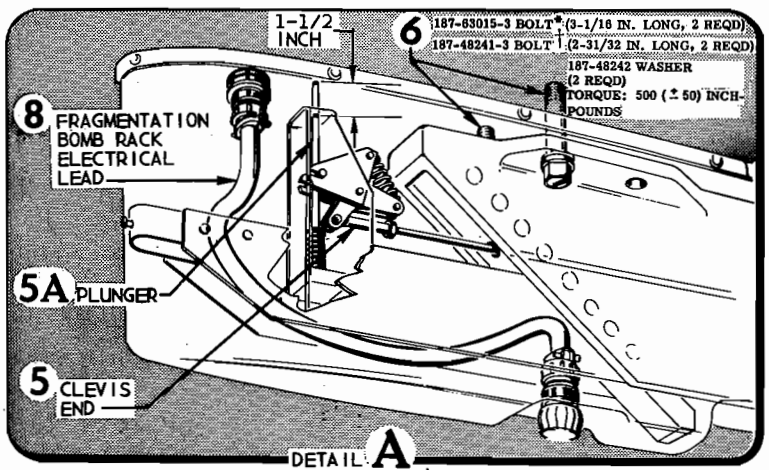
Figure 9-9. Installing Bomb Racks—F-86F-1 Through F-86F-20 Airplanes (Sheet 2 of 2)







*ON F-86F-25 AIRPLANES AF51-13469 THROUGH -13510 AND AF52-5272 THROUGH -5530, F-86F-30 AIRPLANE AF52-4806, AND ALL SUBSEQUENT AIRPLANES

†F-86F-25 AIRPLANES AF51-13170 THROUGH -13468 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4805

1 Connect bomb rack electrical lead to electrical extension harness inside fairing center section. Pull harness aft until lead and harness connector is located over support channel.

2 Connect mechanical release actuating link to bomb rack manual release lever.

2A Connect cocking cable clip to bomb rack cocking strap with 1/8-inch diameter pin and cotter pin.

3 Move bomb rack up into position in fairing; then secure bomb rack.

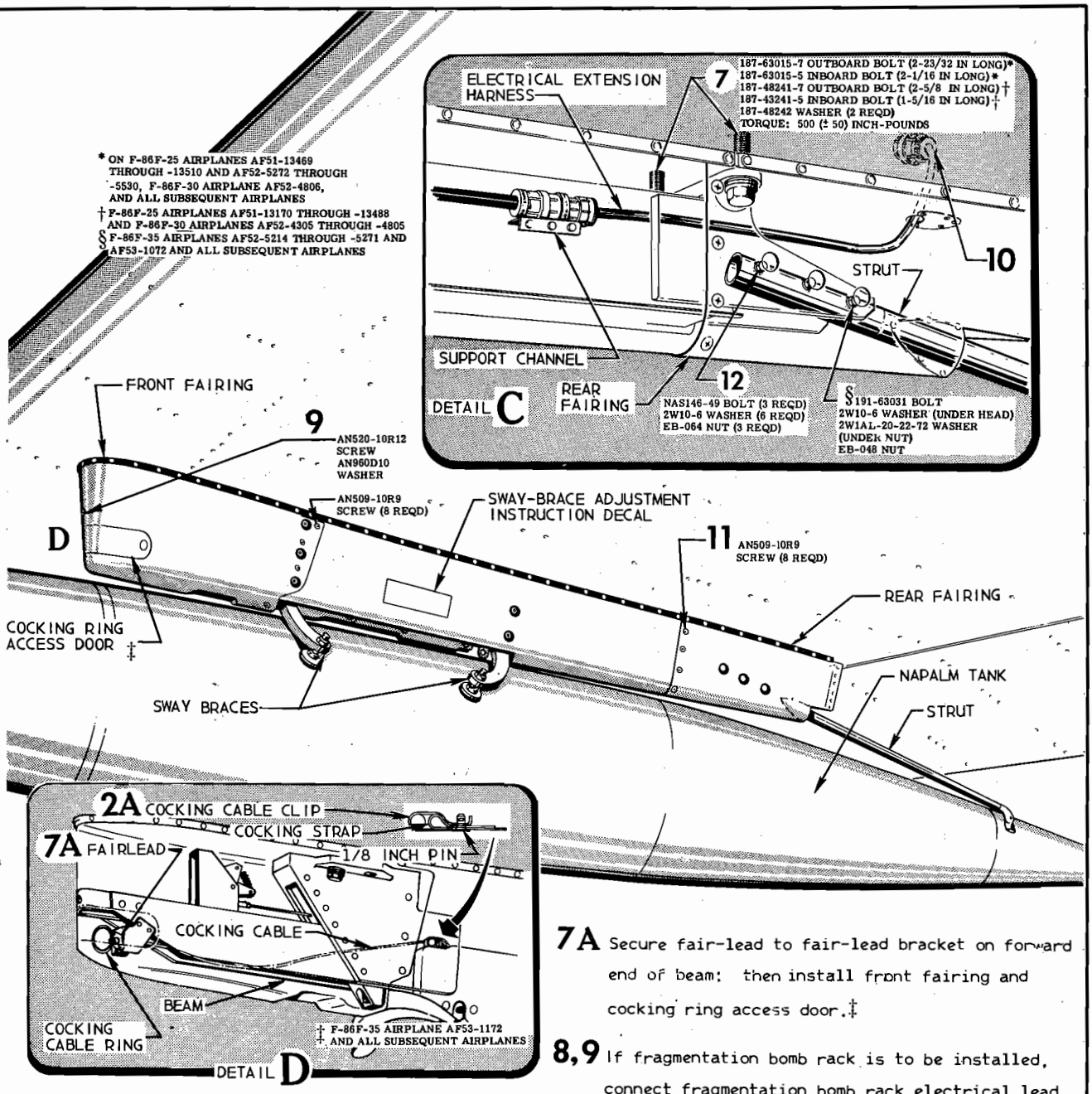
4 Install rear sway brace.

5 Cock bomb rack; then, while holding bomb rack release lever in forwardmost position, adjust mechanical release rod at clevis end until release plunger protrudes from support as shown.

5A Press manual release plunger a maximum of one inch; bomb rack hooks should open fully.

F-86F-2-63-8B

Figure 9-10. Installing Bomb Racks and Fairings—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)



6,7 Remove bolt hole plugs and open receptacle cover plates in wing lower surface. Position center section fairing under wing; then secure fairing to wing, using proper bolts in aligned threaded wing holes.

NOTE Install AN995F41 lockwire through front bolt, around front of fitting, and through bolt on other side. Install AN995F41 lockwire through aft bolt, around aft end of fitting, and through bolt on opposite side.

7A Secure fair-lead to fair-lead bracket on forward end of beam; then install front fairing and cocking ring access door.‡

8,9 If fragmentation bomb rack is to be installed, connect fragmentation bomb rack electrical lead to wing and fairing front section.

10 Connect bomb rack electrical harness plug to receptacle in wing.

NOTE Lower wing flaps fully to obtain access for connecting plug to receptacle.

11 Install fairing rear section.

12 If a napalm tank is to be installed, install tank support strut.

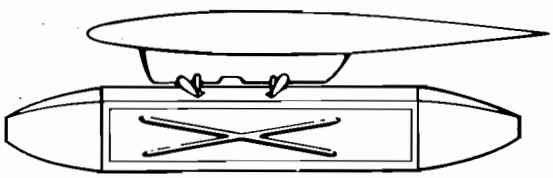
F-86F-2-63-7B

Figure 9-10. Installing Bomb Racks and Fairings—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

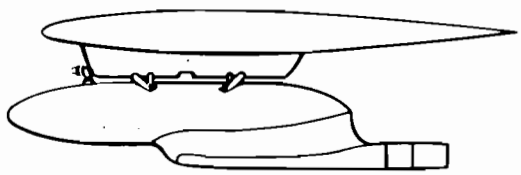
WT	ACTUAL WT	TYPE	DESCRIPTION
100	106.1	AN-M30A1	GENERAL PURPOSE
100	100	M38A2	PRACTICE
100	72	AN-M47A3	INCENDIARY
100	87.2	AN-M4A2	FRAGMENTATION CLUSTER
100	87	M-5	PRACTICE CLUSTER
100	128	AN-M2A2	PRACTICE CLUSTER
100	128	AN-M1A2	FRAGMENTATION CLUSTER
115	125	M70	CHEMICAL
220	216.2	M88	FRAGMENTATION
250	254.7	AN-M57A1	GENERAL PURPOSE
*250	234-265	M89-M90-M98	TARGET IDENTIFICATION
260	263	AN-M81	FRAGMENTATION
*325	329.5	AN-MK41	AIRCRAFT DEPTH
325	323.8	AN-MK53, MOD 1	AIRCRAFT DEPTH
*350	368	AN-MK44	AIRCRAFT DEPTH
*350	354.5	AN-MK47	DEPTH
350	348.6	AN-MK54, MOD 1	AIRCRAFT DEPTH
482	482	R-3 BOMB RACK WITH 18 AN-M-41 BOMBS	PARACHUTE-FRAGMENTATION RACK AND BOMBS †
500	535-545	AN-M64A1	GENERAL PURPOSE
500	499.2	AN-M58A2	SEMI-ARMOR-PIERCING
500	463	AN-M17A1	INCENDIARY CLUSTER
500	463	AN-M14	INCENDIARY CLUSTER
500	473	AN-M76	INCENDIARY
500	438-471	AN-M78	CHEMICAL
500	416	M26A2	FRAGMENTATION CLUSTER
500	590	M27	FRAGMENTATION CLUSTER
540	540	R-3 BOMB RACK WITH 18 AN-M-40 BOMBS	PARACHUTE-FRAGMENTATION RACK AND BOMBS †
588	588	M10	SMOKE TANK
1000	1024-1035	AN-M65A1	GENERAL PURPOSE
1000	1024	AN-M59A1	SEMI-ARMOR-PIERCING
1000	1008	AN-MK33	ARMOR-PIERCING
1000	717-937	AN-M79	CHEMICAL

* F-86F-1 through F-86F-15 Airplanes

† One Type R-3 parachute-fragmentation rack can be installed on each wing bomb rack. When empty, the R-3 rack weighs 126 pounds.



R-3 FRAGMENTATION BOMB RACK



M-10 SMOKE TANK

176-63-6

Figure 9-11. Bomb Loading—F-86F-1 Through F-86F-20 Airplanes (Sheet 1 of 2)

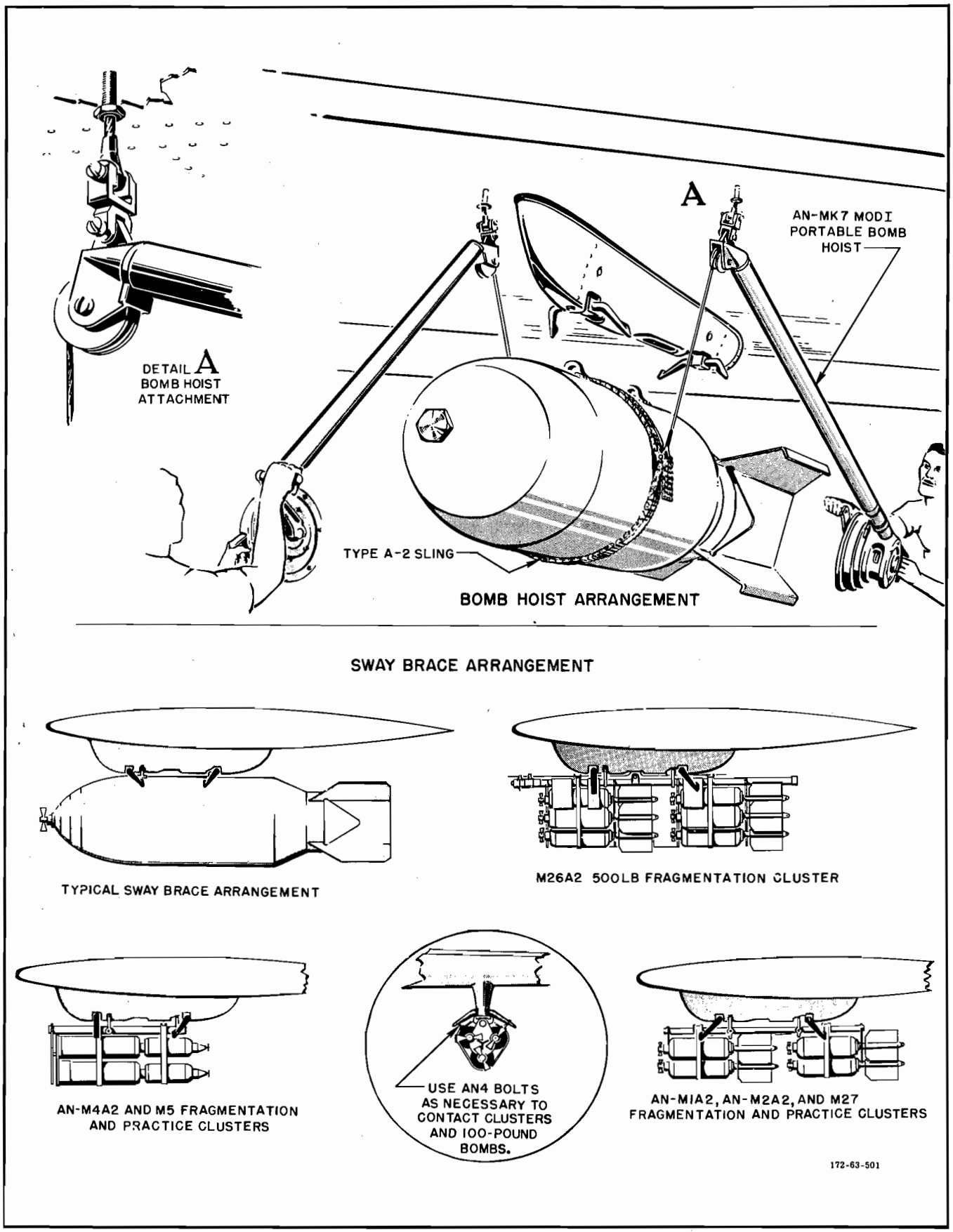


Figure 9-11. Bomb Loading—F-86-1 Through F-86F-20 Airplanes (Sheet 2 of 2)

WT	ACT. WT	TYPE	DESCRIPTION
250	254.7	AN-M57A1	GENERAL-PURPOSE
*482	482	R-3 BOMB RACK WITH 18 AN-M-41A1 BOMBS	PARACHUTE-FRAGMENTATION RACK & BOMB
500	500	X12	GENERAL-PURPOSE
500	592	AN-M64A1 WITH T127E1 FIN	GENERAL-PURPOSE
500	545	AN-M64A1	GENERAL-PURPOSE
*540	540	R-3 BOMB RACK WITH 18 AN-M-40A1 BOMBS	PARACHUTE-FRAGMENTATION RACK & BOMB
750	750	EXTERNAL FIRE BOMB E74	NAPALM TANK
750	750	T54	GENERAL-PURPOSE
†1000	1000	EX. 10, MOD 3	GENERAL-PURPOSE

*One Type R-3 rack can be installed on each wing bomb rack. When empty, the R-3 rack weighs 126 pounds.

†Flap travel will be limited to 20 degrees when 1000-pound bomb is used.

BOMB LOADING ARRANGEMENT FOR MK 6 BOMB LIFT TRUCK

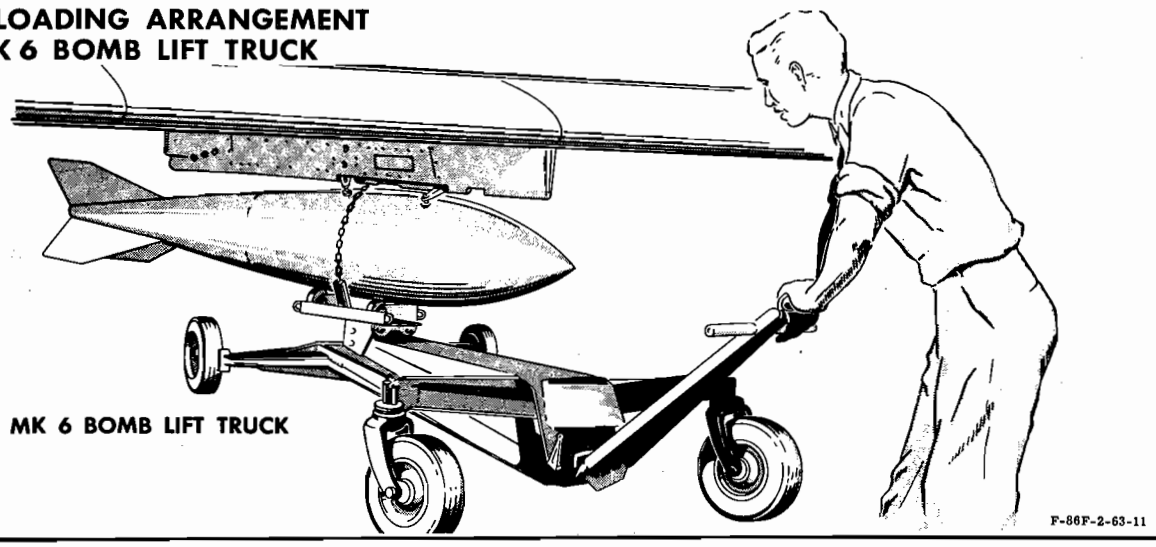
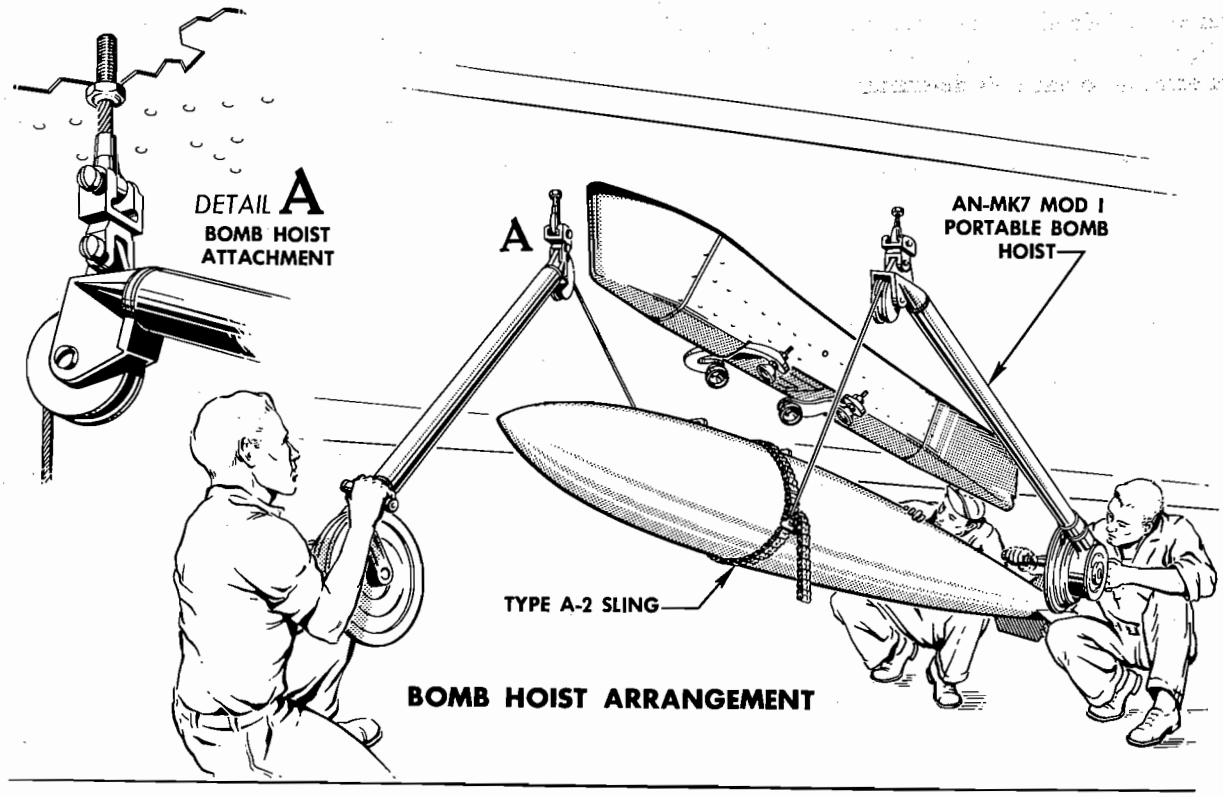
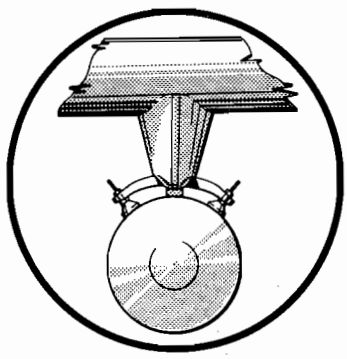


Figure 9-12. Bomb Loading—F-86F-25 and Subsequent Airplanes (Sheet 1 of 2)

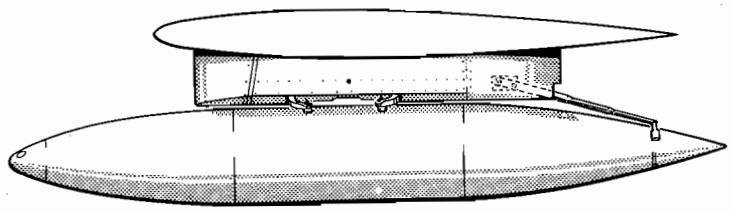


BOMB HOIST ARRANGEMENT

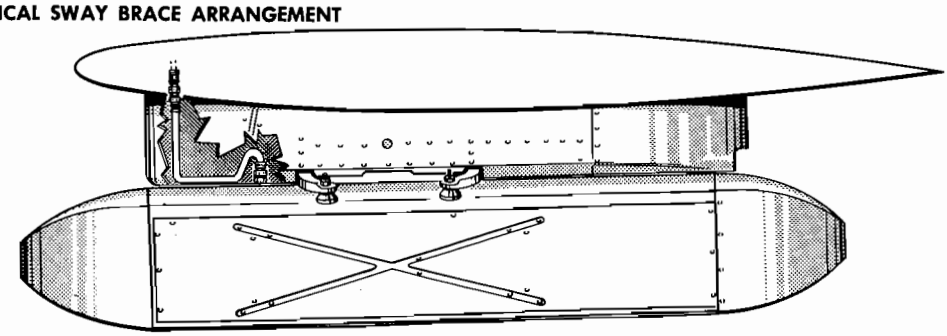
SWAY BRACE ARRANGEMENT



TYPICAL SWAY BRACE ARRANGEMENT



NAPALM TANK WITH DISPLACING STRUT ATTACHED



TYPE R-3 PARACHUTE-FRAGMENTATION BOMB RACK

191-63-2

Figure 9-12. Bomb Loading—F-86F-25 and Subsequent Airplanes (Sheet 2 of 2)

j. Check position of arming wire loops and arming slides as explained in steps f. and g.; then de-energize arming solenoids. Wire loops must be firmly retained after arming solenoid is de-energized.

Note

Rack will not retain wire unless cocked, or unless arming solenoids are energized.

9-31. NORMAL BOMB RACK INSTALLATION (F-86F-1 THROUGH F-86F-20 AIRPLANES).

9-32. Provisions for installing an S-2 type bomb rack are incorporated under each wing at station 99½. Each bomb rack installation consists of a front and a rear bomb rack support assembly, a streamlined fairing, and two sets of bomb sway braces (for single and cluster-type bomb combinations). The sway braces, in each support assembly, are adjustable for various diameter bombs. Wiring for the bomb rack and the fragmentation bomb rack, stowed inside the wing, can be reached through an access door just forward of the front bomb rack support fitting. A door is provided in the front of the bomb rack fairing to permit the fragmentation rack electrical connector plug to drop through the bomb rack fairing and connect to the socket on top of the fragmentation bomb rack. The mechanical release lever (on top of rack) is provided to facilitate tests and loading procedures. This lever can be actuated by use of a screwdriver through the hole provided on right side of bomb rack fairing. A second hole is provided in the fairing on the left side to permit inspection of the bomb rack lock mechanism.

9-33. REMOVING NORMAL BOMB RACK INSTALLATION (F-86F-1 THROUGH F-86F-20 AIRPLANES). See figure 9-9, and remove bomb rack in the following manner:

a. Loosen sway-brace lockscrews and pull sway braces from housing in rack.

b. Loosen front and rear fairing supporting screws, and drop fairing from rack.

c. Disconnect and stow bomb rack wiring in wing; then install access cover.

d. Remove the two bolts supporting bomb rack.

e. Rotate rear support assembly in counterclockwise direction until assembly is free to be removed.

f. Remove the three mounting bolts from front support assembly.

g. Install wing plugs in bomb rack mounting holes.

CAUTION

Screw plugs into wing until they are flush with wing skin. Do not attempt to tighten them further.

9-34. INSTALLING NORMAL BOMB RACK INSTALLATION (F-86F-1 THROUGH F-86F-20 AIRPLANES). See figure 9-9.

9-35. NORMAL BOMB RACK INSTALLATION (F-86F-25 AND SUBSEQUENT AIRPLANES).

9-36. Provisions for installing an S-2A type bomb rack are incorporated under each wing at station 72¼. The right and left bomb rack installation (figure 9-10) consists of a three-piece structural support fairing, two sway braces, an S-2A bomb rack, mechanical release linkage, and two electrical extension harnesses. The fairing is bolted directly into the wing spar area of the wing and incorporates the structural means of supporting the bomb rack. One of the two electrical harnesses provides an extension from the S-2A rack to connect to electrical receptacles in the wings. The other harness extends from the wing electrical wiring into the front of the fairing and provides the electrical connections when fragmentation bomb racks are installed. The S-2A bomb rack may be removed without the fairing being removed, or the fairing and bomb rack may be removed as a unit.

9-37. REMOVING NORMAL BOMB RACK INSTALLATION (F-86F-25 AND F-86F-30 AIRPLANES, AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271 AND 53-1072 THROUGH -1171). The bomb racks may be removed from the fairing when the fairing is on or off the airplane, or the fairing and bomb rack may be removed as a unit. To remove either right or left bomb rack and fairing, see figure 9-10 and proceed as follows:

a. Remove fairing rear section and aft sway brace.

b. With wing flaps fully down for access to receptacle in wing trailing edge, disconnect bomb rack electrical harness from receptacle.

c. If bomb rack is to be removed from fairing, remove the two bomb rack support bolts; then lower rack. When the mechanical release actuating link is exposed, disconnect it from bomb rack actuating lever. Pull bomb rack electrical lead forward sufficiently to expose connector; then disconnect rack lead from electrical harness, leaving harness in fairing.

d. Remove fairing front section.

e. Remove the four bolts securing fairing center section to wing; then lower fairing vertically until mechanical release plunger is free of wing. If racks and fairings are not installed before next flight, close receptacle cover plates and insert plugs in threaded holes in wing.

9-37A. REMOVING NORMAL BOMB RACK INSTALLATION (F-86F-35 AIRPLANE AF53-1172 AND ALL SUBSEQUENT AIRPLANES). To remove bomb racks, see figure 9-10 and proceed as follows:

a. Remove fairing front and rear sections and aft sway brace.

b. With wing flaps fully extended for access to receptacle in wing trailing edge, disconnect bomb rack electrical harness from receptacle.

c. Remove fair-lead attaching screws, allowing cocking cable and fair-lead to drop out of slot in fair-lead mounting bracket and out bottom of beam.

d. Support bomb rack, and remove rack attaching bolts.

e. Lower bomb rack until fair-lead and cocking ring reach cable hole in pylon bar.

f. Remove clip end of cocking cable from bomb rack cocking strap by removing ⅛-inch diameter pin and cotter pin.

g. Disconnect mechanical release actuating link from bomb rack manual release lever, and remove rack.

9-38. INSTALLING NORMAL BOMB RACK (F-86F-25 AND SUBSEQUENT AIRPLANES). See figure 9-10.

9-39. NORMAL BOMB RACKS.

9-40. The S-2A double-hooked bomb rack (figure 9-10) is a 28-volt d-c electrically controlled unit composed of a frame and cover, two bomb carrying hooks, an operating mechanism, and an electrical harness. A manual release lever, bomb arming slides, and a bomb arming trip lever are riveted to the back side of the cover. Two links connect the bombing hooks at their upper ends. The operating mechanism cocks and releases the bomb carrying hook linkage. The frame incorporates the transfer switch housing and a removable cocking slide with swivel ring. S-2A bomb racks installed on F-86F-35 Airplane AF53-1172 and all subsequent airplanes have a cocking cable and ring attached to the forward end of the cocking strap. The swivel ring is removed on these racks. Projecting through the switch housing is a manual trip lever plunger, which is actuated when mechanical external stores are jettisoned and when the bomb rack mechanical release is checked. The electrical harness comprises three solenoids (a release solenoid and two arming solenoids), two switches (a transfer switch and a salvo switch), two terminals (used when carrying chemical tanks), internal wiring, and an external cable, which connects the rack to the bombing system. Maintenance of the bomb rack is limited to installation and removal. If unit is defective, it should be replaced. No lubrication is required.

9-41. FRAGMENTATION BOMB RACKS.

9-42. Each fragmentation bomb rack weighs 126 pounds when empty and 540 pounds when loaded with eighteen AN-M-40 fragmentation bombs. There are no provisions for arming or safetying individual fragmentation bombs. It is impossible to release individual bombs mechanically or to release individual bombs safely from the fragmentation bomb rack. Six individual bomb groups are stacked three deep in two tandem compartments. The bomb release sequence is as follows: The tripping solenoid, located in the rear of the rack, operates and trips the bomb retaining door in the rear bomb compartment. The three bombs in this channel are released, and as the third bomb falls, a mechanical follower moves down. This follower, through a mechanical linkage, trips the bomb retaining door in the front section. As the top bomb falls, the follower in this channel automatically transfers the current to the next channel.

9-43. REMOVING FRAGMENTATION BOMB RACKS. The Type R-3 fragmentation bomb rack may be removed by emergency jettison release (paragraph 9-23) or mechanical release (paragraph 9-6).

CAUTION

When removing fragmentation bomb rack, be prepared to catch the rack as it is released. The rack weighs 126 pounds empty and 540 pounds loaded.

9-44. INSTALLING FRAGMENTATION BOMB RACKS. Before installing bomb rack, first check the rack for cleanness and make sure all moving parts operate freely without binding; then proceed as follows:

a. Close bottom door in rear compartment of bomb rack. Make sure that door locks and that latch does not bind during normal travel.

b. Close bottom door of front compartment, and force mechanical follower in rear compartment up against top of rack. Make sure that door is locked, allow follower to move down, and check to see that door is unlocked.

c. Force mechanical follower in front compartment up against top of rack, and check continuity of circuit through skip (transfer) switch.

d. Remove wing bomb rack fairing. Remove fragmentation rack connector plug from stowage clip in wing and drop plug out through access hole in wing skin.

e. Install bomb rack fairing, with door in leading edge open and with fragmentation rack connector plug extended through opening.

f. Install empty fragmentation rack in same manner in which bomb is loaded, engaging electrical connectors as fragmentation rack is brought into position.

g. Install fragmentation rack on opposite wing as explained in steps a. through f.

h. Temporarily maintain mechanical followers in front compartment of each rack in up position, latch rear compartment doors, and make sure that indicator light on armament switch panel is illuminated.

i. Set controls and make sure that fragmentation rack release solenoids operate; then check that rear compartment doors are unlatched. Then release front compartment mechanical followers.

9-45 through 9-78. (Deleted)

(Figures 9-13 through 9-16 deleted)

9-79. ROCKET SYSTEM.

9-80. On F-86F-1 Airplanes through F-86F-30 Airplanes and F-86F-35 Airplanes AF52-5164 through -5271, the rocket system (figure 9-17) consists of eight removable zero-rail rocket launchers mounted below the wing, a projector release control mounted in the cockpit, and the necessary switches, cabling, and relays. Four launchers are mounted on each outer wing panel, providing a complement of sixteen 5-inch HVAR (high-velocity aerial rockets). The gun-bomb-rocket sight system (paragraphs 9-195 and 9-230) is used for rocket aiming. Rocket arming and firing is accomplished electrically, while jettison release is achieved either electrically or mechanically. (Refer to paragraph 9-6.) On F-86F-35 Airplane AF53-1072 and all subsequent airplanes, five rocket stations are provided on the lower side of each wing to accommodate the installation of twenty HVAR (high-velocity aerial rockets). Rocket arming and release are accomplished in the same manner as on earlier airplanes. Rocket system controls include the following: the bomb-rocket release button (on the pilot's control stick grip); the rocket jettison test switch (on the canopy deck panel); the rocket jettison safety switch (on the right main landing gear strut); the bomb-rocket-tank (jettison) switch (on the left forward console); and the rocket selector switch and rocket arming switch (located on the center pedestal).

9-81. FUNCTION OF ROCKET SYSTEM—ARMING.

9-82. Depressing the bomb release button and setting the rocket arming switch on "INSTANT" energizes the arming solenoids at each rocket station. The energized arming solenoids retain the respective rocket nose fuse arming wires so that when the rocket is fired, not jettisoned (paragraph 9-86), the nose fuse is set for instantaneous detonation upon initial impact with target. When a rocket-firing sequence is accomplished with the rocket arming switch on "OFF" or "DELAY," the nose fuse arming solenoids are not energized; thus the arming wire travels with the rocket, and the nose fuse detonation is delayed. Electrically, there is no difference between the "DELAY" and "OFF" positions of the arming switch. However, once the rocket is fired, the fuse is automatically set for delayed detonation. Whenever the rockets are jettisoned electrically or mechanically (paragraph 9-86), the rocket arming circuit is automatically disrupted (regardless of arming switch position) and the rockets are dropped without being fused.

9-83. FUNCTION OF ROCKET SYSTEM—FIRING.

9-84. Rocket firing may be accomplished in either automatic sequence firing or single sequence firing. Automatic firing sequence is accomplished by setting the rocket release selector reset knob on "1," placing the rocket selector switch on "AUTO," and holding the bomb-rocket release button in the depressed position. This routes electrical power from the primary bus to the rocket release control, which then distributes this power at $1/10$-second intervals to the rocket igniter plugs. The rockets will fire in the sequence shown in figure 9-17 until the store is exhausted or until the bomb-rocket button is released. Single-firing sequence is essentially the same as automatic sequence firing except that the rocket selector switch is set at "SINGLE" and the bomb-rocket button must be depressed and released each time a rocket is fired.

9-85. FUNCTION OF ROCKET SYSTEM—JETTISONING.

9-86. Rocket jettison can be accomplished electrically in two ways. In the first method, positioning the rocket jettison switch to "READY" and depressing the bomb-rocket release button routes power from the primary bus to the rocket jettison relay. Power is then routed from the battery bus through the rocket jettison relay to energize the rocket jettison solenoids. In the second method of rocket jettison, depressing the bomb-rocket-tank salvo (jettison) switch routes power from the battery bus to the rocket jettison relay. In either method of jettison, all rockets are released simultaneously. Electrical rocket jettison is prevented, while the airplane is on the ground, by a safety switch (figure 9-20A) that opens the rocket jettison circuit, when the weight of the airplane compresses the landing gear strut. The rocket arming circuit is ineffective during jettison release. A mechanical release system permits the rockets to be jettisoned unarmed. (Refer to paragraph 9-6.) The function of the rocket jettison release differs from that of bomb-rocket-tank jettison in that only the rockets are jettisoned and not all external stores.

9-87. TROUBLE SHOOTING ROCKET SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Rocket does not fire when rocket selector switch is on "SINGLE" and bomb-rocket release button is pressed.	No power on circuit. Defective bomb-rocket release button. Defective rocket selector switch.	

TROUBLE	PROBABLE CAUSE	REMEDY
	Projector release control reset knob not set.	
	Snap switch within projector release control not closing contact.	Tighten snap switch mounting screws, position adjustment screws until switch closes contact, or bend upper or lower spring assemblies to adjust.
	Projector release control snap spring broken.	
	Projector release control resistor burned out.	
	Projector release control coils not energized or not activating armature.	Check power source.
	Projector release control finger contacts of finger assembly not touching disk contacts.	Replace contact finger assembly if broken.
	Rocket plug at tail fin faulty.	
	Rocket internal wiring or contact faulty.	
	Rocket fin not making electrical contact with rear mount contact screw.	Replace old-style contact screw with new (long-headed) style.
Rockets do not fire when rocket selector switch is on "AUTO" and bomb-rocket release button is pressed.	No power on circuit.	
	Defective bomb-rocket release button.	
	Defective rocket selector switch.	
	Snap switch out of adjustment.	Position adjustment screw until snap switch operates.
	Snap spring broken.	
	Resistor burned out.	
	Armature return spring broken or out of position.	Replace or position spring as required.
	Finger contacts of finger assembly not touching disk contacts.	Replace contact finger assembly if broken.
	Pawl out of adjustment.	
Rocket station dial will not reset to number desired or will not center numeral under window.	Dial loose.	Remove panel assembly, position dial properly, and tighten screws.
	Ratchet assembly loose on shaft.	Position and tighten screws.
	Pawl not releasing ratchet.	Replace projector release control.
	Pawl spring broken.	
Rocket jettison solenoids trip when airplane is on ground and external store jettison switch is actuated.	The rocket jettison solenoids should not trip while on the ground unless the rocket jettison test switch is actuated. Therefore, the rocket jettison safety switch is defective or out of adjustment, rocket jettison test switch contacts are closed, or relay control circuit is shorted to ground.	Repair or replace defective switch or wiring. Readjust safety switch. (See figure 9-20A.)

TROUBLE	PROBABLE CAUSE	REMEDY
Improper sequence of rocket firing.	Defective wiring. Projector release control not functioning properly. Projector release control not set correctly, thereby not firing correct rocket first.	
Rocket arming solenoids are not energized when rocket arming switch is placed on "INSTANT" position.	No power at rocket arming switch. External store jettison switch defective. Rocket arming switch defective. Defective wiring between rocket arming switch and arming solenoids.	Check power source.

9-88. TESTING ROCKET SYSTEM.

9-89. Prior to any rocket-carrying mission, a thorough ground check of the rocket system should be made. Because of the nature of the rocket system, certain tests must be made before the rockets are installed on the airplane, and other tests must be made at intervals during the loading procedure.

WARNING

The rocket preloading test must be performed before any rockets are installed on the airplane. The circuit continuity test must be made after the rockets are installed but before the rear shipping caps are removed. The rocket squib test must be made after the shipping caps are removed but before the igniter wires are plugged in.

9-90. ROCKET SYSTEM PRELOADING TEST. After the rocket mounts are installed but before the rockets are installed, proceed as follows:

a. With arming solenoid de-energized, install an arming wire loop behind spring-loaded ball in solenoid. A 5-pound pull, as measured by a spring scale attached to the arming wire, should not pull the loop free.

b. Increase tension on arming wire to 7 pounds; the loop should pull free.

c. With rocket arming switch set at "INSTANT" and bomb-rocket-tank salvo circuit breaker closed, depress bomb release button; all rocket arming solenoids should actuate simultaneously when the rocket selector switch is placed in the "SINGLE" or "AUTO" position. It should not be possible to pull the arming wire free of the solenoid under any of these conditions.

d. Close and lock rocket release hook in front mounts and hang a 100-pound weight from hook. With bomb-rocket-tank salvo circuit breaker closed, turn rocket jettison switch to "READY" and depress bomb-rocket-tank salvo (jettison) switch. Weight should remain hanging on rack.

e. Leaving bomb-rocket-tank salvo circuit breaker closed and rocket jettison switch on ready, again depress bomb-rocket-tank salvo (jettison) switch and at the same time actuate the rocket jettison test switch. The release hook should open and the weight should fall free. Pulling the mechanical jettison handle should also cause the weight to fall free.

WARNING

Before proceeding with rocket loading, make sure that all armament switches and circuit breakers are off.

9-91. ROCKET SYSTEM CIRCUIT CONTINUITY TEST. After the rockets are installed and before the rear shipping caps are removed, proceed as follows:

a. Check rocket firing power from intervalometer. It should appear at the lower fin sockets of the upper rockets in the proper sequence. See figure 9-17 for rocket-firing sequence.

Note

On early airplanes (paragraph 9-80), the Type B-2 testers that have been modified to include the No. 8 lead may be used to check the rocket-firing sequence. On later airplanes (paragraph 9-80), the testers must be further modified by the addition of additional leads to check the four additional rocket station firing circuits.

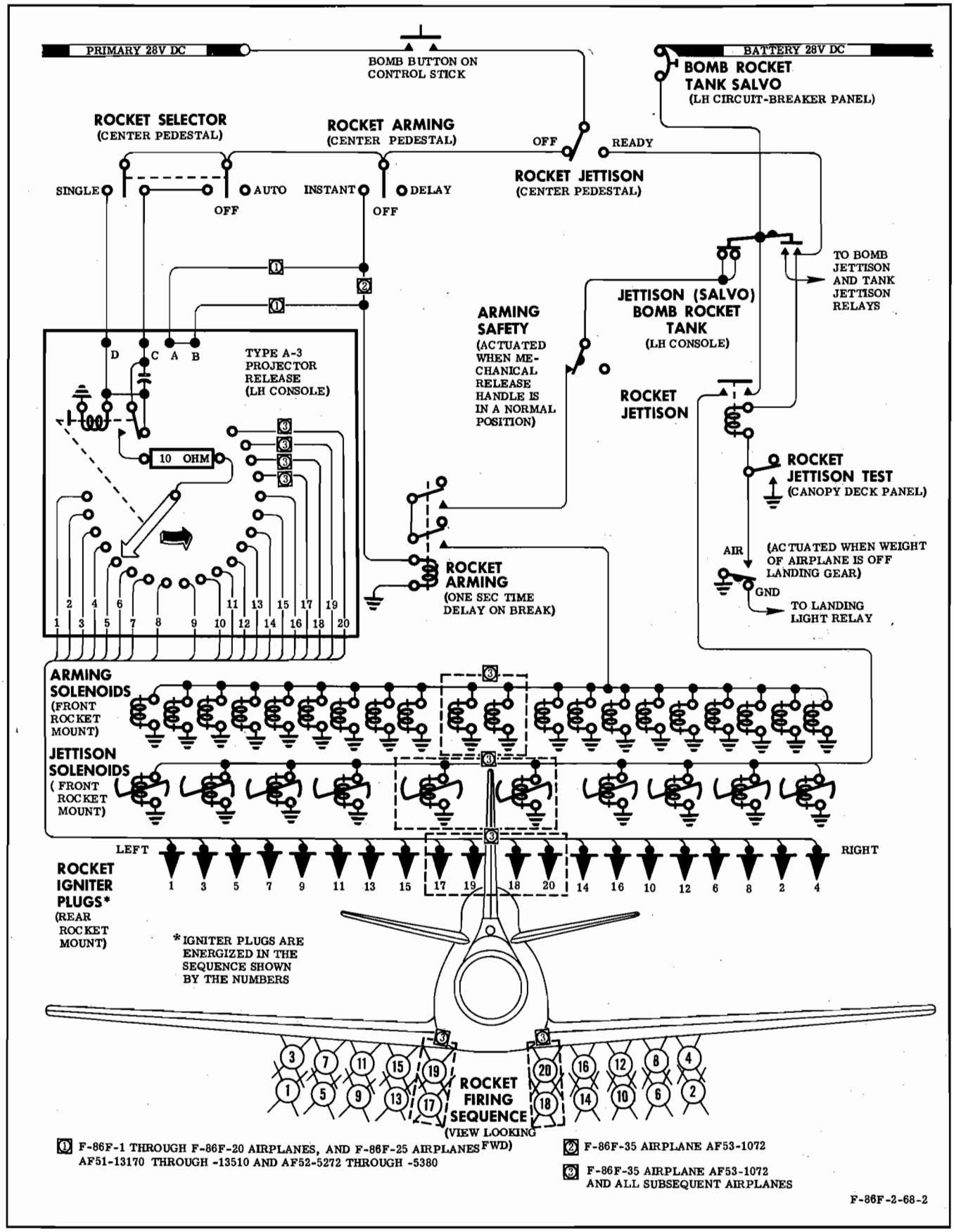
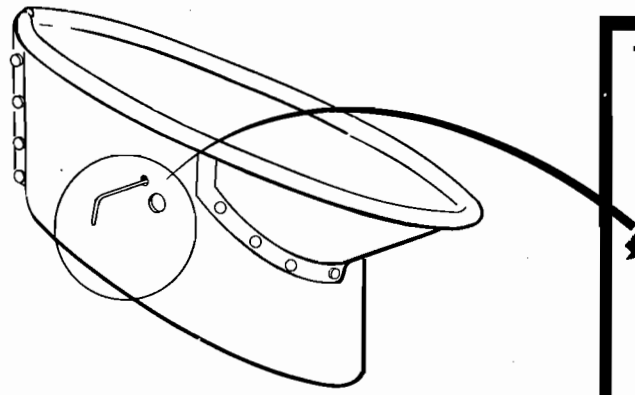
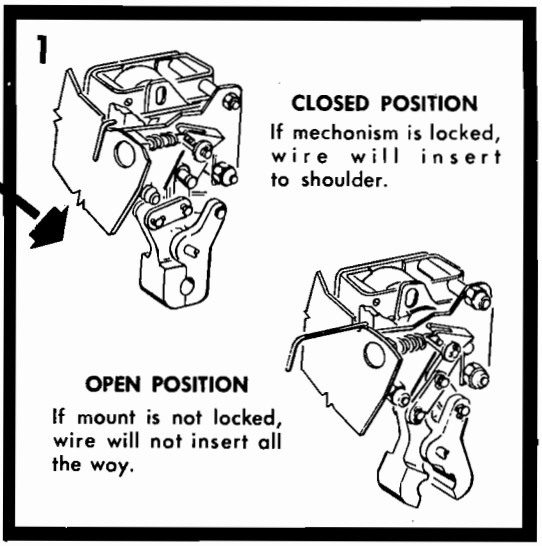
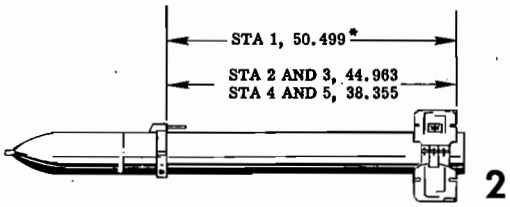


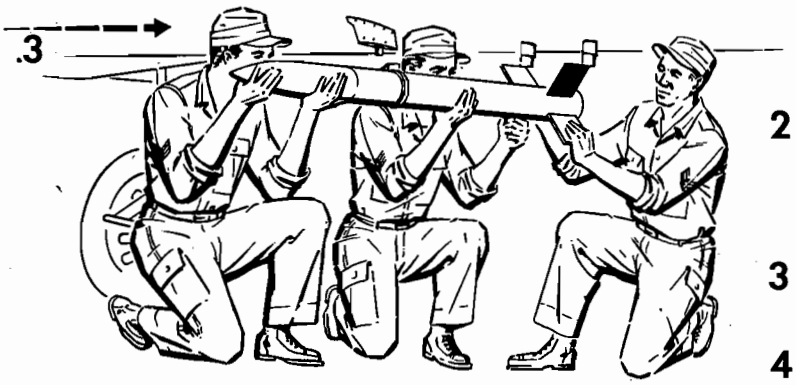
Figure 9-17. Rocket System





1 Cock all front rocket mounts and check that they are locked.





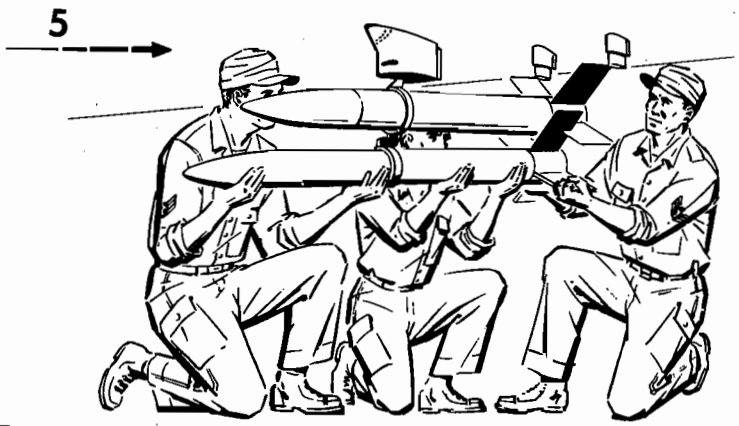
LOADING UPPER ROCKET

2 Using a positioning jig from an M-35 tool kit, set front mounting bands to dimensions shown and torque bolts to 33 foot-pounds.

NOTE Lower rocket band dimensions are 5-1/2 inches shorter than each upper band dimension.

3 Lift rocket into position and slide front rocket mounting pin into release hook, and rocket fins onto the rear mount contact arms.

4 Install shear wire.



LOADING LOWER ROCKET

5 Lift rocket into position and slide front rocket mounting pin and rocket fin notches into engagement with upper rocket as shown.

6 Install shear wire.

7 Install arming wires. Insert loop end into arming solenoid and free end into clip on rocket nose, replacing fuse safety wire.

*F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES

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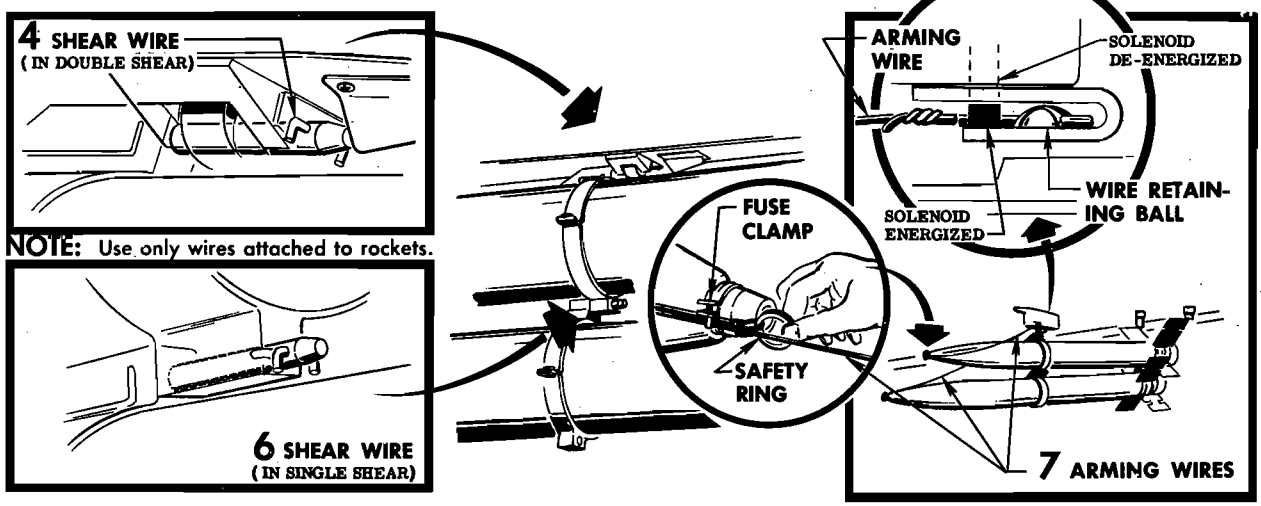
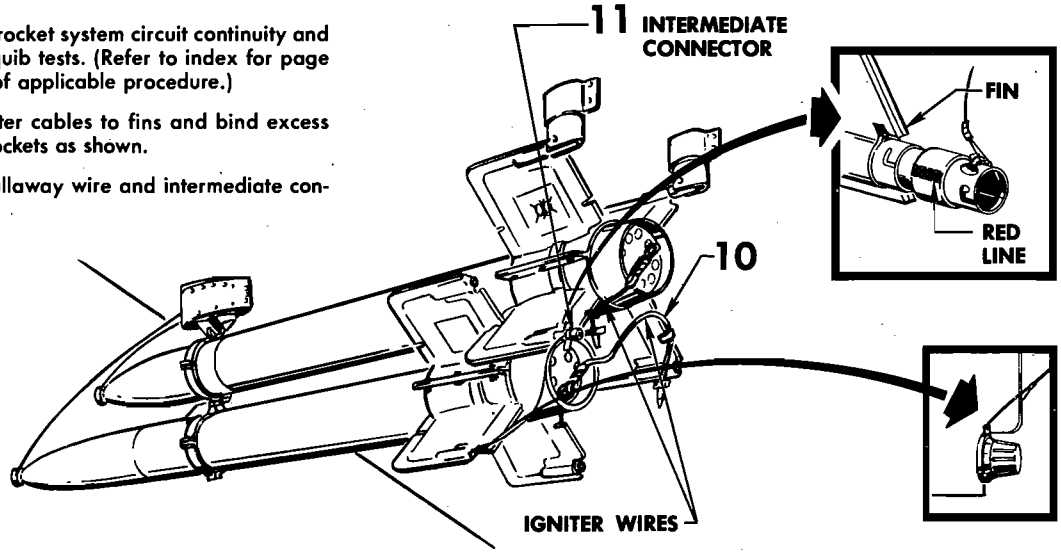
Figure 9-18. Loading Rockets (Sheet 1 of 2)



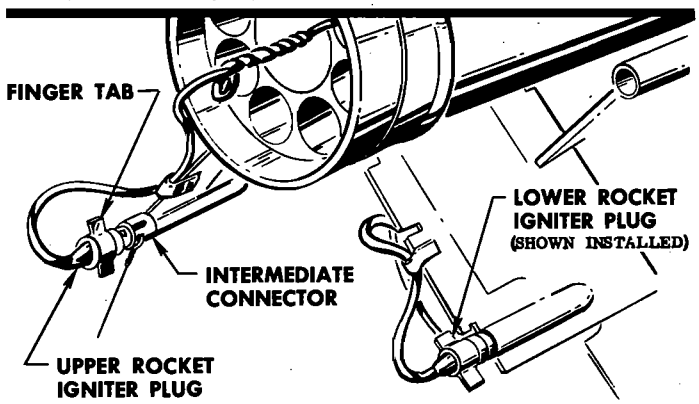
8.9 Perform rocket system circuit continuity and rocket squib tests. (Refer to index for page number of applicable procedure.)

10 Clip igniter cables to fins and bind excess behind rockets as shown.

11 Install pullaway wire and intermediate connector.



WARNING: Determine that all armament circuits are "OFF." With airplane pointed at a safe and uninhabited area, plug in rockets just prior to take-off.



13 Install igniter plugs so that plug tabs are parallel to rocket fin blades. A rearward pull on plug (not cable) will determine whether plug is locked in place.

12 Start at either outboard station; proceed inboard and pass under fuselage to opposite side. Never pass directly in front or rear of plugged-in rockets.

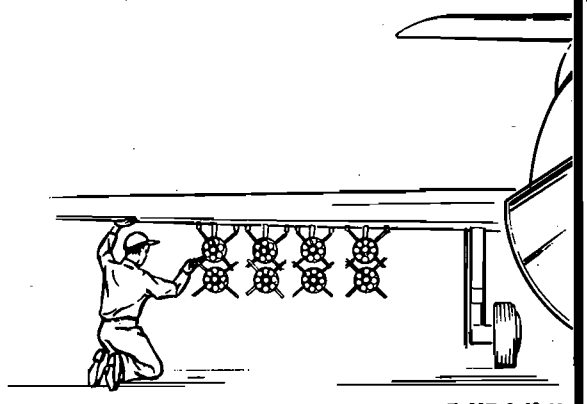
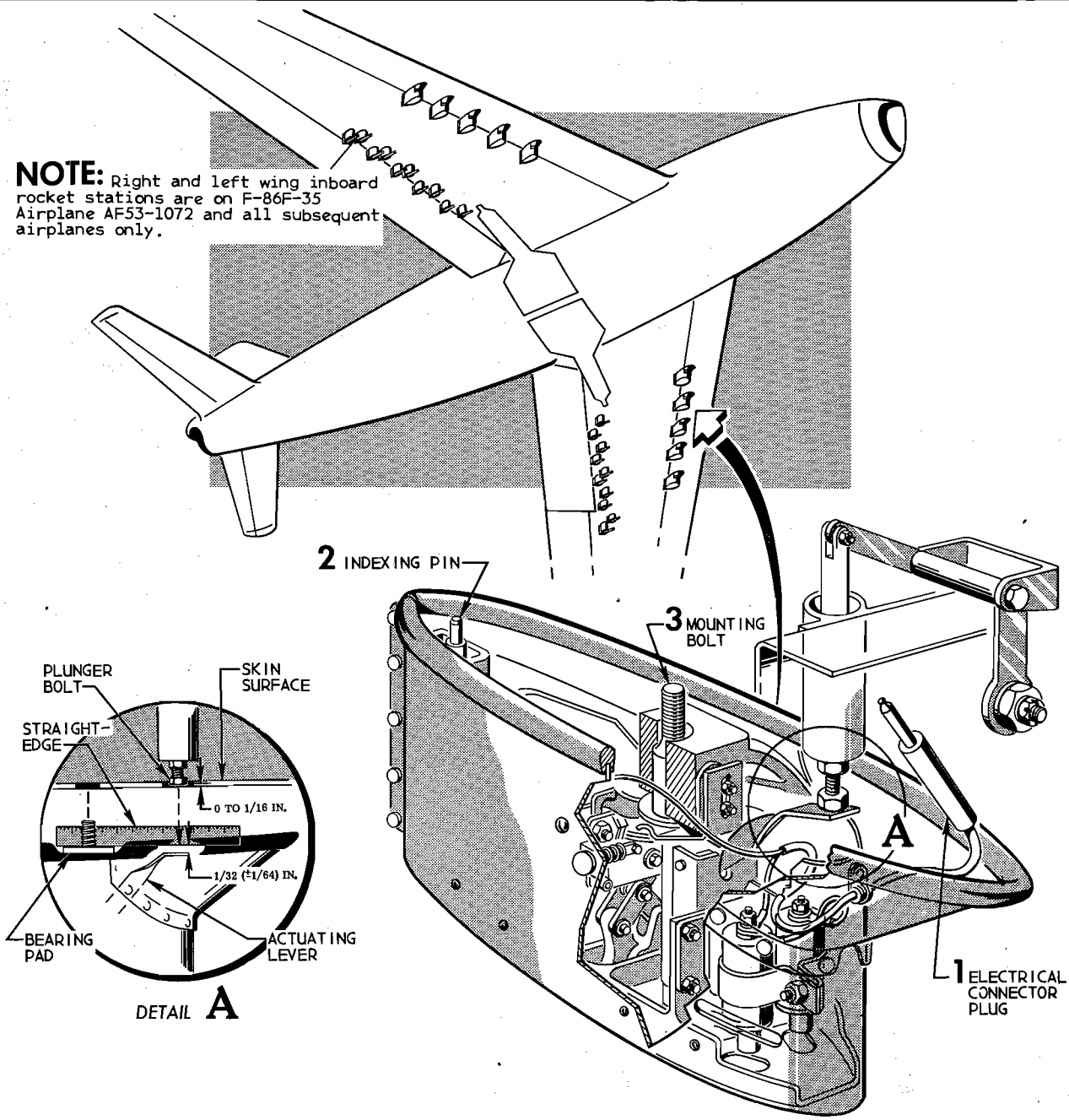


Figure 9-18. Loading Rockets (Sheet 2 of 2)



NOTE: Before installing front rocket launcher, inspect the mounting hole in the wing and remove any foreign material. The launcher should also be inspected for cleanliness and proper condition prior to installation.

1 Lift launcher adjacent to mounting holes and insert electrical connector plug into the socket just forward of the mounting bolt socket.

2 Position launcher so that indexing pin is engaged. Screw mounting bolt into wing until launcher is snug against wing surface.

3 Torque mounting bolt to 500-600 inch-pounds.

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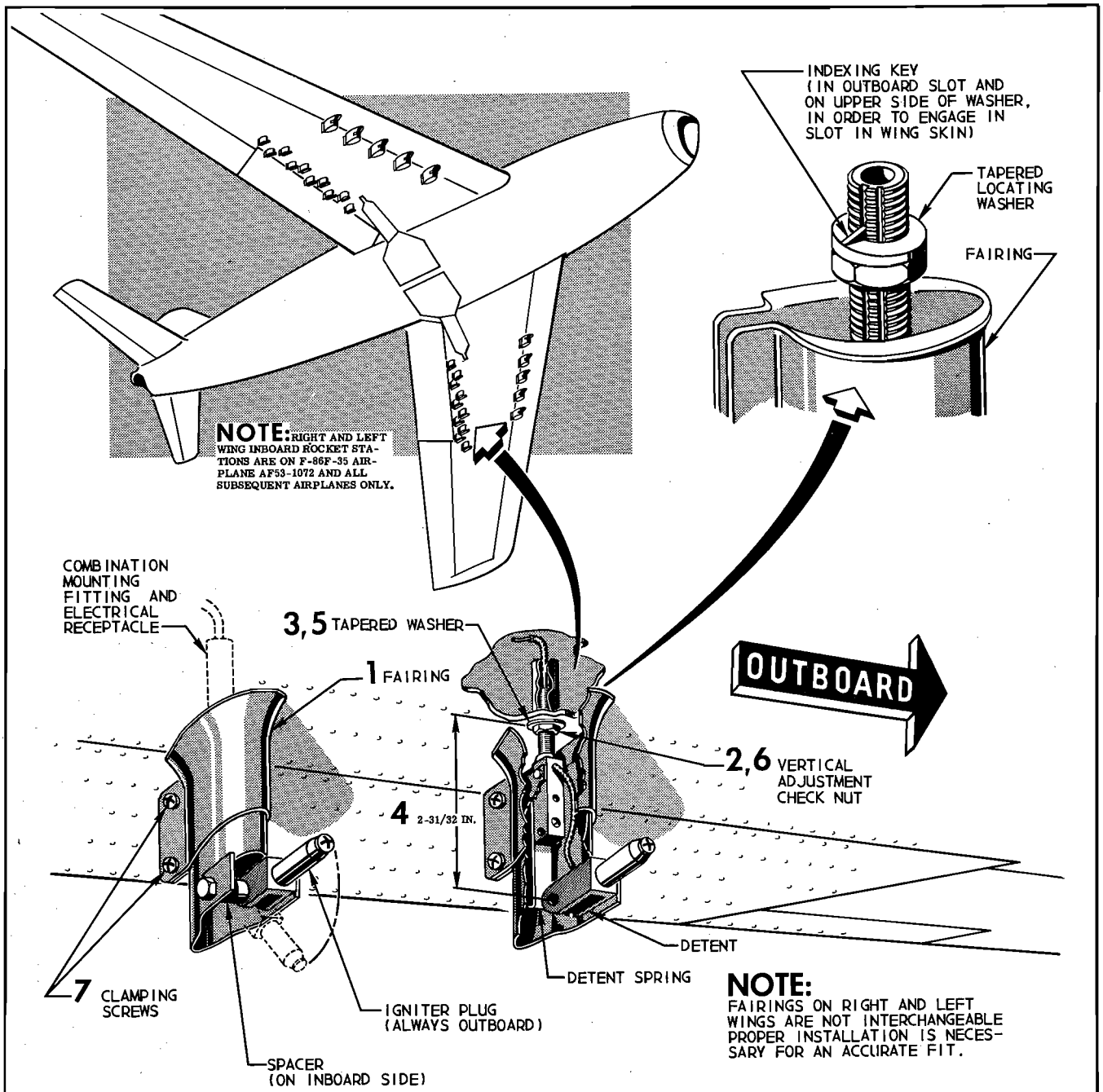
Figure 9-19. Installing Front Rocket Launcher



1, 2 Loosen and lower mount fairing to gain access to check nut.

3 Install check nut and tapered washer. (Position tapered washer so that key will be in keyway on outboard side of rocket launcher centerline.)

4 Insert rocket launcher into socket in lower surface of wing. Turn launcher until igniter plug is facing forward and is approximately 2-31/32 inches from wing skin. Bore sight rocket launcher. (Refer to index for page number of applicable procedure.)

5, 6 After making sure tapered washer is properly engaged, tighten check nut.

7 Slide fairing into engagement with wing skin and tighten clamping screws.

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Figure 9-20. Installing Rear Rocket Launcher

b. With rocket selector switch at "SINGLE," intermittently depress bomb release button on control stick the required number of times to release all rockets. The indicator lights (on the tester) should illuminate consecutively with the action of the bomb release button.

c. Turn rocket selector switch to "AUTO" and reset intervalometer so that number "1" appears in window. Then depress bomb release button for one second. At the end of approximately 0.8 second, all lights on the testers should have illuminated in order.

CAUTION

Any malfunction that causes a light to fail to illuminate, or to illuminate out of order, however momentarily, must be investigated and corrected before rocket loading is continued.

WARNING

Before continuing with rocket loading procedure, make sure all armament circuit breakers and switches are off.

9-92. ROCKET SYSTEM SQUIB TEST. After removing rear shipping caps and before inserting rocket igniter leads in their respective sockets, make a rocket squib test with a Type 680A rocket squib tester according to instructions included with tester.

9-93. LOADING ROCKET SYSTEM.

9-94. Prior to installing rockets, inspect front and rear mounts for cracks and damage. Make sure mounts are correctly and firmly installed. (See figures 9-19 and 9-20.) Then, with front mount jettison hooks open, insert a front rocket mounting-band pin into position and make sure that support pin will slide downward freely in the same manner as if rockets were jettisoned. If binding is detected, remedy it by removing burrs and other obstructions. Perform rocket system preloading test. (Refer to paragraph 9-90.)

WARNING

- Before proceeding with rocket loading, make sure that all armament switches and circuit breakers are off.
- Metal shipping caps, covering the nozzle and igniter cable, are to remain on the rockets during installation.

Install rockets, arming wires, and shear wires (figure 9-18), working from inboard to outboard on each wing, with lower round secured prior to loading adjacent outboard station. When all rockets have been installed, perform rocket system circuit continuity test. (Refer to paragraph 9-91.) Shipping caps may then be removed, and igniter cables from the rockets clipped firmly behind the rockets and fins by means of the trailing edge metal tabs. It is extremely important that any excess cable "slack" be firmly positioned behind the rockets, as much as possible out of the air stream. Friction tape or aluminum strip shall be used for this purpose. One man, working from one side of the airplane to the other, will then check each rocket squib, using a Type 680A tester according to instructions included with tester. No rocket will be carried aloft that does not check properly on the test meter. Rockets must be plugged in just prior to take-off with the rockets pointed toward a safe and uninhabited area. Make sure that all armament circuits are "OFF" and that intervalometer is set on "ONE." Plugging in should commence at either outboard station and should proceed completely across all launcher stations passing under the fuselage after plugging in the inboard station on one side, and proceeding to the inboard station on the other side. Plugging in rockets should be accomplished at arms length, the armorer standing well to one side of the rocket being plugged in, never standing or passing to the rear or front of any rocket previously plugged in. The igniter plug must be inserted firmly as far as possible with the metal wings or finger tabs approximately 30 degrees counterclockwise from parallel to the rocket fin blades, then twisted clockwise into the locking grooves of sockets until the plug wings are parallel to the rocket fin blades. If any doubt exists that the plug is not propertly installed, a rigorous rearward pull on the plug (not the cable) will unseat the plug. The armorer, when plugging in the rockets, must be certain that the intermediate connector and igniter wires are installed correctly. (See figure 9-18.) Immediately upon completion of plugging in rockets, the armorer should give the pilot a visual sign to that effect.

9-95. ROCKET LAUNCHERS.

9-96. Each of the rocket stations consists of two rear mounts and a single front mount. (See figures 9-19 and 9-20.) All mounts are quickly removable. The rear mounts, which incorporate the rocket igniter plugs, have electrical connections within the mount post that make contact with electrical receptacles in the wing when the mounts are installed. On F-86F-35 Airplane AF53-1172 and all subsequent airplanes, the rear rocket launcher igniter posts have a new type screw which ensures a more positive connection between each igniter

post and rocket fin when the rockets are installed. The front mount houses the rocket jettison unit and two arming solenoids. The rocket jettison unit consists mainly of a rotary solenoid, a locking mechanism, and a supporting hook. The supporting hook, which engages the rocket support pin, is held closed by the locking mechanism. When the rotary solenoid is energized during salvo or jettison release, it rotates, allowing the locking mechanism to free the support hook. This permits the weight of the rocket to open the support hook, causing the rocket to be released. Once the mechanism has been tripped, it is easily reset by pushing the cocking button on the right side of the mount. The mechanism can be manually released by depressing the button on the right side of the mount. The two arming solenoids in each forward rocket mount accomplish rocket nose fuse arming.

9-97. REMOVING ROCKET LAUNCHERS. The front and rear rocket launcher mounts may be easily removed by loosening the single retaining bolt in each mount. There are no electrical or other connections to disconnect.

9-98. INSTALLING ROCKET LAUNCHERS. See figures 9-19 and 9-20.

Note

Before installing rear mounts, check electrical contact plates in wings and mounts to make sure they are clean and free from foreign matter.

9-99. BORE SIGHTING ROCKET LAUNCHERS. The rocket launchers may be aligned vertically only to the target board by adjustment of the rear rocket mounts. (See figure 9-20.) To accomplish the rocket bore-sight operation, a suitable sighting fixture must be attached to each top rocket station and aligned to rocket tolerance squares on the target board. This sighting fixture may be locally manufactured. (See figure 9-4A for necessary dimensions.) A stock rocket may be stripped down to the basic motor tube and fins and to the forward mount attachment. Suitable cross hairs may be installed in the forward end of the motor tube, and a disk (with peep hole) may be installed in the rear end of the motor tube. Since the distance from the front and rear rocket mount attaching point varies at each station, the forward motor tube attachment must be adjustable to fit on the rocket mounts at each station. See figure 9-18 for rocket band settings. Install front and rear rocket launchers. (See figures 9-19 and 9-20.) Attach a sighting fixture. (See figure 9-4A.) Then bore sight rocket launchers as follows:

Note

It is only necessary to bore sight the top rocket launchers, at each station, as the lower rockets are supported by the top rockets.

a. Sight to respective rocket tolerance square on target board, making certain that sighting fixture cross hair is on target board mark and within tolerance square.

b. If rear launcher requires vertical adjustments, remove sighting fixture and adjust rear launcher check nut. (See figure 9-20.)

Note

The rocket launchers are not adjustable in azimuth. When azimuth alignment is out of tolerance, the rear launcher must be replaced.

c. When target alignment correction adjustment is complete, reinstall sighting fixture and again sight to target board marks.

d. When all top rocket stations have been aligned, remove sighting fixture and load rockets. (See figure 9-18.)

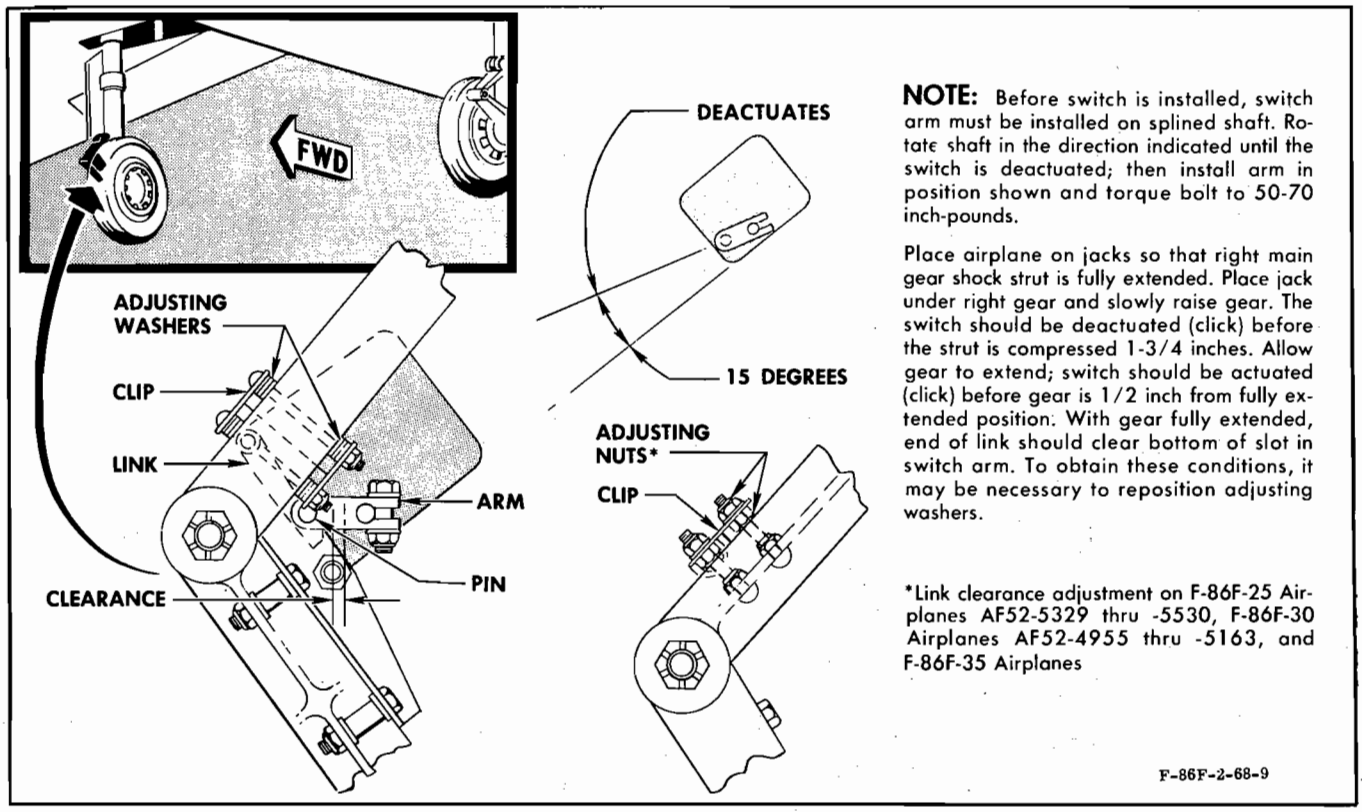


Figure 9-20A. Rocket Jettison Ground Safety Switch Adjustment

9-100. ROCKET SYSTEM PROJECTOR RELEASE CONTROL.

9-101. The Type A-3 projector release control, located on the left console, is an intervalometer having a hand reset knob and a visible numbered dial showing the position of the timer contact arm. In automatic operation, the control (preset at the time of rocket loading) releases rockets at approximately 0.1-second intervals. Automatic operation is effected when the rocket selector switch is in the "AUTO" position and the bomb release button is depressed. Sequence firing of the rockets (figure 9-17) occurs as the stepping relay in the intervalometer advances the timer contact arm across the contacts, thus completing the firing circuits of the rockets consecutively. The intervalometer continues to make contact at 0.1-second intervals until the full sweep of the arm has been completed. With the rocket selector switch in the "SINGLE" position, the operation is similar, except that the contact arm advances only one position each time the bomb release button is depressed.

9-102. GUNNERY SYSTEM.

9-103. The gunnery system (figure 9-21) consists of six Type M-3 .50-caliber machine guns and related equipment. Three guns are installed in each right and left gun compartment located adjacent to the cockpit. Ammunition and expended case and link compartments are located directly below the gun compartments. The normal ammunition complement for each container is 267 rounds (with available space for 33 additional rounds) of .50-caliber ammunition. On F-86F-1 through F-86F-20 Airplanes, and F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5328, ammunition boosters are provided for each gun to convey the ammunition through flexible chutes to the guns. On F-86F-25 Airplanes AF52-5329 through -5530, F-86F-30 Airplane AF52-5064, and all subsequent airplanes, the right and left upper and center guns only (figures 9-21 and 9-22) are equipped with ammunition boosters. The lower guns are equipped with rigid chutes, replacing the boosters. The chutes are installed and removed in the same manner as the ammunition boosters. Manual gun charging cables, ammunition loading hooks, and electric gun heaters are provided. Automatic electropneumatic gun chargers (mounted on the guns), an air compressor, an air bottle, and related equipment is installed on the following airplanes: F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510, AF52-5272 through -5277, -5279 through -5290, -5292, -5294, -5295, -5297, -5298, -5300

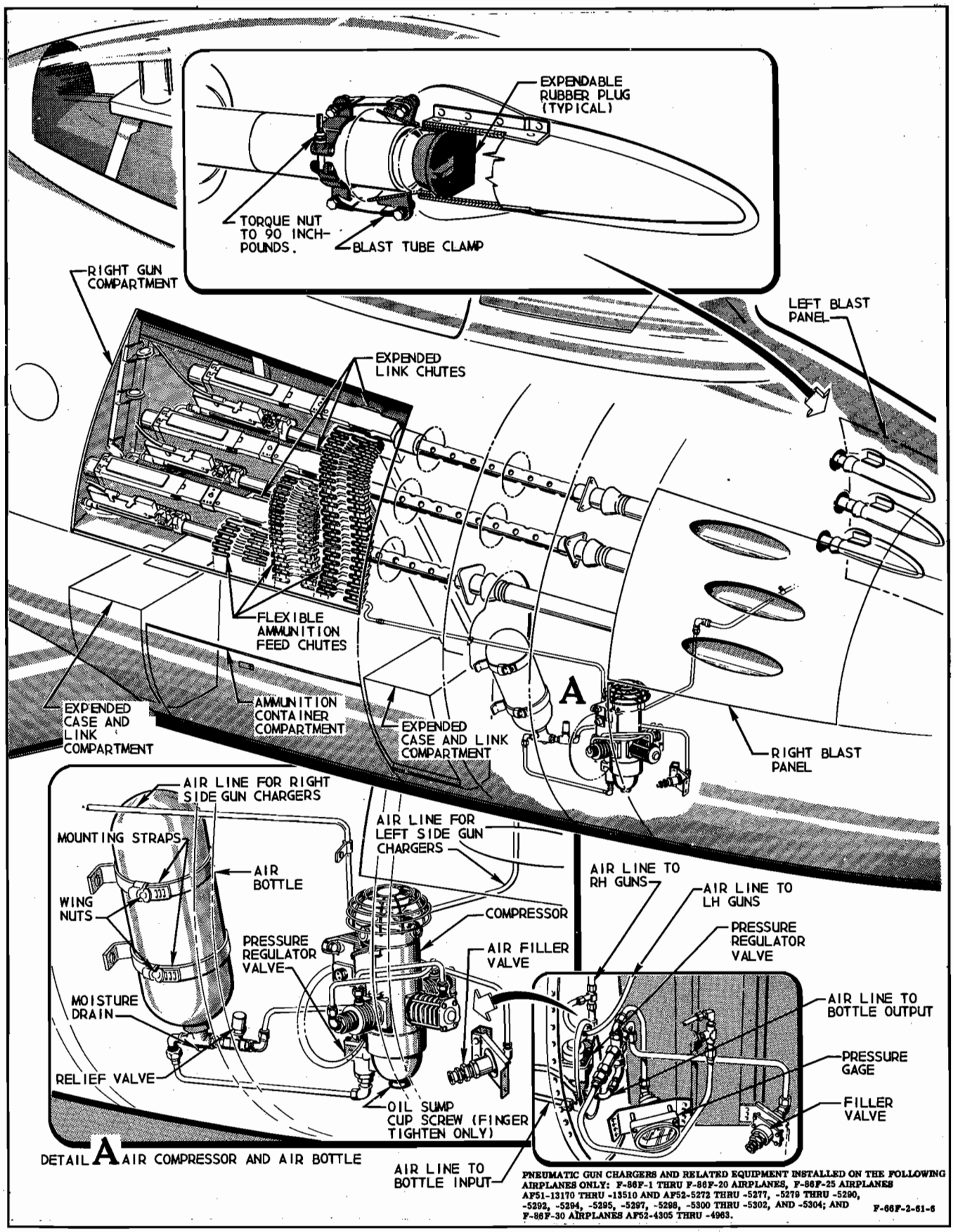


Figure 9-21. Gunnery System (Sheet 1 of 3)

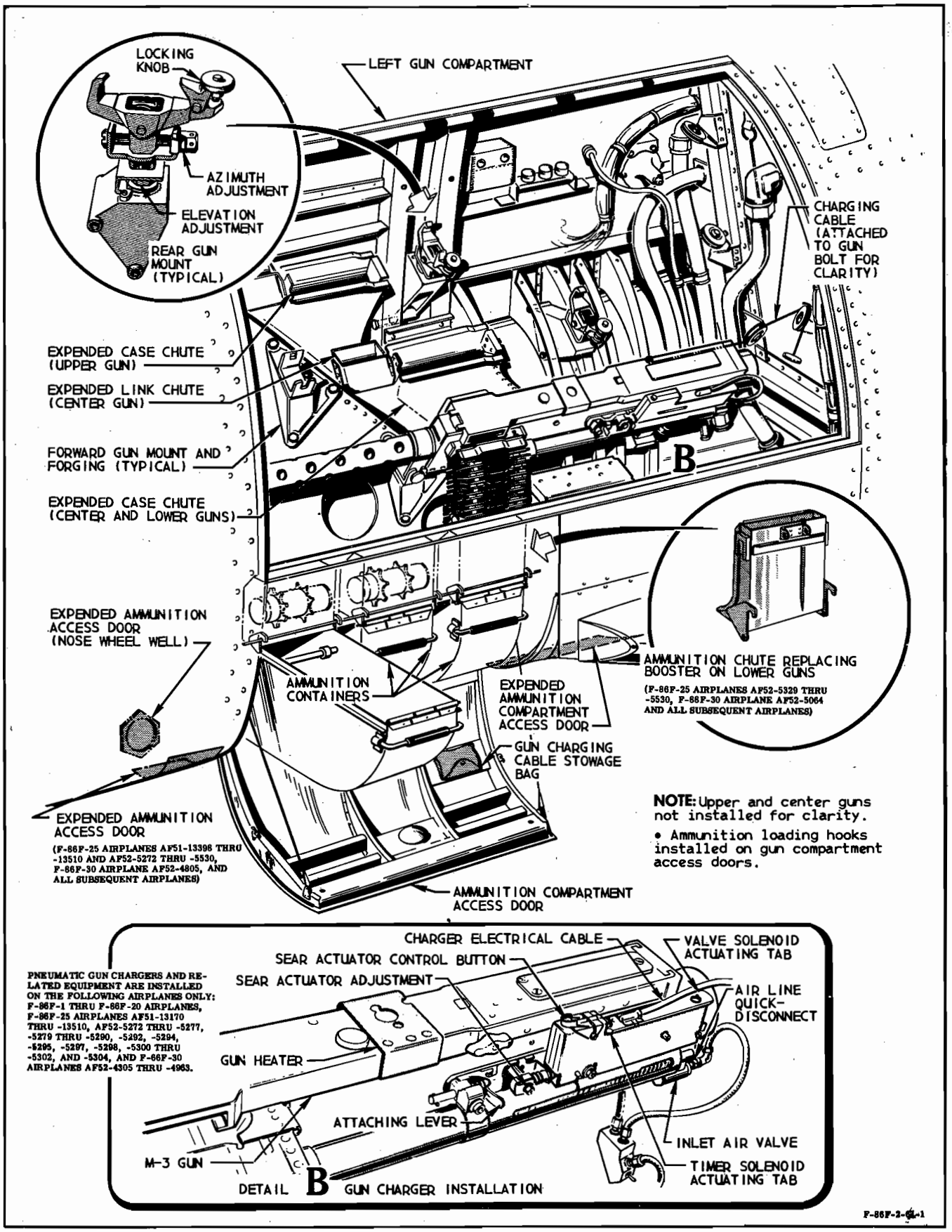
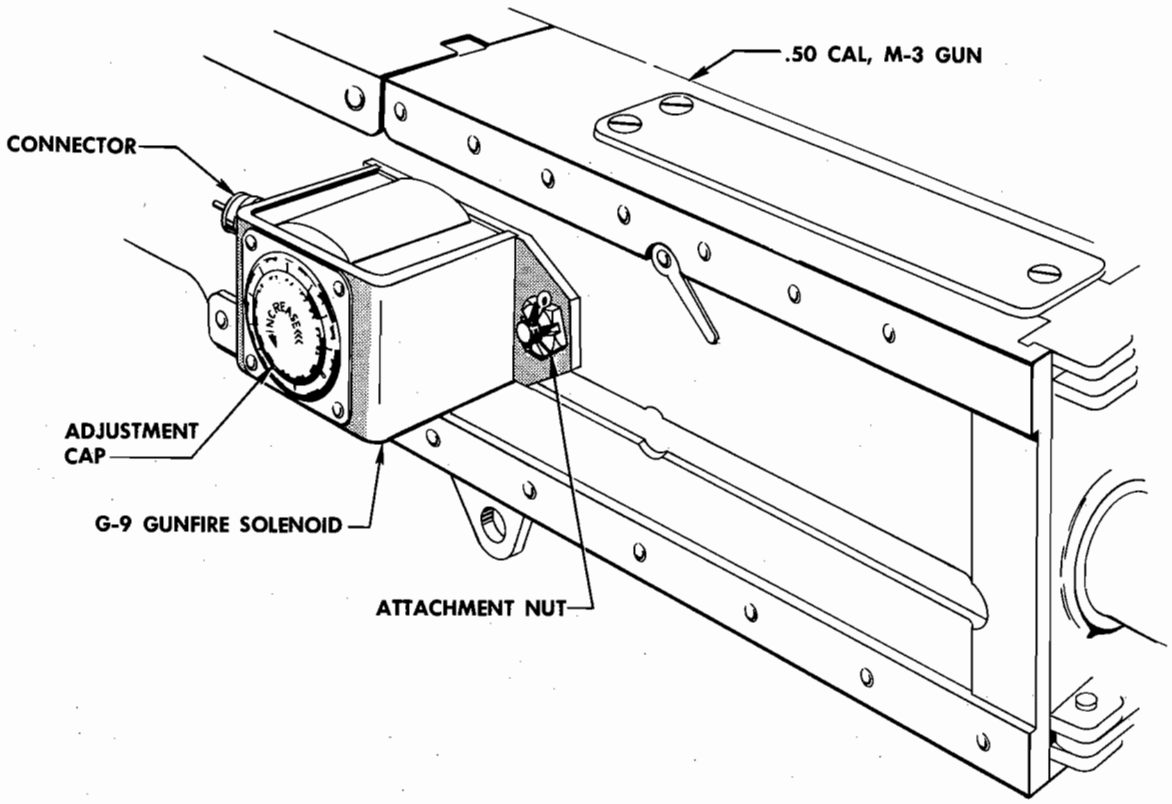


Figure 9-21. Gunnery System (Sheet 2 of 3)



G-9 GUN-FIRING SOLENOID INSTALLATION (TYPICAL) AND GUN-FIRING SYSTEM ELECTRICAL SCHEMATIC ON F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299, -5303 AND -5305 THRU -5530, F-86F-30 AIRPLANE AF52-4964, AND ALL SUBSEQUENT AIRPLANES

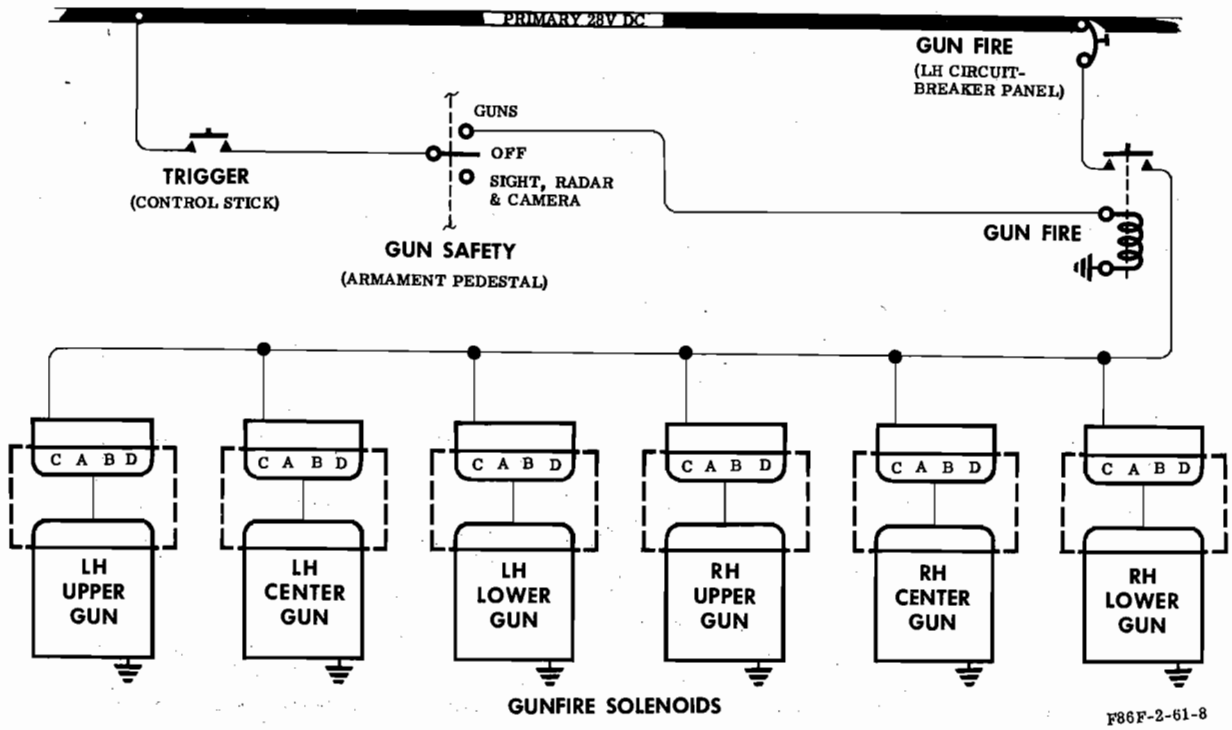


Figure 9-21. Gunnery System (Sheet 3 of 3)

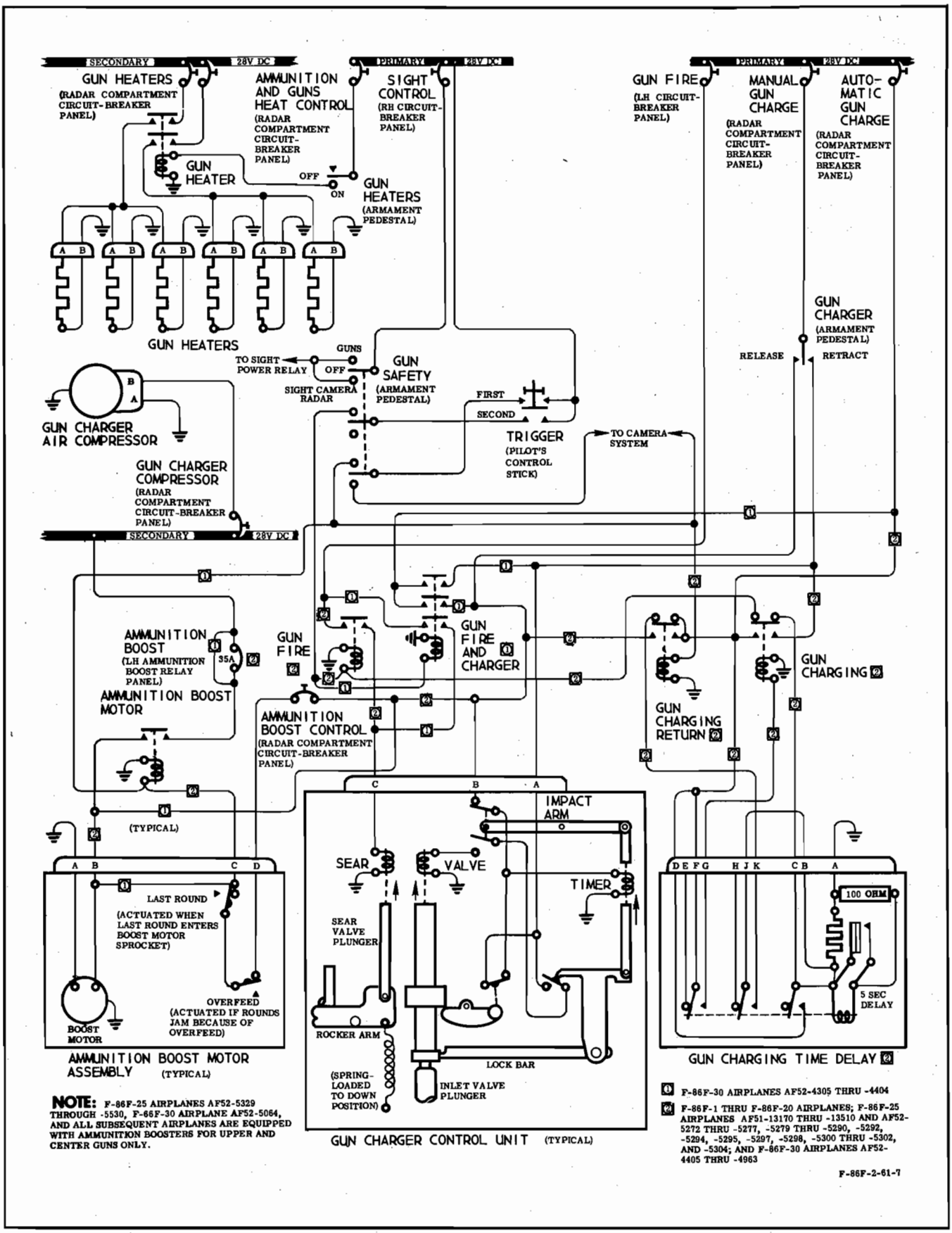


Figure 9-22. Gunnery System Electrical Schematic

through -5302, and -5304, and F-86F-30 Airplanes AF52-4305 through -4963. Automatic gun bolt retraction control for gun barrel cooling (figure 9-22) is provided on F-86F-1 through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5277, -5279 through -5290, -5292, -5294, -5295, -5297, -5298, -5300 through -5302, and -5304, and F-86F-30 Airplanes AF52-4405 through -4963. F-86F-30 Airplanes AF52-4305 through -4404 are not equipped with automatic gun bolt retraction control circuit. (See figure 9-22.) F-86F-25 Airplanes AF52-5278, -5291, -5293, -5296, -5299, -5303, and -5305 through -5530, F-86F-30 Airplane AF52-4964, and all subsequent airplanes are equipped only with gun-firing solenoids, and gun charging operation can be accomplished only by use of the manual charging cables while the airplane is on the ground. No provision for gun barrel cooling is incorporated on these airplanes. Automatic ammunition compartment heating is derived from the cockpit air conditioning and pressurizing system. (Refer to paragraph 4-101.) Gunnery system control switches are located on the center pedestal and control stick.

9-104. FUNCTION OF GUNNERY SYSTEM.

9-105. On airplanes equipped with pneumatic chargers (paragraph 9-103), the guns are loaded for firing (either on the ground or in the air) when the manual gun charging switch is moved to "RETRACT." The rearward motion of the gun bolt, as the bolt is being retracted, allows the gun bolt case extractor arm to strip a live round from the ammunition belt. When the gun charging switch is then moved to "RELEASE," air pressure in the chargers is exhausted, allowing the gun bolts to move into the forward-and-locked firing position. When the gun charging switch is again moved to "RETRACT," the second round is stripped from the ammunition belt and the first round (stripped by previous bolt retraction) is forced into the bolt T-slot firing position. When the gun charging switch is again moved to "RELEASE," all gun bolts move into the forward-and-locked firing position and live rounds are placed in the gun-firing chambers. If the gun bolts (on all airplanes) were left in the retracted (bolt-back) position after the second charging operation (for ground safety) or when an additional gun-firing operation is initiated, either moving the gun charging switch to "RELEASE" or depressing the gun-firing trigger automatically releases the gun bolts. This allows the bolts to move into the forward-and-locked firing position, placing rounds in firing chambers, provided the gun bolt T-slots contain live rounds positioned by previous charging operation. When the actual gun-firing operation is desired, the gun trigger switch is depressed through the first and second trigger detents. The first trigger detent simultaneously energizes all gun charger timer solenoids (contained in charger), which initiates subsequent charger operation to load the guns and energize the ammunition boost motors. The energized boost motors automatically feed the loaded ammunition belt into the guns at a faster rate than the guns can fire the rounds. The second gun trigger detent energizes the gunfire relay, which in turn (on airplanes equipped with automatic bolt retraction control only, paragraph 9-103) energizes the time delay relay and the firing circuit of each gun charger. Each energized firing circuit causes the respective gun charger sear actuator pin to extend and continually actuate the sear of the gun. This allows the gun to fire when the gun bolt is returned to the firing position. The guns fire automatically as long as the trigger switch is depressed and as long as no ammunition feeding and ejection failures occur. The energized gun charger time delay relay (remaining energized through an electrical holding circuit) completes the retract circuit to each gun charger. However, continuous movement of the gun bolt stud prevents the gun charger impact arm from reaching the forward switching position, where it would complete the retract circuit within the gun charger and cause the charger to automatically retract the gun bolt. This condition exists unless an ammunition feeding and ejection failure occurs. Such a failure stops the gun bolt action and allows enough time for the charger impact arm to reach the forward switching position. When the second detent of the trigger switch is released, the gun charger sear actuator pin is retracted and the guns stop firing. When the first detent of the trigger switch is released, the charger release relay is de-energized. On airplanes equipped with automatic bolt retraction control (paragraph 9-103), this opens the direct release circuits to the gun chargers and closes the circuit to the time delay relay. The time delay relay remains closed, maintaining current in the charger retract circuits. The energized retract circuits cause the gun chargers to retract the gun bolts and hold the bolts in the retracted position. This prevents inadvertent gun firing and leaves the gun barrel open for cooling. During the retraction movement of the gun bolt, one live round is charged out of each gun. After 5 seconds, the normally open thermal switch in the time delay relay unit closes (by electric heater action) and de-energizes the relay. This automatically opens the retract circuit to the gun chargers. On airplanes not equipped with automatic gun bolt retraction control (paragraph 9-103), the gun bolts may be retracted by momentarily actuating the gun charging switch to "RETRACT" and then back to off position. This operation will accomplish the identical result (of extracting and ejecting live rounds from all guns, and holding gun bolts retracted for cooling) as the automatic gun bolt retraction control. Gun-firing operation on airplanes equipped with gun-firing solenoids (paragraph 9-103) can be accomplished only when the guns are previously charged on the ground prior to flight. Then placing the gun safety switch, on the armament

pedestal, to "GUNS" position and depressing the gun-firing trigger will energize all gun-firing solenoids simultaneously and fire the guns. The guns continue firing until all rounds are expended or the trigger is released, provided no other stoppages occur. Placing the gun safety switch in the "OFF" position prevents the gun-firing solenoids being energized (and subsequent gun firing) if the trigger is inadvertently depressed. Electric gun heater operation (all airplanes) is obtained when the gun heater switch is positioned to "ON."

9-106. TROUBLE SHOOTING GUNNERY SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
	GUNS, AMMUNITON BOOSTERS, AND GUN HEATERS	
One or more guns fail to fire.	Guns not loaded, charged, timed, or head spaced.	Adjust guns. (See figure 9-23 for adjustment of guns equipped with pneumatic chargers.)
	Defective gun.	
	Faulty ammunition or links.	
	Ammunition jammed between booster and gun.	Lift release wire connected to antirollback switch, and pull ammunition back over sprocket. Check ammunition chutes for bulges.
	Faulty gun-firing solenoids. (Refer to paragraph 9-103 for airplanes affected.)	Clean, adjust, or replace solenoids.
	Booster assembly not functioning properly during high G.	Check last-round switch and overfeed switch; if motor still does not operate, replace motor.
	Damaged boost motor housing.	
Boost motor fails to operate.	Faulty external wiring and connections.	
	Faulty internal wiring, or brush and commutator worn.	Replace boost motor.
Excessive current consumption.	Short circuit within motor.	Replace boost motor.
Antirollback not operating.	Antirollback spring not functioning properly.	Replace boost motor.
Sprocket will not freewheel easily.	Boost motor mounting screws too long.	
	Worn gear clutch or binding of felt seals.	Replace boost motor.
All guns fail to fire.	No power supply.	
	Gun safety switch not on "GUNS."	
	Defective gun safety switch.	Replace control stick grip.
	Gunfire time delay relay defective.	
	Gun-firing relay defective.	
	Open circuit caused by loose connections or defective wiring.	
Ammunition fails to feed.	Defective gun safety switch.	Replace control stick grip.
Gun heaters do not operate.	Gun heater switch not turned "ON."	
	No power to heaters.	
	Open circuit caused by loose connections or defective wiring.	

TROUBLE	PROBABLE CAUSE	REMEDY
	GUN CHARGERS (Refer to paragraph 9-103 for airplanes equipped with pneumatic chargers.)	
Leakage from inlet valve when valve is closed.	Loose plunger guide.	Tighten to a torque of 20 inch-pounds.
	Foreign matter between ball and lower valve seat.	
	Damaged lower valve seat.	Replace charger.
	Valve solenoid plunger adjustment screw out of adjustment.	Replace charger.
	Interference and/or friction from any of the following: solenoid plunger adjustment screw, solenoid plunger, solenoid spring, solenoid, and valve body.	Replace charger.
Leakage from inlet valve when valve is open.	Foreign matter between ball and upper valve seat.	
	Damaged upper valve seat.	Replace charger.
	Valve solenoid plunger adjustment screw out of adjustment.	Replace charger.
	Interference between sear tube and front rocker arm causing improper locking action of lock bar.	Check installation of sear tube and rocker arm.
	Interference between sear tube and lock bar.	Check installation of sear tube and lock bar.
	Cable leads pressing down on front rocker arm.	Rearrange cable leads.
	Weak timer solenoid plunger spring or weak S-spring contact on switch panel, causing sluggish lock bar action.	Replace charger or adjust S-spring tension.
Leakage from sear valve when valve is closed.	Foreign matter between ball and lower seat.	
	Loose sear valve guide.	Tighten to a torque of 20 inch-pounds.
	Damaged lower seat.	Replace charger.
Leakage from sear valve when valve is open.	Foreign matter between ball and upper seat.	
	Damaged upper seat.	Replace charger.
	Insufficient clearance between valve plunger and sear valve rocker.	Replace charger.
Leakage from "O" ring packings with both valves either closed or open.	Loose inlet fitting or inlet plug.	Tighten plug or fitting.
	Damaged "O" ring packing on sear tube.	Replace charger.
Leakage between inlet valve body and cylinder plug, or from back end of piston when retracted with inlet valve open.	Damaged "O" ring packing at front end of inlet valve.	Replace charger.
	Damaged piston center "V" packing.	Replace charger.

TROUBLE	PROBABLE CAUSE	REMEDY
Leakage around piston head at front end of cylinder with inlet valve open.	Damaged piston "O" ring packing. Scored cylinder wall.	Replace charger. Replace charger.
Leakage past exhaust valve plug when inlet valve is open.	Loose plug. Damaged "O" ring packing.	Tighten plug. Replace charger.
Leakage from exhaust ports when inlet valve is open.	Damaged "O" ring packing on check. Damaged check.	Replace charger. Replace charger.
Leakage between sear actuator interconnector and sear valve with valve open.	Interconnector improperly engaged in sear valve body. Damaged interconnector "O" ring packing.	Re-engage interconnector. Replace charger.
Leakage from sear actuator.	Damaged sear actuator.	Replace charger.
Gun charger fails to stay in holdback position when retract circuit is energized. (Pin A on charger electrical plug.)	Sliding contacts in closed position. Sticking rear rocker arm. Interference between sear tube and front rocker arms causing improper locking action of lock bar. Interference between sear tube and lock bar. Cable leads pressing down on front rocker arm. Weak timer solenoid plunger spring or weak S-spring contact on switch panel causing sluggish lock bar action.	Replace charger. Free rocker arm action and increase actuating spring tension. Check installation of sear tube and rocker arm. Check installation of sear tube and lock bar. Rearrange cable leads. Replace charger or adjust S-spring tension.
Valve solenoid inactive when retract circuit is energized. (Pin A on charger electrical plug.)	Timer arm and front rocker contacts not closing. Defective timer solenoid. Rear rocker arm contacts not closing. Defective valve solenoid. Excessive valve solenoid air gap.	Adjust contacts by bending the required amount. Replace charger. Adjust contacts by bending the required amount. Replace charger. Replace charger.
Charger fails to release from holdback position when load circuit is energized. (Pin B on charger electrical plug.)	Impact arm improperly positioned. Damaged or slightly bent impact arm. Timer arm contacts not closing circuit. Defective timer solenoid. Excessive timer solenoid air gap.	Reposition arm. Replace charger. Bend contacts until circuit closes. Replace charger. Reduce air gap by bending front rocker arm tab that engages slot in solenoid plunger.
Sear solenoid inoperative when firing circuit is energized. (Pin C on charger electrical plug.)	Defective solenoid. Damaged leads. Excessive solenoid air gap.	Replace charger. Repair or replace leads. Replace charger.

TROUBLE	PROBABLE CAUSE	REMEDY
Sluggish discharge.	Insufficient exhaust check lubrication.	Remove check and lubricate "O" ring packing with low-temperature grease (Specification MIL-L-4343). Low-temperature lubricating oil may also be dropped through the exhaust ports.
	Foreign matter inside exhaust check.	
Charger does not mount properly on gun.	Spacer ring not projected on same side of gun as mount bracket.	Rotate spacer ring to proper position.
	Charger not firmly mounted on gun.	Check that disconnect spider pulls up tight on wedge bolt pin.
Charger does not mount on gun.	Improper locating of spacer ring.	Turn ring over in order to have screw head on top of ring.

9-107. LOADING GUNNERY SYSTEM.

9-108. Open gun and ammunition compartment access doors. Make certain gunnery control electrical switches are in safe position. See figure 9-21; then proceed as follows:

a. Remove ammunition containers, and position ammunition compartment doors in semilowered position by inserting ball (attached to center portion of door supporting cable) into slot provided on side of door. The door then serves as a loading platform to load the ammunition containers into the respective compartments.

b. See loading instructions stenciled on side of container and load 267 rounds in each container, being sure to leave leading double link empty. If maximum number of rounds is desired, load 33 additional rounds in each container.

c. Place loaded ammunition containers in respective compartments and secure locks; then, using ammunition loading hook (stowed on gun compartment door), reach down through ammunition booster and engage hook with double link left empty in step b.

d. Open gun cover, raise case extractor arm, and lift loaded ammunition belt to engage feeder pawl in gun receiver; then lower case extractor arm, and close and lock gun cover.

e. Charge gun to check ammunition feeding and ejection operation, using manual charging cable, or operate gun chargers (on airplanes equipped with pneumatic chargers, paragraph 9-103) manually or electrically, provided pneumatic system contains sufficient air pressure. Make certain that ammunition feeds freely and does not catch on chutes. Especially observe metal chute that replaces the lower gun ammunition boost motor, and if ammunition catches at either side of chute, remove chute and bend edges of chute to free loaded ammunition belt. Chargers may be operated manually by lifting the timer and valve solenoid tabs. (Refer to paragraph 9-124.)

WARNING

- Do not depress sear actuator control button (on top of charger), as firing of gun will result if gun bolt firing pin mechanism is cocked and firing chamber contains live round.
- Make certain that right and left gun compartment gun charging cables are removed from guns and are properly stowed before closing gun and ammunition compartment doors. If charging cables are left on guns (especially the left gun compartment), it is possible for the cables to foul the surface controls and cause serious damage.

f. Make certain flexible ammunition feed chutes, expended link chutes, ammunition boosters, gun chargers, and gun charging air lines are secured and locked. Then stow ammunition loading hooks and charging cables, and install and lock gun and ammunition access doors. (Refer to paragraph 9-138A.)

9-109. UNLOADING GUNNERY SYSTEM.

9-110. Open gun and ammunition compartment doors. See figure 9-21; then proceed as follows:

a. Open gun cover, lift case extractor arm, remove loaded ammunition belt from feeder pawl, lower extractor arm, and charge gun to remove round from firing chamber. Then disconnect flexible feed chute from side of gun receiver.

b. Release locks on ammunition container and pull container partially out of compartment. Then lift boost motor clutch release wire (paragraph 9-119) and pull loaded ammunition belt back (in reverse direction) through ammunition booster.

c. Open expended link and case compartment access doors on lower side of fuselage and remove expended ammunition into a suitable container.

CAUTION

When emptying expended ammunition, make certain that inspection doors in left and right aft expended ammunition compartments are securely installed. Improper installation of inspection doors can result in expended ammunition entering the wing center section, possibly jamming flight control mechanism.

d. Close and lock gun covers, attach flexible feed chute to gun receiver, secure ammunition container locks, and close expended ammunition compartment access doors. Then close gun and ammunition compartment doors. (Refer to paragraph 9-138A.)

Note

If airplane is to be flown after ammunition is removed from the guns and containers, it is recommended that 90 pounds of ballast weight be added to each ammunition container to

maintain airplane cg. This is especially essential on airplanes with extended wing leading edges (wing slats removed).

9-111. GUNS.

9-112. The six Type M-3 .50-caliber machine guns (figure 9-21) installed in the right and left gun compartments are automatic, recoil-operated, air-cooled machine guns with a high rate of fire. The guns may be removed and replaced without being bore sighted, provided the rear gun mount azimuth and elevation adjustments are not disturbed. The guns must be cleaned, adjusted, serviced, and checked for operation prior to installation. (See figure 9-23 for adjustment of guns equipped with pneumatic chargers.) The front gun mount forging mounting bolts must have stainless-steel washers under bolt heads and nuts, and they must be torqued to 430 inch-pounds.

CAUTION

Gun firing may loosen gun mount forging mounting bolts not torqued to 430 inch-pounds, and damage can result. Therefore, periodic tightening is necessary.

The outside diameter of the gun muzzles must be smooth and the front barrel bearing screws flush with the surface to prevent the gun muzzle locking with the blast tube snap ring seal.

9-113. REMOVING GUNS. Open gun compartment doors. See figure 9-21; then proceed as follows:

a. Remove electric gun heaters. (Refer to paragraph 9-133.)

b. Remove pneumatic gun chargers. (Refer to paragraph 9-125.)

c. Open gun cover, and remove ammunition feed and link ejection chutes from gun receiver.

d. Release rear gun mount by turning locking knob to release clamp.

e. Support gun and release front mount lockpin: then move gun aft and out of gun compartment.

Note

Flexibility of blast tubes provides sufficient clearance for removing gun barrels from snap ring seals.

9-114. INSTALLING GUNS. Open gun compartment doors. See figure 9-21; then proceed as follows:

a. Lubricate guns. (Refer to paragraph 9-117.)

b. Adjust guns. (See figure 9-23 for adjustment of guns equipped with pneumatic chargers.)

c. Insert gun barrel into applicable blast tube opening, with gun receiver in vertical and horizontal alignment with respective mounts.

d. Lower gun to engage front mount, and apply sufficient pressure to snap gun into locked position. Then engage rear mount clamp and secure (finger-tighten) locking knob. No safetying is required.

e. Open gun cover, and attach ammunition feed and link ejection chutes.

f. Install electric gun heater. (Refer to paragraph 9-134.)

g. Install pneumatic gun charger. (Refer to paragraph 9-126.)

h. If rear gun mount adjustments were disturbed, bore sight guns. (Refer to paragraph 9-115.)

i. Load gunnery system. (Refer to paragraph 9-108.)

9-115. BORE SIGHTING GUNS. The guns may be adjusted ¼ degree in both azimuth and elevation during bore-sighting operation, by adjustment of the rear gun mounts. Detent springs in the mount automatically lock the horizontal and vertical adjustments. To align airplane to target board, refer to paragraph 9-10; then, using a breech-type bore-sighting tool, align guns to their respective sighting marks on target board. To unload guns prior to inserting bore-sight tool, refer to paragraph 9-110. Comply only with step a.; then, with gun bolt retracted, insert bore-sight tool.

9-116. ADJUSTING GUNS. See figure 9-23.

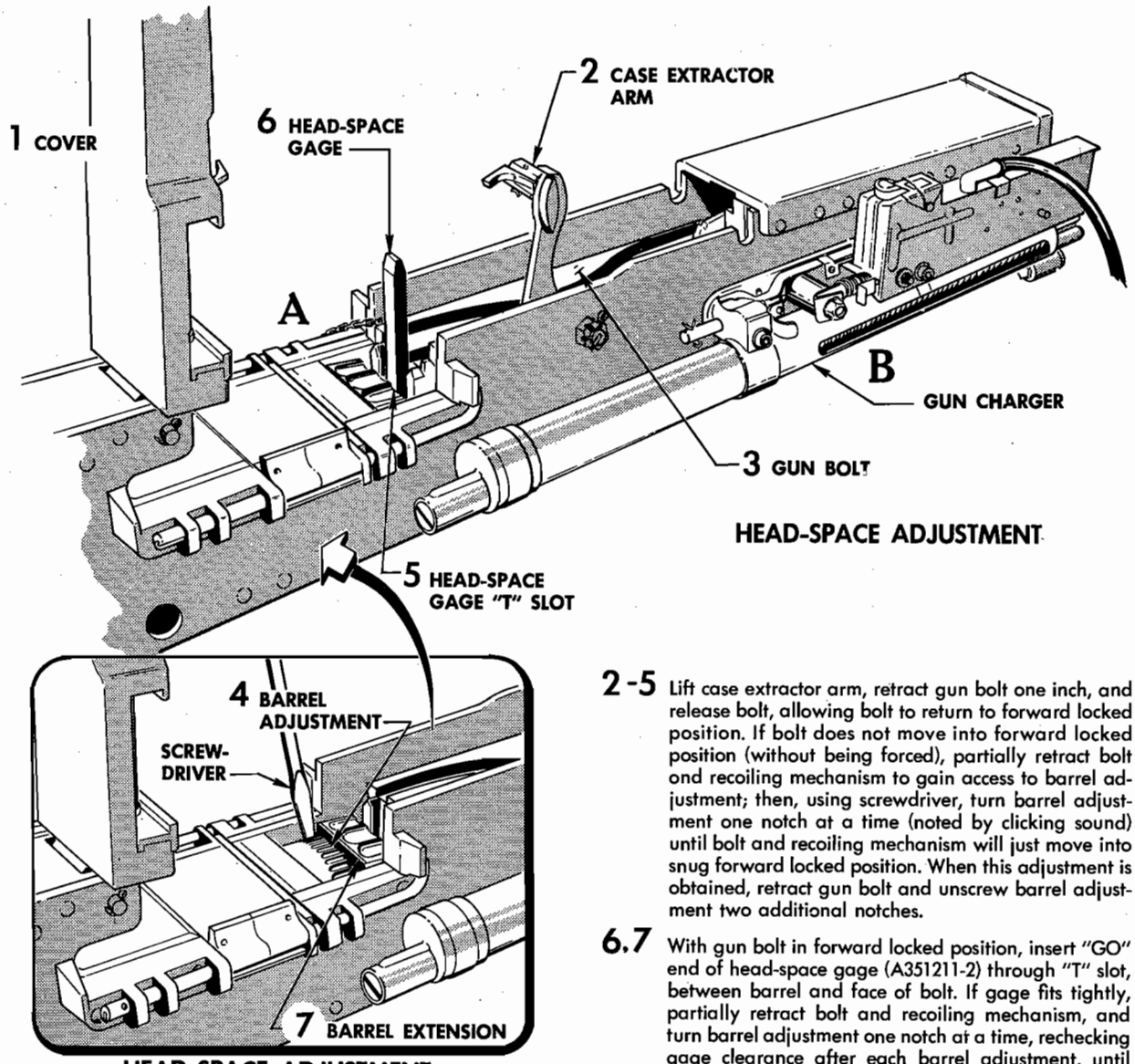
9-117. LUBRICATING GUNS. When guns are kept in readiness for active use and the time required for gun removal is prohibitive, the guns (figure 9-21) may be lubricated while mounted in airplane. To lubricate guns (without removal), open gun compartment doors, make certain gunnery system electrical switches are in safe positions (figure 9-22), and then proceed as follows:

a. Open all gun covers, to prevent any inadvertent gun firing, and remove expendable plugs from gun muzzle blast tubes.

b. Saturate clean, lint-free cloth with special lubricating and preservative oil (Specification MIL-L-644); then wring out excess oil from cloth and wipe a light coating of oil over all accessible surfaces of gun. Oil may be worked into inaccessible crevices, around gun bolt, by using a clean brush or by forcing oiling cloth into crevices.

CAUTION

Wear clean linen gloves while lubricating guns and avoid touching guns with bare hands, as body acids contacting metal causes "sweating" and subsequent metal deterioration.



HEAD-SPACE ADJUSTMENT

HEAD-SPACE ADJUSTMENT

1 With gun fully assembled and gun charger installed (either on bench or in airplane), open gun cover. If gun contains live rounds, unload gun by lifting case extractor arm and removing loaded ammunition belt from feeder pawl; then lower case extractor arm, engaging round in firing chamber, and charge gun to remove round.

NOTE: To retract and release the gun bolt, any of the following methods may be used: pneumatic gun charger, by operation of manually operated button and tabs on charger, provided sufficient air pressure (approximately 850 psi) is available; manual gun charging cable; or lifting case extractor arm for use as a handle to retract and release the gun bolt and recoiling mechanism.

2-5 Lift case extractor arm, retract gun bolt one inch, and release bolt, allowing bolt to return to forward locked position. If bolt does not move into forward locked position (without being forced), partially retract bolt and recoiling mechanism to gain access to barrel adjustment; then, using screwdriver, turn barrel adjustment one notch at a time (noted by clicking sound) until bolt and recoiling mechanism will just move into snug forward locked position. When this adjustment is obtained, retract gun bolt and unscrew barrel adjustment two additional notches.

6,7 With gun bolt in forward locked position, insert "GO" end of head-space gage (A351211-2) through "T" slot, between barrel and face of bolt. If gage fits tightly, partially retract bolt and recoiling mechanism, and turn barrel adjustment one notch at a time, rechecking gage clearance after each barrel adjustment, until gage enters "T" slot freely; then insert "NO GO" end of gage (A351211-2) into "T" slot. If the "NO GO" end of the head-space gage will enter, the head space is too loose. To correct loose head-space adjustment, partially retract gun bolt and recoiling mechanism; then, using screwdriver, turn barrel adjustment, turning barrel into barrel extension one notch at a time, until "NO GO" end of gage will not enter "T" slot. If the "NO GO" end of the gage will not enter the "T" slot and if the "GO" end of the gage does not fit too tightly, the gun head-space adjustment is correct. Gun head-space adjustment must always be in conformance with head-space "GO, NO GO" gage.

CAUTION: Never release bolt firing pin when head-space gage is in "T" slot; a damaged firing pin will result.

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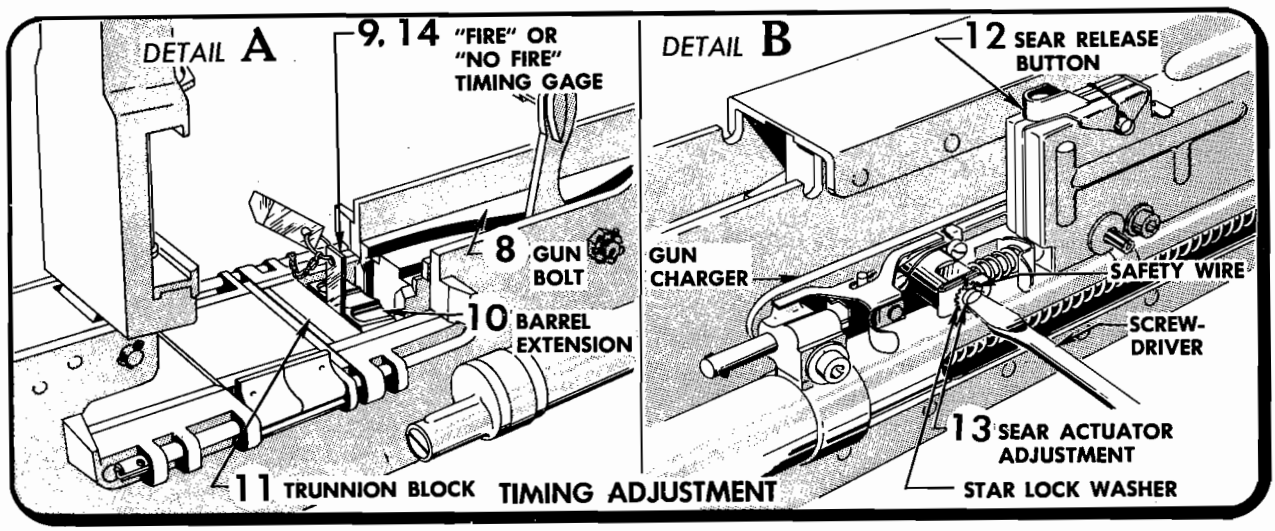
Figure 9-23. Adjusting Guns (Sheet 1 of 2)



TIMING ADJUSTMENT

8-12 Fully retract and release gun bolt to cock bolt firing pin mechanism; then retract bolt approximately ¼ inch and insert .020-inch gun-timing "FIRE" gage (A351214) between, and to the side of, the barrel extension and trunnion block. Depress sear release button (on top of charger), allowing bolt firing pin to release sharply.

Remove "FIRE" gage from between barrel extension and trunnion block; then, after retracting and releasing gun bolt to cock bolt firing pin mechanism, substitute .116-inch "NO FIRE" gage (A351213) for "FIRE" gage. Depress charger sear release button, noting that bolt firing pin *does not* release. If bolt firing pin does release with the "NO FIRE" gage in place, the charger sear actuator adjustment must be readjusted.

13,14 If bolt firing pin does not release when charger sear release button is depressed, turn sear actuator adjustment (on charger) in counterclockwise direction with screwdriver until bolt firing pin just releases (noted by sharp clicking sound); then turn sear actuator adjustment two additional notches.

NOTE: On chargers equipped with star washers under adjustment, safety wire must be installed to lock adjustment.

NOTE: If gun-timing adjustment cannot be obtained, because of worn charger sear actuator, remove and replace gun charger. (Refer to index for page number of removal procedure.) Then repeat gun-timing adjustment.

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Figure 9-23. Adjusting Guns (Sheet 2 of 2)

c. With gun bolt in retracted position and firing chamber empty, swab gun bore extremities, using a gun bore cleaning rod and a gun bore cleaning cloth lightly saturated with special lubricating and preservative oil (Specification MIL-L-644).

d. Wipe excess oil from gun bores and install expendable plugs in all gun muzzle blast tubes.

CAUTION

Gun bores must be wiped dry when firing operation is anticipated. Guns that have been fired the maximum number of times, requiring complete cleaning, lubrication, and adjustment, must be removed from airplane and serviced on bench. To remove guns, refer to paragraph 9-113.

e. Wipe any excess oil from gun receivers; then close and lock gun covers.

f. Close gun compartment doors.

9-118. AMMUNITION BOOSTERS.

9-119. The .50-caliber booster assembly, consisting of an ammunition boost motor and last-round and overfeed switches, is mounted in a housing and installed directly above the ammunition container. The motor, controlled by the last-round and overfeed switches, assists the guns in lifting ammunition from containers. Hughes 110-2100-1, -10, and -11 or AiResearch 29492-1 and -2 boost motors may be installed, as both motors are completely interchangeable. The motor drives a double sprocket which engages the ammunition-filled belt links. The boost motor is equipped with an antirollback device to prevent ammunition from creeping backward during an overfeed condition. When the guns are being fired and an ammunition belt jam occurs between either boost motor and gun, the subsequent buckling action of the ammunition belt deflects a spring-loaded actuator in the booster, actuating the overfeed switch to stop the motor. The gun continues firing rounds, removing rounds from between the gun and the booster until all excess rounds are fired. This releases the actuator and the last-round switch, which restarts the boost motor. The boost motors operate as long as the trigger remains depressed, provided the boost motors do not overfeed or ammunition is not expended. When the last round feeds through the booster, an additional spring-loaded actuator is released to actuate the last-round switch and stop the boost motor. A mechanical release (figure 9-24) is provided on the booster for clearing ammunition jams between gun and booster. A lift of approximately ¼ pound must be exerted on the wire at the top forward face of the housing to release the antirollback mechanism before the ammunition can be pulled (in reverse direction) back through the sprockets. Lifting this wire does not cause the boost motor to freewheel. A 30- to 35-pound pull is required on the ammunition belt to overcome the force of the 120-to-1 gear ratio between the sprocket and boost motor.

9-120. REMOVING AMMUNITION BOOSTERS. Open gun and ammunition compartment doors. See figure 9-21; then proceed as follows:

a. Unload gunnery system. (Refer to paragraph 9-110.)

b. Release ammunition feed chute and ammunition container locks from top and bottom of booster.

c. Disconnect electrical connection and bonding strap, and release booster locks; then lift booster from mounting position to free supporting hooks from mounting rod.

9-121. INSTALLING AMMUNITION BOOSTERS. Open gun and ammunition compartment doors. See figure 9-21; then proceed as follows:

a. Make certain booster electrical control switches are properly adjusted (before installation); then, with booster in mounting position, check for proper clearance. (See figure 9-24.)

Note

Make certain protective insulating cover is installed on last-round switch.

b. With booster support hooks and rods engaged, engage and lock flexible ammunition chute at top of booster.

c. Engage ammunition container locks and booster brackets; then attach electrical connector and attach bonding strap.

d. Load ammunition. (Refer to paragraph 9-108.)

9-122. ADJUSTING AMMUNITION BOOSTERS. See figure 9-24.

9-123. PNEUMATIC GUN CHARGERS.

9-124. A Type B-1 electropneumatic gun charger (paragraph 9-103) is installed on each of the six M-3 machine guns. The charger units are operated by compressed air and utilize 28-volt direct current for operation of control circuits. The charger performs the following functions: charges guns by remote electrical control from cockpit, and pneumatically holds gun bolt in retracted position for purposes of safety and to permit cooling of gun barrel. (There is no electrical circuit demand while gun bolt is being held in the retracted position.) The charger also automatically extracts an unfired round and reloads a new round during gunfire when a failure to fire occurs. It also fires gun by use of an electropneumatic sear actuator contained in the charger, provided the trigger is held depressed. The charger consists of: a timer mechanism electrically operated by a timer solenoid, which releases the mechanism; a solenoid-operated

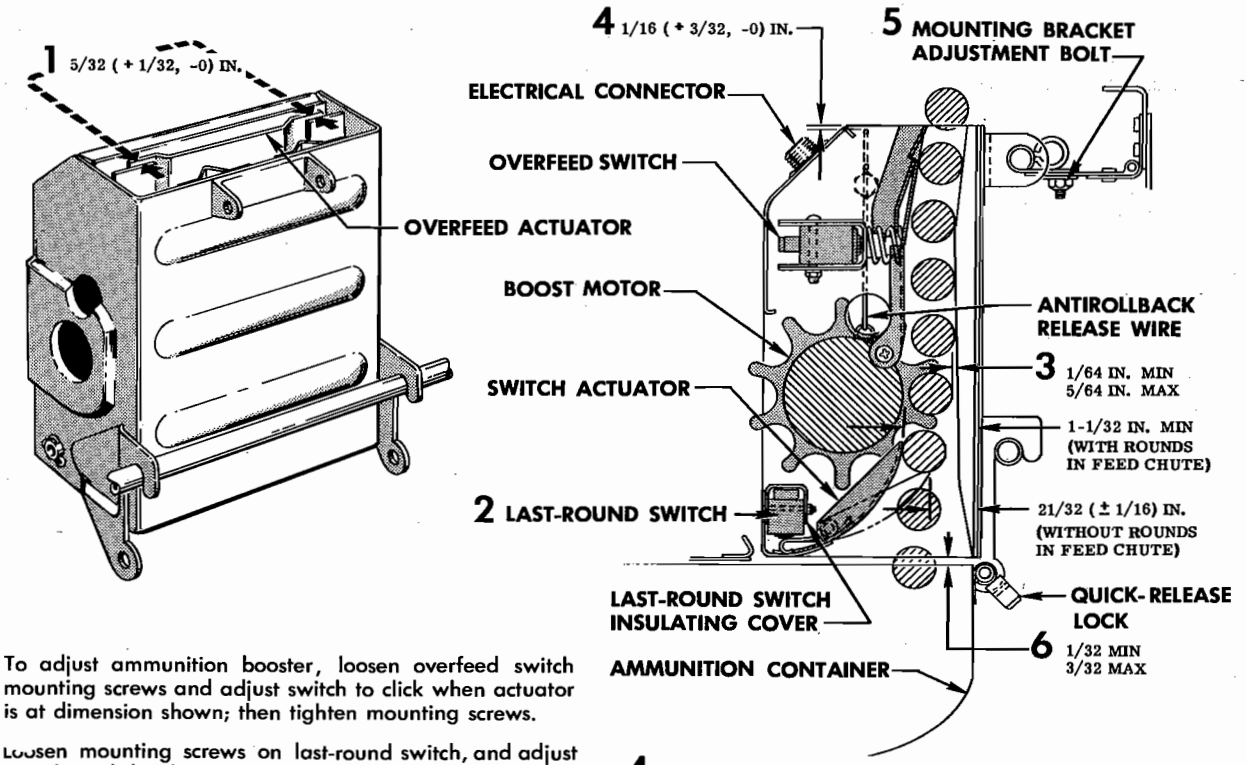


Figure 9-24. Adjusting Ammunition Boosters

air-inlet valve, used in conjunction with a piston, a cylinder, and a double-acting exhaust valve; and a sear actuator pin. The sear actuator pin (contained in the bracket and sear actuator assembly) is controlled by the sear valve and solenoid. Both the piston and sear actuator pin are operated by pneumatic air pressure when the charger retract, load, and fire circuits are energized. Front and rear tabs are provided (on top of the charger) for manual operation of the timer and valve solenoids. A button (protected by a safety cover to prevent inadvertent firing of gun) is also provided on top of the sear solenoid for manual operation of the sear actuator pin. The piston is pneumatically retracted when the rear tab is lifted and is released when the forward tab is lifted, allowing the gun bolt to return to the forward position. The bracket and sear actuator assembly provide means of mounting the charger on gun; when electrically or manually operated, the sear actuator pin controls the firing action of the gun. The air inlet valve solenoid, the air inlet valve, the piston and cylinder, and the double-action exhaust valve provide means for retracting and releasing the gun bolt.

9-125. REMOVING GUN CHARGERS. Open gun compartment doors. See figure 9-21 and refer to paragraph 9-103 for airplanes equipped with pneumatic chargers. To remove gun chargers, proceed as follows:

a. Disconnect electrical plug and release air pressure line quick-disconnect from charger.

b. Pull charger spring-loaded attaching lever forward and lift charger free of gun.

9-126. INSTALLING GUN CHARGERS. Open gun compartment doors. See figure 9-21 and refer to paragraph 9-103 for airplanes equipped with pneumatic chargers. To install gun chargers, proceed as follows:

a. Position charger on side of gun, engaging charger wedge bolt in slot, with spring-loaded attaching lever pulled forward; then release attaching lever, allowing

charger to lock in place. If charger sear actuator adjustment was disturbed, adjust gun timing. (See figure 9-23.)

b. Connect charger electrical plug and air pressure line.

CAUTION

Before attaching air pressure line, make certain fitting on charger and quick-disconnect are free of grease and dirt.

c. Operate charger sufficient number of times to check ammunition feeding and ejection operation.

WARNING

Do not depress sear actuator control button (on top of charger) at any time that gun contains live round in firing chamber, as firing of round will result.

d. Close gun compartment doors.

9-126A. GUN-FIRING SOLENOIDS.

9-126B. The G-9 gun-firing solenoids installed on some F-86F Airplanes (paragraph 9-103) have a removable adjustment cap, a retaining flange, and locking levers so that the solenoid armature and plunger may be disassembled from the solenoid.

Note

All G-9 gun-firing solenoids that do not have these parts should not be used.

9-126C. REMOVING GUN-FIRING SOLENOIDS. To remove gun-firing solenoids from guns, open gun bay doors and proceed as follows:

a. Disconnect electrical gun-firing plug from solenoid.

b. Remove cotter pin and securing shear nut from solenoid attaching bolt. Lift solenoid free of gun.

9-126D. INSTALLING AND ADJUSTING GUN-FIRING SOLENOIDS (GUN TIMING). To install and adjust the gun-firing solenoid on gun, proceed as follows:

a. Energize solenoid with 28-volt direct current and measure from tip of plunger to solenoid base plate. Dimension must not be less than 0.339 inch and must not be more than 0.354 inch.

Note

Solenoid adjustment may be accomplished on a bench or on the airplane. If solenoid is adjusted on airplane, first remove all other gun-firing solenoid plugs; then connect only the plug to solenoid being adjusted and use airplane electrical system to energize solenoid. (See figure 9-21.)

b. De-energize solenoid and measure sear plunger as in step a. Dimension must not exceed 0.224 inch. The minimum allowable adjustment is 0.100 inch. When the solenoid is energized, with the sear plunger adjusted to the fully extended position, the measurement is 0.354 inch. The plunger must be adjustable down to 0.254 inch or less.

Note

Gun-firing solenoids not meeting these requirements must be removed and replaced.

c. Place solenoid on side plate of gun, with electrical connector plug pointing forward.

d. Fasten solenoid to gun side plate with solenoid mounting bolt and install shear nut. Then tighten bolt shear nut and install cotter pin.

e. Rotate solenoid adjustment cap clockwise to maximum position.

f. Cock gun and insert 0.116-inch "NO-FIRE" gage of gage assembly (Part No. 41G201-175) between barrel extension and trunnion block, and allow barrel extension to slowly close on gage.

g. Release firing pin mechanism by operating solenoid. The firing pin should not release.

h. Adjust solenoid plunger protrusion by turning solenoid adjustment cap in a counterclockwise direction, one notch at a time, until firing mechanism is consistently released with "NO-FIRE" gage inserted between trunnion block and barrel extension. The adjustment must be made with the driving spring assembled in the gun. The gun must be manually charged each time the solenoid is energized, whether or not the firing mechanism is released.

i. Rotate solenoid adjustment cap one notch in a clockwise direction. With this setting, the gun will not fire at 0.116 inch out of firing position, but will fire prior to 0.020 inch out of firing position. The setting may be checked with the 0.020-inch "FIRE" and 0.116-inch "NO-FIRE" gages. This check must be made with the back plate assembled on the gun.

j. Tighten solenoid adjustment cap locking screws and secure all four screws with safety wire. Then apply a spot of red paint to adjustment cap and solenoid base for any future adjustment reference.

k. Connect gun-firing solenoid electrical plug.

Note

If gun head-spacing adjustment is desired (on guns equipped with either B-1 chargers or G-9 gun-firing solenoids), see figure 9-23.

9-126E. CLEANING GUN-FIRING SOLENOIDS. To clean the gun-firing solenoids, refer to paragraph 9-126C for solenoid removal and proceed as follows:

a. Remove the four fillister head screws and remove adjustment cap clamping washer, adjustment cap retaining flange, spring washer, and plunger assembly. Clean these parts in carbon tetrachloride (Federal Specification O-C-141). After cleaning, thoroughly dry all parts before reinstallation.

b. Clean out inside of brass cylinder and plunger operating hole.

Note

Do not allow cleaning fluid to enter solenoid coil. If cleaning fluid does contact coil, dry with compressed air.

c. Reassemble solenoid and safety-wire the four fillister head screws.

Note

The gun-firing solenoids should be removed and replaced after 10,000 rounds of ammunition have been fired.

d. Install gun-firing solenoids. (Refer to paragraph 9-126D.)

9-127. GUN CHARGING AIR COMPRESSOR AND AIR BOTTLE.

9-128. The air compressor and air bottle (paragraph 9-103) are provided to furnish and maintain air pressure for the gun charging operation. The compressor consists of a motor-driven, three-stage pump, and an air bottle equipped with drain plug, on bottom of the bottle, to allow accumulated moisture to be removed. The pump automatically maintains air pressure of approximately 1500 psi in the air bottle for operation of the automatic gun chargers. A relief valve is incorporated in the system to relieve air bottle pressure if the pressure becomes too high because of altitude changes. Ground charging of the air bottle is possible when an external high-pressure air line is connected to the filler valve. This eliminates the necessity of waiting for the compressor to charge the air bottle to the required pressure, preceding operation of the chargers.

9-129. REMOVING AIR COMPRESSOR AND AIR BOTTLE. To remove the air compressor and air bottle, see figure 9-21. Disconnect the following interconnecting air lines: the air line interconnecting the compressor and air bottle; the air line connected to the air bottle which supplies the pressurized air to the automatic gun chargers; and the air line from the compressor, which terminates at the four-way junction. After removing these air lines, disconnect electrical plug from compressor. The compressor can be released after the four mounting bolts securing it to its mount have been removed. To remove air bottle, loosen wing screws on the two mounting straps that secure bottle to its mount and lift bottle from mounting position.

9-130. INSTALLING AIR COMPRESSOR AND AIR BOTTLE. To install air compressor, hold compressor in mounting position next to attaching holes and insert the four mounting bolts as shown in figure 9-21. Secure mounting bolts. To install air bottle, position it within its mounting straps and tighten wing screws to secure bottle in place. Connect air lines to compressor and air bottle, and connect electrical plug to compressor.

9-131. ELECTRIC GUN HEATERS.

9-132. The Type J-4 electric gun heater installed on each gun consists of a 100-watt, 28-volt d-c, copper-faced heating element. The heating element is enclosed in a spring-steel case designed to clamp on the gun cover. A rubber-covered electric cord is provided to connect the heater to the electrical system of the airplane.

9-133. REMOVING ELECTRIC GUN HEATERS. Open gun compartment doors. See figure 9-21; then disconnect heater electrical plug and use sufficient force to pull heater case from gun cover.

9-134. INSTALLING ELECTRIC GUN HEATERS. Open gun compartment doors. See figure 9-21; then proceed as follows:

a. Place heater on gun cover, with electric cord pointing toward gun barrel, and use sufficient pressure to force heater case around top of gun cover. Then move heater on gun cover until hole in heater case fits around rivet head on gun cover.

Note

Make certain heater element fits tight against gun cover. Air space between heating element and metal cover of gun causes heating element to burn out when heater is operated.

b. Open gun cover, making certain that heater cord does not rub; then close and lock gun cover.

c. Close gun compartment doors.

9-135. GUN BLAST PANELS, TUBES, AND EXPENDABLE PLUGS.

9-136. Open-port gun blast panels, tubes, and plugs are provided. The center and lower gun blast tubes are clamped to the blast panel at the forward end and are attached by screws at the rear. Expendable rubber plugs are installed in the blast tube forward ends to prevent dust and moisture from entering the gun barrels and gun compartments. The plugs are blown free by the initial burst of gunfire and must be replaced after each gun-firing operation. To install expendable rubber plugs, see figure 9-25.

9-137. REMOVING GUN BLAST PANELS, TUBES, AND EXPENDABLE PLUGS. Open radar compartment access door and make certain gunnery system electrical switches are in safe positions. See figure 9-21; then proceed as follows:

a. Remove expendable rubber plugs from blast tube ends. Remove securing screws and clamps from tubes and pull blast tubes forward to clear gun muzzles.

b. Remove blast panel securing screws (leaving corner screws to be removed last). While supporting blast panel, remove corner securing screws; then lift blast panel free of airplane.

9-138. INSTALLING GUN BLAST PANELS, TUBES, AND EXPENDABLE PLUGS. Open radar compartment access door and make certain gunnery system electrical switches are in safe positions. See figure 9-21; then proceed as follows:

a. Lift blast panel into position. Install corner securing screws to align holes; then install remainder of securing screws.

b. Slide blast tube end (opposite the attaching clamps) over gun barrel. Attach clamps to tube forward ends and install securing screws at rear ends.

c. Install expendable rubber plugs (figure 9-25) in blast tube ends; then close radar compartment access door.

9-138A. INSTALLING AND ADJUSTING GUN COMPARTMENT DOORS.

Note

Gun compartment doors are trimmed and fitted to particular airplanes and are not interchangeable.

Before installing gun compartment doors, inspect Airloc fasteners above forward door latch handle and on lower rear corner of door and dzus fasteners in both door latch handles. Also inspect Airloc and dzus fastener receptacles. Damaged fasteners or receptacles should be repaired or replaced. Then proceed as follows:

a. Place door in position on gun compartment with latch handles open.

b. Close latch handles, observing whether lower edge of door seats properly (becomes flush with fuselage skin) just as handles reach the fully closed position.

c. If the door seats before the latch handles reach the fully closed position, remove door; then loosen locknuts on latch adjustment bolts and turn bolts one turn in clockwise direction. Tighten adjustment bolt locknuts and install door. If seating of door and moving of latch handles to fully closed position still do not coincide, repeat latch bolt adjustment procedure as necessary.

CAUTION

No more than normal hand pressure should be necessary to fully close latch handles. The dzus fasteners are designed to lock the handles in the closed position, not to hold them in place under tension. If latches are subjected to excessive stresses by being forced closed, the latch mechanism may fail, with possible loss of gun compartment door in flight and subsequent damage to airplane and injury to flight personnel.

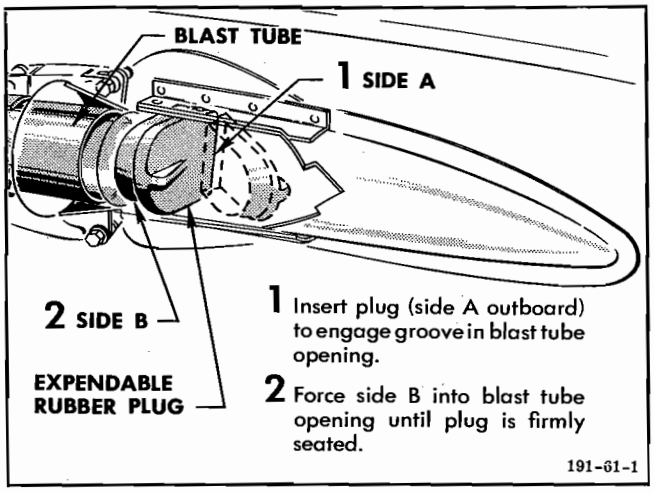


Figure 9-25. Installing Expendable Rubber Plugs

d. If door has not seated when latch handles reach the fully closed position, remove door; then loosen locknuts on latch adjustment bolts and turn bolts one turn in counterclockwise direction. Tighten adjustment bolt locknuts and install door. If seating of door and moving of latch handles to fully closed position still do not coincide, repeat latch bolt adjustment procedure as necessary.

CAUTION

Loosely fitting doors may be torn off the airplane in flight, with subsequent damage to airplane and injury to flight personnel.

e. When latch adjustments have been completed and door is properly seated, lock the two Airloc fasteners on the door and the two dzus fasteners in the latch handles.

9-139. GUN CAMERA SYSTEM.

9-140. The gun camera system (figure 9-26), provided to record results obtained in aerial gunnery training and produce visual records of actual combat, consists of an AN-N6 gun camera, a Type C-1 adjustable mount, electrical wiring, and a shock-resisting mounting bracket. The camera is installed in the lower section of the engine air intake duct on F-86F-1 through F-86F-15 Airplanes, and F-86F-20 Airplanes AF51-13070 through -13086. Only the Type C-1 mount and electrical wiring is included in the engine air intake duct on F-86F-20 Airplanes AF51-13087 through -13169, F-86F-25 Airplanes AF51-13170 through -13510 and AF52-5272 through -5380, and F-86F-30 Airplanes AF52-4305 through -4745. The Type C-1 camera mount provides azimuth and elevation adjustments and a locking screw to lock the adjustment. The mount also permits removal of the gun camera without disturbing the bore-sight adjustments. On airplanes modified by T. O. 1F-86-116 (formerly 01-60JL-116), the camera is removed from the engine air inlet duct location and is reinstalled on the sight head in the cockpit. (See figure 9-28.)

9-141. FUNCTION OF GUN CAMERA SYSTEM.

WARNING

To check operation of camera without firing guns, the gun safety switch must be placed in "SIGHT CAMERA RADAR" position.

9-142. The gun camera circuit (figure 9-26) permits the gun camera to function independently or when the guns are fired. This is accomplished when the gun safety switch is positioned to either "SIGHT CAMERA RADAR" or "GUNS" and the trigger on the control stick grip is depressed. The camera operates independently, by-passing the camera control relay, when the gun safety switch is in the "SIGHT CAMERA RADAR" position and the trigger is depressed. The camera operates to record the effect of gun firing when the gun safety switch is placed in the "GUNS" position and the trigger is depressed. This energizes the camera control relay, completing the circuit to the camera. During camera operation, a solenoid within the camera is energized, retracting the overrun indicator from the aperture. When the trigger is released, the solenoid is de-energized, projecting the indicator into camera view to be photographed for a film record of camera overrun time. The camera will continue to operate, after the trigger is released, for the overrun period set into the camera overrun control. When the temperature in the camera drops below 7.2°C (45°F), the thermal switch automatically turns on the camera heater. When the temperature exceeds 32.2°C (90°F), the heater is automatically turned off.

9-143. TROUBLE SHOOTING GUN CAMERA SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Motor fails to operate.	Gun safety switch not on. Camera circuit breaker open. Open circuit.	

TROUBLE	PROBABLE CAUSE	REMEDY
	Defective gun-firing switch. Defective GSAP relay. Motor brushes worn out.	Replace stick grip. Replace camera.
Motor runs, but camera fails to operate.	Shutter speed selector knob in neutral position.	Set shutter speed selector knob to correspond with index mark.
Gear train stops; clutch on motor slips.	Magazine jams causing motor cutout to open circuit.	Remove magazine and allow motor cutout to cool. Replace with another magazine.
Magazine jams.	Magazine driving spline not properly engaged. Damaged magazine. Improper operation of film claw. Improper operation of magazine driving spline.	Replace magazine. Make certain magazine is inserted all the way into camera. Move magazine drive gear arm so as to fully engage spline. Make certain that access cover closes easily without forcing. Using a gun camera "go, no-go" gage, align guide rail at top of aperture plate so that film claw travels back and forth on an even plane. Make sure that left washer, attached to magazine driving spline, is properly engaged between clutch retract arm and drive shaft retaining spring. Replace magazine driving spline and/or clutch retracting arm.
Film image blurred. (Film moves, shutter opens.)	Improper operation of film claw. Improper timing of shutter and film claw.	Using a "go, no-go" gage, align guide rail at top of aperture plate so that film claw travels back and forth smoothly on an even plane.
Negative out of focus.	Lens assembly securing nuts loose. Dirty filter.	

9-144. GUN CAMERA.

9-145. The magazine-type AN-N6 gun camera (figure 9-27), with an adjustable 35 mm focal lens and filter, is equipped with a constant-speed electric motor and cutout switch, a gear train drive mechanism and clutch, a camera speed selector, an overrun control, a camera film footage indicator, a magazine film footage indicator, and an electrical 40-watt resistor camera body heater. The speed of the camera shutter is controlled by the shutter speed selector knob located on top of the cover. A mark on the camera case is indexed to speed settings on the selector knob ("16," "32," and "64"). All normal photography requires a shutter speed of 16 frames per second. Slow-motion photography requires 64 frames per second and semislow-motion photography requires 32 frames per second. The various positions of the shutter speed knob select different gear ratios of the gear drive train mechanism. A spring clutch and an electrical overload cutout switch prevent damage to the camera if the magazine jams or an overload condition occurs. The camera overrun time of 0 to 5 seconds is adjustable and is calibrated in increments of one second. (Refer to paragraph 9-150.) The camera lens assembly contains two knurled adjustment rings which are used in obtaining the correct lens setting for various light conditions and shutter speeds. The outer ring is the index ring and provides an inner and outer row of figures. The outer figures, which index with an aligning mark on the lens barrel, are "16," "32," and "64," corresponding with the shutter speed selector knob

settings. The inner figures represent anticipated light conditions; "B" (bright), "H" (hazy), "D" (dull), and "3.5" (maximum lens opening for adverse light conditions). The inner ring is the diaphragm opening adjustment ring and provides an arrow and a row of figures representing the various lens aperture openings or "f" stops. The arrow indexes with the light condition figures on the index ring and the "f" stop figures index with an aligning mark on the lens barrel. The camera lens filter provides protection for the lens and should not be removed, except for cleaning purposes. A Type AN-1 aligning indicator, which fits into the magazine chamber is used to properly align the camera with the target board during bore sighting.

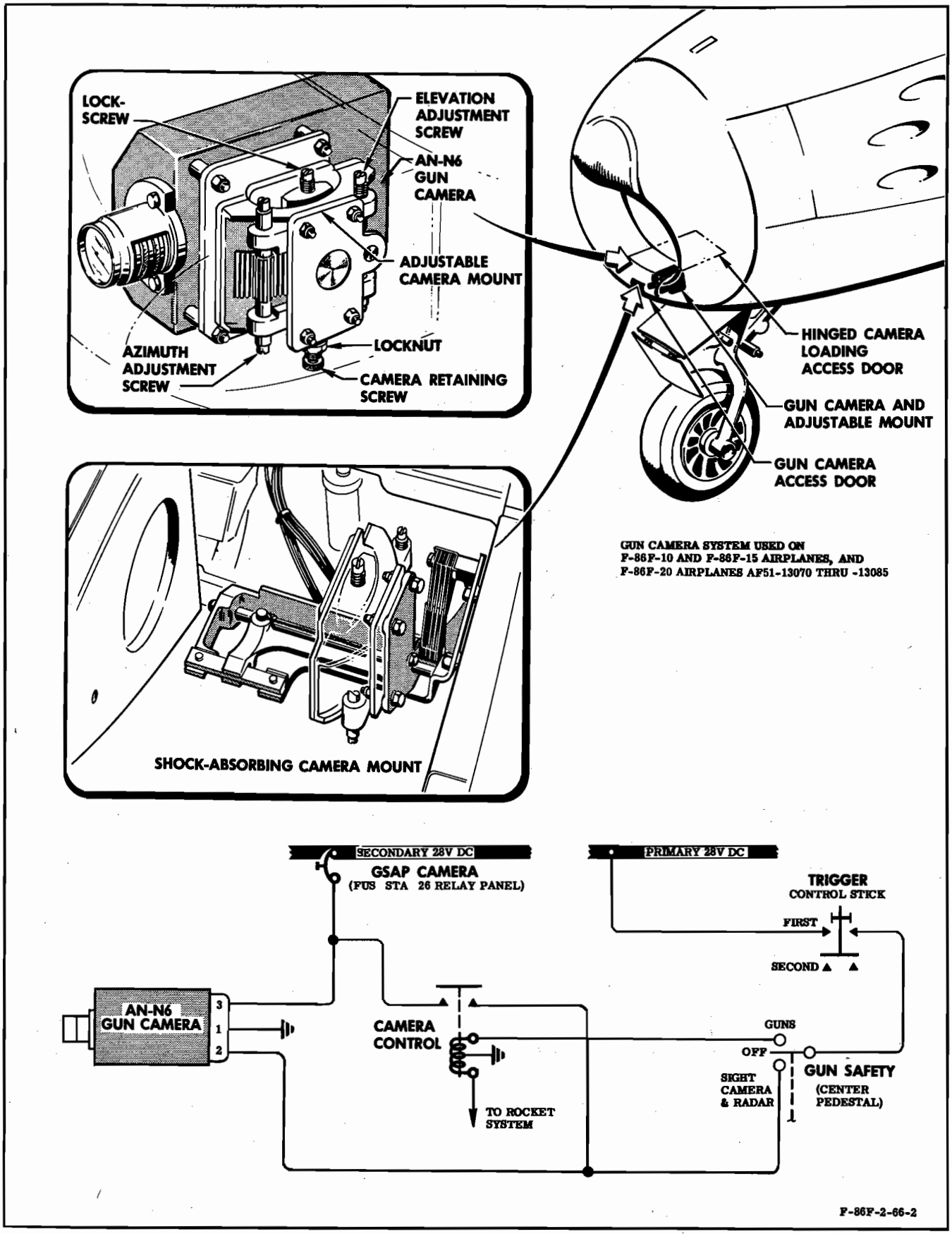


Figure 9-26. Gun Camera System

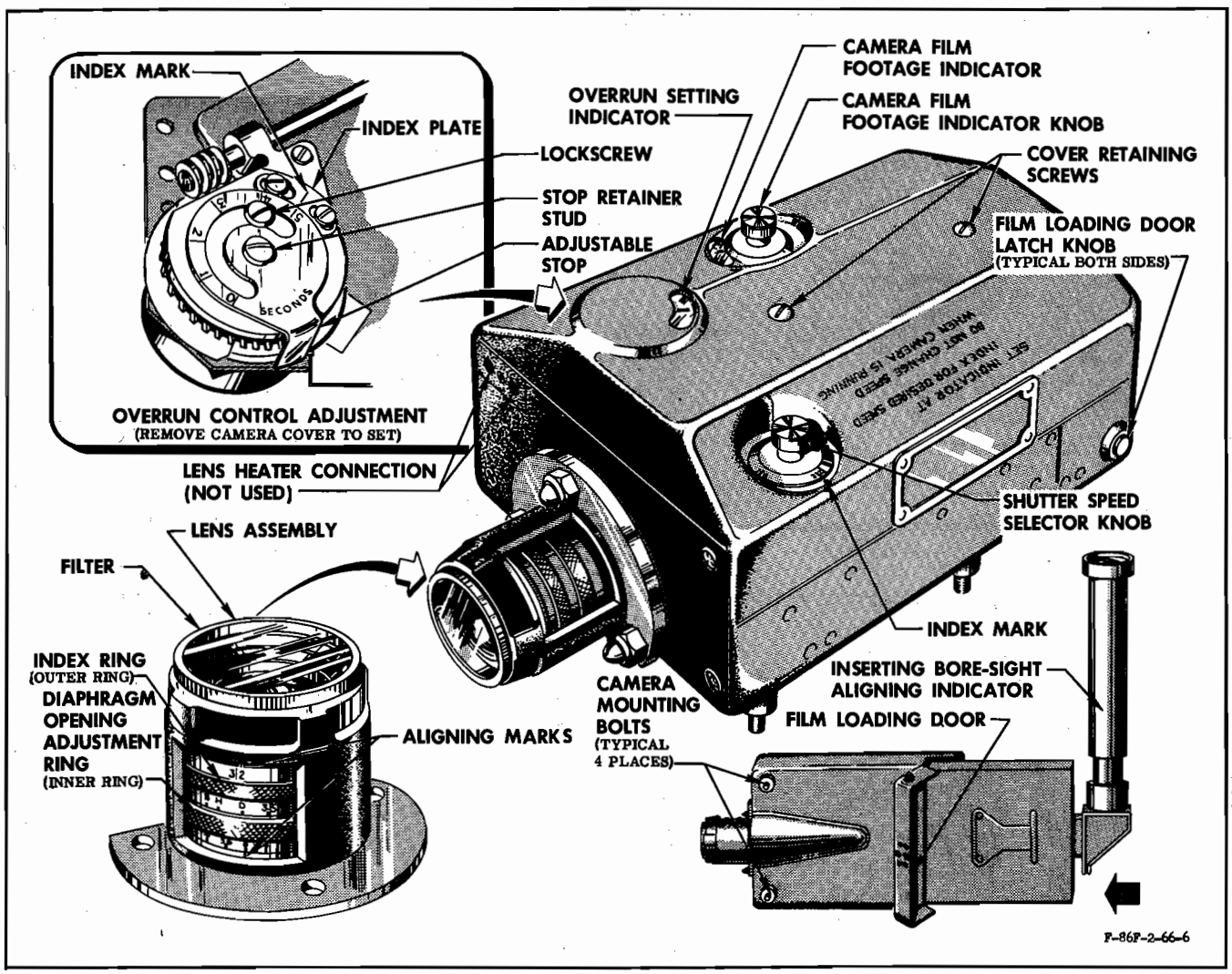


Figure 9-27. AN-N6 Gun Camera

9-146. REMOVING GUN CAMERA. To remove the gun camera without disturbing the elevation and azimuth settings, proceed as follows:

a. Open and remove camera access door in lower section of engine air intake duct.

b. Disconnect electrical lead at camera.

c. Cut safety wire from camera retaining screw.

d. Loosen locknut on camera retaining screw.

e. Hold camera firmly; then loosen camera retaining screw and remove camera.

f. Unload camera. (Refer to paragraph 9-154.)

Note

If camera is to be replaced, remove adapter mounting plate from camera.

9-147. INSTALLING GUN CAMERA. To install the gun camera, proceed as follows:

a. Clean camera (paragraph 9-152) and set camera overrun control (paragraph 9-150).

b. Install adapter mounting plate on camera; then position camera so that mounting plate engages with mount in airplane. Tighten retaining screw and locknut. Safety-wire retainer screws and locknut.

CAUTION

Tighten retainer screw *finger-tight* only.

c. If azimuth and elevation adjustments have been disturbed, bore sight camera. (Refer to paragraph 9-148.)

d. Connect electrical connector plug to camera.

e. Load and prepare camera for use. (Refer to paragraph 9-153.)

f. Install and close camera access door.

WARNING

To check operation of camera without firing guns, place gun safety switch in "SIGHT CAMERA RADAR" position.

9-148. BORE SIGHTING GUN CAMERA. To bore sight the gun camera, align the airplane to the target board (paragraph 9-10) and proceed as follows:

a. Unload camera, leaving film loading door open. (Refer to paragraph 9-154.)

b. Operate camera intermittently to stop shutter in open position. An alternate method to open shutter is to first turn shutter speed selector knob to a neutral position midway between any two shutter speed settings (recognized when a slight stop is felt); then move magazine drive gear arm toward camera mount as far as it will go. This will extend magazine driving spline into magazine chamber so that it can be turned by hand until shutter reaches the desired open position.

c. Move magazine drive gear arm away from camera mount so that magazine driving spline is retracted from magazine chamber.

d. Insert AN-1 aligning indicator into magazine chamber, making sure that retaining spring is placed toward mount side of camera.

e. Set index ring to "64" and diaphragm opening adjustment ring so that arrow is aligned with "D."

f. Sight through aligning indicator to check that camera is aligned with camera sighting mark on target board. (Refer to paragraph 9-10.) If camera does not align properly to target board, loosen adjustment jam nut (figure 9-26) and make azimuth and elevation adjustments on adjustable mount. When uppermost cross hairs of aligning indicator align with camera sighting mark on target board, lock and safety-wire mount adjustments.

g. Remove A-1 aligning indicator.

Note

Be sure to set shutter speed selector knob to one of its three speed settings when bore sighting has been accomplished. The camera will not function if the knob is left in a neutral position.

h. Load and prepare camera for use. (Refer to paragraph 9-153.)

9-149. SETTING GUN CAMERA SHUTTER SPEED AND LENS. To set shutter speed and lens, open and remove camera access door in engine air intake duct and proceed as follows:

a. Turn shutter speed selector knob on camera so that desired setting ("16," "32," or "64" frames per second) is aligned with index mark on camera case.

CAUTION

Do not change shutter speed selector knob setting while camera is in motion. Make certain that desired shutter speed setting is aligned exactly with index mark on camera case.

b. Rotate index ring (outer ring) so that desired shutter speed setting ("16," "32," or "64" frames per second) indexes with aligning mark on lens barrel. Be sure that index ring setting conforms with shutter speed selector knob setting made in step a.

c. Rotate diaphragm opening adjustment ring (inner ring) so that arrow indexes with anticipated light condition mark ("B," "H," "D," or "3.5") on index ring. This will automatically select the correct lens aperture opening or "f" stop, which will be indicated by the indexing of one of the "f" stop figures on the diaphragm opening adjustment ring with the aligning mark on the lens barrel.

d. Replace camera access door.

9-150. SETTING GUN CAMERA OVERRUN CONTROL. To set the gun camera overrun control, remove camera access door and proceed as follows:

a. Remove camera. (Refer to paragraph 9-146.)

b. After removing the two top cover screws, remove top cover. First, raise side opposite cable socket to avoid damage to socket opening, and remove camera top cover.

c. Loosen stop retainer stud and screw. (See figure 9-27.) Then rotate adjustable stop so that index line for desired time of overrun is set against line on index plate. (See figure 9-27.) Be careful not to disturb setting. Dip screw threads in orange shellac (Federal Specification TT-S-271) and tighten stop retainer stud and lockscrew one at a time.

Note

When the adjustable stop is set to "0," the overrun time is zero.

d. Replace cover, being careful to first place socket opening at rear end of camera cover over socket, and gently forcing cover down to avoid damage to socket opening. Then push front end of cover down, install the two top cover screws, and install camera. (Refer to paragraph 9-147.)

9-151. SETTING GUN CAMERA FILM FOOTAGE INDICATOR. To set the gun camera film footage indicator, proceed as follows:

a. Determine amount of unexposed film remaining in magazine by observing reading of magazine film footage indicator, located on side of magazine, opposite drive gear.

b. Push in and turn camera film footage indicator knob until setting corresponds with reading taken from magazine film footage indicator. If this procedure is followed, the camera film footage indicator will indicate the correct amount of film remaining unexposed.

9-152. CLEANING GUN CAMERA. The lens and filter should be cleaned with a soft brush or with special cleaning tissue. If neither brush nor tissue is available, use a clean, soft, lint-free cloth. Do not allow finger marks or dust to remain on exposed surfaces of lens or filter. The filter is to be removed only for cleaning, as it provides protection for the camera lens.

CAUTION

Do not use water, alcohol, cleaning fluid, solvent, or any kind of liquid to clean lens, as liquid will penetrate through to the lens elements.

Remove dust from inside of camera case and from mechanism with high-pressure *dry* air. Use a clean, soft, lint-free cloth for dusting surfaces that can be easily reached and for removing dust, contaminated grease, or oil. If necessary, moisten cloth with a solvent conforming to Federal Specification P-S-661.

9-153. LOADING AND PREPARING GUN CAMERA FOR USE. To load and prepare the gun camera for use, open and remove camera access door (figure 9-26) and proceed as follows:

a. If azimuth or elevation adjustments on gun camera mount have been disturbed, bore sight camera. (Refer to paragraph 9-148.)

b. Check camera for proper operation.

WARNING

To check operation of camera without firing the guns, place gun safety switch in "SIGHT CAMERA RADAR" position.

c. Open film loading door by pushing door latch knobs toward camera lens; then move magazine drive gear arm toward camera mount to retract magazine driving spline from magazine chamber. Insert magazine in place with aperture toward camera lens and magazine film footage indicator toward mount side of camera. Move magazine drive gear arm over end of magazine to engage magazine driving spline. Close film loading door.

CAUTION

Do not force gears to mesh. The film loading door will not close unless the magazine driving spline is fully extended and the drive gears are properly meshed. The magazine film opening is pushed open when the magazine is inserted into the magazine chamber.

d. Set camera film footage indicator. (Refer to paragraph 9-151.)

e. Set camera shutter speed and lens. (Refer to paragraph 9-149.)

f. Clean camera filter and camera access door window. (Refer to paragraph 9-152.)

g. Install and close camera access door.

9-154. UNLOADING GUN CAMERA. To unload the gun camera, open and remove gun camera access door and proceed as follows:

a. Open film loading door by pushing door latch knobs toward camera lens.

b. Retract magazine drive gear arm and remove magazine.

c. Close film loading door to prevent dust and moisture from entering chamber.

9-155. SIGHT RETICLE CAMERA SYSTEM.

9-156. An AN-N6 sight reticle camera is mounted on the sight head (figure 9-28) on F-86F-1 and F-86F-5 Airplanes modified by T. O. 1F-86-116 (formerly T. O. 01-60JL-116), F-86F-20 Airplanes AF51-13071 through -13169, F-86F-25 Airplanes AF51-13170 through -13510 and -5272 through -5380, F-86F-30 Airplanes AF52-4305 through -4745 and -5114 through -5163, and F-86F-35 Airplanes. F-86F-30 Airplanes AF52-5114 through -5163 and F-86F-35 Airplanes also have provisions for the installation of an AN-N9 sight reticle camera. A kit containing parts which will allow installation of an AN-N9 camera are furnished with these airplanes as loose equipment. These parts, consisting of an erector head brace, a camera support block, an adapter, an adapter assembly, and a receptacle, are stowed in the left rear ammunition box when the airplanes are delivered. The camera simultaneously records a picture on film of the target and the sight reticle image. The sight reticle camera circuit provides camera operation either independently or when the guns are fired, depending on the gun safety switch selection. The camera operates independently of the guns when the gun safety switch is placed in "SIGHT CAMERA RADAR"

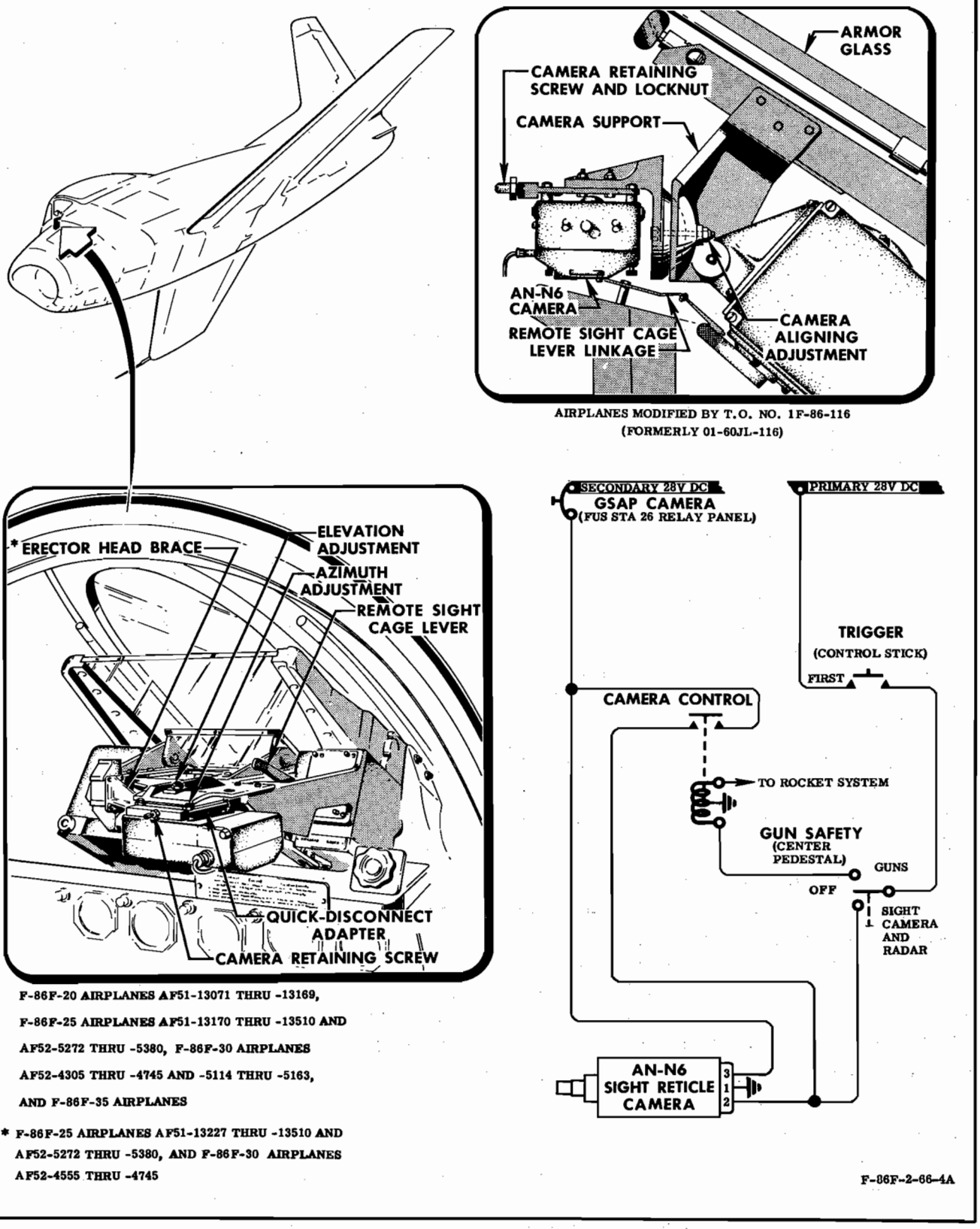


Figure 9-28. Sight Reticle Camera System

position and the trigger on the control stick grip is depressed. When the gun safety switch is placed in "GUNS" position and the trigger is depressed to the second trigger position, the camera operates to record gun firing effectiveness. The AN-N6 sight reticle camera is equipped with an erector head assembly that is attached to the camera lens. The camera erector head assembly, consists of a 180-degree prism housing, a glass dust filter, and a prism cover. The erector permits the camera to be mounted well below the pilot's line of vision and still maintain a full view of the sight reticle image. A camera reflector glass, mounted between the sight head and sight combining glass, reflects the sight reticle image to the camera erector head assembly. An erector head brace is attached to the erector head assembly and camera mounting adapter on F-86F-25 Airplanes AF51-13227 through -13510 and AF52-5272 through -5380, F-86F-30 Airplanes AF52-4555 through -4745, and airplanes modified by T. O. 1F-86F-31 (formerly 01-60JLD-34). This brace provides additional support for the erector head and reduces the effect of vibration, thereby improving the quality of the pictures recorded.

CAUTION

Since some A-4 sight head castings do not incorporate steel inserts, great care should be exercised to avoid damaging the threads in the casting when the camera mount is being attached to the sight head. If the attaching screws are too long, washers should be installed under the heads of the screws.

9-157. TROUBLE SHOOTING SIGHT RETICLE CAMERA SYSTEM.

9-158. For trouble shooting of AN-N6 camera, refer to paragraph 9-143.

9-159. SIGHT RETICLE CAMERA.

9-160. When mounted on the sight head, the AN-N6 camera is equipped with a 180-degree camera erector head mounted on the camera lens and is attached to the camera mount on the A-4 sight head by a quick-disconnect fitting. For more detailed explanation of the AN-N6 camera, refer to paragraph 9-145.

9-161. REMOVING SIGHT RETICLE CAMERA. To remove sight reticle camera, proceed as follows:

a. Disconnect camera electrical connector. (See figure 9-28.)

b. Cut safety wire from camera retaining screw.

c. Hold camera firmly and loosen camera retaining screw; then lift camera from mount.

9-162. INSTALLING SIGHT RETICLE CAMERA. To install sight reticle camera, proceed as follows:

a. Make certain that quick-disconnect adapter is firmly attached to camera. (See figure 9-28.)

b. Place camera on mounting bracket. Tighten and safety-wire quick-disconnect retaining screw.

c. Connect camera electrical plug.

9-163. INSTALLING AND ALIGNING SIGHT RETICLE CAMERA REFLECTOR GLASS. See figure 9-28A.

9-164. BORE SIGHTING SIGHT RETICLE CAMERA. To bore sight the AN-N6 sight reticle camera, first prepare the airplane for harmonization. (Refer to paragraph 9-10.) Insert Type AN-1 camera aligning indicator into camera magazine chamber, with side containing spring toward camera mount. Set index ring to "64" and diaphragm opening adjustment ring so that arrow is aligned with "D."

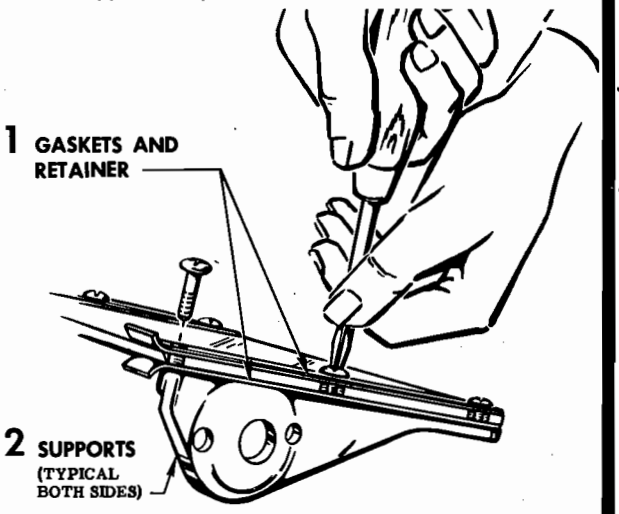
Note

To open shutter, turn shutter speed knob to a neutral position midway between any two shutter speed settings (recognized when a slight stop is felt). Open magazine access cover by pressing door locks forward toward camera lens. Make certain magazine drive gear arm is toward camera mount as far as it will go. This will extend the magazine driving spline all the way into the magazine chamber. Rotate spline by hand to open shutter.

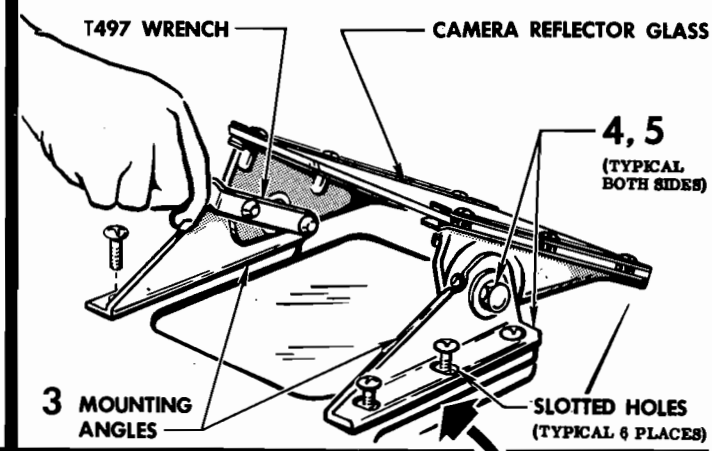
To adjust camera for elevation and azimuth corrections during bore-sight operations, loosen camera adapter mount retaining bolt and rotate adapter mount to desired position; then retighten adapter retaining bolt. To properly align sight reticle camera without use of the target board, operate sight selector unit in "GUN" and "BOMB" positions to make certain reticle image center dot is centered on camera bore-sighting fixture vertical cross hair, as sight is operated in both positions.

9-165. SETTING CAMERA SHUTTER SPEED AND LENS. The instructions in paragraph 9-149 may be used to set shutter speed and lens opening. However, a wider lens setting must be used to compensate for light loss due to the increased number of glass-to-air and glass-to-glass surfaces involved in the camera erector assembly installation. This can be accomplished by rotation of the diaphragm opening adjustment ring to the next lower "f" stop after the instructions in paragraph 9-149 have been complied with.

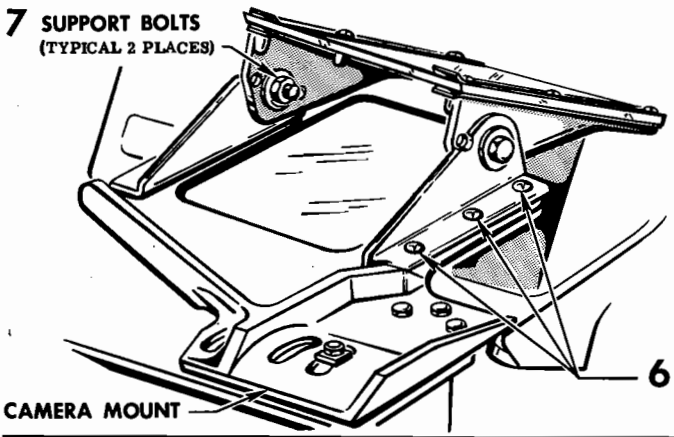
1 2 With gaskets and retainers in place, attach glass to support, carefully tightening all screws, making certain supports are parallel.

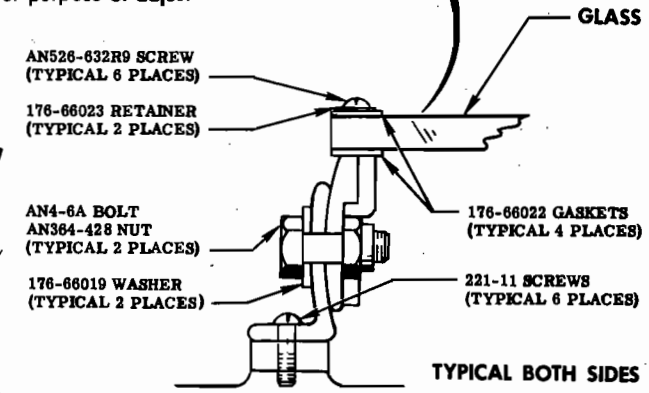


3 - 5 Install mounting angles loosely, and attach reflector glass supports as shown. Insert T497 wrench in two holes in support and mounting angle, and tighten support bolt. Move wrench to opposite side and tighten remaining bolt, making certain that mounting angles are parallel.

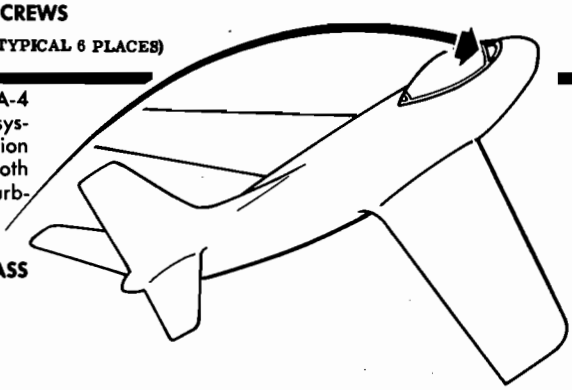


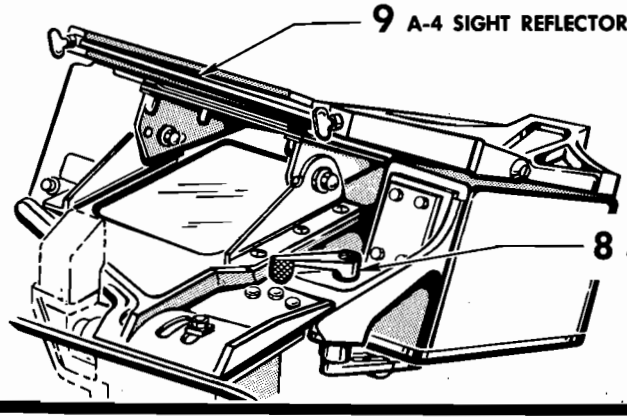
6 7 Tighten screws in mounting angles and camera mount; then loosen support bolts just enough to allow movement of glass assembly by hand for purpose of adjustment.





8 9 To adjust camera reflector glass to a position parallel with A-4 sight reflector glass, turn on and mechanically cage A-4 sight system. (Refer to index for page number of applicable procedure.) Position camera reflector glass with T497 wrench until reticle images on both glasses are superimposed. Tighten support bolts securely without disturbing alignment.





F-86F-2-66-9

Figure 9-28A. Installing and Aligning Sight Reticle Camera Reflector Glass

9-166. SETTING CAMERA OVERRUN CONTROL. Refer to paragraph 9-150.

9-167. SETTING CAMERA FILM FOOTAGE INDICATOR. Refer to paragraph 9-151.

9-168. CLEANING SIGHT RETICLE CAMERA. Refer to paragraph 9-152.

9-169. LOADING AND PREPARING SIGHT RETICLE CAMERA FOR USE. To load sight reticle camera and prepare for use, refer to paragraph 9-153.

9-170. UNLOADING SIGHT RETICLE CAMERA. To unload sight reticle camera, push film loading door latch knobs toward camera lens and open door. Move magazine drive gear arm clear of magazine and pull magazine from camera.

9-171. SIGHT RETICLE AND STRIKE CAMERA SYSTEM.

9-172. The sight reticle camera system (figure 9-29), on F-86F-25 Airplanes AF52-5381 through -5530, F-86F-30 Airplanes AF52-4746 through -5113, and F-86F-35 Airplanes AF53-1072 through -1228 was designed to provide an AN-N9 16 mm motion picture camera mounted on the gun sight head. However, unavailability of the AN-N9 camera has resulted in substitution of the AN-N6 camera on F-86F-25 Airplanes AF52-5381 through -5530 and F-86F-35 Airplanes AF53-1072 through -1228. These airplanes carry, as loose equipment, necessary parts for installation of AN-N9 cameras when they are available. These parts, consisting of an erector head brace, a camera support block, an adapter, an adapter assembly, and a receptacle, are stowed in the left rear ammunition box when the airplanes are delivered. F-86F-30 Airplanes AF52-4746 through -5113 were designed with mounting and wiring provisions for the AN-N9 camera only and consequently were delivered without a camera installed. Installation of a sight reticle camera on these airplanes will depend on future availability of AN-N9 cameras or issuance of AN-N6 conversion kits. For detailed instructions on operation and maintenance of the AN-N6 sight reticle camera, refer to paragraphs 9-156 through 9-170. With an AN-N9 camera installation, a camera shutter aperture control switch, on the right vertical console, electrically controls the camera shutter aperture (in effect, film exposure time). This allows the pilot to compensate for the varying light conditions he may encounter in flight. The sight reticle camera, mounted on the gun sight head, provides a film record of the sight reticle image and the target, simultaneously, during gun and rocket firing or during bombing. The sight reticle camera can also operate independently of gun, rocket, and bombing operations. The camera mount is adjustable to obtain proper azimuth and elevation settings; this permits quick removal of the camera without disturbing the camera alignment. Camera bore sighting, film loading, and camera control adjustments can be made without the camera being removed from the mount. On F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplane AF52-4905, and all subsequent airplanes, provision is made for a Type P-2 strike camera in addition to the AN-N9 or AN-N6 sight reticle camera. The strike camera and its related components are furnished as loose equipment and are installed when a bombing or rocket mission is contemplated. The strike camera operates automatically to record results of bombing and rocket attacks when the bombs are dropped or the rockets are fired. When installed, the P-2 strike camera and its related equipment are located on the underside of the fuselage. (See figure 9-29.) The strike camera is mounted in a drum-shaped camera mount, which is held in the camera support by trunnions. The drum is equipped with adjustment features and a graduated scale for determining the field of coverage. Locking screws are provided for ground alignment of the camera viewing angle. (See figures 9-32 and 9-33.) A plate glass window and a drum shutter assembly protect the camera lens from damage when the airplane is in flight or on the ground. An electric actuator and linkage automatically opens the drum shutter when the camera is operated. Heated air is supplied to the strike camera compartment to defrost the camera window. (Refer to paragraph 4-81.)

9-173. FUNCTION OF SIGHT RETICLE AND STRIKE CAMERA SYSTEM.

9-174. The AN-N9 or AN-N6 sight reticle camera operates simultaneously with gun firing, when the gun safety switch is placed in "GUNS" position and the trigger switch on the control stick grip is depressed to the second position. If it is desired to record the approach and tracking technique on a target before firing the guns, the trigger is depressed only to the first position. This energizes the camera control relay and completes the circuit to the camera. Then, to fire the guns, it is only necessary to depress the trigger to the second position. To record the approach and tracking technique on a friendly target or to record during the entire rocket-firing run, the gun safety switch is placed in "SIGHT CAMERA RADAR" position and the trigger switch is depressed to the first position. This energizes the reticle sight camera directly. With the gun safety switch in the "SIGHT CAMERA RADAR" position, the guns will not fire if the trigger is depressed to the second position. During rocket operations, when the rocket selector switch is set to either "ROCKET SINGLE" or "ROCKET AUTO" and the bomb button is depressed, the P-2 strike camera relay and the AN-N9 or AN-N6 sight reticle camera relay are energized, causing simultaneous operation

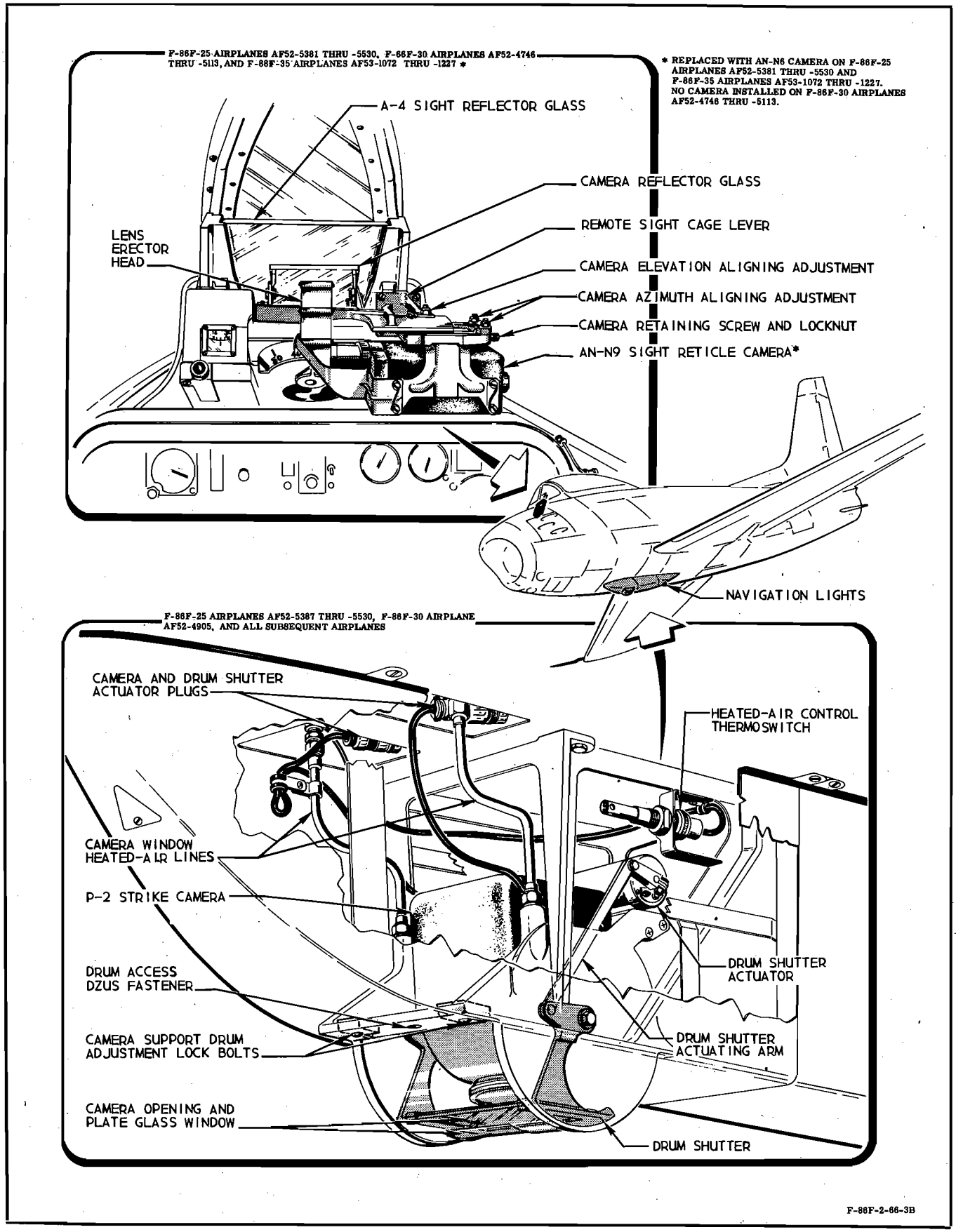


Figure 9-29. Sight Reticle and Strike Camera System (Sheet 1 of 2)

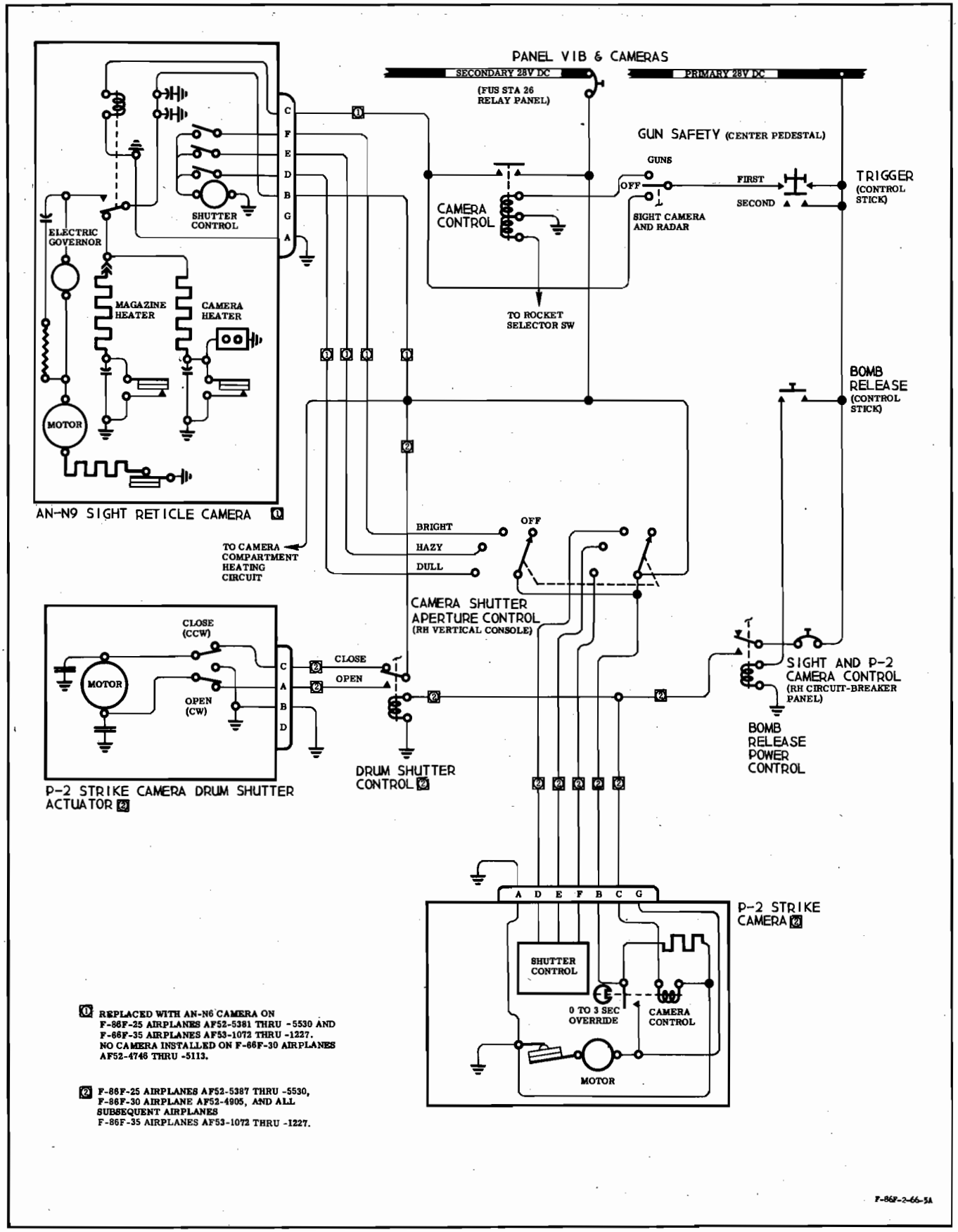


Figure 9-29. Sight Reticle and Strike Camera System (Sheet 2 of 2)

of both the P-2 strike camera and the AN-N9 or AN-N6 sight reticle camera. During bombing operations, when the bomb release selector is placed to either "MANUAL RELEASE" or "AUTO RELEASE" position, the bomb train selector switch is placed in "BOMB SINGLE" or "BOMB SALVO" position, and the bomb button is depressed, only the P-2 strike camera operates. To record bomb strike on target, the bomb button must be held closed.

9-175. TROUBLE SHOOTING SIGHT RETICLE AND STRIKE CAMERA SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
	AN-N9 SIGHT RETICLE CAMERA SYSTEM	
Camera fails to operate.	No voltage at camera plug, as a result of:	
	a. Open circuit breaker.	
	b. Gun safety switch "OFF."	
	c. Defective wiring.	
	d. Defective trigger switch.	Replace grip.
	e. Defective sight reticle camera relay.	
	f. Defective shutter aperture control switch.	
	Camera motor brushes worn.	
	Defective camera trip relay.	Replace camera.
	Defective camera overload thermal switch.	Replace camera.
	Defective camera governor.	Replace camera.
Film image blurred.	Improper operation of camera shutter.	Replace camera.
Improper film exposure.	Either shutter aperture control switch not set for prevailing light conditions or defective switch.	
Hazy or spotty film image.	Camera lens, erector head, reflector glass, and/or windshield dirty.	
	P-2 STRIKE CAMERA	
Strike and sight reticle cameras fail to operate during bombing or rocket operations.	No voltage at camera plug, as a result of:	
	a. Open circuit breaker.	
	b. Armament selector switch "OFF."	
	c. Defective wiring.	
	d. Defective bomb button on control stick grip.	Replace grip.
	e. Defective armament selector switch.	
	f. Defective strike camera relay.	
	g. Defective sight reticle camera relay.	
	h. Defective shutter aperture control switch.	

TROUBLE	PROBABLE CAUSE	REMEDY
	i. Defective bomb salvo and/or bomb release relays during manual bomb salvo operations.	
	j. Defective bomb train and/or bomb release relays during bomb-single operation.	
	Camera brushes worn.	
	Defective camera trip relay.	Replace camera.
	Defective camera overload thermal switch.	Replace camera.
	Defective camera governor.	Replace camera.
Film image blurred.	Improper operation of camera shutter.	Replace camera.
Improper film exposure.	Either shutter aperture control switch not set for prevailing light conditions or defective switch.	
Hazy or spotty film image.	Strike camera lens and/or camera window glass dirty.	
Partial picture obtained with strike camera.	Drum shutter not fully opened.	Adjust drum shutter actuating linkage.

9-176. AN-N9 SIGHT RETICLE CAMERA.

9-177. The AN-N9 sight reticle camera (figure 9-30) is an electrically operated, magazine-type, 16 mm motion-picture camera with an adjustable 35 mm focal-length lens and a filter. The camera contains a constant-speed 24-volt d-c electric motor equipped with a thermal protective device, a variable-ratio gear train, a governor, a trip relay, a lens diaphragm control ring, and overrun control, a shutter speed control, a shutter aperture control, and thermostatically controlled camera and magazine heaters. Additional camera components include a 180-degree erector head mounted on the camera lens, a camera reflector glass mounted forward of the erector head (figure 9-29), and a shutter aperture remote-control switch on the right vertical console in the cockpit. The lens diaphragm control ring is on the camera lens body. It permits manual adjustment of the lens opening ("f" stops) for various light conditions and shutter speeds. The overrun control permits an overrun time of from 0 to 3 seconds, in one-second increments, to be manually set into the camera. When the overrun control is set at any values above "0", the camera will run for that period after the trigger is released. During the overrun period, an identification marker is electrically projected in front of the shutter aperture. This marker is photographed when the camera is in operation and provides a means of identifying overrun time film footage. By varying the ratio of the gear train that couples the camera drive motor to the shutter, the speed control governs the number of film frames per second ("16," "32," or "64") exposed when the camera is in operation. Normal photography requires 16 frames per second; semislow-motion photography, 32; slow-motion photography, 64. The shutter aperture control governs the number of degrees the shutter opens for each frame (in effect, the film exposure time). The aperture is adjustable to compensate for various light conditions and shutter speeds. The aperture may be varied either by the manual shutter aperture control on the camera or the aperture remote-control switch on the right vertical console. The shutter aperture control on the camera provides 5 settings: "A" (180 degrees), "B" (92 degrees 10 minutes), "C" (46 degrees 5 minutes), "D" (23 degrees 2 minutes), and "E" (11 degrees 31 minutes). The shutter aperture remote-control switch in the cockpit provides an "OFF" position and three settings, "BRIGHT," "HAZY" and "DULL." These three settings correspond, respectively, to the "E," "C" and "A" settings on the manual shutter aperture control on the camera. The thermostatically controlled camera and magazine heaters operate at internal temperatures below 10°C (50°F) and cut off above 15.6°C (60°F). An automatic recycling counter indicates the length of unexposed film in the magazine. Three film footage indicators are located on the magazine: one on the lower aft end, one on the

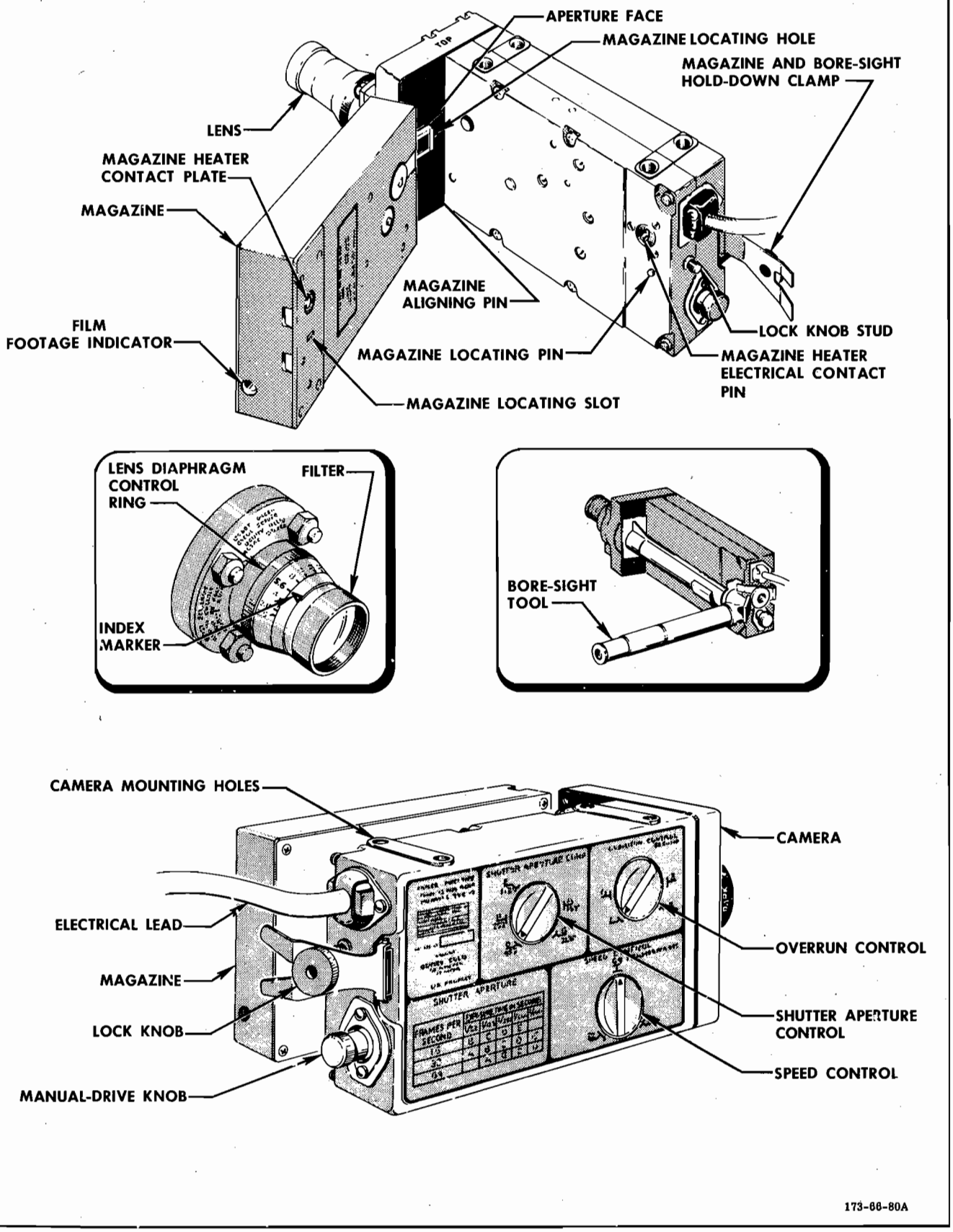


Figure 9-30. AN-N9 Sight Reticle Camera

bottom aft end, and one on the lower outboard side of the magazine. The counter will recycle back to "50" when the magazine cover release button is depressed. The 180-degree erector head assembly is attached to the camera lens, providing full view of the sight reticle image with a minimum of interference with the pilot's vision. The camera reflector glass reflects the sight reticle image to the erector head.

CAUTION

Some A-4 gun sight heads do not incorporate steel inserts in the casting for mounting of the sight reticle camera mount to the sight head. Be careful, when installing camera mount attaching screws, to prevent damage to the threads within the sight head castings by cross-threading or overtorquing the attaching screws. If the attaching screws are too long sufficient washers should be installed under the heads of the screws.

9-178. REMOVING AN-N9 SIGHT RETICLE CAMERA. To remove the camera (figure 9-29), proceed as follows:

a. Disconnect electrical connection from receptacle on top front side of instrument panel.

b. Cut safety wire on camera retainer screw. Loosen camera retainer screw locknut and retainer screw of quick-disconnect while supporting camera; then slide camera aft to remove it from mount. (See figure 9-29.)

Note

Removal of the camera in this manner will not affect the camera alignment adjustments.

9-179. INSTALLING AN-N9 SIGHT RETICLE CAMERA. To install the camera (figure 9-29), proceed as follows:

a. Slide dovetail of quick-disconnect into grooves of receptacle of camera mount, making certain that dovetail is against forward end of receptacle. Tighten camera retainer screw and retainer-screw locknut. Safety-wire retainer screw.

b. Connect electrical connector to receptacle.

c. If azimuth and elevation adjustments have been disturbed, bore sight camera. (Refer to paragraph 9-180.)

9-180. BORE SIGHTING AN-N9 SIGHT RETICLE CAMERA. To bore sight the sight reticle camera (figure 9-29), proceed as follows:

a. Remove magazine from camera.

b. Install bore-sight tool on camera. Clamp tool in position in the same manner as magazine is clamped to camera. (See figure 9-30.)

c. Turn lens diaphragm control to maximum diaphragm opening of f/2.8. Sight through eyepiece of bore-sight tool, and simultaneously depress and rotate (in either direction) manual drive knob until shutter in camera is moved out of line of sight. This procedure will afford an unobstructed view through the camera aperture opening.

d. To focus bore-sight tool, adjust (inward or outward) eyepiece until crossed reticle lines present a sharp image. The upper crossed reticle lines in the bore-sight tool show the optical center of aiming point of the camera.

e. Align airplane to target. (Refer to paragraph 9-10.)

f. To adjust camera for azimuth corrections, loosen the two camera azimuth aligning adjustment nuts. Rotate camera and mount back and forth until vertical reticle lines of bore-sighting tool align with sight mark on target. Tighten adjusting nuts one at a time, being careful not to move camera.

g. To adjust camera for elevation corrections, loosen camera elevation aligning adjustment nut and rotate camera about lateral axis (up and down) until horizontal reticle line of bore-sighting tool is aligned with sight mark on target. Tighten aligning nut, being careful not to move camera.

Note

The bore sight tool is an optical instrument and should be kept in its carrying case when not in use.

9-181. SETTING AN-N9 SIGHT RETICLE CAMERA SHUTTER SPEED. Speed selection is manually obtained by rotation of the speed control knob (figure 9-30) until the pointer on the knob is aligned with the desired speed marking ("16," "32," or "64" frames per second). The camera provides built-in click stops, permitting the speed control knob to be detented into the selected speed setting.

CAUTION

Do not change speed setting while camera is in operation.

9-182. SETTING AN-N9 SIGHT RETICLE CAMERA SHUTTER APERTURE. If the shutter aperture (exposure time) is to be set manually on the camera without the use of the remote-control switch, the setting may be obtained from table III (figure 9-31). First, select the desired shutter speed. (Refer to paragraph 9-181.) Locate this value in the "FRAMES PER SECOND" column in table III. Then read across the table, stopping at the letter setting in the column headed by the desired exposure time. (Example: If a shutter speed of 16 frames per second is chosen and an exposure time of 1/125 second is desired, the correct letter setting is "C".) When the correct letter setting has been determined, depress and rotate the shutter aperture control knob on the camera until the pointer on the knob is aligned with the desired setting. If the shutter aperture is to be set by means of the remote-control switch, move the switch to either the "BRIGHT," "HAZY," or "DULL" position.

9-183. SETTING AN-N9 SIGHT RETICLE CAMERA LENS. If the shutter aperture has been set manually (paragraph 9-182), the correct lens setting may be obtained from table I (figure 9-31). First, in the columns titled "SHUTTER APERTURE SETTINGS AND FRAME SPEEDS," locate the previously selected shutter speed; then read down to the previously selected shutter aperture letter setting. Read across to the right, stopping at the lens setting ("f" stop) in the column headed by the anticipated light condition. (Example: If a shutter speed of 16 frames per second and a shutter aperture setting of "C" are chosen, the correct lens setting for an anticipated "HAZY" light condition is "f/8"). If the shutter aperture is or will be set by means of the remote-control switch (paragraph 9-182), the correct lens setting may be obtained from table II (figure 9-31). First, locate the previously selected shutter speed; then read down, choosing the "f" stop according to whether the lens setting is for a day or night mission. (Example: If a shutter speed of 16 frames per second is selected, the correct lens setting for a day mission is "f/5.6".) As noted in table II, the correct lens setting for a night mission is "f/2.8" (maximum lens opening), regardless of shutter speed.

Note

The correct lens setting in this case is not dependent upon the setting of the shutter aperture, since the remote-control feature permits the pilot to change the aperture setting according to the varying light conditions. Selecting an "f" stop from table II provides a setting for average light conditions, and subsequent movement of the remote-control shutter switch to "BRIGHT," "HAZY," or "DULL" allows more or less exposure time.

When the correct lens setting is determined by either of the above procedures, manually rotate the lens diaphragm control ring until the desired "f" stop is aligned with the index mark on the lens barrel.

9-184. SETTING AN-N9 SIGHT RETICLE CAMERA OVERRUN CONTROL. To make overrun adjustments, depress and turn overrun control knob to desired setting of either 0, 1, 2, or 3 seconds of overrun time. Make certain that knob is properly seated after adjustment is made.

9-185. CLEANING AN-N9 SIGHT RETICLE CAMERA. To clean camera, proceed as follows:

a. Remove dust and film emulsion deposits from raised, chromium-plate aperture face (figure 9-30) with a soft brush or clean, soft, lint-free rag.

b. To clean lens, filter, and erector head dust filter, first carefully brush off dust or grit with a clean, soft, dry brush. Then, using special lens-cleaning tissue or a soft, clean, dry lint-free cotton or linen cloth, polish them gently and thoroughly. Do not allow dust or finger marks to remain on lens or filter surfaces.

EXPOSURE GUIDE FOR LOCAL CONTROL

Set lens diaphragm according to "BRIGHT," "HAZY," or "DULL" light conditions and selected shutter aperture and frame speed combinations.

NOTE: This table is based on use of Class A film and yellow filter.

TABLE I

SHUTTER APERTURE SETTINGS AND FRAME SPEEDS			LENS DIAPHRAGM SETTINGS FOR LIGHT CONDITIONS		
16	32	64	BRIGHT	HAZY	DULL
B	A		f/22	f/11	f/5.6
C	B	A	f/16	f/8	f/4.
D	C	B	f/11	f/5.6	f/2.8
E	D	C	f/8	f/4	f/2.8
	E	D	f/5.6	f/2.8	f/2.8

EXPOSURE GUIDE FOR REMOTE CONTROL

Set lens diaphragm according to frame speed.

TABLE II

FRAME SPEED	16	32	64
LENS DIAPHRAGM (DAY)	f/5.6	f/4	f/2.8
LENS DIAPHRAGM (NIGHT)	f/2.8	f/2.8	f/2.8

SHUTTER APERTURE

TABLE III

FRAMES PER SECOND	EXPOSURE TIME IN SECONDS				
	1/62	1/125	1/250	1/500	1/1000
16	B	C	D	E	
32	A	B	C	D	E
64		A	B	C	D

(These tables appear on camera body.)

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Figure 9-31. AN-N9 Camera Film Exposure Tables

CAUTION

Never use water, alcohol, cleaning solvent, nor any kind of liquid for cleaning lens, as liquid will seep into the lens and damage the mechanism.

Note

To diminish the chances of dirt and foreign matter entering the camera through the aperture and film claw openings, it is advisable to keep the magazine attached to the camera at all times, unless removal is required for film loading or bore sighting.

9-186. LOADING AND PREPARING AN-N9 SIGHT RETICLE CAMERA FOR USE. To load and prepare the camera for use (figure 9-30), proceed as follows:

a. Before installing magazine, remove all dust and film emulsion deposits from raised, chromium-plated aperture face. (Refer to paragraph 9-185.)

b. Insert magazine. Make certain that magazine locating pin on front of magazine is inserted into camera locating hole on right side of aperture plate, and that camera locating pin is inserted into magazine locating slot on back side of magazine. Then press back end of magazine against camera, making certain that magazine heater quick-disconnect pin on camera is inserted into female receptacle on magazine. Apply magazine hold-down clamp, making certain that claws of clamp are inserted into the two grooves on aft end of magazine, by engaging lock knob on threaded lock knob stud. Tighten magazine lock securely by hand.

Note

Make certain that front face of magazine is flush against aperture plate of camera when magazine is installed.

CAUTION

To prevent damage to camera wiring and magazine, pull out camera circuit breaker or disconnect electrical connection at instrument panel before removing or installing magazine.

9-187. UNLOADING AN-N9 SIGHT RETICLE CAMERA. To remove magazine from camera, proceed as follows:

a. Loosen and remove lock knob from lock knob stud.

b. Remove magazine hold-down clamp.

c. Pull aft end of magazine from the side, away from camera, until magazine heater quick-disconnect pin and camera locating pin are clear of magazine. Then pull magazine aft to disengage magazine locating pin from camera locating hole in aperture face.

CAUTION

To prevent short circuit and subsequent damage to camera wiring and the magazine, disengage camera circuit breaker or disconnect camera electrical plug before attempting removal or installation of magazine.

9-188. P-2 STRIKE CAMERA.

9-189. The P-2 strike camera (figure 9-29) is a magazine-type, 70 mm motion picture camera utilized for photographing bomb and air-to-ground rocket attacks. The P-2 strike camera consists of a high-speed, 28-volt, electric motor which is equipped with a thermal protective device, a drive mechanism, a trip relay, a 70 mm equivalent focal length f/2.8 speed lens and filter, a lens diaphragm control, an overrun control, a shutter speed control, a shutter aperture control, a thermostatically controlled camera heater, and a 15-foot film magazine. The shutter aperture control can be set manually when the airplane is on the ground and can be remotely controlled while in flight by the shutter aperture remote-control switch. This switch, on the right vertical console, also controls the AN-N9 sight reticle camera shutter aperture. (Refer to paragraph 9-177.) The overrun control causes the camera to operate for a period of from 0 to 3 seconds after the bomb button is released.

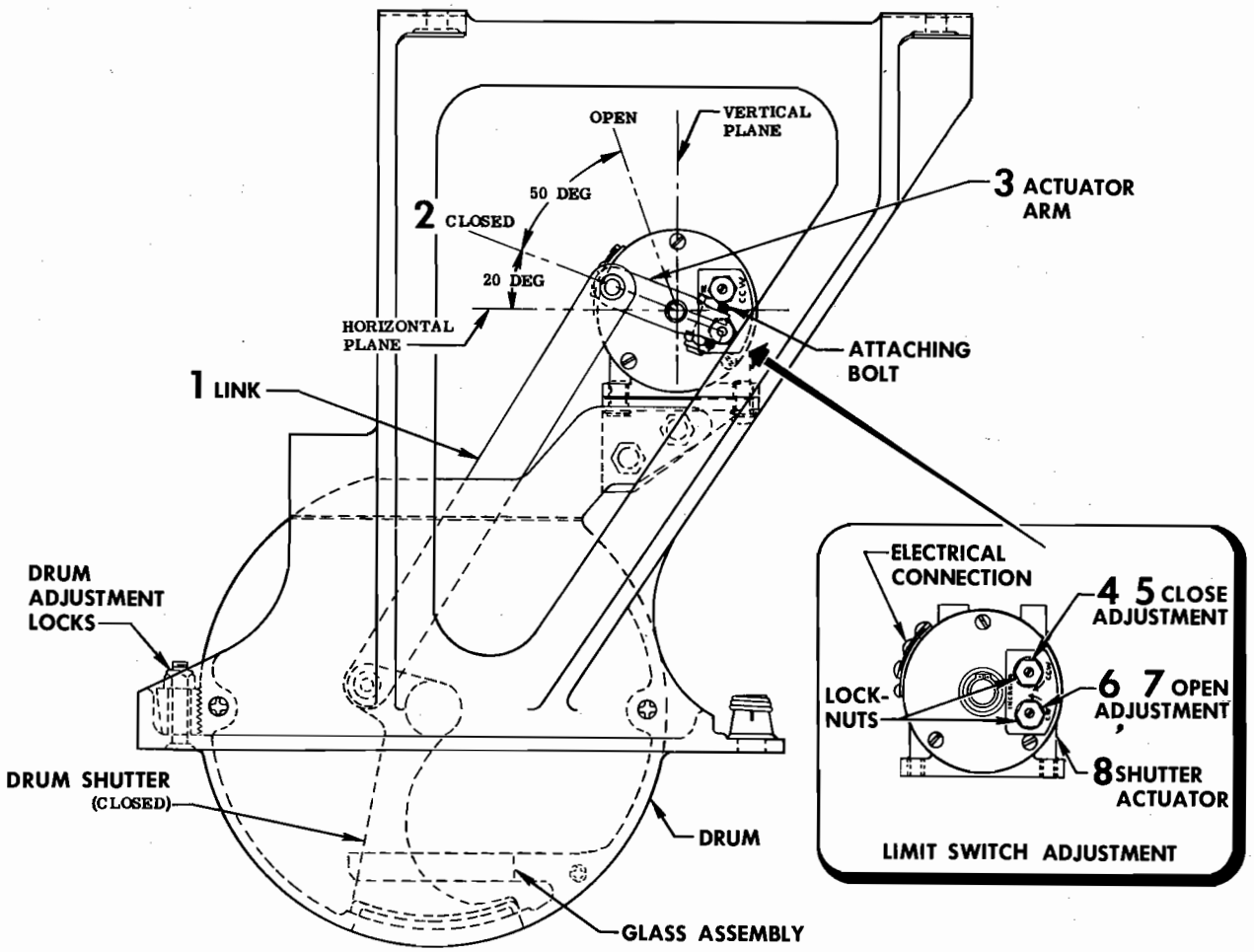
Note

The overrun control should always be set at "0," since the drum shutter closes when the bomb button is released.

A detented, marked shutter speed knob is provided for selecting desired shutter speed. The camera lens has a maximum setting of f/2.8 and a minimum setting of f/16, and is manually controlled. The strike camera is mounted in the drum camera mount and can be adjusted from 40 to 145 degrees below the horizon. The thermostatically controlled heater automatically turns on when the temperature within the camera drops to 2.8°C (37°F) and cuts out when the temperature exceeds 12.8°C (55°F).

9-190. ADJUSTING P-2 STRIKE CAMERA SHUTTER DOOR. See figure 9-32.

9-191. ADJUSTING P-2 STRIKE CAMERA VIEWING ANGLE. See figure 9-33.



1 With fairing removed from camera mount, disconnect link from actuator arm. Close GSAP circuit breaker to move actuator arm to shutter-closed position.

2 Check position of actuator arm with a protractor. Arm should be at position shown.

3 If actuator arm is more than ±5 degrees from shutter-closed position, loosen attaching bolt on actuator arm and reposition arm to position shown.

4,5 Attach link to actuator arm and check to see that shutter fully covers opening in drum, without flanges of shutter touching mount for glass assembly. If adjustments are required to correctly position shutter, loosen locknut on actuator-closed limit switch adjusting screw and turn screw in desired direction to position shutter. Turning adjusting screw in direction of arrow increases travel of actuator arm. When shutter is correctly positioned, tighten locknut, using care not to disturb setting of adjusting screw.

6,7 To check open position of actuator arm, again remove link from arm. Place armament selector switch in "BOMB SINGLE" position and depress bomb button on control stick grip. This causes actuator arm to move to shutter-open position. When actuator reaches its full travel, pull out GSAP circuit breaker before releasing bomb button, to hold actuator in shutter-open position. Actuator arm should be 70 (±2) degrees above horizontal plane. Attach link to actuator arm and check to see that shutter has moved out of view of camera without hitting radius of plate attaching boss. If adjustments are required to correctly position shutter, close GSAP circuit breaker and, with bomb button held down, loosen locknut on open limit switch adjusting screw, and rotate screw in desired position to correctly position shutter. Turning adjusting screw in direction of arrow increases travel of actuator arm. When shutter is correctly positioned, release bomb button and tighten locknut, using care not to disturb setting of adjusting screw.

8 Operate actuator to both open and closed position to check travel of drum shutter. Any minor adjustments still required to obtain proper travel of shutter can be made by further adjustments of actuator limit switches. Replace fairing on camera mount.

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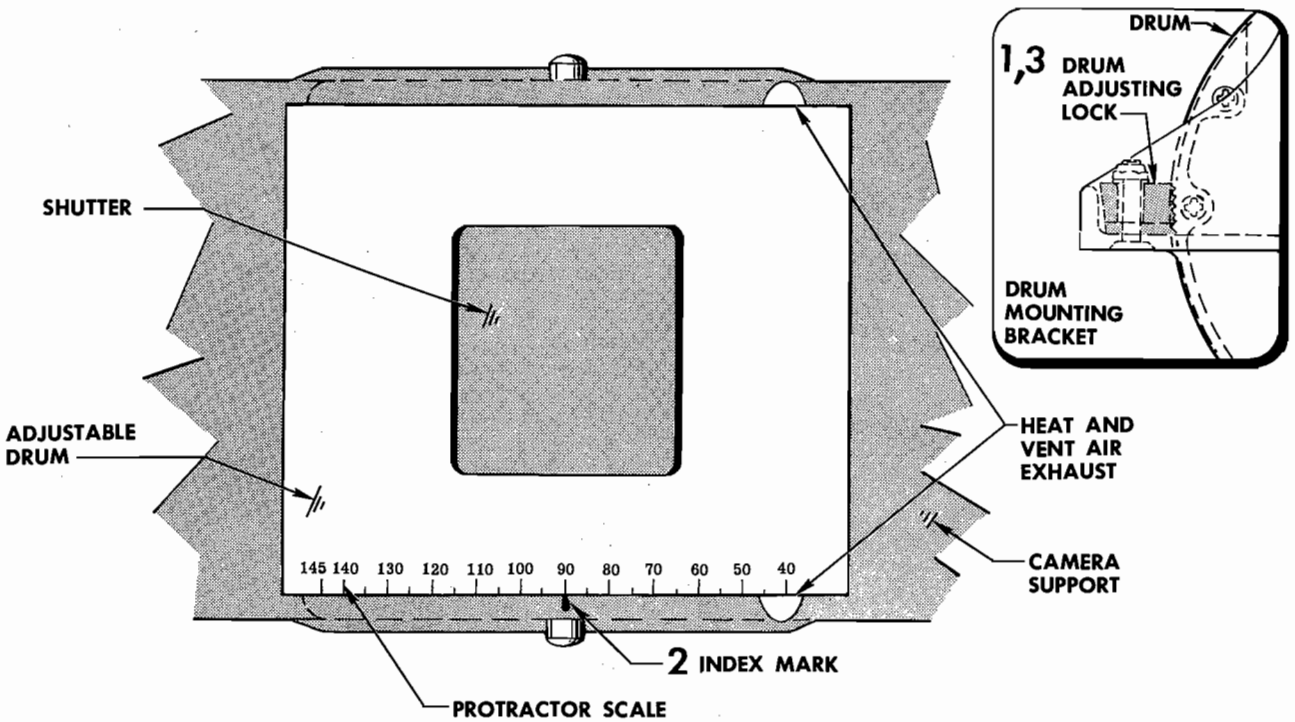
Figure 9-32. Adjusting P-2 Strike Camera Drum Shutter



BOTTOM VIEW OF P-2 STRIKE CAMERA DRUM

1 With fairing removed from camera mount, loosen screws in drum adjusting locks and move serrated teeth away from drum.

2 Rotate drum until index mark on camera support aligns with desired viewing angle on protractor scale.

3 Tighten screws in drum adjusting locks, making sure that serrated teeth of locks mesh with drum. Replace fairing.

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Figure 9-33. Adjusting P-2 Strike Camera Viewing Angle

9-192. A-1CM SIGHT SYSTEM.

9-193. The Type A-1CM gun-bomb-rocket sight, installed in F-86F-1 and F-86F-5 Airplanes, is a universal sighting system, which automatically computes leads as a gun, bomb, or rocket sight. It consists of five principal units and two accessory units. The sight head, the computer, the sight amplifier, the rocket setting unit, and the range servo unit are the principal units, while the dimmer control and bomb-target wind unit are accessories. The A-1CM gun-bomb-rocket sight utilizes the AN/APG-30 radar system to furnish range information to the sight for gunnery operation. The tie-in is accomplished by means of the Type A-3 radar range servo mechanism. The manual range control is incorporated in the throttle quadrant. The control supplies range information to the sight system when the radar system fails; it is also used when the sight system is operating at altitudes below 5000 feet. The sighting system is calibrated to automatically compute leads for ranges between 6000 and 600 feet. As a gun sight, the system will operate from sea level to 40,000 feet; operation between sea level and 5000 feet is accomplished by manual ranging only. Operation from 5000 feet to 40,000 feet can be accomplished with either automatic radar or manual ranging. As a bombsight, the system will operate up to 10,000 feet.

CAUTION

The principal components of the sight installation are not interchangeable with other like units (within the limits of first and second echelon adjustments); therefore, all sight components should be removed, stored, and installed as a unit.

9-194. FUNCTION OF A-1CM SIGHT SYSTEM.

9-195. The A-1CM gun-bomb-rocket sight is a two-gyro, lead and ballistic computing sight. The required leads are computed in the computing unit and relayed by means of microsyns, a sight amplifier, and drive motors

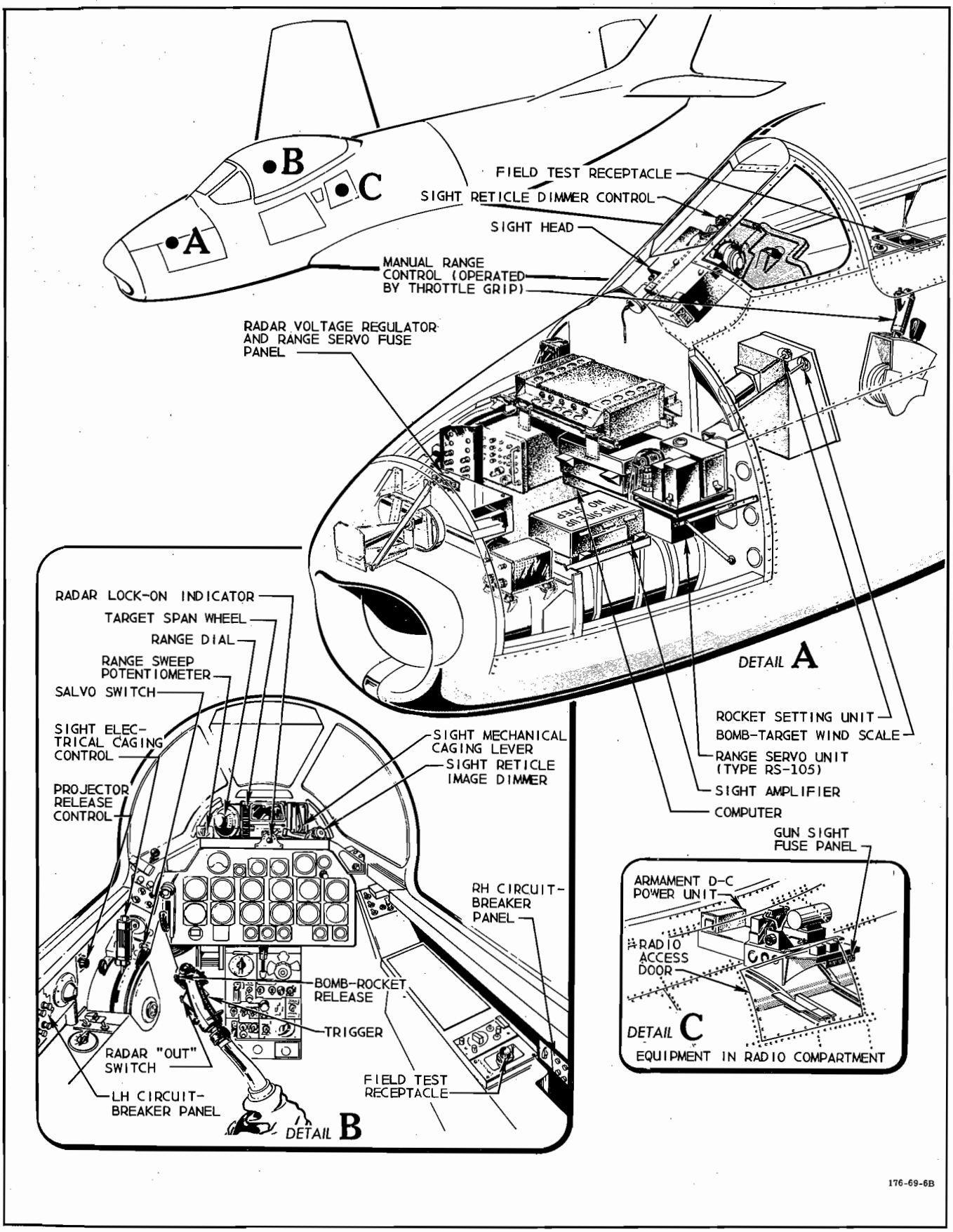


Figure 9-34. A-1CM Sight System Equipment Location

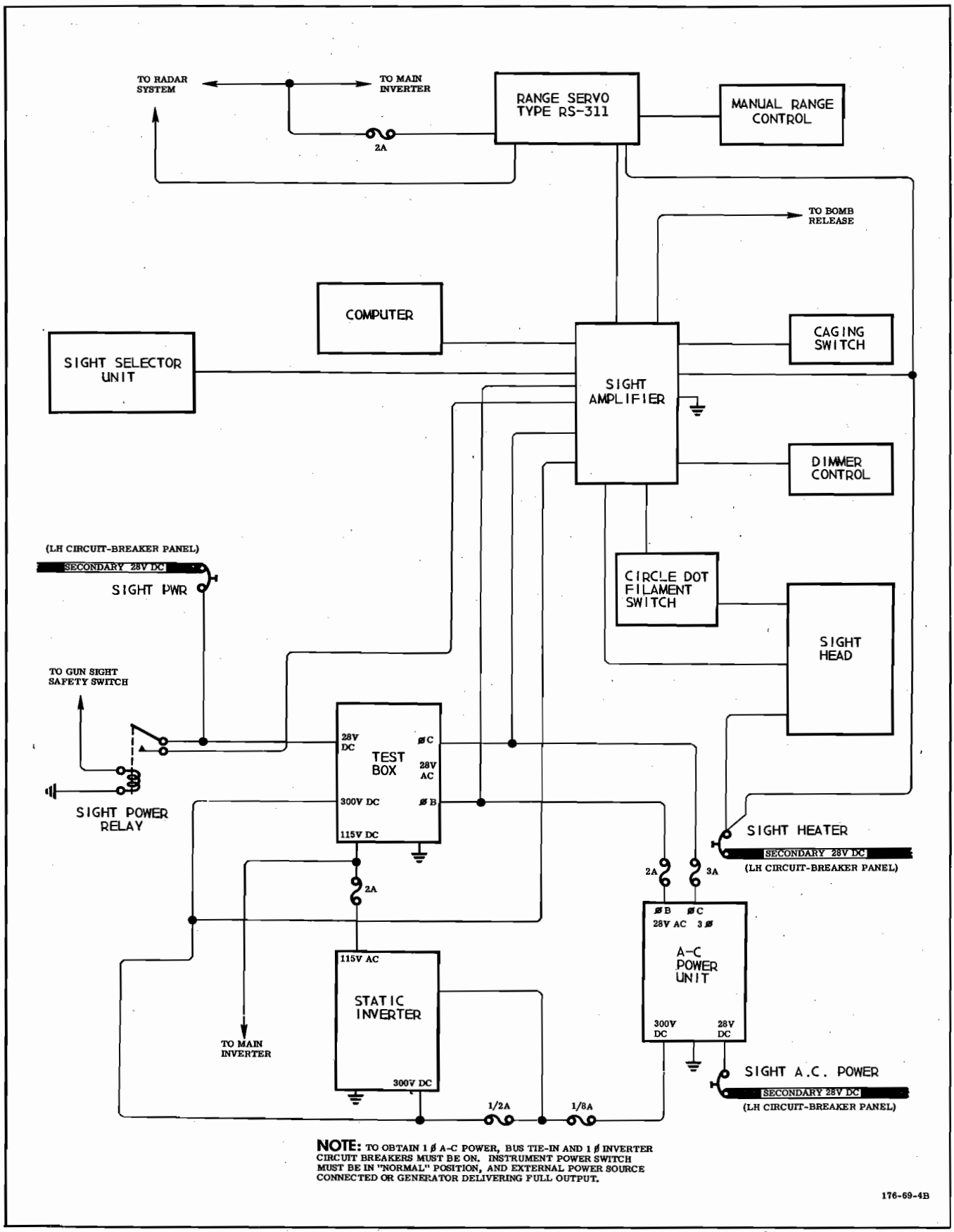


Figure 9-35. A-1CM Sight System Schematic

to a movable mirror in the sight head, which deflects a collimated circle-and-dot reticle image to supply required lead for gunnery and rocketry. When the sight is used for bombing operations, the line of sight is depressed approximately 10 degrees, requiring the pilot to fly a downward path which becomes tangent to a bomb trajectory. The point of tangency is the bomb release point and is indicated to the pilot by extinction of the reticle image circle. With the controls set for an automatic release, bombs are dropped automatically if the release button is closed, and a red flashing light (reflected on the reflector glass) indicates their release. The pilot may control the release of bombs by manual means, if desired. Range input is not required for the sight as a bombsight. The A-1CM gun-bomb-rocket sight, in connection with the AN/APG-30 radar ranging equipment, is completely automatic in operation. When the pilot lines the reticle up with the target, the radar antenna will lock on the target, thus feeding correct range to the sight. All other inputs are derived from the attitude and angular rate of turn of the airplane, the density altitude, and the indicated airspeed. All that is required is that the center dot be kept on the target and then tracked smoothly.

9-196. TROUBLE SHOOTING A-1CM SIGHT SYSTEM.

TROUBLE	PROBABLE CAUSE	REMEDY
Reticle does not appear.	No power.	
Fixed reticle does not appear in "CAGE" position.	Fixed reticle cover not operating.	Check for 28-volt dc.
No stiffness current on tester G-1A.	Defective fuse in 300-volt supply.	
	AMPLIFIER	
No stiffness current.	Faulty sensitivity amplifier tubes.	Replace defective tubes among the following: V-5, V-6, V-7, V-8, V-9, V-10, V-11, and V-12.
Reticle image does not move during damping temperature inspection.	Faulty elevation and deflection amplifier tubes.	Replace defective tubes among the following: V-1, V-2, V-3, and V-4.
Reticle circle size does not change when manual range control is turned and mechanical caging lever is at "UNCAGE."	Faulty range amplifier tubes.	Replace defective tubes among the following: V-10, V-11, V-12, V-6, V-7, V-8, and V-9.
Stiffness current does not vary with range with rocket setting unit in gun-firing position, or does not decrease with rocket setting unit in rocket-firing position.	Faulty tubes in sensitivity channel V-5, V-6, V-7, V-8, and V-9. Open resistor in sensitivity channel.	Replace faulty tubes. If none are found faulty, replace amplifier.
Reticle goes to stop in either deflection or elevation.	Faulty tube or open resistor in deflection or elevation channel.	Replace faulty tubes. If none are found faulty, replace amplifier.
	COMPUTER	
No reappearance of the reticle circle when the bomb-target wind scale is at "BOMB."	Gyro damping fluid not up to temperature.	Wait 5 to 20 minutes until heater lights on tester cycle.
Sight inoperative because of damaged computer.	Moisture condensation in computer due to heater circuit breaker being open.	The heater circuit breaker will be closed at all times during all flights to prevent this damage.

TROUBLE	PROBABLE CAUSE	REMEDY
	SIGHT HEAD	
Reticle does not move during operation.	Mechanical caging lever at "CAGE."	Place mechanical caging lever at "UNCAGE."
Reticle circle does not change diameter as target range changes.	Mechanical caging lever at "CAGE."	Place mechanical caging lever at "UNCAGE."
Dot pipper does not appear.	Faulty dot pipper bulb I-202.	
Reticle circle image does not appear with mechanical caging lever at "CAGE."	Faulty dot pipper bulb I-202.	
Reticle circle image does not appear with mechanical caging lever at "UNCAGE."	Faulty circle bulb I-203.	
Bombs-away flasher bulb does not light.	Faulty bombs-away flasher bulb I-201.	
Fixed and variable reticle appear in "UNCAGE" position.	Sticky fixed reticle cover.	Examine reticle cover for mechanical bind.
Fixed reticle does not appear in "CAGE" position.	Fixed reticle cover not operating.	Check solenoid for continuity.
Circle does not reappear when bomb-target wind scale knob is turned to bombing function.	Sight head stop nut not adjusted.	Adjust sight head bomb stop.

9-197. TESTING A-1CM SIGHT SYSTEM, USING G-1A TESTING ANALYZER.

9-198. Before preflight test of the sight installation, inspect the components, making sure that the connector plugs are tight in their sockets and that all wiring connectors are correctly and firmly joined. Preflight testing of the gun-bomb-rocket sight installation is accomplished as follows:

a. Connect an external power source to airplane. When external power source is connected, the sight and radar thermostatic heaters are automatically energized. Twenty minutes minimum at normal outside air temperatures must be allowed before the sight will operate properly.

b. Open sight and radar compartment access cover.

c. Check all circuit breakers and fuses. These are shown in figure 9-34.

d. Remove dummy plug from G-1A field test receptacle (figure 9-34) and connect field test unit cable to test receptacle. Then place field test unit in cockpit. As soon as the field test unit is plugged in, the heater indicator lamps on field test unit should glow, indicating that the heaters in the computer are on.

e. Place bomb-target wind dial pointer on "ROCKET GUN" position.

f. Place pointer of rocket setting unit on "GUN BOMB" detent position.

g. Place bomb release selector switch on "MANUAL RELEASE."

Note

After the required warm-up period, the thermostatic heaters should have started their indicator lamps on field test unit cycling. (In other words, the lamps go off and on.)

h. Move gun safety switch to "SIGHT CAMERA RADAR." Gyros should start to rotate, and amplifier tubes should glow.

i. Place mechanical caging switch in the "UNCAGE" ("UNCAGED") position.

j. Set field test unit circuit selector on "METER" and density selector on "DENSITY UNIT." By means of the meters, make sure that the following power supply requirements are met: 300 (±3) volt direct current;

28 (±1) volt direct current; 28 (±1) volt (measured between phase 1 and phase 2), 400 (±4) cycle, three-phase alternating current.

k. Check to see that reticle image (a circle with a dot at its center) appears. It may be necessary to rotate the dimmer knob slightly to make the image brighter or dimmer.

l. The circle and dot patterns are illuminated by separate bulbs. Each bulb is provided with two filaments so that if one filament is burned out the other filament may be brought into operation by turning the circle-dot filament switch. Operate both switches for both filaments; if circle or dot pattern does not appear, or appears in only one position of switch, replace defective bulb.

m. With sight electrically caged, move mechanical caging lever back and forth from "CAGE" ("CAGED") to "UNCAGE" ("UNCAGED") position, and check to see that reticle image (both circle and dot) flickers as lever is moved. Leave mechanical caging lever in the "UNCAGE" ("UNCAGED") position.

n. Rotate target span dial, and check to see that diameter of reticle image circle also changes. When the circle is at its greatest diameter, the target span dial should also indicate the maximum figure.

o. Rotate manual range control counterclockwise; the diameter of the circle should be the smallest. Clockwise movement of control should increase the diameter of the reticle image circle and cause the range dial to show decreasing range.

p. Rotate "DIM-BRIGHT" knob back and forth from one extreme to the other, and note that intensity of reticle illumination varies correspondingly.

q. Disconnect radar by removing connector plug, shown in figure 9-35, from range servo unit.

r. Check sensitivity current (the current through stiffness motor coils) versus range by setting the following ranges into sight. First remove cover from range servo unit and manually set range dial until desired reading is indicated. Observe that corresponding elevation and azimuth (deflection) stiffness currents are as indicated in the following table. To make these readings on the field test unit, it is first necessary to move the d-c milliampere selector switch to "100 MA" and the circuit selector switch pointer to stiffness current "DEFLECTION." The deflection stiffness current reading for the range setting will be indicated on the d-c milliampere scale. Before changing range, switch circuit selector switch to stiffness current "ELEVATION" and read milliampere scale.

RANGE DIAL SETTING—FEET	ELEVATION & DEFLECTION STIFFNESS—MILLIAMPERES DC
5400	16 (±2)
4800	18 (±2)
3600	22 (±2)
2400	29 (±2)

Note

These calculations are approximate and are based on the assumption that the density ratio is one. The density ratio is a number obtained when the barometric pressure at sea level is divided by the barometric pressure at the location where the test is being conducted.

CAUTION

Use extreme caution when working on range servo mechanism as high voltages are present.

s. Make sure sight heaters are cycling (which indicates that the damping fluid in the elevation and deflection assembly dampers and the space heater has reached proper operating temperature). Then check characteristic time measurement by setting field test circuit-selector switch pointer to "CHAR TIME-DEFL" position, and set a range of 5400 feet (1800 yards) into sight, using range dial in servo mechanism. This setting should give a d-c milliampere reading of 16 milliamperes. If the exact setting of 5400 feet does not result in an indication of 16 milliamperes, rotate dial until the 16-milliampere reading is indicated.

9-199. TESTING A-1CM SIGHT SYSTEM, USING TESTING ANALYZER 1,000,012 (TYPE G-3).

9-200. To test the A-1CM sight system, proceed as follows:

Note

- Before proceeding with tests, set switches on analyzer to the following positions: "A1—A4" switch to "A1," "SENS CTM SEL" switch to "NORM CTM," "BATTERY" switch to "OFF," "CAGE-UNCAGE" switch to "UNCAGE," "METER BRIDGE SEL" switch to "300V," "TM CUTOFF" switch to "NORM," "DENSITY" switch to "NORM," "RANGE TRANS" switch to "NORM," "RANGE SENS" switch to "NORM," and "ROCKET" switch to "NORM."
- After each test is made, compare readings obtained with manufacturer's data sheet accompanying A-1CM sight.

a. Connect 12-foot cable labeled "TO J-302" to analyzer connector AN3102-24-28P.

b. Connect 2-foot adapter cable to free end of 12-foot interconnecting cable attached in step a.

c. Connect free end of 2-foot adapter cable to field test plug in cockpit.

d. Connect 28-volt d-c power to recessed male connector marked "EXT HTR SUP, 28V DC" on analyzer.

e. After connections are made and power has been applied to A-1 sight, allow analyzer to come up to operating temperature. This will be indicated by first cycling of indicating lamps marked "ANAL" and "REF." (Lights will go out independently, indicating that cycling has occured.) Cycling of computer elevation and deflection thermal switches will be indicated by intermittent lighting of indicating lamps labeled "ELEV" and "DEFL," respectively.

f. Switch "CAGE-UNCAGE" switch to "CAGE."

g. Switch "SENS CTM SEL" switch to "OFF."

h. Switch "METER BRIDGE SEL" switch to "300V" and read voltage indicated on d-c volt-milliammeter.

i. Set "METER BRIDGE SEL" switch to "300V SGT" and place "CAGE-UNCAGE" switch (on sight head) at "UNCAGE." Read voltage indicated on d-c volt-milliammeter.

j. Switch "METER BRIDGE SEL" switch to "28V DC" and read voltage indicated on d-c volt-milliammeter.

k. Set "METER BRIDGE SEL" switch to "1-2" and read voltage indicated on a-c voltmeter.

l. Switch "METER BRIDGE SEL" switch to "SENS CUR" and check frequency of 28-volt, 400-cycle ac as indicated on frequency meter when "FREQ" push button is depressed. Do the same with "METER BRIDGE SEL" switch in "MA METER" position.

m. Switch "SENS CTM SEL" switch to "DEFL MOTOR" and read deflection stiffness motor current on d-c volt-milliammeter.

n. Switch "SENS CTM SEL" switch to "ELEV MOTOR" and read elevation stiffness motor current on d-c volt-milliammeter.

o. Standardize potentiometer bridge by switching "BATTERY" switch to "ON"; then hold "BRIDGE CAL" switch in "REF" position and adjust "BRIDGE BAL" knob until galvanometer indicates zero current. Depress "GALV" push button and again adjust "BRIDGE BAL" knob until galvanometer indicates zero current. Further movement of "BRIDGE BAL" knob upsets standardization. Standardization of the bridge should be done every 15 minutes.

p. After standardization of potentiometer bridge and with "BRIDGE CAL" switch at "TEST," switch "METER BRIDGE SEL" switch to "MA POT."

q. Switch "SENS CTM SEL" switch to "DEFL MOTOR."

r. Adjust position of "SENS CUR" dial until galvanometer indicates zero current. Depress "GALV" push button and again adjust position of "SENS CUR" dial until galvanometer indicates zero current. Read "SENS CUR" dial. (Add inner and outer dial readings to obtain a total reading.) The resulting answer is the deflection stiffness motor current.

Note

To prolong the life of the 4.5-volt battery, it is important to turn "BATTERY" switch to "OFF" except when standardizing the potentiometer bridge or when using the potentiometer bridge for measurement of current or voltage.

s. Repeat step p.; then switch "SENS CTM SEL" switch to "ELEV MOTOR."

t. Repeat step r. The resulting answer is the elevation stiffness motor current.

u. Displace sight dot pipper to obtain characteristic time measurement by switching "SENS CTM SEL" switch to "NORM CTM"; then hold "CHAR TIME, UP-DOWN" switch in either "UP" or "DOWN" position until dot pipper is displaced the desired amount; then release it.

v. Displace sight dot pipper along deflection axis for characteristic time measurements by switching "SENS CTM SEL" switch to "NORM CTM"; then hold "CHAR TIME, LEFT-RIGHT" switch in either "LEFT" or "RIGHT" position until dot pipper is displaced the desired amount; then release it.

Note

Use stop watch to measure characteristic time intervals.

w. After standardization of potentiometer bridge as prescribed in step o., and with "BRIDGE CAL" switch at "TEST," switch "METER BRIDGE SEL" switch to "5V POT GUN."

x. Switch "RANGE SENS" switch to "STD."

y. Adjust position of "SENS CUR" dial until galvanometer indicates zero current. Depress "GALV" push button and again adjust "SENS CUR" dial for zero current indication on galvanometer. Read voltages on "SENS CUR" dial. (Add inner and outer dial readings to obtain total reading.) The resulting answer is the regulated voltage applied to the analyzer standard range network.

z. After standardization of potentiometer bridge and with "BRIDGE CAL" switch at "TEST," switch "METER BRIDGE SEL" switch to "5V POT ROC."

aa. Switch "ROCKET" switch to "STD."

ab. Adjust position of "SENS CUR" dial until galvanometer indicates zero current. Depress "GALV" push button and again adjust "SENS CUR" dial for zero current indication. Read voltage on "SENS CUR" dial. (Inner and outer dial readings must be added to obtain total reading, which is the regulated voltage applied to the analyzer standard rocket network.)

9-200A. BORE SIGHTING A-1CM SIGHT SYSTEM.

a. Level airplane laterally and longitudinally (paragraph 1-16), and align target board in front of airplane as outlined in paragraph 9-10.

b. Open sight and radar access door, and level computer. (See figure 9-36.)

c. Connect an external power source to airplane.

d. Place bomb-target wind dial pointer on "ROCKET GUN."

e. Place rocket setting unit pointer on "GUN BOMB."

f. Place gun safety switch to "SIGHT CAMERA RADAR" position. Allow sight to warm up for approximately 10 minutes.

g. Move mechanical caging lever to "UNCAGED" position.

h. Rotate dimmer control to obtain proper reticle brilliance.

i. Press electrical caging button and observe sight reticle image dot. The dot should appear to be superimposed on the sight aligning mark on the target board. If adjustment in azimuth is required, lower instrument panel and remove azimuth adjustment cover plate. Adjust reticle image in azimuth by first loosening lockscrew; then, while depressing electrical caging button, turn azimuth adjustment screw (figure 9-36) until center dot of reticle is superimposed on sight aligning mark on target board. Release caging button and tighten lockscrew. Replace azimuth adjustment cover plate and reinstall instrument panel. If adjustment in elevation is required, remove access plate on right side of sight head. (See figure 9-37.) To align the center dot with sight aligning mark on target board, first loosen locknut, and then rotate elevation adjustment bolt while depressing electrical caging button (figure 9-36) until center dot is properly aligned with sight aligning mark on target board. Tighten locknut and replace access plate.

j. Turn pointer of rocket setting unit to "5" HVAR ROCKET—N" position. The reticle image should deflect downward and come to rest on the rocket sight mark on the target board. If adjustments are required, adjust the rocket setting unit as outlined in paragraph 9-220. Then return rocket setting unit pointer to "GUN BOMB" position.

k. Move bomb-target wind control to "0." Observe the reticle image position. The image should appear just over the nose section of the airplane. If the circle does not go out during the downward travel of the reticle and does not reappear within 10 seconds after the reticle stabilizes at the bottom of its travel, adjust sight head bombing stop. (Refer to paragraph 9-212.) If the reticle circle still does not go out as the reticle travels downward and then does not reappear after reticle stabilizes (with the caging button both depressed and released), readjust sight head bombing stop as outlined in paragraph 9-212. The circle must come on after the reticle has traveled to bomb position and must stay on when the electrical caging button is depressed.

l. Return sight controls to the inoperative positions and disconnect external power source.

9-201. A-1CM SIGHT SYSTEM COMPUTER.

9-202. The computing unit is composed of the deflection and elevation computing sections, which may be called the "brains" of the sighting system. All required inputs to the system are fed directly into the computer, with the exception of the air density, which enters the computations through the sight amplifier. The computer consists of the gyros, stiffness motors, thermostatically regulated dampers, airspeed correction unit, gunnery and bombing accelerometers, and the microsyn pick-off system. The angular rate of the airplane in a tracking curve causes the gyros to precess, while the range input to the computer is in the form of an opposing torque to the precession of the gyros, the torque being an inverse function of the range. Such a torque is created when a varying current is supplied to the stiffness motors. As the current increases, the stiffness of the motors increases, thus reducing the precession of the gyros for a given angular rate. The thermostatically controlled dampers give the sight stability during tracking by controlling the temperature of the damper fluid. Without damping, it would be extremely difficult to keep the reticle on the target. The airspeed correction unit feeds data to the bombing accelerometer only. The bombing accelerometer in turn applies an opposing torque to the elevation gyro during computing for bombing. The microsyn positioning system may be compared with an a-c selsyn system, in that there are two units which always maintain the same relative position with each other to within plus or minus one-half of one sight mil. Sight computer adjustments and the method of installation are shown in figure 9-36. The computer must be leveled when guns are bore sighted.

9-203. ADJUSTING COMPUTER. The temperature of the damping fluid in the deflection damper and/or elevation damper must be changed if the deflection and/or elevation characteristic time is not satisfactory. The deflection temperature control adjustment is accessible after the cap marked "D" on the lower cover of the computer is removed, and the elevation temperature control adjustment is accessible after the cap marked "E" is removed. Insert special wrench (figure 9-36) into opening and engage it with temperature control adjustment. If the average time during the deflection characteristic time check was less than 3.3 seconds but not less than 2 seconds, turn tool from 5 to 10 degrees (depending upon the amount of error) in a clockwise direction. If the average time was more than 4 seconds but not more than 5.5 seconds, turn adjustment tool in a counterclockwise direction. After adjustments have

been accomplished, replace temperature control adjustment plugs and wait necessary time for telltale lights of field test unit to begin cycling; then accomplish deflection and elevation characteristic time check.

9-204. REMOVING COMPUTER. Remove RT-181/APG-30 transmitter, located directly above computer. Disconnect pitot and static air lines and electrical plugs from computer. Remove mounting screws and lift computer from its mount. (See figure 9-36.)

CAUTION

To avoid spilling damping fluid, do not tip computer on its side or turn it upside down.

9-205. INSTALLING AND LEVELING COMPUTER. See figure 9-36.

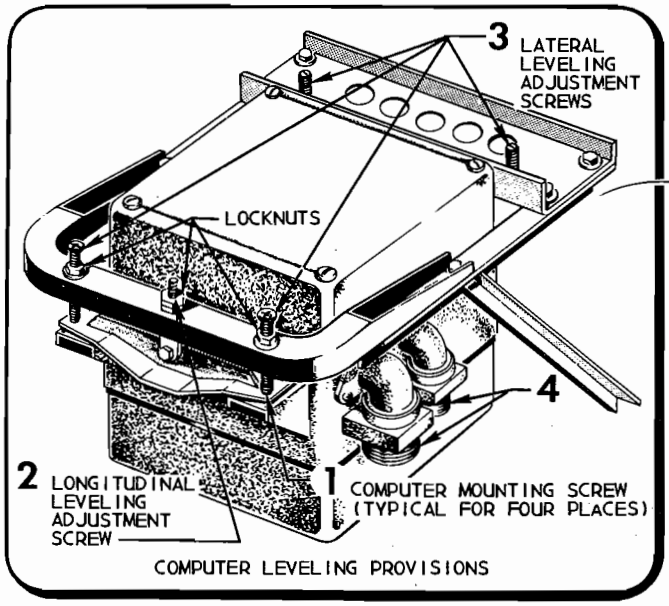
CAUTION

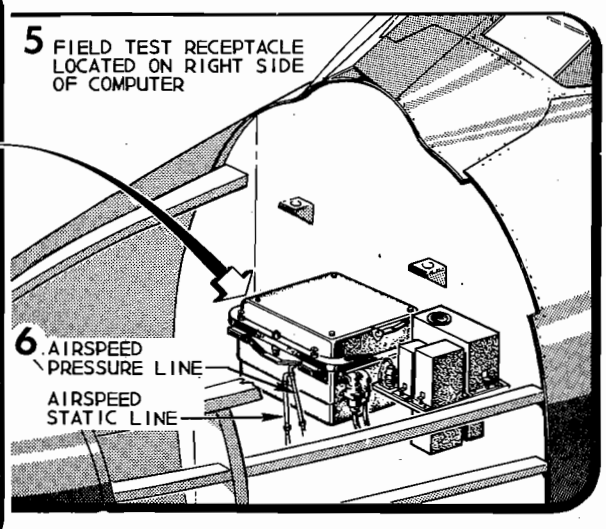
To avoid spilling damping fluid, do not tip computer on its side or turn it upside down.

9-206. MAINTAINING COMPUTER. Maintenance of the computer is limited to examining the mounting, checking the cables for chafing, and checking the pitot and static lines for condition and tight connections.

9-207. A-1CM SIGHT HEAD.

9-208. The sight head consists of the optical system, the mirror drive system, and the sight head case and mounting lugs. (See figures 9-35 and 9-37.) A 3½-inch collimating lens is employed in the sight to afford adequate eye freedom with long eye-to-sight distances. The reticle image is produced by means of a conical reflecting device in the sight head. The maximum diameter of the circle is 170 sight mils, and the minimum diameter is 17 sight mils. A wing span wheel is located on the sight head, which may be adjusted to the span of the target to be attacked. Also attached to the sight head is the radar on-target light, which indicates to the pilot that the radar ranging equipment is locked on the target while tracking. The mechanical caging lever, located to the right and to the bottom side of the sight





1 Install computer in its mount and secure mounting screws.

2, 3 With the airplane leveled, adjust the lateral and longitudinal leveling screws until the computer is level. Secure the screws by tightening the locknuts.

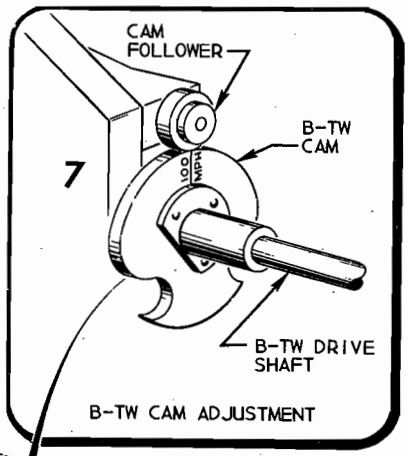
4 Connect the power input and signal input cables.

5 Connect electrical cable to field test receptacle.

6 Connect airspeed pressure and airspeed static lines.

7 Remove cover of computer and set B-TW cam to 100 mph. Set B-TW dial (located on armament pedestal) to 100 mph.

8 Connect shaft from B-TW dial to B-TW drive coupling. Check both B-TW dial and B-TW cam to make certain they are co-ordinated at their 100 mph settings. Replace computer cover.



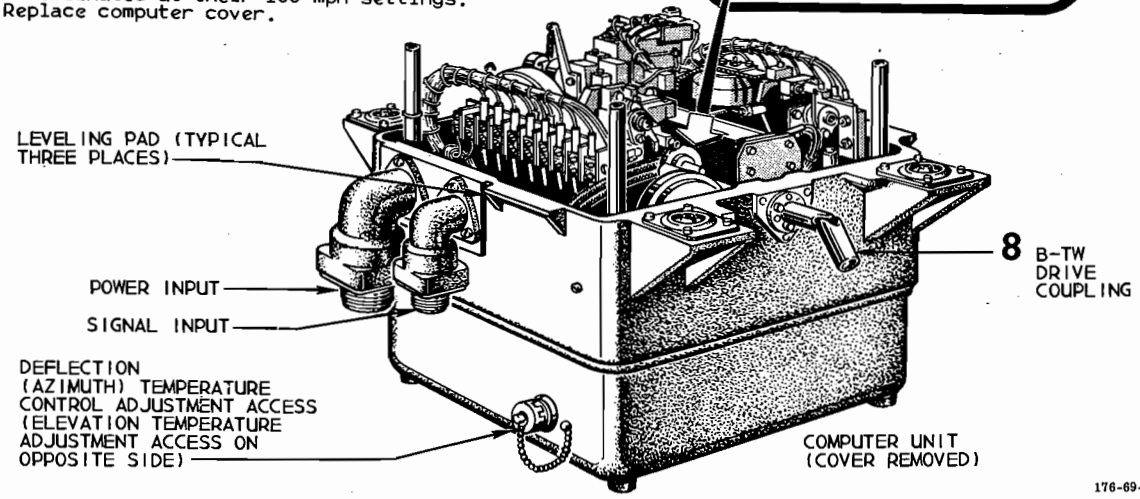


Figure 9-36. Installing, Leveling, and Adjusting Computer

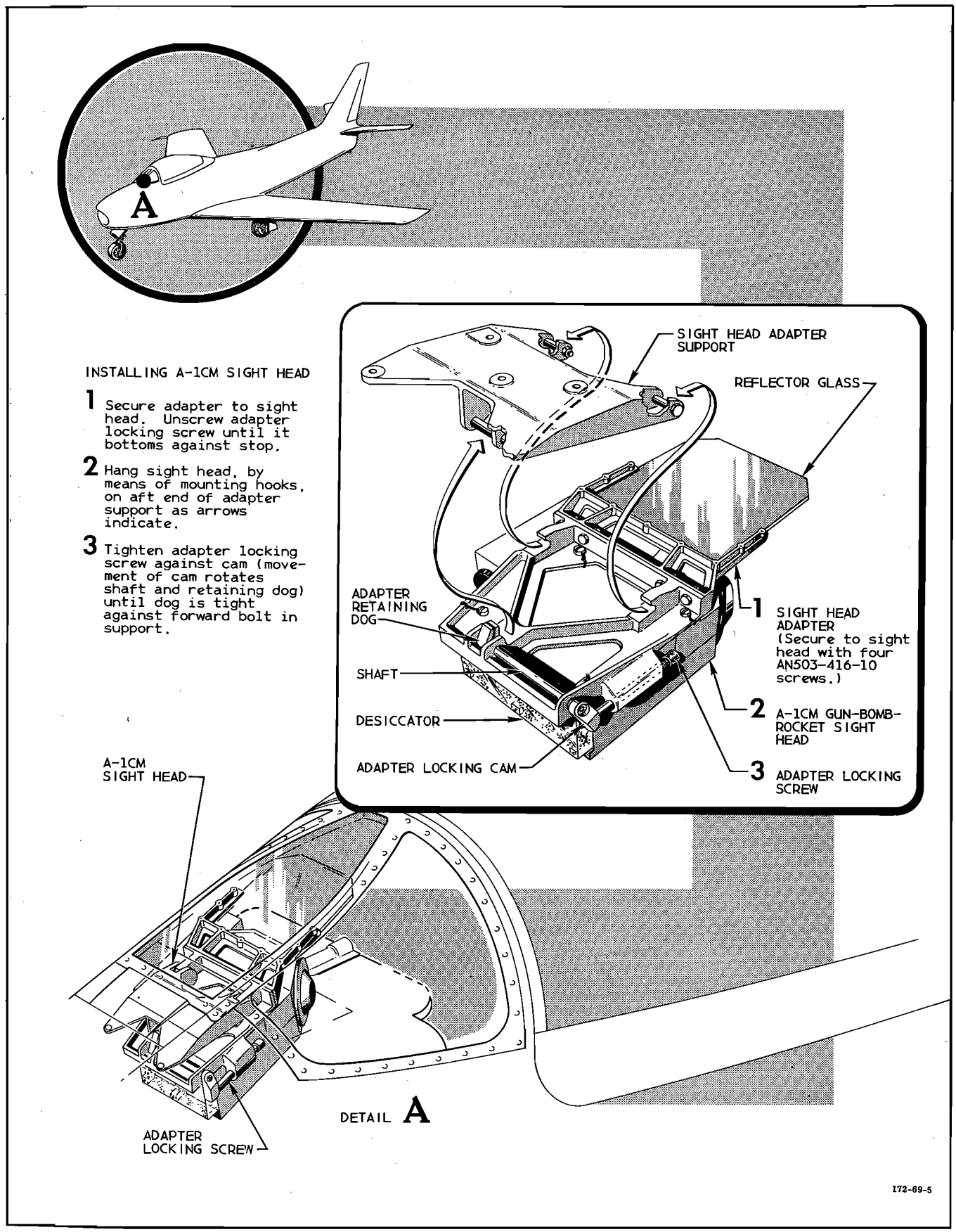


Figure 9-37. Installing A-1CM Sight Head and Reflector Glass

head, is for emergency use in the event that the sight ceases to compute correctly. The mirror drive system consists of the follow-up microsyns, torque motors, and viscous dampers. Mechanical linkage to the mirror thus places the mirror in a corresponding position with the computer shaft in the computer unit. The reticle image is collimated before being reflected to the windshield by the moving mirror, thus eliminating collimating errors due to sight line shift.

9-209. ADJUSTING A-1CM SIGHT HEAD. If it is necessary to adjust a new sight head before checking and installing it in the airplane, proceed as outlined in figure 9-37.

9-210 and 9-211. (Deleted)

9-212. ADJUSTING A-1CM SIGHT HEAD BOMBING STOP. Before adjusting sight head bombing stop, lower instrument panel and remove cover on underside of sight head. (See figure 9-37.) Then set controls and accomplish test outlined in step l. of paragraph 9-198. Make sure field test unit is not installed and dummy plug is in place in field test socket in airplane. Accomplish adjustment as follows:

a. Insert a thin-bladed screwdriver in bombing stop adjustment access hole and engage it with adjustment screw.

b. Rotate B-TW pointer from "ROCKET GUN" to the "0" graduation in "BOMB" position; reticle pattern will begin to drop. When reticle pattern has reached limit of its downward displacement, adjust bombing stop adjustment screw until circle *just* lights up (with caging button depressed or released). Mark this position of adjustment screw.

c. Turn adjustment screw counterclockwise through an arc of approximately one-eighth turn where circle remains illuminated. Continue to turn until circle light goes out; then mark this position.

d. Rotate adjusting screw clockwise until point is reached midway between the two marked positions.

e. Return B-TW pointer to "ROCKET GUN" position and again turn B-TW pointer to "BOMB" as far as the "0" graduation; reticle should function as outlined in step b.

f. Return controls to their inoperative positions.

g. Install cover on bombing stop adjustment access hole and lock instrument panel in place.

9-213. REMOVING A-1CM SIGHT HEAD. To remove sight head, proceed as follows:

a. Lower instrument panel and remove instrument panel shroud.

b. Disconnect electrical plugs.

c. While supporting sight head, loosen adapter locking screw enough to release forward part of sight head.

d. Slide sight head up and aft, releasing sight head from adapter.

9-214. INSTALLING A-1CM SIGHT HEAD. See figure 9-37.

9-215. MAINTAINING A-1CM SIGHT HEAD. Maintenance of the sight head consists mainly of keeping the unit clean, replacing the silica gel cell, and replacing the reticle bulbs. Clean windshield (rectangular window in sight head through which reticle image passes) and range dial window in sight head with a soft, lint-free cloth dampened with warm, clean, soapy water. After cleaning surfaces, thoroughly dry them with a soft, lint-free cloth. To replace circle target index or bombs-away flasher bulbs, lower instrument panel; then remove rectangular cover plate on rear lower portion of sight head. The target index and bombs-away flasher bulbs may be removed with the fingers. Be careful not to damage mechanism. Before removing circle bulb, release clamp screw holding it; use an offset screwdriver or a ¼-inch end wrench. When clamp is loosened, swing bulb to right and then remove it with the fingers.

9-216. A-1CM SIGHT ROCKET SETTING UNIT.

9-217. The rocket setting unit (figure 9-39) is the pilot's control for setting into the sight the information concerning the type of rocket and angle of dive that are necessary for the computer to derive the correct lead angle. This unit also includes a setting for gunnery and dive bombing.

9-218. REMOVING ROCKET SETTING UNIT. To remove rocket setting unit, proceed as follows:

a. Remove instrument panel. (Refer to paragraph 6-6.) Then disconnect AN. connector from rear of unit.

b. Release bottom attaching bracket by sliding unit to the right.

c. Rotate locking handle clockwise through its full arc; then twist body of rocket setting unit clockwise approximately 10 degrees and pull unit forward.

9-219. INSTALLING ROCKET SETTING UNIT. See figure 9-39.

9-220. ADJUSTING ROCKET SETTING UNIT. The adjustment of the rocket setting unit is accomplished during bore-sighting procedure. If the rocket setting unit is out of adjustment, after the check outlined in paragraph 9-198 is accomplished, set the control as follows:

a. Set rocket setting unit pointer at "5" HVAR ROCKET—N"; then remove rocket setting unit (paragraph 9-218).

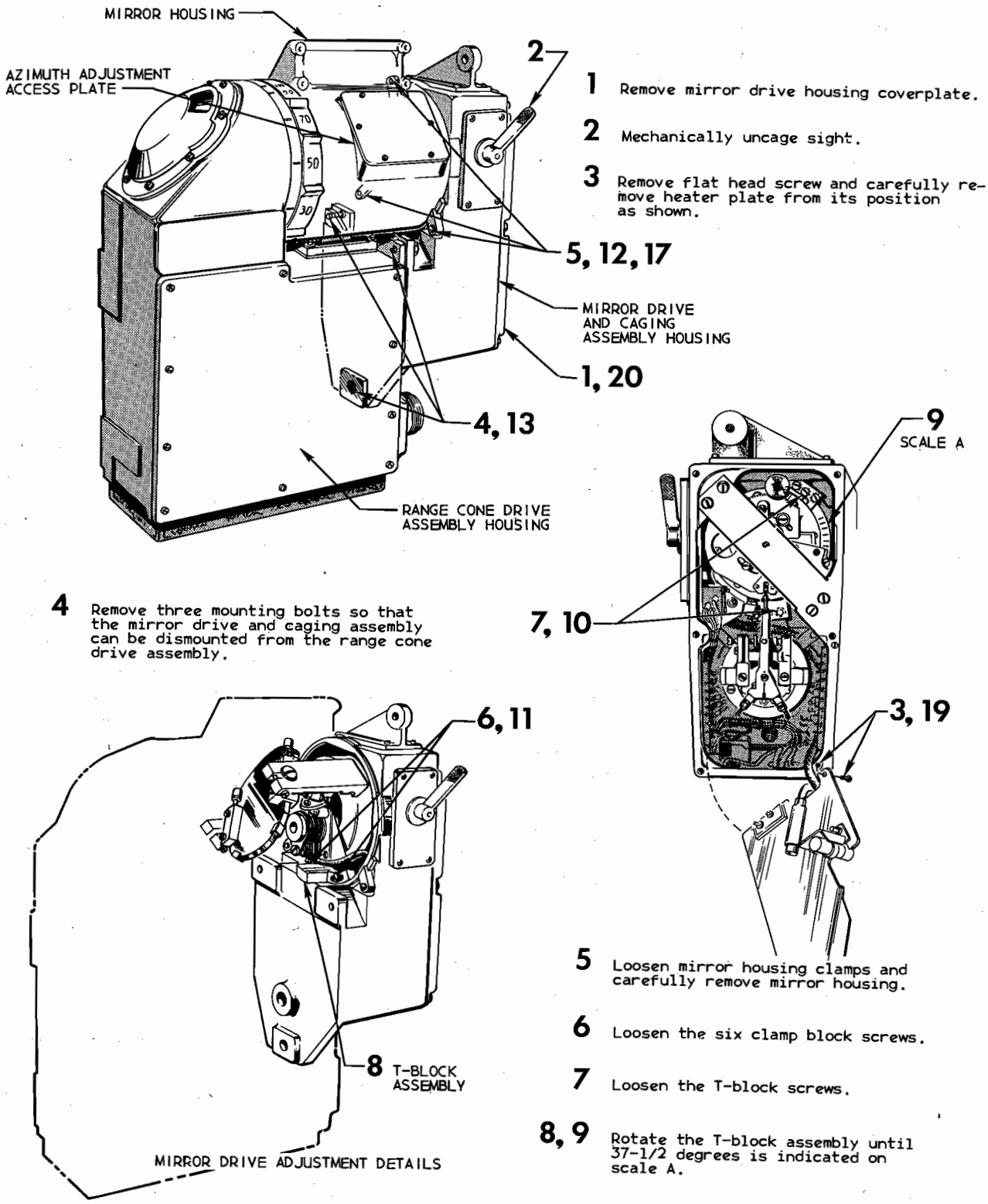
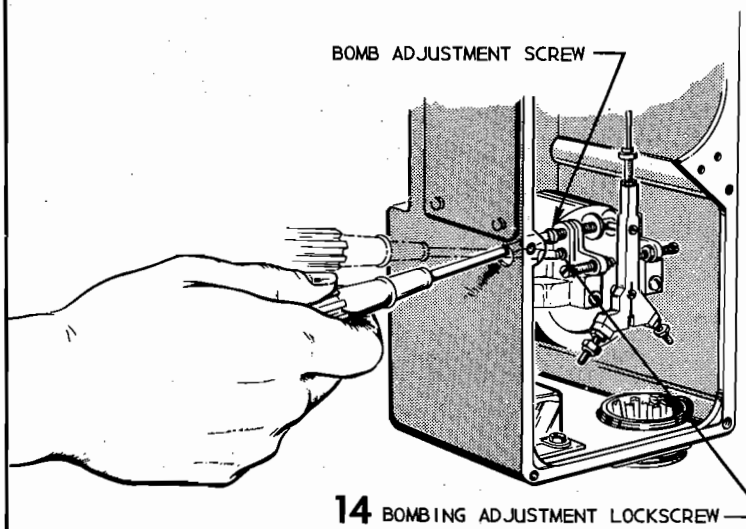


Figure 9-38. Adjusting A-1CM Sight System (Sheet 1 of 2)



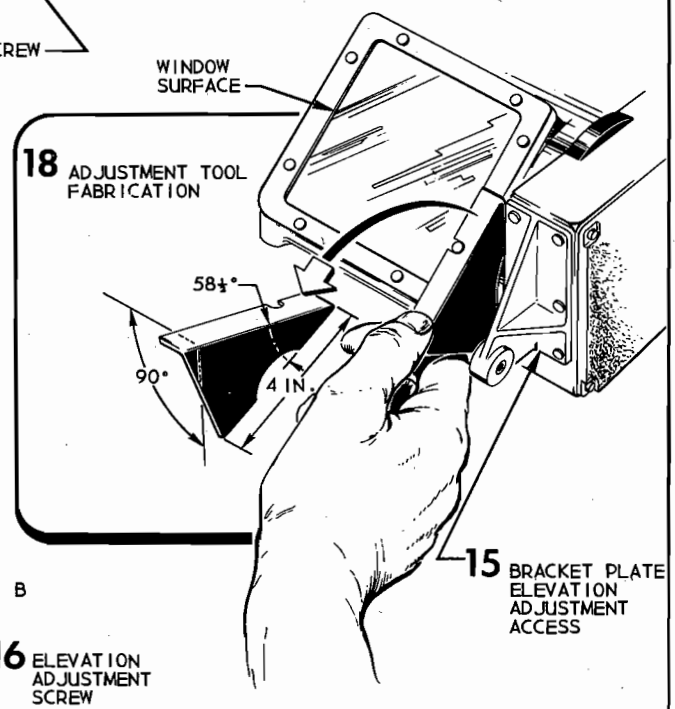
10, 11 Tighten the clamp block and T-block screws.

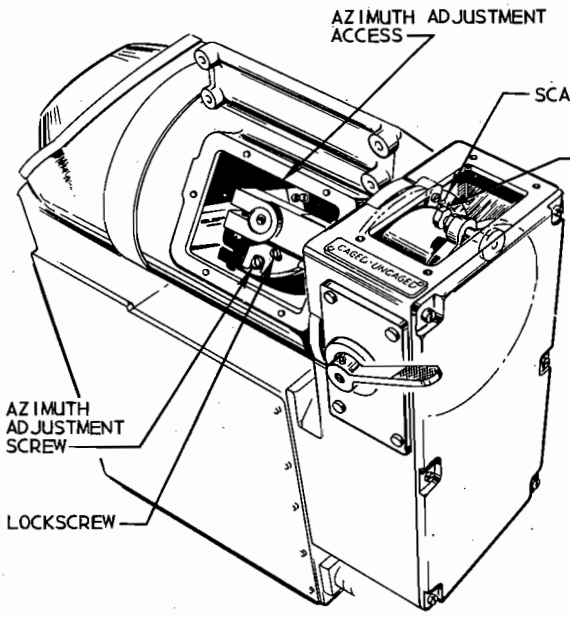
12 Install mirror housing and tighten clamps.

13 Install mirror drive and caging assembly onto the range cone drive assembly.

14 Tighten bombing stop lockscrew if it is loose. It is important that the bombing stop not be moved during tightening.

15, 16 Remove bracket plate and loosen locknut. Turn elevation adjustment screw until the 37-1/2 degree mark on scale B is aligned with indexing line. Tighten locknut and replace bracket plate.





17, 18 Loosen mirror housing clamps. Using locally fabricated tool, rotate barrel housing until window surface makes a 58-1/2 degree angle with surface of sight body at elevation adjustment access. Tighten barrel housing lock lugs.

19, 20 Install heater plate assembly. Replace mirror drive housing cover plate. Install sight head. (Refer to index for page number of applicable procedure.)

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Figure 9-38. Adjusting A-1CM Sight System (Sheet 2 of 2)

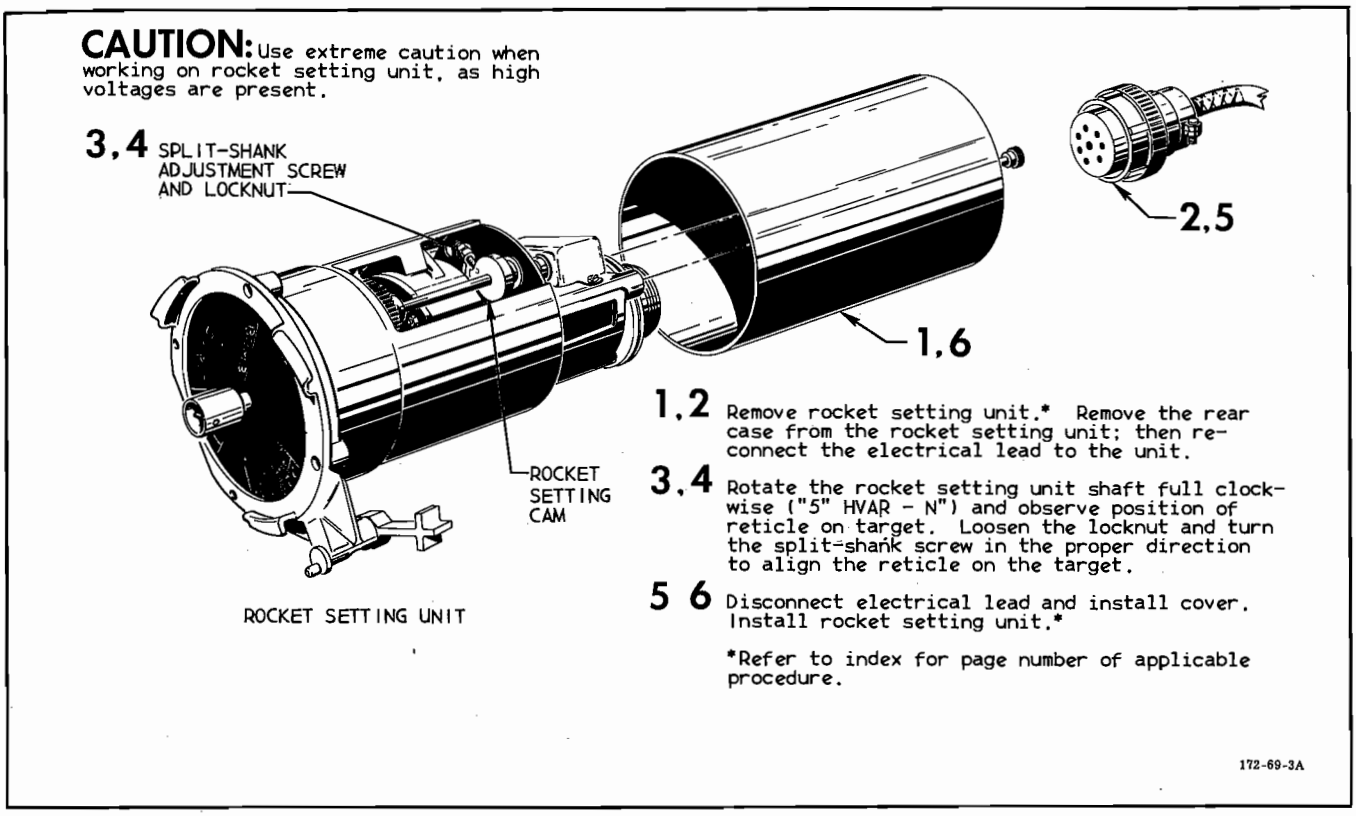


Figure 9-39. Installing and Adjusting Rocket Setting Unit

b. Remove rear case and install AN. connector.

c. Loosen locknut and turn split-shank screw in proper direction to align reticle on target. (See figure 9-39.)

CAUTION

Use extreme caution when working on rocket setting unit, as high voltages are present.

d. Tighten locknut while holding cam follower split-shank screw, and recheck alignment of reticle. Readjust if necessary.

e. Remove AN. connector, reassemble cover, and replace connector.

f. Install rocket setting unit. Make sure when installing rocket setting unit that pointer and unit settings are coordinated.

CAUTION

Do not depress electrical caging button during procedures a. through f., but allow adequate time for reticle to settle.

9-221. A-1CM SIGHT MANUAL RANGING CONTROL.

9-222. The manual ranging control is supplied for use on overland targets at altitudes of less than 5000 feet where radar ranging with the AN/APG-30 radar unit is impossible. This installation consists of a potentiometer, mounted at the base of the power control lever. The power control twist grip, by means of shafting, drives the potentiometer. The potentiometer feeds voltages to an amplifier in proportion to the amount of rotation of the handle. Movement of the twist grip clockwise reduces the range signal; counterclockwise movement increases the range signal. When the twist grip reaches the maximum range (full counterclockwise) position, linkage within the electrical unit actuates a microswitch that transfers the range signal from manual ranging to radar ranging control. A detent is provided in the twist grip to hold the handle in this position.

9-223. ADJUSTING MANUAL RANGING CONTROL. After the AN/APG-30 radar unit and gun sight installation have been checked out, turn on sighting system and allow a 15-minute warm-up period. Then adjust the manual range control installation as follows:

a. Remove friction wheel from quadrant center shaft by loosening locknut and then rotating wheel counterclockwise until wheel disengages from shaft.

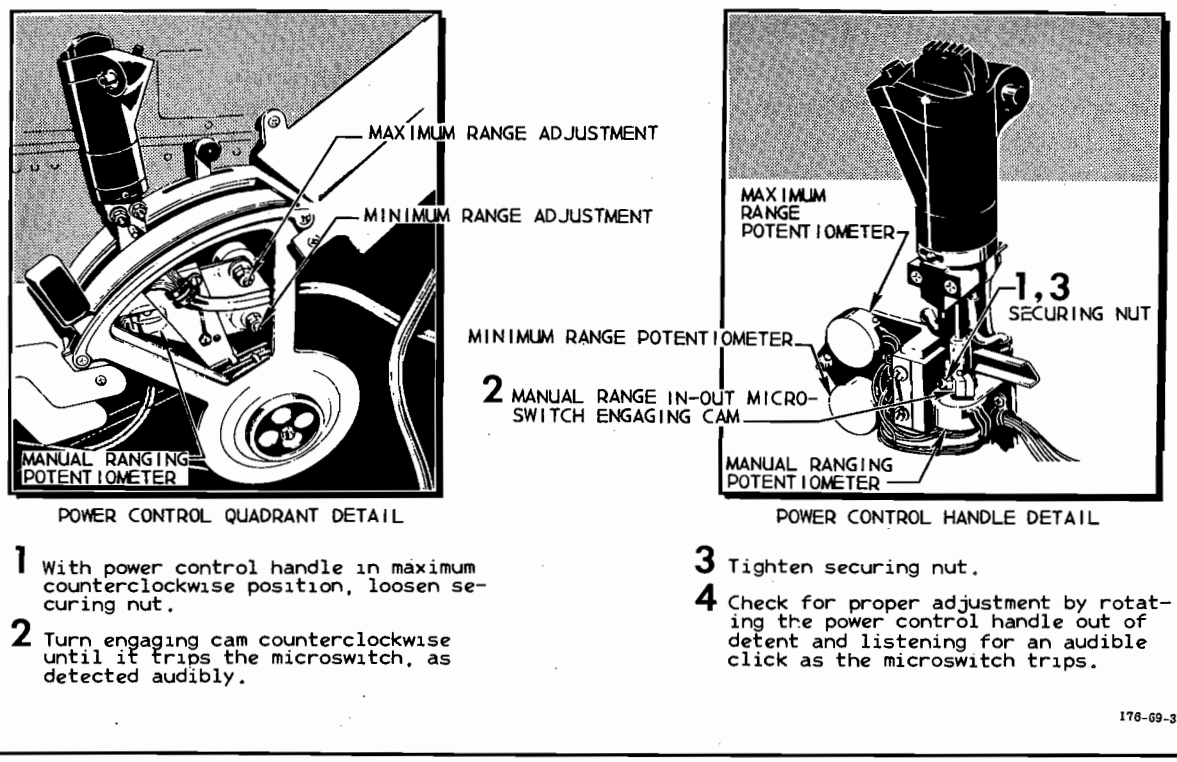


Figure 9-40. Manual Ranging Control Adjustments

b. Remove quadrant access cover plate.

c. Adjust minimum range potentiometer so that, when twist grip is rotated to the full clockwise position, range dial on sight head will read 1200 feet. (See figure 9-40.)

d. Adjust maximum range potentiometer so that, when twist grip is rotated clockwise just beyond microswitch tripping position, range dial on sight head will read 2700 feet.

e. Again check twist grip throws in both positions. Make sure adjustments accomplished during procedures c. and d. are still in effect.

f. Install electrical unit access cover.

g. Install quardant access door.

h. Install friction wheel on quadrant center shaft and then secure with locknut.

9-224. A-1CM SIGHT BOMB-TARGET WIND SCALE.

9-225. The bomb-target wind scale (a pilot's control) is mechanically connected to the computer. Movement of the bomb-target wind scale for the "ROCKET GUN" position places the computer bombing accelerometer in an operating position, and also closes a switch to energize the gun-bomb relays in the amplifier. When the pointer is in the "ROCKET GUN" position, the bombing accelerometer is removed from operation.

9-226. SETTING BOMB-TARGET WIND SCALE. To coordinate the pointer of the bomb-target wind scale with the cam it drives on the computer, first remove the lid of the computer and then rotate the B-TW cam until the mark "100 MPH" is indexed with the center of the cam follower. (See figure 9-38.) Check that the pointer of the B-TW scale is on "100." If the pointer is not on "100," loosen Allen screws on shaft coupler just forward of pedestal, rotate pointer until both units are coordinated, tighten Allen screws in coupling, and then install computer cover.

9-227. A-4 SIGHT SYSTEM.

9-228. The A-4 gun-bomb-rocket sight (figure 9-41) provides a means of aiming the guns, bombs, or rockets. The system contains the following main units: a computer; an amplifier; and a range servo unit, mounted in the gun sight and radar bay in the nose of the airplane; and a sight head and a sight selector unit located in the cockpit. Sight controls and power supply comprise the following: a reticle dimmer, a filament switch, a caging switch and lever, a gun safety switch, a manual range control, a field test plug, a power relay, a fuse panel,

a test box, an a-c power unit, a d-c static converter, and system circuit breakers. These items are located as follows: the manual range control, reticle dimmer, filament switch, gun safety switch, caging switch and lever, and field test plug are located in the cockpit; the fuse panel and the test box are located in the gun sight and radar bay; and the a-c power unit, d-c static converter, and power relay are located in the aft radio bay. On F-86F-35 and subsequent airplanes, a manual pip control for the bombing system is provided. (Refer to paragraph 9-283.)

9-229. FUNCTION OF A-4 SIGHT SYSTEM.

9-230. The A-4 sight operates automatically; however, certain information is manually introduced. Basically, the pilot positions the airplane and operates the guns according to the size and position of the reticle as visually compared with the target. The size of the reticle depends on the setting of the wing span lever and on the range to the target as introduced into the sight system by the radar ranging system, or by the manual range control if the radar is inoperative. Position of the reticle is controlled in both the elevation (up and down) and deflection (left and right) directions and in combinations of these directions. Basic information concerning the displacement of the reticle in all directions originates in the elevation and deflection gyros in the computer. This information is fed through the amplifier and directed to the sight head mirror positioning motors. However, certain manually preset information is introduced into the system to compensate for certain fixed variations in information. (See figure 9-42.) Examples of this type of information are target speed ("TR. HI. LO.") switch, rocket depression angle setting, and wind velocity at a bombing target (bomb-target wind scale). Certain variables concerning distance to the target are introduced into the sight system through the range servo unit and affect both the size and positioning of the reticle.

9-231. TROUBLE SHOOTING A-4 SIGHT SYSTEM.

9-232. The following table comprises a comprehensive trouble shooting chart based on actual experience with the A-4 sight system. A majority of the troubles experienced with the sight will appear as a result of systematic testing of the sight; therefore, the chart has been arranged to present related troubles under the same heading. An index precedes the trouble shooting chart. Before an attempt is made to locate a trouble in the chart, the indication of the trouble should be located in the one *or more* places it appears in the index.

INDEX

A. Reticle.
1. No reticle.
2. Partial or dim reticle.
3. Multiple reticle image.
4. Reticle vibrates (jitters).
5. Reticle vibrates excessively because of jarring or gunfire (gun jitters).
6. Reticle drives to limit in any direction as soon as sight is warmed up.
7. Reticle drifts.

B. Sight head range dial.
1. No dial response.
2. Limited dial ranging.
3. Dial action sluggish.
4. Dial drives to one position.
5. Dial will not drive to 600 feet when sight is mechanically caged.
6. Erratic dial operation.
7. Poor range correspondence.
8. No manual ranging.

C. Reticle positioning system.
1. Caging spread and zero uncertainty.
2. No electrical caging.
3. Reticle drives to one position.
4. Reticle movement limited.
5. Sluggish or erratic reticle movement.
6. Reticle does not function properly in bombing mode.
7. (Deleted)
8. Bore-sight adjustment cannot be made.
9. Miscellaneous troubles.

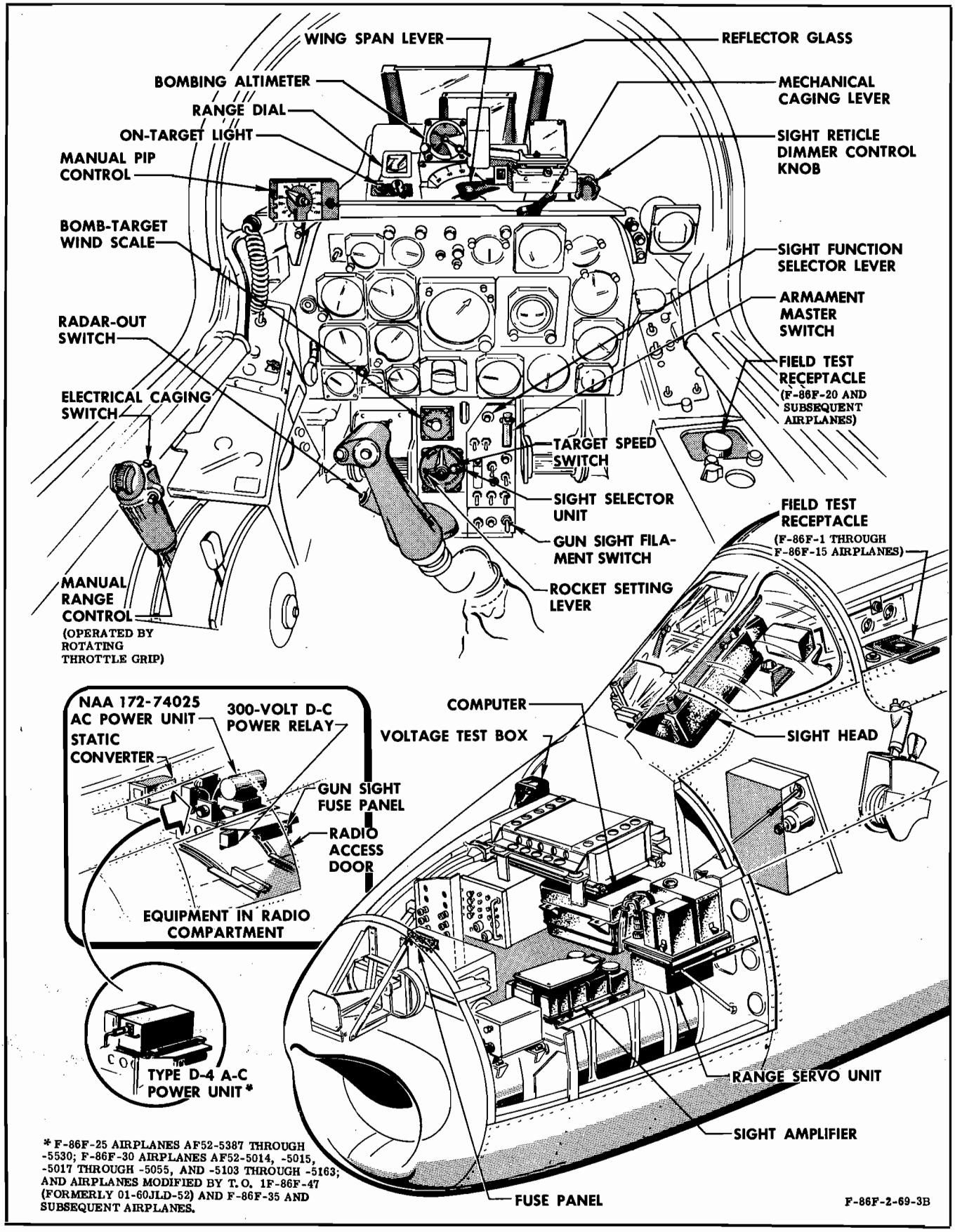
D. Stiffness (sensitivity) current.
1. No stiffness current.
2. High stiffness current.
3. Low stiffness current.
4. Erratic or unbalanced stiffness currents.
5. Stiffness current does not vary with range.

E. Power supply.
1. No 300-volt d-c power.
2. 300-volt d-c (½- or ⅛-ampere) fuses blow.
3. No 28-volt a-c power.
4. 28-volt a-c (2- or 5-ampere) fuses blow.
5. Miscellaneous troubles.

F. Range and Reticle dimensioning system.
1. Reticle diameter will not vary.
2. Range servo dial erratic.

G. Computer.
1. Gyros will not start.
2. Miscellaneous troubles.

H. Miscellaneous.



* F-86F-25 AIRPLANES AF52-5387 THROUGH -5530; F-86F-30 AIRPLANES AF52-5014, -5015, -5017 THROUGH -5055, AND -5103 THROUGH -5163; AND AIRPLANES MODIFIED BY T.O. 1F-86F-47 (FORMERLY 01-60JLD-52) AND F-86F-35 AND SUBSEQUENT AIRPLANES.

Figure 9-41. A-4 Sight System (Sheet 1 of 3)

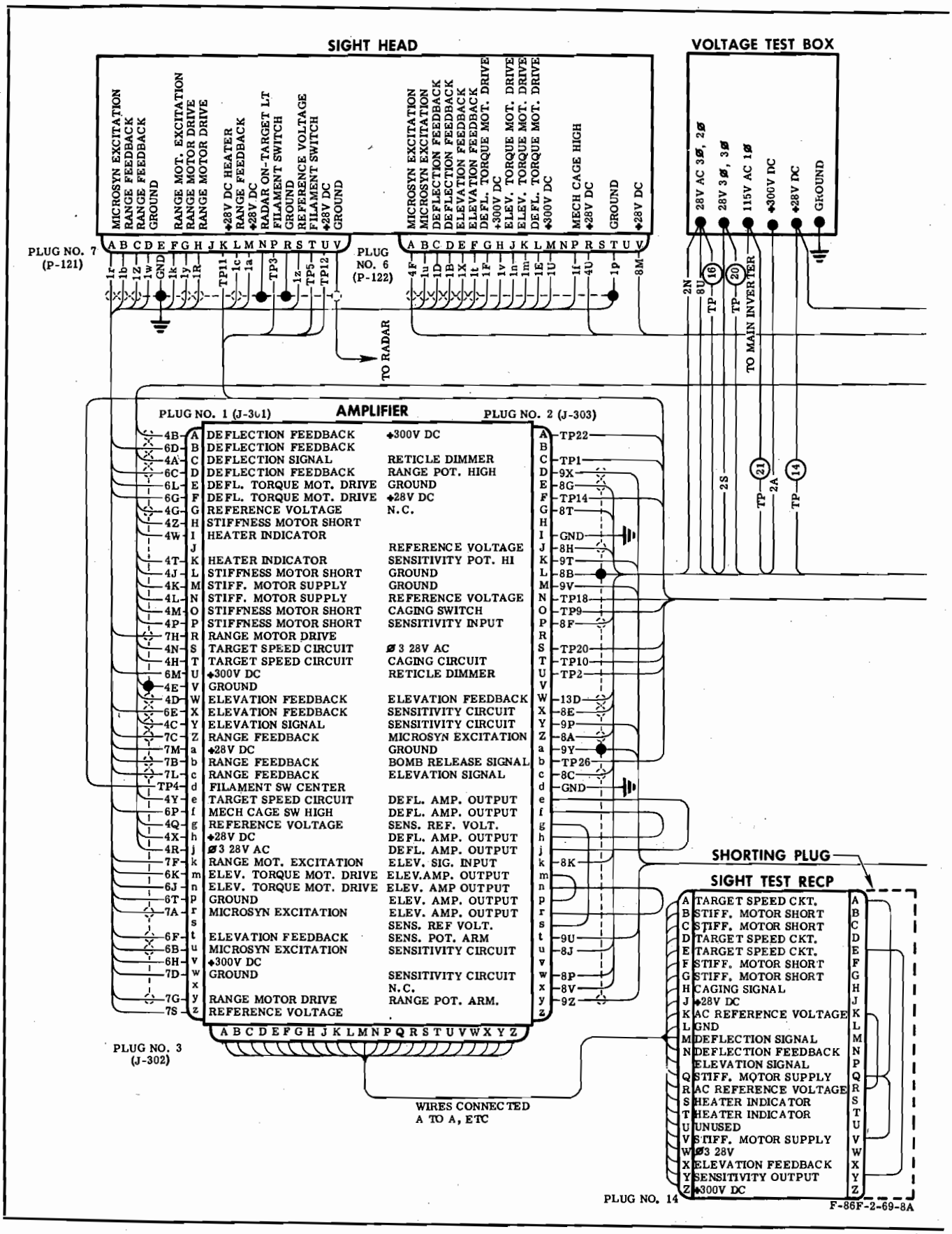
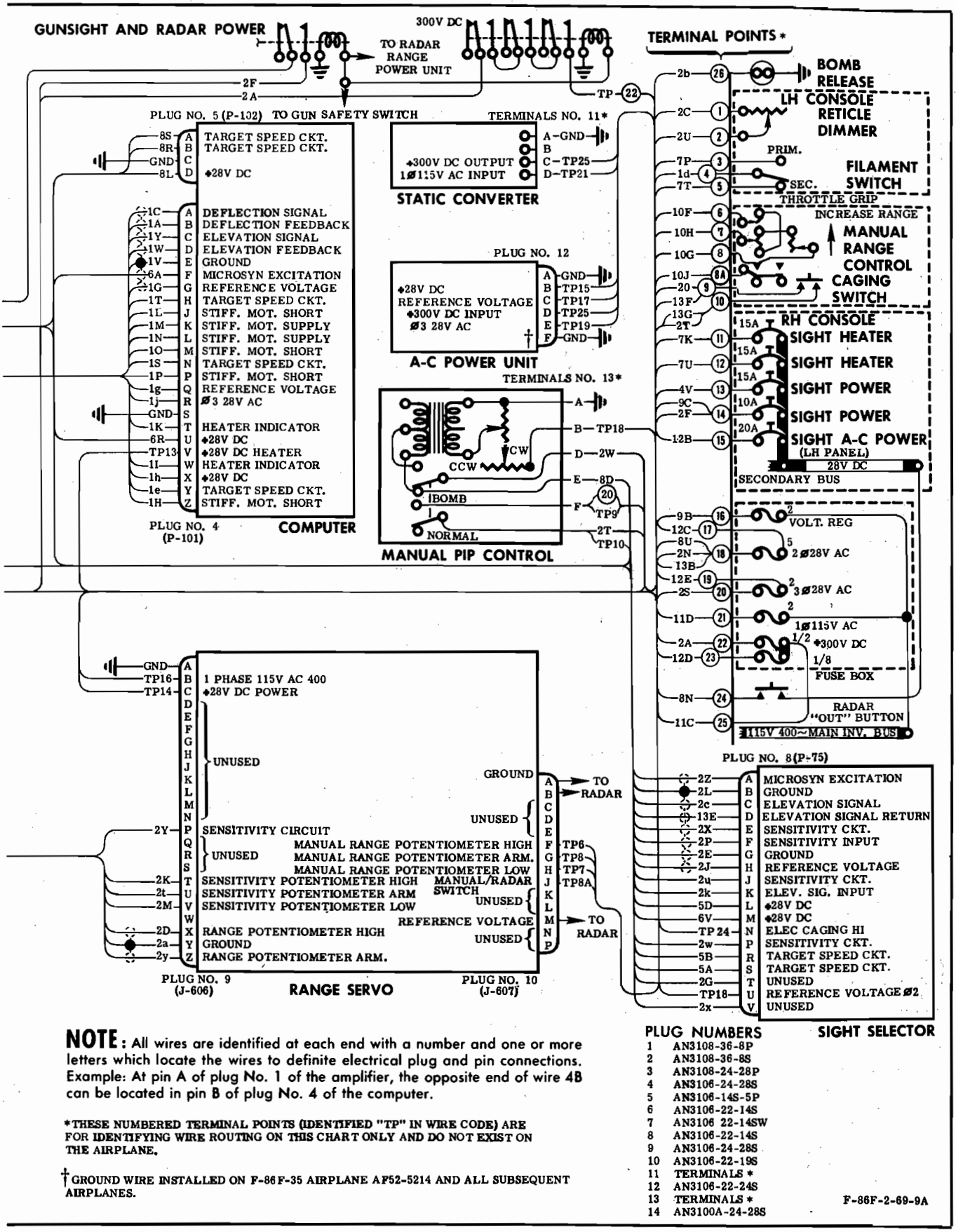


Figure 9-41. A-4 Sight System (Sheet 2 of 3)

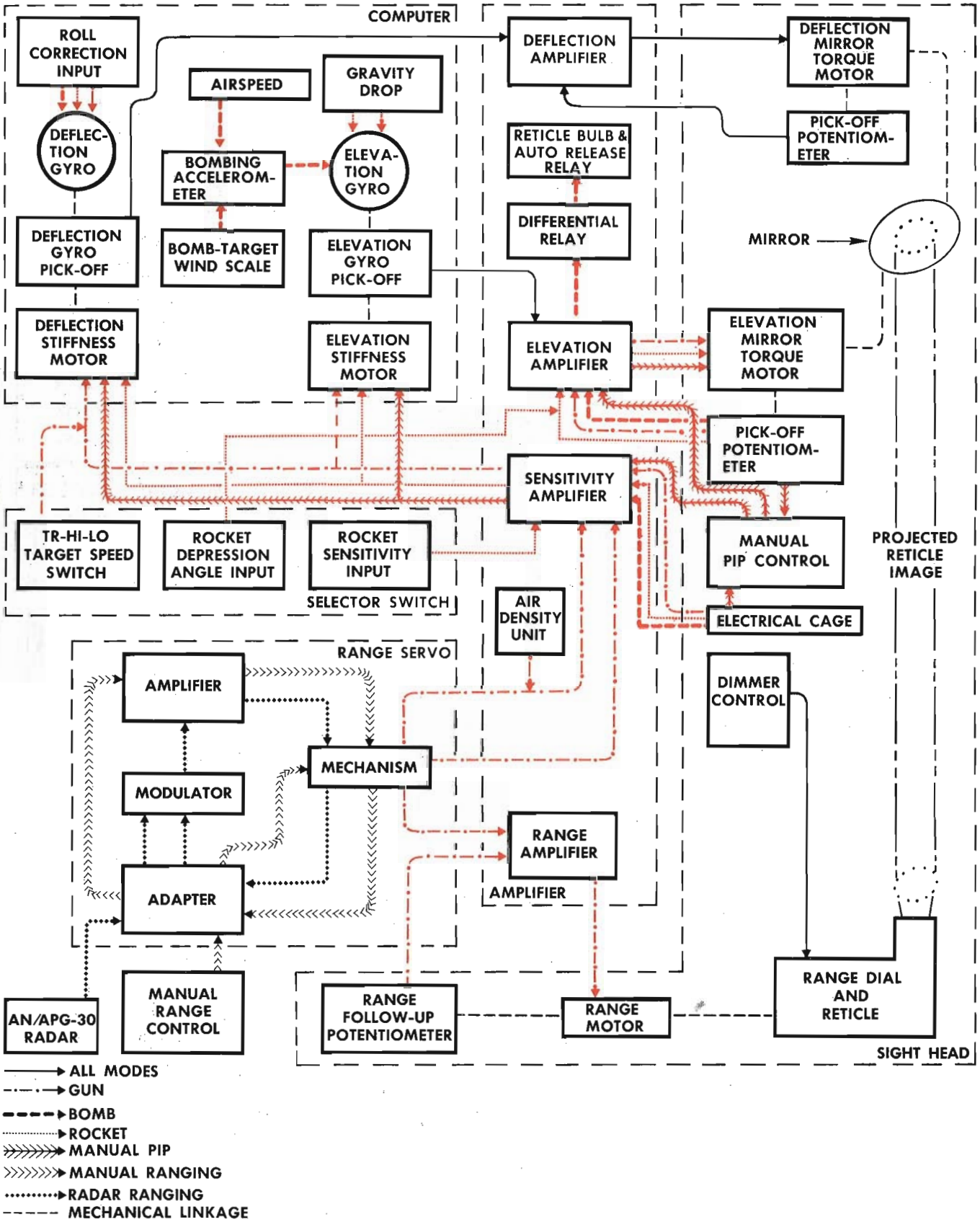


NOTE: All wires are identified at each end with a number and one or more letters which locate the wires to definite electrical plug and pin connections. Example: At pin A of plug No. 1 of the amplifier, the opposite end of wire 4B can be located in pin B of plug No. 4 of the computer.

*THESE NUMBERED TERMINAL POINTS (IDENTIFIED "TP" IN WIRE CODE) ARE FOR IDENTIFYING WIRE ROUTING ON THIS CHART ONLY AND DO NOT EXIST ON THE AIRPLANE.

† GROUND WIRE INSTALLED ON F-86F-35 AIRPLANE AF52-5214 AND ALL SUBSEQUENT AIRPLANES.

Figure 9-41. A-4 Sight System (Sheet 3 of 3)



F-86F-2-69-10

Figure 9-42. Sight System Data Flow Diagram

TROUBLE	PROBABLE CAUSE	REMEDY
	A. RETICLE	
1. No reticle.	Defective relay K-305.	Replace relay K-305.
	Reticle bulb burned out.	Replace bulb.
	Defective reticle bulb assembly.	Replace assembly.
	Defective relay K-301.	Replace relay K-301.
	Broken reticle lamp.	Replace sight head. (Sight head must be disassembled for removal of broken glass.)
	No 28-volt d-c power.	Check power source.
	Dimmer in extreme counter-clockwise position.	Reset dimmer.
	Dimmer potentiometer open.	Replace dimmer.
	Reticle lamp reversed in socket.	Reorient lamp.
2. Partial or dim reticle.	Defective reticle assembly.	Replace sight head.
	Dimmer knob loose on shaft.	Tighten knob.
	Dimmer set too far counterclockwise.	Reset dimmer.

TROUBLE	PROBABLE CAUSE	REMEDY
3. Multiple reticle image.	Faulty camera combining glass.	Replace glass.
	Faulty range assembly.	Replace sight head.
	Faulty reticle assembly.	Replace sight head.
	Chipped or cracked lens.	Replace sight head.
	Cracked or broken mirror.	Replace sight head.
	Camera combining glass not adjusted properly.	Readjust glass.
4. Reticle vibrates (jitters).	Loose fit of torque motor drive ball in mirror yoke.	Replace sight head.
	Loose setscrew in mirror yoke.	Replace sight head.
	Sight microsyn wiring too close to single-phase inverter wiring.	Reroute wiring.
	Loose mirror mounting screws.	Replace sight head.
	Damping fluid leaked out of computer dampers.	Replace computer.
	Damping fluid leaked out of sight head dampers.	Replace sight head.
	Loose mirror mount bearings.	Replace sight head.
	Computer mountings defective.	Replace mountings.
	Defective static converter.	Replace static converter.
	Defective single-phase inverter.	Check single-phase power source.
5. Reticle vibrates excessively because of jarring or gunfire (gun jitters).	Loose mirror mounting screws.	Replace sight head.
	Loose mirror drive assembly.	Replace sight head.
	Loose fit of torque motor drive ball in mirror yoke.	Replace sight head.
	Wiring to computer too tight to permit free movement of computer.	Provide slack in wiring.
	Computer mountings defective.	Replace computer mounts.
	Damping fluid leaked out of computer or sight head dampers.	Replace computer or sight head.
	Sight head loose on mounts.	Tighten mountings.
	Sight combining glass loose.	Tighten.
6. Reticle drives to limit in any direction as soon as sight warms up.	Faulty elevation or deflection amplifier.	Replace elevation or deflection amplifier.
	"Open" in mirror torque motor(s).	Replace sight head.
	Ground in elevation or deflection channel in sight head.	Replace sight head.
	Defective relay K-304.	Replace relay K-304.
	Shorted windings in stiffness motor.	Replace computer.
	Loose connections at sight head.	Tighten connections.
	"Open" in feed-back channel.	Replace sight head.

TROUBLE	PROBABLE CAUSE	REMEDY
7. Reticle drifts.	"Open" stiffness motor.	Replace computer.
	Range servo mechanism unit loose on base.	Tighten mounting.
	"Open" torque motor.	Replace sight head.
	Defective sensitivity amplifier.	Replace sensitivity amplifier.
	Faulty elevation or deflection amplifier.	Replace appropriate amplifier.
	Loose sight test plug.	Tighten plug.
	No three-phase a-c power.	Check three-phase power source.
	B. SIGHT HEAD RANGE DIAL	
1. No dial response.	Defective range amplifier.	Replace range amplifier.
	Foreign matter jamming range drive gear train.	Replace sight head.
	"Open" in plug P-121.	Solder plug or replace sight head.
	Range motor shorted.	Replace sight head.
	Range motor open.	Replace sight head.
	"Open" in potentiometer R-123.	Replace sight head.
	Defective range servo power supply.	Replace range servo power supply.
	Range servo mechanism unit loose on base.	Tighten mounting.
	Defective range servo mechanism unit.	Replace range servo mechanism unit.
2. Limited dial ranging.	Defective range assembly.	Replace sight head.
	Slippage in range drive train.	Replace sight head.
	Defective reticle assembly.	Replace sight head.
	Faulty range servo adapter unit.	Replace range servo adapter unit.
	A-C power off frequency.	Check power source.
3. Dial action sluggish.	Defective range amplifier.	Replace range amplifier.
	Partially shorted range motor.	Replace sight head.
	Low 28-volt a-c power.	Check power supply.
	A-C power off frequency.	Check power supply.
	300-volt d-c voltage too low.	Check power supply.
4. Dial drives to one position.	"Open" in potentiometer R-123.	Replace sight head.
	"Open" in resistor R-124.	Replace sight head.
	"Open" in feed-back circuit.	Replace sight head.
5. Dial will not drive to 600 feet when sight is mechanically caged.	Relay K-121 not functioning properly.	Replace sight head.
	Switch S-123 improperly positioned.	Replace sight head.
	Switch S-124 improperly positioned.	Replace sight head.
	Range motor shorted.	Replace sight head.
	Switch S-122 improperly positioned.	Replace sight head.
	Defective range assembly.	Replace sight head.

TROUBLE	PROBABLE CAUSE	REMEDY
6. Erratic dial operation.	Range servo mechanism not functioning properly.	Replace range servo mechanism unit.
	Burned contacts on switch S-122.	Replace sight head.
	Defective range servo adapter unit.	Replace range servo adapter unit.
	Intermittent "open" in resistor R-124.	Replace sight head.
	Slippage in range drive train.	Replace sight head.
7. Poor range correspondence.	Potentiometer R-123 out of adjustment.	Replace sight head.
	Defective range amplifier.	Replace range amplifier mechanism unit.
	Slippage in range gear train.	Replace sight head.
	Range servo unit out of adjustment.	Adjust range servo.
8. No manual ranging.	Range servo amplifier defective.	Replace range servo amplifier.
	Manual range control potentiometer open.	Replace potentiometer.
	Range amplifier defective.	Replace range amplifier.
	Defective range motor.	Replace sight head.
	A-C power off frequency.	Check power source.
	Manual range control microswitch defective.	Replace switch.
C. RETICLE POSITIONING SYSTEM		
1. Caging spread and zero uncertainty.	Excessive friction in gyro mechanism due to faulty bearings.	Replace computer.
	Torque motor balance out of adjustment.	Replace sight head.
	Gyros binding.	Replace computer.
	Computer gyro obstructed.	Replace computer.
	Deflection gyro balance weight missing.	Replace computer.
	Unbalance between tubes V-202 and V-203.	Replace elevation or deflection amplifier.
2. No electrical caging. (Refer to D.2 for constant electrical caging, i.e., high stiffness current.)	Faulty caging switch.	Replace caging switch.
	Defective relay K-306.	Replace relay K-306.
	Loose sight test plug.	Tighten plug.
3. Reticle drives to one position.	Faulty elevation or deflection amplifier.	Replace elevation or deflection amplifier.
	One side of torque motor open.	Replace sight head.
	Gyro obstructed.	Replace computer.
	Ground in torque motor input circuit.	Replace sight head.
	Torque motor feed-back circuit open.	Replace sight head.

TROUBLE	PROBABLE CAUSE	REMEDY
	Short in gyro stiffness motor.	Replace computer.
	Defective relay K-304.	Replace relay K-304.
	Defective sensitivity amplifier.	Replace sensitivity amplifier.
	Range servo mechanism unit loose on base.	Tighten mounting.
4. Reticle movement limited.	Computer case dented.	Replace computer.
	Rubber insulation on cover binding gyro.	Replace computer.
	Stiffness motor linkage binding.	Replace computer.
	Gyro displacement limited by structure.	Replace computer.
5. Sluggish or erratic reticle movement.	Mirror bearings binding.	Replace sight head.
	Gyro pick-off intermittently grounded.	Replace computer.
	Moisture in plugs.	Dry plugs.
	Stiffness motor linkage binding.	Replace computer.
6. Reticle does not function properly in bombing mode.	Bomb stop out of adjustment.	Replace sight head.
	Gyros binding.	Replace computer.
	Faulty relay K-301.	Replace relay K-301.
	Faulty relay K-304.	Replace relay K-304.
	Faulty relay K-305.	Replace relay K-305.
	Rectifier shorted out.	Replace elevation amplifier.
	Defective elevation amplifier.	Replace elevation amplifier.
	Computer bomb stop out of adjustment.	Replace computer.
	Superelevation assembly binding.	Replace computer.
	Bomb stop shaft bent.	Replace sight head.
7. (Deleted)		
8. Bore-sight adjustment cannot be made.	Bore-sight shaft bent.	Replace sight head.
	Elevation index pointer binding on scale.	Straighten pointer.
9. Miscellaneous troubles.		
Reticle drops when sight switched to "ROCKET."	Switch S-153 shorts to bomb function.	Replace sight selector unit.
	Switch S-153 not making contact.	Replace sight selector unit.
No rocket function.	Microswitch improperly positioned.	Replace sight selector unit.
D. STIFFNESS (SENSITIVITY) CURRENT		
1. No stiffness current.	Defective sensitivity amplifier.	Replace sensitivity amplifier.
	Sensitivity amplifier loose on base.	Tighten mounting.
	Plug J-303 loose.	Tighten plug.
	Faulty relay K-303 or K-305.	Replace relay K-303 or K-305.
	"Open" in stiffness motor.	Replace computer.

TROUBLE	PROBABLE CAUSE	REMEDY
	"Open" in sight selector unit.	Replace sight selector unit.
	No 300-volt d-c power available in sight.	Check power source.
	Short in transformer T-281.	Replace adapter unit.
	Stiffness motor grounded.	Replace computer.
	Defective relay K-306.	Replace relay K-306.
2. High stiffness current. (If excessively high, may be referred to as constant electrical caging.)	Faulty sensitivity amplifier.	Replace sensitivity amplifier.
	Defective air density unit.	Replace amplifier base.
	"Open" in sight selector unit.	Replace sight selector unit.
	Defective adapter unit.	Replace adapter unit.
	Defective stiffness motor.	Replace computer.
3. Low stiffness current.	Faulty sensitivity amplifier.	Replace sensitivity amplifier.
	Defective air density unit.	Replace amplifier base.
4. Erratic or unbalanced stiffness currents.	"Open" in sight selector unit.	Replace sight selector unit.
	Defective air density unit.	Replace amplifier base.
	Faulty sensitivity amplifier.	Replace sensitivity amplifier.
	Defective relay K-103.	Replace computer.
	Defective potentiometer R-106.	Replace computer.
	Defective potentiometer R-105.	Replace computer.
5. Stiffness current does not vary with range.	"Open" in transformer T-221.	Replace sensitivity amplifier.
	Defective sensitivity amplifier.	Replace sensitivity amplifier.
	E. POWER SUPPLY	
1. No 300-volt d-c power.	Switch S-124 defective or improperly positioned.	Replace sight head.
	Defective transformer.	Replace static converter.
	Defective tube 2D21.	Replace static converter.
	Defective filter condenser.	Replace static converter.
	Defective tube 6AS7.	Replace static converter.
2. 300-volt d-c (½- or ⅛-ampere) fuses blow.	Transformer T-121 grounded.	Replace sight head.
	Tube V-253 shorted.	Replace range amplifier.
	Defective relay K-303.	Replace relay K-303.
	Range motor defective.	Replace sight head.
	Stiffness motor shorted.	Replace computer.
	Short in plug P-122.	Rewire plug.
3. No 28-volt a-c power.	"Open" in gyro excitation circuit.	Replace computer.
	Defective power supply.	Check power source.
4. 28-volt a-c (2- or 5-ampere) fuses blow.	Short in gyro excitation circuit.	Replace computer.
	Defective tube 6X4 in range servo power supply.	Replace range servo power supply.
	Defective range motor.	Replace sight head.
5. Miscellaneous troubles. Excessive current.	High-resistance short in gyros.	Replace computer.

TROUBLE	PROBABLE CAUSE	REMEDY
F. RANGE AND RETICLE DIMENSIONING SYSTEM		
1. Reticle diameter will not vary.		
Wing span control ineffective.	Gear in gear train loose.	Replace sight head.
Reticle diameter will not vary during ranging.	Defective range motor.	Replace sight head.
	No 300-volt d-c power.	Check power source.
	Defective range amplifier.	Replace range amplifier.
	Defective range servo mechanism unit.	Replace range servo mechanism unit.
	No 28-volt a-c power.	Check power source.
2. Range servo dial erratic.	Defective range servo mechanism unit.	Replace range servo mechanism unit.
	Range servo mechanism unit dial out of alignment.	Replace range servo mechanism unit.
G. COMPUTER		
1. Gyros will not start.	Winchester plug P-511 broken.	Replace computer.
	"Open" in gyro drive circuit.	Replace computer.
	Gyro motor open.	Replace computer.
	"Open" in J-301.	Rewire plug.
	"Open" in contacts of gyro motor.	Replace computer.
	No 28-volt a-c power to computer.	Check power source.
	One or more of the three-phase fuses blown.	Check power source.
2. Miscellaneous troubles.		
Long characteristic time.	Heaters not operating.	Replace computer.
	Gyros binding.	Replace computer.
	Damping fluid leaked out of computer or sight head dampers.	Replace computer or sight head.
No gravity drop correction.	Gravity drop weight fallen off.	Replace computer.
H. MISCELLANEOUS		
1. Sight selector unit will not stay in "BOMB" or "ROCKET" position.	Detent spring broken or pulled loose.	Replace sight selector unit.
2. Sight selector unit will not return to "GUN" position from "BOMB" or "ROCKET" position.	Solenoid defective.	Replace sight selector unit.
	Defective radar-out switch.	Replace switch.

9-233. TESTING A-4 SIGHT SYSTEM.

9-234. The tests in paragraphs 9-236 through 9-260 are to be performed with the system installed in the airplane. Each paragraph marked with an asterisk (*) can be used as a preflight check. Equipment necessary to perform the tests (figure 9-43) includes a Type G-3 sight system analyzer, a bore-sight target test board, a low-range voltmeter, a range simulator test unit, and an auxiliary power unit. The following chart lists the test equipment required, and the paragraph numbers and titles of the preflight checks and complete system tests to be performed.

EQUIPMENT	PARA	TESTS
PREFLIGHT CHECK		
G-3 analyzer (connected by one cable to the field test plug) Auxiliary power unit	9-237	28-volt d-c supply check
	9-238	300-volt d-c supply check
	9-239	28-volt a-c supply check
	9-240	Preflight caging check
	9-242	Reticle bulb and dimmer control check
	9-243	Bomb function check
	9-244	Gravity drop correction check
	9-245	Reticle movement check
	9-246	Manual pip control check
	9-249	Microsyn excitation current check
	9-255	Preflight rocket depression angle check (fixed sight selector)
	9-255A	Preflight rocket depression angle check (variable sight selector)
COMPLETE SIGHT SYSTEM TEST		
G-3 analyzer (connected by all three analyzer cables) Range simulator test unit Auxiliary power unit Low-range voltmeter	9-236	Gyro rotation check
	9-237	28-volt d-c supply check
	9-238	300-volt d-c supply check
	9-239	28-volt a-c supply check
	9-241	Manual versus electrical caging check
	9-242	Reticle bulb and dimmer control check
	9-243	Bomb function check
	9-245	Reticle movement check
	9-247	Manual pip control test
	9-248	Zero uncertainty check
	9-249	Microsyn excitation current check
	9-250	Standardizing potentiometer bridge
	9-251	Stiffness current test in gunfire mode (current test)
	9-251A	Rocket sensitivity test (fixed sight selector)
	9-251B	Rocket sensitivity test (variable sight selector)
	9-252	Rocket depression angle test (fixed sight selector)
	9-252A	Rocket depression angle test (variable sight selector)
	9-253	Characteristic time test
	9-257	Range correspondence and transmission check
	9-259	Density unit test
	9-260	Gravity drop correction test

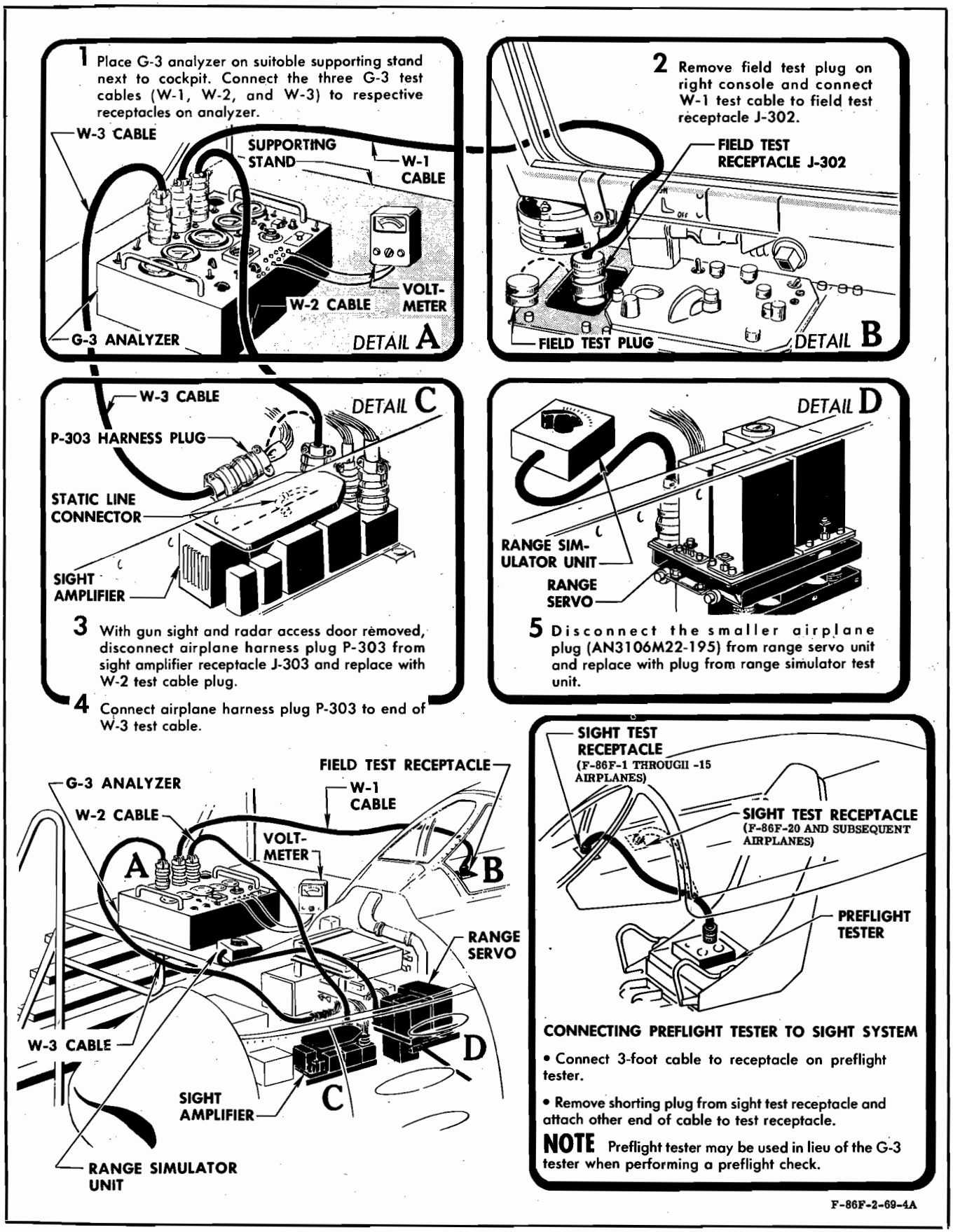


Figure 9-43. Connecting Sight System Test Equipment

9-235. For a complete test of the A-4 sight system, all test equipment must be connected. (See figure 9-43.) In addition, the airplane must be prepared for armament harmonization. (Refer to paragraph 9-10.) Also, a locally constructed A-4 sight system test board (9-45A) must be positioned on the bore-sight target board. For a preflight check, the only test equipment necessary is the G-3 analyzer with the W-1 test cable connected to the field test receptacle. If tests are to be conducted at temperatures below 10°C (50°F), connect power to analyzer at recessed male connector marked "EXT HTR SUP, 28V DC."

Note

The range simulator test unit (figure 9-44) is a substitute for the manual range control. When the range simulator test unit is installed, the manual range control is inoperative.

a. through h. (Deleted)

*i. Before starting preflight checks or complete system tests, and after completing these checks or tests, set G-3 analyzer switches as follows:

SWITCH	SETTING
"SENS CTM SEL"	"NORM CTM"
"BATTERY"	"OFF"
"CAGE-UNCAGE"	"UNCAGE"
"METER SEL"	"SENS CUR"
"TM CUTOFF"	"NORM"
"DENSITY"	"NORM"
"RANGE TRANS"	"NORM"
"RANGE SENS"	"NORM"
"ROCKET"	"NORM"
"METER BRIDGE SEL"	"MA METER"
"A1—A4"	"A4"
"BRIDGE CAL"	"TEST"
"RDA"	"NORM"
"ROCKET DENSITY"	Any position

*j. Perform gyro rotation check. (Refer to paragraph 9-236.)

Note

The gyro rotation check must be performed as power is applied for the first time so that initial rotation of the gyros can be observed.

*k. Connect external 28-volt d-c power to airplane.

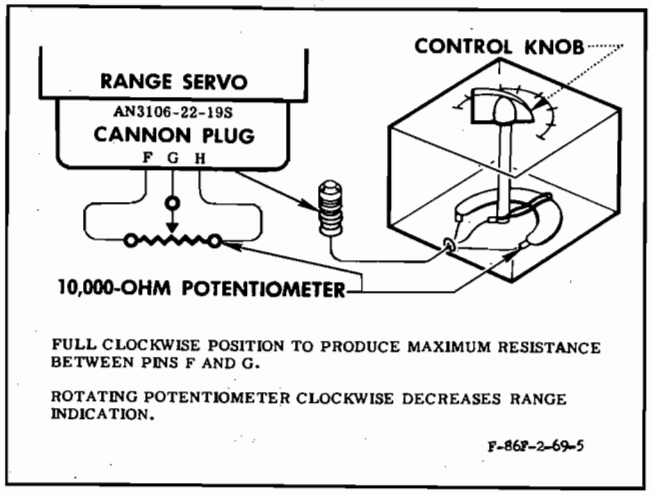


Figure 9-44. Range Simulator Test Unit

*l. Close "SIGHT PWR," "SIGHT A. C. PWR," and "SIGHT HEATER" circuit breakers on left console.

*m. Place gun safety switch located on center pedestal to "SIGHT CAMERA RADAR" position.

*n. Set gun-bomb-rocket selector of sight selector unit (figure 9-48A) to "GUN" position.

*o. Set target speed ("TR. HI. LO.") switch of sight selector unit to "HI." position.

*p. Permit system to warm up for 10 minutes. Correct operating temperature has been reached when sight heaters begin cycling as indicated by pilot lights (on analyzer) marked "ELEV" and "DEFL." Observe that both pilot lights are cycling. If analyzer heating is being used, pilot lights marked "REF" and "ANAL" must also start cycling before tests are begun.

9-236. GYRO ROTATION CHECK. With analyzer connected and with switch settings as in paragraph 9-235, apply power to sight system. With an inspection mirror, observe gyros through the two windows on computer. When power is applied, both gyros should immediately start rotating in the directions shown in figure 9-45.

*9-237. 28-VOLT D-C SUPPLY CHECK. Set "METER SEL" switch at "28V DC." D-C volt-milliammeter should read 28 (+1, −2) volts.

*9-238. 300-VOLT D-C SUPPLY CHECK. With analyzer connected and with switch settings as in paragraph 9-235, set "METER SEL" switch at 300v." D-C volt-milliammeter should read 300 (±7) volts.

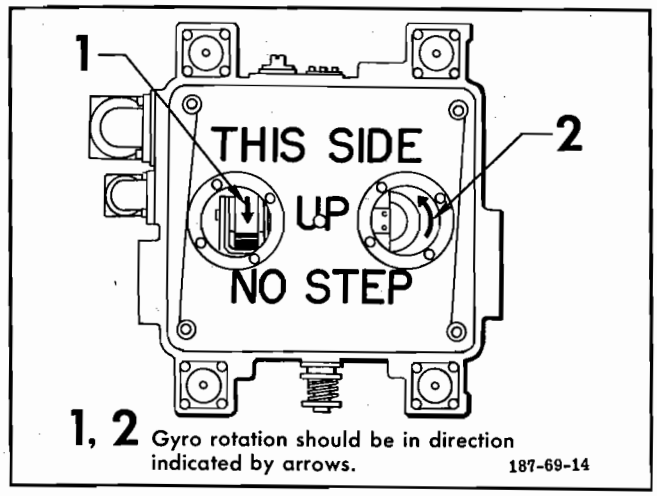


Figure 9-45. Gyro Rotation Check

*9-239. 28-VOLT A-C SUPPLY CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set "METER SEL" switch at "Ø1-2." A-C voltmeter should read 28 (±3) volts.

b. Set "METER SEL" switch at "Ø1-3." A-C voltmeter should read 28 (±3) volts.

c. Set "METER SEL" switch at "Ø2-3." A-C voltmeter should read 28 (±3) volts.

*9-240. PREFLIGHT CAGING CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Make the following switch settings:

SWITCH	SETTING
"RANGE TRANS"	"STD"
"RANGE SENS"	"STD"
"RANGE IN FT"	"6000"
"SENS CTM SEL"	"TOT SENS"
"METER BRIDGE SEL"	"MA METER"

b. Move "CAGE-UNCAGE" switch to "CAGE." Reticle should move upward to a central position on combining glass, and d-c milliammeter should read 60 (±9) milliamperes.

9-241. MANUAL VERSUS ELECTRICAL CAGING CHECK. With A-4 sight system test board in position on bore-sight target board (figure 9-45A), analyzer connected, and switch settings as in paragraph 9-235, proceed as follows:

a. Place "CAGE-UNCAGE" switch in "CAGE" position. The d-c milliammeter should read 60 (±9) milliamperes when the "METER SEL" switch is placed at "SENS CUR."

b. Observe position of tracking index with respect to A-4 gun sight mark on test board. Manually cage sight and compare tracking index position with the electrically caged position. The two positions should be within 5 mils of each other.

*9-242. RETICLE BULB AND DIMMER CONTROL CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Move reticle dimmer control from "BRIGHT" to "DIM" and back. Reticle should decrease in brightness and vanish (during daylight), and then should reappear. With control at "BRIGHT" position, reticle should be clearly visible even on a bright, sunny day.

b. Observe that reticle appears when "SIGHT FILAMENT" switch is in both "PRIM" and "SEC" positions.

*9-243. BOMB FUNCTION CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows: Set sight selector switch on armament pedestal to "BOMB." The reticle should extinguish momentarily and then reappear at a position approximately 10 degrees below the caged position. Depressing the radar-out button on the pilot's control stick should automatically reset the sight selector unit to "GUN" and return the reticle to the gun position.

Note

With sight selector unit in "BOMB" position, electrically caging the sight should not cause the reticle to move from its depressed 10-degree position.

*9-244. GRAVITY DROP CORRECTION CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set switches to the following positions:

SWITCH	SETTING
"CAGE-UNCAGE"	"CAGE"
"RANGE TRANS"	"STD"
"RANGE SENS"	"STD"
"RANGE IN FT"	"6000"

b. Turn "CAGE-UNCAGE" switch to "UNCAGE" while watching reticle. Reticle should drop.

*9-245. RETICLE MOVEMENT CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows: Move "CHAR TIME" switches "UP," "DOWN," "LEFT," and "RIGHT." Observe that reticle moves in coordination with marked positions.

*9-246. MANUAL PIP CONTROL CHECK (F-86F-35 AND SUBSEQUENT AIRPLANES). With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Turn manual pip control switch to "BOMB."

b. Rotate knob on face of manual pip control box to its full clockwise position. The reticle should appear in its bomb stop position (down 10 degrees).

c. Rotate knob to its full counterclockwise position. This should cause the reticle to approach its electrically caged position in unison with the rotation of the knob.

9-247. MANUAL PIP CONTROL TEST (F-86F-35 AND SUBSEQUENT AIRPLANES). With A-4 sight operating and with manual pip control target board (figure 9-50) positioned in front of airplane, proceed as follows:

a. Turn manual pip control switch to "BOMB."

b. Lift the three scales and rotate knob to its full counterclockwise position. The manual pip control pointer should coincide with "0" on the "MILS LEAD" scale. If it does not, reset pointer.

c. Turn knob until pointer is at "160." The pipper should be 160 (±2) mils below electrically caged position. If it is not within tolerance, readjust manual pip control. (Refer to paragraph 9-284.)

d. Rotate knob back to "0," checking at every numbered graduation to see that pipper coincides with pointer to within ±2 mils. Also observe that movement of pipper toward "0" is smooth.

9-248. ZERO UNCERTAINTY CHECK. With A-4 sight system test board in position on bore-sight target board (figure 9-45A), analyzer connected, and switch settings as in paragraph 9-235, proceed as follows:

a. Set switches to the following positions:

SWITCH	SETTING
"RANGE SENS"	"STD"
"RANGE IN FT"	"3600"
"ROCKET DENSITY"	"1. 0"
"DENSITY"	"STD"

b. Displace reticle with "CHAR TIME" switches moved "UP," "DOWN," "LEFT," and "RIGHT." Reticle should be displaced away from center as far as possible.

c. When reticle has been displaced as far as possible in each direction, release "CHAR TIME" switches and permit reticle to return to center.

d. Allow 30 seconds for reticle to return to center. Observe position of reticle with respect to gravity drop mark on A-4 sight system test board. Reticle should return to within 2 mils (diameter of center pip) of the gravity drop mark.

e. Repeat steps b. through d. several times. Each time, the reticle should return to within 2 mils of the gravity drop mark.

*9-249. MICROSYN EXCITATION CURRENT CHECK. With analyzer connected and with switch settings as in paragraph 9-235, the a-c milliammeter should indicate microsyn excitation current at all times. This reading should be 240 (±9) milliamperes.

9-250. STANDARDIZING POTENTIOMETER BRIDGE. To standardize potentiometer bridge, proceed as follows:

a. Set "BATTERY" switch at "ON" and "METER BRIDGE SEL" knob at "MA POT."

b. Hold "BRIDGE CAL" switch at "REF" while adjusting "BRIDGE BAL" switch so that galvanometer indicates zero current. This is a coarse adjustment.

c. Still holding "BRIDGE CAL" switch in "REF" position, depress "GALV" button and readjust "BRIDGE BAL" switch until galvanometer again indicates zero current. Release "GALV" button first, then "BRIDGE CAL" switch. The bridge will now be balanced.

Note

Bridge must be balanced every 15 minutes while in continuous use.

9-251. STIFFNESS CURRENT TEST IN GUNFIRE MODE (CURRENT TEST). With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set switches to the following positions for deflection stiffness current:

SWITCH	SETTING
"METER BRIDGE SEL"	"MA POT"
"SENS CTM SEL"	"DEFL MOTOR"
"BATTERY"	"ON" (from step a., paragraph 9-250)
"RANGE SENS"	"STD"
"RANGE IN FT"	"1200"
"DENSITY"	"STD"
"ROCKET DENSITY"	"0.6"

b. With "BRIDGE CAL" switch at "TEST," adjust "SENS CUR" knob until galvanometer indicates zero current. This is a coarse adjustment.

c. Depress "GALV" button and readjust "SENS CUR" knob until galvanometer again reads zero current. This is a fine adjustment.

d. Read inner and outer dials at engraved mark on indicator at top of "SENS CUR" knob. Multiply reading on outer scale by 10. Divide reading on inner scale by 10. Add resulting inner and outer scale values to obtain actual value of stiffness current in milliamperes.

e. Adjust range simulator until range servo dial indicates "1200."

f. Turn "RANGE SENS" switch from "STD" to "NORM."

g. Readjust "SENS CUR" knob as in steps b. through d. and read current on "SENS CUR" knob again. Compare this reading with reading of step d. Two readings should agree within ±2 milliamperes of each other.

h. Return "RANGE SENS" switch to "STD" and set "RANGE IN FT" switch to "2000."

i. Repeat steps b. through g., with the exception that in step e., adjust range simulator so that range servo dial indicates "2000." Readings should again agree within ±2 milliamperes of each other.

j. Return "RANGE SENS" switch to "STD" and set "RANGE IN FT" switch to "2400."

k. Repeat steps b. through g., with the exception that in step e., adjust range simulator so that range servo dial reads "2400."

l. Check elevation stiffness current by setting "SENS CTM SEL" switch to "ELEV MOTOR" and repeating steps b. through k. Current readings must agree within ±2 milliamperes of each other.

9-251A. ROCKET SENSITIVITY TEST (FIXED SIGHT SELECTOR). With G-3 analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set "METER BRIDGE SEL" switch to "MA METER" and "SENS CTM SEL" switch to "TOT SENS."

b. Set "ROCKET" switch in "NORM" position.

c. Set gun-bomb-rocket lever on sight selector unit to "ROCKET" position.

d. Set rocket setting switch of sight selector unit to rocket positions listed in table and record stiffness current for each position.

e. Set "ROCKET" switch to "STD" position.

f. Set ROCKET-DENSITY" switch successively to "5" HVAR," "2.25" SCAR," and "2.75" FFAR" positions. Stiffness current for each rocket position should be within tolerance specified in the following table:

	STIFFNESS CURRENT — MA	
ROCKET SETTING SW POSITION	ANALYZER STD NETWORK	ROCKET SETTING UNIT
"2.75" FFAR"	20.8 (±1)	20.8 (±1)
"5" HVAR"	15.6 (±1)	15.6 (±1)
"2.25" SCAR"	15.6 (±1)	15.6 (±1)

9-251B. ROCKET SENSITIVITY TEST (VARIABLE SIGHT SELECTOR). With modified G-3 analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set "METER BRIDGE SEL" switch to "MA METER" and "SENS CTM SEL" switch to "TOT SENS."

b. Set "ROCKET" switch in "NORM" position.

c. Set rocket-gun-bomb lever on sight selector unit to "ROCKET" position. The stiffness current should be a fixed value of 36.8 (±1) milliamperes (0.75 second sensitivity) for all positions of the rocket depression angle setting.

d. Set "ROCKET" switch to "STD" position.

e. Set "ROCKET-DENSITY" switch to "5" HVAR" position (rocket sensitivity). The stiffness current should be 36.8 (±1) milliamperes (0.75 second sensitivity).

9-252. ROCKET DEPRESSION ANGLE TEST (FIXED SIGHT SELECTOR). With fixed sight selector portion of A-4 sight system test board positioned on boresight target board (figure 9-45A), G-3 analyzer connected, and switch settings as in paragraph 9-235, proceed as follows:

a. Set "R.D.A." switch in "NORM" position.

b. Set gun-bomb-rocket lever on sight selector unit to "ROCKET" position.

c. Set "ROCKET" switch to "NORM" position.

d. Set rocket setting switch of sight selector unit to rocket positions listed in the following table. Observe tracking index displacement with respect to markings on test board. The A-4 sight system test board is marked off to indicate displacement and tolerance for each rocket setting position. Contrasting colors are used to locate the tracking index within the allowable tolerance area on the test board. The tracking index must fall within the proper colored area representing the allowable tolerance for each rocket setting position.

ROCKET SETTING SW POSITION	TRACKING INDEX DISPLACEMENT (MILS)
"2.75" FFAR S"	32 (±4)
"2.75" FFAR N"	41 (±4)
"5" HVAR S"	61 (±4)
"5" HVAR N"	70 (±4)
"2.25" SCAR S"	73 (±4)
"2.25" SCAR N"	87 (±4)

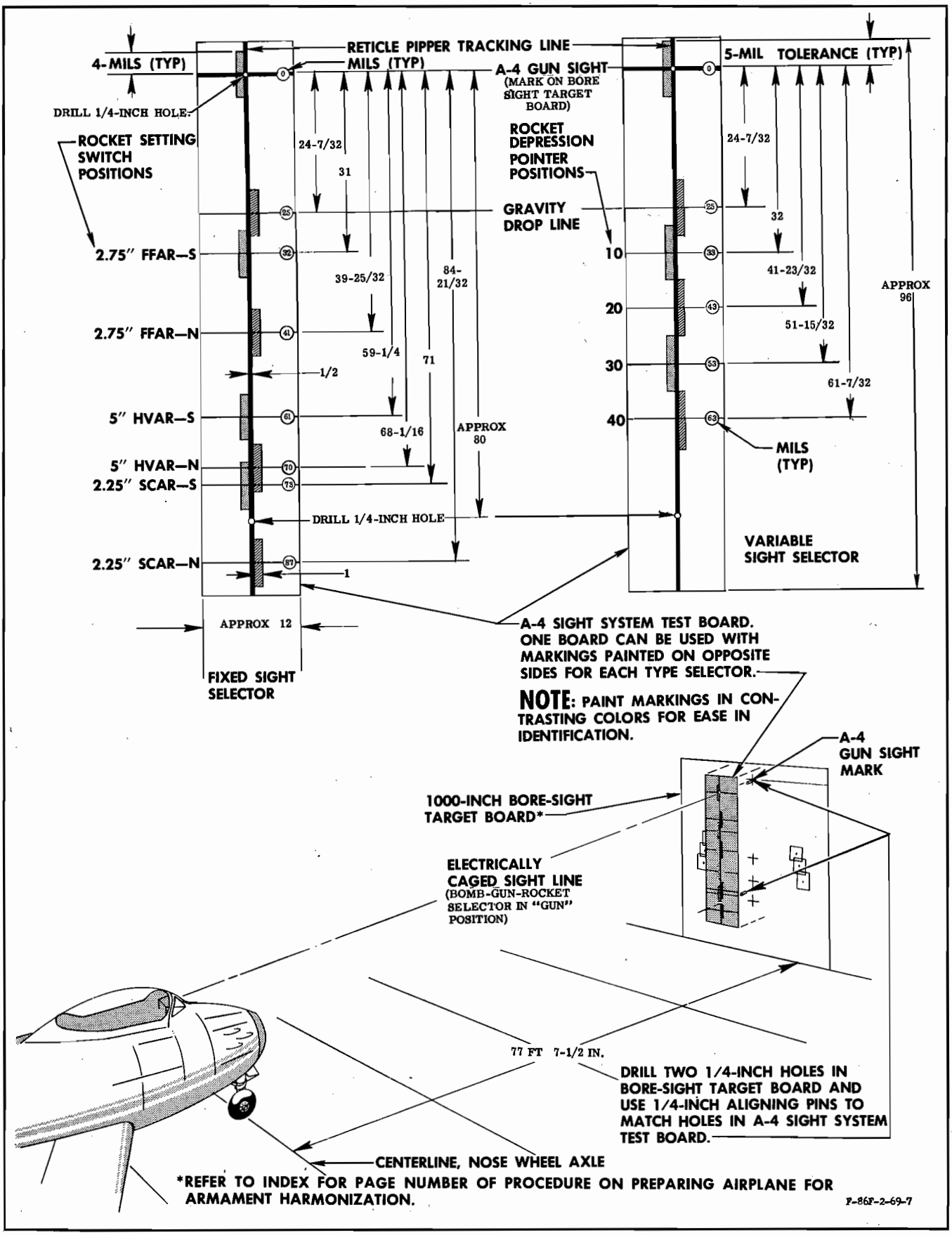


Figure 9-45A. A-4 Sight System Test Board

9-252A. ROCKET DEPRESSION ANGLE TEST (VARIABLE SIGHT SELECTOR). With variable sight selector portion of A-4 sight system test board positioned on bore-sight target board (figure 9-45A), a modified G-3 analyzer connected, and switch settings as in paragraph 9-235, proceed as follows:

a. Set "R.D.A." switch in "NORM" position.

b. Set rocket-gun-bomb lever on sight selector unit to "ROCKET" position.

c. Set "ROCKET" switch in "NORM" position.

d. Position rocket depression angle pointer to values listed in the following table. Observe tracking index displacement with respect to markings on test board. The A-4 sight system test board is marked off to indicate displacement and tolerance for each rocket setting position. Contrasting colors are used to locate the tracking index within the allowable tolerance area on the test board. The tracking index must fall within the proper colored area representing the allowable tolerance for each rocket setting position.

ROCKET DEPRESSION ANGLE (MILS)	TRACKING INDEX DISPLACEMENT (MILS)
10	33 (±5)
20	43 (±5)
30	53 (±5)
40	63 (±5)

9-253. CHARACTERISTIC TIME CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Make the following switch settings:

SWITCH	SETTING
"SENS CTM SEL"	"NORM CTM"
"RANGE SENS"	"STD"
"RANGE IN FT"	"5400"
"ROCKET DENSITY"	"1.0"
"DENSITY"	"STD"

b. Set target speed ("TR.-HI.-LO.") switch of sight selector unit (figure 9-48A) to "TR." position. Also check that velocity gun station adjustment jumper (figure 9-48) in range servo is in "500 KNOTS" position. Plug in low-range a-c voltmeter to analyzer jacks marked "GND" and "VAC, DEFL, TOT." Set voltmeter on 10-volt a-c range.

c. Turn characteristic time "LEFT-RIGHT" switch to "RIGHT" and hold switch until low-range voltmeter indicates above 3 volts; then release switch.

Note

Voltmeter needle swing should be smooth in action, which indicates proper operation of the mirror torque motors and computer gyros.

d. When low-range voltmeter pointer passes the 3-volt mark, start analyzer stop watch. When pointer passes one-volt mark, stop the watch. Record time reading.

e. Repeat steps c. and d. twice more. Record readings; then average all three readings. The average should be 4.5 (±0.6) seconds.

f. Repeat steps c. through e., except turn characteristic time "LEFT-RIGHT" switch to "LEFT." Average reading should again be 4.5 (±0.6) seconds.

g. Change voltmeter test lead from "VAC, DEFL, TOT" to "VAC, ELEV, TOT" and repeat steps c. through e., except hold characteristic time "UP-DOWN" switch to "UP." Average reading should again be 4.5 (±0.6) seconds.

h. Repeat steps c. through e., except turn characteristic time "UP-DOWN" switch to "DOWN." Average reading should again be 4.5 (±0.6) seconds.

9-254. (Deleted)

*9-255. PREFLIGHT ROCKET DEPRESSION ANGLE CHECK (FIXED SIGHT SELECTOR). With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set mechanical caging lever at "CAGE." Set "ROCKET SETTING" switch on sight selector unit to "2.75" FFAR S" and sight selector to "ROCKET."

b. Move "CAGE-UNCAGE" lever to "UNCAGE" while observing reticle. Reticle should drop.

c. While observing reticle, move "ROCKET SETTING" switch on sight selector unit through the following settings *in order:* "2.75" FFAR N," "5" HVAR S," "5" HVAR N," "2.25" SCAR S," and "2.25" SCAR N." At each change of switch setting, the reticle should drop a little more.

d. Return sight selector unit to "GUN."

*9-255A. PREFLIGHT ROCKET DEPRESSION ANGLE CHECK (VARIABLE SIGHT SELECTOR). With a modified G-3 analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Place rocket-gun-bomb selector switch on sight selector unit in "ROCKET" position.

b. Place rocket depression angle pointer on sight selector unit at the 6-mil position. Observe location of reticle on combining glass.

c. Move rocket depression pointer slowly from the 6-mil position to the "50 MILS" position. The reticle should move slowly in a continuously downward direction.

9-256. CAGING CHECK. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set "CAGE-UNCAGE" switch to "CAGE" while observing reticle. The reticle should immediately move to the bore-sight position.

b. While "CAGE-UNCAGE" switch is in "CAGE" position, move caging lever on sight head to "CAGED" position. The reticle should not move more than the diameter of the center pip of the reticle.

9-257. RANGE CORRESPONDENCE AND TRANSMISSION CHECK. Set wing span lever at "90." With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set range simulator to indicate "1200" on range servo unit dial. The sight head range dial should read "1200" (±60).

b. Set range simulator to indicate "2000" on range servo unit dial. The sight head range dial should read "2000" (±100).

c. Set range simulator to indicate "2400" on range servo unit dial. The sight head range dial should read "2400" (±100).

d. Set "RANGE TRANS" switch to "STD." Move "RANGE IN FT" switch through all the settings. The reading on the sight head range dial should agree with the following table:

RANGE SETTINGS ("RANGE IN FT" SWITCH)	SIGHT HEAD DIAL READING
1200	1200 (±60)
3600	3600 (±100)
5400	5400 (±150)

9-258. (Deleted)

9-259. DENSITY UNIT TEST. With analyzer connected and with switch settings as in paragraph 9-235, proceed as follows:

a. Set gun-bomb-rocket selector on sight selector unit (figure 9-48A) to "GUN" position. Then make the following switch settings:

SWITCH	SETTING
"SENS CTM SEL"	"DEFL MOTOR"
"DENSITY"	"NORM"
"METER BRIDGE SEL"	"MA METER"
"ROCKET-DENSITY"	"0.2"

b. Attach a vacuum pump to sight amplifier static line. (See figure 9-43.) With the vacuum pump operating, draw a vacuum of 4.45 in. Hg.

c. Observe reading on d-c milliammeter; then move "DENSITY" switch to "STD" and compare reading to previous one. Readings should be the same.

d. Repeat operation for remaining density ratios and corresponding vacuum settings as given in the following table:

DENSITY RATIO	ABSOLUTE PRESSURE (IN. Hg)
1.0	29.26
0.6	15.56
0.2	4.45

9-260. GRAVITY DROP CORRECTION TEST. With either fixed or variable portion of A-4 sight system test board positioned on bore-sight target board (figure 9-45A), analyzer connected, and switch settings as in paragraph 9-235, proceed as follows:

a. Make the following switch settings:

SWITCH	SETTING
"RANGE SENS"	"STD"
"RANGE IN FT"	"3600"
"DENSITY"	"STD"
"ROCKET-DENSITY"	"0.6"

b. Cage sight by setting "CAGE-UNCAGE" switch to "CAGE." The dot pipper of the reticle should move to the A-4 gun sight mark on the A-4 test board.

c. Uncage sight by setting "CAGE-UNCAGE" switch to "UNCAGE." The dot pipper of the reticle should be depressed by the amount of the gravity drop correction [6 (±1) mils] which is represented by the gravity drop line on the test board.

9-260A. PREFLIGHT CHECK USING RTL 5351 TESTER.

9-260B. To perform a quick functional preflight check (approximately 5 minutes) of the A-4 sight system, connect the preflight tester to the airplane by removing the interconnecting shorting plug on the right forward console, and attaching the test cable end connector (AN3106A24-28P) to the test receptacle and attaching other end of test cable to the tester. (See figure 9-43.) With electrical power applied to the airplane bus system and the sight system operating, proceed as follows:

a. Set "A-1—A-4" switch at "A-4."

b. Set "TEST SELECTOR" switch at "Ø 1-2" and observe 28-volt a-c scale on multimeter. The reading should be within the calibrated portion of scale representing 28.0 (± 3) volts ac.

c. Set "TEST SELECTOR" switch at "Ø 1-3" and "Ø 2-3" and note same reading as for "Ø 1-2" on multimeter.

d. Set "TEST SELECTOR" switch at "28V DC" and observe 28-volt d-c scale on multimeter. The reading should be within calibrated portion of scale representing 28.0 (+1, -2) volts dc.

e. Set "TEST SELECTOR" switch at "300V DC" and observe 300-volt d-c scale on multimeter. The reading

should be within calibrated portion of scale representing 300 (±7) volts dc.

f. Turn manual range control out of detent and hold at point that range dial reads 2400 feet. Set "TEST SELECTOR" switch to "ELEV. SENS. CUR." Compare multimeter reading with elevation data in table following step g., corresponding to gun platform velocity setting of range servo.

g. With range dial still at 2400 feet, set "TR.-HI.-LO." knob to "HI." and set "TEST SELECTOR" switch to "DEFL. SENS. CUR." Compare multimeter reading with deflection data in following elevation and deflection sensitivity current table, corresponding to gun platform velocity setting of range servo.

ELEVATION AND DEFLECTION SENSITIVITY CURRENT TABLE

VELOCITY OF GUN PLATFORM SET INTO RANGE SERVO MECHANISM UNIT	SENSITIVITY CURRENT (MILLIAMPERES)	
	ELEVATION	DEFLECTION
500	26.1–30.1	29.7–33.7
400	26.1–30.1	29.7–33.7
300	25.6–29.6	29.2–33.2

h. Turn "TEST SELECTOR" switch to "LEFT," "RIGHT," "UP," and "DOWN" successively. The reticle should move smoothly in indicated direction.

i. Depress "FREQ." button and read frequency indicated on the "FREQUENCY METER." Read temperature gage and "FREQ. CORRECTIONS" chart (contained on face of tester) and add indicated number of cycles, reading down on chart, to frequency meter reading. The sum of both should be 400 (±2) cps.

j. Observe "ELEV." and "DEFL." lamps. After sight has been operating for a few minutes, they should cycle on and off.

k. Move "CAGED-UNCAGED" lever to "UNCAGED," and depress caging switch; observe position of tracking index (dot in reticle circle). Move "CAGED-UNCAGED" lever to "CAGED" and note displacement of tracking index. It should not exceed 5 mils on sight heads not equipped with adjustable elevation and deflection adjustments. (See figure 9-46.) The tracking index may be used as a 2-mil reference. On sight heads that are equipped with adjustable elevation and deflection adjustments, any displacement of the reticle dot may be corrected during bore-sighting operation.

l. Place "CAGED-UNCAGED" lever at "CAGED." The sight head range dial should drive to 600 (±50) feet.

m. Check on performance of gravity drop accelerometer by rotating manual range control from the extreme clockwise positions in a counterclockwise direction to increase range. The reticle tracking index should slowly drop a few mils as range is increased. Before maximum range is reached, depress caging switch. The tracking index should rise a few mils.

n. Set wing span control lever at 90 feet. Check manual range control by rotating throttle out of detent. The range dial should move out to farthest range set for range control trim potentiometer, usually 2700 feet. Further clockwise rotation will decrease range dial reading until at clockwise stop, range will be around 1200 feet. Simultaneously, diameter of reticle image will increase with decreasing range. With "TEST SELECTOR" switch at "ELEV." or "DEFL.," sensitivity current will register an increase with decreasing range.

o. Set bomb-gun-rocket knob at "BOMB." The reticle should momentarily extinguish and reappear within 30 seconds at a position approximately 10 degrees lower. Depress caging switch. The reticle should not disappear. Depress radar-out button. The bomb-gun-rocket knob should return automatically to "GUN" position.

p. Set bomb-gun-rocket knob at "ROCKET." Turn selector switch knob slowly through full range of dial settings from left to right. The reticle image should drop successively. If sight is equipped with fixed rocket selector unit, the depression will be to six predetermined rocket settings. If the sight is equipped with a variable rocket selector unit, depression should be smooth and continuous as the selector knob is moved from 6 to 50 mils on the graduated dial.

q. Set filament switch in "PRIM" and "SEC" positions. A reticle image should appear for both positions.

r. Rotate dimmer control knob. The intensity of reticle image should vary.

s. Move manual range control to the clockwise stop to set in a 1200-foot range. Move wing span control lever from 30 to 120 feet. The reticle circle should increase in diameter.

t. When all preflight tests have been completed and immediately after sight power is turned off, set "TEST SELECTOR" switch in "Ø 1-2," "Ø 1-3," or "Ø 2-3." Depress "GYRO" button. If gyros have been rotating, an a-c voltage will be impressed on the a-c meter. The meter needle will indicate approximately one-third scale deflection and will gradually move downward as gyros come to a stop.

u. If preflight tests indicate improper operation of the sight system, use the Type G-3 tester to locate trouble.

9-261. BORE SIGHTING A-4 SIGHT SYSTEM.

a. Prepare airplane for harmonization as described in paragraph 9-10.

b. Connect external power to airplane, turn gun safety switch to "SIGHT CAMERA RADAR," close circuit breakers, and permit sight to warm up for 10 minutes.

c. To bore sight the sight system for gun firing on airplanes with early model sight heads incorporating only mechanical bore-sight adjustments (figure 9-46), place gun-bomb-rocket selector on sight selector unit at "GUN" position. Then move mechanical caging lever to "UNCAGE," electrically cage sight, and check to see that reticle pipper is centered on A-4 gun sight target board mark. If reticle pipper is not centered on target board mark, remove sight head elevation and deflection adjustment cover plates. Move mechanical sight caging lever to "CAGED" to prevent damage to sight head mechanism while making adjustments. To align pipper with bore-sight mark, loosen deflection adjustment lockscrews, make a small adjustment to deflection adjustment screw in direction required, and retighten lockscrews. Mechanically uncage sight, and while it is still in electrical cage, observe position of pipper. If more adjustment in deflection direction is needed, repeat this procedure. If adjustment is then necessary in elevation, mechanically recage sight, push in on elevation

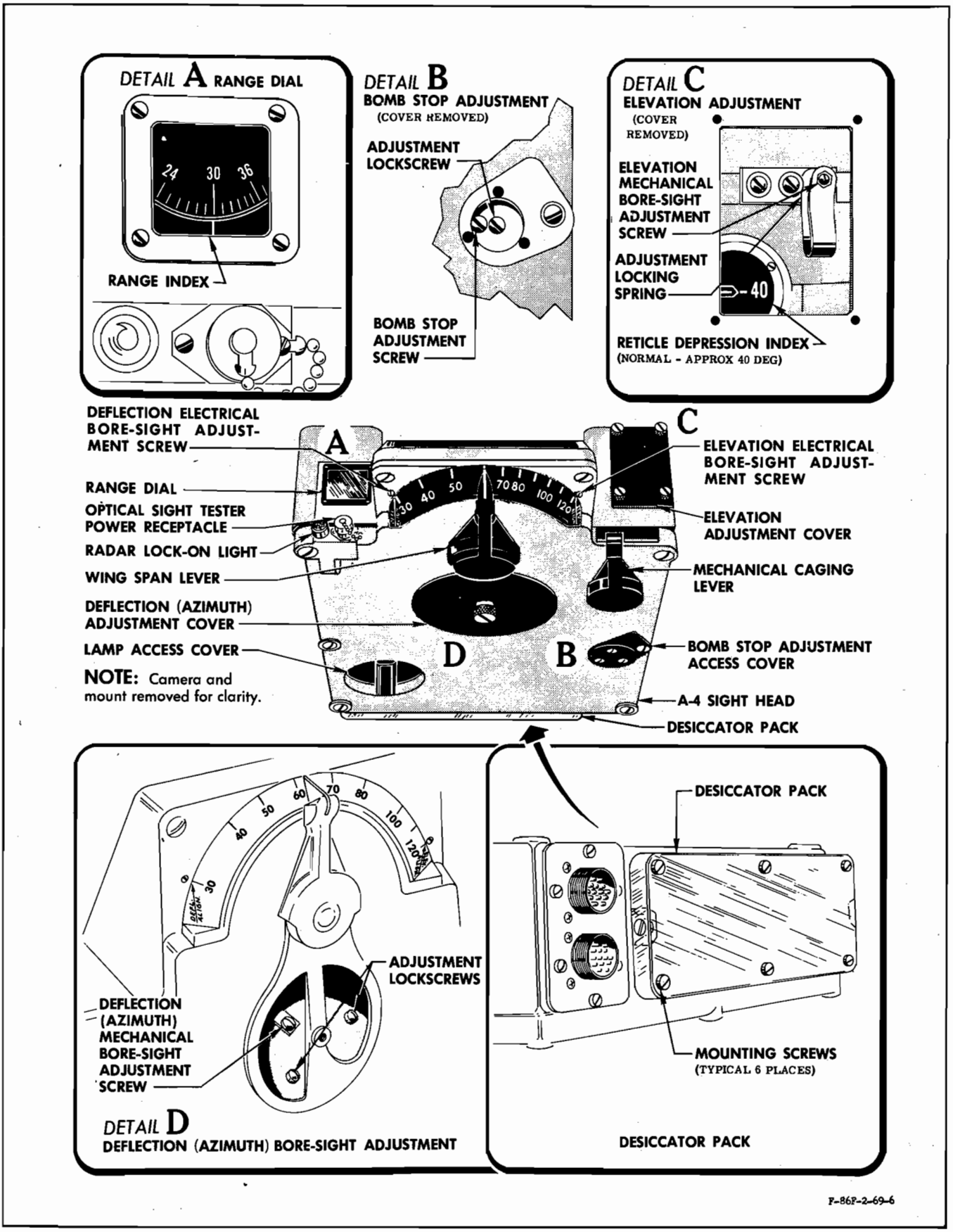


Figure 9-46. A-4 Sight Head

adjustment screw, and adjust as necessary. Release elevation adjustment screw, uncage sight, and again observe position. Repeat this procedure until reticle pipper is superimposed on target board aiming mark when sight is mechanically uncaged but electrically caged.

d. If the sight system has late model sight heads incorporating both mechanical and electrical bore-sight adjustments (figure 9-46), the reticle pipper is first bore sighted for gun firing by use of the mechanical adjustments with the sight mechanically caged. Then the pipper is bore sighted by use of the electrical adjustments with the sight electrically caged. Before starting tests, place gun-bomb-rocket selector on sight selector unit at "GUN" position. To determine if sight is properly bore sighted mechanically, place sight mechanical caging lever to "CAGED" position. If reticle pipper is not centered on A-4 gun sight target board mark, remove elevation and deflection adjustment cover plates. Adjust elevation and mechanical adjustment screws in sight head until pipper is superimposed on target board mark. Replace both elevation and deflection adjustment cover plates on sight head. Move sight mechanical caging lever to "UNCAGED" position and depress electrical caging switch on throttle grip. Again observe position of reticle pipper with respect to A-4 gun sight target board mark. If pipper is not aligned to target board marking, adjust elevation and deflection electrical adjustment screws on sight head until pipper is superimposed on marking. The electrically caged and mechanically caged positions of the reticle pipper should now coincide.

e. To bore sight A-4 sight system for rocketry with fixed sight selector unit incorporated in sight system, place gun-bomb-rocket selector arm in "ROCKET" position and place rocket selector lever to "5" HVAR N" position. Depress and hold electrical caging button. The reticle should move up and appear to rest upon the fixed sight selector rocket sight mark on target board. If adjustments are required, adjust "B.S. ADJ." potentiometer on face of fixed sight selector unit until reticle is superimposed on proper rocket sight aligning mark on target board.

f. To bore sight A-4 sight system for rocketry with variable sight selector unit incorporated in sight system, place rocket-gun-bomb selector arm in "ROCKET" position and place rocket angle depression pointer at 17-mil position. Depress and hold electrical caging button. Adjust "B.S. ADJ." potentiometer on face of variable sight selector unit until reticle appears to be superimposed on variable sight selector rocket sight mark on target board.

9-262. A-4 SIGHT HEAD.

9-263. The A-4 sight head (figure 9-46) contains the optical system and associated electrical devices which control the reticle image. Controlling the size and position of the reticle is the basic function of the sight. Positioning of the reticle, both horizontally and vertically, is accomplished by the elevation and deflection positioning motors. These motors are controlled by signals from the computer through the amplifier. The size of the reticle is controlled by the wing span lever on the sight head and also by the manual or radar range input. Operation of the positioning and reticle size circuits is discussed further in paragraph 9-264. Other components of the sight head include the mechanical caging lever, range dial, radar lock-on light, removable reticle lamp, heaters, and gel cell (desiccator pack). The mechanical caging lever, in the "CAGED" position, locks the mirror elevation and deflection mechanisms in their centered positions, opens the amplifier circuits, and moves the reticle size to its largest position, thus preparing the reticle for use as a fixed sight. The range dial is linked to the reticle size control assembly and to the range drive motor. The dial indicates the range of the target as transmitted by the radar ranging circuits or by the manual ranging control on the throttle. The radar lock-on light illuminates when the radar becomes fixed on a target and is automatically tracking that target in range. It is extinguished when the radar-out button on the control stick is pressed, at which time the radar begins searching for additional targets. The reticle lamp is a double-filament lamp mounted in a quickly-removable socket. The bulb, mounted in the left forward end of the bottom of the sight head, is removed by pressing in on the handle and turning slightly counterclockwise. Care must be taken to see that the bulb is not broken during removal or insertion. To provide a constant temperature in the sight head, and thus an even control of the damping effect of the viscous dampers, several heaters, thermostats, and a blower are incorporated in the sight head. To maintain a dry atmosphere within the sight head, all openings to the head are sealed. A silica gel cell is provided on the forward end of the unit to provide dry air for the interior of the sight head.

9-264. FUNCTION OF A-4 SIGHT HEAD. The sight head translates the electrical signals from the computer and ranging mechanisms into a movable visible reticle superimposed on the target area. This translation occurs in three different operations. Information (figure 9-42) from the system pertaining to displacement of the airplane about its lateral (pitch) axis is fed to the mirror elevation motor, which causes the reticle to move in a vertical direction on the combining glass. Information from the system pertaining to displacement of the airplane about its vertical (yaw) axis is fed to the mirror deflection motor, which causes the reticle to move in a horizontal direction on the combining glass. The size of the reticle is a function both of the size of the target

and of the distance to it. The size of the target is introduced into the system by the wing span lever. At any given range, the larger the target, as indicated by the wing span lever, the larger the reticle. Information concerning the distance to the target is fed from the radar ranging section or the manual ranging control into the range assembly section of the sight head, which controls the diameter of the reticle. The same information is fed to the range dial on the sight head to give a visual indication of the range to the target. The only adjustment that can be made on the sight head involves the use of a bore-sight target, which is covered in paragraph 9-261.

9-265. REMOVING A-4 SIGHT HEAD. The parts and components referred to in the following procedure are identified in figure 9-47. To remove the sight head from the airplane, proceed as follows:

a. Disconnect sight camera power plug from right electrical panel.

b. Remove screws from instrument panel and pull top of instrument panel aft.

c. Remove shroud and disconnect one end of tie bar.

d. Disconnect airplane harness plugs from back of sight.

e. Apply extension along side of sight head onto retaining screw, and rotate wrench fully counterclockwise.

f. Slide sight head aft and slightly upward, and remove sight head.

9-266. INSTALLING A-4 SIGHT HEAD. See figure 9-47.

9-267. A-4 SIGHT SYSTEM AMPLIFIER.

9-268. The sight system amplifier (figure 9-41) contains the components necessary to amplify the inputs from the computer and other sources to the power level necessary to operate the reticle positioning mechanisms in the sight head. Contained in the amplifier are plug-in relays, used for switching both signal data and power output in various modes of sight operation, and plug-in electronic units used for amplification of various signal components. There are five plug-in electronic units: four amplifiers, and an adapter unit. Of the amplifiers, two (elevation and deflection) are identical in operation and construction and are interchangeable. The other two amplifiers (sensitivity and range) are not interchangeable. The adapter unit contains some power supply components for the elevation and deflection amplifiers. Located in the base of the amplifier is the air density unit, which introduces altitude corrections into the system. Also located in the base section is a fan used to cool the amplifier components.

9-269. FUNCTION OF SIGHT SYSTEM AMPLIFIER. The elevation and deflection sections of the amplifier are used to receive information from the computer (figure 9-42), amplify these signals, and send these amplified signals to the respective torque motors in the sight head reticle positioning mechanisms. In the case of rocket fire mode of operation, additional data for the elevation torque motor is acquired from the sight selector unit. The range amplifier receives data from the radar ranging or manual ranging units and amplifies these inputs for use in the reticle size mechanism in the sight head. The sensitivity amplifier receives signals from the ranging and altitude units and amplifies them for use in the elevation and deflection stiffness motors in the computer. Stiffness current is in direct proportion to altitude and in inverse proportion to range.

9-270. A-4 SIGHT SYSTEM COMPUTER.

9-271. The sight system computer (figure 9-41), located in the radar bay, contains the principal mechanical components for computing the prediction angle for the sight. The components are contained in a shock-mounted housing aligned with the airplane. The principal assemblies making up the computer are as follows: the deflection prediction assembly, composed of the deflection gyro, gyro pick-off, stiffness motor, and damper; the elevation prediction assembly, composed of the elevation gyro, gyro pick-off, stiffness motor, damper, and gravity drop accelerometer; and the bombing assembly, composed of the bombing accelerometer, bellows assembly, bomb-target wind scale cam, and bombing solenoid unit. In addition, a fan, several heater units, and thermostats are located in the computer. One set of heaters keeps the gyro viscous dampers at a constant temperature, thereby keeping a constant damping action on the gyro armature. The other set of heaters maintains the mechanical parts of the various assemblies at uniform temperatures so that relatively constant friction levels are maintained. The two gyro rotors in the computer are visible through windows in the top of the unit.

9-272. FUNCTION OF SIGHT SYSTEM COMPUTER. Basic information (figure 9-42) for the sight system is furnished by the gyro assemblies within the computer. The information is based on the departure of the airplane from straight-and-level flight. The deflection gyro is mounted so that its input axis is inclined 10 degrees forward of the vertical centerline of the computer. Departure from level flight about the vertical or longitudinal axis of the airplane induces displacement or precession in the gyro. This precession is transmitted by the gyro pick-off and is used to change the position of the prediction mirror in the sight head in a horizontal direction. The elevation gyro is mounted

with its spin axis parallel to the vertical centerline of the airplane. Departure from straight-and-level flight about the lateral axis produces precession in the elevation gyro. This precession is treated like the deflection gyro precession. Some reduction of the cross-roll error, induced by the airplane turning about its longitudinal axis, is achieved by tilting the deflection gyro 10 degrees. The gravity drop accelerometer is used to correct for gravity drop when the sight is being used in the gunfire or rocket fire mode of operation. When the sight is being used in the bombing mode, information concerning the lead angle and the correct moment to release the bombs is supplied by the bombing accelerometer or superelevation assembly. This assembly, with its static and airspeed bellows, bomb-target wind scale cam, and accelerometer weight, is connected to the elevation gyro assembly by means of a solenoid when the sight selector unit is switched to "BOMB." This assembly is so constructed that for a given altitude and a given ground wind, the bombs or external stores are dropped automatically. Setting the sight selector unit to "BOMB" engages the superelevation assembly into the elevation gyro and shorts out one side of the gyro stiffness motor, thus forcing the gyro to its bomb stop. This action causes the reticle to depress 10 degrees. At the instant of switching, a signal is introduced into the amplifier from the sight head which is compared electronically with the signal coming from the elevation gyro. The signal from the gyro will be equal to the sight head signal as long as the gyro remains on its bomb stop. As long as the signals are equal, bomb release will not be effected. However, depressing the reticle causes the pilot to fly a downward spiral path, thus entering a negative G condition. This causes forces to be applied to the bombing accelerometer which oppose the force of gravity. Since the spiral becomes tighter at a constant rate, the force of gravity is eventually overcome, at which time the accelerometer is forced away from the bomb stop. This causes a difference in the two signal voltages, causing the differential relay to actuate. This in turn energizes the bomb release relay. At the time the bombs are released, the reticle extinguishes momentarily, indicating the release point of the bombs.

9-273. REMOVING COMPUTER. To remove the computer, proceed as follows:

a. Disconnect cables and static air line of amplifier, and remove radar transmitter.

b. Disconnect cables and pitot and static lines to computer.

c. Disconnect bomb-target wind scale drive shaft by pushing forward on spring-loaded collar and letting aft (driving) shaft fall free of connector.

d. Remove computer.

CAUTION

When handling computer, keep it in an upright position. Letting it remain in a tilted position for more than a minute may cause fluid to leak from the viscous dampers.

9-274. INSTALLING COMPUTER. To install the computer, proceed as follows:

a. Place computer in mounting position and connect bomb-target wind scale shaft.

b. Fasten mounting bolts, and connect electrical harness and pitot and static lines.

9-275. A-4 SIGHT SYSTEM RANGE SERVO UNIT.

9-276. The range servo unit (figure 9-48), located in the right aft corner of the radar compartment, introduces manual as well as radar range signals into the sight system. The range servo unit comprises a base assembly and five plug-in units: power supply, adapter, amplifier, modulator, and mechanism. The power supply, made up of a rectifying circuit, filter system, and voltage divider network, is used to supply power to operate the modulator and amplifier sections. The d-c radar range signal is converted into an a-c signal by the modulator and is fed through the adapter and into the amplifier. The amplifier builds the signal to a level necessary to drive the mechanism. In the mechanism, a synchronous motor drives three potentiometers and a range rate generator. These provide the range data for the sight system, as well as position a range dial that is visible through a window on the top cover of the servo mechanism unit.

9-277. A-4 SIGHT SYSTEM FIXED SIGHT SELECTOR UNIT.

9-278. The fixed sight selector unit (figure 9-48A), located on the armament pedestal, provides the means of selecting the mode of operation of the sight system as desired. The fixed selector unit comprises several voltage divider networks controlled by a rotary selector switch, a series of microswitches operated by the gun-bomb-rocket selector handle, a solenoid operated by the radar-out button on the control stick to return the gun-bomb-rocket selector handle to the "GUN" position, a bore-sight adjustment, and a target speed switch. The gun-bomb-rocket selector handle operates a series of microswitches that operate various relays to set up the sight system in the mode of operation desired. An integral part of this spring-loaded selector is the solenoid detent that permits the sight system to resume the gunfire mode of operation any time the solenoid is actuated. The target speed switch may be set to "TR.," "HI.," or "LO.," depending on the speed of the attacking airplane and the relative speed of the target. This switch varies

1 Remove instrument panel mounting wing nuts, and lower instrument panel.

2 Secure adapter to sight head.

3 Rotate wrench on adapter locking screw counterclockwise until screw bottoms against stop.

4 Install sight head on support by engaging adapter pins to support hooks and by engaging support on adapter retaining dog.

5 Rotate wrench clockwise until adapter is held rigidly in support.

6 Connect Cannon plugs at forward end of sight.

7 Reconnect tie rod and install shroud.

8 Connect shroud electrical disconnect.

9 Raise and fasten instrument panel.

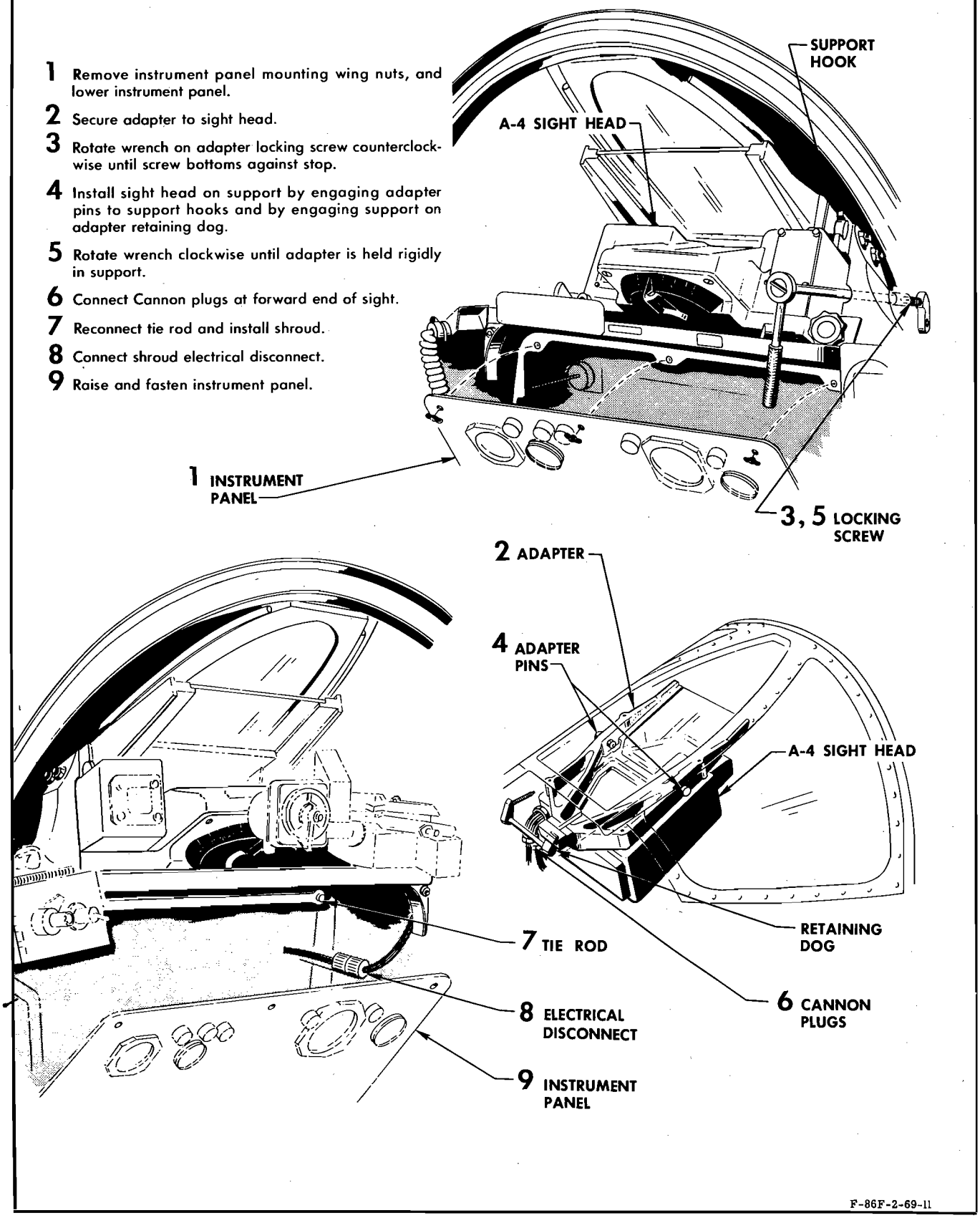


Figure 9-47. Installing Sight Head

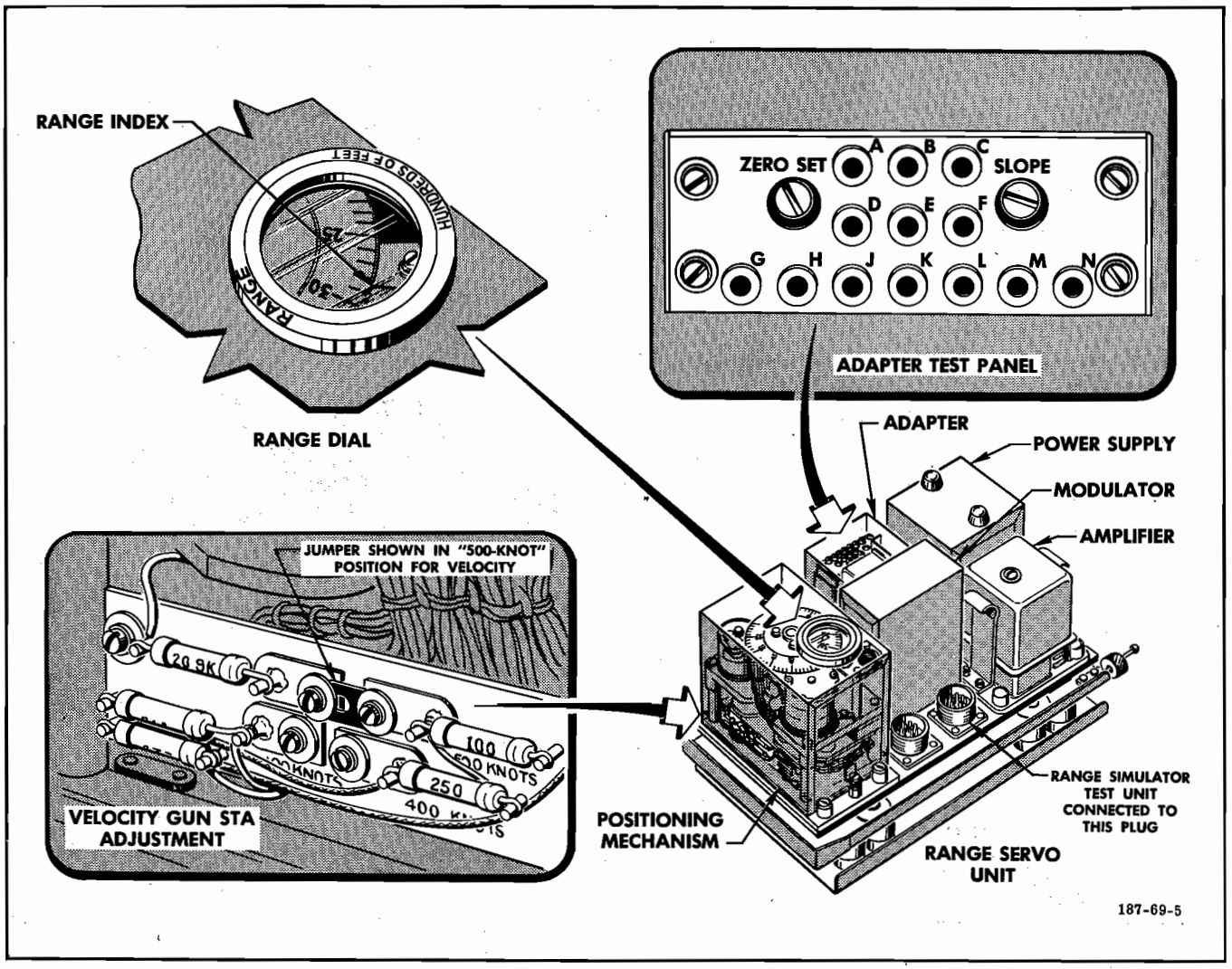


Figure 9-48. A-4 Range Servo Unit

the ratio of the elevation and deflection stiffness currents, thus producing different prediction angles for the different modes of attack. The rocket selector switch has positions for each type of rocket that may be used on the airplane as well as for various dive angles (the "S" and "N" positions). The selector switch taps off voltages from a divider network which, when introduced into the reticle positioning mechanism, depress the reticle to the proper angle for the particular rocket involved. The switch also taps a voltage divider, which selects the stiffness current to produce the proper sight sensitivity for the type of rocket selected.

9-278A. A-4 SIGHT SYSTEM VARIABLE SIGHT SELECTOR UNIT.

9-278B. The variable sight selector unit (figure 9-48A), located on the armament pedestal, is interchangeable with the fixed sight selector unit. Its function is to provide the means of selecting the mode of operation of the sight system (gun, bomb, or rocket). It also provides a continuously variable depression angle with a fixed sensitivity for the air-to-ground rocket-fire mode of operation. The variable selector unit comprises a rocket sensitivity potentiometer, a rocket depression angle potentiometer controlled by the rocket depression angle pointer, a series of microswitches operated by the rocket-gun-bomb selector lever, a solenoid operated by the radar-out button on the control stick to return the rocket-gun-bomb selector lever to the "GUN" position, a bore-sight adjustment, and a target speed switch. The dial on the face of the unit has graduated markings from 6 to 50 mils. Four indices are provided to mark the angles which have been found effective for the types of rockets being fired. The indices can be locked in the desired position by a lock on the side of the dial. The operation of the rocket-gun-bomb selector microswitches, the target speed ("TR. HI. LO.") switch, and the bore-sight potentiometer is the same as the operation of those in the fixed sight selector unit. The rocket depression angle selector maintains a constant

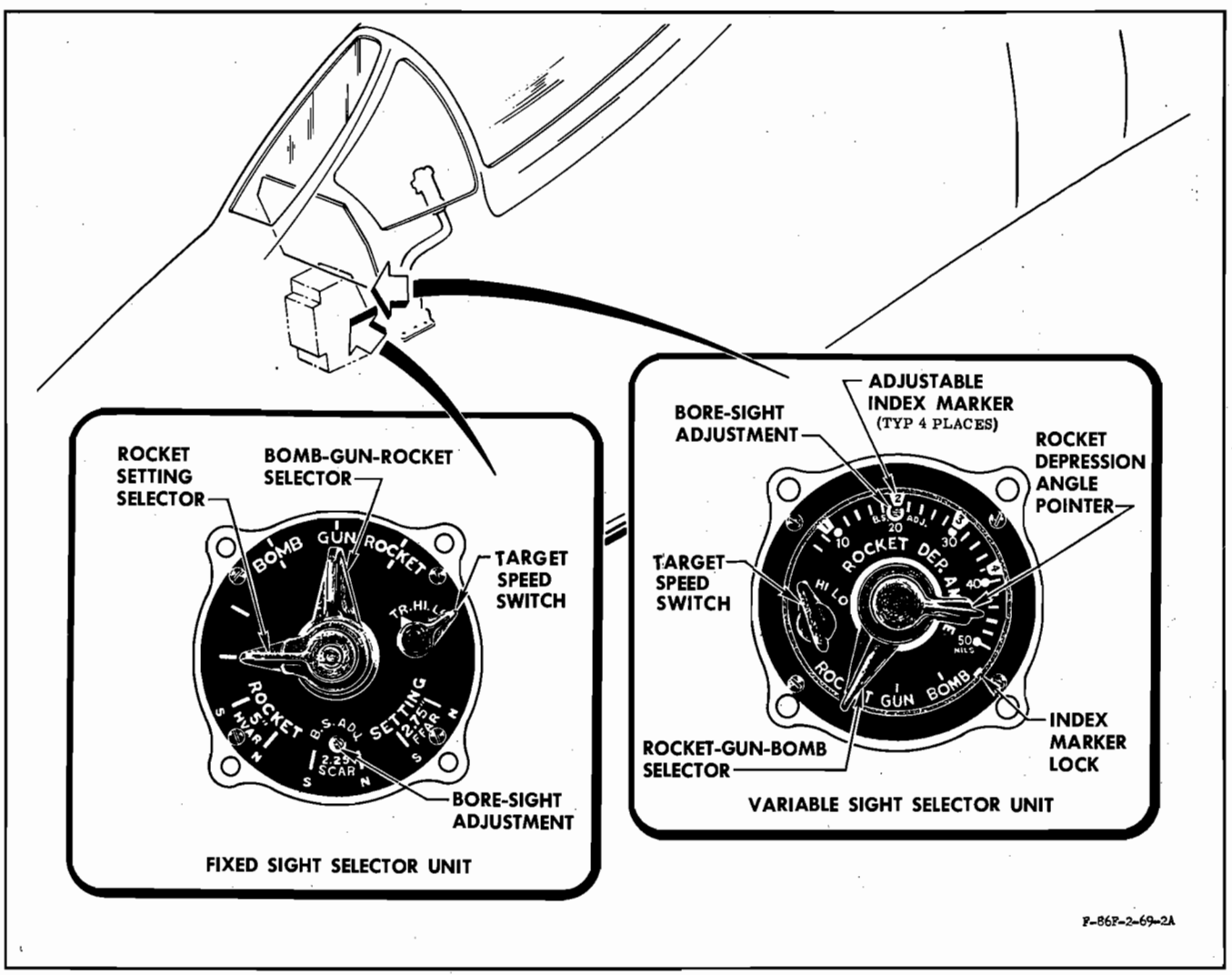


Figure 9-48A. Fixed and Variable Sight Selector Units

stiffness current of 36.8 milliamperes for all rocket depression angles. This increase in stiffness current over that of the fixed selector places a greater restraint on the gyros, thus reducing tracking disturbances on the reticle due to air turbulence. The rocket depression is controlled by the knob on the face of the selector switch. Rotation of this knob to the desired mil setting of the dial varies the signal voltage which is fed to the elevation amplifier.

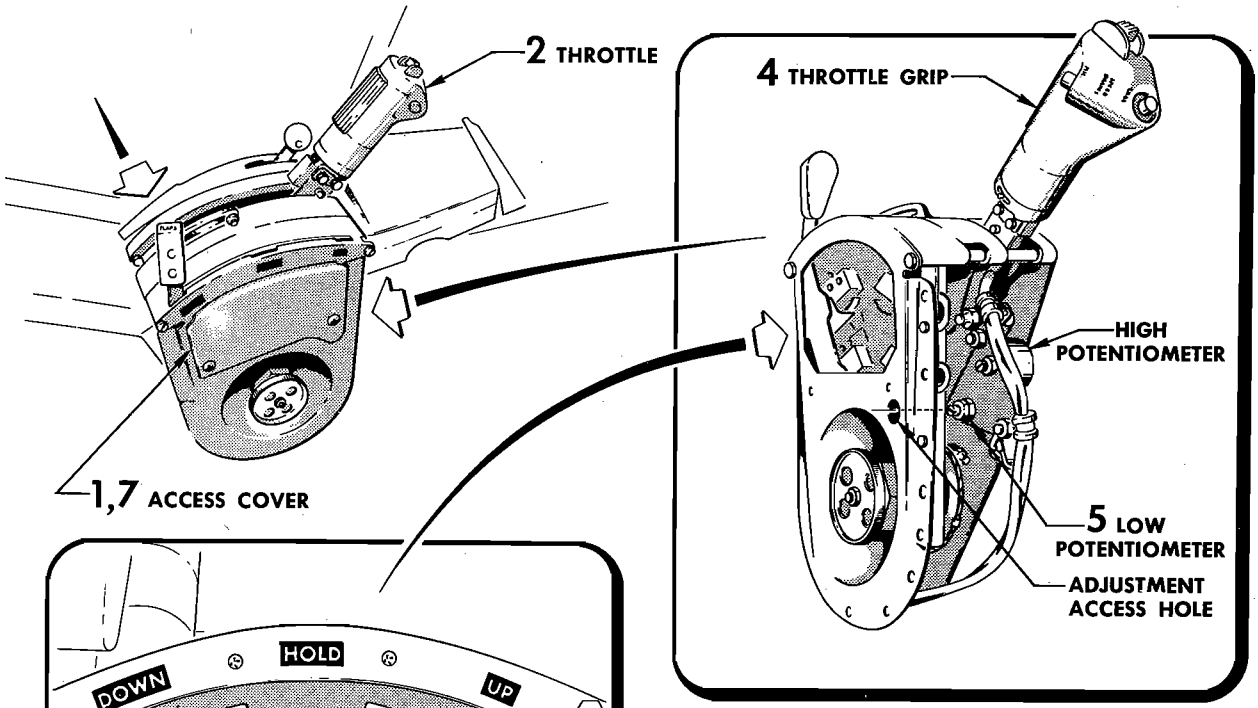
9-279. A-4 SIGHT SYSTEM MANUAL RANGING CONTROL.

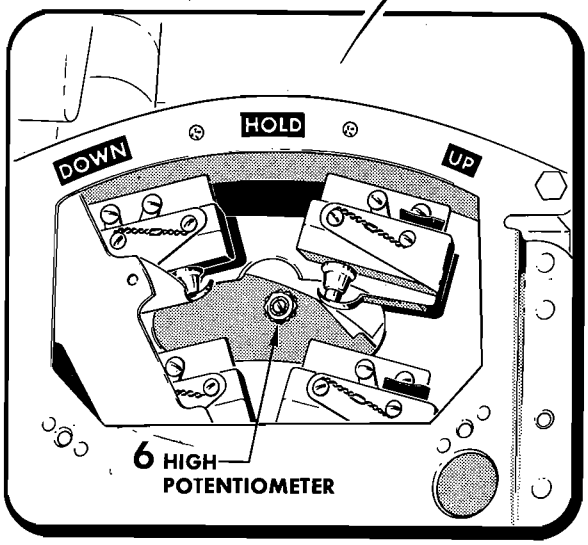
9-280. An integral part of the throttle quadrant is the sight system manual ranging control. (See figure 9-49.) The control, used when radar ranging is not used, is operated by rotation of the throttle grip about its axis. This motion operates a potentiometer, located at the end of an extension rod near the bottom of the throttle quadrant. The handle is spring-loaded to return it to its full counterclockwise position, and a detent is provided to keep it in this position. While the handle is in this position, a microswitch is actuated to provide the sight system with radar ranging information. Rotating the handle slightly away from full counterclockwise position deactuates the microswitch and introduces manual ranging information as provided by the position of the throttle grip.

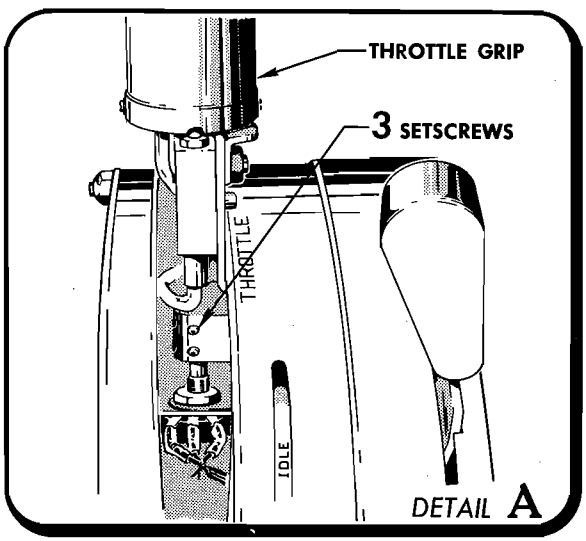
9-281. ADJUSTING MANUAL RANGING CONTROL. With auxiliary power connected to the airplane and with the sight system operating, adjust control. (See figure 9-49.)

9-282. A-4 SIGHT SYSTEM MANUAL PIP CONTROL SYSTEM.

9-283. The manual pip control system, installed on F-86F-35 and subsequent airplanes, is used in conjunction with the A-4 sight system to improve the dive-bombing operation of the airplane. The manual pip control system consists of the manual pip control box, mounted on the left side of the instrument panel shroud,







1 Remove access cover.

2 Place throttle in extreme forward position.

3 Loosen two lower setscrews, and adjust throttle grip so that microswitch is actuated as soon as throttle grip is rotated clockwise out of the detent position. Tighten setscrews.

4 With throttle in extreme forward position and A-4 sight operating, rotate throttle grip clockwise as far as it will go. Range servo dial should read "1200" (+0, −50).

5 If range servo dial reads other than "1200," adjust low potentiometer until reading is "1200" (+0, −50).

6 Move throttle to extreme aft position. Rotate throttle grip counterclockwise until just before it enters the detent position. The range servo dial should read "2700" (+50, −0). If range servo dial is outside of this tolerance, adjust high potentiometer until reading falls within tolerance.

NOTE: Since there is an interaction between the two potentiometers, steps 5 and 6 must be repeated until both readings are within tolerance.

7 Replace access cover.

191-69-6

Figure 9-49. Adjusting Manual Range Control

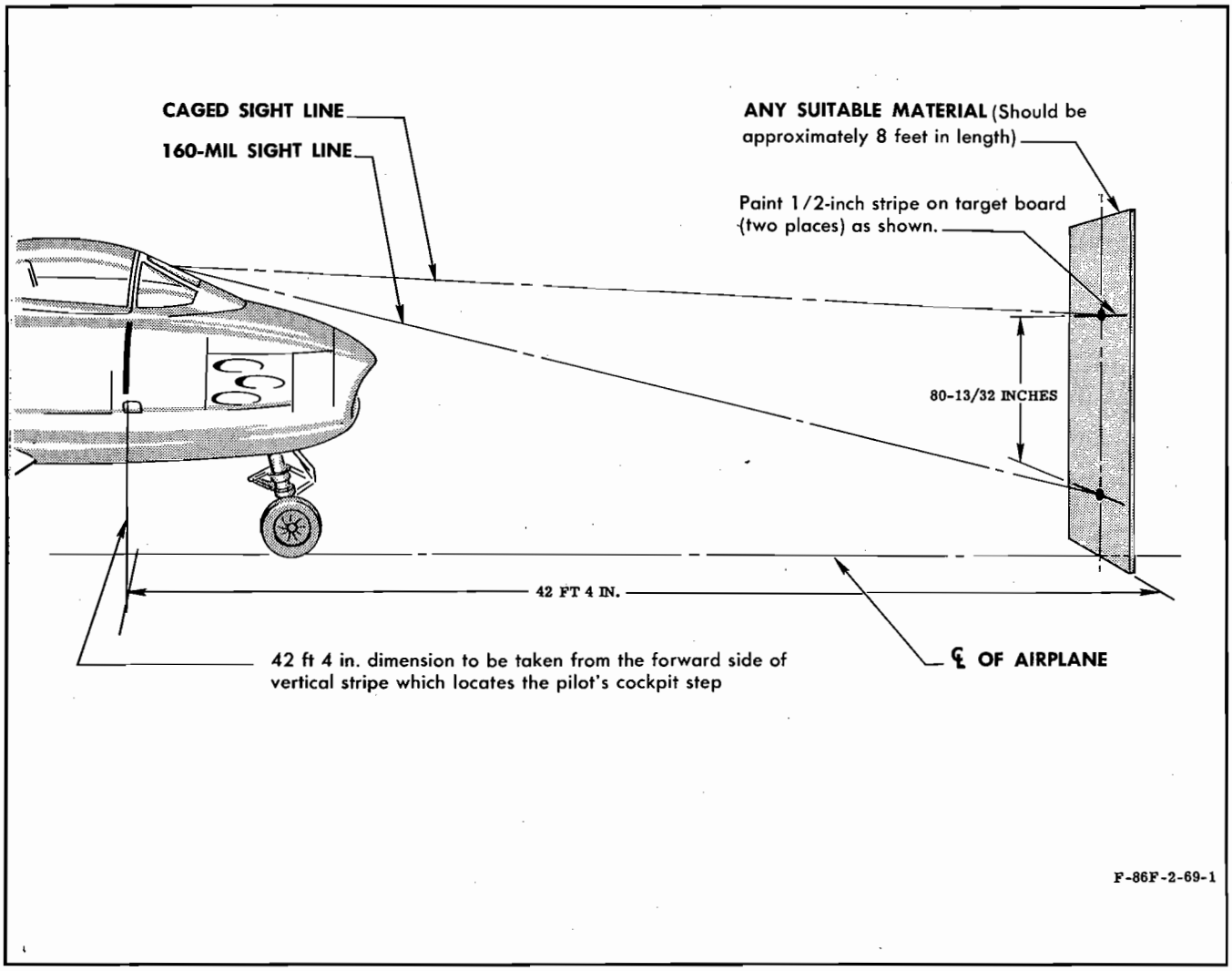


Figure 9-50. Bore-sight Target Board for Adjusting Manual Pip Control

and the bombing altimeter attached to the left side of the sight reticle camera mount. (See figure 9-41.) A modified J-8 attitude gyro, mounted on the main instrument panel, is used to indicate the angle of dive to the pilot. (Refer to paragraph 6-31.) The manual pip control is connected to the sight system by the "BOMB-NORMAL" switch on the manual pip control box. Setting this switch to "NORMAL" permits the sight system to function normally. Setting the switch to "BOMB" electrically cages the sight. Rotating the knob on the face of the manual pip control box depresses the sight reticle from 0 to 170 mils as calibrated on the face plate (mil scale). There are three folding face plates, each with two concentric scales. The inner scales are marked in degrees of dive angle, and the outer scales are marked to give the release altitude above target (index altitude). The output of the manual pip control is fed into the elevation amplifier of the A-4 sight system. The bombing altimeter indicates to the pilot an accurate and safe bomb release and pull-out altitude. The altimeter, a standard cabin altimeter with an index altitude scale attached to the face, is attached to the pitot-static system of the airplane and indicates pressure altitude.

9-284. ADJUSTING MANUAL PIP CONTROL. To adjust the manual pip control, proceed as follows:

a. Turn on and warm up sight system. (Refer to steps k. through m., paragraph 9-235.)

b. (Deleted)

c. Turn manual pip control switch to "BOMB."

d. Lift the three scales, and set pointer to "160" on the "MILS LEAD" scale.

e. Observe position of dot pipper on a bore-sighting board (figure 9-50). The dot pipper should rest on the 160 (±2) mil mark.

f. If adjustments are required, adjust potentiometer

on left side of manual pip control box with a screwdriver until pipper rests on 160 (±2) mil mark on target board or sight optical tester.

Note

The shaft lock should be just loose enough to permit the potentiometer shaft to be turned with a screwdriver without damaging the slot in the shaft.

g. (Deleted)

h. Turn manual pip control switch to "NORMAL."

i. Turn off sight system.

j. (Deleted)

9-285. A-4 SIGHT SYSTEM POWER SUPPLY.

9-286. The a-c and high-voltage d-c power to operate the sight system is provided by two units located in the radio equipment bay. High-voltage d-c power to the sight system is provided by an E-1 static converter, located on the right side of the radar equipment bay. An E-1A static converter can be substituted for the E-1 static converter without a change in airplane wiring. Since mounting provisions for each type converter are different, the mount for the respective converter will also have to be installed. The input to the static converter is 115-volt, single-phase, 400-cycle ac supplied by the radar inverter, located in the forward nose section. The output should be 300 (±3) volt dc. A-C power is supplied by an electronic a-c power supply, either NAA 172-74025 or Type D-4. The D-4 unit is installed in F-86F-25 Airplanes AF52-5387 through -5530, F-86F-30 Airplanes AF52-5014, -5015, -5017 through -5055, and -5103 through -5163, and F-86F-35 and subsequent airplanes. All other airplanes incorporate the NAA 172-74025 power unit. The power unit is located in the radio equipment bay. The Type D-4 a-c power unit provides better frequency regulation and range amplifier response than the NAA 172-74025. On F-86F-35 Airplane AF52-5214 and all subsequent airplanes, a ground wire is added to terminal "F" of the D-4 unit to eliminate voltage fluctuation. (See figure 9-41.) Input to the a-c power unit should be 28 (±3) volt, 400 (±2) cycle, three-phase ac. Additional power supply components comprise the fuse strip and test box (located in the radar and gun sight bay) and the sight and radar power relay (located in the aft radio bay).

Section X
WIRING DATA

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10-1. WIRING DATA GENERAL INFORMATION.

10-2. This section of the book contains pertinent electrical and electronic data necessary for electrical and electronic maintenance technicians to understand the make-up and function of each intercomponent power and control circuit, to trace each such circuit, to make continuity checks, and to accomplish specific trouble shooting on inoperative and improperly functioning circuits. This data consists primarily of simplified wiring diagrams, individual equipment index lists, detailed wiring diagrams, and hookup diagrams. In addition, an index of wiring diagrams (arranged alphabetically, and consisting of a complete title listing, including effectivity and page number) immediately precedes the first electrical wiring diagram. The wiring diagrams are arranged on gate-fold pages so that when a page is opened out, all the information pertaining to a particular electrical or electronic system is complete. This information consists of a simplified wiring diagram, an individual equipment index list, and the detailed wiring diagram, all covering a complete and specific electrical or electronic system. The individual equipment index list will cover only panels and major items of equipment and all other items not located or attached to panels or major items. When plugs and receptacles (not appearing on panels or major items) have the same station location and access, only the plug will appear in the individual equipment index list. Terminal strips will appear in the index list when not shown on a panel. All referenced items will appear. Inasmuch as only a portion of the wiring to some electrical or electronic items is shown on some wiring diagrams, it is sometimes necessary to refer to the electrical or electronic hookup diagrams at the end of this section when replacement or rewiring of the item is desired. Complete wiring to all terminals of applicable items of equipment is shown in the hookup diagram section. An index number hookup list, arranged numerically by index number and consisting of the index number, index title, hookup diagram title complete with effectivity, and the page number of the hookup diagram, precedes the first hookup diagram. The information in this section may be used in conjunction with the detailed information on operation and maintenance supplied in other sections of this handbook.

10-3. WIRING IDENTIFICATION.

10-4. To facilitate wiring installation, each wire is identified by a letter-number combination stamped on the wire at approximately 8-inch intervals throughout its entire length. Following is the identification code for wiring used in F-86F Airplanes. This code does not apply to internal wiring of equipment.

CIRCUIT FUNCTION LETTER	CIRCUITS
A	ALL ARMAMENT AND BOMBING
	AB — Bombing
	AC — Cameras
	AG — Guns
	AK — Chemical
	AR — Rockets
	AS — Sights
C	FLIGHT CONTROL
	CB — Diving brakes
	CS — Surface booster
	CT — Trim tabs
	CW — Wing flaps
D	DEICING OR ANTI-ICING
	DD — Deicing control (mechanical or heat)
	DP — Pitot heater

CIRCUIT FUNCTION LETTER — CIRCUITS

E ENGINE INSTRUMENT
- ED — Fuel flow
- EF — Fuel quantity
- EG — Oil pressure
- ES — Tachometer
- EU — Fuel pressure
- EV — Hydraulic pressure

F FLIGHT INSTRUMENT
- FB — Turn-and-bank indicator
- FH — Gyro horizon
- FR — Remote compass

G LANDING GEAR
- GA — Actuator and retraction
- GC — Wheel steering

H HEATING AND VENTILATING
- HC — Cabin heater
- HG — Gun heater
- HV — Ventilation control

J IGNITION
- JD — Ignition vibrator

K ENGINE CONTROL
- KS — Starter

L LIGHTING
- LB — Blinker
- LE — Extension
- LJ — Instrument
- LL — Landing
- LN — Navigation

M MISCELLANEOUS
- MR — Enclosure operation release, locks, etc
- MW — Wing folding

N GROUND NETWORK WIRING

Any wire that completes the circuit to the ground network from an equipment item is designated with the letter "N."

In explanation, it may be said that any wire with an "N" circuit function letter could be connected to the aircraft ground network without malfunction of the circuit.

- NA — Ground, armament
- NC — Ground, flight control
- ND — Ground, deicing or anti-icing
- NE — Ground, engine instruments
- NF — Ground, flight instruments
- NG — Ground, landing gear
- NH — Ground, heating and ventilating
- NJ — Ground, ignition
- NK — Ground, engine control
- NL — Ground, lighting
- NM — Ground, miscellaneous
- NP — Ground, power
- NQ — Ground, fuel and oil
- NR — Ground, radio navigational and communication equipment
- NS — Ground, radio-operated equipment
- NV — Ground, inverter
- NW — Warning devices

P POWER

All wiring of battery, generator, voltage regulator, alternator field, field supply, rectifier output, generator load equalizer resistor and their controls, etc, has the "P" classification. All d-c power wiring for more than one circuit is identified by the letter "P" with no additional circuit designation letter. This includes feeders from reverse-current relays to busses, from batteries to busses, etc. All d-c feeders or d-c power wiring up to the protector for an individual circuit (other than ground network) is identified by two letters: the letter "P," and a circuit designation letter as shown in the following table.

- PA — Power, armament
- PC — Power, flight controls
- PD — Power, deicing or anti-icing
- PG — Power, landing gear
- PH — Power, heating and ventilation
- PP — Power, generator control, battery control
- PQ — Power, fuel and oil
- PV — Power, inverter

Q FUEL AND OIL
- QB — Fuel booster pump motor
- QF — Fuel transfer pump motor and control
- QT — Throttle control, fuel pump motor

R RADIO NAVIGATIONAL AND COMMUNICATION EQUIPMENT
- RN — Radio navigation
- RV — VHF command

CIRCUIT FUNCTION LETTER	CIRCUITS
S	RADAR-OPERATED EQUIPMENTS
	SG — Gun laying radar
	SX — Recognition radar
V	INVERTER CONTROL
	VX — Inverter a-c control
W	WARNING DEVICES
	WA — Armament warning
	WD — Deicing or anti-icing warning
	WF — Flight instrument warning
	WG — Landing gear warning
	WH — Heating, ventilation, and pressurization warning
	WM —Miscellaneous warning, wing folding
	WP — Power warning
	WV — Inverter warning
X	A-C POWER
	All a-c feeders or a-c power wiring up to an individual circuit (such as protectors) other than the ground network is designated by the letter "X." All external wiring of alternators, inverters, and control equipment has the "X" classification.
	XA — "A" phase of three-phase power
	XB — "B" phase of three-phase power
	XC — "C" phase of three-phase power
	XN — Neutral or grounded wire of three-phase power
	XV — Inverter (single-phase)

10-5. REPLACING WIRE.

10-6. The type and gage wire used in the F-86F Airplanes is dependent on circuit protection, what circuits it is used in, and the location of the wire in the airplane. With these facts in mind, it is extremely important to replace the wiring with the same type and gage removed. Most of the wiring used in the airplane is Specification MIL-W-5086, with the following exceptions:

A. High-temperature, fire-resistant, rockbestos wire, USAF Specification 32659.

1. Used in fire detector system from fire detector relay (station 178) aft.

2. Used in surface control hydraulic system in wire runs from hydraulic units in right and left speed brake wells forward to terminal strip, item 665.

B. Insulated and shielded wire, Specification NA2-6118, Class 3, Type 1.

1. Used in gyrosyn compass system in wire runs from flux valve transmitter (in left wing tip) to control gyro (aft of the cockpit), and two wires that carry synchro output signal (FR8A20 and FR9A20) from control gyro to slaving amplifier.

C. Wire, nylon jacket, Specification JAN-C-76.

1. Type SR1R-1(7)-20-C-9.
Used as hookup wire to throttle and stick grip switches.
Speed brake switch to plug, item 372
Sight caging switch to plug, item 372
Throttle microphone switch to plug, item 372
Gun charger switch to center pedestal

2. Type SR1R-1½(7)-18-C-9.
Throttle microphone switch ground wire.
This wire (Specification JAN-C-76) was selected for its flexibility and resistance to abrasion.

D. Aluminum wire, Specification MIL-W-7072.
Used in some power leads (F-86F-30 and F-86F-35 Airplanes only) for weight reduction purposes.

E. Individually shielded wire, Specification MIL-C-7078.
Used throughout airplane to prevent radiation of energy. Indicated on wiring diagrams in Section X by individually shielded wire symbols.

F. Chromel, Alumel thermocouple leads, MIL-W-5846A, Type III, Class A.
Connects indicator in cockpit to engine harness.

10-7. HOW TO USE WIRING DIAGRAM DATA.

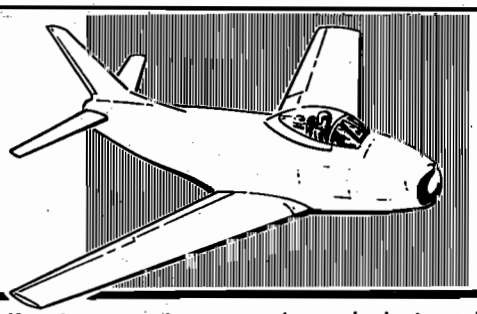
10-8. To efficiently trouble shoot an electrical or electronic system, one must first be familiar with the use of this section. Information on use of wiring diagram data is illustrated in figure 10-1.

10-9. HOW TO USE INDEX NUMBER HOOKUP LIST.

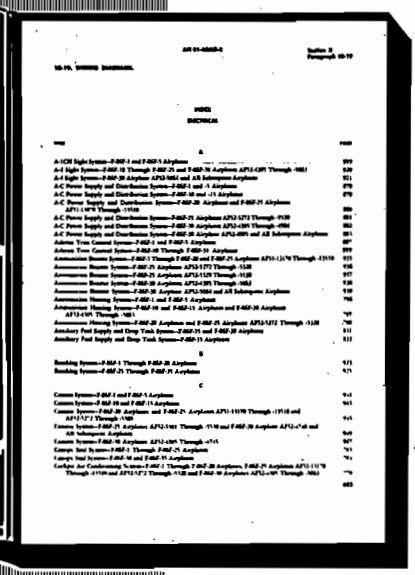
10-10. See figure 10-2.

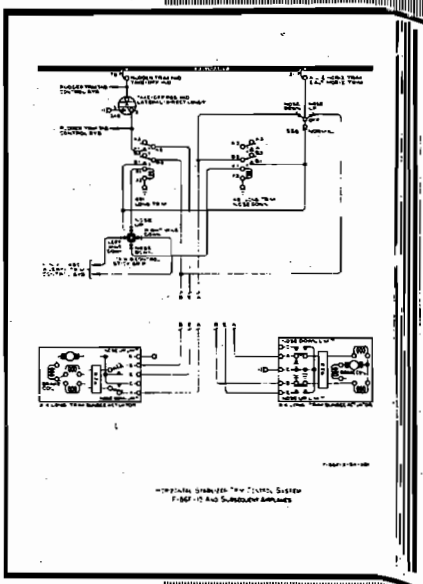
10-11. HOW TO CROSS-REFERENCE TO ILLUSTRATED PARTS BREAKDOWN.

10-12. To locate part numbers and vendor's designation of electrical and electronic parts, it is necessary to refer to the F-86F Illustrated Parts Breakdown, T. O. 1F-86F-4



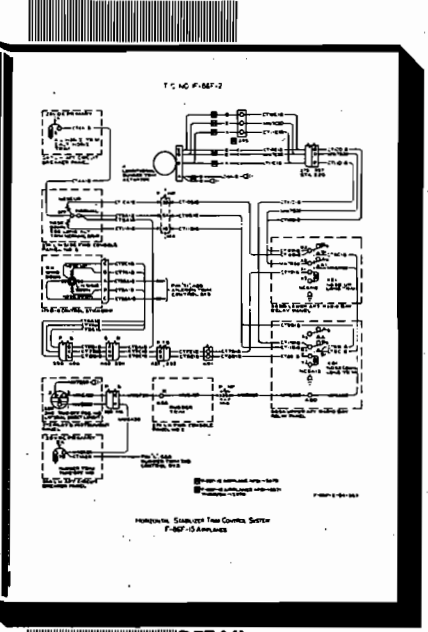
1 If malfunction occurs in a system (example: horizontal stabilizer trim control system), you may wish to check the applicable electrical circuit. First, find the alphabetical wiring diagram index located just in front of the first wiring diagram. In the index, locate the wiring diagram title (example: "Horizontal Stabilizer Trim Control System") and select the applicable diagram (and page number) according to the effectivity of the airplane you are working on.





SIMPLIFIED

ITEM INDEX LIST



DETAIL

2 Turn to the applicable page number listed in the alphabetical wiring diagram index, and there you will find a simplified wiring diagram, an individual item index list, and a detailed wiring diagram.

The simplified wiring diagram shows the wiring of the system in schematic form. It also includes the internal wiring of all units. This drawing can be used to obtain an over-all working knowledge of the electrical function of the system. This simplified drawing is complete enough to determine equipment failures and isolate troubles to definite areas by performing continuity checks between equipment items. In addition, all interconnecting points to other systems are shown and referenced, so that any trouble that is common to two or more systems can be readily isolated.

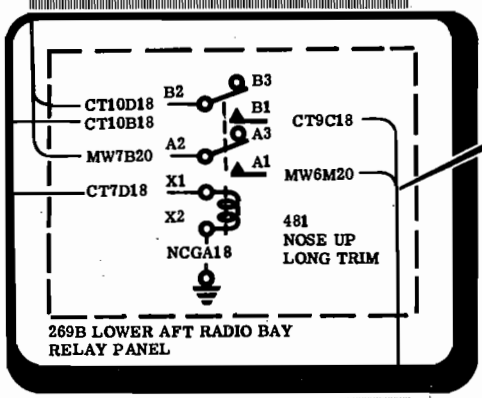
The detailed wiring diagram gives complete hookup information of the system, such as equipment items (terminal strips, plugs, receptacles, wire connectors, etc) and their item index numbers, and all wire segments and their numbers. This drawing can be used to locate troubles caused by broken wires, loose connections, improper hookup, and shorts caused by foreign material or faulty insulation.

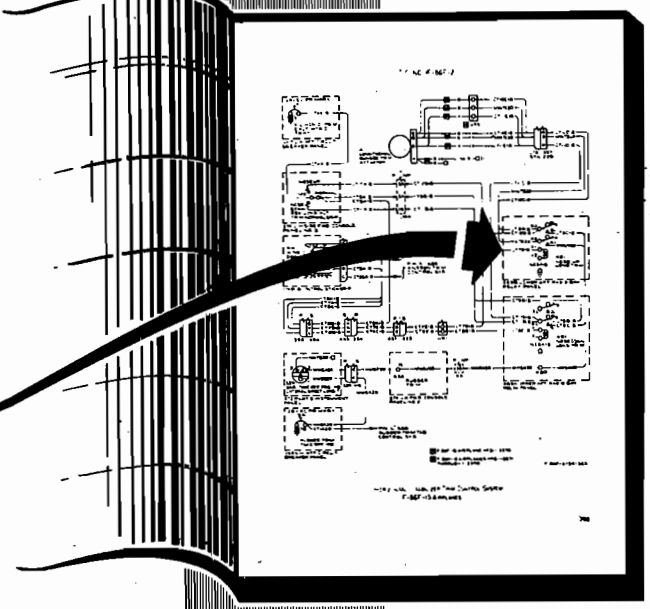
An individual item index list appearing with each detailed wiring diagram gives the index number, name, location, and access for all key items shown on the detailed wiring diagrams but not in the item index list will have the same location and access as the listed unit to which they are attached or upon which they are mounted.

F-66F-2-54-622

Figure 10-1. How to Use Wiring Diagram Data (Sheet 1 of 2)

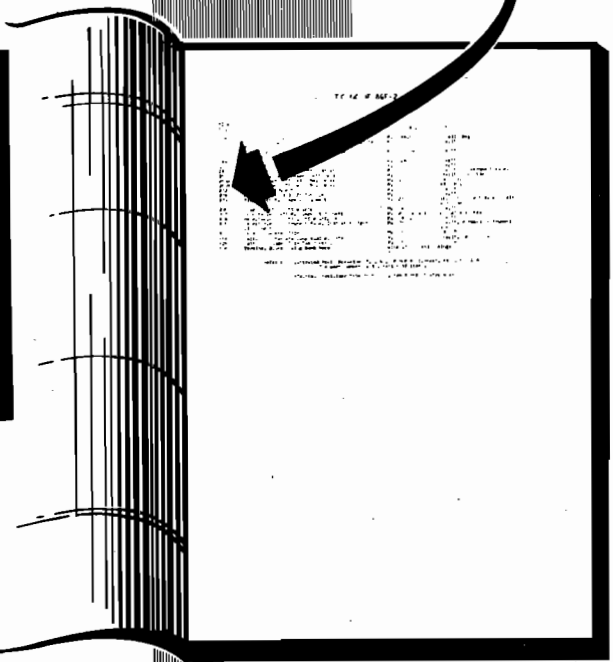
3 While checking the circuit, using the simplified wiring diagram, you may feel your source of trouble is the longitudinal trim relay (item index number 481).





269B Panel—Lower Aft Radio Bay Relay Fus 155 L H Radio Bay

4 Next, refer to the detailed wiring diagram for a circuit continuity check to determine if the longitudinal trim relay (481) is the source of trouble. In some cases, you may find that the trouble you first suspected as being in one system may be traced to another system by means of a reference to a pin number, an item index number, and the title of the detailed wiring diagram on which it appears. To find the station location and access of the longitudinal trim relay (481), refer to the "Lower Aft Radio Bay Relay Panel" (item index number 269B) in the individual item index list. If the detailed diagram does not give the complete hookup of the item index number in question, refer to the hookup diagrams at the end of this section. (Refer to "How to Use Index Number Hookup List.")



5 If you need to order a new part, refer to the Illustrated Parts Breakdown, T.O. 1F-86F-4. (Refer to "How to Use Cross-reference to Illustrated Parts Breakdown.")

F-86F-2-54-623

Figure 10-1. How to Use Wiring Diagram Data (Sheet 2 of 2)

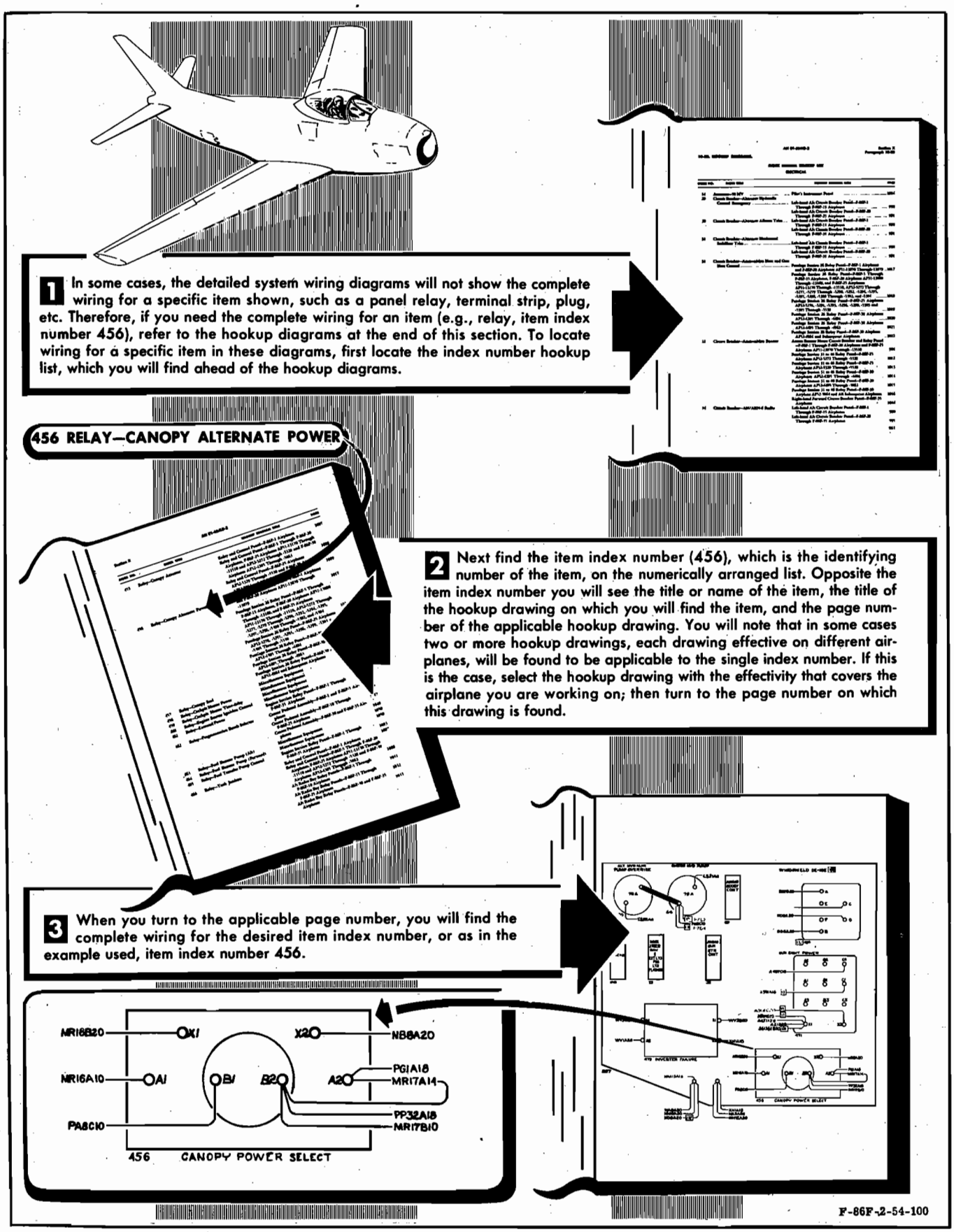


Figure 10.2. How to Use Index Number Hookup List

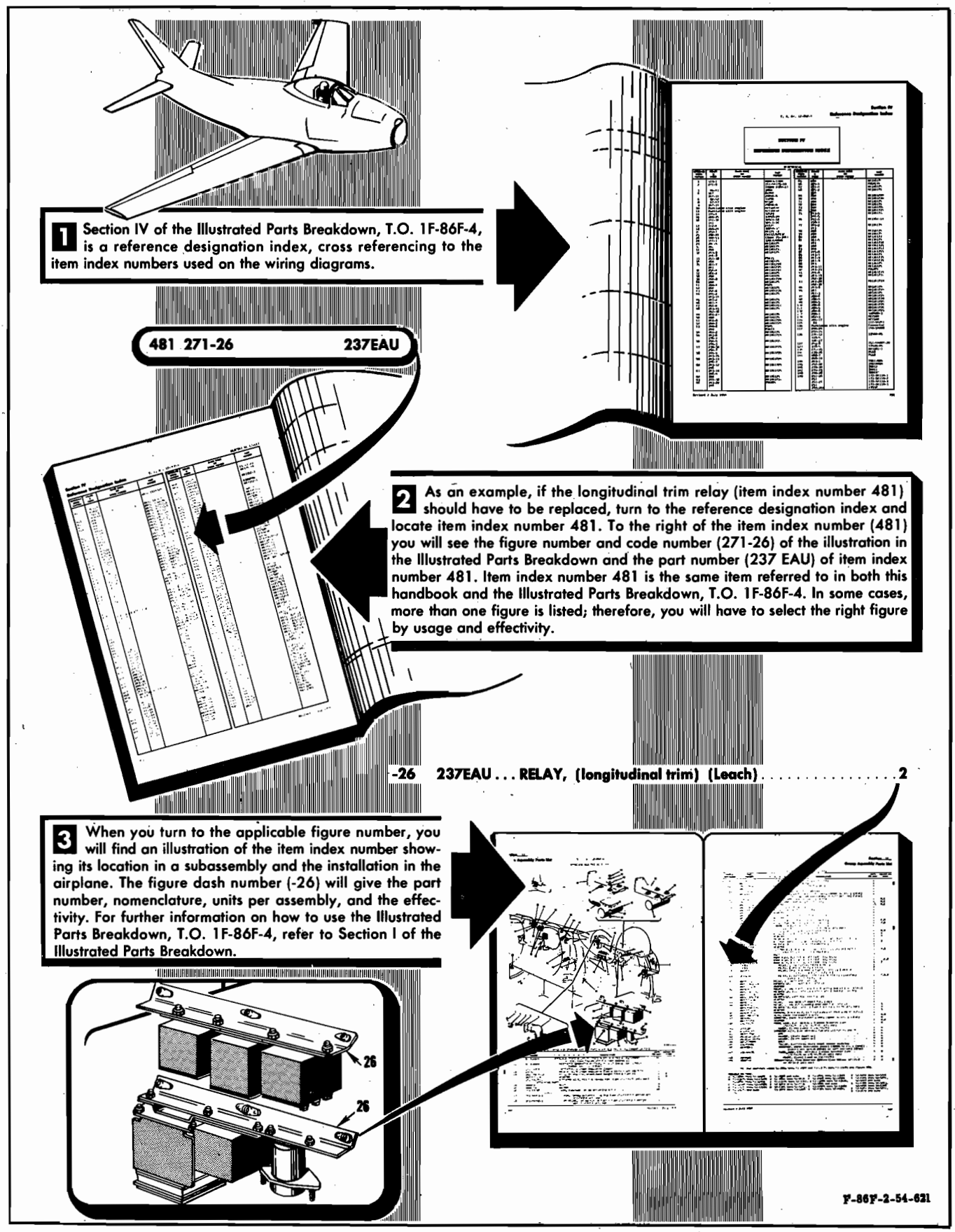


Figure 10-3. How to Cross-reference to Illustrated Parts Breakdown

(formerly 01-60JLD-4). Figure 10-3 explains the cross-indexing system for finding complete information in the Illustrated Parts Breakdown.

10-13. ACCESS AND INSPECTION PROVISIONS.

10-14. Access for general maintenance of the airplane is gained through various access doors. For location of access doors and equipment accessible at each location, see figure 1-4.

10-15. ELECTRICAL AND ELECTRONIC SYMBOL CHARTS.

10-16. The electrical chart (figure 10-4) contains the symbols used throughout the handbook.

10-17. AIRPLANE STATION DIAGRAM.

10-18. The airplane station diagram (figure 1-3) is used in conjunction with the individual index list. The station location is used in locating particular areas on the airplane.

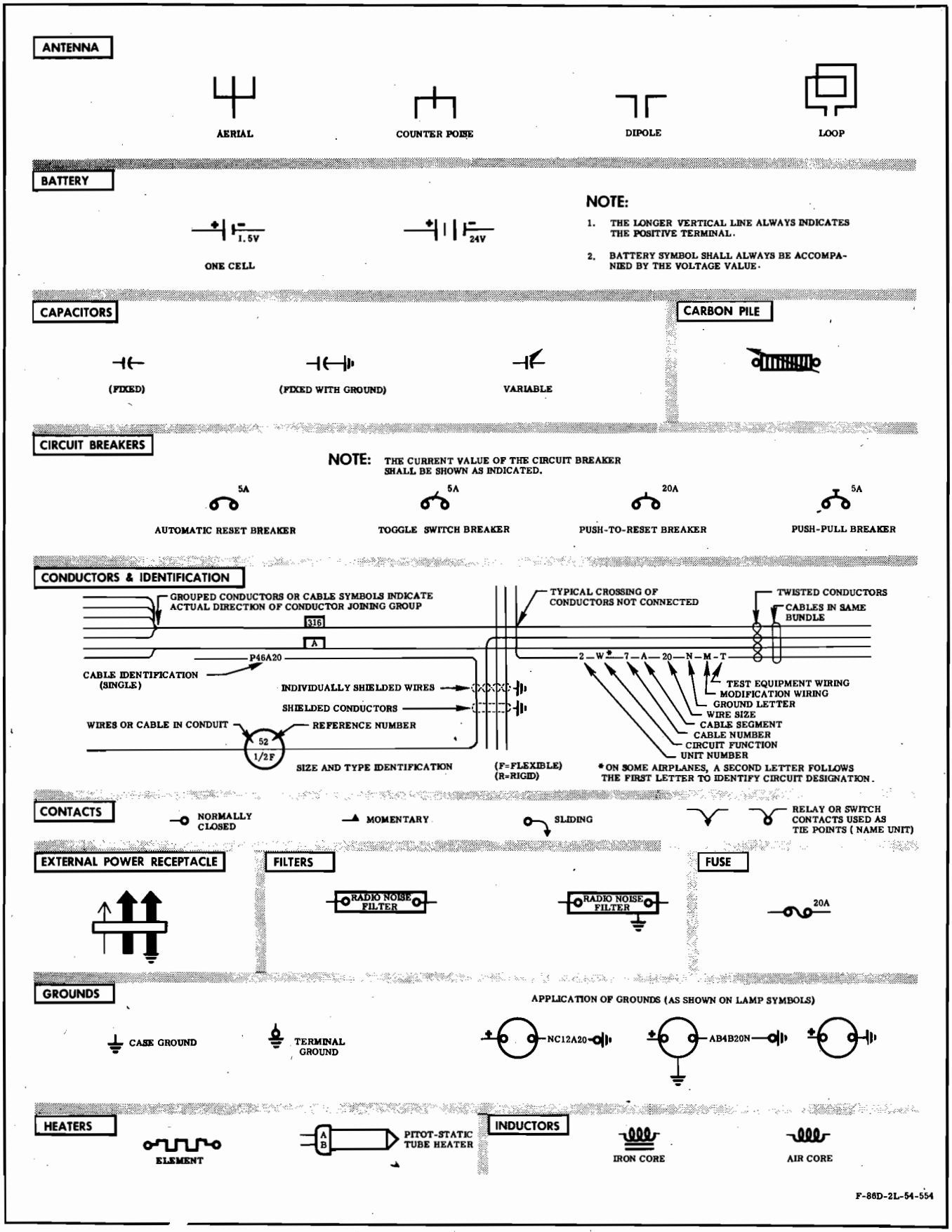


Figure 10-4. Electrical and Electronic Symbol Chart (Sheet 1 of 4)

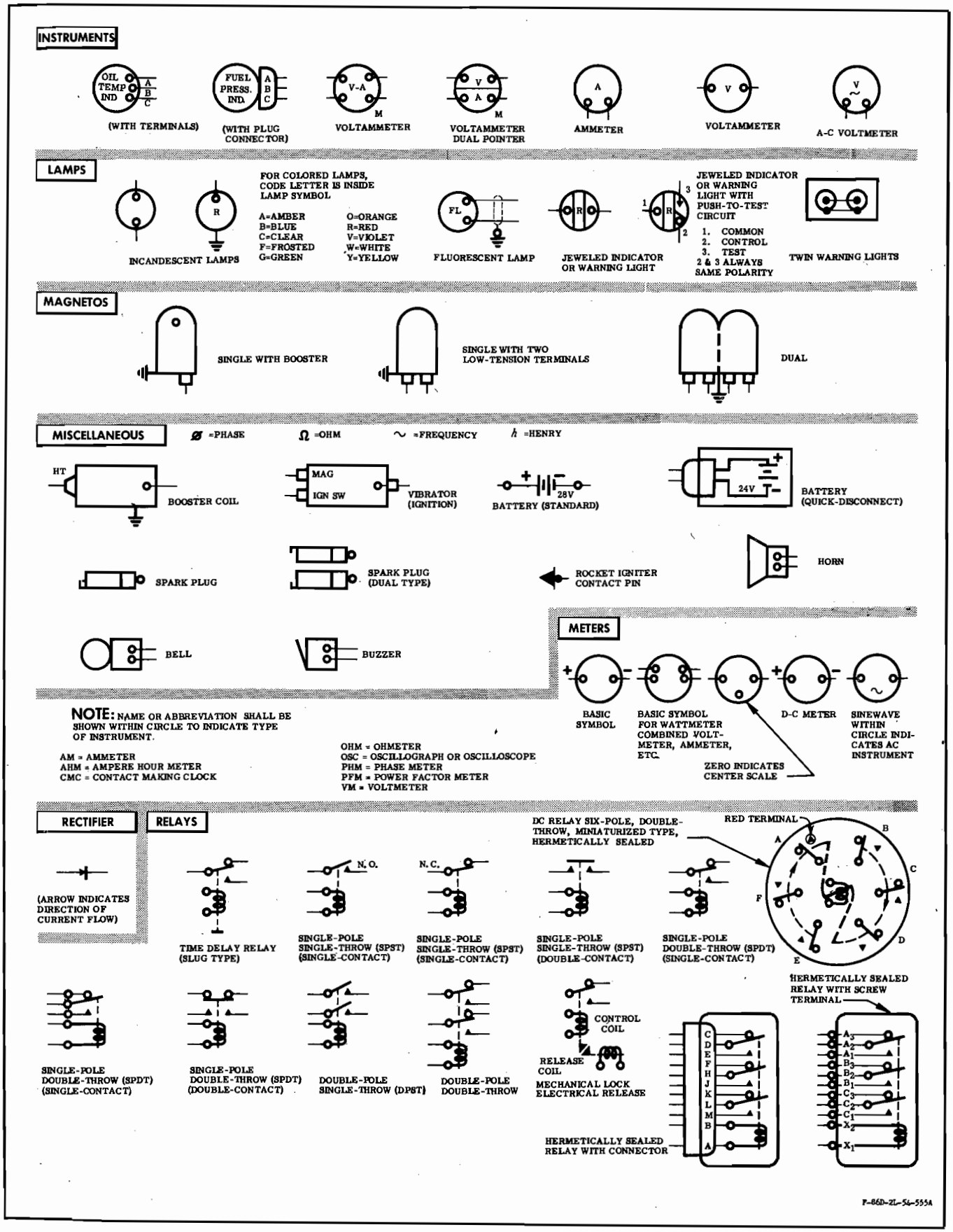


Figure 10-4. Electrical and Electronic Symbol Chart (Sheet 2 of 4)

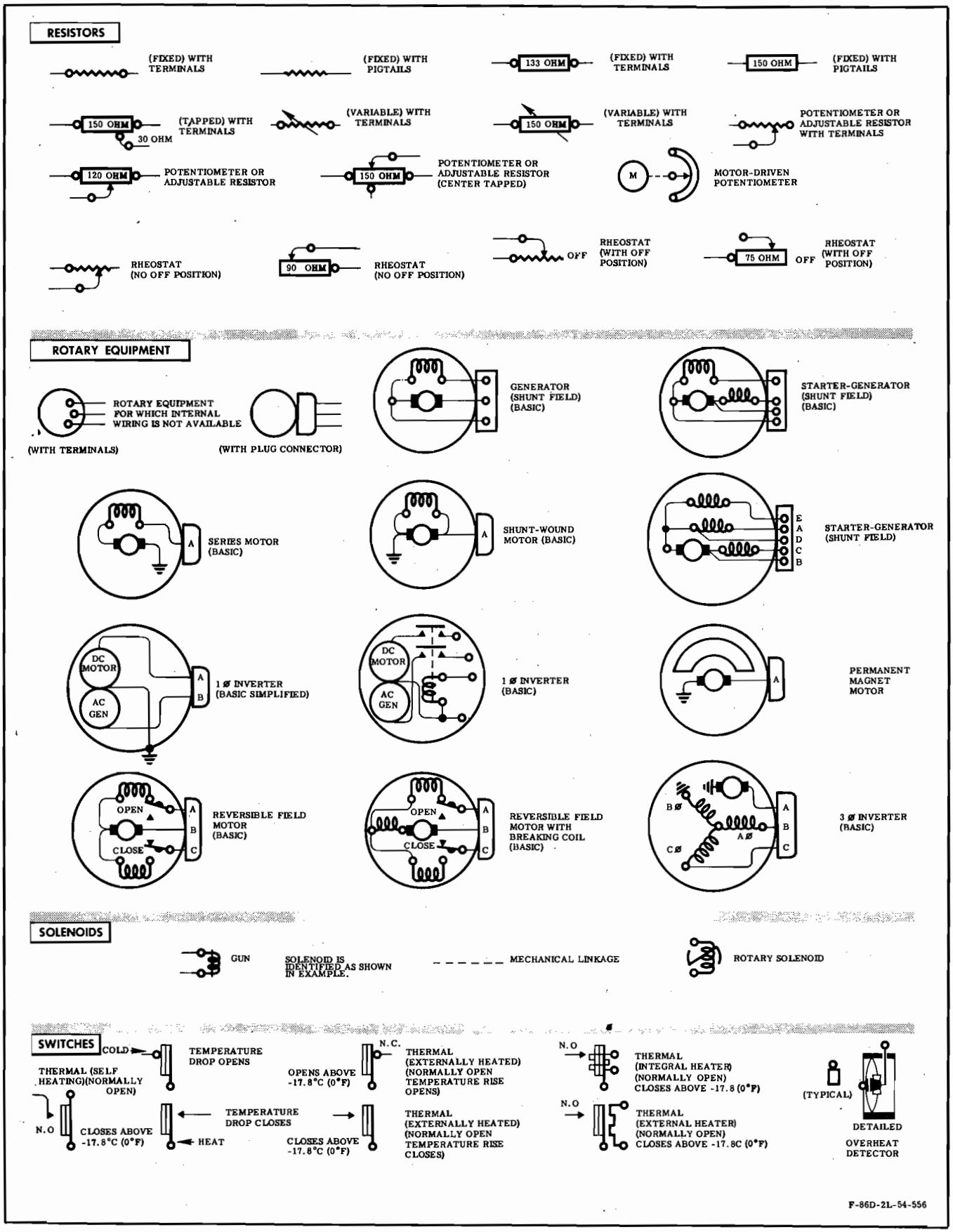
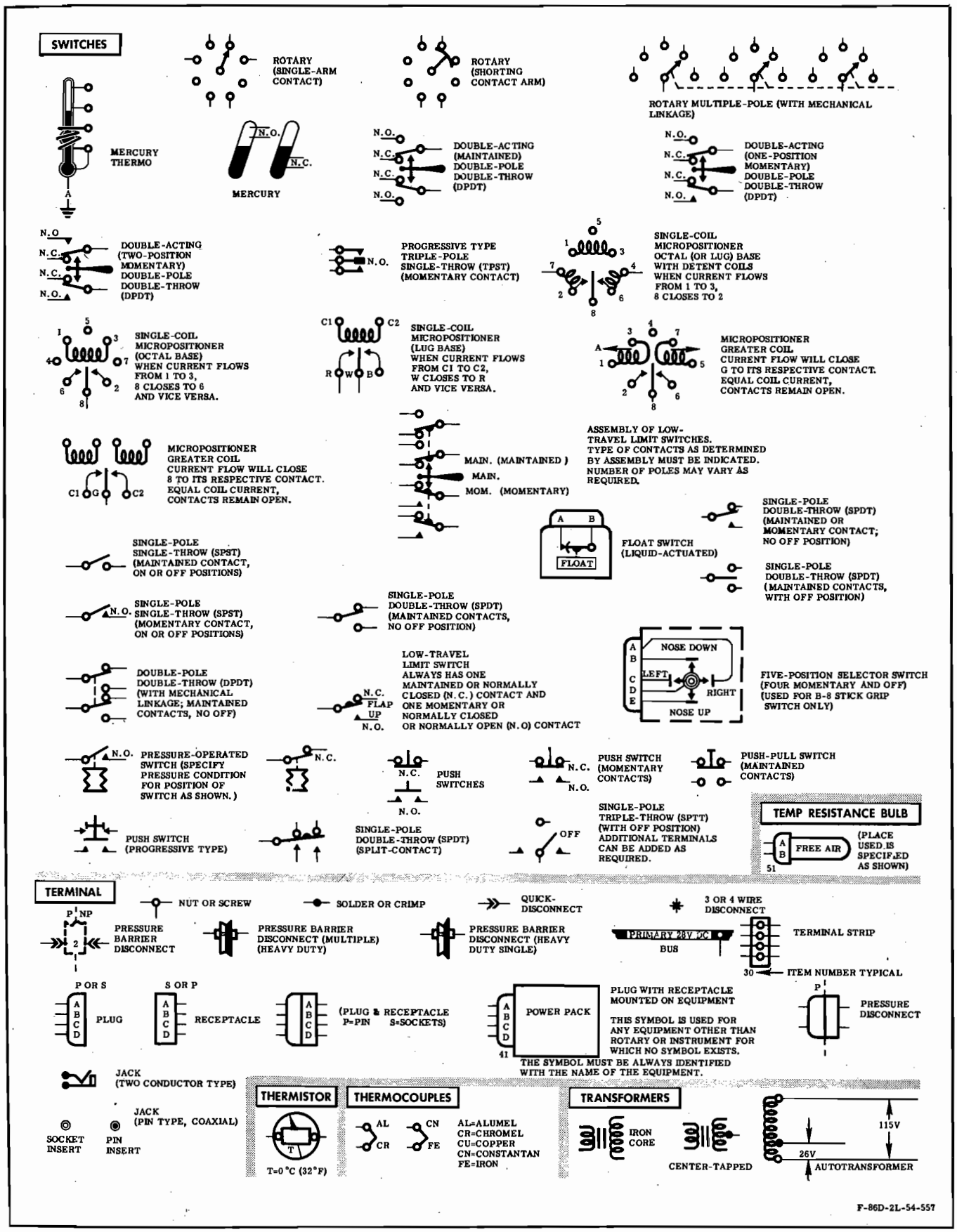


Figure 10-4. Electrical and Electronic Symbol Chart (Sheet 3 of 4)



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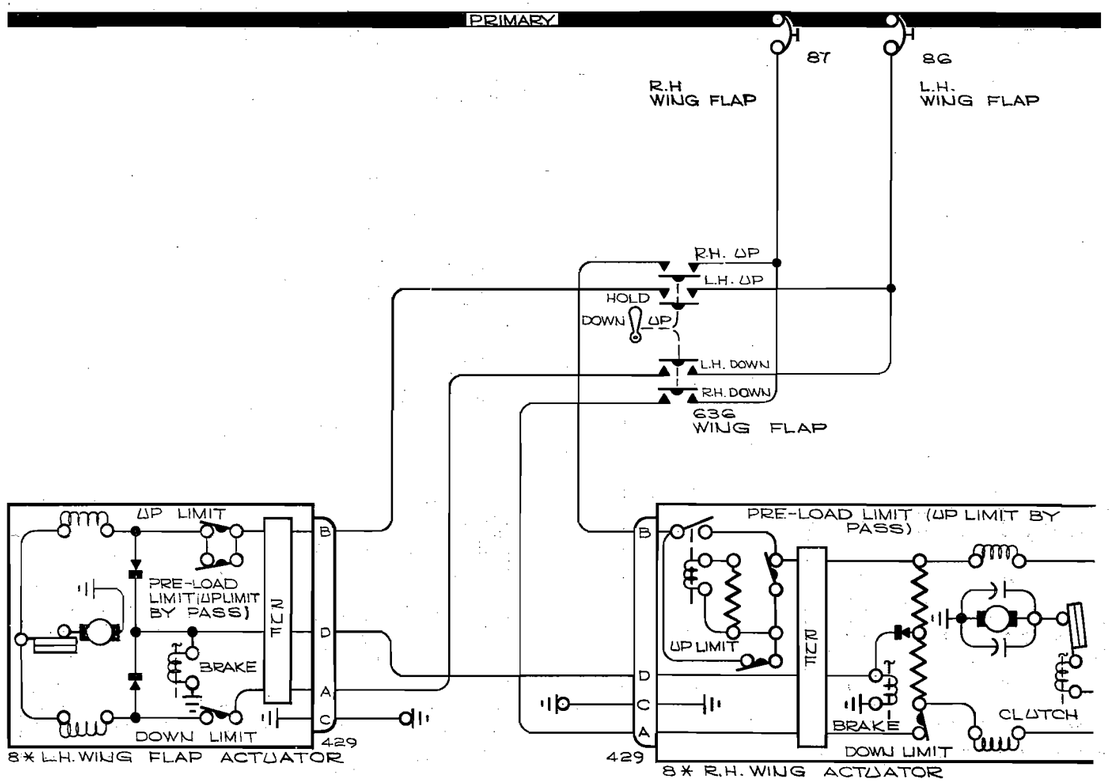
Electrical and Electronic Symbol Chart 678



* INTERCHANGEABLE ITEMS, USE MATCHING PAIRS

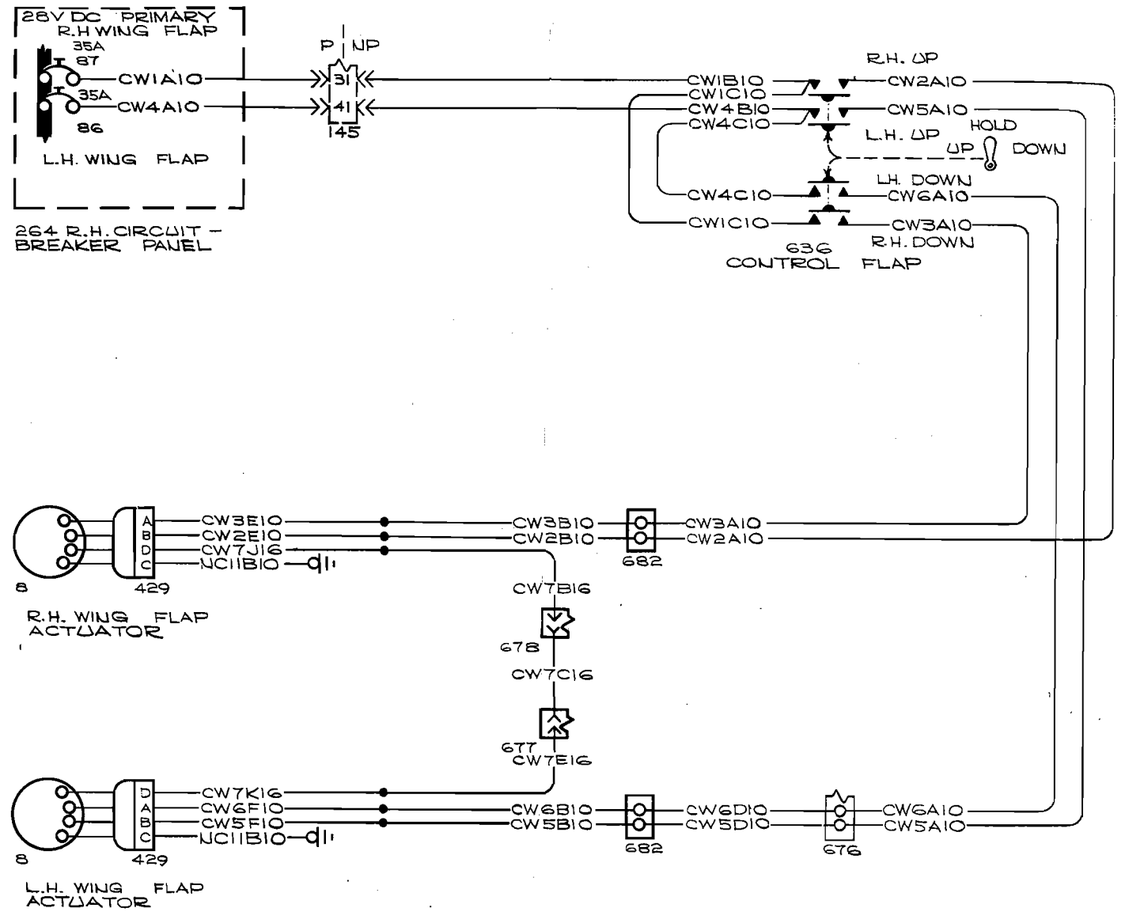
F-86F-2-54-222

WING FLAP SYSTEM

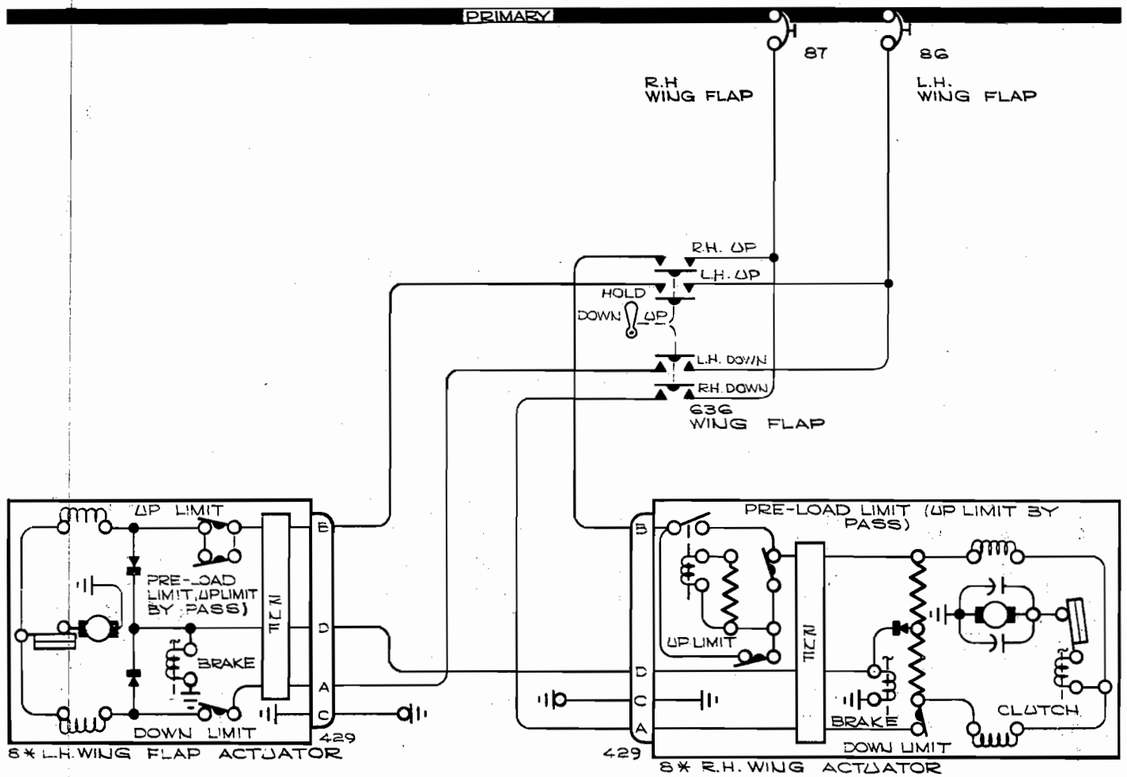
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
8	Actuator - Wing Flap	Wing 105 RH and LH	Wing Flap Bays
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
429	Receptacle - Wing Flap Actuator	Wing 105 RH and LH	Wings
636	Switch - Wing Flap	Fus 95 LH	Throttle Quadrant
676	Terminal Block - Wing Flap	Fus 190 RH and LH	Wheel Wells
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
682	Terminal Block - Wing Disconnect	Fus 190 LH and RH	Wheel Wells

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Wing Flap System - F-86F-1 and F-86F-20 Airplanes AF51-13070 Through -13089



F-86F-2-54-218



* INTERCHANGEABLE ITEMS, USE MATCHING PAIRS

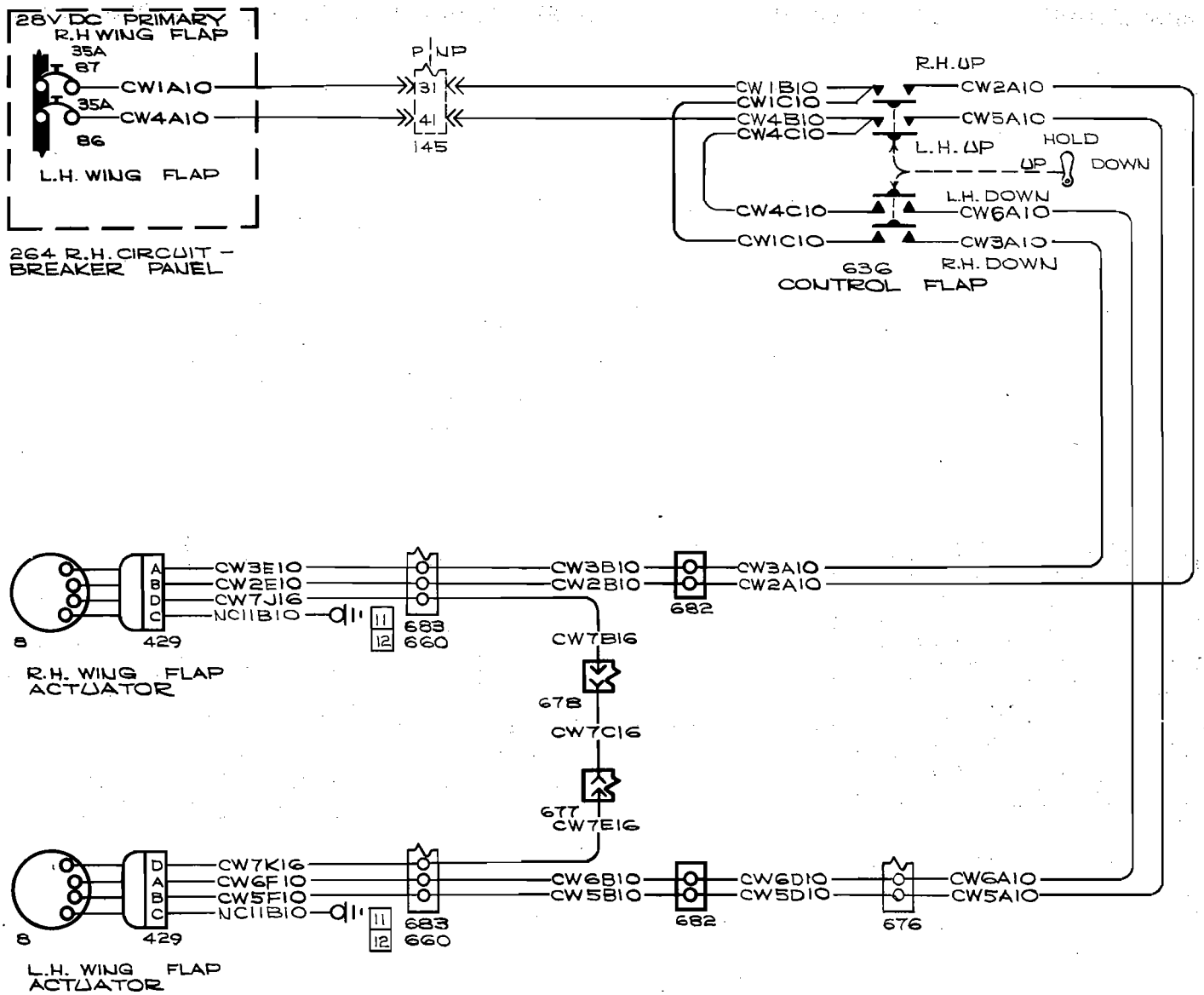
F-86F-2-54-222

Wing Flap System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
8	Actuator - Wing Flap	Wing 105 RH and LH	Wing Flap Bays
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
429	Receptacle - Wing Flap Actuator	Wing 105 RH and LH	Wings
636	Switch - Wing Flap	Fus 95 LH	Throttle Quadrant
660	Terminal Block - Wing Flap Actuator	Wing 56 LH and RH	Wings
676	Terminal Block - Wing Flap	Fus 190 RH and LH	Wheel Wells
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
682	Terminal Block - Wing Disconnect	Fus 190 LH and RH	Wheel Wells
683	Terminal Block - Wing Flap Actuator	Fus 385 CL	Rudder

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Wing Flap System - F-86F-5 Through -15 Airplanes and F-86F-20 Airplanes AF51-13090 Through -13109

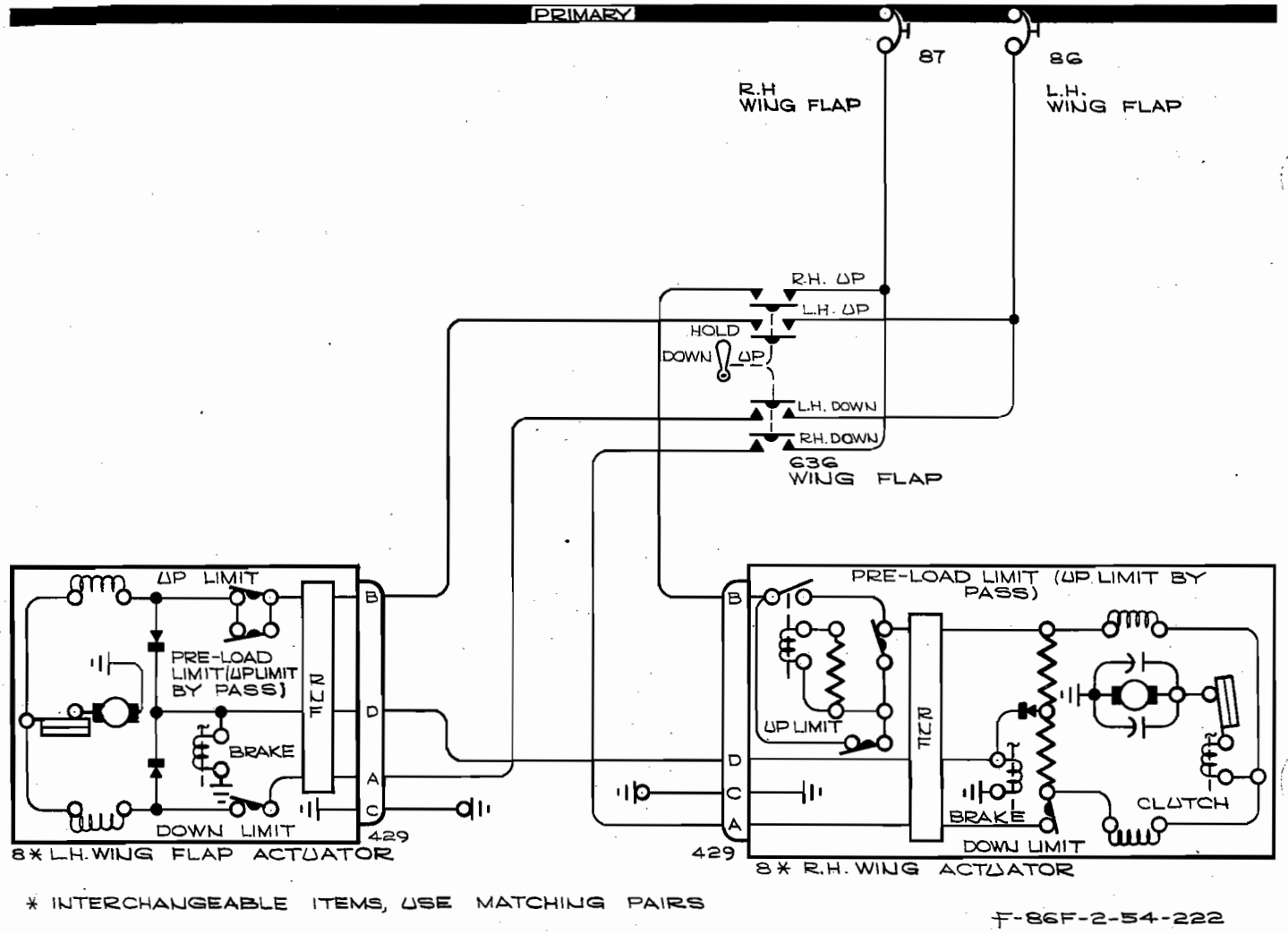


[11] F-86F-5 THROUGH -15 AIRPLANES

[12] F-86F-20 AIRPLANES AF51-13090 THROUGH AF51-13109

F-86F-2-54-221

WING FLAP SYSTEM
F-86F-5 THROUGH -15 AIRPLANES AND
F-86F-20 AIRPLANES AF 51-13090 THROUGH -13109

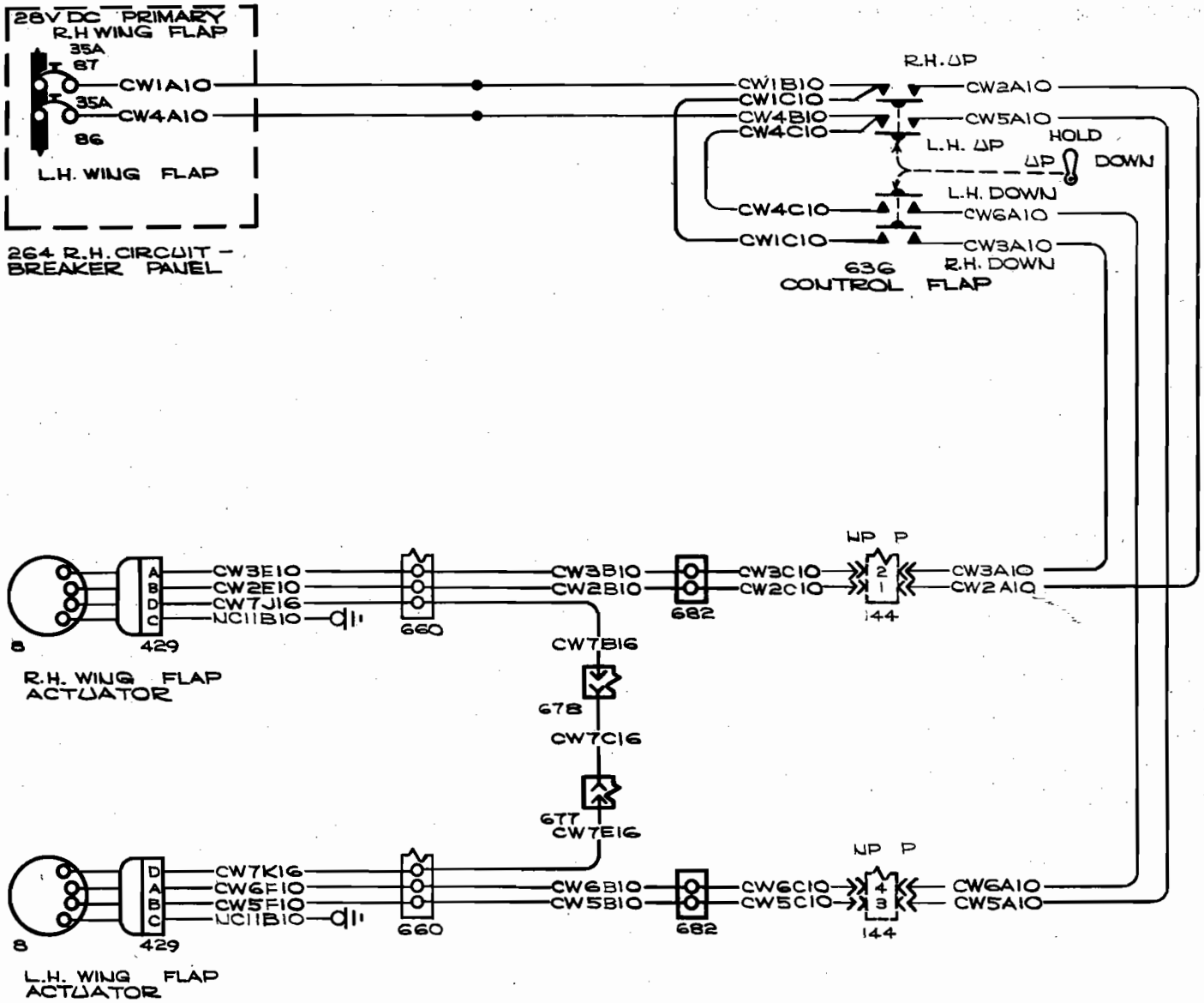


Wing Flap System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
8	Actuator - Wing Flap	Wing 105 RH and LH	Wing Flap Bays
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
429	Receptacle - Wing Flap Actuator	Wing 105 RH and LH	Wings
636	Switch - Wing Flap	Fus 95 LH	Throttle Quadrant
660	Terminal Block - Wing Flap Actuator	Wing 56 LH and RH	Wings
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
682	Terminal Block - Wing Disconnect	Fus 190 LH and RH	Wheel Wells

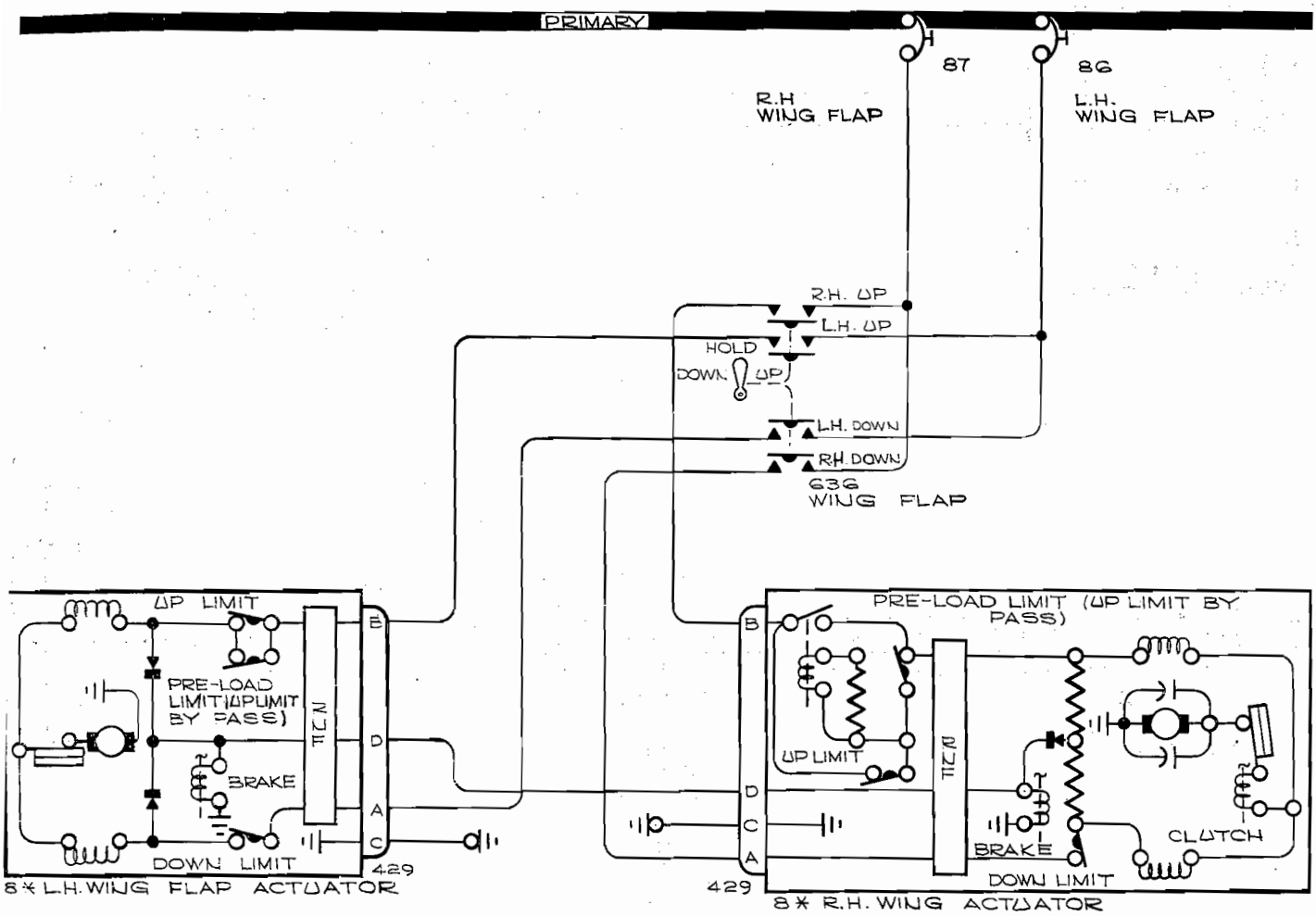
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Wing Flap System F-86F-20 Airplanes AF51-13110 Through AF51-13169 and F-86F-25 Airplanes



F-86F-2-54-219 A

WING FLAP SYSTEM
F-86F-20 AIRPLANES AF51-13110 THROUGH AF51-13169 AND F-86F-25 AIRPLANES



* INTERCHANGEABLE ITEMS, USE MATCHING PAIRS

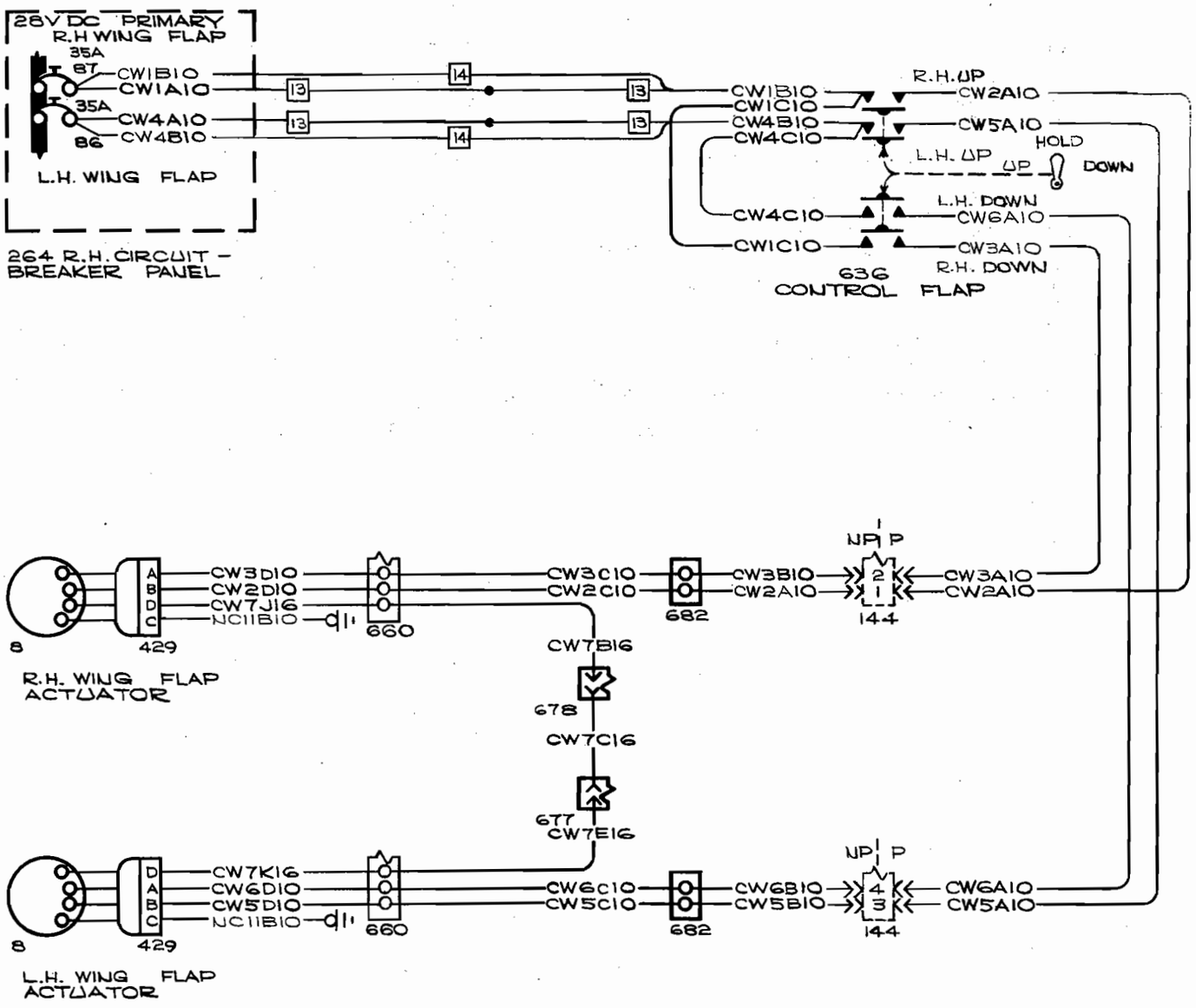
F-86F-2-54-222

Wing Flap System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
8	Actuator - Wing Flap	Wing 105 RH and LH	Wing Flap Bays
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
429	Receptacle - Wing Flap Actuator	Wing 105 RH and LH	Wings
636	Switch - Wing Flap	Fus 95 LH	Throttle Quadrant
660	Terminal Block - Wing Flap Actuator	Wing 56 LH and RH	Wings
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
682	Terminal Block - Wing Disconnect	Fus 190 LH and RH	Wheel Wells

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Wing Flap System - F-86F-30 and F-86F-35 Airplanes

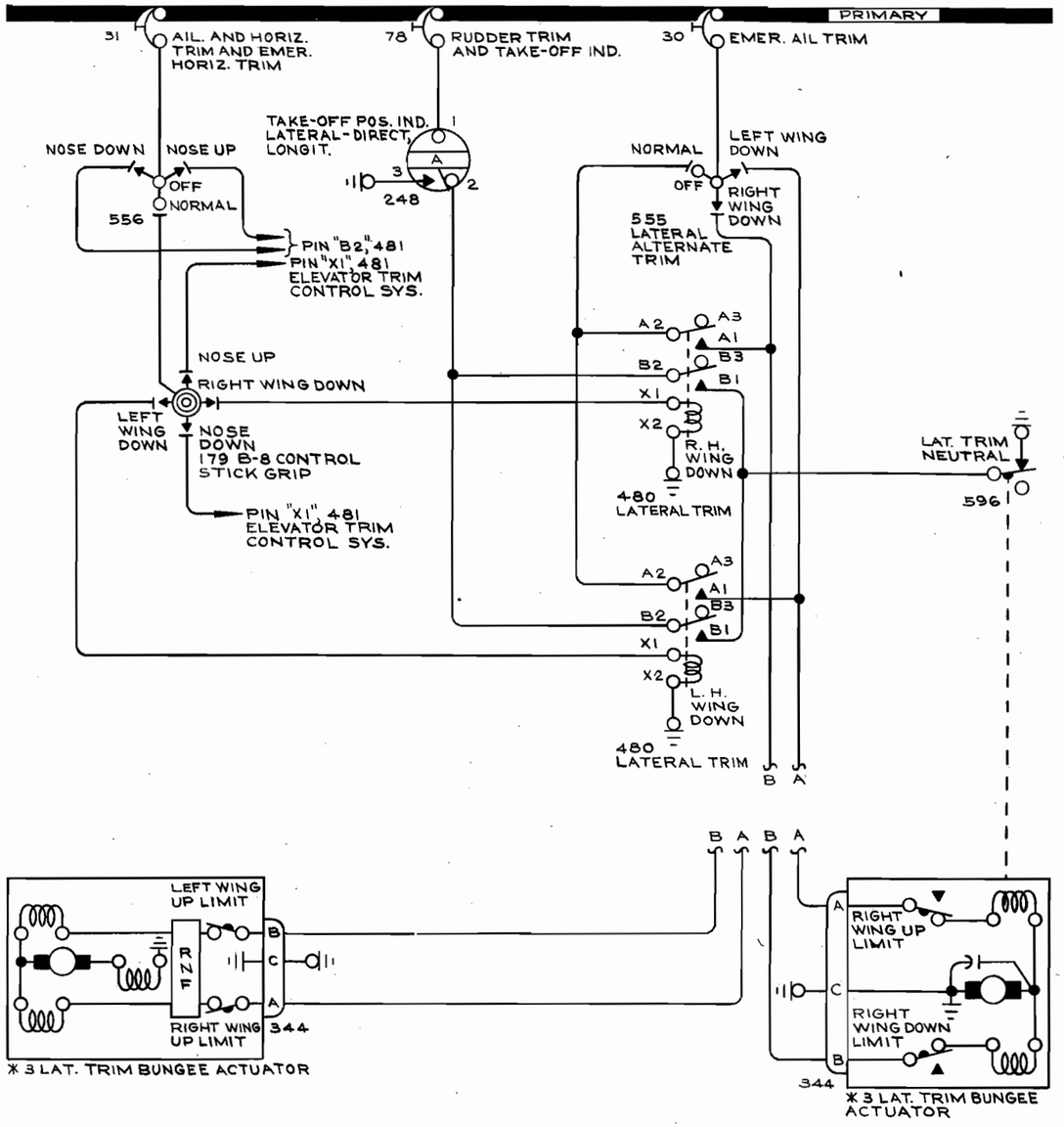


13 F-86F-30 AIRPLANES AF52-4305 THROUGH AF52-4904 AIRPLANES

14 F-86F-30 AIRPLANES AF52-4905 THROUGH AF52-5163 AND F-86F-35 AIRPLANES

F-86F-2-54-220

WING FLAP SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES



* THESE ITEMS ARE INTERCHANGEABLE

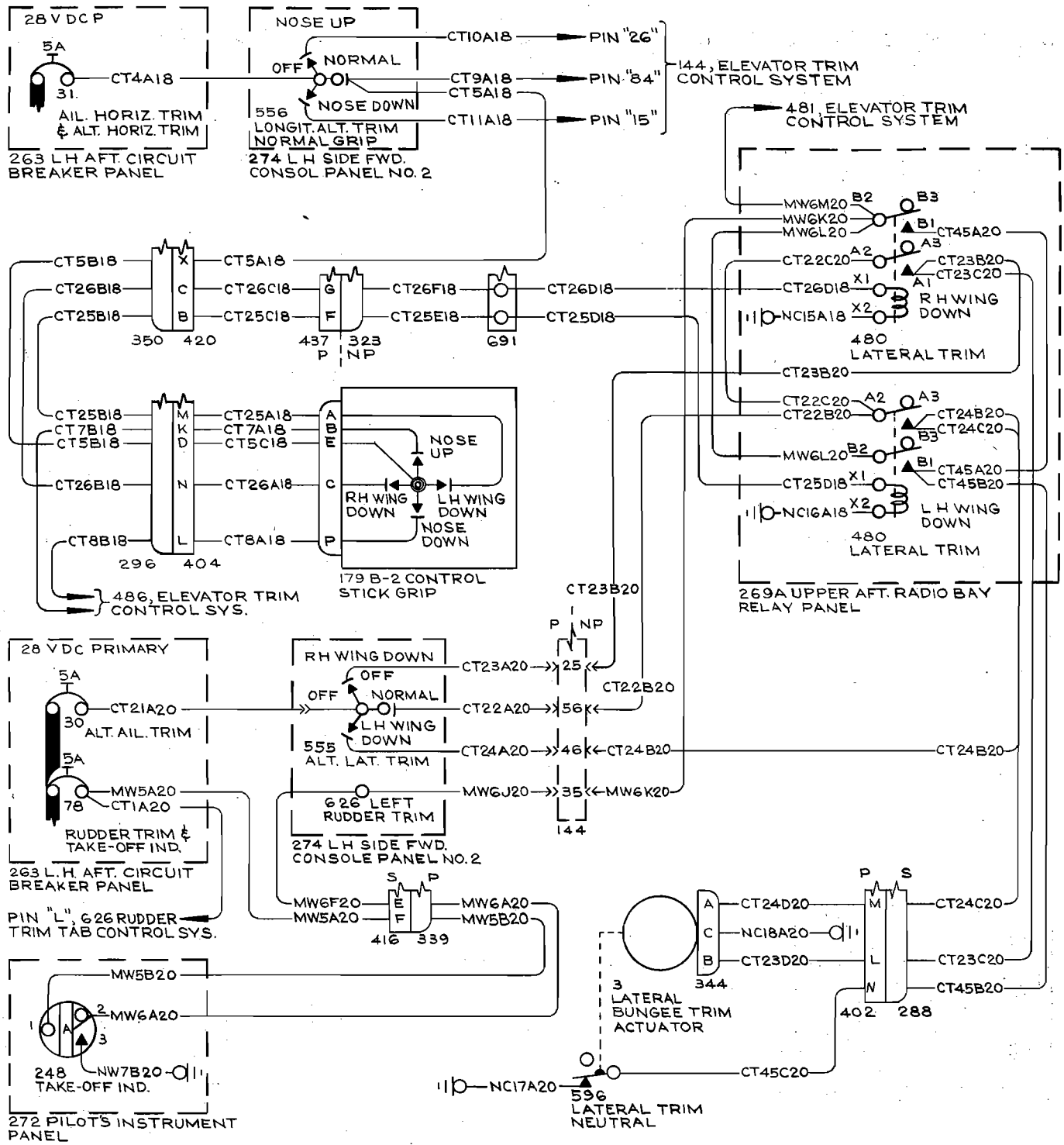
F-86F-2-54-289

AILERON TRIM CONTROL SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
3	Actuator - Lateral Bungee Trim	Fus 130. 7 RH	Wing Slot
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Station 155 Left-hand Side Relay	Fus 155 LH	LH Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
344	Plug - Lateral Bungee Trim Actuator	Fus 133. 5 CL	Slot
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62. 6 LH	Directly Behind Pedestal
481	Relay - Longitudinal Trim	Fus 155 LH	Radio Bay
596	Switch - Lateral Trim Neutral	Fus 84 RH	Wing Slot
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

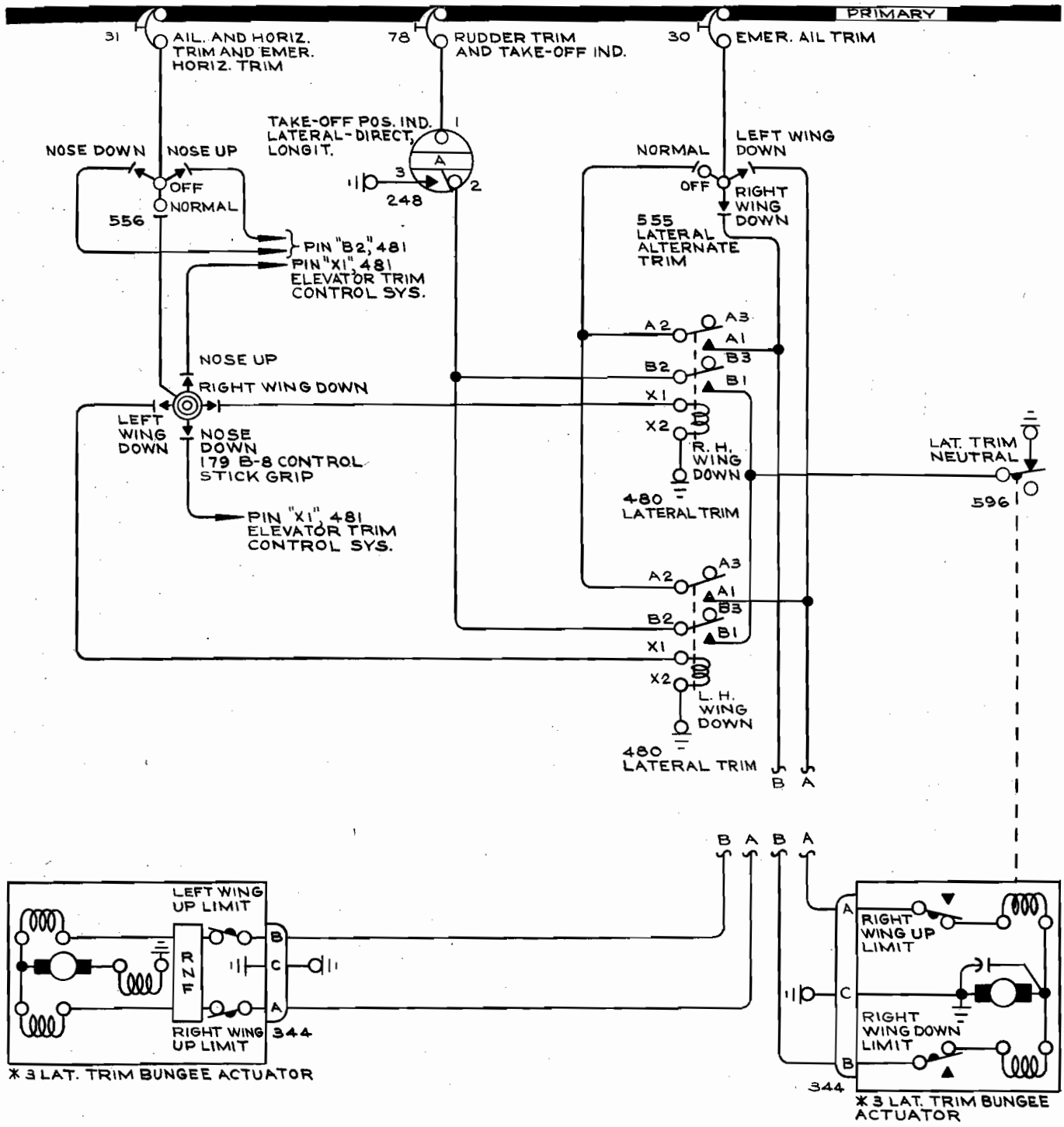
Aileron Trim Control System - F-86F-1 and F-86F-5 Airplanes



F-86F-2-54-287

AILERON TRIM CONTROL SYSTEM
F-86F-1 AND F-86F-5 AIRPLANES

282H



* THESE ITEMS ARE INTERCHANGEABLE

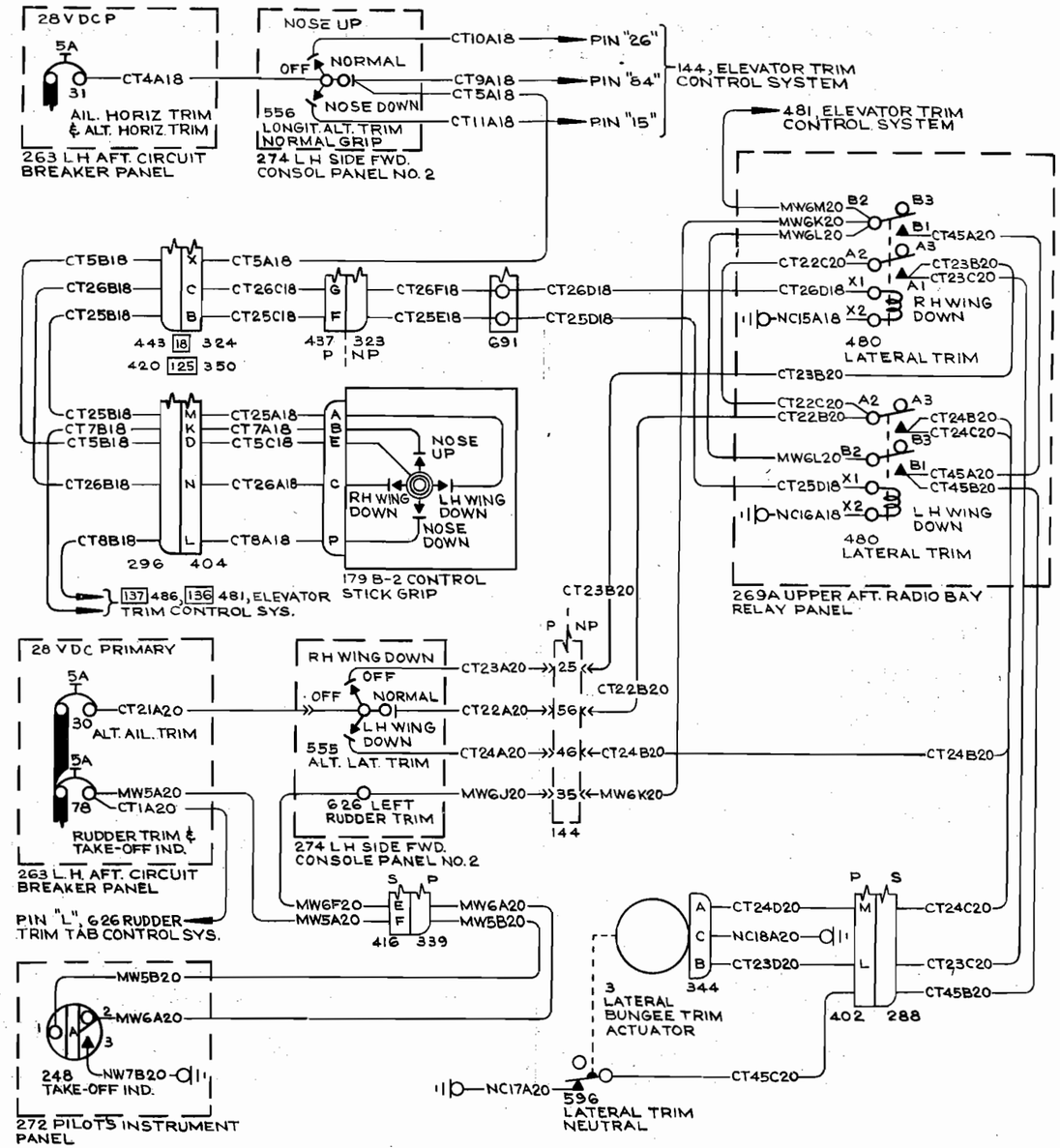
F-86F-2-54-289

AILERON TRIM CONTROL SYSTEM

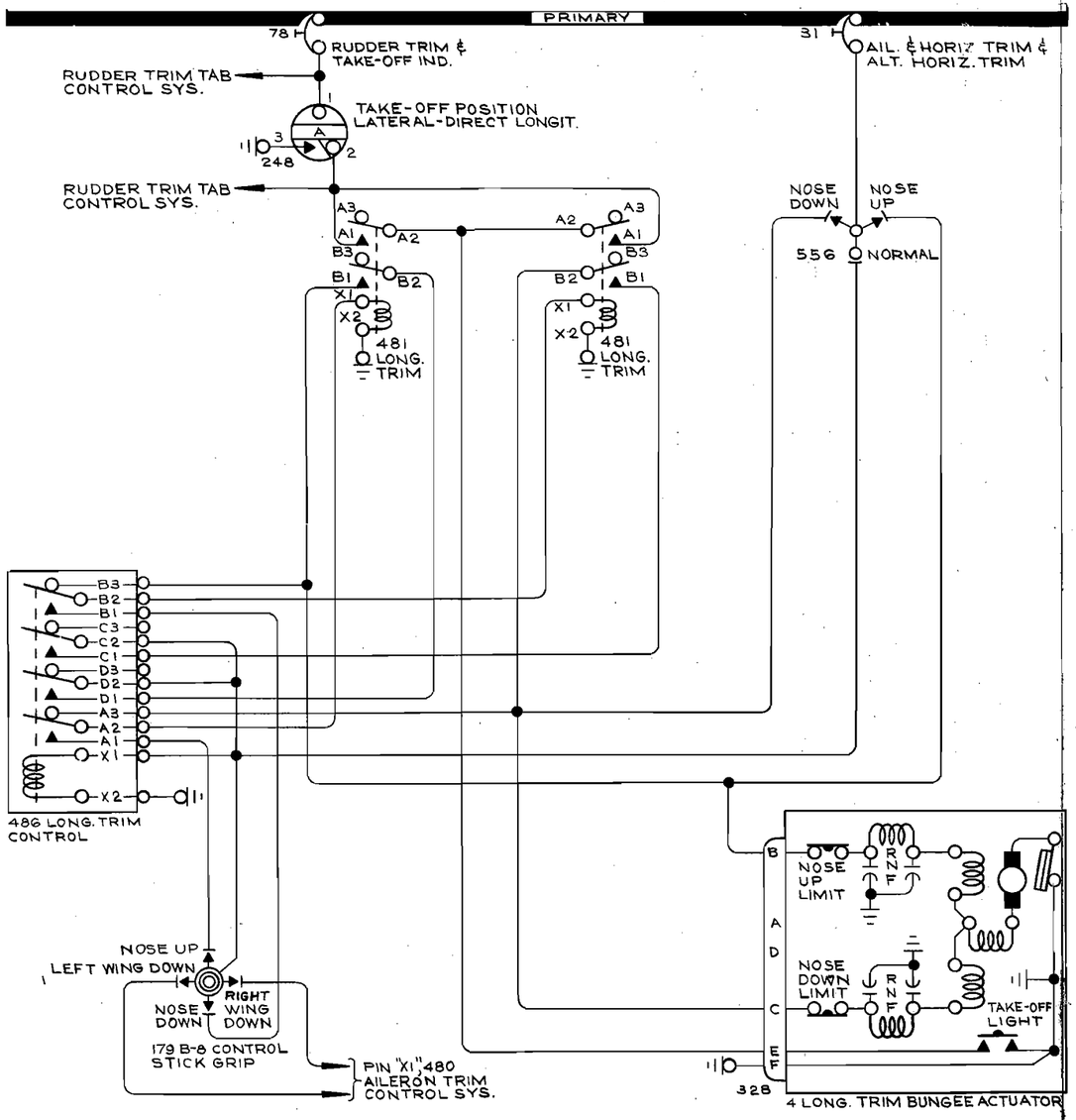
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
3	Actuator - Lateral Bungee Trim	Fus 130.7 RH	Wing Slot
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Station 155 Left-hand Side Relay	Fus 155 LH	LH Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
288	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
344	Plug - Lateral Bungee Trim Actuator	Fus 133.5 CL	Slot
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
443	Receptacle - Wing Aft Disconnect	Fus 190 LH and RH	LH and RH Wheel Well
481	Relay - Longitudinal Trim	Fus 155 LH	Radio Bay
596	Switch - Lateral Trim Neutral	Fus 84 RH	Wing Slot
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Aileron Trim Control System F-86F-10 Through F-86F-35 Airplanes



AILERON TRIM CONTROL SYSTEM
F-86F-10 THROUGH F-86F-35 AIRPLANES



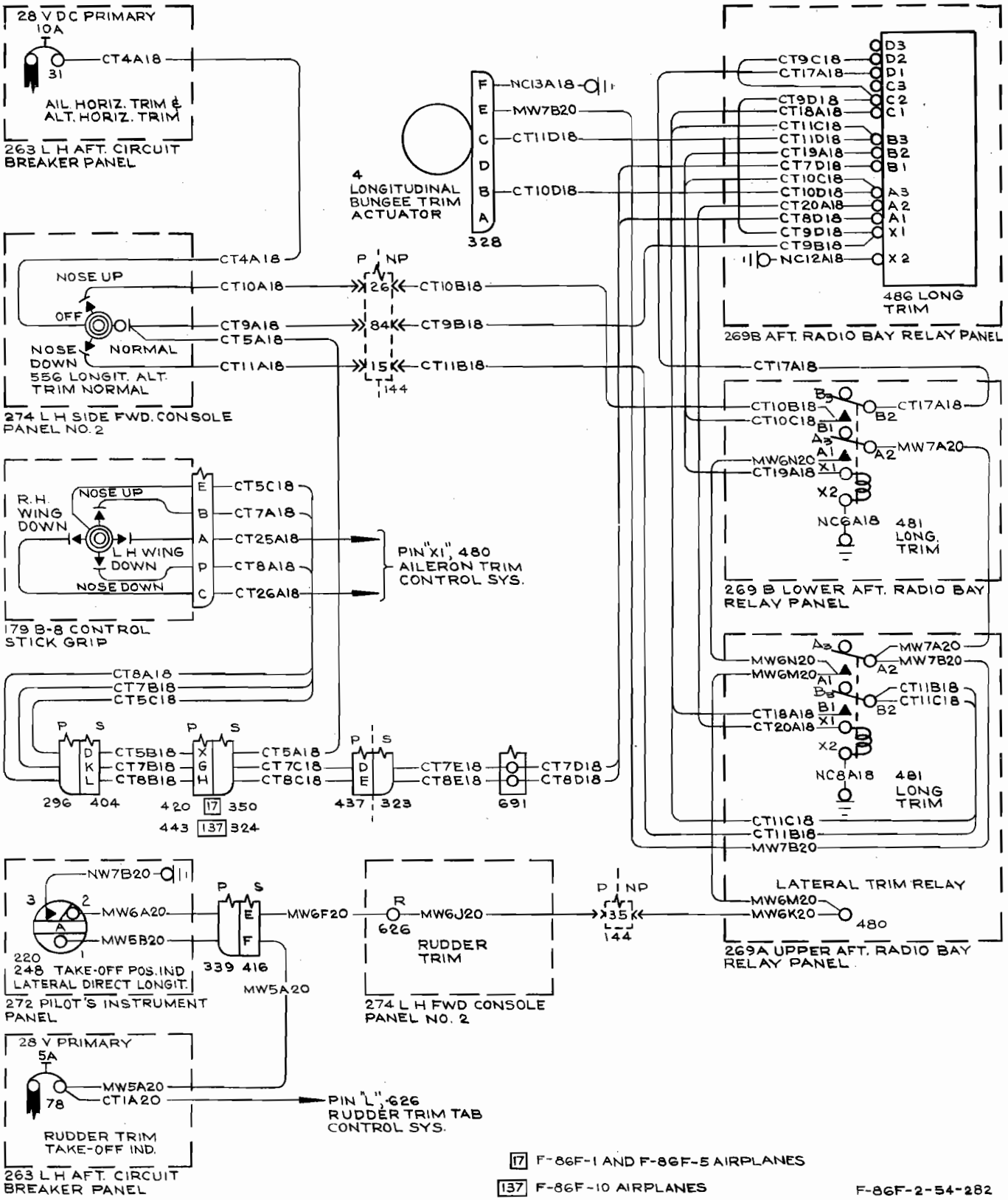
F-86F-2-54-280

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-1 THROUGH F-86F-10 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
4	Actuator - Longitudinal Bungee Trim	Fus 144.6 LH	LH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269A	Panel - Upper Aft Radio Bay Relay	Fus 155 LH	Radio Bay
269B	Panel - Lower Aft Radio Bay Relay	Fus 155 LH	Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
324	Plug - GSAP Camera	Fus 18 CL	Radar Bay
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
480	Relay - Lateral Trim	Fus 155 LH	Radio Bay
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Horizontal Stabilizer Trim Control System - F-86F-1 Through F-86F-10 Airplanes

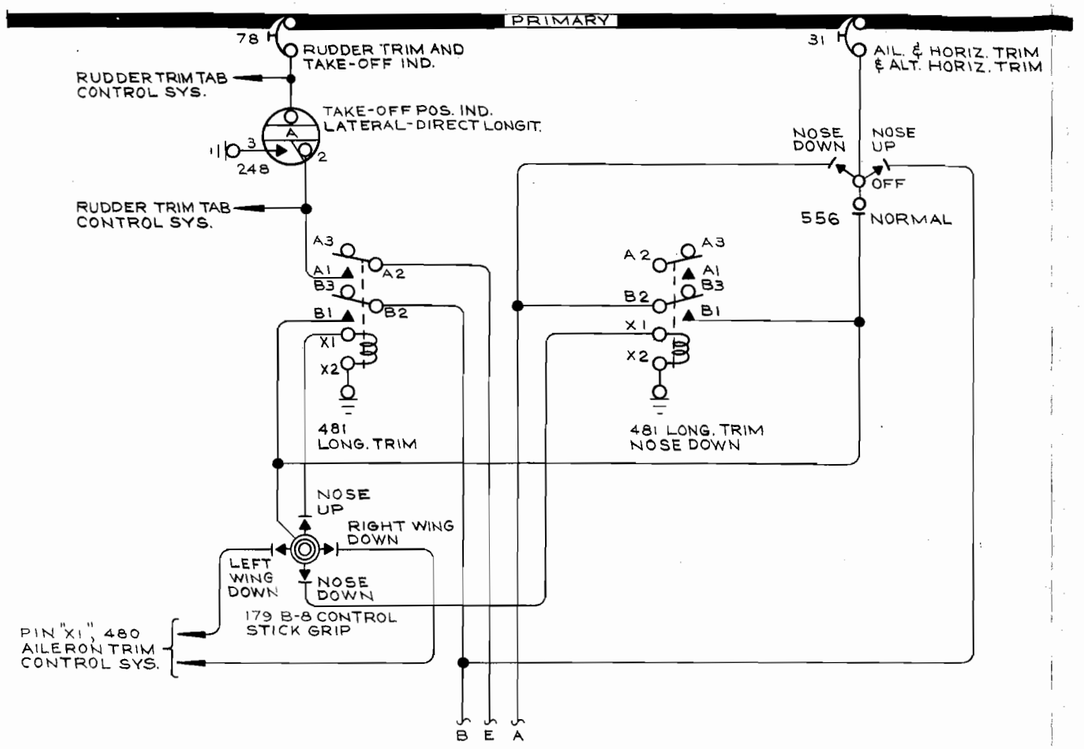


HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-1 THROUGH F-86F-10 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
4	Actuator - Longitudinal Bungee Trim	Fus 144.6 LH	LH Radio Bay
31	Circuit Breaker - Alternate Horizontal Stabilizer Trim	Fus 118 LH	Cockpit
78	Circuit Breaker - Rudder Trim and Take-off Indicator	Fus 118 LH	Cockpit
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269A	Panel - Upper Aft Radio Bay Relay	Fus 155 LH	Radio Bay
269B	Panel - Lower Aft Radio Bay Relay	Fus 155 LH	Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
397	Receptacle - Aft Fuselage Disconnect	Fus 231 LH and RH	LH Engine Access
404	Receptacle - Control Stick Grip (B-8)	Fus 84 CL	Cockpit
416	Receptacle - Instrument Panel Indicator Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
480	Relay - Lateral Trim	Fus 155 LH	Radio Bay
556	Switch - Alternate Longitudinal Trim	Fus 85 LH	Cockpit, LH Console
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
695	Terminal Block - Wing Bomb Rack	Wing 170 LH and RH	Wings

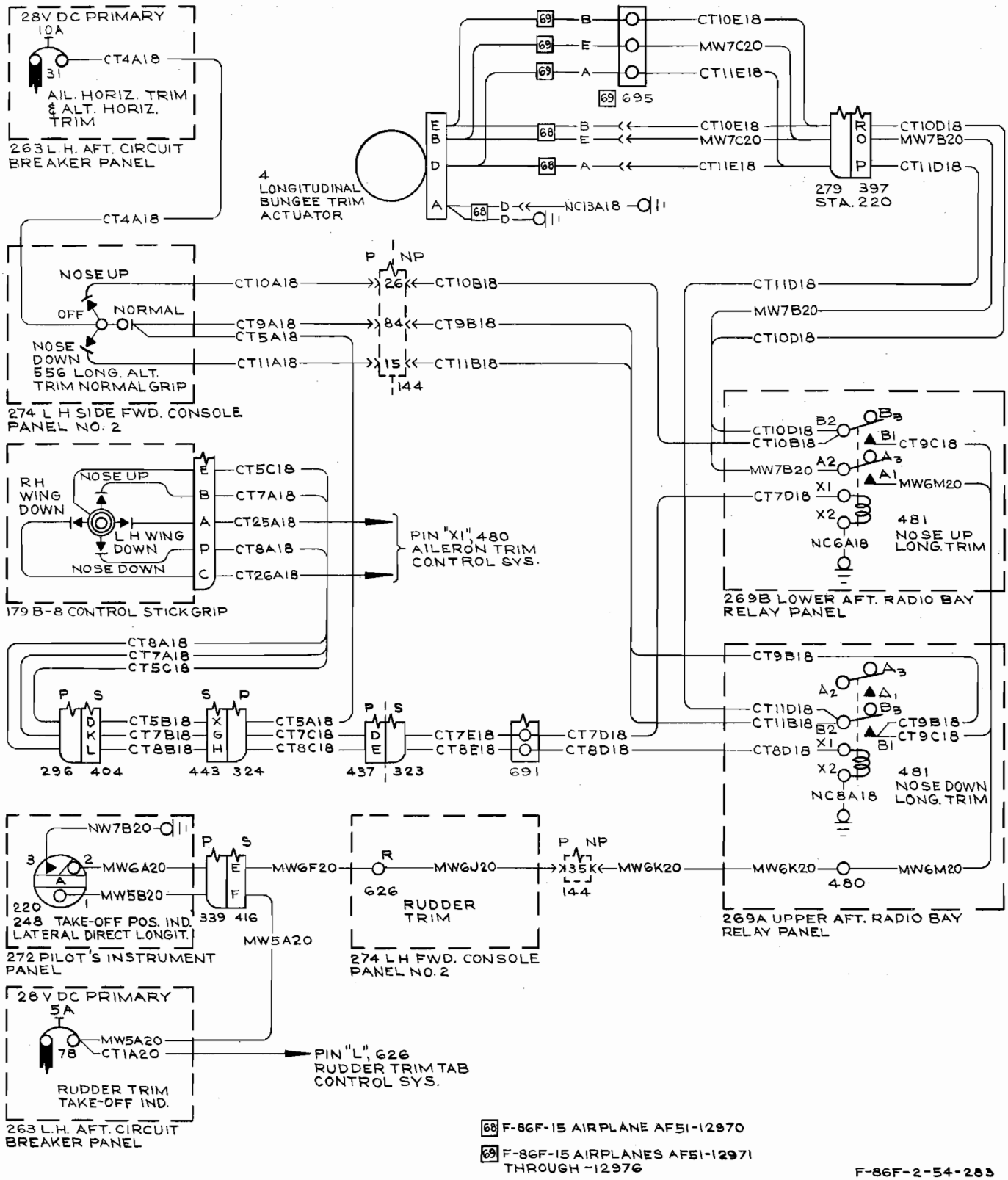
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Horizontal Stabilizer Trim Control System F-86F-15 Airplanes

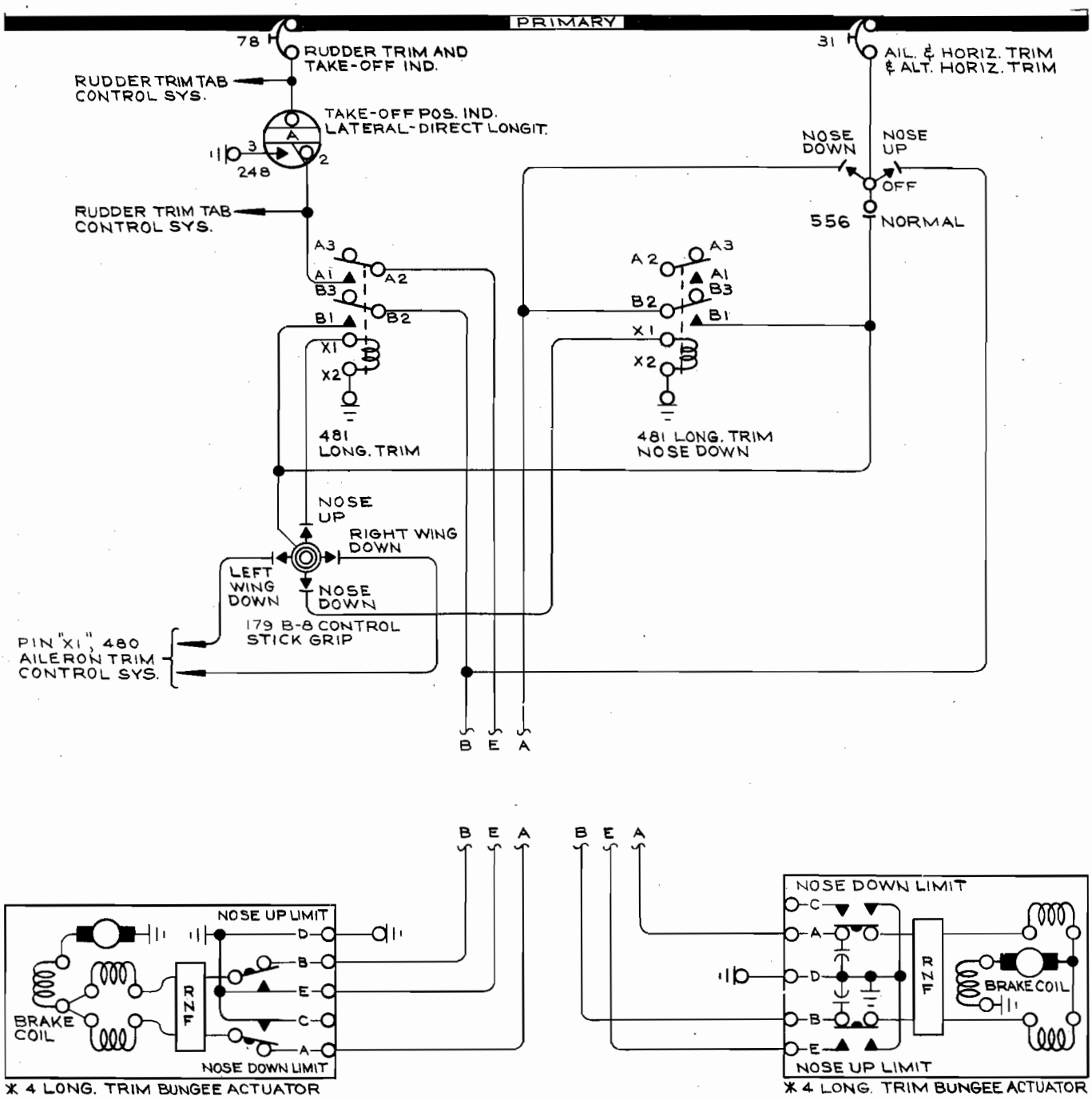


F-86F-2-54-251

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-15 AND SUBSEQUENT AIRPLANES



HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-15 AIRPLANES



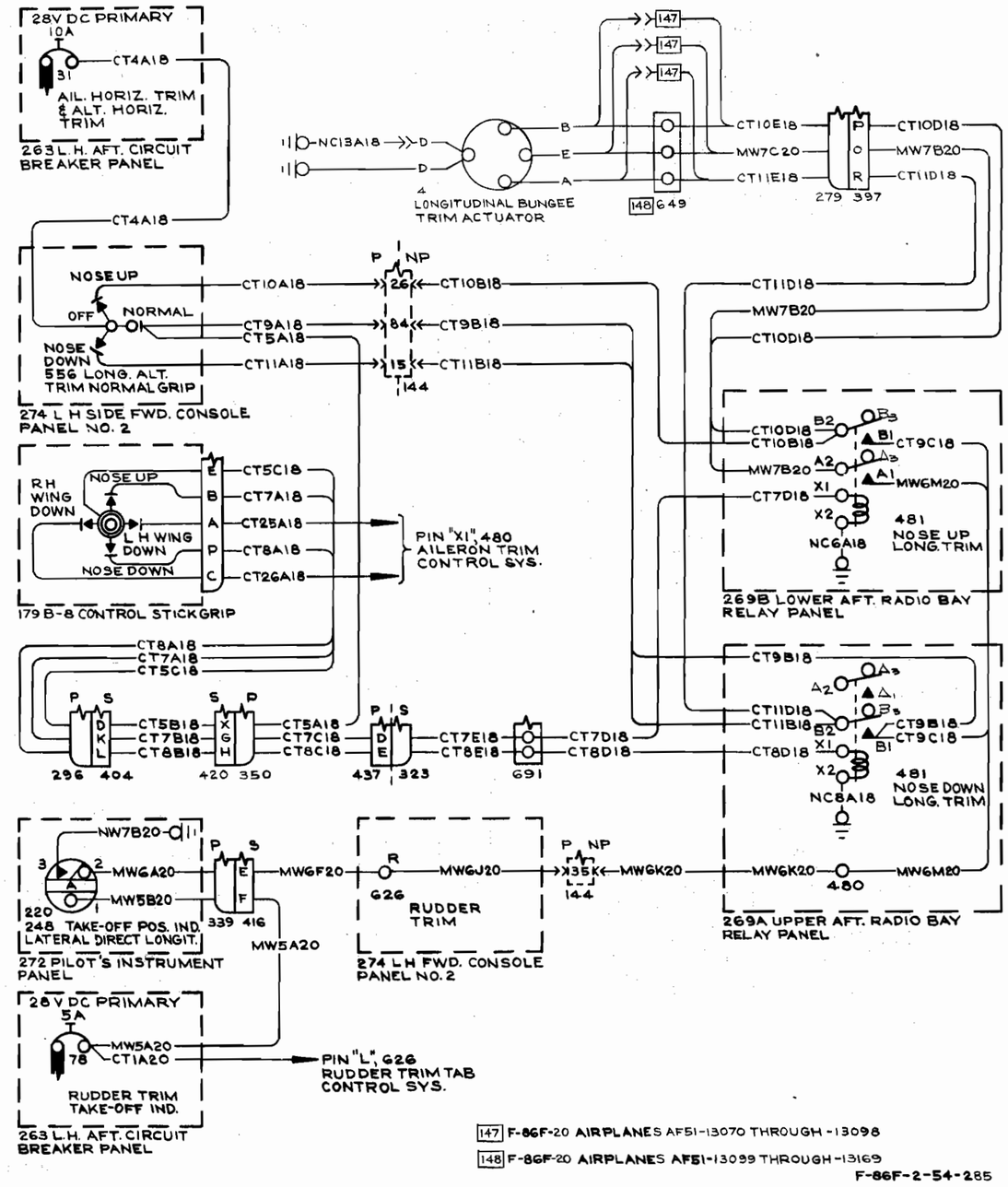
F-86F-2-54-281

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-15 AND SUBSEQUENT AIRPLANES

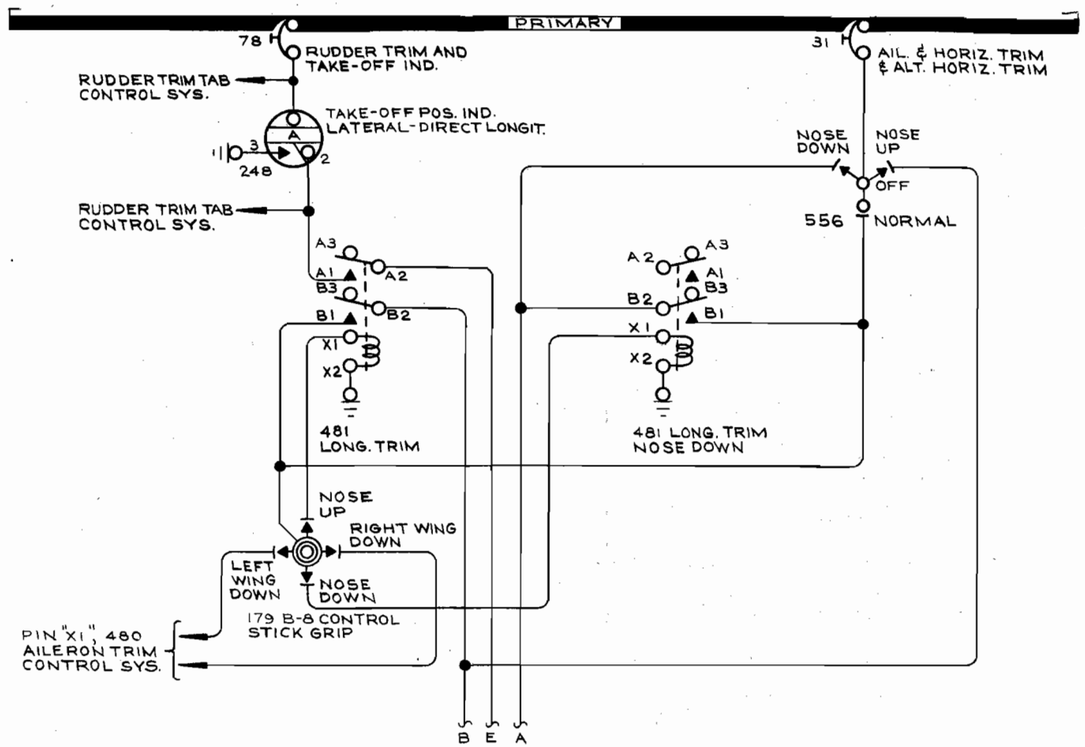
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
4	Actuator - Longitudinal Bungee Trim	Fus 144.6 LH	LH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269A	Panel - Upper Aft Radio Bay Relay	Fus 155 LH	Radio Bay
269B	Panel - Lower Aft Radio Bay Relay	Fus 155 LH	Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

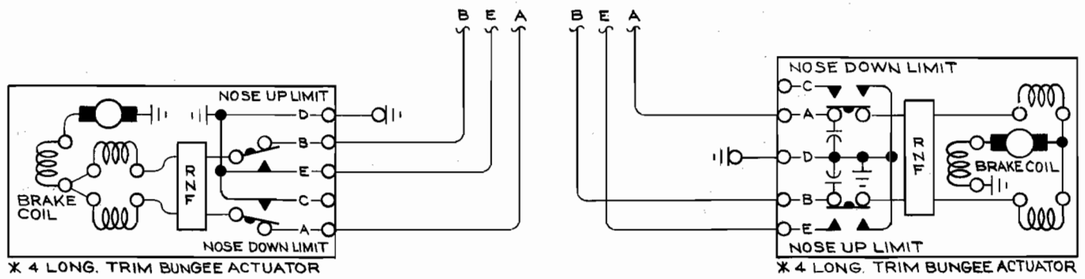
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Horizontal Stabilizer Trim Control System F-86F-20 Airplanes



HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-20 AIRPLANES





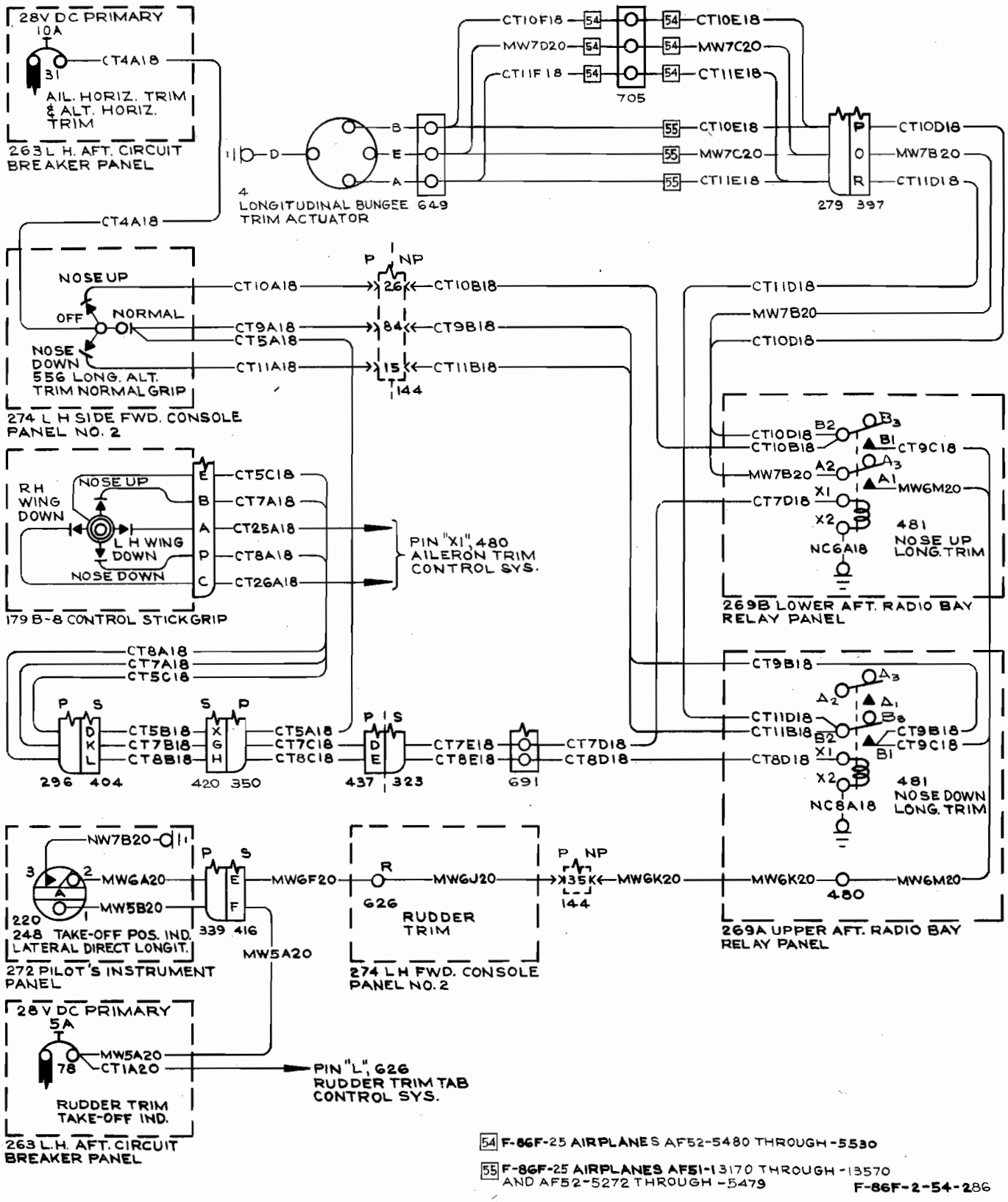
F-86F-2-54-281

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-15 AND SUBSEQUENT AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
4	Actuator - Longitudinal Bungee Trim	Fus 144.6 LH	LH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269A	Panel - Upper Aft Radio Bay Relay	Fus 155 LH	Radio Bay
269B	Panel - Lower Aft Radio Bay Relay	Fus 155 LH	Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
705	Terminal Block - Empennage Equipment	Fus 340 CL	Empennage

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Horizontal Stabilizer Trim Control System F-86F-25 Airplanes

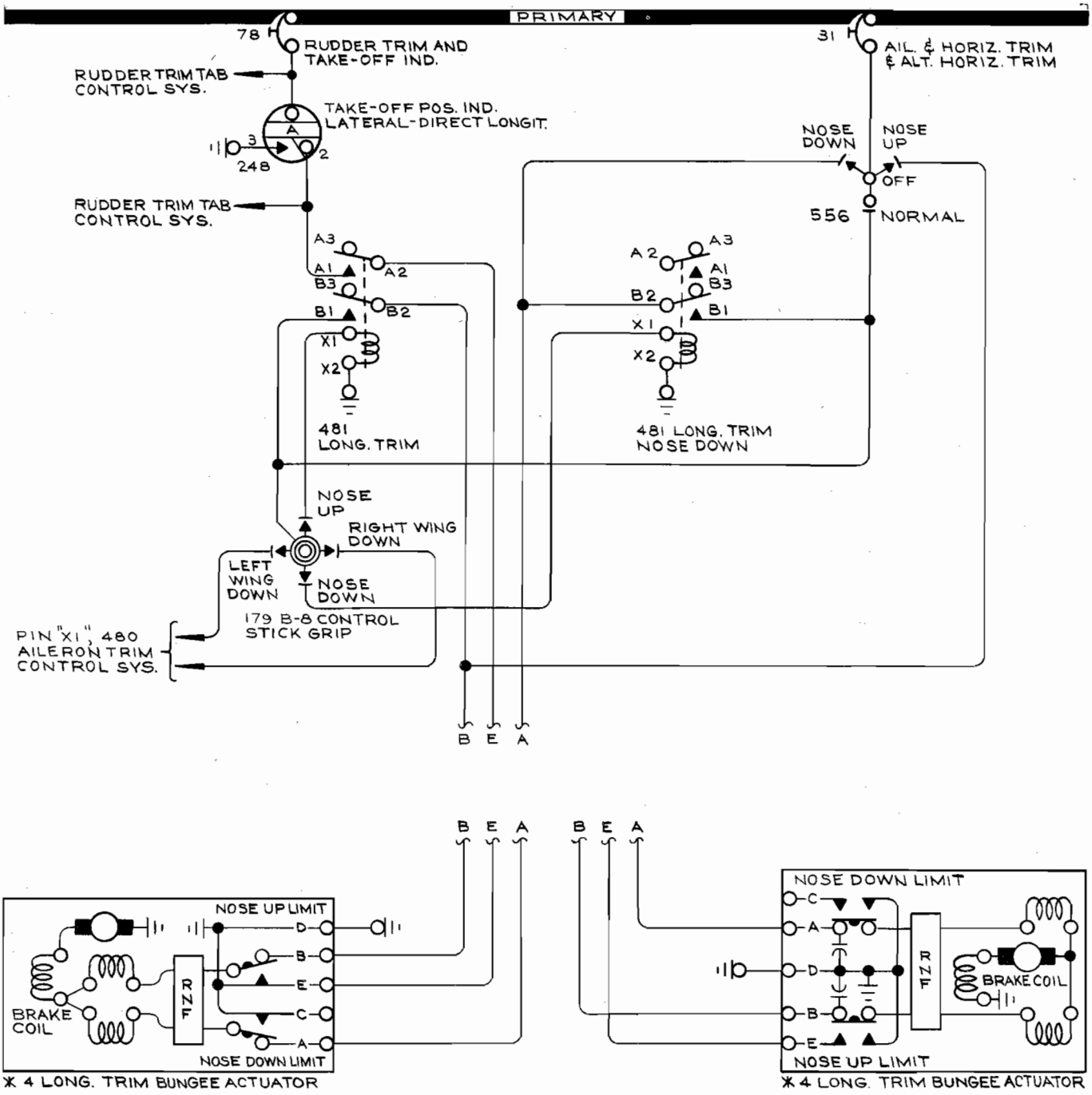


54 F-86F-25 AIRPLANES AF52-5480 THROUGH -5530

55 F-86F-25 AIRPLANES AF51-13170 THROUGH -13570 AND AF52-5272 THROUGH -5479

F-86F-2-54-286

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-25 AIRPLANES



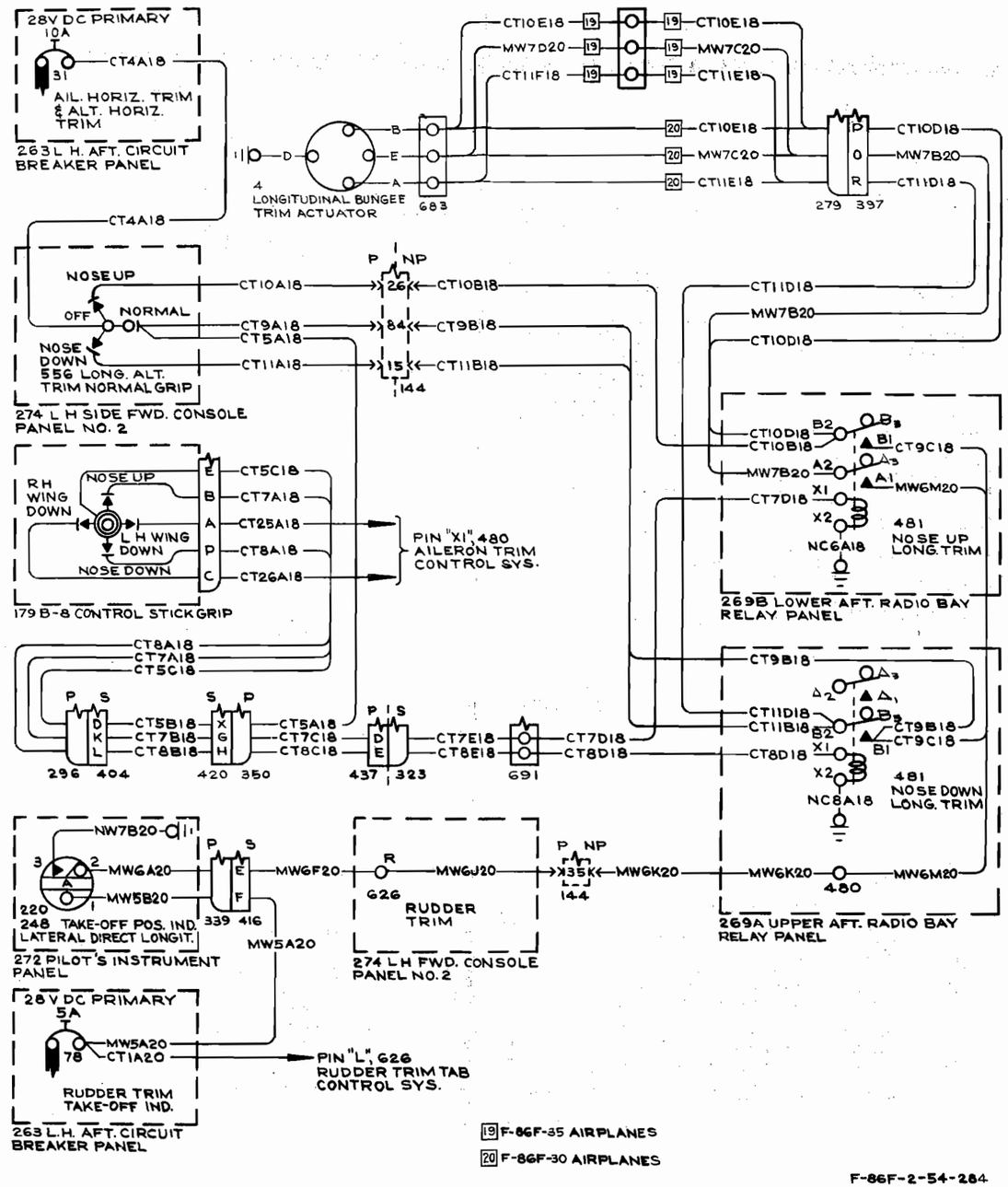
F-86F-2-54-281

HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-15 AND SUBSEQUENT AIRPLANES

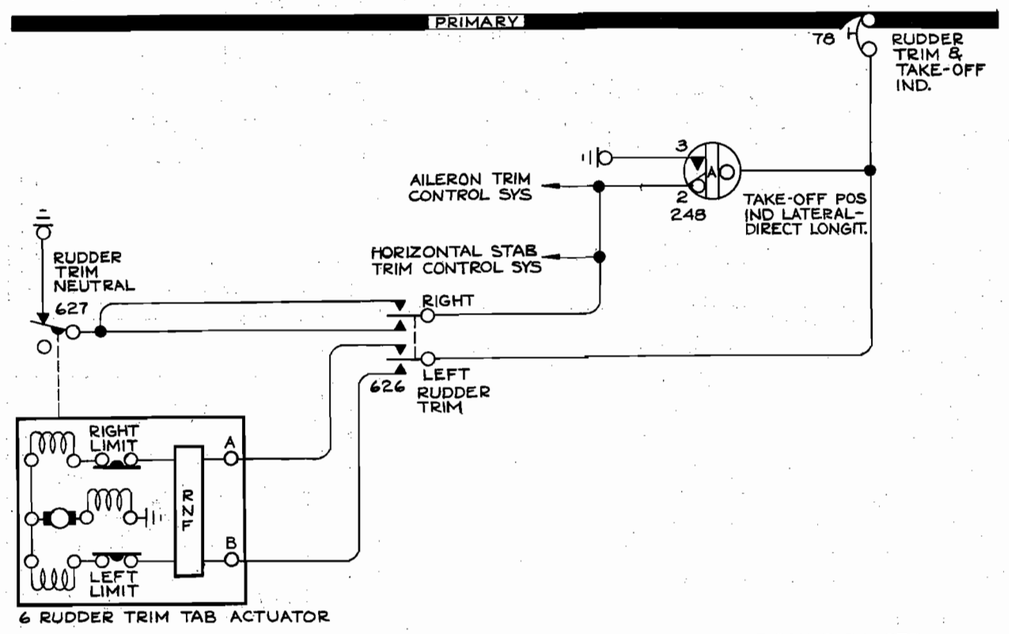
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
4	Actuator - Longitudinal Bungee Trim	Fus 144.6 LH	LH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269A	Panel - Upper Aft Radio Bay Relay	Fus 155 LH	Radio Bay
269B	Panel - Lower Aft Radio Bay Relay	Fus 155 LH	Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
480	Relay - Lateral Trim	Fus 155 LH	Radio Bay
626	Switch - Rudder Trim Tab Control	Fus 85 LH	Console
683	Terminal Block - Wing Flap Actuator	Fus 385 CL	Rudder
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Horizontal Stabilizer Trim Control System - F-86F-30 Airplanes and F-86F-35 Airplanes



HORIZONTAL STABILIZER TRIM CONTROL SYSTEM
F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES



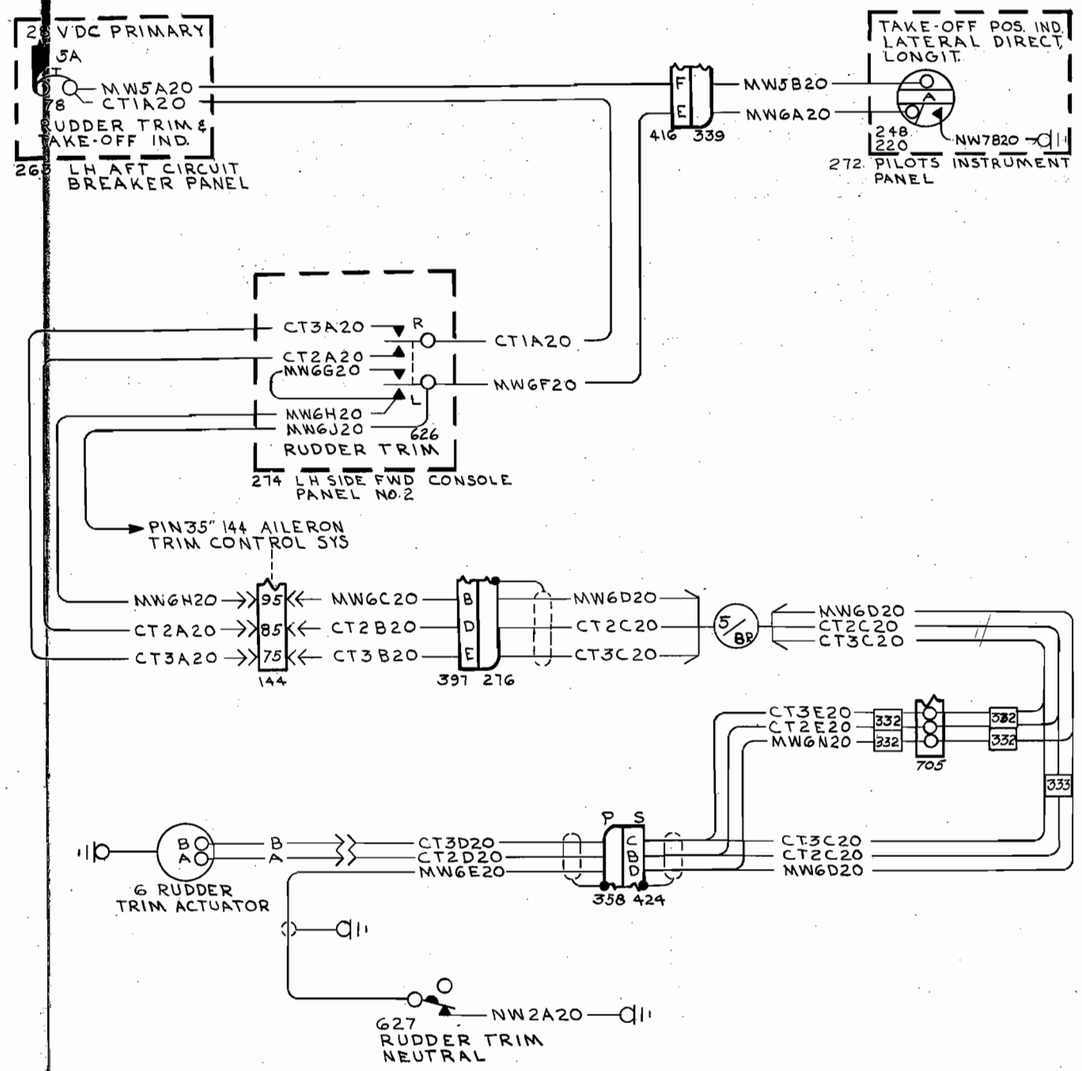
F-86F-2-54-277

Rudder Trim Tab Control System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
6	Actuator - Rudder Trim Tab	Fus 381 CL	Rudder
144	Disconnect Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
339	Plug - Instrument Panel Indicating Light	Fus 76 LH	Forward LH Side of Instrument Panel
358	Plug - Rudder Disconnect	Fus 398 CL	Tail Fairing
627	Switch - Rudder Trim Neutral	Fus 360 CL	Empennage
705	Terminal Block - Empennage Equipment	Fus 340 CL	Empennage

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Rudder Trim Tab Control System

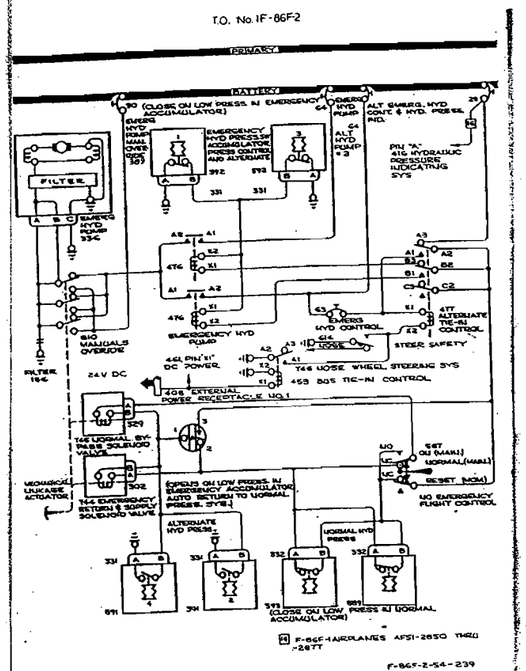


332 F-86F-25 AIRPLANES AF52-5480 THRU -5530 AND F-86F-35 AIRPLANES.

333 F-86F-1 THRU F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5479 AND F-86-30 AIRPLANES

F-86F-2-54-278

Rudder Trim Tab Control System

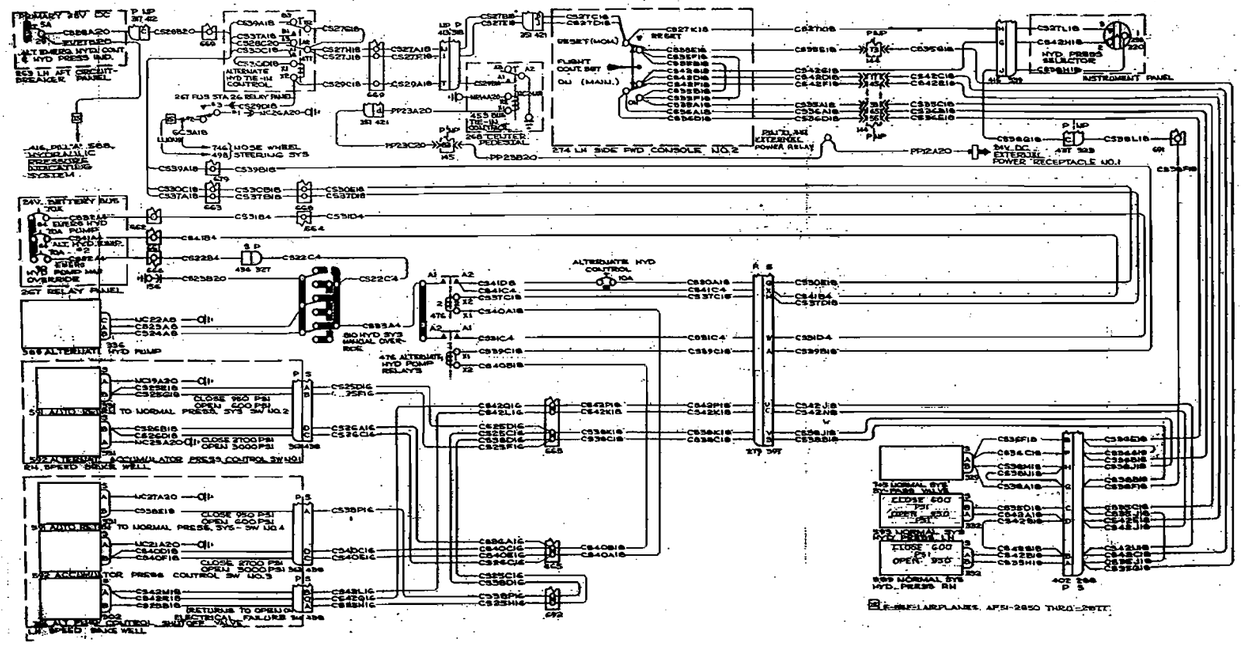


SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-1 AIRPLANES

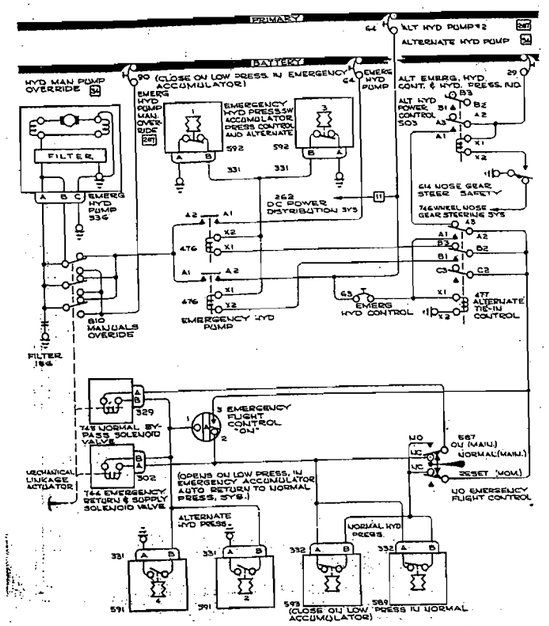
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 134 LH	Cockpit
145	Disconnect - Pressure RH	Fus 134 RH	Cockpit
201	Panel - Aft Radio Compartment Relay	Fus 190 LH	Lft Radio Bay
203	Panel - Circuit-breaker Left-hand	Fus 144 LH	Cockpit - Lft Side
207	Panel - Nose Junction Relay	Fus 190 RH	Radio Bay
208	Panel - Pedestal	Fus 88 CL	Cockpit - Pedestal
212	Panel - Instrument	Fus 88 CL	Cockpit
213	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
272	Plug - Aft Fuselage Disconnect	Fus 261 LH	Cable Disconnect Access Left-hand Side
340	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
302	Plug - Emergency Return and Supply Valve	Fus 288 LH	Lft Speed Brake Well
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 45.4 LH	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 255.5 LH	Aft Section
330	Plug - Hydraulic By-pass Valve - Normal System	Fus 146 CL	Wing Slot - Lower Fuselage
331	Plug - Hydraulic Pressure Switch - Emergency.	Fus 91 LH	Speed Brake Wells
332	Plug - Hydraulic Pressure Switch - Normal	Fus 91 LH	Speed Brake Wells
336	Plug - Hydraulic Pump - Emergency	Fus 244 LH	Aft Section
351	Plug - Pedestal Disconnect	Fus 45.4 LH	Directly Behind Pedestal
363	Plug - Speed Brake Well (Aft)	Fus 275 LH to 288 LH	Fuselage
366	Plug - Forward Fuselage Tank Transmitter	Fus 195.4 RH	RH Radio Bay
385	Pump - Hydraulic Emergency	Fus 252.5 CL	Aft Section
408	Receptacle - External Power	Fus 195 LH	Fuselage Exterior
453	Relay - Nose Tie-in Control	Fus 78 LH	Pedestal
461	Relay - External Power	Fus 195 RH	Engine Access
477	Relay - Hydraulic Tie-in Control - Emergency	Fus 78 CL	Cockpit Pedestal
502	Switch - Hydraulic Pressure - Normal	Fus 91 LH	Instrument Panel
503	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
592	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
641	Terminal Block - Gun Bay LH	Fus 180 LH	Gun Bay
642	Terminal Block - Bomb Rack LH Wheel Well	Fus 120 LH	Wheel Well
661	Terminal Block - Gun Bay	Fus 180 RH	Gun Bay
664	Terminal Block - Hydraulic Pump Emergency	Fus 190 RH	Radio Bay
665	Terminal Block - Hydraulic System Emergency	Fus 255 LH	Engine Access
666	Terminal Block - Hydraulic System Emergency	Fus 120 LH	Wheel Well
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 25 RH	Nose Radio Bay
670	Terminal Block - Wing Lft (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 180 LH	Gun Bay
692	Terminal Block - Speed Brake Well	Fus 81 LH	Speed Brake Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 288 LH	Speed Brake Well
745	Valve - Hydraulic By-pass - Normal	Fus 146 CL	Wing Slot

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Surface Control Hydraulic System - F-86F-1 Airplanes



SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-1 AIRPLANES



[11] F-86F-5 THRU F-86F-15 AIRPLANES
[24] F-86F-20 AIRPLANES AFSI-13080 THRU -13169
[28] F-86F-5 THRU F-86F-15 & F-86F-20 AIRPLANES AFSI-13070 THRU-13079

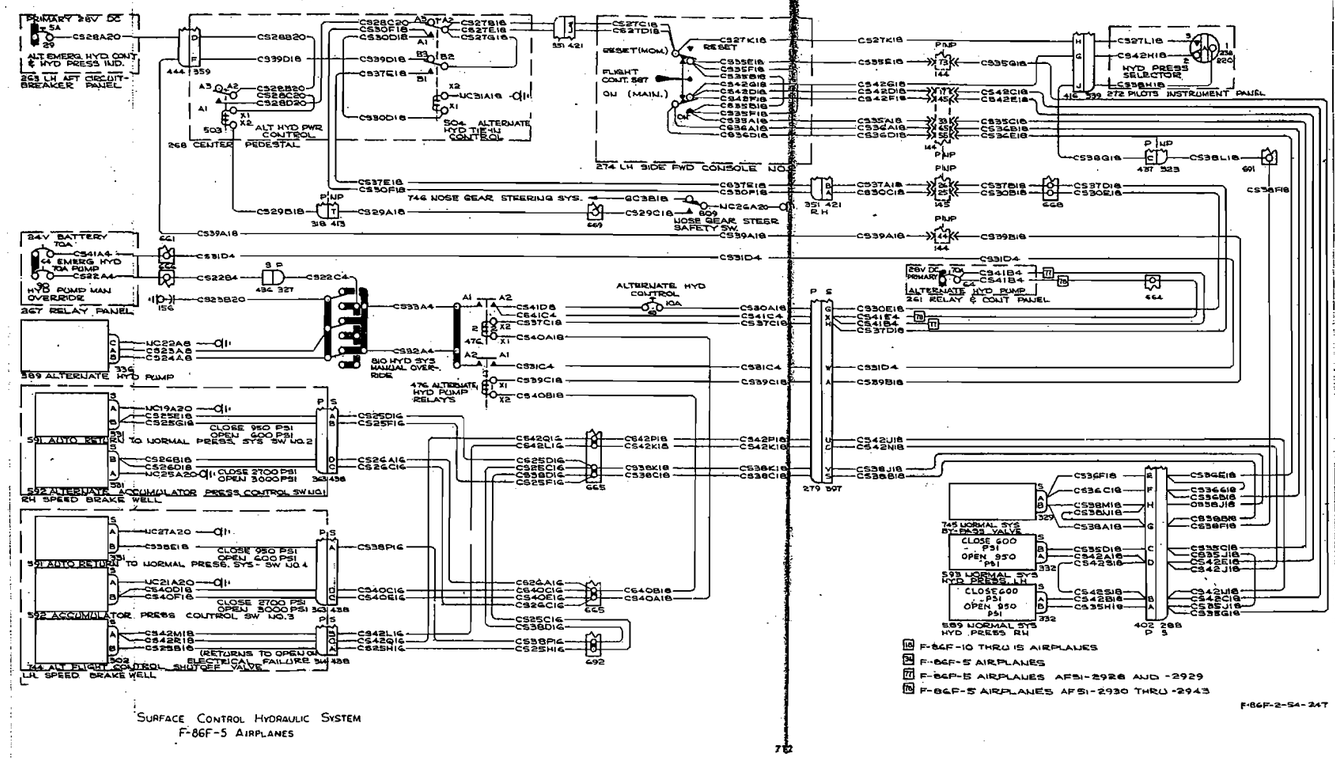
F-86F-2-54-241

SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-5 THROUGH F-86F-20 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - LH Radio Compartment Relay	Fus 170 LH	LH Radio Bay
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
263	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
267	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
268	Panel - Instrument	Fus 78 CL	Cockpit
272	Panel - Left-hand Aft Console	Fus 133 LH	Cockpit
274	Panel - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
279	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
288	Plug - Emergency Return and Supply Valve	Fus 298 LH	LH Speed Brake Well
302	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Hydraulic Pump Manual Override	Fus 293.5 LH	Aft Section
327	Plug - Hydraulic By-pass Valve - Normal System	Fus 166 CL	Wing Slot - Lower Fuselage
329	Plug - Hydraulic Pressure Switch - Emergency	Fus 81 LH	Speed Brake Wells
331	Plug - Hydraulic Pressure Switch - Normal	Fus 81 LH	Speed Brake Wells
332	Plug - Hydraulic Pump - Emergency	Fus 284 LH	Aft Section
336	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 275 LH to 296 LH	Fuselage
363	Plug - Speed Brake Well (Aft)		
364	Plug - Forward Fuselage Tank Transmitter	Fus 155.8 RH	RH Radio Bay
389	Pump - Hydraulic Emergency	Fus 293.5 CL	Aft Section
589	Switch - Hydraulic Pressure - Normal	Fus 81 LH	Instrument Panel
589	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
592	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
593	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
661	Terminal Block - Gun Bay LH	Fus 120 LH	Gun Bay
664	Terminal Block - Hydraulic Pump Emergency	Fus 190 RH	Radio Bay
665	Terminal Block - Hydraulic System Emergency	Fus 255 LH	Engine Access
666	Terminal Block - Hydraulic System Emergency	Fus 120 LH	Wheel Well
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Section Box	Fus 35 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
692	Terminal Block - Speed Brake Well	Fus 81 LH	Speed Brake Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 298 LH	Speed Brake Well
745	Valve - Hydraulic By-pass - Normal	Fus 166 CL	Wing Slot

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ALD-4) for part numbers and location of items.

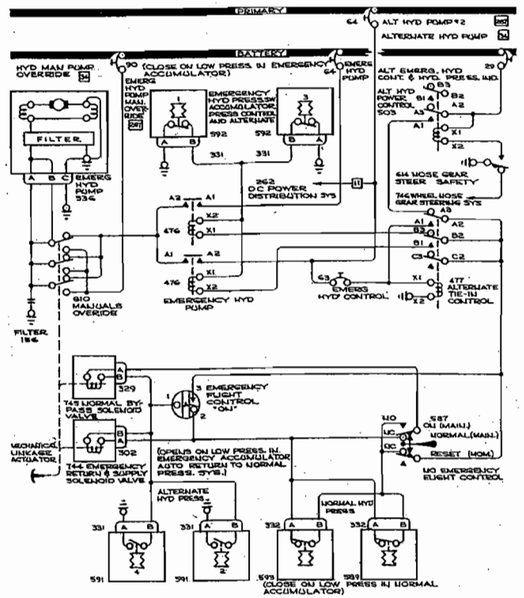
Surface Control Hydraulic System - F-86F-5 Airplanes



SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-5 AIRPLANES

[16] F-86F-10 THRU 15 AIRPLANES
[24] F-86F-5 AIRPLANES
[27] F-86F-5 AIRPLANES AFSI-2928 AND -2929
[28] F-86F-5 AIRPLANES AFSI-2930 THRU -2943

F-86F-2-54-247



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure Lft	Fus 134 LH	Cockpit
145	Disconnect - Pressure Rt	Fus 134 RH	Cockpit
161	Panel - Aft Radio Compartment	Fus 170 LH	Lft Radio Bay
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - Lft Side
267	Panel - Nose Section Relay	Fus 49 LH	Radar Bay
268	Panel - Pedestal	Fus 76 CL	Cockpit - Pedestal
271	Panel - Instrument	Fus 76 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
286	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
303	Plug - Emergency Return and Supply Valve	Fus 228 LH	Lft Speed Brake Well
318	Plug - Forward Pressure Disconnect (Lft Aft)	Fus 62, 6 Lft	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 253.5 LH	Aft Section
329	Plug - Hydraulic By-pass Valve - Normal System	Fus 166 CL	Wing Slot - Lower Fuselage
331	Plug - Hydraulic Pressure Switch - Emergency	Fus 91 LH	Speed Brake Wells
332	Plug - Hydraulic Pressure Switch - Normal	Fus 91 LH	Speed Brake Wells
336	Plug - Hydraulic Pump - Emergency	Fus 344 LH	Aft Section
351	Plug - Pedestal Disconnect	Fus 62, 6 LH	Directly Behind Pedestal
363	Plug - Speed Brake Well (Aft)	Fus 275 Lft to 294 LH	Fuselage
364	Plug - Forward Fuselage Tank Transmitter	Fus 135, 8 RH	Rft Radio Bay
389	Pump - Hydraulic Emergency	Fus 253.5 CL	Aft Section
580	Switch - Hydraulic Pressure - Normal	Fus 91 LH	Instrument Panel
581	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
582	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
583	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
681	Terminal Block - Gun Bay Lft	Fus 190 LH	Gun Bay
684	Terminal Block - Hydraulic Pump Emergency	Fus 190 RH	Radio Bay
685	Terminal Block - Hydraulic System Emergency	Fus 255 LH	Engine Access
686	Terminal Block - Hydraulic System Emergency Override	Fus 120 LH	Wheel Well
688	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	Rft Wheel Well
689	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
693	Terminal Block - Speed Brake Well	Fus 91 LH	Speed Brake Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 291 LH	Speed Brake Well
745	Valve - Hydraulic By-pass - Normal	Fus 166 CL	Wing Slot

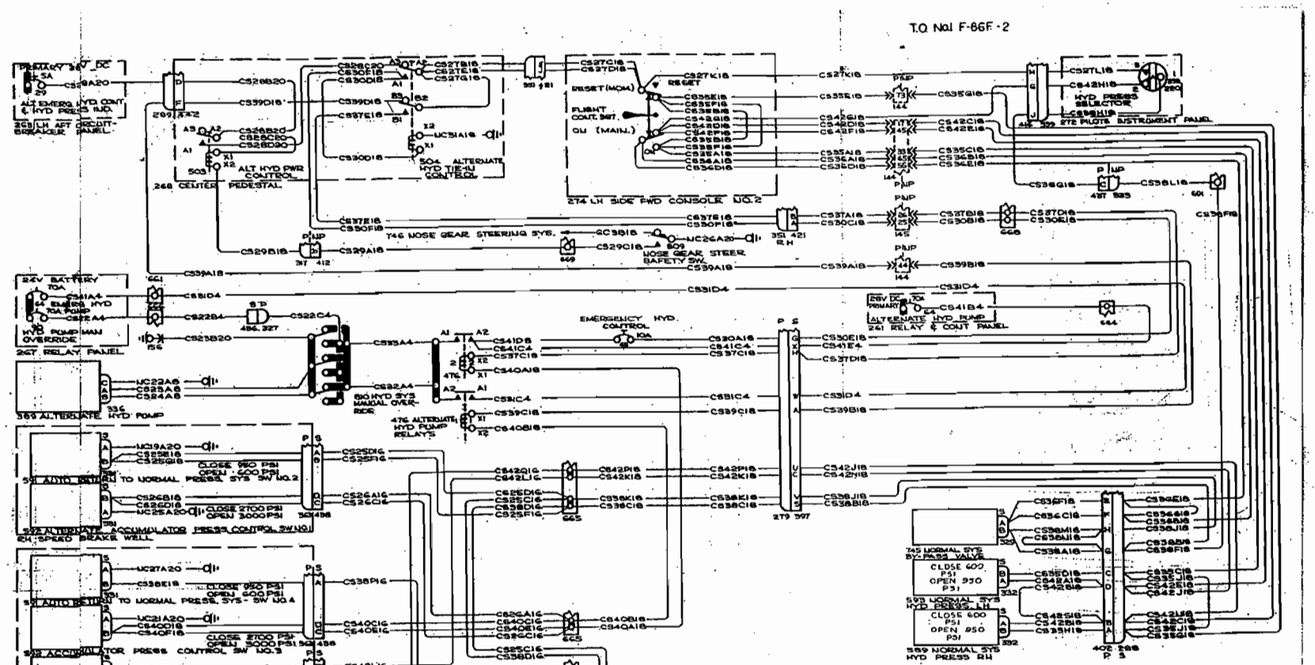
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4)for part numbers and location of items.

Surface Control Hydraulic System F-86F-10 and F-86F-15 Airplanes

[1] F-86F-5 THRU F-86F-15 AIRPLANES
[2] F-86F-20 AIRPLANES AF51-13080 THRU -13169
[3] F-86F-5 THRU F-86F-15 & F-86F-20 AIRPLANES AF51-13070 THRU -13079

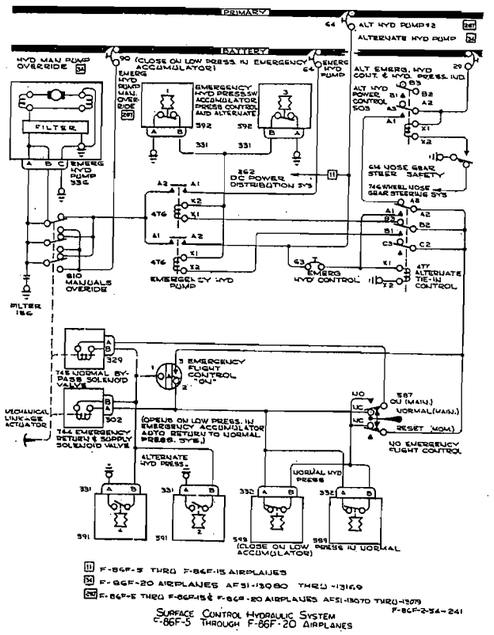
F-86F-2-54-241

SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-5 THROUGH F-86F-20 AIRPLANES



SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-10 THROUGH F-86F-15 AIRPLANES

F-86F-2-54-244

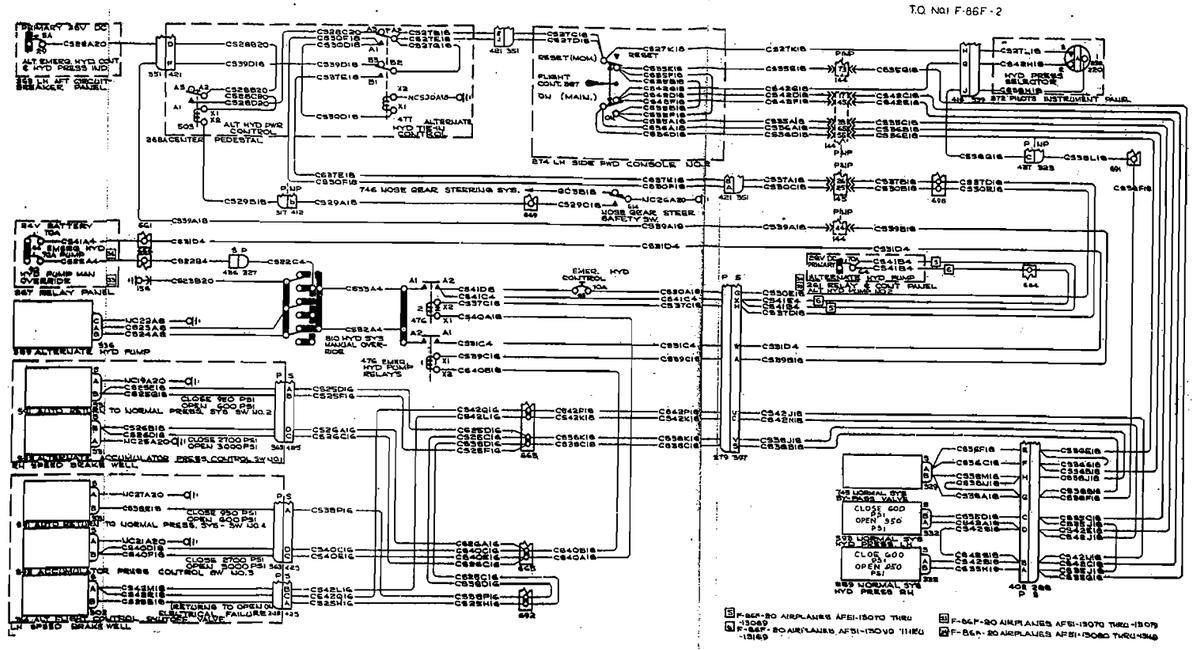


SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-5 THROUGH F-86F-20 AIRPLANES
F-86F-2-34-241

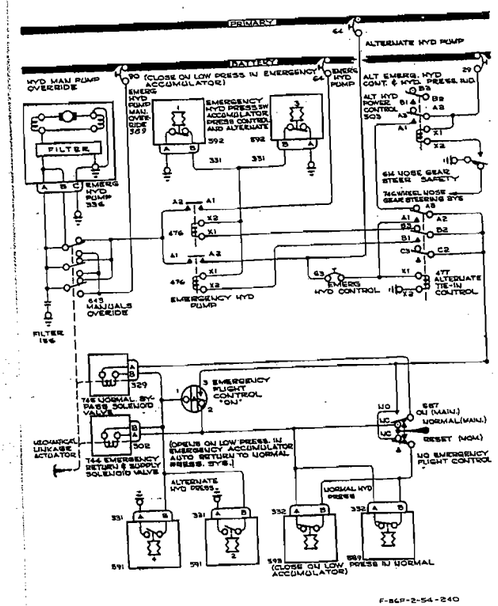
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 134 Aft	Cockpit
145	Disconnect - Pressure RH	Fus 134 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	Lft Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
275	Panel - Left-hand Aft Console	Fus 112 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 361 LH	Cable Disconnect Access Left-hand Side
288	Plug - Center Wing Disconnect	Fus 120 LH	Fuselage Underside
302	Plug - Emergency Return and Supply Valve	Fus 289 LH	Lft Speed Brake Well
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62L & LH	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 257.5 LH	Aft Section
339	Plug - Hydraulic By-pass Valve - Normal System	Fus 168 CL	Wing Slot - Lower Fuselage
331	Plug - Hydraulic Pressure Switch - Emergency	Fus 81 LH	Speed Brake Wells
333	Plug - Hydraulic Pressure Switch - Normal	Fus 82 LH	Speed Brake Wells
338	Plug - Hydraulic Pump - Emergency	Fus 344 LH	Aft Section
351	Plug - Pedestal Disconnect	Fus 62, 8 LH	Directly Behind Pedestal
352	Plug - Speed Brake Well	Fus 275 RH to 288 RH	Fuselage
363	Plug - Speed Brake Well (Aft)	Fus 275 LH to 288 LH	Fuselage
380	Pump - Hydraulic Emergency	Fus 253, 5 CL	Aft Section
413	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
435	Receptacle - Speed Brake Well	Fus 215 LH	Speed Brake Well
471	Relay - Hydraulic Tie-in Control - Emergency	Fus 78 CL	Cockpit Pedestal
560	Switch - Hydraulic Pressure - Normal	Fus 82 LH	Instrument Panel
581	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
582	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
583	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
654	Switch - Nose Wheel Steering Safety	Fus 17 CL	Nose Wheel Well
662	Terminal Block - Gun Bay LH	Fus 220 LH	Gun Bay
664	Terminal Block - Hydraulic Pump Emergency	Fus 190 RH	Radio Bay
685	Terminal Block - Hydraulic System Emergency	Fus 255 LH	Engine Access
686	Terminal Block - Hydraulic System Emergency Override	Fus 130 LH	Wheel Well
689	Terminal Block - Nose Junction Box	Fus 36 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
693	Terminal Block - Speed Brake Well	Fus 81 LH	Speed Brake Well
698	Terminal Block - Landing Gear Connector Upper	Fus 190 LH	Wheel Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 284 LH	Speed Brake Well
745	Valve - Hydraulic By-pass - Normal	Fus 166 CL	Wing Slot

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Surface Control Hydraulic System - F-86F-30 Airplanes and F-86F-35 Airplanes AF51-13070 Through -13169



SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-20 AIRPLANES
F-86F-2-34-243

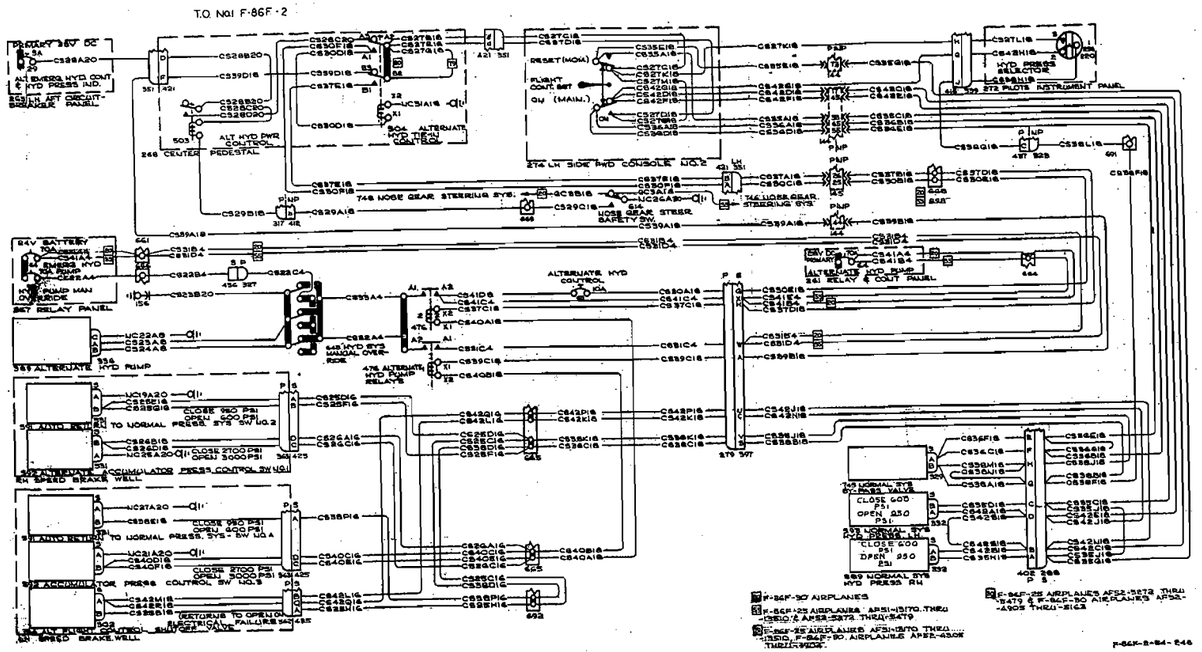


F-86F-2-54-240

Surface Control Hydraulic System
F-86F-25 Through F-86F-35 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 134 LH	Cockpit
145	Disconnect - Pressure RH	Fus 134 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 116 LH	Cockpit - LH Side
263	Panel - Circuit-breaker Left-hand	Fus 40 LH	Radar Bay
267	Panel - Nose Section Relay	Fus 78 CL	Cockpit - Pedestal
268	Panel - Pedestal	Fus 78 CL	Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cable Disconnect Access Left-hand
278	Plug - Aft Fuselage Disconnect	Fus 381 LH	Side
288	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
302	Plug - Emergency Return and Supply Valve	Fus 288 LH	Aft Speed Brake Well
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 82.6 LH	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 152.5 LH	Aft Section
337	Plug - Hydraulic By-pass Valve - Normal System	Fus 166 CL	Wing Slot - Lower Fuselage
339	Plug - Hydraulic Pressure Switch - Emergency	Fus 61 LH	Speed Brake Wells
351	Plug - Hydraulic Pressure Switch - Normal	Fus 61 LH	Speed Brake Wells
353	Plug - Hydraulic Pump - Emergency	Fus 244 LH	Aft Section
356	Plug - Pedestal Disconnect	Fus 82.6 LH	Directly Behind Pedestal
361	Plug - Pedestal Disconnect	Fus 375 RH to 396 RH	Fuselage
382	Plug - Speed Brake Well	Fus 275 LH to 296 LH	Fuselage
383	Plug - Speed Brake Well (Aft)	Fus 353.5 CL	Aft Section
385	Pump - Hydraulic Emergency	Fus 61 LH, CL	Cockpit
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 315 LH	Speed Brake Well
420	Receptacle - Speed Brake Well	Fus 61 LH	Instrument Panel
588	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
591	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
593	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
595	Switch - Hydraulic Pressure - Emergency	Fus 17 CL	Nose Wheel Well
614	Switch - Nose Wheel Steering Safety	Fus 350 LH	Aft Fuselage
642	Switch - Emergency Hydraulic Pump Manual Override	Fus 180 LH	Gun Bay
661	Terminal Block - Gun Bay LH	Fus 180 RH	Radio Bay
664	Terminal Block - Hydraulic Pump Emergency	Fus 338 LH	Engine Access
665	Terminal Block - Hydraulic System Emergency	Fus 130 LH	Wheel Well
666	Terminal Block - Hydraulic System Emergency	Fus 80 LH	Gun Bay
681	Terminal Block - Gun Bay Pressure Disconnect	Fus 61 LH	Speed Brake Well
692	Terminal Block - Speed Brake Well	Fus 190 CL	Wheel Well
698	Terminal Block - Landing Gear Connector Upper	Fus 288 LH	Speed Brake Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 166 CL	Wing Slot
745	Valve - Hydraulic By-pass - Normal		

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JL-4) for part numbers and location of items.



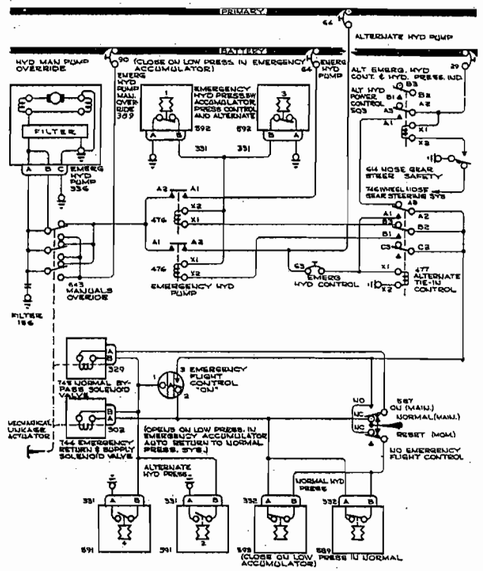
F-86F-30 Airplanes

F-86F-25 Airplanes AF51-13170 thru -13510 & AF52-5272 thru -5479 & F-86F-30 Airplanes AF52-4506 thru -5104

F-86F-25 Airplanes AF51-13170 thru -13510 & AF52-5272 thru -5479 & F-86F-30 Airplanes AF52-4506 thru -5104

F-86K-2-54-240

Surface Control Hydraulic System
F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through 5479 and F-86F-30 Airplanes

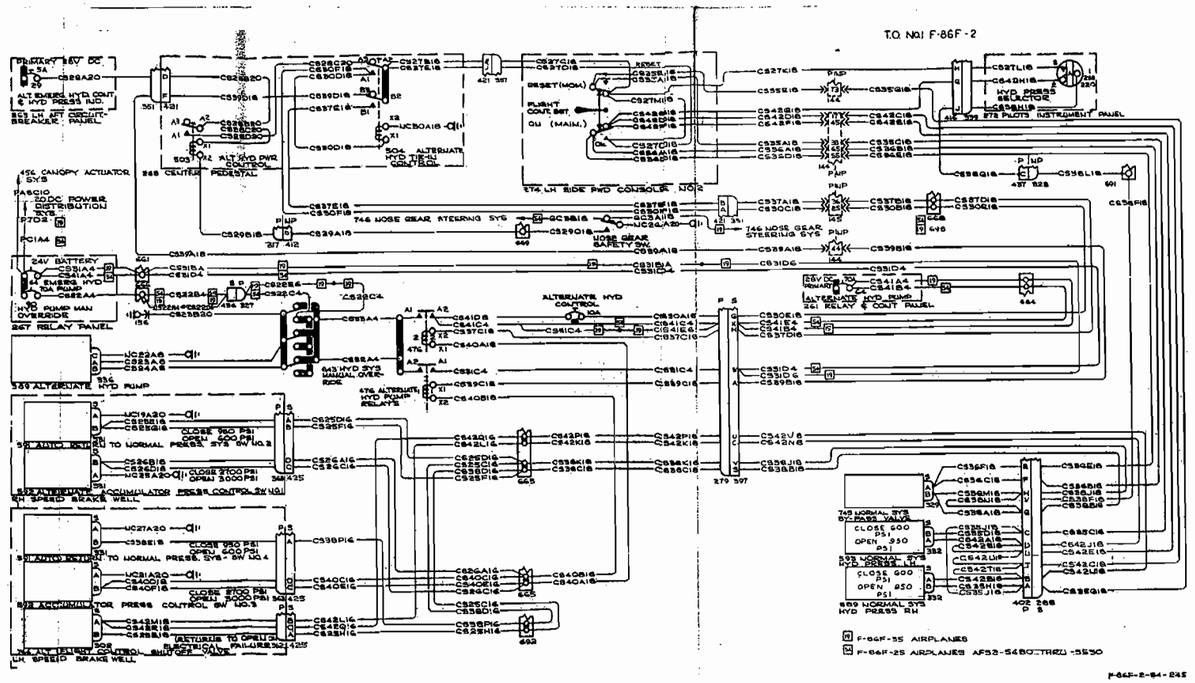


F-86H-2-54-240

SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-25 THROUGH F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
154	Disconnect - Pressure LH	Fus 121 LH	Cockpit
155	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 179 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 73 CL	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
288	Plug - Center Wing Disconnect	Fus 124 LH	Fuselage Underside
302	Plug - Emergency Return and Supply Valve	Fus 298 LH	LH Speed Brake Well
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 253.5 LH	Aft Section
329	Plug - Hydraulic By-pass Valve - Normal System	Fus 156 CL	Wing Slot - Lower Fuselage
331	Plug - Hydraulic Pressure Switch - Emergency	Fus 81 LH	Speed Brake Wells
332	Plug - Hydraulic Pressure Switch - Normal	Fus 81 LH	Speed Brake Wells
336	Plug - Hydraulic Pump - Emergency	Fus 248 LH	Aft Section
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
362	Plug - Speed Brake Well	Fus 275 RH to 298 RH	Fuselage
363	Plug - Speed Brake Well (Aft)	Fus 275 LH to 298 LH	Fuselage
389	Pump - Hydraulic Emergency	Fus 253.5 CL	Aft Section
418	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
435	Receptacle - Speed Brake Well	Fus 315 LH	Speed Brake Well
589	Switch - Hydraulic Pressure - Normal	Fus 61 LH	Instrument Panel
591	Switch - Hydraulic Pressure - Emergency and RH	Fus 310 LH	Speed Brake Wells
592	Switch - Hydraulic Pressure - Emergency	Fus 310 LH and RH	Speed Brake Wells
593	Switch - Hydraulic Pressure - Normal	Fus 310 LH and RH	Speed Brake Wells
614	Switch - Nose Wheel Steering Safety	Fus 17 CL	Nose Wheel Well
643	Switch - Emergency Hydraulic Pump Manual Override	Fus 190 LH	Aft Fuselage
661	Terminal Block - Gun Bay LH	Fus 120 LH	Gun Bay
664	Terminal Block - Hydraulic Pump Emergency	Fus 190 RH	Radio Bay
665	Terminal Block - Hydraulic System Emergency	Fus 255 LH	Engine Access
666	Terminal Block - Hydraulic System Emergency	Fus 130 LH	Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
692	Terminal Block - Speed Brake Well	Fus 81 LH	Speed Brake Well
698	Terminal Block - Landing Gear Connector Upper	Fus 130	Wheel Well
744	Valve - Hydraulic Return and Supply - Emergency	Fus 298 LH	Speed Brake Well
745	Valve - Hydraulic By-pass - Normal	Fus 156 CL	Wing Slot

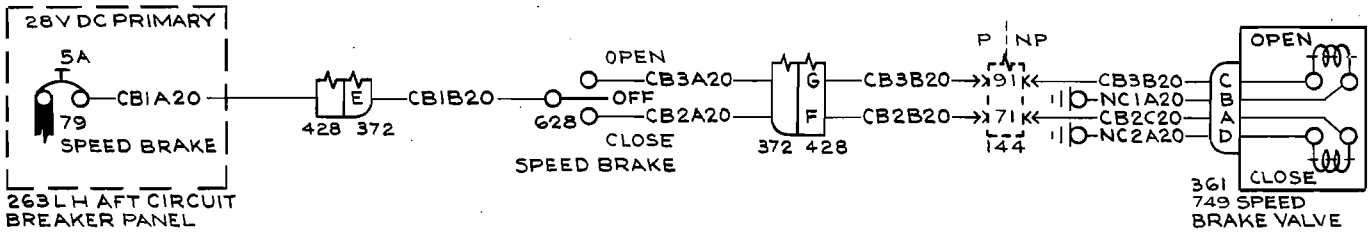
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ALD-4) for part numbers and location of items.



M F-86F-35 AIRPLANES
M F-86F-25 AIRPLANES AF52-5480 THRU 5530

F-86F-2-54-245

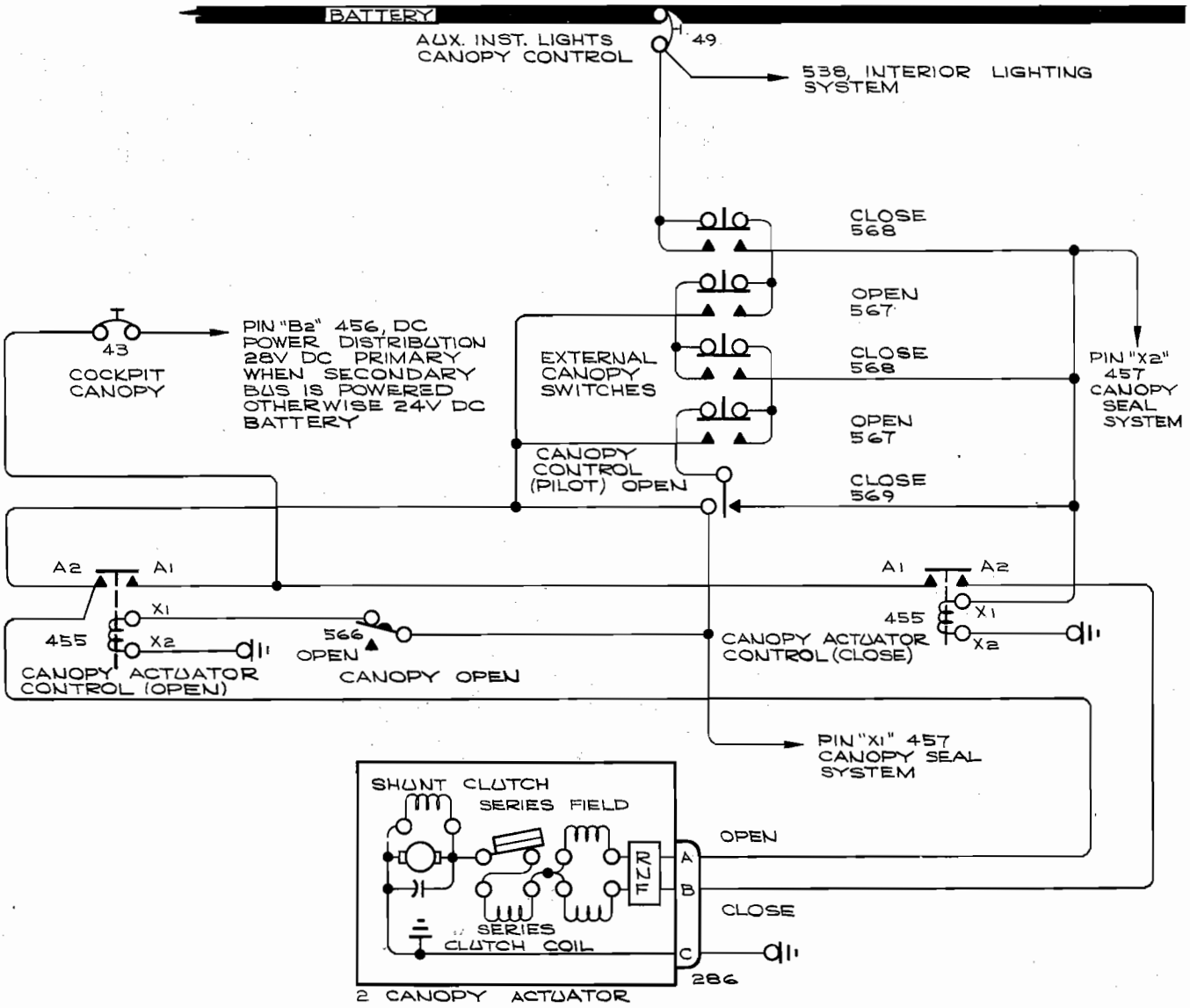
SURFACE CONTROL HYDRAULIC SYSTEM
F-86F-25 AIRPLANES AF52-5480 THROUGH 5530 AND F-86F-35 AIRPLANES



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
361	Plug - Speed Brake	Fus 298 RH and LH	Aft Section
372	Plug - Throttle Disconnect	Fus 93 LH	Cockpit
628	Switch - Speed Brake Control	Fus 95 LH	Throttle
749	Valve - Speed Brake Hydraulic Solenoid	Fus 298 RH	Aft Section

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-230A



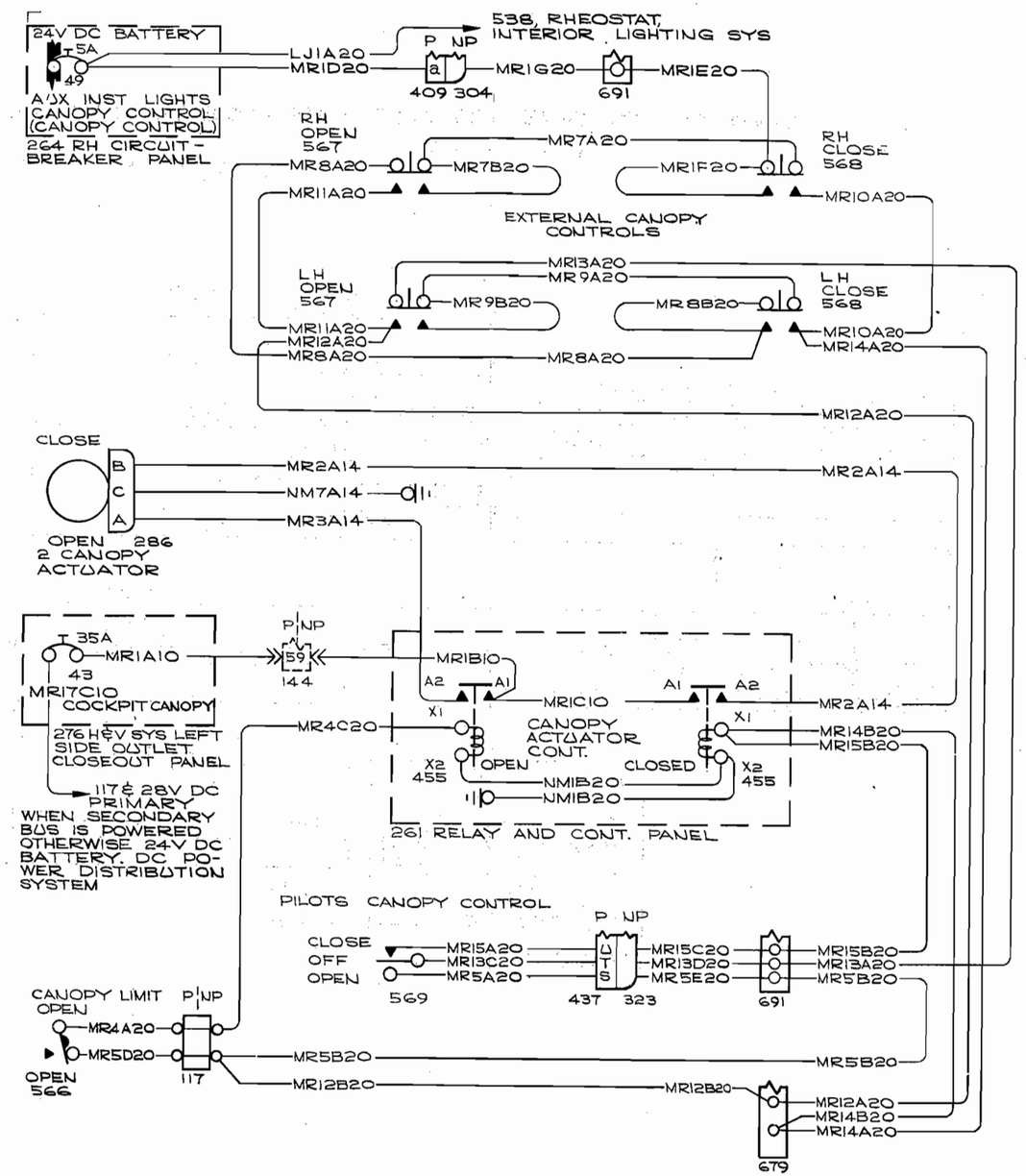
F-86F-2-54-223A

COCKPIT CANOPY SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
2	Actuator - Canopy	Fus 155.8 LH	LH Radio Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
286	Plug - Canopy Actuator	Fus 155.7 LH	LH Radio Bay
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
538	Rheostat - Auxiliary Instrument Light	Fus 81 RH	Cockpit, RH Forward
566	Switch - Canopy Open Limit	Fus 170 RH	Cockpit, Top Deck
567	Switch - Canopy Open - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
568	Switch - Canopy Close - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
569	Switch - Canopy Operating - Pilot	Fus 83 LH	Cockpit, LH Forward Side
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

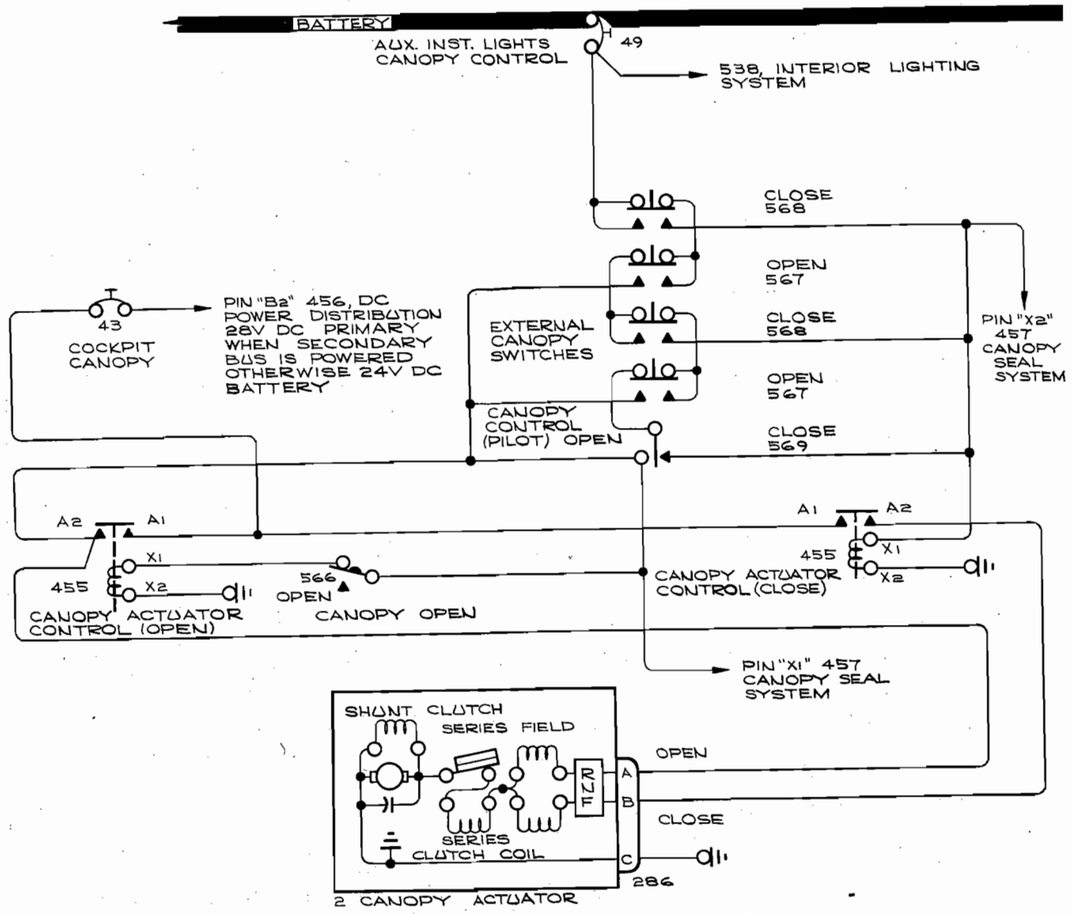
Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Cockpit Canopy System F-86F-1 Through F-86F-25 Airplanes



F-86F-2-54-228

COCKPIT CANOPY SYSTEM
F-86F-1 THROUGH F-86F-25 AIRPLANES



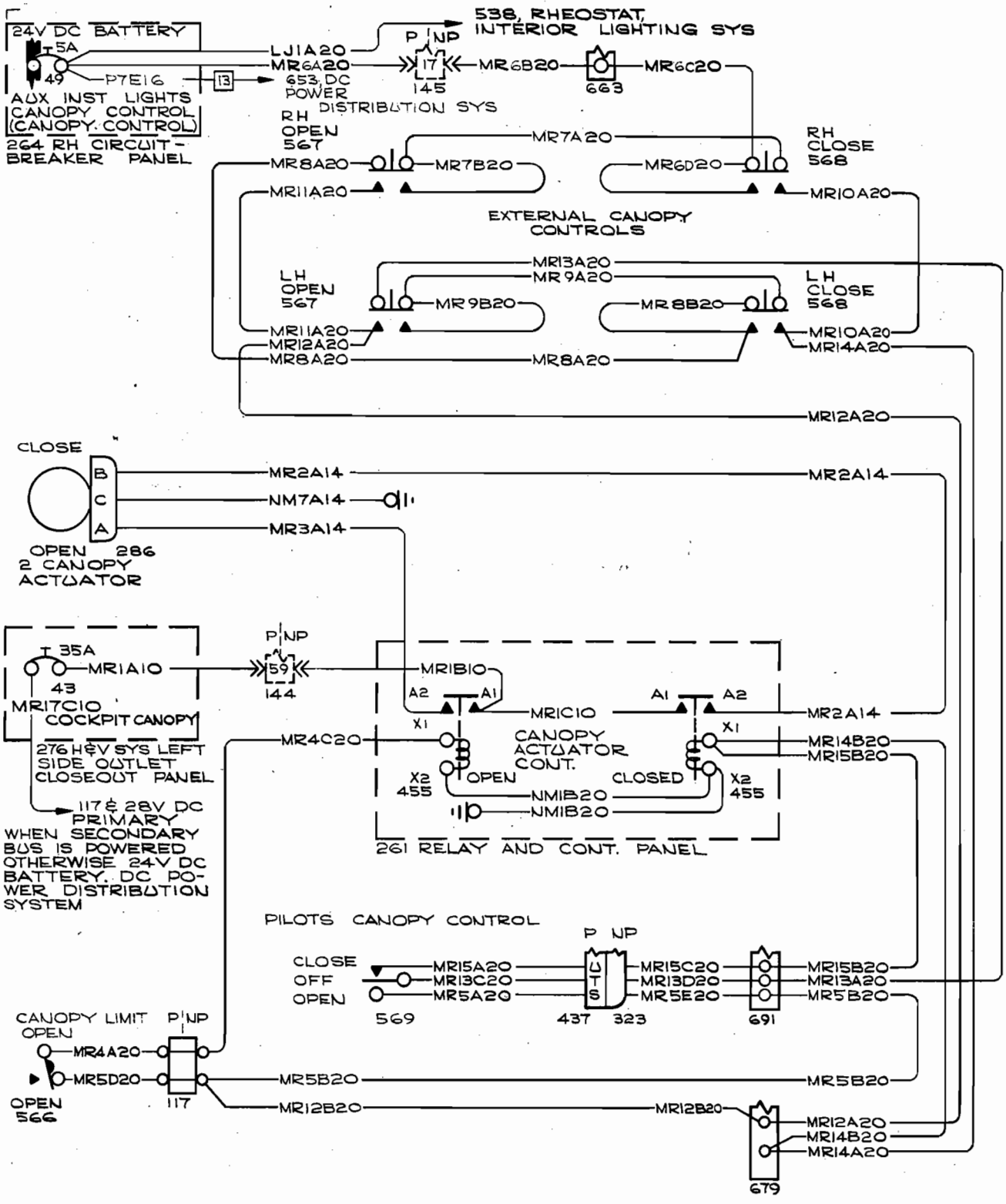
F-86F-2-54-223A

COCKPIT CANOPY SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
2	Actuator - Canopy	Fus 155.8 LH	LH Radio Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
286	Plug - Canopy Actuator	Fus 155.7 LH	LH Radio Bay
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
437	Receptacle - Gun Bay Pressure	Fus 75 RH and LH	Gun Bays
538	Rheostat - Auxiliary Instrument Light	Fus 81 RH	Cockpit, RH Forward
566	Switch - Canopy Open Limit	Fus 170 RH	Cockpit, Top Deck
567	Switch - Canopy Open - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
568	Switch - Canopy Close - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
569	Switch - Canopy Operating - Pilot	Fus 83 LH	Cockpit, LH Forward Side
653	Terminal Block - Ammunition Booster	Fus 86 RH and LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

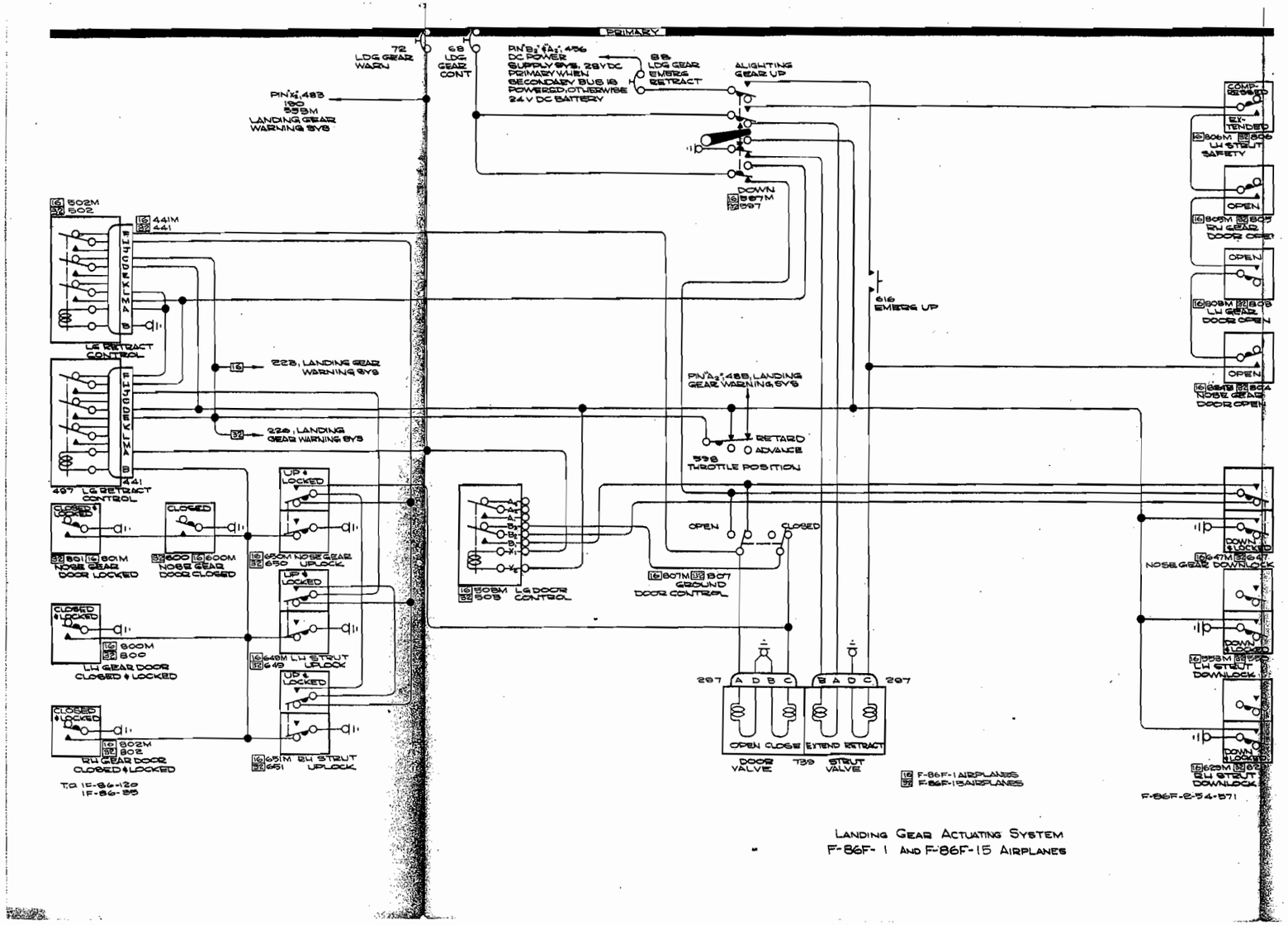
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Cockpit Canopy System F-86F-30 and F-86F-35 Airplanes



F-86F-2-54-224 A

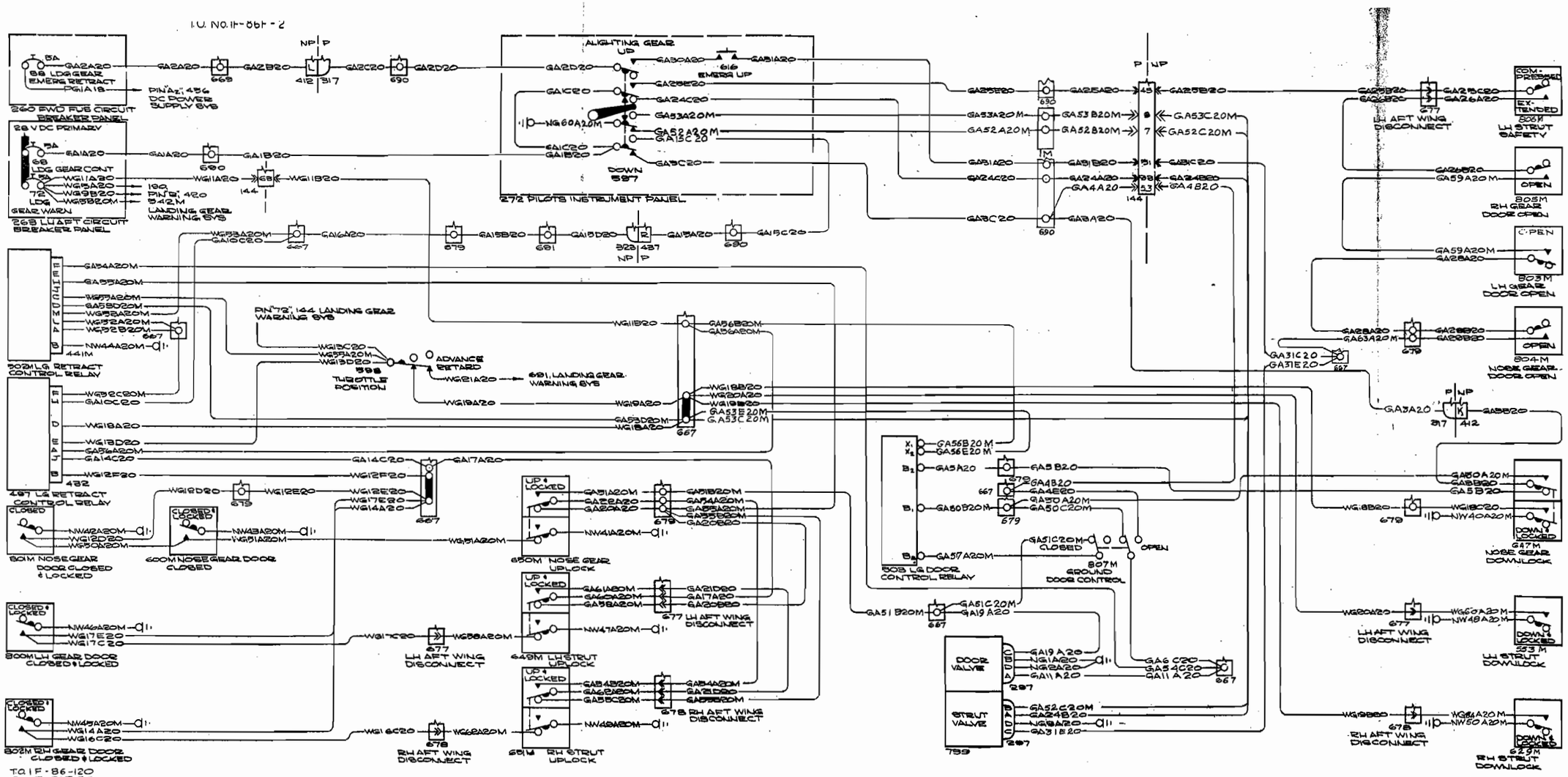
Cockpit Canopy System
F-86F-30 and F-86F-35 Airplanes



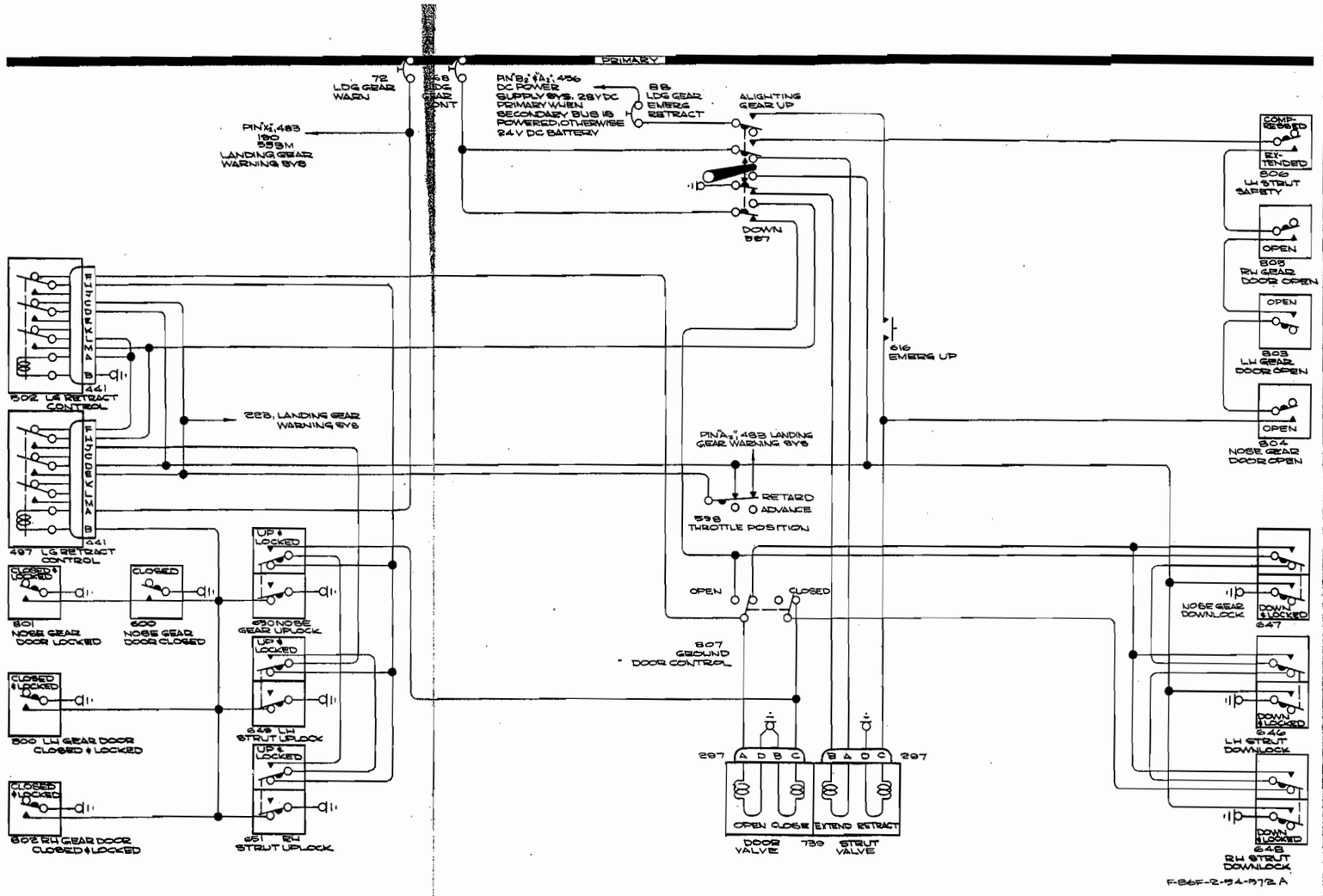
LANDING GEAR ACTUATING SYSTEM
F-86F-1 AND F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 180 RH	RH Wheel Well, Engine Access
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 76 RH	Pedestal
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well
803	Switch - LH Fairing Door Open	Fus 193 LH	Main Wheel Well
804	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
805	Switch - RH Fairing Door Open	Fus 193 LH	Main Wheel Well
806	Switch - LH Strut Safety	Fus 204 LH	LH Main Gear Strut
807	Switch - Ground Door Open	Fus 204 LH	LH Strut Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.



LANDING GEAR ACTUATING SYSTEM
F-86F-1 AIRPLANES

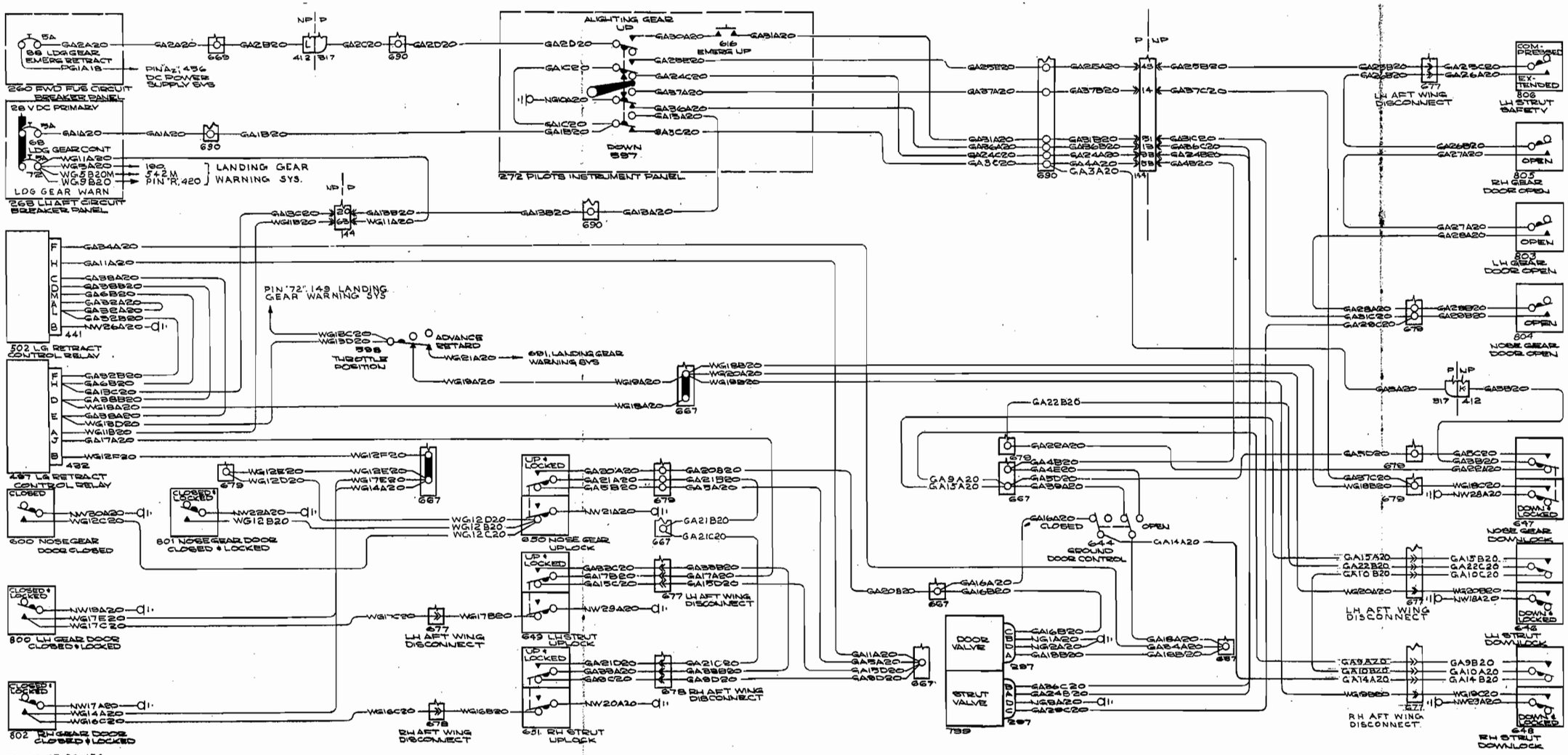


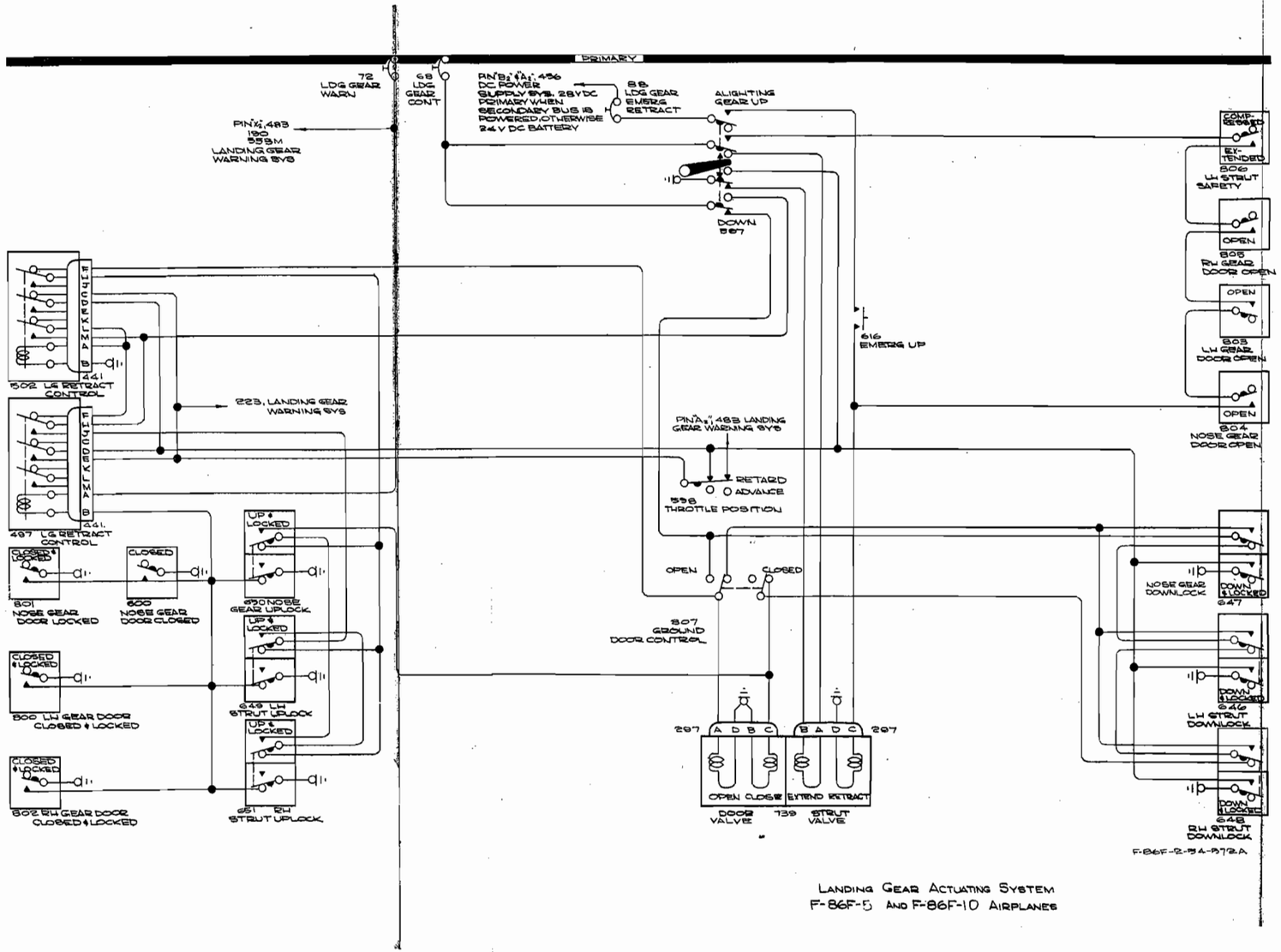
Landing Gear Actuating System
F-86F-10 and F-86F-15 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
149	Filter - Radio Noise - Camera	Fus 60 RH	Above RH Forward Console, Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62, 8 LH	Cockpit - Forward of Pedestal
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71, 5 LH	Cockpit
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
649	Termigal Block - Longitudinal Bungee Trim	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 64 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well
803	Switch - LH Fairing Door Open	Fus 193 LH	Main Wheel Well
804	Switch - Nose Fairing Door	Fus 64 LH	Nose Wheel Well
805	Switch - RH Fairing Door Open	Fus 193 RH	Main Wheel Well
806	Switch - LH Strut Safety	Fus 204 LH	LH Main Gear Strut

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Actuating System - F-86F-5 Airplanes


LANDING GEAR ACTUATING SYSTEM
F-86F-5 AIRPLANES
T.O. NO. 1F-86-136
F-86F-2-54-578
725

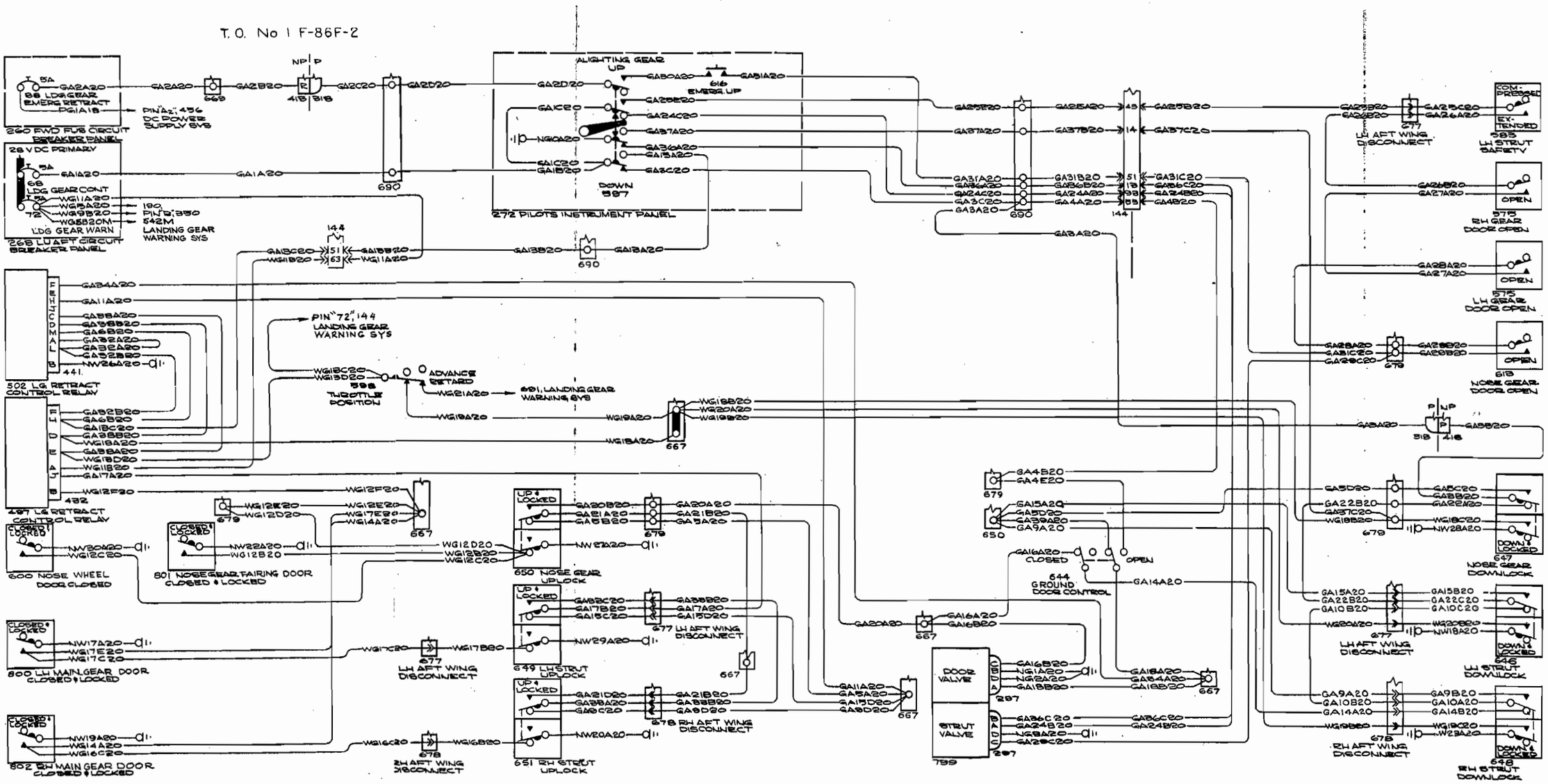


LANDING GEAR ACTUATING SYSTEM
F-86F-5 AND F-86F-10 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Lnading Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
287	Plug - Canopy Pullaway	Fus 126 RH	Cockpit Canopy
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 150 RH	RH Wheel Well, Engine Access
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Diaconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door	Fus 160 RH and LH	Wheel Wells
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

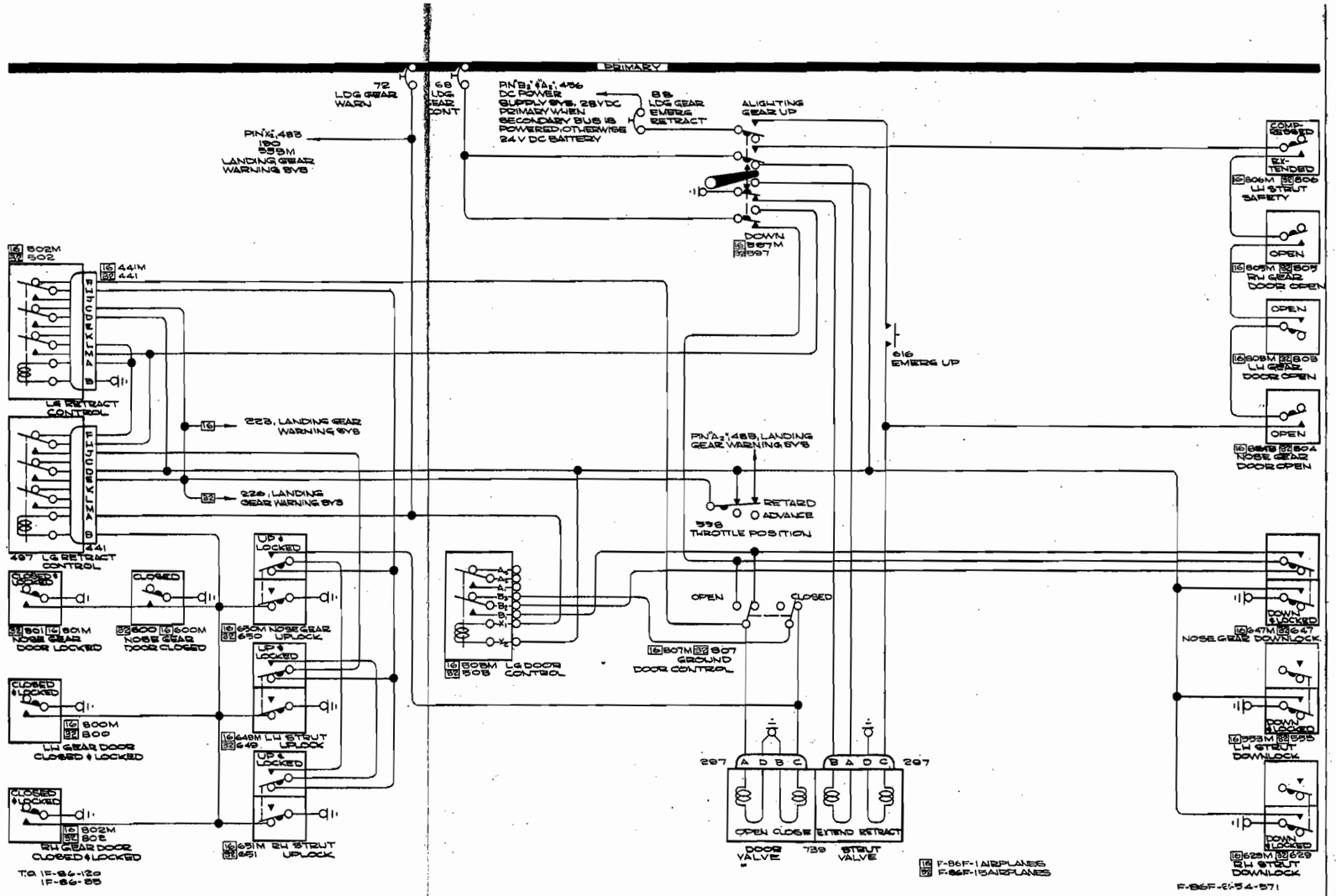
Landing Gear Actuating System - F-86F-10 Airplanes



T.O. 1F-86-156

F-86F-2-54-582

Landing Gear Actuating System
F-86F-10 Airplanes

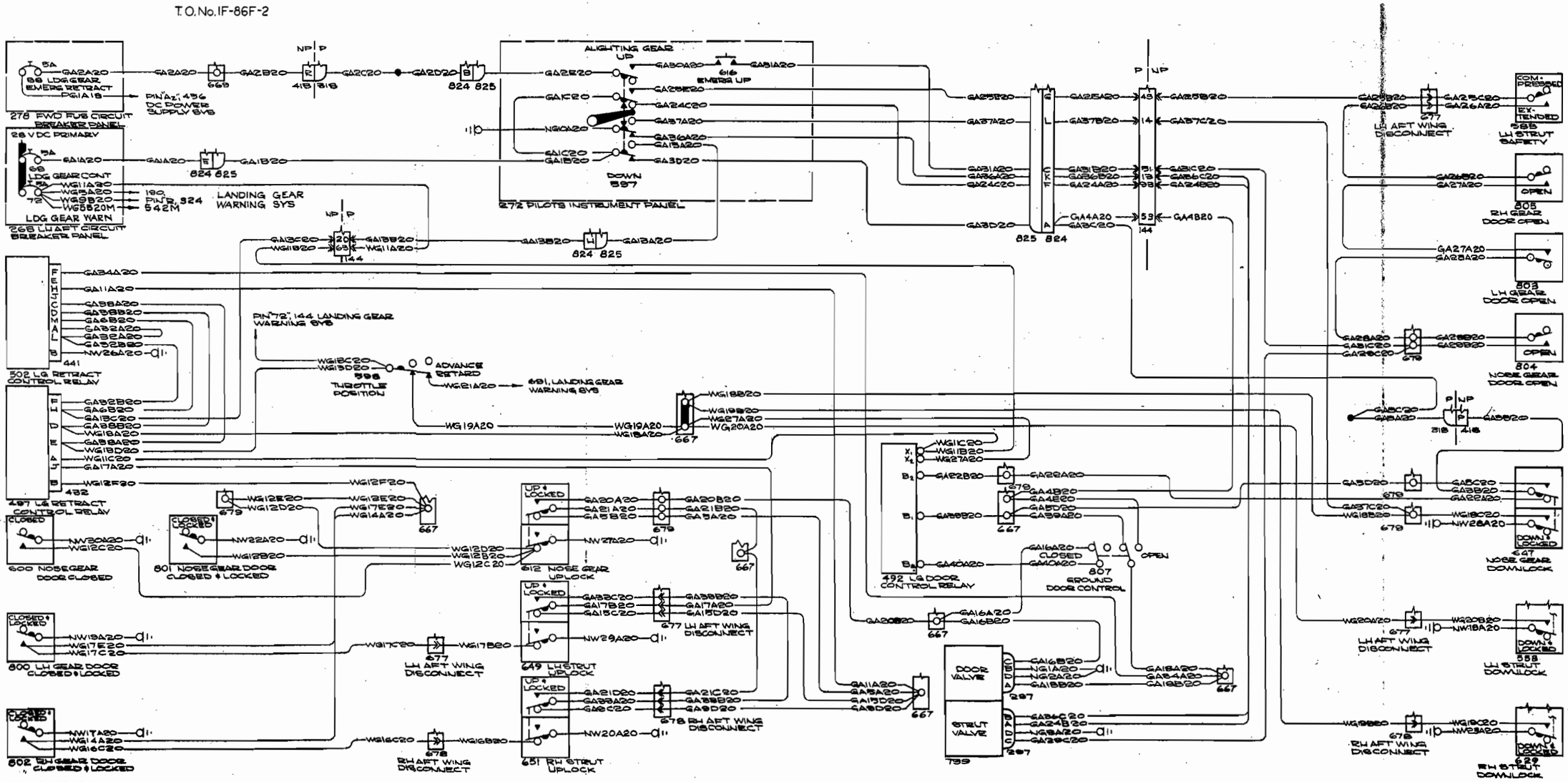


LANDING GEAR ACTUATING SYSTEM
F-86F-1 AND F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
324	Plug - GSAP Camera	Fus 16 CL	Radar Bay
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
492	Relay - Engine Screen Control	Fus 155 LH	Aft LH Radio Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
563	Switch - Ground Sequence Safety	Wing 90 RH and LH	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
651	Terminal Block - Drop Tank	Fus 130 HH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well
803	Switch - LH Fairing Door Open	Fus 193 LH	Main Wheel Well
804	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
805	Switch - RH Fairing Door Open	Fus 193 LH	Main Wheel Well
807	Switch - Ground Door Open	Fus 204 LH	LH Strut Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

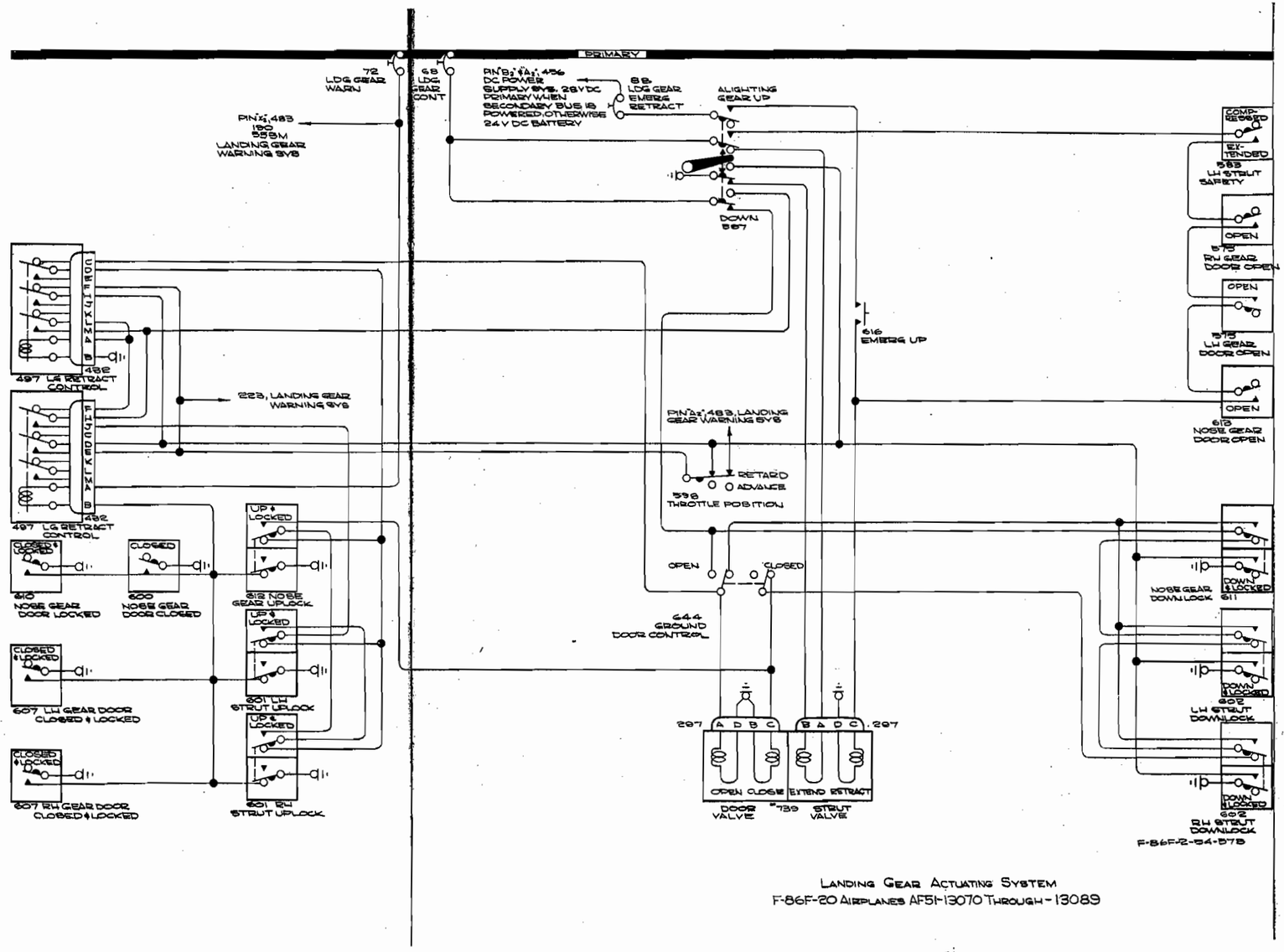
Landing Gear Actuating System - F-86F-15 Airplanes



T.O. 1F-86-156

F-86F-2-54-564

Landing Gear Actuating System
F-86F-15 Airplanes

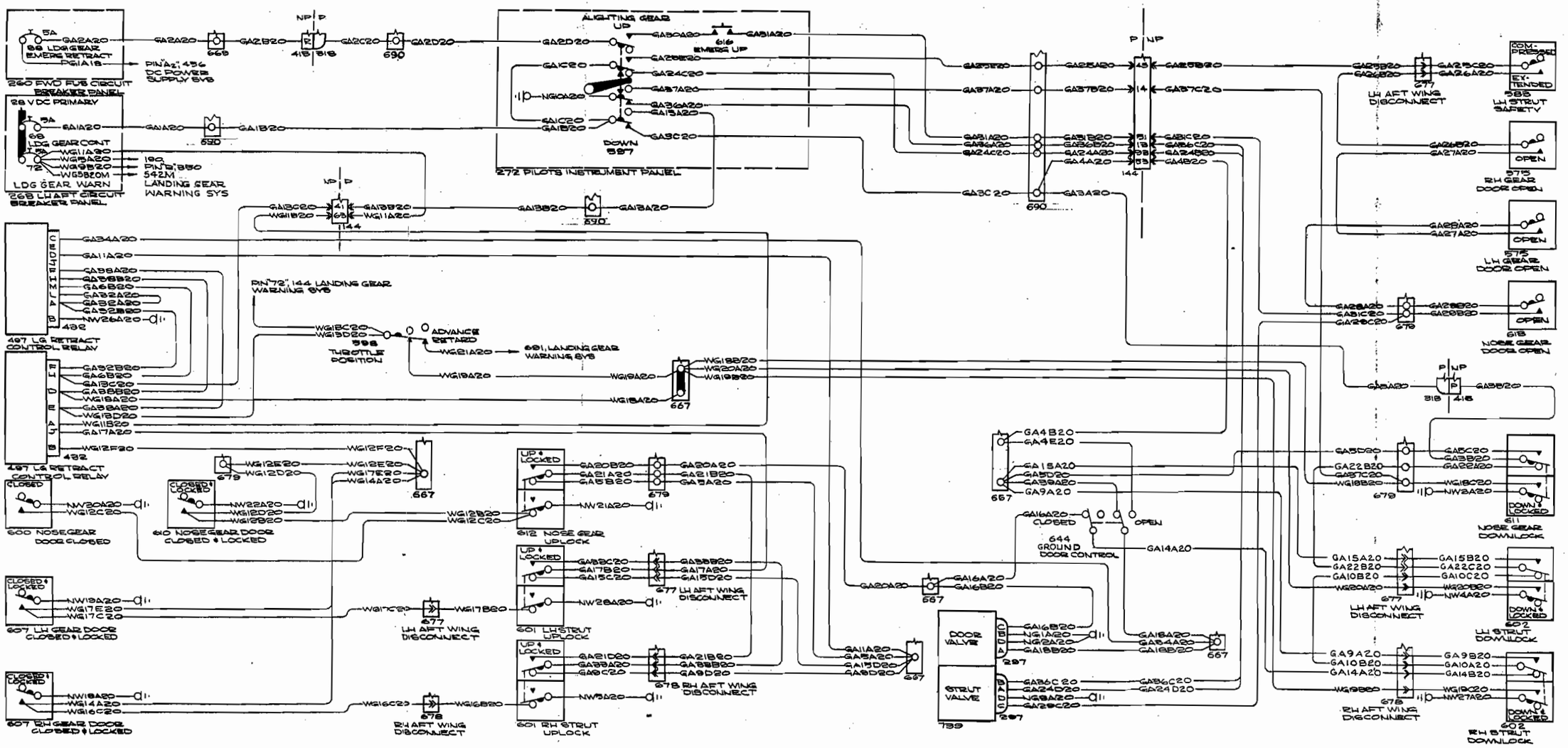


LANDING GEAR ACTUATING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH A/t)	Fus 62.6 LH	Cockpit - Forward of Pedestal
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
563	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
602	Switch - Main Landing Gear Downlock	Wing 90 LH and RH	Wheel Wells
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (A/t)	Fus 190 RH and LH	Wheel Wells
676	Terminal Block - Wing RH (A/t)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80JLD-4) for part numbers and location of items.

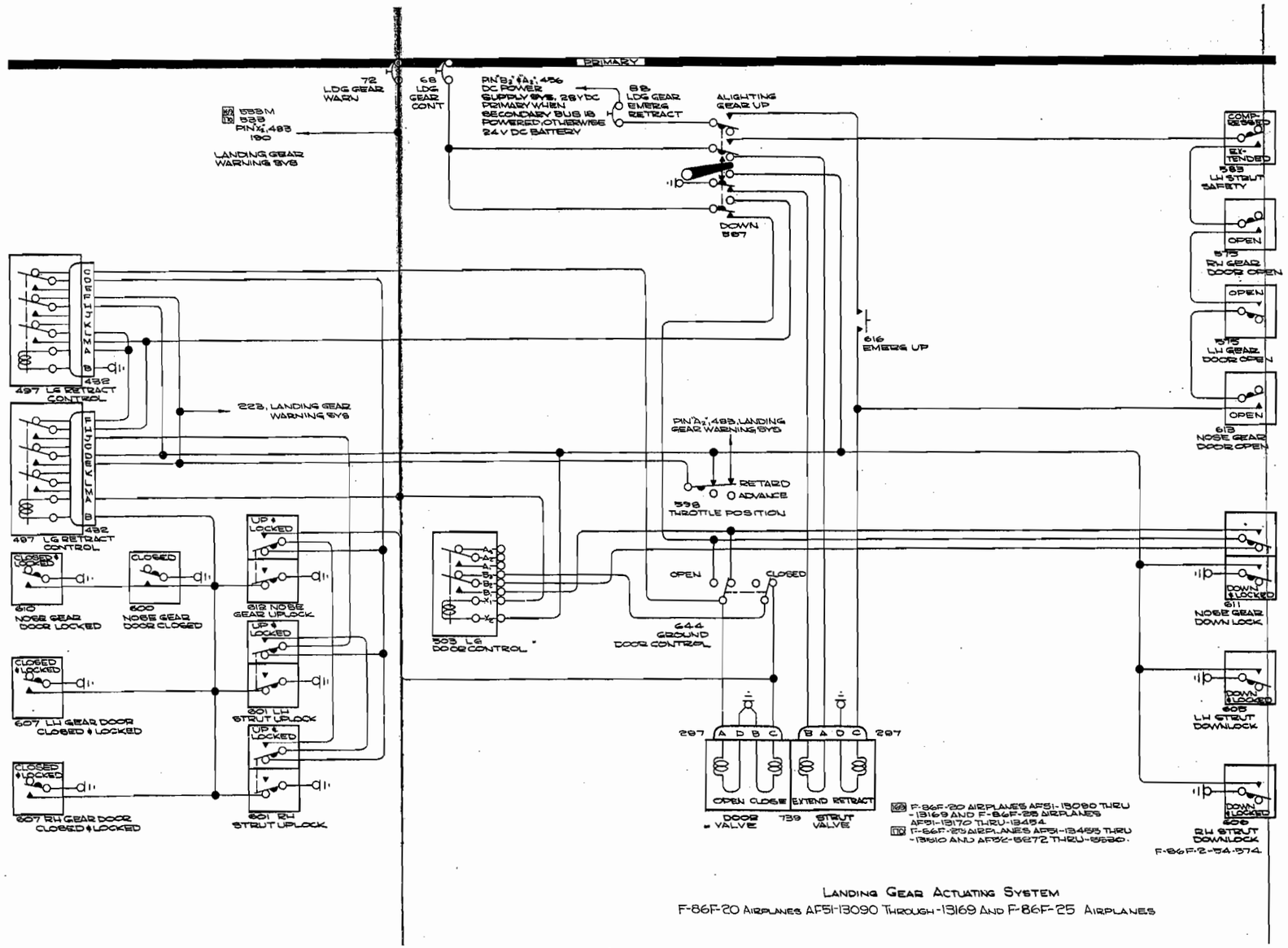
Landing Gear Actuating System - F-86F-20 Airplanes AF51-13070 Through -13089



T.O. 1 F-86-156

F-86F-2-54-583

LANDING GEAR ACTUATING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

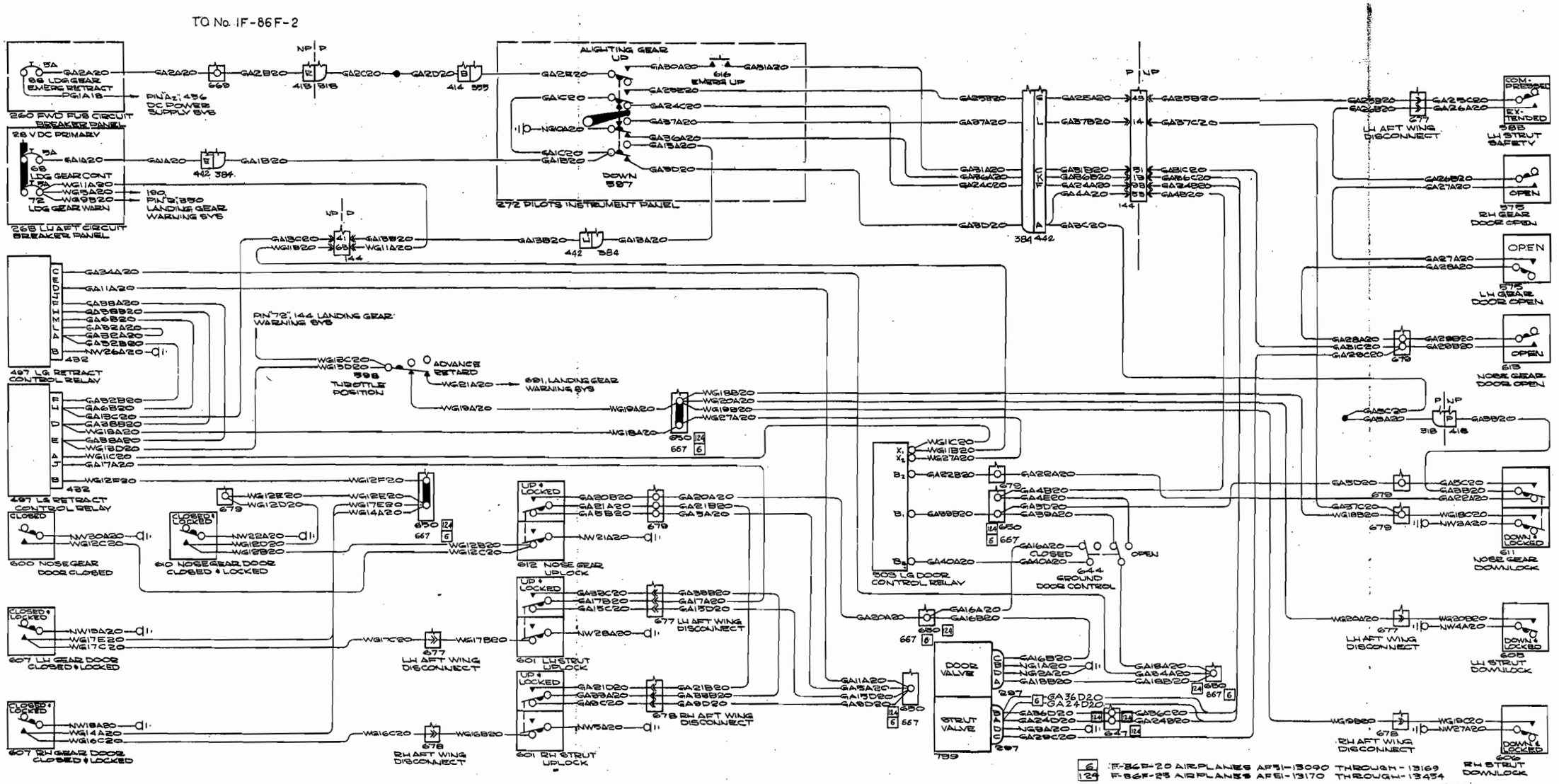


LANDING GEAR ACTUATING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.8 LH	Cockpit - Forward of Pedestal
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.8 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
364	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Actuating System F-86F-20 Airplanes AF51-13090 Through -13169
and F-86F-25 Airplanes AF51-13170 Through -13454



LANDING GEAR ACTUATING SYSTEM

F-86F-20 AIRPLANES AF51-13090 THROUGH-13169 AND F-86F-25 AIRPLANES AF 51-13170 THROUGH-13454

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
193	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 76 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 180 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
575	Switch - Fairing Door Open	Fus 176 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
650	Terminal Block - Wing Bomb	Fus 196 RH	Circuit-breaker Panel
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
701	Terminal Block - Landing Light and Gear Warning	Fus 81 LH	Instrument Panel

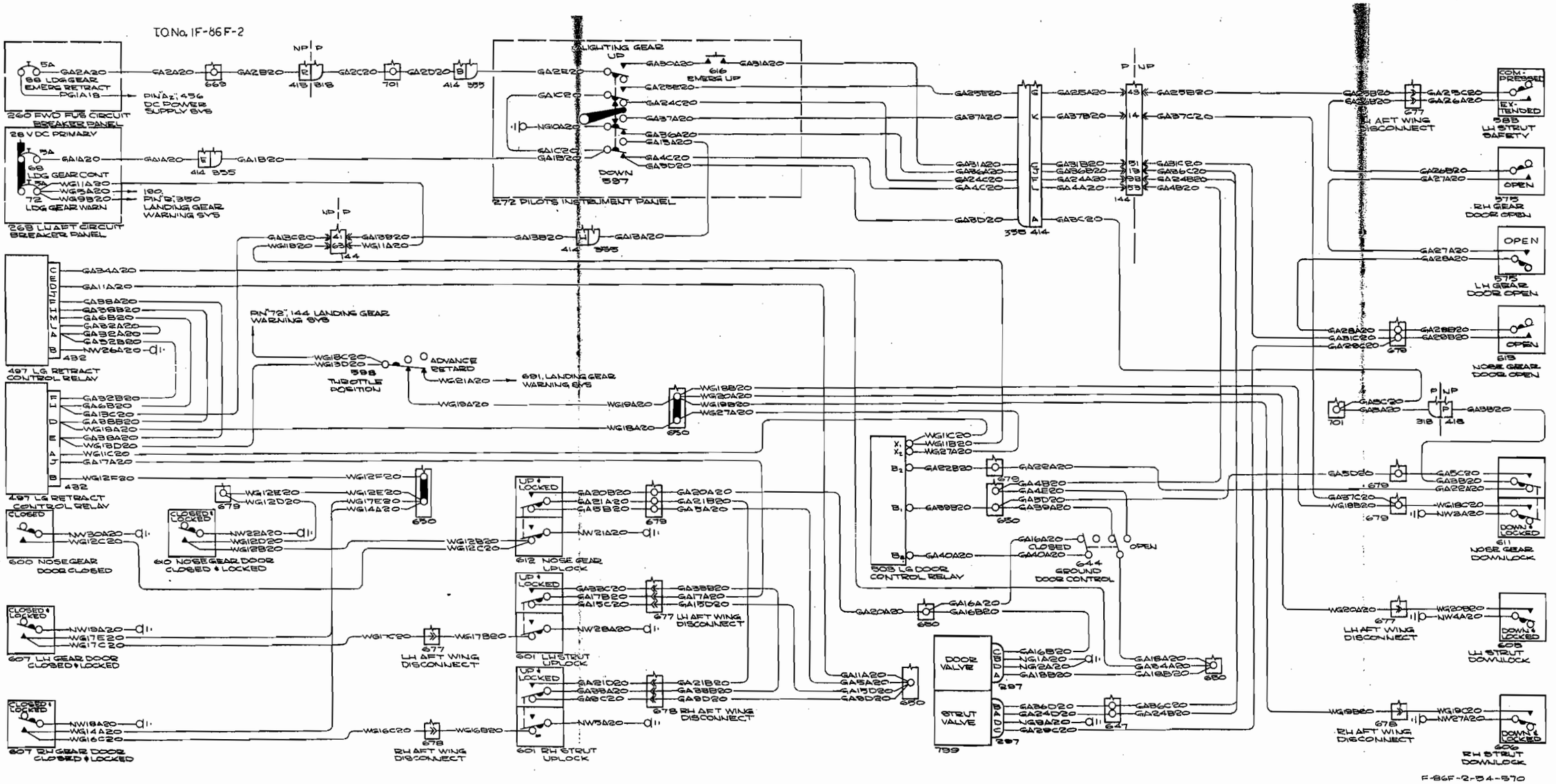
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Actuating System - F-86F-25 Airplanes AF51-13455 Through -13510

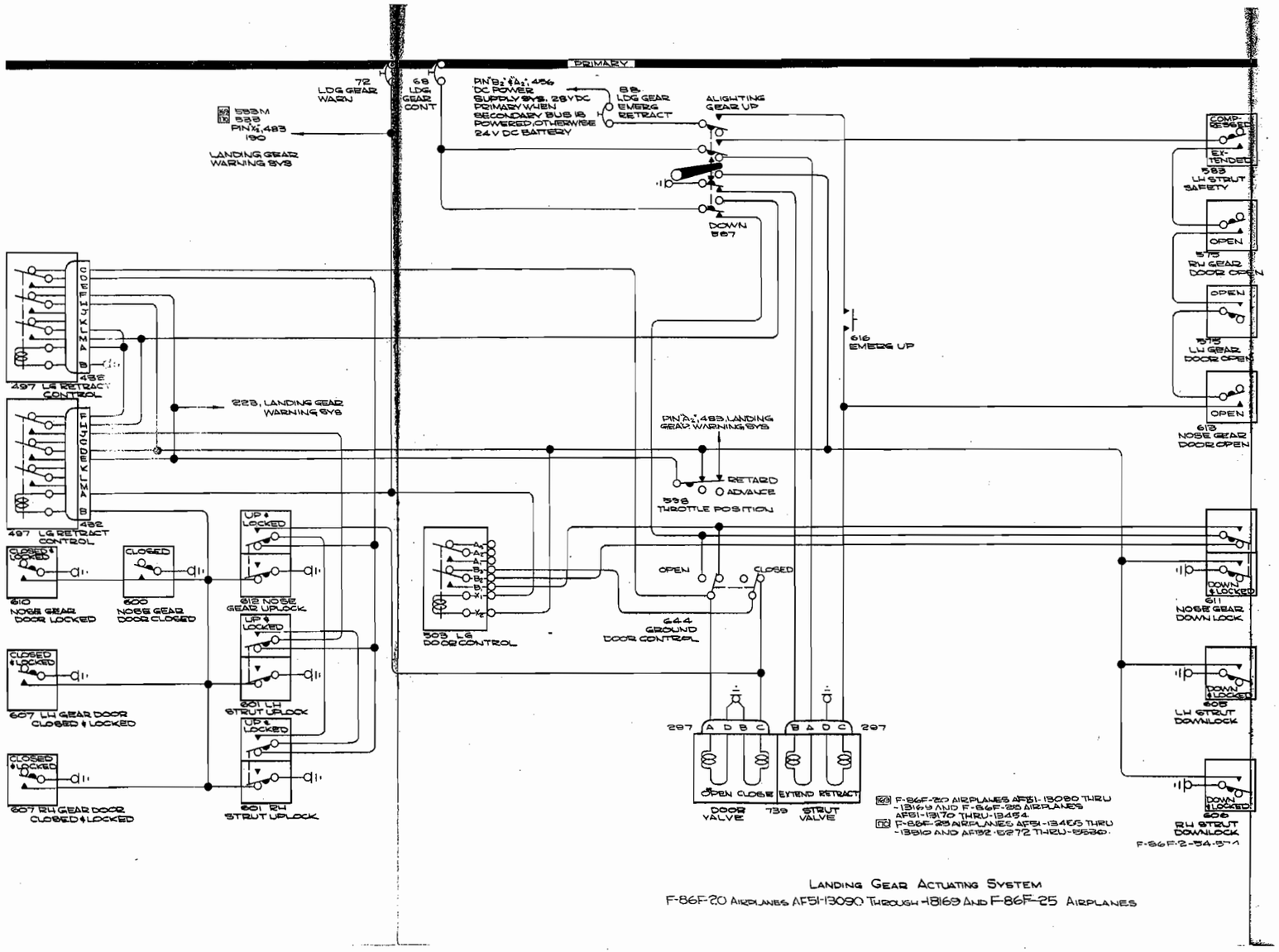
553M F-86F-20 AIRPLANES AF51-13090 THRU -13169 AND F-86F-25 AIRPLANES AF51-13170 THRU-13454

553 F-86F-25 AIRPLANES AF51-13455 THRU -13510 AND AF52-5672 THRU-5730.

LANDING GEAR ACTUATING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES



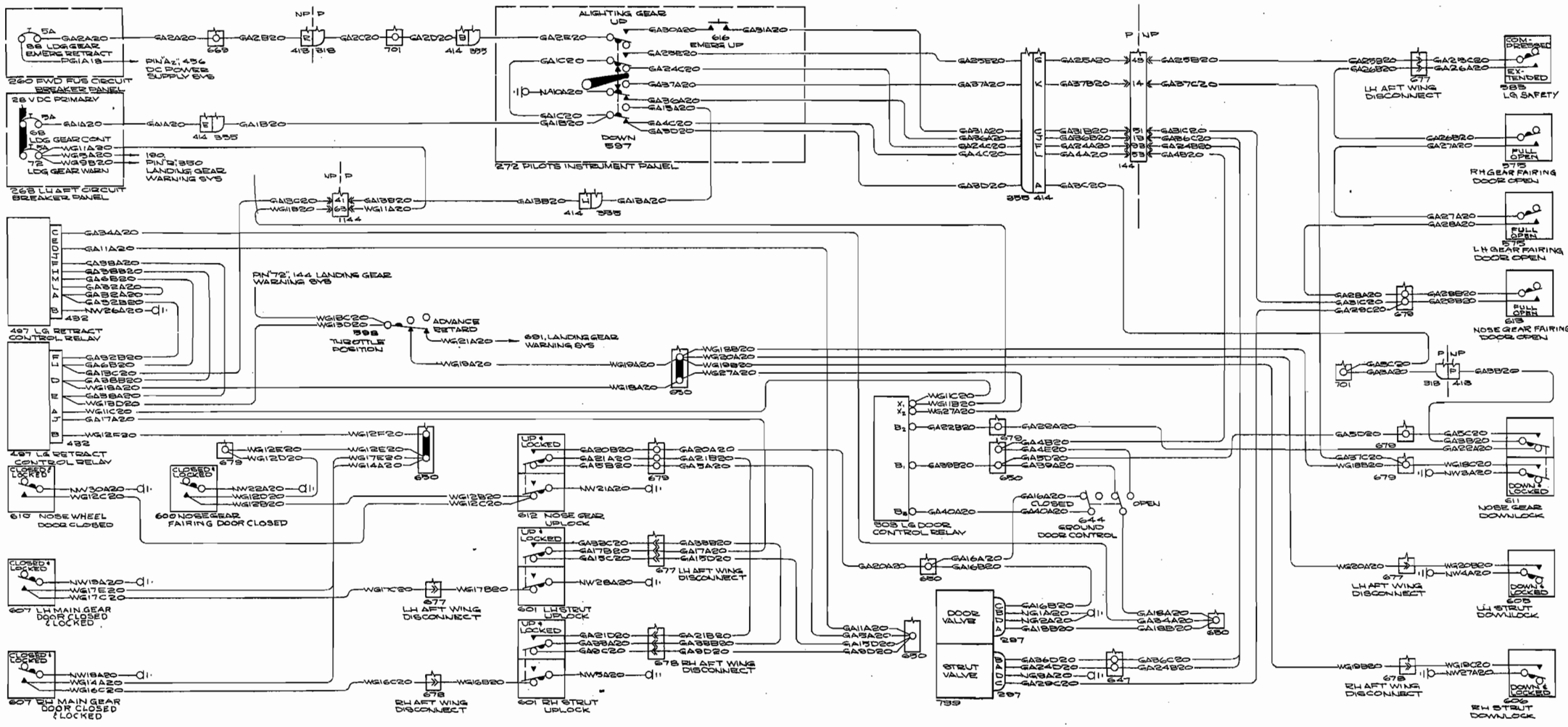
LANDING GEAR ACTUATING SYSTEM
F86F-25 AIRPLANES AF 51-13455 THROUGH-13510



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62. 6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
596	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 150 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
647	Terminal Block - Landing Gear Valve	Fus 180 RH	Wheel Well
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
701	Terminal Block - Landing Light and Gear Warning	Fus 81 LH	Instrument Panel
739	Valve - Landing Gear Struts and Fairing Door Hydraulic Solenoid	Fus 160 RH and LH	Wheel Wells

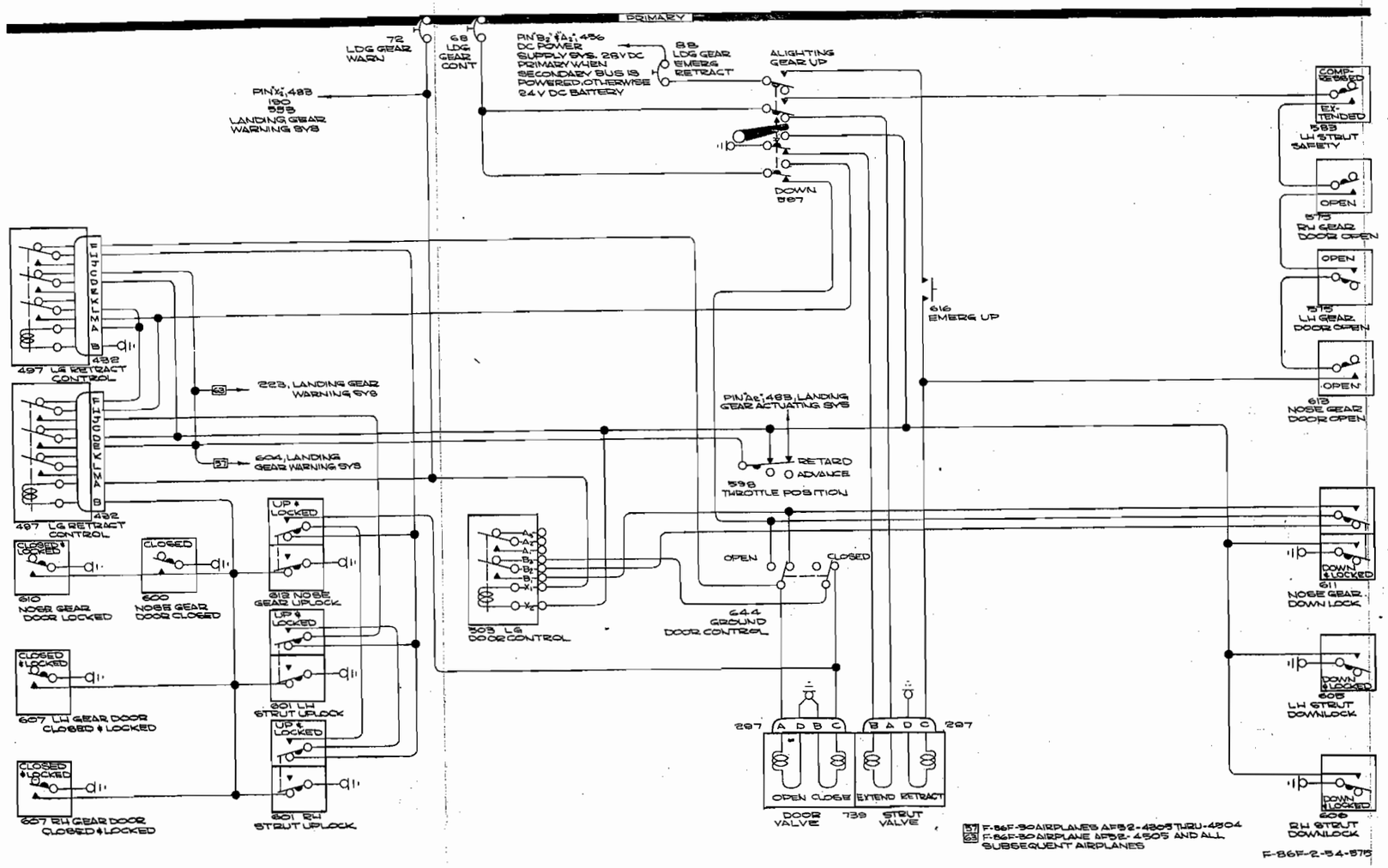
Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

LANDING GEAR ACTUATING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES



F-86F-2-54-580

Landing Gear Actuating System
F-86F-25 Airplanes AF52-5272 Through -5530

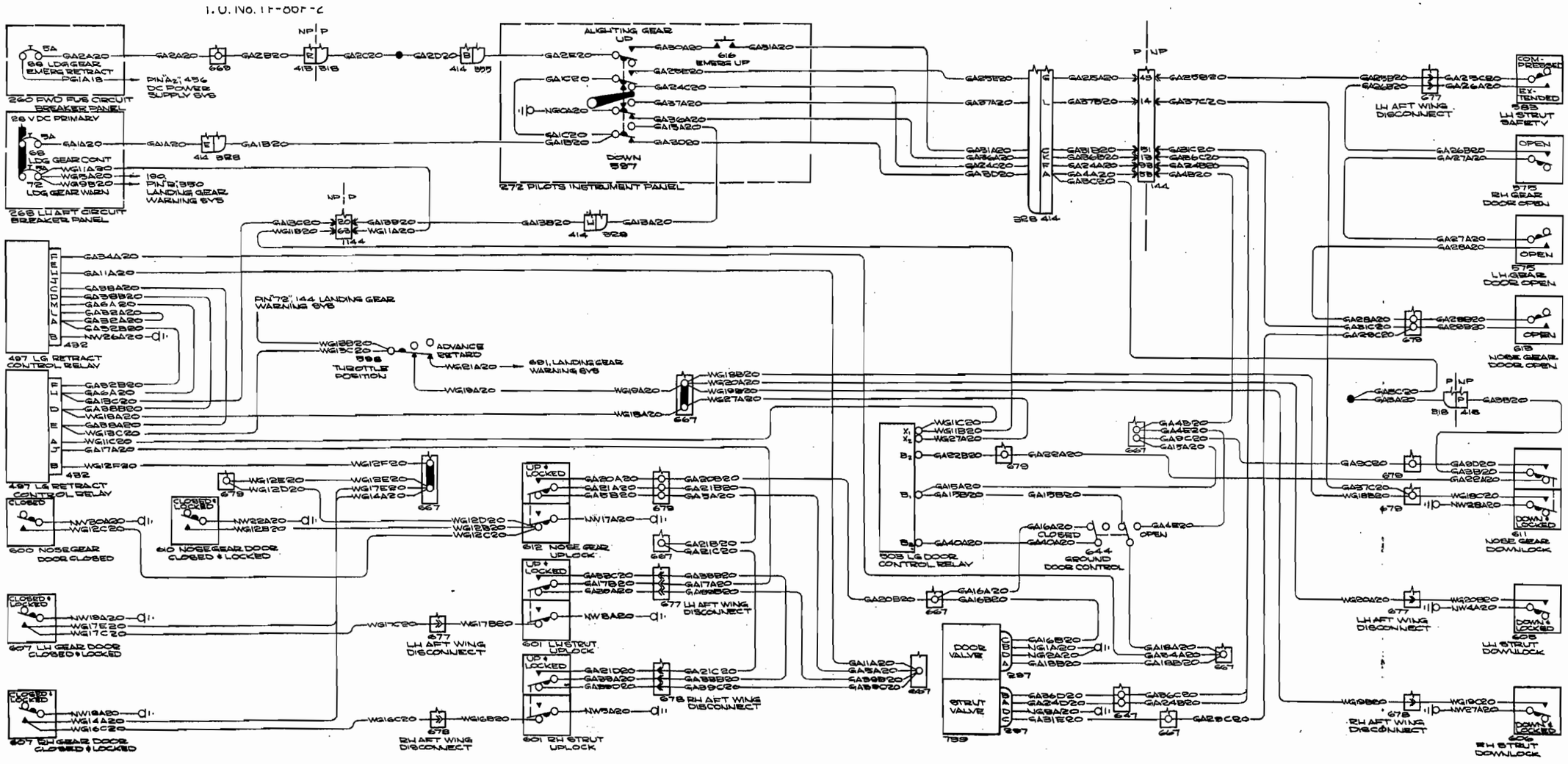


LANDING GEAR ACTUATING SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES

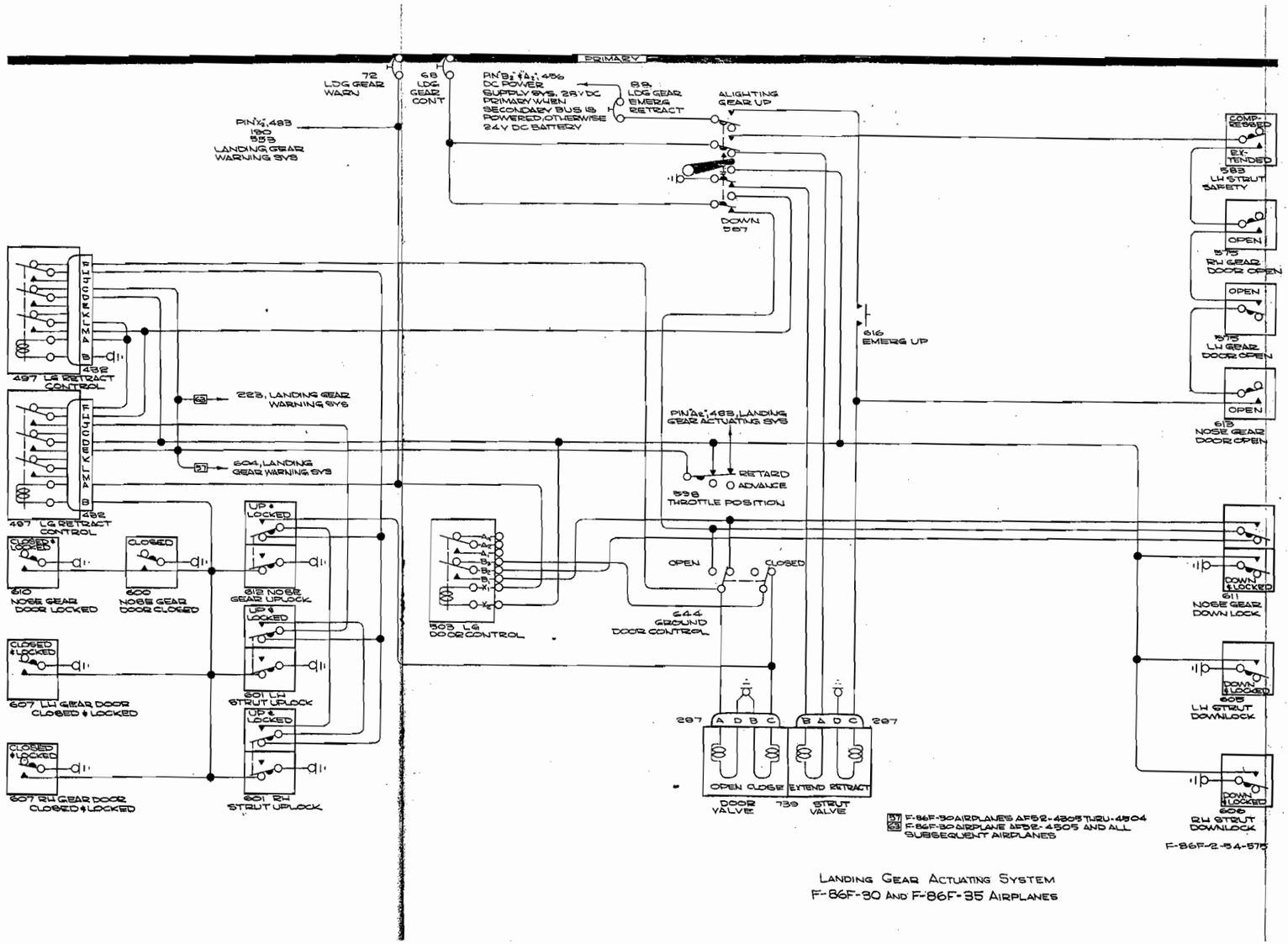
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
297	Plug - Door and Strut Hydraulic Solenoid Valve	Fus 160 RH	RH Wheel Well, Engine Access
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 82.6 LH	Cockpit - Forward of Pedestal
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
350	Plug - Pedestal Disconnect - LH Inboard	Fus 82.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
644	Switch - Ground Door Control	Fus 82 LH	Wheel Well
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
676	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Actuating System F-86F-30 Airplanes AF52-4305 Through -4745



LANDING GEAR ACTUATING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH-4745

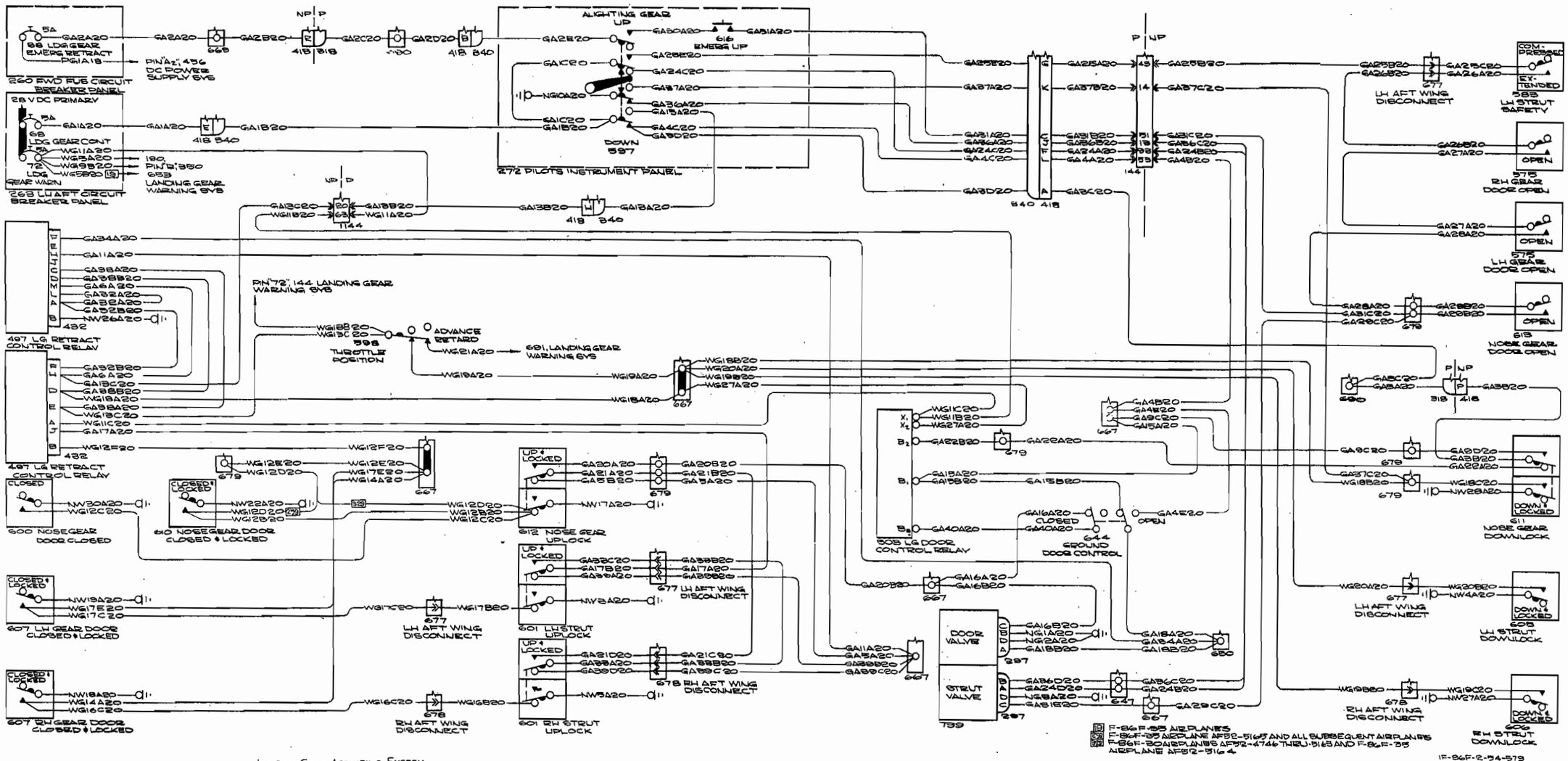


LANDING GEAR ACTUATING SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
340	Plug - Instrument Panel Light Disconnect	Fus 78 LH	Fwd Inst Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 82.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
456	Relay - Canopy Alternate Power	Fus 40 LH	Nose Radar Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
575	Switch - Fairing Door Open	Fus 178 LH	Mid-fuselage
583	Switch - Ground Sequence Safety	Wing 90 RH and LH and Fus 26 CL	Struts, LH and Nose
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
800	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
613	Switch - Nose Wheel Door Open	Fus 26 RH	Nose Wheel Well
653	Terminal Block - Ammunition Booster	Fus 86 RH and LH	Cockpit
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Actuating System - F-86F-30 Airplane AF52-4746 and All Subsequent Airplanes

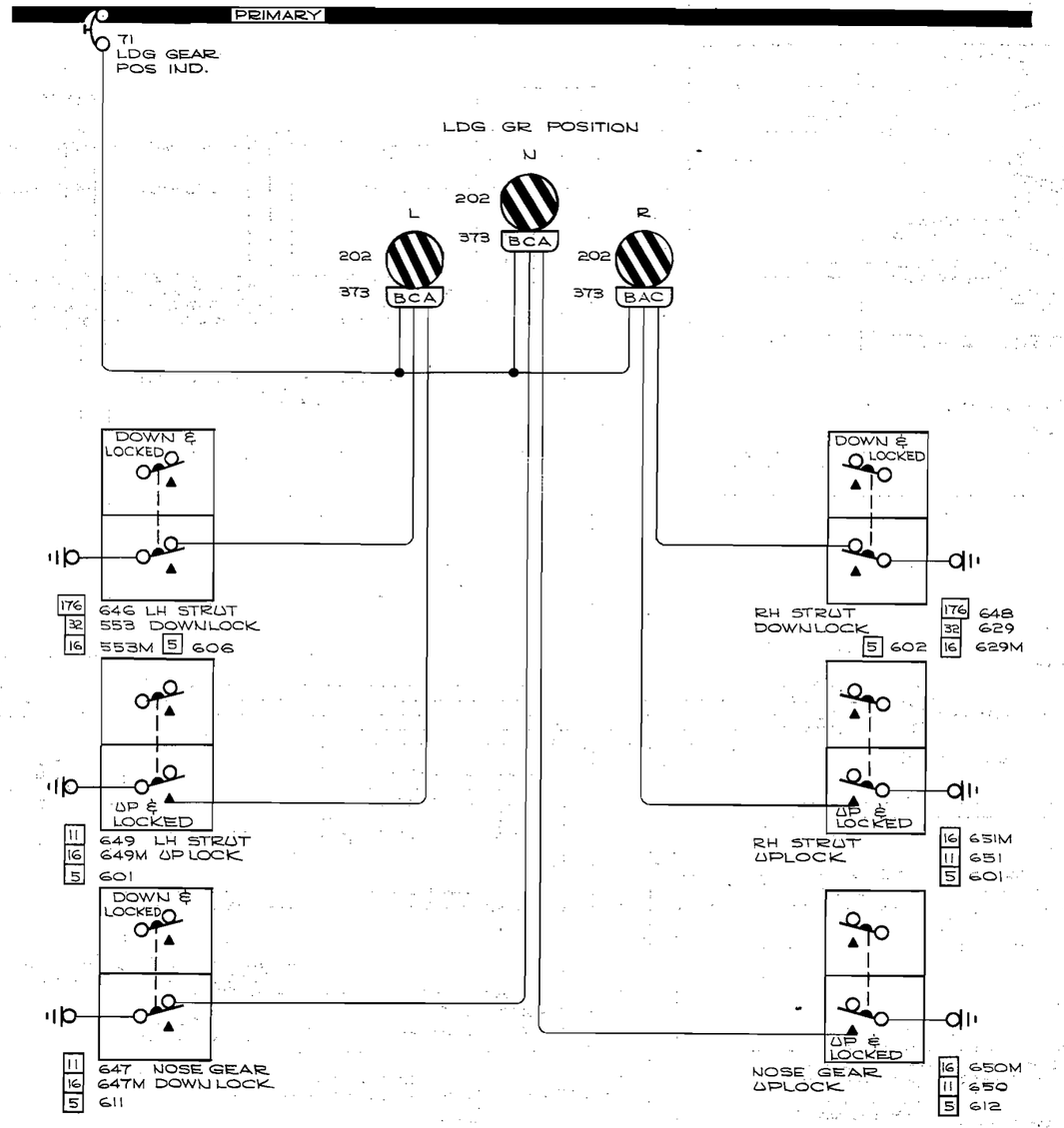


LANDING GEAR ACTUATING SYSTEM
F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

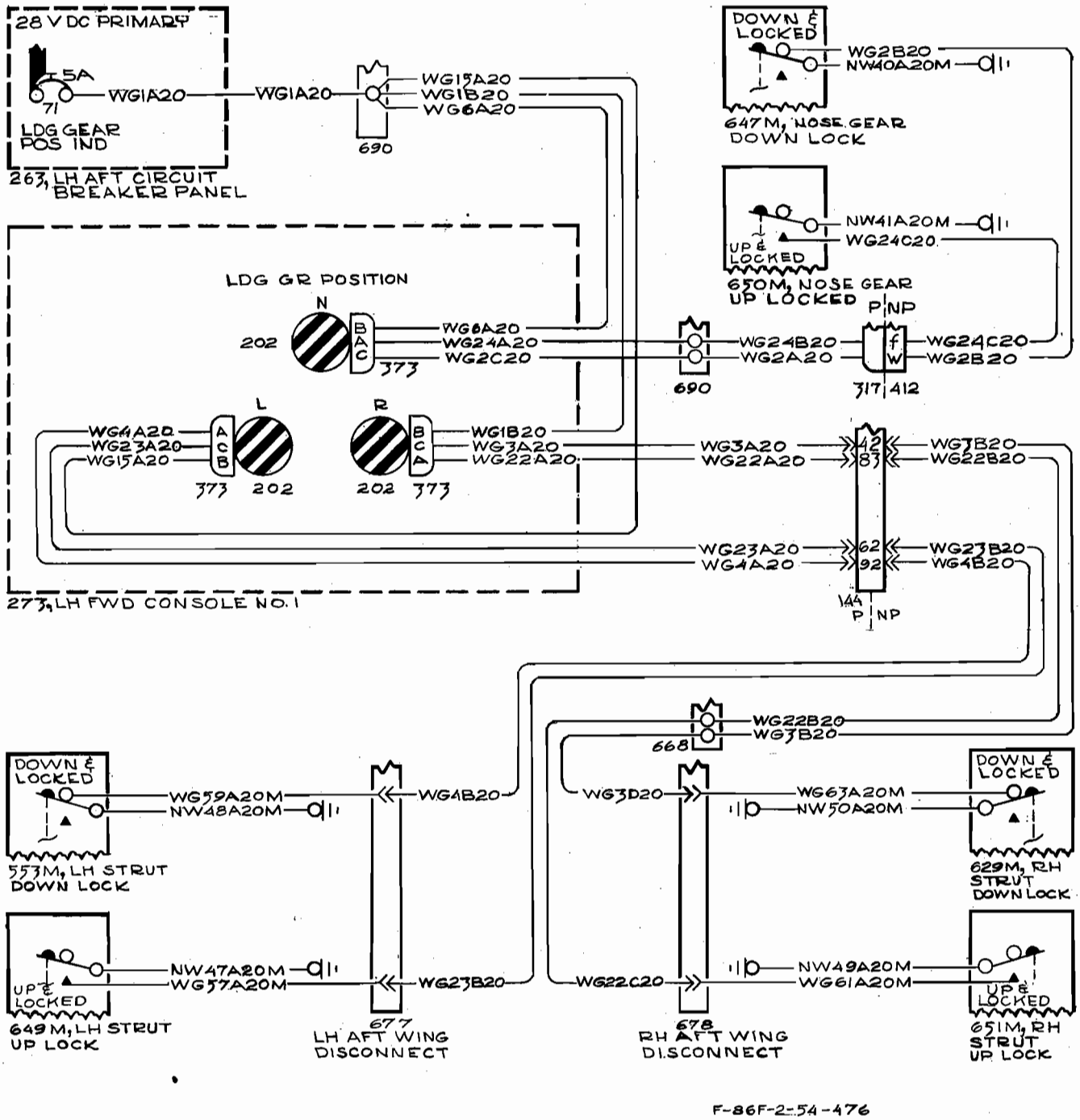
INDEX NO.	DESCRIPTION	STATION	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System F-86F-1 Airplanes

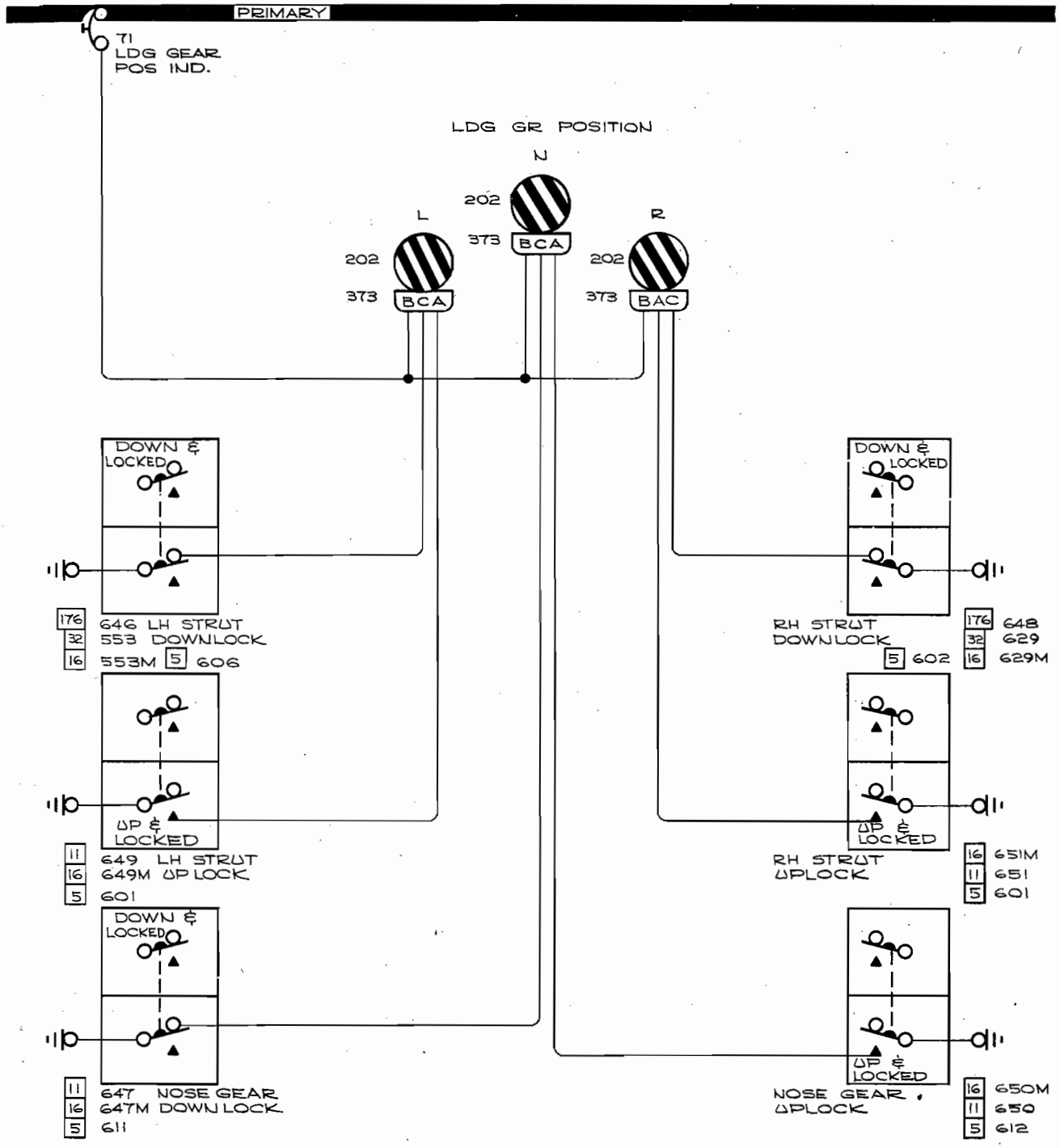


Landing Gear Position Indicating System
F-86F-1 Through F-86F-15 Airplanes And F-86F-20
Airplanes AF51-13070 Through -13089



F-86F-2-54-476

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-1 AIRPLANES



5 F-86F-20 AIRPLANES AF51-13070 THRU -13089
11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
32 F-86F-35 AIRPLANES
176 F-86F-5 & F-86F-10 AIRPLANES

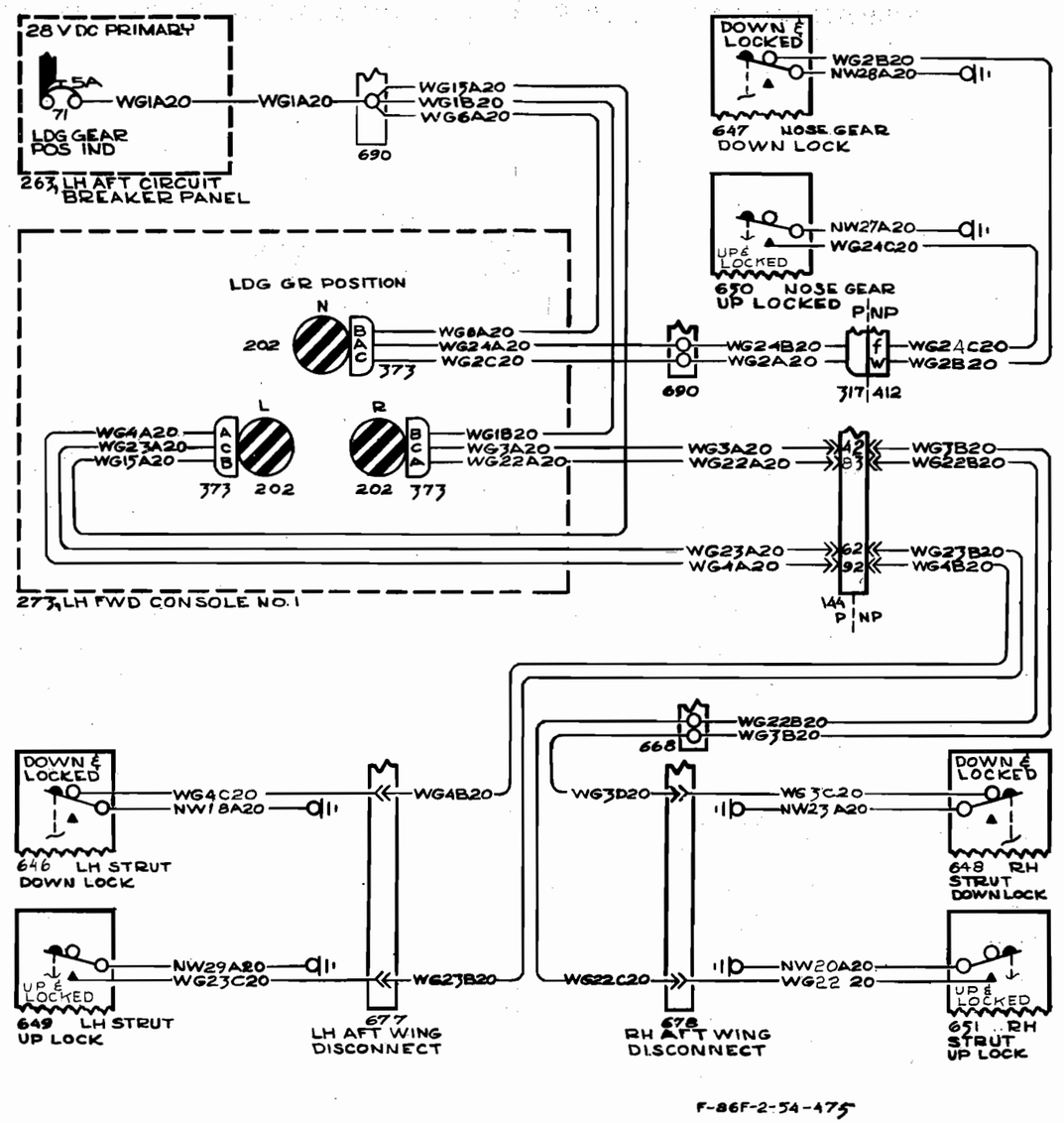
F-86F-2-54-453

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20
AIRPLANES AF51-13070 THROUGH -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System F86-F-5 Airplanes



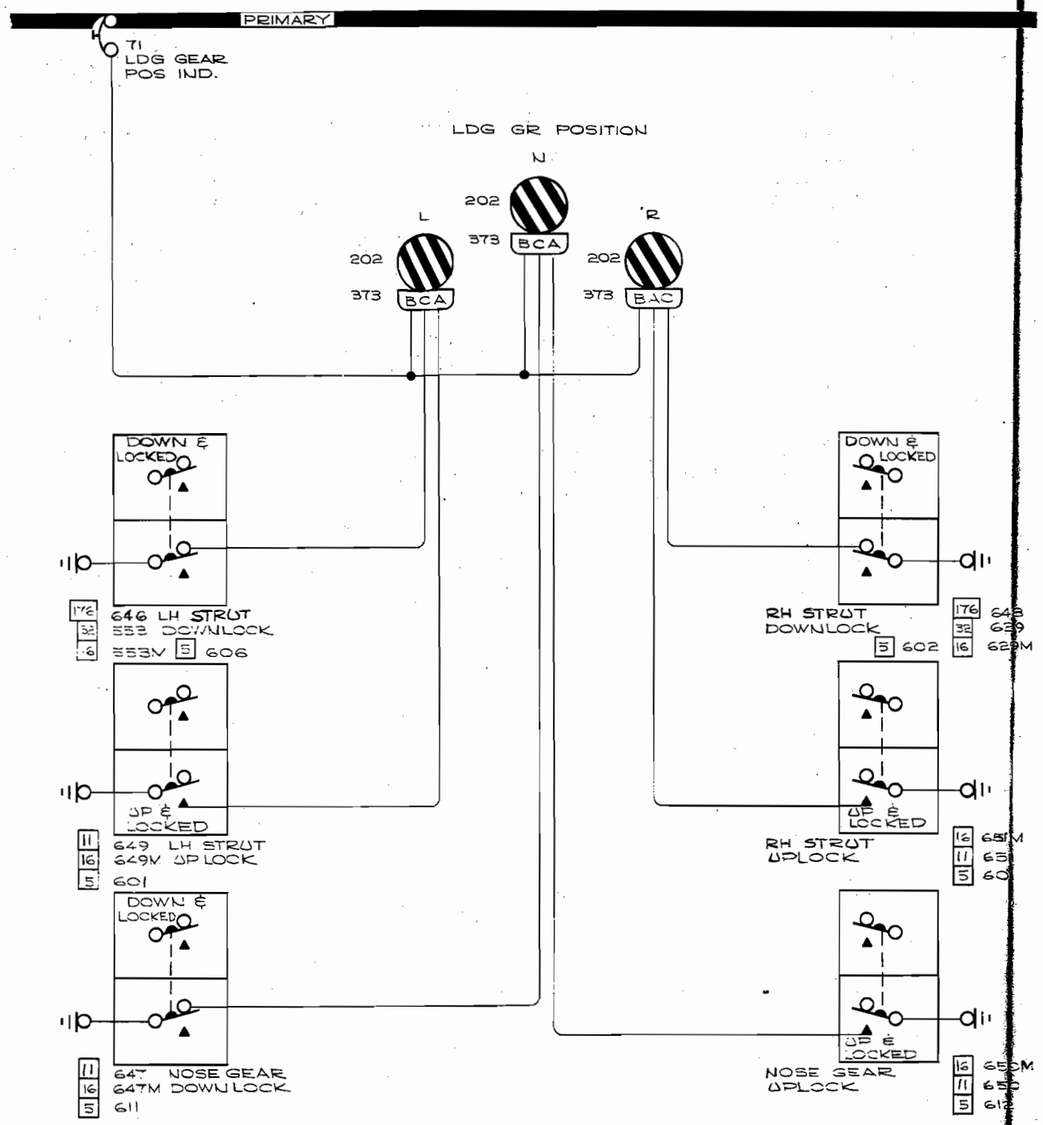
F-86F-2-54-475

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-5 AIRPLANES

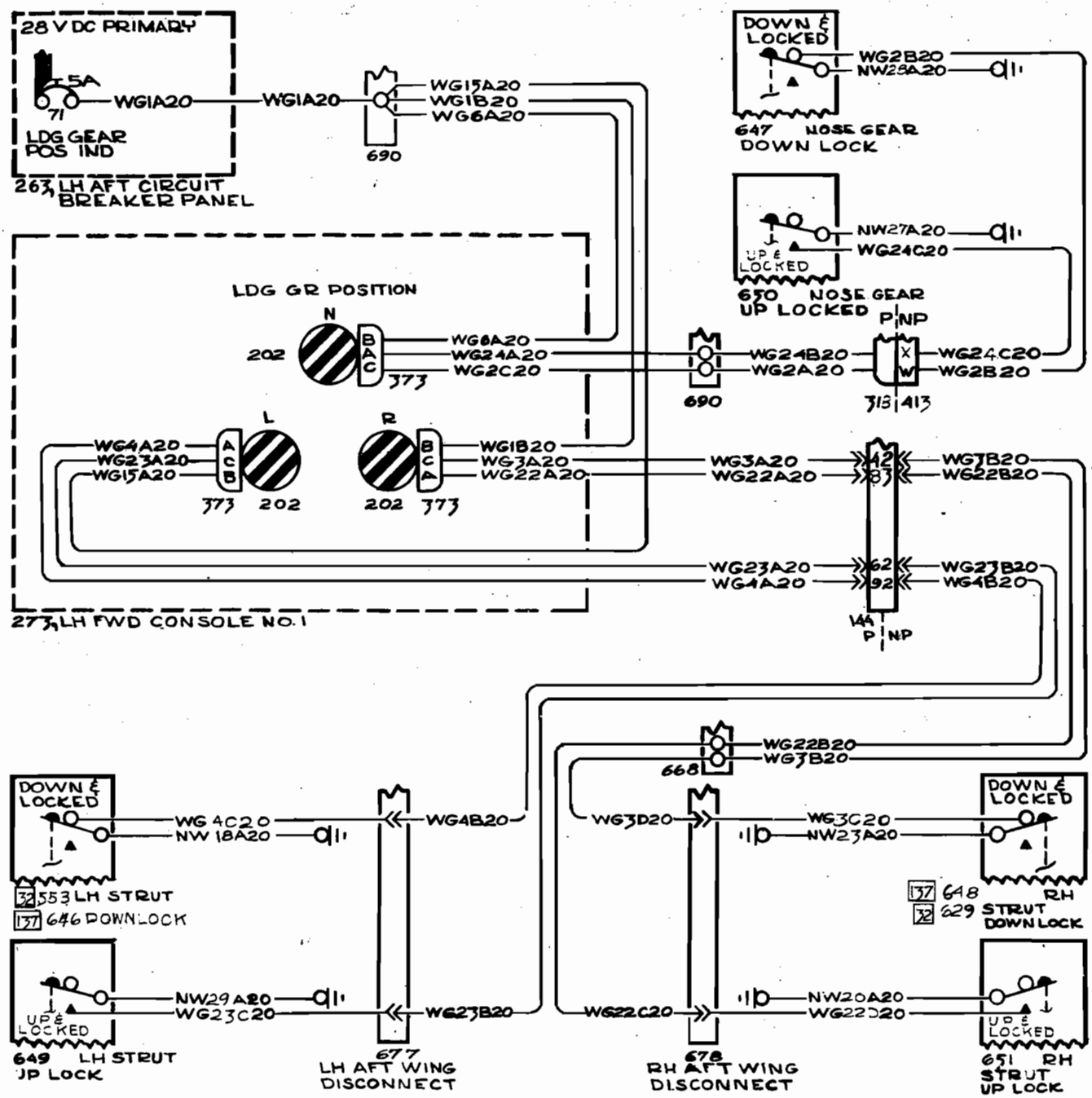
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System F-86-F-10 and F-86-F-15 Airplanes



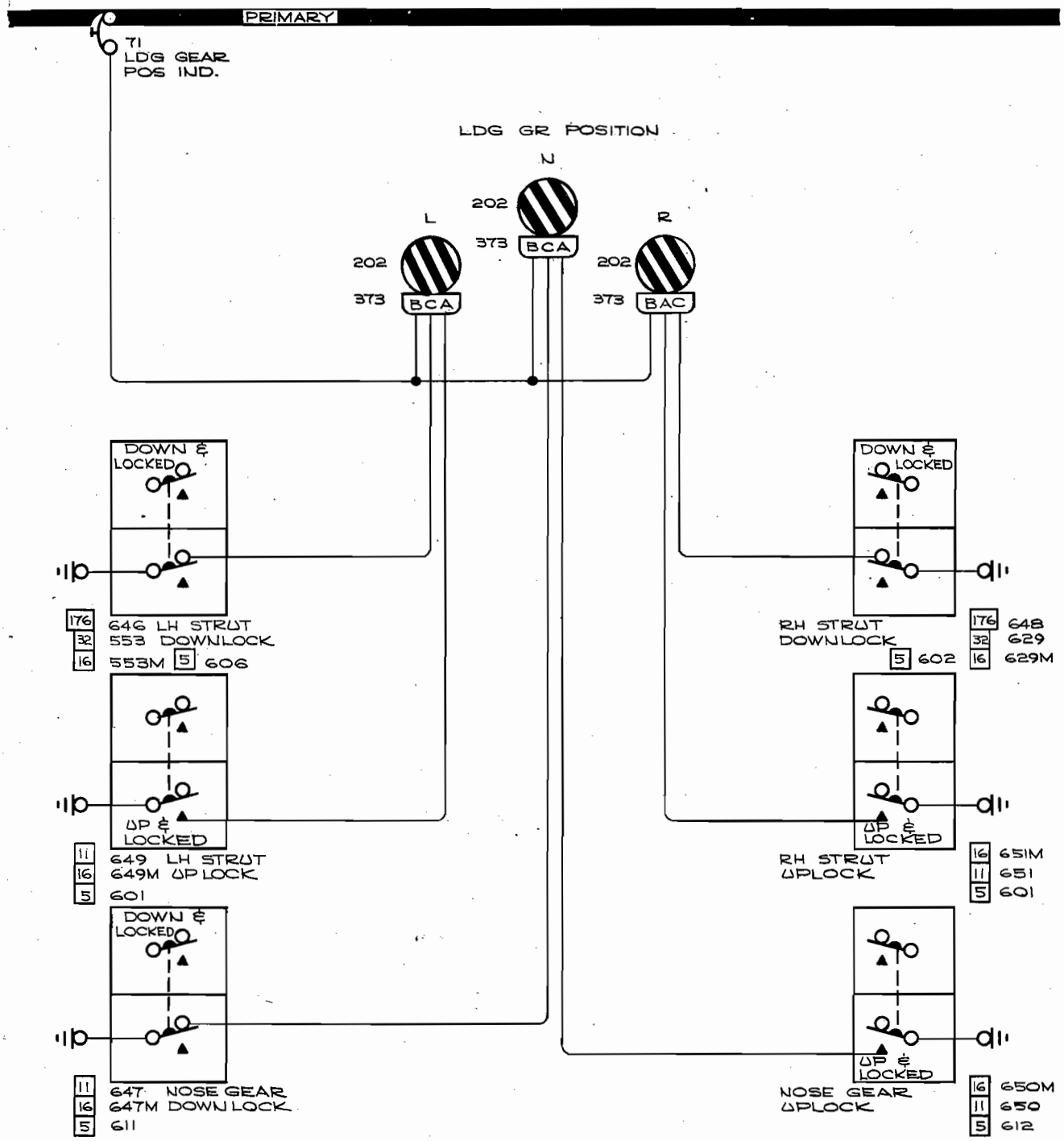
Landing Gear Position Indicating System
F-86F-1 Through F-86F-15 Airplanes And F-86F-20
Airplanes AF51-13070 Through -13089



F-86F-2-54-47

32 F-86F-15 AIRPLANES
137 F-86F-10 AIRPLANES

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-10 AND F-86F-15 AIRPLANES



5 F-86F-20 AIRPLANES AF51-13070 THRU -13089
11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
32 F-86F-35 AIRPLANES
176 F-86F-5 & F-86F-10 AIRPLANES

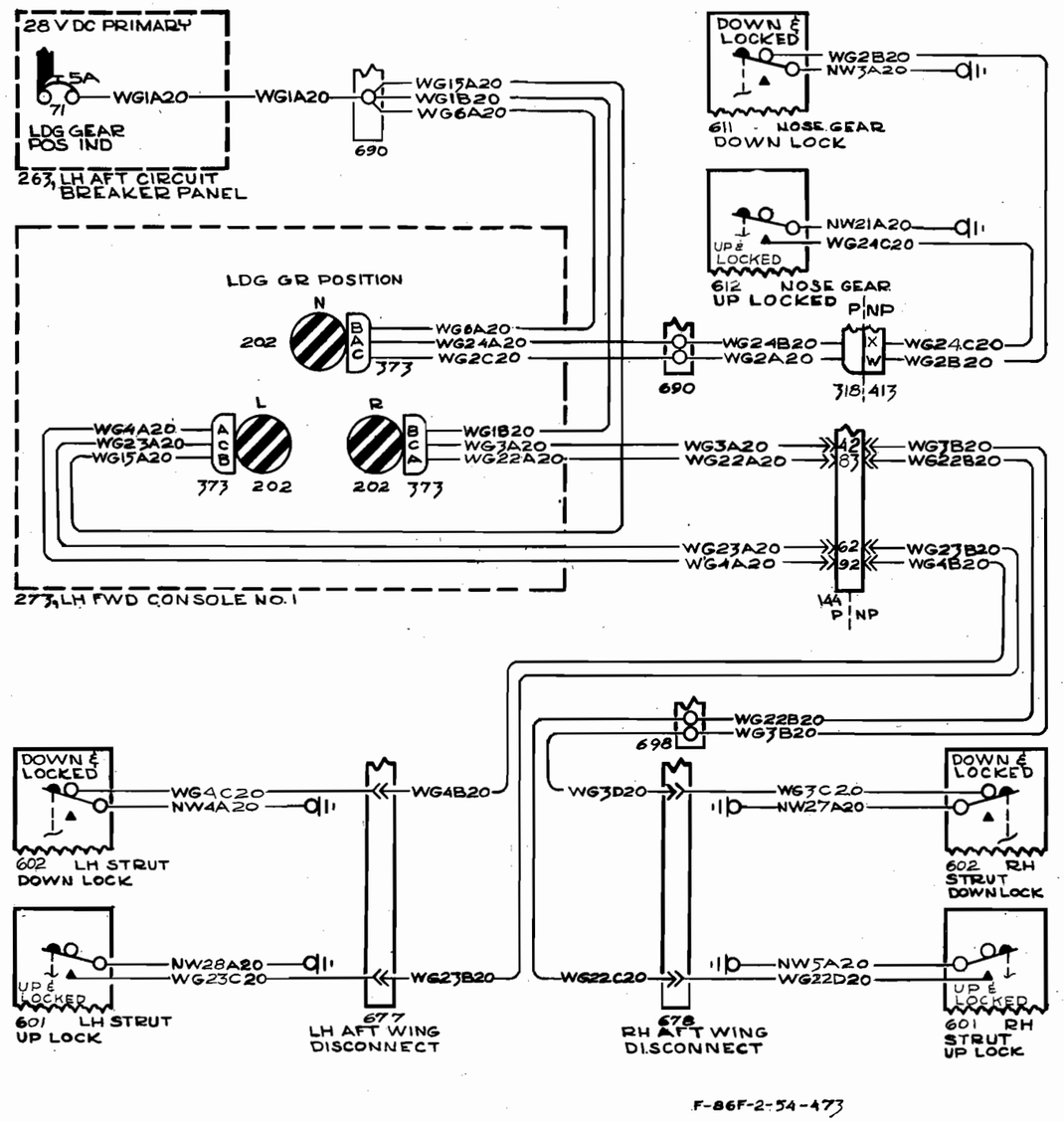
F-86F-2-54-453

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20
AIRPLANES AF51-13070 THROUGH -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
413	Receptacle - Forward Pressure Disconnect (LH Aft)	Fus 62 LH CL	Cockpit
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
602	Switch - Main Landing Gear Downlock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System F-86F-20 Airplanes AF51-13070 Through 13089

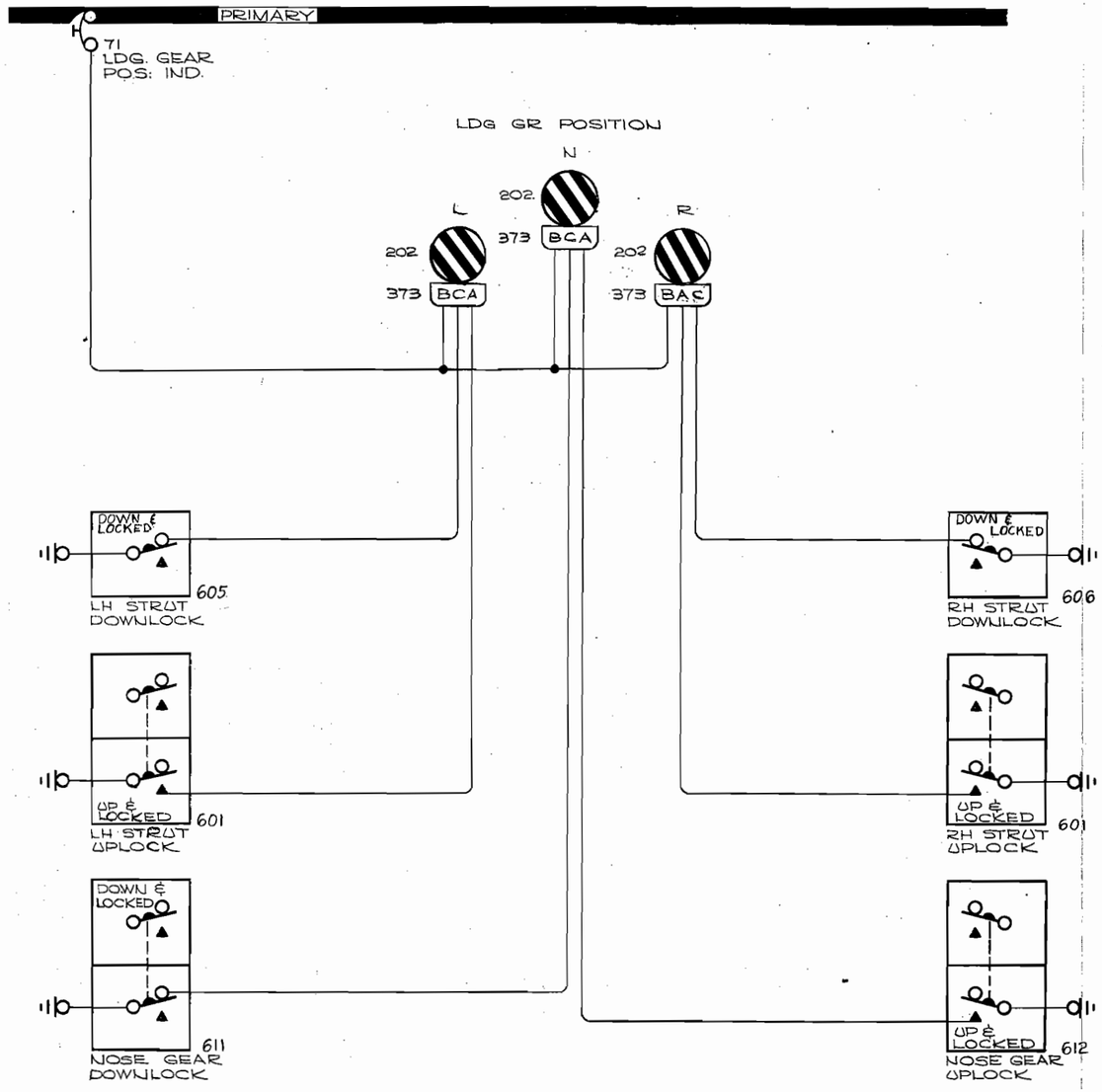


Landing Gear Position Indicating System
F-86F-20 Airplanes AF51-13070 Through -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
413	Receptacle - Forward Pressure Disconnect (LH Aft)	Fus 62 LH CL	Cockpit
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well
699	Terminal Block - N9 Camera Disconnect	Fus 54 CL	Nose Radar Bay
701	Terminal Block - Landing Light and Gear Warning	Fus 81 LH	Instrument Panel

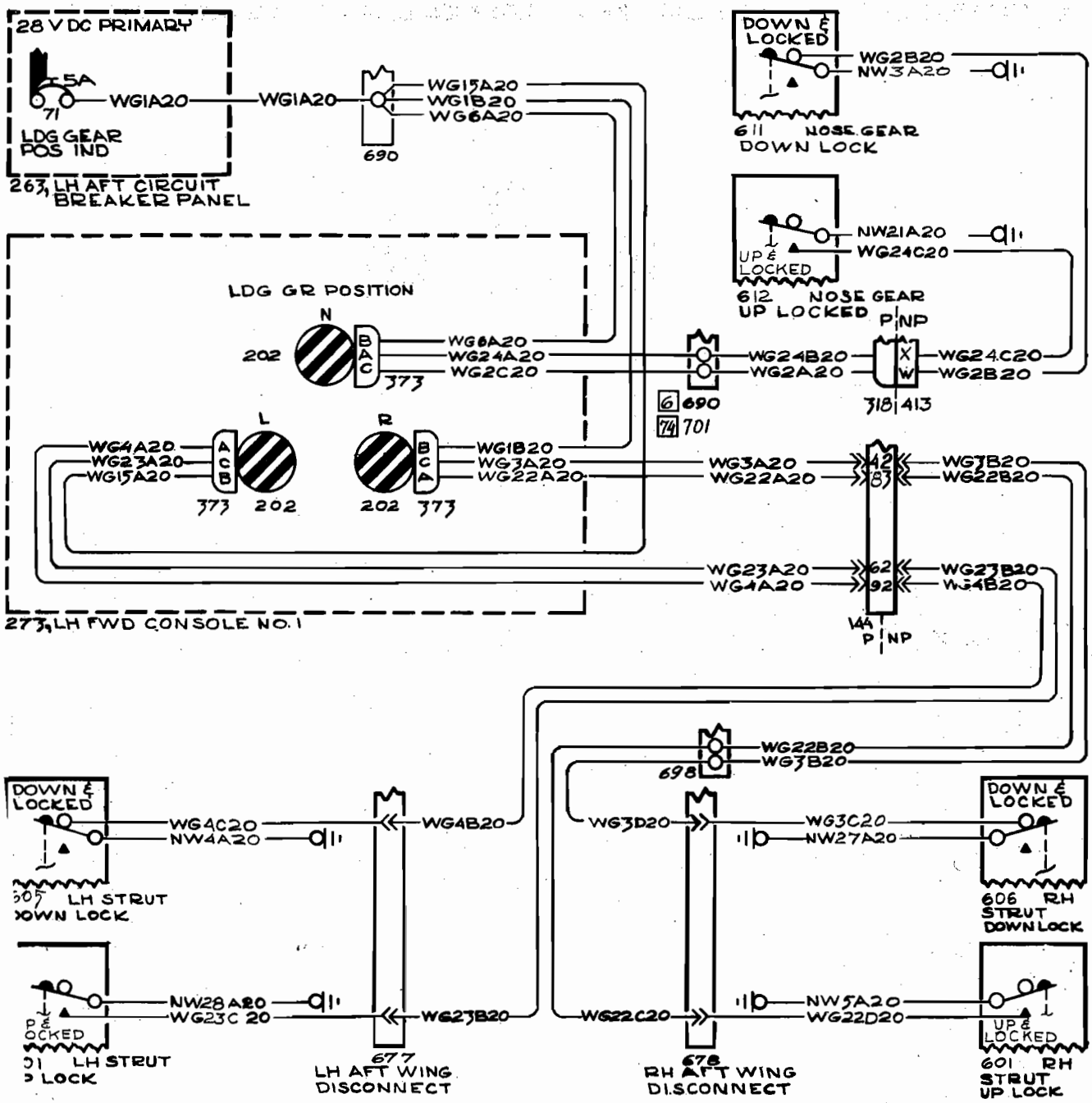
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System F-86F-20 Airplanes AF51-13090 Through -13169 and F-86F-25 Airplanes



F-86F-2-54-454

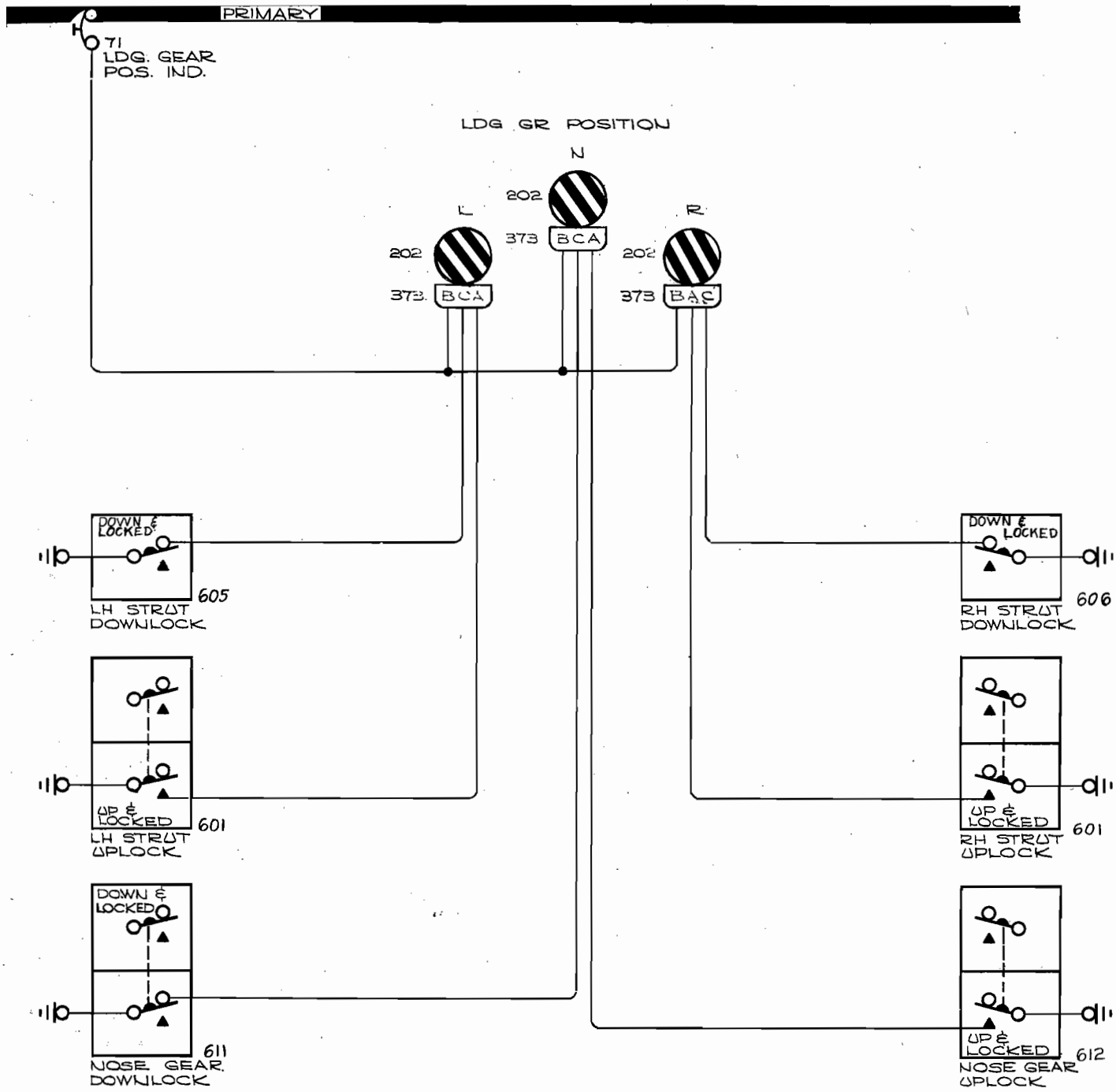
Landing Gear Position Indicating System
F-86F-20 Airplanes AF51-3090 Through -13169 And F-86F-25 Through F-86F-35 Aipplanes



6 F-86F-20 AIRPLANES AF51-13090 THRU-13169
74 F-86F-25 AIRPLANES

F-86F-2-54-472

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH-13169 AND F-86F-25 AIRPLANES



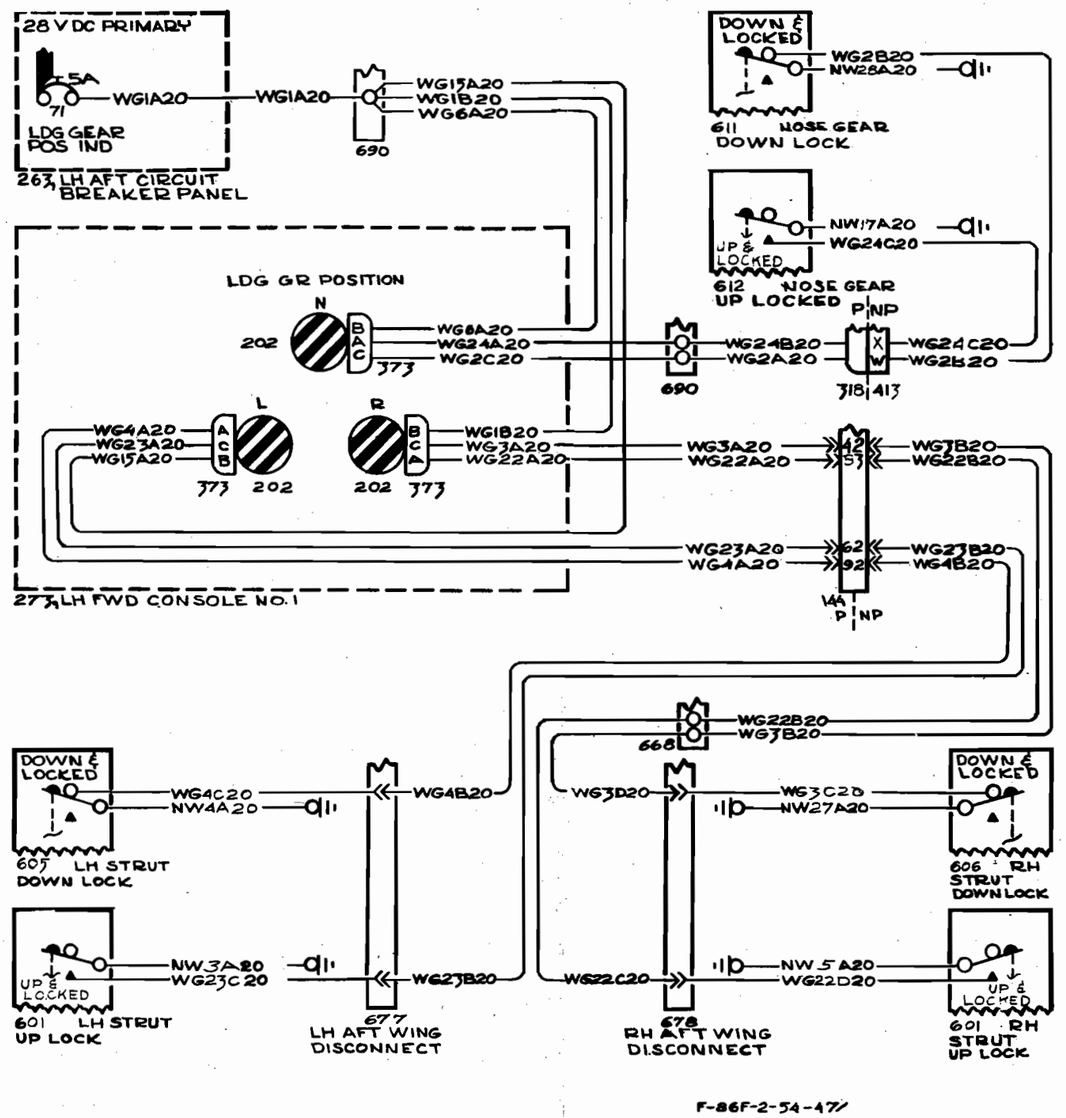
F-86F-2-54-454

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 THROUGH F-86F-35 AIPPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
413	Receptacle - Forward Pressure Disconnect (LH Aft)	Fus 62 LH CL	Cockpit
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel

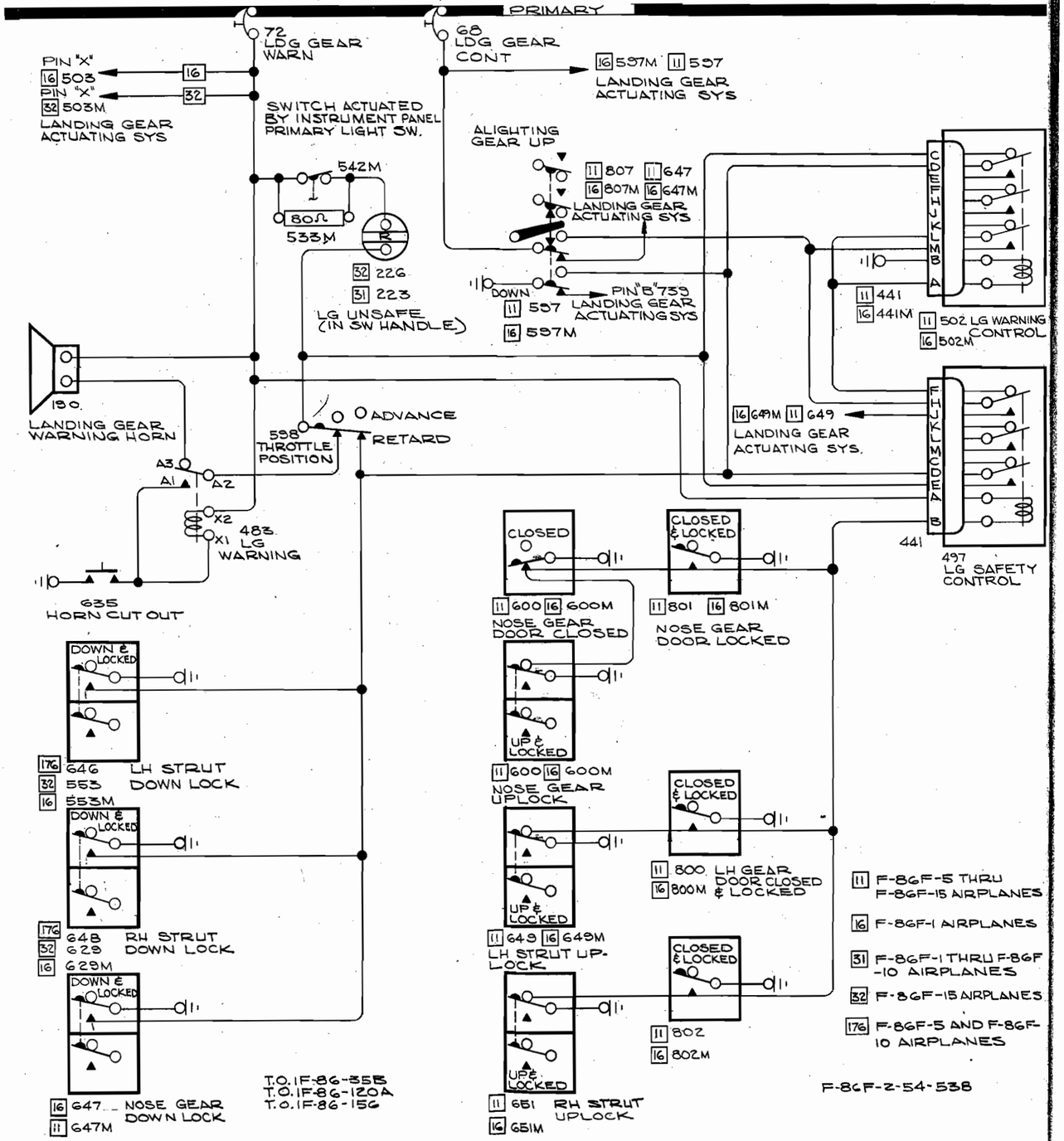
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Position Indicating System - F-86F-30 and F-86F-35 Airplanes



F-86F-2-54-47

LANDING GEAR POSITION INDICATING SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES

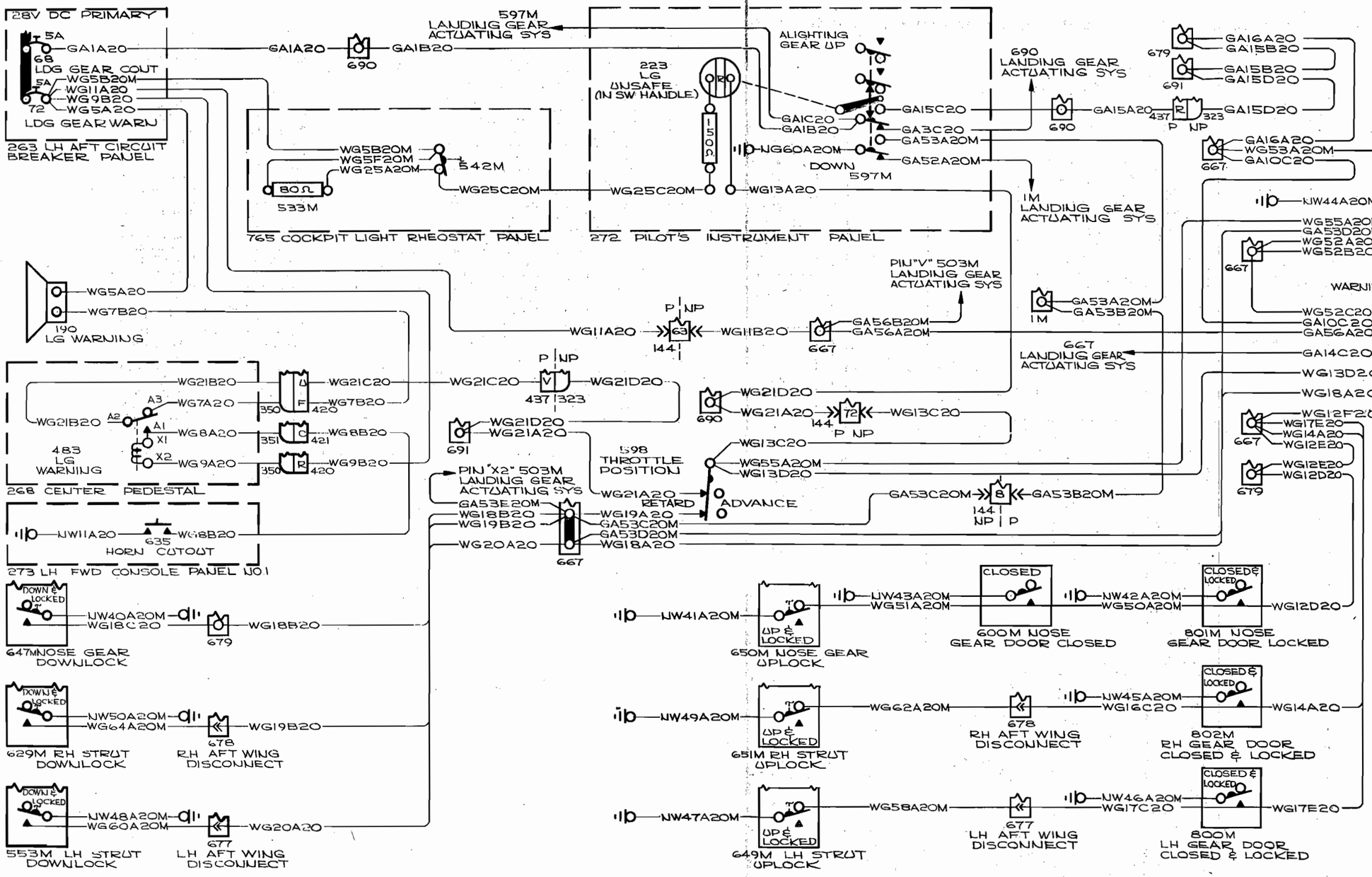


LANDING GEAR WARNING SYSTEM
F-86F-1 THRU F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62. 6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62. 6 LH	Directly Behind Pedestal
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

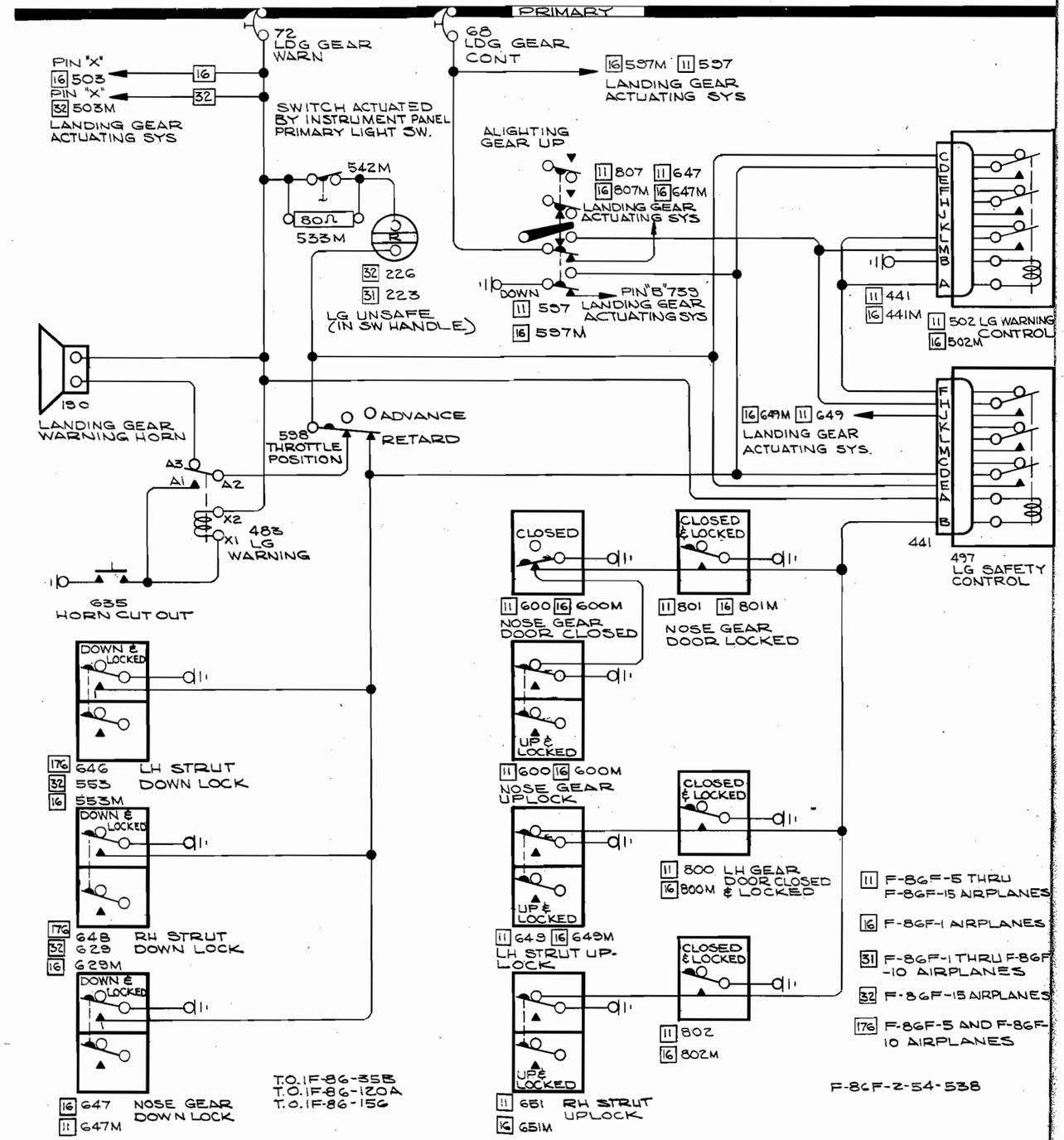
Landing Gear Warning System F-86F-1 Airplanes



LANDING GEAR WARNING SYSTEM

F-86F-1 AIRPLANES

F-86F-2-54-539

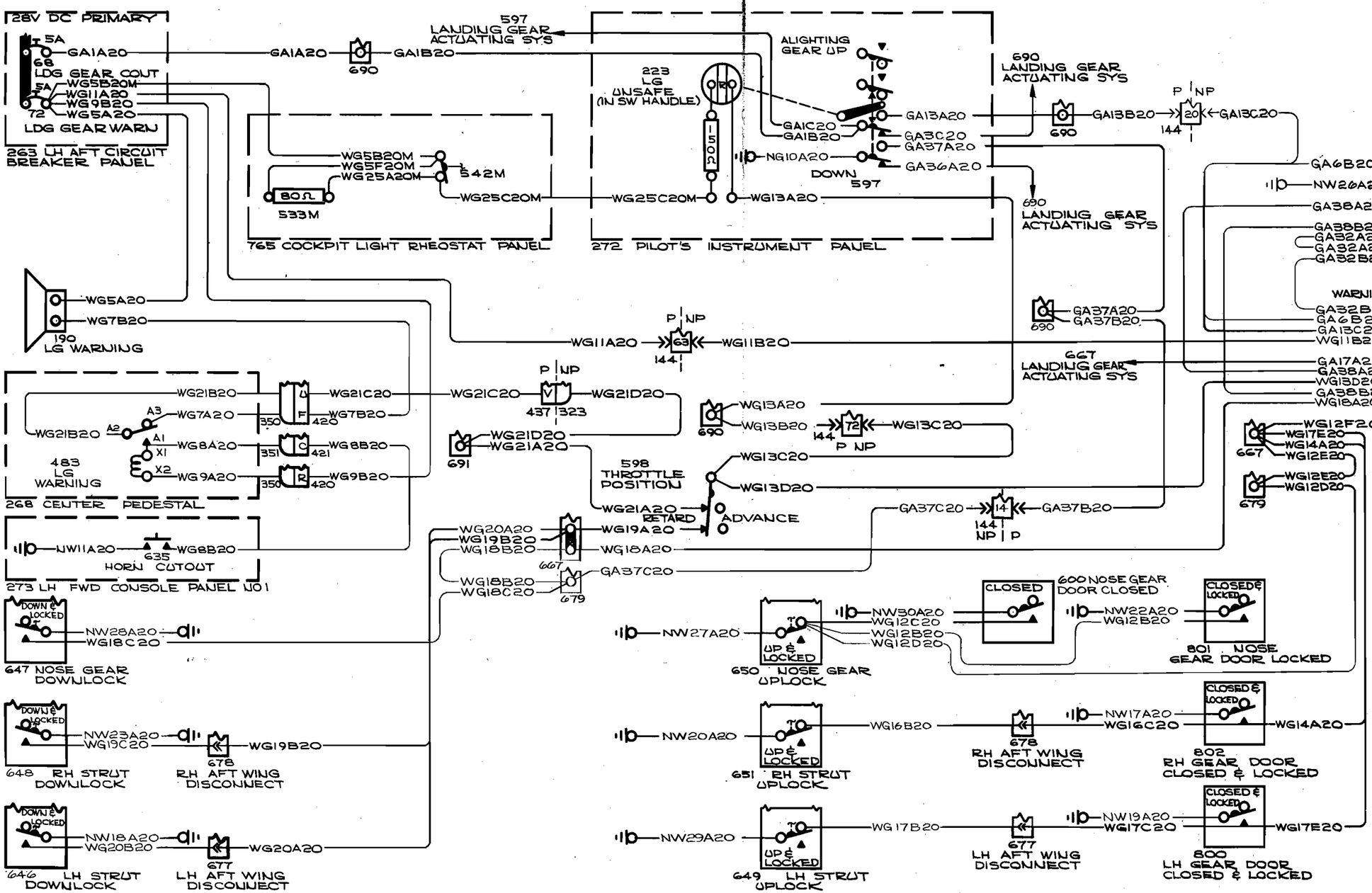


LANDING GEAR WARNING SYSTEM
F-86F-1 THRU F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel Wings
651	Terminal Block - Drop Tank	Fus 139 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

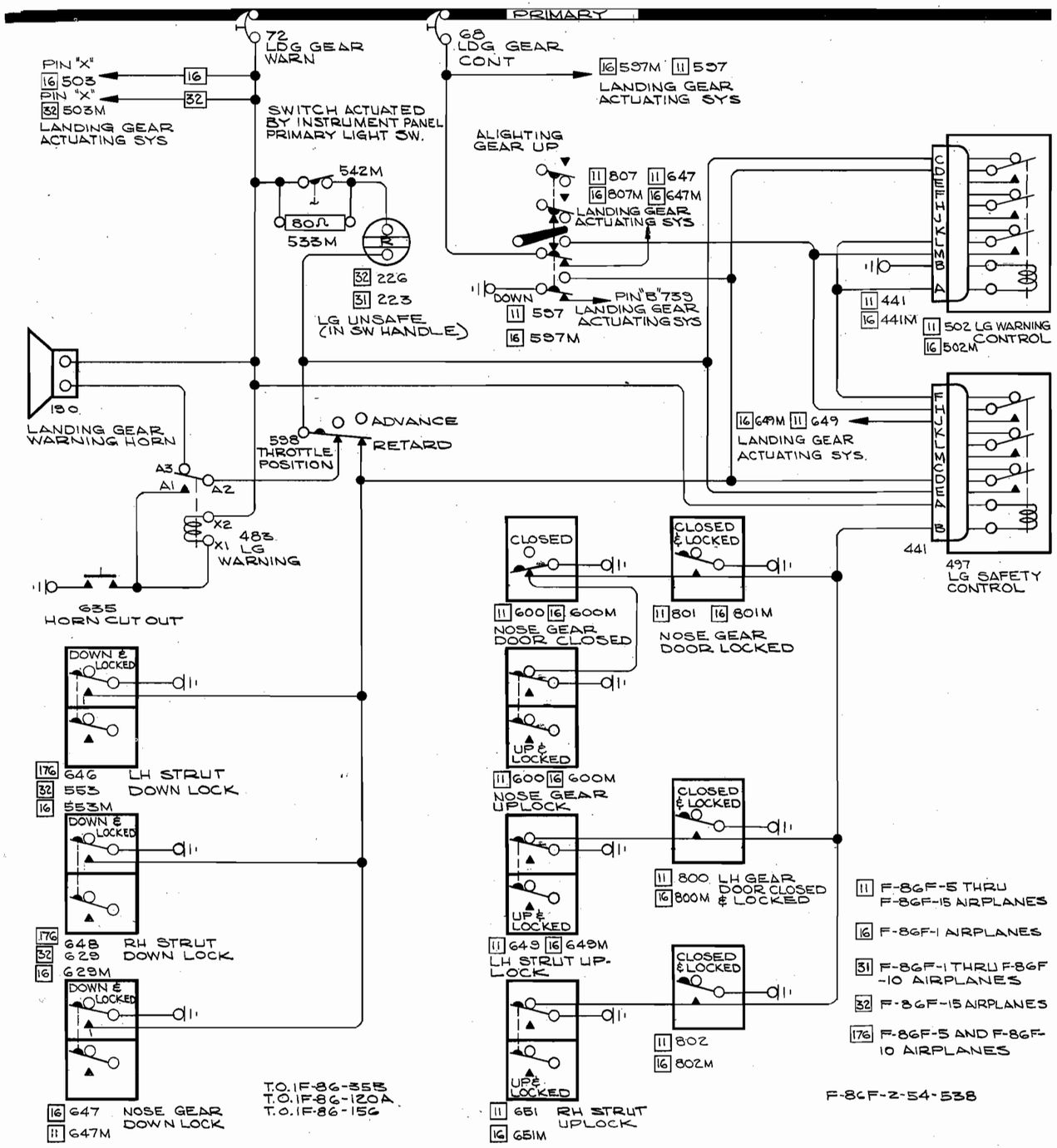
Landing Gear Warning System - F-86F-5 Airplanes



T.O. 1F-86-156

LANDING GEAR WARNING SYSTEM
F-86F-5 AIRPLANES

F-86F-2-54-540

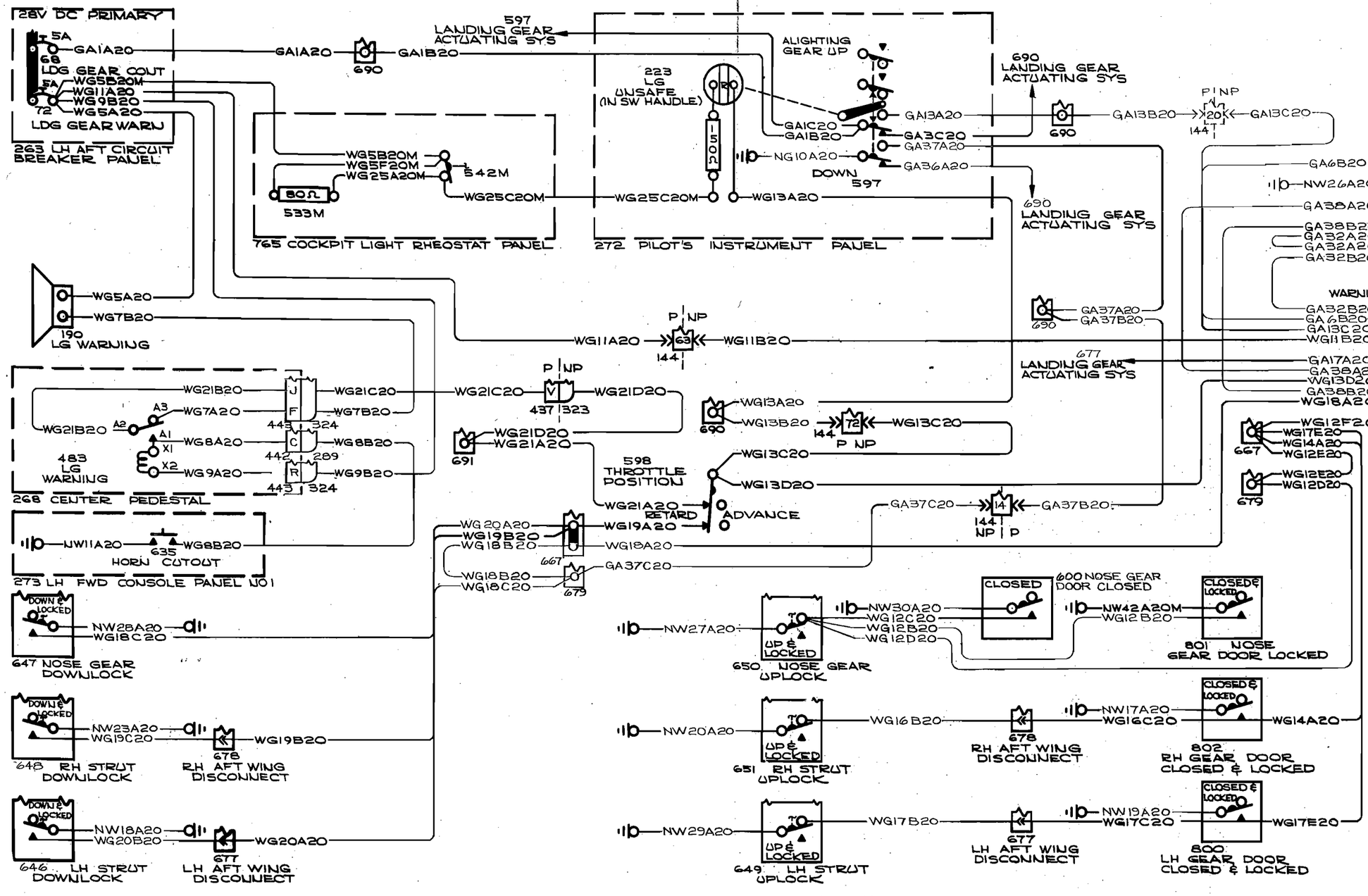


LANDING GEAR WARNING SYSTEM
F-86F-1 THRU F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
324	Plug - GSAP Camera	Fus 18 CL	Radar Bay
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Sice
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System F-86F-10 and F-86F-15 Airplanes



T.O.1F-86-156

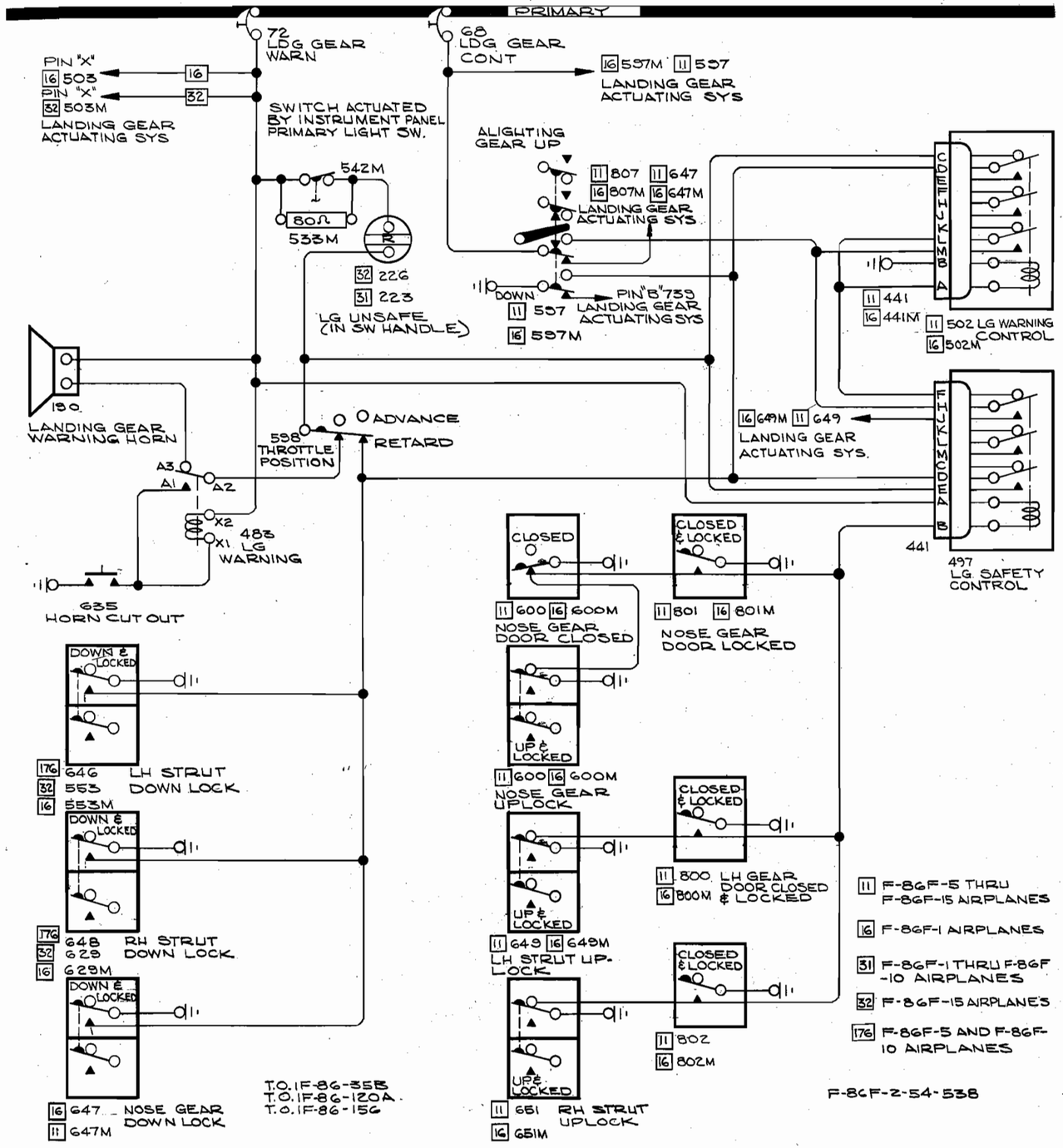
F-86F-2-54-541A

LANDING GEAR WARNING SYSTEM
F-86F-10 AIRPLANES

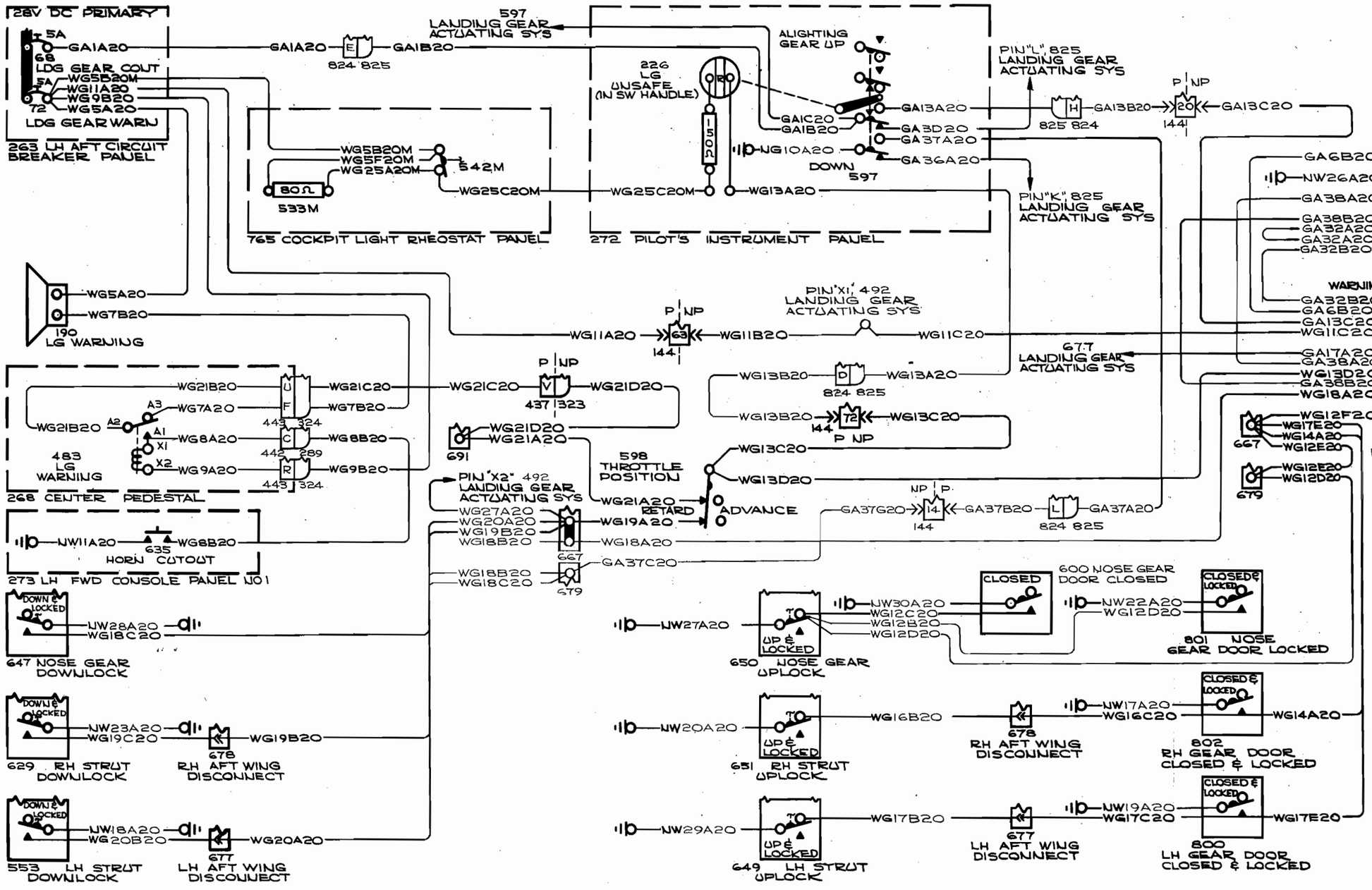
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
324	Plug - GSAP Camera	Fus 18 CL	Radar Bay
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
492	Relay - Engine Screen Control	Fus 155 LH	Aft LH Radio Bay
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
502	Relay - Alternate Hydraulic Power Control	Fus 78 RH	Pedestal
553	Switch - Landing Gear Downlock	Wing 90 LH	Gear Strut
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
629	Switch - Landing Gear Downlock RH	Fus 90 RH	Strut
647	Terminal Block - Landing Gear Valve	Fus 190 RH	Wheel Well
649	Terminal Block - Longitudinal Bungee Trim Actuator	Fus 385 CL	Rudder
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Reostat	Fus 81 RH	Cockpit, RH Side
800	Switch - LH Fairing Door	Fus 193 LH	Nose Wheel Well
801	Switch - Nose Fairing Door	Fus 84 LH	Nose Wheel Well
802	Switch - RH Fairing Door	Fus 193 RH	Nose Wheel Well
825	Plug - Instrument Panel Disconnect	Fus 81 CL	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-15 Airplanes

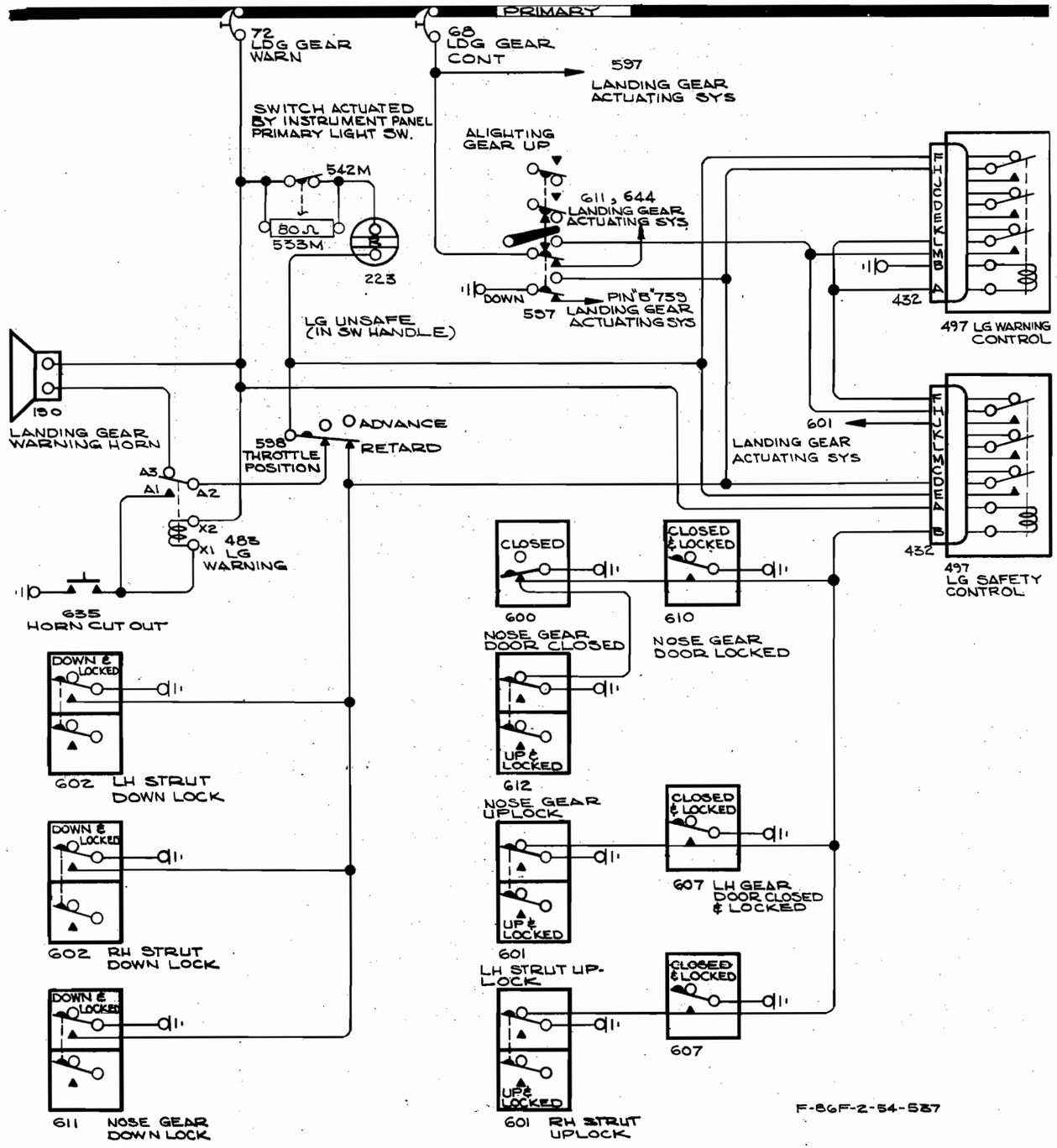


LANDING GEAR WARNING SYSTEM
F-86F-1 THRU F-86F-15 AIRPLANES



LANDING GEAR WARNING SYSTEM
F-86F-15 AIRPLANES

F-86F-2-54-5142

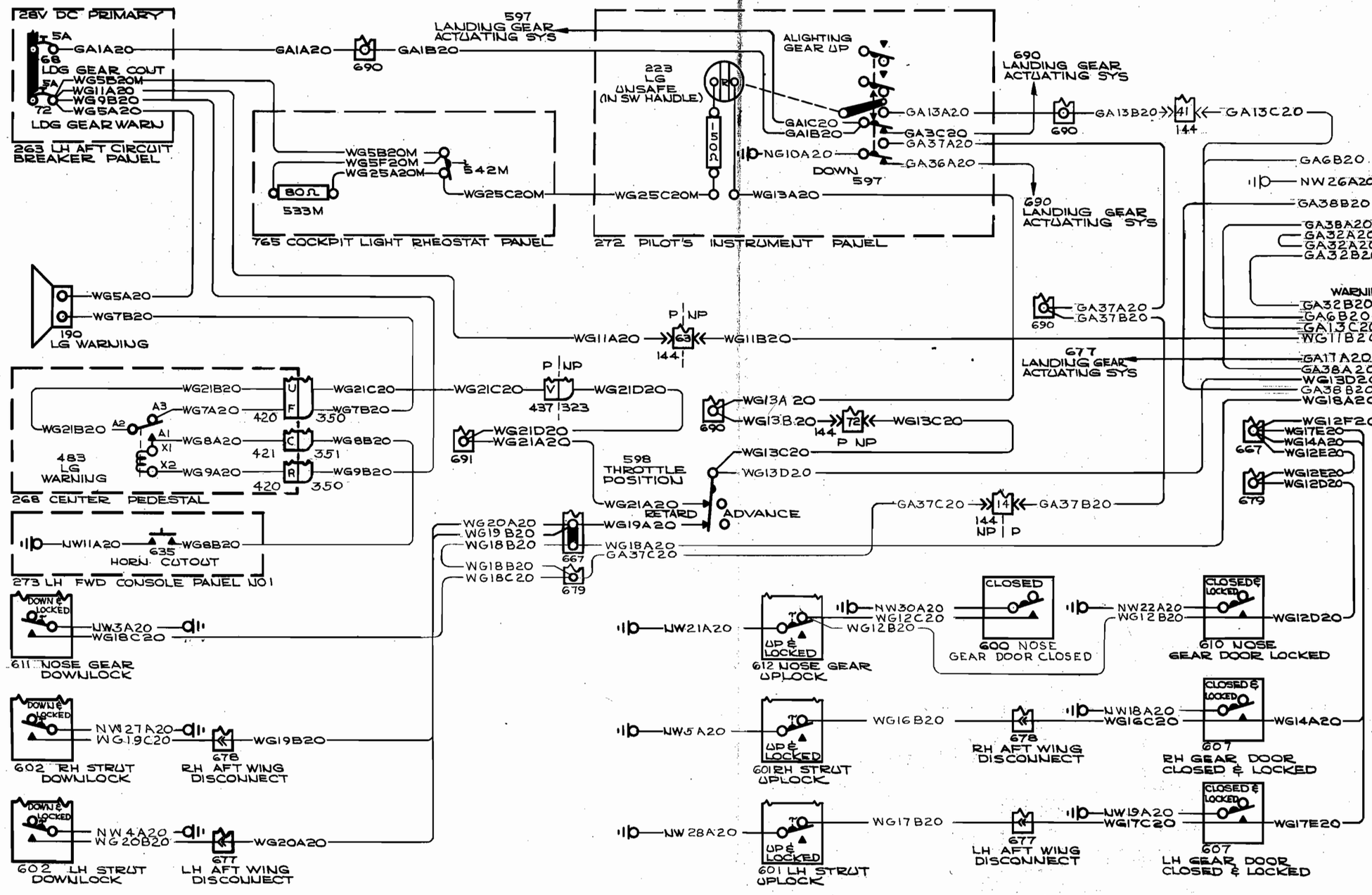


LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
602	Switch - Main Landing Gear Downlock	Wing 90 LH and RH	Wheel Wells
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

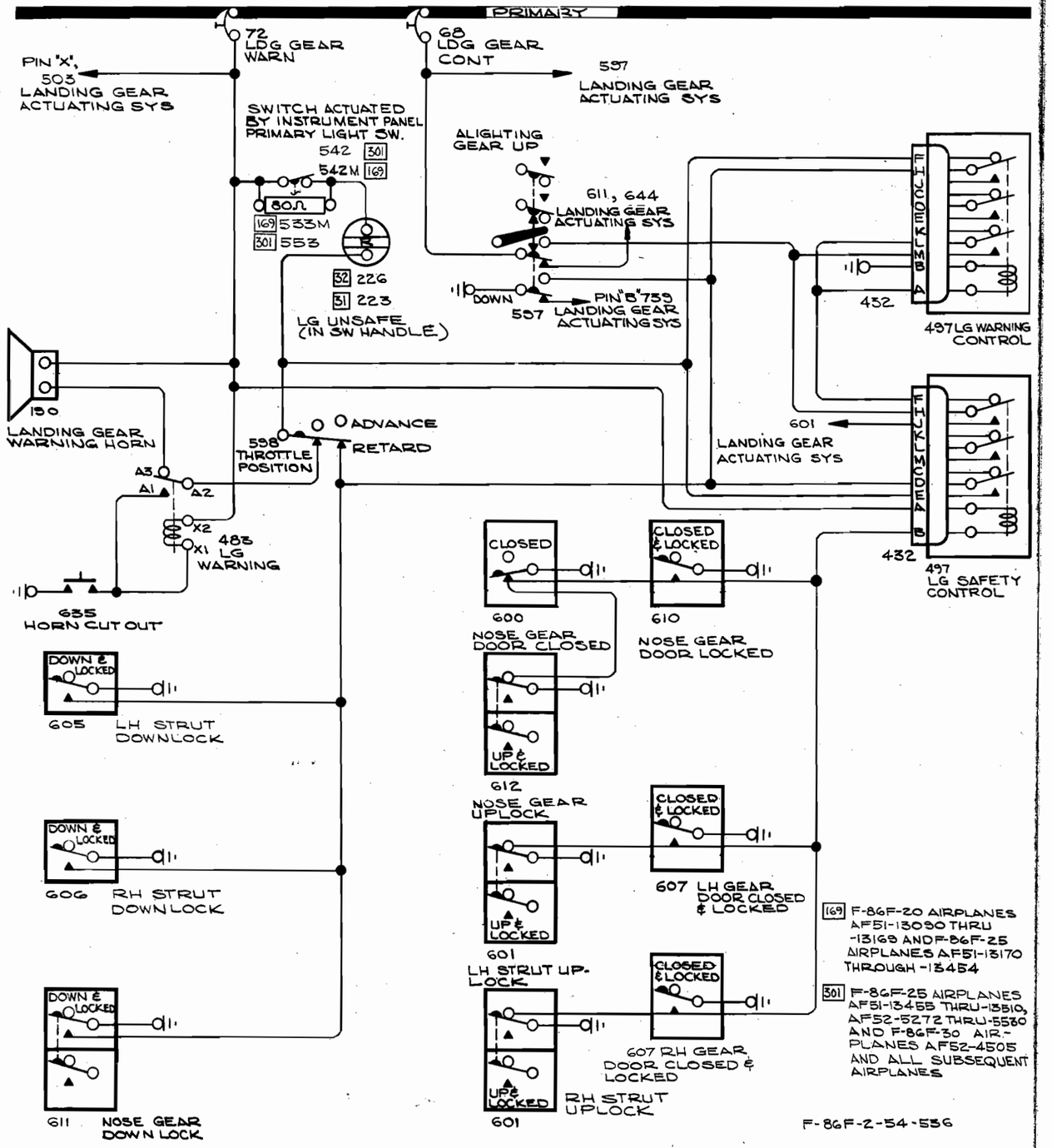
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-20 Airplanes AF51-13070 Through -13089



LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

F-86F-2-54-543

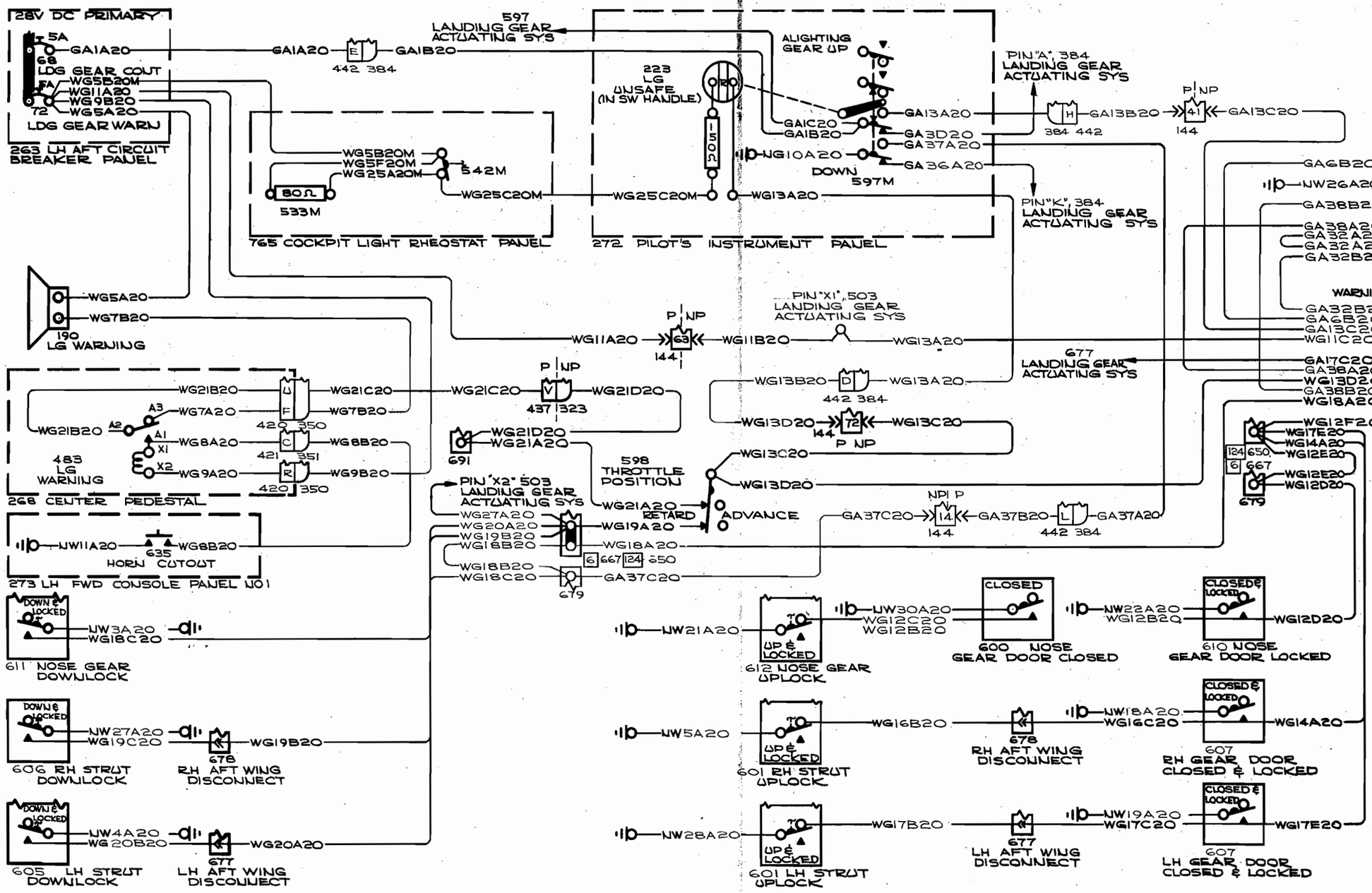


LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THRU-5530 F-86F-30 AIRPLANES AF52-4505 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH-5271 AND AF53-1072 THROUGH-1228

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-20 Airplanes AF51-13090 Through -13169
and F-86F-25 Airplanes AF51-13170 Through -13454

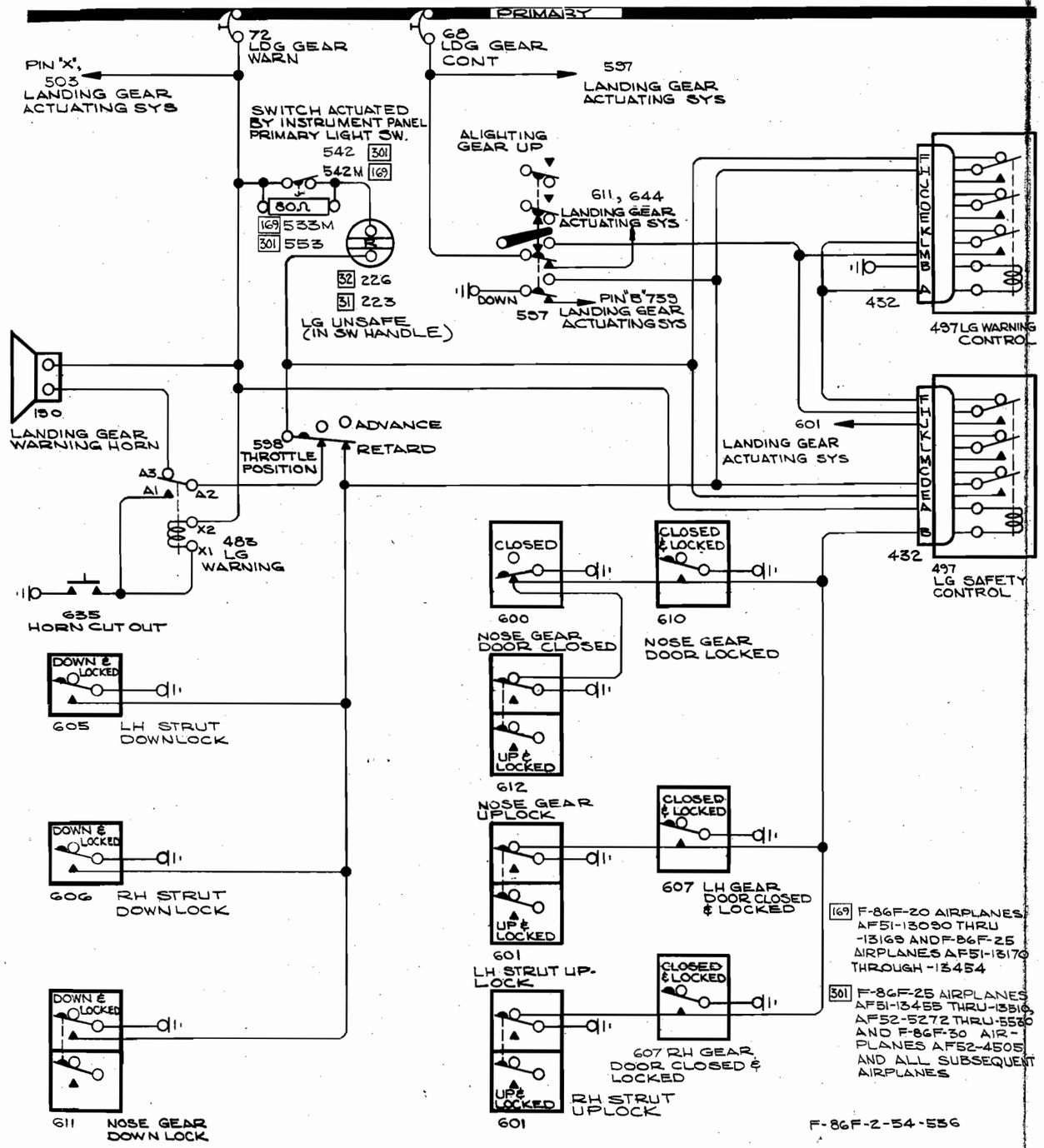


6 F-86F-20 AIRPLANES AF51-13090 THRU -13169

124 F-86F-25 AIRPLANES AF51-13170 THRU -13454

LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES
AF51-13170 THROUGH -13454

F-86F-2-54-544

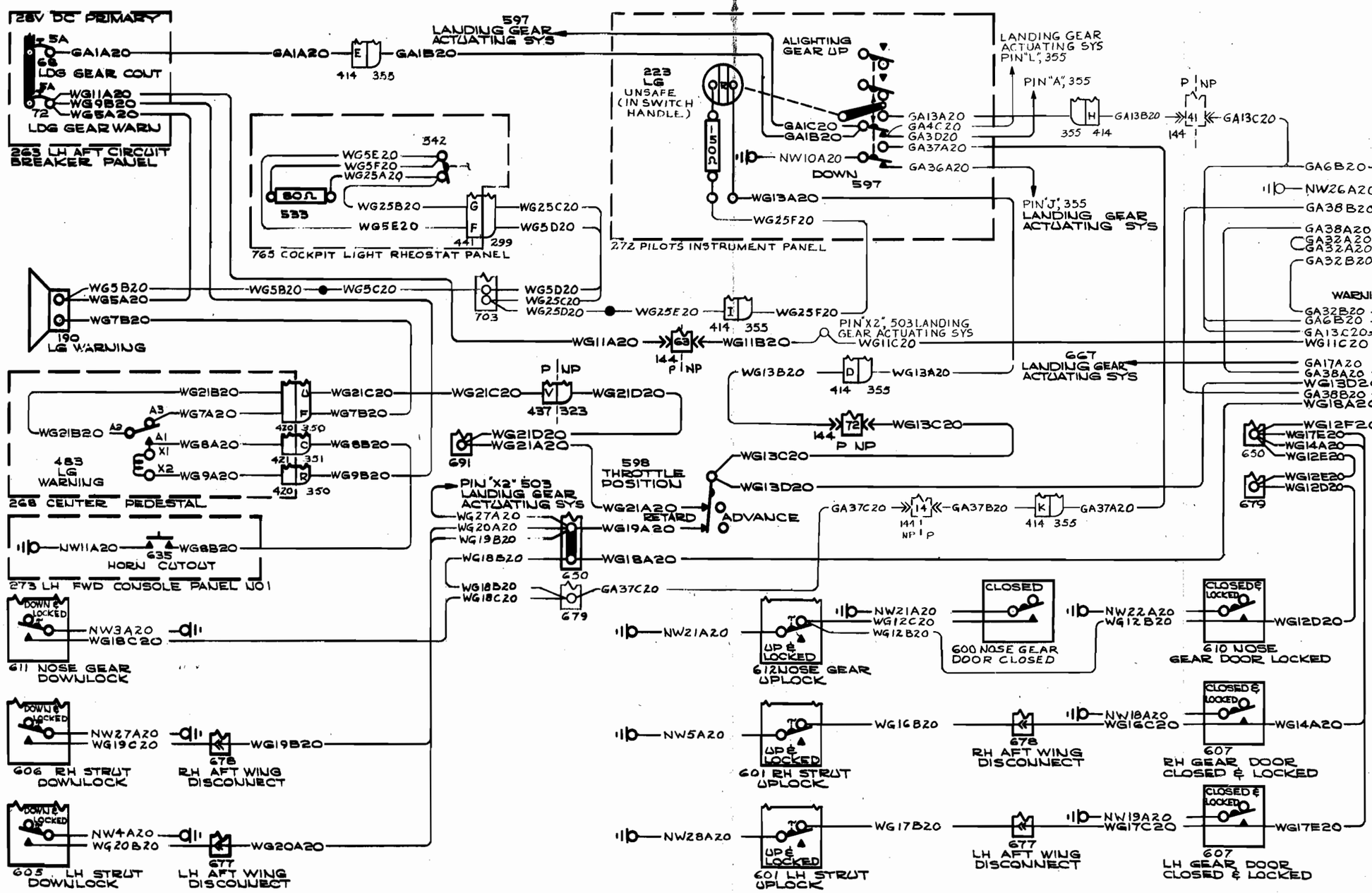


LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THRU-5530 F-86F-30 AIRPLANES AF52-4505 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH-5271 AND AF53-1072 THROUGH-1228

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
414	Receptacle - Instrument Panel Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

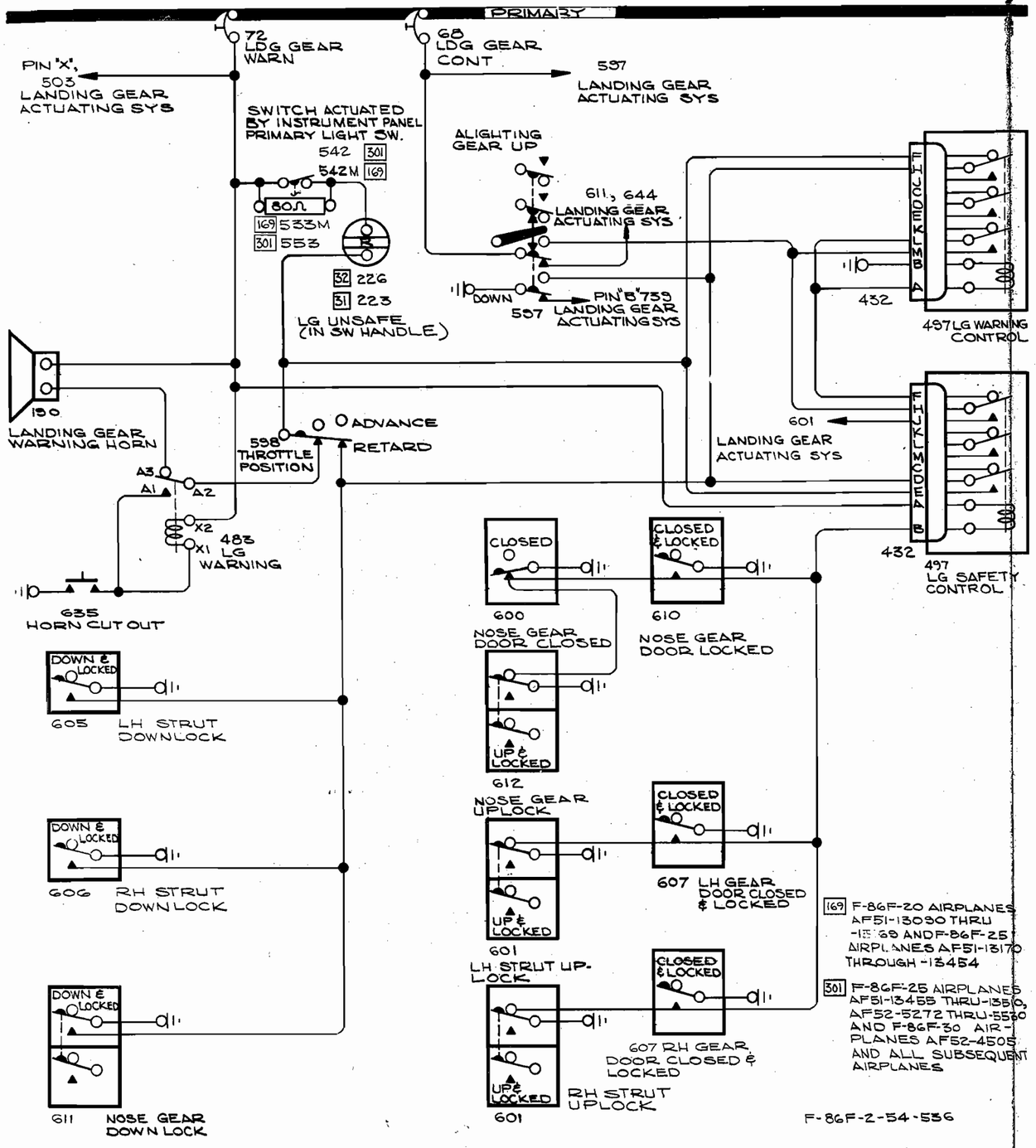
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-25 Airplanes AF51-13455 Through -13510



LANDING GEAR WARNING SYSTEM
F-86F-25 AIRPLANES AF 51-13455 THROUGH -13510

F-86F-2-54-545

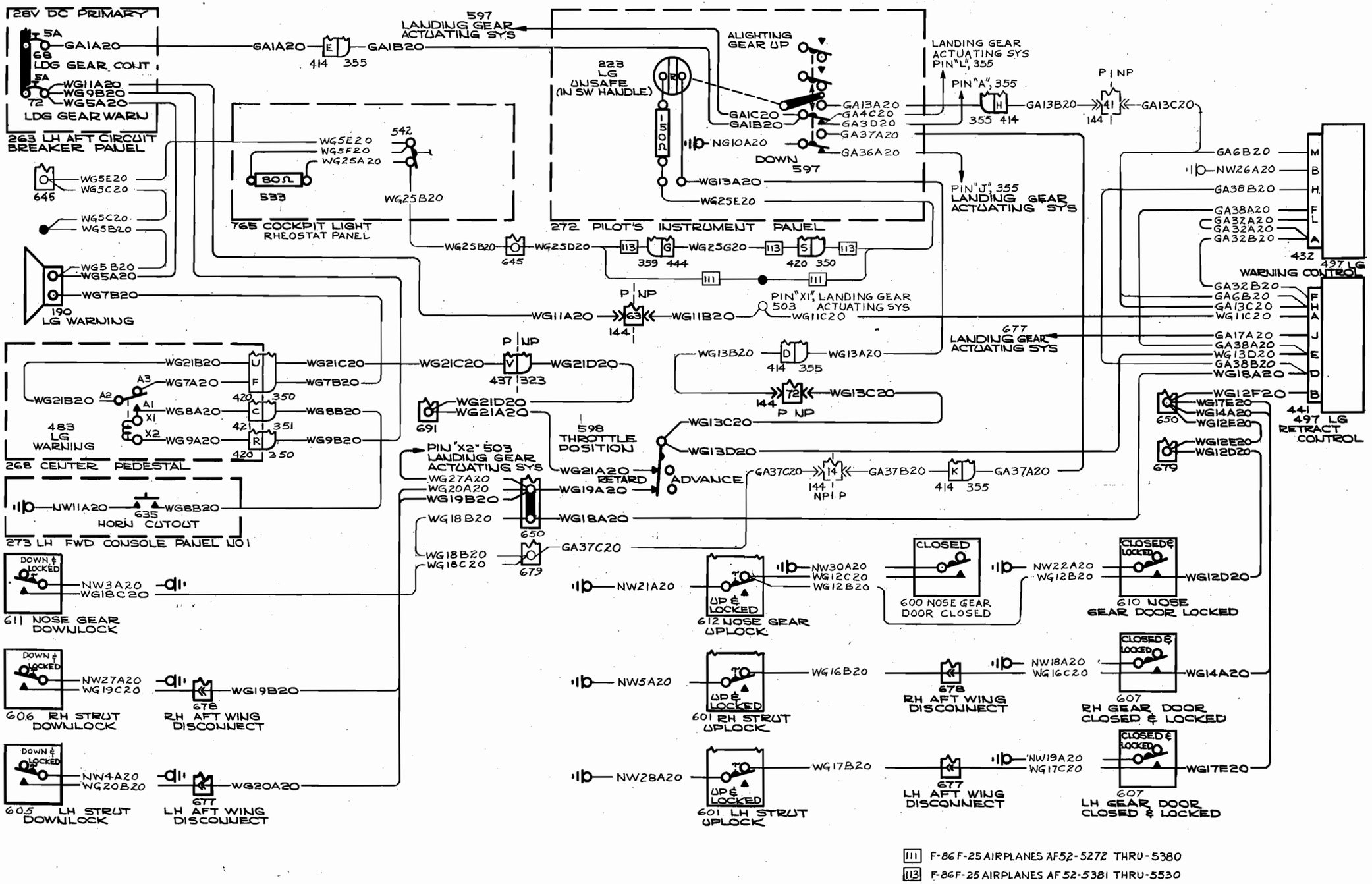


LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13168 AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THRU-5530 F-86F-30 AIRPLANES AF52-4505 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH-5271 AND AF53-1072 THROUGH-1228

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
441	Receptacle - Light Dimming	Fus 85 RH	Cockpit, RH Side
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
645	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
765	Panel Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

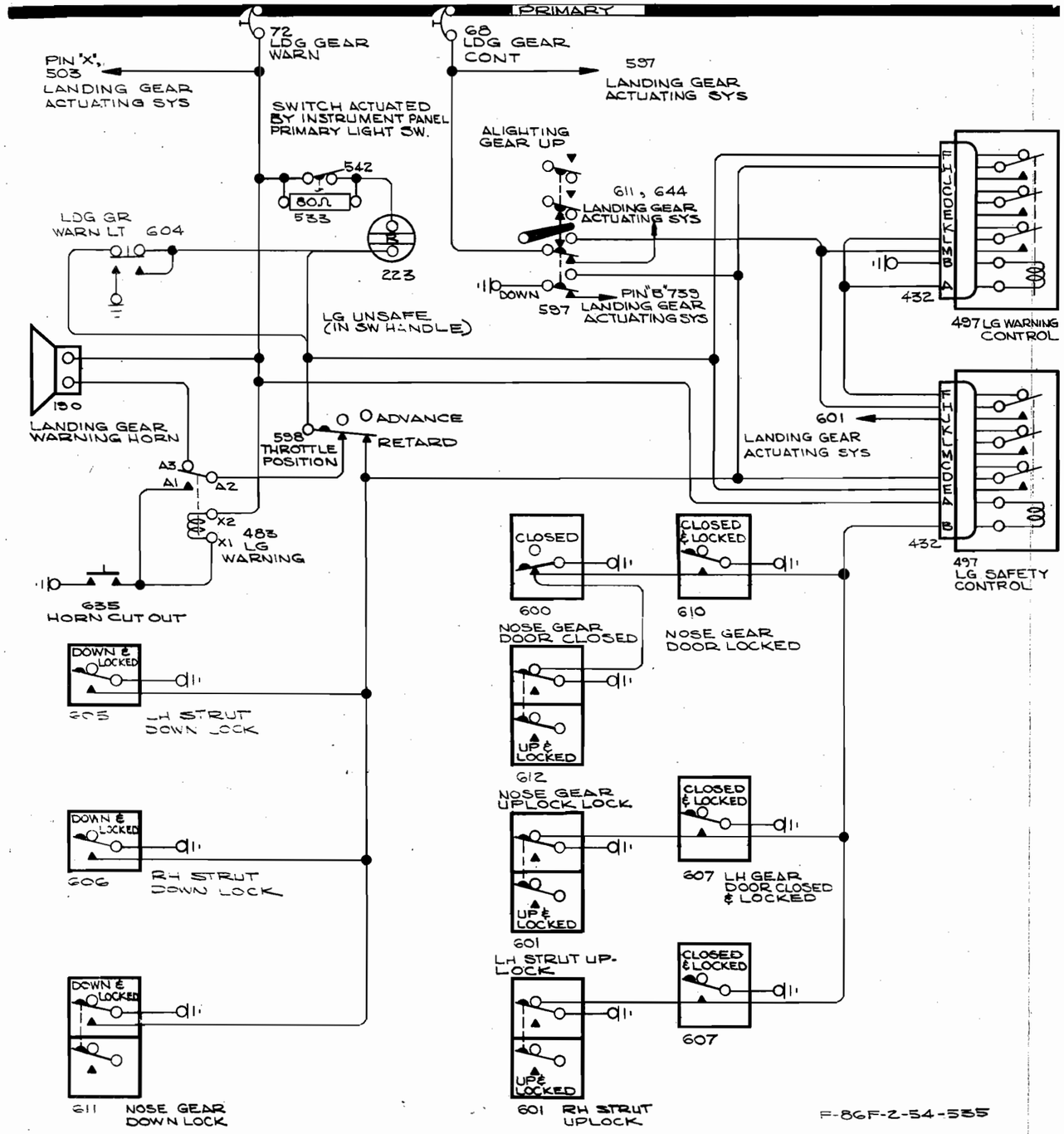
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-25 Airplanes AF52-5272 Through -5530



LANDING GEAR WARNING SYSTEM
F-86F-25 AIRPLANES AF52-5272 THROUGH-5530

F-86F-2-54-546

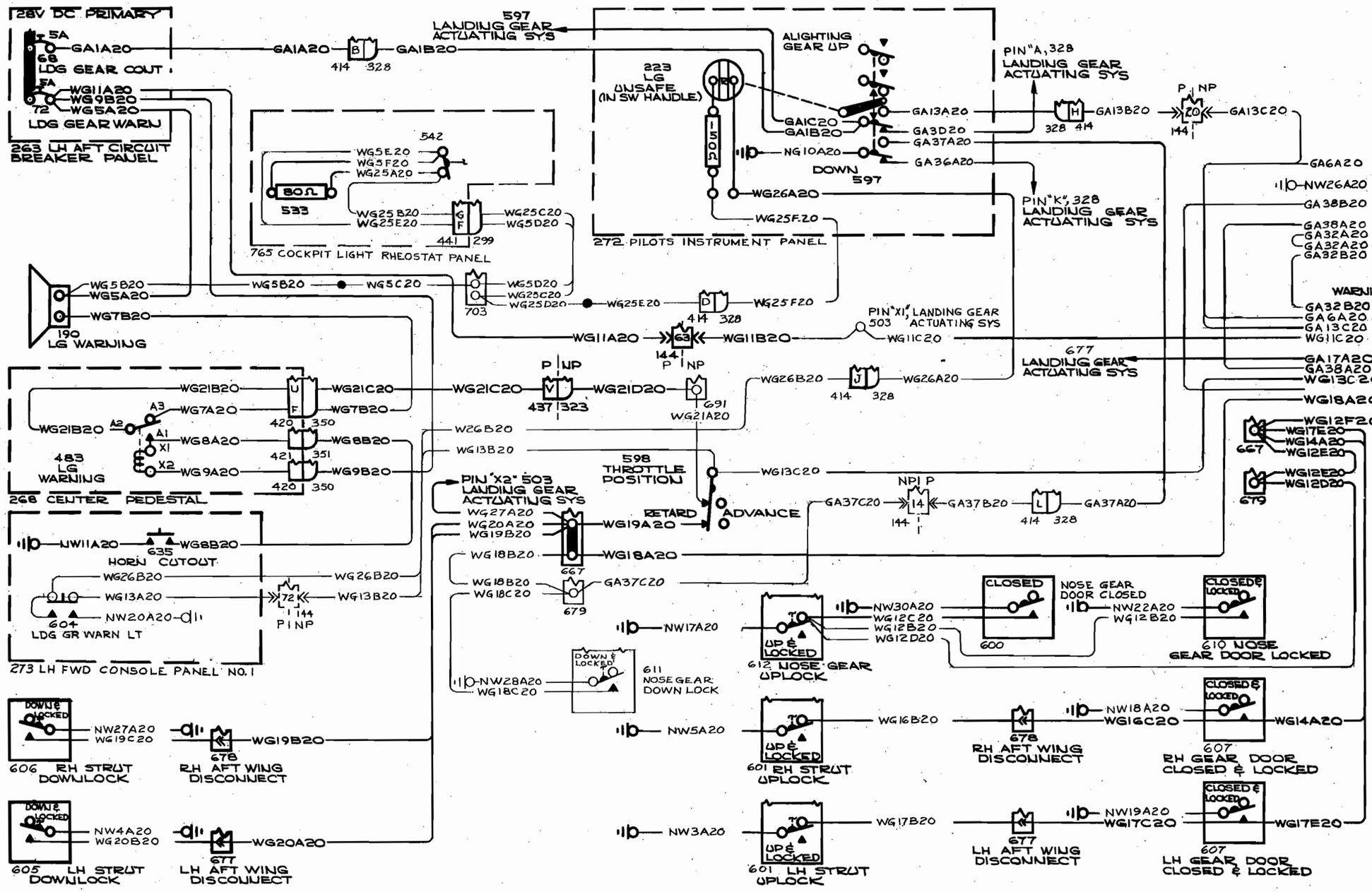


F-86F-2-54-535

LANDING GEAR WARNING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4504

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.



LANDING GEAR WARNING SYSTEM
F-86F-30 AIRPLANES AF 52-4305 THROUGH -4504

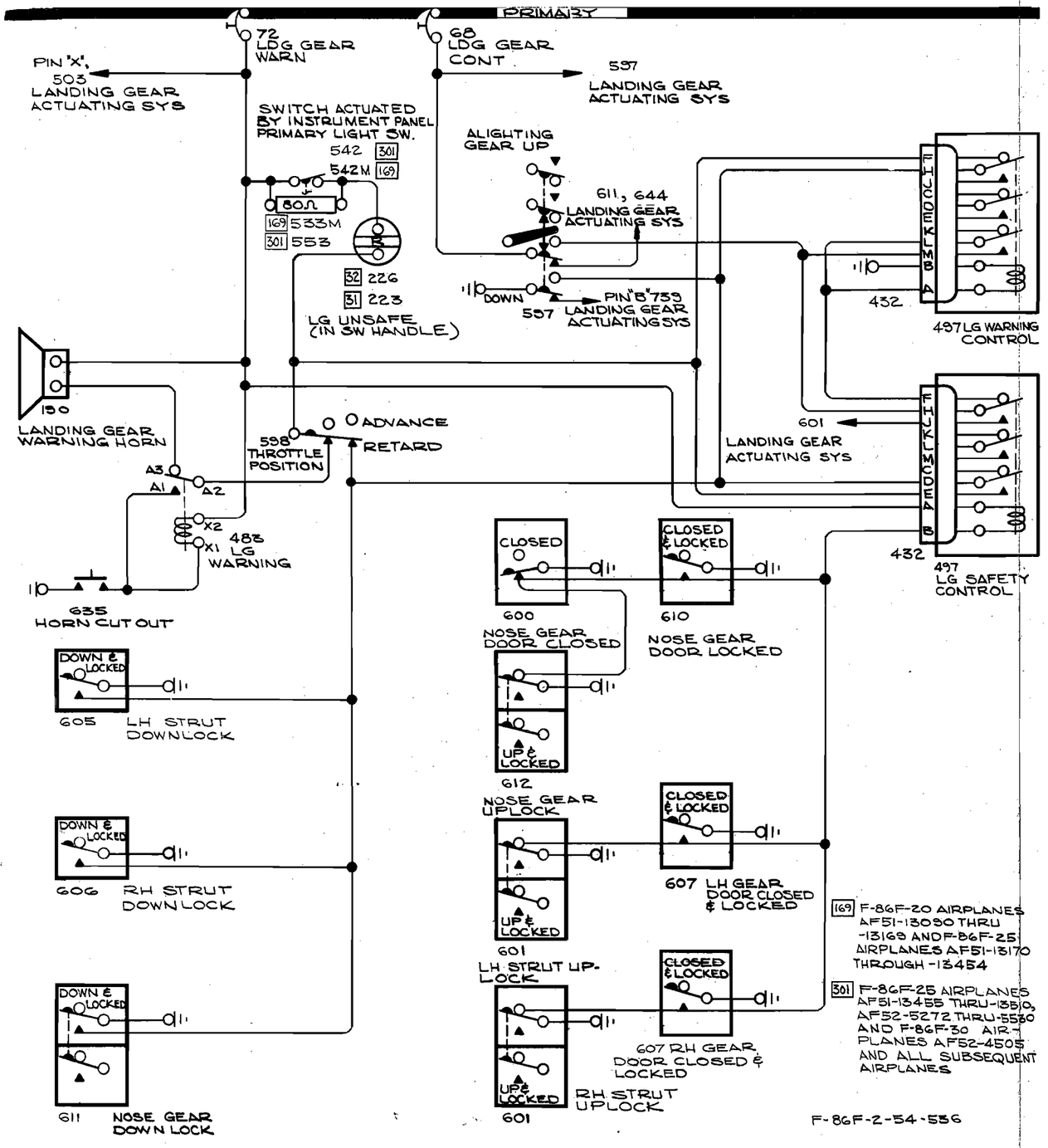
F-86F-2-54-547

INDEX NO.	DESCRIPTION
144	Disconnect - Pressure LH
190	Horn - Landing Gear Warning
263	Panel - Circuit-breaker Left-hand
268	Panel - Pedestal
272	Panel - Instrument
273	Panel - Left-hand Forward Console
299	Plug - Light Dimming
323	Plug - Gun Bay Pressure
328	Plug - Horizontal Stabilizer Bungee Trim Actuator
350	Plug - Pedestal Disconnect - LH Inboard
351	Plug - Pedestal Disconnect
432	Receptacle - Landing Gear Retract Control Relay
497	Relay - Landing Gear Retract Control
503	Relay - Landing Gear Door Control
597	Switch - Landing Gear Control - Pilot
598	Switch - Landing Gear Warning - Throttle
600	Switch - Nose Wheel Door Close
601	Switch - Main Landing Gear Uplock
605	Switch - Left Gear Downlock
606	Switch - Right Gear Downlock
607	Switch - Main Landing Gear Door Lock
610	Switch - Nose Wheel Fairing Door
611	Switch - Nose Wheel Downlock
612	Switch - Nose Wheel Uplock
667	Terminal Block - Landing Gear Connector Lower
677	Terminal Block - Wing LH (Aft)
678	Terminal Block - Wing RH (Aft)
679	Terminal Block - Wing LH (Forward)
691	Terminal Block - Gun Bay Pressure Disconnect
703	Terminal Block - Light Dimming
765	Panel - Cockpit Light Rheostat

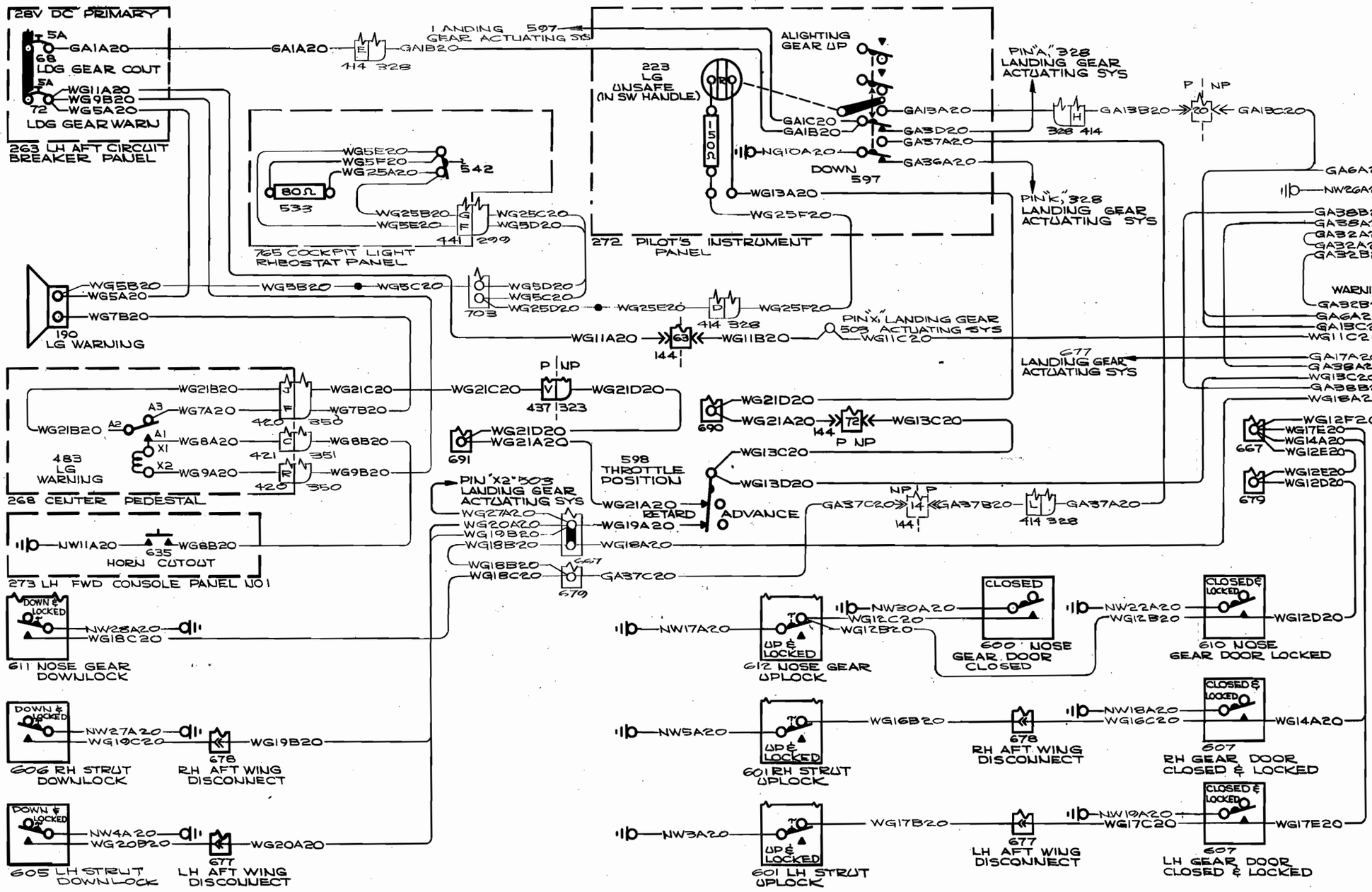
STATION NO.	ACCESS
Fus 124 LH	Cockpit
Fus 117 LH	LH Rear Bulkhead - Cockpit
Fus 118 LH	Cockpit - LH Side
Fus 78 CL	Cockpit - Pedestal
Fus 78 CL	Cockpit
Fus 85 LH	Cockpit
Fus 85 RH	Cockpit, Below RH Console Panels
Fus 124 LH	Gun Bay
Fus 34.1 CL	Tail Assembly
Fus 62.6 LH	Directly Behind Pedestal
Fus 62.6 LH	Directly Behind Pedestal
Fus 204 LH	LH Engine Access
Fus 204 LH	Removal of Engine Required
Fus 79 LH	Cockpit
Fus 81 LH	Instrument Panel
Fus 90 LH	LH Engine Access
Fus 45 CL	Center Nose Wheel Well
Wing 90 LH and RH	Wheel Wells
Wing 90 LH	LH Strut
Wing 90 RH	RH Strut
Fus 190 LH and RH	LH and RH Wheel Well
Fus 26 RH	Nose Wheel Well
Fus 26 RH	Nose Wheel Well
Fus 26 RH	Nose Wheel Well
Fus 190 RH	RH Wheel Well
Fus 190 RH and LH	Wheel Wells
Fus 190 RH and LH	Wheel Wells
Wing 117 LH	Wing
Fus 80 LH	Gun Bay
Fus 81 RH	Cockpit
Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-30 Airplanes AF52-4505 Through AF52-4745



LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THRU-5530 F-86F-30 AIRPLANES AF52-4505 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271 AND AF53-1072 THROUGH -1228



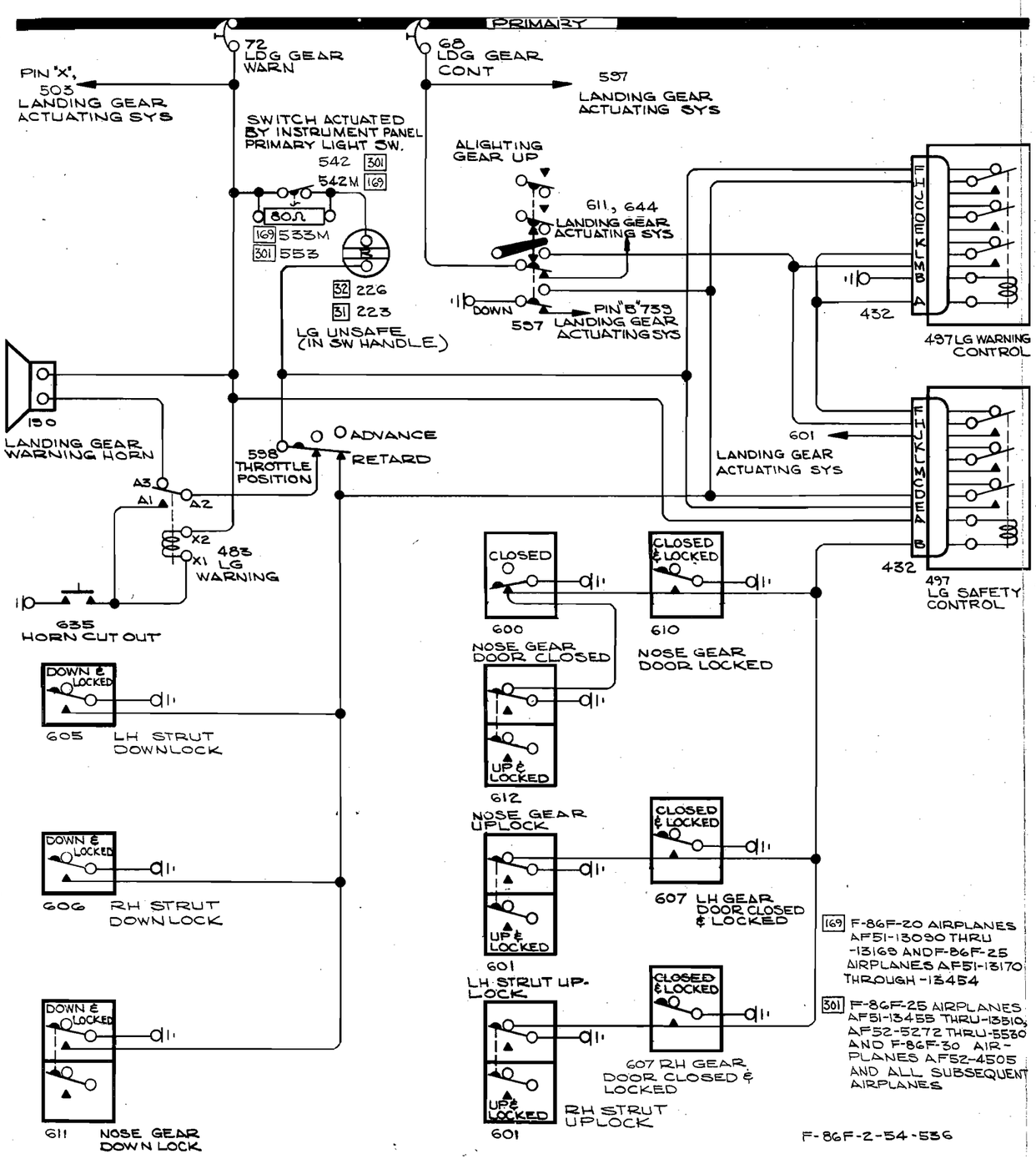
LANDING GEAR WARNING SYSTEM
F-86F-30 AIRPLANES AF52-4505 THROUGH AF52-4745

F-86F-2-54-548

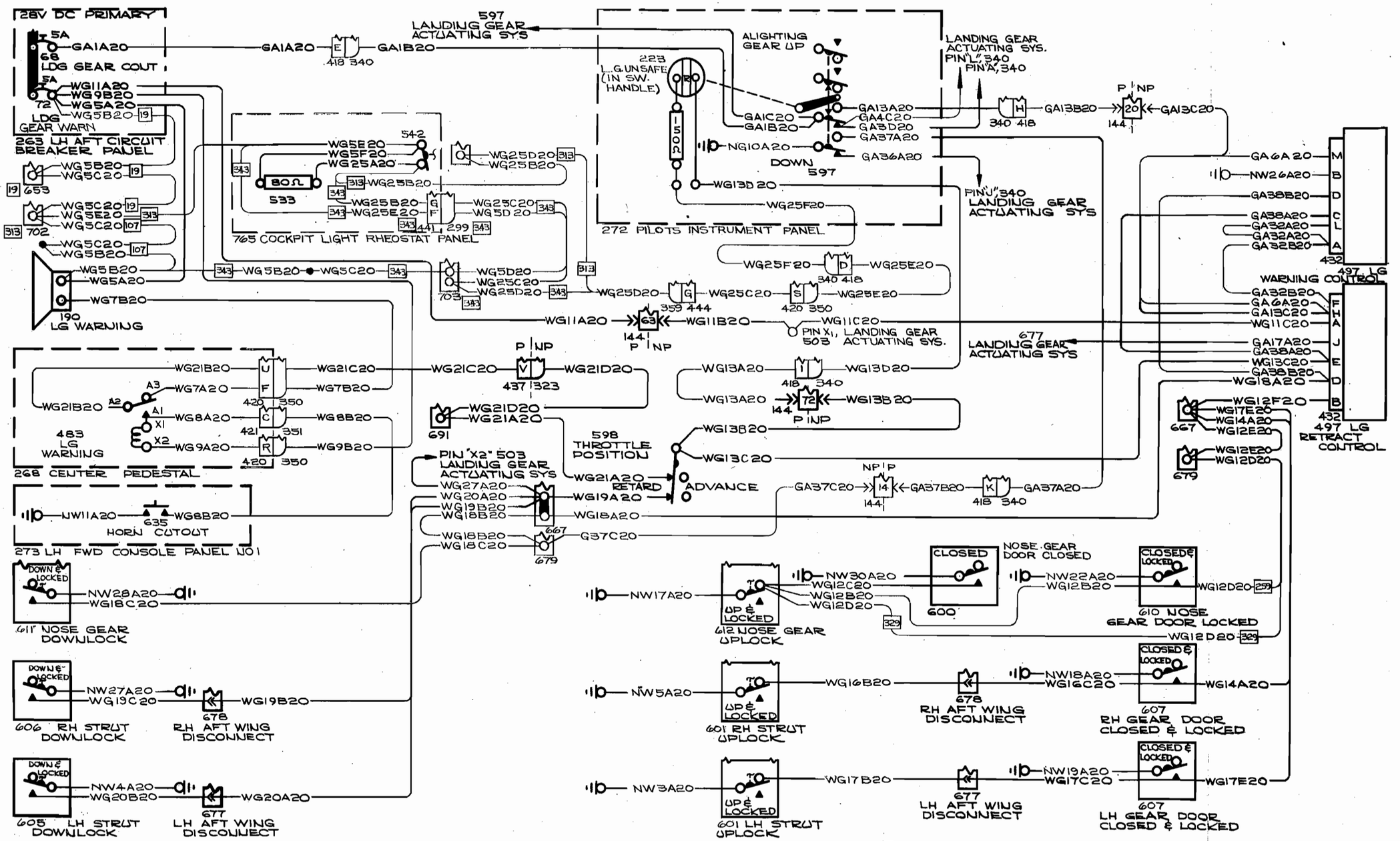
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
190	Horn - Landing Gear Warning	Fus 117 LH	LH Rear Bulkhead - Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
432	Receptacle - Landing Gear Retract Control Relay	Fus 204 LH	LH Engine Access
497	Relay - Landing Gear Retract Control	Fus 204 LH	Removal of Engine Required
503	Relay - Landing Gear Door Control	Fus 79 LH	Cockpit
597	Switch - Landing Gear Control - Pilot	Fus 81 LH	Instrument Panel
598	Switch - Landing Gear Warning - Throttle	Fus 90 LH	LH Engine Access
600	Switch - Nose Wheel Door Close	Fus 45 CL	Center Nose Wheel Well
601	Switch - Main Landing Gear Uplock	Wing 90 LH and RH	Wheel Wells
605	Switch - Left Gear Downlock	Wing 90 LH	LH Strut
606	Switch - Right Gear Downlock	Wing 90 RH	RH Strut
607	Switch - Main Landing Gear Door Lock	Fus 190 LH and RH	LH and RH Wheel Well
610	Switch - Nose Wheel Fairing Door	Fus 26 RH	Nose Wheel Well
611	Switch - Nose Wheel Downlock	Fus 26 RH	Nose Wheel Well
612	Switch - Nose Wheel Uplock	Fus 26 RH	Nose Wheel Well
653	Terminal Block - Ammunition Booster	Fus 86 RH and LH	Cockpit
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
702	Terminal Block - Windshield Heater Switch	Fus 85 RH	Cockpit
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing Gear Warning System - F-86F-30 Airplanes AF52-4746 Through -5163 and F-86F-35 Airplanes



LANDING GEAR WARNING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THRU-5530 F-86F-30 AIRPLANES AF52-4505 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH-5271 AND AF53-1072 THROUGH-1228



19 F-86F-35 AIRPLANES

107 F-86F-30 AIRPLANES AF52-5014 THRU-5163

259 F-86F-35 AIRPLANE AF52-5165 AND ALL SUBSEQUENT AIRPLANES

313 F-86F-30 AIRPLANE AF52-5014 AND ALL SUBSEQUENT AIRPLANES

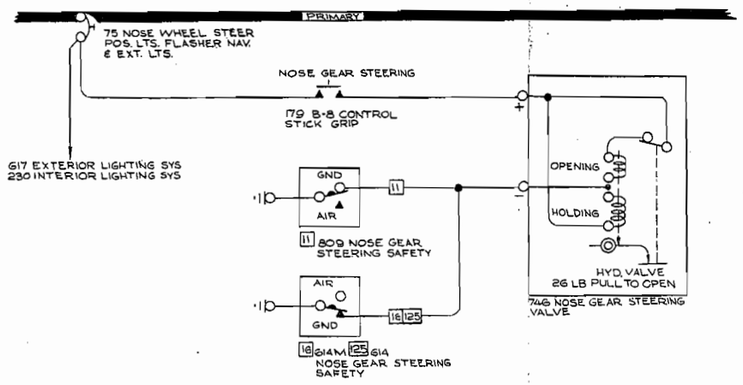
329 F-86F-30 AIRPLANES AF52-4746 THRU-5163 & F-86F-35 AIRPLANE AF52-5164

343 F-86F-30 AIRPLANES AF52-4746 THRU-5013

F-86F-2-54-549

LANDING GEAR WARNING SYSTEM

F-86F-30 AIRPLANES AF52-4746 THROUGH -5163 AND F-86F-35 AIRPLANES



T.O. 1F-86-120

11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
12 F-86F-20 THRU F-86F-35 AIRPLANES

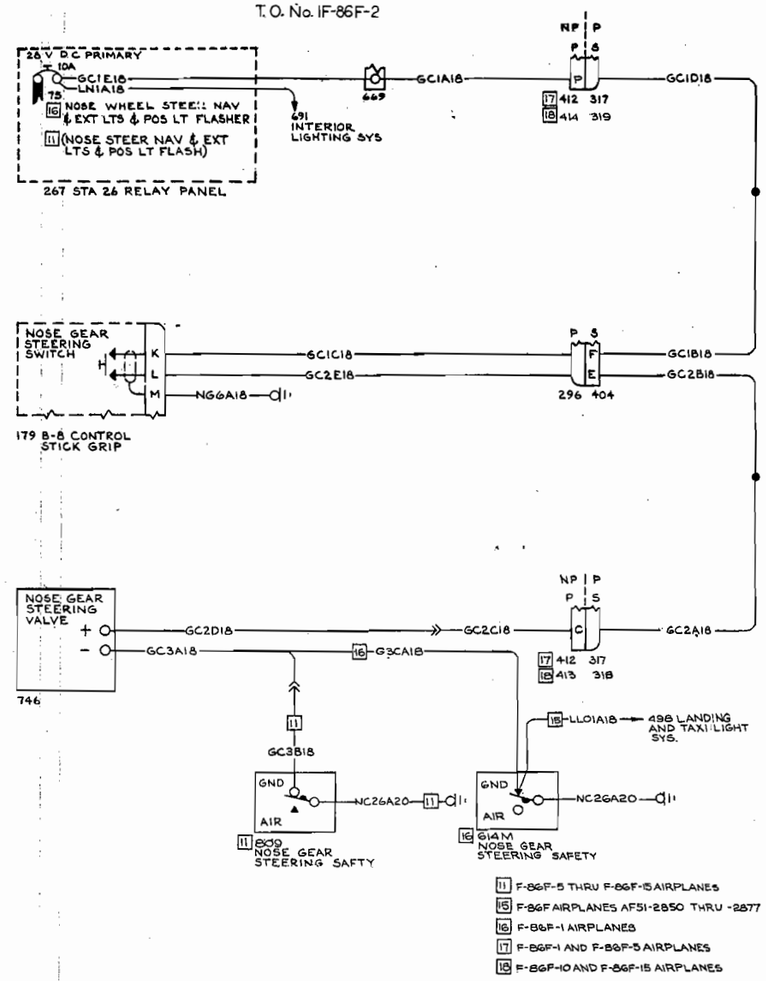
F-86F-2-54-552A

Nose Wheel Steering System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
179	Grip - Control Stick	Fus 85 CL	Cockpit
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
498	Relay - Landing and Taxi Light Control	Fus 170 LH	Radar Bay
614	Switch - Nose Wheel Steering Safety	Fus 17 CL	Nose Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 60 LH	Gun Bay
746	Valve - Nose Wheel Steering Hydraulic Solenoid	Fus 15 CL	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

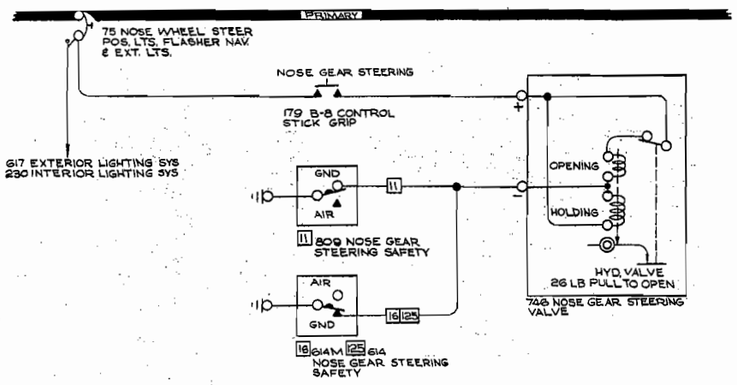
Nose Wheel Steering System - F-86F-1 Through F-86F-15 Airplanes



T.O. 1F-86-120

F-86F-2-54-550

Nose Wheel Steering System
F-86F-1 Through F-86F-15 Airplanes



T.O. 1F-86-180

11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
125 F-86F-20 THRU F-86F-35 AIRPLANES

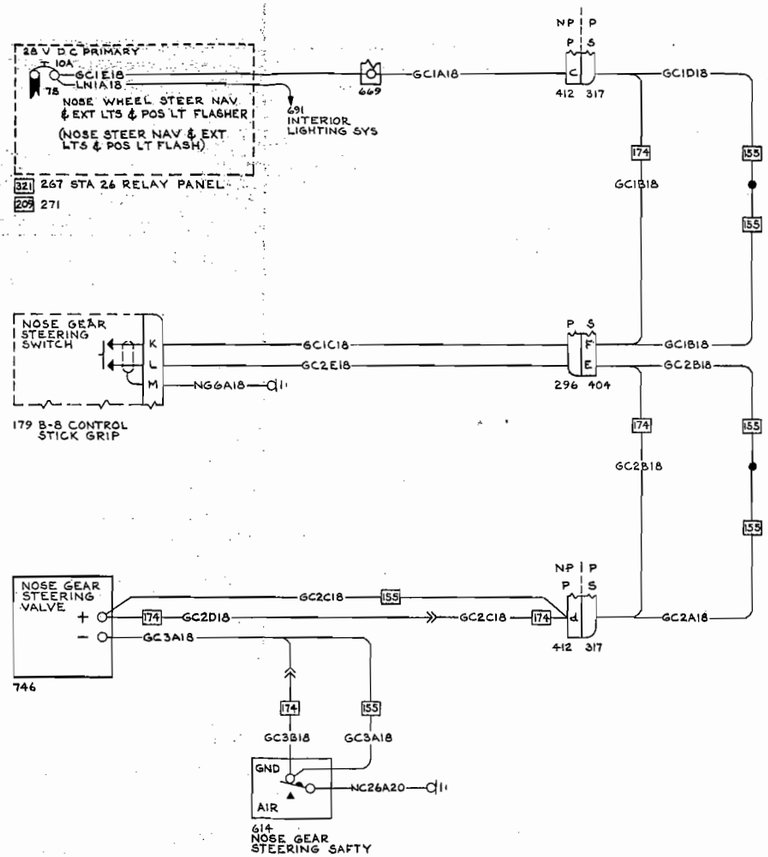
F-86F-2-54-552A

Nose Wheel Steering System

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
179	Grip - Control Stick	Fus 85 CL	Cockpit
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 82.6 LH	Cockpit - Forward of Pedestal
614	Switch - Nose Wheel Steering Safety	Fus 17 CL	Nose Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
746	Valve - Nose Wheel Steering Hydraulic Solenoid	Fus 15 CL	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

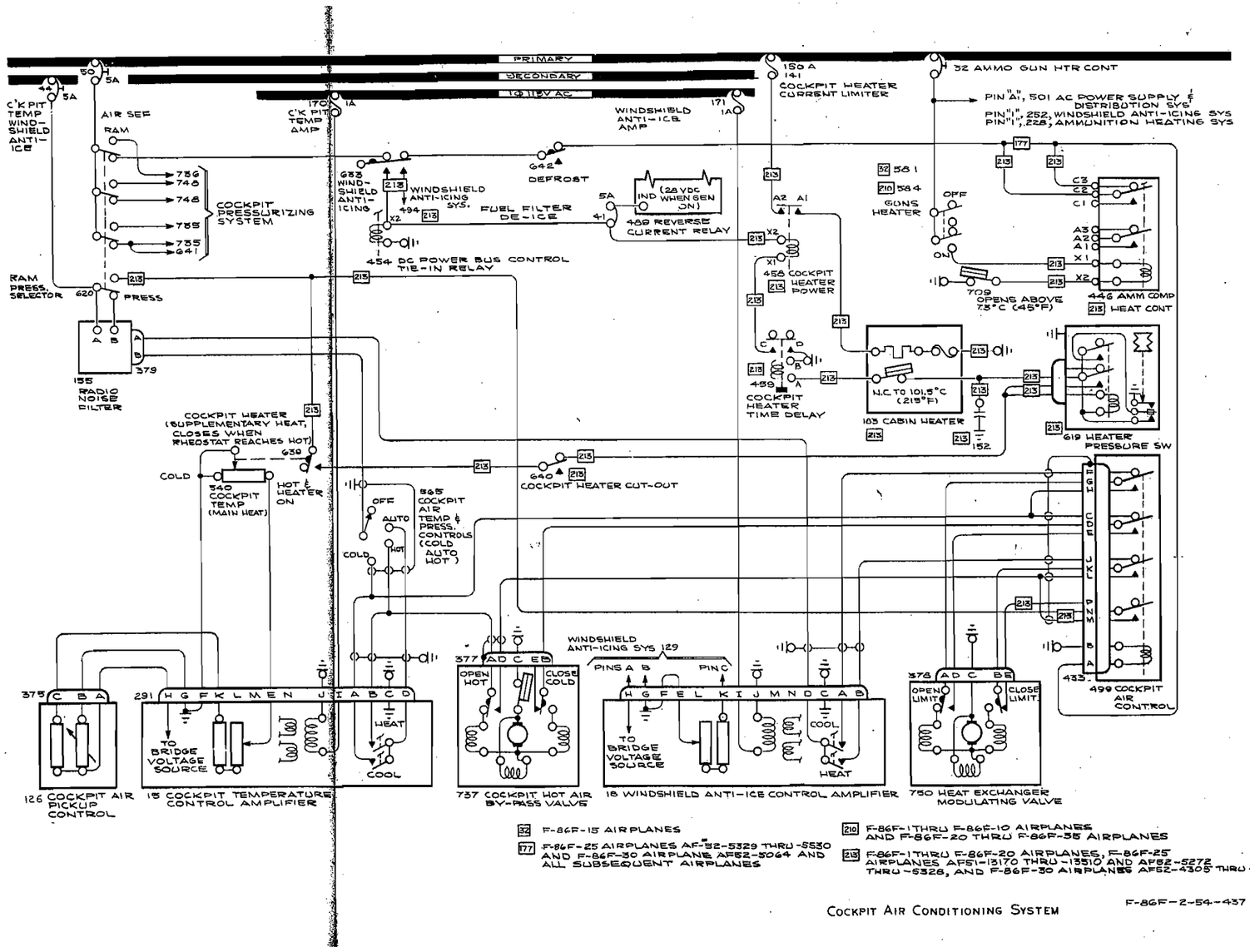
Nose Wheel Steering System - F-86F-20 and Subsequent Airplanes



155 F-86F-20 AND F-86F-25 AIRPLANES
174 F-86F-30 AND F-86F-35 AIRPLANES
209 F-86F-20 AIRPLANES AFS1-13060 THRU -13149 AND F-86F-25 AIRPLANES
321 F-86F-20 AIRPLANES AFS1-13070 THRU -13079 AND F-86F-30 THRU F-86F-35 AIRPLANES

F-86F-2-54-551

Nose Wheel Steering System
F-86F-20 and Subsequent Airplanes



32 F-86F-15 AIRPLANES

177 F-86F-25 AIRPLANES AF-52-5329 THRU -5530 AND F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

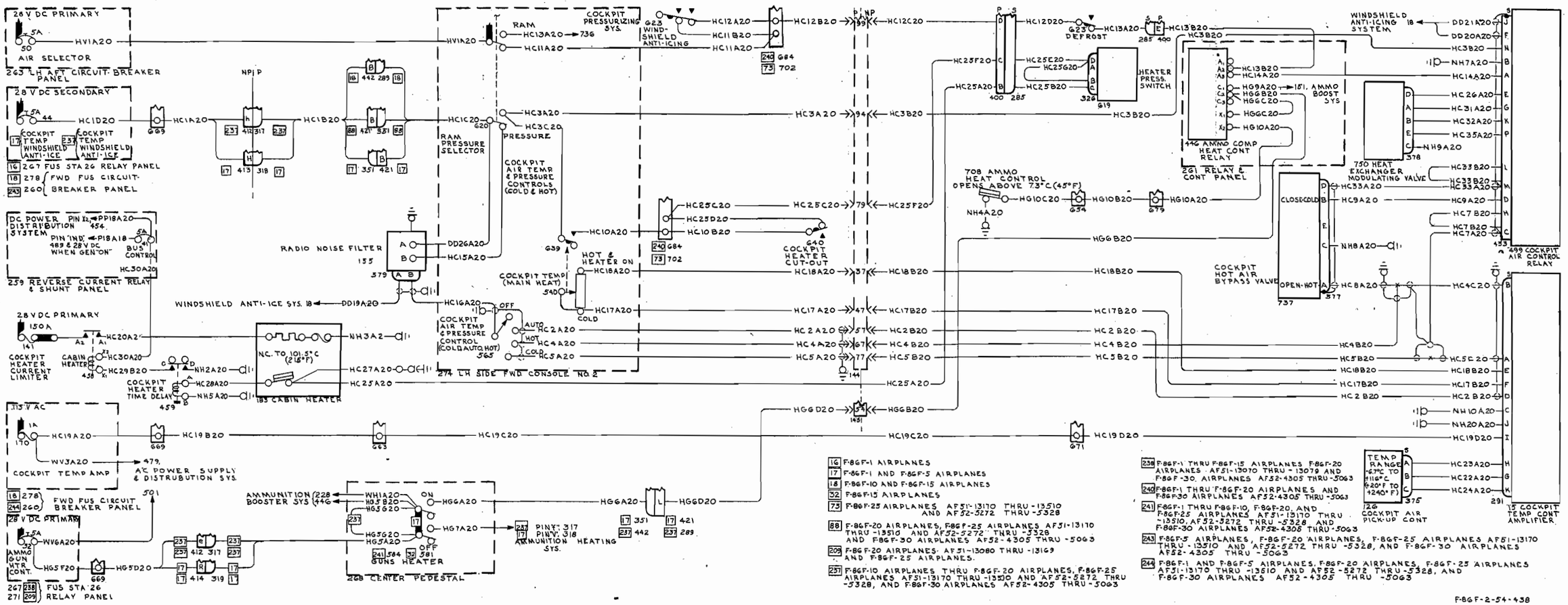
210 F-86F-1 THRU F-86F-10 AIRPLANES AND F-86F-20 THRU F-86F-35 AIRPLANES

213 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES, AF51-13170 THRU -13510 AND AF52-5272 THRU -5328, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
15	Amplifier - Cockpit Temperature Control	Fus 133 RH	RH Radio Bay
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
126	Control Box - Cockpit Air Pickup	Fus 133 RH	RH Radio Bay
141	Current Limiter - Cockpit Heater	Fus 150 RH	RH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
183	Heater - Cockpit	Fus 146 RH	RH Radio Bay
228	Light Assembly - Ammunition Overheat Warning	Fus 85 LH	Cockpit - Left-hand Console
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
291	Plug - Cockpit Temperature Control Amplifier	Fus 138 RH	RH Radio Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
326	Plug - Heater Pressure Switch (Cockpit)	Fus 124 CL	Top Deck, Cockpit
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
375	Plug - Cockpit Air Pickup Control	Fus 126.4 RH	Top Deck
377	Plug - Cockpit Hot-air By-pass Valve	Fus 161 RH	Radio Bay
378	Plug - Heat Exchanger Modulating Valve	Fus 190.1 LH	Top Fuselage
379	Plug - Heat and Vent Radio Noise Filter	Fus 113 LH	Cockpit
400	Receptacle - Canopy Deck Disconnect	Fus 133.5 CL	Cockpit - Top Deck
433	Receptacle - Cockpit Air Control Relay	Fus 204 LH	LH Engine Access
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
446	Relay - Ammunition Heat Control	Fus 170 RH	RH Radio Bay
458	Relay - Cockpit Heater Power	Fus 152 RH	Radio Bay
459	Relay - Cockpit Heater Time-delay	Fus 152 RH	Radio Bay
479	Relay - Inverter Failure Warning	Fus 40 LH	Radio Bay
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
619	Switch - Pressure - Heater	Fus 144 CL	Cockpit, Top Deck
623	Switch - Rocket Jettison Safety	Fus 81 CL	Pedestal
640	Switch - Cockpit Heater Cutout	Fus 90 LH	LH Console
654	Terminal Block - Ammunition Compartment	Fus 87 LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
684	Terminal Block - Windshield Heater Switch	Fus 85 LH	LH Aft Console
702	Terminal Block - Windshield Heater Switch	Fus 85 RH	Cockpit
708	Terminal Block - Rocket Connector	Wing 143 RH and LH	Wings
737	Valve - Cockpit Hot-air By-pass	Fus 161 RH	RH Radio Bay
750	Valve - Heat Exchanger Modulating	Fus 178 LH	Engine Bay

Refer to Illustratsd Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Cockpit Air Conditioning System - F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5328 and F-86F-30 Airplanes AF52-4305 Through -5063.



16 F-86F-1 AIRPLANES

17 F-86F-1 AND F-86F-5 AIRPLANES

18 F-86F-10 AND F-86F-15 AIRPLANES

52 F-86F-15 AIRPLANES

73 F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328

88 F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328 AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

209 F-86F-20 AIRPLANES AF51-13080 THRU -13169 AND F-86F-25 AIRPLANES.

237 F-86F-10 AIRPLANES THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

238 F-86F-1 THRU F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13070 THRU -13079 AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

240 F-86F-1 THRU F-86F-20 AIRPLANES AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

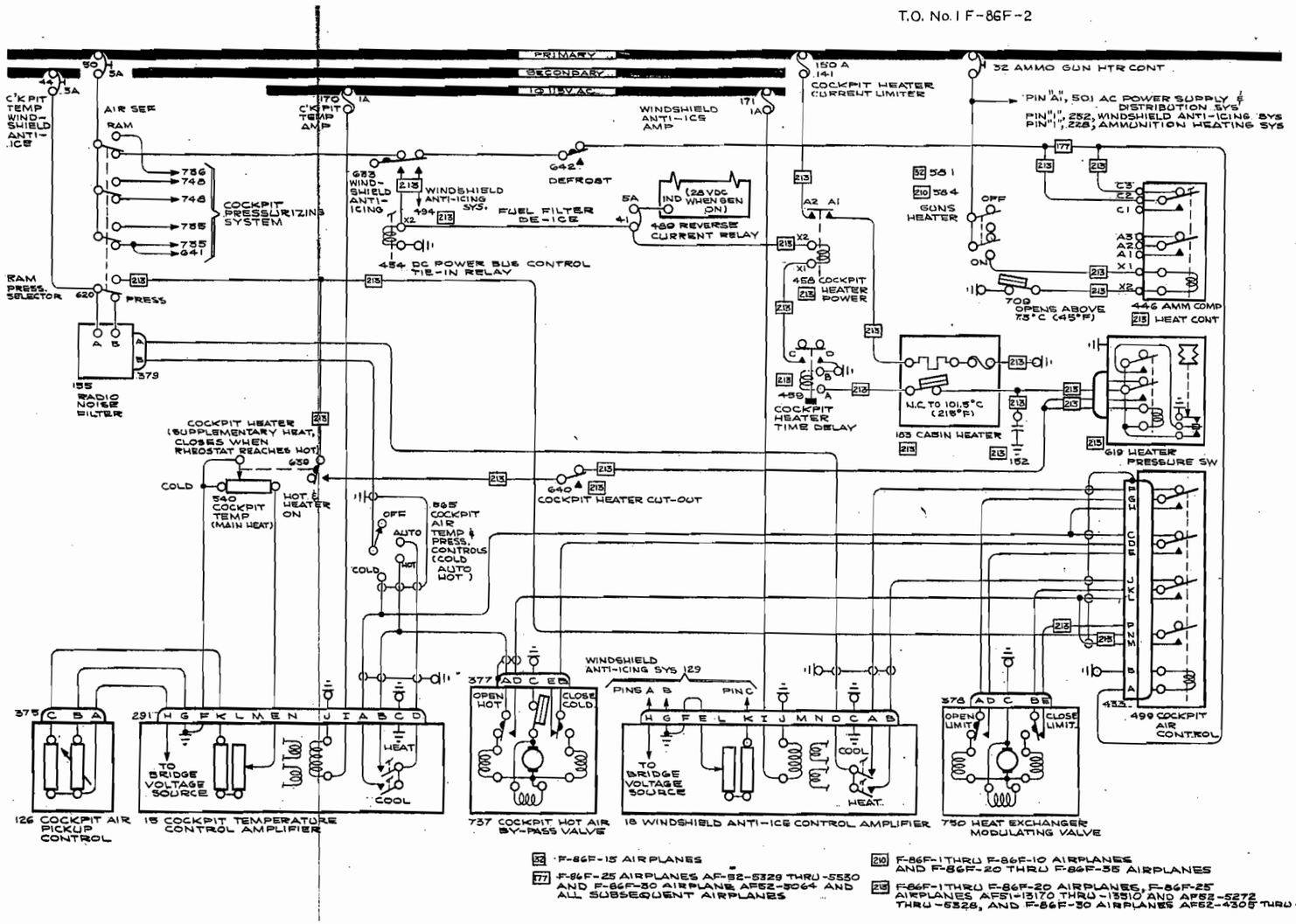
241 F-86F-1 THRU F-86F-10, F-86F-20, AND F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5328 AND F-86F-30 AIRPLANES AF52-4308 THRU -5063

243 F-86F-5 AIRPLANES, F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

244 F-86F-1 AND F-86F-5 AIRPLANES, F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328, AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

F-86F-2-54-438

Cockpit Air Conditioning System
F-86F-1 Through F-86F-20 Airplanes, F-86F-25 Airplanes
AF51-13170 Through -13510 And AF52-5272 Through -5328
And F-86F-30 Airplanes AF52-4305 Through -5063



54 F-86F-15 AIRPLANES

77 F-86F-25 AIRPLANES AF-52-5329 THRU -5530 AND F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

210 F-86F-1 THRU F-86F-10 AIRPLANES AND F-86F-20 THRU F-86F-35 AIRPLANES

215 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5326, AND F-86F-30 AIRPLANES AF52-4305 THRU -5065

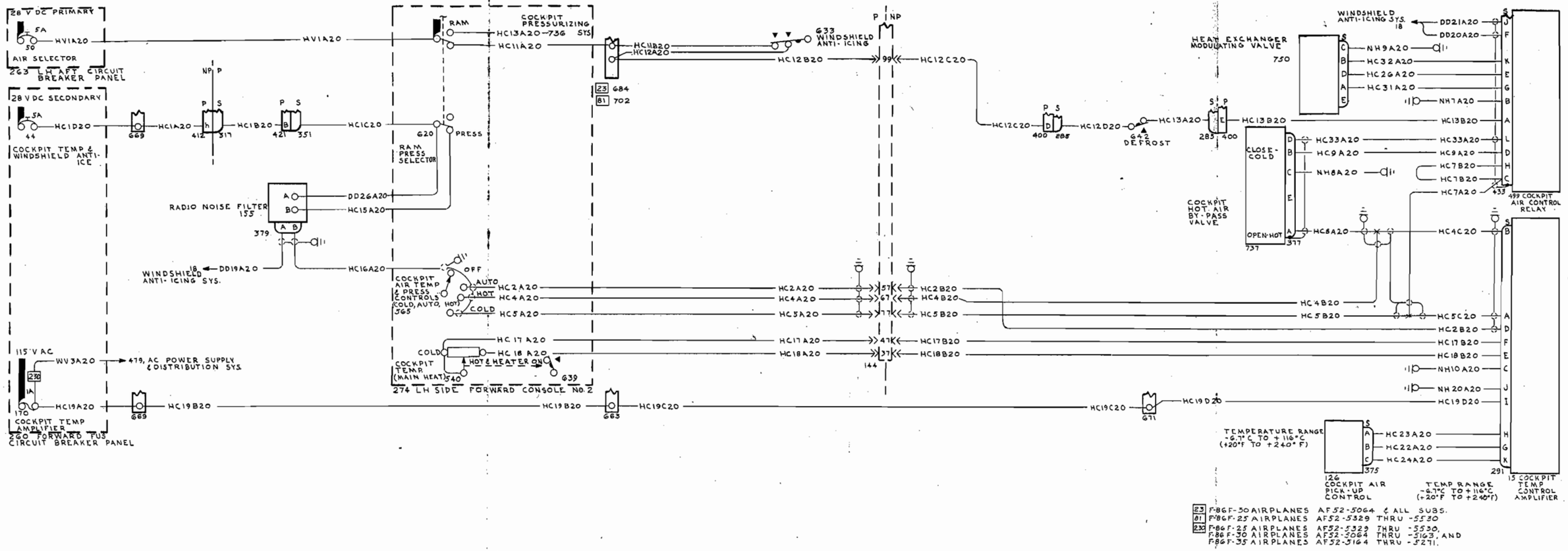
Cockpit Air Conditioning System

F-86F-2-54-437

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
15	Amplifier - Cockpit Temperature Control	Fus 133 RH	RH Radio Bay
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
126	Control Box - Cockpit Air Pickup	Fus 133 RH	RH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
291	Plug - Cockpit Temperature Control Amplifier	Fus 138 RH	RH Radio Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
375	Plug - Cockpit Air Pickup Control	Fus 126.4 RH	Top Deck
379	Plug - Heat and Vent Radio Noise Filter	Fus 113 LH	Cockpit
400	Receptacle - Canopy Deck Disconnect	Fus 133.5 CL	Cockpit - Top Deck
433	Receptacle - Cockpit Air Control Relay	Fus 204 LH	LH Engine Access
479	Relay - Inverter Failure Warning	Fus 40 LH	Radio Bay
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
633	Switch - Windshield Anti-ice Heater	Fus 85 LH	Cockpit
642	Switch - Defrost	Fus 90 LH	LH Side of Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
684	Terminal Block - Windshield Heater Switch	Fus 85 LH	LH Aft Console
702	Terminal Block - Windshield Heater Switch	Fus 85 RH	Cockpit
750	Valve - Heat Exchanger Modulating	Fus 178 LH	Engine Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Cockpit Air Conditioning System F-86F-25 Airplanes AF52-5329 Through -5530 and F-86F-30 Airplane AF52-5064 and All Subsequent Airplanes



23 F-86F-30 AIRPLANES AF52-5064 & ALL SUBS.
81 F-86F-25 AIRPLANES AF52-5329 THRU -5530
230 F-86F-25 AIRPLANES AF52-5329 THRU -5530,
F-86F-30 AIRPLANES AF52-5064 THRU -5163, AND
F-86F-35 AIRPLANES AF52-5164 THRU -5271.

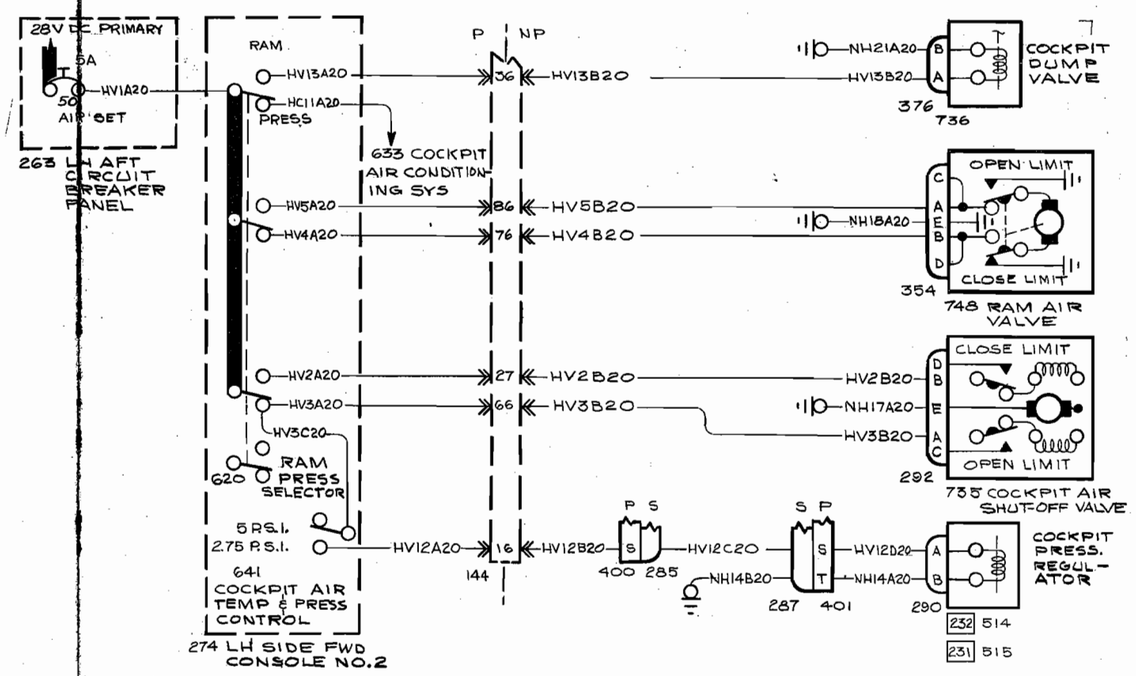
F-86F-2-54-439

Cockpit Air Conditioning System
F-86F-25 Airplanes AF52-5329 Through -5530 And F-86F-30
Airplane AF52-5064 And All Subsequent Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
287	Plug - Canopy Pullaway	Fus 126 RH	Cockpit Canopy
290	Plug - Cockpit Pressure Regulator	Fus 155 CL	Aft End of Canopy
292	Plug - Cockpit Air Shutoff Valve	Fus 155 RH	RH Radio Bay
354	Plug - Ram-air Solenoid Valve	Fus 155 RH	RH Radio Bay
376	Plug - Cockpit Dump Valve	Fus 144.6 RH	Top Deck
514	Regulator - Cockpit Pressure	Fus 155 CL	Aft End of Canopy
515	Regulator - Oxygen	Fus 85 LH	Cockpit, LH Forward Side
633	Switch - Wingshield Anti-ice Heater	Fus 85 LH	Cockpit
735	Valve - Cockpit Air Shutoff	Fus 161 CL	Radio Bay
736	Valve - Cockpit Dump	Fus 124 CL	Cockpit, Top Deck
748	Valve - Ram-air Shutoff	Fus 155 RH	Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Cockpit Pressurizing System

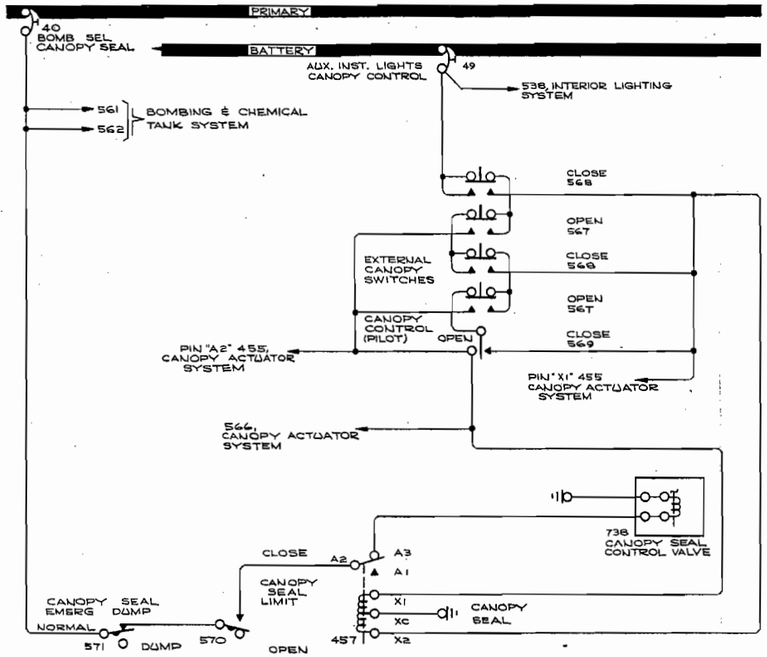


231 F-86F-1 AIRPLANES AF51-2897 THRU -2927 AND F-86F-5 THRU F-86F-15 AIRPLANES

232 F-86F-1 AIRPLANES AF51-2850 THRU -2896 AND F-86F-20 THRU F-86F-35 AIRPLANES

F-86F-2-54-346

COCKPIT PRESSURIZING SYSTEM



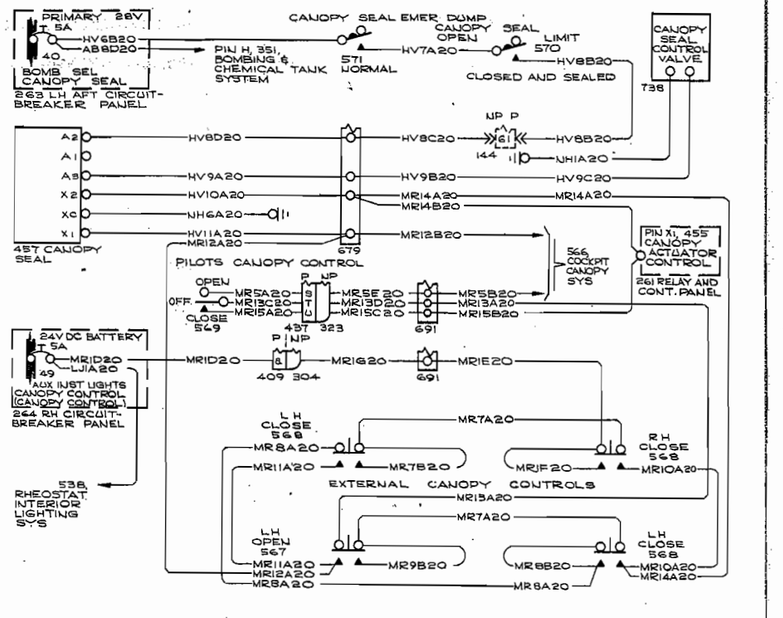
F-86F-2-54-225

CANOPY SEAL SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Curcuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
457	Relay - Canopy Seal	Fus 104 LH	Cockpit
538	Rheostat - Auxiliary Instrument Light	Fus 81 RH	Cockpit, RH Forward
566	Switch - Canopy Open Limit	Fus 170 RH	Cockpit, Top Deck
567	Switch - Canopy Open - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
568	Switch - Canopy Close - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
569	Switch - Canopy Operating - Pilot	Fus 83 LH	Cockpit, LH Forward Side
570	Switch - Canopy Seal Limit	Fus 144 CL	Cockpit, Top Deck Behind Seat
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
738	Valve - Canopy Seal	Fus 155 CL	Top of Fuselage

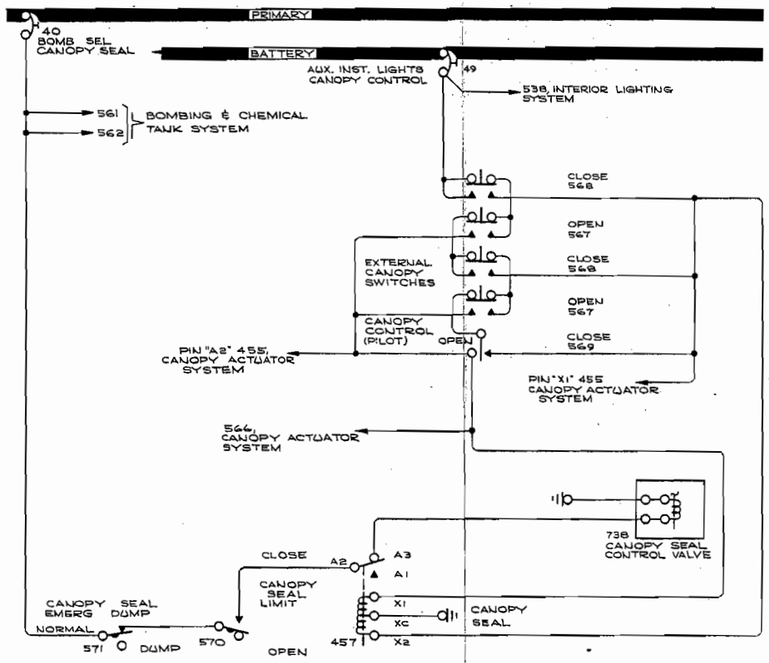
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Canopy Seal System F-86F-1 Through F-86F-25 Airplanes



F-86F-2-54-226

CANOPY SEAL SYSTEM
F-86F-1 THROUGH F-86F-25 AIRPLANES



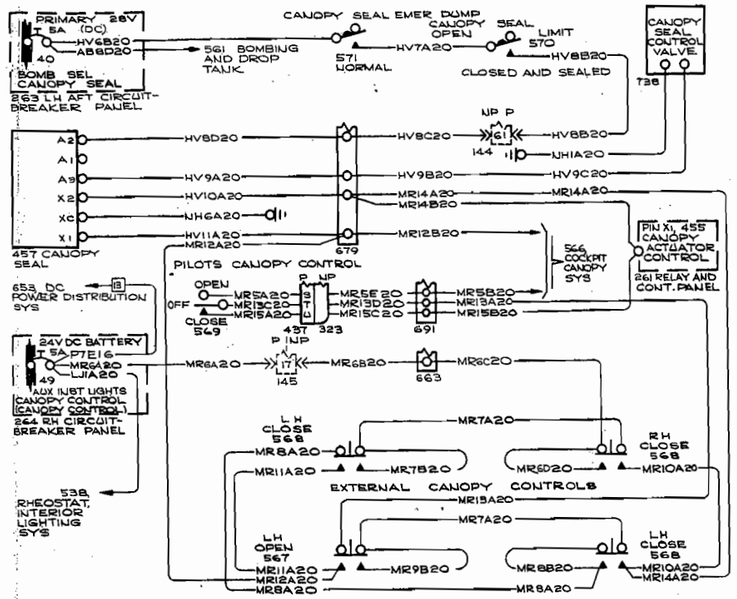
F-86F-2-54-225

CANOPY SEAL SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
457	Relay - Canopy Seal	Fus 104 LH	Cockpit
538	Rheostat - Auxiliary Instrument Light	Fus 81 RH	Cockpit, RH Forward
561	Switch - Bomb Release Selector	Fus 81 CL	Cockpit, Pedestal
566	Switch - Canopy Open Limit	Fus 170 RH	Cockpit, Top Deck
567	Switch - Canopy Open - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
568	Switch - Canopy Close - External	Fus 53 RH and LH	RH and LH Sides of Fuselage Below Cockpit
569	Switch - Canopy Operating - Pilot	Fus 63 LR	Cockpit, LH Forward Side
570	Switch - Canopy Seal Limit	Fus 144 CL	Cockpit, Top Deck Behind Seat
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
653	Terminal Block - Ammunition Booster and LH	Fus 88 RH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
736	Valve - Canopy Seal	Fus 155 CL	Top of Fuselage

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

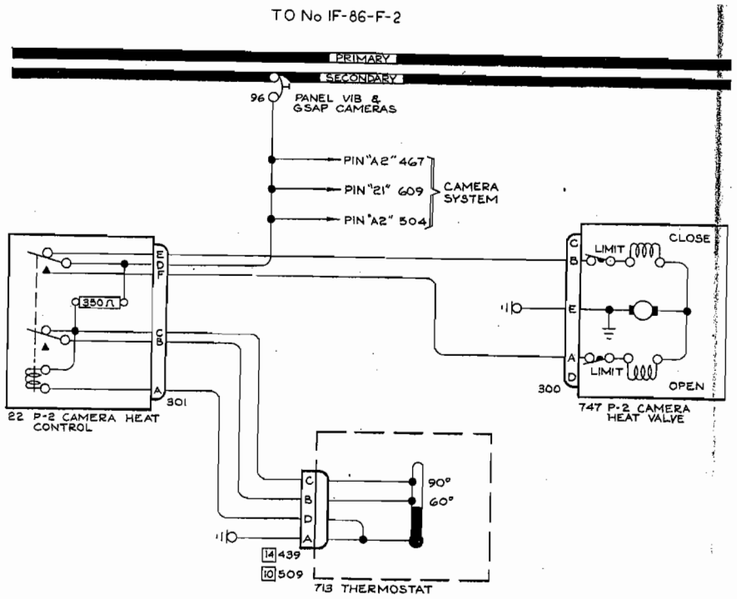
Canopy Seal System - F-86F-30 and F-86F-35 Airplanes



[13] F-86F-35 AIRPLANES

F-86F-2-54-227B

CANOPY SEAL SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES



INDEX

NO.	DESCRIPTION	STATION NO.	ACCESS
22	Control Box - P-2 Camera Heat	Fus 53 RH	Nose Wheel Well
268	Panel - Pedestal	Fus 76 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
300	Plug - P-2 Camera Heat Control Valve	Fus 135 LH	LH Radio Bay
301	Plug - P-2 Camera Heat Control Box	Fus 41 LH	LH Nose Wheel Well Access
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
439	Receptacle - Drop Tank Jettison Solenoid	Fus 143 LH and RH	Drop Tank
504	Relay - P-2 Camera Door Actuator	Fus 65 LH	Nose Wheel Well
609	Switch - Camera Lens Selector	Fus 104 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
678	Terminal Block - Wing Flap	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
693	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay
699	Terminal Block - N9 Camera Disconnect	Fus 54 CL	Nose Radar Bay
713	Thermostat - P2 Camera	Fus 87 LH	Strike Camera Assembly
747	Valve - P-2 Camera	Fus 135 LH	LH Radio Bay

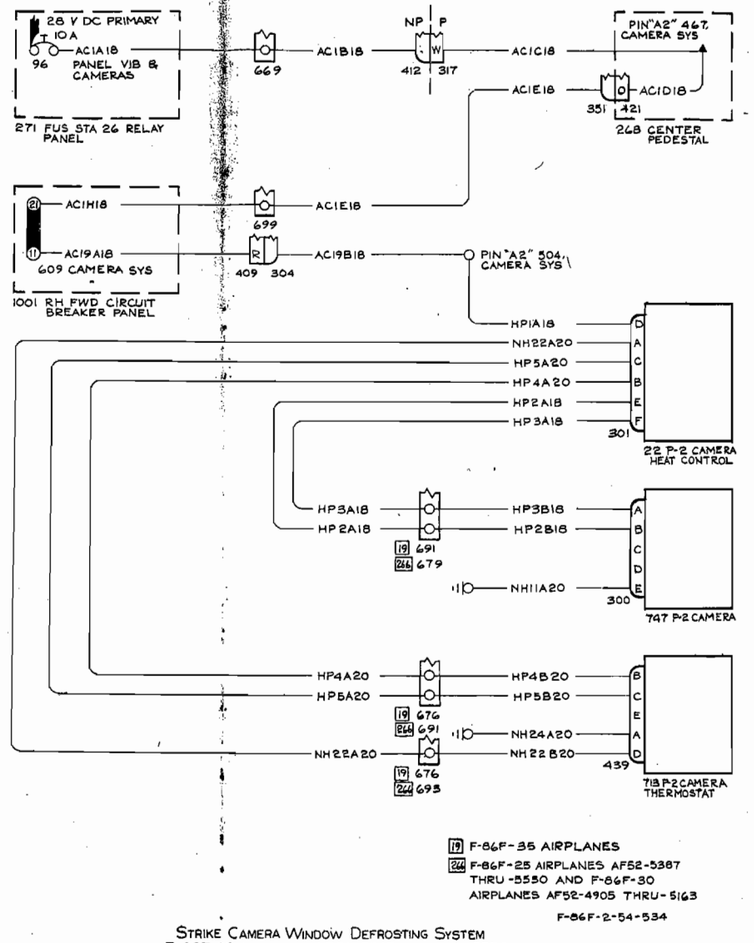
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Strike Camera Window Defrosting System - F-86F-25 Airplanes AF52-5387 Through -5530,
F-86F-30 Airplanes AF52-4905 and All Subsequent Airplanes

[10] F-86-F-25 AIRPLANES AF 52-5387 THRU -5530
[14] F-86-F-30 AIRPLANE AF 52-4905, AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-533

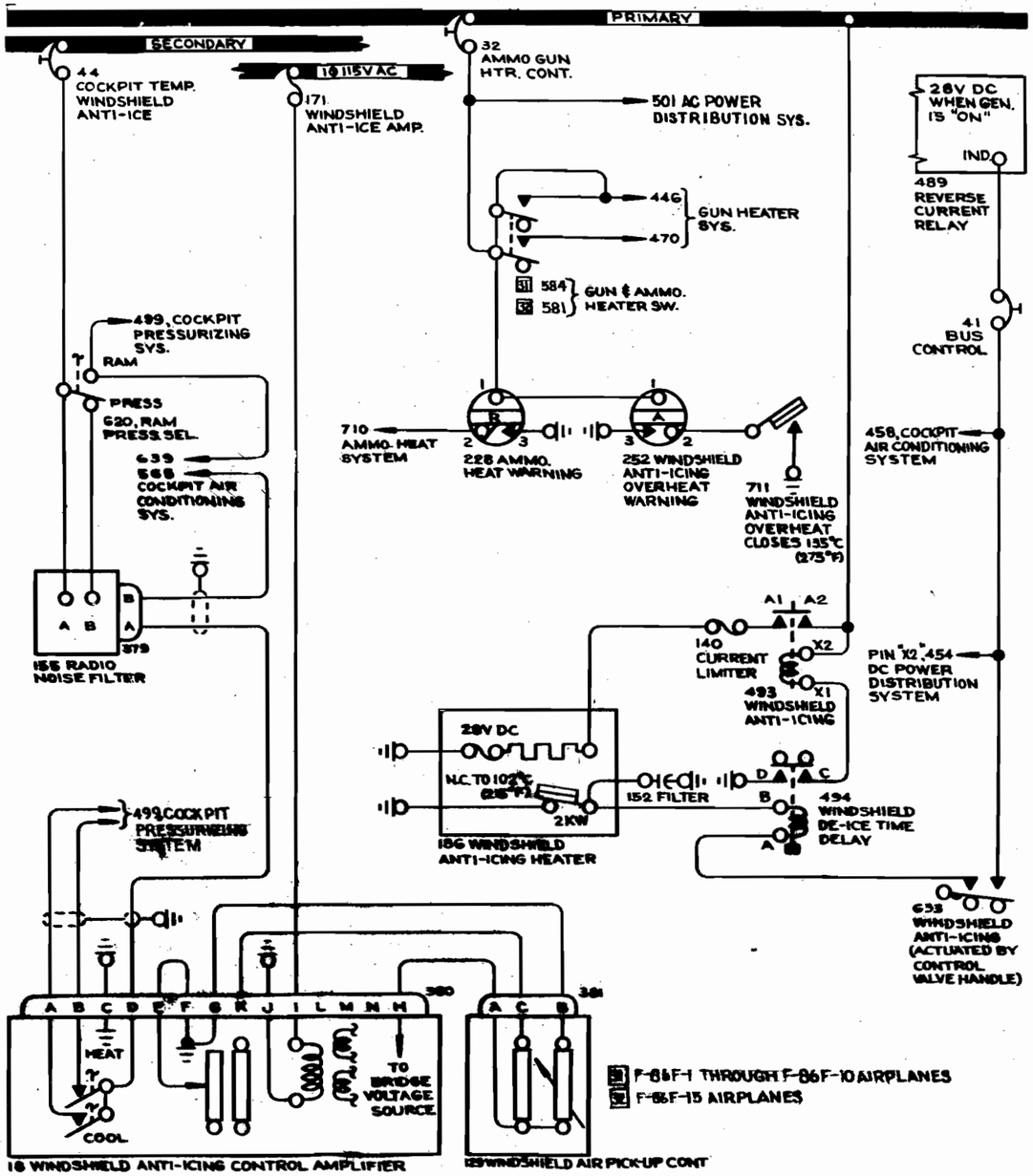
STRIKE CAMERA WINDOW DEFROSTING SYSTEM
F-86F-25 AIRPLANES AF52-5387 THROUGH-5530
F-86F-30 AIRPLANE AF52-4905, AND ALL SUBSEQUENT AIRPLANES



[19] F-86F-35 AIRPLANES
[266] F-86F-25 AIRPLANES AF52-5387 THRU -5530 AND F-86F-30 AIRPLANES AF52-4905 THRU-5163

F-86F-2-54-534

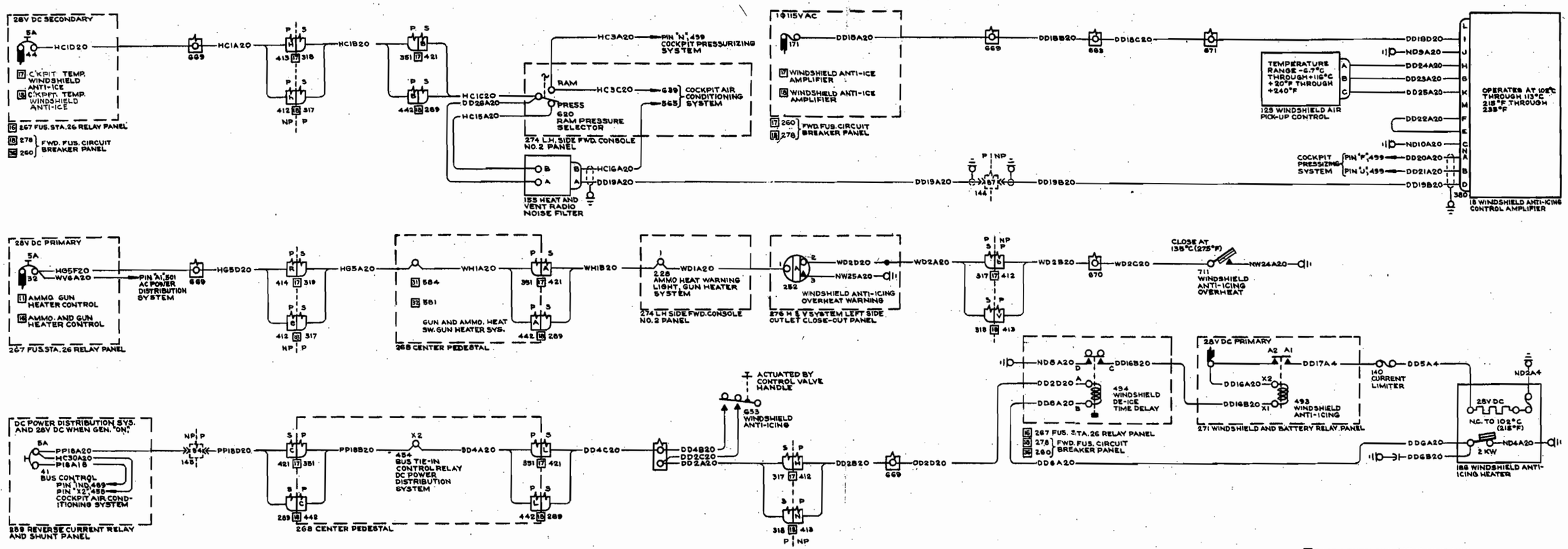
STRIKE CAMERA WINDOW DEFROSTING SYSTEM
F-86F-25 AIRPLANES AF52-5387 THROUGH -5530
F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

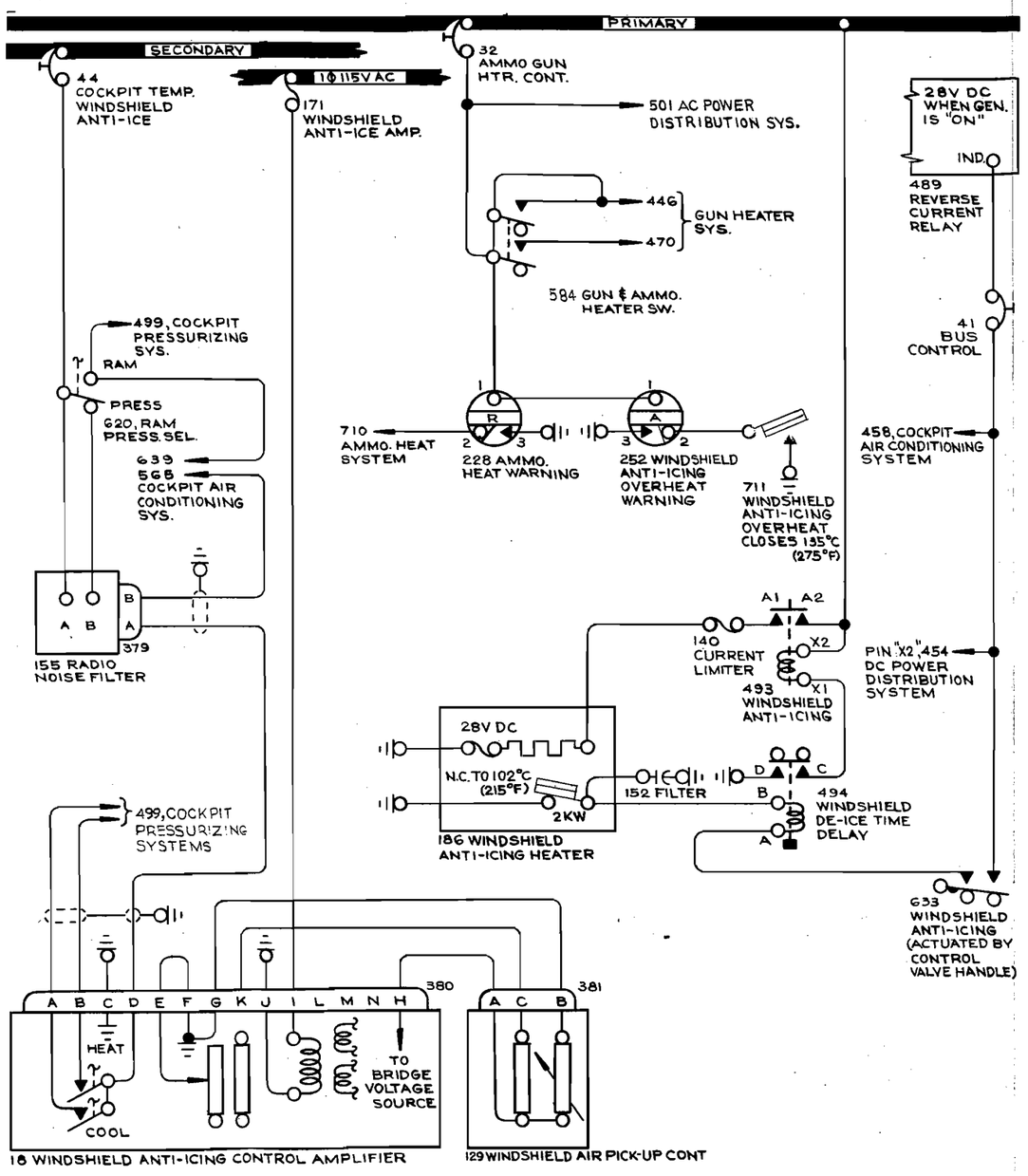


WINDSHIELD ANTI-ICING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
129	Control Box - Windshield Air Pickup	Fus 133 RH	RH Radio Bay
140	Current Limiter - Windshield Anti-ice	Fus 41 LH	Radar Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
186	Heater - Windshield Anti-ice Boost	Fus 52 LH	Radar Bay
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
351	Plug - Pedestal Disconnect	Fus 62. 6 LH	Directly Behind Pedestal
379	Plug - Heat and Vent Radio Noise Filter	Fus 113 LH	Cockpit
380	Plug - Windshield Anti-ice Amplifier	Fus 144. 6 RH	RH Radio Bay
381	Plug - Windshield Air Pickup Control	Fus 161 LH	LH Radio Bay
454	Relay - Bus Tie-in Control	Fus 78 LH	Pedestal
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
633	Switch - Windshield Anti-ice Heater	Fus 85 LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
684	Terminal Block - Windshield Heater Switch	Fus 85 LH	LH Aft Console
711	Thermostat - Windshield Overheat	Fus 52 LH	Radar Bay, Forward Fire Wall

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.


28V DC SECONDARY
5A
44
HC1D20
17 C'KPIT TEMP. WINDSHIELD ANTI-ICE
18 C'KPIT TEMP. WINDSHIELD ANTI-ICE
16 267 FUS. STA. 26 RELAY PANEL
18 278 } FWD. FUS. CIRCUIT BREAKER PANEL
19 260
669
HC1A20
HC1B20
HC1C20
DD28A20
HC15A20
HC3A20
PIN "N" 499 COCKPIT PRESSURIZING SYSTEM
RAM
PRESS
620 RAM PRESSURE SELECTOR
HC3C20
639 COCKPIT AIR CONDITIONING SYSTEM
565
274 L.H. SIDE FWD. CONSOLE NO. 2 PANEL
155 HEAT AND VENT RADIO NOISE FILTER
HC16A20
DD19A20
1 115V AC
171
DD15A20
17 WINDSHIELD ANTI-ICE AMPLIFIER
18 WINDSHIELD ANTI-ICE AMPLIFIER
17 260 } FWD. FUS. CIRCUIT BREAKER PANEL
18 278
669
DD15B20
668
DD15C20
671
DD19B20
144
TEMPERATURE RANGE -67°C THROUGH +116°C +20°F THROUGH +240°F
129 WINDSHIELD AIR PICK-UP CONTROL
DD19D20
ND9A20
DD24A20
DD23A20
DD25A20
DD22A20
ND10A20
COCKPIT PRESSIZING SYSTEM
PIN "F" 499
PIN "U" 499
DD20A20
DD21A20
DD19B20
380
OPERATES AT 102°C THROUGH 113°C 215°F THROUGH 235°F
18 WINDSHIELD ANTI-ICING CONTROL AMPLIFIER
28V DC PRIMARY
5A
32
HG5F20
WV6A20
11 AMMO. GUN HEATER CONTROL
16 AMMO. AND GUN HEATER CONTROL
267 FUS. STA. 26 RELAY PANEL
PIN "A" 501 AC POWER DISTRIBUTION SYSTEM
669
HG5D20
414 17 319
412 18 317
HG5A20
31 584
32 581
GUN AND AMMO. HEAT SW. GUN HEATER SYS.
285 CENTER PEDESTAL
WH1A20
351 17 421
442 18 289
WH1B20
WD1A20
228 AMMO HEAT WARNING LIGHT, GUN HEATER SYSTEM
274 L.H. SIDE FWD. CONSOLE NO. 2 PANEL
252
WD2D20
NW25A20
WINDSHIELD ANTI-ICING OVERHEAT WARNING
276 H & V SYSTEM LEFT SIDE OUTLET CLOSE-OUT PANEL
WD2A20
317 17 412
318 18 413
WD2B20
670
WD2C20
CLOSE AT 135°C (275°F)
711 WINDSHIELD ANTI-ICING OVERHEAT
NW24A20
DC POWER DISTRIBUTION SYS. AND 28V DC WHEN GEN. "ON"
5A
PP18A20
HC30A20
PP18A15
41 BUS CONTROL
PIN "HD" 489
PIN "X2" 488
COCKPIT AIR CONDITIONING SYSTEM
289 REVERSE CURRENT RELAY AND SHUNT PANEL
145
PP18B20
421 17 351
289 18 442
PP18B20
X2
454 BUS TIE-IN CONTROL RELAY DC POWER DISTRIBUTION SYSTEM
268 CENTER PEDESTAL
BD4A20
351 17 421
442 18 289
DD4C20
ACTUATED BY CONTROL VALVE HANDLE
633 WINDSHIELD ANTI-ICING
DD4B20
DD2C20
DD2A20
317 17 412
318 18 413
DD2B20
669
DD2D20
ND6A20
DD16B20
DD2D20
DD6A20
494 WINDSHIELD DE-ICE TIME DELAY
16 267 FUS. STA. 26 RELAY PANEL
18 278 } FWD. FUS. CIRCUIT BREAKER PANEL
19 260
DD6A20
28V DC PRIMARY
A2 A1
DD17A4
DD16A20
DD16B20
493 WINDSHIELD ANTI-ICING
271 WINDSHIELD AND BATTERY RELAY PANEL
140 CURRENT LIMITER
DD5A4
ND2A4
28V DC
N.C. TO 102°C (215°F)
DDGA20
DDGB20
2 KW
ND4A20
186 WINDSHIELD ANTI-ICING HEATER
11 F-86F-5 THROUGH F-86F-15 AIRPLANES
12 F-86F-1 AIRPLANES
17 F-86F-1 AND F-86F-5 AIRPLANES
18 F-86F-10 AND F-86F-15 AIRPLANES
31 F-86F-1 THROUGH F-86F-10 AIRPLANES
32 F-86F-15 AIRPLANES
34 F-86F-5 AIRPLANES
F-86F-2-54-325



F-86F-2-54-329A

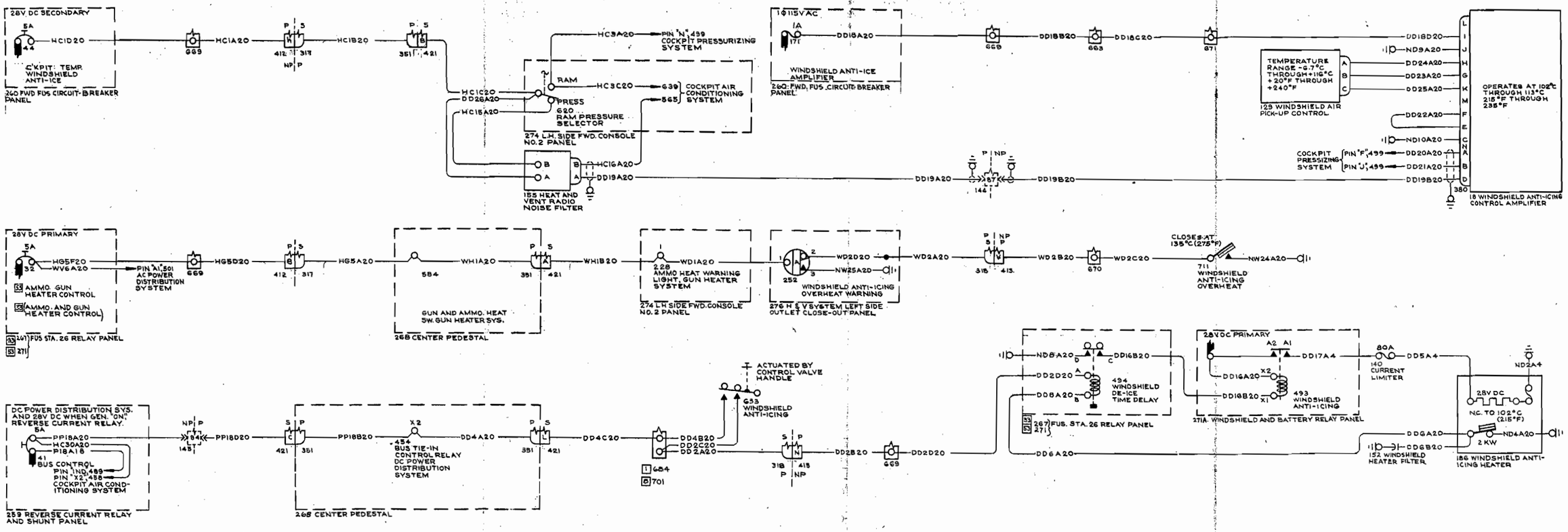
WINDSHIELD ANTI-ICING SYSTEM
F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF 51-13070 THROUGH-13510

INDEX
INDEX

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
129	Control Box- Windshield Air Pickup	Fus 133 RH	RH Radio Bay
140	Current Limiter - Windshield Anti-ice	Fus 41 LH	Radar Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
152	Filter - Cabin and Windshield Heater	Fus 53 LH	Nose Radar Bay
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
186	Heater - Windshield Anti-ice Boost	Fus 52 LH	Radar Bay
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62. 6 LH	Directly Behind Pedestal
380	Plug - Windshield Anti-ice Amplifier	Fus 144. 6 RH	RH Radio Bay
381	Plug - Windshield Air Pickup Control	Fus 161 LH	LH Radio Bay
454	Relay - Bus Tie-in Control	Fus 78 LH	Pedestal
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
633	Switch - Windshield Anti-ice Heater	Fus 85 LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
711	Thermostat - Windshield Overheat	Fus 52 LH	Radar Bay, Forward Fire Wall

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN01-60JLC-4) for part numbers and location of items.

Windshield Anti-icing System - F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 Through -13510



1 F-86F-20 AIRPLANES

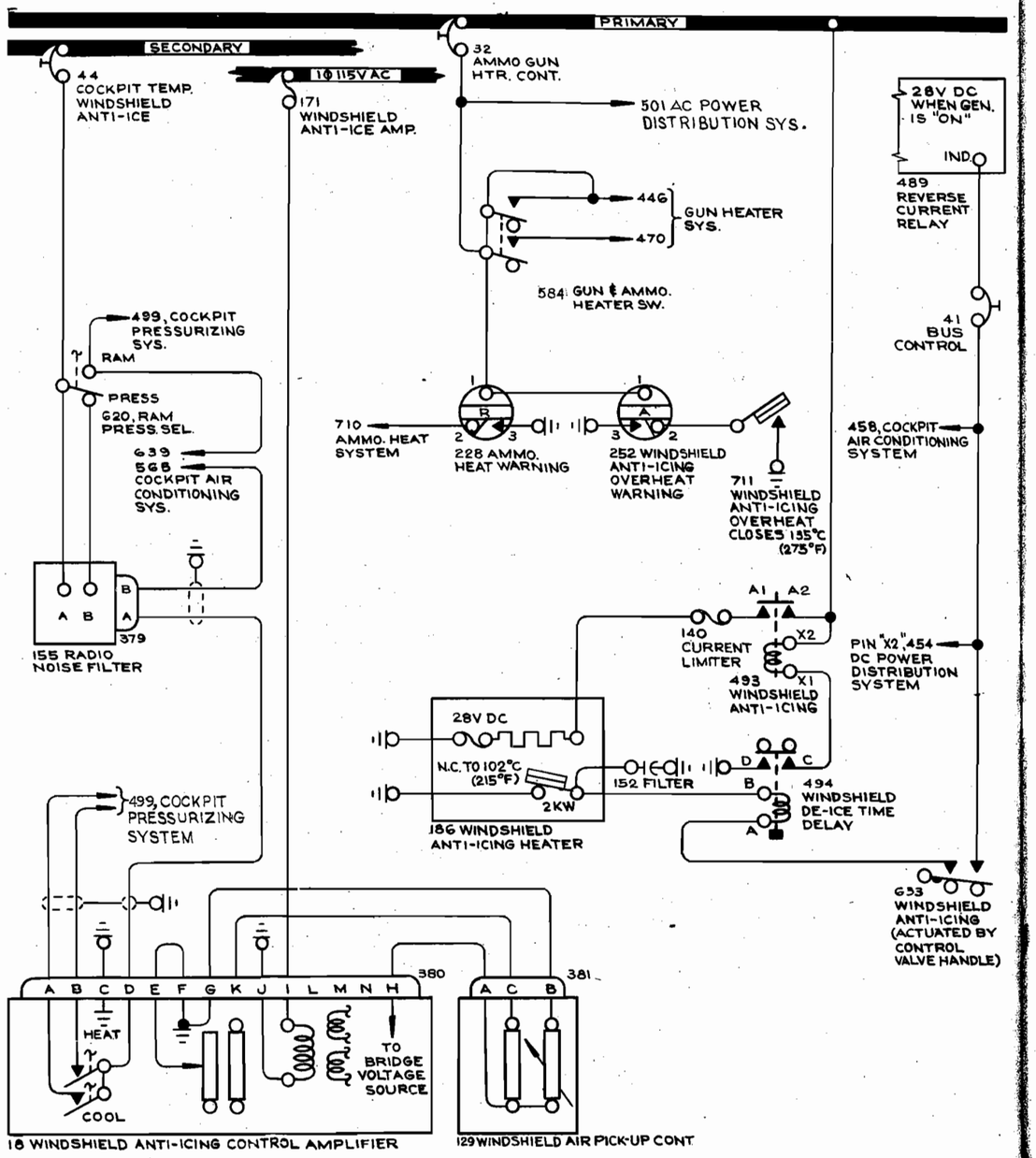
6 F-86F-25 AIRPLANES AF51-13170 THROUGH -13510

33 F-86F-20 AIRPLANES AF51-13070 THROUGH -13079

53 F-86F-20 AIRPLANES AF51-13080 THROUGH -13169 & F-86F-25 AIRPLANES AF51-13170 THROUGH-13510

F-86F-2-54-326

WINDSHIELD ANTI-ICING SYSTEM
F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510

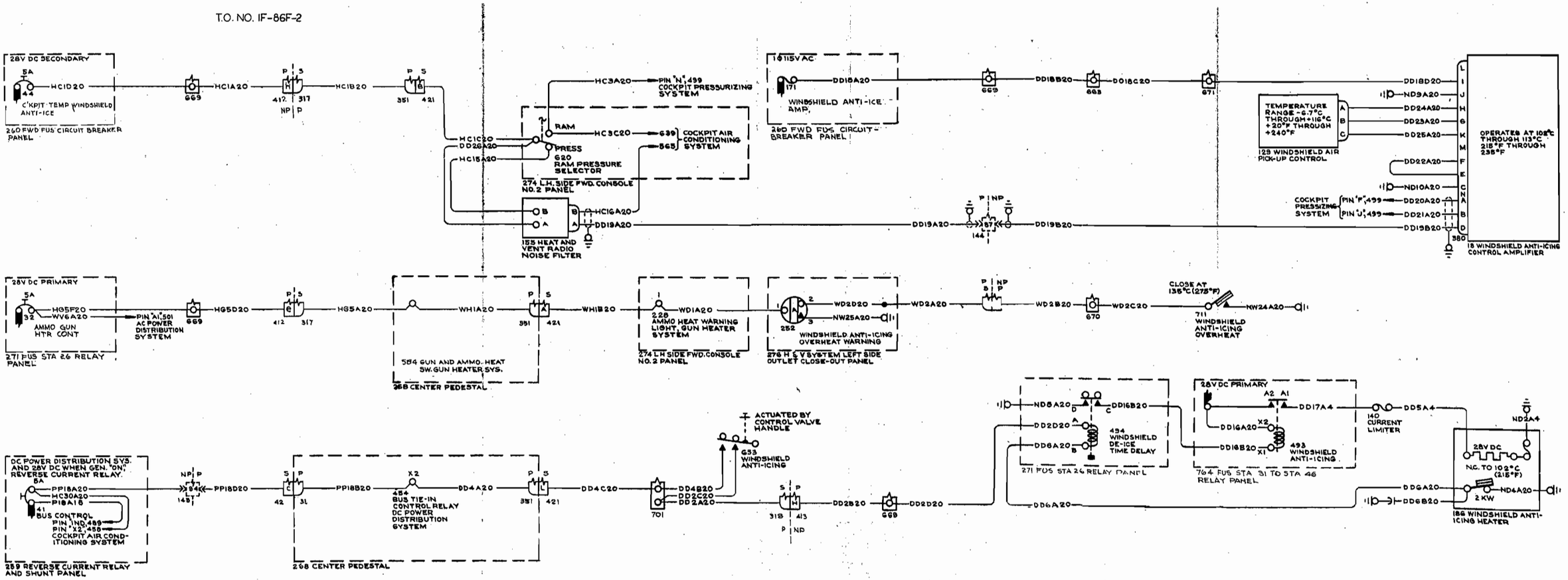


WINDSHIELD ANTI-ICING SYSTEM
F86F-25 AIRPLANES A F 52-5272 THROUGH-5328

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
129	Control Box - Windshield Air Pickup	Fus 133 RH	RH Radio Bay
140	Current Limiter - Windshield Anti-ice	Fus 41 LH	Radar Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
152	Filter - Cabin and Windshield Heater	Fus 53 LH	Nose Radar Bay
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
186	Heater - Windshield Anti-ice Boost	Fus 52 LH	Radar Bay
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62. 6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62. 6 LH	Directly Behind Pedestal
380	Plug - Windshield Anti-ice Amplifier	Fus 144. 6 RH	RH Radio Bay
381	Plug - Windshield Air Pickup Control	Fus 161 LH	LH Radio Bay
454	Relay - Bus Tie-in Control	Fus 78 LH	Pedestal
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
633	Switch - Windshield Anti-ice Heater	Fus 85 LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
711	Thermostat - Windshield Overheat	Fus 52 LH	Radar Bay, Forward Fire Wall
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

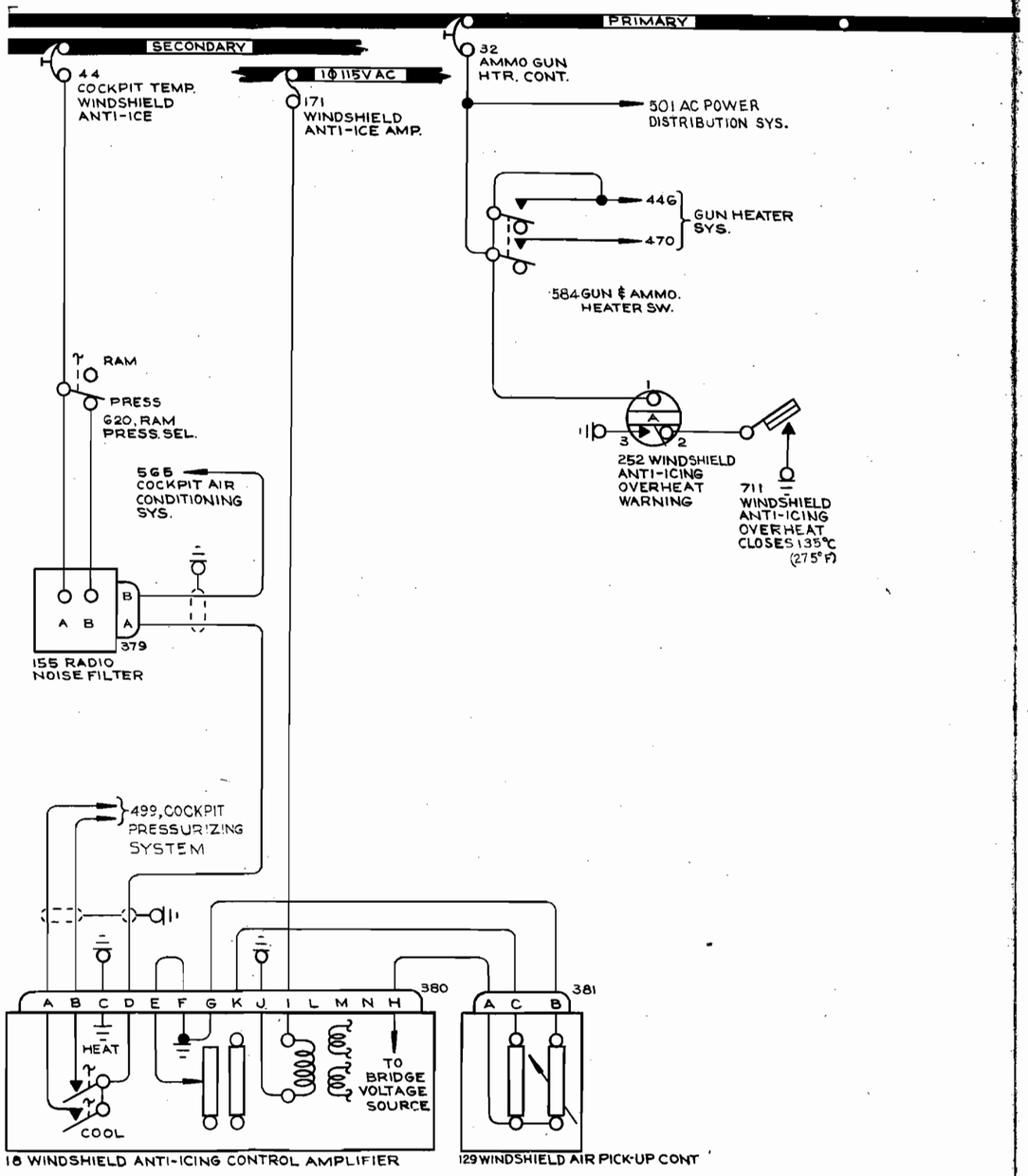
Windshield Anti-Icing System - F-86F-25 Airplanes AF52-5272 Through -5328


28V DC SECONDARY
5A
HC1D20
44
C'KPIT TEMP WINDSHIELD ANTI-ICE
260 FWD FUS CIRCUIT BREAKER PANEL
669
HC1A20
412 NP
317 P
HC1B20
351
421
HC1C20
DD2BA20
HC15A20
HC3A20
PIN 'N',499 COCKPIT PRESSURIZING SYSTEM
RAM
HC3C20
639
COCKPIT AIR CONDITIONING SYSTEM
PRESS
565
620 RAM PRESSURE SELECTOR
274 L.H. SIDE FWD. CONSOLE NO.2 PANEL
HC1GA20
DD19A20
155 HEAT AND VENT RADIO NOISE FILTER
1@115V AC
171
DD18A20
WINDSHIELD ANTI-ICE AMP.
260 FWD FUS CIRCUIT-BREAKER PANEL
669
DD18B20
663
DD18C20
671
DD19A20
87
144
DD19B20
TEMPERATURE RANGE -6.7°C THROUGH +16°C +20°F THROUGH +240°F
123 WINDSHIELD AIR PICK-UP CONTROL
DD18D20
ND9A20
DD24A20
DD25A20
DD25A20
DD22A20
ND10A20
COCKPIT PRESSURIZING SYSTEM
PIN 'F',499
PIN 'J',499
DD20A20
DD21A20
DD19B20
380
OPERATES AT 102°C THROUGH 113°C 215°F THROUGH 235°F
18 WINDSHIELD ANTI-ICING CONTROL AMPLIFIER
28V DC PRIMARY
5A
HG5F20
32
WV6A20
AMMO GUN HTR CONT
271 FUS STA 26 RELAY PANEL
PIN 'A',501 AC POWER DISTRIBUTION SYSTEM
669
HG5D20
412
317
HG5A20
WH1A20
351
421
WH1B20
584 GUN AND AMMO. HEAT SW. GUN HEATER SYS.
268 CENTER PEDESTAL
1
WD1A20
228 AMMO HEAT WARNING LIGHT, GUN HEATER SYSTEM
274 L.H. SIDE FWD. CONSOLE NO.2 PANEL
2
WD2D20
NW25A20
252
WINDSHIELD ANTI-ICING OVERHEAT WARNING
276 H.S.V. SYSTEM LEFT SIDE OUTLET CLOSE-OUT PANEL
WD2A20
WD2B20
670
WD2C20
CLOSE AT 135°C (275°F)
711 WINDSHIELD ANTI-ICING OVERHEAT
NW24A20
ACTUATED BY CONTROL VALVE HANDLE
G53 WINDSHIELD ANTI-ICING
701
DD4B20
DD2C20
DD2A20
DD2B20
669
DD2D20
DC POWER DISTRIBUTION SYS. AND 28V DC WHEN GEN. "ON" REVERSE CURRENT RELAY.
5A
PP18A20
HC30A20
P18A16
41
BUS CONTROL PIN 'ND',489 PIN 'X2',488 COCKPIT AIR CONDITIONING SYSTEM
259 REVERSE CURRENT RELAY AND SHUNT PANEL
NP
P
144
PP18D20
42
31
PP18B20
X2
454 BUS TIE-IN CONTROL RELAY DC POWER DISTRIBUTION SYSTEM
DD4A20
351
421
DD4C20
268 CENTER PEDESTAL
318
413
P
ND
ND5A20
DD16B20
DD2D20
DD6A20
454 WINDSHIELD DE-ICE TIME DELAY
271 FUS STA 26 RELAY PANEL
28V DC PRIMARY
A2
A1
DD17A4
DD16A20
X2
DD16B20
X1
493 WINDSHIELD ANTI-ICING
764 FUS STA 31 TO STA 46 RELAY PANEL
DD5A4
140 CURRENT LIMITER
ND2A4
28V DC
NC. TO 102°C (215°F)
DD6A20
DD6B20
ND4A20
2 KW
186 WINDSHIELD ANTI-ICING HEATER

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
129	Control Box - Windshield Air Pickup	Fus 133 RH	RH Radio Bay
140	Current Limiter - Windshield Anti-ice	Fus 41 LH	Radar Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
380	Plug - Windshield Anti-ice Amplifier	Fus 144.6 RH	RH Radio Bay
381	Plug - Windshield Air Pickup Control	Fus 161 LH	LH Radio Bay
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
711	Thermostat - Windshield Overheat	Fus 52 LH	Radar Bay, Forward Fire Wall

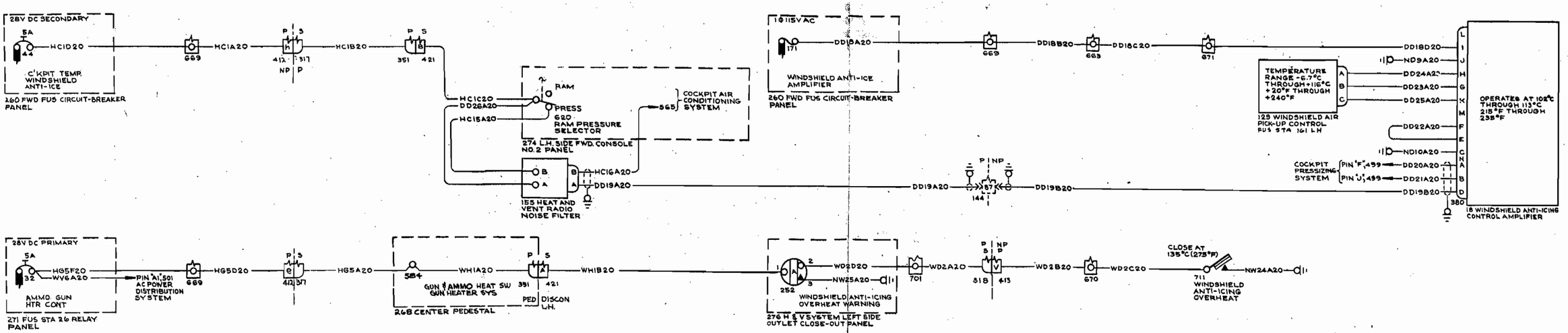
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Windshield Anti-icing System - F-86F-25 Airplanes AF52-5329 Through -5530



F-86F-2-54-332A

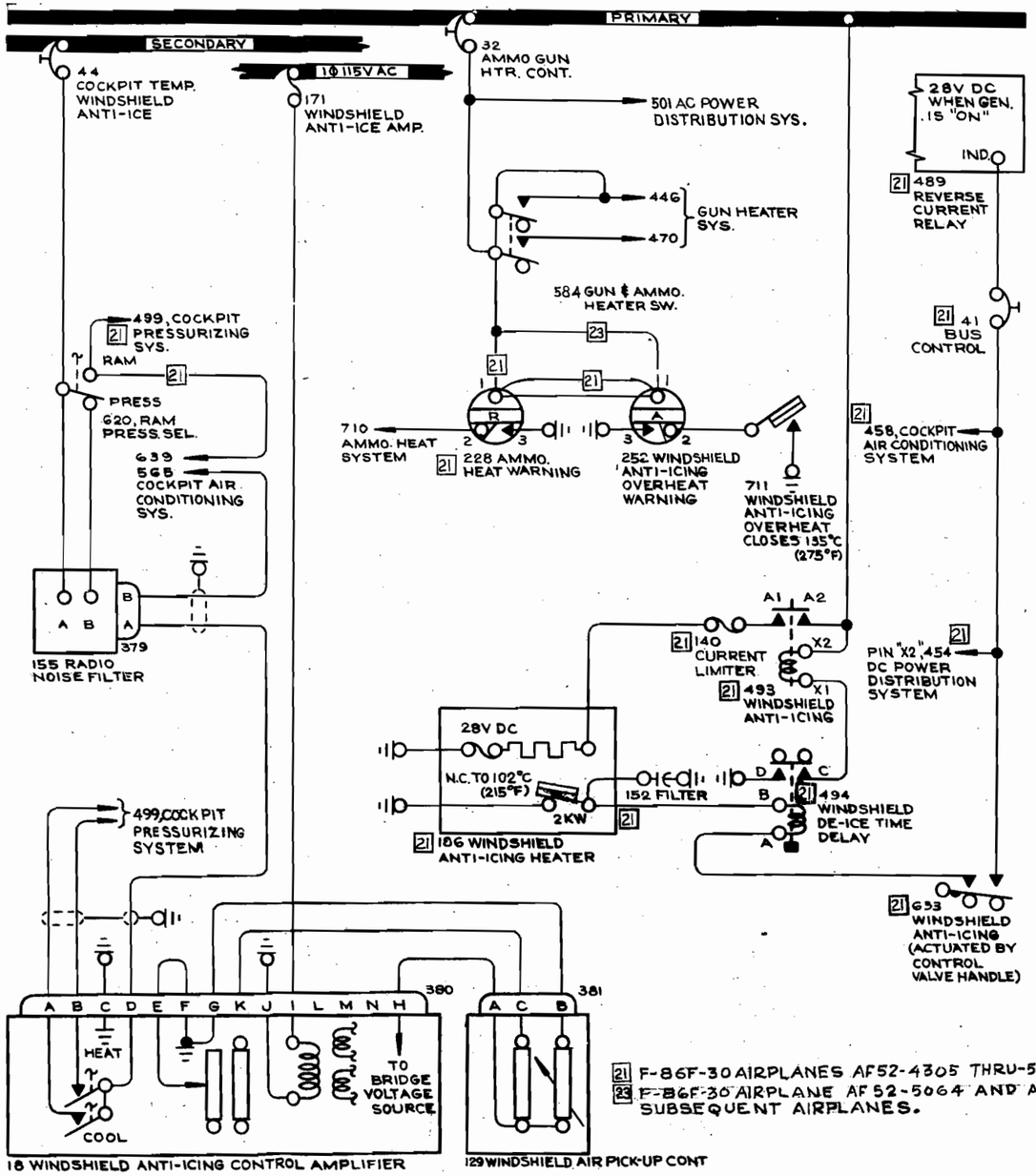
WINDSHIELD ANTI-ICING SYSTEM
F-86F-25 AIRPLANES AF 52-5329 THROUGH-5530


28V DC SECONDARY
5A
44
HC1D20
C'KPIT TEMP. WINDSHIELD ANTI-ICE
260 FWD FUS CIRCUIT-BREAKER PANEL
669
HC1A20
412
317
NP
P
HC1B20
351
421
HC1C20
DD26A20
HC15A20
RAM
PRESS
620 RAM PRESSURE SELECTOR
565
COCKPIT AIR CONDITIONING SYSTEM
274 L.H. SIDE FWD. CONSOLE NO.2 PANEL
B
A
HC16A20
DD19A20
155 HEAT AND VENT RADIO NOISE FILTER
1Φ 115V AC
171
DD15A20
WINDSHIELD ANTI-ICE AMPLIFIER
260 FWD FUS CIRCUIT-BREAKER PANEL
669
DD18B20
669
DD18C20
871
DD18D20
ND9A20
DD24A20
DD23A20
DD25A20
DD22A20
ND10A20
DD20A20
DD21A20
DD19B20
380
TEMPERATURE RANGE -6.7°C THROUGH +116°C +20°F THROUGH +240°F
129 WINDSHIELD AIR PICK-UP CONTROL FUS 5TA 161 L.H
COCKPIT PRESSIZING SYSTEM
PIN "F" 499
PIN "U" 499
OPERATES AT 102°C THROUGH 113°C 215°F THROUGH 235°F
L I J H G K M F E C N A B D
18 WINDSHIELD ANTI-ICING CONTROL AMPLIFIER
DD19A20
87
144
DD19B20
28V DC PRIMARY
5A
32
HG5F20
WV6A20
AMMO GUN HTR CONT
271 FUS STA 26 RELAY PANEL
PIN "A" 501
AC POWER DISTRIBUTION SYSTEM
669
HG5D20
412
317
HG5A20
584
WH1A20
GUN & AMMO HEAT SW GUN HEATER SYS
268 CENTER PEDESTAL
391
421
PED
DISCON L.H.
WH1B20
252
WD2D20
NW25A20
WINDSHIELD ANTI-ICING OVERHEAT WARNING
276 H & V SYSTEM LEFT SIDE OUTLET CLOSE-OUT PANEL
701
WD2A20
518
413
WD2B20
670
WD2C20
CLOSE AT 135°C (275°F)
711
WINDSHIELD ANTI-ICING OVERHEAT
NW24A20

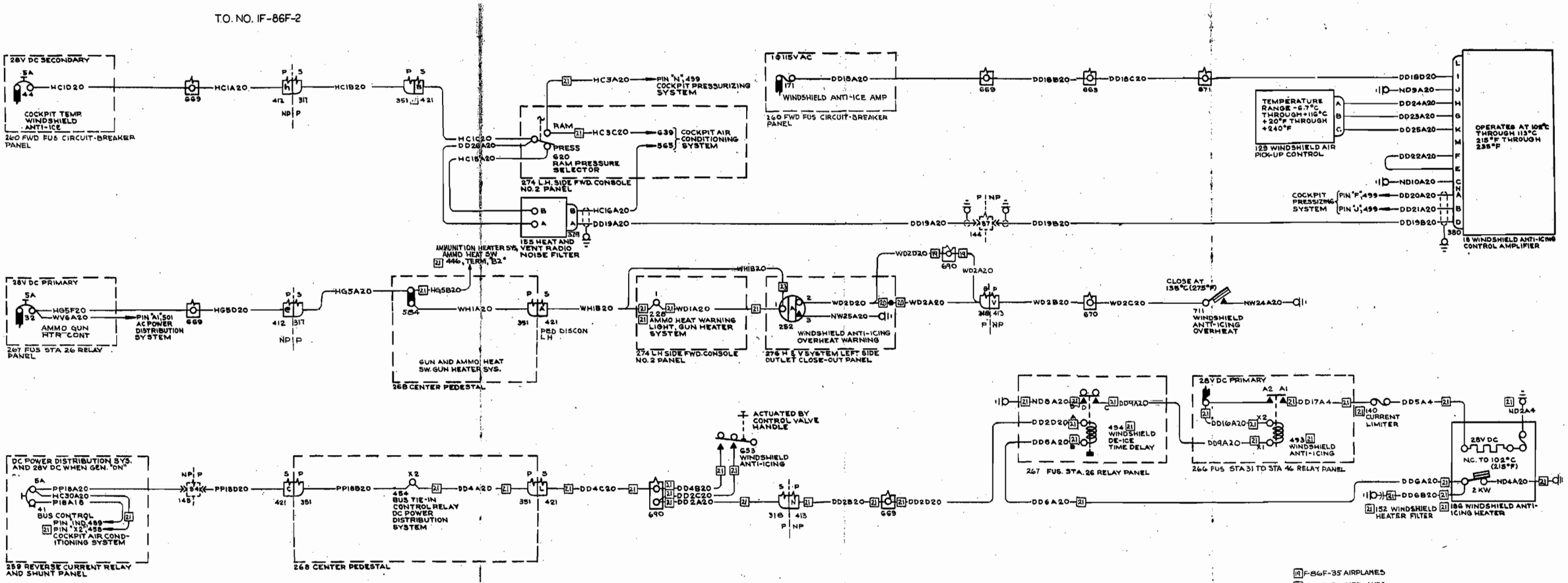
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
18	Amplifier - Windshield Anti-ice Control	Fus 124 RH	RH Radio Bay
129	Control Box - Windshield Air Pickup	Fus 133 RH	RH Radio Bay
140	Current Limiter - Windshield Anti-ice	Fus 41 LH	Radar Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
152	Filter - Cabin and Windshield Heater	Fus 53 LH	Nose Radar Bay
155	Filter - Heat and Vent Radio Noise	Fus 135 LH	Center RH Ammunition Bay
186	Heater - Windshield Anti-ice Boost	Fus 52 LH	Radar Bay
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
380	Plug - Windshield Anti-ice Amplifier	Fus 144.6 RH	RH Radio Bay
381	Plug - Windshield Air Pickup Control	Fus 161 LH	LH Radio Bay
454	Relay - Bus Tie-in Control	Fus 78 LH	Pedestal
499	Relay - Cockpit Air Control	Fus 205 LH	LH Engine Access
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
633	Switch - Windshield Anti-ice Heater	Fus 85 LH	Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
711	Thermostat - Windshield Overheat	Fus 52 LH	Radar Bay, Forward Fire Wall

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Windshield Anti-icing System - F-86F-30 and F-86F-35



Windshield Anti-Icing System
F-86F-30 and F-86F-35 Airplanes



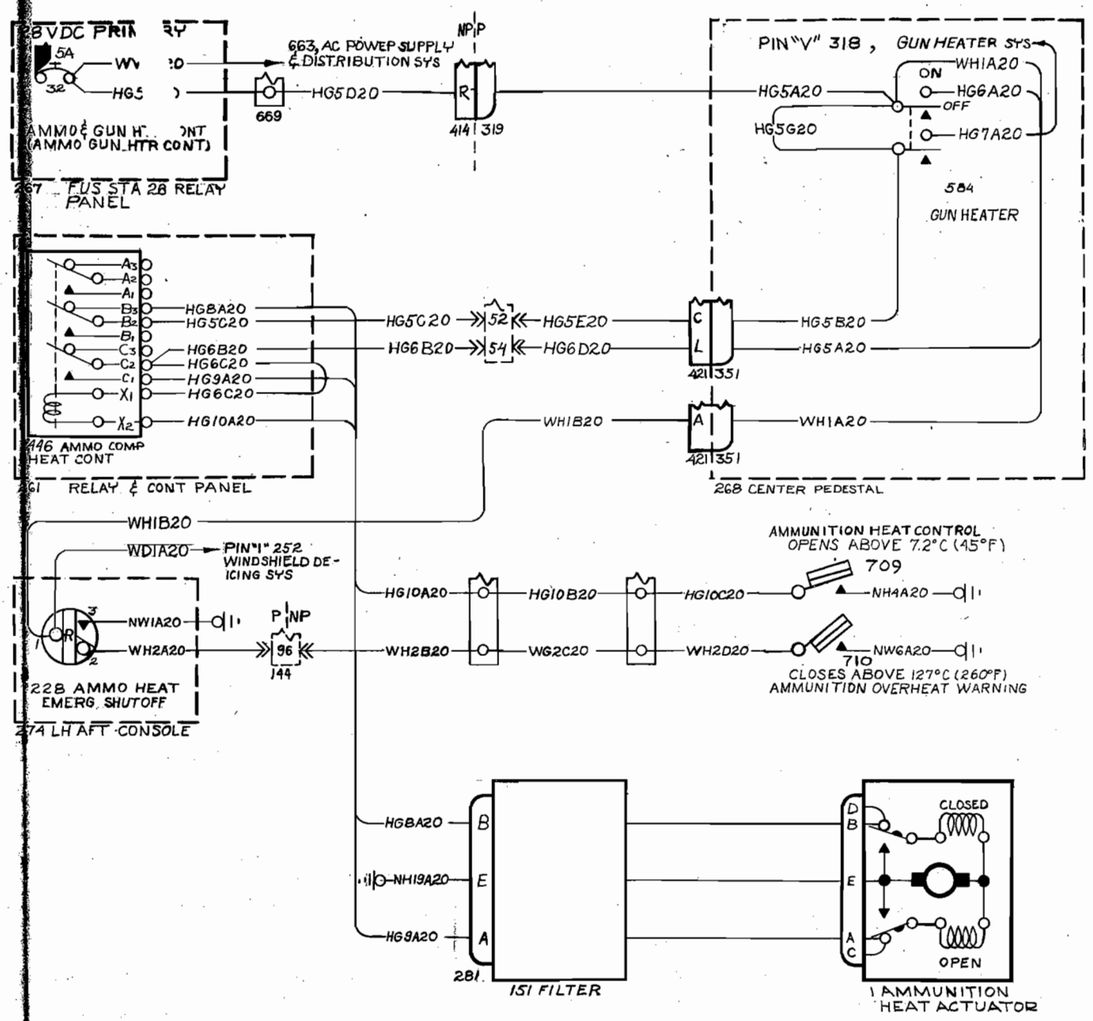
14 F-86F-35 AIRPLANES
20 F-86F-30 AIRPLANES
21 F-86F-30 AIRPLANES AF52-4305 THRU-5063
23 F-86F-30 AIRPLANE AF52-5064, AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-328

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
1	Actuator - Ammunition Heat	Fus 166 LH	LH Engine Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
151	Filter - Ammunition Compartment Heat Actuator	Fus 165 LH	Above Alternate Inverter
252	Light Assembly - Windshield Overheat Warning	Fus 80 LH	Cockpit - Above LH Console
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
281	Plug - Ammunition Heat Filter	Fus 166 LH	LH Radio Bay
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
709	Thermostat - Low-heat Limit (Cabin)	Fus 87 LH	Ammunition Bay
710	Thermostat - Ammunition Overheat	Fus 87 LH	Ammunition Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Heating System - F-86F-1 and F-86F-5 Airplanes

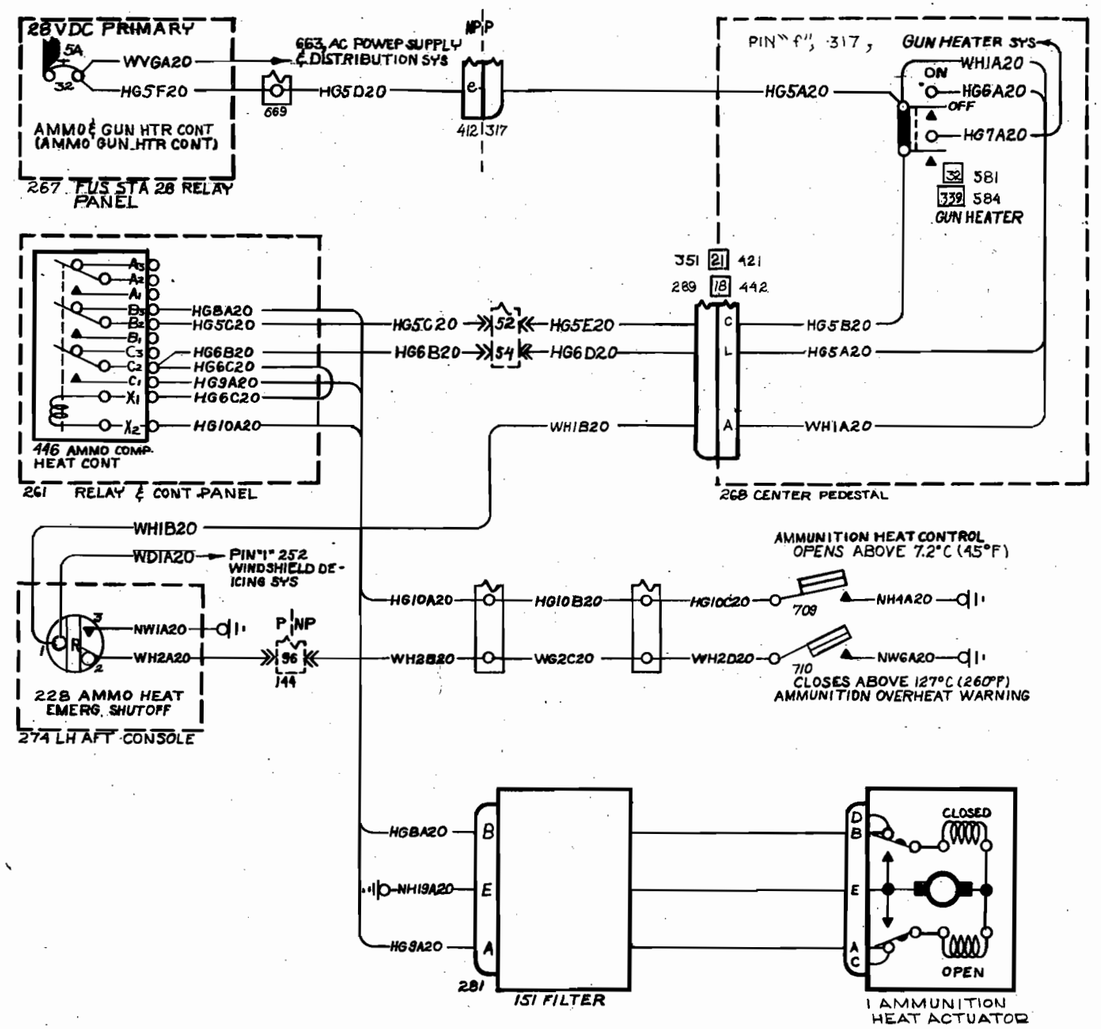


F-86F-2-54-347

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
151	Filter - Ammunition Compartment Heat Actuator	Fus 165 LH	Above Alternate Inverter
252	Light Assembly - Windshield Overheat Warning	Fus 80 LH	Cockpit - Above LH Console
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
281	Plug - Ammunition Heat Filter	Fus 166 LH	LH Radio Bay
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
709	Thermostat - Low-heat Limit (Cabin)	Fus 87 LH	Amminition Bay
710	Thermostat - Ammunition Overheat	Fus 87 LH	Ammunition Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Heating System - F-86F-10 and F-86F-15 Airplanes and F-86F-30 Airplanes AF-52-4305 Through -5063



[18] F-86F-10 AND F-86F-15 AIRPLANES

[32] F-86F-15 AIRPLANES

[21] F-86F-30 AIRPLANES AF52-4305 THRU-5063

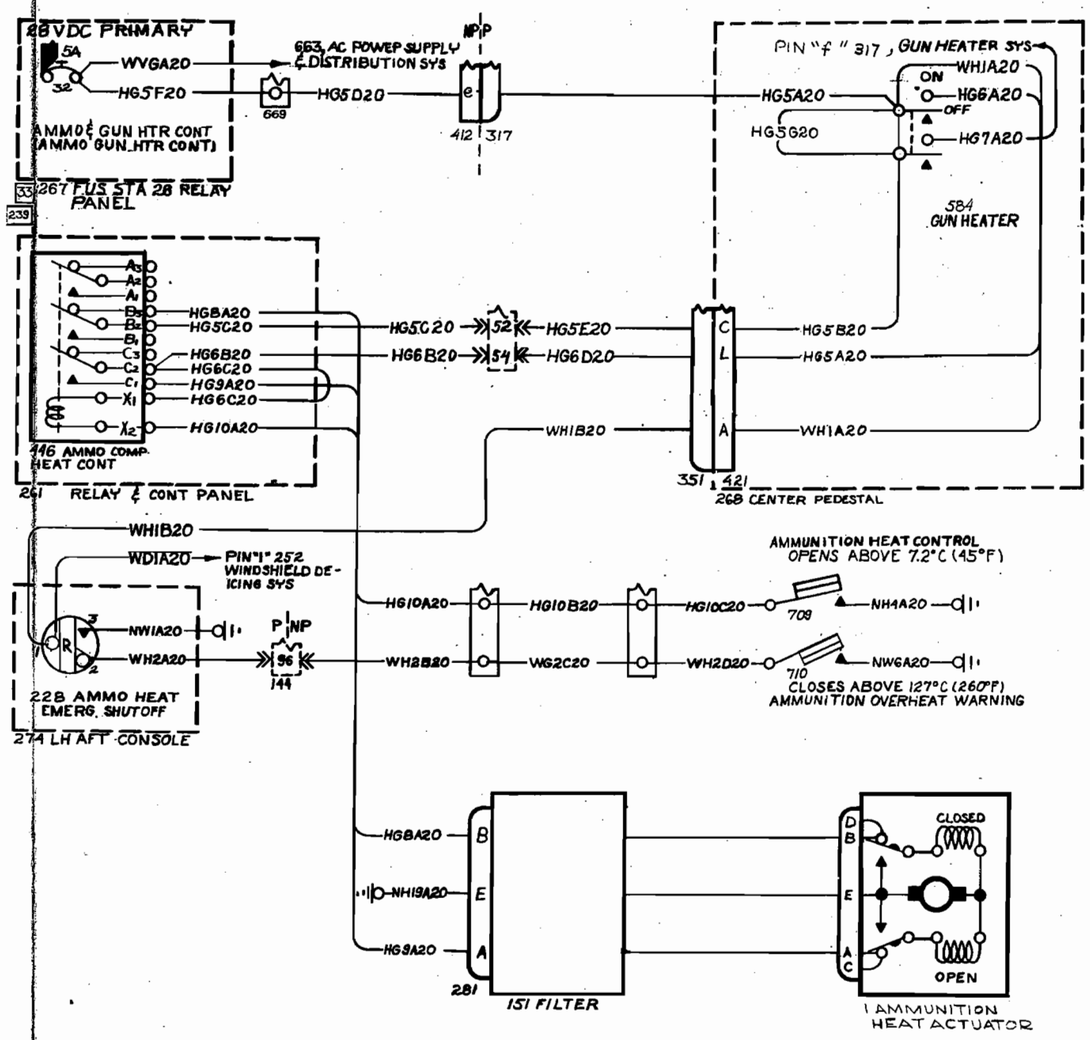
[339] F-86F-10 AND F-86F-30, AIRPLANES AF52-4305 THRU-5063

F-86F-2-54-456

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
1	Actuator - Ammunition Heat	Fus 166 LH	LH Engine Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
151	Filter - Ammunition Compartment Heat Actuator	Fus 165 LH	Above Alternate Inverter
252	Light Assembly - Windshield Overheat Warning	Fus 80 LH	Cockpit - Above LH Console
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
281	Plug - Ammunition Heat Filter	Fus 166 LH	LH Radio Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
709	Thermostat - Low-heat Limit (Cabin)	Fus 87 LH	Ammunition Bay
710	Thermostat - Ammunition Overheat	Fus 87 LH	Ammunition Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-3) for part numbers and location of items.

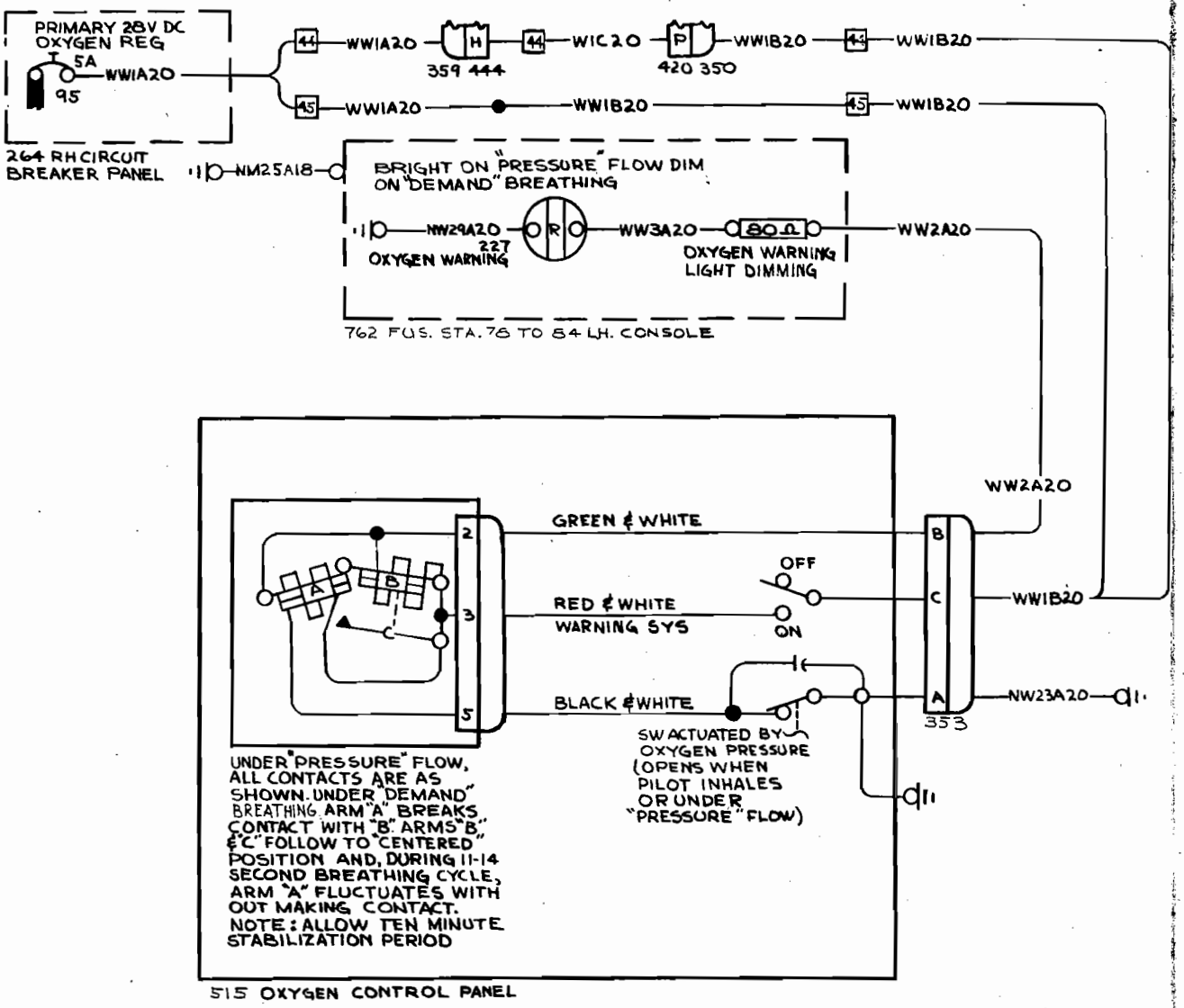
Ammunition Heating System - F-86F-20 Airplanes and F-86F-25 Airplanes AF52-5272 Through -5328



[33] F-86F-15 AIRPLANES

[239] F-86F-20 AIRPLANES AF51-13080 THRU-13169 AND F-86F-25 AIRPLANES AF52-5272 THRU -5328

F-86F-2-54-455A



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
515	Regulator - Cxygen	Fus 85 LH	Cockpit, LH Forward Side
762	Panel - Fuselage Station 78 LH Console	Fus 78 LH	Cockpit

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Oxygen Regulator System - F-86F-20 and F-86F-25 Airplanes, AF51-13170 Through -13510 and AF52-5272 Through -5386

[44] F-86F-25 AIRPLANES AF52-5381 THRU -5386

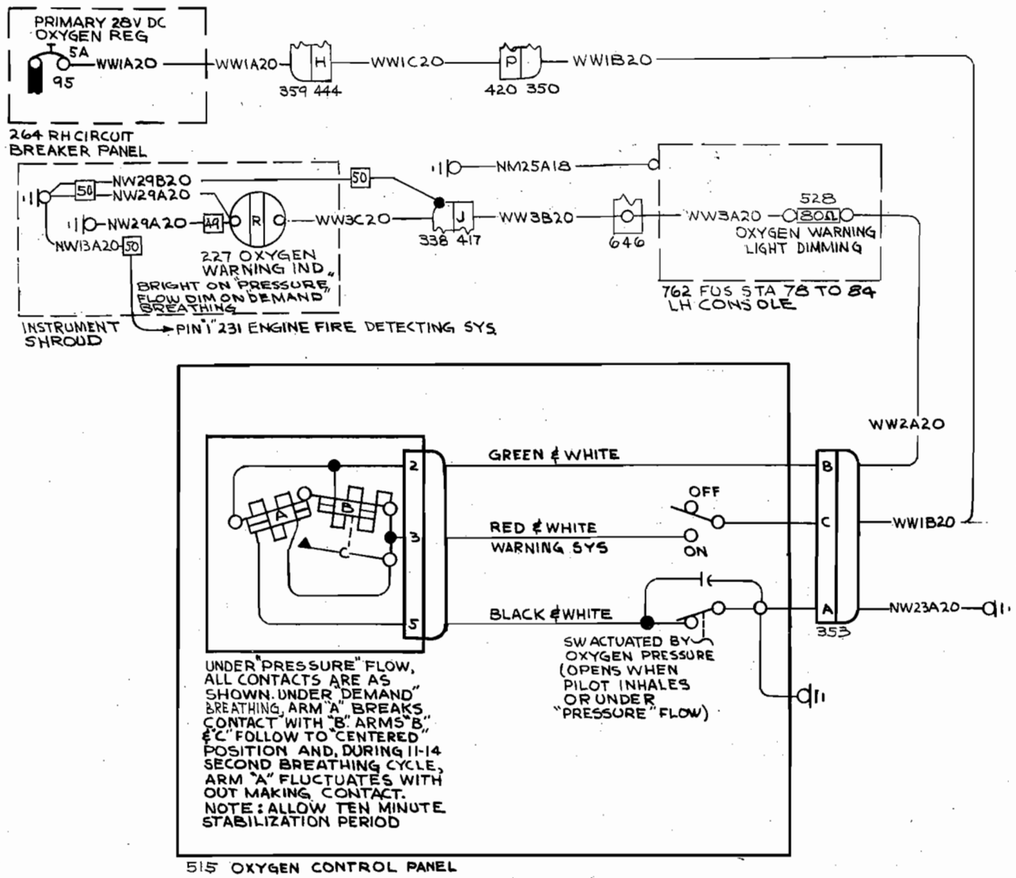
[45] F-86F-20 AIRPLANES & F-86F-25 AIRPLANES AF51-13170 THRU-13510 & AF52-5272 THRU-5380

F-86F-2-54-311

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
95	Circuit Breaker - Oxygen Regulator	Fus 118 RH	Cockpit
227	Lamp - Oxygen Regulator Warning	Fus 81 CL	Instrument Panel Shroud
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
417	Receptacle - Instrument Panel Shroud Disconnect	Fus 71 RH	Cockpit, Forward RH Side
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
444	Receptacle - Pedestal Disconnect (RH)	Fus 71.5 RH	Cockpit
515	Regulator - Oxygen	Fus 85 LH	Cockpit, LH Forward Side
528	Resistor - Oxygen Warning Light	Fus 85 LH	Cockpit, LH Side
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
762	Panel - Fuselage Station 78 LH Console	Fus 78 LH	Cockpit

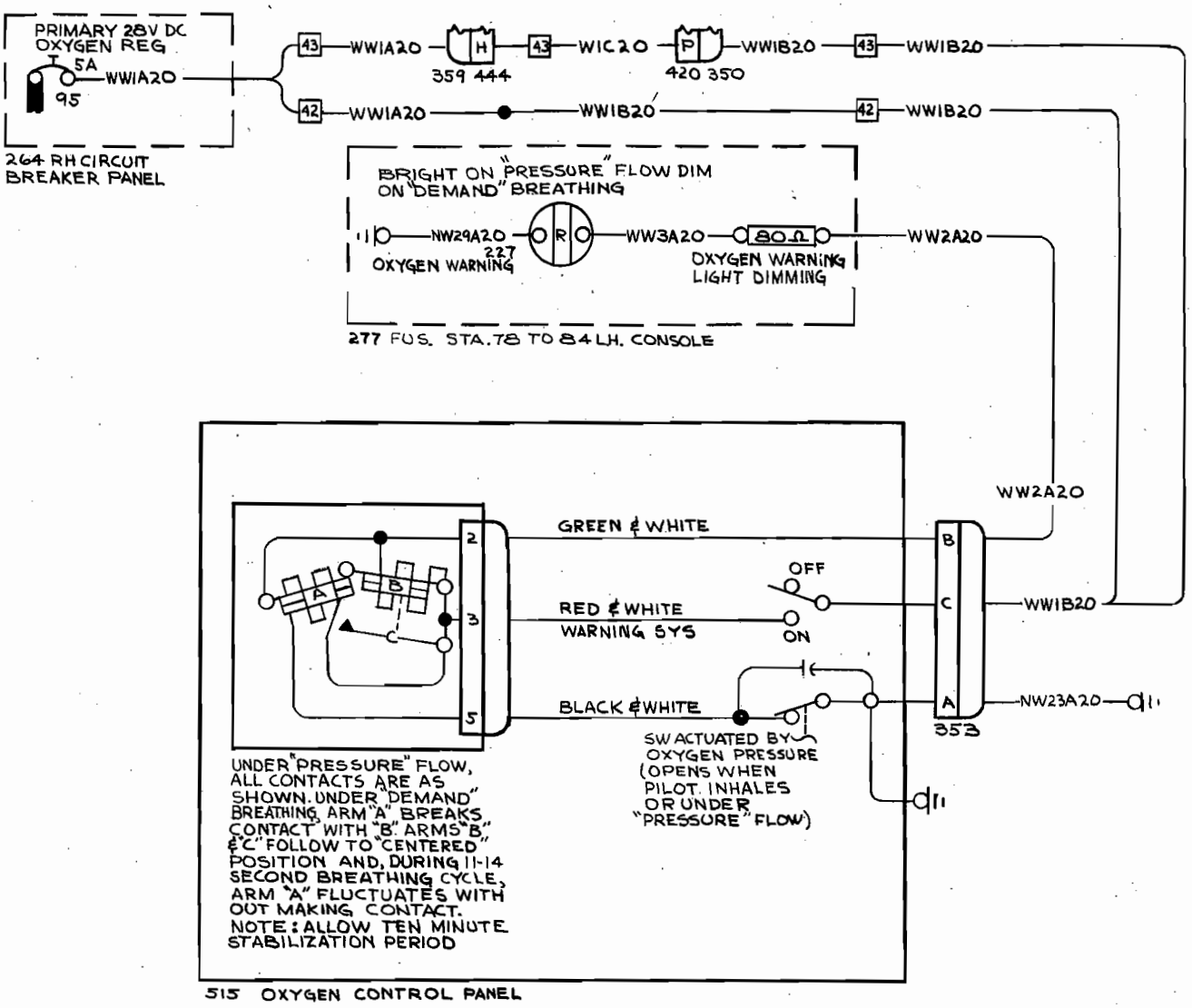
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Oxygen Regulator System - F-86F-25 Airplanes AF52-5387 Through -5530



49 F-86F-25 AIRPLANES AF52-5387 THRU -5446
50 F-86F-25 AIRPLANES AF52-5447 THRU -5530

F-86F-2-54-310



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
95	Circuit Breaker - Oxygen Regulator	Fus 118 RH	Cockpit
227	Lamp - Oxygen Regulator Warning	Fus 81 CL	Instrument Panel Shroud
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
444	Receptacle - Pedestal Disconnect (RH)	Fus 71.5 RH	Cockpit
515	Regulator - Oxygen	Fus 85 LH	Cockpit, LH Forward Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

[42] F-86F-30 AIRPLANES AF52-4305 THRU-4745

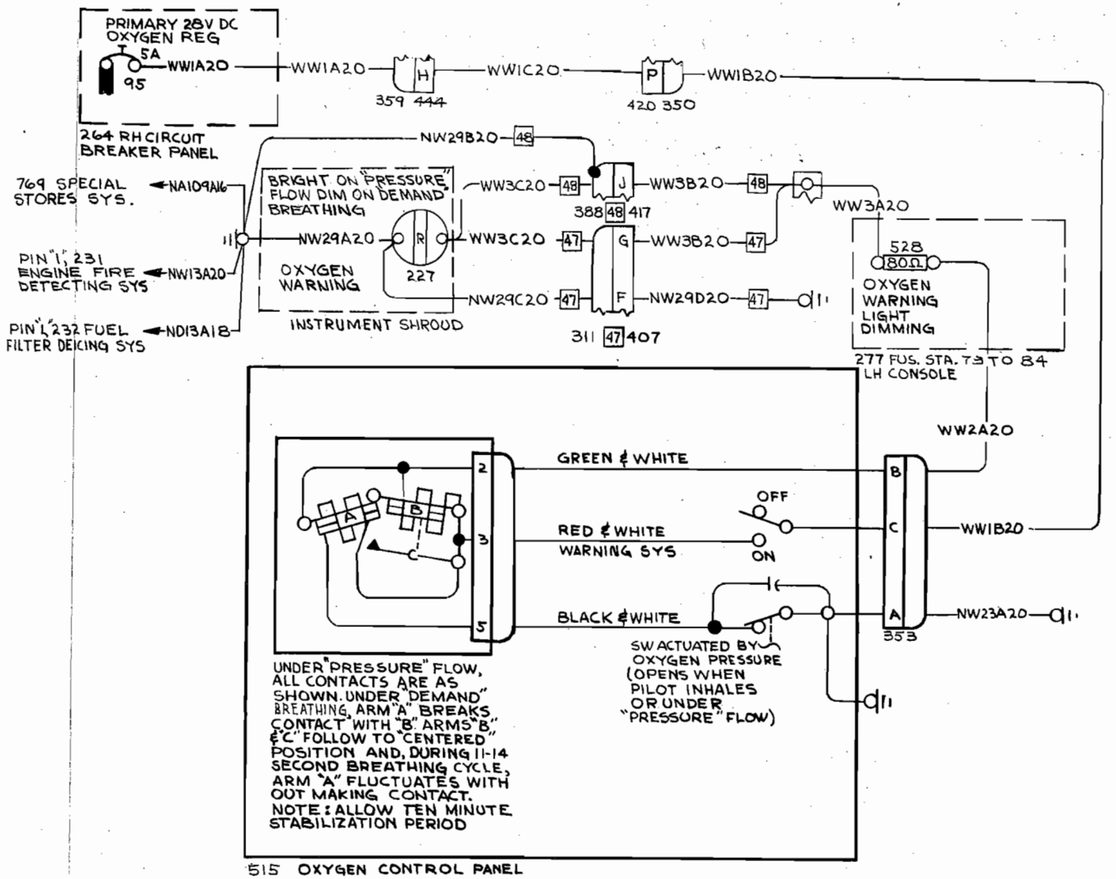
[43] F-86F-30 AIRPLANES AF52-4746 THRU-4954

F-86F-2-54-308

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
95	Circuit Breaker - Oxygen Regulator	Fus 118 RH	Cockpit
227	Lamp - Oxygen Regulator Warning	Fus 81 CL	Instrument Panel Shroud
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
232	Light Assembly - Fuel Filter Deice	Fus 81 LH	Cockpit - Instrument Panel Shroud
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
311	Plug - Fuel Totalizer Amplifier	Fus 68 LH	LH Access Plates in Nose Wheel Well
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
407	Receptacle - Light Control Disconnect	Fus 93 RH	Cockpit, RH Console
417	Receptacle - Instrument Panel Shroud Disconnect	Fus 71 RH	Cockpit, Forward RH Side
420	Receptacle - Pedestal Disconnect (LH Inboard)	Fus 71.5 LH	Cockpit
444	Receptacle - Pedestal Disconnect (RH)	Fus 71.5 RH	Cockpit
515	Regulator - Oxygen	Fus 85 LH	Cockpit, LH Forward Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Oxygen Regulator System - F-86F-30 Airplane AF52-4955 Through -5163 and F-86F-35

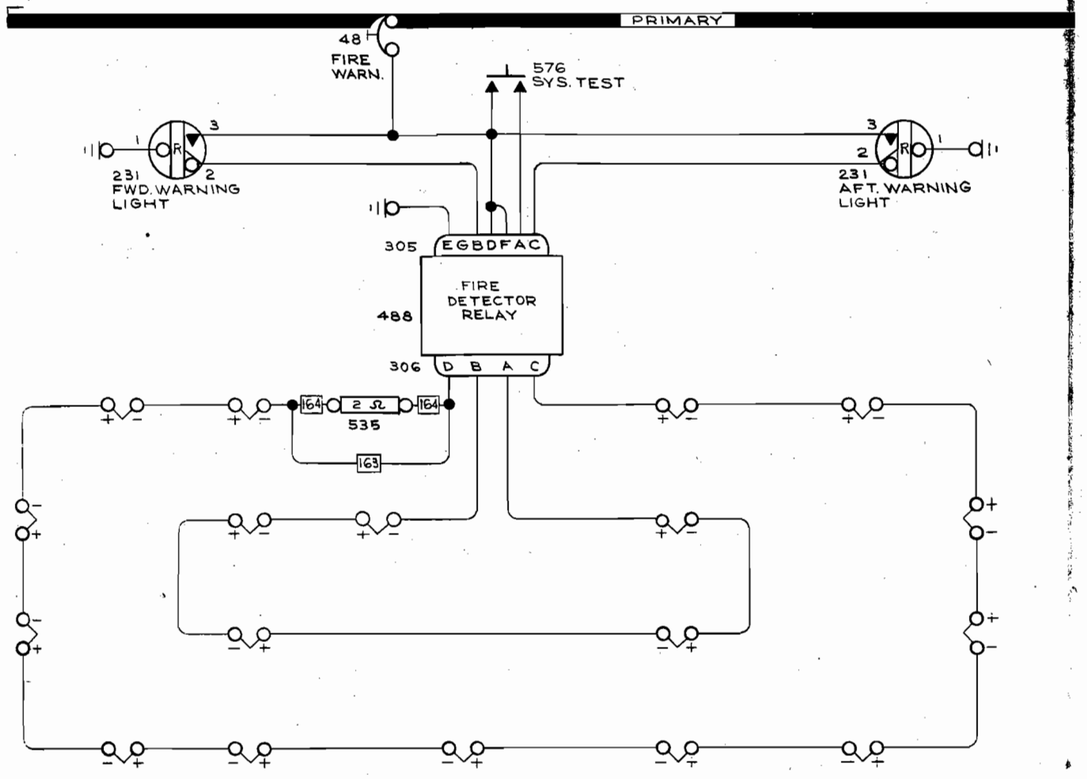


515 OXYGEN CONTROL PANEL

47 F-86F-35 AIRPLANES

48 F-86F-30 AIRPLANES AF52-4955 THRU-5163

F-86F-2-54-309



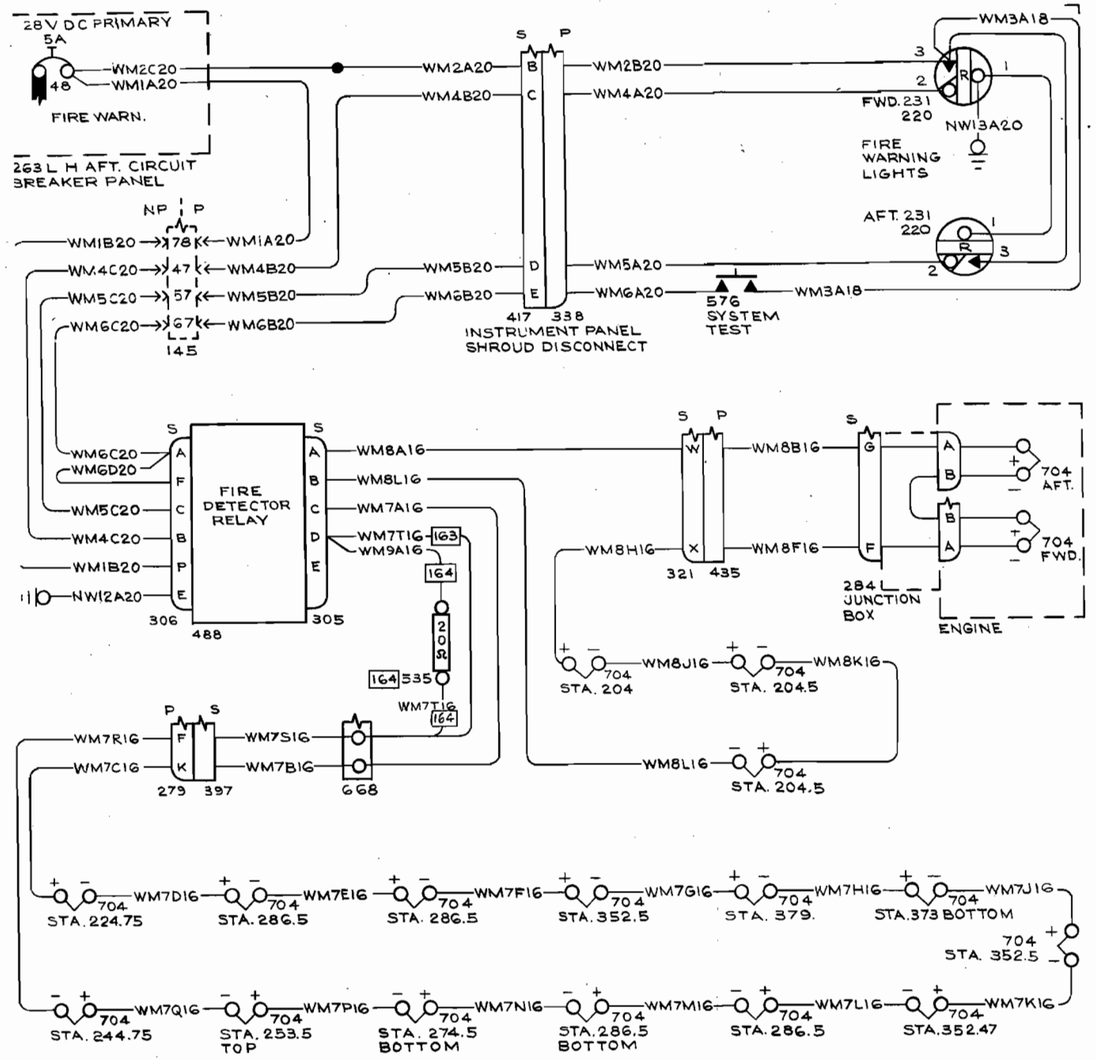
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
305	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

163 F-86F-1 AIRPLANES AF51-2850 THROUGH -2900

164 F-86F-1 AIRPLANES AF51-2901 THROUGH -2927 AND F-86F-5 THROUGH F-86F-15 AIRPLANES F-86F-2-54-318

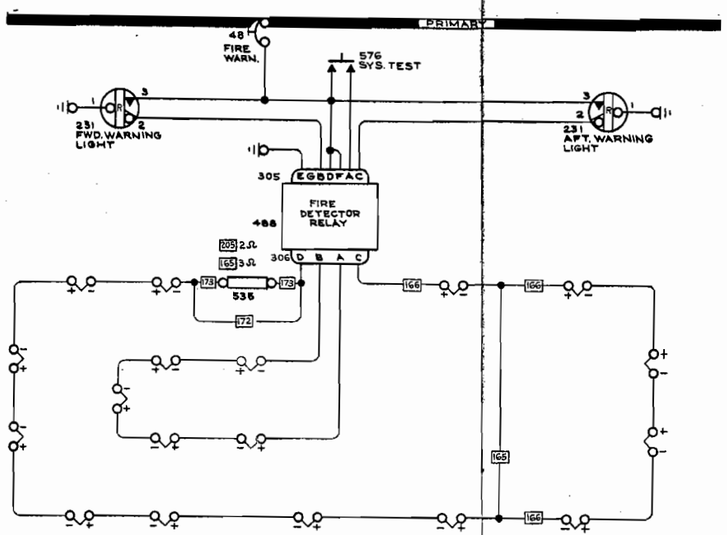
ENGINE FIRE DETECTING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES



163 F-86F-1 AIRPLANES AF51-2850 THROUGH -2900

164 F-86F-1 AIRPLANES AF51-2901 THROUGH -2927 AND F-86F-5 THROUGH F-86F-15 AIRPLANES F-86F-2-54-312

ENGINE FIRE DETECTING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES



165 F-86F-20 AIRPLANES AF51-13150 THROUGH -13169
166 F-86F-20 AIRPLANES AF51-13070 THROUGH -13149
172 F-86F-20 AIRPLANES AF51-13070 THROUH -13129
173 F-86F-20 AIRPLANES AF51-13130 THROUGH -13169
205 F-86F-20 AIRPLANES AF51-13130 THROUGH -13149

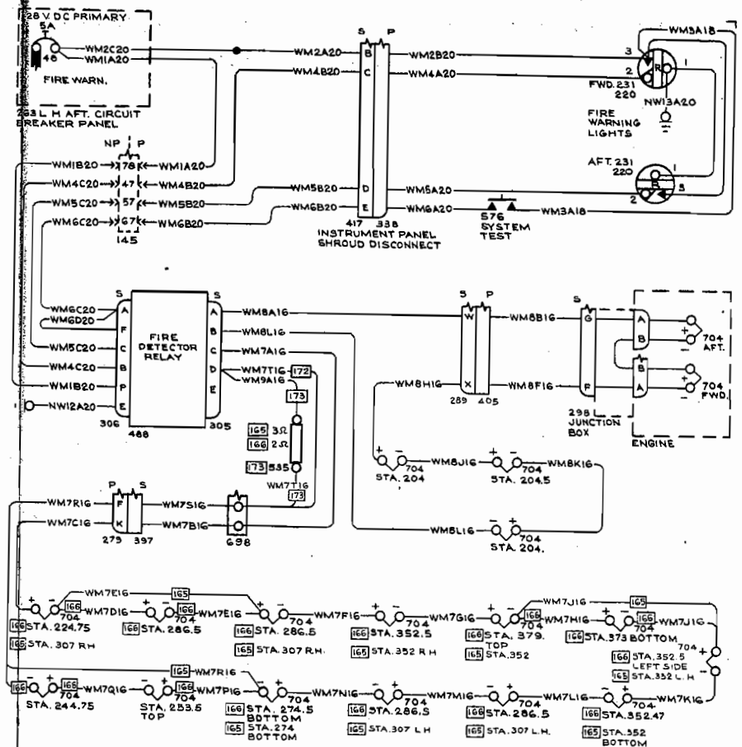
F-86F-2-54-321

ENGINE FIRE DETECTING SYSTEM
F-86F-20 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
435	Receptacle - Drop Tank Jettison Solenoid Disconnect	Wing 143 RH and LH	Drop Tank
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

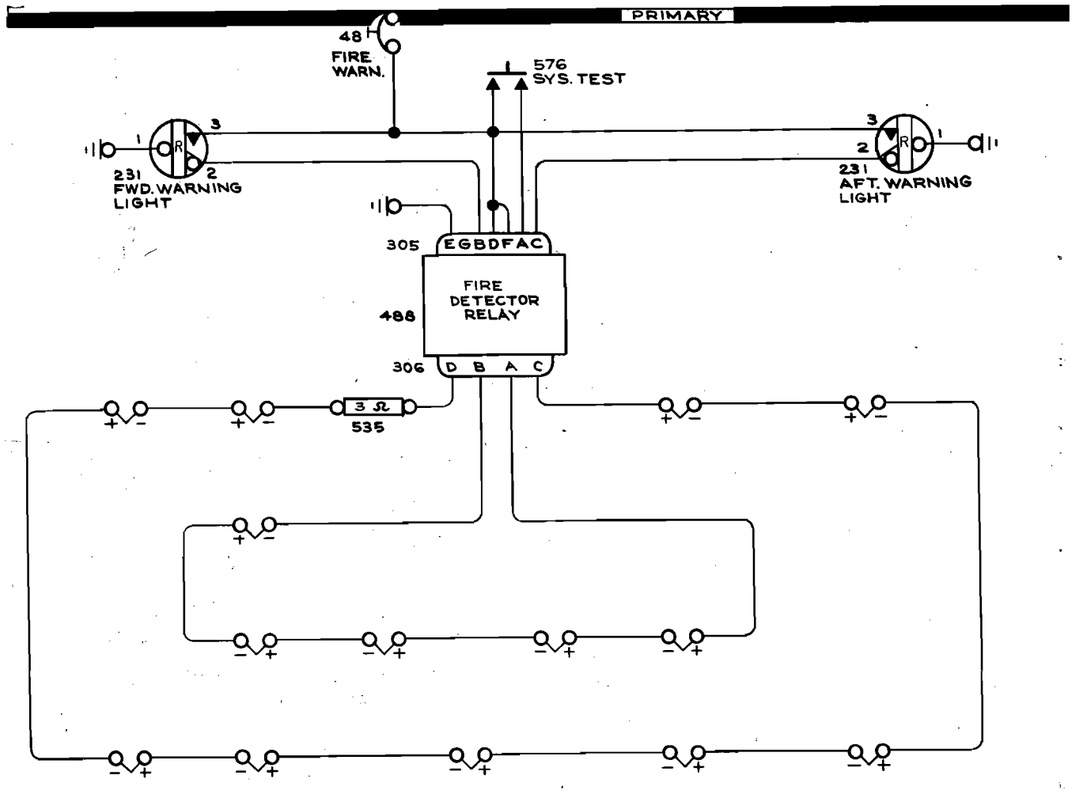
Engine Fire Detecting System F-86F-20 Airplanes



165 F-86F-20 AIRPLANES AF51-13150 THROUGH -13169
166 F-86F-20 AIRPLANES AF51-13070 THROUGH -13149
172 F-86F-20 AIRPLANES AF51-13070 THROUGH -13129
173 F-86F-20 AIRPLANES AF51-13130 THROUGH -13169

F-86F-2-54-315

ENGINE FIRE DETECTING SYSTEM
F-86F-20 AIRPLANES

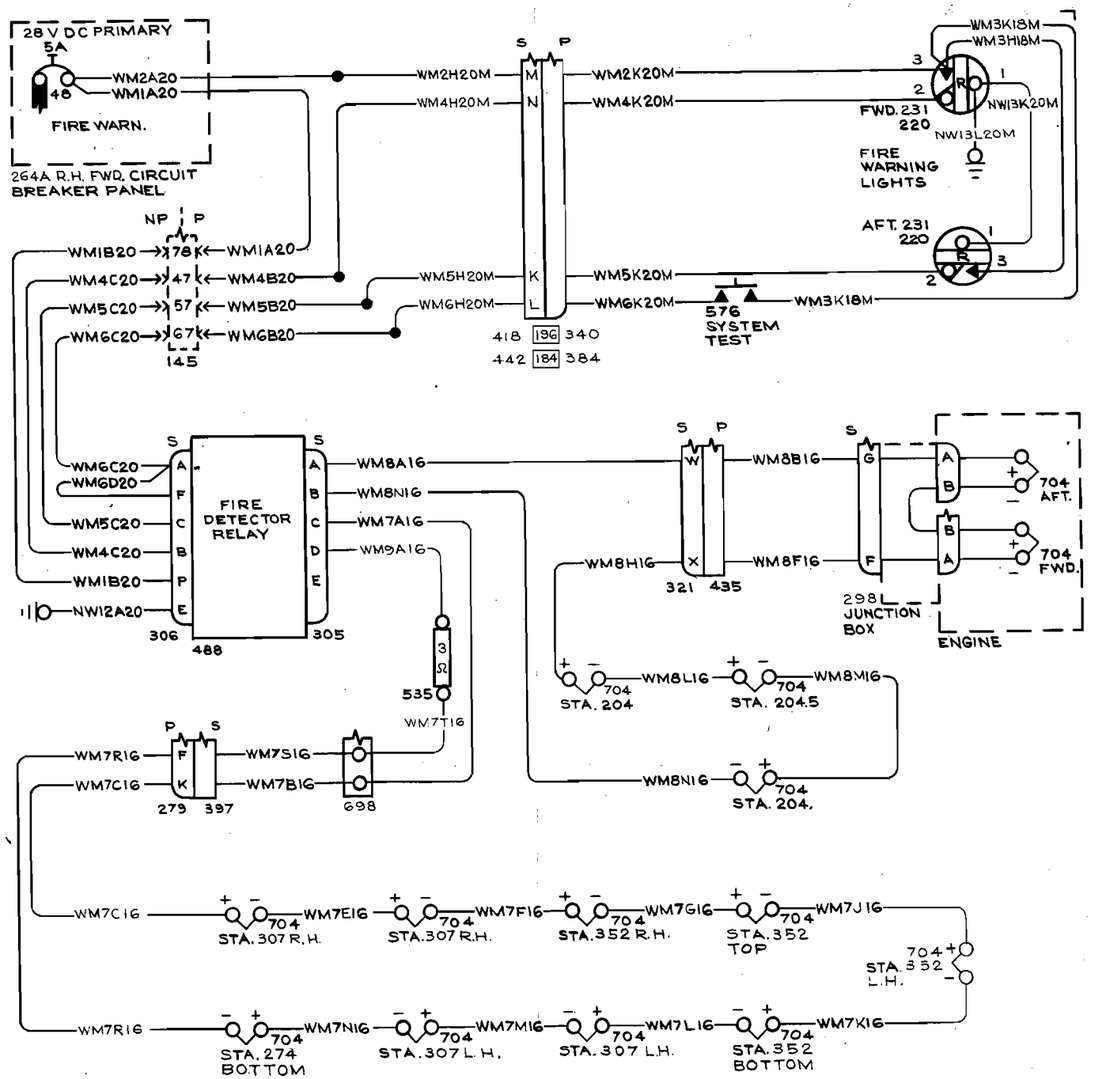


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
264A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
305	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
418	Receptacle - Instrument Panel Light Disconnect	Fus 74 LH	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-319

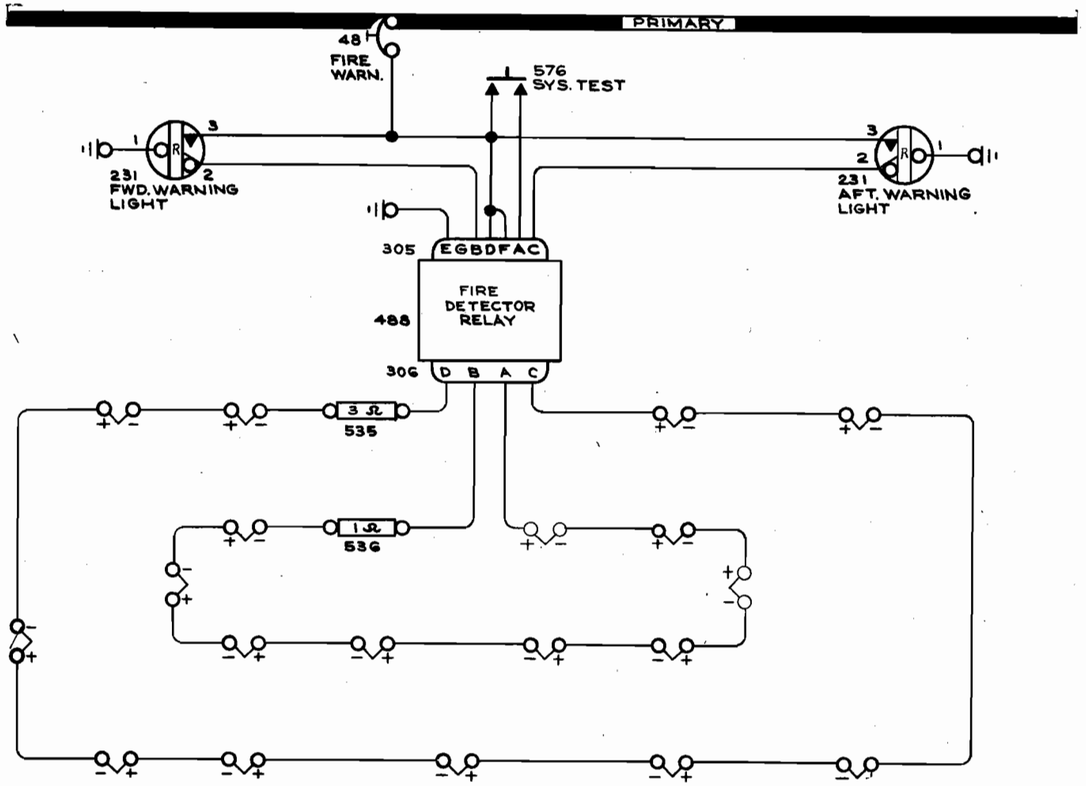
ENGINE FIRE DETECTING SYSTEM
F-86F-25 AIRPLANES AF51-13170 THROUGH -13283 AND
F-86F-30 AIRPLANES AF52-4405 THROUGH -4604



184 F-86F-25 AIRPLANES AF51-13170 THROUGH -13283
196 F-86F-30 AIRPLANES AF52-4405 THROUGH -4604

F-86F-2-54-313

ENGINE FIRE DETECTING SYSTEM
F-86F-25 AIRPLANES AF51-13170 THROUGH -13283
AND F-86F-30 AIRPLANES AF52-4405 THROUGH -4604



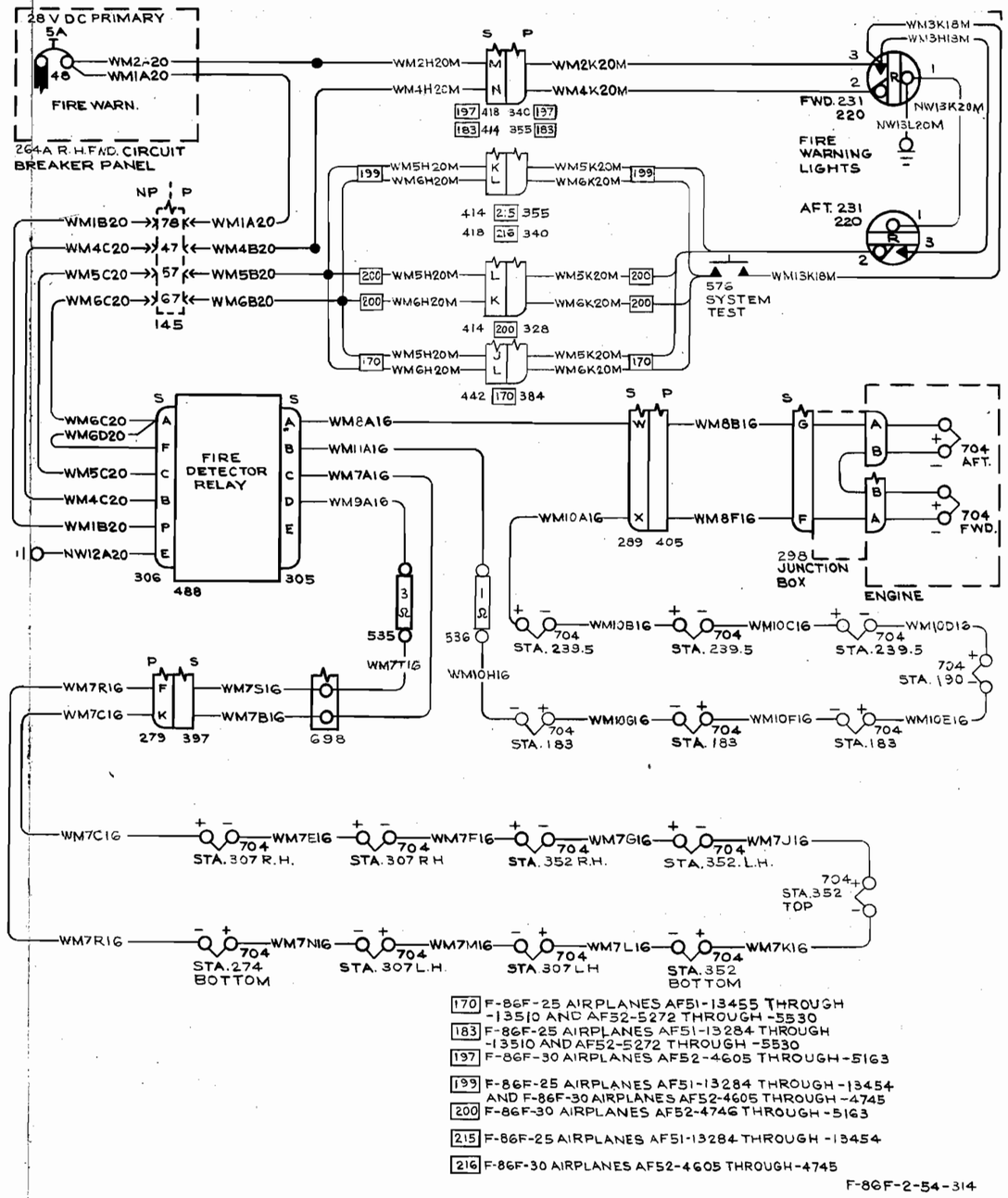
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
264A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
305	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
342	Plug - Inverter - 3-phase (Main)	Fus 155.8 LH	LH Radio Bay
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
414	Receptacle - Instrument Panel Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
418	Receptacle - Instrument Panel Light Disconnect	Fus 74 LH	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
536	Resistor - Forward Fire Detector Warning Loop	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-320

ENGINE FIRE DETECTING SYSTEM

F-86F-25 AIRPLANES AF51-13284 THROUGH -13510 AND AF52-5272 THROUGH -5530 F-86F-30 AIRPLANES AF52-4605 THROUGH -5163



170 F-86F-25 AIRPLANES AF51-13455 THROUGH -13510 AND AF52-5272 THROUGH -5530

183 F-86F-25 AIRPLANES AF51-13284 THROUGH -13510 AND AF52-5272 THROUGH -5530

197 F-86F-30 AIRPLANES AF52-4605 THROUGH -5163

199 F-86F-25 AIRPLANES AF51-13284 THROUGH -13454 AND F-86F-30 AIRPLANES AF52-4605 THROUGH -4745

200 F-86F-30 AIRPLANES AF52-4746 THROUGH -5163

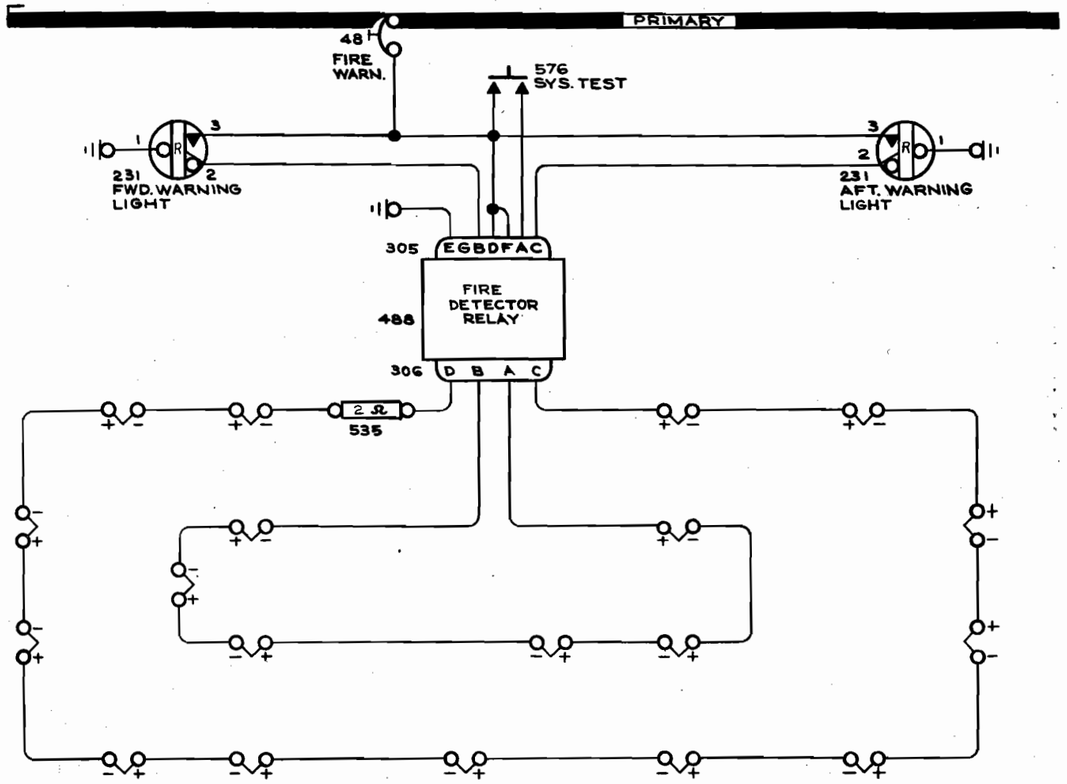
215 F-86F-25 AIRPLANES AF51-13284 THROUGH -13454

216 F-86F-30 AIRPLANES AF52-4605 THROUGH -4745

F-86F-2-54-314

ENGINE FIRE DETECTING SYSTEM

F-86F-25 AIRPLANES AF51-13284 THROUGH -13510 AND AF52-5272 THROUGH -5530 F-86F-30 AIRPLANES AF52-4605 THROUGH -5163

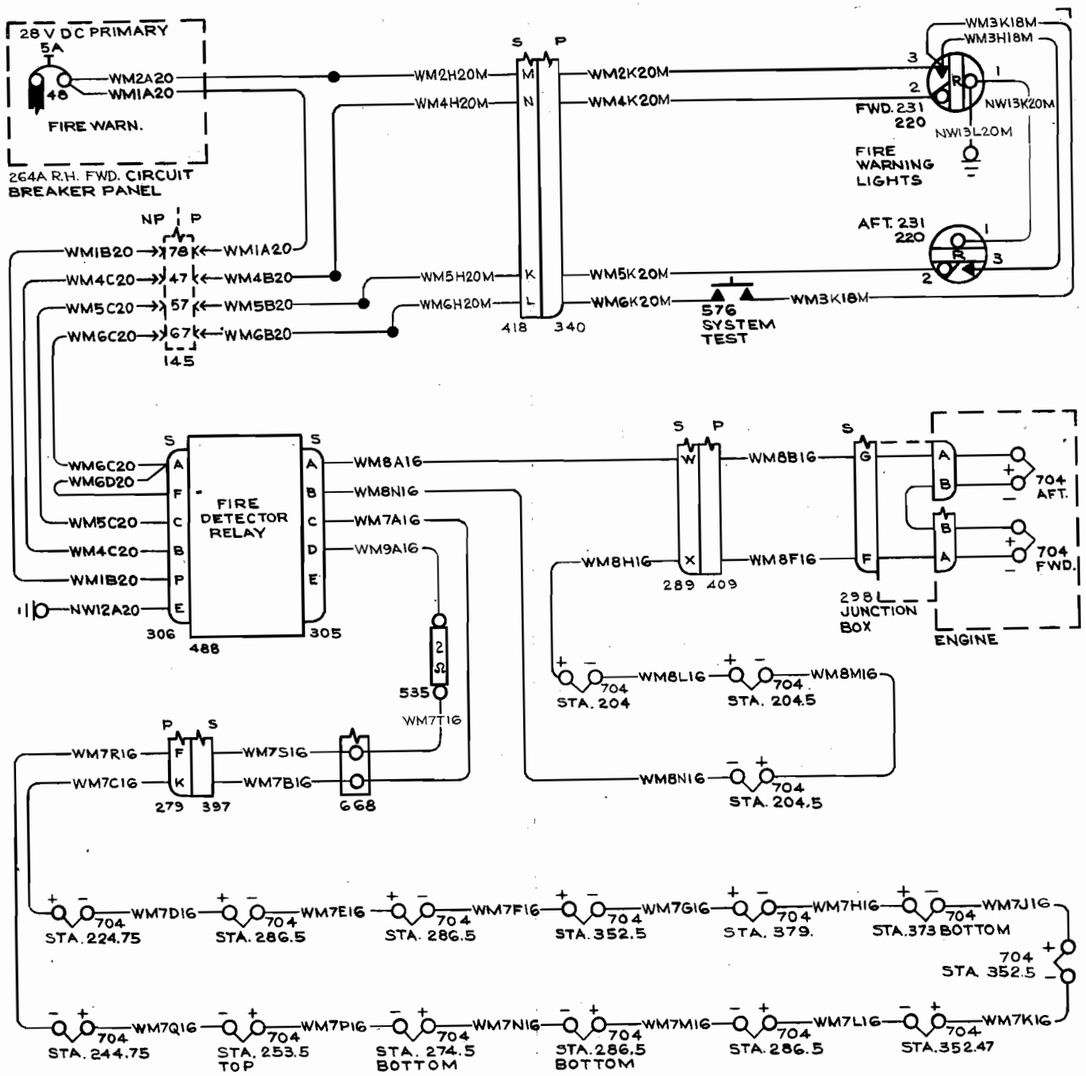


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
264A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
305	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
418	Receptacle - Instrument Panel Light Disconnect	Fus 74 LH	Cockpit
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

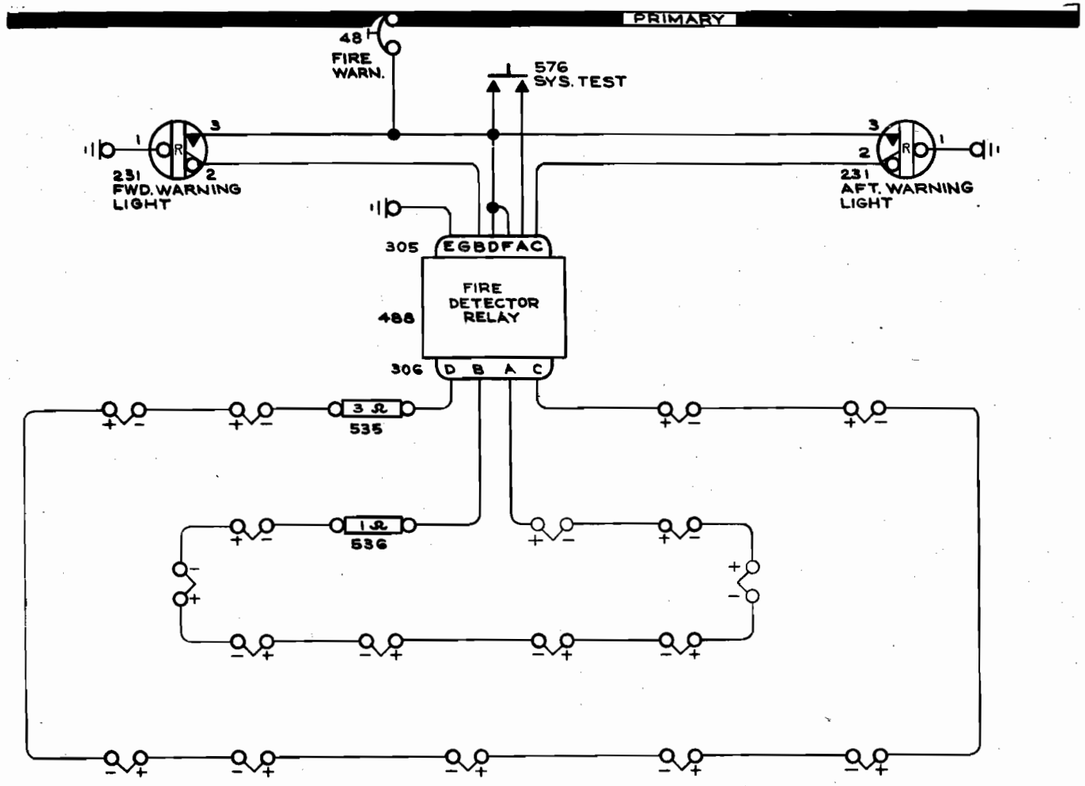
F-86F-2-54-322

ENGINE FIRE DETECTING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4404



F-86F-2-54-316

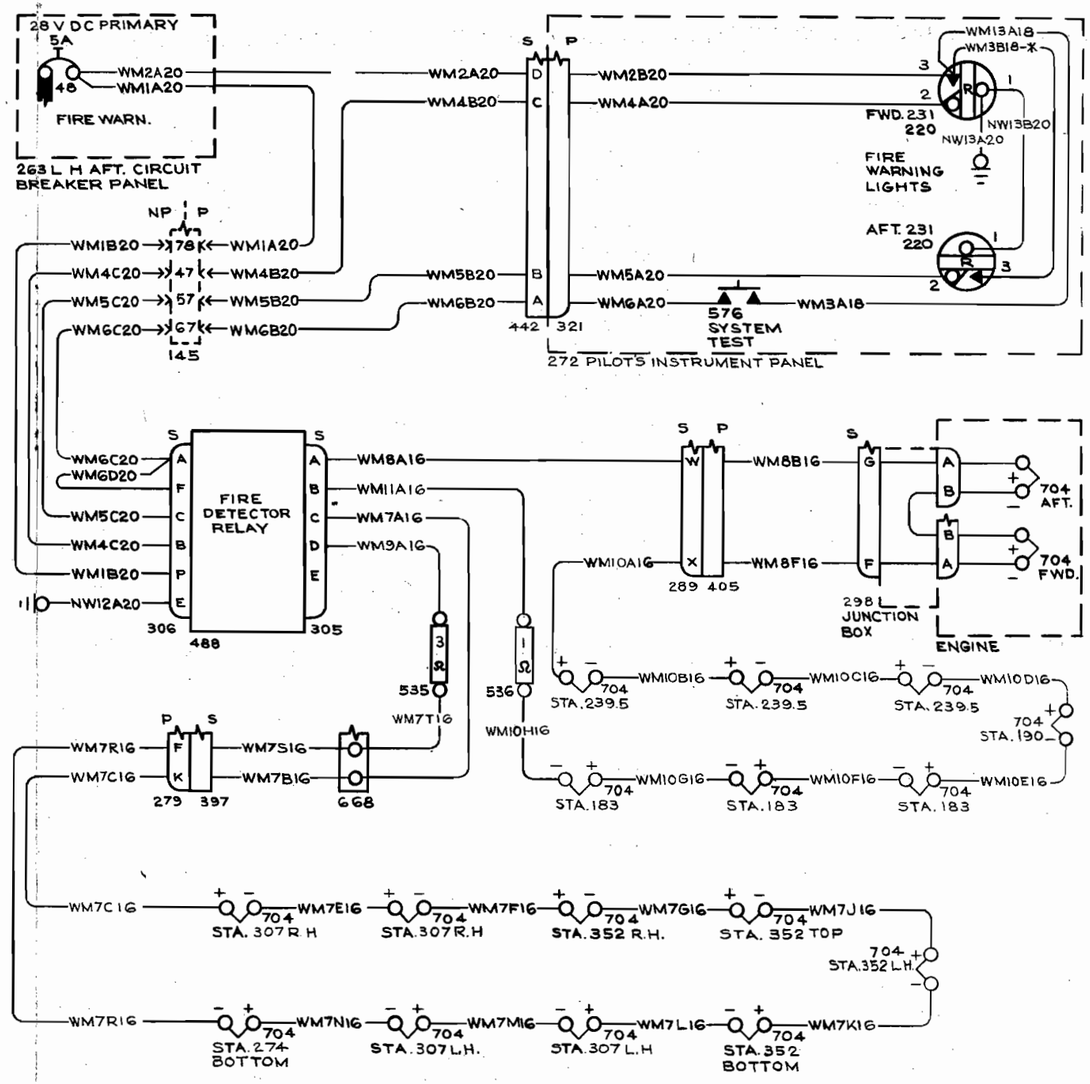
ENGINE FIRE DETECTING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4404



NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
305	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
306	Plug - Fire Warning Relay	Fus 160 RH	RH Radio Bay
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
535	Resistor - Fire Detector Warning	Fus 183 LH	LH Radio Bay
536	Resistor - Forward Fire Detector Warning Loop	Fus 183 LH	LH Radio Bay
576	Switch - Fire Detector Test	Fus 81 CL	Cockpit, Instrument Panel
704	Thermocouple - Fire Detector	Fus 253 RH	Engine Access

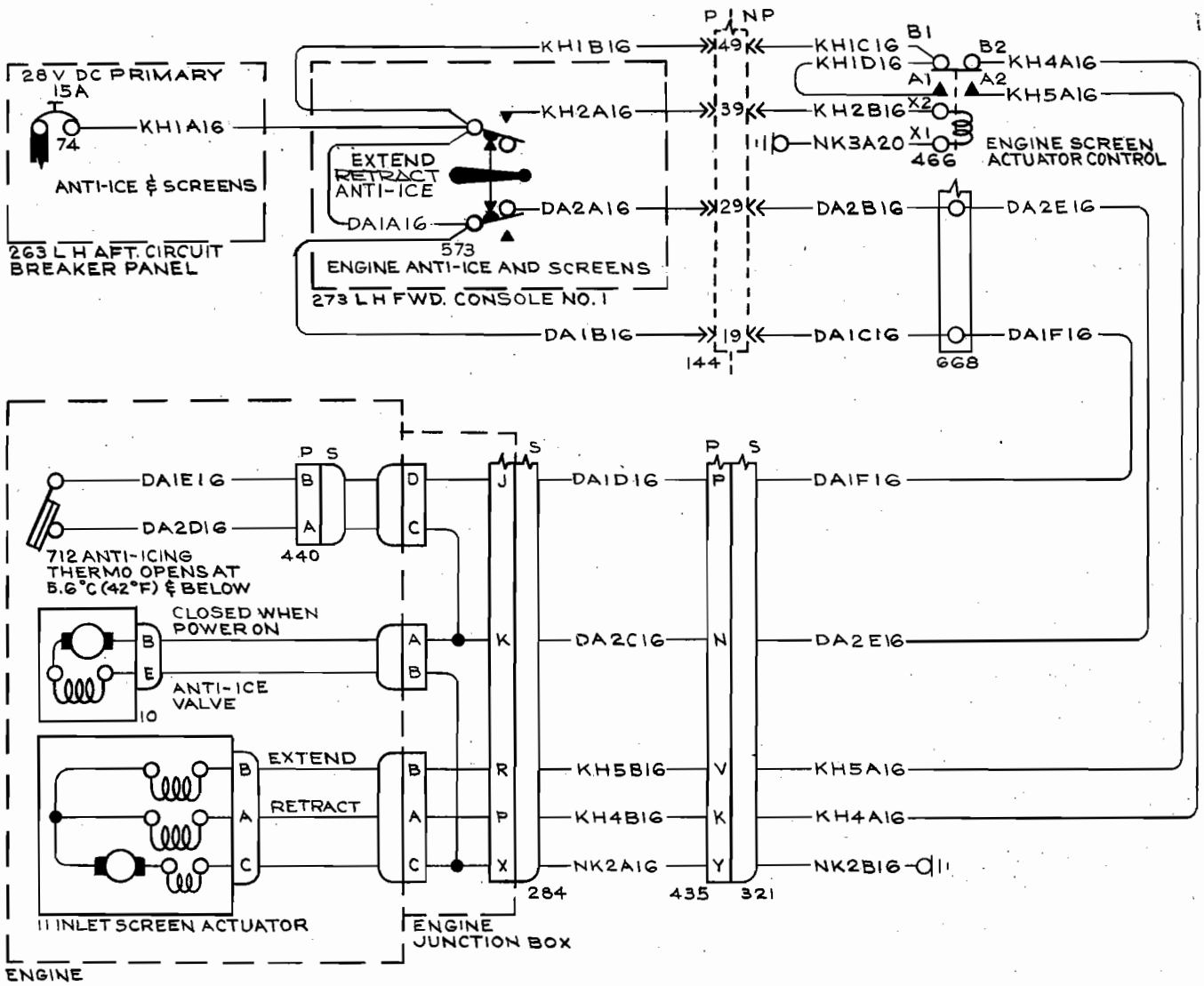
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-323



* JUMPER WIRE USED ON AIRPLANE AF52-5164

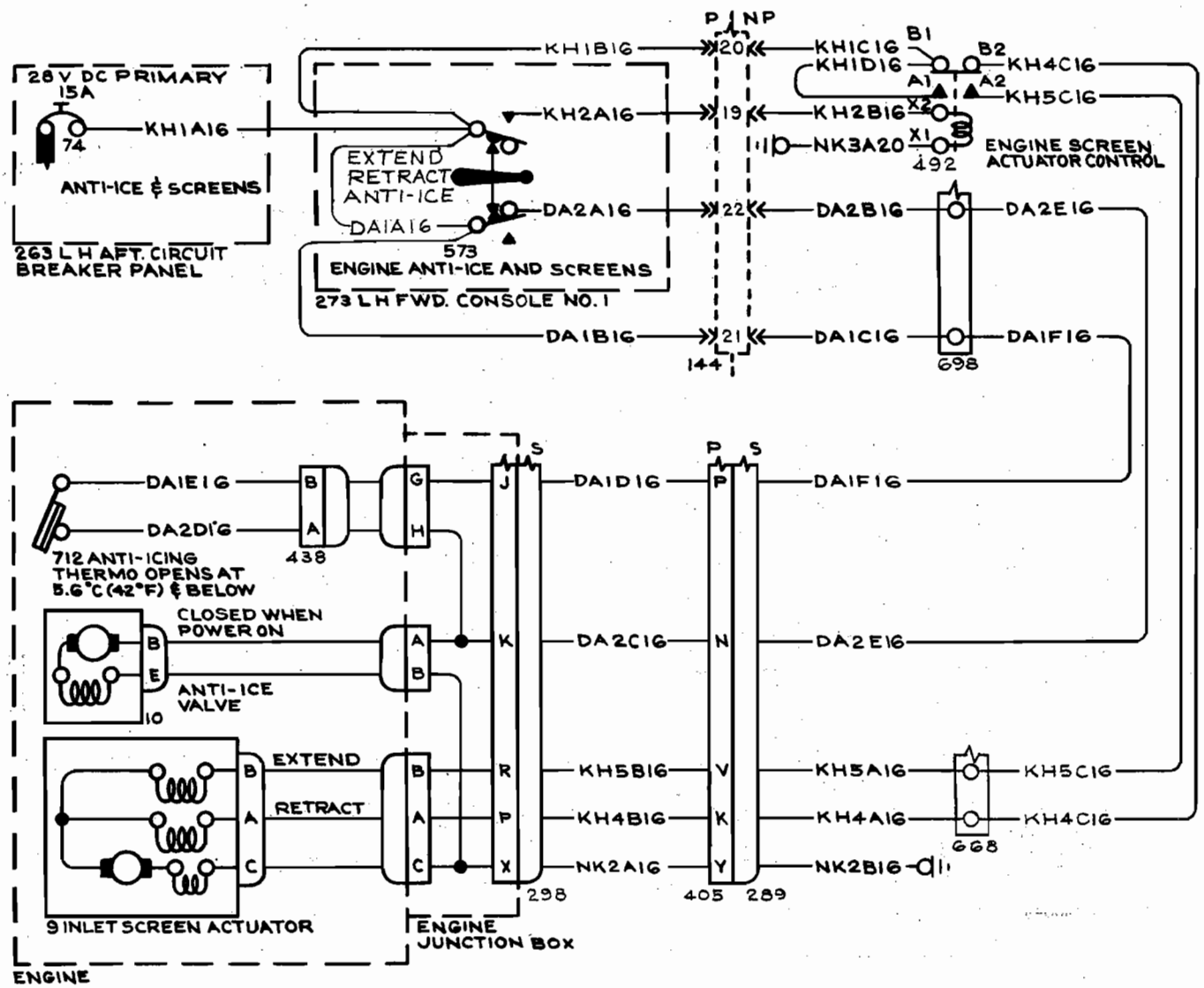
F-86F-2-54-317



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
114	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
435	Receptacle - Drop Tank Jettison Solenoid Disconnect	Wing 143 RH and LH	Drop Tank
466	Relay - Tank Jettison	Fus 75 CL	Center Pedestal
573	Switch - Engine Anti-ice and Screen	Fus 90 LH	Cockpit, Forward LH Console
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

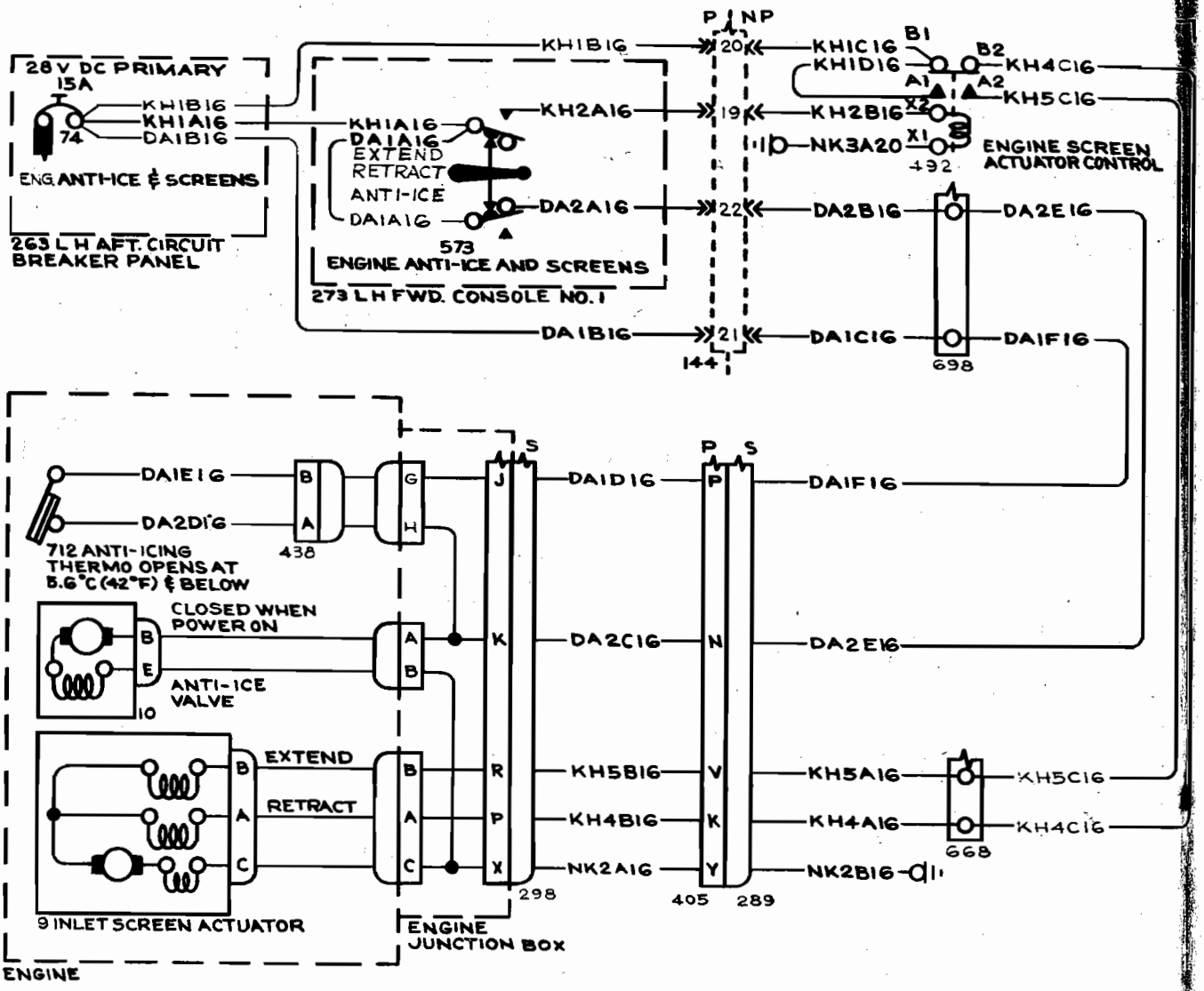
F-86F-2-54-340A



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
9	Actuator - Engine Screen	Fus 178 RH	RH Engine Bay
10	Actuator - Engine Anti-icing Valve	Fus 178 LH	LH Engine Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
438	Receptacle - Engine Anti-ice Thermostat	Fus 90 LH	Engine Snood
492	Relay - Engine Screen Control	Fus 155 LH	Aft LH Radio Bay
573	Switch - Engine Anti-ice and Screen	Fus 90 LH	Cockpit, Forward LH Console
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well
712	Thermostat - Engine Anti-ice	Fus 185 CL	Engine

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-341A



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
9	Actuator - Engine Screen	Fus 178 RH	RH Engine Bay
10	Actuator - Engine Anti-icing Valve	Fus 178 LH	LH Engine Bay
74	Circuit Breaker - Engine Anti-ice and Screen Actuator	Fus 90 RH	Cockpit
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
438	Receptacle - Engine Anti-ice Thermostat	Fus 90 LH	Engine Snood
492	Relay - Engine Screen Control	Fus 155 LH	Aft LH Radio Bay
573	Switch - Engine Anti-ice and Screen	Fus 90 LH	Cockpit, Forward LH Console
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well
712	Thermostat - Engine Anti-ice	Fus 185 CL	Engine

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

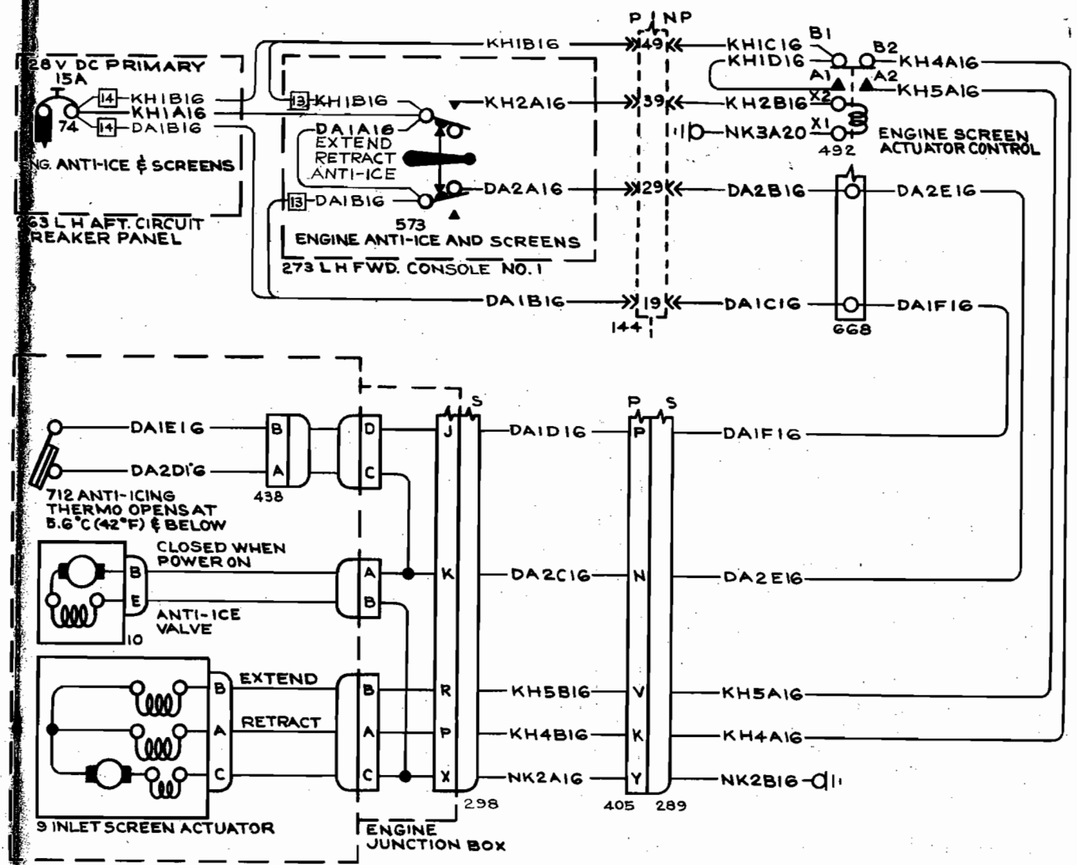
F-86F-2-54-342

ENGINE AIR SCREEN AND ANTI-ICING SYSTEM
F-86F-25 AIRPLANES AF52-5272 THROUGH -5530

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
9	Actuator - Engine Screen	Fus 178 RH	RH Engine Bay
10	Actuator - Engine Anti-icing Valve	Fus 178 LH	LH Engine Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
405	Receptacle - Engine Disconnect	Fus 197 RH	Engine Access
438	Receptacle - Engine Anti-ice Thermostat	Fus 90 LH	Engine Snood
492	Relay - Engine Screen Control	Fus 155 LH	Aft LH Radio Bay
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
712	Thermostat - Engine Anti-ice	Fus 185 CL	Engine

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Air Screen and Anti-icing System - F-86F-30 and F-86F-35 Airplanes



[13] F-86F-30 AIRPLANES AF52-4305 THROUGH -4904
[14] F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

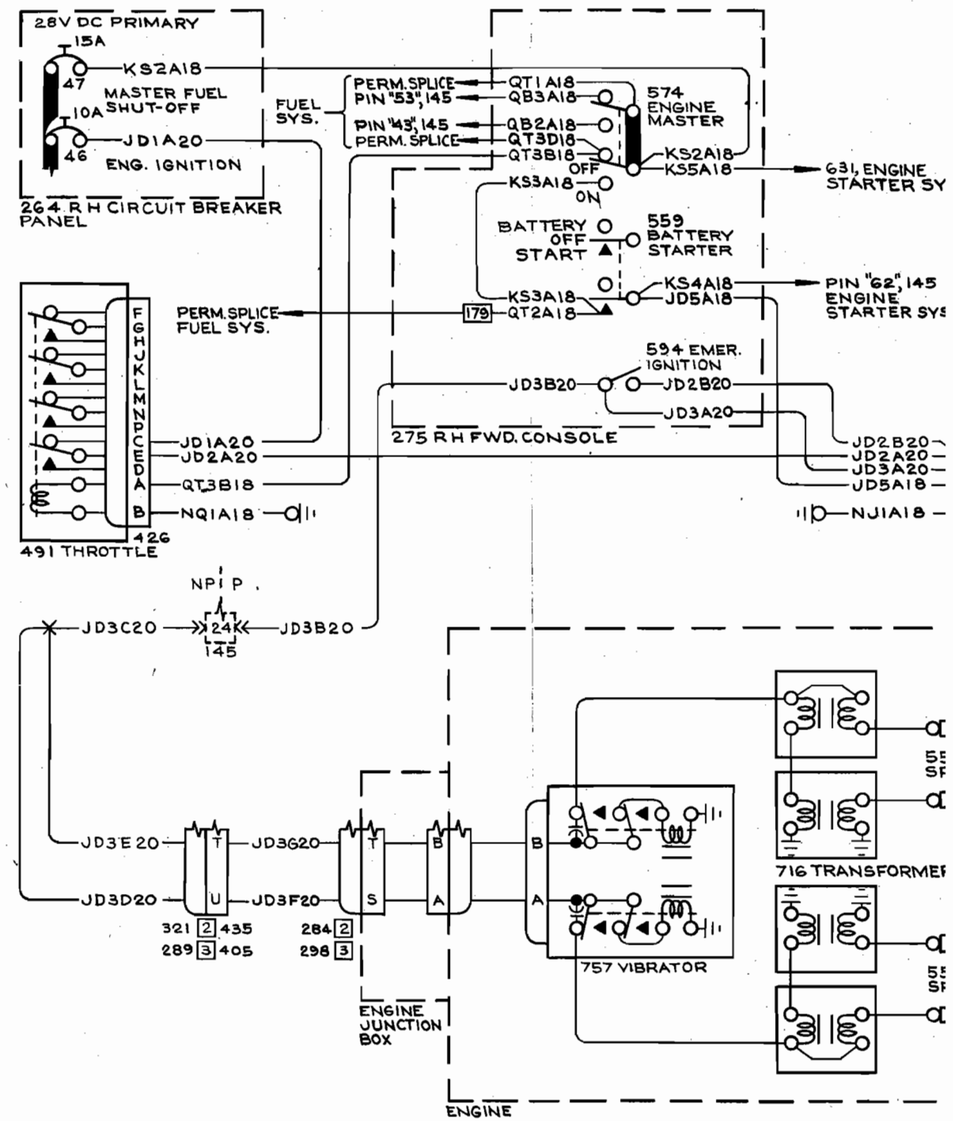
F-86F-2-54-3434

ENGINE AIR SCREEN AND ANTI-ICING SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
460	Relay - Engine Starter Ignition Control	Fus 55 RH	Nose Radar Bay
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
552	Spark Plug - Ignition	Fus 205 LH and RH	Spark Plug Access Doors
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
716	Transformer - Engine Ignition	Fus 205 RH	Engine
757	Vibrator - Ignition	Fus 210 RH	Engine

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Ignition System F-86F-1 Through F-86F-15 Airplanes and F-86F-20 Airplanes AF51-13070 Through -13109



2 F-86F-1 THROUGH F-86F-15 AIRPLANES

3 F-86F-20 AIRPLANES AF51-13070 THROUGH-13109

179 F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH-13079

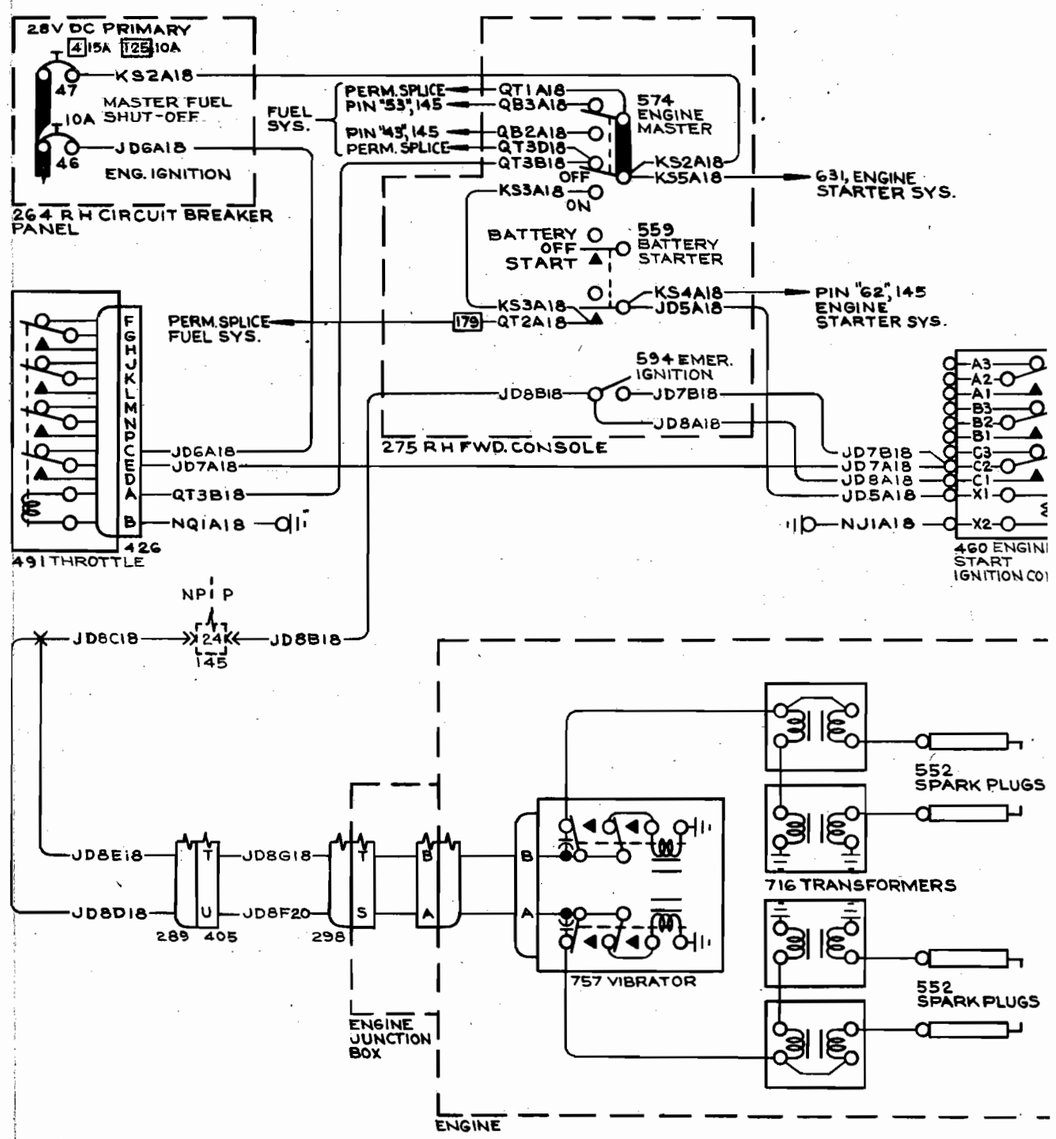
F-

ENGINE IGNITION SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES AND
F-86F-20 AIRPLANES AF51-13070 THROUGH-13109

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
460	Relay - Engine Starter Ignition Control	Fus 55 RH	Nose Radar Bay
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
552	Spark Plug - Ignition	Fus 205 LH and RH	Spark Plug Access Doors
594	Switch - Ignition - Emergency	Fus 90 RH	RH Forward Console
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
716	Transformer - Engine Ignition	Fus 205 RH	Engine
757	Vibrator - Ignition	Fus 210 RH	Engine

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Ignition System F-86F-20 Airplanes AF51-13110 Through -13169 And F-86F-25 Through F-86F-35 Airplanes



4 F-86F-20 AIRPLANES AF51-13110 THROUGH -13169

25 F-86F-25 THROUGH F-86F-35 AIRPLANES

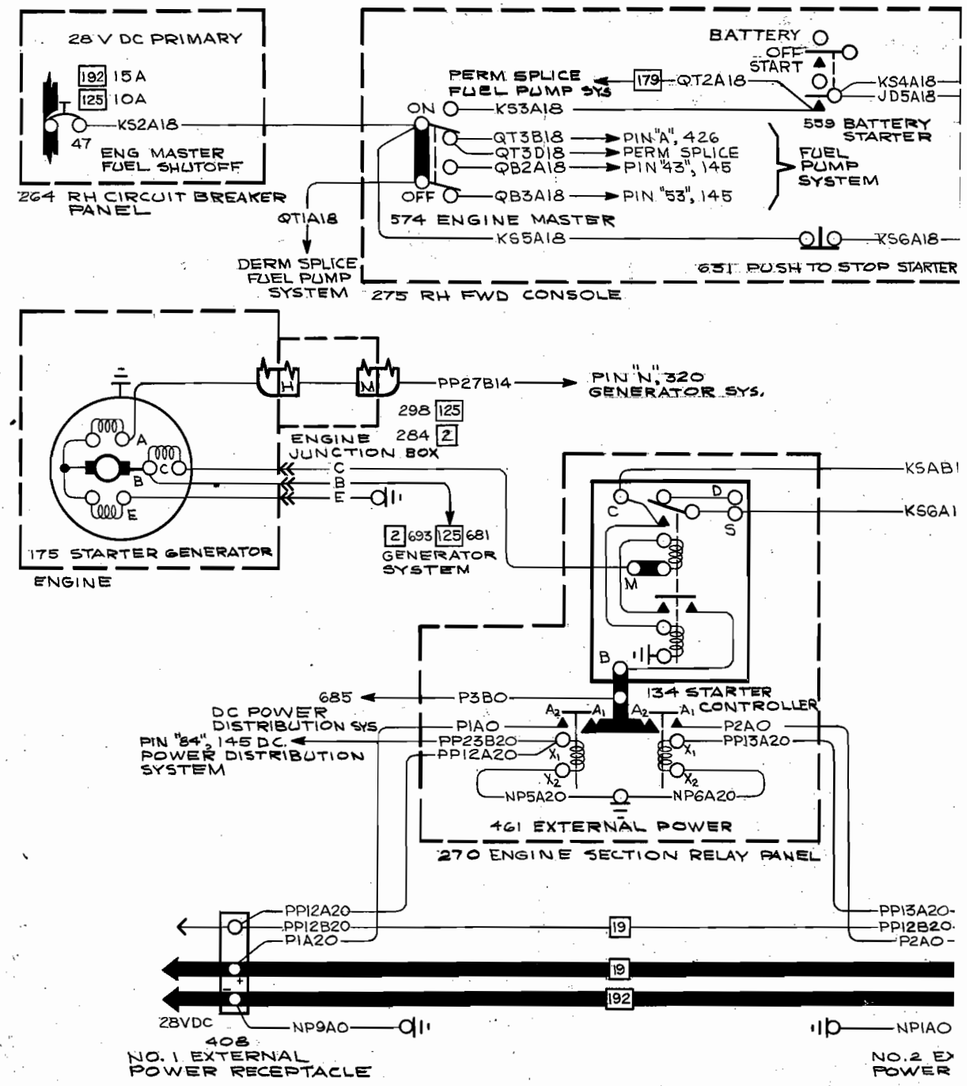
F-8GF-2-54-34

Engine Ignition System
F-86F-20 Airplanes AF51-13110 Through -13169
And F-86F-25 Through F-86F-35 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
175	Generator - Starter	Fus 185 CL	Within Engine Snood
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
270	Panel - Station 190 Relay	Fus 185 RH	RH Engine Access
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
320	Plug - Generator Field Control Relay	Fus 155. 8 RH	RH Radio Bay
408	Receptacle - External Power	Fus 185 LH	Fuselage Exterior
460	Relay - Engine Starter Ignition Control	Fus 55 RH	Nose Radar Bay
681	Terminal Block - Reverse-current Relay	Fus 133 RH	Radio Bay
693	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Starter System



2 F-86F-1 THRU F-86F-15 AIRPLANES

19 F-86F-35 AIRPLANES

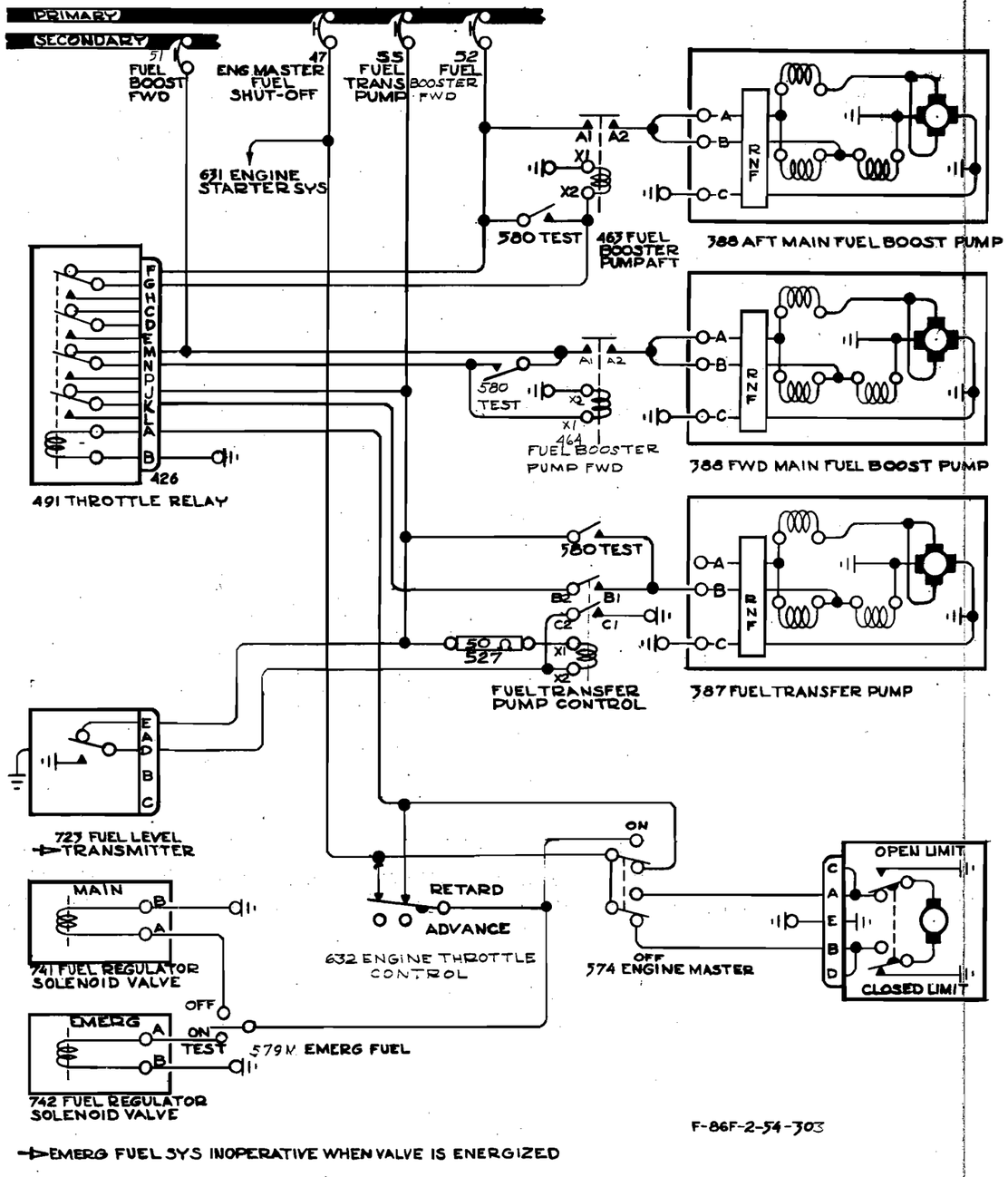
125 F-86F-20 THRU F-86F-35 AIRPLANES

179 F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13079

192 F-86F-1 THRU F-86F-20 AIRPLANES

F-86F-2-54-

ENGINE STARTER SYSTEM

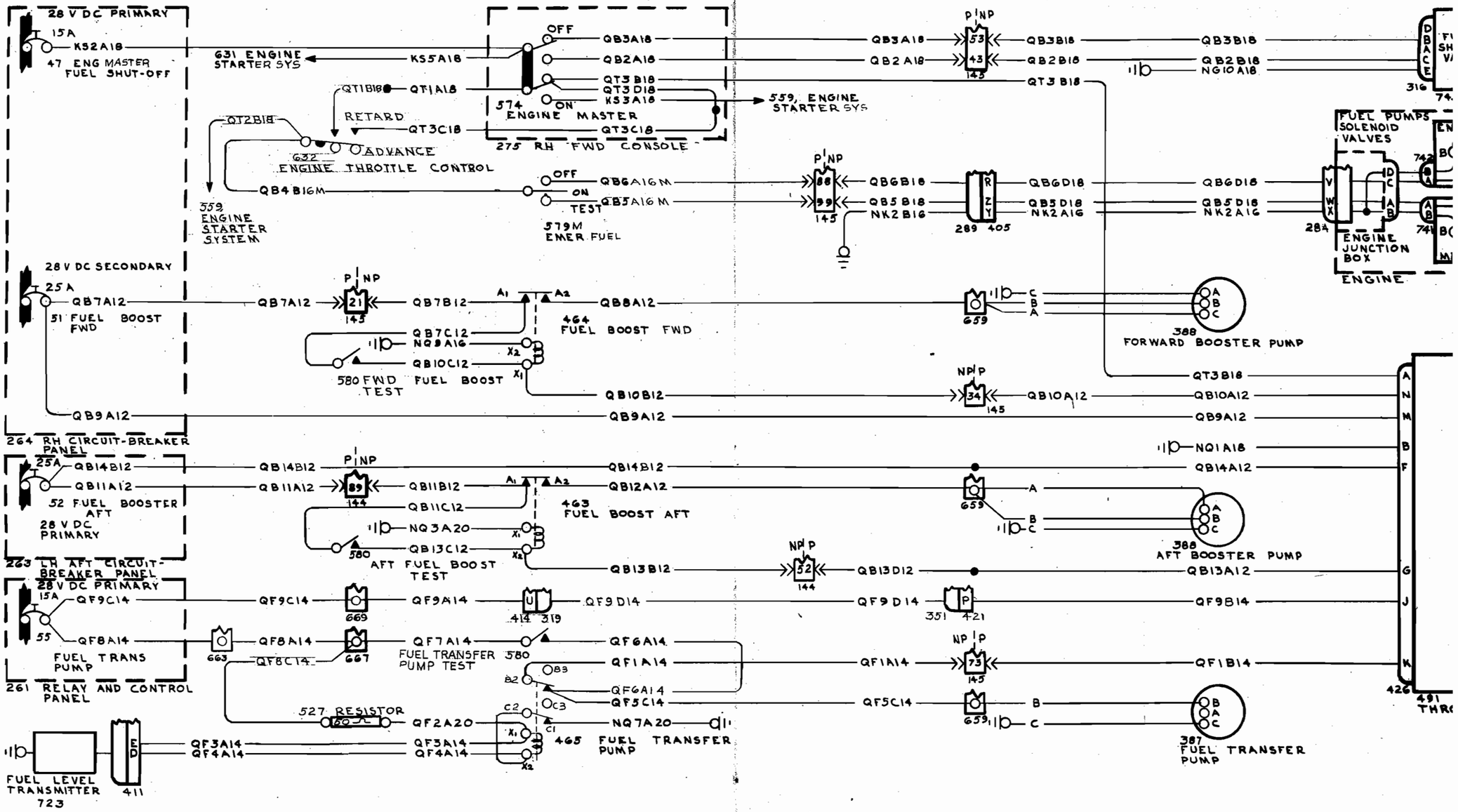


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
316	Plug - Fuel Shutoff Valve Solenoid	Fus 204.5 LH	LH Engine Access
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
387	Pump - Fuel Transfer	Fus 197 CL	Aft Section
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
426	Receptacle - Throttle Relay	Fus 56 LH	Cockpit, LH Side
463	Relay - Fuel Booster Pump (Aft)	Fus 215 LH	Engine Access
464	Relay - Fuel Booster Pump (Forward)	Fus 190 LH	Engine Access
465	Relay - Fuel Transfer Pump Control	Fus 165 RH	Engine Access
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
527	Resistor - Fuel Transfer Relay	Fus 185 RH	Engine Access
559	Switch - Battery and Starter	Fus 90 RH	Cockpit, RH Forward Conso
580	Switch - Fuel Transfer and Main Pump Test	Fus 190 RH and LH	Wheel Wells
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
632	Switch - Throttle Engine Control	Fus 90 LH	LH Throttle Quadrant
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
743	Valve - Fuel Shutoff	Fus 204.5 LH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

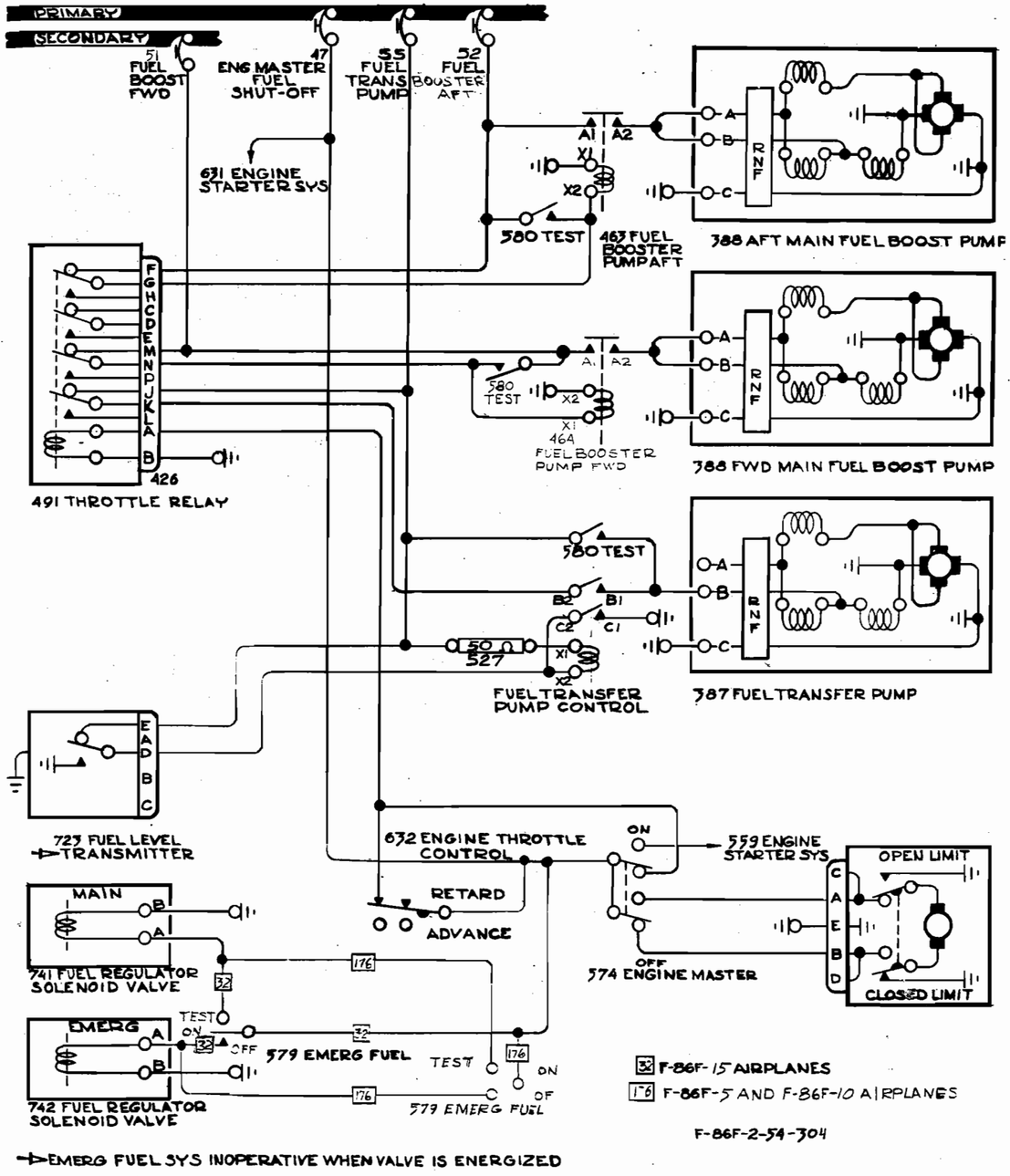
Fuel System - F-86F-1 Airplanes

FUEL SYSTEM
F-86F-1 AIRPLANES



F-86F-2-54-298

FUEL SYSTEM
F-86F-1 AIRPLANES

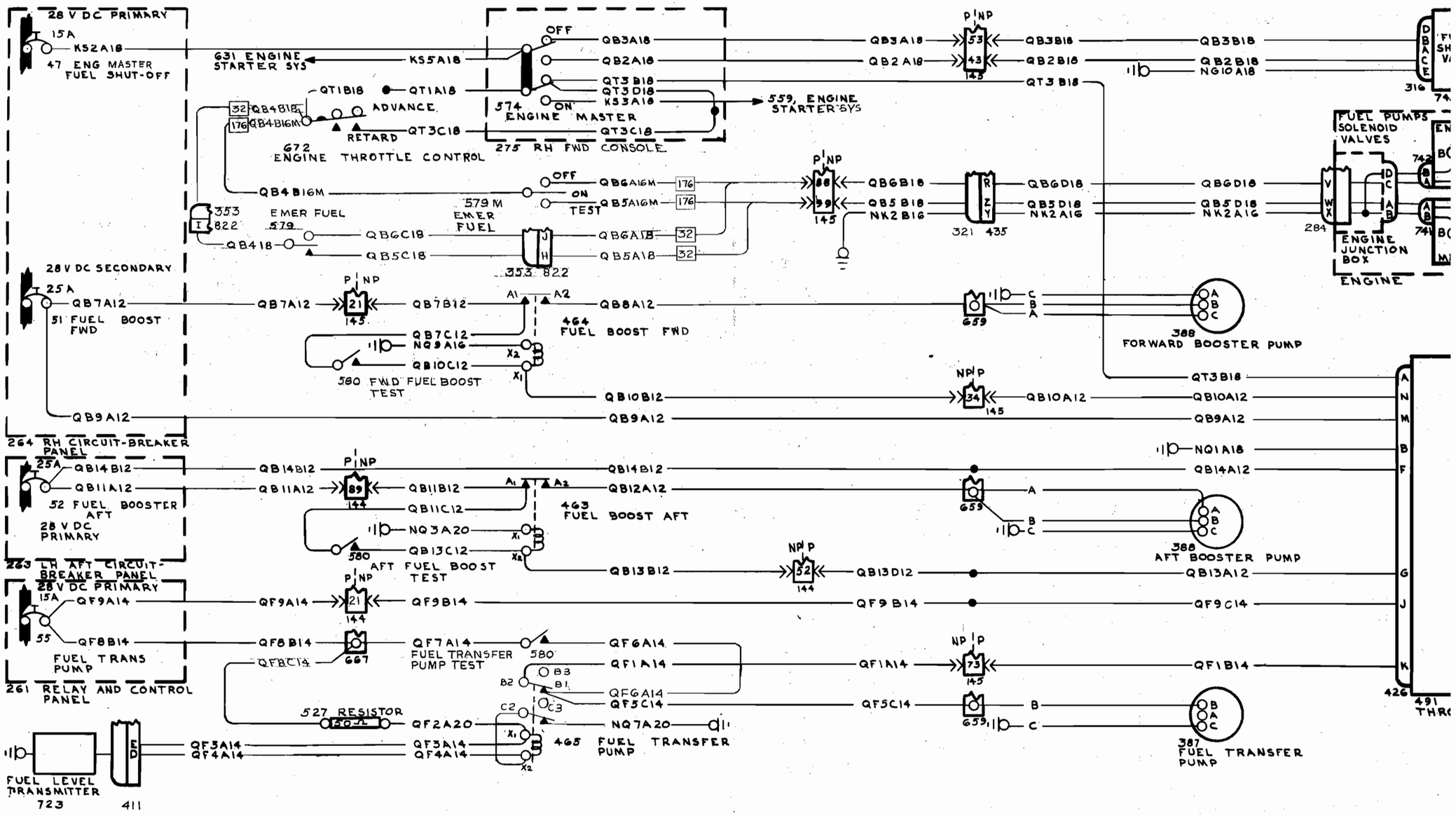


FUEL SYSTEM
F-86 F-5 THROUGH F-86F-15 AIRPLANES

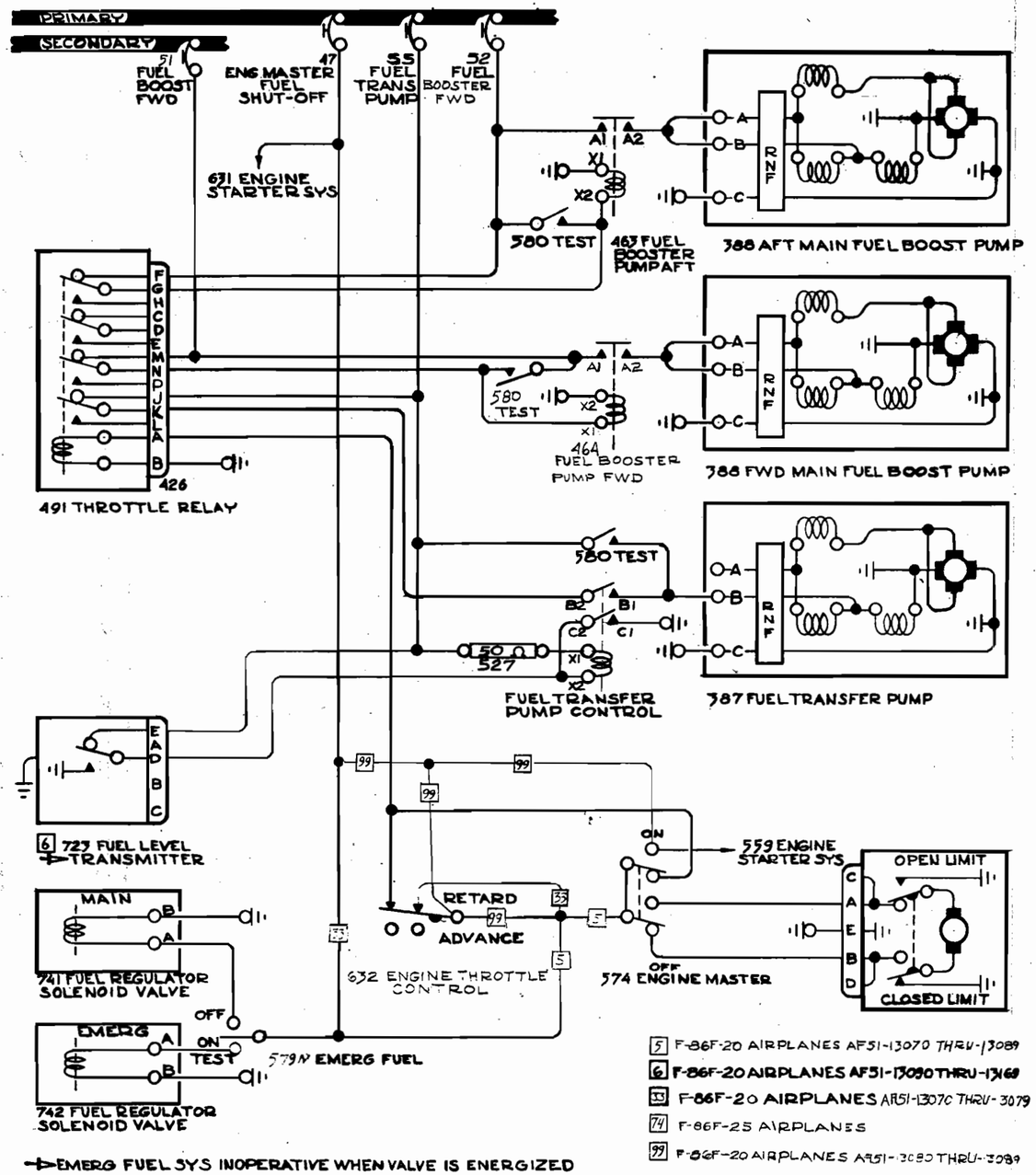
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
316	Plug - Fuel Shutoff Valve Solenoid	Fus 204.5 LH	LH Engine Access
321	Plug - Engine Disconnect	Fud 205 LH	Engine Bay RH
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
387	Pump - Fuel Transfer	Fus 197 CL	Aft Section
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
426	Receptacle - Throttle Relay	Fus 56 LH	Cockpit, LH Side
435	Receptacle - Drop Tank Jettison Solenoid Disconnect	Wing 143 RH and LH	Drop Tank
463	Relay - Fuel Booster Pump (Aft)	Fus 215 LH	Engine Access
464	Relay - Fuel Booster Pump (Forward)	Fus 190 LH	Engine Access
465	Relay - Fuel Transfer Pump Control	Fus 165 RH	Engine Access
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
527	Resistor - Fuel Transfer Relay	Fus 185 RH	Engine Access
559	Switch - Battery and Starter	Fus 90 RH	Cockpit, RH Forward Console
579	Switch - Fuel System - Emergency	Fus 81 LH	Instrument Panel
580	Switch - Fuel Transfer and Main Pump Test	Fus 190 RH and LH	Wheel Wells
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
632	Switch - Throttle Engine Control	Fus 90 LH	LH Throttle Quadrant
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
743	Valve Fuel Shutoff	Fus 204.5 LH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel System - F-86F-5 Through F-86F-15 Airplanes



FUEL SYSTEM
F-86F-5 THROUGH F-86F-15 AIRPLANES

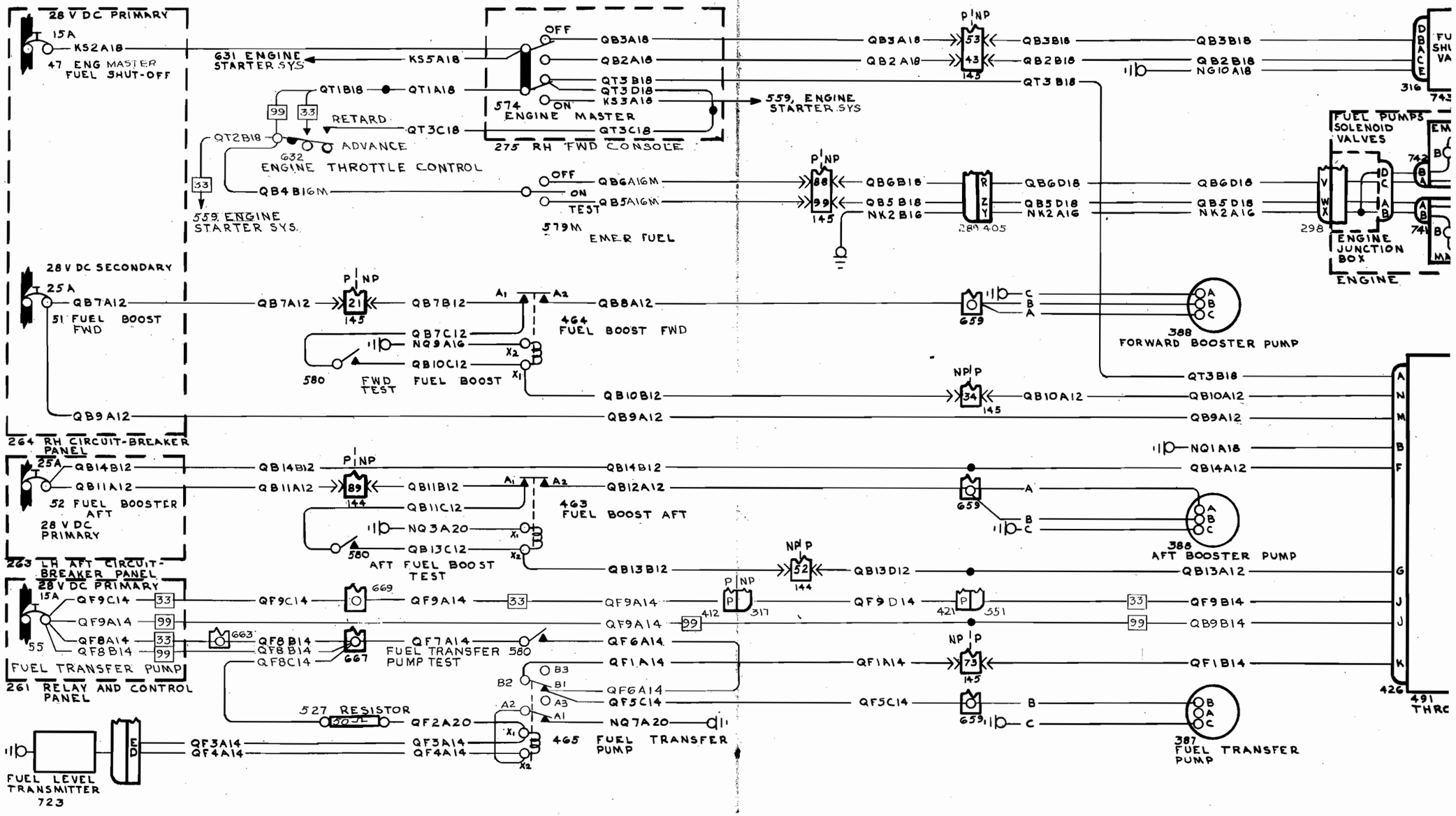


FUEL SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit breaker Right-hand	Fus 118 RH	Cockpit - RH
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
316	Plug - Fuel Shutoff Valve Solenoid	Fus 204.5 LH	LH Engine Access
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
387	Pump - Fuel Transfer	Fus 197 CL	Aft Section
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
426	Receptacle - Throttle Relay	Fus 56 LH	Cockpit, LH Side
463	Relay - Fuel Booster Pump (Aft)	Fus 215 LH	Engine Access
464	Relay - Fuel Booster Pump (Forward)	Fus 190 LH	Engine Access
465	Relay - Fuel Transfer Pump Control	Fus 165 RH	Engine Access
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
527	Resistor - Fuel Transfer Relay	Fus 185 RH	Engine Access
559	Switch - Battery and Starter	Fus 90 RH	Cockpit, RH Forward Console
580	Switch - Fuel Transfer and Main Pump Test	Fus 190 RH and LH	Wheel Wells
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
632	Switch - Throttle Engine Control	Fus 90 LH	LH Throttle Quadrant
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
743	Valve - Fuel Shutoff	Fus 204.5 LH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel System - F-86F-20 Airplanes AF51-13070 Through -13089



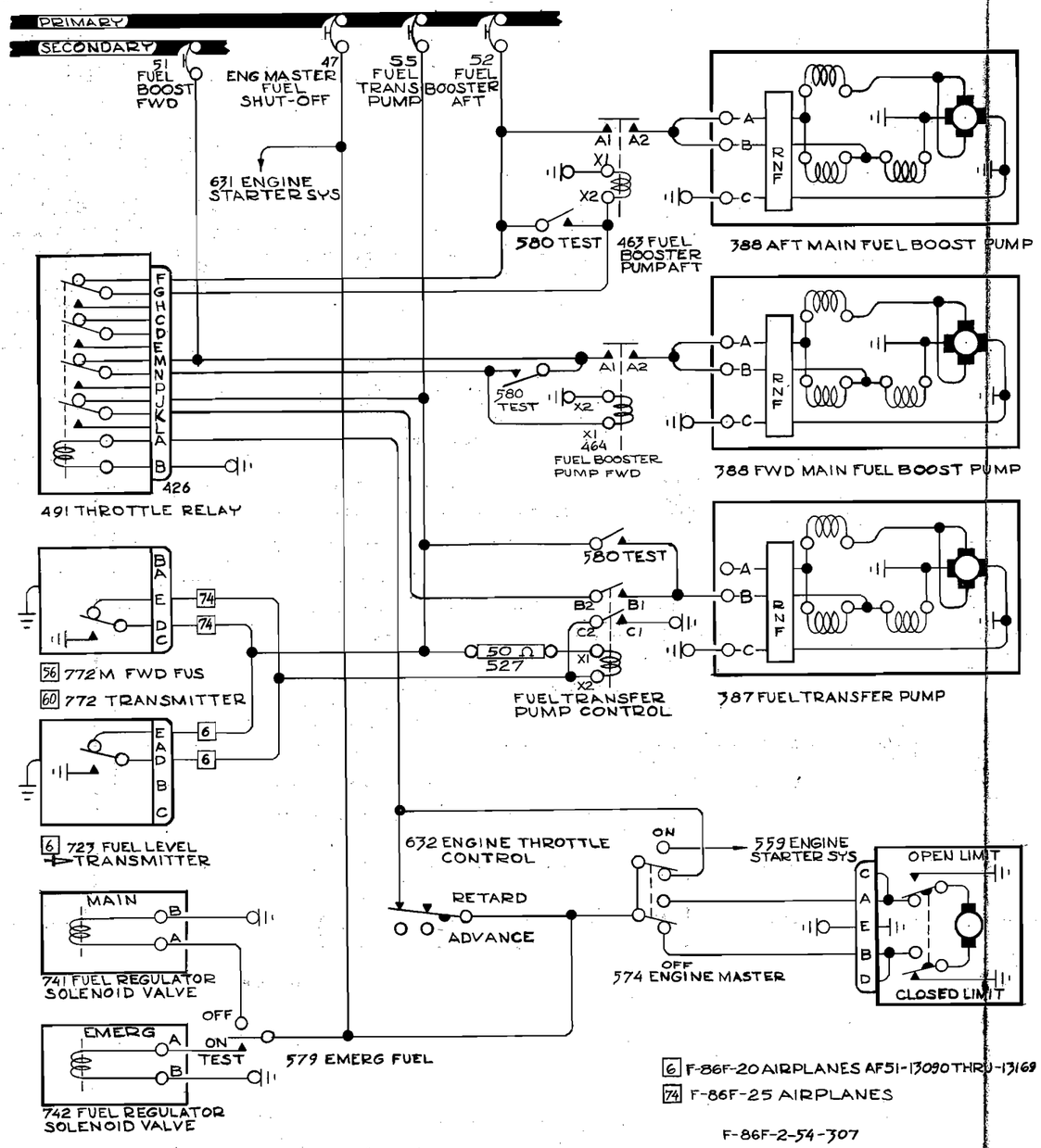
33 F-86F-20 AIRPLANES AF51-13070 THRU -13079

99 F-86F-20 AIRPLANES AF51-13080 THRU -13089

F-86F-2-54-300

FUEL SYSTEM

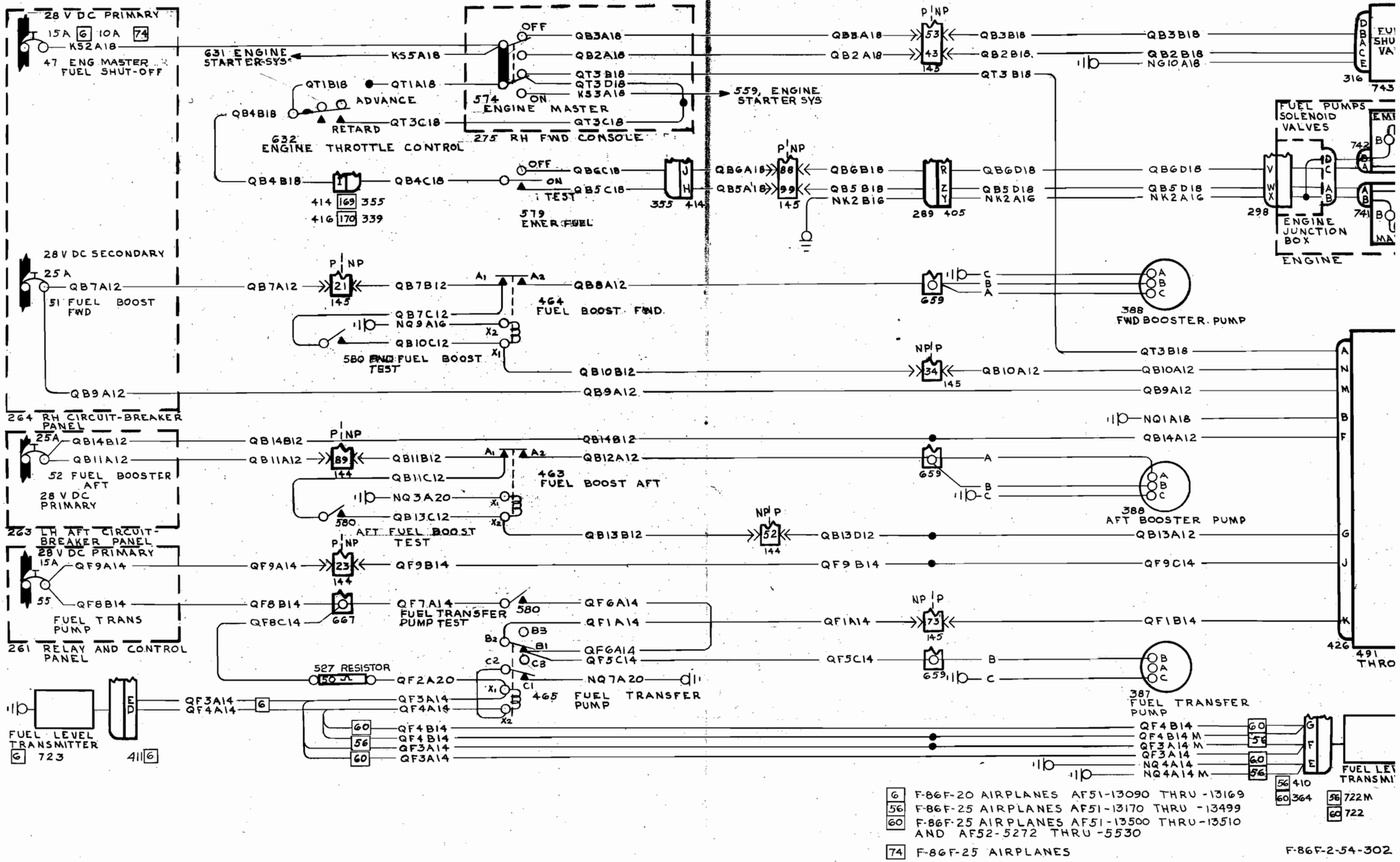
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089



FUEL SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH
-13169 AND F-86F -25 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
316	Plug - Fuel Shutoff Valve Solenoid	Fus 204.5 LH	LH Engine Access
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
364	Plug - Forward Fuselage Tank Transmitter	Fus 155.8 RH	RH Radio Bay
387	Pump - Fuel Transfer	Fus 197 CL	Aft Section
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
389	Pump - Hydraulic Emergency	Fus 253.5 CL	Aft Section
410	Receptacle - Fuel Level Transfer	Fus 250 LH	LH Emergency Access
414	Receptacle - Instrument Panel Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
416	Receptacle - Instrument Panel Indicator Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
426	Receptacle - Throttle Relay	Fus 56 LH	Cockpit, LH Side
463	Relay - Fuel Booster Pump (Aft)	Fus 215 LH	Engine Access
464	Relay - Fuel Booster Pump (Forward)	Fus 190 LH	Engine Access
465	Relay - Fuel Transfer Pump Control	Fus 165 RH	Engine Access
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
527	Resistor - Fuel Transfer Relay	Fus 185 RH	Engine Access
559	Switch - Battery and Starter	Fus 90 RH	Cockpit, RH Forward Console
579	Switch - Fuel System - Emergency	Fus 81 LH	Instrument Panel
580	Switch - Fuel Transfer and Main Pump Test	Fus 190 RH and LH	Wheel Wells
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
632	Switch - Throttle Engine Control	Fus 90 LH	LH Throttle Quadrant
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
722	Transmitter - Fuselage (Forward) Fuel Level	Fus 155 RH	RH Radio Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
743	Valve - Fuel Shutoff	Fus 204.5 LH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.



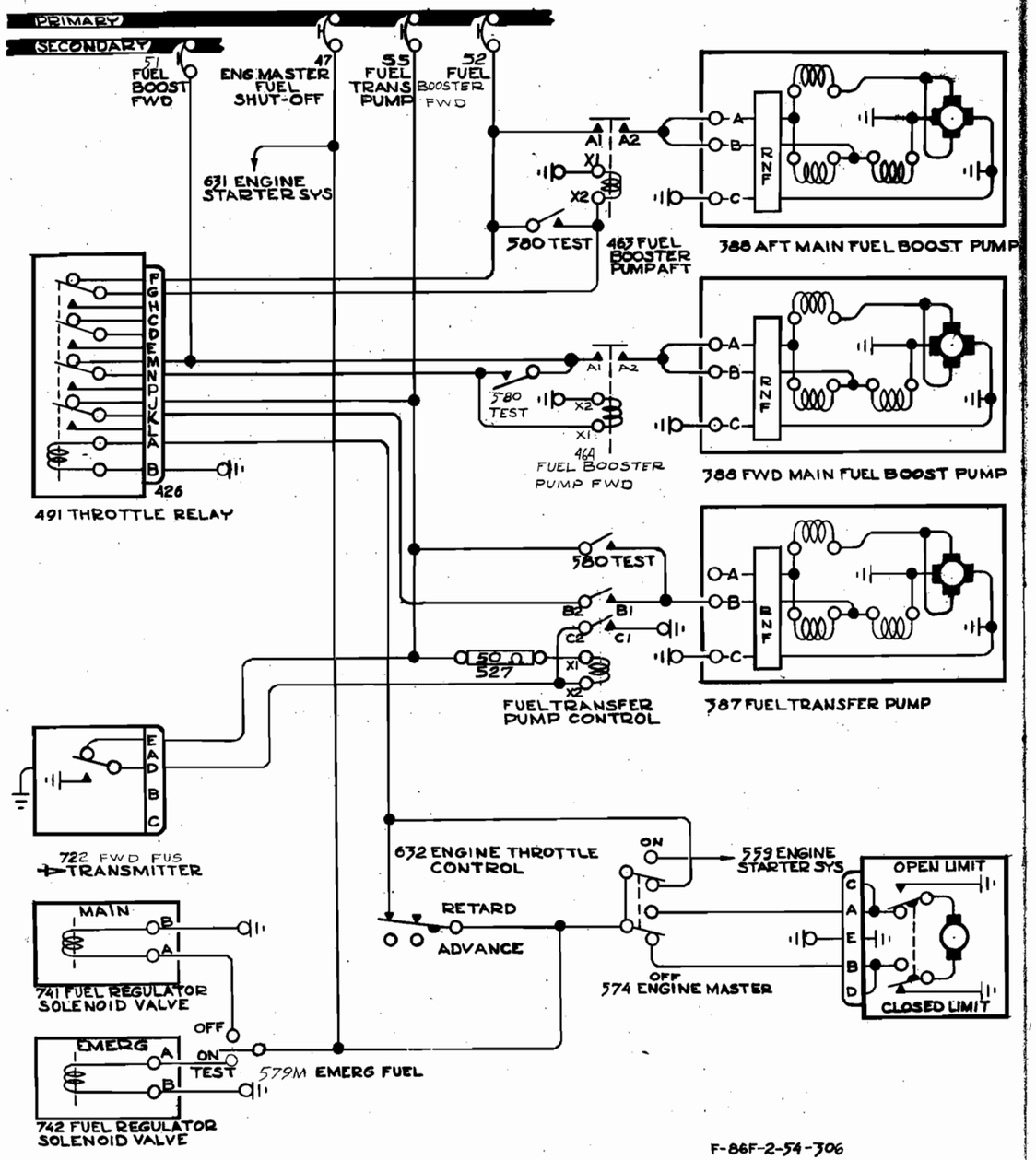
Fuel System

F-86F-20 Airplanes AF51-13090 Through -13169 And F-86F-25 Airplanes

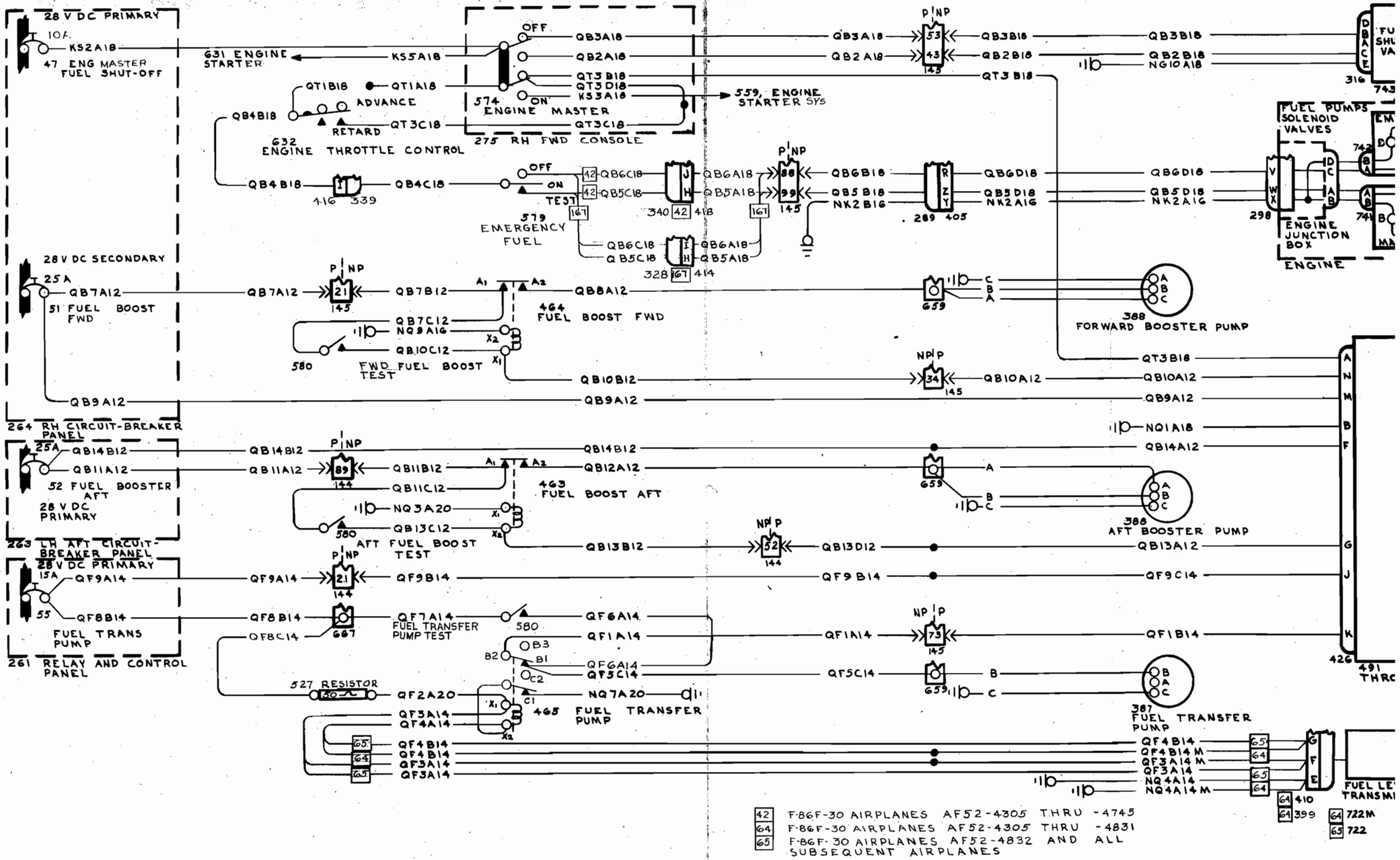
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
316	Plug - Fuel Shutoff Valve Solenoid	Fus 204.5 LH	LH Engine Access
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
339	Plug - Instrument Panel Indicating Light	Fus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
387	Pump - Fuel Transfer	Fus 197 CL	Aft Section
388	Pump - Fuel Booster - Main	Fus 144.6 CL	Radio Bay
399	Receptacle - Bomb Rack (S-2)	Fus 143 RH and LH	Wings
410	Receptacle - Fuel Level Transfer	Fus 250 LH	LH Emergency Access
414	Receptacle - Instrument Panel Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
416	Receptacle - Instrument Panel Indicator Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
418	Receptacle - Instrument Panel Light Disconnect	Fus 74 LH	Cockpit
426	Receptacle - Throttle Relay	Fus 56 LH	Cockpit, LH Side
463	Relay - Fuel Booster Pump (Aft)	Fus 215 LH	Engine Access
464	Relay - Fuel Booster Pump (Forward)	Fus 190 LH	Engine Access
465	Relay - Fuel Transfer Pump Control	Fus 165 RH	Engine Access
491	Relay - Throttle	Fus 56 LH	Nose Radar Bay
527	Resistor - Fuel Transfer Relay	Fus 185 RH	Engine Access
559	Switch - Battery and Starter	Fus 90 RH	Cockpit, RH Forward Console
579	Switch - Fuel System - Emergency	Fus 81 LH	Instrument Panel
580	Switch - Fuel Transfer and Main Pump Test	Fus 190 RH and LH	Wheel Wells
631	Switch - Starter Stop	Fus 85 RH	RH Forward Console
632	Switch - Throttle Engine Control	Fus 90 LH	LH Throttle Quadrant
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
722	Transmitter - Fuselage (Forward) Fuel Level	Fus 155 RH	RH Radio Bay
743	Valve - Fuel Shutoff	Fus 204.5 LH	Engine Access

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel System - F-86F-30 and F-86F-35 Airplanes



FUEL SYSTEM
F-86F-30 AND F-86F-35 AIRPLANES



42 F-86F-30 AIRPLANES AF52-4305 THRU -4745

64 F-86F-30 AIRPLANES AF52-4305 THRU -4831

65 F-86F-30 AIRPLANES AF52-4832 AND ALL SUBSEQUENT AIRPLANES

161 F-86F-30 AIRPLANES AF52-4746 THRU -5163 AND F-86F-35 AIRPLANES

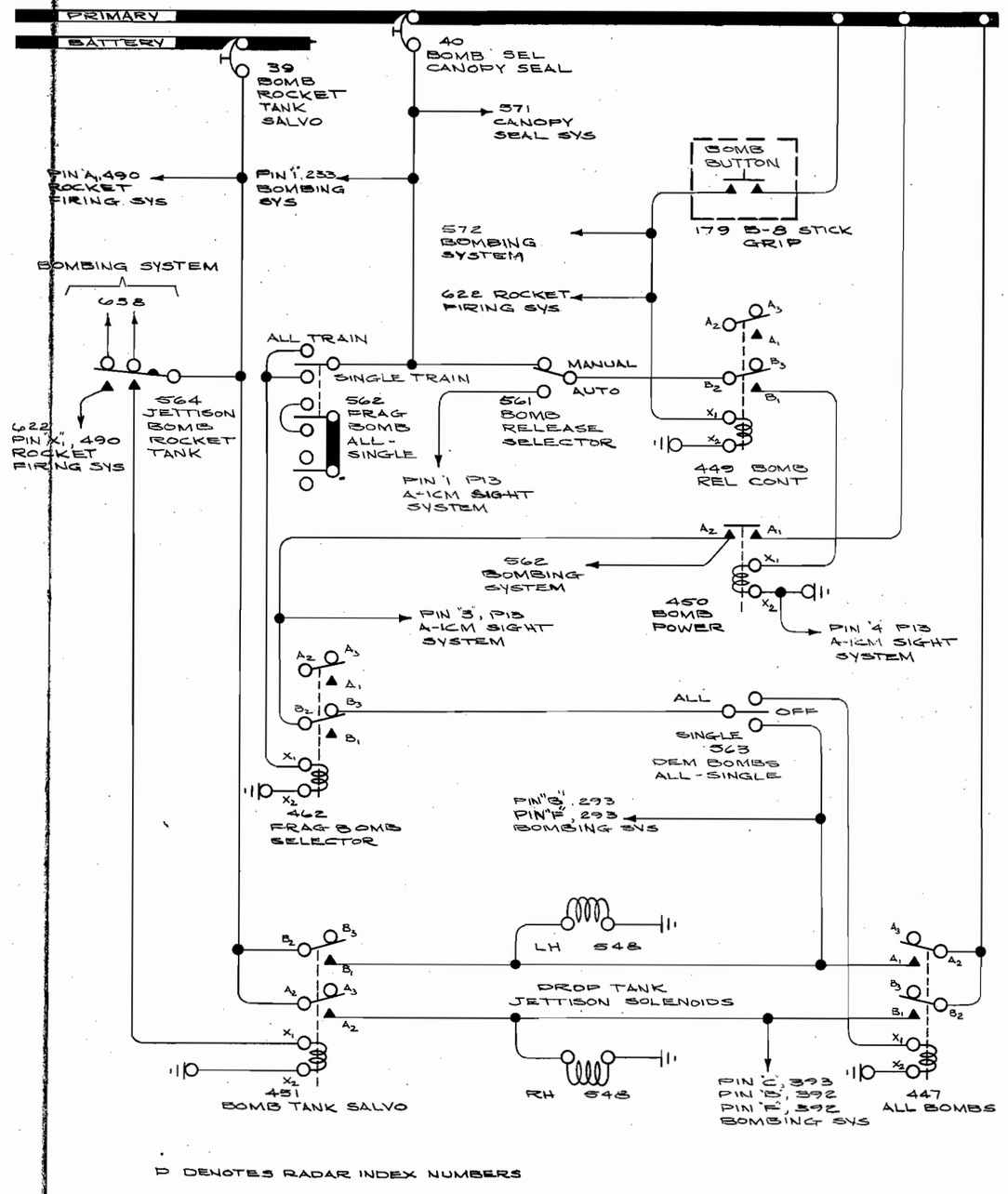
F-86F-2-54-301

FUEL SYSTEM
F-86F-30 THROUGH F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION		
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
327	Plug - Hydraulic Pump Manual Override	Fus 253.5 LH	Aft Section
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
399	Receptacle - Bomb Rack (S-2)	Fus 143 RH and LH	Wings .
434	Receptacle - N9 Camera (GSAP)	Fus 71 CL	Cockpit and Forward Landing Lights
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
572	Switch - Chemical Tank Selector (M-10)	Fus 81 CL	Pedestal
622	Switch - Rocket Jettison	Fus 81 CL	Pedestal
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

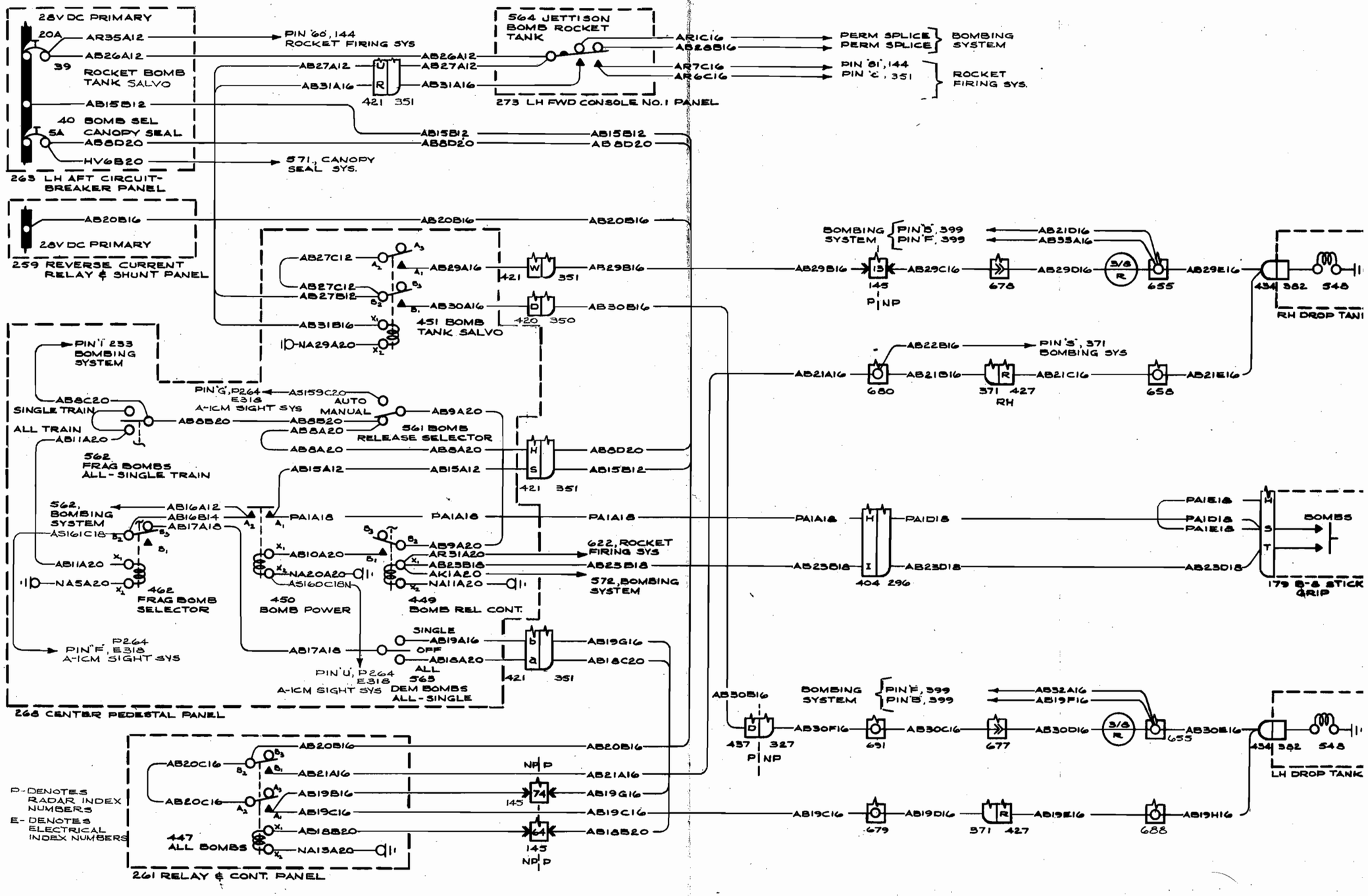
Drop Tank System - F-86F-1 and F-86F-5 Airplanes



D DENOTES RADAR INDEX NUMBERS

F-86F-2-54-420

Drop Tank System
F-86F-1 and F-86F-5 Airplanes



DROP TANK SYSTEM

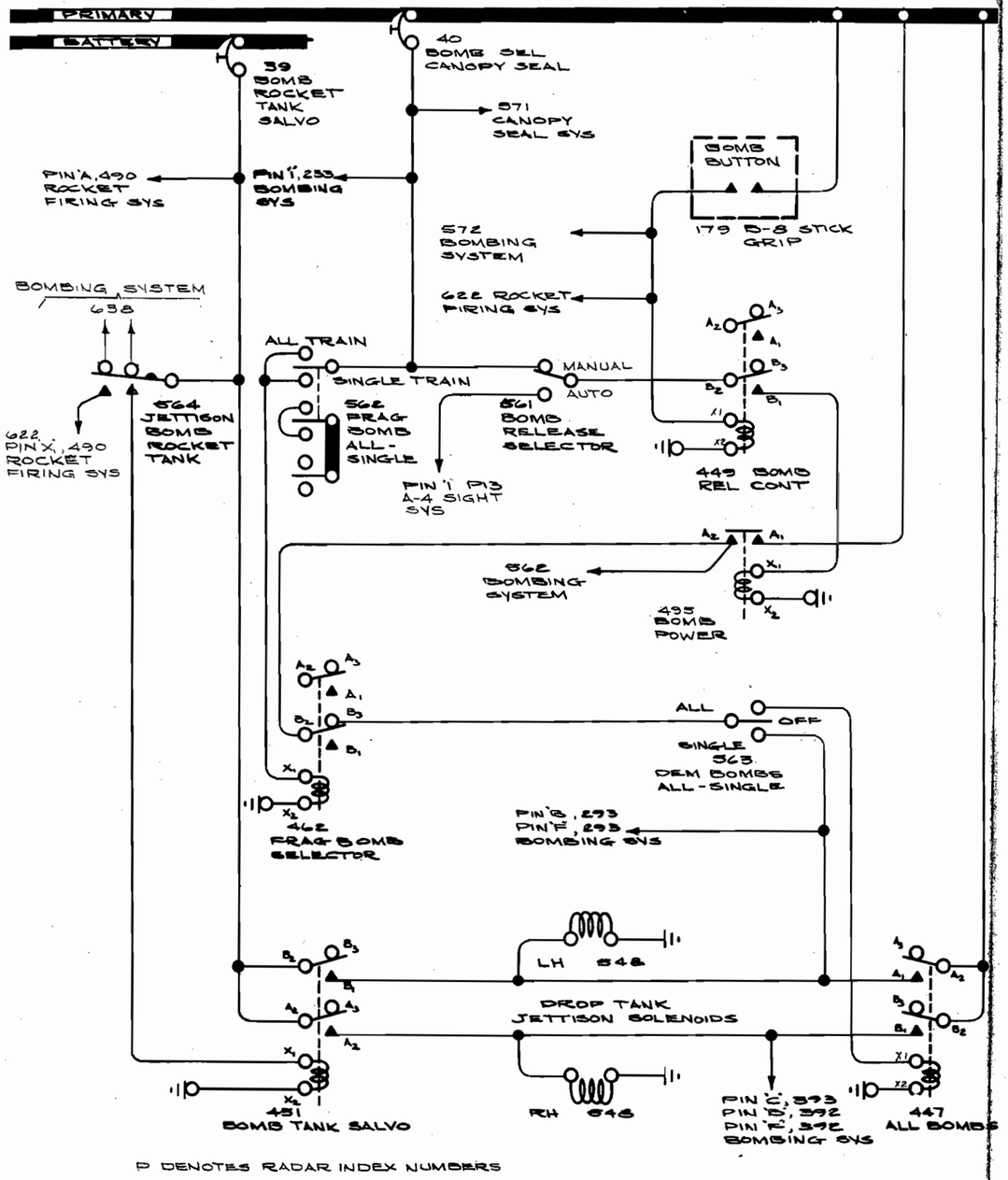
F-86F-1 AND F-86F-5 AIRPLANES

F-86F-2-54-424

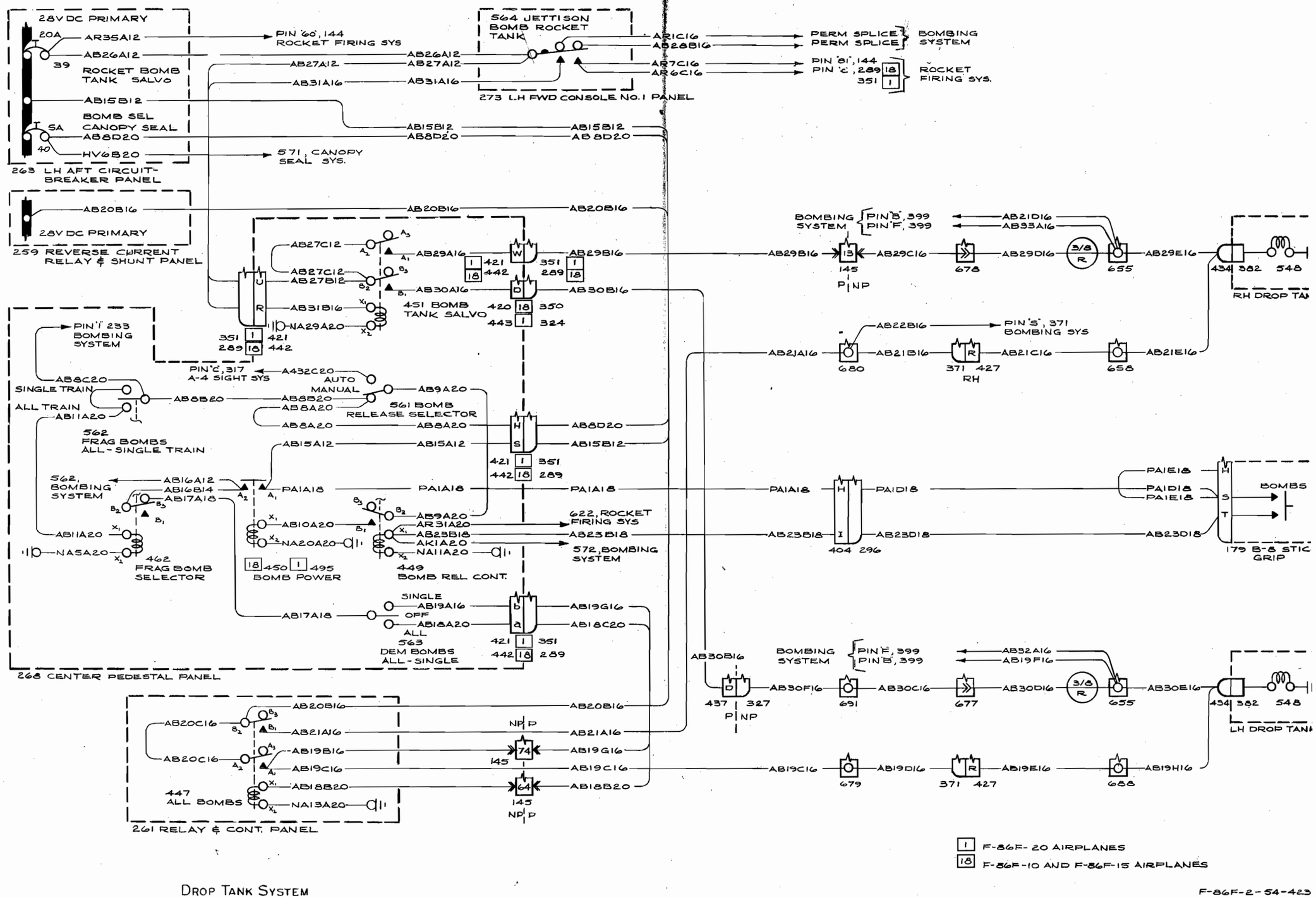
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
327	Plug - Hydraulic Pump Manual Override	Fus 253.5 LH	Aft Section
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
399	Receptacle - Bomb Rack (S-2)	Fus 143 RH and LH	Wings
434	Receptacle - N9 Camera (GSAP)	Fus 71 CL	Cockpit and Forward Landing Lights
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
572	Switch - Chemical Tank Selector (M-10)	Fus 81 CL	Pedestal
622	Switch - Rocket Jettison	Fus 81 CL	Pedestal
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

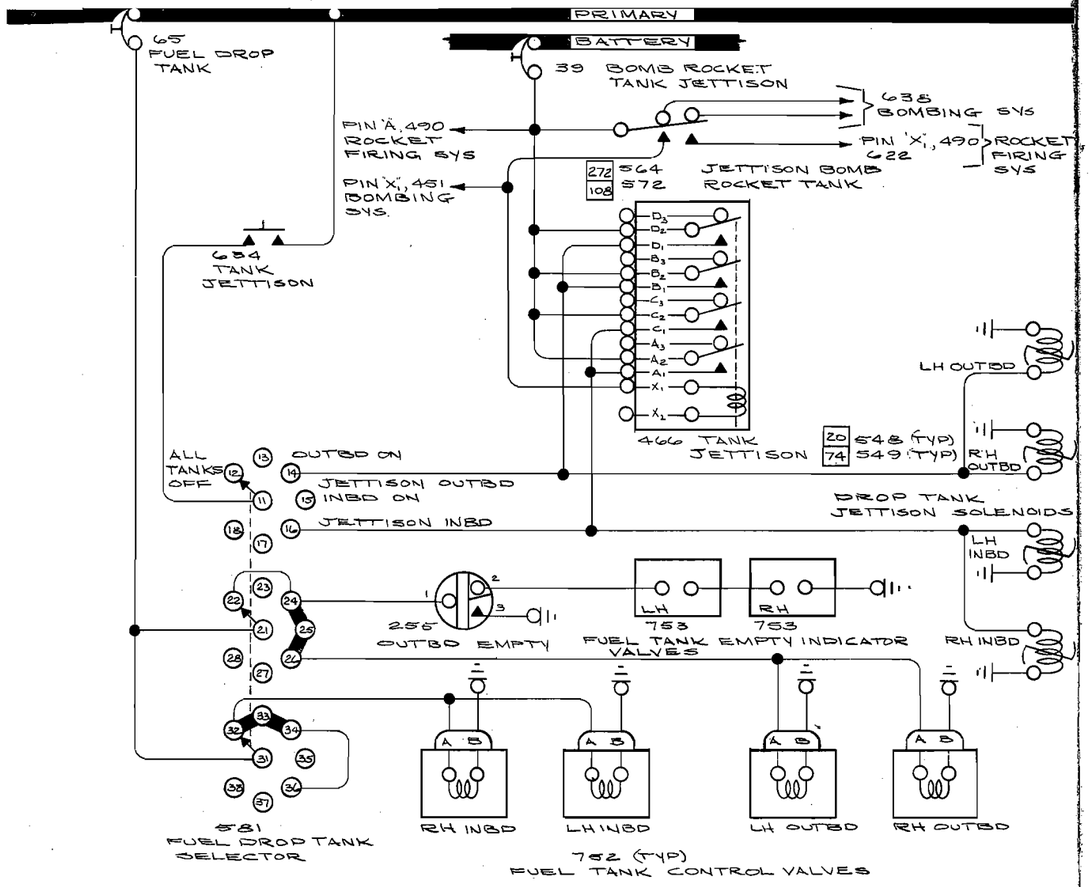
Drop Tank System - F-86F-10 Through F-86F-20 Airplanes



Drop Tank System
F-86F-10 Thru F-86F-20 **Airplanes**



DROP TANK SYSTEM
F-86F-10 THRU F-86F-20 AIRPLANES



20 F-86F-30 AIRPLANES

74 F-86F-25 AIRPLANES

108 F-86F-30 AIRPLANES AFS2-4906 THRU -5163

272 F-86F-25 AND F-86F-30 AIRPLANES AFS2-4306 THRU -4904

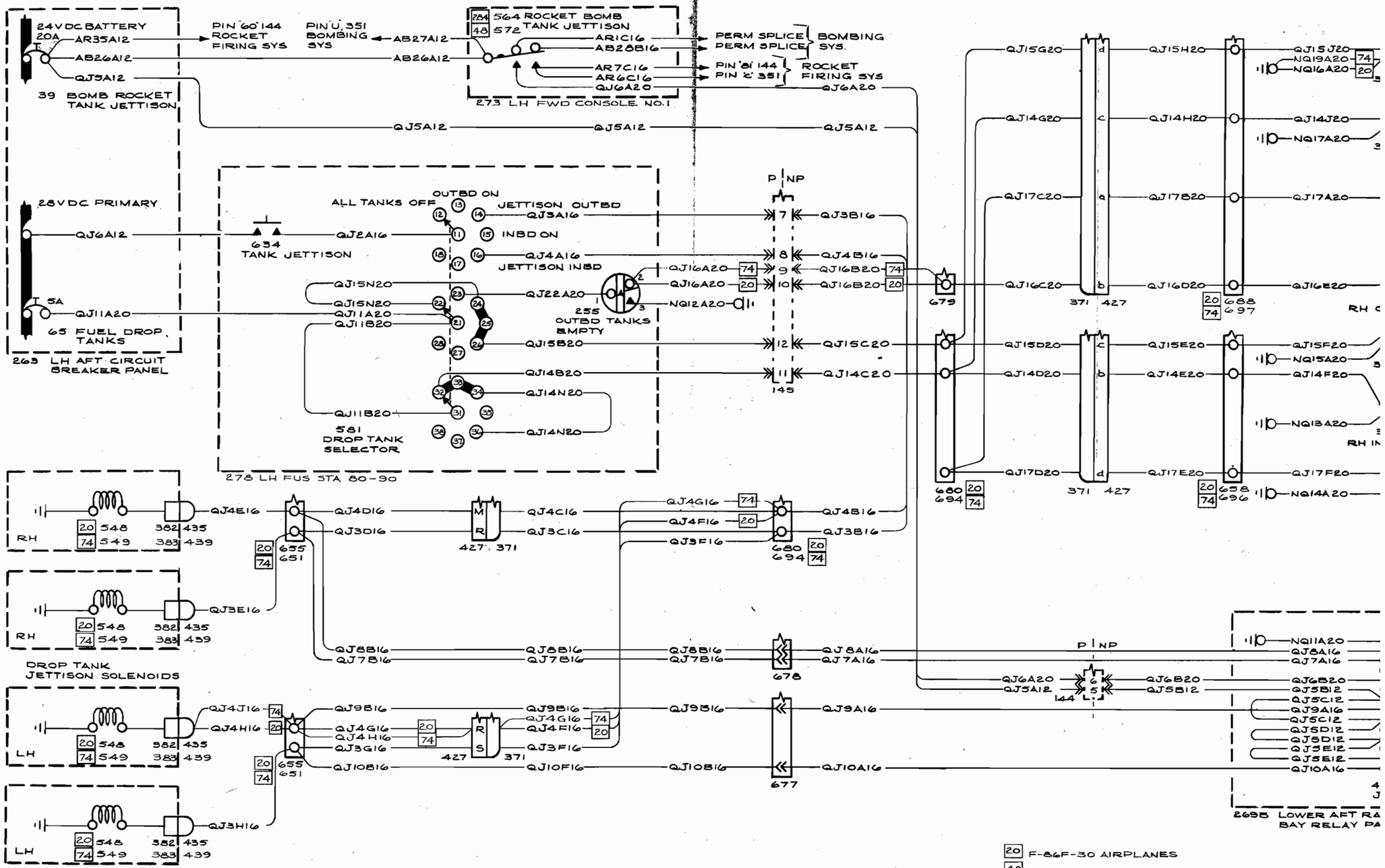
F-86F-2-54-422

AUXILARY FUEL SUPPLY AND DROP TANK SYSTEM
F-86F-25 AND F-86F-30 AIRPLANES

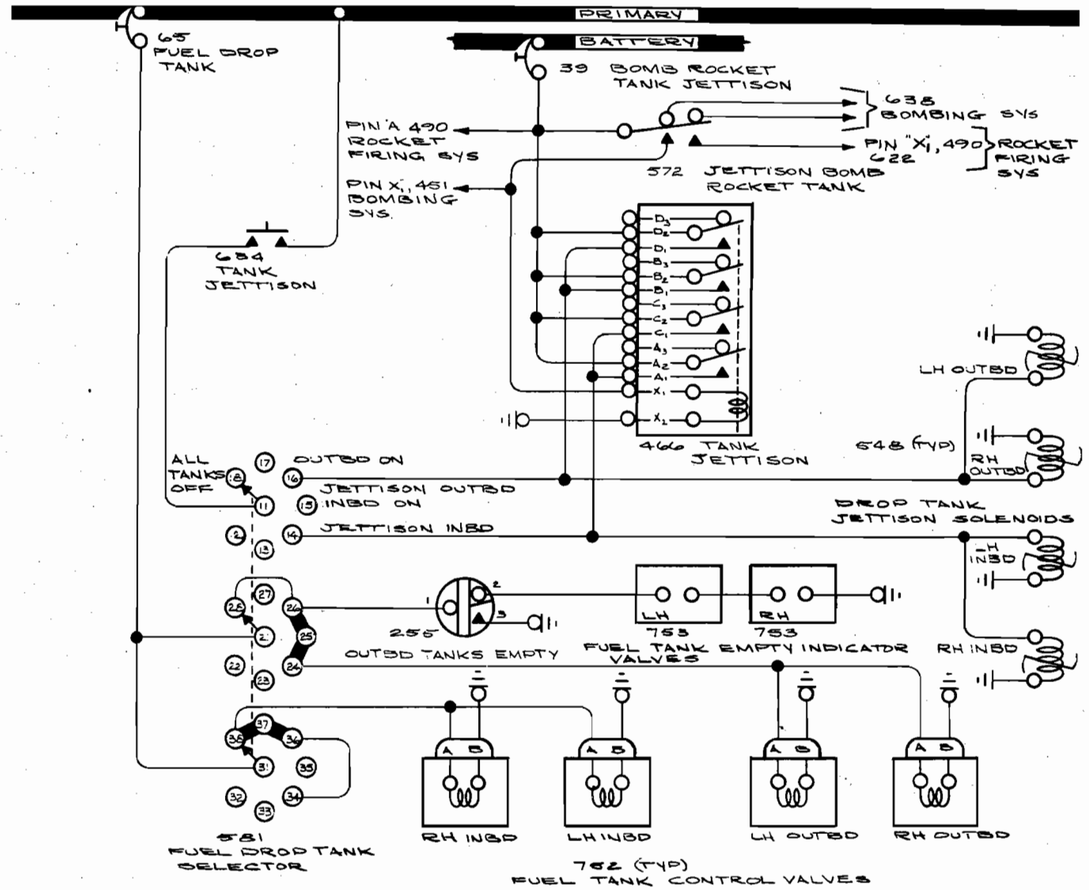
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Station 155 Left-hand Side Relay	Fus 155 LH	LH Radio Bay
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
313	Plug - Fuel Tank Control Valve	Wing 105 RH and LH	RH and LH Wing Leading Edges
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
383	Plug - Drop Tank Jettison Solenoid	Fus 152 RH and LH	Drop Tanks
435	Receptacle - Drop Tank Jettison Solenoid Disconnect	Wing 143 RH and LH	Drop Tank
439	Receptacle - Drop Tank Jettison Solenoid	Fus 143 LH and RH	Drop Tank
549	Solenoid - Drop Tank Jettison	Wing 143 LH	Drop Tank
564	Switch - Bomb Salvo	Fus 81 CL	Cockpit, Pedestal
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
696	Terminal Block - RH Bomb Rack	Wing 70 RH	Wing
697	Terminal Block - LH Bomb Rack	Wing 70 LH	Wing
752	Valve - Fuel Tank Control (RH)	Wing 105 RH and LH	Wings
753	Valve - Fuel-tanks-empty Light Switch	Fus 251 LH and RH	Wings Leading Edge

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Auxiliary Fuel Supply and Drop Tank System - F-86D-25 and F-86F-30 Airplanes



AUXILARY FUEL SUPPLY AND DROP TANK SYSTEM
F-86F-25 AND F-86F-30 AIRPLANES

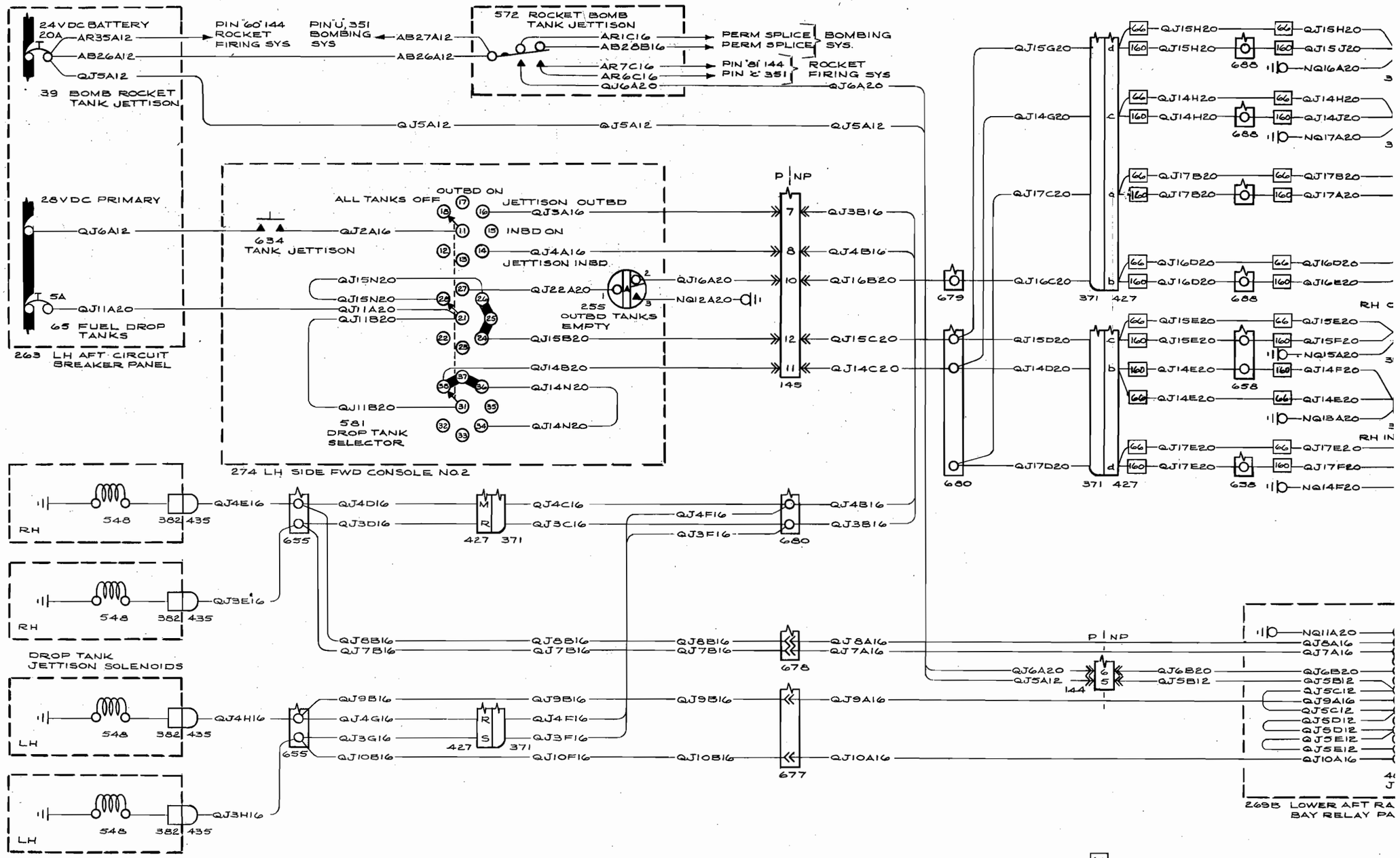


F-86F-2-54-421

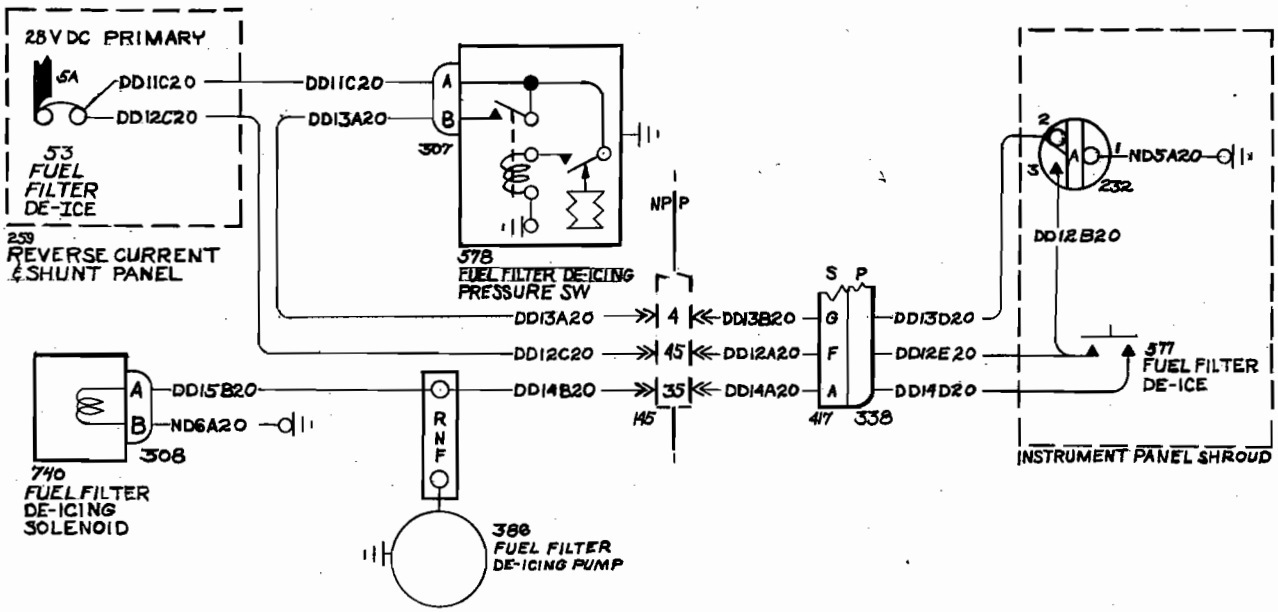
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Station 155 Left-hand Side Relay	Fus 155 LH	LH Radio Bay
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
313	Plug - Fuel Tank Control Valve	Wing 105 RH and LH	RH and LH Wing Leading Edges
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
435	Receptacle - Drop Tank Jettison Solenoid Disconnect	Wing 143 RH and LH	Drop Tank
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
677	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
752	Valve - Fuel Tank Control (RH)	Wing 105 RH and LH	Wings
753	Valve - Fuel-tanks-empty Light Switch	Fus 251 LH and RH	Wings, Leading Edge

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD 4) for part numbers and location of items.

Auxiliary Fuel Supply and Drop Tank System - F-86F-35 Airplanes



AUXILARY FUEL SUPPLY AND DROP TANK SYSTEM
F-86F-35 AIRPLANES

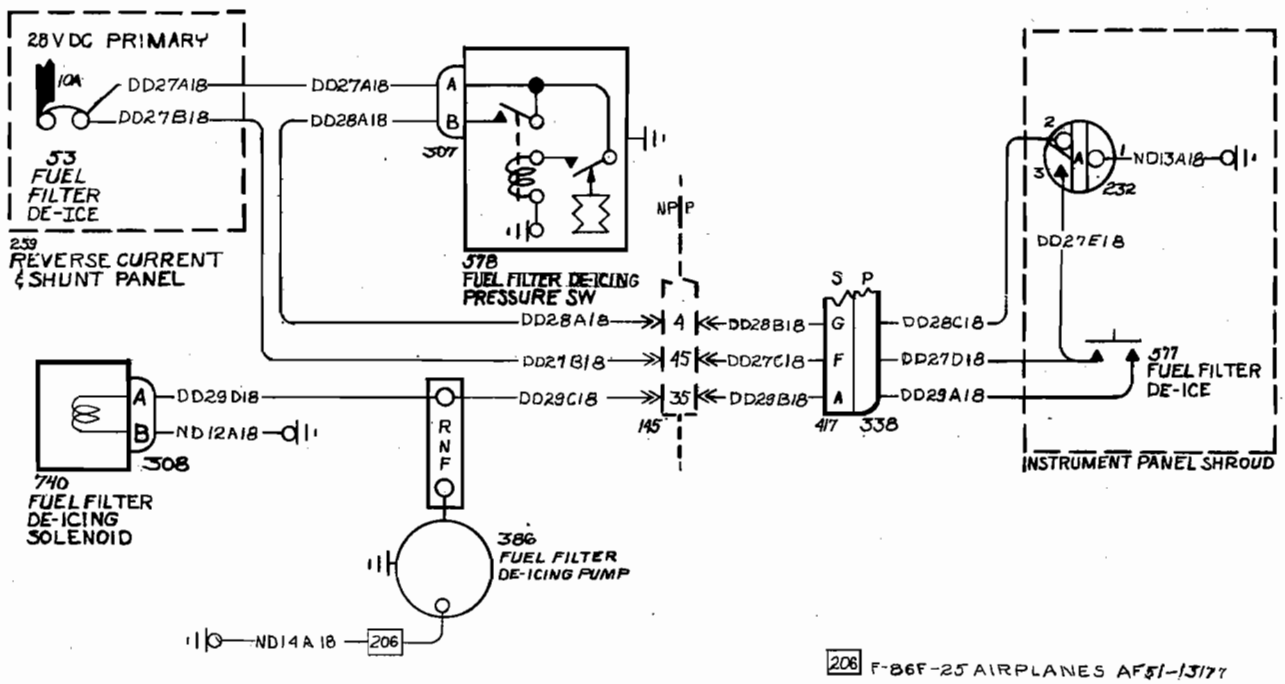


F-86F-2-54-335

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
307	Plug - Fuel Filter Deice Pressure Switch	Fus 205 LH	LH Engine Bay
308	Plug - Fuel Filter Deice Valve	Fus 205 LH	LH Engine Bay
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
578	Switch - Fuel Filter Deice Pressure	Fus 82 LH	LH Engine Access
740	Valve - Fuel Filter Deice Solenoid	Fus 205 LH	Engine Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

FUEL FILTER DE-ICING SYSTEM
F-86F-1 THROUGH F-86F-20 AIRPLANES



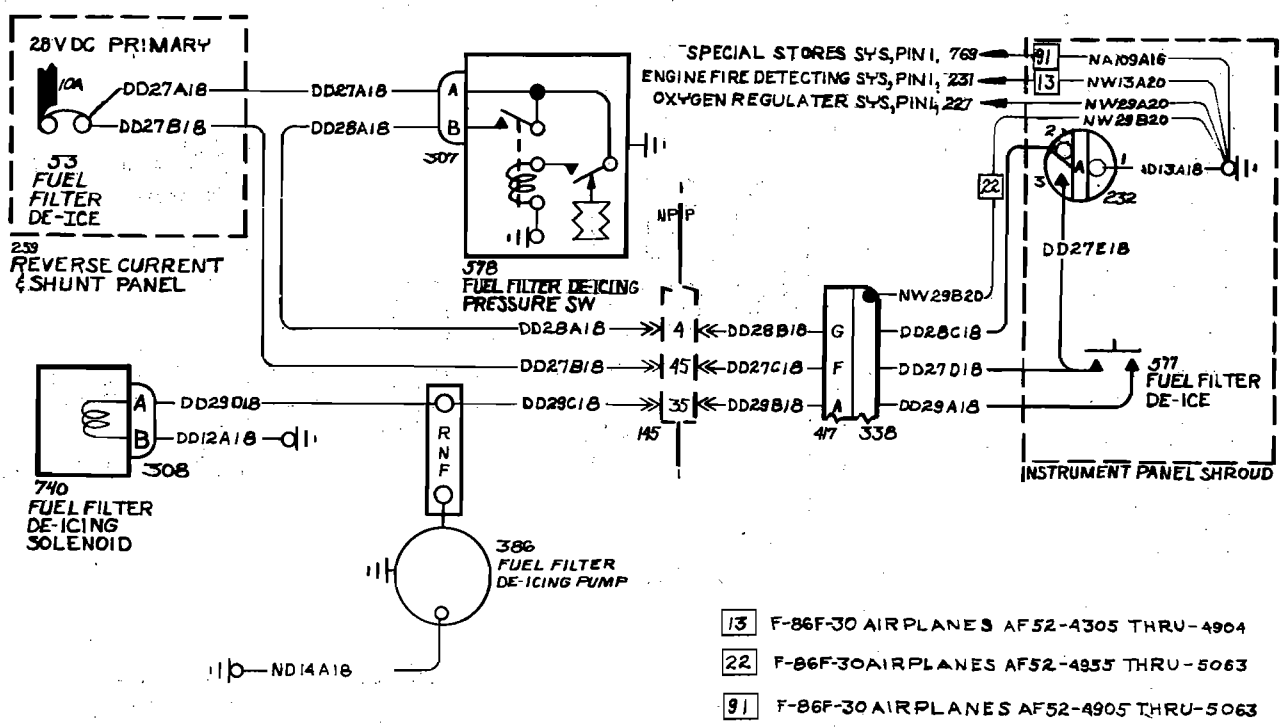
206 F-86F-25 AIRPLANES AF51-13177 THRU-13510 AND AF52-5272 THRU-5386

F-86F-2-54-336

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
307	Plug - Fuel Filter Deice Pressure Switch	Fus 205 LH	LH Engine Bay
308	Plug - Fuel Filter Deice Valve	Fus 205 LH	LH Engine Bay
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
578	Switch - Fuel Filter Deice Pressure	Fus 82 LH	LH Engine Access
740	Valve - Fuel Filter Deice Solenoid	Fus 205 LH	Engine Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

FUEL FILTER DE-ICING SYSTEM
F-86F-25 AIRPLANES AF51-13170 THROUGH-13510 AND AF52-5272 THROUGH-5386



13 F-86F-30 AIRPLANES AF52-4305 THRU-4904

22 F-86F-30 AIRPLANES AF52-4955 THRU-5063

91 F-86F-30 AIRPLANES AF52-4905 THRU-5063

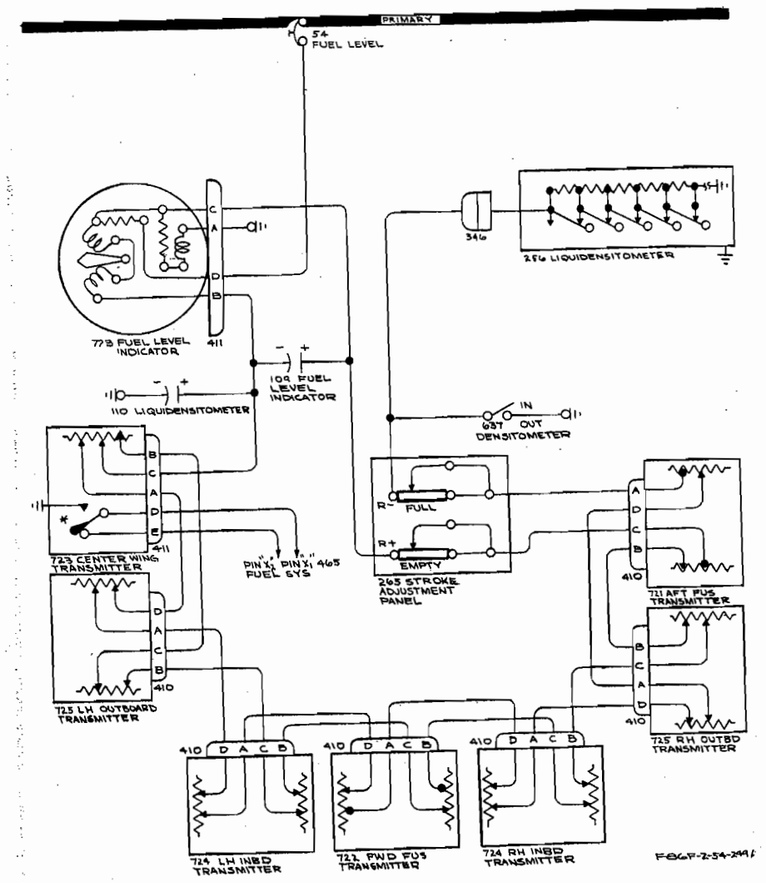
F-86F-2-54-337

(1 of 1A)

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
227	Lamp - Oxygen Regulator Warning	Fus 81 CL	Instrument Panel Shroud
231	Light Assembly - Fire Detector Warning	Fus 81 RH	Instrument Panel
232	Light Assembly - Fuel Filter Deice	Fus 81 LH	Cockpit - Instrument Panel Shroud
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
307	Plug - Fuel Filter Deice Pressure Switch	Fus 205 LH	LH Engine Bay
308	Plug - Fuel Filter Deice Valve	Fus 205 LH	LH Engine Bay
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
417	Receptacle - Instrument Panel Shroud Disconnect	Fus 71 RH	Cockpit, Forward RH Side
577	Switch - Fuel Filter Deice	Fus 81 CL	Cockpit, Instrument Panel Shroud
578	Switch - Fuel Filter Deice Pressure	Fus 82 LH	LH Engine Access
740	Valve - Fuel Filter Deice Solenoid	Fus 205 LH	Engine Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel Filter De-Icing System
F-86F-30 Airplanes AF52-4905 Through -5063

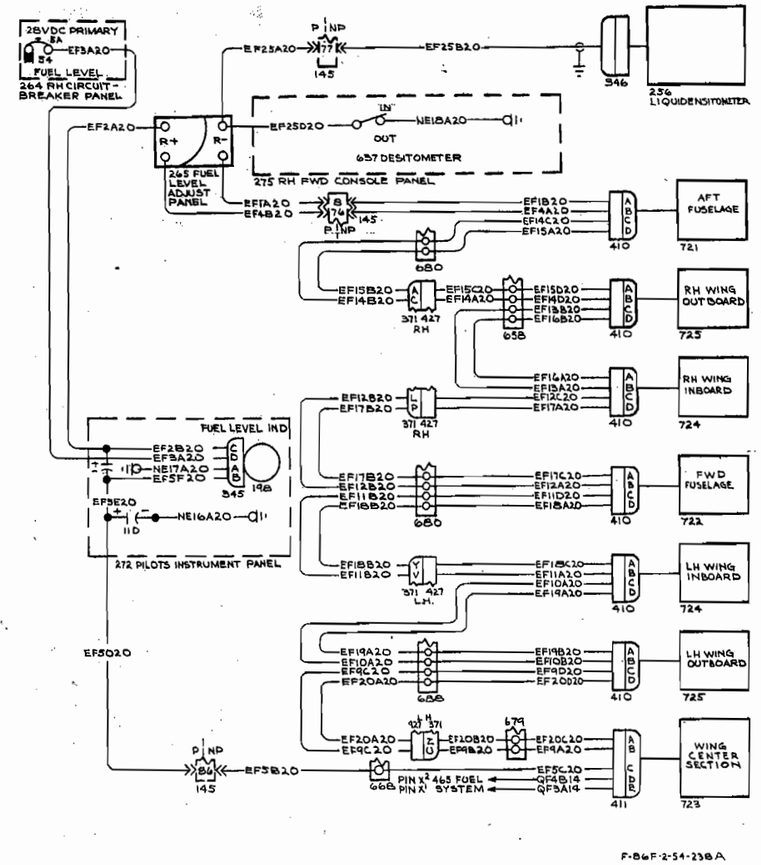


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
256	Liquidensitometer	Fus 190 LH	Wing Center Section Fuel Cell
264	Panel - Circuit-breaker Right-hand	Fus 116 RH	Cockpit - RH
265	Panel - Fuel Level Adjustment	Fus 126 RH	Inside Cover of Right-hand Pressure Disconnect in Cockpit
272	Panel - Instrument	Fus 76 CL	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
346	Plug - Liquidensitometer	Fus 61 RH	RH Wheel Well
371	Plug - Wing Wtring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
410	Receptacle - Fuel Level Transfer	Fus 250 LH	LH Emergency Access
411	Receptacle - Fuel Level Transfer	Fus 160 RH	RH Wheel Well
465	Relay - Fuel Transfer Pump Control	Fus 166 RH	Engine Access
656	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
721	Transmitter - Fuselage (Aft) Fuselage Fuel Level	Fus 250 LH	LH Emergency Access
722	Transmitter - Fuselage (Forward) Fuel Level	Fus 155 RH	RH Radio Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
724	Transmitter - Wing Outer Panel (Inboard) Fuel Level	Fus 250 LH and RH	Wings
725	Transmitter - Wing Outer Panel (Outboard) Fuel Level	Fus 250 LH and RH	Wings

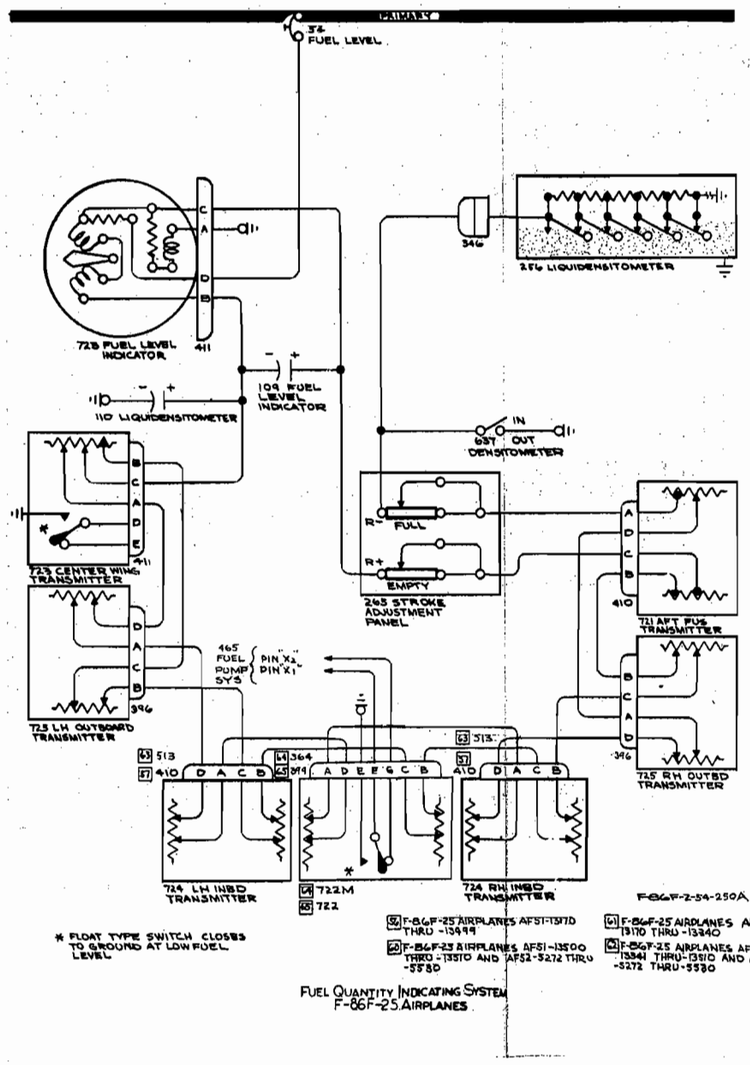
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel Quantity Indicating System - F-86F-1 Through F-86F-20 Airplanes

Fuel Quantity Indicating System
F-86F-1 Thru F-86F-20 Airplanes



Fuel Quantity Indicating System
F-86F-1 Through F-86F-20 Airplanes

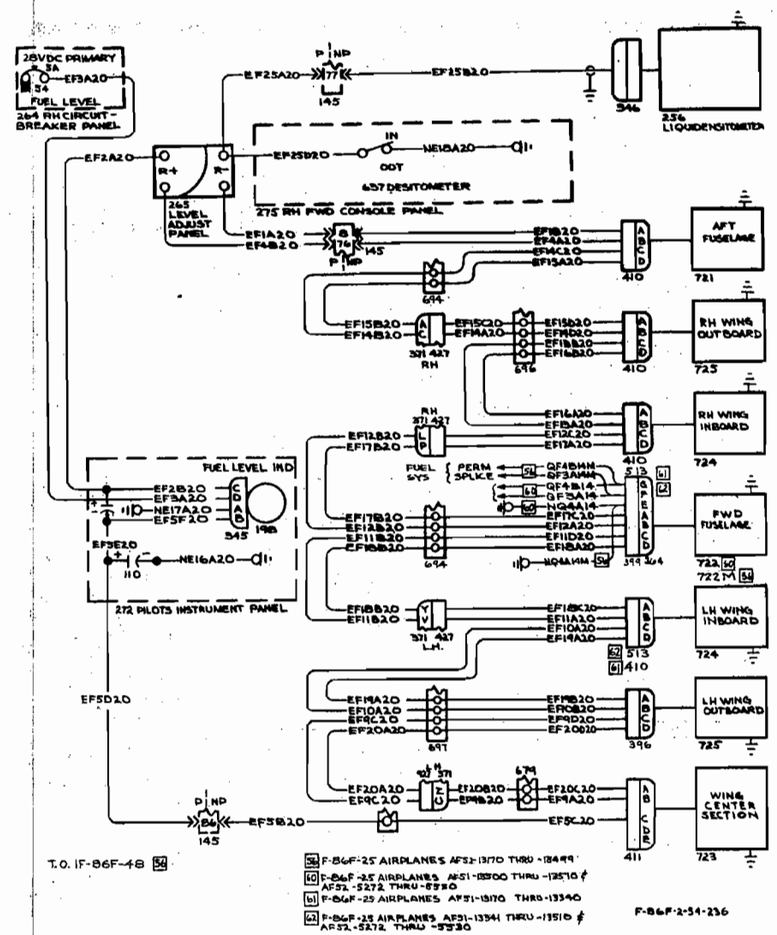


Fuel Quantity Indicating System
F-86F-25 Airplanes

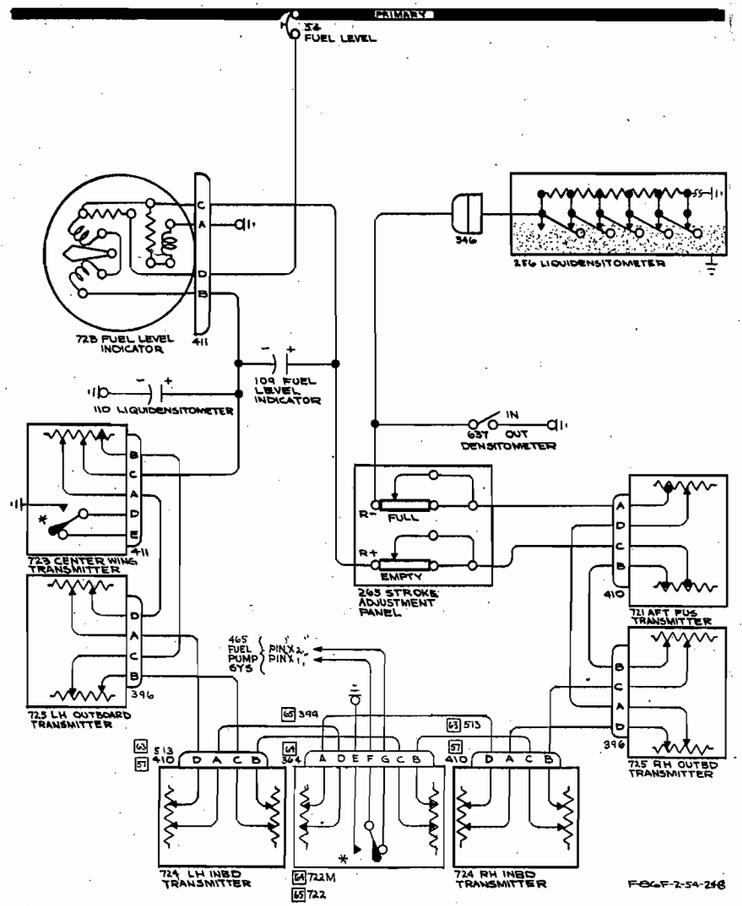
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
256	Liquidensitometer	Fus 190 LH	Wing Center Section Fuel Cell
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
265	Panel - Fuel Level Adjustment	Fus 126 RH	Inside Cover of Right-hand Pressure Disconnect in Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
346	Plug - Liquidensitometer	Fus 81 RH	RH Wheel Well
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
396	Receptacle - Outboard Fuel Level Transmitter	Wings 126 RH and LH	Wings
410	Receptacle - Fuel Level Transfer	Fus 250 LH	LH Emergency Aecess
411	Receptacle - Fuel Level Transfer	Fus 160 RH	RH Wheel Well
637	Switch - Fuel Density Correction	Fus 90 RH	RH Forward Console
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
696	Terminal Block - RH Bomb Rack	Wing 70 RH	Wing
697	Terminal Block - LH Bomb Rack	Wing 70 LH	Wing
721	Transmitter - Fuselage (Aft) Fuselage Fuel Level	Fus 250 LH	LH Emergency Access
722	Transmitter - Fuselage (Forward) Fuel Level	Fus 155 RH	RH Radio Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
724	Transmitter - Wing Outer Panel (Inboard) Fuel Level	Fus 250 LH and RH	Wings
725	Transmitter - Wing Outer Panel (Outboard) Fuel Level	Fus 250 LH and RH	Wings

Refer to Illustrated Parts Breakdown T. O. No. 1F-88F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel Quantity Indicating System F-86F-25 Airplanes



Fuel Quantity Indicating System
F-86F-25 Airplanes



* FLOAT TYPE SWITCH CLOSES TO GROUND AT LOW FUEL LEVEL

57 F-86F-30 AIRPLANES AF52-4305 THRU -4504

63 F-86F-30 AIRPLANE AF52-4505 AND ALL SOSEQUENT AIRPLANES

64 F-86F-30 AIRPLANES AF52-4305 THRU -4831

65 F-86F-30 AIRPLANE AF52-4832 AND ALL SUBSEQUENT AIRPLANES

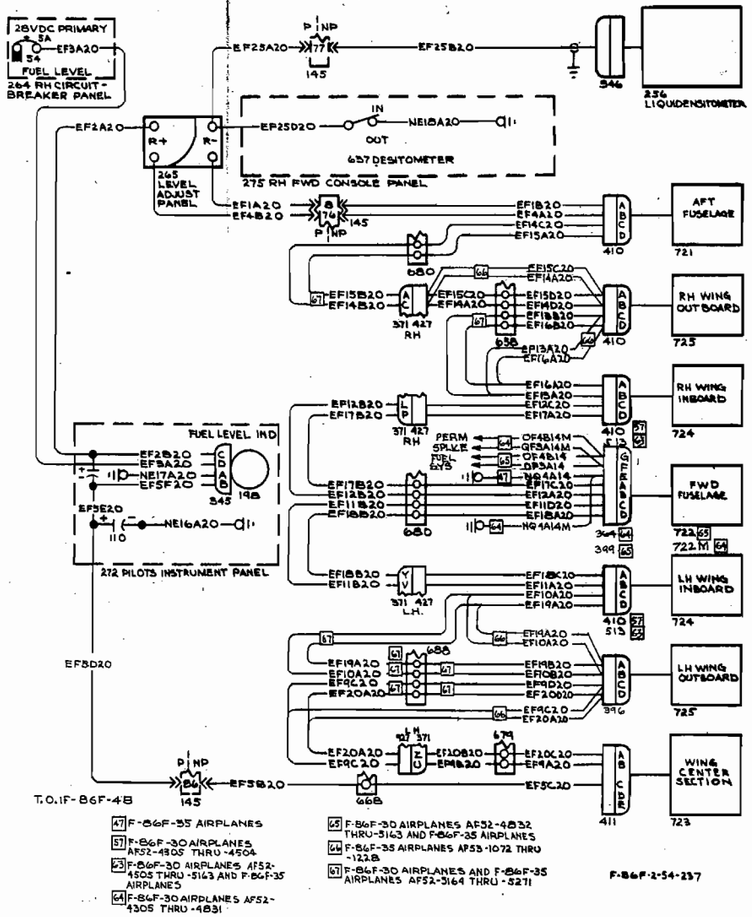
FUEL QUANTITY INDICATING SYSTEM
F-86F-30 AND -35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
256	Liquidensitometer	Fus 190 LH	Wing Center Section Fuel Cell
284	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
265	Panel - Fuel Level Adjustment	Fus 126 RH	Inside Cover of Right-hand Pressure Disconnect in Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
346	Plug - Liquidensitometer	Fus 81 RH	RH Wheel Well
364	Plug - Forward Fuselage Tank Transmitter	Fus 155.8 RH	RH Radio Bay
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
396	Receptacle - Outboard Fuel Level Transmitter	Wings 126 RH and LH	Wings
399	Receptacle - Bomb Rack (S-2)	Fus 143 RH and LH	Wings
410	Receptacle - Fuel Level Transfer	Fus 250 LH	LH Emergency Access
411	Receptacle - Fuel Level Transfer	Fus 160 RH	RH Wheel well
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
721	Transmitter - Fuselage (Aft) Fuselage Fuel Level	Fus 250 LH	LH Emergency Access
722	Transmitter - Fuselage (Forward) Fuel Level	Fus 155 RH	RH Radio Bay
723	Transmitter - Wing (Center) Fuel Level	Fus 190 RH	RH Wheel Well
724	Transmitter - Wing Outer Panel (Inboard) Fuel Level	Fus 250 LH and RH	Wings
725	Transmitter - Wing Outer Panel (Outboard) Fuel Level	Fus 250 LH and RH	Wings

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Fuel Quantity Indicating System - F-86F-30 and F-86F-35 Airplanes

TO No IF-86F-2



47 F-86F-35 AIRPLANES

57 F-86F-30 AIRPLANES AF52-4305 THRU -4504

63 F-86F-30 AIRPLANES AF52-4505 THRU -5163 AND F-86F-35 AIRPLANES

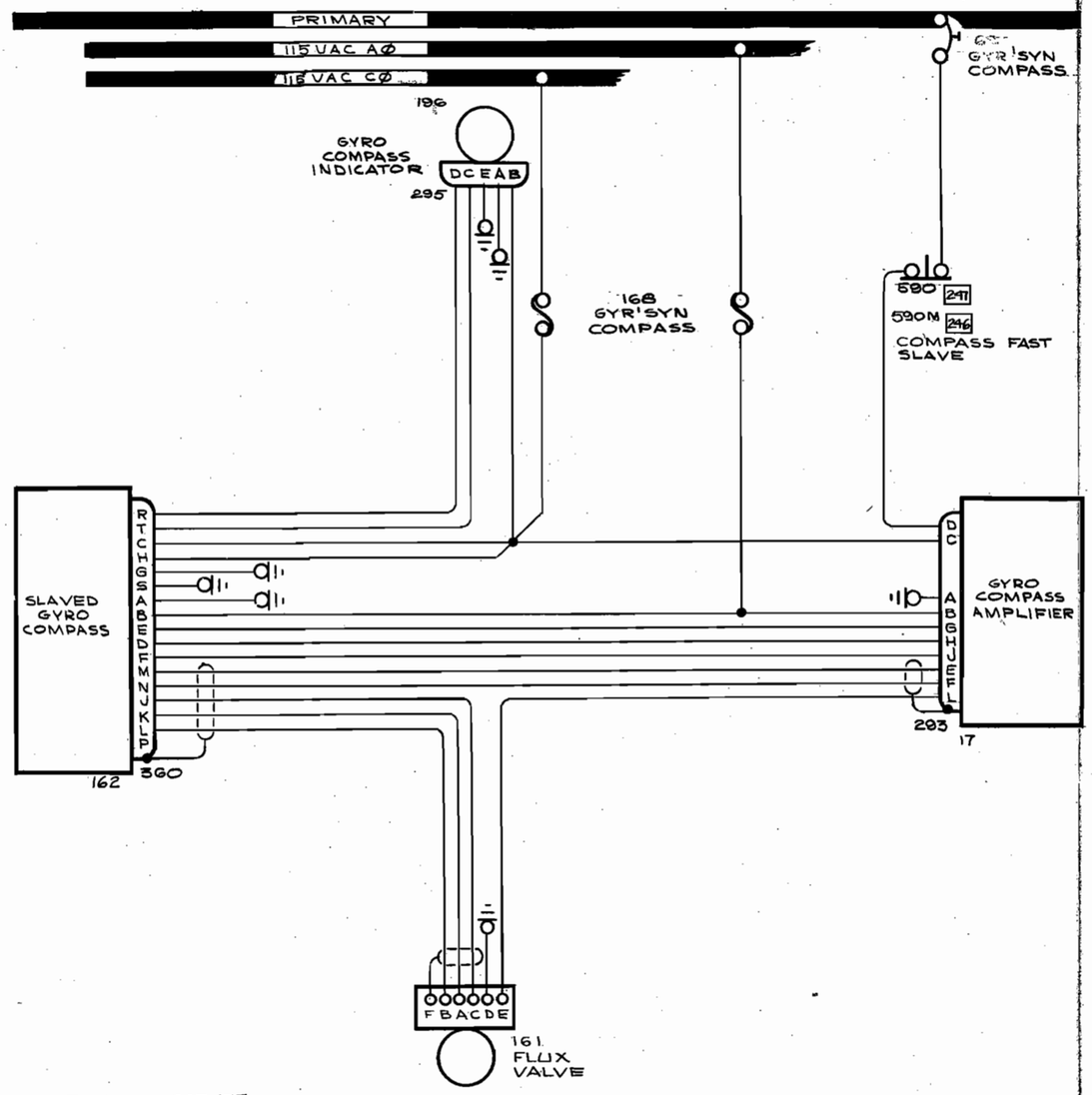
64 F-86F-30 AIRPLANES AF52-4305 THRU -4831

65 F-86F-30 AIRPLANES AF52-4832 THRU-5163 AND F-86F-35 AIRPLANES

64 F-86F-35 AIRPLANES AF53-1072 THRU -1238

67 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU -5271

FUEL QUANTITY INDICATING SYSTEM
F-86F-30 AND 35 AIRPLANES



T.O. No. 1 F-86F-133

246 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13490 AND F-86F-30 AIRPLANES AF52-4305 THRU -4504

247 F-86F-25 AIRPLANES AF51-13491 THRU -13510, AF52-5272 THRU -5530, AND F-86F-30 AIRPLANE AF52-4605 AND ALL SUBSEQUENT AIRPLANES

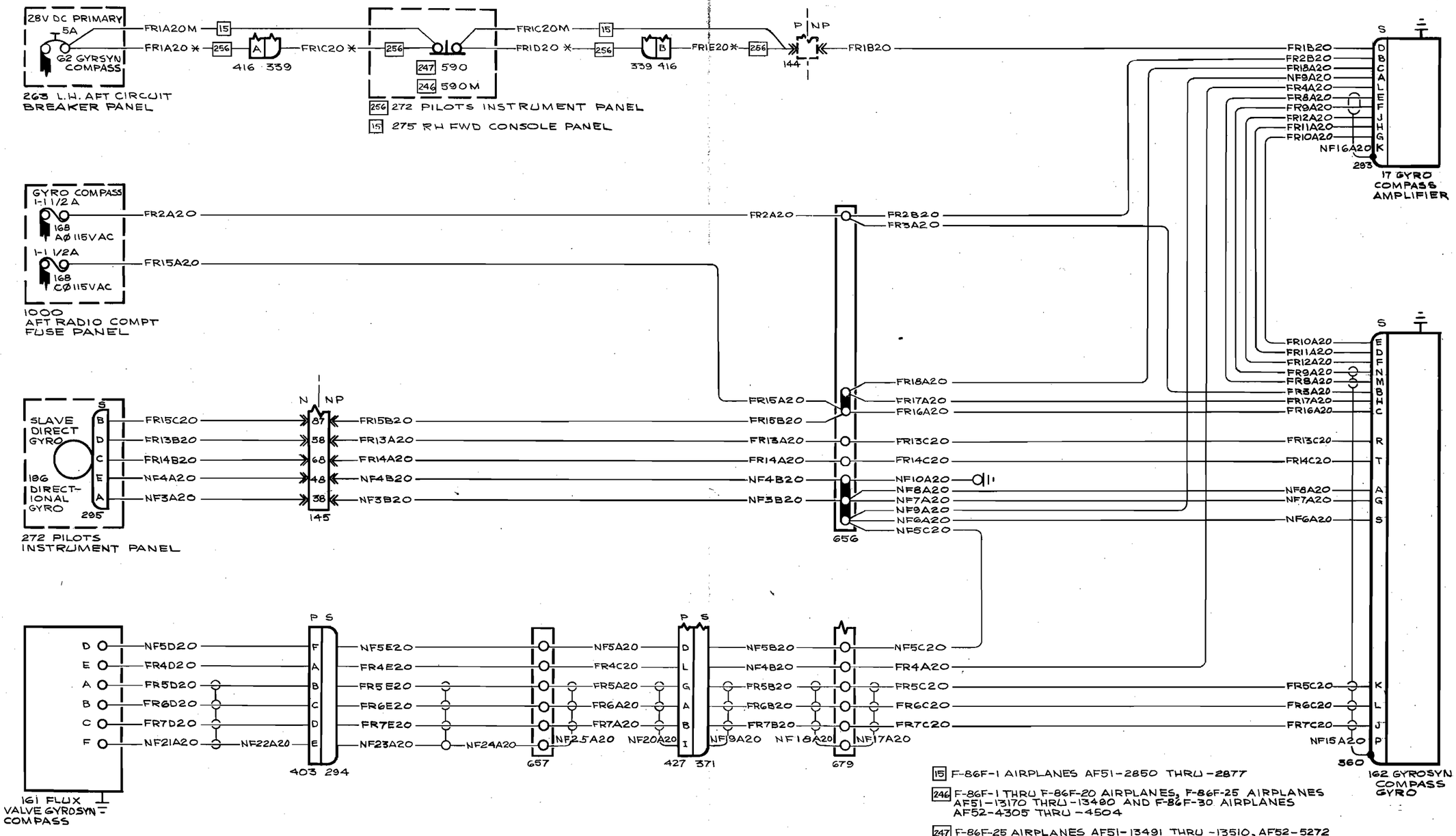
F-86F-2-54-356

GYRO COMPASS SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
17	Amplifier - Gyrocompass	Fus 144.6 RH	RH Radio Bay
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
161	Flux Valve - Gyrosyn Compass Gyro	Fus 158 LH	LH Wing, Near Tip
162	Unit - Gyrosyn Compass Gyro	Fus 148 RH	RH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
293	Plug - Compass Amplifier (Gyro)	Fus 63 LH	Left Labs Access Bay
294	Plug - Compass Flux Gate	Fus 251 LH	LH Wing Tip
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Foward LH Side of Instrument Panel
360	Plug - Slaved Gyrocompass	Fus 71 LH	Forward of Cockpit
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
656	Terminal Block - Compass	Fus 125 CL	Below Cockpit
657	Terminal Block - Compass - Gyro	LE 250 LH	Wing
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Gyro Compass System



T.O. NO. 1 F-86-133

* ADD MODIFICATION LETTER "M" ON F-86F-1 AIRPLANES AF51-2878 THRU -2927, F-86F-5 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF-51-13170 THRU -13490, AND F-86F-30 AIRPLANES AF52-4305 THRU -4504

15 F-86F-1 AIRPLANES AF51-2850 THRU -2877

246 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13480 AND F-86F-30 AIRPLANES AF52-4305 THRU -4504

247 F-86F-25 AIRPLANES AF51-13491 THRU -13510, AF52-5272 THRU -5530, AND F-86F-30 AIRPLANE AF52-4505 AND ALL SUBSEQUENT AIRPLANES

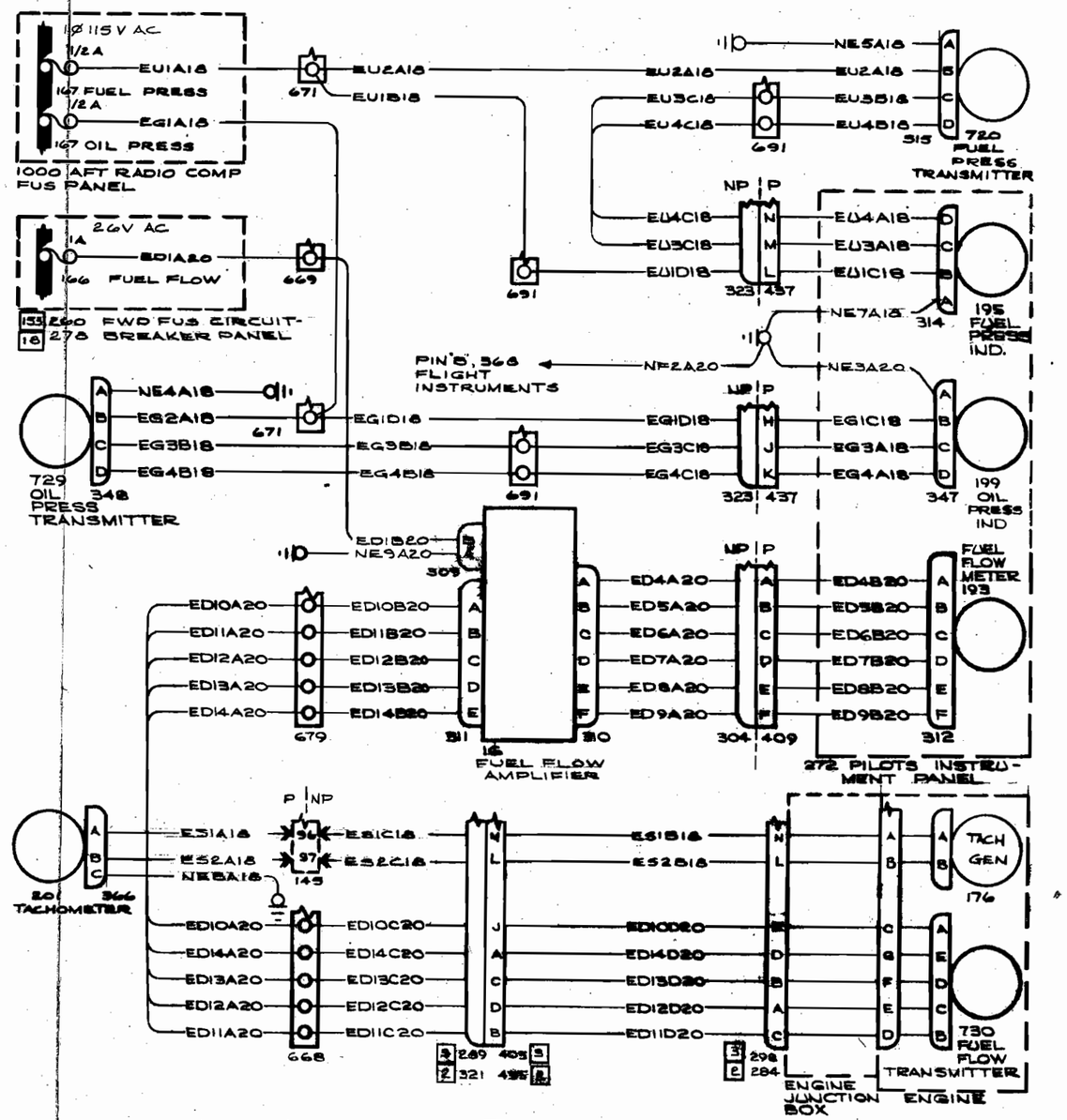
256 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-5 THRU F-86F-35 AIRPLANES

F-86F-2-54-357

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
16	Amplifier - Fuel Flow Totalizer	Fus 65 RH	Nose Wheel Well
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
309	Plug - Fuel Totalizer Amplifier	Fus 68 LH	LH Access Plates in Nose Wheel Well
311	Plug - Fuel Totalizer Amplifier	Fus 68 LH	LH Access Plates in Nose Wheel Well
321	Plug - Engine Disconnect	Fus 205 LH	Engine Bay RH
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
348	Plug - Oil Pressure Transfer	Fus 81 LH	LH Engine Bay
366	Plug - Tachometer Indicator	Fus 81 CL	Instrument Panel RH
368	Plug - Turn-and-Bank Indicator	Fus 80 LH	Forward Cockpit
515	Regulator - Oxygen	Fus 85 LH	Cockpit, LH Forward Side
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdwon T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Instruments - F-86F-1 Through F-86F-15, F-86F-20 Airplanes AF51-13070 Through -13109



[2] F-86F-1 THRU F-86F-15 AIRPLANES

[3] F-86F-20 AIRPLANES AF-13070 THRU -13109

[18] F-86F-10 & F-86F-15 AIRPLANES

[155] F-86F-1 & F-86F-5 AIRPLANES & F-86F-20 AIRPLANES AF51-13070 THRU -13109

F-86F-2-54-258

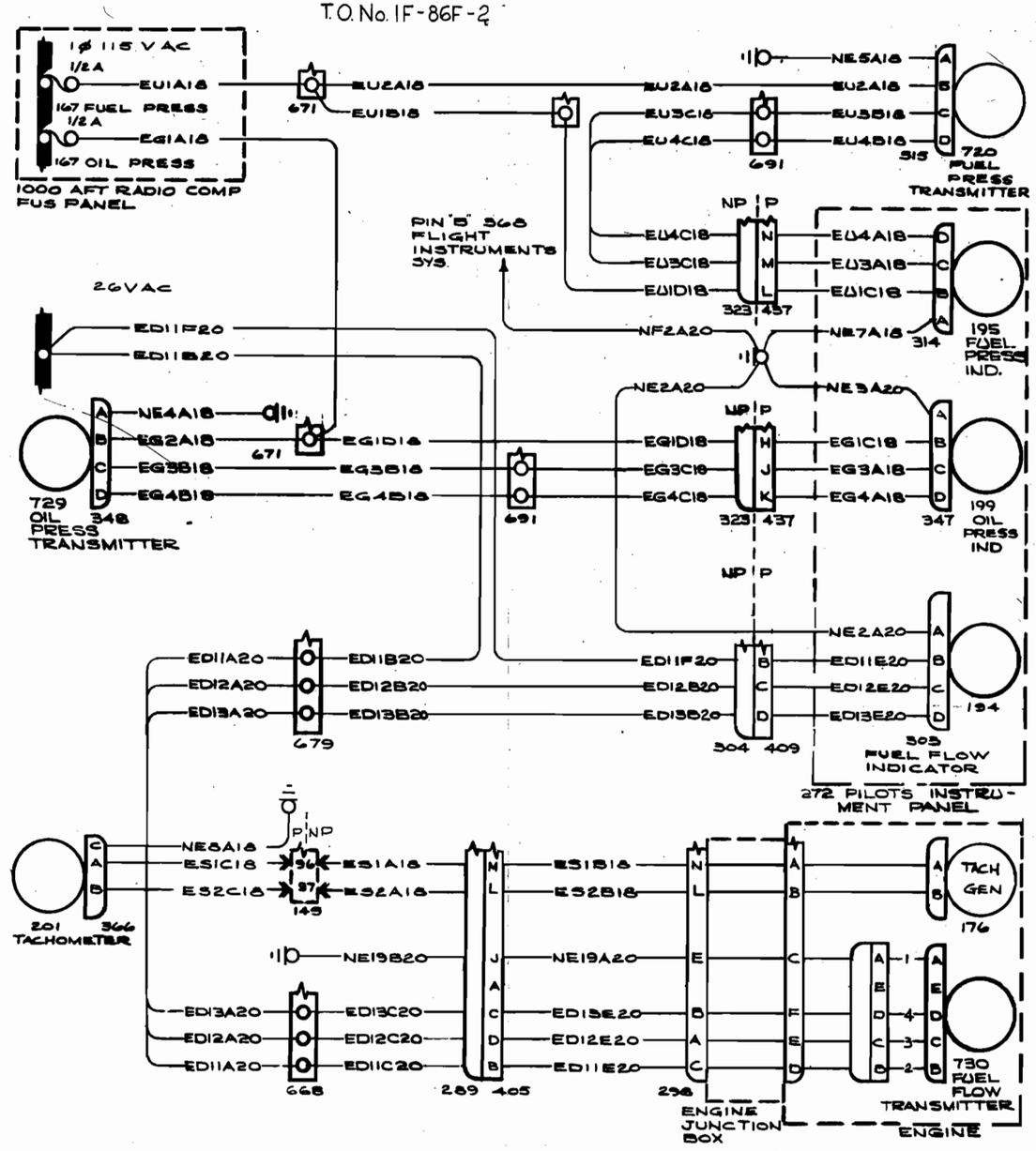
ENGINE INSTRUMENTS
F-86F-1 THRU F-86F-15
F-86F-20 AIRPLANES, AF51-13070 THROUGH -13109

INDEX NO.	DESCRIPTION	STATION	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
176	Generator - Tachometer	Fus 185 CL	Within Engine Snood
201	Indicator - Tachometer	Fus 81 RH	Instrument Panel
272	Panel - Instrument	Fus 78 CL	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
368	Plug - Turn-and-Bank Indicator	Fus 80 CL LH	Forward Cockpit
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
720	Transmitter - Fuel Pressure	Fus 81 LH	LH Engine Access
729	Transmitter - Oil Pressure	Fus 81 LH	LH Engine Access
730	Transmitter - Fuel Flowmeter	Fus 205 RH	Engine
1000	Panel - Aft Radio Comp Fus	Fus 157 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Instruments F-86F-20 Airplanes AF51-13110 Through -13169 and F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5446 and F-86F-30 Airplanes AF52-4305 Through -4904

T.O. No. 1F-86F-2



F-86F-2-54-256A

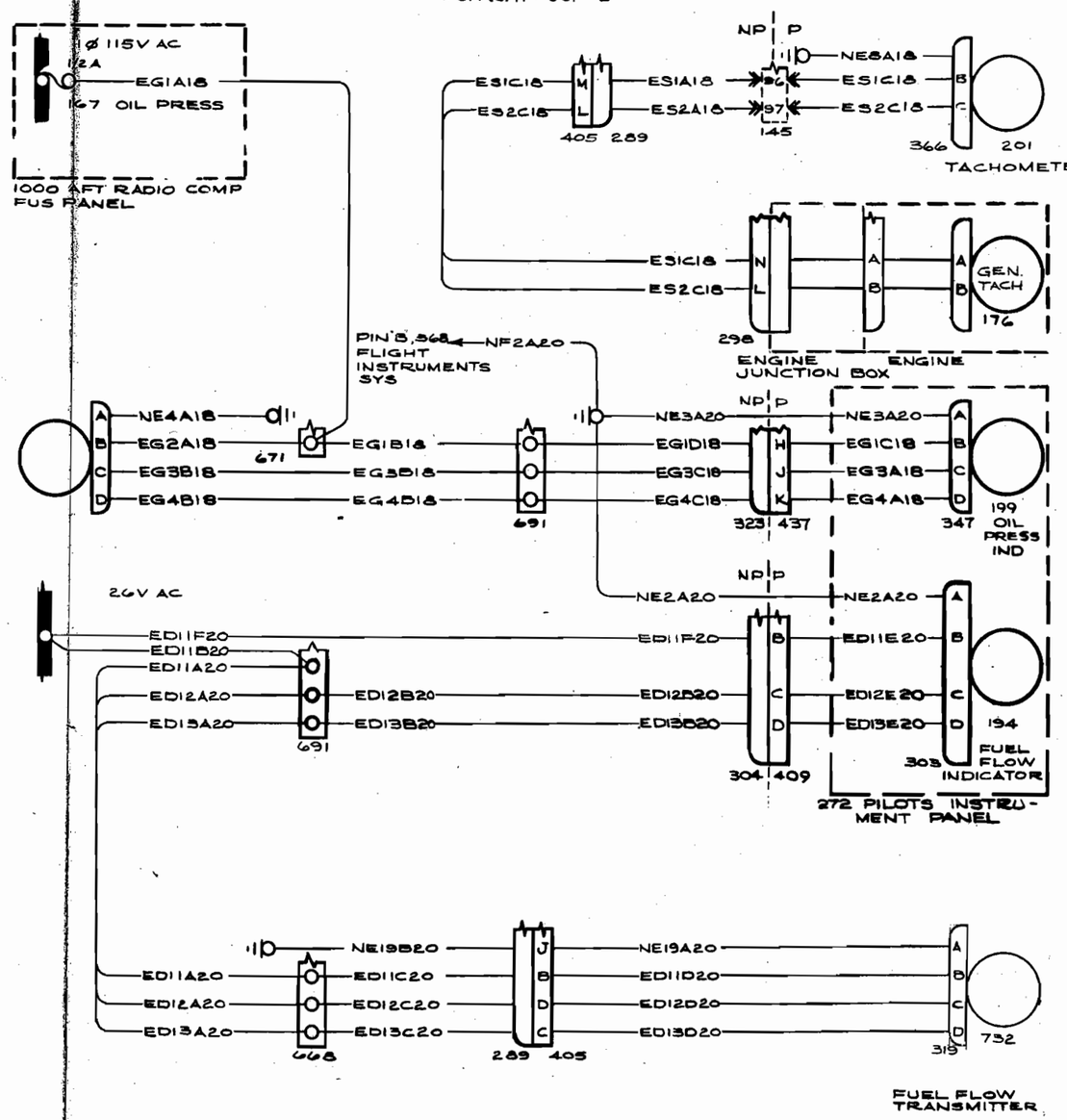
ENGINE INSTRUMENTS

F-86D-20 AIRPLANES AF51-13110 THROUGH -13169 AND F-86F-25 AIRPLANES AF51-13170 THROUGH 13510 AND AF52-5272 THROUGH -5446 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4904

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
176	Generator - Tachometer	Fus 185 CL	Within Engine Snood
199	Indicator - Cil Pressure	Fus 81 RH	Instrument Panel
201	Indicator - Tachometer	Fus 81 RH	Instrument Panel
272	Panel - Instrument	Fus 78 CL	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
366	Plug - Tachometer Indicator	Fus 81 CL	Instrument Panel RH
368	Plug - Turn-and-Bank Indicator	Fus 80 LH	Forward Cockpit
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Instruments - F-86F-25 Airplanes AF52-5447 Through -5530

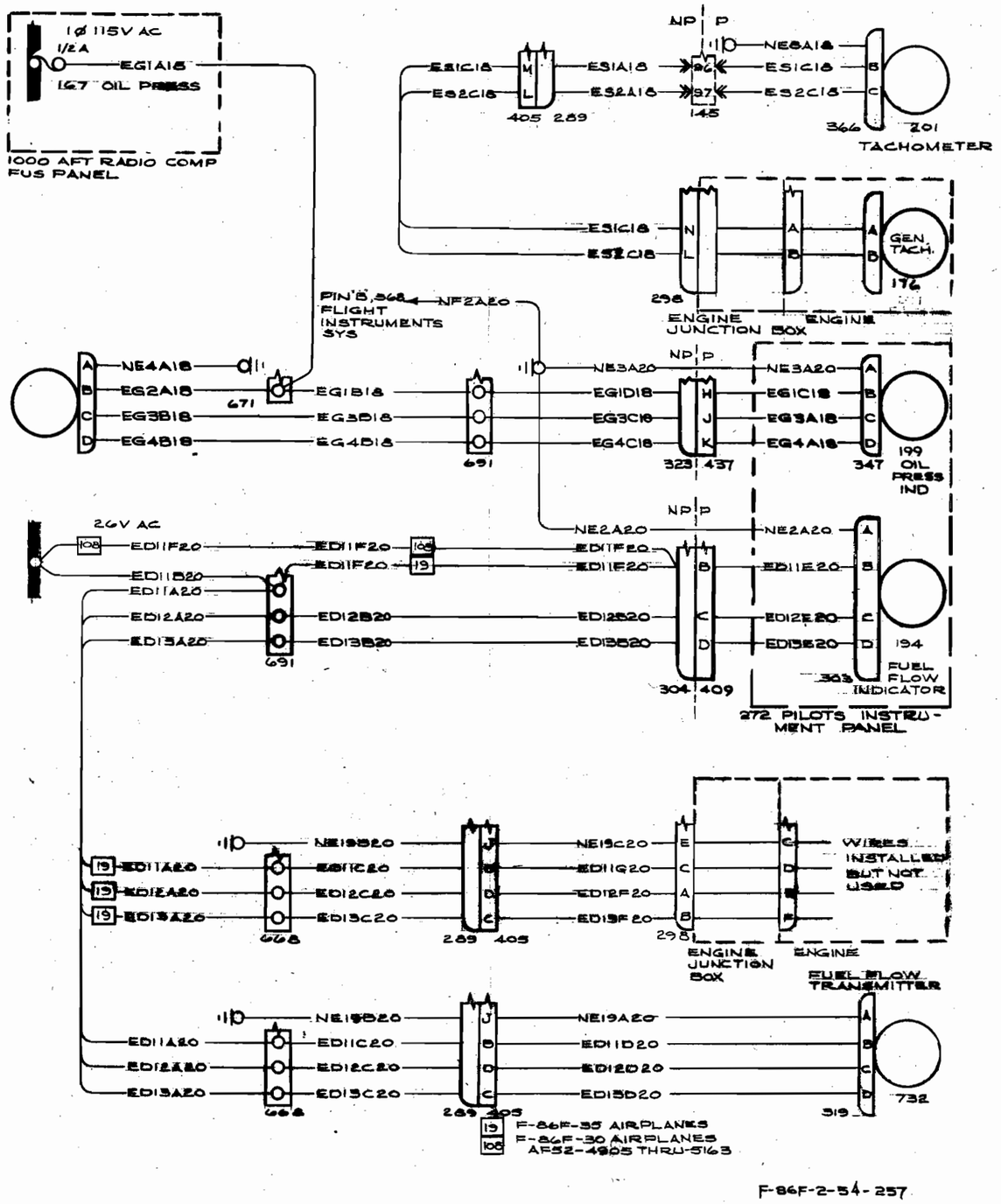


F-86F-2-54-255

INDEX NO.	DESCRIPTION	STATION	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
366	Plug - Tachometer Indicator	Fus 81 CL	Instrument Panel RH
368	Plug - Turn-and-Bank Indicator	Fus 80 CL LH	Forward Cockpit
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
1000	Panel - Aft Radio Comp Fus	Fus 157 LH	LH Radio Bay

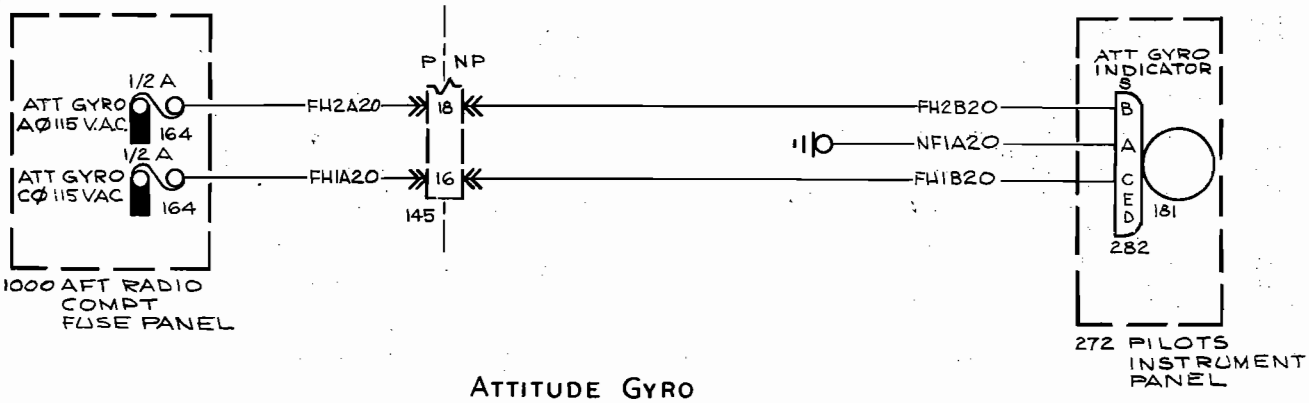
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Engine Instruments F-86F-30 Airplane AF52-4905 and All Subsequent Airplanes

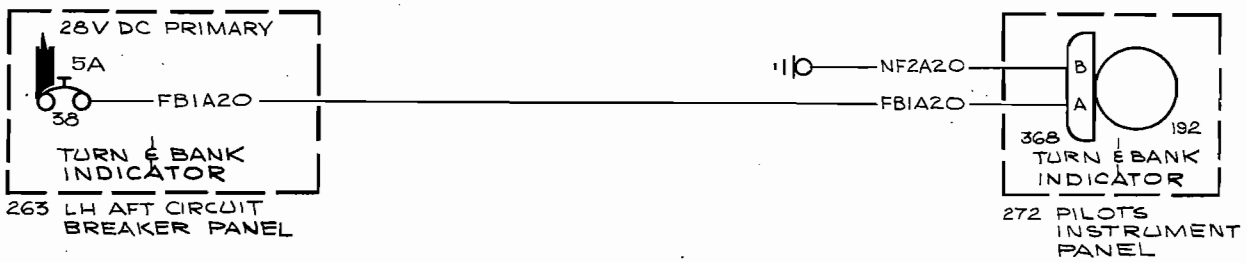


F-86F-2-54-257

ENGINE INSTRUMENTS
F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES



ATTITUDE GYRO



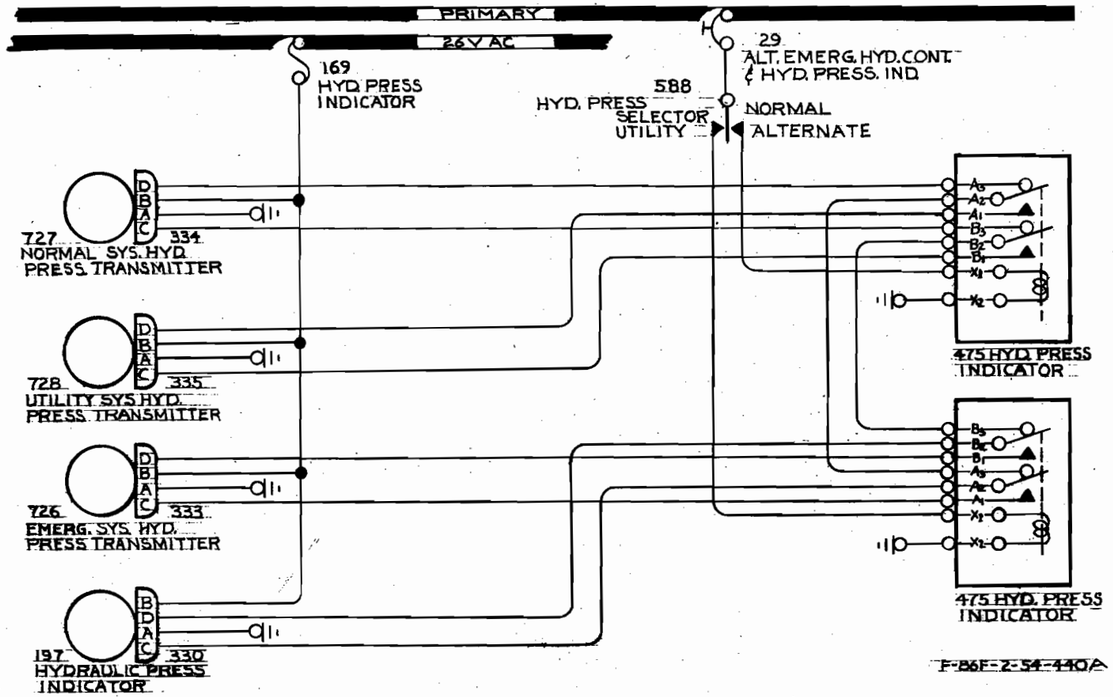
TURN AND BANK INDICATOR SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
272	Panel - Instrument	Fus 78 CL	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part number and location of items.

F-86F-2-54-348

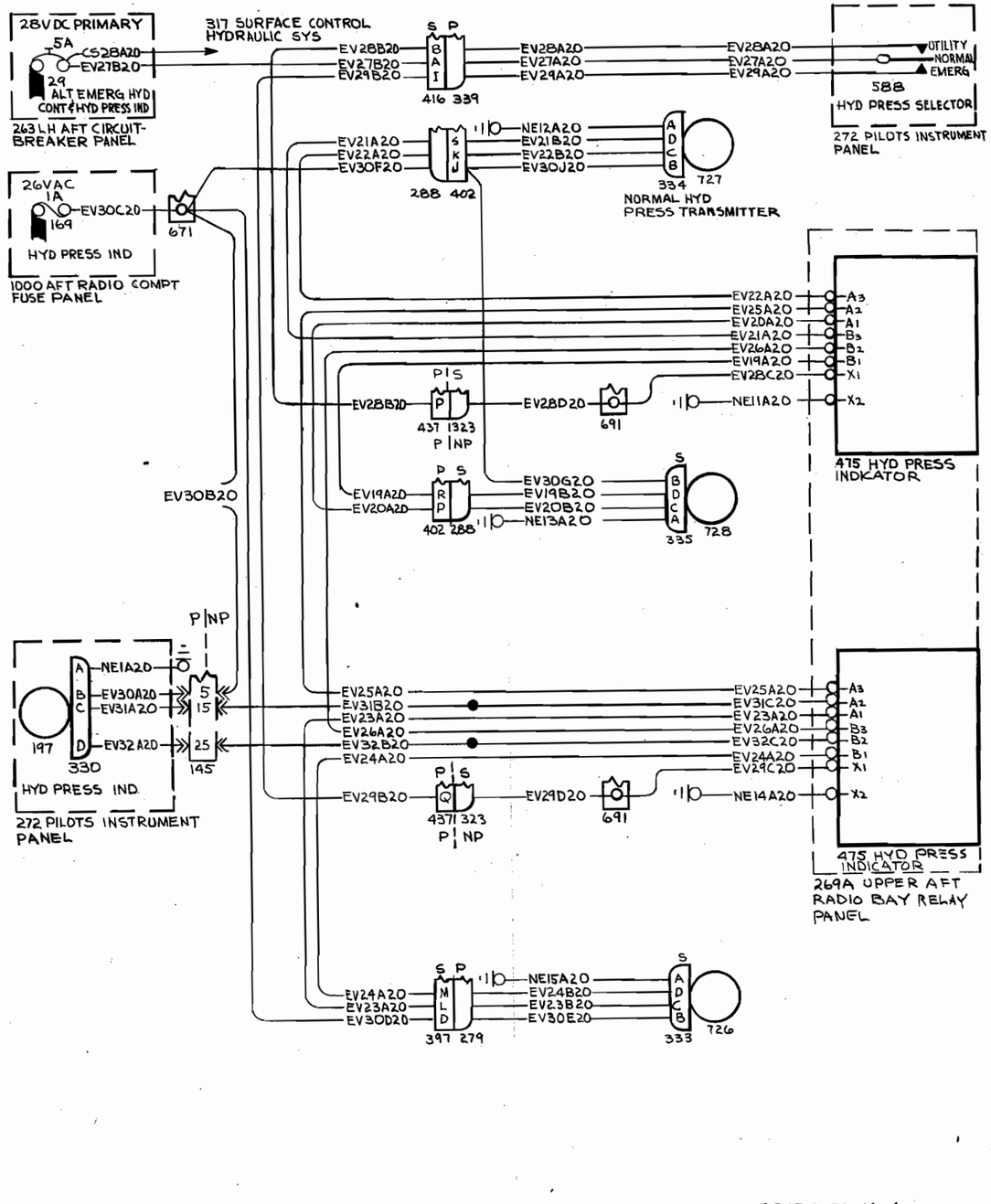
FLIGHT INSTRUMENTS SYSTEM

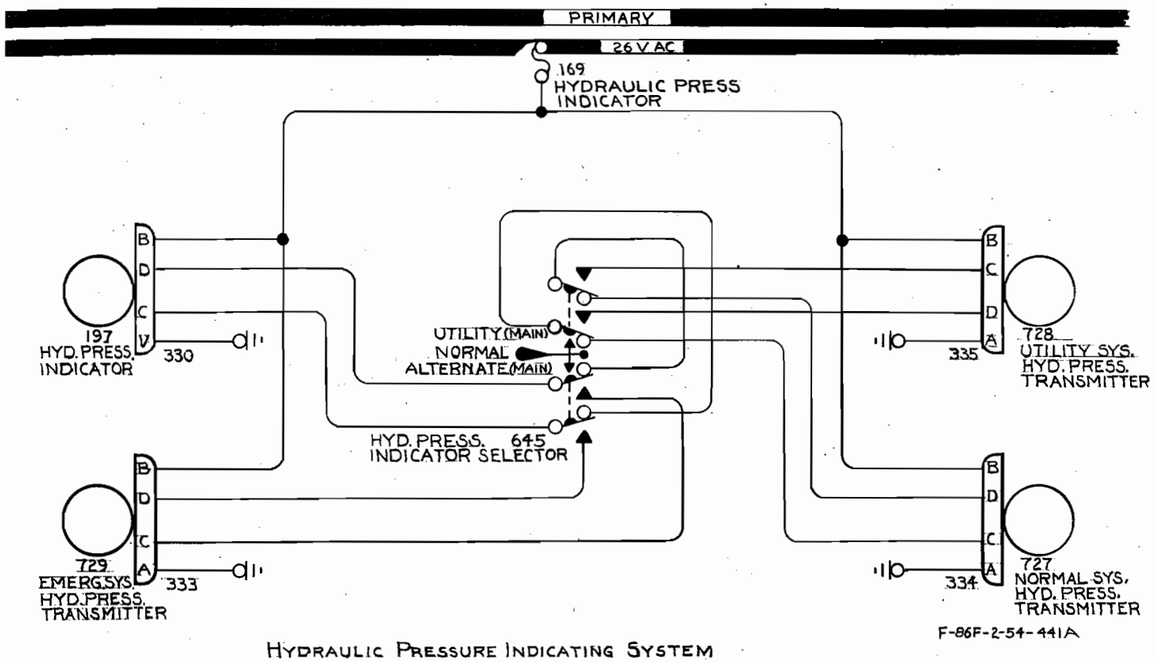


HYDRAULIC PRESSURE INDICATING SYSTEM
F-86F-1 AIRPLANES AF51-2850 THROUGH -2877

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Station 155 Left-hand Side Relay	Fus 155 LH	LH Radio Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
288	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
726	Transmitter - Hydraulic Pressure Emergency	Fus 81 LH	Data Case Access
727	Transmitter - Hydraulic Pressure Normal	Fus 155 CL	Wing Slot
728	Transmitter - Hydraulic Pressure Utility	Fus 155 CL	Wing Slot
1000	Panel - Aft Radio Compt Fuse	Fus 157 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.



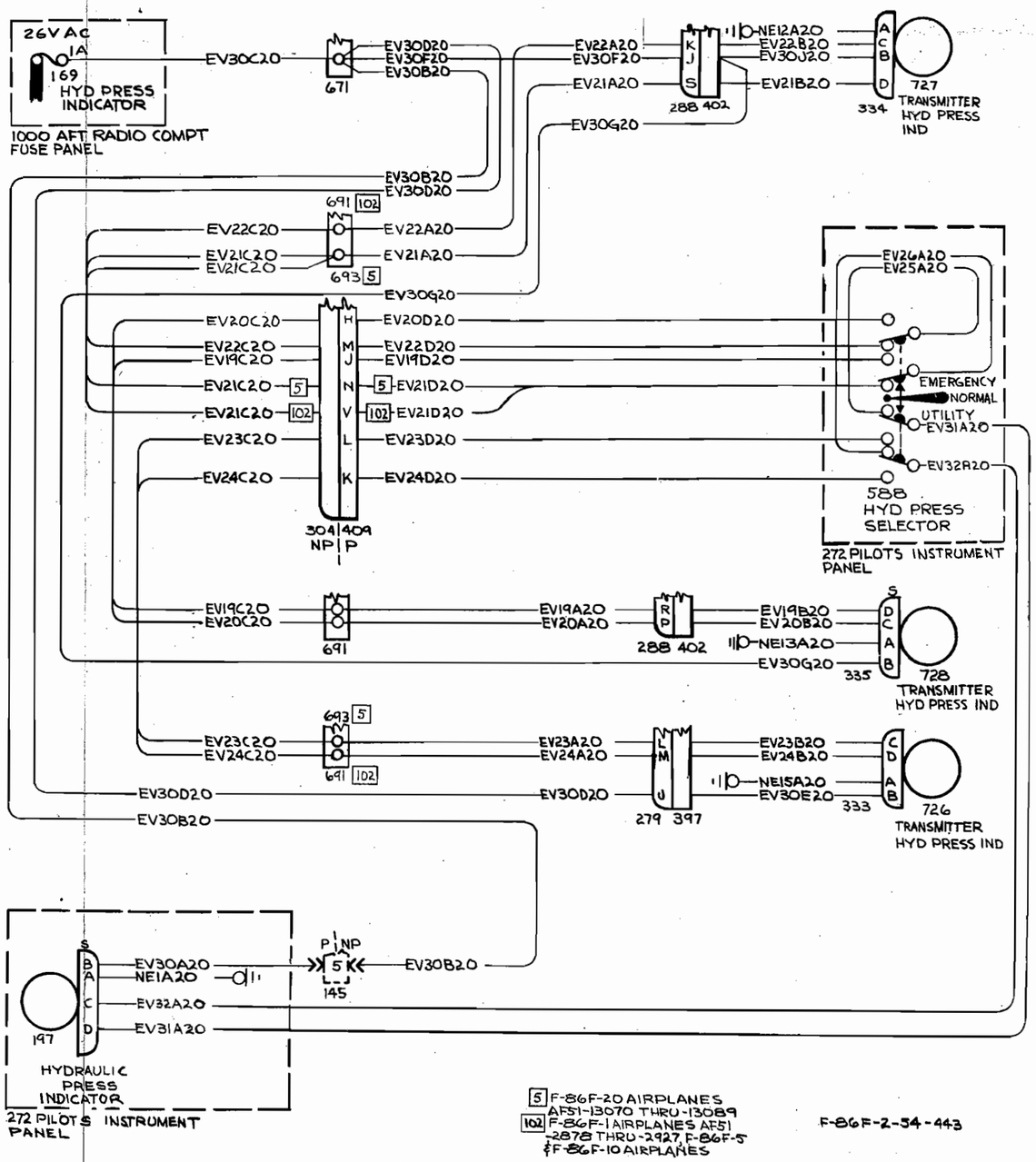


HYDRAULIC PRESSURE INDICATING SYSTEM
F-86F-1 AIRPLANE AF51-2878 AND ALL SUBSEQUENT AIRPLANES

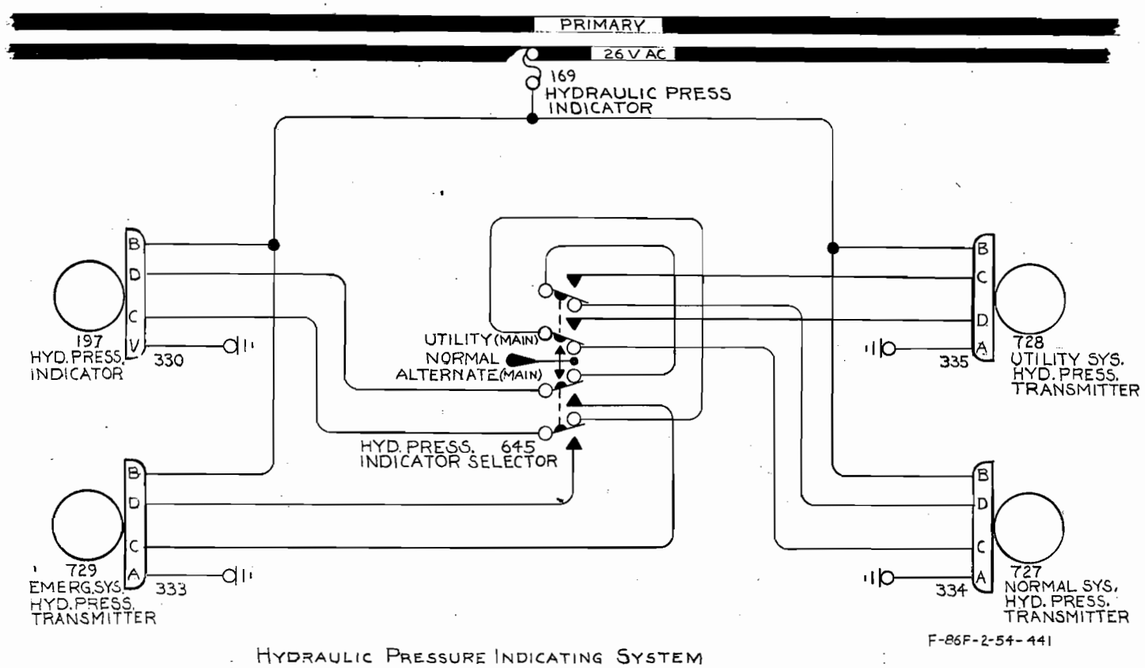
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
288	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
333	Plug - Hydraulic Pressure Transfer - Emergency	Fus 81 LH	Data Case Access - LH Aft Section
334	Plug - Hydraulic Pressure Transfer - Normal	Fus 81 LH	Wing Slot
335	Plug - Hydraulic Pressure Transfer - Utility	Fus 81 LH	Wing Slot
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
693	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay
726	Transmitter - Hydraulic Pressure Emergency	Fus 81 LH	Data Case Access
727	Transmitter - Hydraulic Pressure Normal	Fus 155 CL	Wing Slot
728	Transmitter - Hydraulic Pressure Utility	Fus 155 CL	Wing Slot
1000	Panel - Aft Radio Compt Fuse	Fus 157 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Hydraulic Pressure Indicating System - F-86F-1 Airplanes AF51-2878 Through -2927, F-86F-5 and F-86F-10 Airplanes, F-86F-20 Airplanes AF51-13070 Through -13089



HYDRAULIC PRESSURE INDICATING SYSTEM
F-86F-1 AIRPLANES AF51-2878 THROUGH -2927, F-86F-5 AND F-86F-10 AIRPLANES,
F-86F-20 AIRPLANES AF51-13070 THROUGH 13089

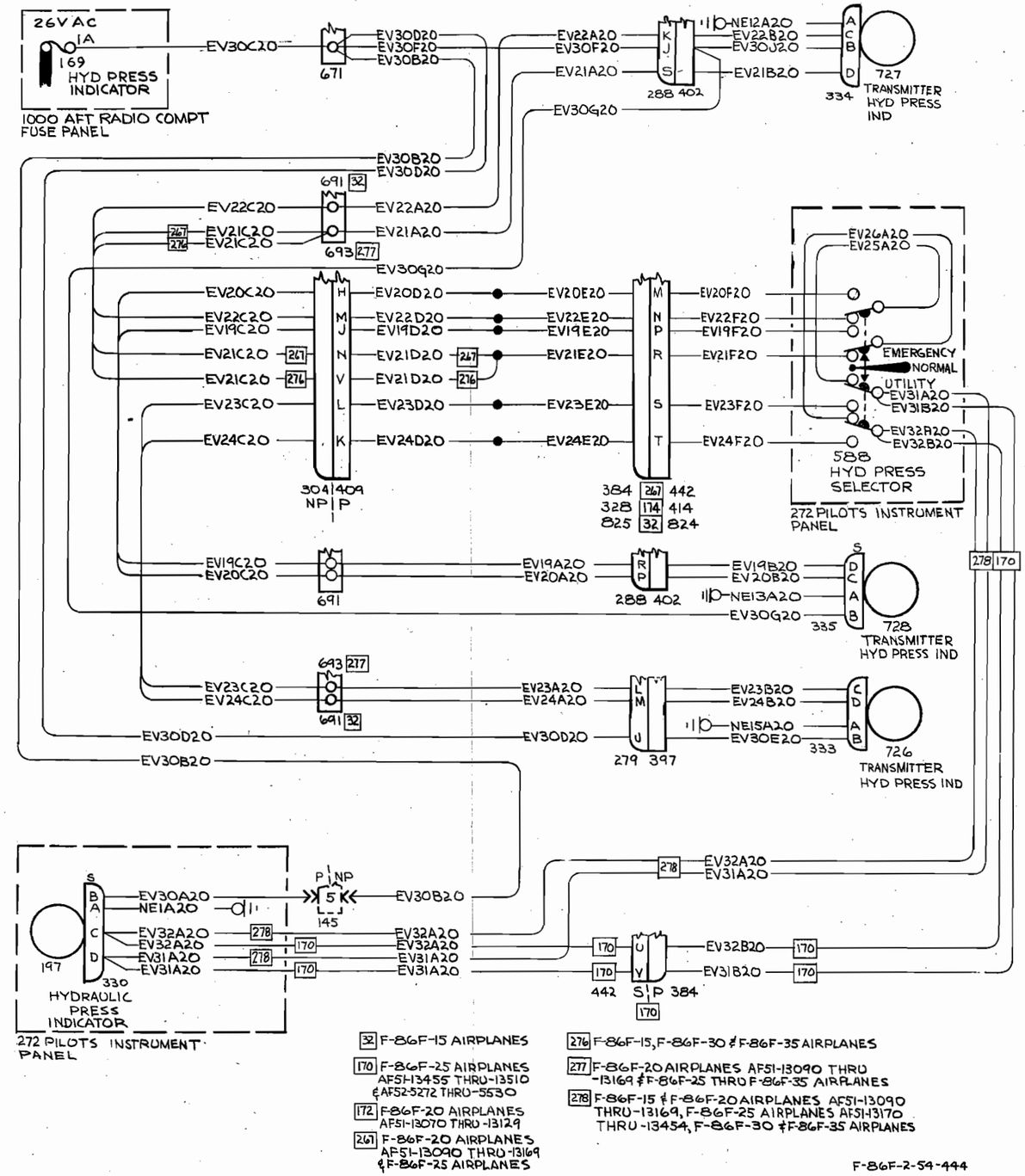


HYDRAULIC PRESSURE INDICATING SYSTEM
F-86F-1 AIRPLANE AF51-2878 AND ALL SUBSEQUENT AIRPLANES

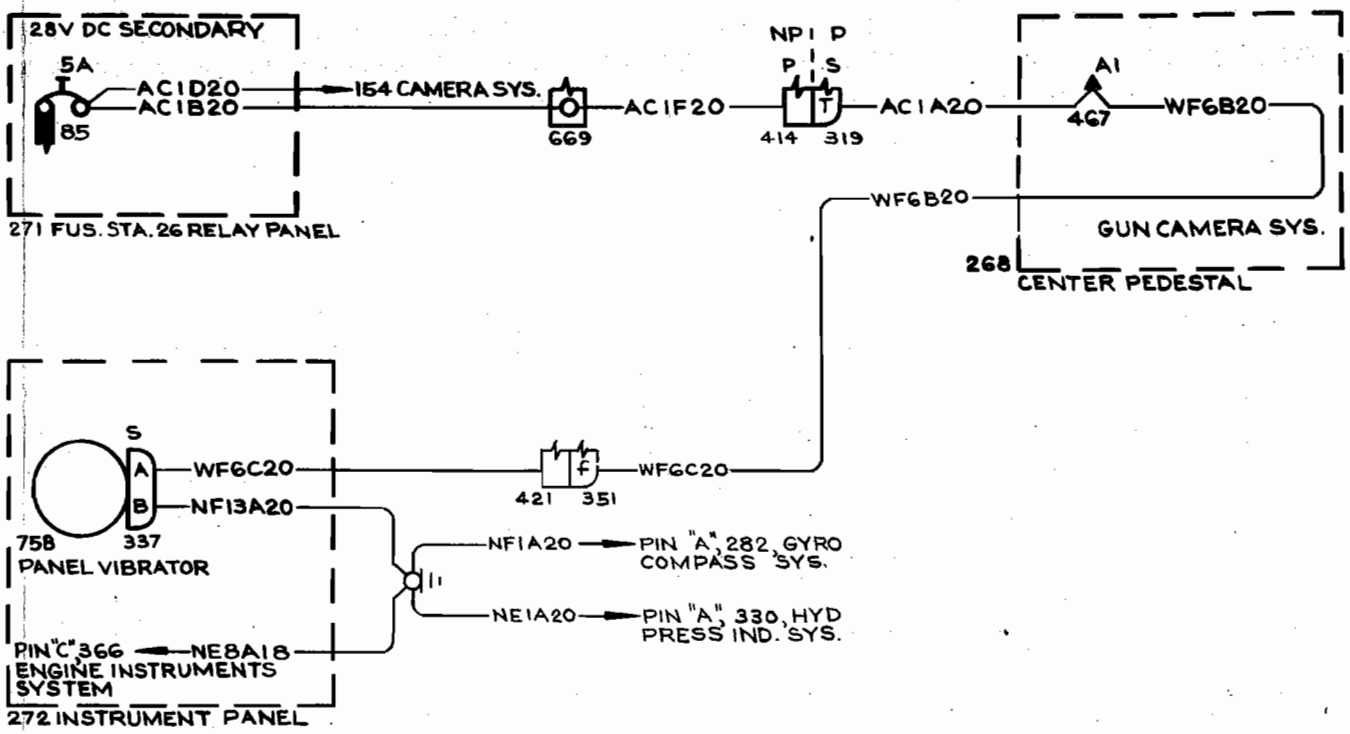
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
272	Panel - Instrument	Fus 78 CL	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
288	Plug - Center Wing Disconnect	Fus 129 LH	Fuselage Underside
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
333	Plug - Hydraulic Pressure Transfer - Emergency	Fus 81 LH	Data Case Access - LH Aft Section
334	Plug - Hydraulic Pressure Transfer - Normal	Fus 81 LH	Wing Slot
335	Plug - Hydraulic Pressure Transfer - Utility	Fus 81 LH	Wing Slot
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
693	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay
726	Transmitter - Hydraulic Pressure Emergency	Fus 81 LH	Data Case Access
727	Transmitter - Hydraulic Pressure Normal	Fus 155 CL	Wing Slot
728	Transmitter - Hydraulic Pressure Utility	Fus 155 CL	Wing Slot
1000	Panel - Aft Radio Compt	Fus 157 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Hydraulic Pressure Indicating System -
F-86F-15 Airplanes, F-86F-20 Airplanes AF51-13090 Through -13169 and F-86F-25 Through F-86F-35 Airplanes



HYDRAULIC PRESSURE INDICATING SYSTEM
F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 THROUGH F-86F-35 AIRPLANES

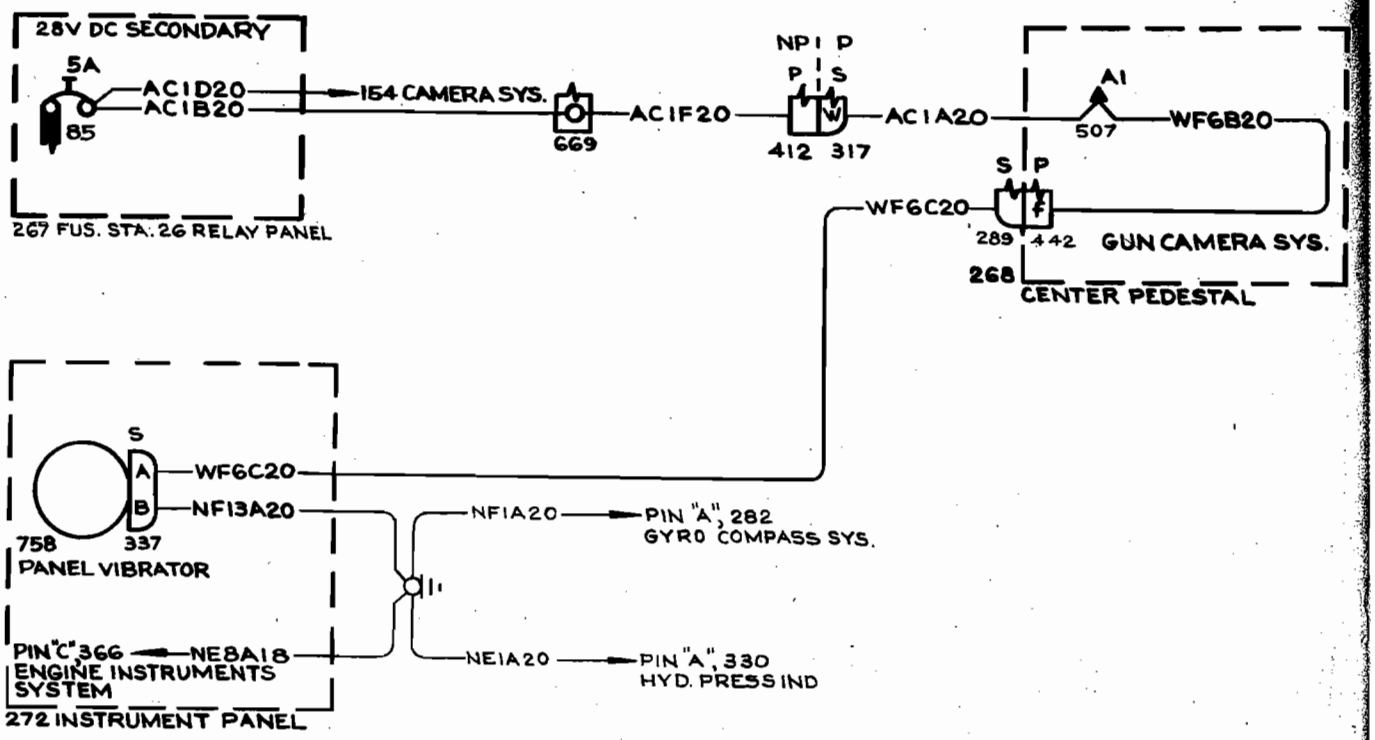


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
282	Plug - Attitude Gyro	Fus 80 LH	Cockpit - Instrument Panel
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
330	Plug - Hydraulic Pressure Indicator	Fus 81 LH	Instrument Panel - Cockpit
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-361

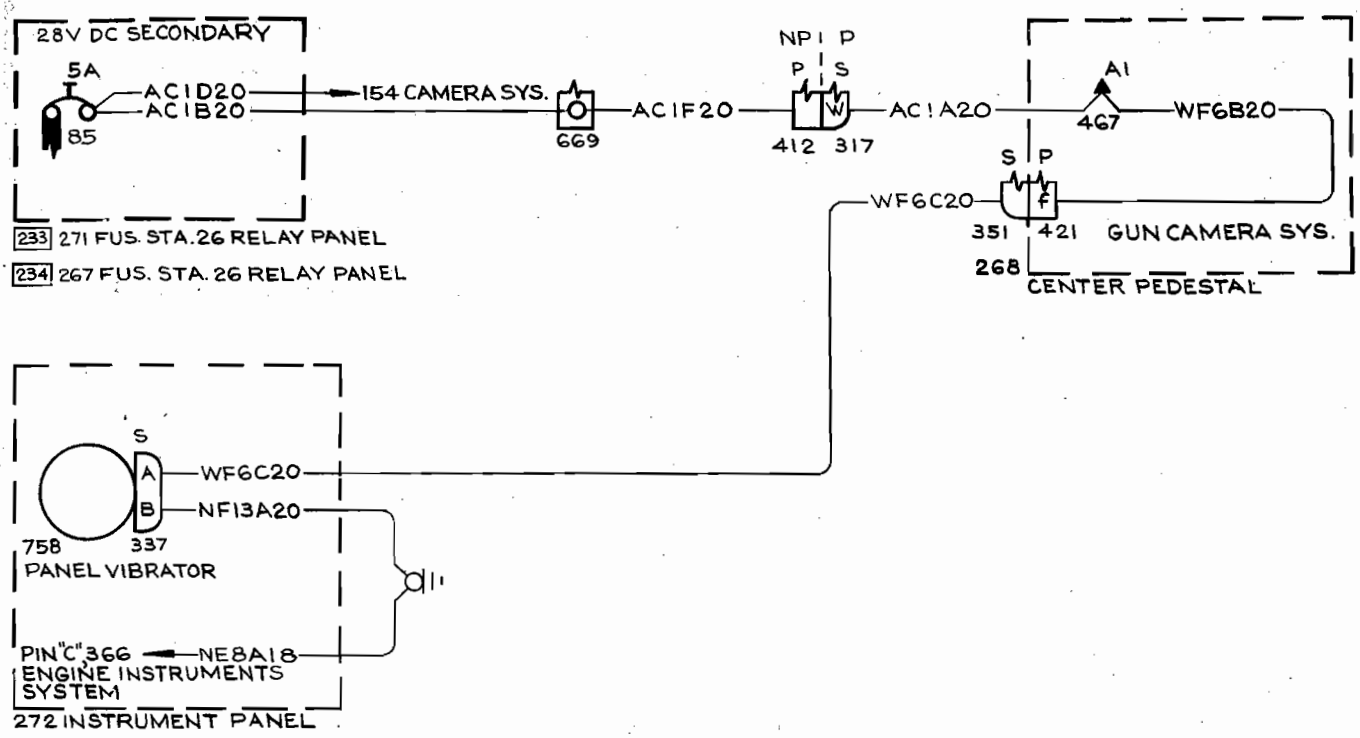
PANEL VIBRATOR SYSTEM
F-86F-1 AND F-86F-5 AIRPLANES



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
282	Plug - Attitude Gyro	Fus 80 LH	Cockpit - Instrument Panel
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
330	Plug - Hydraulic Pressure Indicator	Fus 81 LH	Instrument Panel - Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-358



INDEX NO.	DESCRIPTION	STATION	ACCESS
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

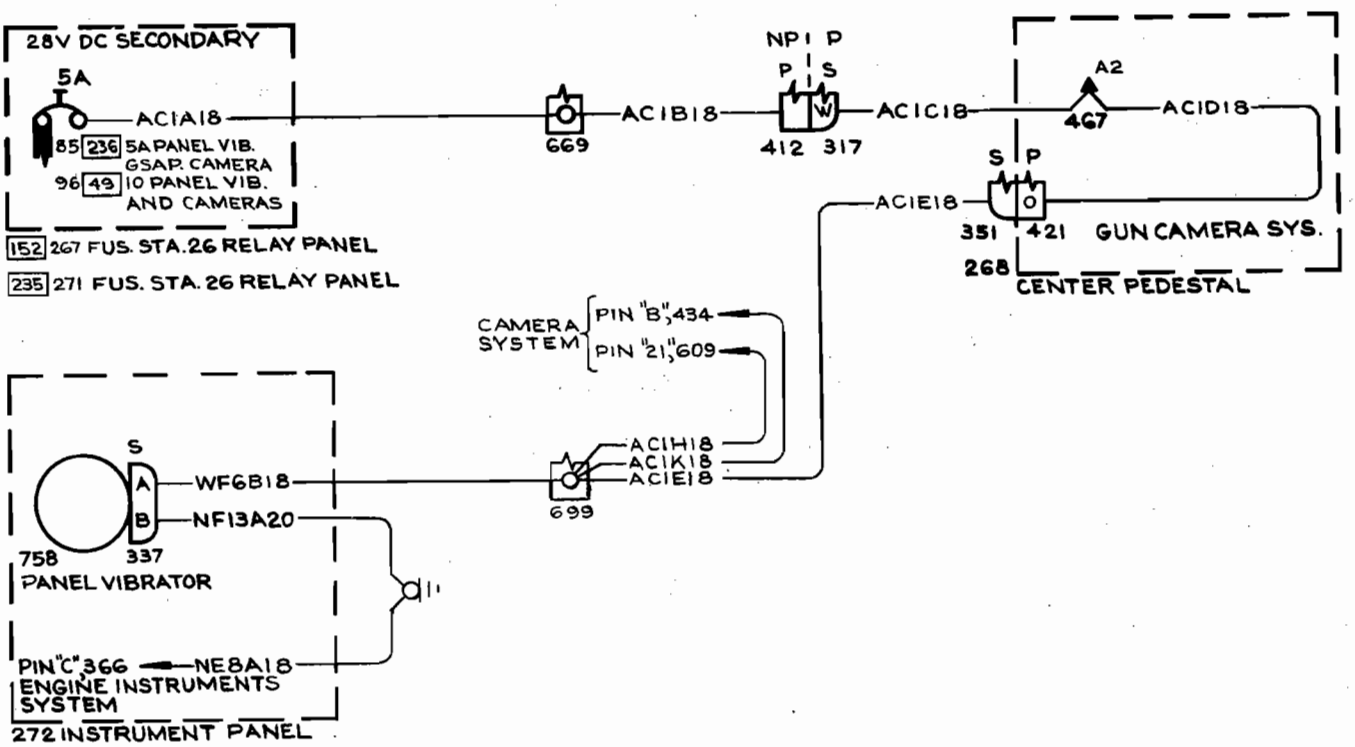
233 F-86F-20 AIRPLANES AF51-13080 THROUGH -13169 AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380

234 F-86F-20 AIRPLANES AF51-13070 THROUGH -13079 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

F-86F-2-54-339

PANEL VIBRATOR SYSTEM

F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745



INDEX NO.	DESCRIPTION
267	Panel - Nose Section Relay
268	Panel - Pedestal
271	Panel - Fuselage Station 26 Relay
272	Panel - Instrument
317	Plug - Forward Pressure Disconnect (LH Forward)
351	Plug - Pedestal Disconnect
434	Receptacle - N9 Camera (GSAP)
609	Switch - Camera Lens Selector
669	Terminal Block - Nose Junction Box
699	Terminal Block - N9 Camera Disconnect

STATION NO.	ACCESS
Fus 40 LH	Radar Bay
Fus 78 CL	Cockpit - Pedestal
Fus 26 RH	Nose Radar Bay
Fus 78 CL	Cockpit
Fus 62.6 LH	Cockpit - Forward of Pedestal
Fus 62.6 LH	Directly Behind Pedestal
Fus 71 CL	Cockpit and Forward Landing Lights
Fus 104 RH	Cockpit
Fus 35 RH	Nose Radar Bay
Fus 54 CL	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

49 F-86F-25 AIRPLANES AF52-5387 THROUGH -5446

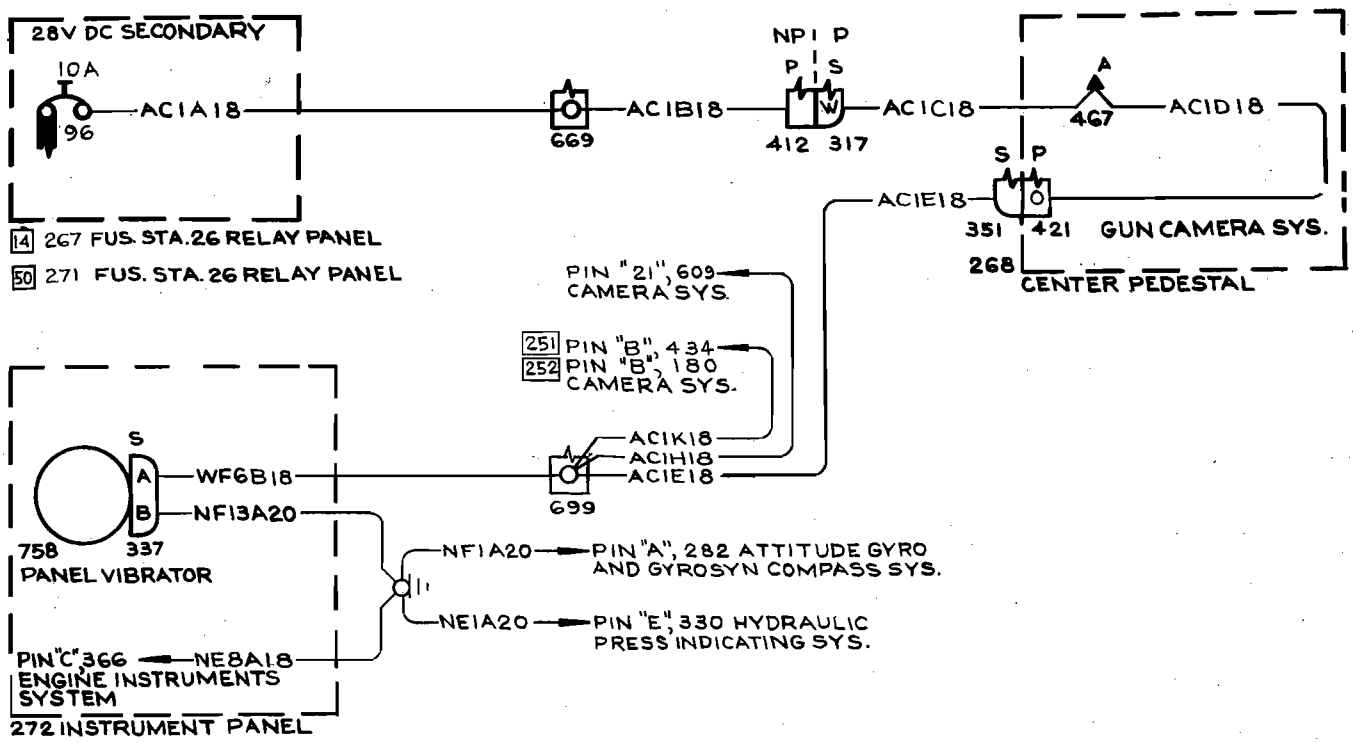
152 F-86F-30 AIRPLANES AF52-4746 THROUGH -4904

235 F-86F-25 AIRPLANES AF52-5381 THROUGH -5446

236 F-86F-25 AIRPLANES AF52-5381 THROUGH -5386 AND F-86F-30 AIRPLANES AF52-4746 THROUGH -4904

F-86F-2-54-359

PANEL VIBRATOR SYSTEM
F-86F-25 AIRPLANES AF52-5381 THROUGH -5446 AND
F-86F-30 AIRPLANES AF52-4746 THROUGH -4904



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
180	Harness Assembly - Electrical N6 Camera Adapter	Fus 79 RH	Cockpit
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
282	Plug - Attitude Gyro	Fus 80 LH	Cockpit - Instrument Panel
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
330	Plug - Hydraulic Pressure Indicator	Fus 81 LH	Instrument Panel - Cockpit
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
434	Receptacle - N9 Camera (GSAP)	Fus 71 CL	Cockpit and Forward Landing Lights
609	Switch - Camera Lens Selector	Fus 104 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
699	Terminal Block - N9 Camera Disconnect	Fus 54 CL	Nose Radar Bay

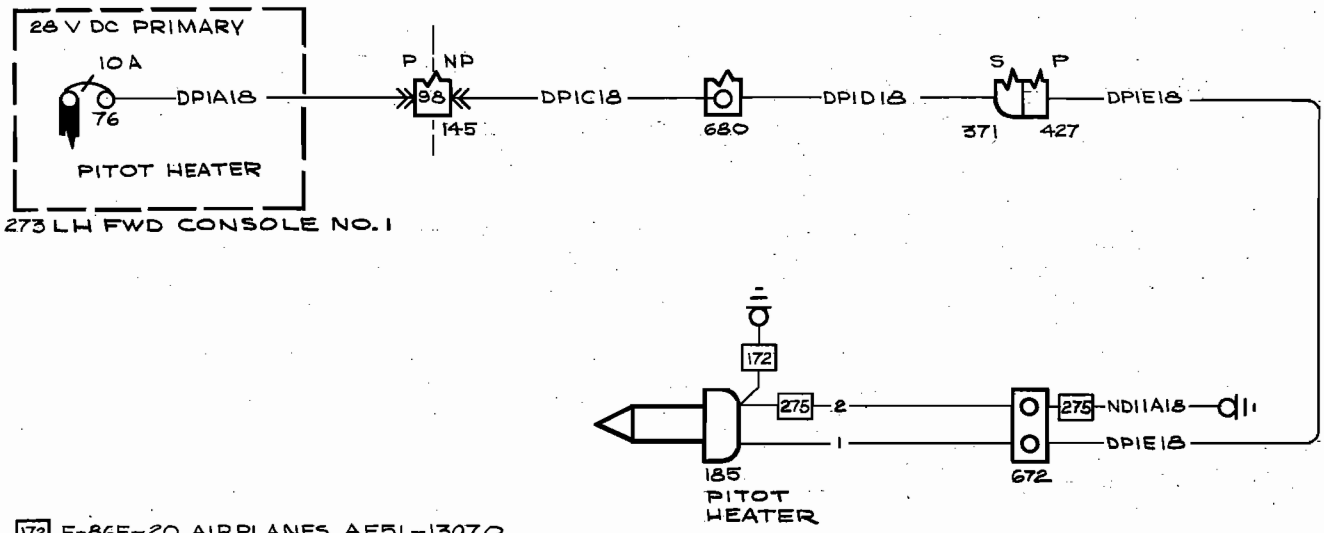
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

14 F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES
50 F-86F-25 AIRPLANES AF52-5447 THROUGH -5530

251 F-86F-25 AIRPLANES AF52-5447 THROUGH -5530, F-86F-30 AIRPLANES AF52-4905 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5213
252 F-86F-35 AIRPLANE AF52-5214 AND ALL SUBSEQUENT AIRPLANES.

F-86F-2-54-360

PANEL VIBRATOR SYSTEM
F-86F-25 AIRPLANES AF52-5447 THROUGH -5530,
F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES



172 F-86F-20 AIRPLANES AF51-13070 THRU -13129

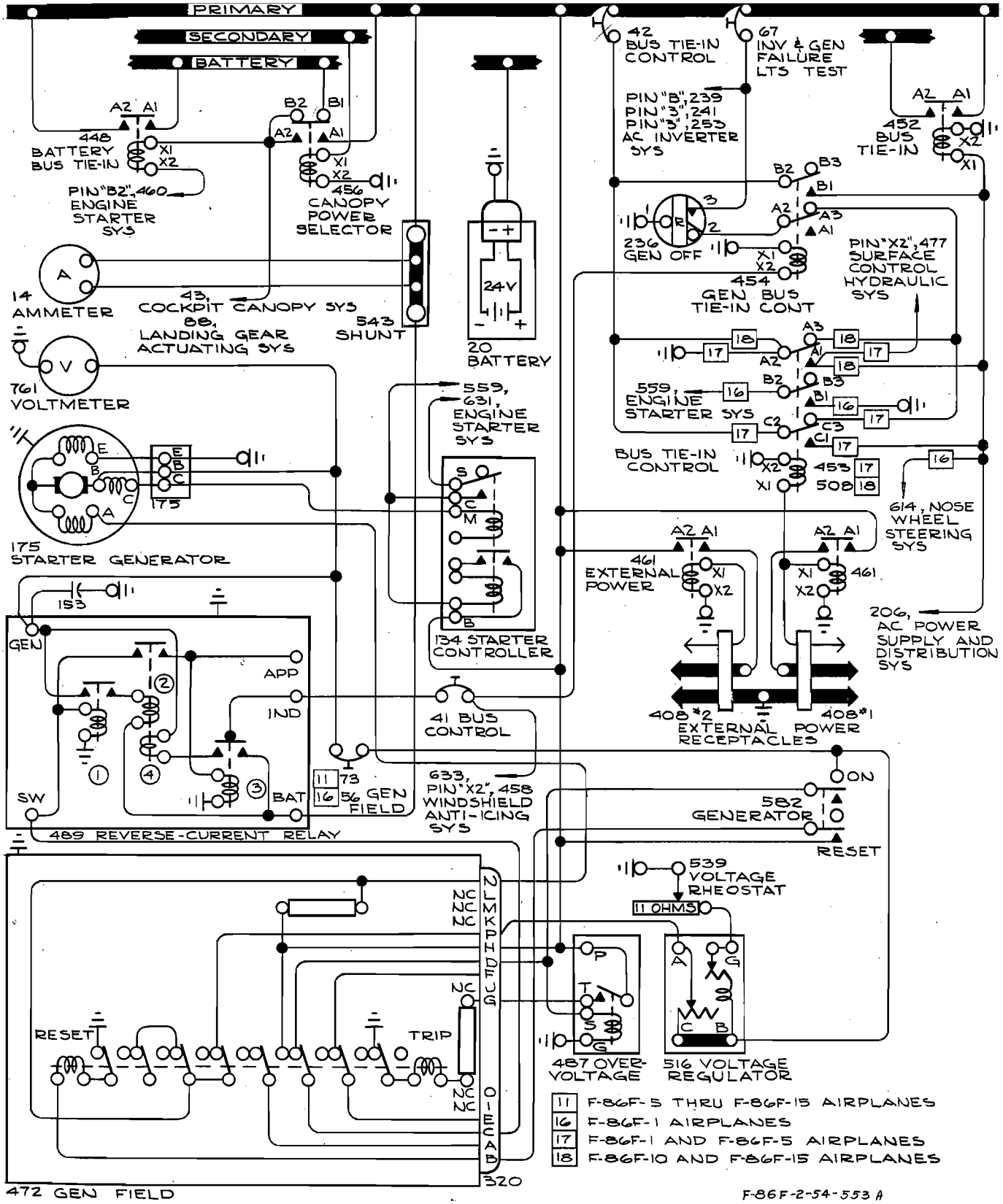
275 F-86F-1 THRU F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13130 THRU -13168 AND F-86F-25 THRU F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
185	Heater - Pitot	Wing 262 RH	RH Wing Tip - in Pitot Tube
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
672	Terminal Block - Pitot Heater	Wing 251 RH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

F-86F-2-54-436

PITOT HEATER SYSTEM

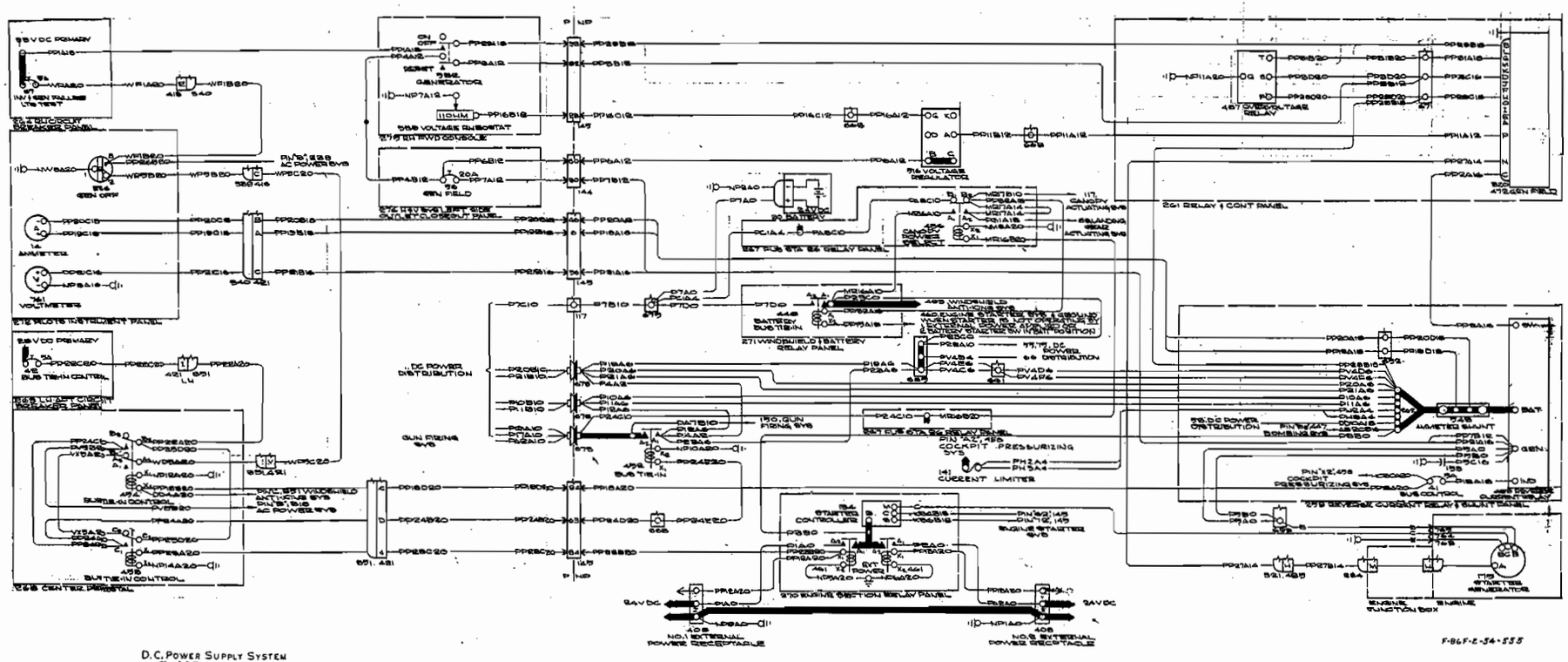


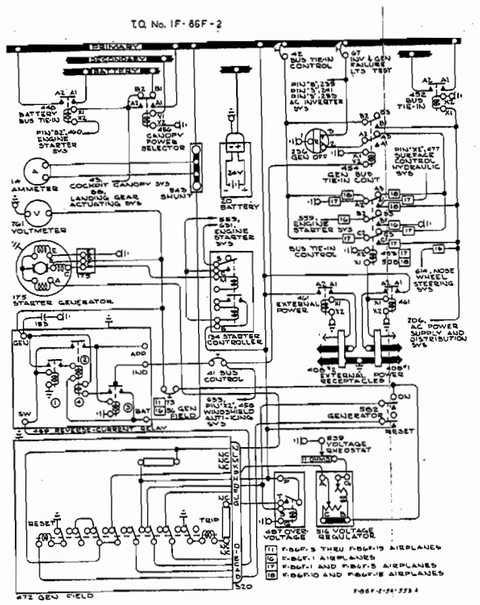
D C Power Supply System
F-86F-1 Through F-86F-15 Airplanes

	STATION NO.	ACCESS
apere	Fus 96 CL	Radar Bay
Fuel Transfer Pump	Fus 118 RH	RH Radio Bay
Inverter	Fus 121 LH	Cockpit
Nose Wheel Steering Navigation Flasher	Fus 25 RH	Nose Radar Bay
Landing Gear Emergency Hatract re Block Barrier	Fus 15 RH Fus 130 RH and LH	Nose Radar Bay Cockpit
Cockpit Heater	Fus 150 RH	RH Radio Bay
ure LH	Fus 128 LH	Cockpit
ure RH	Fus 129 RH	Cockpit
n Booster	Fus 97 RH and LH	Gun Bays
rrent Relay and Shunt	Fus 125 RH	RH Wheel Well
Compartment Relay	Fus 170 LH	LH Radio Bay
eaker Left-hand	Fus 118 LH	Cockpit - LH Side
eaker Right-hand	Fus 118 RH	Cockpit - RH
on Relay	Fus 40 LH	Radar Bay
	Fus 78 CL	Cockpit - Pedestal
IO Relay	Fus 105 RH	RH Engine Access
ttation 86 Relay	Fus 25 RH	Nose Radar Bay
	Fus 78 CL	Cockpit
	Fus 85 RH	Cockpit
l Forward Console	Fus 100 LH	Cockpit
Forward Circuit-breaker	Fus 97 LH and RH	LH and RH Gun Bay
Boost Motor Filter	Fus 105 CL	Engine Sneed CL
Transmitter	Fus 105 LH	Engine Bay RH
onnect	Fus 105 LH	Forward LH Side of Instrument
Panel Indicating Light	Fus 76 LH	Panel
Panel Light Disconnect	Fus 76 LH	Pwd Inst Panel
isconnect	Fus 62.6 LH	Directly Behind Pedestal
rnal Power	Fus 105 LH	Fuselage Exterior
	Fus 105 LH	Cockpit
aster Power	Fus 153 RH	Radio Bay
nster Ignition Control	Fus 55 RH	Nose Radar Bay
l Anti-Ice Power	Fus 125 LH	Cockpit
ator Voltage	Fus 121 LH	LH Radio Bay
Gun Bay LH	Fus 130 LH	Gun Bay
Gun Bay	Fus 80 RH	Gun Bay
Pressure	Fus 114 RH	Gun Bay
Battery	Fus 26 RH	Nose Radar Bay
Primary Bus RH	Fus 93 RH	Nose Radar Bay
Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay

Illustrated Parts Breakdown T.O. No. 1F-86F-2 (formerly AN 01-60JD-2) for part numbers and location of items.

DC Power Supply System - F-86F-1 Airplanes


28 VDC PRIMARY
28 VDC PRIMARY
DC POWER DISTRIBUTION
GUN FIRING SYS
BUS TIE-IN CONTROL
BUS TIE-IN CONTROL
BUS TIE-IN CONTROL

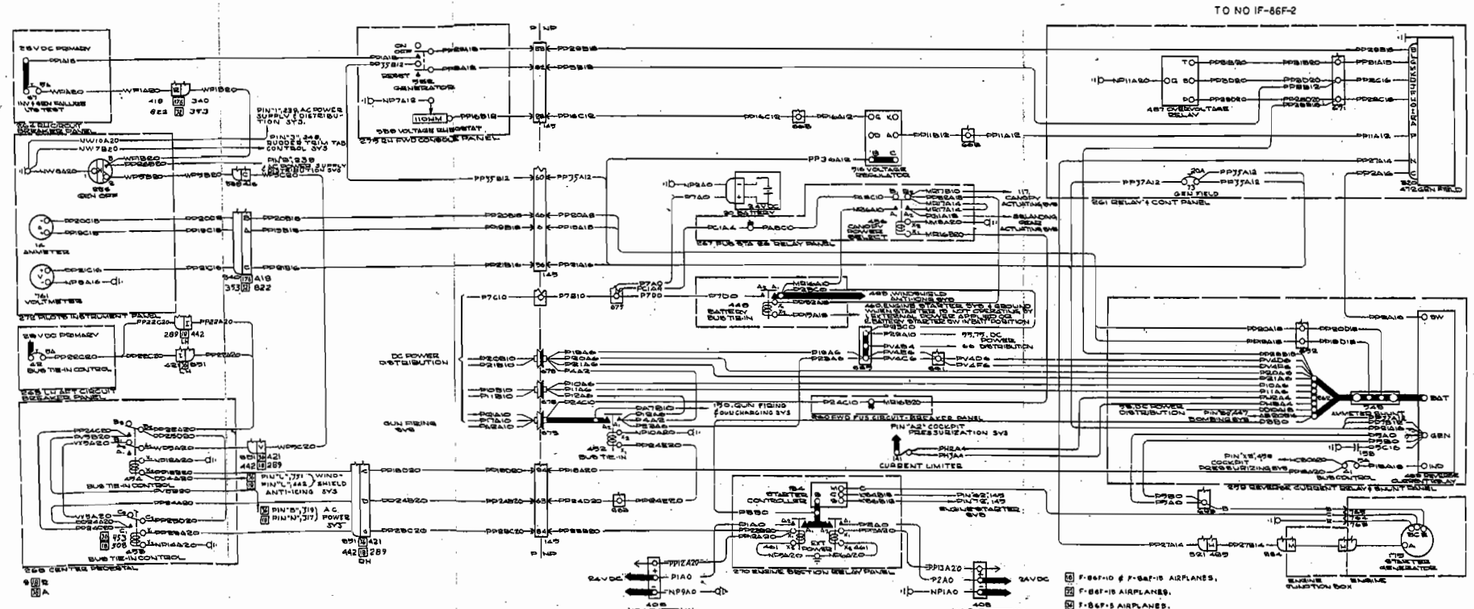


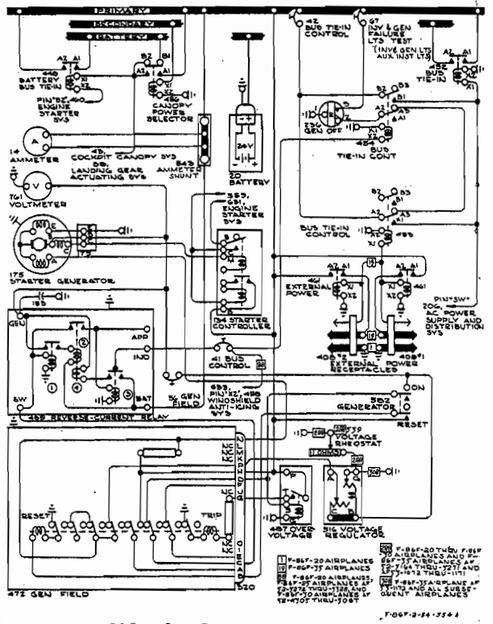
D C Power Supply System
F-86F-1 Through F-86F-15 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
20	Battery - 24V 35 Ampere	Fus 96 CL	Radar Bay
50	Circuit Breaker - Fuel Transfer Pump	Fus 118 RH	RH Radio Bay
52	Circuit Breaker - Inverter	Fus 118 LH	Cockpit
73	Circuit Breaker - Nose Wheel Steering Navigation and Utility Light Flasher	Fus 88 RH	Nose Radar Bay
88	Circuit Breaker - Landing Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
117	Connector - Pressure Block Service	Fus 130 RH and LH	Cockpit
141	Current Limiter - Cockpit Heater	Fus 150 RH	RH Radio Bay
195	Disconnect - Pressure Kit	Fus 108 RH	Cockpit
232	Light Assembly - Fuel Failure Warning	Fus 81 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
249	Light Assembly - Wheels Down	Fus 125 RH	RH Wheel Well
250	Panel - Reverse-current Relay and Shunt	Fus 86 RH	Nose Radar Bay
251	Panel - Pressure Fuselage Circuit-breaker	Fus 109 LH	LH Radio Bay
261	Panel - Aft Radio Compartment Relay	Fus 118 LH	Cockpit - LH Side
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH
264	Panel - Circuit-breaker Right-hand	Fus 120 LH	Radar Bay
267	Panel - Gun Ignition Relay	Fus 92 CL	Cockpit - Pedestal
268	Panel - Pedestal	Fus 93 CL	Cockpit - Pedestal
270	Panel - Station 190 Relay	Fus 105 RH	RH Engine Access
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
319	Plug - Forward Pressure Disconnect (LH Forward)	Fus 108 LH	Cockpit - Forward of Pedestal
320	Plug - Fuel Flow Transmitter	Fus 108 CL	Engine Bonnet CL
321	Plug - Engine Disconnect	Fus 160 LH	Engine Bay RH
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Pot Instr Panel
351	Plug - Pedestal Disconnect	Fus 82.5 LH	Directly Behind Pedestal
352	Plug - Oxygen Regulator	Fus 84 LH	Cockpit
353	Receptacle - Panel Power	Fus 105 LH	Fuselage Exterior
666	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
682	Relay - Bus Tie-in	Fus 125 LH	Cockpit
958	Regulator - Generator Voltage	Fus 125 LH	Cockpit
516	Terminal Block - Gun Bay LH	Fus 80 LH	Gun Bay
661	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
663	Terminal Block - Pressure	Fus 119 RH	Gun Bay
673	Terminal Block - Battery	Fus 96 RH	Nose Radar Bay
674	Terminal Block - Primary Bus RH	Fus 83 RH	Nose Radar Bay
686	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 RH	Gun Bay
693			

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JB-4) for part numbers and location of items.

DC Power Supply - F-86F-5 Through F-86F-15 Airplanes



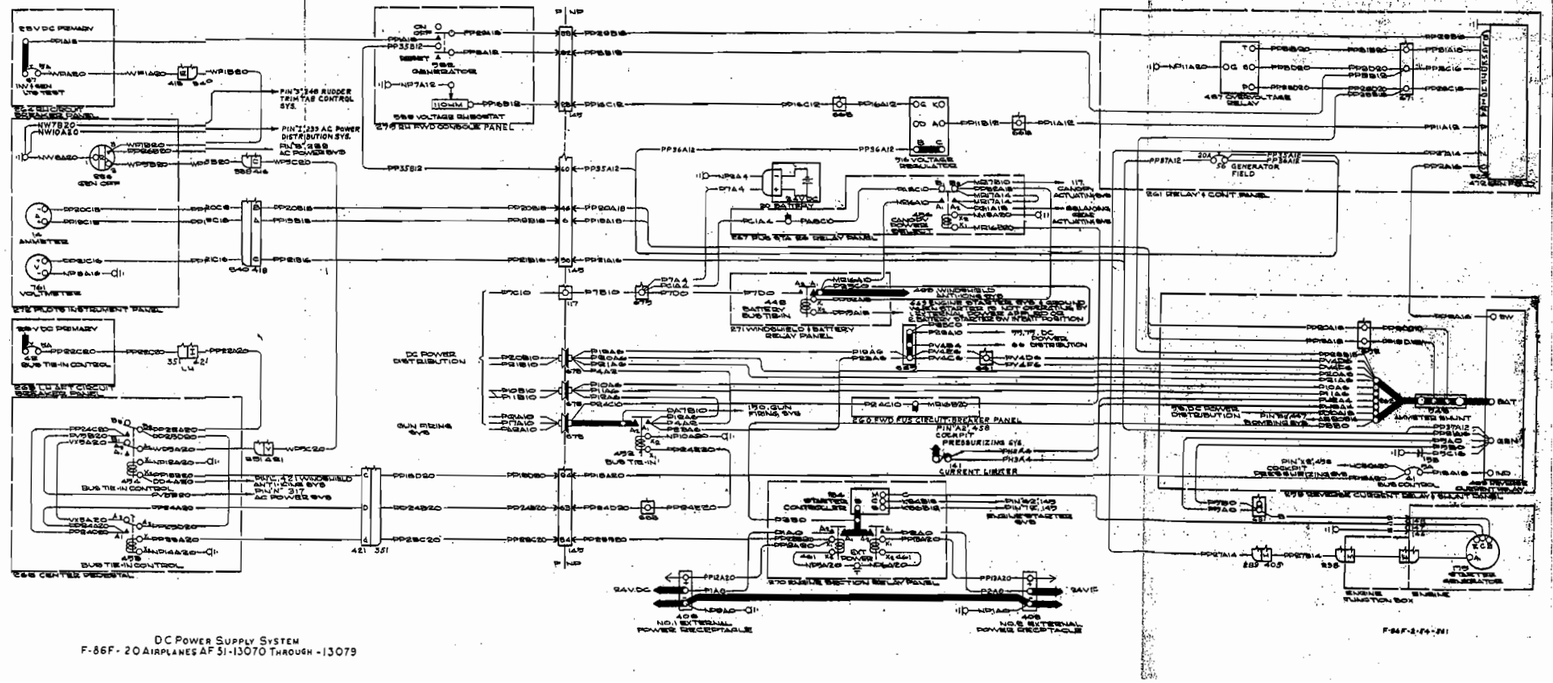


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
20	Battery - 24V 38 Ampere	Fus 96 CL	Radar Bay
88	Circuit Breaker - Landing Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
		and 134	
191	Current Limiter - Cockpit Heater	Fus 150 RH	RH Radio Bay
195	Disconnect - Pressure RH	Fus 184 RH	Cockpit
196	Filter - Ammunition Booster	Fus 97 RH and LH	Gun Bays
250	Light Assembly - Combined Failure Warning	Fus 81 CL	Cockpit - Instrument Panel
278	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Reverse-current Relay and Shunt	Fus 185 RH	RH Wheel Well
266	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
267	Panel - Aft Radio Compartment Relay	Fus 175 LH	LH Radio Bay
268	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
269	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
270	Panel - Fuselage Station 26 Relay	Fus 40 LH	Radar Bay
271	Panel - Fuselage Station 26 Relay	Fus 40 RH	Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
289	Plug - Engine Disconnect	Fus 185 RH	RH Engine Access
295	Plug - Engine Harness Disconnect	Fus 185 RH	RH Engine Access
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
320	Plug - Generator Field Control Relay	Fus 155.8 RH	RH Radio Bay
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 78 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
431	Receptacle - Bus Disconnect	Fus 62.6 LH	Directly Behind Pedestal
433	Receptacle - External Power	Fus 185 LH	Fuselage Exterior
451	Receptacle - Pedestal Disconnect	Fus 71.9 RH	Cockpit
452	Relay - Bus Tie-in	Fus 155 LH	Cockpit
458	Relay - Cockpit Heater Power	Fus 152 RH	Radio Bay
472	Relay - Generator Field Control	Fus 170 LH	Radio Bay
487	Relay - Overvoltage	Fus 170 LH	Radio Bay
516	Regulator - Generator Voltage	Fus 183 LH	LH Radio Bay
661	Terminal Block - Gun Bay LH	Fus 120 LH	Gun Bay
663	Terminal Block - Gun Bay	Fus 90 RH	Gun Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
675	Terminal Block - Battery	Fus 26 RH	Nose Radar Bay
681	Terminal Block - Reverse-current Relay	Fus 133 RH	Radio Bay
685	Terminal Block - Primary Bus RH	Fus 45 RH	Nose Radar Bay

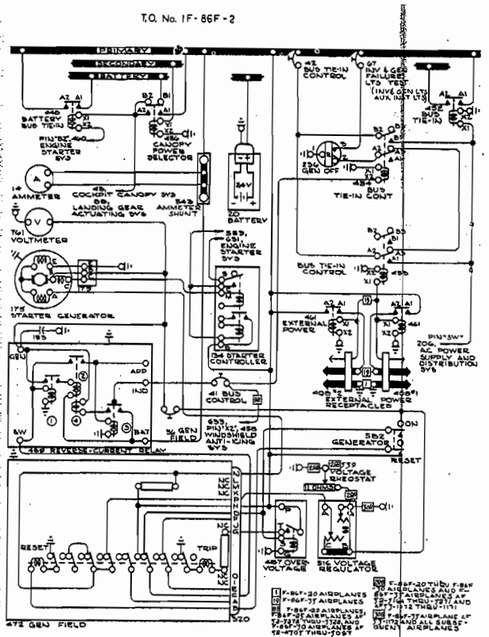
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ZL2-4) for part numbers and location of items.

D-0 Power Supply System - F-86F-20 Airplanes AF51-13070 Through -13079

DC Power Supply System
F-86F-20 Through F-86F-35 Airplanes



DC Power Supply System
F-86F-20 Airplanes AF 51-13070 Through -13079



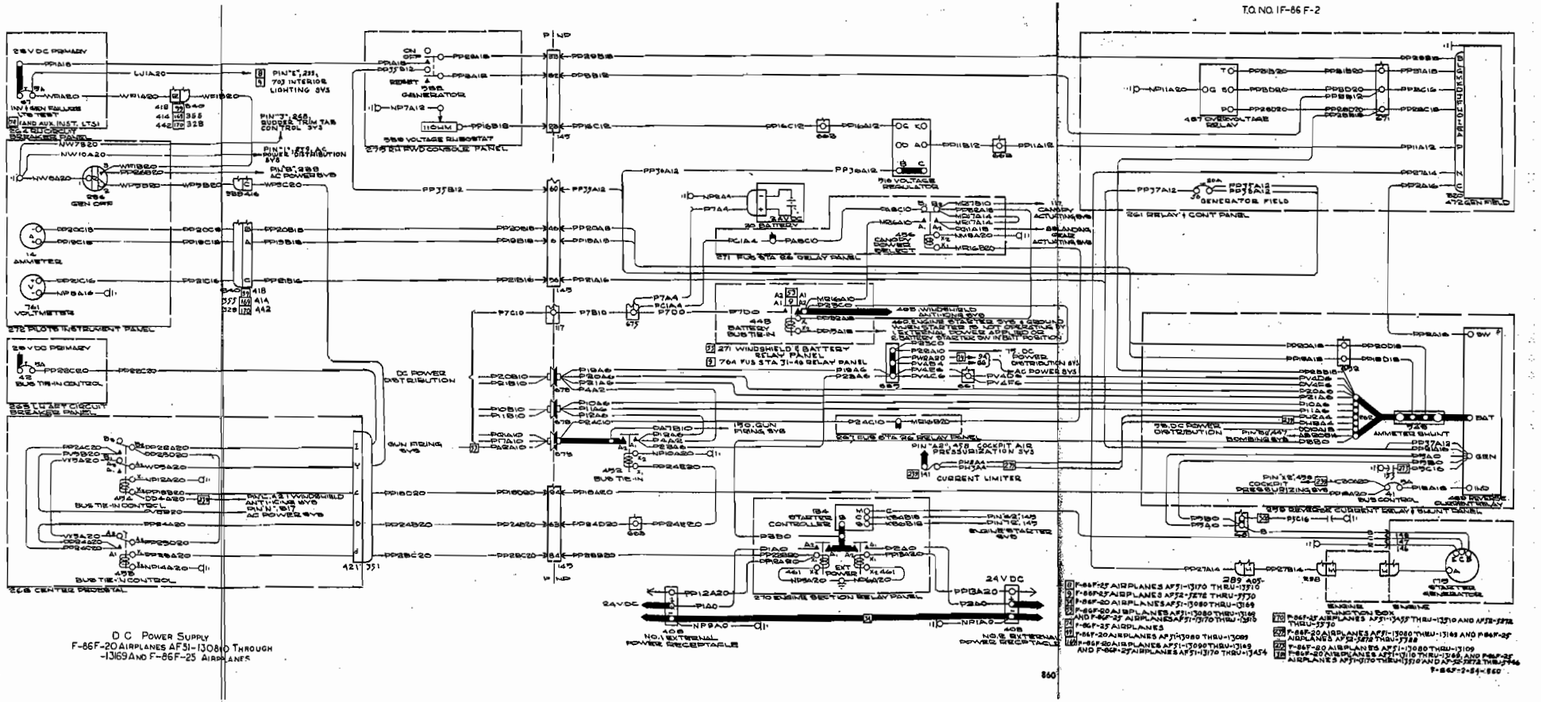
DC Power Supply System
F-86F-20 Through F-86F-35 Airplanes

F-86F-2-84-3764

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
20	Battery - 24V 24 Ampere	Fus 98 CL	Radar Bay
88	Circuit Breaker - Landing Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
141	Current Limiter - Cockpit Heater	Fus 160 RH	RH Radio Bay
145	Disconnect - Pressure RH	Fus 194 RH	Cockpit
239	Light Assembly - Inverted Failure Warning	Fus 41 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Reverse-current Relay and Shunt	Fus 185 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker left-hand	Fus 168 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
270	Panel - Station 190 Relay	Fus 166 RH	RH Engine Access
271	Panel - Fuselage Station 26 Relay	Fus 38 RH	Nose Radar Bay
272	Panel - Instrument	Fus 76 CL	Cockpit
275	Panel - Right-hand Forward Console	Fus 65 RH	Cockpit
289	Plug - Engine Disconnect	Fus 180 RH	RH Emergency Bay
298	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62, 6 LH	Cockpit - Forward of Pedestal
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 54, 1 CL	Tail Assembly
330	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Ped Inst Panel
381	Plug - Pedestal Disconnect	Fus 82, 6 LH	Directly Behind Pedestal
555	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
408	Receptacle - External Power	Fus 183 LH	Fuselage Exterior
421	Receptacle - Pedestal Disconnect	Fus 71, 5 RH	Cockpit
453	Relay - Bus Tie-in	Fus 125 LH	Cockpit
458	Relay - Cockpit Heater Power	Fus 162 RH	Radio Bay
663	Terminal Block - Gun Bay	Fus 60 RH	Gun Bay
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
675	Terminal Block - Battery	Fus 46 RH	Nose Radar Bay
681	Terminal Block - Reverse-current Relay	Fus 183 RH	Radio Bay
695	Terminal Block - Primary Bus RH	Fus 42 RH	Nose Radar Bay
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

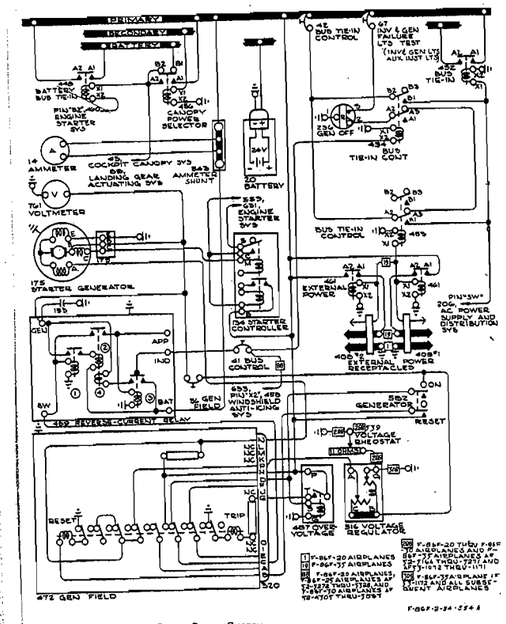
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80ALD-4) for part numbers and location of items.

DC Power Supply - F-86F-20 Airplanes AF51-13080 Through -13169 and F-86F-25 Airplanes



DC Power Supply
F-86F-20 Airplanes AF51-13080 Through -13169 and F-86F-25 Airplanes

T.O. No. 1F-86F-2



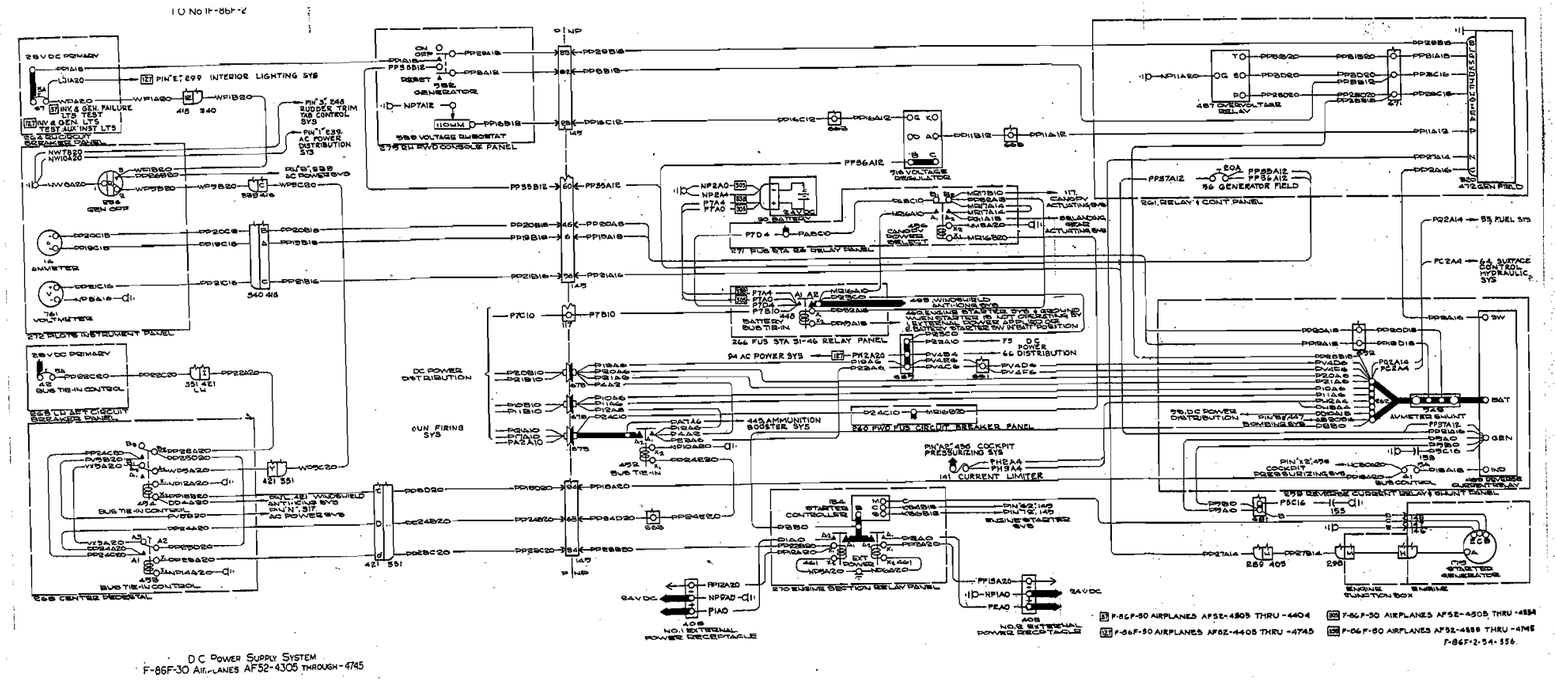
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
55	Circuit Breaker - Fuel Transfer Pump	Fus 118 RH	RH Radio Bay
64	Circuit Breaker - Hydraulic Pump Emergency	Fus 28 RH	Nose Radar Bay
66	Circuit Breaker - Inverter	Fus 118 LH	Cockpit
75	Circuit Breaker - Nose Wheel Steering Navigation and Utility Light Flasher	Fus 28 RH	Nose Radar Bay
88	Circuit Breaker - Leading Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
141	Current Limiter - Cockpit Heater	Fus 150 RH	RH Radio Bay
145	Disconnect - Pressure RH	Fus 134 RH	Cockpit
153	Filter - Generator Box	Fus 158 RH	RH Radio Bay
238	Light Assembly - Inverted Failure Warning	Fus 81 CL	Cockpit - Instrument Panel
245	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
259	Panel - Reverse-current Relay and Shunt	Fus 155 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 96 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - Lft Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH and LH	Cockpit - RH
268	Panel - Gun Charger Relay	Fus 78 CL	Gun Bays
286	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
310	Panel - Station 100 Relay	Fus 105 RH	RH Engine Access
371	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
372	Panel - Instrument	Fus 78 CL	Cockpit
375	Panel - Right-hand Forward Console	Fus 93 RH	Cockpit
389	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
396	Plug - Engine Harness Disconnect	Fus 160 RH	RH Engine Access
397	Plug - Forward Pressure Disconnect (LH Forward)	Fus 63.6 LH	Cockpit - Forward of Pedestal
399	Plug - Instrument Panel Indicating Light Disconnect	Fus 78 LH	Forward Lft Side of Instrument Panel
400	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
401	Plug - Pedestal Disconnect	Fus 63.6 LH	Directly Behind Pedestal
408	Receptacle - External Power	Fus 185 LH	Fuselage Exterior
491	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
445	Relay - Ammunition Booster	Fus 28 RH and LH	Nose Radar Bay
452	Relay - Bus Tie-in	Fus 128 LH	Cockpit
488	Relay - Cockpit Heater Power	Fus 169 RH	Radio Bay
490	Relay - Engine Starter Ignition Control	Fus 65 RH	Nose Radar Bay
493	Relay - Windshield Anti-ice Power	Fus 138 LH	Cockpit
516	Regulator - Generator Voltage	Fus 132 LH	Lft Radio Bay
681	Terminal Block - Gun Bay LH	Fus 120 LH	Gun Bay
682	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
683	Terminal Block - Pressure	Fus 114 RH	Gun Bay
684	Terminal Block - Reverse-current Relay	Fus 133 RH	Radio Bay
685	Terminal Block - Primary Bus RH	Fus 63 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-80TJ-4) for part numbers and location of items.

D.C. Power Supply System - F-86F-30 Airplanes AF52-4305 Through -4745

DC Power Supply System
F-86F-20 Through F-86F-35 Airplanes

T.O. No. 1F-86F-2


28 V DC PRIMARY
PIN'S E 299 INTERIOR LIGHTING SYS
INV & GEN. FAILURE LTS TEST
INV & GEN. LTS TEST AUX INST LTS
RESET 75B GENERATOR
115 VAC 3Ø 400 CPS
115 VAC 1Ø 400 CPS
26 VAC 400 CPS
PIN'S E 299 INTERIOR LIGHTING SYS
RUDDER TRIM TAB CONTROL SYS
AC POWER DISTRIBUTION SYS
115 VOLT RHEOSTAT
GEN OFF
AMMETER
VOLTMETER
212 BLOWER INSTRUMENT PANEL
28 V DC PRIMARY
DC POWER DISTRIBUTION
6 CIRCUIT BREAKERS PANEL
6 GUN FIRING SYS
BUS TIE-IN CONTROL
ESS CENTER PEDESTAL
DC POWER DISTRIBUTION
44 AC POWER SYS
44 AMMUNITION BOOSTER SYS
PRESSURIZING SYS
CURRENT LIMITER
ENGINE STARTER SYS
STARTER CONTROLLERS
ENGINE SECTION RELAY PANEL
NO.1 EXTERNAL POWER RECEPTACLE
NO.2 EXTERNAL POWER RECEPTACLE
24 VDC
28 V DC POWER DISTRIBUTION
66 DC POWER DISTRIBUTION
264 FUS STA 51-46 RELAY PANEL
271 BUS STA 52 RELAY PANEL
ESS DC POWER DISTRIBUTION
ESS DC POWER DISTRIBUTION SYS
ESS DC POWER DISTRIBUTION SYS
ESS REVERSE CURRENT RELAY & SHUNT PANEL
ESS CIRCUIT BREAKERS PANEL
ESS BUS TIE-IN CONTROL
ESS BUS TIE-IN CONTROL
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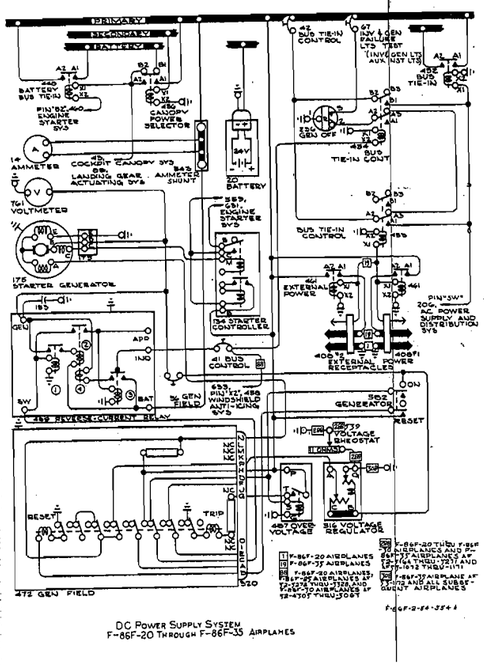
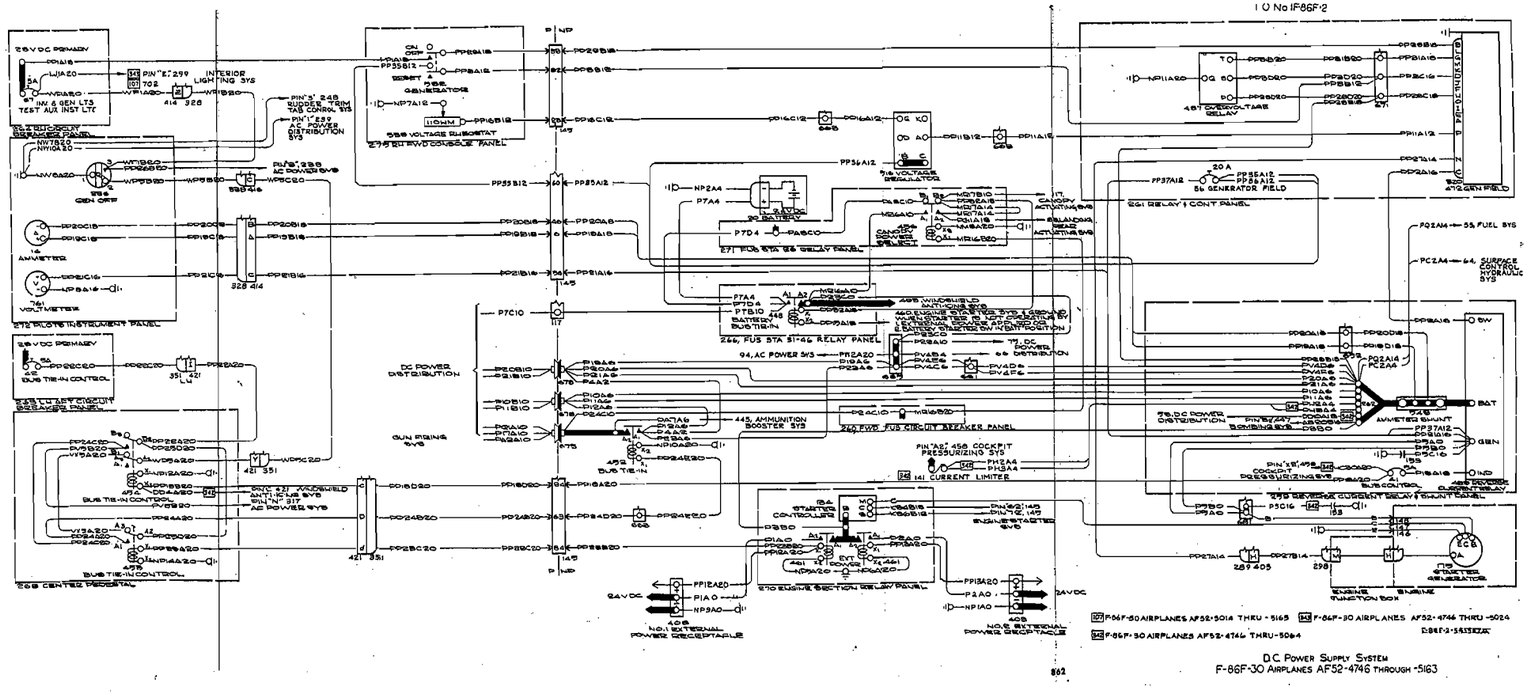


D.C. Power Supply System
F-86F-20 Through F-86F-35 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
55	Circuit Breaker - Fuel Transfer Pump	Fus 110 RH	RH Radio Bay
64	Circuit Breaker - Hydraulic Pump Emergency	Fus 25 RH	Nose Radar Bay
66	Circuit Breaker - Landing Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
141	Current Limiter - Cockpit Heater	Fus 150 RH	RH Radio Bay
145	Disconnect - Pressure RH	Fus 191 RH	Cockpit
183	Filter - Generator Bus	Fus 1 RH	RH Radio Bay
230	Light Assembly - Inverted Failure Warning	Fus 41 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
269	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
280	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
281	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
282	Panel - Circuit-breaker Right-hand	Fus 110 RH	Cockpit - RH
284	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
288	Panel - Pedestal	Fus 76 CL	Cockpit - Pedestal
289	Panel - Station 190 Relay	Fus 193 RH	RH Engine Access
291	Panel - Fuselage Station 28 Relay	Fus 18 RH	Nose Radar Bay
292	Panel - Instrument	Fus 78 CL	Cockpit
293	Panel - Right-hand Forward Console	Fus 95 RH	Cockpit
298	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
299	Plug - Engine Harness Disconnect	Fus 163 RH	RH Engine Access
308	Plug - Light Dimming	Fus 83 RH	Cockpit, Below RH Console Panels
309	Plug - Light Dimming	Fus 82.5 LH	Cockpit - Forward of Pedestal
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 155.5 RH	RH Radio Bay
330	Plug - Generator Field Control Relay	Fus 113 RH and LH	Tail Assembly
338	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 24.1 CL	Forward LH Side of Instrument
339	Plug - Instrument Panel Indicating Light	Fus 76 LH	Panel
351	Plug - Pedestal Disconnect	Fus 82.5 LH	Directly Behind Pedestal
406	Receptacle - External Power	Fus 188 LH	Fuselage Exterior
431	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
445	Relay - Ammunition Booster	Fus 26 RH and LH	Nose Radar Bay
452	Relay - Bus Tie-in	Fus 135 LH	Cockpit
458	Relay - Cockpit Heater Power	Fus 152 RH	Radio Bay
472	Relay - Generator Field Control	Fus 170 LH	Radio Bay
516	Regulator - Generator Voltage	Fus 132 LH	LH Radio Bay
661	Terminal Block - Gun Bay LH	Fus 130 LH	Gun Bay
662	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
671	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
681	Terminal Block - Reverse-current Relay	Fus 132 RH	Radio Bay
685	Terminal Block - Primary Bus RH	Fus 41 RH	Nose Radar Bay
703	Terminal Block - Windshield Heater Switch	Fus 85 RH	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ELO-3) for part numbers and location of items.

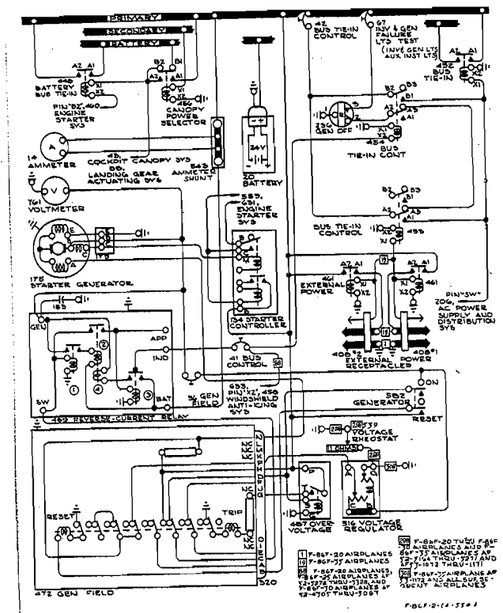
D.C. Power Supply System - F-86F-30 Airplanes AF52-4746 Through -5163



D.C. Power Supply System
F-86F-30 Airplanes AF52-4746 through -5163

[27] F-86F-30 AIRPLANES AF52-5014 THRU -5163 [43] F-86F-30 AIRPLANES AF52-4746 THRU -5024
[43] F-86F-30 AIRPLANES AF52-4746 THRU -5084

D86F2-2-55358XA

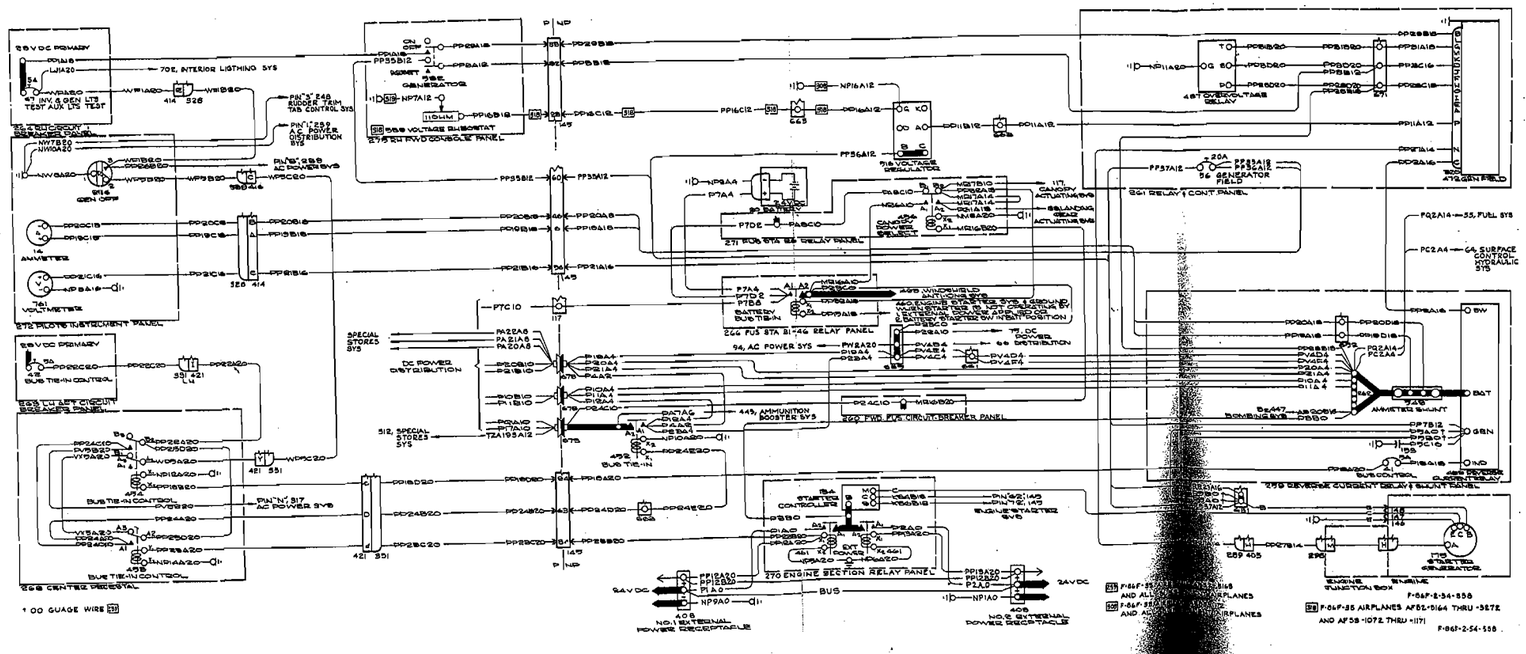


DC Power Supply System
F-86F-20 THROUGH F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
	Circuit Breaker - Fuel Transfer Pump	Fus 116 RH	RH Radio Bay
	Circuit Breaker - Hydraulic Pump Emergency	Fus 35 RH	Nose Radar Bay
64	Circuit Breaker - Landing Gear Emergency Retract	Fus 15 RH	Nose Radar Bay
88	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
117		Fus 124 RH	Cockpit
145	Disconnect - Pressure Rig	Fus 81 Clr	Cockpit - Instrument Panel
233	Light Assembly - Inverted Failure Warning	Fus 80 Clr	Cockpit - Instrument Panel
248	Light Assembly - Tire-oil Indicator	Fus 155 RH	RH Radio Wall
249	Panel - Remove-current Relay and Shunt	Fus 170 LH	LH Radio Bay
250	Panel - Alt Radio Compartment Relay	Fus 118 LH	Cockpit - LH Side
263	Panel - Circuit-breaker Left-hand	Fus 113 LH	Cockpit - RH
264	Panel - Circuit-breaker Right-hand	Fus 113 RH and LH	Gun Bays
286	Panel - Gun Charger Relay		
268	Panel - Pedestal	Fus 78 Clr	Cockpit - Pedestal
270	Panel - Station 190 Relay	Fus 158 RH	RH Engine Access
271	Panel - Fuselage Station 26 Relay	Fus 156 RH	Nose Radar Bay
272	Panel - Instrument	Fus 58 Clr	Cockpit
275	Panel - Right-hand Forward Console	Fus 88 RH	Cockpit
289	Plug - Engine Starter Disconnect	Fus 160 RH	RH Emergency Bay
288	Plug - Engine Access Disconnect	Fus 150 RH	RH Engine Access
288	Plug - Engine Fire Control Relay	Fus 165, 8 RH	RH Radio Bay
289	Plug - Generator Field Control Relay	Fus 24, 1 Clr	Tail Assembly
290	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 76 LH	Forward LH Side of Instrument Panel
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 78 LH	
101	Plug - Pedestal Disconnect	Fus 25, 1 LH	Directly Behind Pedestal
409	Receptacle - External Power	Fus 126 LH	Fuselage Exterior
447	Relay - Alt-bombs	Fus 172 LH	LH Radio Bay
450	Relay - Engine Starter Ignition Control	Fus 88 RH	Nose Radar Bay
472	Relay - Generator Field Control	Fus 150 LH	Radio Bay
473	Relay - Overvoltage	Fus 170 LH	Radio Bay
493	Relay - Windshield Anti-ice Power	Fus 158 LH	Cockpit
515	Regulator - Generator Voltage	Fus 133 LH	LH Radio Bay
661	Terminal Block - Gun Bay LH	Fus 130 LH	Gun Bay
662	Terminal Block - Gun Bay RH	Fus 60 RH	Gun Bay
663	Terminal Block - Overvoltage Relay	Fus 170 LH	Radio Bay
671	Terminal Block - Pressure	Fus 114 RH	Gun Bay
672	Terminal Block - Pressure-current Relay	Fus 123 RH	Radio Bay
681	Terminal Block - Primary Bus RH	Fus 43 RH	Nose Radar Bay
685	Terminal Block - Primary Bus LH		

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of Items.

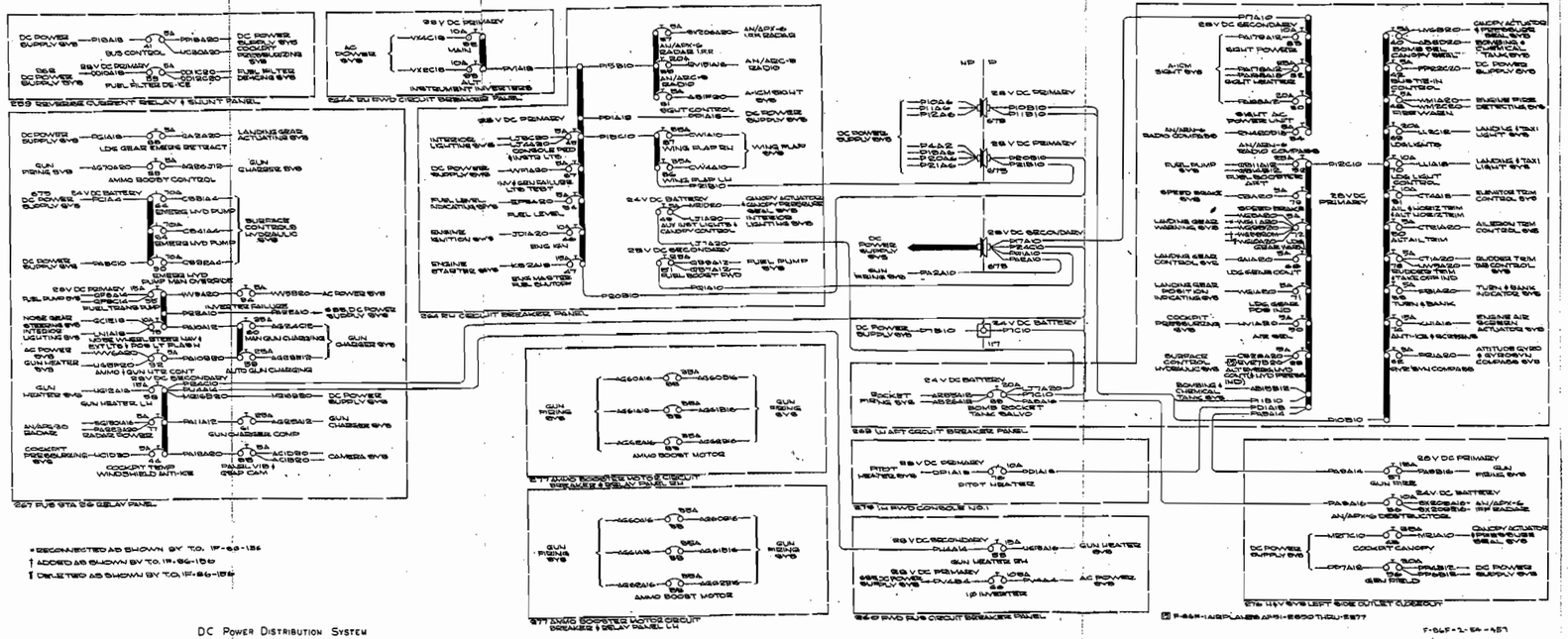
D.O. Power Supply System - F-86F-35 Airplanes



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
29	Circuit Breaker - Alternate Hydraulic Control Emergency	Pnl 118 LH	Cockpit
30	Circuit Breaker - Alternator Aileron Trim	Pnl 118 LH	Cockpit
31	Circuit Breaker - Alternate Horizontal Stabilizer Trim	Pnl 118 LH	Cockpit
34	Circuit Breaker - AN/ARN-6 Radio	Pnl 118 LH	Cockpit
38	Circuit Breaker - Turn-and-Bank Indicator	Pnl 118 LH	Cockpit
40	Circuit Breaker - Bomb Selector and Canopy Seal	Pnl 118 LH	Cockpit
43	Circuit Breaker - Gun Trip-in	Pnl 118 LH	Cockpit
48	Circuit Breaker - Fire-warning	Pnl 118 LH	Cockpit
50	Circuit Breaker - Oil Temperature and Air Selector	Pnl 118 LH	Cockpit
52	Circuit Breaker - Fuel Booster Ark	Pnl 118 LH	Cockpit
62	Circuit Breaker - Gyrosyn Compass	Pnl 118 LH	Cockpit
68	Circuit Breaker - Landing Gear Control	Pnl 118 LH	Cockpit
69	Circuit Breaker - Landing Light	Pnl 118 LH	Cockpit
70	Circuit Breaker - Landing Gear Control	Pnl 118 LH	Cockpit
71	Circuit Breaker - Landing Gear Position Indicator	Pnl 118 LH	Cockpit
72	Circuit Breaker - Landing Gear Warning	Pnl 118 LH	Cockpit
74	Circuit Breaker - Engine Anti-ice and Screen Actuator	Pnl 90 RH	Cockpit
78	Circuit Breaker - Rudder Trim and Take-off Indicator	Pnl 118 LH	Cockpit
79	Circuit Breaker - Speed Brake	Pnl 118 LH	Cockpit
80	Circuit Breaker - Right A-C Power Unit	Pnl 118 LH	Cockpit
82	Circuit Breaker - Right Heater	Pnl 118 RH	Cockpit
83	Circuit Breaker - Right Tower	Pnl 98 RH	Nose Radar Bay
117	Connector - Pressure Bloak Barrier	Pnl 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Pnl 125 RH	RH Wheel Well
263	Panel - Circuit-breaker Left-hand	Pnl 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Pnl 118 RH	Cockpit - RH Side
264A	Panel - Circuit-breaker Right-hand Forward	Pnl 98 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Pnl 85 LH	Cockpit
273	Panel - Left-hand Forward Console	Pnl 100 LH	Cockpit
276	Panel - Left-hand Forward Circuit-breaker	Pnl 113 RH	Gun Bays
277	Panel - Ammunition Booster Relay	Pnl 113 RH and LH	Gun Bays
673	Terminal Block - Pressure	Pnl 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JD-4) for part numbers and location of items.

D-C Power Distribution System - F-86F-1 Airplanes



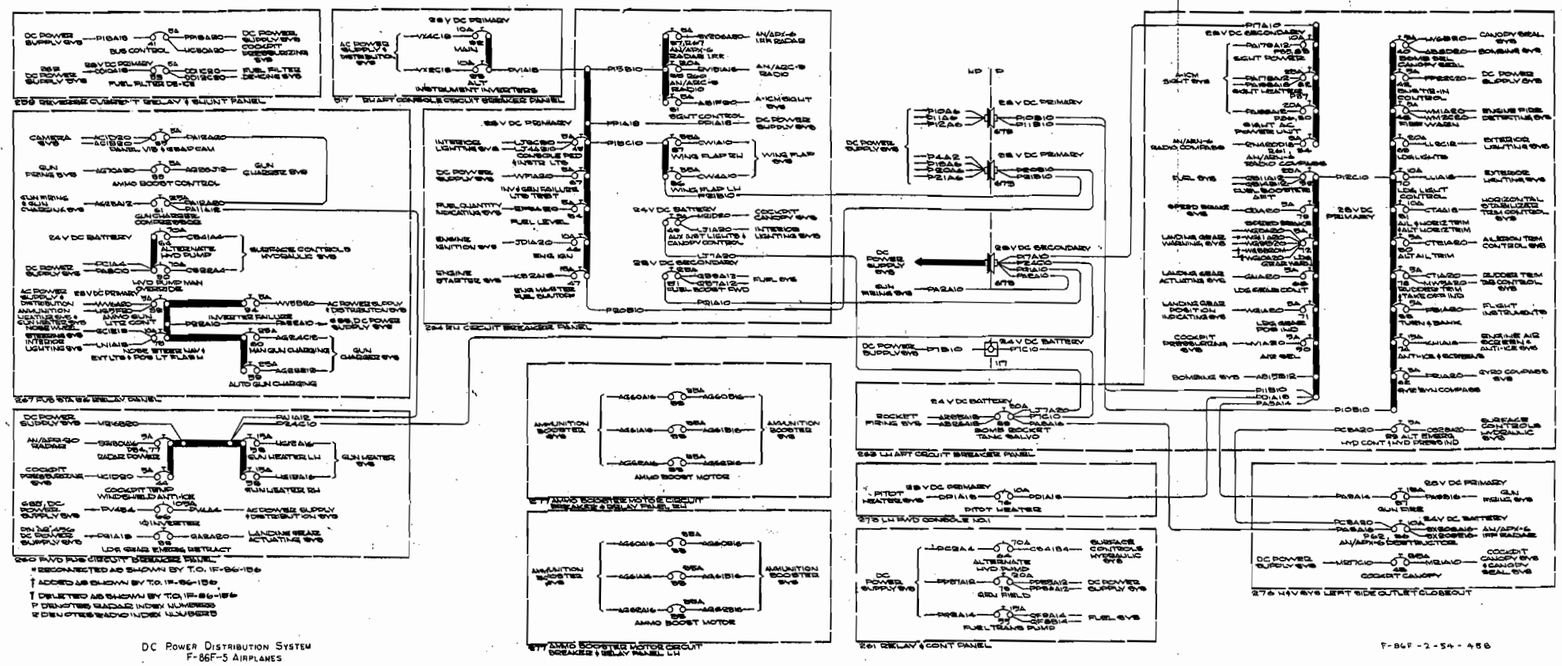
* RECONNECTED AS SHOWN BY T.O. 1F-86-126
† ADDED AS SHOWN BY T.O. 1F-86-150
‡ DELETED AS SHOWN BY T.O. 1F-86-154

DC Power Distribution System
F-86F-1 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
250	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
251	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
260	Panel - A/C Radio Compartment Relay	Fus 170 LH	Lt Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 80 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-2 (formerly AN 01-60JLD-2) for part numbers and location of items.

DC Power Distribution System - F-86F-5 Airplanes



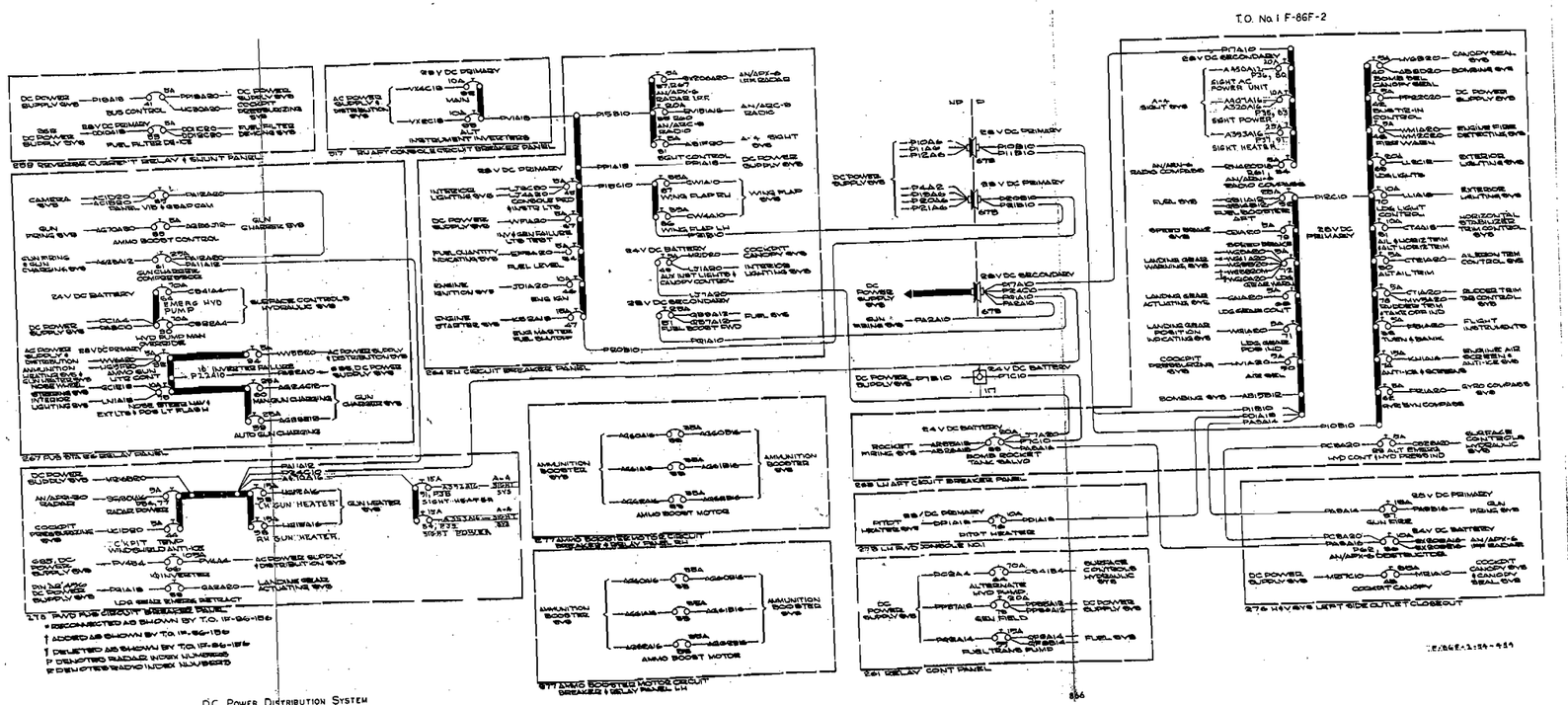
DC Power Distribution System
F-86F-5 Airplanes

F-86F-2-54-458

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
8A	Compass Loop Cable	Pus 130 RH	Canopy to LH Radio Bay
91	Adapter	Pus 133 LH	LH Radio Bay
117	Connector - Pressure Block Barrier	Pus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Pus 125 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Pus 110 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Pus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Pus 118 RH	Cockpit - RH
267	Panel - Nose Section Forward Circuit-breaker	Pus 10.1 LH	Radar Bay
276	Panel - Left-hand Forward Relay	Pus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Pus 113 RH and LH	Gun Bays
278	Panel - Left-hand Fuselage Station 90	Pus 90 LH	Cockpit
673	Terminal Block - Pressure	Pus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-1) for part numbers and location of items.

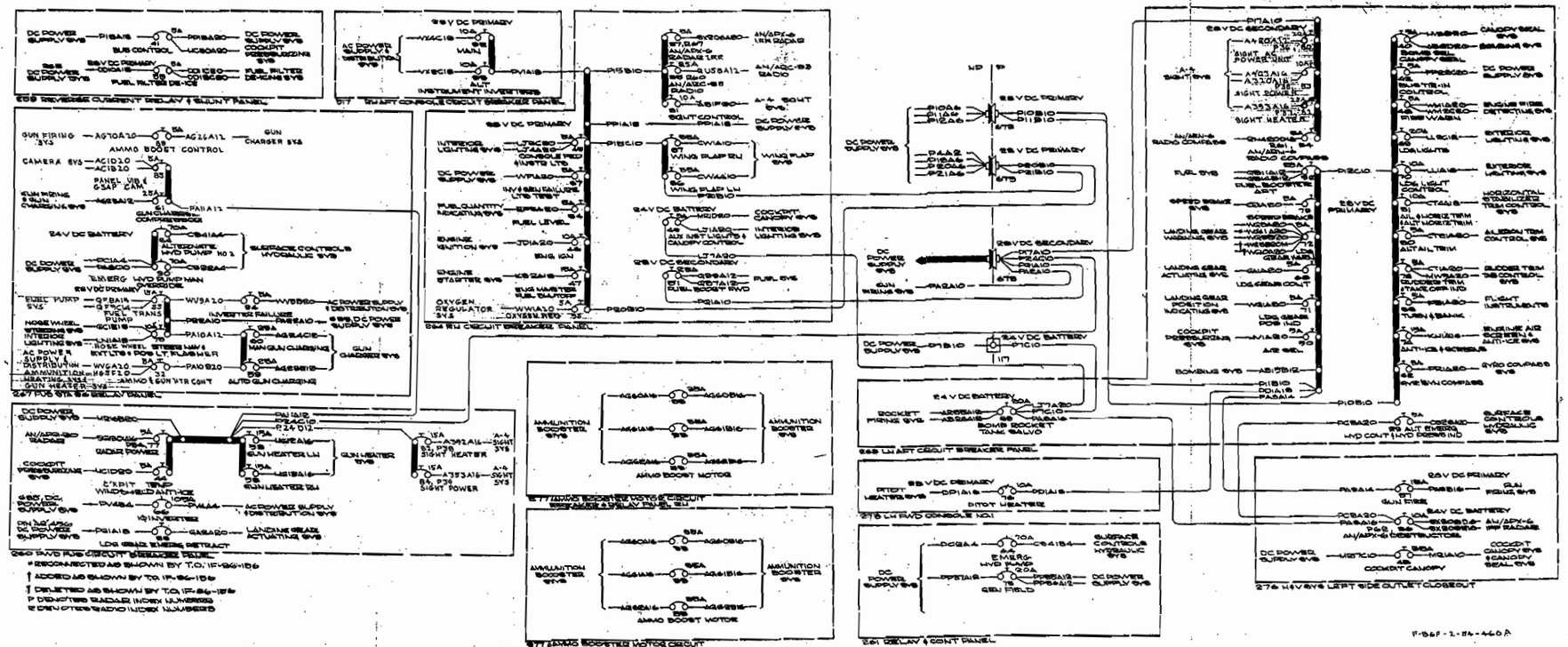
DC Power Distribution System - F-86F-10 and F-86F-15 Airplanes


28 V DC PRIMARY
28 V DC SECONDARY
28 V DC BATTERY
DC POWER SUPPLY SYS
DC PRIMARY BUS CONTROL
DC SECONDARY BUS CONTROL
AC POWER SUPPLY SYS
AC PRIMARY BUS CONTROL
AC SECONDARY BUS CONTROL
INSTRUMENT INVERTERS
115 V AC PRIMARY
115 V AC SECONDARY
26 V AC PRIMARY
26 V AC SECONDARY
CAMERA SYS
GUN FIRING & GUN CHARGING SYS
GUN CHARGER SYS
ELECTRONIC CONTROLS HYDRAULIC SYS
HYD PUMP MAN OVERRIDE
EMERG HYD PUMP
AUTO GUN CHARGING
AMMO BOOST CONTROL
AMMO BOOST LITE CONT
AMMUNITION BOOSTER SYS
AMMUNITION BOOSTER MOTOR
AMMUNITION BOOSTED SYS
GUN HEATER
GUN HEATERS
GUN HEATER SYS
GUN SIGHT SYS
GUN SIGHT POWER
GUN SIGHT HEATER
PITOT HEATER
PITOT HEATERS
WINDSHIELD ANTI-ICE SYS
WINDSHIELD ANTI-ICE CONT
ANTI-ICE & DEFOGGING SYS
ANTI-ICE & DEFOGGING
ANTI-ICE & DEFOGGING SYS
ANTI-ICE SYS
ALTERNATE HYD PUMP
GEN FIELD
FUEL TRANS PUMP
FUEL SYS
LANDING GEAR ACTUATING SYS
LANDING GEAR POSITION INDICATING SYS
LDG GEARS RETRACT
LDG GEARS EXTEND
LANDING GEAR WARNING SYS
LANDING GEAR ACTUATING SYS
LDG GEAR POS IND
LANDING GEAR WARNING
LANDING LIGHTS SYS
LANDING LIGHTS CONT
LANDING LIGHTS
NOSE WHEEL STEERING SYS
NOSE WHEEL STEERING
NOSE WHEEL STEERING CONT
NOSE WHEEL STEERING SYS
NOSE WHEEL STEERING
EXTERIOR LIGHTING SYS
EXTERIOR LIGHTS
FORM. STEER. LIGHT
FORM. STEER. LIGHTS
FORM. STEER. LIGHT CONT
FORM. STEER. LIGHT SYS
FORM. STEER. LIGHTS
EXT LTS FOR LT FLASH
INTERIOR LIGHTING SYS
INTERIOR LIGHTS
COCKPIT LIGHTING SYS
COCKPIT LIGHTS
CANOPY SEAL SYS
CANOPY SEAL
CANOPY SEAL CONT
CANOPY SEAL

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Plug	Fus 91 RH	Cockpit, RH Console
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 136 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 105 RH	RH Wheel Well
260	Panel - Forward Passage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

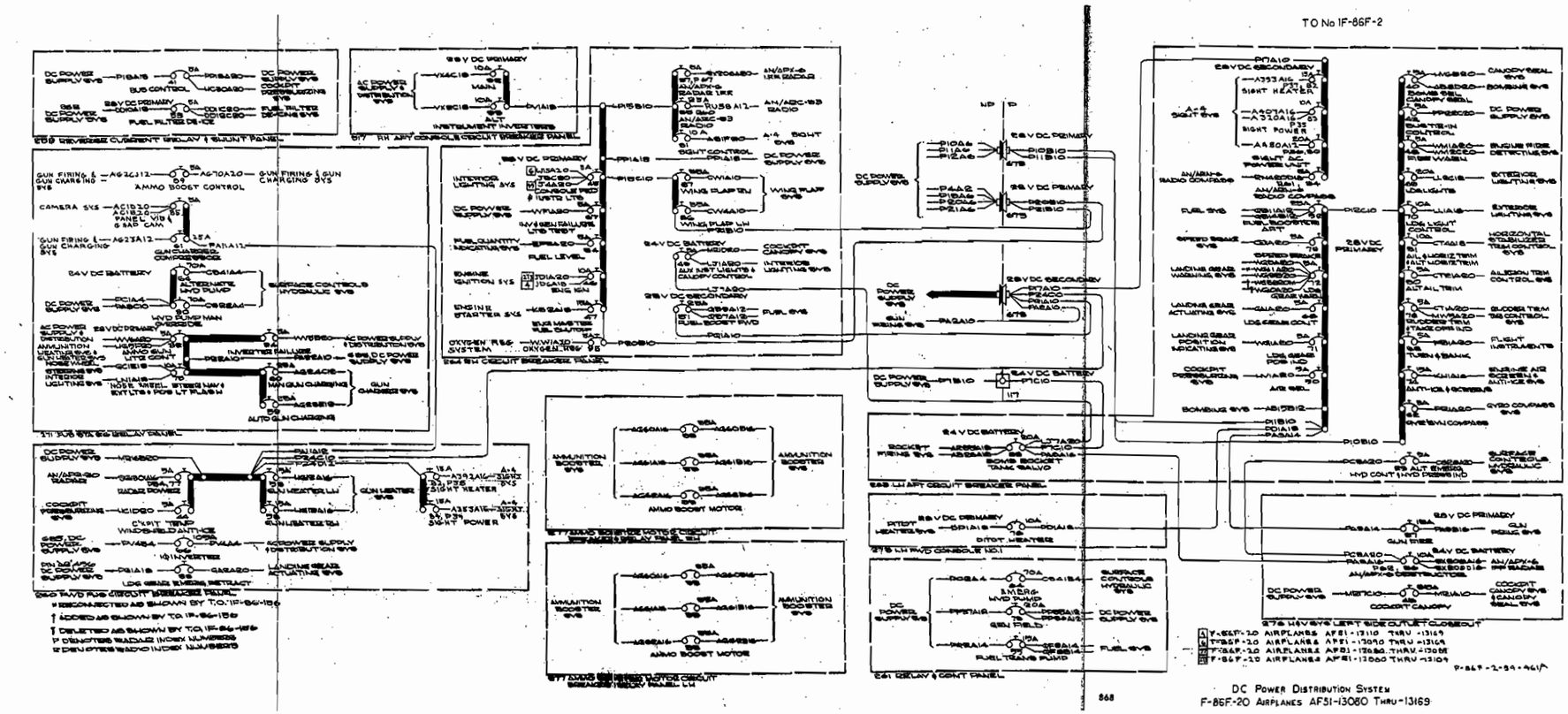
DC Power Distribution System - F-86F-20 Airplanes AF51-13070 Through -13079



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
85	Plug	Fus 91 RH	Cockpit, RH Console
82	Adapter	Fus 103	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 120 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 129 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 116 RH	Cockpit - RH
269	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
279	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80FLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-20 Airplanes AF51-13080 Through -13169



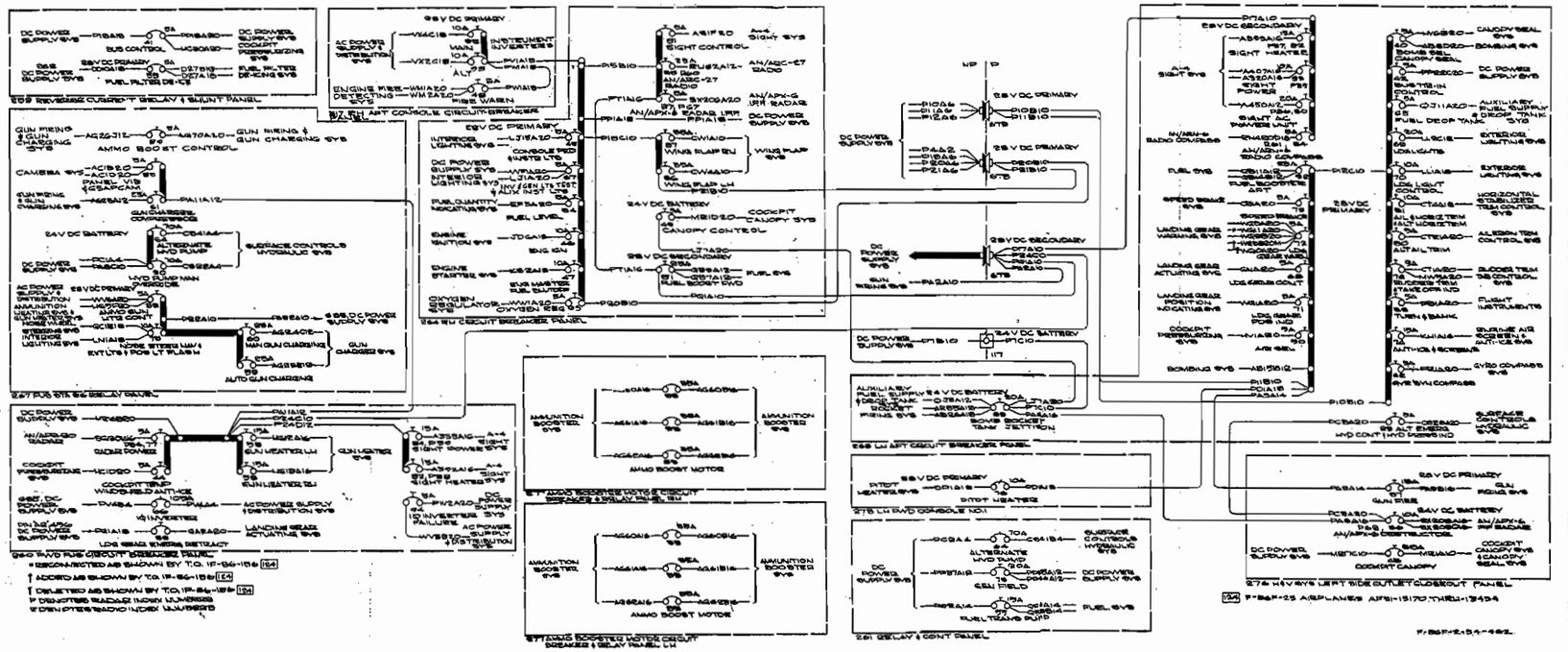
DC Power Distribution System
F-86F-20 Airplanes AF51-13080 Thru -13169

P-86F-2-54-461

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 112 RH	Cockpit
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 126 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
260	Panel - Reverse-current Relay and Shunt	Fus 135 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 35 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
270	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
872	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80ALD-4) for part numbers and location of items.

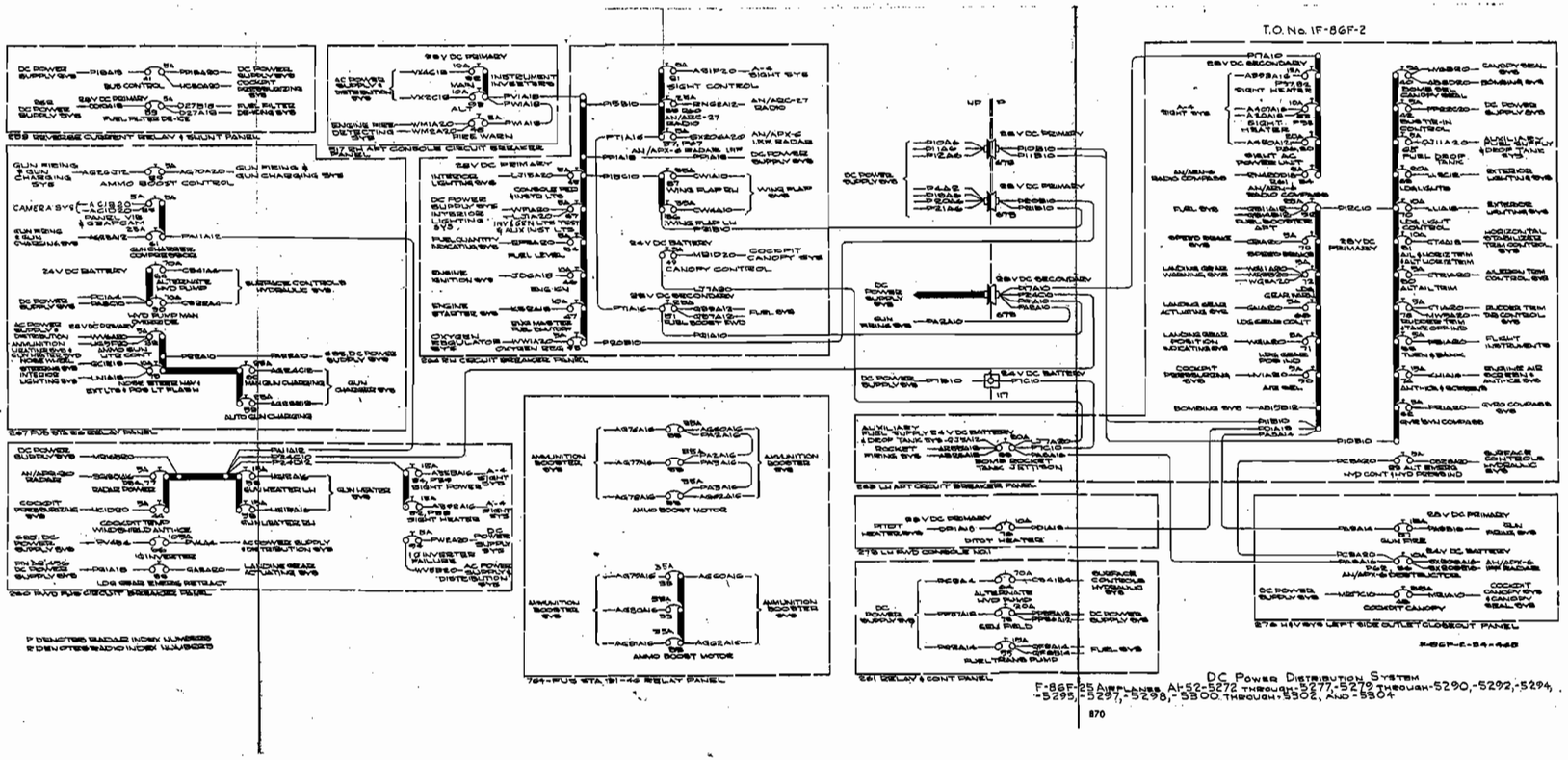
DC Power Distribution System F-86F-25 Airplanes AF51-13170 Through -13510


28 V DC PRIMARY
28 V DC SECONDARY
24 V DC BATTERY
AMMO BOOST CONTROL
GUN FIRING & GUN CHARGING SYS
SURFACE CONTROLS HYDRAULIC SYS
AUTO GUN CHARGING
AMMO BOOST MOTOR
AMMUNITION BOOSTER SYS
GUN HEATER SYS
LDG GEAR WARNING DISTRIBUTION
AC POWER SUPPLY & DISTRIBUTION SYS
DC POWER SUPPLY SYS
INSTRUMENT INVERTERS
ENGINE FIRE-WARN DETECTING SYS
AN/ASC-27 RADIO
AN/APX-6 IFF RADAR
AN/APN-6 RADAR
WING FLAP SYS
COCKPIT CANOPY SYS
FUEL SYS
ENGINE IGNITION SYS
ENGINE STARTER SYS
OXYGEN REGULATOR SYS
INTERIOR LIGHTING SYS
CAMERA SYS
GUN FIRING & GUN CHARGING SYS
AUXILIARY FUEL SUPPLY & DROP TANK JETTISON SYS
ENGINE ANTI-ICE SYS
ENGINE ANTI-ICE CONTROL
ENGINE ANTI-ICE SCREENS & ANTI-ICE SYS
ALTERNATE HYD PUMP
ALTERNATE HYD SYS
ALTERNATE HYD PUMP CONTROL
ALTERNATE HYD CONTROL

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
83	Adapter	Fus 103	Radio Compartment
84	Compass Loop Cable	Fus 120 RH	Canopy to LH Radio Bay
85	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
359	Panel - Reverse-current Relay and Shunt	Fus 128 RH	RH Wheel Well
359	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
361	Panel - Aft Radio Compartment Relay	Fus 130 LH	LH Radio Bay
363	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
364	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
367	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
376	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
678	Terminal Block - Pressure	Fus 114 RH	Gun Bay
784	Panel - Fuselage Station 31-66 Relay	Fus 41-45 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80ALD-4) for part numbers and location of items.

DC Power Distribution System F-86F Airplanes AF52-5272 Through -5277, -5279 Through -5290, -5292, -5294, -5295, -5297, -5298, -5300 Through -5302, and -5304


T.O. No. 1F-86F-2
28 V DC PRIMARY
28 V DC SECONDARY
28 V DC BATTERY
GUN FIRING & GUN CHARGING SYS
AMMO BOOST CONTROL
CAMERA SYS
GUN HEATER LH
GUN HEATER RH
AMMUNITION BOOSTERS SYS
AMMO BOOST MOTOR
ENGINE IGNITION SYS
ENGINE STARTER SYS
FUEL QUANTITY INDICATING SYS
OXYGEN EQUALIZATOR SYS
INTERIOR LIGHTING SYS
DC POWER SUPPLY SYS
AC POWER SUPPLY & DISTRIBUTION
ANTI-ICING & DEICING SYS
ENGINE FIRE DETECTING SYS
FIRE WARN
INSTRUMENT INVERTERS
AN/ASQ-27 RADIO
AN/APX-6 IFF, RWR
AN/APX-6 RADAR, IFF
AN/ARC-27 RADIO
WING FLAP SYS
FUEL SYS
COCKPIT CANOPY CONTROL
SURFACE CONTROLS HYDRAULIC SYS
ALTERNATE HYD PUMP
EDH FIELD
FUEL TRANS PUMP
ALTERNATE HYD SUMP
HYD SUMP MAN OVERRIDE
MAIN GUN CHARGING
AUTO GUN CHARGING
GUN CHARGING SYS
GUN HEATER SYS
ANTI-ICING & DEICING SYS
CANOPY SEAL SYS
BOMBING SYS
LANDING GEAR ACTUATING SYS
LANDING GEAR POSITION INDICATING SYS
LANDING GEAR WARNING SYS
COCKPIT PRESSURIZATION SYS
ARMAMENT
AUXILIARY FUEL SUPPLY & DROP TANK SYS
ROCKET FIRING SYS
ROCKET JETTISON
PITOT HEATER SYS
ANTI-ICING & DEICING SYS
GUN SYNC
RADIO COMPASS
AN/ARN-6 RADIO COMPASS
AN/ARC-27 RADIO
AN/APX-6 IFF
AN/APX-6 RADAR
AN/APX-6 DECODER
AN/APX-6 INTERROGATOR
AN/APX-6 DISCRIMINATOR
AN/APX-6 CONTROL
AN/APX-6 INDICATOR
AN/APX-6 MODULATOR
AN/APX-6 RECEIVER
AN/APX-6 TRANSMITTER
AN/APX-6 POWER SUPPLY
AN/APX-6 RWR
AN/APX-6 RWR INDICATOR
AN/APX-6 RWR CONTROL
AN/APX-6 RWR RECEIVER
AN/APX-6 RWR POWER SUPPLY
AN/APX-6 RWR ANTENNA
AN/APX-6 RWR CONTROL
AN/APX-6 RWR INDICATOR

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
91	Adapter	Fus 133 LH	LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 116 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-25 Airplanes AF52-5278, -5291, -5293, -5296, -5299, -5303, and -5305 Through -5328

259 REVERSE CURRENT RELAY & SHUNT PANEL
517 RH AFT CONSOLE CIRCUIT BREAKER PANEL
264 RH CIRCUIT BREAKER PANEL
267 FUS STA 26 RELAY PANEL
260 FWD FUS CIRCUIT BREAKER PANEL
764 FUS STA 31-46 RELAY PANEL
263 LH AFT CIRCUIT BREAKER PANEL
276 LH FWD CONSOLE NO.1
261 RELAY & CONT PANEL
276 LH 28V SYS LEFT SIDE OUTLET CLOSEOUT PANEL
28V DC PRIMARY
28V DC SECONDARY
24V DC BATTERY
P DENOTES RADIO INDEX NUMBERS
R DENOTES RADAR INDEX NUMBERS
F-86F-2-54-464A

DC Power Distribution
F-86F-25 Airplanes AF52-5278, -5291, -5293, -5296, -5299 and AF53-5303, -5305
Through -5328

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
91	Adapter	Fus 133 LH	LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
96	Brush Holder - Loop Disconnect	Fus 133 LH	Canopy
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-25 Airplanes AF52-5329 Through -5530

P DENOTES RADAR INDEX NUMBERS
R DENOTES RADIO INDEX NUMBERS

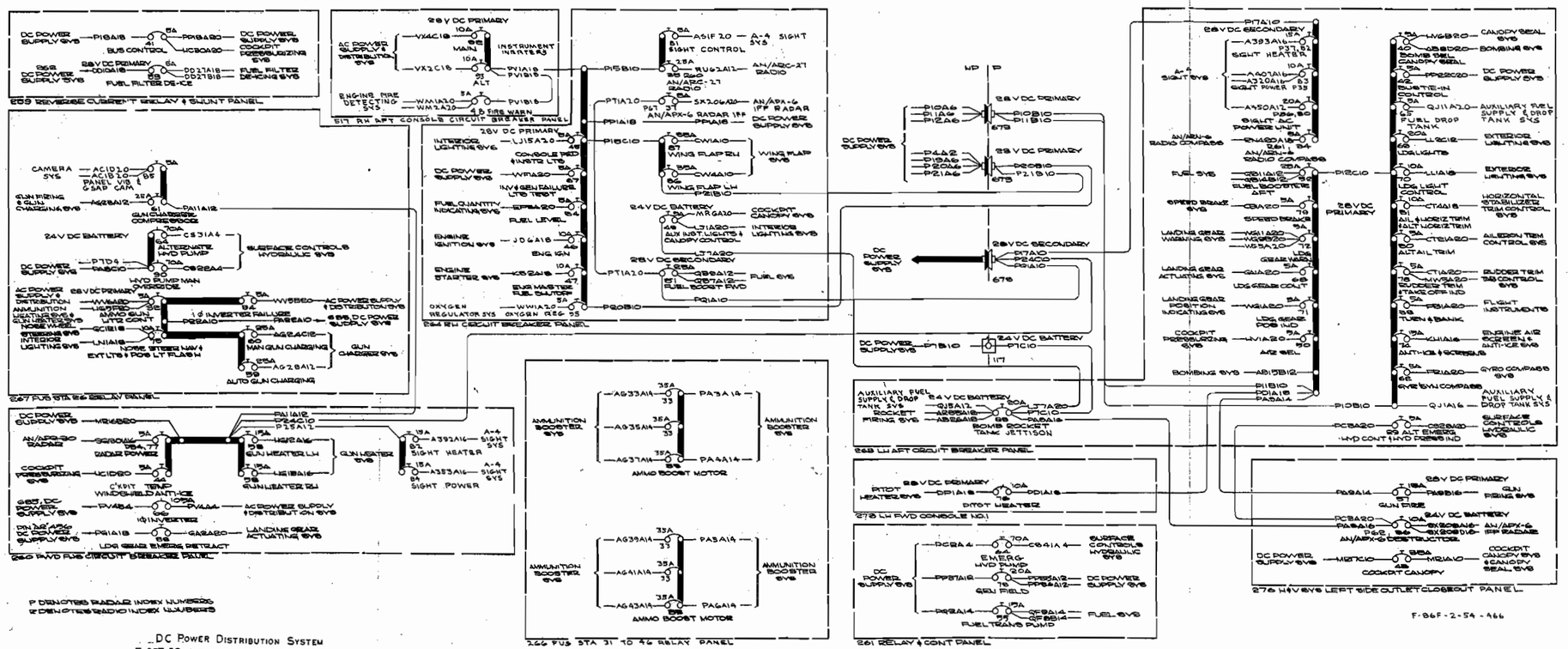
F-86F-2-54-465

DC Power Distribution System
F-86F-25 Airplanes AF52-5329 Thru -5530

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay
784	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

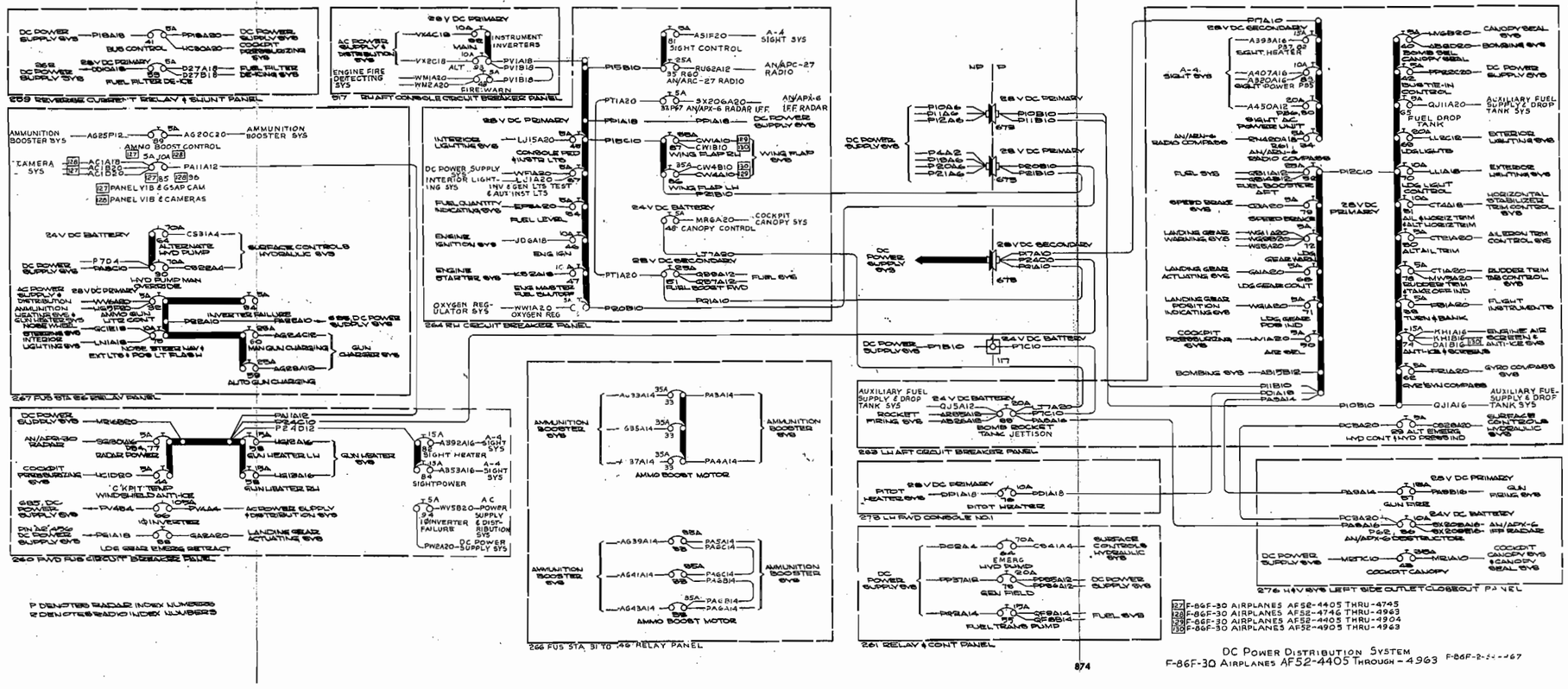
DC Power Distribution System F-86F-30 Airplanes AF52-4305 Through -4404



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
83	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
96	Brush Holder - Loop Disconnect	Fus 133 LH	Canopy
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Alt Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 116 RH	Cockpit - RH
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
873	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60ZLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-30 Airplanes AF52-4405 Through -4963

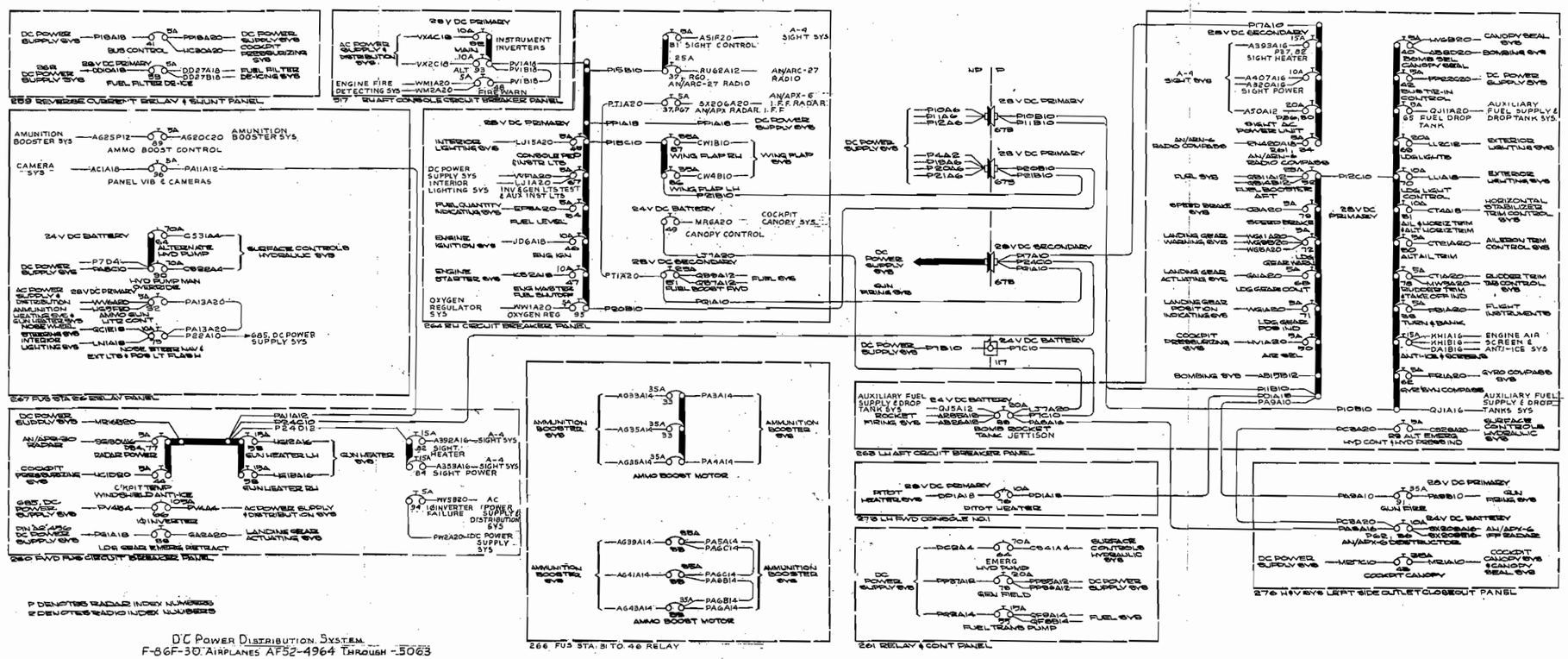


DC Power Distribution System
F-86F-30 Airplanes AF52-4405 Through - 4963 F-86F-2-[illegible]-67

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
61	Circuit Breaker (AN/ARN-6)	Fus 113 LH	Cockpit
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 125	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
91	Adapter	Fus 133 LH	LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 119 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

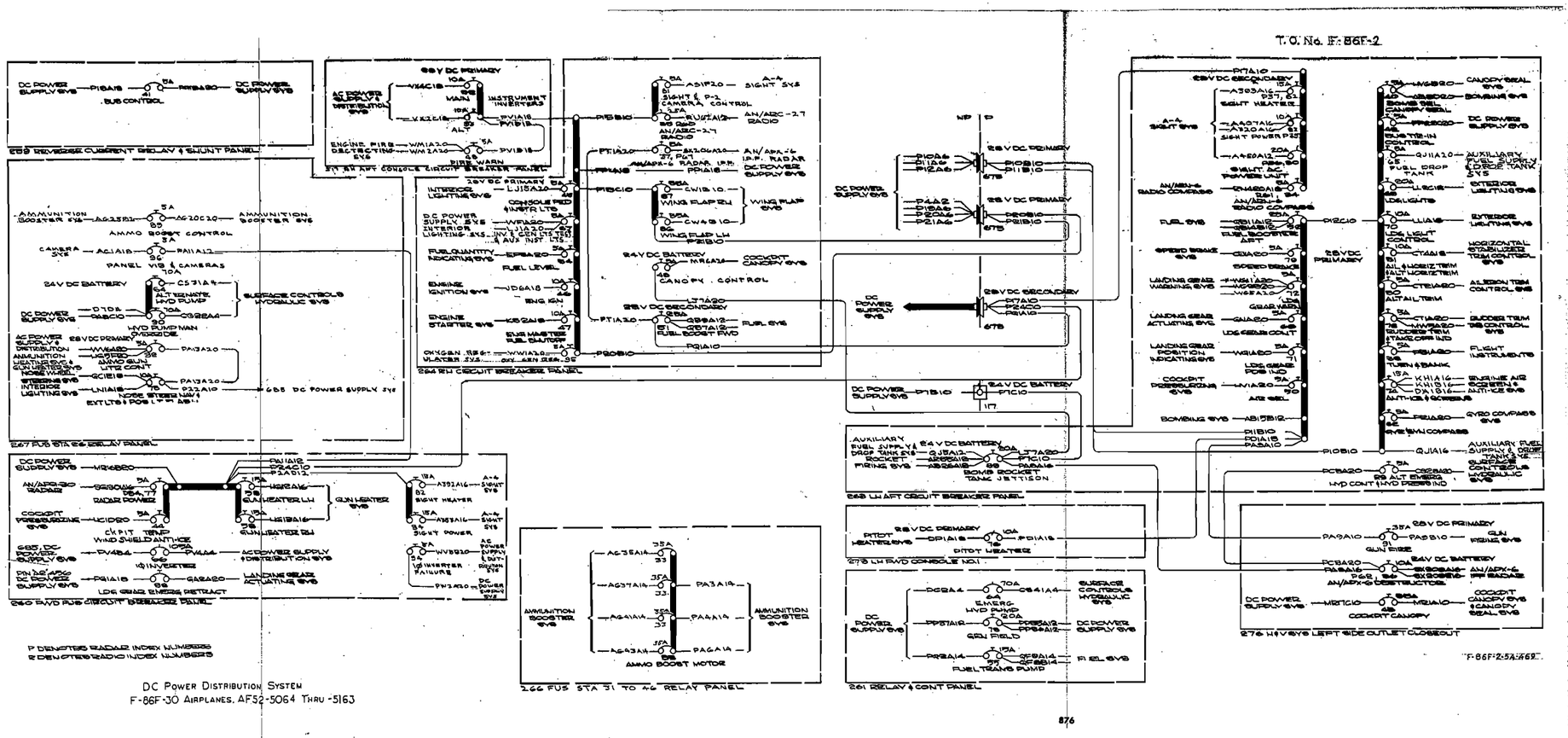
DC Power Distribution System F-86F-30 Airplanes AF52-4984 Through -5063



INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
65	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 133	Radio Compartment
84	Compass Loop Cable	Fus 130 RH	Canopy to Lft Radio Bay
91	Adapter	Fus 133 LH	LH Radio Bay
95	Base Assembly - Loop Disconnect	Fus 135 LH	Canopy Deck
96	Brush Holder - Loop Disconnect	Fus 133 LH	Canopy
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
673	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-80JLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-30 Airplanes AF52-5064 Through -5163

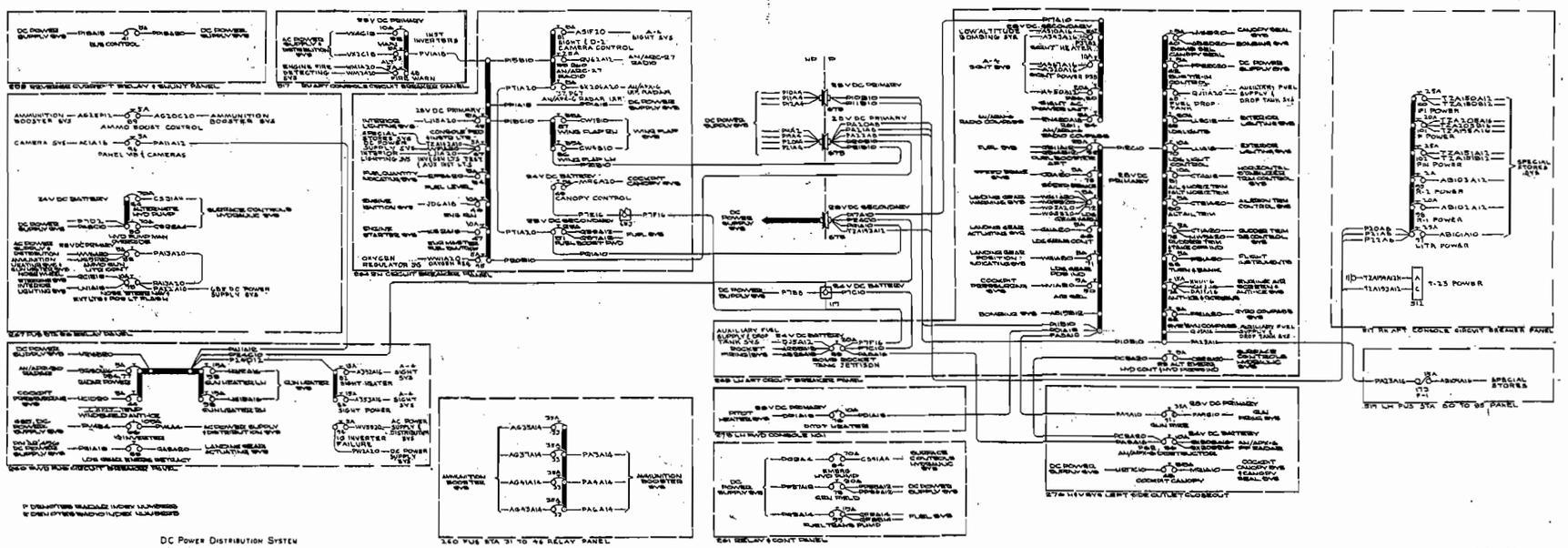


DC Power Distribution System
F-86F-30 Airplanes, AF52-5064 Thru -5163

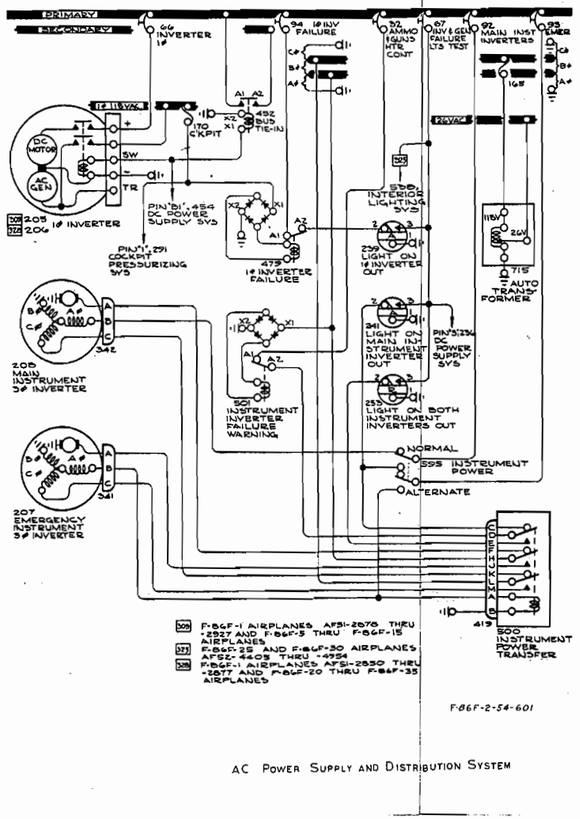
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
81	Receptacle - Pressure Disconnect	Fus 113 RH	Cockpit
82	Adapter	Fus 132	Radio Compartment
84	Compass Loop Cable	Fus 120 RH	Canopy to Lit Radio Bay
85	Base Assembly - Loop Disconnect	Fus 120 LH	Canopy Deck
86	Brush Holder - Loop Disconnect	Fus 120 LH	Canopy
87	Plug - Loop Pressure Disconnect	Fus 183 RH	Canopy
88	Receptacle - Loop Pressure Disconnect	Fus 183 RH	Canopy
89	Plug - Compass Loop	Fus 120 LH	Canopy Bow
100	Receptacle - Compass Loop	Fus 120 LH to Canopy	Canopy Bow
101	Adapter	Fus 120 RH to Canopy	Canopy
117	Connector - Pressure Block Barrier	Fus 120 RH and LH	Cockpit
252	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
260	Panel - Forward Foreign Circuit-breaker	Fus 28 RH	Nose Radar Bay
261	Panel - All Radio Crossfeed Relay	Fus 270 LH	LH Radio Bay
262	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - Lft Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
287	Panel - Nose Position Relay	Fus 40 LH	Radar Bay
350	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
377	Panel - Ammunition Booster Relay	Fus 112 RH and LH	Gun Bays
452	Terminal Block - Ammunition Booster	Fus 96 RH and LH	Cockpit
613	Terminal Block - Pressure	Fus 114 RH	Gun Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ZLD-4) for part numbers and location of items.

DC Power Distribution System F-86F-35 Airplane


28 V DC PRIMARY
28 V DC SECONDARY
28 V DC BATTERY
AMMUNITION BOOSTER SYS
AMMO BOOST CONTROL
CAMERA SYS
PANEL VIB (CAMERAS)
SURFACE CONTROLS HYDRAULIC SYS
LANDING GEAR ACTUATING SYS
LOW ALTITUDE BOMBING SYS
CANOPY CONTROL
WING FLAP SYS
FUEL SYS
ENGINE STARTER SYS
OXYGEN REGULATOR 35
AUXILIARY FUEL SUPPLY (DROP TANK) SYS
ROCKET JET TANK JETTISON
GUN HEATER SYS
GUN CHARGER SYS
AN/APG-37 RADAR
AN/APG-27 RADIO
AN/ARC-27 RADIO
AN/APX-6 IFF
AN/APN-6 RADAR ALT
AN/APG-5 RADAR (AIR)
AN/ARN-6 RADIO COMPASS
AN/APN-1 RADAR BEACON
AN/ARC-34 RADIO
AN/ARC-33 RADIO
AN/ARC-3 RADIO
AN/ARC-27 RADIO
AN/ARC-44 RADIO
AN/ARC-38 RADIO
AN/ARC-28 RADIO
AN/ARC-4 RADIO
AN/ARC-5 RADIO
AN/ARC-1 RADIO
AN/ARC-2 RADIO
AN/ARC-7 RADIO
AN/ARC-8 RADIO
AN/ARC-9 RADIO
AN/ARC-10 RADIO
AN/ARC-11 RADIO
AN/ARC-12 RADIO
AN/ARC-13 RADIO
AN/ARC-14 RADIO
AN/ARC-15 RADIO
AN/ARC-16 RADIO
AN/ARC-17 RADIO
AN/ARC-18 RADIO
AN/ARC-19 RADIO
AN/ARC-20 RADIO
AN/ARC-21 RADIO
AN/ARC-22 RADIO
AN/ARC-23 RADIO
AN/ARC-24 RADIO
AN/ARC-25 RADIO
AN/ARC-26 RADIO

T.O. No. 1F-86F-2



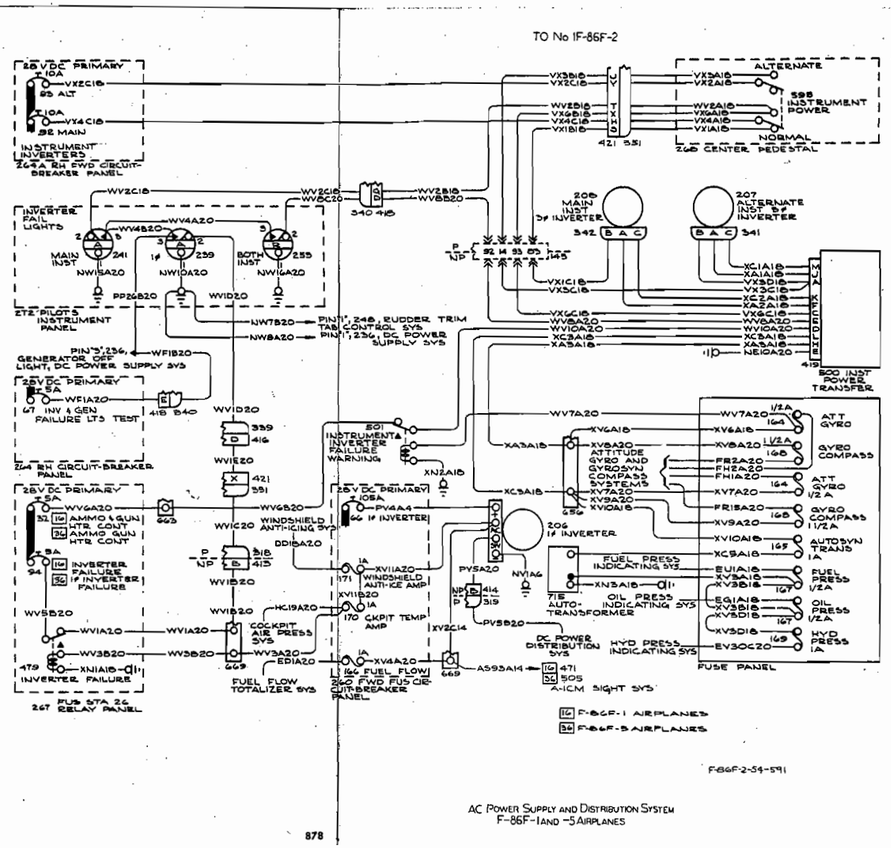
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
185	Disconnect - Pressure RH	Pus 124 RH	Cockpit
206	Inverter - One-phase 1500VA 115 V	Pus 15 CL	Radar Bay
207	Inverter - 3-phase 1000VA 115 V	Pus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 1000VA 115 V	Pus 178 LH	Left-hand Radio Bay
216	Light Assembly - Generator Failure Warning	Pus 80 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Pus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Pus 26 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Pus 118 RH	Cockpit - RH
264A	Panel - Circuit-breaker Right-hand Forward	Pus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Pus 40 LH	Radar Bay
268	Panel - Pedestal	Pus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Pus 78 CL	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Pus 62.6 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Pus 185 CL	Engine Snoot CL
339	Plug - Instrument Panel Indicating Light Disconnect	Pus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Pus 76 LH	Fwd Inst Panel
341	Plug - Inverter - 3-phase (Alternate)	Pus 170 LH	LH Radio Bay
342	Plug - Inverter - 3-phase (Main)	Pus 155.0 LH	LH Radio Bay
351	Plug - Pedestal Disconnect	Pus 62.6 LH	Directly Behind Pedestal
419	Receptacle - Instrument Power Transfer Relay	Pus 156 LH	LH Radio Bay
471	Relay - Gun Sight Power	Pus 80 LH	Radar Bay
500	Relay - Instrument Power Transfer	Pus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Pus 183 LH	Radio Bay
656	Terminal Block - Compass	Pus 125 CL	Below Cockpit
663	Terminal Block - Gun Bay	Pus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Pus 35 RH	Nose Radar Bay
715	Transformer - Auto 26V to 115V	Pus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AC Power Supply and Distribution System - F-86F-1 and -5 Airplanes

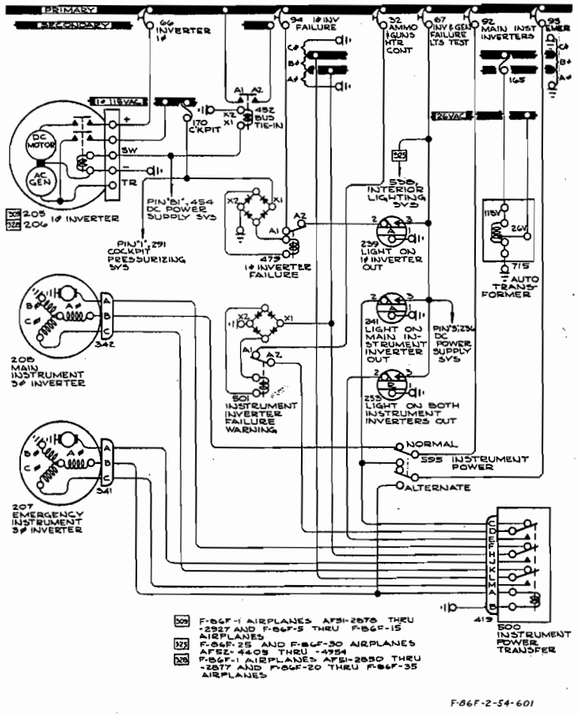
AC Power Supply and Distribution System

TO No 1F-86F-2



AC Power Supply and Distribution System
F-86F-1 and -5 Airplanes

T.O. No. 1F-86F-2



309 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-2 THRU F-86F-15 AIRPLANES
323 F-86F-25 AND F-86F-30 AIRPLANES AF52-4403 THRU -4954
326 F-86F-1 AIRPLANES AF51-2830 THRU -2877 AND F-86F-20 THRU F-86F-35 AIRPLANES

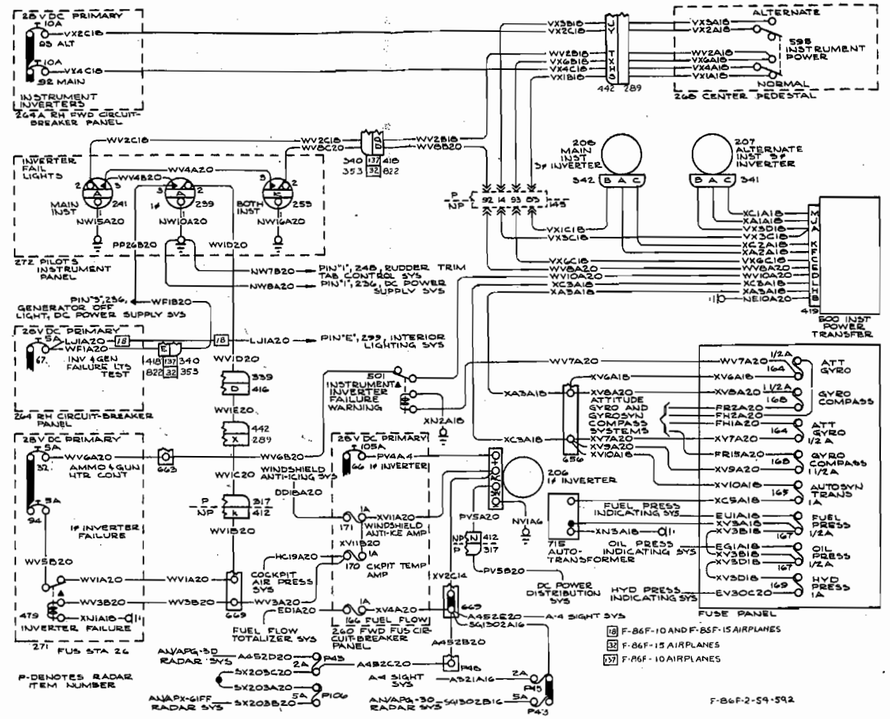
F-86F-2-54-601

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
93P	Fus - Amplifier and Servo-400 A.C.	Fus 122 RH	Nose Radar Bay
95P	Fus - Voltage Regulator-115 V.A.C.	Fus 18 LH	Nose Radar Bay
88P	Terminal Strip	Fus 42 to 47 LH	RH Gun Bay
106P	Fuse (115 VAC)	Fus 114 LH	LH Radio Bay
195	Disconnect - Pressure RH	Fus 124 RH	Cockpit -
206	Inverter - One-phase 1500VA 115 V	Fus 15 CL	Radar Bay
207	Inverter - 3-phase 100VA 115 V	Fus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 100VA 115 V	Fus 174 LH	Left-hand Radio Bay
236	Light Assembly - Generator Failure Warning	Fus 80 CL	Cockpit - Instrument Panel
240	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
264A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
268	Panel - Pedestal	Fus 76 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 76 CL	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 64.6 LH	Cockpit - Forward of Pedestal
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
381	Plug - Inverter - 3-phase (Alternate)	Fus 170 LH	LH Radio Bay
382	Plug - Inverter - 3-phase (Main)	Fus 155.8 LH	LH Radio Bay
393	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
419	Receptacle - Instrument Power Transfer Relay	Fus 156 LH	LH Radio Bay
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
500	Relay - Instrument Power Transfer	Fus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
566	Terminal Block - Compass	Fus 125 CL	Below Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
715	Transformer - Auto 26V to 115V	Fus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AC Power Supply and Distribution System F-86F-10 and -15 Airplanes

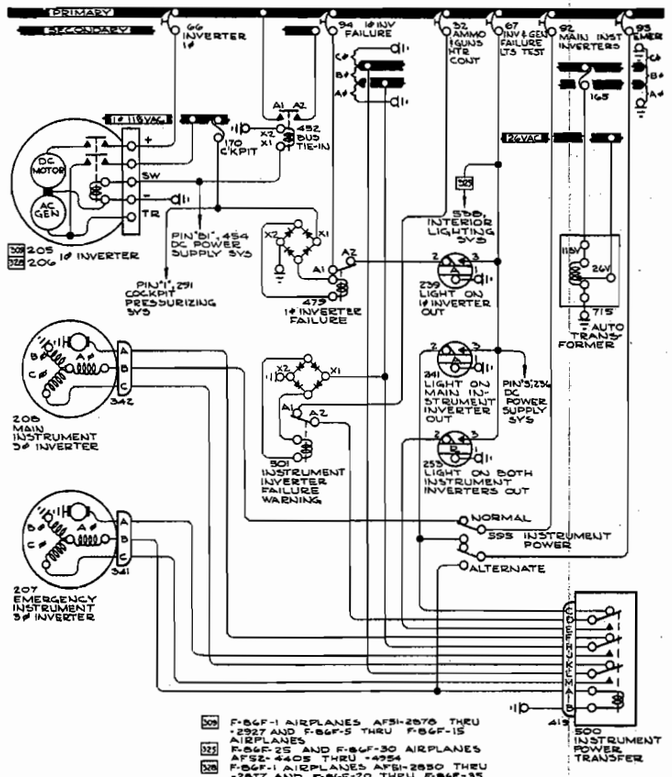
TO No 1F-86F-2



18 F-86F-10 AND F-86F-15 AIRPLANES
30 F-86F-15 AIRPLANES
537 F-86F-10 AIRPLANES

F-86F-2-59-592

AC POWER SUPPLY AND DISTRIBUTION SYSTEM F-86F-10 AND -15 AIRPLANES



509 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-5 THRU F-86F-15 AIRPLANES
527 F-86F-25 AND F-86F-30 AIRPLANES AF52-4405 THRU -4954
528 F-86F-1 AIRPLANES AF51-2850 THRU -2877 AND F-86F-20 THRU F-86F-35 AIRPLANES

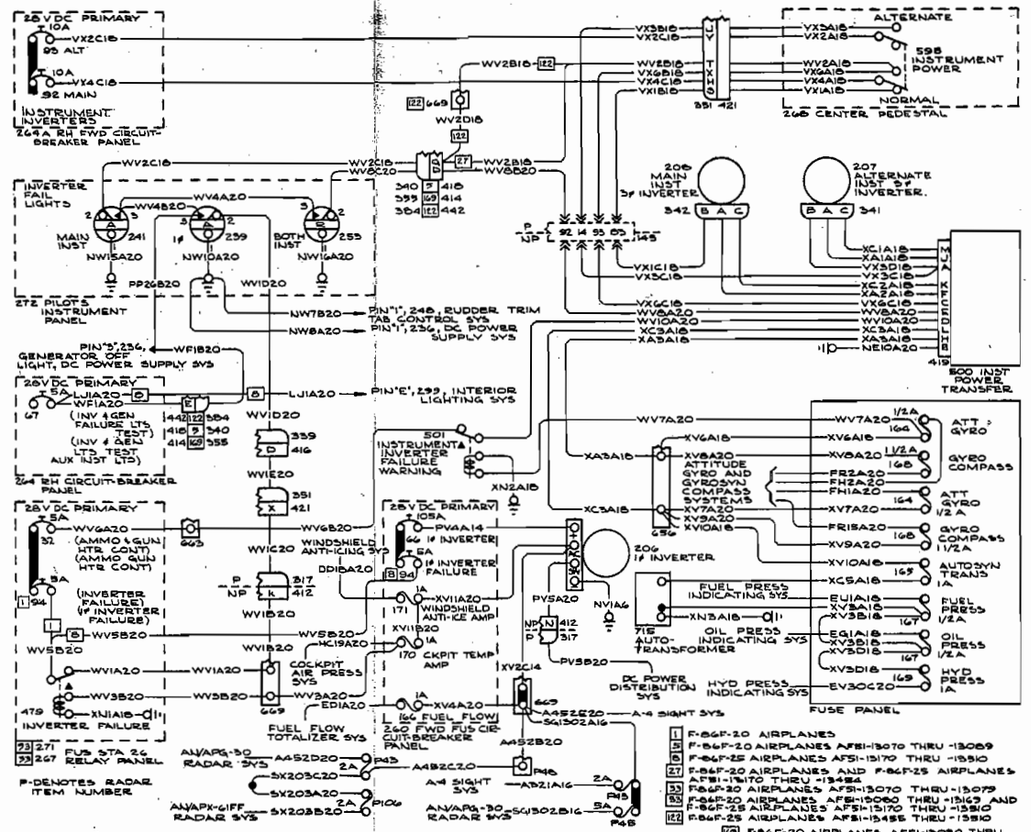
F-86F-2-54-601

AC POWER SUPPLY AND DISTRIBUTION SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
p43	Fuse - Amplifier and Servo-400 A.C.	Fus 122 RH	Nose Radar Bay
p45	Fuse - Voltage Regulator-115 V.A.C.	Fus 18 LH	Nose Radar Bay
p108	Fuse (115 VAC)	Fus 144 LH	LH Radio Bay
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
206	Inverter - One-phase 1500VA 115 V	Fus 16 CL	Radar Bay
207	Inverter - 3-phase 100VA 115 V	Fus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 100VA 115 V	Fus 174 LH	Left-hand Radio Bay
236	Light Assembly - Generator Failure Warning	Fus 80 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Fus 28 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
264A	Panel - Circuit-breaker Right hand Forward	Fus 28 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 28 Relay	Fus 28 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.8 LH	Cockpit - Forward of Pedestal
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 78 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 78 LH	Fwd Inst Panel
341	Plug - Inverter - 3-phase (Alternate)	Fus 170 LH	LH Radio Bay
342	Plug - Inverter - 3-phase (Main)	Fus 165.8 LH	LH Radio Bay
351	Plug - Pedestal Disconnect	Fus 82.8 LH	Directly Behind Pedestal
356	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
419	Receptacle - Instrument Power Transfer Relay	Fus 156 LH	LH Radio Bay
500	Relay - Instrument Power Transfer	Fus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
656	Terminal Block - Compass	Fus 126 CL	Below Cockpit
863	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
869	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
716	Transformer - Auto 26V to 115V	Fus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

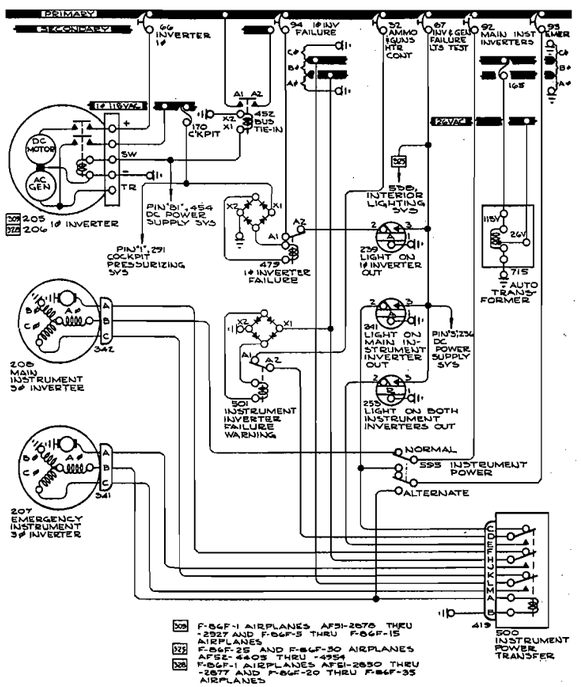
AC Power Supply and Distribution System - F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13070 Through -13510



1 F-86F-20 AIRPLANES
35 F-86F-20 AIRPLANES AF51-13070 THRU -13089
6 F-86F-25 AIRPLANES AF51-13170 THRU -13510
27 F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU -13454
33 F-86F-20 AIRPLANES AF51-13070 THRU -13079
53 F-86F-20 AIRPLANES AF51-13080 THRU -13169 AND F-86F-25 AIRPLANES AF51-13170 THRU -13310
182 F-86F-25 AIRPLANES AF51-13455 THRU -13510
169 F-86F-20 AIRPLANES AF51-13090 THRU 13169 AND F-86F-25 AIRPLANES AF51-13170 THRU -13454

F-86F-2-54-595

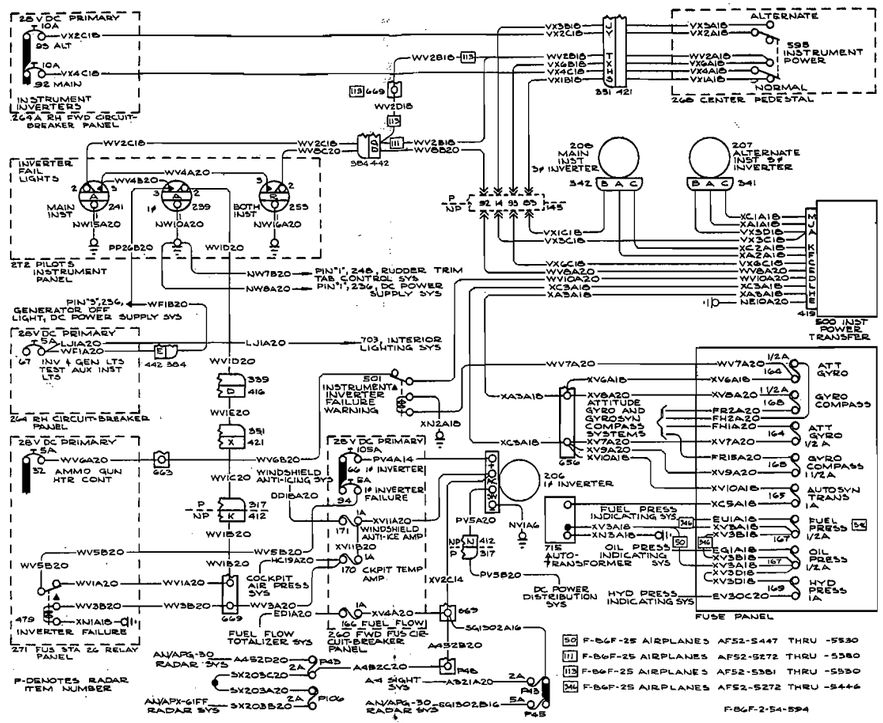
AC POWER SUPPLY AND DISTRIBUTION SYSTEM
F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13070 THRU -13510



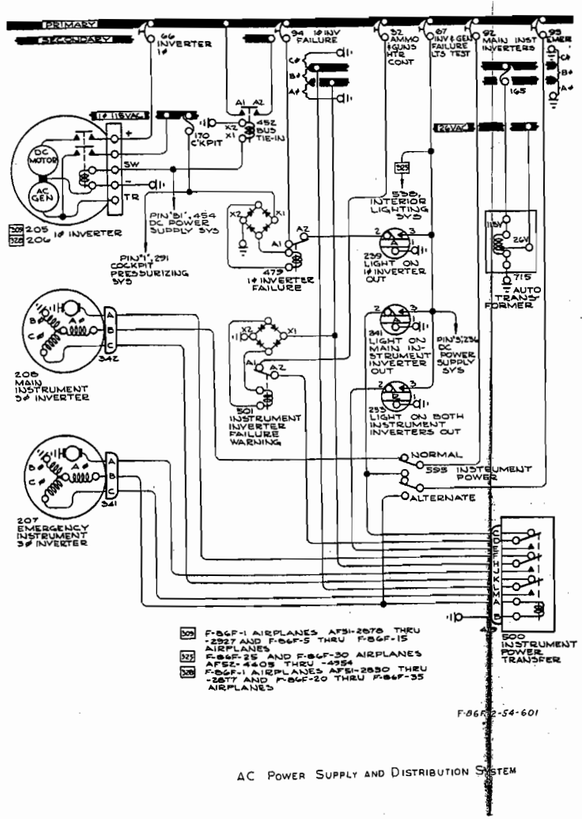
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
43P	Fuse - Amplifier and Servo-800 A.C.	Fus 122 RH	Nose Radar Bay
45P	Fuse - Voltage Regulator-115 V.A.C.	Fus 18 LH	Nose Radar Bay
48P	Terminal Strip	Fus 42 to 47 LH	RH Gun Bay
106P	Fuse (115 VAC)	Fus 144 LH	LH Radio Bay
115	Disconnect - Pressure RH	Fus 124 RH	Cockpit
206	Inverter - One-phase 1500VA 115 V	Fus 15 CL	Radar Bay
207	Inverter - 3-phase 1000A 115 V	Fus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 1000A 115 V	Fus 174 LH	Left-hand Radio Bay
236	Light Assembly - Generator Failure Warning	Fus 80 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
268	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
268A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
288	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
272	Panel - Instrument	Fus 78 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
341	Plug - Inverter - 3-phase (Alternate)	Fus 170 LH	LH Radio Bay
342	Plug - Inverter - 3-phase (Main)	Fus 155.8 LH	LH Radio Bay
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
419	Receptacle - Instrument Power Transfer Relay	Fus 156 LH	LH Radio Bay
500	Relay - Instrument Power Transfer	Fus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
656	Terminal Block - Compass	Fus 125 CL	Below Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
715	Transformer - Auto 26V to 115V	Fus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

A-C Power Supply and Distribution System - F-86F-25 Airplanes AF52-5272 Through -5530



AC Power Supply And Distribution System
F-86F-25 Airplanes AF52-5272 Thru -5530

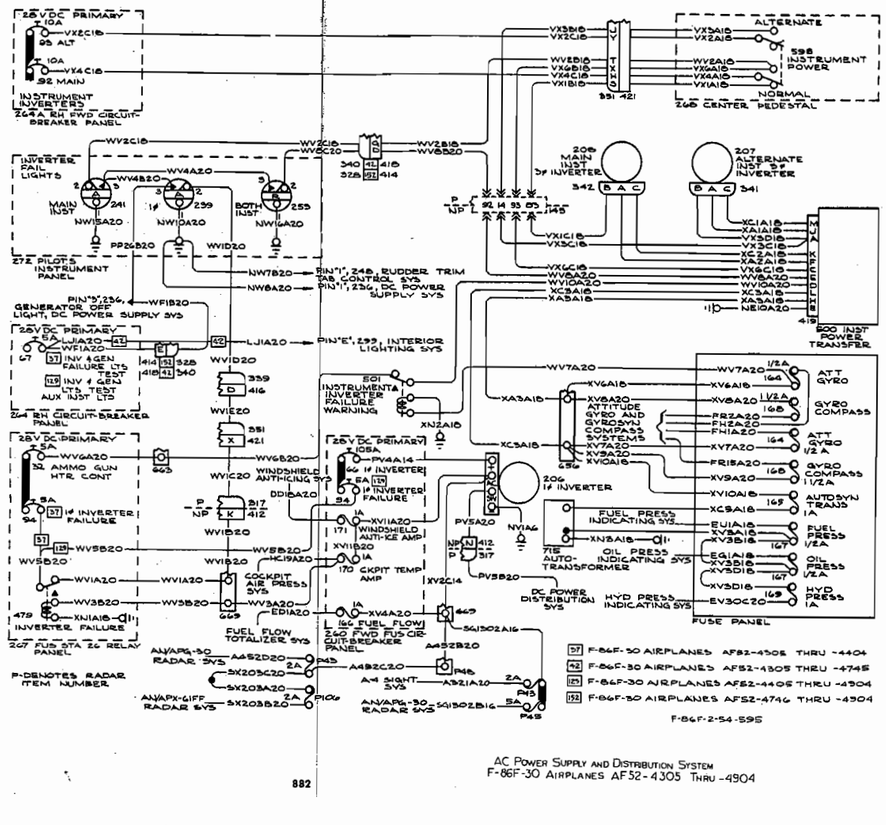


AC Power Supply and Distribution System

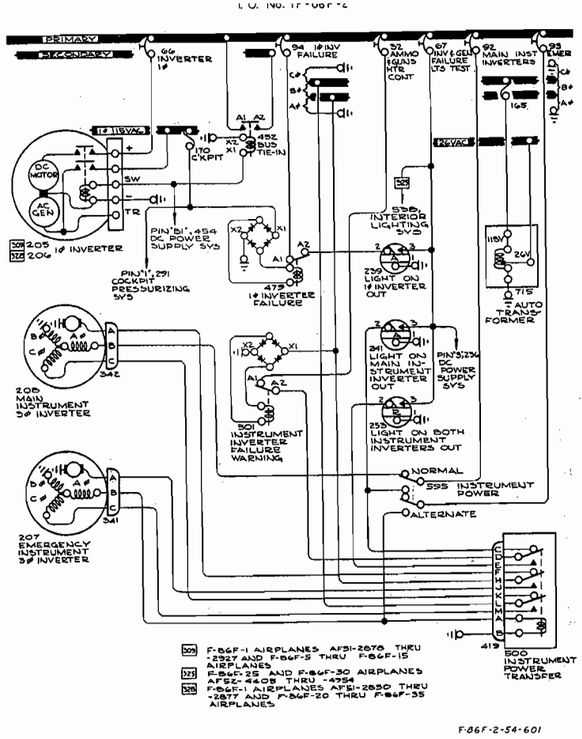
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
43P	Fuse - Amplifier and Servo-400 A.C.	Fus 122 RH	Nose Radar Bay
45P	Fuse - Voltage Regulator - 115 V.A.C.	Fus 18 LH	Nose Radar Bay
106P	Fuse (115 VAC)	Fus 144 LH	LH Radio Bay
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
207	Inverter - 3-phase 100VA 115 V	Fus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 100VA 115 V	Fus 174 LH	Left-hand Radio Bay
236	Light Assembly - Generator Failure Warning	Fus 80 CL	Cockpit - Instrument Panel
248	Light Assembly - Take-off Indicator	Fus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Fus 116 RH	Cockpit - RH
264A	Panel - Circuit-breaker Right-hand Forward	Fus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 70 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
289	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 63.6 LH	Cockpit - Forward of Pedestal
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
339	Plug - Instrument Panel Indicating Light Disconnect	Fus 76 LH	Forward LH Side of Instrument Panel
340	Plug - Instrument Panel Light Disconnect	Fus 76 LH	Fwd Inst Panel
341	Plug - Inverter - 3-phase (Alternate)	Fus 170 LH	LH Radio Bay
342	Plug - Inverter - 3-phase (Main)	Fus 155, 8 LH	LH Radio Bay
351	Plug - Pedestal Disconnect	Fus 63.6 LH	Directly Behind Pedestal
419	Receptacle - Instrument Power Transfer Relay	Fus 155 LH	LH Radio Bay
500	Relay - Instrument Power Transfer	Fus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Fus 183 LH	Radio Bay
683	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
859	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
715	Transformer - Auto 26V to 115V	Fus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80JLD-4) for part numbers and location of items.

AC Power Supply and Distribution System - F-86F-30 Airplanes AF52-4305 Through -4904



AC Power Supply and Distribution System
F-86F-30 Airplanes AF52-4305 Thru -4904



505 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-5 THRU F-86F-15 AIRPLANES
529 F-86F-25 AND F-86F-30 AIRPLANES AF52-4408 THRU -4954
565 F-86F-1 AIRPLANES AF51-2930 THRU -2877 AND F-86F-20 THRU F-86F-35 AIRPLANES

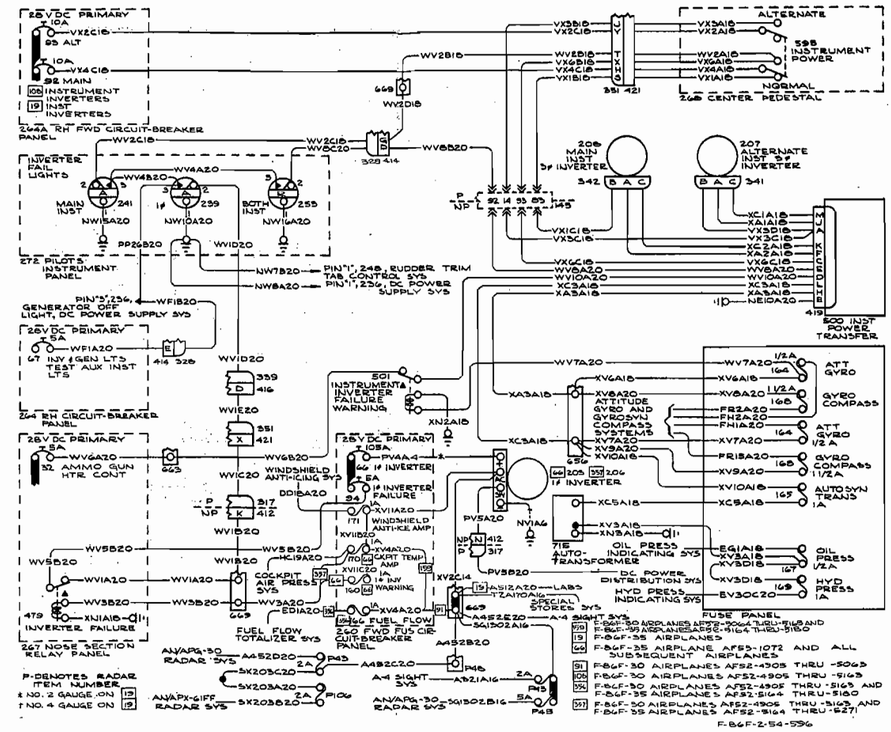
F-86F-2-54-601

AC Power Supply and Distribution System

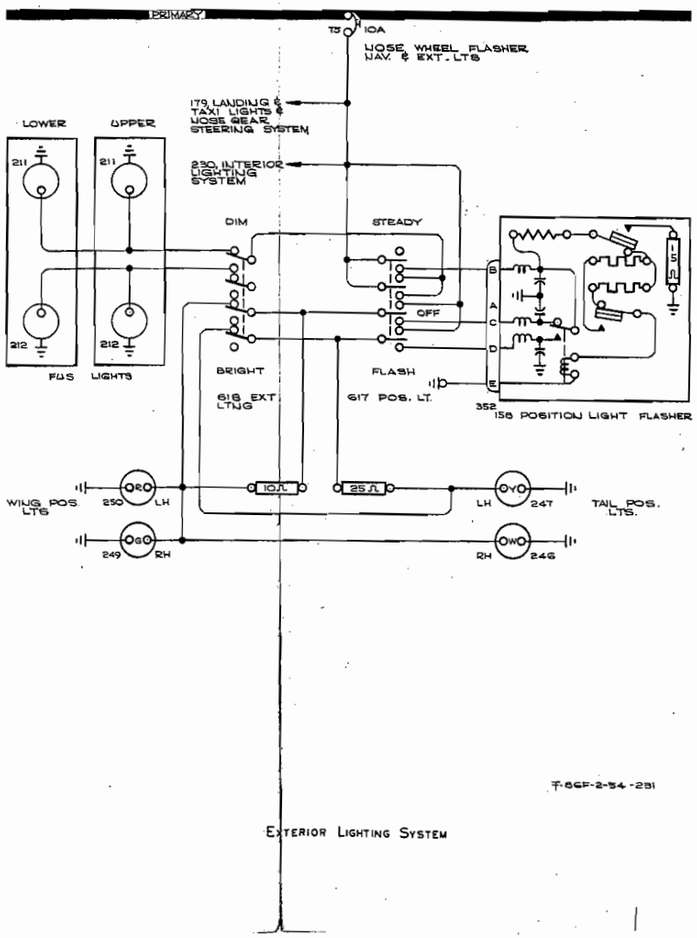
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
83P	Fuse - Amplifier and Servo-AOO A,C.	Pus 122 RH	Nose Radar Bay
85P	Fuse - Voltage Regulator 115 V.A.C.	Pus 18 LH	Nose Radar Bay
98P	Terminal Strip	Pus 42 to 47 LH	RH Gun Bay
145	Disconnect - Pressure RH	Pus 124 RH	Cockpit
205	Inverter - One-phase 1500VA 115 V	Pus 20 CL	Nose Radar Bay
206	Inverter - One-phase 1500VA 115 V	Pus 15 CL	Radar Bay
207	Inverter - 3-phase 1OOVA 115 V	Pus 150 LH	Left-hand Radio Bay
208	Inverter - 3-phase 1OOVA 115 V	Pus 174 LH	Left-hand Radio Bay
236	Light Assembly - Generator Failure Warning	Pus 80 CL	Cockpit - Instrument Panel
248	Light Assembly - Wave-off Indicator	Pus 80 CL	Cockpit - Instrument Panel
260	Panel - Forward Fuselage Circuit-breaker	Pus 26 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Pus 118 RH	Cockpit - RH
264A	Panel - Circuit-breaker Right-hand Forward	Pus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Pus 40 LH	Radar Bay
268	Panel - Pedestal	Pus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Pus 78 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Pus 62.6 LH	Cockpit - Forward of Pedestal
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Pus 34.1 CL	Tail Assembly
339	Plug - Instrument Panel Indicating Light Disconnect	Pus 76 LH	Forward LH Side of Instrument Panel
341	Plug - Inverter - 3-phase (Alternate)	Pus 170 LH	LH Radio Bay
342	Plug - Inverter - 3-phase (Main)	Pus 155.8 LH	LH Radio Bay
351	Plug - Pedestal Disconnect	Pus 62.6 LH	Directly Behind Pedestal
419	Receptacle - Instrument Power Transfer Relay	Pus 156 LH	LH Radio Bay
500	Relay - Instrument Power Transfer	Pus 156 LH	Radio Bay
501	Relay - Inverter Failure Warning	Pus 183 LH	Radio Bay
666	Terminal Block - Compass	Pus 125 CL	Below Cockpit
667	Terminal Block - Gun Bay	Pus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Pus 35 RH	Nose Radar Bay
715	Transformer - Auto 26V to 115V	Pus 124 LH	LH Radio Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-2 (formerly AN 01-60JLD-2) for part numbers and location of items.

AC Power Supply and Distribution System F-86F-30 Airplane AF52-4905 and All Subsequent Airplanes



AC Power Supply And Distribution System
F-86F-30 Airplane AF52-4905 And All Subsequent Airplanes



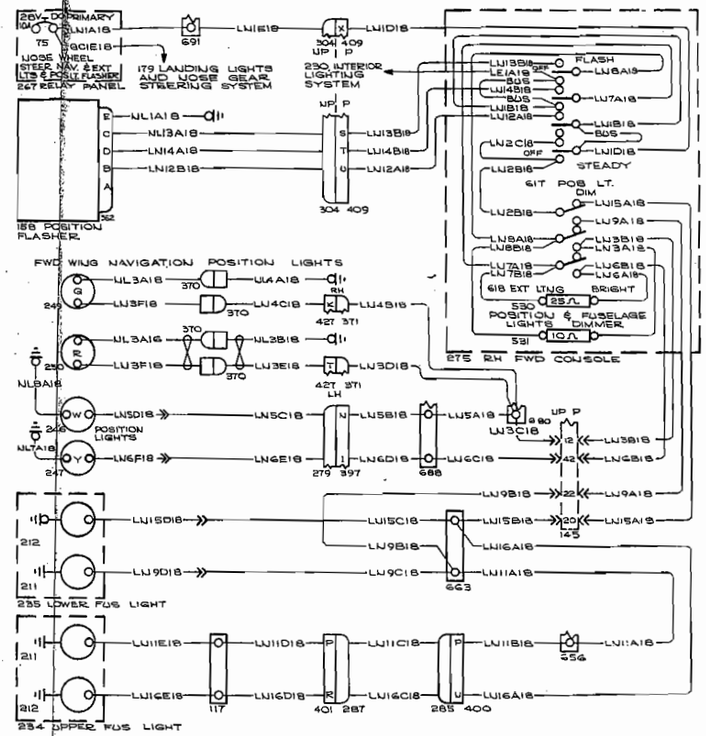
T-86F-2-54-231

EXTERIOR LIGHTING SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
158	Flasher - Position Light	Fus 67 LH	Nose Wheel Well
179	Grip - Control Stick	Fus 85 CL	Cockpit
234	Light Assembly - Fuselage Light Upper	Fus 178 CL	Upper Fuselage
235	Light Assembly - Fuselage Light Lower	Fus 177 CL	Lower Fuselage
249	Light Assembly - Wing Position - Green	Wing 108 RH	RH Wing Tip
250	Light Assembly - Wing Position - Red	Wing 108 LH	LH Wing Tip
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
285	Plug - Canopy Deck Disconnect	Fus 136 RH	Cockpit - Top Deck
287	Plug - Canopy Pullaway	Fus 126 RH	Cockpit Canopy
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
352	Plug - Position Light Flasher	Fus 82 LH	Nose Wheel Well
370	Plug - Wing Light Disconnect	Wing 282, 3 RH and LH	Wings
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
656	Terminal Block - Compass	Fus 125 CL	Below Cockpit
863	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
698	Terminal Block - Landing Gear Connector Upper	Fus 190 CL	Wheel Well
705	Terminal Block - Empennage Equipment	Fus 340 CL	Empennage

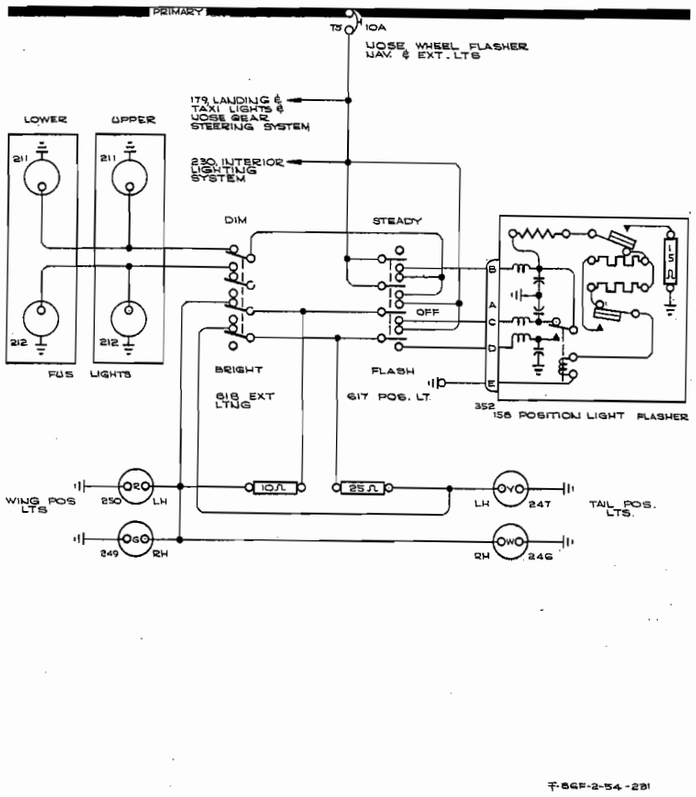
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4)for part numbers and location of items.

Exterior Lighting System - F-86F-1 Through F-86F-15 Airplanes



T-86F-2-54-232

EXTERIOR LIGHTING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES



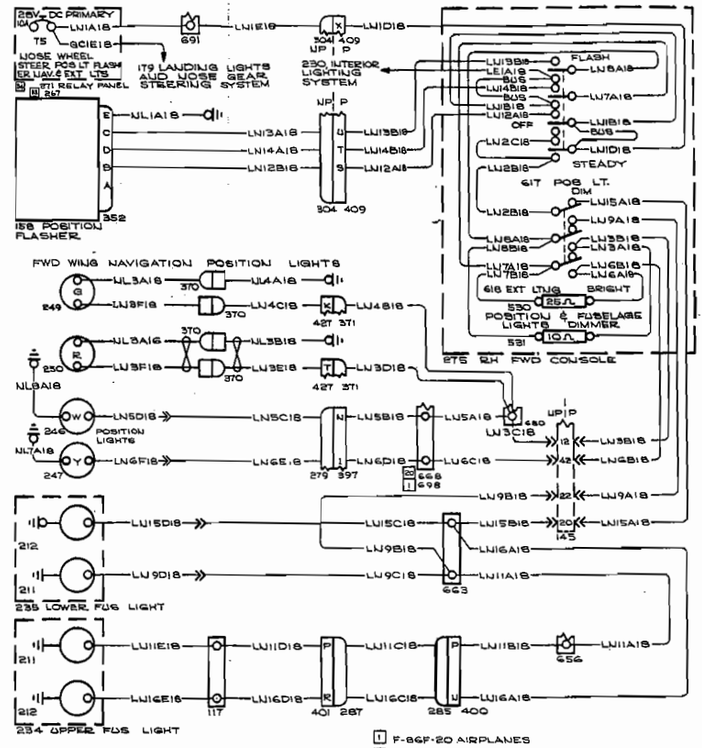
F-86F-2-54-231

EXTERIOR LIGHTING SYSTEM

INDEX NO.	DESCRIPTION	STATION	ACCESS
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
158	Flasher - Position Light	Fus 67 LH	Nose Wheel Well
179	Grip - Control Stick	Fus 85 CL	Cockpit
234	Light Assembly - Fuselage Light Upper	Fus 176 CL	Upper Fuselage
235	Light Assembly - Fuselage Light Lower	Fus 177 CL	Lower Fuselage
246	Light Assembly - Tail Position - White	Fus 430 CL	Fuselage - Empennage
247	Light Assembly - Tail Position - Yellow	Fus 430 CL	Fuselage - Empennage
249	Light Assembly - Wing Position - Green	Wing 106 RH	RH Wing Tip
250	Light Assembly - Wing Position - Red	Wing 106 LH	LH Wing Tip
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
275	Panel - Right-hand Forward Console	Fus 86 RH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 261 LH	Cable Disconnect Access Left-hand Side
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
287	Plug - Canopy Pullaway	Fus 126 RH	Cockpit Canopy
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
352	Plug - Position Light Flasher	Fus 82 LH	Nose Wheel Well
370	Plug - Wing Light Disconnect	Wing 262.3 RH and LH	Wings
371	Plug - Wing Wiring Disconnect	Fus 128 RH	Root of Wing Forward LH Side
658	Terminal Block - Compass	Fus 125 CL	Below Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
668	Terminal Block - Landing Gear Connector Upper	Fus 190 RH	RH Wheel Well
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
698	Terminal Block - Landing Gear Connector Upper	Fus 190	Wheel Well

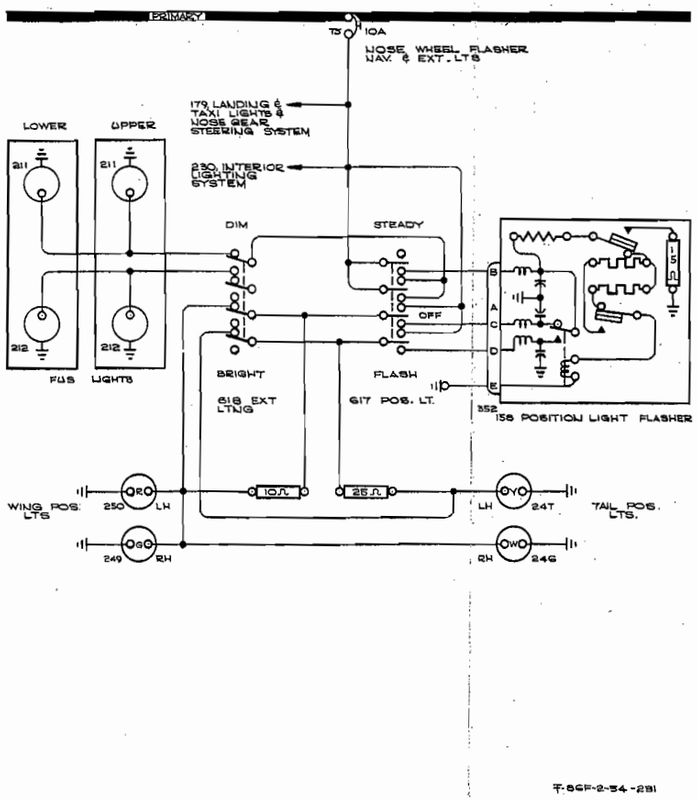
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Exterior Lighting System F-86F-30 and F-86F-30 Airplanes



F-86F-2-54-233

EXTERIOR LIGHTING SYSTEM
F-86F-20 AND F-86F-30 AIRPLANES



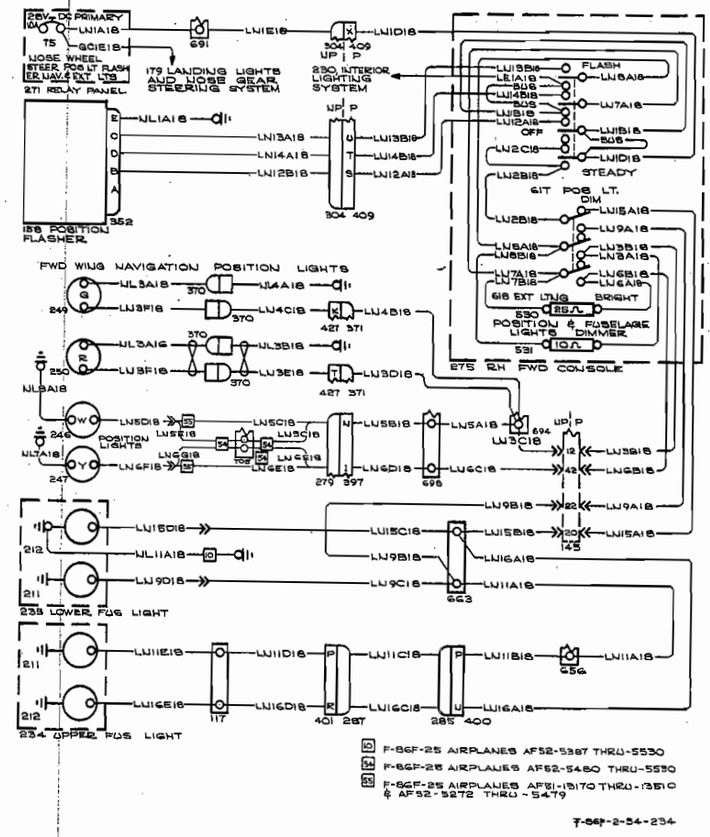
F-86F-2-54-231

EXTERIOR LIGHTING SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
158	Flasher - Position Light	Fus 67 LH	Nose Wheel Well
179	Grip - Control Stick	Fus 85 CL	Cockpit
234	Light Assembly - Fuselage Light Upper	Fus 178 CL	Upper Fuselage
235	Light Assembly - Fuselage Light Lower	Fus 177 CL	Lower Fuselage
249	Light Assembly - Wing Position - Green	Wing 108 RH	RH Wing Tip
250	Light Assembly - Wing Position - Red	Wing 108 LH	LH Wing Tip
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
276	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
279	Plug - Aft Fuselage Disconnect	Fus 281 LH	Cable Disconnect Access Left-hand Side
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
287	Plug - Canopy Pullaway	Fus 126 RH	Cockpit Canopy
304	Plug - Flasher Pressure Disconnect	Fus 60 LH	LH Nose Wheel Well Access
352	Plug - Position Light Flasher	Fus 62 LH	Nose Wheel Well
370	Plug - Wing Light Disconnect	Wing 262.3 RH and LH	Wings
371	Plug - Wing Wiring Disconnect	Fus 139 RH	Root of Wing Forward LH Side
656	Terminal Block - Compass	Fus 125 CL	Below Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
696	Terminal Block - Landing Gear Connector Upper	Fus 190 LH	Wheel Well
705	Terminal Block - Empennage Equipment	Fus 340 CL	Empennage

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80JLD-4) for part numbers and location of items.

Exterior Lighting System - F-86F-25 Airplanes



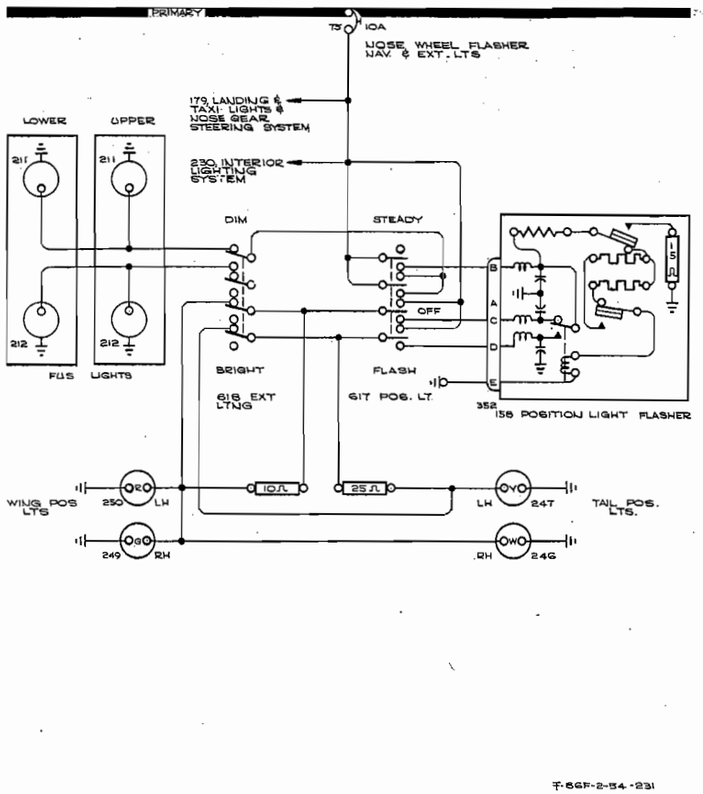
10 F-86F-25 AIRPLANES AF52-5387 THRU-5530

10 F-86F-25 AIRPLANES AF52-5480 THRU-5590

10 F-86F-25 AIRPLANES AF51-13170 THRU-13510 & AF52-5272 THRU-5479

F-86F-2-54-234

EXTERIOR LIGHTING SYSTEM
F-86F-25 AIRPLANES



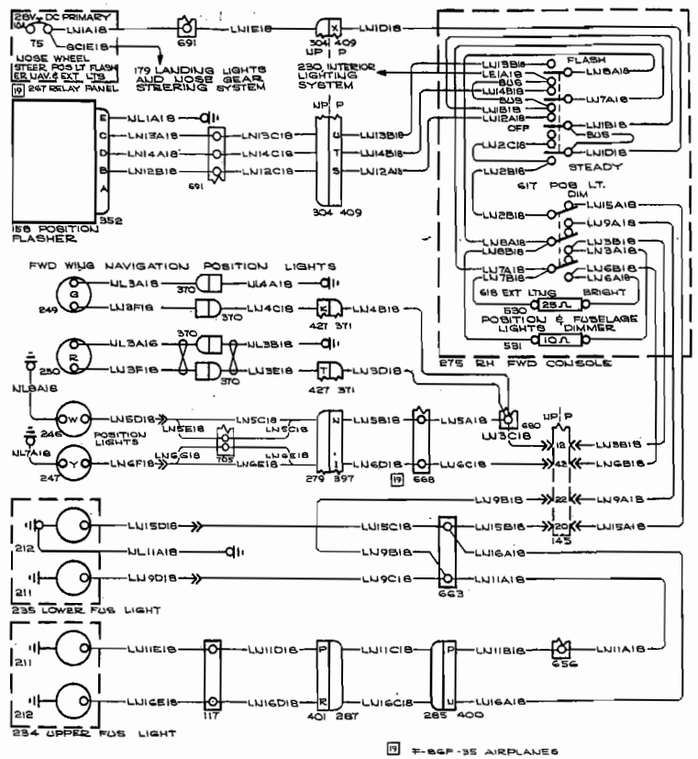
F-86F-2-54-231

EXTERIOR LIGHTING SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
117	Connector - Pressure Block Barrier	Fus 130 RH and LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
158	Flasher - Position Light	Fus 67 LH	Nose Wheel Well
179	Grip - Control Stick	Fus 85 CL	Cockpit
234	Light Assembly - Fuselage Light Upper	Fus 178 CL	Upper Fuselage
235	Light Assembly - Fuselage Light Lower	Fus 177 CL	Lower Fuselage
249	Light Assembly - Wing Position - Green	Wing 108 RH	RH Wing Tip
250	Light Assembly - Wing Position - Red	Wing 108 LH	LH Wing Tip
287	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
379	Plug - Aft Fuselage Disconnect	Fus 381 LH	Cable Disconnect Access Left-hand Side
285	Plug - Canopy Deck Disconnect	Fus 138 RH	Cockpit - Top Deck
287	Plug - Canopy Pullaway	Fus 128 RH	Cockpit Canopy
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
352	Plug - Position Light Flasher	Fus 62 LH	Nose Wheel Well
370	Plug - Wing Light Disconnect	Wing 262.3 RH and LH	Wings
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
658	Terminal Block - Compass	Fus 125 CL	Below Cockpit
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
698	Terminal Block - Landing Gear Connector Upper	Fus 190 CL	Wheel Well
705	Terminal Block - Empennage Equipment	Fus 340 CL	Empennage

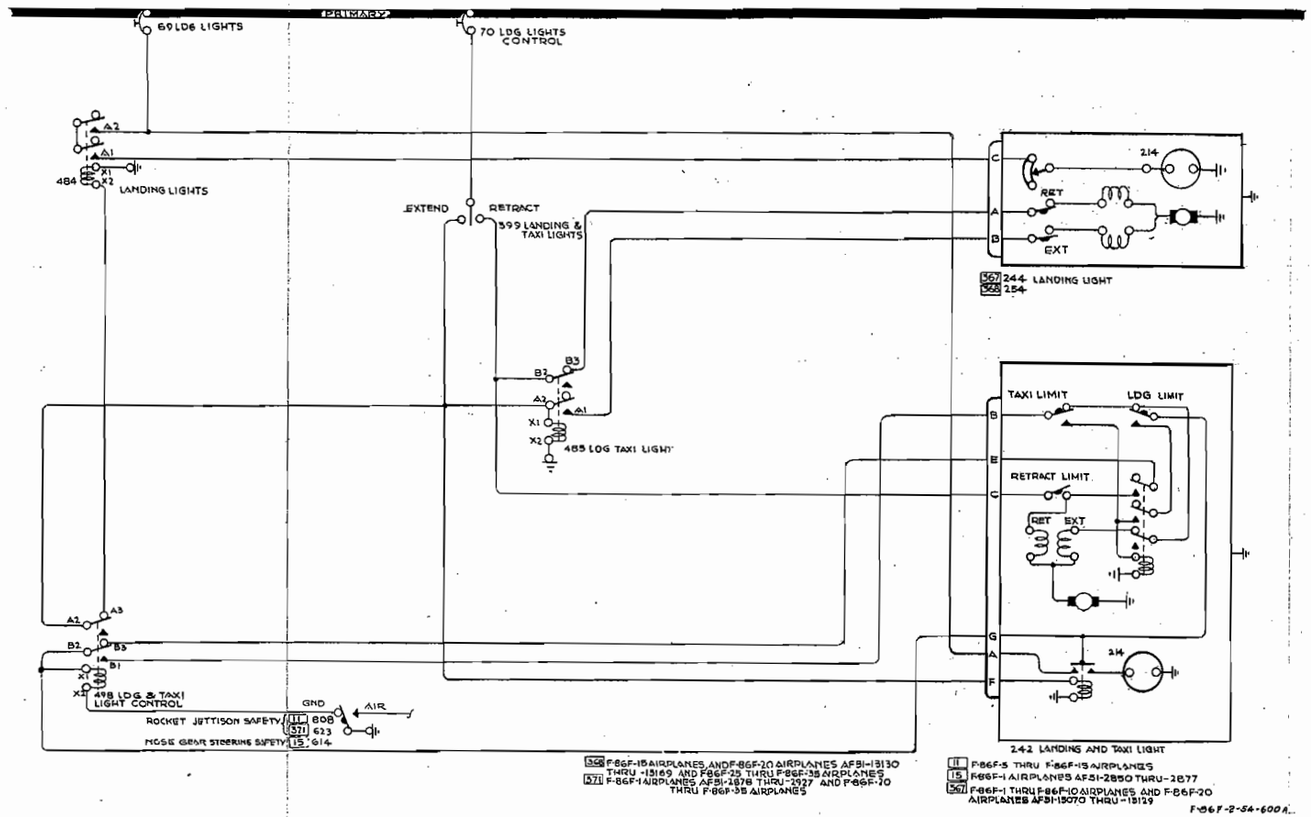
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-80JLD-4)for part numbers and location of items.

Exterior Lighting System - F-86F-35 Airplanes



F-86F-2-54-235

EXTERIOR LIGHTING SYSTEM
F-86F-35 AIRPLANES

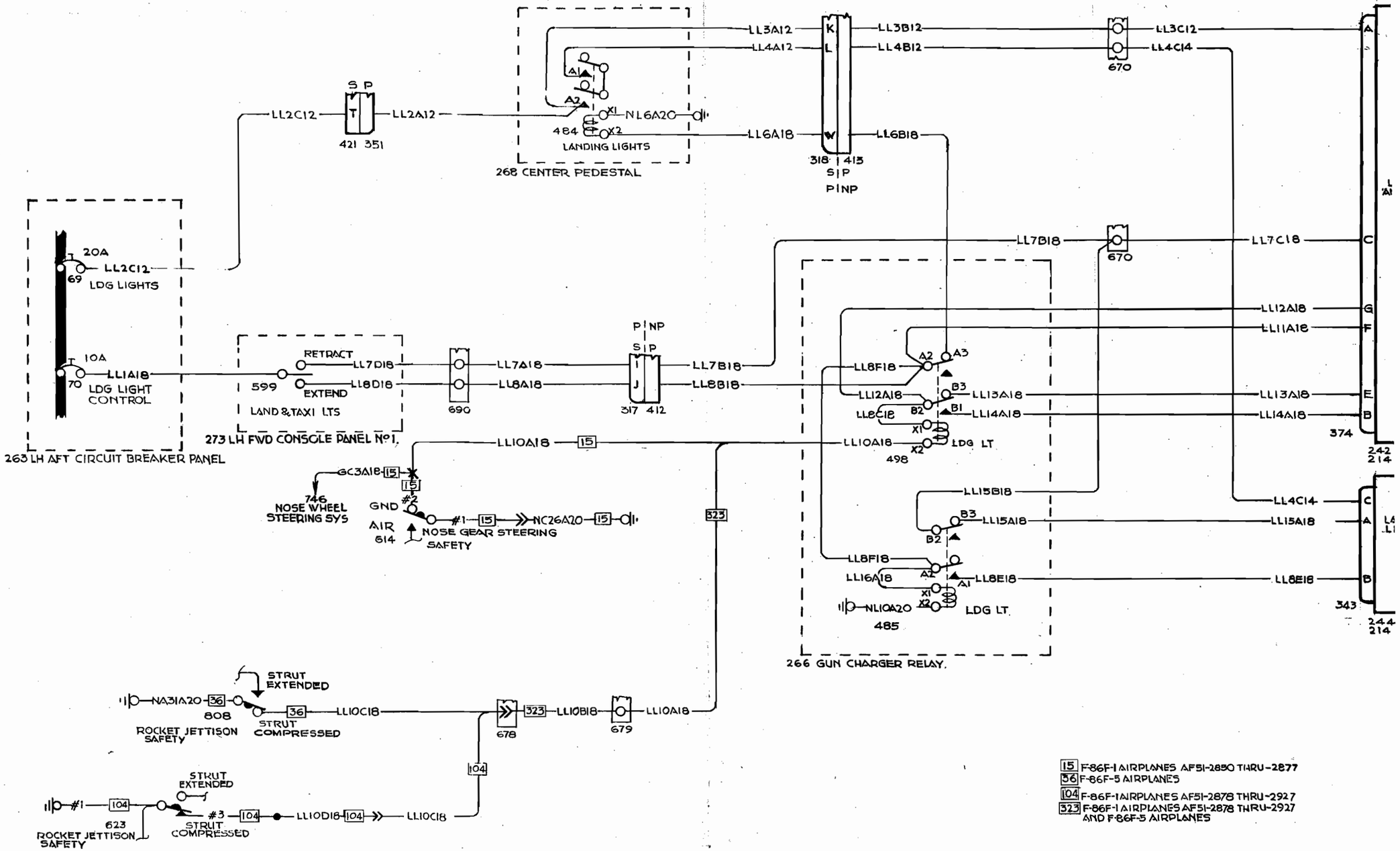


LANDING AND TAXI LIGHT SYSTEM

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
214	Lamp - Landing	Fus 17 CL	Nose - Lower Side
242	Light Assembly - Landing and Taxi	Fus 17 CL	Fuselage - Lower Nose
244	Light Assembly - Retractable Landing	Fus 17 CL	Fuselage - Lower Nose
263	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
268	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
269	Panel - Pedestal	Fus 76 CL	Cockpit - Pedestal
272	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
343	Plug - Landing Light	Fus 20 CL	Lower Fuselage - Nose Section
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
374	Plug - Landing and Taxi Light	Fus 26 CL	Nose Radar Bay
496	Relay - Landing and Taxi Light Control	Fus 170 LH	Radar Bay
614	Switch - Nose Wheel Steering Safety	Fus 17 CL	Nose Wheel Well
623	Switch - Rocket Jettison Safety	Fus 81 CL	Pedestal
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 61 LH	Instrument Panel
748	Valve - Nose Wheel Steering Hydraulic Solenoid	Fus 15 CL	Nose Wheel Well
808	Switch - Rocket Jettison Safety	Fus 61 CL	Pedestal

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

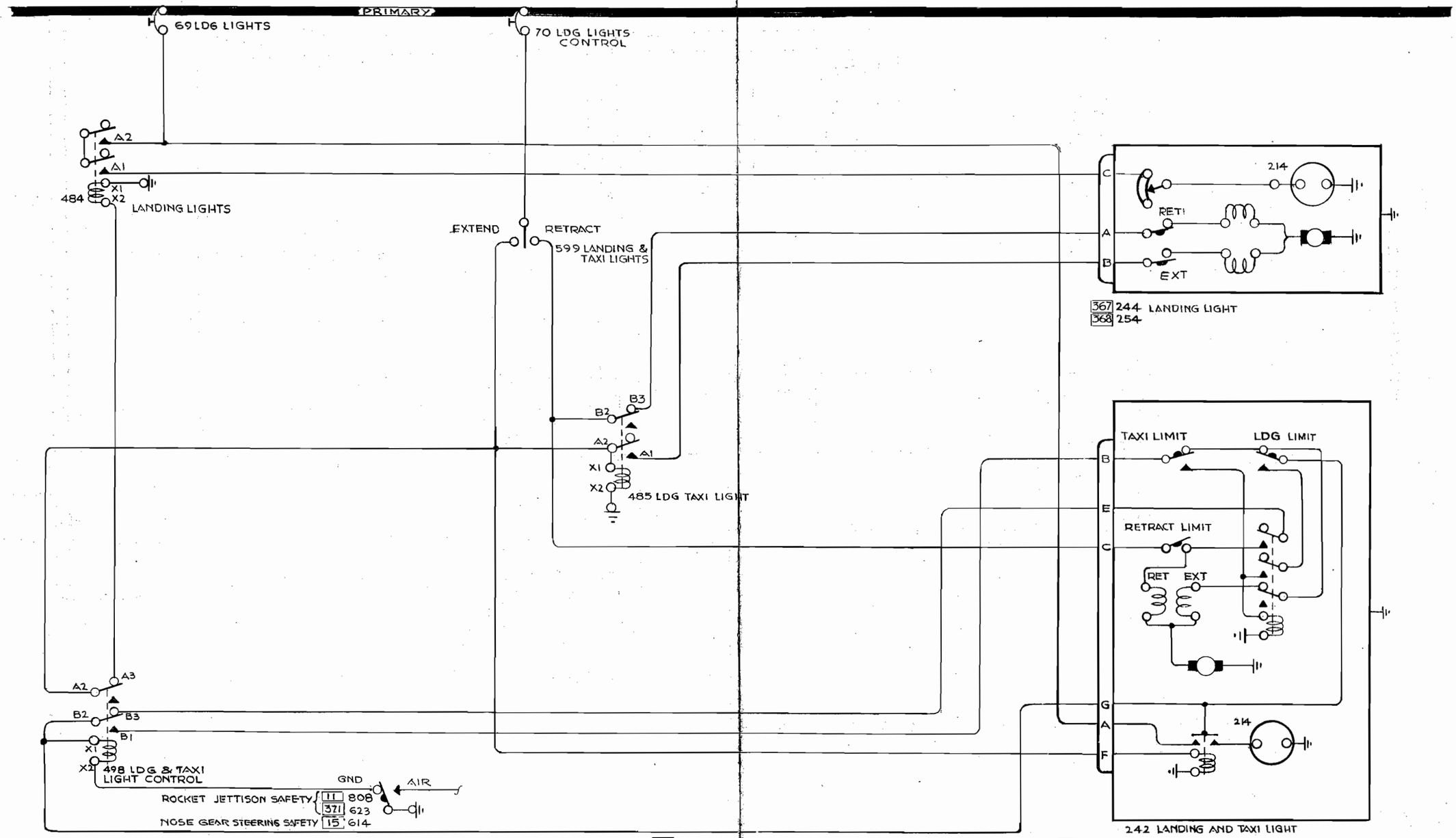
Landing and Taxi Light System - F-86F-1 and F-86F-5 Airplanes



15 F-86F-1 AIRPLANES AF51-2850 THRU-2877
56 F-86F-5 AIRPLANES
104 F-86F-1 AIRPLANES AF51-2878 THRU-2927
323 F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 AIRPLANES

F-86F-2-54-597

LANDING AND TAXI LIGHT SYSTEM
F-86F-1 AND F-86F-5 AIRPLANES



368 F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13130 THRU -13169 AND F-86F-25 THRU F-86F-35 AIRPLANES

371 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-20 THRU F-86F-35 AIRPLANES

11 F-86F-5 THRU F-86F-15 AIRPLANES

15 F-86F-1 AIRPLANES AF51-2850 THRU -2877

367 F-86F-1 THRU F-86F-10 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13129

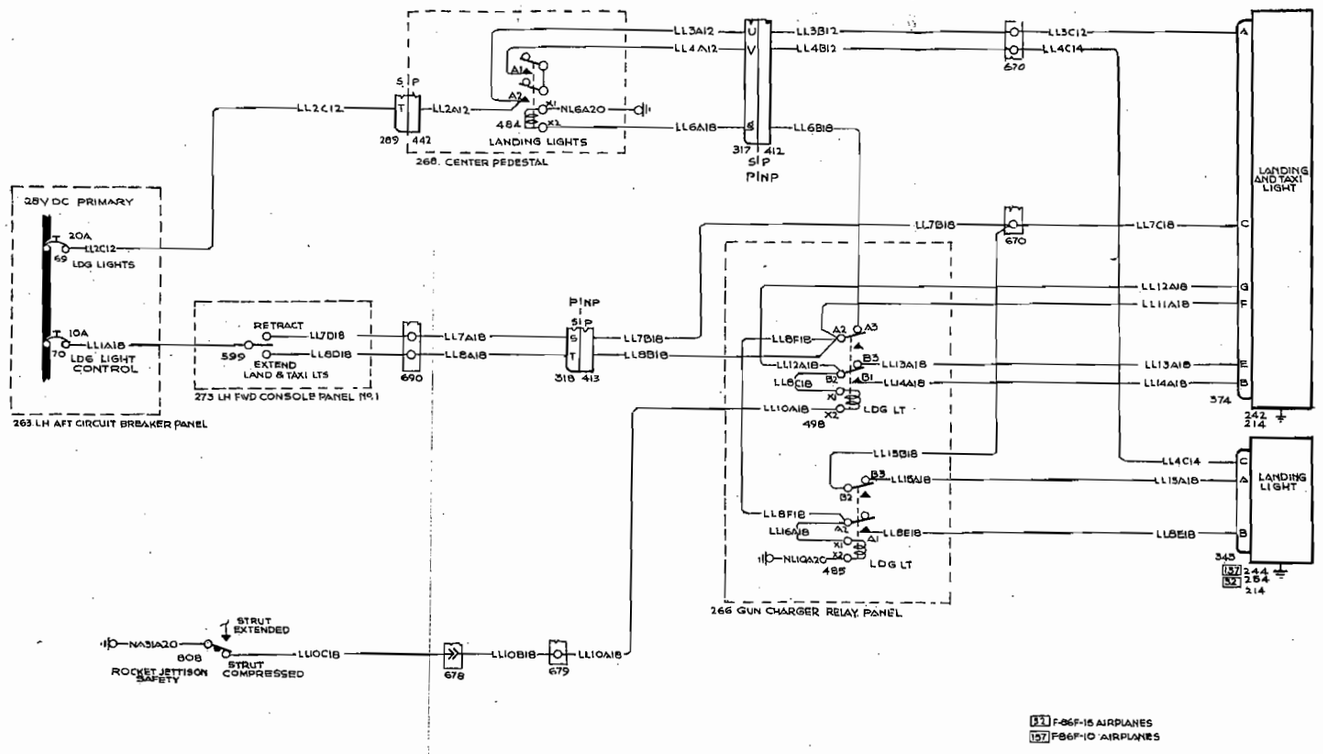
F-86F-2-54-600A

LANDING AND TAXI LIGHT SYSTEM

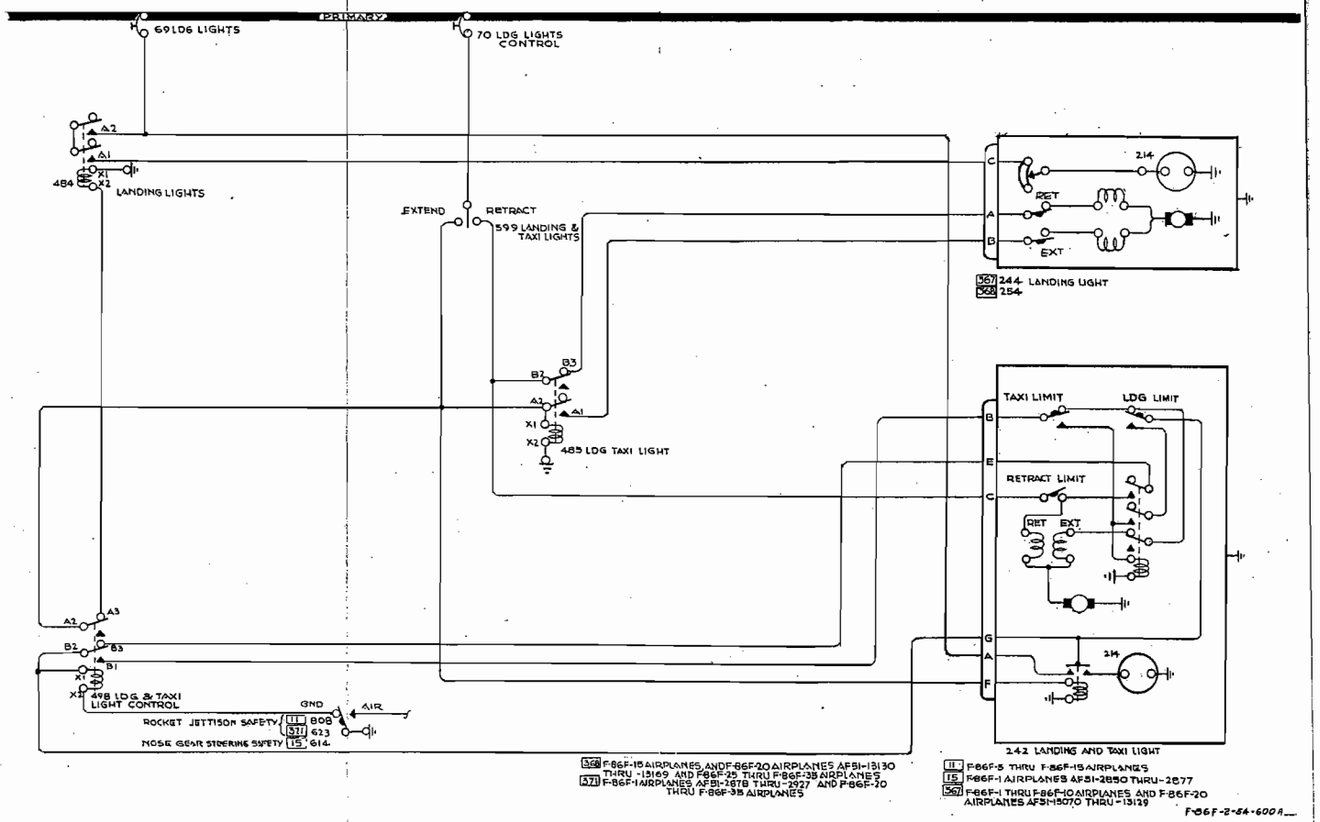
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
214	Lamp - Landing	Fus 17 CL	Nose - Lower Side
242	Light Assembly - Landing and Taxi	Fus 17 CL	Fuselage - Lower Nose
244	Light Assembly - Retractable Landing	Fus 17 CL	Fuselage - Lower Nose
254	Light Assembly - Retractable Landing	Fus 17 CL	Lower Fuselage - Nose
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
343	Plug - Landing Light	Fus 20 CL	Lower Fuselage - Nose Section
374	Plug - Landing and Taxi Light	Fus 26 CL	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
808	Switch - Rocket Jettison Safety	Fus 81 CL	Pedestal

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of Items.

Landing and Taxi Light System - F-86F-10 and F-86F-15 Airplanes



Landing And Taxi Light System
F-86F-10 And F-86F-15 Airplanes

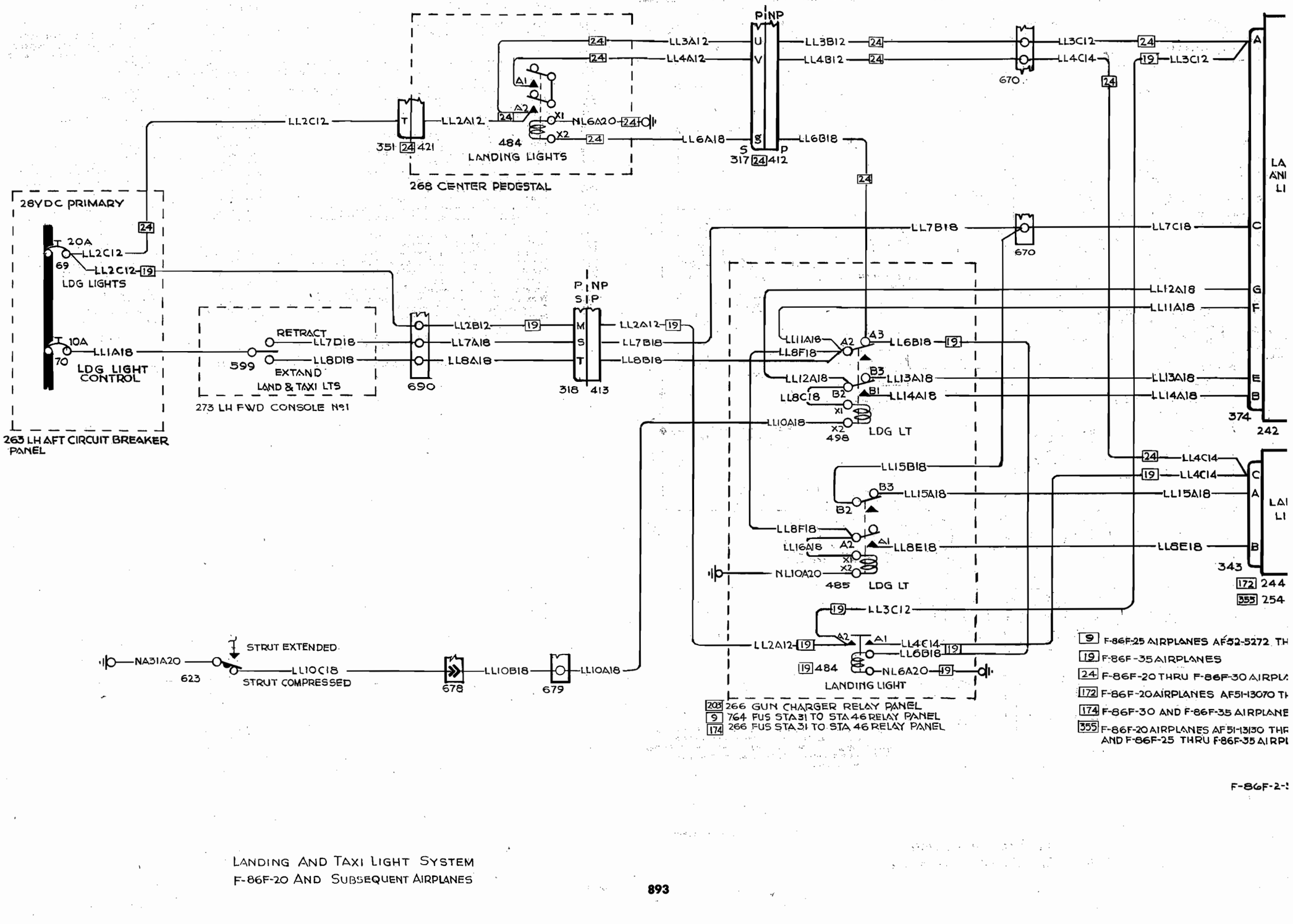


LANDING AND TAXI LIGHT SYSTEM

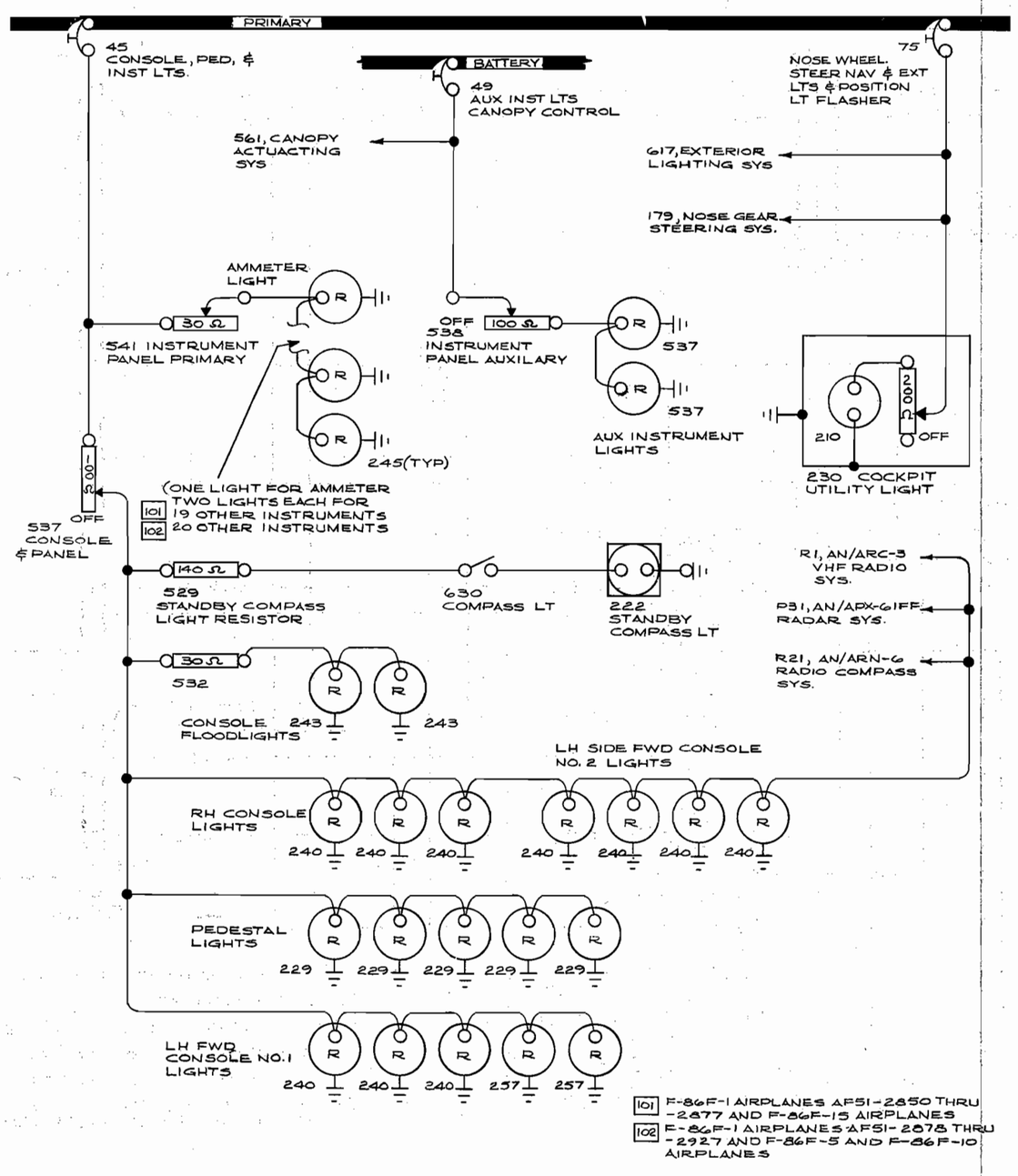
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
242	Light Assembly - Landing and Taxi	Fus 17 CL	Fuselage - Lower Nose
244	Light Assembly - Retractable Landing	Fus 17 CL	Fuselage - Lower Nose
254	Light Assembly - Retractable Landing	Fus 17 CL	Lower Fuselage - Nose
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
343	Plug - Landing Light	Fus 20 CL	Lower Fuselage - Nose Section
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
374	Plug - Landing and Taxi Light	Fus 26 CL	Nose Radar Bay
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
623	Switch - Rocket Jettison Safety	Fus 81 CL	Pedestal
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
690	Terminal Block - Landing Gear Control Disconnect	Fus 81 LH	Instrument Panel
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Landing and Taxi Light System F-86F-20 and Subsequent Airplanes



LANDING AND TAXI LIGHT SYSTEM
F-86F-20 AND SUBSEQUENT AIRPLANES



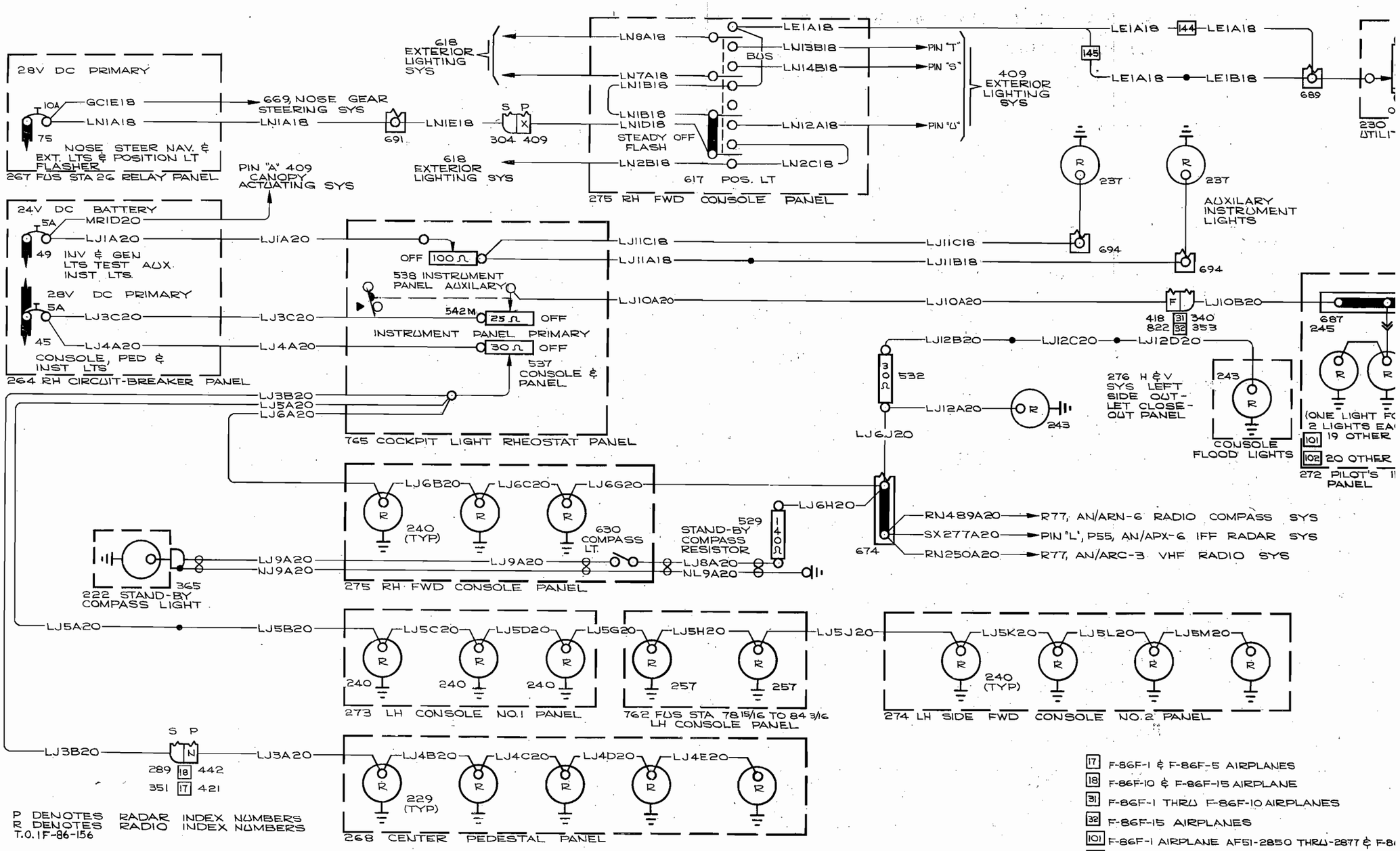
F-86F-2-54-290

INTERIOR LIGHTING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
49	Circuit Breaker - Canopy Control	Fus 118 RH	Cockpit
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
257	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
353	Plug - Oxygen Regulator	Fus 85 LH	Cockpit
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
529	Resistor - Stnad-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
541	Rheostat - Primary Instrument Light	Fus 87 RH	Cockpit, RH Forward Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System F-86F-1 Through F-86F-15 Airplanes

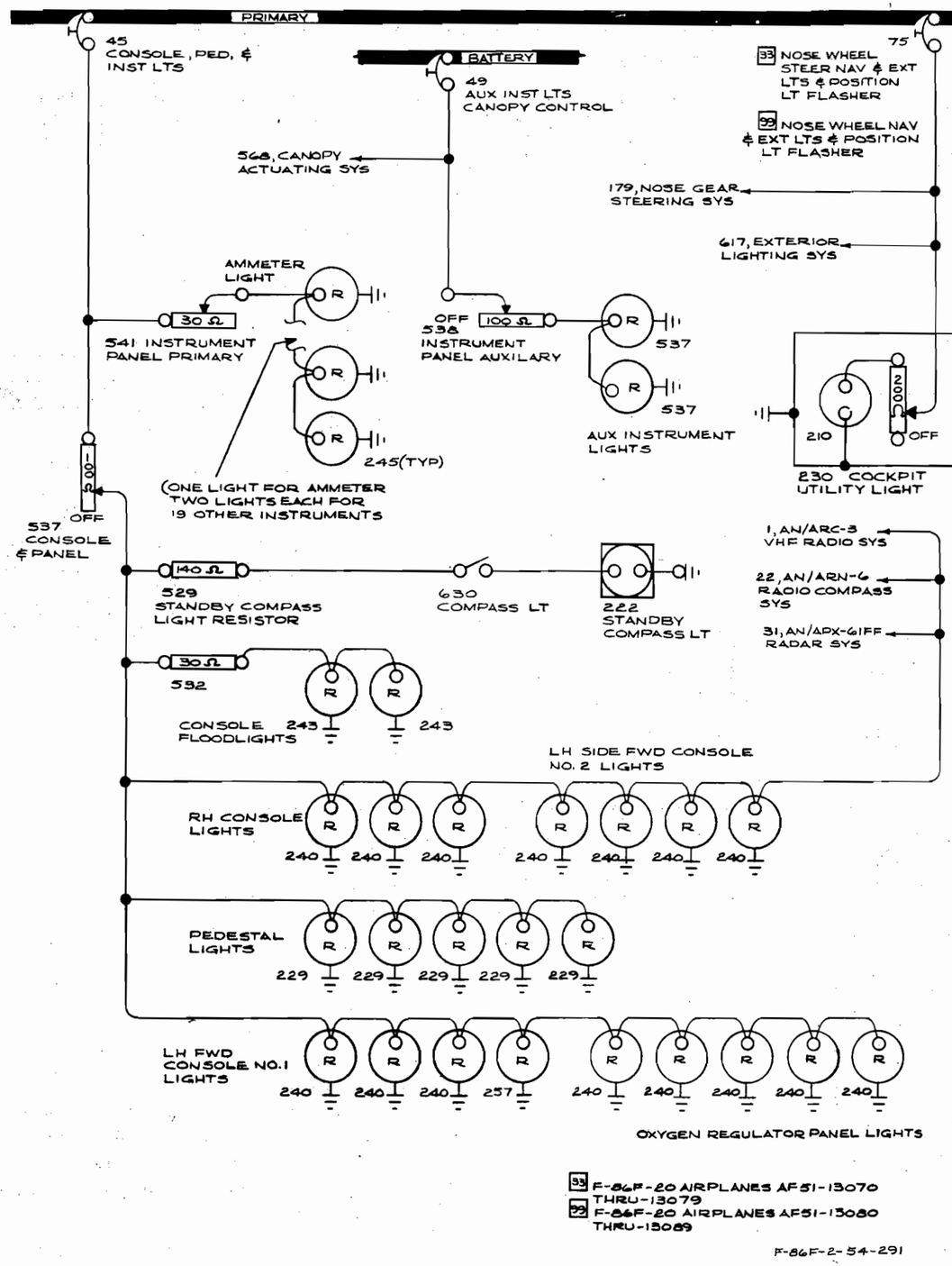


INTERIOR LIGHTING SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
49	Circuit Breaker - Canopy Control	Fus 118 RH	Cockpit
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary)	Fus 124 LH	Cockpit
24[illegible]	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
257	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
367	Plug - Light Control Disconnect	Fus 9[illegible] RH	Cockpit RH
407	Receptacle - Light Control Disconnect	Fus 9[illegible] RH	Cockpit, RH Console
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
418	Receptacle - Instrument Panel Light Disconnect	Fus 74 LH	Cockpit
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
541	Rheostat - Primary Instrument Light	Fus 87 RH	Cockpit , RH Forward Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 25 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
706	Terminal Block - Auxiliary Instrument Light	Fus 95 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part number and location of items.

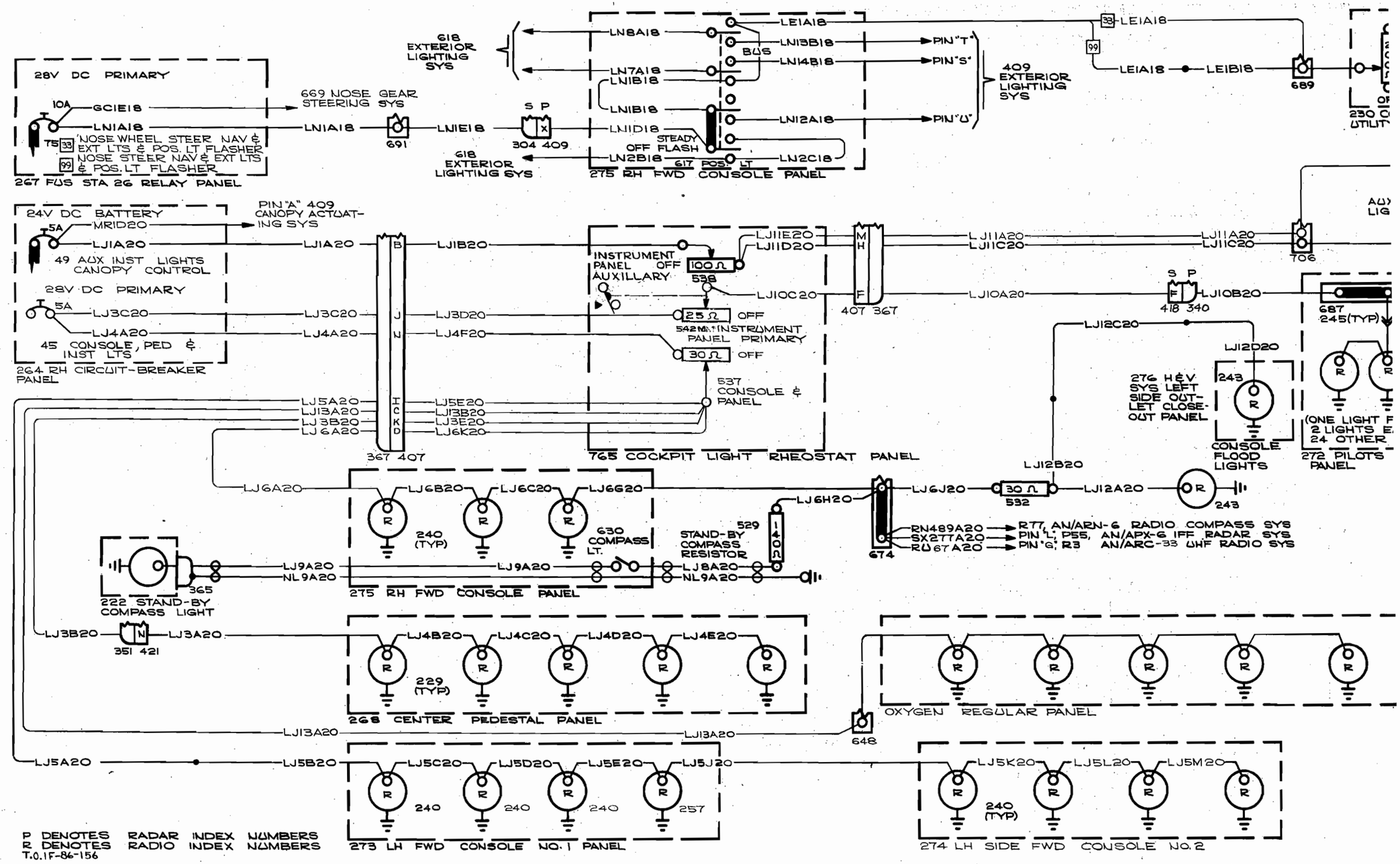
Interior Lighting System F-86F-20 Airplanes AF51-13070 Through -13089



33 F-86F-20 AIRPLANES AF51-13070 THRU-13079
99 F-86F-20 AIRPLANES AF51-13080 THRU-13089

F-86F-2-54-291

INTERIOR LIGHTING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

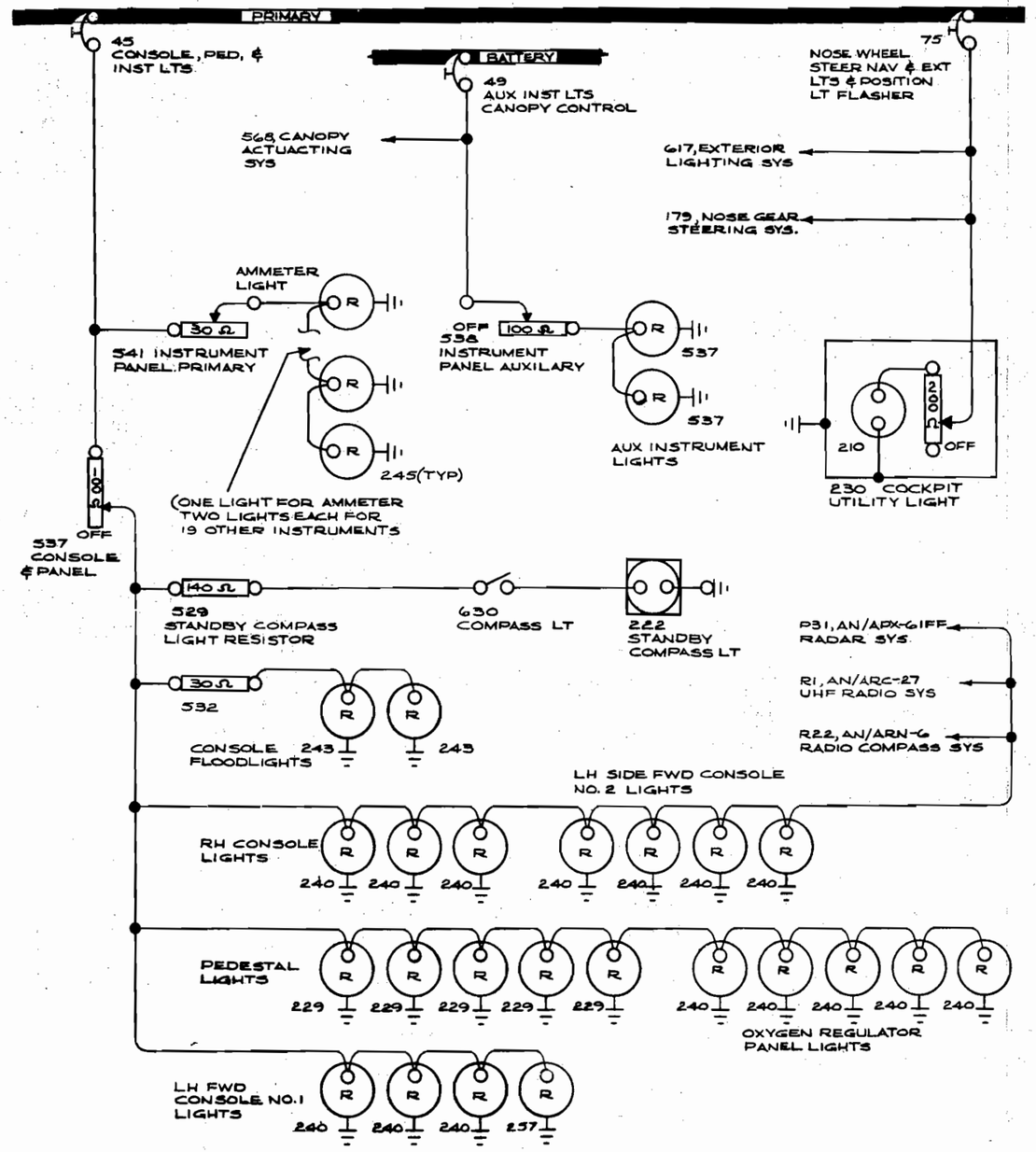


33 F-86F-20 AIRPLANES AF51-13070 THRU 1307

99 F-86F-20 AIRPLANES AF51-13080 THRU 13

F-86F-

INTERIOR LIGHTING SYSTEM
F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

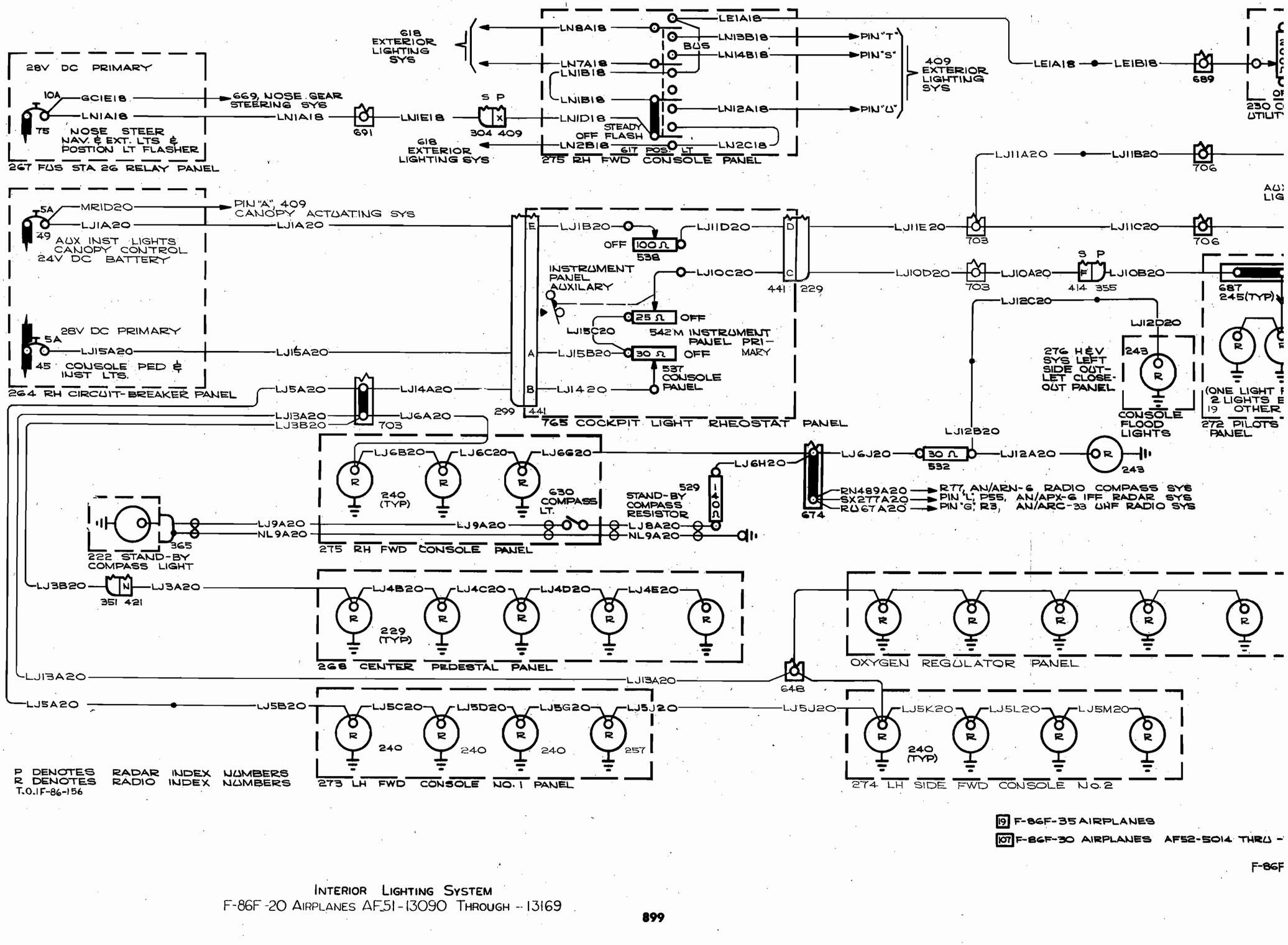


F-86F-2-54-292

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
49	Circuit Breaker - Canopy Control	Fus 118 RH	Cockpit
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
257	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
541	Rheostat - Primary Instrument Light	Fus 87 RH	Cockpit, RH Forward Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
706	Terminal Block - Auxiliary Instrument Light	Fus 95 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System - F-86F-20 Airplanes AF51-13090 Through -13169

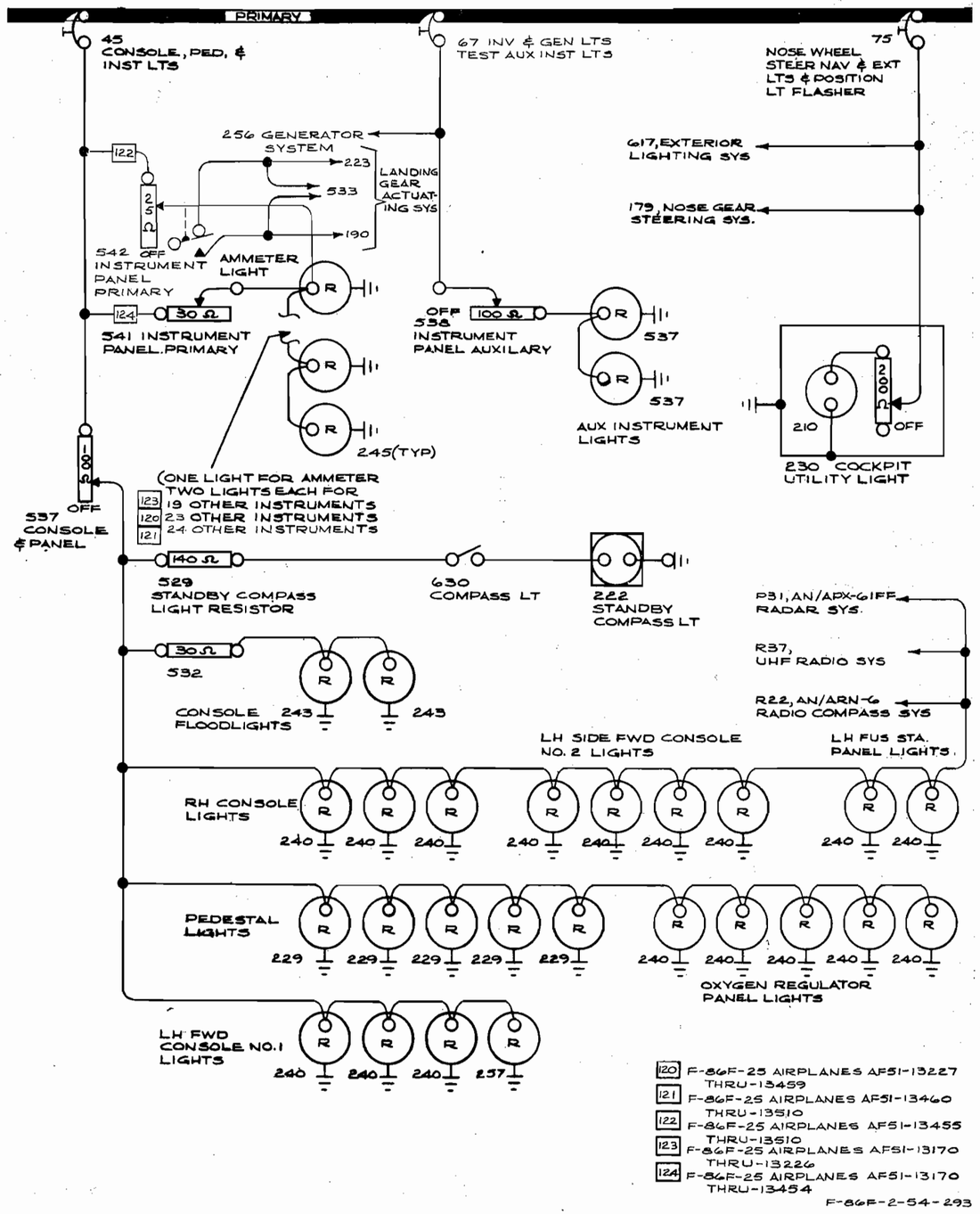


INTERIOR LIGHTING SYSTEM
F-86F-20 AIRPLANES AF51-13090 THROUGH -13169

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side (Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
257	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
355	Plug - Instrument Panel Light Disconnect	Fus 81 LH	Instrument Panel
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
384	Plug - Landing Gear Control Disconnect	Fus 81 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Flood light	Fus 90 RH	Cockpit, RH Side
541	Rheostat - Primary Instrument Light	Fus 87 RH	Cockpit, RH Forward Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
706	Terminal Block - Auxiliary Instrument Light	Fus 95 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

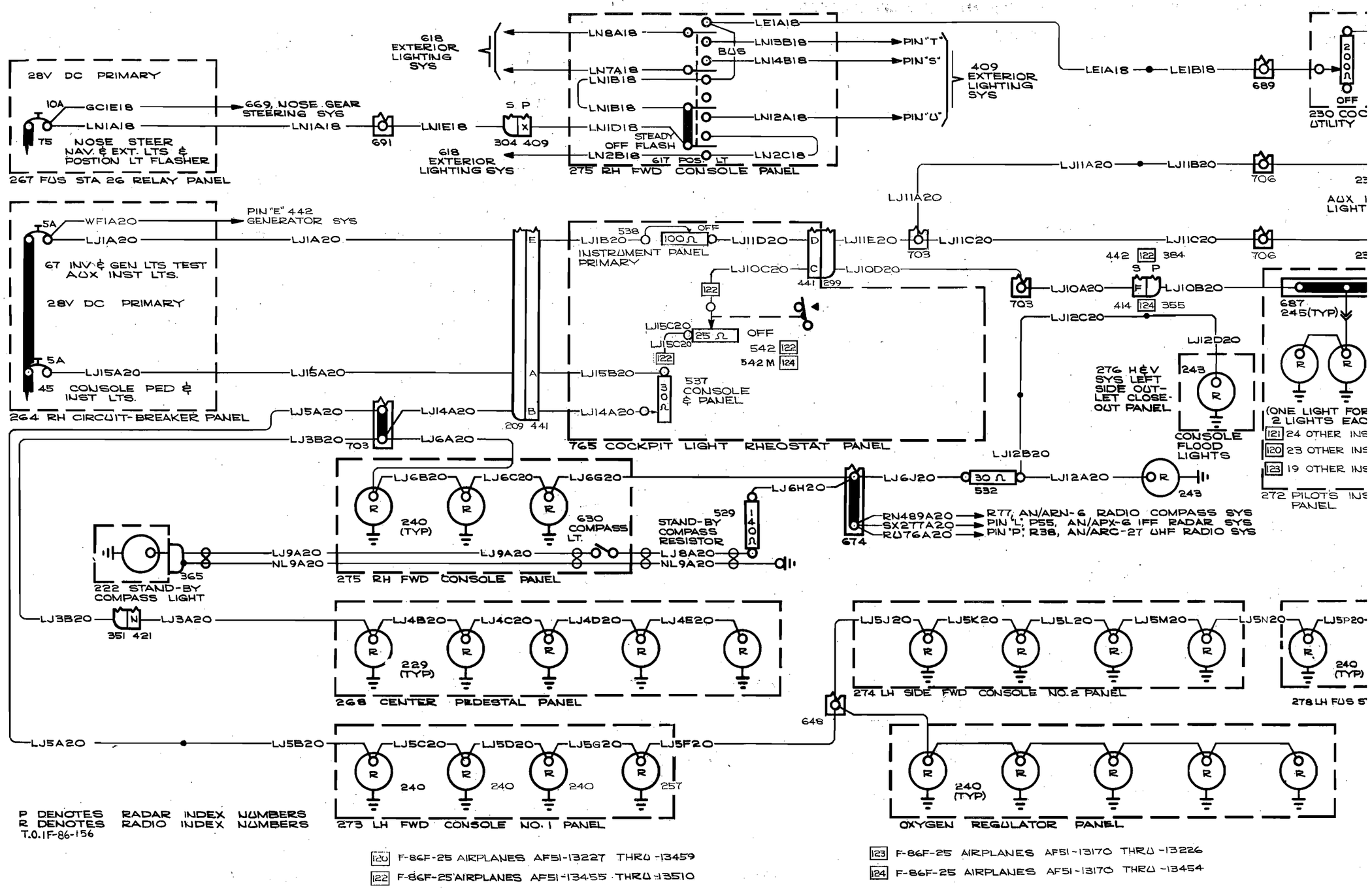
Interior Lighting System F-86F-25 Airplanes AF51-13170 Through -13510



120 F-86F-25 AIRPLANES AF51-13227 THRU-13459
121 F-86F-25 AIRPLANES AF51-13460 THRU-13510
122 F-86F-25 AIRPLANES AF51-13455 THRU-13510
123 F-86F-25 AIRPLANES AF51-13170 THRU-13226
124 F-86F-25 AIRPLANES AF51-13170 THRU-13454

F-86F-2-54-293

INTERIOR LIGHTING SYSTEM
F-86F-25 AIRPLANES AF51-13170 THROUGH -13510



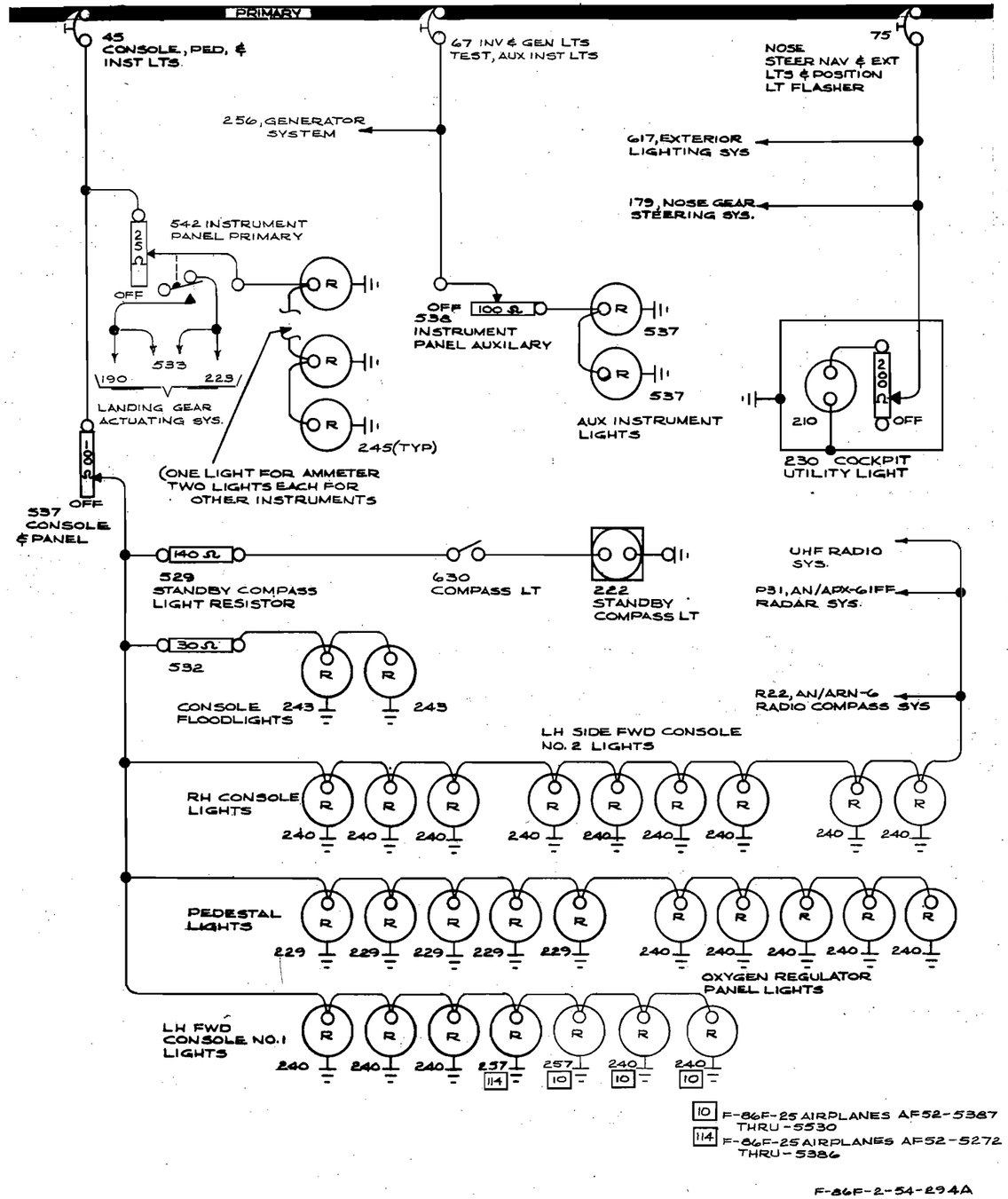
F-86F-2-

INTERIOR LIGHTING SYSTEM
F-86F-25 AIRPLANES AF51-13170 THROUGH -13510

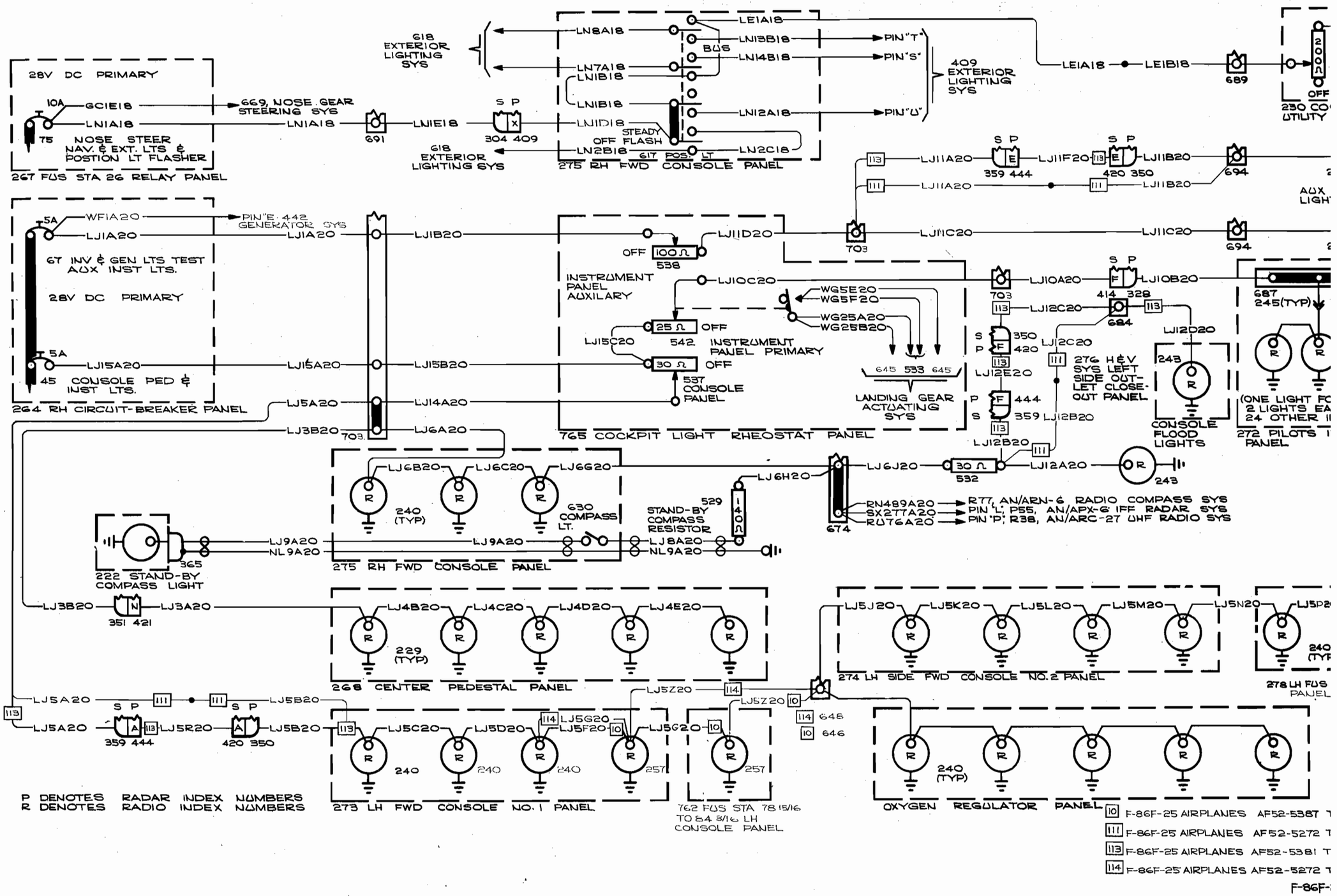
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
275	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
645	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
648	Terminal Block - Oxygen Regulator	Fus 101 RH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
762	Panel - Fuselage Station 78 LH Console	Fus 78 LH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

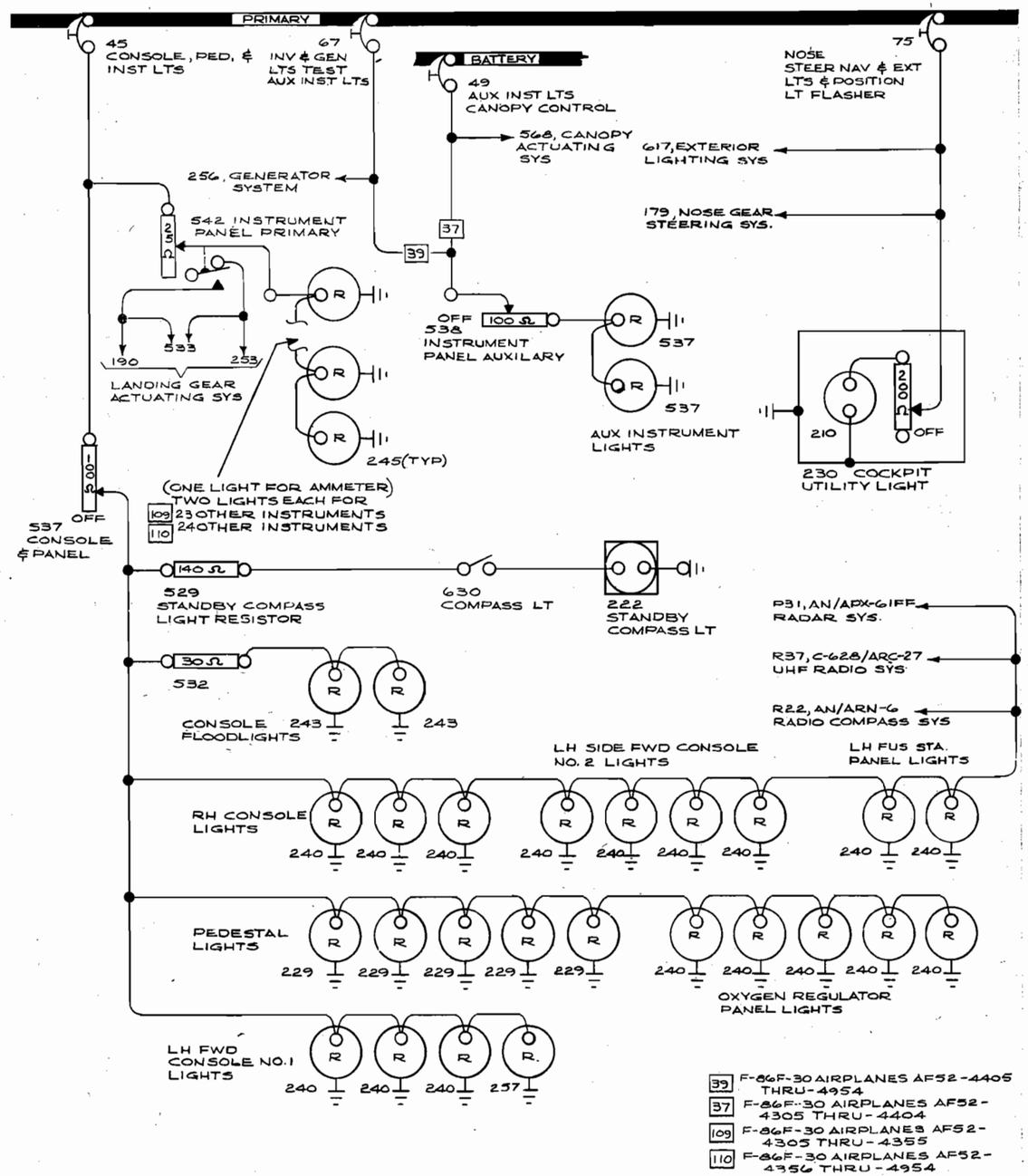
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System F-86F-25 Airplanes AF52-5272 Through -5530



INTERIOR LIGHTING SYSTEM
F-86F-25 AIRPLANES AF52-5272 THROUGH -5530


28V DC PRIMARY
10A
GCIE18
669, NOSE GEAR STEERING SYS
LNIA18
75 NOSE STEER NAV. & EXT. LTS & POSTION LT FLASHER
267 FUS STA 26 RELAY PANEL
618 EXTERIOR LIGHTING SYS
LN8A18
LN7A18
LNIB18
LNIB18
LNIE18
691
S P
304 409
LNID18
LN2B18
618 EXTERIOR LIGHTING SYS
LE1A18
LN3B18
LN4B18
BUS
LN12A18
617 POS. LT
LN2C18
275 RH FWD CONSOLE PANEL
PIN "T"
PIN "S"
PIN "U"
409 EXTERIOR LIGHTING SYS
LE1A18
LE1B18
689
2005
OFF
230 CO
UTILITY
LJ11A20
LJ11F20
LJ11B20
694
359 444
420 350
AUX LIGH
5A
WF1A20
PIN "E" 442 GENERATOR SYS
LJ1A20
LJ1B20
6T INV & GEN LTS TEST AUX INST LTS.
28V DC PRIMARY
5A
LJ15A20
LJ15B20
45 CONSOLE PED & INST LTS.
264 RH CIRCUIT-BREAKER PANEL
LJ5A20
LJ14A20
LJ3B20
703
LJ6A20
OFF
100 Ω
538
LJ11D20
703
LJ1C20
694
INSTRUMENT PANEL AUXILARY
LJ10C20
WG5E20
WG5F20
WG25A20
WG25B20
25 Ω
OFF
LJ15C20
542
INSTRUMENT PANEL PRIMARY
30 Ω
OFF
537 CONSOLE PANEL
645 533 645
LANDING GEAR ACTUATING SYS
765 COCKPIT LIGHT RHEOSTAT PANEL
703
LJ10A20
S P
LJ10B20
414 328
687
245(TYP)
LJ12C20
684
LJ12D20
S 350
P 420
LJ12C20
LJ12E20
P 444
S 359
LJ12B20
276 H&V SYS LEFT SIDE OUT-LET CLOSE-OUT PANEL
243
CONSOLE FLOOD LIGHTS
(ONE LIGHT FC
2 LIGHTS EA
24 OTHER
272 PILOTS
PANEL
LJ6B20
LJ6C20
LJ6G20
240 (TYP)
630 COMPASS LT.
LJ6H20
LJ6J20
30 Ω
532
LJ12A20
243
529 STAND-BY COMPASS RESISTOR
140 Ω
674
RN489A20
SX277A20
RU76A20
R77, AN/ARN-6 RADIO COMPASS SYS
PIN "L" P55, AN/APX-6 IFF RADAR SYS
PIN "P" R38, AN/ARC-27 UHF RADIO SYS
LJ9A20
NL9A20
LJ9A20
LJ8A20
NL9A20
365
222 STAND-BY COMPASS LIGHT
275 RH FWD CONSOLE PANEL
LJ3B20
N
LJ3A20
351 421
LJ4B20
LJ4C20
LJ4D20
LJ4E20
229 (TYP)
268 CENTER PEDESTAL PANEL
LJ5J20
LJ5K20
LJ5L20
LJ5M20
LJ5N20
LJ5P2
240 (TYP
274 LH SIDE FWD CONSOLE NO. 2 PANEL
278 LH FUS PANEL
LJ5Z20
114
LJ5Z20
10
114 646
10 646
LJ5A20
S P
111
LJ5B20
LJ5A20
A
113
LJ5R20
359 444
420 350
LJ5B20
LJ5C20
LJ5D20
LJ5G20
LJ5F20
LJ5G20
240
240
240
257
257
273 LH FWD CONSOLE NO. 1 PANEL
762 FUS STA 78 15/16 TO 84 3/16 LH CONSOLE PANEL
240 (TYP)
OXYGEN REGULATOR PANEL
P DENOTES RADAR INDEX NUMBERS
R DENOTES RADIO INDEX NUMBERS
10 F-86F-25 AIRPLANES AF52-5387
111 F-86F-25 AIRPLANES AF52-5272
113 F-86F-25 AIRPLANES AF52-5381
114 F-86F-25 AIRPLANES AF52-5272
F-86F-

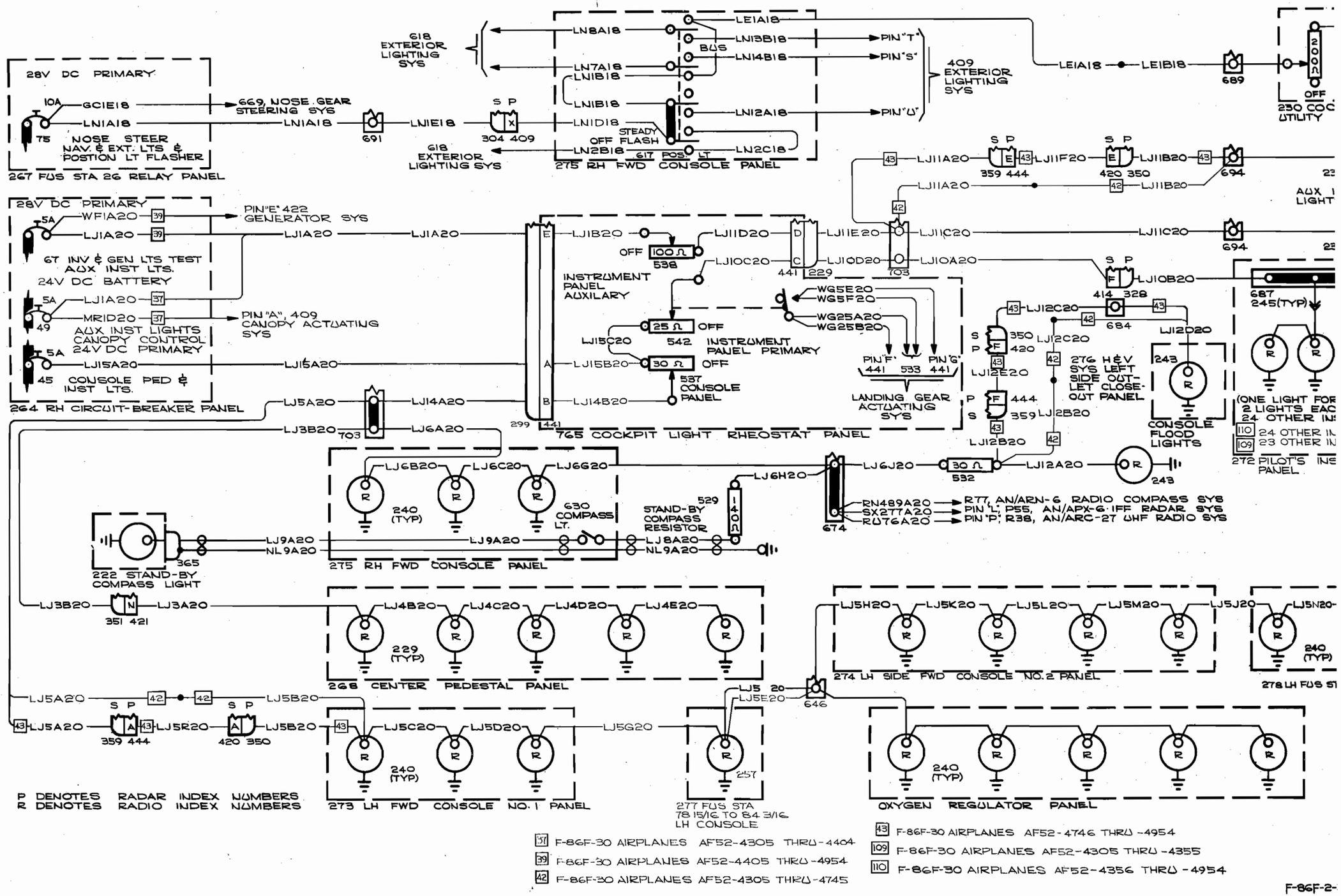


INTERIOR LIGHTING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4954

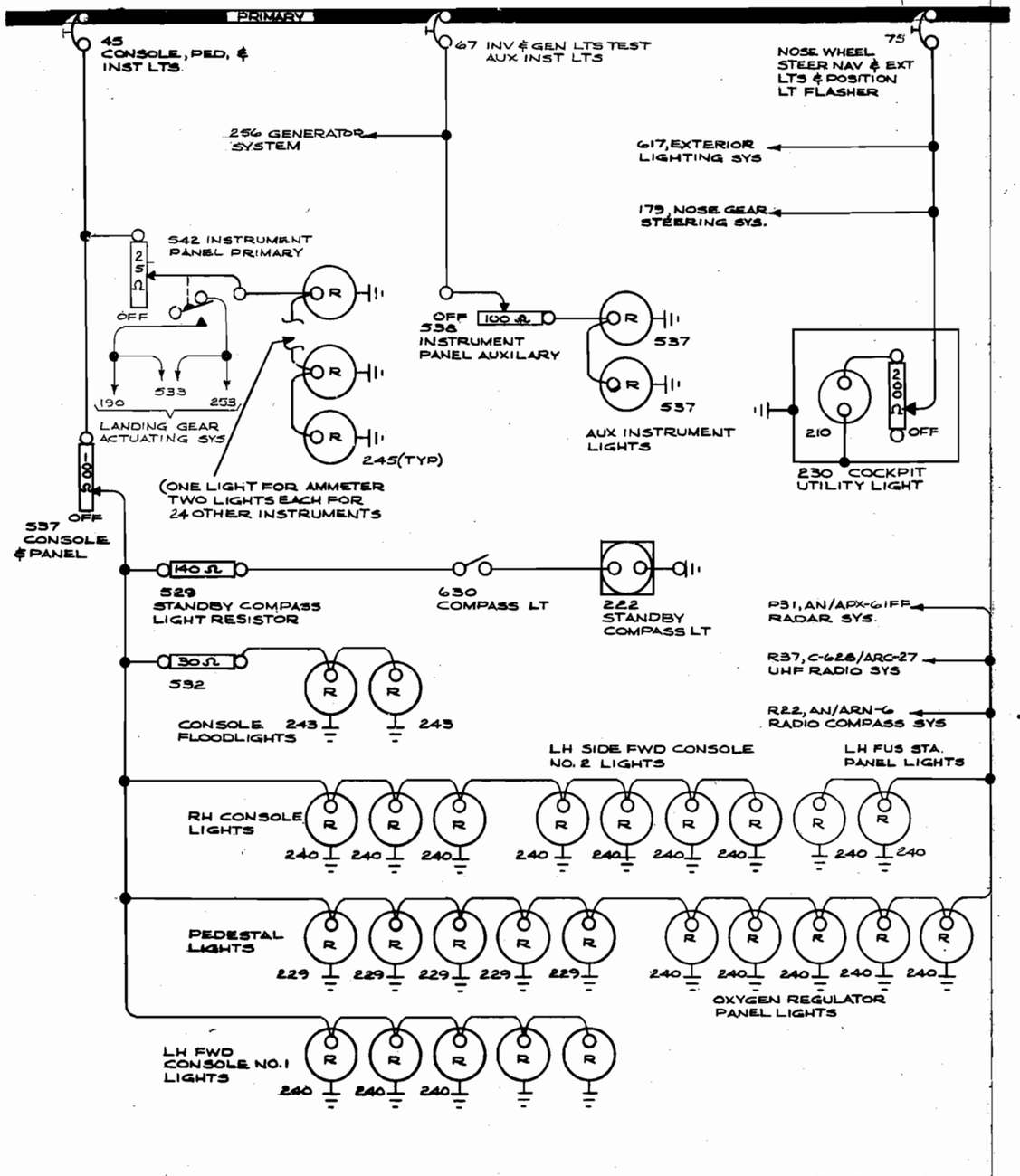
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
49	Circuit Breaker - Canopy Control	Fus 118 RH	Cockpit
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
257	Light Assembly - Fuselage 78 Panel Illumination	Fus 78 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
422	Receptacle - Rocket-firing	Fus 143 RH and LH	Wings
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	Instrument Panel
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System F-86F-30 Airplanes AF52-4305 Through -4954



INTERIOR LIGHTING SYSTEM
F-86F-30 AIRPLANES - AF52-4305 THROUGH -4954

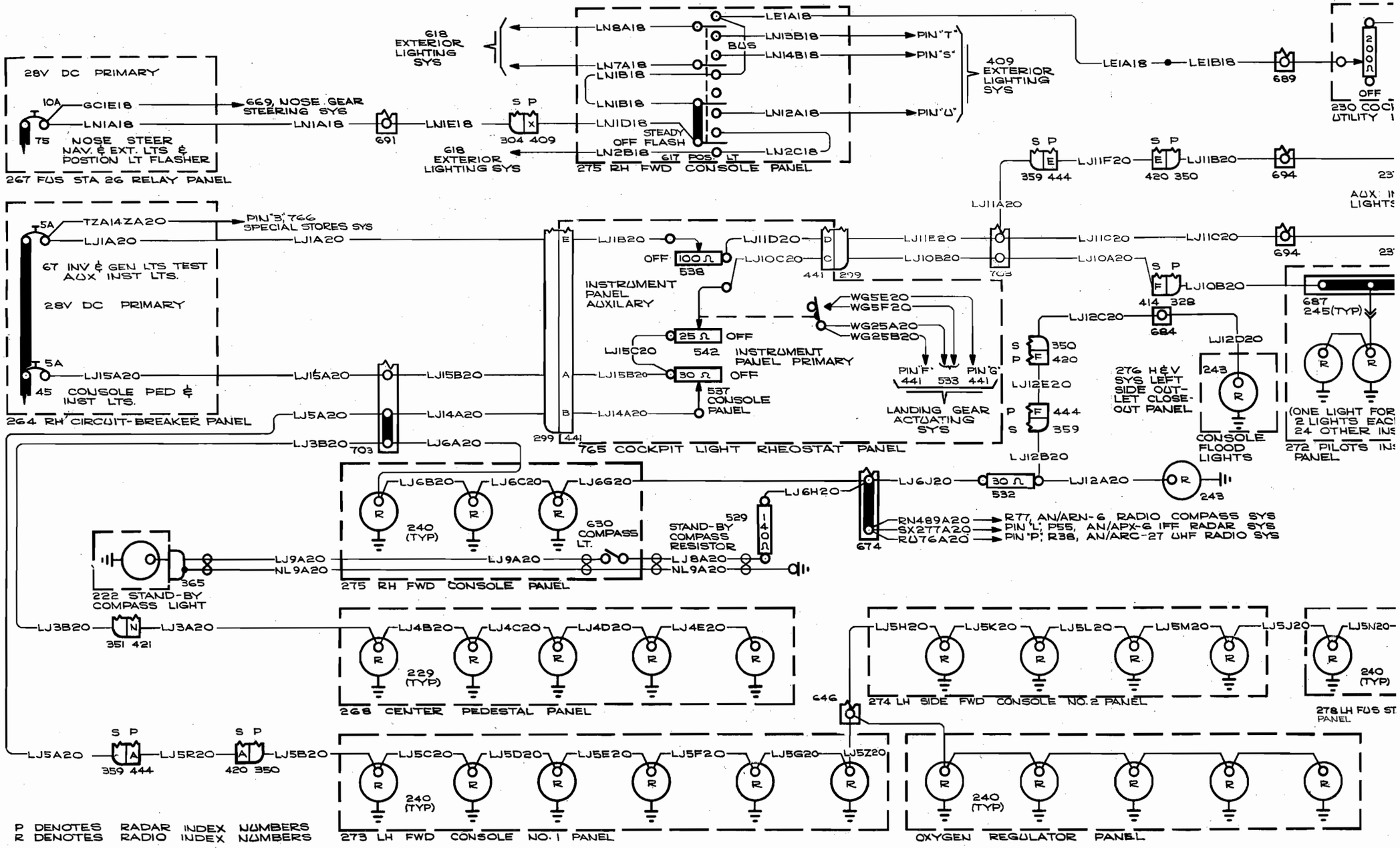


INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
274	Panel - Left-hand Aft Console	Fus 113 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
299	Plug - Light Dimming	Fus 85 RH	Cockpit, Below RH Console Panels
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
703	Terminal Block - Light Dimming	Fus 81 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System F-86F-30 Airplanes AF52-4955 Thru -5013

INTERIOR LIGHTING SYSTEM
F-86F-30 AIRPLANES AF52-4955 THROUGH -5013

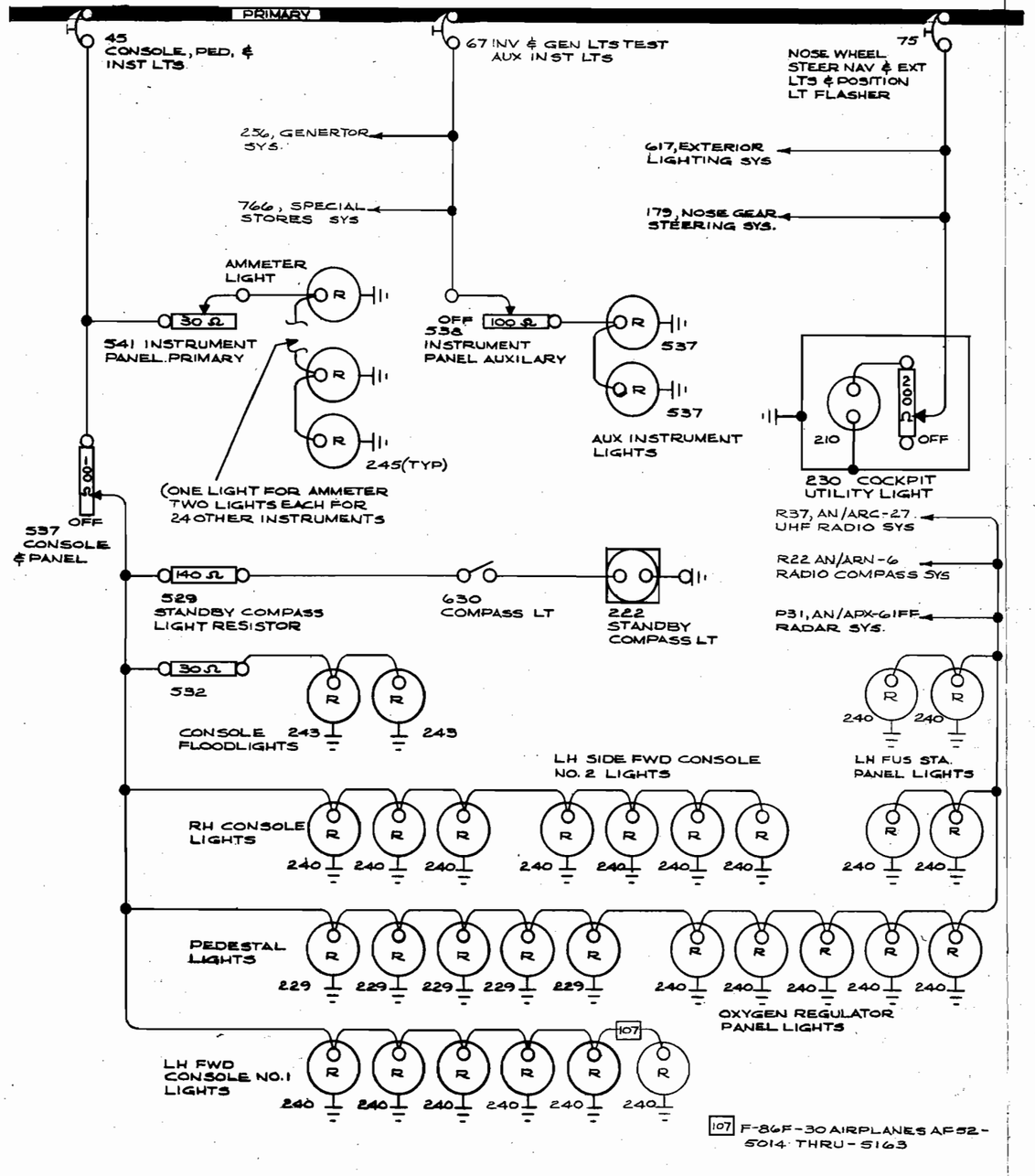

28V DC PRIMARY
10A
GCIE18
LN1A18
75
NOSE STEER NAV. & EXT. LTS & POSTION LT FLASHER
267 FUS STA 26 RELAY PANEL
669, NOSE GEAR STEERING SYS
691
LN1E18
S P
304 409
618 EXTERIOR LIGHTING SYS
LN8A18
LN7A18
LN1B18
LN1B18
LN1D18
LN2B18
LE1A18
LN3B18
LN4B18
LN2A18
LN2C18
BUS
STEADY OFF FLASH
GIT POS LT
275 RH FWD CONSOLE PANEL
PIN "T"
PIN "S"
PIN "U"
409 EXTERIOR LIGHTING SYS
LE1A18
LE1B18
689
OFF
230 COCKPIT UTILITY
5A
TZA14ZA20
LJ1A20
PIN "3" 766 SPECIAL STORES SYS
6T INV & GEN LTS TEST AUX INST LTS.
28V DC PRIMARY
5A
LJ15A20
45
CONSOLE PED & INST LTS.
264 RH CIRCUIT-BREAKER PANEL
LJ5A20
LJ3B20
703
LJ15B20
LJ14A20
LJ6A20
LJ1B20
OFF
100 Ω
538
LJ11D20
LJ10C20
441 209
LJ11E20
LJ10B20
INSTRUMENT PANEL AUXILARY
25 Ω
OFF
542
INSTRUMENT PANEL PRIMARY
LJ15C20
30 Ω
OFF
537 CONSOLE PANEL
299 441
765 COCKPIT LIGHT RHEOSTAT PANEL
WG5E20
WG5F20
WG25A20
WG25B20
PIN "F" 441
533
PIN "G" 441
LANDING GEAR ACTUATING SYS
LJ11A20
703
S P
359 444
LJ11F20
S P
420 350
LJ11B20
694
LJ11C20
LJ10A20
S P
414 328
LJ10B20
LJ12C20
694
LJ12D20
S 350
P 420
LJ12E20
P 444
S 359
LJ12B20
276 H&V SYS LEFT SIDE OUTLET CLOSEOUT PANEL
243
CONSOLE FLOOD LIGHTS
687
245(TYP)
(ONE LIGHT FOR 2 LIGHTS EACH 24 OTHER INS
272 PILOTS INS PANEL
LJ6B20
LJ6C20
LJ6G20
240 (TYP)
630 COMPASS LT.
529
STAND-BY COMPASS RESISTOR
140Ω
LJ6H20
674
LJ6J20
30 Ω
532
LJ12A20
243
RN48A20 → R77, AN/ARN-6 RADIO COMPASS SYS
SX27TA20 → PIN "L" P55, AN/APX-6 IFF RADAR SYS
RUT6A20 → PIN "P" R38, AN/ARC-27 UHF RADIO SYS
LJ9A20
NL9A20
LJ9A20
LJ8A20
NL9A20
365
222 STAND-BY COMPASS LIGHT
275 RH FWD CONSOLE PANEL
LJ3B20
N
LJ3A20
351 421
LJ4B20
LJ4C20
LJ4D20
LJ4E20
229 (TYP)
268 CENTER PEDESTAL PANEL
LJ5H20
LJ5K20
LJ5L20
LJ5M20
LJ5J20
LJ5N20
240 (TYP)
274 LH SIDE FWD CONSOLE NO. 2 PANEL
278 LH FUS ST PANEL
646
LJ5A20
S P
359 444
LJ5R20
S P
420 350
LJ5B20
LJ5C20
LJ5D20
LJ5E20
LJ5F20
LJ5G20
LJ5Z20
240 (TYP)
273 LH FWD CONSOLE NO. 1 PANEL
240 (TYP)
OXYGEN REGULATOR PANEL
P DENOTES RADAR INDEX NUMBERS
R DENOTES RADIO INDEX NUMBERS

F-86F-2-1

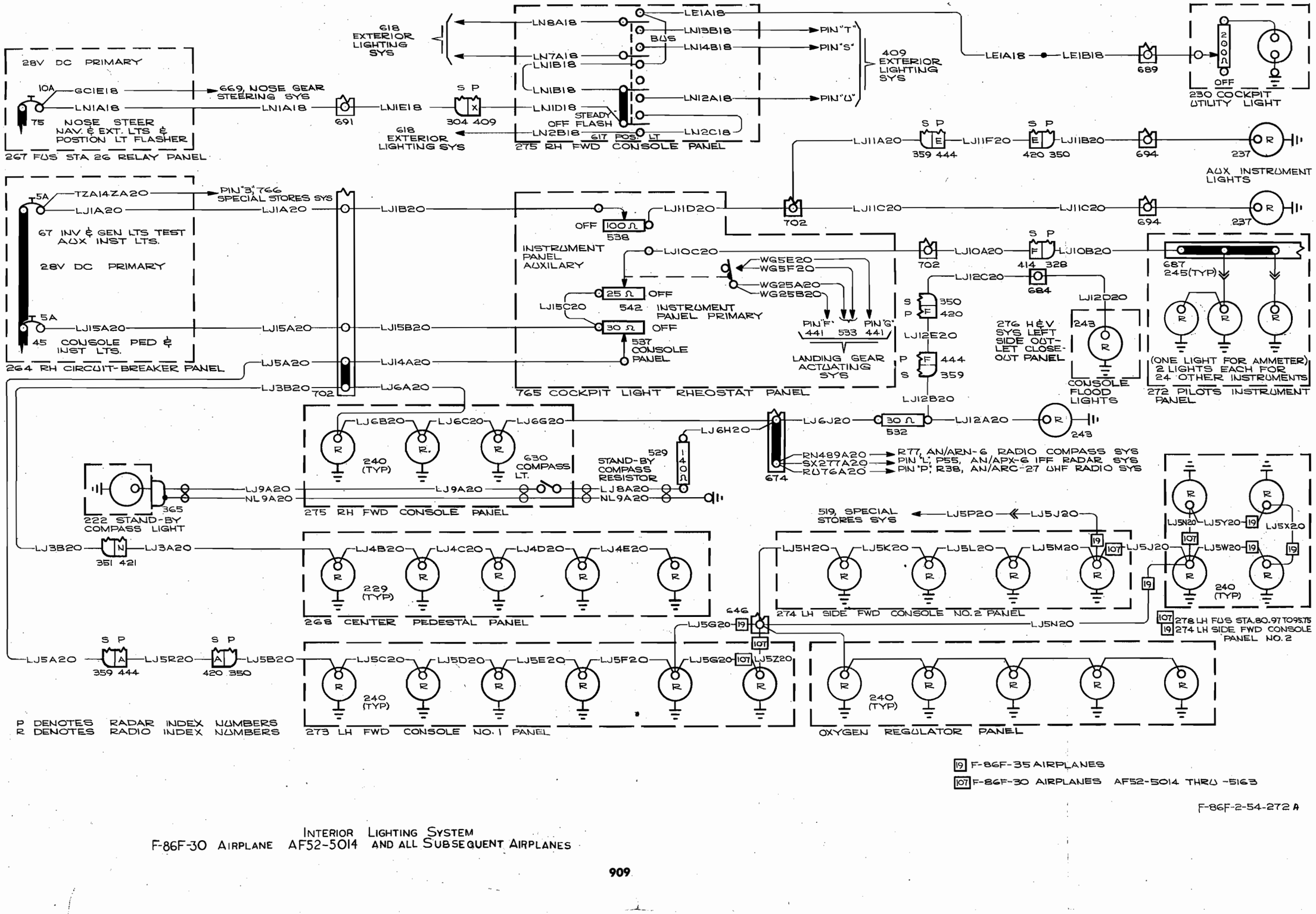
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
222	Lamp - Stand-by Compass	Fus 80 RH	Cockpit - Right-hand Side of Shroud on Stand-by Compass
230	Light Assembly - Cockpit Utility	Fus 85 LH	Cockpit - Left-hand Console
237	Light Assembly - Instrument Floodlight (Auxiliary.)	Fus 124 LH	Cockpit
243	Light Assembly - Left-hand and Right-hand Console Flood	Fus 95 RH and LH	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
272	Panel - Instrument	Fus 78 CL	Cockpit
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
275	Panel - Right-hand Forward Console	Fus 85 RH	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
328	Plug - Horizontal Stabilizer Bungee Trim Actuator	Fus 34.1 CL	Tail Assembly
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
359	Plug - Pedestal Disconnect	Fus 71.5 RH	Cockpit
365	Plug - Stand-by Compass Light	Fus 80 LH	Cockpit
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
529	Resistor - Stand-by Compass Light	Fus 85 RH	Cockpit, RH Side
532	Resistor - Console Floodlight	Fus 90 RH	Cockpit, RH Side
618	Switch - Position and Fuselage Light Dimmer	Fus 85 RH	Cockpit, RH Forward
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay
684	Terminal Block - Windshield Heater Switch	Fus 85 LH	LH Aft Console
689	Terminal Block - Cockpit Utility Light	Fus 81 LH	LH Console
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
702	Terminal Block - Windshield Heater Switch	Fus 85 RH	Cockpit
765	Panel - Cockpit Light Rheostat	Fus 81 RH	Cockpit, RH Side

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Interior Lighting System F-86F-30 Airplane AF52-5014 and All Subsequent Airplanes



INTERIOR LIGHTING SYSTEM
F-86F-30 AIRPLANE AF52-5014 AND ALL SUBSEQUENT AIRPLANES

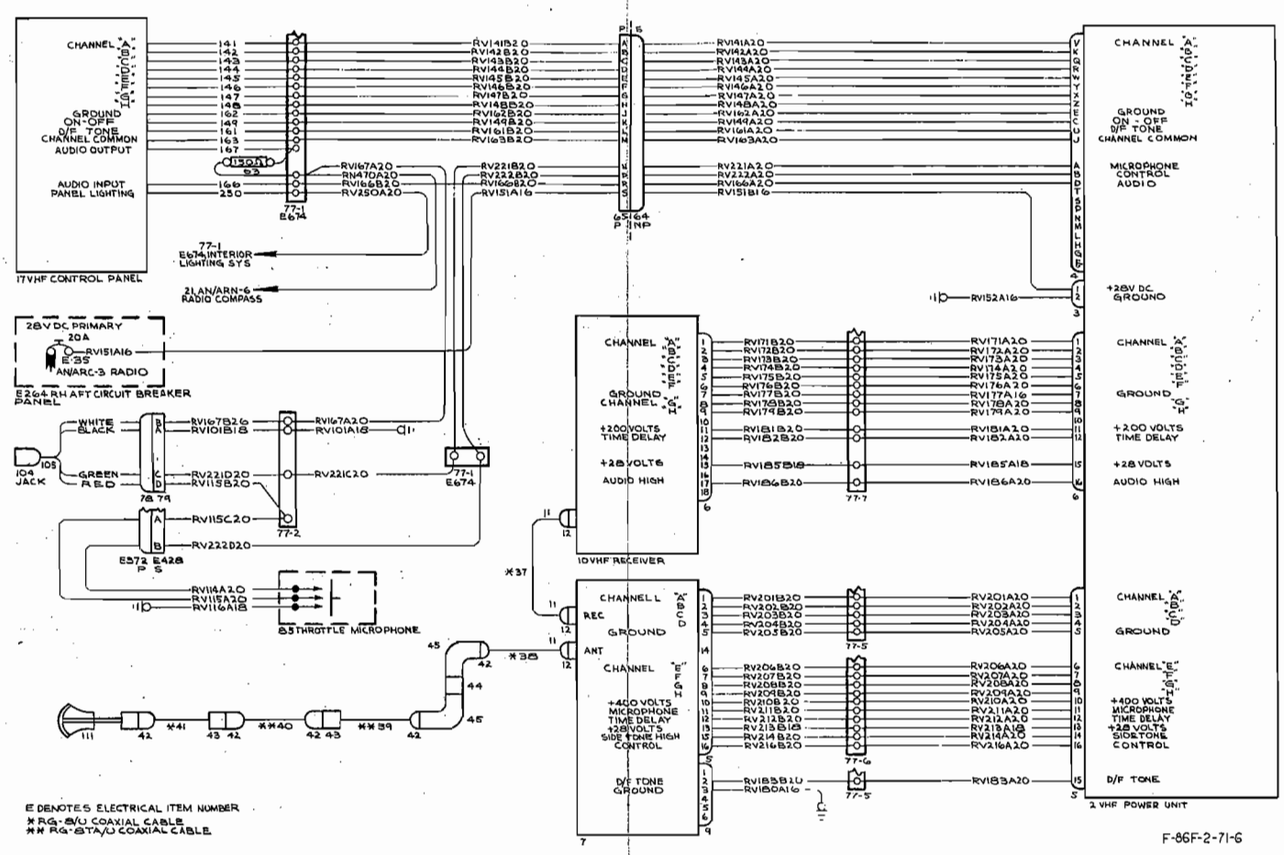


INTERIOR LIGHTING SYSTEM
F-86F-30 AIRPLANE AF52-5014 AND ALL SUBSEQUENT AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
11	Adapter - Right Angle	Fus 95 RH	
12	Adapter - Right Angle	Fus 124 LH	
38	Plug - Control Panel	Fus 93 RH	Cockpit
41	Plug - Radio Set Control	Fus 140 LH	LH Radio Bay
42	Plug - Radio Set Control	Fus 140 LH	LH Radio Bay
45	Receiver - Transmitter (ARC-27)	Fus 117 LH to 130 Center	Lower Fuselage
64	Plug - Pressure Disconnect	Fus 113 RH	Cockpit
77-1	Terminal Strip	Fus 95	Cockpit
77-2	Terminal Strip	Fus 117	Cockpit
85	Throttle Switch - Microphone	Fus 85 LH	Cockpit - Throttle Quadrant
104	Jack	Fus 81 Center	Cockpit
105	Cordage	Fus 81 Center	Cockpit
E264	Panel - Circuit-breaker Right-hand	Fus 110 RH	Cockpit - RH
E378	Plug - Throttle Disconnect	Fus 93 LH	Cockpit
E428	Receptacle - Throttle Disconnect	Fus 93 LH	Cockpit
E674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JL0-4) for part numbers and location of items.

AN/ARC-3 Command Set System F-86F-1 Through F-86F-15 Airplanes



F-86F-2-71-6

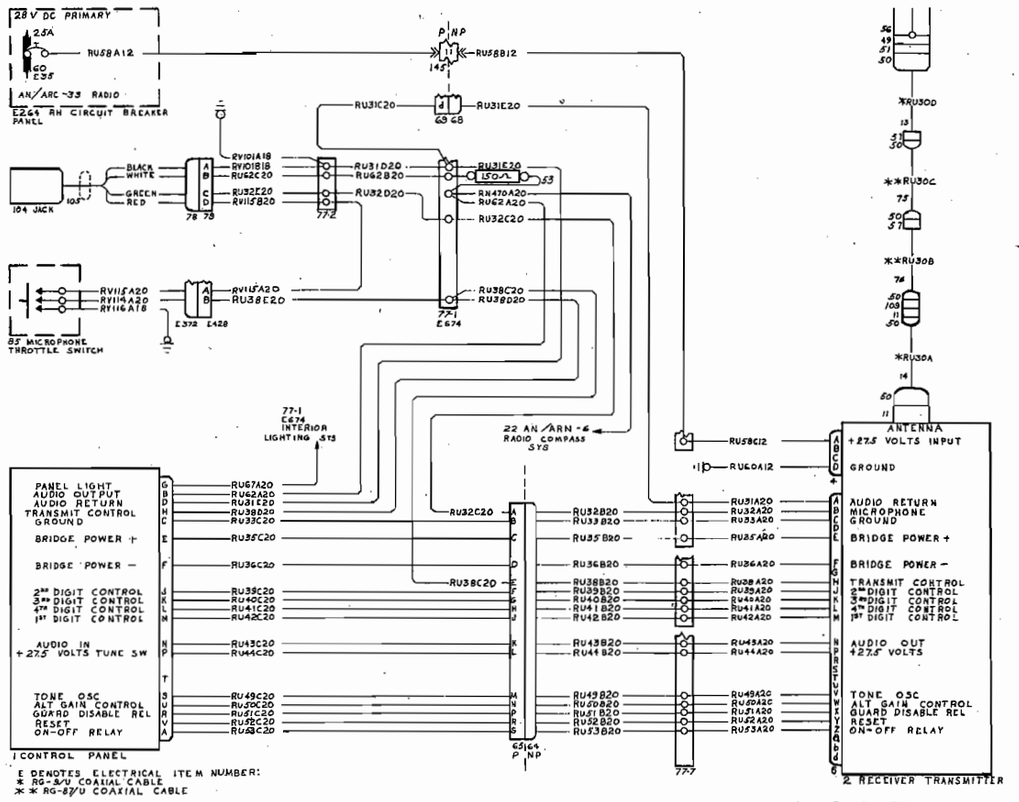
AN/ARC-3 COMMAND SET SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES

T.O. No. 1F-86F-2

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
22	Control Panel (ARN-6 Compass)	Fus 71 LH	Cockpit
50	Plug	Fus 130 RH	RH Gun Bay
64	Plug - Sight Selector	Fus 70 Center	Cockpit
68	Plug - Pressure Disconnect	Fus 113 RH	Gun Bay
77	Terminal Strip	Fus 95	Cockpit
77	Terminal Strip	Fus 117	Cockpit
77	Terminal Strip	Fus 125	Cockpit
78	Plug - Pressure Disconnect	Fus 65 CL	Cockpit
85	Throttle Switch - Microphone	Fus 85 LH	Cockpit - Throttle Quadrant
104	Jack	Fus 81 Center	Cockpit
105	Cordage	Fus 81 Center	Cockpit
145	RH Pressure Block	Fus 110 RH	Cockpit
268	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
E372	Plug - Throttle Disconnect	Fus 93 LH	Cockpit
E674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/ARC-33 Command Set System F-86F-20 Airplanes

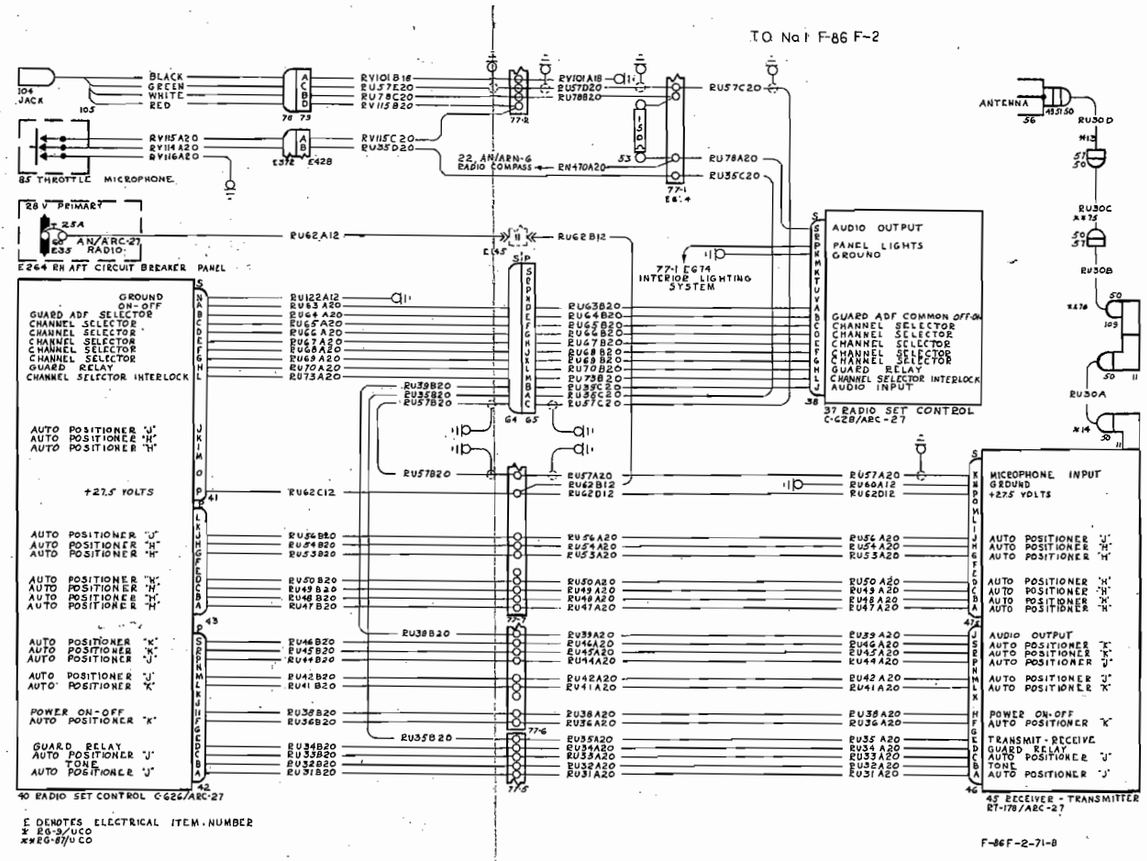


AN/ARC-33 Command Set System
F-86F-20 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
22	Control Panel (ARN-6 Compass)	Fus 71 LH	Cockpit
37	Control Panel (ARC-27)	Fus 93 RH	Cockpit
38	Plug - Control Panel	Fus 93 RH	Cockpit
40	Radio Set Control (ARC-27)	Fus 140 LH	LH Radio Bay
A1	Plug - Radio Set Control	Fus 140 LH	LH Radio Bay
A2	Plug - Radio Set Control	Fus 140 LH	LH Radio Bay
A3	Plug - Radio Set Control	Fus 140 LH	LH Radio Bay
45	Receiver - Transmitter (ARC-27)	Fus 117 LH to 130 Center	Lower Fuselage
A6	Plug - Receiver-Transmitter	Fus 117 LH	Lower Fuselage
A7	Plug - Receiver-Transmitter	Fus 117 LH	Lower Fuselage
50	Plug	Fus 130 RH	RH Gun Bay
56	Antenna (VHF-UHF)	Vert Stabilizer 45 Center	Tip of Vertical Stabilizer
64	Plug - Pressure Disconnect	Fus 113 RH	Cockpit
77	Terminal Strip	Fus 95	Cockpit
77	Terminal Strip	Fus 117	Cockpit
77	Terminal Strip	Fus 125	Cockpit
78	Plug - Pressure Disconnect	Fus 65 CL	Cockpit
85	Throttle Switch - Microphone	Fus 95 LH	Cockpit - Throttle Quadrant
104	Jack	Fus 81 Center	Cockpit
105	Cordage	Fus 81 Center	Cockpit
E264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
E372	Plug - Throttle Disconnect	Fus 93 LH	Cockpit
E674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86P-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/ARC-27 Command Set System - F-86P-25 and Subsequent Airplanes



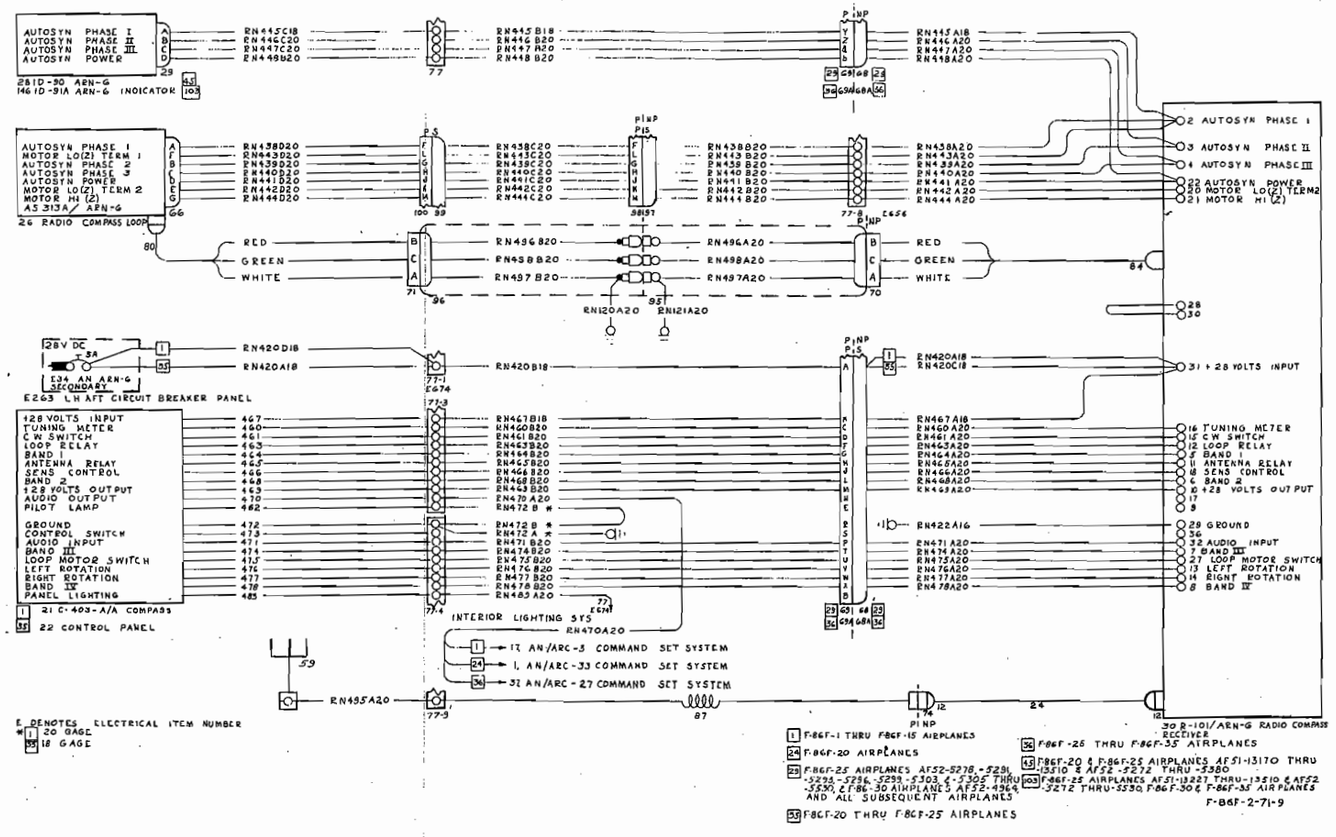
AN/ARC-27 Command Set System
F-86F-25 And Subsequent Airplanes

F-86F-2-71-8

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
12	Adapter - Right Angle	Fus 124 LH	LH Radio Bay
22	Control Panel (ARN-6 Compass)	Fus 71 LH	Cockpit
24	Sense Antenna Cable	Fus 133 LH to 180 RH	LH Radio Bay
26	Compass Loop	Fus 135 Center	Canopy
28	Compass Indicator	Fus 71 LH	Cockpit
29	Plug - Compass Indicator	Fus 71 LH	Cockpit
30	Compass Receiver (ARN-6)	Fus 124 Center to 153 Center	LH Radio Bay
59	Sensing Antenna. (ARN-6)	Fus 95 Center to Fus 135 Center	Canopy
68	Plug - Pressure Disconnect	Fus 113 RH	Gun Bay
70	Receptacle - Compass Loop Disconnect	Fus 130 LH	Canopy Deck
71	Receptacle - Compass Loop Disconnect	Fus 130 LH	Canopy
74	Feed Thru Connector	Fus 130 RH	NH Gun Bay
77	Terminal Strip	Fus 95	Cockpit
77	Terminal Strip	Fus 117	Cockpit
77	Terminal Strip	Fus 125	Cockpit
77	Terminal Strip	Fus 130	Canopy to LH Radio Bay
80	Compass Loop Cable	Fus 130 RH	Canopy to LH Radio Bay
84	Compass Loop Cable	Fus 133 RH	Cockpit
87	Cord - Kellog Koiled	Fus 135 LH	Canopy Deck
95	Base Assembly - Loop Disconnect	Fus 133 LH	Canopy
96	Brush Holder - Loop Disconnect	Fus 133 RH	Canopy
97	Plug - Loop Pressure Diaconnect	Fus 120 LH to Fus 130 RH	Canopy Bow
100	Receptacle - Compass Loop	Fus 81 LH	Cockpit
146	Compass Indicator	Fus 118 LH	Cockpit - LH Side
263	Panel - Circuit-breaker Left-hand	Fus 26 RH	Nose Radar Bay
674	Terminal Block - Radio		

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/ARN-6 Radio Compass System



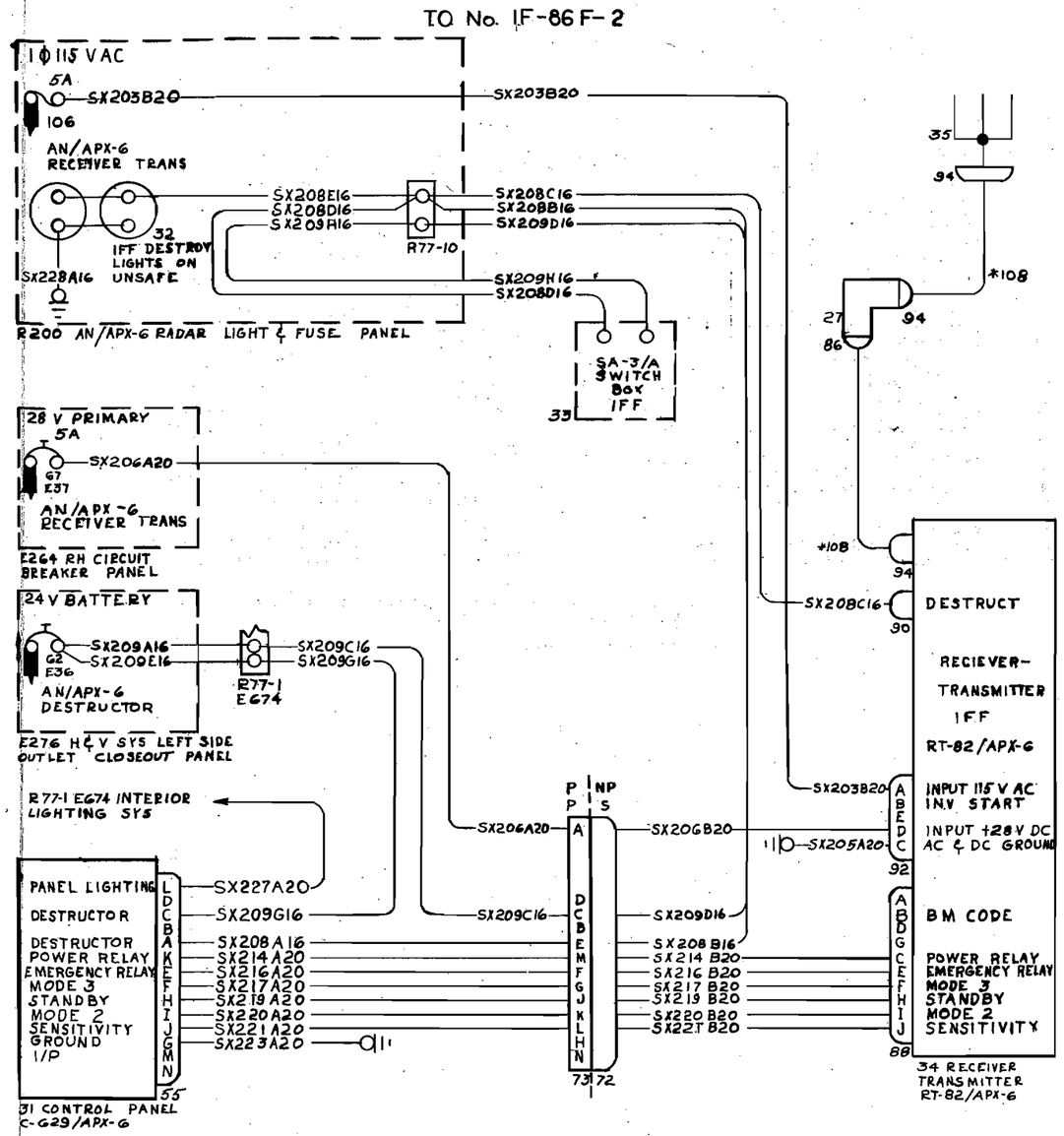
AN/ARN-6 · Radio Compass System

INDEX NO.	DESCRIPTION
31	Radar Set Control (APX-6)
33	Switch Box
34	Receiver - Transmitter
35	Antenna Assembly
55	Plug
72	Plug - Pressure Disconnect
77	Terminal Strip
86	Radio Frequency Jack
88	Plug (APX-6 Receiver)
90	Plug (APX-6 Receiver)
92	Plug (APX-6 Receiver)
94	Radio Frequency Plug
94	Radio Frequency Plug
108	Coaxial Cable (APX-6 Antenna)
264	Panel - Circuit-breaker Right-hand
276	Panel - Left-hand Forward Circuit-breaker
674	Terminal Block - Radio

STATION NO.	ACCESS
Fus 81 CL	Cockpit
Fus 150 LH	LH Radio Bay
Fus 140 LH	LH Radio Bay
Fus 155 Center	Lower Fuselage
Fus 91 RH	Cockpit, RH Console
Fus 113 RH	Cockpit
Fus 95 RH	Cockpit
Fus 125 RH	Cockpit
Fus 133 LH	LH Radio Bay
Fus 133 LH	LH Radio Bay
Fus 133 LH	LH Radio Bay
Fus 133 LH	LH Radio Bay
Fus 125 RH	RH Gun Bay
Fus 144 LH to Fus 124 LH	Lower Fuselage to LH Radio Bay
Fus 118 RH	Cockpit - RH
Fus 100 LH	Cockpit
Fus 26 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/APX-6 IFF Radar System - F-86F-1 Through F-86F-15 Airplanes



R DENOTES RADIO INDEX NUMBER
E DENOTES ELECTRICAL INDEX NUMBER
* RG-8.U COAXIAL CABLE

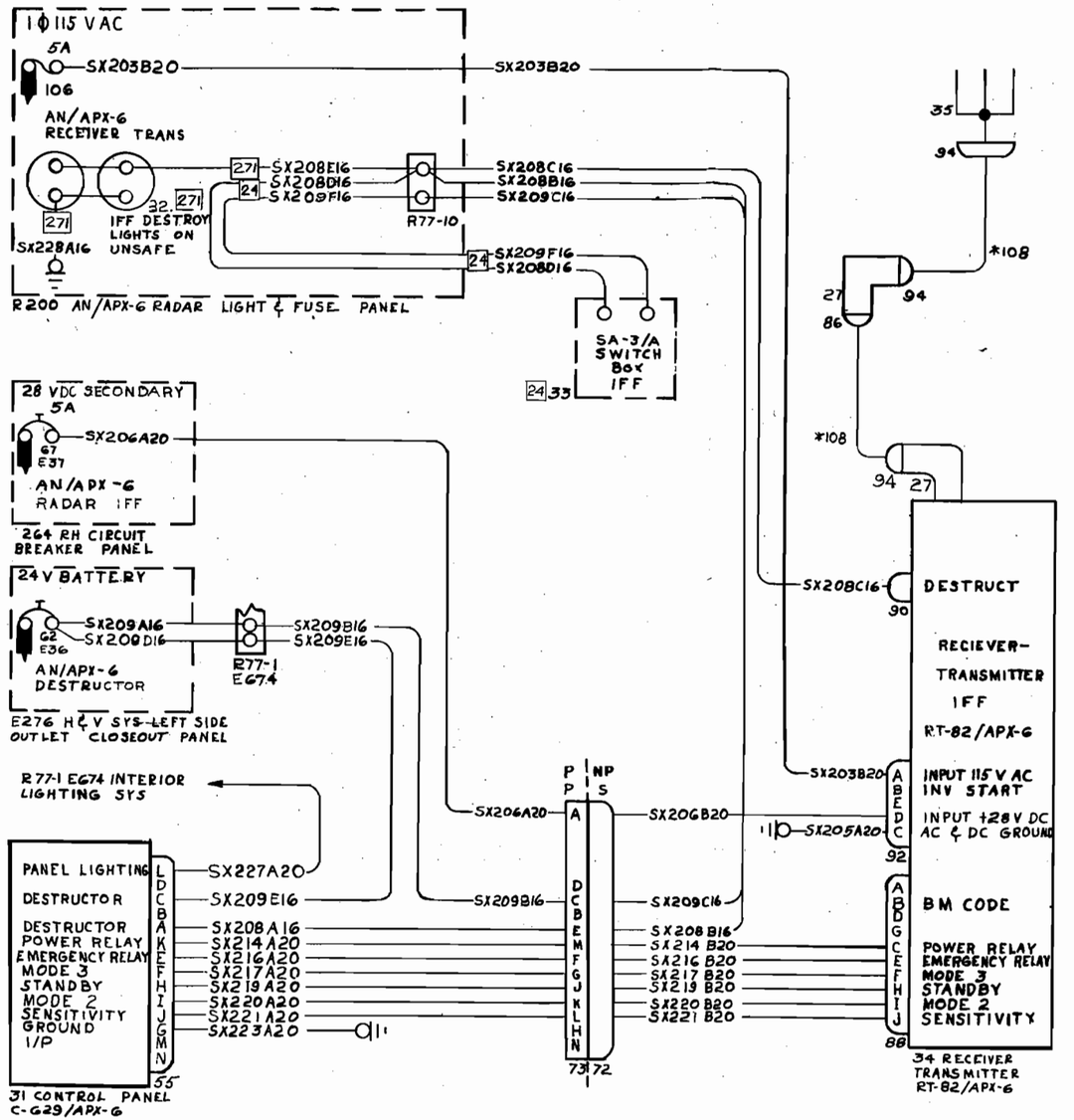
F-86F-2-7419

AN/APX-6 IFF RADAR SYSTEM
F-86F-1 THROUGH F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
31	Radar Set Control (APX-6)	Fus 81 CL	Cockpit
33	Switch Box	Fus 150 LH	LH Radio Bay
34	Receiver - Transmitter	Fus 140 LH	LH Radio Bay
35	Antenna Assembly	Fus 155 Center	Lower Fuselage
55	Plug	Fus 91 RH	Cockpit, RH Console
72	Plug - Pressure Disconnect	Fus 113 RH	Cockpit
77	Terminal Strip	Fus 95 RH	Cockpit
86	Radio Frequency Jack	Fus 125 RH	Cockpit
88	Plug (APX-6 Receiver)	Fus 133 LH	LH Radio Bay
90	Plug (APX-6 Receiver)	Fus 133 LH	LH Radio Bay
92	Plug (APX-6 Receiver)	Fus 133 LH	LH Radio Bay
94	Radio Frequency Plug	Fus 125 RH	RH Gun Bay
108	Coaxial Cable (APX-6 Antenna)	Fus 144 LH to Fus 124 LH	Lower Fuselage to LH Radio Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
674	Terminal Block - Radio	Fus 26 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/APX-6 IFF Radar System - F-86F-20 Through F-86F-35 Airplanes



R DENOTES RADIO INDEX NUMBER
E DENOTES ELECTRICAL INDEX NUMBER
* RG-8-U COAXIAL CABLE

24 F-86F-20 THRU F-86F-30 AIRPLANES
271 F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU -13480 AND F-86F-30 AIRPLANES AF52-4305 THRU -4804

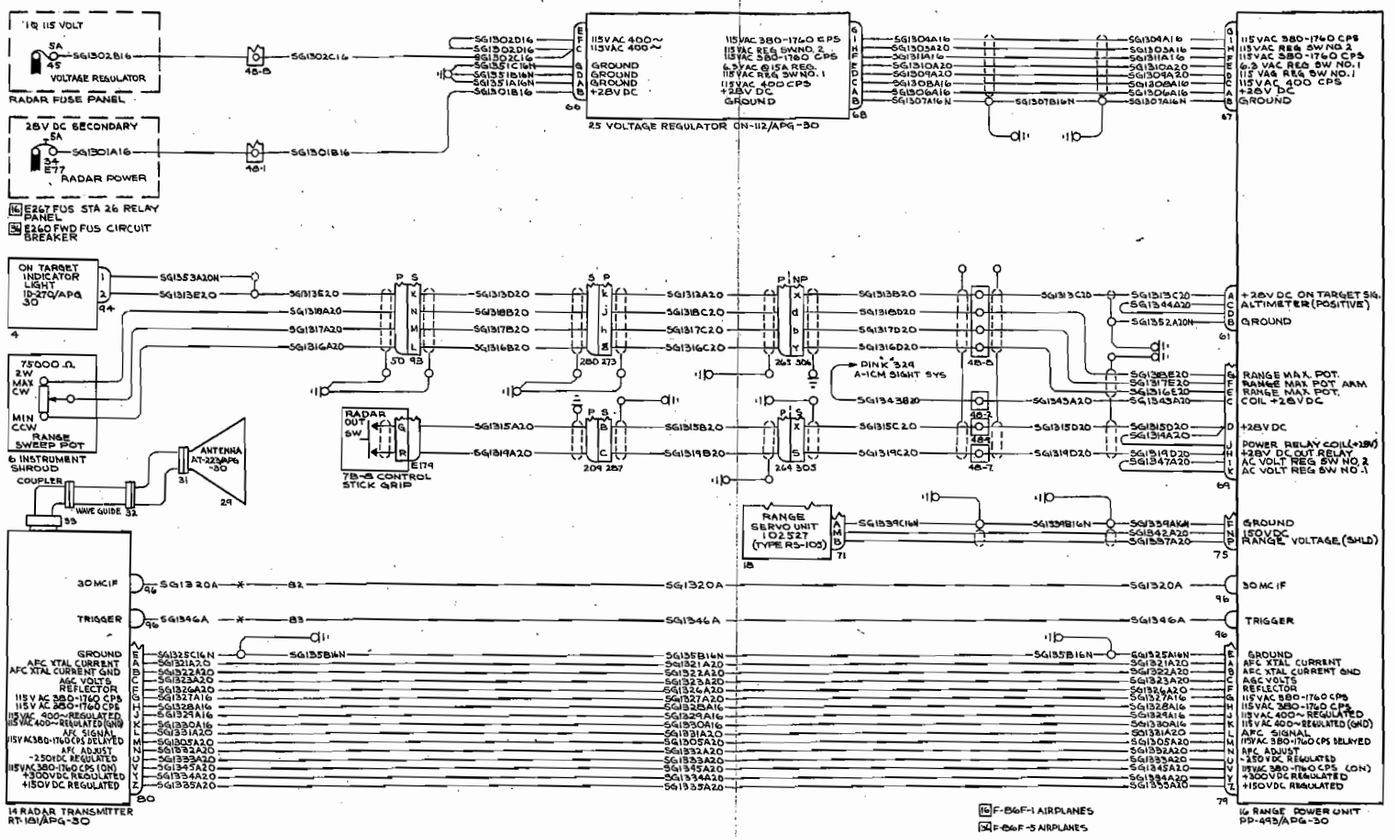
F-86F-2-74-18

AN/APX-6 IFF RADAR SYSTEM
F-86F-20 THROUGH F-86F-35 AIRPLANES

INDEX NO.	DESCRIPTION	STATION	ACCESS
4			
6	Range Sweep Potentiometer	Fus 71 LH	Cockpit
7	Radar Cut Switch	Fus 85 Center	Cockpit
14	Radar Transmitter	Fus 45 RH	Nose Radar Bay
18	Range Servo Unit	Fus 29 LH	Nose Radar Bay
25	Voltage Regulator	Fus 15 to 26 LH	Radar Bay Nose Section
29	Antenna	Fus 5 to 15 Center	Nose Radar Bay
31	Wave Guide - Rigid	Fus 15 to 18 RH	Nose Radar Bay
32	Wave Guide - Flexible	Fus 18 to 41 RH	Nose Radar Bay
33	Coupler	Fus 41 RH	Nose Radar Bay
48	Terminal Strip	Fus 42 to 47 LH	RH Gun Bay
50			
61	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
66	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
67	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
68	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
69	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
71	Plug - Range Servo Unit	Fus 48 Center	Nose Radar Bay
75	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
79	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
80	Plug - Transmitter	Fus 45 Center	Nose Radar Bay
94			
96	Plug	Fus 53 LH	Nose Radar Bay
179	Grip - Control Stick	Fus 86 CL	Cockpit
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
265	Panel - Fuel Level Adjustment	Fus 126 RH	Inside Cover of Right-hand Pressure Disconnect in Cockpit
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
329	Plug - Hydraulic By-pass Valve - Normal System	Fus 166 CL	Wing Slot - Lower Fuselage

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/APG-30 Radar System F-86F-1 and F-86F-5 Airplanes



*RG 7I/UCO-AXIAL CABLE
E DENOTES ELECTRICAL INDEX NO

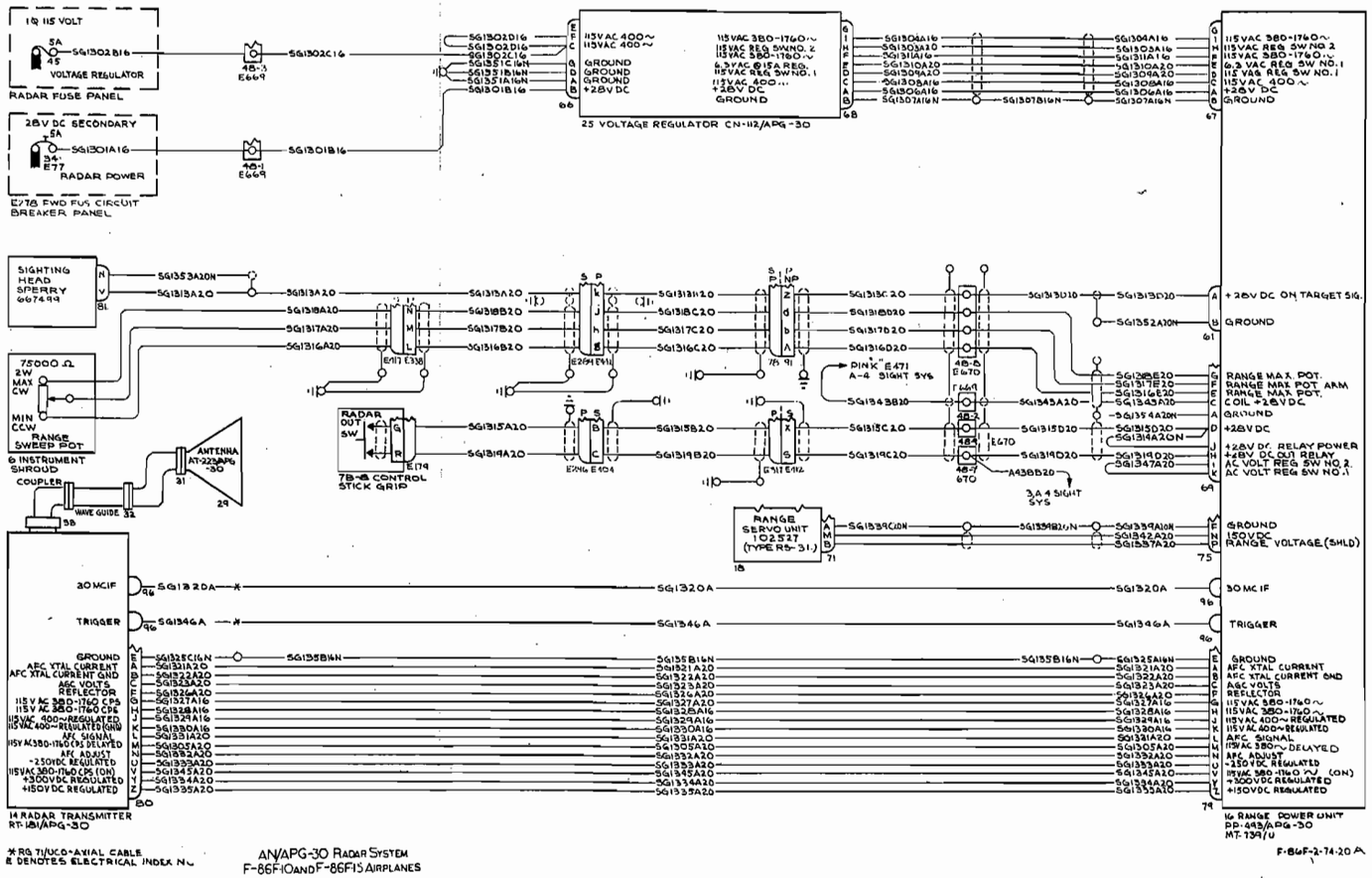
AN/APG-30 Radar System
F-86F-1 and F-86F-5 Airplanes

F-86F-2-74-22

INDEX NO.	DESCRIPTION	STATION	ACCESS
1	Sighting Head	Fus 71 Center	Cockpit
3	Sight Selector Unit	Fus 80 Center	Cockpit
6	Range Sweep Potentiometer	Fus 71 LH	Cockpit
7	Radar Cut Switch	Fus 85 Center	Cockpit
14	Radar Transmitter	Fus 45 RH	Nose Radar Bay
16	Range Power Unit	Fus 55 RH	Nose Radar Bay
18	Range Servo Unit	Fus 29 LH	Nose Radar Bay
25	Voltage Regulator	Fus 15 to 26 LH	Radar Bay Nose Section
29	Antenna	Fus 9 to 15 Center	Nose Radar Bay
31	Wave Guide - Rigid	Fus 15 to 18 RH	Nose Radar Bay
32	Wave Guide - Flexible	Fus 18 to 41 RH	Nose Radar Bay
33	Coupler	Fus 41 RH	Nose Radar Bay
48	Terminal Strip	Fus 42 to 47 LH	RH Gun Bay
61	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
66	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
67	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
68	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
69	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
70	Plug - Range Servo Unit	Fus 38 LH	Nose Radar Bay
75	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
78	Plug - Pressure Disconnect	Fus 65 CL	Cockpit
79	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
80	Plug - Transmitter	Fus 45 Center	Nose Radar Bay
81	Plug - Sighting Head	Fus 60 Center	Nose Radar Bay
96	Plug	Fus 53 LH	Nose Radar Bay
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 69.6 LH	Cockpit - Forward of Pedestal
471	Relay - Gun Sight Power	Fus 40 LH	Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

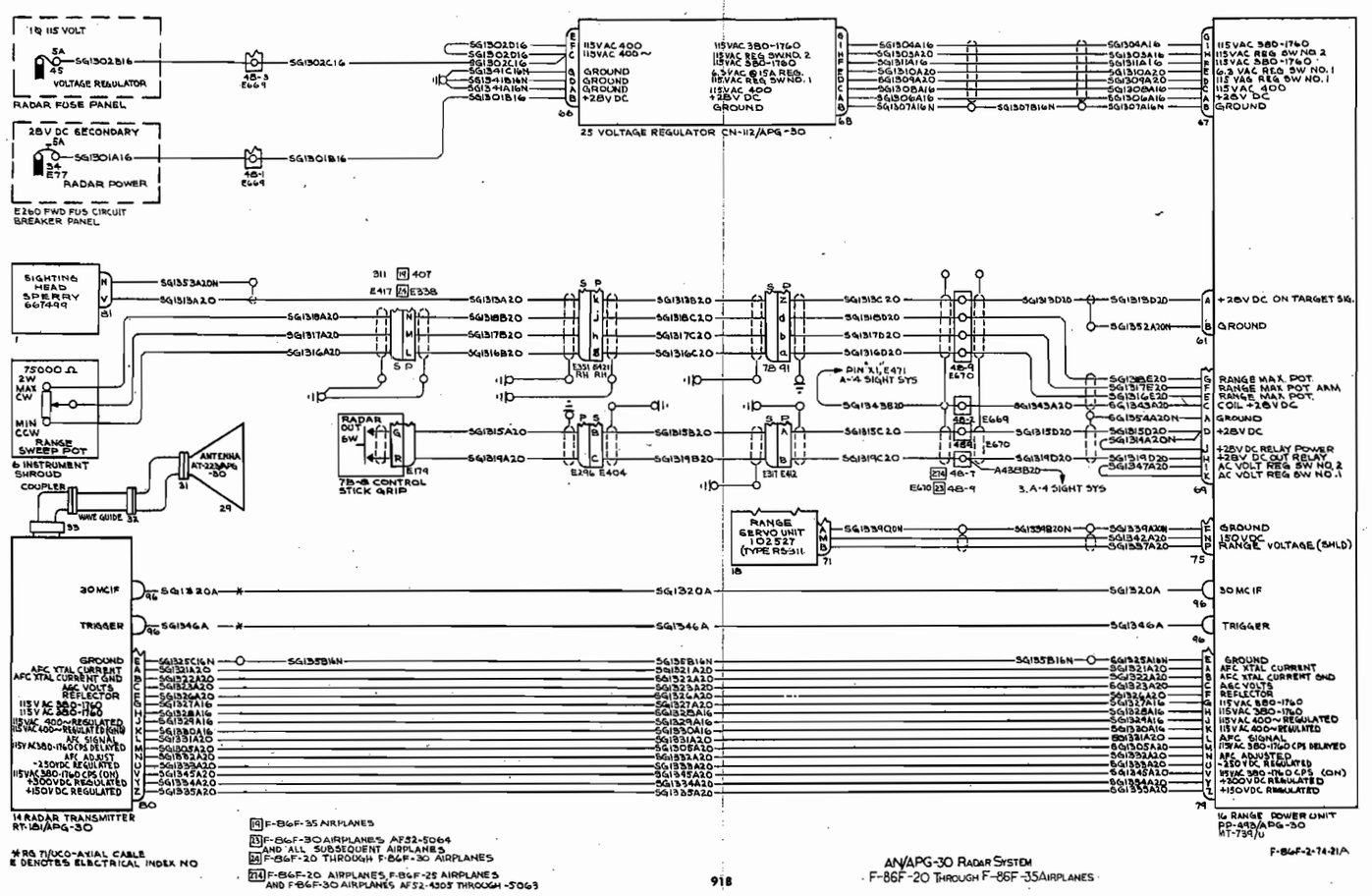
AN/APG-30 RADAR System F-86F-10 and F-86F-15 Airplanes



INDEX NO,	DESCRIPTION	STATION	ACCESS
1	Sighting Head	Fus 71 Center	Cockpit
3	Sight Selector Unit	Fus 80 Center	Cockpit
6	Range Sweep Potentiometer	Fus 71 LH	Cockpit
7	Radar Out Switch	Fus 85 Center	Cockpit
14	Radar Transmitter	Fus 45 RH	Nose Radar Bay
16	Range Power Unit	Fus 55 RH	Nose Radar Bay
18	Range Servo Unit	Fus 29 LH	Nose Radar Bay
25	Voltage Regulator	Fus 15 to 26 LH	Radar Bay Nose Section
29	Antenna	Fus 5 to 15 Center	Nose Radar Bay
31	Wave Guide - Rigid	Fus 15 to 18 RH	Nose Radar Bay
32	Wave Guide - Flexible	Fus 18 to 41 RH	Nose Radar Bay
33	Coupler	Fus 41 RH	Nose Radar Bay
48	Terminal Strip	Fus 42 to 47 LH	RH Gun Bay
61	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
66	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
67	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
68	Plug - Voltage Regulator	Fus 12 LH	Nose Radar Bay
69	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
71	Plug - Range Servo Unit	Fus 48 Center	Nose Radar Bay
75	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
78	Plug - Pressure Disconnect	Fus 85 CL	Cockpit
79	Plug - Range Power Unit	Fus 30 RH	Nose Radar Bay
80	Plug - Transmitter	Fus 45 Center	Nose Radar Bay
91	Receptacle	Fus 53 RH	Cockpit Pressure
96	Plug	Fus 53 LH	Nose Radar Bay
179	Grip - Control Stick	Fus 85 CL	Cockpit
280	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
404	Receptacle - Control Stick Grip (B-8)	Fus 84 CL	Cockpit
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
417	Receptacle - Instrument Panel Shroud Disconnect	Fus 71 RH	Cockpit, Forward RH Side
471	Relay - Gun Sight Power	Fus 40 LH	Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

AN/APG-30 Radar System F-86F-20 Through F-86F-35 Airplanes



AN/APG-30 Radar System
F-86F-20 Through F-86F-35 Airplanes

F-86F-2-74-21A

DWG NO.	DESCRIPTION	STATION NO.	ACCESS
P6	Manual Range Control Unit	Fus 80 LH	Cockpit
P9	Engine Switch	Fus 90 LH	Cockpit
P21	Voltage Test Box	Fus 65 RH	Nose Radar Bay
P31	Computer	Fus 65 Center	Nose Radar Bay
P32	Amplifier	Fus 55 LH	Nose Radar Bay
P35	Right Gun Unit	Fus 35 LH	Nose Radar Bay
P37	Radar Computer - D.C.	Fus 115 RH	LH Radio Bay
P39	Armament Power Unit - A.C.	Fus 115 LH	Nose Radar Bay
P48	Terminal Strip	Fus 45 thru 47 RH	RH Gun Bay
P49	Terminal Plate	Fus 100 LH	Cockpit, Pressure Wall
P62	Circuit Breaker - Fuel Booster Forward	Fus 119 RH	Cockpit
P63	Plug - Booster Circuit	Fus 65 Center	Nose Radar Bay
P65	Plug - Camera	Fus 55 Center	Nose Radar Bay
P71	Plug - Range Servo Unit	Fus 65 Center	Nose Radar Bay
P72	Plug - Computer	Fus 45 Center	Nose Radar Bay
P74	Plug - Sighting Head	Fus 65 CC	Cockpit
P77	Plug - Pressure Disconnect	Fus 65 CL	Cockpit
P81	Plug - Sighting Head	Fus 82 Center	Nose Radar Bay
P83	Plug - Antenna Disconnect	Fus 82 RH	Nose Radar Transmitter
P84	Cable Assembly - Reference MS-1138A	Fus 83	Between Bays
P93	Receptacle	Fus 56 RH	Cockpit Instrument
P94	Receptacle - Lamp Pressure Disconnect	Fus 112 RH	Cockpit
P100	Plug - Pressure Disconnect	Fus 30 RH	Aft Cockpit, Pressure
P110	Potentiometer	Fus 80 LH	Cockpit, LH Throttle Quadrant
P111	Potentiometer	Fus 90 LH	Cockpit, LH Throttle Quadrant
P112	Potentiometer	Fus 100 LH	Cockpit, LH Throttle Quadrant
P113	Switch	Fus 90 LH	Cockpit
168	Disconnect - Pressure RH	Fus 120 RH	Cockpit
206	Inverter - One-phase 1500VA 115 V	Fus 115 LH	Radar Bay
262	Panel - Circuit-breaker Left-hand	Fus 119 LH	Cockpit, LH Rib
263	Panel - Circuit-breaker Right-hand	Fus 119 RH	Cockpit - RH
265	Panel - Fuel Level Adjustment	Fus 155 RH	Inside Cover of Right-hand Propane Compartment in Cockpit
267	Panel - Nose Section Relay	Fus 42 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
270	Panel - Fuselage Forward Circuits	Fus 88 LH	Cockpit
274	Plug - Flasher Pressure Disconnect	Fus 88 LH	LH Nose Wheel Well Access
298	Plug - Fire Warning Relay	Fus 100 RH	RH Radio Bay
304	Plug - Fire Warning Relay	Fus 100 RH	RH Radio Bay
318	Plug - Forward Pressure Disconnect (LH A/C)	Fus 45 LH	Cockpit - Forward of Pedestal
319	Plug - Thumb Disconnect	Fus 45 LH	Cockpit
320	Receptacle - Pressure Disconnect	Fus 76 RH	Cockpit
421	Receptacle - Pedestal	Fus 88 LH	Cockpit
438	Terminal Block - Pressure Disconnect	Fus 120 RH	Nose Radar Bay
439	Terminal Block - Nose Junction Box	Fus 40 RH	Nose Radar Bay
690	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (Normally AN 01-60GJD-4) for part numbers and location of items.

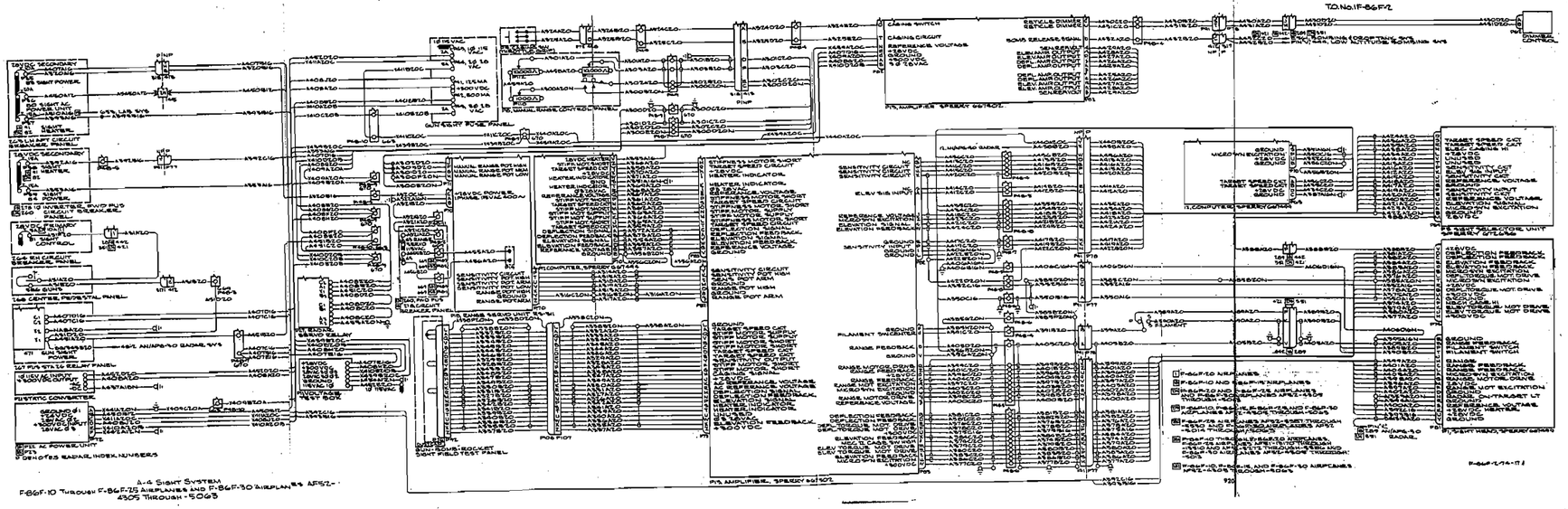
A-1CM Sight System - F-86F-1 and F-86F-5 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
1P	Sighting Head	Fus 11 Center	Cockpit
2P	Sight Selector Unit	Fus 88 Center	Cockpit
3P	Control Range Control Unit	Fus 94 LH	Cockpit
4P	Sighting Switch	Fus 94 RH	Cockpit
11P	Voltage Test Box	Fus 80 RH	Nose Radar Bay
12P	Computer	Fus 88 Center	Nose Radar Bay
13P	Amplifier	Fus 94 LH	Nose Radar Bay
14P	Radio Terminal Unit	Fus 94 RH	Nose Radar Bay
15P	Radio Connector - D.C.	Fus 110 LH	Main Radar Bay
16P	Armament Power Unit - A.C.	Fus 110 LH	LH Radio Bay
17P	D-C Armament Power Unit - A.C.	Fus 110 LH	LH Radio Bay
18P	Relay - 200 V.D.C.	Fus 71 CL	Cockpit
19P	Current - Limit Cockpit	Fus 42 to 47 LH	Cockpit, Pressure Wall
48P	Terminal Strip	Fus 100 LH	Main Radar Bay
49P	Plug - Diode Ground	Fus 88 Center	Nose Radar Bay
50P	Plug - Computer	Fus 88 Center	Cockpit
51P	Plug - Right Sensor	Fus 94 RH	Nose Radar Bay
52P	Plug - Range Servo Unit	Fus 94 Center	Nose Radar Bay
53P	Plug - Elevation Unit	Fus 94 LH	Radio Compartment
54P	Plug - D.C. Pwr Supply	Fus 68 Center	Nose Radar Bay
55P	Plug - Computer	Fus 65 Center	Nose Radar Bay
56P	Plug - Sighting Head	Fus 65 CL	Cockpit
57P	Plug - Pressure Disconnect	Fus 53 CL	Cockpit
58P	Plug - Pressure Disconnect	Fus 88 Center	Nose Radar Bay
59P	Plug - Sighting Unit	Fus 88 RH	Nose Radar Bay
60P	Plug - Amplifier	Fus 94 LH	Nose Radar Bay
61P	Plug - Amplifier	Fus 94 RH	Cockpit, Pressure
62P	Receptacle	Fus 82 RH	RH Forward Crawlway
63P	Receptacle	Fus 82 RH	RH Forward Crawlway
101P	Temperature - Pressure Disconnect	Fus 53 RH	RH Cockpit, Pressure
102P	Temperature - Pressure Disconnect	Fus 88 RH	Cockpit
151	Disconnect - Pressure Fit	Fus 94 RH	Nose Radar Bay
390	Pivot - Forward Pantilgo Circuit-Breaker	Fus 118 LH	Cockpit - LH Side
391	Pivot - Circuit-breaker Shroud	Fus 118 LH	Cockpit - RH
392	Pivot - Circuit-breaker Hold-down	Fus 60 LH	Radar Bay
393	Pivot - Circuit-breaker Relay	Fus 60 LH	Radar Bay - Forward
394	Pivot - Pedestal	Fus 60 LH	Cockpit
398	Panel - Left-hand Pantilgo Station 99	Fus 110 RH	RH Emergency Bay
399	Plug - Engine Disconnect	Fus 82 LH	Cockpit - Forward of Pedestal
417	Plug - Forward Pressure Disconnect (LH Forward)	Fus 82 LH	Cockpit - Forward of Pedestal
418	Plug - Forward Pressure Disconnect (LH AFD	Fus 82 LH	Cockpit - Behind Pedestal
1511	Plug - Pedestal Disconnect	Fus 94 LH	Cockpit
1512	Plug - Throttle Disconnect	Fus 94 LH & RH	Cockpit
1521	Receptacle - Pedestal Disconnect	Fus 82 LH	Cockpit, Behind Instrument Panel
1522	Receptacle - Landing Gear Control Disconnect	Fus 88 RH and LH	Cockpit
1523	Terminal Block - Jettison Booster	Fus 88 RH	Gun Bay
1524	Terminal Block - Spare	Fus 88 RH	Nose Radar Bay
1525	Terminal Block - Nose Junction Box	Fus 88 RH	Nose Radar Bay
1526	Terminal Block - Nose Wiring	Fus 88 LH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-1 (formerly AN 01-90LD-4) for part numbers and locations of items.

A-4 Sight System - F-86F-10 and F-86F-15 Airplanes, F-86F-20 Through F-86F-30 Airplanes, F-86F-30 Airplanes AF52-5295 Through -5363

T.O. No. 1F-86F-2

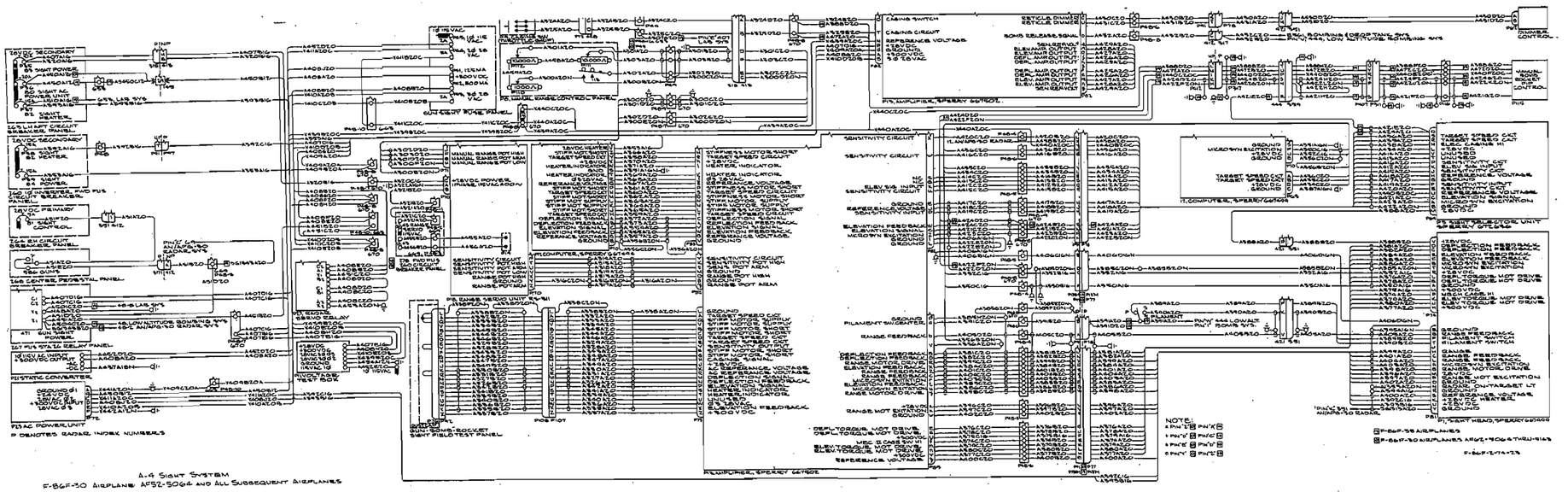

115 V.A.C. 400 CYCLE POWER
26 V.D.C. SECONDARY
26 V.D.C. PRIMARY
SIGHT POWER
SIGHT A-C CIRCUIT BREAKER PANEL
SIGHT D-C CIRCUIT BREAKER PANEL
D-C CIRCUIT BREAKER PANEL
CENTER PEDESTAL PANEL
SIGHT RELAY PANEL
SYSTEMS CONVERTER
SIGHT HEATER CONTROL
SIGHT HEATER RELAY
SIGHT HEATER
SIGHT RELAY
SIGHT RELAY BOX
SIGHT RELAY PANEL
SIGHT RELAY BOX
SIGHT RELAY
SIGHT RELAY BOX
SIGHT RELAY
SIGHT RELAY BOX
SIGHT RELAY

T.O. No. 1F-86F-2

TERMINAL NO.	DESCRIPTION	STATION NO.	ACCESS
1	Blanking Panel	Fus 21 Center	Controls
2	Voltage Test Unit	Fus 86 Center	Controls
3	Voltage Test Box	Fus 86 FR	Nose Radar Bay
4	Computer	Fus 93 Center	Nose Radar Bay
5	Amplifier	Fus 93 FR	Nose Radar Bay
6	Static Converter - D.C.	Fus 158 LH	LH Radio Bay
7	Static Converter Power Unit - A.C.	Fus 158 RH	RH Radio Bay
8	Relay - 300 P.D.C.	Fus 19 LH to 77 LH	LH Radio Bay
9	Terminal Strip	Fus 104 LH	Controls, Pressure Veh
10	Fuse Holder	Fus 60 Center	Nose Radar Bay
11	Fuse & Battery Control	Fus 93 Center	Nose Radar Bay
12	Plug - Connector	Fus 60 Center	Controls
13	Plug - Electric Selector	Fus 60 Center	Nose Radar Bay
14	Plug - Radio Control Unit	Fus 60 LH	Controls
15	Plug - Heating Head	Fus 60 Center	Nose Radar Bay
16	Plug - Pressure Disconnect	Fus 60 LH	Controls
17	Plug - Pressure Disconnect	Fus 60 Center	Nose Radar Bay
18	Plug - Pressure Head	Fus 93 LH	Nose Radar Bay
19	Plug - Amplifier	Fus 60 LH	Controls
20	Plug - Amplifier	Fus 104 LH	Controls, LH Throttle Quadrant
21	Potentiometer	Fus 60 LH	Controls, LH Throttle Quadrant
22	Potentiometer	Fus 60 Center	Controls, Pedestal Panel
23	Terminal Strip - Radar Control Section	Fus 60 LH	Controls
24	Terminal Strip	Fus 60 LH	Controls
25(-)	Plug - Pressure Disconnect	Fus 60 CC	Controls
26	Terminal Strip - Pressure Disconnect	Fus 104 RH	Controls
27	Plug - Pressure Disconnect	Fus 60 RH	Controls - RH
28	Panel - Forward Fuselage Circuit-breaker	Fus 60 LH	Controls - LH Side
29	Panel - Circuit-breaker Left-hand	Fus 158 RH	Controls - RH
30	Panel - Circuit-breaker Right-hand	Fus 60 LH	Radar Bay
31	Panel - Circuit Relay	Fus 60 LH	Pedestal - Pedestal
32	Panel - Pedestal	Fus 93 LH	Controls
33	Panel - Left-hand Fuselage Station 93	Fus 60 LH	Controls - Forward of Pedestal
34	Panel - Forward Fuselage Disconnect (LH Forward)	Fus 158 LH	Controls - Forward of Pedestal
35	Plug - Forward Fuselage Disconnect (LH aft)	Fus 158 LH	Controls - Forward of Pedestal
36	Plug - Pedestal Disconnect	Fus 60 LH	Directly Behind Pedestal
37	Plug - Pedestal Disconnect	Fus 60 LH	Controls
38	Plug - Throttle Disconnect	Fus 93 LH	Controls
39	Terminal Block - Fuselage Disconnect (RH)	Fus 60 RH	Controls
40	Switch - Hook Pedestal Detector	Fus 93 LH	Controls, Pedestal
41	Terminal Block - Ammunition Booster	Fus 93 RH and LH	Controls
42	Terminal Block - Gun Rel	Fus 93 RH	Nose Radar Bay
43	Terminal Block - Nose Junction Box	Fus 93 LH	Nose Radar Bay
44	Terminal Block - Nose Fitting	Fus 93 LH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JD-4) for part numbers and location of items.

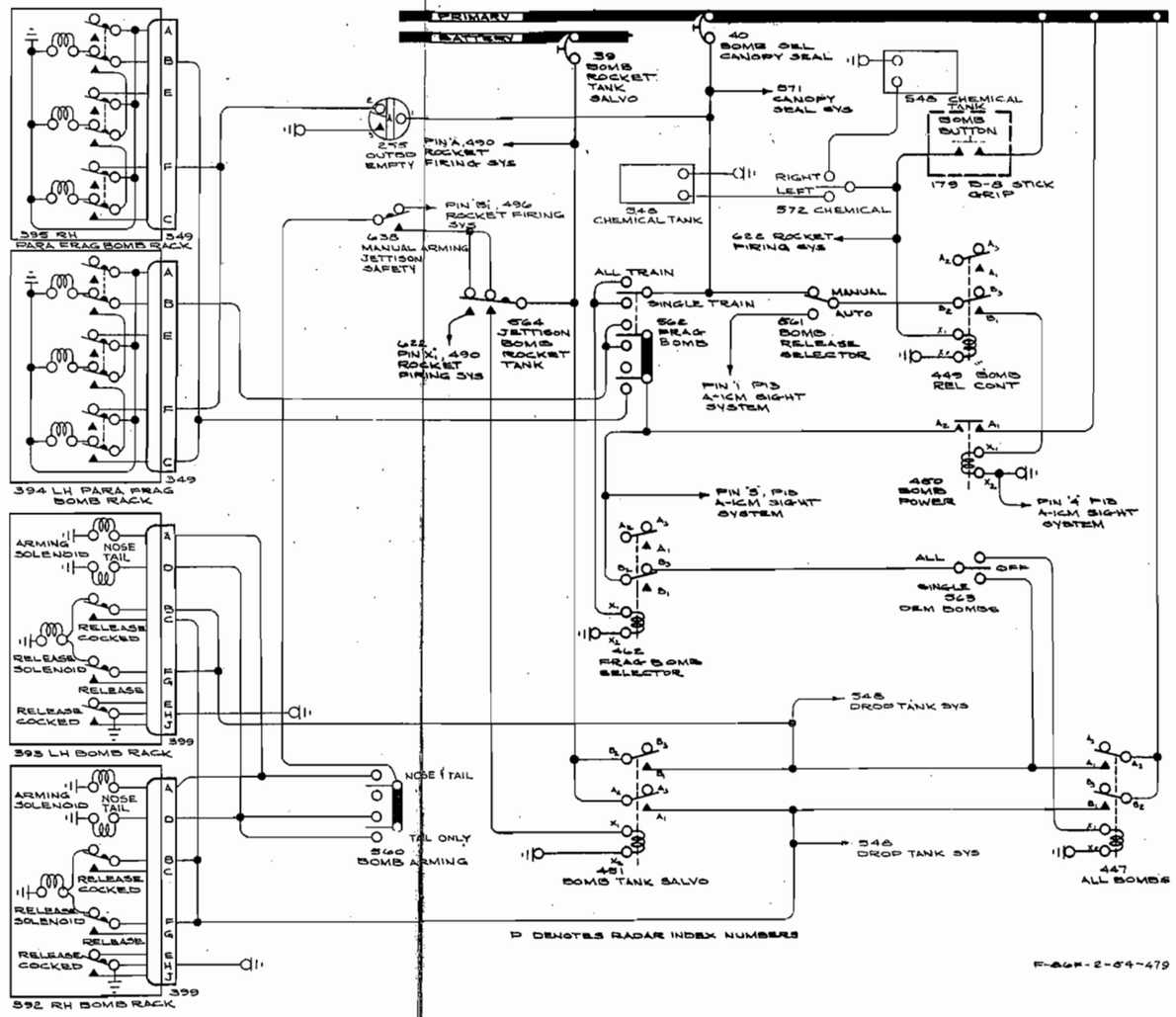
A-4 Sight System - F-86F-30 Airplane AF52-5064 and All Subsequent Airplanes


115 VAC 400 CPS ESS BUS
28 VDC ESS BUS
28 VDC PRIMARY
28 VDC SECONDARY
ESS LIGHT CIRCUIT BREAKER PANEL
ESS BUS CIRCUIT BREAKER PANEL
PRIMARY BUS CIRCUIT BREAKER PANEL
SECONDARY BUS CIRCUIT BREAKER PANEL
SIGHT POWER CONTROL
SIGHT HEATER CONTROL
SIGHT HEATER
SIGHT HEATER RELAY
SIGHT HEATER CIRCUIT BREAKER
SIGHT HEATER RELAY
SIGHT HEATER CONTROL

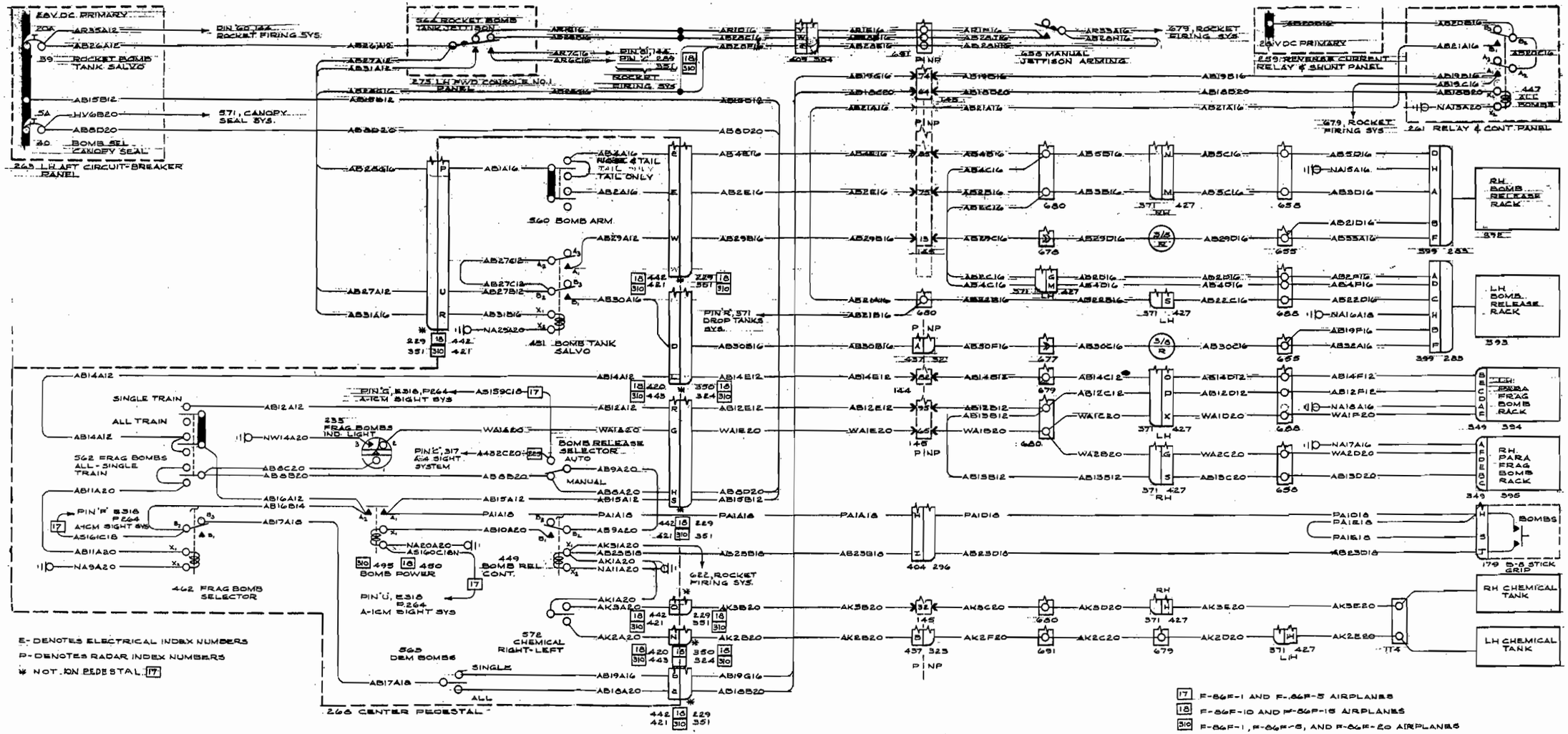
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
114	Connector - Chemical Tank	Wing 100 RH and LH	Wing
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
229	Light Assembly - Console and Pedestal	Fus 81 RH and LH	Cockpit
259	Panel - Reverse-current Relay and Shunt	Fus 125 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
283	Plug - Bomb Rack - S-2	Wing 126 RH and LH	Wings
289	Plug - Engine Disconnect	Fus 160 RH	RH Emergency Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
349	Plug - Parafragmentation Rack	Fus 143 RH and LH	Lower Side of Wings
351	Plug - Pedestal Disconnect	Fus 62, 6 LH	Directly Behind Pedestal
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
392	Rack - Bomb Release (RH)	Fus 161 RH	Lower Wings
393	Rack - Bomb Release (LH)	Fus 161 LH	Lower Wings
394	Rack - Parafragmentation Release (LH)	Fus 161 LH	Lower Wings
395	Rack - Parafragmentation Release (RH)	Fus 160 RH	Wing
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
427	Receptacle - Wing Wiring Disconnect	Fus 129 RH	Foot of Wing Forward LH Side
442	Receptacle - Landing Gear Control Disconnect	Fus 61 LH	Cockpit, Behind Instrument Panel
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
638	Switch - Manual Jettison Arming Safety	Fus 81 CL	Pedestal
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
678	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Bombing System - F-86F-1 Through F-86F-20 Airplanes



BOMBING SYSTEM
F-86F-1 THROUGH F-86F-20 AIRPLANES



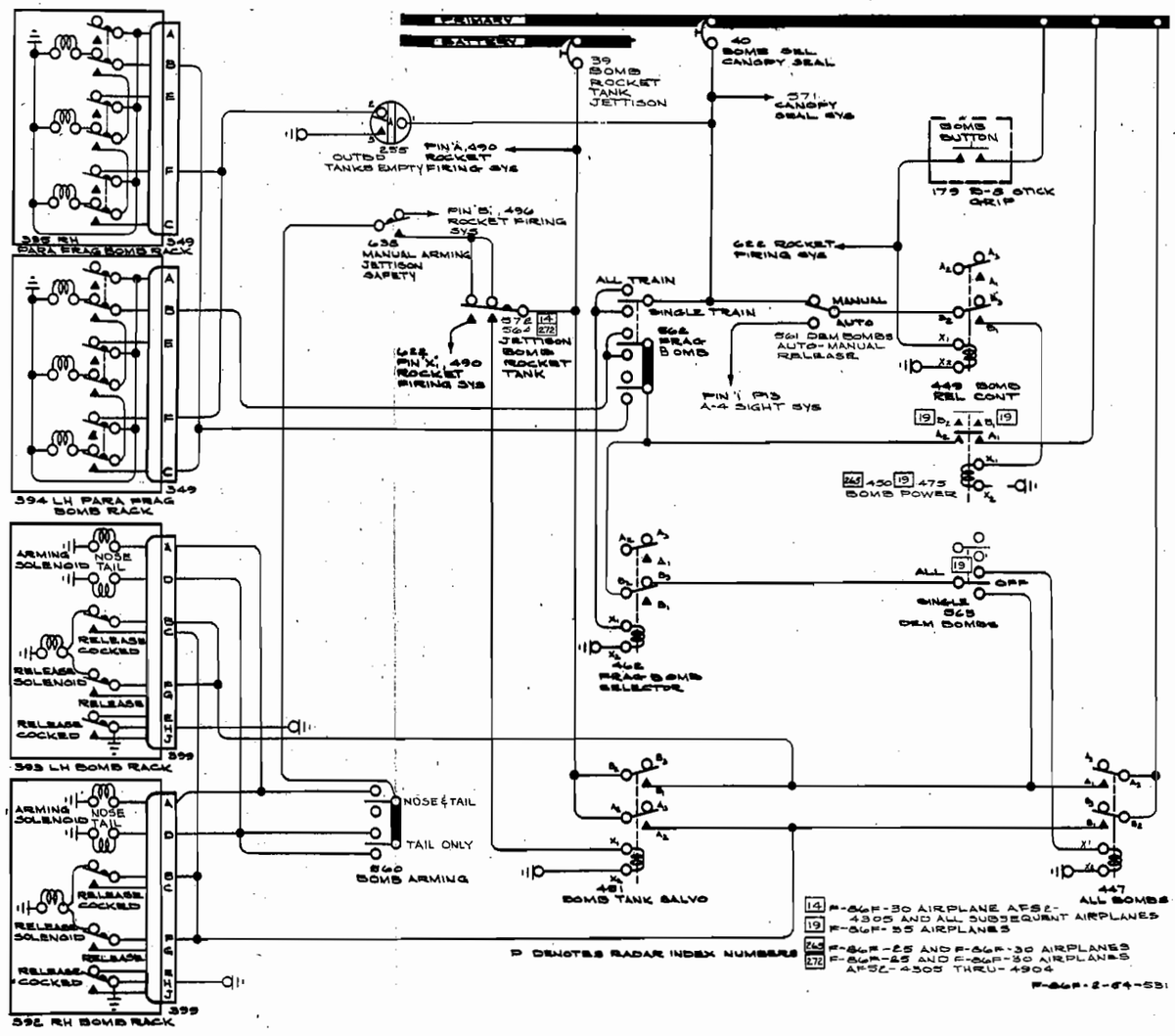
F-86F-2-54-479

Bombing System
F-86F-1 Through F-86F-20 Airplanes

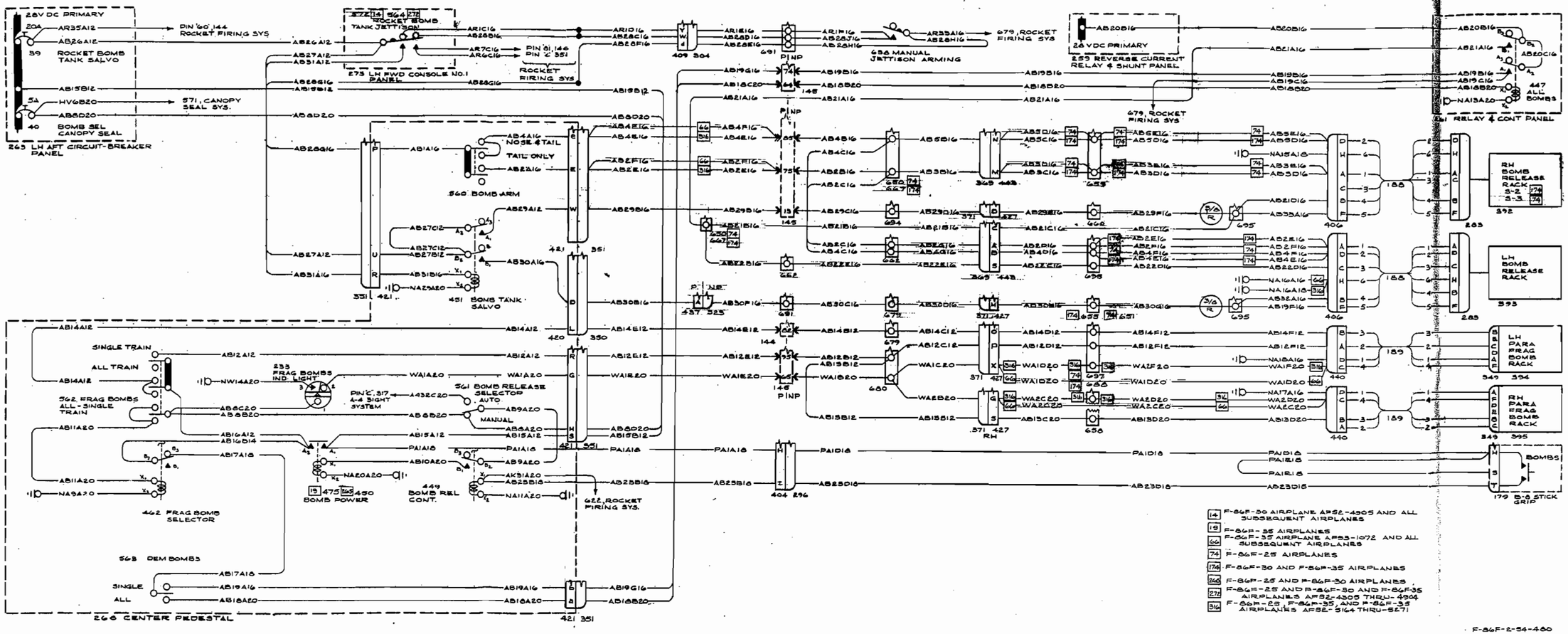
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
144	Disconnect - Pressure LH	Fus 124 LH	Cockpit
145	Disconnect - Pressure RH	Fus 124 RH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
188	Harness - Bomb Rack	Wing 125 LH and RH	LH and RH Lower Side of Wing
189	Harness - Parafragmentation Rack	Wing 125 LH and RH	LH and RH Lower Side of Wing
259	Panel - Reverse-current Relay and Shunt	Fue 125 RH	RH Wheel Well
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
263	Panel - Circuit-breaker Left-hand	Fus 116 LH	Cockpit - LH Side
266	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Left-hand Forward Console	Fus 85 LH	Cockpit
283	Plug - Bomb Rack - S-2	Wing 128 RH and LH	Wings
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
323	Plug - Gun Bay Pressure	Fus 124 LH	Gun Bay
349	Plug - Parafragmentation Rack	Fus 143 RH and LH	Lower Side of Wings
350	Plug - Pedestal Disconnect - LH Inboard	Fus 62.6 LH	Directly Behind Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
369	Plug - Wing Aft Disconnect	Fus 190 LH and RH	Lower Wheel Wells LH and RH
371	Plug - Wing Wiring Disconnect	Fus 129 RH	Root of Wing Forward LH Side
392	Rack - Bomb Release (RH)	Fus 161 RH	Lower Wings
393	Rack - Bomb Release (LH)	Fus 161 LH	Lower Wings
394	Rack - Parafragmentation Release (LH)	Fus 161 LH	Lower Wings
395	Rack - Parafragmentation Release (RH)	Fus 160 RH	Wing
406	Receptacle - Bomb Rack	Fus 143 RH and LH	Wing
409	Receptacle - Flasher Pressure Disconnect	Fus 80 LH	Nose Wheel Well
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
440	Receptacle - Parafragmentation Rack	Wing 125 LH and RH	LH-RH Wing
449	Relay - Bomb Release Control	Fus 78 CL	Cockpit
462	Relay - Fragmentation Bomb Selector	Fus 75 LH	Pedestal, LH Inboard
475	Relay - Ammunition Boost Motor	Fus 39 RH	Nose Wheel Well
571	Switch - Canopy Seal Emergency Dump	Fus 133 RH	Cockpit
622	Switch - Rocket Jettison	Fus 81 CL	Pedestal
638	Switch - Manual Jettison Arming Safety	Fus 81 CL	Pedestal
650	Terminal Block - Wing Bomb	Fus 195 RH	Circuit-breaker Panel
651	Terminal Block - Drop Tank	Fus 130 RH and LH	Wings
655	Terminal Block - Bomb Salvo	Wing 100 LH and RH	Wings
658	Terminal Block - RH Forward Wing	Fus 117 RH	Wing
659	Terminal Block - Fuel Booster and Transfer Pump	Fus 144 CL	Radio Bay
660	Terminal Block - Wing Flap Actuator	Wing 56 LH and RH	Wings
662	Terminal Block - Bomb Rack LH Wheel Well	Fus 120 LH	Wheel Well
667	Terminal Block - Landing Gear Connector Lower	Fus 190 RH	RH Wheel Well
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Forward)	Wing 117 RH	Wing
688	Terminal Block - LH Forward Wing Leading Edge	Wing 118 LH	Wing
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
694	Terminal Block - Bomb System	Fus 125 CL	Beneath Cockpit
695	Terminal Block - Wing Bomb Rack	Wing 179 LH and HH	Wings
697	Terminal Block - LH Bomb Rack	Wing 170 LH	Wing

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

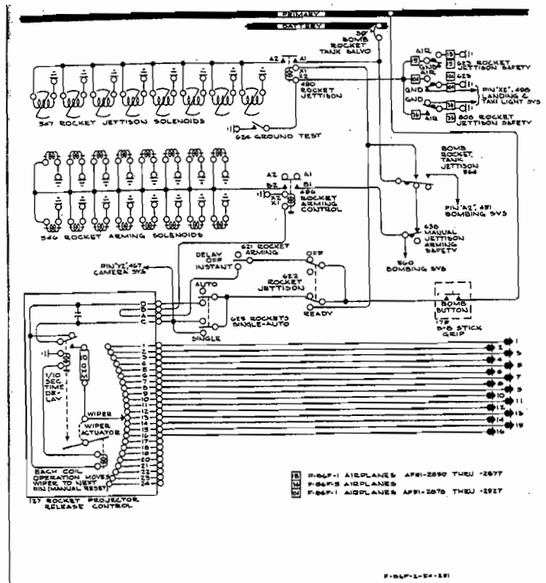
Bombing System - F-86F-25 Through F-86F-35 Airplanes



Bombing System
F-86F-25 Through F-86F-35 Airplanes



Bombing System
F-86F-25 Through F-86F-35 Airplanes

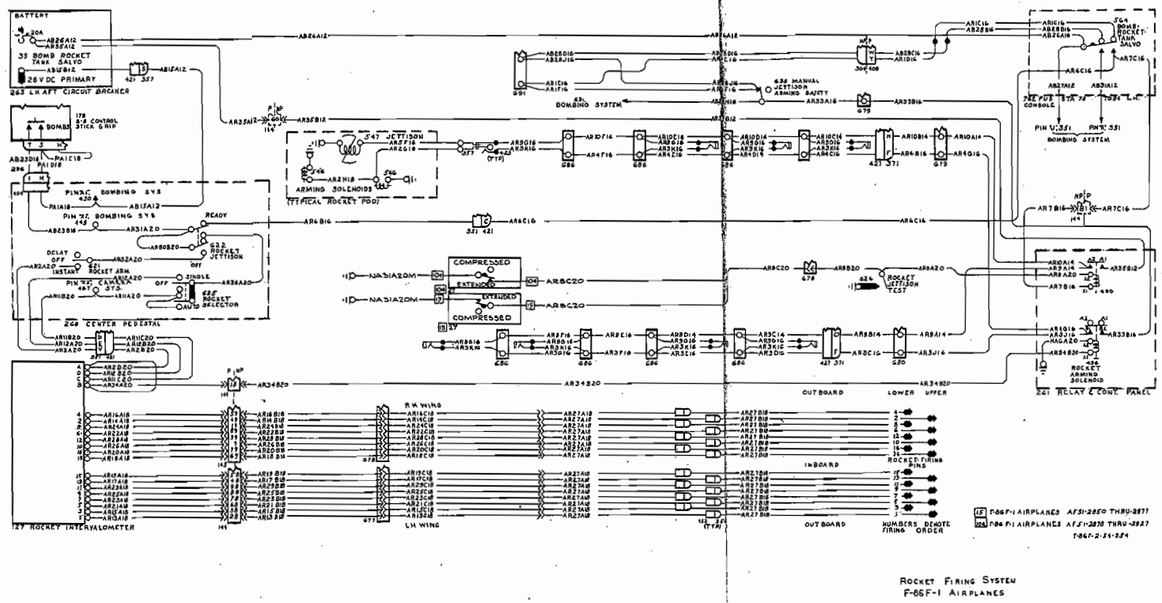


ROCKET FIRING SYSTEM
F-86F-1 AND F-86F-5 AIRPLANES

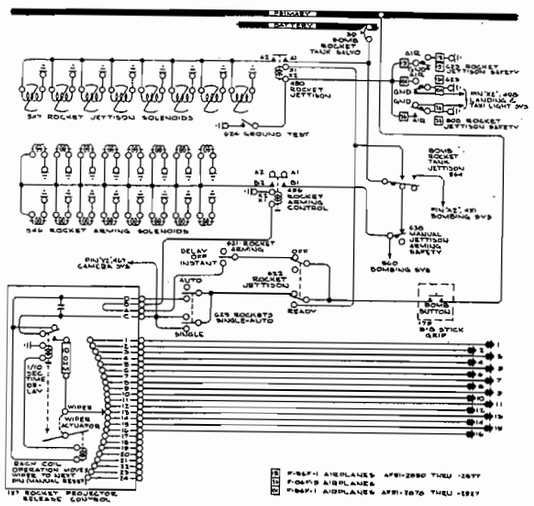
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
127	Control Box - Rocket Projectile Release	Fus 190 LH	LH Aft Console - Cockpit
144	Disconnect - Pressure LH	Fus 134 LH	Cockpit
179	Grip - Control Stick	Fus 85 CL	Cockpit
181	Panel - Alt Radio Compartment Relay	Fus 110 LH	LH Rear Gun Bay
185	Panel - Circuit-breaker Left-hand	Fus 119 LH	Cockpit - LH Side
189	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
205	Plug - Control Stick Grip	Fus 64 CL	Cockpit
206	Plug - Fisher Pressure Disconnect	Fus 80 LH	LH Rear Wheel Well Access
251	Plug - Pedestal Disconnect	Fus 85.8 LH	Directly Behind Pedestal
256	Plug - Rocket-firing	Fus 143 RH and LH	Wing Rear
257	Plug - Rocket Pad	Fus 143 RH and LH	Wing Rear
271	Plug - Wing Wiring Disconnect	Fus 139 RH	Root - Wing Forward LH Side
431	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
548	Solenoid - Rocket Arm	Wing 143 RH and LH	Wing Rear
547	Solenoid - Rocket Jettison	Wing 143 RH and LH	Wing Rear
634	Switch - Rocket Jettison Test	Fus 190 RH	RH Rear Well
538	Switch - Manual Jettison Arming Safety	Fus 85 CL	Pedestal
671	Terminal Block - Wing LH (Aft)	Fus 190 RH and LH	Wheel Wells
672	Terminal Block - Wing RH (Aft)	Fus 190 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing Root
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing Root
696	Terminal Block - Rocket Pod	Fus 117 LH and RH	Wing Root
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
703	Panel - Fuselage Station 78 LH Console	Fus 78 LH	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ALD-4) for part number and location of items.

Rocket Firing System - F-86F-1 Airplane



ROCKET FIRING SYSTEM
F-86F-1 AIRPLANES



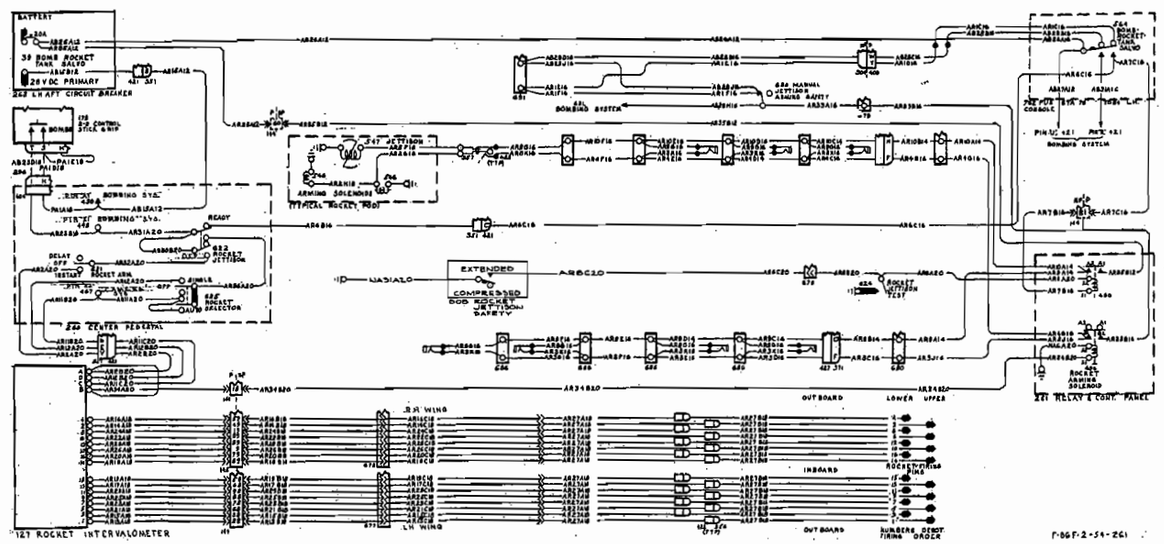
F-86F-2-84-2A

Rocket Firing System
F-86F-1 and F-86F-5 Airplanes

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
137	Ct Wrel Box - Rocket Projectile Release	Fus 130 LH	LH Aft Console - Cockpit
144	Disconnect - Pressure LH	Fus 134 LH	Cockpit
179	Grip - Control Stick	Fus 82 CL	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
265	Panel - Circuit-breaker Left-hand	Fus 158 LH	Cockpit - LH Side
286	Panel - Pedestal	Fus 98 CL	Cockpit - Pedestal
296	Plate - Control Stick Grip	Fus 84 CL	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 84 CL	Cockpit
305	Plug - Recbal-Wing	Fus 80 LH	LH Main Wheel Well Access
317	Plug - Rocket Pod	Fus 143 RH and LH	Wing
321	Plug - Wing Wiring Disconnect	Fus 143 RH and LH	Wing
431	Receptacle - Pedestal Disconnect	Fus 229 RH	Back of Wing Forward LH Side
540	Solenoid - Rocket Arm	Fus 91.5 RH	Cockpit
541	Solenoid - Rocket Jettison	Wing 142 RH and LH	Wing
624	Switch - Rocket Jettison Test	Wing 143 RH and LH	Wing
636	Switch - Manual Jettison Arming Safety	Fus 103 RH	RH Wheel Well
697	Terminal Block - Wing LH (All)	Fus 81 CL	Pedestal
698	Terminal Block - Wing RH (All)	Fus 190 RH and LH	Wheel Wells
699	Terminal Block - Wing LH (Forward)	Fus 190 RH and LH	Wheel Wells
860	Terminal Block - Wing RH (Center)	Wing 115 LH	Wing
866	Terminal Block - Rocket Pod	Wing 113 RH	Wing
881	Terminal Block - Gun Bay Pressure Disconnect	Fus 117 LH and RH	Wings
903	Panel - Fuselage Station 98 LH Console	Fus 80 LH	Gun Bay
		Fus 98 LH	Cockpit

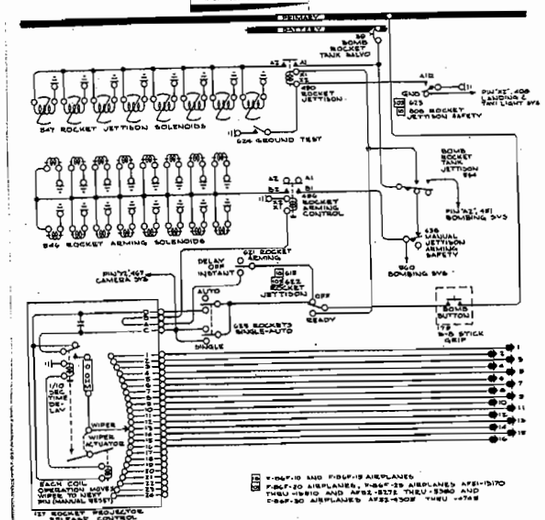
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-40ALD-4) for part numbers and location of items.

Rocket Firing System - F-86F-5 Airplane



F-86F-2-54-2G1

Rocket Firing System
F-86-5 Airplanes



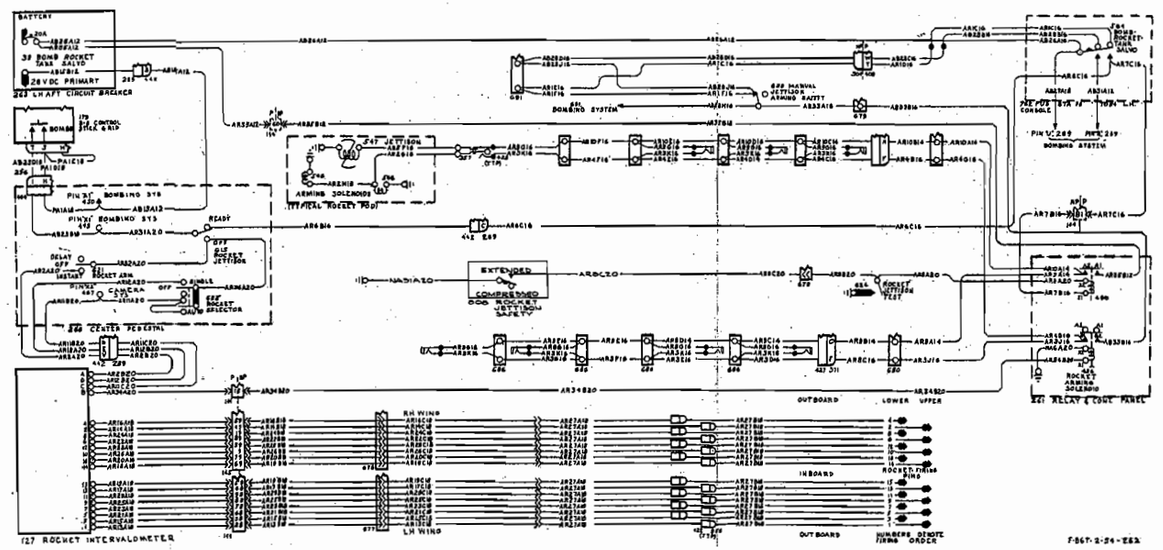
F-86F-1-24-52A

Rocket Firing System
F-86F-10 Through -20 Airplanes, F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5380 and F-86F-30 Airplanes AF52-4305 Through -4745

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
121	Control Box - Rocket Projectile Release	Fus 150 LH	LH Aft Console - Cockpit
144	Disconnect - Pressure LH	Fus 134 LH	Cockpit
170	Grip - Control Stick	Fus 88 CL	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 150 LH	LH Radio Bay
265	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
288	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
288	Panel - Engine Disconnect	Fus 150 RH	RH Emergency Bay
293	Plug - Control Stick Grip	Fus 84 CL	Cockpit
296	Plug - Thruster Pressure Disconnect	Fus 88 LH	LH Nose Wheel Well Access
336	Plug - Rocket-firing	Fus 102 RH	Wing
337	Plug - Rocket Pod	Fus 143 RH and LH	Wing
		Fus 139 RH	
371	Plug - Wing Wiring Disconnect	Fus 41 LH	Root of Wing Forward LH Side
443	Receptacle - Landing Gear Control Disconnect		Cockpit, Behind Instrument Panel
648	Solenoid - Rocket Arm	Wing 148 RH and LH	Wing
847	Solenoid - Rocket Jettison	Wing 148 RH and LH	Wing
115	Switch - Rocket Jettison	Fus 88 CL	Pedestal
438	Switch - Rocket Jettison Test	Fus 150 RH	RH Wheel Well
455	Switch - Manual Jettison Arming Safety	Fus 84 CL	Pedestal
677	Terminal Block - Wing LH (Aft)	Fus 139 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (Aft)	Fus 150 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 117 RH	Wing
684	Terminal Block - Rocket Pod	Fus 117 LH and RH	Wings
681	Terminal Block - Gun Bay Pressure Disconnect	Fus 46 LH	Gun Bay
765	Panel - Fuselage Station 96 LH Console	Fus 98 LH	Cockpit

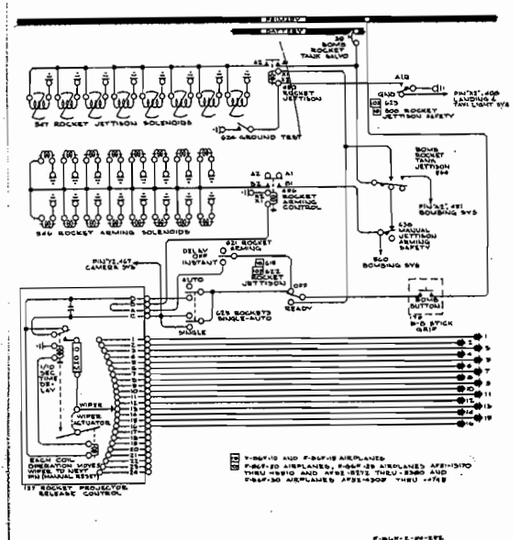
Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (Corrosprty AN 01-80FLD-4) for part numbers and location of items.

Rocket Firing System - F-86F-10 and F-86F-15 Airplane



F-86F-2-24-52A

Rocket Firing System
F-86F-10 And F-86F-15 Airplanes



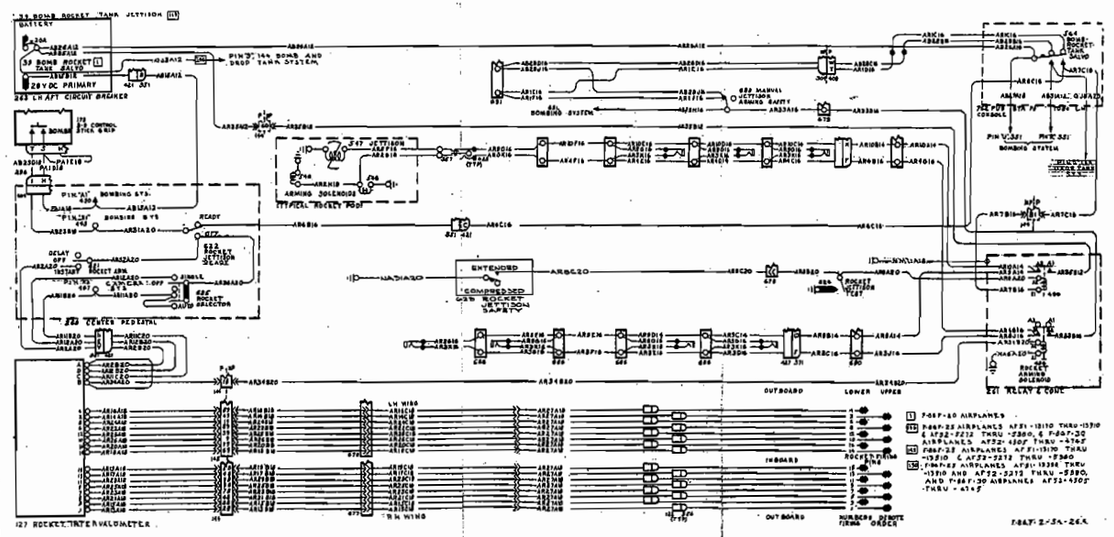
ROCKET FIRING SYSTEM
F-86 D-10 THROUGH -30 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

929

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
127	Control Box - Rocket Projectile Release	Fus 120 LH	LH Aft Console - Cockpit
144	Disconnect - Pressure LH	Fus 126 LH	Cockpit
178	Grip - Control Stick	Fus 84 CL	Cockpit
261	Panel - Aft Radio Compartment Relay	Fus 170 LH	LH Radio Bay
265	Panel - Circuit-breaker Self-latch	Fus 118 LH	Cockpit - LH Side
268	Panel - Pedestal	Fus 58 CL	Cockpit - Pedestal
271	Panel - Ammunition Booster Relay	Fus 112 RH and LH	Gun Bays
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
324	Plug - Fisheye Pressure Disconnect	Fus 85 LH	LH Main Wheel Well Access
351	Plug - Pedestal Disconnect	Fus 83.8 LH	Directly Behind Pedestal
354	Plug - Rocket-firing	Fus 142 RH and LH	Wing
355	Plug - Rocket Pod	Fus 142 RH and LH	Wing
368	Plug - Pedestal Disconnect	Fus 58 LH	Cockpit
371	Plug - Wing Wiring Disconnect	Fus 139 RH	Root of Wing Forward LH Ribs
452	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
453	Receptacle - Pedestal Disconnect (RH)	Fus 71.5 RH	Cockpit
568	Solenoid - Rocket Arm	Wing 142 RH and LH	Wing
569	Solenoid - Rocket Jettison	Wing 142 RH and LH	Wing
606	Switch - Rocket Jettison Test	Fus 190 RH	RH Wheel Well
638	Switch - Manual Jettison Arming Safety	Fus 91 CL	Pedestal
877	Terminal Block - Wing LH (All)	Fus 180 RH and LH	Wheel Wells
878	Terminal Block - Wing RH (All)	Fus 180 RH and LH	Wheel Wells
879	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
880	Terminal Block - Wing RH (Forward)	Wing 117 RH	Wing
885	Terminal Block - Rocket Pod	Fus 117 LH and RH	Wings
892	Terminal Block - Gun Bay Pressure Disconnect	Fus 68 LH	Gun Bay
982	Panel - Fuselage Station 98 LH Console	Fus 98 LH	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-40JLD-4) for part numbers and location of items.

Rocket Firing System - F-86F-30 Airplanes, F-86F-35 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5380 and F-86F-30 Airplanes AF52-4305 Through -4745



[1] F-86F-20 AIRPLANES

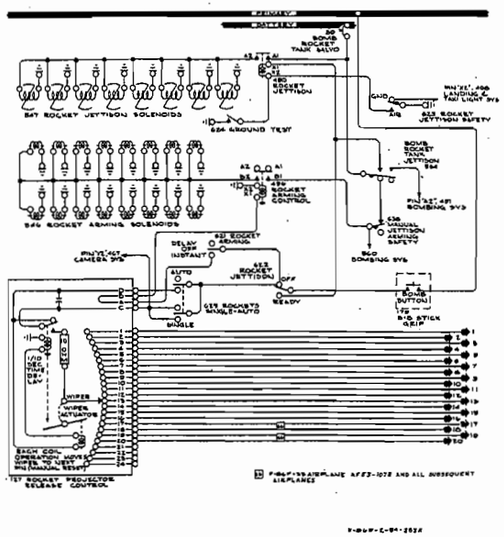
[2] F-86F-25 AIRPLANES AF51-13170 THRU -13710 & AF52-5272 THRU -5380, & F-86F-30 AIRPLANES AF52-4305 THRU -4745

[3] F-86F-25 AIRPLANES AF51-13170 THRU -13210 & AF52-5272 THRU -5340

[4] F-86F-25 AIRPLANES AF51-13286 THRU -13710 AND AF52-5272 THRU -5380, AND F-86F-30 AIRPLANES AF52-4305 THRU - 4745

... Rocket Firing System

F-86F-20 Airplanes, F-86F-25 Airplanes AF51-13170 ... Through -13510 ... And AF52-5272 Through -5380, And F-86F-30 Airplanes AF52-4305 Through -4745



[1] F-86F-25 AIRPLANE AF52-5381 AND ALL SUBSEQUENT AIRPLANES

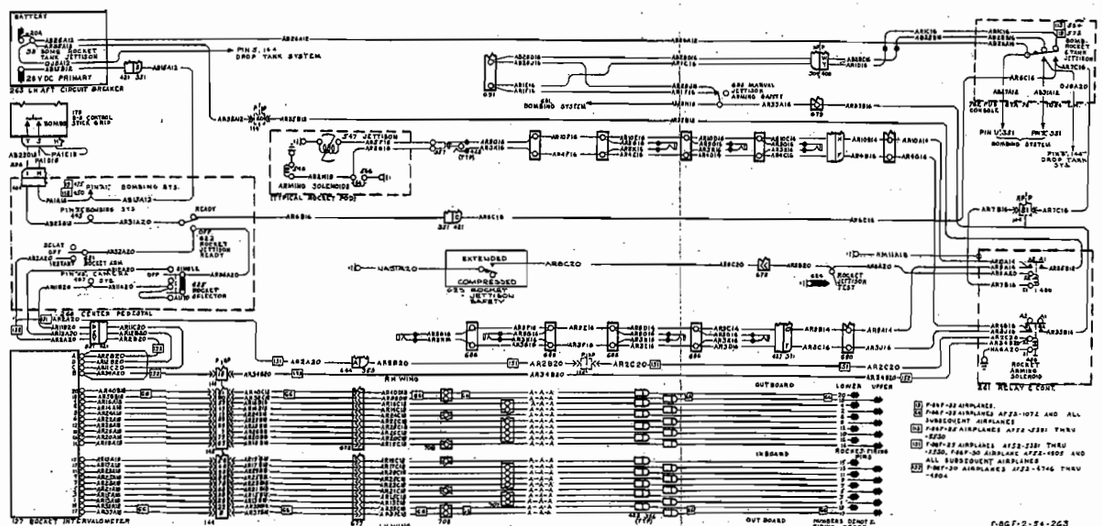
F-86F-2-94-262A

INDEX NO.	DESCRIPTION	STATION NO.	LOCUS
157	Control Box - Rocket Projectile Release	Fus 100 LH	LH Aft Console - Cockpit
165	Disconnect - Pressure LH	Fus 104 LH	Cockpit
172	Grip - Control Stick	Fus 93 CL	Cockpit
672	Panel - Aft Radio Compartment Relay	Fus 110 LH	LH Radio Bay
163	Panel - Circuit-Inverter Left-Hand	Fus 113 LH	Cockpit - LH Side
162	Panel - Pedestal	Fus 70 CL	Cockpit - Pedestal
210	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
208, 209	Plug - Control Stick Grip	Fus 81 CL	Cockpit
204	Plug - Flasher Pressure Disconnect	Fus 90 LH	LH Rear Wheel Well Access
203	Plug - Pedestal Disconnect	Fus 80.4 LH	Directly Behind Pedestal
156	Plug - Rocket-Firing	Fus 143 RH and LH	Wing
357	Plug - Rocket Pod	Fus 143 RH and LH	Wing
202	Plug - Pedestal Disconnect	Fus 71.3 RH	Cockpit
201	Plug - Wing Wiring Disconnect	Fus 129 RH	Back of Wing Forward LH Side
161	Receptacle - Pedestal Disconnect	Fus 71.3 RH	Cockpit
164	Receptacle - Wing Wiring Disconnect (RH)	Fus 129 RH	Wing
160	Relay - Ammunition Boost Motor	Fus 72 CL	Gun Bays Wheel Well
348	Solenoid - Rocket Arm	Wing 143 RH and LH	Wing
347	Solenoid - Rocket Jettison	Wing 143 RH and LH	Wing
676	Switch - Overload Push Actuator (M-10)	Fus 81 CL	Pedestal
674	Switch - Rocket Jettison Test	Fus 81 CL	Pedestal
158	Switch - Rocket Jettison Firing Safety	Fus 81 CL	Cockpit
677	Terminal Block - Wing LH (AF2)	Fus 100 RH and LH	Wheel Wells
678	Terminal Block - Wing RH (AF1)	Fus 100 RH and LH	Wheel Wells
679	Terminal Block - Wing LH (Forward)	Wing 119 LH	Wing
680	Terminal Block - Wing RH (Center)	Wing 119 RH	Wing
686	Terminal Block - Number Two	Fus 119 LH and RH	Wings
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
707	Terminal Block - Rocket Connector	Wing 143 RH and LH	Wings
705	Terminal Block - Rocket Connector	Wing 143 RH and LH	Wings
768	Panel - Fuselage Station 98 LH Console	Fus 98 LH	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (Formerly AF 01-60JSD-4) for item numbers and locations of items.

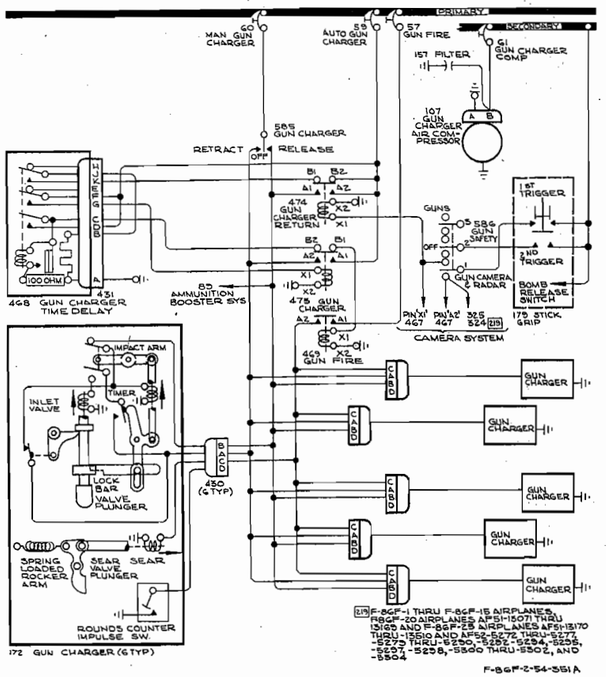
Rocket Firing System - F-86F-25 Airplanes AF52-5381 Through -5530 and F-86F-30 Airplane AF52-4746 and All Subsequent Airplanes

ROCKET FIRING SYSTEM
F-86F-25 AIRPLANES AF52-5381 THROUGH -5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES



F-86F-2-54-263

ROCKET FIRING SYSTEM
F-86F-25 AIRPLANE AF52-5380 THROUGH -5530 AND
F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES



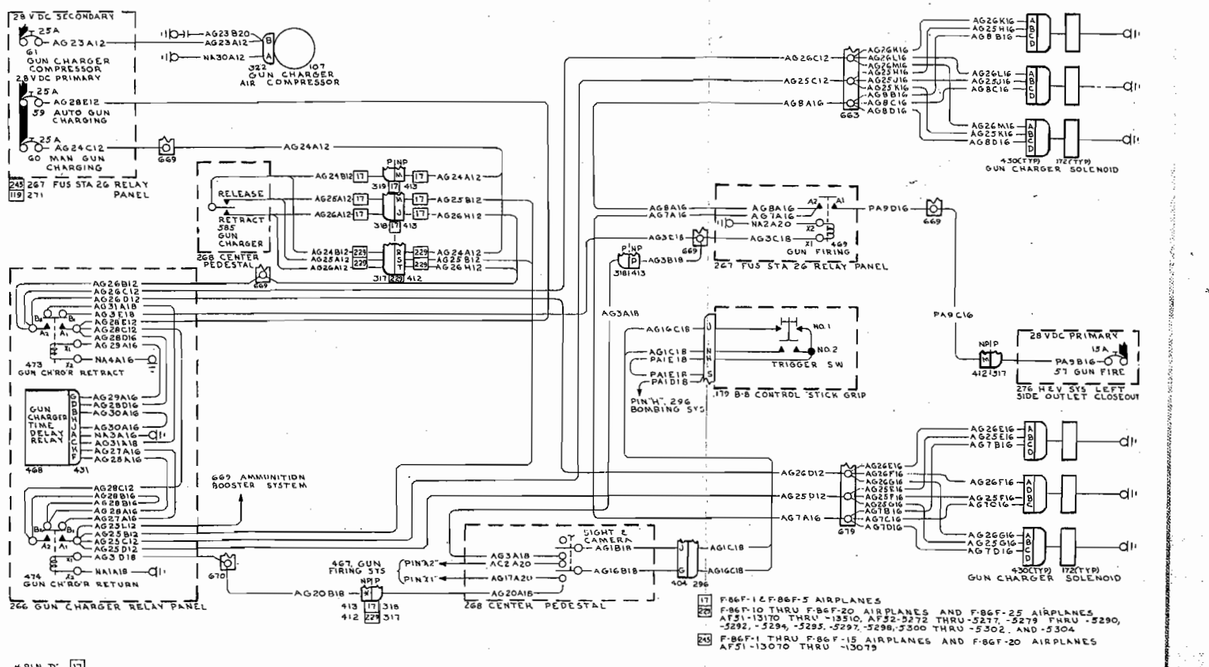
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
107	Compressor - Gun Charger Air	Fus 20 LH	Nose Radar Bay
172	Gun Charger	Fus 26 LH	Radar Bay
179	Grip - Control Stick	Fus 85 CL	Cockpit
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
273	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
296	Plug - Control Stick Grip	Fus 64 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.5 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.5 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
322	Plug - Gun Charger Air Compressor	Fus 197.5 RH	Access Plate on RH Side of Fuselage Above Nose Wheel Well
430	Receptacle - Gun Charger	Fus 26 RH and LH	Gun Bays
367	Relay - GSAP Camera	Fus 75 CL	Pedestal
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

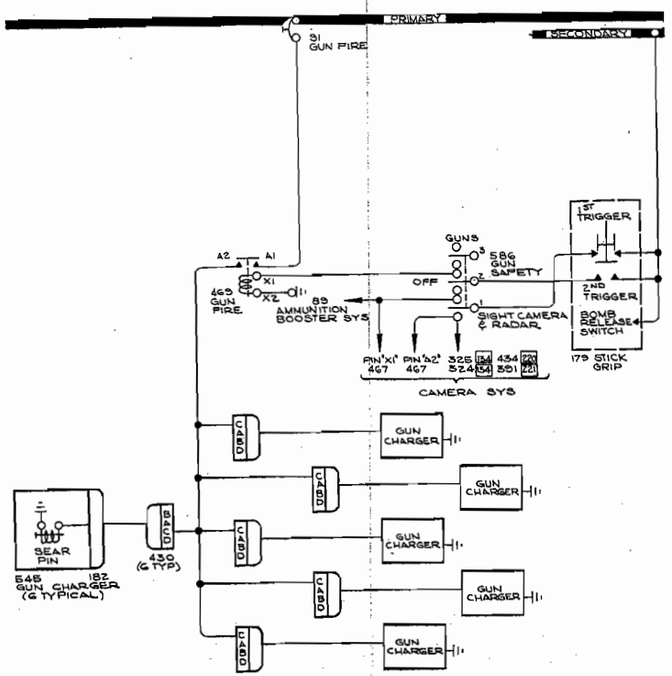
Gun Firing and Gun Charging System - F-86F-1 Through F-86F-20 and F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5277, 5279 Through -5290, 5292, 5294, 5295, 5297, 5298, 5300 Through -5302 and -5304

Gun Firing And Gun Charging System
F-86F-1 Thru F-86F-20 Airplanes And F-86F-25 Airplanes AF51-13170 Thru -13510 And AF52-5272 Thru -5277, -5279 Thru -5290, -5292, -5294, -5295, -5297, -5298, -5300 Thru -5302, And -5304

931



Gun Firing And Gun Charging System
F-86F-1 Through F-86F-20 And F-86F-25 Airplanes AF51-13170 Through -13510 And AF52-5272 Through -5277, 5279 Through -5290, 5292, 5294, 5295, 5297, 5298, 5300 Through -5302 And -5304



[34] F-86F-25 AF52-5278, -5281, -5283, 5296, -5299, -5305, AND -5305 THRU -5530

[22] F-86F-25 AIRPLANES AF52-5581 THRU -5559 F-86F-30 AIRPLANES AF52-4964 THRU-5163 AND F-86F-35 AIRPLANES

[21] F-86F-25 AIRPLANES AF52-5387 THRU -5559 F-86F-30 AIRPLANES AF52-4964 THRU-5163 AND F-86F-35 AIRPLANES

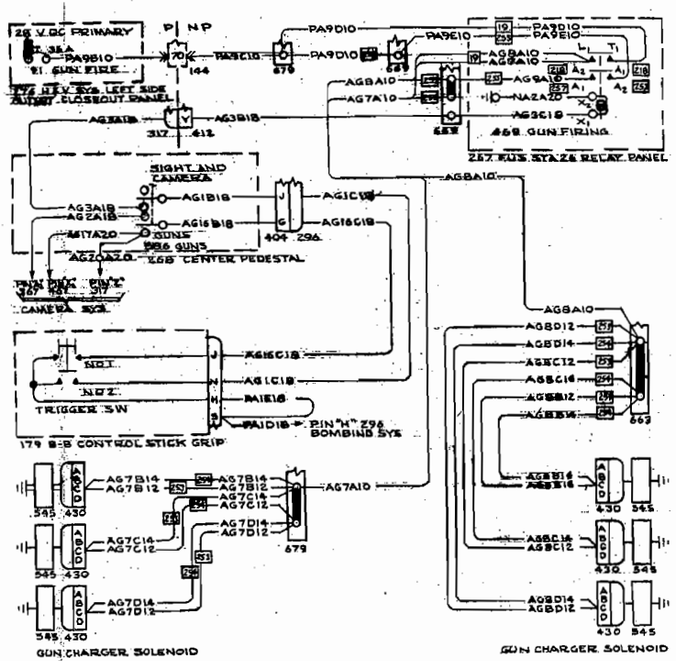
F-86F-2-54-345

Gun Firing And Gun Charging System
F-86F-25 Airplanes AF52-5278, -5291, -5293, 5296, 5299, -5303, and -5305 Through -5530 F-86F-30 and All Subsequent Airplanes

INDEX NO.	DESCRIPTION	STATION	ACCESS
144	Disconnect - Pressure LH	Pus 124 LH	Cockpit
179	Grip - Control Stick	Pus 85 CL	Cockpit
267	Panel - Nose Section Relay	Pus 40 LH	Radar Bay
268	Panel - Pedestal	Pus 78 CL	Cockpit - Pedestal
276	Panel - Left-hand Forward Circuit-breaker	Pus 100 LH	Cockpit
296	Plug - Control Stick Grip	Pus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Pus 62.6 LH	Cockpit - Forward of Pedestal
412	Plug - Light Control Disconnect	Pus 93 RH	Cockpit RH
367	Receptacle - Gun Charger	Pus 26 RH and LH	Gun Bays
430	Relay - GSAP Camera	Pus 75 CL	Pedestal
467	Solenoid - Gun-firing	Pus 86 LH	Radar Bay
545	Terminal Block - Gun Bay	Pus 80 RH	Gun Bay
663	Terminal Block - Nose Junction Box	Pus 35 RH	Nose Radar Bay
669	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing
679			

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Gun Firing and Gun Charging System F-86F-25 Airplane AF52-5278, -5291, -5293, -5296, -5299, -5303, and -5305 Through -5530 and F-86F-30 Airplane AF52-4964 and All Subsequent Airplanes



[19] F-86F-35 AIRPLANES

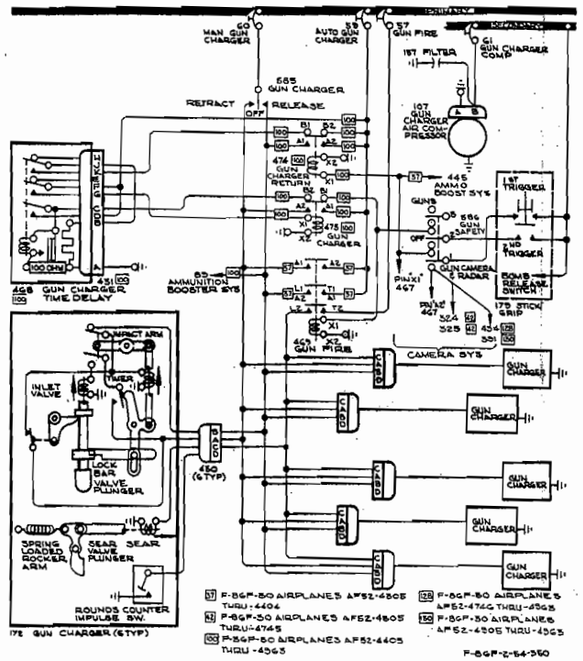
[25] F-86F-30 AIRPLANES AF52-4964 THRU -5163 AND F-86F-35 AF52-5164 THRU -5213.

[24] F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299 -5303, AND -5305 THRU -5530 AND F-86F-35 AIRPLANE AF52-5214 AND ALL SUBSEQUENT AIRPLANES

[23] F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299, -5303 AND -5305 THRU -5530 AND F-86F-30 AIRPLANES AF52-4964 THRU -5163

F-86F-2-54-352

Gun Firing and Gun Charging System
F-86F-25 Airplane AF52-5278, -5291, -5293, -5296, -5299, -5303 and -5305 Through -5530 and F-86F-30 Airplane AF52-4964 and All Subsequent Airplanes



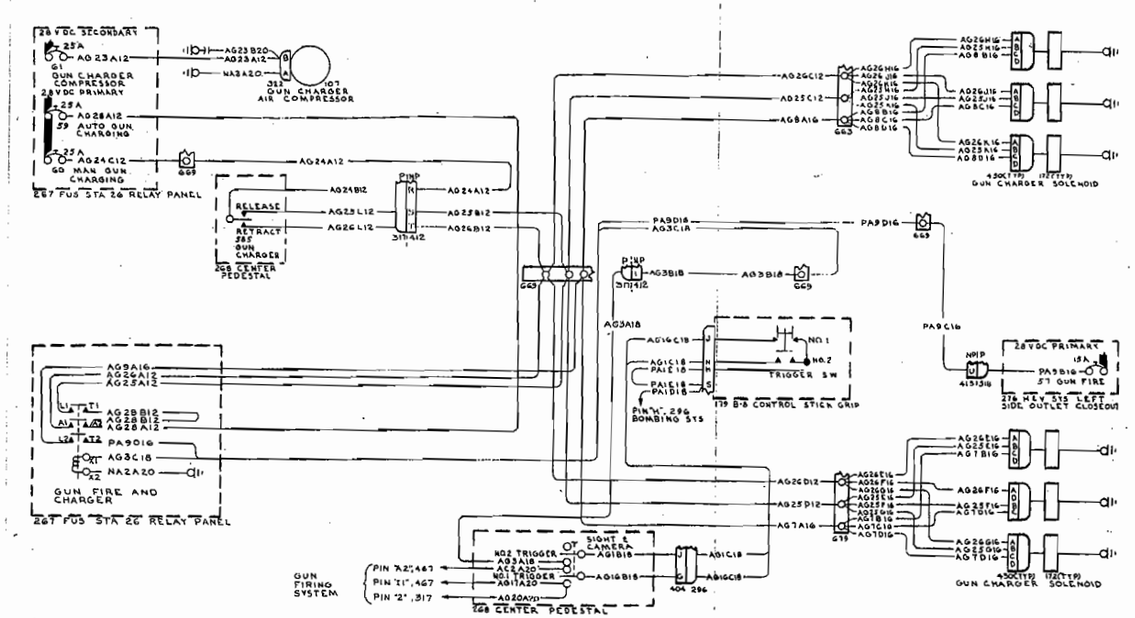
INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
107	Compressor - Gun Charger Air	Fus 20 LH	Nose Radar Bay
178	Gun Charger	Fus 26 LH	Radar Bay
179	Grip - Control Stick	Fus 85 CL	Cockpit
897	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
868	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
276	Panel - Left-hand Forward Circuit-Breaker	Fus 100 LH	Cockpit
896	Plug - Control Stick Grip	Fus 84 CL	Cockpit
137	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
138	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
192	Plug - Gun Charger Air Compressor	Fus 197.5 RH	Access Plate on RH Side of Fuselage Above Nose Wheel Well
430	Receptacle - Gun Charger	Fus 26 RH and LH	Gun Bays
867	Relay - GSAP Camera	Fus 75 CL	Pedestal
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (Formerly AN 01-60JLD-4) - for part numbers and location of items.

Gun Firing and Gun Charging System - F-86F-30 Airplanes AF52-4305 Through -4804

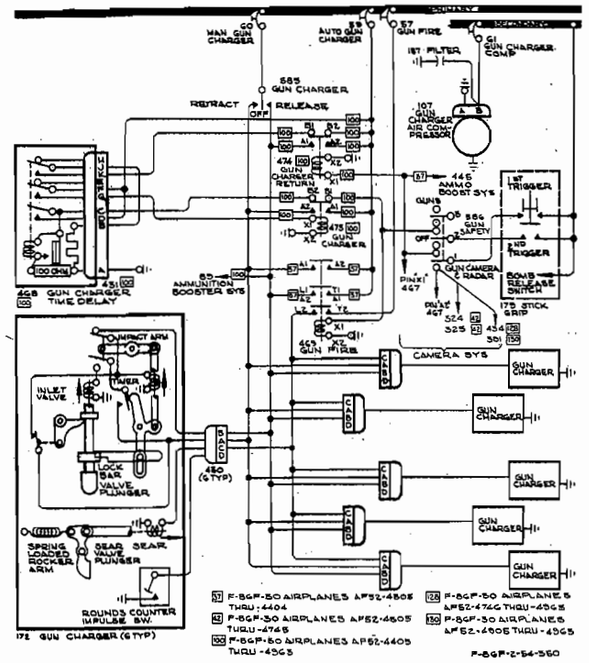
Gun Firing And Gun Charging System
F-86F-30 Airplanes AF52-4305 Through -4963

933



F-86F-2-54-353

Gun Firing And Gun Changing System
F-86F-30 Airplanes AF52-4305 Through - 4404

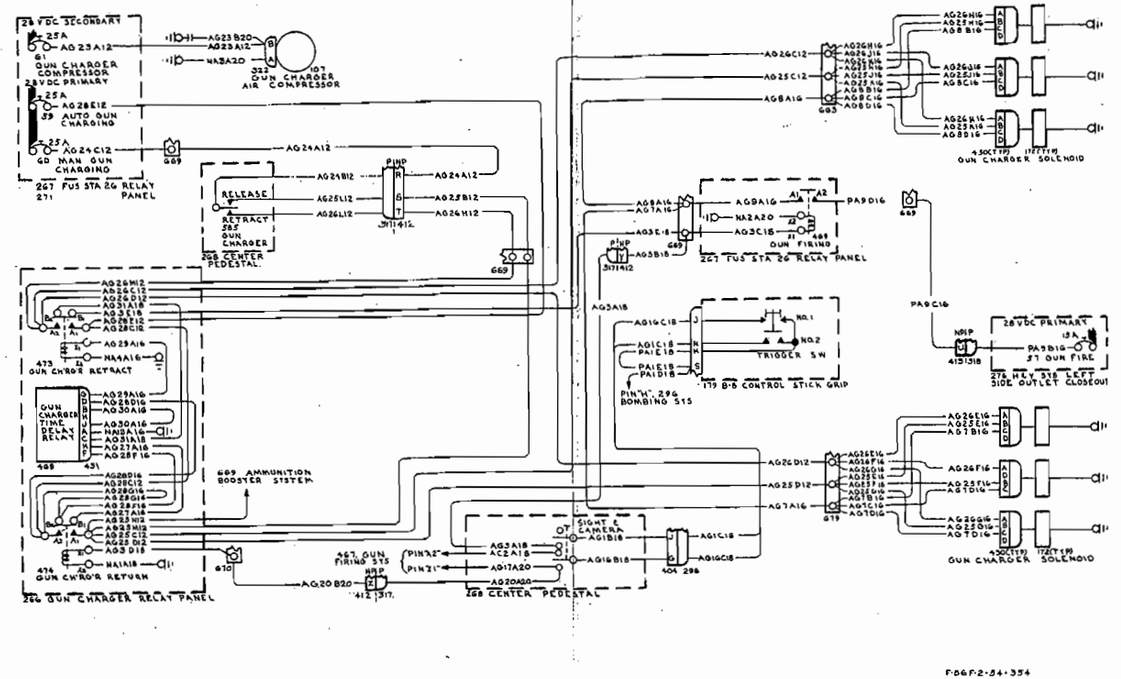


GUN FIRING AND GUN CHARGING SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4365

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
107	Compressor - Gun Charger Air	Fus 82 LH	Nose Radar Bay
172	Gun Charger	Fus 85 LH	Radar Bay
173	Grip - Control Stick	Fus 85 CL	Cockpit
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 80 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 85 RH	Nose Radar Bay
276	Panel - Left-hand Forward Circuit-breaker	Fus 100 LH	Cockpit
296	Plug - Control Stick Grip	Fus 64 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.5 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.5 LH	Cockpit - Forward of Pedestal
330	Plug - Gun Charger Air Compressor	Fus 197.5 RH	Access Plate on RH Side of Fuselage Above Nose Wheel Well
430	Receptacle - Gun Charger	Fus 85 RH and LH	Gun Bays
467	Relay - GSAP Camera	Fus 75 CL	Pedestal
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 85 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 80 LH	Nose Radar Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60ZLD-4) for part numbers and location of items.

Gun Firing and Gun Charging System - F-86F-30 Airplanes AF52-4805 Through -4963



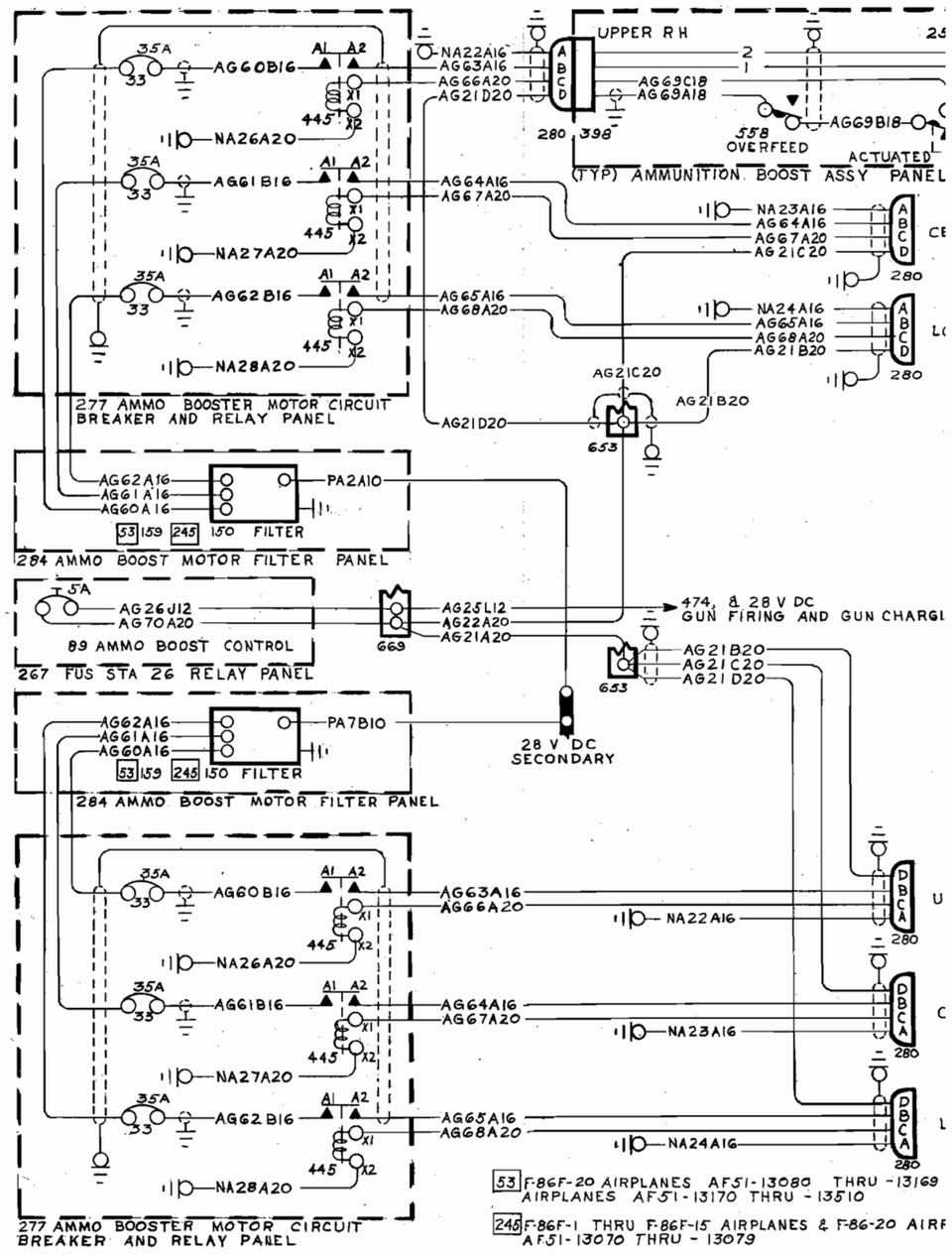
F-86F-2-54-354

GUN FIRING AND GUN CHARGING SYSTEM
F-86F-30 AIRPLANES AF52-4405 THROUGH -4963

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
277	Panel - Ammunition Booster Relay	Fus 113 RH and LH	Gun Bays
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
474	Relay - Gun Charging Return	Fus 113 LH	Gun Bay
653	Terminal Block - Ammunition Booster	Fus 86 RH and LH	Cockpit
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Booster System - F-86F-1 Through F-86F-20 and F-86F-25 Airplanes AF51-13170 Through -13510

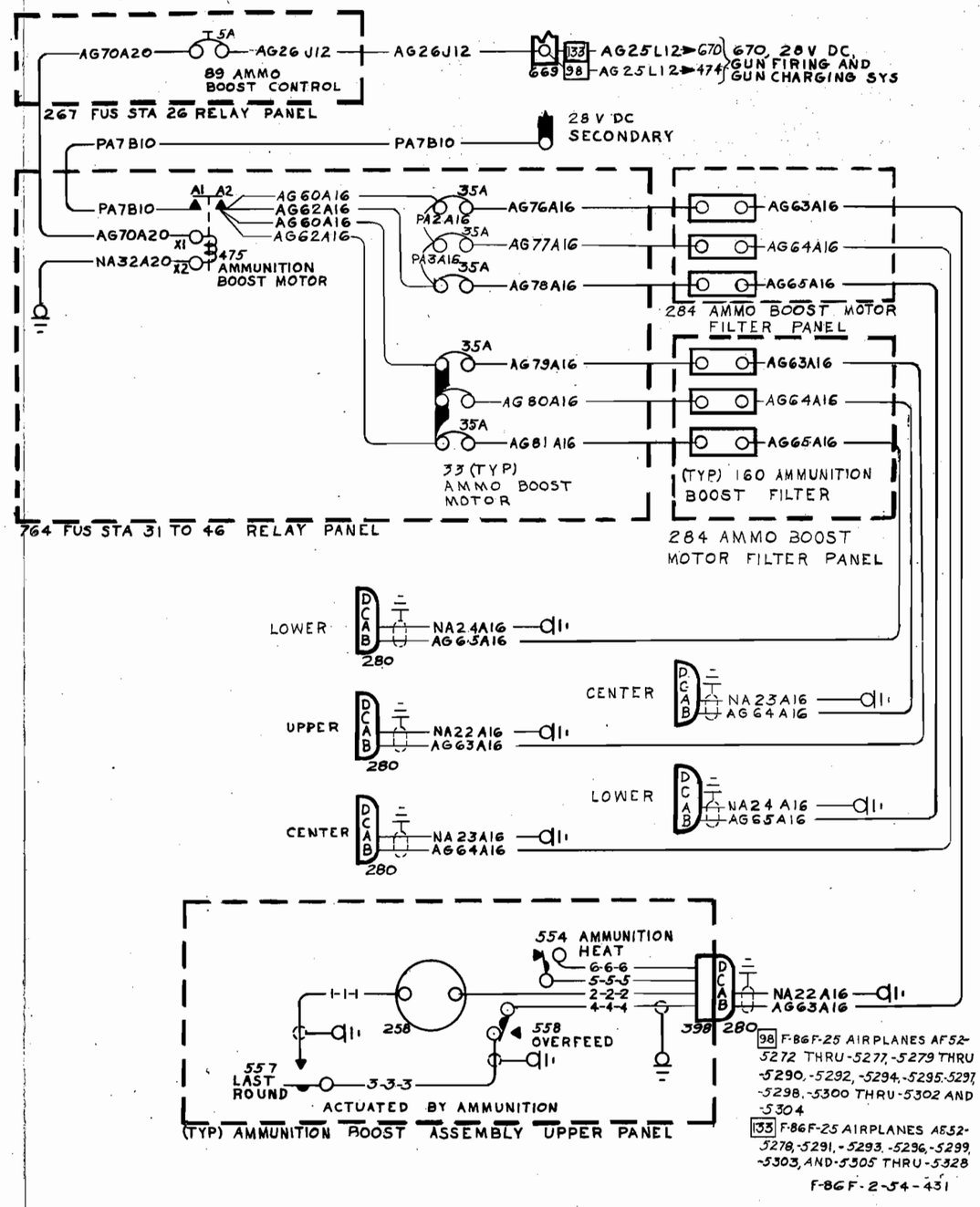


AMMUNITION BOOSTER SYTEM
F-86F-1 THROUGH F-86F-20 AND F-86F-25
AIRPLANES AF51-13170 THROUGH -13510

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
258	Motor - Ammunition Booster	Fus 104 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
474	Relay - Gun Charging Return	Fus 113 LH	Gun Bay
554	Switch - Ammunition Heat	Fus 104 LH	Gun Bay
557	Switch - Ammunition Last-round	Fus 104 RH and LH	Gun Bays
558	Switch - Ammunition Overfeed	Fus 104 RH and LH	Gun Bays
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Booster System F-86F-25 Airplanes AF52-5272 Through -5328

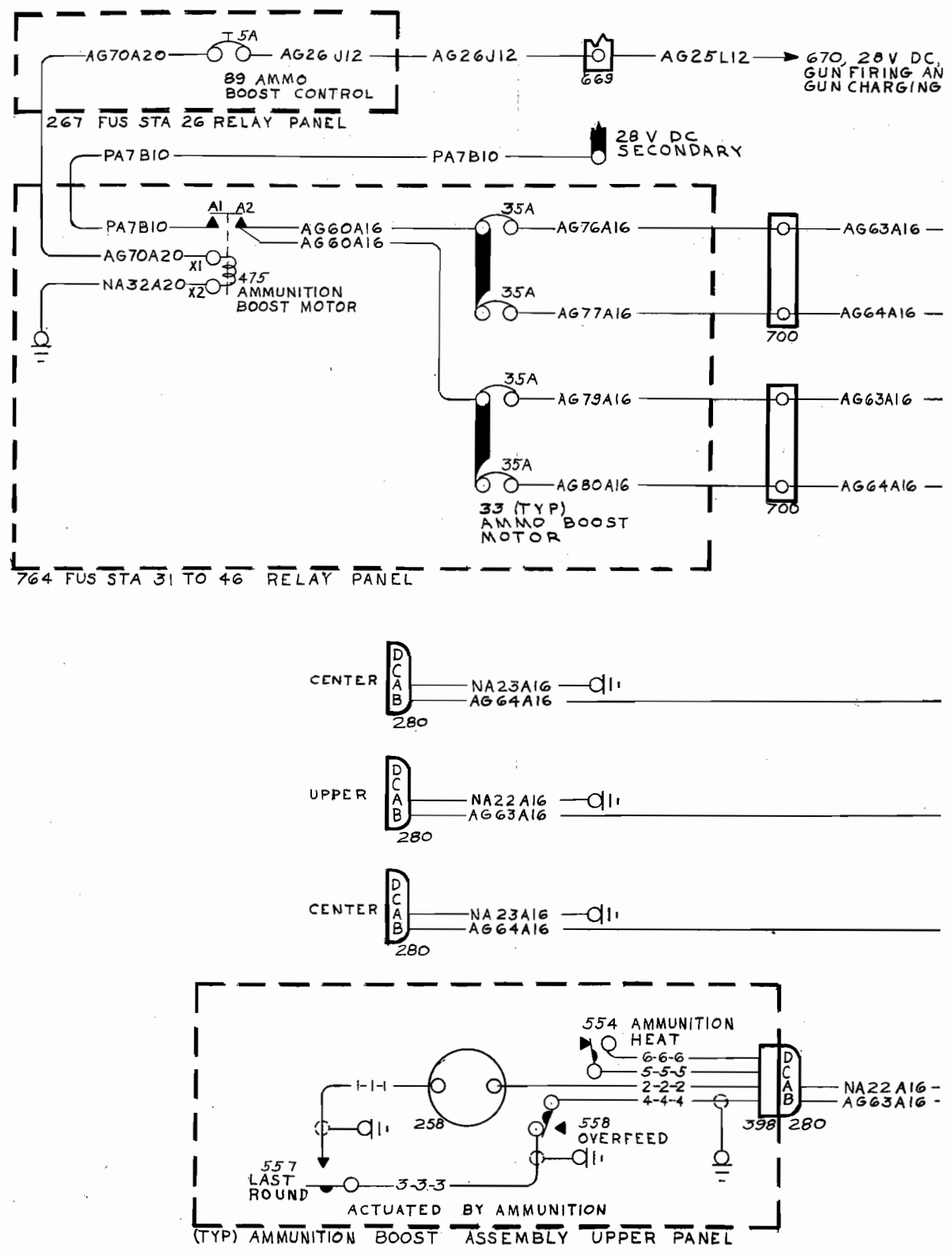


AMMUNITION BOOSTER SYSTEM
F-86F-25 AIRPLANES AF52-5272 THROUGH-5328

INDEX NO.	DESCRIPTION	STATION	ACCESS
258	Motor - Ammunition Booster	Fus 104 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
554	Switch - Ammunition Heat	Fus 104 LH	Gun Bay
557	Switch - Ammunition Last-round	Fus 104 RH and LH	Gun Bays
558	Switch - Ammunition Overfeed	Fus 104 RH and LH	Gun Bays
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
700	Terminal Block - Ammunition Boost Assembly	Wing 60 LH	Wing
764	Panel - Fuselage Station 31-46 Relay	Fus 31-46 RH	Nose Wheel Well

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Booster System F-86F-25 Airplanes AF52-5329 Through -5380

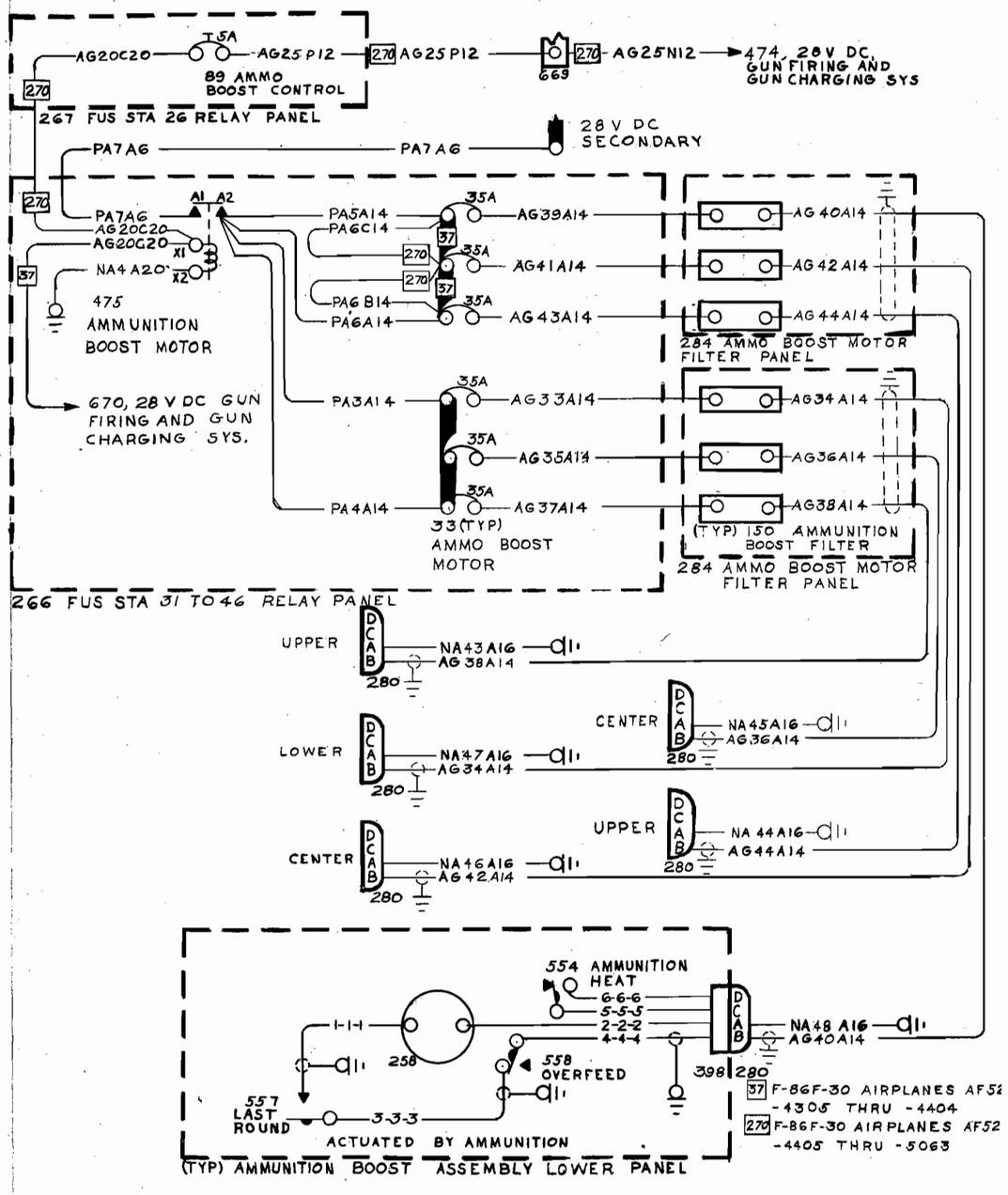


AMMUNITION BOOSTER SYSTEM
F-86F-25 AIRPLANES AF52-5329 THROUGH-5530

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
284	Panel - Ammunition Boost Motor Filter	Fus 95 LH and RH	LH and RH Gun Bay
474	Relay - Gun Charging Return	Fus 113 LH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Booster System - F-86F-30 Airplanes AF52-4305 Through -5063

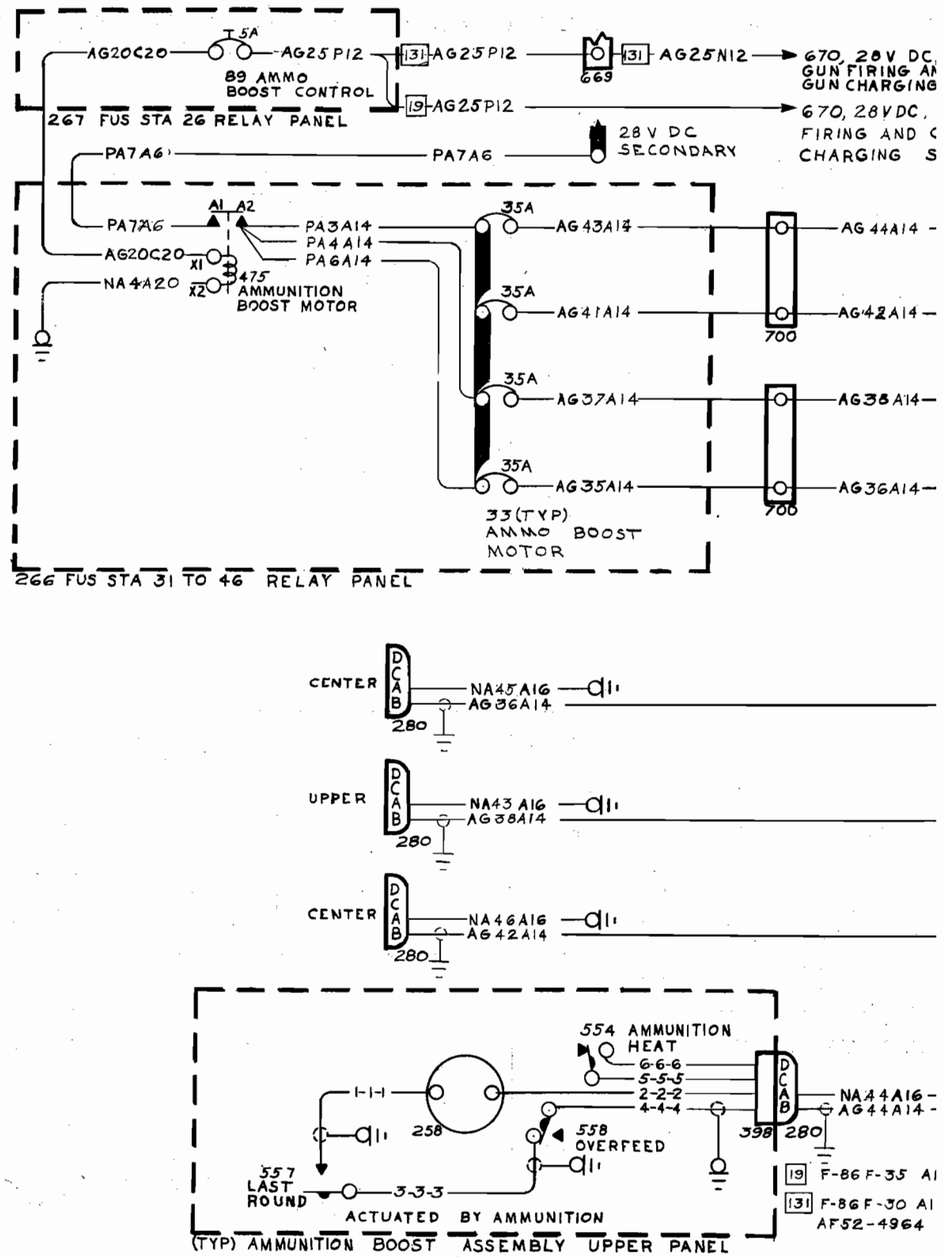


AMMUNITION BOOSTER SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
258	Motor - Ammunition Booster	Fus 104 RH and LH	Gun Bays
266	Panel - Gun Charger Relay	Fus 113 RH and LH	Gun Bays
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
280	Plug - Ammunition Booster Motor	Fus 113 RH	Gun Bay
554	Switch - Ammunition Heat	Fus 104 LH	Gun Bay
557	Switch - Ammunition Last-round	Fus 104 RH and LH	Gun Bays
558	Switch - Ammunition Overfeed	Fus 104 RH and LH	Gun Bays
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
700	Terminal Block - Ammunition Boost Assembly	Wing 60 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Ammunition Booster System F-86F-30 Airplane AF52-5064 And All Subsequent Airplanes



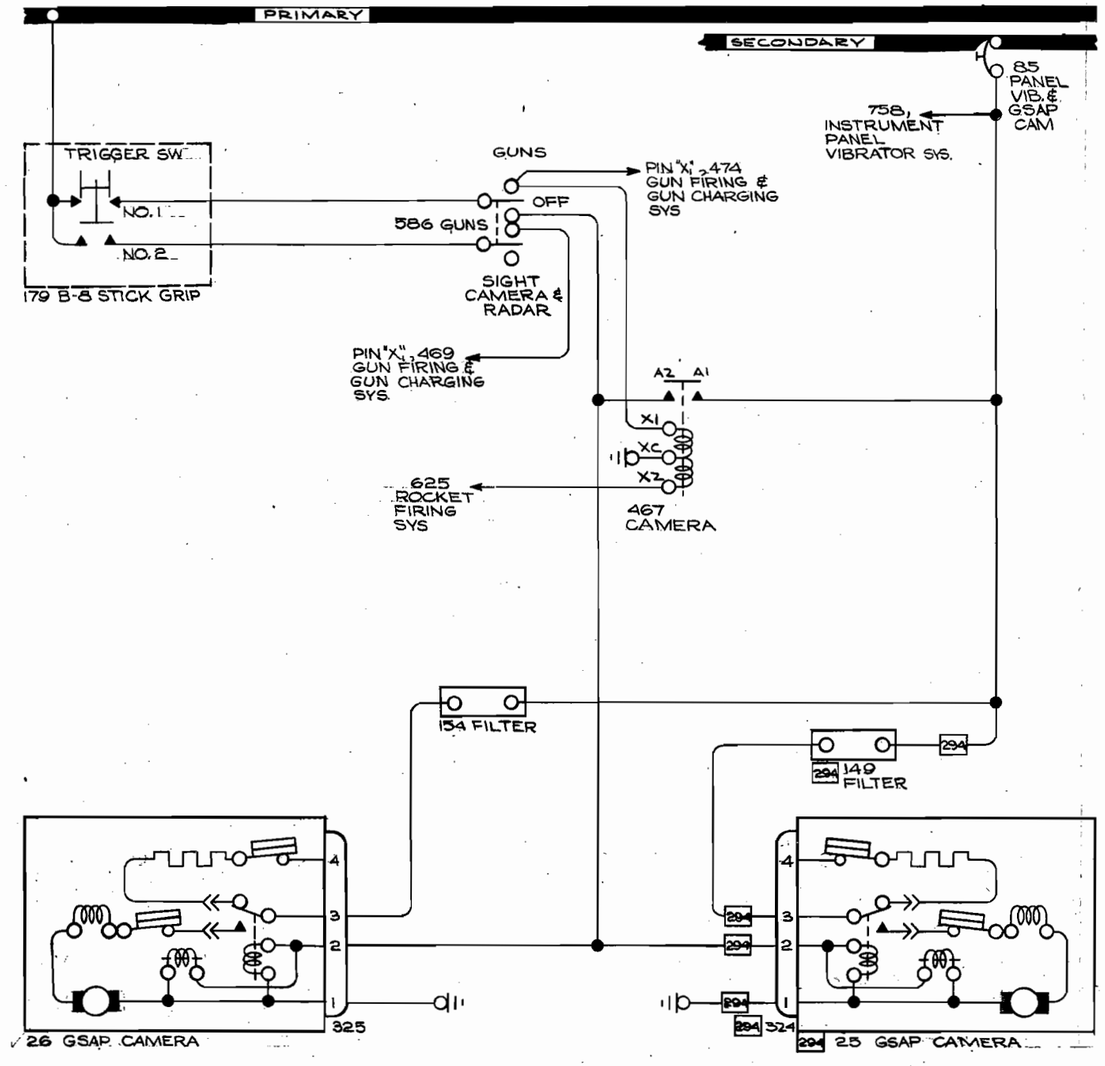
F-86

AMMUNITION BOOSTER SYSTEM
F-86F-30 AIRPLANE AF52-5064,
AND ALL SUBSEQUENT AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
26	Camera - GSAP	Fus 15 CL	Lower Fuselage
154	Filter - Radio Noise Camera	Fus 80 RH	Aft of Instrument Panel
179	Grip - Control Stick	Fus 85 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
319	Plug - Fuel Flow Transmitter	Fus 185 CL	Engine Snood CL
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
414	Receptacle - Instrument Panel Light Disconnect	Fus 76 LH	Cockpit, Forward Instrument Panel
450	Relay - Bomb Release Power	Fus 78 CL	Cockpit
469	Relay - Gun-firing	Fus 40 LH	Radar Bay
471	Relay - Gun Sight Power	Fus 40 LH	Radar Bay
473	Relay - Gun Charger Retract	Fus 113 LH	Gun Bay
474	Relay - Gun Charging Return	Fus 113 LH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
758	Vibrator Assembly - Instrument Panel	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

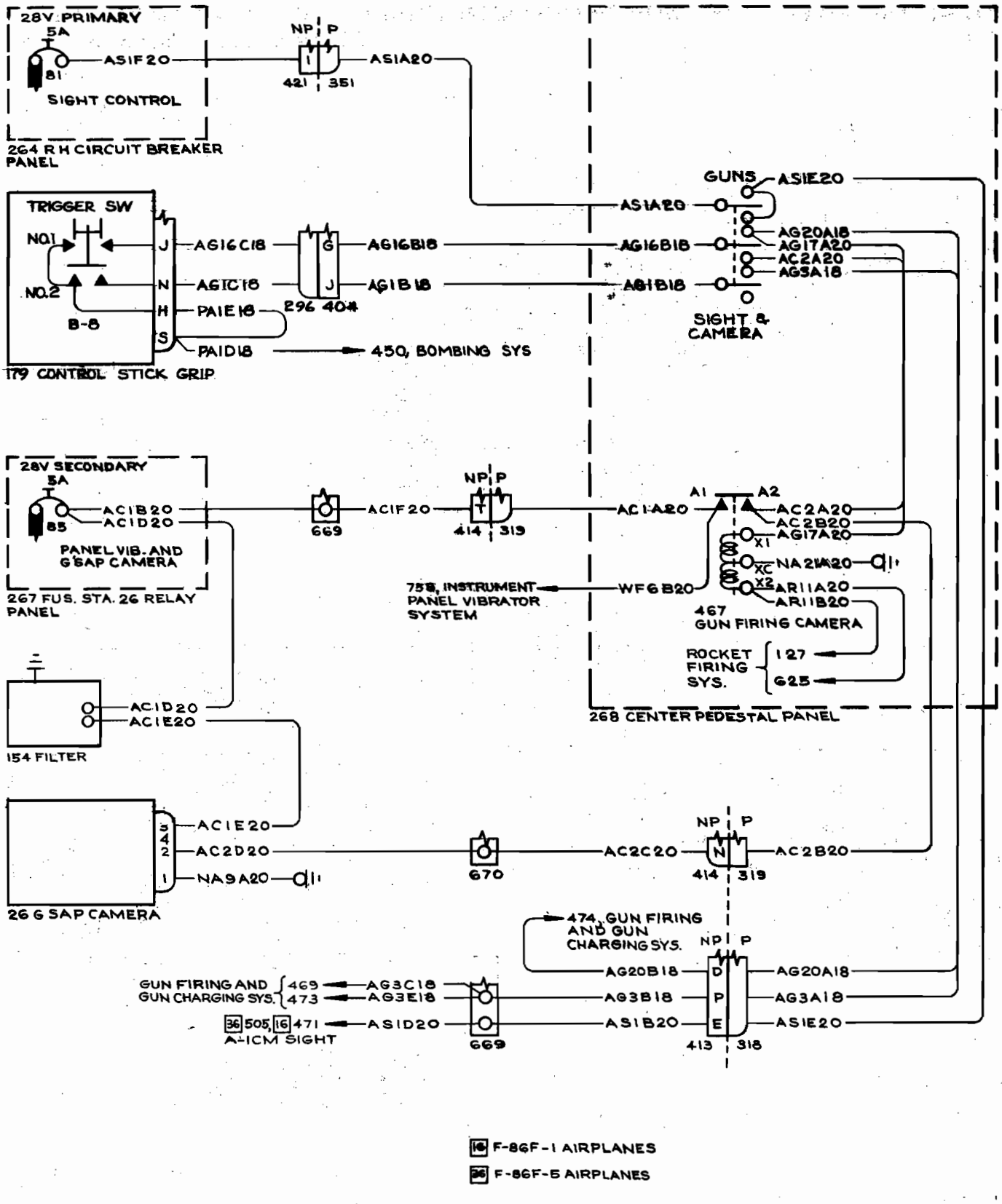
Camera System F-86F-1 and F-86F-5 Airplanes



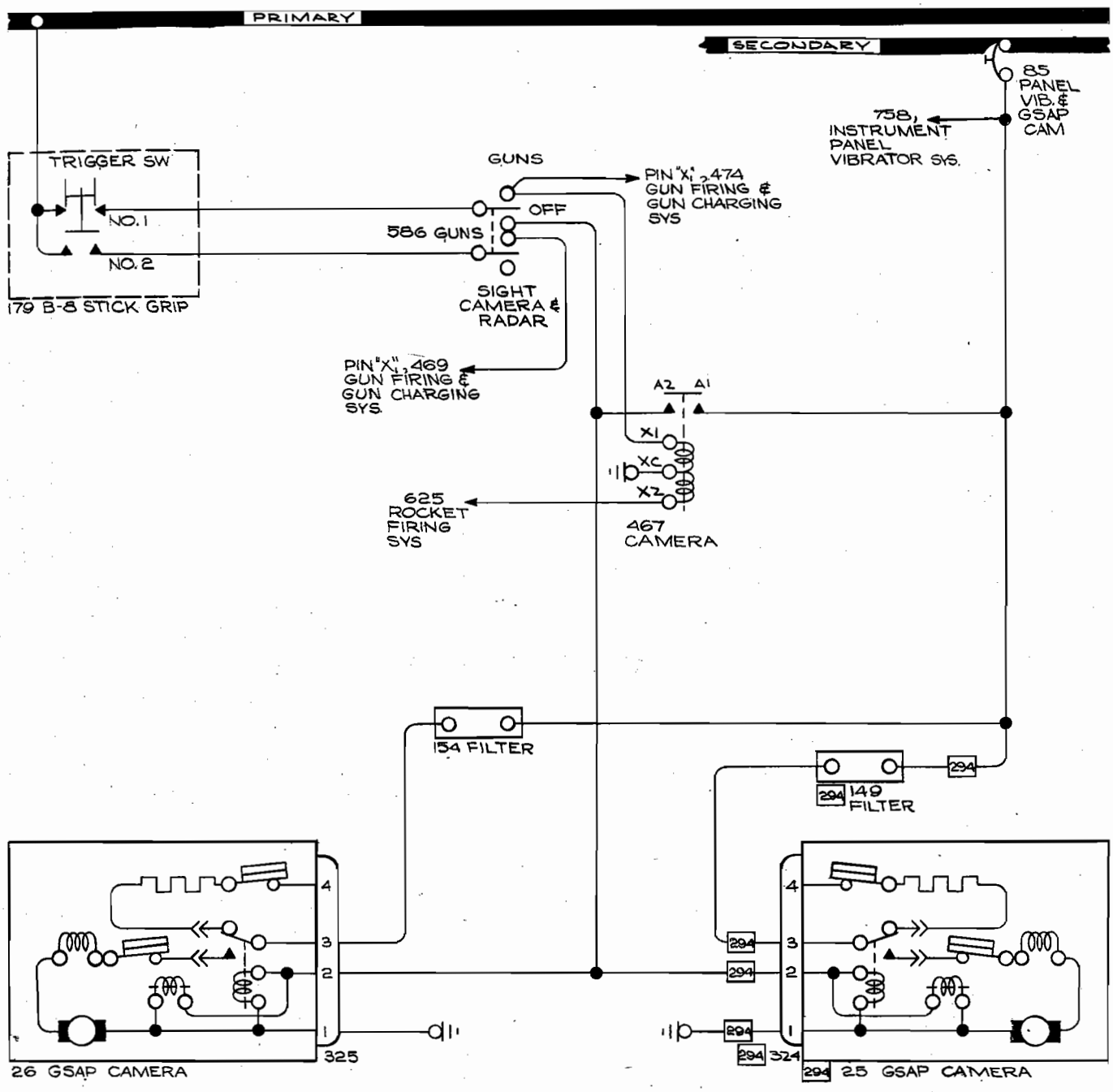
294 F-86F-20 AIRPLANES AF51-13071 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380 AND F-86F-30 AIRPLANES AF52-4305 THRU -4745

F-86F-2-54-451

CAMERA SYSTEM
F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745



CAMERA SYSTEM
F-86F-1 AND F-86F-5 AIRPLANES



294 F-86F-20 AIRPLANES AF51-13071 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380 AND F-86F-30 AIRPLANES AF52-4305 THRU -4745

F-86F-2-54-451

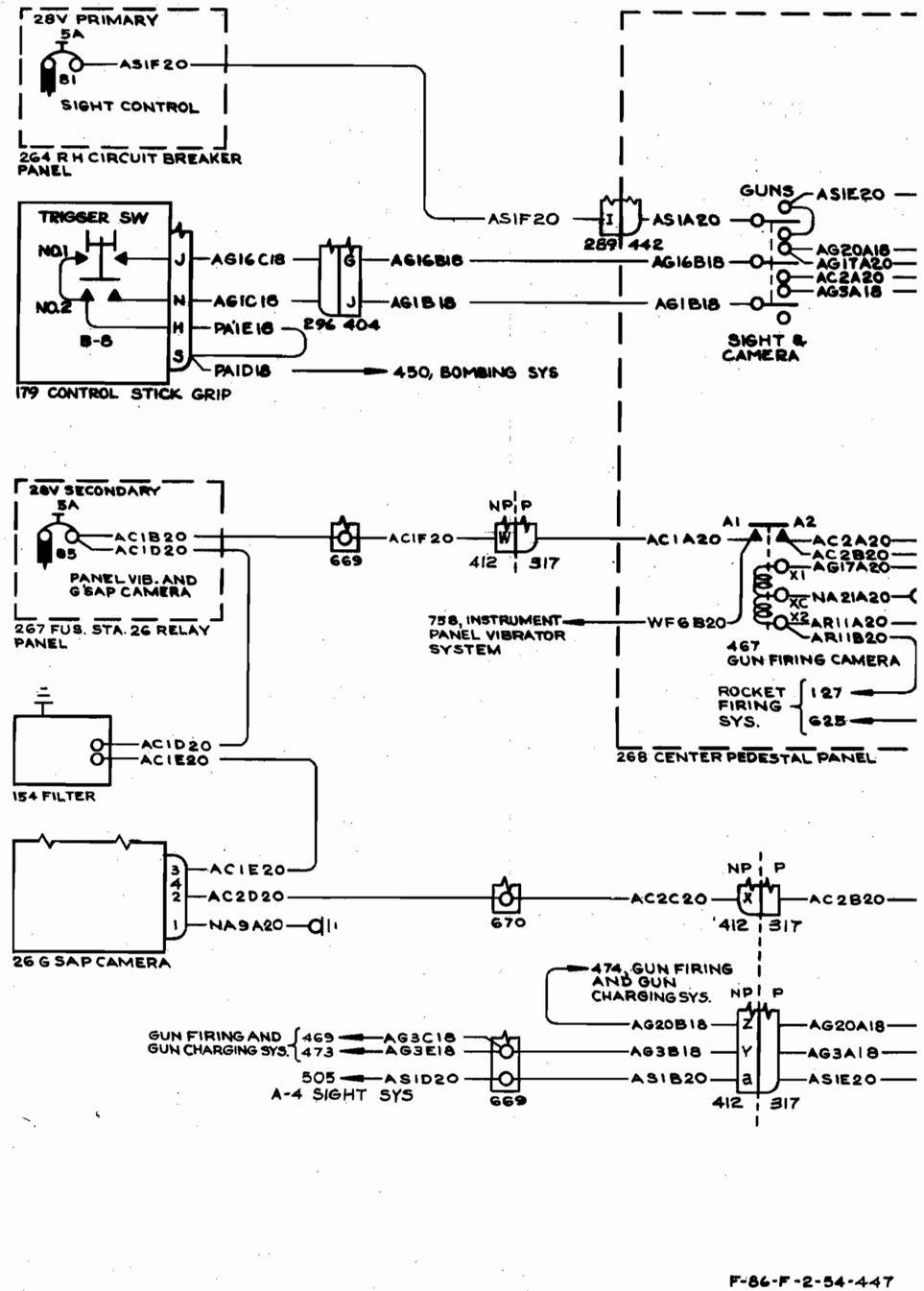
CAMERA SYSTEM

F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
26	Camera - GSAP	Fus 15 CL	Lower Fuselage
154	Filter - Radio Noise Camera	Fus 80 RH	Aft of Instrument Panel
179	Grip - Control Stick	Fus 85 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
450	Relay - Bomb Release Power	Fus 78 CL	Cockpit
469	Relay - Gun firing	Fus 40 LH	Radar Bay
473	Relay - Gun Charger Retract	Fus 113 LH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
758	Vibrator Assembly - Instrument Panel	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Camera System - F-86F-10 and F-86F-15 Airplanes



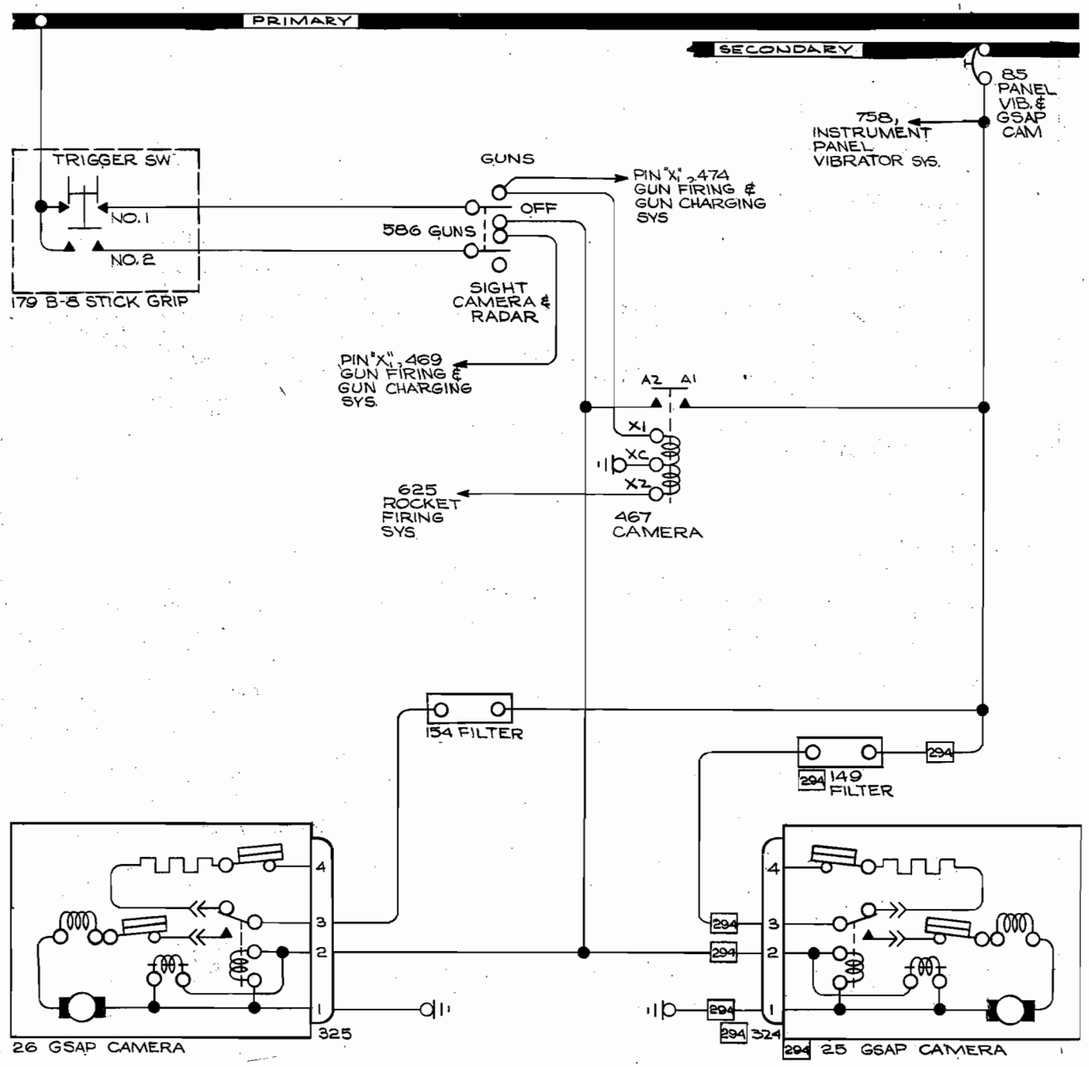
F-86-F-2-54-447

CAMERA SYSTEM
F-86F-10 AND F-86F-15 AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
25	Camera - Sight - GSAP	Fus 81 CL	Cockpit
26	Camera - GSAP	Fus 15 CL	Lower Fuselage
149	Filter - Radio Noise - Camera	Fus 60 RH	Above RH Forward Console, Cockpit
154	Filter - Radio Noise Camera	Fus 80 RH	Aft of Instrument Panel
179	Grip - Control Stick	Fus 85 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
324	Plug - GSAP Camera	Fus 18 CL	Radar Bay
338	Plug - Instrument Panel Shroud Disconnect	Fus 81 RH	Behind Instrument Panel
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
450	Relay - Bomb Release Power	Fus 78 CL	Cockpit
469	Relay - Gun-firing	Fus 40 LH	Radar Bay
471	Relay - Gun Sight Power	Fus 40 LH	Radar Bay
473	Relay - Gun Charger Retract	Fus 113 LH	Gun Bay
474	Relay - Gun Charging Return	Fus 113 LH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
758	Vibrator Assembly - Instrument Panel	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

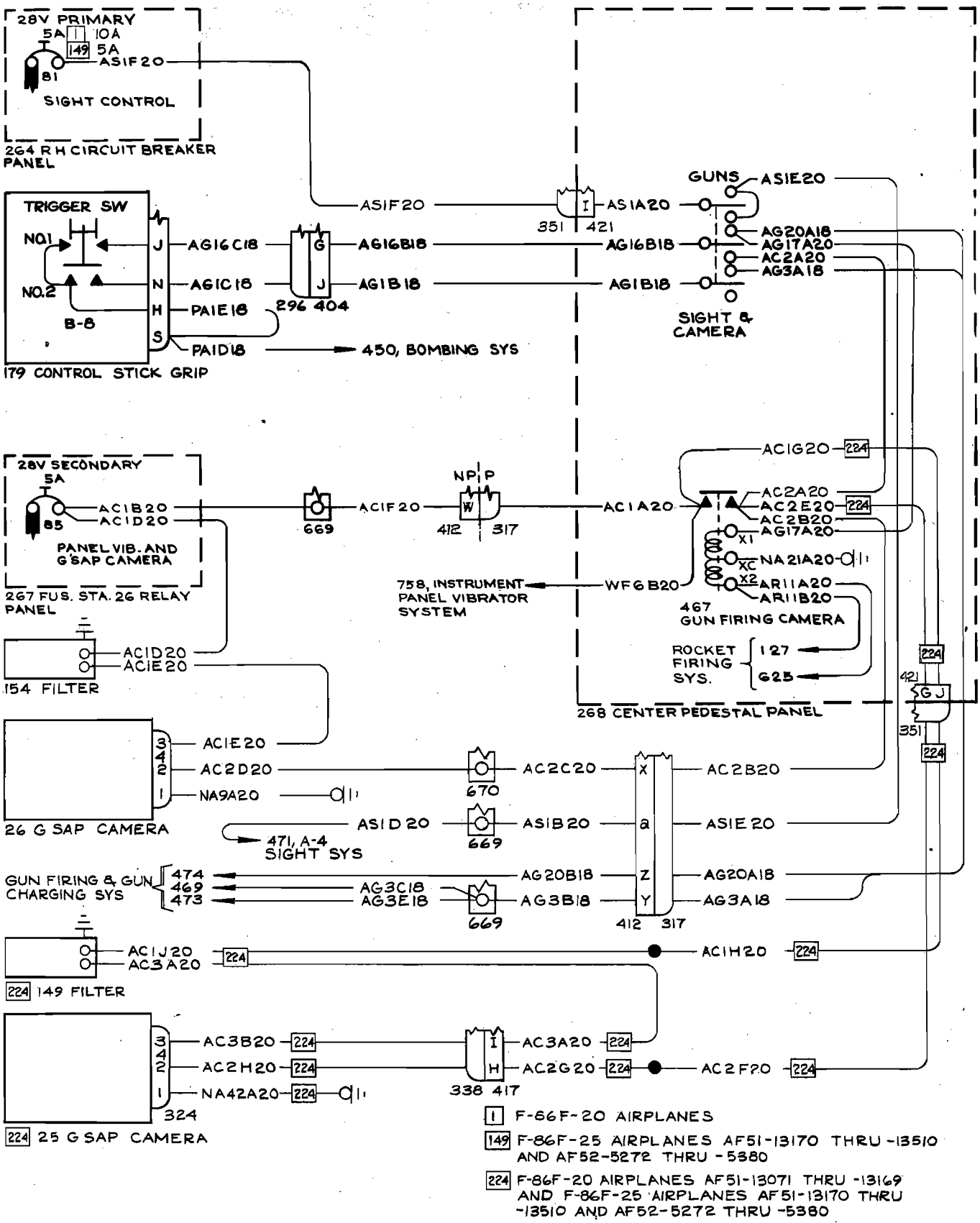
Camera System - F-86F-20 Airplanes and F-86F-25 Airplanes AF51-13170 Through -13510 and AF52-5272 Through -5380



294 F-86F-20 AIRPLANES AF51-13071 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380 AND F-86F-30 AIRPLANES AF52-4305 THRU -4745

F-86F-2-54-451

CAMERA SYSTEM
F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745



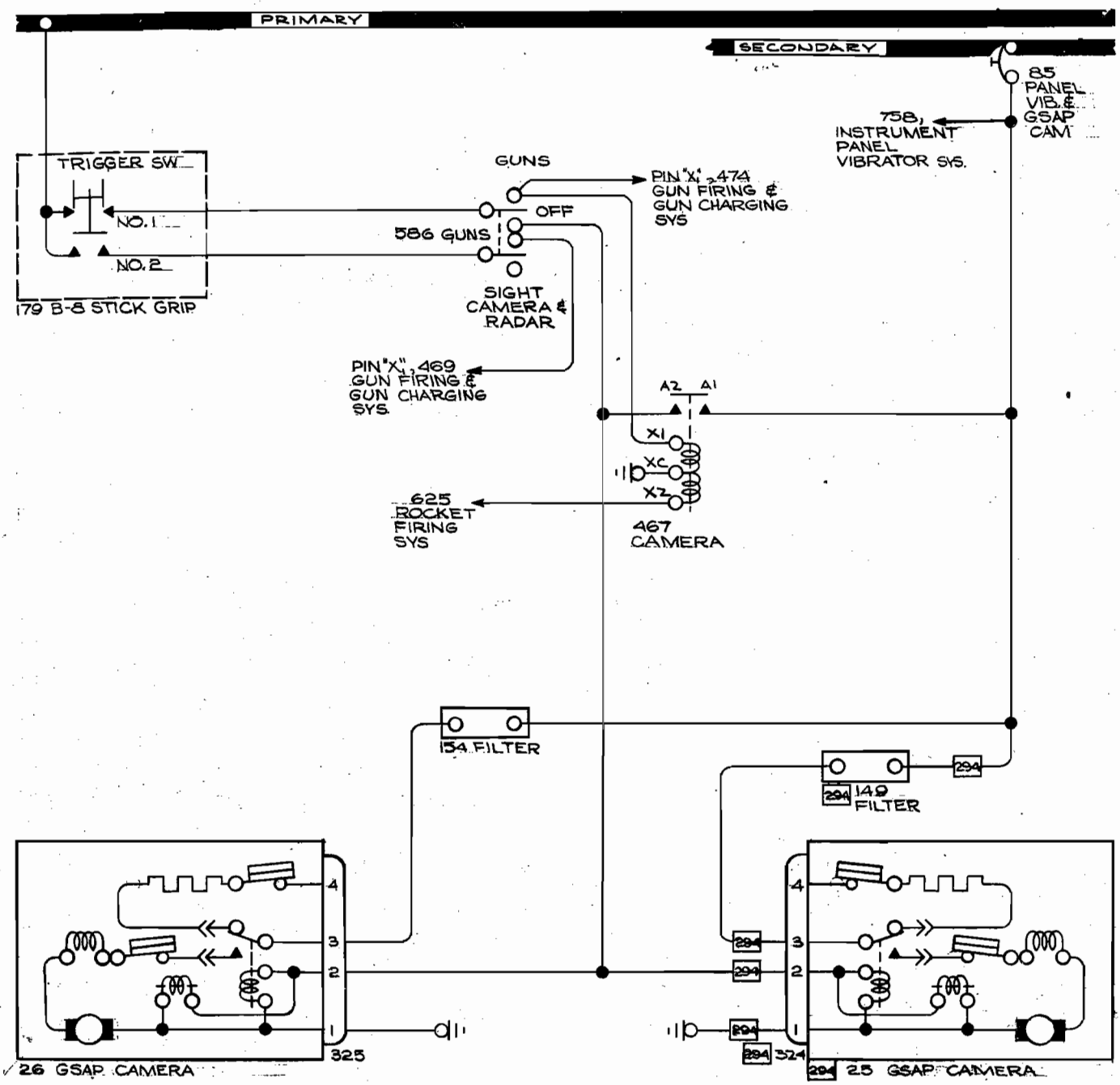
[1] F-86F-20 AIRPLANES

[149] F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380

[224] F-86F-20 AIRPLANES AF51-13071 THRU -13169 AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380

CAMERA SYSTEM F-86F-2-54-448

F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH 13510 AND AF52 5272 THROUGH 5380



294 F-86F-20 AIRPLANES AF51-13071 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5380 AND F-86F-30 AIRPLANES AF52-4305 THRU -4745

F-86F-2-54-451

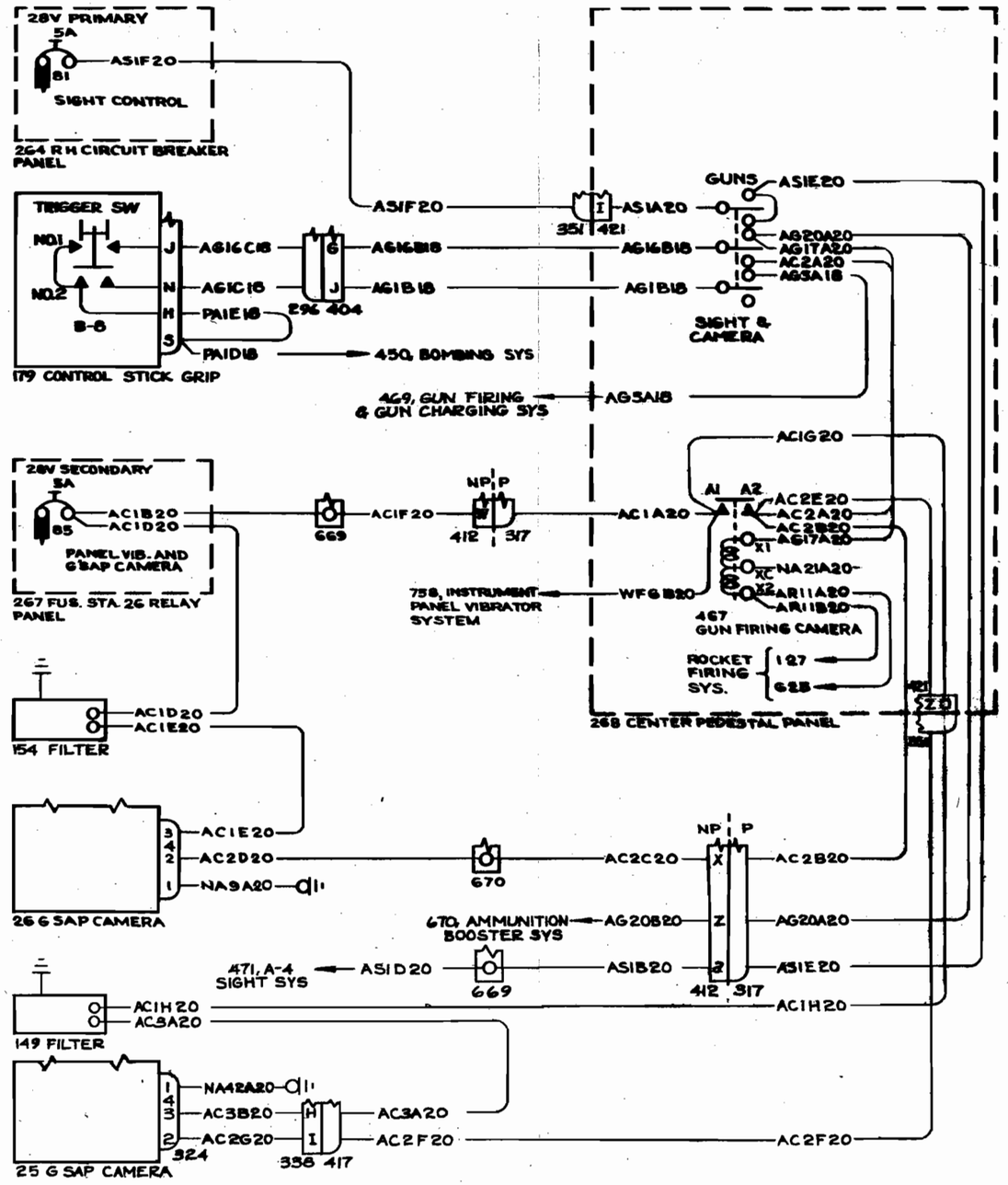
CAMERA SYSTEM

F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380, AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
25	Camera - Sight - GSAP	Fus 81 CL	Cockpit
26	Camera - GSAP	Fus 15 CL	Lower Fuselage
149	Filter - Radio Noise - Camera	Fus 60 RH	Above RH Forward Console, Cockpit
154	Filter - Radio Noise Camera	Fus 80 RH	Aft of Instrument Panel
179	Grip - Control Stick	Fus 85 CL	Cockpit
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
324	Plug - GSAP Camera	Fus 18 CL	Radar Bay
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
417	Receptacle - Instrument Panel Shroud Disconnect	Fus 71 RH	Cockpit, Forward RH Side
450	Relay - Bomb Release Power	Fus 78 CL	Cockpit
469	Relay - Gun-firing	Fus 40 LH	Radar Bay
471	Relay - Gun Sight Power	Fus 40 LH	Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
670	Terminal Block - Nose Wiring	Fus 40 LH	Nose Radar Bay
758	Vibrator Assembly - Instrument Panel	Fus 81 LH	Instrument Panel

Refer to Illustrated Parts Breakdown T. O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Camera System - F-86F-30 Airplanes AF52-4305 Through -4745

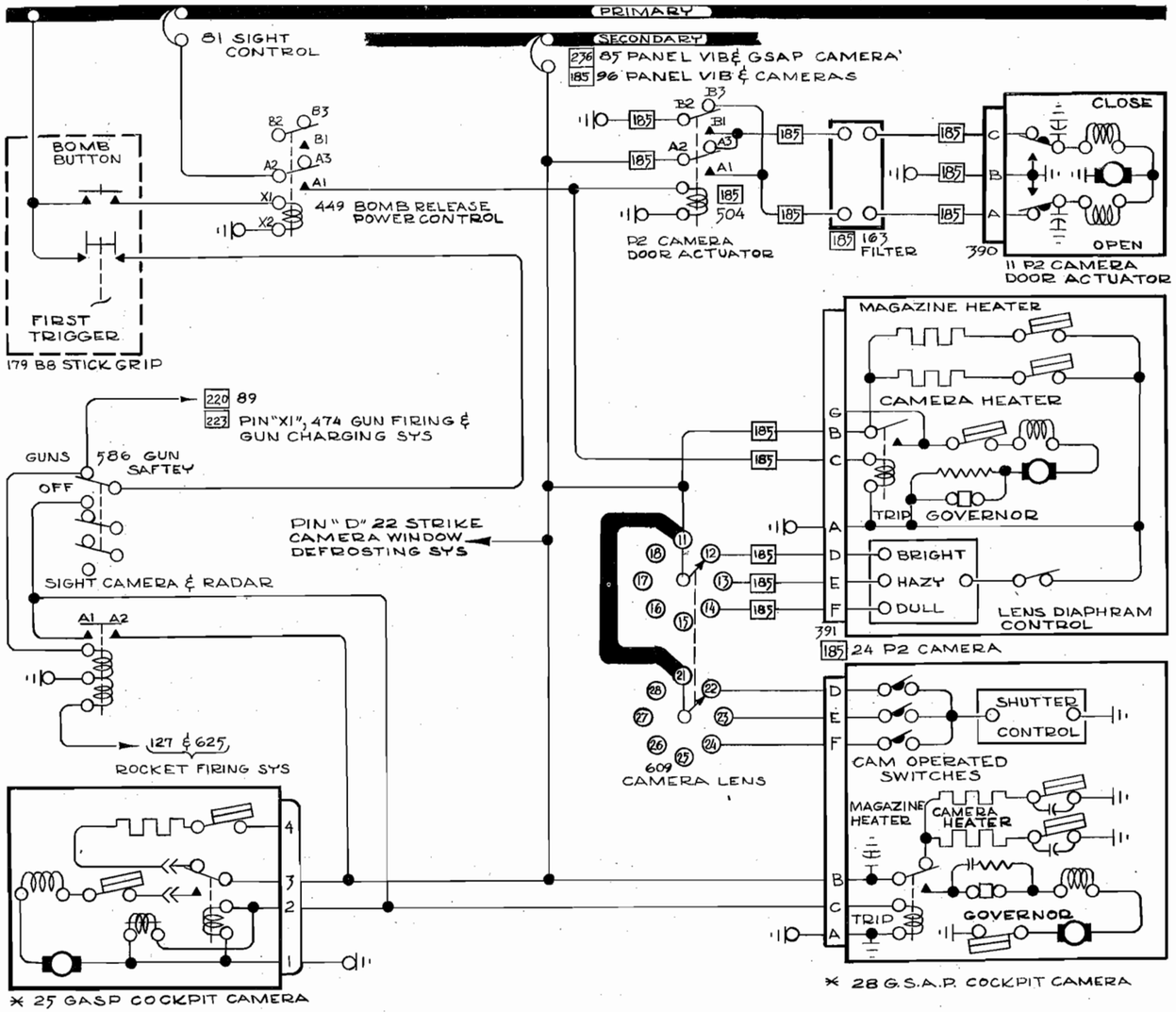


CAMERA SYSTEM
F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
11	Actuator - P-2 Camera Door	Fus 16 CL	Lower Fuselage
22	Control Box - P-2 Camera Heat	Fus 53 RH	Nose Wheel Well
24	Camera - P-2 Strike	Fus 93 CL	Lower Fuselage
P121	Terminal Strip	Fus 72 LH	LH Lower Wheel Well Compartment
163	Filter - P-2 Camera Door Actuator	Fus 117 CL	Through AN/ARC-27
179	Grip - Control Stick	Fus 85 CL	Cockpit
263	Panel - Circuit-breaker Left-hand	Fus 118 LH	Cockpit - LH Side
264	Panel - Circuit-breaker Right-hand	Fus 118 RH	Cockpit - RH
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
296	Plug - Control Stick Grip	Fus 84 CL	Cockpit
304	Plug - Flasher Pressure Disconnect	Fus 80 LH	LH Nose Wheel Well Access
312	Plug - Fuel Flow Totalizer Indicator	Fus 81 CL	Cockpit, Instrument Panel
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
390	Receptacle - P-2 Camera Door Actuator	Fus 16 CL	Nose Radar Bay
391	Receptacle - Aft Fuselage Disconnect	Fus 231 LH	LH Emergency Access
404	Receptacle - Control Stick Grip (B-8)	Fus 84 CL	Cockpit
412	Receptacle - Forward Pressure Disconnect (LH Forward)	Fus 81 LH CL	Cockpit
434	Receptacle - N9 Camera (GSAP)	Fus 71 CL	Cockpit and Forward Landing Lights
469	Relay - Gun-firing	Fus 40 LH	Radar Bay
504	Relay - P-2 Camera Door Actuator	Fus 65 LH	Nose Wheel Well
609	Switch - Camera Lens Selector	Fus 104 RH	Cockpit
622	Switch - Rocket Jettison	Fus 81 CL	Pedestal
646	Terminal Block - Flasher Pressure Receptacle	Fus 75 LH	Nose Radar Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
676	Terminal Block - Wing Flap	Fus 190 RH and LH	Wheel Wells
691	Terminal Block - Gun Bay Pressure Disconnect	Fus 80 LH	Gun Bay
699	Terminal Block - N9 Camera Disconnect	Fus 54 CL	Nose Radar Bay
1001	Panel - Camera Lens Selector	Fus 90 RH	Cockpit

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Camera System - F-86F-25 Airplanes AF52-5381 Through -5530 and F-86F-30 Airplane AF52-4746 and All Subsequent Airplanes



* SEE DETAIL DRAWING FOR ADAPTER HARNESSES PROVIDING INTERCHANGABILITY OF CAMERAS 25 & 28

10 F-86F-25 AIRPLANES AF52-5387 THRU-5530

14 F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

185 F-86F-25 AIRPLANES AF52-5387 THRU-5530 AND F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

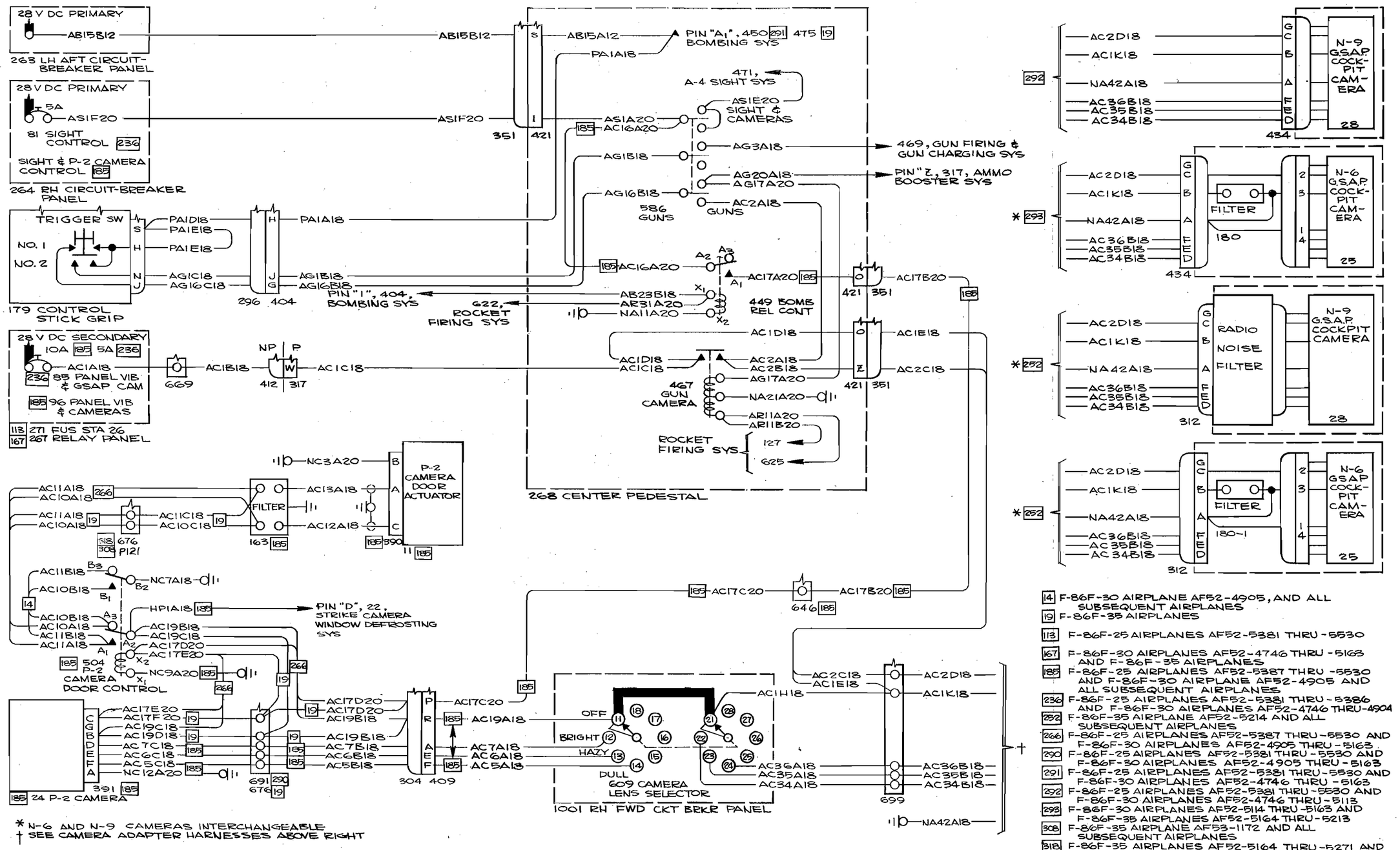
220 F-86F-25 AIRPLANES AF52-5381 THRU-5530, F-86F-30 AIRPLANES AF52-4964 THRU-5163 AND F-86F-35 AIRPLANES

223 F-86F-30 AIRPLANES AF52-4705 THRU-4963

236 F-86F-25 AIRPLANES AF52-5381 THRU-5386 AND F-86F-30 AIRPLANES AF52-4746 THRU-4904

F-86F-2-54-452

CAMERA SYSTEM
F-86F-25 AIRPLANES AF52-5381 THROUGH -5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES



* N-6 AND N-9 CAMERAS INTERCHANGEABLE
† SEE CAMERA ADAPTER HARNESSES ABOVE RIGHT

14 F-86F-30 AIRPLANE AF52-4905, AND ALL SUBSEQUENT AIRPLANES
19 F-86F-35 AIRPLANES
113 F-86F-25 AIRPLANES AF52-5381 THRU -5530
167 F-86F-30 AIRPLANES AF52-4746 THRU -5163 AND F-86F-35 AIRPLANES
185 F-86F-25 AIRPLANES AF52-5387 THRU -5530 AND F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES
236 F-86F-25 AIRPLANES AF52-5381 THRU -5386 AND F-86F-30 AIRPLANES AF52-4746 THRU-4904
252 F-86F-35 AIRPLANE AF52-5214 AND ALL SUBSEQUENT AIRPLANES
266 F-86F-25 AIRPLANES AF52-5387 THRU -5530 AND F-86F-30 AIRPLANES AF52-4905 THRU -5163
290 F-86F-25 AIRPLANES AF52-5381 THRU -5530 AND F-86F-30 AIRPLANES AF52-4905 THRU -5163
291 F-86F-25 AIRPLANES AF52-5381 THRU -5530 AND F-86F-30 AIRPLANES AF52-4746 THRU -5163
292 F-86F-25 AIRPLANES AF52-5381 THRU -5530 AND F-86F-30 AIRPLANES AF52-4746 THRU -5113
293 F-86F-30 AIRPLANES AF52-5114 THRU -5163 AND F-86F-35 AIRPLANES AF52-5164 THRU -5213
308 F-86F-35 AIRPLANE AF53-1172 AND ALL SUBSEQUENT AIRPLANES
318 F-86F-35 AIRPLANES AF52-5164 THRU -5271 AND AF53-1072 THRU -1171

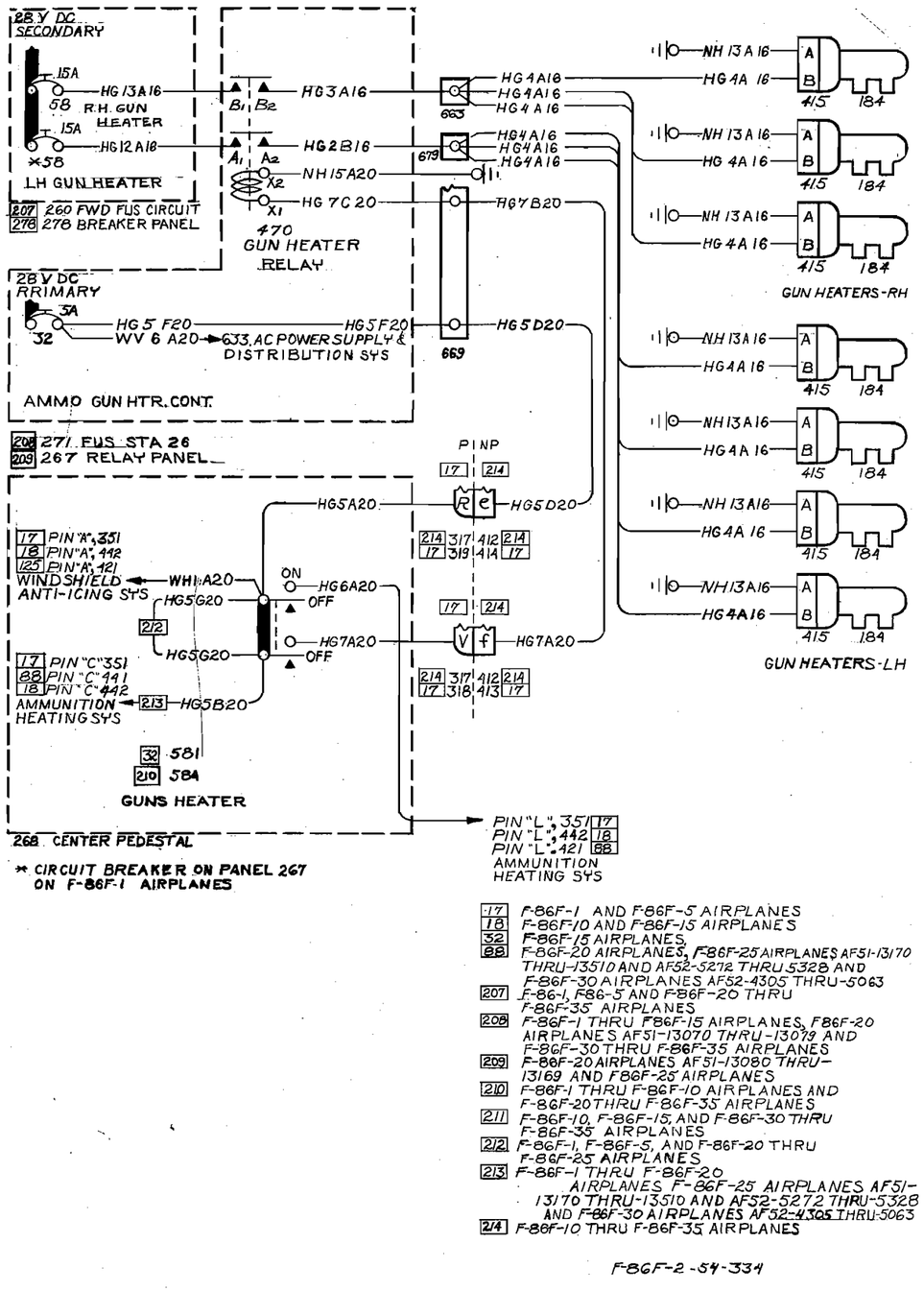
F-86F-2-54-449

CAMERA SYSTEM
F-86F-25 AIRPLANES AF52-5381 THROUGH -5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

INDEX NO.	DESCRIPTION	STATION NO.	ACCESS
184	Heater - Gun	Fus 105 LH and RH	LH and RH Gun Bays - Mounted on Guns
260	Panel - Forward Fuselage Circuit-breaker	Fus 26 RH	Nose Radar Bay
267	Panel - Nose Section Relay	Fus 40 LH	Radar Bay
268	Panel - Pedestal	Fus 78 CL	Cockpit - Pedestal
271	Panel - Fuselage Station 26 Relay	Fus 26 RH	Nose Radar Bay
278	Panel - Left-hand Fuselage Station 90	Fus 90 LH	Cockpit
317	Plug - Forward Pressure Disconnect (LH Forward)	Fus 62.6 LH	Cockpit - Forward of Pedestal
318	Plug - Forward Pressure Disconnect (LH Aft)	Fus 62.6 LH	Cockpit - Forward of Pedestal
351	Plug - Pedestal Disconnect	Fus 62.6 LH	Directly Behind Pedestal
415	Receptacle - Gun Heater	Fus 109 RH and LH	Gun Bays
421	Receptacle - Pedestal Disconnect	Fus 71.5 RH	Cockpit
442	Receptacle - Landing Gear Control Disconnect	Fus 81 LH	Cockpit, Behind Instrument Panel
663	Terminal Block - Gun Bay	Fus 80 RH	Gun Bay
669	Terminal Block - Nose Junction Box	Fus 35 RH	Nose Radar Bay
679	Terminal Block - Wing LH (Forward)	Wing 117 LH	Wing

Refer to Illustrated Parts Breakdown T.O. No. 1F-86F-4 (formerly AN 01-60JLD-4) for part numbers and location of items.

Gun Heater System



* CIRCUIT BREAKER ON PANEL 267 ON F-86F-1 AIRPLANES

17 F-86F-1 AND F-86F-5 AIRPLANES
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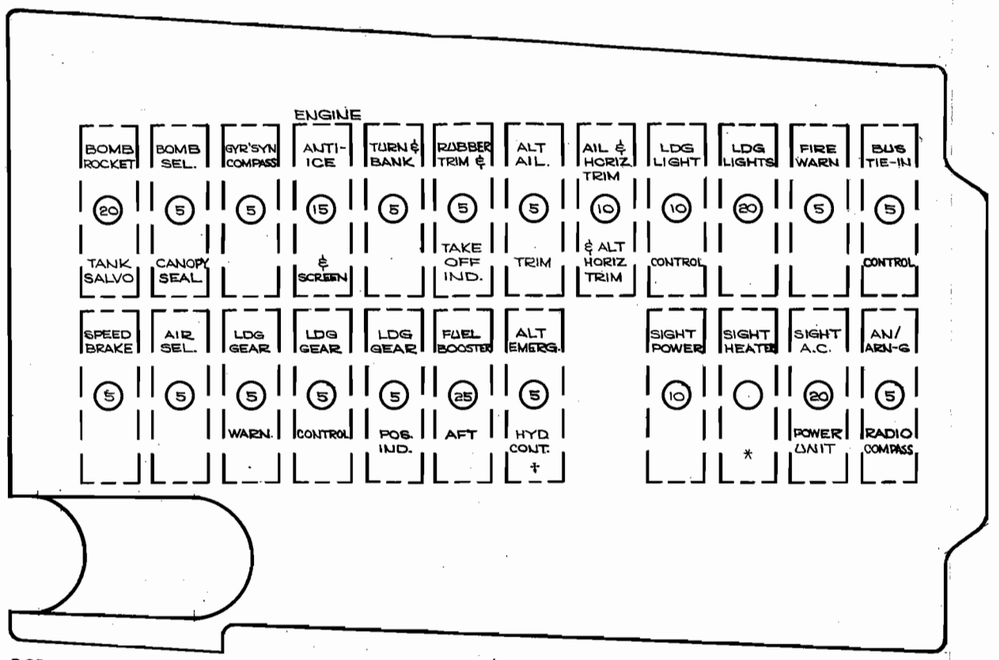

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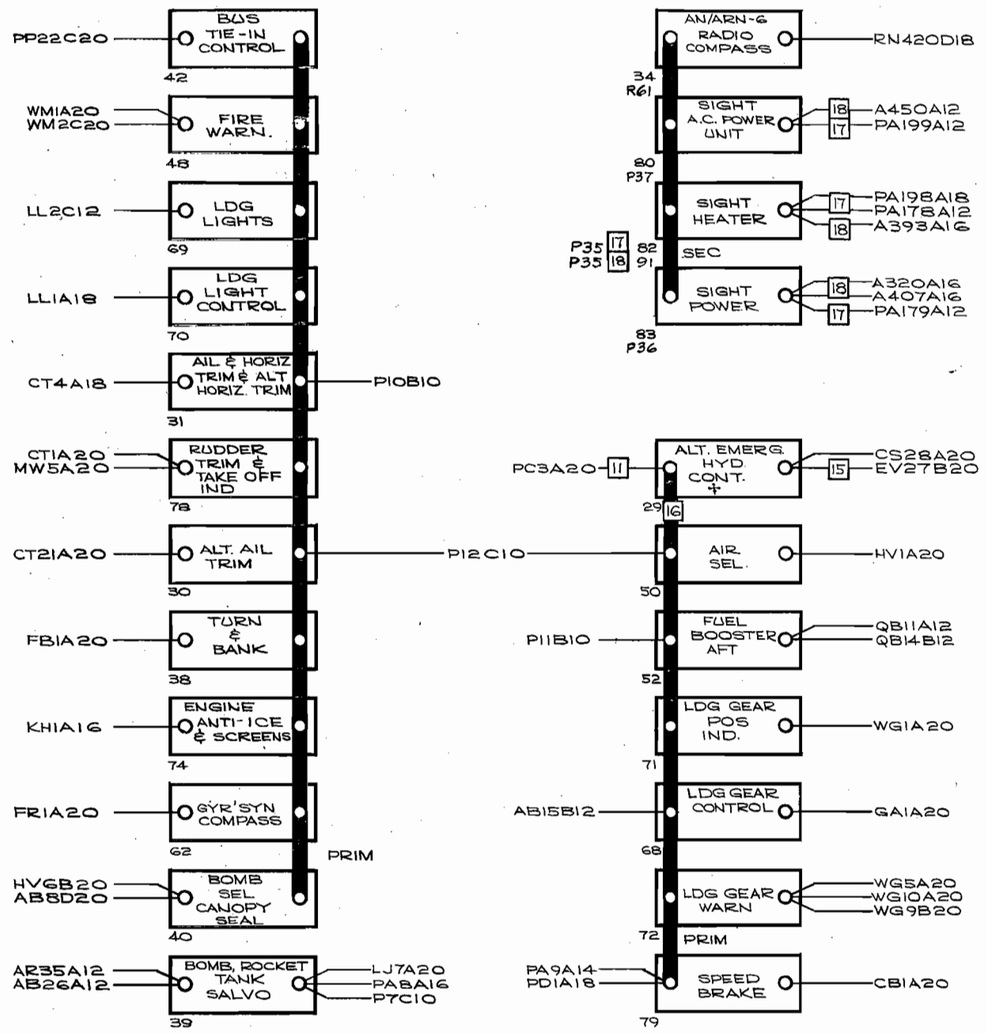
* 25A CIRCUIT BREAKER ON [17]
15A CIRCUIT BREAKER ON [18]

† "& HYD. PRESS. IND." REQUIRED ON [15]

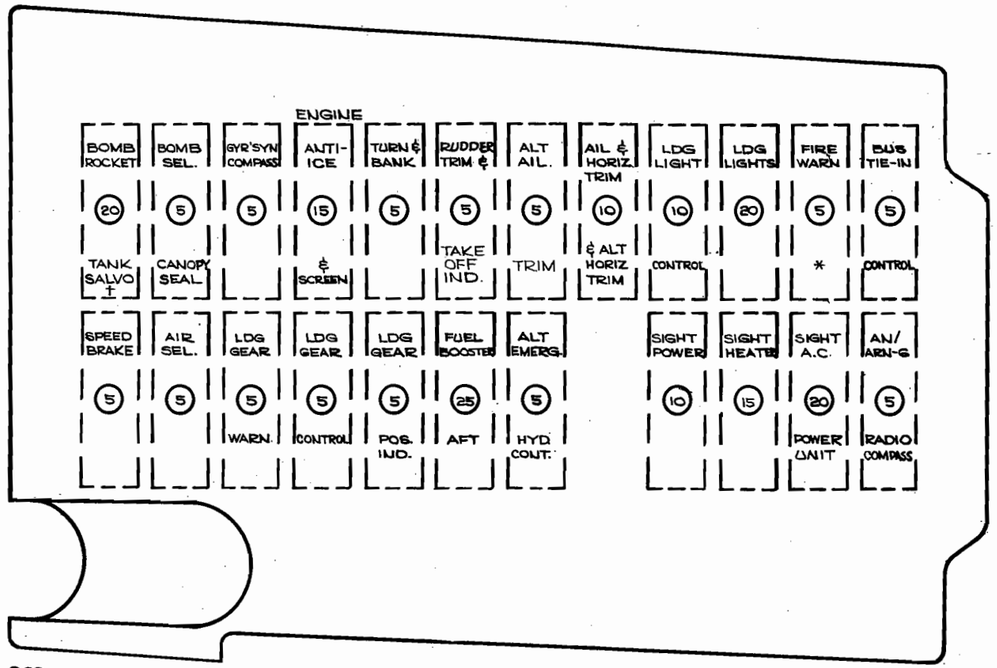
RD DENOTES RADAR INDEX NUMBER
R DENOTES RADIO INDEX NUMBER



[11] F-86F-5 THRU F-86F-15 AIRPLANES
[15] F-86F-1 AIRPLANES AF51-2850 THRU -2877
[16] F-86F-1 AIRPLANES
[17] F-86F-1 & F-86F-5 AIRPLANES
[18] F-86F-10 & F-86F-15 AIRPLANES

F-86F-2-54-413A

LEFT-HAND AFT CIRCUIT BREAKER PANEL
F-86F-1 THROUGH F-86F-15 AIRPLANES



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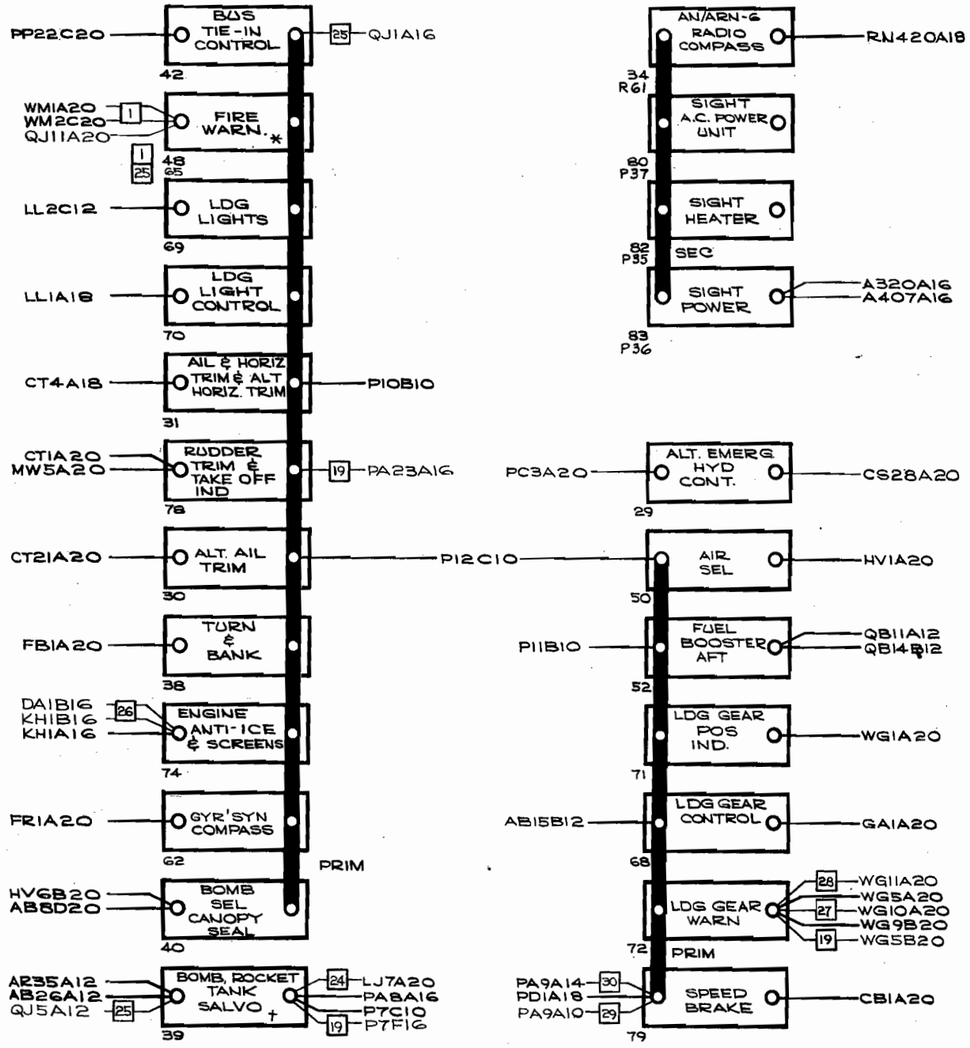
* "FIRE WARN". [1] BECOME "FUEL DROP TANKS" [25]

† AS SHOWN [1], BECOMES "BOMB, ROCKET, TANK JETTISON" ON [25]

P DENOTES RADAR INDEX NUMBER
R DENOTES RADIO INDEX NUMBER

LEFT-HAND AFT CIRCUIT BREAKER PANEL
F-86F-20 THROUGH F-86F-35 AIRPLANES



[1] F-86F-20 AIRPLANES

[19] F-86F-35 AIRPLANES

[24] F-86F-20 THRU F-86F-30 AIRPLANES

[25] F-86F-25 THRU F-86F-35 AIRPLANES

[26] F-86F-25 AIRPLANES AF52-5272 THRU-5530 & F-86F-30 AIRPLANE AF52-4905, & ALL SUBSEQUENT AIRPLANES

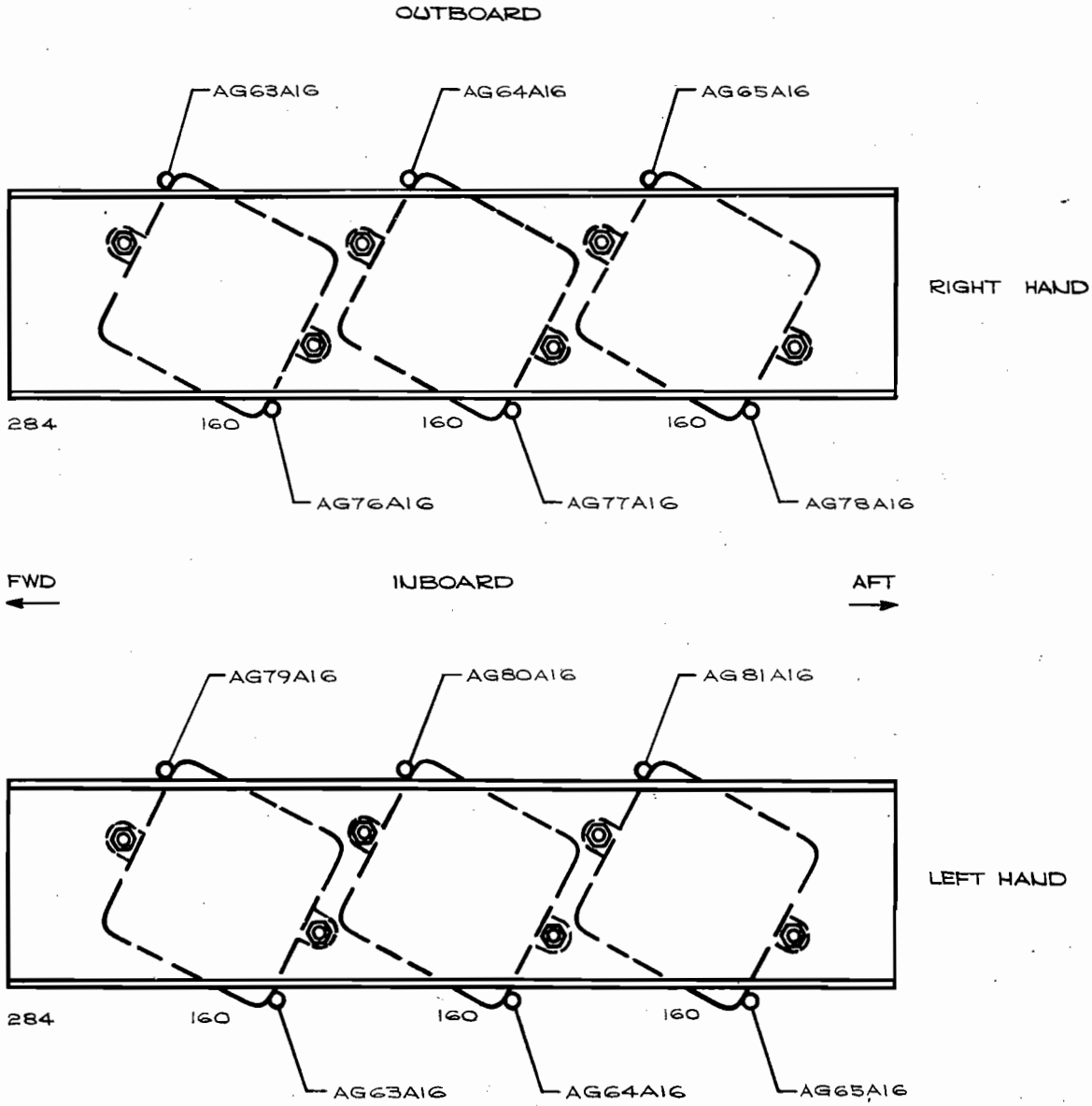
[27] F-86F-20 AIRPLANES & F-86F-25 AIRPLANES AF51-13170 THRU-13454

[28] F-86F-25 AIRPLANE AF51-13455, & ALL SUBSEQUENT AIRPLANES

[29] F-86F-25 AIRPLANES AF52-5278, -5291-5293, -5296, -5299, -5303, & -5305 THRU-5530, & F-86F-30 AIRPLANE AF52-4964, & ALL SUBSEQUENT AIRPLANES

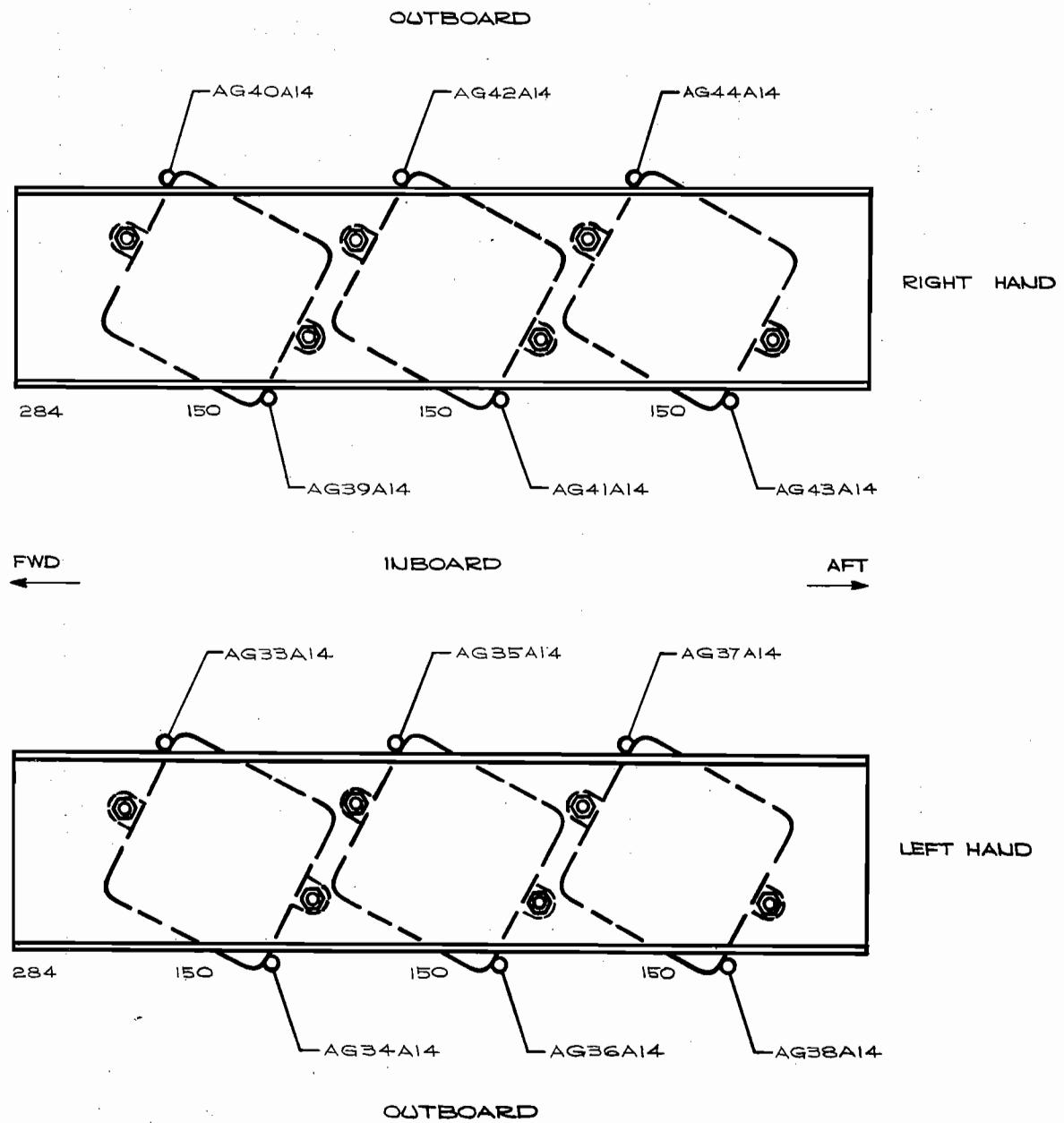
[30] F-86F-20 AIRPLANES & F-86F-25 AIRPLANES AF51-13170 THRU-13510 & AF52-5272 THRU-5277, -5279 THRU-5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU-5302, & -5304; & F-86F-30 AIRPLANES AF52-4305 THRU-4963

F-86F-2-54-412A



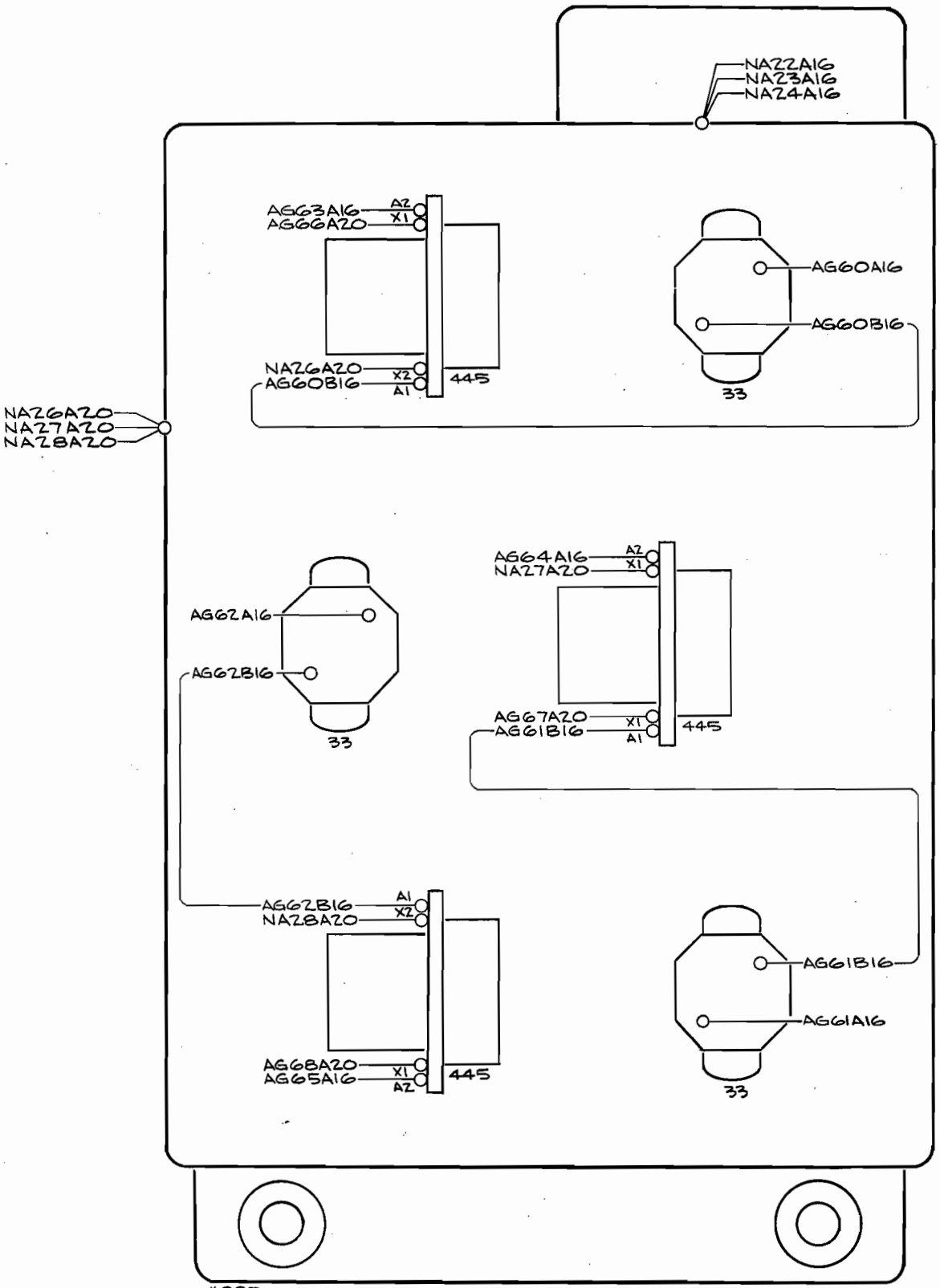
F-86F-2-54-414A

AMMUNITION BOOSTER MOTOR FILTER PANEL
F-86F-25 AIRPLANES AF52-5272 THROUGH -5328



F-86F-2-54-415

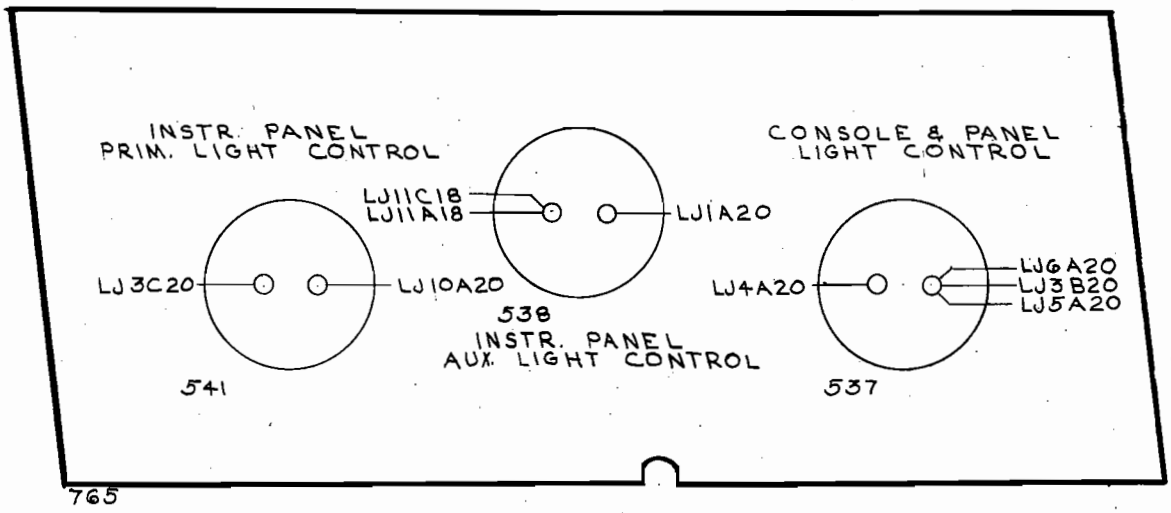
AMMUNITION BOOSTER MOTOR FILTER PANEL
F-86F-30 AIRPLANES AF 52-4305 THROUGH -5063



*L.H. SHOWN, R.H. OPPOSITE WITH MATCHING WIRE NO'S IN SAME RESPECTIVE POSITIONS

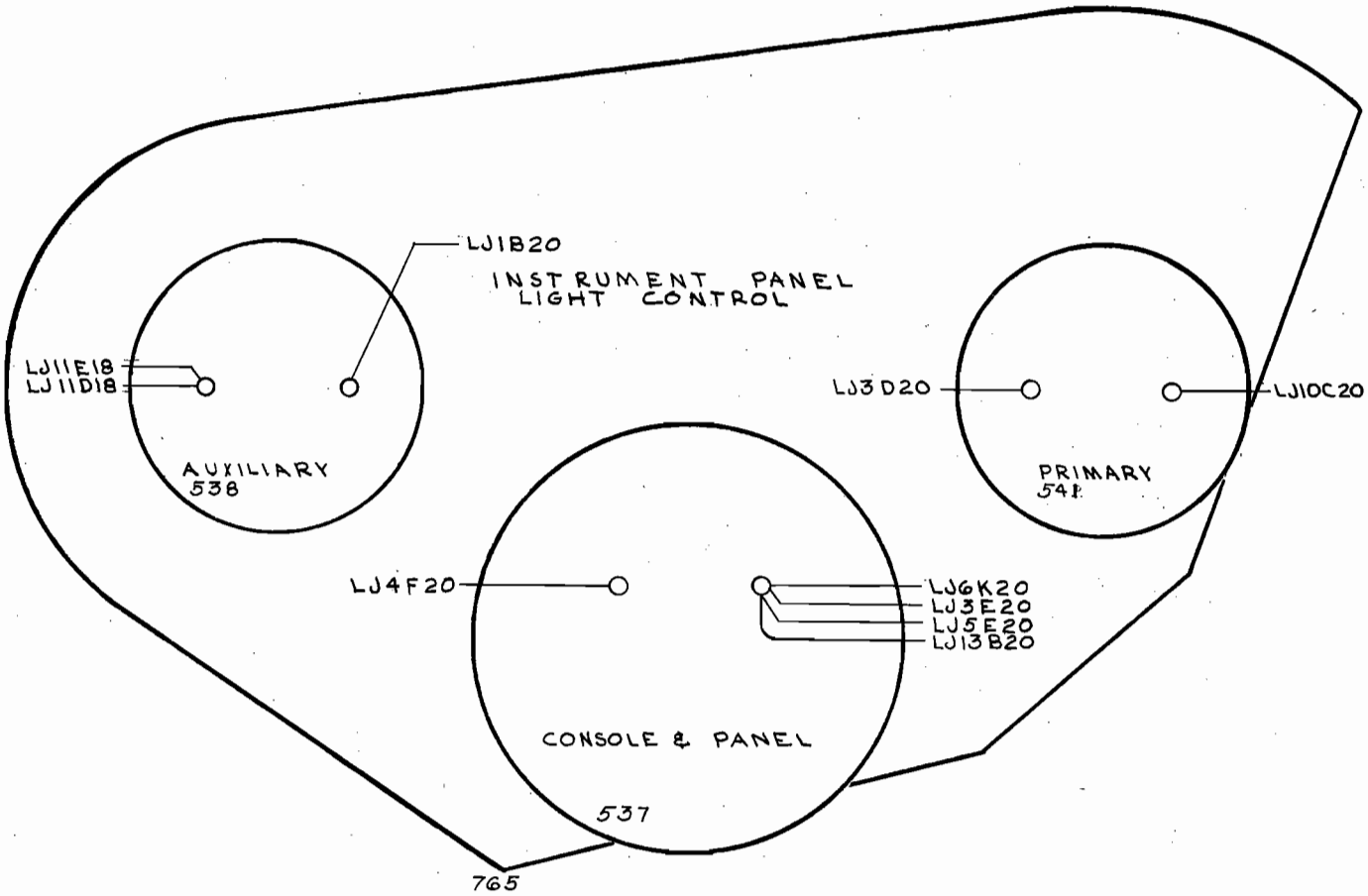
F-86F-2-54-416

AMMO BOOSTER MOTOR CIRCUIT BREAKER AND RELAY PANEL
F-86F-1 THROUGH F-86F-20 AIRPLANES
AND F-86F-25 AIRPLANES AF51-13070 THROUGH -13510



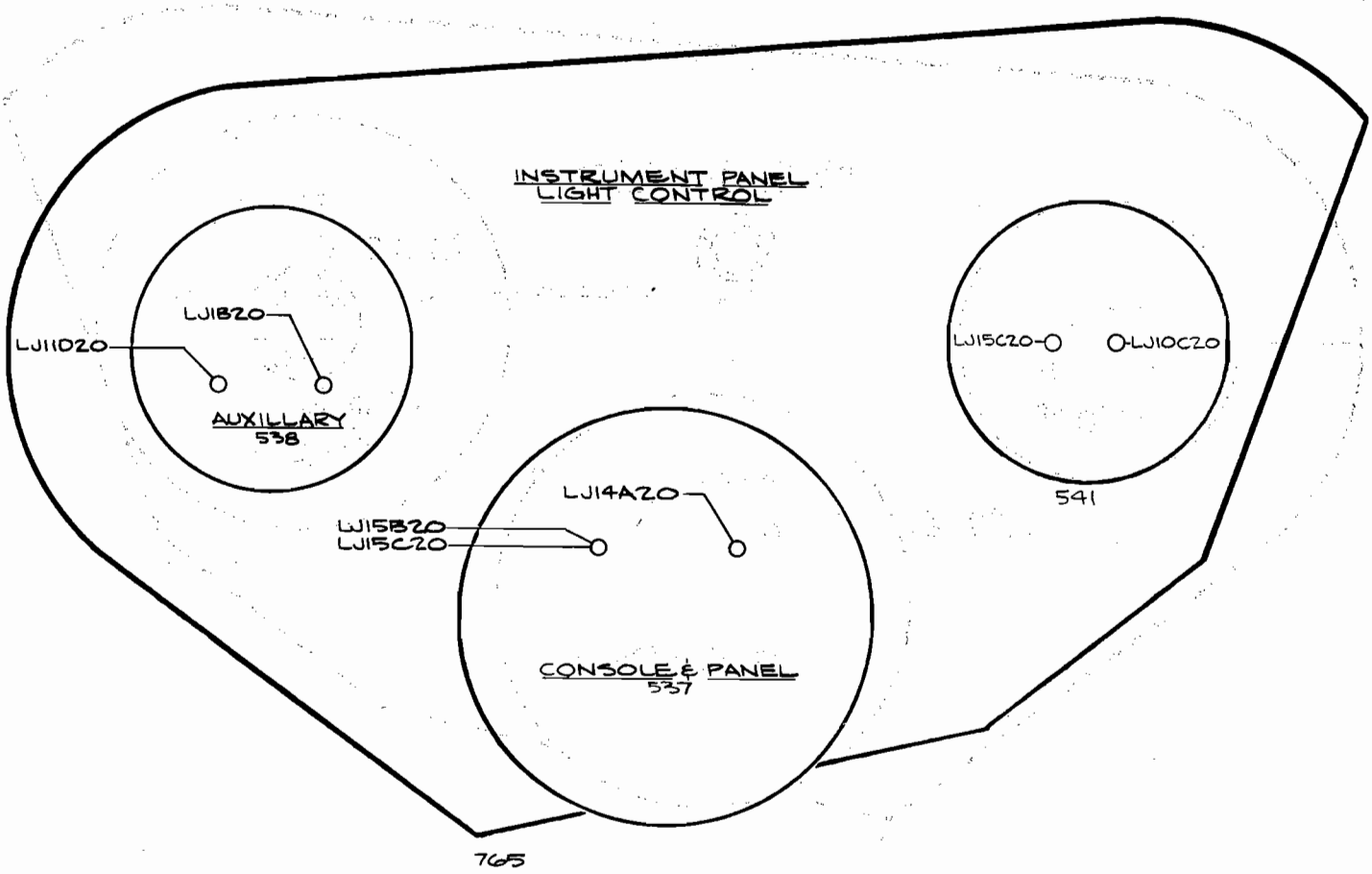
F-86F-2-54-428

COCKPIT LIGHT RHEOSTAT PANEL
F-86F-1 THROUGH F-86F-15 AIRPLANES



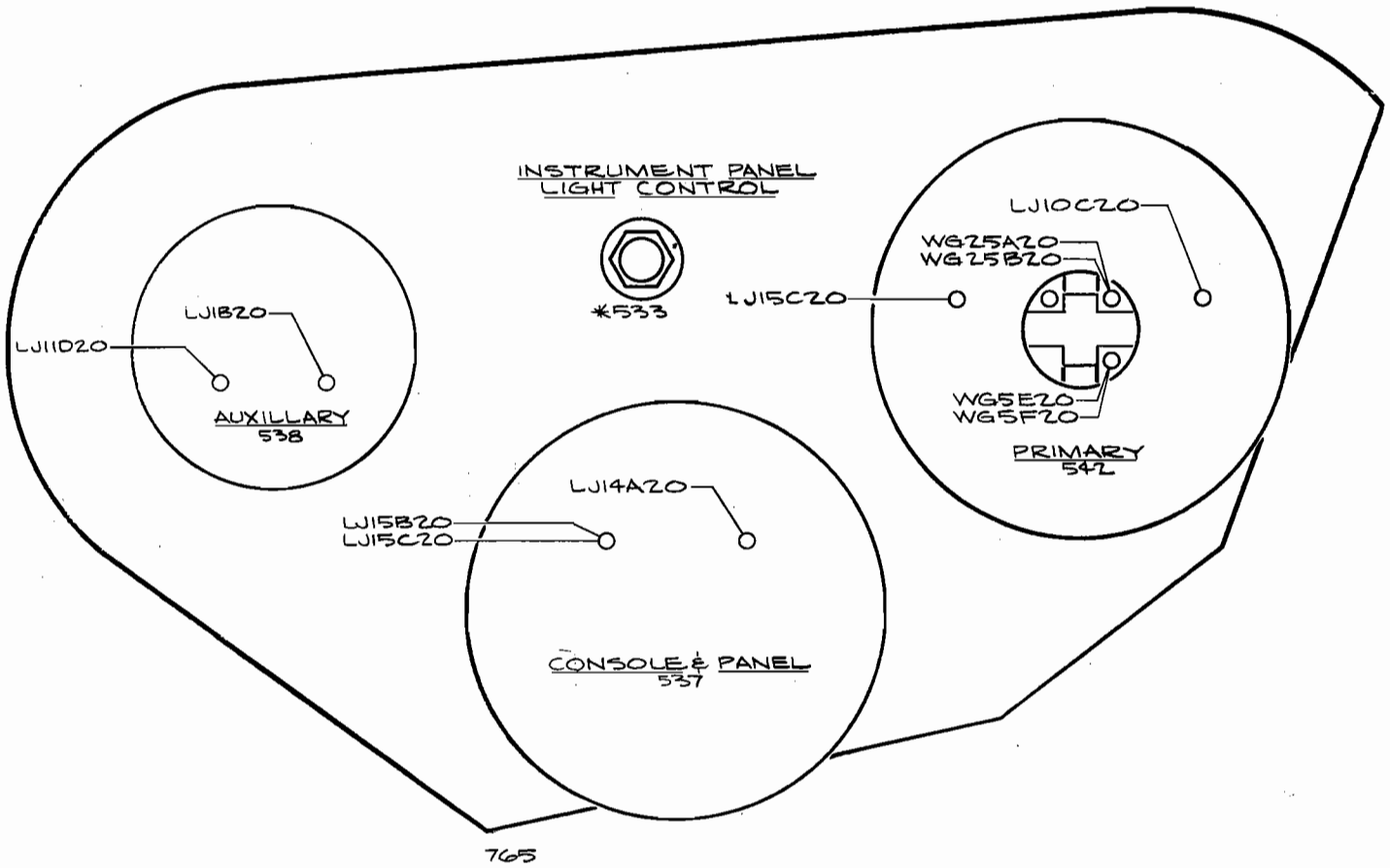
F-86F-2-54-429

COCKPIT LIGHT RHEOSTAT PANEL
F-86F-20 AIRPLANES AF51-13070 THROUGH-13089

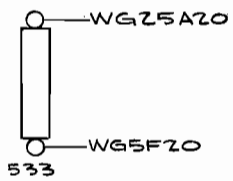


F-86F-2-54-417

Cockpit Light Rheostat Panel
F-86F-20 Airplanes AF51-13090 Through -13169 and
F-86F-25 Airplanes AF51-13170 Through -13454

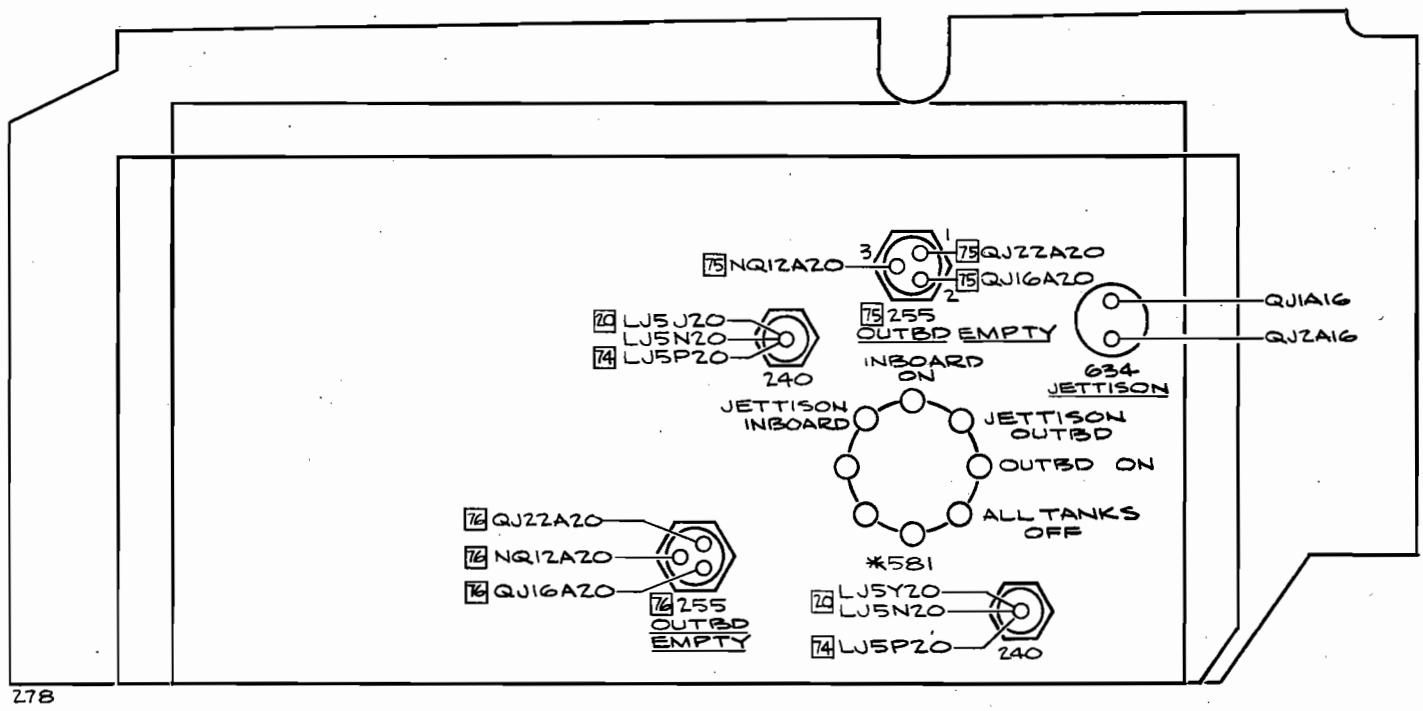


* SEE DETAIL BELOW PANEL

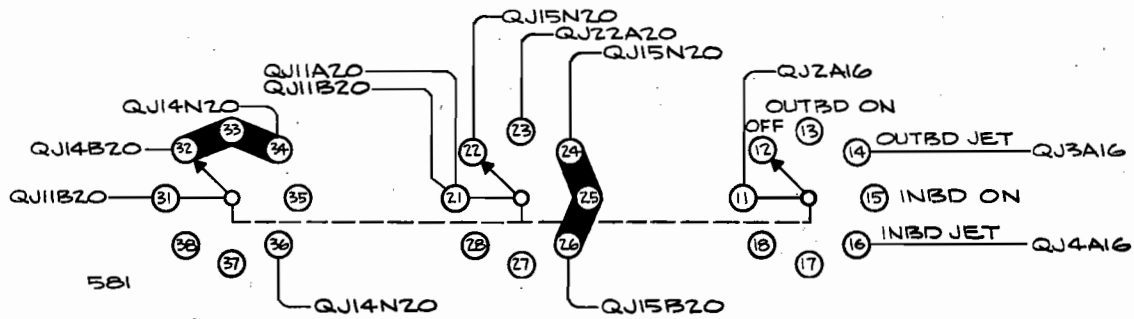


F-86F-2-54-418

Cockpit Light Rheostat Panel
F-86F-25 Airplanes AF51-13455 Through -13510, AF52-5272 Through -5530, F-86F-30 and F-86F-35 Airplanes



* SEE DETAIL BELOW PANEL



20 F-86F-30 AIRPLANES

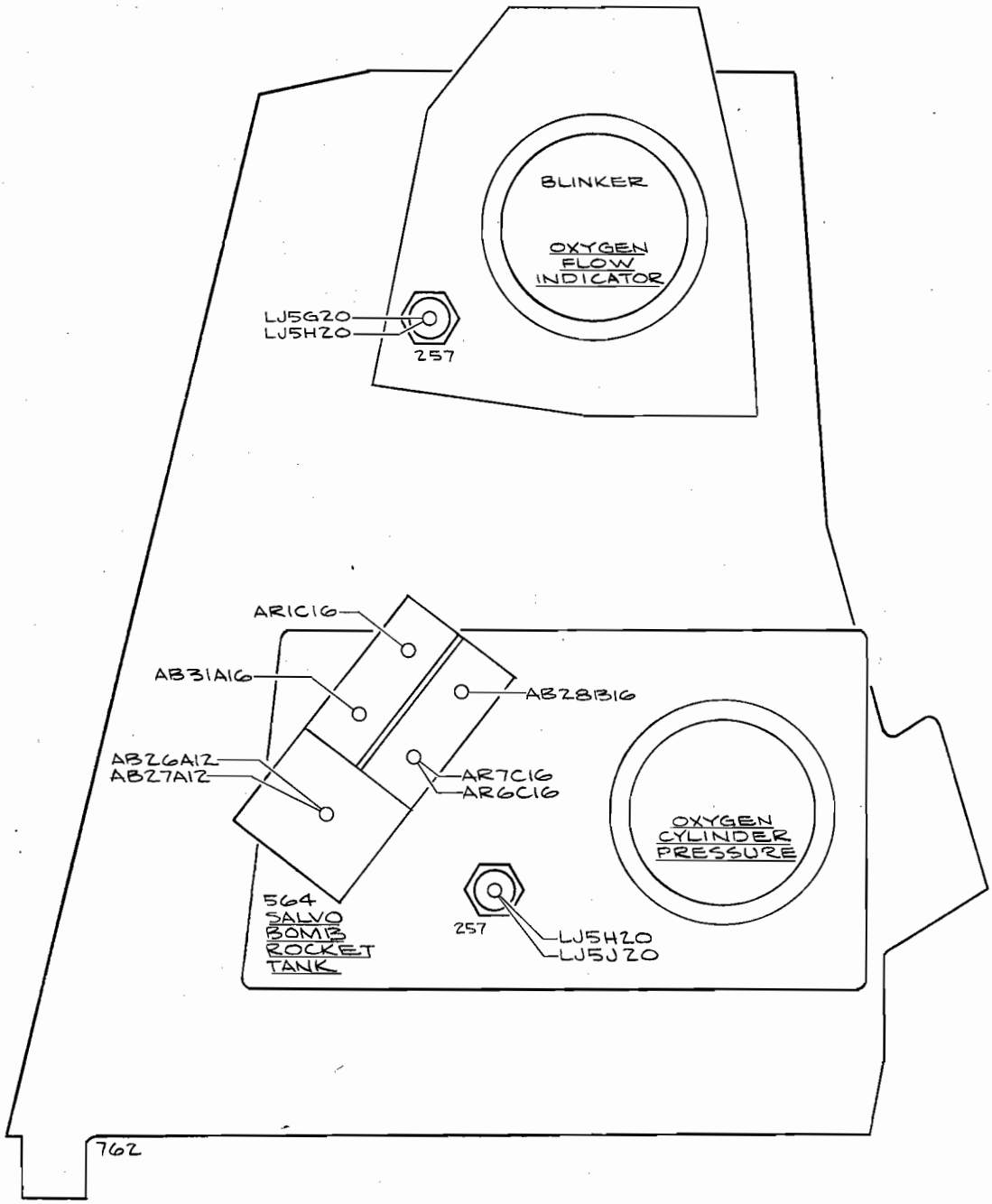
74 F-86F-25 AIRPLANES

75 F-86F-25 AIRPLANES AF51-13170 THROUGH-13283 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4454

76 F-86F-25 AIRPLANES AF51-13284 THROUGH-13510, AF52-5272 THROUGH-5530, AND F-86D-30 AIRPLANES AF52-4455 THROUGH -5163

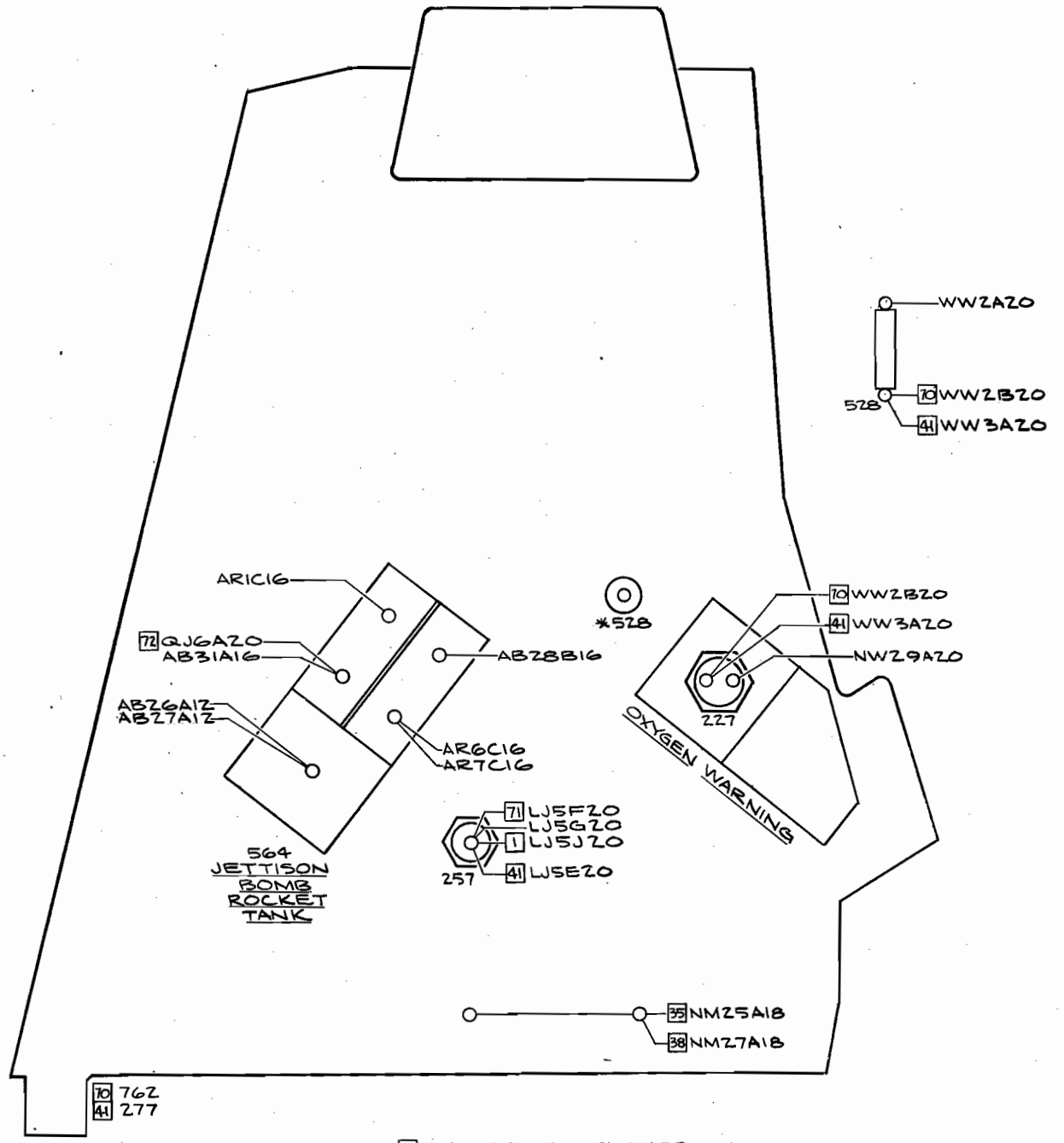
F-86F-2-54-411A

LEFT HAND FUSELAGE STATION 80 TO STATION 95 PANEL
F-86F-25 AND F-86F-30 AIRPLANES



F-86F-2-54-408A

FUSELAGE STATION 78 TO STATION 84 LEFT HAND CONSOLE PANEL
F-86F-1 THROUGH F-86F-15 AIRPLANES



1 F-86F-20 AIRPLANES

35 F-86F-25 AIRPLANES AF51-13398 THROUGH -13510 AND AF52-5272 THROUGH -5386

38 F-86F-30 AIRPLANES AF52-4505 THROUGH -4954

41 F-86F-30 AIRPLANES AF52-4305 THROUGH -4954

70 F-86F-20 AIRPLANES, AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5386

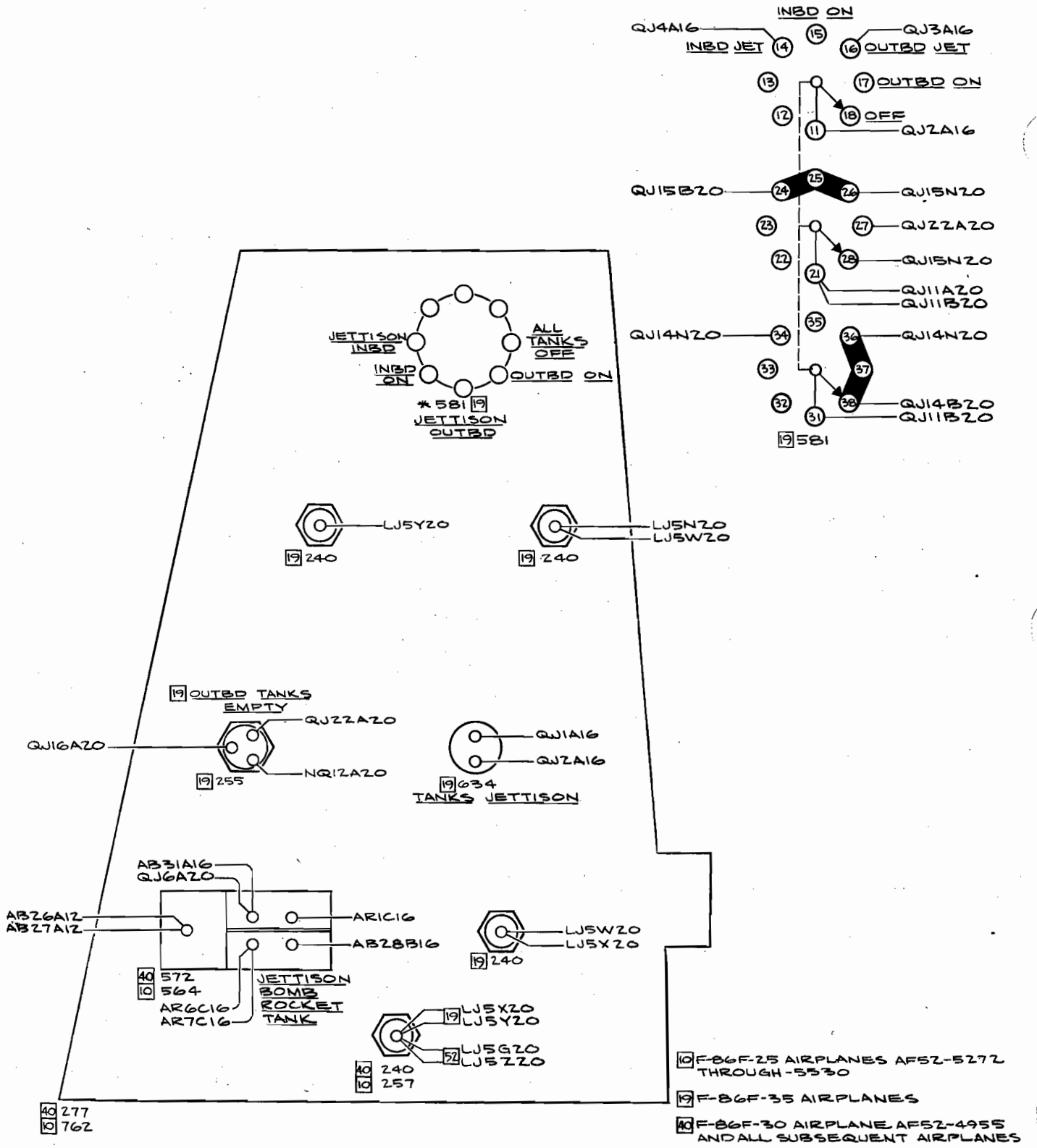
71 F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5386

72 F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5386, AND F-86D-30 AIRPLANES AF52-4305 THROUGH -4954

*SEE DETAIL AT RIGHT OF PANEL

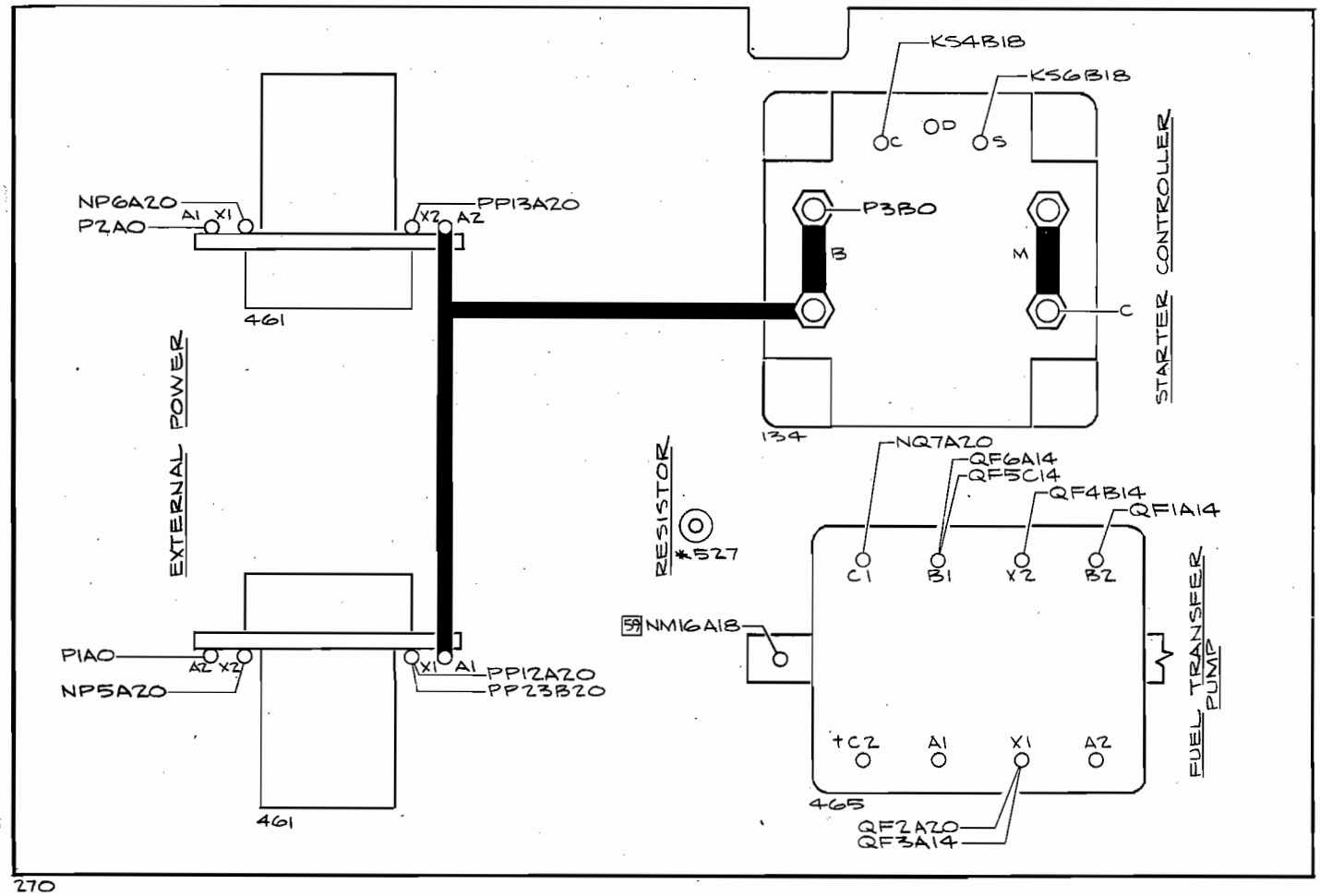
F-86F-2-54-409A

FUSELAGE STATION 78 TO STATION 84 LEFT HAND CONSOLE PANEL
F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5386 AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4954

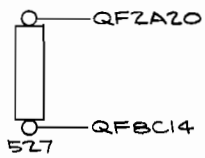


F-86F-2-54-410A

FUSELAGE STATION 78 TO STATION 84 LEFT HAND CONSOLE PANEL F-86F-25 AIRPLANES AF52-5387 THROUGH -5530 AND F-86F-30 AIRPLANE AF52-4955 AND ALL SUBSEQUENT AIRPLANES



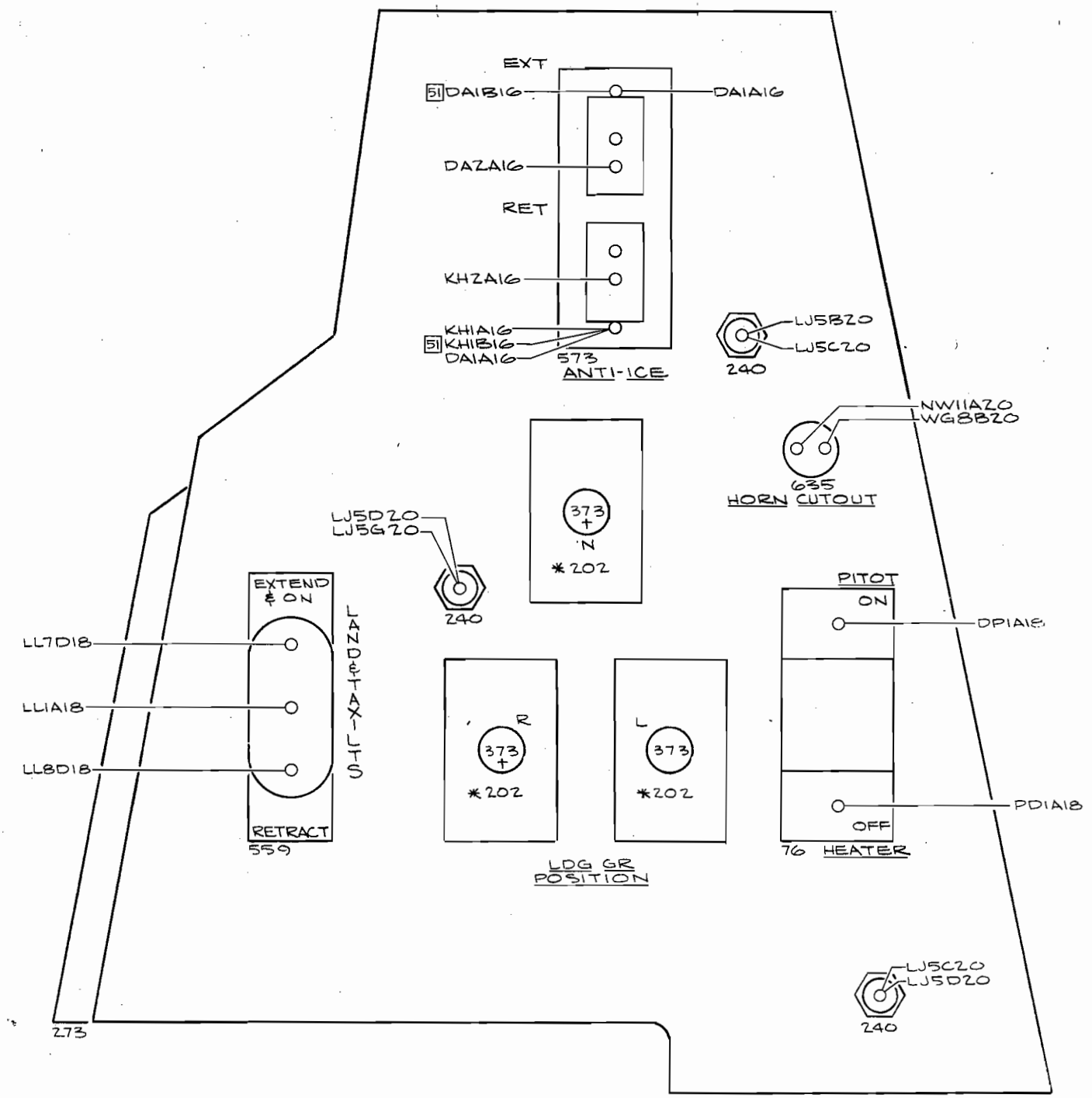
* SEE DETAIL BELOW
+ PINS "C2" AND "X2" CONNECTED INTERNALLY

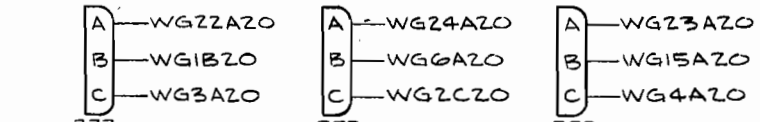


59 F-86F-25 AIRPLANES AF51-13398 THROUGH -13510, AF52-5272 THROUGH -5530, F-86F-30 AIRPLANE AF52-4505, AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-407

ENGINE SECTION. RELAY PANEL
F-86F-1 THROUGH F-86F-35 AIRPLANES





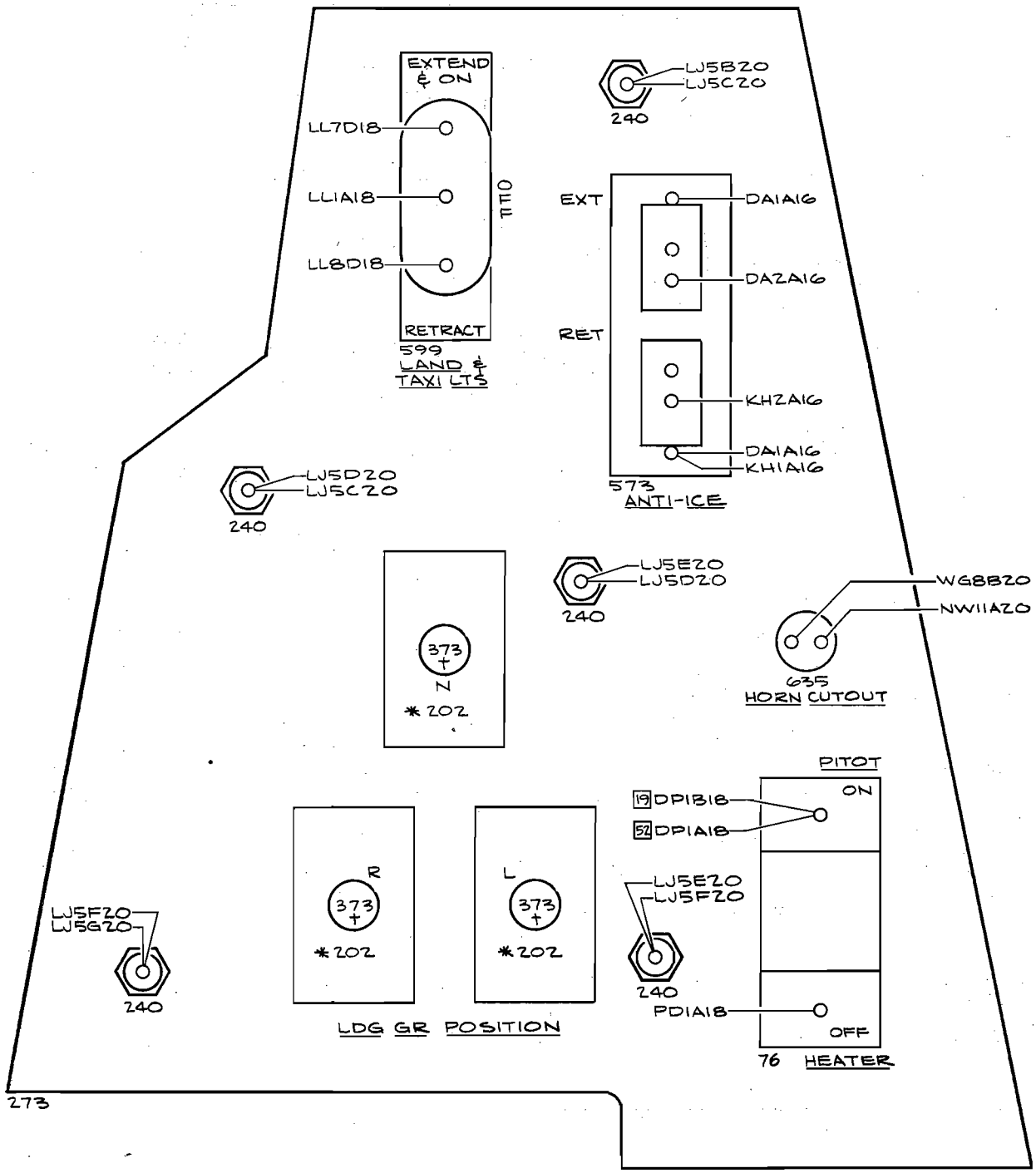
*DENOTES GOVERNMENT FURNISHED PROPERTY
† SEE DETAILS BELOW PANEL

51 F-86F-1 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH -13510, AND F-86F-30 AIRPLANES AF52 -4505 THROUGH -4904

F-86F-2-54-405

LEFT HAND FORWARD CONSOLE PANEL

F-86F-1 THROUGH F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510, AF52-5272 THROUGH-5386, AND F-86F-30 AIRPLANES AF52-4505 THROUGH -4954



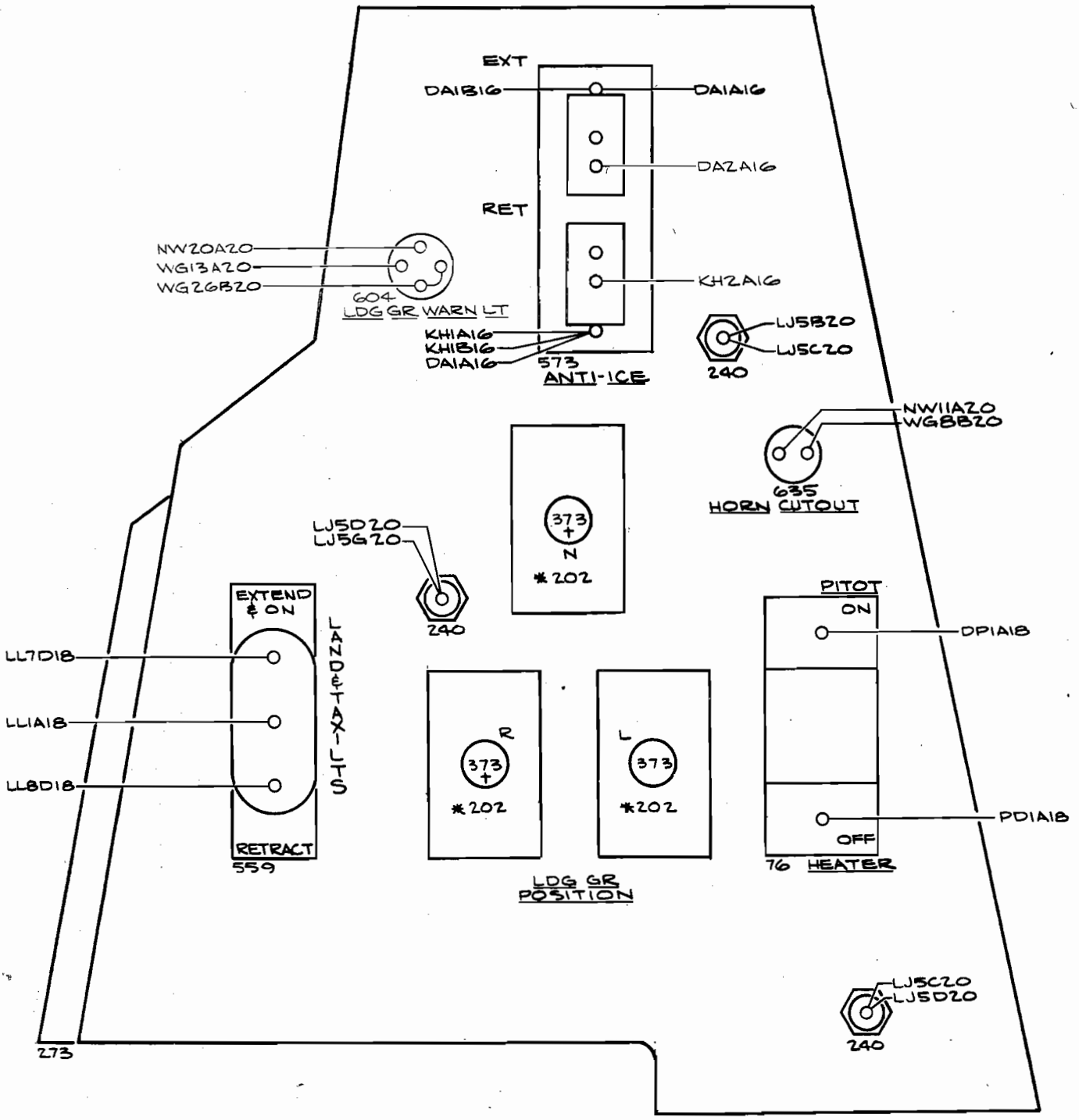
19 F-86F-35 AIRPLANES

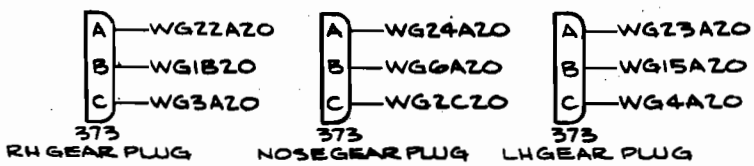
52 F-86F-25 AIRPLANES AF52-5387 THROUGH-5530 AND F-86F-30 AIRPLANES AF52-4955 THROUGH -5163

*DENOTES GOVERNMENT FURNISHED PROPERTY
†SEE DETAILS BELOW PANEL

F-86F-2-54-404 A

LEFT HAND FORWARD CONSOLE PANEL NO.1
F-86F-25 AIRPLANES AF52-5387 THROUGH -5530 AND
F-86F-30 AIRPLANE AF52-4955 AND ALL SUBSEQUENT AIRPLANES



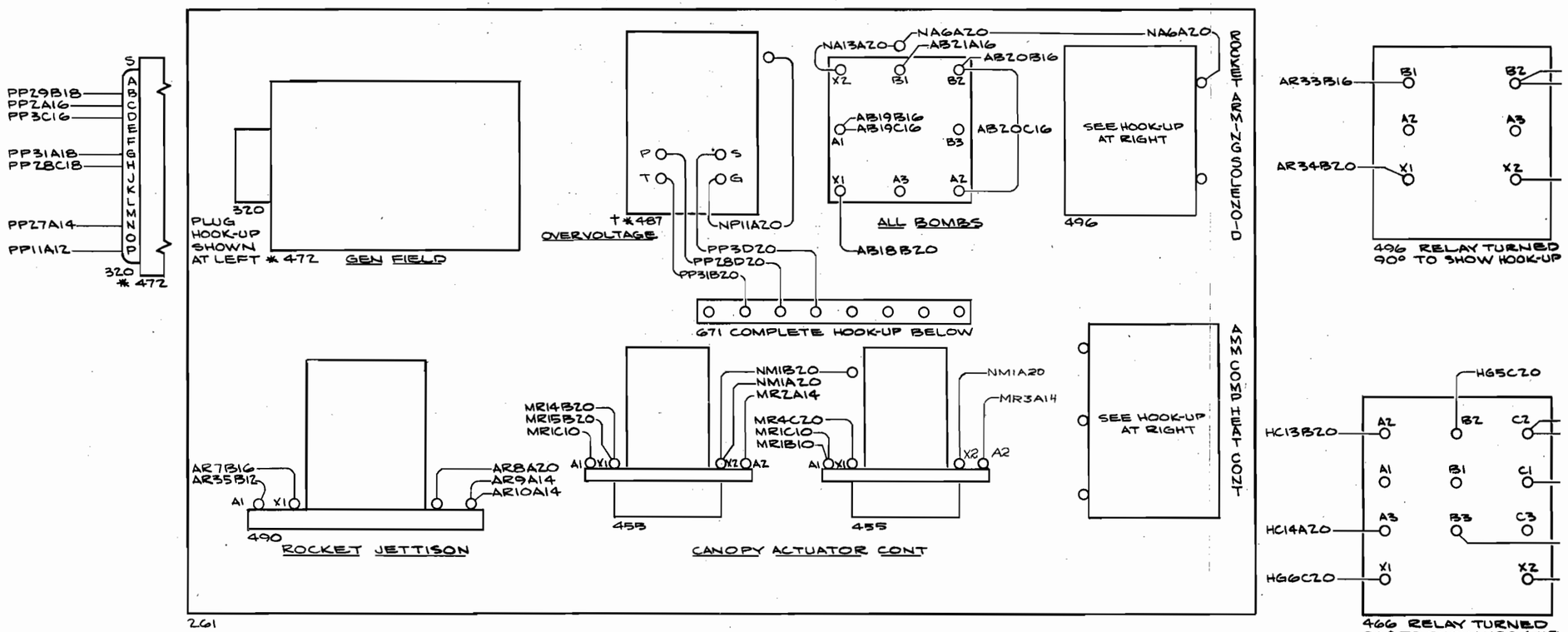


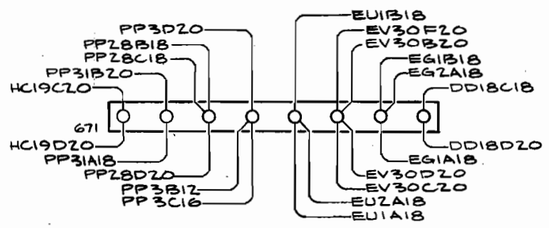
*DENOTES GOVERNMENT FURNISHED PROPERTY
†SEE DETAILS BELOW PANEL

F-86F-2-54-406

LEFT HAND FORWARD CONSOLE PANEL

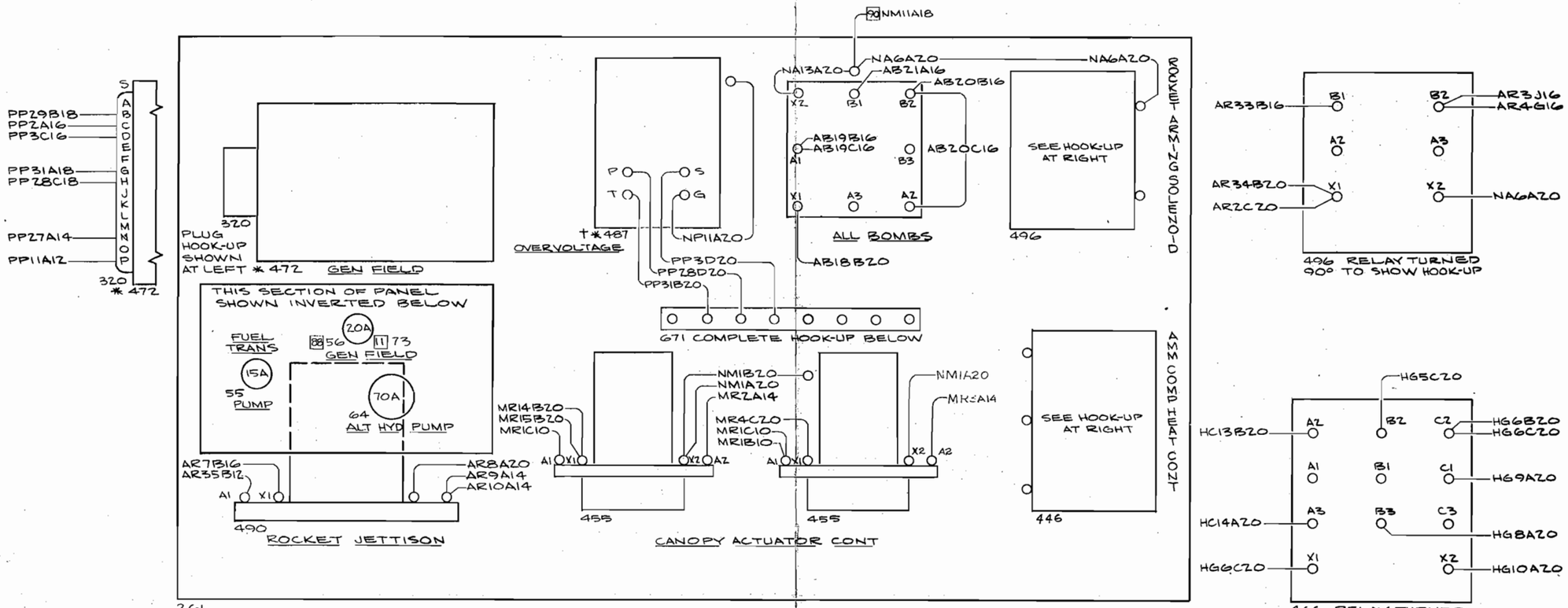
F-86F-30 AIRPLANES AF52-4305 THROUGH -4504

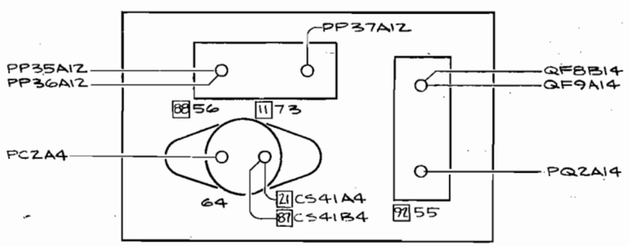


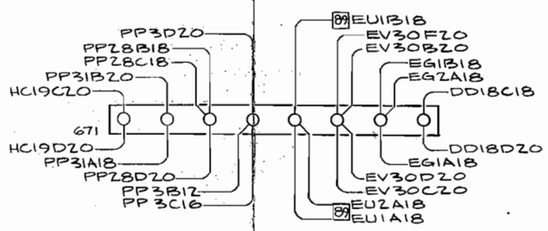


* DENOTES GOVERNMENT FURNISHED EQUIPMENT

F-86F-2-54-403 /







11 F-86F-5 THROUGH F-86F-15 AIRPLANES

21 F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

86 F-86F-30 AIRPLANES AF52-5014 THROUGH-5063

87 F-86F-5 THROUGH F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH-5328

88 F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH-13510 AND AF52-5272 THROUGH-5328, AND F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

89 F-86F-5 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH-13510 AND AF52-5272 THROUGH-5328 AND F-86F-30 AIRPLANES AF52-4305 THROUGH-4904

90 F-86F-25 AIRPLANES AF51-13398 THROUGH-13510 AND AF52-5272 THROUGH-5530, AND F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

91 F-86F-30 AIRPLANES AF52-4905 THROUGH-5063

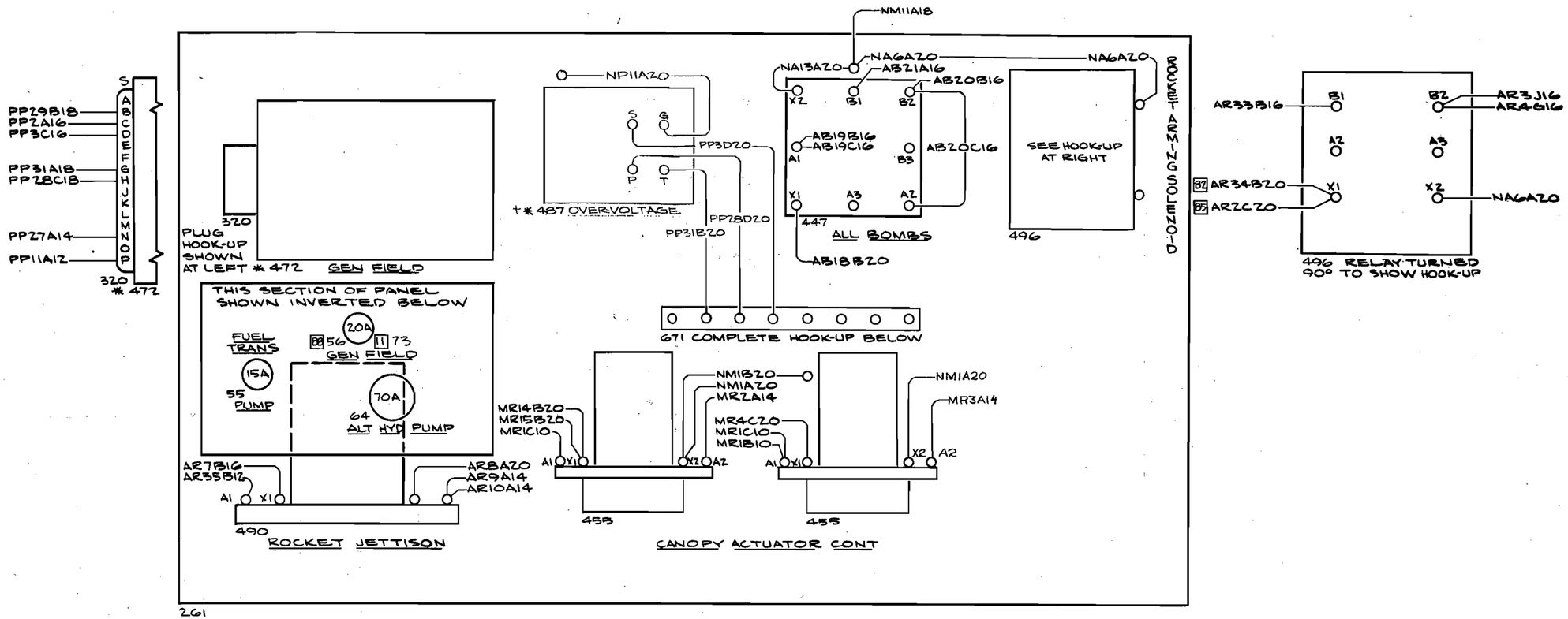
92 F-86F-5 THROUGH F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13080 THROUGH-13510 AND AF52-5272 THROUGH-5328 AND F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

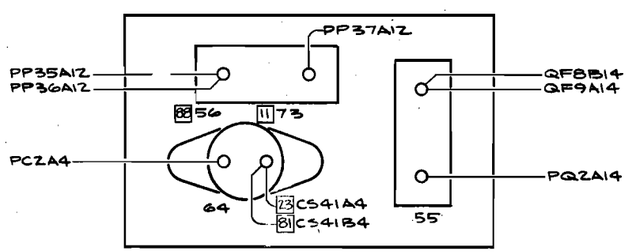
F-86F-2-54-401A

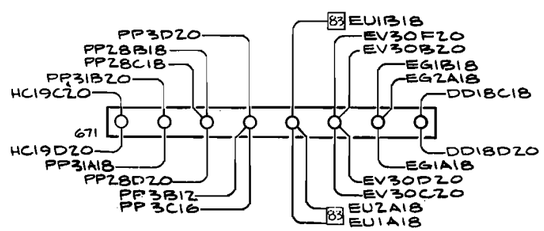
* DENOTES GOVERNMENT FURNISHED EQUIPMENT
+ ROTATE OVERVOLTAGE RELAY 90° COUNTER-CLOCKWISE 86

RELAY AND CONTROL PANEL

F-86F-5 THROUGH F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THROUGH-13510 AND AF52-5272 THROUGH-5328 AND F-86F-30 AIRPLANES AF52-4305 THROUGH-5063







23 F-86F-30 AIRPLANE AF52-4955 AND ALL SUBSEQUENT AIRPLANES

81 F-86F-25 AIRPLANES AF52-5329 THROUGH-5530

82 F-86F-25 AIRPLANES AF52-5329 THROUGH-5380

83 F-86F-25 AIRPLANES AF52-5329 THROUGH-5446

84 F-86F-25 AIRPLANES AF52-5329 THROUGH-5386

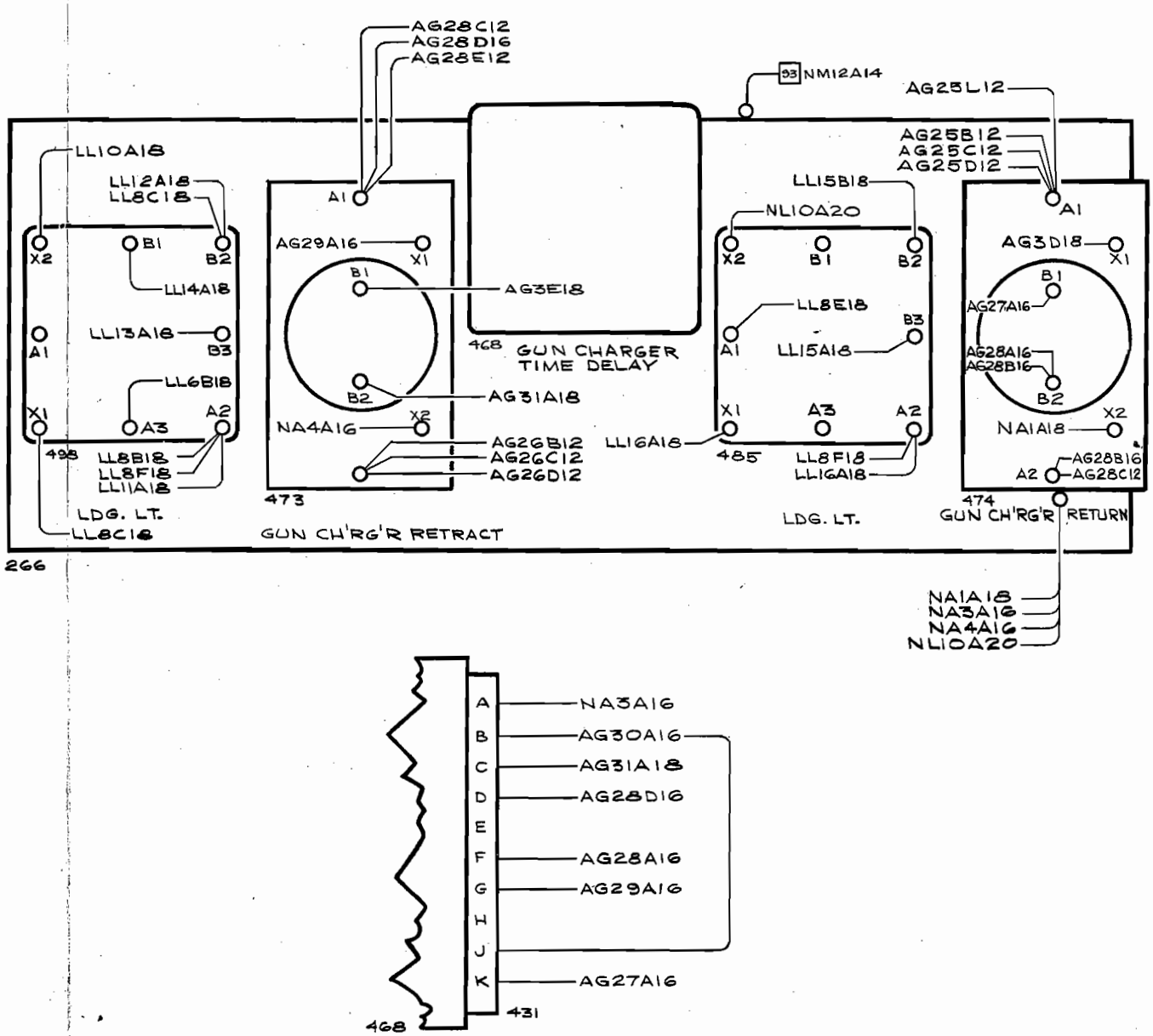
85 F-86F-25 AIRPLANES AF52-5381 THROUGH-5530, F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-402A

* DENOTES GOVERNMENT FURNISHED EQUIPMENT
ROTATE OVERVOLTAGE RELAY 90° CLOCKWISE 84

RELAY AND CONTROL PANEL

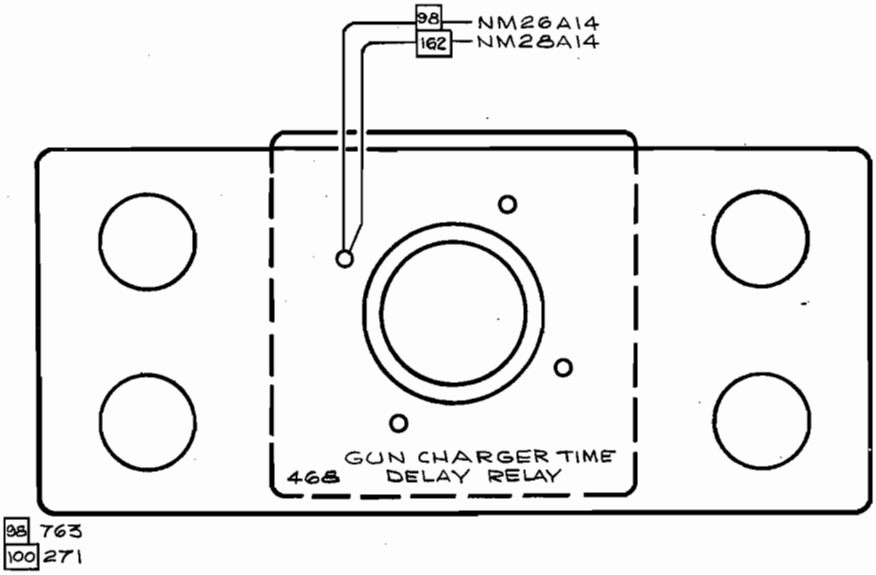
F-86F-25 AIRPLANES AF52-5329 THROUGH -5530 AND F-86F-30 AIRPLANES AF52-5064 AND ALL SUBSEQUENT AIRPLANES

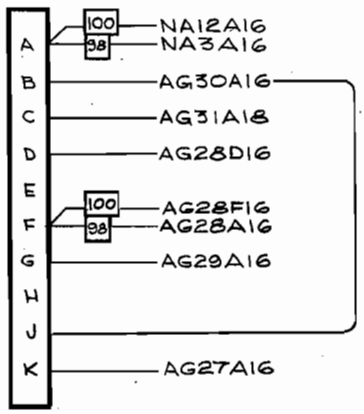


93 F-86F-25 AIRPLANES AF51-13398 THRU -13510

F-86F-2-54-399

GUN CHARGER RELAY PANEL
F-86F-1 THROUGH F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510





RELAY RECEPTACLE CONNECTIONS

98 F-86F-25 AIRPLANES AF52-5272 THRU -5277, -5279 THRU -5290, -5292, -5294, -5295, 5297, -5298, -5300 THRU -5302, AND -5304

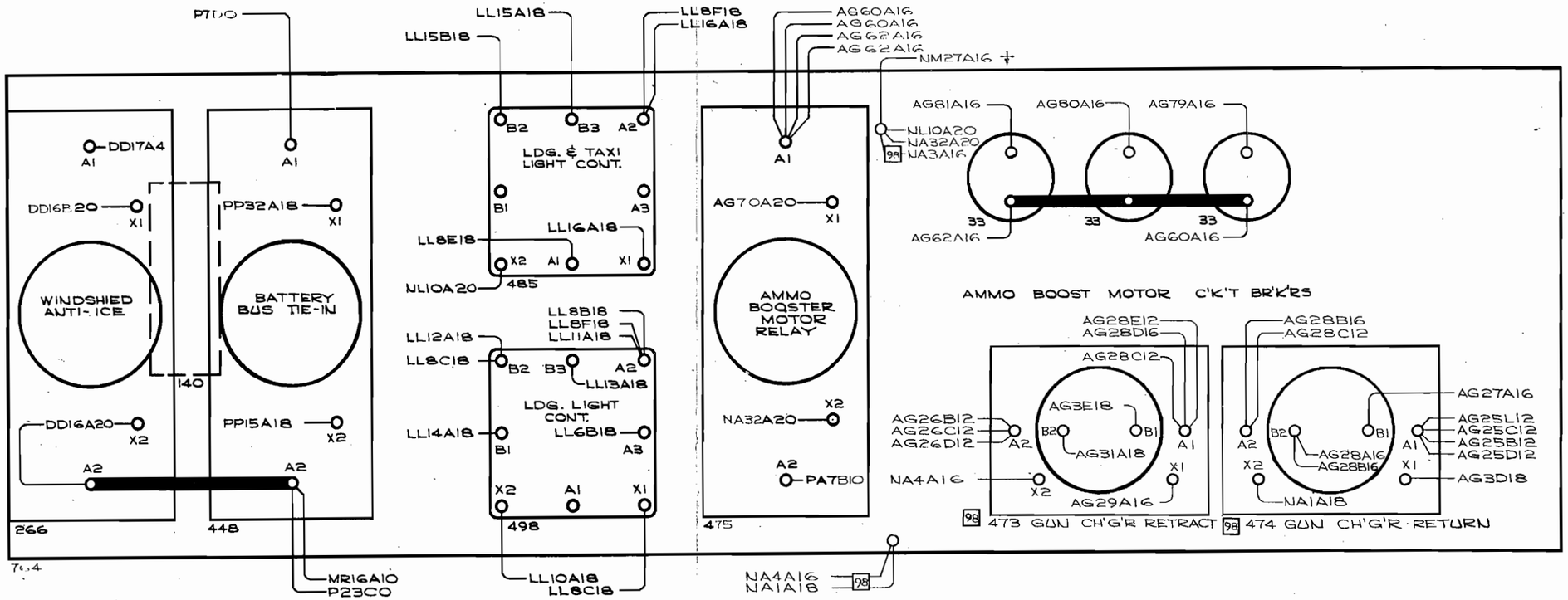
100 F-86F-30 AIRPLANES AF52-4405 THRU -4963

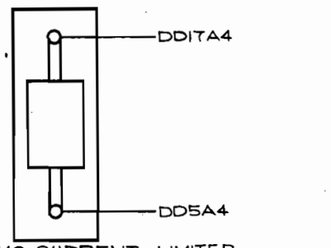
162 F-86F-30 AIRPLANES AF52-4505 THRU -4963

F-86F-2-54-400

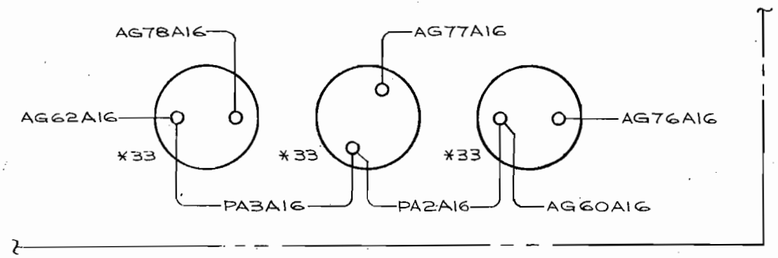
GUN CHARGER TIME DELAY RELAY PANEL

F-86F-25 AIRPLANES AF52-5272 THROUGH -5277, -5279 THROUGH -5290 -5292, -5294, -5295, -5297, -5298, -5300 THROUGH -5302, -5304 AND F-86F-30 AIRPLANES AF52-4405 THROUGH -4963





140 CURRENT LIMITER
(FOUND ON BACK OF PANEL)



† CONNECTED ON BACK OF PANEL

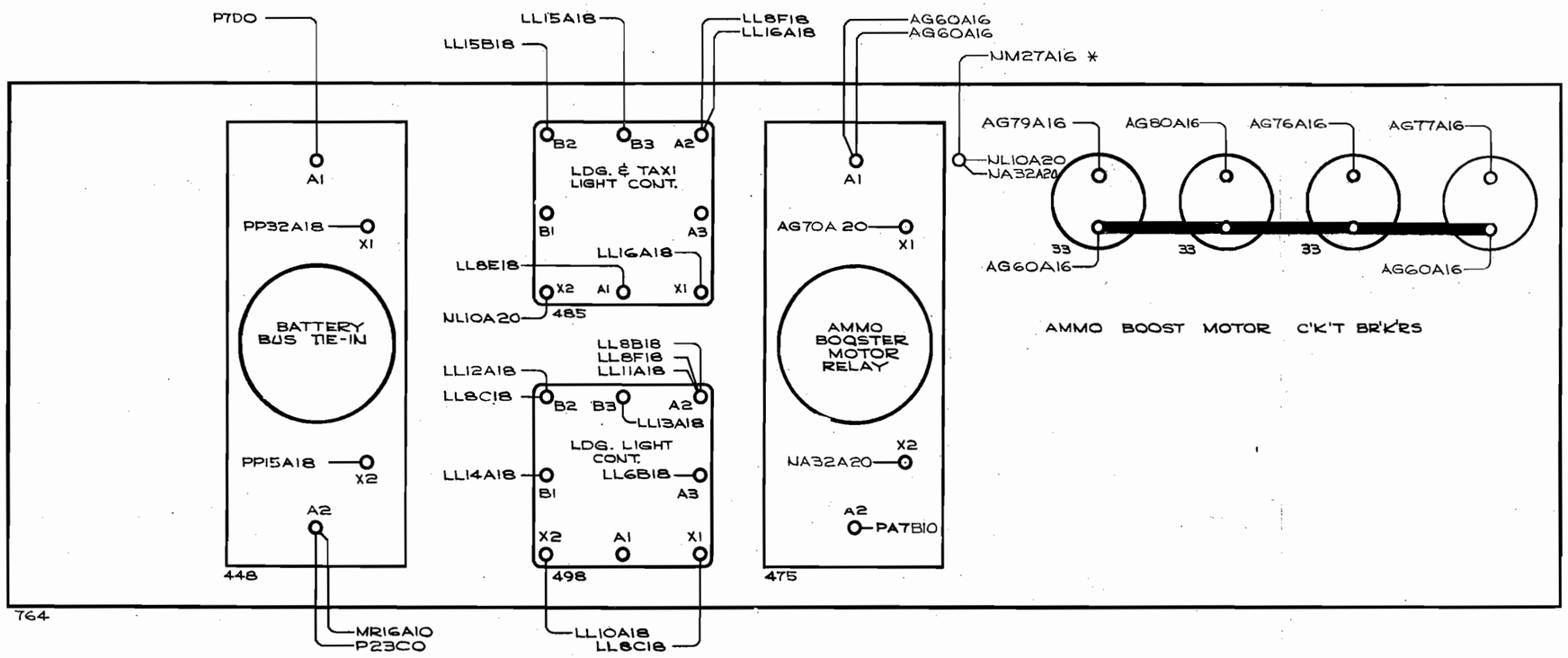
* MOUNTED ON BACK OF PANEL DIRECTLY BEHIND OTHER CIRCUIT BREAKERS

98 F-86F-25 AIRPLANES AF52-5272 THRU -5277, -5279 THRU -5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU -5302, AND -5304

FUSELAGE STATION 31 TO 46 RELAY PANEL

F-86F 25 AIRPLANES AF52-5272 THROUGH 5328

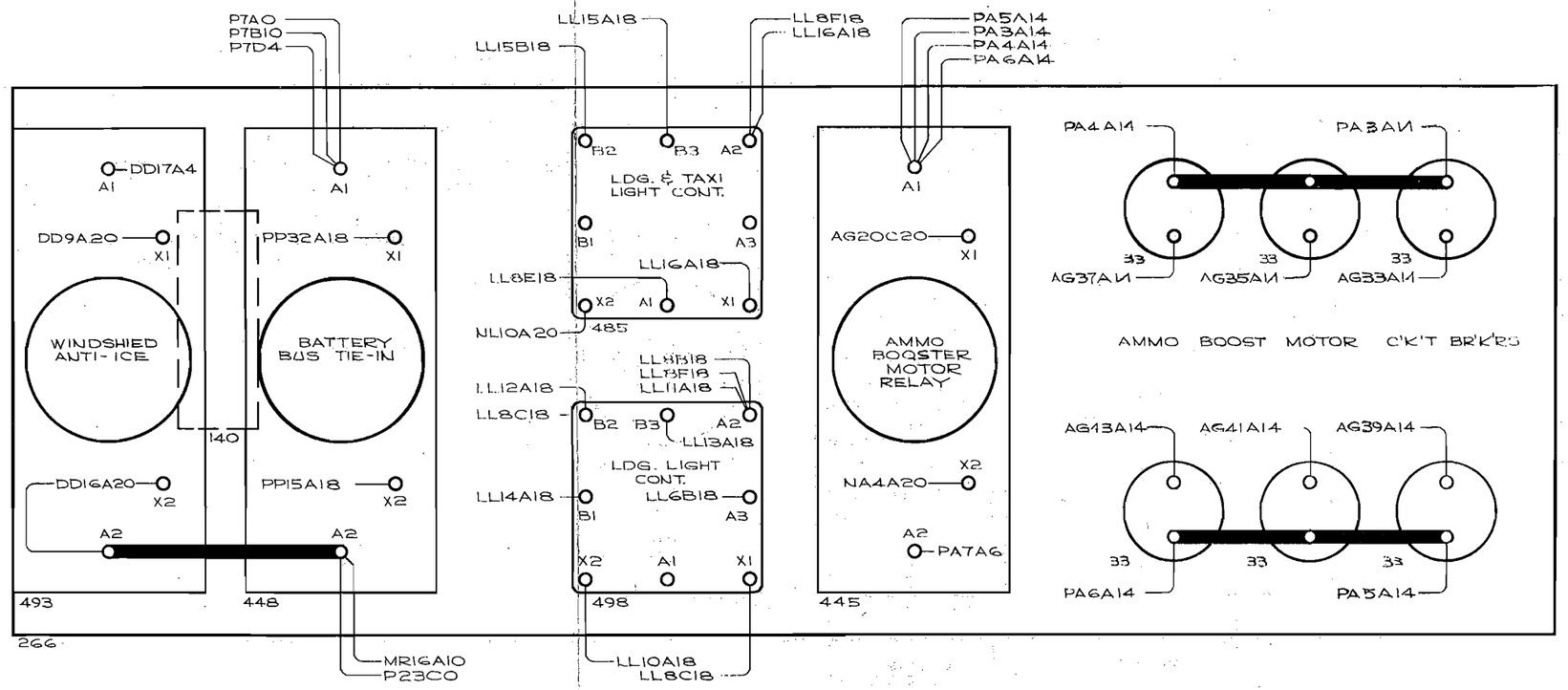
F-86F-2-54-397A



*CONNECTED ON BACK OF PANEL

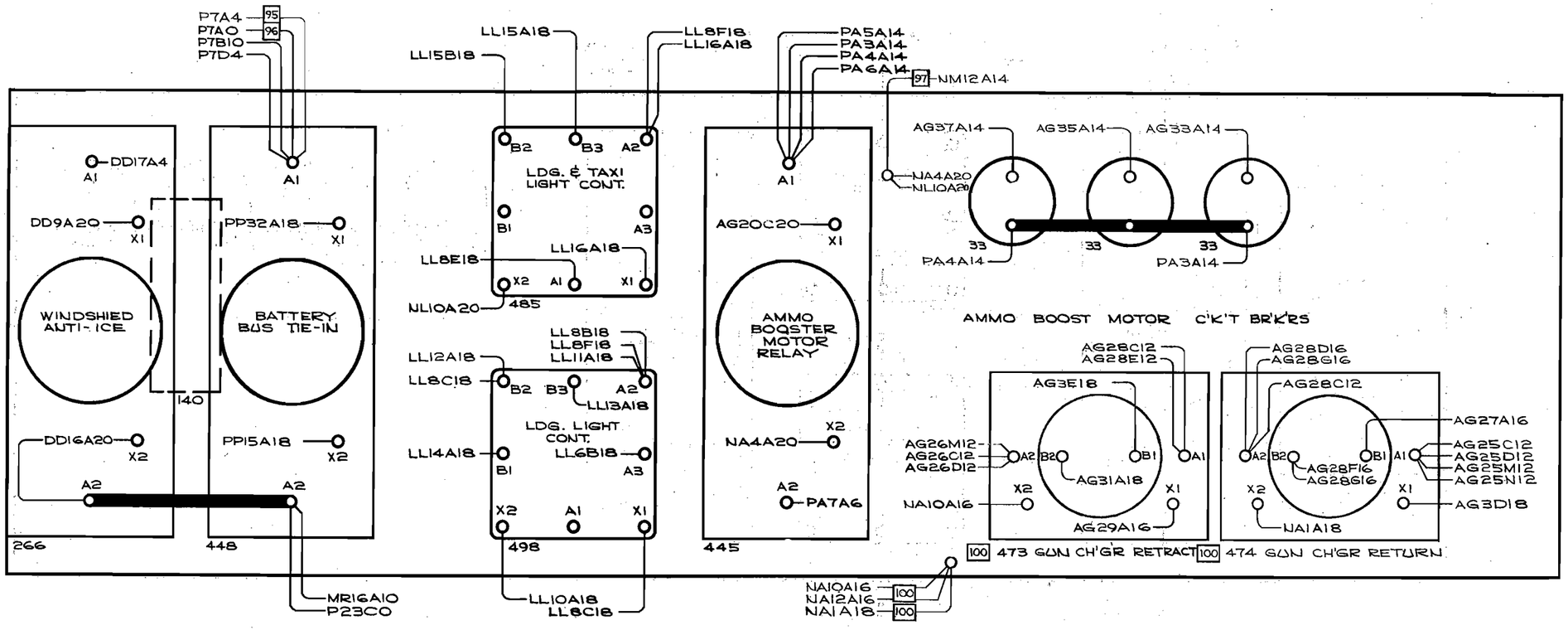
FUSELAGE STATION 31 TO 46 RELAY PANEL
F-86F-25 AIRPLANES AF52-5329 THROUGH -5530

F-86F-2-54-398



F-86F-2-54-394

FUSELAGE STATION 31 TO 46 RELAY PANEL
F-86F-30 AIRPLANES AF52-4305 THROUGH -4404



† CONNECTED ON BACK OF PANEL

* MOUNTED ON BACK OF PANEL DIRECTLY BEHIND OTHER CIRCUIT BREAKERS

95 F-86F-30 AIRPLANES AF52-4555 THRU -5063

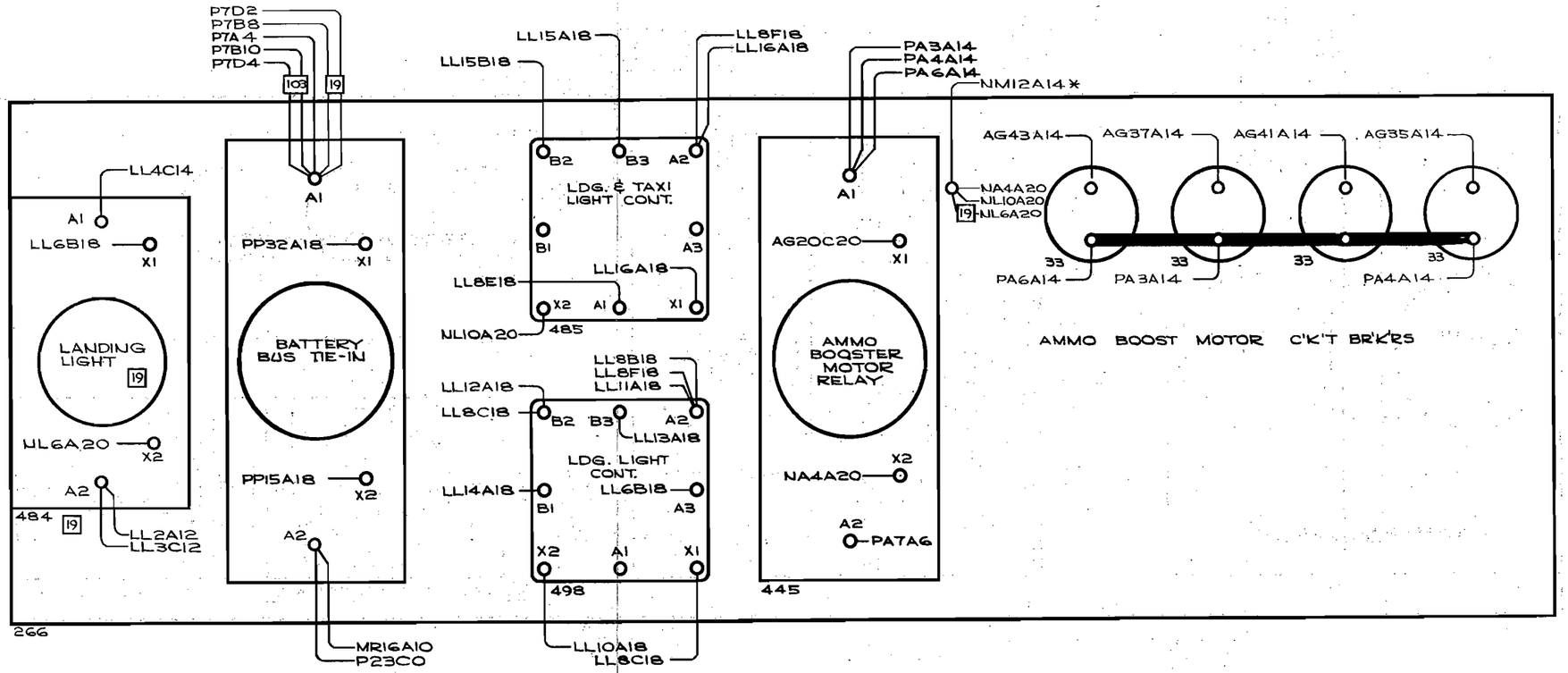
96 F-86F-30 AIRPLANES AF52-4405 THRU -4554

97 F-86F-30 AIRPLANES AF52-4505 THRU -5063

100 F-86F-30 AIRPLANES AF52-4405 THRU -4963

Fuselage Station 31 To 46 Relay Panel

F-86F-30 Airplanes AF52-4405 Through -5063



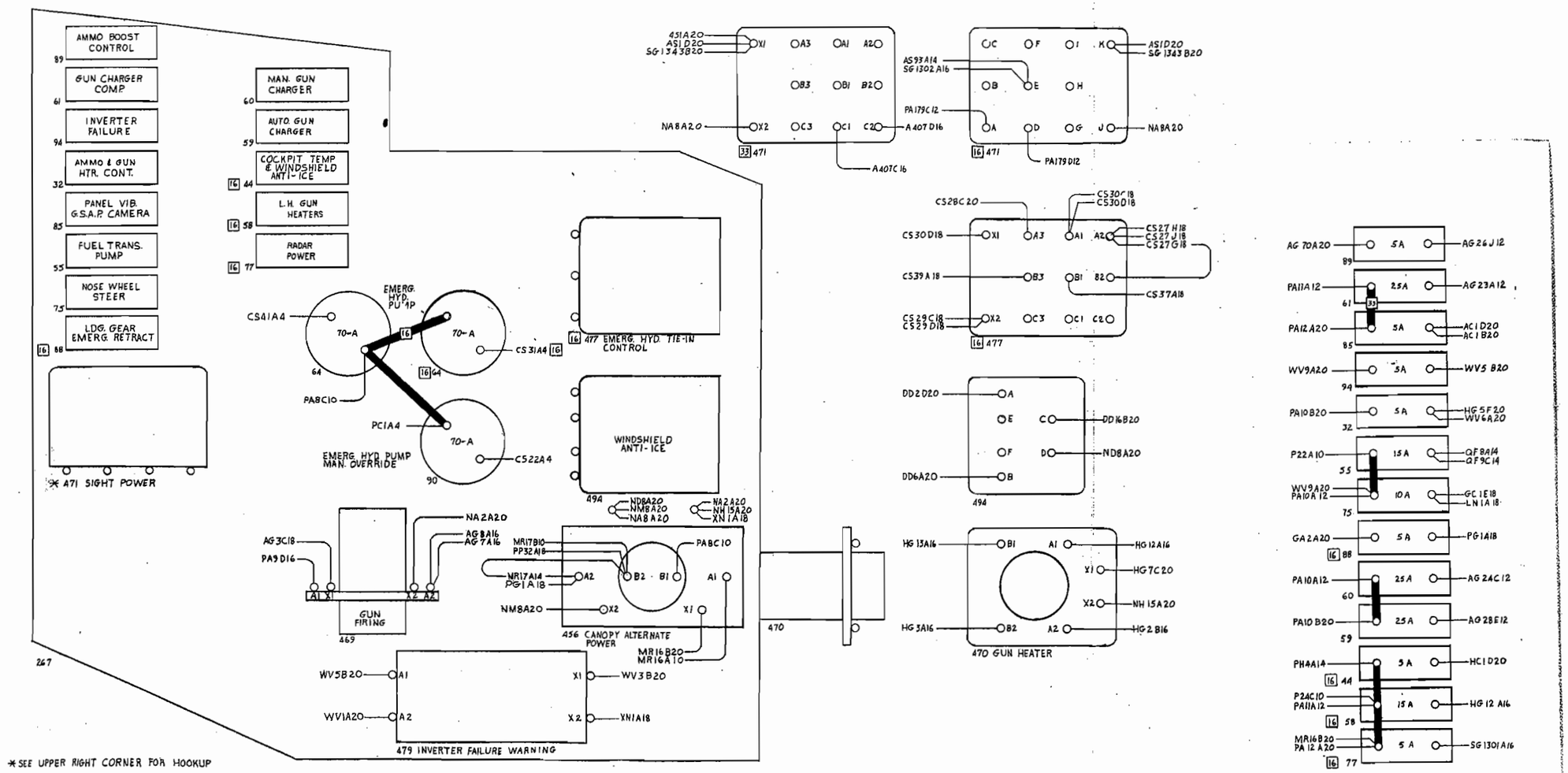
* CONNECTED ON BACK OF PANEL

19 F-86F-35 AIRPLANES

103 F-86F-30 AIRPLANES AF52-5064 THRU -5163

FUSELAGE STATION 31 TO 46 RELAY PANEL
F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

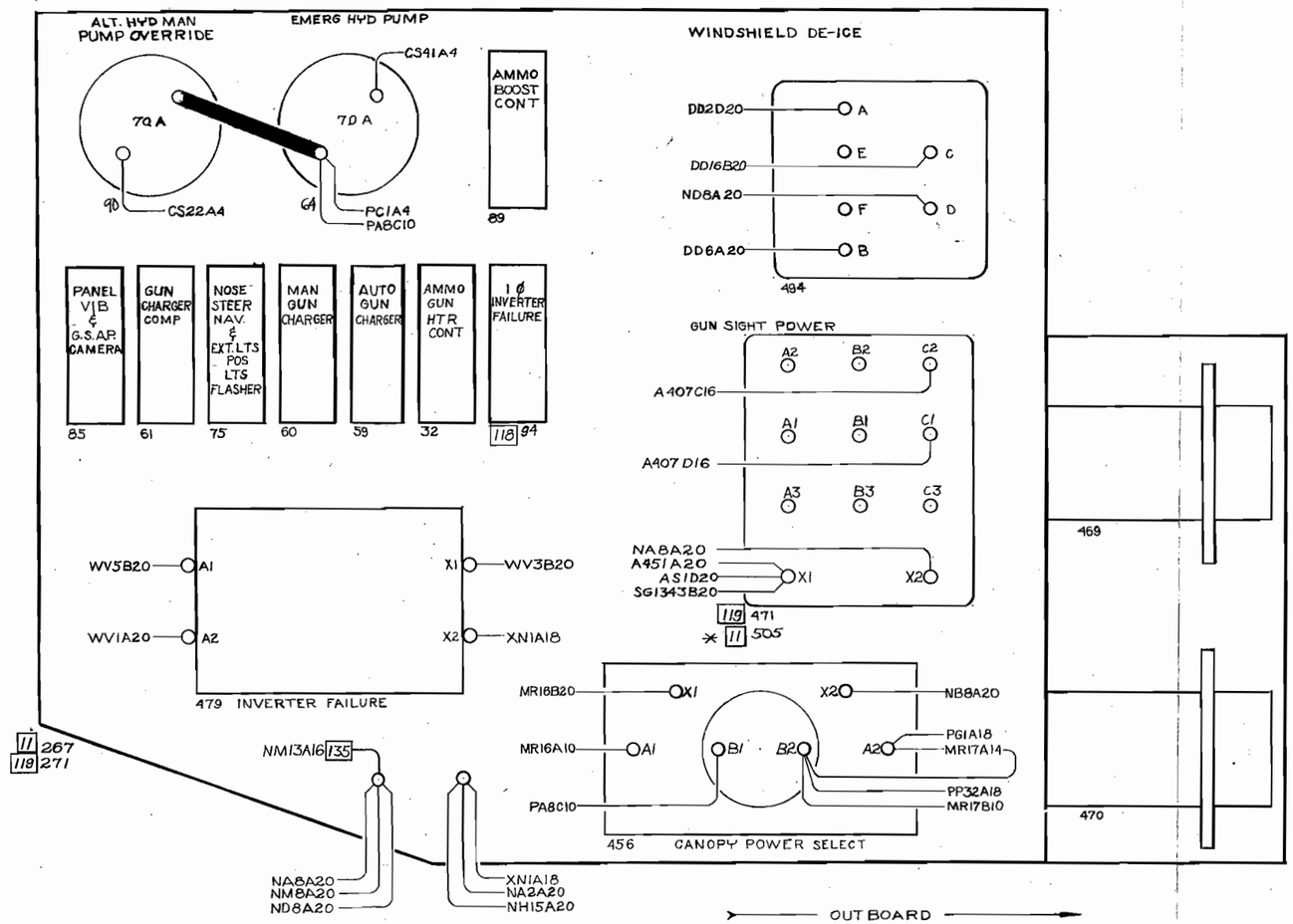
F-86F-2-54-396

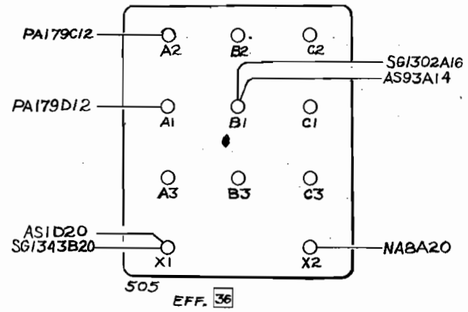


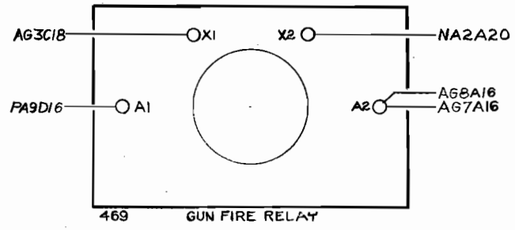
FUSELAGE STATION 26 RELAY PANEL
F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13079

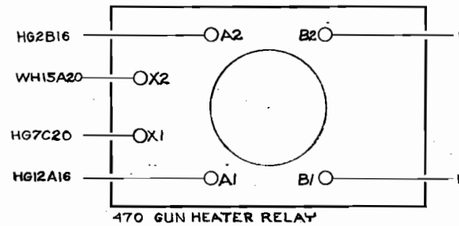
[16] F-86F-1 AIRPLANES
[33] F-86F-20 AIRPLANES AF51-13070 THRU -13079

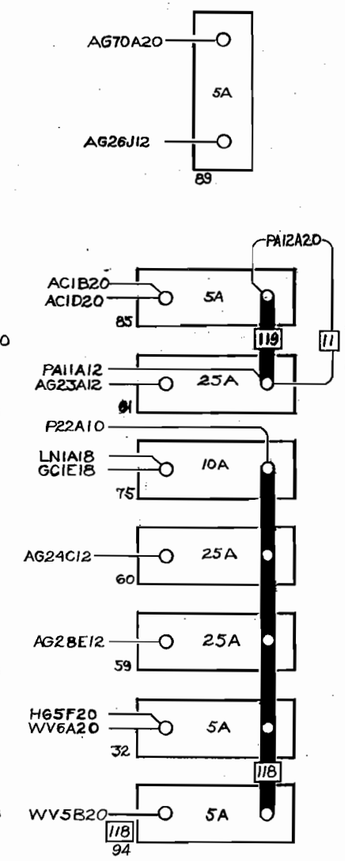
F86F-2-54-391











* SEE UPPER RIGHT OF DRAWING FOR EFF. 36

FUSELAGE STATION 26 RELAY PANEL
F-86F-5 THROUGH F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13080 THROUGH-13169, AND F-86F-25 AIRPLANES AF51-13170 THROUGH-13510, AF52-5272 THROUGH-5277, -5279 THROUGH-5290, 5292, -5294, -5295, -5297, -5298, -5300 THROUGH-5302, AND -5304

11 F-86F-5 THRU F-86F-15 AIRPLANES

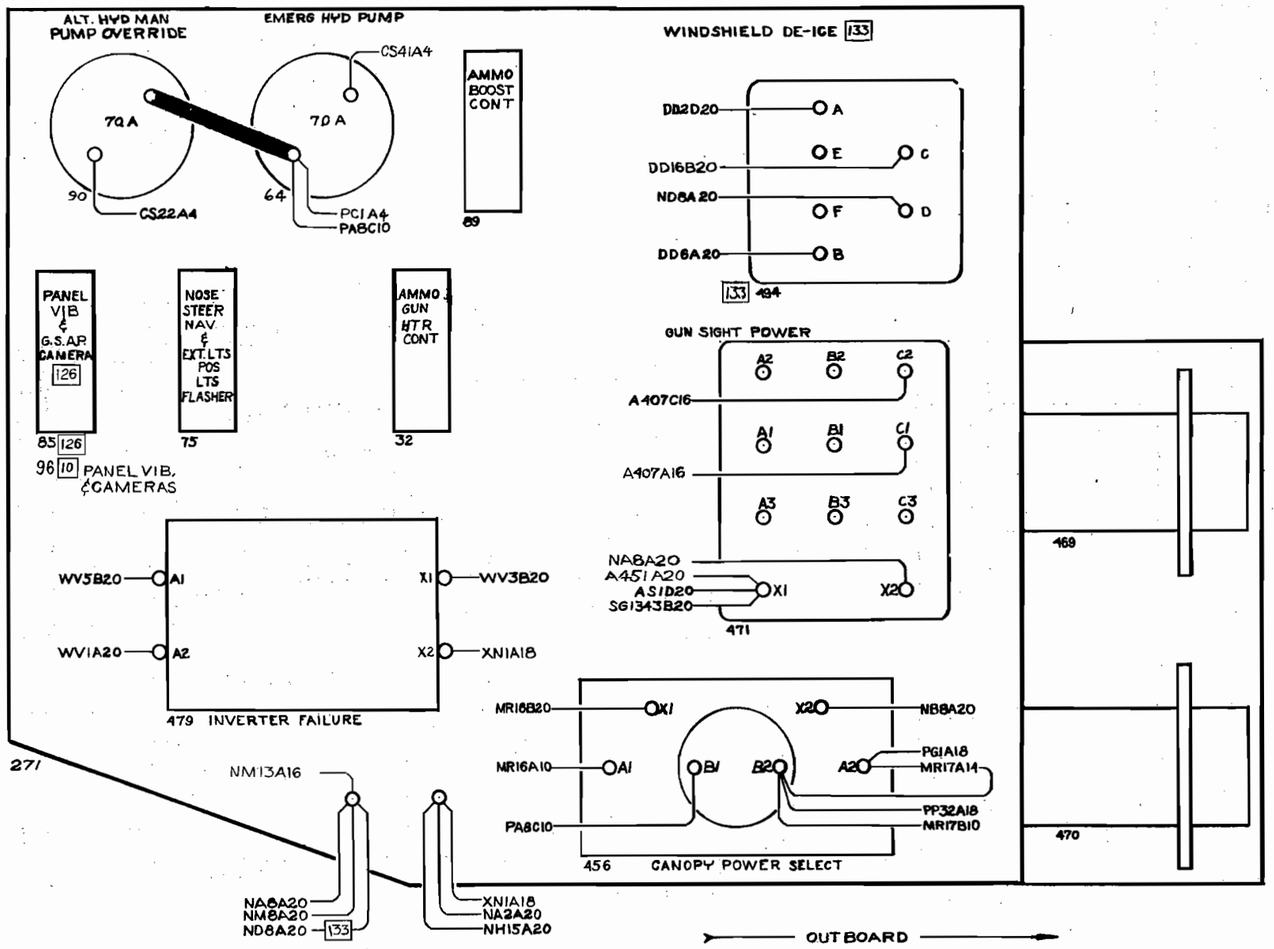
36 F-86F-5 AIRPLANES

118 F-86F-5 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13080 THRU-13169

119 F-86F-20 AIRPLANES AF51-13080 THRU-13169, AND F-86F-25 AIRPLANES AF51-13170 THRU-13510, AF52-5272 THRU-5277, -5279 THRU-5290, -5292, -5294 -5295, -5297, -5298, -5300 THRU-5302, AND -5304

135 F-86F-25 AIRPLANES AF51-13398 THRU-13510, AF52-5272 THRU-5277, -5279 THRU-5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU-5302, AND -5304

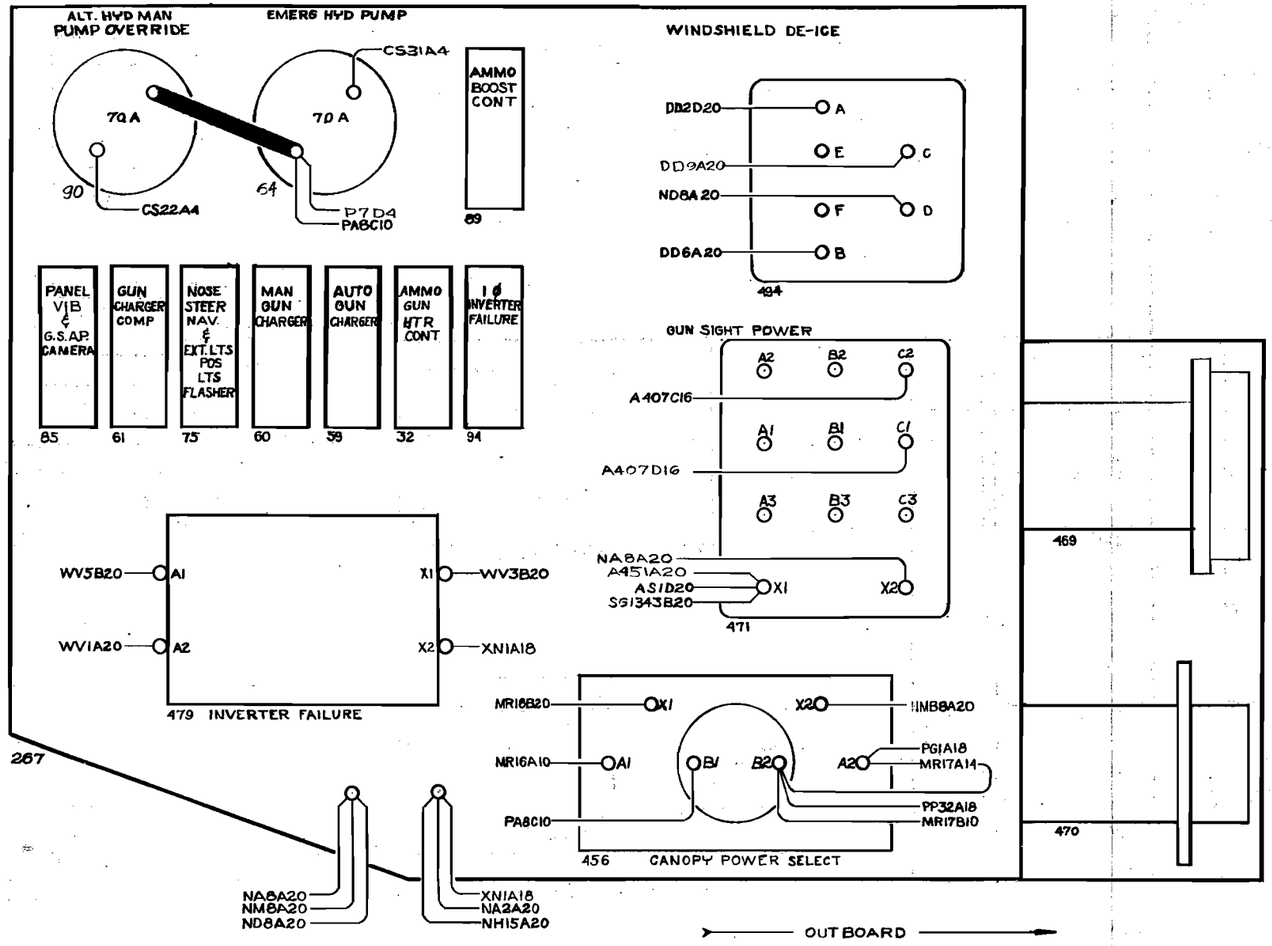
F-86F-2-54-392

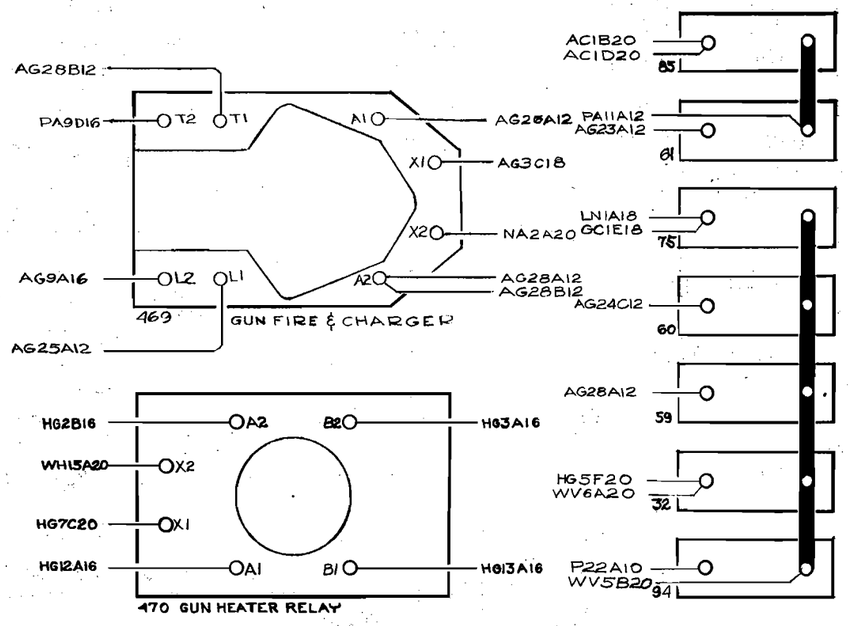


10 F-86F-25 AIRPLANES AF52-5387 THRU-5530
113 F-86F-25 AIRPLANES AF52-5381 THRU-5530
129 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, 5299, -5303, AND -5305 THRU -5386
133 F-86F-25 AIRPLANES AF52-5278, -5291, -5291, -5293, -5296, 5299, -5303, AND -5305, THRU-
134 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5299, -5303 AND -5306 THRU -5380

F-86F-2-54-393

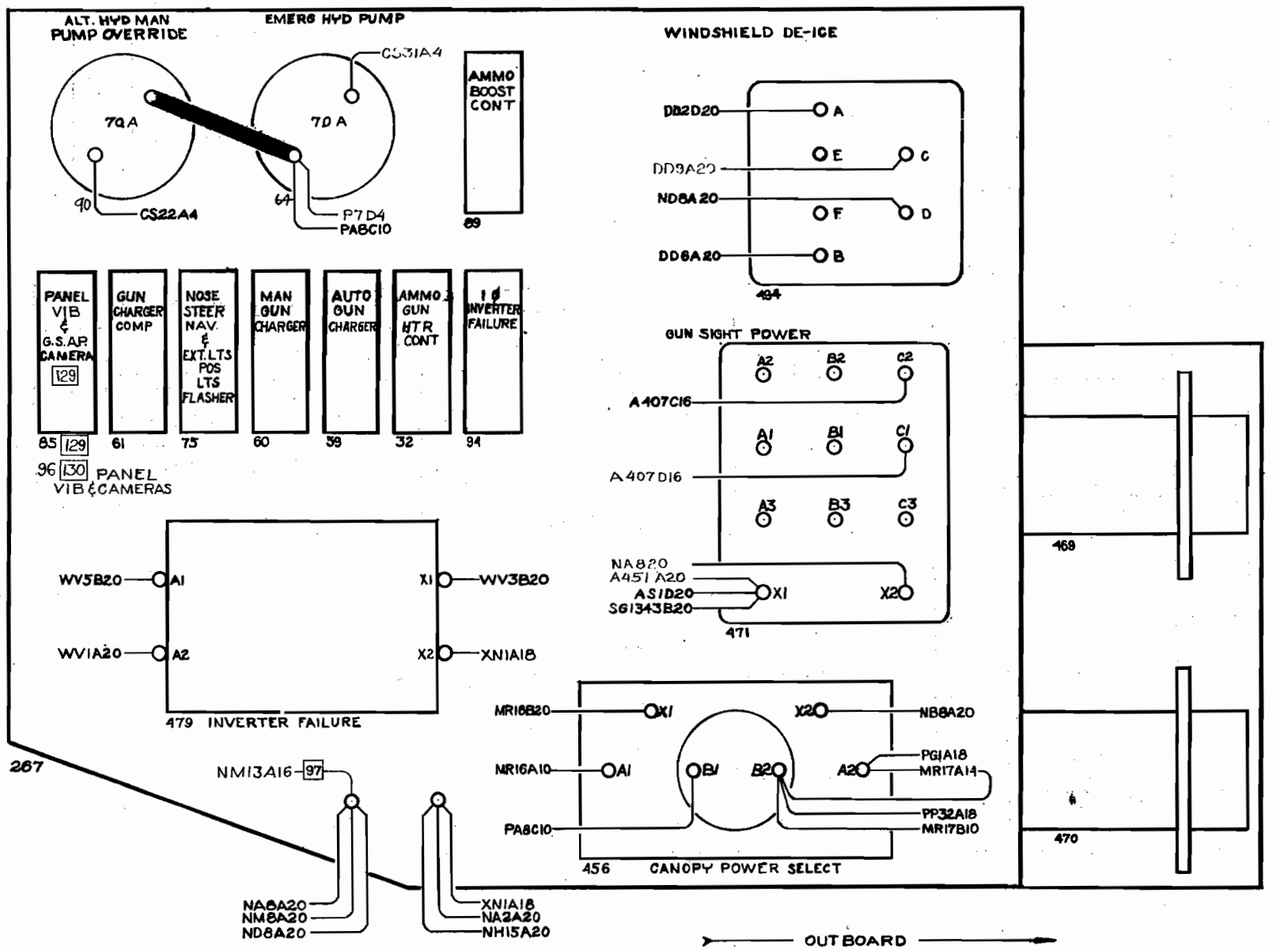
FUSELAGE STATION 26 RELAY PANEL
F-86F-25 AIRPLANES AF52-5278,
,-5291, -5293, -5296, -5299, -5303 AND -5305 THROUGH -5530

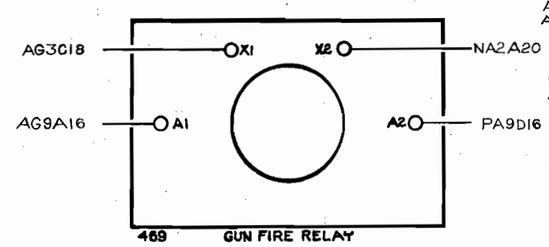


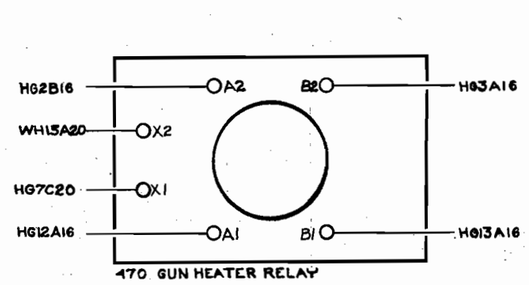


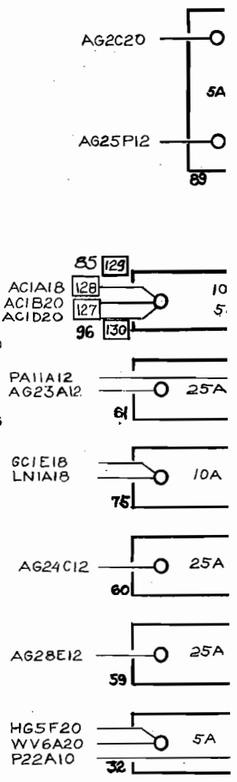
F-86F-2-54-388

FUSELAGE STATION 26 RELAY PANEL
F-86F-30 AIRPLANES AF52-4305 THROUGH -4404





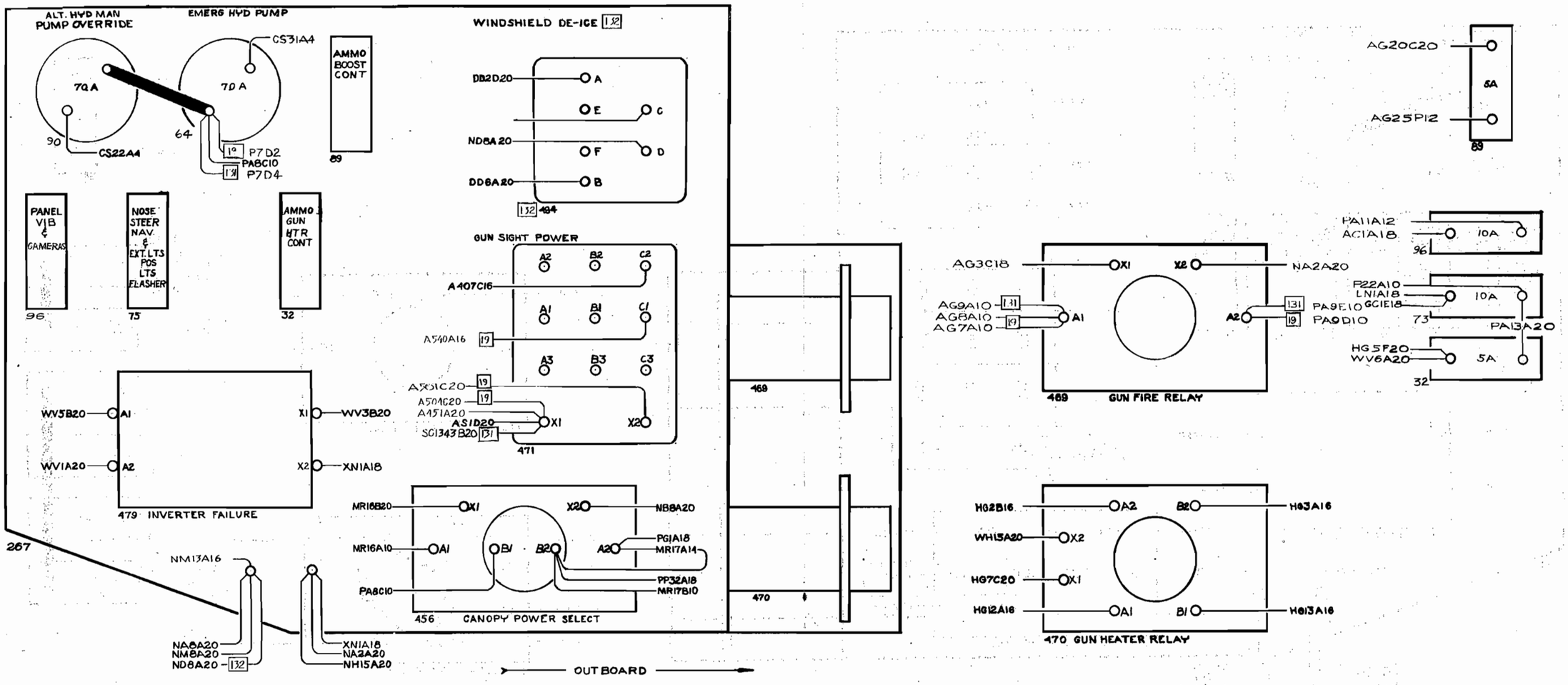




97 F-86F-30 AIRPLANES AF52-4505 THRU-5
127 F-86F-30 AIRPLANES AF52-4405 THRU-47
128 F-86F-30 AIRPLANES AF52-4746 THRU-
129 F-86F-30 AIRPLANES AF52-4405 THRU-49
130 F-86F-30 AIRPLANES AF52-4905 THRU-496

F-86F-2-54-389

FUSELAGE STATION 26 RELAY PANEL
F-86F-30 AIRPLANES AF52-4405 THROUGH - 4963



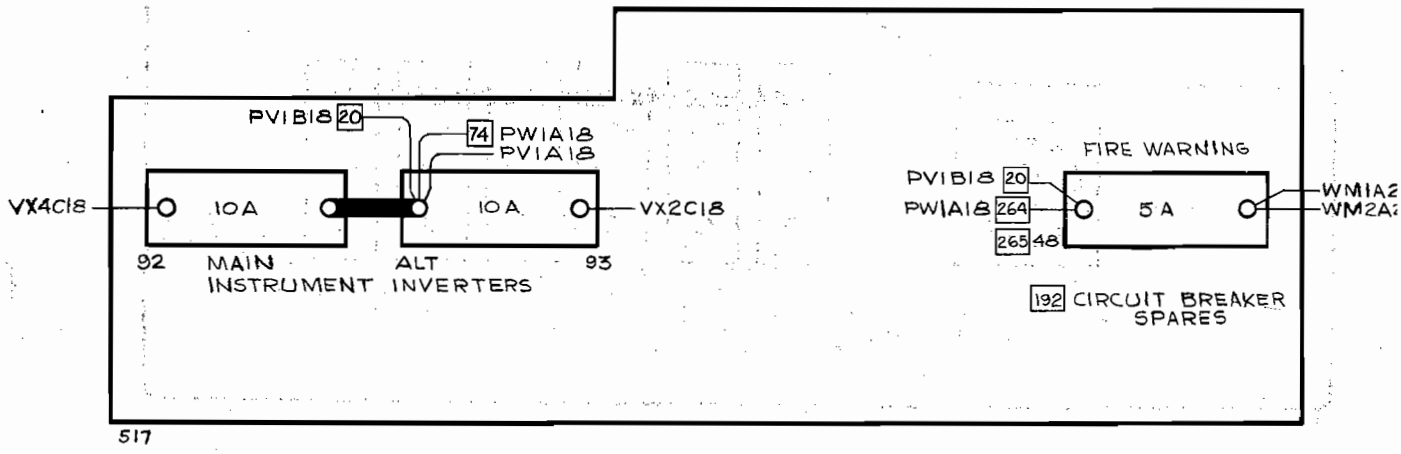
19 F-86F-35 AIRPLANES

131 F-86F-30 AIRPLANES AF52-4964 THRU-5163

132 F-86F-30 AIRPLANES AF52-4964 THRU-5063

F-86F-2-54-39C

FUSELAGE STATION 26 RELAY PANEL
F-86F-30 AIRPLANES AF52-4964 AND SUBSEQUENT AIRPLANES



20 F-86F-30 AIRPLANES

74 F-86F-25 AIRPLANES

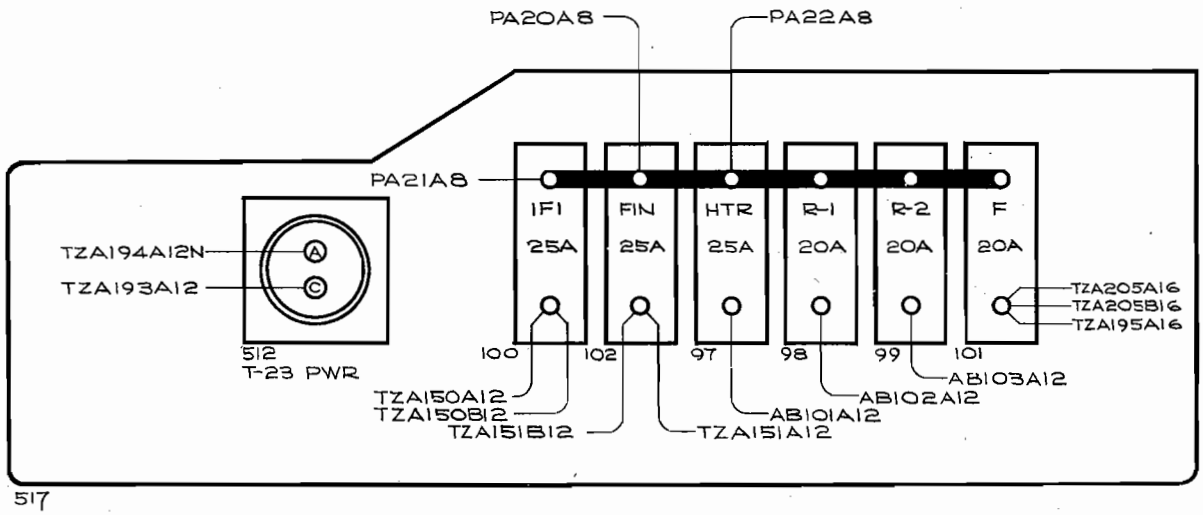
192 F-86F-1 THRU F-86F-20 AIRPLANES

264 F-86F-1 THRU F-86F-15 AND F-86F-25 AIRPLANES

265 F-86F-25 AND F-86F-30 AIRPLANES

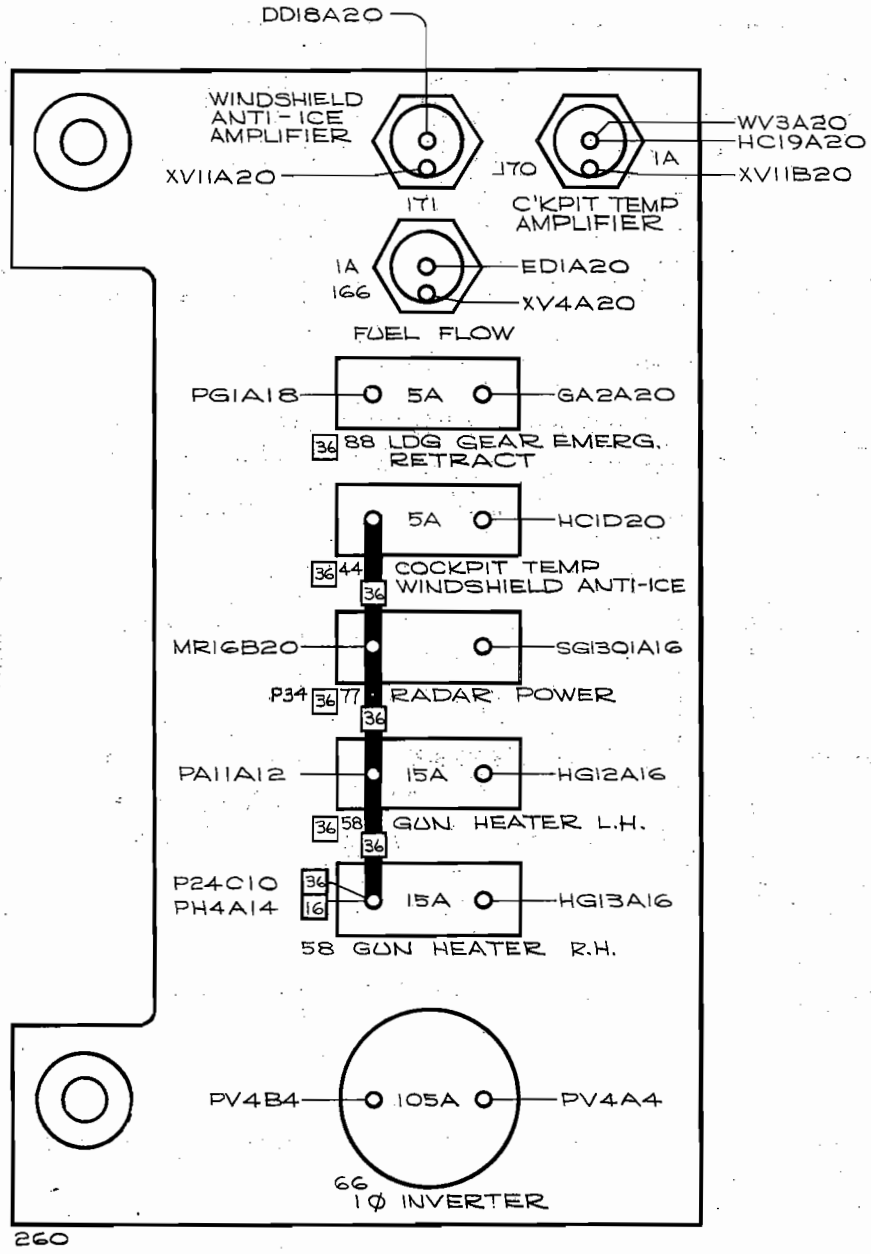
F-86F-2-54-370

RIGHT HAND AFT CONSOLE CIRCUIT BREAKER PANEL
F-86F-1 THROUGH F-86F-30 AIRPLANES



F-86F-2-54-387

RIGHT HAND AFT CONSOLE CIRCUIT BREAKER PANEL
F-86F-35 AIRPLANES

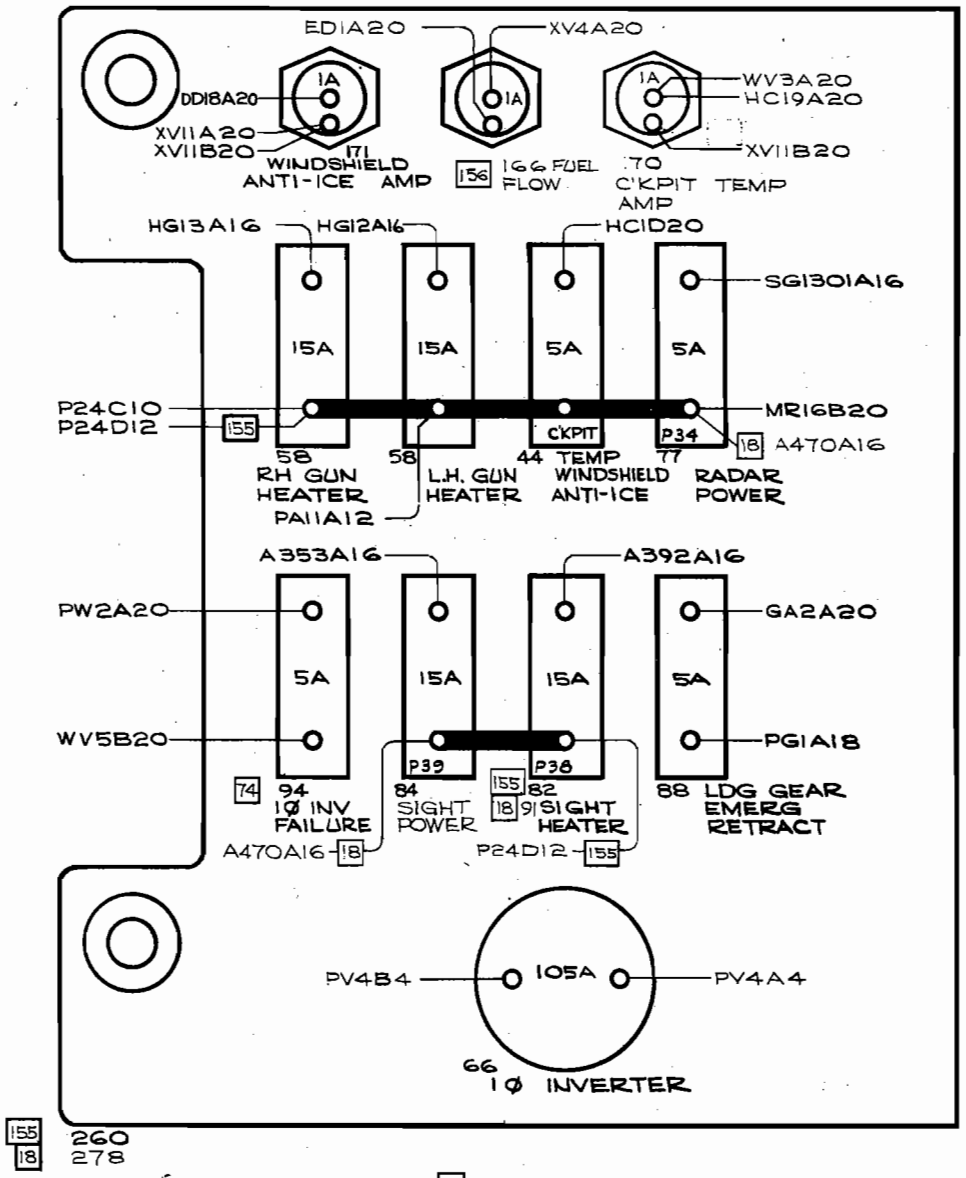


16 F-86F-1 AIRPLANES
36 F-86F-5 AIRPLANES

P DENOTES RADAR INDEX NUMBER

F-86F-2-54-383A

FORWARD FUSELAGE CIRCUIT BREAKER PANEL
F-86F-1 AND F-86F-5 AIRPLANES



18 F-86F-10 & F-86F-15 AIRPLANES

74 F-86F-25 AIRPLANES

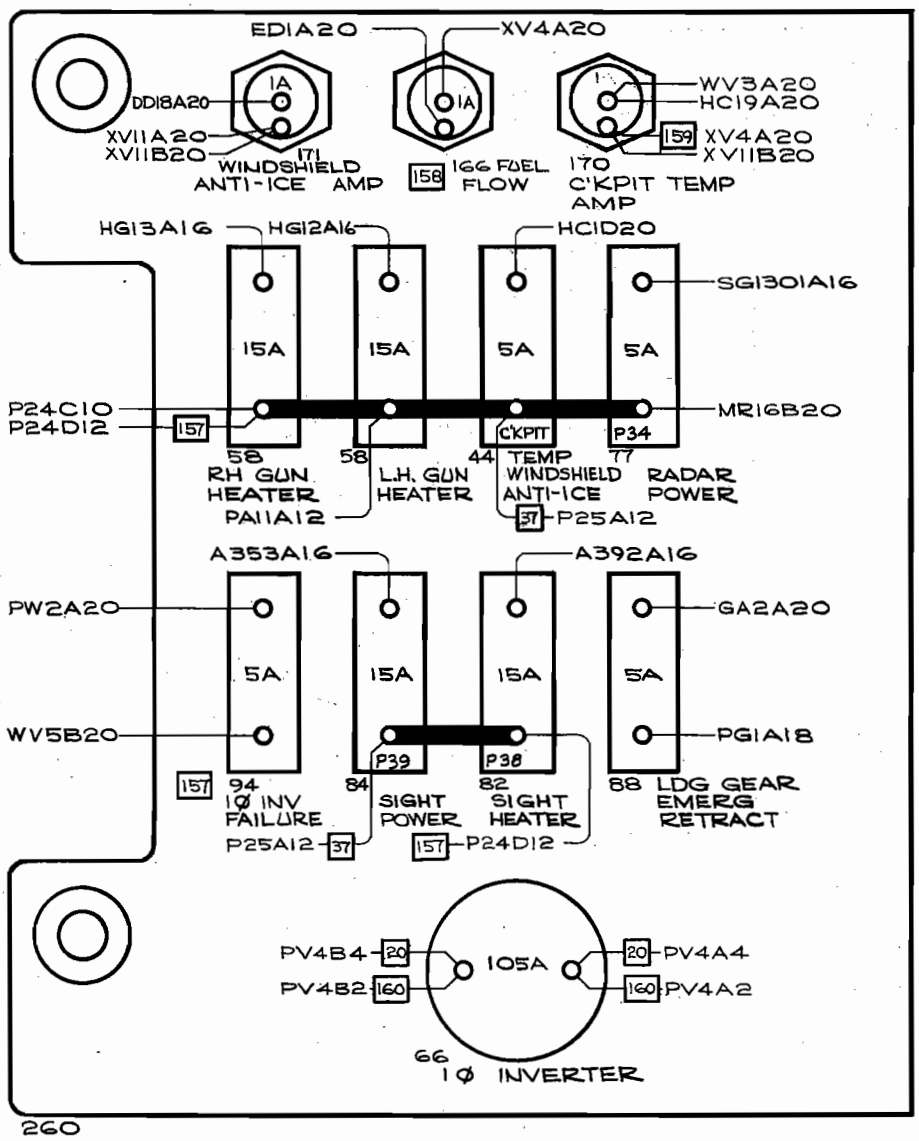
155 F-86F-20 & F-86F-25 AIRPLANES

156 F-86F-10 THRU F-86F-20 AIRPLANES & F-86F-25 AIRPLANES AF51-13170 THRU -13510 & AF52-5272 THRU -5489

F-86F-2-54-3848

P DENOTES RADAR INDEX NUMBER

FORWARD FUSELAGE CIRCUIT BREAKER PANEL
F-86F-10 THROUGH F-86F-25 AIRPLANES



20 F-86F-30 AIRPLANES

37 F-86F-30 AIRPLANES AF52-4305 THRU -4404

157 F-86F-30 AIRPLANES AF52-4405 THRU -5163 & F-86F-35 AIRPLANES AF52-5164 THRU -5271

158 F-86F-30 & F-86F-35 AIRPLANES AF52-5164 THRU -5271

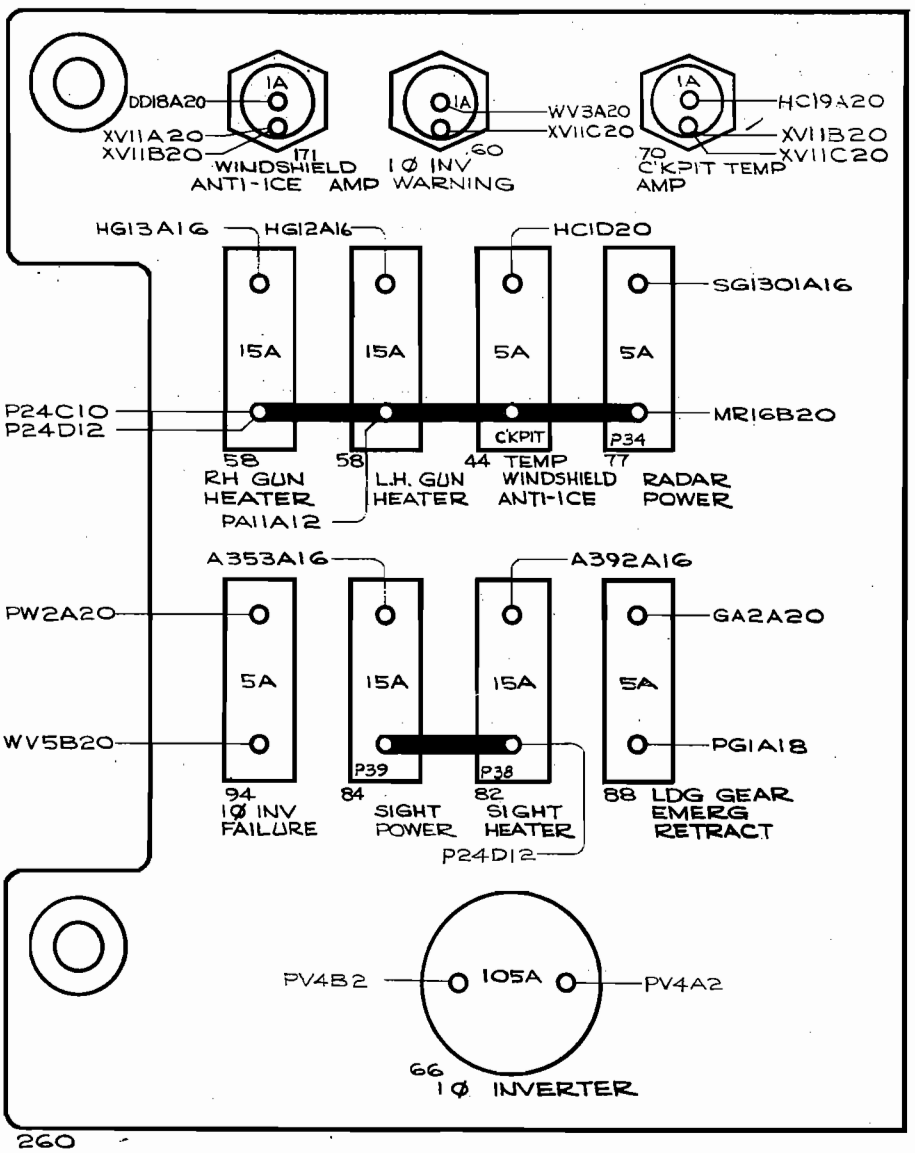
159 F-86F-30 AIRPLANES AF52-5064 THRU -5163 & F-86F-35 AIRPLANES AF52-5164 THRU -5180

160 F-86F-35 AIRPLANES AF52-5164 THRU -5271

P DENOTES RADAR INDEX NUMBER

F-86F-2-54-386A

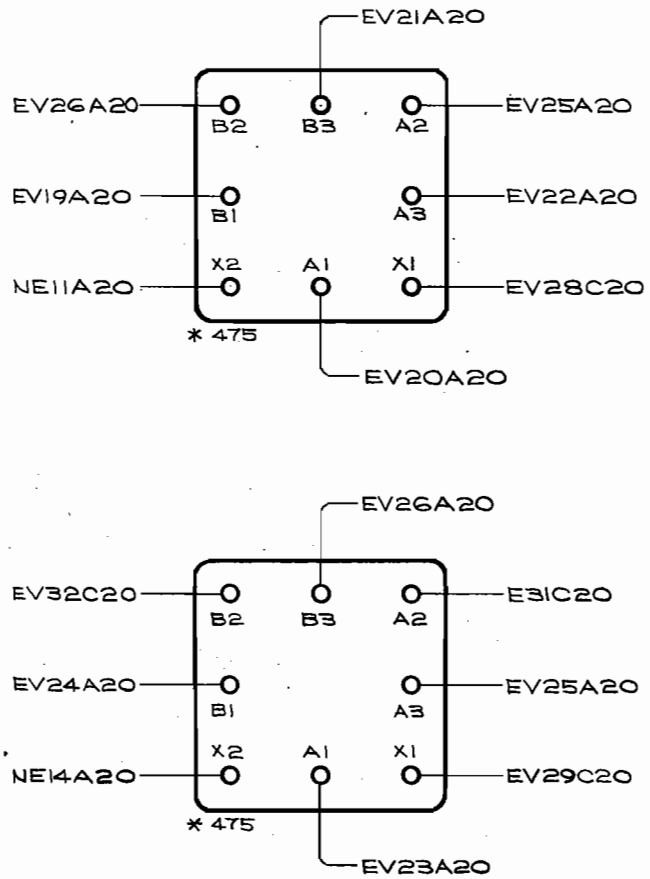
FORWARD FUSELAGE CIRCUIT BREAKER PANEL
F-86F-30 AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271



P DENOTES RADAR INDEX NUMBER

F-86F-2-54-385A

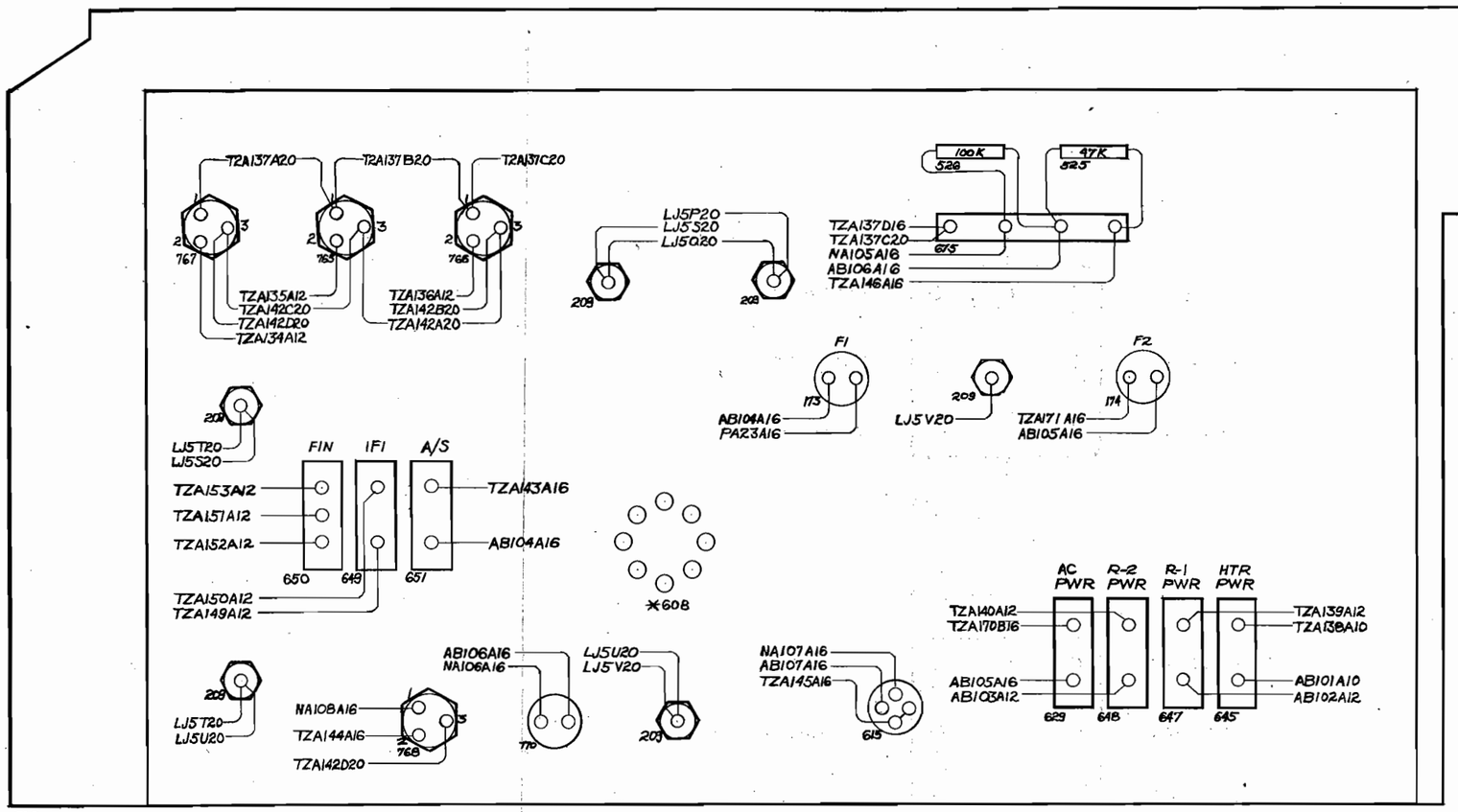
FORWARD FUSELAGE CIRCUIT BREAKER PANEL
F-86F-35 AIRPLANES AF53-1072 AND ALL SUBSEQUENT AIRPLANES



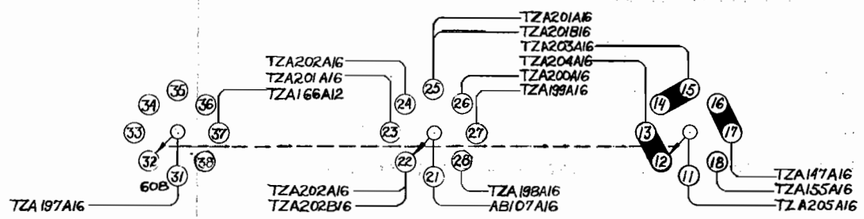
* MOUNTED ON AFT RADIO COMPARTMENT SHELF APPROXIMATELY STA. 155

F-86F-2-54-382

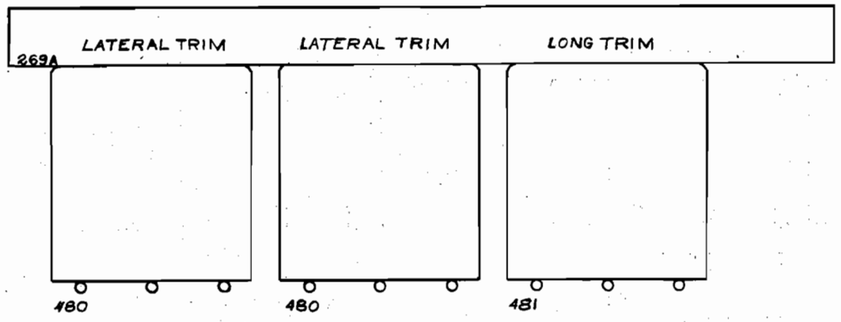
HYDRAULIC PRESSURE INDICATOR RELAYS
F-86F-1 AIRPLANES AF51-2850 THROUGH -2877

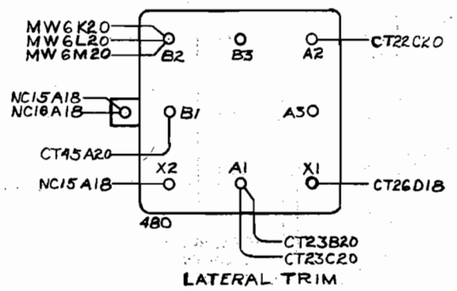


519

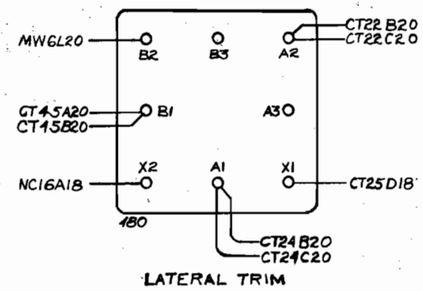


* SEE DETAIL BELOW PANEL

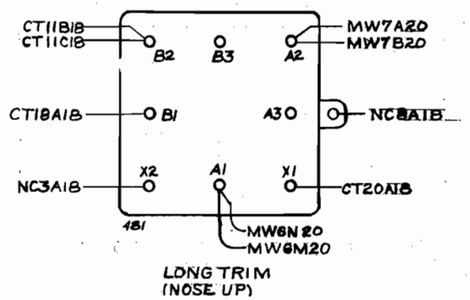




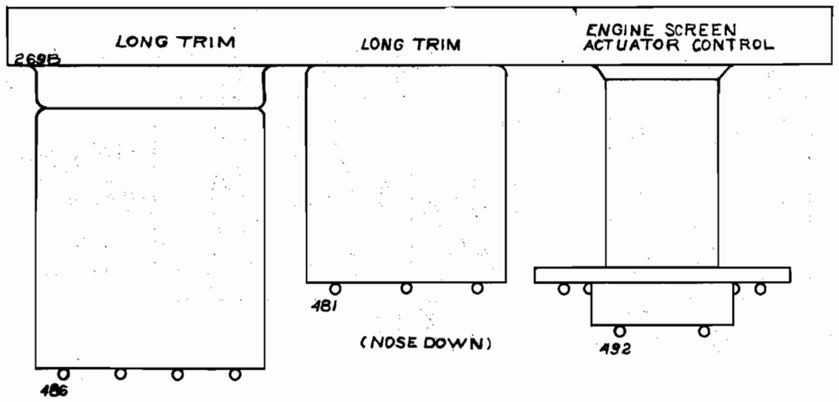
LATERAL TRIM

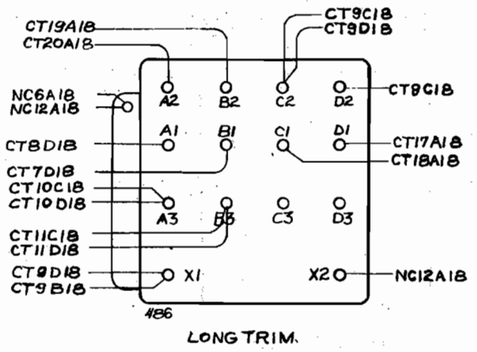


LATERAL TRIM

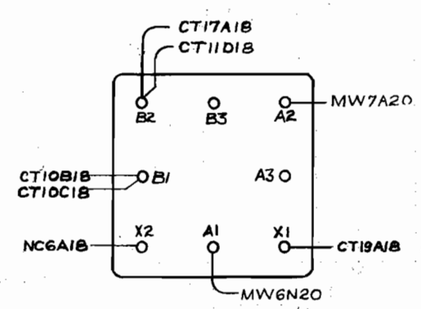


LONG TRIM
(NOSE UP)

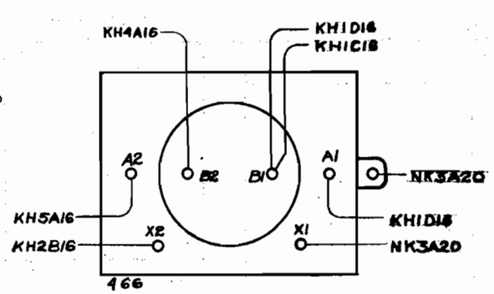




LONG TRIM



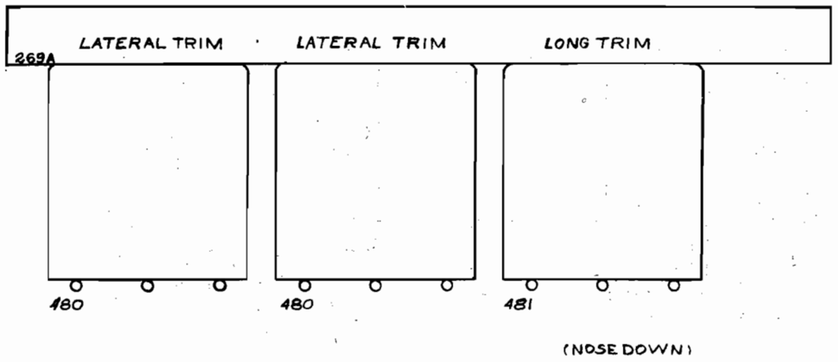
LONG TRIM
NOSE DOWN

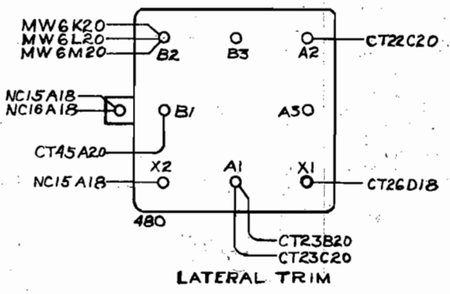


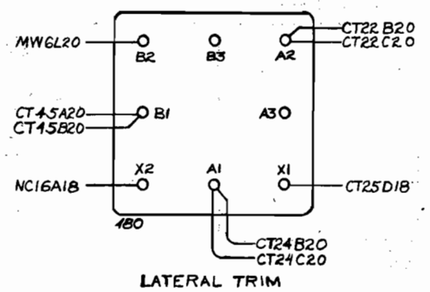
ENGINE SCREEN
ACTUATOR CONTROL

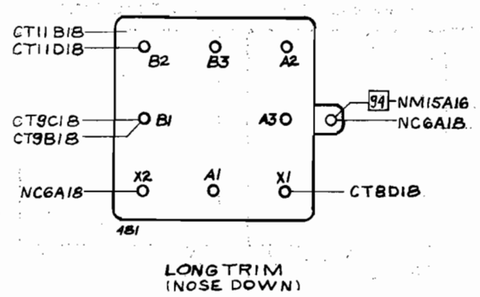
AFT RADIO BAY RELAY PANELS
F-86F-1 THROUGH F-86F-10 AIRPLANES

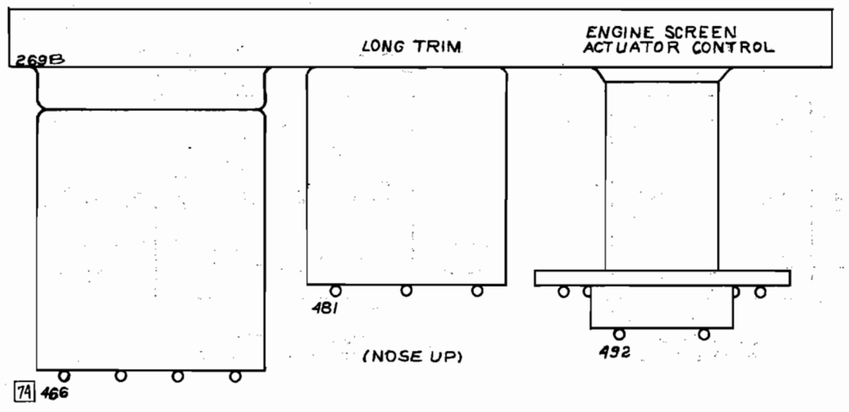
F-86F-2-54-382A

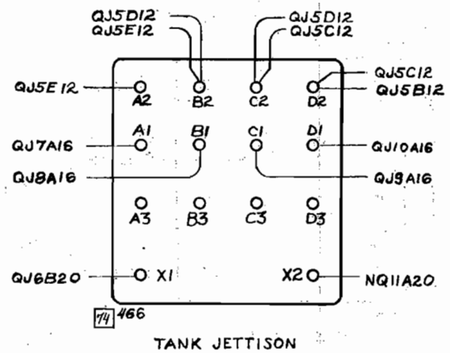


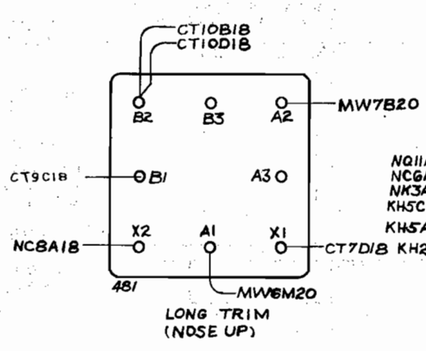


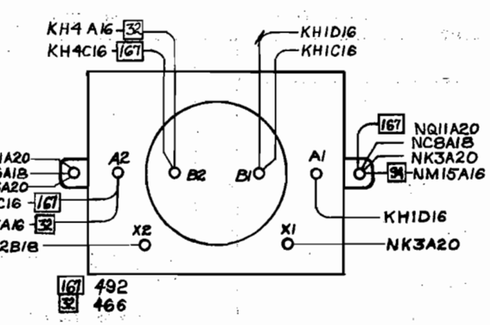












32 F-86F-15 AIRPLANES

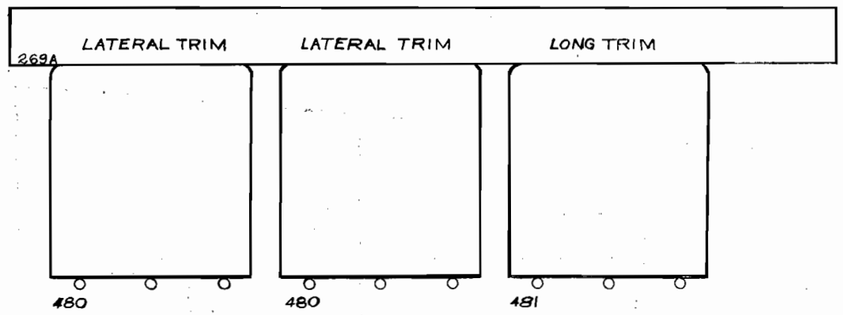
74 F-86F-25 AIRPLANES

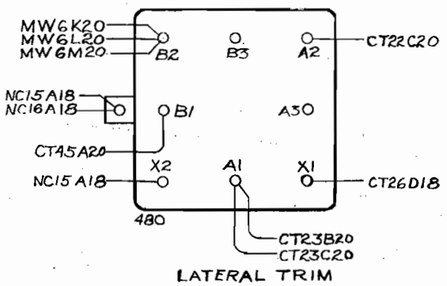
94 F-86F-25 AIRPLANES AF51-13398 THRU -13510 AND AF52-5272 THRU-5530

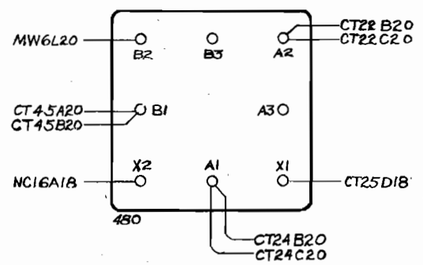
155 F-86F-20 AND F-86F-25 AIRPLANES

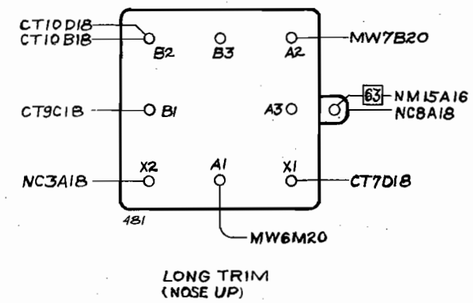
F-86F-2-54-379

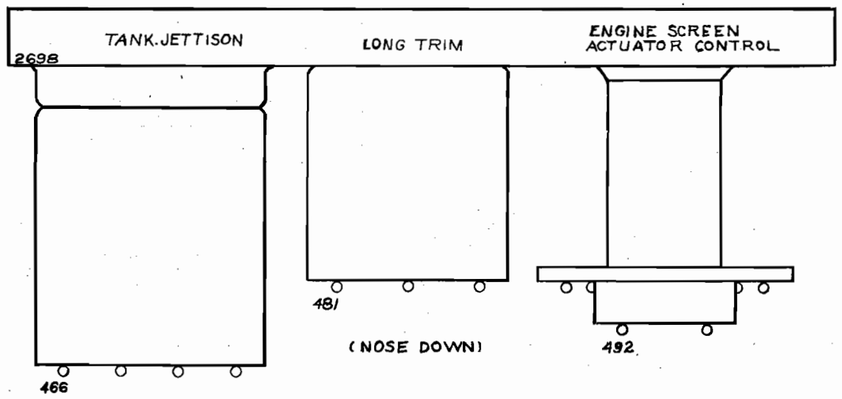
AFT RADIO BAY RELAY PANELS
F-86F-15 THROUGH F-86F-25 AIRPLANES

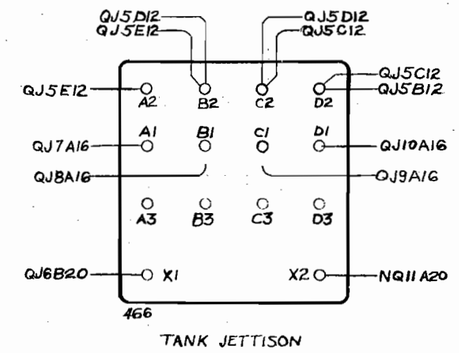


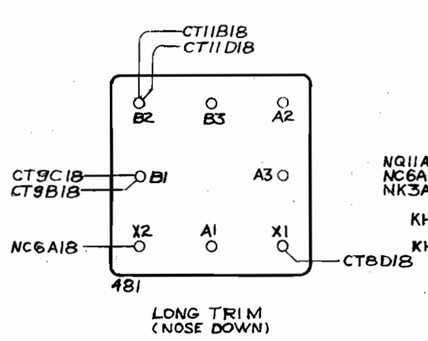


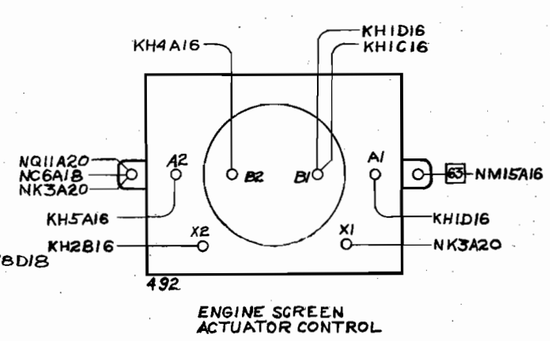








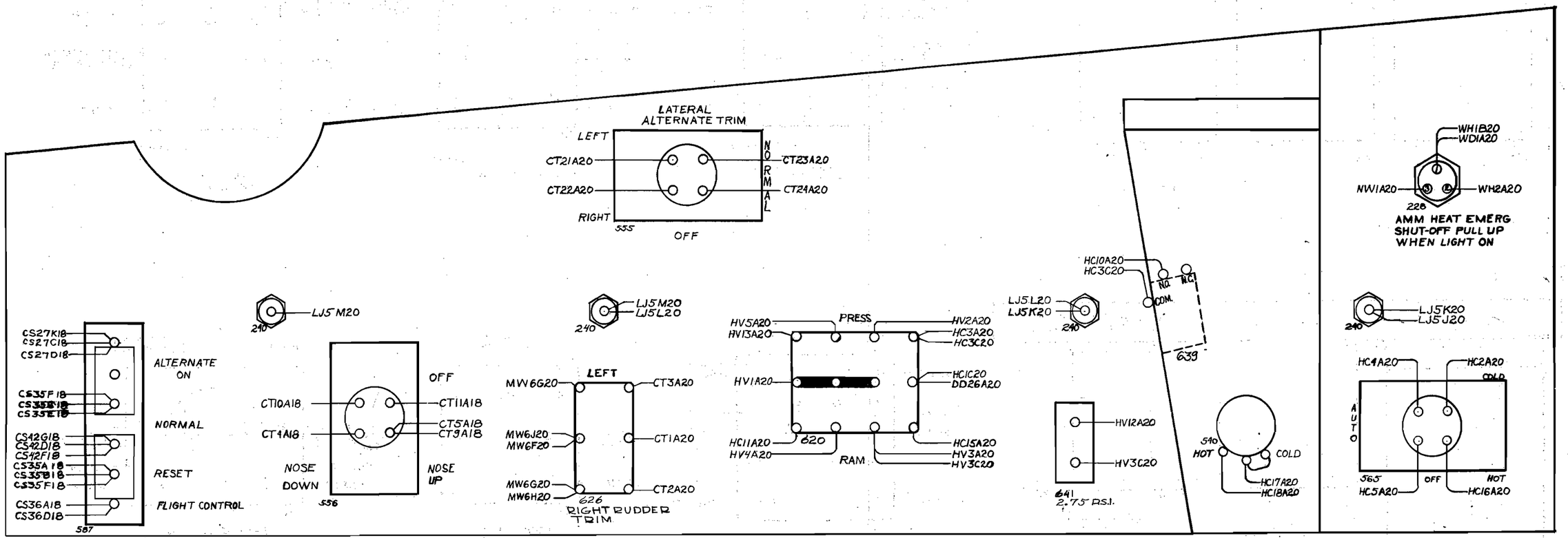




63 F-86F-30 AIRPLANES AF52-4505 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-378

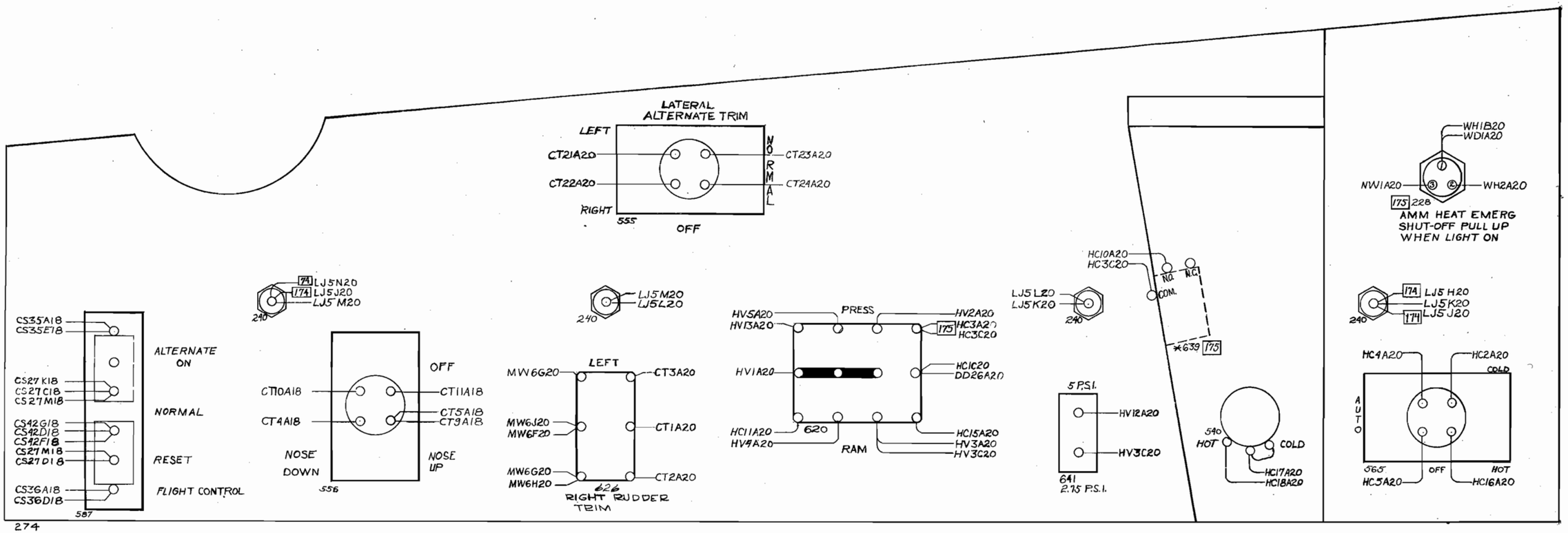
AFT RADIO BAY RELAY PANELS
F-86F-30 AND F-86F-35 AIRPLANES



274

F-86F-2-54-376A

LEFT-HAND SIDE FORWARD CONSOLE PANEL NO. 2
F-86F-1 THROUGH F-86F-20 AIRPLANES

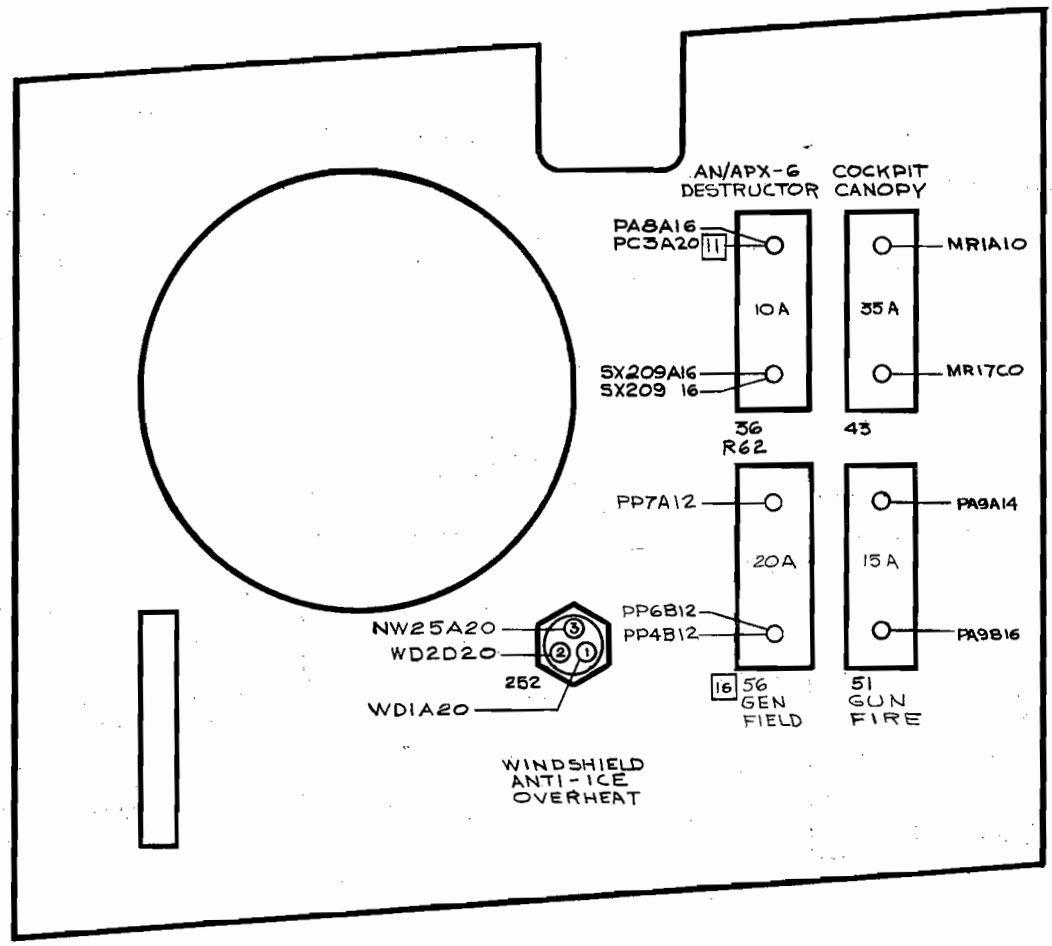


* SWITCH 639 MOUNTED ON BACK OF ITEM 540 FOR 97

74 F-86F-25 AIRPLANES
97 F-86F-30 AIRPLANES AF52-4505 THRU-5063
174 F-86F-30 AND F-86F-35 AIRPLANES
175 F-86F-25 AIRPLANES AF51-13170 THROUGH-13510
AF52-5272 THROUGH-5328 AND F-86F-30
AIRPLANES AF52-4305 THROUGH-5063

F-86F-2-54-377A

LEFT-HAND SIDE FORWARD CONSOLE PANEL NO. 2
F-86F-25 THROUGH F-86F-35 AIRPLANES

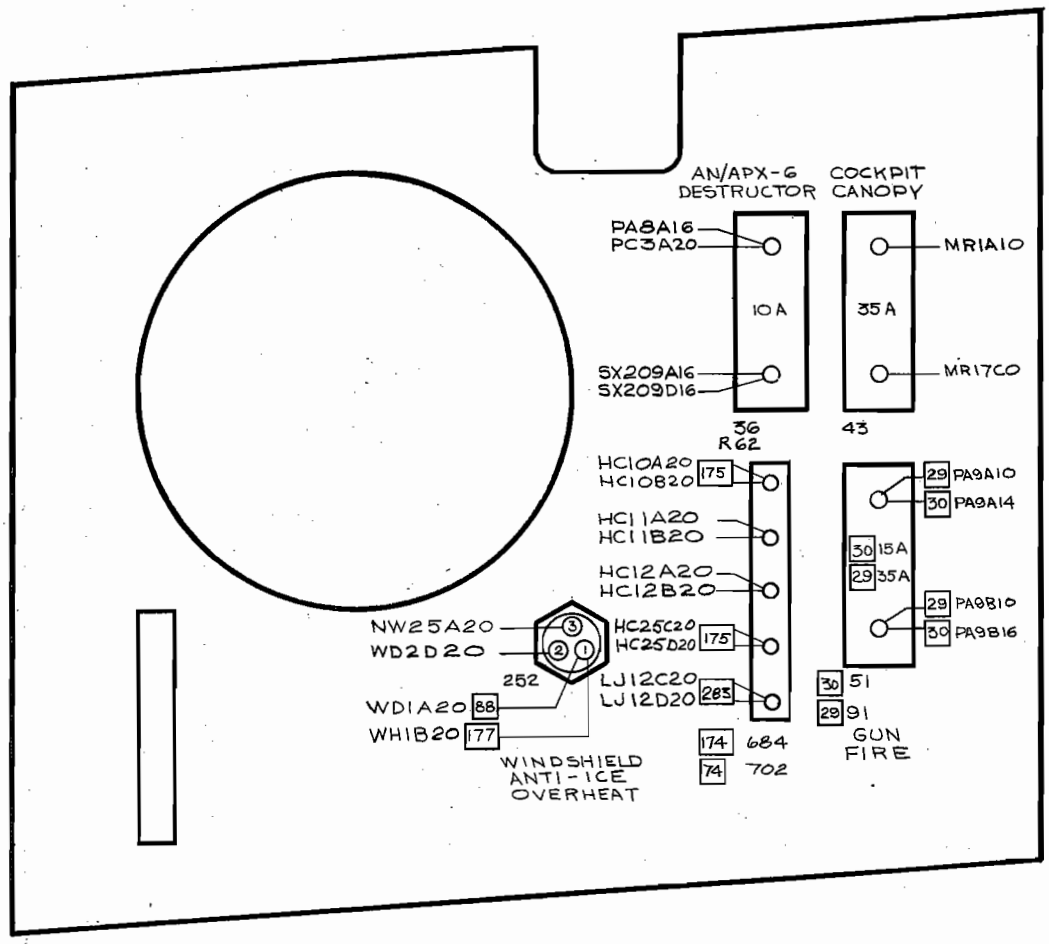


11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES

R DENOTES RADIO INDEX NUMBERS

F-86F-2-54-375A

HEAT AND VENT SYSTEM LEFT SIDE OUTLET CLOSEOUT PANEL
F-86F-1 THROUGH F-86F-15 AIRPLANES



29 F-86F-25 AIRPLANES AF52-5278, -5293, -5296, -5299, -5303, AND 5305 THRU -5530, AND F-86F-30 AIRPLANE AF52-4964, AND ALL SUBSEQUENT AIRPLANES

30 F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52 -5272 THRU-5277, -5279 THRU 5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU -5302, AND -5304, AND F-86F-30 AIRPLANES AF52-4305 THRU-4963

74 F-86F-25 AIRPLANES

88 F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-5272 THRU -5328, AND -F-86F-30 AIRPLANES AF52-4305 THRU - 5063

174 F-86F-30 AND F-86F-35 AIRPLANES

175 F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5328 AND F-86F-30 AIRPLANES AF52-4305 THRU - 5063

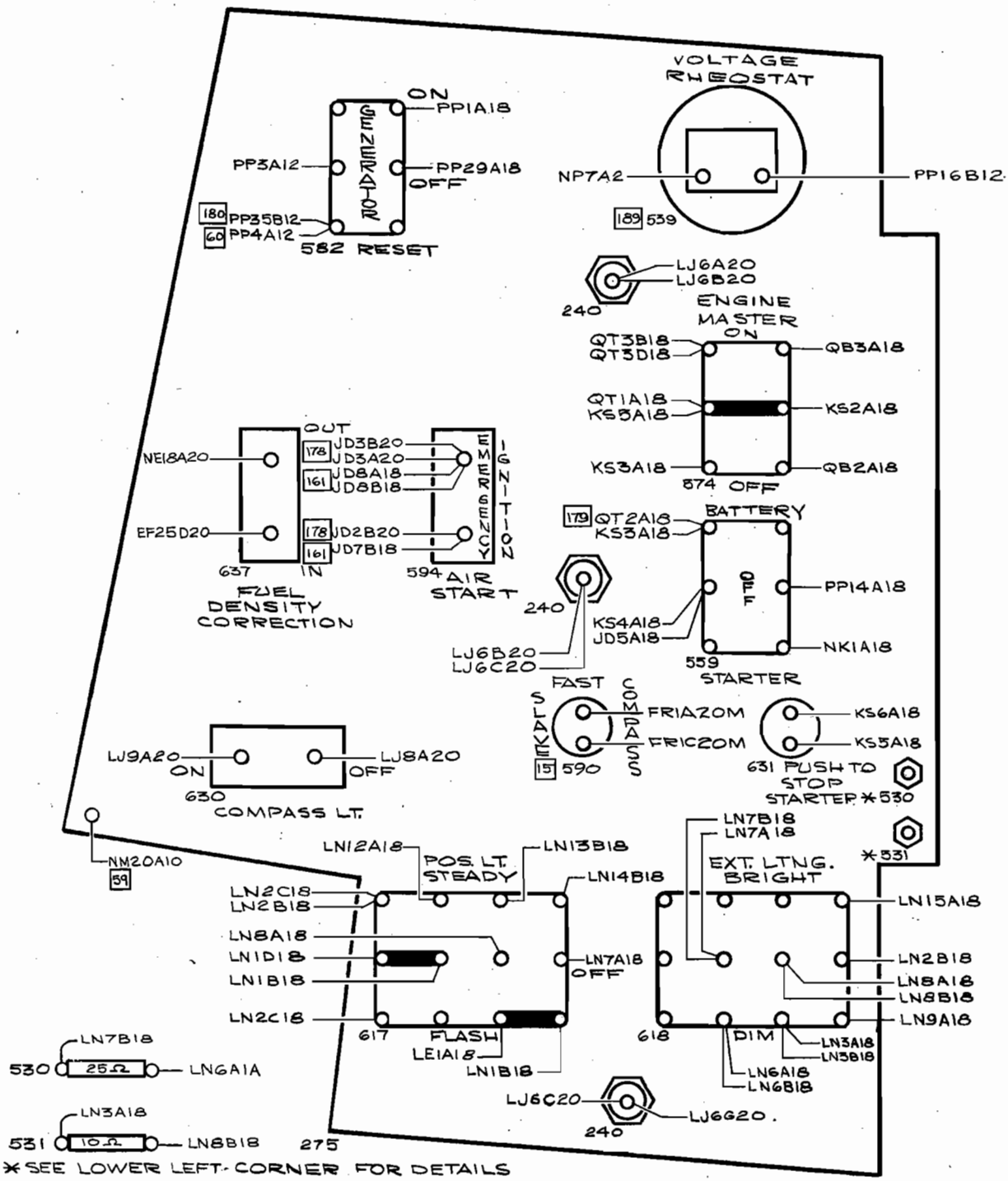
177 F-86F-25 AIRPLANES AF52-5329 THRU -5530 AND F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

283 F-86F-25 AIRPLANES AF52-5272 THRU-5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

R DENOTES RADIO INDEX NUMBERS

F-86F-2-54-374A

HEAT AND VENT SYSTEM LEFT SIDE OUTLET CLOSEOUT PANEL
F-86F-20 THROUGH F-86F-35 AIRPLANES



*SEE LOWER LEFT-CORNER FOR DETAILS

15 F-86F-1 AIRPLANES AF-51-2850 THRU -2877

16 F-86F-1 AIRPLANES

59 F-86F-25 AIRPLANES AF51-13398 THRU -13510, AF52-5272 THRU -5530, F-86F-30 AIRPLANE AF52-4505, AND ALL SUBSEQUENT AIRPLANES

161 F-86F-20 AIRPLANES AF51-13110 THRU -13169 AND F-86F-25 THRU F-86F-35 AIRPLANES

178 F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13109

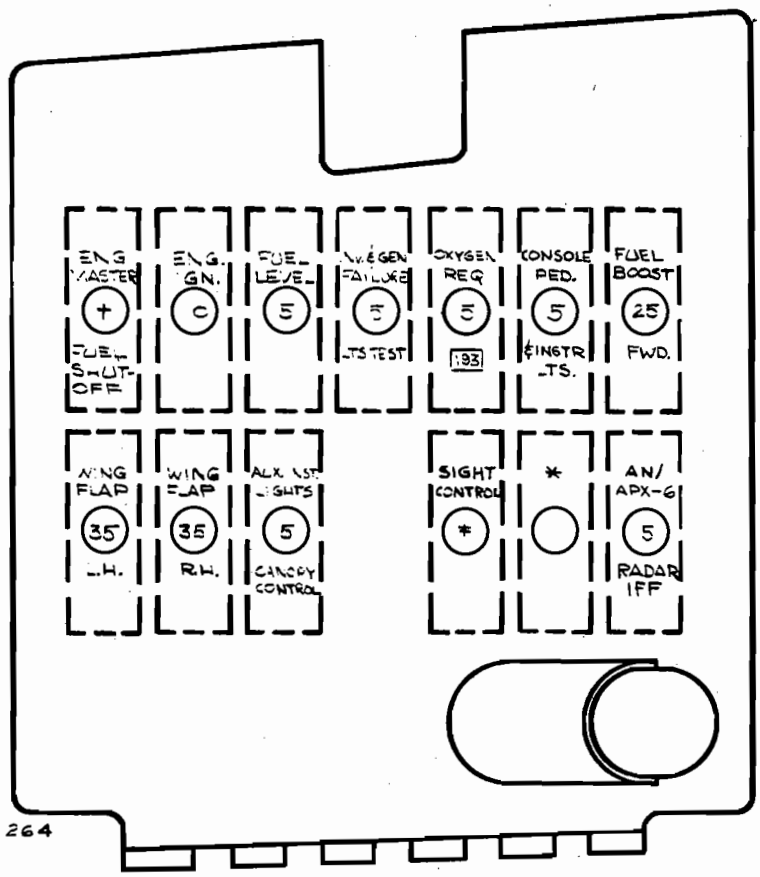
179 F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13079

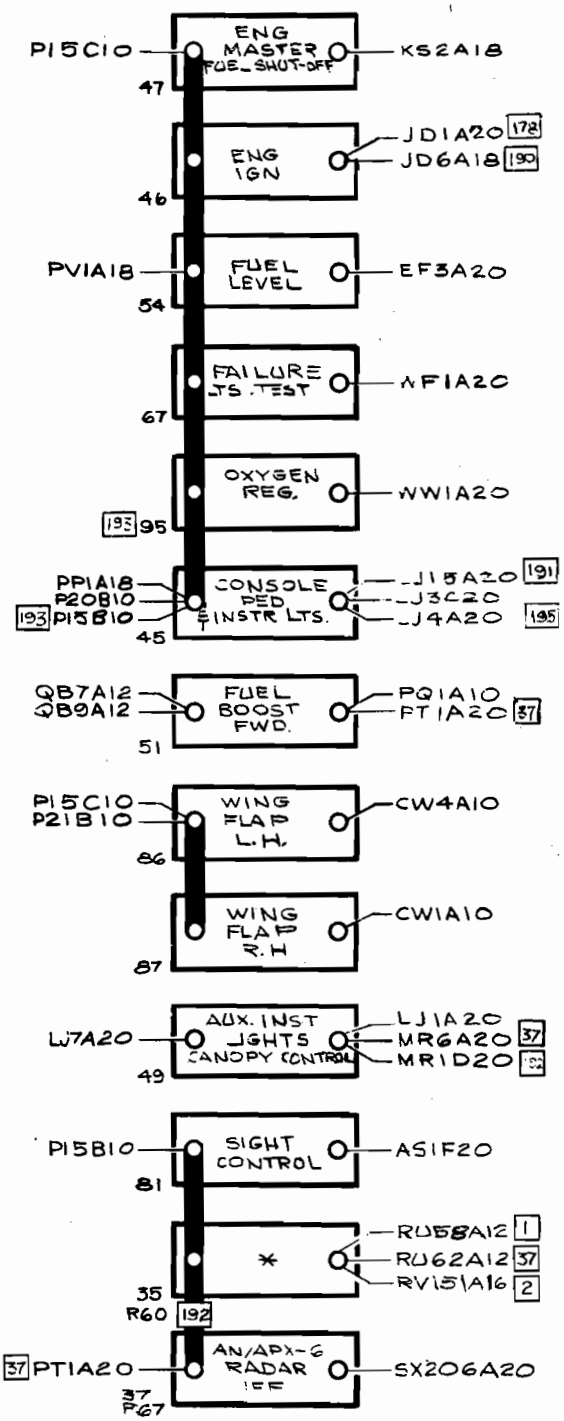
180 F-86F-5 THRU F-86F-35 AIRPLANES

181 F-86F-1 THRU F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU -5271 AND AF53-1072 THRU -1171

F-86F-2-54-373

RIGHT-HAND FORWARD CONSOLE PANEL





* AN/ARC-3 RADIO, 20A [2]
AN/ARC-33 RADIO, 25A [1]
AN/ARC-27 RADIO, 25A [37]

† 10A [37]
15A [192]

‡ 5A [194]
10A [1]

[1] F-86F-20 AIRPLANE

[2] F-86F-1 THRU F-86F-15 AIRPLANES

[37] F-86F-30 AIRPLANES AF52-4305 THRU -4404

R DENOTES RADIO INDEX NUMBER
D DENOTES RADAR INDEX NUMBER

[178] F-86F-1 THRU F-86F-5 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13109

[190] F-86F-20 AIRPLANES AF51-13110 THRU-13168 AND F-86F-30 AIRPLANES AF52-4305 THRU-4404

[191] F-86F-20 AIRPLANES AF51-13090 THRU-13169 AND F-86F-30 AIRPLANES AF52-4305 THRU -4404

[192] F-86F-1 THRU F-86F-20 AIRPLANES

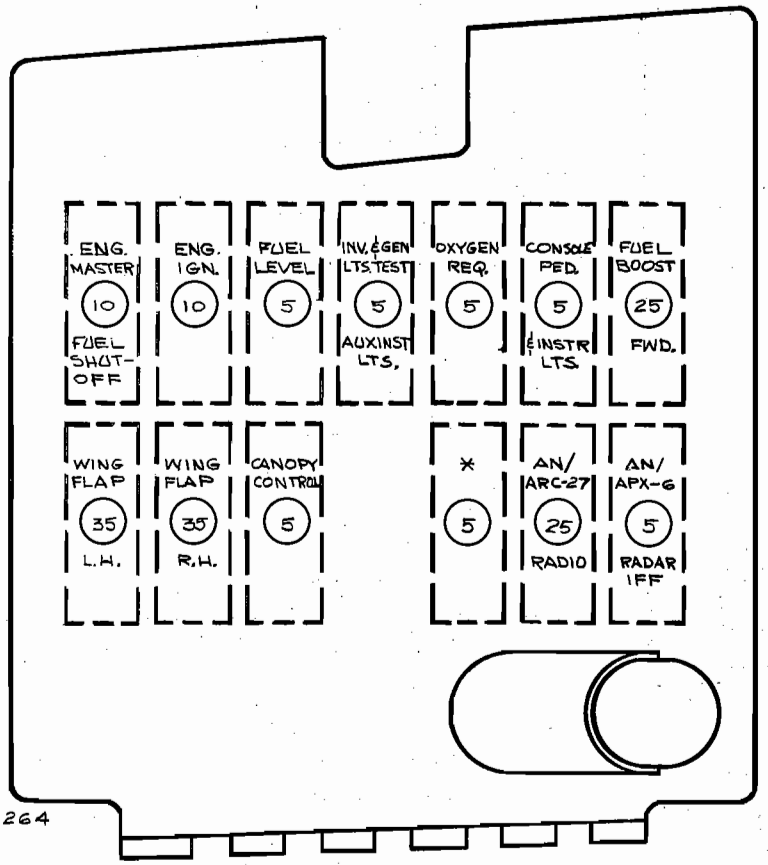
[193] F-86F-20 AIRPLANES AND F-86F-30 AIRPLANES AF52-4305 THRU -4404

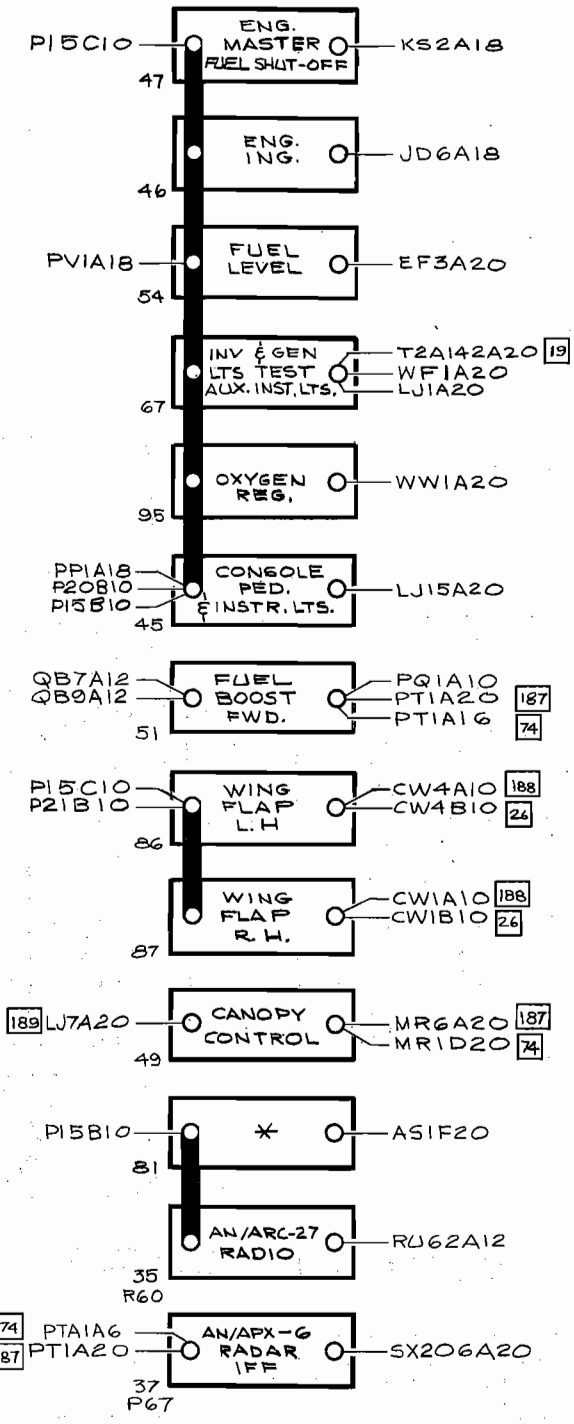
[194] F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-30 AIRPLANES AF52-4305 THRU -4404

[195] F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANE AF51-13070 THRU -13089

F-86F-2-54-371A

RIGHT-HAND CIRCUIT BREAKER PANEL
F-86F-1 THROUGH F-86F-20 AIRPLANES AND F-86F-30 AIRPLANES AF52-4305 THROUGH -4404





* "SIGHT CONTROL" 186
"SIGHT & P-2 CAMERA CONTROL" 185

19 F-86F-35 AIRPLANES

26 F-86F-25 AIRPLANES AF52-5272 THRU -5530 AND F-86F-30 AIRPLANE AF52-4905; AND ALL SUBSEQUENT AIRPLANES

74 F-86F-25 AIRPLANES

185 F-86F-25 AIRPLANES AF52-5387 THRU -5530 AND F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

186 F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5386 AND F-86F-30 AIRPLANES AF52-4405 THRU -4904

187 F-86F-30 AIRPLANE AF52-4405 AND ALL SUBSEQUENT AIRPLANES

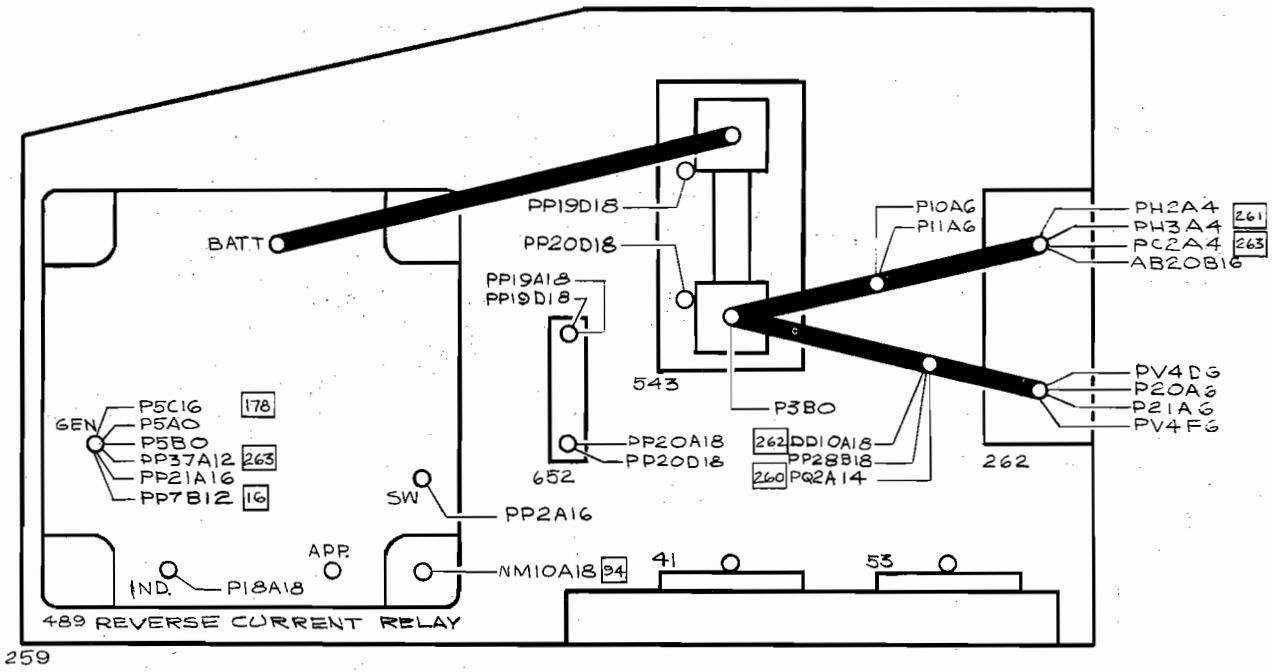
188 F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND F-86F-30 AIRPLANES AF52-4405 THRU -4904

189 F-86F-25 AND F-86D-30 AIRPLANES AF52-4405 THRU -4904

R DENOTES RADIO INDEX NUMBER
P DENOTES RADAR INDEX NUMBER

F-86F-2-54-372A

RIGHT-HAND CIRCUIT BREAKER PANEL
F-86F-25 AIRPLANES AND F-86F-30 AIRPLANE AF52-4405 AND ALL SUBSEQUENT AIRPLANES



16 F-86F-1 AIRPLANES

71 F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386

94 F-86F-25 AIRPLANES AF51-13398 THRU -13510 AND AF52-5272 THRU-5530

178 F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13109

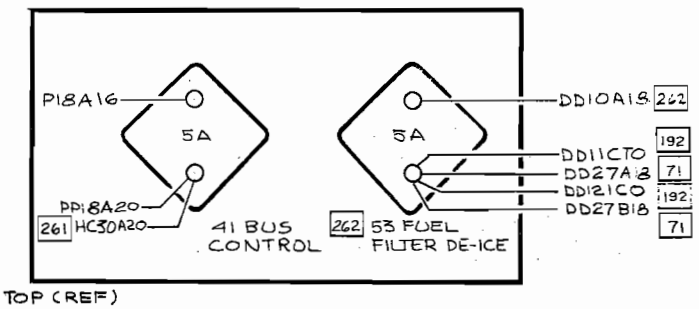
192 F-86F-1 THRU F-86F-20 AIRPLANES

260 F-86F-5 THRU F-86F-15 AIRPLANES F-86F-20 AIRPLANES AF51-13080 THRU -13169 AND F86F-25 AIRPLANES

261 F-86F-1 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328

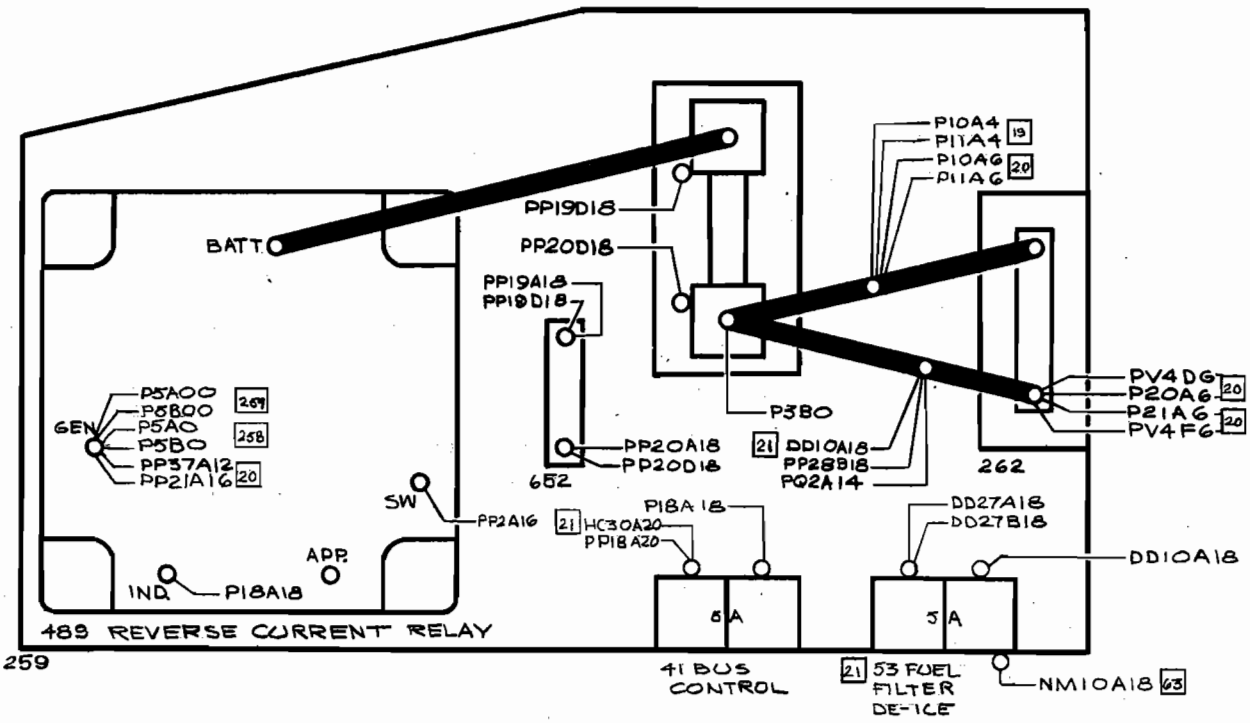
262 F-86F-1 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386

263 F-86F-5 THRU F-86F-25 AIRPLANES



F-86F-2-54-369

REVERSE CURRENT RELAY AND SHUNT PANEL
F-86F-1 THROUGH F-86F-25 AIRPLANES



19 F-86F-35 AIRPLANES

20 F-86F-30 AIRPLANES

21 F-86F-30 AIRPLANES AF52-4305 THRU -5065

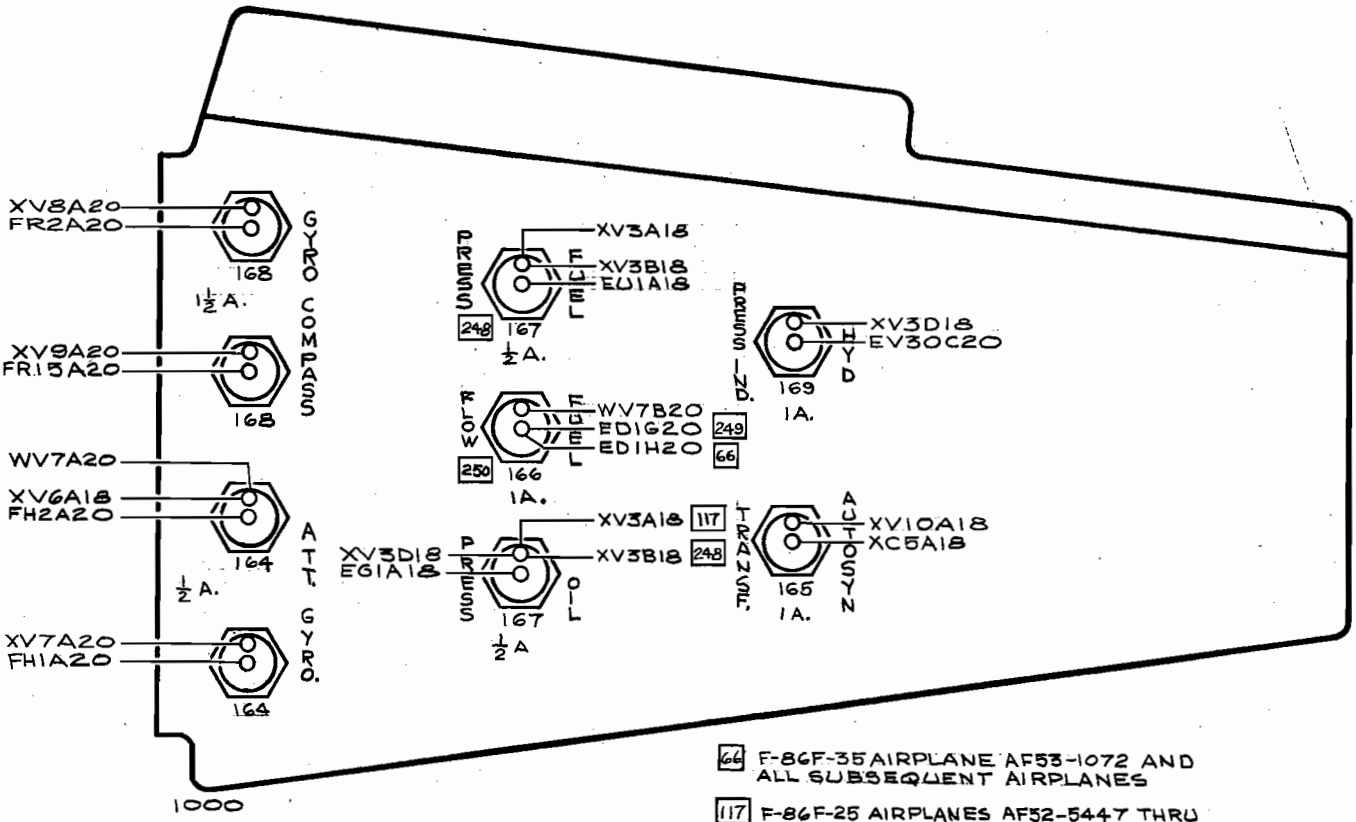
63 F-86F-30 AIRPLANE AF52-4505 AND ALL SUBSEQUENT AIRPLANES

258 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANE AF52-5164

259 F-86F-35 AIRPLANE AF52-5165 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-368

REVERSE CURRENT RELAY AND SHUNT PANEL
F-86F-30 AND F-86F-35 AIRPLANES



66 F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES

117 F-86F-25 AIRPLANES AF52-5447 THRU -5530, F-86F-30 AIRPLANE AF52-4905, AND ALL SEBSEQUENT AIRPLANES

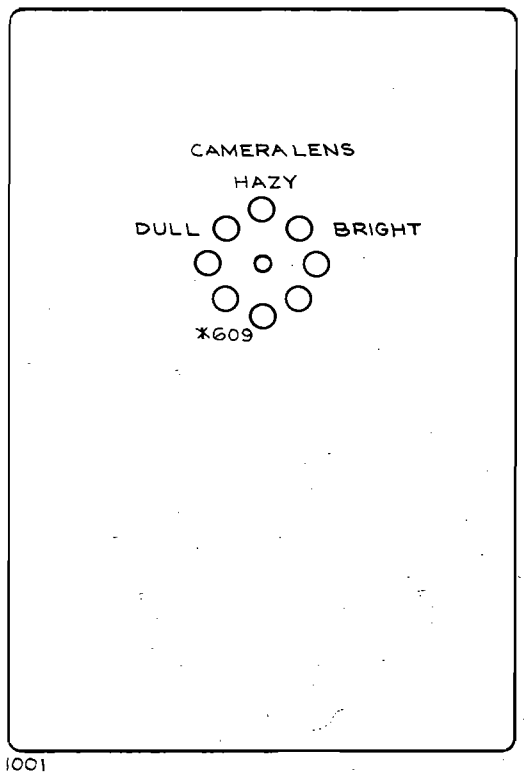
248 F-86F-1 THRU F-86F-20 AIRPLANES F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5446, AND F-86F-30 AIRPLANES AF52-4305 THRU -4904

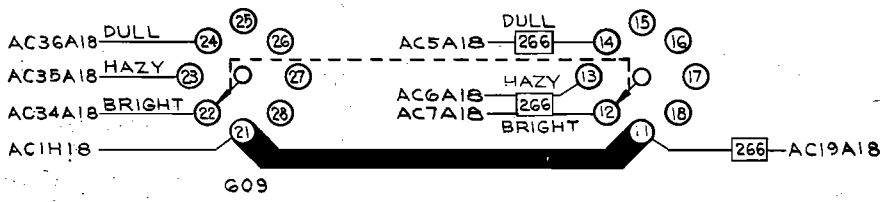
249 F-86F-25 AIRPLANES AF52-5490 THRU -5530 AND F-86F-35 AIRPLANES AF52-5181 THRU -5271

250 F-86F-25 AIRPLANES AF52-5490 THRU -5530 AND F-86F-35 AIRPLANE AF52-5181 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-367

AFT RADIO COMPARTMENT FUSE PANEL



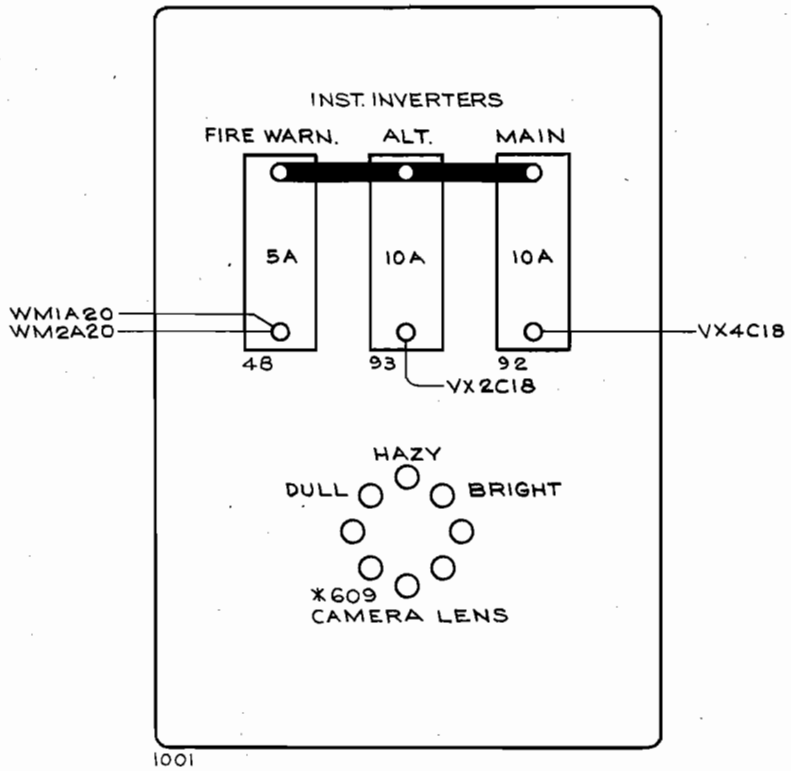


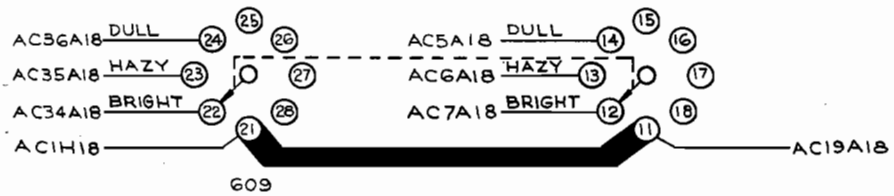
266 F-86F-25 AIRPLANES AF52-5387 THROUGH -5530 AND F-86F-30 AIRPLANES AF52-4905 THROUGH -5163

* SEE DETAIL BELOW PANEL

F-86F-2-54-365A

RIGHT-HAND FORWARD CIRCUIT BREAKER PANEL
F-86F-25 AIRPLANES AF52-5307 THROUGH -5530
AND F-86F-30 AIRPLANES AF52-4746 THROUGH -5163



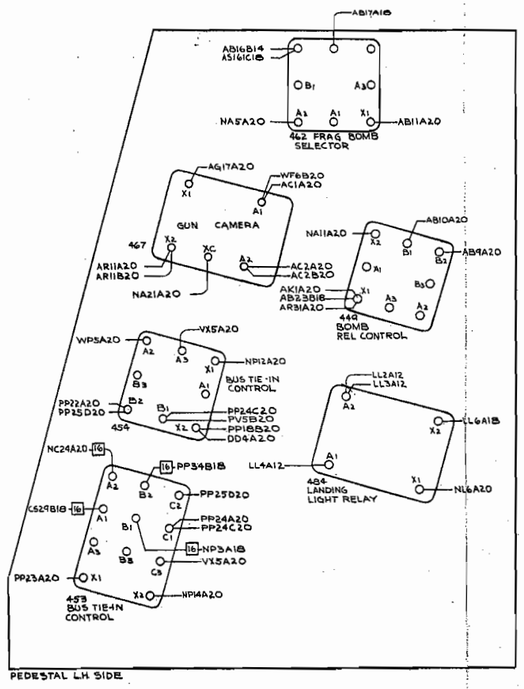


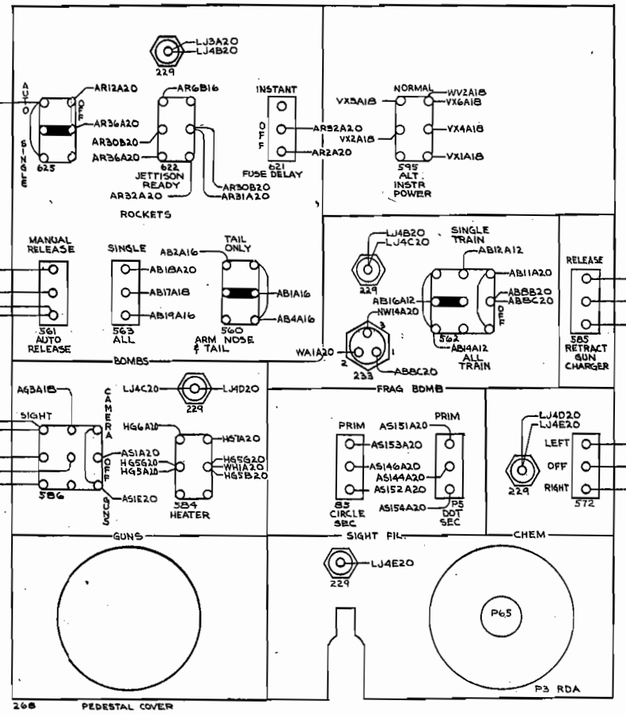
* SEE DETAIL BELOW PANEL

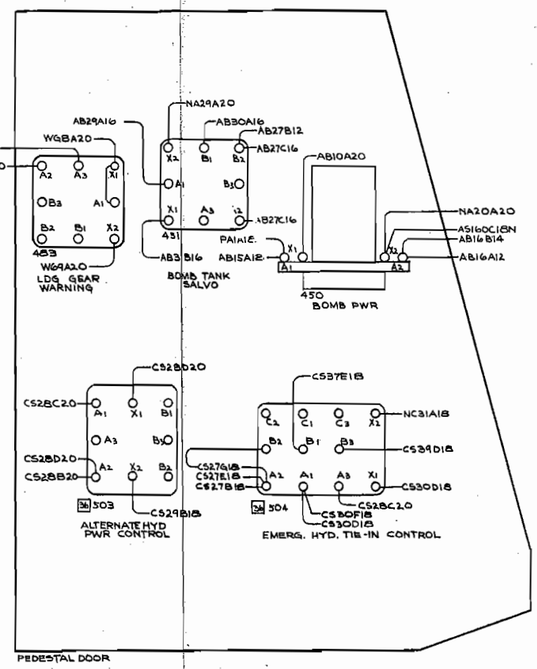
F-86F-2-54-366

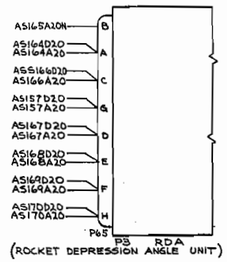
RIGHT-HAND FORWARD CIRCUIT BREAKER PANEL
F-86F-35 AIRPLANES

TO No1F-86F-2







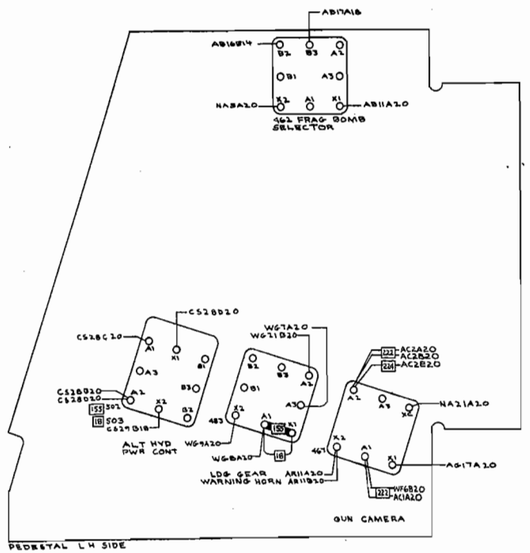


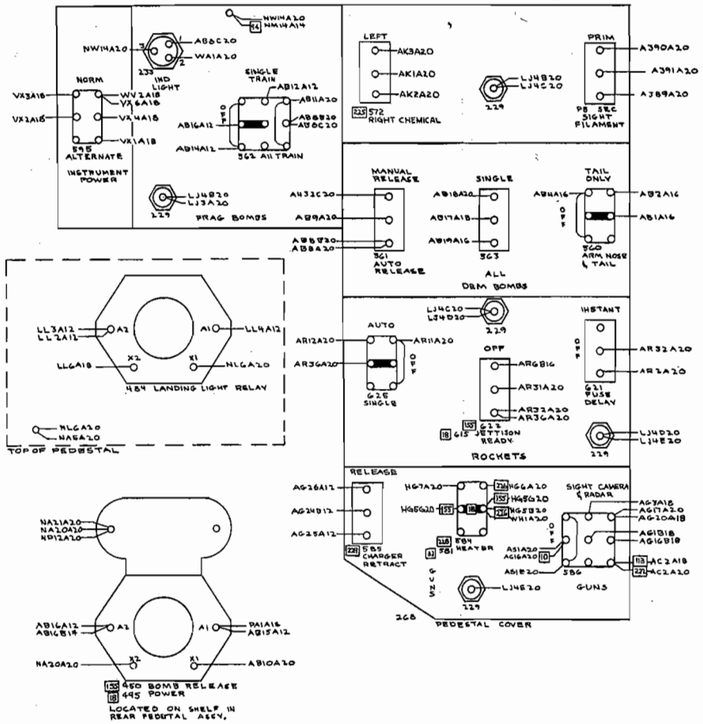
P INDICATES RADAR INDEX NUMBER

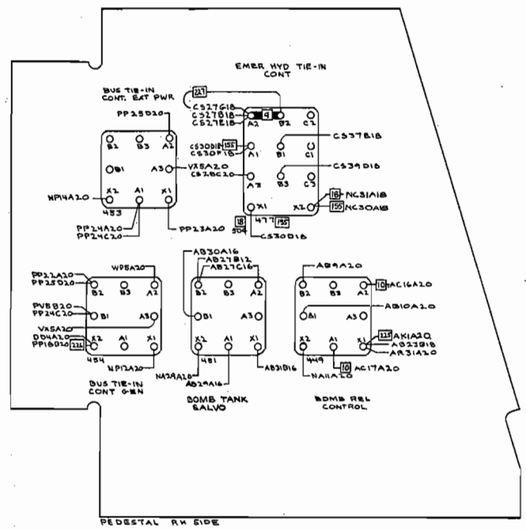
16 F-86F-1 AIRPLANES
36 F-86F-5 AIRPLANES

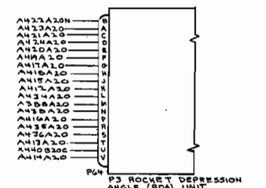
F-86F-2-54-364

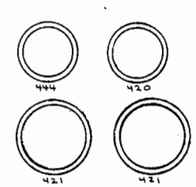
Center Pedestal Assembly
F-86F-1 and F-86F-5 Airplanes

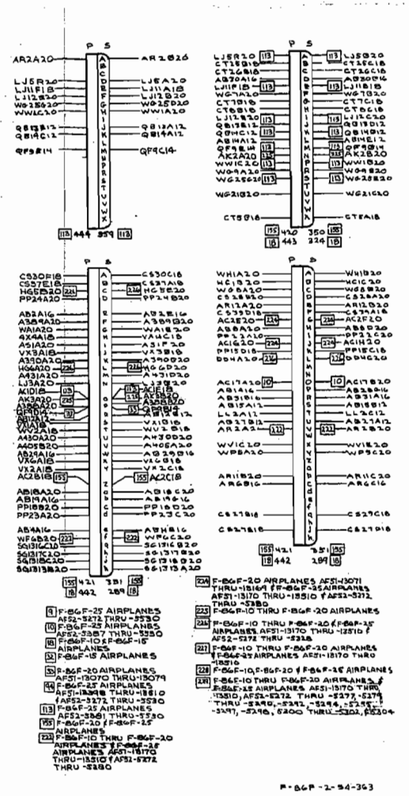











P5
AR2A20
AR2B16
LJ5R20
LJ5F18
LJ12B20
W93B20
WW1C20
LJ5E20
LJ11A18
LJ12D20
W92D20
WW1A20
Q8I2A12
Q8I4C12
Q8I6A12
Q8I4C14
QF8C14
LJ5B20
CT5E18
CT3C18
LJ11B18
W93B20
W67A20
W92B20
WW1C20
CT5B18
Q8I2A12
Q8I6A12
QF8D14
QF8A14
AK2A20
WW1B20
W94B20
W92B20
WW1C20
W92A20
W93E20
W92I20
W92I6A0
CT5D18
CT5A18
C530C18
C537A18
W68B20
PP24B20
AB2B16
AB9A20
AB9D20
PP21C20
AC1A20
AC2E20
AC1G20
PP15D18
PP16C18
D9A20
AC1TA20
AB3B16
AB3A16
AB3I16
AB3I14
LL3C12
AB3J12
AB3J16
AB3A5
WV1C20
WP8A20
AR1B20
AR1C20
AR6B16
AR6C16
C537B18
C537D18
C537B18
C537D18
P5
P6
WH1B20
WC1C20
W68A20
C538A20
AB1A20
C537A18
AC2E20
AB8A20
PP21C20
AC1G20
PP15D18
D9A20
AC1TA20
AB3B16
AB3A16
AB3I16
AB3I14
LL3C12
AB3J12
AB3J16
AB3A5
WV1C20
WP8A20
AR1B20
AR1C20
AR6B16
AR6C16
C537B18
C537D18
C537B18
C537D18
W1HA20
WC1C20
W68A20
C538A20
AB1A20
C537A18
AC2E20
AB8A20
PP21C20
AC1G20
PP15D18
D9A20
AC1TA20
AB3B16
AB3A16
AB3I16
AB3I14
LL3C12
AB3J12
AB3J16
AB3A5
WV1C20
WP8A20
AR1B20
AR1C20
AR6B16
AR6C16
C537B18
C537D18
C537B18
C537D18
AB4A16
WF6B20
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SG1B1A20
SG1B1B20
AB9A16
WF6C20
SG1B1E820
SG1B1D820
SG1B1A20
W92A20
W93E20
W92I6A0
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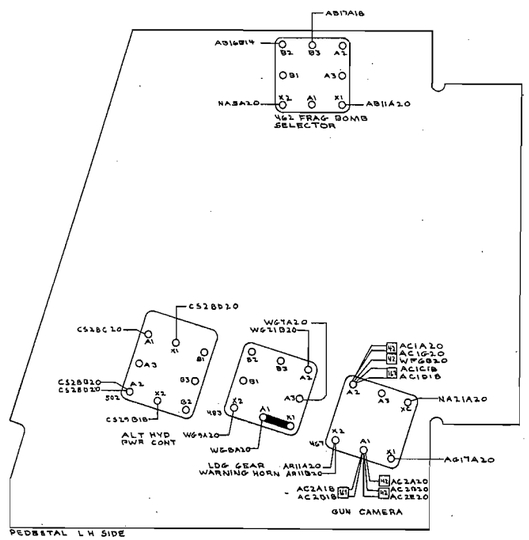
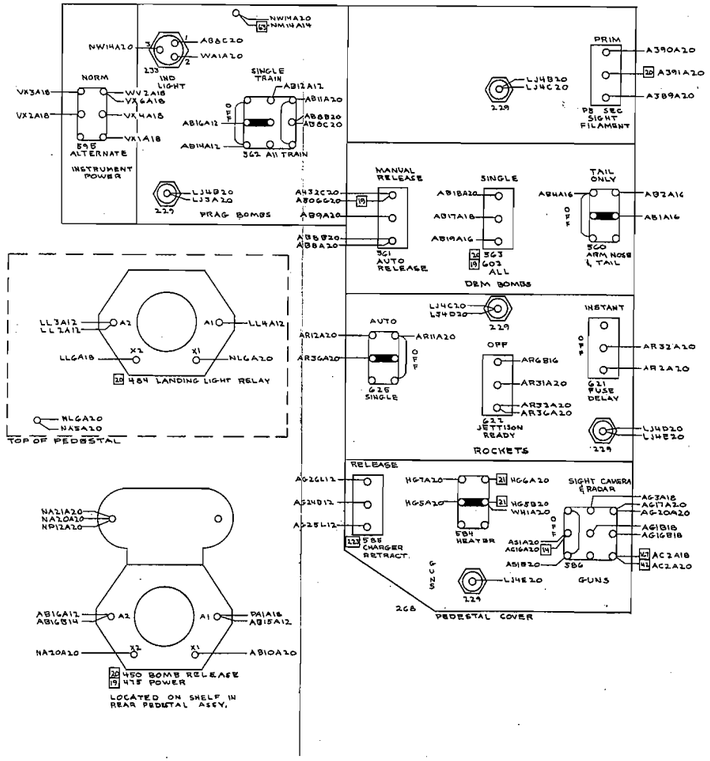
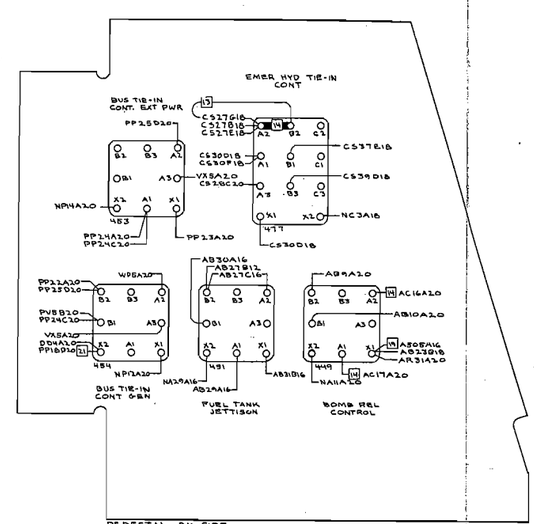
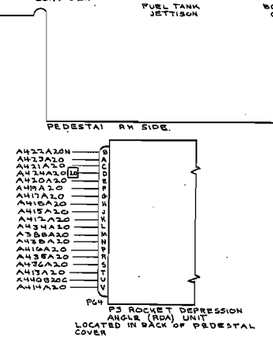
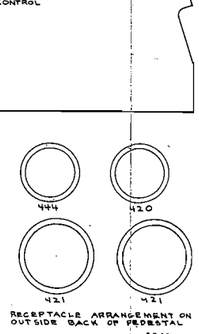


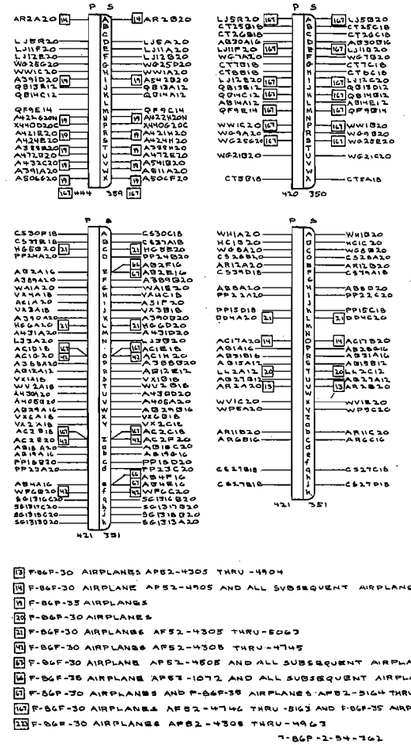
P DENOTES RADAR INDEX NUMBER











19 F-86F-30 AIRPLANES AF52-4305 THRU -4904

16 F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

15 F-86F-35 AIRPLANES

20 F-86F-30 AIRPLANES

21 F-86F-30 AIRPLANES AF52-4305 THRU-5063

18 F-86F-30 AIRPLANES AF52-4305 THRU-4745

17 F-86F-30 AIRPLANE AF52-4505 AND ALL SUBSEQUENT AIRPLANES

14 F-86F-30 AIRPLANE AF52-1072 AND ALL SUBSEQUENT AIRPLANES

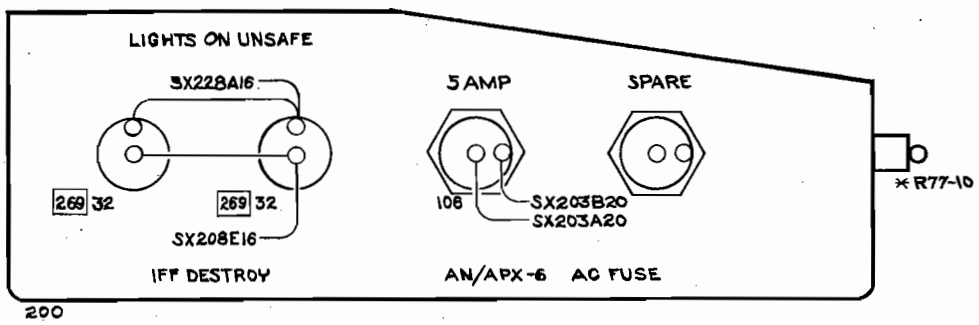
13 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU 5271

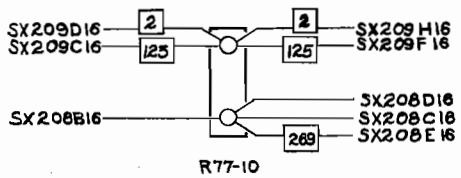
167 F-86F-30 AIRPLANES AF52-4746 THRU -5163 AND F-86F-35 AIRPLANES

233 F-86F-30 AIRPLANES AF52-4305 THRU-4963

7-86P-2-54-761

CENTER PEDESTAL ASSEMBLY
F-86F-30 AND F-86F-35 AIRPLANES





R DENOTES RADIO INDEX NUMBERS
* SEE DETAILS BELOW PANEL

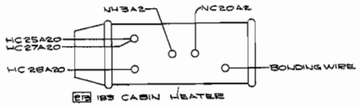
2 F-86F-1 THRU F-86F-15 AIRPLANES

125 F-86F-20 THRU F-86F-35 AIRPLANES

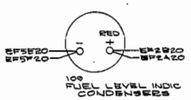
269 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13480 AND F-86F-30 AIRPLANES AF52-4305 THRU-4809

AN/APX-6 RADAR LIGHT AND FUSE PANEL

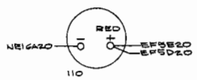
F-86F-2-54-426A



215 193 CABIN HEATER



109 FUEL LEVEL INDIC CONDENSERS



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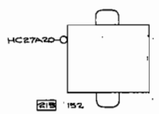
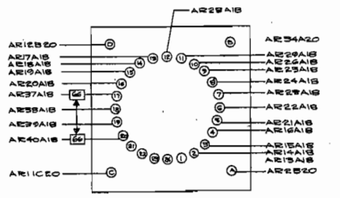
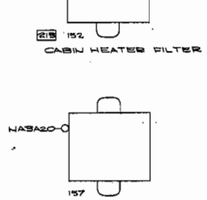


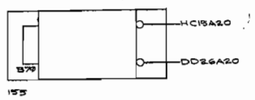
215 152
CABIN HEATER FILTER



127 ROCKET INTEERVALOMETER



157
GUN CHRG COMP RADIO NOISE FILTER



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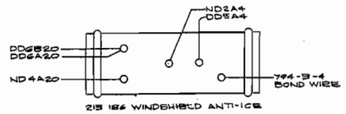
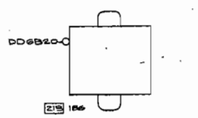


215 186 WINDSHIELD ANTI-ICE



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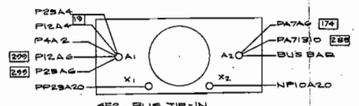
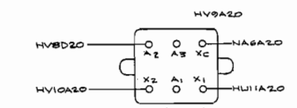
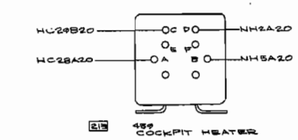


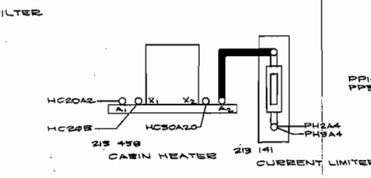
452 BUS TIE-IN



457 CANOPY SEAL

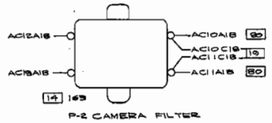


215 455 COCKPIT HEATER

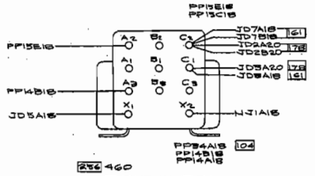


213 459 CABIN HEATER
213 191 CURRENT LIMITER

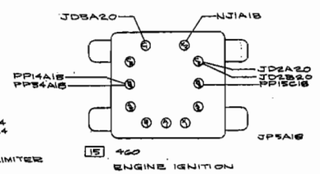
HEAT & VENT RADIO NOISE FILTER



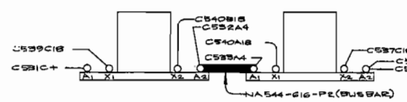
14 169 P-2 CAMERA FILTER



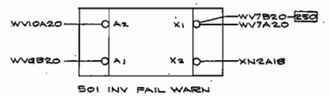
256 460 ENGINE IGNITION



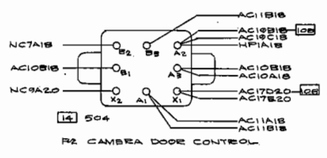
15 460 ENGINE IGNITION



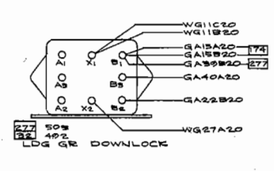
476 EMERG HYD PUMP



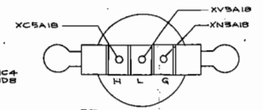
501 INV FAIL WARN



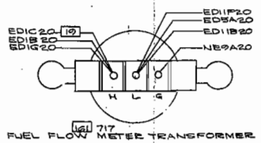
14 504 P2 CAMBEA DOOR CONTROL



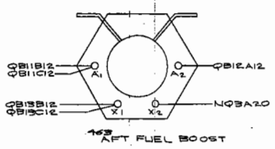
277 50% 95 40% LDG GR DOWNLOCK



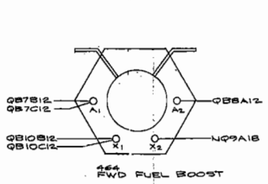
715 AUTO SYN TRANS



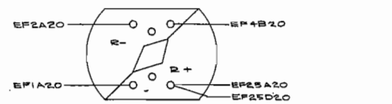
161 717 FUEL FLOW METER TRANSFORMER



163 AFT FUEL BOOST



464 FWD FUEL BOOST



265 FUEL LEVEL ADJUST PANEL

14 F-86F-30 AIRPLANE AF52-4805, AND ALL SUBSEQUENT AIRPLANES

18 F-86F-1 AIRPLANES AF51-2850 THRU-2877

19 F-86F-35 AIRPLANES

32 F-86F-15 AIRPLANES

66 F-86F-25 AIRPLANE AF52-1072 AND ALL SUBSEQUENT AIRPLANES

80 F-86F-25 AIRPLANES AF52-5272 THRU-5479 AND F-86F-30 AIRPLANES AF52-4905 THRU-5103

104 F-86F-1 AIRPLANES AF51-2878 THRU-2927

108 F-86F-30 AIRPLANES AF52-4905 THRU-5189

141 F-86F-20 AIRPLANES AF51-13110 THROUGH-13169 AND F-86F-25 THROUGH F-86F-85 AIRPLANES

174 F-86F-30 AND F-86F-35 AIRPLANES

178 F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH-13109

215 F-86F-1 THRU- F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13310 AND AF52-5272 THRU-5828, AND F-86F-30 AIRPLANES AF52-4805 THRU-5095

250 F-86F-25 AIRPLANES AF52-5490 THRU-5532 AND F-86F-35 AIRPLANES AF52-5181 AND ALL SUBSEQUENT AIRPLANES

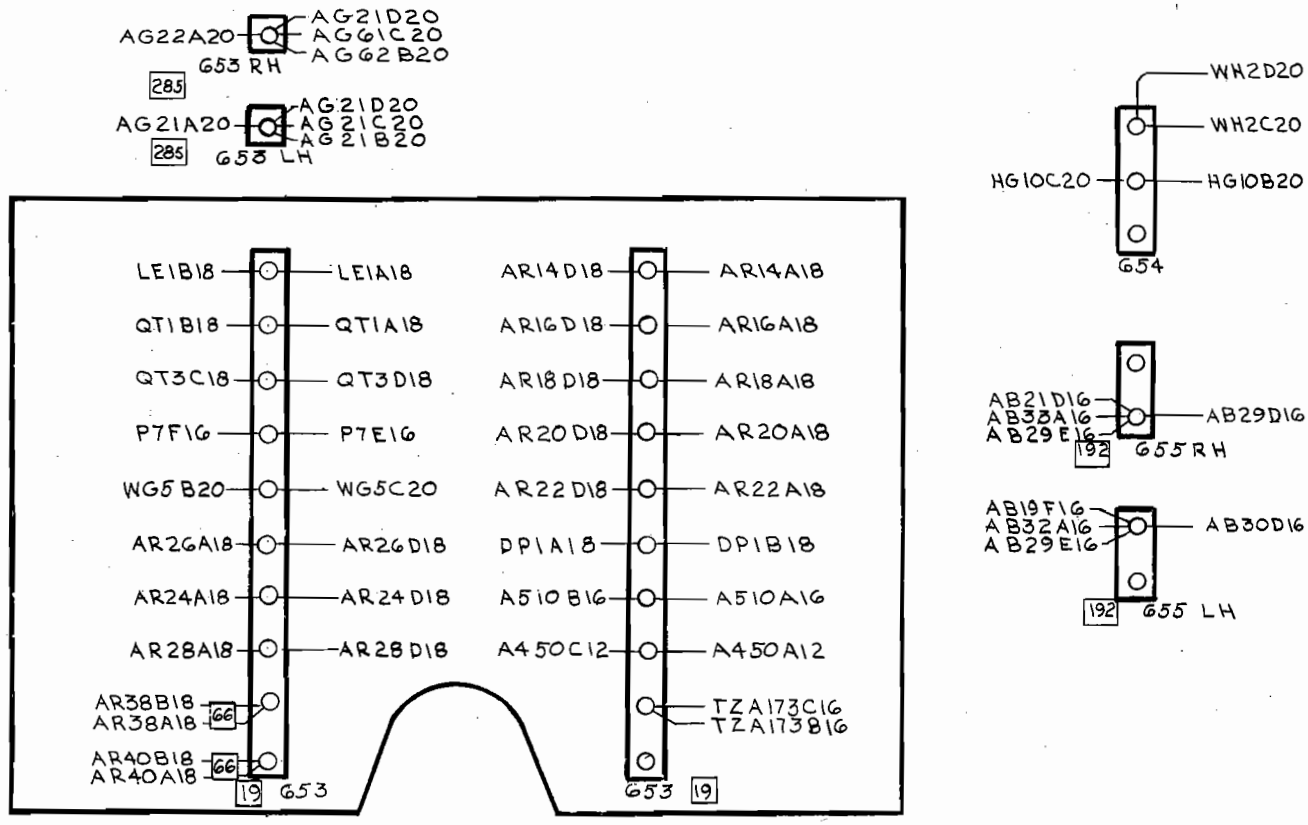
264 F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 THRU- F-86F-35 AIRPLANES

277 F-86F-20 AIRPLANES AF51-13090 THRU-13169 AND F-86F-25 THRU- F-86F-35 AIRPLANES

280 F-86F-1 THRU- F-86F-25 AIRPLANES

296 F-86F-1 THRU- F-86F-30 AIRPLANES

F-86F-E-54-4274



19 F-86F-35 AIRPLANES

66 F-86F-35 AIRPLANE AF53-1072 & ALL SUBSEQUENT AIRPLANES

67 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU -5271

174 F-86F-30 AND F-86F-35 AIRPLANES

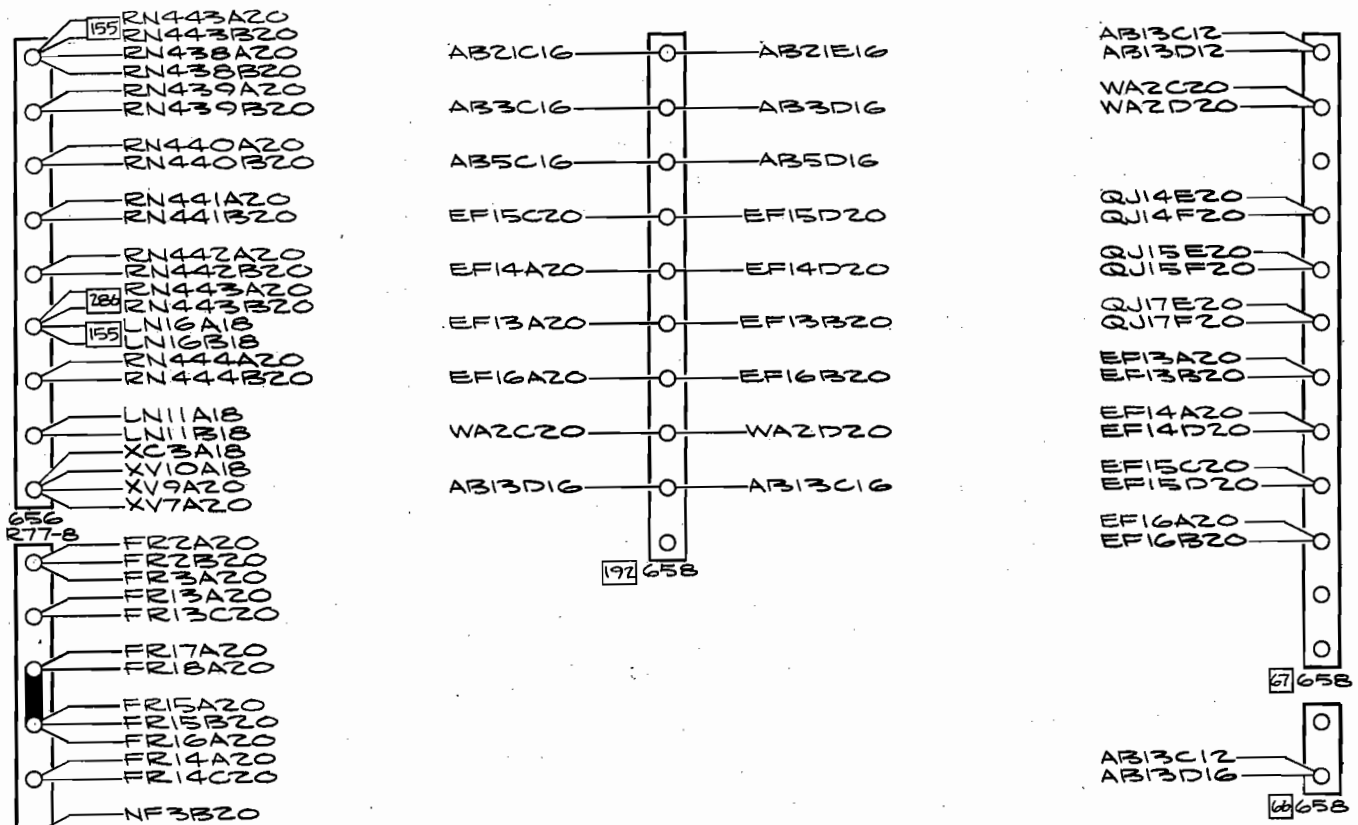
192 F-86F-1 THRU F-86F-20 AIRPLANES

285 F-86F-1 THRU F-86F-25 AIRPLANES

* THIS PIN DOES NOT APPEAR 67

F-86F-2-54-481

TERMINAL STRIPS
(SHEET 1 OF 14)



2 F-86F-1 THROUGH F-86F-15 AIRPLANES

66 F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES

67 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5271

155 F-86F-20 AND F-86F-25 AIRPLANES

192 F-86F-1 THROUGH F-86F-20 AIRPLANES

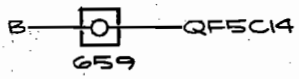
286 F-86F-1 THROUGH F-86F-15 AIRPLANES AND F-86F-30 THROUGH F-86F-35 AIRPLANES

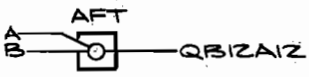
* THIS PIN DOES NOT APPEAR 2

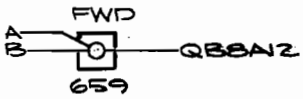
R DENOTES RADIO INDEX NUMBER

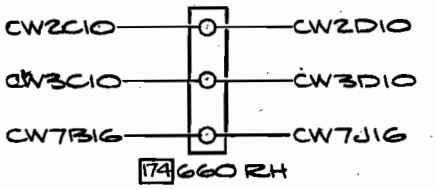
F-86F-2-54-482

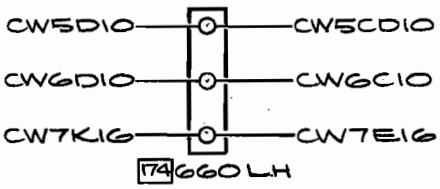
TERMINAL STRIPS
SHEET 2 OF 14

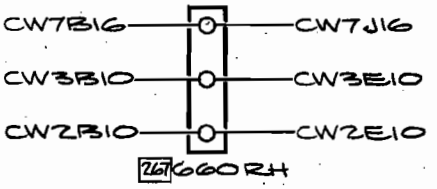


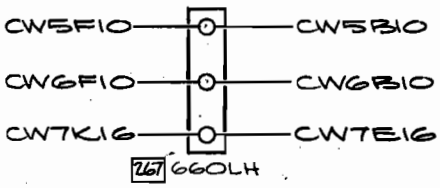


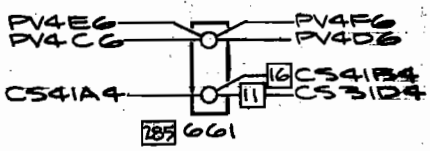


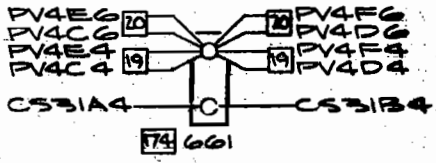


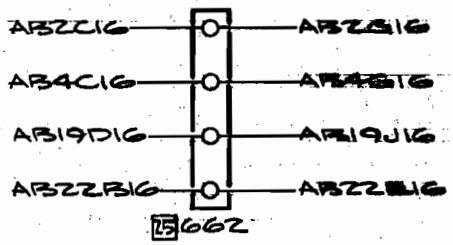








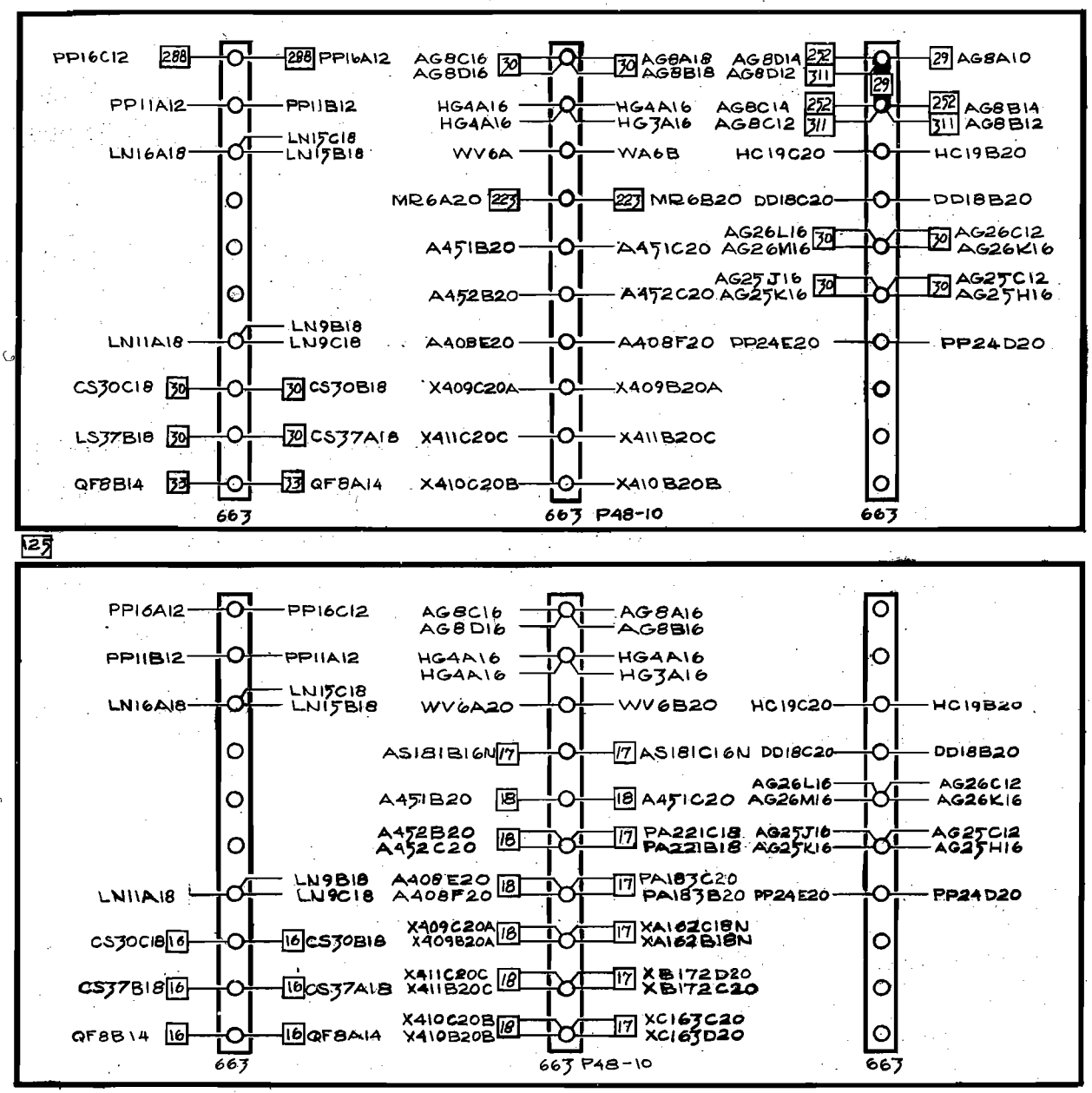




11 F-86F-5 THROUGH F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
19 F-86F-35 AIRPLANES
20 F-86F-30 AIRPLANES
25 F-86F-25 THROUGH F-86F-35 AIRPLANES
174 F-86F-30 AND F-86F-35 AIRPLANES
167 F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES
285 F-86F-1 THROUGH F-86F-25 AIRPLANES

F-86F-2-54-483

TERMINAL STRIPS
SHEET 3 OF 14



P DONATES RADAR INDEX NUMBERS

2 F-86F-1 THRU F-86F-15 AIRPLANES

16 F-86F-1 AIRPLANES

17 F-86F-1 AND F-86F-5 AIRPLANES

18 F-86F-10 AND F-86F-15 AIRPLANES

29 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299, -5303, AND -5305 THRU -5530, AND F-86F -30 AIRPLANE AF52-4964, AND ALL SUBSEQUENT AIRPLANES

30 F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-5272 THRU-5277, -5279 THRU -5290, -5292, -5294, -5295, 5297, -5298, -5300 THRU-5302, AND -5304, AND F-86F-30 AIRPLANES AF52-4305 THRU -4963

33 F-86F-20 AIRPLANES AF51-13070 THRU-13079

125 F-86F-20 THRU F-86F-35 AIRPLANES

223 F-86F-30 AIRPLANES AF52-4305 THRU-4963

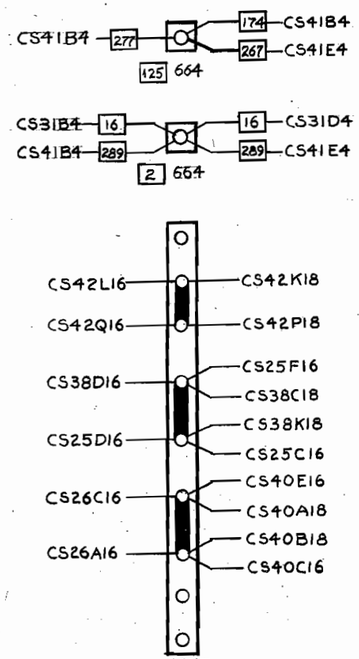
252 F-86F-35 AIRPLANE AF52-5214 AND ALL SUBSEQUENT AIRPLANES

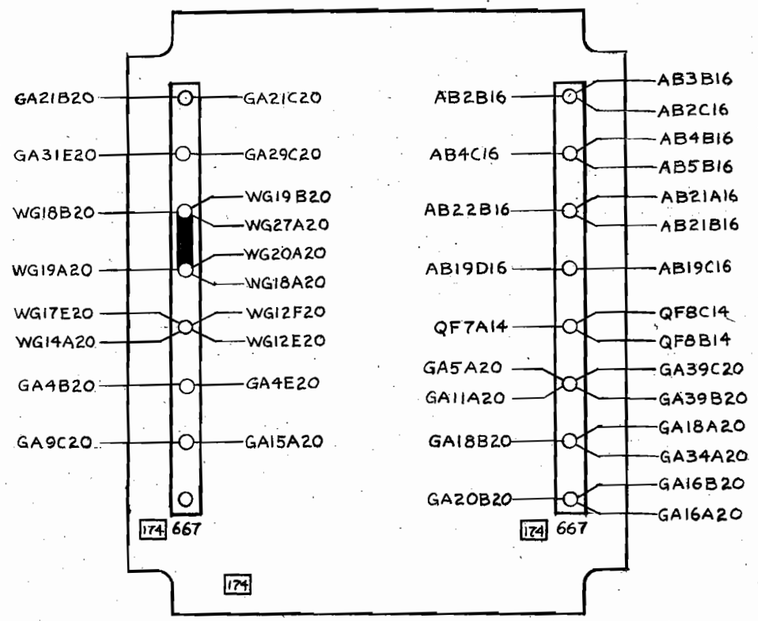
288 F-86F-20 THRU F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU-5271 AND AF53-1072 THRU -1171

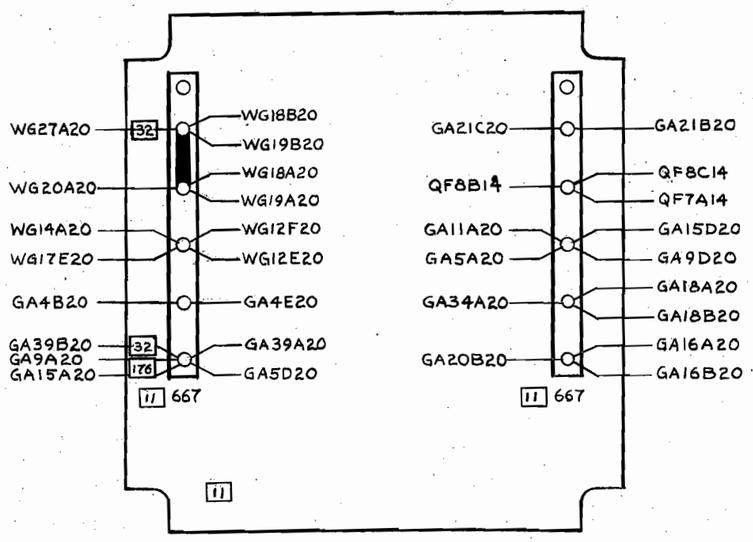
311 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299, -5303, -5305 THRU -5530, F-86F-30 AIRPLANES AF52-4964 THRU -5163, AND F-86F-35 AIRPLANES AF52-5164 THRU -5213

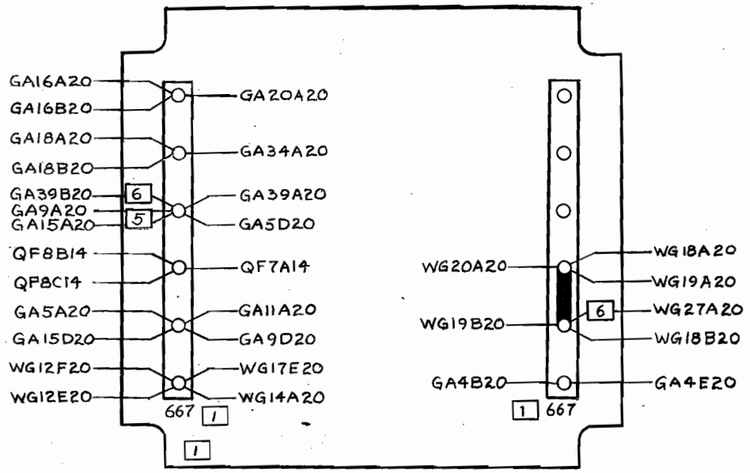
F-86F-2-54-484

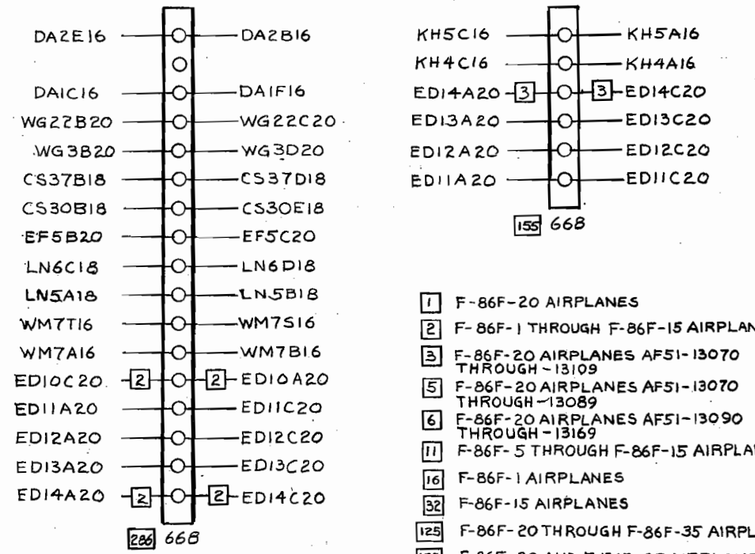
TERMINAL STRIPS (SHEET 4 OF 14)











1 F-86F-20 AIRPLANES

2 F-86F-1 THROUGH F-86F-15 AIRPLANES

3 F-86F-20 AIRPLANES AF51-13070 THROUGH -13109

5 F-86F-20 AIRPLANES AF51-13070 THROUGH -13089

6 F-86F-20 AIRPLANES AF51-13090 THROUGH -13169

11 F-86F-5 THROUGH F-86F-15 AIRPLANES

16 F-86F-1 AIRPLANES

32 F-86F-15 AIRPLANES

125 F-86F-20 THROUGH F-86F-35 AIRPLANES

155 F-86F-20 AND F-86F-25 AIRPLANES

174 F-86F-30 AND F-86F-35 AIRPLANES

176 F-86F-5 AND F-86F-10 AIRPLANES

267 F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 AIRPLANES

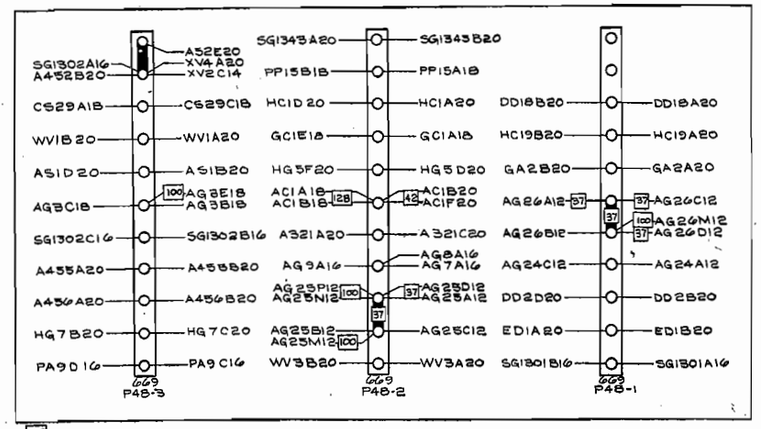
277 F-86F-20 AIRPLANES AF51-13090 THROUGH -13169 AND F-86F-25 THROUGH F-86F-35 AIRPLANES

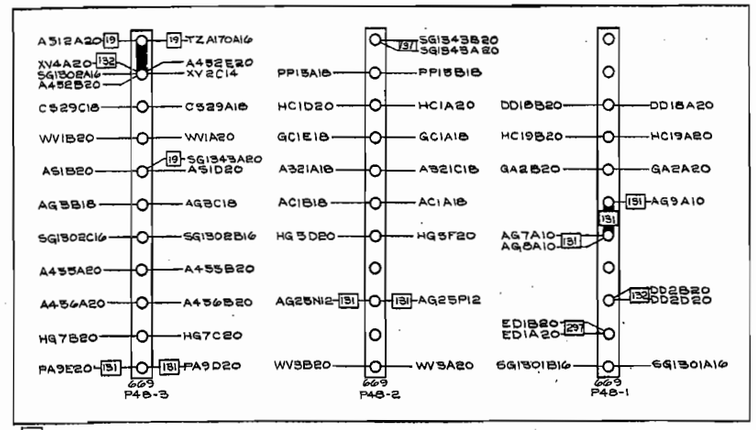
286 F-86F-1 THROUGH F-86F-25 AIRPLANES AND F-86F-30 AND F-86F-35 AIRPLANES

289 F-86F-5 AIRPLANE AF51-2930 THROUGH 2943 AND F-86F-10 AND F-86F-15 AIRPLANES

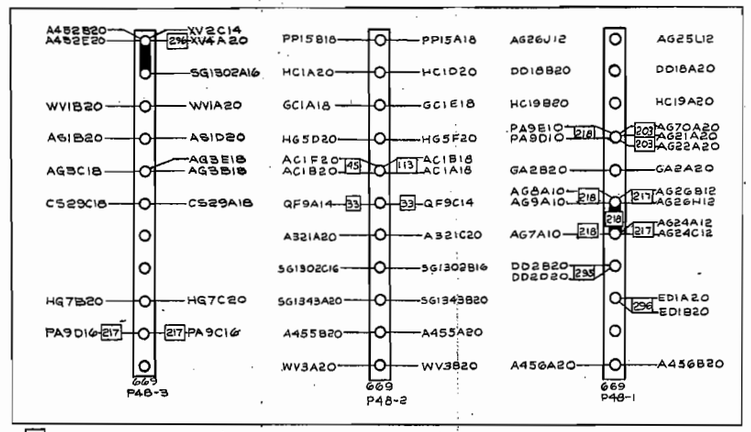
F-86F-2-54-485

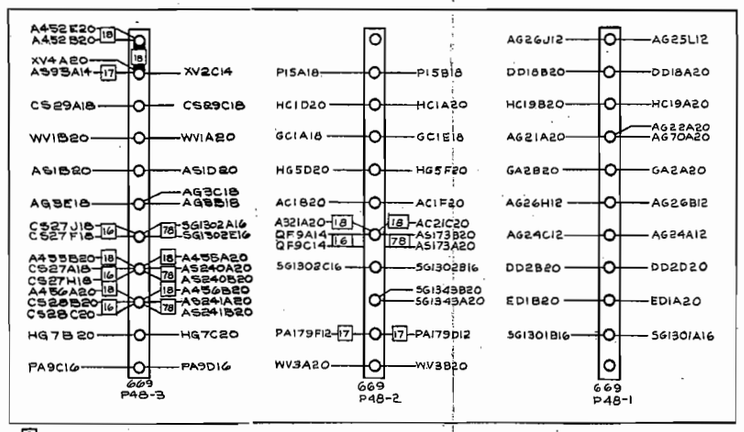
TERMINAL STRIPS
(SHEET 5 OF 14)





P DENOTES RADAR INDEX NUMBER





[2] F-86F-1 THROUGH F-86F-15 AIRPLANES

[11] F-86F-5 THROUGH F-86F-15 AIRPLANES

[16] F-86F-1 AIRPLANES

[17] F-86F-1 AND F-86F-5 AIRPLANES

[18] F-86F-10 AND F-86F-15 AIRPLANES

[19] F-86F-35 AIRPLANES

[33] F-86F-20 AIRPLANES AF51-13070 THROUGH -13079

[37] F-86F-30 AIRPLANES AF52-4305 THROUGH -4404

[42] F-86F-30 AIRPLANES AF52-4305 THROUGH -4745

[45] F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5380

[78] F-86F-5 AIRPLANES AF51-2930 THROUGH -2943

[100] F-86F-30 AIRPLANES AF52-4405 THROUGH -4963

[113] F-86F-25 AIRPLANES AF52-5381 THROUGH -5530

[146] F-86F-30 AIRPLANES AF52-4746 THROUGH -4963

[151] F-86F-30 AIRPLANES AF52-4964 THROUGH -5163

[158] F-86F-30 AIRPLANES AF52-4964 THROUGH -5065

[155] F-86F-20 AND F-86F-25 AIRPLANES

[203] F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13070 THROUGH -13510

[217] F-86F-20 AND F-86F-25 AF52-13170 THROUGH -13510 AND AF52-5272 THROUGH -5277, -5279 THROUGH -5290, -5292, -5294, -5295, -5297, 5298, -5300 THROUGH -5302 AND -5304

[218] F-86F-25 AIRPLANES AF52-5278, -5291, -5293 -5296, -5299, -5303 AND -5305 THROUGH -5530

[223] F-86F-30 AIRPLANES AF52-4305 THROUGH -4963

[257] F-86F-30 AIRPLANE... AF52-4964 AND ALL SUBSEQUENT AIRPLANES

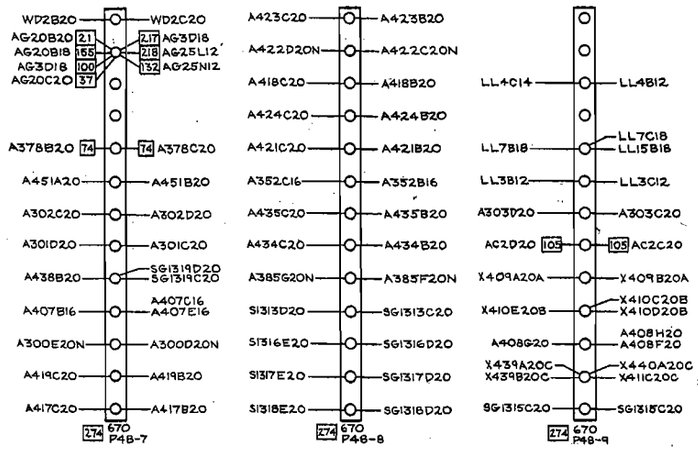
[295] F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5328

[296] F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510 AND AF52-5272 THROUGH -5489

[297] F-86F-30 AIRPLANES AF52-4964 THROUGH -5163 AND F-86F-35 AIRPLANES AF52-5164 THROUGH -5180

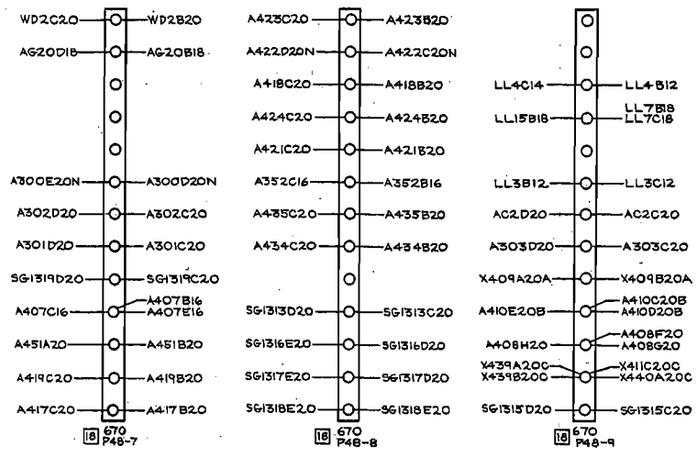
F-86F-2-54-486

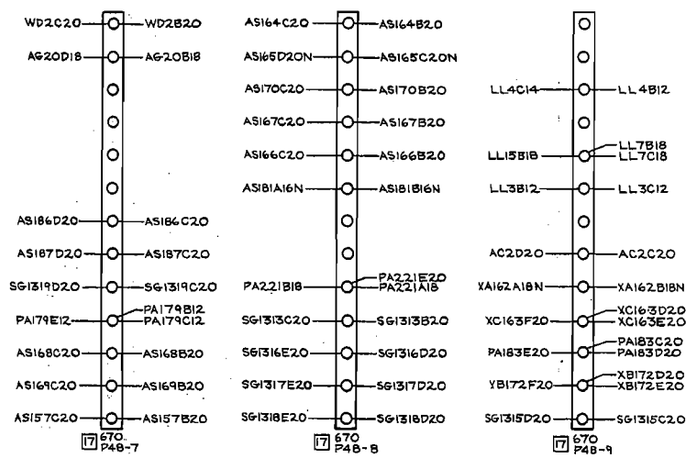
TERMINAL STRIPS
SHEET 6 OF 14



'P' DENOTES RADAR INDEX NUMBERS

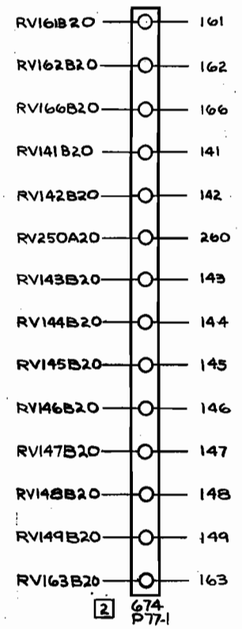
TERMINAL STRIPS
(SHEET 7 OF 14)

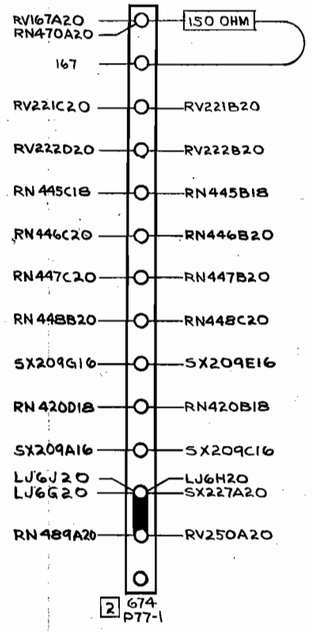


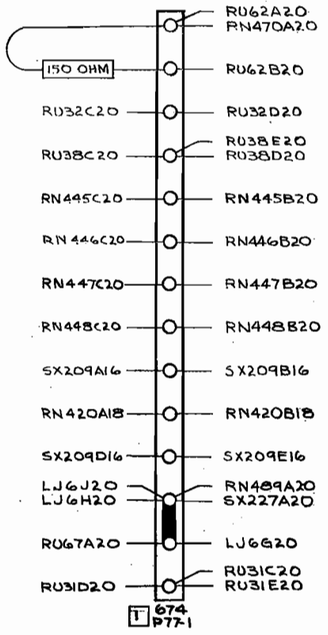


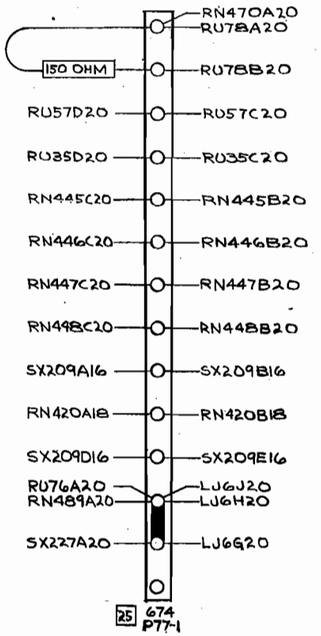
17 F-86F-1 AND F-86F-5 AIRPLANES
18 F-86F-10 AND F-86F-15 AIRPLANES
19 F-86F-35 AIRPLANES
21 F-86F-30 AIRPLANES AF52-4305 THRU -5063
23 F-86F-30 AIRPLANE AF52-5064, AND ALL SUBSEQUENT AIRPLANES
37 F-86F-30 AIRPLANES AF52-4306 THRU -4404
74 F-86F-25 AIRPLANES
100 F-86F-30 AIRPLANES AF52-4405 THRU -4963
103 F-86F-30 AIRPLANES AF52-5064 THRU -5163
105 F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-5272 THRU, AND F-86F-30 AIRPLANE AF52-4305 THRU -4745
132 F-86F-30 AIRPLANES AF52-4964 THRU -5063
165 F-86F-20 AND F-86F-25 AIRPLANES
217 F-86F-20 AND F-86F-25 AIRPLANES AF52-13170 THRU-13510 AND AF52-5272 THRU -5277, -5279 THRU -5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU -5302, AND -5304
218 F-86F-25 AIRPLANES AF52-5278, -5291, 5293, -5296, -5299, -5303, AND -5305 THRU -5330
274 F-86F-20 AND F-86F-25 AIRPLANES AND F-86F-30 AIRPLANES AF52-4305 THRU -5063

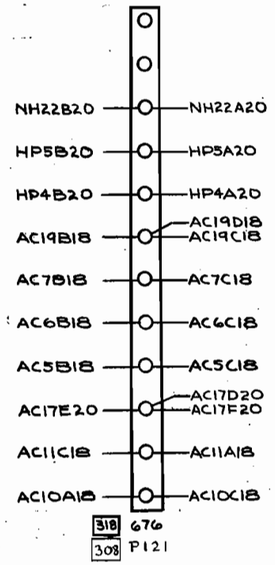
F-86F-2-54-487



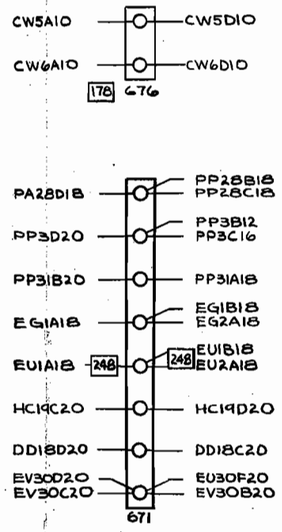


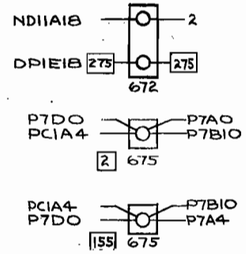






'P' DENOTES RADAR INDEX NUMBER





1 F-86F-20 AIRPLANES

2 F-86F-1 THRU F-86F-15 AIRPLANES

25 F-86F-25 THRU F-86F-35 AIRPLANES

155 F-86F-20 & F-86F-25 AIRPLANES

178 F-86F-1 THRU F-86F-15 AIRPLANES & F-86F-20 AIRPLANES AF51-13070 THRU -13109

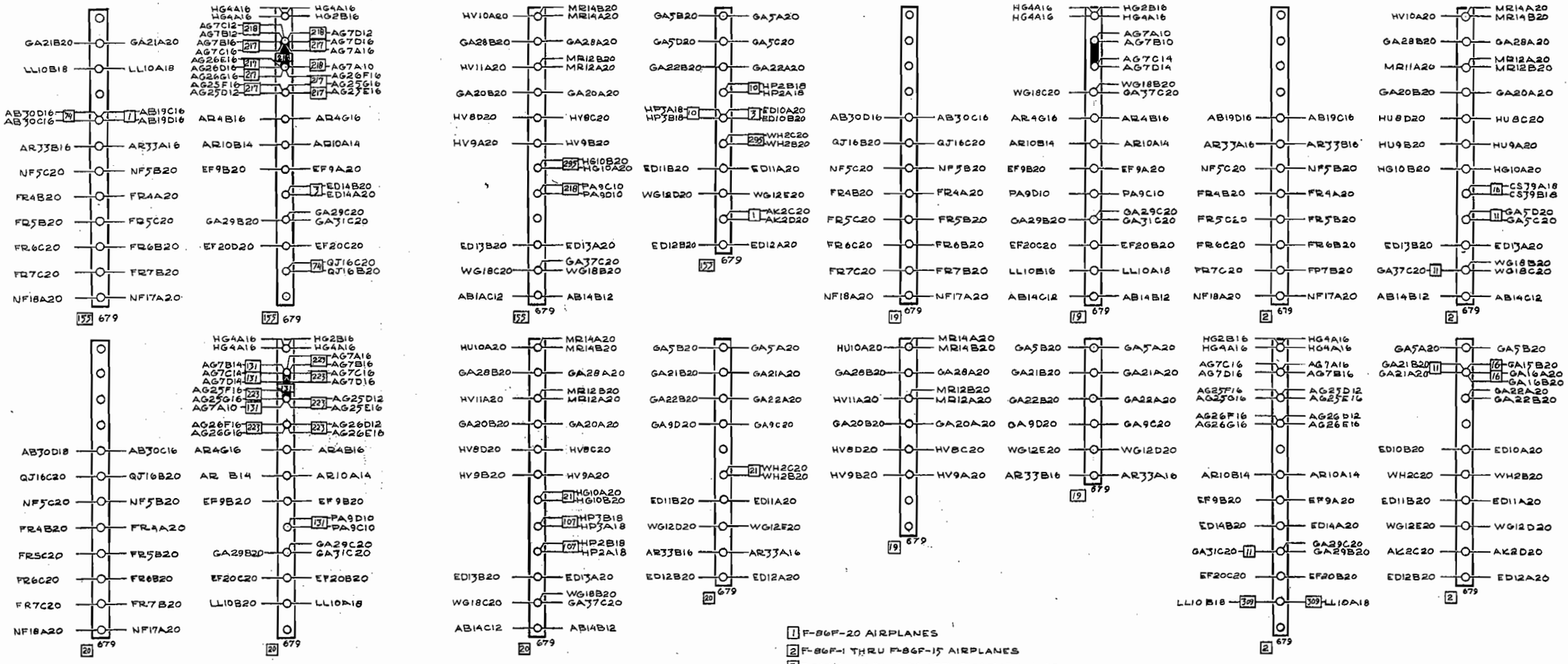
248 F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5446, & F-86F-30 AIRPLANES AF52-4305 THRU -4904

275 F-86F-1 THRU F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13130 THRU -13169 & F-86F-25 THRU F-86F-35 AIRPLANES

308 F-86F-35 AIRPLANE AF53-1172 AND ALL SUBSEQUENT AIRPLANES

318 F-86F-35 AIRPLANES AF52-5164 THRU -5271, AND AF53-1072 THRU -1171

F-86F-2-54-488A



1 F-86F-20 AIRPLANES

2 F-86F-1 THRU F-86F-15 AIRPLANES

3 F-86F-20 AIRPLANES AF51-13070 THRU-13109

10 F-86F-25 AIRPLANES AF52-5387 THRU-5530

11 F-86F-5 THRU F-86F-15 AIRPLANES

16 F-86F-1 AIRPLANES

19 F-86F-35 AIRPLANES

20 F-86F-30 AIRPLANES

21 F-86F-30 AIRPLANES AF52-4305 THRU-5063

74 F-86F-25 AIRPLANES

107 F-86F-30 AIRPLANES AF52-5014 THRU-5163

131 F-86F-30 AIRPLANES AF52-4964 THRU-5163

177 F-86F-20 AND F-86F-25 AIRPLANES

217 F-86F-20 AND F-86F-25 AIRPLANES AF52-13170 THRU-13510 AND AF52-5272 THRU-5277 THRU-5279 THRU-5290, -5292, -5294, -5295, -5297, -5298, -5300 THRU-5302 AND -5304

218 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, 5296-5299, -5303 AND -5305 THRU-5530

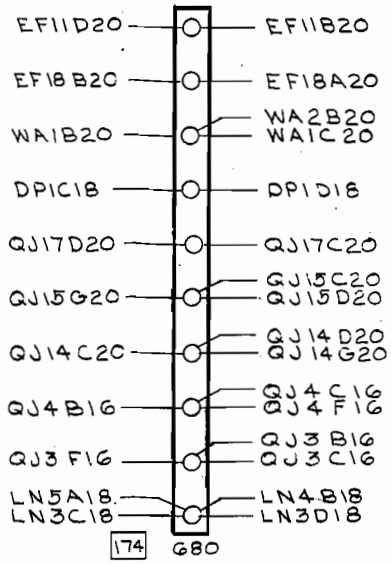
223 F-86F-30 AIRPLANES AF52-4305 THRU-4963

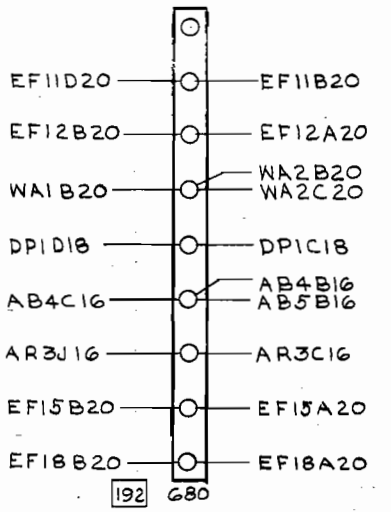
295 F-86F-20 AND F-86F-25 AIRPLANES AF-51-13170 THRU-13510 AND AF52-5272 THRU-5328

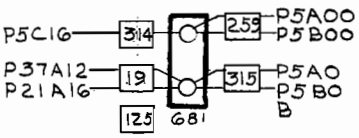
309 F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 THRU F86F-15 AIRPLANES

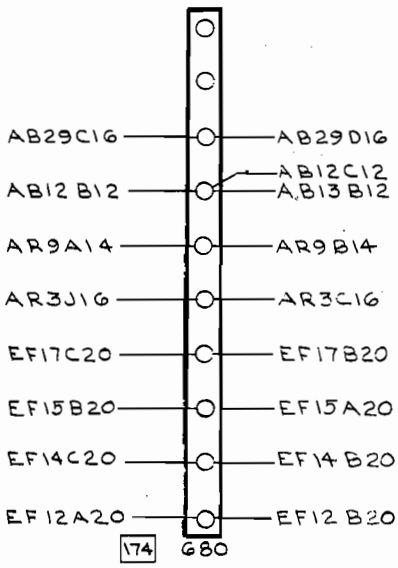
F-86F-2-54-489

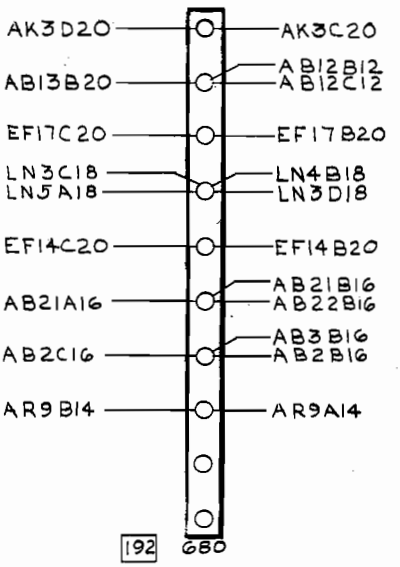
TERMINAL STRIPS
(SHEET 9 OF 14)

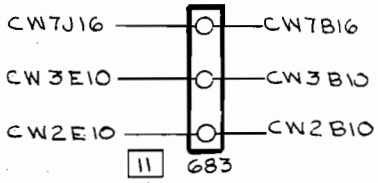


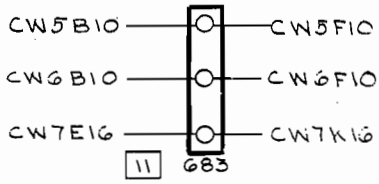


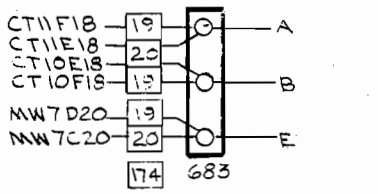


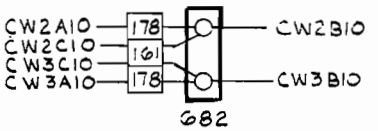


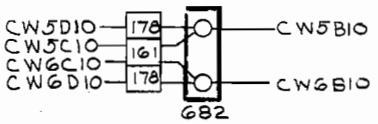








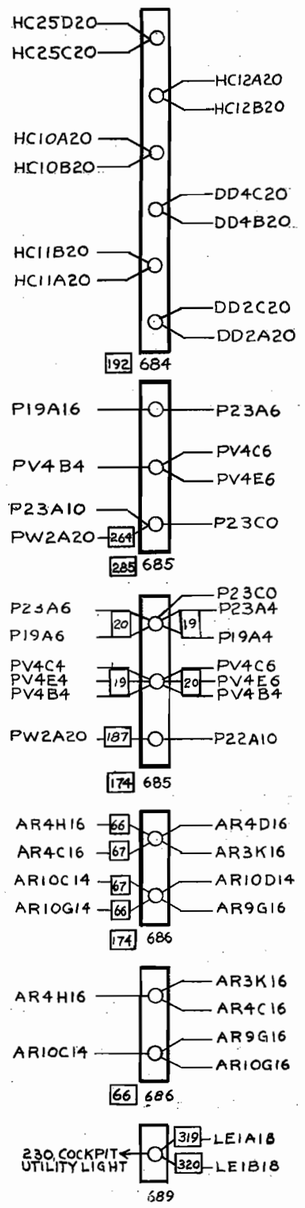




11	F-86F-5 THRU F-86F-15 AIRPLANES
19	F-86F-35 AIRPLANES
20	F-86F-30 AIRPLANES
125	F-86F-20 THRU F-86F-35 AIRPLANES
161	F-86F-20 AIRPLANES AF51-13110 THRU -13169 & F-86F-25 THROUGH F-86F-35 AIRPLANES
174	F-86F-30 & F-86F-35 AIRPLANES
178	F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13109
192	F-86F-1 THRU F-86F-20 AIRPLANES
259	F-86F-35 AIRPLANE AF52-5165 AND ALL SUBSEQUENT AIRPLANES.
314	F-86F-20 AIRPLANES AF51-13110 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 & AF52-5272 THRU -5446, & F-86F-30 AIRPLANES AF52-4305 THRU -5063
315	F-86F-20, F-86F-25, F-86F-30 AIRPLANES & F-86F-35 AIRPLANE AF52-5164

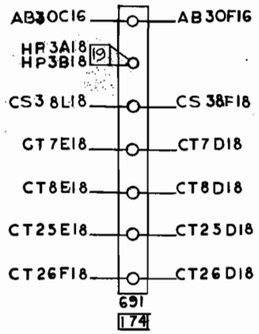
F-86F-2-54-490

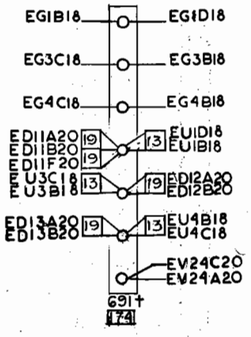
TERMINAL STRIPS
(SHEET 10 OF 14)

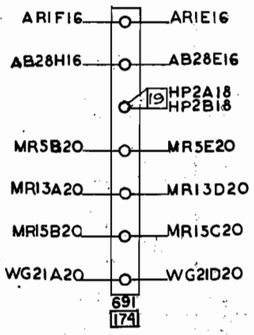


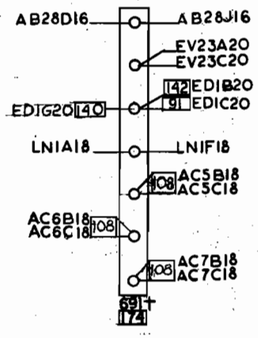
1 F-86F-20 AIRPLANES
2 F-86F-1 THROUGH F-86F-15 AIRPLANES
5 F-86F-20 AIRPLANES AF51-13070 THROUGH -13089
16 F-86F-1 AIRPLANES
19 F-86F-35 AIRPLANES
20 F-86F-30 AIRPLANES
21 F-86F-30 AIRPLANES AF52-4305 THROUGH - 5063
31 F-86F-1 THROUGH F-86F-10 AIRPLANES
66 F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES
67 F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THROUGH-5271
167 F-86F-30 AIRPLANES AF52-4746 THROUGH-5163 AND F-86F-35 AIRPLANES
174 F-86F-30 AND F-86F-35 AIRPLANES
176 F-86F-5 AND F-86F-10 AIRPLANES
187 F-86F-30 AIRPLANE AF52-4405 AND ALL SUBSEQUENT AIRPLANES
192 F-86F-1 THROUGH F-86F-20 AIRPLANES
264 F-86F-1 THROUGH F-86F-15 AND F-86F-25 AIRPLANES
285 F-86F-1 THROUGH F-86F-25 AIRPLANES
319 F-86F-1 AIRPLANES AF51-2850, -2851 AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13079
320 F-86F-1 AIRPLANES AF51-2852 THROUGH-2927, F-86F-5 THROUGH F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13080 THROUGH -13169 AND F-86F-25 THROUGH F-86F-35 AIRPLANES

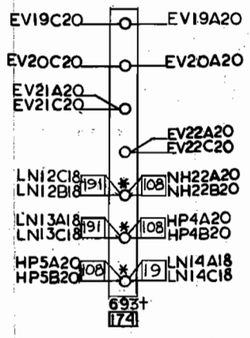
TERMINAL STRIPS
(SHEET 11 OF 14)

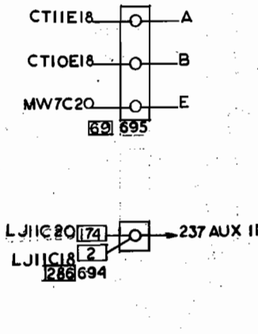


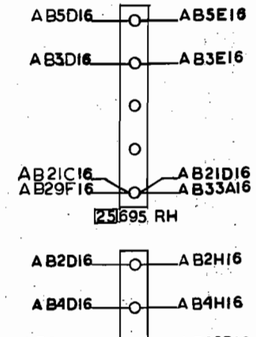


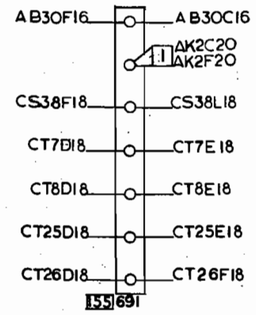


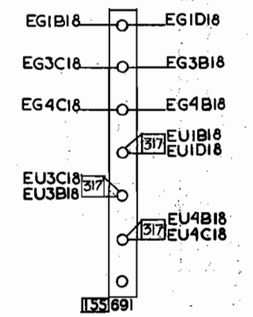


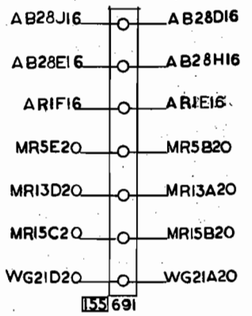


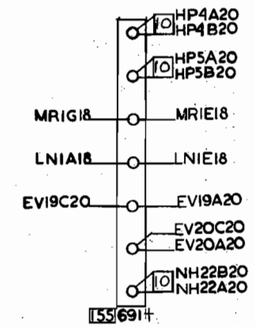


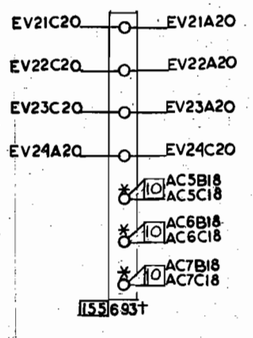


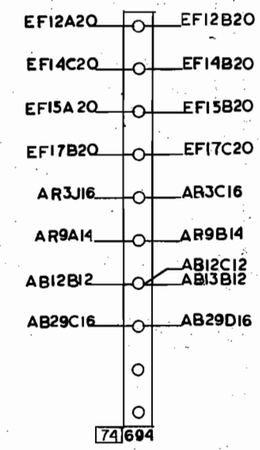


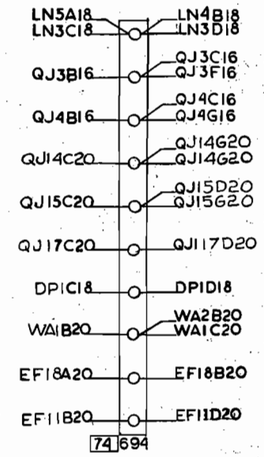


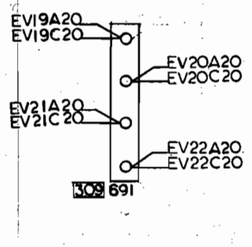


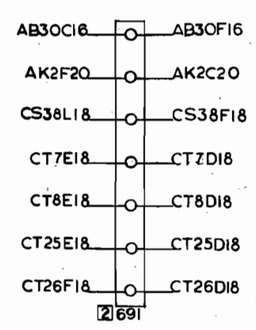


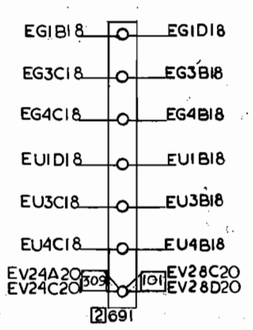


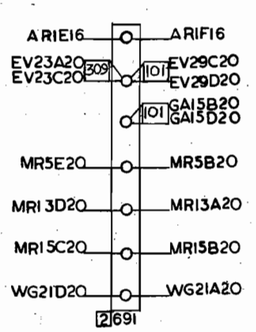


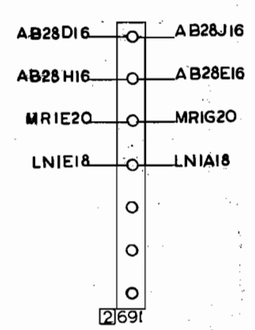


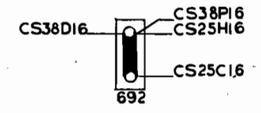


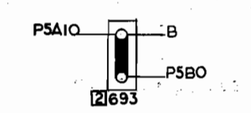












+DUE TO CONVENIENCE IN HARNESS INSTALLATION SOME DEVIATION BETWEEN HOOKUP & DETAIL DWGS MAY BE ENCOUNTERED

*PINS DO NOT APPEAR [344]

[1] F-86F-20 AIRPLANES

[2] F-86F-1 THRU F-86F-15 AIRPLANES

[10] F-86F-25 AIRPLANES AF52-5387 THRU-5530

[13] F-86F-30 AIRPLANES AF52-4305 THRU-4904

[19] F-86F-35 AIRPLANES

[25] F-86F-25 THRU F-86F-35 AIRPLANES

[69] F-86F-15 AIRPLANES AF51-12971 THRU 12976

[74] F-86F-25 AIRPLANES

[101] F-86F-1 AIRPLANES AF51-2850 THRU-2877 AND F-86F-15 AIRPLANES

[108] F-86F-30 AIRPLANES AF52-4905 THRU-5163

[140] F-86F-35 AIRPLANE AF52-5181 AND ALL SUBSEQUENT AIRPLANES

[142] F-86F-35 AIRPLANES AF52-5164 THRU-5180

[155] F-86F-20 AND F-86F-25 AIRPLANES

[174] F-86F-30 AND F-86F-35 AIRPLANES

[286] F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-30 AND F-86F-35 AIRPLANES

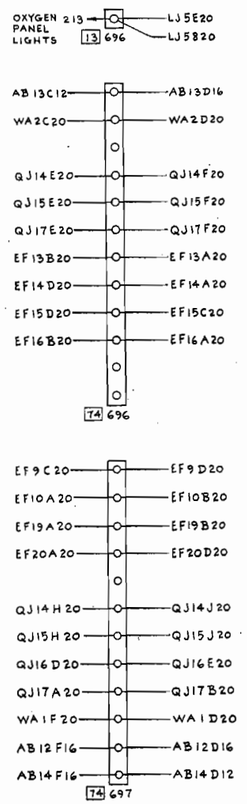
[309] F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 THRU F-86F-15 AIRPLANES

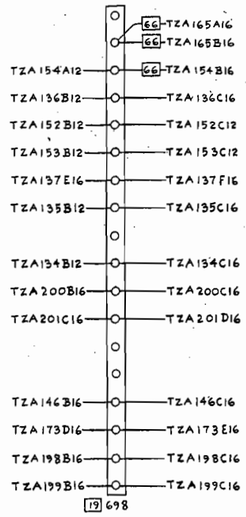
[317] F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-5272 THRU 5446

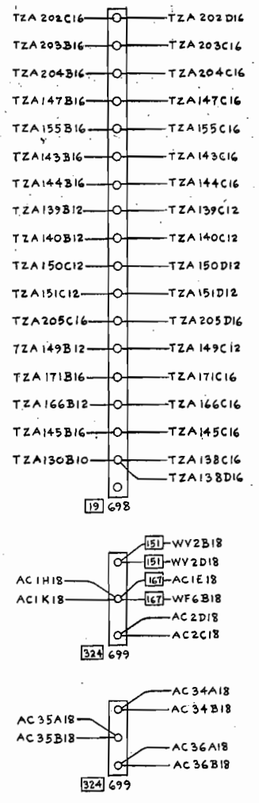
[344] F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF52-13170 THRU 13510 AND AF52-5272 THRU -5386 AND F-86F-30 AIRPLANES AF52-4305 THRU-4904

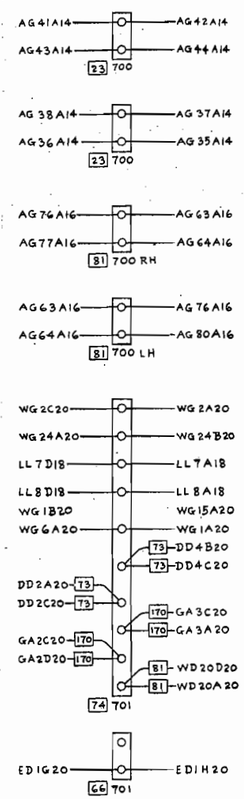
F-89F-2-54-492

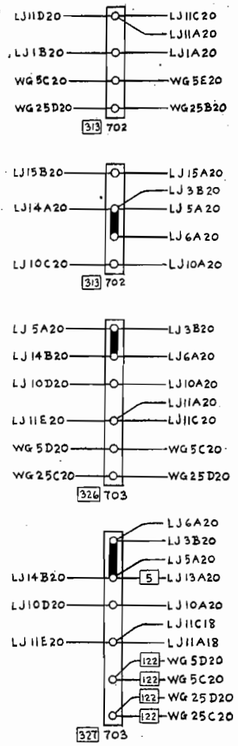
TERMINAL STRIPS
(SHEET 12 OF 14)











3 F-86F-20 AIRPLANES AF51-13070 THRU -13109

5 F-86F-20 AIRPLANES AF51-13070 THRU -13089

13 F-86F-30 AIRPLANES AF52-4305 THRU -4904

19 F-86F-35 AIRPLANES

23 F-86F-30 AIRPLANE AF52-5064 AND ALL SUBSEQUENT AIRPLANES

66 F-86F-35 AIRPLANE AF53-1072, AND ALL SUBSEQUENT AIRPLANES

73 F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5328

74 F-86F-25 AIRPLANES

81 F-86F-25 AIRPLANES AF52-5329 THRU -5530

113 F-86F-25 AIRPLANES AF52-5381 THRU -5530

122 F-86F-25 AIRPLANES AF51-13455 THRU -13510

151 F-86F-25 AIRPLANES AF52-5381 THRU -5530, F-86F-30 AIRPLANE AF52-4905, AND ALL SUBSEQUENT AIRPLANES

155 F-86F-20 AND F-86F-25 AIRPLANES

167 F-86F-30 AIRPLANES AF52-4746 THRU -5163, AND F-86F-35 AIRPLANES

170 F-86F-25 AIRPLANES AF51-13455 THRU -13510 AND AF52-5272 THRU -5530

174 F-86F-30 AND F-86F-35 AIRPLANES

313 F-86F-30 AIRPLANE AF52-5014, AND ALL SUBSEQUENT AIRPLANES

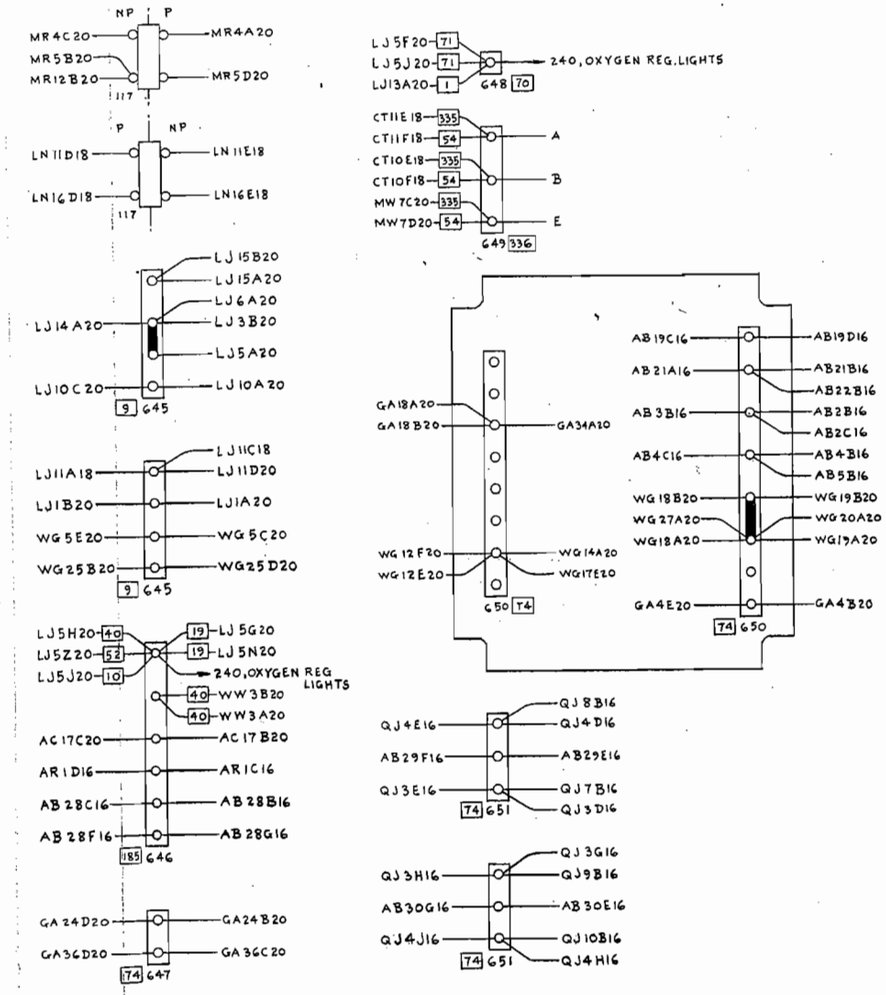
324 F-86F-25 AIRPLANES AF52-5381 THRU -5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

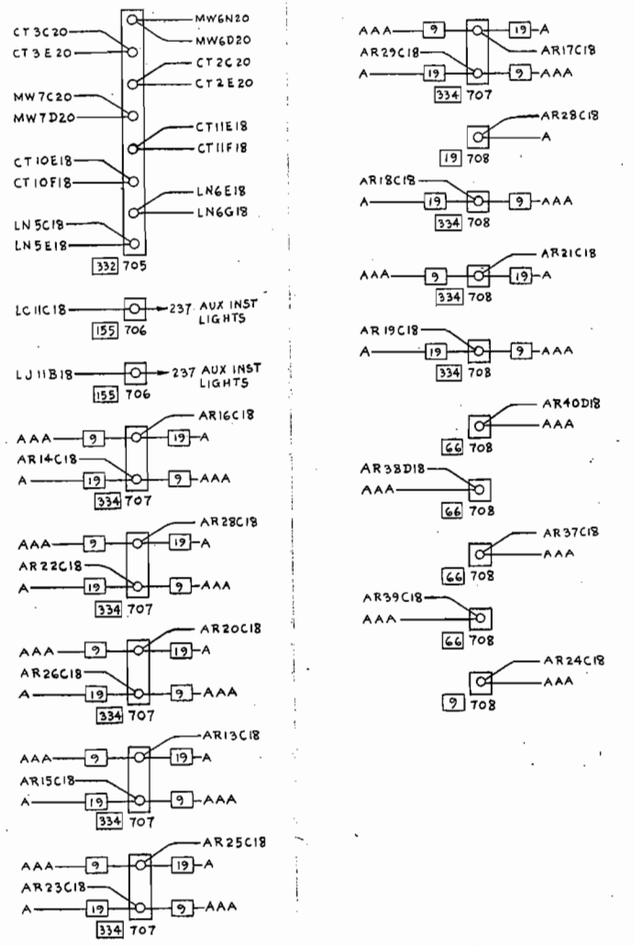
326 F-86F-30 AIRPLANES AF52-4305 THRU -5013

327 F-86F-20 AIRPLANES AF51-13090 THRU -13169, AND F-86F-25 AIRPLANES AF51-13170 THRU -13510

F-86F-2-54-493

NOTE- EFFECTIVE ON F-86F-20 THROUGH F-86F-35 AIRPLANES





1 F-86F-20 AIRPLANES

9 F-86F-25 AIRPLANES AF52-5272 THRU -5530

10 F-86F-25 AIRPLANES AF52-5387 THRU -5530

19 F-86F-35 AIRPLANES

40 F-86F-30 AIRPLANE AF52-4955 AND ALL SUBSEQUENT AIRPLANES

52 F-86F-25 AIRPLANES AF52-5387 THRU -5530, AND F-86F-30 AIRPLANES AF52-4955 THRU -5163

54 F-86F-25 AIRPLANES AF52-5480 THRU -5530

66 F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES

70 F-86F-20 AIRPLANES, AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386

71 F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5386

74 F-86F-25 AIRPLANES

155 F-86F-20 AND F-86F-25 AIRPLANES

185 F-86F-25 AIRPLANES AF52-5387 THRU -5530, AND F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

332 F-86F-25 AIRPLANES AF52-5480 THRU -5530, AND F-86F-35 AIRPLANES

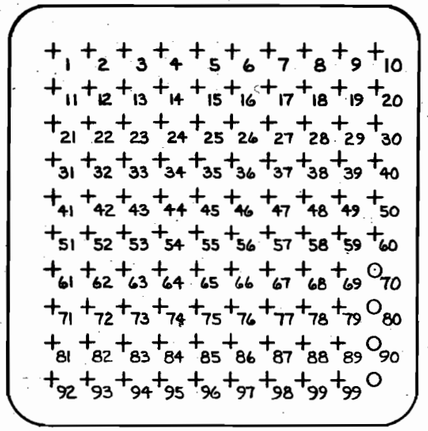
334 F-86F-25 AIRPLANES AF52-5272 THRU -5530, AND F-86F-35 AIRPLANES

335 F-86F-20 AIRPLANES AF51-13099 THRU -13169, AND F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5479

336 F-86F-20 AIRPLANES AF51-13099 THRU -13169, AND F-86F-25 AIRPLANES

F-86F-2-54-434

TERMINAL STRIPS
SHEET 14 OF 14



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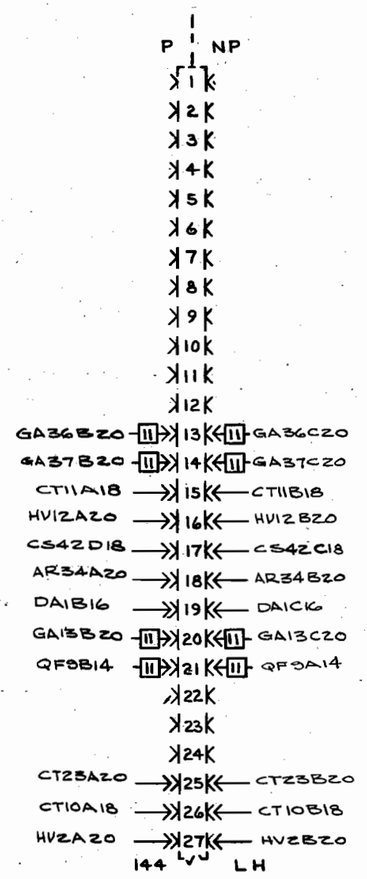
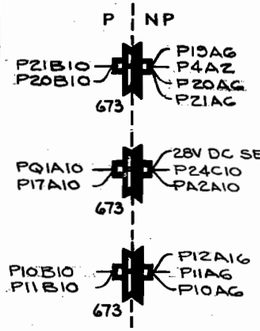
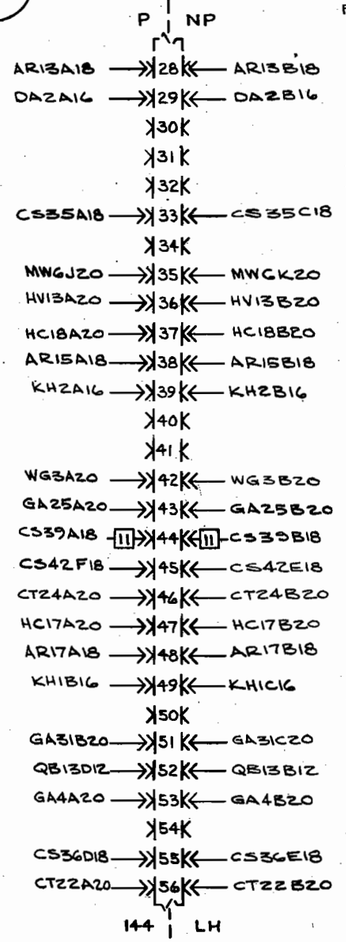
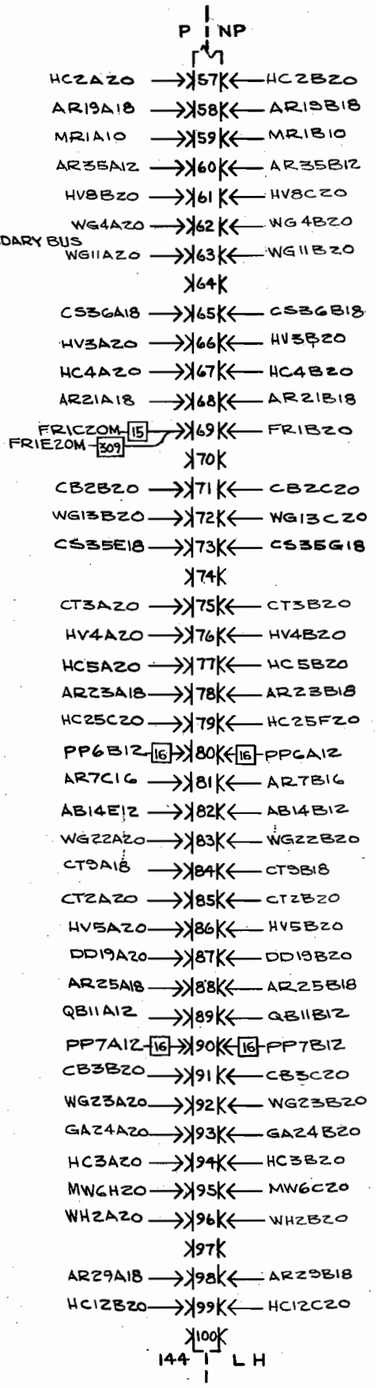
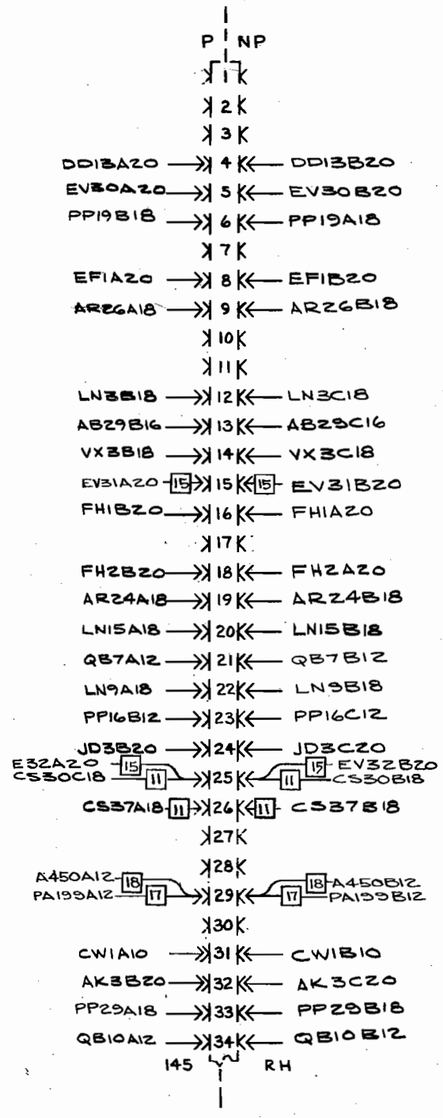
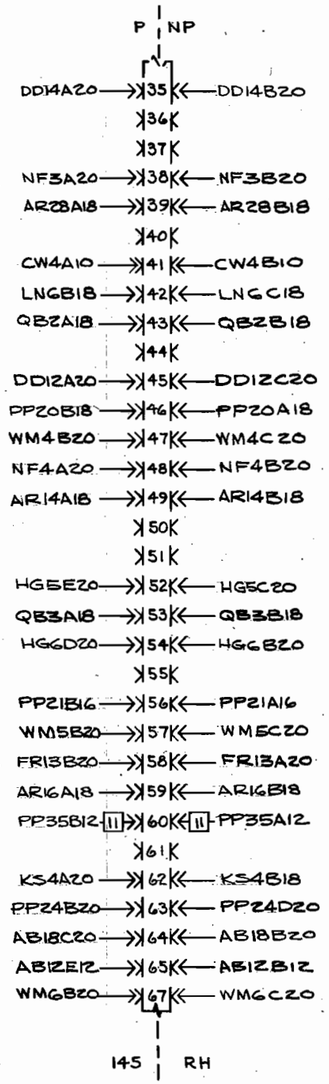


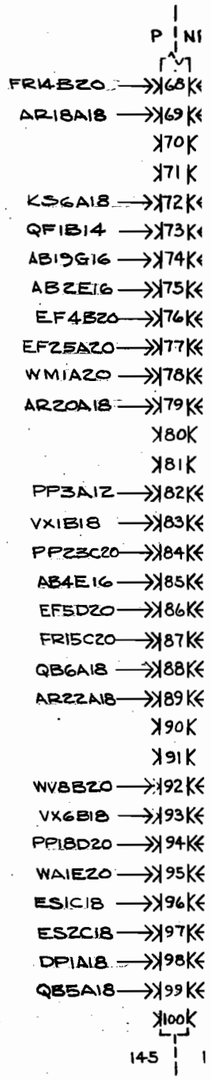








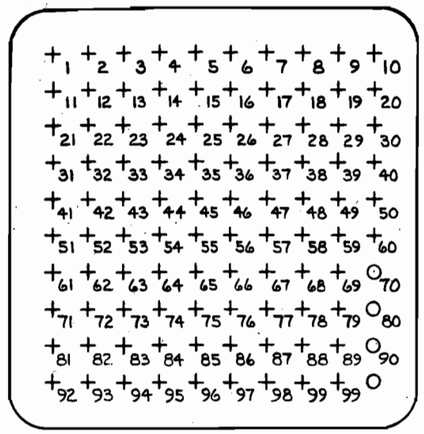




11 F-86F-5 THRU F-86F-15 AIRPLANES
15 F-86F-1 AIRPLANES AF51-2850 THRU 2877
16 F-86F-1 AIRPLANES
17 F-86F-1 AND F-86F-5 AIRPLANES
18 F-86F-10 AND F-86F-15 AIRPLANES
309 F-86F-1 AIRPLANES AF51-2878 THRU 2927 AND F-86F-5 THRU F-86F-15 AIRPLANES

F-86F-2-54-45

PRESSURE DISCONNECTS
F-86F-1 THROUGH F-86F-15 AIRPLANES



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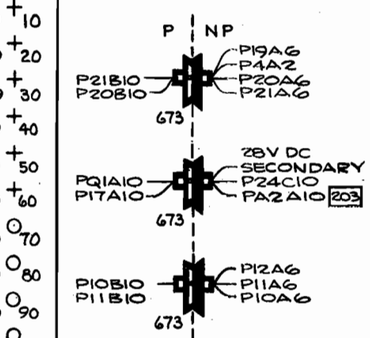
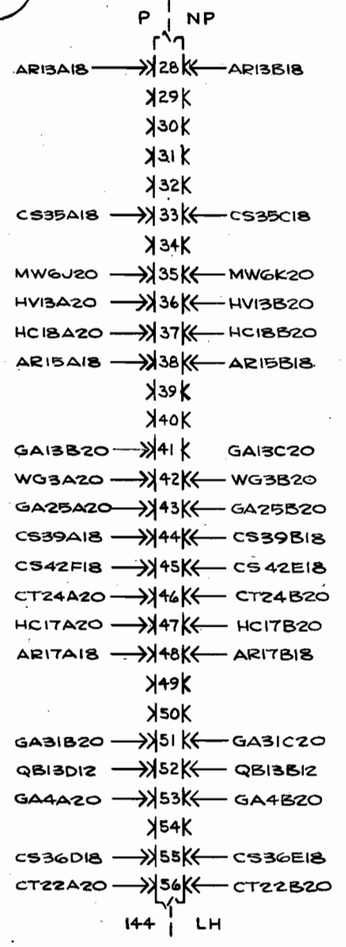
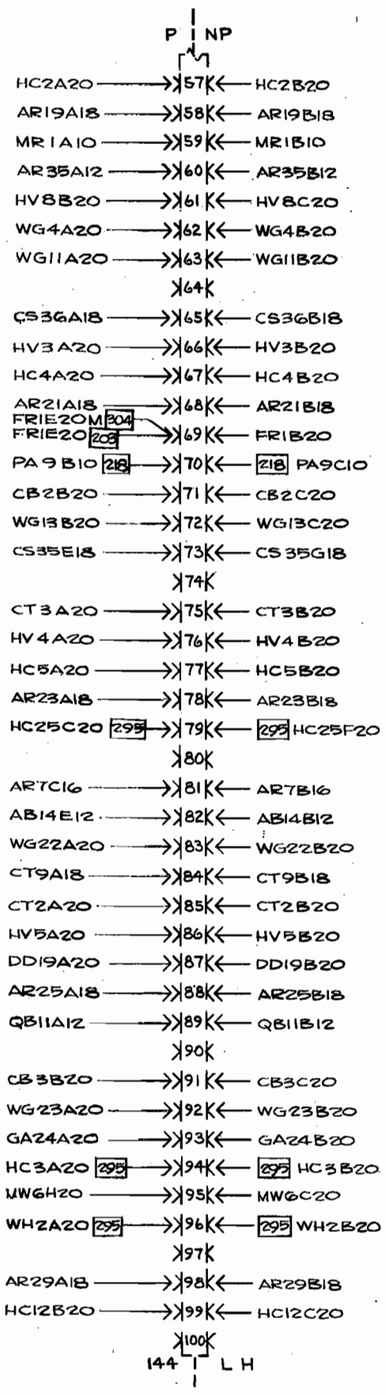
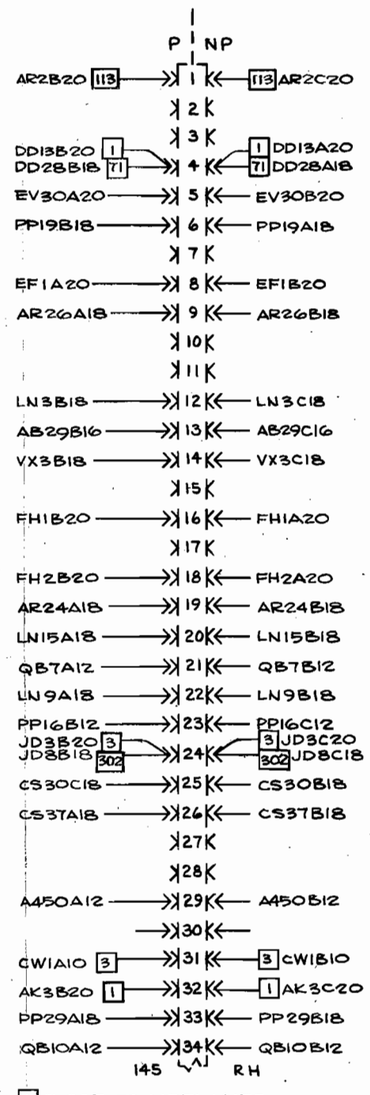
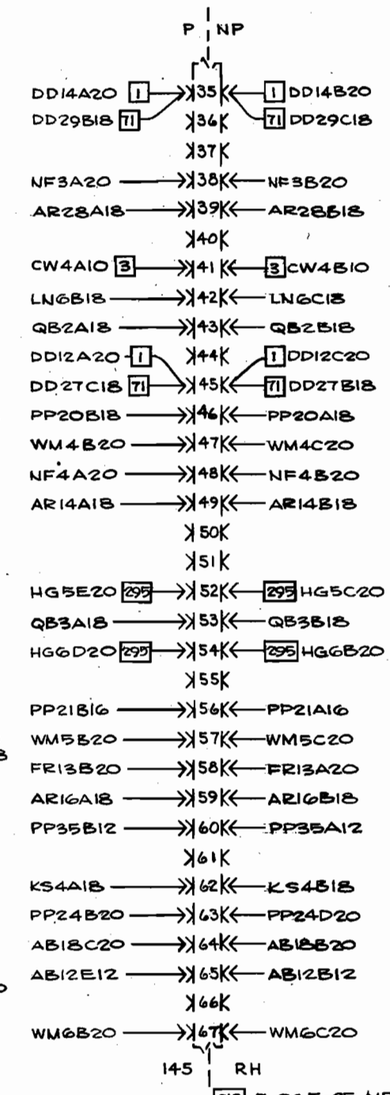
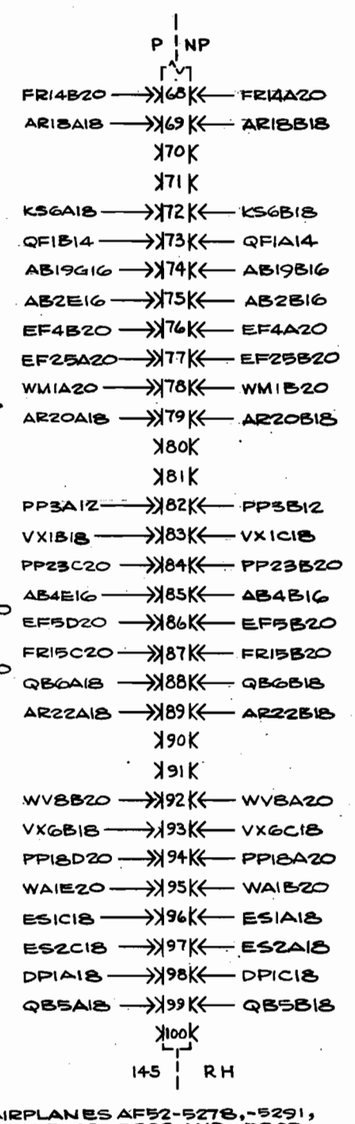












1 F-86F-20 AIRPLANES

3 F-86F-20 AIRPLANES AF51-13070 THRU -13109

48 F-86F-20 AIRPLANES, AND F-86F-25 AIRPLANES AF51-13170 THRU-13510, AND AF52-5272 THRU-5380

71 F-86F-25 AIRPLANES AF51-13170 THRU-13510, AND AF52-5272 THRU-5386

74 F-86F-25 AIRPLANES

113 F-86F-25 AIRPLANES AF52-5381 THRU-5530

203 F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13070 THRU-13510

209 F-86F-20 AIRPLANES AF51-13080 THRU-13169, AND F-86F-25 AIRPLANES

218 F-86F-25 AIRPLANES AF52-5278, -5291, -5293, -5296, -5299, -5303 AND -5305 THRU-5530

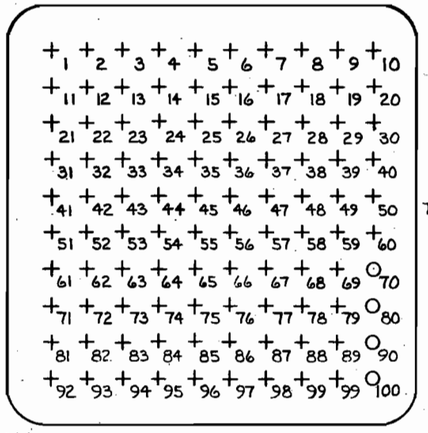
295 F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU-13510, AND AF52-5272 THRU-5328

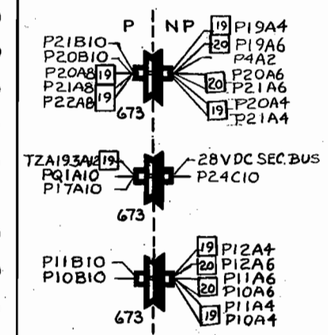
302 F-86F-20 AIRPLANES AF51-13110 THRU-13169 AND F-86F-25 AIRPLANES

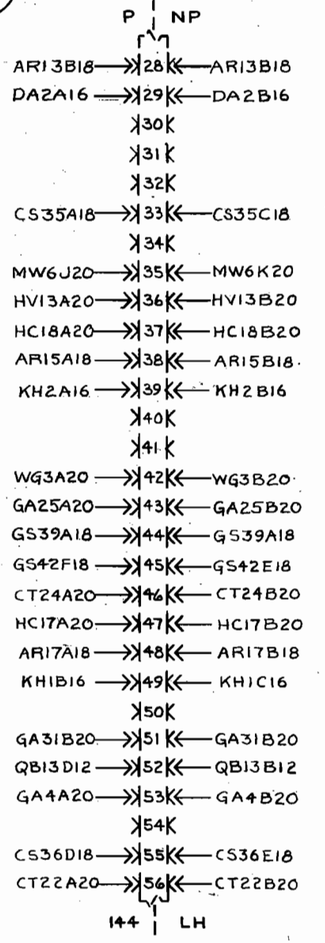
303 F-86F-25 AIRPLANES AF51-13491 THRU-13510, AND AF52-5272 THRU -5530

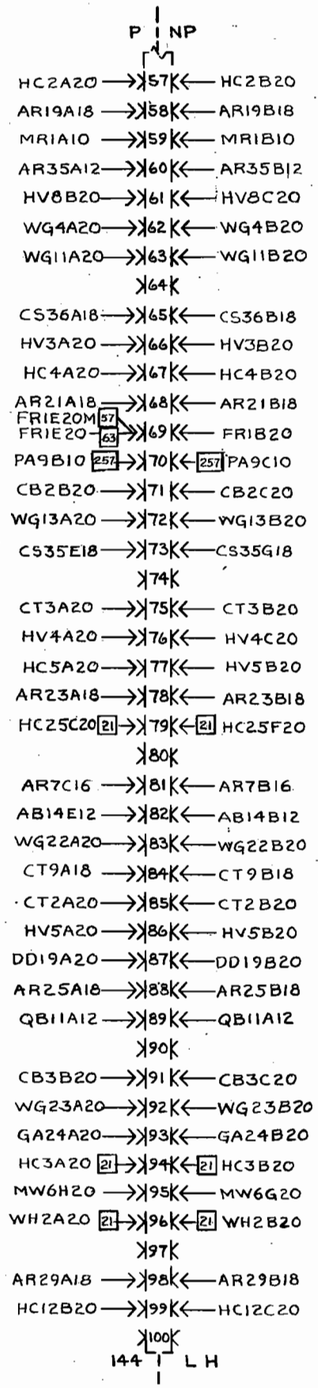
304 F-86F-20 AIRPLANES AF51-13070 THRU-13490

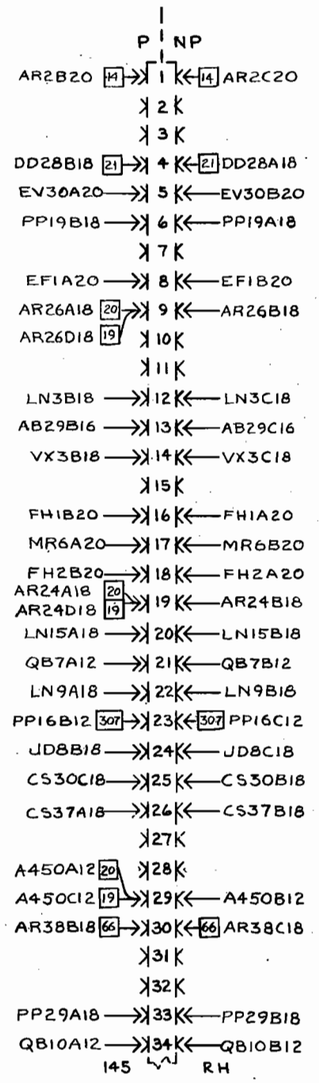
F-86F-2-54-495

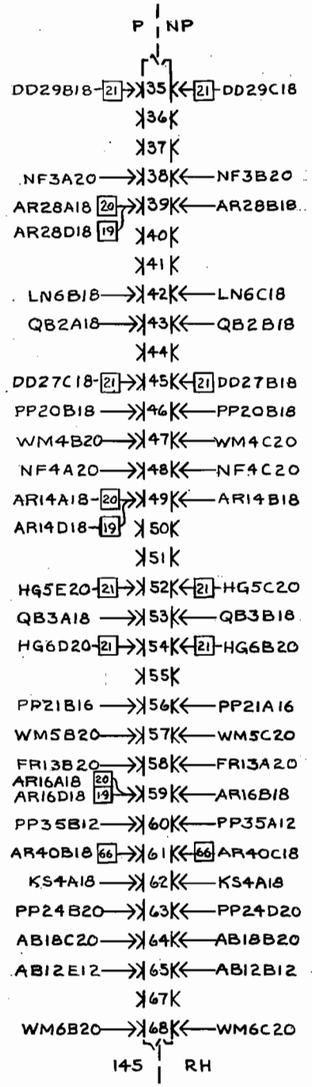


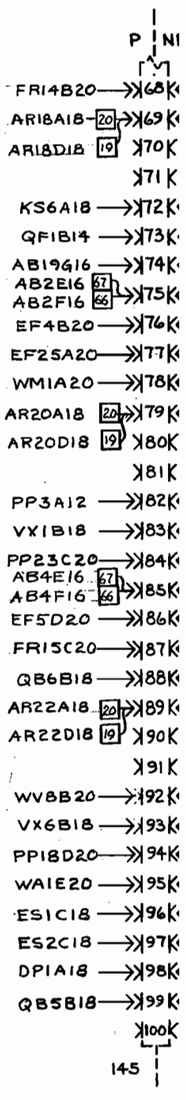












13 F-86F-30 AIRPLANES AF52-4305 THROUGH-4904

14 F-86F-30 AIRPLANE AF52-4905 AND ALL SUBSEQUENT AIRPLANES

19 F-86F-35 AIRPLANES

20 F-86F-30 AIRPLANES

21 F-86F-30 AIRPLANES AF52-4305 THROUGH-5063

57 F-86F-30 AIRPLANES AF52-4305 THROUGH-4504

63 F-86F-30 AIRPLANES AF52-4505 AND ALL SUBSEQUENT AIRPLANES

66 F-86F-35 AIRPLANE AF53-1072 AND AL SUBSEQUENT AIRPLANES

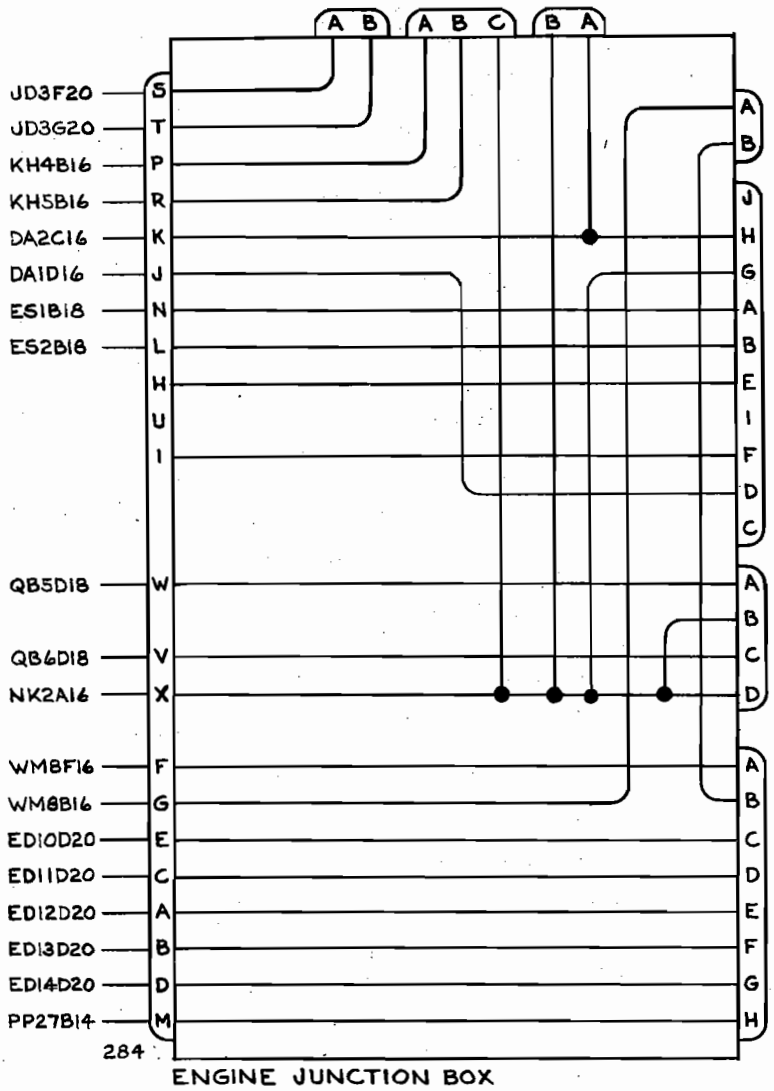
67 F-86F-30 AIRPLANES AND F-86F-35 AI AF52-5164 THROUGH-5271

257 F-86F-30 AIRPLANE AF52-4964 AND AL SUBSEQUENT AIRPLANES

307 F-86F-30 AIRPLANES AND F-86F-35 AI AF52-5164 THROUGH-5271 AND AF53 THROUGH-1171

F-86F-2-54-497

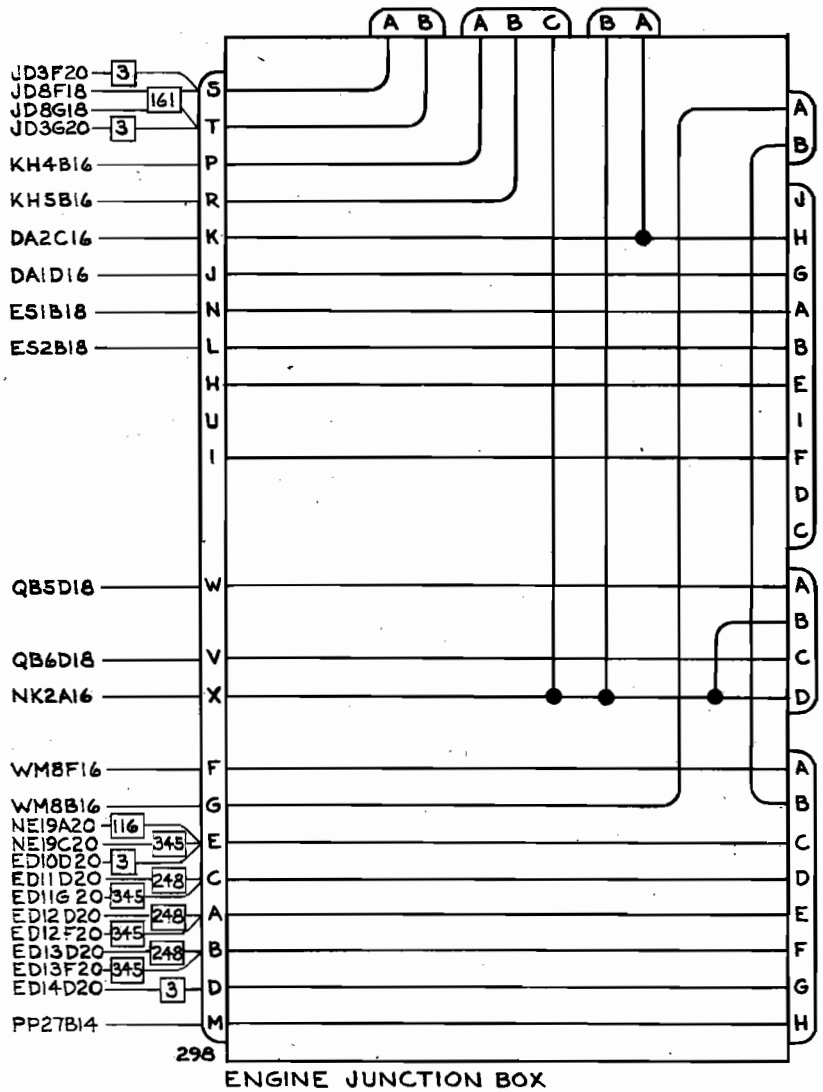
PRESSURE DISCONNECTS
F-86F-30 AND F-86F-35 AIRPLANES



F-86F-2-54-498

ENGINE JUNCTION BOX

F-86F-1 THROUGH F-86F-15 AIRPLANES



ENGINE JUNCTION BOX

[3] F-86F-20 AIRPLANES AF51-13070 THRU -13109

[116] F-86F-20 AIRPLANES AF51-13110 THRU -13169, F-86F-25 AIRPLANES AF51-13170 THRU -13510 AND AF52-5272 THRU -5446, AND F-86F-30 AIRPLANES AF52-4305 THRU -4904

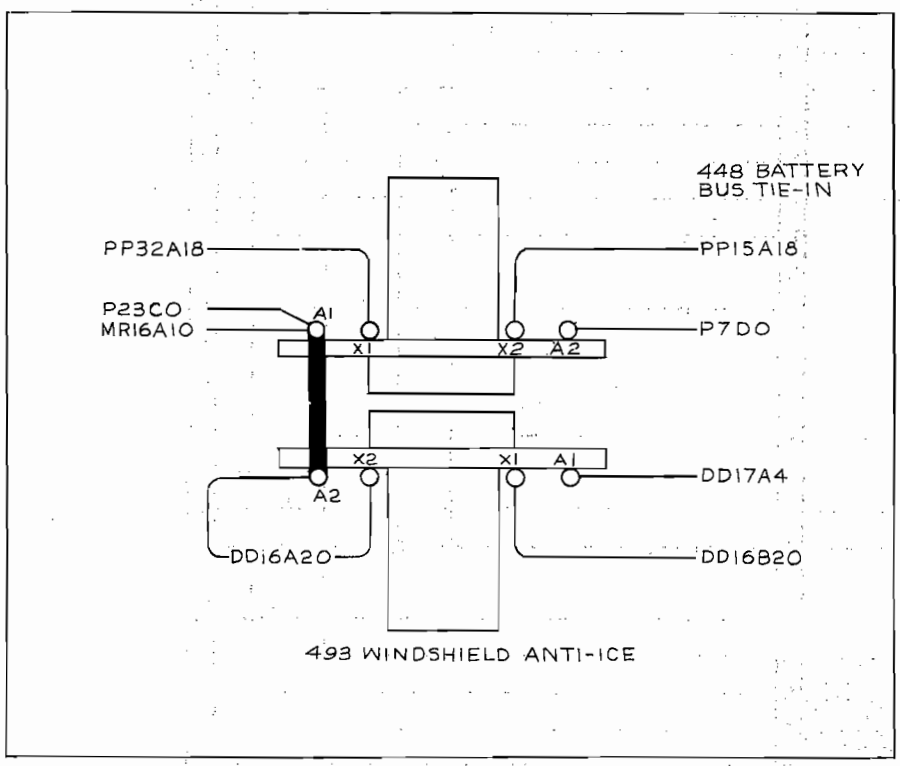
[161] F-86F-20 AIRPLANES AF51-13110 THRU -13169 AND F-86F-25 THRU F-86F-35 AIRPLANES

[248] F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU -5446, AND F-86F-30 AIRPLANES AF52-4305 THRU -4904

[345] F-86F-25 AIRPLANES AF52-5447 THRU -5530 AND F-86F-35 AIRPLANES

F-86F-2-54-499

ENGINE JUNCTION BOX
F-86F-20 THROUGH F-86F-35 AIRPLANES

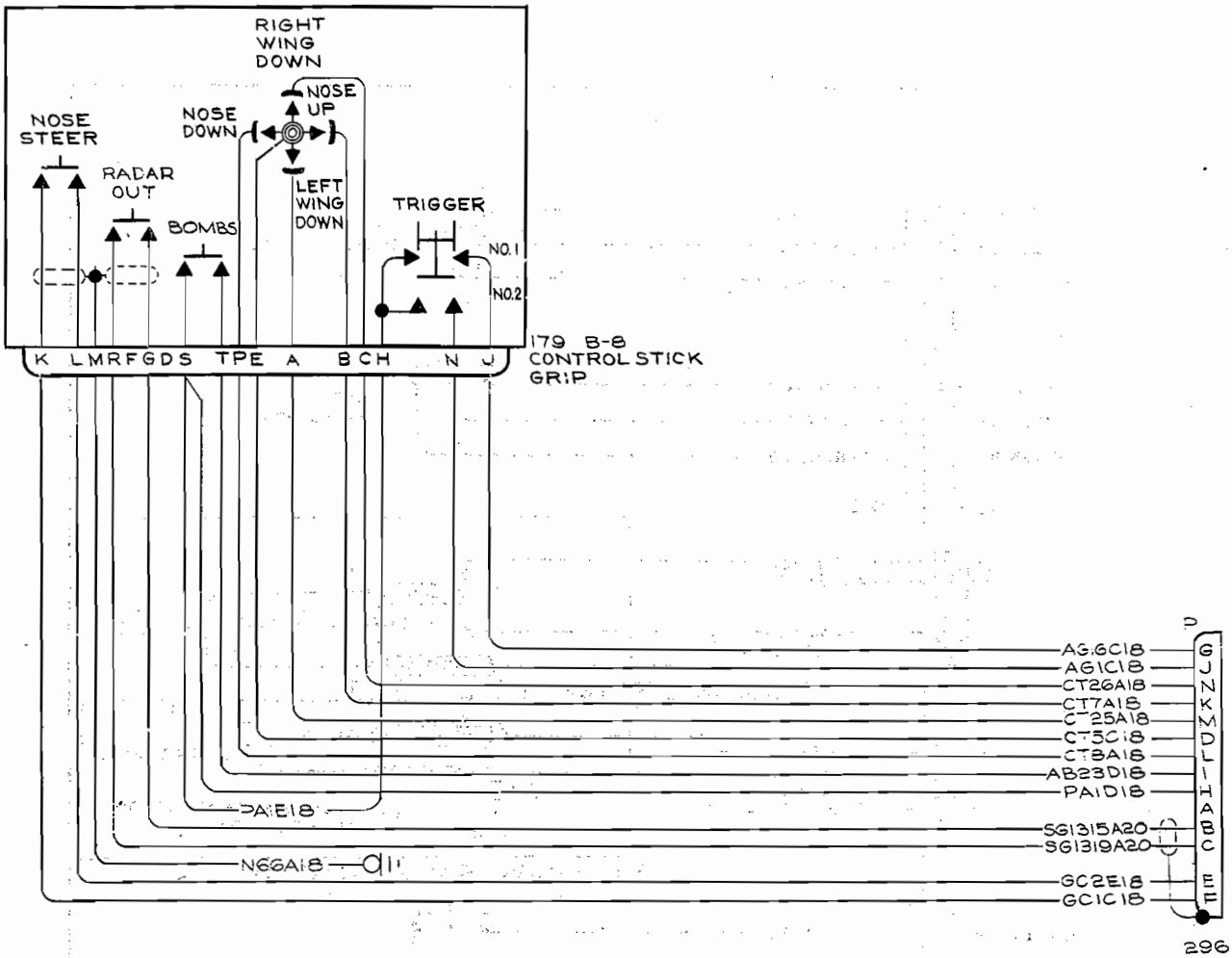


[2] 271
[203] 271A

[2] F-86F-1 THRU F-86F-15 AIRPLANES
[203] F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13070 THRU -13510

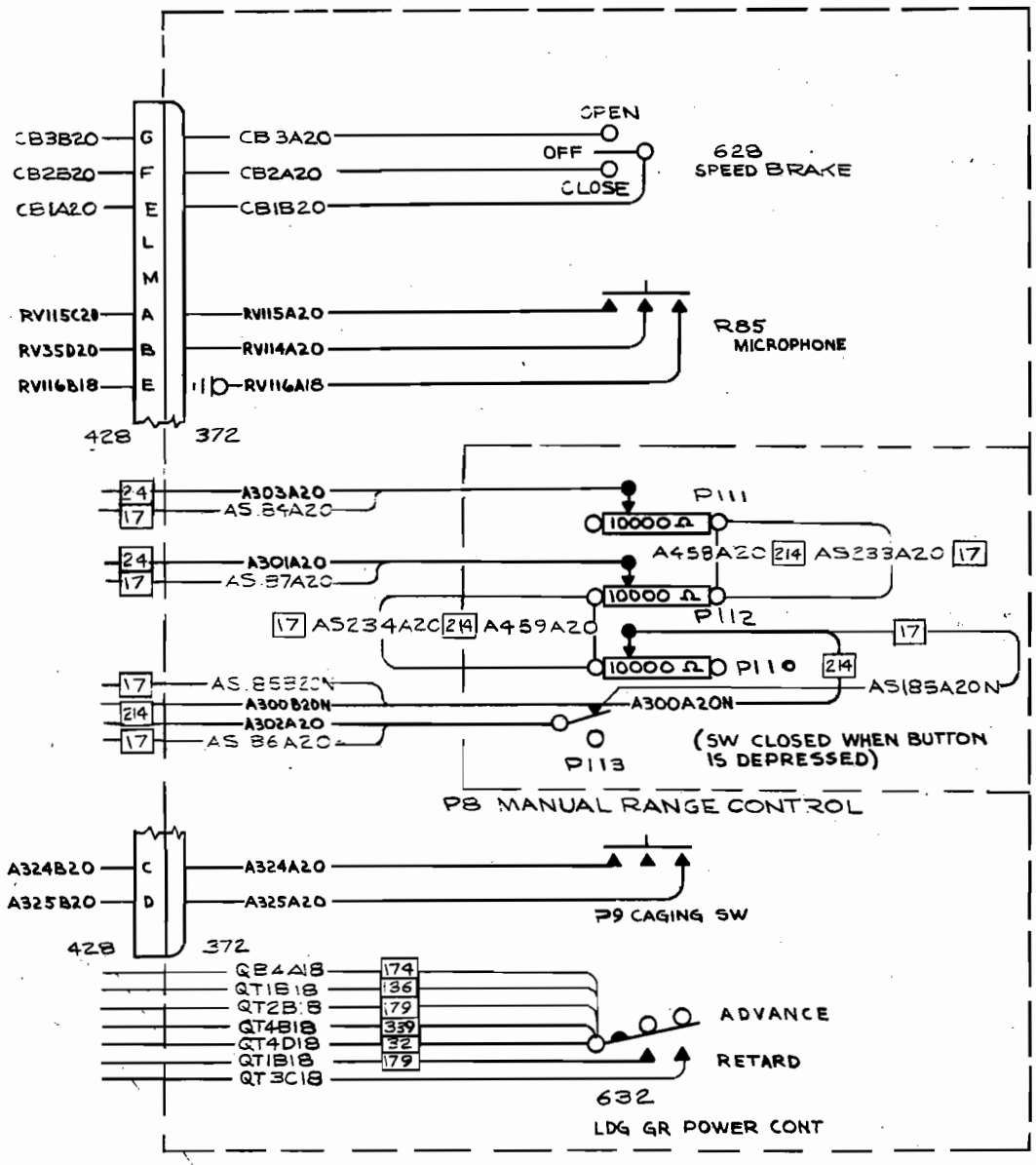
F-86F-2-54-501

WINDSHIELD ANTI-ICE AND BATTERY RELAY PANEL
F-86F-1 THROUGH F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THROUGH -13510



F-86F-2-54-502

CONTROL STICK



17 F-86F-1 AND F-86-5 AIRPLANES
32 F-86F-15 AIRPLANES
136 F-86F-5 THRU F-86F-35 AIRPLANES
174 F-86F-30 THRU F-86F-35 AIRPLANES
179 F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THROUGH -13079
214 F-86F-10 THRU F-86F-35 AIRPLANES
339 F-86F-1 THRU F-86F-10 AND F-86F-20 AND F-86F-25 AIRPLANES

P DENOTES RADAR INDEX NO.
R DENOTES RADIO INDEX NO.

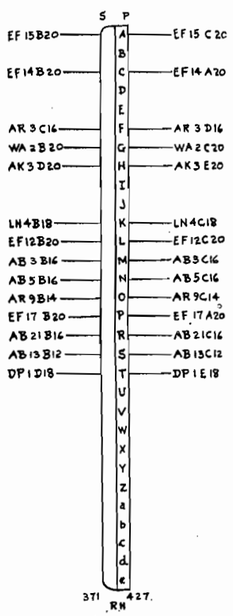
F-86F-2-54-503

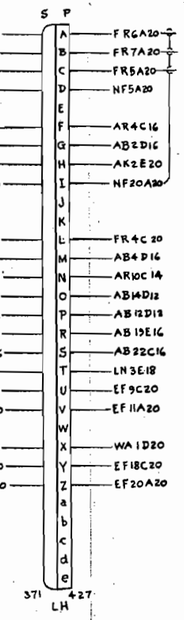
THROTTLE QUADRANT ASSEMBLY

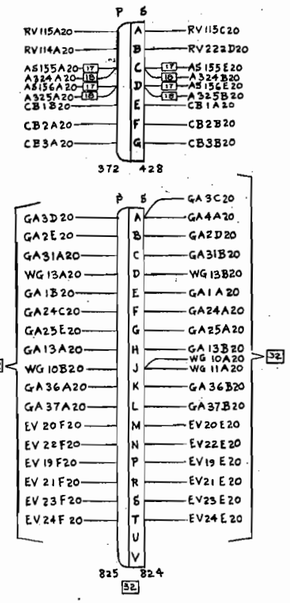
NOTE: EFFECTIVE ON F-86F-1 THRU F-86F-15 AIRPLANES
R DENOTES RADIO INDEX NO.

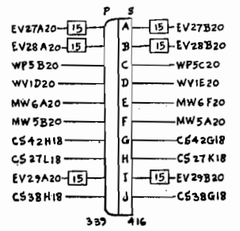
F-86F-2-54-504

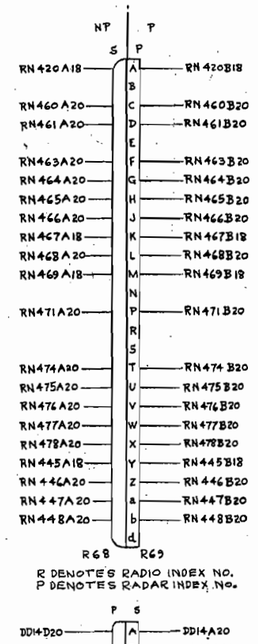
PLUGS AND RECEPTACLES
(SHEET 1 OF 9)

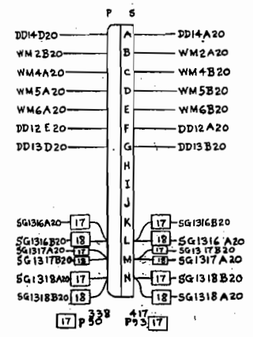


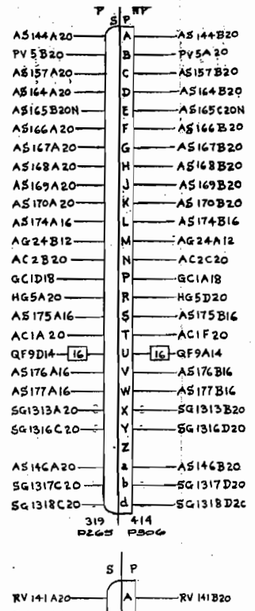


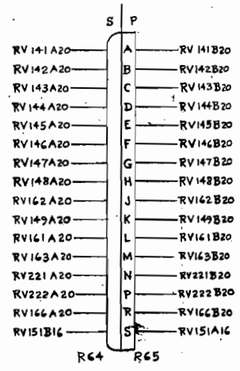


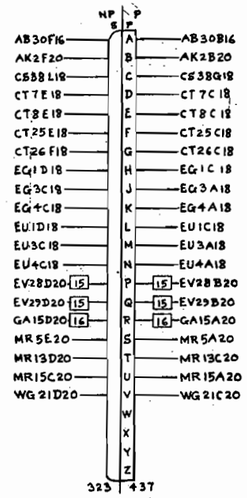


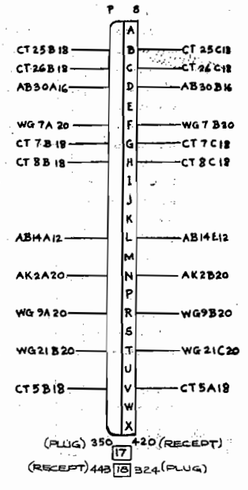


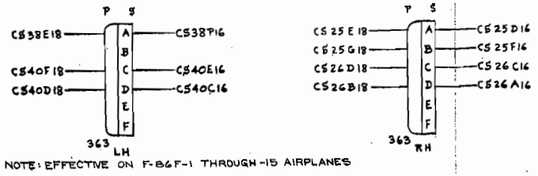












NOTE: EFFECTIVE ON F-86F-1 THRUOGH-15 AIRPLANES

15 F-86F-1 AIRPLANES AF 51-2850 THRU-2877
16 F-86F-1 AIRPLANES
17 F-86F-1 AND F-86F-5 AIRPLANES
18 F-86F-10 AND F-86F-15 AIRPLANES
32 F-86F-15 AIRPLANES

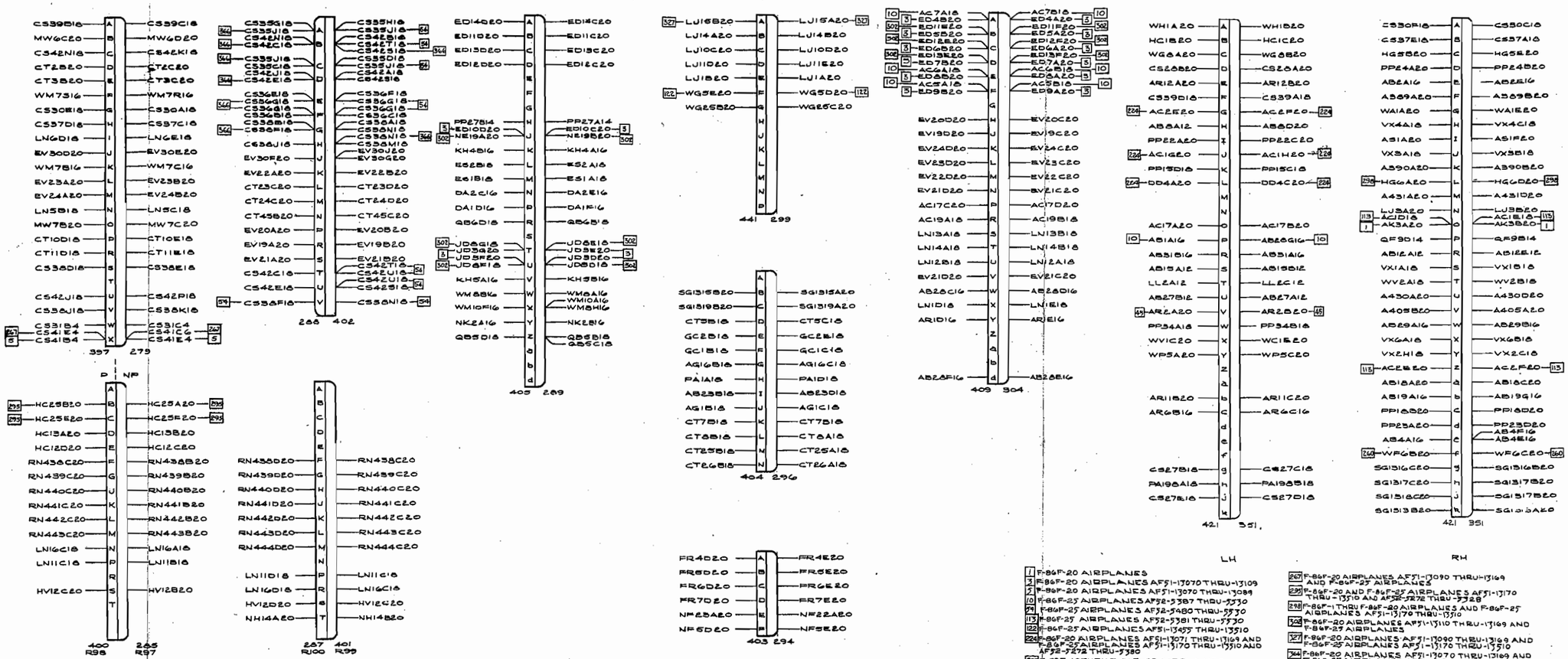
F-86F-2-54-506

PLUGS AND RECEPTACLES
(SHEET 2 OF 9)

NOTE:
EFFECTIVE ON
F-86F-1 THRU F-86F-15 AIRPLANES
P DENOTES RADAR INDEX NO.
R DENOTES RADIO INDEX NO.

16 F-86F-1 AIRPLANES
17 F-86F-1 AND F-86F-5 AIRPLANES
18 F-86F-10 AND F-86F-15 AIRPLANES
32 F-86F-15 AIRPLANES

F-86F-2-54-506



NOTE: EFFECTIVE ON F-86F-20 THRU F-86F-25 AIRPLANES

1 F-86F-20 AIRPLANES

3 F-86F-20 AIRPLANES AF51-13070 THRU-13109

7 F-86F-20 AIRPLANES AF51-13070 THRU-13089

10 F-86F-25 AIRPLANES AF52-5367 THRU-5370

9 F-86F-25 AIRPLANES AF52-5480 THRU-5530

113 F-86F-25 AIRPLANES AF52-5381 THRU-5730

122 F-86F-25 AIRPLANES AF51-13455 THRU-13510

224 F-86F-20 AIRPLANES AF51-13071 THRU-13169 AND F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-7272 THRU-7380

225 F-86F-10 THRU F-86F-20 AIRPLANES

280 F-86F-5 THRU F-86F-15 AIRPLANES, F-86F-20 AIRPLANES AF51-13080 THRU-13169 AND F-86F-25 AIRPLANES

267 F-86F-20 AIRPLANES AF51-13090 THRU-13169 AND F-86F-25 AIRPLANES

295 F-86F-20 AND F-86F-25 AIRPLANES AF51-13170 THRU-13510 AND AF52-7272 THRU-7328

298 F-86F-1 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13510

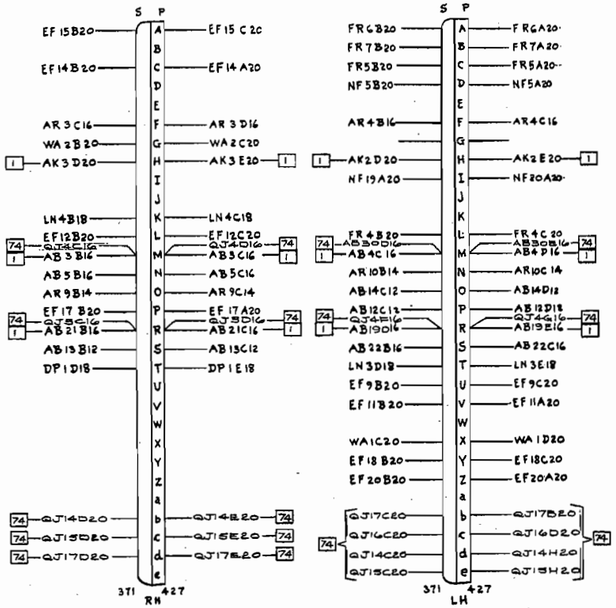
308 F-86F-20 AIRPLANES AF51-13110 THRU-13169 AND F-86F-25 AIRPLANES

327 F-86F-20 AIRPLANES AF51-13090 THRU-13169 AND F-86F-25 AIRPLANES AF51-13170 THRU-13510

364 F-86F-20 AIRPLANES AF51-13070 THRU-13169 AND F-86F-25 AIRPLANES AF51-13170 THRU-13710 AND AF52-5272 THRU-5474

F-86F-2-54-507A

PLUGS AND RECEPTACLES
SHEET 4 OF 9

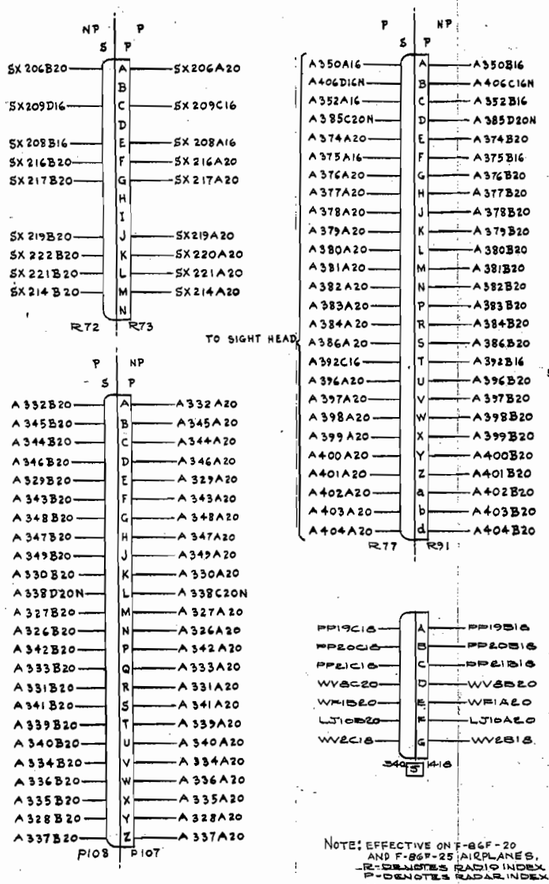


NOTE: EFFECTIVE ON F-86F-20 AND F-86F-25 AIRPLANES
R- DENOTES RADIO INDEX NO.

1 F-86F-20 AIRPLANES
9 F-86F-25 AIRPLANES AF52-5272 THROUGH-5530
10 F-86F-25 AIRPLANES AF52-5357 THROUGH-5530
19 F-86F-25 AIRPLANES AF51-2850 THROUGH-2877
24 F-86F-1 AIRPLANES
113 F-86F-25 AIRPLANES
168 F-86F-25 AIRPLANES AF52-5381 THROUGH-5530
F-86F-20 AIRPLANES AF51-13020 THROUGH-13169 AND F-86F-25 AIRPLANES AF51-13170 THROUGH-13484
170 F-86F-25 AIRPLANES AF51-13455 THROUGH-13510 AND AF52-5272 THROUGH-5530
224 F-86F-20 AIRPLANES AF51-13071 THROUGH-13169 AND F-86F-25 AIRPLANES AF51-13170 THROUGH-13510 AND AF52-5272 THROUGH-5530

F-86F-2-54-508A

PLUGS AND RECEPTACLES
(SHEET 5 OF 9)

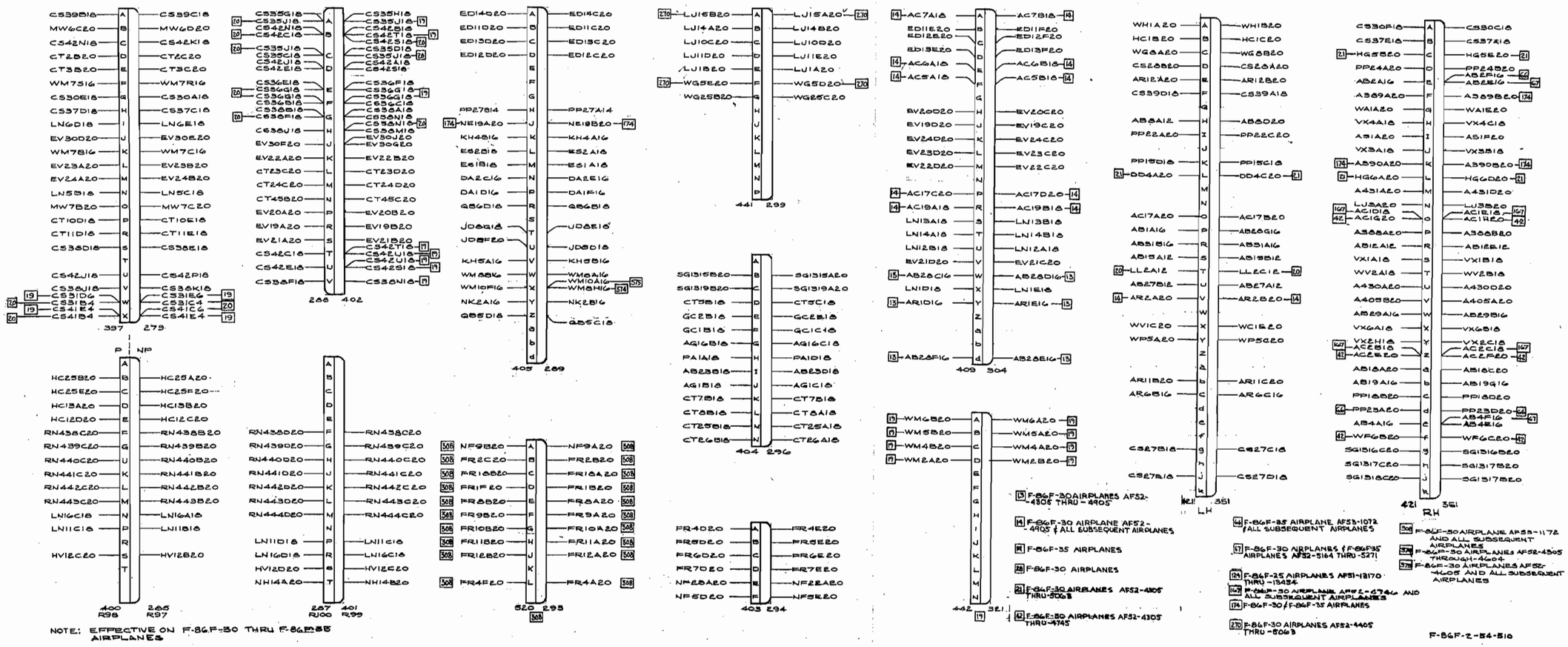


5 F-86F-20 AIRPLANES AF51-13070 THRU -13089

169 F-86F-20 AIRPLANES AF51-13090 THRU -13168 AND F-86F-25 AIRPLANES AF51-13170 THRU-13454

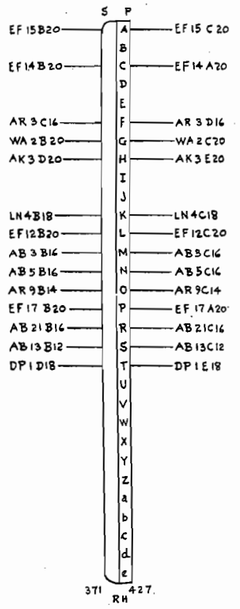
170 F-86F-25 AIRPLANE AF51-13455 THRU -13510 AND AF52-5272 THRU-5330

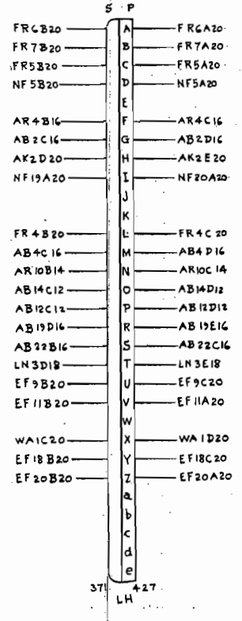
F-86F-2-34-509A

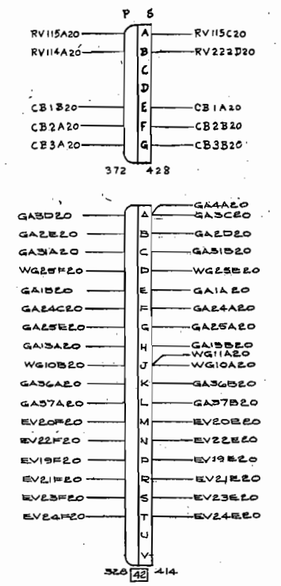


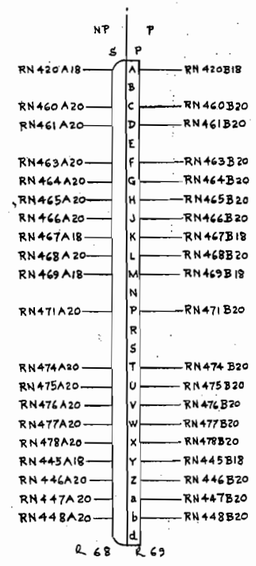
PLUGS AND RECEPTACLES
SHEET 7 OF 9

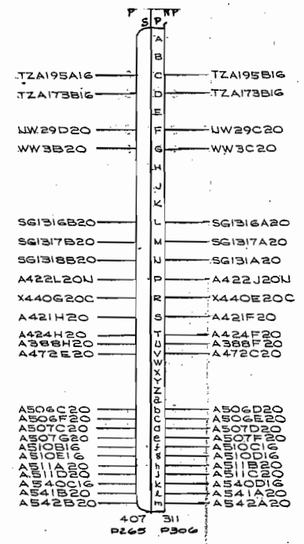
F-86F-2-54-510

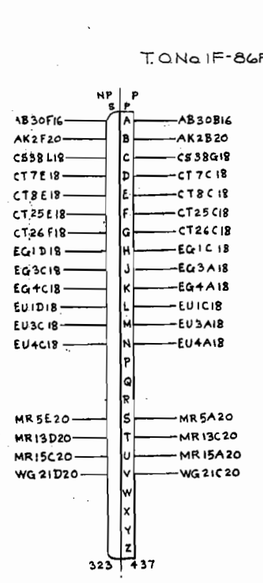


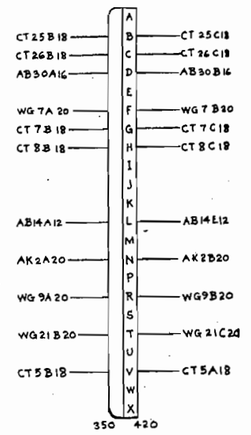


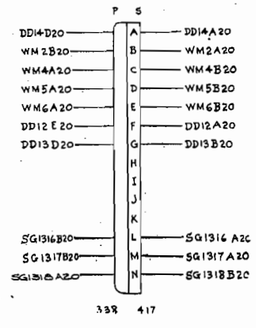


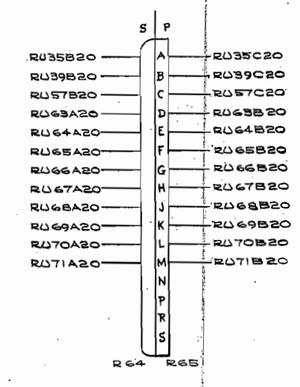


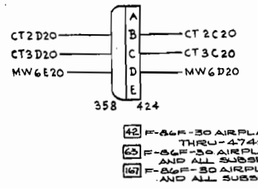


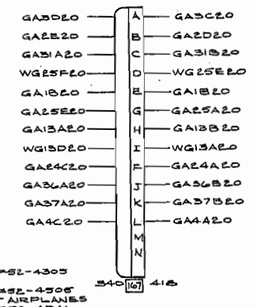


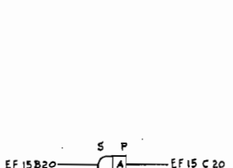


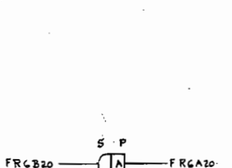










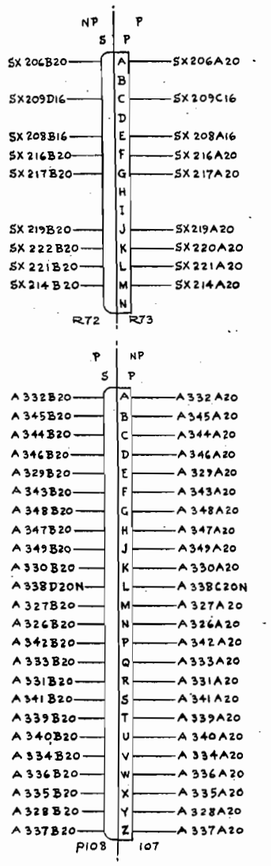


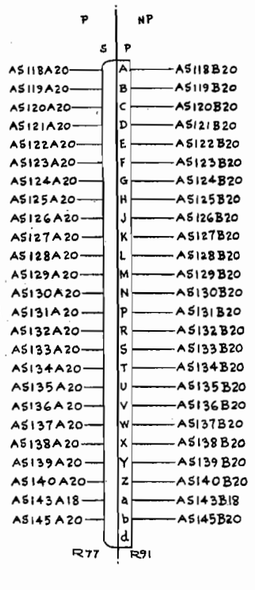
NOTE: EFFECTIVE ON F-86F-30 AND F-86F-35 AIRPLANES

42 F-86F-30 AIRPLANE AF52-4303 THRU-47443
63 F-86F-30 AIRPLANE AF52-4506 AND ALL SUBSEQUENT AIRPLANES
167 F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

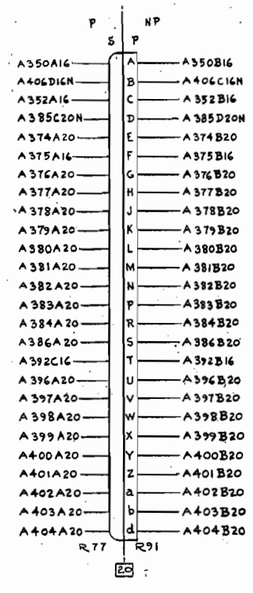
F-86F-2-54-511A

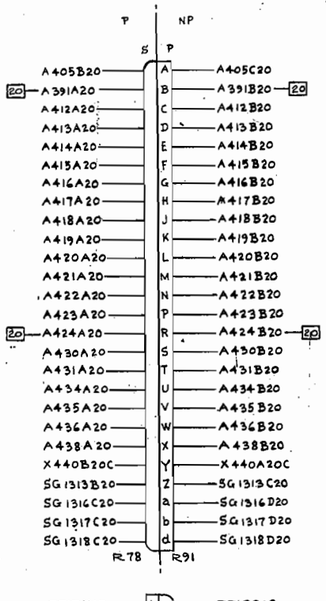
PLUGS AND RECEPTACLES
SHEET 8 OF 9

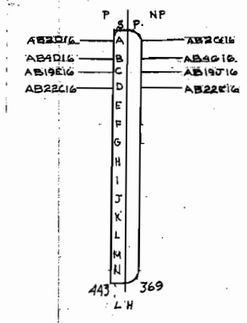


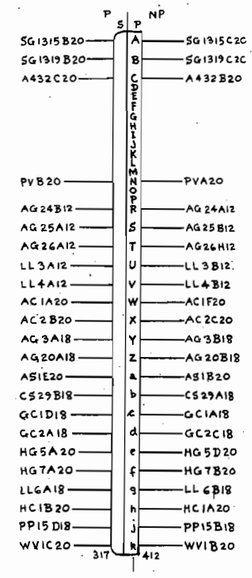


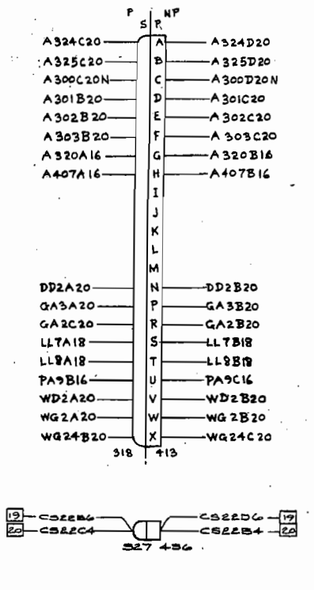
NOTE: EFFECTIVE ON F-86F-30 THRU F-86F-35 AIRPLANES
R- DENOTES RADIO INDEX NO.
P- DENOTES RADAR INDEX NO.

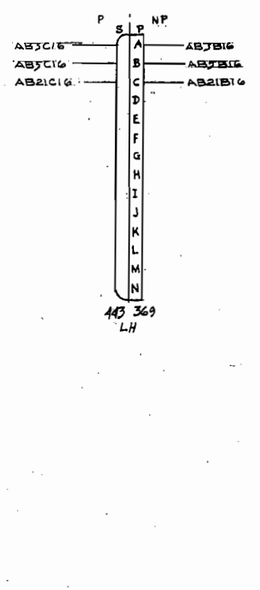


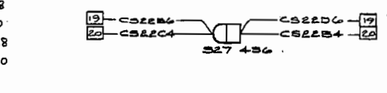








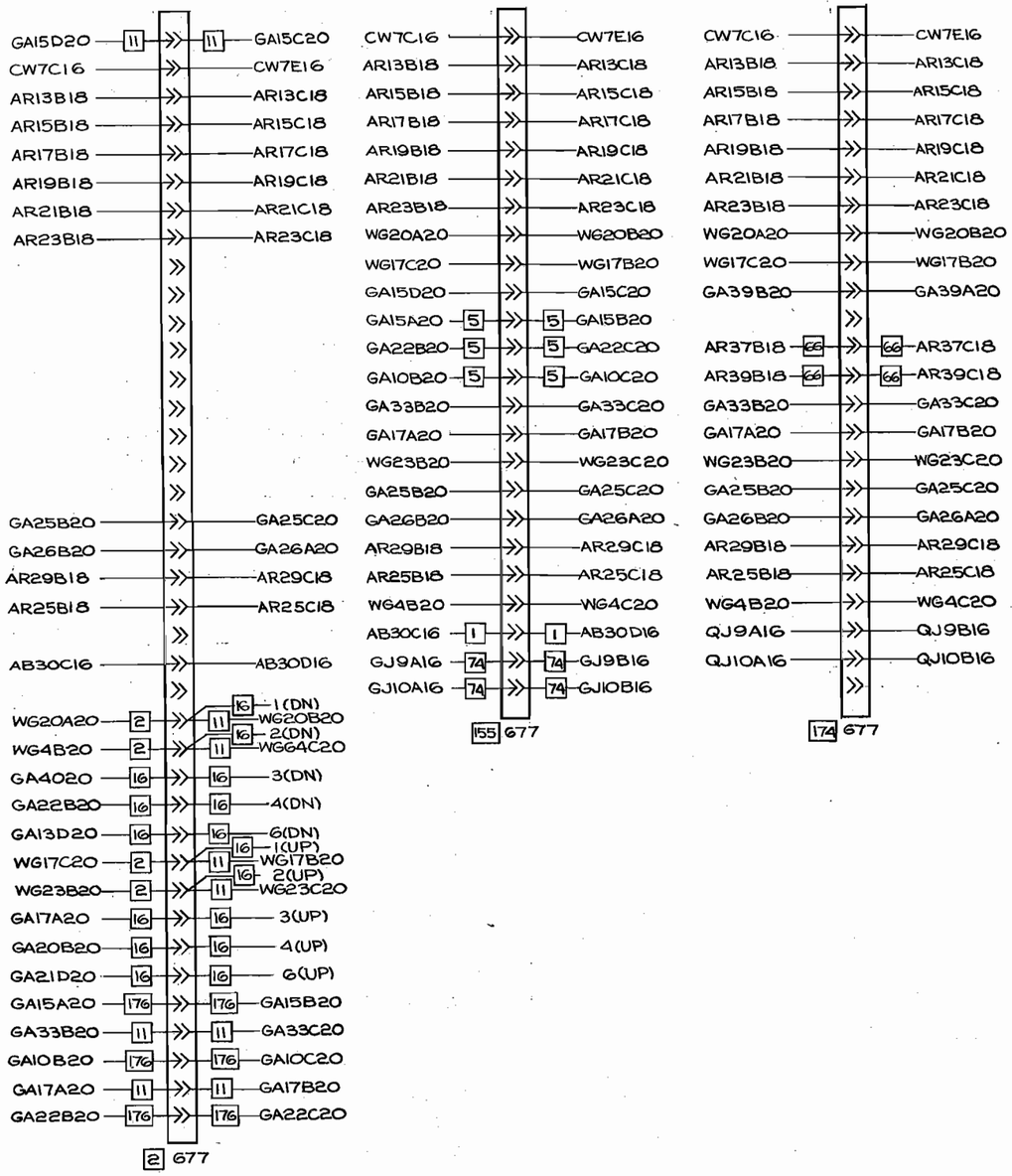




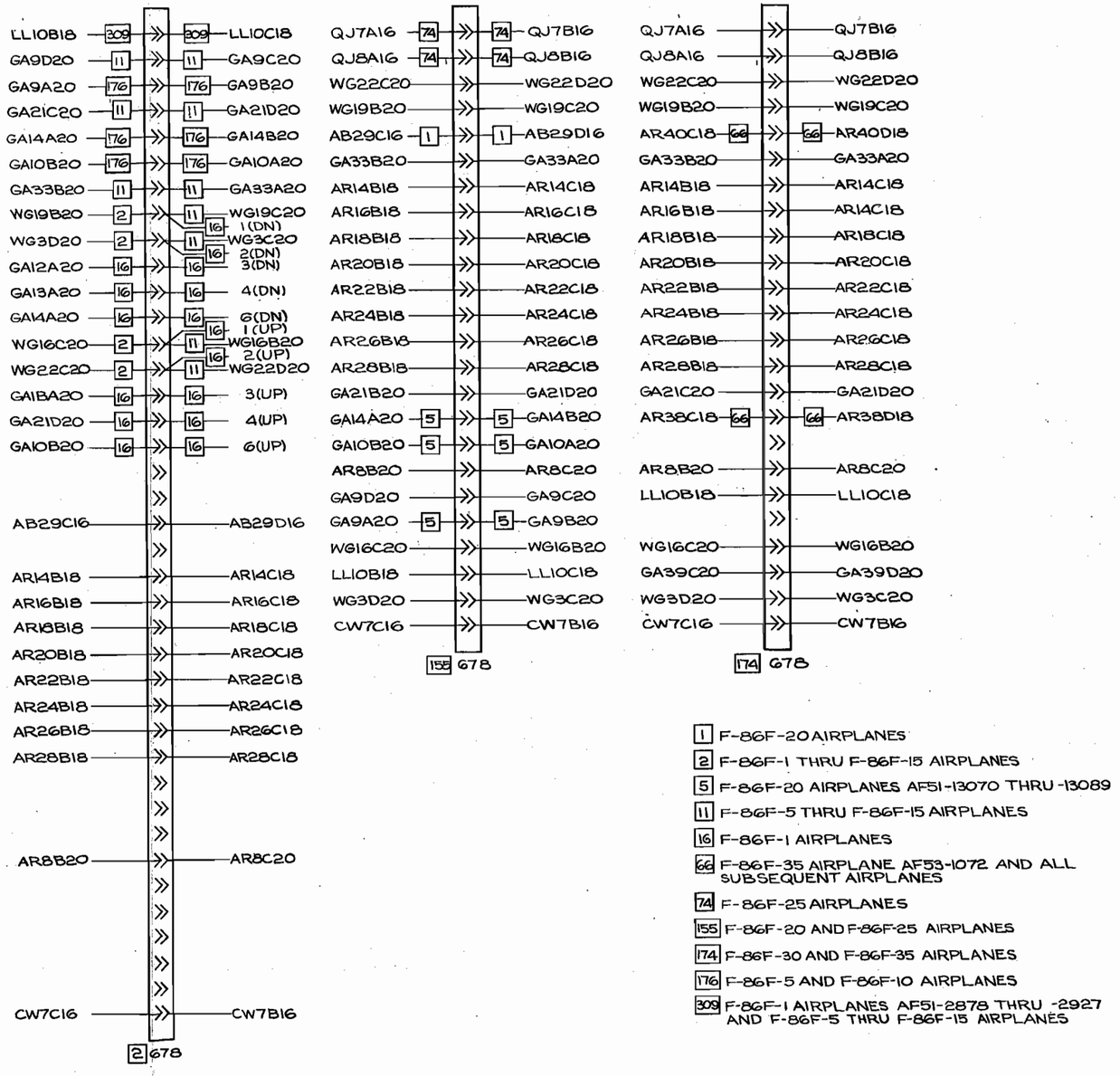
14 F-86F-30 AIRPLANES AF52-4905 AND ALL SUBSEQUENT AIRPLANES
19 F-86F-35 AIRPLANES
20 F-86F-30 AIRPLANES
42 F-86F-30 AIRPLANES AF52-4305 THRU-4954
152 F-86F-30 AIRPLANES AF52-4746 THRU-4904
167 F-86F-30 AIRPLANES AF52-4746 THRU-5163 AND ALL SUBSEQUENT AIRPLANES

F-86F-2-54-512A

PLUGS AND RECEPTACLES
(SHEET 9 OF 9)



LEFT HAND AFT WING DISCONNECTS



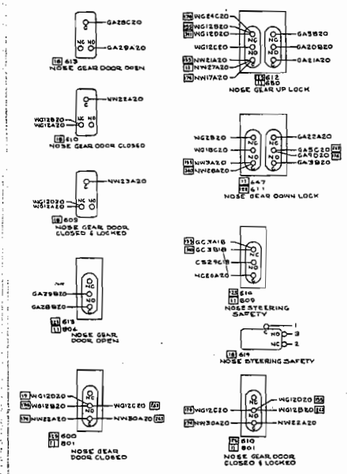
1 F-86F-20 AIRPLANES
2 F-86F-1 THRU F-86F-15 AIRPLANES
5 F-86F-20 AIRPLANES AF51-13070 THRU -13089
11 F-86F-5 THRU F-86F-15 AIRPLANES
16 F-86F-1 AIRPLANES
66 F-86F-35 AIRPLANE AF53-1072 AND ALL SUBSEQUENT AIRPLANES
74 F-86F-25 AIRPLANES
155 F-86F-20 AND F-86F-25 AIRPLANES
174 F-86F-30 AND F-86F-35 AIRPLANES
176 F-86F-5 AND F-86F-10 AIRPLANES
309 F-86F-1 AIRPLANES AF51-2878 THRU -2927 AND F-86F-5 THRU F-86F-15 AIRPLANES

RIGHT HAND AFT WING DISCONNECTS

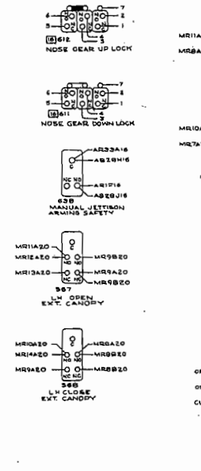
F-86F-2-54-513

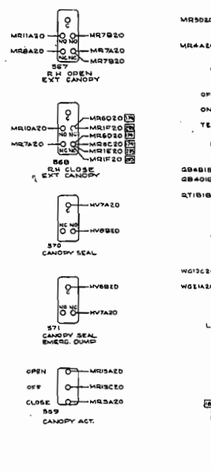
AFT WING DISCONNECTS

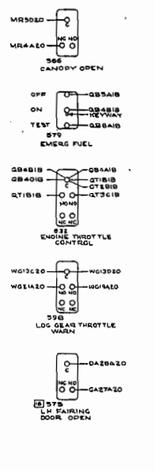
T.O. NO 1F-86F-2

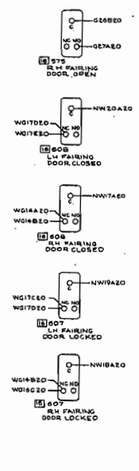


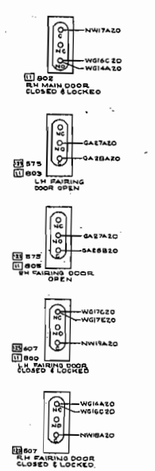
MISCELLANEOUS SWITCHES

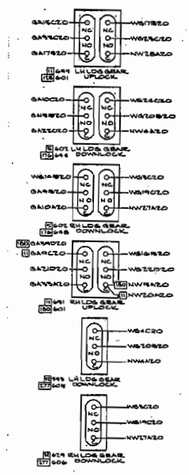


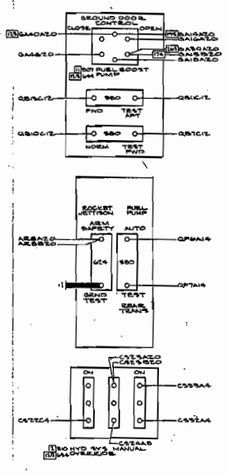


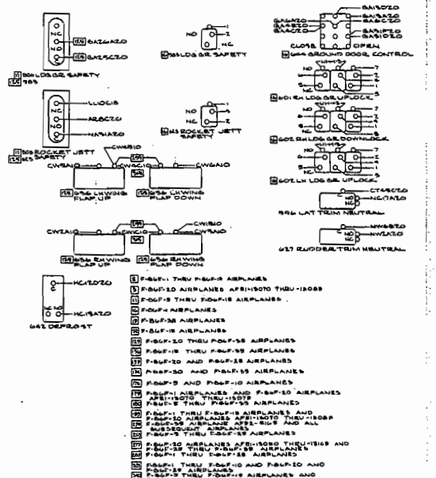






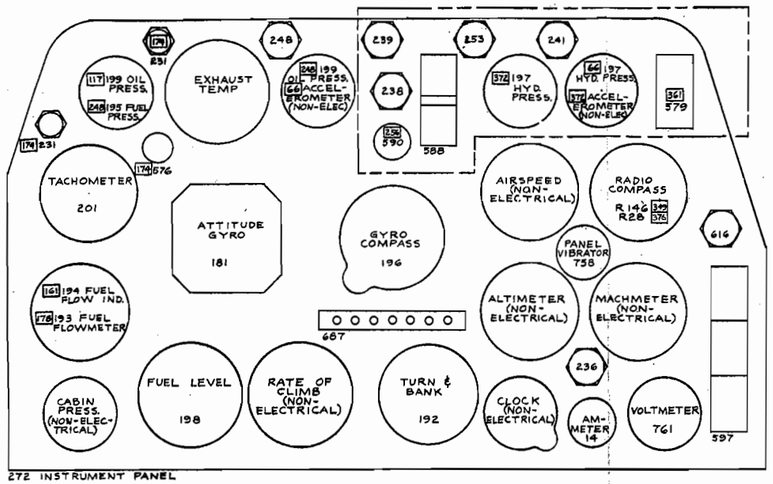






- F-86F-1 THRU F-86F-5 AIRPLANES
- F-86F-10 AIRPLANES AF51-13070 THRU -13088
- F-86F-15 THRU F-86F-25 AIRPLANES
- F-86F-40 AIRPLANES
- F-86F-35 AIRPLANES
- F-86F-15 AIRPLANES
- F-86F-20 THRU F-86F-35 AIRPLANES
- F-86F-15 THRU F-86F-35 AIRPLANES
- F-86F-20 AND F-86F-25 AIRPLANES
- F-86F-30 AND F-86F-35 AIRPLANES
- F-86F-5 AND F-86F-10 AIRPLANES
- F-86F-1 AIRPLANES AND F-86F-20 AIRPLANES
- F-86F-5 THRU F-86F-35 AIRPLANES
- F-86F-1 THRU F-86F-5 AIRPLANES AND F-86F-10 AIRPLANES AF51-13070 THRU -13088
- F-86F-35 AIRPLANE AF51-9149 AND ALL SUBSEQUENT AIRPLANES
- F-86F-5 THRU F-86F-35 AIRPLANES
- F-86F-30 AIRPLANES AF51-13092 THRU -13169 AND F-86F-35 THRU F-86F-55 AIRPLANES
- F-86F-1 THRU F-86F-35 AIRPLANES
- F-86F-1 THRU F-86F-10 AND F-86F-20 AND F-86F-35 AIRPLANES
- F-86F-5 THRU F-86F-15 AIRPLANES AND F-86F-30 AND F-86F-35 AIRPLANES
- F-86F-5 THRU F-86F-15 AND F-86F-30 AIRPLANES AND F-86F-55 AIRPLANE AF51-9164

F-86F-2-SA-54



272 INSTRUMENT PANEL

TACHOMETER
A — E51C18
B — E52C18
C — NE8A18
201 366

FUEL FLOWMETER
A — ED4B20
B — ED5B20
C — ED6B20
D — ED7B20
E — ED8B20
F — ED9B20
176 193 312

FUEL PRESS.
A — NE7A18
B — EU1C18
C — EU3A18
D — EU4A18
248 195 314

GYRO COMPASS
A — NF3A20
B — FR15C20
C — FR14B20
D — FR13B20
E — NF4A20
196 295

FUEL FLOW IND.
A — NE2A20
B — ED11E20
C — ED12E20
D — ED13E20
161 194 303

ATTITUDE GYRO
A — NF1A20
B — FH2B20
C — FH1B20
D
E
181 282

OIL PRESS.
A — NE3A20
B — EG1C18
C — EG3A18
D — EG4A18
199 347

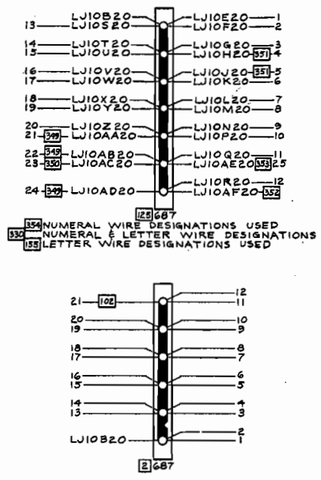
HYD. PRESS.
A — NE1A20
B — EV30A20
C — EV31A20 347
EV31B20 347 167
D — EV32A20 347 167
EV32B20 167
197 330

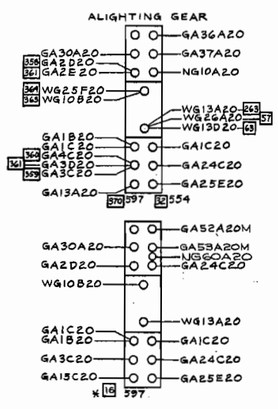
FUEL LEVEL
A — NE17A20
B — EF5F20
C — EF2B20
D — EF3A20
198 345

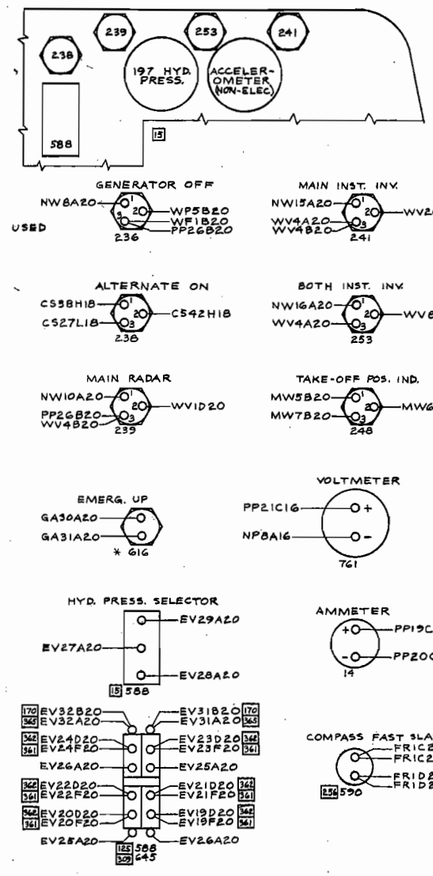
TURN & BANK
A — FB1A20
B — NF2A20
192 368

PANEL VIBRATOR
A — WF6B18 364 346
B — WF6C20 346
758 337

R DENOTES RADIO INDEX NUMBER
* DO NOT APPEAR ON 272 PANEL 15







[2] F-86F-1 THRU F-86F-15 AIRPLANES

[13] F-86F-30 AIRPLANES AF52-4305 THRU-4904

[15] F-86F-1 AIRPLANES AF51-2850 THRU - 2877

[16] F-86F-1 AIRPLANES

[25] F-86F-25 THRU F-86F-35 AIRPLANES

[38] F-86F- 15 AIRPLANES

[51] F-86F-30 AIRPLANES AF52-4305 THRU-4504

[63] F-86F-30 AIRPLANES AF52-4505 AND ALL SUBSEQUENT AIRPLANES

[102] F-86F-1 AIRPLANES AF51-2878 THRU-2927, F-86F-5 AND F-86F-10 AIRPLANES

[117] F-86F-25 AIRPLANES AF52-5447 THRU-5530 F-86F-30 AIRPLANES AF52-4905 AND ALL SUBSEQUENT AIRPLANES

[125] F-86F-20 THRU F-86F-35 AIRPLANES

[155] F-86F-20 AND F-86F-25 AIRPLANES

[161] F-86F-20 AIRPLANES AF51-13110 THRU-13169 AND F-86F-25 THRU F-86F-35 AIRPLANES

[167] F-86F-30 AIRPLANES AF52-4746 THRU-5163 AND F-86F-35 AIRPLANES

[170] F-86F-25 AIRPLANES AF51-13455 THRU-13510 AND AF52-5272 THRU -5530

[174] F-86F-30 AND F-86F-35 AIRPLANES

[178] F-86F-1 THRU F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13109

[196] F-86F-1 THRU F-86F-20 AIRPLANES

[247] F-86F-25 AIRPLANES AF51-13491 THRU-13510, AF52-5272 THRU-5530 AND F-86F-30 AIRPLANES AF52-4905 AND ALL SUBSEQUENT AIRPLANES

[248] F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU -13510, AF52-5272 THRU-5446 AND F-86F-30 AIRPLANES AF52-4305 THRU-4904

[254] F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 THRU F-86F-35 AIRPLANES

[256] F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AFE2-5164

[259] F-86F-35 AIRPLANES AF52-5165 AND ALL SUBSEQUENT AIRPLANES

[263] F-86F-5 THRU F-86F-25 AIRPLANES

[277] F-86F-20 AIRPLANES AF51-13090 THRU-13169 AND F-86F-25 THRU F-86F-35 AIRPLANES

[299] F-86F-1 AIRPLANES AF51-2878 THRU-2927 AND F-86F-5 THRU F-86F-15 AIRPLANES

[324] F-86F-25 AIRPLANES AF52-5381 THRU -5530 AND F-86F-30 AIRPLANE AF52-4746 AND ALL SUBSEQUENT AIRPLANES

[330] F-86F-30 AIRPLANE AND ALL SUBSEQUENT AIRPLANES

[347] F-86F-1 THRU F-86F-25 AIRPLANES AND F-86F-30 AIRPLANE AF52-4305 THRU -4746

[348] F-86F-1 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13510, AF52-5272 THRU-5380 AND F-86F-30 AIRPLANES AF52-4305 THRU-4746

[349] F-86F-25 AIRPLANES AF51-13227 AND ALL SUBSEQUENT AIRPLANES

[350] F-86F-25 AIRPLANES AF51-13227 THRU-13510, AF52-5272 THRU-5530 AND F-86F-30 AIRPLANES AF52-4305 THRU -4904

[361] F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13510, AF52-5272 THRU-5446, AND F-86F-30 AND F-86F-35 AIRPLANES

[362] F-86F-25 AIRPLANES AF52-5447 THRU -5530 AND F-86F-35 AIRPLANES AF53-1072 THRU -1228

[363] F-86F-25 AIRPLANES AF51-13460 THRU -13510, AF52-5272 THRU-5530 AND F-86F-30 AIRPLANES AF52-4355 AND ALL SUBSEQUENT AIRPLANES

[364] F-86F-30 AIRPLANES AF52-4305 THRU -4454

[366] F-86F-5 AND F-86F-10 AIRPLANES, F-86F-20 AIRPLANES AF51-13070 THRU-13089 AND F-86F-30 AND F-86F-35 AIRPLANES

[369] F-86F-5 AND F-86F-10 AIRPLANES AND F-86F-20 AIRPLANES AF51-13070 THRU -13089

[346] F-86F-25 AIRPLANES AF51-13455 THRU -13510, AF52-5272 THRU-5530 AND F-86F-30 AIRPLANES AF52-4746 AND ALL SUBSEQUENT AIRPLANES

[361] F-86F-15 AIRPLANES AND F-86F-20 AIRPLANES AF51-13090 AND ALL SUBSEQUENT AIRPLANES

[365] F-86F-1 AIRPLANES AF51-2878 THRU-2927, F-86F-5 AND F-86F-10 AIRPLANES, AND F-86F-20 AIRPLANES AF51-13070 THRU 13089

[343] F-86F-5 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13454

[344] F-86F-25 AIRPLANES AF51-13455 AND ALL SUBSEQUENT AIRPLANES

[345] F-86F-1 AIRPLANES AF51-2878 THRU-2927, F-86F-5 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU-13454 AND F-86F-30 AND F-86-35 AIRPLANES

[349] F-86F-1 AIRPLANES AF51-2878 THRU -2927, F-86F-5 THRU F-86F-20 AIRPLANES, F-86F-25 AIRPLANES AF51-13170 THRU-13490 AND F-86F-30 AIRPLANES AF52-4305 THRU-4904

[370] F-86F-5 THRU F-86F-35 AIRPLANES

[372] F-86F-1 AIRPLANES AF51-2878 THRU-2927, F-86F-5 THRU F-86F-30 AIRPLANES AND F-86F-35 AIRPLANES AF52-5164 THRU -5271

[376] F-86F-1 THRU F-86F-20 AIRPLANES AND F-86F-25 AIRPLANES AF51-13170 THRU -13226

F-86F-2-54-515

PILOT'S. INSTRUMENT PANEL

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T.O. 1F-86F-2A

SUPPLEMENT

HANDBOOK MAINTENANCE INSTRUCTIONS

USAF SERIES F-86F AIRCRAFT

This publication supplements T.O. 1F-86F-2, dated 10 September 1954. A SUITABLE REFERENCE TO THIS SUPPLEMENT WILL BE MADE ON THE TITLE PAGE AND OPPOSITE THE AFFECTED PARAGRAPH AND FIGURE IN THE BASIC HANDBOOK.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

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27 JANUARY 1955

1. PURPOSE.

This supplement is issued to provide detailed mooring instructions for F-86F aircraft. Standard mooring anchor patterns have been considered in these instructions.

2. INSTRUCTIONS.

Paragraph 1-18, page 14, Section I, is changed to read as follows:

* * * * *

1-18. MOORING FOR HIGH WINDS.

The secure installation of the proper size wheel chocks is most important in mooring an aircraft for high velocity winds. Therefore, when mooring the aircraft, use wheel chocks (four inches high) manufactured to the dimensions given in AF drawing No. 42D6594-2. For ice or snow, use metal codapsible ice-grip wheel chocks, stock No. 8200-159006, AF drawing No. 50D6602. Another important factor is the weight of the aircraft. The figures below give aircraft weights and relative wind velocities that make tie-down necessary. To make use of these figures, it is advisable to know the approximate weight of the aircraft in its various configurations: such as, fully equipped for its missions, with or without drop tanks, and fully loaded or empty of fuel and

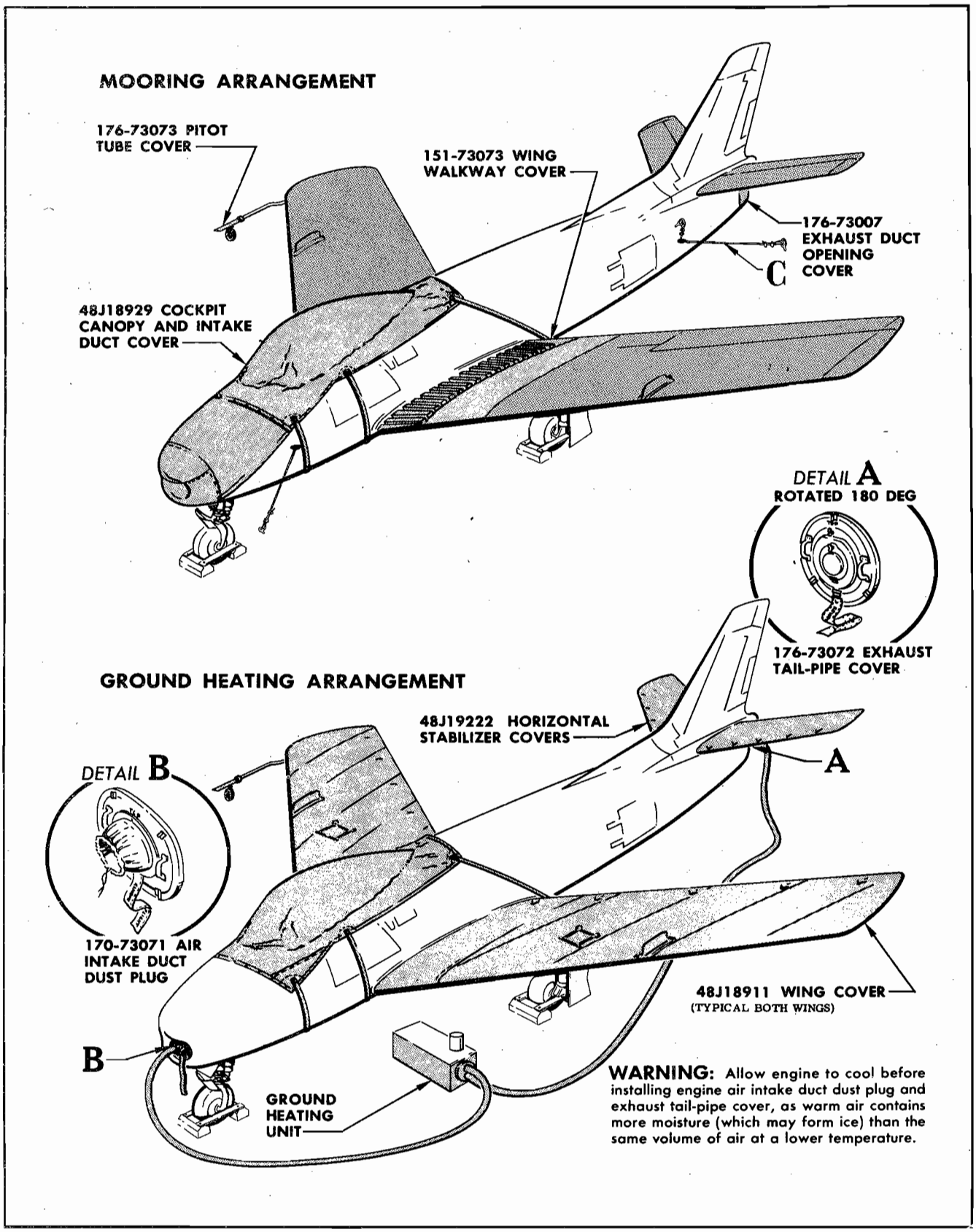

Figure 1-10 – Protective Covers, Ground Heating Attachments, and Mooring Diagram.
(Revised 27 January 1955)

ammunition. During emergencies, knowledge of this information is especially useful for selecting the aircraft which need to be tied down first.

AIRCRAFT WEIGHT IN POUNDS	TIE DOWN IF WIND IS EXPECTED TO BE AT OR ABOVE	
	(Dry Pavement)	(Wet Pavement)
14,800	88 Knots	73 Knots
15,000	91 Knots	74 Knots
16,000	94 Knots	76 Knots
17,000	97 Knots	78 Knots
18,000	99 Knots	80 Knots
20,200	104 Knots	85 Knots

WARNING

Structural damage can occur from high velocity surface winds. Therefore, if at all possible, the aircraft should be evacuated to a safe weather area if a tornado, hurricane, or wind above 110 knots is expected. However, if the aircraft is subjected to these conditions, check surface controls and their hinge points for damage.

* * * * *

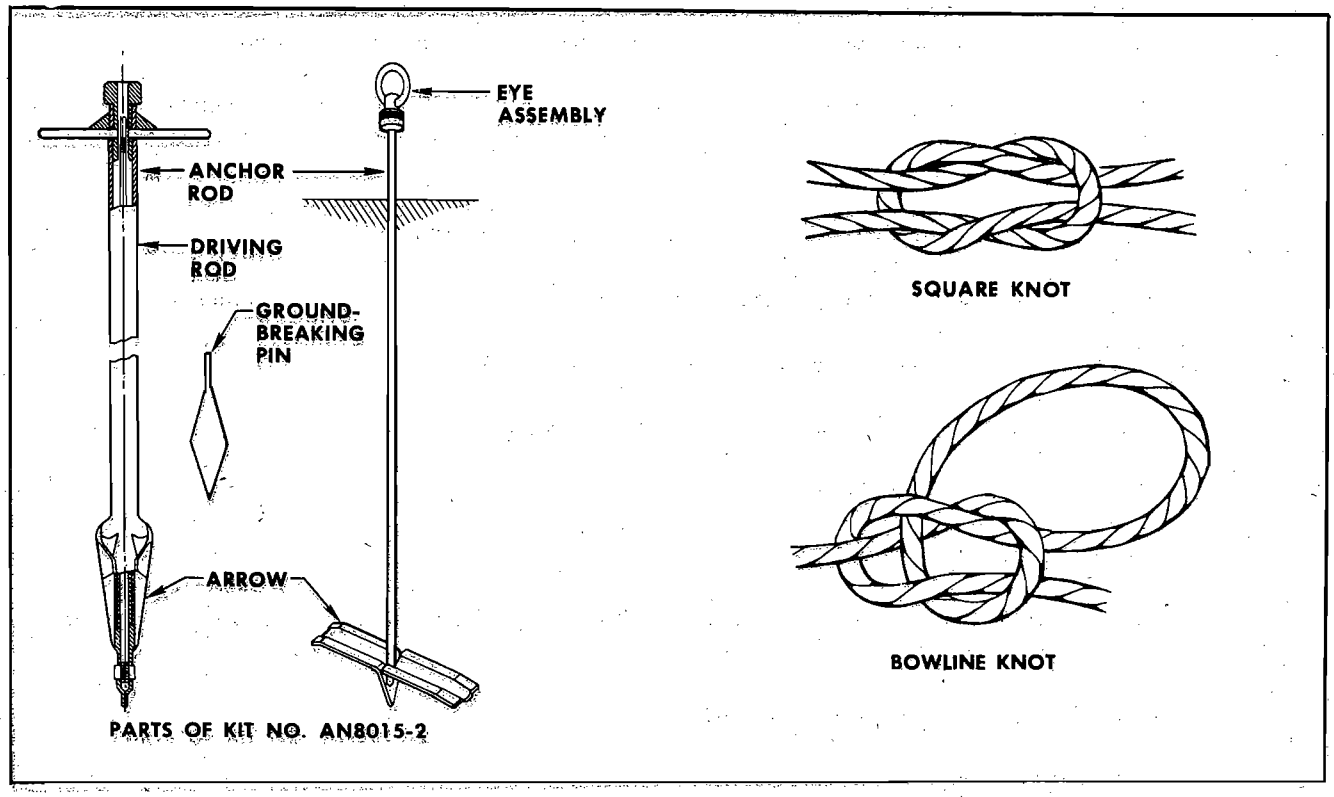

Figure 1-10A – Mooring Details. (Added 27 January 1955)

Paragraph 1-18A, page 15, Section I, is changed to read as follows:

* * * * *

1-18A. MOORING PROCEDURE.

If high winds are expected to come from one direction without shifting, moor as follows:

a. Head aircraft in the direction from which highest forecasted wind or gusts will come.

b. Locate it slightly more than wing span distance from other aircraft with the nose mooring point approximately three feet downwind from the ground mooring anchor.

c. Deflate nose gear strut. (Refer to paragraph 1-57.)

d. If time permits, fill all fuel tanks to capacity, including drop tanks, if installed.

e. Place wheel chocks in front of main gear wheels.

f. Install forward fuselage mooring eye, part No. E1007, in forward fuselage mooring point at station 87. The mooring eye is provided in mooring and jacking kits, part Nos. E1696 or E1696-10. (See figures 1-19 and 1-20.)

g. Attach mooring tie-down to mooring fitting. Make the tie-down from 3/16-inch aircraft cable or chain that will sustain 3000 pounds pull-test. Secure the cable to the mooring eye with two wire rope clips, stock No. 6700-195135. Secure the chain with aircraft steel bolts. Use 3/4-inch manila rope if cable or chain tie-down is not available. However, rope is least desirable because of its tendency to shrink when wet. Secure the mooring rope with a square or bowline knot. (See figures 1-10 and 1-10A.)

h. Slip mooring tie-down through ground mooring anchor and tighten to keep as much movement as possible out of the nose strut. Secure the tie-down at the anchor end as in step "g".

i. Place chocks aft of the main gear wheels and secure by nailing wood cleats from chock to chock on each side of the wheel. Use ropes to secure chocks when wood cleats are not available or when using ice-grip chocks.

j. Chock nose wheel fore and aft and secure the chocks as in step "i".

k. Install intake duct dust plug and exhaust tailpipe cover. (After engine has cooled.)

l. Align and lock surface controls. (Refer to paragraph 1-21.)

m. Set parking brakes, if so equipped. (Refer to paragraph 1-20.)

n. Retract wing flaps and dive flaps.

o. Close canopy and other openings.

p. As climatic conditions dictate, install cockpit canopy and intake duct cover, other protective covers, or tape openings.

q. Secure wing slats in the retracted position.

r. Disconnect battery.

s. Secure all maintenance stands and loose equipment.

NOTE

After high winds, check aircraft for damage from flying objects. Check all surface controls throughout their full range of travel.

Inflate nose gear strut, connect battery, and install plugs in fuselage mooring eye holes before flight.

t. If high winds are expected to be variable or shifting, install rear fuselage mooring eye, part No. E992, in fitting at station 379, and install additional mooring tie-downs as shown in "C" of figure 1-10. These additional tie-downs should be tight and secure; however, do not tighten to the extent that a strain is placed on the aircraft structure or forward fuselage mooring point. Heading the aircraft in the direction of the highest velocity winds is not as critical with the additional tie-downs. The location of mooring anchors in parking areas may make it necessary to vary as much as 45 degrees from the direction of the expected winds.

u. When parking area mooring anchors are not available or accessible, use "dead man" type anchors that will sustain 3000 pounds pull without failure, or mooring kits, part No. AN8015-2.

* * * * *

Paragraph 1-18B, page 16, Section I, is changed to read as follows:

* * * * *

1-18B. INSTALLING MOORING KIT, PART NO. AN8015-2.

Use the following procedure for installing the mooring kit: (See figure 1-10A.)

a. Screw anchor rod into arrow.

b. Slip driving rod over the anchor rod and into the socket of the arrow.

c. Turn the cam of the driving rod so that the prongs of the arrow are not spread by driving.

d. If ground is hard, break the surface with the ground breaking pin.

e. Align the rod with the aircraft mooring fitting and drive the arrow in the ground until the driving rod handle is approximately three inches from the ground.

f. Rotate the driving rod handle 90 degrees and give it a sharp blow to spread the arrow prongs.

g. Return the driving rod to the driving position and withdraw.

h. Align the squared socket of the eye assembly with the squared end of the anchor rod, fit it in place, and screw the knurled nut down tightly.

i. Set the arrow prongs by pulling up on the eye assembly.

NOTE

Withdraw the anchor rods by turning the eye assembly counter-clockwise. Leave the arrows in the ground.

* * * * *

T.O. 1F-86F-2B

SUPPLEMENT

HANDBOOK
MAINTENANCE INSTRUCTIONS

USAF SERIES
F-86F
AIRCRAFT

This technical order supplements T.O. 1F-86F-2, dated 10 September 1954, to make corrections as indicated herein. A SUITABLE REFERENCE TO THIS SUPPLEMENT WILL BE MADE ON THE TITLE PAGE AND AFFECTED FIGURE IN THE BASIC HANDBOOK.

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SMAMA—Mar 55—6,825

10 FEBRUARY 1955

1. PURPOSE.

This supplement is issued to correct an error in the instructions outlined in the basic handbook for torquing wing attachment bolts.

2. INSTRUCTIONS.

Torque values listed for AN bolts in figure 2-1 of the basic handbook are incorrect. Use torque values listed in figure 1-17A of the basic handbook for these bolts.

END