PARTIAL FLIGHT MANUAL

USAF SERIES

T-39B

AIRCRAFT

CONTRACT

FO4606 - 72 - C - 0123

See T.O. 0-1-1-5 for current status of Flight Manuals, Safety Supplements, Operational Supplements, and Flight Crew Checklists.

This publication is incomplete without T.O. 1T-39A-1.

This publication replaces Operational Supplements 1S-1.

Commanders are responsible for bringing this publication to the attention of all personnel cleared for operation of subject aircraft.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

31 OCTOBER 1971

CHANGE 1 — 30 APRIL 1972

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Total number of pages in this manual is 129 consisting of the following:

Page No.	# Change No.
Title	1
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i – ii	0
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8-4 Blank	0
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CURRENT FLIGHT CREW CHECKLIST

T.O. 1T-39B-1CL-1	30 April 1972
T.O. 1T-39B-1CL-2	30 Jan 1970

Zero in these columns indicate an original page.

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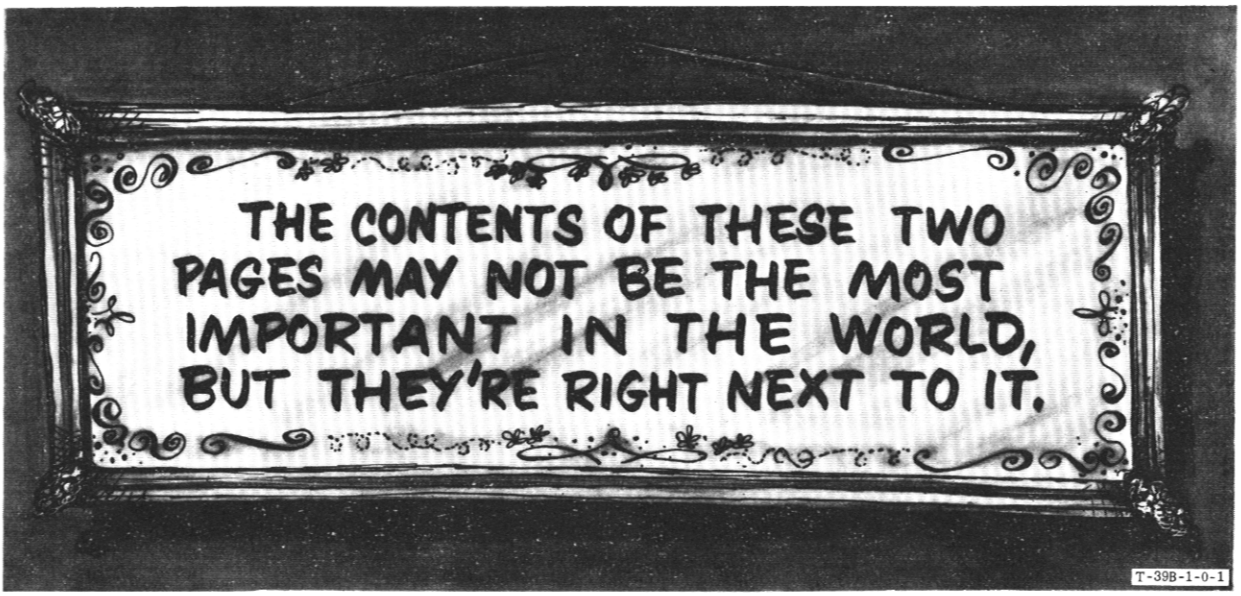
Alphabetical Index

† Refer to T.O. 1T-39A-1.



Scope.

This partial manual contains the necessary information for safe and efficient operation of the T-39B, and covers the differences between it and the T-39A. All information and operating instructions not covered in this manual remain unchanged and are covered in T.O. 1T-39A-1.

Sound Judgment.

This manual provides the best possible operating instructions under most circumstances, but it is not a substitute for sound judgment. Multiple emergencies, adverse weather, terrain, etc., may require modification of the procedures.

Permissible Operations.

The Flight Manual takes a "positive approach" and normally states only what you can do. Unusual operations or configurations (such as asymmetrical loading) are prohibited unless specifically covered herein. Clearance must be obtained from the Flight Manual Manager before any questionable operation is attempted which is not specifically permitted in this manual.

How to Be Assured of Having Latest Data.

Refer to T.O.0-1-1-5A, which lists all current Flight Manuals, Safety Supplements, Operational Supplements, and Checklists. Its frequency of issue and brevity ensures an accurate, up-to-date listing of these publications.

Standardization and Arrangement.

Standardization assures that the scope and arrangement of all Flight Manuals are identical. The manual is divided into independent sections to simplify reading it straight through or using it as a reference manual. The first three sections must be read thoroughly and fully understood before attempting to fly the airplane. The remaining sections provide important information for safe and efficient mission accomplishment.

Supplements.

The current status of each Supplement affecting your airplane can be determined by referring to T.O. 0-1-1-5A. The title page of the Flight Manual and the title block of each Supplement should be checked to determine the effect they may have on existing Supplements. You must remain constantly aware of all Supplements—current Supplements must be complied with but there is no point in restricting your operation by complying with a replaced or rescinded Supplement. Upon receiving each Supplement, file it in the front of your Flight Manual, and make reference to it on the Supplement Summary page. If existing Flight Manual information or procedures are revised, a reference to the applicable Supplement should then be written in the margin of the page opposite the affected write-up. A Safety Supplement may be replaced by an Operational Supplement or an Operational Supplement may be replaced by a Safety Supplement.

SAFETY SUPPLEMENTS. Information involving safety will be promptly forwarded to you by Safety Supplements. Supplements covering loss of life will get to you in 48 hours by TWX, and those concerning serious damage to equipment within 10 days by mail.

OPERATIONAL SUPPLEMENTS. Nonsafety requirements or airplane changes affecting flight crew information that is not timely, or that cannot be practically or adequately covered in the Flight Manual at the time of a scheduled change or revision will be forwarded to you by Operational Supplements.

Checklists.

The Flight Manual contains only amplified checklists. Abbreviated checklists have been issued as separate technical orders. (Refer to the back of the title page for the T.O. number and date of your latest checklist.) Line items in the Flight Manual and checklists are identical with respect to arrangement and item number. Whenever a Supplement affects the abbreviated checklist, write in the applicable change on the affected checklist page. As soon as possible, a new checklist page, incorporating the supplement will be issued. This will keep handwritten entries of supplement information in your checklist to a minimum.

How to Get Personal Copies.

Each flight crew member is entitled to personal copies of the Flight Manual, Safety Supplements, Operational Supplements, and Checklists. The required quantities should be ordered before you need them to assure prompt receipt. Check with your supply personnel; it is their job to fulfill your Technical Order requests. Basically, you must order the required quantities on the Numerical Index and Requirement Table (T.O. 0-1-1-5). Technical Orders 00-5-1 and 00-5-2 give detailed information for properly ordering these publications. Make sure a system is established at your base to deliver these publications to the flight crew immediately upon receipt.

Flight Manual and Checklist Binders.

Loose-leaf binders and sectionalized tabs are available for use with your manual. These are obtained through local purchase procedures and are listed in the Federal Supply Schedule (FSC Group 75, Office Supplies, part 1). Binders are also available for carrying your abbreviated checklist. These binders contain plastic envelopes into which individual checklist pages are inserted. They are available in three capacities: 15-, 25-, and 40-envelope binders, respectively. Check with your supply personnel for assistance in securing these items.

J201 Computer.

A J201 computer (Federal Stock No. 6686-076-0759) is included as miscellaneous equipment with this airplane. This computer is used to compute P_{t5} for engine thrust setting and as an aid to in-flight planning. It is also a valuable aid in obtaining various conversion and correction factors, as well as performing certain numerical computations. Operation of this computer is explained in Appendix I of the T-39A Flight Manual, T.O. 1T-39A-1. The J201 computer is stowed in a pouch on the overhead panel. Additional computers may be obtained through normal supply channels.

Warnings, Cautions, and Notes.

The following definitions apply to "Warnings," "Cautions," and "Notes" found throughout the manual.

WARNING

Operating procedures, techniques, etc., which will result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which will result in damage to equipment if not carefully followed.

NOTE

An operating procedure, technique, etc., which is considered essential to emphasize.

Illustration Changes.

To help you more easily find, on illustrations, changes that might otherwise be inconspicuous, the following identifier will be used:

NEW

Your Responsibility—To Let Us Know.

Every effort is made to keep the Flight Manual current. Review conferences with operating personnel and a constant review of accident and flight test reports assure inclusion of the latest data in the manual. However, we cannot correct an error unless we know of its existence. In this regard, it is essential that you do your part. Comments, corrections, and questions regarding this manual or any phase of the Flight Manual program are welcomed. AF Form 847 will be used for recommending changes to the Flight Manual in accordance with instructions in AFR 60-9 and T.O. 00-5-1. These will be forwarded through command headquarters to SMAMA, McClellan AFB, California 95652, Attn: MMSTA. AF Forms 847 are routed to MMSTA for control purposes only. Technical content of the Flight Manual is the responsibility of the Flight Manual Manager (MMEAH) and all comments and questions transmitted by means other than the AF Form 847 will be submitted directly to the Flight Manual Manager, SMAMA, McClellan AFB, California 95652, Attn: MMEAH.

SUPPLEMENT SUMMARY

Safety Supplements are numbered as follows: 1SS-1, 1SS-2, etc. Operational Supplements are numbered 1S-1, 1S-2, etc. These supplements will be in numerical sequence, and if you find you are missing one, check T.O. 0-1-1-5 to see whether the supplement was issued and, if so, is still in effect. It may have been replaced or rescinded before you received your copy. If it is still active, see your Publication Distribution Officer and get your copy. It should be noted that a supplement number will never be used more than once.

SUPPLEMENTS REPLACED BY THIS CHANGE OR RESCINDED

NUMBER	DATE	SHORT TITLE	DISPOSITION

ACTIVE SUPPLEMENTS

This portion is to be filled in by you when you receive your Flight Manual and to be added to as you receive additional supplements. Refer to T.O. 0-1-1-5 for latest information if any questions arise.

Supplements outstanding at the time of preparation of this page have been listed below for your convenience.

DATE	SHORT TITLE

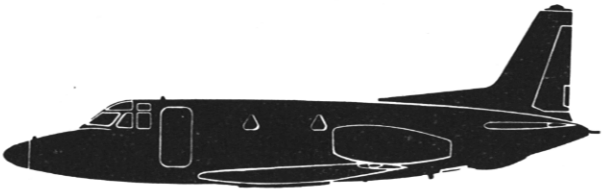
(Refer to T-39A Flight Manual, T.O. 1T-39A-1.)

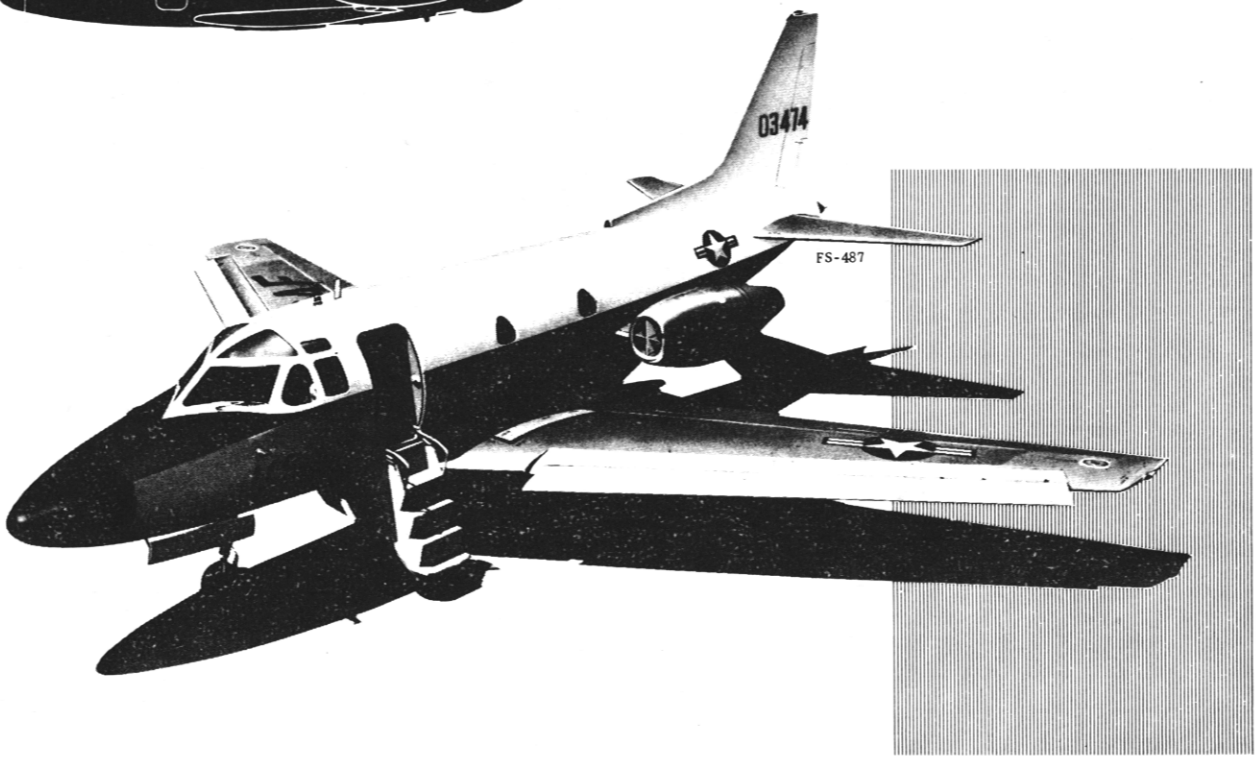
TCTO IDENTIFICATION

The following TCTOs, affecting T-39B Airplanes, are covered in this Partial Flight Manual. This is not a complete T.O. listing and does not include rescinded TCTOs. Refer to the Numerical Index and Requirement Table (T.O. 0-1-1-5A) for the complete listing of TCTOs for these airplanes.

T. O. NUMBER	SUBJECT

T-39B





T-39B-1-00-3B

DESCRIPTION

SECTION I

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Airplane	1-1
Engines	1-3
Oil System	†
Electrical Power Supply Systems	1-3
Hydraulic System	1-11
Flight Control System	1-17
Wing Slats	†
Wing Flap System	†
Speed Brake System	†
Landing Gear System	†
Nosewheel Steering System	1-17
Wheel Brake System	†
Instruments	1-17
Indicator, Caution, and Warning Light System	1-20
Emergency Equipment	1-20
Oxygen Walk-around Bottle	†
Entrance Door	†
Pilots' Seats	†
Pilot's Sliding Window	†
Auxiliary Equipment	†

All information on discription is contained in the T-39A Flight Manual, T.O. 1T-39A-1, except the following:

AIRPLANE.

The T-39B Airplane, built by the North American Rockwell Corporation, is a radar navigational trainer. The primary mission of this airplane is training in radar navigation and radarscope interpretation for rated pilots.

AIRPLANE WEIGHT.

The approximate takeoff gross weight is as follows:

Crew of five and wing fuel	17,100 pounds
The preceding, plus 100 gallons of fuselage fuel	17,760 pounds
The preceding, plus full fuselage fuel	18,320 pounds

The approximate basic weight is as follows:

Airplane plus engine oil and trapped fuel	10,100 pounds

For more detailed weight information, refer to Weight Limitations in section V.

MAIN DIFFERENCES TABLE.

The main differences between the T-39A and T-39B Airplanes are shown in figure 1-2.

AIRPLANE SERIAL NUMBERS.

Airplane serial numbers are as follows:

T-39B-1	AF59-2873 and -2874
T-39B-1	AF60-3474 through -3477

INTERIOR ARRANGEMENT.

The airplane is designed with two standby students' console and radarscope stations and an instructor's seat. There is also a jump seat provided for the instructor between the two student positions. This section also contains the intermediate electronics compartment.

FLIGHT CREW.

Accommodations are provided for a pilot and main student, with two standby students and an instructor.

† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

GENERAL ARRANGEMENT

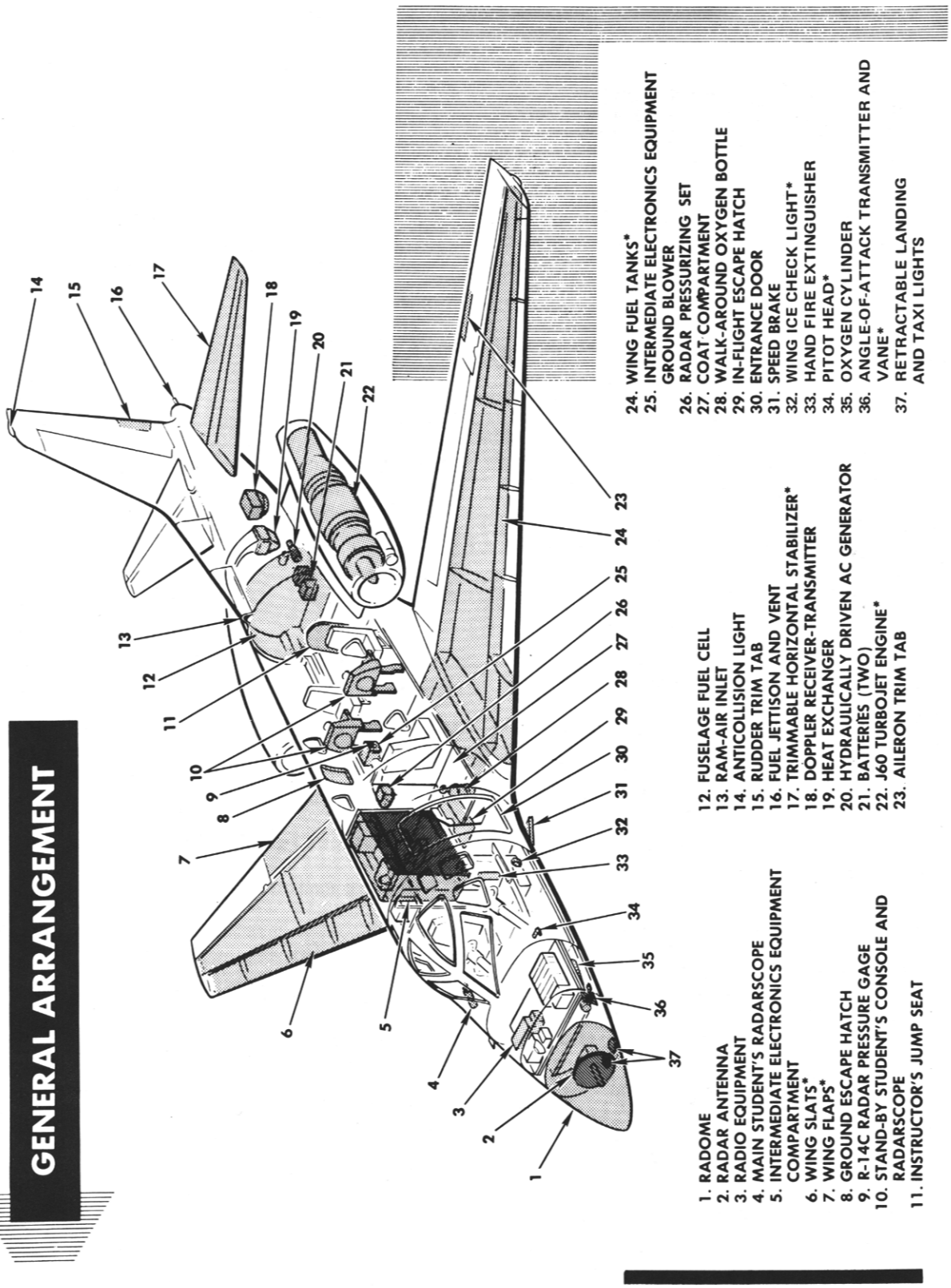


Figure 1-1

MAIN DIFFERENCES TABLE

ITEM	T-39A	T-39B
MISSION	PROFICIENCY TRAINER	RADAR-NAVIGATIONAL TRAINER
RADAR (NAVIGATIONAL)	NO	DOPPLER
RADAR (SEARCH AND RANGE)	NO	R-14C RADAR
HYDRAULIC POWER	ONE ELECTRIC MOTOR-DRIVEN PUMP	TWO ENGINE-DRIVEN PUMPS
AC ELECTRICAL POWER	ONE MAIN INVERTER, ONE STAND-BY INVERTER (TWO ENGINE-DRIVEN AC GENERATORS FOR WINDSHIELD HEATING ONLY)	ONE HYDRAULIC MOTOR-DRIVEN AC GENERATOR AND ONE STAND-BY INVERTER
NAVIGATOR'S STATION	YES (AF60-3478 AND ALL LATER AIRPLANES)	NO
MAIN STUDENT'S STATION	NO	YES
STAND-BY STUDENT'S STATIONS	NO	YES
CREW, PASSENGERS, OR STUDENTS (TOTAL)	SIX	FIVE

Figure 1-2

The main student can act as copilot at the discretion of the pilot.

ENGINES.

The engine accessory drive gearbox is waist-mounted and is driven by the compressor rotor through a bevel gear and shaft system that also serves as the input system during starting. This gear and shaft system powers the engine-mounted hydraulic pump.

ENGINE MASTER SWITCHES.

Moving either engine master switch to ON opens the respective fuel shutoff valve and arms the respective hydraulic shutoff and bypass valve system.

NOTE

After engine shutdown, the engine master switch should be turned OFF before the electrical master and battery master switches are positioned at OFF. This allows the fuel shutoff valve and the hydraulic shutoff and bypass valve to close.

STARTER SYSTEM.

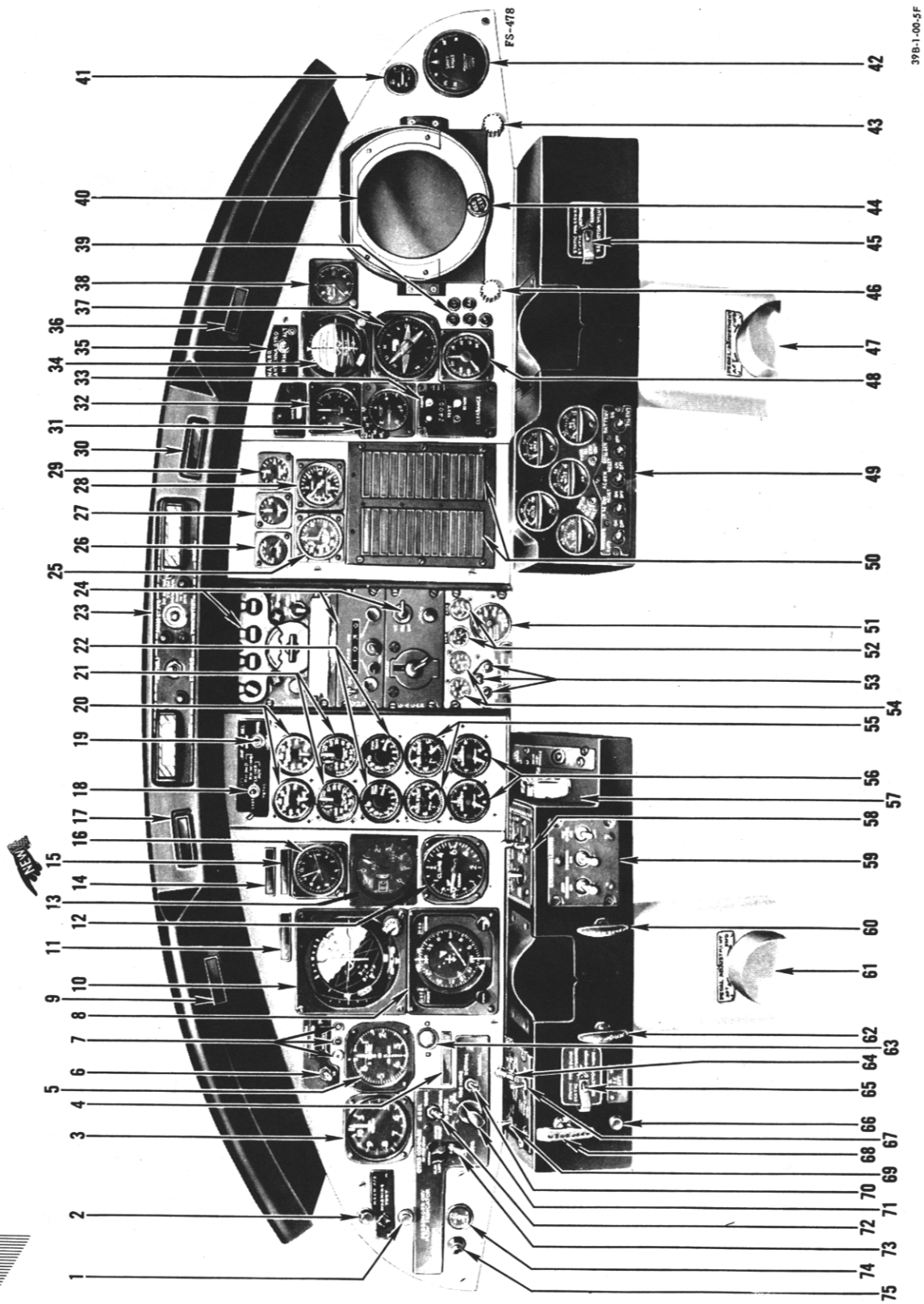
The hydraulic pump output, during cranking, is bypassed through the closed hydraulic shutoff valve to the pump inlet, reducing the starting load. When the cranking cycle has ended, the hydraulic shutoff and bypass valve opens, stopping pump bypass, and the hydraulic system is pressurized.

AIR START SWITCH.

The respective hydraulic pump is bypassed when the air start switch is placed in the LEFTHAND ON or RIGHT-HAND ON position.

ELECTRICAL POWER SUPPLY SYSTEMS.

The alternating current system is powered by a hydraulically driven 400-cycle, 3-phase ac generator, rated at 120/208 volts. A dc-powered standby inverter energizes the essential ac circuits whenever ac generator output is not available. For ground operations, external power can be supplied to the ac system.



COCKPIT—FORWARD VIEW

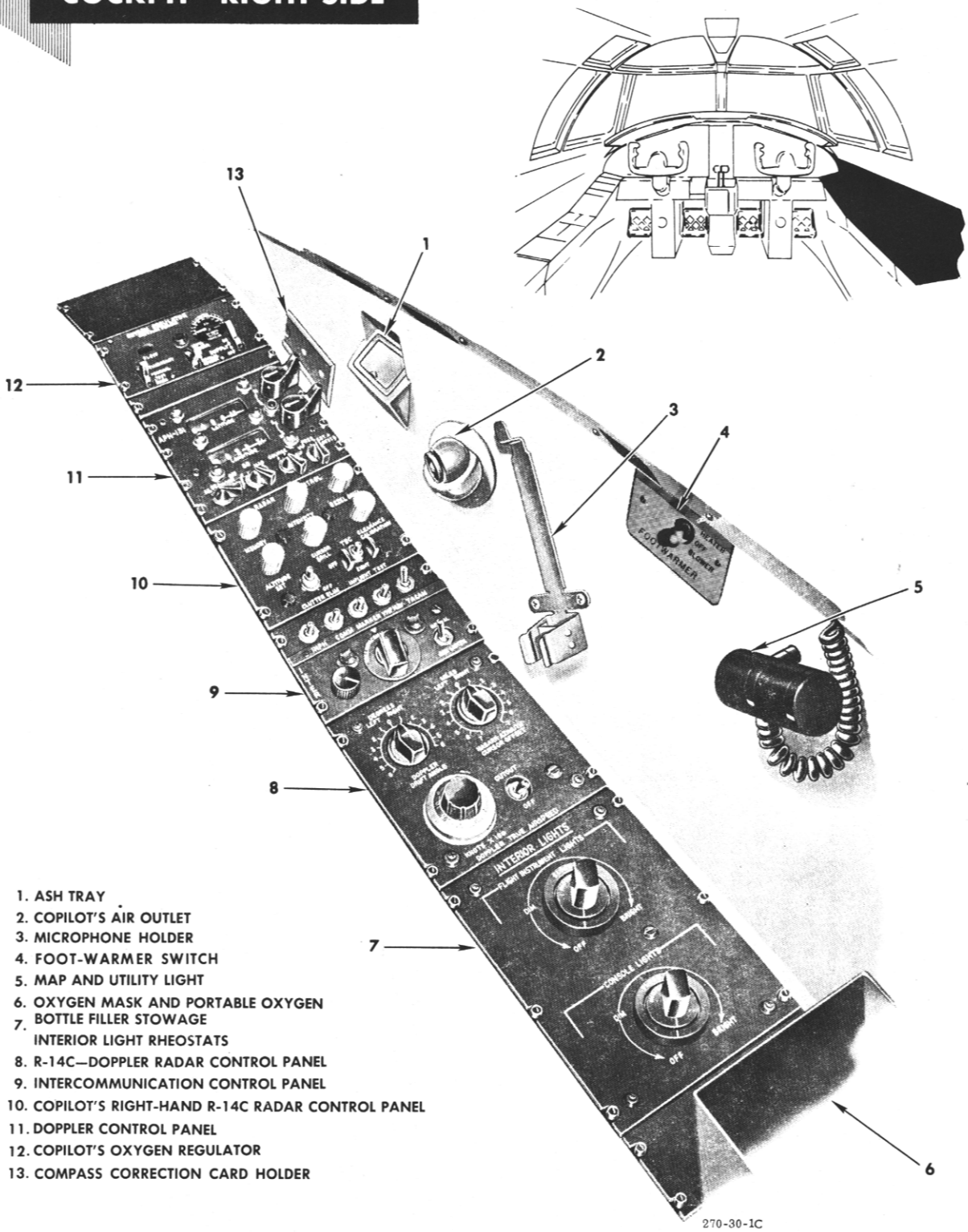
Figure 1-3

		REFER PAGE
1.	Passenger's oxygen flow indicator light	4-17‡
2.	Mach airspeed warning test button	1-50‡
3.	Mach indicator	1-50‡
4.	Course select fail caution light	4-49‡
5.	Airspeed indicator	1-50‡
6.	Marker beacon sensitivity switch	4-39‡
7.	Marker beacon lights	4-39‡
8.	Horizontal situation indicator	4-48‡
9.	Nosewheel steering-on indicator light	1-45‡
10.	Attitude director indicator	4-47‡
11.	Main steering system failure caution light	1-45‡
12.	Vertical velocity indicator	1-50‡
13.	Altimeter	1-48‡
14.	Pressurization duct failure caution light	4-6‡
15.	Aft fuselage overheat caution light	1-57‡
16.	Clock	
17.	Master caution light	1-17
18.	Fuel quantity switch	1-19‡
19.	Antenna selector switch	4-29‡
20.	Exhaust total pressure gages	1-13‡
21.	Tachometers	1-14‡
22.	Exhaust gas temperature gages	1-14‡
23.	Fire extinguisher control panel	1-55‡
24.	Radio control panels	4-29‡
25.	Cabin altimeter and differential-pressure indicator	4-7‡
26.	Horizontal stabilizer trim position indicator	1-38‡
27.	Rudder trim tab position indicator	1-38‡
28.	Cabin pressure rate-of-change indicator	4-7‡
29.	Aileron trim tab position indicator	1-39‡
30.	Master caution light	1-17
31.	Accelerometer	1-51‡
32.	Airspeed indicator	1-50‡
33.	Clearance plane indicator	4-13
34.	Attitude indicator	1-50‡
35.	R-14C antenna gyro switch †	4-9
36.	Nosewheel steering-on indicator light	1-45‡
37.	Course-track-distance indicator	4-17
38.	Clock	

		REFER PAGE
39.	Mode selection lights	4-9
40.	Radarscope	4-9
41.	Antenna tilt indicator	4-9
42.	Ground speed - drift angle indicator	4-17
43.	Horizon knob	4-13
44.	Filter knob	4-14
45.	Copilot's static-pressure selector	1-50‡
46.	Video knob	4-13
47.	Copilot's rudder pedal adjustment knob	1-36‡
48.	Free air temperature indicator	1-51‡
49.	Electrical indicator and control panel	1-13
50.	Caution-warning light panel	1-17
51.	Wing flap position indicator	1-39‡
52.	Hydraulic pressure gages	1-16
53.	Landing gear position lights	1-43‡
54.	Oil pressure gages	1-15‡
55.	Fuel flow indicator	1-14‡
56.	Fuel quantity gages	1-19‡
57.	Landing gear control panel	1-41‡
58.	Alternate trim control panel	1-38‡
59.	Exterior lighting control panel	4-31‡
60.	Parking brake T-handle	1-47‡
61.	Pilot's rudder pedal adjustment knob	1-36‡
62.	Gust lock T-handle	1-36‡
63.	Compass slaving indicator	4-38‡
64.	Speed brake emergency dump switch	1-39‡
65.	Pilot's static-pressure selector	1-47‡
66.	Landing gear electric reset button	1-43‡
67.	Horizontal stabilizer trim limit test switch	1-38‡
68.	Landing gear emergency release T-handle	1-42‡
69.	Signal data recorder switch †	4-52‡
70.	Heading mode selector switch	4-47‡
71.	Flight director mode selector switch	4-47‡
72.	Pilot's course selector switch	4-47‡
73.	Gyrocompass mode switch	4-38‡
74.	Oxygen cylinder pressure gage	4-17‡
75.	Oxygen warning horn cutout button	4-17‡

† Some airplanes. (Refer to applicable text.)
‡ Refers to page in T-39A Flight Manual, T.O. 1T-39A-1.

COCKPIT—RIGHT SIDE

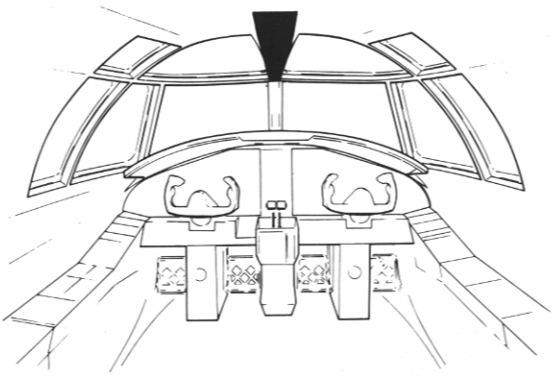


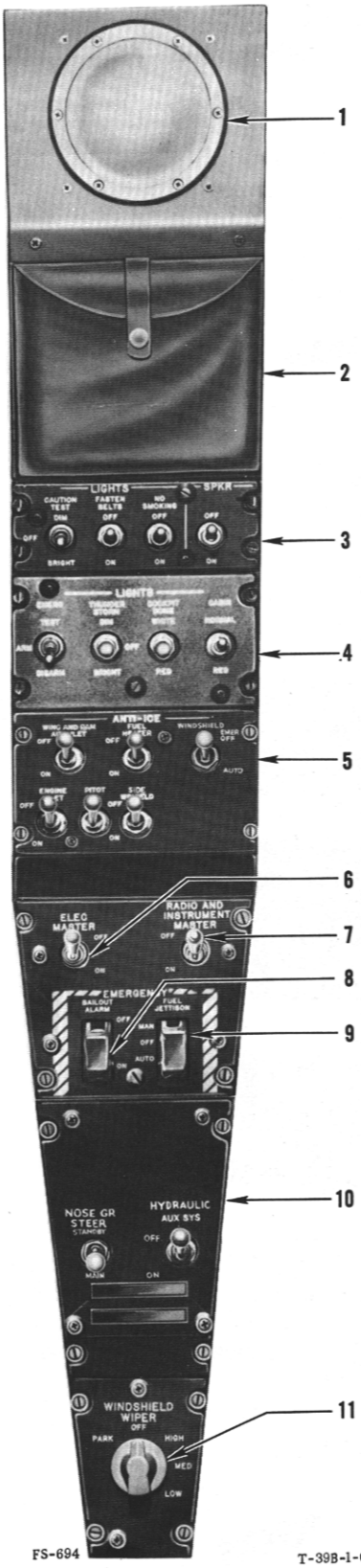
1. ASH TRAY
2. COPILOT'S AIR OUTLET
3. MICROPHONE HOLDER
4. FOOT-WARMER SWITCH
5. MAP AND UTILITY LIGHT
6. OXYGEN MASK AND PORTABLE OXYGEN BOTTLE FILLER STOWAGE
7. INTERIOR LIGHT RHEOSTATS
8. R-14C—DOPPLER RADAR CONTROL PANEL
9. INTERCOMMUNICATION CONTROL PANEL
10. COPILOT'S RIGHT-HAND R-14C RADAR CONTROL PANEL
11. DOPPLER CONTROL PANEL
12. COPILOT'S OXYGEN REGULATOR
13. COMPASS CORRECTION CARD HOLDER

39B-1-00-7E

Figure 1-4

OVERHEAD CONTROL PANELS





1. DOME LIGHT
2. ENGINE COMPUTER POUCH
3. INTERIOR LIGHT AND SPEAKER CONTROL PANEL
4. LIGHT CONTROL PANEL
5. ANTI-ICE CONTROL PANEL
6. ELECTRICAL MASTER SWITCH
7. RADIO AND INSTRUMENT MASTER SWITCH
8. BAIL-OUT ALARM SWITCH
9. FUEL JETTISON SWITCH
10. HYDRAULIC CONTROL PANEL
11. WINDSHIELD WIPER CONTROL KNOB

Figure 1-5

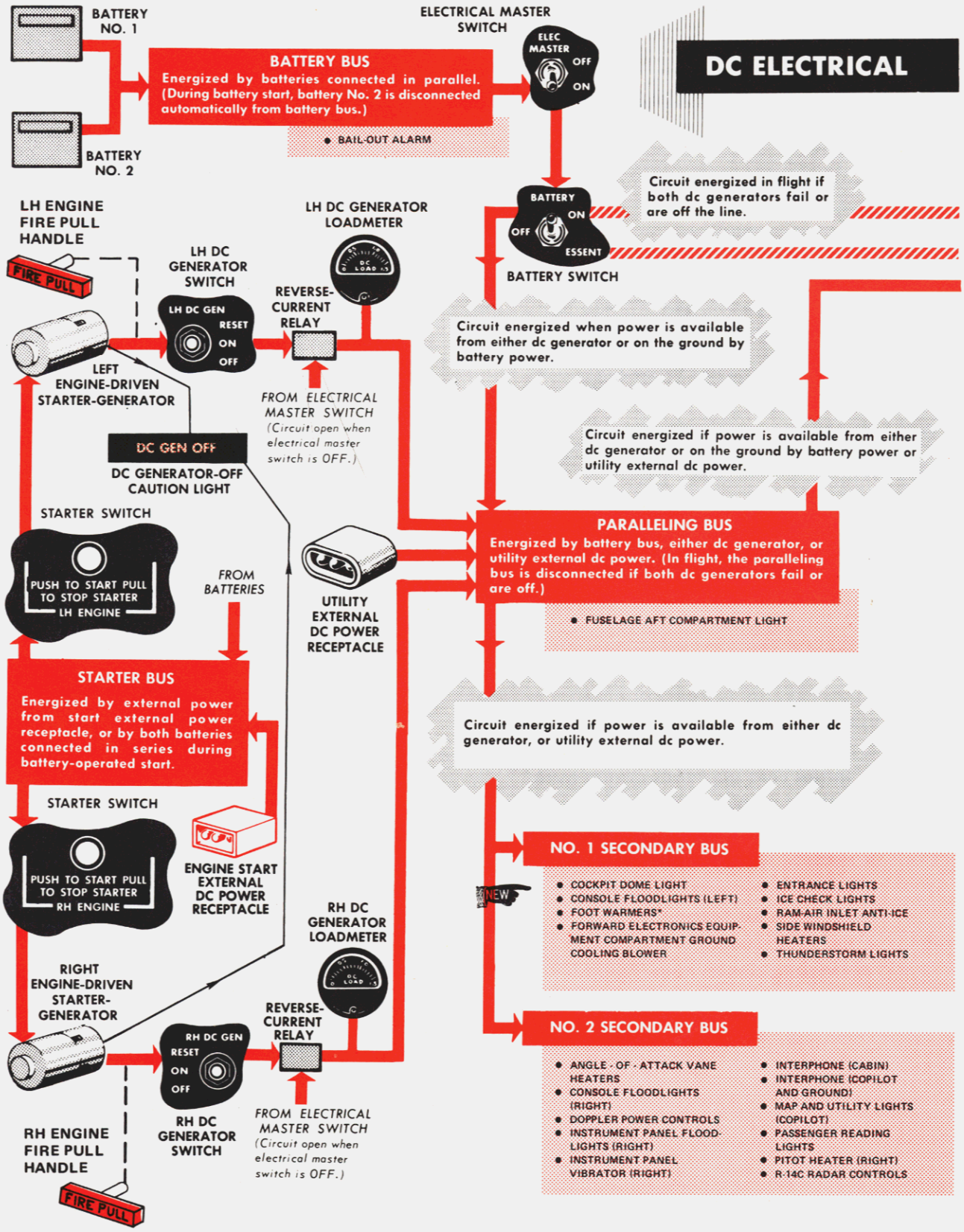

DC ELECTRICAL
BATTERY NO. 1
BATTERY NO. 2
BATTERY BUS
Energized by batteries connected in parallel. (During battery start, battery No. 2 is disconnected automatically from battery bus.)
• BAIL-OUT ALARM
ELECTRICAL MASTER SWITCH
ELEC MASTER
OFF
ON
Circuit energized in flight if both dc generators fail or are off the line.
BATTERY
ON
OFF
ESSENT
BATTERY SWITCH
LH ENGINE FIRE PULL HANDLE
FIRE PULL
LH DC GENERATOR LOADMETER
LH DC GENERATOR SWITCH
LH DC GEN
RESET
ON
OFF
REVERSE-CURRENT RELAY
LEFT ENGINE-DRIVEN STARTER-GENERATOR
FROM ELECTRICAL MASTER SWITCH
(Circuit open when electrical master switch is OFF.)
Circuit energized when power is available from either dc generator or on the ground by battery power.
Circuit energized if power is available from either dc generator or on the ground by battery power or utility external dc power.
DC GEN OFF
DC GENERATOR-OFF CAUTION LIGHT
STARTER SWITCH
PUSH TO START PULL TO STOP STARTER
LH ENGINE
FROM BATTERIES
UTILITY EXTERNAL DC POWER RECEPTACLE
PARALLELING BUS
Energized by battery bus, either dc generator, or utility external dc power. (In flight, the paralleling bus is disconnected if both dc generators fail or are off.)
• FUSELAGE AFT COMPARTMENT LIGHT
STARTER BUS
Energized by external power from start external power receptacle, or by both batteries connected in series during battery-operated start.
Circuit energized if power is available from either dc generator, or utility external dc power.
STARTER SWITCH
PUSH TO START PULL TO STOP STARTER
RH ENGINE
ENGINE START EXTERNAL DC POWER RECEPTACLE
RH DC GENERATOR LOADMETER
NO. 1 SECONDARY BUS
NEW
• COCKPIT DOME LIGHT
• CONSOLE FLOODLIGHTS (LEFT)
• FOOT WARMERS*
• FORWARD ELECTRONICS EQUIPMENT COMPARTMENT GROUND COOLING BLOWER
• ENTRANCE LIGHTS
• ICE CHECK LIGHTS
• RAM-AIR INLET ANTI-ICE
• SIDE WINDSHIELD HEATERS
• THUNDERSTORM LIGHTS
RIGHT ENGINE-DRIVEN STARTER-GENERATOR
RH DC GEN
RESET
ON
OFF
REVERSE-CURRENT RELAY
NO. 2 SECONDARY BUS
• ANGLE-OF-ATTACK VANE HEATERS
• CONSOLE FLOODLIGHTS (RIGHT)
• DOPPLER POWER CONTROLS
• INSTRUMENT PANEL FLOODLIGHTS (RIGHT)
• INSTRUMENT PANEL VIBRATOR (RIGHT)
• INTERPHONE (CABIN)
• INTERPHONE (COPILOT AND GROUND)
• MAP AND UTILITY LIGHTS (COPILOT)
• PASSENGER READING LIGHTS
• PITOT HEATER (RIGHT)
• R-14C RADAR CONTROLS
RH ENGINE FIRE PULL HANDLE
RH DC GENERATOR SWITCH
FROM ELECTRICAL MASTER SWITCH
(Circuit open when electrical master switch is OFF.)
FIRE PULL

Figure 1-6

POWER DISTRIBUTION

(FUNCTIONAL FLOW DIAGRAM)

NOTE

Systems using more than one power source are listed under the ac or dc bus that would normally be lost first.

DC ESSENTIAL BUS

Energized by paralleling bus. (In flight, if both dc generators fail or are off, the battery bus automatically powers the essential bus. If this transfer fails, the essential bus can be energized by the battery bus by moving the battery switch to *ESSENT.*)

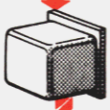
NEW

- AAU-19/A ALTIMETER
- AC GENERATOR HYDRAULIC DRIVE SHUTOFF VALVE
- AC GENERATOR SWITCH
- AIR START SWITCH
- ANTICOLLISION LIGHTS
- ATTITUDE DIRECTOR
- BAGGAGE COMPARTMENT LIGHT
- BLEED-AIR SHUTOFF VALVES
- CABIN AIR DUMP VALVE
- CAUTION AND WARNING LIGHTS
- CAUTION AND WARNING LIGHT TEST CIRCUIT
- COAT COMPARTMENT LIGHT
- COMMAND RADIO (UHF)
- COMMAND RADIO ANTENNA SELECTOR SWITCH
- COURSE SELECTOR SWITCH
- DC GENERATOR FIELD CONTROL
- DC GENERATOR SWITCHES
- DIRECTIONAL INDICATING SYSTEM
- DOOR SEAL CONTROL
- ELECTRONIC SHELF COOLING BLOWER
- EMERGENCY RAM-AIR VALVE
- ENGINE CONTROL PANEL FLOODLIGHTS
- ENGINE FIRE DETECTOR SYSTEM
- ENGINE FIRE EXTINGUISHER SYSTEM CONTROL
- ENGINE IGNITION
- ENGINE INLET AND GUIDE VANE ANTI-ICE CONTROL
- ENGINE MASTER SWITCHES
- ENGINE STARTER SWITCHES
- FLAPS
- FLAP POSITION INDICATOR
- FLIGHT DIRECTOR COMPUTER
- FLIGHT DIRECTOR MODE SWITCH
- FREE AIR TEMPERATURE GAGE
- FUEL BOOST PUMPS
- FUEL BOOST PUMP CROSS-FEED
- FUEL FILTER ANTI-ICE SYSTEM CONTROL
- FUEL JETTISON CONTROL
- FUEL SHUTOFF VALVES
- FUEL TANK CROSS-FEED
- GLIDE PATH RECEIVER
- HEADING MODE SWITCH
- HYDRAULIC SHUTOFF AND BYPASS VALVES
- INSTRUMENT FLOODLIGHTS
- INSTRUMENT PANEL FLOOD-LIGHTS (LEFT)
- IFF
- IFF CAUTION LIGHT
- IFF COMPUTER
- IFF TEST SET
- INSTRUMENT PANEL VIBRATOR (LEFT)
- INTERPHONE (PILOT)
- LANDING AND TAXI LIGHTS
- LANDING GEAR CONTROL
- LANDING GEAR POSITION INDICATORS AND WARNING SYSTEM
- MAP AND UTILITY LIGHTS (PILOT)
- MARKER BEACON SYSTEM
- NOSE WHEEL STEERING CONTROL
- OXYGEN WARNING HORN
- PASSENGERS' OXYGEN FLOW INDICATOR LIGHT
- PASSENGER COMPARTMENT DOME LIGHTS
- PASSENGER COMPARTMENT STEP LIGHT
- PASSENGER COMPARTMENT SIGNS
- PEDESTAL FLOODLIGHTS
- PITOT HEAT CONTROL
- PITOT HEATER (LEFT)
- POSITION LIGHTS
- RADIO PANEL FLOODLIGHTS
- RADIO AND INSTRUMENT MASTER SWITCH
- SPEED BRAKE CONTROL
- STAND-BY INVERTER
- TRIM SYSTEM (NORMAL AND ALTERNATE)
- TRIM POSITION INDICATORS
- TURN-AND-SLIP INDICATOR
- VOR LOCALIZER RECEIVER
- WINDSHIELD ANTI-ICE CONTROL
- WINDSHIELD WIPERS

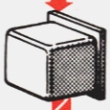
DC VOLTMETER

(Normally, the dc voltmeter indicates dc essential bus voltage; however, when either generator voltage button is depressed, the respective generator voltage will be indicated.)

INTERIOR EMERGENCY LIGHT SWITCH

NO. 1 

INTERIOR EMERGENCY LIGHT POWER UNITS

 NO. 2

Circuits energized if essential bus fails when switch is at *ARM.*

- GROUND ESCAPE HATCH EMERGENCY LIGHT
- IN-FLIGHT ESCAPE HATCH EMERGENCY LIGHT

- COCKPIT EMERGENCY LIGHT
- ENTRANCE DOOR EMERGENCY LIGHT

DC POWER

DC EMERGENCY POWER

DC ELECTRICAL POWER DISTRIBUTION.

See figure 1-6.

DC Secondary Busses.

The No. 1 and No. 2 dc secondary busses are energized by the paralleling bus if either dc generator is on the line, or if utility external power is applied.

BATTERY SWITCH.

If the battery switch is turned OFF in flight, and either dc generator is on the line, all dc busses (except the starter bus) remain energized.

AC ELECTRICAL POWER DISTRIBUTION.

Alternating current power is distributed from the following electrical busses: 115-volt, A-, B-, and C-phase secondary ac busses, 115-volt ac essential bus, No. 1 and No. 2 26-volt busses, and right and left 5-volt ac indirect light busses. (See figure 1-8.)

A-, B-, and C-phase AC Busses.

The 115-volt A-, B-, and C-phase secondary busses are powered by the ac generator or by power from the ac external power receptacle. Normally (when the standby inverter is not on), the A-phase secondary ac bus powers the 115-volt ac essential bus. The B-phase secondary bus powers the right 5-volt ac indirect light bus through a step-down transformer. A-, B-, and C-phase power is supplied to the instrument transformer for the attitude indicator system. Before A-, B-, and C-phase power can be supplied to the R-14C and Doppler systems, the two hydraulic pump pressure-sensing switches must be closed. (Each pressure switch closes when the output of its respective pump is about 2700 psi and opens when pressure drops to about 1200 psi.)

AC Essential Bus.

The 115-volt ac essential bus (figure 1-8) is normally energized by the ac generator through the 115-volt A-phase secondary ac bus. If the stand-by inverter is turned on or is operating because of ac generator failure, the ac essential bus is disconnected automatically from the A-phase secondary bus and becomes powered by the standby inverter.

Right and Left 5-volt AC Indirect Light Busses.

The two 5-volt ac busses (figure 1-8) are powered through two step-down transformers, one for each 5-volt bus. The right 5-volt bus is powered by the 115-volt B-phase secondary ac bus and the left 5-volt ac bus is powered by the 115-volt ac essential bus.

AC GENERATOR SWITCH.

The three-position ac generator switch (figure 1-7), on the copilot's inboard instrument panel, controls the ac generator by dc essential bus power.

NOTE

The ac generator switch is ineffective and the ac generator is off the line if the generator control hydraulic pressure switch is open. (The pressure switch closes when system pressure is about 2700 psi and opens when pressure drops to about 1200 psi.)

When the ac generator switch is ON, a solenoid-operated hydraulic shutoff valve is deenergized open to allow hydraulic pressure to power the ac generator drive motor. The ac generator then is connected to the ac circuits. Overvoltage or underfrequency will take the ac generator off the line automatically. If this happens, the switch may be held momentarily at RESET then released to ON in an attempt to restore normal operation. When the ac generator switch is at OFF, dc essential bus power closes the hydraulic shutoff valve. This shuts off hydraulic power to the ac generator drive motor and the generator is shut down.

CAUTION

The ac generator switch should be OFF during engine start (air or ground) and during engine shutdown, to reduce the high torque loads applied to the engine accessory drive train.

INVERTER SWITCH.

For normal operation, the inverter switch (figure 1-7) should be at AUTOMATIC (labeled AUTO). With the switch in this position, the standby inverter is inoperative and is in a standby condition as long as the ac generator is operating and is on the line. If the ac generator then fails or goes off the line, the standby inverter comes on automatically to power the vertical gyro and the ac essential bus. If the inverter switch is moved to ON, the standby inverter comes on regardless of ac generator output, and supplies power to the vertical gyro and the ac essential bus. (The ac generator, if operating when the inverter switch in ON, powers only the 115-volt, A-, B-, and C-phase secondary ac busses.) The inverter circuit is inoperative when the inverter switch is OFF.

AC GENERATOR-OFF CAUTION LIGHT.

The AC GEN OFF amber caution light (figure 1-12), on the caution-warning light panel, is illuminated whenever the ac generator is off the line.

AC GENERATOR OVERHEAT CAUTION LIGHT.

The AC GEN OHEAT amber caution light (figure 1-12), on the caution-warning light panel, comes on when the ac generator approaches an overheat condition.

AC INSTRUMENT POWER-OFF CAUTION LIGHT.

The AC INST PWR OFF amber caution light (figure 1-12), on the caution-warning light panel, comes on when the ac essential bus is not energized. If the standby inverter has been turned on, or is on because of ac generator failure, illumination of the ac instrument power-off caution light indicates standby inverter failure.

NOTE

When the inverter switch is at AUTOMATIC, the inverter is engaged automatically whenever the ac generator is not on the line. During this condition, the instrument power-off caution light blinks as the inverter comes up to speed.

AC LOADMETER.

The ac loadmeter (figure 1-7), on the copilot's inboard instrument panel, is connected to the 115-volt, A-phase secondary ac bus and shows the load being drawn from the ac generator in terms of percentage of the total generator output. In normal flight, with both R-14C and Doppler radar systems operating, the ac loadmeter should read approximately 0.8.

AC VOLTMETER.

The ac voltmeter (figure 1-7), on the copilot's inboard instrument panel, is connected to the 115-volt, A-phase secondary ac bus and indicates voltage of the ac generator.

EXTERNAL POWER RECEPTACLES.

The ac external power receptacle (figure 1-13) permits all the ac busses to be powered by an ac external source. The ac receptacle access is on the left lower side of the fuselage, below the two dc external power receptacles.

CIRCUIT BREAKERS.

Certain circuits which use more than one phase of ac power have circuit breakers mechanically interconnected by a cover enclosing all the individual breakers. Circuit breakers accessible to the flight crew are shown in figure 1-9.

ELECTRICAL BUS AVAILABILITY.

Figure 1-10 shows, in simplified form the various electrical power sources and the busses each is capable of energizing. The information presented is based on the assumption that all affected electrical system switches are in their normal operating positions. Details of automatic and manual switching are not presented; however, the busses affected are shown energized for both normal and alternate power sources.

HYDRAULIC SYSTEM.

The hydraulic system is a 3000 psi system powered by two engine-driven hydraulic pumps, one on each engine. Hydraulic fluid is supplied from a reservoir with a 2.6-gallon fluid capacity. To provide a positive inlet pressure at the pump and to prevent foaming and boiloff at altitude, the hydraulic reservoir is pressurized during normal operation to 60-65 psi by a mixture of cabin air and hydraulic fluid, metered to the reservoir through an aspirator regulator. The auxiliary hydraulic system is the same as in the T-39A Airplane.

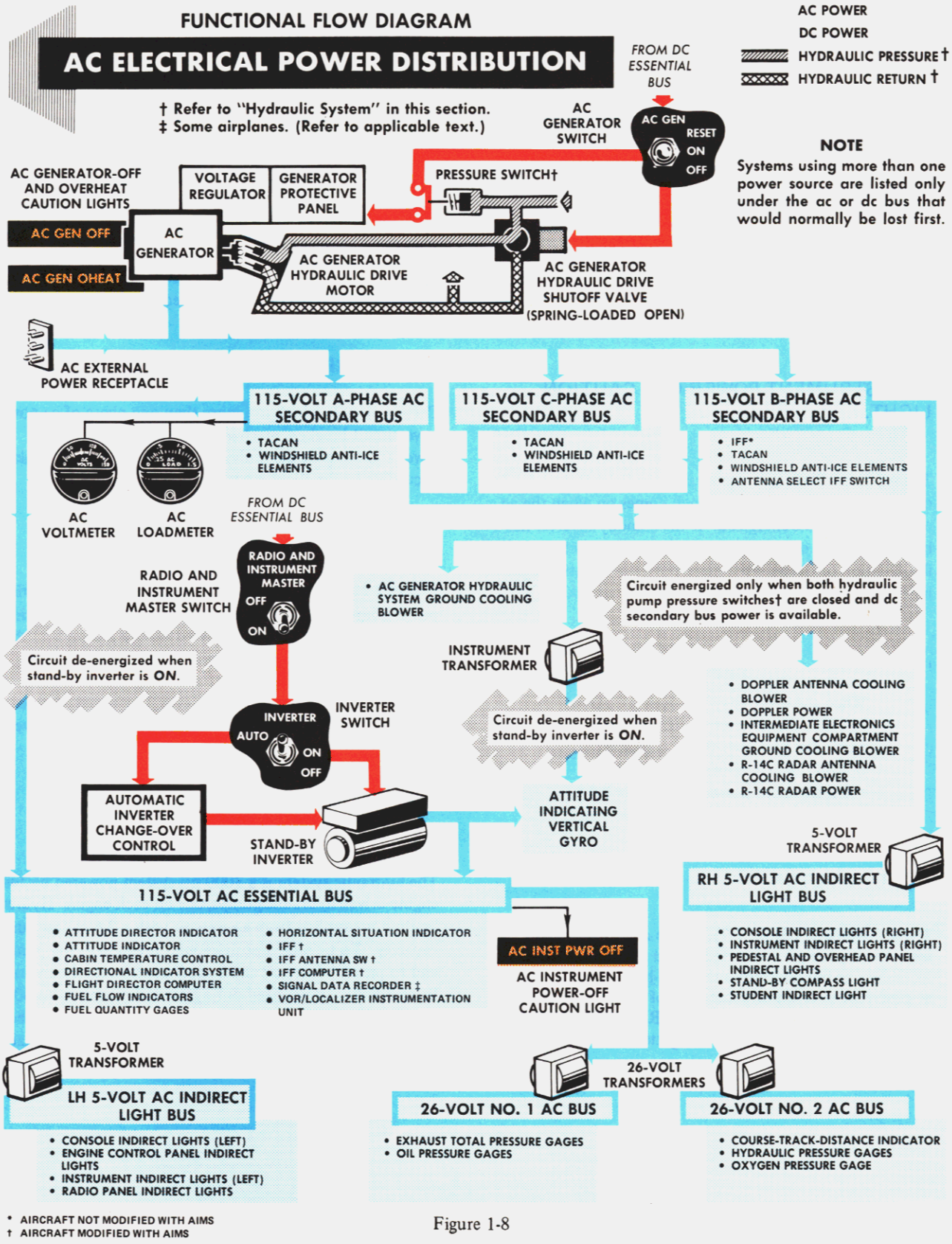

FUNCTIONAL FLOW DIAGRAM
AC ELECTRICAL POWER DISTRIBUTION
† Refer to "Hydraulic System" in this section.
‡ Some airplanes. (Refer to applicable text.)
AC POWER
DC POWER
HYDRAULIC PRESSURE †
HYDRAULIC RETURN †
FROM DC ESSENTIAL BUS
AC GENERATOR SWITCH
AC GEN
RESET
ON
OFF
NOTE
Systems using more than one power source are listed only under the ac or dc bus that would normally be lost first.
AC GENERATOR-OFF AND OVERHEAT CAUTION LIGHTS
AC GEN OFF
AC GEN OHEAT
VOLTAGE REGULATOR
GENERATOR PROTECTIVE PANEL
PRESSURE SWITCH†
AC GENERATOR
AC GENERATOR HYDRAULIC DRIVE MOTOR
AC GENERATOR HYDRAULIC DRIVE SHUTOFF VALVE (SPRING-LOADED OPEN)
AC EXTERNAL POWER RECEPTACLE
115-VOLT A-PHASE AC SECONDARY BUS
• TACAN
• WINDSHIELD ANTI-ICE ELEMENTS
115-VOLT C-PHASE AC SECONDARY BUS
• TACAN
• WINDSHIELD ANTI-ICE ELEMENTS
115-VOLT B-PHASE AC SECONDARY BUS
• IFF*
• TACAN
• WINDSHIELD ANTI-ICE ELEMENTS
• ANTENNA SELECT IFF SWITCH
AC VOLTMETER
AC LOADMETER
FROM DC ESSENTIAL BUS
RADIO AND INSTRUMENT MASTER SWITCH
RADIO AND INSTRUMENT MASTER
OFF
ON
• AC GENERATOR HYDRAULIC SYSTEM GROUND COOLING BLOWER
Circuit energized only when both hydraulic pump pressure switches† are closed and dc secondary bus power is available.
Circuit de-energized when stand-by inverter is ON.
INSTRUMENT TRANSFORMER
• DOPPLER ANTENNA COOLING BLOWER
• DOPPLER POWER
• INTERMEDIATE ELECTRONICS EQUIPMENT COMPARTMENT GROUND COOLING BLOWER
• R-14C RADAR ANTENNA COOLING BLOWER
• R-14C RADAR POWER
INVERTER
AUTO
ON
OFF
INVERTER SWITCH
Circuit de-energized when stand-by inverter is ON.
AUTOMATIC INVERTER CHANGE-OVER CONTROL
STAND-BY INVERTER
ATTITUDE INDICATING VERTICAL GYRO
5-VOLT TRANSFORMER
RH 5-VOLT AC INDIRECT LIGHT BUS
• CONSOLE INDIRECT LIGHTS (RIGHT)
• INSTRUMENT INDIRECT LIGHTS (RIGHT)
• PEDESTAL AND OVERHEAD PANEL INDIRECT LIGHTS
• STAND-BY COMPASS LIGHT
• STUDENT INDIRECT LIGHT
115-VOLT AC ESSENTIAL BUS
• ATTITUDE DIRECTOR INDICATOR
• ATTITUDE INDICATOR
• CABIN TEMPERATURE CONTROL
• DIRECTIONAL INDICATOR SYSTEM
• FLIGHT DIRECTOR COMPUTER
• FUEL FLOW INDICATORS
• FUEL QUANTITY GAGES
• HORIZONTAL SITUATION INDICATOR
• IFF †
• IFF ANTENNA SW †
• IFF COMPUTER †
• SIGNAL DATA RECORDER ‡
• VOR/LOCALIZER INSTRUMENTATION UNIT
AC INST PWR OFF
AC INSTRUMENT POWER-OFF CAUTION LIGHT
5-VOLT TRANSFORMER
LH 5-VOLT AC INDIRECT LIGHT BUS
• CONSOLE INDIRECT LIGHTS (LEFT)
• ENGINE CONTROL PANEL INDIRECT LIGHTS
• INSTRUMENT INDIRECT LIGHTS (LEFT)
• RADIO PANEL INDIRECT LIGHTS
26-VOLT TRANSFORMERS
26-VOLT NO. 1 AC BUS
• EXHAUST TOTAL PRESSURE GAGES
• OIL PRESSURE GAGES
26-VOLT NO. 2 AC BUS
• COURSE-TRACK-DISTANCE INDICATOR
• HYDRAULIC PRESSURE GAGES
• OXYGEN PRESSURE GAGE
* AIRCRAFT NOT MODIFIED WITH AIMS
† AIRCRAFT MODIFIED WITH AIMS

Figure 1-8

ELECTRICAL CONTROL PANEL

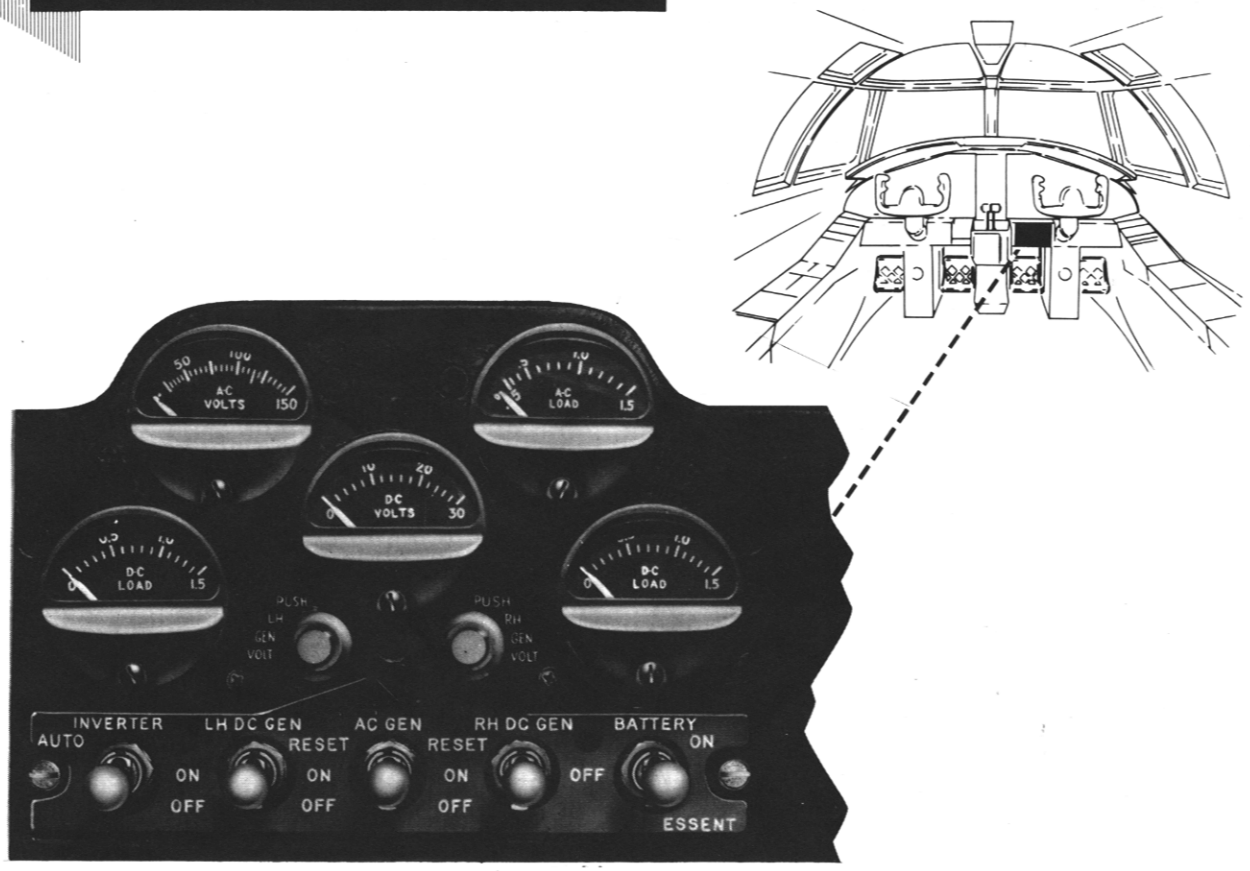


Figure 1-7

HYDRAULIC POWER SYSTEM.

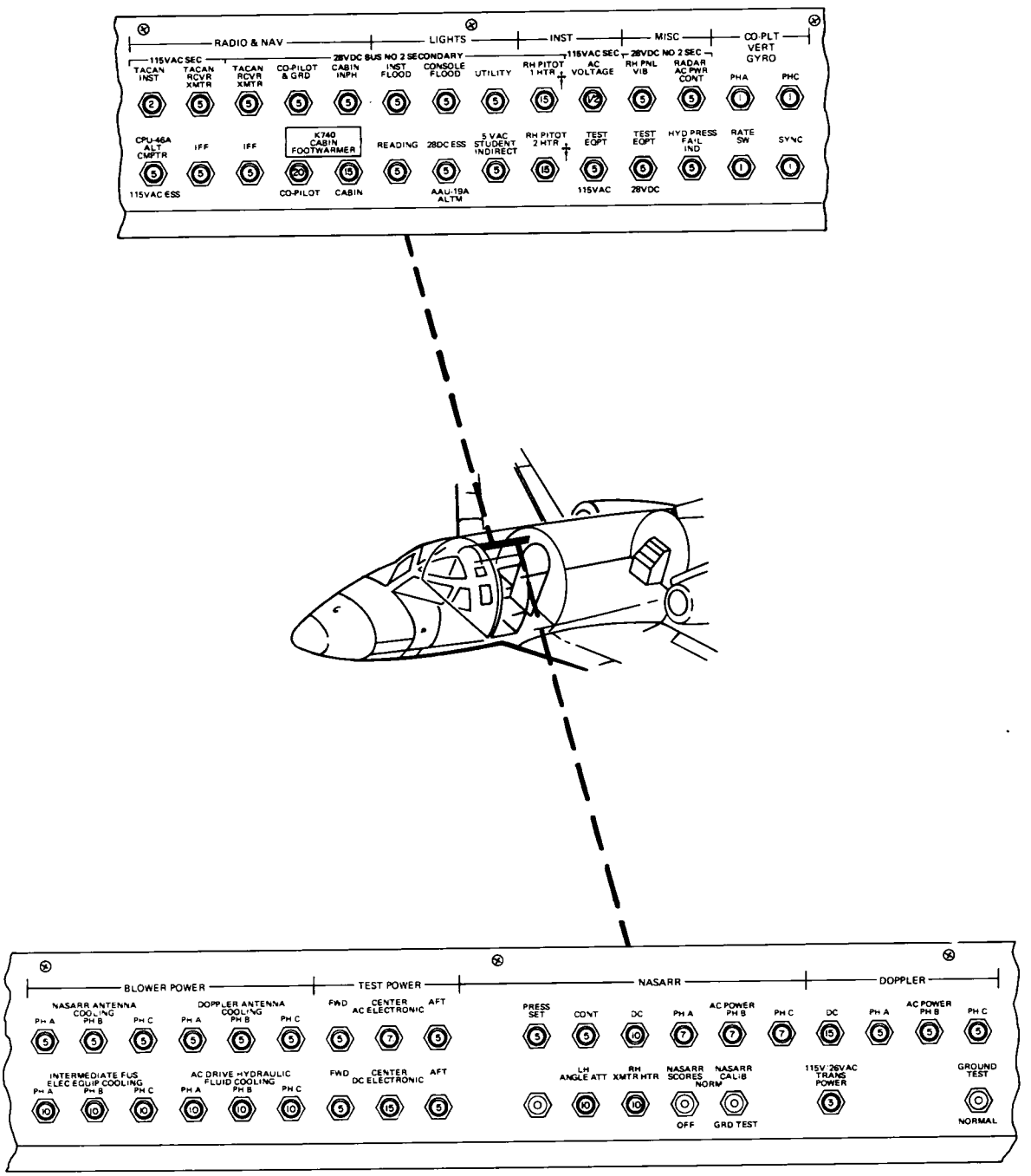
Hydraulic pressure is provided by two engine-driven, variable displacement, constant pressure pumps, one on each engine. (See figure 1-11.) The pumps pressurize a common line, and check valves prevent crossflow between the pumps.

A shutoff and bypass valve, mounted in the inlet line to each hydraulic pump, control the flow of fluid from the reservoir to the pump. These valves are solenoid-operated and are energized closed by dc essential bus power. (Therefore, the valves fail "safe" in the open position if dc essential bus power fails.) Normally, each valve is controlled by the corresponding engine master switch; however, the valves are pressure sensitive and close automatically (even if deenergized open) if pressure of the respective pump is below about 400 psi. When the valves are open, fluid flows from the reservoir to the pumps; when either valve is closed, flow from the reservoir to the pump is shut off and a pump bypass circuit is created which routes the output of the respective pump back to the pump inlet. The valves are energized closed when the respective starter button or the air start switch is engaged. This permits the pump to bypass during the start and relieves the pump torque load from the engine. When the engine reaches about 40 percent rpm, or the air start switch is turned to OFF, the valve is deenergized open to stop the pump bypass circuit and pressurize the hydraulic power system. In addition, the valves are energized closed when the corresponding engine fire pull T-handle is actuated. (Refer to Emergency Equipment in this section.)

A ram-air-cooled heat exchanger, in the system return line, removes the heat created by all system units except the brake system, which has a separate return. On the ground, when ram air is not available, an electrically driven blower is engaged automatically to provide airflow through the heat exchanger. (The blower is shut down when the weight of the airplane is off the landing gear.)

Three pressure actuated switches in the hydraulic system are used to control certain portions of the ac electrical system. The ac generator control pressure switch must be

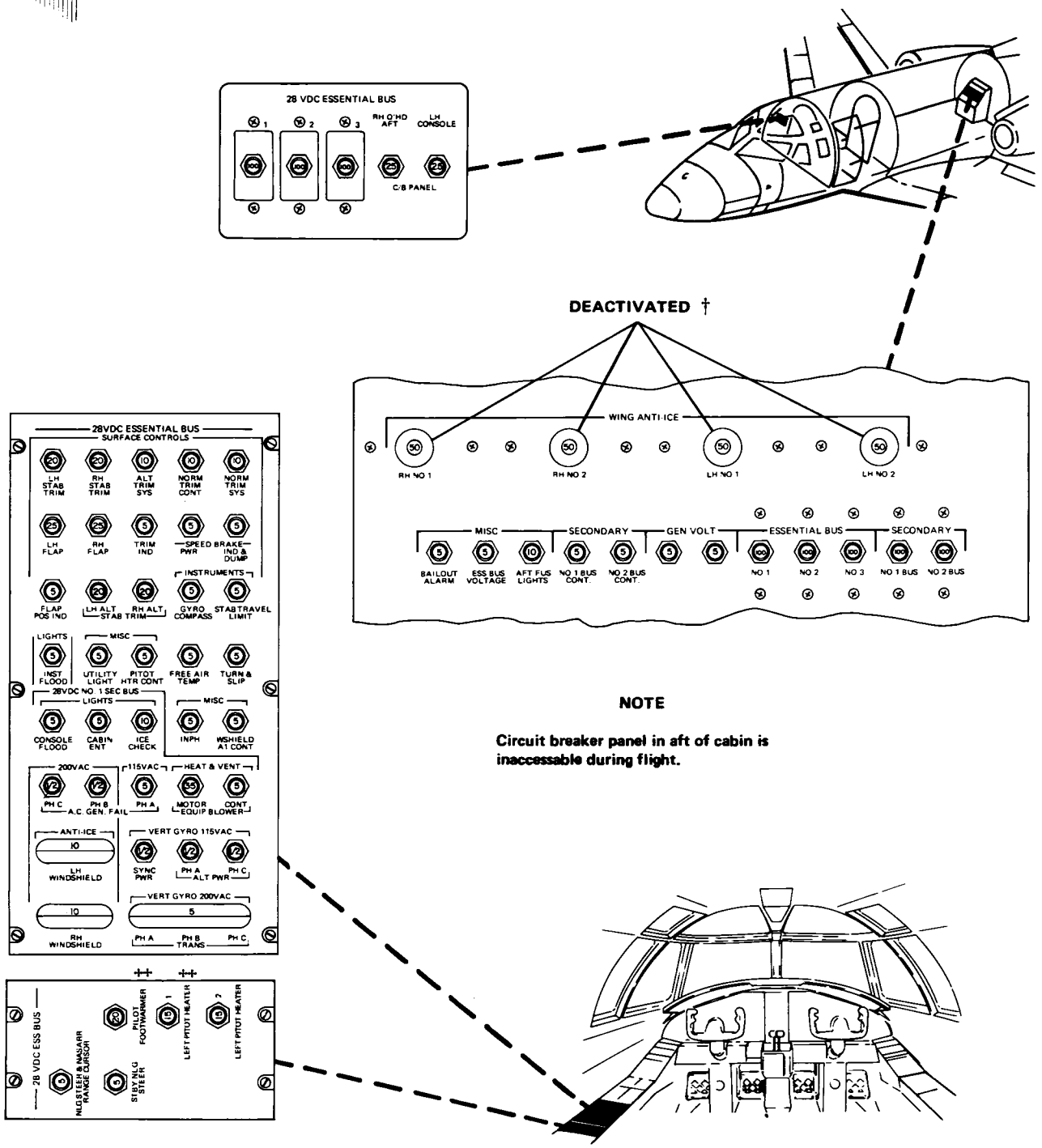
CIRCUIT-BREAKER PANELS (TYPICAL)



† Aircraft modified with AIMS

Figure 1-9 (Sheet 1 of 3)

CIRCUIT-BREAKER PANELS (TYPICAL)



NOTE

Circuit breaker panel in aft of cabin is inaccessable during flight.

† T.O. 1T-39-830

‡ Aircraft modified with AIMS

Figure 1-9 (Sheet 2 of 3)

CIRCUIT-BREAKER PANELS (TYPICAL)

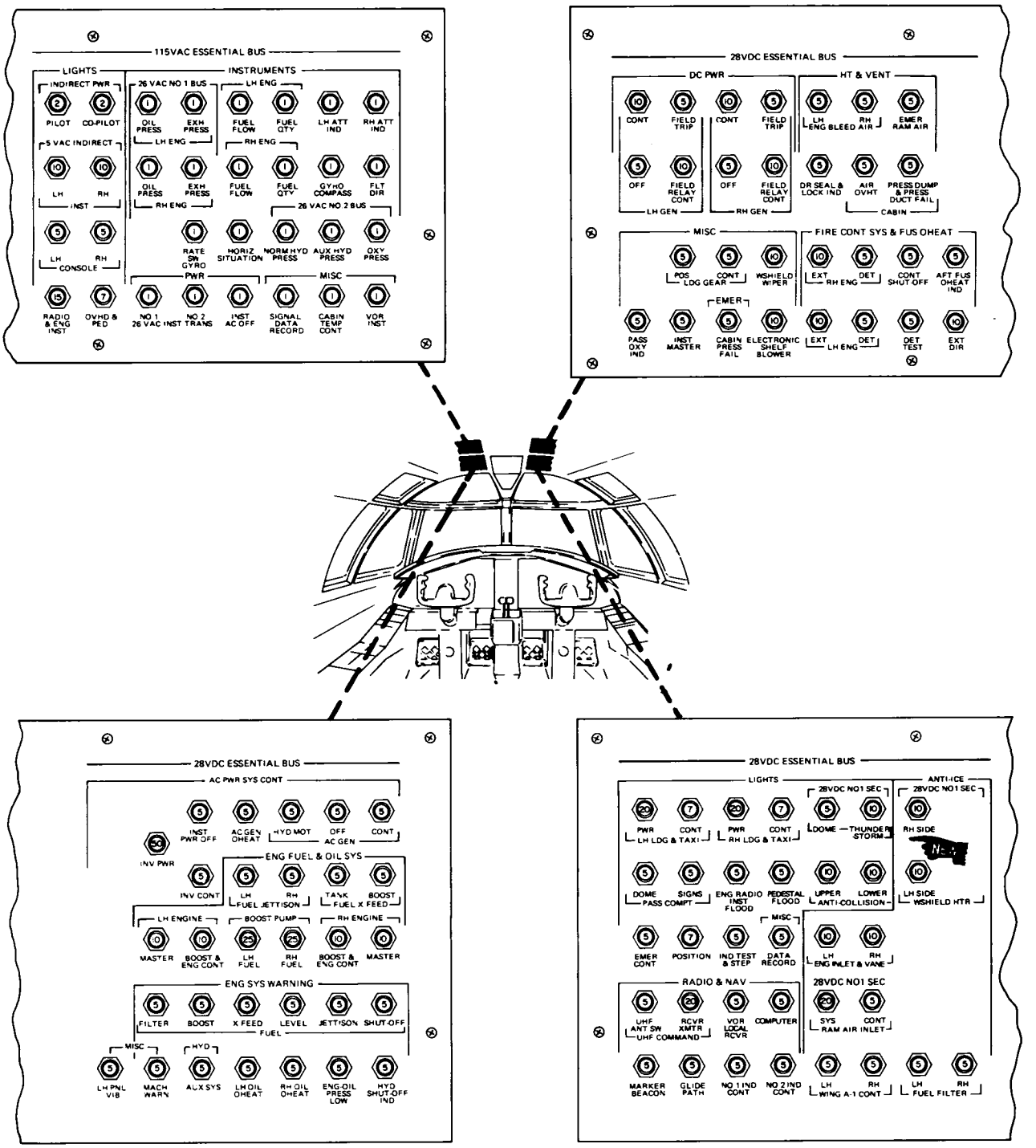


Figure 1-9 (Sheet 3 of 3)

ELECTRICAL BUS AVAILABILITY

NOTE: If the standby inverter is manually selected when the ac generator is operating, the ac generator will power only the ac secondary busses.

POWER SOURCE	DC BUSSES					AC BUSSES	
	BATTERY	STARTER	PARALLEL	ESSENTIAL	SECONDARY	SECONDARY	ESSENTIAL
UTILITY EXTERNAL DC POWER	ENERGIZED		ENERGIZED	ENERGIZED	ENERGIZED		
ENGINE START EXTERNAL POWER		ENERGIZED					
AC EXTERNAL POWER						ENERGIZED	ENERGIZED
BOTH DC GENERATORS OPERATING	AIR AND GROUND		AIR AND GROUND	AIR AND GROUND	AIR AND GROUND		
ONE DC GENERATOR OPERATING	AIR AND GROUND		AIR AND GROUND	AIR AND GROUND	AIR AND GROUND		
BATTERY POWER ONLY	AIR AND GROUND	AIR AND GROUND	ENERGIZED	AIR AND GROUND			
AC GENERATOR OPERATING						AIR AND GROUND	AIR AND GROUND
STANDBY INVERTER OPERATING							AIR AND GROUND

AIR AND GROUND — ENERGIZED — GROUND ONLY — DE-ENERGIZED

39B-1-54-9A

Figure 1-10

closed for generator operation and the two pump pressure switches, one for each hydraulic pump, must be closed to supply ac power to the R-14C and Doppler systems. (The pressure switches close when pressure is above about 2700 psi and open when pressure drops to about 1200 psi.

HYDRAULIC PRESSURE GAGES.

Two hydraulic pressure gages, on the center instrument panel, are powered by the No. 2 26-volt ac bus. One gage indicates normal hydraulic system pressure; the other gage indicates auxiliary system pressure.

HYDRAULIC SHUTOFF VALVE FAILURE CAUTION LIGHT.

The HYD SHUTOFF FAIL amber caution light (figure 1-12), on the caution-warning light panel, comes on if either the right or left hydraulic shutoff and bypass valve does not function properly.

HYDRAULIC PUMP FAILURE CAUTION LIGHTS.

The LH HYD PUMP FAIL and RH HYD PUMP FAIL amber caution lights, powered by the No. 2 dc secondary bus, are on the overhead hydraulic control panel. (See figure 1-12.) The left or right light will come on any time the pressure output of the respective pump is below 1200 psi.

FLIGHT CONTROL SYSTEM.

CONTROL WHEELS.

The pilot's and copilot's control wheels are the same except that the copilot's control wheel incorporates radar control switches. (See figure 4-5.)

NOSEWHEEL STEERING SYSTEM.

The nosewheel steering system is the same as in the T-39A Airplane.

NOSEWHEEL STEERING SYSTEM SELECTOR SWITCH.

The nosewheel steering system selector switch is on the overhead hydraulic control panel. (See figure 1-5.)

INSTRUMENTS.

MAGNETIC COMPASS.

An error of as much as 20 degrees to the magnetic compass indication may occur on the ground because of operation of the forward electronics compartment ground blower. This blower is deenergized when the airplane becomes airborne. A check of the magnetic compass may be made when airborne.

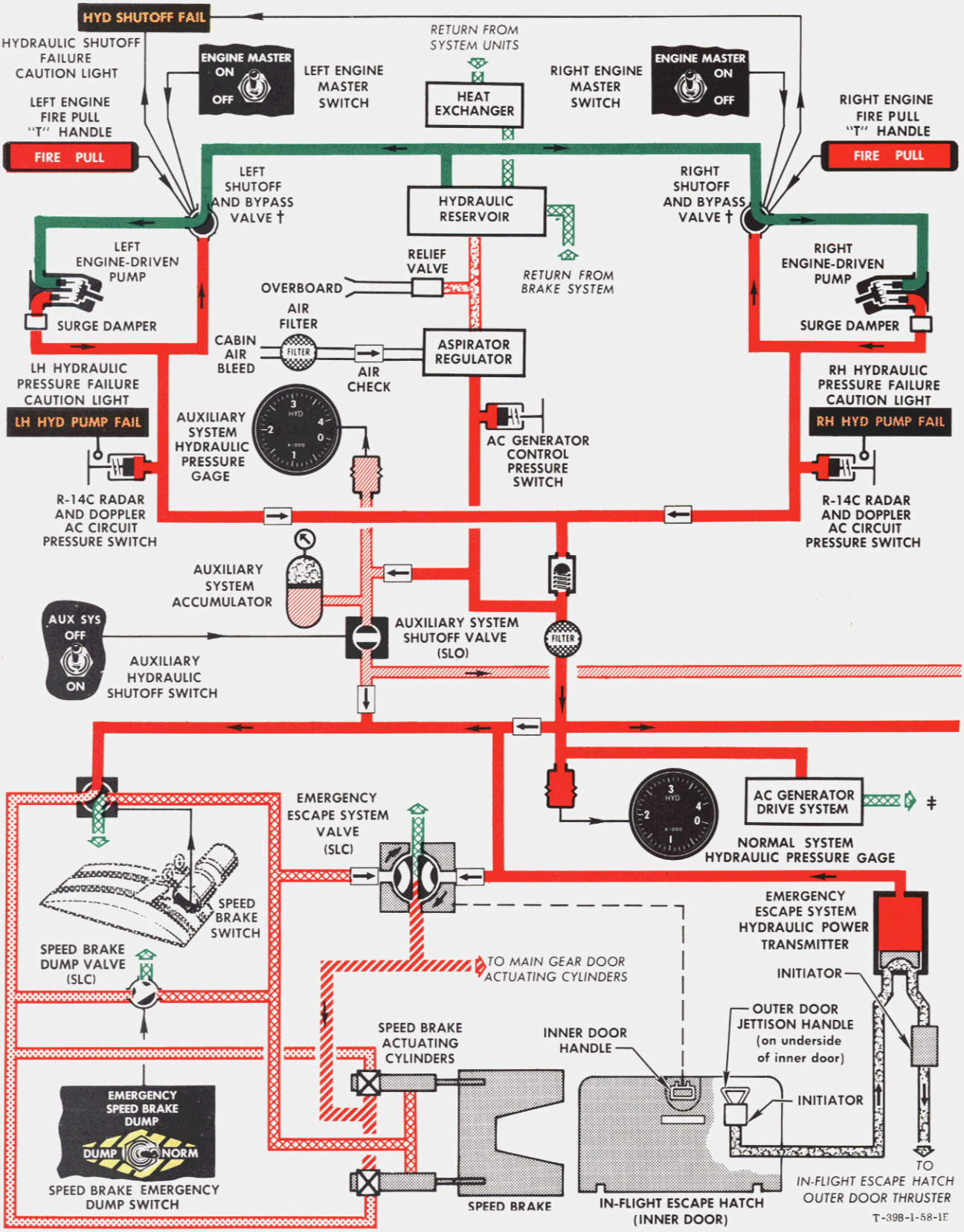

HYD SHUTOFF FAIL
HYDRAULIC SHUTOFF FAILURE CAUTION LIGHT
ENGINE MASTER ON OFF
LEFT ENGINE MASTER SWITCH
RETURN FROM SYSTEM UNITS
HEAT EXCHANGER
RIGHT ENGINE MASTER SWITCH
ENGINE MASTER ON OFF
LEFT ENGINE FIRE PULL "T" HANDLE
FIRE PULL
RIGHT ENGINE FIRE PULL "T" HANDLE
FIRE PULL
LEFT SHUTOFF AND BYPASS VALVE †
HYDRAULIC RESERVOIR
RIGHT SHUTOFF AND BYPASS VALVE †
LEFT ENGINE-DRIVEN PUMP
RELIEF VALVE
RETURN FROM BRAKE SYSTEM
RIGHT ENGINE-DRIVEN PUMP
OVERBOARD
AIR FILTER
SURGE DAMPER
SURGE DAMPER
CABIN AIR BLEED
FILTER
ASPIRATOR REGULATOR
AIR CHECK
LH HYDRAULIC PRESSURE FAILURE CAUTION LIGHT
RH HYDRAULIC PRESSURE FAILURE CAUTION LIGHT
LH HYD PUMP FAIL
RH HYD PUMP FAIL
AUXILIARY SYSTEM HYDRAULIC PRESSURE GAGE
AC GENERATOR CONTROL PRESSURE SWITCH
R-14C RADAR AND DOPPLER AC CIRCUIT PRESSURE SWITCH
R-14C RADAR AND DOPPLER AC CIRCUIT PRESSURE SWITCH
AUXILIARY SYSTEM ACCUMULATOR
AUX SYS OFF ON
AUXILIARY SYSTEM SHUTOFF VALVE (SLO)
FILTER
AUXILIARY HYDRAULIC SHUTOFF SWITCH
AC GENERATOR DRIVE SYSTEM
‡
NORMAL SYSTEM HYDRAULIC PRESSURE GAGE
EMERGENCY ESCAPE SYSTEM VALVE (SLC)
SPEED BRAKE SWITCH
EMERGENCY ESCAPE SYSTEM HYDRAULIC POWER TRANSMITTER
SPEED BRAKE DUMP VALVE (SLC)
TO MAIN GEAR DOOR ACTUATING CYLINDERS
INITIATOR
OUTER DOOR JETTISON HANDLE (on underside of inner door)
SPEED BRAKE ACTUATING CYLINDERS
INNER DOOR HANDLE
INITIATOR
EMERGENCY SPEED BRAKE DUMP
DUMP NORM
SPEED BRAKE EMERGENCY DUMP SWITCH
SPEED BRAKE
IN-FLIGHT ESCAPE HATCH (INNER DOOR)
TO IN-FLIGHT ESCAPE HATCH OUTER DOOR THRUSTER
T-39B-1-58-1E

Figure 1-11

HYDRAULIC SYSTEM

- NORMAL PRESSURE
- AUXILIARY PRESSURE
- SUPPLY
- RETURN
- DOWN OR RIGHT
- UP OR LEFT
- EMERGENCY PRESSURE
- ASPIRATED FLUID
- GAS LINE
- PRIORITY VALVE (Opens when pressure is about 900 psi.)
- CHECK VALVE
- ELECTRICAL CONNECTION
- MECHANICAL LINKAGE
- PRESSURE SWITCH (Opens when pressure is below about 1200 psi. Closes when pressure is above about 2700 psi.)
- SHUTTLE VALVE
- PRESSURE TRANSMITTER
- SLC SPRING-LOADED CLOSED
- SLO SPRING-LOADED OPEN

† Closed automatically during engine start and when pump pressure is below about 400 psi.
‡ Refer to "AC Electrical Power Distribution" in this section.

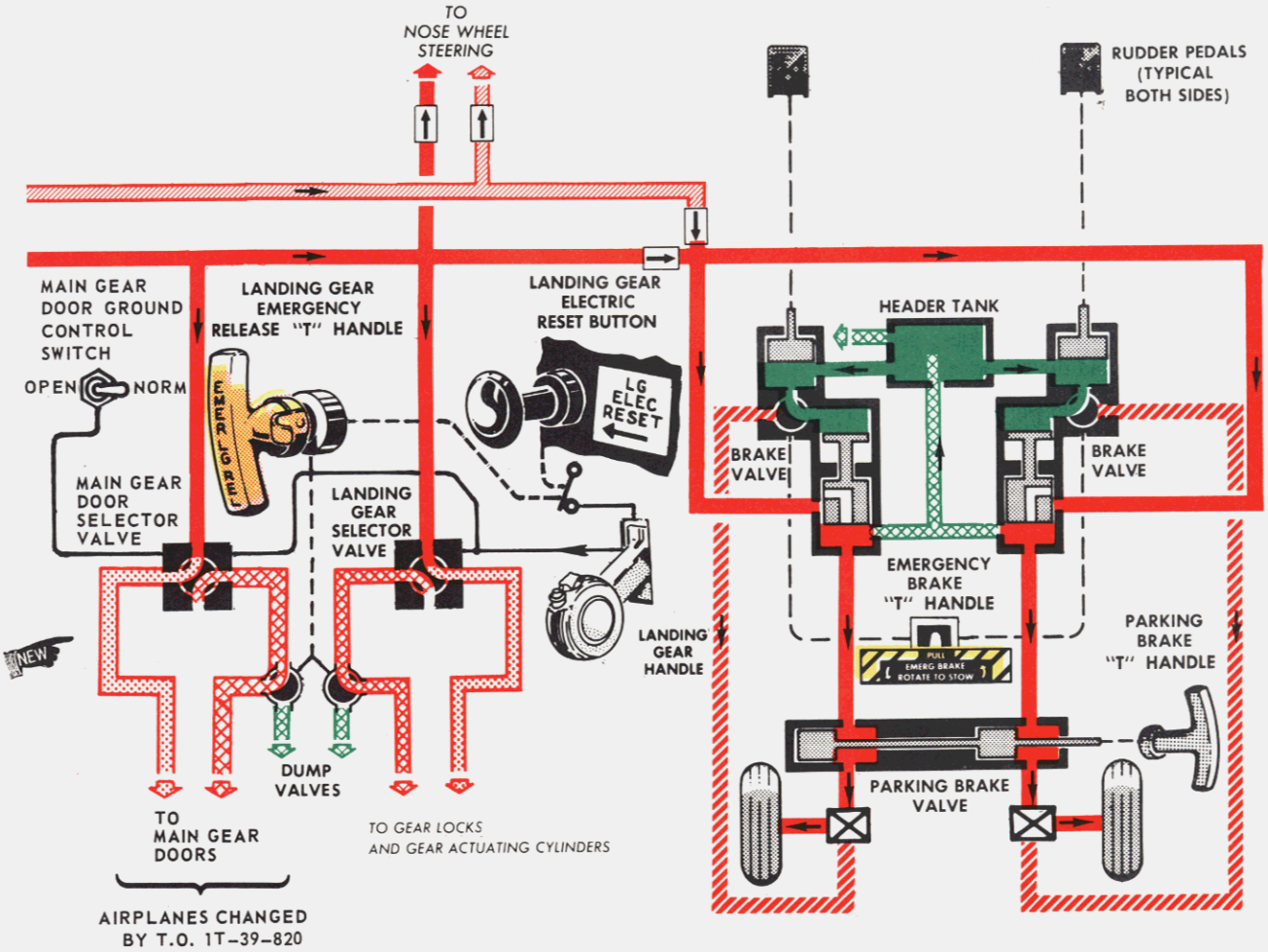


Figure 1-11

INDICATOR, CAUTION, AND WARNING LIGHT SYSTEM.

A caution-warning light panel, mounted on the copilot's inboard instrument panel, contains two banks of placard-type caution lights and one warning light. (See figure 1-12.) All of the placard-type lights on the caution-warning light panel are amber caution lights except one, the CABIN PRESS FAIL, which is a red warning light. Two amber master caution lights are installed in the cockpit, one in front of the pilot on the instrument panel shroud, and one in front of the copilot on the instrument panel shroud. Both master caution lights come on whenever any one of the placard-type caution lights or the warning light is initially illuminated. This alerts the pilot or copilot to check the placard-type lights on the instrument panel to determine which system is malfunctioning. The master caution lights may be extinguished by momentarily pressing either light. This leaves only the placard-type caution light on until the fault is cleared. There are five other amber caution lights which will cause the master caution lights to come on when illuminated. The MAIN STEER FAIL, AFT FUS OHEAT, and PRESS DUCT FAIL caution lights are on the pilot's outboard instrument panel. The LH HYD PUMP FAIL and RH HYD PUMP FAIL caution lights are on the overhead hydraulic control panel. There are other caution and warning lights in the cockpit that do not illuminate the master caution lights when they come on. They are the two red starter button ignition-on warning lights, the red landing gear unsafe warning light, the amber pilot's course select fail caution light, and the red warning lights in the engine fire pull T-handles. The indicator lights in the cockpit are the white, amber, and purple marker beacon lights; the three green landing gear position indicator lights: the green passenger oxygen flow indicator light; and the two green nosewheel steering on indicator lights.

CAUTION LIGHT TEST SWITCH.

A caution light test switch, on the overhead interior light and speaker control panel (3, figure 1-5), is powered by the dc essential bus. The switch has three positions—BRIGHT, DIM, and OFF (center)—and is spring-loaded to the OFF position. When the switch is actuated in either the BRIGHT or DIM position, the respective circuit of all placard-type caution lights, master caution lights, and indicator and warning lights (except the ignition-on-warning lights and the warning lights in the fire pull T-handles) comes on to indicate any defective lamps.

INDICATOR, CAUTION, AND WARNING. LIGHTS.

Caution and warning lights are provided to call attention to a condition or function that is not normal and may require action. All lights are powered by the dc essential bus except the hydraulic pump failure lights, which are powered by the No. 2 dc secondary bus. The pilot's flight instrument lights rheostat provides the dimming control for all indicator, caution, and warning lights except the ignition-on warning lights and the warning lights in the engine fire pull T-handles. For details concerning an individual light, refer to the paragraph covering it in the respective system description. All lights presented on illustrations in this manual are shown illuminated for information only.

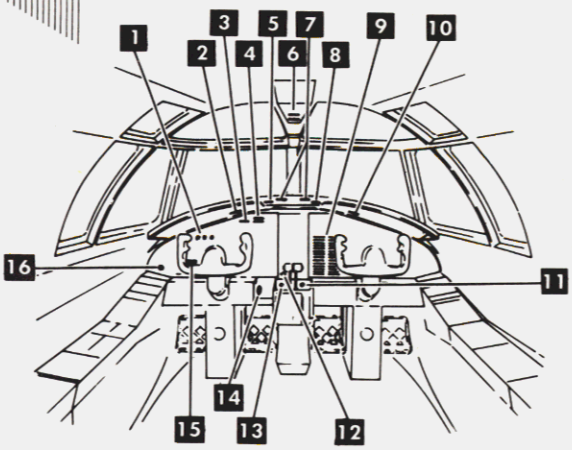
EMERGENCY EQUIPMENT.

ENGINE FIRE-EXTINGUISHING SYSTEM.

Engine Fire Pull T-Handles.

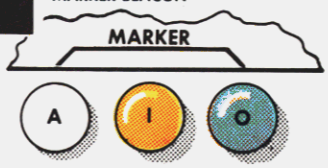
When either engine fire pull T-handle (labeled FIRE PULL) is pulled, the respective fuel shutoff valve is closed, the dc generator is taken off the line, the engine air-bleed valve is closed, the hydraulic shutoff and bypass valve is shut off, and the fire extinguisher selector switch is armed. Pulling the right engine fire pull T-handle positions the spring-loaded direction valve to direct the agent to the right engine pod. The left engine fire pull T-handle has no effect on the direction valve because the valve is normally open to the left engine pod.

INDICATOR, CAUTION, AND WARNING LIGHTS (TYPICAL)



	CABIN PRESS FAIL	CABIN AIR OHEAT
	DOOR OPEN	WINDSHIELD OHEAT
9		SPEED BRAKE OPEN
	LH ENG DE-ICE FAIL	RH ENG DE-ICE FAIL
	FUEL SHUTOFF FAIL	HYD SHUTOFF FAIL
	FUEL FILTER BLOCK	FUEL JETTISON OPEN
	LH FUEL HEAT ON	RH FUEL HEAT ON
	FUEL TANK X-FD FAIL	FUEL PUMP X-FD FAIL
	LH FUEL PRESS LOW	RH FUEL PRESS LOW
	LOW FUEL LEVEL	OIL PRESS LOW
	LH OIL OHEAT	RH OIL OHEAT
	AC GEN OHEAT	DC GEN OFF
	AC INST PWR OFF	AC GEN OFF

1 MARKER BEACON



2 NOSE STEER ON

10

3 MAIN STEER FAIL

4 AFT FUS OHEAT

PRESS DUCT FAIL

5 MASTER CAUTION

8

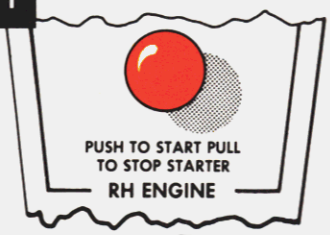
6 LH HYD PUMP FAIL

RH HYD PUMP FAIL

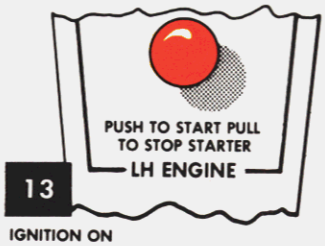
7

FIRE WARNING LIGHT

11 IGNITION ON WARNING LIGHT



12 LANDING GEAR POSITION INDICATOR LIGHTS



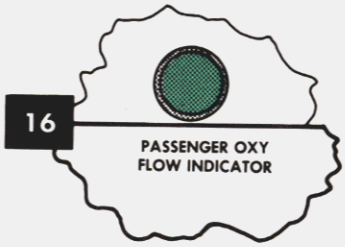
13 IGNITION ON WARNING LIGHT

14 LANDING GEAR WARNING LIGHT

15 COURSE SELECT FAILURE

PILOT C SEL FAIL

16



T39B-1-00-8D

Figure 1-12

NOTE

When using JP-5 or aviation gasoline, refer to "Alternate and Emergency Fuel Limitations" in Section V, "Operation on Alternate or Emergency Fuel" in Section VII, and "Fuel Specific Weight" in Part I of Appendix I.

- When emergency fuel is used, it is necessary to add 3 percent of Military Specification MIL-L-22851, Type II or Type III, Grade 1100, engine oil to the aviation gasoline for fuel pump lubrication. Aviation gasoline has poor lubricating properties, and the engine oil is necessary to prevent failure of the pump.
- When the NATO O-148 engine oil (Military Specification MIL-L-7808) is not available, NATO O-149 may be used or mixed with O-148 up to 50 percent. In such a case, when O-148 becomes available, the oil tank should be drained and filled with O-148.

SERVICING

NOTE

For detailed information on fuels, refer to T.O. 42 B1-1-14.

† Contains fuel icing inhibiter.

	TYPE FUEL	USAF–MILITARY SPECIFICATION		NATO SYMBOL	COMMERCIAL DESIGNATION
FUEL SPECIFIED	WIDE-CUT GASOLINE	JP-4†	MIL-T-5624	F-40 †	ASTM TYPE B (JET B)
ALTERNATE	KEROSENE	NONE	NONE	NONE	ASTM TYPE A (JET A)
		NONE	NONE	F-34 †	ASTM JET A-1
		NONE	NONE	F-42	NONE
		JP-5	MIL-T-5624	F-44	NONE
EMERGENCY	AVIATION GASOLINE	80/87	MIL-G-5572	F-12	AVGAS 80/87
		NONE	NONE	NONE	AVGAS 91/98
		100/130	MIL-G-5572	F-18	AVGAS 100/130
		NONE	NONE	NONE	AVGAS 108/135
		115/145	MIL-G-5572	F-22	AVGAS 115/145
ENGINE OIL			MIL-L-7808	O-148 O-149	
HYDRAULIC FLUID			MIL-H-5606	H-515	
OXYGEN			MIL-O-27210		
FIRE-EXTINGUISHING AGENT (ENGINE)			MIL-D-4540		

Figure 1-13 (Sheet 1 of 2)

SERVICING DIAGRAM

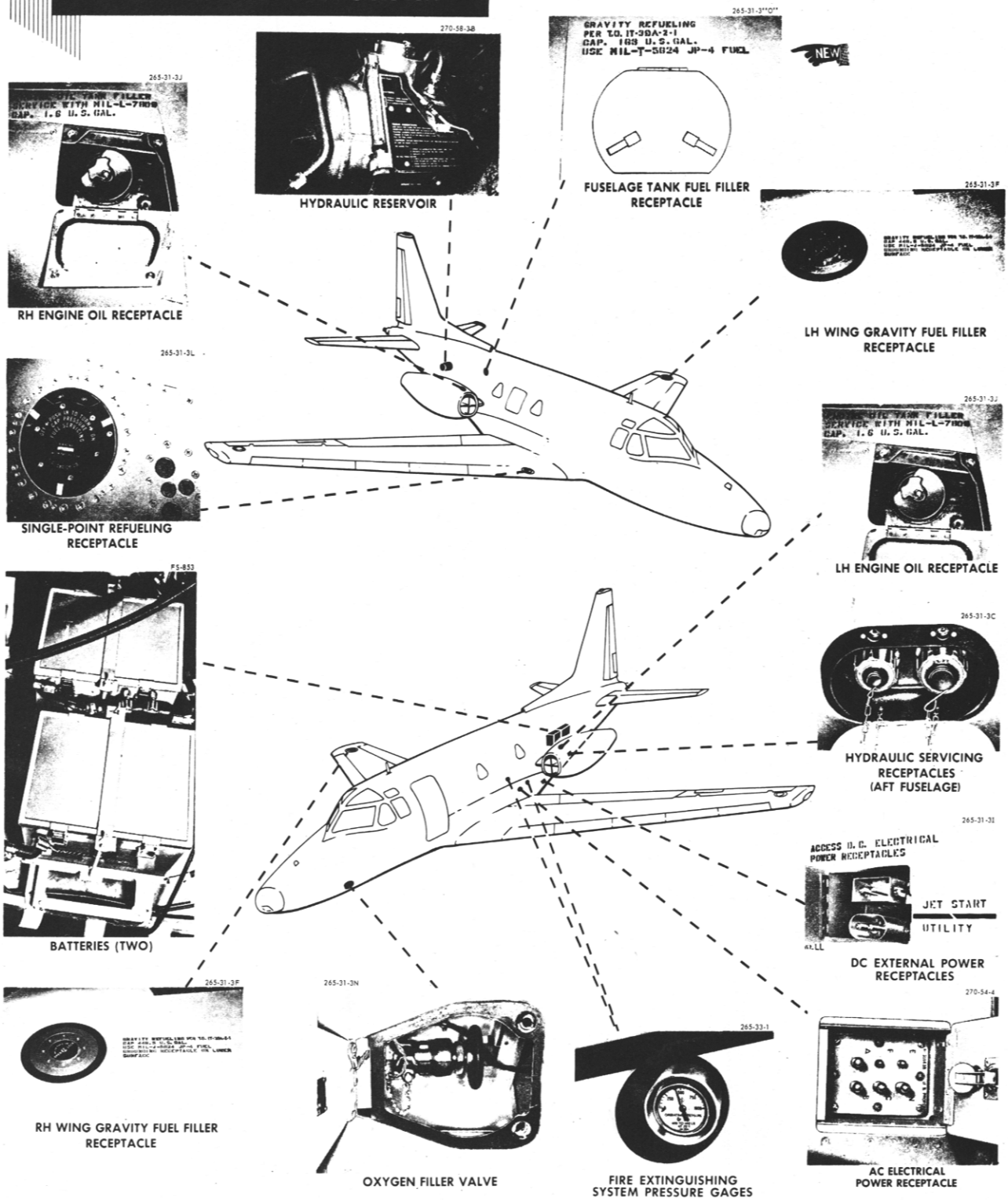


Figure 1-13 (Sheet 2 of 2)

NORMAL PROCEDURES

SECTION II

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PREPARATION FOR FLIGHT.

FLIGHT RESTRICTIONS.

Refer to section V for detailed airplane and engine limitations.

FLIGHT PLANNING.

Preflight planning data, such as takeoff performance, fuel quantity, cruise data, and other performance information to complete the proposed mission, is determined by using the performance data contained in appendix I of T-39A Flight Manual, T.O. 1T-39A-1. Communication requirements are determined from appropriate flight planning and flight information publications.

TAKE-OFF AND LANDING DATA CARD.

Refer to parts 2 and 6 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1, for the information necessary to fill out the Takeoff and Landing Data Card contained in T.O. 1T-39B-1CL-1, before each flight.

WEIGHT AND BALANCE.

Refer to section V for weight and balance limitations. For loading information, refer to Weight and Balance Technical Manual, T.O. 1-1B-40. Before each flight, check takeoff and anticipated landing gross weight and balance. Ensure that a Form 365F has been completed for weight and balance clearance.

CHECKLIST.

The pilot is responsible for accomplishment of all checklists in the same sequence they are presented in this section.

When the aircraft is operated by two qualified pilots, the checklists will be accomplished on a "Challenge and Response" basis. Accomplishment of each item will be indicated by the proper response. If no response is given for a particular item, stop and demand a response before continuing. "Capital letters indicate the crew member making the response. The symbols (P-CP) and (CP) used hereafter will refer to pilot and copilot, and copilot only. If no symbol is shown, the pilot will accomplish the checklist item. The copilot will normally read the checklist and perform such duties as indicated, as well as those directed by the pilot. Certain portions of the checklist normally will be accomplished silently and are indicated by shaded areas in the margin. Upon completion of each checklist, the copilot will advise the pilot that the checklist called for has been completed.

THRU-FLIGHT INSPECTION.

The thru-flight checklist may be accomplished when the airplane is assigned missions which require intermediate stops by the same flight crew and no maintenance is per-

formed during these stops.(aircraft servicing is not considered maintenance). Thru-flight checklist items are indicated by an asterisk(*). These items must be accomplished in thru-flight operations and are designed to minimize pilot workload. The remaining items may be accomplished at the discretion of the pilot. All items under BEFORE TAKEOFF and subsequent checks through JUST BEFORE PARKING must be accomplished for all flights. If normal Engine Shutdown procedures are used, rather than asterisk items only, then the complete checklist must be followed.

PREFLIGHT CHECK.

It shall be the responsibility of the pilot to ensure that an exterior and interior inspection, as outlined, and a preflight inspection have been performed. It shall also be the responsibility of the pilot to ensure that each crew member has accomplished his individual inspection requirement as outlined in this Section and in Section VIII.

BEFORE EXTERIOR INSPECTION.

*1. Form 781 - Checked and Stowed.

Check Form 781 for engineering status, and make sure the airplane has been serviced with the required amounts of fuel, oil, oxygen, and miscellaneous equipment for the intended mission.

2. Check flight information publications - As required.

* EXTERIOR INSPECTION.

The flight crew exterior inspection procedures are predicated on the fact that maintenance personnel have completed all postflight and preflight requirements outlined in sections I and II of the Preflight – Basic Postflight Inspection Work Cards, T.O. 1T-39A-6WC-1PRPO. Duplicate inspections by the flight crew have been eliminated, except for certain items required in the interest of safety. The flight crew inspection is to check the airplane general condition and should follow the path as shown in figure 2-1. If the airplane preflight is accomplished at a strange field, refer to the detail preflight inspection in section I of the Preflight – Basic Postflight Inspection Work Cards, T.O. 1T-39A-6WC-1PRPO.

INTERIOR CHECK.

The following checks are to be performed upon entering the airplane.

Cabin.

*1. Interior - Check loose articles stowed.

When cargo is carried, check that it is properly loaded and secured.

2. Survival equipment (Overland/Overwater) - Check as required.

Insure that the proper survival equipment is carried onboard the aircraft for the mission to be flown.

3. Cabin speaker switch - As required.

4. Cabin emergency escape hatches - Check.

Check that both the ground and inflight escape hatches are properly latched, secured, and unobstructed, remove ground safety pin if parachutes are carried.

*5. Coat compartment - Check.

Check that loose articles are properly secured, and that the first aid kit, oxygen walk-around bottle, and emergency ax are installed and secured.

*6. Main entrance door - As required.

7. Hand fire extinguisher - Check.

Check the fire extinguisher at the back of the pilot's seat for condition and pressure (safetied and inspected).

*8. Crew/passenger briefing - Completed.

a. Mission

(1) Estimated time enroute

(2) Destination

(3) Weather

(4) Altitude and airspeed

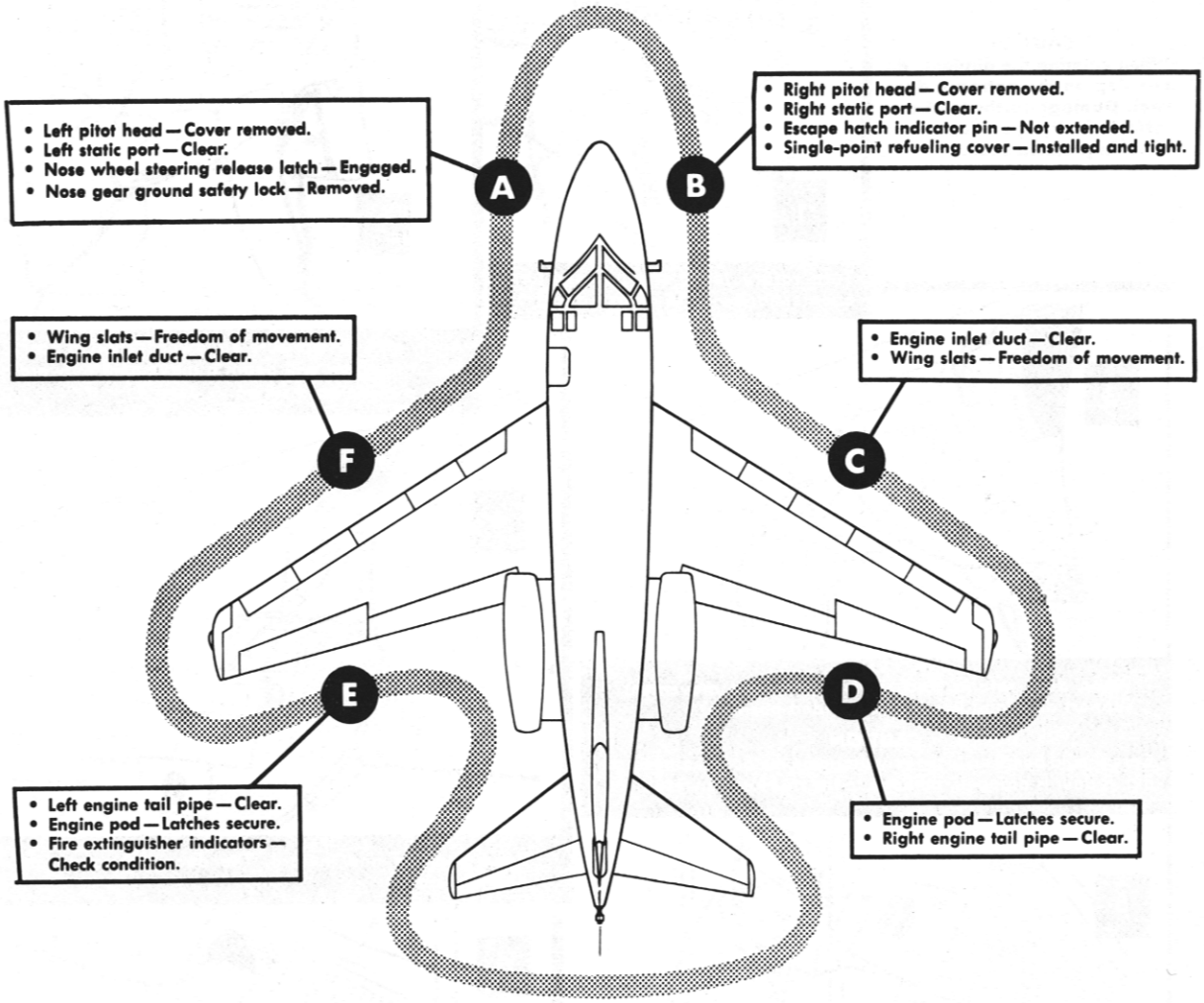
b. Survival equipment (location, fitting, and use)

c. Oxygen

(1) Oxygen demonstration

(2) Warning horn

EXTERIOR INSPECTION



NOTE

While making the exterior inspection, check all surfaces for general condition; check for fuel, oil, and hydraulic leaks; all covers and ground maintenance locks removed; struts for proper extension and airplane properly chocked.

NOTE

The inspections required by the flight crew are the minimum requirements for a safe flight; however, additional checks may be made at the discretion of the flight crew.

Figure 2-1

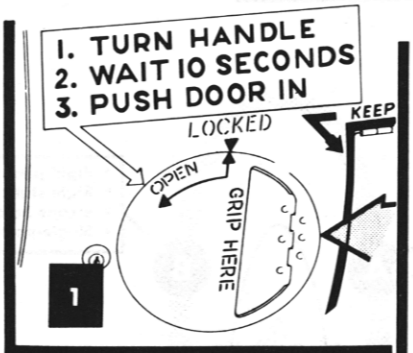
ENTRANCE DOOR OPERATION

NOTE

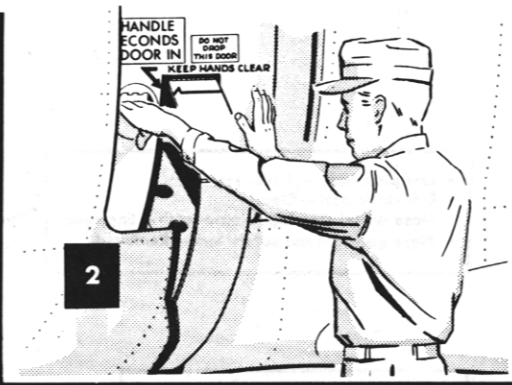
For opening the door from the inside and closing from the outside, use reverse sequence.

CAUTION

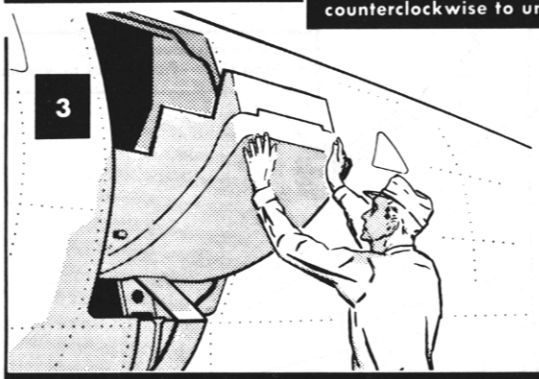
When entering the airplane, do not step on the entrance door seal. Damage to the seal can result in faulty operation or loss of cabin pressurization.



Turn rotary latch one-quarter turn counterclockwise to unlock door.



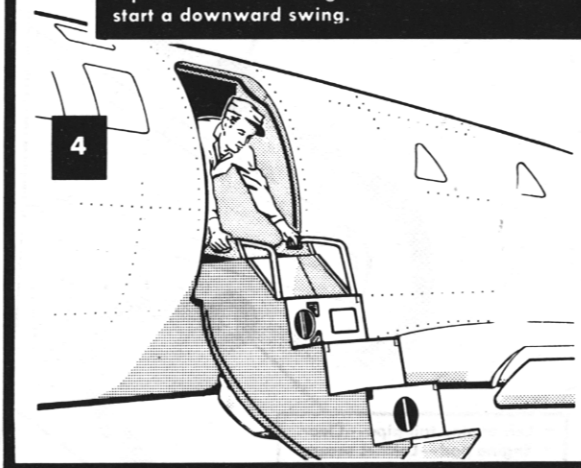
Apply an even pressure on lower section of door. The top of the door will begin a movement outward and start a downward swing.



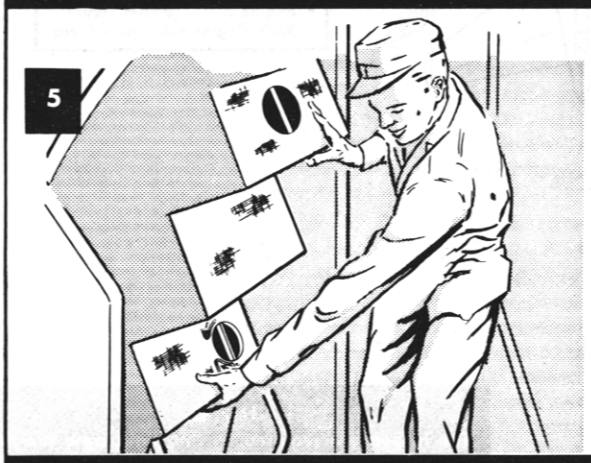
When door rotates and starts downward movement, support door and lower to extended position.

CAUTION

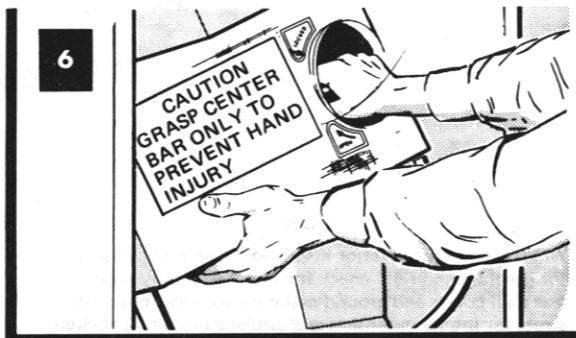
Care should be taken to prevent dropping the door during opening. If door is dropped, damage to the structure can result.



Raise door up and inward. The door will rotate and float inward.



Push door outward, using an even pressure on upper and lower sections of door.



When door is in place, turn rotary locking handle one-quarter turn counterclockwise to lock door.

T-39-1-00-3

Figure 2-2

d. Crash landing, and ditching

e. Escape hatches

f. Seat belt and no smoking signs

g. Interphone

h. Environmental

(1) Speed brake noise

(2) Emergency pressurization

(3) Cabin lights

(4) Air outlets (eyeball)

i. Relief containers

j. Prohibited items

BEFORE STARTING ENGINES.

NOTE

When using alternate or emergency fuels, refer to Alternate and Emergency Fuel Limitations in section V.

Starting with the overhead panel, make a check of the cockpit. Items that are duplicated on the panel or consoles are called out only once.

*1. Nosegear pin - REMOVED and STOWED.

*2. Seat and rudder pedals - ADJUSTED. (P-CP)

*3. Circuit breakers - IN. (P-CP)

4. Windshield wiper switch - OFF.

*5. Gear handle - DOWN.

Visually check gear handle down.

*6. Speed brake switch - OUT.

If speed brake is up, move switch to IN.

7. Landing-taxi light switches - RETRACT/OFF.

8. Footwarmer switches - As required (P-CP)

*9. APU– CONNECTED and ON.

If a battery start is to be made, refer to "BATTERY START checklist."

10. Battery switch - ON. (CP)

NOTE

With utility external dc power applied to the airplane, monitor the dc voltmeter. If the voltage exceeds 29.5 volts, leave the battery switch at OFF until external power is disconnected.

11. DC generators - ON. (CP)

12. AC generator -OFF. (CP)

13. Inverter - AUTO. (CP)

14. Command radios - ON. (P-CP)

*15. Electrical master - ON.

16. Radio and instrument master - ON.

17. Caution light test - TEST.

Check illumination of caution, warning, and indicator lights.

18. Seat belt and no smoking signs - As required.

19. Cockpit speaker - As required.

*20. Emergency light - TEST and ARM.

21. Interior lights - As required. (P-CP)

Check operation of the following before a flight that will begin or terminate during darkness.

a. Thunderstorm lights

b. Cockpit dome light

c. Cabin lights

d. Console lights

e. Flight instrument light

f. Radio and engine instrument lights

g. Pedestal and overhead panel lights

22. Anti-icing switches - OFF.

a. Engine inlet

b. Side windshield

c. Windshield anti-ice switch

d. Fuel heater

e. Ram-air inlet

23. Pitot heat - CHECKED and OFF.

24. Fuel jettison - OFF.

25. Auxiliary hydraulic power - OFF.

26. Nosewheel steering - MAIN.

27. Flaps - UP. (P-CP)

Check handle up; visually check indicator and flaps.

28. Interphone - SET. (P-CP)

29. Oxygen system - CHECKED. (P-CP)

a. Regulator supply levers - On.

Check that regulator supply levers are safetied at ON.

b. Regulator pressure gage - Check.

Check regulator pressure gage indicator at 350 (±50) psi.

c. Regulator diluter levers - 100%.

d. Mask - On and connected.

e. Emergency lever - Hold in TEST MASK position.

Check for no flow around mask while holding breath. This indicated proper mask fit and serviceable hose and connectors. Release emergency lever.

f. Emergency Lever - Emergency.

Breathe normally for a minimum of 3 cycles. The blinker should show alternately black and white. Hold breath, a white blinker indicates a leak.

g. Regulator diluter lever - Normal.

Hold breath, blinker should remain black. A white blinker indicates a leak. Breathe normally for a minimum of 3 cycles. The blinker should show alternately black and white.

CAUTION

If any leaks are detected, corrective action must be taken prior to flight.

NOTE

It is possible for the white of the blinker to show by movement of the regulator. Therefore, leaks should be detected by movement of the blinker in relation to its "AT-REST" position.

h. Emergency lever - Normal.

i. Regulator diluter lever - 100%.

j. Automatic manual override lever - Closed.

k. Passengers' toggle valve - On.

*30. Oxygen system quantity - CHECK.

Check oxygen system pressure to determine if the oxygen system has been serviced for the intended mission. (Fully charged condition is about 1800 psi at 70°F.)

31. Mach-airspeed warning - TESTED.

*32. Gyrocompass mode - AUTO.

It may be necessary to place the switch at D/G and back to AUTO to obtain initial fast slaving.

*33. Flight director mode - NAV.

34. Heading mode - As required.

35. Gear emergency T-handle - IN.

36. Gear electric reset button - DEPRESSED.

37. Static pressure - STATIC. (P-CP)

*38. Gust lock - IN.

WARNING

Ensure that aileron area is clear before gust lock is disengaged.

NOTE

In high or gusty winds, it may be desirable to leave the gust lock engaged during engine start. Full throttle cannot be obtained and nosewheel steering is not available, unless the gust lock is disengaged.

39. Flight controls - CHECKED.

    Check for proper direction of travel.

40. Trim system - CHECKED AND SET. (P-CP)

    a. Trim selector - Normal.

    b. Emergency trim disconnect button - Test.

       Momentarily activate the horizontal stabilizer trim and observe that the trim movement stops when the disconnect button is depressed.

    c. Takeoff trim - Set.

       (1) Aileron - Set to 0.

       (2) Rudder - Set to 0.

       (3) Horizontal stabilizer - Set 2 to 5 degrees.

WARNING

Takeoff should not be attempted unless the trim system operates properly.

41. Position lights - ON.

*42. Gear position lights - CHECKED.

*43. Fuel quantity and gages - CHECKED.

    Check movement of quantity pointers.

NOTE

If fuel unbalance exceeds 200 pounds, this condition should be corrected before takeoff.

44. UHF antenna - AUTO.

45. Navigation equipment - OFF.(CP)

*46. Fire pull T-handles - IN.

*47. Fire detector system - TESTED.

48. Air start - OFF.

*49. Throttles - OFF.

*50. Fuel crossfeed and tank selector switch - NORMAL.

51. Cabin temperature - AUTO.

52. Cabin air - OFF.

53. Emergency brake T-handle - IN.

54. IFF - OFF.

STARTING ENGINES.

Whenever practical, engine start should be accomplished on paved surface to minimize the possibility of dirt and foreign object damage. If practical, the airplane should be headed into, or at right angles to, the wind. (See figure 2-6 for danger areas.)

Engine starts can be made with external or airplane battery power. If external power is used, the power unit must provide a minimum of 24 volts dc and 800 amperes. Start either engine, using the following procedure:

*1. Engine masters - ON.

*2. Danger areas - CLEAR. (P-CP)

*3. Start first engine - STARTED.

    a. Starter button - Depress.

       If the starter button pops up, hold it depressed until engine rpm reaches approximately 30 percent.

CAUTION

If 8-percent rpm is not attained in 15 seconds, or there is no indication of oil pressure within 20 seconds, the starter button should be pulled out to stop the starting cycle.

- The starter is limited to 2 minutes of operation in any 20-minute period to prevent damage to the starter.

b. Throttle - IDLE at 8 to 10 percent rpm.

c. **Engine instruments - Checked.**

(1) Fuel flow gage - Monitor.

Fuel flow should not exceed 600 pounds per hour, to prevent engine overtemperature.

(2) Exhaust gas temperature gage - Check.

A rise of exhaust gas temperature should occur within 20 seconds after the throttle is advanced to IDLE.

If an exhaust gas temperature rise does not occur within this 20 seconds, or the maximum allowable starting exhaust gas temperature of 525°C is exceeded, return the throttle to OFF and clear the engine.

CAUTION

If a rapid rise in exhaust gas temperature occurs, the throttle should be returned to OFF at 475°C to preclude exceeding the maximum allowable starting exhaust gas temperature.

- If the maximum allowable exhaust gas temperature limits are exceeded, do not attempt another start until engine inspection by maintenance personnel is completed.

(3) Engine tachometer - Check.

Engine rpm should increase steadily, with the throttle at IDLE, to 41-44 percent.

If the engine fails to accelerate to IDLE rpm within one minute after an initial indication of exhaust gas temperature, the throttle should be returned to OFF.

If the ignition-on light fails to go out after IDLE rpm is obtained, pull the starter button up to de-energize the starter and ignition.

*4. Parking brake - SET.

CAUTION

When setting the parking brake, if the parking brake T-handle does not remain extended, repeat the brake setting procedure, applying more pressure on the brake pedals. Do not try to set the parking brake by pulling harder on the T-handle, as damage to the linkage may occur.

*5. Start second engine - (Repeat steps 3.a through 3.c)

*6. Hydraulic pump fail caution lights - CHECKED.

If either light is illuminated, advance the respective throttle momentarily.

*7. APU - Disconnected.

*8. Battery switch - ON. (CP)

CLEARING ENGINE.

When it is necessary to clear an engine of trapped fuel or vapor during ground operation, check that the electrical master, battery, and engine master switches are ON and that the throttles are OFF. Depress the engine starter button and motor the engine for 30 seconds. Then pull the engine starter button and allow the engine to stop rotating before attempting another start.

CAUTION

If it is not desired to motor the engine, allow 2 minutes for fuel to drain before attempting another start. This will prevent possible damage to the engine.

GROUND OPERATION.

WARNING

If a Military Thrust engine run-up is made during ground operation, be sure the main wheels are chocked, and hold the wheel brakes on, because at light gross weights the airplane wheels may slide.

No engine warmup is necessary. During cold weather starting, the oil pressure may be as high as 60 psi, but will return to normal after approximately 5 minutes. As soon as the engine stabilizes at idle rpm with normal gage reading, the throttle may be advanced to Military Thrust.

WARNING

If a throttle is inadvertently retarded from IDLE to CLOSE, a flameout of that engine occurs immediately. The throttle must not be readvanced without a complete starting procedure. Otherwise, the resulting flow of unburned fuel into the engine can create a fire hazard.

BEFORE TAXIING.

*1. Safety belt and shoulder harness - SECURED AND ADJUSTED. (P-CP)

*2. Speed brake - IN.

*3. Throttles - 60 percent rpm.

*4. AC generator - ON. (CP)

Check ac loadmeter returns to normal (0.7 and 0.8).

*5. Doppler power - MAG. (CP)

Check ac loadmeter returns to normal.

*6. Throttles - IDLE.

*7. Electrical systems - CHECKED. (CP)

a. DC loadmeters - Checked.

b. DC generator switches - RESET; then ON, if necessary.

After the dc generators have been brought on the line, recheck the dc loadmeter readings. Normal dc loadmeter reading is 0.3 and 0.7. The loadmeter readings should be within two scale marks of each other.

c. AC and dc voltmeters - Check.

Check the voltmeters for proper generator output readings. Normally the dc voltmeter will read approximately 28 volts and the ac voltmeter will read approximately 115 volts.

*8. Windshield heat - ON.

If windshield overheat caution light is on, leave windshield heat off.

a. Windshield anti-ice - AUTOMATIC.

b. Side windshield anti-ice - ON.

*9. Navigational equipment - ON.

*10. Cabin air selector - BOTH.

*11. IFF - STANDBY.

*12. Caution and warning lights - CHECKED.

All applicable lights out.

*13. Steering - ENGAGED.

14. Anti-collision light - ON.

*15. Hydraulic pressure - CHECKED.

*16. Chocks - REMOVED.

*17. Taxi light - As required.

CAUTION

To prevent damage to plastic light cover, do not leave the light on longer than 2 minutes during static ground testing. During taxi, use LEFTHAND ONLY position.

TAXIING.

CAUTION

Avoid taxiing over arresting gear at high speed. The recommended speed brake position when crossing arresting gear cables is IN if the main gear doors are closed, OUT if the main gear doors are open.

NOTE

Painted areas on ramps, taxiways and runways are significantly more slippery than non-painted areas. Painted areas sometimes serve as condensation surfaces, and it is possible to have wet, frosty or even icy conditions on these areas when the overall weather condition is dry. Therefore, use caution when taxiing over these painted surfaces and when lining up for takeoff, because of the possibility of skids and loss of control occurring.

- During all taxi operations, copilot should monitor hydraulic pressure.

*1. Normal brakes - CHECKED.

2. Emergency brake - CHECKED.

3. Normal brakes - RECHECKED.

4. Standby steering - CHECKED.

   a. Steering - Standby.

   b. Standby steering - Check.

   c. Steering - Main.

5. Steering - ENGAGED.

WARNING

If either main or standby steering is inoperative, the mission should be aborted.

*6. Flight instruments and navigational equipment - CHECKED. (P-CP)

BEFORE TAKEOFF.

1. Speed brake - IN.

2. Flaps - UP.

3. Trim - SET.

4. Fuel differential - CHECKED.

NOTE

Fuel unbalance between wing tanks should not exceed 200 pounds, If this condition exists, the nose of the airplane will have a tendency to swing toward the heavy wing during takeoff.

5. Flight controls - CHECKED.

   Check for freedom of movement.

6. Cabin air selector - BOTH.

7. Fuel heater - OFF.

CAUTION

If fuel heater use is necessary before takeoff, its operation must be completed before takeoff.

8. Crew briefing - COMPLETED. (P-CP)

   a. Departure procedures.

   b. Emergency recovery.

   c. Takeoff data.

9. Sliding window - LOCKED.

LINEUP.

1. IFF/SIF - SET. (CP)

TAKE-OFF AND INITIAL CLIMB

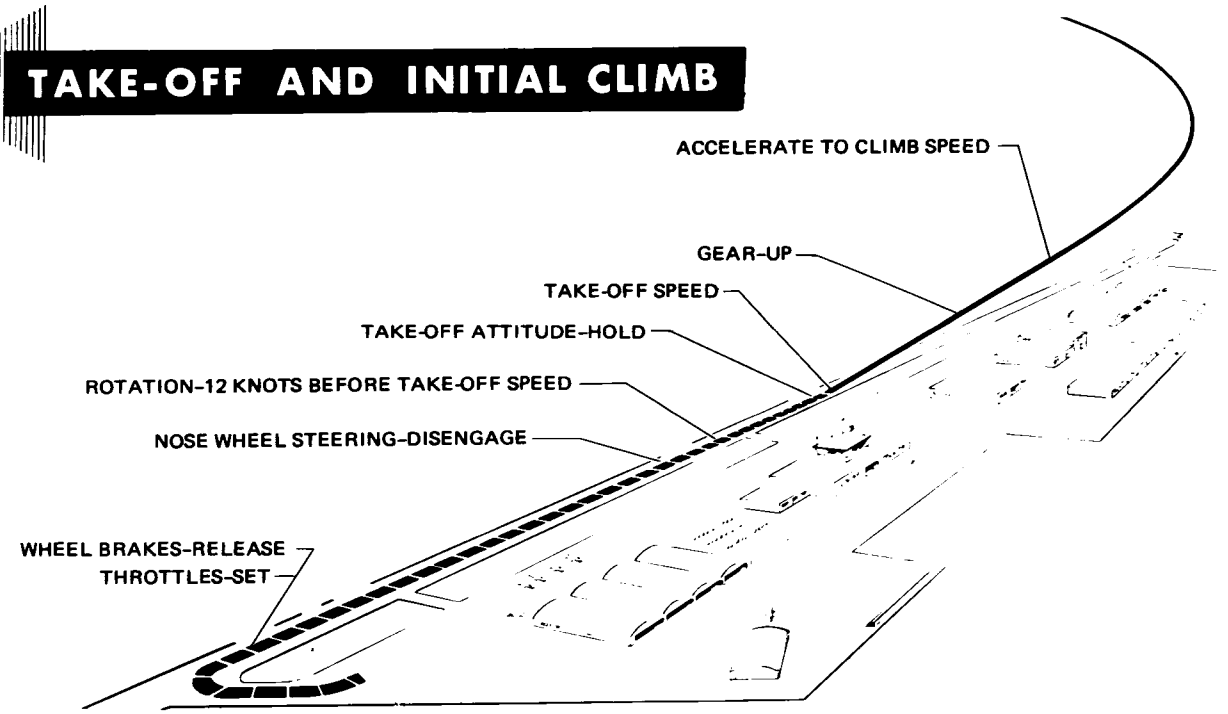


Figure 2-3

2. Heading indicators - CHECKED. (P-CP)

3. Pitot heat - ON.

4. Ram-air inlet anti-ice - As required.

   Use before takeoff and/or in flight, before entering known icing conditions (visible moisture), only when the indicated outside air temperature (IOAT) is between +5°C and -5°C.

5. Engine inlet anti-ice - As required.

   Use before takeoff and/or in flight if the indicated outside air temperature (IOAT) is between +5°C and and -20°C with visible moisture present. It should also be turned on if any accumulation of ice is noted on the airplane.

6. Throttles - SET.

   When using engine anti-ice, reduce computed Military Thrust P_t5 by 5 percent.

7. Engine instruments - CHECKED.

TAKEOFF.

See figure 2-3 for takeoff and initial climb.

WARNING

Premature rotation or allowing airspeed to build up above recommended rotation speed increases ground run considerably.

NORMAL TAKEOFF.

NOTE

The procedures set forth will produce results given in part 2 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1. Refer to the appropriate charts for takeoff distance and speed.

- Nosewheel steering should be disengaged when the rudder becomes effective at approximately 60 knots IAS.
- Ailerons may be used to effectively aid in directional control on the ground during takeoff.
- Do not use brakes for directional control, as takeoff distances will be increased.

During the takeoff run, engine instruments should be monitored. An increase in exhaust total pressure due to ram effect as airspeed increases is normal. Once the proper exhaust total pressure has been set, no further adjustments are necessary during the takeoff run unless engine limits are being exceeded. Maintain directional control with the nosewheel steering, rudder, and ailerons. At 12 knots below the recommended takeoff speed for gross weight and altitude, rotate the airplane (approximately 10 degrees) at such a rate that the airplane will assume the takeoff attitude at the recommended takeoff speed. This rotation should be smooth, and overrotation must be avoided. Hold takeoff attitude and allow the airplane to fly off the runway. Maintain takeoff attitude until climb schedule is reached.

CROSSWIND TAKEOFF.

In addition to the procedures used for a normal takeoff, it will be necessary during a crosswind takeoff to keep the airplane in a three-point attitude longer than normal. Refer to crosswind chart in part 2 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1, to determine the minimum rotation speed to be obtained before aerodynamic steering (rudder control) will be sufficient to maintain directional control. When takeoff is started, directional control is maintained with nosewheel steering, rudder, and ailerons. Also be prepared to counteract drift after breaking ground.

AFTER TAKEOFF.

When the airplane is definitely airborne, and there is no possibility of settling back onto the runway:

1. Gear - UP.

CAUTION

The landing gear and doors should be completely up and locked before 180 KIAS. Check that steady light in landing gear handle is out.

2. Landing-taxi light switches - RETRACT and OFF.

   When landing-taxi lights are used for takeoff, they must be retracted before limit airspeed is reached, to prevent damage by air loads to the operating mechanism.

3. Throttles - Adjusted.

   If necessary, adjust throttles to prevent overboost and to prevent exceeding engine limits.

CLIMB.

Climbs can be made using either Military or Normal Rated Thrust; however, Normal Rated Thrust climbs are recommended for extending engine life. When climbing at Normal Rated Thrust, maintain 240 knots IAS until 0.64 mach is intercepted; for Military Thrust climb, maintain 270 knots IAS until 0.68 mach is intercepted. Refer to engine limitations in Section V.

CAUTION

Because of changing conditions during a climb, it is necessary to recompute and reset thrust settings periodically. As the climb progresses to higher altitudes, the possibility of overboosting the engines increases. Above 15,000 feet, the thrust setting should be checked at each 5,000 foot interval using the tabular charts or the J201 computer.

1. Seat belt and no smoking signs - As required. (CP)

   The FASTEN SEAT BELTS and NO SMOKING signs should be used any time unusual flight conditions are expected or encountered (such as turbulence, smoke or fumes in the airplane, etc.)

2. Pressurization system - Checked. (CP)

   During the climb (above 8,000 feet), check that cabin altitude and pressure differential are following schedule.

3. Altimeter - SET. (P-CP)

4. Oxygen - As required. (P-CP)

CRUISE.

After Level off make following checks:

1. Compute P_t5 - Computed. (P-CP)

   The maximum P_t5 for any cruise condition will be the computed Normal Rated Thrust for that Mach, altitude, and temperature. This maximum value will vary with Mach, altitude, and temperature, and should be rechecked periodically during cruise. During level acceleration, P_t5 may be in creased to correspond with the increasing Mach.

2. Battery - As required.

   After level off and any time the dc loadmeters are higher than normal, place the battery switch at OFF and note the change in loadmeter readings. If this change exceeds one half scale marking on either loadmeter, leave the battery switch at OFF for the remainder of the flight. If this check is completed before 30 minutes of flight has elapsed and

results in more than one half scale deflection, continue normal operation and accomplish check again after 30 minutes of flight has elapsed. High dc loadmeter readings during the first 30 minutes of flight are not conclusive as low charged batteries will cause higher than normal readings until charged. In cases where the battery switch is left off, make an entry in the AFTO form 781 for a maintenance check of the batteries.

3. Fuel heater - Check.

   Refer to Section IV of T-39A Flight Manual, T.O. 1T-39A-1, for fuel heater operation.

CAUTION

To reduce the possibility of flameout during flight above 35,000 feet, maintain at least 180 knots IAS and adjust throttles one at a time, avoiding rapid movements.

- During low level training missions, the TACAN and VOR should be turned off to prolong their service life.

FLIGHT CHARACTERISTICS.

Refer to Section VI of T-39A Flight Manual, T.O. 1T-39A-1, for information regarding flight characteristics.

DESCENT.

1. Crew briefing - COMPLETED.

   a. Weather.

   b. Field facilities.

   c. Approach procedures.

   d. Alert passengers.

2. Altimeter - SET. (P-CP)

3. Anti-icing - As required.

NOTE

A minimum of 75 percent power must be maintained to provide adequate bleed air for anti-icing.

BEFORE LANDING.

During the final phase of the descent and approach to the field, make the following checks:

1. Seat belt and no smoking signs - As required. (CP)

2. Fuel quantity - Check. (CP)

   If the low fuel level caution light is on, move fuel crossfeed and tank selector switch to X-FEED for landing. Wing fuel differential should not exceed 200 pounds.

3. Fuel heater - As required. (CP)

4. Landing data - CHECKED. (P-CP)

5. Gear - DOWN.

CAUTION

Before moving the gear handle, press and hold the release safety button. Hold button depressed until the handle is full down.

Check for gear-down-and-locked indication.

NOTE

If after a normal waiting period, a safe gear-down indication is not observed, press the landing gear downlock electric reset button to relieve the hydraulic pressure on the spring-loaded downlock pins. On airplanes not equipped with the downlock electric reset, the same function may be accomplished by pulling the landing gear emergency release T-handle (approximately 2 inches). The landing gear electric reset button should be pressed after the T-handle is returned to the stowed position. If a safe gear-down indication does not occur immediately, refer to landing gear emergency lowering procedure in Section III.

- The pilots Flight Instrument Indirect Light Rheostat knob dims the gear position indicator lights.

6. Flaps - As required.

7. Hydraulic pressure - CHECKED. (CP)

   During landing phase, the copilot will monitor hydraulic pressure.

8. Landing light - As required.

LANDING.

NORMAL LANDING TECHNIQUE.

See figure 1-4 for normal traffic entry and pattern procedures.

NOTE

The use of the speed brake and the amount of flaps that can be used are optional; however, it is recommended that full flaps be used to decrease the landing speed. Refer to part 6 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1, for final approach airspeeds and landing distances.

Fly a smooth, power-on final approach, maintaining a rate of descent between 500 and 1000 fpm. Use smooth control pressures during the flare, touching down on the main wheels first.

CAUTION

Every attempt should be made to have the arresting system cables that conflict with the landing roll removed from the runway or else the rubber grommets spaced 50 feet on either side of centerline. When the nosewheel rolls over arresting system cables at high speed, the cable bounce may cause speed brake or main gear door damage. When touching down prior to the approach end arresting gear, avoid lowering nosewheel until past cable. Avoid taxiing over the arresting gear at high speed. The recommended speed brake position when crossing arresting gear cables is IN if the main gear doors are closed, OUT if the main gear doors are open.

NOTE

Do not attempt a full-stall landing, as the tail could drag the ground at high angles of attack.

After touchdown, raise wing flaps, gently lower the nose wheels to the runway, and check the wheel brakes. Use rudder for directional control, and when required, nosewheel steering. Monitor hydraulic pressure.

CAUTION

Do not engage nosewheel steering during landing roll unless rudder pedal position is at or near neutral.

HEAVY-WEIGHT LANDING.

To avoid excessive sink rates, maintain proper approach and touchdown speeds for weight and configuration. Partial power should be maintained until touchdown.

MINIMUM-ROLL LANDING.

CAUTION

During a minimum-roll landing approach, airspeed and power control must be maintained to avoid excessive sink rates.

To achieve a minimum-roll landing, fly final approach at 5 knots IAS less than the recommended approach speed for weight and configuration, with the speed brake out, touching down as near the end of the runway as possible.

Retard throttles to IDLE as soon as main gear touchdown is felt, retract flaps immediately, lower nosewheel, start braking action, and (if required) engage nosewheel steering. If desired, one engine may be shut down to reduce engine thrust and aid in reducing the landing roll.

CAUTION

Aerodynamic braking is ineffective, therefore, optimum braking can be achieved by applying a continuously increasing force on the pedals as the airplane slows down, attempting to remain just short of skidding.

SLIPPERY RUNWAY LANDING.

The approach technique for a slippery runway landing is the same as for a minimum-roll landing. The braking effectiveness varies greatly on slippery runways; therefore, the conditions of the runway must be determined by ground personnel and the pilot advised accordingly. Using the reported runway condition reading, determine total ground roll distance. (Refer to part 6 appendix I of T-39A Flight Manual, T.O. 1T-39A-1.) Strict adherence to the correct final approach airspeed is essential. Aerodynamic braking is ineffective, particularly during cold temperatures when idle thrust is high. Braking should be commenced as soon as the nosewheel is on the runway. A combination of rudder, ailerons, brakes, and nosewheel steering may be required for directional control. If stopping distance is critical, the landing roll can be substantially reduced by shutting down one or both engines after touchdown.

HYDROPLANING.

Hydroplaning, in its meaning here, is a condition where the tires of the airplane are separated from runway surface by a fluid. Under conditions of total hydroplaning, the hydrodynamic pressures between the tire and runway lift the tires off the runway to the extent that wheel rotation slows and actually stops. The major factors in determining when an

airplane will hydroplane are forward speed and tire pressure. To a lesser degree, the airplane gross weight, depth of water on the surface, texture of the surface, type of tire used, and condition of the tires influence and total hydroplaning speed. Total hydroplaning in this airplane with recommended tire pressures and 1/8 to 1/4-inch of water or slush on the runway can be expected at approximately 78 knots IAS for the nose gear tires and 116 knots IAS for the main gear tires. Hydroplaning is aggravated in landings with a tailwind component because of increased ground speeds. Partial hydroplaning occurs to varying degrees below these speeds.

Whenever an airplane is subjected to hydroplaning to any degree, directional control becomes difficult. Under total hydroplaning conditions, nosewheel steering is ineffective and wheel braking is nonexistent.

The adverse effects of hydroplaning can be minimized by consideration and application of the following:

1. Smooth tires tend to hydroplane with as little as 1/10-inch of water and possibly at slightly lower speeds. Ribbed tires tend to release hydrodynamic pressures and will not hydroplane until water depth is 2/10 to 3/10-inch.

2. Takeoffs with extreme crosswinds and water-covered runways should be made with caution. When lift-off speed is greater than hydroplaning speed, the airplane is subjected to the effects of the crosswind while hydroplaning.

3. An aborted takeoff on a wet runway initiated at or near hydroplaning speed will require considerably more runway than one aborted on a dry runway.

4. For landing, reduce gross weight below 15,000 pounds and effect a positive, touchdown early to utilize available runway. Lower nose wheels to runway before applying brakes.

   Maintain directional control with rudder and aileron, to below nose gear tire hydroplaning speed.

LANDING IN TURBULENCE.

For landing in turbulence, approach speed should be increased as needed to provide additional control margin. With a known gust factor, add one half the gust factor to approach speed. For example, with a wind of 10 knots and gusts to 20 knots, add 5 knots.

CROSSWIND LANDING.

In addition to the procedures used for a normal landing, the following should be accomplished.

NOTE

Before landing, refer to the crosswind chart in part 2 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1, for the headwind component in order to compute the landing distance, and the crosswind component to determine the minimum speed for nosewheel touchdown.

In a strong crosswind, the approach speed should be increased and partial or no flaps used. On final approach, crab or drop a wing to keep lined up with the runway. However, if crabbing, the airplane must be aligned with the runway just before touchdown. At touchdown, lower nose wheels to runway as soon as possible, maintaining aileron into the wind throughout the landing roll.

NOTE

With the nosewheel off the ground, the airplane tends to weathervane into the wind; with the nosewheel on the ground, the airplane tends to turn downwind.

After the nosewheels are on the runway, the airplane will assume greater directional stability, particularly if kept on the upwind side of the runway crown. Because of the close inboard location of the engines, practically no advantage is gained by using asymmetrical power settings during crosswind landings. A combination of rudder, aileron, brakes, and nose wheel steering should be used for directional control.

CAUTION

Do not engage nosewheel steering until rudder position is at or near neutral.

NO-FLAP LANDING.

No special technique is required for landing without wing flaps, other than extending the pattern. However, during base, turn onto final, and final approach, speed should be increased 10 knots above normal pattern speeds.

TOUCH-AND-GO LANDING.

Touch-and-go landing may be practiced, using the procedures outlined for a normal landing to the point of touchdown, followed by a go-around. Nose wheels should normally be kept off the runway throughout the touch-and-go landing.

LANDING PATTERNS (TYPICAL)

NOTE

Refer to appropriate charts in Appendix I for final approach and touchdown speeds.

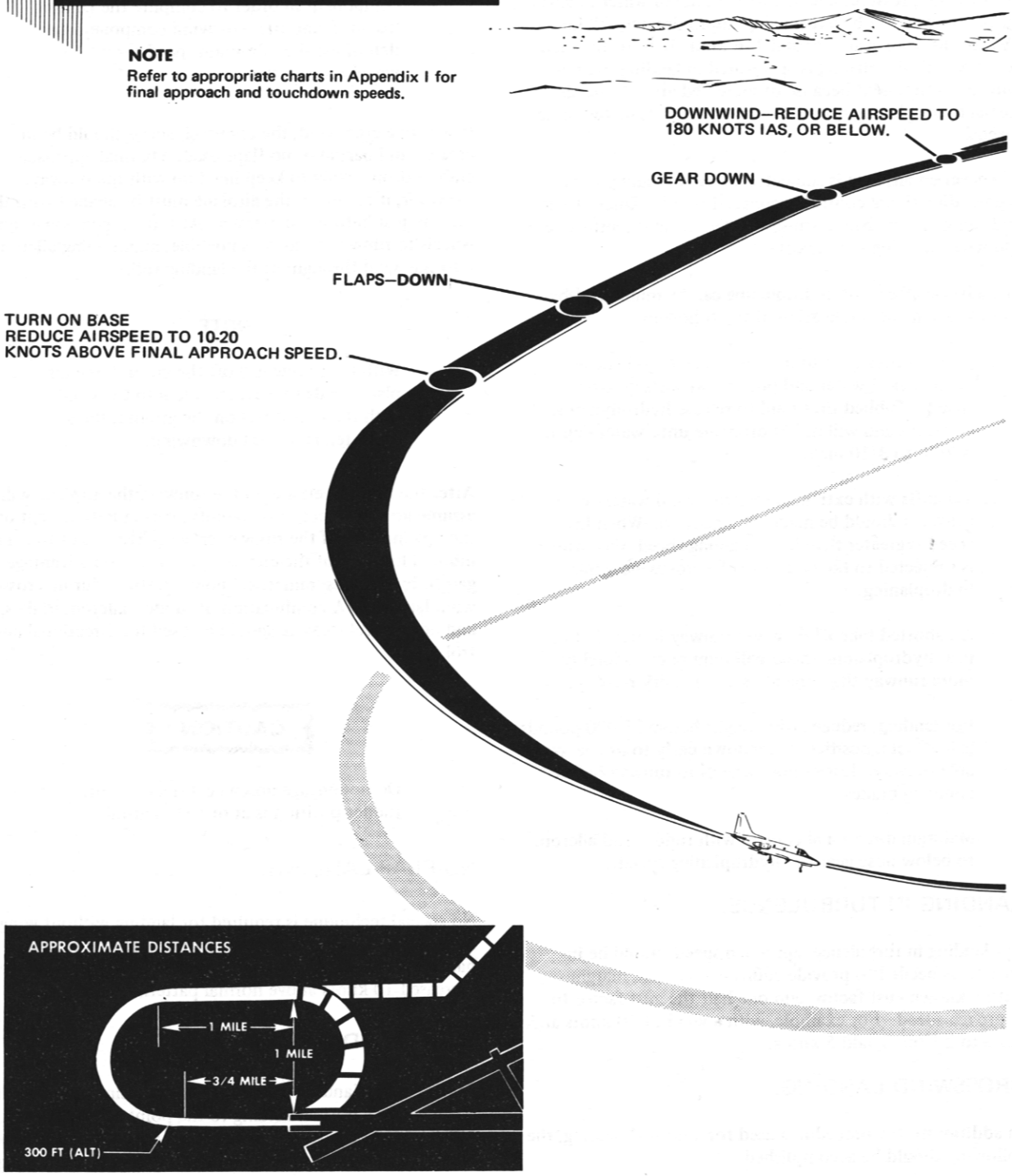
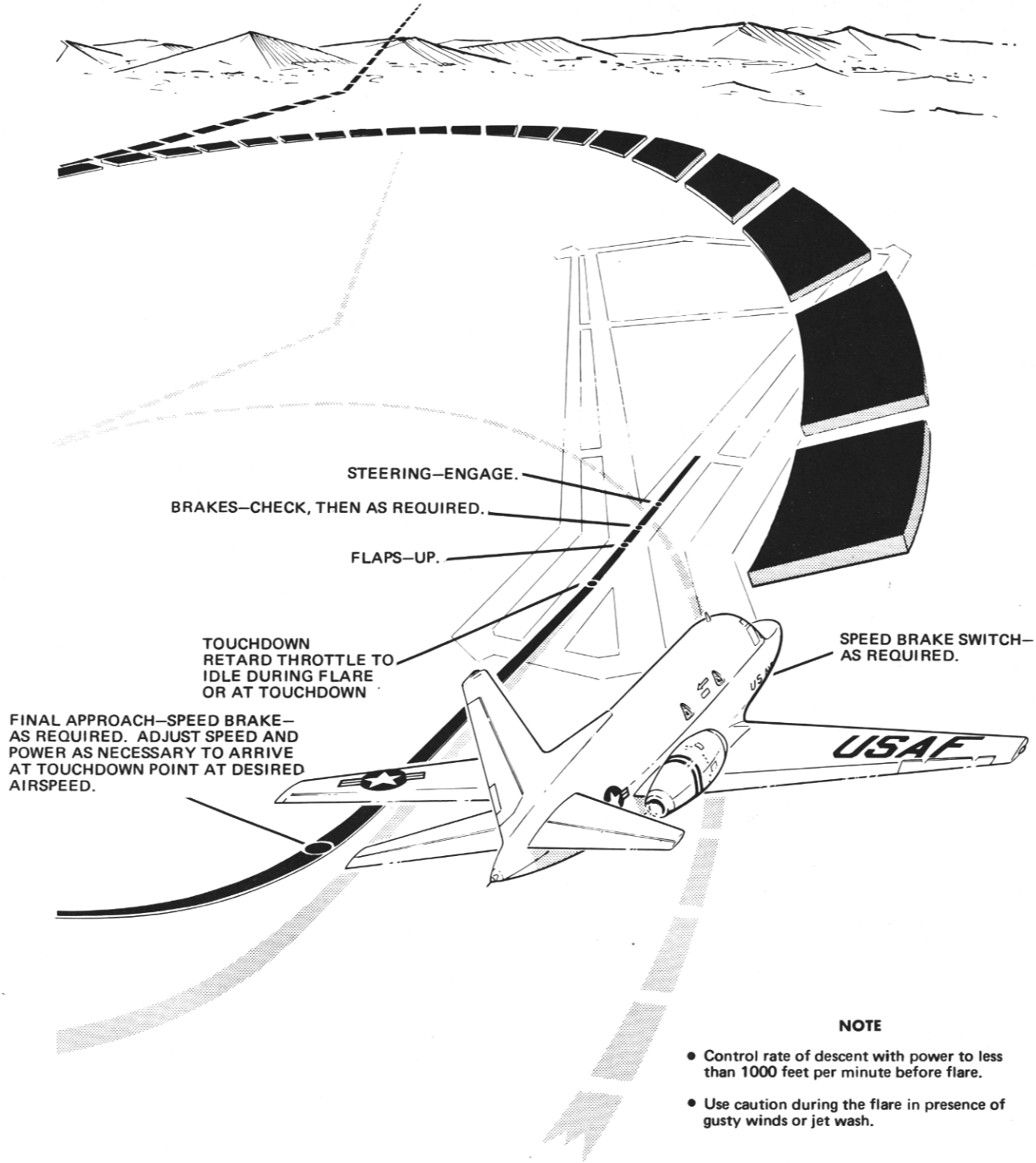


Figure 2-4



NOTE

- Control rate of descent with power to less than 1000 feet per minute before flare.
- Use caution during the flare in presence of gusty winds or jet wash.

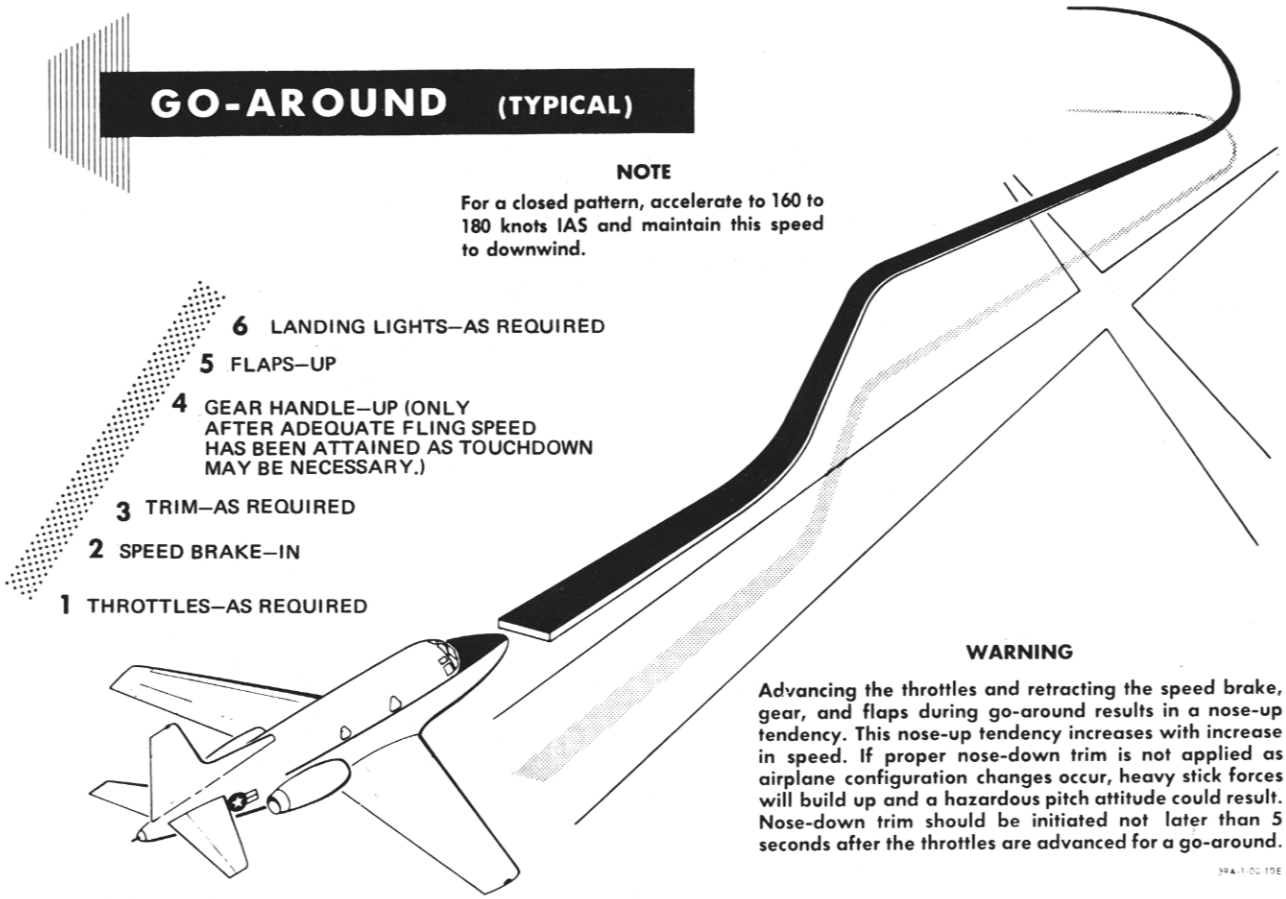


Figure 2-5

CAUTION

Rapid throttle advances during touch-and-go landings and go-arounds may produce undesirable yaw as a result of uneven engine acceleration. A smooth, positive throttle movement will reduce this condition to a minimum.

GO-AROUND.

For making a go-around, see figure 2-5 for complete procedure.

AFTER LANDING.

AFTER CLEARING RUNWAY.

1. AC generator - OFF. (CP)
2. Speed brake - As required.

   For taxiing on unimproved areas or under adverse weather conditions, move the speed brake in.
3. Anti-icing - OFF. (CP)
4. IFF - OFF. (CP)
5. Landing-taxi light - As required. (CP)
6. Navigational equipment - OFF. (CP)
7. Trim - SET. (CP)

   Reset trim for takeoff.
8. Hydraulic pressure - CHECKED. (CP)

   During all taxi operations, the copilot will monitor hydraulic pressure.
9. Cabin air selector - OFF. (CP)

NOTE

It is permissible to shut down one engine during taxiing, to reduce braking required and extend brake and tire life.

JUST BEFORE PARKING.

1. Speed brake - OUT.

WARNING

When hydraulic pressure is near 2700 psi and nosewheel steering, brakes and speed brakes are operated simultaneously or in rapid succession, momentary loss of nosewheel steering may result. Therefore, speed brakes should be extended at a time when instantaneous response from nosewheel steering is not a necessity as in a congested parking area.

ENGINE SHUTDOWN.

The engines should be operated for about 5 minutes at reduced thrust (85 percent rpm or below) before shutdown to stabilize engine temperatures. Operation during approach and taxi can be considered as reduced thrust time. At parking area, proceed as follows:

*1. Brakes - HOLDING.

Hold brakes until chocks are in place.

*2. Throttles - OFF.

NOTE

Check that the engines decelerate freely, and listen for any unusual engine noises during shutdown.

*3. Engine masters - OFF.

4. Radios - OFF. (P-CP)

5. Footwarmers - OFF. (P-CP)

*6. Gust lock - ENGAGED.

7. Exterior lights - OFF.

8. Inverter - OFF. (CP)

9. Generators and battery - OFF. (CP)

*10. Emergency lighting - DISARMED.

*11. Electrical master - OFF.

12. Radio and instrument master switch - OFF.

BEFORE LEAVING AIRPLANE.

NOTE

When the airplane is to be parked for extended periods of time, it should, if possible, be refueled after landing to preclude wing fuel transfer from high to low wing.

Make the following checks before leaving airplane:

1. Light switches - OFF. (P-CP)

*2. IFF/SIF - Classified codes removed. (CP)

If classified codes have been inserted, they must be removed or properly protected to prevent compromise.

*3. Form 781 - Completed.

CAUTION

Make appropriate entries in Form 781 covering any limits in the Flight Manual that have been exceeded during the flight. Entries must also be made if any engine compressor stalls were encountered, or when, in the pilot's judgment, the airplane has been exposed to unusual or excessive operations such as hard landings, excessive braking action during aborted takeoffs, long and fast landings, long taxi runs at high speeds, etc.

NOTE

Engine compressor and turbine disk operating life limits are determined by mechanical and thermal stresses incurred during engine operation and require recording of flight cycles in addition to operatin hours. A full cycle is defined as the power change from engine start to normal rated thrust or greater, followed by engine shutdown. A partial cycle is defined as any power change equal to or greater than idle to normal rated thrust, in flight or on the ground. Partial cycles are equal to 0.4 of a full cycle. The total true cycles will be the sum of the number of full and partial cycles accrued during each flight and must be recorded under Remarks (Block II) on AFTO Form 781 for each individual engine. Cycles will be computed as follows:

Full Cycle: Engine start to normal rated thrust or greater, followed by engine shutdown regardless of duration.

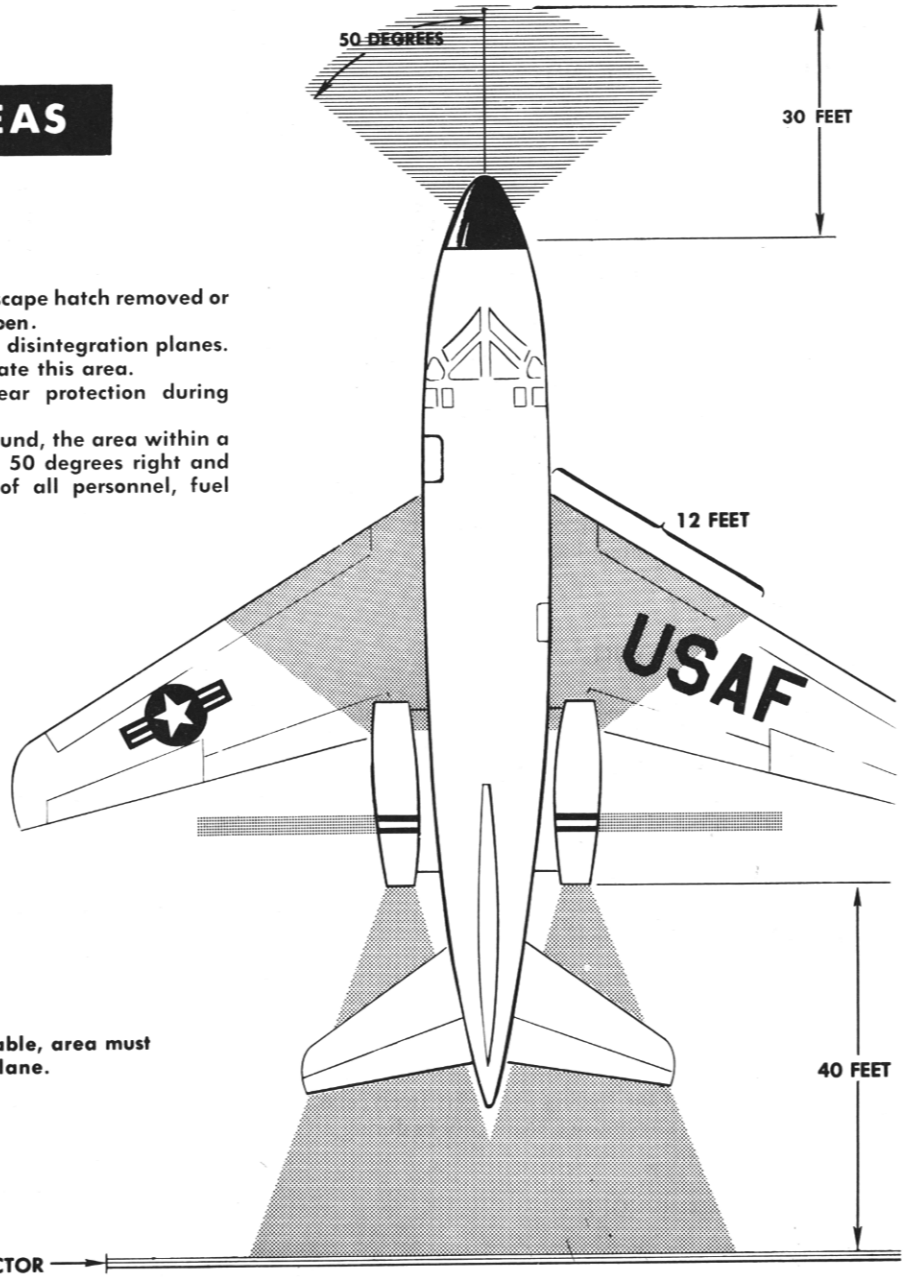
DANGER AREAS

WARNING

- Do not operate right engine with escape hatch removed or left engine above idle with door open.
- Keep clear of engine turbine wheel disintegration planes. Red stripes on engine pods designate this area.
- Ground personnel should wear ear protection during engine operation.
- When radar is operated on the ground, the area within a radius of 30 feet of the nose and 50 degrees right and left of centerline must be clear of all personnel, fuel trucks, etc.

NOTE

- If blast deflector is not available, area must be clear 100 feet aft of airplane.



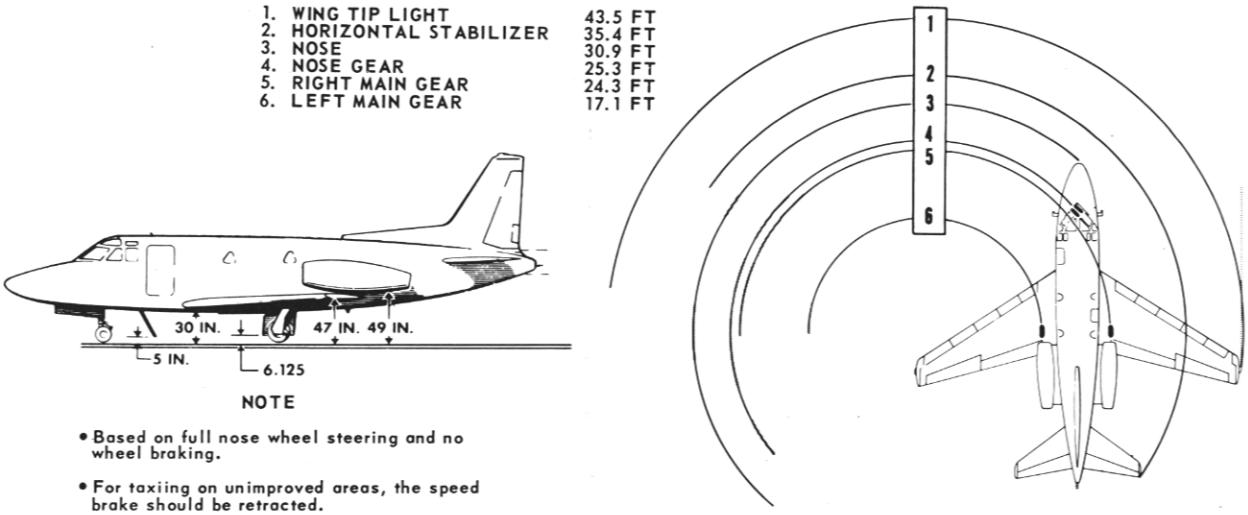
DISTANCE AFT OF TAIL PIPE—FEET	5	10	15	20	25	30	40	50	60
VELOCITY—MPH	1365	785	505	435	320	265	190	150	115
	305	170	120	95	70	60	35		
TEMPERATURE	650°C (1200°F)	343°C (650°F)	232°C (450°F)	182°C (360°F)	143°C (290°F)	127°C (260°F)	99°C (210°F)	80°C (175°F)	52°C (125°F)
	315°C (600°F)	243°C (470°F)	170°C (340°F)	132°C (270°F)	107°C (225°F)	85°C (185°F)	65°C (150°F)		

Military Thrust in BLACK figures.
Idle Thrust in WHITE figures.

T-39B-1-73-2C

Figure 2-6

MINIMUM TURNING RADIUS AND GROUND CLEARANCE



NOTE

- Based on full nose wheel steering and no wheel braking.
- For taxiing on unimproved areas, the speed brake should be retracted.

Figure 2-7

Partial Cycle:

1. Touch-and-Go landing, 0.4 cycles.

2. Full stop landing without engine shutdown, 0.4 cycles.

3. Throttle movement associated with low approaches are not counted as cycles.

4. Nosegear ground safety lock - Installed.

BATTERY START.

This airplane is designed to be self-sufficient; successful battery starts can normally be expected, provided the batteries are in good condition. As with any start, the airplane must be parked into, or at right angles to, the wind. The ac-powered engine instruments will not be available until after the electrical master switch has been placed at ON, energizing the standby inverter. Start engine, using the following procedure:

CAUTION

The main gear wheels must be chocked during engine starts, as hydraulic pressure for wheel brake operation is not available until the engine has attained approximately 40 percent rpm.

1. Battery switch - ON. (CP)

2. DC generators - ON. (CP)

3. Inverter - AUTO. (CP)

4. Radio and instrument master switch - ON.

5. Electrical master - ON.

   DC voltmeter, minimum 21 volts.

6. Engine Masters - ON.

7. Command radio - ON.

8. Starter button - Depressed.

   It may be necessary to hold starter button depressed.

CAUTION

To prevent engine damage, if there is no tachometer indication of engine rotation or oil pressure within 20 seconds, pull out the starter button to stop the starting cycle.

9. Throttle - IDLE at 8 to 10 percent rpm.

10. Monitor EGT and rpm very closely. The same limitations apply as for external power start. If rpm stabilizes below idle while EGT continues to increase, a hot start may be anticipated.

11. Engine instruments - CHECKED. (P-CP)

12. Parking brake - SET.

13. Complete checklist items not previously covered.

14. Start other engine. (Repeat steps 8 through 11.)

    Operate the engine at 65% to 70% rpm while starting the second engine.

STRANGE FIELD PROCEDURE.

If mission requirements require a landing at a strange field where ground personnel are not completely familiary with your airplane or where ground personnel are not available, the pilot is responsible for the condition of the airplane. The postflight and preflight inspections must be accomplished in accordance with sections I and II of the Preflight - Basic Postflight Inspection Work Cards, T.O. 1T-39A-6WC-1PRPO.

EMERGENCY PROCEDURES

SECTION III

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DEFINITIONS.

CRITICAL PROCEDURE.

A critical procedure is an emergency that must be performed immediately without reference to printed checklists and which must be committed to memory. These procedures are presented in Capitalized **BOLDFACE** type.

LAND AS SOON AS POSSIBLE.

A landing should be accomplished at the nearest suitable airfield.

LAND AS SOON AS PRACTICAL.

Landing will be accomplished at the discretion of the aircraft commander.

INTRODUCTION.

The outline presented in this section is divided into four separate groups. GROUND, TAKEOFF, INFLIGHT and LANDING EMERGENCIES. The major portion is set up in alphabetical sequence except where chronological order fits various emergencies

The procedures contained in this section are considered the best for coping with the various emergencies that may be encountered during operation of this airplane. Only single failures are considered; however, each failure presents a different problem. The procedures presented in **BOLDFACE TYPE** are the procedures that must be committed to memory, as the time factor in an emergency of this type will not allow use of a checklist except as a cleanup reference. A pilot with a thorough knowledge of these procedures will be better able to cope with the problems encountered. Even though the procedures are considered the best possible, sound judgment must be used when multiple emergencies, adverse weather, terrain clearance, etc., are encountered.

CAUTION AND WARNING LIGHTS - INITIAL ACTION.

Figure 3-1 is a ready-reference list of all caution and warning lights, and a condensed list of initial steps to be performed in an attempt to isolate the cause of light illumination. Each step is followed by a reference to the subject and section where detailed information and procedures may be found.

EMERGENCY SIGNALS.

If an emergency arises, the crew and passengers should be kept informed and the nearest ground station informed as to the type of emergency and planned action. If the emergency requires some action by the passengers, the pilot will notify them of the emergency and the action required over the interphone. In case the interphone is inoperative or time is critical, the alarm bell will be utilized as the signal. The emergency alarm bell signals are as follows:

- 6 short rings - Prepare for ditching or forced landing.
- 1 long sustained ring - Brace for ditching or forced landing.
- 3 short rings - Prepare for bailout.
- 1 long sustained ring - Bail out.

With the emergency escape hatch open, it is possible that the alarm bell will not be heard.

CAUTION AND WARNING LIGHTS-REFERENCES

LIGHT	PROCEDURE REFERENCE	
	CHECKLIST	FLT. MAN.
CABIN PRESS	E-16	3-22
DOOR OPEN	E-12	3-17
LH ENG DEICE FAIL	–	4-1/4-9†
FUEL SHUTOFF FAIL	–	
FUEL FILTER BLOCK	–	4-13†
LH FUEL HEAT ON	–	4-13†
FUEL TANK X-FD FAIL	–	1-19†
LH FUEL PRESS LOW	E-15	3-21
LOW FUEL LEVEL	–	2-13
LH OIL OHEAT	–	3-23
AC GEN OHEAT	–	4-11†
AC INST PWR OFF	–	3-19
MAIN STEER FAIL	–	3-10
AFT FUS OHEAT	E-16	3-22
PRESS DUCT FAIL	E-16	3-22

LIGHT	PROCEDURE REFERENCE	
	CHECKLIST	FLT. MAN.
CABIN AIR OHEAT	–	4-6†
WINDSHIELD OHEAT	–	4-4
SPEED BRAKE OPEN	–	1-40†
RH ENG DEICE FAIL	–	4-1/4-9†
HYD SHUTOFF FAIL	–	1-17
FUEL JETTISON OPEN	E-15	3-21
RH FUEL HEAT ON	–	4-13†
FUEL PUMP X-FD FAIL	–	1-19†
RH FUEL PRESS LOW	E-15	3-21
OIL PRESS LOW	E-16	3-23
RH OIL OHEAT	–	3-23
DC GEN OFF	E-13	3-18
AC GEN OFF	E-13	3-19
LH HYD PUMP FAIL	E-15	3-22
RH HYD PUMP FAIL	E-15	3-22

†Refer to pages in T-39A Flight Manual, T.O. 1T-39A-1.

GROUND EMERGENCIES

ENGINE FIRE ON THE GROUND.

If the fire warning light comes on or there are other indications of fire during ground operation, proceed as follows:

1. **THROTTLE - OFF.**

2. Advise tower.

3. Engine - Windmill.

   If a fire occurs after shutdown, the pilot must insure that the battery, engine masters and electrical master are on. Allow the engine to windmill, holding starter button in if necessary, for a maximum of 90 seconds. If fire does not go out, or ground personnel indicate the fire is in the pod, accomplish steps 4 through 10 as required.

4. Fire pull T-handle - Pull.

   When the fire pull T-handle is pulled, it will arm and direct the fire extinguisher system. Battery power is available for motoring the engine, if an APU is not connected.

5. Fire extinguisher switch - EXT NO. 1.

6. If fire continues, fire extinguisher - EXT NO. 2.

7. Starter button - PULL.

8. Shut down other engine - if operating.

9. Engine masters - OFF.

10. Electrical master - OFF.

WARNING

Do not attempt to restart the engine until the cause of the fire or overheat condition has been determined.

CAUTION

When the starter is used to motor the engine, the starter is limited to 2 minutes of continuous operation during any 20-minute period.

During or immediately following engine shutdown, oil or fuel fumes may be noticed coming from the tailpipe or inlet duct of either engine, depending on ground wind conditions. These fumes indicate a presence of fuel or oil in the hot section of the engine. The appearance of black smoke from the tailpipe of either engine after shutdown indicates burning oil or fuel, which could damage the engine. In case either fumes or smoke is present, the engine should be motored the same as for an engine fire.

WARNING

All personnel should keep clear of the tailpipe for at least 3 minutes if fumes or smoke is present, to prevent possible injury.

BRAKE FAILURE.

1. Auxiliary hydraulic switch - ON.

If auxiliary system fails proceed to step 2.

2. Emergency brake T-handle - PULL.

   If brake failure occurs, or appears imminent, as a result of normal hydraulic system failure, select auxiliary hydraulic system and stop aircraft. If both normal and auxiliary hydraulic system fail, pull emergency brake control T-handle and apply intermittent pressure to the top of the rudder pedals to pump up the brakes. Five applications, with resulting time lag, may be required to pump up the brake pressure to obtain emergency braking. Once the pressure is built up, do not release the pedals completely; otherwise, the pumping action will have to be repeated.

WARNING

When the emergency brake system is used, only one pilot is to operate and pump the brakes to ensure effective braking.

NOTE

Do not attempt to taxi on the emergency brake system, other than to clear the runway.

GROUND EMERGENCIES (Cont)

Emergency braking may be simulated by pulling out the emergency brake control T-handle. However, without hydraulic system failure, reservoir air pressure will be available to minimize the pumping action required to obtain effective braking.

EMERGENCY ENTRANCE AND ESCAPE EXITS.

For emergency entrance and escape exits, see figure 3-2.

NOSEWHEEL STEERING EMERGENCY DISCONNECT.

If a malfunction of the nosewheel steering system occurs and is jeopardizing directional control of the airplane, a free castering nosegear may be obtained as follows:

1. Electrical master switch - OFF.

CAUTION

When the electrical master switch is placed at OFF, all electrical systems including the dc generators will be inoperative.

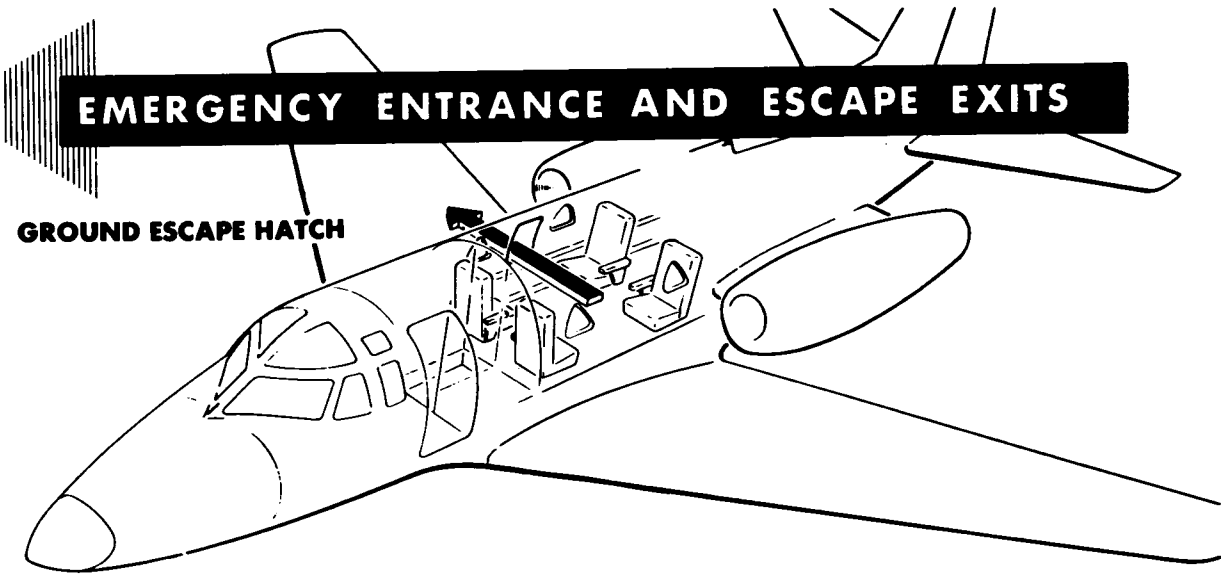
2. Nosewheel steering selector switch - MAIN.
3. Electrical master switch - ON.

NOTE

Further operation of the nosewheel steering system is not recommended until the system has been checked by maintenance.

EMERGENCY ENTRANCE AND ESCAPE EXITS

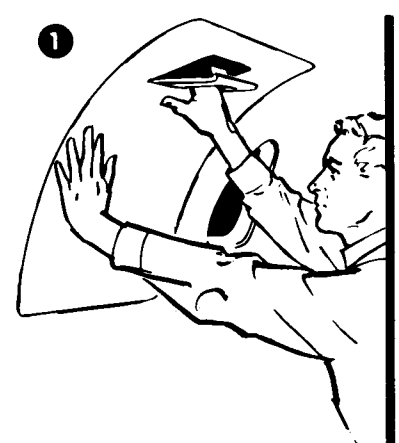
GROUND ESCAPE HATCH



NOTE

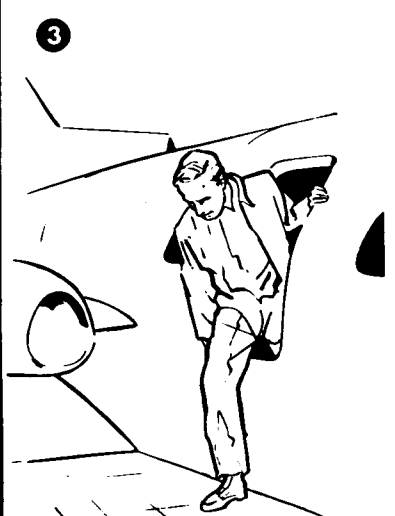
Ground escape hatch should be used for ground escape under most conditions and in case of ditching.

- Door is to be removed before landing, upon instructions from pilot.
- For emergency exit through ground escape hatch, pull handle in door and pull inward. NEW



1 Insert hand into handhold and pull down.

2 Rotate top of door down and then lift door out. Stow the door.

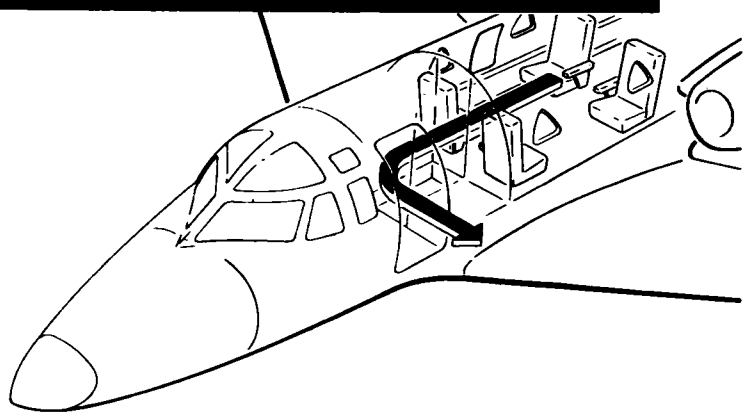


3 Deplane by stepping through escape hatch onto wing.

Figure 3-2 (Sheet 1 of 2)

EMERGENCY ENTRANCE AND ESCAPE EXITS

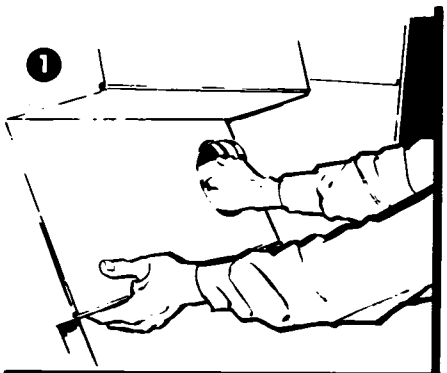
MAIN ENTRANCE DOOR



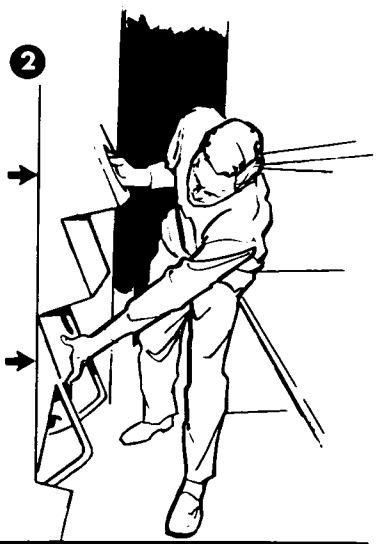
NOTE

The main entrance door is used for ground escape when fire is present on the right side of the airplane or the emergency condition does not warrant the use of the ground emergency escape hatch.

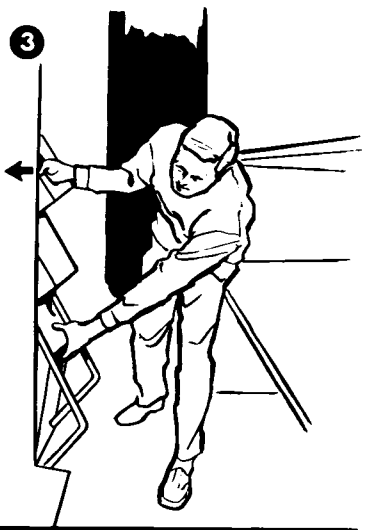
- For emergency entrance through main entrance door, turn handle in door and push inward at the lower edge of the door, rotating the top outward and down. (Refer to Entrance Door Operation in section II.



1 With door in place, turn rotary locking handle one-quarter turn clockwise to unlock door.



2 Pull entire door inward first, using an even pressure on the upper and lower sections.



3 Rotate the top of the door outward.

4 Grasp the handles and allow the door to rotate downward until door is in place, or it is resting on ground, depending on condition of airplane.

Figure 3-2 (Sheet 2 of 2)

TAKEOFF EMERGENCIES

ABORT.

Before takeoff, the pilot should determine the applicable speeds and takeoff distances in case of fire or failure of one engine. (Refer to part 2 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1.)

Decision Speed for Abort.

The abort procedures are based on the use of decision speed. This decision speed is either refusal speed or rotation speed, whichever is less. If the runway length available is approximately the critical field length, the computed refusal speed will be the lesser value and will determine the abort decision. However, if the runway length available is much greater than the critical field length, the airplane rotation speed becomes the decision speed since it is less than the refusal speed. In using decision speed, only two cases are considered: (1) the takeoff should be aborted if a failure or emergency occurs before dicision speed, (2) the takeoff should be continued if the failure or emergency occurs after decision speed. (Refer to part 2 of appendix I of T-39A Flight Manual. T.O. 1T-39A-1.)

Abort Procedure.

The abort procedure is basically the same for any takeoff emergency. Depending upon the severity of the situation, do as many of the following as necessary.

1. **THROTTLES - AS REQUIRED.**

Steps 2 through 7 will be performed, as required.

2. Wheel brakes - Applied.
3. Fire pull T-handle - PULL.
4. Fire extinguisher switch - EXT. NO. 1.

   If fire warning still continues or there are other indications of fire, use extinguisher No. 2.

5. Steering - ON.
6. Engine masters - OFF. (after airplane stops).
7. Electrical master - OFF.

NOTE

Nosewheel steering is not available when the electrical master switch is OFF. Be prepared to use emergency brakes, if needed.

RUNWAY OVERRUN BARRIER.

Tests reveal that successful barrier engagements with a standard Type MA-1A runway overrun barrier are unlikely. If barrier engagement is imminent, retract speed brake and aim nosewheel between the vertical straps of barrier webbing.

ENGINE FAILURE/FIRE AFTER DECISION SPEED.

If decision speed had been reached or passed, maintain directional control and continue takeoff. When the airplane is safely airborne, retract the landing gear and accelerate to beat single engine climb speed after reaching safe altitude. Determine which engine has failed (the airplane will tend to yaw into the dead engine) and trim airplane after getting the emergency under control.

1. Gear - Up, when safely airborne.

   If flaps and speed brake are extended, they should be retracted.

2. Throttles - As required.

   If a fire warning light is on, the respective throttle should be moved to IDLE. If the fire warning light goes out within 10 seconds, continue operation at reduced thrust. If the warning light stays

MINIMUM CONTROL SPEED

SAFE SINGLE-ENGINE SPEED

SPEEDS GIVEN ARE BASED ON FLIGHT TEST
SEA LEVEL — STANDARD DAY

90 KNOTS IAS

OR STALL SPEED PLUS 5 KNOTS
(WHICHEVER IS HIGHER)

NOTE

Use power-off stall speeds as shown on stall speed chart in Section VI.

V_{MCG} – MINIMUM CONTROL SPEED (GROUND)
V_{MCA} – MINIMUM CONTROL SPEED (AIR)

115 KNOTS IAS — FOR GROSS WEIGHT – 18,320 POUNDS NEW

110 KNOTS IAS — FOR GROSS WEIGHT – 17,760 POUNDS NEW

Minimum control speed (ground) is the speed at which the airplane can be controlled on the ground with a failed engine and by use of aerodynamic controls alone. The speed is based on the failed engine windmilling, Military Thrust on the good engine, the nose wheel off the runway, and use of ailerons and rudder to maintain directional control within 25 feet of the desired path.

Minimum control speed (air) is the speed required to provide sufficient control to fly a straight path over the ground with a failed engine. This speed is based on the engine windmilling, Military Thrust on the good engine, and no more than 5 degrees bank away from the failed engine. At minimum control speed, it may be necessary to sacrifice altitude for airspeed while putting the airplane in a clean configuration and obtaining sufficient airspeed to climb. Refer to Appendix I for single-engine take-off speed and distance.

TAKE-OFF

WING FLAPS UP
SPEED BRAKE RETRACTED
LANDING GEAR UP
WEIGHT 18,320 POUNDS

129 KNOTS IAS NEW

FOR GROSS WEIGHT – 17,760 POUNDS NEW

125 KNOTS IAS

For other gross weights, use initial climb-out speeds shown on climb-out distance — one-engine chart. Observe weight and temperature limits as shown on take-off ground run chart in Appendix I.

Safe single-engine speeds shown are based on Military Thrust on the good engine.

LANDING

NEW

For gross weights of 15,000 lb or more, two-engine final approach speeds should be used below this weight, a safe single-engine speed of 115 knots is minimum.

WING FLAPS 66%
SPEED BRAKE RETRACTED
LANDING GEAR DOWN
WEIGHT 15,000 LB OR LESS

115 KNOTS IAS

BEST SINGLE ENGINE CLIMB SPEED

(REFER TO APPENDIX I, PART 2.)

WING FLAPS UP
SPEED BRAKE RETRACTED
LANDING GEAR UP
ALL GROSS WEIGHTS NEW

180 KNOTS IAS

Figure 3-3

on, move throttle OFF and continue with the checklist. If a partial power loss is experienced on one engine, it may be desirable to leave the throttle of the affected engine as is and continue with single engine operations.

Steps 3 through 7 will be performed as required.

3. Fire pull T-handle - PULL.
4. Fire extinguisher - EXT NO. 1
5. If fire continues, fire extinguisher - EXT NO. 2
6. Fuel - Jettison. (As required)
7. Land as soon as possible.

NOTE

Refer to SINGLE-ENGINE LANDING, this section.

- Refer to AIR START PROCEDURES, this section, if a restart is contemplated.

LANDING GEAR INFLIGHT ALTERNATE RETRACTION.

If the landing gear warning light (steady light in the landing gear handle knob) remains on after the gear handle is placed in the UP position procedure as follows:

1. Maintain airspeed below geardown limit speed.
2. Gear handle - DOWN.

   Check gear position indicators for safe indication.
3. Gear electric reset button - Press.
4. Gear handle - UP.

   If the gear fails to retract, proceed to step 5.
5. Gear handle - DOWN.
6. Fuel - Jettison (as required).
7. Land as soon as practical.

NOSEWHEEL STEERING SYSTEM FAILURE.

If control of the nosewheel steering has automatically transferred to standby system, the nosewheel steering system may be disengaged, while still on the ground by pressing and releasing either nosewheel steering button. If the standby system is not disengaged during the takeoff roll, it will disengage automatically when the aircraft becomes airborne. Disengagement of the standby system is indicated by the nosewheel steering-on indicator lights, main steering system failure caution light, and master cuation lights going out.

CAUTION

If these lights remain illuminated, do not raise the landing gear, and land as soon as practical.

If the main system fails on takeoff with a smooth transfer to the standby system, the subsequent landing may be made following normal nosewheel steering procedures. At steering engagement, anticipate another automatic transfer to the standby system. If, however, large steering excursions were noted on the initial failure, pull the NLG STEER-MAIN circuit breaker (on left console) to isolate the failed system. Before landing, the selector switch should be positioned at MAIN. The standby steering system can now be engaged by placing the nosewheel steering selector switch to STANDBY and disengaged by returning the selector switch to MAIN. Do not engage the steering system by selecting STANDBY until the nosewheels are firmly on the runway and the rudder pedals are at or about neutral. When landing with a failed main nosewheel steering system steering engagement by either of the above procedures should be delayed, if practicable, until the aircraft is slowed to taxi speed.

CAUTION

If the nosewheel steering selector switch is in the STANDBY position during landing, the steering is energized at touchdown and the nosewheels will be positioned proportional to rudder pedal position.

After manual transfer to the standby system with a failed main system, a subsequent failure may not result in a disconnection of the standby steering. Free caster may be obtained by any one of the following procedures:

1. Return steering selector switch to MAIN.
2. Turn off Electrical Master switch.
3. Pull NLG STEER-STBY circuit breaker.

NOTE

Reference Figure 3-5 NOSEWHEEL STEERING OPERATIONAL CHART.

NOSE WHEEL STEERING—OPERATION CHART

CONDITION	COCKPIT INDICATION	REMARKS
Normal operation (main system engaged). Steering selector switch at MAIN.	NOSE STEER ON indicator lights on. Normal nosewheel steering.	• Engage or disengage with either steering button. • Automatically disengage at nosewheel liftoff.
WARNING The aircraft should not be operated with a known failed steering system. However, if overriding operational considerations dictate use with a failed system or if a failure occurs during a takeoff or landing, the following conditions are provided for aircrew information.		
Main system failure (automatic transfer to standby system). Steering selector switch at MAIN. **NOTE** **Subsequent failure of standby system will normally result in an automatic disengagement and free caster.**	NOSE STEER ON indicator lights on. MAIN STEER FAIL caution light on. MASTER CAUTION lights on. Nosewheels turn in response to rudder pedals.	To use steering on the landing rollout engage steering with either steering button. Standby system can be disengaged with either steering button if the steering selector switch is left in MAIN position. Refer to nosewheel steering system in Section III.
Operation with a known main system failure when manual transfer to standby system has been accomplished by placing the steering selector switch to standby. NLG STEER MAIN circuit breaker should also be pulled.	NOSE STEER ON indicator lights on. MAIN STEER FAIL caution lights on. MASTER CAUTION lights on. Nosewheels turn in response to rudder pedals. Subsequent failure of standby system may not result in a disconnection of the standby steering. Free caster may be obtained by any one of the following procedures: 1. Return steering selector switch to MAIN. 2. Turn off Electrical Master Switch. 3. Pull NLG STEER STBY circuit breaker.	• Disengage steering by returning selector switch to MAIN. or • Automatically disengaged at main gear liftoff. • To avoid premature steering, the steering selector switch should be placed at MAIN before landing. Return steering selector switch to STANDBY for steering only after nosewheels are on the runway and with rudder pedals at or about neutral.
Operation with a known failed standby system. **WARNING** Disengage standby steering by pulling NLG STEER STBY circuit breaker.	NOSE STEER ON indicator lights on. Nosewheels turn in response to rudder pedals.	• Engage or disengage with either steering button. • If failure occurs, will automatically transfer to free caster. • Automatically disengaged at nose wheel liftoff.

Figure 3–4

TIRE FAILURE.

Tire failure on takeoff may present more problems than a tire failure on landing. Directional control is more difficult at the higher takeoff gross weights during an abort; therefore, if speed is at or near takeoff speed, continue takeoff and burn fuel down, or jettison, before landing.

WARNING

Tire failure on any gear may appear as a nosewheel vibration, and if takeoff is continued, the landing gear should not be retracted. If tire failure is suspected, have the tire visually checked for fire by a report from another airplane or the tower, and land as soon as practical. Landing should be made in accordance with the instructions in Main Gear Tire Failure Landing in this section.

Main Gear Tire Failure on Takeoff.

Directional control is more difficult and braking efficiency is greatly reduced at higher gross weights with failure of one or both main gear tires. Therefore, under certain conditions, the takeoff should be continued rather than aborted. (Refer to Abort in this section.)

Nosegear Tire Failure on Takeoff.

Nosegear tire failure is serious if either tire fails on the takeoff or landing roll. If one tire has failed or lost pressure, the remaining tire is definitely overloaded and it is much more likely to fail, especially at high gross weights. In case of complete nosegear tire failure on the takeoff run and if speed is too slow to continue takeoff, the takeoff should be aborted. (Refer to Abort in this section.)

NOTE

If nosegear tire failure occurs at or near rotation, the pilot may elect to continue the takeoff in order to reduce the gross weight of the airplane. Control on the ground is much easier at lighter gross weights.

- Even though heavy braking increases the load on the nosegear, it is considered more important that the airplane be stopped as quickly as possible rather than to attempt to lighten nosewheel loading at the expense of a longer roll. However, holding the control wheel full back during braking may reduce some of the load from the nosewheels.

INFLIGHT EMERGENCIES

AIR START PROCEDURES.

Immediate Restart.

In the event of a flameout, the following restart procedure should be attempted:

CAUTION

For flights above 29,000 feet, a relight by this procedure is unlikely and an engine fire is probable.

1. Throttle (affected engine) - IDLE.
2. Air start switch (affected engine) - ON.
3. Air start switch - OFF after relight is obtained.

Steps 4 and 5 must be performed if restart is not obtained.

4. Throttle - OFF.
5. Air start switch - OFF.

Further air start attempts should be made using the Normal Restart.

Normal Restart.

Successful air starts can be made at or below 29,000 feet, within a wide range of airspeeds. (See figure 3-5.) Before attempting an air start, an effort should be made to determine the cause of the engine failure. If the failure is caused by an obvious mechanical breakdown, as indicated by the engine instruments; or by excessive vibration) or the fire extinguisher has been activated, a restart should not be attempted.

CAUTION

If there is to be a delay of several minutes before an airstart is attempted, turn off unnecessary electrical equipment to conserve battery power, i.e., UHF radio.

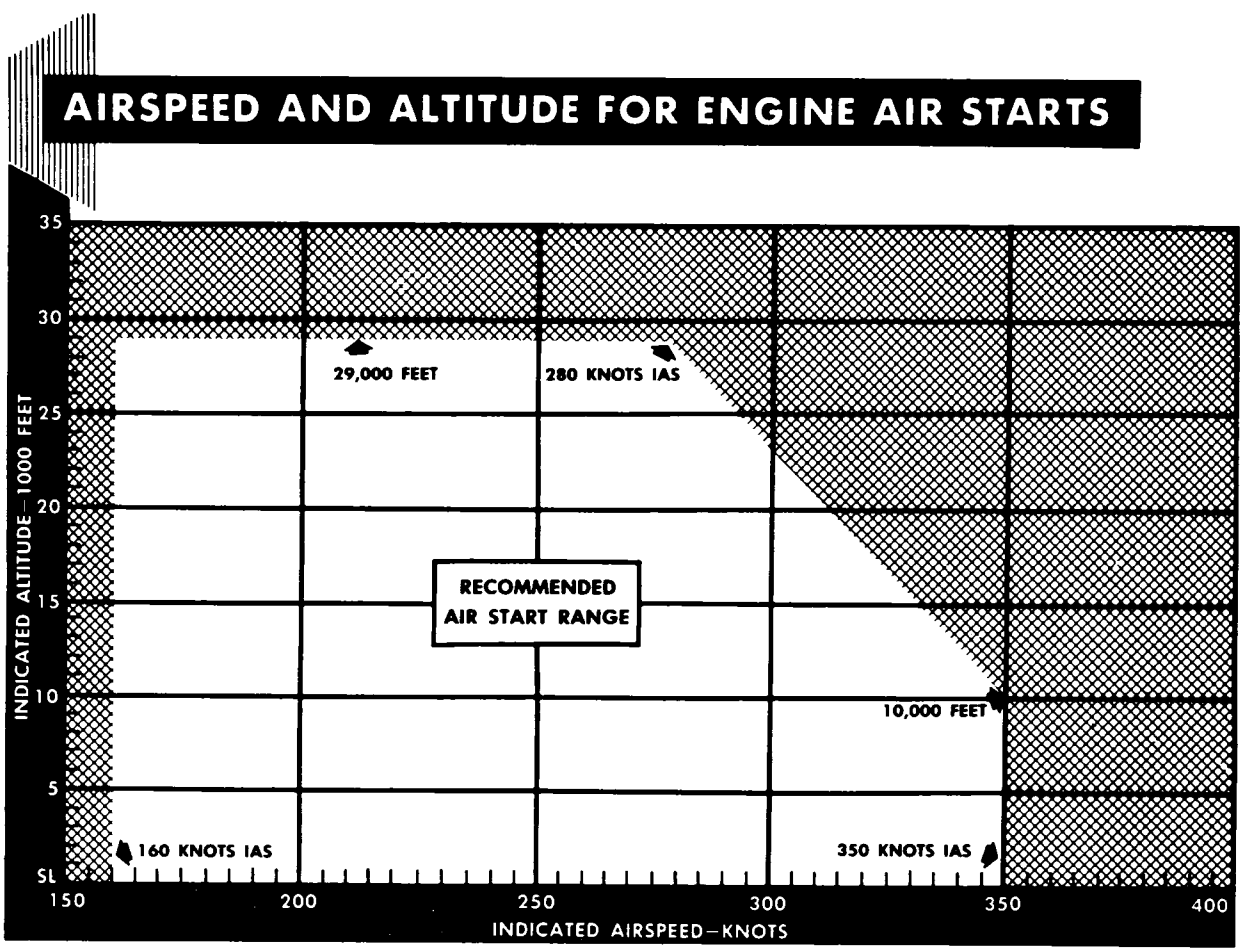
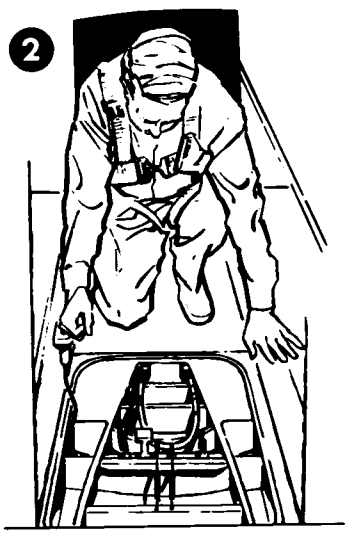


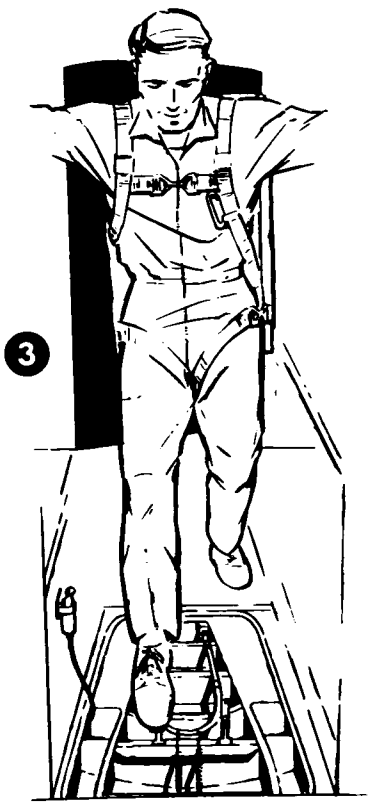
Figure 3-5

BAIL-OUT PROCEDURES

Lift the inflight inner escape door and rotate it to the vertical locked position.



Pull D-handle mounted on bottom of inflight inner escape door. Pulling the D-handle will jettison the outer door. If the outer door fails to jettison, proceed to step 3.



If pulling the D-handle fails to jettison the outer door, then the manual release pedal must be pushed to jettison the outer door.

Figure 3-6 (Sheet 1 of 2)

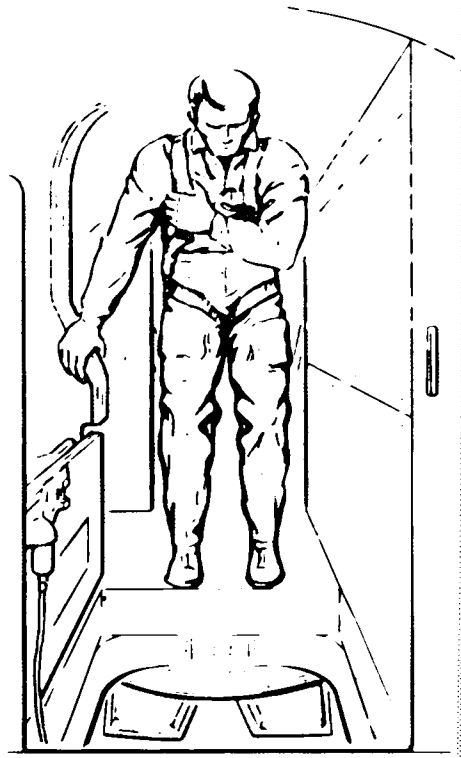
BAIL-OUT PROCEDURES

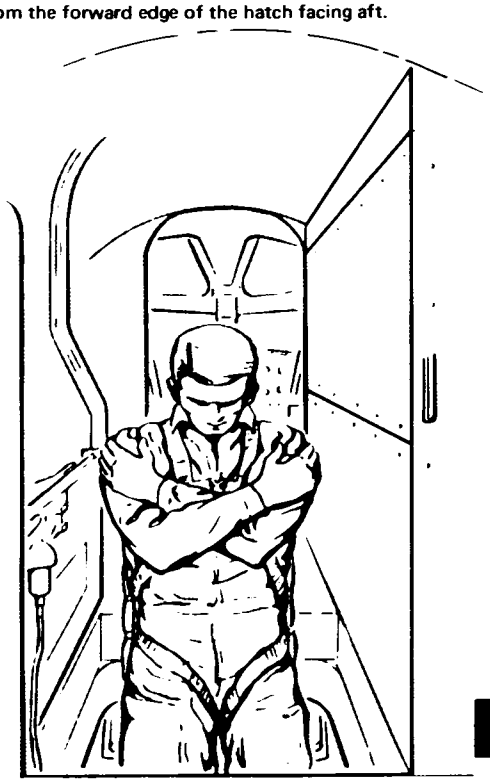
ALL CREW MEMBERS AND PASSENGERS WILL USE THE FOLLOWING BAIL-OUT PROCEDURE:

4 With escape hatch jettisoned stand at forward edge of hatch facing aft.

NOTE

Personnel in the cabin will step across the open hatch and bail out from the forward edge of the hatch facing aft.





5 Drop feet first through open hatch with arms folded across chest. Keep elbows in close to body.

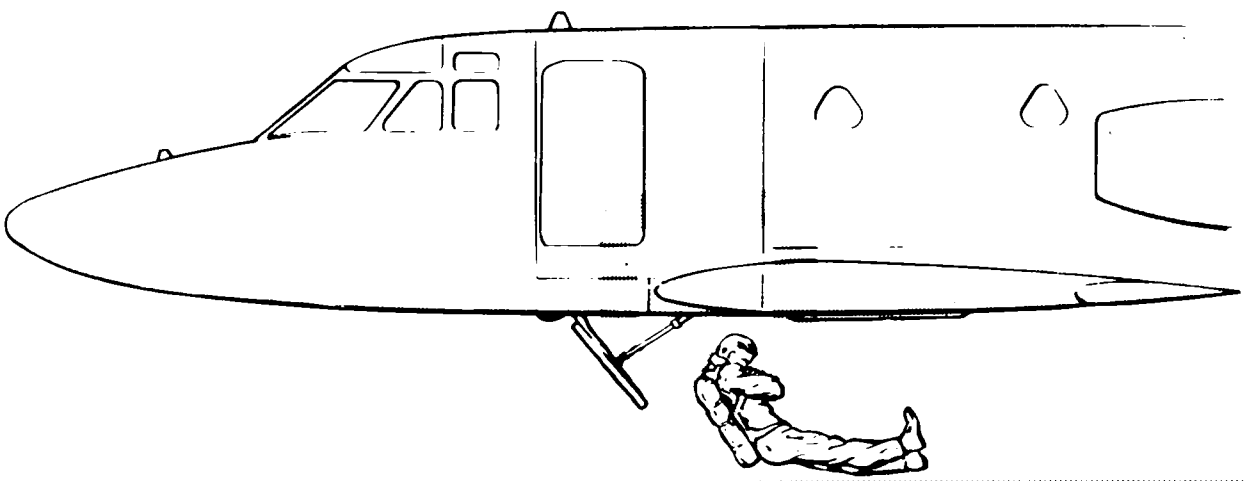


Figure 3-6 (Sheet 2 of 2)

INFLIGHT EMERGENCIES (Cont)

1. Airspeed and altitude - Check.

   Airspeed and altitude should be within air start range. (See figure 3-5.)

2. Fuel crossfeed and tank selector switch - X-FEED.

3. Fire pull T-handle - Check IN.

4. Engine master switch - ON.

5. Air start switch - ON.

CAUTION

The ignition duty cycle is limited to 2 minutes ON, 3 minutes OFF, 2 minutes ON, and 23 minutes OFF.

NOTE

If engine rpm is below 8 percent, the starter ignition button may be used to accelerate the start.

- If engine rpm drops below generator cutout speed, it may be necessary to reset the generator after the start is completed.

6. Throttle - IDLE; then as required.

   Check exhaust temperature rise and rpm increase to idle rpm. Then advance throttle as required. If there is no indication of lightup within 20 seconds after the throttle has been moved to IDLE, or if engine fails to accelerate to idle rpm within one minute after lightup, retard throttle to OFF and repeat start attempt.

7. Air start switch - OFF.

NOTE

Air start switch must be turned OFF before the generator can be brought back on the line.

8. Fuel crossfeed and tank selector switch - As required.

If Engine Fails to Start or No Start Is to Be Attempted.

If the engine fails to start or the decision has been made not to attempt an air start, proceed as follows:

1. Throttle - OFF.

2. Air start switch - OFF.

3. Engine master switch - OFF.

4. Fuel crossfeed and tank selector switch - Check CROSSFEED.

   Fuel balancing may be used as required, because the crossfeed and tank selector switch overrides the throttle actuated boost pump cutoff switch on the affected engine.

NOTE

During single engine operation, if proper trim technique is not used, fuel quantity gages will be inaccurate. Fuel tank differential should not exceed 200 pounds.

5. Fuel - Jettison (if necessary).

6. Land as soon as possible.

   Refer to SINGLE-ENGINE LANDING, this section.

BAILOUT.

The optimum altitude and airspeed for bailout is 120 to 300 knots IAS in 1 G flight between 5000 and 15,000 feet. Bailout should be made rapidly and in order, so that personnel involved will land as close together as possible.

INFLIGHT EMERGENCIES (Cont)

WARNING

If time and conditions permit, it is recommended that all bailouts be made below 20,000 feet. This reduces the possibility of losing consciousness from lack of oxygen after leaving the airplane.

- If bailout is to be made above 20,000 feet, stay on oxygen until just before leaving the airplane. After assuming the bailout position, actuate the automatic parachute-arming lanyard just before bailout.

In certain emergency conditions, it may be desirable to bail out the crew while the pilot and main student remain aboard to attempt to land the airplane or to avoid populated areas. This decision is left to the discretion of the pilot.

PILOTS' AND CREW BAILOUT.

WARNING

Do not bail out from the main entrance door or the ground escape hatch because of the danger of striking the airplane structure. Also, if the main entrance door were opened in flight, the door could obstruct the bailout escape path of the crew.

For correct bailout technique and body positions, see figure 3-6 and proceed as follows:

1. Radio distress procedure.
2. Alert crew/passengers.
3. Cabin air selector - RAM & DUMP.

   If time and conditions permit, move the cabin air selector switch to RAM & DUMP. This will ensure that cabin pressure is dumped before the inflight escape hatch is actuated.

4. Gear - DOWN (as required).

   If the pilot intends to land the airplane, the landing gear should be lowered before the inflight escape hatch inner door is opened.

WARNING

Once this inner door is opened, the gear cannot be lowered or the speed brake retracted until the door is again closed.

5. Inflight escape hatch inner door handle - Pull rapidly.
6. Inflight escape hatch outer door D-handle - Pull.

   If the outer door fails to jettison, push the manual release pedal to jettison the door.

7. Crew/passenger - Bailout.
8. Pilots - Bail out.

DOOR-OPEN-INFLIGHT EMERGENCY.

Illumination of the door-open caution light indicates that the main entrance door or inflight escape hatch outer door is not fully locked closed, or that the inflight escape hatch inner door has been raised. If any of these conditions exist, pressurization air to the door seals will be shut off and depressurization will occur, illuminating the cabin pressure failed warning light when the cabin altitude goes above 10,000 feet. If depressurization does not occur, the door-open caution light indication is probably false and a faulty light circuit should be suspected. If the door-open caution light comes on in flight, follow this procedure.

1. Seat belt sign - ON.

   All occupants fasten seat belts.

2. Reduce airspeed and altitude.

CAUTION

If possible, avoid use of the speed brake because the door in question may be the inflight escape hatch outer door and a retracted speed brake will help prevent it from leaving the airplane.

3. Investigate cause of caution light.

   If it can be determined that the warning was caused by raising the inner door, it is safe to close the door

and continue the flight in the normal manner. Otherwise, continue flight at reduced speed and land as soon as practical.

4. Fuel - Jettison (as required).

5. Land as soon as practical.

Avoid flight conditions causing positive pressure on the main entrance door, such as yawing and slipping.

WARNING

Although the main entrance door and the ground escape door are of the plug type, their behavior when unlocked with the fuselage depressurized is unpredictable. Damage to the airplane or injury to the occupants could result if these doors are accidentally opened in flight.

ELECTRICAL POWER SYSTEM FAILURE.

NOTE

When the electrical master switch is OFF, all normal dc and ac power and all warning and caution lights will be inoperative.

DC GENERATOR FAILURE.

If the dc generator-off caution light comes on, check the dc loadmeters to determine which dc generator has failed. The other dc generator is capable of supplying essential electrical power needed for operation. If one generator has failed or has been disconnected for any reason, the dc secondary busses are disconnected. However, the generator-off caution light will be on. If the engine is operating, attempt to bring the generator back into the circuit as follows:

1. R-14C and Doppler power switches - OFF.

2. Generator circuit breakers - Check.

If any of the generator circuit breakers are popped, attempt to reset them. If any pop again, do not reset.

3. Generator switch - RESET, momentarily; then move to ON.

If the caution light remains out and the loadmeter shows normal system loads, the failure was temporary. If the caution light comes on again, turn generator switch to OFF.

NOTE

If the dc generator fails to reset and flight conditions permit, attempt to reset by turning both dc generators off and resetting them one at a time.

4. R-14C and Doppler power switches - ON.

FAILURE OF BOTH DC GENERATORS.

In flight, if the dc generator-off caution light comes on and the loadmeters indicate both generators have failed, the paralleling bus will be automatically disconnected and the essential bus emergency relay is energized closed, providing an automatic connection between the battery bus and the dc essential bus. Attempt to bring the generators back into the circuit as follows:

CAUTION

If the automatic connection between the battery bus and the essential bus fails, the pilot can manually energize the essential bus emergency relay by moving the battery switch to ESSENT.

- The battery switch should be placed at ESSENT only after it has been determined that the essential bus emergency relay has failed to transfer power operations.

- All dc busses except the dc essential bus are automatically disconnected from the battery bus, so that the remaining battery power will be conserved for essential purposes only.

1. R-14C and Doppler power switches - OFF.

2. Generator circuit breakers - Check.

3. Generator switches - RESET, momentarily; then ON.

If the caution light remains out, the failure may have been temporary.

4. DC loadmeter - Check.

If dc loadmeters show normal system load on both genera-

tors, continue mission. If the generators fail to reset, attempt to reset again. If generators fail to reset after several attempts to reset, proceed with step 5.

5. Generator switches - OFF.

6. Battery switch - ESSENT (if necessary).

   The length of time that usable battery power is available for continuous operation is approximately 45 minutes. Battery output may be decreased, however, by a number of variable factors, including low state of battery charge.

7. All nonessential electrical equipment - OFF.

   Turn off all nonessential equipment that flight conditions permit.

8. Fuel - Jettison (if necessary).

9. Land as soon as possible.

AC GENERATOR FAILURE.

If the ac generator-off caution light comes on, the essential ac load is automatically powered by the inverter, provided the radio and instrument master switch is at ON and the inverter switch is at AUTOMATIC. However, the ac generator should be reset if possible.

NOTE

If the ac generator fails, the windshield anti-ice system is inoperative.

1. R-14C and Doppler power switches - OFF.

2. AC generator circuit breaker - Check.

3. AC generator switch - RESET, momentarily; then ON.

If the caution light remains out, the failure may have been temporary.

4. AC voltmeter - Check.

   If the voltmeter shows normal voltage, continue the mission. If the generator fails to reset, attempt to reset again.

5. AC generator switch - OFF (if necessary).

   If the generator fails to reset, move the generator switch to OFF.

6. Inverter operation - Check.

   If the instrument power-off caution light comes on, indicating a possible failure of the automatic instrument power transfer system, move the inverter switch from AUTOMATIC to ON. If the instrument power-off caution light remains on, ac power is lost for the remainder of the flight.

SMOKE AND FUMES.

CAUTION

All odors not identifiable by the flight crew shall be considered toxic. Immediately go on 100% oxygen. Properly ventilate the aircraft and land as soon as practical. Do not take off when unidentified odors are detected.

If smoke and fumes are detected, proceed as follows:

1. **OXYGEN MASKS - ON.**

2. Automatic manual override lever - Open (if required).

NOTE

If smoke and fumes are detected early enough or are not strong enough to require immediate action, the contaminated air may be isolated by moving the cabin air selector switch to LEFTHAND ENGINE. If this does not eliminate the contaminated air, move the cabin air selector switch to RIGHTHAND ENGINE. If contaminated air persists, proceed to step 3.

3. Cabin air selector - RAM & DUMP.

4. Descent to safe altitude.

5. Pilot's window - Open (as required).

   If altitude permits and the contaminated air cannot be cleared and vision is obstructed by smoke or fumes, opening the side window may improve the vision.

ENGINE FAILURE/FIRE.

Failures of jet engines are, as a rule, the result of improper fuel scheduling or incorrect operating technique during critical flight conditions. If engine failure is due to improper operating technique, an air start can usually be made to restore engine operation. In case of obvious mechanical failure, an air start should not be attempted. Except for higher rates of descent, the airplane has normal flight characteristics with both engines dead. The single engine handling characteristics are excellent. Unbalanced engine thrust does have a slight tendency to yaw the airplane

toward the dead engine which must be neutralized with aileron and rudder, or trim. The airplane can be trimmed hands-off, and all normal flight maneuvers may be performed as long as the recommended single engine airspeed is maintained. (See figure 3-3.) If engine failure/fire occurs in flight, refer to ENGINE FAILURE/FIRE AFTER DECISION SPEED.

Engine Shutdown Demonstration.

When demonstrating inflight engine shutdown, place the throttle of the selected engine at IDLE for one minute before continuing to OFF.

FIRE OR EXPLOSION.

Each engine pod is equipped with a fire and overheat detector circuit and a pressure-type fire extinguisher system. A portable hand fire extinguisher, for use in case of a cabin fire, is mounted on the bulkhead aft of the pilot's seat.

WARNING

Whenever a fire or overheat warning light comes on or a cabin fire is suspected, it is recommended that the passengers be alerted, oxygen masks be used, and that the pilot select 100 percent oxygen. Refer to SMOKE AND FULES in this section.

- Use discretion when the second container is to be selected, as only two extinguishing agent containers are available.
- Except in an emergency, do not attempt to restart the engine if the extinguisher system has been actuated.
- The extinguishing agent (dibromodifluoromethane) in the engine fire extinguisher system can produce toxic effects if inhaled.

ELECTRICAL FIRE AND ISOLATION.

If an electrical fire occurs, proceed as follows to isolate the cause of the fire:

1. Oxygen masks - On.
2. Automatic manual override lever - (As required).
3. Electrical master - OFF (VFR only).

NOTE

When the electrical master switch is placed at OFF, all systems including the dc generators and cabin pressurization will be inoperative.

4. All nonessential electrical equipment - OFF.
5. All circuit breakers - Check for indication of defective circuit.

If fire persists:

6. Cabin air selector - RAM & DUMP (electrical master - ON, momentarily).
7. Use portable fire extinguisher (as required).
8. Descend to safe altitude.
9. Land as soon as practical.

If fire is isolated:

10. Electrical master - ON.
11. Individually restore all equipment previously turned OFF.

Electrical fires will continue to emit fumes and smoke after the source of fire has been removed. Allow sufficient time for the indication of, or recurrence of, fire to occur when restoring power to equipment that had been turned off.

CABIN FIRE - NONELECTRICAL.

If a fire is discovered in the cabin, proceed as follows:

1. Oxygen masks - On.
2. Automatic manual override lever - OPEN (as required).
3. Use portable fire extinguisher (if required).
4. Descend to safe altitude.

Depending upon the type of fire involved, it may be desired to remain at altitude. For example, if the fire was in a seat, remaining at altitude would help to contain the fire, because of the lack of oxygen after pressurization is dumped.

5. Cabin air selector switch - RAM & DUMP.

6. After air is clear, repressurize cabin.

FUEL SYSTEM FAILURE.

Failure of a tank-mounted pump or engine-driven centrifugal fuel pump will cause the corresponding low fuel pressure caution light to illuminate. If the caution light comes on, proceed as follows to preclude a possible engine flameout.

1. Fuel crossfeed and tank selector - X-FEED.

WARNING

When only one boost pump is operating, the last 195 pounds of fuel in the tank with the inoperative boost pump may not be available. As much as 390 pounds of fuel may not be available when operating on suction feed (both tank-mounted boost pumps inoperative).

2. Low fuel pressure caution light - Check.

If failure was due to an inoperative tank-mounted boost pump, the low fuel pressure caution light will go out. However, if the centrifugal element of the engine-driven pump failed, the caution light will remain on and the crossfeed and tank selector switch should be returned to NORMAL position.

TANK-MOUNTED BOOST PUMP FAILURE.

NOTE

With the fuel crossfeed and tank selector switch at X-FEED, one tank-mounted boost pump will maintain normal two-engine operation at all altitudes (provided the remaining boost pump is receiving fuel); however, the wing fuel may become out of balance. If this condition occurs, a steady-state constant-heading sideslip of one-half to one ball deflection with the heavy wing high will correct the condition. Fuel will transfer at a rate of approximately 100 pounds per minute, using one-half ball deflection. Fuel quantity gages are unreliable, except in coordinated flight.

- If wing fuel becomes out of balance, a steady-state constant-heading sideslip of one-half to one ball deflection with the heavy wing high will correct the condition. Fuel will transfer at a rate of approximately 100 pounds per minute, using one-half ball deflection. Fuel quantity gages are unreliable, except in coordinated flight.

WARNING

High engine thrust settings and low fuel level condition are critical with single boost pump operation. Therefore, place the fuel crossfeed and tank selector switch to the NORM position under the following conditions:

a. On final approach with both engines operating.

b. During other flight conditions when the total required fuel flow for both engines exceeds 2400 pounds per hour and the fuel quantity in the wing of the operating boost pump is 1200 pounds or less.

NOTE

With the fuel crossfeed and tank selector switch at NORM, the engine with the inoperative fuel boost pump will be on suction feed.

The engine-driven centrifugal fuel pump has suction feed capabilities in case of tank-mounted boost pump failure; however, this capability is limited, dependent upon fuel temperature. The engines will operate better on suction feed (tank-mounted boost pump inoperative) at higher altitudes with "cold soaked" fuel than they will with warmer fuel

FUEL JETTISON.

Placing the fuel jettison switch to AUTOMATIC automatically jettisons fuel to a preset level, depending on flight

attitude. An alternate means of jettisoning is also provided by moving the fuel jettison switch to the spring-loaded MANUAL position.

WARNING

When the fuel jettison switch is held in the MANUAL position, there is no automatic cutoff feature. Caution should be used, as all remaining fuel could be jettisoned.

NOTE

Fuel jettison is impossible with failure of both boost pumps.

AUTOMATIC FUEL JETTISONING FAILURE.

During automatic fuel jettisoning, a malfunction of a cell-mounted float switch could cause the respective fuel jettison shutoff valve to remain open. If the valve remains open, all fuel in the respective wing tank will be jettisoned. An open jettison valve is indicated by the FUEL JETTISON OPEN caution light remaining on and a continuation of fuel jettisoning (as indicated by abnormal decrease of fuel quantity). If this occurs, proceed as follows:

1. Fuel jettison switch - OFF.

   Automatic shutoff should occur between approximately 1400 and 2200 total pounds of fuel remaining.

2. FUEL JETTISON OPEN caution light - Check OUT.

3. Fuel quantity gages - Check.

   Check fuel quantity gages to determine whether fuel jettisoning has stopped. If fuel continues to jettison, proceed to step 4.

4. Left and right fuel jettison circuit breakers - PULL.

HYDRAULIC POWER SYSTEM FAILURE.

If one hydraulic pump fails, the other pump will provide hydraulic system operation; however, all nonessential ac electrical equipment should be turned off. This reduces the loads on the accessory drive train. There is an auxiliary hydraulic power system, powered by an accumulator, that should be used only when necessary, and then to augment, or be used in place of, the normal system.

NOTE

If one hydraulic pump fails, lower the landing gear using the emergency landing gear lowering procedure to reduce the load on the remaining pump. If a go-around is necessary, it is recommended that the landing gear not be retracted. If it becomes necessary to retract the landing gear, depress the landing gear electric reset button before placing the landing gear handle up.

In case of a hydraulic pump failure, proceed as follows:

1. R-14C and Doppler power switches - OFF.

2. Speed brake switch - OFF (center).

3. Auxiliary hydraulic power switch - ON (when necessary).

WARNING

The speed brake should be used only when essential to the mission and then only for one extension. Monitor auxiliary pressure closely during speed brake extension. If pressure drops to 1900 psi, return the speed brake switch to OFF (center) to conserve the remaining fluid and pressure for nosewheel steering and braking during landing.

Do not attempt to taxi the airplane with less than 1700 psi available for nosewheel steering and brakes. Taxiing with the emergency brakes only is not recommended.

EMERGENCY DESCENT.

Circumstances may arise which require a rapid descent in the shortest time possible. If this occurs, move throttles to IDLE, extend the speed brake, and maintain limit airspeed or Mach during the descent.

LOSS OF PRESSURIZATION.

Illumination of the CABIN PRESS FAIL warning light indicates a probable pressurization leak in the cabin and/or around the door seal. The cabin air selector switch should remain positioned at BOTH ENG, as selection of EMER PRESS will aggravate this condition. Maintain engine power

settings as high as flight conditions will permit to ensure availability of maximum bleed air for pressurization.

Illumination of the PRESS DUCT FAIL caution light or silultaneous illumination of the PRESS DUCT FAIL and CABIN PRESS FAIL lights indicates a loss of pressurization duct pressure, or a loss of both pressurization duct pressure and airplane pressurization. Under this condition, emergency pressurization is to be used. In case of a pressurization failure, proceed as follows:

1. **OXYGEN MASKS - ON.**
2. Cabin air selector - Either a or b as required.
   a. Cabin pressure fail light - BOTH.
   b. Pressure duct fail light or AFT FUS OHEAT light - EMER PRESS.

   If cabin pressurization is not restored, proceed to step 3.
3. Emergency descent - To below 25,000 feet.
4. Automatic manual override lever - Check OPEN.
5. Crew/Passenger oxygen masks - Check on.
6. Oxygen warning horn cutout button - Push.
7. Cabin air selector - RAM (if required).

OIL SYSTEM FAILURE.

OIL PRESSURE (ABOVE 50 PSI).

If oil pressure indicates above 50 psi during flight, proceed as follows:

1. Throttle - Reduce thrust.
2. Oil pressure - Monitor.

NOTE

If a reduction in thrust will bring the oil pressure within limits, continue operation at reduced thrust and monitor oil pressure closely. If throttle reduction will not reduce oil pressure within limits, or there is any subsequent increase in pressure, shut engine down.

If fuel fumes are present in the cockpit, the engine should be shut down (regardless of the oil pressure indication after thrust is reduced) because of the possibility of a ruptured fuel oil cooler causing a fire hazard.

3. Throttle - OFF.
4. Fuel - Jettison (if necessary).
5. Land as soon as possible.

OIL PRESSURE (35 to 40 PSI).

If, during flight, the oil pressure drops to the 35 to 40 psi range and is steady, reduce thrust on the affected engine to below 90 percent rpm and proceed with the flight. The condition must be corrected before the next flight. If the oil pressure fluctuates in the 35 to 40 psi range, proceed as follows:

1. Throttle - Reduce thrust.

Reduce thrust until the fluctuation stops; if fluctuation does not stop at idle rpm, proceed with step 2.

2. Fuel - Jettison (if necessary).
3. Land as soon as practical.

OIL PRESSURE (BELOW 35 PSI).

If oil pressure drops to or fluctuates below 35 psi, proceed as follows:

1. Shut down engine.
2. Fuel - Jettison (if necessary).
3. Land as soon as possible.

ENGINE OIL OVERHEAT.

Whenever the engine oil inlet temperature exceeds 121°C as indicated by either of the oil overheat caution lights coming on, check the related pressure gage. If the overtemperature is experienced after a reduction in throttle setting, for example, as thrust is reduced from climb to cruise, it is recommended the throttle be advanced. This will serve to increase the fuel flow, thereby increasing the cooling capacity of the fuel oil-cooler until the heat rejection from the engine can be accommodated.

INFLIGHT EMERGENCIES (Cont)

CAUTION

If the temperature does not return to the operating range within a reasonable time after the throttle is advanced, the oil pressure gage should be closely monitored, as an engine oil system failure and subsequent engine failure could occur.

High oil temperatures experienced during level, constant thrust operation may indicate an engine or oil system malfunction. Under these conditions, reduce thrust in an attempt to control oil temperature. In either case, if the oil temperature cannot be controlled within limits, either shut the engine down, or land as soon as practical.

SPEED BRAKE SYSTEM FAILURE.

A speed brake emergency dump switch is provided to close the speed brake in flight. In case of a complete hydraulic system failure, move the speed brake switch to the OFF (center) position. Placing the speed brake emergency dump switch to DUMP then dumps any trapped hydraulic fluid and allows air loads to return the speed brake to a trail position. Returning the switch to NORMAL creates a hydraulic lock that prevents the speed brake from lowering.

Should an electrical malfunction cause the speed brake switch to remain energized in the OUT position, the speed brake dump valve becomes inoperative. To restore electrical energy to operate the dump valve, pull the speed brake power circuit breaker on the left console. This circuit breaker should not be reset until the electrical malfunction has been corrected.

RUNAWAY TRIM.

If the horizontal stabilizer, rudder or ailerons continue to trim after the normal trim switch has been returned to center (resulting in excessive trim), follow this procedure:

1. **TRIM EMERGENCY DISCONNECT - PRESS.**

   This de-energizes the normal trim circuit.

2. Trim control selector - OFF.

3. Trim emergency disconnect - Release.

   Check that trim malfunction has stopped.

4. Trim control selector - ALTERNATE; then trim as required.

   Place the trim control selector switch at ALTERNATE, and check to see whether the trim malfunction has stopped. If the runaway trim condition is still evident, proceed with step 5.

5. Trim control selector - OFF.

TRIM FAILURE.

If any of the trim systems should fail in either extreme travel position, the force required to neutralize the controls or to move the control surface to the opposite extreme is not beyond physical capabilities. If a failure occurs in the rudder trim switch or the normal trim switch on the control wheel, proceed as follows:

1. Trim circuit breakers - Check IN.

2. Trim control selector switch - ALTERNATE.

3. Elevator, aileron, and rudder alternate trim switches - As required.

LANDING EMERGENCIES

BELLY LANDING.

A skid on the lower fuselage (wing joint) is provided to facilitate a belly landing and to lessen airplane damage. Before a belly landing, jettison as much fuel as practical and proceed as follows:

CAUTION

If the equipment is available and time and conditions permit, the runway should be foamed to eliminate fire hazard and reduce airplane damage.

- When the gear is not down and locked, only 6 degrees of nose up elevation trim is available. If more nose up elevation trim is required, the alternate trim system must be used.

1. Loose equipment - Secure.
2. Fuel - Jettison.
3. Alert crew/passengers.
4. Pressurization - Off.
5. Ground excape hatch - Remove and stow.
6. Safety belts - Tighten.
7. Exterior lights - Off.
8. Hold normal approach speed.
9. Flaps - Down.
10. Throttles - As required to maintain a minimum sink rate in a level attitude.
11. Speed brake - In.
12. Throttles - Off (just before touchdown).

CAUTION

Avoid touching down in a nose-high attitude.

13. Electrical master - Off.

BRAKE FAILURE.

In flight, if it is anticipated that the emergency brake system will be required for landing, it should be selected before touchdown.

WARNING

To preclude landing with a locked wheel brake, do not pump up and hold brake pedals down before landing.

After touchdown, the brake pressure should be built up and maintained before rudder effectiveness is lost. When committed to emergency braking, do not revert to normal braking.

NOTE

Do not attempt to taxi on the emergency brake system, other than to clear the runway.

DITCHING.

The airplane has good static buoyancy qualities, floating near level or slightly tail low. Exit should be made from the ground escape hatch. Crew as well as pilots should be made familiar with their cuties, position, and procedures. Jettison as much fuel as practical to lighten airplane and improve flotation. Ditch while power is still available if possible, so that the most desirable approach can be made.

WARNING

Do not jettison the escape hatch if ditching is imminent.

CAUTION

When the gear is not down and locked, only 6 degrees of nose up elevation trim is available. If more nose up elevation trim is required, the alternate trim system must be used.

1. Radio distress procedure.
2. Fuel - Jettison
3. Alert crew/passengers.
4. Pressurization - Off.
5. Ground escape hatch - Remove and stow.
6. Safety belts - Tighten.

DUAL FLAME-OUT LANDING (TYPICAL)

SPEEDS GIVEN ARE APPLICABLE FOR ANY WEIGHT CONDITION

PROCEDURE TO USE WHEN:
Engines are windmilling or frozen or whenever an emergency requires.

WARNING

If terrain is unknown or unsuitable for dual flameout landing, bail out.

NOTE

- The wing flaps may be raised if it is necessary to extend the glide distance.
- The speed brake and wing flaps are to be used as required to ensure reaching the landing spot.

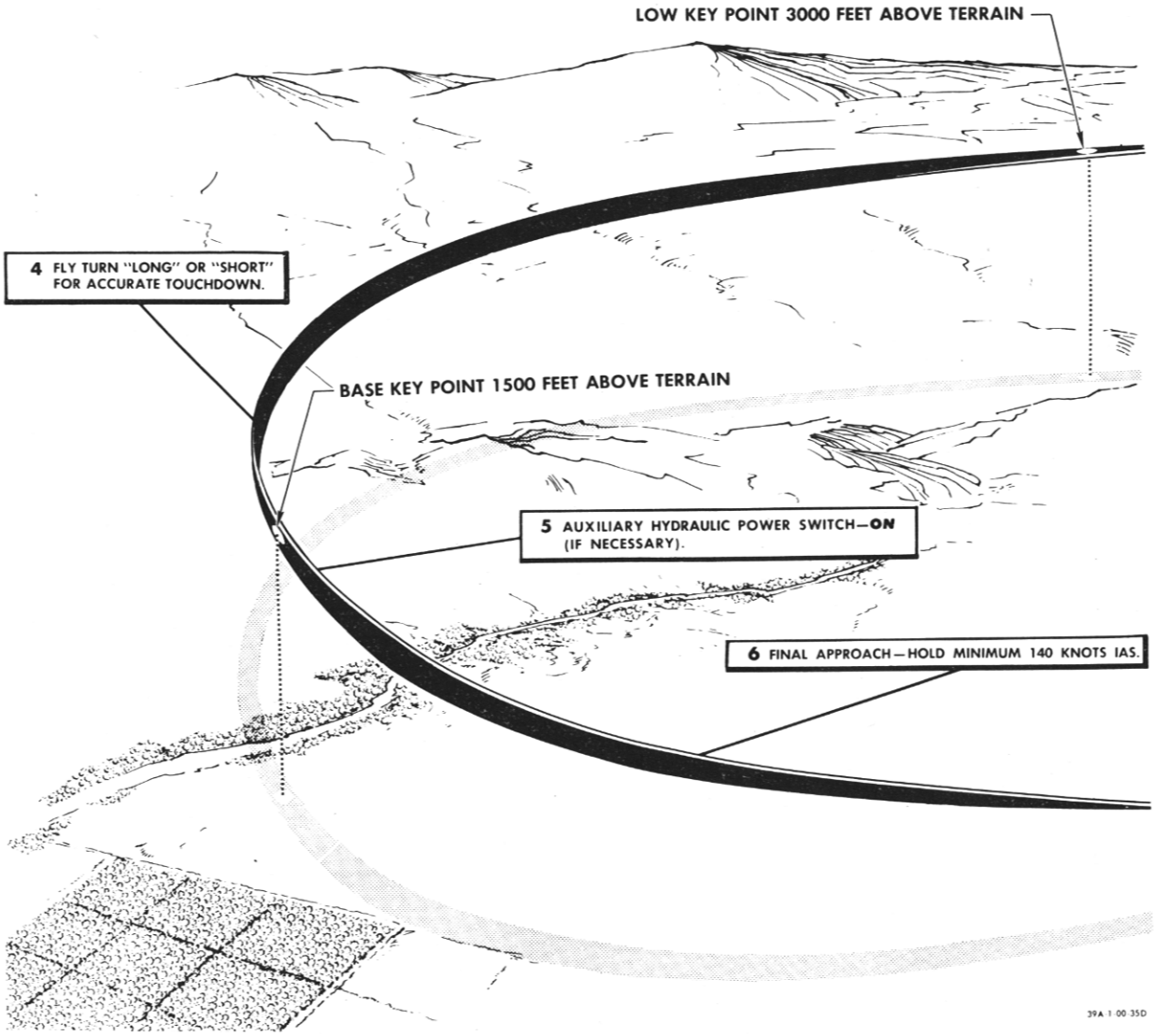
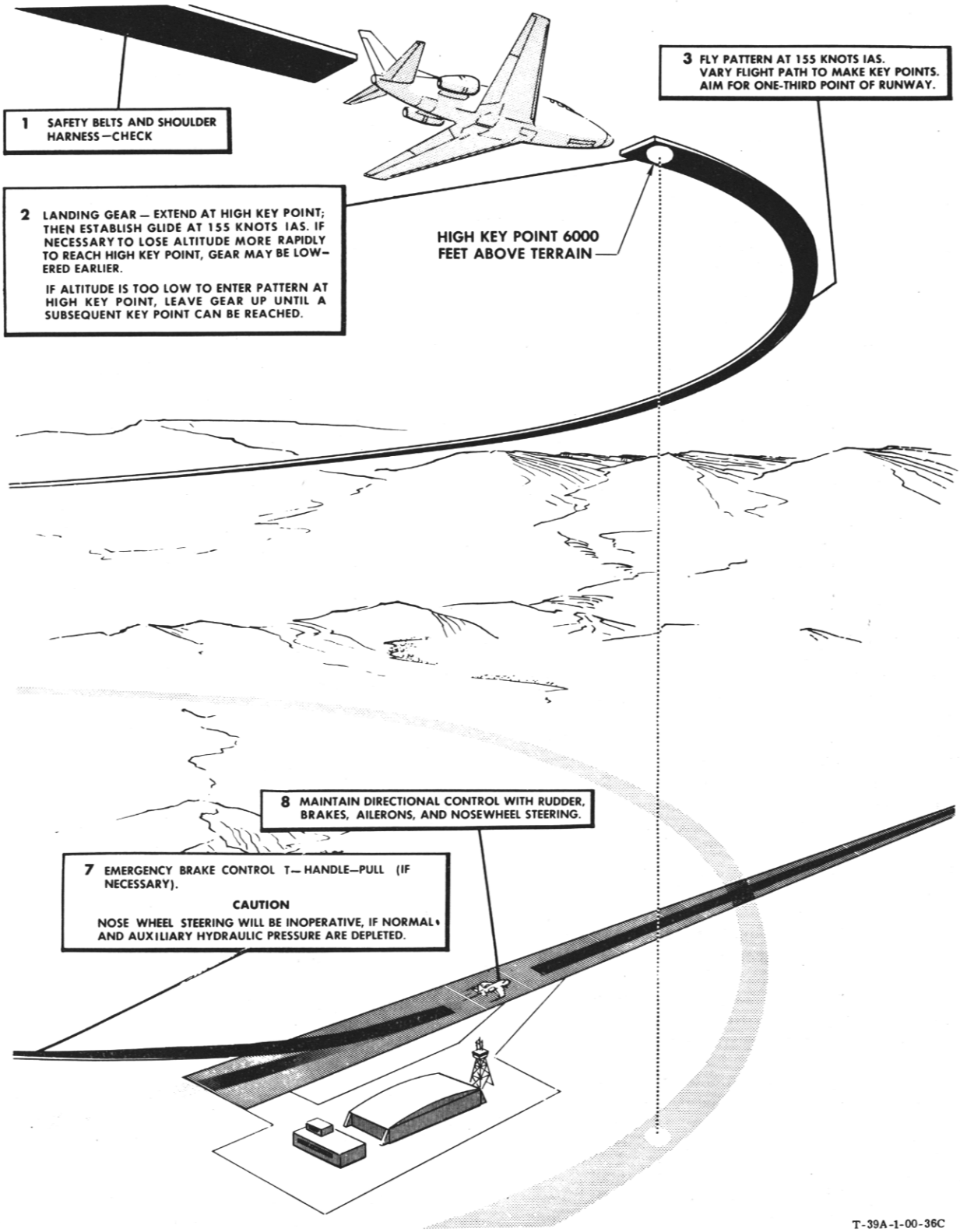


Figure 3-7


1 SAFETY BELTS AND SHOULDER HARNESS—CHECK
2 LANDING GEAR — EXTEND AT HIGH KEY POINT; THEN ESTABLISH GLIDE AT 155 KNOTS IAS. IF NECESSARY TO LOSE ALTITUDE MORE RAPIDLY TO REACH HIGH KEY POINT, GEAR MAY BE LOWERED EARLIER.
IF ALTITUDE IS TOO LOW TO ENTER PATTERN AT HIGH KEY POINT, LEAVE GEAR UP UNTIL A SUBSEQUENT KEY POINT CAN BE REACHED.
3 FLY PATTERN AT 155 KNOTS IAS. VARY FLIGHT PATH TO MAKE KEY POINTS. AIM FOR ONE-THIRD POINT OF RUNWAY.
HIGH KEY POINT 6000 FEET ABOVE TERRAIN
8 MAINTAIN DIRECTIONAL CONTROL WITH RUDDER, BRAKES, AILERONS, AND NOSEWHEEL STEERING.
7 EMERGENCY BRAKE CONTROL T—HANDLE—PULL (IF NECESSARY).
CAUTION
NOSE WHEEL STEERING WILL BE INOPERATIVE, IF NORMAL AND AUXILIARY HYDRAULIC PRESSURE ARE DEPLETED.

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LANDING EMERGENCIES (Cont)

7. Gear - Up.

8. Flaps - Down.

9. Speed brake - In.

10. Normal approach - Keep wings level and slightly nose-high.

CAUTION

Unless the wind is high or the sea is rouch, plan approach heading parallel to any uniform swell pattern, and try to touch down along a wave crest or just after the crest passes. If the surface is irregular, the best procedure is to approach into the wind and touchdown on the falling side of a wave.

11. Throttles - Off.

12. Electrical Master - Off.

13. Abandon airplane through the ground escape hatch.

FORCED LANDING.

FORCED LANDING VS BAILOUT.

If parachutes are available, the decision to attempt a forced landing or to bail out (or have all the crew except the pilot and main student bail out) remains with the pilot. It is impossible to establish a predetermined set of rules and instructions which would provide a ready made decision applicable to all emergencies of this nature. The basic conditions listed, combined with the pilot's analysis of the condition of the airplane, type of emergency, and his proficiency, are of prime importance in determining the action to be taken. These variables make a quick and accurate decision difficult:

1. Dual flameout landing should only be attempted on a prepared or designated suitable surface.

2. If both engines are flamed out and there is insufficient altitude to bail out and a prepared surface is not available, land with the landing gear down.

3. Approaches to the runway should be clear and should not present a problem for a dual flameout approach.

NOTE

If both engines are flamed out and a suitable area is available over which the airplane can be abandoned, do not attempt to land on a field which has approaches located over heavily populated areas.

- If possible, before bailout, attempt to turn the airplane toward an area where injury or damage to persons or property on the ground or water is least likely to occur.

4. Weather and terrain conditions must be favorable. Cloud cover, ceiling, visibility, turbulence, surface wind, etc., must not impede in any manner the establishment of a proper flameout landing pattern.

NOTE

Night dual flameout landings or dual flameout landings under poor lighting conditions, such as at dusk or dawn, should not be contemplated, regardless of weather or field lighting.

LANDINGS ON UNPREPARED SURFACES.

1. Loose equipment - Secure.

2. Fuel - Jettison (as required).

3. Alert crew/passengers.

4. Pressurization - Off.

5. Ground escape hatch - Remove and stow.

6. Safety belts - Tighten.

7. Exterior lights - Off.

8. Fly a dual flameout pattern to selected landing spot (if possible).

9. Gear - Down.

10. Flaps - Down.

11. Speed brakes - In.

12. Alarm bell - Actuate, as required.

13. Touchdown at normal landing speed.

14. Evacuate aircraft.

MAXIMUM GLIDE.

For maximum glide distance (refer to Descents in part 5 of appendix I of T-39A Flight Manual, T.O. 1T-39A-1) with both engines failed (windmilling or frozen), the best gliding speed is 170 knots IAS for a clean airplane, with landing gear and flaps up and speed brake in. (See figure 3-8.) When

LANDING EMERGENCIES (Cont)

speed is maintained at 170 knots IAS, the glide ratio is about 12.5 to 1. Thus, for every 10,000 feet of altitude, the airplane will glide about 21 nautical miles. The glide ratio and glide distance of the airplane with the landing gear down are about half of those obtainable with the landing gear up.

PRECAUTIONARY LANDING.

During emergency operation or when there is doubt of any system capability, a precautionary landing pattern (PLP) should be used. The pattern should conform as nearly as possible to normal instrument or visual approach procedures and references. However, the PLP should allow sufficient time and space to permit any corrections necessary to assure a landing from the first approach. If a complete loss of thrust is anticipated, applicable portions of the forced landing pattern (figure 3-8) should be used.

LANDING GEAR EMERGENCY OPERATION.

LANDING GEAR EMERGENCY LOWERING.

For the landing gear emergency lowering procedure, see figure 3-9.

After the landing gear has been extended by the emergency lowering procedure, leaving the T-handle hooked in the cut out position accomplishes the following:

1. The hydraulic dump valve is held in the open position making it impossible for the landing gear up circuit to be pressurized.

2. Electrical power is removed from the landing gear handle thus preventing the hydraulic selector valve from moving the the retract position.

3. There is no advantage to be gained by restowing the emergency release T-handle. The landing gear down lock pins are held in position by a 70 pound spring force. Restowing the T-handle will not cause hydraulic pressure to be applied to the down lock pins.

If the landing gear emergency lowering procedure has been thoroughly followed and unsafe landing gear indication is observed in the cockpit (failure to have "three in the green" or the red light in the gear handle), a tower flyby or chase plane may verify the landing gear position. If the landing gear appears to be fully extended and the decision is made to make a normal landing, the approach, touchdown, and ground roll should be held as straight as possible. At the end of the ground roll, stop the airplane and visually check all downlock pins. The main gear inspection can be made from behind the wing by looking up into the strut wells outboard of the main gear struts. The nosegear downlock pin can be inspected from behind the nosewheel well from either side of the forward fuselage. Do not tow airplane until the landing gear downlock pins are observed to be properly engaged.

WARNING

The maintenance safety locks will not prevent main gear from retracting when towing.

LANDING GEAR HANDLE STUCK UP.

Failure of the pushbutton controlled solenoid lock may prevent movement of the landing gear handle to DOWN, even though the remainder of the landing gear system functions normally. In this case, attempt normal gear extension as follows:

1. Landing gear downlock override button - Depress and hold.

2. Landing gear handle - DOWN. Check for normal operation of landing gear system.

   If normal operation does not occur, check that landing gear control circuit breaker is in. If popped out, reset one time. If the circuit breaker is in but the landing gear fails to extend, utilize landing gear emergency lowering procedures.

DEMONSTRATED EMERGENCY LOWERING.

Emergency lowering of the landing gear can be demonstrated by using the Landing Gear Emergency Lowering procedure in this section. After demonstration is completed, restow the emergency release T-handle and press the landing gear electric reset button prior to gear retraction.

CAUTION

To prevent damage to the surrounding equipment, care must be used when replacing the T-handle to the stowed position.

LANDING EMERGENCIES (Cont)

LANDING WITH ONE OR BOTH SLATS INOPERABLE.

If one or both wing slats should fail to extend, the final approach airspeed should be increased by 15 knots. Fly the airplane down to the runway. Do not allow the airplane to float. Just before contact with the runway, rotate the nose so that the main gear contacts the runway first.

LANDING WITH ANY ONE MAIN GEAR UP.

If any one main gear is up and cannot be lowered, retract the other gear if possible, and make a belly landing. If the gear cannot be retracted, land on the extended gear, proceeding as follows:

CAUTION

When the gear is not down and locked, only 6 degrees of nose up elevation trim is available. If more nose up elevation trim is required, the alternate trim system must be used.

1. Loose equipment - Secure.
2. Fuel - Jettison (as required).
3. Alert crew/passengers.
4. Pressurization - Off.
5. Ground escape hatch - Remove and stow.

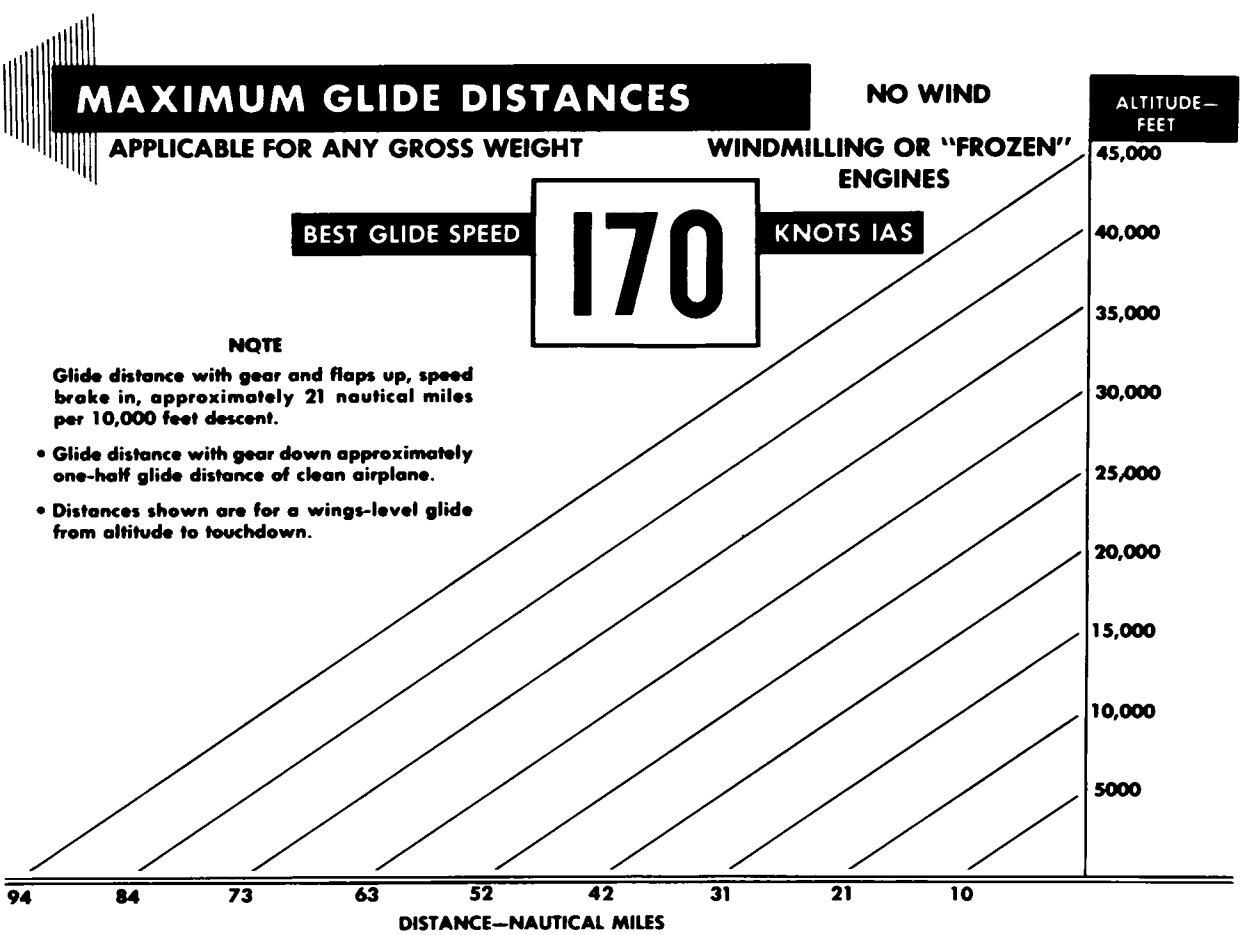


Figure 3-8

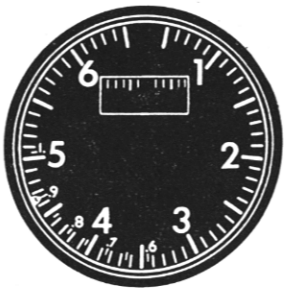
LANDING EMERGENCIES (Cont)

6. Safety belts - Tighten.
7. Exterior lights - Off.
8. Approach - Normal.
9. Flaps - Down.
10. Speed brake - In.
11. Hold unsafe gear off as long as possible.
12. Throttles - Off.
13. Electrical master - Off.

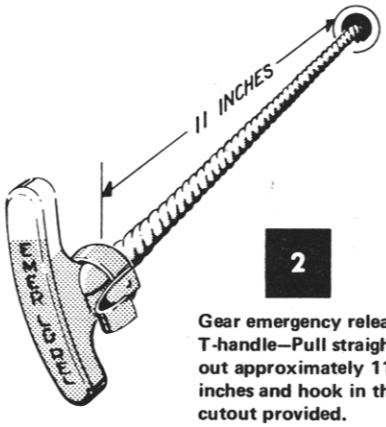
LANDING WITH NOSEGEAR UP.

In the event only the nosegear cannot be extended to the down and locked position it is recommended that landing be accomplished with the main gear down.

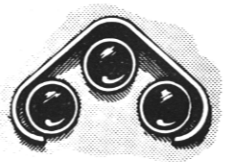
LANDING GEAR EMERGENCY LOWERING



1 Airspeed—Reduce below maximum gear lowering speed.



2 Gear emergency release T-handle—Pull straight out approximately 11 inches and hook in the cutout provided.



3 Gear position lights—Check for safe indication.

NOTE

A smooth and gradual increase of aileron and rudder force which results in a yaw angle of a single ball width deflection should be held until the respective main gear locks down. Repeat single ball width deflection for the other main gear. However, if the main gear still fails to lock, the yaw angle may be increased as much as required, so long as gear limit speed is not exceeded.

- All landing gear should lock down in approximately 30 seconds; this time may be longer during cold-weather operation.

4 Gear handle—DOWN (if possible).

CAUTION

NEW

Do not press the landing gear electric reset button preparatory to gear retraction until the landing gear handle and the landing gear are both in the down position.

Figure 3-9

LANDING EMERGENCIES (Cont)

CAUTION

If the equipment is available and time and conditions permit, the runway should be foamed to eliminate fire hazard and reduce airplane damage.

1. Loose equipment - Secure.
2. Fuel - Jettison (as required).
3. Alert crew/passengers.
4. Pressurization - Off.
5. Ground escape hatch - Remove and stow.
6. Safety belts - Tighten.
7. Exterior lights - Off.
8. Hold normal approach speed.
9. Flaps - Down.
10. Throttles - As required to maintain a minimum sink rate.
11. Speed brake - In.

After touchdown proceed with step 12.

12. Throttles - Off.
13. Flaps - Up.
14. Electrical master - Off.

NOTE

Gently lower the nose to the runway prior to loss of elevator control to prevent sudden drop and structural damage. Use rudder and brakes for directional control.

PRACTICE ENGINE-OUT MANEUVERS.

Practice Dual Flameout Landing.

Dual flameout landings and approaches may be practiced with both engines at IDLE and the speed brake extended.

NOTE

It is recommended that the applicable forced landing techniques and procedures (figure 3-6) be followed during a simulated forced landing.

Practice Single Engine Landing.

Single engine landings may be practiced with one engine at IDLE, using either the forced landing or the normal landing pattern.

SINGLE ENGINE LANDING.

If a single engine landing is required, it is the pilot's decision as to the type of pattern to be used. If the failure may affect the operation of the good engine, the applicable portions of the forced landing pattern should be used. (Fig. 3-8). If the failure will not affect operation of other systems, normal landing patterns may be used. (Fig. 2-4.) Normal final approach speeds may be used; however, at gross weights below 15,000 lb, a safe single engine speed of 115 knots IAS is to be maintained until landing is assured. The following single-engine configuration is recommended: wing flaps set at zero to maximum of 66 percent, and speed brake IN. Maintain the recommended single engine approach airspeed. When the landing is assured, wing flaps may be lowered and speed brake extended. When less than 66 percent of flaps is selected single engine approach speeds will be increased by 10 KIAS. If an engine is lost on final approach with a full flap configuration, the approach may be completed leaving the flaps extended.

NOTE

Better single engine go-around acceleration can be expected with flaps up, because of the lesser drag developed in the no flap configuration.

SINGLE ENGINE GO-AROUND.

NOTE

The safe single-engine speed (see figure 3-3) should be maintained until a safe altitude is reached. Then accelerate to best single-engine climb speed (180 knots IAS).

The decision for a go-around should be made as early as possible. Anticipate strong rudder pressure to offset differential thrust as throttle is advanced. Follow the procedures below:

1. Throttle (good engine) - As required.

LANDING EMERGENCIES (Cont)

2. Speed brake - In.
3. Maintain safe single-engine speed.
4. Gear - Up.
5. Flaps - Up.

TIRE FAILURE.

Main Gear Tire Failure Landing.

When landing with a flat main gear tire, proceed as follows:

1. Fuel - Jettison (if required).
2. Normal approach.

   Land on side of runway that is away from flat tire. This will reduce the need for differential braking if the airplane pulls toward the low tire.

3. Normal touchdown.
4. Flaps - Up.
5. Steering - Engage.

CAUTION

Do not engage nosewheel steering until rudder position is at or near neutral.

6. Wheel brakes - As required.

Nosegear Tire Failure Landing.

When landing is to be made with flat nosegear tire, proceed as follows:

1. Normal approach.
2. Nosewheels - Hold off.

   The nosewheels can be held off longer by retracting the wing flaps, maintaining attitude, and full nose-up trim. Ease nosewheels to runway. When nosewheels touch down, proceed to step 3.

3. Steering - Engage.

CAUTION

Avoid extreme rudder pedal deflections when nosewheel steering is engaged, since this may cause nosewheels to skid or skip sideways, and steering effectiveness will be lost.

4. Brakes - Optimum.
5. Control wheel - Full aft.

AUXILIARY EQUIPMENT

SECTION IV

TABLE OF CONTENTS

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Lighting Equipment 4-7
Navigation Equipment 4-8
Single-point Refueling System . . . . . †
Gravity Refueling . . . . . †
Miscellaneous Equipment . . . . . †

All information on auxiliary equipment is contained in the T-39A Flight Manual, T.O. 1T-39A-1, except the following:

AIR CONDITIONING AND PRESSURIZATION SYSTEM.

See figure 4-1.

ANTI-ICING SYSTEMS.

ENGINE ANTI-ICE FAILURE LIGHTS.

The LH ENG DE-ICE FAIL or RH ENG DE-ICE FAIL amber caution lights (figure 1-13) on the caution-warning light panel, come on only when the respective normally closed inlet anti-icing shutoff valve fails to open with the engine inlet anti-icing switch at ON.

WINDSHIELD ANTI-ICING SYSTEM.

The windshield is heated by A, B, and C phases of the ac busses. The automatic temperature control unit maintains the glass at the proper temperature for defogging and bird-proofing and to prevent formation of ice. A switch in the cockpit is used only to shut off the heater in case of an overheat condition. A caution light warns of an overheat condition.

Windshield Anti-Ice Switch.

The two-position windshield anti-ice switch (figure 4-2), on the anti-ice control panel, is powered by the dc essential bus. The switch has two positions, AUTOMATIC (labeled AUTO) and EMERGENCY OFF (labeled EMER OFF). Moving the switch to AUTOMATIC permits the windshield temperature control unit to sense and control the temperature of the windshield glass, and the switch should remain in this position at all times, except in the case of an overheat condition. This ensures birdproofing of the windshield. Moving the switch to EMERGENCY OFF shuts off all power to the windshield heaters. This should be done only if an overheat condition develops.

NOTE

If the forward windshields have been exposed to solar heating, the windshield overheat caution light may come on when the dc essential bus is energized, regardless of the position of the windshield anti-ice switch. If the copilot's side window or the overhead windows have been exposed to solar heating, the windshield overheat caution light may come on immediately after placing the side windshield anti-ice switch at ON. If the light comes on immediately when the dc essential bus is energized, the windshield anti-ice system should be left off until the windshield has cooled sufficiently

†Refer to T-39A Flight Manual, T.O. 1T-39A-1.

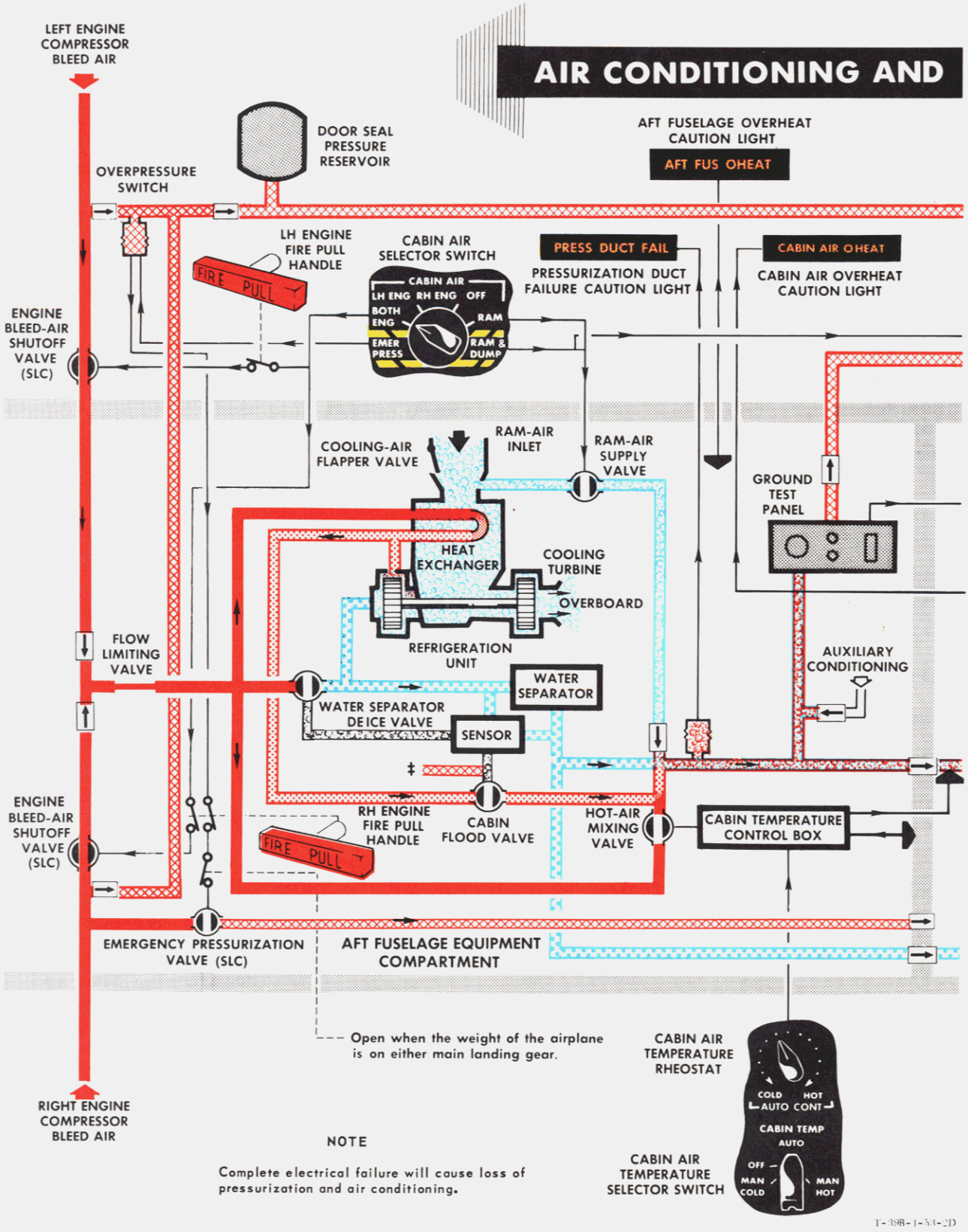
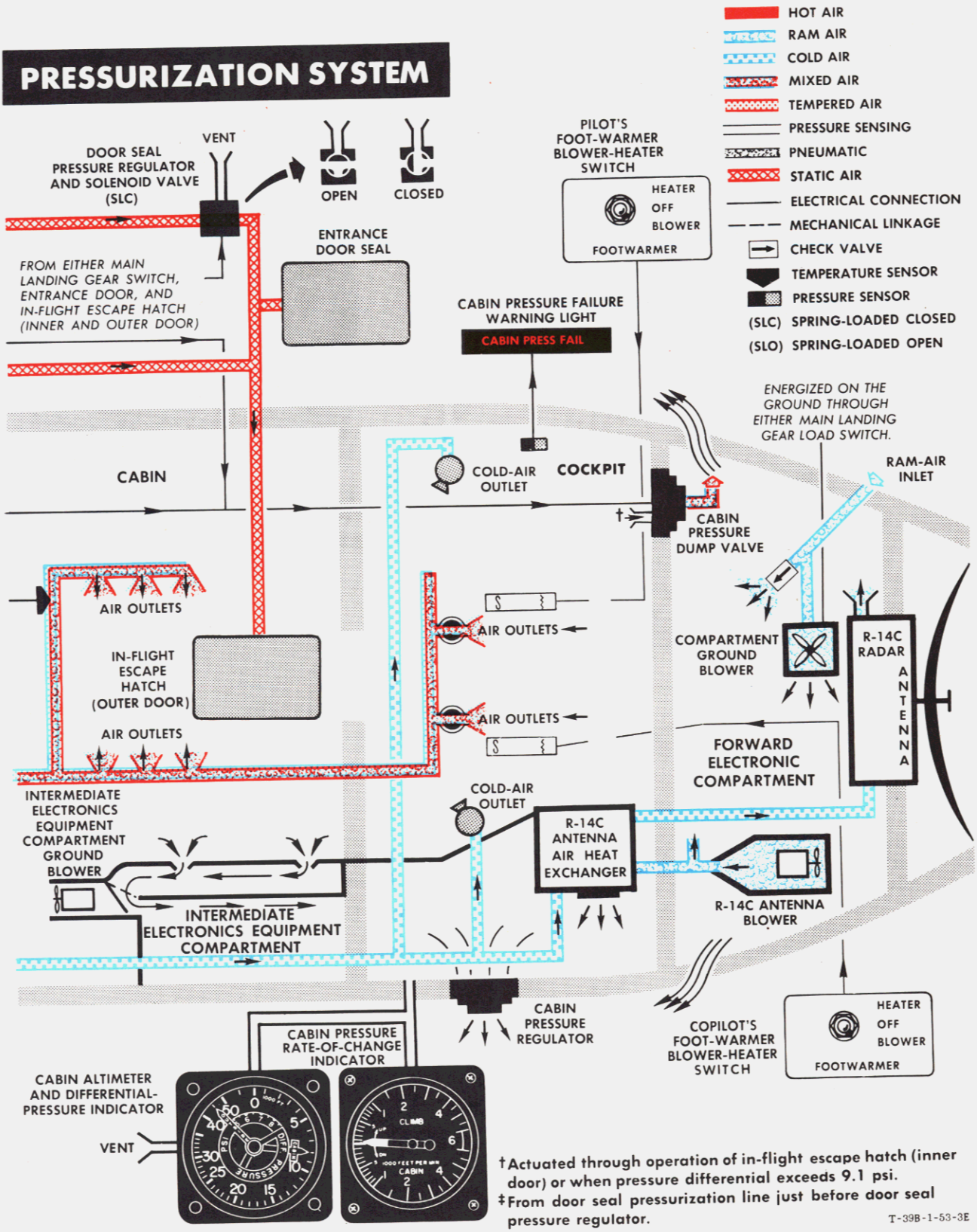

AIR CONDITIONING AND
LEFT ENGINE COMPRESSOR BLEED AIR
DOOR SEAL PRESSURE RESERVOIR
AFT FUSELAGE OVERHEAT CAUTION LIGHT
AFT FUS OHEAT
OVERPRESSURE SWITCH
LH ENGINE FIRE PULL HANDLE
FIRE PULL
CABIN AIR SELECTOR SWITCH
CABIN AIR
LH ENG
RH ENG
OFF
BOTH ENG
RAM
EMER PRESS
RAM & DUMP
PRESS DUCT FAIL
PRESSURIZATION DUCT FAILURE CAUTION LIGHT
CABIN AIR OHEAT
CABIN AIR OVERHEAT CAUTION LIGHT
ENGINE BLEED-AIR SHUTOFF VALVE (SLC)
COOLING-AIR FLAPPER VALVE
RAM-AIR INLET
RAM-AIR SUPPLY VALVE
GROUND TEST PANEL
HEAT EXCHANGER
COOLING TURBINE
OVERBOARD
REFRIGERATION UNIT
FLOW LIMITING VALVE
AUXILIARY CONDITIONING
WATER SEPARATOR
WATER SEPARATOR DEICE VALVE
SENSOR
‡
ENGINE BLEED-AIR SHUTOFF VALVE (SLC)
RH ENGINE FIRE PULL HANDLE
CABIN FLOOD VALVE
HOT-AIR MIXING VALVE
CABIN TEMPERATURE CONTROL BOX
EMERGENCY PRESSURIZATION VALVE (SLC)
AFT FUSELAGE EQUIPMENT COMPARTMENT
Open when the weight of the airplane is on either main landing gear.
CABIN AIR TEMPERATURE RHEOSTAT
COLD
HOT
AUTO
CONT
CABIN TEMP
AUTO
CABIN AIR TEMPERATURE SELECTOR SWITCH
OFF
MAN COLD
MAN HOT
RIGHT ENGINE COMPRESSOR BLEED AIR
NOTE
Complete electrical failure will cause loss of pressurization and air conditioning.
T-39B-1-53-2D

Figure 4-1

PRESSURIZATION SYSTEM



†Actuated through operation of in-flight escape hatch (inner door) or when pressure differential exceeds 9.1 psi.

‡From door seal pressurization line just before door seal pressure regulator.

T-39B-1-53-3E

AIR CONDITIONING, PRESSURIZATION, AND ANTI-ICING SYSTEM CONTROLS

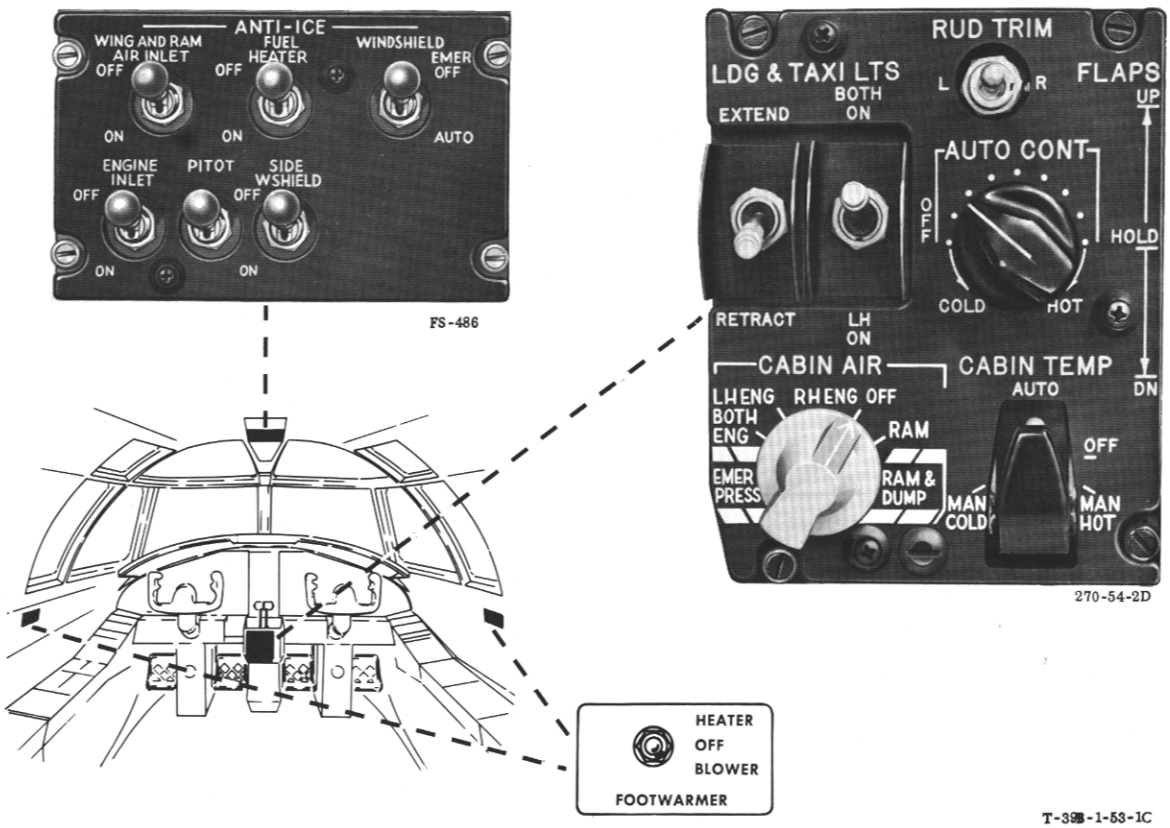


Figure 4-2

to put the light out. If the light comes on immediately when the side windshield anti-ice switch is placed at ON, the switch should be placed at OFF. Periodically during flight, the side windshield anti-ice switch should be placed at ON, and left at ON, only when the light remains out.

- When the windshield overheat caution light comes on in flight, the malfunctioning system should be turned off until the fault is corrected. The malfunctioning system may be isolated by alternately placing the windshield anti-ice switch and the side windshield anti-ice switch OFF. The caution light will go out, after a short waiting period, when the faulty system is turned off.

- When the windshield anti-ice system is turned on, there will normally be a slight ac loadmeter fluctuation, a slight normal hydraulic system fluctuation, and a slight hum in the headset.

Windshield Overheating.

If the windshield overheat caution light comes on, proceed as follows:

1. Windshield anti-ice switch - EMER OFF.
2. Windshield overheat caution light - Check out.

   If the caution light does not go out after a short waiting period, proceed to steps 3 and 4.

3. Side windshield anti-ice switch - OFF.
4. Windshield overheat caution light - Check out.

   Light should go out after a short waiting period.

OXYGEN DURATION—HOURS

CREW—5

CABIN ALTITUDE—FEET	GAGE PRESSURE—PSI 1800	1500	1000	500	100 AND BELOW
40,000 AND ABOVE	2.6 (2.6)	2.2 (2.2)	1.4 (1.4)	0.7 (0.7)	EMERGENCY—DESCEND TO ALTITUDE NOT REQUIRING OXYGEN
30,000	1.9 (1.9)	1.6 (1.6)	1.0 (1.0)	0.5 (0.5)	
20,000	2.4 (1.6)	2.0 (1.3)	1.3 (0.9)	0.6 (0.4)	
10,000	3.1 (1.3)	2.7 (1.1)	2.6 (0.7)	0.8 (0.3)	

- Upper figures indicate all occupants on ***NORMAL OXYGEN.***
- Figures in parentheses indicate pilot and copilot on ***100% OXYGEN*** and other occupants on ***NORMAL OXYGEN.***
- With only pilot and copilot, and both using ***100% OXYGEN,*** oxygen duration will be approximately 1.5 hours with a 10,000-foot cabin altitude.

T-39B-1-73-1

Figure 4-3

CAUTION

The malfunctioning system should not be turned on until the fault is corrected.

OXYGEN SYSTEM.

OXYGEN FLOW INDICATORS.

There is no oxygen flow indicator for the jump seat oxygen mask.

OXYGEN MASKS - CABIN.

There is no oxygen mask or "in-use" valve in the right forward oxygen mask compartment. An oxygen mask and "in-use" valve are over the jump seat at the cabin rear bulkhead.

COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT

See figure 4-4 for antenna locations.

RADIO AND INSTRUMENT MASTER SWITCH.

This switch has the same function as on T-39A Airplanes and, in addition, controls electrical power to the main student's and standby students' course-track-distance indicators.

INTERCOMMUNICATION SET - AN/AIC-10A.

Cabin Speaker Switch.

NOTE

The cabin speaker switch should be OFF at all times, to prevent feedback from occurring between the cabin speaker and the pilot's microphone.

Intercommunication Control Panels (Cockpit and Cabin).

There are five intercommunication control panels for interstation use. One panel, for the pilot, is on the left console. Another panel (10, figure 1-4), for the main student, is on the right console. The instructor's panel is on the right side

RADIO AND RADAR ANTENNA LOCATIONS

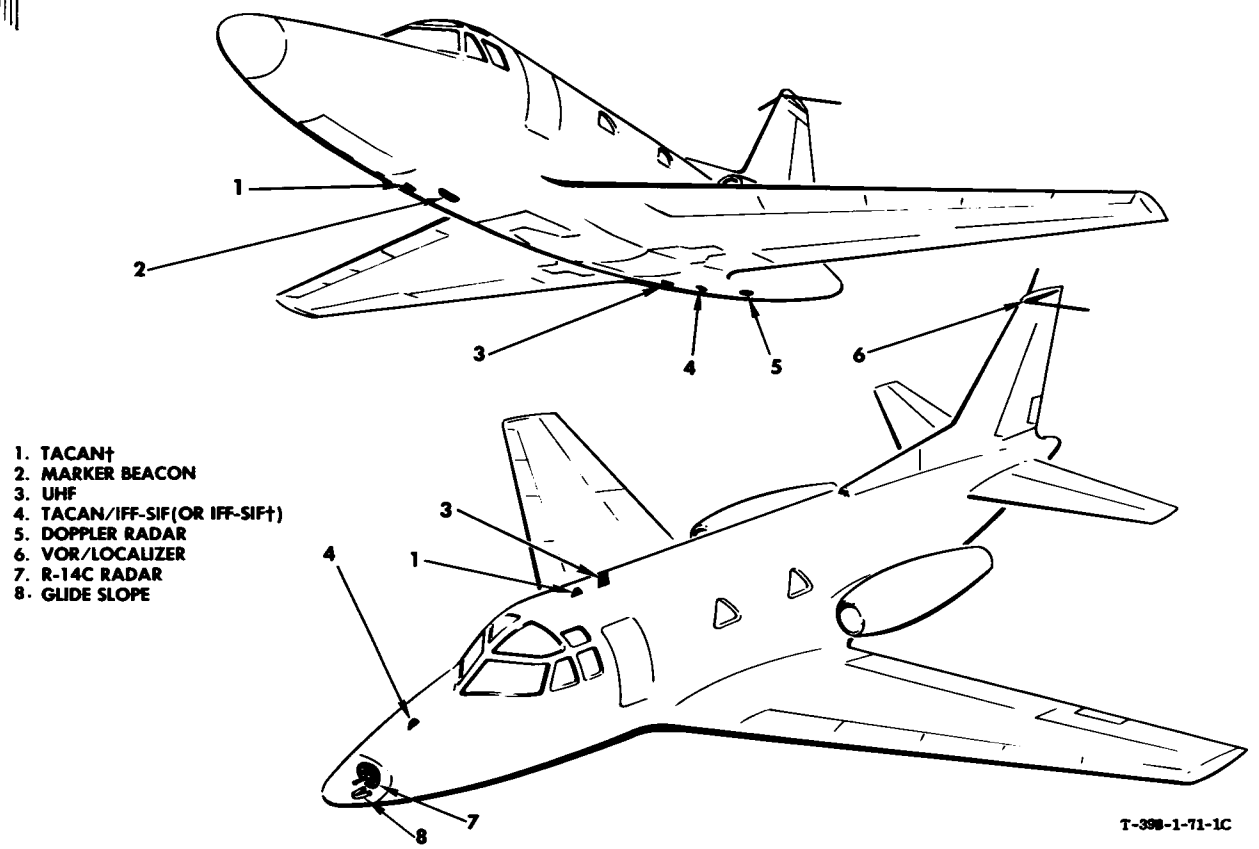


Figure 4-4

of the instructor-student compartment aft bulkhead. A panel is on each standby student's console. The controls on each of these panels and their operation are basically similar; the variations are due to the duty function of the user.

NOTE

In the following paragraphs, only the mixer and function selector switch positions and functions which differ from those on T-39A Airplanes are explained. Some of these are peculiar to certain panels, which can readily be determined by the inclusion or omission of such identification from a given panel. For example, the function selector switch position PILOT PRIVATE (Labeled PILOT PVT) is on only the instructor's panel; therefore, this function is not available to the standby students. Unmarked mixer switches, which are on certain panels, have no function.

MIXER SWITCHES. The mixer switch marked COMM permits reception of command radio signals when the function selector switch is at INTERPHONE, INSTRUCTOR PRIVATE, or PILOT PRIVATE. The CABIN mixer switch permits reception by the instructor of a standby student's interphone signals when the latter's function selector switch is at INSTRUCTOR PRIVATE. The PILOT mixer switch permits reception by the instructor of the pilot's interphone signals when the pilot's function selector switch is at INSTRUCTOR PRIVATE. The INST mixer switch permits reception by a standby student of the instructor's interphone signals when the instructor's function selector switch is at CABIN PRIVATE.

FUNCTION SELECTOR SWITCH. With the pilot's function selector switch at INSTRUCTOR PRIVATE (labeled INST PVT), the pilot's interphone signals will be heard by the instructor when the latter's PILOT mixer switch is ON or function selector switch is at PILOT PRIVATE (labeled PILOT PVT). With the instructor's function selector switch

at PILOT PRIVATE, the instructor's interphone signals will be heard by the pilot when the latter's function selector switch is at INSTRUCTOR PRIVATE. With the instructor's function selector switch at CABIN PRIVATE (labeled CABIN PVT), the instructor's interphone signals will be heard by the standby students when their INST mixer switches are ON or their function selector switches are at INSTRUCTOR PRIVATE. With the standby students' function selector switches at INSTRUCTOR PRIVATE, their interphone signals will be heard by the instructor when his CABIN mixer switch is ON or his function selector switch is at CABIN PRIVATE.

Interphone-Microphone Switch and Microphone Button.

In order for the pilot to call the instructor by use of the private interphone line (pilot's function selector switch at INSTRUCTOR PRIVATE), the MICROPHONE position of the pilot's interphone-microphone switch must be used. All other functions of the pilot's interphone-microphone switch and microphone button are the same as on T-39A Airplanes. All functions of the main student's interphone-microphone switch (38, figure 4-5) are the same as for the copilot on T-39A Airplanes.

Operation of Intercommunication Set - AN/AIC-10A.

For private interphone operation between pilot and instructor:

1. Pilot's function selector switch - INSTRUCTOR PRIVATE.

2. Instructor's function selector switch - PILOT PRIVATE.

3. Interphone-microphone switch or instructor's microphone button - MICROPHONE or press, and talk.

NOTE

The switch or button must be released to allow the station to reply.

For private interphone operation between instructor and standby student or students:

1. Instructor's function selector switch - CABIN PRIVATE.

2. Standby student's or students' function selector switch(es) - INSTRUCTOR PRIVATE.

3. Instructor's or standby student's microphone button - Press, and talk.

NOTE

The button must be released to allow the called station to reply.

LIGHTING EQUIPMENT.

EXTERIOR LIGHTING.

The landing-taxi lights are retractable and, when in use, extend below the nose into the air stream.

Landing-Taxi Light Switches.

Landing-taxi light position and illumination are controlled by two adjacent switches (figure 4-2) which are powered by the dc essential bus. The switches are on the aft face of the center pedestal. When the lefthand switch is moved to EXTEND, both landing-taxi lights extend to the landing position. Upon landing, when the weight of the airplane is on the nosegear, both lights automatically extend further to the taxi position, providing properly directed beams for taxiing. If a touch-and-go landing is made and the switch is left at EXTEND, both lights return to the landing position, as the weight of the airplane is removed from the nosegear. Moving the lefthand switch to RETRACT causes both lights to retract. The lights may be stopped at any point between the retracted and extended position, by moving the switch to the center OFF position. This shuts off electrical power to the light motors. The switch should be turned OFF after desired light position is attained. Moving the righthand switch to BOTH ON turns on both landing-taxi lights. Moving the switch to LEFTHAND ON (labeled LH ON) turns on the lefthand landing-taxi light only. Both lights go out when the switch is moved to the center OFF position.

INTERIOR LIGHTING.

The standby students' consoles are indirectly illuminated by edge lighting, while direct lighting is provided by two overhead floodlights.

Standby Student's Console Light Switch.

Each standby student console has a console light switch (figure 4-5) outboard of the radarscope (labeled CONSOLE LIGHTS). The switch controls lighting of all panels and instruments except radarscopes, on the standby students' consoles. Moving the switch from OFF to BRIGHT (labeled BRT) gives maximum brightness. The lights may be dimmed by moving the switch to DIM. Each switch is powered by the No. 2 dc secondary bus and righthand 5-volt ac indirect light bus.

Standby Student's Console Floodlight Rheostat.

The standby students' consoles can be illuminated by two adjustable overhead floodlights, one directly above each

console. Turning the rheostat knob (figure 4-5) clockwise from OFF through DIM to BRIGHT, labeled BRT (cabin light color-control switch NORMAL) turns on and increases the brightness of the floodlights. Each rheostat is powered by the dc secondary bus.

Standby Student's Console Floodlight Button.

Either standby student's console overhead floodlight may be turned on to maximum brightness (cabin light color-control switch NORMAL), or off, by pressing the button next to the light. Each switch is wired in parallel with the respective standby student's console floodlight rheostat. Thus, when the standby student's console floodlight button is pressed, the floodlight will come on bright, regardless of rheostat position. When the button is pressed to turn the light off, the light will return to the brightness setting on the rheostat. Each switch is powered by the dc secondary bus.

Flight Instrument Light Rheostat.

The R-14C range lights can be varied in brightness by use of the main student's INDIRECT knob. However, when the flight instrument lighting system is off, the dimming circuit is bypassed and the range lights come on to maximum brightness. All other functions of the main student's flight instrument light rheostat are the same as for the copilot's rheostat in T-39A Airplanes.

NOTE

The pilot's flight instrument INDIRECT knob controls brightness of the R-14C mode selection lights to either dim (when the knob is full counter-clockwise) or full bright (by initial clockwise movement of the knob).

Cabin Light Color Control Switch.

The function of this switch is basically the same as on the T-39A Airplanes. However, moving the switch to RED turns on the red dome lights in the cabin and turns off the entrance lights and both students' console floodlights.

Standby Students' Console Floodlights and Switches.

The standby students' console floodlights and switches are functionally the same as the passengers' reading lights and switches on the T-39A Airplanes.

NAVIGATION EQUIPMENT.

NAVIGATOR'S STATION.

The T-39B Airplanes do not have a navigator's station.

HEADING INDICATING SYSTEM.

The pilot's heading indicating system on the T-39B Airplane operates the same as the system on the T-39A Airplane.

The compass system provides signals to the compass cards of the copilot's (main student's) and standby students' course-track-distance indicators to show a stabilized magnetic heading. The copilot's and standby students' course-track-distance indicator pointers display information from the doppler radar system.

MARKER BEACON RECEIVER.

The marker beacon receiver for T-39B Airplanes is the same as the system used on T-39A Airplanes, except that there are no marker beacon lights on the copilot's outboard instrument panel.

FLIGHT DIRECTOR SYSTEM.

The flight director system on T-39B Airplanes is the same as on T-39A Airplanes, except that there is no copilot's course selector switch, copilot's course select fail light, or copilot's course select inoperative light. In addition, the bearing-distance-heading and course indicators are not installed in T-39B Airplanes. Functionally, this means that, on T-39B Airplanes, the main student has no control over the flight director system, and flight director presentations are not made on any of the main student's instruments.

R-14C RADAR SYSTEM.

The R-14C is a compact, lightweight, all purpose radar system that provides search and range information through radarscope presentations. Specifically, it provides air-to-air search, air-target acquisition, and tracking functions for simulated fighter-type missions, and ground mapping, contour mapping, and terrain avoidance for navigation and simulated bombing. The system also can be utilized for detecting and avoiding thunderstorm areas. Targets or terrain in blind modes are presented simultaneously on three radarscopes: one on the main student's instrument panel, and one on each standby student's console.

The radarscopes and associated equipment are pressurized to prevent possible loss of power due to arcing and corona effects. There are two control panels and a training throttle for the main student. The main student's righthand radar control panel is on the right console. An identical control panel is on each standby student's console. The main student's left radar control panel and training throttle are attached to a pivot arm secured to the center pedestal. The arm may be moved straight up for ground stowage, to an intermediate position for operation, and down for inflight stowage. A spring pin in the pivot arm must be pulled to release the arm from any of the three detented positions.

The control panel is equipped with a handrest to facilitate switch operation. The system is a monopulse radiation type and is powered by the No. 2 dc secondary bus and the 115-volt A, B, and C phase secondary busses. The system uses the MD-1 vertical gyro system pitch and roll signals for reference.

WARNING

When the R-14C radar system is being checked or operated by the flight crew on the ground, the area within a radius of 30 feet of the nose of the airplane and 50 degrees right and left of the airplane centerline must be clear of all personnel and operations involving fuel or other flammables, because of the radiation hazard involved.

Radarscope.

The radarscope (7 and 55, figure 4-5) is a cathode-ray storage tube, 5 inches in diameter. The radarscope presents navigation mapping displays, terrain clearance, and search and attack displays of the R-14C system. An engraved scale over the face of the scope defines the display area and contains the range scale and azimuth scale. Illumination of these scales may be varied when the radar system is energized. Controls are provided for selecting and controlling the various radarscope presentations.

NOTE

The inverter switch must be at AUTOMATIC for operation of the R-14C. If the inverter switch is placed in any other position, the R-14C system will be inoperative because of loss of electrical power.

Angle of Attack Vanes.

Two vanes, one on each side of the fuselage, just aft of the radome, electrically provide signals to the R-14C system. The signals are used in the terrain avoidance mode to supply angle of attack information for radarscope orientation. The vanes are electrically heated by the No. 2 dc secondary bus (system power switch at SYSTEM POWER) when the weight of the airplane is off the landing gear.

R-14C Radar System Controls and Indicators.

SYSTEM POWER SWITCH. The three-position system power switch (17, figure 4-5) controls electrical power to the R-14C system. When the switch is at STDBY, the radar transmitter is off and the antenna is in the stowed position, but the remainder of the system is on. With the switch at SYSTEM POWER, the entire system is activated. Moving the switch to OFF (the switch toggle must be lifted to obtain this position) disconnects all power to the system. The switch is powered by the No. 2 dc secondary bus.

NOTE

If either of the hydraulic pumps or the ac generator fails, the R-14C system will be inoperative because of loss of electrical power.

DOPPLER GROUND SPEED - DRIFT ANGLE INDICATOR. Refer to Doppler Radar System - AN/APN-131 in this section.

MODE SELECTION LIGHTS. Five lights (10 and 57, figure 4-5), powered by the No. 2 dc secondary bus, are provided to indicate the radar mode that is selected through the mode selector buttons. For whichever operating mode is in use, the corresponding mode selection light comes on and displays the mode letters. The letters that appear in the individual lights and the operating modes for which they stand are as follows:

GS - ground map spoil (wide beam)

GP - ground map pencil (narrow beam)

TA - terrain avoidance

AA - air-to-air

CM - contour map

These lights can be tested through the caution light test switch. The pilot's flight instrument INDIRECT knob controls the intensity of these lights to either dim (knob full counterclockwise) or bright (knob at any position except full counterclockwise).

ANTENNA TILT INDICATOR. This indicator (4 and 58, figure 4-5), powered by the No. 2 dc secondary bus, is on the main student's instrument panel and the righthand standby student's console. A scale and pointer show the number of degrees the antenna is positioned above or below the antenna bore-sight line (3 degrees below the fuselage reference line) in air-to-air, contour map, and terrain avoidance modes, and the number of degrees the antenna is positioned above or below the true horizontal in the ground map mode. The scale reads a maximum of 15 degrees up and 30 degrees down.

ANTENNA TILT WHEEL. The antenna tilt wheel (18, figure 4-5) controls elevation positioning of the antenna in ground map and air-to-air modes. The thumb wheel varies the antenna elevation angle from up 20 degrees from the antenna boresight line to down about 40 degrees from the antenna boresight line.

R-14C ANTENNA GYRO SWITCH. The antenna gyro switch (3, figure 4-5), labeled "NASARR ANTENNA GYRO," has two positions, NORM and ALT. In the NORM position, the antenna receives signals from the pilot's gyro system. In the ALT position, the signal source for the

R-14C RADAR AND DOPPLER CONTROLS AND INDICATORS

. . .. MAIN STUDENT

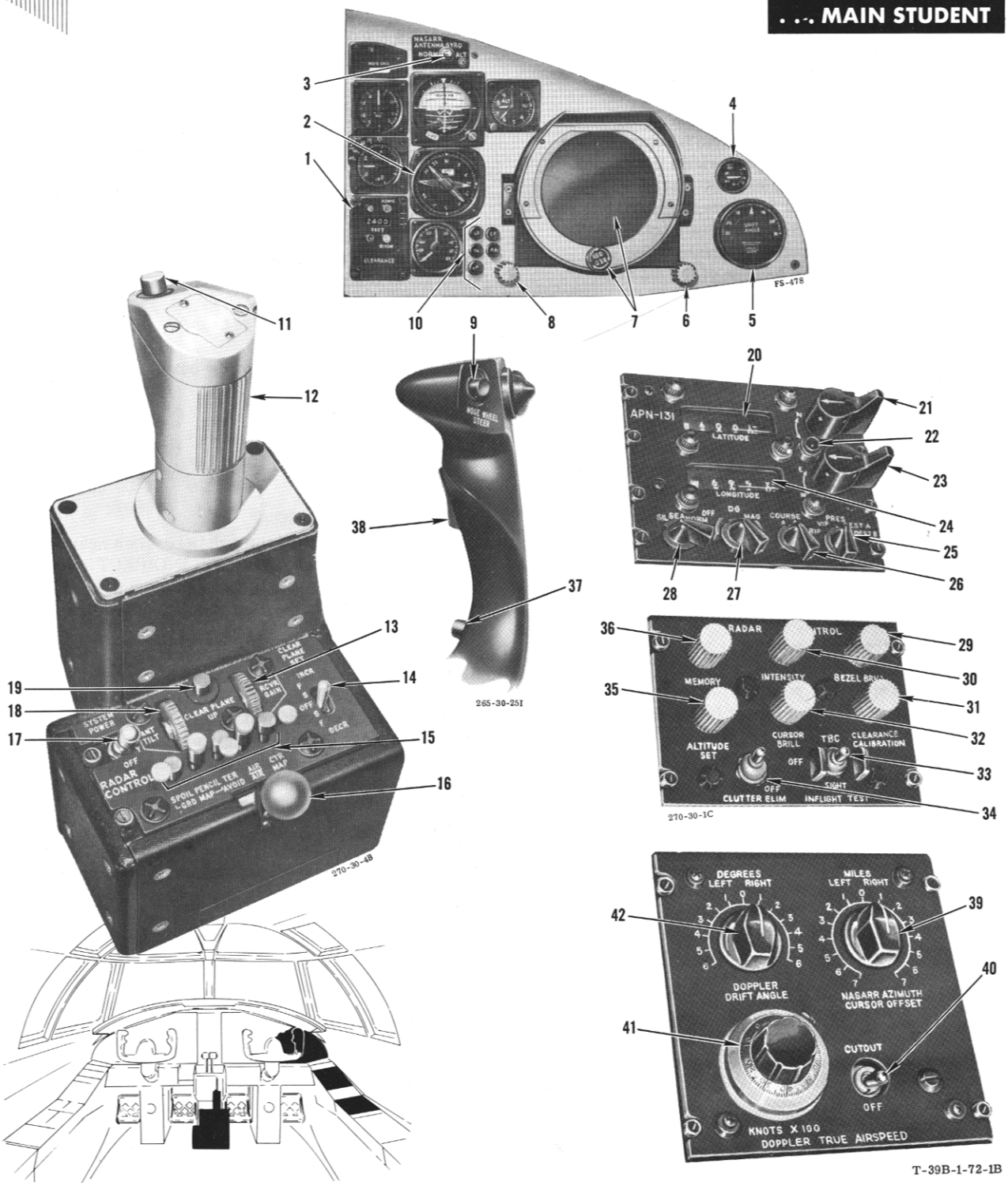
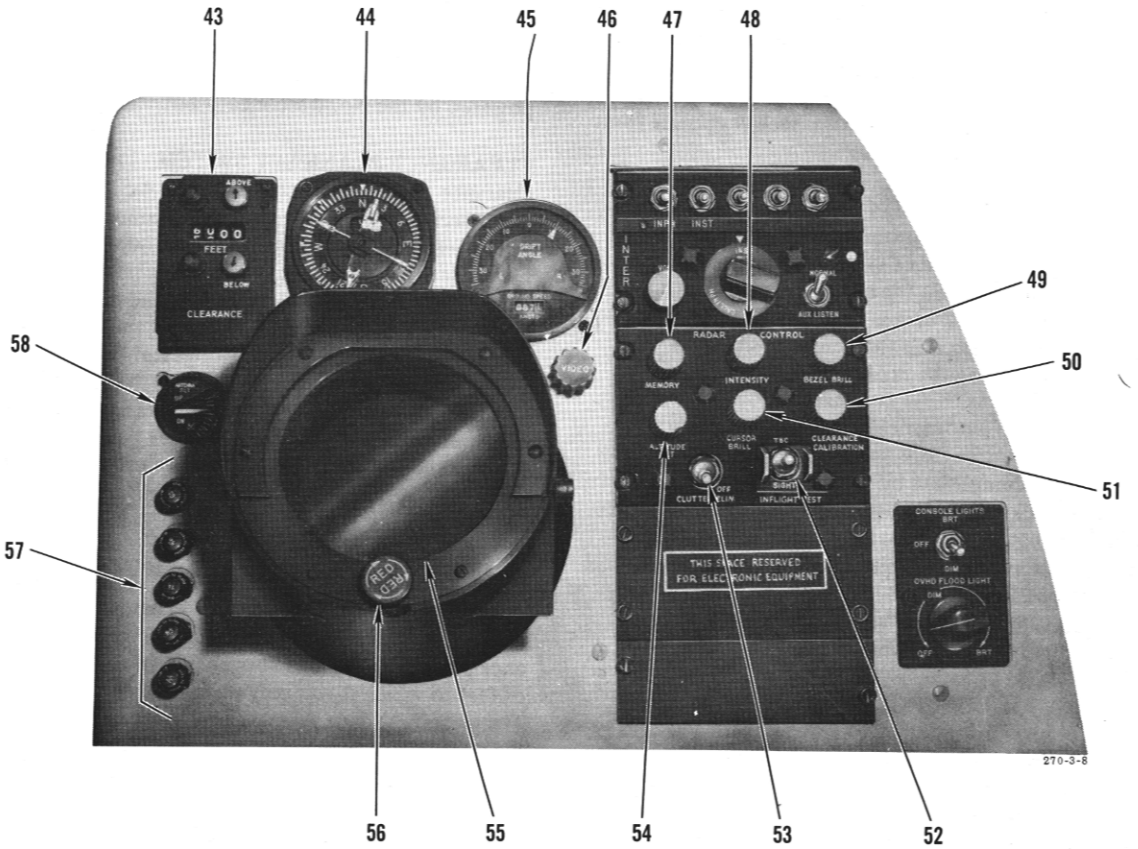


Figure 4-5

. . . STAND-BY STUDENTS

NOTE

The right-hand stand-by student's instrument panel is shown. The left-hand stand-by student's instrument panel is identical, except that the console light switch and overhead floodlight knob are on the left side of the panel and there is no antenna tilt indicator.



1. CLEARANCE PLANE INDICATOR
2. COURSE-TRACK-DISTANCE INDICATOR
3. R-14C ANTENNA GYRO SWITCH‡
4. ANTENNA TILT INDICATOR
5. GROUND SPEED—DRIFT ANGLE INDICATOR
6. HORIZON KNOB
7. RADARSCOPE AND FILTER KNOB
8. VIDEO KNOB
9. RADAR RANGE CURSOR—NOSE WHEEL STEERING BUTTON
10. MODE SELECTION LIGHTS
11. RADAR ACTION REJECT BUTTON
12. TRAINING THROTTLE
13. R-14C RECEIVER GAIN WHEEL
14. CLEARANCE PLANE SET SWITCH
15. MODE SELECTOR BUTTONS
16. HANDREST
17. R-14C SYSTEM POWER SWITCH
18. ANTENNA TILT WHEEL
19. CLEARANCE PLANE-UP BUTTON
20. LATITUDE COUNTER
21. LATITUDE SLEW KNOB
22. MEMORY LIGHT
23. LONGITUDE SLEW KNOB
24. LONGITUDE COUNTER
25. COORDINATE DISPLAY SWITCH
26. COURSE SWITCH
27. DOPPLER SYSTEM POWER—HEADING REFERENCE SWITCH
28. FUNCTION SWITCH
29. BEZEL BRILLIANCE KNOB
30. INTENSITY KNOB
31. CLEARANCE CALIBRATION KNOB †
32. CURSOR BRILLIANCE KNOB
33. IN-FLIGHT TEST SWITCH (INOPERATIVE)
34. CLUTTER ELIMINATOR SWITCH †
35. ALTITUDE SET KNOB †
36. MEMORY KNOB
37. RADAR RANGE SWEEP BUTTON (ON FRONT OF WHEEL)
38. INTERPHONE-MICROPHONE SWITCH (ON FRONT OF WHEEL)
39. AZIMUTH CURSOR OFFSET KNOB
40. AIRSPEED CUTOUT SWITCH
41. TRUE AIRSPEED KNOB
42. DOPPLER DRIFT ANGLE KNOB
43. CLEARANCE PLANE INDICATOR
44. COURSE-TRACK-DISTANCE INDICATOR
45. GROUND SPEED—DRIFT ANGLE INDICATOR
46. VIDEO KNOB
47. MEMORY KNOB
48. INTENSITY KNOB
49. BEZEL BRILLIANCE KNOB
50. CLEARANCE CALIBRATION KNOB †
51. CURSOR BRILLIANCE KNOB
52. IN-FLIGHT TEST SWITCH (INOPERATIVE)
53. CLUTTER ELIMINATOR SWITCH †
54. ALTITUDE SET KNOB †
55. RADARSCOPE
56. FILTER KNOB
57. MODE SELECTION LIGHTS
58. ANTENNA TILT INDICATOR

† Inoperative on stand-by student's panels.

T-39B-1-72-2B

R-14C antenna is transferred from the pilot's gyro system to the copilot's gyro system. The pilot's and copilot's attitude indicators receive signals from their respective gyro systems at all times. Power is through the 28-volt dc essential bus.

RADAR ACTION REJECT BUTTON. This button (11, figure 4-5), on the top of the training throttle grip, controls acquisition and rejection of a target, depending on the air-to-air phase selected. During air-to-air search, the button must be depressed momentarily to transfer to either visual or blind manual acquisition phase. Which will be selected is dependent on the position of the blind-visual acquisition switch. During air-to-air attack, if it is desired to reject a target after lockon, momentarily depressing the radar action reject button will break lockon, and the radar will revert to acquisition phase. The button receives power from the No. 2 dc secondary bus.

BLIND-VISUAL ACQUISITION SWITCH. This switch, controlled by rotation of the training throttle grip (12, figure 4-5), allows selection of visual or blind manual acquisition phase of operation in the air-to-air mode. During air-to-air search phase, visual acquisition may be selected while the training throttle grip is in the detent position by momentarily depressing the radar action reject button. [illegible] to the boresight line. At the same time, the range gate automatically slews in range until lockon occurs. Transfer from search to blind manual acquisition phase is accomplished by rotating the training throttle grip clockwise and momentarily depressing the radar action reject button. When the range gate is positioned by rotation of the training throttle grip to intersect the target image, lockon will occur. The throttle grip is spring-loaded to the detent position. The switch receives power from the No. 2 dc secondary bus.

MANUAL RANGE CONTROL. During operation in the air-to-air blind acquisition phase, manual radar ranging is accomplished by rotation of the training throttle grip from the detent position in a clockwise direction. Rotation of the grip back and forth while clockwise of the detent position moves the range gate on the radarscope accordingly. Full clockwise rotation of the grip positions the range gate to minimum range. This control receives power from the No. 2 dc secondary bus.

RESUME SEARCH SWITCH. This switch, controlled by rotation of the training throttle grip, is operated by a counterclockwise rotation of the grip from its detent position. Rotation of the grip counterclockwise from the detent position causes the radar to resume the air-to-air search phase.

MODE SELECTOR BUTTONS. The five system mode selector buttons (15, figure 4-5), control selection of the desired radar mode and corresponding system operation. These key-type buttons are labeled as follows:

GRD MSP SPOIL (wide beam deflected downward)

GRD MAP PENCIL (narrow beam)

TER AVOID

AIR-AIR

CTR MAP

The related mode selection light will come on to indicate the radar mode selected. The mode selector buttons are powered by the No. 2 secondary bus.

CLEARANCE PLANE SET SWITCH. The five-position clearance plane set switch (14, figure 4-5), powered by the No. 2 secondary bus, controls the clearance plane setting in terrain avoidance and contour map modes. Spring-loaded to the center OFF position, the switch is marked INCR and DECR. The switch is also marked F and S above the center position (increase) and S and F below the center position (decrease). Clearance plane settings can be slewed within 0 to 6000 feet above or below the airplane in 100-foot increments, with either a fast (F) or a slow (S) slewing rate. However, positioning of the clearance plane above the airplane, either during or after slewing the desired setting, requires that the clearance plane up button be held depressed.

CLEARANCE PLANE UP BUTTON. The clearance plane up momentary contact button (19, figure 4-5) is marked CLEAR PLANE UP. When this button is pressed, the clearance plane is positioned above the airplane the same number of feet to which it was previously set below the airplane. The clearance plane remains set above the airplane only as long as the button is held down. The button is powered by the No. 2 dc secondary bus.

CLEARANCE CALIBRATION KNOB. This knob (31, figure 4-5), labeled CLEARANCE CALIBRATION, is used to establish accurate radarscope and clearance plane indicator presentations in terrain avoidance and contour map modes. Functionally, it acts as a vernier adjustment of the clearance plane setting. With the altitude differential between airplane altitude and terrain reference point set on the clearance plane indicator, the knob should be rotated as necessary until the selected reference point image just begins to appear on the radarscope. At this point, the system will be properly calibrated for clearance plane indications. The knob is inoperative on the standby students' consoles. The copilot controls clearance plane calibration for the entire system.

WARNING

For missions involving terrain avoidance or contour map mode, the calibration should be accomplished as soon as possible after takeoff.

CLEARANCE PLANE INDICATOR. The clearance plane indicator (1 and 43, figure 4-5) numerically shows the clearance plane in feet (from 0 to 6000) set into the system when in contour map or terrain avoidance modes. Two indicator lights, each marked with an arrow, come on when the clearance plane is set above or below the airplane. The upper light (arrow up), labeled ABOVE, comes on to indicate that the clearance plane is set above the airplane; the lower light (arrow down), labeled BELOW, comes on to indicate that the clearance plane is set below the airplane. The indicator is powered by the No. 2 dc secondary bus.

Radarscope Display Controls.

CLUTTER ELIMINATOR SWITCH. This switch (34 and 53, figure 4-5), labeled CLUTTER ELIM, has ON and OFF positions. With the switch at ON, the eliminator circuits are energized by the No. 2 dc secondary bus to reduce ground clutter, sea return, and jamming signals that may appear on the radarscopes in the air-to-air search mode. The switch is inoperative on the standby students' consoles. The main student controls radar scope presentation.

RADAR RANGE CURSOR - NOSEWHEEL STEERING BUTTON. This button (9, figure 4-5) is labeled RADAR RANGE CURSOR - NOSEWHEEL STEER. In its dual function, it changes radar range cursor setting when the airplane is airborne, and energizes nosewheel steering control circuits when the airplane is on the ground. When the airplane is airborne, with each depression of the button, the setting of the radarscope range cursor changes through three ranges in ground map and contour map modes. The button is powered by the dc essential bus.

RADAR RANGE SWEEP BUTTON. The radar range sweep button (37, figure 4-5), labeled RADAR RANGE SWEEP, is on the lower right forward side of the main student's control wheel. Its function is to switch radarscope range presentations. Consecutive depressions of the button produce three different range scales in ground map, and two in other modes. An illuminated number (range light) corresponding to the range selected will appear at the top of the radarscope.

The range lights can be dimmed by use of the main student's flight instrument light INDIRECT rheostat. However, when the flight instrument lighting system is off, the dimming circuit is bypassed and the range lights come on bright. The button is powered by the No. 2 dc secondary bus.

AZIMUTH CURSOR OFFSET KNOB. The azimuth cursor offset knob (39, figure 4-5), labeled NASARR AZIMUTH CURSOR OFFSET, positions the radarscope azimuth cursor to any position across the radarscope from 0 to 7 nautical miles left to 0 to 7 nautical miles right.

BEZEL BRILLIANCE KNOB. Intensity of the radarscope edge lighting is controlled by the bezel brilliance knob (29 and 49, figure 4-5), labeled BEZEL BRILL. Clockwise rotation increases light intensity. The knob is powered by the No. 2 dc secondary bus.

MEMORY KNOB. The memory knob (36 and 47, figure 4-5) controls a potentiometer that varies the period of time a video target display remains on the radarscopes. The knob is labeled MEMORY. Clockwise rotation increases memory time of the display.

ALTITUDE SET KNOB. This knob (35 and 54, figure 4-5), marked ALTITUDE SET, positions the distance from the apex of the radarscope at which ground map display begins. This distance is a function of airplane altitude and must be minimized to produce an undistorted horizontal projection of the ground map display. The knob is operated only in the ground map and contour map modes. The knob is inoperative on the standby students' consoles. The main student controls this adjustment on the standby students' radarscopes.

INFLIGHT TEST SWITCH. This switch (33 and 52, figure 4-5), labeled INFLIGHT TEST, is inoperative because the airplane is not equipped with a toss-bomb computer.

INTENSITY KNOB. The intensity knob (30 and 48, figure 4-5), labeled INTENSITY, is normally set after the other radarscope controls, and regulates the overall intensity of the radarscope display. Clockwise rotation increases display intensity. The knob is powered by the 115-volt C phase ac secondary bus.

CURSOR BRILLIANCE KNOB. This knob (32 and 51, figure 4-5), labeled CURSOR BRILL, is used to vary light intensity of the azimuth cursor and the horizon line. Clockwise rotation of this knob increases light intensity.

HORIZON KNOB. The horizon knob (6, figure 4-5) vertically positions the artificial horizon lines on all three radarscopes. Clockwise rotation moves the horizon lines up; counterclockwise rotation, down.

VIDEO KNOB. The video knob (8 and 46, figure 4-5) controls the video pedestal height or radarscope target or ground return information. It also controls the brilliance of the range cursor or range gate. Clockwise rotation increases the pedestal.

DOPPLER DRIFT ANGLE KNOB. This knob (42, figure 4-5), labeled DOPPLER DRIFT ANGLE, is used to manually set into the system the airplane drift angle as read from

the Doppler ground speed - drift angle indicator. Turning the knob clockwise or counterclockwise rotates the radarscope azimuth cursor to show right or left drift, respectively, from 0 through 6 degrees. Rotating the drift angle knob to the right, for right drift, rotates the cursor to the right.

RADAR RECEIVER GAIN WHEEL. This thumb wheel (13, figure 4-5), labeled RCVR GAIN, controls the sensitivity variation or the amount of target return displayed on the radarscopes in the ground map mode. Forward wheel rotation increases sensitivity or gain of the radar receiver.

FILTER KNOB. The RED filter knob (7 and 56, figure 4-5), on the radarscope bezel, provides a red filter for night operation. Turning the knob clockwise introduces the filter.

Pressurizing Set Test Switch.

The No. 2 dc secondary bus-powered pressurizing set test switch is on the pressurizing set on the floor, forward of the righthand standby student's console. The switch is spring-loaded to NORMAL ON so that whenever the radar system is energized (system power switch at STBY or ON), pressure is supplied to the radarscopes and associated components. A pressure switch in the system regulates system pressure between 15 and 17.25 psia. A low limit switch set at the 11.8 psia and a pressure relief valve set at 25 psia prevent excessive pressures. The R-14C system will not operate if system pressure falls below 11.8 psia. When the pressurizing set test switch is moved to MOMENTARY ON, the system pressure switch is bypassed and power is connected directly to the air compressor motor. For test purposes, the switch should be held at MOMENTARY ON until the system pressure relief valve begins to relieve pressure. This should occur at 25 psia on the system pressure gage.

NOTE

> The pressure system is disconnected when the weight of the airplane is on the landing gear. Pull the landing gear circuit breaker to simulate an in-flight condition before beginning the pressure test, and push in the circuit breaker after the test is completed. If ac and dc external power is connected to the airplane, the radar external power control relay will be energized, which makes it unnecessary to pull the LDG GEAR - POS circuit breaker.

System Pressure Gage.

A gage just forward of the righthand standby student's console, on the cabin blower housing, indicates pressure in pounds per square inch absolute that is being supplied to the radar system components. The gage is the direct-reading type, calibrated in one-pound increments from 0 to 25. Normal operating range is from 15 to 17.5 psia, with a low limit of 11.8 psia and a high limit of 25 psia.

R-14C Ground Test Switches.

Three secondary bus-powered switches on the NASARR-doppler circuit breaker panel are used for ground test of the R-14C system. One switch, labeled NASARR SCOPES, has NORMAL and OFF positions. (The NORMAL position is labeled NORM.) Another switch, labeled NASARR CALIB, has NORMAL and GROUND TEST positions (labeled NORM and GRD TEST). The third switch, labeled RANGE CURSOR, has NORMAL and GROUND TEST positions. (The GROUND TEST position is labeled GRD TEST.) All three switches must be at NORMAL before takeoff.

Radar Modes.

GROUND MAP. In the ground map mode, the radar antenna beam scans the ground ahead of the airplane in a pattern of 90 degrees in azimuth and 54 degrees in elevation. The spoil beam pattern is presented on the radarscope by a 90-degree sector scan pattern in coordinates of ground range and relative bearing. The antenna is programmed in a single bar pattern. Artificial horizon lines, range and azimuth cursors, and three range scale selections are provided.

The antenna scan pattern in the ground map mode is stabilized in roll and pitch. However, by adjustment of the antenna tilt wheel, the beam can be varied up 20 degrees and down approximately 40 degrees from the antenna boresight line. Varying the angle of antenna tilt shifts the area of optimum return. A pencil beam or spoil beam may be used.

CONTOUR MAP. The contour map mode provides a picture of the terrain contour in the forward quadrant. The display is shown as a 90-degree azimuth sector in ground range and relative bearing. Range and azimuth cursors and artificial horizon lines are provided as in the ground map mode. Two range scale selections are provided.

Contour map is very useful for correction of airplane drift, determination of landmark heights, and instrument let-downs on fields surrounded by mountainous terrain. In contrast to ground map which differentiates between surface features, contour map differentiates between altitudes of topographical projection above a preset clearance plane which is parallel to true horizontal at all times (the antenna is roll-and-pitch stabilized), at a level that is manually adjustable from 0 to ± 6000 feet relative to the altitude of the airplane. Only those surface features that have sufficient height to project into the clearance plane are visible on the radarscope.

TERRAIN AVOIDANCE. The terrain avoidance mode is designed to enable the pilot to avoid collision with obstacles such as hills and mountains, during low level flight. Azimuth coverage ± 45 degrees from the centerline of the airplane is provided. An artificial horizon shows the roll attitude of

the airplane through 360 degrees, and pitch attitude through ± 30 degrees.

In terrain avoidance, as in contour map, only those objects that extend above a preset clearance plane are displayed on the radarscope. Also, as in contour map, the clearance plane level above or below the airplane is adjustable from 0 to 6000 feet with respect to the airplane. One difference is that the orientation of the clearance plane is maintained parallel to the flight path rather than to true horizontal as in contour map. Because of this, obstacles appear on the radarscopes only when a collision course is being flown with respect to the terrain obstacles. In consideration of this airplane's maximum maneuvering capability, certain restrictions are imposed on operation in the terrain avoidance mode. (Refer to R-14C Terrain Avoidance Mode Restriction in section V.)

Two range scale selections are available. A fail-safe cursor (an illuminated arc near the apex of the azimuth sweep approximately at the 1- to 6-mile range) appears on the radarscope to indicate that the system is operating satisfactorily. This cursor disappears if a malfunction occurs in the circuits involved in the computation of the warning signal. A continuous flashing of the cursor indicates a malfunction of the transmitter, local oscillator, automatic-frequency control, or automatic-frequency control mixer.

AIR-TO-AIR SEARCH. The radar antenna operates in a two-bar scan covering 90 degrees azimuth and 10.2 degrees elevation in air-to-air search. The antenna pattern may be controlled in tilt from 20 degrees up to approximately 40 degrees down. Two range selections are available. During blind acquisition, the radarscope presents a limited sector scan covering only ± 5 degrees in azimuth and ± 2.0 degrees in elevation. Artificial horizon lines and the range gate cursor are displayed on the radarscope.

AIR-TO-AIR ACQUISITION. Air-to-air acquisition provides a transition from air-to-air search to air-to-air track. Two methods of acquisition are available, visual and blind.

During visual acquisition, automatic search within a predetermined range is activated by pressing the radar action reject button. When the target is brought within this range, the range gate will lock on and automatically track the target. The target may be rejected and the range gate returned to search by momentarily pressing the action reject button.

During blind acquisition, the radarscope is used to acquire the target. When the sweeping antenna beam intersects the target, the radar action reject button is depressed and the antenna scan narrows to an elliptical pattern ± 5 degrees in azimuth and ± 2 degrees in elevation about the target. Lockon occurs when the range gate is moved (by rotation of the training throttle grip when out of detent clockwise) to intersect the target image. Target rejection is the same as in visual acquisition.

AIR-TO-AIR TRACK. In air-to-air track, the radar provides the tracking displays with range, range rate, steering dot and steering circle, artificial horizon lines and relative bearing information. At target lockon, the radarscope presentation will collapse to a scan whose angle shows antenna azimuth angle with respect to the airplane. After target lockon, by either the blind or visual method, the radar automatically tracks the acquired target in range or angle, within the limits of the antenna gimbal mount and range-tracking circuits. Target range is indicated by an intensified range gate along the scan. The range rate gap in the range circle represents closing range rates when displaced to the right of the top center of the range circle, and opening rates when displaced to the left of the top center of the range circle. Maximum displacement of the gap is normally 180 degrees to the right, representing maximum closing rate, and 45 degrees to the left, representing maximum opening rate.

Normal Operation of R-14C Radar System.

Refer to Normal Operation of Doppler and R-14C Radar Systems in section VIII.

DOPPLER RADAR SYSTEM - AN/APN-131.

The AN/APN-131 Doppler radar system is an automatic, self-contained system that provides a computed solution for a navigational problem from a present position to a selected destination. The system computes a solution for a navigational problem along a great circle course over any portion of the earth. Two problems of up to 2000 nautical miles each may be initially set into the system. Both of these problems are simultaneously computed, and either may be selected or reset at any time, providing an unlimited distance capability. During flight, the system computes and displays present position, course, ground track, distance to destination, ground speed, and drift angle.

The Doppler radar system transmits three beams of microwave energy to the ground through three antenna horns and receives the ground reflected energy, the frequency of which is compared to the frequency of the transmitted signals. The difference frequency for each beam is resolved into forward, side, and vertical velocities of the airplane. These velocities are then integrated with heading information from the directional indicating system and resolved into north, south, east, and west velocities, thus giving direction and speed of travel over the earth.

During short periods, when the Doppler signal may be lost, such as during extreme maneuvers (displacement beyond ± 27 degrees of roll and pitch), a wind memory feature enables the computing system to maintain relatively accurate ground position. This is done by computing the wind component through comparison of ground speed and airspeed components during normal operation. When the system then goes to memory operation, the airspeed and wind components are resolved into ground speed. However, pitch or roll displacement beyond ± 20 degrees but less than

±27 degrees may result in reduced accuracy, depending on such conditions as airspeed, altitude, etc.

The Doppler radar system is powered by the No. 2 dc secondary bus and the 115-volt A, B, and C phase ac secondary busses.

Doppler Radar System Controls and Indicators.

FUNCTION SWITCH. The function switch (28, figure 4-5) has the following positions: SIL, SEA, NORM, and FIX. The SIL position is used for radar silence when it becomes necessary during flight to discontinue transmission of microwave energy (a precaution against detection). When at SIL, the switch cuts off power to the transmitter. With no transmission and the resulting loss of Doppler return, the system operates on wind memory. Whenever the trackers cease tracking doppler returns from any one or all the antenna beams, either by institution of radar silence or by other means, the system automatically switches to memory operation.

Turning the switch to SEA shifts the computer to a seastate condition, introducing a constant factor that compensates for overwater bias errors, ensuring true present-position information. When flying over a water mass, if the function switch is not turned to SEA, an approximate 4-percent error results in computation of present position for an average sea state.

The switch should be at NORM at all times except when over water, when radar silence is required, or when a new fix is to be made en route.

The FIX position allows the pilot to set in or correct the present-position display of the Doppler system when over known coordinates when the coordinate display switch is at PRES. The switch is powered by the No. 2 dc secondary bus.

NOTE

If the function and coordinate display switches are left temporarily at FIX and RIP or VIP, respectively, after a fix has been obtained over a fix point, the Doppler will automatically revert to normal operation when the correction of the present position data has been achieved.

COURSE SWITCH. The course switch (26, figure 4-5) is used to select the desired magnetic course and distance presentations on the course-track-distance indicator. The switch has two positions, A and B, that are directly related to the DEST A and DEST B positions of the coordinate display switch.

COORDINATE DISPLAY SWITCH. The coordinate display switch (25, figure 4-5) has the following positions: RIP, VIP, PRES, DEST A, and DEST B. When the switch is turned to PRES, the present-position coordinates of latitude and longitude are displayed on the latitude and longitude counters. The present-position counters can be set or reset only when the function switch is at FIX.

With the coordinate display switch set at DEST A or DEST B, the display is the coordinates of destination A or B, as selected. The destination coordinates can be viewed and reset any time a route to a new destination is required. To set in the prime destination position or a preset check point, the switch should first be turned to DEST A. The DEST B position permits an alternate destination to be set in if a prime destination has been set in with the switch at DEST A, or it permits a prime destination to be set in if a preset check point has been set in with the switch at DEST A.

The switch is turned to VIP for automatic corrections of the present-position coordinates to the coordinates of a visual identification point that is set in as either destination A or B. For example, during a flight to a point selected as destination A, the course switch will be at A, and the coordinate display switch will normally be at PRES. When the airplane is less than 50 miles from visual identification fix point (destination A), the coordinate display switch should be turned to VIP. As the airplane passes directly over the fix point, the function switch should be turned to FIX, and after a few seconds, back to NORM, SEA, or SIL, as required, and the coordinate display switch returned to PRES.

NOTE

If the function and coordinate display switches are left temporarily at FIX and RIP or VIP, respectively, after a fix has been obtained over a fix point, the Doppler will automatically revert to normal operation when the correction of the present position data has been achieved.

- With the coordinate display switch at RIP, operation is the same as in the VIP position. The RIP position was designed for use in obtaining automatic correction of the present-position coordinate display to a radar identification point. In this installation, however, the error signal necessary for this operation is not available.

SYSTEM POWER - HEADING REFERENCE SWITCH. When the system power - heading reference switch (27, figure 4-5) is turned from OFF to either DG or MAG, No. 2 dc secondary bus power is applied to the Doppler system. After approximately one-minute time delay, system power supply output voltages are applied to all Doppler units. The DG mode is designed for use at latitudes above 75 degrees, where a magnetic compass system becomes unreliable. With the gyrocompass mode switch at DG, the gyro of the heading indicating system is freed from control of the flux detector. The heading indicating system can then be manually corrected to indicate true north and feed heading

information into the Doppler computer. However, there will be a drift error (maximum allowable of ± 2 degrees per 15 minutes), Coriolis force, and a meridian convergence error which will gradually build up over a period of time, and the Doppler outputs will be in error by the amount of gyro precession, Coriolis force, and meridian convergence errors.

With the system power - heading reference switch at MAG, the heading indicating system is utilized for inputs of magnetic heading. The MAG position should be used at all latitudes below 75 degrees. In this mode, the gyrocompass mode switch must be in the MAG position to feed magnetic north reference signals to the Doppler computer.

NOTE

If either of the hydraulic pumps or the ac generator fails, the Doppler system will be inoperative because of loss of electrical power.

LATITUDE SLEW KNOB. The latitude slew knob (21, figure 4-5) has N and S positions. Turning the knob changes the degrees and minutes shown on the LATITUDE counters adjacent to the switch. When correctly set, the counters show the latitude of the initial position (present position) or the latitude of destination A or B, as determined by position of the coordinate display switch. During flight, the counters automatically change to indicate the present position latitude of the airplane. The counters may be slewed slowly by turning the knob only part way, to a detent. A full turn of the knob provides fast slewing.

LONGITUDE SLEW KNOB. The longitude slew knob (23, figure 4-5) has E and W positions. Turning the knob changes the degrees and minutes shown on the LONGITUDE counters adjacent to the switch. When correctly set, the counters show the longitude of the intiial position (present position) or the longitude of destination A or B, as determined by the position of the coordinate display switch. During flight, the counters automatically change to indicate the present position longitude of the airplane. The counters may be slewed slowly by turning the knob only part way, to a detent. A full turn of the knob provides fast slewing.

MEMORY LIGHT. A dimmable-type memory light (22, figure 4-5), labeled MEMORY, comes on when the system is operating on wind memory. In this mode, radar return signals are not being received. The system automatically switches to memory operation when transmitter power is cut off, if signals received are inadequate, or if the airplane should pitch or roll more than 27 degrees. In memory operation, the ground velocity and distance traveled are computed by using the stored wind and a true airspeed input. When the navigation system returns to normal operation, the light goes out. The light is powered by the No. 2 dc secondary bus.

NOTE

If operating in the memory mode, the display values may become inaccurate. A fix should be taken as soon as possible to check and correct present position.

TRUE AIRSPEED CUTOUT SWITCH. The true airspeed cutout switch (40, figure 4-5) is normally at OFF. Moving the switch to CUTOUT disables the true airspeed circuit in the computer, nulling to zero any velocity previously set into the system. Since the Doppler system may be operating in wind memory before take-off, this switch must be moved to CUTOUT before the Doppler system is energized on the ground, to prevent erroneous airspeed information being fed into the computer system from any previous residual setting of the true airspeed knob. During the initial part of the takeoff roll, after normal takeoff speed is set in on the true airspeed knob, the cutout switch should be returned to OFF.

TRUE AIRSPEED KNOB. This knob (41, figure 4-5) is used to set true airspeed information into the present-position computer for airspeed computation in the memory mode. The knob inner dial is calibrated from 0 to 99, to indicate knots. A window in the knob outer dial displays numerals from 0 to 14 to indicate hundreds of knots. For example, if a 510-knot reading is desired, turn knob until the number 5 appears in the window at the index mark; then turn knob left or right until the number 10 is aligned with the index mark. A friction lock lever at the base of the knob, when moved clockwise, locks the knob. Counterclockwise movement of the lever unlocks the knob.

GROUND SPEED - DRIFT ANGLE INDICATOR. The ground speed of the airplane in knots and the number of degrees of airplane drift are shown on the ground speed - drift angle indicator (5 and 45, figure 4-5). A pointer moves on a dial marked in one-degree increments to show left or right drift to a maximum of 35 degrees. Ground speed to a maximum of 1999 knots is displayed on a four-digit counter.

COURSE-TRACK-DISTANCE INDICATOR. The course-track-distance indicator (2 and 44, figure 4-5) consists of a rotating compass card, two pointers, and a distance indicator. The compass card receives heading information from the heading indicating system and displays this magnetic heading against a fixed reference mark at the 12 o'clock position on the dial. A compass correction card is above either the pilot's or the copilot's side console.

Signals from the Doppler system drive the No. 2 pointer to indicate the magnetic course (command heading) to fly. The angle designated by this pointer is the correct angle to be flown with respect to magnetic north, to reach the preselected destination. The No. 1 pointer provides ground track information gained from the Doppler receiver. This

angle is the direction of travel with respect to magnetic north the airplane is actually flying. Two placards on the lower edge of the instrument are labeled 1 - GRD TCK and 2 - CMD HDG. On the face of the instrument, the distance indication ranges from 1999 to 0000 and provides a miles-to-go reference from the present position to a preselected destination. The thousand numeral is obscured unless the distance to destination is 1000 miles or more. An OFF warning bar covers the distance counters when the system function switch is at OFF or if the system power supply shuts off because of a malfunction in the system.

NOTE

The OFF warning bar will disappear approximately one minute after the Doppler system is turned on, indicating that the system is warmed up and ready for operation.

Normal Operation of Doppler Radar System - AN/APN-131.

Refer to Normal Operation of Doppler and R-14C Radar Systems in section VIII.

Loss of Doppler.

If airplane ac or dc power is lost, the Doppler radar system will be inoperative. The system will resume operation automatically about one minute after electrical power is restored. However, a manual fix should be made as soon as possible, to correct present-position coordinates.

If the Doppler system fails while airplane electrical power is available, it may be due to an overload in the Doppler system. The system power - heading reference switch should be turned OFF, then back to MAG (or DG). If overload was the cause, the system may resume operation in about one minute, and a manual fix should be taken to correct present-position coordinates.

OPERATING LIMITATIONS

SECTION V

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Maneuvering Limitations . . . . . †
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All information on operating limitations is contained in the T-39A Flight Manual, T.O. 1T-39A-1, except the following:

MINIMUM CREW.

The minimum crew consists of a pilot and copilot on all missions except on radar training sorties. See section VIII for crew composition on radar training sorties.

INSTRUMENT MARKINGS.

See figure 5-1 for instrument markings of the normal hydraulic system pressure gage and accelerometer. Refer to Instrument Markings in section V of T-39A Flight Manual, T.O. 1T-39A-1, for markings of the following instruments:

Airspeed, horizontal stabilizer trim position, and fuel flow indicators

Exhaust temperature, fuel quantity, and oil pressure gages

Machmeter, auxiliary hydraulic system pressure gage, and tachometer

AIRSPEED LIMITATIONS.

Refer to T-39A Flight Manual, T.O. 1T-39A-1, for all airspeed limitations, except landing-taxi light extension speed.

LANDING-TAXI LIGHT EXTENSION SPEED.

Maximum allowable airspeed with the landing-taxi lights extended is 180 knots IAS. If they are extended above this speed, they can be damaged.

ACCELERATION LIMITATIONS.

The primary factor affecting acceleration limitations is the condition of fuel in the aft fuselage and wing tanks. To ensure correct interpretation of the acceleration limitations imposed on this airplane, the following definitions apply:

a. Symmetrical applies where the airplane bank angle is constant (no roll). Therefore, the airplane may be in other than a wings-level attitude, but must not be rolling during the period of accelerated flight.

b. Unsymmetrical applies where the airplane is rolling during the period of accelerated flight.

Acceleration limitations are imposed on this airplane for either structural or aerodynamic reasons. The structural limitations apply at all altitudes but may be less restrictive than the aerodynamic limits. The operating flight limits diagrams (figure 5-2) show the symmetrical maneuvering envelopes for two loading conditions. The altitudes at which aerodynamic limits prevail are noted on the diagrams. The aerodynamic limits are imposed to prevent encountering flight conditions where a sudden upfloat of the ailerons will occur, resulting in an abrupt change in lateral controllability. The composite structural-aerodynamic symmetrical limits are presented on a scribed plate along the upper edge of the accelerometer. (See figure 5-1.)

EQUIPMENT LIMITATIONS.

R-14C AND DOPPLER SYSTEM RESTRICTIONS.

During flight conditions where ram air is being used or when cabin pressure altitude goes above 10,000 feet, the R-14C and Doppler systems must be turned off, to prevent damage to the equipment.

† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

INSTRUMENT MARKINGS

HYDRAULIC PRESSURE GAGE

NORMAL SYSTEM

	1500 to 2800 psi	Caution

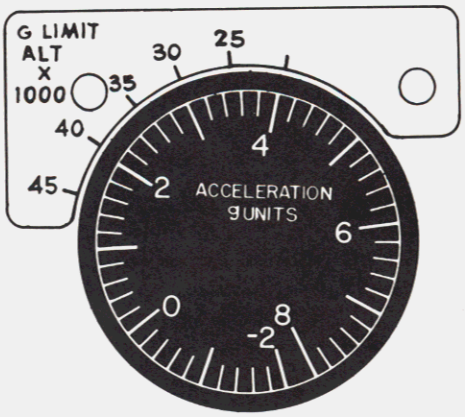
Shows malfunction with no flow demand. Permissible during high flow demand.

	2800 to 3200 psi	Normal
	3200 psi	Maximum

NOTE

Momentary overshoot permissible during transient conditions such as large flow demands by the various hydraulically operated systems.

ACCELEROMETER



NOTE

The scribed plate shows limit G as a function of altitude only for symmetrical flight and for fuel loading conditions where each fuel quantity gage indicates 2700 pounds or less. Refer to "Acceleration Limitations" in this section for additional limits.

T-39B-1-51-1B

Figure 5-1

R-14C TERRAIN AVOIDANCE MODE RESTRICTION.

The terrain avoidance mode of the R-14C radar system is to be used only for training and familiarization. It is to be used only during VFR conditions, and with the pilot continuously monitoring the actual terrain clearance. This restriction is necessary to prevent reaching the point on a collision course where this airplane's maneuvering capability to clear the obstacle will be exceeded.

CENTER OF GRAVITY LIMITATIONS.

The following paragraphs outline specific limitations which must be observed in order to maintain the airplane center of gravity within limits.

a. During takeoff, landing, and scheduled climbs or dives, all occupants must be seated. The instructor's jump seat must not be occupied during takeoff and landing.

b. During flight, only one person is permitted aft of the standby students' seats, and no one is permitted aft of the instructor's jump seat.

PARACHUTE STOWAGE LIMITATIONS.

Parachutes will be stowed as follows:

a. The pilot and main student may stow their parachutes behind their seats, if the fore-aft adjustment required will permit such stowage.

b. The remaining parachutes may be stowed between the right remote radar console and the bulkhead of the intermediate electronic equipment compartment.

WEIGHT LIMITATIONS.

The maximum allowable ramp or takeoff gross weight for this airplane is 18,320 pounds. It is the responsibility of the pilot to determine that these weights are not exceeded.

Three factors will affect the airplane's actual gross weight (before engine start). They are:

a. The basic weight of the airplane, which is given in T.O. 1-1B-40 for the individual airplane.

b. Weight of personnel to be carried (standard weight of 190 pounds per person including clothing, personal equipment, and parachute).

c. Weight of fuel to be carried: 6975 pounds maximum.

NOTE

The airplane is restricted from carrying cargo, and no allowance is made for baggage.

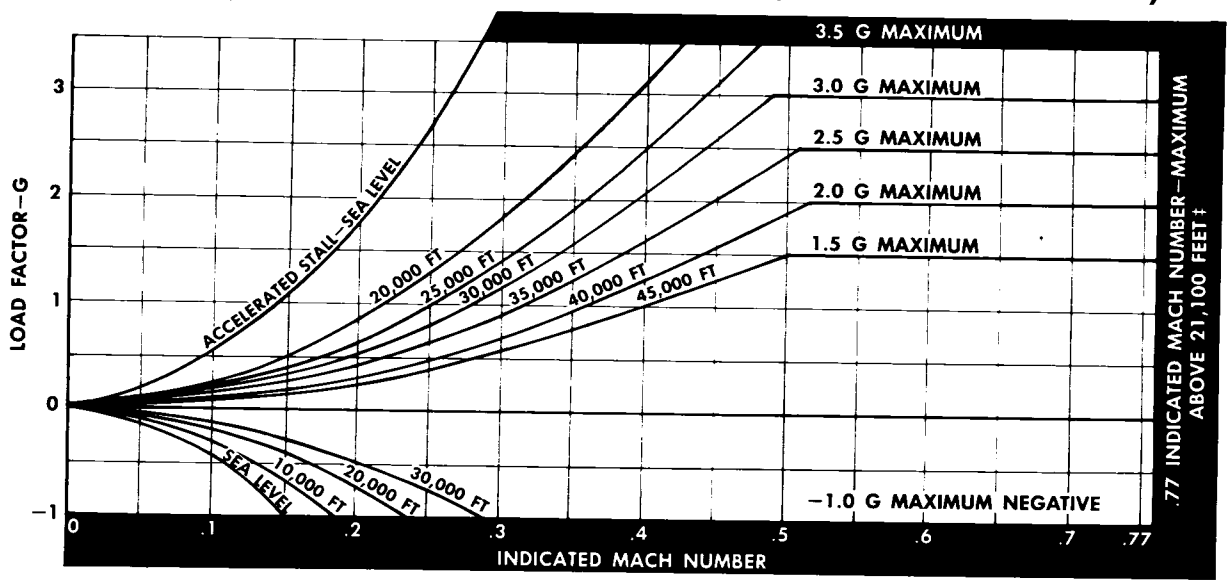
No two airplanes have the same basic weight, and the number of personnel to be carried and the amount of fuel required may vary with the mission. Consequently, it would be possible to load an airplane in excess of 18,320 pounds. This would occur if the airplane's basic weight were at or near the design maximum and if five persons and full wing and fuselage tank fuel were to be carried. Thus, if the desired loading condition will result in the airplane's gross weight exceeding 18,320 pounds, the fuselage fuel tank must not be serviced beyond the amount which would cause the airplane gross weight to exceed 18,320 pounds.

LOADING CONDITIONS

Each fuel quantity gage indicating 2700 pounds or less fuel and all personnel seated.

OPERATING FLIGHT LIMITS

(SYMMETRICAL LIMITS†)



NOTE

- G-limit below 25,000 feet is structural limit.
- G-limits above 25,000 feet are imposed to prevent encountering an abrupt reduction in lateral controllability.

CAUTION

With landing gear or flaps extended, do not exceed 2.0 G; otherwise, structural damage can occur.

† UNSYMMETRICAL LIMITS—
Sea level to 36,000 feet: +2.33 G and 0 G.
36,000 to 45,000 feet: +2.33 G varying linearly to +1.5 G and 0 G.

‡ From sea level to 21,100 feet, maximum allowable airspeed is 350 knots IAS.

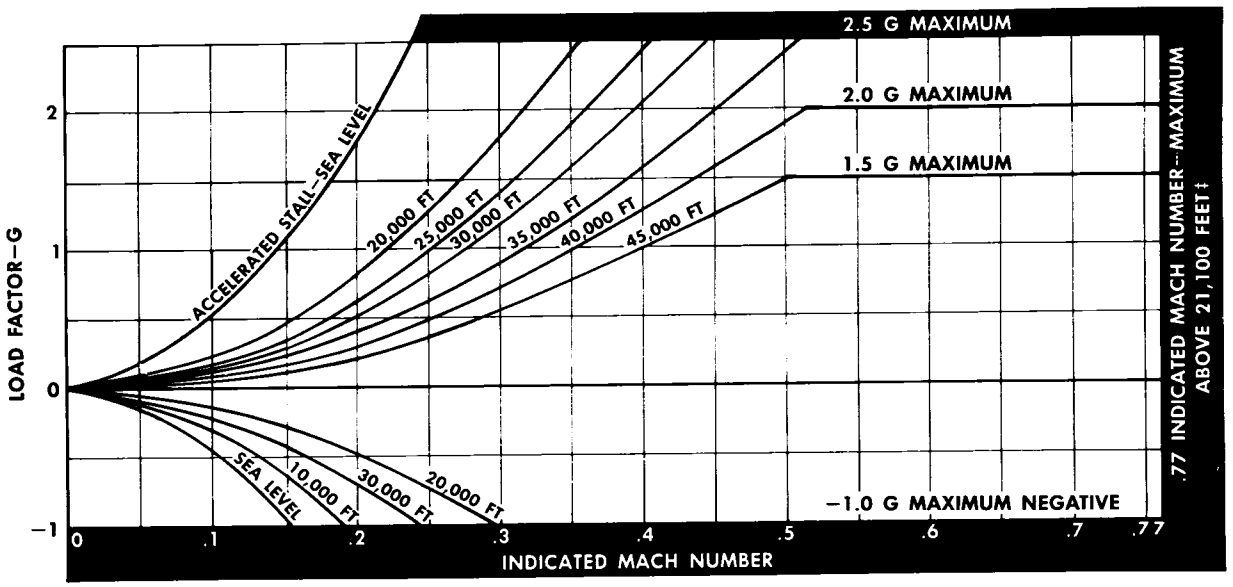
T-39B-1-93-3

Figure 5-2

LOADING CONDITIONS

[redacted]

Each fuel quantity gage indicating more than 2700 pounds or personnel standing.



NOTE

- G-limit below 35,000 feet is structural limit.
- G-limits above 35,000 feet are imposed to prevent encountering an abrupt reduction in lateral controllability.

CAUTION

With landing gear or flaps extended, do not exceed 2.0 G; otherwise, structural damage can occur.

† UNSYMMETRICAL LIMITS—
Sea level to 40,000 feet: +1.67 G and 0 G.
40,000 feet to 45,000 feet: +1.67 G varying linearly to +1.5 G and 0 G.

‡ From sea level to 21,100 feet, maximum allowable airspeed is 350 knots IAS.

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NOTE

For Sections VI and VII, refer to T-39A Flight Manual, T.O. 1T-39A-1.

CREW DUTIES

SECTION VIII

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INTRODUCTION.

In this section, the primary and alternate duties of the normal flight crews are discussed. This section does not include information already covered in sections II and III. The normal flight crew for a radar training mission consists of a pilot, a radar navigation instructor and three students. For passenger transport missions, the minimum crew consists of two pilots. All duties connected with the actual flying of the airplane will be performed by the pilot, assisted by the crew member in the main student's position. Exception: instructor pilots may operate the airplane from the right-hand seat.

PILOT.

It is the pilot's responsibility to ensure that a thorough inspection of the airplane and all equipment is properly conducted in sufficient time to permit correction of discrepancies without incurring delays. The pilot is responsible for briefing the crew for the proposed mission, and for directing action in case of emergencies. The pilot's checklist is contained in T.O. 1T-39B-1CL-1.

MAIN STUDENT POSITION (COPILOT).

The crew member in the main student's position will aid the pilot, as directed, in performing the assigned mission, if necessary. It will be his responsibility as main student to inspect the R-14C and Doppler equipment, and report its condition to the radar navigation instructor. The main student's checklist is contained in T.O. 1T-39B-1CL-2.

NOTE

If the flight does not include a radar navigational training mission and R-14C and Doppler are not to be used, turn the R-14C system power and Doppler system power–heading reference switches OFF during the interior check and leave them off throughout the flight.

NORMAL OPERATION OF DOPPLER AND R-14C RADAR SYSTEMS.

When a radar navigational training mission is flown, both the R-14C and Doppler systems will be used. The following composite procedures are for such a mission. Unless otherwise qualified, the following procedures apply to the crew member in the main student's position.

Interior Check.

1. Safety belt and shoulder harness – Secured and adjusted.
2. Seat and rudder pedals – Adjust.
3. Training throttle – Takeoff position.
4. R-14C system power switch – OFF.
5. Ground map mode selector button – Depress.
6. Receiver gain wheel – Full aft.
7. Video knob – Full counterclockwise.
8. Oxygen supply lever – Safetied ON.
9. Doppler function switch – NORM.
10. Doppler system power – heading reference switch – OFF.
11. Course switch – A.
12. Coordinate display switch – DEST B.
13. Memory knob – Full counterclockwise.
14. Intensity knob – Full clockwise.
15. Bezel brilliance knob – Full clockwise.
16. Altitude set knob – Full counterclockwise.
17. Cursor brilliance knob – Full clockwise.
18. Clearance calibration knob – Full counterclockwise.
19. Clutter eliminator switch – OFF.
20. Inflight test switch – OFF.
21. INPH and COMM mixer switches – ON.
22. Interphone function selector switch – INTERPHONE.
23. Doppler drift angle knob – Zero.
24. Azimuth cursor offset knob – Zero.
25. True airspeed knob – Set to climb true airspeed.

26. True airspeed cutout switch – CUTOUT.
27. Console light rheostats – As required.
28. Flight instrument light rheostats – As required.

Ground Operation (After Engine Start).

Before proceeding check with pilot.

NOTE

Pilot must have turned ac generator switch ON.

1. Doppler system power-heading reference switch – MAG.

NOTE

After one minute, the OFF warning bar on the course-track-distance indicator will disappear, indicating the system is ready for operation.

2. Longitude and latitude slew knobs – As required to set destination B.
3. Coordinate display switch – DEST A.
4. Longitude and latitude slew knobs – As required to set destination A.
5. Coordinate display switch – PRES.
6. Doppler function switch – FIX.
7. Longitude and latitude slew knobs – As required to set present position.
8. Doppler function switch – NORM.
9. Course-track-distance indicator – Check distance readout.
10. Altimeter – Set.

During Takeoff.

1. True airspeed cutout switch – OFF (above 70 knots IAS).
2. R-14C system power switch – ON (SYSTEM POWER).

After Takeoff.

1. Training throttle – Operate position.
2. Radar range sweep button – Depress to obtain middle range.
3. Cursor brilliance knob – Adjust.
4. Memory knob – Quarter turn clockwise.
5. Video knob – Adjust.
6. Radar range cursor – Nosewheel steering button – Check for operation of all cursors.
7. Radar receiver gain wheel – Adjust.
8. Antenna tilt wheel – As required.
9. Intensity knob – As required.
10. Memory knob – As required.

After Leveloff.

1. Ground map mode selector button – Depress.
2. Antenna tilt wheel – Full forward.
3. Radar range sweep button – Depress to obtain 13 nm range.
4. Altitude set knob – Clockwise to remove altitude hole.
5. Antenna tilt wheel – As required.
6. Mode selector buttons – Depress desired button.
7. Radar range sweep button – Depress to obtain desired range.
8. Horizon set knob – Adjust horizon lines.

Terrain Avoidance Inflight Check.

1. Terrain avoidance mode selector button – Depress.
2. Terrain avoidance mode selection light – Check on.
3. Radar range sweep button – Depress to obtain 13 nm range.
4. Clearance plane set switch – Set 600 feet below.
5. Clearance plane lights – Check BELOW light on.
6. Failsafe cursor – Check at approximately the one mile range.
7. Clearance plane set switch – Set 6000 feet below.
8. Failsafe cursor – Check at approximately the 6-mile range.

Clearance Calibration.

1. Contour map or terrain avoidance mode selector button – Depress.
2. Contour map or terrain avoidance mode selection light – Check on.
3. Radar range sweep button – Depress to obtain desired range.
4. Airplane altitude – Maintain.
5. Clearance plane set switch – Set to known clearance.
6. Clearance calibration knob – Turn clockwise to optimize reference point.

En Route Manual Fix.

1. Coordinate display switch – PRES.
2. Doppler function switch – FIX, when over fix point.
3. Longitude and latitude slew knobs – As required.
4. Doppler function switch – NORM.

En Route Automatic Fix.

1. Coordinate display switch – VIP.
2. Course switch – A or B as required.
3. Doppler function switch – FIX, when over fix point.
4. Doppler function switch – NORM.
5. Coordinate display switch – PRES.

Before Landing.

1. Radar receiver gain wheel – Full aft.
2. Video knob (all scopes) – Full counterclockwise.

3. R-14C system power switch – STANDBY; then OFF.
4. Doppler system power-heading reference switch – OFF.
5. Training throttle – Landing position.
6. Safety belt and shoulder harness – Secured.

RADAR NAVIGATION INSTRUCTOR.

In addition to his instructional duties, the radar navigation instructor will aid the pilot as directed in accomplishing the assigned mission.

INTERIOR CHECK.

1. Form 781 – Check.
2. R-14C (placarded NASARR) and Doppler circuit breakers – IN.
3. R-14C (placarded NASARR) ground test switches – NORMAL.
4. Entrance way – Loose articles stowed.
5. Coat compartment – Loose articles stowed.
6. Inflight escape hatch – Ground safety pin removed and door latched.
7. Cabin – Loose articles stowed.
8. Ground escape hatch – Secure and unobstructed.
9. Instructor's intercommunications control panel – Check.
10. Cabin speaker switch – As required.
11. Instructor's interphone INPH and COMM mixer switches – ON.
12. Instructor's interphone function selector switch – INTERPHONE.
13. Cabin oxygen masks – Stowed.
14. First aid kit – Installed.
15. Portable oxygen bottle – Charged.
16. Hand fire extinguisher – Charged.
17. Seat belt – Secured and adjusted.

STUDENTS.

In addition to their student responsibilities, the students will assist other crew members as directed.

INTERIOR CHECK (CONSOLES).

1. Safety belt and shoulder harness – Secured and adjusted.
2. Video knob – Full counterclockwise.
3. Memory knob – Mid-position.
4. Intensity knob – Full clockwise.
5. Bezel brilliance knob – Full clockwise.
6. Cursor brilliance knob – Full clockwise.
7. Interphone switches – As required.

AFTER TAKEOFF.

1. Cursor brilliance knob – Adjust.
2. Video knob – Adjust.
3. Intensity knob – As required.
4. Memory knob – As required.

BEFORE LANDING.

1. Video knob – Full counterclockwise.
2. Safety belt and shoulder harness – Secured.

ALL-WEATHER OPERATION

SECTION IX

All information on all-weather operation is contained in the T-39A Flight Manual, T.O. 1T-39A-1, except the following:

INSTRUMENT FLIGHT PROCEDURES

This airplane has all the basic flight instruments and radio-navigation equipment for IFR flight, as well as the UHF command radio required to control the flight. A flight director system has been incorporated to aid the pilot during instrument flight. (Refer to Flight Director System in Section IV.) In addition, there are two radar systems, the R-14C radar system and the Doppler radar system (AN/APN-131), which, when operated by a qualified operator, can be a valuable navigational aid to the pilot. (Refer to R-14C Radar System and Doppler Radar System - AN/APN-131 in section IV.)

NOTE

Although it is desirable to avoid flight through areas of turbulence and thunderstorms, it is not always possible. This is particularly true when flying under instrument flight conditions, especially at night. Clouds containing high moisture content are radar reflective and, therefore, can be detected and avoided by use of the R-14C radar. Should frontal penetration be necessary, ground map mode, pencil beam, should be employed to detect the frontal areas. This mode of operation affords optimum radar range and antenna tilt adjustment for frontal detection. It is recommended that the airplane be steered through the areas of least radar return to avoid the most turbulent areas.

PERFORMANCE DATA

APPENDIX I

NOTE

All performance data is contained in the T-39A Flight Manual, T.O. 1T-39A-1, except the following:

DATA AS OF: OCTOBER 1964
BASED ON: **FLIGHT TEST**
(USAF FTC-TDR-64-23, AND NAA)

OPERATIONAL RANGE PROFILE

MAXIMUM RAMP WEIGHT – 18,320 LB
(AIRPLANES CHANGED BY T.O. 1T-39-795)

MODEL: T-39B
ENGINES: (2) J60-P3 OR -3A
FUEL: JP-4

NOTE

1. Fuel allowance of 380 pounds for start, taxi, take-off, and acceleration to climb speed schedule included.
2. Use Military Thrust for climb.
3. Cruise-climb at Normal Rated Thrust and .76 Mach number.
4. Cruise at recommended Mach number.
5. Maximum take-off gross weight is 18,175 lb.

CRUISE-CLIMB PATH
POUNDS OF FUEL USED
TOTAL ELAPSED TIME

CRUISE DATA

ALTITUDE	MACH	CAS	TAS	FUEL FLOW LB/HR
CRUISE-CLIMB	.76		436	1610 TO 1260
30,000	.64	240	380	1680 TO 1450
20,000	.55	250	335	1890 TO 1670
10,000	.49	270	315	2250 TO 2070
SEA LEVEL	.45	300	300	2800 TO 2730

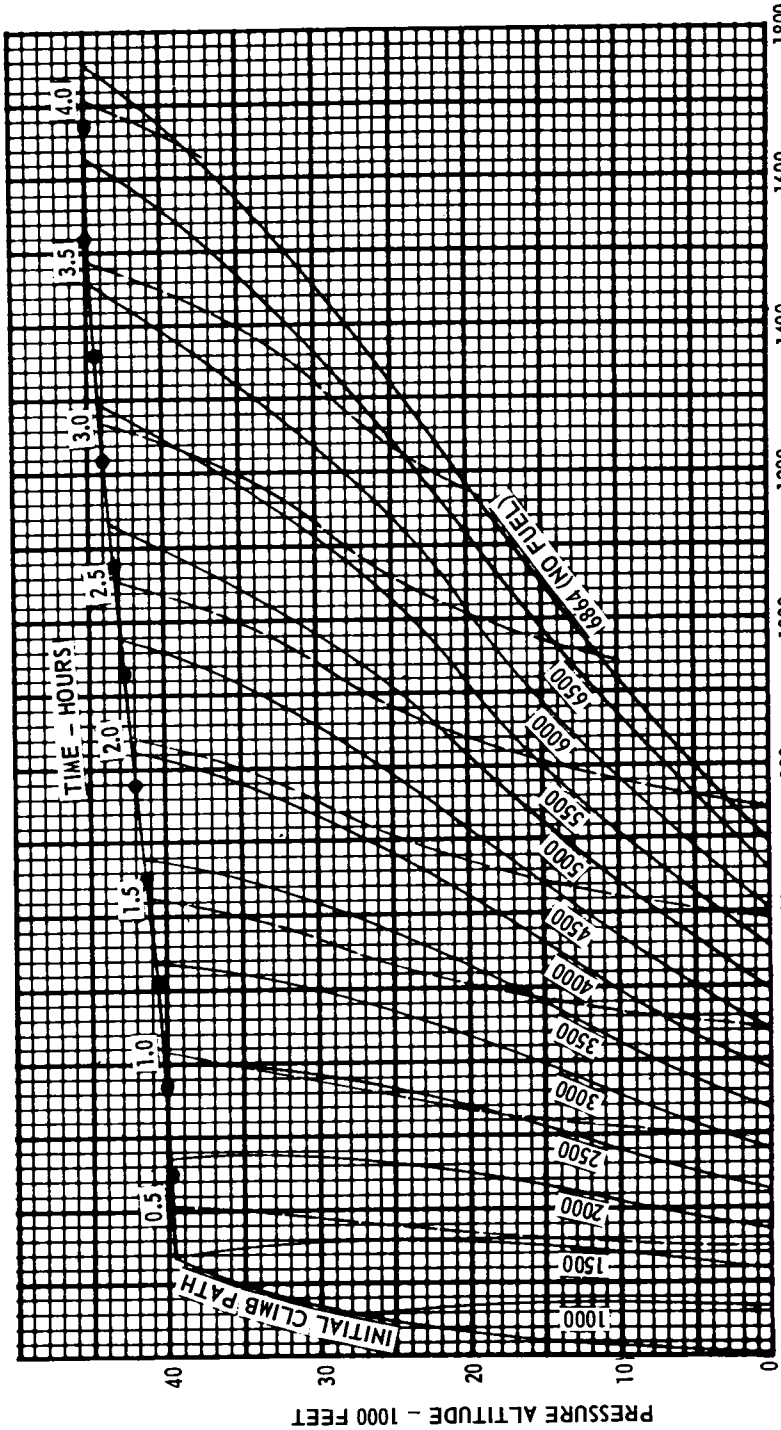


Figure A-1

DATA AS OF: OCTOBER 1964
BASED ON: **FLIGHT TEST**
(USAF FTC-TDR-24-23, AND NAA)

MAXIMUM RANGE PROFILE

MAXIMUM RAMP WEIGHT – 18,320 LBS
(AIRPLANES CHANGED BY T.O. 1T-39-795)

MODEL: T-39B
ENGINES: (2) J60-P-3 OR -3A
FUEL: JP-4

NOTE

1. Fuel allowance of 380 pounds for start, taxi, take-off, and acceleration to climb speed schedule included
2. Use Military Thrust for climb
3. Cruise-climb at Normal-Rated Thrust and .72 Mach number
4. Cruise at recommended Mach number
5. Maximum take-off weight – 18,175 lb.

CRUISE CLIMB PATH
POUNDS OF FUEL USED
TOTAL ELAPSED TIME

CRUISE DATA				
ALTITUDE	MACH	CAS	TAS	FUEL FLOW LB/HR
CRUISE-CLIMB	.72		412	1537 TO 1094
40,000	.67	190	384	1457 TO 1096
30,000	.57	205	335	1520 TO 1175
20,000	.48	218	295	1700 TO 1350
10,000	.42	230	268	1950 TO 1595
SEA LEVEL	.36	240	240	2326 TO 2037

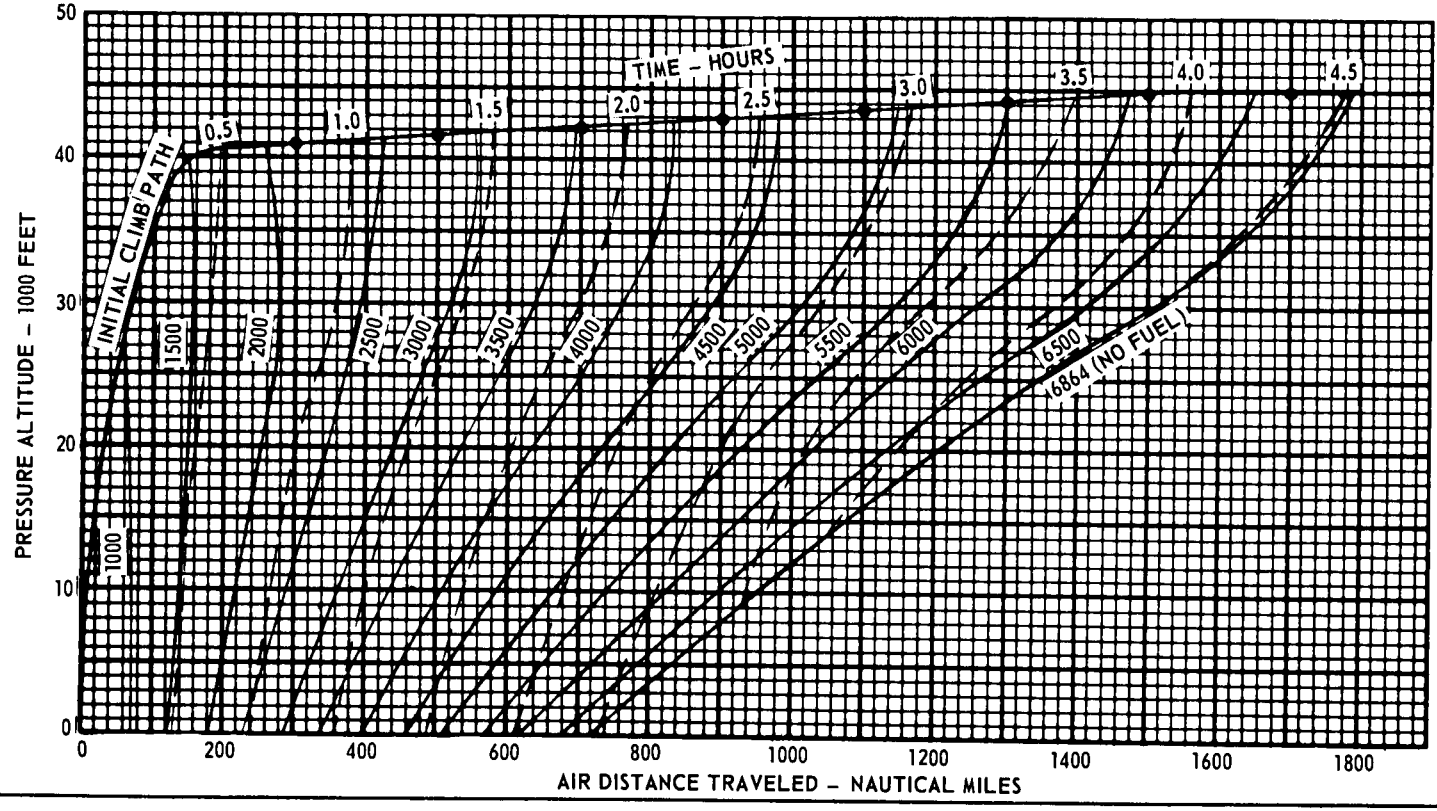


Figure A-2

DATA AS OF: OCTOBER 1964
BASED ON: FLIGHT TEST (USAF FTC-TDR-64-23, AND NAA)

SINGLE ENGINE RETURN PROFILE

MAXIMUM TAKE-OFF GROSS WEIGHT – 18,175 LB
(AIRPLANES CHANGED BY T.O. 1T-39-795)

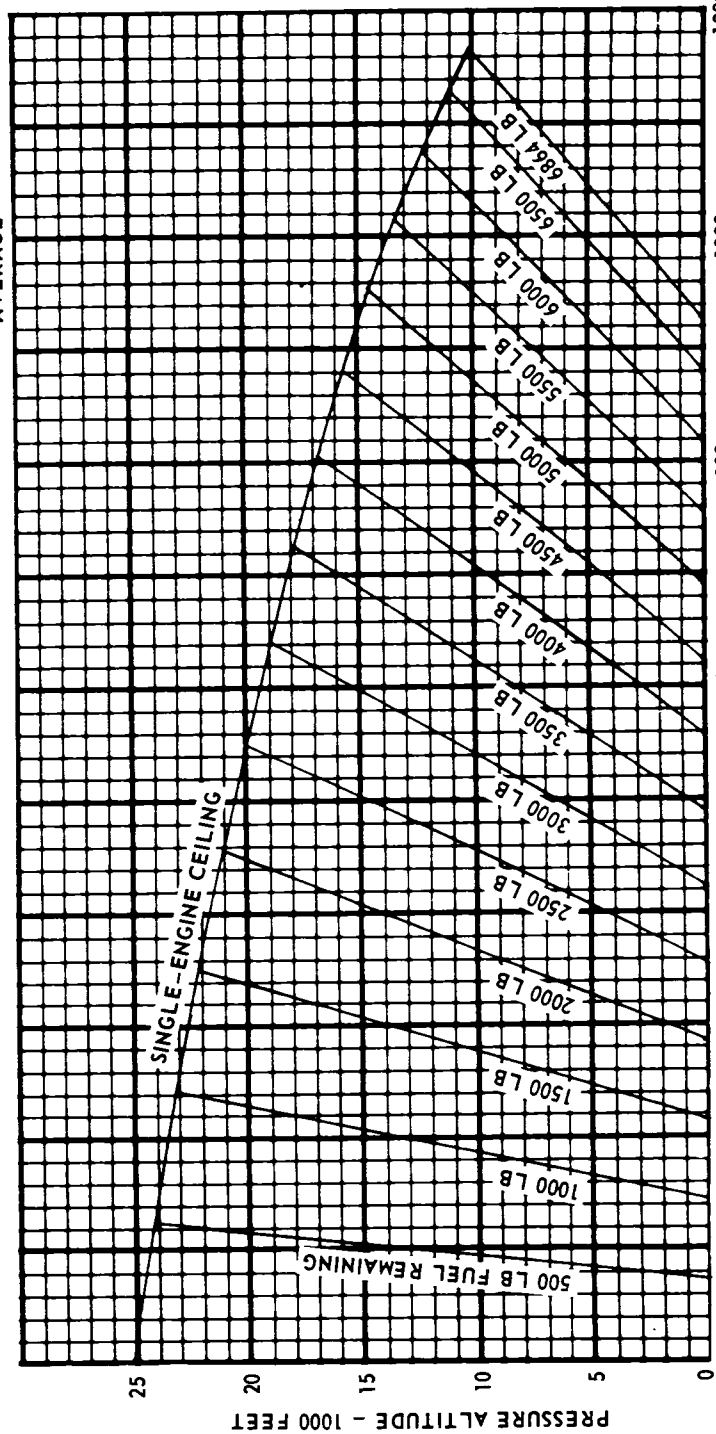
MODEL: T-39B
ENGINE: J60-P-3 OR -3A
FUEL: JP-4

PRESSURE ALTITUDE (FEET)	MACH NO.	APPROXIMATE CAS	APPROXIMATE TAS*	APPROXIMATE FUEL FLOW LB/HR
CRUISE CLIMB			269	1770 TO 1030
15,000	.426	211	263	1480 TO 1080
10,000	.391	217	248	1750 TO 1130
5000	.363	220	236	1810 TO 1200
SEA LEVEL	.349	229	229	1920 TO 1320

*AVERAGE

NOTE

- Data does not include any reserve fuel.
- Single-engine ceiling is based on Normal Rated Thrust.



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† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

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† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

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† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

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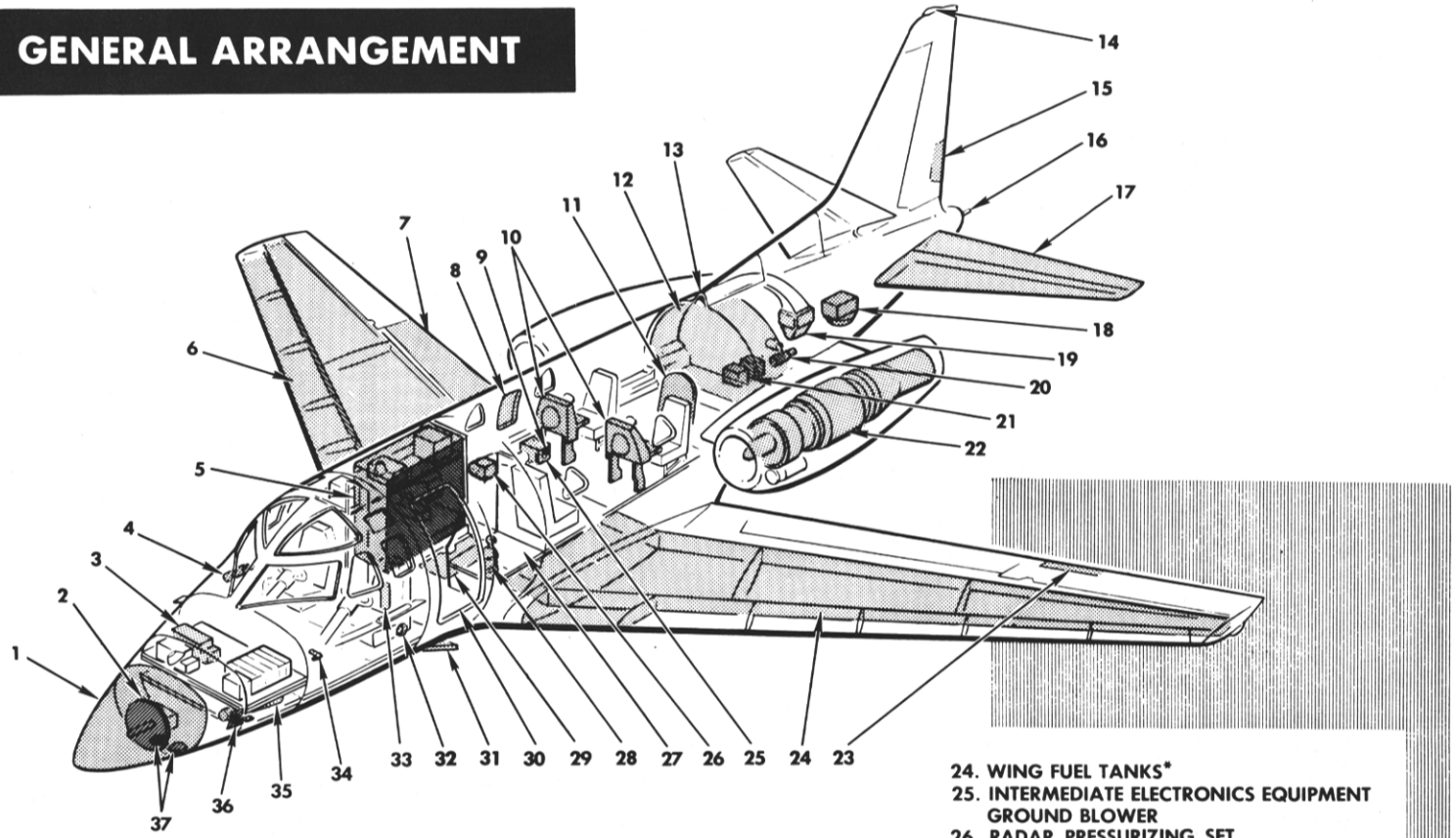
† Refer to T-39A Flight Manual, T.O. 1T-39A-1.

GENERAL ARRANGEMENT



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3. RADIO EQUIPMENT
4. MAIN STUDENT'S RADARSCOPE
5. INTERMEDIATE ELECTRONICS EQUIPMENT COMPARTMENT
6. WING SLATS*
7. WING FLAPS*
8. GROUND ESCAPE HATCH
9. R-14C RADAR PRESSURE GAGE
10. STAND-BY STUDENT'S CONSOLE AND RADARSCOPE
11. INSTRUCTOR'S JUMP SEAT
12. FUSELAGE FUEL CELL
13. RAM-AIR INLET
14. ANTICOLLISION LIGHT
15. RUDDER TRIM TAB
16. FUEL JETTISON AND VENT
17. TRIMMABLE HORIZONTAL STABILIZER*
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19. HEAT EXCHANGER
20. HYDRAULICALLY DRIVEN AC GENERATOR
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31. SPEED BRAKE
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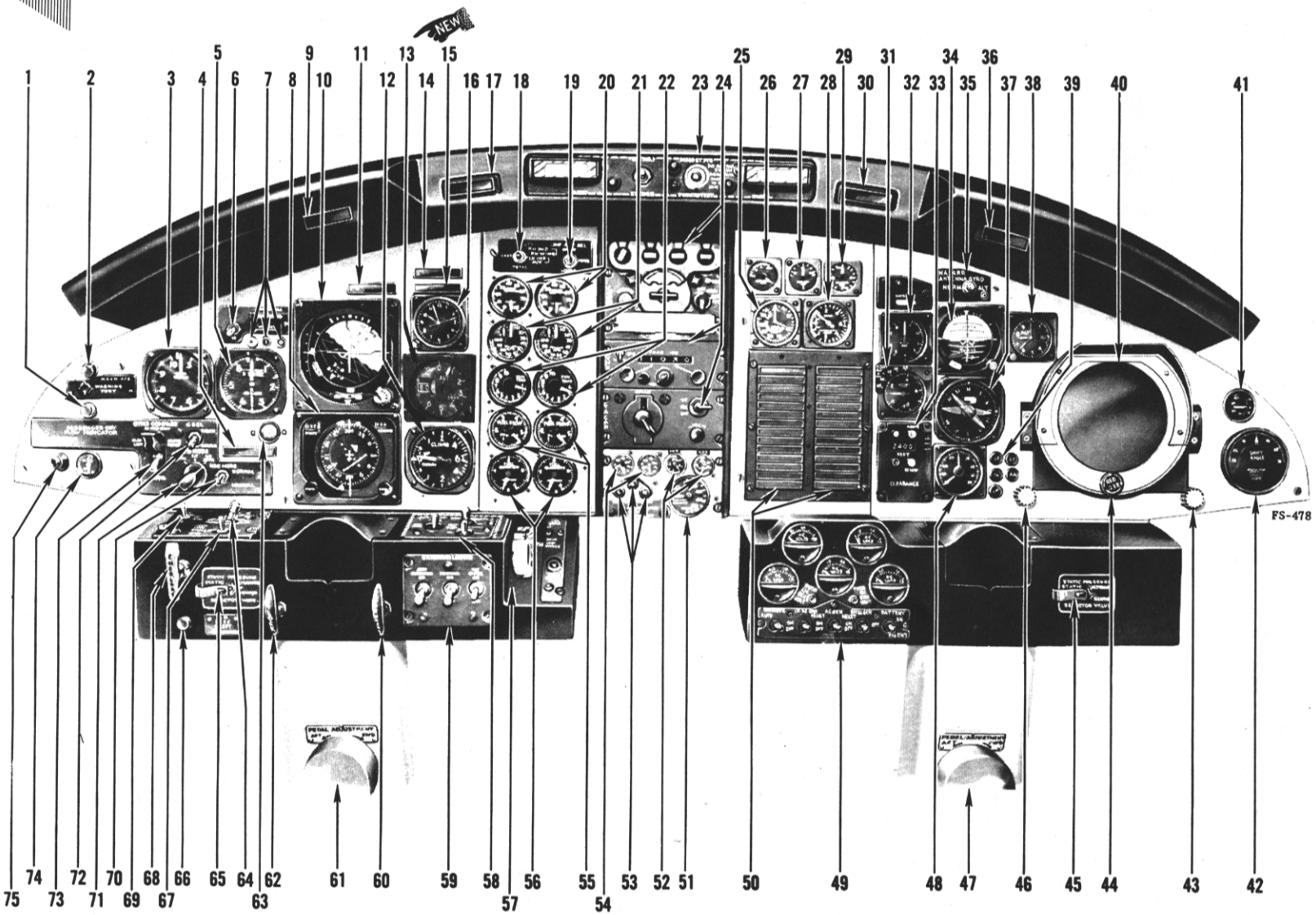
34. PITOT HEAD*
35. OXYGEN CYLINDER
36. ANGLE-OF-ATTACK TRANSMITTER AND VANE*
37. RETRACTABLE LANDING AND TAXI LIGHTS

*Typical both sides.

Figure 1-1

COCKPIT—FORWARD VIEW



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65.	Pilot's static-pressure selector	1-47‡
66.	Landing gear electric reset button	1-43‡
67.	Horizontal stabilizer trim limit test switch	1-38‡
68.	Landing gear emergency release T-handle	1-42‡
69.	Signal data recorder switch †	4-52‡
70.	Heading mode selector switch	4-47‡
71.	Flight director mode selector switch	4-47‡
72.	Pilot's course selector switch	4-47‡
73.	Gyrocompass mode switch	4-38‡
74.	Oxygen cylinder pressure gage	4-17‡
75.	Oxygen warning horn cutout button	4-17‡

† Some airplanes. (Refer to applicable text.)
‡ Refers to page in T-39A Flight Manual, T.O. 1T-39A-1.

DATA AS OF: OCTOBER 1964
BASED ON: **FLIGHT TEST**
(USAF FTC-TDR-64-23,
AND NAA)

OPERATIONAL RANGE PROFILE

MAXIMUM RAMP WEIGHT – 18,320 LB
(AIRPLANES CHANGED BY T.O. 1T-39-795)

MODEL: T-39B
ENGINES: (2) J60-P3 OR -3A
FUEL: JP-4

NOTE

1. Fuel allowance of 380 pounds for start, taxi, take-off, and acceleration to climb speed schedule included.
2. Use Military Thrust for climb.
3. Cruise-climb at Normal Rated Thrust and .76 Mach number.
4. Cruise at recommended Mach number.
5. Maximum take-off gross weight is 18,175 lb.

CRUISE-CLIMB PATH
POUNDS OF FUEL USED
TOTAL ELAPSED TIME

CRUISE DATA				
ALTITUDE	MACH	CAS	TAS	FUEL FLOW LB/HR
CRUISE-CLIMB	.76		436	1610 TO 1260
30,000	.64	240	380	1680 TO 1450
20,000	.55	250	335	1890 TO 1670
10,000	.49	270	315	2250 TO 2070
SEA LEVEL	.45	300	300	2800 TO 2730

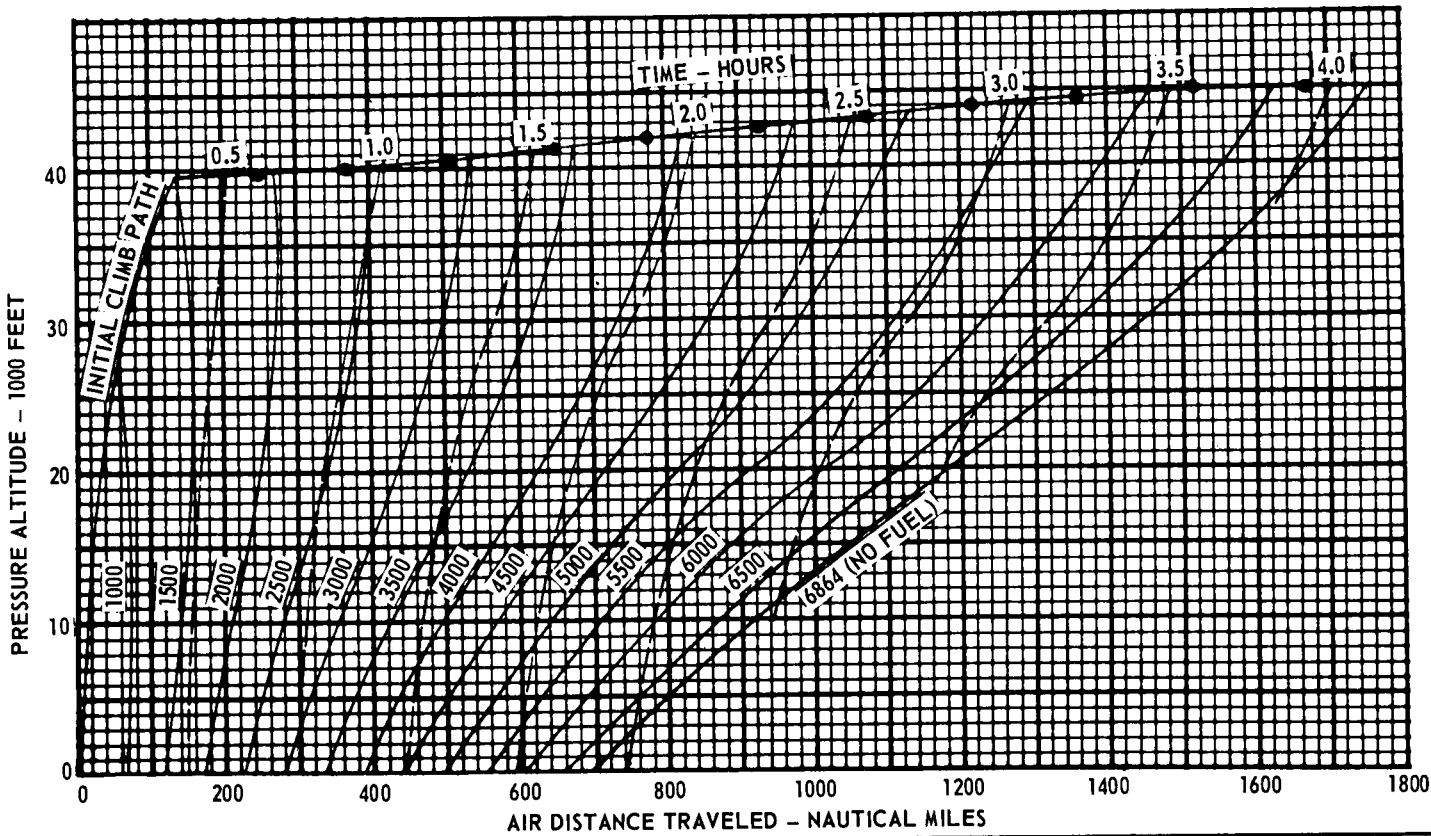

Figure A-1

DATA AS OF: OCTOBER 1964
BASED ON: **FLIGHT TEST**
(USAF FTC-TDR-24-23, AND NAA)

MAXIMUM RANGE PROFILE

MAXIMUM RAMP WEIGHT – 18,320 LBS
(AIRPLANES CHANGED BY T.O. 1T-39-795)

MODEL: T-39B
ENGINES: (2) J60-P-3 OR -3A
FUEL: JP-4

NOTE

1. Fuel allowance of 380 pounds for start, taxi, take-off, and acceleration to climb speed schedule included
2. Use Military Thrust for climb
3. Cruise-climb at Normal-Rated Thrust and .72 Mach number
4. Cruise at recommended Mach number
5. Maximum take-off weight – 18,175 lb.

CRUISE CLIMB PATH
POUNDS OF FUEL USED
TOTAL ELAPSED TIME

CRUISE DATA				
ALTITUDE	MACH	CAS	TAS	FUEL FLOW LB/HR
CRUISE-CLIMB	.72		412	1537 TO 1094
40,000	.67	190	384	1457 TO 1096
30,000	.57	205	335	1520 TO 1175
20,000	.48	218	295	1700 TO 1350
10,000	.42	230	268	1950 TO 1595
SEA LEVEL	.36	240	240	2326 TO 2037

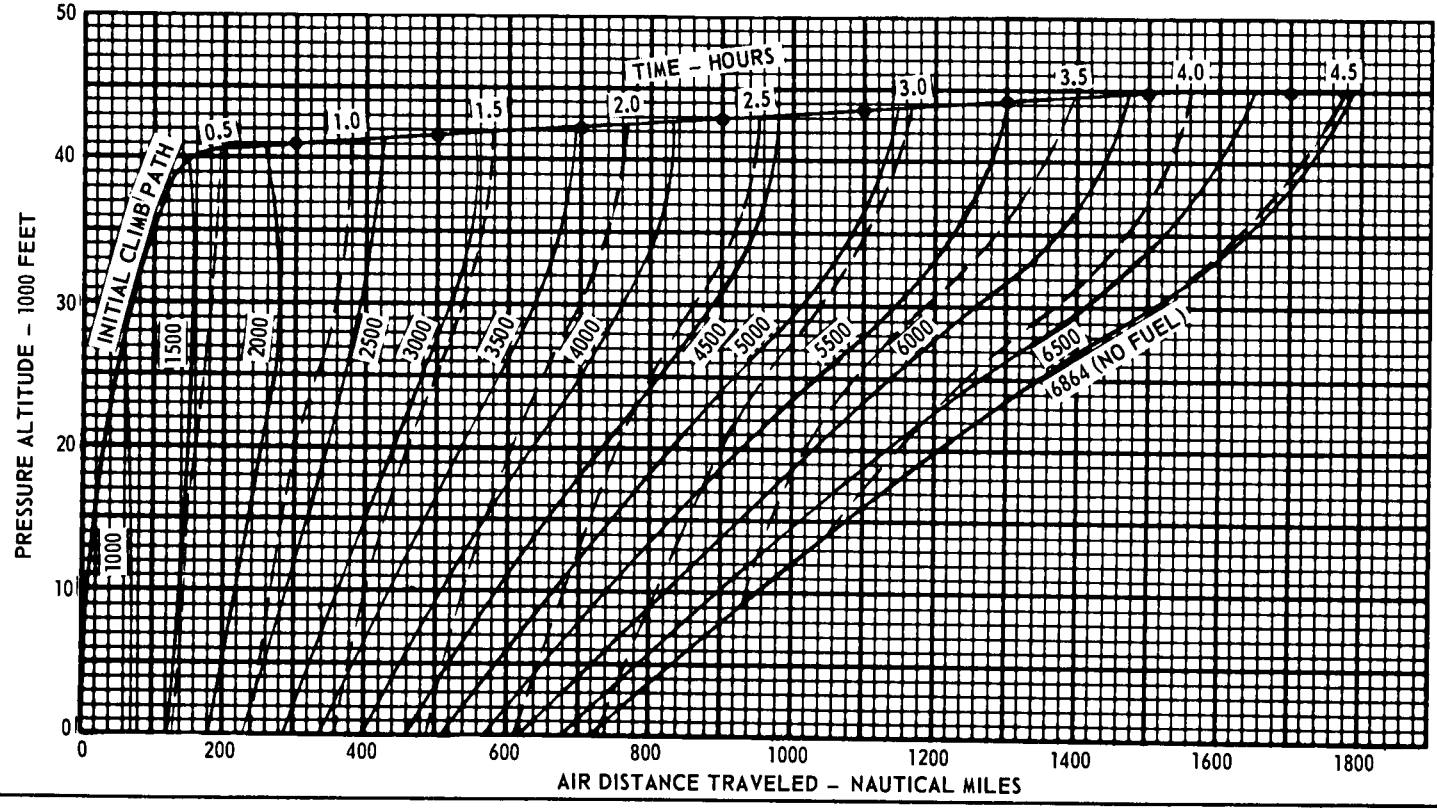

Figure A-2

DATA AS OF: OCTOBER 1964
BASED ON: FLIGHT TEST (USAF FTC-TDR-64-23, AND NAA)

SINGLE ENGINE RETURN PROFILE

MAXIMUM TAKE-OFF GROSS WEIGHT – 18,175 LB
(AIRPLANES CHANGED BY T.O. 1T-39-795)

MODEL: T-39B
ENGINE: J60-P-3 OR -3A
FUEL: JP-4

NOTE

- Data does not include any reserve fuel.
- Single-engine ceiling is based on Normal Rated Thrust.

PRESSURE ALTITUDE (FEET)	MACH NO.	APPROXIMATE		
		CAS	TAS*	FUEL FLOW LB/HR
CRUISE CLIMB			269	1770 TO 1030
15,000	.426	211	263	1480 TO 1080
10,000	.391	217	248	1750 TO 1130
5000	.363	220	236	1810 TO 1200
SEA LEVEL	.349	229	229	1920 TO 1320

*AVERAGE

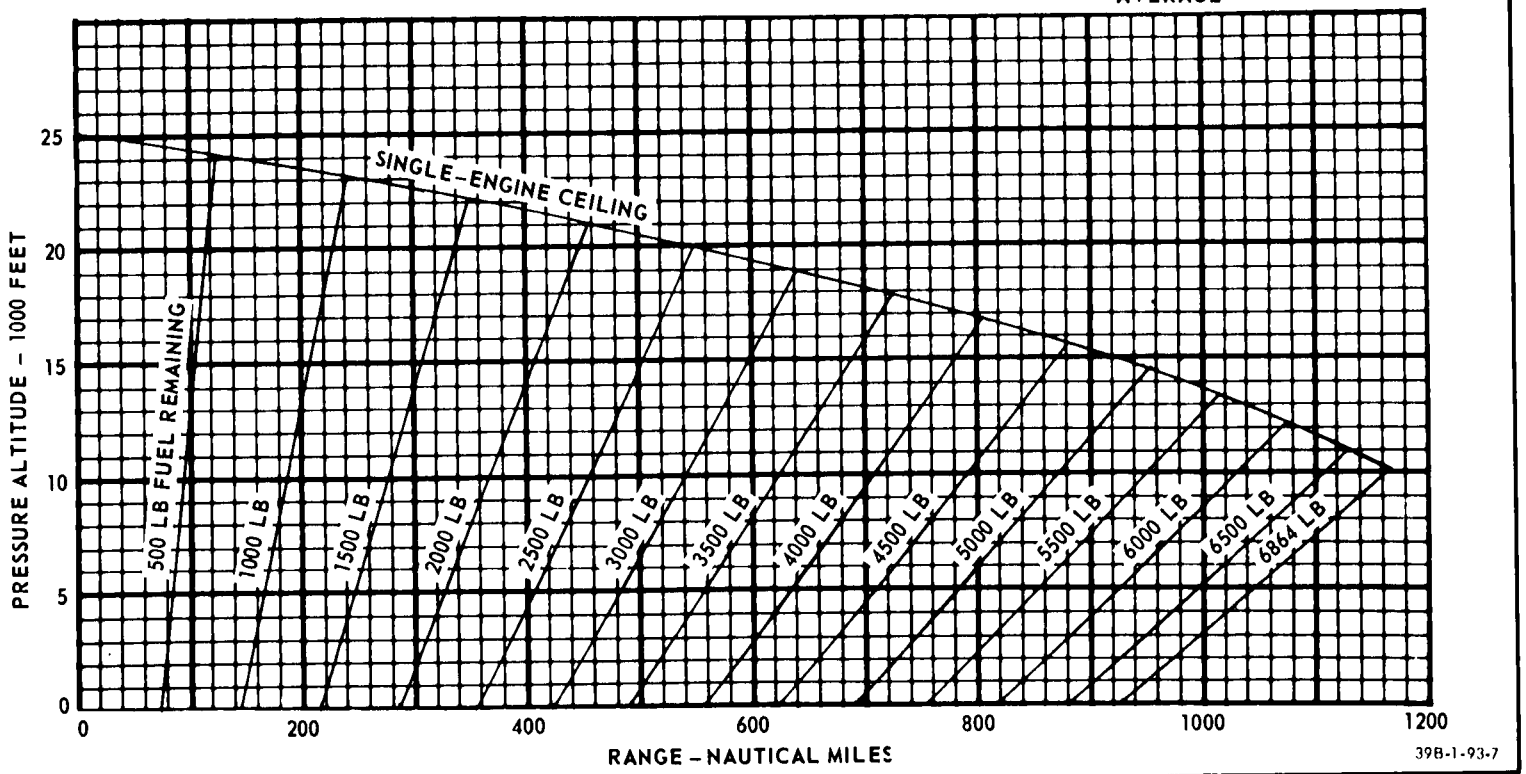

Figure A-3