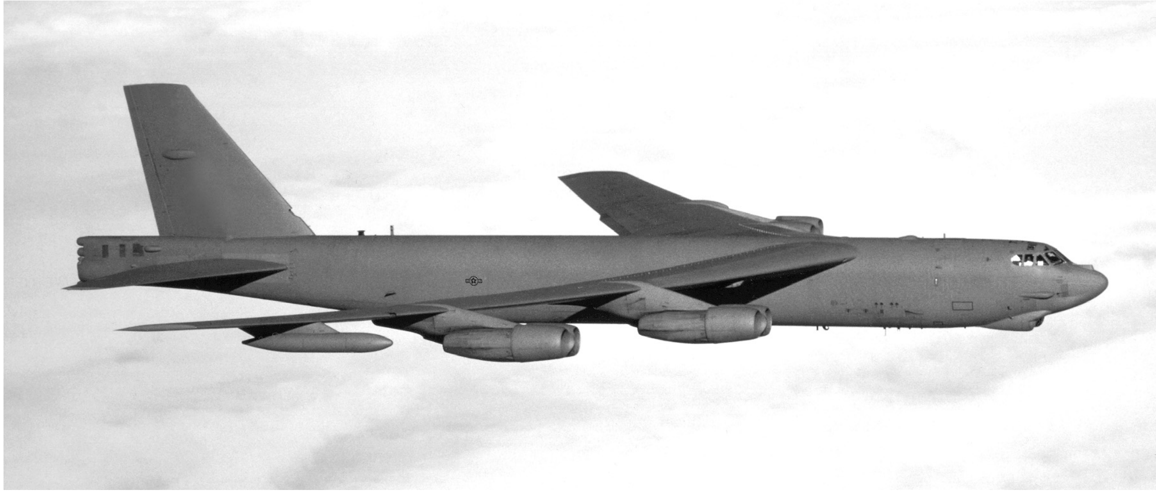
Radar Navigator's/Navigator's Manual

USAF SERIES B-52H AIRCRAFT

THE BOEING COMPANY
F33657-79-C-0416
F34601-03-D-0066



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1 JULY 2005

CHANGE 1 - 1 JUNE 2006

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Dates of issue for original and changed pages are:

Original 0 1 Jul 05
Change 1 1 Jun 06

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 846 CONSISTING OF THE FOLLOWING:

Page No.	Change No.
* Title	1
* A	1
* Flyleaf-1	1
Flyleaf-2 Blank	0
i	0
* ii	1
iii – vi	0
* vii	1
viii	0
1-1	0
1-2 Blank	0
1-3 – 1-11	0
1-12 Blank	0
* 1-13	1
1-14 – 1-41	0
1-42 Blank	0
* 1-43	1
1-44 – 1-53	0
* 1-54	1
1-55 – 1-75	0
* 1-76	1
1-77 – 1-110	0
* 1-111	1
1-112 – 1-115	0
* 1-116	1
1-117	0
* 1-118 – 1-119	1
1-120 – 1-122	0
* 1-123	1
1-124	0
1-125 – 1-127	0
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1-129 – 1-139	0
1-140 Blank	0
1-141 – 1-169	0
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1-171 – 1-175	0
* 1-176	1
1-177 – 1-211	0
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1-213 – 1-237	0
* 1-238	1
1-239 – 1-243	0
1-244 Blank	0
1-245 – 1-263	0
1-264 Blank	0
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1A-2 Blank	0
1A-3 – 1A-11	0
1A-12 Blank	0
* 1A-13	1
1A-14 – 1A-19	0
1A-20 Blank	0
1A-21 – 1A-27	0
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1A-124	0
* 1A-125 – 1A-126	1
1A-127 – 1A-185	0
* 1A-186	1
* 1A-187 – 1A-232 Deleted	1
1A-233 – 1A-235	0
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1A-237 – 1A-238	0
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3-131 – 3-138	0
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3-140 – 3-161	0
3-162 Blank	0
Glossary-1 – Glossary-6	0
* Glossary-7	1
Glossary-8 Blank	0
* Index-1	1
Index-2 – Index-3	0
* Index-4	1
Index-5	0
* Index-6	1
Index-7 – Index-10	0

CURRENT FLIGHT CREW CHECKLISTS

Radar Navigator's/Navigator's Abbreviated Checklist T.O. 1B-52H-1-12CL-1 1 Jul 05 Change 1 1 Jun 06

Upon receipt of the second and subsequent changes to this technical order, personnel responsible for maintaining this publication in current status will ascertain that all previous changes have been received and incorporated. Action should be taken promptly if the publication is incomplete.

*The asterisk indicates pages changed, added, or deleted by the current change.

ADDITIONAL COPIES OF THIS PUBLICATION MAY BE OBTAINED BY USAF ACTIVITIES IN ACCORDANCE WITH T.O. 00-5-1.

STATUS OF SAFETY AND OPERATIONAL SUPPLEMENTS

This supplement status page is based on information available to the manual editor as of the date of this publication. The information may not be current as it must be updated by any subsequent supplement status pages and by reference to T.O. 0-1-CD-1.

SUPPLEMENTS IN THIS CHANGE

Number	Date	Short Title	Section Affected
S-4	1 JAN 06	LITENING Targeting Pod	IA, II

OUTSTANDING SUPPLEMENTS

Number	Date	Short Title	Section Affected

Table of Contents

* Refer to T.O. 1B-52H-1.

** Refer to applicable Aircrew Weapons Delivery Manual.

LIST OF ILLUSTRATIONS - Titles included in alphabetical index

Before operating the B-52 aircraft read the following pages carefully!

SCOPE. This manual provides the radar navigator and navigator with aircrew oriented technical information regarding the AN/ASQ-176 Offensive Avionics System and its subsystems, conventional gravity weapon release system, and specific normal and abnormal operating procedures. It gives simplified descriptive information, discusses normal and malfunction indications, and advisories. Instructions in this manual are for a crew inexperienced in the operation of this aircraft. This manual provides the best possible operating instructions under most circumstances, but it is a poor substitute for sound judgment. Multiple emergencies, adverse weather, terrain, etc may require modification of the procedures.

COMPLEMENTARY MANUALS. This manual must be used with one or more of the following manuals to obtain all the information necessary for safe and efficient operation of the B-52H aircraft. These manuals have been separated from this manual for your convenience in handling information which may be classified, applicable only to certain aircraft configurations, or used only by certain crewmembers.

T.O. 1B-52H-1-1	B-52H Flight Manual – Appendix 1, Performance Data
T.O. 1B-52H-1-12	B-52H Radar Navigator's/Navigator's Manual
T.O. 1B-52H-1-13	B-52H Electronic Warfare Officer's Manual
T.O. 1B-52H-5	B-52H Basic Weight Checklist and Loading Data
T.O. 1B-52H-25-1	B-52H Nuclear Bomb Delivery Technical Manual – Basic Information (SECRET RESTRICTED DATA) (Title Unclassified)
T.O. 1B-52H-25-2	B-52H Nuclear Bomb Delivery Basic Information and Operating Procedures
T.O. 1B-52H-25-3	B-52H Nuclear Bomb Mission Planning Manual (SECRET RESTRICTED DATA) (Title Unclassified)
T.O. 1B-52H-30-1	B-52H Aircrew Weapon Delivery Manual – AGM-129
T.O. 1B-52H-30-4	B-52H Aircrew Weapon Delivery Technical Manual – AGM-86B
T.O. 1B-52H-34-2-1	B-52H Aircrew Conventional Weapons Delivery Manual
T.O. 1B-52H-34-2-5	B-52H Aircrew Weapon Delivery Manual (Nonnuclear) – WCMD
T.O. 1B-52H-34-2-6	B-52H Aircrew Weapon Delivery Manual (Nonnuclear) – JDAM
T.O. 1B-52H-34-2-7	B-52H Aircrew Weapon Delivery Manual (Nonnuclear) – AGM-154 JSOW
T.O. 1B-52H-34-2-8	B-52H Aircrew Weapon Delivery Manual (Nonnuclear) – AGM-158 JASSM
T.O. 1B-52H-34-2-9	B-52H Aircrew Weapon Delivery Manual (Nonnuclear) – AGM-86C/D

PERMISSIBLE OPERATIONS. The Flight Manual takes a "positive approach" and normally states only what you can do. Unusual operations or configurations are prohibited unless specifically covered herein. Clearance from the using command must be obtained before any questionable operation, which is not specifically permitted in this manual, is attempted. Before granting the clearance, the using command may request coordination or engineering assistance/approval from Oklahoma City ALC. Request should be made through the Flight Manual Manager.

HOW TO BE ASSURED OF HAVING LATEST DATA. Refer to T.O. 0-1-CD-1 for a listing of all current flight manuals, safety, or operational supplements, and checklists. Also, check the flight manual cover page, the title block of each safety and operational supplement and all status pages attached to formal safety and operational supplements. Clear up all discrepancies before flight.

HOW TO BE ASSURED OF HAVING LATEST DATA. Refer to T.O. 0-1-CD-1 for a listing of all current flight manuals, safety, or operational supplements, and checklists. Also, check the flight manual cover page, the title block of each safety and operational supplement and all status pages attached to formal safety and operational supplements. Clear up all discrepancies before flight.

ARRANGEMENT. The manual is divided into seven fairly independent sections to simplify reading it straight through or using it as a reference manual.

SAFETY SUPPLEMENTS. Information involving safety will be promptly forwarded to you in a safety supplement. Urgent information is published in interim safety supplements and transmitted by teletype. Formal supplements are mailed. The supplement title block and status page (published with formal supplement only) should be checked to determine the supplement's effect on the manual and other outstanding supplements.

OPERATIONAL SUPPLEMENTS. Information involving changes to operating procedures will be forwarded to you by operational supplements. The procedure for handling operational supplements is the same as for safety supplements.

CHECKLISTS. The flight manual contains itemized procedures with necessary amplifications. The checklist contains itemized procedures without the amplification. Primary line items in the flight manual and checklist are identical. If a formal safety or operational supplement affects your checklist, the affected checklist page will be attached to the supplement. Cut it out and insert it over the affected page but never discard the checklist page in case the supplement is rescinded and the page is needed.

FLIGHT MANUAL BINDERS. Looseleaf binders and sectionalized tabs are available for use with your manual. They are obtained through local purchase procedures and are listed in the Federal Supply Schedule (FSC Group 75, Office Supplies, Part 1). Check with your supply personnel for assistance in procuring these items.

WARNINGS, CAUTIONS, AND NOTES. The following definitions apply to “Warnings,” “Cautions,” and “Notes” found throughout the manual.

WARNING

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

CAUTION

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

NOTE

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

SHALL, WILL, SHOULD, and MAY. The following definitions apply to the words:

SHALL or WILL	The instructions or procedures prefaced by “shall” or “will” are mandatory.
SHOULD	Normally used to indicate a preferred but nonmandatory method of accomplishment.
MAY	An acceptable or suggested means of accomplishment.

CHANGE SYMBOLS. Changes to existing material and addition of new material are indicated by one of three types of symbols determined by the nature of the material affected. Text material utilizes a vertical line in the margin adjacent to the affected area. New illustrations (figures) utilize a vertical line in the outer margin of the page. Photographs and line drawings use a miniature pointing hand to highlight the affected area. Diagrams and schematics utilize a grey tone (screening) to highlight the affected area. Change symbols are not used for blank space resulting from deletions, indexes, and tabular data where changes cannot be identified, relocation of material, or correction of minor inaccuracies unless such correction changes the meaning.

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, supplementary manuals, checklists, or any phase of the Flight Manual program are welcomed. These should be forwarded to your local standardization/evaluation unit and routed as directed by AFI 11-215 to the Flight Manual Manager, 327 BMSG/EN, Tinker AFB, Oklahoma 73145-3021.

Aircraft Coding

The information contained in this manual covers all B-52H aircraft. USAF Serial numbers are used to distinguish information related to one aircraft or group of aircraft from that which is applicable to the other aircraft. When serial numbers appear by a paragraph or illustration, the information applies only to the aircraft represented by the serial numbers. Where no serial numbers appear on a paragraph or illustration, the information is applicable to all B-52H aircraft.

- Symbol ▶ means “thru” or “on.” Example:
  60-001▶ 60-015 – Identifies B-52H AF60-001 thru AF60-015
  61-016▶ – Identifies B-52H AF61-016 and on
- ▲ AIRCRAFT NO LONGER IN SERVICE
- CS Aircraft modified by TCTO 1B-52H-756 (Integrated Conventional Stores Management System)
- # Aircraft not CSRL capable

USAF B-52H Serial No.

60-001	CS
60-002	#
60-003	CS
60-004	CS
60-005	#
60-006	▲
60-007	CS
60-008	
60-009	CS
60-010	CS
60-011	CS
60-012	#
60-013	CS
60-014	CS
60-015	CS
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61-032	CS
61-033	▲
61-034	#
61-035	#
61-036	
61-037	▲
61-038	CS
61-039	CS
61-040	

Personnel Coding

Where necessary to distinguish crewmembers, the following code letters will be used

(P)	Pilot	(IP)	Instructor Pilot
(CP)	Copilot	(IN)	Instructor Navigator
(N)	Navigator	(DI)	Defense Instructor
(G)	Gunner	(GC)	Ground Crew
(RN)	Radar Navigator	(10th)	Tenth Crewmember
(EW)	EW Officer		

The amplified checklist describes in detail the steps to be completed. Each major part of multi-crewmember checklists has been assigned to a crewmember to be read by that crewmember, and to be accomplished by others in the crew. When necessary to show which crewmember will accomplish certain steps, the normal crew coding is used and the code letters will appear after the response to each step. Where a dash (-) is used in crew coding, such as P-CP, P-CP-RN, or any combination of crewmembers, each crewmember will accomplish the step. Where a slash (/) is used, such as P/CP, either crewmember will accomplish the step. A verbal response will be given by the crewmember(s) performing the action. There are exceptions to the verbal response as some of the checklists are to be accomplished silently. When a single crewmember is responsible for a checklist and accomplishment of all items, no crew coding will appear. All duties and responsibilities of the aerial gunner are deleted. Any crew member occupying the gunner’s ejection seat will continue to be referred to as “Gunner”.

Software and Hardware Coding

The information contained in this manual covers all the available versions of the B-52H OAS software. The following coding applies:

[CS] – Applies when Coventional Weapon (Integrated Convential Stores Management System (ICSMS)) Software is loaded on the aircraft.

[NS] – Applies when Nuclear Weapon (Block II) Software is loaded on the aircraft.

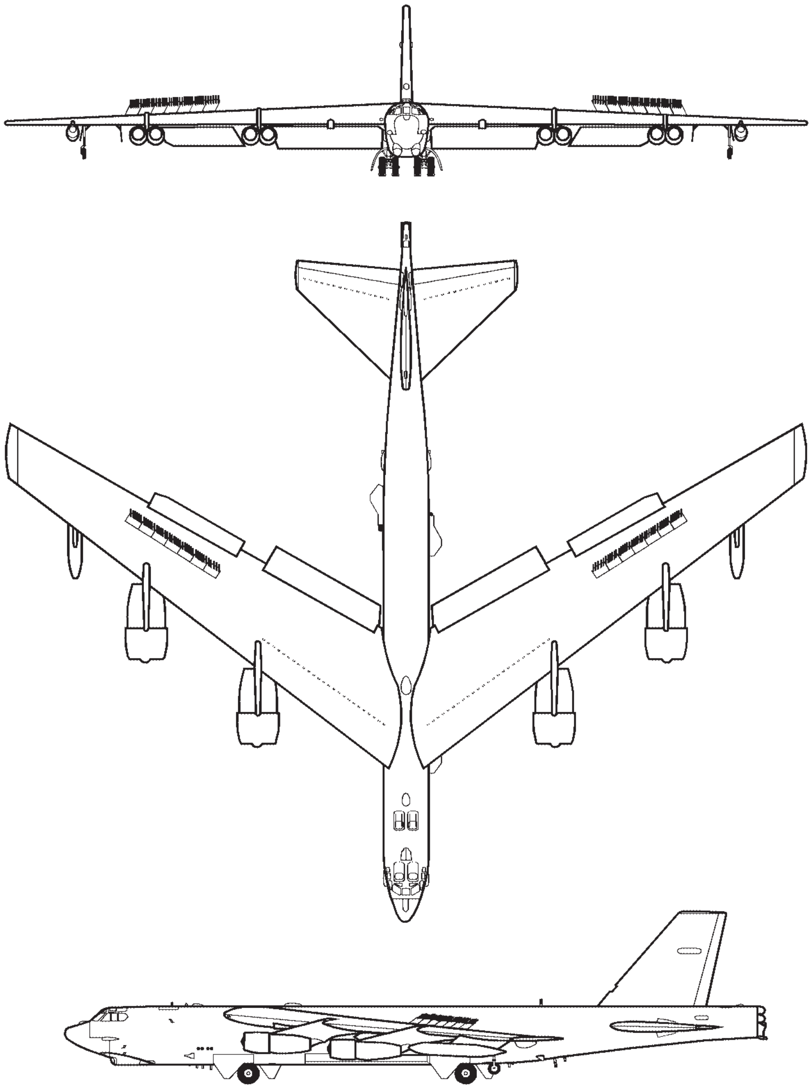
Retrofit Coding

The following code symbols along with the word “***Less***” are used to distinguish information related to aircraft that have the described retrofit change incorporated from that which is applicable to aircraft not yet retrofitted. This list contains only TCTO’s currently active. Those known to be completed are not included.

CODING EXAMPLE: **DR** T.O. 1B-52H-792, Installation of IU/TACAN Replacement on B-52H aircraft. Information applicable to aircraft until they are modified in accordance with T.O. 1B-52H-792 will be coded ***Less*** **DR**. Information applicable to aircraft modified in accordance with T.O. 1B-52H-792 will be coded **DR**.

SYMBOL	T.O. NO.	TITLE
CS	1B-52H-753	Installation of Global Positioning System (GPS) on B-52H Aircraft (ECP 0109).
	1B-52H-756	Installation of Integrated Conventional Stores Management System (ICSMS) on B-52H Aircraft (ECP 0109).
DJ	1B-52H-749	Installation of AN/ARC-210(V) V/UHF Radio on B-52H Aircraft.
DL	1B-52-2422	Installation of Dual Modem II AFSATCOM Radio System on B-52H Aircraft.
DQ	1B-52H-785	Installation AN/ARC-210 Retrofit.
DU	1B-52H-803	Installation of Demand Assigned Multiple Access (DAMA) System for the ARC-210 Radio and Advanced Narrowband Digital Voice Terminal (ANDTV) KY-100 System Capability for the ARC 210/ARC-164 Radios on B-52H Aircraft.
DY	1B-52H-805	Replacement of Electro-Optical Viewing System (EVS) Steerable Television set (STV) and Camera Electronics on B-52H Aircraft.
EA	1B-52H-823	Installation of Pilot EVS Monitor Input switch on B-52H Aircraft.
[AMI]	1B-52H-830	Replacement of Ballistics Computer Set AN/AYQ-10 and Inertial Navigation System AN/ASN-136 on B-52H Aircraft. Baseline for ***[AMI]*** includes **DJ** ***.***
[TP]	1B-52H-851	Installation of Targeting Pod on B-52H Aircraft.

The B-52H Stratofortress



Systems Description and Operation section I

[AMI]

table of contents **page**

THE AIRCRAFT

DESCRIPTION

The Boeing B-52 "Stratofortress" aircraft is of the land based heavy bombardment class designed for long range flight at high speed and altitude. The tactical mission is the destruction of surface objectives by bombs and missiles. The aircraft has provisions for ten crewmembers: a basic crew of five, three instructors and two additional crewmembers. The basic crew consists of pilot, copilot, radar navigator, navigator and electronic warfare officer. The instructor crew includes an instructor pilot, instructor navigator and instructor electronic warfare officer. Finally, the gunner and tenth man positions are also available for additional seating. A highly variable weapons load may be carried on external pylons in combination with internal cluster rack or CSRL mounted weapons loads. Up to 12 cruise missiles may be carried externally.

NOTE

> AGM-86C/D missiles will not be carried in mixed loads with AGM-86B or AGM-129.

The CSRL can carry up to eight AGM-86B/86C/86D, B-61, or B-83 weapons internally. These weapon loads cannot be mixed on the CSRL.

The aircraft can suspend a variety of gravity weapons internally on cluster rack assemblies (three cluster rack assemblies, up to 27 weapons total). Externally, the B-52 can suspend weapons using an AGM-28 pylon under each wing with standard rack adapter beams attached to each pylon and two sets of multiple ejector racks (MER) giving a total external carriage capability of 24 weapons. The heavy stores adapter beam (HSAB) can be attached to a stub pylon and up to nine MAU-12 bomb racks can be attached to each HSAB for a total external carriage capability on the HSAB of up to 18 weapons.

SPECIAL FEATURES

The aircraft is characterized by swept wings and empennage, four underslung nacelles housing eight turbofan engines, a quadricycle main landing gear, and a tip gear near each outboard engine nacelle. Engine bleed air provides the air supply for air conditioning and anti-icing. Cartridge starters are installed to provide for engine starts without assistance from an auxiliary air cart or auxiliary electrical power cart. Primary electrical power is 205-volt ac and is provided by four engine-driven generators. Hydraulic pressure is supplied by six engine-driven hydraulic pumps and two electric motor-driven hydraulic pumps. Primary pitch and yaw control is maintained by hydraulically actuated rudder and elevators. Lateral control is maintained by operation of hydraulically actuated spoilers. By varying the method of control, these same spoilers serve as airbrakes. The entire horizontal stabilizer is moved by a hydraulic mechanism to provide pitch trim. A steering and crosswind crab system provides steering of the forward main landing gear and also properly positions both forward and rear main landing gear for crosswind landings. A hydraulically driven revolver-type launcher installation in the bomb bay provides umbilical and ejector rack connections for the weapons which may be launched/released automatically or manually by the navigators. The weapon/missile equipment interfaces with the AN/ASQ-176 offensive avionics system, AN/APN-224 radar altimeter, and the aircraft electrical, bleed air, and body hydraulic systems. Weapon selective jettison capability is available to the navigator and radar navigator. Either the Weapons Control Panel (WCP) or backup MFD display and the keyboard may be used for computer controlled safe jettison of individual or multiple weapons. The pilot is provided with an ejector unlock consent switch and a prearm consent switch (cooperative with the WCP on the navigators' front panel), a launcher hydraulic system selector switch, and a bomb bay and missile jettison control which will jettison all weapons from the aircraft. The pilot is also provided with pylon jettison switches and pylon jettison consent switches. The Radar Navigator is provided with a bomb bay and missile jettison switch, which will jettison only conventional gravity weapons. This switch is inoperative for all CSRL gravity weapons and all nuclear and conventional missiles.

For additional information on the weapons installed, refer to the applicable weapons delivery manual for the MIU and WIU supported weapons shown on the Complimentary Manuals list in the front pages of this manual.

An electro-optical viewing system (EVS) is installed to provide pilots and navigators with a visual presentation of the area ahead of the aircraft during both day and night missions.

A GPS Navigation System provides position updates and emulated TACAN data to the crew and a moving map display to the pilots.

An Air Force Satellite Communications System (AFSATCOM) terminal is installed and is a half-duplex UHF terminal providing communications in both line-of-sight (LOS) and satellite modes. **DL** A dual modem capability has been added to the AFSATCOM. The Airborne Miniature Receive Terminal (MRT) AN/ARR-85(V) is installed to provide reliable VLF/LF reception and printout of secure and nonsecure messages at extended ranges in nuclear and/or jamming environments.

DIMENSIONS

Wing Span	185 feet
Fuselage Length	159 feet 4 inches
Height	
To top of fin	40 feet 8 inches
Fin folded	21 feet 6 inches
Tread	
Centerline outboard main tires	11 feet 4 inches
Centerline tip gear to tip gear	148 feet 5 inches

NAVIGATORS’ SYSTEMS

The following B-52H navigators’ systems are covered in this manual:

- OFFENSIVE AVIONICS SYSTEM
- RENDEZVOUS RADAR AN/APN-69
- NONNUCLEAR WEAPON CONTROL SYSTEM
- NONNUCLEAR WEAPON SUSPENSION SYSTEM
- NONNUCLEAR WEAPON CARRIAGE AND RELEASE SYSTEM

The following B-52H aircraft systems which may be applicable to the radar navigator/navigator are contained in T.O. 1B-52H-1.

- DOORS AND WINDOWS
- OXYGEN SYSTEM
- EMERGENCY EQUIPMENT
- ESCAPE SYSTEMS
- ELECTRICAL POWER SYSTEMS
- LIGHTING EQUIPMENT
- BOMB DOOR SYSTEM
- PNEUMATIC SYSTEMS (Air Conditioning and Pressurization)
- INSTRUMENTS
- NAVIGATION RADIOS
- COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT
- ELECTRO-OPTICAL VIEWING SYSTEM (EVS) (AN/ASQ-151)
- MISCELLANEOUS EQUIPMENT

EQUIPMENT CIRCUIT PROTECTION AND LOCATION DIAGRAMS

For locations of circuit breakers accessible in flight and additional circuit protection, refer to the applicable subsection of Section I of T.O. 1B-52H-1. Navigation and weapon delivery system circuit breakers and their locations are also located in this manual in Section III.

AIRCREW EMERGENCY PROCEDURES

Section III of T.O. 1B-52H-1 contains the aircrew emergency procedures for all crewmembers.

ABNORMAL OPERATION AND MALFUNCTION ANALYSIS

For abnormal operation and malfunction analysis of B-52H navigators' systems see Section III.

AUTHORIZED WEAPONS

Only those weapons listed in T.O. 1B-52H-1 are authorized for carriage and delivery in the configuration and quantity shown. Additional information on nuclear gravity weapons is contained in T.O. series 1B-52H-25. Additional information on nonnuclear gravity weapons is contained in T.O. 1B-52H-34-2-1. Information on missiles can be found in the applicable missile aircrew weapon delivery manual (-30 series for nuclear armed missiles or -34 series for missiles with nonnuclear warheads.)

RADAR NAVIGATOR'S/NAVIGATOR'S STATION

Figures 1-1, 1-2, and 1-3 illustrate the layout of a typical radar navigators and navigators station.

Radar Navigators' Station (Typical)

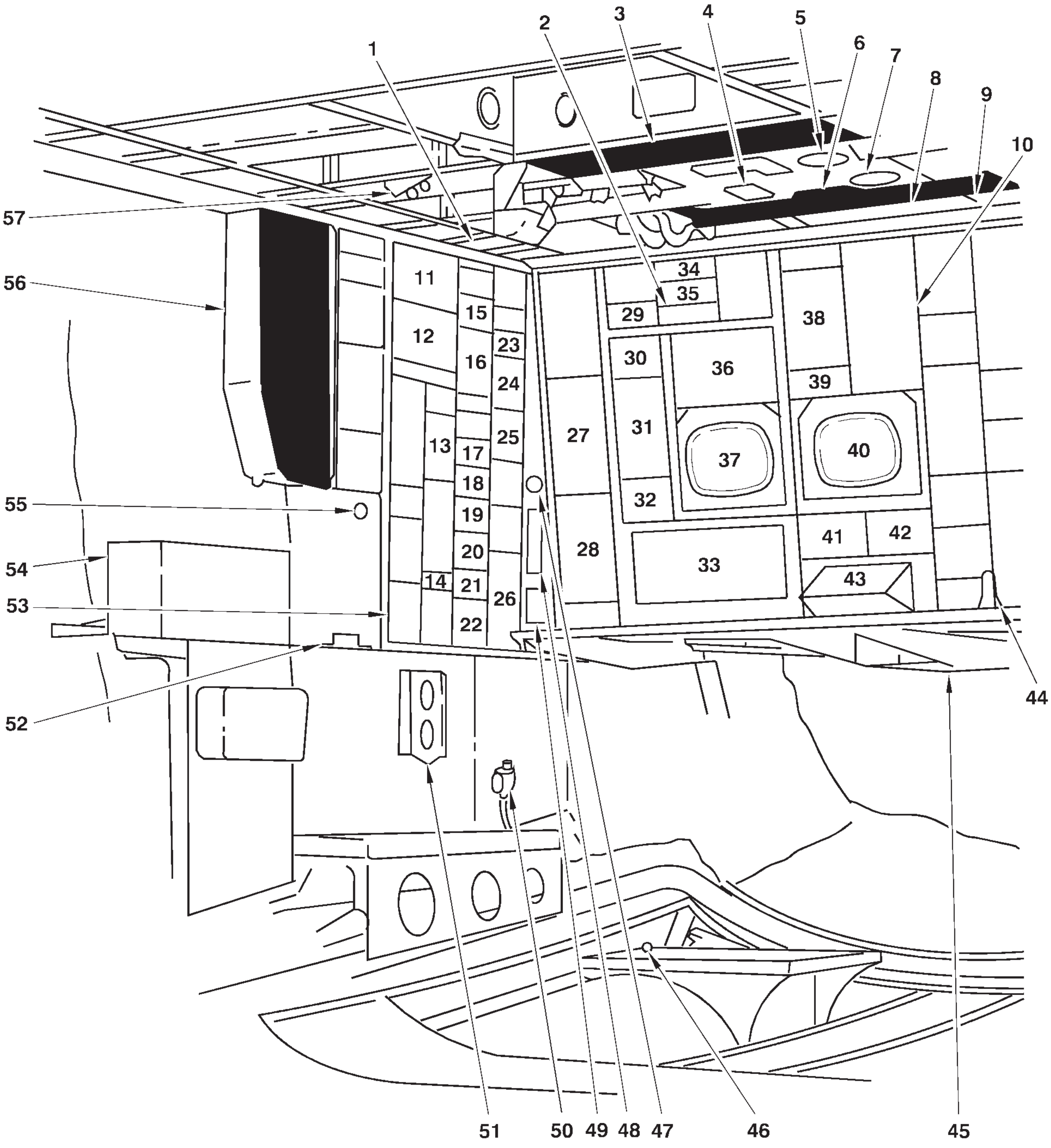


Figure 1-1 (Sheet 1 of 2)

1	EVS OPTICAL LIGHT FILTER STOWAGE
2	AIRFLOW LIGHTS
3	AFT BNS CIRCUIT BREAKER PANEL
4	RELEASE CIRCUITS DISCONNECT
5	REAR SPECIAL WEAPON MANUAL RELEASE HANDLE
6	LEFT FORWARD BNS CIRCUIT BREAKER PANEL
7	FORWARD SPECIAL WEAPON MANUAL RELEASE HANDLE
8	RIGHT FORWARD BNS CIRCUIT BREAKER PANEL
9	BNS LIGHT CONTROL PANEL
10	DCU-238/A AMAC CONTROLLER
11	BOMB INDICATOR LIGHTS
12	DIGITAL BOMB RELEASE INTERVAL CONTROL
13	SPECIAL WEAPONS LOCK INDICATOR PANEL
14	EA PILOT'S EVS MONITOR INPUT SWITCH
15	BNS EXTERNAL POWER PANEL
16	MASTER BOMB CONTROL PANEL
17	BOMB BAY JETTISON CONTROL PANEL
18	ALQ-117 TO BNS BLANKING SWITCH
19	CODED SWITCH SET CONTROL PANEL
20	OXYGEN REGULATOR
21	AUX MIXER SWITCH PANEL
22	INTERPHONE CONTROL PANEL
23	EVS ENVIRONMENTAL CONTROL
24	SPECIAL WEAPONS INDICATOR
25	SPECIAL WEAPONS CONTROL PANEL
26	CONVENTIONAL WEAPON PANEL
27	BLANK
28	RADAR CONTROL TEST PANEL
29	BOMB DOOR CONTROL VALVE CHECK PANEL
30	INDICATOR LIGHT DIMMER
31	*[TP]* ADVANCED GUIDED WEAPON CONTROL PANEL or *Less [TP]* BLANK
32	RADAR PRESENTATION PANEL
33	RADAR NAVIGATOR MANAGEMENT PANEL
34	RADOME RAM AIR FLOW LOW AND CABIN AIR FLOW LOW LIGHTS
35	RADAR LOW PRESSURE LIGHTS
36	*[TP]* VIDEO MONITOR or *Less [TP]* STOWAGE
37	LEFT MULTIFUNCTION DISPLAY
38	AVTR REMOTE CONTROL UNIT
39	TEMPERATURE CONTROL SELECTOR
40	RIGHT MULTIFUNCTION DISPLAY
41	EVS VIDEO SELECT PANEL
42	EVS STEERING CONTROL PANEL
43	KEYBOARD
44	*[TP]* INTEGRATED TRACK HANDLE
45	BNS DESICCATOR
46	INTERPHONE MIKE FOOT SWITCH
47	ASHTRAY
48	AIR OUTLET KNOBS
49	TIME DELAY BYPASS AND BOMB TONE SCORING PANEL
50	D-2 BOMB RELEASE SWITCH
51	BOMB INDICATOR CARDS HOLDER
52	AERP BLOW MOUNTING BRACKET
53	BLANK
54	DATA BUS
55	AERP ELECTRICAL CONNECTOR
56	AUXILIARY BNS CIRCUIT BREAKER PANEL
57	OXYGEN HOSE RETAINER STRAP

Figure 1-1 (Sheet 2 of 2)

Navigators’ Station (Typical)

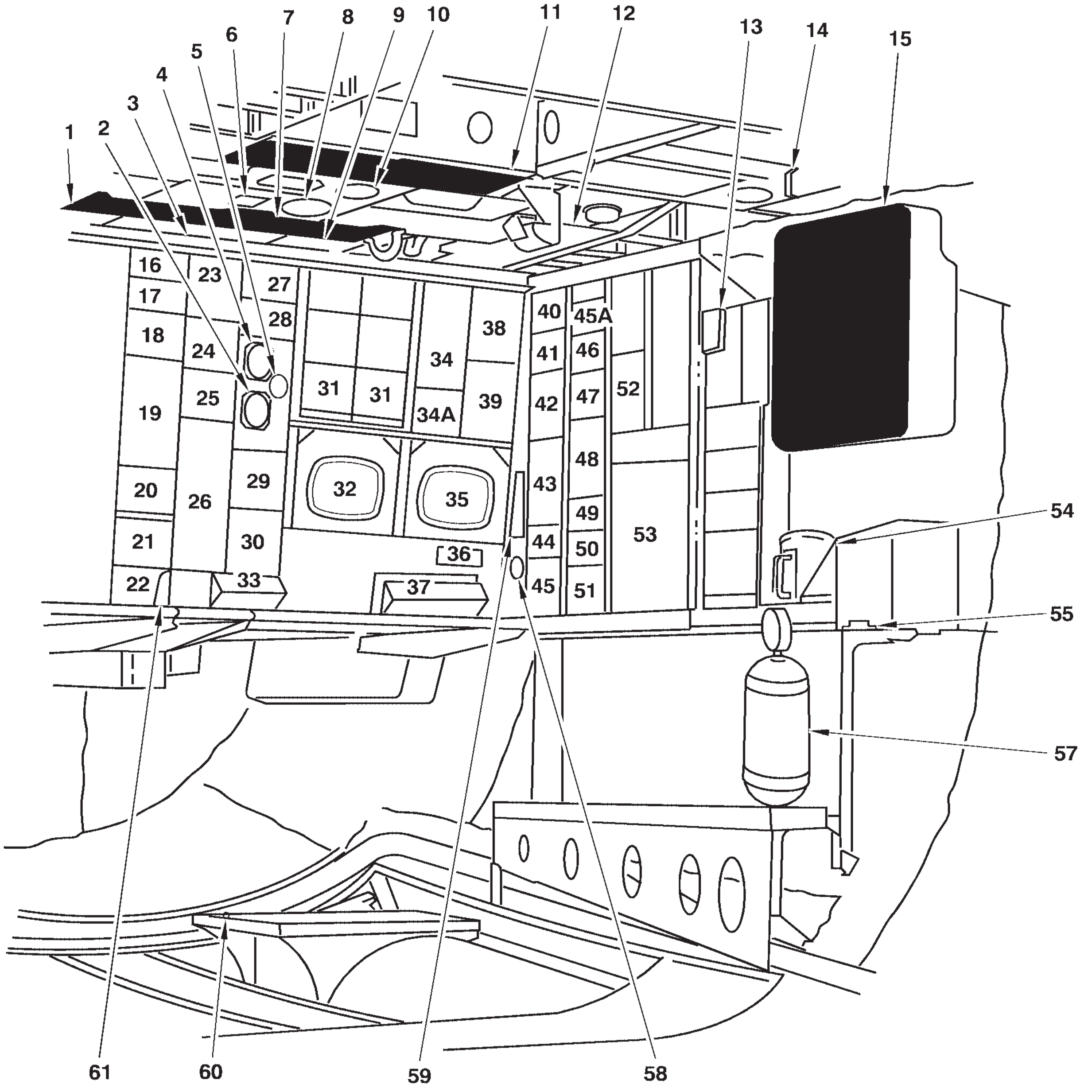
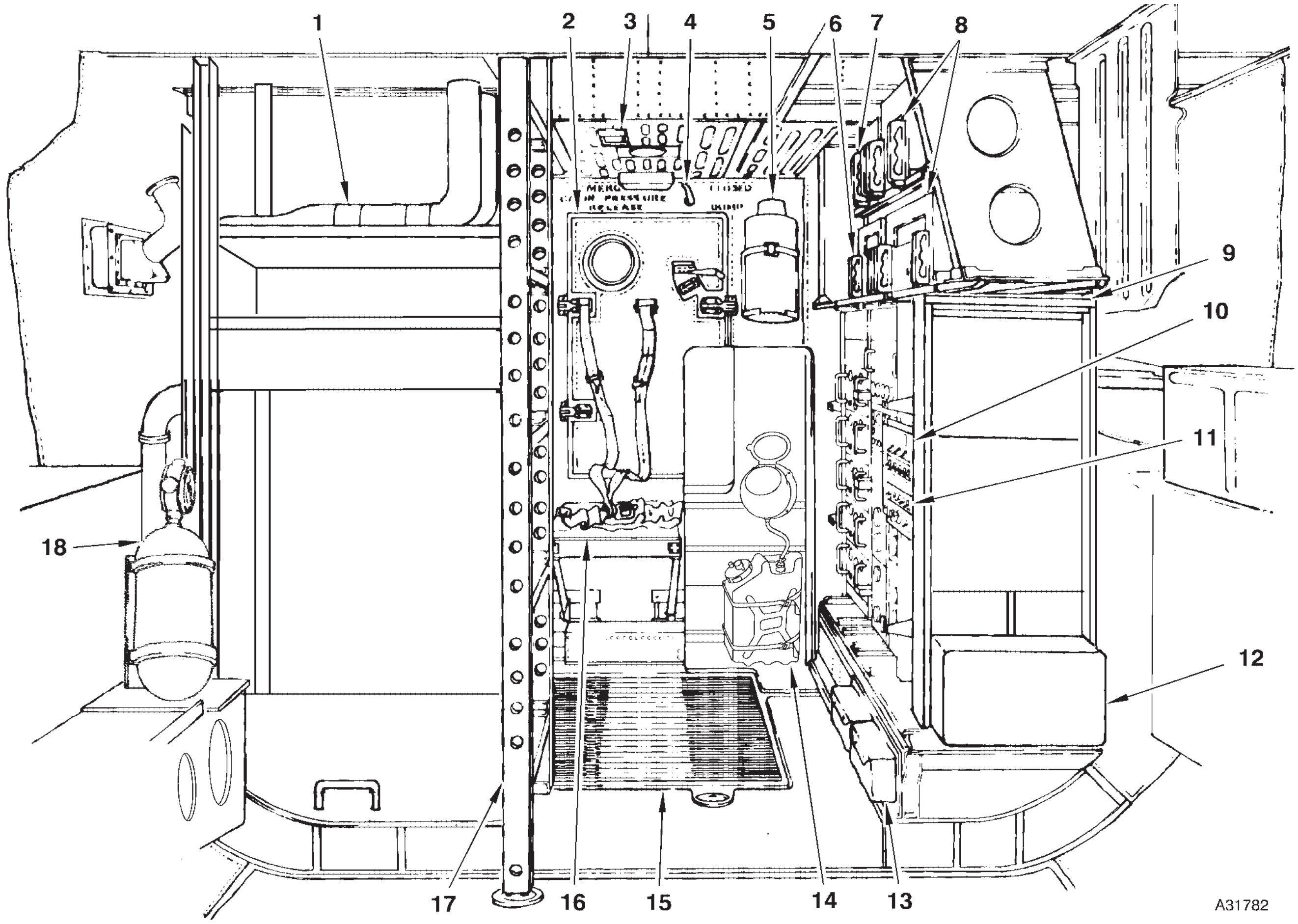


Figure 1-2 (Sheet 1 of 2)

1 LEFT FORWARD BNS CIRCUIT BREAKER PANEL
2 BAROMETRIC ALTIMETER
3 BNS LIGHT CONTROL
4 TRUE AIRSPEED INDICATOR
5 OUTSIDE AIR TEMPERATURE GAGE
6 RELEASE CIRCUITS DISCONNECT
7 RIGHT FORWARD BNS CIRCUIT BREAKER PANEL
8 FORWARD SPECIAL WEAPON MANUAL RELEASE HANDLE
9 SPARE LAMPS CONTAINER
10 REAR SPECIAL WEAPON MANUAL RELEASE HANDLE
11 AFT BNS CIRCUIT BREAKER PANEL
12 EVS OPTICAL LIGHT FILTER STOWAGE
13 PDUC POWER SWITCH AND CIRCUIT BREAKER
14 OXYGEN HOSE RETAINER STRAP
15 EVS CIRCUIT BREAKER PANEL
16 EMERGENCY ALARM LIGHT AND BNS STEERING PANEL
17 FLIR CONTROL PANEL
18 EMERGENCY ALARM LIGHT
19 COMPUTER CONTROL PANEL
20 STV CONTROL PANEL
21 MRT PRINTER
22 MRT REMOTE CONTROL UNIT
23 **DU** KY-100 PROCESSOR
24 DOPPLER CONTROL – INDICATOR PANEL
25 OAS POWER CONTROL PANEL
26 WEAPON CONTROL PANEL
27 **DU** COMSEC MODE CONTROL PANEL
28 INDICATOR LIGHT DIMMER
29 RADAR PRESENTATION PANEL
30 INTERFACE UNIT CONTROL PANEL
31 DATA TRANSFER RECEPTACLE
32 LEFT MULTIFUNCTION DISPLAY
33 PROGRAMMABLE KEYBOARD
34 *Less* **DL** STOWAGE
DL AFSATCOM CONTROL PANEL
34A **DU** DAMA REMOTE CONTROL UNIT
35 RIGHT MULTIFUNCTION DISPLAY
36 EVS VIDEO SELECT PANEL
37 KEYBOARD
38 *Less* **DL** AFSATCOM CONTROL PANEL
DL STOWAGE
39 AFSATCOM KEYBOARD
40 APN-69 PRESSURIZATION PANEL
41 BLANK
42 AFSATCOM PRINTER
43 RENDEZVOUS RADAR CONTROL PANEL
44 RADAR PRESSURE CONTROL PANEL
45 LOS UHF (AN/ARC-171(V))
45A DOPPLER DRIFT CONTROL
46 DIGITAL DATA LOADER
47 (DEACTIVATED)
48 (DEACTIVATED)
49 OXYGEN REGULATOR
50 AUX MIXER SWITCH PANEL
51 INTERPHONE CONTROL PANEL
52 ALTERNATE JETTISON CONTROL PANEL
53 AVTR RECORDER
54 HOT CUP
55 AERP BLOWER MOUNTING BRACKET AND ELECTRICAL CONNECTOR
56 DELETED
57 PORTABLE OXYGEN BOTTLE
58 ASHTRAY
59 LIGHT DIMMER CONTROL PANEL
60 INTERPHONE MIC FOOT SWITCH
61 *[TP]* INTEGRATED HAND CONTROL UNIT

Figure 1-2 (Sheet 2 of 2)

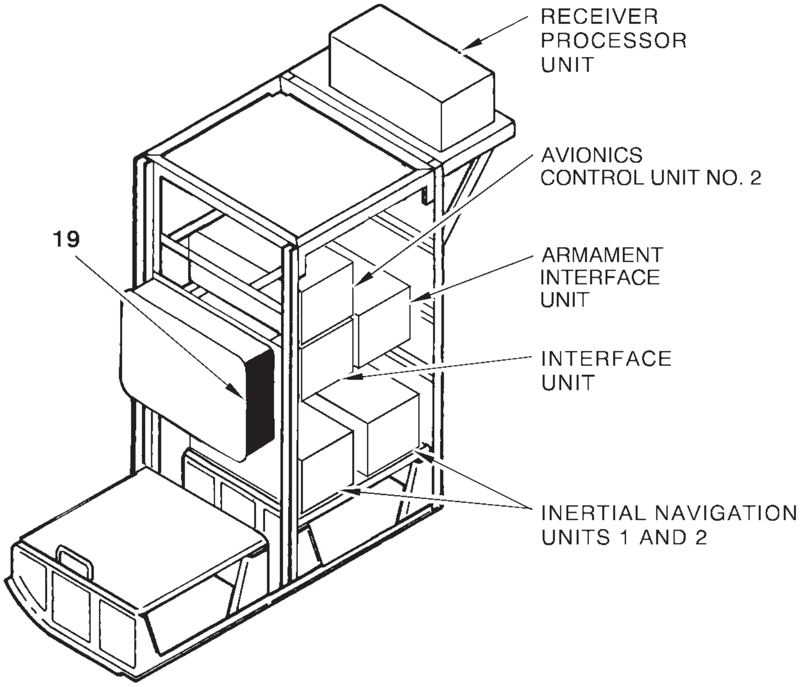
Navigators' Compartment-Aft



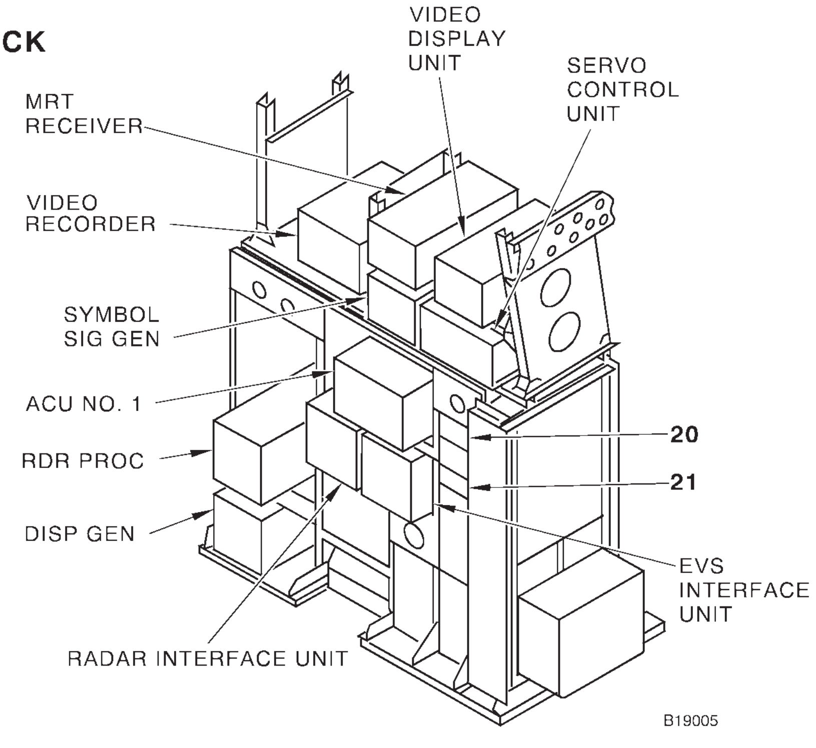
NAVIGATOR COMPARTMENT – AFT

1	RIGHT EQUIPMENT RACK
2	PRESSURE BULKHEAD DOOR
3	SERVICE DOMELIGHT
4	EMERGENCY CABIN PRESSURE RELEASE HANDLE
5	DRINKING WATER CONTAINER
6	VIDEO RECORDER
7	MRT RECEIVER
8	EVS COMPONENTS
9	LEFT EQUIPMENT RACK
10	OXYGEN REGULATOR (INSTRUCTOR NAVIGATOR'S)
11	INSTRUCTOR NAVIGATOR'S INTERPHONE CONTROL PANEL
12	A 9000 S/V BOX
13	LANDING GEAR GROUND LOCK STOWAGE CONTAINERS
14	URINAL
15	LOWER DECK FOLDING HATCH
16	INSTRUCTOR NAVIGATOR'S TAKEOFF AND LANDING STATION
17	LADDER
18	PORTABLE OXYGEN BOTTLE

Figure 1-3 (Sheet 1 of 2)



RIGHT EQUIPMENT RACK



LEFT EQUIPMENT RACK

19	RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL	20	IN'S OXYGEN PANEL
		21	IN'S INTERPHONE PANEL

Figure 1-3 (Sheet 2 of 2)

OFFENSIVE AVIONICS SYSTEM (OAS)

OAS Configuration

AN/ASQ-176 OFFENSIVE AVIONICS SYSTEM

The Avionics Mid-life Improvement (AMI) program upgrades the B-52H Offensive Avionics System (OAS). During this upgrade, the Avionics Control Units (ACUs), the Data Transfer Units (DTUs), and the Inertial Navigation Systems (INSs) are being replaced. All of the OAS software is being rehosted in Ada 95 and/or redesigned as required to accommodate the new hardware.

The AN/ASQ-176 Offensive Avionics System (OAS) is a computer controlled electronics system providing nearly automatic navigation and weapon delivery. The system is composed of the following equipment (the section of this manual giving coverage is in parentheses following the equipment title):

- Digital Data Set AN/AYK-17
- Control-Display Set AN/ASQ-175
- Ballistics Computer Set
- Inertial Navigation Set
- Electronic Altimeter Set AN/APN-224 (Radar Altimeter)
- Attitude Heading Gyroscope Set AN/ASN-134 (Attitude Heading Reference Set)
- Radar Navigation Set AN/APN-218 (Doppler Radar)
- Radar Set Group OY-73/ASQ-176
- Control-Monitor Set AN/AWQ-3
- Video Recorder RO-523/ASQ-175
- Global Positioning System (GPS) AN/ARN-151(V)

The avionics computers (ACUs) are controlled by either the Flight Computer Program (FCP) or the Ground Maintenance Computer Program (GMCP). Only the OAS operation by means of the FCP is given in this manual. All serial data exchange between the various pieces of equipment is through digital data signals phased back and forth on the MIL-STD-1553 data bus. The system is designed to be highly automatic in order to cut operator workload and eliminate operator error. Two ACUs are provided to give partial redundancy. The system is loaded with the desired computer programs, mission and target data, and missile data before takeoff. The system can be aligned to a known position and then fly to programmed destinations and to programmed missile/weapon release points. The navigators monitor system progress and update the navigation information with checkpoint fixes when possible.

OAS SUBSYSTEMS

The OAS is broken down functionally into five subsystems; however, these subsystems are not physically identifiable in the aircraft. Figure 1-4 shows a diagram of the five subsystems, their relationship to each other, and the basic equipment related to each. All of the equipment is tied to (interfaced with) the MIL-STD-1553 data bus. The subsystems are:

- Interface Subsystem
- Controls and Display Subsystem
- Computational Subsystem
- Navigational Subsystem
- Weapon Control and Display Subsystem

AN/ASQ-176 Subsystem Diagram

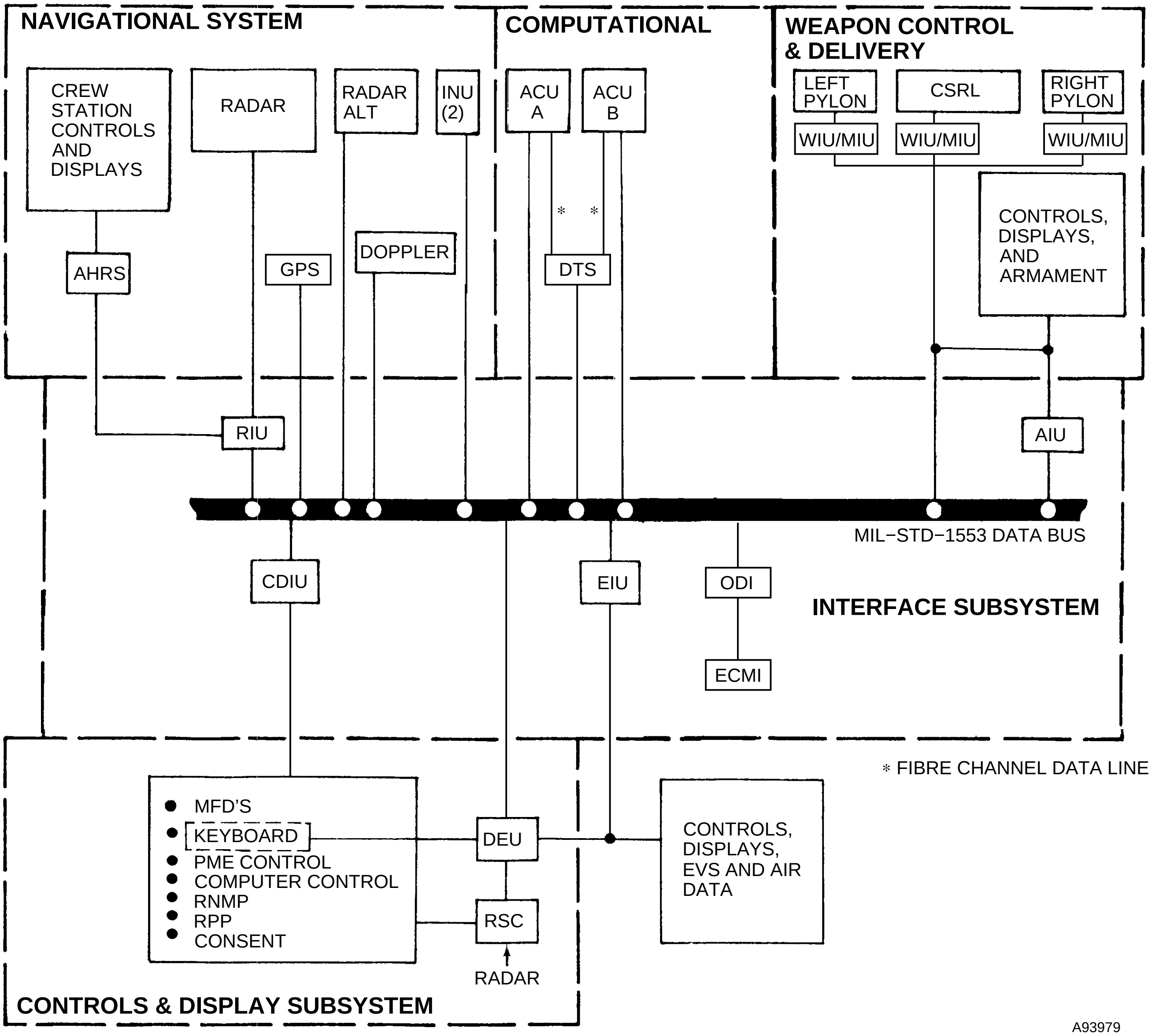


Figure 1-4

Interface Subsystem

The interface subsystem, technically called the Digital Data Set AN/AYK-17, accomplishes the tieing together of the various equipment in the subsystems by means of the MIL-STD-1553 digital data bus. In order to provide signal compatibility and proper data format, interface units are required for certain equipment.

CONTROLS AND DISPLAY INTERFACE UNIT (CDIU)

This is a signal data converter for the following equipment:

- Radar Navigator Management Panel
- Pilot Jettison Panel
- Weapon Control Panel
- Computer Control Panel
- OAS Power Control Panel

EVS INTERFACE UNIT (EIU)

This is a signal data converter for the following functions and equipment:

- Control of EVS steering, symbols and NFOV
- Air data from pilot's pitot system and copilot's static system for computation of TAS and maintenance of OAS HA
- Pilot's Flight Command Indicator (FCI) instrument
- TTG and FCI on FRMT 3, pilot's EVS displays

RADAR INTERFACE UNIT (RIU)

This is a signal data converter for the following equipment:

- RNMP control of radar
- Autopilot
- Attitude Heading Reference System
- Bomb Release (GWD SMO)
- Radar Presentation Panels
- Bomb Door Control (GWD SMO)

MISSILE INTERFACE UNIT (MIU)

Missile interface units for the bomb bay and pylons are decoder-receivers for all the control and data functions for the missiles at this location. The MIUs require cooling air when they are turned on. In flight this is ram air, on the ground a cooling air fan is connected to the ram air inlet. These MIUs have power switches located on the OAS power control panel and information on their use is given in the applicable weapons delivery manuals 1B-52H-34 series (missiles).

ARMAMENT INTERFACE UNIT (AIU)

The armament interface unit is a signal data converter for the following equipment:

- Bomb Door Control (Nuclear FCP, CALCM SMO and CF-59)
- Launcher Rotation Circuits
- Bomb Tone Scoring
- Environmental Control Unit
- Radar Altimeter

WEAPONS INTERFACE UNIT

See appropriate weapons delivery manual.

OFFENSIVE/DEFENSIVE INTERFACE (ODI)

The Offensive/Defensive Interface (ODI) application is specifically designed for the Avionics Midlife Improvement (AMI) modification. ODI transmits time and navigation data from the OAS Avionics Control Units (ACU) to the Electronics Countermeasures Improvement (ECMI) system, ALQ-172(V)2, on the MIL-STD-1553A B/D data bus pair. ODI also displays B/D bus status and ECMI equipment status on the Prime Mission Equipment (PME) Status Display (FRMT-6, screen 2).

Controls and Display Subsystem

The controls and display subsystem provides the operators access to the OAS to allow control, supervision, and readout of the various system functions. Technically this subsystem is called Control-Display Set AN/ASQ-175 and consists of the following components:

- OAS Power Control Panel
- Multifunction Displays
- Keyboards
- Computer Control Panel
- Radar Presentation Panel
- RN Management Panel
- Weapon Control Panel
- Video Recorder
- Display Electronics Unit
- Radar Scan Converter

Computational Subsystem

The computational subsystem (figure 1-5) consists of a data transfer system, two avionics computer units, data buses, and Fibre Channel data line. The computational subsystem is the brain of the OAS and performs all calculations needed for navigation and weapon delivery, all coding, decoding and communication of data, and all systems management and control functions. The avionics processors (computers) are designed to work together in a synchronized manner to accomplish all OAS tasks. The processors are designated A and B. For processor malfunction operation, see Abnormal Operation, Section III. The data buses, designated A, B, C, D, E, F, G, and H are collectively called a MIL-STD-1553 data bus which is the communication path for all OAS prime mission equipment. The Fibre Channel data line allows high speed direct communication between the data transfer system and the avionics computers. FRMT-6 Prime Mission Equipment Status Display shows bus faults. Generally, the navigation and weapon delivery functions are accomplished on one pair of buses and the control and display functions on the others. The Data Transfer System (DTS) is the data input device for the OAS. The DTS consists of two Data Transfer Receptacles (DTR) and one Data Transfer Cartridge (DTC) per DTR. These cartridges contain computer programming information, mission data information, weapon software and mission data, GPS data, and blank space on which to record mission data. The computational subsystem is controlled by the navigator using the computer control panel.

Navigational Subsystem

The navigational subsystem is a group of sensors which provide measured data necessary for navigation and control of the aircraft. This equipment consists of the following:

- Inertial Measurement
- Doppler Radar
- Radar Altimeter
- Attitude Heading Reference System
- Radar
- Air Data Computer
- Global Positioning System

Complete coverage of navigation methods and procedures is contained in OAS NAVIGATION, this section.

Weapon Control and Delivery Subsystem

The weapon control and delivery subsystem, technically called Control-Monitor Set AN/AWQ-3, provides the means to control and monitor the weapons. Coverage for this equipment is given in this section.

INFLIGHT OPERATION

All of the OAS, except for the Attitude Heading Reference System (AHRS) and radar altimeter, is controlled from the navigator’s and radar navigator’s station. The AHRS is controlled by the copilot and the radar altimeter is controlled by both pilots. OAS startup, shutdown, and weapon control are managed by the navigator. Both navigators are able to view the same displays and both have keyboards for controlling the system. See figures 1-1 and 1-2 for location of various system control and indicator panels at the navigators’ stations.

Computational Subsystem Data Flow

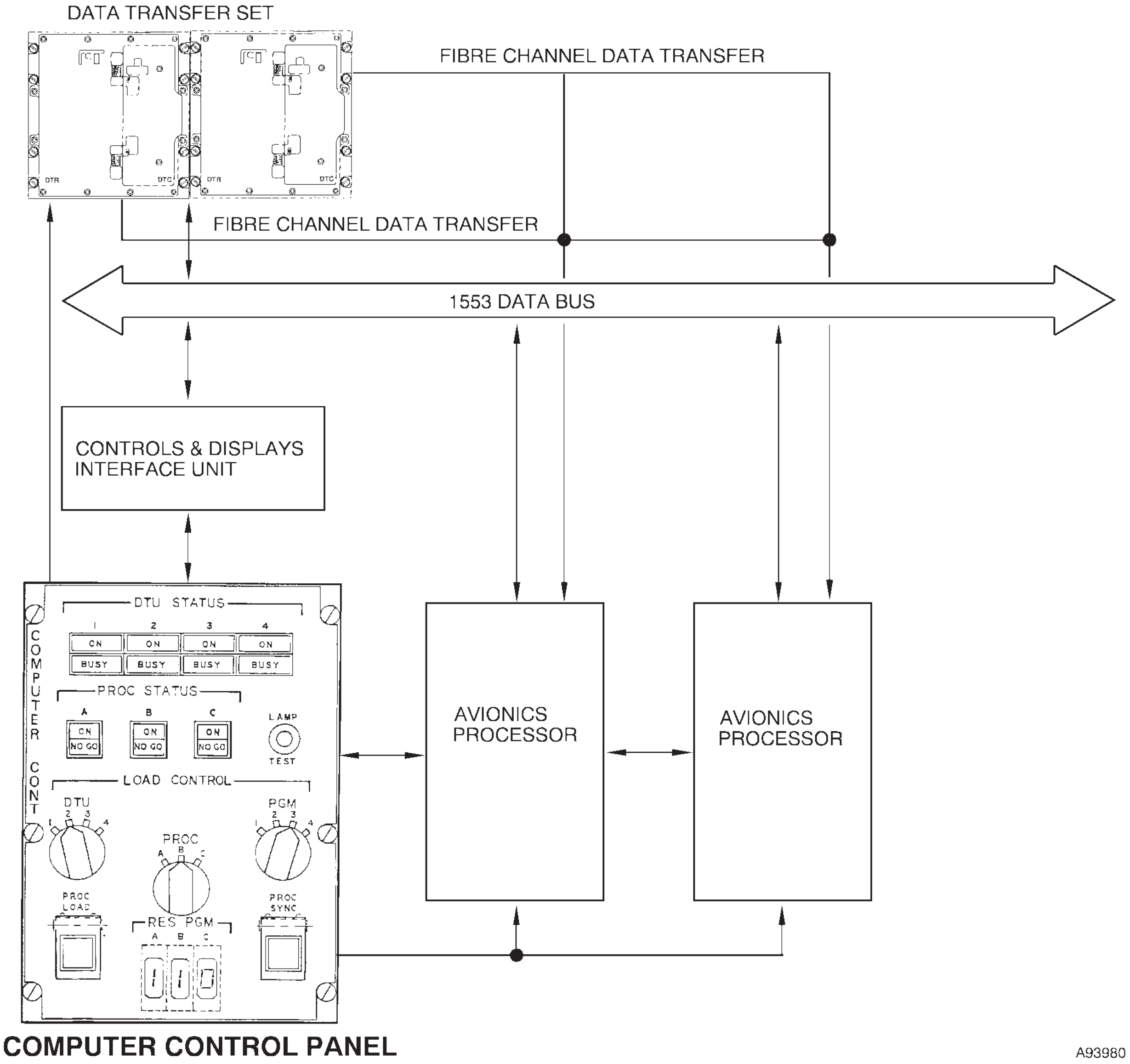


Figure 1-5

ASQ-176 SOFTWARE

The OAS software provides an aircraft navigation capability and control for release or launch of weapons. The operational computer program consists of the Ground Maintenance Computer Program (GMCP) and the Flight Computer Program (FCP). The FCP consists of the Flight Management Software (FMS), Common Stores Processing (CSP) software, ODI software and, if required, one or more Stores Management Overlay(s) (SMO). The FMS controls navigation, radar, controls and displays. The CSP contains common stores processing data and supports SMO operations. The ODI software contains the software functions necessary for interfacing with EW Officer's equipment. The SMO contains necessary weapon control delivery functions.

SMO

Functions performed by the SMO include weapon programing, weapon control processing, Launch Acceptability Region (LAR)/impact point calculations, simulation processing, controls and displays processing, and built-in-test processing. To perform its required functions, the SMO interfaces with existing aircraft weapon system components, the OAS sources of navigation, steering, controls and displays processing, mission data, and with the global positioning system (GPS) hardware.

The SMO menu can be displayed to allow the operator to select the appropriate SMO. Up to 10 SMOs can be listed on the SMO Load Menu, CF-62. Two or more SMOs can be loaded at once, however, only one can be primary at any time. The exception is the nuclear SMO, which cannot be loaded with other SMOs.

CSP

Common Stores Processing (CSP) is software provided to:

- Incorporate stores/weapons capabilities which are common in Stores Management Overlays (SMO).
- Provide an OAS capability to allow multi-SMO operation.

CSP is a support application and is automatically loaded, unloaded and terminated by the FMS. Therefore, operator actions are not required to initialize, terminate or restart the CSP.

FMS screens affected wholly or in part by the CSP are CF, CF-5, CF-6, CF-E, FRMT, FRMT-6, and FRMT-77. Additional specific operations of controls and displays operation with specific weapon types, including weapon jettison, are discussed in the applicable T.O. 1B-52H-25 series, T.O. 1B-52H-30 series, or T.O. 1B-52H-34-2 series Manuals.

The CSP operates in the three operational modes: Strike, Full Simulation, and Partial Simulation. STRIKE mode is the operational mode used to deliver weapons to targets. When the CSP is loaded, the system is initialized into STRIKE mode. In FULL SIMULATION (FULL SIM) mode all WCE controlled by the CSP is simulated and the real WCE cannot be operated. In partial simulation mode the Common Strategic Rotary Launcher (CSRL) can be operated. All other WCE controlled by the CSP is simulated and cannot be operated.

FULL SIMULATION mode and PARTIAL SIMULATION (PART SIM) mode are equivalent, except that 1553A bus traffic is transmitted from the ACUs to the PDUC to allow for CSRL rotation in PART SIM. PART SIM mode is exited by returning to STRIKE mode.

NOTE

CSP will inhibit a SMO load change (CF-62, MDFY-11) if the operating mode is in FULL SIM or PART SIM.

SMO specific restrictions and prerequisite conditions for commands are discussed in the applicable T.O. 1B-52H-25 series, T.O. 1B-52H-30 series, or T.O. 1B-52H-34-2 series manuals.

Multi-SMO Operation

The CSP allows for operation of multiple SMOs. Each stores location (Left Pylon, Bay, and Right Pylon) can have a separate SMO assigned. One SMO is designated primary by the operator with the other SMO(s) designated secondary. Nuclear and Non Nuclear SMOs cannot be mixed. Not all SMOs are certified for multi-SMO operation. Table 1–1 is a matrix containing the SMO load combinations and their status.

NOTE

- When a SMO is designated as the Primary SMO (CF–62x), all of that SMO's weapon functionality is available. The Primary SMO's weapons can be powered, aligned, monitored, targeted, ranged, launched and jettisoned (through the OAS).
- If a SMO is not the Primary SMO, only WIU power, heating and monitoring functions (FRMT-7A, 7C and 77) are available for that SMO's weapons.
- Currently, a SMO assigned to either pylon will be assigned to both pylons.

Additional information on operations with specific multiple SMOs is contained in the applicable T.O. 1B-52H-34-2 series Manuals.

Multi-SMO Load Combinations

BAY SMO	PYLON SMO					
	GWD	CALCM	JDAM	WCMD	JASSM	NUC
GWD	Y		D	D		N
CALCM		Y			Y	N
NUC	N	N	N	N	N	Y

Y	SMOs can be loaded and operated simultaneously.
N	SMOs cannot be loaded and operated simultaneously.
D	Identified as desired capability, but not presently certified.
Blank	Potential capability, not implemented.

Table 1–1

ASQ-176 INFLIGHT MALFUNCTION ANALYSIS AND CORRECTION

The OAS has a built-in-test (BIT) feature which constantly correlates the functions of all the system components. When the BIT system detects a fault, advisory messages are displayed on the MFD's. The advisory message will remain until acknowledged by one of the navigators. The fault advisory is also recorded automatically on the DTC and in the ACU NVM. In certain cases the OAS will automatically work around the fault, particularly where there is system redundancy. Some items in the radar will still require operator analysis and corrective action. Abnormal Operation and Malfunction Analysis information is contained in Section III of this manual in the same order as the subsection containing a part related to that equipment. Section III also contains an OAS malfunction index arranged alphabetically which lists the malfunction advisory and action to be taken.

ASQ-176 SYSTEM POWER CONTROL

POWER SOURCE

Circuit breaker and power source information for the OAS is given at the end of Section III. Illustrations of the various circuit breaker panels accessible in flight are contained in T.O. 1B-52H-1. Circuit breaker nomenclature information on individual systems is given in T.O. 1B-52H-1 in the Section I subsection pertaining to that system.

POWER TURN-ON

Almost all OAS equipment is supplied power under control of the OAS master power switch. Certain radar functions and cooling and pressurization are under control of individual switches. After OAS master power is turned on, the FMS is loaded. See FMS INITIALIZATION, this section. An integrated checklist for OAS startup is given in the Navigator's Checklists in Section II.

OAS Control Panels and Display Units

DESCRIPTION

The integrated keyboards (IKB) and multifunction display (MFD) indicators are the main communication means between the navigators and the OAS. There are two MFD and a keyboard at each navigator station, allowing each navigator to have the same control and display capability. The keyboards provide system function selection, data control, and tracking control. The keys and controls are functionally grouped. The MFD are cathode ray tube indicators having a TV type format and accommodate both EVS and radar type displays in addition to alphanumeric data displays. The MFD are the means to view the various system displays and programmed data.

POWER SOURCE

Power to the keyboards and left MFD is under control of the OAS MASTER POWER switch. Power to the right MFD is under control of the EVS video select switch (when rotated out of OFF position). The MFD and the associated controls and display interface unit (CDIU) and display electronics unit (DEU) use ac and dc power supplied through circuit breakers on the left forward BNS circuit breaker panel and the right S/V filter box circuit breaker panel. See Section III for circuit breaker listing and refer to 1B-52H-1 for circuit breaker illustrations. OAS power turn-on information is given in FMS INITIALIZATION, in this Section.

CONTROLS AND INDICATORS

OAS POWER CONTROL PANEL

The OAS Power Control Panel (PCP) (figure 1-6) located on the navigators’ front panel provides power control for the OAS through the OAS MASTER POWER switch. The IME power switches supply power to the two Inertial Navigation Units (INUs) using the IME 1 and IME 2 switches, and the Weapon Interface Units (WIUs) using the MIU/LP, MIU/BAY, and MIU/RP power switches. The OAS Master Power and IME switches have safety covers. All legends are backlit green when power is on.

DATA TRANSFER SYSTEM (DTS)

The DTS (figure 1-7) consists of the two Data Transfer Receptacles (DTR) with one Data Transfer Cartridge (DTC) for each DTR. The DTRs are configured such that if the capability of one receptacle becomes degraded or inoperative the other receptacle’s full operational capability will be unaffected. The DTS design is suitable for the B-52 aircraft’s operating environment and includes a primary and alternate mode of operation. In the primary mode of operation both DTRs and their respective cartridges are fully operational. In the alternate mode of operation one of the DTRs in the DTS is not fully operational but the system continues to record and transmit data.

The DTS has dual redundant MIL-STD-1553A and Fibre Channel (FC) interfaces. The 1553 and Fibre Channel interface functions are able to receive or transmit to the ACUs. In addition, they interact with a memory controller to access and store data as requested by the ACUs. The memory controller shall control reading and writing of all data to the memory devices. The DTS provides for a portion of the memory to be designated as Read Only Memory (ROM). The DTC ROM is protected via hardware and software features while hosted on the aircraft, and can only be modified or erased by the ground mission planning system. Figures 1-4 and 1-5 illustrate the interface between the DTS and the ACUs.

Data Transfer Receptacle (DTR)

The DTR provides a receptacle that is permanently mounted in the aircraft. This receptacle is mechanically and electrically compatible with the removable Data Transfer Cartridge. The DTR provides all interfaces to the aircraft. The DTR provides connectors for electrical power and signal interfaces to the aircraft. The DTR contains a power supply that converts alternating current power from the aircraft to internal Direct Current (DC) power for use by the DTR circuitry. The DTR also supplies power to the DTC. The DTR contains internal heat exchangers and an aircraft cooling air interface for the efficient dissipation of heat.

The DTR provides two styles of digital communication interface: a dual redundant MIL-STD-1553A digital communications interface and two, full duplex Fibre Channel Arbitrated Loop (AL) Ports. The DTR provides a data link between these external interfaces and mass memory storage via a high speed digital interface to the DTC.

Data Transfer Cartridge (DTC)

The DTC (figure 1-7) is the removable mass storage media used for data transfer. The DTC is a removable cartridge that is mechanically and electrically compatible with the Data Transfer Receptacle. The DTC has a high speed digital interface to the DTR that is used to transfer data from mass memory to the aircraft via the DTR. The DTC provides high capacity nonvolatile mass memory data storage that is expandable by the installation of additional circuit cards. The DTC contains hardware accelerator circuits to support high performance mass memory management functions.

DTS OPERATING PROCEDURES

DTC Installation

To install a DTC in the DTR:

1. Open DTC access door on DTR.
2. Lock Access Door in open position by opening door until door latch mechanism engages.

NOTE

> DTC access door is spring actuated to the closed position

3. Slide the DTC into the DTR until the connectors mate.
4. Close the handle on the DTC.

NOTE

> Closing the handle on the DTC activates a pin which locks the DTC in the DTR.

DTC Removal

To remove a DTC from the DTR:

1. Open the handle on the DTC.

NOTE

> Opening the handle on the DTC activates a pin which unlocks the DTC from the DTR.

2. Slide the DTC out of the DTR.
3. Unlatch DTC access door and close.

NOTE

> DTC access door is spring actuated to the closed position.

Two DTC Operation

When two DTCs are installed, the FMS will recognize and use only one. If both DTCs are inserted before the FMS is loaded, the left DTC will be used. If the FMS is loaded before inserting the DTCs, the first DTC inserted and latched will be used.

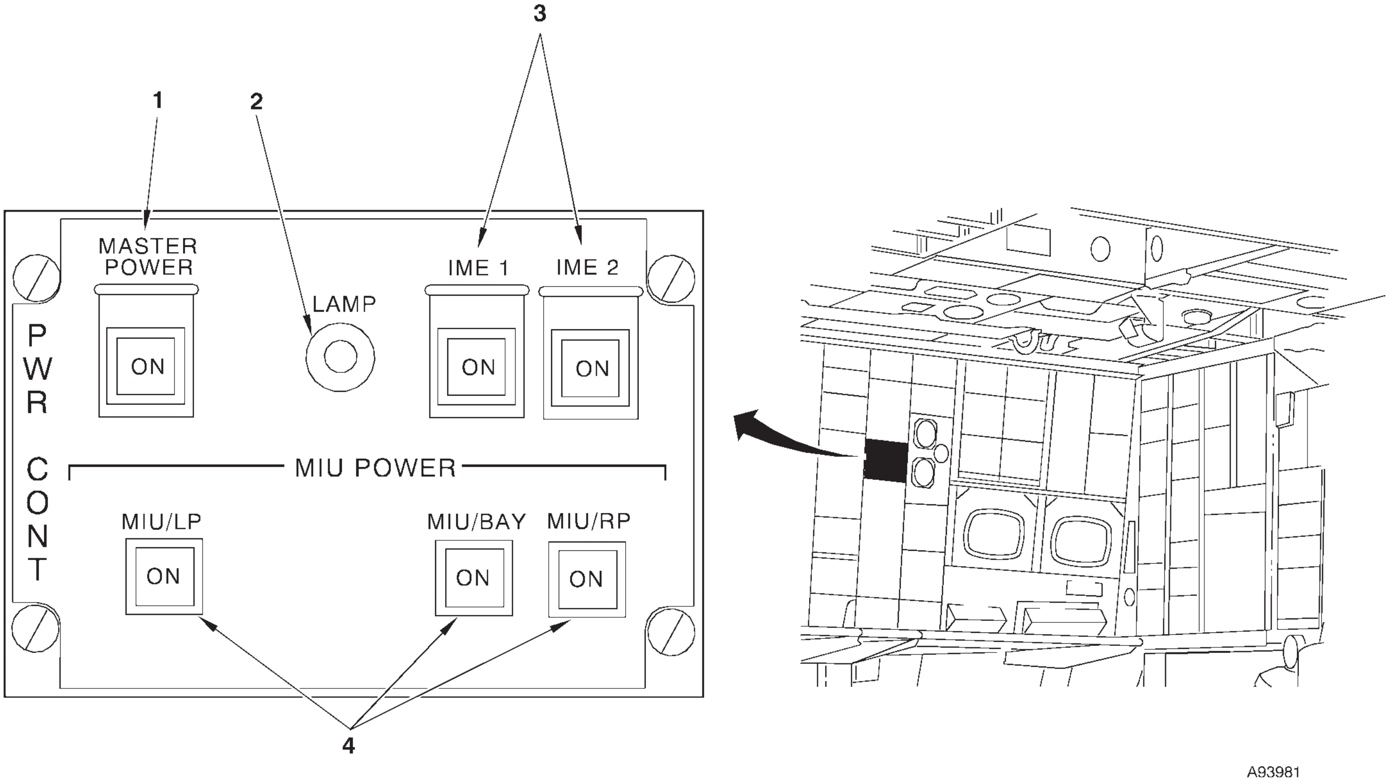
If the active DTC fails or another DTC is desired, use the following procedure:

1. Open the handle on both DTCs (removal is not necessary).
2. Close the handle on the preferred DTC.
3. When the preferred DTC appears on the CF-61 screen, the handle on the remaining DTC may be closed.

COMPUTER CONTROL PANEL

The Computer Control Panel controls operation of the avionics processors, controls data loading from the DTCs and allows monitoring of DTS and processor functions. See figure 1-8 for description and functional information on the computer control panel.

OAS Power Control Panel



1 OAS MASTER POWER SWITCH
2 LAMP TEST SWITCH
3 INERTIAL MEASUREMENT EQUIPMENT (IME-1 AND IME-2) SWITCHES
4 MISSILE INTERFACE UNIT (MIU) POWER SWITCHES (3)

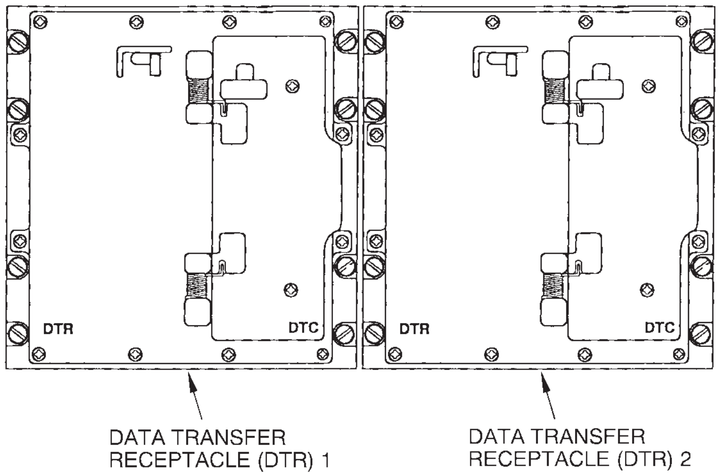
Figure 1-6 (sheet 1 of 2)

OAS Power Control Panel (Cont)

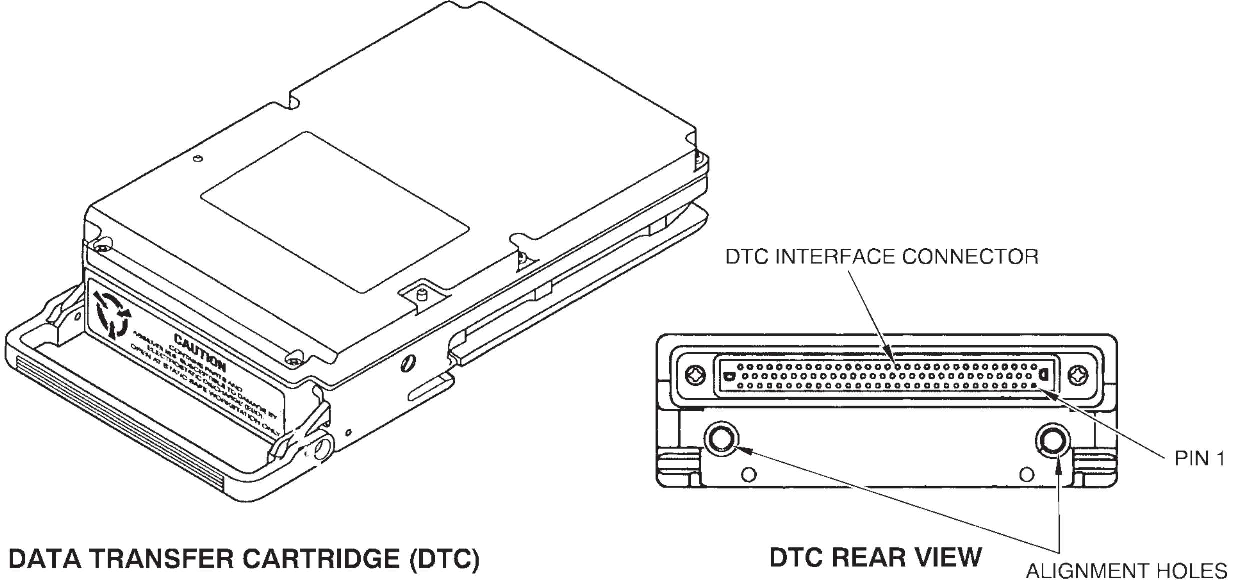
NO.	CONTROL-INDICATOR	FUNCTION
1	OAS MASTER POWER Switch	ON (light on) Pressing the switch while the ON light is off lights the ON light and sends master power to: ● Display Electronics Unit ● Multifunction Displays (2 left) ● Integrated Keyboards ● Data Transfer System ● ACUs ● INU Interlock (IME switches) ● MIU Power Switches ● Interface Units (EIU, RIU, CDIU, AIU, ODI) ● Radar Scan Converter ● RN Management Panel ● Radar Presentation Panels ● Video Recorder ● Weapon Control Panel OFF (light off) Pressing the switch while the ON light is lit removes power from all the preceding equipment. If turned off prior to shutdown by CF-67, processor classified data is not erased. Unless INUs are shutdown using CF-67 or CF-16 and CF-26, the INUs will remain powered. INU condition is not monitored after OAS power off. **CAUTION** If OAS power is removed with out shutting down the INUs using CF-67 or CF-16 and CF-26, the INUs will continue in a powered on state. The only way power can be removed is by repowering OAS and using the CF commands or by pulling the NO.1 and NO. 2 INS DC B/U circuit breakers and the No.1 and No.2 INS AC PWR circuit breakers. Failure to remove power to the INUs could result in damage to equipment after ECS shutdown.
2	LAMP Test Switch	Tests all lights on the Power Control Panel
3	Inertial Measurement Equipment (IME-1 and IME-2) Switches	The IME-1 switch applies power to inertial navigation unit (INU) No.1. Once the power has been applied, INUs can only be turned off with CF-67 or CF-16 and CF-26 commands. The ON light in the switch indicates the status of INU power only while OAS is powered. If power is removed from the OAS, the ON light will go off regardless of the power status of the INU. The IME-2 switch functions for INU-2 in the same manner the IME-1 switch functions for INU-1.
4	Missile Interface Unit (MIU) POWER Switches (3)	Command power on or off to the weapon interface units. MIU/LP - Commands power to the left pylon MIU/WIU. MIU/BAY - Commands power to the rotary launcher MIU/NUC SLU. MIU/RP - Commands power to the right pylon MIU/WIU.

Figure 1-6 (Sheet 2 of 2)

Data Transfer System

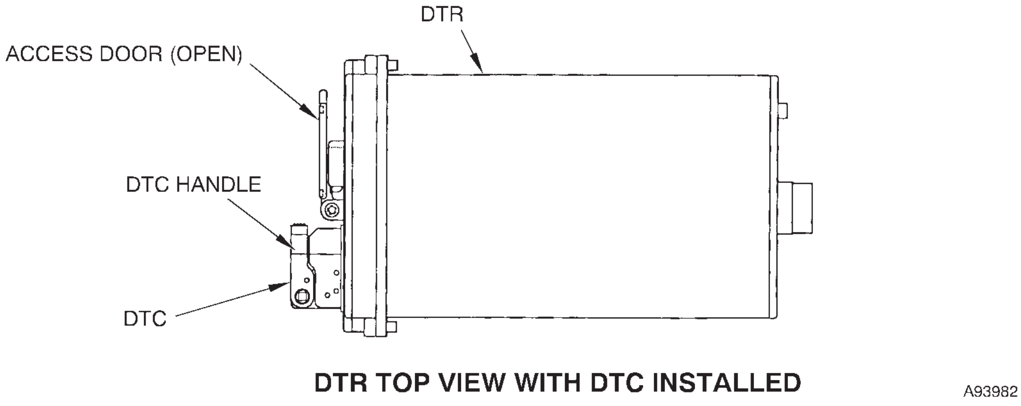


DATA TRANSFER SYSTEM (DTS)



DATA TRANSFER CARTRIDGE (DTC)

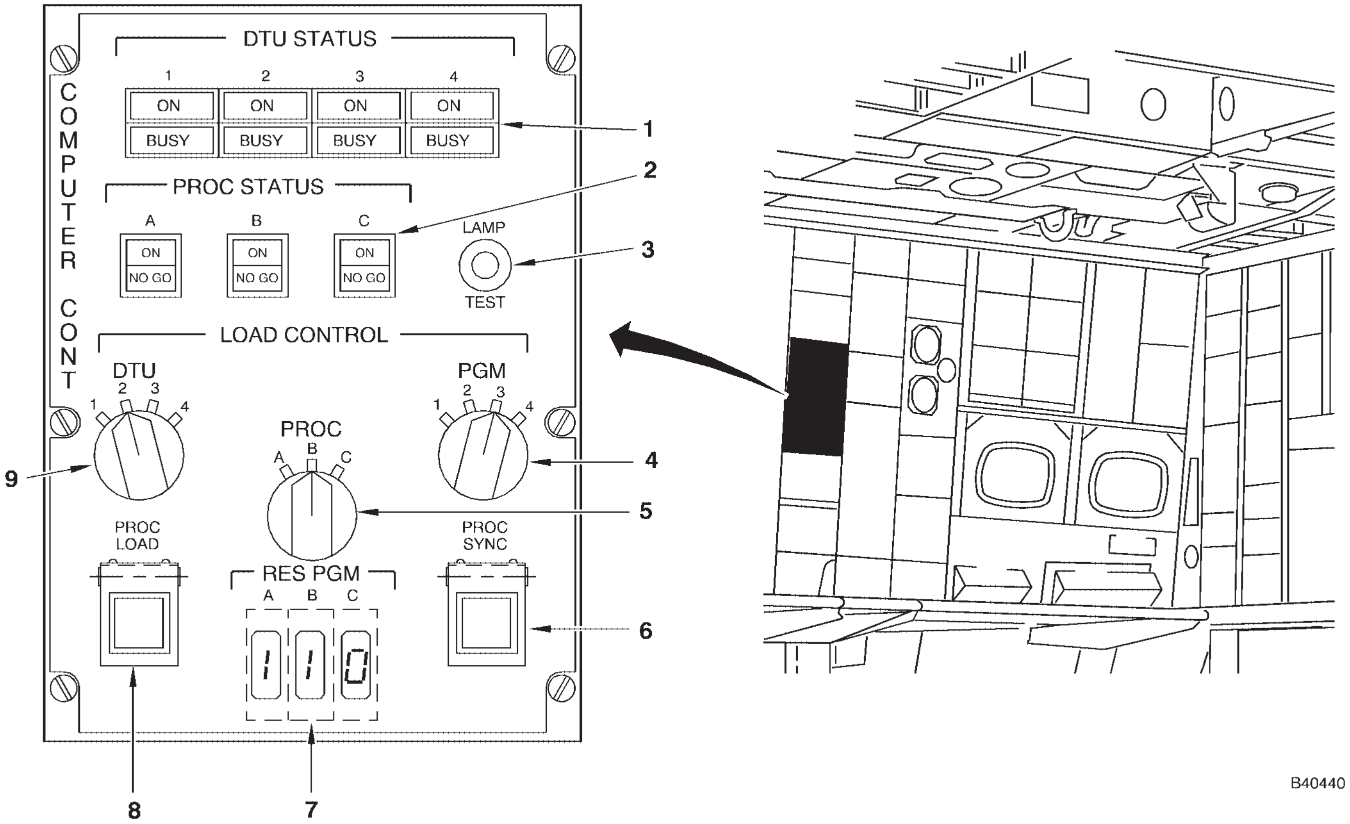
DTC REAR VIEW



DTR TOP VIEW WITH DTC INSTALLED

Figure 1-7

Computer Control Panel



1 DTU STATUS LIGHTS (4 PLACES)
2 PROCESSOR STATUS LIGHTS
3 LAMP TEST LIGHT
4 PROGRAM SELECTOR SWITCH
5 PROCESSOR SELECTOR SWITCH
6 PROCESSOR SYNCHRONIZATION SWITCH
7 RESIDENT PROGRAM DISPLAY
8 PROCESSOR LOAD SWITCH
9 DTU SELECTOR SWITCH

Figure 1-8 (Sheet 1 of 2)

NO.	CONTROL-INDICATOR	FUNCTION
1	DTU STATUS Lights (4)	ON light (green) illuminates approximately 60 seconds after power is applied to corresponding DTR. ON lights 3 and 4 are inoperative BUSY lights 1 through 4 are inoperative.
2	Processor (PROC) STATUS Lights (3)	ON (green) when power is applied to processor. NO GO (amber) when processor has failed a BIT test either when power is initially applied or processor has failed after loading. The processor can be reset by pressing the status light to re-accomplish the self-test. STATUS Light C is inoperative.
3	LAMP TEST Switch	Tests all lights on Computer Control panel.
4	Program (PGM) Selector Switch	Marked 1 thru 4 for selecting the respective program.
5	Processor (PROC) Selector Switch	Marked A, B, or C for selecting the processor to be loaded. Position C is inoperative.
6	Processor Synchronization (PROC SYNC) Switch	Initializes processors.
7	Resident Program (RES PGM) Display	Indicates program number loaded in respective avionics processor. Program No. Program 0 No Program Loaded 1 Spare 2 Spare 3 GMCP 4 FMS 5 Spare 6 Spare 7 CLSF Data Erased Program 7 is only displayed when the operator commands classified data erase. Resident Program C always indicates 0.
8	Processor (PROC LOAD) Switch	Initiates loading of the processor selected by PROC Selector switch.
9	DTU Selector Switch	Inoperative.

Figure 1-8 (Sheet 2 of 2)

KEYBOARD

See figure 1-9 for control and functional information on the keyboard. All controls except for the MFD brightness knobs and the trackball are press-to-actuate keys or switches.

Keyboard Track Control Function

The track control function allows the operator to select RDR or EVS crosshair at either station. The track control selection and station priority is as follows:

1. When the FCP is loaded, RDR is selected automatically at the radar navigator's station and deselected at the navigator's station, EVS is selected automatically at the navigator's station and deselected at the radar navigator's station, and MAN EVS is deselected at both stations
2. RDR or EVS can be selected at either station. When selected, the respective function is deselected at the other station.
3. Selection of EVS at either station automatically deselects MAN EVS at the same station (if selected).
4. Selection of MAN EVS at either station automatically deselects EVS at the same station if RDR is not selected. If RDR is selected, MAN EVS is ignored.
5. MAN EVS and EVS cannot be selected at the same time.

Track control signals are monitored from both navigator stations and corrections from both stations are computed if RDR is selected at one station and EVS is selected at the other station. If RDR and EVS are selected at the same station, corrections are computed for the RDR crosshair only.

RADAR NAVIGATOR MANAGEMENT PANEL

The Radar Navigator Management Panel (RNMP), (figure 1-10), provides the operator with controls to perform operations with the navigation equipment and indicators to show the status of the navigation equipment and operations. The function of the BOMB INHB switch is determined by the SMO. See T.O. 1B-52H-34-2-1 and T.O. 1B-52H-25-2. Figure 1-10 shows the RNMP and gives the primary purpose of each of its controls and indicators. The RNMP primary use is to check and/or update navigation data.

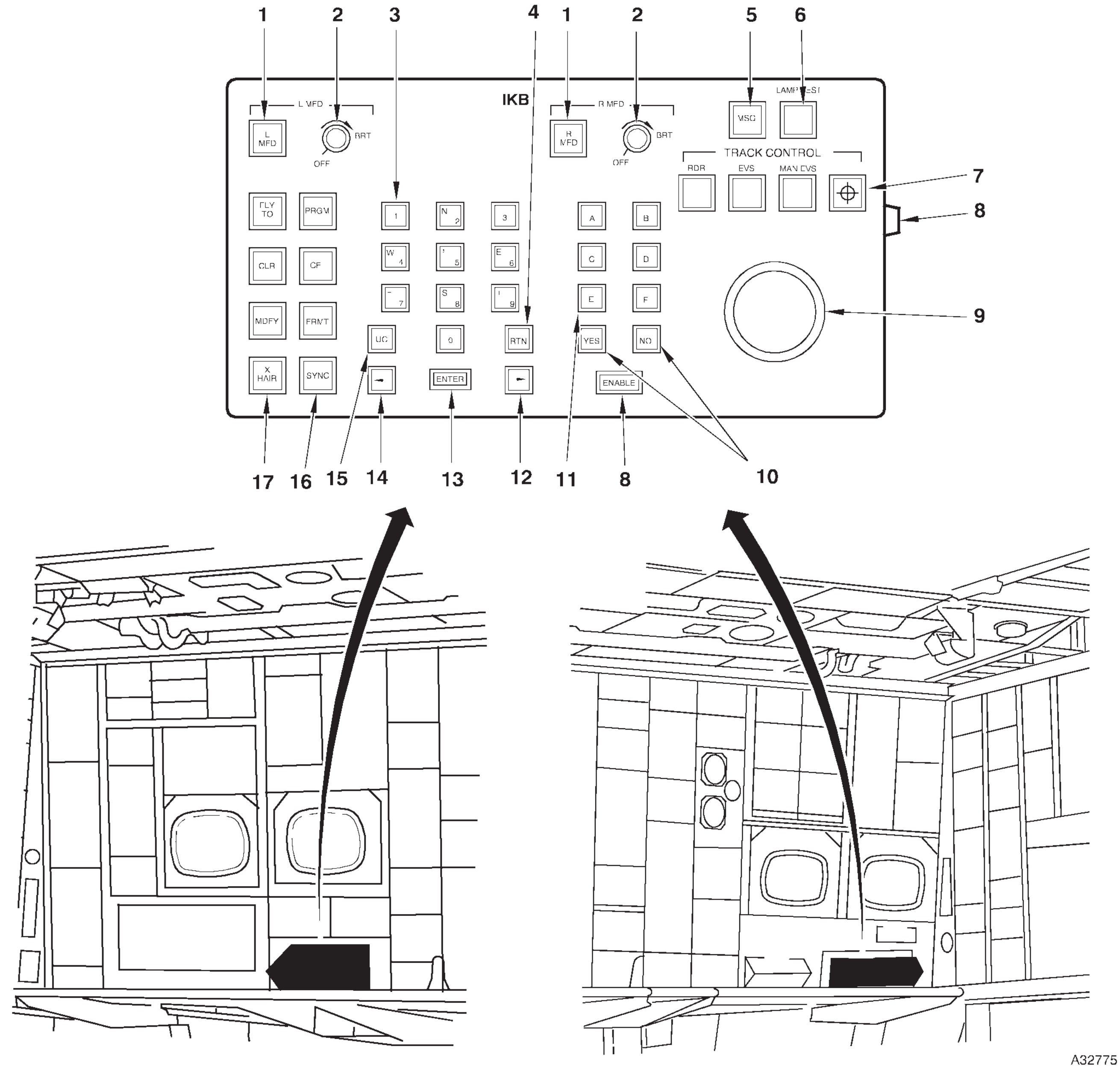
WEAPON CONTROL PANEL

The Weapon Control Panel (WCP) (figure 1-11), located on the navigator's front panel, provides controls for weapon power application, weapon power removal, weapon jettison, or weapon abort. Weapons are selected with the LOCATION (LP, BAY, and RP) and STATION (1, 2, 3, 4, 5, 6, 7, 8, and ALL) switches. The WCP station switches are enabled only when a location have been selected. If no location is selected when a station switch has been selected, the advisory message LOCATION?? will be displayed on each MFD. If an invalid station is selected, the advisory STATION?? will be displayed on each MFD. WCP operation with specific weapon types is discussed in the applicable T.O. 1B-52H-25 series, T.O. 1B-52H-30 series, or T.O. 1B-52H-34-2 series Manuals.

PILOT'S MUNITIONS CONSENT PANEL

The Pilot's Munitions Consent panel (figure 1-12) contains the PREARM-OFF and LOCK-UNLOCK switches. The panel provides unlock consent for powering the weapon ejectors. The PREARM function of the pilot's switch is only used with nuclear weapons. The LOCK-UNLOCK switch is guarded in the LOCK position. The Pilot's Munitions Consent panel operation with specific weapon types is discussed in the applicable T.O. 1B-52H-25 series, T.O. 1B-52H-30 series, or T.O. 1B-52H-34-2 series Manuals

Keyboard



1	L MFD AND R MFD SELECTION SWITCHES (2)
2	MFD BRIGHTNESS CONTROL KNOBS
3	0 - 9 KEYS
4	RETURN KEY
5	MESSAGE SWITCH
6	LAMP TEST SWITCH
7	TRACK CONTROL SWITCHES (4)
8	ENABLE SWITCHES (2)
9	TRACKBALL
10	YES AND NO KEYS
11	A - F KEYS (6)
12	ADVANCE KEY
13	ENTER KEY
14	BACKSPACE KEY
15	UPPER CORNER KEY
16	SYNCHRONIZATION KEY
17	COMMAND KEYS (7)

Figure 1-9 (Sheet 1 of 3)

Keyboard (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
1	L MFD and R MFD Selection Switches (2)	Select either MFD for data display of inputs from the keyboard.
2	MFD Brightness (BRT) Control Knobs (2)	Adjusts the brightness of the symbols on the respective MFD.
3	0 - 9 Keys (10)	Enter the respective number in the data/command to be transferred. When used in conjunction with upper corner key, gives N, S, E, W, +, -, and comma (,).
4	Return (RTN) Key	Places the MFD cursor to the first operator-changeable position in the row designated.
5	Message (MSG) Switch	Acknowledges an existing MFD message.
6	LAMP TEST Switch	Test all lights on the keyboard.
7	TRACK CONTROL Switches (4)	Select the track control reference mode or sighting mode. RDR switch selects radar crosshair tracking and allows positioning of the radar crosshairs. EVS switch selects EVS crosshair tracking and allows positioning of the EVS crosshairs. **NOTE** Both RDR and EVS switches may be selected simultaneously, slaving the EVS crosshairs to the RDR crosshairs. MAN EVS switch enables EVS sighting without tracking. EVS is positioned with the trackball. Only functions when both RDR and EVS track control switches deselected. ⌖ (crosshairs on TGT) switch is used for alternate true heading functions. The switch is pressed when the crosshairs are on the sighting point. Light does not come on when pressed.
8	ENABLE Switches (2)	When pressed, enable the trackball.
9	Trackball	Moving the trackball causes the EVS or radar crosshairs to move in a corresponding direction when an enable switch is pressed.
10	YES and NO Keys (2)	Answers questions after displayed on all four MFD.
11	A - F Keys (6)	Enters the respective letter in the data/command to be transferred.

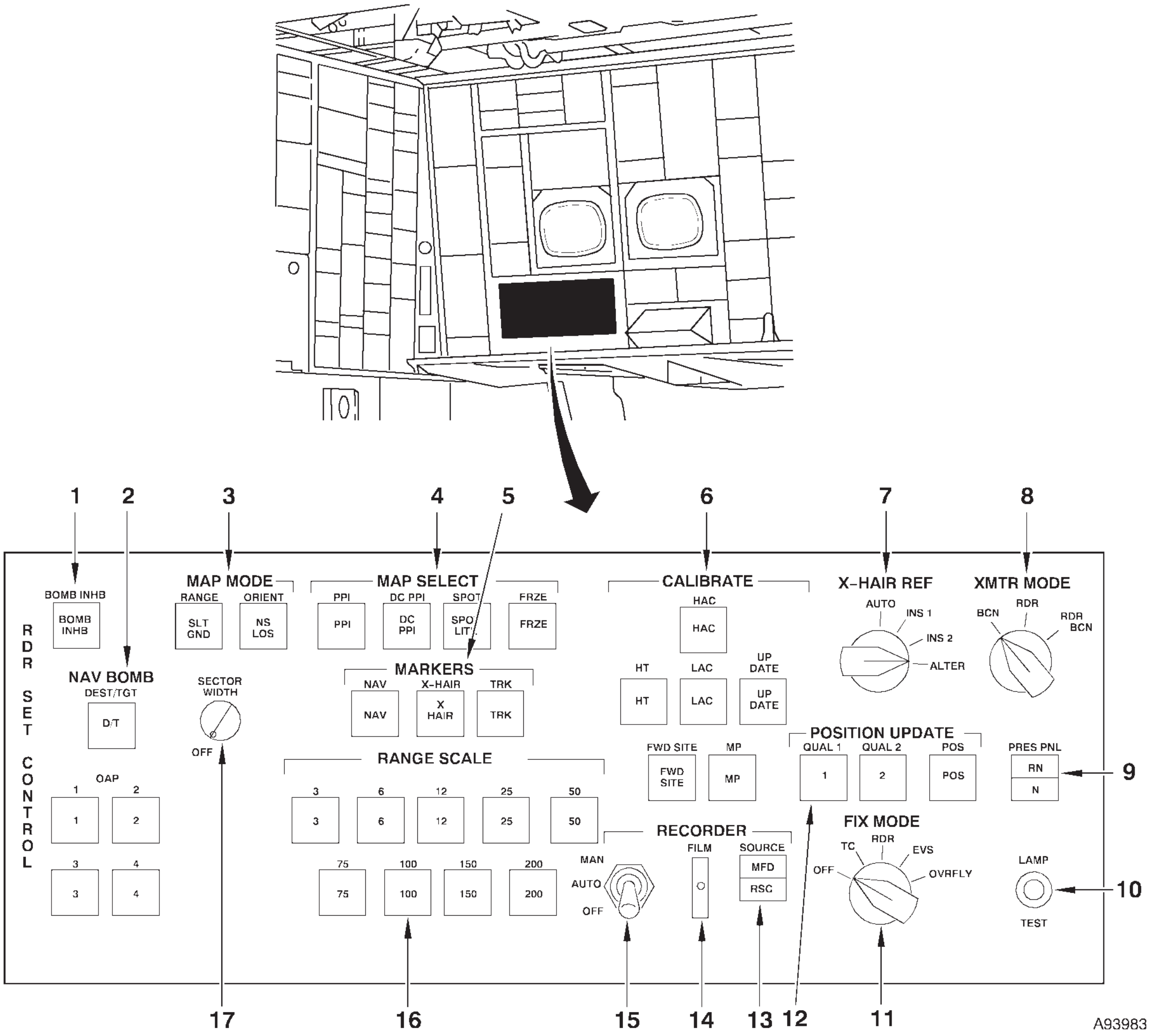
Figure 1-9 (Sheet 2 of 3)

NO.	CONTROL-INDICATOR	FUNCTION
12	Advance (→) Key	The key move the cursor on the MFD to the right.
13	ENTER Key	Completes the operator sequence. When pressed, data/commands will be transferred to OAS and/or displayed on MFD.
14	Backspace (←) Keys	The keys move the cursor on the MFD to the left.
15	Upper Corner (UC) Key	When pressed, the number keys enter the symbols in the upper left corner of the key.
16	SYNC Key	Provides for re-synchronization of the video display. When synchronization is lost (rolling of display on MFD), SYNC 1 ENTER should restore synchronization. If the display continues to roll, command SYNC 2 ENTER.
17	Command Keys (7)	FLY–TO provides navigational information for the manual selection of a stored destination/target or to the crosshairs. PRGM displays current event program or selected event program. CLR erases menu display data that has been overlaid on an existing format, keyboard data, and position fix data. CF displays OAS mode supervision menu or initiates entry into specific OAS mode. MDFY initiates operator changes to MFD displayed data. FRMT displays video and/or data. X–HAIR controls fixpoint sequencing mode and manual crosshair positioning mode.

Figure 1-9 (Sheet 3 of 3)

Radar Navigator Management Panel

NAVIGATION FUNCTIONS



1 BOMB INHB SWITCH
2 NAV BOMB SWITCHES (5)
3 MAP MODE SWITCHES (2)
4 MAP DISPLAY SELECT SWITCHES (4)
5 MARKER SWITCHES (3)
6 CALIBRATE SWITCHES (6)
7 CROSSHAIR (X-HAIR) REFERENCE SWITCH
8 TRANSMITTER (XMTR) MODE SWITCH
9 PRESENTATION (PRES) PANEL SELECTOR SWITCH
10 LAMP TEST SWITCH
11 FIX MODE SELECTOR SWITCH
12 POSITION UPDATE SWITCHES (3)
13 RECORDER SOURCE SWITCH
14 FILM LIGHT
15 VIDEO RECORDER MODE SWITCH
16 RANGE/SCALE SWITCHES (9)
17 SECTOR WIDTH KNOB

Figure 1-10 (Sheet 1 of 4)

NO.	CONTROL-INDICATOR	FUNCTION
1	BOMB INHB Switch	Inhibits the release command to the gravity weapon release circuits, preventing automatic bomb release.
2	Destination, Target, and Offset (NAV BOMB) Switches (5)	DEST/TGT - Used to position EVS or RDR crosshairs on the destination or target. OAP 1, 2, 3, or 4 - Position EVS or RDR crosshairs to the selected offset aiming point.
3	MAP MODE Switches (2)	RANGE selects altitude compensation mode. SLT gives uncompensated linear display. GND gives altitude compensated ground range. ORIENT selects map orientation. NS gives north stabilized display. LOS gives track-up display.
4	MAP Display Select Switches (4)	PPI gives radar display with aircraft at center of display. DCPPI gives displaced center radar display with aircraft at edge of display. SPOT gives 3, 6, 12, 25, or 50 mile map display with crosshair at center of the display. FRZE causes radar display to be static.
5	Marker Switches (3)	Use individually or together. NAV gives range rings and heading marker. TRK gives dashed line signifying aircraft track. X HAIR gives a crosshair display.
6	CALIBRATE Switches (6)	HAC - Calibrates true altitude using radar data. LAC - Calibrates true altitude using radar altimeter data. HT - Used to correct stored HT (Height of Terrain) for HAC, LAC, and MP only. MP - Used for memory point wind calibration. UPDATE - Completes a HAC, LAC, or MP update. FWD SITE - Rapidly moves crosshairs down track one half the distance of the selected range.
7	Crosshair Reference (X-HAIR REF) Switch (with fix mode selection switch OFF)	AUTO - Uses OAS selected navigation system for crosshair positioning. INS 1 - Places the crosshairs based on INS-1 present position. INS 2 - Places the crosshairs based on INS-2 present position. ALTER - Places the crosshairs based on the alternate navigation model. **NOTE** With the RDR or EVS selected on the on the FIX MODE selector switch, crosshair placement is based on the prime navigation model and radar or EVS buffers are computed for the navigation model selected with the X-HAIR REF switch.

Figure 1-10 (Sheet 2 of 4)

Radar Navigator Management Panel (Cont)

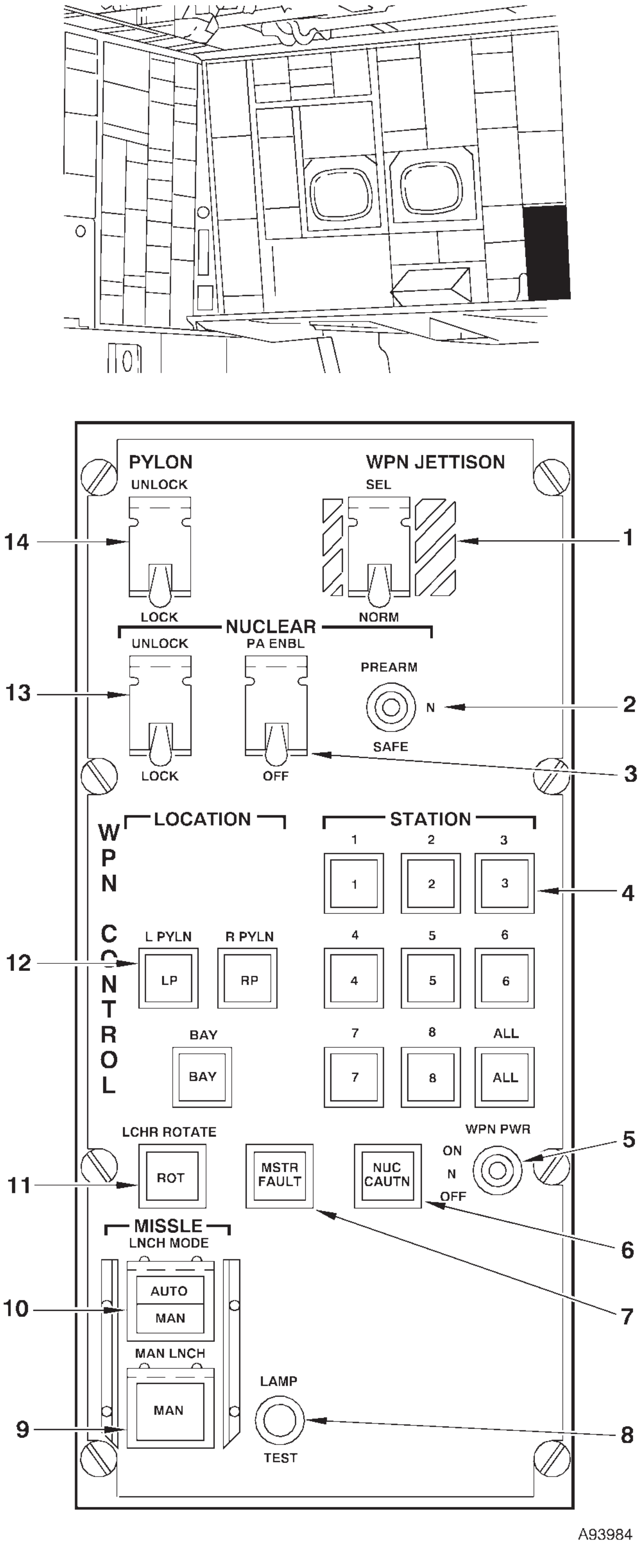
NO.	CONTROL-INDICATOR	FUNCTION
8	Transmitter (XMTR) Mode Switch	Selects radar transmitting operational mode. BCN gives display without ground map video for use with rendezvous beacon. RDR gives radar ground map video. RDR BCN combines radar and beacon video.
9	Presentation (PRES) PNL Selector Switch	Selects RN or N panel for control of radar.
10	LAMP TEST Switch	Push to test switch which illuminates lights on RNMP when depressed.
11	FIX MODE Selector Switch	Selects method of position fixing. OFF deselects previous position fixing mode, erases related messages, zeros crosshair buffers. **WARNING** In order to reset the buffer values to zero, the Fix Mode Selector Switch must be pushed in, turned to the OFF position, and then released in the OFF position. The operator may then reselect a fix mode. Reset of the buffers to zero will be verified, by displaying and evaluating the buffer values following this procedure. TC - Not Used. RDR - Radar crosshair used for position update. EVS - EVS azimuth and elevation used for position update. OVRFLY - Overfly of a known position used for position update. **NOTE** Pressing this switch displays the selected x-hair buffers on the radar navigator's FRMT-1 and FRMT-2.
12	POSITION UPDATE Switches (3)	Used to start computations for updating the navigation modules to accept or reject position fix information as selected by FIX MODE selector switch. QUAL 1 - Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is a well defined point (highest quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is most confident. QUAL 2 - Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is less well defined (lesser quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is less confident. POS - Zeroes the buffers in all navigation models. The computations are used for steering and targeting routines. **NOTE** Use of these switches alters the buffers.

Figure 1-10 (Sheet 3 of 4)

NO.	CONTROL-INDICATOR	FUNCTION
13	RECORDER SOURCE Switch	MFD mode records video from the radar navigator's left MFD. RSC mode records video directly from the radar scan converter.
14	FILM Light	Comes on steady when the video recorder is out of film. The light may come on momentarily during manual operation due to film slack.
15	Video Recorder Mode Switch	OFF position, the recorder is off. AUTO position allows for automatic operation of the video recorder. MAN position activates the recorder each time the switch is positioned to MAN. The switch is spring-loaded to the AUTO position from MAN.
16	RANGE/SCALE Switches (9)	Select range for PPI or DCPPI radar maps (RANGE light on) or scale for spotlight maps (SCALE light on). **NOTE** The SPOT and RANGE/SCALE switches do not function as indicated with some radar scan converters installed. See NORMAL OPERATION, this section, for procedures.
17	SECTOR WIDTH Knob	Controls sector width of radar scan.

Figure 1-10 (Sheet 4 of 4)

Weapon Control Panel



1	WEAPON JETTISON SELECT SWITCH
2	NUCLEAR PREARM-SAFE SWITCH
3	NUCLEAR PA ENBL-OFF SWITCH
4	STATION SWITCHES (9)
5	WEAPON POWER SWITCH
6	NUCLEAR CAUTION LIGHT
7	MASTER FAULT LIGHT
8	LAMP TEST SWITCH
9	MISSILE MANUAL LAUNCH SWITCH
10	MISSILE LAUNCH MODE SWITCH
11	LAUNCHER ROTATE SWITCH
12	LOCATION SWITCHES (3)
13	NUCLEAR LOCK-UNLOCK SWITCH
14	PYLON LOCK-UNLOCK SWITCH

Figure 1-11 (Sheet 1 of 3)

NO.	CONTROL-INDICATOR	FUNCTION
1	WPN JETTISON Select (SEL) Switch	Spring-loaded to NORM (off) position. Used with unlock consent from pilot's munitions consent panel and WCP nuclear lock/unlock switch. SEL - Jettisons weapons selected on location and station switches.
2	NUCLEAR PREARM-SAFE Switch	Three position, spring-loaded to neutral (N). PREARM - With pilot's prearm consent and WCP prearm enable, prearms weapons selected by WCP location and station switches. SAFE - Commands safe to all selected weapons.
3	NUCLEAR PA ENBL (Prearm Enable) Switch	Guarded two position switch used with pilot's consent to allow OAS controlled weapons to be prearmed.
4	STATION Switches (9)	Used with location switches to select individual weapon stations (1 thru 8) or all (ALL) stations at the selected location for weapon operational functions.
5	Weapon Power (WPN PWR) Switch	Three position, spring-loaded to neutral (N). ON - Commands power be applied to the weapons selected by the location and station switches on the WCP. OFF - Commands power be removed from the weapons selected by the WCP.
6	Nuclear Caution (NUC CAUTN) Light	Indicates warhead arming fault or consent disagreement between pilot and navigator. Pressing will turn the light off and erase the message if the fault has cleared.
7	Master (MSTR) FAULT Light	Indicates a fault has occurred and more information is available on the MFD. Pressing acknowledges receipt of message, turns light off, and erases message.
8	LAMP TEST Switch	When pressed all panel lights will come on.
9	MISSILE Manual Launch (MAN LNCH) Switch	Starts the missile launch countdown if SAIR exists. Light will remain on until missile has been launched.
10	MISSILE LNCH MODE Switch	Alternately selects automatic (AUTO) or manual (MAN) launch mode and turns on respective light. MAN overrides auto and enables manual launch switch. Light also indicates OAS selected launch mode. The switch also selects the release mode of the CSRL loaded gravity weapons. **NOTE** The MISSILE LNCH MODE switch is controlled by CSP. When CSP is loaded at OAS turn-on, the launch mode defaults to Manual. The operator can change the launch mode to Auto or back to Manual before a SMO is loaded and that mode is retained when the SMO is loaded. The primary SMO may then change the launch mode to manual under certain SMO-unique situations (See applicable weapon T.O.). The SMO cannot change the launch mode to Auto; only the operator can select Auto.

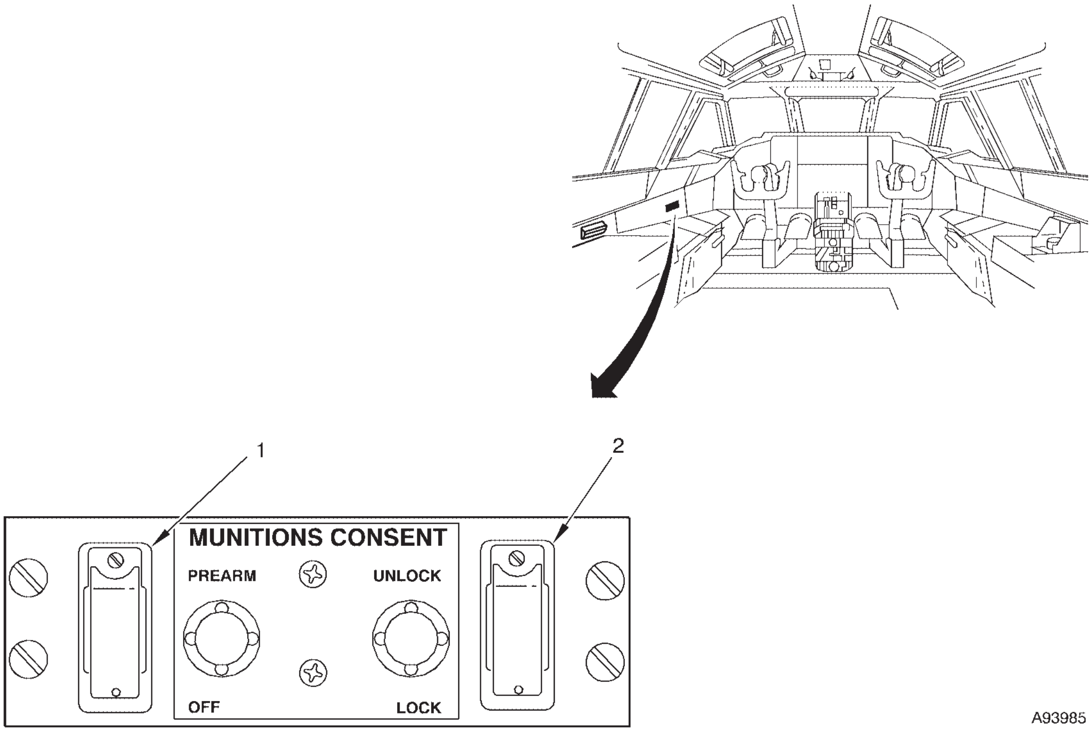
Figure 1-11 (Sheet 2 of 3)

Weapon Control Panel (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
11	LCHR ROTATE (ROT) SWITCH	Used in manual launch mode to position WCP selected missile in launch position. Light remains on until launcher is in commanded position.
12	LOCATION Switches (3)	Used with station select switches to select missiles for missile operational functions. Left Pylon (LP) - Selects left pylon missiles. Right Pylon (RP) - Selects right pylon missiles. Bay Launcher (BAY) - Selects launcher missiles.
13	NUCLEAR LOCK-UNLOCK Switch	Guarded two position switch used with pilot's consent to lock and enable unlock of missile ejectors. **NOTE** With Nonnuclear Weapon SMO's, In SIM Mode a momentary UNLOCK CONSENT message will be displayed each time the NUCLEAR LOCK-UNLOCK switch is positioned. The message will clear automatically.
14	PYLON LOCK-UNLOCK Switch	Guarded two position lever lock switch gives consent to jettison missile pylons.

Figure 1-11 (Sheet 3 of 3)

Pilots' Munition Consent Panel



NO.	CONTROL-INDICATOR	FUNCTION
1	LOCK/UNLOCK Consent Switch	The lock/unlock switch gives the pilot the capability to provide consent to allow unlock of ejectors and release of weapons.
2	PREARM/OFF Consent Switch	The prearm/off switch gives the pilot the capability to provide consent to allow prearming commands to be sent to nuclear weapons.

Figure 1-12

MULTI-FUNCTION DISPLAYS (MFDs)

Two types of MFDs are used with OAS at each navigators' station. The MFD on the left is optimized for OAS data display. The monitor on the right is optimized for display of EVS images. Since both display monitor types can be used to display OAS data, the term MFD as used in the B-52H aircrew manuals applies to both the left and right monitors.

See figure 1-13 for control and functional information on navigators' MFDs. Also shown is the general data display arrangement with prime mission data (PMD) displayed at the top of the display and advisory data for the system and weapons displayed near the bottom of the display. Details of information given in both of these areas is shown in figure 1-16. Information on the various functional displays, formats, and program information shown in the main central area of the MFD is given later in this section.

MFD OPERATION

FMS provides data and menu options to the operator via four Multifunction Displays (MFD). Each IKB controls two of the MFD, but only one MFD at a time will respond to valid display commands entered from the IKB. The indicators of L MFD and R MFD on the IKB indicate which MFD (the left or the right, respectively) will currently respond to display commands from that IKB. The operator can choose which MFD to control by pressing the R MFD or L MFD buttons on the IKB.

Either MFD can be selected using the keyboard to display data. Once a display is commanded it will remain until another display is commanded on that MFD, even if changes are being commanded on the other MFD. Current data changes applicable to all displays will be shown regardless of keyboard selection. The same display called up on two MFD differs due to different display update rates. The left MFD is operational as soon as OAS power is turned on and the right MFD is operational when the EVS video select switch is moved out of OFF position. The MFD may be tuned for brightness and contrast on any displayed information. A test button on the left MFD provides a test pattern which can be used as an aid in tuning. It is not necessary to de-tune the MFD (turning contrast and brightness ccw) when turning the system off.

Multifunction Display

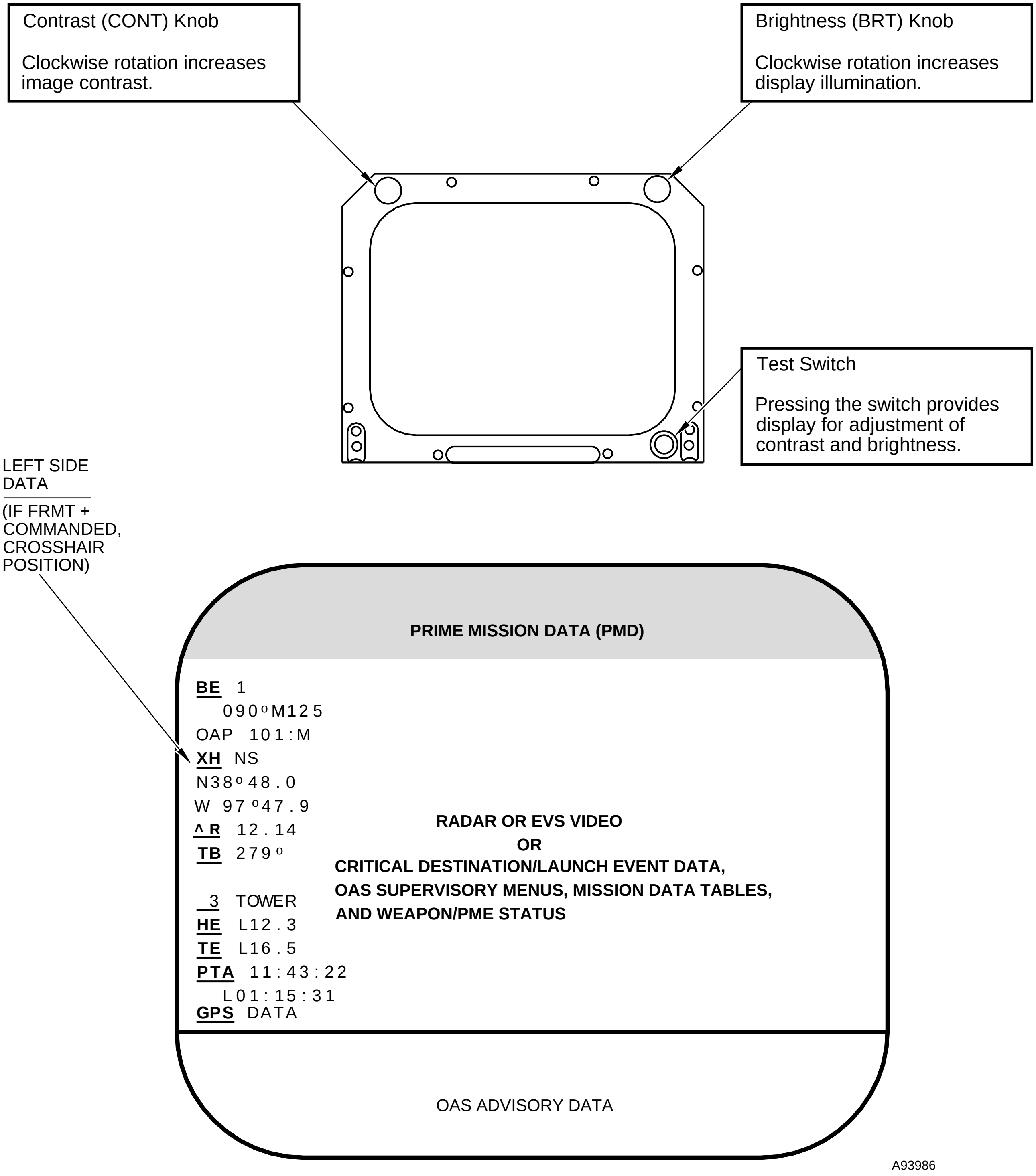


Figure 1-13

FMS MFD Displays

FMS MFD DISPLAYS

Most of the programming needs of the OAS are handled automatically by the FMS and the SMOs. However, some programming requirements must be accomplished by the operator inputting commands and data through the keyboard to the system. The MFDs allow the operator to see the results of these keyboard inputs as well as maintain the automatically programmed functions of the system. A display electronics unit (DEU) accommodates most of the main functions of the keyboards and MFDs by accomplishing the following: handling input and output functions of the keyboards, interfacing with the data bus, alphanumeric character generation, and distribution of scan converted radar video and EVS video to the MFDs. Scan conversion of the radar results in radar returns and markers bearing small alterations in their shape as they are broken down into small rectangular elements. This is particularly apparent at the cardinal points for circular shaped information and off-cardinal point angular information.

KEYBOARD OPERATION

The keyboard controls selection of MFD for display, track control, message answering and advisory control, and system command and data entry.

SYSTEM COMMAND AND DATA ENTRY FUNCTIONS

System command and data entry actions accomplished on the keyboard can be monitored on the selected MFD as each step is made. For example, if Control Function 61 is to be selected and entered, the following actions on the keyboard and results on the MFD will be obtained:

1. Press CF key, the control function display identifier CF- will appear on the lower left area of the MFD, see figure 1-17. A small underline appears at the right of the control function identifier. This is the cursor and indicates the location of an enterable item.
2. Press 6 key. The cursor moves right to next blank space. Press 1 key. Cursor moves right to next blank space.
3. Press ENTER key. The cursor moves under the 6 and the CF-61 display fills in.

NOTE

> All keys should be pressed firmly and held momentarily on all entries so that the computers will properly accept the entry. A brief touch may not result in entry acceptance.

Similar keyboard actions interactive with the MFD are used to accomplish other system control and data entry functions. Data entry/data modification is accomplished with the MDFY key. Only lines preceded by a number designator can be modified. For example, if the month, day, and year are to be entered in the CF-61 display (figure 1-23) accomplish the following on the selected MFD displaying CF-61:

1. Press MDFY key. The identifier MDFY appears in place of the CF-61 identifier.
2. Press the 3 key, since the line to have data entered is numbered 3. The cursor moves to the next space to the right of the 3.
3. Press ENTER key. The display on line 3 moves down to the line previously occupied by the MDFY symbol and the cursor moves to the first modifiable number. Cursor must then be backspaced to the letter.
4. Press keys for date. The cursor will skip over the / symbols to the next modifiable space.
5. After all keys are pressed and display is checked for desired data, press ENTER key. The data then fills in on line 3.

If an improper/illogical command is entered, the command becomes reverse highlighted and the system ignores the command. It will be necessary to reenter the proper data.

During command and data entry procedures, it will be necessary to enter characters on the upper left corner of a key. To accomplish this, press the UC (upper corner) key prior to pressing each character key. It should be noted that in some system commands a comma (,) exists in the command and it is necessary to use the above upper corner procedures to obtain the comma.

If the operator enters invalid data values in a modifiable line the affected data fields will be displayed in reverse video. If an invalid value is input in more than one field, only the first field with an invalid value will be displayed in reverse video on the command line when the ENTER key is pressed. If a valid value is input for that window, the next window with an invalid value will be displayed in reverse video on the command line.

The input method for numeric modifiable fields can vary. Numeric inputs can be entered by inputting the number along with leading zeros, such as 01 for a two-digit field. An alternate method is to press the right arrow key once for each leading zero or leading blank position. To enter 200 in a five-digit field, press the right arrow key twice then enter 200.

Message answering is accomplished by pressing the MSG key after message is displayed on all four MFDs. This removes the messages/advisories from all the MFDs and allows any subsequent messages/ advisories to be displayed. There is no message priority system so an existing message may mask another message which may be of more importance. Therefore, it is important to acknowledge a message as soon as possible. The master fault and nuclear caution messages cannot be erased by pressing the message key.

Some FMS commands require the operator to answer a yes or no question. Row 23 on all four MFDs is reserved for this type of question to be displayed. The operator responds to a question of this type via the YES and NO keys on an IKB in control of the MFD that displays the question. If a question is not answered in 120 seconds, the computer will assume a no response and erase the question. Therefore it is important to answer questions as soon as possible.

The advisory message acknowledge switch (MSG) is used to clear any advisory message currently displayed on the MFDs. If no advisory message is displayed when the advisory switch is momentarily pressed, the switch selection will be ignored. If other advisory message displays are pending, the next message is displayed after the advisory message window on each MFD is cleared.

MFD DISPLAYS

System command and data displays are grouped into three categories: Control Functions, Formats, and Programs. The system commands are listed in figure 1-14.

The operator can change numbered line items on these displays using the MDFY function. Data displayed in normal video highlight consists of light letters on a dark background and data displayed in reverse video highlight are dark letters on a light background. See KEYBOARD OPERATION, this section.

If the operator enters certain commands that cannot be processed due to current conditions, an advisory message will be displayed. If the operator enters an invalid command through the IKB, the command will be displayed in reverse video

PRIMARY APPLICATION LOADER MENU

The Primary Application Loader Menu (figure 1-15) shows all available primary applications resident on the DTS or in ACU Non-Volatile Memory (NVM). A version identifier is displayed to the right of each application name on the display. Primary Application Loader is used to determine which primary application is resident in ACU non-volatile memory and the version of that application, to select a primary application to be loaded from the DTC, to inhibit ACU operation, or to remove the primary application from ACU non-volatile memory. See FMS INITIALIZATION, this Section for use of the Primary Application Loader Menu.

PRIME MISSION DATA DISPLAY

The Prime Mission Data (PMD) displays aircraft location, flight parameters, and mission parameters to monitor mission performance. Full and Partial PMDs are shown on figure 1-16. A one line PMD (not shown) only displays time-to-go to current destination, steering heading error with associated course correction arrow, SMO ID, and time of day.

The following commands request Full PMDs: FRMT-2, FRMT-4, FRMT-5, FRMT-6, FRMT-8, FRMT-9 and PRGM. The FRMT-1 requests a Partial PMD. The FRMT-7 command requests a one line PMD. All other commands (CF or FRMT) display the last requested PMD if room allows in PMD data area of the screen. If data associated with the previous general area display is displayed in the PMD data area (e.g. Mission Data Load Display, CF-81), the prime mission data area will be blanked.

For PMD displayed on FRMT or PRGM displays, selection of a number preceded by a comma (,x) (x = 1, 2, or 3) following the display selection will display PMD using INU 1 (x = 1), INU 2 (x = 2), or ALTER nav (x = 3) as the nav model. This function allows for the display and comparison of PMD from two nav models on adjacent MFDs.

Operator Commands

COMMAND	FUNCTION
CF	CONTROL FUNCTION MENU
CF-1	INU-1 SUPERVISION MENU
CF-11	(INU-1 SUPV) GND ALIGN
CF-12	(INU-1 SUPV) AIR/AUTO NAV
CF-13	(INU-1 SUPV) GPS-NAV
CF-14	(INU-1 SUPV) DPLR-NAV
CF-15A	(INU-1 SUPV) NAV
CF-16	(INU-1 SUPV) SHUTDOWN
CF-17	(INU-1 SUPV) ENHANCED INTERRUPTED ALIGNMENT (EIA)
CF-18	(INU-1 SUPV) REINIT
CF-2	INU-2 SUPERVISION MENU
CF-21	(INU-2 SUPV) GND/AUTO NAV
CF-22	(INU-2 SUPV) AIR/AUTO NAV
CF-23	(INU-2 SUPV) GPS-NAV
CF-24	(INU-2 SUPV) DPLR-NAV
CF-25A	(INU-2 SUPV) NAV
CF-26	(INU-2 SUPV) SHUTDOWN
CF-27	(INU-2 SUPV) ENHANCED INTERRUPTED ALIGNMENT (EIA)
CF-28	(INU-2 SUPV) REINIT
CF-3	ALTERNATE NAVIGATION SUPERVISION MENU
CF-31	(ALTER NAV) AUTO
CF-321	(ALTER NAV) GPS VELOCITY AND AHRS HEADING
CF-322	(ALTER NAV) GPS VELOCITY AND EMERG HEADING
CF-331	(ALTER NAV) DPLR VELOCITY AND AHRS HEADING
CF-332	(ALTER NAV) DPLR VELOCITY AND EMERG HEADING
CF-341	(ALTER NAV) TAS+W/V VELOCITY AND AHRS HEADING
CF-342	(ALTER NAV) TAS+W/V VELOCITY AND EMERG HEADING
CF-351	(ALTER NAV) EMERG VELOCITY AND AHRS HEADING
CF-352	(ALTER NAV) EMERG VELOCITY AND EMERG HEADING
CF-36	(ALTER NAV) PRESENT POSITION SYNCHRONIZATION
CF-4	NAVIGATION MODE SUPERVISION MENU
CF-41A	(NAV REF) AUTO
CF-42	(NAV REF) INU-1
CF-43	(NAV REF) INU-2
CF-44A	(NAV REF) ALTER
CF-45	(NAV REF) INU SYNCH

Figure 1-14 (Sheet 1 of 3)

COMMAND	FUNCTION
CF-5	WEAPON SUPERVISION MENU
CF-5A	(WPN SUPV) LEFT PYLON WEAPON SUPERVISION
CF-5B	(WPN SUPV) BAY WEAPON SUPERVISION
CF-5C	(WPN SUPV) RIGHT PYLON WEAPON SUPERVISION
CF-50	(WPN SUPV) STRIKE MODE
CF-51	(WPN SUPV) PART SIMULATION MODE
CF-52	(WPN SUPV) FULL SIMULATION MODE
CF-59	(WPN SUPV) BAY DOORS
CF-6	FCP SUPERVISION MENU
CF-61	(FCP SUPV) FCP INITIALIZATION DISPLAY (START UP)
CF-62	(FCP SUPV) SMO MENU
CF-62x	(FCP SUPV) PRIMARY SMO SELECT. x= A (LP), B (Bay), or C (RP)
CF-64	(FCP SUPV) CLASSIFIED MEMORY ERASE
CF-65	(FCP SUPV) DATA RECORD
CF-66	(FCP SUPV) ERASE PME FAULTS
CF-67	(FCP SUPV) FCP TERMINATION DISPLAY (SHUTDOWN)
CF-68	(FCP SUPV) ECU POWER OVERRIDE
CF-69A	(FCP SUPV) SHUTDOWN PRIMARY ACU
CF-69B	(FCP SUPV) SHUTDOWN SECONDARY ACU
CF-7	STEERING SUPERVISION MENU
CF-71	(STEER SUPV) AUTO
CF-72	(STEER SUPV) DIRECT
CF-73	(STEER SUPV) CENTERLINE RECOVERY
CF-8	MISSION SUPERVISION MENU
CF-81 & CF-81,n	(MSN SUPV) LOAD DTU MISSION DATA. n = 1 THROUGH 9, THE NUMBER OF THE B-52 MISSION IN THE SELECTED SORTIE.
CF-82A	(MSN SUPV) LEFT PYLON WEAPON GROUP MENU
CF-82B	(MSN SUPV) BAY WEAPON GROUP MENU
CF-82C	(MSN SUPV) RIGHT PYLON WEAPON GROUP MENU
CF-DB	SELECT PREVIOUS SORTIE (CF-81 DISPLAY), PREVIOUS PAGE (FRMT-9, FRMT-10)
CF-DF	SELECT NEXT SORTIE (CF-81 DISPLAY), NEXT PAGE (FRMT-9, FRMT-10)
CF-E	WCP/PCP BACKUP DISPLAY
CF-F	RNMP BACKUP DISPLAY
FRMT	FORMAT MENU
FRMT-1	RADAR DISPLAY
FRMT-2 & FRMT-2,x	RADAR DISPLAY WITH PMD. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR PMD
FRMT-3	EVS DISPLAY
FRMT-4 & FRMT-4,x	EVS DISPLAY WITH PMD. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR PMD

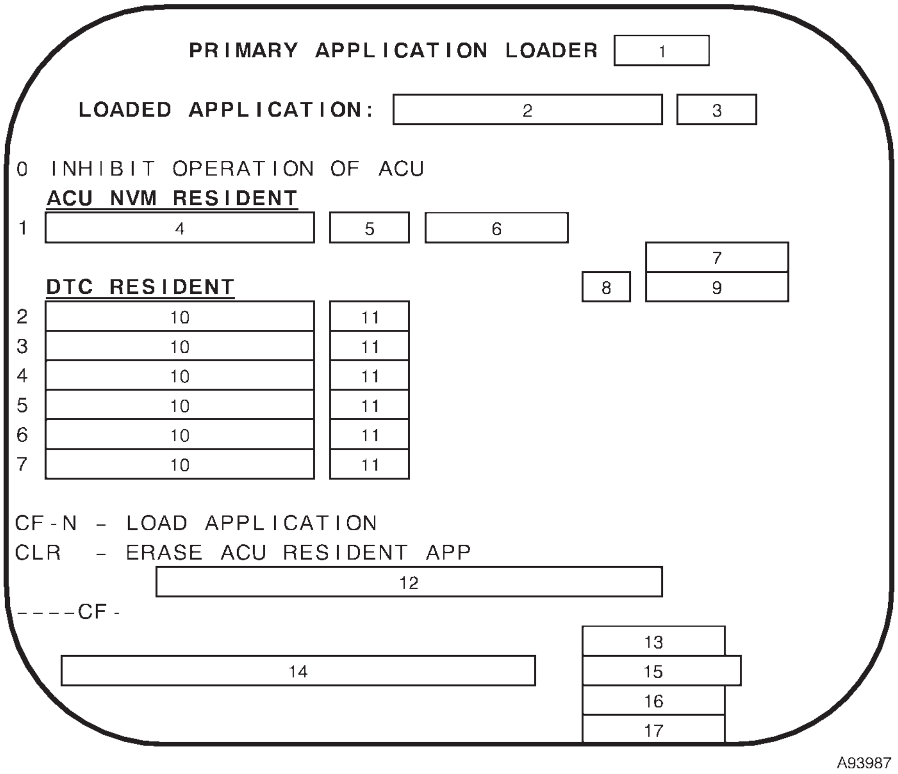
Figure 1-14 (Sheet 2 of 3)

Operator Commands (Cont)

COMMAND	FUNCTION
FRMT-5 & FRMT-5,x	EVS FULL DISPLAY. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR PMD
FRMT-6 & FRMT-6,x	PME STATUS DISPLAY. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR PMD
FRMT-7A	LEFT PYLON WEAPON STATUS AND INVENTORY DISPLAY
FRMT-7B	BAY WEAPON STATUS AND INVENTORY DISPLAY
FRMT-7C	RIGHT PYLON WEAPON STATUS AND INVENTORY DISPLAY
FRMT-77	STORES INVENTORY SUMMARY DISPLAY
FRMT-8 & FRMT-8,x	EMERGENCY DATA DISPLAY. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR PMD
FRMT-9 & FRMT-9,nn	FIXPOINT DATA DISPLAY. nn = SELECTED DESTINATION NUMBER.
FRMT-10 & FRMT-10,nn	DESTINATION AND OFFSET DATA DISPLAY. nn = SELECTED DESTINATION NUMBER.
FRMT-D	RADAR SCAN CONVERTER BUILT-IN TEST DISPLAY
PRGM, PRGM nn, & PRGM nn,x	PROGRAM DISPLAY FOR SITUATIONAL AWARENESS DATA. nn = SELECTED DESTINATION NUMBER. x = 1 (INU -1), 2 (INU-2), OR 3(ALTER NAV) NAV SOURCE FOR THE DISPLAY
PRGM-E	NUCLEAR DAMAGE ASSESSMENT/STRIKE SYMBOLOGY DISPLAY

Figure 1-14 (Sheet 3 of 3)

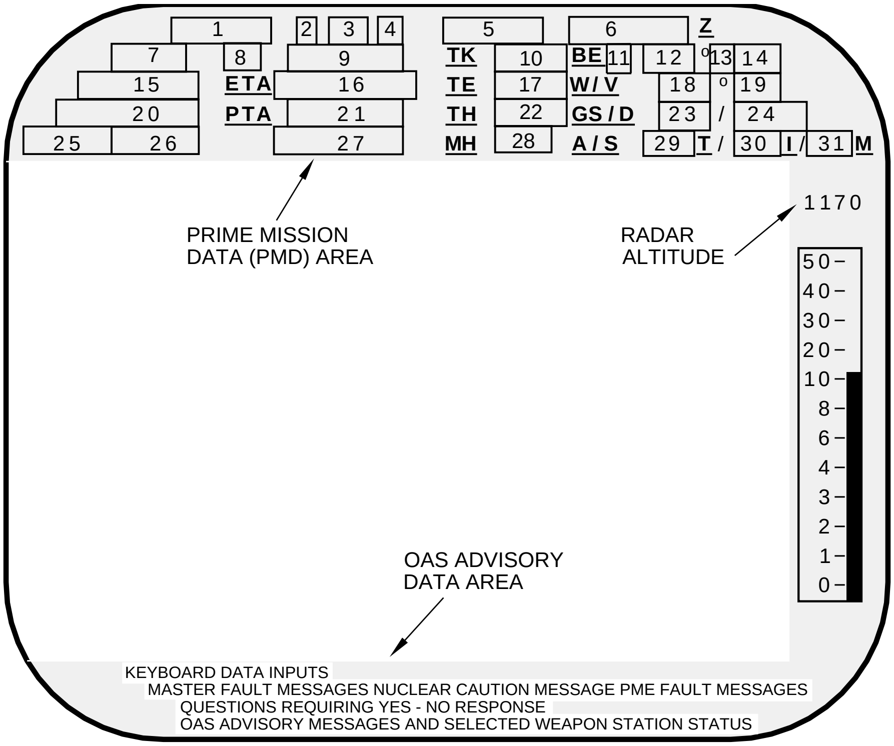
Primary Application Loader Menu



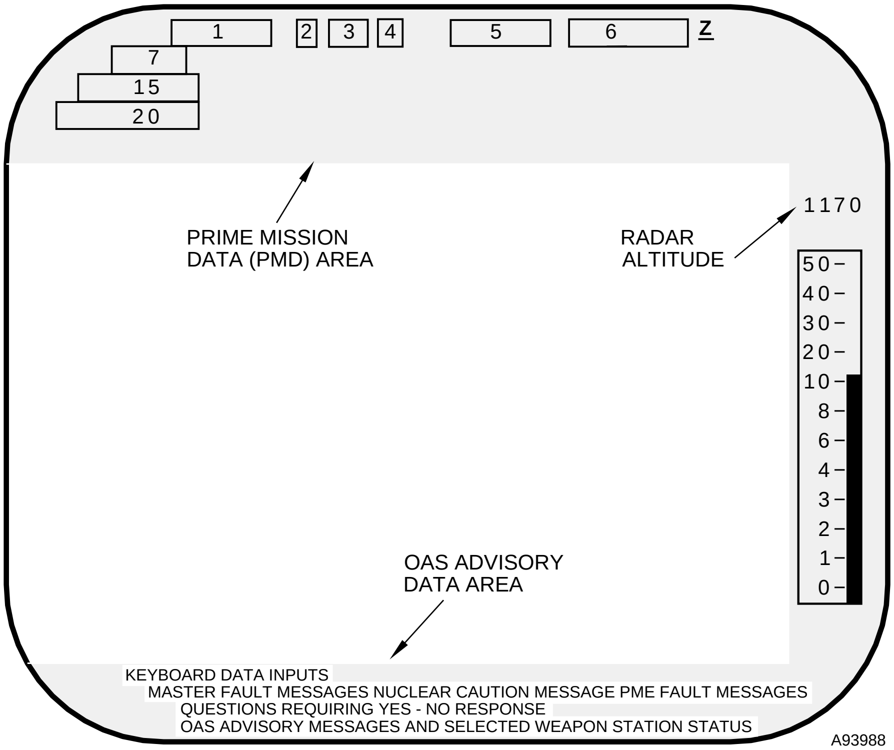
1 PRIMARY APPLICATION LOADER VERSION NUMBER
2 RESIDENT PRIMARY APPLICATION NAME
3 RESIDENT PRIMARY APPLICATION VERSION NUMBER
4 NVM PRIMARY APPLICATION NAME
5 NVM PRIMARY APPLICATION VERSION NUMBER
6 INDICATION OF PRIMARY OR SECONDARY ACU
7 PRIMARY APPLICATION LOADER OPERATION
8 PER CENT COMPLETE
9 OPERATION IN PROGRESS
10 DTC APPLICATIONS
11 DTC APPLICATION VERSION NUMBERS
12 PRIMARY APPLICATION LOADER OPERATION MESSAGE
13 DEU STATUS
14 VERIFICATION PROMPT
15 LOAD ERROR
16 DTR 1 COMMUNICATION
17 DTR 2 COMMUNICATION

Figure 1-15

Prime Mission Data Display Examples



FULL PMD



PARTIAL PMD

Figure 1-16 (Sheet 1 of 6)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
1	Time-to-go	NO	
	h:mm:ss		Time-to-go to current destination when no application is providing time-to-go or the time provided by another application. Displayed in hours, minutes and seconds with leading zeros in the minutes and seconds fields and limited to the range 0:00:20 to 9:59:59.
	0:00:ss (Reverse Video)		Time-to-go when Time-to-go is less than 20 seconds.
2	Left Arrow	NO	
	<		Left arrow displayed when a turn to the left is required to steer in the desired direction.
	(Blank)		Displayed when a turn to the right is required or no turn is required.
3	Steering Heading Error	NO	
	n.n		Heading error numeric value displayed in degrees and tenths of a degree when the error is less than 10 degrees.
	nnn		Heading error numeric value displayed in degrees when the error is 10 degrees or greater. Displayed with leading blanks and limited to 180.
4	Right Arrow	NO	
	>		Right arrow displayed when a turn to the right is required to steer in the desired direction.
	(Blank)		Displayed when a turn to the left is required or no turn is required.
5	Primary SMO ID	NO	
	nnnnnnn		Primary SMO mnemonic.
6	Time of Day	NO	
	hh:mm:ss		Time of day (UTC) displayed in hours, minutes and seconds with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
7	Altitude MSL	NO	
	nnnn0 or -nnn0		Current aircraft altitude above mean sea level computed by the selected navigation source. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the altitude is below sea level.
	nnnn0 or -nnn0 (Reverse Video)		Emergency aircraft altitude above mean sea level when the selected navigation source is using emergency entered by the operator.
8	Destination No.	NO	
	nn		Current destination number when the destination is pre-planned. Displayed with a leading blank.
	_+		The radar sighting point, EVS sighting point, fixpoint or offset aimpoint is the current destination.

Figure 1-16 (Sheet 2 of 6)

Prime Mission Data Display Examples (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
9	Destination Mnemonic	NO	
	aaaaaaaaaa		Ten character current destination mnemonic from mission data when the current destination is pre-planned.
	RDR XH (Reverse Video)		Current destination mnemonic when the radar sighting point is the current destination.
	EVS XH (Reverse Video)		Current destination mnemonic when the EVS sighting point is the current destination.
	FXPT (Reverse Video)		Current destination mnemonic when a mission data fixpoint is the current destination.
	OAP (Reverse Video)		Current destination mnemonic when a mission data offset aimpoint is the current destination.
10	Ground Track	NO	
	nnn.n		Current aircraft ground track computed by the selected navigation source. Displayed in degrees from 0 to 359.9 with leading blanks.
	nnn.n (Reverse Video)		Emergency aircraft ground track when the source of the data is alternate navigation and alternate navigation is using emergency or last-pass ground track.
11	Bull’s Eye No.	NO	
	n		Bull’s eye number for the station where PMD is displayed.
12	Bull’s Eye Bearing	NO	
	nnn		Bearing from the bull’s eye identified in the Bull’s Eye No. display to the aircraft relative to magnetic north when M is displayed in the Mag/True Bearing display or true north when T is displayed. Displayed in degrees from 0 to 359 with leading blanks.
	nnn (Reverse Video)		No magnetic variation data is available when M is selected.
13	Bull’s Eye Bearing Reference	NO	
	M T		Displayed when magnetic bearing is selected for bull’s eye data. Displayed when true bearing is selected for bull’s eye data.
14	Bull’s Eye Range	NO	
	nnn		Range from selected bull’s eye to the aircraft. Displayed in nautical Miles with leading blanks and limited to 999. **NOTE** Bull’s Eye data is calculated independently by the GPS IU/TACAN displayed at the pilot’s MFD and Prime Mission Data displayed at the navigator’s station. Small variations in bearing and range between the two systems should be expected. Resolution at the pilot station is 0.05 NM while the navigator station is 0.5NM leading to inherent rounding differences.

Figure 1-16 (Sheet 3 of 6)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
15	Latitude	NO	
	add°mm.m		Current aircraft latitude computed by the selected navigation source including position-only correction. Displayed in degrees, minutes and tenths of minutes with a leading blank following a and leading zeros in the minutes field. The a is N when latitude is positive and S when latitude is negative.
16	ETA	NO	
	hh:mm:ss		Estimated-time-of-arrival at the current destination displayed in hours, minutes and seconds, limited from 0:00:00 to 24:00:00, and with a leading blank in the hours field and leading zeros in the minutes and seconds fields. Computed by the selected navigation source based on current ground speed and great circle distance direct to the current destination.
17	Track Error	NO	
	ann.n		Distance from current aircraft position to the great circle path from the previous destination to the current destination computed by the prime navigation source. The a is L when the aircraft is to the left of the great circle path and R when the aircraft is to the right. nn.n is the distance in nautical miles and limited to 99.9. Displayed with leading blanks following the direction indicator.
18	Wind Direction	NO	
	nnn		Direction from which the wind is blowing computed by the selected navigation source. Displayed in degrees from 0 to 359 with leading blanks.
	nnn (Reverse Video)		Emergency or last-pass wind direction.
19	Wind Speed	NO	
	nnn		Wind speed computed by the selected navigation source. Displayed in knots with leading blanks.
	nnn (Reverse Video)		Emergency or last-pass wind speed.
20	Longitude	NO	
	addd°mm.m		Current aircraft longitude computed by the selected navigation source including position-only correction. Displayed in degrees, minutes and tenths of minutes with leading blanks following a and leading zeros in the minutes field. The a is E when longitude is positive and W when longitude is negative.
21	Planned Time of Arrival	NO	
	hh:mm:ss		Planned time of arrival at the current destination when flying to a pre-planned destination. Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
	hh:mm:ss		Estimated time of arrival at the current destination computed by the prime navigation source when flying to a destination other than a pre-planned destination.

Figure 1-16 (Sheet 4 of 6)

Prime Mission Data Display Examples (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
22	True Heading	NO	
	nnn.n		Current aircraft true heading computed by the selected navigation source. Displayed in degrees from 0 to 359.9 with leading blanks.
	nnn.n (Reverse Video)		Emergency aircraft true heading when the source of the data is alternate navigation and alternate navigation is using emergency or last-pass true heading.
23	Groundspeed	NO	
	nnn		Current aircraft ground speed computed by the selected navigation source. Displayed in knots with leading blanks.
	nnn (Reverse Video)		Emergency aircraft ground speed when the source of the data is alternate navigation and alternate navigation is using emergency or last-pass ground speed.
24	Drift Correction	NO	
	snn.n		Current aircraft drift correction angle computed by the selected navigation source. Displayed in degrees and tenths of degrees with a leading blank following s. s is blank for positive drift correction angles and - for negative drift correction angles.
	snn.n (Reverse Video)		Emergency aircraft drift correction angle when the source of the data is alternate navigation and alternate navigation is using emergency or last-pass drift.
25	Prime Navigation Source	NO	
	INU-1		Displayed when INU 1 is the prime navigation source.
	INU-2		Displayed when INU 2 is the prime navigation source.
	ALTER		Displayed when Alternate Navigation is the prime navigation source.
26	PMD Navigation Source	NO	
	/PMD-1		Navigation source selected for PMD display is INU 1 and INU 1 is not prime.
	/PMD-2		Navigation source selected for PMD display is INU 2 and INU 2 is not prime.
	/PMD-3		Navigation source selected for PMD display is Alternate Navigation and Alternate Navigation is not prime.
	(Blank)		Navigation source selected for PMD display is the prime navigation source.

Figure 1-16 (Sheet 5 of 6)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
27	Early/Late Time of Arrival	NO	
	a hh:mm:ss		Early/late time of arrival at the current destination computed by the prime navigation source when flying to a pre-planned destination. Displayed in hours, minutes and seconds with a leading blanks in the hours field and leading zeros in the minutes and seconds fields. The a preceding the hours is E when the destination will be reached at or prior to the planned time and L when the destination will be reached after the planned time.
	E 0:00:00		When flying to any destination other than a pre-planned destination.
28	Mag Heading	NO	
	nnn		Current aircraft magnetic heading computed by the selected navigation source. Displayed in degrees from 0 to 359 with leading blanks.
	nnn (Reverse Video)		Emergency aircraft magnetic heading when the source of the data is alternate navigation and alternate navigation is using emergency or last-pass magnetic heading.
29	TAS	NO	
	nnn		Current aircraft true air speed displayed in nautical miles per hour with leading blanks.
	nnn (Reverse Video)		Emergency or last-pass aircraft true air speed.
30	IAS	NO	
	nnn		Current aircraft indicated airspeed when current air data is available. Displayed in nautical miles per hour with leading blanks.
	nnn (Reverse Video)		Last valid aircraft indicated airspeed when current air data is not available. Displayed in nautical miles per hour with leading blanks.
31	Mach No.	NO	
	.nn		Current aircraft mach number computed by the selected navigation source. Displayed with a leading zero.
	.nn (Reverse Video)		Aircraft mach number when the source of the data is based on emergency or last-pass aircraft true airspeed.

Figure 1-16 (Sheet 6 of 6)

CONTROL FUNCTIONS (CF)

Control Function (CF) displays are used to monitor and provide control for navigation and steering modes, weapon supervision, FCP supervision, and mission supervision. The CF Menu displays a list of CF displays available to the operator, and may be reached by pressing CF ENTER on an IKB. See figures 1-17 through 1-30 for examples of CF displays.

Operator entry of a CF command will cause the Control Function (CF) menu (figure 1-17) to be displayed on the selected MFD at the station where the command was entered. Other CF Displays can be displayed by entering a CF-n command on an IKB, where n is a valid CF menu number. Some of the CF menus provide a variety of FMS commands that can be entered with a command format of CF-a,b where a is a valid CF menu number and b is a valid FMS command number offered on that menu.

INERTIAL NAVIGATION SUPERVISION MENUS

The CF-1 (INU-1 SUPV), or CF-2 (INU-2 SUPV) display (figure 1-18) is used to view navigation mode, control computation of navigation data. INU-2 is similar to INU-1 except the commands start with 2.

Operator entry of a CF-1 or CF-2 command will cause the Inertial Navigation Supervision menu to be displayed on the selected MFD at the station where the command was entered.

From the CF-menu, INU-1 and or INU-2 are displayed with mode status including a field for manual selection (represented by an :M). To change mode statuses, select CF-1 or CF-2 on the IKB. This will bring up a list of INU modes that can be picked from by selecting CF, plus the value before each mode. If any system fails, even though manually selected, the FCP will select the next best system and the :M will go reverse highlighted

ALTERNATE NAVIGATION SUPERVISION MENU

Alternate Navigation Menu (CF-3) (figure 1-19) controls computation of navigation data. This display is used to view and select alternate navigation options. The current alternate navigation system mode (if any) is displayed on the selected MFD for reference.

Operator entry of a CF-3 command will cause the Alternate Navigation Supervision Menu to be displayed on the selected MFD at the station where the command was entered.

With CF-3 displayed the operator can change mode status by entering CF-3ab. Where a is 2, 3, 4, or 5, the identifier associated with velocity reference GPS, DPLR, TAS+W/V, or EMERG respectively. The b or third digit is 1 or 2, the identifier associated with the attitude/heading reference AHRS or EMERG respectively (see sheet 1, figure 1-19).

NAVIGATION MODE SUPERVISION MENU

Navigation Mode Supervision Menu (CF-4) (figure 1-20) identifies control commands and displays data associated with the selection of the prime navigation system and the synchronization of the inertial navigation systems.

Operator entry of a CF-4 command will cause the Navigation Mode Supervision Menu to be displayed on the selected MFD at the station where the command was entered.

With CF-4 displayed, the operator can reference INU settings for INU-1, INU-2 and Alter. The operator has the option to look at each mode by entering CF-y. where y is the identifier associated with the line of data to be referenced. The prime navigation source is displayed on the NAV REF line of the display.

The INU SYNCH line shows the difference between the prime and non-prime INU wander angles. INU synchronization is commanded when a CF-45 command is entered. Synchronization of the INU navigation coordinate frames is necessary to avoid impacting alignment of some weapons when prime data source is switched from one INU to the other INU.

WEAPON SUPERVISION MENU

Weapon Supervision Menu (CF-5) (figure 1-21) displays the current operational mode (STRIKE, PART SIM, or FULL SIM), operational mode commands (CF-50, CF-51, and CF-52), commands to request the Weapon Supervision Menu of each SMO that is operating in the ACU (CF-5A, 5B, and 5C), and bomb bay door status and command (CF-59).

Operator entry of a CF-5 command will cause the Weapon Supervision Menu to be displayed on the selected MFD at the station where the command was entered.

Three operational modes can be requested. The CF-50, CF-51, and CF-52 commands request the STRIKE, PART SIM, and FULL SIM operational modes respectively. The OAS only allows the loading of a SMO if the system is in STRIKE mode. While the weapon system is in FULL SIM mode, the Weapon Control Equipment (WCE) (e.g. WIU/MIU, Nuc SLU, WPA, and PDUC) responses are “simulated” and the WCE cannot actually be turned on or operated. WCE and/or weapons are not required to be loaded on the aircraft for FULL SIM operation. PART SIM is similar to FULL SIM except 1553A bus traffic is transmitted from the ACUs to the PDUC to allow for CSRL rotation.

CF-5A displays the weapon supervision menu of the SMO controlling the left pylon; CF-5B, the weapon supervision menu of the SMO controlling the bay; and CF-5C, the weapon supervision menu of the SMO controlling the right pylon weapon supervision menu. The title of the SMO associated with each station will follow the 5A, 5B, and 5C commands on the CF-5 Menu. See the respective weapon T.O.s for a further description.

The operator can open or close bay doors by using CF-59. The Bomb Bay Doors may be in one of three states Open (OPEN), Closed (CLSD), or Unlatched (UNLTCHD). The unlatched state indicates that the doors are currently in transition from Open to Closed or vice versa. The current state of the Bomb Bay Doors is indicated on the CF-5 menu. The operator may request the doors be toggled between the Open and Closed states by entering a CF-59 command. FMS may not accept the operator’s request due to another application, such as a SMO, requiring control of the doors. If the operator’s request is not accepted, the CF-59 command will be reverse highlighted on the MFD on which it was entered.

FLIGHT COMPUTER PROGRAM SUPERVISION MENU

The Flight Computer Program (FCP) Supervision Menu (CF-6) (figure 1-22) allows the operator to initiate and terminate the FCP, erase classified information, data record, erase PME faults, shutdown ACUs, and display SMO menu. The primary SMO, if any, is displayed on the selected MFD for reference.

Operator entry of a CF-6 command will cause the FCP Supervision Menu to be displayed on the selected MFD at the station where the command was entered.

With CF-6 displayed the operator can enter commands including: STARTUP, SMO MENU, CLSF MEM ERASE, DATA RECORD, ERASE PME FAULTS, SHUTDOWN, ECU POWER OVERRIDE, SHUTDOWN PRIMARY ACU, and SHUTDOWN SECONDARY ACU. The command is selected by entering CF-y on the IKB, where y is the identifier associated with the line of data to be selected.

The CF-68 ECU PWR ORIDE command can be used to toggle (enable or disable) the ECU fault override associated with the unavailability of Environmental Control Unit (ECU) power. The CSP displays this command description and the current status of the ECU power override option, whether it is enabled (ON) or disabled (OFF), to the right of the command description on the FCP Supervision Menu, CF-6. Only when the override is OFF can an ECU or ECU PWR master fault message be displayed when applicable (See associated weapon T.O.).

Primary ACU shutdown is initiated by entering a CF-69A command and secondary ACU shutdown is initiated by a CF-69B command. When the primary ACU is shutdown, the secondary ACU will be reconfigured to become the primary ACU, if it is operational. The primary SMO is displayed on the selected MFD for reference.

FCP Initialization Display

FCP Initialization Display (CF-61) (figure 1-23) will allow the operator to initialize the following data using the IKB and MDFY function:

- Time of day
- Initial aircraft latitude, longitude and altitude *
- Planned-time-of-arrival (PTA) reference destination and the planned time of arrival at that destination
- Current month, day and year *
- Clearance plane altitude
- Aircraft tail number *
- Latitude and longitude of bull’s eye points 1 and 2

An asterisk identifies data that is initialized upon FCP startup from data stored into ACU memory the last time the system was shutdown. These items maintain their value in the event that the ACU reconfigures as the primary ACU.

SMO Load Menu

The SMO Load Menu (CF-62) (figure 1-24) allows the operator to load multiple SMOs into memory and to select one of the loaded SMOs to be the Primary SMO. One SMO can be loaded and assigned to each store location on the aircraft (left pylon, bay and right pylon) or assigned to multiple locations.

With the CF-62 menu displayed, the operator will enter MDFY-11 to copy the following text to the bottom of the MFD for modification:

11 SMO LOAD   LP__ BAY__ RP__

The operator will enter the number of the desired SMO into the field corresponding to the location the SMO is to control and press ENTER. The location: LP (left pylon), BAY, or RP (right pylon) is defined by the cursor, which can be moved using the arrow keys on the IKB.

- When a SMO is assigned to multiple stores locations, only one copy of the SMO will be loaded into ACU memory. If a SMO currently residing in memory is specified in the load command, that SMO will be unloaded and reloaded, even if it is assigned to the same location(s). All weapon status data and all MIU/WIU status data will be lost as a result of the reload.
- If one SMO is to be assigned to the left pylon and a different SMO assigned to the right pylon, the assignments must be made in the same command.

NOTE

Currently, a SMO assigned to either pylon will be assigned to both pylons.

- If a SMO is assigned to one pylon in the load command, the SMO assigned to the one pylon will be assigned to the other pylon by the FMS, even if a different SMO is currently assigned to the other pylon when the command is entered.
- To unload a SMO, enter 00 for the location.
- If one SMO is to be assigned to all locations, the assignments should be made in the same command.
- Multiple SMOs must be compatible with each other. The number entered will be displayed in reverse video on line 11 when the designated SMOs are not compatible. Previously loaded SMOs will not be affected, but no SMO will be loaded until the SMO assignments are corrected.
- When multiple SMOs are loaded, the OAS will select the first SMO loaded as primary. To manually select a Primary SMO, the operator will enter CF-62x, where x is A, B or C, denoting the left pylon, bay, or right pylon, respectively.

NOTE

- The FMS shall prevent a Nuclear SMO (NUC SMO) from being loaded with any conventional weapon SMO.
- The OAS allows the loading of a SMO only if the system is in STRIKE mode.

FCP Termination Display

The FCP Termination Display (CF-67) (figure 1-25), allows the operator to shutdown FCP, erase classified information, or view FCP status.

The operator may terminate FMS by entering a CF-67 command. Upon entering this command, a question will be displayed asking the operator to confirm the command. If the terminate command is confirmed, the operator will be asked whether or not classified data should be erased. The operator should respond to this question with either the YES or the NO on the IKB. FMS will then perform a shutdown of all equipment and terminate processing. If classified data erase is selected, the IU, if it is operating, will be commanded to erase classified data, each powered INU and each DTR will be commanded to erase classified data and then classified data will be erased from each ACU that is operational. The Declassification Status display (figure 1-26) will be displayed on all four MFD when declassification begins following normal shutdown and will remain displayed after classified data is erased from the ACUs. If NO is selected or if no response is entered within 120 seconds, FCP termination will be performed without erasing classified data.

STEERING SUPERVISION MENU

The Steering Supervisory Menu (CF-7) (figure 1-27) allows the operator to choose between auto, direct, and centerline recovery steering control. The current steering mode is displayed on the selected MFD for reference.

Operator entry of a CF-7 command will cause the Steering Supervision Menu to be displayed on the selected MFD at the station where the command was entered.

Auto steering mode allows a secondary application, such as a SMO, to specify the steering mode. If there is no secondary application requesting a specific steering mode, then FMS will select the direct steering mode. The operator can select Auto steering mode by entering a CF-71 command on an IKB.

When operating in Direct steering mode, the FMS computes a heading that will steer the aircraft along a great circle path from the aircraft’s current position to the current destination. The operator can select Direct steering mode by entering a CF-72 command on an IKB.

When operating in Center Line Recovery steering mode, the FMS computes a heading that will steer the aircraft along a great circle path from the previous destination to the current destination. The operator can select Center Line Recovery mode by entering a CF-73 command on an IKB. If the aircraft is not on the great circle path from the previous destination to the current destination when Center Line Recovery mode is selected, commands will be generated to steer the aircraft back to that great circle path over the shortest distance.

A secondary application cannot control the steering mode when Direct steering mode or Center Line Recovery mode is commanded by the operator.

When a new steering mode is selected, the operator will see the steering mode indicator on CF-7 change to reflect the new steering mode.

NOTE

When Auto is selected the CF-7 will show the steering mode that was automatically selected by the secondary application or FMS.

MISSION SUPERVISION MENU

Mission Supervision Menu (CF-8) (figure 1-28) allows the operator to see the resident sortie and B-52 mission and also identifies the commands to select a sortie and a corresponding mission (CF-81) and request Weapon Group Menus of each SMO that is operating in the ACU. From one to eight sorties can be resident on a DTC. Each sortie contains up to nine missions. A mission, as defined by FMS, contains up to 99 destinations, 99 fixpoints, 42 OAPs, and data required by the weapon SMOs for release of weapons at one or more of the destinations. AFMSS refers to a mission as a route.

Operator entry of a CF-81 command will cause the Mission Data Load display to be displayed on the selected MFD at the station where the command was entered. Sorties are selected using CF-DF command for “next” sortie or the CF-DB command for “previous” sortie or MDFY 1 followed by the number of the desired sortie.

Once the sortie is selected, the operator may choose from a list of up to 9 missions to load using the Mission Data Load Display (CF-81), see figure 1-29. Entry of CF-81,n will cause the selected mission data to load.

CF-82A, B, and C commands request the Weapon Group Menu for the SMO controlling the left pylon, bay, and right pylon respectively. The Weapon Group Menu for a SMO provides information about the weapon mission data that is resident on the DTC for that SMO. The title of the SMO associated with each station will follow the 82A, 82B, and 82C commands on the CF-8 display if these commands are valid, otherwise the invalid command will display in reverse video.

The CF-DF and CF-DB commands will be displayed on the command line of the MFD in reverse video when any of the following conditions exist:

- No DTC is available.
- The DTC does not contain a sortie.
- The DTC contains only one sortie and that sortie is already selected.

WCP/PCP BACKUP DISPLAY

During abnormal operation the MFD will display an advisory that WCP/PCP is malfunctioning. The WCP/PCP Backup Display (CF-E) (figure 1-30) correlates with the WCP/PCP controls, to allow the operator to select functions regardless of control panel status.

Operator entry of a CF-E command will cause the WCP backup menu to be displayed on the selected MFD at the station where the command was entered.

To work around malfunctions on the WCP/PCP, the operator will use the CF-E command by entering the symbol that correlates with the WCP/PCP panel in the same sequence as normal operation. Once entered the new selection will be underlined on the MFD. WCP provides the capability to select weapons and control weapon power, jettison and launch. Some functions are not available to use from CF-E. When exiting CF-E the operator should switch MIU/WIU PWR to EN HW SWCH (CF-E9D) to enable the MIU POWER switches on the PCP.

RNMP BACKUP DISPLAY

RNMP Backup Display (CF-F) (figure 1-31) correlates with RNMP control panel to allow the operator to use the IKB to enter commands regardless of RNMP status. The operator enters a command by entering the symbol that correlates with the RNMP panel in the same sequence as normal operation.

Operator entry of a CF-F command will cause the RNMP backup menu to be displayed on the selected MFD at the station where the command was entered.

The RNMP Backup Display request (CF-F) correlates with the RNMP to control MAP MODE, MAP SELECT, MARKERS, RANGE/SCALE, CALBR, XMTR, UPDATE, and FIX MODE switches. Each control has different selections the operator can make from the command line by entering CF-Fnn. Once the commanded change is made, the active mode or the switch position will be underlined on the display (the selected active mode will also be highlighted on the RNMP). When using the XMTR mode switch the selector switch must be set to the appropriate position on the RNMP when commanding changes except for the EN HW SWCH position. When exiting CF-F the operator should switch XMTR and FIX MODE to EN HW SWCH (CF-F74 and CF-F65), to enable the respective rotary hardware switches on the RNMP.

Control Function Menu (CF)

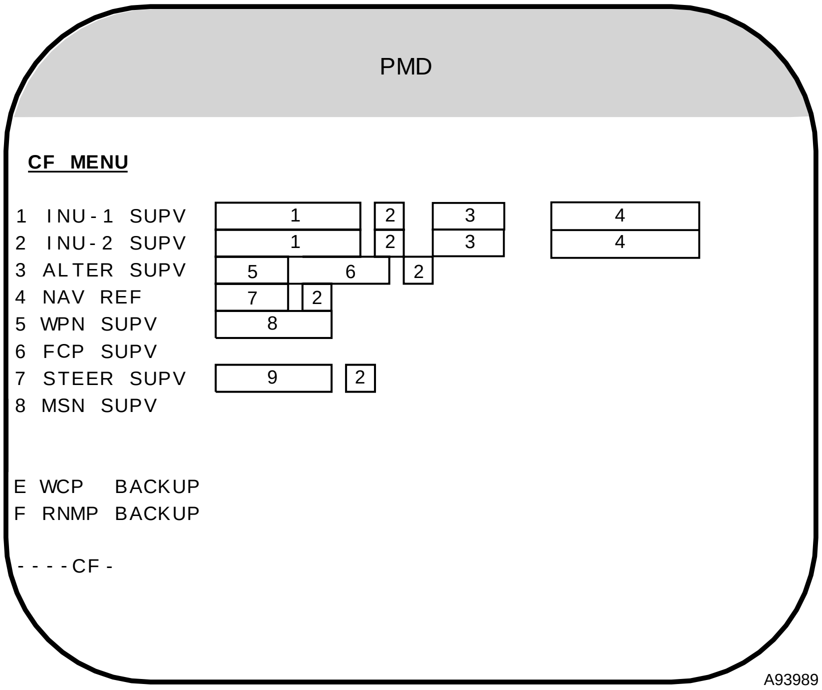


Figure 1-17 (Sheet 1 of 4)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	INU Status	NO	
	OFF		There is no communication with the associated INU.
	AIR ALIGN		The INU is currently operating in attitude mode and/or is performing course leveling.
	CHK DATA		The INU is ready to navigate and is waiting for a FLY–TO command.
	DECLASS (Blinking Video)		Power removal from the associated INU has been commanded and declassification is in progress.
	DECLASS		Power has been removed from the associated INU after successful declassification.
	DECLASS (Reverse Video)		Declassification of the associated INU was unsuccessful and the INU is no longer communicating.
	STANDBY		The associated INU is powered, but an alignment mode has not been commanded.
	EGC		An Enhanced Gyrocompass (EGC) ground align has been commanded, but has not completed.
	READY		EGC or Enhanced Interrupted Alignment (EIA) has been commanded and has completed.
	NARF		The INU entered Nav mode, detected no motion and is obtaining additional ground alignment in Navigation Alignment Refining (NARF) mode.
	EIA		The INU is in EIA ground align mode.
	GPS-NAV		The INU is navigating and is being aided with GPS data.
	DPLR-NAV		The INU is navigating and is being aided with Doppler data.
	NAV		The INU is navigating without velocity aiding.
2	Manual Select	NO	
	M:		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been manually selected and data from the specified source is being used.
	M: (Reverse Video)		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been manually selected and data from the specified source is not being used.
	(Blank)		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been automatically selected.

Figure 1-17 (Sheet 2 of 4)

Control Function Menu (CF) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
3	Alignment Time Remaining	NO	
	mm:ss		Time remaining in alignment or time in NARF for the associated INU. Displayed in minutes and seconds with a leading blank in the minutes field and leading zeros in the seconds field and limited to 99:59.
	00:00		EGC or EIA alignment is complete.
	(Blank)		Communication with the associated INU is not successful or no ground alignment has been performed.
4	Ground Alignment Status	NO	
	INIT		An EGC ground alignment has been commanded and the INU is in the initial state.
	ATT		An EGC ground alignment has been performed such that the INU can support attitude mode.
	ATT+HDG		An EGC ground alignment has been performed such that the INU can support attitude and heading in the attitude mode.
	n.n NM/HR		An EGC or EIA ground alignment has been performed and the INU can support identified performance (this value is estimated performance based upon time and not guaranteed).
	(Blank)		Communication with the associated INU is not successful or no ground alignment was performed.
5	Velocity Source	NO	
	__GPS		Alternate navigation velocity and position data are derived from the GPS sensor.
	_DPLR		Alternate navigation velocity data is derived from the Doppler sensor.
	TAS+W		Alternate navigation velocity data is derived from true airspeed and winds data.
	EMERG (Reverse Video)		Alternate navigation velocity data is derived from emergency true airspeed or emergency winds data or both.
	(Blank)		Alternate navigation is not navigating.

Figure 1-17 (Sheet 3 of 4)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
6	Heading Source	NO	
	/AHRS		Alternate navigation heading data is derived from the AHRS sensor.
	/INU		Alternate navigation heading data is derived from an INU.
	/EMERG (Reverse Video)		Alternate navigation heading data is derived from emergency data and velocity data is derived from the GPS or Doppler sensors or from true airspeed and winds data.
	(Blank)		Displayed when any of the following are true: 1. Alternate navigation velocity data is derived from emergency data. 2. Alternate navigation heading data is derived from emergency data.
7	Prime Nav Source	NO	
	INU-1		INU 1 is the prime navigation source.
	INU-2		INU 2 is the prime navigation source.
	ALTER		Alternate navigation is the prime navigation source.
	(Blank)		No prime navigation source has been identified.
8	Operational Mode	NO	
	STRIKE		Operational mode is Strike.
	PART SIM		Operational mode is Partial Simulation.
	FULL SIM		Operational mode is Full Simulation.
9	Steering Mode	NO	
	DIRECT		The steering mode is direct.
	CL RCVY		The steering mode is centerline recovery.

Figure 1-17 (Sheet 4 of 4)

INU Supervision Menu (CF-1, CF-2)

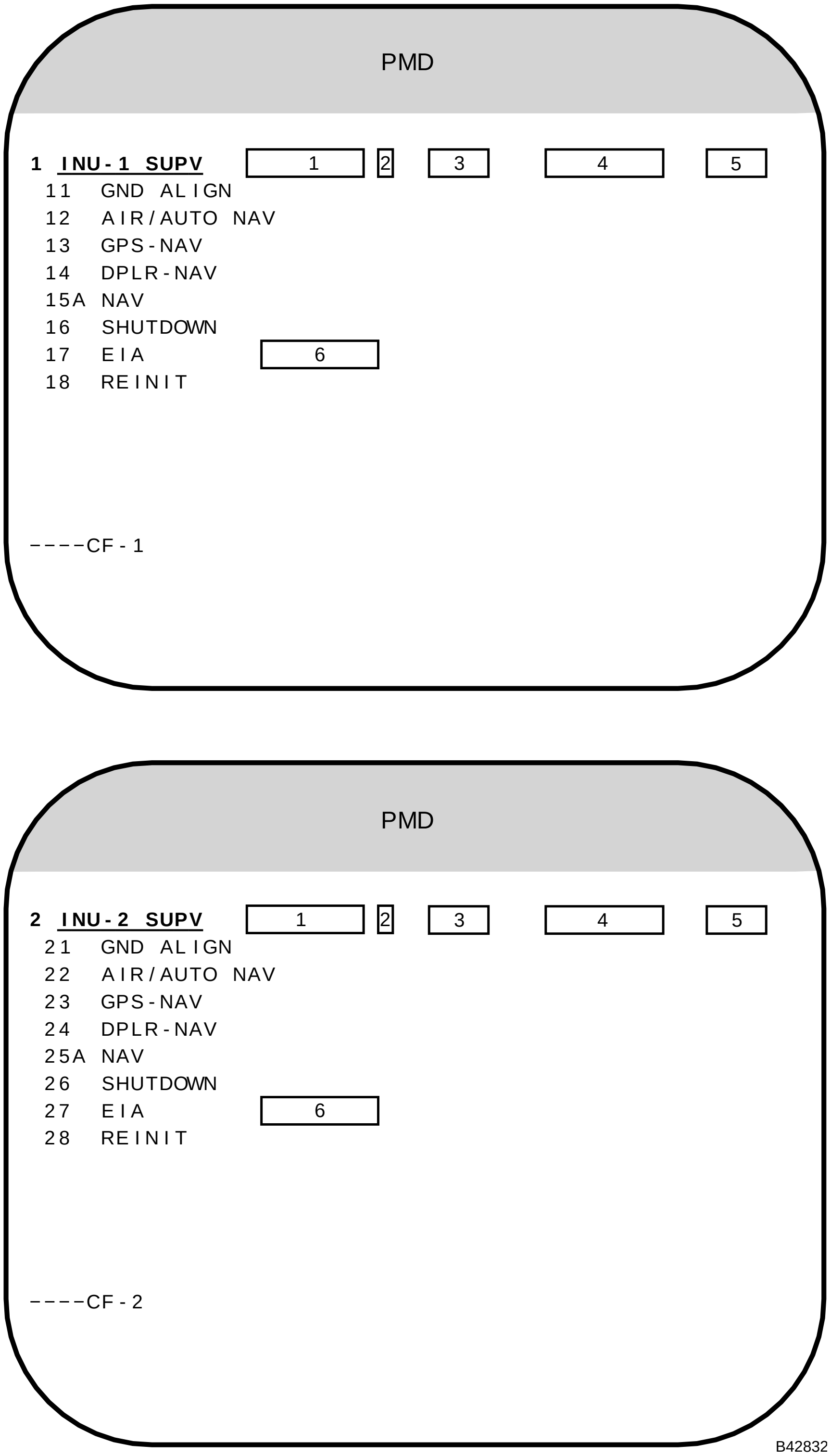


Figure 1-18 (Sheet 1 of 3)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	INU Status	NO	
	OFF		There is no communication with the associated INU.
	AIR ALIGN		The INU is currently operating in attitude mode and/or performing course leveling.
	CHK DATA		The INU is ready to navigate and is waiting for a FLY–TO command.
	DECLASS (Blinking Video)		Power removal from the associated INU has been commanded and declassification is in progress.
	DECLASS		Power has been removed from the associated INU after successful declassification.
	DECLASS (Reverse Video)		Declassification of the associated INU was unsuccessful and the INU is no longer communicating.
	STANDBY		The associated INU is powered, but an alignment mode has not been commanded.
	EGC		An Enhanced Gyrocompass (EGC) ground align has been commanded, but has not completed.
	READY		EGC or Enhanced Interrupted Alignment (EIA) has been commanded and has completed.
	NARF		The INU entered Nav mode, detected no motion and is obtaining additional ground alignment in Navigation Alignment Refining (NARF) mode.
	EIA		The INU is in EIA ground align mode.
	GPS-NAV		The INU is navigating and is being aided with GPS data.
	DPLR-NAV		The INU is navigating and is being aided with Doppler data.
	NAV		The INU is navigating without velocity aiding.
2	Manual Select	NO	
	M:		The aiding mode of the associated INU has been manually selected and data from the specified source is being used.
	M: (Reverse Video)		The aiding mode of the associated INU has been manually selected and data from the specified source is not being used.
	(Blank)		The aiding mode of the associated INU has been automatically selected.
3	Alignment Time Remaining	NO	
	mm:ss		Time remaining in alignment or time in NARF for the associated INU. Displayed in minutes and seconds with a leading blank in the minutes field and leading zeros in the seconds field and limited to 99:59.
	00:00		EGC or EIA alignment is complete.
	(Blank)		Communication with the associated INU is not successful or no ground alignment has been performed.

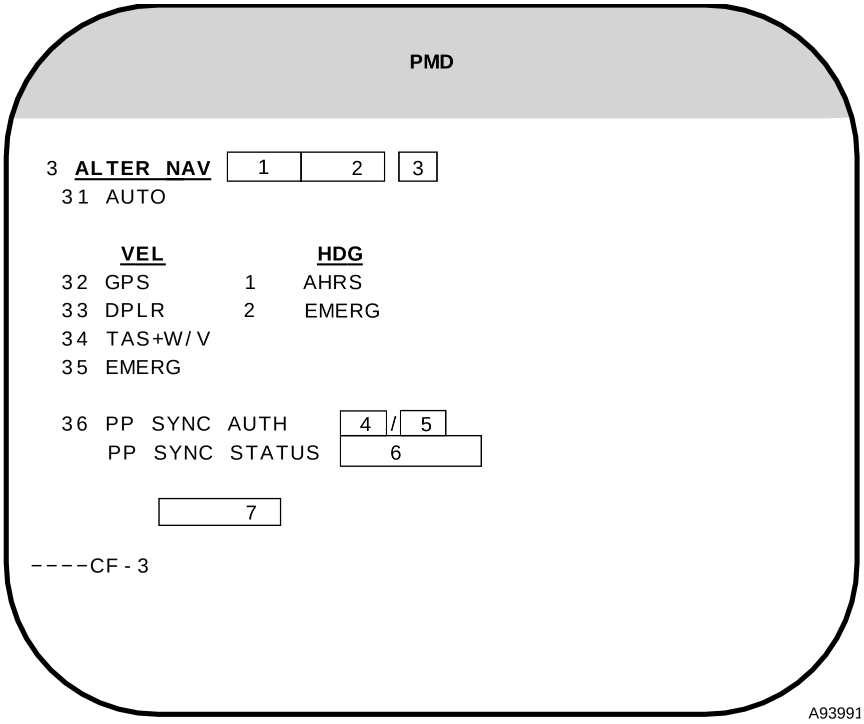
Figure 1-18 (Sheet 2 of 3)

INU Supervision Menu (CF-1, CF-2) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
4	Ground Alignment Status	NO	
	INIT		An EGC ground alignment has been commanded and the INU is in the initial state.
	ATT		An EGC ground alignment has been performed such that the INU can support attitude mode.
	ATT+HDG		An EGC ground alignment has been performed such that the INU can support attitude and heading in the attitude mode.
	n.n NM/HR		An EGC or EIA ground alignment has been performed and the INU can support identified performance (this value is estimated performance based upon time and not guaranteed).
	(Blank)		Communication with the associated INU is not successful or no ground alignment was performed.
5	Deflection-Of-Vertical	NO	
	DOV		Last attempt to read Deflection-Of-Vertical failed.
	(Blank)		Last attempt to read Deflection-Of-Vertical was successful.
6	EIA status	NO	
	CHANGE HDG		EGC has been completed and EIA cannot be commanded without heading change.
	READY		EIA is available to be commanded.
	UNAVAILABLE		EGC did not fully complete, or auto transition to NAV occurred from EGC.
	TIME OUT		EIA was not commanded within 15 minutes of the completion of EGC.
	(Blank)		EGC has not completed, EIA is active, EIA is completed or TAS has exceeded 80 knots.

Figure 1-18 (Sheet 3 of 3)

Alternate Navigation Supervision Menu (CF-3)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Velocity Source	NO	
	__GPS		Alternate navigation velocity and position data are derived from the GPS sensor.
	_DPLR		Alternate navigation velocity data is derived from the Doppler sensor.
	TAS+W		Alternate navigation velocity data is derived from true airspeed and winds data.
	EMERG (Reverse Video)		Alternate navigation velocity data is derived from emergency true airspeed or emergency winds data or both.
	(Blank)		Alternate navigation is not navigating.
2	Heading Source	NO	
	/AHRS		Alternate navigation heading data is derived from the AHRS sensor.
	/INU		Alternate navigation heading data is derived from an INU.
	/EMERG (Reverse Video)		Alternate navigation heading data is derived from emergency data and velocity data is derived from the GPS or Doppler sensors or from true airspeed and winds data.
	(Blank)		Displayed when any of the following are true: 1. Alternate navigation velocity data is derived from emergency data. 2. Alternate navigation heading data is derived from emergency data.

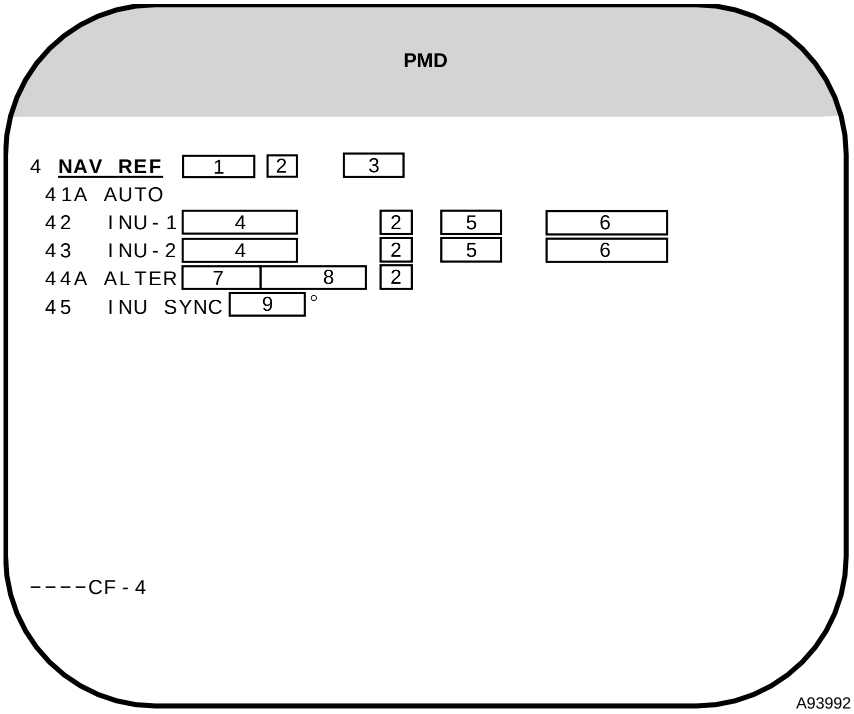
Figure 1-19 (Sheet 1 of 2)

Alternate Navigation Supervision Menu (CF-3) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
3	Manual Select	NO	
	M:		The source of data used by alternate navigation has been manually selected and data from that source is being used.
	M: (Reverse Video)		The source of data used by alternate navigation has been manually selected, but data from that source is not being used.
	(Blank)		The source of data used by alternate navigation has been automatically selected.
4	Yes Status	NO	
	YES		Alternate navigation present position synchronization is not authorized.
	YES (Underlined Video)		Alternate navigation present position synchronization is authorized.
5	No Status	NO	
	NO		Alternate navigation present position synchronization is authorized.
	NO (Underlined Video)		Alternate navigation present position synchronization is not authorized.
6	PP Sync Status	NO	
	ACTIVE		Alternate navigation present position is being synchronized with the present position computed by the prime INU.
	INACTIVE		Alternate navigation present position is not being synchronized with the present position computed by the prime INU because of one or more of the following reasons: 1. Alternate navigation is aided with GPS. 2. The difference in position computed by the two INUs is not within tolerance. 3. Alternate navigation prime position synchronization is not authorized by the operator.
7	BARO-ALT Status	NO	
	BARO-ALT		Barometric altitude data is invalid.
	(Blank)		Barometric altitude data is valid.

Figure 1-19 (Sheet 2 of 2)

Navigation Mode Supervision Menu (CF-4)



WINDOW	DISPLAY	MODIFIABLE	FUNCTION
1	Prime Nav Source	NO	
	INU-1		INU 1 is the prime navigation source.
	INU-2		INU 2 is the prime navigation source.
	ALTER		Alternate navigation is the prime navigation source.
	(Blank)		No prime navigation source has been identified.
2	Manual Select	NO	
	M:		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been manually selected and data from the specified source is being used.
	M: (Reverse Video)		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been manually selected and data from the specified source is not being used.
	(Blank)		The aiding mode of the associated INU, the source of data used by alternate navigation, or the prime navigation system has been automatically selected.

Figure 1-20 (Sheet 1 of 4)

Navigation Mode Supervision Menu (CF-4) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
3	Deflection-Of-Vertical	NO	
	DOV		Last attempt to read Deflection-Of-Vertical failed.
	(Blank)		Last attempt to read Deflection-Of-Vertical was successful.
4	INU Status	NO	
	OFF		There is no communication with the associated INU.
	AIR ALIGN		The INU is currently operating in attitude mode and/or performing course leveling.
	CHK DATA		The INU is ready to navigate and is waiting for a FLY–TO command.
	DECLASS (Blinking Video)		Power removal from the associated INU has been commanded and declassification is in progress.
	DECLASS		Power has been removed from the associated INU after successful declassification.
	DECLASS (Reverse Video)		Declassification of the associated INU was unsuccessful and the INU is no longer communicating.
	STANDBY		The associated INU is powered, but an alignment mode has not been commanded.
	EGC		An Enhanced Gyrocompass (EGC) ground align has been commanded, but has not completed.
	READY		EGC or Enhanced Interrupted Alignment (EIA) has been commanded and has completed.
	NARF		The INU entered Nav mode, detected no motion and is obtaining additional ground alignment in Navigation Alignment Refining (NARF) mode.
	EIA		The INU is in EIA ground align mode.
	GPS-NAV		The INU is navigating and is being aided with GPS data.
	DPLR-NAV		The INU is navigating and is being aided with Doppler data.
	NAV		The INU is navigating without velocity aiding.
5	Alignment Time Remaining	NO	
	mm:ss		Time remaining in alignment or time in NARF for the associated INU. Displayed in minutes and seconds with a leading blank in the minutes field and leading zeros in the seconds field and limited to 99:59.
	00:00		EGC or EIA alignment is complete.
	(Blank)		Communication with the associated INU is not successful or no ground alignment has been performed.

Figure 1-20 (Sheet 2 of 4)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
6	Ground Alignment Status	NO	
	INIT		An EGC ground alignment has been commanded and the INU is in the initial state.
	ATT		An EGC ground alignment has been performed such that the INU can support attitude mode.
	ATT+HDG		An EGC ground alignment has been performed such that the INU can support attitude and heading in the attitude mode.
	n.n NM/HR		An EGC or EIA ground alignment has been performed and the INU can support identified performance (this value is estimated performance based upon time and not guaranteed).
	(Blank)		Communication with the associated INU is not successful or no ground alignment was performed.
7	Velocity Source	NO	
	__GPS		Alternate navigation velocity and position data are derived from the GPS sensor.
	_DPLR		Alternate navigation velocity data is derived from the Doppler sensor.
	TAS+W		Alternate navigation velocity data is derived from true airspeed and winds data.
	EMERG (Reverse Video)		Alternate navigation velocity data is derived from emergency true airspeed or emergency winds data or both.
	(Blank)		Alternate navigation is not navigating.
8	Heading Source	NO	
	/AHRS		Alternate navigation heading data is derived from the AHRS sensor.
	/INU		Alternate navigation heading data is derived from an INU.
	/EMERG (Reverse Video)		Alternate navigation heading data is derived from emergency data and velocity data is derived from the GPS or Doppler sensors or from true airspeed and winds data.
	(Blank)		Displayed when any of the following are true: 1. Alternate navigation velocity data is derived from emergency data. 2. Alternate navigation heading data is derived from emergency data.

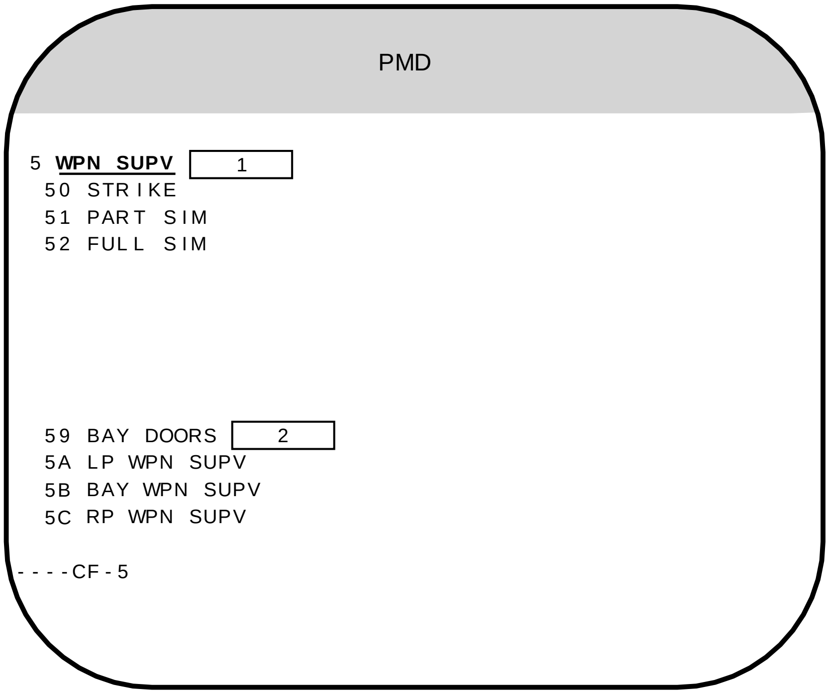
Figure 1-20 (Sheet 3 of 4)

Navigation Mode Supervision Menu (CF-4) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
9	INU Sync	NO	
	sn.nnn		Magnitude of the difference between the prime INU wander angle and the non-prime INU wander angle when no SMO has indicated that the difference is unacceptable for weapon alignment. Displayed in degrees and thousandths of a degree and limited to 9.999. “s” is blank when the difference is positive and “–” when the difference is negative.
	sn.nnn (Reverse Video)		Magnitude of the difference between the prime INU wander angle and the non-prime INU wander angle when one or more SMO have indicated that the difference is unacceptable for weapon alignment. Displayed in degrees and thousandths of a degree and limited to 9.999. ‘s’ is blank when the difference is positive and “–” when the difference is negative.
	(blank)		No INU or only one INU is operating.

Figure 1-20 (Sheet 4 of 4)

Weapon Supervision Menu (CF-5)



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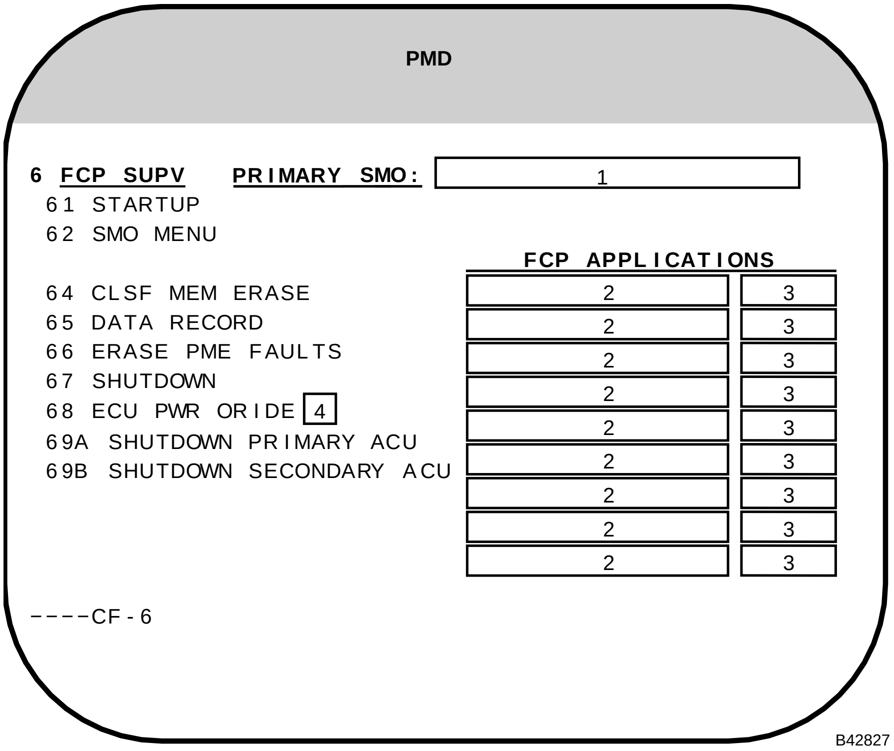
NOTE

For a detailed description of CF-5 see the applicable Aircrew Weapon Delivery Manual.

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
1	Operational Mode	NO	
	STRIKE		Operational mode is Strike.
	PART SIM		Operational mode is Partial Simulation.
	FULL SIM		Operational mode is Full Simulation.
2	Bomb Bay Door Status	NO	
	OPEN		AIU door status indicates bay doors are open.
	CLOSED		AIU door status indicates bay doors are closed.
	UNLTCHD		AIU door status indicates bay doors are not open and not closed.
	UNLTCHD (Reverse Video)		AIU door status indicates bay doors are both open and closed.

Figure 1-21

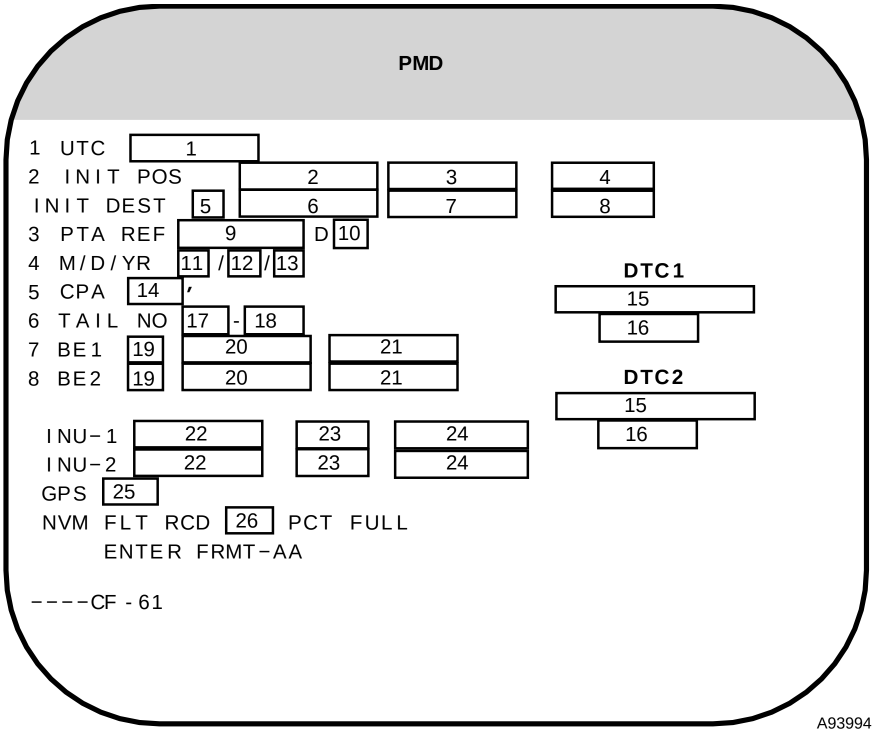
FCP Supervision Menu (CF-6)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Primary SMO Title	NO	
	24 Character Label		Primary SMO title.
2	FCP Application Title	NO	
	24 Character Label		Title of each non-SMO FCP application (FMS, CSP, and ODI) successfully loaded into ACU memory.
	24 Character Label (Blinking Video)		Title of each non-SMO FCP application (FMS, CSP, and ODI) that is in the process of being loaded into ACU memory.
	24 Character Label (Reverse Video)		Title of each non-SMO FCP application (FMS, CSP, and ODI) that failed to successfully load into ACU memory.
3	FCP Application Version/Revision	NO	
	6 Character Label		Version/revision identifier of the associated FCP application.
4	ECU Power Override Switch	NO	
	ON		ECU power override is commanded.
	OFF		ECU power override is not commanded.

Figure 1-22

FCP Initialization Display (CF-61)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	UTC	YES	
	hh:mm:ss		Time of day (UTC) displayed in hours, minutes and seconds with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
2	Initial Latitude	YES	
	sdd^{o}mm.mmm		Initial aircraft latitude. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. s is N when latitude is positive and S when latitude is negative.
3	Initial Longitude	YES	
	sddd^{o}mm.mmm		Initial aircraft longitude. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. s is E when longitude is positive and W when longitude is negative.
4	Initial Altitude	YES	
	nnnn0 or –nnn0		Initial aircraft altitude above mean sea level. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the altitude is below sea level.

Figure 1-23 (Sheet 1 of 5)

FCP Initialization Display (CF-61) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
5	Initial Destination No.	NO	
	nn		Initial destination number when the destination is pre-planned. Displayed with a leading blank.
	_+		The radar or EVS sighting point, or a fixpoint or offset aimpoint is the current destination.
6	Initial Destination Lat	NO	
	sdd °mm.mmm		Initial destination latitude. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. s is N when latitude is positive and S when latitude is negative.
7	Initial Destination Long	NO	
	sddd°mm.mmm		Initial destination longitude. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. s is E when longitude is positive and W when longitude is negative.
8	Initial Destination Elevation	NO	
	nnnn0 or –nnn0		Initial destination elevation above mean sea level. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the elevation is below sea level.
9	Planned Time-of-Arrival (PTA)	YES	
	hh:mm:ss		Planned time-of-arrival reference time (PTA at destination identified in PTA Destination display). Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields. To enter a PTA reference time that is in the next Zulu day requires the addition of 24 hours to the PTA reference time. The combination of PTA reference time and 24 hour addition for next Zulu day compensation can not exceed 48 hours.
10	PTA Destination	YES	
	nn		Number of the destination to be reached at the PTA shown in PTA display.
11	Current Month	YES	
	nn		Current month displayed with a leading blank.
12	Current Day	YES	
	nn		Current day displayed with a leading blank.
13	Current Year	YES	
	nn		Current year displayed with a leading zero.
14	Clearance Plane Altitude	YES	
	nnnn		Clearance Plane Altitude (CPA) displayed in feet.

Figure 1-23 (Sheet 2 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
15	DTC Label	NO	
	16 Character Label		DTC label.
	16 Character Label (Reverse Video)		DTC label, DTR or DTC faults are detected.
	DTC - BAD_ FORMAT (Reverse Video)		Cartridge format is incorrect.
	CARTRIDGE_ ABSENT		DTR indicates that no cartridge is installed.
	(Blank)		DTR indicates that no cartridge is installed or communication with the DTC is not possible.
16	FMS File Date	NO	
	mm/dd/yy		Date that last FMS read-only file was written to the associated DTC. Displayed as month/day/year with leading blanks in the month and day fields and a leading zero in the year field.
17	Tail Year No.	YES	
	nn		Year of aircraft manufacture (tail year number).
18	Tail Unit No.	YES	
	nnnn		Aircraft unit number displayed with leading zeros.
19	Bull’s Eye Bearing Reference	YES	
	M		M is displayed when the bearing is a Magnetic Bearing.
	T		T is displayed when the bearing is a True Bearing.
20	Bull’s Eye Lat	YES	
	sdd°mm.mmm		Latitude of associated Bull’s Eye. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. The s is N when latitude is north and S when latitude is south.
21	Bull’s Eye Long	YES	
	sddd°mm.mmm		Longitude of associated Bull’s Eye. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. The s is E when longitude is east and W when longitude is west.

Figure 1-23 (Sheet 3 of 5)

FCP Initialization Display (CF-61) (Cont)

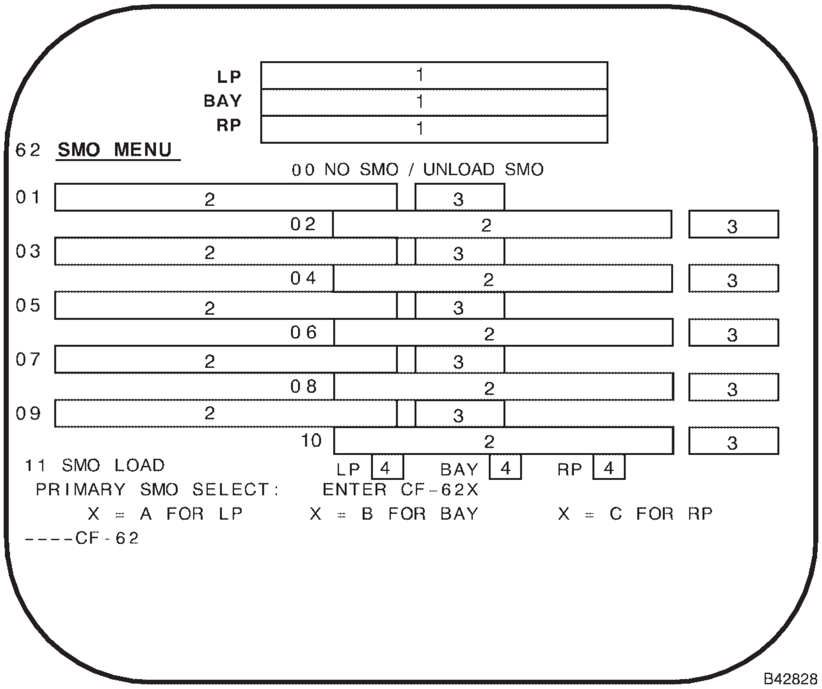
WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
22	INU Status	NO	
	OFF		There is no communication with the associated INU.
	AIR ALIGN		The INU is currently operating in attitude mode and/or performing course leveling.
	CHK DATA		A FLY–TO command has not been entered.
	DECLASS (Blinking Video)		Power removal from the associated INU has been commanded and declassification is in progress.
	DECLASS		Power has been removed from the associated INU after successful declassification.
	DECLASS (Reverse Video)		Declassification of the associated INU was unsuccessful and the INU is no longer communicating.
	STANDBY		The associated INU is powered, but an alignment mode has not been commanded.
	EGC		An Enhanced Gyrocompass (EGC) ground align has been commanded, but has not completed.
	READY		EGC or Enhanced Interrupted Alignment (EIA) has been commanded and has completed.
	NARF		The INU entered Nav mode, detected no motion and is obtaining additional ground alignment in Navigation Alignment Refining (NARF) mode.
	EIA		EIA ground align has been commanded, but has not completed.
	GPS-NAV		The INU is navigating and is being aided with GPS data.
	DPLR-NAV		The INU is navigating and is being aided with Doppler data.
	NAV		The INU is navigating without velocity aiding.
23	Alignment Time Remaining	NO	
	mm:ss		Time remaining in alignment or time in NARF for the associated INU. Displayed in minutes and seconds with a leading blank in the minutes field and leading zeros in the seconds field and limited to 99:59.
	00:00		EGC or EIA alignment is complete.
	(Blank)		Communication with the associated INU is not successful or no ground alignment has been performed.

Figure 1-23 (Sheet 4 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
24	Ground Alignment Status	NO	
	INIT		An EGC ground alignment has been commanded and the INU is in the initial state.
	ATT		An EGC ground alignment has been performed such that the INU can support attitude mode.
	ATT+HDG		An EGC ground alignment has been performed such that the INU can support attitude and heading in the attitude mode.
	n.n NM/HR		An EGC or EIA ground alignment has been performed and the INU can support identified performance (this value is estimated performance based upon time and not guaranteed).
	(Blank)		Communication with the associated INU is not successful or no ground alignment was performed.
25	GPS Status	NO	
	OFF		Communication has not been established with the GPS.
	DATA		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation use.
	DATA (Bright Underlined Video)		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation and inertial navigation use.
	DATA (Reverse Video)		Communication has been established with the GPS and the status received indicates that the GPS data is not valid for alternate navigation or inertial navigation use.
	NO GO (Reverse Video)		Communication has been established with the GPS previously, but communication is not currently possible.
26	NVM Fault Recording	NO	
	nnn		Percent of non-volatile memory reserved for fault recording that is used. Displayed with leading zeros.

Figure 1-23 (Sheet 5 of 5)

SMO Load Menu (CF-62)



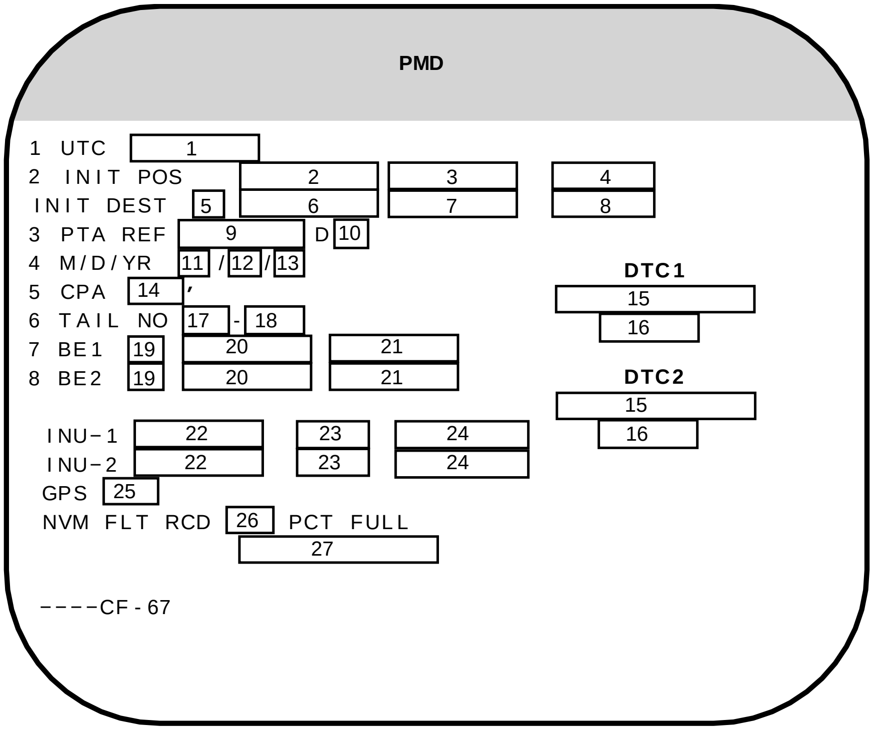
WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	SMO Title	NO	
	24 Character Label (Blinking Video)		Title of the SMO assigned to the corresponding location while the SMO is being loaded.
	24 Character Label		Title of the SMO assigned to the corresponding location after the SMO has been successfully loaded and the SMO is not the Primary SMO.
	24 Character Label (Bright Underline)		Title of the SMO assigned to the corresponding location and that SMO is the Primary SMO.
	24 Character Label (Reverse Video)		Title of the SMO assigned to the corresponding location if the SMO has failed.
	(Blank)		No SMO is assigned to the corresponding location.
2	DTC SMO Title	NO	
	24 Character Label		Title of each SMO load module that is resident on the DTC.
	(Blank)		All SMO titles resident on the DTC have been displayed.

Figure 1-24 (Sheet 1 of 2)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
3	Version/Revision Identifier	NO	
	6 Character Label		SMO version/revision identifier.
	(Blank)		All SMO version/revision identifiers have been displayed.
4	SMO Menu No.	YES	
	nn		Number associated with the SMO that is assigned to the corresponding location and either loading of that SMO has not completed or the other two assigned SMOs are not compatible. Displayed as an integer with a leading blank.
	nn (Reverse Video)		Number associated with the SMO that is assigned to the corresponding location and that SMO is not compatible with another assigned SMO.
	(Blank)		Displayed prior to a command to load a SMO at the corresponding location and after successful or unsuccessful completion of the SMO load.

Figure 1-24 (Sheet 2 of 2)

FCP Termination Display (CF-67)



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WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	UTC	YES	
	hh:mm:ss		Time of day (UTC) displayed in hours, minutes and seconds with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
2	Initial Latitude	YES	
	sdd^{o}mm.mmm		Initial aircraft latitude. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. s is N when latitude is positive and S when latitude is negative.
3	Initial Longitude	YES	
	sddd^{o}mm.mmm		Initial aircraft longitude. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. s is E when longitude is positive and W when longitude is negative.
4	Initial Altitude	YES	
	nnnn0 or –nnn0		Initial aircraft altitude above mean sea level. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the altitude is below sea level.

Figure 1-25 (Sheet 1 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
5	Initial Destination No.	NO	
	nn		Initial destination number when the destination is pre-planned. Displayed with a leading blank.
	_+		The radar or EVS sighting point, or a fixpoint or offset aimpoint is the current destination.
6	Initial Destination Lat	NO	
	sdd °mm.mmm		Initial destination latitude. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. s is N when latitude is positive and S when latitude is negative.
7	Initial Destination Long	NO	
	sddd°mm.mmm		Initial destination longitude. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. s is E when longitude is positive and W when longitude is negative.
8	Initial Destination Alt	NO	
	nnnn0 or –nnn0		Initial aircraft altitude above mean sea level. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the altitude is below sea level.
9	Planned Time-of-Arrival (PTA)	YES	
	hh:mm:ss		Planned time-of-arrival reference time (PTA at destination identified in PTA Destination display). Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
10	PTA Destination	YES	
	nn		Number of the destination to be reached at the PTA shown in PTA display.
11	Current Month	YES	
	nn		Current month displayed with a leading blank.
12	Current Day	YES	
	nn		Current day displayed with a leading blank.
13	Current Year	YES	
	nn		Current year displayed with a leading zero.
14	Clearance Plane Altitude	YES	
	nnnn		Clearance Plane Altitude (CPA) displayed in feet.

Figure 1-25 (Sheet 2 of 5)

FCP Termination Display (CF-67) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
15	DTC Label	NO	
	16 Character Label		DTC label.
	CARTRIDGE ABSENT		DTR indicates that no cartridge is installed.
	(Blank)		Communication with the DTC is not possible.
16	FMS File Date	NO	
	mm/dd/yy		Date that last FMS read-only file was written to the associated DTC. Displayed as month/day/year with leading blanks in the month and day fields and a leading zero in the year field.
17	Tail Year No.	YES	
	nn		Year of aircraft manufacture (tail year number).
18	Tail Unit No.	YES	
	nnnn		Aircraft unit number displayed with leading zeros.
19	Bull’s Eye Bearing Reference	YES	
	M		M is displayed when the bearing is a Magnetic Bearing.
	T		T is displayed when the bearing is a True Bearing.
20	Bull’s Eye Lat	YES	
	sdd°mm.mmm		Latitude of associated Bull’s Eye. Displayed in degrees, minutes and thousandths of minutes with a leading blank following s and leading zeros in the minutes field. The s is N when latitude is north and S when latitude is south.
21	Bull’s Eye Long	YES	
	sddd°mm.mmm		Longitude of associated Bull’s Eye. Displayed in degrees, minutes and thousandths of minutes with leading blanks following s and leading zeros in the minutes field. The s is E when longitude is east and W when longitude is west.

Figure 1-25 (Sheet 3 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
22	INU Status	NO	
	OFF		There is no communication with the associated INU.
	AIR ALIGN		The INU is currently operating in attitude mode and/or performing course leveling.
	CHK DATA		A FLY–TO command has not been entered.
	DECLASS (Blinking Video)		Power removal from the associated INU has been commanded and declassification is in progress.
	DECLASS		Power has been removed from the associated INU after successful declassification.
	DECLASS (Reverse Video)		Declassification of the associated INU was unsuccessful and the INU is no longer communicating.
	STANDBY		The associated INU is powered, but an alignment mode has not been commanded.
	EGC		An Enhanced Gyrocompass (EGC) ground align has been commanded, but has not completed.
	READY		EGC or Enhanced Interrupted Alignment (EIA) has been commanded and has completed.
	NARF		The INU entered Nav mode, detected no motion and is obtaining additional ground alignment in Navigation Alignment Refining (NARF) mode.
	EIA		EIA ground align has been commanded, but has not completed.
	GPS-NAV		The INU is navigating and is being aided with GPS data.
	DPLR-NAV		The INU is navigating and is being aided with Doppler data.
	NAV		The INU is navigating without velocity aiding.
23	Alignment Time Remaining	NO	
	mm:ss		Time remaining in alignment or time in NARF for the associated INU. Displayed in minutes and seconds with a leading blank in the minutes field and leading zeros in the seconds field and limited to 99:59.
	00:00		EGC or EIA alignment is complete.
	(Blank)		Communication with the associated INU is not successful or no ground alignment has been performed.

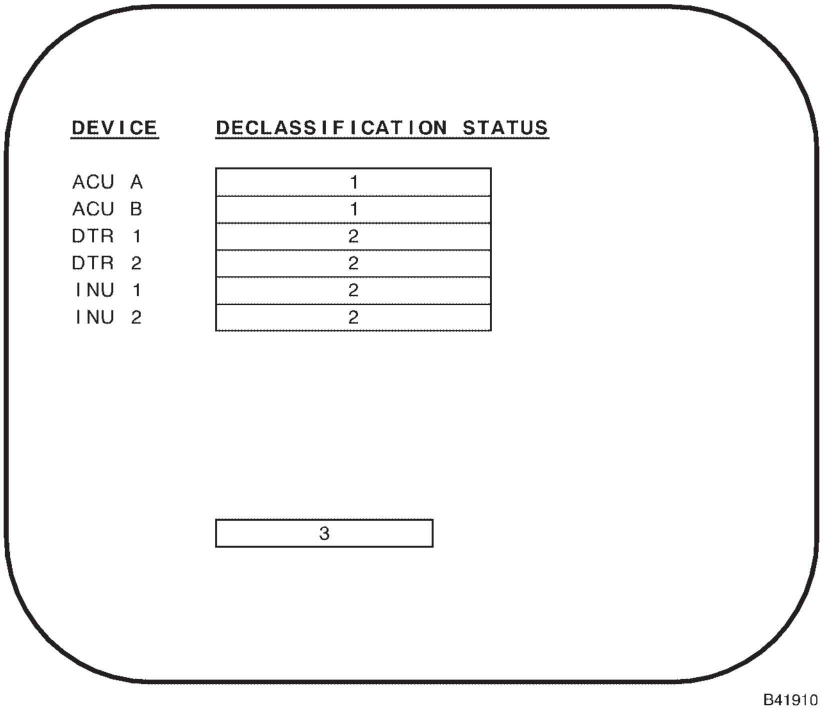
Figure 1-25 (Sheet 4 of 5)

FCP Termination Display (CF-67) (Cont)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
24	Ground Alignment Status	NO	
	INIT		An EGC ground alignment has been commanded and the INU is in the initial state.
	ATT		An EGC ground alignment has been performed such that the INU can support attitude mode.
	ATT+HDG		An EGC ground alignment has been performed such that the INU can support attitude and heading in the attitude mode.
	n.n NM/HR		An EGC or EIA ground alignment has been performed and the INU can support identified performance (this value is estimated performance based upon time and not guaranteed).
	(Blank)		Communication with the associated INU is not successful or no ground alignment was performed.
25	GPS Status	NO	
	OFF		Communication has not been established with the GPS.
	DATA		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation use.
	DATA (Bright Underlined Video)		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation and inertial navigation use.
	DATA (Reverse Video)		Communication has been established with the GPS and the status received indicates that the GPS data is not valid for alternate navigation or inertial navigation use.
	NO GO (Reverse Video)		Communication has been established with the GPS previously, but communication is not currently possible.
26	Fault Recording Percent of NVM	NO	
	nnn		Percent of NVM reserved for fault recording that is used.
27	Logoff Status	NO	
	LOGOFF IN PROG		Displayed from the time that the classified data erase prompt is answered until logoff is complete.
	LOGOFF COMPLETE		Displayed after logoff is complete.
	(Blank)		Displayed prior to the time that the classified data erase prompt is answered. The classified data erase prompt is issued when a CF-67 command is entered.

Figure 1-25 (Sheet 5 of 5)

Declassification Status Display



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	ACU Declassification Status	NO	
	DECLASS IN PROGRESS		Declassification of permanent memory in the corresponding ACU is in progress.
	DECLASS COMPLETE		Declassification of permanent memory in the corresponding ACU has been successfully completed.
	DECLASS UNKNOWN (Blinking Video)		Declassification of permanent memory in the corresponding ACU is not known.
	DECLASS FAILED (Reverse Video)		Declassification of permanent memory in the corresponding ACU has failed.

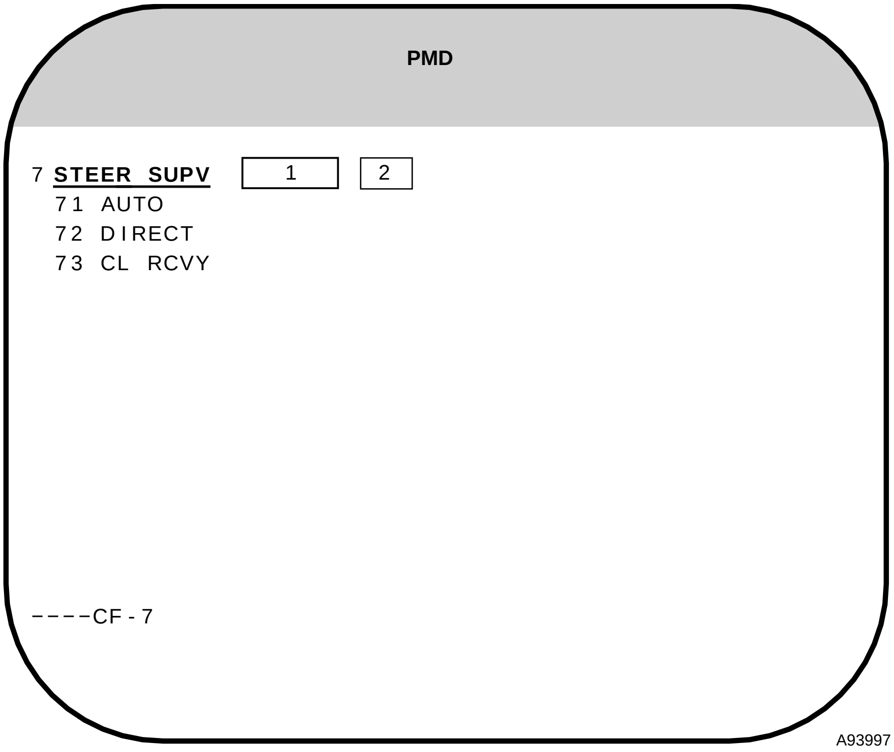
Figure 1-26 (Sheet 1 of 2)

Declassification Status Display (Cont)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
2	Device Declassification Status	NO	
	DECLASS IN PROGRESS		Declassification of the corresponding device is in progress.
	DECLASS COMPLETE		Declassification of the corresponding device has been successfully completed.
	DECLASS UNKNOWN (Blinking Video)		Declassification of the corresponding device is unknown.
	DECLASS FAILED (Reverse Video)		Declassification of the corresponding devise has failed.
3	Logoff Status	NO	
	LOGOFF IN PROG		Displayed from the time that the classified data erase prompt is answered until logoff is complete.
	LOGOFF COMPLETE		Displayed after logoff is complete.
	(Blank)		Displayed prior to the time that the classified data erase prompt is answered. The classified data erase prompt is issued when a CF-67 command is entered.

Figure 1-26 (Sheet 2 of 2)

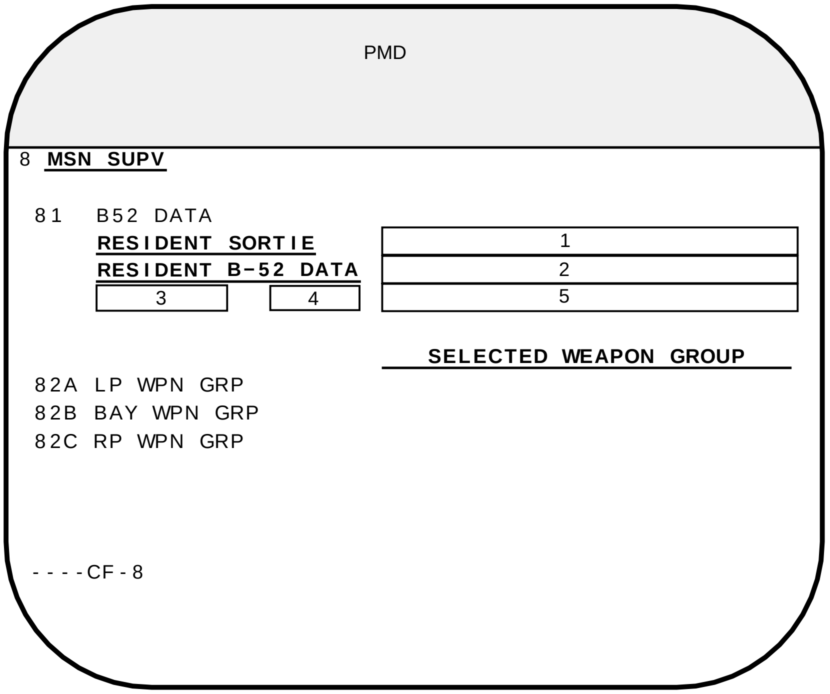
Steering Supervision Menu (CF-7)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Steering Mode	NO	
	DIRECT		The steering mode is direct.
	CL RCVY		The steering mode is centerline recovery.
2	Manual Mode	NO	
	:M		The steering mode has been manually selected.
	(Blank)		The steering mode has been automatically selected.

Figure 1-27

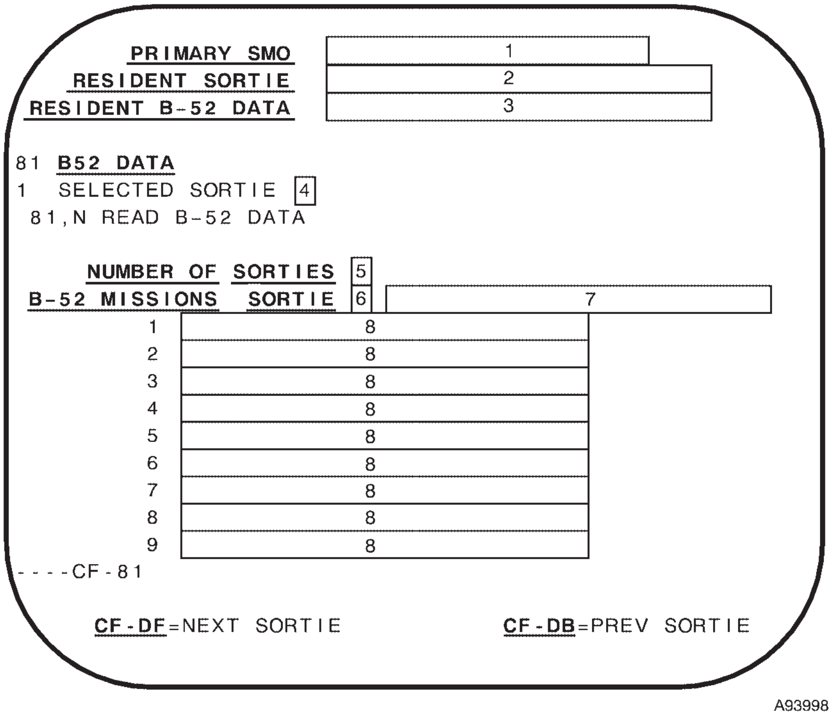
Mission Supervision Menu (CF-8)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Sortie Title	NO	
	28 Characters		Title of the sortie from which the ACU resident mission was loaded.
	(Blank)		No mission is loaded into the ACU or mission data load is in progress.
2	Mission Title	NO	
	28 Characters		Title of the resident mission when a mission is loaded into the ACU.
	(Blank)		No mission is loaded into the ACU or mission data load is in progress.
3	Data Pump Load Indicator	NO	For operational test use only.
	DATA PUMP (Bright Underlined Video)		Displayed when data pump tables have been loaded.
	(Blank)		Displayed when data pump tables have not been loaded.
4	Data Pump Version No.	NO	For operational test use only.
	6 Characters		Data pump version number displayed when data pump tables have been loaded.
	(Blank)		Displayed when data pump tables have not been loaded.
5	Data Pump File Label	NO	For operational test use only.
	28 Characters		Data pump file label displayed when data pump tables have been loaded.
	(Blank)		Displayed when data pump tables have not been loaded

Figure 1-28

B-52 Mission Data Load Display (CF-81)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Primary SMO Title	NO	
	24 Character Label		Primary SMO title.
2	Sortie Title	NO	
	28 Character Label		Title of the sortie from which the ACU resident mission was loaded.
	(Blank)		No mission is loaded into the ACU or mission data load is in progress.
3	Mission Title	NO	
	28 Character Label		Title of the mission loaded into the ACU.
	(Blank)		No mission is loaded into the ACU or mission data load is in progress.
4	Sortie No. Select	YES	
	n		Selected sortie number (1 - 8).

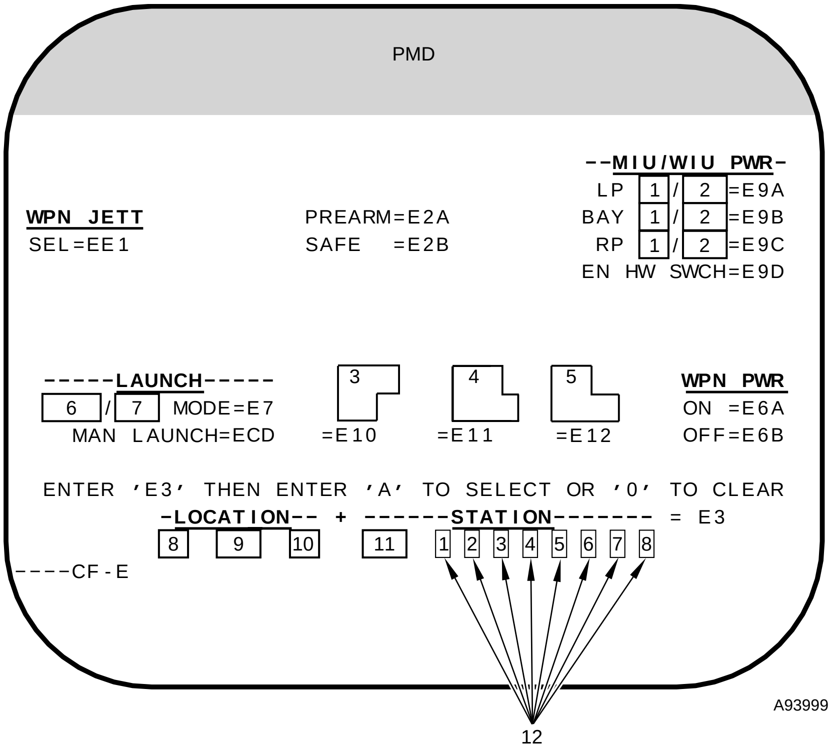
Figure 1-29 (Sheet 1 of 2)

B-52 Mission Data Load Display (CF-81) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
5	DTC Sortie Count	NO	
	0		No DTC is installed or no sorties are resident on the DTC.
	n		Number of sorties resident on the DTC that is installed.
6	Selected Sortie No.	NO	
	n		Selected sortie number (1 - 8).
7	Selected Sortie Title	NO	
	28 Character Label		Title of selected sortie on the DTC.
	(Blank)		No DTC is available.
8	DTC Mission Title	NO	
	28 Character Label		Title of each mission data file resident in the DTC for the selected sortie.
	(Blank)		No DTC is available.

Figure 1-29 (Sheet 2 of 2)

WCP/PCP Backup Display (CF-E)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	MIU Power Status	NO	
	ON (Bright Underlined Video)		MIU power is on.
	ON		MIU power is off.
2	MIU Power Status	NO	
	OFF (Bright Underlined Video)		MIU power is off.
	OFF		MIU power is on.
3	Launcher Rotation Status	NO	
	LCHR ROT (Bright Underlined Video)		Launcher is rotating.
	LCHR ROT		Launcher is not rotating.
4	Master Fault Status	NO	
	MSTR FAULT (Bright Underlined Video)		A MASTER FAULT is displayed.
	MSTR FAULT		A MASTER FAULT is not displayed.

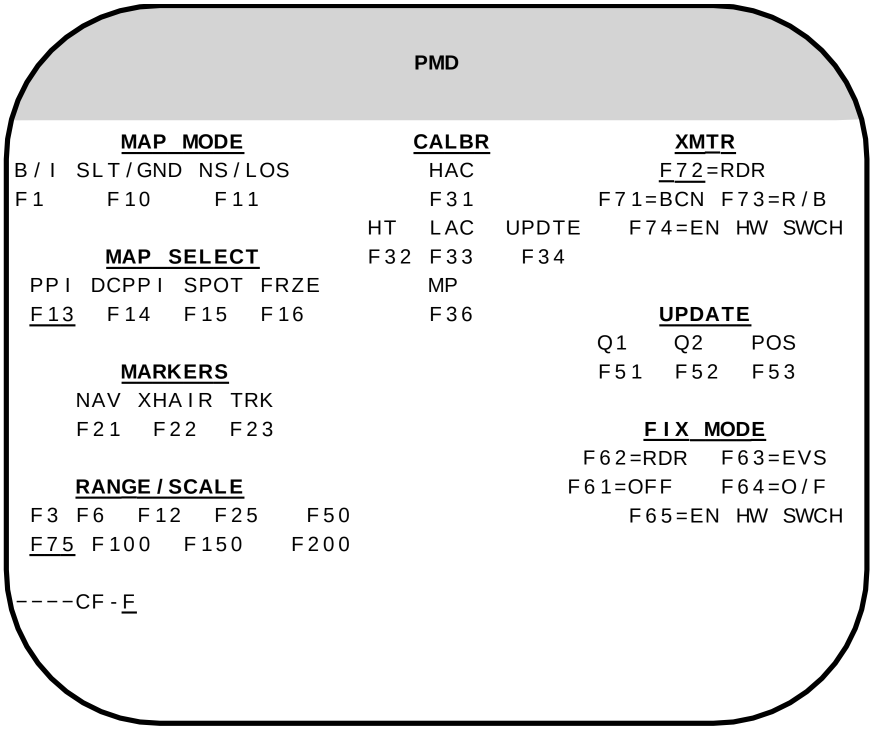
Figure 1-30 (Sheet 1 of 2)

WCP/PCP Backup Display (CF-E) (Cont)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
5	Nuclear Caution Status	NO	
	NUC CAUTN (Bright Underlined Video)		A NUCLEAR CAUTION is displayed.
	NUC CAUTN		A NUCLEAR CAUTION is not displayed.
6	AUTO Launch Mode Status	NO	
	AUTO (Bright Underlined Video)		Launch mode is automatic.
	AUTO		Launch mode is manual.
7	MAN Launch Mode Status	NO	
	MAN (Bright Underlined Video)		Launch mode is manual.
	MAN		Launch mode is automatic.
8	Location Identifier	NO	
	LP (Bright Underlined Video)		Left pylon is selected.
	LP		Left pylon is not selected.
9	Location Identifier	NO	
	BAY (Bright Underlined Video)		Bay location is selected.
	BAY		Bay location is not selected.
10	Location Identifier	NO	
	RP (Bright Underlined Video)		Right pylon is selected.
	RP		Right pylon is not selected.
11	Station Identifier	NO	
	ALL (Bright Underlined Video)		ALL station switch is selected.
	ALL		ALL station switch is not selected.
12	Station Identifier	NO	
	Station Number 1 Thru 8 (Bright Underlined)		Station is selected.
	Station Number 1 Thru 8		Station is not selected.

Figure 1-30 (Sheet 2 of 2)

RNMP Backup Display (CF-F)



CF F RNMP BACKUP DISPLAY

NOTE

- The active mode or switch position will be underlined.
- When selecting BCN, RDR, or RDR/BCN the XMTR mode selector switch must be set to the appropriate position when commanding CF-F71, CF-F72, or CF-F73 due to the mechanization of the OAS.
- To ensure normal operation of the XMTR and FIX MODE functions of the RNMP, command CF-F74 and CF-F65 prior to exiting CF-F.

Figure 1-31

FORMATS (FRMT)

Format (FRMT) displays are used to display a variety of data that is used by FMS. The Format Menu (figure 1-32) gives a list of Format Displays available to the operator upon loading the FMS, and may be displayed on any of the MFD by entering a FRMT command. See figure 1-33 through 1-41 for examples of format displays.

Formats display radar, EVS, FMS data, and weapon status and inventory for each loaded SMO. Formats are commanded using the FRMT key with the designator for the desired display. FRMT ENTER provides a menu of all available formats for quick reference. Selection of FRMT-n (n = 1-5) will display either radar video (n = 1 or 2) or EVS video (n = 3 thru 5) and the associated data group for the prime nav model (PMD when n = 2, 4, 5). Selection of FRMT-n, x (n = 2, 4, 5; x = 1, 2, or 3) will display either radar or EVS video (n) and PMD for INU 1 (x = 1), INU 2 (x = 2), or the ALTER nav model (x = 3). Selection of FRMT +, provided FRMT-1, 2 or 5 is currently displayed, will change the azimuth and range lines in the left data column of the FRMT display to latitude and longitude readout of either the radar or EVS crosshair position. The readout will update if the crosshair is moved. A FRMT + command to any display other than FRMT-1, 2 or 5 will not be accepted by the OAS.

FRMT-1, FRMT-2 and FRMT-5 display range and bearing from a reference point, referred to as a Bull’s Eye. The coordinates of the reference points can be input through CF-61. The Bull’s Eye to be used as the reference point on FRMT-1, FRMT-2 or FRMT-5 can be selected as follows:

1. Enter MDFY-BE to copy the line containing the Bull’s Eye number to the bottom of the MFD for modification.

The information contained on the specified line will be copied to the command row of the MFD with the cursor under the Bull’s Eye number as: BE $\underline{n}$ (n = 1 or 2).

2. Insert the desired Bull’s Eye number (1 or 2) using the IKB.
3. Press the ENTER key.

RADAR DISPLAYS

The operator may bring up a radar display on an MFD with the FRMT-1 or FRMT-2 command (figure 1-33). FMS can control how data from the radar is displayed on an MFD through inputs from the RNMP and IKB.

EVS DISPLAYS

FMS allows the operator to display screens on any of the MFD with data from the Electro-Optical Viewing System (EVS). The operator may bring up an EVS display with, FRMT-3, FRMT-4 or FRMT-5 commands. Figure 1-34 shows the EVS display. Figure 1-35 shows the EVS display with data added as a result of selecting FRMT-4 or FRMT-5. See T.O. 1B-52H-1 for a description of EVS.

PRIME MISSION EQUIPMENT (PME) STATUS DISPLAY

Prime mission equipment fault status is displayed in response to a FRMT-6 command or a FRMT-6,n command where n specifies the source of the navigation data to be displayed in the PMD area. (1=INU1, 2=INU2,3=Alt Nav). Faults are recorded on the DTC and in non-volatile memory in each ACU. The fault is only recorded on the first occurrence at the time the status changes from go to no-go. Recorded fault data includes subsystem equipment identification, fault status data, and time of failure. Fault status data can be retrieved from processor memory and displayed with a FRMT-6 command. Hardware, data bus, and fibre channel faults are displayed. A reverse highlighted X in the FLT column indicates a current hardware fault. A reverse highlighted letter in the BUS or FC column indicates a current bus or fibre channel fault in the corresponding channel. When a fault is corrected or transient, the indication is a normal X or letter. A CF-66 command clears all corrected and transient faults and is always valid.

WEAPONS STATUS AND INVENTORY DISPLAYS

FRMT-7, FRMT-7A, 7B, 7C, and FRMT-77 display weapon status and inventory to the operator.

FRMT-7, Primary Weapon Data, is weapon specific and will not appear on the FRMT menu until a SMO is loaded. Refer to the applicable Aircrew Weapon Delivery T.O. for description of this format.

FRMT-7A, 7B, 7C are weapon specific and appear on the FRMT menu, but are not selectable, until a SMO is loaded. The title of the loaded SMO associated with each station will follow the 7A, 7B, and 7C commands on the FRMT menu display. FRMT-7A, FRMT-7B, and FRMT-7C commands request the Weapon Status from each SMO operating in the ACU for the left pylon, bay, and right pylon respectively. Refer to the applicable Aircrew Weapon Delivery T.O. for the description of these formats.

Operator entry of FRMT-77 displays The Stores Inventory Summary Display. The Stores Inventory Summary Display provides generic store/weapon information for all locations. All data on this display is controlled by the CSP. None of the fields displayed by the CSP are modifiable.

EMERGENCY DATA DISPLAY

With the FRMT-8 menu displayed (figure 1-38), the operator may enter emergency values by entering MDFY and the number that correlates with the data the operator wishes to change. Except for frame count, the value will indicate current value with C, or emergency values with E. Emergency values are reverse highlighted on the PMD display for navigation.

FIXPOINT DATA DISPLAY

With the FRMT-9 and FRMT-9,nn displayed, the operator can review and revise fix point information. Figure 1-39 shows FRMT-9 and FRMT-9,nn displays.

The next set of seven fixpoints can be requested for display by entering a CF-DF command. The previous set of seven fixpoints can be requested for display by entering a CF-DB command. They are valid for selecting the next or previous set of fixpoint data only when FRMT-9 is presented on an MFD and that MFD is the selected MFD at the station where the command is entered.

DESTINATION AND OFFSET DATA DISPLAYS

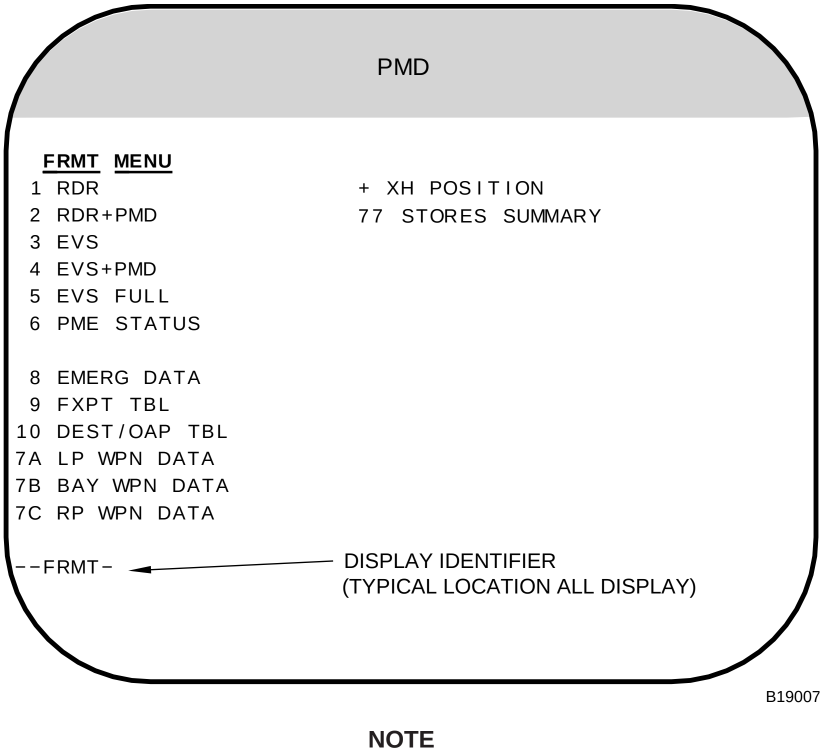
The FRMT-10 and FRMT-10,nn (figure 1-40) displays provide information on the destinations loaded in the current mission data. The operator can modify the coordinates, elevation, turn short/overfly (course transition mode), and Planned Time of Arrival (PTA), for a destination as well as the coordinates and elevation for any OAP associated with a destination.

The next two destinations can be requested for display by entering a CF-DF command. The previous two destinations can be requested for display by entering a CF-DB command. They are valid for selecting the next or previous set of destination data only when FRMT-10 is presented on an MFD and that MFD is the selected MFD at the station where the command is entered.

RADAR SCAN CONVERTER BUILT-IN-TEST

Figure 1-41 shows the radar scan converter built-in test display, FRMT-D

Format Menu (FRMT)

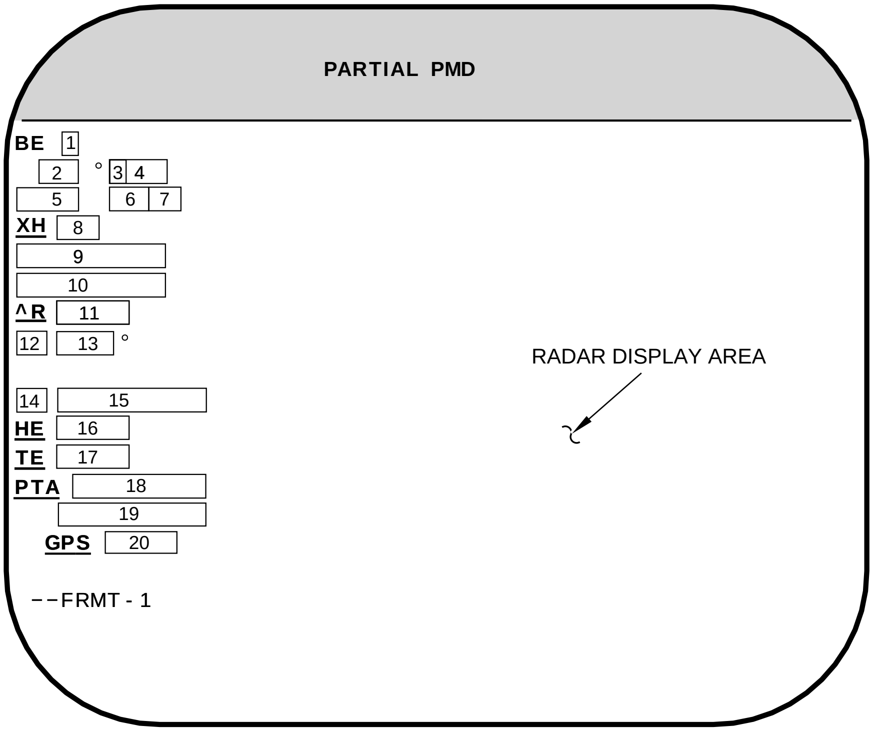


NOTE

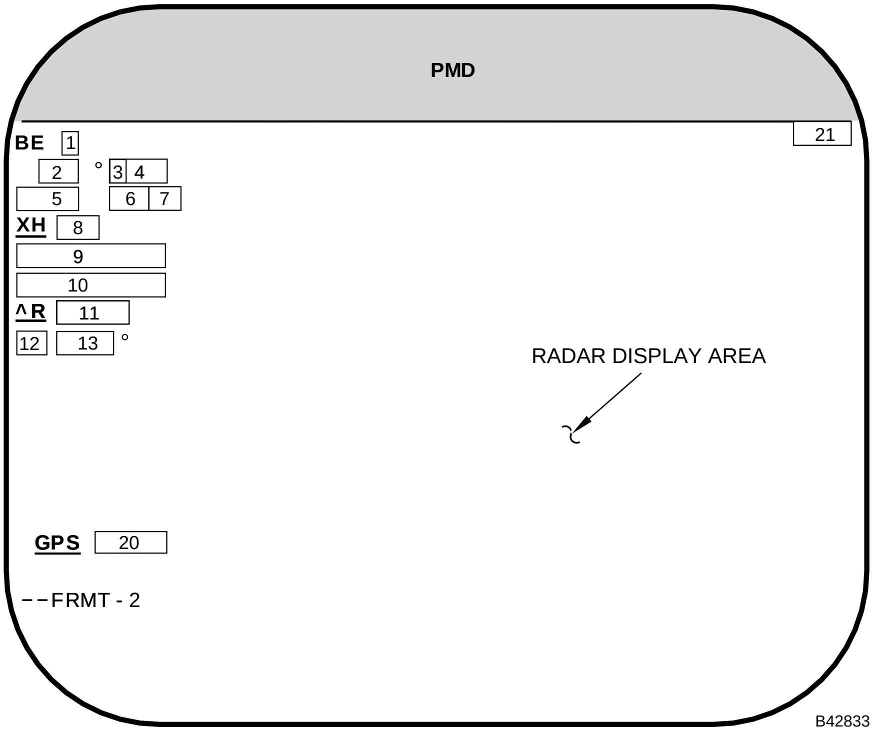
FRMT-7 (Primary Weapon Data) will not appear as a menu item, until a SMO is loaded.

Figure 1-32

Radar Display (FRMT-1 & FRMT-2)



FRMT-1



FRMT-2

Figure 1-33 (Sheet 1 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Bull's Eye No.	YES	
	n		Selected Bull's Eye number.
2	Bull's Eye Bearing	NO	
	nnn		Bearing from selected Bull's Eye to the aircraft relative to magnetic north (M selected) or true north (T selected). Displayed in degrees from 0 to 359 with leading blanks. The magnetic variation at the Bull's Eye is used to calculate magnetic bearings.
	nnn (Reverse Video)		No magnetic variation data is available when "M" is selected.
3	Bull's Eye Bearing Reference	NO	
	M		M is displayed when the bearing is a Magnetic Bearing.
	T		T is displayed when the bearing is a True Bearing.
4	Bull's Eye Range	NO	
	nnn		Range from selected Bull's Eye to the aircraft. Displayed with leading blanks and limited to 999 NM.
5	GPI Type Mnemonic	NO	
	4 Characters		Ground Position Indicator (GPI) type mnemonic provided by carrier mission data when the GPI for the Radar is a preplanned GPI, or a GPI type mnemonic provided by the GPI data source when the GPI is created by a SMO.
	FXPT		GPI type mnemonic when the GPI is a forward site point created by the FMS.
	DEST		GPI type mnemonic when the GPI is a destination created by the FMS.
6	GPI Identifier	NO	
	nnn		Number of the GPI selected for the Radar when a preplanned GPI is selected.
	(Blank)		GPI identifier when forward sight is selected.
	_+_		GPI identifier when forward sight is not selected and the GPI for the associated sensor is not preplanned.
7	GPI Manual Select	NO	
	:M		The GPI has been manually selected.
	(Blank)		The GPI has been automatically selected.

Figure 1-33 (Sheet 2 of 5)

Radar Display (FRMT-1 & FRMT-2) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
8	Radar Orientation	NO	
	NS		The radar map orientation is north stabilized.
	LOS		The radar map orientation is line-of-sight.
9	Fiducial Mark/ Crosshair Azimuth	NO	
	AZ nnn.n° (AZ Bright Underlined Video)		Azimuth label and radar crosshair azimuth when radar orientation is north stabilized. Displayed in degrees from 0 to 359.9 with leading blanks preceding the numeric value.
	AZ annn.n° (AZ Bright Underlined Video)		Azimuth label and radar crosshair bearing when radar orientation is line-of-sight. The a is L when the crosshair position is to the left of aircraft track and R when the crosshair position is to the right of aircraft track. Displayed in degrees from L180.0 to R180.0 with leading blanks following the direction indicator.
	a dd° mm.mm		Latitude of the point identified by the radar crosshair. Displayed in degrees, minutes and hundredths of minutes with leading blanks following an a and leading zeros in the minutes field when FRMT+ is commanded for the associated sensor. The a is N when latitude is North and S when latitude is South.
10	Fiducial Mark/ Crosshair Range	NO	
	RS nnnn.n (RS Bright Underlined Video)		Range label and radar crosshair slant range when radar map slant range is selected. Displayed in nautical miles and tenths of nautical miles with leading blanks preceding the numeric value and limited to 9999.9.
	RG nnnn.n (RG Bright Underlined Video)		Range label and radar crosshair ground range when radar map ground range is selected. Displayed in nautical miles and tenths of nautical miles with leading blanks preceding the numeric value and limited to 9999.9.
	addd° mm.mm		Longitude of the point designated by the radar crosshair. Displayed in degrees, minutes and hundredths of minutes with leading blanks following a and leading zeros in the minutes field when FRMT+ is commanded for the associated sensor. The a is E when longitude is East and W when longitude is West.
11	Adjustment Distance	NO	
	nn.nn		Radar sighting point position adjustment (buffer) distance displayed in nautical miles and hundredths of a nautical mile with leading zeroes and limited to 99.99.
12	Radar Orientation	NO	
	TB (Bright Underlined Video)		The radar map orientation is north stabilized.
	RB (Bright Underlined Video)		The radar map orientation is line-of-sight.

Figure 1-33 (Sheet 3 of 5)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
13	Adjustment Direction	NO	
	_nnn		Radar sighting point position adjustment (buffer) direction when the radar map orientation is north stabilized. Displayed in degrees from 0 to 359 with leading blanks.
	annn		Radar sighting point position adjustment (buffer) direction when the radar map orientation is line-of-sight. The a is L when the sighting point position adjustment direction is to the left of aircraft track and R when the sighting point position adjustment direction is to the right of aircraft track. Displayed in degrees from L180 to R179 with leading blanks following the direction indicator.
14	Current Destination Number	NO	
	nn (Normal Underline Video)		Current destination number when the destination is pre-planned. Displayed with a leading blank.
	_+ (Normal Underline Video)		The radar sighting point, or a fixpoint or offset aimpoint is the current destination.
15	Current Destination Mnemonic	NO	
	10 characters		Current destination mnemonic from mission data when the current destination is pre-planned.
	RDR XH (Reverse Video)		Current destination mnemonic when the radar sighting point is the current destination.
	FXPT (Reverse Video)		Current destination mnemonic when a mission data fixpoint is the current destination.
	OAP (Reverse Video)		Current destination mnemonic when a mission data offset aimpoint is the current destination.
16	Heading Error	NO	
	ann.n		Aircraft heading error. Displayed in degrees and tenths of a degree with a leading blank following a. The a is R when a turn to the left is required to steer in the desired direction and L when a turn to the right is required to steer in the desired direction.
17	Track Error	NO	
	ann.n		Distance from current aircraft position to the great circle path from the previous destination to the current destination computed by the prime navigation source. The a is R when the aircraft is to the right of the great circle path and L when the aircraft is to the left. nn.n is the distance in nautical miles and limited to 99.9. Displayed with leading blanks following the direction indicator.

Figure 1-33 (Sheet 4 of 5)

Radar Display (FRMT-1 & FRMT-2) (Cont)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
18	Planned Time of Arrival	NO	
	hh:mm:ss		Planned time of arrival at the current destination when flying to a pre-planned destination. Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
	hh:mm:ss		Estimated time of arrival at the current destination computed by the prime navigation source when flying to a destination other than a pre-planned destination
19	Early/Late Time of Arrival	NO	
	a hh:mm:ss		Early/late time of arrival at the current destination computed by the prime navigation source when flying to a pre-planned destination. Displayed in hours, minutes and seconds with a leading blanks in the hours field and leading zeros in the minutes and seconds fields. The a preceding the hours is E when the destination will be reached at or prior to the planned time and L when the destination will be reached after the planned time.
	E 0:00:00		When flying to any destination other than a pre-planned destination.
20	GPS Status	NO	
	OFF		Communication has not been established with the GPS.
	DATA		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation use.
	DATA (Bright Underlined Video)		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation and inertial navigation use.
	DATA (Reverse Video)		Communication has been established with the GPS and the status received indicates that the GPS data is not valid for alternate navigation or inertial navigation use.
	NO GO (Reverse Video)		Communication has been established with the GPS previously, but communication is not currently possible.
21	Radar Altimeter Altitude	NO	
	nnn0		Radar altimeter altitude rounded to the nearest 10 feet. Displayed when radar altimeter altitude is available and valid.
	(Blank)		Radar altimeter is not providing radar altitude or altitude is invalid.

Figure 1-33 (Sheet 5 of 5)

EVS Display (FRMT-3)

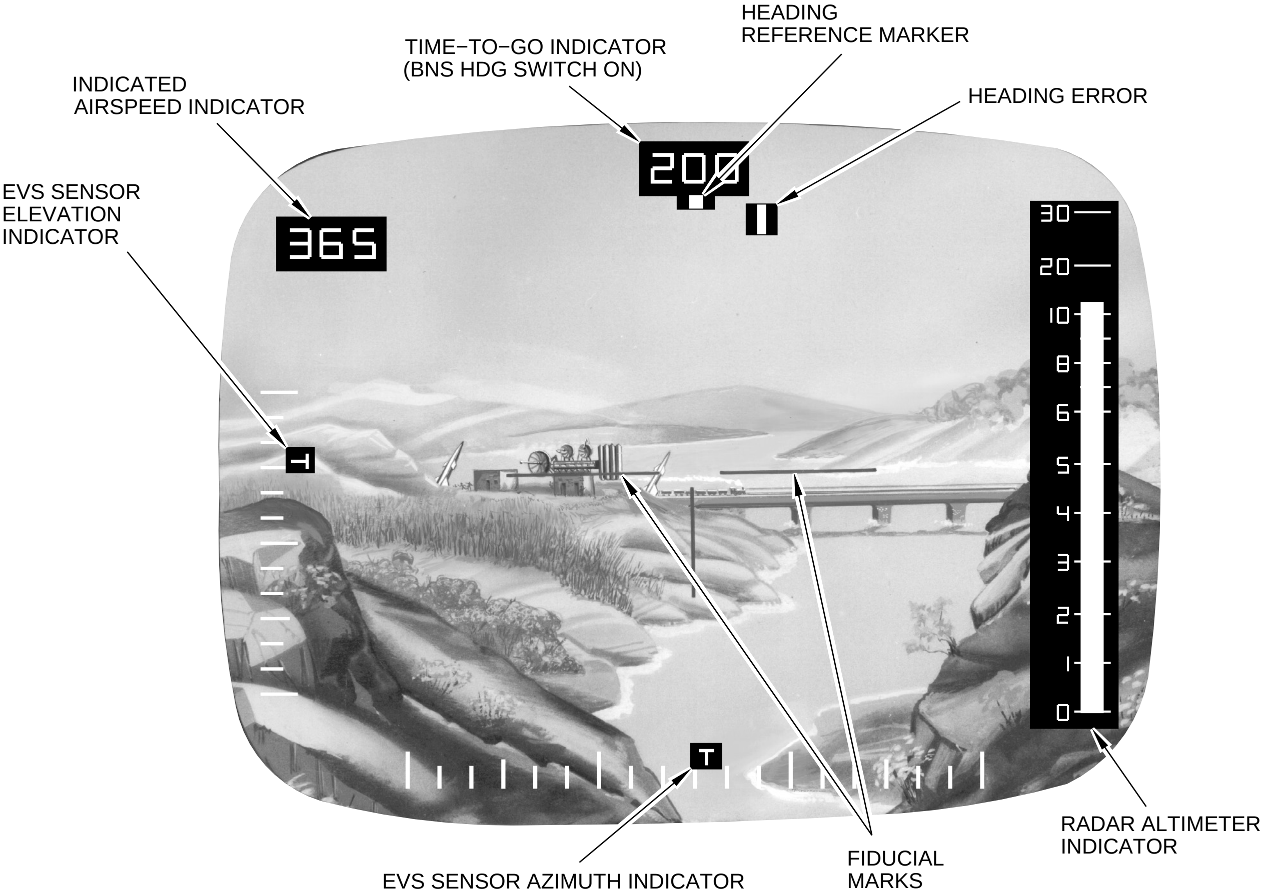


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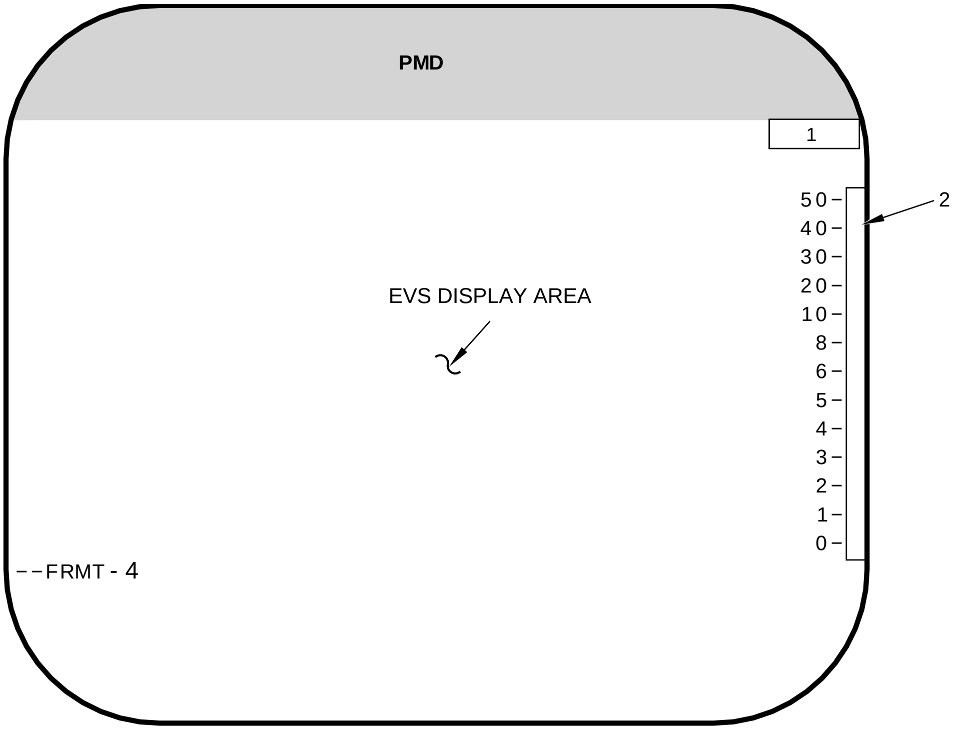
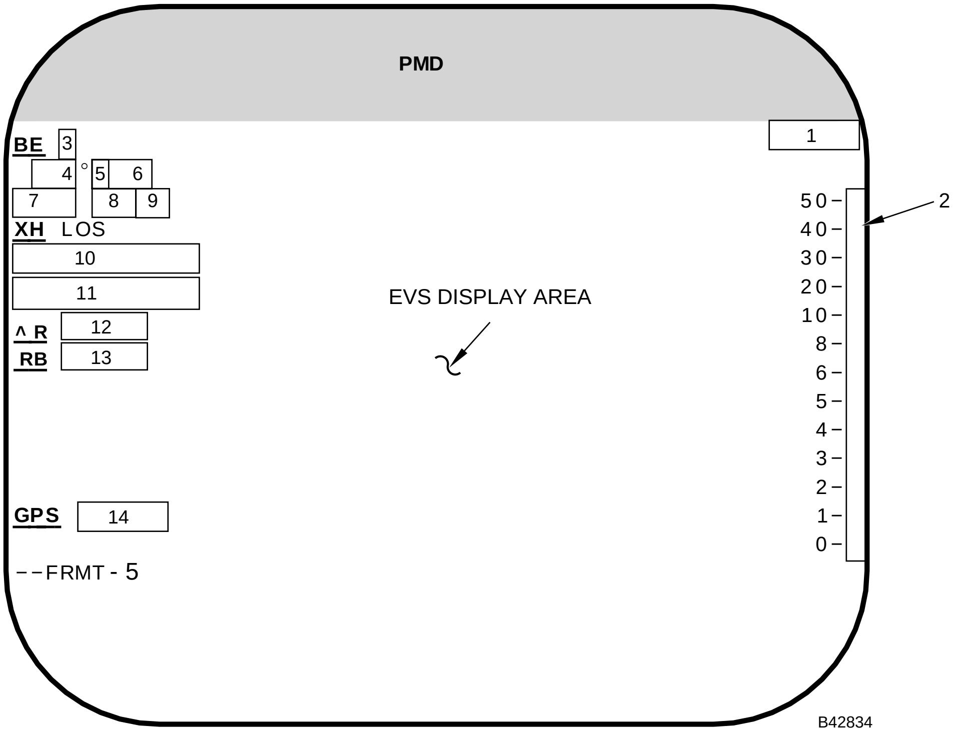
Figure 1-34

EVS Data Display (FRMT-4 & FRMT-5)



FRMT-4



FRMT-5

Figure 1-35 (Sheet 1 of 4)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
1	Radar Altimeter Altitude	NO	
	nnn0		Radar altimeter altitude rounded to the nearest 10 feet. Displayed when radar altimeter altitude is available and valid.
	(Blank)		Radar altimeter is not providing radar altitude or altitude is invalid.
2	Radar Altimeter Ribbon		
	(Vertical Bar)		Radar altimeter ribbon.
	(Blank)		Radar altimeter is not providing radar altitude or altitude is invalid.
3	Bull's Eye No.	YES	
	n		Selected Bull's Eye number.
4	Bull's Eye Bearing	NO	
	nnn		Bearing from selected Bull's Eye to the aircraft relative to magnetic north (M selected) or true north (T selected). Displayed in degrees from 0 to 359 with leading blanks.
	nnn (Reverse Video)		No magnetic variation data is available when M is selected.
5	Bull's Eye Bearing Reference	NO	
	M		M is displayed when the bearing is a Magnetic Bearing.
	T		T is displayed when the bearing is a True Bearing.
6	Bull's Eye Range	NO	
	nnn		Range from selected Bull's Eye to the aircraft. Displayed with leading blanks and limited to 999 NM.
7	GPI Type Mnemonic	NO	
	4 Characters		Ground Position Indicator (GPI) type mnemonic provided by carrier mission data when the GPI for the EVS is a preplanned GPI, or a GPI type mnemonic provided by the GPI data source when the GPI is created by a SMO.
	FXPT		GPI type mnemonic when the GPI is a forward site point created by the FMS.
	DEST		GPI type mnemonic when the GPI is a destination created by the FMS.

Figure 1-35 (Sheet 2 of 4)

EVS Data Display (FRMT-4 & FRMT-5) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
8	GPI Identifier	NO	
	nnn		Number of the GPI selected for the EVS when a preplanned GPI is selected.
	(Blank)		GPI identifier when forward sight is selected.
	_+_		GPI identifier when forward sight is not selected and the GPI for the EVS is not preplanned.
9	GPI Manual Select	NO	
	:M		The GPI has been manually selected.
	(Blank)		The GPI has been automatically selected.
10	Fiducial Mark/ Crosshair Azimuth	NO	
	AZ nnn.n° (AZ Bright Underlined Video)		Azimuth label and EVS fiducial mark azimuth. Displayed in degrees from 0 to 359.9 with leading blanks preceding the numeric value.
	AZ annn.n° (AZ Bright Underlined Video)		Azimuth label and EVS fiducial mark bearing. The a is L when the crosshair position is to the left of aircraft track and R when the crosshair position is to the right of aircraft track. Displayed in degrees from L180.0 to R180.0 with leading blanks following the direction indicator.
	a dd° mm.mm		Latitude of the point identified by the EVS fiducial mark. Displayed in degrees, minutes and hundredths of minutes with leading blanks following an a and leading zeros in the minutes field when FRMT+ is commanded for the associated sensor. The a is N when latitude is North and S when latitude is South.
11	Fiducial Mark/ Crosshair Range	NO	
	RS nnnn.n (RS Bright Underlined Video)		Range label and EVS fiducial mark slant range. Displayed in nautical miles and tenths of nautical miles with leading blanks preceding the numeric value and limited to 9999.9.
	RG nnnn.n (RG Bright Underlined Video)		Range label and EVS fiducial mark ground range. Displayed in nautical miles with leading blanks preceding the numeric value and limited to 9999.9.
	addd° mm.mm		Longitude of the point designated by the EVS fiducial mark. Displayed in degrees, minutes and hundredths of minutes with leading blanks following a and leading zeros in the minutes field when FRMT+ is commanded for the associated sensor. The a is E when longitude is East and W when longitude is West.
12	Adjustment Distance	NO	
	nn.nn		EVS sighting point position adjustment distance displayed in nautical miles and hundredths of a nautical mile with leading zeroes and limited to 99.99.

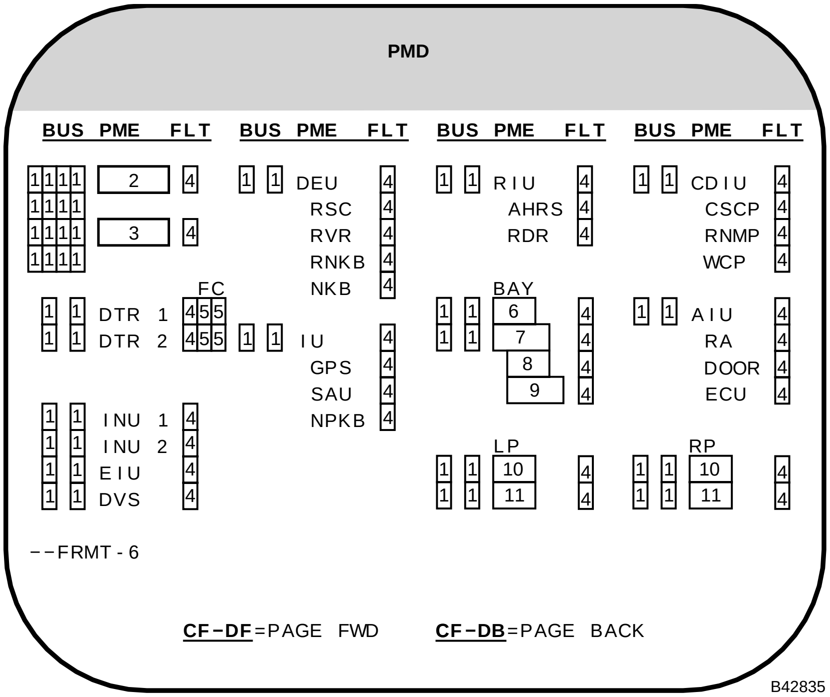
Figure 1-35 (Sheet 3 of 4)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
13	Adjustment Direction	NO	
	annn		EVS sighting point position adjustment direction. a is L when the sighting point position adjustment direction is to the left of aircraft track and R when the sighting point position adjustment direction is to the right of aircraft track. Displayed in degrees from L180 to R179 with leading blanks following the direction indicator.
14	GPS Status	NO	
	OFF		Communication has not been established with the GPS.
	DATA		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation use.
	DATA (Bright Underlined Video)		Communication has been established with the GPS and the status received indicates that the GPS data is valid for alternate navigation and inertial navigation use.
	DATA (Reverse Video)		Communication has been established with the GPS and the status received indicates that the GPS data is not valid for alternate navigation or inertial navigation use.
	NO GO (Reverse Video)		Communication has been established with the GPS previously, but communication is not currently possible.

Figure 1-35 (Sheet 4 of 4)

PME Status Display (FRMT-6)

SCREEN 1



SCREEN 2

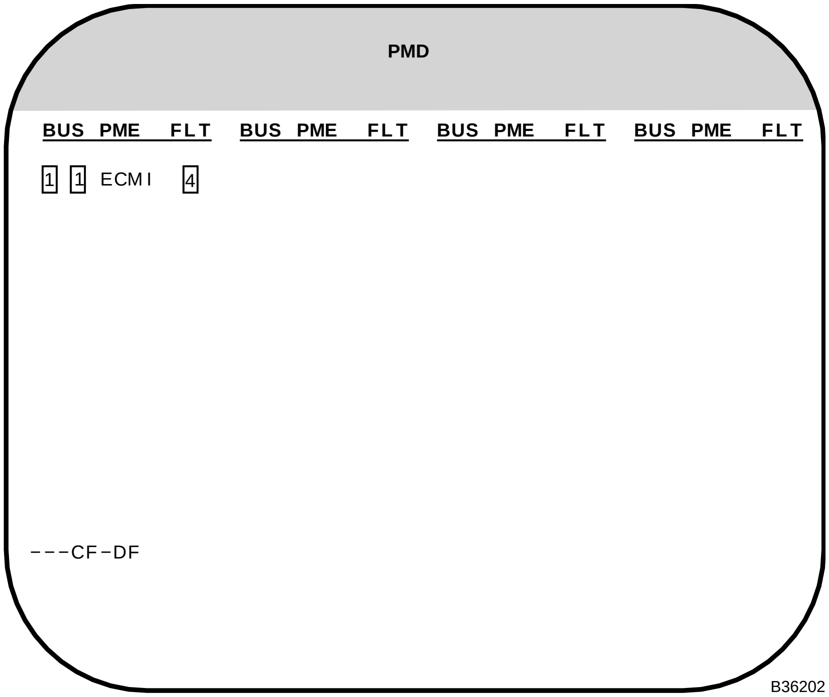


Figure 1-36 (Sheet 1 of 3)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Device Bus Test	NO	
	A, B, C, D, E, F, G or H	NO	The corresponding device has failed bus test as a remote terminal on the indicated bus since the last time faults were cleared (CF-66), but is currently passing bus test on that bus.
	A, B, C, D, E, F, G or H (Reverse Video)		The corresponding device is currently failing bus test as a remote terminal on the indicated bus.
	(Blank)		The corresponding device has not failed bus test as a remote terminal on the associated bus since the last time faults were cleared.
2	ACU A	NO	
	ACU A (Bright Underline Video)		Displayed when ACU A is the primary ACU.
	ACU A		Displayed when ACU A is the secondary ACU.
3	ACU B	NO	
	ACU B (Bright Underline Video)		Displayed when ACU B is the primary ACU.
	ACU B		Displayed when ACU B is the secondary ACU.
4	Device Fault	NO	
	X		The corresponding device has failed since the last time faults were cleared (CF-66), but is currently not faulted.
	X (Reverse Video)		The corresponding device is currently faulted.
	(Blank)		The corresponding device has not failed since the last time faults were cleared.
5	Fibre Channel	NO	
	A or B		Fibre channel communication between the associated DTR and the indicated ACU (A or B) is currently operable, but has been inoperable since the last time faults were cleared (CF-66).
	A or B (Reverse Video)		Fibre channel communication between the associated DTR and the indicated ACU is not operational.
	(Blank)		Fibre channel communication between the associated DTR and the indicated ACU has not failed since the last time faults were cleared.
6	Bay MIU/SLU Assignment	NO	
	MIU		MIU is assigned to the Bay Location. The fault fields apply to the MIU.
	SLU (NUC)		NUC SLU is assigned to the Bay Location. The fault fields apply to the NUC SLU.
	(Blank)		No MIU or Nuc SLU is assigned to the Bay Location.

Figure 1-36 (Sheet 2 of 3)

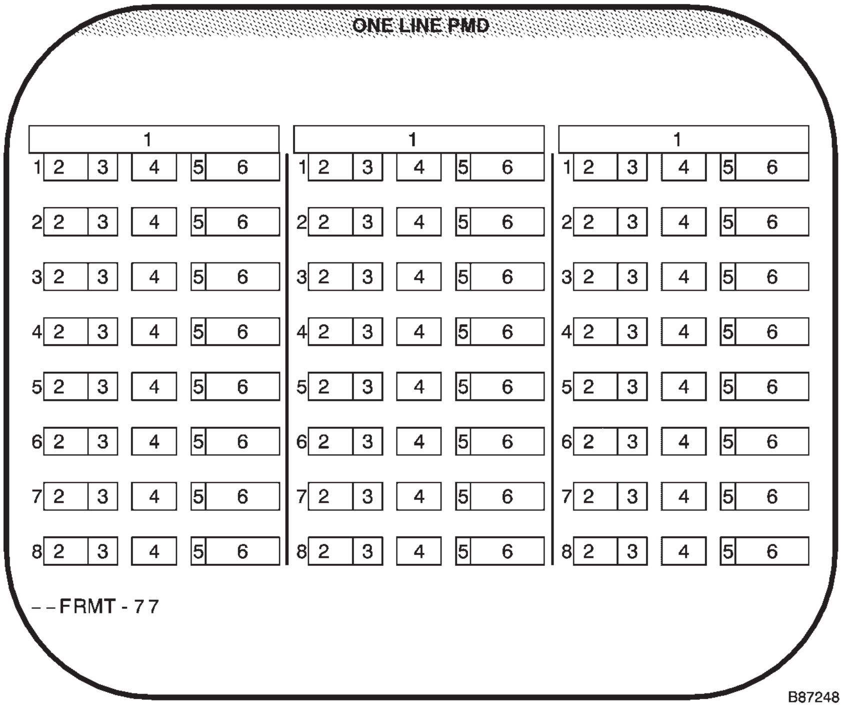
PME Status Display (FRMT-6) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
7	Bay PDUC Assignment	NO	
	PDUC		PDUC is assigned to the Bay Location. The fault fields apply to the PDUC.
	(Blank)		No PDUC is assigned to the Bay Location.
8	Bay PDU Assignment	NO	
	PDU		PDUC/PDU is assigned to the Bay Location. The fault fields apply to the PDU.
	(Blank)		No PDUC/PDU is assigned to the Bay Location.
9	Bay CSRL Assignment	NO	
	CSRL		CSRL is assigned to the Bay Location. The fault fields apply to the CSRL.
	(Blank)		No CSRL is assigned to the Bay Location.
10	MIU/WIU Pylon Assignment	NO	
	MIU		MIU is assigned to the designated Pylon Location. The fault fields apply to the MIU.
	WIU		WIU is assigned to the Pylon Location. The fault fields apply to the WIU.
	(Blank)		No MIU or WIU is assigned to the Pylon Location.
11	WPA Pylon Assignment	NO	
	WPA		WPA is assigned to the Pylon Location. The fault fields apply to the WPA.
	(Blank)		No WPA is assigned to the Pylon Location.

Figure 1-36 (Sheet 3 of 3)

Stores Inventory Summary Display (FRMT-77)

[BSB]



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	SMO Title	NO	
	17 Characters		SMO title assigned to the location (truncated to 17 characters).
	17 Characters (Bright Underlined Video)		Primary SMO title (truncated to 17 characters)
	(Blank)		No SMO assigned to the Location.
2	Weapon Type	NO	
	aa		Weapon type as provided by the loaded aircraft mission data (No SMO loaded at the location or the SMO cannot confirm the actual weapon type).
	aa (Bright Underlined Video)		Weapon type as provided by the loaded aircraft mission data, that the SMO has confirmed does match the actual store type.
	aa (Reverse Video)		Weapon type as provided by the loaded aircraft mission data, that the SMO has confirmed does not match the actual store type.
	(Blank)		Weapon data is not being provided by loaded aircraft mission data or no aircraft mission data is loaded.

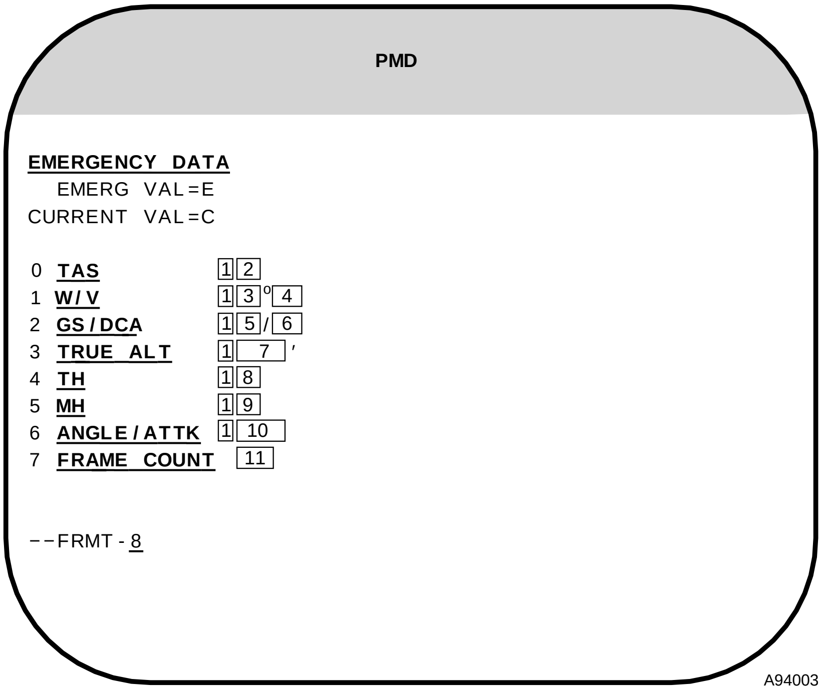
Figure 1-37 (Sheet 1 of 2)

Stores Inventory Summary Display (FRMT-77) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
3	Weapon Status	NO	
	aa		Two-digit weapon status (e.g. ON, OF, CA, AL, GO) as provided by the particular weapon SMO. Refer to the applicable weapon manual for details of display.
	(Blank)		No SMO assigned to the location, or no weapon status has been provided by the SMO.
4	Direct Target/ Launch Point	NO	
	nn or Dn		Launch point number (nn) or direct target number (Dn) assigned as provided by the SMO. Refer to the applicable weapon manual for details of display.
	(Blank)		No SMO assigned to the location, or no direct target or launch point has been provided by the SMO.
5	Time To In-Range	NO	
	mm		Time-to-go to In-Range as provided by the SMO that is 10 minutes or greater (up to 60 minutes). Refer to the applicable weapon manual for details of display.
	m:ss		Time-to-go to In-Range as provided by the SMO, that is less than 10 minutes. And, highlight mode as provided by the SMO. Refer to the applicable weapon manual for details of display.
	(Blank)		No SMO assigned to the location, or no time to In-Range provided by the SMO, or SMO has decided it is not applicable.

Figure 1-37 (Sheet 2 of 2)

Emergency Data Display (FRMT-8)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Data Source	YES	
	C		The corresponding data is computed by the prime navigation source.
	E (Reverse Video)		The corresponding data is emergency data entered by the operator or computed from other emergency data.
2	TAS	YES	
	nnn		Computed true air speed displayed in knots when C is displayed in the corresponding Data Source window. Emergency true air speed when E is displayed in the corresponding Data Source window.
3	Wind Direction	YES	
	nnn		Computed wind direction displayed in degrees from 0 to 359 when C is displayed in the corresponding Data Source window. Emergency wind direction when E is displayed in the corresponding Data Source window.
4	Wind Speed	YES	
	nnn		Computed wind speed displayed in knots when C is displayed in the corresponding Data Source window. Emergency wind speed when E is displayed in the corresponding display Data Source window.

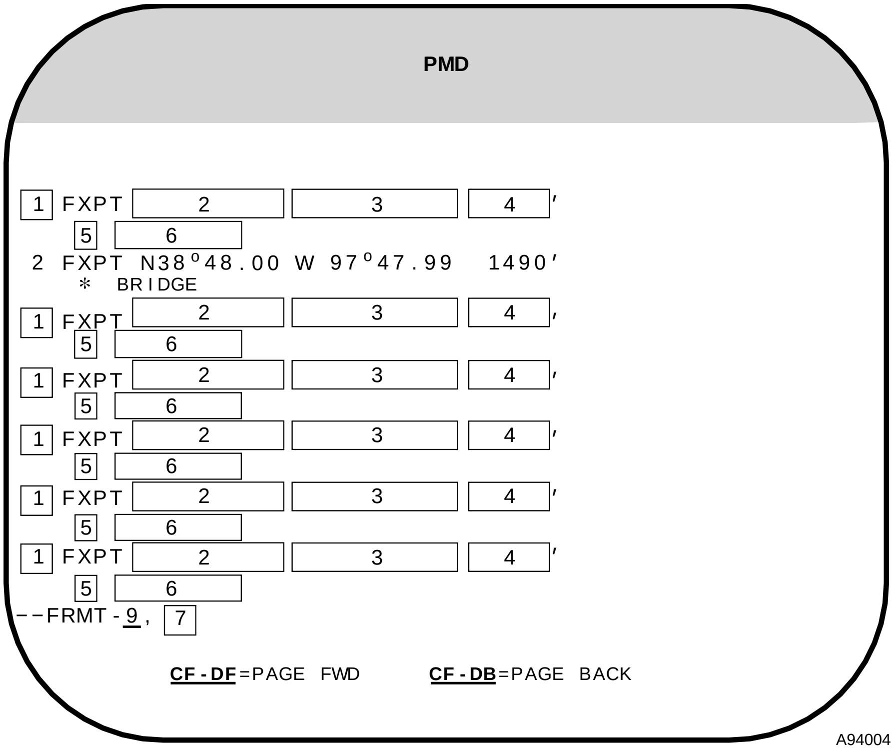
Figure 1-38 (Sheet 1 of 2)

Emergency Data Display (FRMT-8) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
5	Ground Speed	YES	
	nnn		Computed ground speed displayed in knots when C is displayed in the corresponding Data Source window. Emergency ground speed when E is displayed in the corresponding Data Source window.
6	Drift Correction Angle	YES	
	snn		Computed drift correction angle displayed in degrees when C is displayed in the corresponding Data Source window. The s is blank for positive drift correction angles and – for negative drift correction angles. Emergency drift correction angle when E is displayed in the corresponding Data Source window.
7	True Altitude	YES	
	nnnn		Computed true altitude displayed in feet rounded to the nearest 10 feet when C is displayed in the corresponding Data Source window. Emergency true altitude when E is displayed in the corresponding Data Source window.
8	True Heading	YES	
	nnn		Computed true heading displayed in degrees from 0 to 359 when C is displayed in the corresponding Data Source window. Emergency true heading displayed in degrees from 0 to 359 when E is displayed in the corresponding Data Source window.
9	Magnetic Heading	YES	
	nnn		Computed magnetic heading displayed in degrees from 0 to 359 when C is displayed in the corresponding Data Source window. Emergency magnetic heading displayed in degrees from 0 to 359 when E is displayed in the corresponding Data Source window.
10	Angle of Attack	YES	
	ann.n		Computed angle of attack displayed in degrees and tenths of degrees when C is displayed in the corresponding Data Source window. The a is blank for positive angles of attack and – for negative angles of attack. Emergency angle of attack displayed in degrees and tenths of degrees when E is displayed in the corresponding Data Source window. a is blank for positive angles of attack and – for negative angles of attack.
11	Frame Count	YES	
	nnnn		Video recorder frame count. The video recorder frame count is recorded on each frame of film.

Figure 1-38 (Sheet 2 of 2)

Fixpoint Data Display (FRMT-9 & FRMT-9nn)



NOTE

- Line 2 shows a typical example of fixpoint data
- FRMT-9 ENTER will command display of fixpoints 1 through 7, if manual fixpoint sequencing is active. FRMT-9,nn ENTER commands a display beginning with fixpoint nn.

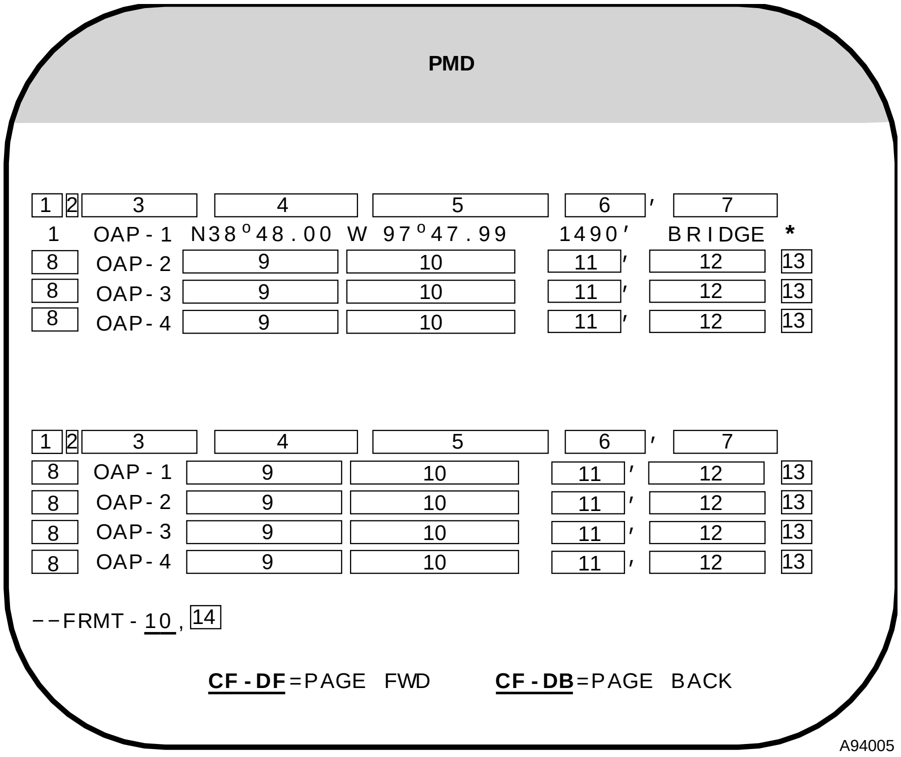
Figure 1-39 (Sheet 1 of 2)

Fixpoint Data Display (FRMT-9 & FRMT-9nn) (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Fixpoint Number	NO	
	nn		Fixpoint number
2	Fixpoint Latitude	YES	
	add°mm.mmm		Latitude of the corresponding fixpoint. Displayed in degrees, minutes and thousandths of minutes with a leading blank following an a and leading zeros in the minutes field. The a is N when latitude is in the Northern Hemisphere and S when latitude is in the Southern Hemisphere.
3	Fixpoint Longitude	YES	
	addd°mm.mmm		Longitude of the corresponding fixpoint. Displayed in degrees, minutes and thousandths of minutes with leading blanks following an a and leading zeros in the minutes field. The a is E when longitude is East and W when longitude is West.
4	Fixpoint Elevation	YES	
	nnnn0 or –nnn0		Elevation of the corresponding fixpoint. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the elevation is negative.
5	Modified	NO	
	*		The coordinates of the corresponding fixpoint or offset aimpoint have been modified since mission data was last loaded.
	(Blank)		The coordinates of the corresponding fixpoint or offset aimpoint have not been modified since mission data was last loaded.
6	Fixpoint Mnemonic	NO	
	Ten Character Label		Mnemonic of the corresponding fixpoint
7	FRMT-9 Fixpoint	YES	
	nn		Selected Fixpoint number for FRMT-9,nn.

Figure 1-39 (Sheet 2 of 2)

Destination & Offset Data Display (FRMT-10 & FRMT-10nn)



NOTE

- OAP-1 shows a typical example of OAP data
- FRMT-10 ENTER will command display of the current active destination and the next sequential destination
- FRMT-10,nn ENTER will command display of the destination nn and the next sequential destination

Figure 1-40 (Sheet 1 of 3)

Destination & Offset Data Display (FRMT-10 & FRMT-10nn) (Cont)

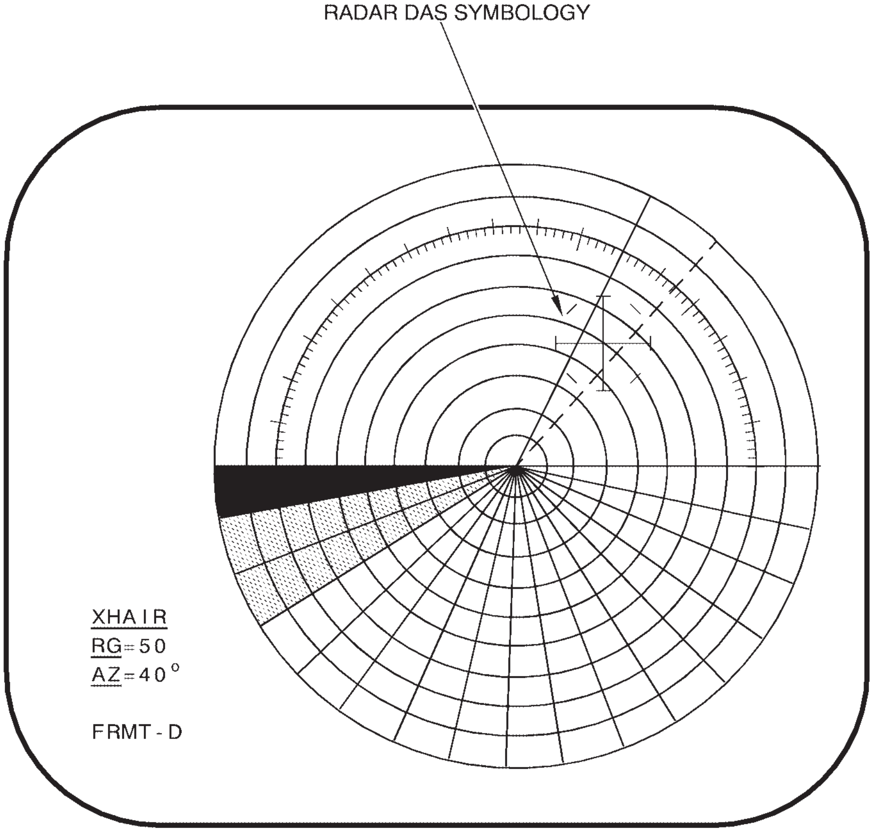
WINDOW	DISPLAY	MODIFIABLE	FUNCTION
1	Destination Number	NO	
	nn		Destination numbers when the destination is pre-planned. Displayed with a leading blank.
	_+		The radar or EVS sighting point, or a fixpoint or offset aimpoint is the current destination.
2	Course Transition	YES	
	– (minus sign)		The turn parameter for the corresponding destination is turn-short.
	(Blank)		The turn parameter for the corresponding destination is overfly.
3	Destination Mnemonic	NO	
	10 Character Label		Destination mnemonic.
4	Destination Latitude	YES	
	add°mm.mmm		Latitude of corresponding destination. Displayed in degrees, minutes and thousandths of minutes with a leading blank following an a and leading zeros in the minutes field. The a is N when latitude is in the Northern Hemisphere and S when latitude is in the Southern Hemisphere.
5	Destination Long.	YES	
	addd°mm.mmm		Longitude of corresponding destination. Displayed in degrees, minutes and thousandths of minutes with leading blanks following an a and leading zeros in the minutes field. The a is E when longitude is East and W when longitude is West.
6	Destination Elevation	YES	
	nnnn0 or –nnn0		Elevation of corresponding destination. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the elevation is negative.
7	Planned Time-of-Arrival	YES	
	hh:mm:ss		Planned Time of Arrival at the corresponding destination. Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields. Input range is in hours, minutes and seconds (00:00:00 to 24:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields.
8	OAP Number	NO	
	nn		Offset Aimpoint (OAP) number for each OAP associated with the corresponding destination.
9	OAP Latitude	YES	
	add°mm.mmm		Latitude of each OAP associated with the corresponding destination. Displayed in degrees, minutes and thousandths of minutes with a leading blank following an a and leading zeros in the minutes field. The a is N when latitude is in the Northern Hemisphere and S when latitude is in the Southern Hemisphere.

Figure 1-40 (Sheet 2 of 3)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
10	OAP Longitude	YES	
	addd°mm.mmm		Longitude of each OAP associated with the corresponding destination. Displayed in degrees, minutes and thousandths of minutes with leading blanks following an a and leading zeros in the minutes field. The a is E when longitude is East and W when longitude is West.
11	OAS Elevation	YES	
	nnnn0 or –nnn0		Elevation of each OAP associated with the corresponding destination. Displayed to the nearest 10 feet with leading blanks when positive and with leading blanks following the sign character when negative. The first character space is a minus sign when the elevation is negative.
12	OAP Mnemonic	NO	
	10 Character Label		Mnemonic of each OAP associated with the corresponding destination.
13	Modification Indicator	NO	
	*		The coordinates of the corresponding fixpoint or offset aimpoint have been modified since mission data was last loaded.
	(Blank)		The coordinates of the corresponding fixpoint or offset aimpoint have not been modified since mission data was last loaded.
14	Destination Number	YES	
	nn		Destination sequence number of destination selected for FRMT-10,nn.

Figure 1-40 (Sheet 3 of 3)

Radar Scan Converter Built-In Test Display (FRMT-D)



FRMT- D RADAR SCAN CONVERTER BUILT-IN TEST

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NOTE

Display shows multiple shades of gray and aids in tuning the MFD for best contrast and brightness level.

Figure 1-41

PROGRAM (PRGM) DISPLAYS

The PRGM display provides the operator with current and planned mission data, mission profile information, and weapon delivery data.

Program displays may be brought up with one of the following commands:

- PRGM ENTER
- PRGM nn ENTER
- PRGM nn,x ENTER

The default display shows information about the current and the next destination using the prime navigation source.

If the nn parameter was entered, the display shows information about the current destination and the destination designated by the nn parameter using the prime navigation source. The nn parameter falls in the range of 0 - 99 but must be a valid destination in the mission data.

If an x was also entered, the display will show information about the current destination and the destination designated by the nn parameter using the navigation source designated by the ,x. The x is 1 (INU-1), 2 (INU-2), or 3 (ALTER nav).

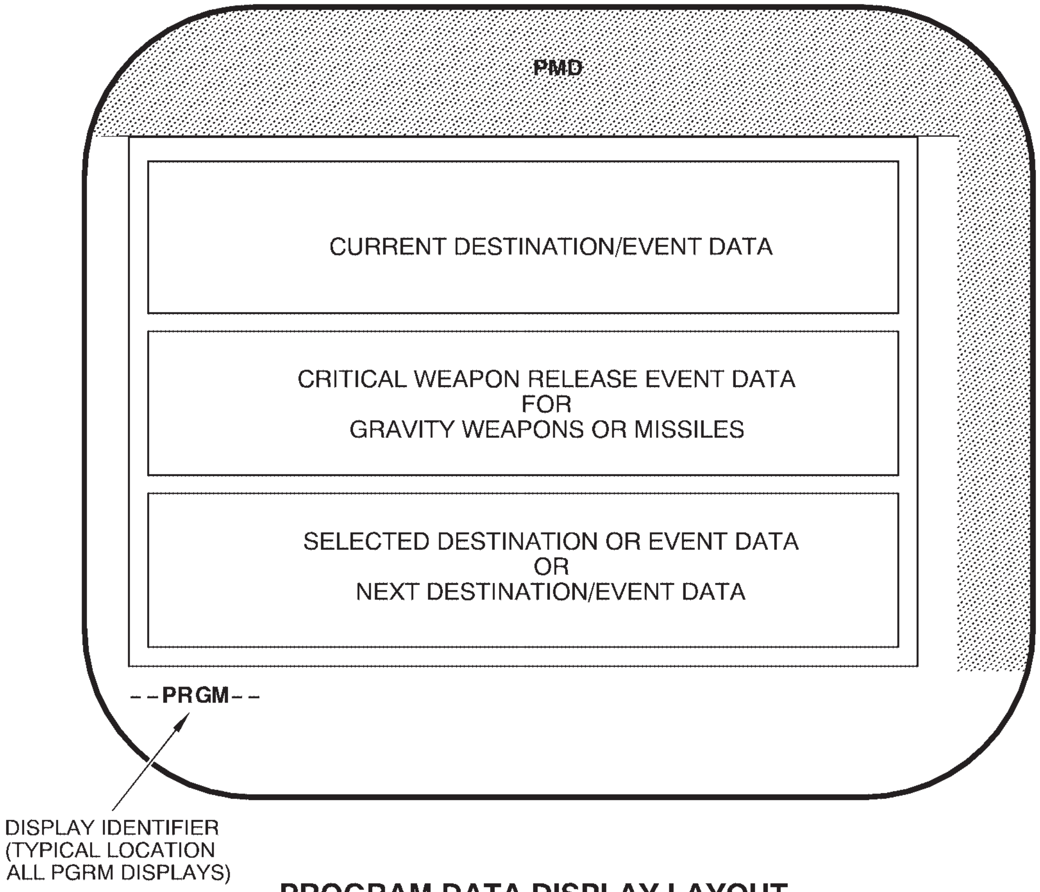
See figure 1-42 for basic PRGM Display layout and figure 1-43 for examples of the PRGM and PRGM-nn display items. Weapon specific PRGM displays are contained in the applicable Aircrew Weapon Delivery Manuals.

DAMAGE ASSESSMENT/STRIKE SYMBOLOGY (NUCLEAR ONLY)

Damage assessment/strike symbology (DA/S) can be displayed either for a radar or an EVS target. The EVS and radar DA/S are similar and shown in figure 1-44. DA/S symbology can be generated for a radar or EVS target when it is designated as a DA/S target in the mission data tape. DA/S symbology is generated when the radar or EVS crosshair is placed on the target direct either manually or automatically from the IP to TTG=0. When EVS sighting is active the DA/S symbology can be commanded by PRGM-E ENTER and erased with CLR-E ENTER. DA/S size is related to range selected, the size being inversely proportional to the range selected.

When the EVS is slaved to to the radar, the EVS DA/S symbol will be immediately synchronized to the radar crosshair, regardless of PRGM-E or CLR-E. For a DA/S target with the EVS slaved to the radar, selecting the X–HAIR marker button on the RNMP is the same as a PRGM-E command; deselecting the X–HAIR marker button is the same as a CLR-E command.

Program Display Layout



PROGRAM DATA DISPLAY LAYOUT

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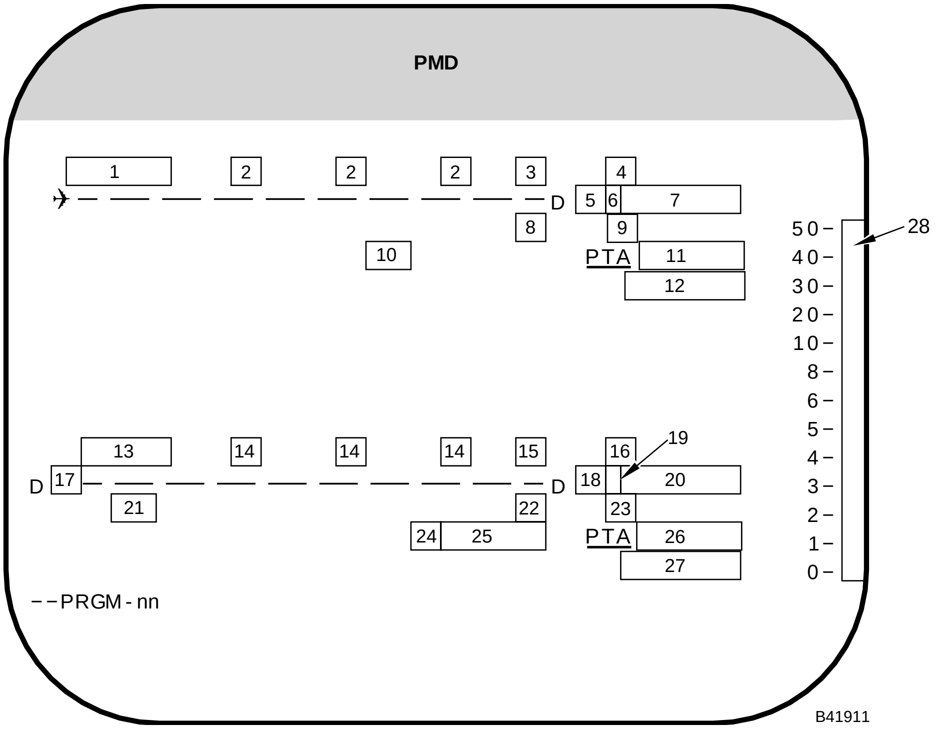
Figure 1-42

PRGM Displays (PRGM & PRGM-nn)



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Minimum Safe Altitude	NO	
	nnnn0		Minimum safe altitude enroute to current destination from mission data displayed to the nearest 10 feet.
2	Consecutive Fixpoint No.	NO	
	nn		Fixpoint sequence numbers associated with the current destination.
3	Destination OAP	NO	
	[]		The current destination has an OAP.
	(Blank)		The current destination does not have an OAP.
4	Destination 2nd OAP	NO	
	[]		The current destination has a second OAP.
	(Blank)		The current destination does not have a second OAP.

Figure 1-43 (Sheet 1 of 4)

PRGM Displays (PRGM & PRGM-nn)(Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
5	Initial/Current Destination No.	NO	
	nn		Initial destination number when the destination is preplanned. Displayed with a leading blank.
	_+		The radar or EVS sighting point, or a fixpoint or offset aimpoint is the current destination.
6	Turn Parameter	NO	
	– (minus sign)		The turn parameter for the current destination is turn-short.
	(Blank)		The turn parameter for the current destination is overfly.
7	Destination Mnemonic	NO	
	10 Character Label		Current destination mnemonic from mission data when the current destination is preplanned.
	RDR XH (Reverse Video)		Current destination mnemonic when the radar sighting point is the current destination.
	EVS XH (Reverse Video)		Current destination mnemonic when the EVS sighting point is the current destination.
	FXPT (Reverse Video)		Current destination mnemonic when a mission data fixpoint is the current destination.
	OAP (Reverse Video)		Current destination mnemonic when a mission data offset aimpoint is the current destination.
8	Destination 3rd OAP	NO	
	[]		The current destination has a third OAP.
	(Blank)		The current destination does not have a third OAP.
9	Destination 4th OAP	NO	The current destination has a fourth OAP.
	[]		The current destination has a fourth OAP.
	(Blank)		The current destination does not have a fourth OAP.
10	Distance To Go	NO	
	nnn		Distance to go to current destination.
11	Planned Time-of-Arrival	NO	
	hh:mm:ss		Planned time of arrival at the current destination when flying to a preplanned destination. Displayed in hours, minutes and seconds (00:00:00 to 48:00:00) with a leading blank in the hours field and leading zeros in the minutes and seconds fields. Estimated time of arrival at the current destination computed by the prime navigation source when flying to a destination other than a preplanned destination.

Figure 1-43 (Sheet 2 of 4)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
12	Early/Late Time of Arrival	NO	
	a hh:mm:ss		Early/late time of arrival at the current destination computed by the prime navigation source when flying to a pre-planned destination. Displayed in hours, minutes and seconds with a leading blanks in the hours field and leading zeros in the minutes and seconds fields. The a preceding the hours is E when the destination will be reached at or earlier than the planned time and L when the destination will be reached after (later than) the planned time.
	E 0:00:00		When flying to any destination other than a preplanned destination.
13	Minimum Safe Altitude	NO	
	nnnn0		Minimum safe altitude enroute to next/selected destination from mission data displayed to the nearest 10 feet.
14	Consecutive Fixpoint No.	NO	
	nn		Consecutive fixpoint numbers associated with the next/selected destination.
15	Next/Selected Destination OAP	NO	
	[]		The next/selected destination has an OAP.
	(Blank)		The next/selected destination does not have an OAP.
16	Next/Selected 2nd Destination OAP	NO	
	[]		The next/selected destination has a second OAP.
	(Blank)		The next/selected destination does not have a second OAP.
17	Destination No. Preceding Next Dest.	NO	
	nn		Number of destination that precedes the next/selected destination number in display window 18. Displayed with leading blank.
18	Next/Selected Destination No.	NO	
	nn		Next/selected destination number displayed with a leading blank.
19	Turn Parameter	NO	
	– (minus sign)		The turn parameter for the current destination is turn-short.
	(Blank)		The turn parameter for the current destination is overfly.
20	Next/Selected Destination Mnemonic	NO	
	10 Character Label		Next/selected destination mnemonic from mission data when the current destination is preplanned.

Figure 1-43 (Sheet 3 of 4)

PRGM Displays (PRGM & PRGM-nn)(Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
21	Magnetic Heading	NO	
	nnn		Magnetic heading to next destination computed by the prime navigation source. Displayed in degrees from 0 to 359 with leading blanks.
22	Next/Selected Destination 3rd OAP	NO	
	[]		The next/selected destination has a third OAP.
	(Blank)		The next/selected destination does not have a third OAP.
23	Next/Selected Destination 4th OAP	NO	
	[]		The next/selected destination has a fourth OAP associated with it.
	(Blank)		The next/selected destination does not have a fourth OAP.
24	Time Enroute Label	NO	
	ETE		Estimated Time Enroute label when next destination data is displayed.
	PTE		Planned Time Enroute label when selected destination data is displayed.
25	Time Enroute	NO	
	hh:mm:ss		Estimated-time-enroute from the current destination to the next destination. Displayed in hours, minutes and seconds with a leading blank in the hours field and leading zeros in the minutes and seconds fields and limited from 0:00:00 to 24:00:00. Estimated-time-enroute from the destination preceding the selected destination to the selected destination.
26	Planned Time of Arrival	NO	
	hh:mm:ss		Planned Time of Arrival at next/selected destination in hh:mm:ss (00:00:00 to 48:00:00).
27	Early/Late Time of Arrival	NO	
	a_hh:mm:ss		Early/late time-of-arrival at the next destination when data is displayed for the next destination. The value is computed based upon data provided by the prime navigation source. The a preceding the hours is E when the destination will be reached at or prior to the planned time and L when the destination will be reached after the planned time. Early/late time-of-arrival at the next/selected destination when data is displayed for any destination other than the next destination.
28	Radar Altimeter Ribbon		
	(Vertical Bar)		Radar altimeter ribbon.
	(Blank)		Radar altimeter is not providing radar altitude or altitude is invalid.

Figure 1-43 (Sheet 4 of 4)

Nuclear Damage Assessment/Strike Symbology Displays (PRGM-E)

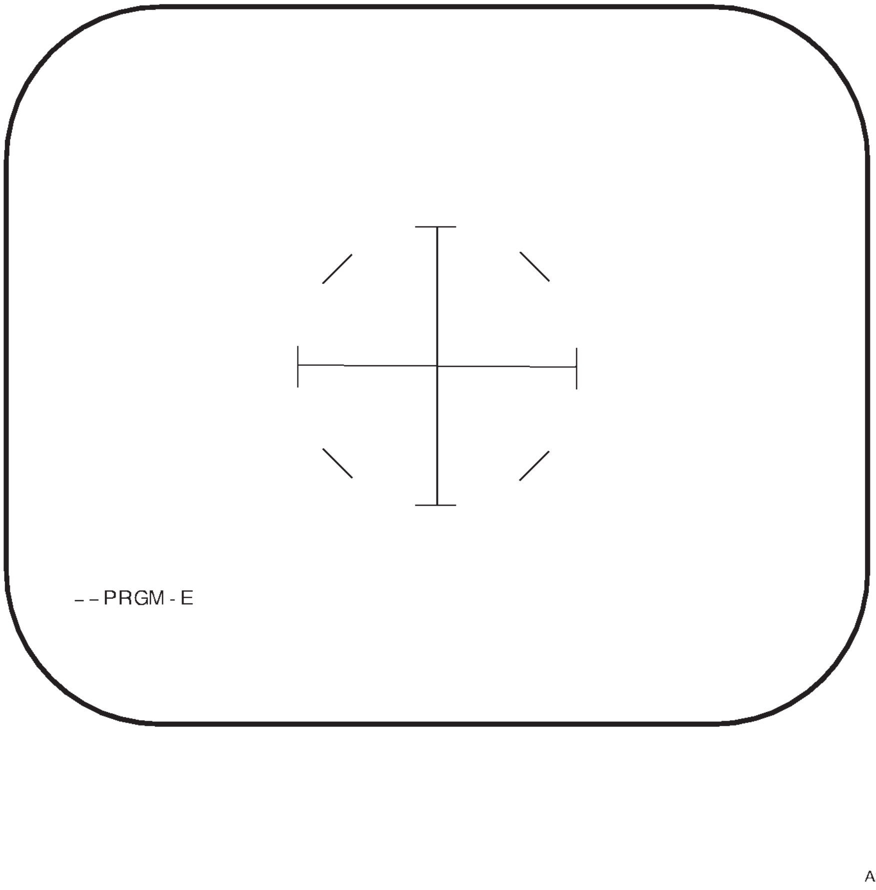


Figure 1-44

FMS Initialization and Termination

OAS POWER CONTROL

The OAS is designed to operate on external power or aircraft generator power and to tolerate small transients in the power supply. The system is designed to accommodate the transition from ground power to aircraft power but not from aircraft to ground. Operation of the OAS can be performed with either external or internal air and power sources.

POWER ON

When OAS master power is turned on (see OAS System Configuration, this Section), power becomes available to the DTS and the avionics processors as indicated by the green ON status lights on the computer control panel. No switching is necessary on the computer control panel. Blinking NO OAS DATA messages appear on selected MFD's.

PROGRAM LOAD

The operator may load the FMS application from the DTC into an ACU through interaction with the CCP and IKB. For full-up operation of FMS, the FMS must be loaded into both ACUs. For each ACU that is to have FMS loaded the following actions must be performed.

BRINGING UP THE PRIMARY APPLICATION LOADER

The Primary Application Loader, which is present on a DTC containing the FMS application, loads FMS into an ACU. The operator can bring up the Primary Application Loader for an ACU by selecting an ACU with the ACU selector switch on the CCP and then pressing the PROC LOAD switch, also on the CCP. The Primary Application Loader is downloaded from the DTC into ACU RAM and executed. This will bring up the Primary Application Loader display (figure 1-45), on all MFDs. The Primary Application Loader display shows all available primary applications resident on the DTC or in ACU Non-Volatile Memory (NVM). A version identifier is displayed to the right of the each application name on the menu.

LOADING FMS

The operator may load one of the available applications by using an IKB to select the CF, followed by the number or letter associated with the desired application on the Primary Application Loader display, and then pressing the ENTER. The operator will be prompted with the following question:

LOAD APPLICATION? YES/NO

Following a YES response, the operator will be asked:

LOADING PRIMARY ACU? YES/NO

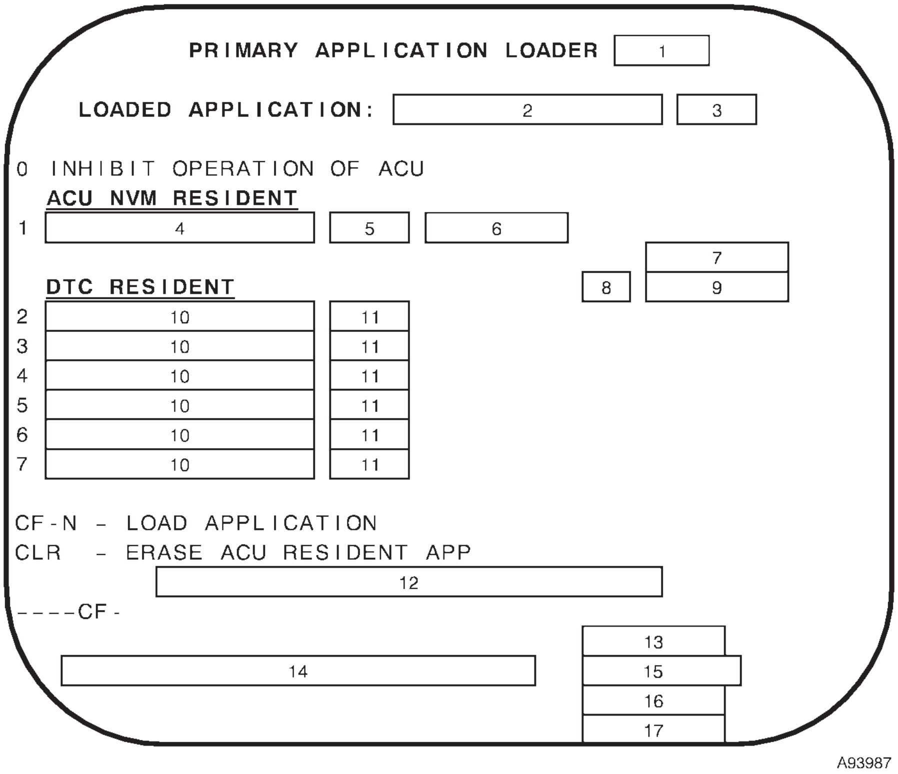
The FMS is designed to support a two ACU mode of operation, with one of the ACU being the primary processor and the other ACU serving as a backup in the event that the primary ACU fails. To identify the ACU to operate in the Primary mode, select YES on the IKB. The Primary Application Loader will then transfer processor control to FMS. The associated ACU program indicator on the CCP will be updated to indicate the application is resident and executing by displaying a 4.

When applying power to an ACU that already has FMS loaded into NVM, FMS will set the resident program indicator on the CCP to display the number 4 to indicate that the FMS is loaded, and retrieve the following data from ACU memory.

- Initial latitude, longitude and elevation
- Current month, day and year
- Aircraft tail number
- Latitude, longitude and elevation of destination one

To ensure a backup capability, the operator must load the second processor by repeating the steps used with the first processor, except that a NO response should be entered when the question "LOADING PRIMARY ACU?" is displayed. If both ACUs are identified as the primary ACU or as the secondary ACU, the FMS will determine which ACU is primary and which is secondary based upon the physical location of the ACU. Once the ACUs are loaded, the FMS must be initialized to bring the FMS to operational mode. To initialize the FMS, press the PROC SYNC switch. If only one ACU has FMS loaded, that ACU will remove power from the other ACU.

Primary Application Loader Display



WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
1	Primary Application Loader Version No.	NO	
	6 Characters		Primary Application Loader version number.
2	Resident Primary Application Name	NO	
	17 Characters		Name of the primary application resident in the ACU and ready for operation.
3	Resident Primary Application Version No.	NO	
	6 Characters		Version number of the primary application resident in the ACU and ready for operation.

Figure 1-45 (Sheet 1 of 4)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
4	NVM Primary Application Name	NO	
	17 Characters		Name of the primary application resident in the ACU non-volatile memory while it is not being loaded for operation.
	17 Characters (Blinking Video)		Name of primary application resident in the ACU non-volatile memory while it is being loaded for operation.
	NONE AVAILABLE		No application is resident in ACU non-volatile memory.
	(Blank)		Displayed while ACU non-volatile memory is being erased.
5	NVM Primary Application Version No.	NO	
	6 Characters		Version number of the primary application resident in the ACU non-volatile memory while it is not being loaded for operation.
	6 Characters (Blinking Video)		Version number of the primary application resident in the ACU non-volatile memory while it is being loaded for operation.
	(Blank)		No application is resident in ACU non-volatile memory**.**
6	Primary/Secondary ACU Indicator	NO	
	PRIMARY		The application in ACU non-volatile memory is loaded to operate as the primary ACU.
	PRIMARY (Blinking Video)		The application in ACU non-volatile memory is being loaded and will operate as the primary ACU.
	SECONDARY		The application in ACU non-volatile memory is loaded to operate as the secondary ACU.
	SECONDARY (Blinking Video)		The application in ACU non-volatile memory is being loaded and will operate as the secondary ACU.
	(Blank)		No application is resident in ACU non-volatile memory**.**
7	Primary Application Loader Operation	NO	
	ACU ERASE		The primary application is being erased from ACU non-volatile memory.
	DTC LOAD		A primary application is being loaded from the DTC.
	(Blank)		No Primary Application Loader operation is in progress.
8	Percent Complete	NO	
	nnn		The percent of the erase or load operation that is complete.
9	Operation in Progress	NO	
	PCT CMPLT		A primary application is being loaded from the DTC or the ACU resident application is being erased.
	(Blank)		No Primary Application Loader operation is in progress.

Figure 1-45 (Sheet 2 of 4)

Primary Application Loader Display (Cont)

WINDOW	DISPLAY	MODI-FIABLE	FUNCTION
10	DTC Applications	NO	
	17 Characters		Name of each primary application resident on the DTC while it is not being loaded for operation.
	17 Characters (Blinking Video)		Name of the primary application resident on the DTC while it is being loaded for operation.
	(Blank)		The name of all primary applications available on the DTC have been displayed.
11	DTC Applications Version No.	NO	
	6 Characters		Version number of each primary application resident in the DTC while it is not being loaded for operation.
	6 Characters (Blinking Video)		Version number of the primary application resident in the DTC while it is being loaded for operation.
	(Blank)		The version number of all primary applications resident on the DTC have been displayed.
12	Primary Application Loader Operation Message	NO	
	LOADING APPLICATION n INTO ACU x (Bright Video)		Primary Application Loader is in the process of loading the application identified on the display as application ‘n’ into the processor identified by “x” and writing the application to non-volatile memory, if the application is identified as a NVM resident application.
	ACU x LOAD COMPLETE (Bright Video)		Primary Application Loader has completed loading the identified ACU.
	ERASING ACU x RESIDENT APP (Bright Video)		Primary Application Loader is in the process of erasing the primary application from non-volatile memory in the processor identified by x.
	ACU x RESIDENT APP ERASED (Bright Video)		Primary Application Loader has completed erasing the primary application from non-volatile memory in the processor identified by x.
	ACU x OPERATION INHIBITED		The operation of ACU x is inhibited by Primary Application Loader.
	(Blank)		No Primary Application Loader operation is in progress.
13	DEU Status	NO	
	DEU ERROR (Reverse Video)		A DEU error has been detected.
	(Blank)		No DEU error has been detected.

Figure 1-45 (Sheet 3 of 4)

WINDOW	DISPLAY	MODIFIABLE	FUNCTION
14	Verification Prompt	NO	
	LOAD APPLICATION n? YES/NO (Bright Video)		Displayed when a primary application load command is entered until the YES or NO switch on either IKB is pressed, where n is the number that was entered to request the load.
	LOADING PRIMARY ACU? YES/NO (Bright Video)		Displayed when YES is selected in response to the primary application load prompt until the YES or NO switch on either IKB is pressed.
	ERASE ACU RESIDENT APP? YES/NO (Bright Video)		Displayed when a command is entered to erase the non-volatile memory in an ACU until the YES or NO switch on either IKB is pressed.
	INHIBIT ACU OPERATION? YES/NO (Bright Video)		Displayed when the command to inhibit ACU operation is entered.
	(Blank)		No question is pending.
15	Load Error	NO	
	LOAD ERROR (Reverse Video)		An error occurred while loading the selected primary application.
	(Blank)		No loading error has been occurred.
16	DTR 1 Comm	NO	
	DTR 1 FC (Reverse Video)		Communication with DTR 1 is not possible on the fiber channel interface.
	DTR 1 1553 (Reverse Video)		Communication with DTR 1 is not possible on the 1553 bus interface.
	DTR 1 COM (Reverse Video)		Communication with DTR 1 is not possible on the fiber channel interface or the 1553 bus interface.
	(Blank)		Communication with DTR 1 is possible on both the fiber channel interface and the 1553 bus interface.
17	DTR 2 Comm	NO	
	DTR 2 FC (Reverse Video)		Communication with DTR 2 is not possible on the fiber channel interface.
	DTR 2 1553 (Reverse Video)		Communication with DTR 2 is not possible on the 1553 bus interface.
	DTR 2 COM (Reverse Video)		Communication with DTR 2 is not possible on the fiber channel interface or the 1553 bus interface.
	(Blank)		Communication with DTR 2 is possible on both the fiber channel interface and the 1553 bus interface.

Figure 1-45 (Sheet 4 of 4)

FMS OPERATIONS

INITIALIZING DATA ENTRY

Once FMS is loaded and executing, the operator must initialize data on the CF-61 display to ensure correct navigation calculations by FMS. See FCP Initialization Display (CF-61) this section.

CLEARING A RESIDENT ACU LOAD

When loaded into the ACU, the FMS is stored in permanent Non-Volatile Memory (NVM). When the operator wishes to load and execute single ACU programs, such as the Ground Maintenance Computer Program (GMCP), the FMS application in NVM of the ACU that is not going to be used must be overwritten. To do so, load the Primary Application Loader for the ACU that FMS is being removed from using the procedures for bringing up the Primary Application Loader. The application loaded in NVM will be displayed on the Primary Application Loader display. To remove the application, enter a CLR command on an IKB to inform the Primary Application Loader software to erase the application from NVM. When complete, the display will indicate:

ACU x RESIDENT APP ERASED

where x is A or B depending on the ACU being erased.

MISSION DATA LOAD

The FMS provides a method for the user to load a sortie and a mission data file from the DTS. Up to eight sorties can be resident on a DTC. Each sortie contains up to nine B-52 missions. Mission data consist of a set of up to 99 pre-planned destinations, 99 fixpoints, 42 OAPs and data required by the weapon SMOs for release of weapons at one or more of the destinations. The resident sortie or mission, if any, can be viewed on the Mission Supervision Display, CF-8, or the Mission Data Load Display, CF-81. To load a sortie and mission see Mission Supervision Display this section.

NOTE

The mission DTC should remain installed and latched in order to update magnetic variation and deflection of vertical data. If the DTC must be removed, the original or another DTC with the same data base should be installed as soon as possible in order to update the navigation system.

SMO LOAD

FMS allows the operator to load multiple Stores Management Overlays (SMO) into memory and select one of the loaded SMO to be the Primary SMO. For each possible weapon location one SMO can be loaded. The CF-62 display shows all the SMO available from the DTS, indicates which (if any) of these SMO are already loaded, indicates which SMO (if any) is the primary SMO, allows the operator to modify what SMO are loaded, what location(s) each SMO is to control, and allows the operator to select a SMO to be the primary SMO. To load SMOs and designate a primary SMO see SMO Load Menu (CF-62) this section.

FCP TERMINATION

Normal FTP Termination

The operator may initiate normal FCP termination by entering a CF-67 command. Following the command entry the following question is displayed:

ERASE CLSF DATA? YES/NO

If YES is selected, the IU will be commanded to erase classified data if it is operating, each INU to which power is applied and each DTR will be commanded to erase classified data and then classified data will be erased from each ACU that is operational. The Declassification Status display will be displayed on all four MFD when declassification begins following normal shutdown and will remain displayed after classified data is erased from the ACUs.

If NO is selected or if no response is entered within 120 seconds, FCP termination will be performed without erasing classified data.

Emergency FTP Termination

Emergency FCP termination is performed as follows. Enter a CF-64 command. The following question will be displayed:

ERASE CLSF DATA? YES/NO

If YES is selected, the IU will be commanded to erase classified data if it is operating, each INU to which power is applied will be commanded to erase classified data and then classified data will be erased from each ACU that is operational.

NOTE

Following a CF-64 command, the IME 1 and 2 ON lights on the OAS Power Control Panel may remain on even though the INUs are powered off.

If NO is selected or if no response is entered within 120 seconds, the FCP continues operating without interruption.

Inertial Navigation System

DESCRIPTION

Two Ring Laser Gyro based inertial navigation units (INUs) are installed in the aircraft. Each is a self-contained, all-attitude navigation set providing outputs of linear and angular acceleration, velocity, position, heading, attitude (roll, pitch, and azimuth), baro-inertial altitude, body angular rates and time tags. The INU requires electrical power, turn-on and mode commands, initialization data, and pressure altitude data for unaided inertial operation.

POWER SUPPLY

Primary power is 115 volt, 400 Hz, single-phase ac supplied by AC Bus 3 (INU-1) and AC Bus 5 (INU-2) via the left forward BNS overhead circuit breaker panel from circuit breakers marked NO. 1 INS AC PWR and NO. 2 INS AC PWR. Backup power is 28 volt dc supplied by the forward battery via No. 1 INS DC B/U POWER circuit breaker on the LLC circuit breaker panel for INU-1 and the aft battery via No. 2 INS DC B/U POWER circuit breaker on the RLC circuit breaker panel for INU-2.

CONTROLS AND INDICATORS

The OAS power control panel, shown in figure 1-6, contains the two IME power switches that activate the inertial navigation units.

SYSTEM INTERFACES

The INU interfaces with avionics systems over a MIL-STD-1553A dual redundant serial data bus. Input data such as mode selection and position and output data such as navigation, attitude, and performance parameters are transmitted across these buses. The INU is controlled by the computational subsystem software, the radar navigator and navigator keyboards, and the OAS power control panel.

INU SYSTEM OPERATION

The two independent inertial navigation systems (INS)s each consists of an INU and the software which interacts with the INU to perform the navigation function. Alignment of each INU may be performed on the ground or in the air and may be refined and updated throughout a flight. The progress of each INU ground alignment can be observed on the respective Inertial Navigation Supervision menu, CF-1 or CF-2.

The ground align and air align processes and the control of the operating mode of each INU is described in the following paragraphs. The Control Function commands entered through an IKB to control the mode of each INU include two digits. The first digit indicates the INU (1 or 2) and the second digit indicates the mode to be entered or the action to be taken. In the following paragraphs, these commands will be shown as CF-n1, CF-n2, etc. where n is 1 to specify INU-1 and 2 to specify INU-2. The text and data displayed in the following windows during normal INU operation are also identified:

- INU Status
- Manual Select
- Alignment Time Remaining
- Ground Alignment Status
- Enhanced Interrupted Alignment (EIA) Status

When a text string or the meaning of the data is identified for each window, that text or data will continue to be displayed until a different text string or a new meaning of the data is identified.

The aircraft parameters computed by the inertial navigation processing are maintained in the event that the backup ACU is reconfigured as the primary ACU.

INERTIAL NAVIGATION UNIT POWER APPLICATION

Power is applied to an INU by pressing the respective IME switch on the Power Control Panel. OFF will be displayed in the INU Status window of the Control Function menu and the Inertial Navigation Supervision menu until power has been applied to the associated INU and communication with that INU has been established. Prior to INU power application, the operator should assure that the initial aircraft position has been entered and a FLY-TO command has been entered. CHK_DATA will be displayed in the INU Status window, if INU power is applied prior to a FLY-TO command and until a FLY-TO command is entered.

After a FLY-TO command is entered and the INU is powered on, prior to the operator commanding an alignment mode and the aircraft true airspeed does not exceeded 80 knots, STANDBY will be displayed in the respective INU Status window, until an alignment mode is commanded. Manual Select, Alignment Time Remaining, Ground Alignment Status, and EIA Status windows will be blank. The operator can command either the ground align mode or air align mode.

If the INU is powered on after a FLY-TO command and the aircraft true airspeed exceeds 80 knots, an air alignment initialization will be performed automatically and automatic aiding mode selection will be enabled.

INERTIAL NAVIGATION GROUND ALIGNMENT

Ground alignment of INU-1 is commanded by entering a CF-11 command and for INU-2 by entering a CF-21 command. Enhanced Gyro Compass (EGC) mode will be entered when ground align begins. During the EGC mode, EGC will be displayed in the INU Status window and :M will be displayed in the Manual Select window. The Alignment Time Remaining window will display the time remaining in ground alignment and the Ground Alignment Status window will display the alignment status. Approximately 90 seconds after ground alignment is commanded, INU-n DEG NAV RDY will be displayed as an advisory message and 8.0 NM/HR will be displayed in the Ground Alignment Status window.

If a FLY-TO is entered before the INU-n DEG NAV RDY advisory message is displayed for an INU is commanded into the air alignment mode and the aiding mode selection process is initialized to automatic.

If a FLY-TO command is not entered and the aircraft is moved before the INU-n DEG NAV RDY advisory message is displayed for an INU, that INU is shut down and the advisory message INU-n EGC ABORT is displayed. If a FLY-TO command is entered after the INU-n DEG NAV RDY advisory message is displayed for an INU, that INU is commanded into navigation mode and NARF will be displayed to indicate that the INU is operating in the Navigation-Alignment Refining Feature (NARF) mode (NAV may be displayed momentarily). The INU can be commanded back into EGC mode by re-entering the ground align command for that INU (CF-11 or CF-21). EGC alignment will resume from the point at which it was interrupted.

A specific aiding mode (including free inertial) or automatic aiding mode selection can now be commanded. When an aiding mode or automatic aiding mode selection is commanded, ground alignment will be terminated and the Navigation Alignment Refining Feature (NARF) mode will be disabled to allow aiding by external sensors.

If an aiding mode is not commanded, ground align will complete approximately 9 minutes after ground align is commanded. INU-n READY will be displayed as an advisory message and READY will be displayed in the INU Status window. The Alignment Time Remaining window will display zero and the Ground Alignment Status window will show 0.3 NM/HR to reflect performance for a full-performance ground alignment. Even though READY is displayed, the INU will continue to ground align until commanded to enter navigation mode.

If the alignment is to be interrupted to move the aircraft during the nine-minute ground-align interval, the operator must enter a FLY-TO command. NAV will be displayed in the INU Status window. Once the aircraft is stopped again, ground alignment can be resumed (Interrupted Alignment) when a ground align command is re-entered (CF-11 or CF-21). Until a ground align command is entered, NARF will be displayed in the INU Status window to indicate that the INU is operating in the Navigation Alignment Refinement Feature (NARF) mode. NAV will be displayed again after the ground align is commanded until the nine-minute alignment is complete.

When a FLY-TO command is entered after the nine-minute alignment is complete, the INU will be commanded into navigation mode. NAV will be displayed in the INU Status window, the Manual Select window will change to blank, and the EIA Status window will display CHANGE HDG to indicate that Enhanced Interrupted Alignment can be performed. When the airplane is not moving, the INU will operate in the NARF mode and the INU Status window will change to NARF.

ENHANCED INTERRUPTED ALIGNMENT

The enhanced interrupted alignment mode is commanded for INU-1 by entering a CF-17 command and for INU-2 by entering a CF-27 command. The EIA process is performed to provide a more accurate alignment by using two different headings to perform the ground alignment process.

EIA Procedures

1. EGC completed. Ensure the approximate nine-minute alignment has completed. READY will be displayed in the INS Status window, 0.3 NM/HR will be displayed in the Ground Alignment Status window, and the Alignment Time Remaining window will be zero.
2. FLY-TO command entered. NAV will be displayed in the INU status window, the Manual Select window will change to blank, and the EIA Status window will display CHANGE HDG, to indicate that Enhanced Interrupted Alignment can be performed. When the airplane is not moving, the INU will operate in the NARF mode and the INU Status window will display NARF.
3. Taxi or move the aircraft to a heading that is 70 degrees or more different than the initial aircraft heading. While the aircraft is moving, NAV will be displayed in the INU Status window. After the heading is changed and the aircraft is stopped, READY will be displayed in the EIA Status window to indicate that the system can be commanded into the EIA mode by entering a CF-n7 command. Until this command is entered, NARF will be displayed in the INU Status window.

NOTE

> The EIA Status window will indicate TIME OUT if EIA is not commanded within 15 minutes of commanding the INU into NAV mode (FLY-TO) and EIA will no longer be available. Other EIA command rejection criteria are listed in figure 1-46.

4. CF-17/27 command entered. The EIA status will be blanked, EIA will be displayed in the INU status window and :M will be displayed in the Manual Select window. The Alignment Time Remaining window will begin counting down from 6 minutes and the Ground Alignment Status window will reflect the INU alignment status. EIA will complete approximately 6 minutes after EIA is commanded. INU-n READY will be displayed as an advisory message and the INU Status window will display READY. The Alignment Time Remaining window will have counted down to zero and the Ground Alignment Status window will show 0.2 NM/HR to reflect performance for an enhanced interrupted alignment.
5. FLY-TO command entered. The INU will be commanded into navigation mode and NARF will be displayed in the INU Status window, as long as the aircraft is not moving and no aiding mode has been commanded. If the aircraft is moving and no aiding mode has been commanded, NAV will be displayed. If an aiding mode has been commanded, the aiding mode will be displayed in the INU Status window.

The enhanced interrupted alignment command will be displayed on the command line of the MFD in reverse video when any of the following conditions are true:

- One or more of the conditions identified in the EIA Command Rejection Criteria Table exists, see figure 1-46.
- Aircraft True Airspeed has exceeded 80 knots since INU power application prior to a FLY-TO command being entered.
- The operator has commanded air align by entering an Inertial Aiding Mode.
- Power has not been applied to the INU or communication with the INU has not been established.

EIA Command Rejection Criteria

Rejection Reason	EIA Status Window
FLY-TO was commanded during the first nine minutes of ground align	UNAVAILABLE
Aircraft was moved prior to entering a FLY-TO command after the first nine minutes of ground align.	UNAVAILABLE
Aircraft heading was not changed by 70 degrees or more	CHANGE HDG
EIA command not entered within 15 minutes of commanding the INU into NAV mode	TIME OUT

Figure 1-46

INERTIAL NAVIGATION AIR ALIGNMENT

Air alignment of an INU will begin when commanded by the operator or automatically as described in INERTIAL NAVIGATION UNIT POWER APPLICATION. Air align mode is initiated by commanding air align and automatic aiding mode selection (CF-12 and CF-22), GPS aiding mode (CF-13 and CF-23), Doppler aiding mode (CF-14 and CF-24), and unaided (free inertial) mode (CF-15A and CF-25A). Air alignment can be commanded while the aircraft is on the ground. Once Air alignment has been commanded, all ground alignment modes including NARF are disabled until the INU is shut down and restarted.

To align an INU in the air, enter an air alignment mode command followed by INU power application when the aircraft is flying straight and level and can remain in un-accelerated flight for approximately 10 seconds until air alignment initialization is complete. AIR ALIGN will be displayed in the INU Status window while the INU is performing air alignment initialization. Following air alignment initialization, the commanded aiding mode is enabled if one was commanded prior to INU power application or automatic aiding mode selection is enabled if it was commanded or if no aiding mode was commanded. The selected operating mode will be displayed in the INU Status window.

INERTIAL NAVIGATION MODE CONTROL

The inertial navigation system operating mode selection process is initialized to automatic for each INU when the FMS is initialized. When the operating mode selection process is automatic, the Free Inertial mode is selected if the aircraft velocity is less than 80 knots and at least a minimal ground alignment has been performed. This will allow the INU to use the NARF function to improve the ground alignment accuracy when the airplane stops. If the aircraft velocity is 80 knots or greater, the GPS Inertial and Doppler Inertial aiding modes can be selected. The automatic mode selection process will select the GPS Inertial aided mode if the required GPS data is available. If the required GPS data is not available, the Doppler Inertial aided mode will be selected if Doppler data is available. If the required Doppler data is not available, the Free Inertial mode will be selected.

The operator can command each inertial navigation system into any one of the modes by entering the commands shown in figure 1-47. If data from the selected aiding source is available, the specified system will begin operating in the designated mode and :M will be displayed in the Manual Select window on the CF displays (normal video). If data from the selected aiding source is not available, :M will be displayed in reverse video and the INU will operate in Free Inertial.

IKB COMMAND	COMMANDED AIDING MODE	DISPLAY
CF-n3	GPS	GPS-NAV
CF-n4	Doppler	DPLR-NAV
CF-n5A	Free Inertial (no velocity aiding)	NAV

n = 1 for INU-1 or 2 for INU-2

Figure 1-47

INERTIAL NAVIGATION UNIT RE-INITIALIZATION

INU re-initialization can be initiated by the operator for each INU independently by entering a CF-n8 command. When re-initialization of INU-1 is commanded, the following question will be displayed to the operator.

INU-1 REINIT? YES/NO

The question will identify INU-2 when re-initialization of INU-2 is commanded. Re-initialization will not be performed and normal operation of the INU will continue if the NO switch on either IKB is selected or if neither key is selected within 120 seconds. If the YES switch on either IKB is selected, the INU is commanded into attitude mode to perform a filter leveling process and then air alignment initialization is performed. AIR ALIGN will be displayed in the INU Status window until air alignment initialization is complete. The INU will then resume normal operation. For best results, the re-initialization command should be entered only when the aircraft is flying straight and level and can remain in un-accelerated flight for approximately 10 seconds until air alignment initialization is complete.

INERTIAL NAVIGATION UNIT SHUTDOWN

INU shutdown may be initiated by the operator for each INU independently by entering a CF-n6 command. The INU saves fault and alignment data to EPROM and performs declassification processing. When declassification processing is completed successfully, DECLASS will be displayed in the appropriate INU Status window in normal video. If declassification processing fails, DECLASS will be displayed in reverse video in the appropriate INU Status window and INU n DECLASS will be displayed as an advisory message in reverse video, where “n” is 1 or 2 to identify the INU.

CAUTION

> If OAS power is removed prior to shutting down the ACUs, the INUs will remain powered and operating. To shutdown the INUs, re-power the OAS and perform proper ACU shutdown procedures. If the OAS cannot be re-powered, pull the NO.1 and NO.2 INS DC B/U circuit breakers and the NO.1 and NO.2 INS AC PWR circuit breakers to prevent continuous operation of the INUs on the ground.

Global Positioning System

DESCRIPTION

The global positioning system (GPS) provides velocity and position data to the OAS and to those weapons requiring position update. GPS provides position updates to all three NAV models. When aircraft GPS equipment is turned on, an estimate of present position, velocity, and time is entered. Then, the GPS equipment begins to search for and track satellites. Data received from a satellite signal basically does three things: it identifies the satellite number, locates the satellite in space, and establishes system time. The aircraft GPS receiver calculates range to the satellite by measuring the time of receipt of signal and multiplies the time by the speed of light. The result of this calculation locates the aircraft on a sphere of radius whose center is the transmitting satellite. With range to one satellite known, a range measurement is made to two other satellites. Using the three range measurements and elementary geometry, GPS equipment determines that point which is the aircraft's precise position in terms of latitude, longitude, and altitude. Range to a fourth satellite is required to determine the time offset from the user's crystal clock with respect to the GPS atomic time standard. Velocity measurement is achieved by counting the Doppler shift from GPS center frequency. Satellite information is fed through aircraft GPS components and flows to the avionics processors for distribution to navigation and weapon delivery components. Two dead reckoning navigation submodes, aided inertial (GPS/NAV) and GPS/AHRS, serve as the prime and best alternate navigation systems, respectively. See OAS Navigation, this section, for further navigation mode explanation. Augmentation of GPS adds several avionics units and a controlled reception pattern antenna (CRPA). The CRPA is designed to convert free-space propagated GPS navigation signals into radio frequency signal voltages for routing to the antenna electronics unit (AEU). Refer to T.O. 1B-52H-1 for the CRPA location. The AEU performs special filtering and radio frequency amplification of CRPA output and provides composite signals to the receiver processor unit (RPU) and splitter amplifier unit (SAU). The RPU receives, tracks, and processes signals from the AEU and provides position, velocity, and time information to the appropriate interfaces. The RPU maintains critical memory during power interruption by using a back-up battery incorporated into the receiver. The SAU obtains radio frequency and time mark pulses and provides amplification and distribution of signals to information switching units (ISUs) (located on the heavy stores adapter beam pylons). The SAU receives power when one of the weapon interface unit switches are on. The GPS interface unit (IU) receives inputs from the programmable keyboard and RPU and relays the signals through the SAU to the pylon ISUs. The IU and RPU are located on the right equipment rack in the navigator's compartment. GPS Navigation Functions are shown in figure 1-48.

The GPS IU also controls the TACAN Emulation function and supplies data to the Mission Route Screen/Moving Map Display, and the Destination Data Screen on the Pilots' MFDs. (Refer to T.O. 1B-52H-1 for description of the TACAN Emulation functions).

POWER SOURCE

The GPS avionics are powered by 115 vac and 28 vdc. Information for GPS shown on OAS displays is controlled by OAS power requirements. See OAS System Configuration, this section. Initialization, GPS avionics control, and transfer of position, time, and velocity data is accomplished through the data bus. Circuit breakers for GPS controls and avionics are located on the EVS circuit breaker panel.

CONTROLS AND DISPLAYS

All GPS data is displayed on the MFD's or programmable keyboard. See FMS MFD DISPLAYS, this section, for OAS control function and format displays containing GPS information.

INTERFACE UNIT CONTROL PANEL

The Interface Unit Control Panel (IUCP) (figure 1-49) located at the navigator's station provides control to power up/down the advanced guided weapons control panel (AGWCP), GPS interface unit (IU), the GPS receiver processor unit (RPU), and the programmable keyboard (PKB). It is also used to load and zeroize crypto key data. The IUCP uses 28 vdc power. Pressing the GPS/IU power switch to ON applies power to GPS avionics.

DIGITAL DATA LOADER

The Digital Data Loader (DDL) (figure 1-49) located at the navigator's side panel and is used to load the data contained in the Digital Data Loader Cartridge (DDLC) into the IU.

DIGITAL DATA LOADER CARTRIDGE

The Digital Data Loader Cartridge (DDLC) contains the following data:

- GPS Almanac Data file. (Identical to that stored in the DTS).
- GPS Interface Unit Software (IUS) load file.
- Navaid Information file. The Navaid database contains selected data on TACAN, VOR/DME, and VORTAC stations worldwide from the Digital Aeronautical Flight Information File.

PROGRAMMABLE KEYBOARD

The programmable keyboard (PKB) provides the navigator a means of data entry and display in conjunction with the IU to perform operations required to support the integration of GPS into the ICSMS system. The PKB (figure 1-50) consists of 20 programmable software keys with switch legends and functions. The PKB keys will accommodate two sizes of type, graphic images, and bit mapped displays. The PKB accepts data from the IU to produce the key legend displays and communicates with the IU via the serial data bus. Thus, the PKB displays navigational data from the GPS and allows manual initialization of the GPS. The PKB is mounted next to the OAS integrated keyboard (IKB) at the navigator's station.

NAVIGATION MODES

The GPS displays are shown in FMS MFD DISPLAYS, this Section. When GPS and inertial inputs are valid, GPS/NAV is displayed in the INU Status window. The prime navigation system, GPS/NAV, requires valid GPS inputs and one of the inertial navigation systems to be operational. For alternate navigation modes, GPS supplies velocity and position data and is always shown in normal video. In GPS/AHRS mode, heading data is derived from the AHRS. In GPS/EMERG mode, heading is derived from emergency data and EMERG will appear in reverse video on CF-3 Heading Source window. The GPS status can be monitored on CF-61 and indicates either OFF, DATA, or NO GO. DATA in normal video indicates the GPS is valid for alternate navigation, bright underlined video indicates the GPS is valid for alternate navigation and inertial navigation use, and reverse video indicates GPS is not valid for either alternate or inertial navigation use. NO GO indicates that although communication with GPS was established previously, communication is not currently possible.

GPS Navigation Functions

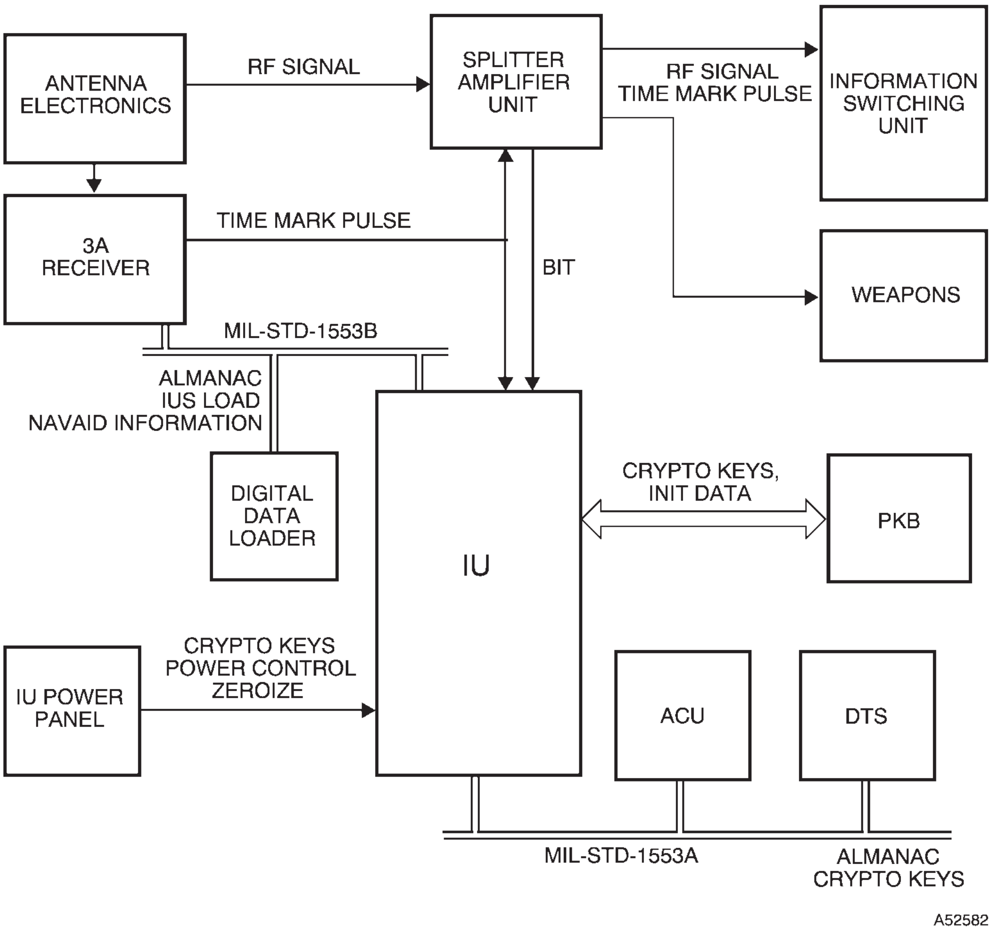
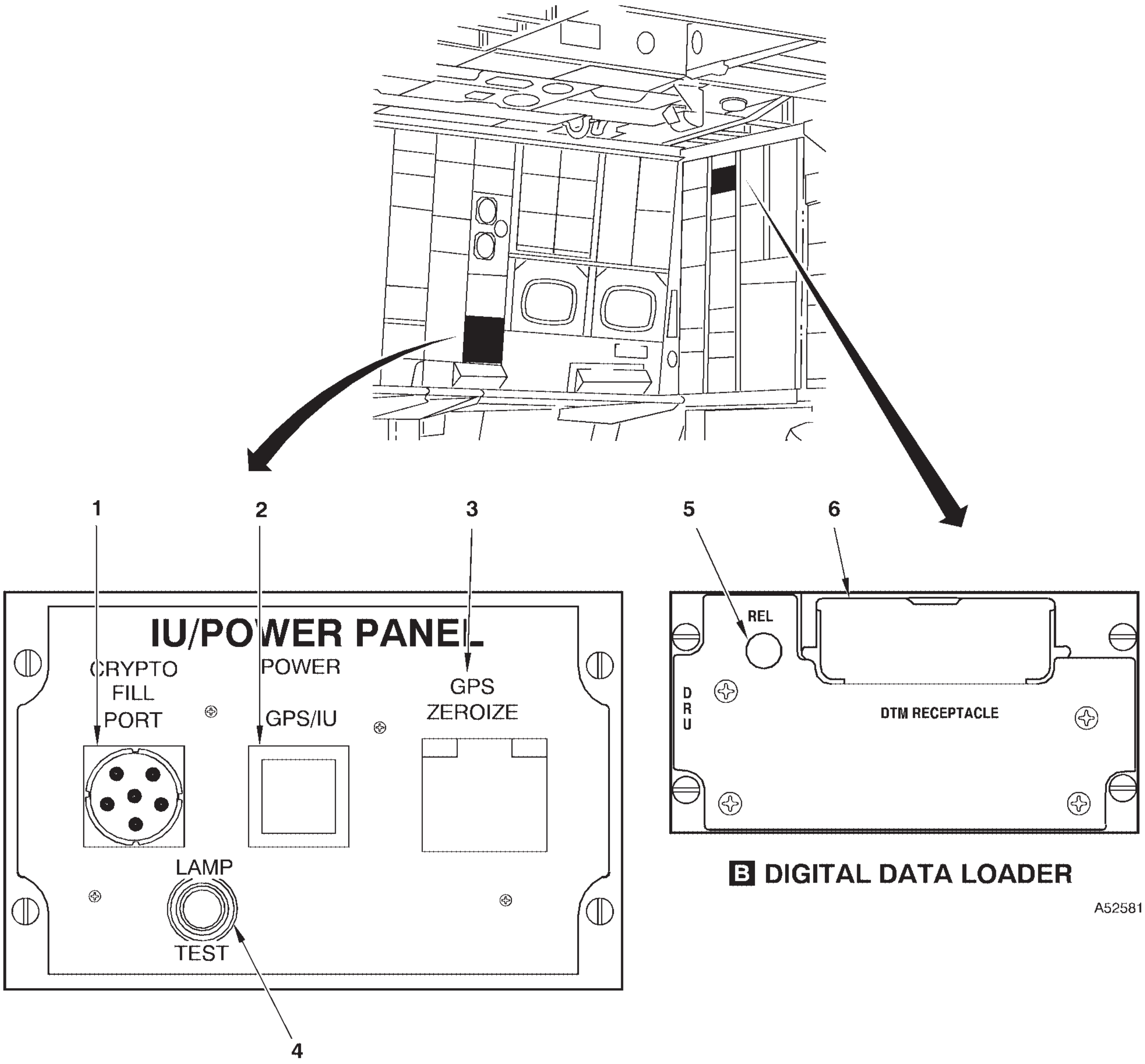


Figure 1-48

Interface Unit Controls and Indicators



B DIGITAL DATA LOADER

A INTERFACE UNIT CONTROL PANEL

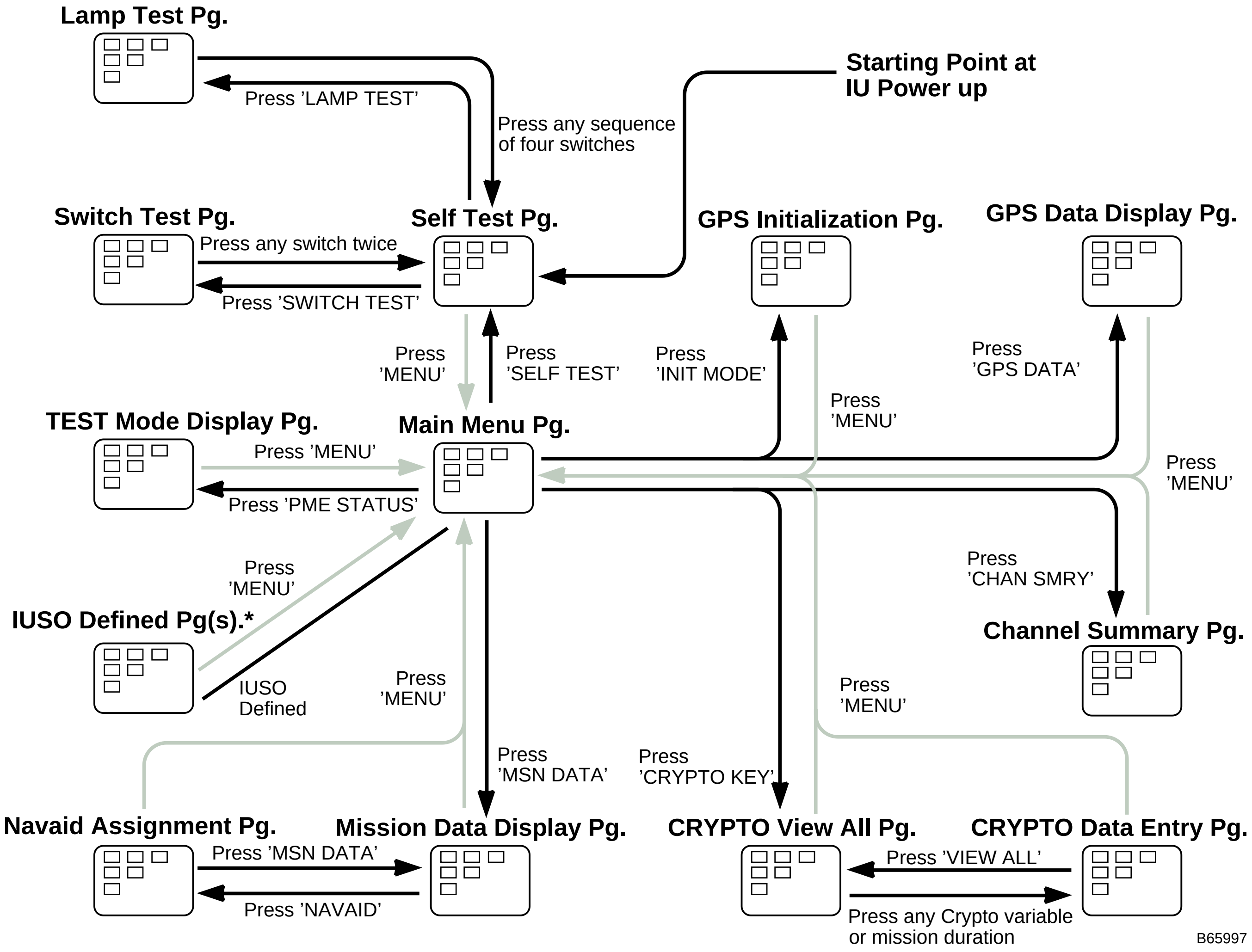
1 CRYPTO FILL PORT
2 GPS/IU POWER PUSHBUTTON SWITCH
3 GPS ZEROIZE PUSHBUTTON SWITCH
4 LAMP TEST SWITCH
5 REL (RELEASE) PUSHBUTTON SWITCH
6 DDLC SLOT

Figure 1-49 (Sheet 1 of 2)

NO.	CONTROL-INDICATOR	FUNCTION
	A INTERFACE UNIT CONTROL PANEL	
1	Crypto Fill Port	The port is used to connect the KYK-13 or CYZ-10 to the IU. A protective cap covers the fill port when not in use. The fill port is shown with the cap removed.
2	GPS/IU POWER Pushbutton Switch	Pressing the switch applies power to the GPS/IU. A lit light in the switch indicates power is applied to GPS/IU.
3	GPS ZEROIZE Pushbutton Switch	Pressing the switch sends a command to zeroize the GPS crypto keys. Absence or presence of Crypto Keys can be monitored in field 1 of the PKB Main Menu page. **NOTE** Once pressed the ZEROIZE switch remains depressed until pressed a second time. Pressing the switch a second time resets the switch to the non-depressed position. The switch must be reset in order to resend a zeroize command.
4	LAMP TEST Switch	Tests all lights on Interface Unit Control Panel.
	B DIGITAL DATA LOADER	
5	REL (Release) Pushbutton Switch	Pressing the button unlatches the DDLC from the slot. **NOTE** The position of the DDLC in the slot appears the same whether latched or unlatched. The DDLC must be pressed or pulled in order to determine if it is actually latched in the slot.
6	DDLC Slot	Slot for inserting the DDLC.

Figure 1-49 (Sheet 2 of 2)

Programmable Keyboard



The above graphic represents the relationship between the pages displayed on the PKB. The gray lines represent paths back to the Main Menu page. The uppercase text in single quotes represent the legend text of the switch that the operator must press to move to a different page.

Each PKB page is covered in detail in the following sheets of this figure.

* An Interface Unit Software Overlay (IUSO) may provide additional pages for display on the PKB. Any additional pages tied to an IUSO will be covered in the T.O. applicable to the IUSO.

Figure 1-50 (Sheet 1 of 36)

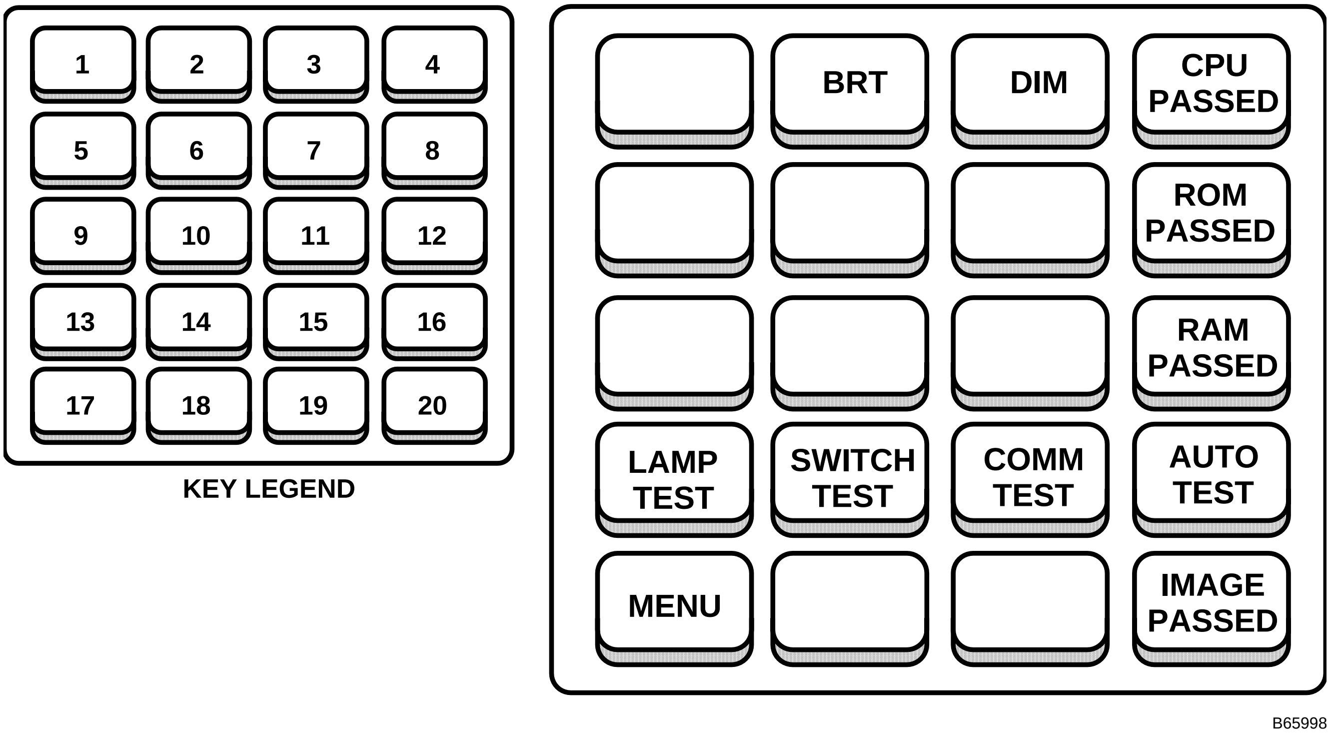
Following is a list of the 12 pages that can be displayed on the PKB.

PAGE	SHEET	FUNCTION
SELF TEST	3	This page is displayed upon the application of IU power. It is used to perform various self test procedures associated with the PKB.
LAMP TEST	5	This page is used to check the operation of the pixels on each switch.
SWITCH TEST	5	This page is used to test the operation of PKB switch responses.
MAIN MENU	6	This page is used to select other pages displayed by the PKB.
GPS INITIALIZATION	8	This page is used for initializing GPS position, velocity, and time.
GPS DATA DISPLAY	11	This page is used for displaying the current position, velocity, and time as received from the GPS receiver.
CHANNEL SUMMARY	15	This page is used for displaying the satellite tracking status of the GPS receiver.
CRYPTO VIEW ALL	20	This page is used to view the last Crypto Key entries made from the PKB and the mission duration. This page is also used to aid Crypto Key entry through the Crypto Fill Port.
CRYPTO KEY DATA ENTRY	23	This page is used to enter Crypto Key data or mission duration from the PKB.
MISSION DATA DISPLAY	25	This page is used to display the current Navaid (TACAN, VOR/DME, VORTAC) assignment for a destination.
NAVAID ASSIGNMENT	28	This page is used to change the Navaid assignment of a destination.
TEST MODE DISPLAY	31	This page is used to display BIT results for LRUs. For selected LRUs, this page may also be used to initiate a BIT

Figure 1-50 (Sheet 2 of 36)

Programmable Keyboard (Cont)

SELF TEST PAGE (TYPICAL)



The Self Test page is the first page that appears after power is applied to the IU. This page allows the operator to perform a series of tests on the PKB to ensure its proper operation. These tests include a COMM and an AUTO test. In addition to these tests, the operator may access the Lamp Test page and the Switch Test page from the Self Test Page.

KEY	CONTROL-INDICATOR	FUNCTION
1	Blank	This key is not used on the Self Test page.
2	BRT Switch	The BRT switch is used to increase the illumination of the legends on all of the PKB pages.
3	DIM Switch	The DIM switch is used to decrease the illumination of the legends on all of the PKB pages.
4	CPU PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the CPU test. PASSED is displayed If the CPU passes the test and FAILED is displayed if it fails.
5–7	Blank	These keys are not used on the Self Test page.
8	ROM PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the ROM test. PASSED is displayed If the ROM passes the test and FAILED is displayed if it fails.
9–11	Blank	These keys are not used on the Self Test page.
12	RAM PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the RAM test. PASSED is displayed If the RAM passes the test and FAILED is displayed if it fails.
13	LAMP TEST Switch	The LAMP TEST switch is used to access the Lamp Test page.
14	SWITCH TEST Switch	The SWITCH TEST switch is used to access the Switch Test page.

Figure 1-50 (Sheet 3 of 36)

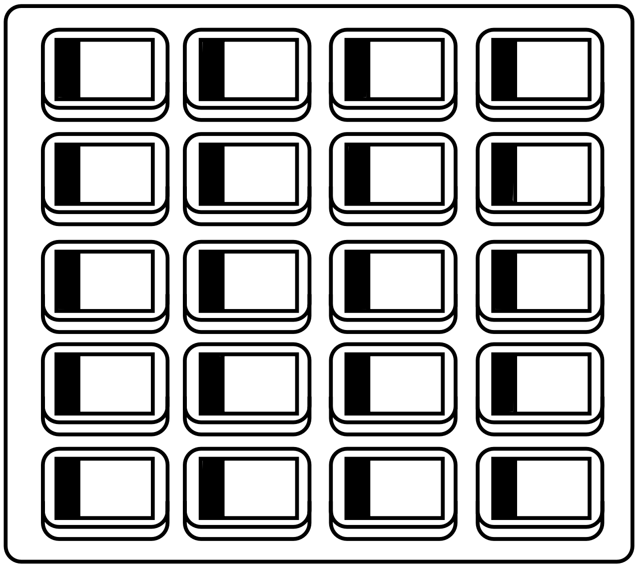
SELF TEST PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
15	COMM TEST Switch	The COMM TEST switch is used to determine if communication between the PKB and the IU is healthy. When this switch is pressed, a host test request message is sent to the IU. During the test, key 19 will display IS ACTIVE. The IU then has 10 seconds to answer the test message. Upon completion of the test, key 19 will display HAS PASSED, if the test passes, or HAS FAILED, if the test fails or the IU takes longer than 10 seconds. In either case, key 19 will return to its normal state after 10 seconds.
16	AUTO TEST Switch	The AUTO TEST switch is used to perform a series of tests on the PKB. These tests include an IMAGE, ROM, RAM, and CPU test. When this switch is pressed, keys 4, 8, 12, and 20 will be used to display the results of the tests. A pass or fail status will be reported for all of the tests. If a fault condition occurs, the IU will record the fault. A fault condition does not necessarily indicate that all PKB functions will be affected. If PKB use is continued, problems may or may not be encountered depending on the nature of the failure. Display of AUTO TEST results remain for 10 seconds, then the PKB display returns to the self test display.
17	MENU Switch	This switch serves a dual purpose. The first purpose of this switch is to display the MENU legend upon the successful download of the database from the IU to the PKB. While this legend is blank, it should have no response to operator selection. Once the MENU legend is displayed, the operator may select this switch to access the Main Menu page. If the MENU legend fails to appear shortly after power has been applied to the IU, then the operator may press the COMM TEST switch to attempt to re-download the database.
18	Blank	This key is not used on the Self Test page.
19	COMM TEST Display Key	Used during the COMM TEST. During the test, the key will display IS ACTIVE. The IU then has 10 seconds to answer the test message. Upon completion of the test, the key will display HAS PASSED, if the test passes, or HAS FAILED, if the test fails or the IU takes longer than 10 seconds. In either case, key 19 will return to its normal state (blank) after 10 seconds.
20	IMAGE PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the IMAGE (Image RAM of the PKB) test. PASSED is displayed If the IMAGE passes the test and FAILED is displayed if it fails.

Figure 1-50 (Sheet 4 of 36)

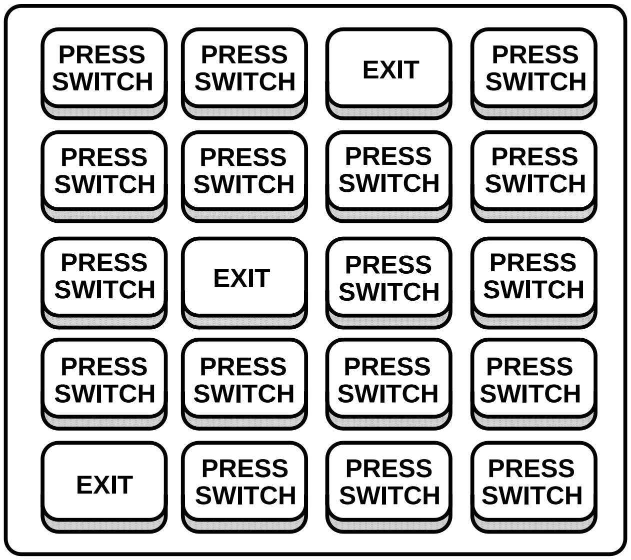
Programmable Keyboard (Cont)

LAMP TEST PAGE



The Lamp Test page is used to check the operation of all of the pixels in all of the PKB switches. When the Lamp Test page is first displayed, it will look as above. This graphic shows the first of a series of four similar displays on this page. The blackened areas are illuminated pixels. When the operator selects any switch, all the keys will clear, then illuminate the second column of pixels. The operator must press any two additional switches before returning to the Self Test page. In the process of pressing three switches, four different columns of pixels will be illuminated on all keys allowing inspection of every pixel of every switch.

SWITCH TEST PAGE (TYPICAL)



The Switch Test page is used to inspect the PKB response to the selection of a switch by the operator. Upon display of the Switch Test page, all keys will display PRESS SWITCH. When the operator selects any of the switches, the text in the key will change to EXIT, assuming the PKB acknowledged the switch selection. To thoroughly evaluate the PKB, all 20 switches should be checked.

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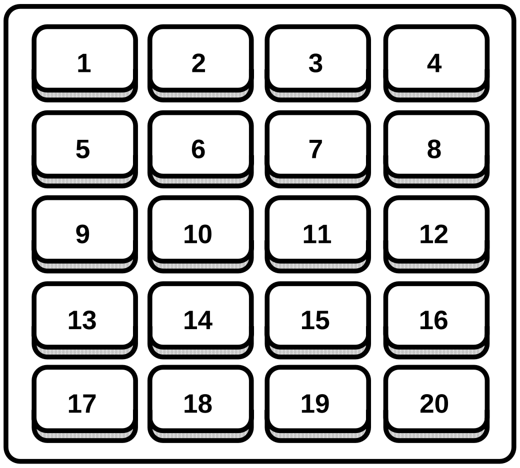
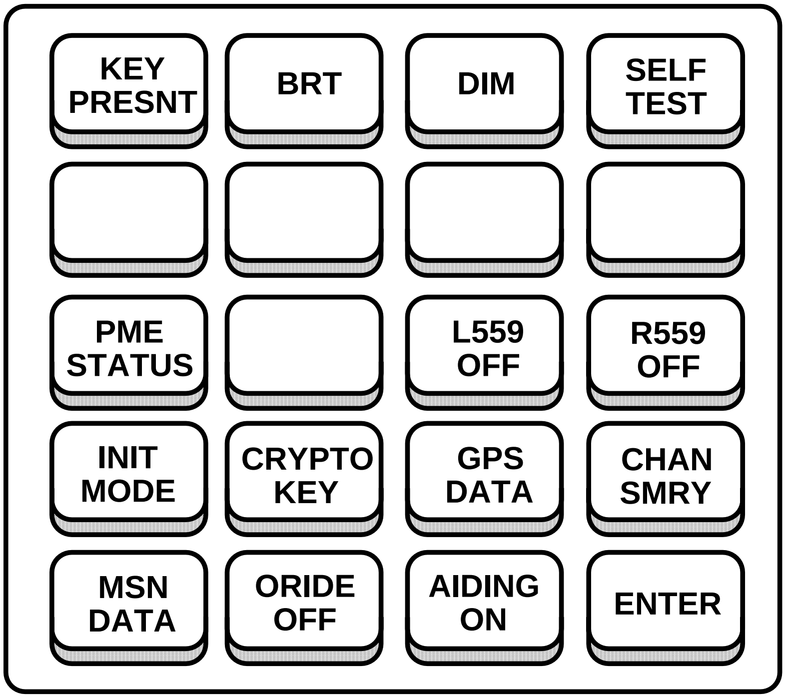
Figure 1-50 (Sheet 5 of 36)

MAIN MENU PAGE (TYPICAL)



KEY LEGEND



The Main Menu page serves as the jumping point for accessing the majority of the pages that the PKB displays. An example of the Main Menu page is shown above. When the operator chooses a switch that blinks upon selection, it is an indication that the ENTER switch must be pressed to carry out the desired action. Blinking may be stopped by selecting the blinking switch again or by selecting a different switch.

KEY	CONTROL-INDICATOR	FUNCTION
1	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (C/A) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.
2	BRT Switch	The BRT switch is used to increase the illumination of the legends on all of the PKB pages.
3	DIM Switch	The DIM switch is used to decrease the illumination of the legends on all of the PKB pages.
4	SELF TEST Switch	The SELF TEST switch is used to access the Self Test page.
5–8	IUSO Defined Keys	These keys are reserved for use by an IUSO. If an IUSO is loaded, these switches will be available to the IUSO for accessing IUSO specific pages.

Figure 1-50 (Sheet 6 of 36)

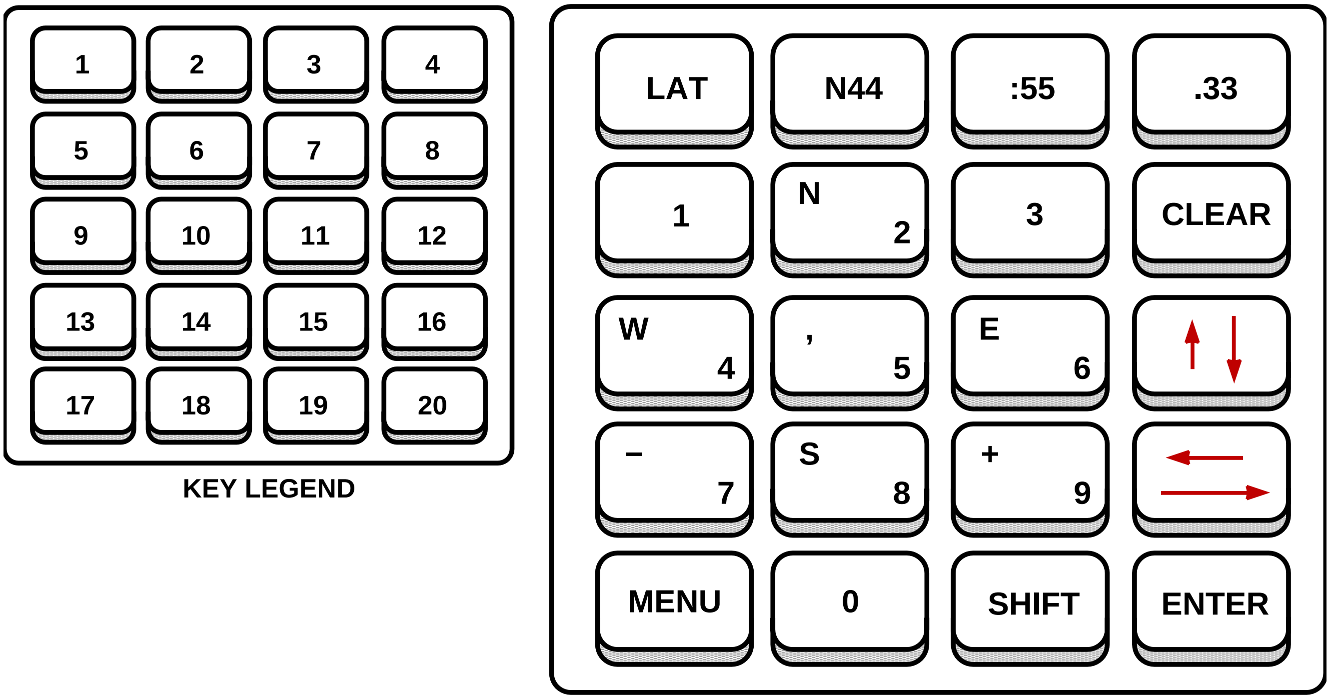
Programmable Keyboard (Cont)

MAIN MENU PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
9	PME Status Switch	The PME STATUS switch is used to access the Test Mode Display page and indicate faults.
	PME STATUS	Indicates that there are no faults (past or present) awaiting operator acknowledgement.
	PME STATUS	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
10	Blank	This key is not used on the Main Menu page.
11	L559 Status Switch	This switch is used for removing or applying power to the left 559 station. When power modification to the left 559 station has been inhibited by an IUSO, the legend will be underlined. When an IUSO has inhibited power modification, this switch will serve as a status switch for the power state.
	L559 OFF	L559 power is OFF. It is underlined when L559 power application is inhibited.
	L559 ON	L559 power is ON.
12	R559 Status Switch	This switch is used for removing or applying power to the right 559 station. When power modification to the right 559 station has been inhibited by an IUSO, the legend will be underlined. When an IUSO has inhibited power modification, this switch will serve as a status switch for the power state.
	R559 OFF	R559 power is OFF. It is underlined when R559 power application is inhibited.
	R559 ON	R559 power is ON.
13	INIT MODE Switch	The INIT MODE switch is used to access the GPS Initialization page.
14	CRYPTO KEY Switch	The CRYPTO KEY switch is used to access the Crypto Key View All page.
15	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
16	CHAN SMRY Switch	The CHAN SMRY switch is used to access the Channel Summary page.
17	MSN DATA Switch	The MSN DATA switch is used to access the Mission Data Display page.
18	Crypto Key Override Switch	This switch is used to allow the operator to override navigation crypto keys.
	ORIDE OFF	Indicates that the crypto keys are not being overridden. Default state.
	ORIDE ON	Indicates that the crypto keys are being overridden.
19	INU AIDING Enable/Disable Switch	This switch allows the operator to enable or disable Inertial Navigation System (INU) feedback aiding of the GPS User Equipment (UE).
	AIDING OFF	Indicates that the IUS is not providing Alt Nav and INU feedback information to the GPS UE.
	AIDING ON	Indicates that the IUS is providing Alt Nav and INU feedback information to the GPS UE. Default state.
20	ENTER Switch	The ENTER switch is used to carry out any action associated with a blinking legend. For example, if the ORIDE ON legend is blinking and the operator presses the ENTER switch, the ORIDE ON legend will toggle to ORIDE OFF. Pressing the ENTER switch while no legends are blinking will be ignored.

Figure 1-50 (Sheet 7 of 36)

GPS INITIALIZATION PAGE (TYPICAL)



B66001

The Initialization mode format provides a manual method for the operator to insert initialization data to the GPS IU. Initialization mode may be used for GPS startup or to correct erroneous data inflight. The format allows entry of latitude, longitude, altitude, date, time, groundspeed, and ground track information.

The GPS Initialization page functions by displaying one initialization field at a time. The operator is responsible for entering the proper values and pressing the ENTER switch to temporarily hold the data. Pressing the ENTER switch will automatically display the next field for entry.

NOTE

If the operator presses the up/down arrow switches without pressing the ENTER switch, any newly entered data for that field will be discarded.

When the operator is done entering all of the initialization data the SEND DATA legend is automatically displayed. If partial data is entered, the operator is required to press the up/down arrow or ENTER switches until the SEND DATA legend is displayed on switch 1. Once the SEND DATA legend is displayed, the operator needs to press this switch in order to re-initialize the GPS receiver. Pressing the ENTER switch alone will not cause the data to be sent to the GPS receiver.

If the data entry fields (keys 2–4) are displayed outlined by a box, an invalid value has been entered. Pressing any other switch, with the exception of the ENTER switch and the first four switches, will remove the box.

When the GPS Initialization page is displayed, the values displayed in the data entry fields will be the last values entered at the last re-initialization or the default values.

Figure 1-50 (Sheet 8 of 36)

Programmable Keyboard (Cont)

GPS INITIALIZATION PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
1	Data Field Definition/ SEND DATA Switch	Used to indicate the type of the data entry field being displayed and to indicate that all data is ready to be sent to the GPS receiver.
	LAT	The latitude data entry field is being displayed in keys 2–4.
	LONG	The longitude data entry field is being displayed in keys 2–4.
	ALT	The altitude data entry field is being displayed in key 2. Altitude displayed times 10 equals the actual altitude above Mean Sea Level (MSL).
	DATE	The date data entry field is being displayed in keys 2–4.
	TIME	The time data entry field is being displayed in keys 2–4.
	GTA	The ground track angle in degrees is being displayed in key 2.
	GS	The ground speed in knots is being displayed in key 2.
	SEND DATA	The SEND DATA switch is not a data entry field identifier. Pressing this switch will send the currently entered data to the IU for GPS re-initialization
2	Data Field Display Key	Keys 2 through 4 are used for displaying the data entry fields for the items listed in key 1. A cursor is placed under the current character/value being modified. If an errant value is entered, the field will be outlined by a box upon pressing the ENTER switch. The box can be removed by pressing any switch other than the ENTER switch or the first four switches.
	xdd	Data Entry for Latitude x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	Data Entry for Longitude; x = E for East or W for West; ddd = 0 to 180 degrees.
	ffff	Data Entry for Altitude above Mean Sea Level (actual altitude is displayed altitude times 10); ffff = –130 to 5000.
	mm	Data Entry for Date (Month); mm =1 to 12.
	hh	Data Entry for Time (Hours); hh = 0 to 23.
	ddd	Data Entry for Ground Track Angle in degrees; ddd = 0 to 359.
	nnn	Data Entry for Ground Speed in Knots; Range nnn = 0 to 650.
3	Data Field Display Key	
	:mm	Data Entry for Latitude or Longitude minutes; mm = 0 to 59.
	dd	Data Entry for Date (Day); dd = 0 to 31.
	:mm	Data Entry for Time (Minutes); mm = 0 to 59.
4	Data Field Display Key	
	.mm	Data Entry for Latitude or Longitude hundredths of minutes; mm = 0 to .99.
	yy	Data Entry for Date (Year); yy = 0 to 99.
	:ss	Data Entry for Time (Seconds); ss = 0 to 59.
5–7	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept this default value for initialization.

Figure 1-50 (Sheet 9 of 36)

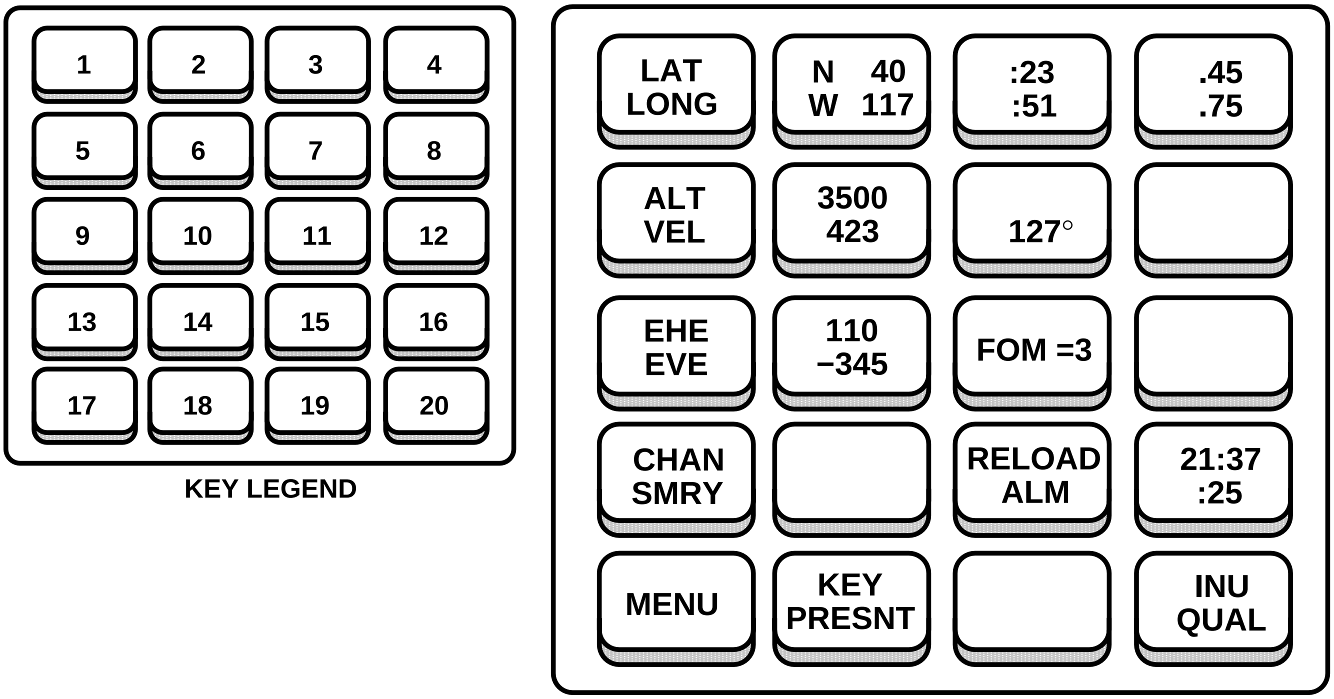
GPS INITIALIZATION PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
9–11	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the various data entry fields described under key 1. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry fields. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the data entry fields displayed in keys 2–4.
19	SHIFT Switch	The SHIFT switch is used to enter characters displayed in the upper left hand corner of the legends. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to accept a value displayed in the data entry field for temporary storage. The value is stored until the SEND DATA switch (see key 1) is selected. Range checks will also be made when the ENTER switch is pressed. Pressing the ENTER switch will automatically display the next data entry field.

Figure 1-50 (Sheet 10 of 36)

Programmable Keyboard (Cont)

GPS DATA DISPLAY PAGE (TYPICAL)



B66002

The GPS has a stand alone capability which allows use of the GPS equipment in an unaided mode, if AIDING OFF is selected. The GPS Data Display page is used to display the current position, altitude, velocity, Estimated Horizontal Error (EHE), Estimated Vertical Error (EVE), Figure of Merit (FOM), Universal Time Coordinated (UTC), Crypto Key status, GPS fault status, and GPS/Mode Quality status.

Keys 1, 5 and 9 are static legends and only serve as tags. They indicate what kind of data is being displayed to the right of the legend. For example, the LAT LONG legend indicates that the top of keys 2–4 represent the current latitude and the bottom of the legends represent the current longitude.

Figure 1-50 (Sheet 11 of 36)

GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	LAT/LONG Legend Key	Static text to indicate that the upper portions of keys 2–3 represent latitude and the lower portions indicate longitude.
2	LAT/LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
3	LAT/LONG Minutes Display Key	
	:mm	Latitude (upper portion) and Longitude (lower portion) minutes; :mm = 0 to 59.
4	LAT/LONG Hundredths of Minutes Display Key	
	.mm	Latitude (upper portion) and Longitude (lower portion) hundredths of minutes; .mm = .0 to .99.
5	ALT/VEL Legend Key	Static text to indicate that the upper portion of key 6 represent aircraft altitude and the lower portion indicates aircraft velocity (ground speed). The other component of velocity, the ground track angle, is displayed in the lower portion of key 7.
6	ALT/VEL Display Key	
	ffff	(Upper Portion) Stand Alone GPS altitude above mean sea level (displayed altitude times 10 equals the actual MSL altitude); ffff = 0 to 9999.
	nnn	(Lower Portion) Stand Alone ground speed (GS) in knots; nnn = 0 to 999.
7	Ground Track Angle Display Key	
	ddd°	(Lower Portion) Stand Alone ground track angle (GTA); ddd° = 0 to 359; GTA is blanked for GPS ground speed values less than 60 knots. The upper portion of this key is blank.
8	Blank	This key is not used on the GPS Data Display page.
9	EHE/EVE Legend Key	Static text to indicate that the upper portion of key 15 represents the GPS Estimated Horizontal Error (EHE) and the lower portion indicates the GPS Estimated Vertical Error (EVE).
10	EHE/EVE Display Key	
	sXXXXX	(Upper Portion) EHE display in feet; s = blank for positive or – for negative.
	sYYYYY	(Lower Portion) EVE display in feet; s = blank for positive or – for negative.
11	FOM Display Key	This switch is used for displaying the Figure of Merit (FOM). A FOM number 1 to 9 is displayed as an estimate of GPS performance. A higher number indicates lower comparable system performance. A number 1 FOM displayed indicates an estimated position error of less than 25 meters. A number 9 FOM displayed indicates an estimated error in excess of 5000 meters.
	FOM = n	Stand Alone GPS Figure-of-Merit; n = 0 to 9; Default to zero.
12	Blank	This key is not used on the GPS Data Display page.
13	CHAN SMRY Switch	The CHAN SMRY switch is used to access the Channel Summary page.
14	RELOAD YES? Switch	Is displayed only during a request to reload almanac data confirmation. Pressing this switch with RELOAD YES? displayed will cause almanac data to be retrieved from the GPS UE. The almanac data reload confirmation can be cancelled by pressing switch 11 while RELOAD NO? is displayed or by displaying another page.

Figure 1-50 (Sheet 12 of 36)

Programmable Keyboard (Cont)

GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
15	RELOAD ALM/ RELOAD NO? Switch	When RELOAD ALM is displayed, this switch is used to request a reload of almanac data by causing the GPS UE to be reinitialized. When pressed, the operator will be asked for confirmation before the almanac data reload is performed. The almanac reload confirmation request can be cancelled by pressing this switch while RELOAD NO? is displayed or by displaying another page. Reloading the almanac data blanks this switch during the GPS UE initialization. If OAS data is not available, GPS Initialization data must be entered to complete GPS UE initialization. Once GPS UE initialization completes, the RELOAD ALM legend will re-appear. **NOTE** Reloading almanac should be performed after the GPS UE has acquired and tracked at least 4 satellites for a period of at least 30 minutes. This allows the GPS UE adequate time to download an updated set of almanac data from the satellites
16	TIME Display Key	Stand Alone Universal Time Coordinated (UTC) data.
	hh:mm :ss	Displayed time is rounded to the nearest whole second; hh = 0 to 23 hours, mm = 0 to 59 minutes, and ss = 0 to 59 seconds.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (C/A) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.
19	GPS Fault Status Switch	This switch is used to display the GPS fault status. When a fault occurs, the type of fault will be displayed in a box, until the operator presses this switch. If there are no additional faults, the key will return to a state displaying all reported GPS LRU faults.
	$\boxed{\text{AE}}$	AE displayed in box outline when the GPS AE is faulted, until the operator acknowledges the fault by pushing the switch (priority 1). Acknowledging the fault does not clear the fault.
	$\boxed{\text{RPU}}$	RPU displayed in box outline when the GPS RPU is faulted, until the operator acknowledges the fault by pushing the switch (priority 2). Acknowledging the fault does not clear the fault.
	$\boxed{\text{BATT}}$	BATT displayed in box outline when the GPS battery is faulted, until the operator acknowledges the fault by pushing the switch (priority 3). Acknowledging the fault does not clear the fault.
	AE/RPU BATT	Displayed on IU start up and after one or more of the above GPS fault(s) has been acknowledged. While each fault exists, its associated legend, AE, RPU, and BATT, will be displayed. Displays blanks when not faulted.

Figure 1-50 (Sheet 13 of 36)

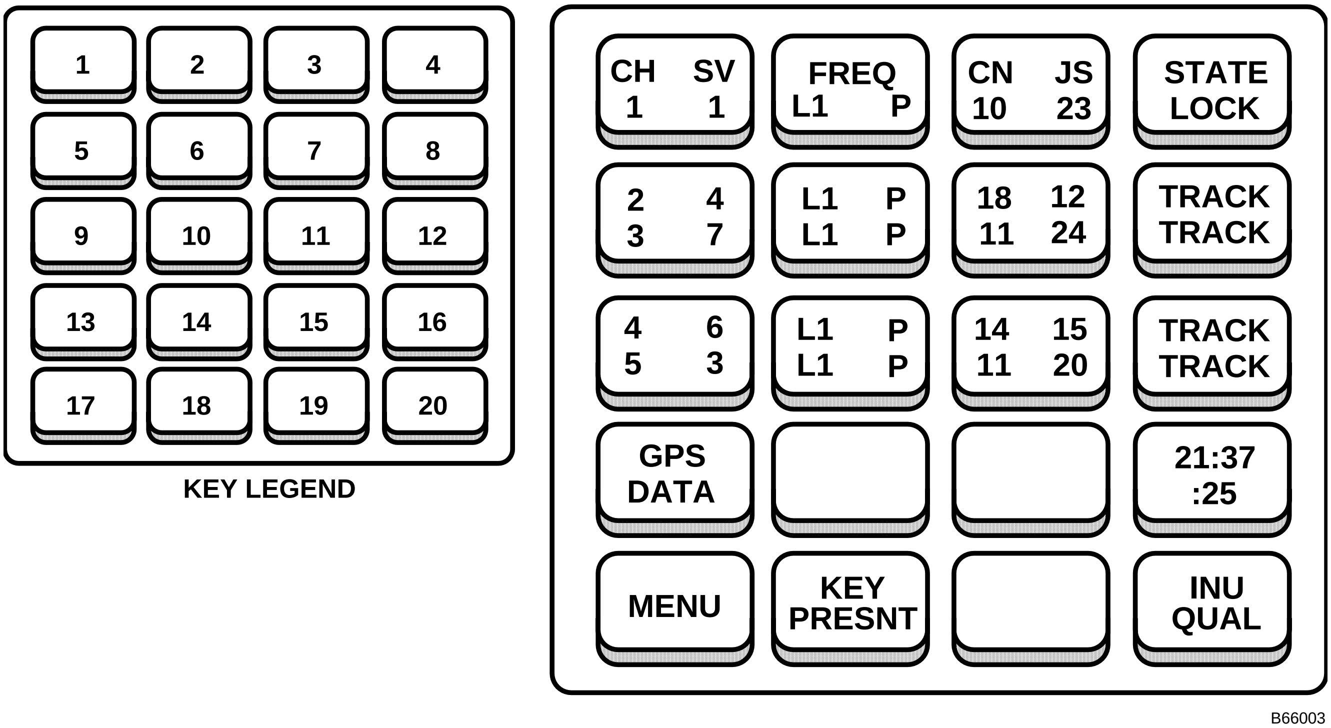
GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
20	GPS Status Key	This key is used for displaying the GPS status
	INIT REQ	Displayed when GPS receiver is requesting INIT data. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded.
	DTS ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DTC. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded.
	DDLC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DDLC .
	COLD START	GPS receiver is requesting almanac data and IUS has failed to retrieve it from DTC on first attempt. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded. Once almanac data is received, the IU will terminate cold start and proceed with a normal startup. **NOTE** The cold start may vary in length from 15 minutes up to an hour or more depending on the satellite configuration available at a given place and time.
	INU QUAL	Displayed when IU status indicates GPS data is good enough for an INU update.
	ALTNAV QUAL	Displayed when IU status indicates GPS data is good enough for an ALTNAV update.
	LOW QUAL	Displayed when IU status indicates GPS data is not good enough for an INU or an ALTNAV update. Can also be displayed when there is no communication with FMS.
	DATA?	Displayed when GPS does not have a valid navigation solution.

Figure 1-50 (Sheet 14 of 36)

Programmable Keyboard (Cont)

CHANNEL SUMMARY PAGE (TYPICAL)



KEY	CONTROL-INDICATOR	FUNCTION
1	Satellite CH (Channel) and SV (Satellite Vehicle ID) Display Key	Keys 1, 5 and 9 are used to display the satellite ID number that each channel is tracking. The channel is designated in the CH column and the SV ID is displayed in the SV column.
	CH SV	(Upper Portion) Static legend to designate the columns as the CH (Channel) and SV (Satellite Vehicle ID) columns.
	1 ss	(Lower Portion) 1 represents Channel number 1; ss represents the satellite number. ss = 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
2	Frequency Display Key	Keys 2, 6 and 10 are used to display the frequency and code being used for each channel.
	FREQ	(Upper Portion) Static legend to designate the column as the frequency (and code) that is being used for each channel.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 1. Fields are blank, if the channel is faulted. ff= L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate)

Figure 1-50 (Sheet 15 of 36)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
3	CN (Carrier to Noise Ratio) and JS (Jamming to Signal Ratio) Display Key	Keys 3, 7 and 11 are used to display the CN and the JS for each channel. Both ratios are displayed in dB.
	CN JS	(Upper Portion) Static legend to designate the column as the CN and the JS of each channel.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 1. Fields are blank, if the channel is faulted. nn= 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
4	Tracking STATE Display Key	Keys 4, 8 and 12 are used to display the tracking state for each channel of the GPS receiver.
	STATE	(Upper Portion) Static legend to designate the column as the tracking state that is being used for each channel.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 1. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Lower Portion The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Lower Portion)The receiver has encountered a signal drop and is currently attempting to reacquire the signal.
	FAULT	(Lower Portion) Displayed if channel is faulted.
5	Channels 2 and 3 SV Display Key	Key displays the satellite ID number for Channels 2 and 3. ss= 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
	2 ss	(Upper Portion) 2 represents Channel 2; ss represents the satellite number.
	3 ss	(Lower Portion) 3 represents Channel 3; ss represents the satellite number.
6	Channels 2 and 3 Frequency Display Key	Key displays the frequency and code being used for Channels 2 and 3. ff= L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate).
	ff cc	(Upper Portion) ff represents the frequency and cc represents the code being used for Channel 2. Fields are blank, if the channel is faulted.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 3. Fields are blank, if the channel is faulted.

Figure 1-50 (Sheet 16 of 36)

Programmable Keyboard (Cont)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
7	Channels 2 and 3 CN and JS Display Key	Key displays the CN and the JS for Channels 2 and 3. Fields are blank, if the channel is faulted. nn= 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
	nn jj	(Upper Portion) nn represents the CN and jj represents the JS for Channel 2.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 3.
8	Channels 2 and 3 Tracking STATE Display Key	Key displays the tracking state for Channels 2 and 3.
	xxxxxx	(Upper Portion) Represents the tracking state being used for Channel 2. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 3. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Upper/Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Upper/Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Upper/Lower Portion) The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Upper/Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Upper/Lower Portion) The receiver has encountered a signal drop and is currently attempting to re-acquire the signal.
	FAULT	(Upper/Lower Portion) Displayed if channel is faulted.
9	Channels 4 and 5 SV Display Key	Key displays the satellite ID number for Channels 4 and 5. ss= 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
	4 ss	(Upper Portion) 4 represents Channel 4; ss represents the satellite number.
	5 ss	(Lower Portion) 5 represents Channel 5; ss represents the satellite number.
10	Channels 4 and 5 Frequency Display Key	Key displays the frequency and code being used for Channels 4 and 5. ff= L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate).
	ff cc	(Upper Portion) ff represents the frequency and cc represents the code being used for Channel 4. Fields are blank, if the channel is faulted.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 5. Fields are blank, if the channel is faulted.

Figure 1-50 (Sheet 17 of 36)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
11	Channels 4 and 5 CN and JS Display Key	Key displays the CN and the JS for Channels 4 and 5. Fields are blank, if the channel is faulted. nn= 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
	nn jj	(Upper Portion) nn represents the CN and jj represents the JS for Channel 4.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 5.
12	Channels 4 and 5 Tracking STATE Display Key	Key displays the tracking state for Channels 4 and 5.
	xxxxxx	(Upper Portion) Represents the tracking state being used for Channel 4. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 5. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Upper/Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Upper/Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Upper/Lower Portion) The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Upper/Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Upper/Lower Portion) The receiver has encountered a signal drop and is currently attempting to re-acquire the signal.
	FAULT	(Upper/Lower Portion) Displayed if channel is faulted.
13	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
14–15	Blank	These keys are not used on the Channel Summary page.
16	TIME Display Key	Stand Alone Universal Time Coordinated (UTC) data.
	hh:mm:ss	Displayed time is rounded to the nearest whole second; hh = 0 to 23 hours, mm = 0 to 59 minutes, and ss = 0 to 59 seconds.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.

Figure 1-50 (Sheet 18 of 36)

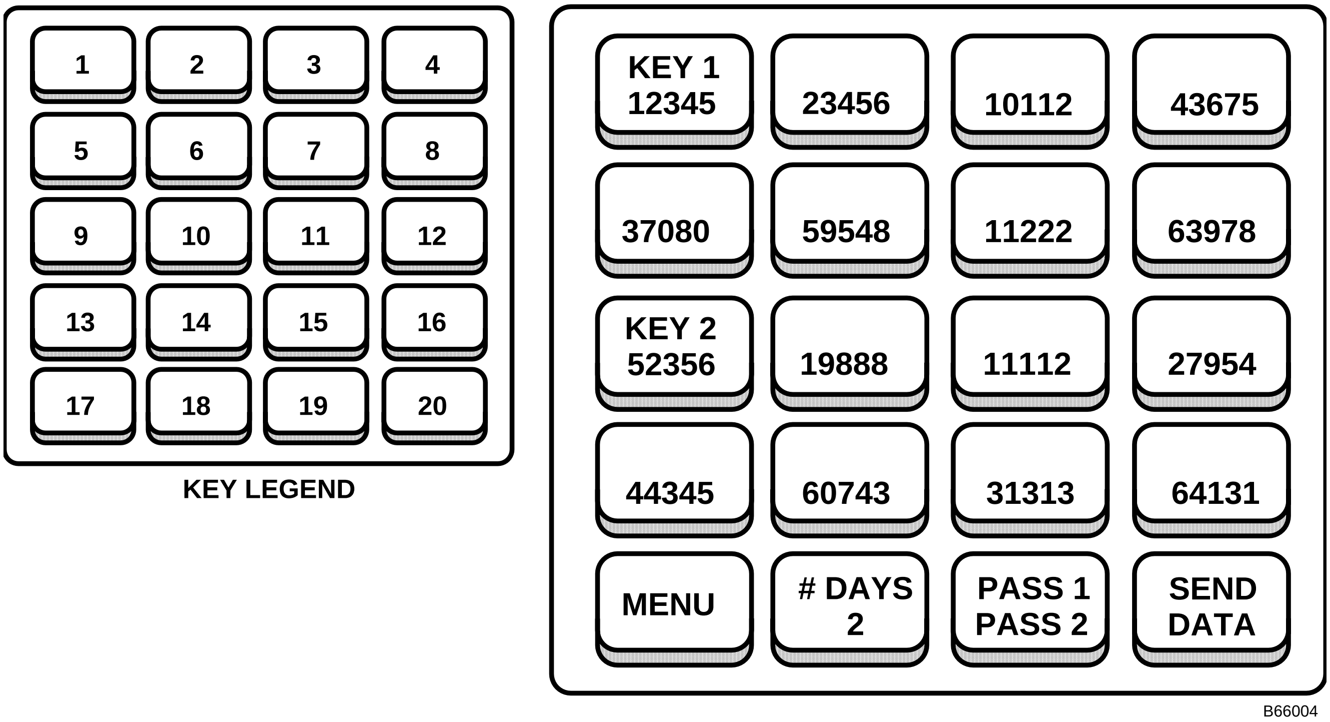
Programmable Keyboard (Cont)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
18	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (CA) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.
19	GPS Fault Status Switch	This switch is used to display the GPS fault status. When a fault occurs, the type of fault will be displayed in a box, until the operator presses this switch. If there are no additional faults, the key will return to a state displaying all reported GPS LRU faults.
	AE	AE displayed in box outline when the GPS AE is faulted, until the operator acknowledges the fault by pushing the switch (priority 1). Acknowledging the fault does not clear the fault.
	RPU	RPU displayed in box outline when the GPS RPU is faulted until the operator acknowledges the fault by pushing the switch (priority 2). Acknowledging the fault does not clear the fault.
	BATT	BATT displayed in box outline when the GPS battery is faulted until the operator acknowledges the fault by pushing the switch (priority 3). Acknowledging the fault does not clear the fault.
	AE/RPU BATT	Displayed on IU start up and after one or more of the above GPS fault(s) has been acknowledged. While each fault exists, its associated legend, AE, RPU, and BATT, will be displayed. Displays blanks when not faulted.
20	GPS Status Key	This key is used for displaying the GPS status
	INIT REQ	Displayed when GPS receiver is requesting INIT data. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded.
	DTS ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DTC. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded.
	DDLC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DDLC.
	COLD START	GPS receiver is requesting almanac data and IUS has failed to retrieve it from DTC on first attempt. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTC is properly loaded. Once almanac data is received, the IU will terminate cold start and proceed with a normal startup. **NOTE** The cold start may vary in length from 15 minutes up to an hour or more depending on the satellite configuration available at a given place and time.
	INU QUAL	Displayed when IU status indicates GPS data is good enough for an INU update.
	ALTNAV QUAL	Displayed when IU status indicates GPS data is good enough for an ALTNAV update.
	LOW QUAL	Displayed when IU status indicates GPS data is not good enough for an INU or an ALTNAV update. Can also be displayed when there is no communication with FMS.
	DATA?	Displayed when GPS does not have a valid navigation solution.

Figure 1-50 (Sheet 19 of 36)

CRYPTO VIEW ALL PAGE (TYPICAL)



KEY LEGEND

The Crypto Key View All page is used to display the most recent set of Crypto Keys entered from the PKB. This page is also used to display the mission duration and the GPS receiver parity test in order to facilitate checking and modifying a previous input. The Crypto Key View All page can be displayed by pressing CRYPTO KEY on the Main Menu page.

Keys 1–8 are used to display the 8 components that make up the first Crypto Key. Similarly, keys 9–16 are used to display the 8 components that make up the second Crypto Key. The values displayed for these keys represent the last values entered by the operator. Selecting any of these switches will take the operator to the Crypto Key Data Entry page. The value that will be displayed on the Crypto Key Data Entry page will be the component displayed on the switch selected. In other words, if the operator wants to edit the first component of the first Crypto Key, pressing switch 1 would display the Crypto Key Data Entry page with the first component displayed for editing. Crypto Keys entered through the Crypto Fill Port will not be displayed on the PKB.

KEY	CONTROL-INDICATOR	FUNCTION
1	Crypto KEY 1 Display Switch	Key denotes that keys 1 through 8 are designated for displaying Crypto key 1 data. These switches are also used to access the associated data line on the Crypto Key Data Entry page.
	KEY 1	(Upper Portion) Static legend to designate that keys1 through 8 represent crypto KEY 1 data.
	xxxxx	(Lower Portion) Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
2–8	Crypto Key 1 Data Display Switches	
	xxxxx	Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).

Figure 1-50 (Sheet 20 of 36)

Programmable Keyboard (Cont)

CRYPTO VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9	Crypto KEY 2 Display Switch	Key denotes that keys 9 through 16 are designated for displaying Crypto key 2 data. These switches are also used to access the associated data line on the Crypto Key Data Entry page.
	KEY 2	(Upper Portion) Static legend to designate that keys 9 through 16 represent crypto KEY 2 data.
	xxxxx	(Lower Portion) Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
10–16	Crypto Key 2 Data Display Switches	
	xxxxx	Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	#DAYS Switch	This switch is used for displaying the mission duration in days. The duration may be anywhere from 1 to 14 days in length. Pressing this switch will also display the Crypto Key Data Entry page with the mission duration field displayed for editing.
	#DAYS	(Upper Portion) Static legend to denote that this switch displays the mission duration in days.
	xx	(Lower Portion) Mission duration; xx = 1 to 14 days.
19	Crypto Key Parity Display Key/ Crypto Fill Port Data Entry Aiding Switch	This switch serves two purposes, displaying Crypto Key parity status and aiding data entry through the Crypto Fill Port.
	Crypto Key Parity Display Key	When used to display Crypto Key parity status, a pass or fail indication for each key will be reported when the operator selects the SEND DATA (key 20) switch. If the status comes back as failed, the operator may press the SEND DATA switch again after exiting and redisplaying the Crypto Key View All page. The top of the legend is reserved for displaying Crypto Key 1 parity status and the bottom for Crypto Key 2 parity status. Parity tests will appear one at a time and will complete within a nominal time of 30 seconds if two keys are being sent. If FAIL 1 and FAIL 2 are displayed, key data should be reviewed for errors, corrected if necessary, and retransmitted.
	FAIL 1	(Upper Portion) Indicates parity fail for key 1 data transferred to the GPS UE.
	FAIL 2	(Lower Portion) Indicates parity fail for key 2 data transferred to the GPS UE.
	PASS 1	(Upper Portion) Indicates parity pass for key 1 data transferred to the GPS UE.
	PASS 2	(Lower Portion) Indicates parity pass for key 2 data transferred to the GPS UE.
	Crypto Fill Port Data Entry Aiding Switch	This switch is also used to aid data entry from the Crypto Fill Port. When either a KYK-13 or CYZ-10 is detected at the Crypto Fill Port (power must be applied to the fill device), CRYPTO FILL will be displayed as an indication that Crypto Key data may be entered through the Crypto Fill Port. (Refer to the KYK-13 or CYZ-10 operator manual for instruction on selecting the key for entry.) Pressing this switch while CRYPTO FILL is displayed, will change the switch display to LOAD. Pressing the switch while LOAD is displayed will load any available Crypto Key from the Crypto Fill Port into the IU memory location specified by switch 20, CRYPTO KEY 1 or CRYPTO KEY 2.

Figure 1-50 (Sheet 21 of 36)

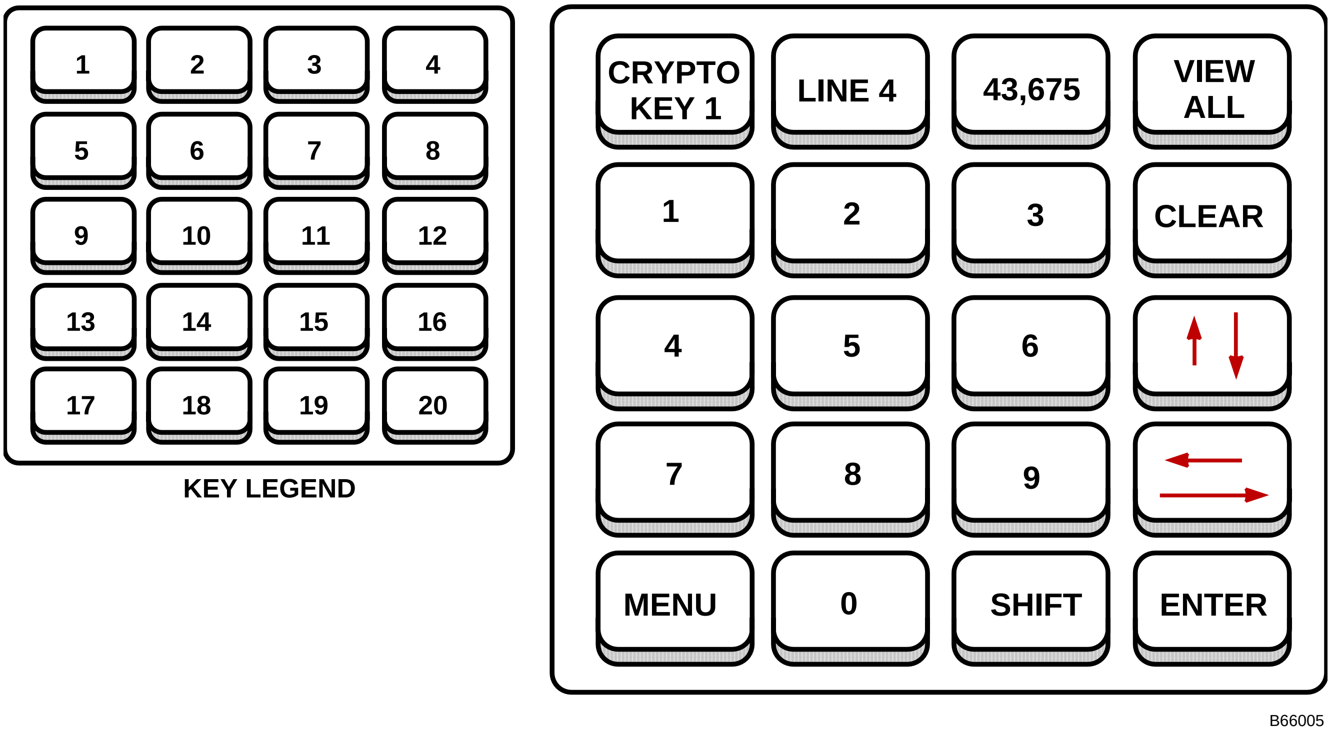
CRYPTO VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
19 (Cont)	Crypto Fill Port Data Entry Aiding Switch (Cont)	With LOAD displayed, the location in IU memory may be selected with switch 20 which will read either CRYPTO KEY 1 or CRYPTO KEY 2. The IU memory location should be selected before LOAD is pressed. Any Crypto Key existing in the specified location will be overwritten when LOAD is selected. **NOTE** The CYZ-10 protocol must be set to KYK-13 in order for the CYZ-10 to be detected. Crypto Keys entered through the Crypto Fill Port will not be displayed on the PKB.
	CRYPTO FILL	Displayed when a KYK-13 or CYZ-10 is detected at the Crypto Fill Port.
	LOAD	Displayed after CRYPTO FILL has been selected. Selecting while LOAD is displayed will cause the Crypto Key to be read in from the Crypto Fill Port.
20	SEND DATA Switch/ IU Memory Location Selection Switch	This switch serves two purposes, sending Crypto Key data to the GPS receiver and specifying where to place Crypto Key data in IU memory loaded from the Crypto Fill Port.
	SEND DATA Switch	When SEND DATA is displayed, this switch is used to send the Crypto Keys to the GPS receiver. Pressing the SEND DATA switch will initiate a zeroize signal to the GPS receiver to remove any previously transmitted crypto keys for the GPS receiver. The zeroize action is then followed by the transmission of mission duration and crypto key 1 and/or crypto key 2 before beginning the crypto key verification process. After pressing this switch, the SEND DATA legend will disappear. During the period that the legend is blanked, the operator may not attempt to re-send the Crypto Keys. Between 15 and 20 seconds after the SEND DATA switch is pressed, a parity status will be displayed on switch 19. SEND DATA will not be displayed again until the Crypto Key View All page is exited and redisplayed. If SEND DATA is pressed while switch 19 is displaying CRYPTO FILL, then the Crypto Keys sent to the GPS receiver will be the keys last entered via the Crypto Fill Port. If CRYPT FILL is not displayed, then the Crypto Keys sent to the GPS receiver will be the keys last entered via the PKB. **NOTE** When keys are sent from the Crypto Fill Port, the PKB entered keys will automatically be zeroized.
	SEND DATA	Static legend displayed when VIEW ALL page is displayed. Extinguished when selected by the operator.
	IU Memory Location Selection Switch	When loading Crypto Keys from the Crypto Fill Port, this switch is also used to specify which IU memory location to place the data into, Key 1 or Key 2. When LOAD is displayed on switch 19, switch 20 is used to cycle through the available IU memory locations, CRYPTO KEY 1 and CRYPTO KEY 2. When the desired memory location is displayed on switch 20, LOAD may be pressed to load the data from the Crypto Fill Port into the displayed memory location. After cycling through all memory locations, switch 19 and 20 will change back to CRYPTO FILL and SEND DATA respectively.
	CRYPTO KEY 1	Specifies that the Crypto Key loaded from the Crypto Fill Port is to be loaded into the Crypto Key 1 IU memory location when LOAD (switch 19) is pressed
	CRYPTO KEY 2	Specifies that the Crypto Key loaded from the Crypto Fill Port is to be loaded into the Crypto Key 2 IU memory location when LOAD (switch 19) is pressed.

Figure 1-50 (Sheet 22 of 36)

Programmable Keyboard (Cont)

CRYPTO KEY DATA ENTRY PAGE (TYPICAL)



The Crypto Key Data Entry page is used for modifying the Crypto Key variables and the mission duration. The Crypto Key Data Entry page can be displayed by pressing CRYPTO KEY on the Main Menu page and then pressing any of switches 1–16 or 18 on the Crypto Key View All page.

The Crypto Key Data Entry page functions by displaying one Crypto Key component field at a time. The operator is responsible for entering the proper values and pressing the ENTER switch to temporarily hold the data. Pressing the ENTER switch will automatically display the next field for entry.

NOTE

If the operator presses the up/down arrow switches without pressing the ENTER switch, any newly entered data for that field will be discarded.

If the data entry field (key 3) becomes outlined by a box, an invalid value has been entered and cannot be processed. Pressing any other switch, with the exception of the ENTER switch and the first three switches, will remove the outline.

Figure 1-50 (Sheet 23 of 36)

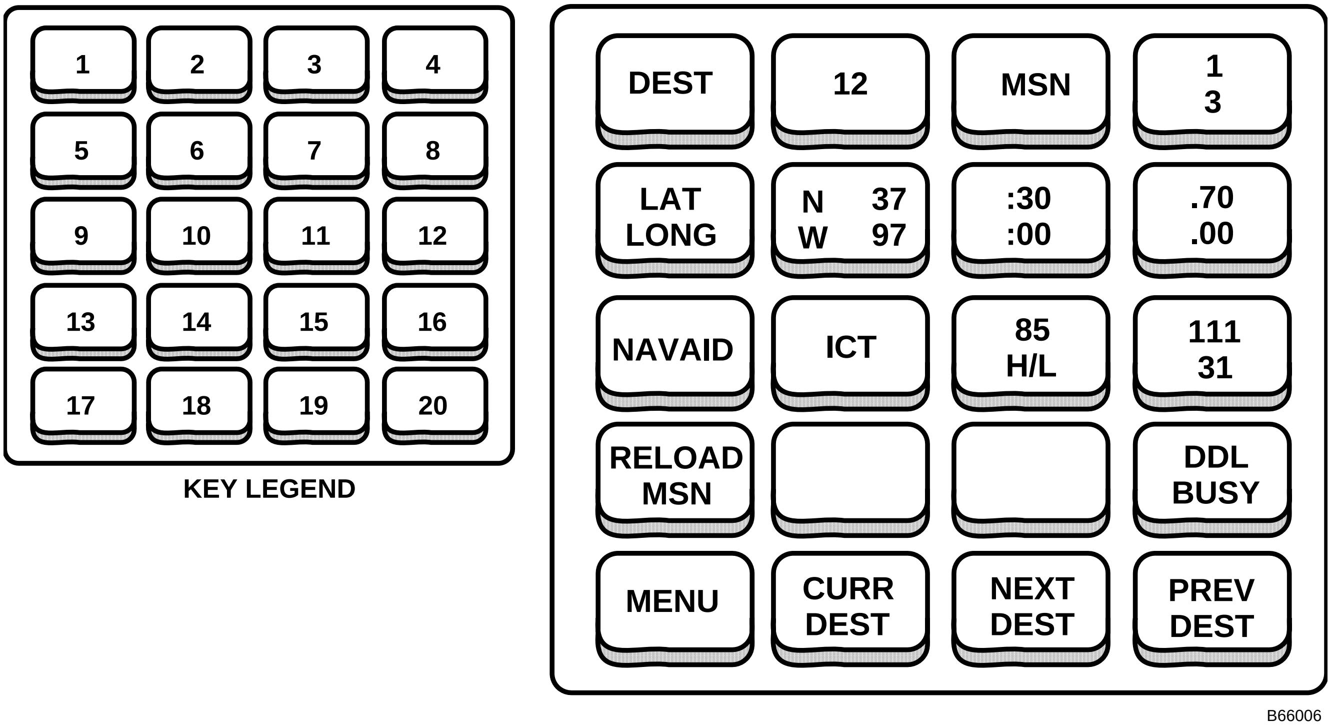
CRYPTO KEY DATA ENTRY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	Data Entry Legend Key 1	This key is used to display the type of the data entry field being modified.
	MSN LENGTH	Signifies that the mission duration edit field is being displayed in key 3.
	CRYPTO KEY n	Signifies that a Crypto Key component edit field is being displayed in key 3. n is either 1 or 2 and denotes the Crypto Key.
2	Data Entry Legend Key 2	This key is used to either display which of the eight Crypto Key components is being displayed for editing or DAYS = for mission duration editing.
	DAYS=	Prompt for Mission Duration (# of days for MSN LENGTH (key1)).
	LINE n	Prompt for Crypto Key Component data. n = 1 through 8. (line # for CRYPTO KEY n (key1)).
3	Edit Field Key	This key is used to display the edit fields for each of the key components and the mission duration. A cursor is placed under the current character/value being modified. If an errant value is entered, the field will be outlined with a box upon pressing the ENTER switch. The outline can be removed by pressing any switch, except the ENTER or the first three switches.
	xx	Prompt for Mission Duration. xx = 1 through 14 days.
	xxxxx	Prompt for Crypto Key Component data. xxxxx= 0 to 65,535.
4	VIEW ALL Switch	The VIEW ALL switch is used to access the Crypto Key View All page.
5–7	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept the default value as the component value.
9–11	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the various data entry fields described under key 1. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry field. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the data entry field displayed in key 3.
19	SHIFT Switch	The SHIFT switch is used to select the up and left arrow keys. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to accept the value displayed in the data entry field.

Figure 1-50 (Sheet 24 of 36)

Programmable Keyboard (Cont)

MISSION DATA DISPLAY PAGE (TYPICAL)



The Mission Data Display page is used to view the Navaid assignments (if any) associated with each destination. The Mission Data Display page can be displayed by pressing MSN DATA on the Main Menu page.

The operator may use this page to scroll through all of the destinations in a mission by using the NEXT DEST and PREV DEST switches. In addition, the operator may use the CURR DEST switch to return to the current destination.

This page displays each destination one at a time along with the current sortie and mission number, the destination latitude and longitude, and the Navaid ICAO identifier, channel, range and bearing to the destination.

KEY	CONTROL-INDICATOR	FUNCTION
1	DEST (Destination) Legend Key	Static text to indicate that the display in key 2 represents the selected destination. When DEST becomes underlined (DEST), this is an indication that the destination number in key 2 represents the current destination.
2	Selected Destination Display Key	Destination numerical designation.
	ww	ww = 1 to 99. Default is 1. Blank for no Navaid assignment. ww = XH for Fly-To-Crosshair.
3	MSN Legend Key	Static text to indicate that the display in key 4 represents the loaded mission number.
4	Mission/Sortie Number Display Key	Loaded sortie number (top of legend) and mission number (bottom of legend).
	s	(Upper Portion) Sortie number; s = 1 to 8. Blank when no data available.
	m	(Lower Portion) Mission number; m = 1 to 9. Blank when no data available.
	NO MSN	(Lower Portion) Displayed when no mission data has been entered.

Figure 1-50 (Sheet 25 of 36)

MISSION DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
5	Destination LAT/ LONG Legend Key	Static text to indicate that the upper portions of keys 6 –7 represent the latitude and the lower portions indicate the longitude of the selected destination.
6	Destination LAT/ LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
7	Destination LAT/ LONG Minutes Display Key	
	:mm	Latitude (upper portion) and Longitude (lower portion) minutes; :mm = 0 to 59.
8	Destination LAT/ LONG Hundredths of Minutes Display Key	
	.mm	Latitude (upper portion) and Longitude (lower portion) hundredths of minutes; .mm = .0 to .99.
9	NAVAID Legend Key/ Switch	The NAVAID switch is used to access the Navaid Assignment page. In addition the NAVAID text on the key denotes that the data displayed in keys 10–12 represents the Navaid data assigned to the destination displayed in key 2.This legend will only be displayed if both a mission and the Navaid database have been successfully loaded and the selected destination is not a Fly-To-Destination
10	NAVAID ID Key	This switch is used to display the ICAO four letter Navaid identifier assigned to the destination displayed in key 2.
	aaaa	aaaa = The ICAO abbreviation of the Navaid station. aaaa = Blank when no Navaid is assigned.
11	Navaid Channel and Usage Code Display Key	This upper portion of this key is used to display the channel associated with the Navaid assigned to the destination displayed in key 2, while the lower portion of the key displays the usage code for the assigned Navaid.
	cccc	(Upper Portion) cccc is the channel designation for the currently assigned Navaid. Blank for no Navaid assignment.
	HIGH	(Lower Portion) Indicates assigned Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates assigned Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates assigned Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates assigned Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the assigned Navaid is assigned for use in the terminal areas.
12	Navaid Range and Bearing Display Key	This key is used to display the range and bearing from the Navaid to the destination displayed in key 2. The bearing in degrees is displayed on the top of the legend and the range is displayed on the bottom of the legend.
	ddd°	(Upper Portion) Magnetic bearing from the Navaid to the destination. ddd = 1 to 360 degrees. Blank for no Navaid assignment.
	mmm NM	(Lower Portion) Range in nautical miles from the Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM). Blank for no Navaid assignment.
	CHNL	(Lower Portion) Displayed when the range of the assigned Navaid is more than 200 NM from the destination. This occurs only when the destination’s original flight plan has been modified. If the range for the assigned Navaid was part of the original flight plan, then the actual range will be displayed as read from the DDLC.

Figure 1-50 (Sheet 26 of 36)

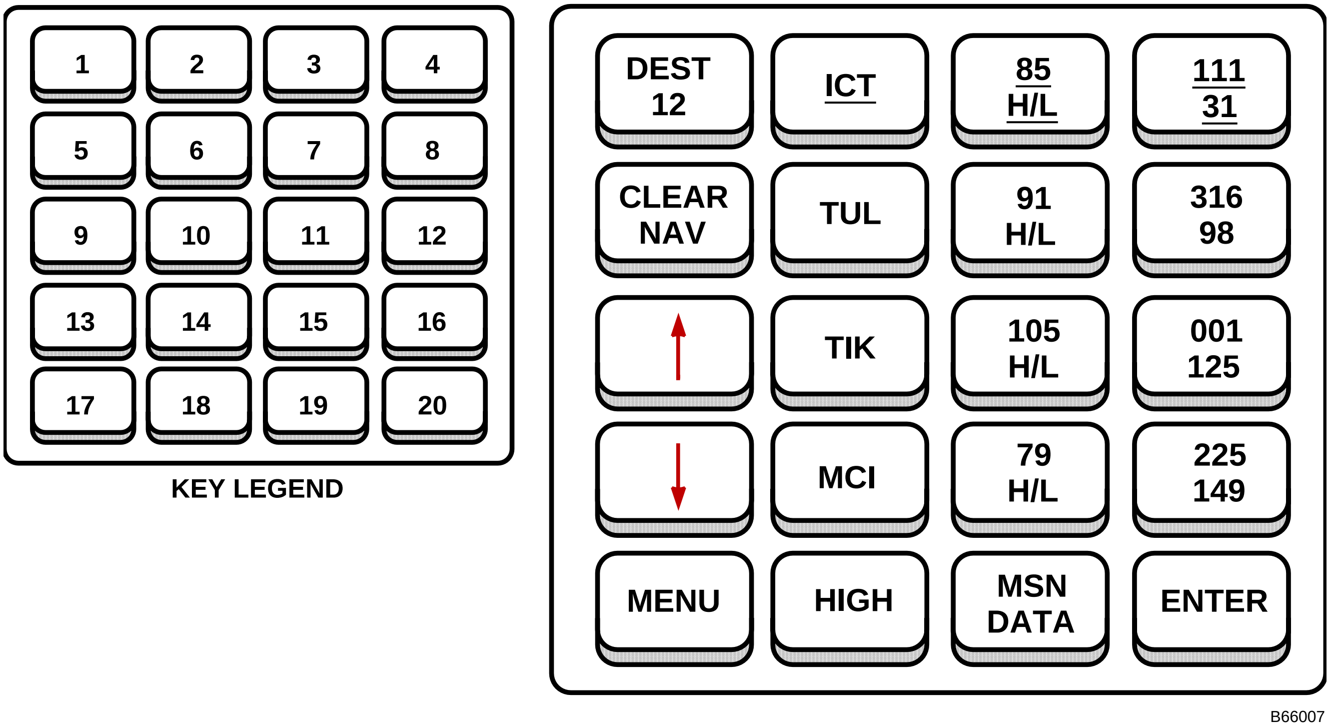
Programmable Keyboard (Cont)

MISSION DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
13	RELOAD MSN Switch/RELOAD NO? Switch	This switch is used to request a reload of the mission from the ACU. The operator will be asked for confirmation before the mission reload is carried out. The mission reload confirmation request can be cancelled by pressing this switch while RELOAD NO? is displayed or by displaying another page. Once the request to reload has been confirmed, the process cannot be stopped or undone.
	RELOAD MSN	When displayed, this button is used to begin a mission reload. Confirmation is requested before the process is completed.
	RELOAD NO?	When displayed, this button is used to cancel the request to reload a mission.
14	RELOAD YES? Switch	This switch is used for a confirmation during a request to reload mission data. During a request to reload mission data RELOAD YES? is displayed. Pressing this switch while RELOAD YES? is displayed will cause the IU to reload the mission data from the ACU. The mission reload confirmation request can be cancelled by pressing switch 13 while RELOAD NO? is displayed or by displaying another page. Once the request to reload has been confirmed, the process cannot be stopped or undone. Generally, the mission will only need to be reloaded from the PKB when there is a communication failure that prevents the IU from reading the mission from the ACU.
	RELOAD YES?	When displayed, this button is used to confirm the request to reload a mission. **NOTE** Pressing this switch will erase all modifications to the planned mission.
15	DDLC Error Display Key	When DDLC DATA? is displayed, this is an indication that the DDLC data may be corrupted or an error has occurred in the data transfer process.
16	DDLC Status Display Key	When NO DDLC is displayed, this is an indication that the DDLC needs to be installed or is not being detected as installed. If the DDLC is installed, it may be necessary to pull out and reinsert the cartridge. When DDL BUSY is displayed, this is an indication that the DDLC is currently being read.
	DDL BUSY	Displayed when the DDLC is being accessed by the IU.
	NO DDLC	Displayed when a DDL Cartridge cannot be detected.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	CURR DEST (Current Destination) Switch	Pressing this switch will display the current destination in key 2 and its associated data on the rest of the page. The DEST text in key1 will become underlined to indicate that the displayed destination is the current destination.
19	NEXT DEST (Next Destination) Switch	Pressing this switch will display the next destination in the mission route. Subsequent pressing of the switch will cycle forward through the destinations in numerical order.
20	PREV DEST (Next Destination) Switch	Pressing this switch will display the previous destination in the mission route. Subsequent pressing of the switch will cycle backward through the destinations in numerical order.

Figure 1-50 (Sheet 27 of 36)

NAVAID ASSIGNMENT PAGE (TYPICAL)



NOTE

- Arrows (keys 9 and 13) will only be displayed when there are enough Navaids within the predetermined range to warrant a scroll either up or down.
- Keys 2, 3 and 4 have an underline placed at the bottom of each item in order to separate the currently selected Navaid from the additional Navaids found to be within the predefined range.

The Navaid Assignment page is used to change the Navaid assignment for a destination. The Navaid Assignment page can be displayed by pressing MSN DATA on the Main Menu page followed by pressing NAVAID on the Mission Data Dis play page.

This page may only be displayed when both a mission and the Navaid database have been successfully loaded and the destination displayed on the Mission Data Display page is not a Fly-To-Destination. The Navaid Assignment page operates by providing the operator with a list of Navaids found to be within 200 NM. The operator may then select any Navaid in the list and assign it to the displayed destination. If a Navaid is already assigned to the displayed destination, then it will not be displayed in the list. The operator may also remove any Navaid assignment by pressing the CLEAR NAV switch followed by the ENTER switch. Pressing this switch will remove any Navaid assignment as well as place the removed Navaid back into the list for selection. It is important to note that this page can only be accessed through the Mission Data Display page.

Keys 6–8, 10–12, & 14–16 make up the list of scrollable Navaids that may be selected for assignment. The first column (keys 6, 10 & 14) displays the ICAO identifiers for the Navaids in the list. The second column (keys 7, 11, & 15) displays the channel and the usage code for the Navaids in the list. The third column (keys 8, 12, & 16) displays the range and bearing from the Navaids in the list to the destination. Navaids are sorted by increasing range from the destination. This means that the closest Navaid to the destination will always be the first Navaid in the list. Selecting any switch in a row associated with a Navaid will cause the entire row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1. Subsequently, the new Navaid will be placed in keys 2–4 and the previously assigned Navaid, if any, will be placed back into the list for selection. A selected blinking row may be deselected by selecting any switch in the same blinking row or by selecting another Navaid.

Figure 1-50 (Sheet 28 of 36)

Programmable Keyboard (Cont)

NAVAID ASSIGNMENT PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	DEST (Destination) Key	This key displays the number of the destination that is available for modification. This destination number will be the last destination that was displayed on the Mission Data Display page. The operator may not change this value from this page. If the operator needs to change the assignment of a destination other than the displayed destination in this legend, it will be necessary to return to the Mission Data Display page and scroll through the list of destinations until the desired destination is displayed on the Mission Data Display page.
	DEST	(Upper Portion) Static legend.
	ww	(Lower Portion) Destination numerical designation. ww = 1 to 99. The selected destination number from the Mission Data Display page.
2	Current NAVAID ID Key	This switch is used to display the ICAO four letter Navaid identifier currently assigned to the destination displayed in key 1.
	aaaa	aaaa represents the ICAO abbreviation of the currently selected Navaid station, underlined to denote it is the current Navaid.
3	Current Navaid Channel and Usage Code Display Key	The upper portion of this key is used to display the channel associated with the Navaid assigned to the destination displayed in key 1, while the lower portion of the key displays the usage code for the assigned Navaid. The data in both the upper and lower portions of the key are underlined to show they are associated with the current Navaid.
	cccc	(Upper Portion) cccc is the channel designation for the currently assigned Navaid.
	HIGH	(Lower Portion) Indicates assigned Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates assigned Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates assigned Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates assigned Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the assigned Navaid is assigned for use in the terminal areas.
4	Current Navaid Range and Bearing Display Key	This key is displays the range and bearing from the current Navaid to the destination displayed in key 1. The bearing in degrees is displayed on the top of the key and the range is displayed on the bottom of the key. The data in both the upper and lower portions of the key are underlined to show they are associated with the current Navaid.
	ddd°	(Upper Portion) Magnetic bearing from the current Navaid to the destination. ddd = 1 to 360 degrees.
	mmm NM	(Lower Portion) Range in nautical miles from the current Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM).
	CHNL	(Lower Portion) Displayed when the range of the assigned Navaid is more than 200 NM from the destination. This occurs only when the destination's original flight plan has been modified. If the range for the assigned Navaid was part of the original flight plan, then the actual range will be displayed as read from the DDLC.
5	CLEAR NAV Switch	The CLEAR NAV switch is used to remove any Navaid assignment from the displayed destination. Pressing the ENTER switch (key 20) while this switch is blinking will not only remove the assignment, but will also place the Navaid back into the list of Navaids for selection. Subsequently, keys 2–4 will become blanked out, indicating there is no assignment associated with the displayed destination.
6, 10 &14	Available Navaid ID Switches	Displays the ICAO identifiers for the alternate Navaids for the destination displayed in key 1. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	aaaa	aaaa represents the ICAO abbreviation of the alternate Navaid station.

Figure 1-50 (Sheet 29 of 36)

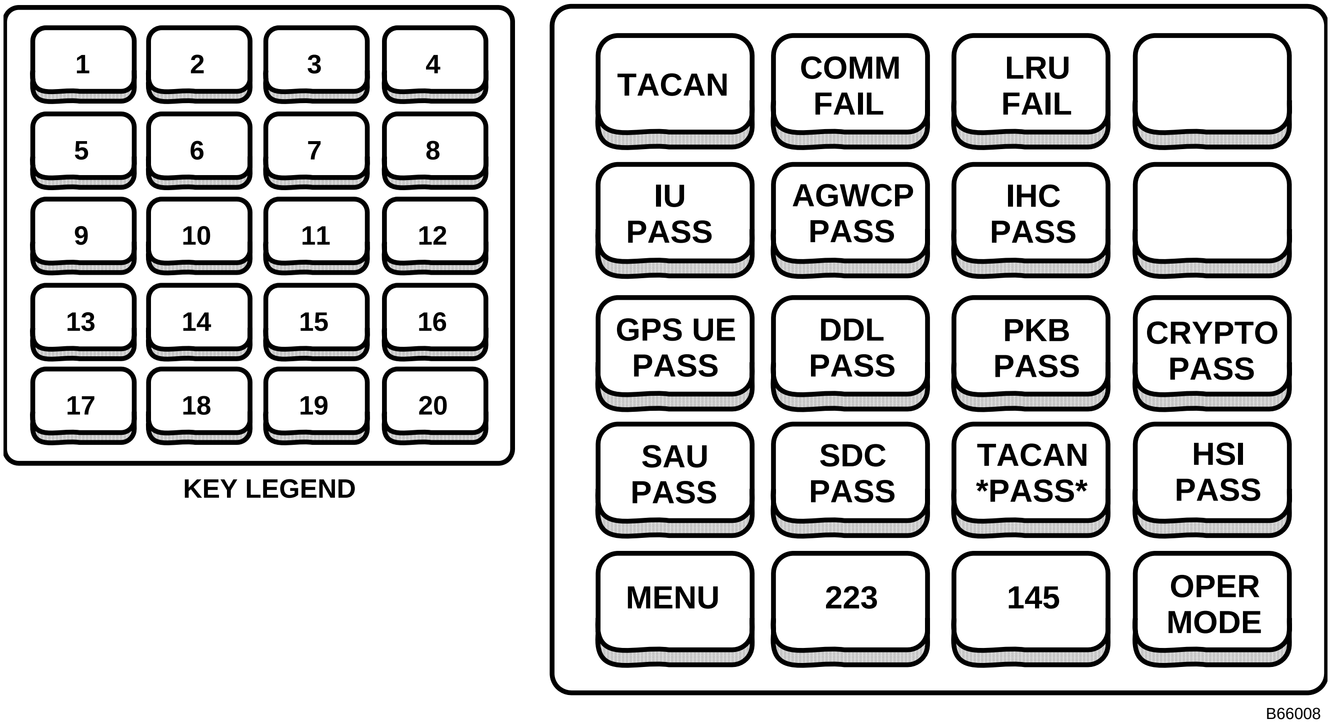
NAVAID ASSIGNMENT PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
7, 11 & 15	Alternate Navaid Channel and Usage Code Display Switches	The upper portion of this key is used to display the channel associated with the alternate Navaid for the destination displayed in key 1, while the lower portion of the key displays the usage code for the Navaid. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	cccc	(Upper Portion) cccc is the channel designation for the alternate Navaid.
	HIGH	(Lower Portion) Indicates alternate Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates alternate Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates alternate Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates alternate Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the alternate Navaid is assigned for use in the terminal areas.
8, 12 &16	Alternate Navaid Range and Bearing Display Switches	This key displays the range and bearing from the alternate Navaid to the destination displayed in key 1. The bearings in degrees are displayed on the top of the key and the ranges are displayed on the bottom of the key. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	ddd°	(Upper Portion) Magnetic bearing from the alternate Navaid to the destination. ddd = 1 to 360 degrees.
	mmm NM	(Lower Portion) Range in nautical miles from the alternate Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM).
9 & 13	Up and Down Arrow Switches	These two keys together allow the operator to scroll through the list of selectable Navaids. Each arrow will appear when there are Navaids either higher in the list or lower in the list respectively. When the top of the list has been reached, the up arrow will be removed as an indication. Similarly, when the bottom of the list has been reached, the down arrow will be removed as an indication.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Usage Code Filter Toggle Switch	This switch is used to toggle between the Navaids having a usage code of HIGH, LOW, or TERM.
	HIGH	Indicates that the displayed Navaids are high power stations based on the usage code. Includes Navaids with usage codes of High, RNAV, and High/Low.
	LOW	Indicates that the displayed Navaids are low power stations based on the usage code. includes Navaids with usage codes of Low, RNAV, and High/Low.
	TERM	Indicates that the displayed Navaids are terminal stations based on the usage code. Includes Navaids with usage codes of Terminal only.
19	MSN DATA Switch	The MSN DATA switch is used to access the Mission Data Display page.
20	ENTER Switch	The ENTER switch is used to make a Navaid assignment to the displayed destination. When a selected Navaid is blinking or the CLEAR NAV key is blinking, the operator may press this switch to update the Navaid assignment for the displayed destination in key 1. If a Navaid is not selected or the CLEAR NAV key is not blinking, then pressing the ENTER switch will have no effect.

Figure 1-50 (Sheet 30 of 36)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL)



KEY LEGEND

The Test Mode Display, accessed by pressing PME STATUS on the Main Menu page, is used for displaying fault status for selected LRUs. The page operates in two modes: Test Mode and Operational Mode. In Test Mode, available only when the ground speed is less than 100 knots and the true air speed is less than 102 knots, the operator may initiate a BIT or request an IUS reload. In the Operational Mode only LRU fault status are provided.

This page will display asterisks on keys for LRUs that have incurred faults that have not been acknowledged by the operator. Faults can be acknowledged by pressing the switch associated with the designated LRU. For example, if a fault occurs in the TACAN, then key 15 will display TACAN *PASS*. The asterisks are an indication that a fault has occurred sometime in the past and has not been acknowledged by the operator. The PASS indication signifies that the TACAN passed its most recent BIT. In contrast, if the LRU is still faulted, *FAIL* will be displayed. Pressing this switch will clear the asterisks and display any unacknowledged faults that have occurred in keys 2 and 3.

Keys 2 and 3 indicate failures, however, it is the assigned LRU switch (e.g. switch 15 for the TACAN) that indicates the current LRU fault status. Therefore, it is possible that the LRU may indicate a passing condition although faults are being reported in keys 2 and 3. In this case the fault indications in keys 2 and 3 are past faults.

The operator is not required to punch off each fault associated with an LRU. For example, if 10 intermittent faults occur on a respective LRU between operator acknowledgements, then only one acknowledgement will be required. Any subsequent faults will function in the same manner. While an LRU remains faulted, it will not require further fault acknowledgement.

Figure 1-50 (Sheet 31 of 36)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	LRU Legend Key	This key is used to display the name of the LRU whose BIT status is being displayed.
	AGWCP	Indicates that the AGWCP BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	GPS UE	Indicates that the GPS UE BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	DDL	Indicates that the DDL BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	SDC	Indicates that the SDC BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	IU	Indicates that the IU BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	IHC	Indicates that the IHC BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	PKB	Indicates that the PKB BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	CRYPTO	Indicates that the CRYPTO BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	SAU	Indicates that the SAU BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	TACAN	Indicates that the TACAN BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	HSI	Indicates that the HSI BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
2	LRU BIT Status Key	This key displays the BIT status of the LRU designated in key 1.
	WAIT	Indicates that the LRU is processing an operator initiated BIT (IBIT).
	COMM FAIL	Indicates that a communication failure has been detected by the BIT.
	COMM ADVS	Indicates that a communication advisory has been detected by the BIT.
3	LRU Fault Status Key	This key displays the BIT fault status of the LRU designated in key 1.
	LRU FAIL	Indicates that an LRU fault has been detected by BIT.
	aa/ccc/ bbbb	Displayed only for the GPS LRU, aa = AE, bbbb = BATT, and/or ccc = RPU; displays blanks when not faulted.
4	INIT (Initiate) BIT Switch	When an LRU is available for operator initiated BIT and the page is in the Test Mode, this key will display INIT BIT. Pressing this switch while INIT BIT is displayed will initiate a BIT for the LRU displayed on key 1. Subsequently, key 2 will display WAIT, until the BIT is completed. Once the IBIT is complete, the results will be displayed in keys 2 and 3. The first BIT must complete before another BIT may be started for the same LRU.
	INIT BIT	Displayed only in Test Mode for LRUs which are available for operator initiated BIT.

Figure 1-50 (Sheet 32 of 36)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
5	IU Fault Status Switch	This switch displays the current fault status for the Interface Unit (IU). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current IU fault status and any unacknowledged faults will be displayed on key 3.
	IU	(Upper Portion) Static legend to indicate that this is the IU Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IU faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IU faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IU fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IU fault and it and perhaps previous faults have not been acknowledged.
6	AGWCP Fault Status Switch	This switch displays the current fault status for the Advanced Guided Weapon Control Panel (AGWCP). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current AGWCP fault status and any unacknowledged faults will be displayed on key 3.
	AGWCP	(Upper Portion) Static legend to indicate that this is the AGWCP Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no AGWCP faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no AGWCP faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an AGWCP fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an AGWCP fault and it and perhaps previous faults have not been acknowledged.
7	IHC Fault Status Switch	This switch displays the current fault status for the Integrated Hand Control (IHC). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current IHC fault status and any unacknowledged faults will be displayed on key 3.
	IHC	(Upper Portion) Static legend to indicate that this is the IHC Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IHC faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IHC faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IHC fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IHC fault and it and perhaps previous faults have not been acknowledged.
8	Blank	This key is not used on the Test Mode Display page.

Figure 1-50 (Sheet 33 of 36)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9	GPS UE Fault Status Switch	This switch displays the current fault status for the Global Positioning System User Equipment (GPS UE). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current GPS UE fault status and any unacknowledged faults will be displayed on key 3.
	GPS UE	(Upper Portion) Static legend to indicate that this is the GPS UE Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no GPS UE faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no GPS UE faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an GPS UE fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an GPS UE fault and it and perhaps previous faults have not been acknowledged.
	ADVS	(Lower Portion) Indicates that a battery fault or communication advisory has occurred with the GPS UE. When asterisks border the status, this indicates that a fault has occurred that has not been acknowledged yet.
	ADVS	(Lower Portion) Indicates that a battery fault or communication advisory has occurred with the GPS UE. When asterisks border the status, this indicates that a fault has occurred and it and perhaps previous faults have not been acknowledged.
10	DDL Fault Status Switch	This switch displays the current fault status for the Digital Data Loader (DDL). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current DDL fault status and any unacknowledged faults will be displayed on key 3.
	DDL	(Upper Portion) Static legend to indicate that this is the DDL Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no DDL faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no DDL faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an DDL fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an DDL fault and it and perhaps previous faults have not been acknowledged.
11	PKB Fault Status Switch	This switch displays the current fault status for the Programmable Keyboard (PKB). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current PKB fault status and any unacknowledged faults will be displayed on key 3.
	PKB	(Upper Portion) Static legend to indicate that this is the PKB Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no PKB faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no PKB faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an PKB fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an PKB fault and it and perhaps previous faults have not been acknowledged.

Figure 1-50 (Sheet 34 of 36)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
12	CRYPTO Fault Status Switch	This switch displays the current fault status for CRYPTO. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current CRYPTO fault status and any unacknowledged faults will be displayed on key 3.
	CRYPTO	(Upper Portion) Static legend to indicate that this is the CRYPTO Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no CRYPTO faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no CRYPTO faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an CRYPTO fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an CRYPTO fault and it and perhaps previous faults have not been acknowledged.
13	SAU Fault Status Switch	This switch displays the current fault status for the Splitter Amplifier Unit (SAU). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current SAU fault status and any unacknowledged faults will be displayed on key 3.
	SAU	(Upper Portion) Static legend to indicate that this is the SAU Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SAU faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SAU faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SAU fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SAU fault and it and perhaps previous faults have not been acknowledged.
14	SDC Fault Status Switch	This switch displays the current fault status for the Signal Data Converter (SDC). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current SDC fault status and any unacknowledged faults will be displayed on key 3.
	SDC	(Upper Portion) Static legend to indicate that this is the SDC Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SDC faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SDC faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SDC fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SDC fault and it and perhaps previous faults have not been acknowledged.
15	TACAN Fault Status Switch	This switch displays the current fault status for the TACAN. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current TACAN fault status and any unacknowledged faults will be displayed on key 3.
	TACAN	(Upper Portion) Static legend to indicate that this is the TACAN Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no TACAN faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no TACAN faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an TACAN fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an TACAN fault and it and perhaps previous faults have not been acknowledged.

Figure 1-50 (Sheet 35 of 36)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
16	HSI Fault Status Switch	This switch displays the current fault status for the HSI. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current HSI fault status and any unacknowledged faults will be displayed on key 3.
	HSI	(Upper Portion) Static legend to indicate that this is the HSI Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no HSI faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no HSI faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an HSI fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an HSI fault and it and perhaps previous faults have not been acknowledged.
17	MENU Switch	The MENU switch is used to access the Menu page.
18	CPIN/RELOAD IUS Switch	In the Operational Mode, this switch is used to display up to the last three digits of the Computer Program Identification Number (CPIN). In the Test Mode this switch is used during the IUS reload process. Pressing this switch while RELOAD IUS is displayed will cause a confirmation of RELOAD NO? to be displayed on this key and RELOAD YES? to be displayed on key 19. Pressing this switch, while RELOAD NO? is displayed, will cancel the IUS reload process. This switch will have no response at any other time.
	nnn	Display of the CPIN version number. Displayed only in the Operational Mode
	RELOAD IUS	Displayed only while in Test Mode. Pressing this switch will cause the prompt RELOAD YES? on key 19 and RELOAD NO? on key 18 for confirmation on reloading the IUS.
	RELOAD NO?	In Test Mode, this is displayed when the operator has pressed RELOAD IUS. Pressing will cancel the IUS reload process.
19	IUS Version Number/ RELOAD YES? Switch	In the Operational Mode, this switch is used to display the IUS version number. In the Test Mode this switch is used during the IUS reload process. Pressing this switch while RELOAD YES? is displayed will cause the IUS to be reloaded.
	nnn	Display of the IUS version number. Displayed only in the Operational Mode
	RELOAD YES?	In Test Mode, this is displayed when the operator has pressed RELOAD IUS (key 18). Pressing RELOAD YES? will begin the process of reloading the IUS.
20	OPER MODE/ TEST MODE Switch	This switch is used to toggle between the IU Test and Operational Modes. The switch displays the active mode. The Operation Mode can be selected at any time, but the Test Mode can only be selected when the aircraft is on the ground and the True Air Speed is less that 102 knots and the Ground Speed is less than 100 knots. During takeoff, if the IU is in Test Mode when the aircraft leaves the ground, the IU will automatically reset to Operational Mode, but any IBIT in progress will run to completion. The mode will always return to Operational Mode when the Test Mode Display page is exited.
	OPER MODE	Indicates that the IUS is in Operational Mode.
	TEST MODE	Indicates that the IUS is in Test Mode.

Figure 1-50 (Sheet 36 of 36)

NORMAL OPERATION

After GPS power-on and a subsequent 30 to 45 second power-on test, GPS will enter the initialization mode. The navigation software, with valid data, will place GPS into the navigation mode. Manual initialization data provides starting navigation parameters for GPS and comes from the operator and/or sensor data. The IU, after receiving valid initialization data from the flight computer program (FCP) DDLC, or PKB, will command GPS to NAV mode. Once GPS has acquired the satellites and set valid status, GPS DATA will appear on the CF-61 display. GPS status on the CF-61 display will continue to show reverse highlighted GPS DATA until valid GPS data becomes available.

Crypto Keys obtained from the PKB or Crypto Fill Port may be entered at any time. Crypto Keys entered via the PKB or Crypto Fill Port will overwrite any keys previously sent to the GPS receiver. However, Crypto Keys retrieved from the DTC will not overwrite any keys entered through the PKB or Crypto Fill Port.

PROGRAMMABLE KEYBOARD (PKB) OPERATION

The PKB (figure 1-50) displays stored IU data and also allows operator input. Operator data entry is accomplished by pressing the appropriate keys. The keyboard may be used for a variety of system tests, to enter GPS initialization data, select GPS DATA display, select Channel Summary display, or enter crypto information.

Power Turn-On Procedures

The GPS is turned on as follows:

1. Follow OAS/INU turn-on procedures.

2. Turn on the GPS and IU power by pressing the IU power pushbutton switch on the IUCP. GPS is fully operational when the GPS DATA block (normal or bright video) appears on the CF-61 display.

Power Turn-Off Procedures

The GPS is shut down as follows:

1. Press the GPS ZEROIZE pushbutton to zeroize GPS crypto data. When NO KEY is displayed on the PKB, the data has been zeroized.

2. Turn off GPS and IU on the IUCP by pressing the pushbutton IU power switch.

3. Follow OAS/INU shutdown procedures.

PKB CONTROLLED CAPABILITIES

Verifying Proper Operation of the PKB

There are several tests which may be performed on the PKB to verify that it is operating properly. These tests are implemented using three different pages on the PKB. These pages include:

a. The Self Test Page

b. The Lamp Test Page

c. The Switch Test Page

The Self Test page allows the operator to perform a PKB self test by pressing the AUTO TEST switch. The PKB will then perform a BIT on its CPU, ROM, RAM, and display hardware. In addition to the self test, the operator can press the COMM TEST switch to verify proper communication between the IU and the PKB.

NOTE

> If AUTO TEST is pressed while a database download is in progress (before MENU is displayed) it may be necessary to press COMM TEST to continue the download after the Auto Test completes. This will be necessary only if the Auto Test exceeds 9 seconds in length.

The Lamp Test page allows the operator to perform a test on all of the pixels that are used to light the switches on the PKB

The Switch Test page allows the operator to perform a test on all of the switches on the PKB to ensure that they are responding properly.

Verifying Proper Operation of Other Line Replaceable Units (LRU)

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch. This will display the Test Mode Display page.

c. Each LRU monitored by the IUS will be displayed on the Test Mode Display page with either a PASS, ADVS, or FAIL indication.

Status for the following LRUs is provided on the Test Mode Display page on the PKB:

(1.) IU
(2.) AGWCP
(3.) PKB
(4.) SAU
(5.) SDC
(6.) GPS UE
(7.) DDL
(8.) IHC
(9.) Crypto Fill Port
(10.) TACAN Control Panel
(11.) HSI

Initiating Built in Tests

An operator initiated BIT may only be performed when the PKB is in Test Mode. The PKB may only be set into Test Mode if True Air Speed is less than 102 knots and Ground Speed is less than 100 knots.

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press ENTER. This will display the Test Mode Display page.

c. Press the OPER MODE switch to toggle the PKB into test mode. TEST MODE will be displayed on key 20 when in test mode.

d. Press the status switch with the name of the desired LRU. If an operator initiated BIT is allowed, INIT BIT will appear on key 4. The LRU name will also be displayed on key 1. Operator initiated BIT may be performed on the following LRUs:

(1.) AGWCP
(2.) GPS UE
(3.) DDL
(4.) SDC

e. Press INIT BIT to begin BIT for the LRU displayed on key 1. A WAIT.. indication will be displayed while the BIT is in progress.

f. When the WAIT.. indication disappears, the result of the BIT will be displayed on keys 2 & 3 of the PKB.

Multiple BIT may be run sequentially, but no more than one BIT may be run on the same LRU at any time.

Acknowledging Faults with the PKB

When a fault has been detected in the system by the IUS, the MENU legend on the PKB will change to ***MENU***. This is an indication that a fault has occurred that has not been acknowledged. To acknowledge the fault, accomplish the following steps:

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. The LRU that faulted will be displayed with asterisks beside its status. (e.g. *PASS* or *FAIL*).

d. Press the status switch of the faulted LRU. The cause of the fault, LRU FAIL or COMM FAIL will be displayed on keys 2 and 3. The asterisks will then be removed.

If a fault is detected several times before it is acknowledged, the LRU will only need to be acknowledged once. Once a fault has been acknowledged, pressing the current fault status switch for the LRU again will display current fault status on keys 2 and 3. A new fault detection will cause the asterisks to be redisplayed.

Determining the CPIN

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. Up to the last three digits of the CPIN are displayed on key 18.

Determining the IUS Version

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. The last three digits of the IUS Version Number are displayed on key 19.

Reloading the IUS from the PKB

The IUS may be reloaded only if True Air Speed is less than 102 knots and Ground Speed is less than 100 knots.

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. Press the OPER MODE switch to toggle the PKB into test mode. TEST MODE will be displayed on key 20 when in test mode.

d. Press RELOAD IUS.

e. Press RELOAD YES?.

Setting Mission Duration

Mission Duration is displayed on the Crypto Key View All page. The Mission Duration may have a value between 1 and 14 days.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch. This will display the Crypto Key View All page.

c. Press the Mission Duration switch (switch 18) to display the Crypto Key Data Entry page.

d. MSN LENGTH is displayed on key 1 when the Mission Duration is being entered through the Crypto Key Data Entry page. The value is displayed on key 3.

e. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value.

f. Press ENTER when the correct initial value has been entered.

g. When the Mission Duration has been entered, press VIEW ALL to display the Crypto Key View All page.

h. Press SEND DATA on the Crypto Key View All page to send the Mission Duration to the GPS receiver.

NOTE

> Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

Providing INU Feedback Aiding

Feedback aiding of INU data to the GPS receiver can be enabled on the Main Menu page using the aiding ON/OFF switch.

a. From the Main Menu page, press the AIDING ON/OFF (switch 19).

b. With AIDING ON/OFF blinking, press the ENTER switch on the Main Menu page. This will toggle the aiding state.

Applying Power to the WBL559 Stations

a. From the Main Menu page, press the desired 559 switch (switch 11 or 12).

b. With the desired 559 legend blinking, press the ENTER switch on the Main Menu page. This will toggle the power state of the selected 559 station.

When power application has been inhibited, the keys will become underlined as an indication that the 559 power state cannot be modified and provides current status only. The power inhibit is controlled by the IUSO.

Initializing Position, Velocity, and Time

a. From the Main Menu page, press the INIT MODE switch.

b. With INIT MODE blinking, press the ENTER switch on the Main Menu page. This will display the GPS Initialization page.

c. The item being initialized will be displayed on key 1. The following items may be initialized through the GPS Initialization page:

(1.) Latitude
(2.) Longitude
(3.) Altitude (In feet x10 above mean sea level)
(4.) Date
(5.) Time
(6.) Ground Speed (In knots)
(7.) Ground Track Angle (In degrees)

d. Press the up/down arrows or ENTER to move through the list of data entry fields. The current initialization value for the each initialization item will be displayed on keys 2 through 4.

e. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value. Values requiring the selection of the SHIFT switch are displayed in the upper left hand corner of the numerical legends.

f. Press ENTER when the correct initial value has been entered.

g. When all initial values have been entered, use the up/down arrows or ENTER to scroll through the list of data entry fields until SEND DATA is displayed on key 1.

h. Press SEND DATA to send the initialization data to the GPS receiver.

The GPS receiver will re-initialize with the entered data when the SEND DATA switch is pressed. Out of range values are indicated by the presence of an outline. Out of range values are not sent to the GPS receiver and instead are replaced by the last valid value entered.

Viewing Current GPS Data

a. From the Main Menu page, press the GPS DATA switch.

b. With GPS DATA blinking, press the ENTER switch on the Main Menu page. This will display the GPS Data Display page.

The following items are displayed on the GPS Data Display page:

(1.) Latitude and Longitude.

(2.) Altitude above MSL in feet (scaled by a factor of ten) and Velocity in knots.

(3.) Ground Track Angle.

(4.) Estimated Horizontal Error (EHE) and Estimated Vertical Error (EVE) in feet.

(5.) Figure of Merit (FOM).

Viewing Satellite Tracking Status

The tracking status of all five channels may be observed on the Channel Summary page.

a. From the Main Menu page, press the CHAN SMRY switch.

b. With CHAN SMRY blinking, press the ENTER switch. This will display the Channel Summary page. This page displays the following data for each channel:

(1.) Satellite Vehicle ID

(2.) Frequency (L1 or L2)

(3.) Code (P or CA)

(4.) Carrier to Noise Ratio (In dB)

(5.) Jamming to Signal Ratio (In dB)

(6.) Tracking State

Fault indications for each channel are displayed under the Tracking State. When a fault occurs the rest of the data for that channel will be blanked.

Reloading the Mission from the PKB

A mission must be loaded into the FMS before any mission may be loaded into the IU. Generally, the mission will not have to be reloaded from the PKB as the mission is automatically loaded at IU power up and when mission number changes are detected. Reloading the mission from the PKB will cause the mission data to be read from both the DTC and the DDLC and will also reload the Navaid database from the DDLC.

NOTE

Reloading the mission from the PKB will discard any modifications made to the mission through FRMT-10 using FMS. This will only discard modifications that are stored in the IU. This will not cause mission modifications stored in FMS to be discarded.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch. This will display the Mission Data Display page.

c. Press RELOAD MSN.

d. Press RELOAD YES?'.

Generally, the mission will only need to be reloaded from the PKB when there is a communication failure that prevents the IU from reading in the mission data, or when a mission having the same mission number as the mission currently loaded in FMS needs to be read from the DTC.

NOTE

Reloading the mission from the PKB only reloads the mission data into the IU, it does not cause FMS to reload the mission.

Modifying Destinations when a Mission is not Loaded

FMS allows a destination to be defined/modified, without loading a mission, using FRMT-10. However, the IUS does not allow a destination to be defined without loading a mission into the IU. If a valid mission is not resident in the IU at the time of the destination modification, the IUS will not detect the modification and thus will not validate the destination's new Lat/Long.

Modifying Destinations not in the Original Flight Plan

Some missions may not utilize every available destination (e.g. only 50 of the 99 destinations may be used). The IUS treats these unused destinations as invalid and therefore does not display any information about them. However, it is possible to validate these destinations by modifying the destination's Lat/Long using FRMT-10 of the FMS. Once modified, the new destination can have a Navaid assigned to it using the PKB, but it will not be connected to any other destination in the route.

Viewing Destinations in the Current Mission from the PKB

Destinations and their associated Navaids can be viewed on the Mission Data Display page of the PKB.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch, to display the Mission Data Display page.

The current destination is designated by underlining DEST on key 1. The operator may scroll through the list of destinations in numerical order by pressing the NEXT DEST and PREV DEST switches. If the operator reaches the end of the list, continued scrolling will wrap around to the beginning of the list and vice versa. The operator may also go directly to the Current Destination by pressing the CURR DEST switch.

The data displayed for each destination on the Mission Data Display page is:

a. Destination Latitude

b. Destination Longitude

c. Mission Number

d. Navaid Assignment (If a Navaid is assigned)

  (1.) Navaid ICAO Identifier

  (2.) Navaid Channel

  (3.) Navaid Usage Code

  (4.) Navaid Range

  (5.) Navaid Bearing (From the Navaid to the Destination)

Changing Navaid Assignments for Destinations

The operator may change the Navaid assignment for a destination using the Navaid Assignment page.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch., to display the Mission Data Display page.

c. The mission must be loaded before mission data can be displayed or a Navaid Assignment can be made. Using the PREV DEST and NEXT DEST switches, move through the destinations in the mission until the desired destination number is displayed on key 2.

d. Press NAVAID (switch 9) to display the Navaid Assignment page. The destination for Navaid Assignment will now appear on switch 1 of the Navaid Assignment page any currently assigned Navaid will appear on keys 2–4.

e. When the Navaid Assignment page is first displayed, the Navaid database is searched for all Navaids within 200 NM of the destination's Lat/Long. The Navaids are displayed in increasing range from the destination. Navaids are also filtered by usage code. Select the appropriate usage code filter using switch 18. Following is a list of the available filters:

  (1.) LOW – includes Navaids with usage codes of Low, RNAV, and High/Low.

  (2.) HIGH – includes Navaids with usage codes of High, RNAV, and High/Low.

  (3.) TERM – includes Navaids with usage codes of Terminal.

f. If more than three Navaids are within 200 NM of the destination, up and/or down arrows will appear on switches 9 and 13. Use the up and down arrows to scroll through the list of Navaids until the Navaid for assignment is displayed.

g. Each Navaid is displayed in a row of three switches. Press any of the three switches displaying the desired Navaid data until the entire row is blinking.

h. Press ENTER.

The operator may also remove any assignment by pressing the CLEAR NAV switch in step g. instead of a Navaid in the list. If the up arrow is not shown, then the operator is at the top of the Navaid list. If the down arrow is not shown, then the operator is at the bottom of the list. A Fly-To-Crosshair destination cannot have a Navaid Assigned to it.

NOTE

> The operator may not change the displayed destination from the Navaid Assignment page. The operator must return to the Mission Data Display page to select a destination for assignment modification.

CRYPTO KEYS

Crypto Keys may be entered three different ways, through the Crypto Fill Port, the DTC, and the PKB. Keys will only be accepted after the date has been initialized. The date may be initialized either from initialization data entered on the PKB or from the FMS prime initialization data.

NOTE

> Crypto Key data will not be sent to the GPS receiver until the date has been initialized. This is because the date is required to determine the correct set of keys to use. When initializing from the FMS using prime initialization data, OAS initialization (CF-61) data and a Fly-To-xx must be entered prior to applying GPS/IU power.

Crypto Keys will be retrieved from the mission DTC when available and when Crypto Key data has not been entered from the PKB or Crypto Fill Port. Crypto Key data retrieved from the DTC is not maintained and is therefore not recallable once the operator has modified the Crypto Key data. If the mission DTC is not installed, then the IUS will retry acquisition of Crypto Key data from the DTC every two minutes until the DTC (with Crypto Key data present) is installed or until keys are obtained from the PKB or the Crypto Fill Port.

Crypto Keys obtained from the PKB or Crypto Fill Port may be entered at any time. Crypto Keys entered via the PKB or Crypto Fill Port will overwrite any keys previously sent to the GPS receiver. However, Crypto Keys retrieved from the DTC will not overwrite any keys entered through the PKB or Crypto Fill Port.

Entering Crypto Keys through the PKB

Crypto Keys are entered through the Crypto Key Data Entry page. Each key is made up of eight components which the operator may edit one at time. Each component may have a value between 0 and 65535.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch on the Main Menu page. This will display the Crypto Key View All page.

c. Press any of the displayed Crypto Key components switches (1–16) to display the Crypto Key Data Entry page.

d. The item being initialized is displayed in keys 1 and 2. The initial value is displayed on key 3.

e. Press the up/down arrows or ENTER to move through the list of data entry fields.

f. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value.

g. Press ENTER when the correct initial value has been entered.

h. When all initial values have been entered, press VIEW ALL to display the Crypto Key View All page.

i. Make sure that all Crypto Key fill devices are disconnected from the Crypto Fill Port.

j. Press SEND DATA on the Crypto Key View All page to send the Crypto Key data to the GPS receiver.

k. Parity status for each non-zero Crypto Key will be displayed on key 19 of the Crypto Key View All page after a 15 to 20 second delay for transmission.

NOTE

> Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

If the Crypto Keys fail to pass parity, the operator will need to exit the page, display the Crypto Key View All page again and resend the keys by pressing SEND DATA again.

NOTE

> A Crypto Fill Port device cannot be connected to the Crypto Fill Port when sending PKB entered Crypto Keys or else the last keys entered through the Crypto Fill Port will be sent to the receiver instead of the PKB entered keys.

Entering Crypto Keys through the Crypto Fill Port

The Crypto Key View All page must be displayed to enter Crypto Keys via the Crypto Fill Port. A KYK-13 or CYZ-10 using a KYK-13 protocol may be used to enter Crypto Keys through the Crypto Fill Port. Keys entered via the Crypto Fill Port will not be displayed on the PKB.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch on the Main Menu page. This will display the Crypto Key View All page.

c. Connect either a KYK-13 or a CYZ-10 using a KYK-13 protocol to the Crypto Fill Port.

d. Apply power to the Crypto Fill device. Upon applying power to the fill device, CRYPTO FILL will appear on key 19.

e. Select the desired key on the Crypto Fill device for entry into the IU. Refer to the KYK-13 or CYZ-10 user manual for instruction on selecting the key for entry.

f. Press CRYPTO FILL. This will display LOAD and CRYPTO KEY 1 on switches 19 and 20.

g. Select the location in IU memory to load the Crypto Key info with switch 20. Available locations are CRYPTO KEY 1 and CRYPTO KEY 2. The location displayed on switch 20 designates where the key will be placed. Selecting switch 20 will cycle through each location and then return to the CRYPTO FILL and SEND DATA legends on switches 19 and 20.

h. With the desired IU memory location displayed on switch 20, press LOAD. This will transfer data from the fill device connected to the Crypto Fill Port to IU memory. Any previous Crypto Key at the location displayed on switch 20 will be overwritten.

i. When the data transfer is complete, switches 19 and 20 will return to CRYPTO FILL and SEND DATA.

j. Repeat steps f. through i. for a second Crypto Key if desired.

k. Press SEND DATA on the Crypto Key View All page to send the Crypto Key data to the GPS receiver.

NOTE

> Make sure that the Crypto Key fill devices remains powered up and connected to the Crypto Fill Port, while sending data to the GPS receiver. Leaving the fill device in this state allows the IUS to determine which set of Crypto Key data to send to the GPS receiver.

l. Parity status for each non-zero Crypto Key will be displayed on legend 19 of the Crypto Key View All page after a 15 to 20 second delay for transmission.

NOTE

> Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

There are two locations in IU memory that are reserved for holding Crypto Keys entered via the Crypto Fill Port. Any Crypto Fill Port communication failures will be displayed on the Test Mode Display page. Any existing key in the chosen location will be overwritten.

NOTE

> Sending Crypto Keys from the Crypto Fill Port will zeroize any keys entered via the PKB

Crypto Key Status

The Crypto Key status indicates the presence Crypto Keys in the GPS receiver. The Crypto Key status is provided on three different pages:

a. The Main Menu Page (switch 1)

b. The GPS Data Display Page (switch 18)

c. The Channel Summary Page (switch 18)

On each page, the Crypto Key status will be reported as zeroized or not present, NO KEY, as present and waiting verification, KEY RCVR, or as present and in use, KEY PRESNT.

Zeroizing Crypto Keys

Crypto Variables are zeroized through the IU Power Panel. By pressing the GPS ZEROIZE button, Crypto Keys will be removed from the GPS receiver and the IU. In addition, the Crypto Key status will change to NO KEY.

Overriding Crypto Status to Good

If it has been determined that position estimates are good enough for INU updates, then the operator may override the Crypto Data Status to good by selecting the override ON/OFF switch on the Main Menu page.

a. From the Main Menu page, press the ORIDE ON/OFF (switch 18).

b. With the ORIDE ON/OFF legend blinking, press the ENTER. This will toggle the crypto status override state.

Strategic Radar (AN/APQ-166)

DESCRIPTION

The ASQ Strategic AN/APQ-166 Radar Set Group includes the receiver-transmitter/modulator (RTM), antenna system, radar processor, display generator, and radar navigator management panel.

The radar set transmits high energy RF pulses that bounce off targets and return to the radar set group for presentation on the multifunction display as video.

POWER SOURCE

Power for the radar set is applied through circuit breakers on the right and left forward BNS overhead circuit breaker panel, the auxiliary BNS circuit breaker panel and the right S/V filter box circuit breaker panel. The voltages required for operation are 115-volts ac and 28-volts dc.

CONTROLS AND DISPLAYS

Refer to figure 1-51 for the description of the radar controls and indicators and figures 1-52 thru 1-55 for radar display formats.

RADAR VIDEO

The radar transmits RF energy pulses that are returned to the radar receiver for conversion to video that is displayed on the MFD. The object (target) that reflects the video will be displayed each time the radar antenna beam passes over it.

Radar video can be requested for display on any MFD. Radar video with a limited set of pertinent data overlayed on it is displayed in response to a FRMT-1 command. Radar video with a detailed set of pertinent data overlayed on it is displayed in response to a FRMT-2 or a FRMT-2,n command, where “n” identifies the navigation system that is the source of the prime mission data. Data from the prime navigation system is displayed when the operator does not specify a source. The valid values of “n” and the corresponding navigation system are 1 for INU-1, 2 for INU-2, or 3 for alternate navigation. The command will be displayed on the command line of the MFD in reverse video when “n”' is not a valid number.

Ground Map Video

Ground map video is available for navigation and weather avoidance at the radar navigator’s and navigator’s stations. Range selection from 3 to 200 nm is controlled on the RNMP or through use of CF-F commands. Ground map and beacon video can be displayed simultaneously by selection of the radar/beacon transmitter mode on the RNMP or with CF-F. When the pilot selects a terrain avoidance stabilization mode, ground map video at the radar navigators’ and navigators’ stations will be optimum with a range selection of 25 nm or less. A decrease of video intensity will occur if ranges of 50 nm or greater are selected due to a decrease in pulse width with higher range selections (i.e., 1 ms versus 0.4 ms). When the pilot selects a TA stabilization mode, a failure warning video band should be visible from 42 to 47 nm with a 50 nm or greater range selection.

NOTE

> Range selection changes by the navigation team while flying terrain avoidance will cause a momentary drop out in the pilot’s terrain trace as the transmitter changes PRF. This is normal and should not be considered a malfunction. Multiple changes in rapid succession could be distracting and should be avoided.

Terrain Avoidance (TA) Video (Pilots’ Profile Display)

The radar processor analyzes radar return signals to establish patterns of landmass below and forward of the aircraft. The computer accounts for antenna position, clearance plane setting, target range and vertical position, relative to boresight, to compute profile video. The profile video is displayed on the pilot and copilot EVS Monitor.

TYPES OF RADAR DISPLAYS

The three navigation displays are controlled by the RNMP. The terrain avoidance display is controlled by the radar control test panel. The navigation displays are PPI, DCPPI, and spotlight. The PPI map positions the aircraft in the center of the radar map. The DCPPI map places the aircraft on the edge of the radar map and shows a 180° Field of View (FOV). The Spotlite map points the radar directly at the part of the map where the radar crosshair is displayed. Each display can be oriented either line-of-sight (LOS) or north stabilized (NS). LOS orients the display along the aircraft track and the north stabilized display orients true north at the top of the display.

The type of radar map that can currently be displayed will have its corresponding switch-indicator on the RNMP lit. The operator can control which type of map will be displayed on the Radar Display by pressing that map’s corresponding Switch-indicator on the RNMP. When the operator presses one of the radar map type switches, the indicator for that switch will light. The other two radar map switches will not be lit, and any radar displays on the MFD will change to reflect the new map type.

For each of the radar map displays, the operator may control the way in which the range to points on the map is computed. In slant (SLT) range mode the range is calculated from the aircraft to a point on the ground. In ground (GRD) range mode altitude is compensated for and the range is calculated from a position on the ground directly beneath the aircraft to a point on the ground. FRMT-1 and FRMT-2 indicate current range mode as either RS, slant range, or RG, ground range.

The type of radar map that can currently be displayed will have its corresponding pushbutton on the RNMP lit. The operator can control which type of map will be displayed on the Radar Display by pressing that map’s corresponding pushbutton on the RNMP. When the operator presses one of the radar map type pushbutton the indicator for that pushbutton will light. The indicators on the pushbutton for the other two radar maps will not be lit, and any radar displays on the MFD will change to reflect the new map type.

The operator may select one of three possible radar transmitter mode settings. The three radar transmitter modes are beacon (BCN), radar (RDR), and radar/beacon (RDR/BCN). The transmitter mode setting is controlled using the XMTR MODE switch on the RNMP. To change the mode the operator should turn the switch to the position corresponding to the desired transmitter mode.

Plan Position Indicator (PPI) Display

The MFD will present a plan position indicator (PPI) scan type radar display that places the aircraft in the center of the radar map. The size of the area is determined by the selected range which represents ground distance, in nautical miles, from center of display to the edge. When NAV markers are selected, azimuth bezel marks are displayed on the range mark at 80% of the selected range. The bezel azimuth marks are displayed every 2° at the top 180° of the MFD and every 10° on the bottom half of the MFD. In addition to the full scan display a sector scan mode, controlled by sector width knob, is provided to allow the operator to observe a particular area or radar return. In PPI sector scan, the vertex of the display remains in the center of the display.

When the sector width knob is rotated out of detent, the PPI will sector approximately 15° with the ANT speed switch in SLOW and approximately 45° with the ANT speed switch in FAST. Continued rotation of the sector width knob expands the sector to approximately 190°. Figure 1-52 is an example of PPI display.

Displaced Center Plan Position Indicator (DCPPI) Display

The DCPPI display moves the center of the sweep to the edge of the scope as shown in figure 1-53. The DCPPI map places the aircraft on the edge of the radar map and shows a 180° Field of View (FOV).

Spotlight Display

The spotlight display is shown in figure 1-54. The Spotlite map points the radar directly at the part of the map where the radar crosshair is displayed. When spotlight is selected, map center becomes the present position of the crosshair location and remains fixed, regardless of crosshair inputs, until reselection of spotlight, at which time map center will again become crosshair position. No track or NAV markers are available in spotlight mode.

In spotlight mode, radar PRF and PW are dependent on range to crosshair and display scale selected.

The following are known points of transition when intensity changes will occur:

LET X = RANGE TO X–HAIR + ONE HALF RANGE SCALE SELECTED

X(NM)	PRF(Hz)	PW(MS)
95	323 (±6)	2.25 (+0.25/–0.05)
Between 60 & 95	808 (±16)	1.00 (+0.1)
Between 45 & 60	1212 (±24)	1.00 (±0.1)
Between 25 & 45	1617 (±32)	0.40 (±0.1)
25	1617 (±32)	0.20 (+0.05/–0.07)

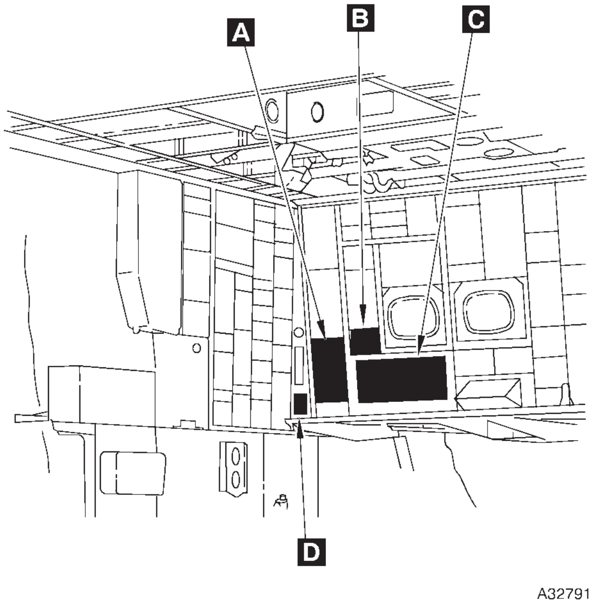
RADAR CROSSHAIR CONTROL

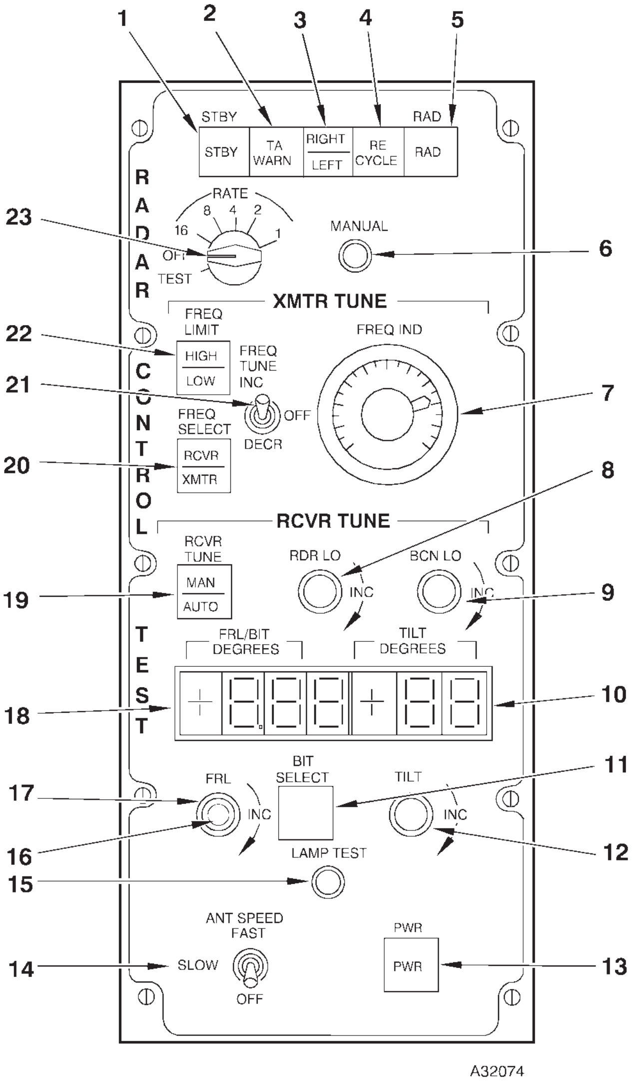
On any of the radar maps with the X–HAIR marker displayed, FMS allows the operator to control the placement of the radar crosshair on the radar map through input from the IKB in control of the MFD. The operator must first associate the trackball (TB) control on the IKB with the radar by pressing the RDR pushbutton. Once the TB control is associated with the radar, the indicator of the RDR pushbutton will be illuminated and all other pushbutton in the Track Control group will be extinguished. The operator can then move the crosshair position on the display by holding down the ENBL while moving the TB. See Navigation and Steering this section.

ALQ-117 TO BNS BLANKING SWITCH

The ALQ-117 to BNS blanking switch provides a means to disable the ALQ-172 blanking circuits in the radar processor for the navigator’s video. The switch has ON--OFF positions. ON position is the normal operating position and allows the navigator’s video to be blanked during ALQ-172 transmission. OFF position provides a ground to disable the navigator’s blanking circuits and permits ALQ-172 interference to be displayed with navigator’s video.

Radar Control Panels

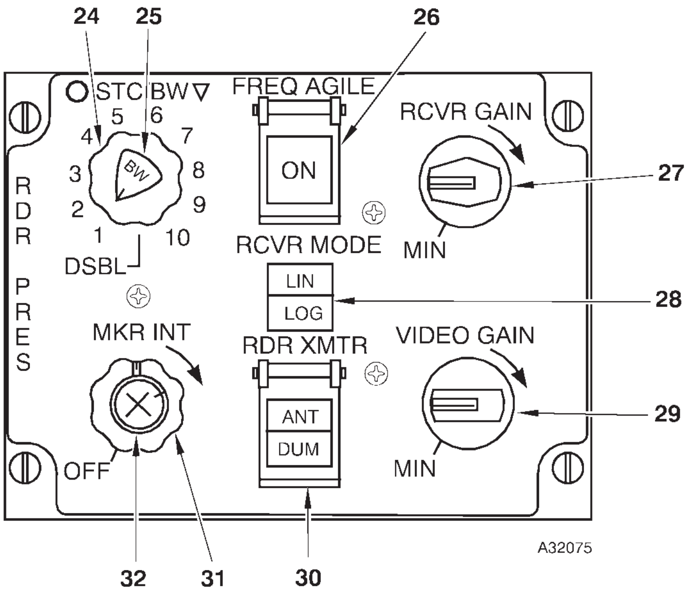




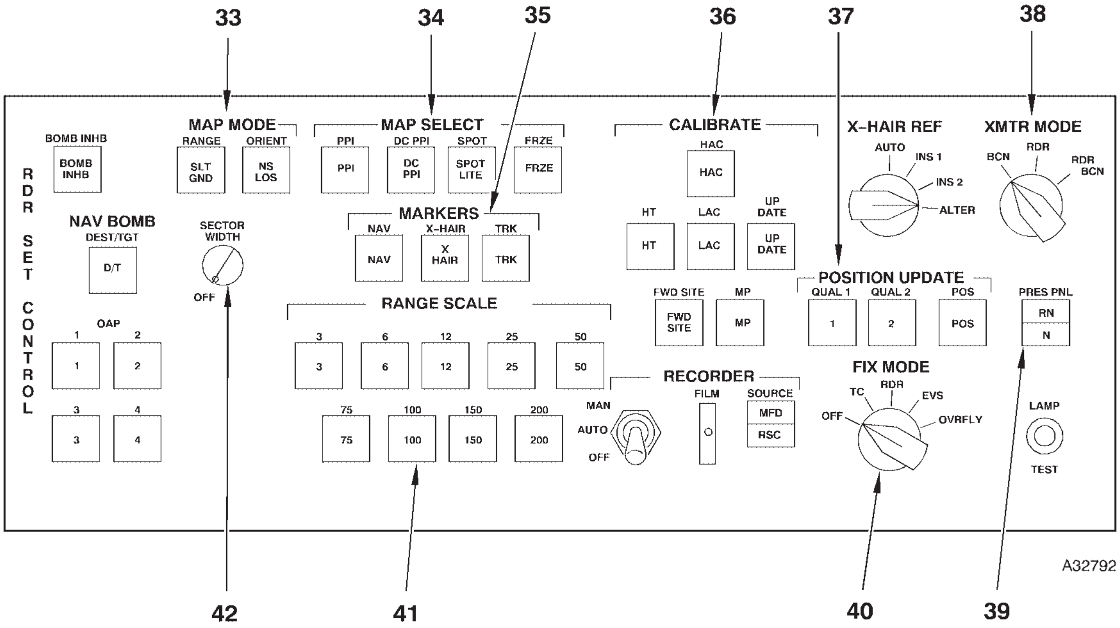
A RADAR CONTROL TEST PANEL

1	STANDBY SWITCH
2	TA WARNING LIGHT
3	RIGHT-LEFT SWITCH
4	RAD RECYCLE LIGHT
5	RAD SWITCH
6	MANUAL PUSHBUTTON
7	FREQUENCY INDICATOR
8	RADAR LOCAL OSCILLATOR TUNE KNOB
9	BEACON LOCAL OSCILLATOR TUNE KNOB
10	ANTENNA TILT INDICATOR
11	BIT SELECT SWITCH
12	ANTENNA TILT CONTROL KNOB
13	RADAR POWER SWITCH
14	ANTENNA SPEED SWITCH
15	LAMP TEST BUTTON
16	FRL CONTROL KNOB
17	FRL LOCKING KNOB
18	FRL/BIT INDICATOR
19	RECEIVER TUNE SWITCH
20	FREQUENCY SELECT SWITCH
21	RADAR FREQUENCY TUNE SWITCH
22	FREQUENCY LIMIT LIGHT
23	RATE SWITCH

Figure 1-51 (Sheet 1 of 9)



B RADAR PRESENTATION PANEL

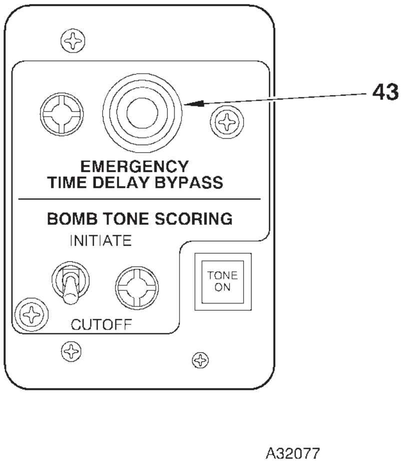


C RADAR NAVIGATOR MANAGEMENT PANEL

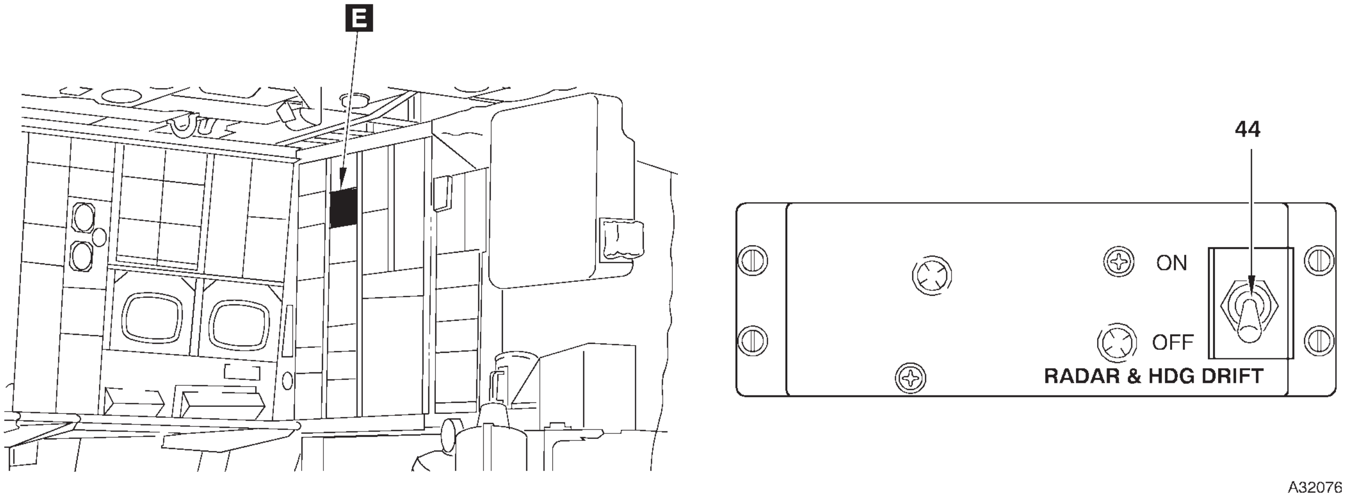
24	STC KNOB
25	BEAM WIDTH KNOB
26	FREQUENCY AGILE SWITCH
27	RECEIVER GAIN KNOB
28	RECEIVER MODE SWITCH
29	VIDEO GAIN KNOB
30	RADAR TRANSMITTER SWITCH
31	NAV AND TRACK MARKER INTENSITY KNOB
32	CROSSHAIR MARKER INTENSITY KNOB
33	MAP MODE SWITCHES (2)
34	MAP DISPLAY SELECT SWITCHES (4)
35	MARKER SWITCHES (3)
36	CALIBRATE SWITCHES (6)
37	POSITION UPDATE SWITCHES (3)
38	TRANSMITTER MODE SWITCH
39	PRESENTATION PANEL SELECTOR SWITCH
40	FIX MODE SELECTOR SWITCH
41	RANGE/SCALE SWITCHES (9)
42	SECTOR WIDTH KNOB

Figure 1-51 (Sheet 2 of 9)

Radar Control Panels (Cont)



D EMERGENCY TIME DELAY BYPASS PANEL



E DOPPLER DRIFT CONTROL PANEL PANEL

43	EMERGENCY TIME DELAY BYPASS BUTTON	44	RADAR & HEADING DRIFT SWITCH

Figure 1-51 (Sheet 3 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
		A RADAR CONTROL TEST PANEL
1	STBY Switch	When pressed, places the transmitter in standby. The green STBY light comes on approximately 5 minutes after power application or any other time the transmitter is in standby.
2	TA WARN Light	Red light is used to indicate failure warning or when clearance plane is set below 200 feet at the pilots' station or the pilots' TA test button is pressed.
3	RIGHT-LEFT Switch	Two position push actuated switch out is left, in is right. Controls on which side frequency shifting occurs in conjunction with the rate switch.
4	RAD RECYCLE Light	Amber light comes on for 1 second when an overload condition exists, or a short term power supply interruption occurs.
5	RAD Switch	When pressed, after the standby light comes on, starts the transmitter operation. The red RAD light comes on when the transmitter is in radiate mode.
6	MANUAL Pushbutton	Initiates an incremented drive signal to the magnetron drive motor each time the pushbutton is pressed and released. The pushbutton is operational only when one of the drive rates is selected on the rate switch.
7	FREQ IND	Displays base indicated frequency in 10 MHz increments. The doghouse at 775 MHz displays the beacon frequency. **NOTE** Eight frequency bands, separated by 125 MHz, are available for strategic radar operation. Setting the frequency indicator to 125, 250, 375, 500, 625, 750, or 875 may cause the radar to shift between adjacent bands and cause the TA trace to move around. Avoid settings at or near (±10 MHz) these increments.
8	Radar (RDR) Local (LO) Oscillator TUNE Knob	Tunes the radar local oscillator when the XMTR MODE selector switch on the RNMP is set to RDR and the receiver tune switch is in MANUAL. RDR LO can be disabled by rotating maximum clockwise.
9	Beacon (BCN) Local (LO) Oscillator TUNE Knob	Tunes the beacon local oscillator when the XMTR MODE selector switch on the RNMP is set to BCN or RDR BCN and the receiver tune switch is in MANUAL.
10	Antenna Tilt Indicator	The indicator scale is used to select the approximate tilt angle and is adjustable from –30 to +4.0.
11	BIT SELECT	Used in conjunction with the FRL/BIT indicator to display BIT information.
12	Antenna TILT Control Knob	Positions antenna in tilt. The control is bypassed during TA operation.
13	Radar PWR Switch	Two position pushbutton switch, out is off, in is on. Applies power to the radar and the green PWR light comes on when power is applied.

Figure 1-51 (Sheet 4 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR CONTROL TEST PANEL (Cont)	
14	ANTENNA Speed Switch	Three position lever lock switch with OFF, SLOW, and FAST positions. OFF stops antenna rotation. SLOW rotates the antenna at 8 1/2 rpm. If TA is selected the antenna will automatically change to fast rotation. FAST rotates the antenna at 20 rpm.
15	LAMP TEST Button	When the LAMP TEST button is pressed, all of the lights on the Radar Control Test panel come on. The FRL/BIT and TILT indicators should display +8.88 and +88 respectively.
16	FRL Control Knob	Used in conjunction with FRL indicator to set the FRL angle-of-attack into the system. **NOTE** Some FRL angle settings cannot be selected to the nearest hundredth of a degree. The operator must use the next high or lower value to the nearest hundredth of a degree.
17	FRL Locking Knob	CW rotation will lock FRL control knob at set position. CCW rotation unlocks the knob. **NOTE** Tightening or loosening the FRL locking knob could cause the FRL control knob to turn, changing the FRL setting. Ensure the correct FRL is still present in the FRL/BIT window after tightening or loosening the FRL locking knob.
18	FRL/BIT Indicator	Used in conjunction with the FRL adjust knob to set the FRL angle-of-attack in the system. When the BIT select switch is pressed, the FRL/BIT indicator displays the BIT test. **CAUTION** Do not attempt to set the indicator beyond +5.00° and –5.00°. **NOTE** On some aircraft, the FRL angle cannot be set beyond approximate ±4.97. This is a system characteristic, not a malfunction.
19	Receiver (RCVR) TUNE Switch	AUTO selects automatic tuning of the radar or beacon receiver. Manual (MAN) selects manual tuning of the radar or beacon receiver. **WARNING** Due to degradation of TA system accuracy, manual tuning will not be used during actual TA operations.

Figure 1-51 (Sheet 5 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR CONTROL TEST PANEL (Cont)	
20	FREQ SELECT Switch (Push Actuated)	XMTR displays transmitter frequency on the FREQ IND meter. RCVR displays receiver frequency on the FREQ IND meter.
21	Radar Frequency (FREQ) TUNE Switch	Changes transmitter magnetron frequency when spring-loaded switch is held to DECR or INCR position.
22	FREQ LIMIT Light	HI green light comes on when transmitter magnetron is at its high frequency limit. LO green light comes on when transmitter magnetron is at its low frequency limit.
23	RATE Switch	Selects the drive rate in automatic frequency mode. It has a TEST position, an OFF position, and five selectable drive rate positions. **CAUTION** The RATE switch must be OFF prior to turning the radar power switch ON or damage to the radar receiver-transmitter can occur.
	B RADAR PRESENTATION PANEL	
24	STC Knob	Increases sensitivity time control by rotating the knob clockwise. This causes the gain of the short range returns relative to the long range returns to decrease.
25	Beam Width (BW) Knob	Is used to reduce the apparent beam width. Rotating the knob clockwise out of the detent causes the apparent beam width to progressively widen. Beam width is not operational when in the TA mode.
26	Frequency (FREQ) AGILE Switch	Provides for a continuous frequency change at a set rate and reduction of ground clutter.
27	Receiver (RCVR) GAIN Knob	Enhances the radar video target signature. Adjustment is varied to provide the smallest and sharpest returns on the radar.
28	Receiver (RCVR) Mode Switch	Changes the gain distribution to either LIN or LOG. LIN gain rate displays returns relative to their reflective energy. LOG gain rate increases the video intensity for returns at longer ranges.

Figure 1-51 (Sheet 6 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
	B RADAR PRESENTATION PANEL (Cont)	
29	VIDEO GAIN Knob	Is used to control the brilliance of the radar returns in relation to scope background.
30	Radar Transmitter (RDR XMTR) Switch	Changes the radar output to either Antenna or Dummy Modes. ANT mode allows the radar energy to be transmitted from the antenna. DUM mode allows the radar energy to be fed into a dummy circuit.
31	Nav and Track Marker Intensity (MKR INT) Knob	Increases the intensity of both the navigation and track markers by rotating the outer knob from OFF.
32	Crosshair Marker Intensity (MKR INT) Knob	Increases the intensity of the crosshair by rotating inner knob from OFF.
	C RADAR NAVIGATOR MANAGEMENT PANEL	
33	MAP MODE Switches (2)	RANGE selects altitude compensation mode. SLT – Uncompensated linear display. GND – Altitude compensated ground range. ORIENT selects map orientation. NS – North stabilized display. LOS – Track-up display.
34	MAP Display Select Switches (4)	PPI gives radar display with aircraft at center of display. DCPPI gives displaced center radar display with aircraft at edge of display. SPOT gives 3, 6, 12, 25, or 50 mile map display with crosshair at center of the display. FRZE causes radar display to be static.
35	Marker Switches (3)	Use individually or together. NAV gives range rings and heading marker. TRK gives dashed line signifying aircraft track. X HAIR gives a crosshair display.
36	CALIBRATE Switches (6)	Select calibration mode and command update. HAC calibrates true altitude when the radar altimeter cannot be used. LAC calibrates true altitude with the radar altimeter below 5,000 feet absolute altitude. HT enables HT correction (Height of Terrain). MP initiates Memory Point wind calibration. UPDATE enters HAC, LAC, and MP data into the computer and changes buffers. FWD SITE rapidly moves crosshairs forward 1/2 the distance of the selected range.

Figure 1-51 (Sheet 7 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
	C RADAR NAVIGATOR MANAGEMENT PANEL (Cont)	
37	POSITION UPDATE Switches (3)	**NOTE** Use of these switches alters the buffers. Used to start computations for updating the navigation modules to accept or reject position fix information as selected by FIX MODE selector switch. See Position Update Switch Selection, this section. QUAL 1 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is a well defined point (highest quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is most confident. QUAL 2 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is less well defined (lesser quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is less confident. POS – Zeroes the buffers in all navigation models. The computations are used for steering and targeting routines.
38	Transmitter (XMTR) Mode Switch	Selects radar transmitting operational mode. BCN gives display without ground map video for use with rendezvous beacon. RDR gives radar ground map video. RDR BCN combines radar and beacon video.
39	Presentation (PRES) PNL Selector Switch	Selects RN or N panel for control of radar.
40	FIX MODE Selector Switch	Selects method of position fixing. OFF deselects previous position fixing mode, erases related messages, and zeros crosshair buffers. TC – Not used. RDR – Radar crosshair used for position update. EVS – EVS azimuth and elevation used for position update. OVRFLY – Overfly of a known position used for position update. **NOTE** Pressing this switch displays the selected x-hair buffers on the radar navigator’s FRMT-1 and FRMT-2.
41	RANGE/SCALE Switches (9)	Select range for PPI or DCPPI radar maps (RANGE light on) or scale for spotlight maps (SCALE light on). **NOTE** The SPOT and RANGE/SCALE switches do not function as indicated with some radar scan converters installed. See NORMAL OPERATION, this section, for procedures.
42	SECTOR WIDTH Knob	Controls both ground map and TA modes.

Figure 1-51 (Sheet 8 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
D EMERGENCY TIME DELAY BYPASS PANEL		
43	EMERGENCY TIME DELAY BYPASS Button	Provides emergency means of bypassing the radar warmup timer in flight should a short interruption of power occur. **CAUTION** Pressing the emergency time delay bypass button before the radar has warmed up sufficiently will burn out the radar set. The emergency time delay bypass should only be used as an emergency means of bypassing the OAS radar warmup timer and should be used only after the radar power on light has been illuminated for a minimum of 3 minutes.
E DOPPLER DRIFT CONTROL PANEL		
44	RADAR & HDG DRIFT SWITCH	ON – Normal position, drift information supplied to TA and radar systems. Orients the systems to ground track from the OAS prime NAV model. OFF – Supplies a zero drift signal to TA and radar systems, orienting the display about aircraft heading rather than ground track. Used when OAS drift value is invalid. **NOTE** Notify pilot when radar and heading drift switch is OFF.

Figure 1-51 (Sheet 9 of 9)

PPI Radar Display

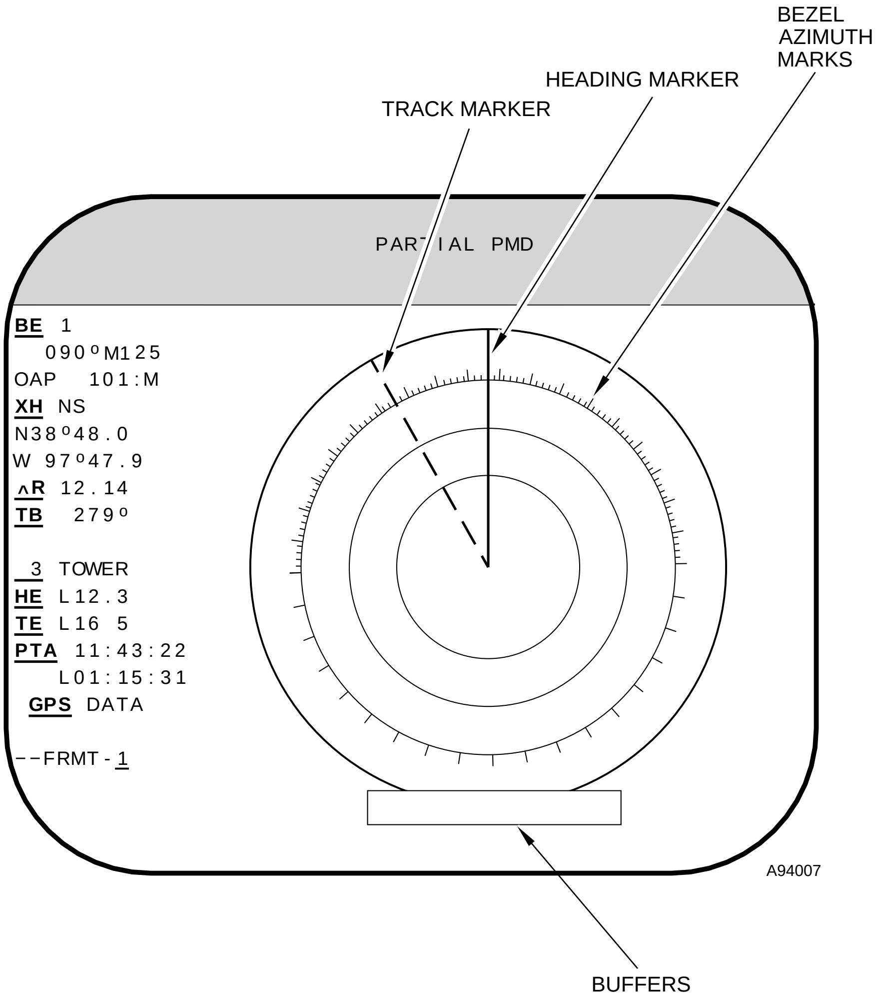


Figure 1-52

DCPPI Radar Display

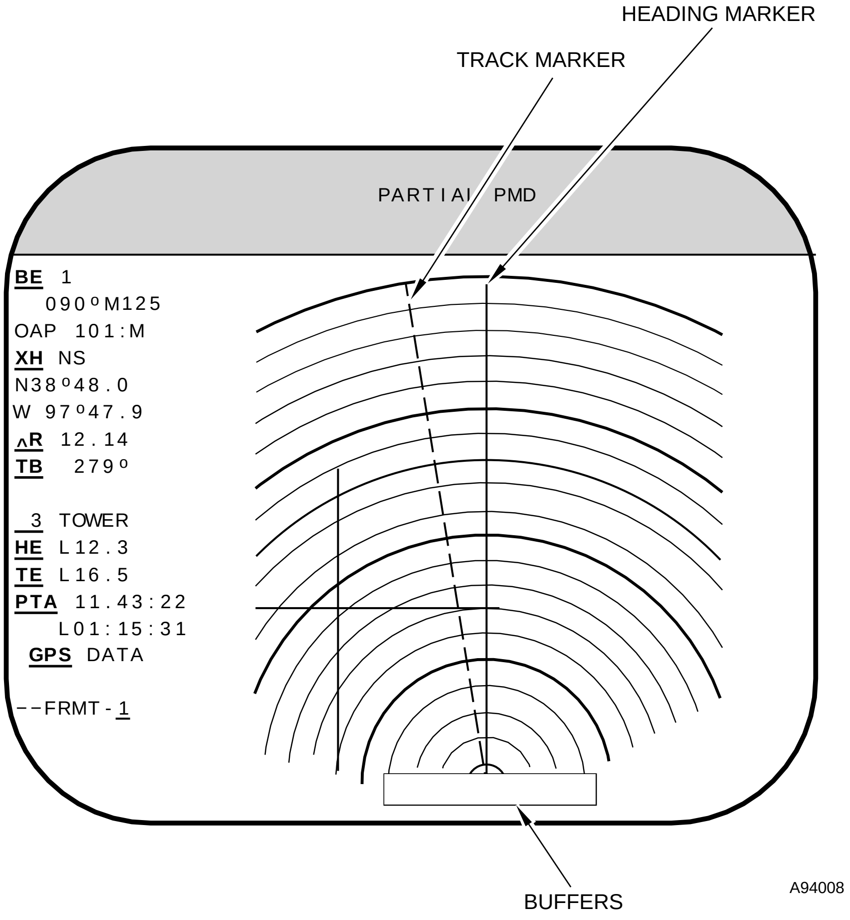
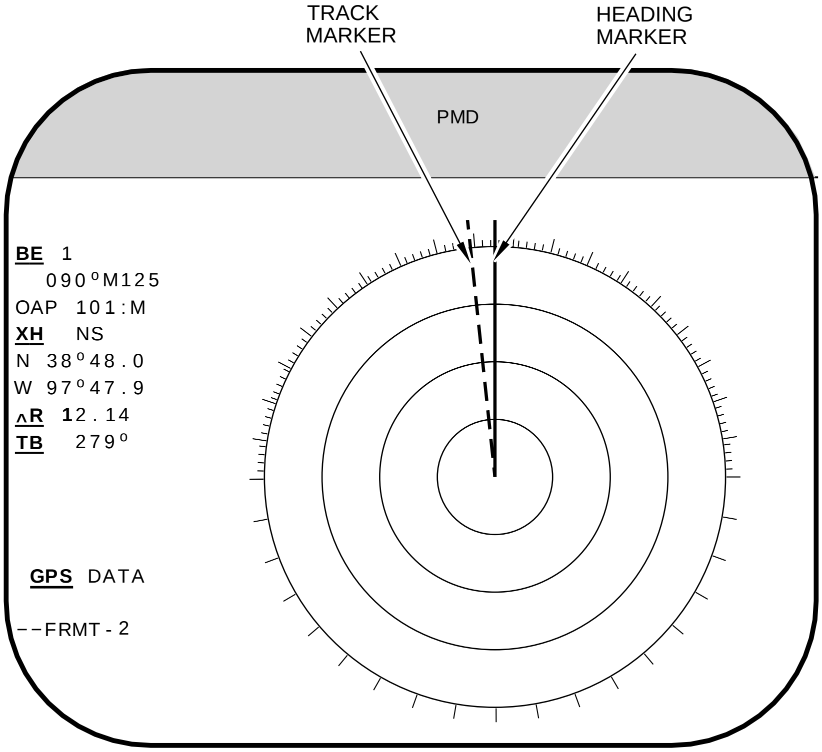
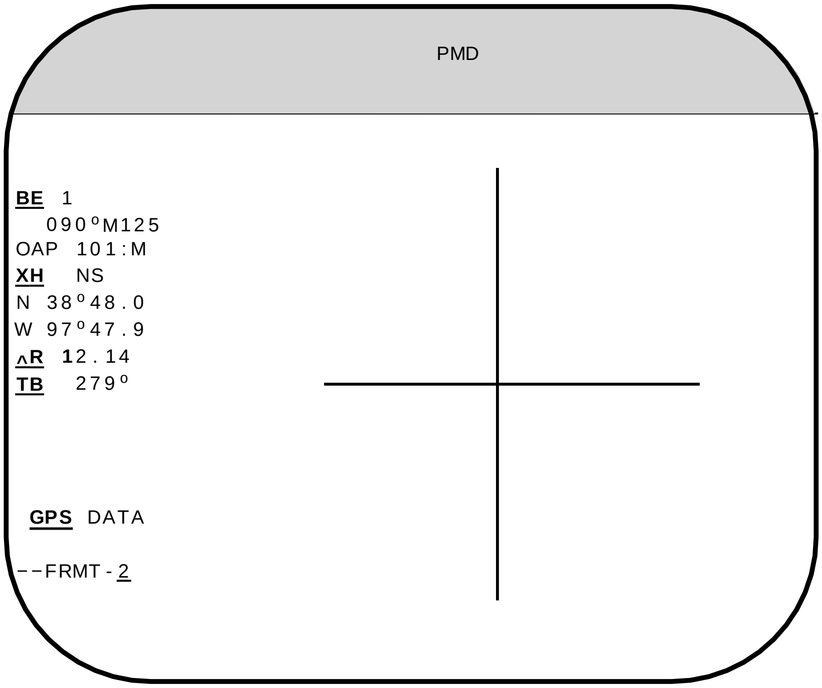


Figure 1-53

Spotlight Radar Display



BEFORE SELECTION



AFTER SELECTION

A94009

Figure 1-54

TA Display

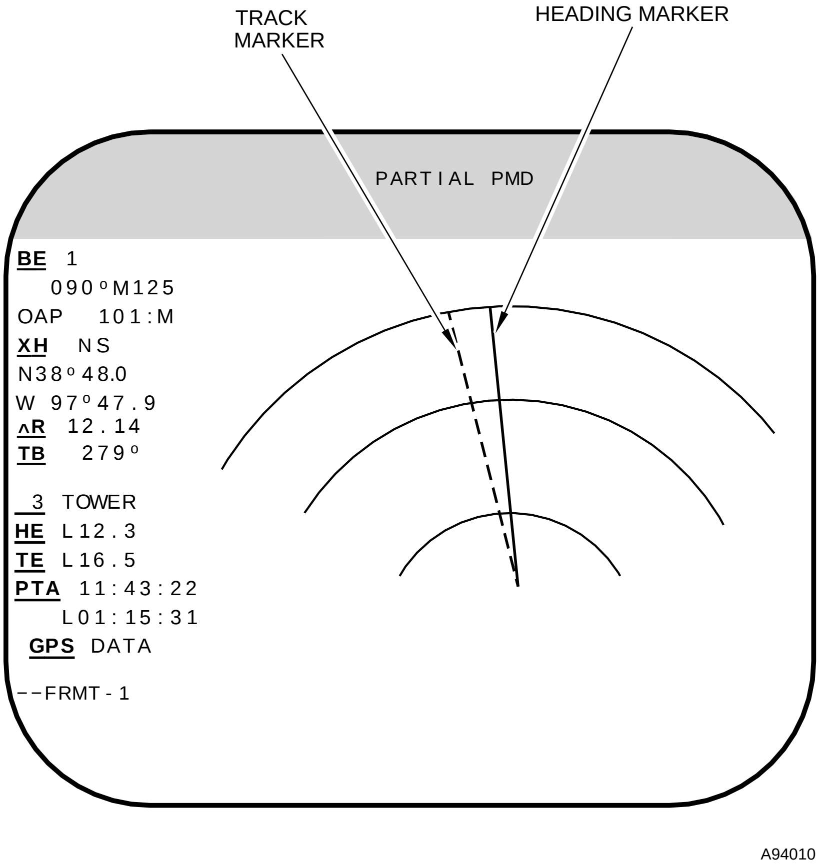


Figure 1-55

NORMAL OPERATION

Reflected energy is picked up by the antenna and fed to the receiver for detection and MFD presentation. A ground map presentation is provided at the radar navigator's and navigator's stations in all modes of operation. When the pilot selects a TA mode of operation, height of terrain information is also provided up to 10 miles ahead of the aircraft at the pilots' station.

RADAR TURN-ON

Power to the radar set and operational capability is accomplished after OAS is turned on through the following switches:

- Radar Control Test Panel (RCTP), radar power and antenna switches on.
- Radar Pressure Control Panel, switches normal on.
- Radar Navigator Management Panel, select mode of operation.
- MFD, adjust contrast and brightness knobs for presentation.

RADAR TUNING

The following steps are to be used as a technique for tuning the radar for an optimum display. Time limitations or equipment malfunction may warrant using a variation of these steps.

1. Presentation Panel Select Switch – RN
2. RN's L MFD – Selected
3. All Knobs on Radar Presentation Panel – Full counterclockwise
4. RN's L MFD – Adjust using brightness and contrast knobs, tune video just below visibility threshold
5. Antenna Tilt Control Knob – Set –3°
6. FRMT-D – Selected, check and ensure radar display has clarity for 16 shades of gray
7. FRMT-1 – Selected
8. NAV Markers Select Button – Pressed
9. Marker Intensity – Adjusted
10. RCVR MODE Switch – LIN
11. RDR XMTR Switch – ANT
12. Video Gain Knob – Full clockwise, then back off $^1/_2$ to $^3/_4$ turn
13. RCVR GAIN Knob – Full clockwise
14. Radiate Button – Pressed (when cleared)
15. Radar Presentation – Adjusted, use STC in combination with RCVR GAIN to get optimum presentation. Beam width or frequency agility, as desired, also may be used to alter presentation
16. Presentation Select Switch – NAV, navigator should tune his display using same procedures

Radar Presentation Control

The radar presentation panel (figure 1-51) gives the radar navigator and navigator control of the apparent beam width and brightness of the video on their MFD. The video gain should be adjusted for optimum viewing prior to adjusting the receiver gain. The STC knob is used to adjust the gain of the radar beam for optimum video presentation, and is used to minimize the over–intensification of short range targets. Rotating the knob clockwise causes the gain of short range returns relative to the long range returns to be decreased and results in a more uniform presentation over the entire range.

RECEIVER MODE

The receiver mode selection of LIN (Linear) or LOG (Logarithmic) function affects the video return as viewed on the MFD. In LIN, the gain of the return is directly proportional to its reflected energy. The LOG function enables video compression of the receiver-transmitter to enhance the weaker video returns, while stabilizing the close in video returns. Each mode selection will effect the video return.

BEAM WIDTH

The beam width control knob will adjust the apparent radar beam width to facilitate "finer" returns. Rotating the knob clockwise out of the detent causes the beam width to progressively widen to aid in radar tuning. Beam width is not operational when in TA mode.

Radar Video Freeze

The FRZE selection, on the RNMP, stops movement of the radar video display and the display remains stationary until FRZE is deselected. This selection allows additional viewing time of the display and precise positioning of the crosshairs. The crosshairs can be manually positioned, but do not drift when placed on a point. The freeze display can be selected at any time except when memory point wind calibration mode is active. The OAS ignores the freeze request under these conditions. During the freeze interval, the map mode, map select, markers, and range scale selection cannot be changed and the video display is not adjustable. The crosshair reference positions can be selected for display and evaluation during freeze. If radar and EVS track control functions are selected at the same time, the EVS crosshair is slaved to the radar crosshair. If FRZE is commanded with both track control functions selected, the EVS stops updating and appears to drift off the target when the radar display is frozen. When radar freeze is deselected, radar video is again updated to where the crosshairs are on target and, since radar and EVS are coupled, EVS will reorient to the target.

NOTE

- When freeze is selected, both inertial navigational models go into the free-inertial mode and remain in this status until FRZE is deselected. Extended operation with FRZE selected could degrade the OAS navigational capability.

- Do not manually deselect the freeze display or command another freeze display while the OAS is processing the radar position update. This action may cause the Kalman filter to reinitialize. Under this condition the Kalman filter is not synchronized with the INS Schuler cycle.

- If a QUAL fix is taken while in FRZE mode, FRZE mode will automatically be exited once the OAS has processed the fix.

Marker Generation

Markers are generated and controlled by the computers. They are used to provide range and azimuth reference relative to aircraft position.

NAV MARKERS

The nav markers consist of fixed slant or ground range markers and aircraft heading marker.

X–HAIR MARKERS

The crosshair markers consist of a vertical and horizontal crosshair. The variable range is generated following each radar pulse transmission. The intersection of the two markers comprise a crosshair that is displayed on the MFD to identify a single-point on the ground map corresponding to where the computer calculates the target location. The crosshairs can be moved using the trackball, and the size of the crosshair is determined by time since the last fix, and range selected. A large crosshair size may indicate a need for a position fix update. With DCPPI or PPI MAP MODES selected, the crosshairs should be placed on the sighting point only when the radar sweep passes through the point to ensure accurate crosshair placement on the sighting point. This problem does not exist in the spotlight mode.

TRACK MARKER

A track marker is a dashed line on the MFD that is consistent with the aircraft track angle. The length of the dash will indicate either distance or time depending on range/scale selection as follows:

RANGE/SCALE	PPI/DCPPI
3	950 ft
6	1900 ft
12	1 min
25	1 min
50	1 min
75 to 200	1 min

Range and Scale Selection

When the radar set is in PPI or DCPPI mode, the range select switches on the radar navigator management panel are enabled. Spotlight selects the scale function based on current range to crosshairs when selected. The maximum scale selection is 50. If more than 50 was selected the scale goes to 50 and reverts back to the previous range when spotlight is deselected. Only one switch can be selected at a time. The PPI range is measured from the center to the top of the display. DCPPI range is twice (X2) the PPI size. Spotlight scale is measured from edge to edge of the display. Operator can manually select spotlight scale at any time.

MAP MODE SELECTION

The range mode function on the RNMP is used for radar map altitude compensation. Slant (SLT) results in a radar map that is not compensated for altitude, therefore the video is portrayed at a distance measured directly from the aircraft to the return. Ground (GND) results in a radar map that is altitude compensated and the video represents a ground distance from the return to the aircraft.

NOTE

> Crosshair displays for fix points greater than 200 nm could be displayed at ranges within the 200 nm video presentation.

Orientation Mode Selection

The two orientation modes are available for map orientation: North stabilized (NS) or line-of-sight (LOS). NS results in a North stabilized radar map. When radar, or radar and EVS control modes have been selected, the fore and aft movement of the "trackball," located on the keyboard, will move the crosshair North or South. A left or right trackball displacement will move the crosshair West or East. LOS (line-of-sight) results in a radar map that is oriented to track up. The crosshair azimuth will be at the top of the MFD and right-left trackball movement will move the crosshair right or left. When EVS is the only mode selected, and radar is deselected, the orientation of the track control signal is automatically LOS.

Crosshair Reference Position

The crosshair reference switch and the position fix mode switch determine the position of the crosshairs on the MFD. If the position fix mode switch is OFF, the position of the crosshairs on the MFD is determined by the navigation mode selected on the crosshair reference switch. As the crosshair reference switch is rotated from position to position, the crosshairs will move on the MFD. If the position fix mode switch is not OFF, the crosshairs displayed on the MFD will always be those computed by the prime navigation model. As the crosshair reference switch is rotated from position to position, the crosshairs will not move. Rather the crosshair buffer data displayed at the bottom of the MFD will change.

Forward Sighting

For a discussion of forward sighting see Navigation and Steering this section.

Antenna Control

The radar antenna can be controlled in tilt and sector. The radar control test panel allows the operator to adjust the FRL angle during flight to compensate for changes in the aircraft angle-of- attack. The radar antenna tilt controls the antenna tilt for uniform ground painting at various altitudes. Sector scan is controlled by the sector width knob on the RNMP. Rotating the knob clockwise from OFF gives approximately a 15° sector scan with the ANT speed switch in SLOW and approximately 45° with the ANT speed switch in FAST about the center of the display. A sector scan of approximately 190° can be obtained with full rotation of the sector width knob. During terrain avoidance mode of operation a scan of +45° about ground track is present with sector width off or just out of detent. Rotation of sector width knob to its full clockwise position will produce a variance of the TA sector from +45° about ground track to +95° about ground track.

Navigators' Compartment Radar Equipment

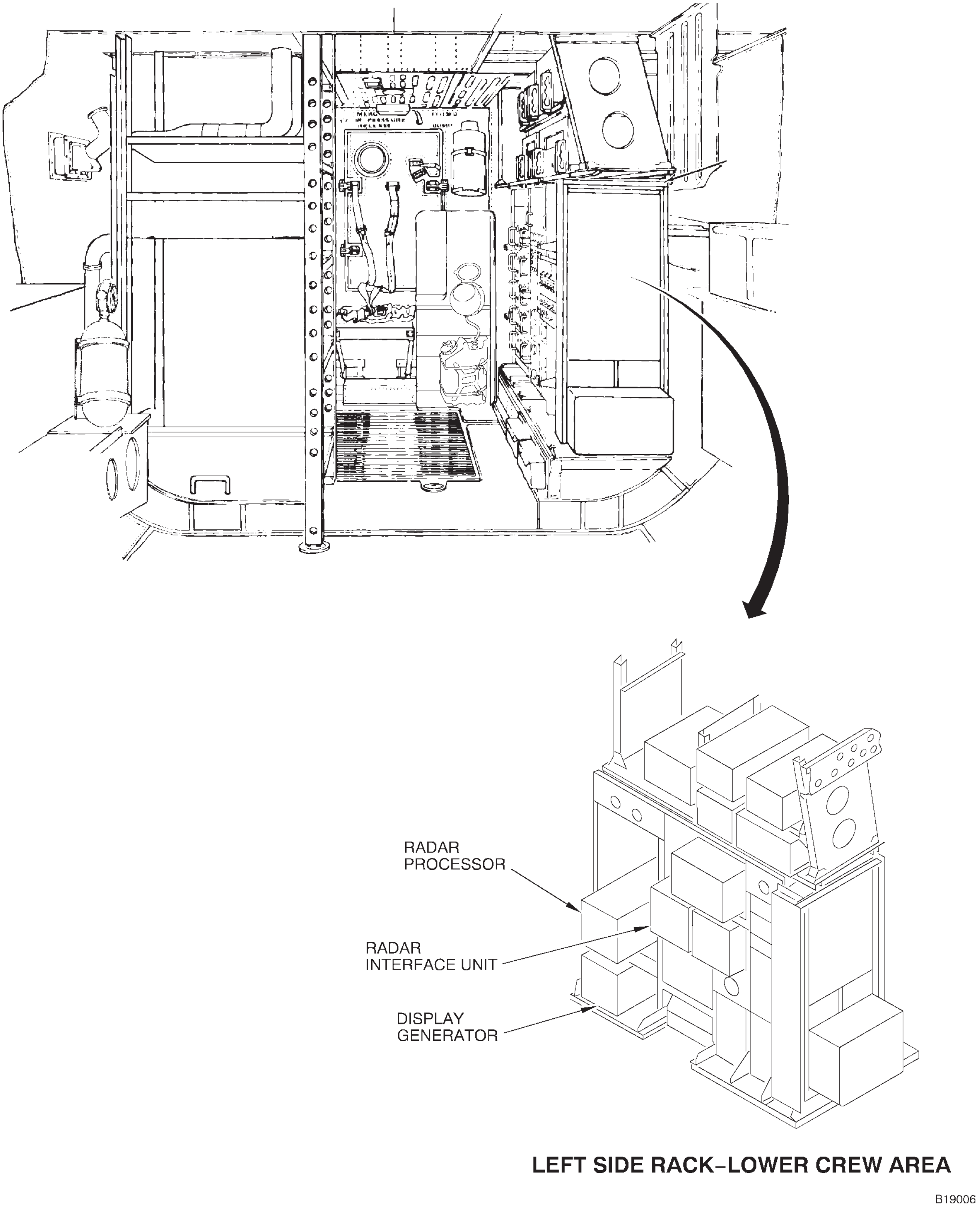


Figure 1-56

Radar Altimeter and Doppler Radar Systems

RADAR ALTIMETER SYSTEM (AN/APN-224)

The radar altimeter system, operated at the pilots' station, is tied in to the OAS to provide absolute altitude information for use during low altitude operation. The radar altimeters are used in conjunction with the terrain avoidance system. The radar altimeter is operated as directed in the pilots' checklist. For more information on the radar altimeter at the pilots' station refer to T.O. 1B-52H-1.

Indicating only the highest terrain within its 90° conical shaped pattern, this system will function without degrade up to 45° of pitch and roll, and 2200 fps of climb or descent. Predicted error tolerance is 3 feet or 4% of indicated altitude, whichever is greater. The digital radar altitude is displayed on FRMT-2, 4, and 5 only when the radar altimeter is operational and has completed a warmup period of approximately 1 minute. The radar altitude will not be displayed when the radar altimeter is no go. The radar altitude ribbon is displayed on FRMT-3, 4, 5, and the PRGM current event displays. The length of the ribbon is proportional to the radar altitude. A 3000 foot altitude ribbon is displayed on FRMT-3 (EVS only), and a 5000 foot ribbon is displayed on FRMT-4, 5, and PRGM displays. When the radar altitude is greater than 3000 or 5000 feet, the full ribbon will be displayed. Tie in to the OAS is through the armament interface unit to the data bus.

A modifiable clearance plane altitude (CPA) can be set using CF-61 or modified directly on any format with a radar altimeter ribbon (except FRMT-3). The CPA can be set between 0 and 5000 feet (to nearest 10 feet), and initializes at 800 feet. Once set, the CPA will cause the radar altimeter indicator (ribbon) on FRMT-4, FRMT-5 and the PRGM current events display to flash whenever the radar altimeter reading goes below the set CPA. The radar altimeter indicator (ribbon) displayed on FRMT-3 flashes based on the setting of the radar altimeter cursor at the pilots station.

To avoid nuisance flashing of the EVS altitude indicators, the cursor and CPA may be set up to 100 feet lower than the clearance altitude being flown.

The actual setting will be based on crew judgment and altitude. The cursor and CPA will not be set below 200 feet for TA operations. To preclude confusion when switching between FRMT-3 and 4, or 5, or to a PRGM current event display the cursor and CPA should be set to the same value.

DOPPLER RADAR SYSTEM (AN/APN-218)

The AN/APN-218 radar navigation set, referred to as the Doppler radar system, uses the Doppler principle to determine aircraft groundspeed and drift angle. This information is displayed to the navigators as groundspeed and drift correction angle. The Doppler also measures velocities (heading, drift, and vertical), and provides this data directly to the data bus. A Doppler antenna is installed on the lower centerline of the fuselage forward of the bomb doors.

POWER SUPPLY

The Doppler radar system is supplied ac power through a circuit breaker marked DOPPLER RDR on the OAS NAV portion of the auxiliary BNS circuit breaker panel.

CONTROLS AND DISPLAYS

Controls and displays for the Doppler radar system are all on the Doppler control-indicator panel at the navigators' station. For functional information on the controls and displays, see figure 1-57.

DOPPLER RADAR SYSTEM OPERATION

The Doppler radar system is placed in operation by selecting LAND or SEA on the mode switch. The system will warm up and run the BIT test automatically during the first 90 seconds of operation, transmitting microwave energy to the surface, and measuring reflected signals to indicate the aircraft groundspeed and drift angle. The BIT test checks the LRUs in sequence and a DPLR message is displayed while the BIT test is in progress. If a malfunction occurs, the BIT stops and a number is displayed in the GS and DA display indicating which LRU failed the BIT. Pressing the test switch checks the display lights in the GS and DA windows and reinitiates the BIT from the beginning. During this BIT, numbers (1-6) flash in the GS display while the test is in progress. LRU failures are indicated in the same fashion. In normal operation, the system has two automatic modes of operation, normal and memory. Switching between the modes occurs automatically. When the signal to noise ratio of the radar ground echoes drops too low or the aircraft exceeds ±25° pitch and ±40° roll, the system switches to memory mode. In this mode the system displays the last good groundspeed and drift angle data it measured and the memory light is turned on. When the ground return signal to noise ratio improves sufficiently, the system switches back to normal mode, the memory light goes off, and the measured data is displayed within 15 seconds. The memory light can be expected to be on when the aircraft is stationary. The Doppler inputs become valid at 96 KTS groundspeed.

NOTE

> The Doppler has a tendency to lock onto the spinning fan blades on ground power and/or cooling carts. This causes the Doppler to register a groundspeed and causes the OAS initial position to move. This could cause a problem if the OAS is operating on ground power with the Doppler ON.

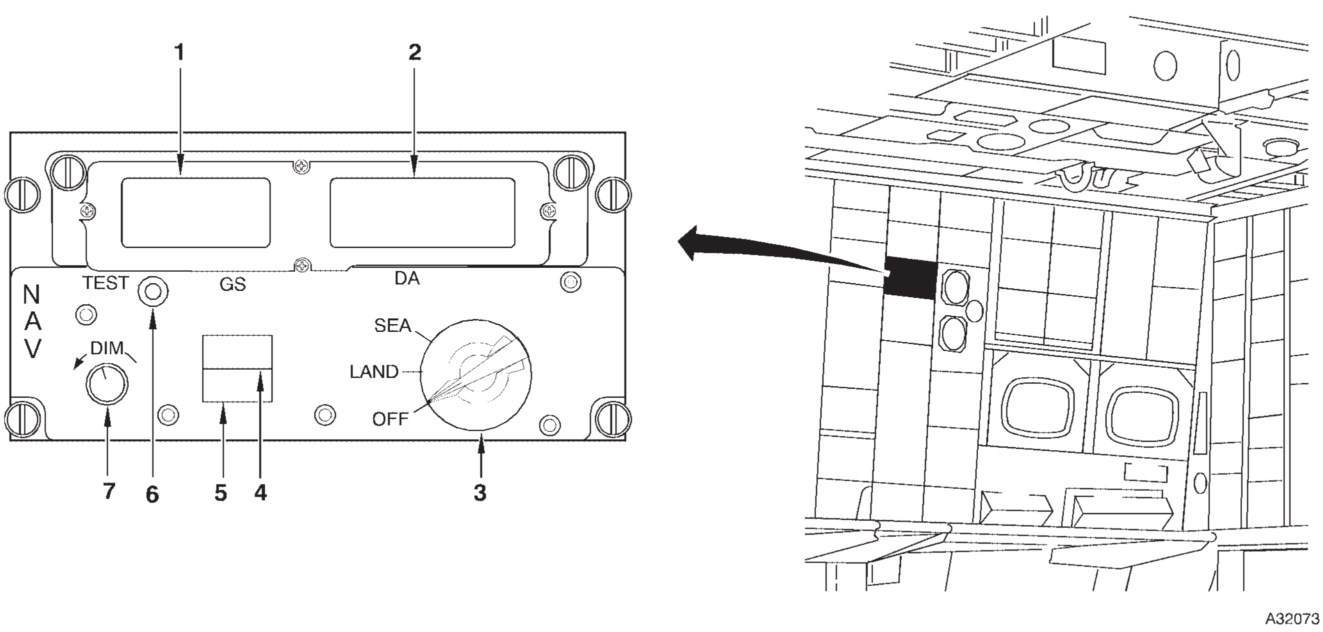
When approaching the land-sea boundary for large bodies of water, the Doppler mode switch should be placed in the mode corresponding to the earth's surface which will be encountered after boundary transition. The Doppler mode switch should be changed over land regardless of transition direction. This procedure will allow for a smooth change of the error states in the Kalman filter for transition from Doppler-over-land operation to Doppler-over-water operation (or vice versa). Changing the Doppler mode switch from LAND to SEA (or vice versa) produces the Kalman filter error state change and also enables the Doppler to account for the differences in radar reflectivity from land and water. When flying continuously along a land-water boundary (a coastline or shoreline), the different Doppler beams will have inconsistent reflection characteristics leading to inaccurate velocity determination; in this situation INUs operating in Doppler-inertial mode should be placed in free-inertial mode. When there is doubt regarding the earth's surface being flown over or when there is uncertainty as to the ability to perform the above procedure when crossing land-water boundaries, INUs operating in Doppler-inertial mode should be placed in free-inertial mode.

NOTE

> Not having the Doppler mode switch in SEA while over large bodies of water or delayed switching while over land when transitioning from LAND to SEA (or vice versa) can degrade navigation system accuracy and navigation handoff information accuracy to weapons. This degradation will be most pronounced when navigation updates are limited and might be unrecoverable, if GPS is denied or position updates are unavailable.

The system is shut down by placing the mode switch to OFF.

Doppler Control-Indicator Panel



NO.	CONTROL-INDICATOR	FUNCTION
1	Groundspeed (GS) Display	Shows the doppler computed speed in knots. During BIT check shows step number and during light check shows 888.
2	Drift Correction Angle (marked DA) Display	Shows the doppler drift correction angle in degrees. During BIT check shows diagnostic number and during light check shows +88.8.
3	Mode Switch	Used to control the doppler system. OFF turns off doppler system. LAND is used over land and provides groundspeed and drift correction angle information. SEA is used over water and provides corrections to the groundspeed for the effects of returns received from water.
4	Memory (MEM) Light	Comes on when the doppler is in memory mode.
5	Malfunction (MAL) Light	Comes on if the doppler system is defective.
6	TEST Switch	When pressed momentarily, activates the built-in-test (BIT) equipment. When held in, checks display lights and activates BIT.
7	DIM Knob	Controls illumination intensity of groundspeed and drift angle displays.

Figure 1-57

Navigation and Steering

DESCRIPTION

The OAS provides computation of basic navigation data, steering commands, and reference for weapon delivery computations for display to the operator. It consists of three navigation models: INS-1, INS-2, and alternate navigation. INS-1 and INS-2 are identical models and the alternate navigation model provides a backup navigation capability. EVS, GPS, air data sensors, and the magnetic azimuth detector supplement the navigation inputs. True airspeed information from the pilot's pitot-static system is supplied to all three navigation models. The pitot static system also provides differential pressure to the OAS for computation of true altitude. The Kalman filters, (one in each processor), compare, analyze, and average navigation data inputs to provide an OAS best estimate of present position. Dead reckoning, steering, and position fix modes are the operating modes for the navigation function as shown in figure 1-58. The dead reckoning mode has two operating submodes; aided-inertial is the prime submode and alternate is the backup submode. When aided-inertial cannot support navigation, OAS will automatically select alternate navigation. Direct (great circle) and centerline recovery are the two steering submodes. Three position fixes and three calibration procedures can be accomplished: radar, EVS, and overfly. HAC, LAC, and memory point are the calibration procedures. The navigation and guidance subsystem is interfaced with and supported by the computational, controls and display, interface equipment, and weapon control and delivery subsystems to provide accurate control and display of navigation data.

DATA FLOW

Data is transmitted to the avionics processors from the various interfaced subsystems by the MIL-STD-1553 data bus. The INS, Doppler velocity, GPS , and TAS sensor inputs are compared by the Kalman filter circuits, an error analysis is performed, and the best estimate of present position is computed. The present position data goes to the display electronics unit (DEU) for display in PMD. Air data inputs are interfaced with the EVS interface unit (EIU) and then sent to the avionics processors by the data bus. The OAS data flow diagrams for INS and ALTER NAV are shown in figure 1-59 and figure 1-60.

NAVIGATION FUNCTIONS

Three navigation functions are provided: dead reckoning, steering, and position fix.

DEAD RECKONING

The dead reckoning function computes current aircraft position based on known starting position, course flown, and accumulated distance traveled from starting point. The two dead reckoning modes are aided-inertial and alternate. Aided-inertial is primary except during fast reaction takeoff situations when alternate is primary. Aided-inertial is selected automatically as primary when one INS completes coarse alignment. Alternate navigation is selected automatically when aided-inertial data inputs are unavailable. Alternate navigation computations are performed at the same time as aided-inertial computations to provide a ready reference in the event of aided-inertial failure. Present position is provided to the alternate navigation computations whenever a position fix is taken and every 15 minutes from the prime INS.

NOTE

AFMSS computes time between points using aircraft turn radius. OAS computes the time direct without considering the time to turn, therefore, a difference could exist between the flight plan ETE and the OAS computed time-to-go.

Aided-Inertial

Each inertial navigation system can be operated in any one of three aiding modes; Free Inertial, Doppler Inertial and GPS Inertial. When an inertial navigation system is operating in the Free Inertial mode, NAV will be displayed in the INU Status window on CF, CF-1, CF-2, CF-4, CF-61, or CF-67, and the INU produces a navigation solution independent of other navigation velocity sensors. When an inertial navigation system is operating in the Doppler Inertial aiding mode**,** DPLR-NAV will be displayed in the INU Status window and velocity data derived from the Doppler radar is passed to the INU that it uses to refine its calculation of position and velocities. Position updates from external sensors are used to refine the navigation solution for either the Free Inertial or Doppler Inertial mode. When an inertial navigation system is operating in the GPS Inertial aiding mode, GPS-NAV will be displayed in the INU Status window and position and velocity data derived from the GPS is passed to the INU that it uses to refine its calculation of position and velocities.

The inertial navigation system operating mode selection process is initialized to automatic for each INU when the FMS is initialized. When the operating mode selection process is automatic, the Free Inertial mode is selected if the aircraft velocity is less than 80 knots and at least a minimal ground alignment has been performed. This will allow the INU to use the NARF function to improve the ground alignment accuracy when the airplane stops. If the aircraft velocity is 80 knots or greater, the GPS Inertial and Doppler Inertial aiding modes can be selected. The automatic mode selection process will select the GPS Inertial aided mode if the required GPS data is available. If the required GPS data is not available, the Doppler Inertial aided mode will be selected if Doppler data is available. If the required Doppler data is not available, the Free Inertial mode will be selected.

The operator can command each inertial navigation system into any one of the modes by entering the commands shown below. If data from the selected aiding source is available, the specified system will begin operating in the designated mode and :M will be displayed in the Manual Select window on the CF displays (normal video). If data from the selected aiding source is not available, :M will be displayed in reverse video and the INU will operate in Free Inertial.

IKB COMMAND	COMMANDED AIDING MODE	DISPLAY
CF-n3	GPS	GPS-NAV
CF-n4	Doppler	DPLR-NAV
CF-n5A	Free Inertial (no velocity aiding)	NAV

n = 1 for INU-1 or 2 for INU-2

The source of altitude data for an inertial navigation system may be derived from either GPS altitude or reference altitude. Valid GPS altitude will be used when an inertial system is GPS aided. Reference altitude will be used when an inertial system is Doppler aided or unaided and when GPS altitude is not valid. High altitude calibrations and low altitude calibrations will not affect the computed altitude of an inertial system when it is GPS aided.

Alternate Navigation

Alternate navigation is backup to aided-inertial. The alternate navigation system uses data from the GPS sensor, velocity sensors, heading sensors, attitude sensors, air data sensors and emergency data to compute the aircraft position, velocities, heading and attitude. Alternate navigation processing begins when the first FLY-TO-n command is entered. The initial aircraft position, entered by the operator using the FCP Initialization display is used as the starting position for alternate navigation.

The alternate navigation system operates in the modes identified below.

MODE	VELOCITY DATA SOURCE	HEADING DATA SOURCE
*AUTOMATIC (CF-31)	FMS selected, in the following order of preference: 1. GPS 2. Doppler Radar 3. TAS & W/V 4. Emergency Data 5. Last Valid Data	FMS selected, in the following order of preference: 1. AHRS 2. Prime INU 3. Emergency Data 4. Last Valid Data
GPS/AHRS (CF-321)	GPS	AHRS
GPS/EMERG (CF-322)	GPS	Emergency Data
Doppler/AHRS (CF-331)	Doppler Radar	AHRS
Doppler/EMERG (CF-332)	Doppler Radar	Emergency Data
TAS/AHRS (CF-341)	TAS & W/V Data	AHRS
TAS/EMERG (CF-342)	TAS & W/V Data	Emergency Data
EMERG/AHRS (CF-351)	Emergency Data	AHRS
EMERG/EMERG (CF-352)	Emergency Data	Emergency Data

* The alternate navigation system operating mode selection process is initialized to automatic when the FMS is initialized.

When GPS data is selected as the velocity source, either manually or automatically, the alternate navigation present position is set equal to the GPS computed position and then propagated using GPS velocity data until the next set of GPS position data is available. When GPS data is not available or the operator has commanded a non-GPS mode for alternate navigation, the present position is propagated using the most preferred source of velocity, attitude and heading data that is available for the mode commanded.

The alternate navigation operating mode can be observed on the Alternate Navigation Supervision menu, CF-3. The operator can command the alternate navigation system into any of the listed modes. If data from the selected source is available, the alternate navigation system will begin using data from the selected source and :M will be displayed in Manual Select window of the Alternate Navigation Supervision menu in normal video. If data from the selected source is not available, :M will appear in reverse video.

The aircraft parameters computed by the alternate navigation processing are maintained in the event that the backup ACU reconfigures as the primary ACU.

Emergency is selected automatically when sensor data is not available to support another navigation mode or selected manually. Emergency data is input using FRMT-8 and present position is computed from manual input data. Emergency is terminated by manually selecting another navigation submode or automatically when input data supports a higher submode if emergency was automatically selected. See ABNORMAL OPERATION, Section III, for alternate navigation procedures.

STEERING CONTROL

The operator can control the steering commands generated by the FMS by selecting how the course to the current destination point is computed (Steering Mode), and by selecting the way in which the FMS determines when to transition from the current destination to the next destination (Course Transition Mode).

Steering Modes

The operator can command the direct steering mode or the centerline recovery steering mode, or he can command automatic steering mode selection. When automatic steering mode selection is commanded, FMS will select the direct steering mode. When operating in the direct steering mode, the FMS computes a heading that will steer the aircraft along a great circle path from the aircraft's current position to the current destination. When operating in the centerline recovery steering mode, the FMS computes a heading that will steer the aircraft along a great circle path from the previous destination to the current destination. If the aircraft is not on the great circle path from the previous destination to the current destination, commands will be generated to steer the aircraft back to that great circle path over the shortest distance and then to the current destination. A secondary application cannot control the steering mode when either direct steering or centerline recovery steering mode is commanded by the operator.

The current steering mode and the steering commands are displayed on the Steering Supervision menu. A :M will be displayed on the Steering Supervision menu when the steering mode is commanded by the operator.

The current steering mode remains the same in the event that the backup ACU reconfigures as the primary ACU.

Steering modes are selected using the following CF-7 commands:

CF MODE	RESPONSE
CF-71	Automatically selects steering mode upon application of power
CF-72	Selects direct steering
CF-73	Selects centerline recovery

Course Transition Modes

The Course Transition mode is defined for each destination in the mission data. The Course Transition mode for a destination determines when the FMS will transition from the current destination to the next destination. The FMS can be commanded to either steer the aircraft over a destination before transitioning to the next destination (Overfly mode), or fly a smooth transition from one course to another (Turn Short mode).

The Course Transition mode for the current and next destination is indicated on the FRMT-10. FRMT-10,nn can display the Course Transition mode for any destination in mission data. A destination planned as Turn Short is indicated by a dash (–) appearing in the first space before the Destination ID field. If a destination is planned as Overfly, the space will be blank. The operator may set the Course Transition mode for a destination by selecting the FRMT-10/FRMT-10,nn display showing the destination of interest, entering MDFYnn on the IKB (where nn is the number associated with the destination of interest), using the ← and/or → key(s) to position the cursor under the first space in front of the Destination ID field, pressing UC + if overfly is desired or UC – if turn short is desired, and then pressing ENTER. The character in front of the Destination ID field should update to reflect the new Course Transition mode for this destination

NOTE

> Modifying the Course Transition Mode for a destination may be inhibited if the destination is associated with a SMO event.

Destination Selection And Sequencing

The current destination can be selected by the operator or automatically by the FMS. The operator can select any of the following points as the current destination:

- Any destination defined by B-52 mission data.
- Any fixpoint or offset aimpoint defined by B-52 mission data
- The radar sighting point
- The EVS sighting point

The current destination number is maintained in the event that the backup ACU reconfigures as the primary ACU. Sequencing is based on the type of current destination.

AUTOMATIC DESTINATION SEQUENCING

FMS will automatically sequence to the next destination, which will become the current destination, once the sequence point for the current destination has been reached. The sequence point is determined by the Course Transition mode that is currently selected. If the Overfly mode is selected, the aircraft will be steered to the current destination before destination sequencing will occur. If the Turn Short mode is selected, the FMS will sequence to the next destination when the aircraft has reached a point where it can begin the turn to the new current destination and roll out of the turn on a great circle path defined by the previous destination and the current destination.

Any next destination chosen by FMS will be the next sequentially numbered destination from mission data, or if the current destination is the last destination in the mission sequence, the next destination will be the first destination in the mission sequence. Indication of the next destination can be viewed on the PRGM or FRMT-10 display. For any of the pre-planned destinations, the next destination that will be chosen can be seen on the PRGM nn display or the FRMT-10,nn display where nn is the number of pre-planned destination.

PRE-PLANNED DESTINATION

Any destination defined by mission data can be selected as the current destination by entering a FLY-TO-nn command where nn represents a mission pre-planned destination. nn can be any combination of one or two numeric characters except 0 and 00. When 0 or 00 is entered, the command will be displayed on the command line of the MFD in reverse video. The preceding destination in the B-52 mission that is resident in memory becomes the previous destination. The destination following the selected destination becomes the next destination unless destination 99 is selected as the current destination in which case destination 1 is selected as the next destination. When destination 1 is selected as the current destination, the initial aircraft position will be the previous destination if mission data has not been loaded since the first destination selection command. If mission data has been loaded since the first destination selection command, the location of the aircraft at the time B-52 mission data was last loaded will be the previous destination when destination 1 is selected as the current destination. This provides a previous destination that accommodates centerline recovery steering. Automatic destination sequencing is enabled when a command is entered to fly to a pre-planned destination.

FIXPOINT AND OFFSET DESTINATIONS

Any fixpoint defined by mission data can be selected as the current destination by entering a FLY-TO-Fnn command where nn represents a mission fixpoint number. nn can be any combination of one or two numeric characters except 0 and 00. When 0 or 00 is entered, the command will be displayed on the command line of the MFD in reverse video.

Any offset aimpoint defined by mission data can be selected as the current destination by entering a FLY-TO-Fddn command where n represents a valid offset aimpoint number for the destination specified by dd. dd can represent any combination of two numeric characters other than 00. When 00 is entered, for the destination or n is not valid, the command will be displayed on the command line in reverse video. The numbers which represent valid offset aimpoints for a destination are defined by the B-52 mission data that is resident in the ACU. Up to four offset aimpoint can be associated with one destination.

When a fixpoint or offset aimpoint is selected as the current destination, the location of the aircraft at the time the destination selection command was entered becomes the previous destination and automatic destination sequencing is disabled. The next destination number remains unchanged. The previous and current destination coordinates are maintained in the event that the backup ACU reconfigures as the primary ACU.

RADAR AND EVS SIGHTING DESTINATIONS

The operator can select the radar sighting point as the current destination when he is controlling radar or the EVS sighting point as the current destination when he is controlling EVS. The sighting point is selected as the current destination by entering a FLY-TO + command. When a sensor sighting point is selected as the current destination, the location of the aircraft at the time the destination selection command was entered becomes the previous destination and automatic destination sequencing is disabled. The next destination number remains unchanged. The previous and current destination coordinates are maintained in the event that the backup ACU reconfigures as the primary ACU.

RADAR AND EVS CROSSHAIR

Crosshair Track Control

The FMS supports both radar and EVS crosshairs. The RDR and EVS track control switches on the IKB are used to associate the trackball (TB) and X-HAIR command with the radar and EVS crosshairs and to enable radar and EVS position update. The RNav and Nav can use EVS and radar crosshairs independently. Selecting both RDR and EVS track control on the same IKB slaves the EVS crosshair to the RDR crosshair. FMS initially gives radar track control to the Nav.

The operator must select RDR track control and display FRMT-1 or 2 to enable the following functions: select radar Ground Position Indicator (GPI), track ball control of radar crosshair, radar position update, HAC, HT, radar memory point, and display radar buffers. The operator must select EVS track control and display FRMT-3, 4, or 5 to enable the following functions: select EVS GPI, track ball control of EVS crosshair, EVS position update, EVS memory point, and display EVS buffers.

Ground Position Indicator (GPI) Selection

A GPI is a known geographical position used as a reference point in determining crosshair position. After setting track control to RDR, EVS or both, use a X-HAIR command or the RNMP to reference the crosshair to a GPI. The GPI can be a fixpoint listed on on FRMT-9, an Offset Aimpoint (OAP) or destination listed on FRMT-10, or a forward sight point. To select a fixpoint, enter X-HAIR-nnn where nnn is the OAP number listed on FRMT-10. To select a destination, first enter FLY-TO-nn then select DEST/ TGT on the RNMP or enter X-HAIR-0.

Forward Sighting

Forward sighting is used to rapidly move the crosshairs ahead of the aircraft on the display to expedite crosshair placement on a point. Forward sighting is selected via the following sequence:

- Select TRACK CONTROL function RDR or EVS on keyboard.
- Select CALIBRATE function FWD SITE on RNMP. With RDR track reference selected (or both RDR and EVS), the radar crosshair will move to a new position as follows:

MAP TYPE	CROSSHAIR POSITION
DCPPI/ SPOTLIGHT	Center of radar display directly ahead of the aircraft
PPI	Directly ahead of the aircraft midway between the center of the display and the edge of the map

If SPOTLIGHT map select function has been selected, the radar display is displaced about the crosshairs. If only the electro-optical viewing system (EVS) track reference is selected, the EVS sensor will be pointed directly ahead of the aircraft with the crosshair position at a ground range of 8 miles. The crosshairs will track in FWD SITE. FWD SITE can be deselected by selecting D/T, OAP, or a X-HAIR command.

Fixpoint Sequencing

The operator can select a GPI manually by selecting RDR or EVS track control and entering a X-HAIR command. The crosshair will remain on the selected GPI until entry of another X-HAIR command or activation of automatic fixpoint sequencing. The operator can command FMS to enable automatic fixpoint sequencing and to automatically select a GPI for a sensor by entering a X-HAIR command at the station where the sensor is controlled. The command will be displayed on the command line of the MFD in reverse video if neither sensor is controlled at the station where the command was entered. When automatic fixpoint sequencing is commanded for radar or EVS, the first fixpoint associated with the current destination is selected as the current GPI for the sensor and automatic fixpoint sequencing is enabled for that sensor. The first fixpoint associated with the current destination is defined by the resident B-52 mission data. While automatic fixpoint sequencing is enabled for a sensor, the next fixpoint associated with the current destination, if one is defined, will be selected when the current fixpoint is out of the field of view of the sensor or the next fixpoint is closer to the aircraft than the current fixpoint. If another fixpoint is not defined for the current destination, the fixpoint remains unchanged. When a DCPPI radar map is being displayed and when the radar terrain avoidance mode is selected, the field-of-view for radar is 85 degrees to the left and right of aircraft centerline. When a PPI or spotlight map is being displayed, and the radar terrain avoidance mode is not selected, the field-of-view for radar is 110 degrees to the left and right of aircraft centerline. The EVS field-of-view is 45 degrees to the left and right of aircraft centerline.

POSITION FIX

Three horizontal position fix modes and four calibration procedures are available (figure 1-58). Radar, EVS, and Overfly are the three position fix modes and High Altitude Calibration (HAC), Low Altitude Calibration (LAC), Memory Point Wind Calibration, and Alternate True Heading Calibration are the four calibration procedures.

Horizontal Position Error Correction

The aircraft horizontal position error can be determined in each of three position fix modes; radar, EVS and Overfly. The operator can measure the error in the computed aircraft horizontal position using the radar or the EVS. The error is determined by the FMS by comparing the computed aircraft position with the known ground position of the current destination when commanded to do so by the operator. The operator selects the position fix mode and the associated display using the FIX MODE switch on the RNMP. The operator can select the radar, EVS or overfly position fix modes by setting the FIX MODE switch in the RDR, EVS and OVRFLY positions respectively. The operator can command the FMS to process the measured position error by selecting either the QUAL 1 switch, the QUAL 2 switch or the POS switch on the RNMP. The selected position fix mode will be deselected when the FIX MODE switch is moved to the OFF or TC positions or is between positions.

The measured position error will be processed to determine the reasonableness of the error measurement for each inertial navigation system that is not operating in the GPS aided mode. If the error measurement is reasonable for an inertial navigation system, the amount of the correction incorporated will be determined based upon the data generated from the alignment process and previous position fixes. The amount accepted will be used to correct the current position and to refine the calculation of aircraft position and velocities computed by that navigation system. If the error measurement is not reasonable, the position fix will be rejected and the operator will be prompted to determine if a position fix reject override is desired.

Radar position fix uses radar as the primary sensor and position update is determined by radar crosshair position.

EVS uses either forward looking infrared or steerable television as the primary sensor for fixpoint position determination, and is functionally similar to the radar position fix mode except that track ball corrections are processed to steer the EVS sensor to place the checkpoint image in the center of the projected intersection of the fiducial marks.

Overfly submode is used for position update when a good visual point is available for overflight or to obtain a position fix when other position fixes are inoperative.

Calibration Procedures

HAC, LAC, Memory Point Wind Calibration, and Alternate True Heading Calibration are the four available calibration procedures.

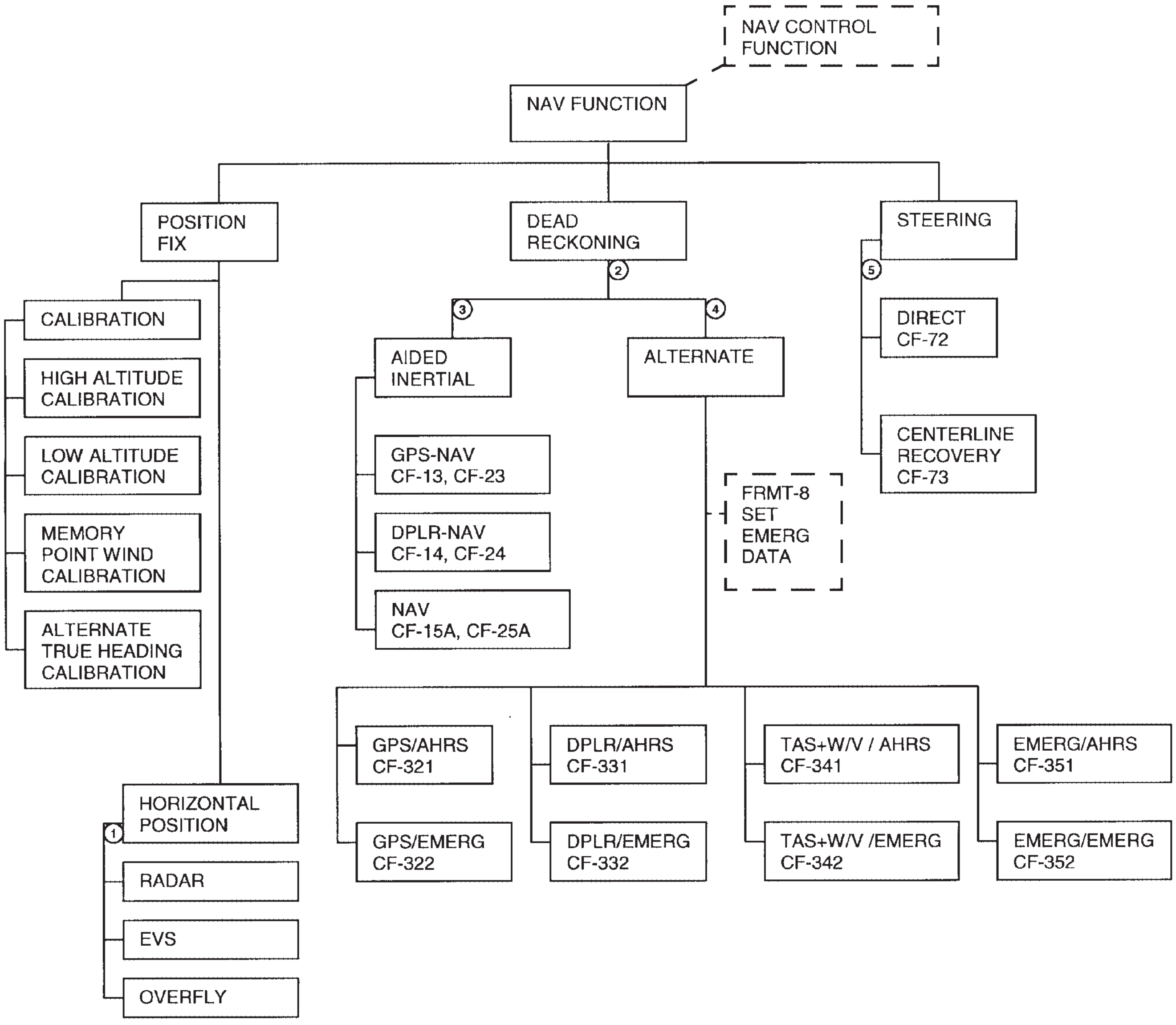
HAC is accomplished using the radar and computational software during the HAC interval to position the variable range marker on the MFD radar display. HAC is initiated by the radar navigator and the track ball is used to position the range marker on the edge of the altitude hole. Altitude is updated using slant range as the altitude above the terrain.

LAC is accomplished using the radar altimeter inputs. This must be accomplished below 5000 feet AGL for radar altimeter availability. After initiation of the low altitude calibration mode, the avionics processor uses radar altitude data to compute altitude above mean sea level as the sum of terrain elevation and radar altitude and updates system altitude.

Memory point wind calibration procedure is used to update winds in the alternate navigation mode when doppler data is unreliable. Wind is updated using memory point function with the radar or EVS crosshair. See ABNORMAL OPERATION, Section III, for memory point wind calibration procedures.

Alternate True Heading Calibration is used to update the AHRS heading using the radar or EVS when AHRS is operating in the directional gyro (DG) mode. Alternate True Heading Calibration processing is initiated by entering a X-HAIR-n,n command on an IKB to select two ground position indicators (GPI) for the sensor to be used for the calibration. Each n represents any fixpoint or offset aimpoint. Destinations cannot be selected as either GPI.

Navigation Function Tree Diagram



① Manually selected on RNMP or through use of CF-F.

② CF-41A OAS selects prime nav model (either Inertial or Alternate).

③ CF-42/43 Operator commands INU 1/2 as prime nav model.

④ CF-44A Operator commands Alter as prime nav model. OAS will or operator can select CF-31, 321,322, 331, 332, 341, 342, 351, or 352.

⑤ CF-71 OAS selects STEERING mode.

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Figure 1-58

OAS – INU Data Flow

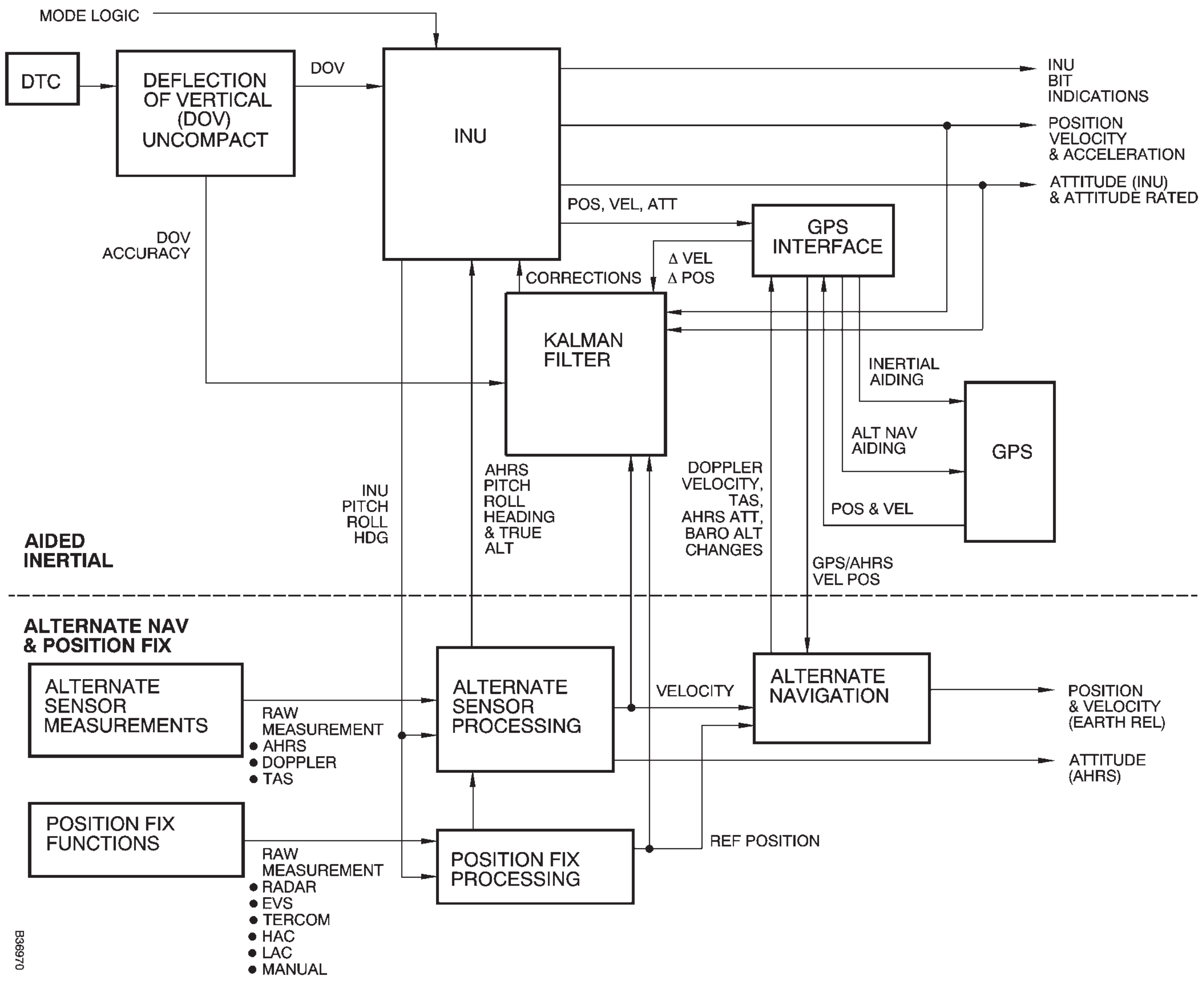


Figure 1-59

OAS Data Flow to ALTER NAV Diagram

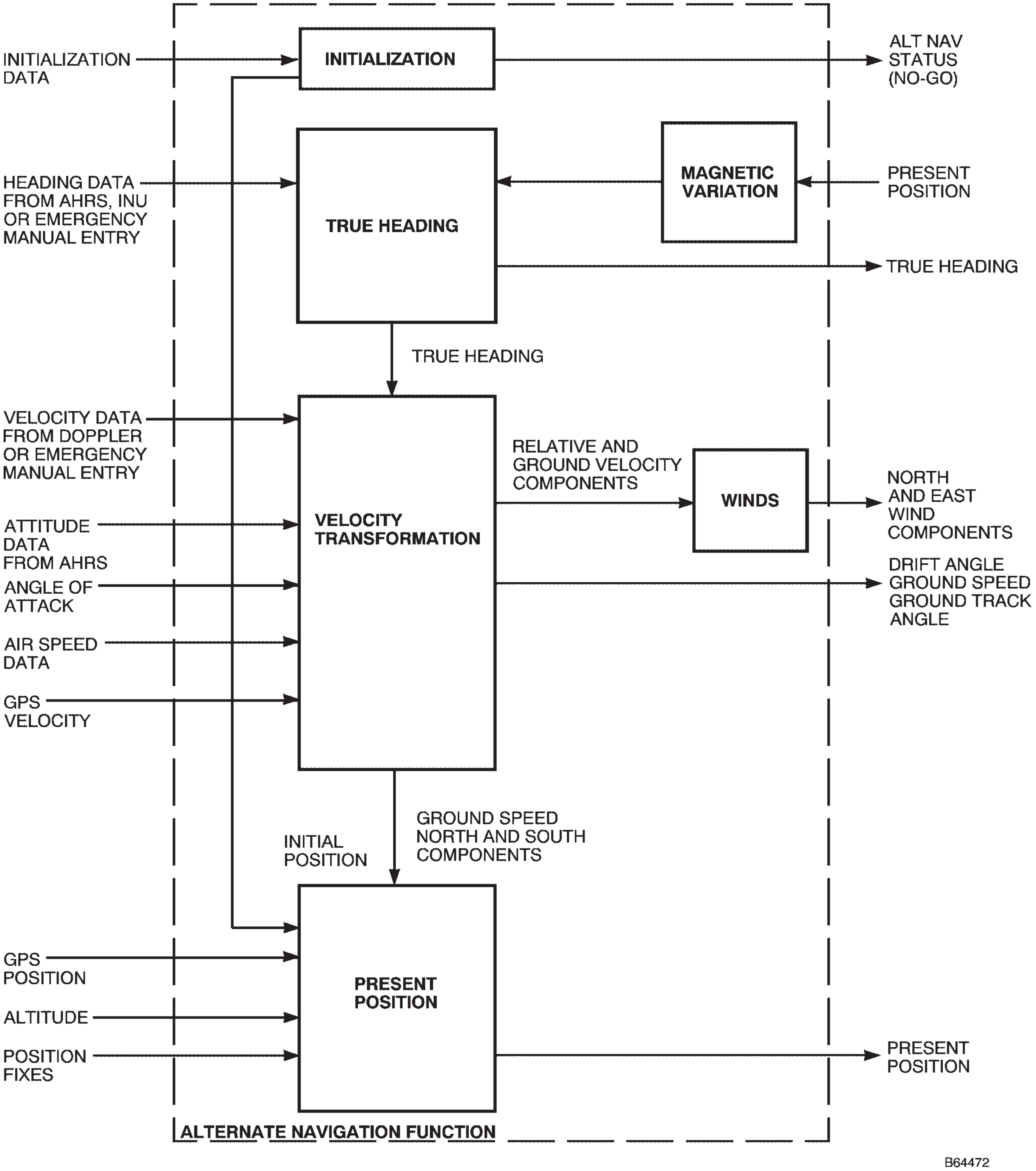
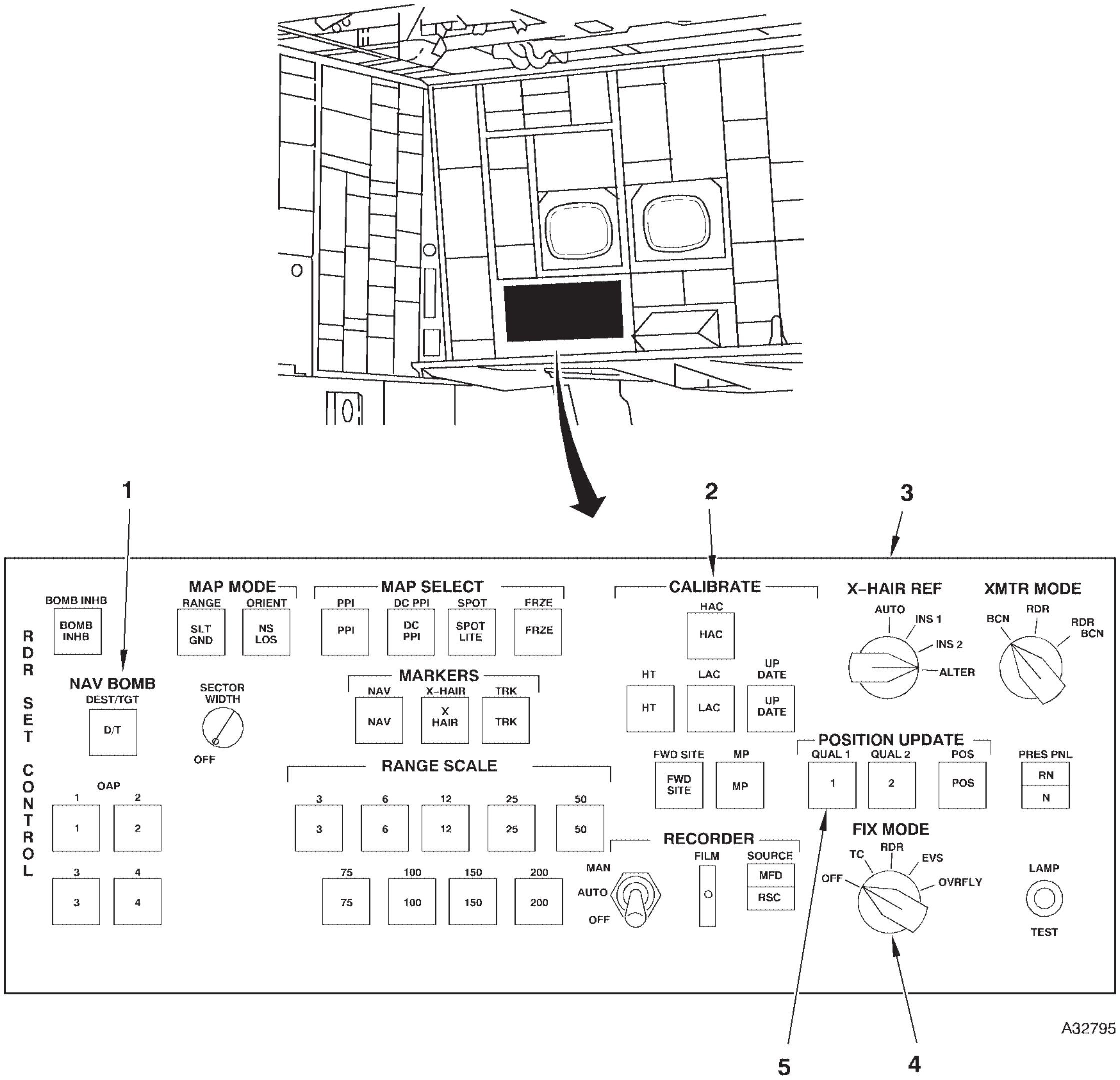


Figure 1-60

Radar Navigator Management Panel (RNMP)

NAVIGATION FUNCTIONS



1 NAV BOMB SWITCHES (5)
2 CALIBRATE SWITCHES (6)
3 CROSSHAIR REFERENCE SWITCH
4 FIX MODE SELECTOR SWITCH
5 POSITION UPDATE SWITCHES (3)

Figure 1-61 (Sheet 1 of 2)

Radar Navigator Management Panel (RNMP) (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
1	Destination, Target, and Offset (NAV/BOMB) Switches (5)	DEST/TGT – Used to position EVS or RDR crosshairs on the destination or target. OAP 1, 2, 3, or 4 – Position EVS or RDR crosshairs to the selected offset aiming point.
2	CALIBRATE Switches (6)	HAC – Calibrates true altitude using radar data. LAC – Calibrates true altitude using radar altimeter data. HT – Used to correct stored HT (Height of Terrain) for HAC, LAC, and MP only. MP – Used for memory point wind calibration. UPDATE – Completes a HAC, LAC, or MP update. FWD SITE – Rapidly moves crosshairs down track one half the distance of the selected range.
3	Crosshair Reference (X–HAIR REF) Switch (with fix mode selection switch OFF)	AUTO – Uses OAS selected navigation system for crosshair positioning. INS 1 – Places the crosshairs based on INU-1 present position. INS 2 – Places the crosshairs based on INU-2 present position. ALTER – Places the crosshairs based on the alternate navigation model. **NOTE** With the RDR or EVS selected on the on the FIX MODE selector switch, crosshair placement is based on the prime navigation model and radar or EVS buffers are computed for the navigation model selected with the X-HAIR REF switch.
4	FIX MODE Selector Switch	Selects method of position fixing. OFF – Deselects previous position fixing mode, erases related messages, zeros crosshair buffers. TC – Not used. RDR – Radar crosshair used for position update. EVS – EVS azimuth and elevation used for position update. OVRFLY – Overfly of a known position used for position update. **NOTE** Pressing this switch displays the x-hair buffers.
5	POSITION UPDATE Switches (3)	Used to start computations for updating the navigation modules to accept or reject position fix information as selected by FIX MODE selector switch. QUAL 1 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is a well defined point (highest quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is most confident. QUAL 2 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is less well defined (lesser quality). For OVRFLY, starts processing with Kalman filtering, to be used when position is less confident. POS – Zeroes the buffers in all navigation models. The computations are used for steering and targeting routines. **NOTE** Use of these switches alters the buffers.

Figure 1-61 (Sheet 2 of 2)

NORMAL OPERATION

SYSTEM MANAGEMENT AND EVALUATION

The OAS has the capability of self-management through its own monitoring and self-test programs. The OAS automatically downgrades to another submode when a failure is detected. The system can also automatically upgrade to a higher submode of operation if a malfunction is corrected. The operator monitors the system by observing the data on the MFDs and makes a decision to manually override the OAS if necessary. If a manual selection is made, the OAS will shift down to another submode if a malfunction occurs and the M (normal video on the applicable CF-1, 2, or 3 display) which indicated the original manual selection will be reverse video highlighted. If the malfunction clears, the OAS will only shift to the mode that was manually selected until the OAS is returned to AUTO mode or another mode is manually selected.

Prime Nav Model Selection

Three navigation models are used for computations in navigation function: INU-1, INU-2, and alternate. The FMS will select the prime navigation system, while automatic mode selection is active. The automatic prime navigation system selection process will select an INU, as the prime navigation system, if one or both INUs are operating. If both INUs are operating, the INU that is determined to have the most reliable solution (based upon a series of checks concerning aiding mode, position fix residual magnitude, position and velocity rejects and heading comparisons) will be selected as the prime navigation system. If neither INU is operating, alternate navigation is selected as the prime navigation system. This occurs even though an aided-inertial mode has been manually selected. If a navigation reference is manually selected as prime and becomes unreliable, another navigation reference must be selected.

NOTE

> The navigation system selected as the prime system is maintained in the event that the backup ACU reconfigures as the primary ACU.

The navigation references are selected using the following CF-4 commands:

CF MODE	DISPLAY	RESPONSE
CF-41A	41A AUTO	Automatic selection
CF-42	42 INU-1	INU-1 as reference
CF-43	43 INU-2	INU-2 as reference
CF-44A	44A ALTER	Alter Nav as reference

Kalman Filtering

The Kalman filters, one in each processor, perform the basic function of updating the INUs from external measurements of position and velocity. The filters perform an onboard error analysis of system performance and use the results to combine the navigation sensor data in an optimal manner. The filters operate on error differences between computed position and velocity, and externally measured position and velocity. The filters correct the navigation data error on the basis of these differences and compute a best estimate of present position. The filters are performing alternate navigation computations in the background at the same time aided-inertial computations are going on and INU position updates are scheduled to the alternate model every 15 minutes.

BUFFERS

Buffer values are the differences between crosshair position and the selected navigation reference. The buffer values change when a position update is commanded or when manual trackball inputs are incorporated. Buffer values are stored and not displayed when FWD SITE, HAC, LAC, or MP is active. With RDR track control selected, radar buffers for the prime navigation model are displayed in nautical miles on FRMT-1 and FRMT-2 left side display. To display radar buffers in feet in the OAS advisory area, select the desired navigation model with the Crosshair Reference switch and press the Fix Mode switch. With EVS track control selected, EVS prime model buffers are displayed in nautical miles on FRMT-5 left side data. To display EVS buffers in feet in the OAS advisory area, select the desired navigation model with the Crosshair Reference switch and press the Fix Mode switch.

WARNING

> In order to reset the buffer values to zero, the Fix Mode Selector Switch must be pushed in, turned to the OFF position, and then released in the OFF position. The operator may then reselect a fix mode. Reset of the buffers to zero will be verified, by displaying and evaluating the buffer values following this procedure.

DESTINATION SEQUENCING/INSERTION

If the aircraft passes within 600 feet of the current destination, or turn short point, the OAS automatically sequences to the next higher numeric destination and provides steering and TTG information. If the aircraft does not pass within 600 feet of the destination, the OAS automatically sequences to the next destination when the distance increases to 6000 feet outbound. If the aircraft misses the destination more than 6000 feet, the OAS will not automatically sequence to the next destination. In this case, the next destination must be manually selected. The operator can manually select any destination in the destination table using a FLY-TO nn ENTER. This also allows the operator to deviate from the planned route for such things as time control or weather avoidance. For example, if the operator is flying towards destination 3 and wishes to fly to destination 6 and skip 4 and 5, enter FLY-TO-6. The current destination number and information change to reflect destination 6. If the current action point (PRGM) is selected, the display is updated with destination 6 and 7 information. The destination sequencing reverts to automatic after passing destination 6.

The SMO will inhibit automatic destination sequencing, if the current destination is a missile launch point with a missile assigned and the aircraft remains inside the in-range boundary or the current destination is a bomb target with a bomb assigned, in manual launch mode and all bomb release determinations are met. The automatic destination sequencing will be inhibited, until the weapon is released or the Nav/RNav issues a FLY-TO command.

A new destination can be entered or any destination modified on FRMT-10 by using the MDFY function. If the operator wishes to fly to a fixpoint, place the crosshair on the fixpoint, and select FLY–TO + ENTER. The current destination number and identifier of PMD changes to read RDR XH or EVS XH, and no sequence number is displayed. Steering commands are computed to the fixpoint coordinates adjusted for buffers. The resulting FCI and TTG will direct the aircraft to the exact point under the crosshair, regardless of position error in the prime navigation model. If the crosshair is moved off the point, steering commands will still be generated to the previous crosshair coordinates until a subsequent FLY-TO + is entered.

FIXPOINT SEQUENCING/INSERTION

NOTE

> OAS crosshair can hang up when they track out of the TA Sector in manual or in automatic sequencing. This problem can be corrected by deselecting crosshair and reselecting crosshair on the RNMP.

The crosshair is sequenced automatically to the next numerically higher fixpoint or manually to a selected fixpoint if in manual fixpoint sequencing. Fixpoints are numbered sequentially from 1 to 99. Automatic fixpoint sequencing occurs under any of the following conditions:

- When the relative position of the next higher numbered fixpoint is closer to the aircraft than the current fixpoint.
- In any radar mode when the relative bearing is greater than 110° to the sighting point and the relative bearing is greater than 45° for EVS.
- If the fixpoint it is on was manually selected, it will remain on that fixpoint until manually moved or when X-HAIR ENTER is actuated.

If a follow-on fixpoint does not exist, the current fixpoint remains current regardless of its position with respect to the aircraft and the sequence mode remains in automatic. The OAS automatically selects the first fixpoint when power is initially applied. Manual fixpoint sequencing is initiated and remains in the manual sequencing mode until action is taken to reenter the automatic mode. The OAS does not automatically reenter the automatic fixpoint sequence mode under any conditions except when exiting BOMB mode.

Manual fixpoint sequencing is entered or exited upon selection or deselection of the following functions:

ENTER MANUAL SEQUENCING	EXIT MANUAL SEQUENCING
HAC	HAC is deselected or HAC update is commanded via UPDATE selection
MP	MP is deselected or MP update is commanded via UPDATE selection
FWD SITE	FWD SITE mode deselected (X-HAIR ENTER)
X-HAIR NN ENTER or X-HAIR 0 ENTER	X-HAIR ENTER selected
OAP-N Selected	OAP-N deselected (cannot be deselected in BOMB mode)
D/T Selected	D/T deselected (cannot be deselected in BOMB mode)
BOMB	Current destination is not a gravity target and D/T and OAP-N is deselected

Fixpoint position can be modified by manually entering new fixpoint position data on FRMT-9 using the modify function.

POSITION UPDATES

Position updates are controlled by the RNMP (figure 1-59). Three position updates can be accomplished: radar, EVS, and overfly. The FIX MODE switch selects the type of position update to be accomplished. Once a fix is taken, the Kalman filter gives a priority to the fixed based on the type of update. The priority determines how much of the fix will be used to update the navigation models. The priority given to the updates in determining order is: radar, EVS, and overfly.

NOTE

> If an INU or the alternate navigation model is using GPS inputs (GPS/NAV or GPS AHRS), manual position updates will not be processed for that navigation model.

Radar

Radar position updates are accomplished using the radar crosshair position. The position fix mode switch has the following effect on the X-HAIR reference switch and radar crosshair position.

POSITION FIX MODE	X-HAIR REFERENCE/ DISPLAY DATA CHARACTERISTICS
OFF	Track control corrections and NAV position buffers will be set to zero such that rotation of the X-HAIR reference from one position to another results in the radar crosshair moving on the display. All crosshair display data appearing on the bottom of the MFD will be erased.
RDR	Position buffers including track control corrections are displayed for the selected X-HAIR reference. Rotation of the X-HAIR reference from position to position will not cause the radar crosshair to move on the display; but the buffer data is updated to reflect the selected X-HAIR reference.

Select the MFD supporting the radar display and perform a HAC or LAC if required. Locate the fixpoint on the radar display and place the FIX MODE switch to RDR. The following message appears on the bottom of the MFD:

RDR ΔR = nnnnϕ′ TB = nnn° (north up map)
RDR ΔR = nnnnϕ′ RB = xnnn° (track up map).
x = L or R

The message displays difference between the crosshair position and the selected NAV model position. The size of the crosshair is consistent with the OAS estimate of accuracy of the crosshair reference mode selected. The trackball on the keyboard is used to manually position the crosshair on the fixpoint. The radar display can be frozen for analysis of the radar display and aid in precise positioning of the crosshair. Crosshair movement is reflected in range and bearing data displayed on the MFD. Present position is updated using the RNMP POSITION UPDATE switches. See POSITION UPDATE SWITCH SELECTION, this section.

EVS

The procedures for accomplishing an EVS position fix are identical to radar position fix procedures except for the following minor differences. Select EVS on an MFD and accomplish a HAC or LAC. If a HAC cannot be accomplished due to unreliable radar, simulate a HAC by varying ΔH until the EVS crosshair stops drifting off the selected ground point. The FIX MODE select switch has the same operation in EVS as it does in RDR. The EVS position buffers (north stabilized) appears on the bottom of the MFD as follows:

EVS Δ R = nnn0’ TB = xnnn°’

Selecting line-of-sight (LOS) on the RNMP will cause the EVS position buffers to appear as follows:

EVS Δ R = nnnn0’ RB = xnnn°’

NOTE

> The position buffers will only be displayed on an EVS display (FRMT 3, 4, or 5).

All update fix criteria are identical to those defined for a radar position fix. See POSITION UPDATE SWITCH SELECTION, this section.

Overfly

The overfly position fix is used in emergency situations such as failure of the radar set or radar scan converter, and atmospheric conditions restrict EVS viewing range. To perform an overfly fix, the update point must be in the destination table. The steering mode goes to direct during the overfly position fix procedure until the overfly fix is entered by the operator. Select any MFD to support the overfly position fix. Coordinate overfly points with the pilots. If an overfly point is selected that exists in the fixpoint table, select X-HAIR-nn ENTER, zero the buffers, then command FLY-TO + ENTER. If the overfly point is not the current destination, you must command FLY-TO-xx ENTER. If the overfly point is not on either table, enter it on the destination table and command FLY-TO-xx ENTER. Position the fix mode switch to OVRFLY. The following message will be displayed on the selected MFD:

O/F Δ R = nnnnn’ TB = 000° (north up map)

O/F Δ R = nnnnn’ RB = 000° (track up map)

The buffers (ΔR) display the exact value if less than 99990’. If the buffers are more than 99990’, 99990’ is displayed until ΔR reaches 99990’ and then decreases until a position update is commanded.

The pilot advises when on top of the selected point and the operator presses one of the POSITION UPDATE switches. The corrections to present position are displayed on the selected MFD as follows:

O/F Δ R = nnnnn’ TB/RB = nnn° (north up map)

O/F Δ R = nnnnn’ RB = 000° (track up map)

If fix is rejected, see INU FIX REJECT OVERRIDE PROCEDURES, this section, for response.

Position Update Switch Selection

NOTE

> If an INU or the alternate navigation system is using GPS inputs (GPS/NAV or GPS AHRS), manual position updates will not be processed.

The POSITION UPDATE switches are used to update OAS present position. The operator should base his decision to select one of the three switches based on the type of fixpoint. QUAL 1 should be selected if the fixpoint is a well defined point target. QUAL 2 should be selected if the fixpoint is a less defined area target.

Selection of either QUAL switch subjects the fix data to reasonableness tests by the Kalman filter. The OAS subjects the update information to accept/reject criteria comparing inertial and Doppler data to AHRS, TAS, and other sensor data. If the fix inputs are acceptable, the Kalman filter will determine what portion of the position, velocity, and sensor calibration inputs will be integrated into the nav models. If the operator selected QUAL 1 instead of QUAL 2, the Kalman filter accepts a higher percentage of the fix data.

The QUAL 1 and QUAL 2 update switch selection should be based on factors such as operator experience, fix point familiarity, and presentation definition of the radar target The Kalman filter considers variables such as range and altitude in the weighting process. However, the operator should ensure accurate altitude and aiming prior to selection of QUAL 1 or QUAL 2. Fixing with an inaccurate HA will induce position error by skewing the range to the radar return. Additionally, the operator must consider the effects radar inherent errors have on radar return presentation and accurate cross hair placement, especially at longer ranges.

If POS is selected, system latitude and longitude change to reflect range and bearing information exactly as generated by the operator. The buffer value for the prime NAV model will be zero while POS is selected. If the POS light is on, pressing POS will deselect POS, turn the POS light off, and the existing position (updated for the time POS was selected) and position buffers prior to selecting POS will be displayed. A POS update changes position only and then only for the time POS is actually selected. Only a QUAL1/QUAL 2 update will change velocities. Selection of a QUAL switch will also deselect POS. POS update is inhibited between 60 and 0 TTG in bomb mode.

NOTE

> Because of differences in computing present position by OAS and cruise missiles, POS should not be used for cruise missile launch points.

INU Fix Reject Override Procedures

Following a QUAL 1 or QUAL 2 selection by the operator, the OAS may reject the fix inputs. It will then generate a fix override question near the bottom of the MFD.

FIX REJ – 1/2/3 ORIDE? YES-NO

1/2/3 indicates the rejecting NAV models
(1 = INU 1; 2 = INU 2; 3 = Alternate NAV)

The operator must respond to the question within 120 seconds or a NO response is assumed. In this case, no updates are made to the rejecting nav models, and the message is erased. If the operator responds NO, the above action will take place immediately. If the operator answers YES, the OAS will erase the messages and store in its memory that the override action has taken place. However, no updates are made to the rejecting nav model(s). Once the override process is initiated, a new GPI should be selected and another position fix update attempted. If the new update is accepted the update is taken and the override process is terminated. If the new update is rejected, the same message will be displayed with the same acknowledgement question. On a second update rejection, a YES response will cause that the entire position update to be incorporated and alignment will be restarted.

If the operator does override on his second attempted position update, the rejecting nav model(s) will react as follows:

1. Both INUs rejected the first fix. No velocity reset is made, position is reset using radar measurements, and the Kalman filter will be adjusted to accept more of the velocity data it samples.
2. One INU accepted and one INU rejected the first fix. The rejecting INU resets its velocities to the accepting INU’s and the rejecting position is reset using radar measurements.

NOTE

> When responding YES to a second fix override question, this fix will only be processed by the nav model that rejected the first fix. No velocity or position update will be made to the nav model that accepted the first fix.

Alter Nav Fix Reject Procedures

The OAS will generate the fix reject message if the alternate nav model rejected the position update. Because the alternate nav model reject occurs for position error only, the reject can be overridden immediately. If the operator decides to respond “YES” to the question, the alternate nav system position will be updated immediately.

Heading Error Measurement and Correction

The operator can correct aircraft heading error using the radar or EVS. This operation is referred to as an Alternate True Heading Calibration (ATHC). The aircraft heading can be corrected by performing the following steps:

1. Select Directional Gyro mode for AHRS.
2. Either command alternate navigation to be the prime navigation source or set the X-HAIR REF switch on the RNMP to the ALTER position and set the FIX MODE switch to the OFF position.
3. Select a radar or EVS display and the corresponding track control.
4. Initiate a radar or EVS ATHC.

    (a) ATHC processing is initiated by entering a X-HAIR–n,n command on an IKB to select two ground position indicators (GPI) for the sensor to be used for the calibration. Each n represents any fixpoint or offset aimpoint.

    (b) The ATHC display is shown in the advisory area of the MFD that is displaying the radar or EVS.

5. Move the crosshair onto the GPI that was identified first in the ATHC process.
6. Select crosshair-on-target switch on the IKB. The crosshair will move to the vicinity of the image of the second GPI.
7. Move the crosshair onto the image of the GPI that was identified second in the command that initiated the ATHC process. The measured heading error can be observed in the ATHC advisory display.
8. Select crosshair-on-target switch on the IKB. The following question will be displayed.

UPDATE HDG? YES/NO

9. Respond by selecting either the YES switch or the NO switch on the IKB.

    (a) If YES is selected, the alternate navigation true heading is updated.

    (b) If NO is selected or if no response is entered within 120 seconds, the alternate navigation true heading calibration is terminated without changing the computed true heading.

An ATHC is terminated in the event that the backup ACU reconfigures as the primary ACU.

EMERGENCY TRUE HEADING

With FRMT-8 displayed the operator will enter MDFY-4 on the IKB, and press enter. TH data is then displayed at the bottom of the MFD for modification. Enter the new value using the IKB, press enter. The displayed value will indicate current value with C, or emergency values with E. Emergency values are reverse highlighted on the PMD display for navigation.

Altitude Calibration Procedures

HIGH ALTITUDE CALIBRATION

The operator can perform a high altitude radar calibration after verification of the correct H_T. Select RDR track control response on the keyboard and the MFD supporting the radar display. Position antenna tilt to full down. Then select HAC on the RNMP and the radar display automatically changes to the following:

MAP – Spotlight
MAP ORIENTATION – LOS (0° azimuth)
MAP SCALE – 3 NM
MARKERS – XH (crosshair) only
MAP MODE – SLT

The following message is displayed on the MFD.

HAC HT = ±nnnn’ HA = nnnnn ΔH = 0000’

Check HAC HT against actual terrain elevation. If there is a difference, depress HT switch. A 24 HT = nnnn’ will be displayed above the HAC HT. Modify 24 – ENTER will allow the operator to change the value of the HT. Modifying the HT line will also modify the HAC HT value. Note the difference between the position of the crosshair range mark and the line of the first terrain returns and use the track control to position the crosshair range mark on the line of returns. ΔH and the new true altitude will be displayed on the MFD. The largest ΔH that can be accepted during any one update is 29,000 feet. If the new value is reasonable, enter it in the OAS using the update key on the RNMP. Selection of UPDATE causes HAC reasonableness criteria to be processed. If the OAS considers the new true altitude value to be reasonable, the new true altitude value will be used and the event will be recorded.

After recording, the message will be erased and fixpoint sequencing mode will revert to automatic if automatic was active prior to initiating the HAC, and the radar will return to the display prior to the HAC. If the new altitude is not reasonable, the HA = nnnn’ message will appear in reverse video. HAC may be deselected by pressing the HAC switch or selecting LAC. Deselection terminates the function, erases all messages and the HAC legend.

NOTE

HAC must be manually deselected when in TA mode.

LOW ALTITUDE CALIBRATION

The operator will select the MFD supporting the radar or EVS display to perform a low altitude calibration (LAC). Then select LAC on the RNMP and the following message appears on the selected MFD:

LAC HT = ±nnnn’ HA = ±nnnn’ ΔH = ±nnnn’

Verify the correct calibration terrain elevation (H_T) and update if required. Observe the computed true altitude (HA) value, and if reasonable, press the UPDATE key. If the true altitude value is not reasonable, LAC can be terminated by pressing the LAC key. If HA is updated, the new value is displayed in PMD. In the case of radar altimeter failure, fly over flat terrain of known HT and use HAC for altitude calibration.

NOTE

- When HAC or LAC is completed, ensure the HT switch is pressed OFF.
- If an INU or the alternate navigation system is using GPS input (GPS/NAV or GPS/AHRS) HACs or LACs will not be processed into the nav model’s HA. However, the OAS maintains an HA for use by nav models not tied to GPS and this HA is updated.

Wind Velocity Error Measurement and Correction

The operator can measure the wind speed and direction using the radar or EVS. This operation is referred to as a Memory Point (MP) Winds Calibration. The wind speed and direction can be measured by performing the following steps:

1. Select a radar or EVS display and the corresponding track control.
2. Move the crosshair onto the image of any point.
3. Initiate a radar or EVS Memory Point Winds Calibration by selecting MP switch on the RNMP
4. If the crosshair drifts away from the image of the chosen point, reposition the crosshair on the point. The Memory Point Winds Calibration display will be updated to show the computed values of wind velocity and the computed change in wind velocity. When the crosshair no longer drifts away from the image of the chosen point, the current wind velocity has been measured accurately.

5 To update the computed winds, press the UP DATE switch on the RNMP. To exit the Memory Point Winds Calibration mode without changing the computed winds, select the MP switch again.

A Memory Point Winds Calibration is terminated in the event that the backup ACU reconfigures as the primary ACU.

OAS Weapon Control and Delivery Subsystem

DESCRIPTION

The weapon control and delivery subsystem consists of the aircraft equipment, OAS, and weapon hardware and software required to control, monitor, and deliver gravity weapons and missiles. The subsystem provides for automatic or manual release/launch of the weapons against preselected targets or targets of opportunity.

In automatic mode the OAS generates the release signal. The OAS performs all initialization, targeting, arming, monitoring, and launch functions required for the missiles. The OAS navigation subsystem provides steering to the selected release or missile launch point. In addition, the OAS monitors aircraft TAS, pitch and roll, and aircraft altitude and advises the operator through the current event program, if any of these parameters are unsafe for missile launch.

BOMBING

In the bomb mode the avionics processor solves the bombing problem to determine the correct heading and proper time for bomb release. During this time, the navigation portion of OAS continues to compute the aircraft present position. Solution of the bombing problem starts with values of range to the target which have been determined from modified aircraft latitude and longitude based on target position. The processor combines this information with programmed ballistics data, altitude, desired height of burst, aircraft absolute altitude and aircraft ground velocities to determine steering commands and time-to-go to the release point (figure 1-62). The OAS is capable of accomplishing the bomb run without operator inputs. Based on the accuracy of the present position in the OAS, the crosshair will be automatically positioned on the target or an offset aimpoint for the target when the system sequences, or is sequenced to the target. Using this crosshair position information, the OAS then generates steering commands and time-to-go to the release point if no operator inputs are made. At the release point, the OAS generates a release signal and will drop a weapon if the release mechanisms in the aircraft have been properly configured. The operator may refine the actual target position by using the track ball on the keyboard. Synchronous bomb release is based on the final crosshair position. Operator corrections to OAS crosshair placement are normally desired for precision bombing. The crosshair may be allowed to track the target direct or an offset aimpoint. Steering calculations to the release point however, are made as if the crosshair was tracking the target directly.

NOTE

Accurate OAS system altitude is critical for the bombing solution. Inaccurate altitude calibrations will result in weapons impacting long or short of the target. Additionally, altitude errors impact the sighting solution and cause positional errors. For low altitude bombing, LAC errors which place the system altitude below target elevation when the aircraft reaches BRL will cause the OAS to revert to a preset height above target (100 ft for conventional and 200 ft for nuclear) and an automatic release will occur.

BOMB STEERING

OAS steering is designed for both general navigation and bomb delivery. In the bomb steering mode, heading calculations are adjusted for the weapon's ballistics (downrange and crossrange) so the aircraft is steered to a release point rather than the target (impact point). Once released, the weapon travels ballistically downrange and crossrange, to a point at or above the target. Both the direct and centerline recovery modes of steering are available in the bomb mode of operation. In direct steering, the OAS generates steering commands based on a continually updated track established between the aircraft present position and the release point. FCI deflections in direct steering represent only differences between the direct route to the release point and aircraft heading (track angle error). In the centerline recovery steering mode, the OAS establishes a fixed ground track between the destination immediately prior to the target and the release point. FCI deflections in this steering mode represent both track angle error and aircraft crosstrack position error. In centerline recovery steering, the OAS will first steer the aircraft back to the fixed track and then to the release point once the crosstrack position error is nullified. Because this mode of steering could require large steering (and as a result large bank angle) corrections near the release point, if the aircraft is off track, the OAS automatically changes its steering mode when it reaches a point 6000 feet from the release point. This mode change occurs in both direct and centerline recovery steering. At the point the OAS intercepts 6000 feet to release, a new release track is established between the intercept point and the release point. Based on this new track, the OAS then generates centerline recovery steering commands to the release point regardless of the steering mode selected. When the specific track from the point prior to the target (normally the IP) through release is desired, centerline recovery (CF-73) should be commanded at the IP. Turn short is not available in either bomb steering mode.

TIMING

In bomb mode, the OAS Gravity Weapons Computer Program calculates the weapon impact point four times every second. This impact point is determined using the current navigation data and weapons ballistics data to calculate the weapon's time of fall, downrange, and crossrange values after release. Weapon downrange and crossrange are subtracted from the aircraft range to the target, establishing a weapon release point. The range between the aircraft and the release point is the downrange miss distance or distance to go to release. Downrange miss distance is divided by aircraft groundspeed to determine time to go to release (TTG).

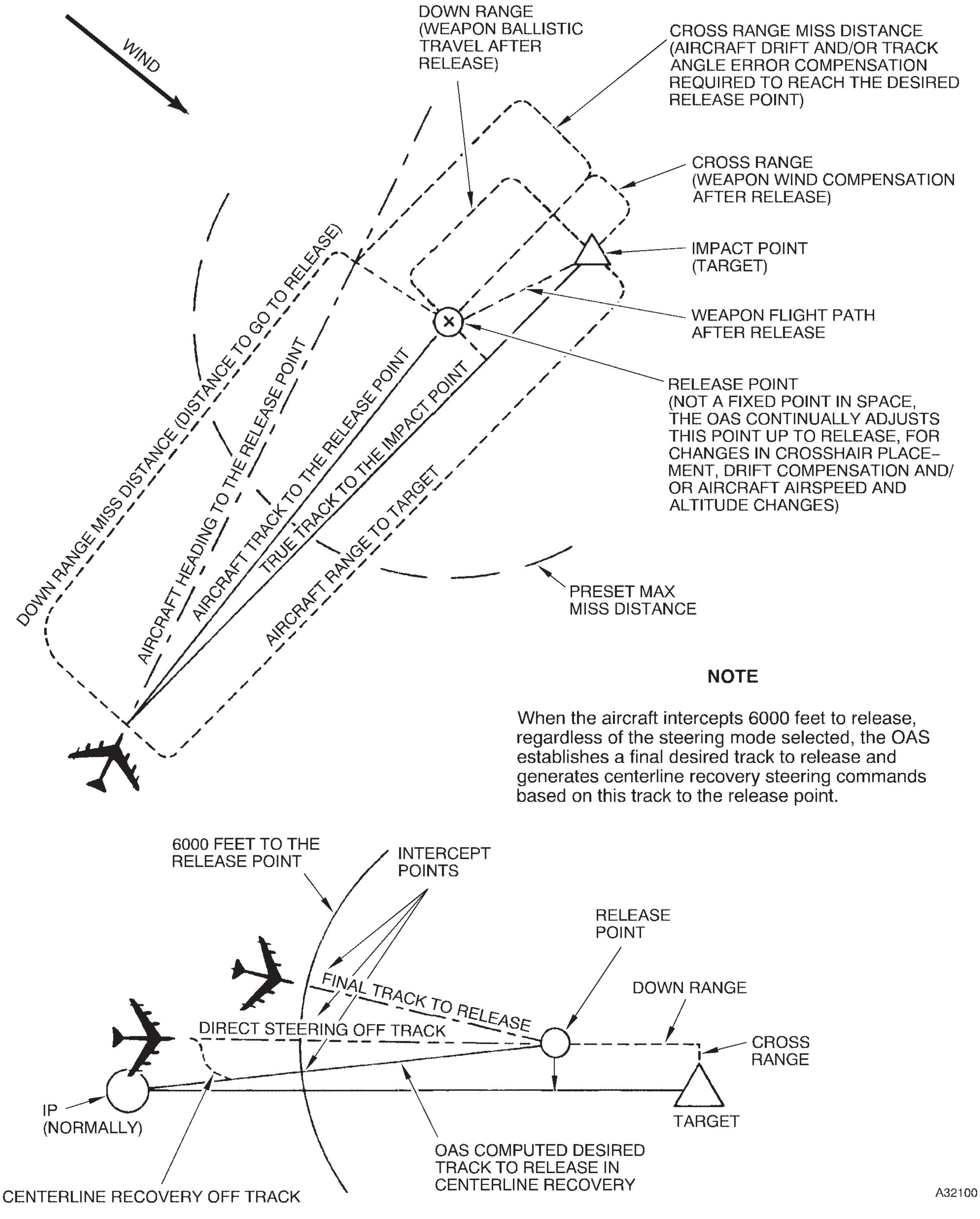
The weapon's downrange value representing the weapon's downrange travel after release will vary as aircraft airspeed and altitude change approaching the target. The weapon's crossrange value represents the weapon's lateral movement after release due to wind drift.

The crossrange miss distance represents the lateral displacement the aircraft would attain at any given point during the bomb run if aircraft heading and groundspeed were held constant for the amount of time remaining on TTG while aircraft drift, based on the current wind, was removed from the DR equation. Assuming the FCI is kept centered, as the aircraft moves downtrack toward the release point, crossrange miss distance becomes proportionately smaller as TTG decreases, with both values reaching zero at the release point. In the situation where the FCI is not centered (direct steering) or not centered with the aircraft on desired track (centerline recovery), a crossrange miss distance due to track angle error, independent of drift compensation, is generated. If the track angle error is not rectified (FCI centered) prior to release, the magnitude of the error will be reflected in a crossrange miss distance greater than zero and result in a release weapon impacting left or right of the desired impact point.

When TTG is equal to or less than 180 milliseconds (ms) and the aggregate value (resultant vector) of downrange miss distance and crossrange miss distance is less than the preset maximum miss distance, the OAS will send a release signal.

In the situation where TTG never reaches 180 ms inbound to the release point (i.e., FCI not centered), the OAS will sense when TTG stops decreasing. Since the TTG will not remain static, at the instant the OAS detects an increase in TTG, the max miss distance is checked and, if the miss distance parameter is met, the OAS sends a release signal.

Bomb Problem Solution



NOTE

When the aircraft intercepts 6000 feet to release, regardless of the steering mode selected, the OAS establishes a final desired track to release and generates centerline recovery steering commands based on this track to the release point.

Figure 1-62

BOMB INHIBIT

The bomb inhibit switch is used to prevent automatic bomb release. Bomb inhibit must be selected prior to 1 second to go (TTG) to inhibit the OAS from sending a release command. When selected, the bomb inhibit light comes on and remains on until after TTG = 0 or bomb inhibit is deselected. Bomb inhibit can be deselected at any time up to TTG = 1. The OAS will remain in bomb mode regardless of the bomb inhibit selection. The bomb inhibit switch does not alter any OAS function except that the bomb release command is not formatted and the bomb doors will not open.

WARNING

If a bomb run is aborted select bomb inhibit and ensure bombing system switch is MANUAL. If the doors did open, they must be closed manually after selecting bomb inhibit or after the OAS has sequenced to the next destination.

NOTE

- When bomb inhibit is active, the message BOMB INHIBIT ACTIVATED will be displayed in reverse highlight on all four MFDs for 10 seconds. The message will overwrite all other messages on the line and erase all OAS advisory messages. The blinking B/I message on the PRGM display is not affected. When bomb inhibit is deselected, the OAS will not automatically display any information that was erased. In order to display any information that was previously erased, the event that caused the information to be displayed must reoccur.

- When an RIU malfunction is detected and during OAS reconfiguration, OAS enters bomb inhibit and remains in bomb inhibit. Bomb inhibit must be exited manually.

PRGM B +

PRGM B+ allows the radar crosshair position to become a target. BXX TGT will be displayed as the next or selected destination. The radar crosshair position becomes the target coordinates. The OAS enters BOMB mode, selects bomb inhibit, and reverts to manual fixpoint and destination sequencing, Bomb inhibit must be manually deselected to complete a weapon release. The weapon delivery parameters for the next scheduled gravity weapon target are used to support the target under the radar crosshair. Mission data must be loaded with at least one gravity target to support PRGM B+.

NOTE

When entering PRGM B+ to select a target-of-opportunity weapon event, the operator should not follow this command with a FLY-TO + command. This will cause the primary ACU to shutdown. Normal reconfiguration will take place, but considerations should be made for continuing with one processor.

MAXIMUM MISS DISTANCE VALUE

A maximum miss distance value is entered on the DTC for each gravity target loaded on the DTC. This magnitude of the maximum miss distance depends on the source used to plan and write the mission DTC. If using the Mission Data Preparation System (MDPS), the mission planner can specify the maximum miss distance value. However, if the Air Force Mission Support System (AFMSS) Mission Planning System (MPS) is used to write the mission DTC, the value is automatically set to 3,000 feet. In order for OAS to command an automatic release, the OAS must sense that the aircraft is within this preset distance to the release point and that time to go is less than or equal to 180 milliseconds. If the OAS senses the aircraft position exceeds this maximum miss distance parameter, it will inhibit an automatic release. Keeping the FCI centered during the bomb run will preclude this release inhibit function from becoming a factor for release.

NUCLEAR WEAPONS

POWER SUPPLY

Power is supplied through circuit breakers on the right forward BNS circuit breaker panel for the bomb system and auxiliary BNS circuit breaker panel for the OAS computers and interface units. For applicable circuit breaker information see Section III or refer to T.O. 1B-52H-1.

OAS INTERFACE

All control and monitor functions for the AGM-86 and AGM-129 missiles are carried out by the armament interface unit (AIU) and the missile interface unit (MIU) upon receipt of commands from the OAS power control panel, the weapon control panel, the keyboards, and the avionics processors. The automatic functions of gravity weapon delivery are performed by the RIU, AIU, and processors. The actual control and release functions for CSRL loaded gravity weapons carried out in the same manner as for missiles, with the nuclear station logic unit (NUC SLU) performing the same functions for gravity weapons as performed for missiles by the MIU.

For missiles and CSRL gravity weapons, with OAS power on and the FCP loaded, the MIU power switch on the OAS power control panel will command the AIU, thru the data bus, to apply power to the MIU/NUC SLU. After a 40 minute warm uptime, the navigator, using the weapon control panel (WCP) commands the MIU/NUC SLU to turn on power to the selected weapons. The navigator also uses the WCP, through the data bus, to issue commands to the MIU/NUC SLU for prearming functions, ejector unlock enable, pylon unlock consent, launch/release mode, manual launch/release, and selective jettison. The pylon unlock, nuclear lock/unlock, and prearm enable are hardwired switches and do not require computer program software to function. The automatic weapon functions such as environmental control, heater power, bomb door commands , and launcher rotation are controlled by the AIU. The automatic launch/release mode, when selected by the navigator on the WCP is controlled by the avionics processor. The MFDs are used by the operator to monitor navigation, weapon status, and targeting. The keyboards, along with the MFDs can be used to modify weapon targeting and in addition, to perform WCP functions, if necessary.

CONTROLS AND DISPLAYS

Operator commands to the weapons are processed and displayed by the OAS. The control and displays associated with weapon control and delivery are discussed in OAS CONTROL PANELS AND DISPLAY UNITS and FMS MFD DISPLAYS, this Section; and the applicable weapon delivery manuals.

Nuclear Gravity Weapon Controls and Delivery Displays

The OAS system controls automatic release of gravity nuclear weapons against programmed targets. FRMT-7 and FRMT-77 displays show weapon status and inventory. Each gravity weapon has its own code, as shown in figure 1-64. These codes are displayed on FRMT-10 and Current Event Program displays. For detailed functional description, refer to T.O. 1B-52H-25.

Nuclear Missile Controls and Delivery Displays

The OAS system controls programming, prearming, and launching of ALCM (AGM-86B) and ACM (AGM-129) missiles. For detailed functional description of the missile controls and displays, refer to the applicable missile’s Aircrew Weapon Delivery Manual. Missile information and targeting data for these missiles are contained on the DTC, as is cruise launch point and route of flight information. The information is loaded into an avionics processor by the operator for use by the OAS system as needed. FRMT-7 and FRMT-77 displays show missile location, power and alignment status, and arm status. A total of 20 missiles may be depicted, eight ALCM on the bomb bay mounted CSRL, and 12 ALCM or 12 ACMs external, six on each pylon. Current event program contains prime mission data across the top of the MFD with the remainder of the MFD divided into current destination data, critical weapon release data, and selected event or next event data. FRMT-7 and current event displays allow the operator to monitor weapon, navigation, and launch functions.

WEAPON SIMULATION

Nuclear weapon simulation is enabled with CF-51 and CF-52. In PART SIM (CF-51) and FULL SIM (CF-52) mode, the bomb doors will open and close automatically. FULL SIM will simulate operation of the CSRL, NUC-SLU/MIUs, and up to eight gravity weapons or ALCM in the bomb bay and twelve external ALCM or ACM. PART SIM allows rotation of the CSRL and simulates the NUC-SLU/MIUs and up to eight gravity weapons or ALCM in the bomb bay and twelve external ALCM or ACM. If missiles are carried and the OTL/JTA mission word is not present or a strike mission tape is loaded, gravity weapon simulation is not possible. In any simulation mode, the DBRIC light remains off and the BDI/TG = 0 light does not come on.

NUCLEAR PRACTICE BOMBS

SMU-105/C Interface Simulator

The SMU-105/C Interface Simulator is designed to simulate the electrical logic interface of special weapons. A SMU-105/C is used on each CSRL station a simulated weapon is desired. If a BDU drop is to be accomplished, a special cable must be connected to the aft end of the MAU-12 bomb rack in order for the SMU-105/C to respond to the release signal.

NOTE

> Switch settings for various weapons are printed on the SMU-105/C.

The SMU-105/C must be used to electrically simulate actual weapons when practice munitions such as the BDU-38 are to be released. If a BDU drop is to be accomplished, a special cable must be connected to the aft end of the MAU-12 bomb rack on the CSRL in order for the SMU-105/C to respond to the release signal. All prearm and monitor functions are accomplished through the OAS. Also, the CSRL does not use the PAL system, requiring PAL to be enabled prior to flight. Therefore, S1 switches will be set to (0) and the S2 switches to (1) when B61-7 or B83 weapons are simulated. If the S2 switch is set to (0) a PAL LOCKD error message for that bomb station will be displayed on FRMT-7. For CSRL releases with practice bombs loaded, a SMU-105/C for each bomb must be installed, and only one release per station is possible without an OAS recycle.

NOTE

> Switch settings for various weapons are printed on the SMU-105/C.

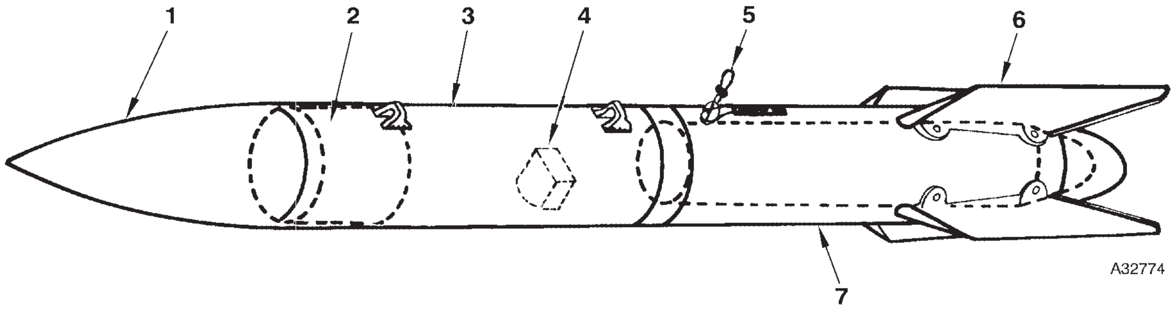
To simulate jettison with the SMU-105/C simulator installed, the aircrew will use the checklists in Section II of T.O. 1B-52H-25-2.

BDU-38/B Practice Bomb

The BDU-38/B practice bomb (figure 1-63) simulates the B61 flight characteristics by having the same configuration, weight, center of gravity, and moments of inertia. The practice bomb weighs 715 (±15) pounds, has a maximum diameter of 13.3 inches, and an overall length of 141.6 inches. The practice bomb consists of a nose section, center section, and aft section as depicted in figure 1-63.

Release of the BDU-38/B practice bomb is accomplished through the normal or emergency aircraft bomb release circuits. As the bomb drops away from the aircraft, the pullout lanyard hardware is extracted which enables the circuit and starts the parachute delay timer. At the completion of the specified delay time the battery supplies power to activate the parachute deployment system. The timer is set by weapons maintenance personnel during installation of the battery pack. It can be set for 225, 550, or 1500 milliseconds. For B-52 carriage, the timer is set for 1500 milliseconds delay.

BDU-38/B Practice Bomb



1 NOSE SECTION
2 BALLAST
3 CENTER SECTION
4 BATTERY PACK
5 LANYARD HARDWARE
6 FINS
7 PARACHUTE DEPLOYMENT ASSEMBLY

Figure 1-63

CONVENTIONAL GRAVITY WEAPONS

The conventional gravity weapon delivery system provides the aircraft with a means of carrying, selecting arming options, and releasing nonnuclear gravity weapons. Release methods associated with the suspension systems are OAS, D-2, and jettison.

POWER SUPPLY

Power is supplied through circuit breakers on the right forward BNS circuit breaker panel for the bomb system and auxiliary BNS circuit breaker panel for the OAS computers and interface units. For applicable circuit breaker information see Section III or refer to T.O. 1B-52H-1.

OAS INTERFACE

Functions performed by the SMO include weapon control processing, impact point calculations, simulation processing, controls and displays processing, and built-in-test processing. To perform its required functions, the SMO interfaces with existing aircraft weapon system components, the OAS sources of navigation, steering, controls and displays processing, mission data, and with the global positioning system (GPS) hardware.

All requirements for delivery of nonnuclear weapons can be accomplished automatically using stored mission data. Mission data is entered into the OAS from the flight computer program (FCP), which contains the SMO, via the DTC, or by supplemental manual operator position inputs by use of the keyboard. Bomb mode is entered when the operator commands the aircraft to FLY-TO a target, when sequencing to a stored target as the next destination, or when the operator designates a target. While in bomb mode, impact point and Time-To-Go (TTG) are continuously calculated, using target information obtained from stored mission data as supplemented by operator input. In AUTO, bomb door opening and weapon release is accomplished automatically. When TTG reaches zero, the SMO issues a release signal to the bomb release system which processes the signal and directs weapon release sequencing.

The operator has the capability to enter Bomb Train Adjust Distance (BTAD) via CF-530. BTAD can be implemented to center a bomb string/stick and or to correct for any known release system bias. In addition, the operator has the option to enter modified ballistic wind on CF-53 and to review the modified winds on the CF-53 or through the PRGM-NN display.

NOTE

- The SMO will not send a release signal if bomb inhibit is selected.

- TTG on FRMT and PRGM displays, and EARLY/LATE times on PRGM displays are calculated to the release point time set on FRMT-10 or PTA on CF-61 whichever was input last.

CONTROLS AND DISPLAYS

Operator commands to the weapons are processed and displayed by the OAS. The control and displays associated with weapon control and delivery are discussed in OAS CONTROL PANELS AND DISPLAY UNITS and FMS MFD DISPLAYS, this Section; and in T.O. 1B-52H-34-2-1.

The OAS system controls automatic release of gravity weapons against programmed targets. FRMT-7 and FRMT-77 displays show weapon status and inventory. Each gravity weapon has its own code as shown in figure 1-64. These codes are displayed on FRMT-10 and Current Event Program displays.

WEAPON SIMULATION

The SMO provides the capability to perform a weapon delivery mission with simulated weapons. OAS has two simulation modes: PART SIM and FULL SIM. Both SIM modes allow bomb door operation. Although the SMO will not simulate weapon/rack responses, weapon/rack malfunctions, or other weapon control and monitor functions, the SMO will accomplish the following inflight operations while in the simulation mode:

- Bomb mode entry/exit
- Impact point prediction
- Bomb steering
- Bomb door control (doors must be closed manually following simulated release in partial simulation mode)
- Remote bomb site (RBS) tone cutoff
- Bomb scoring
- Weapon event recording

Operational status, weapon inventory, fault conditions, and a summary of any SMO weapon delivery program is displayed on the OAS multifunction display (MFD). The keyboard provides the operator the capability to update or modify the nonnuclear weapon delivery program in the mission data, to reassign weapons to new targets, or to vary the arming options.

Gravity Weapons PRGM Display Codes

OAS DISPLAY CODE	NONNUCLEAR WEAPONS
B01	MK-82 GP
B02	MK-84 GP
B03	Reserved
B04	Reserved
B05	MK-56 Finned MK-56 Unfinned
B06	Reserved
B07	M117 GP M129 MJU-1/U*
B08	MK-82 Snakeye MK-62 (QS)
B09	M117R M117D*
B10	MK-82 AIR
B11	Reserved
B12	MK 20 ROCK*
B13	Reserved
B14	Reserved
B15	Reserved
B16	MK-83 GP*
B17	CBU-87/B CEM
B18	CBU-89/B GATOR
B19	MK-63 Mod 0 with MK-12 Fin
B20	Reserved
B21	MK-65 (QS)
B22	Bomb Modifiable Ballistics Weapon
B23	Reserved
B24	GBU-10 (PAVEWAY I)*
B25	GBU-10 (MK-84 PAVEWAY II)
B26	GBU-10 (BLU-109 PAVEWAY II)
B27	GBU-12 (PAVEWAY II)
B28	Reserved
B29	M117 AIR
B30	BDU-48 (Practice Bomb)*
OAS DISPLAY CODE	**NUCLEAR WEAPONS**
B61	B-61
B83	B-83/B-83-1

NOTE

- This table lists weapon ballistics programmed in the FCP only.
- Refer to T.O. 1B-52H-1 for list of authorized weapons.
- For Modifiable Ballistics codes refer to T.O. 1B-52H-34-2-1.

*These weapons are no longer in the inventory.

Figure 1-64

CONVENTIONAL MISSILES AND TARGETABLE MUNITIONS/WEAPONS

POWER SUPPLY

Power is supplied through circuit breakers on the right forward BNS circuit breaker panel for the weapon systems and auxiliary BNS circuit breaker panel for the OAS computers and interface units. For applicable circuit breaker information see Section III or refer to T.O. 1B-52H-1.

OAS INTERFACE

The OAS controls programming, release or launch, and jettison of nonnuclear weapons. The OAS operational computer program consists of a ground maintenance computer program (GMCP) and flight computer program (FCP). The FCP consists of the flight management system (FMS) and stores management overlay (SMO). The FMS controls navigation, radar, controls and displays, and supports the SMO. The SMO contains all weapon control delivery functions.

Functions performed by the SMO include weapon control processing, release point calculations, simulation processing, controls and displays processing, and built-in-test processing, etc. To perform its required functions, the SMO interfaces with existing aircraft weapon system components, the OAS sources of navigation, steering, controls and displays processing, mission data, and with the global positioning system (GPS) hardware.

All requirements for delivery of nonnuclear weapons can be accomplished automatically using stored mission data. Mission data is entered into the OAS from the flight computer program (FCP), which contains the SMO, via the DTC or by supplemental manual operator position inputs by use of the keyboard.

For further information on conventional missiles, targetable munitions/weapons, and aircrew procedures refer to the applicable T.O. 1B-52H-34-2 series manual:

WEAPON	T.O. NUMBER
Wind Corrected (WCMD)	T.O. 1B-53H-34-2-5
Direct Attack (JDAM)	T.O. 1B-53H-34-2-6
AGM-158 (JASSM)	T.O. 1B-53H-34-2-8
AGM-86C/D (CALCM)	T.O. 1B-53H-34-2-9

CONTROLS AND DISPLAYS

Operator commands to the weapons are processed and displayed by the OAS. The controls and displays associated with weapon control and delivery are discussed in OAS CONTROL PANELS AND DISPLAY UNITS and FMS MFD DISPLAYS, this Section; and the applicable weapon delivery manuals.

The OAS system controls programming, prearming, and launching/releasing of conventional missiles and targetable munitions. For detailed functional description of each weapon's controls and displays, refer to the applicable missile's Aircrew Weapon Delivery Manual. Weapon information and targeting data for these weapons are contained on the DTC, as is launch/release point and route of flight information. The information is loaded into an avionics processor by the operator for use by the OAS system as needed. FRMT-7 and FRMT-77 displays show weapon location and power, alignment and arm status. Current event program contains prime mission data across the top of the MFD with the remainder of the MFD divided into current destination data, critical weapon release data, and selected event or next event data. FRMT-7 and current event displays allow the operator to monitor weapon, navigation, and launch/release functions.

WEAPON SIMULATION

NOTE

OAS only allows loading of a SMO when the system is in STRIKE mode.

The simulation modes, PART SIM and FULL SIM, provide the ability to conduct crew training without using actual weapons or all of the real weapon control equipment (WCE). FULL SIM simulates the weapons and all of the WCE. PART SIM simulates the weapons and all of the WCE except the PDUC. Operation of the actual bay doors is supported in either simulation mode.

The functionality of the controls and displays subsystem in either FULL SIM or PART SIM mode is essentially the same as it is for STRIKE.

FULL SIM mode can be commanded while in STRIKE mode by entering CF-52. PART SIM mode can be commanded while in STRIKE mode by entering CF-51. The simulation modes are exited by returning to STRIKE mode. The operator can verify the currently active weapon system mode, whether STRIKE, FULL SIM, or PART SIM, by observing the appropriate window on either the CF- Menu or the CF-5 Menu.

The primary difference between STRIKE mode and FULL SIM mode is that 1553A bus traffic is not transmitted from the ACUs to the WCE (e.g., Weapon Interface Unit (WIU), Missile Interface Unit (MIU), and Power Drive Unit Controller (PDUC)). While the weapons system is in FULL SIM mode, the WCE element responses are simulated and the WCE cannot actually be powered on or operated. WCE and/or weapons are not required to be loaded on the aircraft for the operator to use and operate FULL SIM mode. There is little discernible difference between STRIKE and FULL SIM modes to the operator since the controls and displays function equivalently in both modes. The operator may notice a slight timing difference on the displays for the WCE responses, since FULL SIM timing is based on nominal times and not actual times.

PART SIM mode is the same as FULL SIM mode with one exception: in PART SIM mode 1553A bus traffic is transmitted from the ACUs to the PDUC to allow for CSRL rotation.

JOINT DIRECT ATTACK MUNITION (JDAM)

A total of 12 JDAM weapons may be loaded, six from each Heavy Stores Adapter Beam (HSAB) mounted on an external pylon. Weapon unlock control require pilot-navigator action. Other JDAM monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators with an additional Alternate Jettison Control Panel (AJCP) provided at the navigators' station. For further information, refer to T.O. 1B-52H-34-2-6 for JDAM weapons.

WIND CORRECTED MUNITION DISPENSER (WCMD)

A total of 12 WCMD weapons may be loaded, six from each HSAB mounted on an external pylon. Weapon unlock control require pilot-navigator action. Other WCMD monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators with an additional Alternate Jettison Control Panel (AJCP) provided at the navigators' station. For further information, refer to T.O. 1B-52H-34-2-5 for WCMD weapons.

JOINT AIR-TO-SURFACE STANDOFF MISSILE (JASSM) AGM-158

A total of 12 JASSM weapons may be loaded, six from each HSAB mounted on an external pylon. Weapon unlock control require pilot-navigator action. Other JASSM monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators with an additional Alternate Jettison Control Panel (AJCP) provided at the navigators' station. For further information, refer to T.O. 1B-52H-34-2-8 for JASSM weapons.

CONVENTIONAL AIR LAUNCHED CRUISE MISSILE (CALCM) AGM-86C/D

A total of 20 AGM-86C/D CALCMs may be loaded (12 missiles externally on cruise missile pylons and 8 missiles internally on the CSRL) for launch against preprogrammed targets. Each left and right underwing pylon will accommodate six missiles. Missile types cannot be mixed at a given location. Missile unlock control require pilot-navigator action. Other CALCM monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators. For further information, refer to T.O. 1B-52H-34-2-9 for AGM-86C/D missiles.

Airborne Video Tape Recorder

DESCRIPTION

The airborne video tape recorder (AVTR) consists of two components; the audiovisual tape recorder, located on the navigator's right side panel and the remote control unit (RCU) located on the radar navigator's front panel. The system is powered by 115 vac and is protected by a circuit breaker marked AVTR on the EVS circuit breaker panel. It will record video signals from the pilot's TA display, or radar/EVS video from the RN's left or right MFD. The recorder will also record interphone and UHF-1 radio on two audible channels. The system can be operated in a manual mode or an automatic mode (see Figure 1-65 for controls and indicators). It has an indicator group to indicate current mode of operation and amount of tape remaining. The video recorder is powered and controlled through the RCU. The video tape cassettes are loaded by the navigator and the tape is automatically threaded when the power switch on the RCU is placed on. The tape is automatically unthreaded at the end of the tape or can be unthreaded through the use of the unthread switch on the recorder at any time the STBY light is illuminated on the RCU. The system has no tape rewind capability. Tape cassettes contain sufficient tape for approximately 30 minutes of continuous recording in the manual mode. If operated in the automatic mode, the system will record for 10 seconds and then pause for 10, 20, or 30 seconds depending on the position of the delay select switch, thereby extending the recording time for a single cassette up to 2 hours.

NORMAL OPERATION

CAUTION

> Do not insert tape cassette into recorder before RCU power has been applied.

1. Place RCU mode select switch to STBY.
2. Turn RCU power switch to ON. The power-on indicator light comes on and the time display shows a random indication.
3. Insert tape cassette into recorder and close cover. The tape automatically threads and STBY light comes on.
4. Set the LED time remaining readout by setting the time remaining on the cassette (up to 30 minutes) on the time set thumbwheels and then depressing the tape time set button. LED reflects time set.
5. To record, the mode select switch must be placed to AUTO or MAN. If in AUTO, ensure the delay select switch is placed at 10, 20, or 30 as dictated by mission requirements.

CAUTION

> The RCU mode switch must be in STBY and the tape unthreaded prior to tape cassette removal.

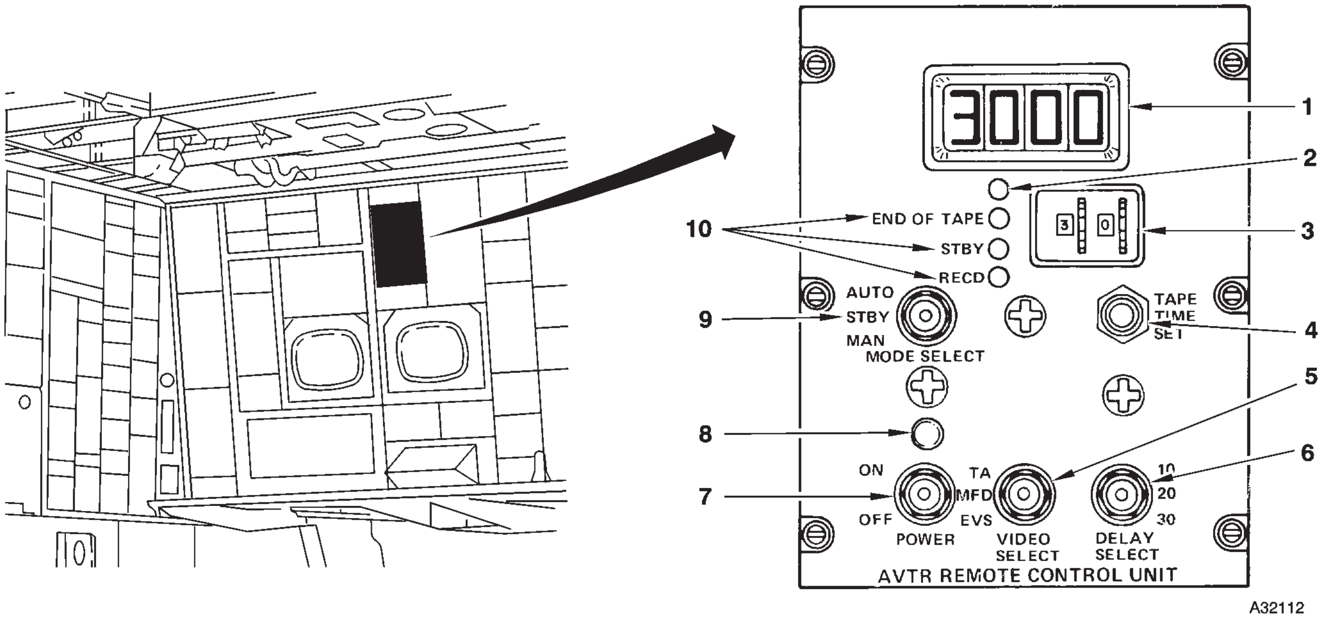
6. To remove a tape cassette, place the mode switch to STBY. If EOT light is not on, press the tape unthread switch on the recorder. Then press the cassette remove button on the recorder to remove tape.

NOTE

> The cassette remove button's function is inhibited until tape unthreading is complete.

7. Place RCU power switch OFF.

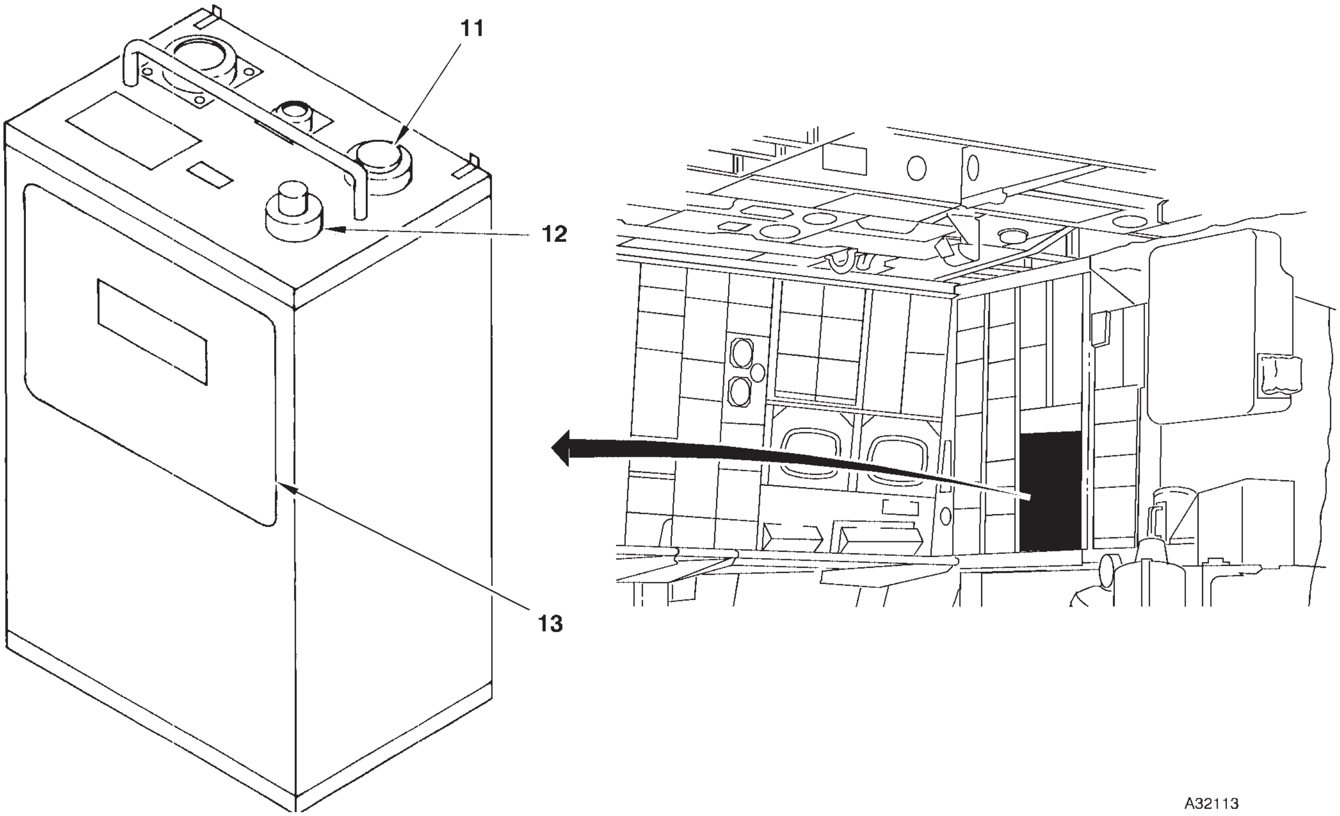
Airborne Video Tape Recorder Controls and Indicators



A AVTR REMOTE CONTROL UNIT

NO.	CONTROL-INDICATOR	FUNCTION
		A AVTR REMOTE CONTROL UNIT
1	LED Readout	Displays approximate time (minutes and seconds) remaining on tape. Recorder will not stop recording when the indicator shows 0 if there is still any unrecorded tape.
2	Photo Cell	Automatic control of LED brightness (unlabeled).
3	Time Set Thumbwheel Switches	Used in conjunction with TAPE TIME SET button to set in minutes, the LED readout.
4	TAPE TIME SET Button	Depressing button causes the time set in Time Set Thumbwheel switches to be displayed in the LED readout.
5	VIDEO SELECT Switch	TA – Selects video from pilot’s TA display for recording.
		MFD – Selects video from RN’s left MFD for recording.
		EVS – Selects video from RN’s right MFD for recording.
6	DELAY SELECT Switch	Selects the time the recorder will delay in seconds between 10-second recording sessions.
7	POWER Switch	ON – Provides power to the RCU and video recorder.
		OFF – Deenergized the AVTR system.
8	POWER ON Light	Comes on when the power switch on the RCU is placed ON.
9	MODE SELECT Switch	AUTO – Save tape feature; causes recorder to pause for selected time (10, 20, or 30 seconds) between 10 second recording sessions.
		STBY – Places recorder in standby mode if power is applied and a tape cassette is threaded in the recorder.
		MAN – Causes recorder to record continuously until end of tape.
10	Record Function Indicators	END OF TAPE – Comes on when end of tape is reached.
		STBY – Comes on when power is applied and a cassette is threaded in the recorder.
		RECD – Comes on anytime recorder is recording.

Figure 1-65 (Sheet 1 of 2)



B AIRBORNE VIDEO TAPE RECORDER

NO.	CONTROL-INDICATOR	FUNCTION
	B AIRBORNE VIDEO TAPE RECORDER	
11	Cassette Remove Button	Opens tape loading door when pressed.
12	Tape Unthread Switch	If EOT light is not on, press to unthread tape prior to tape removal.
13	Tape Loading Door	Provides access to tape cassette.

Figure 1-65 (Sheet 2 of 2)

OAS Video Recorder

DESCRIPTION

The OAS is provided with a video recorder under control of the radar navigator to record radar and EVS video along with other displayed system data. The recorder functions as a mission data recorder and provides film recorded data which can be utilized to reconstruct the mission and analyze system performance.

CONTROLS AND INDICATORS

Controls and indicators for the video recorder equipment are located on the RNMP at the radar navigator's station and on the video recorder unit and associated film magazine. See figure 1-68 for control and indicator functional information on the RNMP and figure 1-67 for control and indicator functional information on the video recorder unit and magazine.

VIDEO RECORDER

The video recorder unit (figure 1-67) is located on top of the left equipment rack behind the radar navigator. The recorder contains a small cathode ray tube, mirrors, and a 35 mm camera which accommodates a film magazine on which the projected images are recorded. The film magazine is installed/removed through an access door in the front of the recorder. The front of the recorder also contains a record test switch and BIT indicator used primarily for maintenance.

DATA TRANSFER

The radar navigator can control which video source is desired to be recorded by actuation of the source switch. MFD position records all video and data on the radar navigator's left MFD. If radar video is not being displayed on that MFD and its recording is desired, RSC should be selected. Video being processed through the radar scan converter will be recorded. A simplified schematic of the system control and data flow is shown on figure 1-66. During operation if the left MFD or the RSC should fail, the computer program will select the opposite source and so indicate by the respective light illumination, regardless of selected switch position.

NORMAL OPERATION

The video recorder is normally operated in an automatic mode controlled by the OAS. The recorder will shoot one frame of film when any of the following events occur:

- High Altitude Calibration
- Low Altitude Calibration
- Memory Point Wind Calibration
- Position Fix/Update
- Missile Countdown to Launch
- Bomb Countdown to Release
- Destination Update at TTG = 0
- Any Fly-To Command
- 30-Second Interval Below 5000 Feet AGL
- 2- Minute intervals Above 5000 Feet AGL

The recorder will automatically record any position fix reject messages and operating responses to these messages. The recorder will also record UTC for a radar freeze when the freeze is selected. The program will set frame numbers to 0001 when the navigator initializes UTC during the start-up procedure. The radar navigator can initiate recording at any time desired by actuating the mode switch to MAN. Actuate the mode switch to MAN for each frame.

RECORDER FILM LOADING

Film magazine loading into the video recorder is accomplished as follows:

1. Check the video recorder mode switch is in OFF.
2. Open the recorder access door and make sure the magazine lock lever is in the stowed position.
3. Insert the film magazine and rotate lock lever counterclockwise to the vertical position, ensuring the lever fits into the detent in the front of the magazine.
4. Close and latch the access door.
5. Manually reset BIT indicator on recorder by rotating it clockwise while power is on. BIT indicator remains black.
6. Actuate the record switch to TEST position five times to advance film to start position.

OPERATING MODES

The video recorder is normally operated during the entire flight. The equipment is normally operated in automatic mode to allow the OAS to command the required recording. If a special event record is desired, the radar navigator may select the manual mode to command recording.

NOTE

> Aircraft present position and true altitude are erased from the PMD display when an event is recorded.

Recorder Operation

The video recorder is placed in operation after OAS master power has been turned on by placing the video recorder mode switch to AUTO. Select the desired recording source by actuating the source switch to the appropriate position as indicated by the respective switch light being on.

RECORDER FILM REMOVAL

Film magazine removal from the recorder is accomplished as follows:

1. Check video recorder mode switch in OFF.
2. Open the recorder access door.
3. Rotate lock lever clockwise to the stowed position.
4. Pull on film magazine handle and remove from the recorder.
5. Close recorder access door.

Video Recorder Data Flow

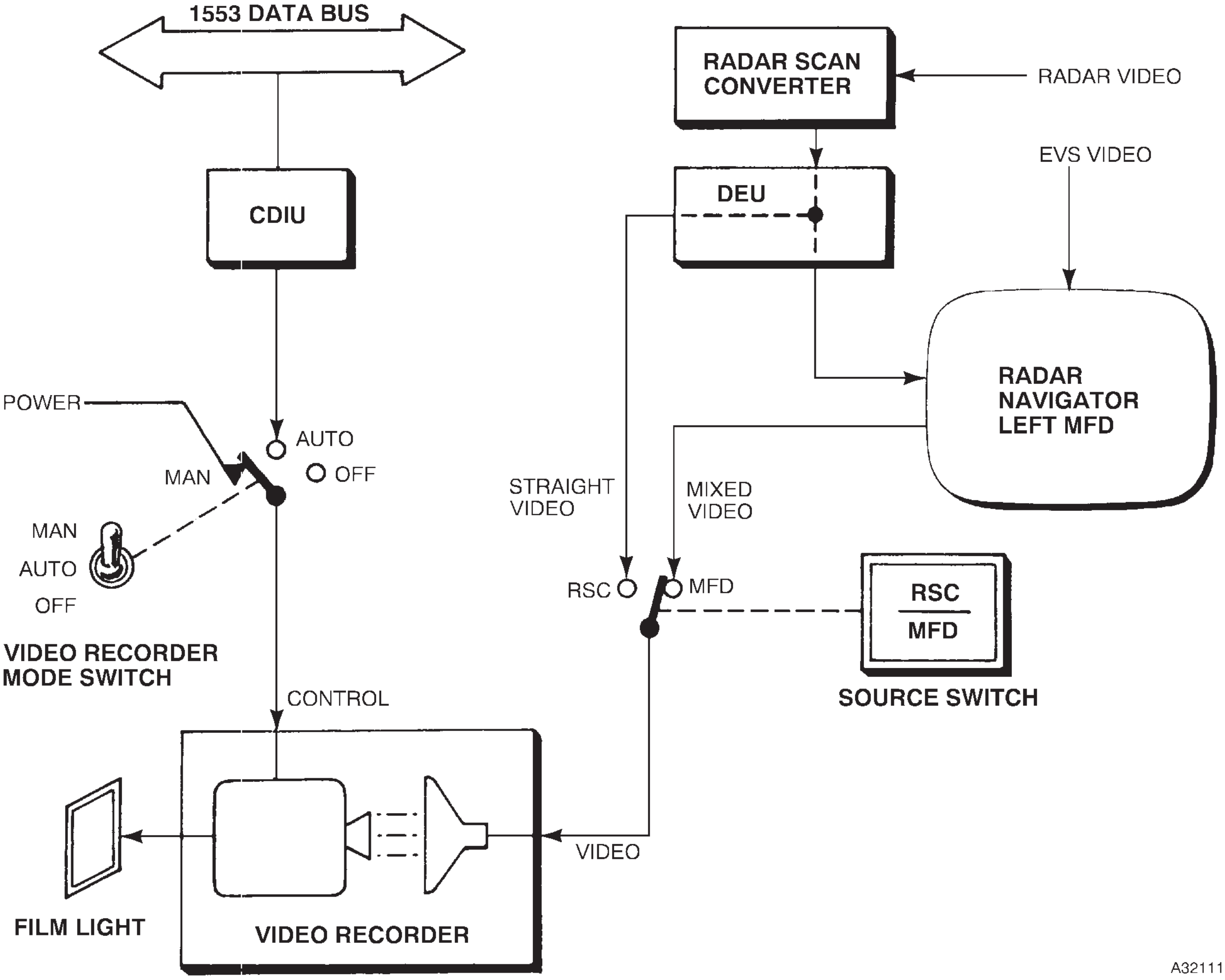
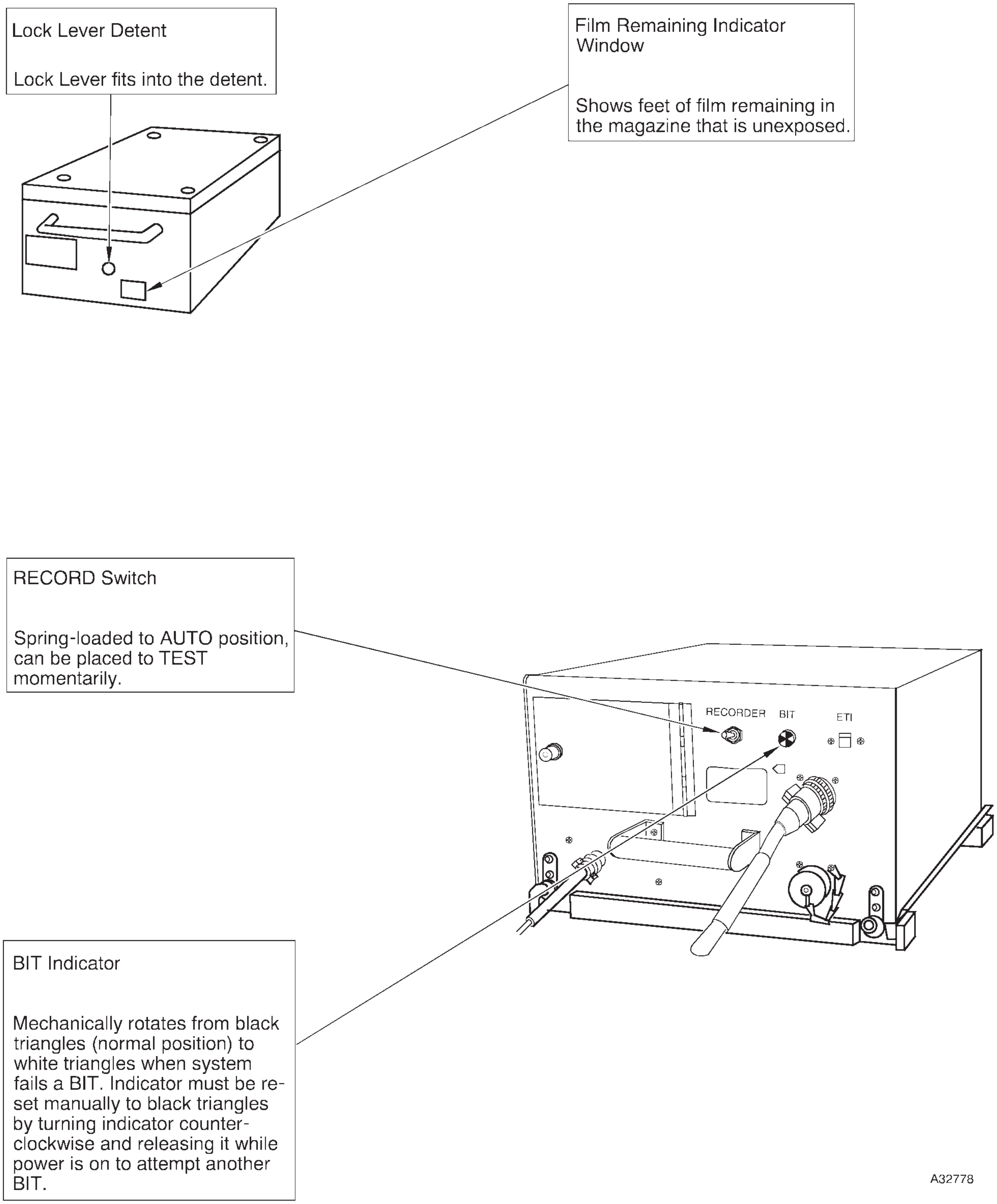


Figure 1-66

Video Recorder



Lock Lever Detent

Lock Lever fits into the detent.

Film Remaining Indicator Window

Shows feet of film remaining in the magazine that is unexposed.

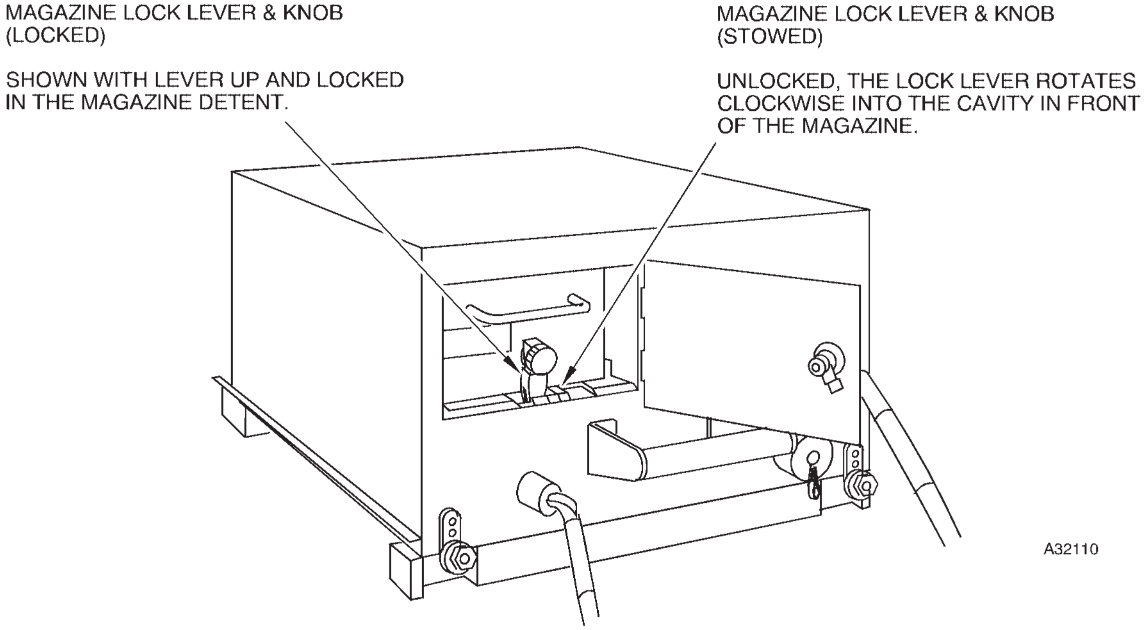
RECORD Switch

Spring-loaded to AUTO position, can be placed to TEST momentarily.

BIT Indicator

Mechanically rotates from black triangles (normal position) to white triangles when system fails a BIT. Indicator must be reset manually to black triangles by turning indicator counterclockwise and releasing it while power is on to attempt another BIT.

Figure 1-67 (Sheet 1 of 2)

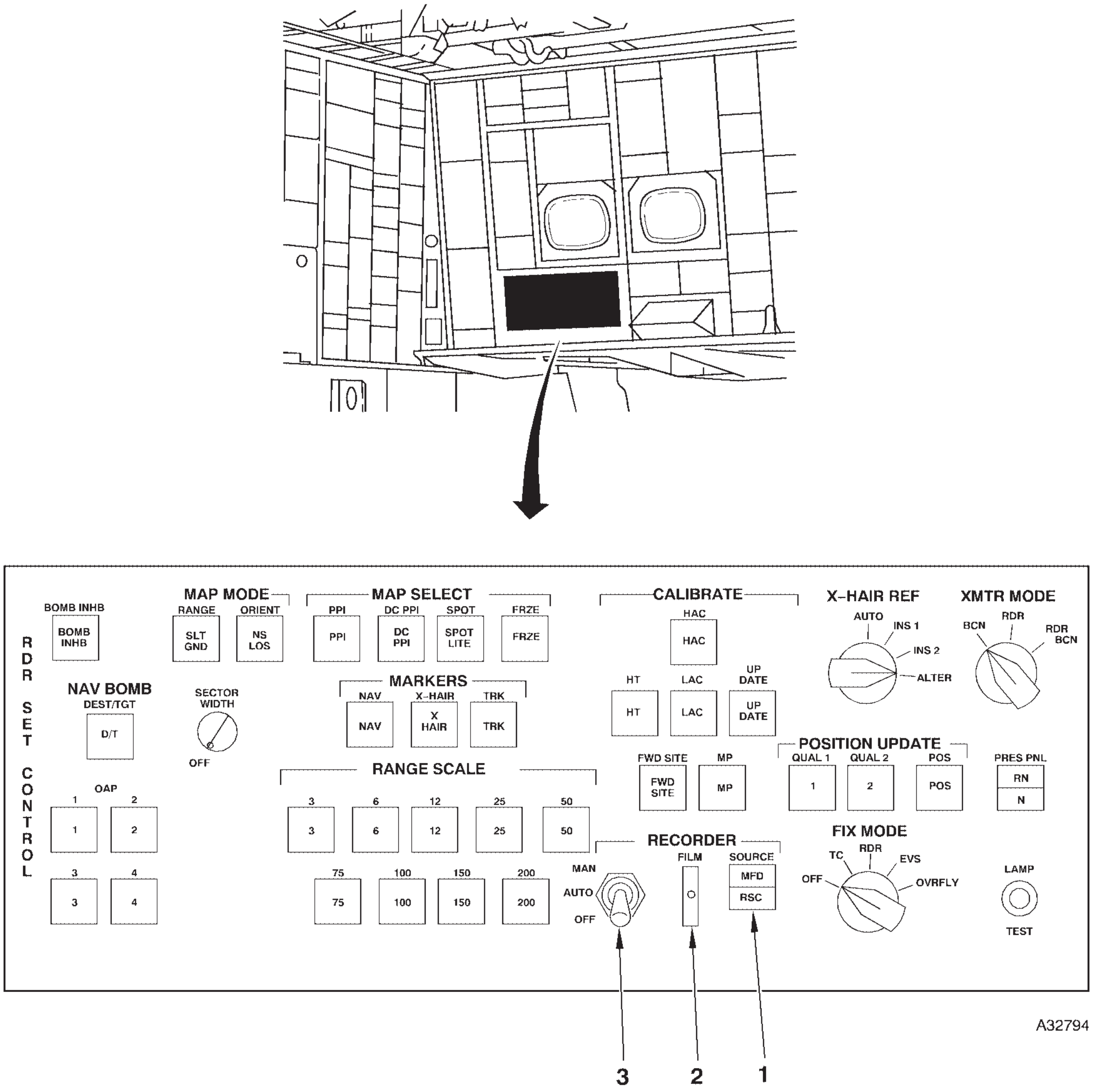


VIDEO RECORDER WITH FILM MAGAZINE INSTALLED

Figure 1-67 (Sheet 2 of 2)

Video Recorder Controls

RADAR NAVIGATOR MANAGEMENT PANEL



NO.	CONTROL-INDICATOR	FUNCTION
1	SOURCE Switch	MFD mode records video from the radar navigator's left MFD. RSC mode records video directly from the radar scan converter.
2	FILM Light	Comes on steady when the video recorder is out of film. The light may come on momentarily during manual operation due to film slack.
3	Video Recorder Mode Switch	OFF position, the recorder is off. AUTO position allows for automatic operation of the video recorder. MAN position activates the recorder each time the switch is positioned to MAN. The switch is spring-loaded to the AUTO position from MAN.

Figure 1-68

OAS Cooling

DESCRIPTION

The OAS requires cooling in two distinct electronic component areas as follows:

- Radome (forward)
- Remote Modules

Equipment mounted in the radome is cooled by ram air during flight and by a ground blower during ground operation. Cooling air from the air conditioning pack can also be obtained from an air cart connected to No. 2 nacelle or from an engine run. This equipment includes the avionics processors, display electronics unit, and radar scan converter.

CONTROLS AND INDICATORS

Indication of insufficient cooling to OAS equipment which may result in equipment overheat is provided by three separate indicating circuits. See figure 1-69 for control and indicator functional information.

NORMAL OPERATION

GROUND OPERATION

During ground operation of the OAS, adequate cooling is required at all times. The ground blowers switch must always be ON during ground operation of the OAS radar. Generally, the forward radome blower will provide adequate cooling of radome-mounted equipment for any ambient temperature up to 108°F. Air from a ground air conditioning cart or from the aircraft air conditioning pack will always be required for remote modules cooling and for the power supply heat exchanger cooling.

NOTE

> When it is necessary to operate the OAS prior to engine start, the air conditioning system master switch may be placed to OFF for short periods of time, not to exceed 10 minutes during engine start.

Power to the OAS radar is automatically removed when the radome airflow low light comes on while the aircraft is on the ground.

INFLIGHT OPERATION

During flight, OAS strategic radar operation is not interrupted by actuation of any of the overheat protective circuits. The cabin airflow low light serves as a caution, but will not result in OAS radar power shutdown.

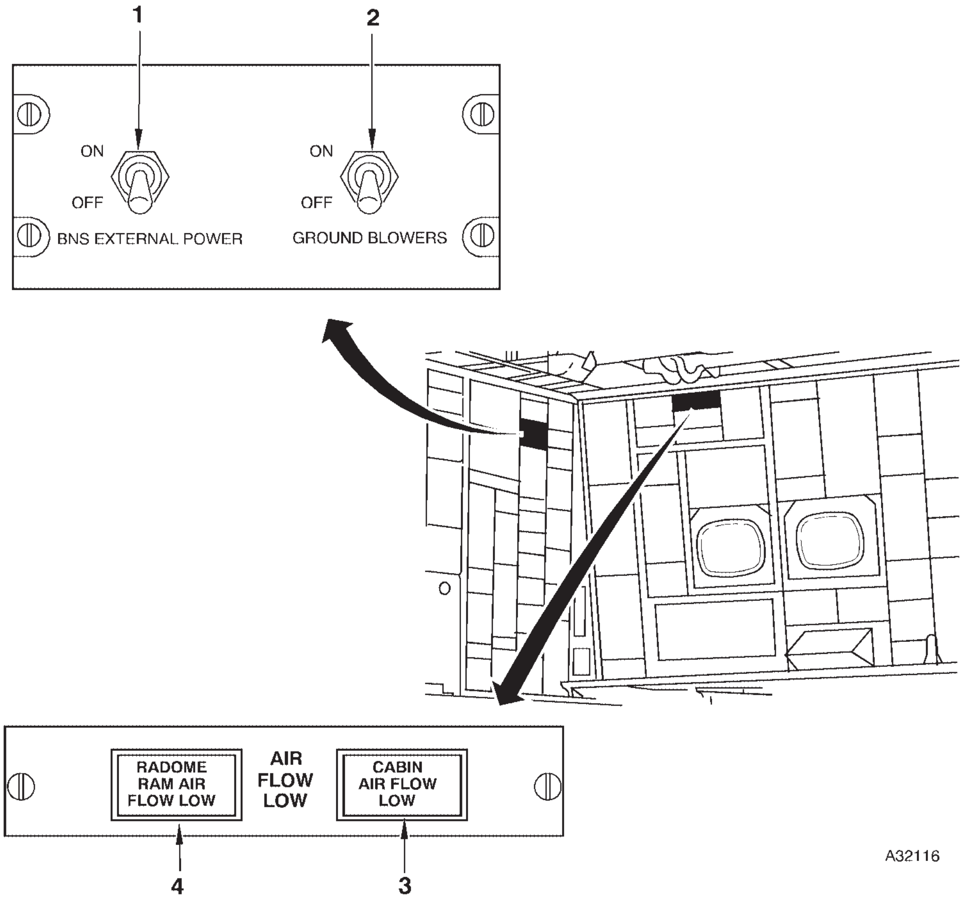
CAUTION

> The OAS equipment must be turned OFF when the cooling airflow is stopped by turning the air conditioning system master switch to OFF.

NOTE

> The OAS may remain on for short periods of time, not to exceed 10 minutes.

Cooling System Controls and Indicators



NO.	CONTROL-INDICATOR	FUNCTION
1	BNS EXTERNAL POWER Switch	OFF inflight.
2	GROUND BLOWERS Switch	ON position powers ground blowers inside the radome to cool OAS radar equipment. The switch must be on for OAS radar ground operation. Inflight, power is turned off by a squat switch when weight is off the wheels.
3	CABIN AIRFLOW LOW Light	An amber light that comes on if the cooling effect of air supplied to the remote modules rack is insufficient.
4	RADOME RAM AIR FLOW LOW Light	An amber light that comes on if the air flowing through the forward radome cooling system ducts has insufficient cooling effect.

Figure 1-69

Radar Pressurization

DESCRIPTION

Pressurization is provided during flight by the cabin pressurization and radar pressurization systems. For information relative to the cabin pressurization system, refer to T.O. 1B-52H-1, Section I. The radar pressurization unit is located in the lower forward crew compartment (figure 1-70) and can be operated continuously, if necessary, to maintain the proper radar pressure. The high pressure system pressurizes the strategic radar waveguide. The low pressure system is deactivated. A single pressure pump, in conjunction with a low pressure cutoff valve and pressure switches, supplies the high pressure system.

CONTROLS AND INDICATORS

A radar pressure control panel marked RADAR PRESSURE is located on the navigator's side panel and has two sets of controls and indicators, one for the high pressure system and one for the low pressure system. The low pressure system controls are deactivated. Two radar low pressure lights are located on the radar navigator's front panel. See figure 1-71 for control and indicator functional information.

NORMAL OPERATION

Normal operation of the radar pressure system is provided as follows:

1. Ensure that the radar pressure circuit breakers are in and press-to-test the indicator lights.
2. Place pressure pump control switch to NORMAL ON. Observe the applicable pump indicator light illuminated.
3. The high pressure gage should indicate in the green area after the pressure has built up and the radar pressure low light should be off.

NOTE

- The high pressure system may cycle up to 11 times per hour after reaching stability at altitude but should not operate more than 1 minute for each cycle. Excessive cycling indicates a pressure leak or malfunction.

- After the pressure pump control switches have been placed to ON, approximately 2 to 3 minutes of pump operation should be allowed to extinguish the radar pressure low light prior to suspecting a malfunction.

- High pressure readings outside the green band indicate a malfunction. See Malfunction Index, Section III.

Radar Pressurization Unit Configuration

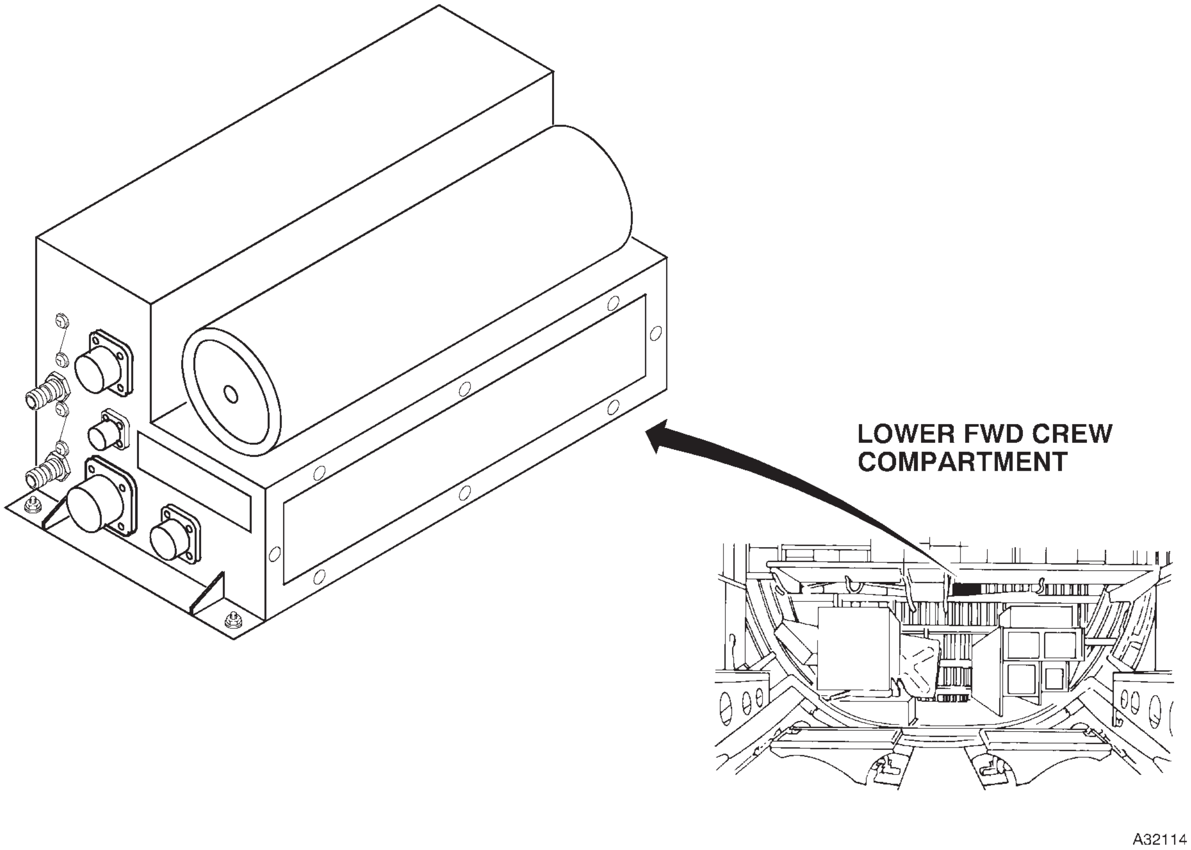
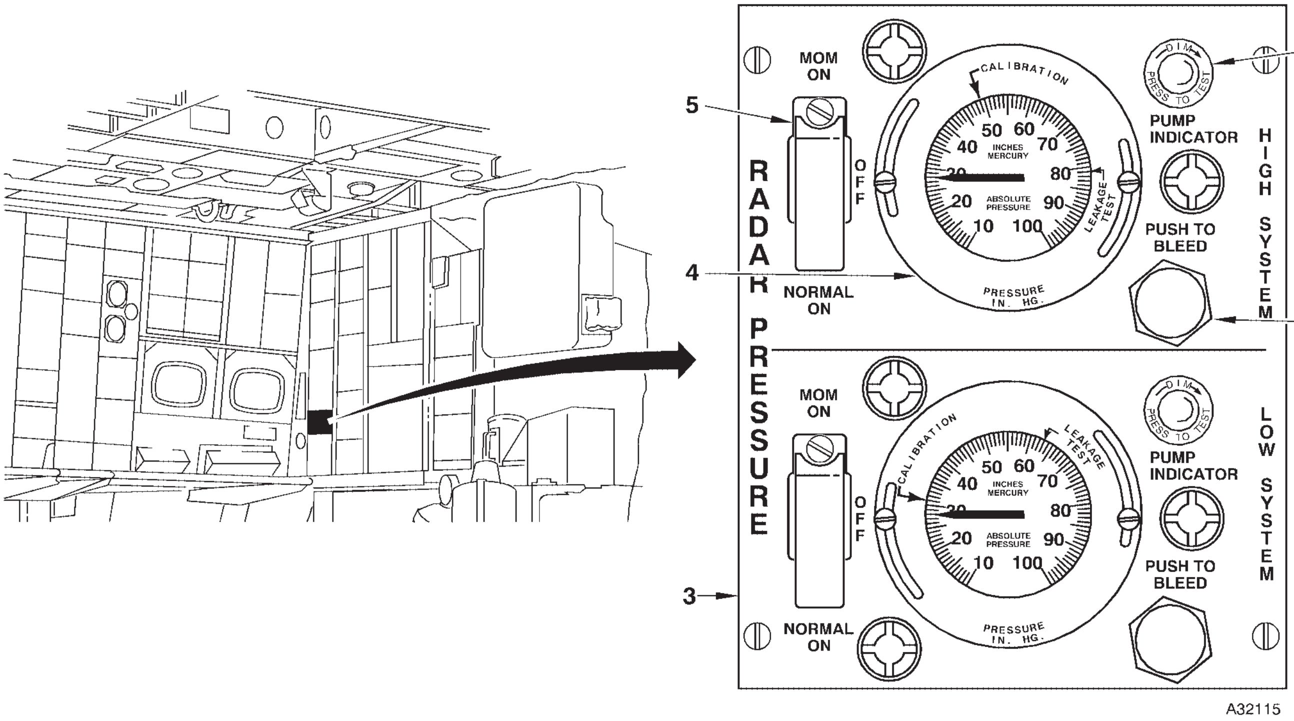


Figure 1-70

Radar Pressurization Controls and Indicators

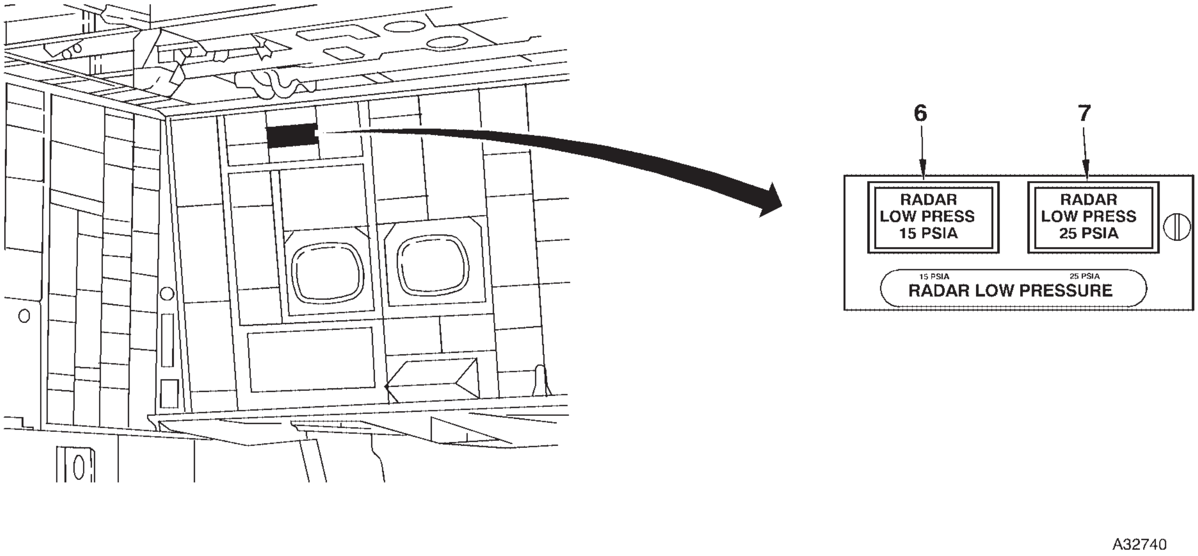


A RADAR PRESSURE CONTROL PANEL

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR PRESSURE CONTROL PANEL	
1	PUMP INDICATOR Light	A green press-to-test light will come on when the system is receiving pressurization from the pump.
2	PUSH TO BLEED Switch	Bleeds pressure from the system.
3	LOW SYSTEM	SYSTEM IS DEACTIVATED
4	Pressure Gage	Displays system pressure in inches of mercury.
5	Pressure Pump Control Switch	The switch is spring-loaded from MOM ON to OFF position and guarded to NORMAL ON. NORMAL ON – Provides automatic control of high pressure system. MOM ON – Momentary position, which when held, provides continuous operation of the pressure pump and system pressure will build as long as the switch is held. OFF – In OFF, the pump will not operate.

Figure 1-71 (Sheet 1 of 2)

Radar Pressurization Controls and Indicators (Cont)



B RADAR LOW PRESSURE LIGHTS

NO.	CONTROL-INDICATOR	FUNCTION
	B RADAR LOW PRESSURE LIGHTS	
6	RADAR LOW 15 PSIA PRESSURE Light	The RADAR LOW PRESSURE 15 PSIA light is de-activated.
7	RADAR LOW 25 PSIA PRESSURE Light	An amber press-to-test light comes on when the radar pressure system is low. The RADAR LOW 25 PSIA light will come on when the system pressure is below 18 PSIA.

Figure 1-71 (Sheet 2 of 2)

Air Combat Maneuvering Instrumentation (ACMI) System

DESCRIPTION

Air Combat Maneuvering Instrumentation (ACMI) systems are used on some training and test ranges to provide measurement and observation of participating aircraft on graphical display systems at ground range control and training facilities. ACMI systems enable real-time control and monitoring of air missions as well as post-mission reconstruction and debriefings. ACMI systems include four subsystems: the tracking instrumentation system (TIS), the aircraft instrumentation system (AIS), the control and computation subsystem (CCS), and the display and debriefing system (DDS). The AIS pod is the airborne subsystem of ACMI. Refer to T.O. 1-1M-34 for additional information about ACMI systems.

NOTE

> For the purposes of this manual, ACMI is used to describe any range instrumentation system including those which may have range- or contractor-specific names.

AIRCRAFT INSTRUMENTATION SYSTEM (AIS) POD

The AIS pod (figure 1-72) enables high fidelity tracking and flight data recording for mission monitoring, reconstruction, and debriefing when B-52s are operated on specially-instrumented training and test ranges. The pod is typically constructed from an AIM-9 Sidewinder missile body shell, usually with a needle-like air data sensor at the forward end. Major components of the pod include the air data sensor and an inertial reference unit to measure flight parameters, a digital interface unit, a transponder, and a digital data link receiver and transmitter. Some pod types feature a self-contained GPS unit.

The AIS pod automatically data links selected flight parameter information such as heading, altitude, airspeed, pitch, and bank to the TIS where it is processed, recorded, and displayed on range control displays and mission debriefing systems. Each pod's data signal contains a unique identifier allowing all pod-equipped aircraft to be individually labeled and displayed on range control and debriefing system video screens.

Except for an electrical power source, AIS pods are completely self-contained and do not interface with any aircraft avionics. The pods draw both 115 volt ac and 28 volt dc power from the aircraft. Refer to T.O. 1-1M-34 for details about current AIS pod variants in use at various ACMI range complexes, and for more information on how AIS pods interface with the ground-based subsystems of ACMI systems.

The AIS pod is pylon-mounted under either wing at the 559 station hard point, which is located approximately half way between the inboard and outboard engine struts (figure 1-72). The pod is mated to an LAU-105 launcher, which is in turn attached to adapter assemblies on the bottom of an ALE-25 pylon fitted to the airplane at wing station 559.

ALE-25 PYLON

The ALE-25 pylon (figure 1-72) is attached to the left or right wing at the 559 station by installation of an aft mounting bracket on the underside of the wing and two bolts at the forward end of the pylon. Forward and aft launcher adapter assemblies on the bottom of the ALE-25 pylon are used to attach a LAU-105 launcher. An electrical cable routed through the pylon connects to a receptacle in the wing and to the electrical cable in the LAU-105 launcher.

LAU-105 LAUNCHER

The LAU-105 launcher (figure 1-72) provides the mechanical and electrical interface between the ALE-25 pylon and the AIS pod.

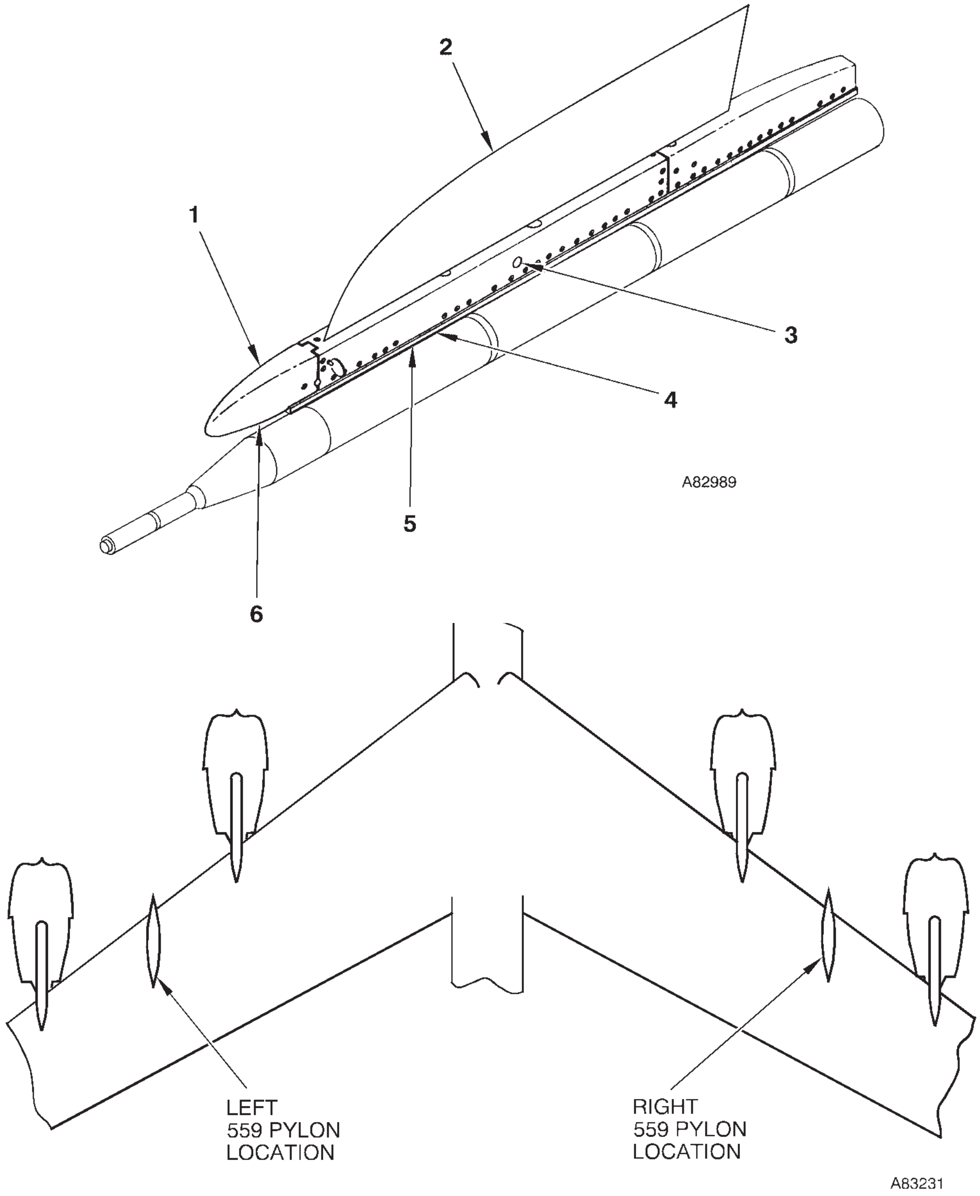
CONTROLS AND INDICATORS

Pushbuttons on the navigator's PKB (figure 1-73) control power to the AIS pod. With battery and interphone on and GPS IU power on, pressing the applicable pushbutton applies aircraft power to the pod and changes the pushbutton legend from OFF to ON. The STA 559 dc circuit breaker on the right forward BNS circuit breaker panel supplies 28 volt dc power to the pod.

NORMAL OPERATION

Aircrew operation of the AIS pod consists of a visual preflight inspection of the pylon and pod, turning power on and off at the appropriate times during the mission, and reporting aircraft, mission, and pod information to the applicable range control agency as briefed or when requested.

AIS Pod

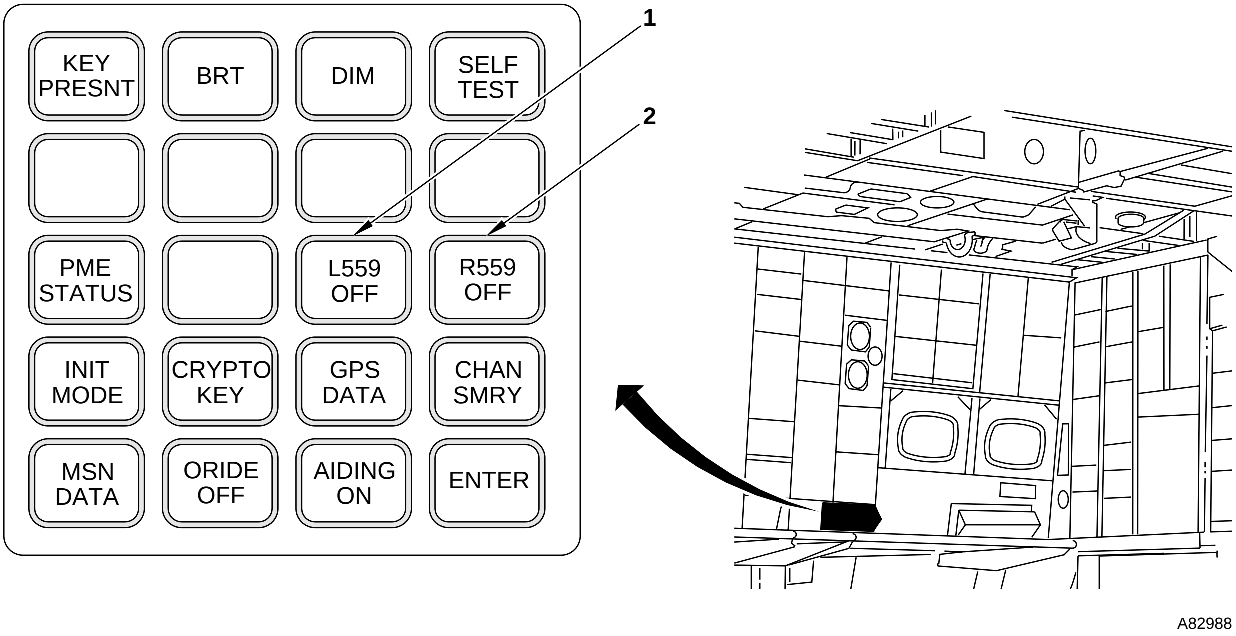


1 LAUNCHER NOSE COVER
2 559 PYLON
3 DETENT PIN
4 SNUBBER ASSEMBLY (2 PLACES)
5 POD HANGER (2 PLACES)
6 UMBILICAL CABLE

Figure 1-72

AIS Pod Controls and Indicators

PROGRAMMABLE KEYBOARD A

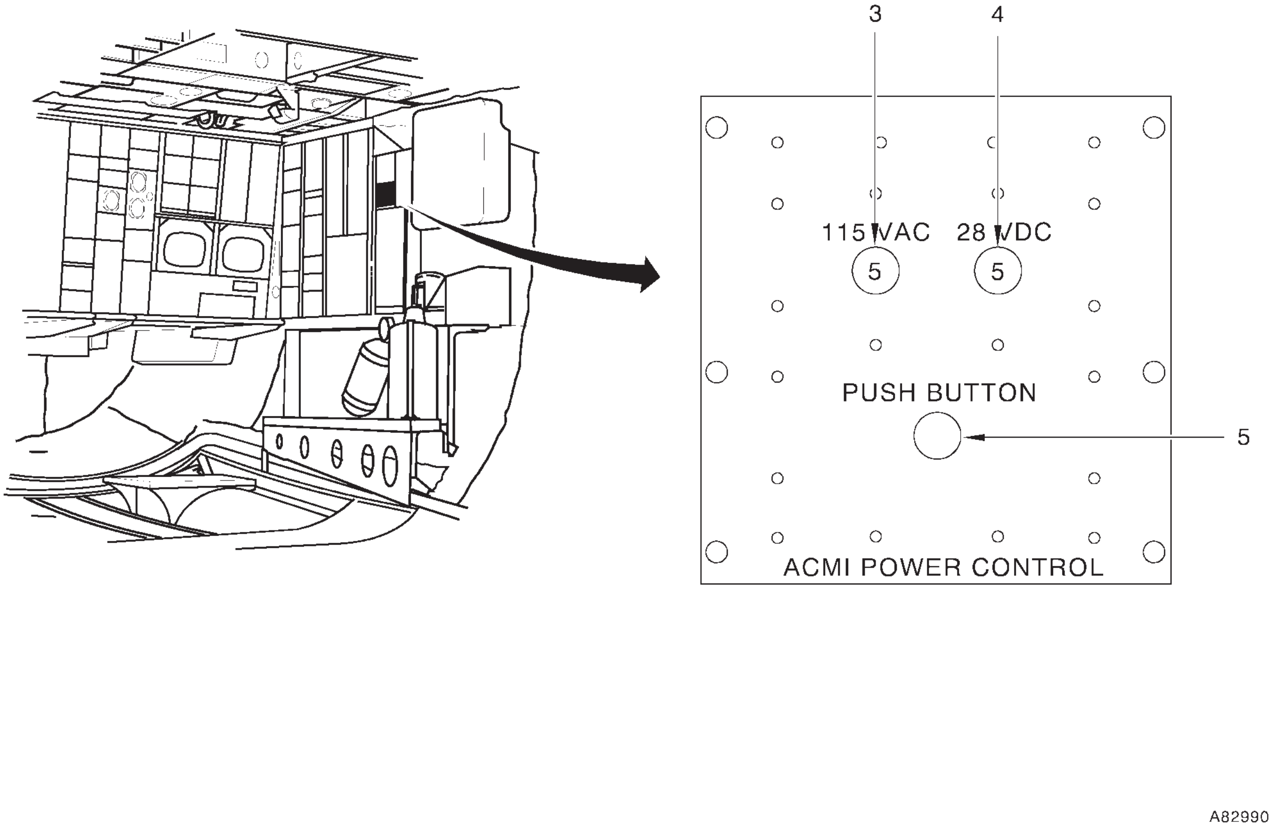


NO.	CONTROL-INDICATOR	FUNCTION
		A PROGRAMMABLE KEYBOARD
1	L559 OFF	L559 power is OFF. Underlined when L559 power application is inhibited.
	L559 ON	L559 power is ON.
2	R559 OFF	R559 power is OFF. Underlined when R559 power application is inhibited.
	R559 ON	R559 power is ON.

Figure 1-73 (Sheet 1 of 2)

AIS Pod Controls and Indicators (Cont)

ACMI POWER CONTROL PANEL B



NO.	CONTROL-INDICATOR	FUNCTION
		B ACMI POWER CONTROL PANEL
3	115 VAC Circuit Breaker	Provides 115 volt ac power to the AIS pod.
4	28 VDC Circuit Breaker	Provides 28 volt dc power to the AIS pod.
5	PUSH BUTTON	Two-position ON/OFF pushbutton switch. When pressed to the ON position, 28 volt dc and 115 volt ac power is applied to the AIS pod and the switch lights.

Figure 1-73 (Sheet 2 of 2)

RENDEZVOUS RADAR AN/APN-69

DESCRIPTION

The APN-69 radar is used for in flight rendezvous. The set includes a receiver, transmitter, and a control panel which is located at the navigator's station. The beacon provides range and bearing information for an interrogating aircraft, using the radar-beacon mode of his radar, to "home" on the beacon signal. Transmissions are coded to permit positive identification between aircraft. The set operates on TR power and 118-volt single-phase ac power. A pressurization kit provides pressurization for the system waveguide. The controls for operating the pressurization kit are located at the navigator's station.

AN/APN-69 PRESSURIZATION PANEL

The APN-69 pressurization panel (see figure 1-74), located at the navigator's station, contains an amber low pressure warning light and a two-position pressurization switch. The pressurization kit is provided with a relief valve that allows the exterior and interior pressures of the APN-69 waveguide to equalize during descent from altitude.

AN/APN-69 CONTROL PANEL

The APN-69 rendezvous radar control panel is shown in figure 1-74.

NORMAL OPERATION

The following procedure is used to place the rendezvous radar in operation.

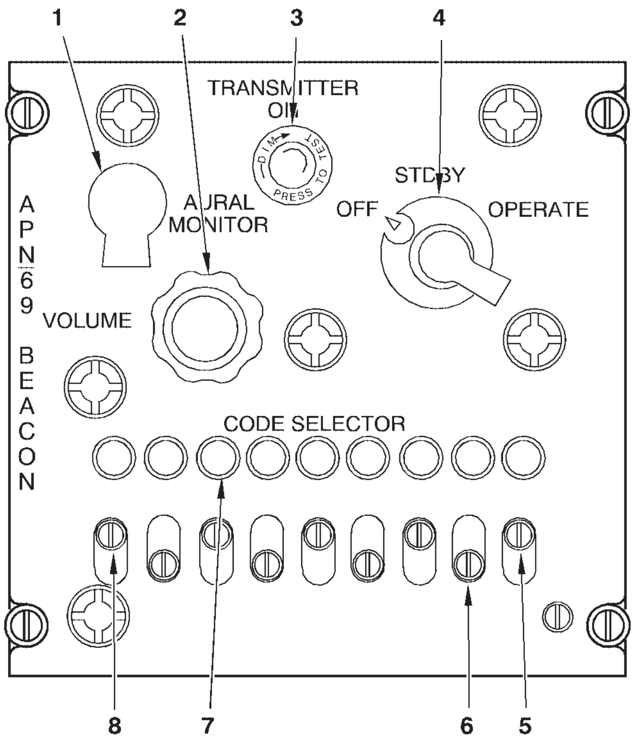
1. Place the power switch to STDBY.
2. Place pressurization switch to COMPRESSOR ON.
3. Allow approximately 3 minutes for warmup and place power switch to OPERATE. After the warmup period, the transmitter-on light will come on indicating that the set is ready for automatic operation and will reply to interrogating pulses of the proper characteristics.
4. Select code. As an example of a 3-2 code, the first (which is stationary and common to all code combinations), second, third, fifth, and sixth code selector switches would be in the up (on) position; all other code selector switches would be in the down (off) position. This would be a five-element code. Do not insert more than six code elements, including the stationary element, at one time.
5. The operation of the rendezvous radar may be monitored over the interphone by pulling the appropriate interphone mixer switch to the on position.
6. If it is desired to discontinue operation temporarily, place the power switch to STDBY. In this manner, the equipment is kept ready for immediate use.

CAUTION

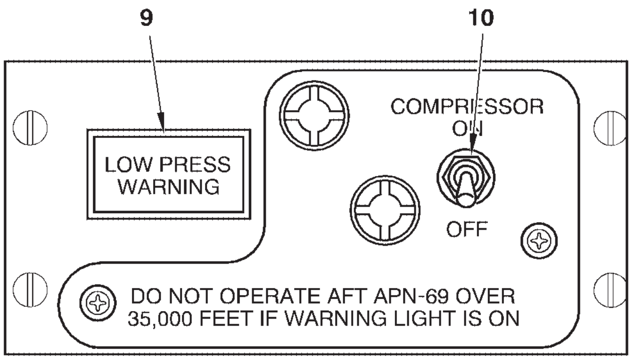
> Place power switch to STDBY, if the low pressure warning light illuminates, if above 35,000 feet pressure altitude. This will prevent damage to receiver-transmitter set.

7. To deenergize the equipment, place power switch to OFF and pressurization switch to OFF.

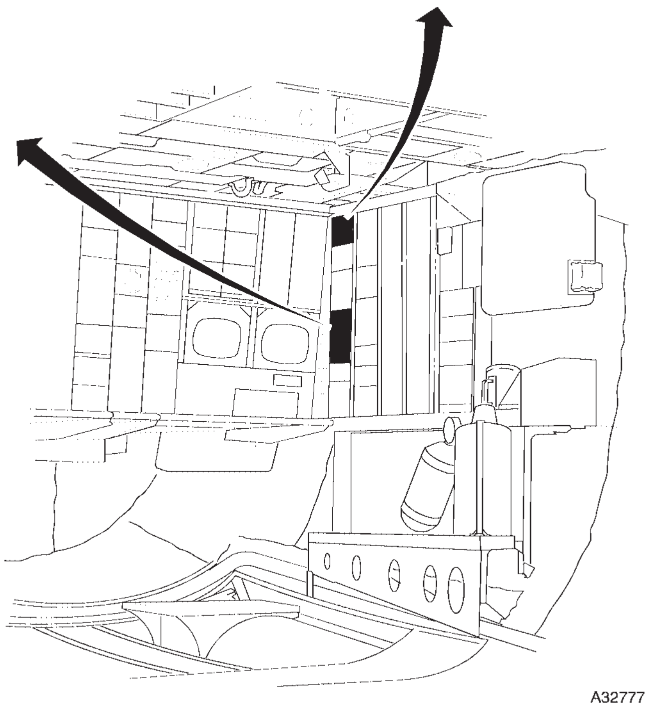
Rendezvous Radar Control Panels



A APN-69 CONTROL PANEL



B APN-69 PRESSURIZATION PANEL



1 MONITOR JACK
2 VOLUME KNOB
3 TRANSMITTER ON INDICATOR LIGHT
4 POWER SWITCH
5 CODE 9 SELECTOR SWITCH
6 CODE SELECTOR SWITCH (7 PLACES)
7 CODE SELECTOR INDICATOR LIGHTS (9 PLACES)
8 COMMON CODE SELECTOR SWITCH
9 LOW PRESSURE WARNING LIGHT
10 COMPRESSOR ON/OFF SWITCH

Figure 1-74 (Sheet 1 of 2)

NO.	CONTROL-INDICATOR	FUNCTION
A APN-69 CONTROL PANEL		
1	Monitor Jack	The monitor jack is used for test purposes. When a headset is connected to the jack, random noises (or periodic triggering of the system) may be heard and is indicative of set operation.
2	Volume Knob	The volume knob is used to adjust the audio signal level when monitoring the set over the interphone.
3	Transmitter On Indicator Light (green)	The green transmitter on indicator light illuminates when high voltage has been applied to the transmitter and indicates that the set is ready for operation.
4	Power Switch	A rotary-type power switch has OFF- - STDBY- -OPERATE positions. STDBY position supplies power to all system circuits except the high voltage circuits. OPERATE position completely energizes the system provided a 3-minute warmup period is observed after turning to STDBY. OFF position removes all power from the set.
5	Code 9 Selector Switch	The code 9 selector switch when set to ON causes the transmission of a special response when the OAS system is in operation.
6	Code Selector Switch (7 Places)	Seven code selector slide switches are used to set up the code combinations in the response transmission. The code element corresponding to an individual switch can be included in the reply by pulling out on the spring-loaded knob and sliding the switch to ON (up) position.
7	CODE SELECTOR Indicator Lights (9 Places)	Nine indicator lights indicate when the respective code element is included in the radar response.
8	Common CODE SELECTOR Switch	The common code selector switch corresponding to the first code element is stationary. This code element is common to all code combinations.
B APN-69 PRESSURIZATION PANEL		
9	LOW PRESS WARNING Light (amber)	The amber low pressure warning light will illuminate if the pressure is allowed to decrease to 6.17 inches Hg (41,500 feet pressure altitude) and will remain illuminated until the pressure is returned to 8.35 inches Hg (35,000 feet pressure altitude). The illuminated low pressure warning light indicates damage to the rendezvous radar set may occur if it is operated, **CAUTION** If the warning light remains illuminated for a period of more than 15 minutes, the APN-69 pressurization switch should be placed to OFF position as the motor and pressurization pump are designed to operate not more than 15 minutes each hour.
10	COMPRESSOR ON/OFF Switch	The two-position pressurization switch with COMPRESSOR ON- -OFF positions controls a pressurization kit used to pressurize the APN-69 rendezvous radar waveguides. In normal operation, the pressurization kit holds the pressure between 7.2 and 8.88 inches Hg (38,000 and 33,000 feet pressure altitude).

Figure 1-74 (Sheet 2 of 2)

Systems Description and Operation section IA

Less [AMI]

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table of contents **page**

THE AIRCRAFT

DESCRIPTION

The Boeing B-52 "Stratofortress" aircraft is of the land based heavy bombardment class designed for long range flight at high speed and altitude. The tactical mission is the destruction of surface objectives by bombs and missiles. The aircraft has provisions for ten crewmembers: a basic crew of five, three instructors and two additional crewmembers. The basic crew consists of pilot, copilot, radar navigator, navigator and electronic warfare officer. The instructor crew includes an instructor pilot, instructor navigator and instructor electronic warfare officer. Finally, the gunner and tenth man positions are also available for additional seating. A highly variable weapons load may be carried on external pylons in combination with internal cluster rack or CSRL mounted weapons loads. Up to 12 cruise missiles may be carried externally.

NOTE

> AGM-86C/D missiles will not be carried in mixed loads with AGM-86B or AGM-129.

The CSRL can carry up to eight AGM-86B/86C/86D, B-61, or B-83 weapons internally. These weapon loads cannot be mixed on the CSRL.

The aircraft can suspend a variety of gravity weapons internally on cluster rack assemblies (three cluster rack assemblies, up to 27 weapons total). Externally, the B-52 can suspend weapons using an AGM-28 pylon under each wing with standard rack adapter beams attached to each pylon and two sets of multiple ejector racks (MER) giving a total external carriage capability of 24 weapons. The heavy stores adapter beam (HSAB) can be attached to a stub pylon and up to nine MAU-12 bomb racks can be attached to each HSAB for a total external carriage capability on the HSAB of up to 18 weapons.

SPECIAL FEATURES

The aircraft is characterized by swept wings and empennage, four underslung nacelles housing eight turbofan engines, a quadricycle main landing gear, and a tip gear near each outboard engine nacelle. Engine bleed air provides the air supply for air conditioning and anti-icing. Cartridge starters are installed to provide for engine starts without assistance from an auxiliary air cart or auxiliary electrical power cart. Primary electrical power is 205-volt ac and is provided by four engine-driven generators. Hydraulic pressure is supplied by six engine-driven hydraulic pumps and two electric motor-driven hydraulic pumps. Primary pitch and yaw control is maintained by hydraulically actuated rudder and elevators. Lateral control is maintained by operation of hydraulically actuated spoilers. By varying the method of control, these same spoilers serve as airbrakes. The entire horizontal stabilizer is moved by a hydraulic mechanism to provide pitch trim. A steering and crosswind crab system provides steering of the forward main landing gear and also properly positions both forward and rear main landing gear for crosswind landings. A hydraulically driven revolver-type launcher installation in the bomb bay provides umbilical and ejector rack connections for the weapons which may be launched/released automatically or manually by the navigators. The weapon/missile equipment interfaces with the AN/ASQ-176 offensive avionics system, AN/APN-224 radar altimeter, and the aircraft electrical, bleed air, and body hydraulic systems. Weapon selective jettison capability is available to the navigator and radar navigator. Either the Weapons Control Panel (WCP) or backup MFD display and the keyboard may be used for computer controlled safe jettison of individual or multiple weapons. The pilot is provided with an ejector unlock consent switch and a prearm consent switch (cooperative with the WCP on the navigators' front panel), a launcher hydraulic system selector switch, and a bomb bay and missile jettison control which will jettison all weapons from the aircraft. The pilot is also provided with pylon jettison switches and pylon jettison consent switches. The Radar Navigator is provided with a bomb bay and missile jettison switch, which will jettison only conventional gravity weapons. This switch is inoperative for all CSRL gravity weapons and all nuclear and conventional missiles.

For additional information on the weapons installed, refer to the applicable weapons delivery manual for the MIU and WIU supported weapons shown on the Complimentary Manuals list in the front pages of this manual.

An electro-optical viewing system (EVS) is installed to provide pilots and navigators with a visual presentation of the area ahead of the aircraft during both day and night missions.

A GPS Navigation System provides position updates and emulated TACAN data to the crew and a moving map display to the pilots.

An Air Force Satellite Communications System (AFSATCOM) terminal is installed and is a half-duplex UHF terminal providing communications in both line-of-sight (LOS) and satellite modes. **DL** A dual modem capability has been added to the AFSATCOM. The Airborne Miniature Receive Terminal (MRT) AN/ARR-85(V) is installed to provide reliable VLF/LF reception and printout of secure and nonsecure messages at extended ranges in nuclear and/or jamming environments.

DIMENSIONS

Wing Span	185 feet
Fuselage Length	159 feet 4 inches
Height	
To top of fin	40 feet 8 inches
Fin folded	21 feet 6 inches
Tread	
Centerline outboard main tires	11 feet 4 inches
Centerline tip gear to tip gear	148 feet 5 inches

NAVIGATORS' SYSTEMS

The following B-52H navigators' systems are covered in this manual:

- OFFENSIVE AVIONICS SYSTEM
- RENDEZVOUS RADAR AN/APN-69
- NONNUCLEAR WEAPON CONTROL SYSTEM
- NONNUCLEAR WEAPON SUSPENSION SYSTEM
- NONNUCLEAR WEAPON CARRIAGE AND RELEASE SYSTEM

The following B-52H aircraft systems which may be applicable to the radar navigator/navigator are contained in T.O. 1B-52H-1.

- DOORS AND WINDOWS
- OXYGEN SYSTEM
- EMERGENCY EQUIPMENT
- ESCAPE SYSTEMS
- ELECTRICAL POWER SYSTEMS
- LIGHTING EQUIPMENT
- BOMB DOOR SYSTEM
- PNEUMATIC SYSTEMS (Air Conditioning and Pressurization)
- INSTRUMENTS
- NAVIGATION RADIOS
- COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT
- ELECTRO-OPTICAL VIEWING SYSTEM (EVS) (AN/ASQ-151)
- MISCELLANEOUS EQUIPMENT

EQUIPMENT CIRCUIT PROTECTION AND LOCATION DIAGRAMS

For locations of circuit breakers accessible in flight and additional circuit protection, refer to the applicable subsection of Section I of T.O. 1B-52H-1. Navigation and weapon delivery system circuit breakers and their locations are also located in this manual in Section III.

AIRCREW EMERGENCY PROCEDURES

Section III of T.O. 1B-52H-1 contains the aircrew emergency procedures for all crewmembers.

ABNORMAL OPERATION AND MALFUNCTION ANALYSIS

For abnormal operation and malfunction analysis of B-52H navigators' systems see Section III.

AUTHORIZED WEAPONS

Only those weapons listed in T.O. 1B-52H-1 are authorized for carriage and delivery in the configuration and quantity shown. Additional information on nuclear gravity weapons is contained in T.O. series 1B-52H-25. Additional information on nonnuclear gravity weapons is contained in T.O. 1B-52H-34-2-1. Information on missiles can be found in the applicable missile aircrew weapon delivery manual (-30 series for nuclear armed missiles or -34 series for missiles with nonnuclear warheads.)

RADAR NAVIGATOR'S/NAVIGATOR'S STATION

Figures 1A-1, 1A-2, and 1A-3 illustrate the layout of a typical radar navigators and navigators station.

Radar Navigators' Station (Typical)

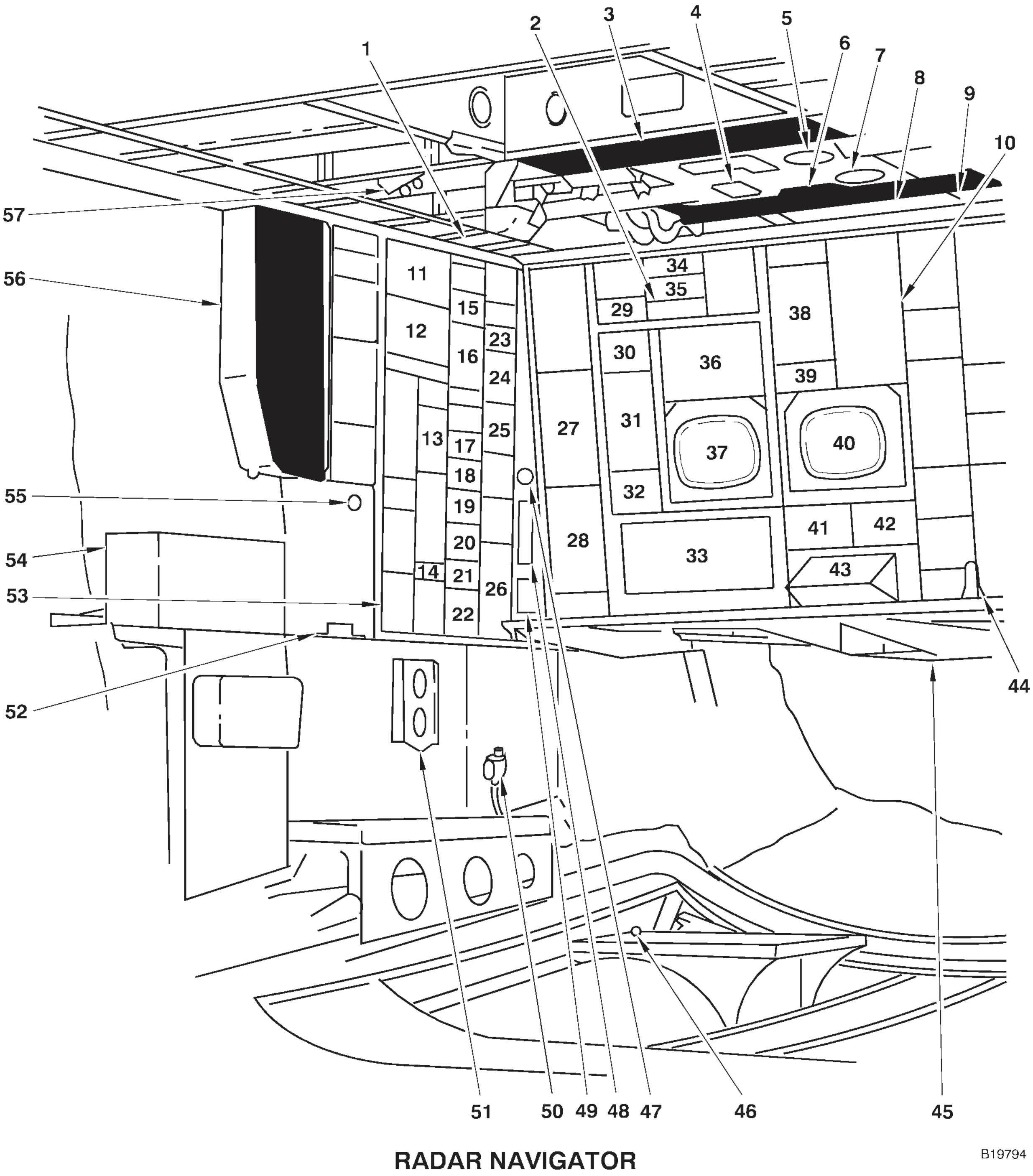


Figure 1A-1 (Sheet 1 of 2)

1 EVS OPTICAL LIGHT FILTER STOWAGE
2 AIRFLOW LIGHTS
3 AFT BNS CIRCUIT BREAKER PANEL
4 RELEASE CIRCUITS DISCONNECT
5 REAR SPECIAL WEAPON MANUAL RELEASE HANDLE
6 LEFT FORWARD BNS CIRCUIT BREAKER PANEL
7 FORWARD SPECIAL WEAPON MANUAL RELEASE HANDLE
8 RIGHT FORWARD BNS CIRCUIT BREAKER PANEL
9 BNS LIGHT CONTROL PANEL
10 DCU-238/A AMAC CONTROLLER
11 BOMB INDICATOR LIGHTS
12 DIGITAL BOMB RELEASE INTERVAL CONTROL
13 SPECIAL WEAPONS LOCK INDICATOR PANEL
14 EA PILOT'S EVS MONITOR INPUT SWITCH
15 BNS EXTERNAL POWER PANEL
16 MASTER BOMB CONTROL PANEL
17 BOMB BAY JETTISON CONTROL PANEL
18 ALQ-117 TO BNS BLANKING SWITCH
19 CODED SWITCH SET CONTROL PANEL
20 OXYGEN REGULATOR
21 AUX MIXER SWITCH PANEL
22 INTERPHONE CONTROL PANEL
23 EVS ENVIRONMENTAL CONTROL
24 SPECIAL WEAPONS INDICATOR
25 SPECIAL WEAPONS CONTROL PANEL
26 CONVENTIONAL WEAPON PANEL
27 BLANK
28 RADAR CONTROL TEST PANEL
29 BOMB DOOR CONTROL VALVE CHECK PANEL
30 INDICATOR LIGHT DIMMER
31 *[TP]* ADVANCED GUIDED WEAPON CONTROL PANEL or
Less [TP] BLANK
32 RADAR PRESENTATION PANEL
33 RADAR NAVIGATOR MANAGEMENT PANEL
34 RADOME RAM AIR FLOW LOW AND CABIN AIR FLOW LOW LIGHTS
35 RADAR LOW PRESSURE LIGHTS
36 *[TP]* VIDEO MONITOR or
Less [TP] STOWAGE
37 LEFT MULTIFUNCTION DISPLAY
38 AVTR REMOTE CONTROL UNIT
39 TEMPERATURE CONTROL SELECTOR
40 RIGHT MULTIFUNCTION DISPLAY
41 EVS VIDEO SELECT PANEL
42 EVS STEERING CONTROL PANEL
43 KEYBOARD
44 *[TP]* INTEGRATED TRACK HANDLE
45 BNS DESICCATOR
46 INTERPHONE MIKE FOOT SWITCH
47 ASHTRAY
48 AIR OUTLET KNOBS
49 TIME DELAY BYPASS AND BOMB TONE SCORING PANEL
50 D-2 BOMB RELEASE SWITCH
51 BOMB INDICATOR CARDS HOLDER
52 AERP BLOW MOUNTING BRACKET
53 BLANK
54 DATA BUS
55 AERP ELECTRICAL CONNECTOR
56 AUXILIARY BNS CIRCUIT BREAKER PANEL
57 OXYGEN HOSE RETAINER STRAP

Figure 1A-1 (Sheet 2 of 2)

Navigators' Station (Typical)

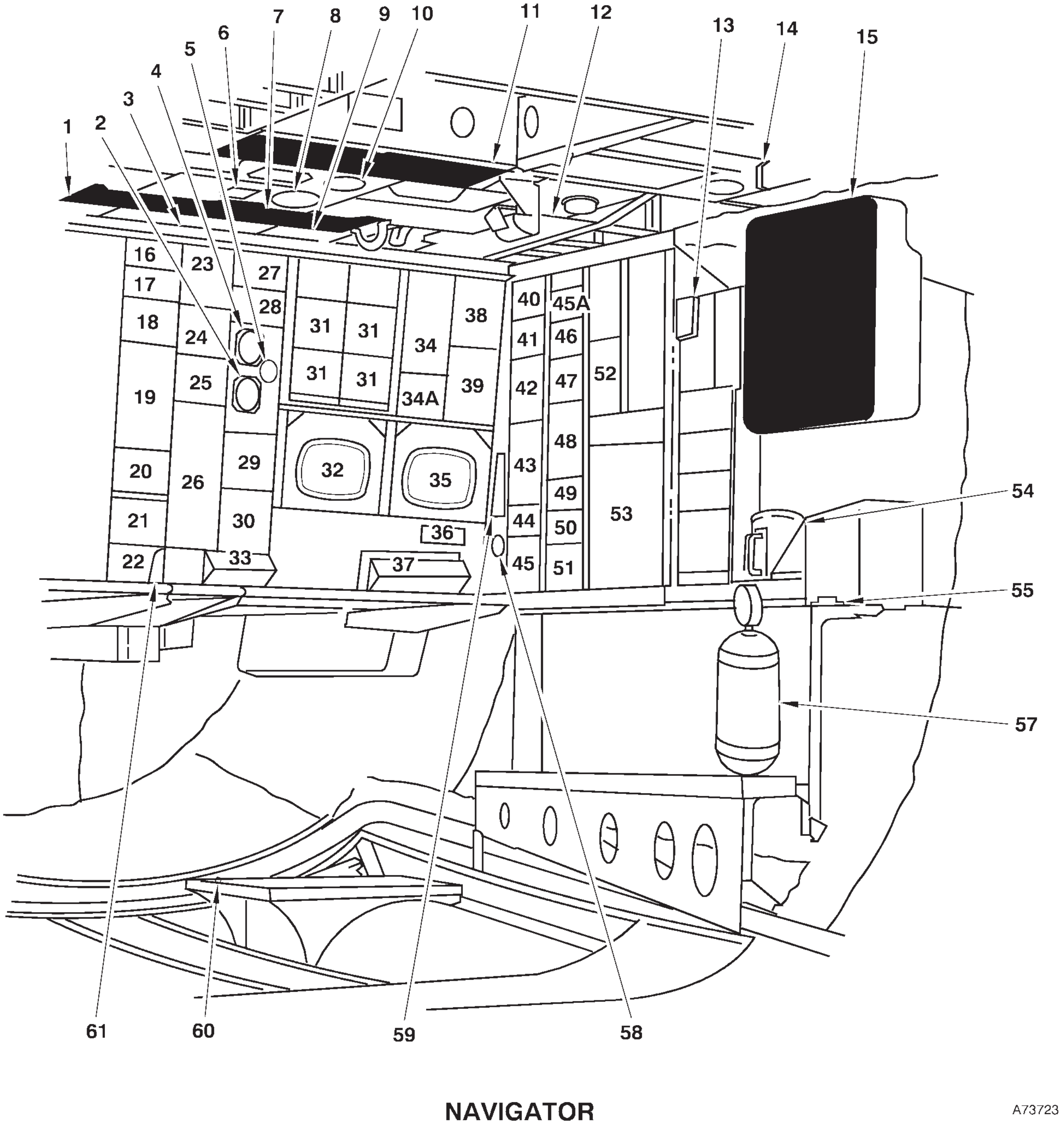
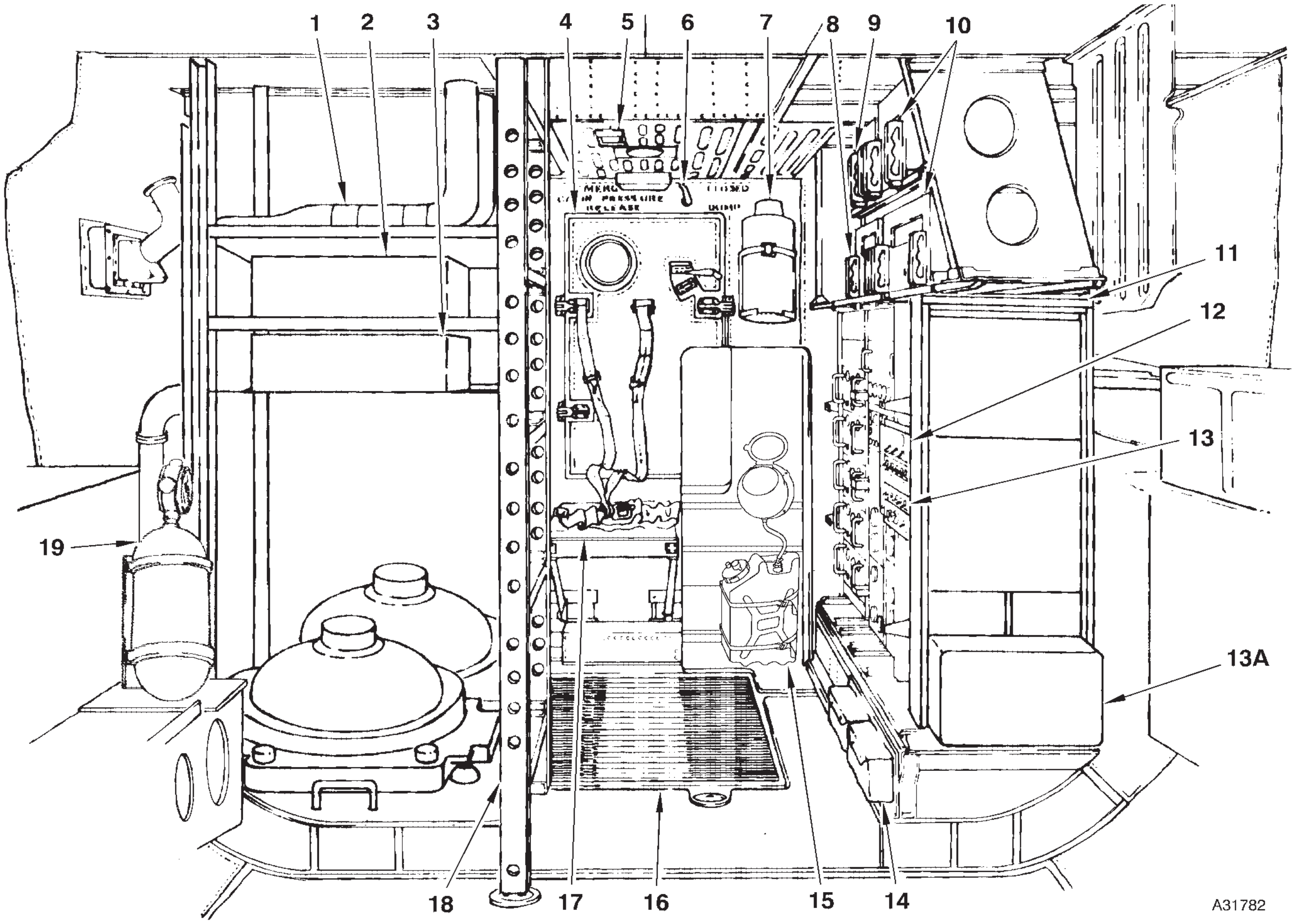


Figure 1A-2 (Sheet 1 of 2)

1 LEFT FORWARD BNS CIRCUIT BREAKER PANEL
2 BAROMETRIC ALTIMETER
3 BNS LIGHT CONTROL
4 TRUE AIRSPEED INDICATOR
5 OUTSIDE AIR TEMPERATURE GAGE
6 RELEASE CIRCUITS DISCONNECT
7 RIGHT FORWARD BNS CIRCUIT BREAKER PANEL
8 FORWARD SPECIAL WEAPON MANUAL RELEASE HANDLE
9 SPARE LAMPS CONTAINER
10 REAR SPECIAL WEAPON MANUAL RELEASE HANDLE
11 AFT BNS CIRCUIT BREAKER PANEL
12 EVS OPTICAL LIGHT FILTER STOWAGE
13 PDUC POWER SWITCH AND CIRCUIT BREAKER
14 OXYGEN HOSE RETAINER STRAP
15 EVS CIRCUIT BREAKER PANEL
16 EMERGENCY ALARM LIGHT AND BNS STEERING PANEL
17 FLIR CONTROL PANEL
18 BLANK
19 COMPUTER CONTROL PANEL
20 STV CONTROL PANEL
21 MRT PRINTER
22 MRT REMOTE CONTROL UNIT
23 DU KY-100 PROCESSOR
24 DOPPLER CONTROL – INDICATOR PANEL
25 OAS POWER CONTROL PANEL
26 WEAPON CONTROL PANEL
27 DU COMSEC MODE CONTROL PANEL
28 INDICATOR LIGHT DIMMER
29 RADAR PRESENTATION PANEL
30 INTERFACE UNIT CONTROL PANEL
31 DATA TRANSFER UNIT CARTRIDGE LOCATION
32 LEFT MULTIFUNCTION DISPLAY
33 PROGRAMMABLE KEYBOARD
34 *Less* DL STOWAGE
DL AFSATCOM CONTROL PANEL
34A DU DAMA REMOTE CONTROL UNIT
35 RIGHT MULTIFUNCTION DISPLAY
36 EVS VIDEO SELECT PANEL
37 KEYBOARD
38 *Less* DL AFSATCOM CONTROL PANEL
DL STOWAGE
39 AFSATCOM KEYBOARD
40 APN-69 PRESSURIZATION PANEL
41 BLANK
42 AFSATCOM PRINTER
43 RENDEZVOUS RADAR CONTROL PANEL
44 RADAR PRESSURE CONTROL PANEL
45 DJ LOS UHF (AN/ARC-171(V))
45A DOPPLER DRIFT CONTROL
46 DIGITAL DATA LOADER
47 VERTICAL CAMERA CONTROL PANEL (DEACTIVATED)
48 VERTICAL CAMERA INTERVALOMETER (DEACTIVATED)
49 OXYGEN REGULATOR
50 AUX MIXER SWITCH PANEL
51 INTERPHONE CONTROL PANEL
52 ALTERNATE JETTISON CONTROL PANEL
53 AVTR RECORDER
54 HOT CUP
55 AERP BLOWER MOUNTING BRACKET AND ELECTRICAL CONNECTOR
56 DELETED
57 PORTABLE OXYGEN BOTTLE
58 ASHTRAY
59 LIGHT DIMMER CONTROL PANEL
60 INTERPHONE MIC FOOT SWITCH
61 *[TP]* INTEGRATED TRACK HANDLE

Figure 1A-2 (Sheet 2 of 2)

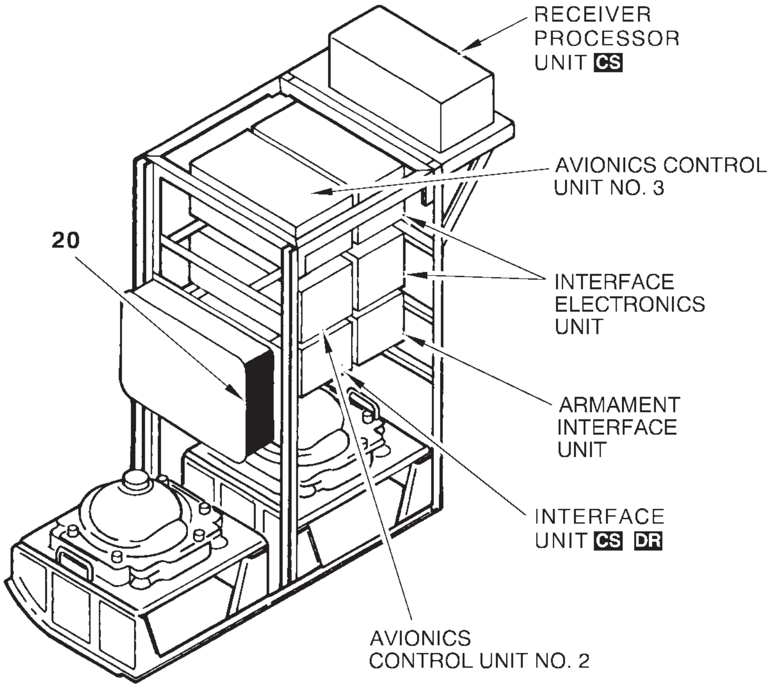
Navigators' Compartment-Aft



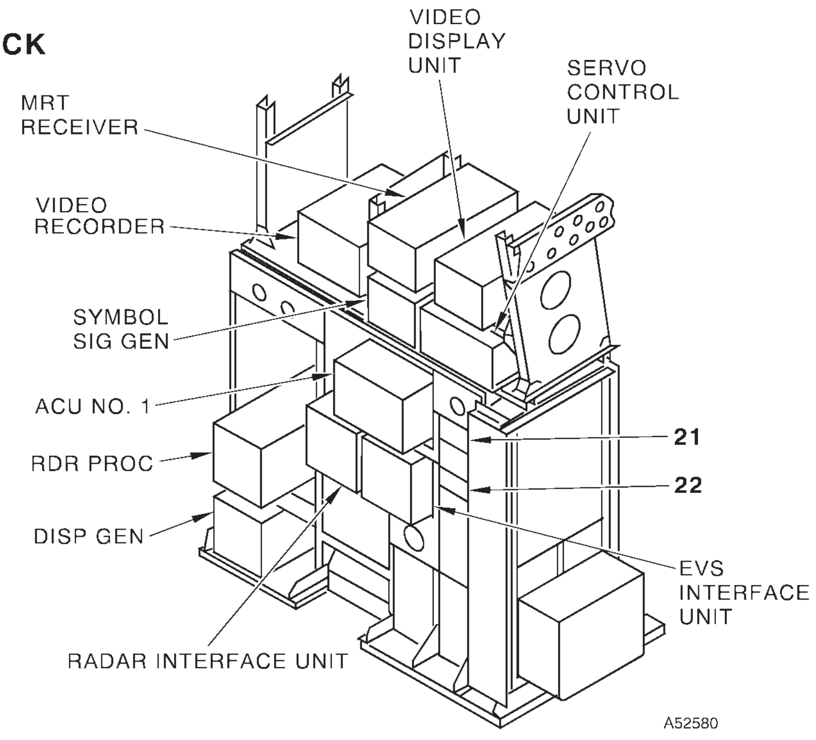
NAVIGATOR COMPARTMENT – AFT

1 RIGHT EQUIPMENT RACK
2 OAS INERTIAL ELECTRONICS UNIT (IEU) 1
3 OAS INERTIAL ELECTRONICS UNIT (IEU) 2
4 PRESSURE BULKHEAD DOOR
5 SERVICE DOMELIGHT
6 EMERGENCY CABIN PRESSURE RELEASE HANDLE
7 DRINKING WATER CONTAINER
8 VIDEO RECORDER
9 MRT RECEIVER
10 EVS COMPONENTS
11 LEFT EQUIPMENT RACK
12 OXYGEN REGULATOR (INSTRUCTOR NAVIGATOR'S)
13 INSTRUCTOR NAVIGATOR'S INTERPHONE CONTROL PANEL
13A A 9000 S/V BOX
14 LANDING GEAR GROUND LOCK STOWAGE CONTAINERS
15 URINAL
16 LOWER DECK FOLDING HATCH
17 INSTRUCTOR NAVIGATOR'S TAKEOFF AND LANDING STATION
18 LADDER
19 PORTABLE OXYGEN BOTTLE

Figure 1A-3 (Sheet 1 of 2)



RIGHT EQUIPMENT RACK



LEFT EQUIPMENT RACK

20 **RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL**

21 **IN'S OXYGEN PANEL**

22 **IN'S INTERPHONE PANEL**

Figure 1A-3 (Sheet 2 of 2)

OFFENSIVE AVIONICS SYSTEM (OAS) (AN/ASQ-176)

OAS Configuration

AN/ASQ-176 OFFENSIVE AVIONICS SYSTEM

The AN/ASQ-176 Offensive Avionics System (OAS) is a computer controlled electronics system providing nearly automatic navigation and weapon delivery. The system is composed of the following equipment (the section of this manual giving coverage is in parentheses following the equipment title):

- Digital Data Set AN/AYK-17
- Control-Display Set AN/ASQ-175
- Ballistics Computer Set AN/AYQ-10
- Inertial Navigation Set AN/ASN-136
- Electronic Altimeter Set AN/APN-224 (Called Radar Altimeter in this manual)
- Attitude Heading Gyroscope Set AN/ASN-134 (Called Attitude Heading Reference Set in this manual)
- Radar Navigation Set AN/APN-218 (Called Doppler Radar in this manual)
- Radar Set Group OY-73/ASQ-176
- Control-Monitor Set AN/AWQ-3
- Video Recorder RO-523/ASQ-175
- ***[CS]*** Global Positioning System (GPS) AN/ARN-151(V)

NOTE

> The GPS is an integral part of the OAS only when conventional software is loaded. With nuclear software loaded, the GPS can be used as a stand-alone system.

The computers are controlled by a magnetic tape containing the Flight Computer Program (FCP) and Ground Maintenance Computer Program (GMCP). Only the OAS operation by means of the FCP is given in this manual. All serial data exchange between the various pieces of equipment is through digital data signals phased back and forth on the MIL-STD-1553 data bus. The system is designed to be highly automatic in order to cut operator workload and eliminate operator error. Three computers are provided to give partial redundancy. The system is loaded with the desired computer programs, mission and target data, and missile data before takeoff. The system can be aligned to a known position at takeoff and proceeds to fly to the programmed destinations and to programmed missile/weapon release points. The navigators monitor system progress and update the navigation information with checkpoint fixes when possible.

OAS SUBSYSTEMS

The OAS is broken down functionally into five subsystems; however, these subsystems are not physically identifiable in the aircraft. Figure 1A-4 shows a diagram of the five subsystems, their relationship to each other, and the basic equipment related to each. All of the equipment is tied to (interfaced with) the MIL-STD-1553 data bus. The subsystems are:

- Interface Subsystem
- Controls and Display Subsystem
- Computational Subsystem
- Navigational Subsystem
- Weapon Control and Display Subsystem

AN/ASQ-176 Subsystem Diagram

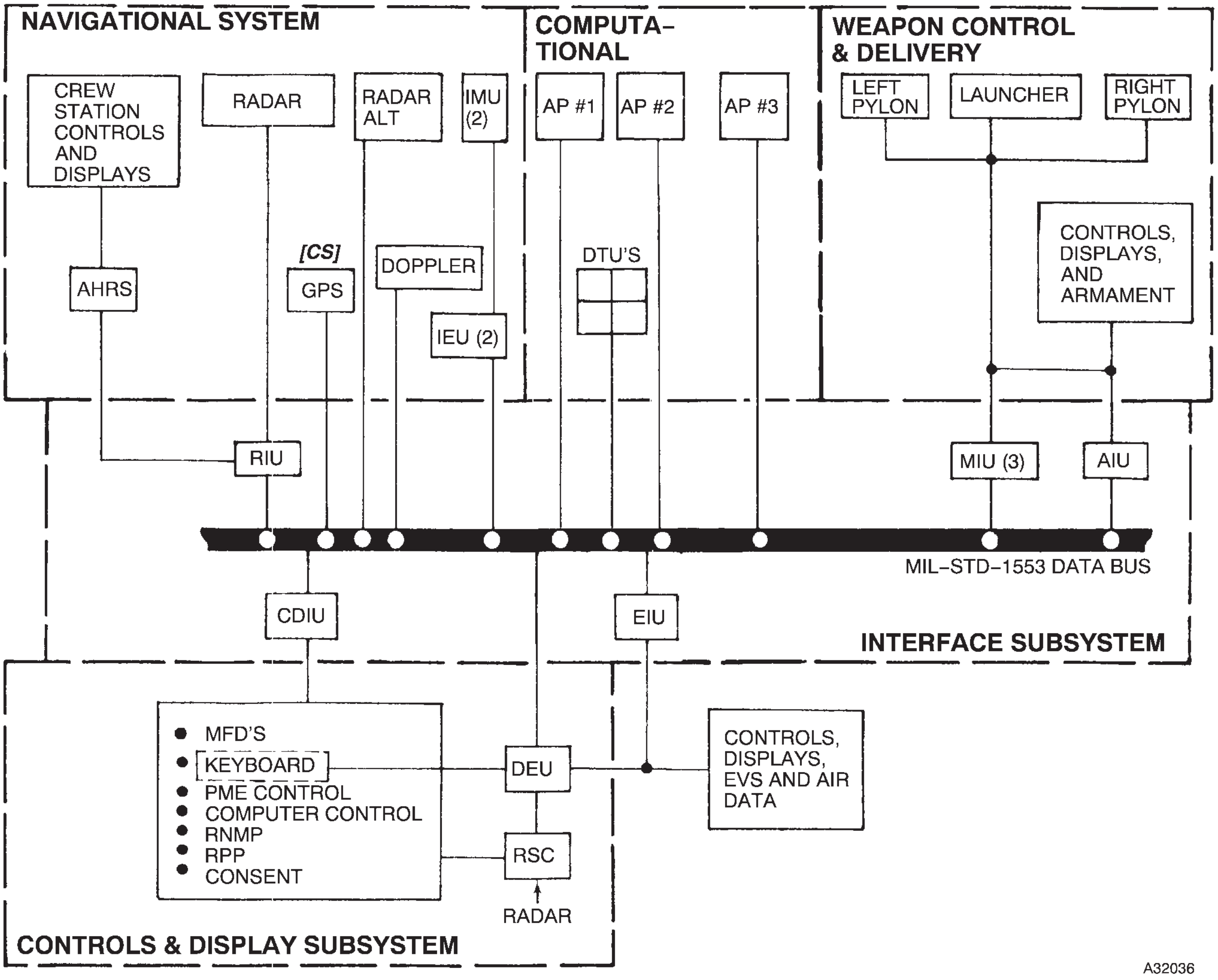


Figure 1A-4

Interface Subsystem

The interface subsystem, technically called the Digital Data Set AN/AYK-17, accomplishes the tieing together of the various equipment in the subsystems by means of the MIL-STD-1553 digital data bus. In order to provide signal compatibility and proper data format, interface units are required for certain equipment.

CONTROLS AND DISPLAY INTERFACE UNIT (CDIU)

This is a signal data converter for the following equipment:

- Radar Navigator Management Panel
- Pilot Jettison Panel
- Weapon Control Panel
- Computer Control Panel
- OAS Power Control Panel

EVS INTERFACE UNIT (EIU)

This is a signal data converter for the following functions and equipment:

- Control of EVS steering, symbols and NFOV
- Air data from pilot's pitot system and copilot's static system for computation of TAS and maintenance of OAS HA
- Pilot's Flight Command Indicator (FCI) instrument
- TTG and FCI on FRMT 3, pilot's EVS displays

RADAR INTERFACE UNIT (RIU)

This is a signal data converter for the following equipment:

- RNMP control of radar
- Autopilot
- Attitude Heading Reference System
- Bomb Release (GWD SMO)
- Radar Presentation Panels
- Bomb Door Control (GWD SMO)

MISSILE INTERFACE UNIT (MIU)

Missile interface units for the bomb bay and pylons are decoder-receivers for all the control and data functions for the missiles at this location. The MIUs require cooling air when they are turned on. In flight this is ram air, on the ground a cooling air fan is connected to the ram air inlet. These MIUs have power switches located on the OAS power control panel and information on their use is given in the applicable weapons delivery manuals 1B-52H-34 series (missiles).

ARMAMENT INTERFACE UNIT (AIU)

The armament interface unit is a signal data converter for the following equipment:

- Bomb Door Control (Nuclear FCP, CALCM SMO and CF-59)
- Launcher Rotation Circuits
- Bomb Tone Scoring
- Environmental Control Unit
- Radar Altimeter

WEAPONS INTERFACE UNIT

See appropriate weapons delivery manual.

Controls and Display Subsystem

The controls and display subsystem provides the operators access to the OAS to allow control, supervision, and readout of the various system functions. Technically this subsystem is called Control-Display Set AN/ASQ-175 and consists of the following components:

- OAS Power Control Panel
- Multifunction Displays
- Keyboards
- Computer Control Panel
- Radar Presentation Panel
- RN Management Panel
- Weapon Control Panel
- Video Recorder
- Display Electronics Unit
- Radar Scan Converter

Computational Subsystem

The computational subsystem, technically called Ballistics Computer Set AN/AYQ-10, is composed of data transfer units and three avionics processors. See OAS DATA TRANSFER UNITS AND COMPUTER CONTROL, this section, for coverage of this equipment.

Navigational Subsystem

The navigational subsystem is a group of sensors which provide measured data necessary for navigation and control of the aircraft. This equipment consists of the following:

- Inertial Measurement
- Doppler Radar
- Radar Altimeter
- Attitude Heading Reference System
- Radar
- Air Data Computer
- ***[CS]*** Global Positioning System

Complete coverage of navigation methods and procedures is contained in OAS NAVIGATION, this section.

Weapon Control and Delivery Subsystem

The weapon control and delivery subsystem, technically called Control-Monitor Set AN/AWQ-3, provides the means to control and monitor the weapons. Coverage for this equipment is given in this section.

INFLIGHT OPERATION

All of the OAS, except for the Attitude Heading Reference System (AHRS) and radar altimeter, is controlled from the navigator’s and radar navigator’s station. The AHRS is controlled by the copilot and the radar altimeter is controlled by both pilots. OAS startup, shutdown, and weapon control are managed by the navigator. Both navigators are able to view the same displays and both have keyboards for controlling the system. See figures 1A-1 and 1A-2 for location of various system control and indicator panels at the navigators’ stations.

AN/ASQ-176 INFLIGHT MALFUNCTION ANALYSIS AND CORRECTION

The OAS has a built-in-test (BIT) feature which constantly correlates the functions of all the system components. When the BIT system detects a fault, advisory messages are displayed on the MFD’s. The advisory message will remain until acknowledged by one of the navigators. The fault advisory is also recorded automatically by the mission data recording tape for use by maintenance personnel. In certain cases the OAS will automatically work around the fault, particularly where there is system redundancy. Some items in the radar will still require operator analysis and corrective action. Abnormal Operation and Malfunction Analysis information is contained in Section III in the same order as the subsection containing a part related to that equipment. Section III containing an OAS malfunction index arranged alphabetically which lists the malfunction advisory and action to be taken.

AN/ASQ-176 SYSTEM POWER CONTROL

POWER SOURCE

Circuit breaker and power source information for the OAS is given at the end of Section III. Illustrations of the various circuit breaker panels accessible in flight are contained in T.O. 1B-52H-1. Circuit breaker nomenclature information on individual systems is given in T.O. 1B-52H-1 in the Section I subsection pertaining to that system.

POWER TURN-ON

Almost all OAS equipment is supplied power under control of the OAS master power switch. Certain radar functions and cooling and pressurization are under control of individual switches. After OAS master power is turned on, the flight computer program (FCP) is loaded and the processors synchronized so that system control can be properly maintained. CF-61, which is displayed on an MFD, is used to start up the system. The inertial measuring equipment is time sensitive to power application (and removal) since it contains an electrically powered and stabilized gyro. An integrated checklist for OAS startup is given in the Navigator’s Checklists in Section II.

OAS Power Control Panel

The OAS power control panel contains the OAS master power switch. See figure 1A-5 for an illustration of the panel and functional information concerning the OAS master power switch.

Power Turn-On Procedures

The OAS is designed to operate on external power or aircraft generator power and to tolerate small transients in the power supply. The system is designed to accommodate the transition from ground power to aircraft power but not from aircraft to ground. Operation of the OAS can be performed with either external or internal air and power sources. Procedures for turning the system on can be found in Section II. The system is turned on as follows:

1. Complete Interior Inspection Checklist.
2. Install the DTU cartridge containing the FCP.
3. Push OAS master power switch to ON. The light inside the switch will be on and the DTU and avionics processor status lights on the computer panel will be on. The system is ready for further power up procedures.
4. Load and synchronize the avionics processors.
5. Command CF-61.
6. Command CF-81, n.
7. Turn on Inertial Navigation System(s).

Power Turn-Off Procedures

OAS shutdown is a timed phase sequence of events controlled by the processors due to the de-spin requirement of the INS's and the classified data erase requirement of the processors. The normal de-spin time for the IMU is 300 seconds. When OAS processing time is added to the de-spin time the total for an OAS controlled de-spin is 325 seconds. The classified data erase time is 1000 seconds. If aircraft power is removed abruptly or before de-spin is complete, de-spin power is supplied from a gyro despin battery which is activated by an emergency shutdown signal. Accordingly, aircraft power switching should be coordinated with the navigator to avoid damage to the INSs. The processor controlled shutdown is initiated with a CF-67 command. The OAS is shut down as follows:

1. Call up CF-67. The following message will appear near the bottom of the MFD:
   SHUTDOWN OAS? YES/NO

NOTE

- Do not proceed until SHUTDOWN OAS? YES/NO is shown on all four MFD's.
- Selection of CF-61 after initiating shutdown procedures on CF-67 will unnecessarily confuse and delay system shutdown. Do not call up CF-61 after initiating shutdown procedures with CF-67.

2. The navigator will answer YES by pressing the YES key on the keyboard to start the shutdown sequence. Another message will appear in the same location as follows:
   ERASE CLSF DATA? YES/NO

NOTE

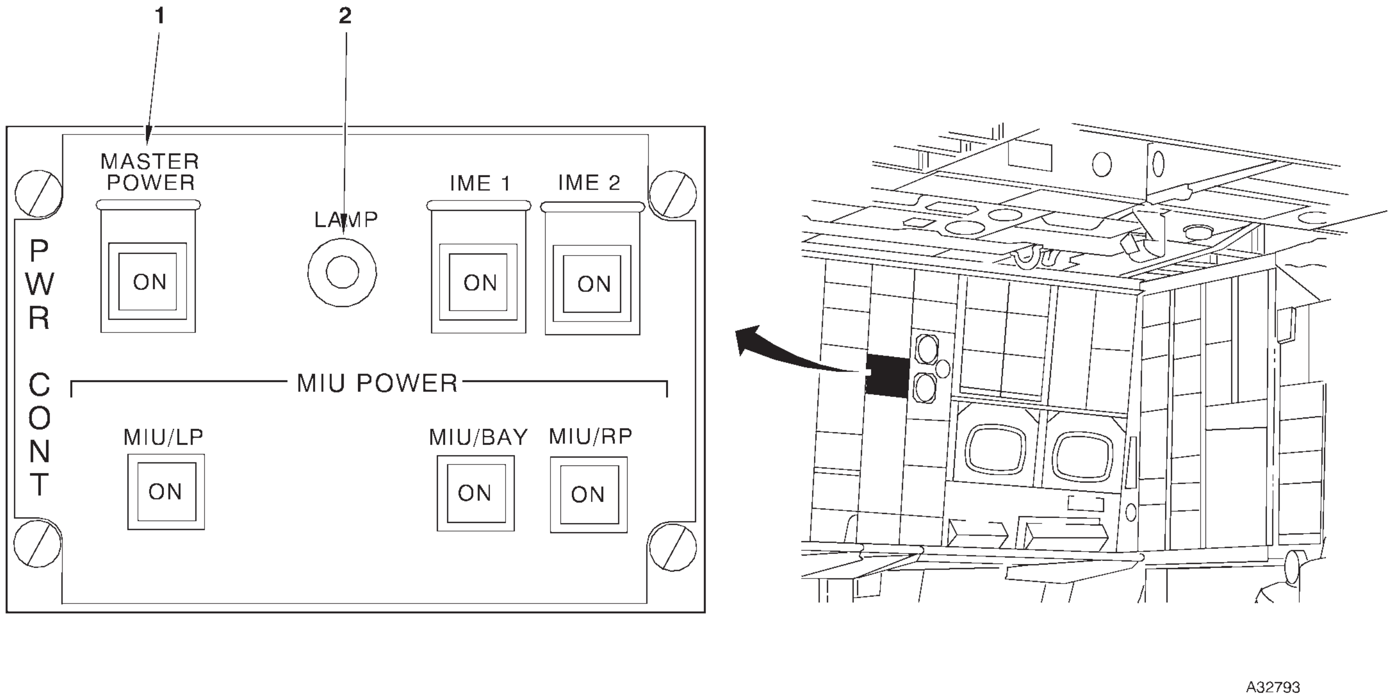
- Do not proceed until ERASE CLASSIFIED DATA? YES/NO is shown on all four MFD's.
- UTC must be entered prior to erasure, if not previously entered.

3. When the question is answered, the message is erased, the LOGOFF message appears, and the shutdown sequence begins. The 325 second countdown starts for each IME and is displayed on the MFD.
4. When despin is complete for both INS's, the following messages appear:
   IME1-SHUTDOWN
   IME2-SHUTDOWN
   LOGOFF COMPLETE
5. If the answer to the ERASE CLSF DATA question was YES, approximately 5 seconds after the LOGOFF COMPLETE message is displayed, all four MFD's go blank except for a blinking cursor. Classified data is now being erased and this takes approximately 1000 seconds. When classified data erase is completed for each processor, the number 7 appears in the RES PGM window on the computer control panel. A CLSF DATA ERASED message is displayed on all four MFD's followed by a flashing NO OAS DATA message on all four MFD's. If the answer to ERASE CLSF DATA question was NO, omit step 5 and proceed to step 6 after NO OAS DATA message is displayed on all four MFD's.
6. Press OAS master power switch to OFF.
7. Advise pilot that OAS is OFF.
8. Remove DTU cartridges.

CAUTION

Do not turn OAS master power switch OFF nor turn aircraft AC power OFF prior to receipt of IME-X SHUTDOWN and NO OAS DATA messages.

OAS Power Control Panel



NO.	CONTROL-INDICATOR	FUNCTION
1	OAS MASTER POWER Switch	ON (light on) sends master power to: ● Display Electronics Unit ● Multifunction Displays (2 left) ● Data Transfer Units ● Processors ● INS Cooling Fans ● IMU Interlock (IME switches) ● Interface Units (EIU, RIU, CDIU, AIU) ● Radar Scan Converter ● RN Management Panel ● Radar Presentation Panel ● Video Recorder ● Weapon Control Panel OFF (light off) removes power from all above equipment. If turned OFF prior to shutdown by CF-67, causes IMUs to begin de-spin and processor classified data is not erased. IMU condition not monitored except by de-spin lights on the IEU.
2	LAMP Test Switch	Tests all lights on the Power Control Panel

Figure 1A-5

OAS Keyboards and Multifunction Displays

DESCRIPTION

The keyboards and multifunction display (MFD) indicators are the main communication means between the navigators and the OAS. There are two MFD's and a keyboard at each navigator station, allowing each navigator to have the same control and display capability. The keyboards provide system function selection, data control, and tracking control. The keys and controls are functionally grouped. The MFD's are cathode ray tube indicators having a TV type format and accommodate both EVS and radar type displays in addition to alphanumeric data displays. The MFD's are the means to view the various system displays and programmed data.

POWER SOURCE

Power to the keyboards and left MFD's is under control of the OAS master power switch. Power to the right MFD's is under control of the EVS video select switch (when rotated out of OFF position). The MFD's and the associated controls and display interface unit (CDIU) and display electronics unit (DEU) use ac and dc power supplied through circuit breakers on the left forward BNS circuit breaker panel and the right S/V filter box circuit breaker panel. See Section III for circuit breaker listing and refer to 1B-52H-1 for circuit breaker illustrations. OAS power turn-on information is given in OAS SYSTEM CONFIGURATION.

CONTROLS AND INDICATORS

Keyboard

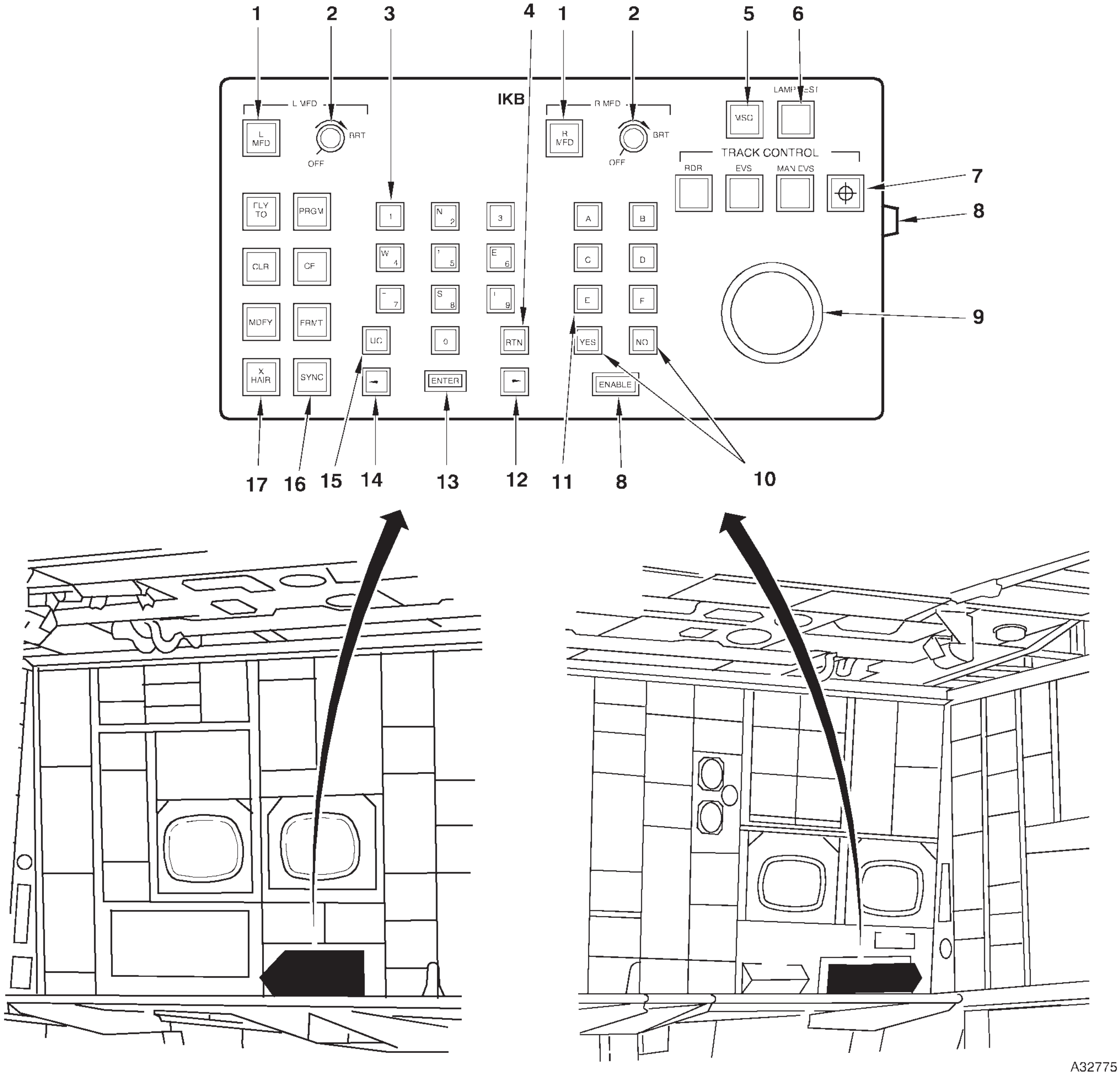
See figure 1A-6 for control and functional information on the keyboard. All controls except for the MFD brightness knobs and the trackball are press-to-actuate keys or switches.

MFD's

Two types of MFD's are used with OAS at each navigators' station. The MFD on the left is optimized for OAS data display. The monitor on the right is optimized for display of EVS images. Since both display monitor types can be used to display OAS data, the term MFD as used in the B-52H aircrew manuals applies to both the left and right monitors.

See figure 1A-7 for control and functional information on navigators' MFD's. Also shown is the general data display arrangement with prime mission data (PMD) being displayed at the top and the Radar Altimeter data on the right side of the display area. Advisory data for the system and weapons is near the bottom of the display. Details of information given in both of these areas is shown in figure 1A-7. Information on the various functional displays, formats, and program information shown in the main central area of the MFD is given later in this section.

Keyboard



1 L MFD AND R MFD SELECTION SWITCHES (2)
2 MFD BRIGHTNESS CONTROL KNOBS
3 0 - 9 KEYS
4 RETURN KEY
5 MESSAGE SWITCH
6 LAMP TEST SWITCH
7 TRACK CONTROL SWITCHES (4)
8 ENABLE SWITCHES (2)
9 TRACKBALL
10 YES AND NO KEYS
11 A - F KEYS (6)
12 ADVANCE KEY
13 ENTER KEY
14 BACKSPACE KEY
15 UPPER CORNER KEY
16 SYNCHRONIZATION KEY
17 COMMAND KEYS (7)

Figure 1A-6 (Sheet 1 of 3)

Keyboard (Cont)

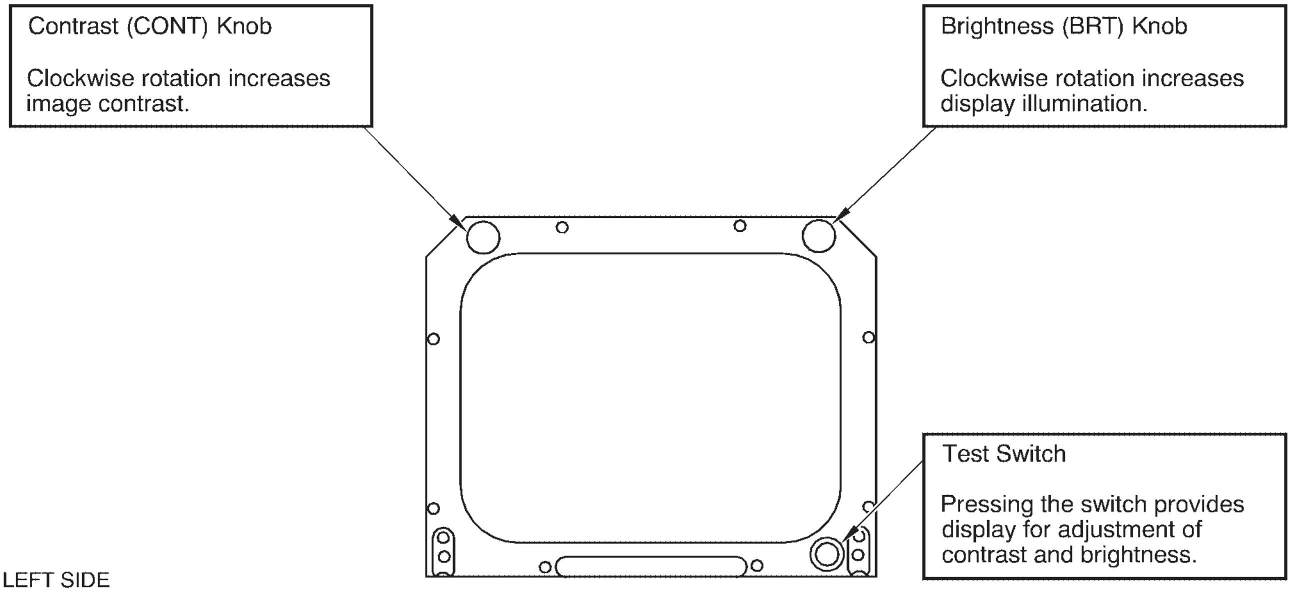
NO.	CONTROL-INDICATOR	FUNCTION
1	L MFD and R MFD Selection Switches (2)	Select either MFD for data display of inputs from the keyboard.
2	MFD Brightness (BRT) Control Knobs (2)	Adjusts the brightness of the symbols on the respective MFD.
3	0 – 9 Keys (10)	Enter the respective number in the data/command to be transferred. When used in conjunction with upper corner key, gives N, S, E, W, +, –, and comma (,).
4	Return (RTN) Key	Places the MFD cursor to the first operator-changeable position in the row designated.
5	Message (MSG) Switch	Acknowledges an existing MFD message.
6	LAMP TEST Switch	Test all lights on the keyboard.
7	TRACK CONTROL Switches (4)	Select the track control reference mode or sighting mode. RDR switch selects radar crosshair tracking and allows positioning of the radar crosshairs. EVS switch selects EVS crosshair tracking and allows positioning of the EVS crosshairs. **NOTE** Both RDR and EVS switches may be selected simultaneously, slaving the EVS crosshairs to the RDR crosshairs. MAN EVS switch enables EVS sighting without tracking. EVS is positioned with the trackball. Only functions when both RDR and EVS track control switches deselected. ⌖ (crosshairs on TGT) switch is used for CF-135 and alternate true heading functions. The switch is pressed when the crosshairs are on the beacon or sighting point. Light comes on momentarily when pressed.
8	ENABLE Switches (2)	When pressed, enable the trackball.
9	Trackball	Moving the trackball causes the EVS or radar crosshairs to move in a corresponding direction when an enable switch is pressed.
10	YES and NO Keys (2)	Answers questions after displayed on all four MFD’s.
11	A – F Keys (6)	Enters the respective letter in the data/command to be transferred.

Figure 1A-6 (Sheet 2 of 3)

NO.	CONTROL-INDICATOR	FUNCTION
12	Advance (→) Key	The key move the cursor on the MFD to the right.
13	ENTER Key	Completes the operator sequence. When pressed, data/commands will be transferred to OAS and/or displayed on MFD.
14	Backspace (←) Keys	The keys move the cursor on the MFD to the left.
15	Upper Corner (UC) Key	When pressed, the number keys enter the symbols in the upper left corner of the key.
16	SYNC Key	Provides for re–synchronization of the video display. When synchronization is lost (rolling of display on MFD), SYNC 1 ENTER should restore synchronization. If the display continues to roll, command SNYC 2 ENTER.
17	Command Keys (7)	FLY TO provides navigational information for the manual selection of a stored destination/target or to the crosshairs. PRGM displays current event program or selected event program. CLR erases menu display data that has been overlaid on an existing format, keyboard data, and position fix data. CF displays OAS mode supervision menu or initiates entry into specific OAS mode. MDFY initiates operator changes to MFD displayed data. FRMT displays video and/or data. X HAIR controls fixpoint sequencing mode and manual crosshair positioning mode.

Figure 1A-6 (Sheet 3 of 3)

Multifunction Display (MFD)



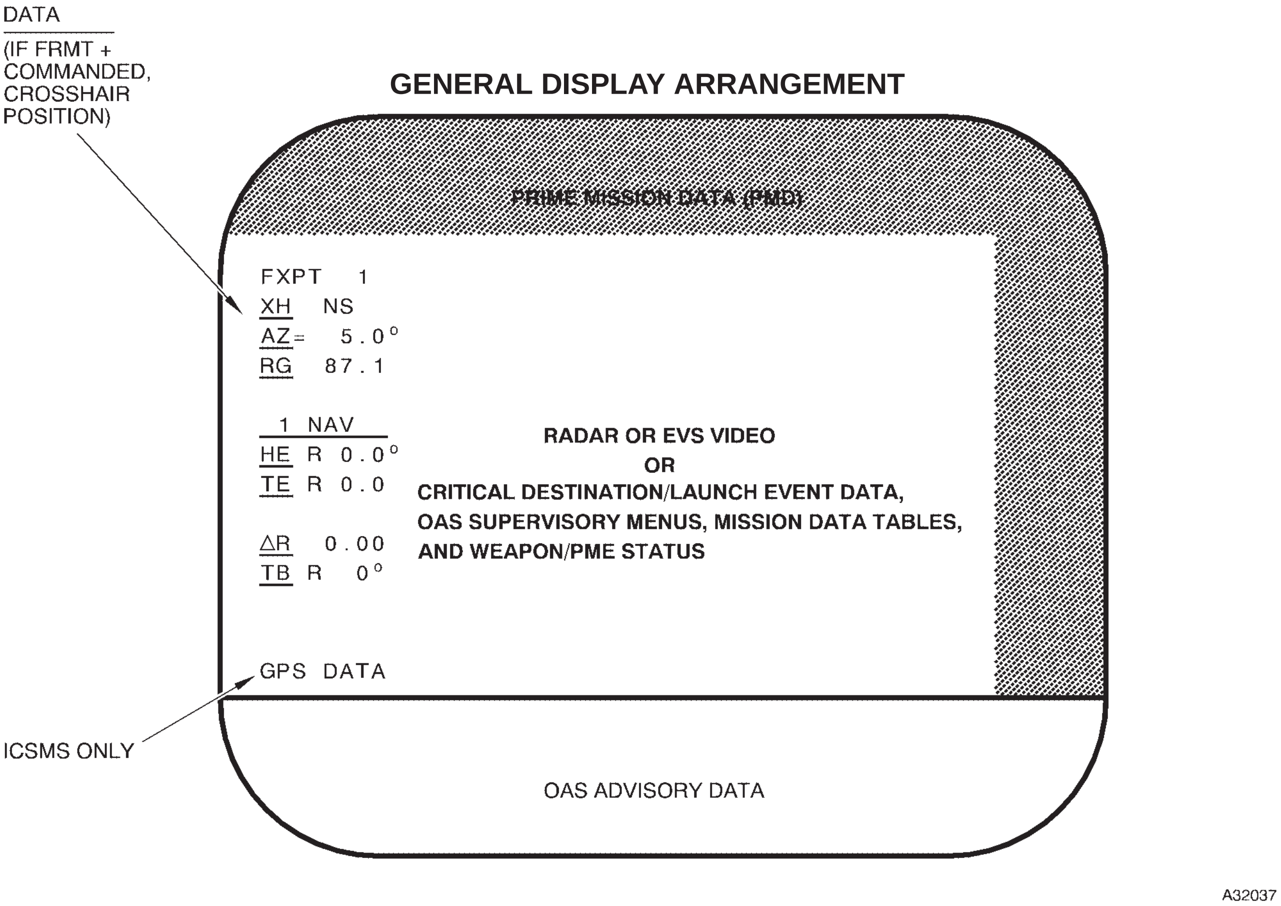
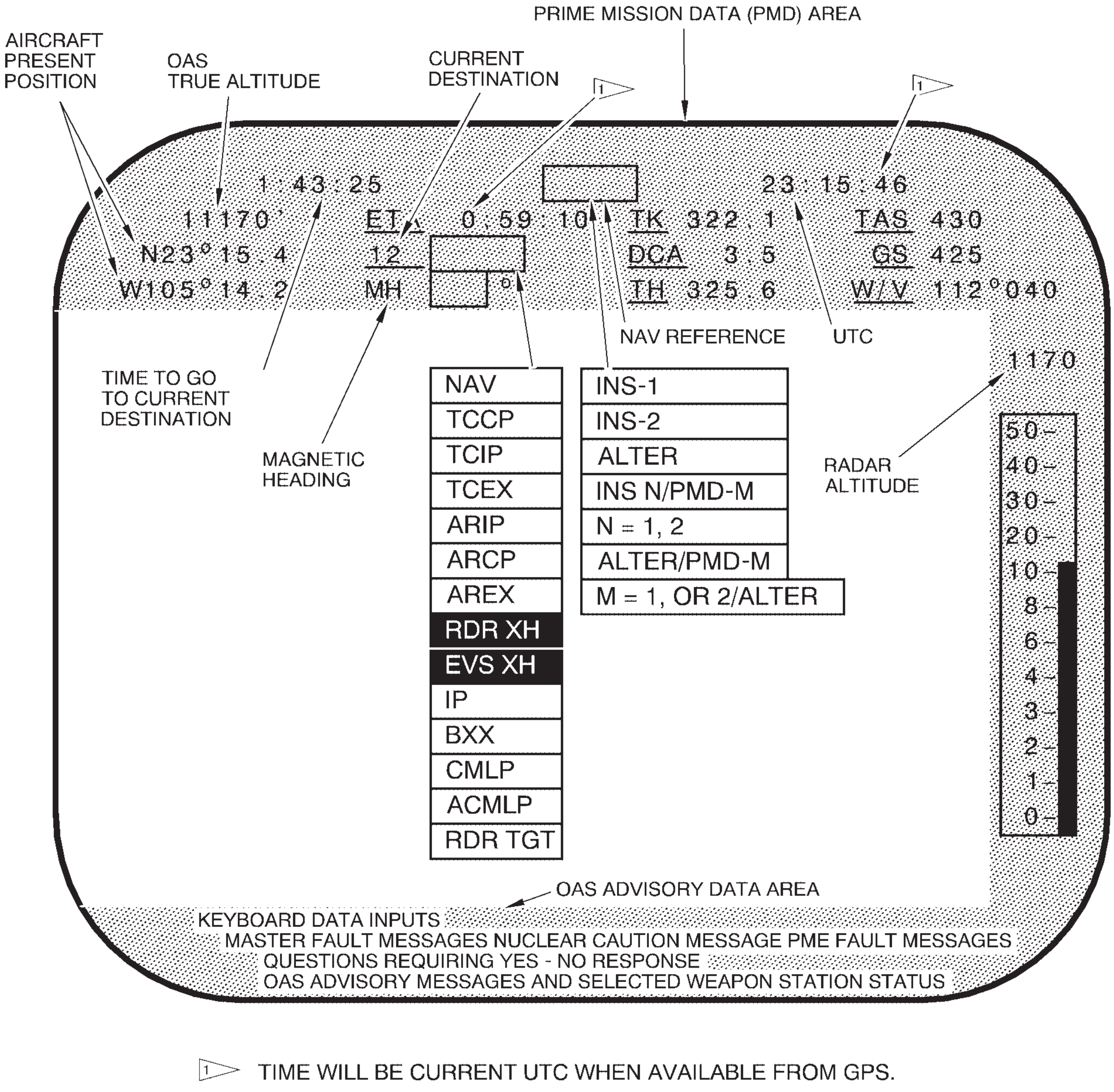


Figure 1A-7 (Sheet 1 of 2)



PRIME MISSION DATA AND ADVISORY AREA DETAILS

Figure 1A-7 (Sheet 2 of 2)

NORMAL OPERATION

Most of the programming needs of the OAS are handled automatically by the Flight Computer Program. However, some programming requirements must be accomplished by the operator inputting commands and data through the keyboard to the system. The MFD's allow the operator to see the results of these keyboard inputs as well as maintain the automatically programmed functions of the system. A display electronics unit (DEU) accommodates most of the main functions of the keyboards and MFD's by accomplishing the following: handling input and output functions of the keyboards, interfacing with the data bus, alphanumeric character generation, and distribution of scan converted radar video and EVS video to the MFD's. Scan conversion of the radar results in radar returns and markers bearing small alterations in their shape as they are broken down into small rectangular elements. This is particularly apparent at the cardinal points for circular shaped information and off-cardinal point angular information.

KEYBOARD OPERATION

The keyboard controls selection of MFD for display, track control, message answering and advisory control, and system command and data entry.

System Command and Data Entry Functions

System command and data entry actions accomplished on the keyboard can be monitored on the selected MFD as each step is made. For example, if Control Function 61 is to be selected and entered, the following actions on the keyboard and results on the MFD will be obtained:

1. Press CF key, the control function display identifier CF- will appear on the lower left area of the MFD. See figure 1A-8 for display examples. The small underline at the right of the control function identifier is the cursor and indicates the location of an enterable item.
2. Press 6 key. Cursor moves right to next blank space. Press 1 key. Cursor moves right to next blank space.
3. Press ENTER key. The cursor moves under the 6 and the CF-61 display fills in.

NOTE

> All keys should be pressed firmly and held momentarily on all entries so that the computers will properly accept the entry. A brief touch may not result in entry acceptance.

Similar keyboard actions interactive with the MFD are used to accomplish other system control and data entry functions. Data entry/data modification is accomplished with the MDFY key. Only lines preceded by a number designator can be modified. For example, if the month, day, and year are to be entered in the CF-61 display (figure 1A-8) accomplish the following on the selected MFD displaying CF-61:

1. Press MDFY key. The identifier - - MDFY - appears in place of the CF-61 identifier.
2. Press the 4 key since the line to have data entered is numbered 4. The cursor moves to the next space to the right of the 4.
3. Press ENTER key. The display on line 4 moves down to the line previously occupied by the MDFY symbol and the cursor moves to the first modifiable number. Cursor must then be backspaced to the letter.
4. Press keys for date. The cursor will skip over the / symbols to the next modifiable space.
5. After all keys are pressed and display is checked for desired data, press ENTER key. The data then fills in on line 4.

If an improper/illogical command is entered, the command becomes reverse highlighted and the system ignores the command. It will be necessary to reenter the proper data.

During command and data entry procedures, it will be necessary to enter characters on the upper left corner of a key. To accomplish this, press the UC (upper corner) key prior to pressing each character key. It should be noted that in some system commands a comma (,) exists in the command and it is necessary to use the above upper corner procedures to obtain the comma.

Message answering is accomplished by pressing the MSG key after message is displayed on all four MFD's. This removes the messages/advisories from all the MFD's and allows any subsequent messages/advisories to be displayed. There is no message priority system so an existing message may mask another message which may be of more importance. Therefore, it is important to acknowledge a message as soon as possible. The master fault and nuclear caution messages cannot be erased by pressing the message key.

Question answering is accomplished by the YES or NO keys after message is displayed on all four MFD's. If a question is not answered in 60 seconds, the computer will assume a no response and erase the question. Therefore it is important to answer questions as soon as possible.

Track Control Function

The track control function allows the operator to select RDR or EVS crosshair at either station. The track control selection and station priority is as follows:

1. When the FCP is loaded, RDR is selected automatically at the radar navigator's station and deselected at the navigator's station, EVS is selected automatically at the navigator's station and deselected at the radar navigator's station, and MAN EVS is deselected at both stations.
2. RDR or EVS can be selected at either station. When selected, the respective function is deselected at the other station.
3. Selection of EVS at either station automatically deselects MAN EVS at the same station (if selected).
4. Selection of MAN EVS at either station automatically deselects EVS at the same station if RDR is not selected. If RDR is selected, MAN EVS is ignored.
5. MAN EVS and EVS cannot be selected at the same time.

Track control signals are monitored from both navigator stations and corrections from both stations are computed if RDR is selected at one station and EVS is selected at the other station. If RDR and EVS are selected at the same station, corrections are computed for the RDR crosshair only.

MFD OPERATION

Either MFD can be selected using the keyboard to display data. Once a display is commanded it will remain until another display is commanded on that MFD, even if changes are being commanded on the other MFD. Current data changes applicable to all displays will be shown regardless of keyboard selection. The same display called up on two MFD's differs due to different display update rates. The left MFD is operational as soon as OAS power is turned on and the right MFD is operational when the EVS video select switch is moved out of OFF position. The MFD's may be tuned for brightness and contrast on any displayed information. A test button on the left MFD provides a test pattern which can be used as an aid in tuning. It is not necessary to detune the MFD's (turning contrast and brightness ccw) when turning the system off.

EA Pilots EVS Monitor Input Switch

A guarded two position switch at the Radar Navigators station selects EVS data input source for the EVS monitor on the Pilots instrument panel. Display of IU/TACAN data is not affected by this switch. The two positions of the switch are NORMAL PILOT DATA and RN RH MFD DATA. For a discussion of the switch and its operation refer to PILOT EVS MONITOR INPUT SWITCH in the OFFENSIVE AVIONICS SYSTEM Subsection, Section I of T.O. 1B-52H-1.

SYSTEM COMMAND AND DATA DISPLAYS

System command and data displays are grouped into three categories: Control Functions, Formats, and Programs.

The operator can change numbered line items on these displays using the MDFY function. Data displayed in normal video highlight consists of light letters on a dark background and data displayed in reverse video highlight are dark letters on a light background. See KEYBOARD OPERATION, this section.

Control Functions (CF)

Control functions are used to start up/shut down the OAS, command and alter system operations, and provide backups for WCP and RNMP. Control functions are commanded using the CF key on the keyboard with the designator for the desired display. CF ENTER provides a menu (list) of all available control functions for quick reference. See figure 1A-8 for examples of CF displays.

Control Function Displays (CF)

[NS]

CF CONTROL FUNCTION MENU

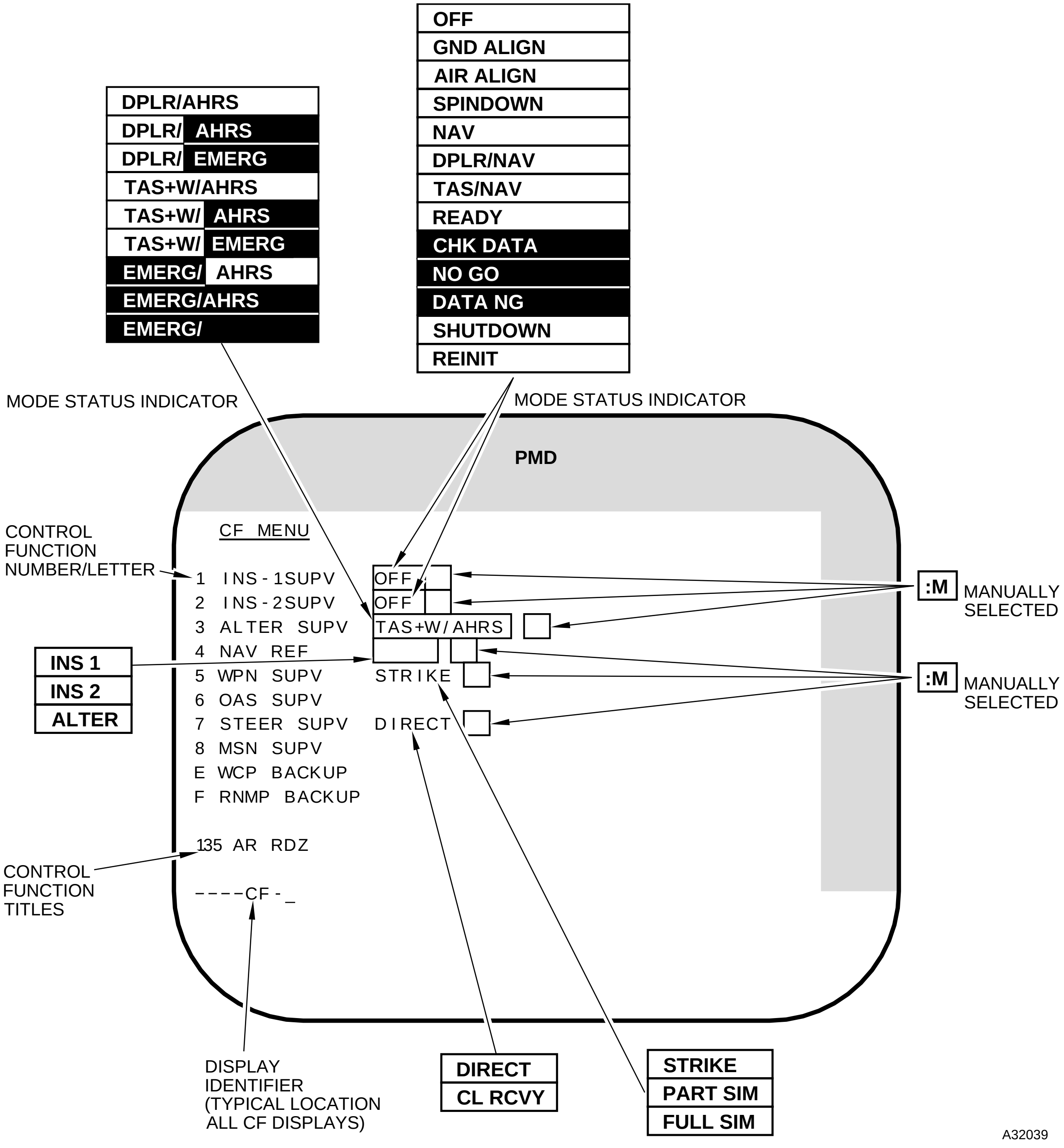


Figure 1A-8 (Sheet 1 of 17)

[CS]

CF CONTROL FUNCTION MENU

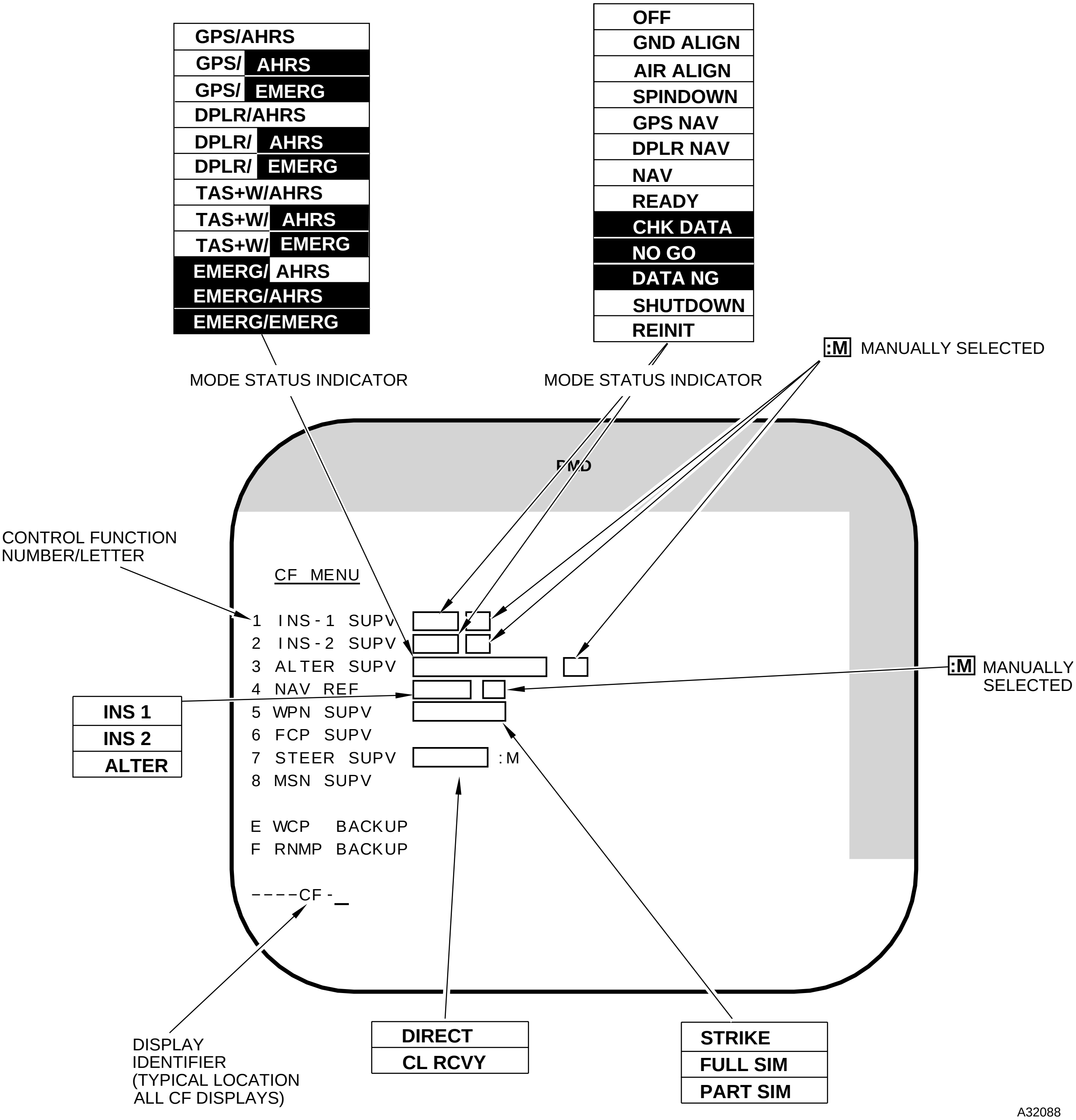
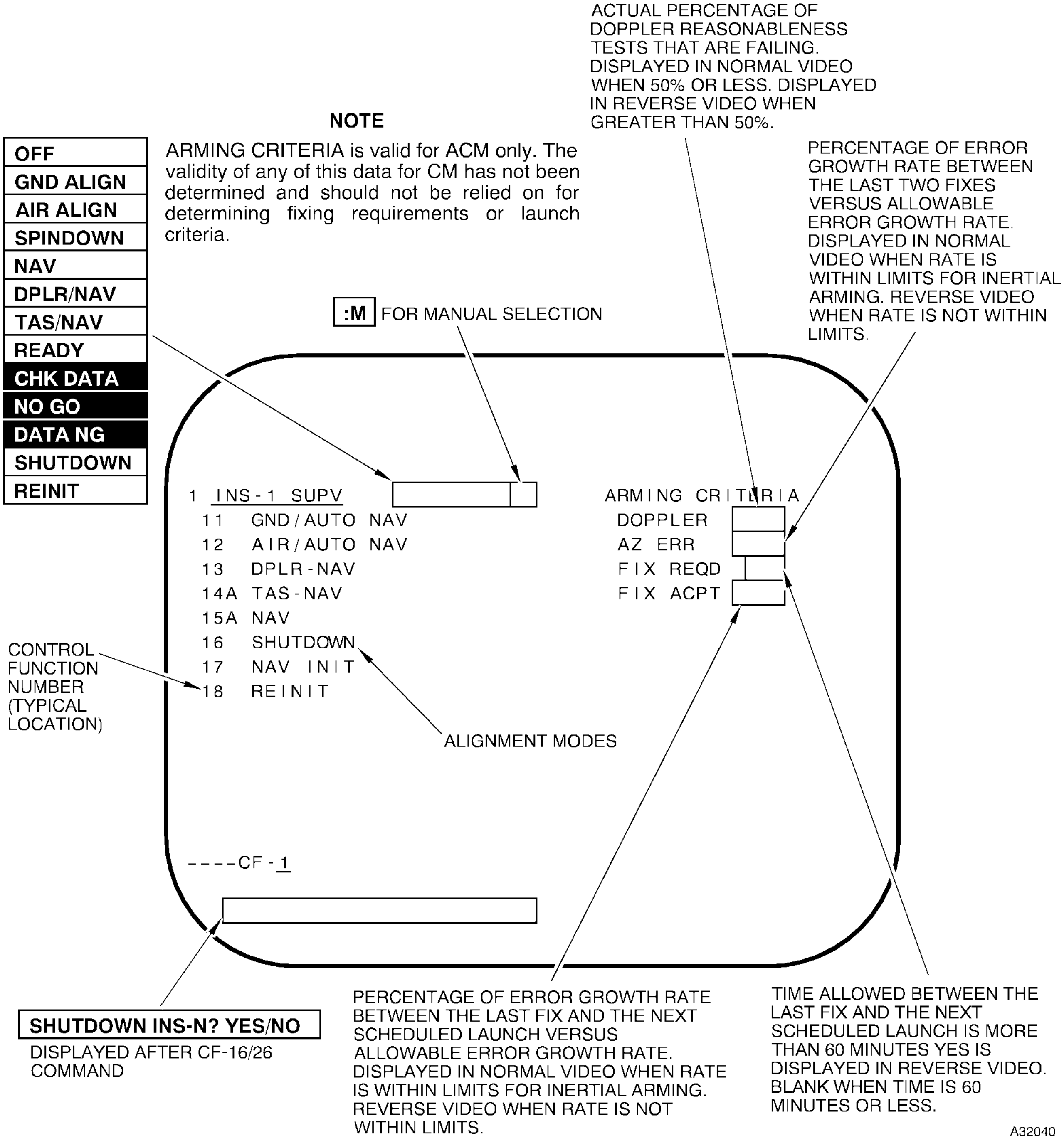


Figure 1A-8 (Sheet 2 of 17)

Control Function Displays (CF) (Cont)

[NS]

CF-1, CF-2 INS SUPERVISION MENU



NOTE

ARMING CRITERIA is valid for ACM only. The validity of any of this data for CM has not been determined and should not be relied on for determining fixing requirements or launch criteria.

ACTUAL PERCENTAGE OF DOPPLER REASONABLENESS TESTS THAT ARE FAILING. DISPLAYED IN NORMAL VIDEO WHEN 50% OR LESS. DISPLAYED IN REVERSE VIDEO WHEN GREATER THAN 50%.

PERCENTAGE OF ERROR GROWTH RATE BETWEEN THE LAST TWO FIXES VERSUS ALLOWABLE ERROR GROWTH RATE. DISPLAYED IN NORMAL VIDEO WHEN RATE IS WITHIN LIMITS FOR INERTIAL ARMING. REVERSE VIDEO WHEN RATE IS NOT WITHIN LIMITS.

:M FOR MANUAL SELECTION

CONTROL FUNCTION NUMBER (TYPICAL LOCATION)

ALIGNMENT MODES

SHUTDOWN INS-N? YES/NO DISPLAYED AFTER CF-16/26 COMMAND

PERCENTAGE OF ERROR GROWTH RATE BETWEEN THE LAST FIX AND THE NEXT SCHEDULED LAUNCH VERSUS ALLOWABLE ERROR GROWTH RATE. DISPLAYED IN NORMAL VIDEO WHEN RATE IS WITHIN LIMITS FOR INERTIAL ARMING. REVERSE VIDEO WHEN RATE IS NOT WITHIN LIMITS.

TIME ALLOWED BETWEEN THE LAST FIX AND THE NEXT SCHEDULED LAUNCH IS MORE THAN 60 MINUTES YES IS DISPLAYED IN REVERSE VIDEO. BLANK WHEN TIME IS 60 MINUTES OR LESS.

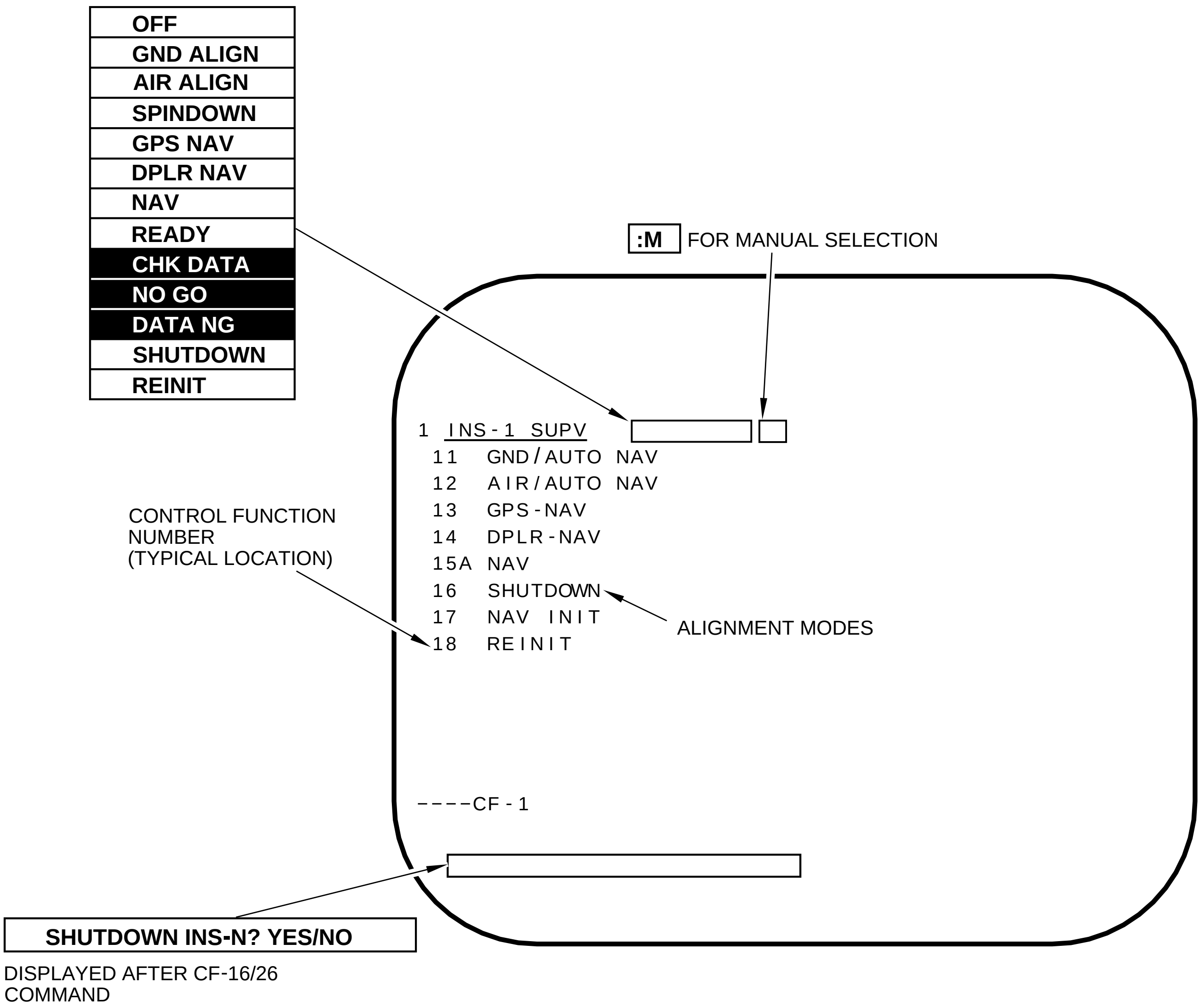
NOTE

- INS-2 Supervision Menu is similar to INS-1 except that the commands begin with the number 2.
- If any system fails, even though manually selected, the OAS will select the next best system and the :M will go reverse video.

Figure 1A-8 (Sheet 3 of 17)

[CS]

CF-1, CF-2 INS SUPERVISION MENU



NOTE

- INS-2 SUPERVISION MENU SIMILAR TO INS-1 EXCEPT THAT THE COMMANDS BEGIN WITH THE NUMBER 2.
- IF ANY SYSTEM FAILS, EVEN THOUGH MANUALLY SELECTED, THE FCP WILL SELECT THE NEXT BEST SYSTEM AND THE :M WILL GO REVERSE VIDEO.

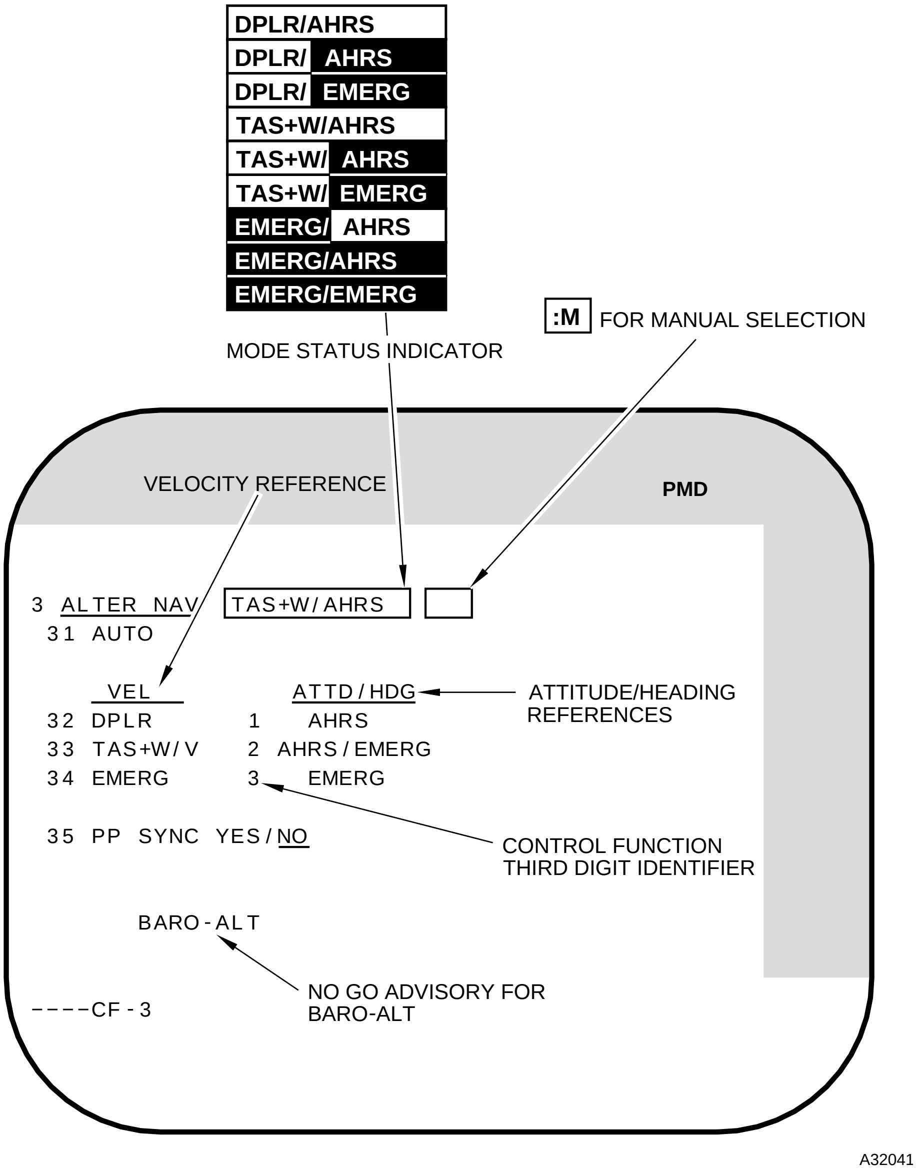
A32089

Figure 1A-8 (Sheet 4 of 17)

Control Function Displays (CF) (Cont)

[NS]

CF-3 ALTERNATE NAVIGATION SUPERVISION



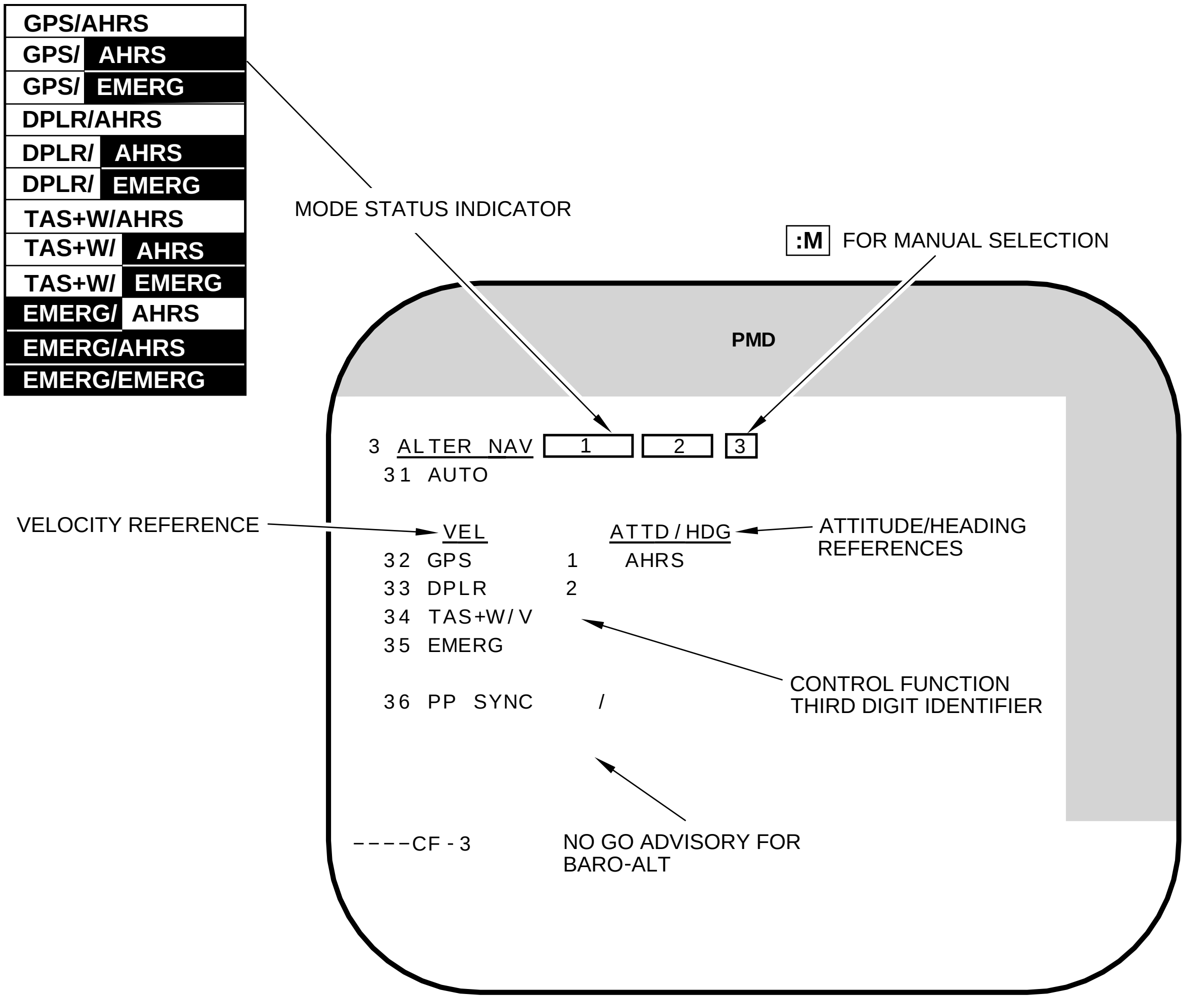
NOTE

- The current choice for CF-35 is underlined.
- The BARO-ALT advisory is displayed only if the barometric altimeter is NO-GO

Figure 1A-8 (Sheet 5 of 17)

[CS]

CF-3 ALTERNATE NAVIGATION SUPERVISION



NOTE

- The current choice for CF-36 is underlined.
- The BARO-ALT advisory is displayed only if the barometric altimeter is NO-GO.

A32090

Figure 1A-8 (Sheet 6 of 17)

Control Function Displays (CF) (Cont)

[NS]

CF-4 NAVIGATION REFERENCE MODES

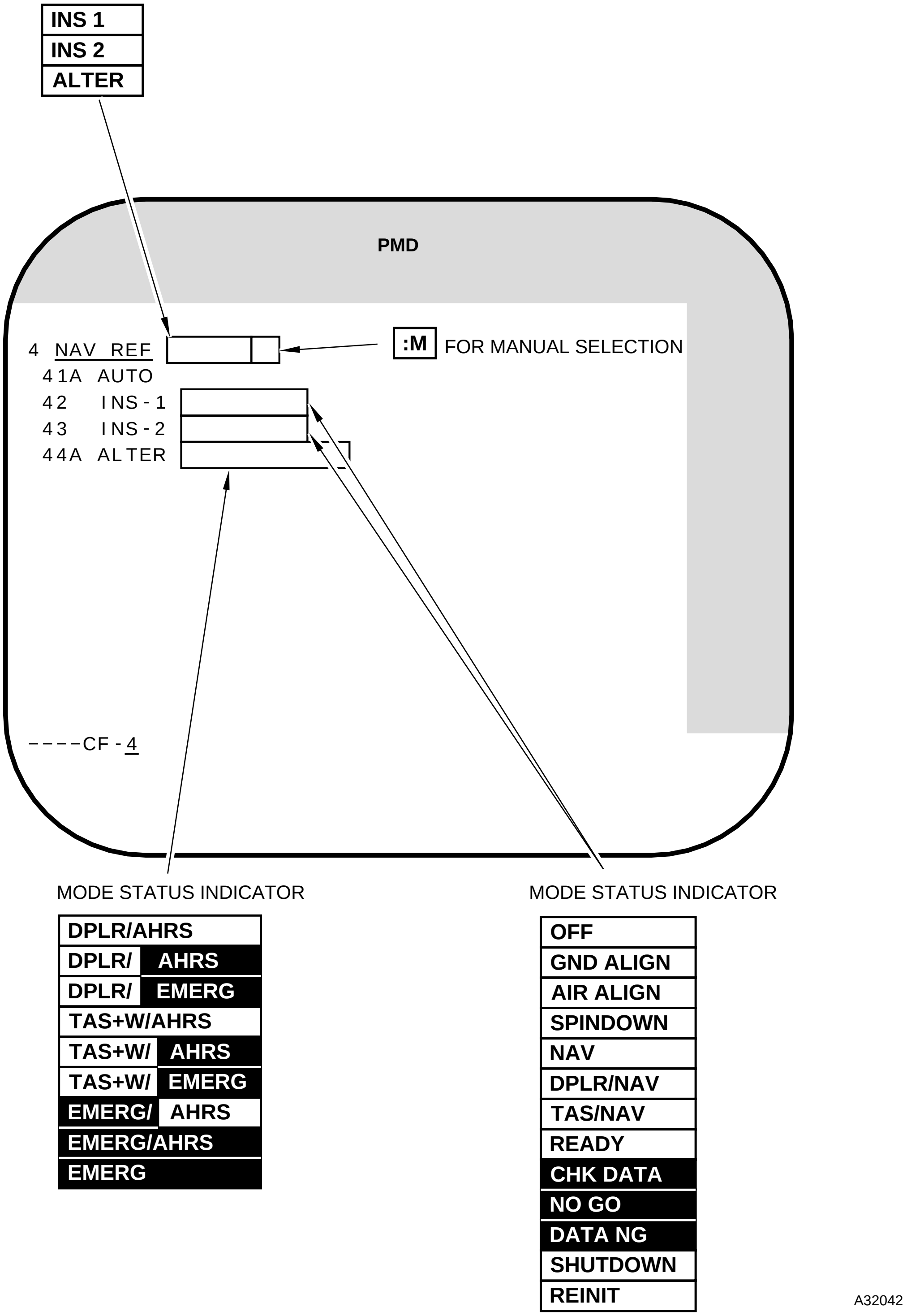


Figure 1A-8 (Sheet 7 of 17)

[CS]

CF-4 NAVIGATION REFERENCE MODES

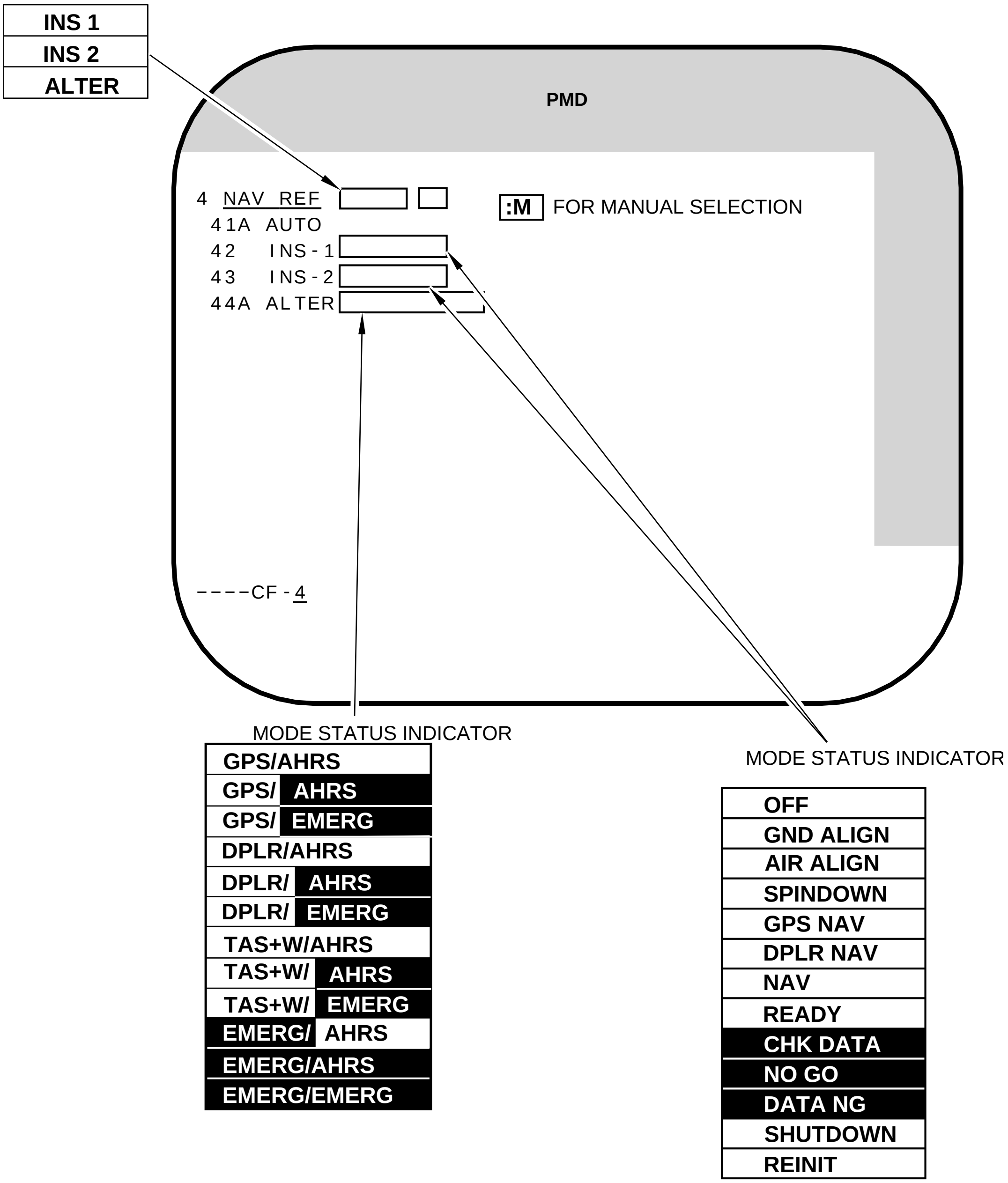


Figure 1A-8 (Sheet 8 of 17)

Control Function Displays (CF) (Cont)

[CS][NS]

CF-5 WEAPON SUPERVISION MENU

NOTE

CF-5 is weapon specific. The nuclear weapon CF-5 is shown below. See the applicable weapon manual for CF-5 display and details.

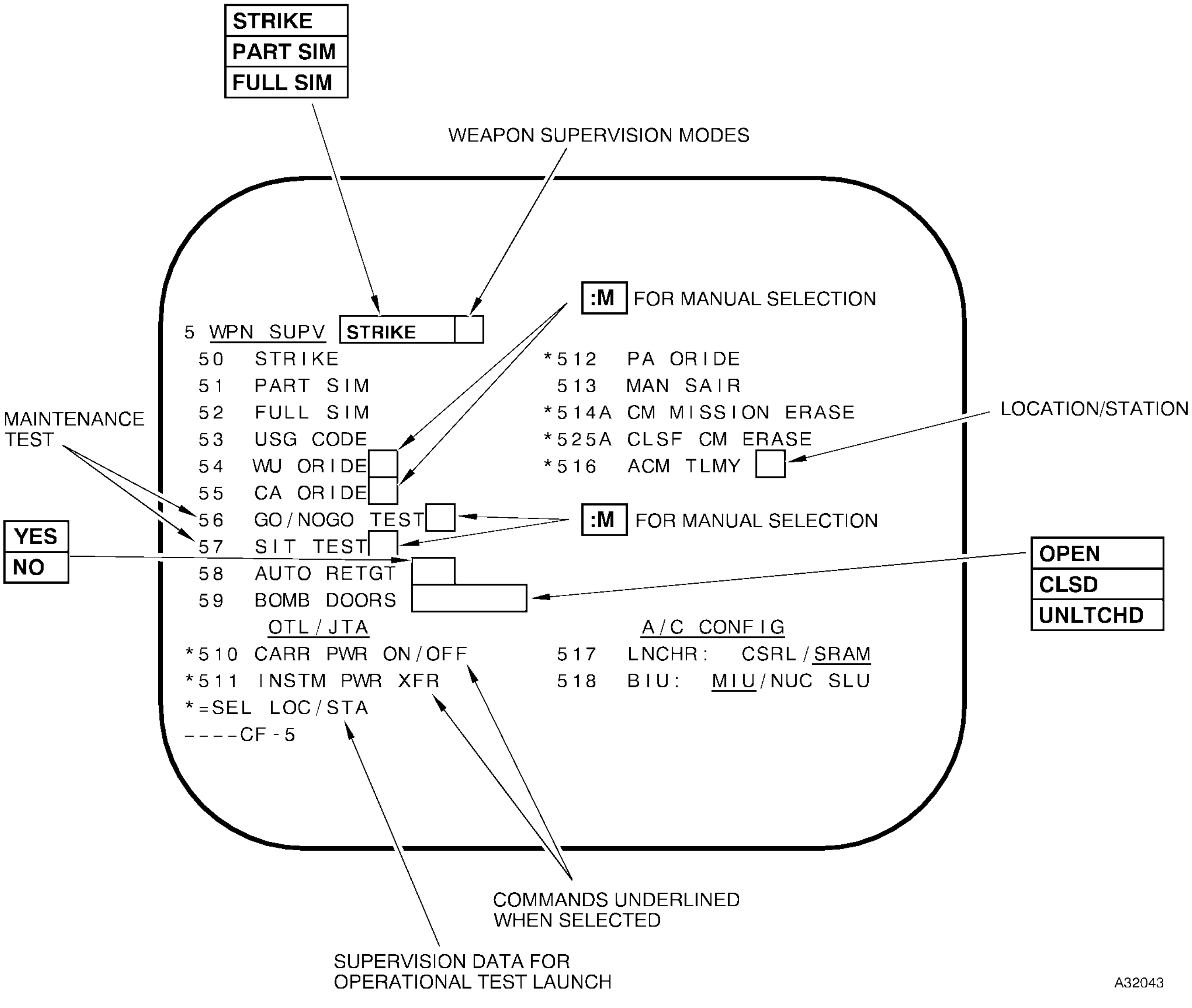


Figure 1A-8 (Sheet 9 of 17)

[CS][NS]

CF-6 OAS SUPERVISION MENU

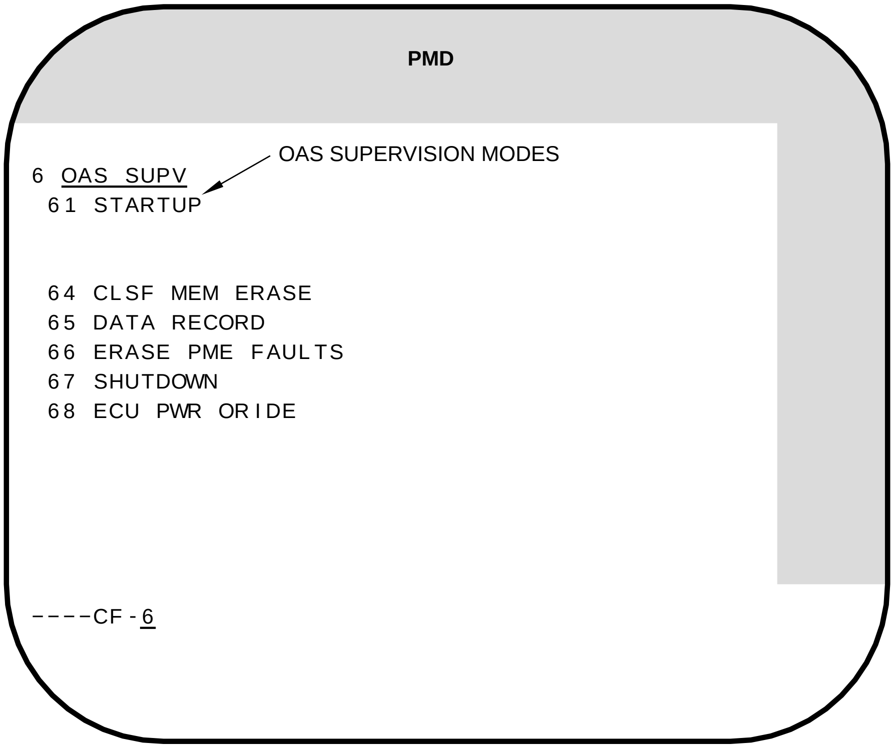


Figure 1A-8 (Sheet 10 of 17)

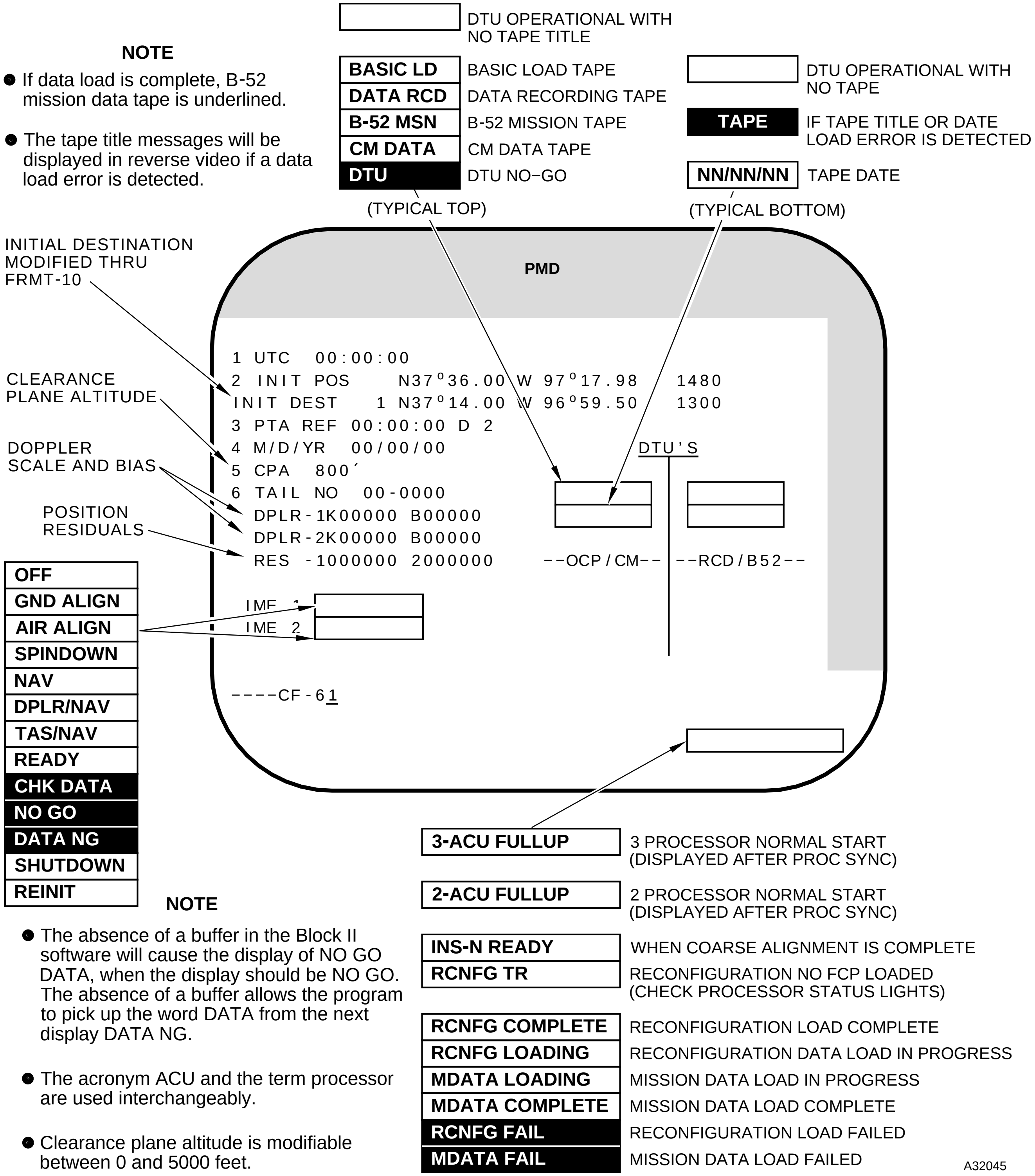
Control Function Displays (CF) (Cont)

[NS]

CF-61 OAS STARTUP

NOTE

- If data load is complete, B-52 mission data tape is underlined.
- The tape title messages will be displayed in reverse video if a data load error is detected.



	DTU OPERATIONAL WITH NO TAPE TITLE
BASIC LD	BASIC LOAD TAPE
DATA RCD	DATA RECORDING TAPE
B-52 MSN	B-52 MISSION TAPE
CM DATA	CM DATA TAPE
DTU	DTU NO−GO

	DTU OPERATIONAL WITH NO TAPE
TAPE	IF TAPE TITLE OR DATE LOAD ERROR IS DETECTED
NN/NN/NN	TAPE DATE

3-ACU FULLUP	3 PROCESSOR NORMAL START (DISPLAYED AFTER PROC SYNC)
2-ACU FULLUP	2 PROCESSOR NORMAL START (DISPLAYED AFTER PROC SYNC)
INS-N READY	WHEN COARSE ALIGNMENT IS COMPLETE
RCNFG TR	RECONFIGURATION NO FCP LOADED (CHECK PROCESSOR STATUS LIGHTS)
RCNFG COMPLETE	RECONFIGURATION LOAD COMPLETE
RCNFG LOADING	RECONFIGURATION DATA LOAD IN PROGRESS
MDATA LOADING	MISSION DATA LOAD IN PROGRESS
MDATA COMPLETE	MISSION DATA LOAD COMPLETE
RCNFG FAIL	RECONFIGURATION LOAD FAILED
MDATA FAIL	MISSION DATA LOAD FAILED

NOTE

- The absence of a buffer in the Block II software will cause the display of NO GO DATA, when the display should be NO GO. The absence of a buffer allows the program to pick up the word DATA from the next display DATA NG.
- The acronym ACU and the term processor are used interchangeably.
- Clearance plane altitude is modifiable between 0 and 5000 feet.

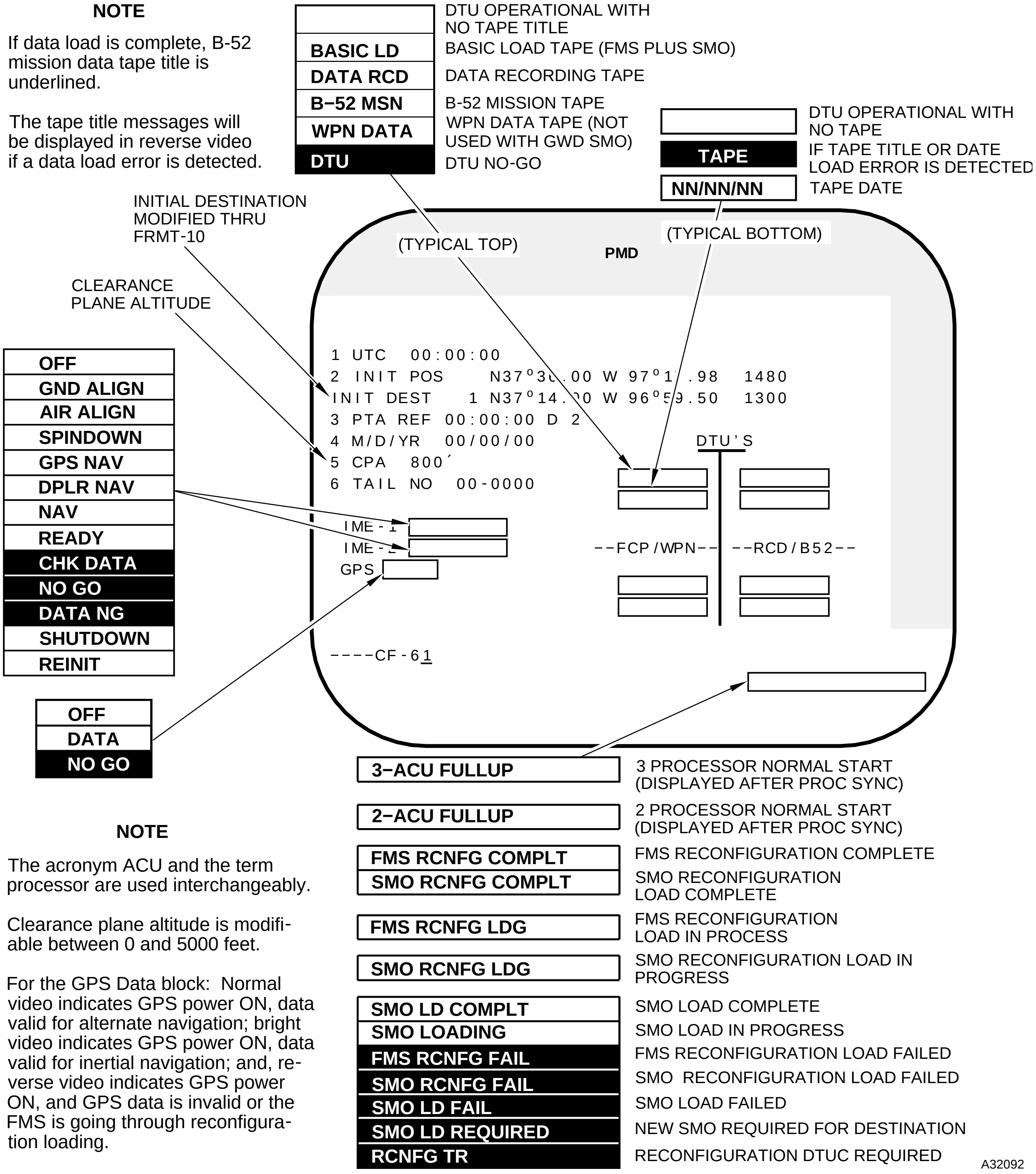
Figure 1A-8 (Sheet 11 of 17)

[CS]

CF-61 OAS STARTUP

NOTE

- If data load is complete, B-52 mission data tape title is underlined.
- The tape title messages will be displayed in reverse video if a data load error is detected.



NOTE

- The acronym ACU and the term processor are used interchangeably.
- Clearance plane altitude is modifiable between 0 and 5000 feet.
- For the GPS Data block: Normal video indicates GPS power ON, data valid for alternate navigation; bright video indicates GPS power ON, data valid for inertial navigation; and, reverse video indicates GPS power ON, and GPS data is invalid or the FMS is going through reconfiguration loading.

Figure 1A-8 (Sheet 12 of 17)

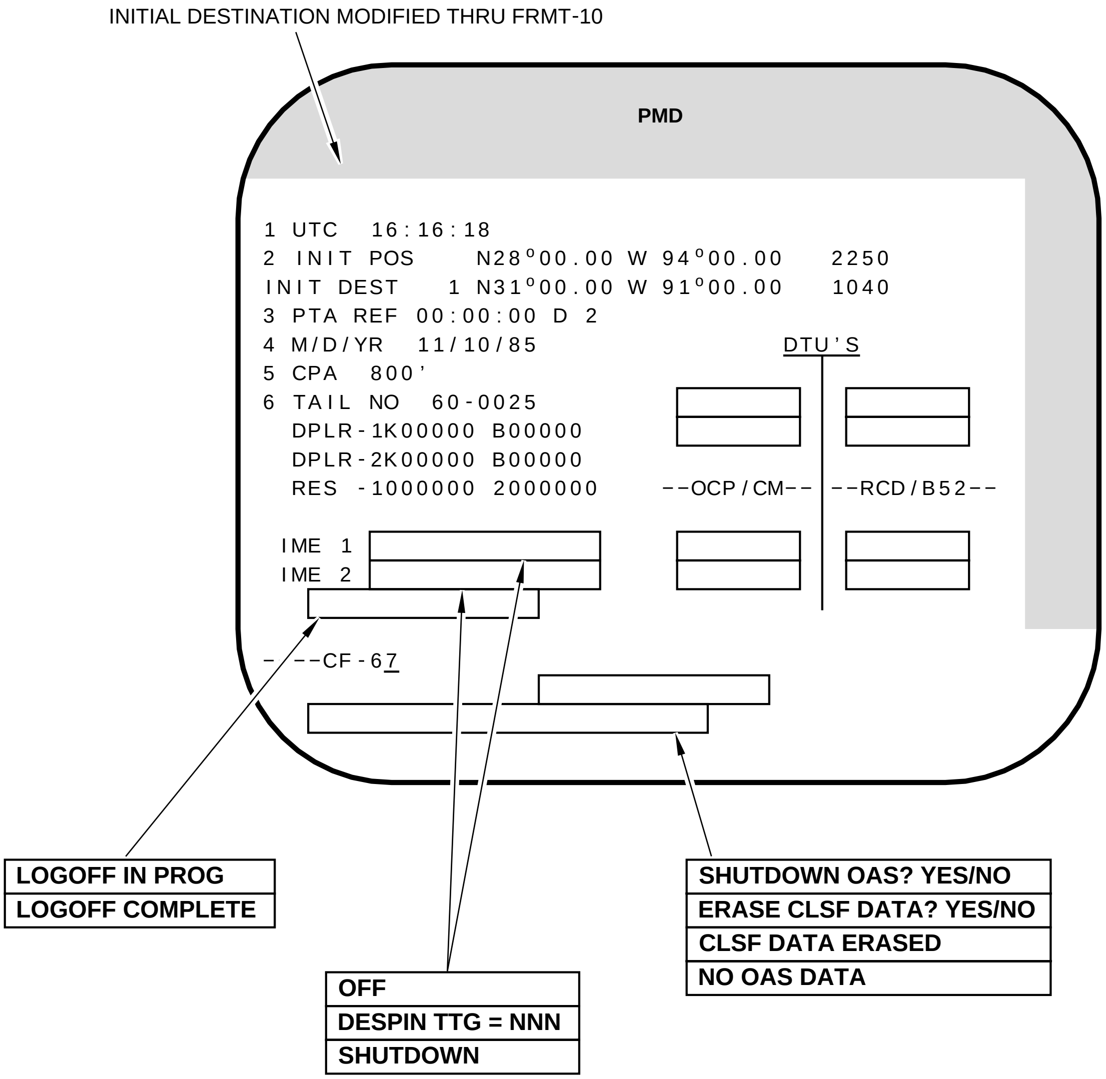
Control Function Displays (CF) (Cont)

[NS]

CF-67 OAS SHUTDOWN

NOTE

UTC must be entered prior to shutdown.



```
1 UTC   16:16:18
2 INIT POS     N28°00.00 W 94°00.00    2250
INIT DEST    1 N31°00.00 W 91°00.00    1040
3 PTA REF 00:00:00 D 2
4 M/D/YR  11/10/85                   DTU'S
5 CPA  800'
6 TAIL NO  60-0025
  DPLR-1K00000 B00000
  DPLR-2K00000 B00000
  RES -1000000 2000000     --OCP/CM-- --RCD/B52--
 IME 1
 IME 2
- --CF-67
```

Figure 1A-8 (Sheet 13 of 17)

[CS]

CF-67 OAS SHUTDOWN

NOTE

UTC must be entered prior to shutdown.

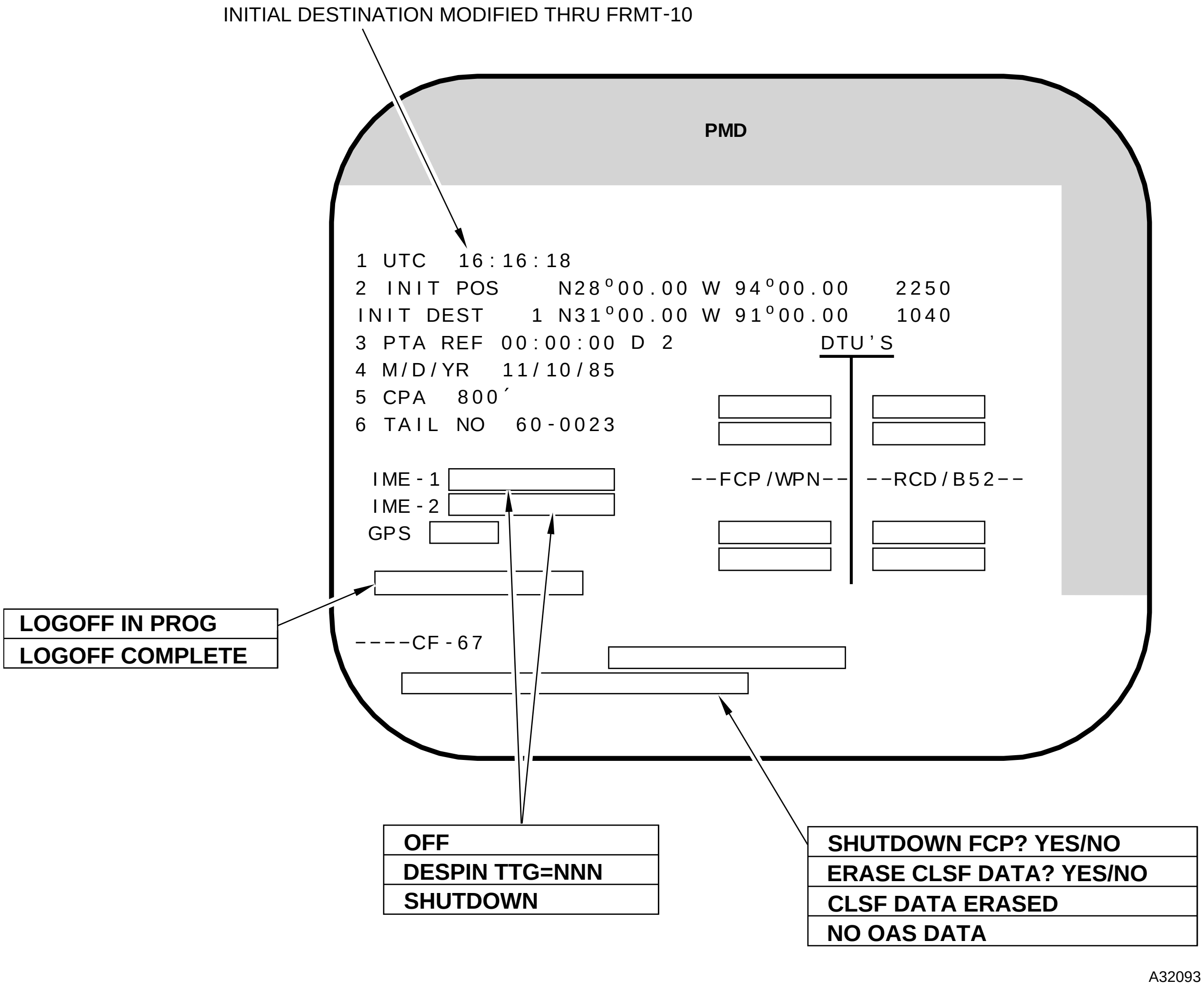
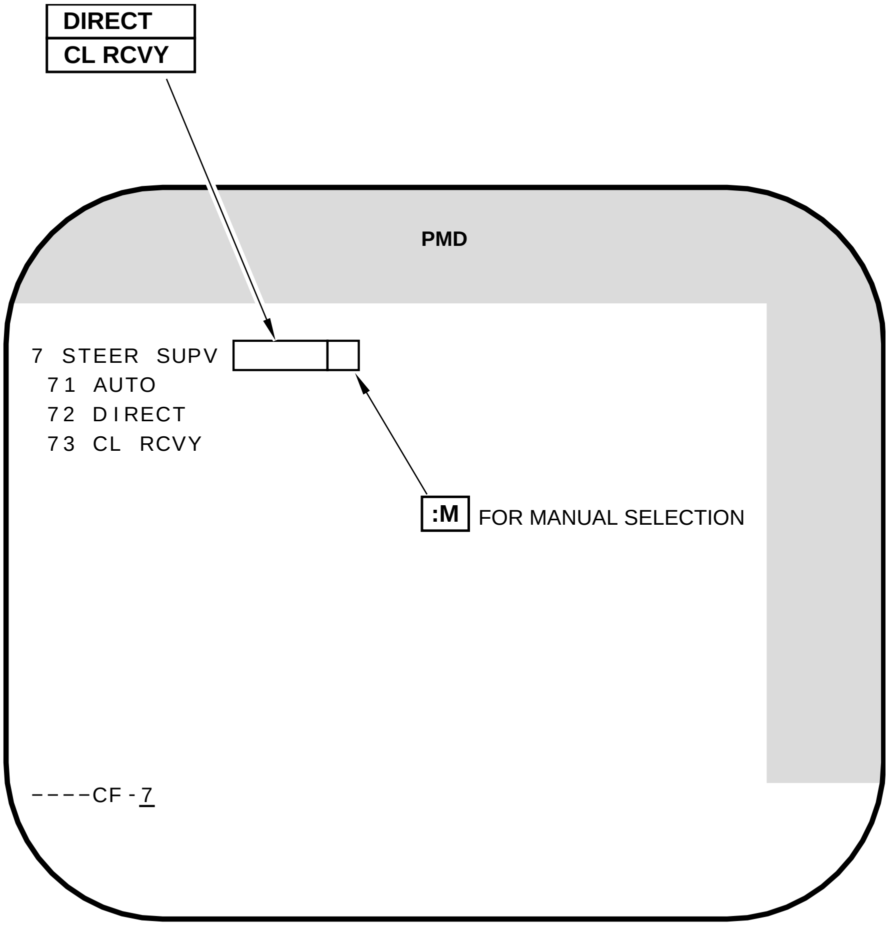


Figure 1A-8 (Sheet 14 of 17)

Control Function Displays (CF) (Cont)

[CS][NS]

CF-7 STEERING SUPERVISION MENU



A32047

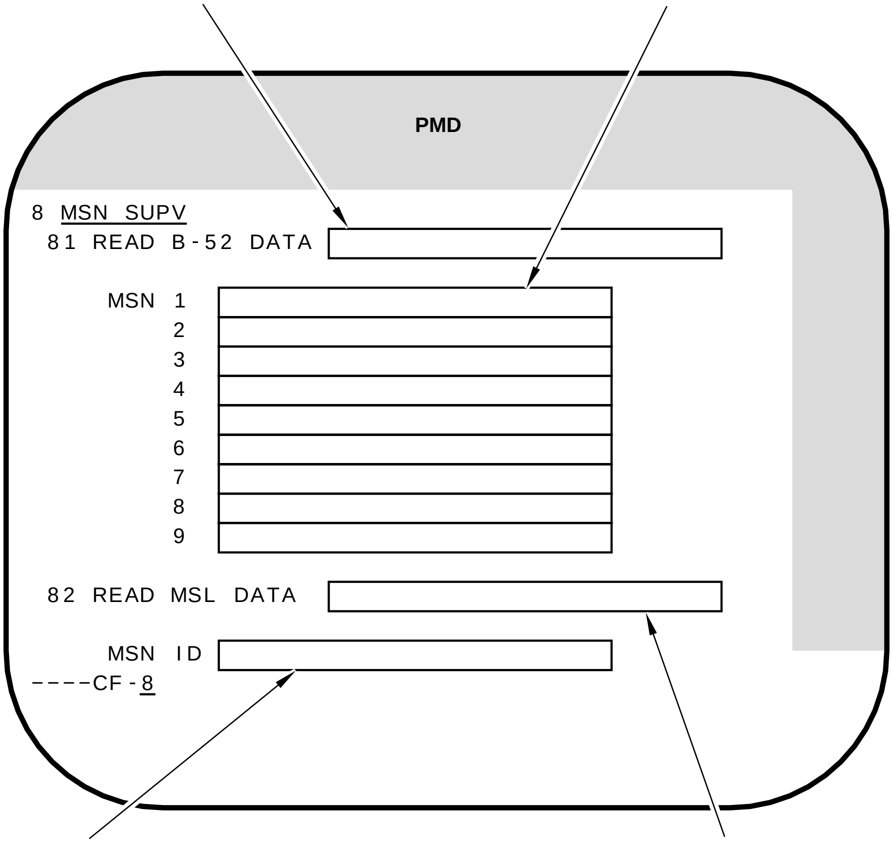
Figure 1A-8 (Sheet 15 of 17)

[NS]

CF-8 MISSION SUPERVISION

B-52 MISSION DATA WHICH HAS BEEN LOADED IN THE OAS. LINE IS DISPLAYED AT THE COMPLETION OF MISSION LOAD.

AVAILABLE B-52 MISSIONS RESIDENT ON THE B-52 MISSION TAPE. UP TO 9 MISSIONS MAY BE STORED ON A TAPE.



CRUISE MISSILE GROUP DATA FOR THE ALCM/ACM TAPE WHICH IS PHYSICALLY PRESENT IN A POWERED DTU CAVITY. THE OAS READS THE TAPE HEADER AT DTU CAVITY POWER APPLICATION AND THEN DISPLAYS THE 'MSN ID' LINE.

CRUISE MISSILE GROUP DATA FOR THE ALCM/ACM TAPE WHICH HAS BEEN LOADED IN THE MISSILES VIA A CF-81, N OR CF-82 COMMAND. DATA IS LOADED AUTOMATICALLY AFTER EITHER COMMAND HOWEVER, THE LINE IS ONLY DISPLAYED AFTER A CF-82 ENTRY.

NOTE

- CF-81, N will be reverse highlighted if selected during
  - Ter Com Fix
  - Missile Launch Countdown
  - While in Bomb Mode
- If mission data load is in progress, Ter Com Fix, Missile Launch Countdown, or Bomb Mode cannot be entered.
- B-52 mission and cruise missile group data consists of 1 to 28 characters.

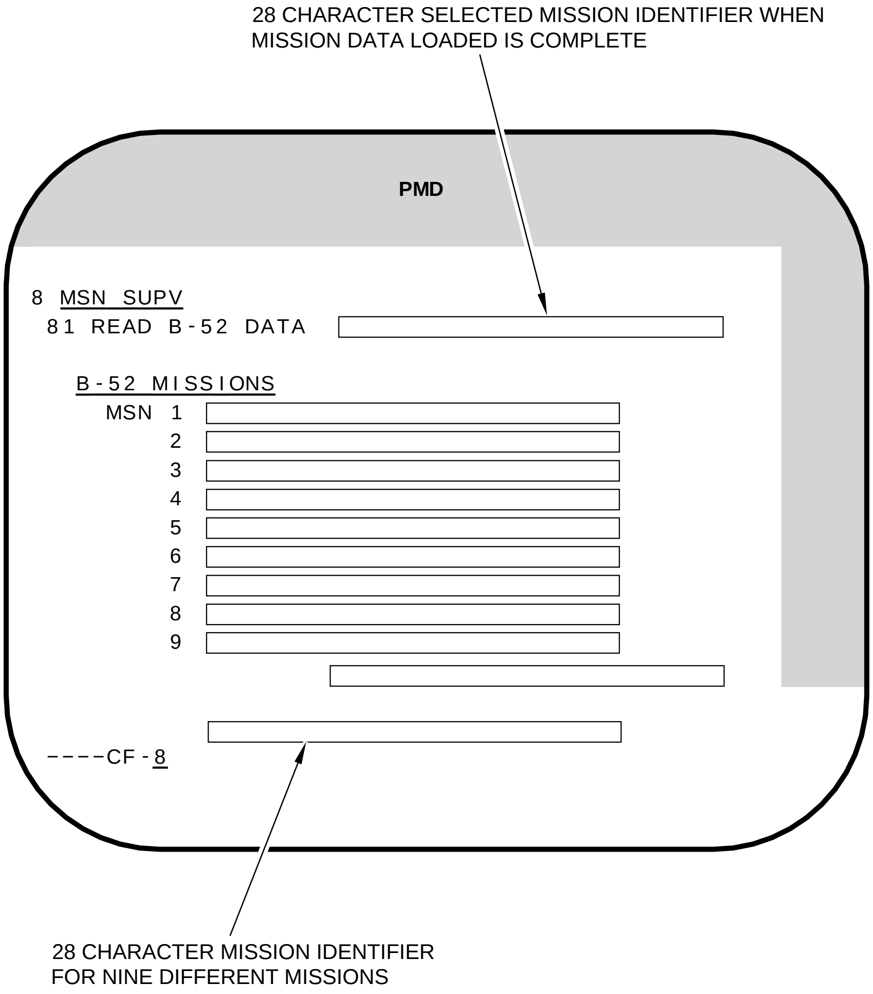
A32048

Figure 1A-8 (Sheet 16 of 17)

Control Function Displays (CF) (Cont)

[CS]

CF-8 MISSION SUPERVISION



NOTE

The mission identifiers can display from 1 up to a maximum of 28 characters.

A32094

Figure 1A-8 (Sheet 17 of 17)

Formats (FRMT)

Formats display radar, EVS, equipment status, weapon status, and mission data. Formats are commanded using the FRMT key with the designator for the desired display. FRMT ENTER provides a menu of all available formats for quick reference. See figure 1A-9 for examples of format displays. Selection of FRMT-n (n = 1-6) will display either radar video (n = 1,2) or EVS video n = 3-5) and the associated data group for the n selection for the prime nav model (PMD when n = 2, 4, 5). Selection of FRMT-n, x (n = 2, 4, 5; x = 1-4) will display either radar or EVS video (n) and PMD for INS 1 (x = 1), INS 2 (x = 2), or the ALTER nav model (x = 3). This function allows for the display and comparison of PMD from two nav models on adjacent MFDs. Selection of FRMT +, provided FRMT-1 through FRMT-6 is currently displayed, will change the azimuth and range lines in the left data column of the FRMT display to latitude and longitude readout of either the radar or EVS crosshair position. The readout will update if the crosshair is moved. A FRMT + command to any display other than FRMT-1 through FRMT-6 will not be accepted by the OAS.

Programs (PRGM)

Programs display current and planned mission data, mission profile information, and weapon delivery data. Programs are commanded using the PRGM key with the designator for the desired display. PRGM ENTER provides navigational information for the current and next destination. See figure 1A-10 for examples of the program displays.

Fault Data Display

Prime mission equipment fault status is displayed on FRMT-6 as shown in figure 1A-9, and recorded onto the data recording tape via the DTU. The fault is only recorded on the first occurrence at the time the status changes from go to no-go. Recorded fault data includes subsystem equipment identification, fault status data, and time of failure. Fault status data can be retrieved from processor memory and displayed with a FRMT-6 command. Hardware, data bus, and software errors are displayed. An X is placed in the fault column following the acronym when a fault is detected. The X will be displayed in reverse highlight. The appropriate letter corresponding to a data bus fault is displayed in reverse highlight in the bus column preceding the acronym when a data bus fault is detected.

FRMT-6 displays current PME status at all times and PME faults will be erased with a CF-66 command.

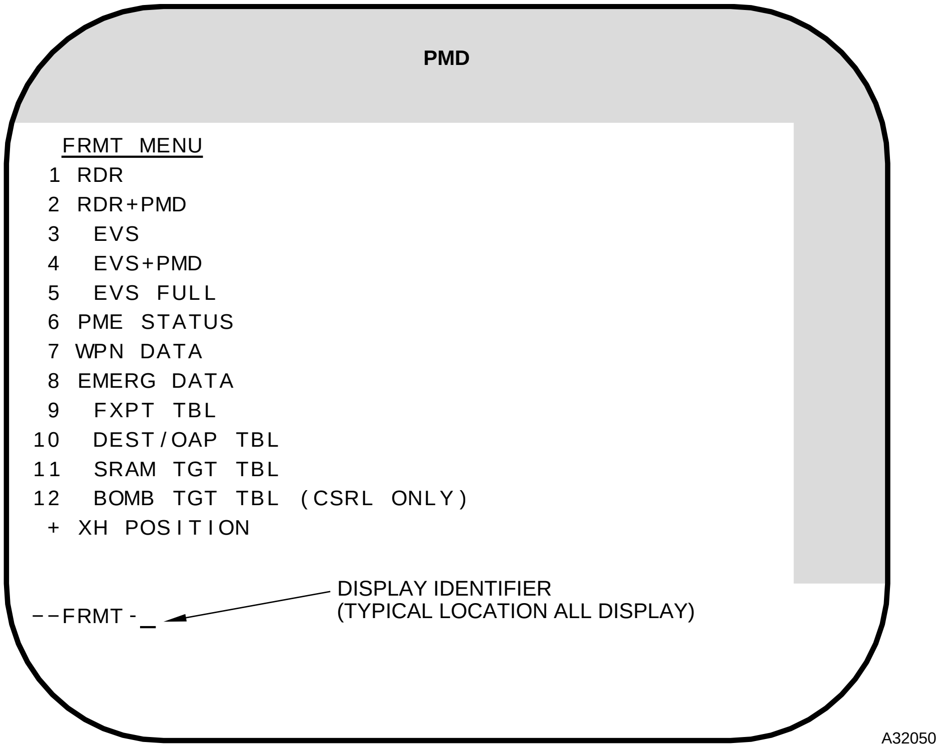
Damage Assessment/Strike Symbology (Nuclear Only)

Damage assessment/strike symbology (DA/S) can be displayed either for a radar or an EVS target. The EVS and radar DA/S are similar and shown in figure 1A-10. DA/S symbology can be generated for a radar or EVS target when it is designated as a DA/S target in the mission data tape. DA/S symbology is generated when the radar or EVS crosshair is placed on the target direct either manually or automatically from the IP to TTG=0. When EVS sighting is active the DA/S symbology can be commanded by PRGM-E ENTER and erased with CLR-E ENTER. DA/S size is related to range selected, the size being inversely proportional to the range selected.

Format Displays (FRMT)

[NS]

FRMT FORMAT MENU

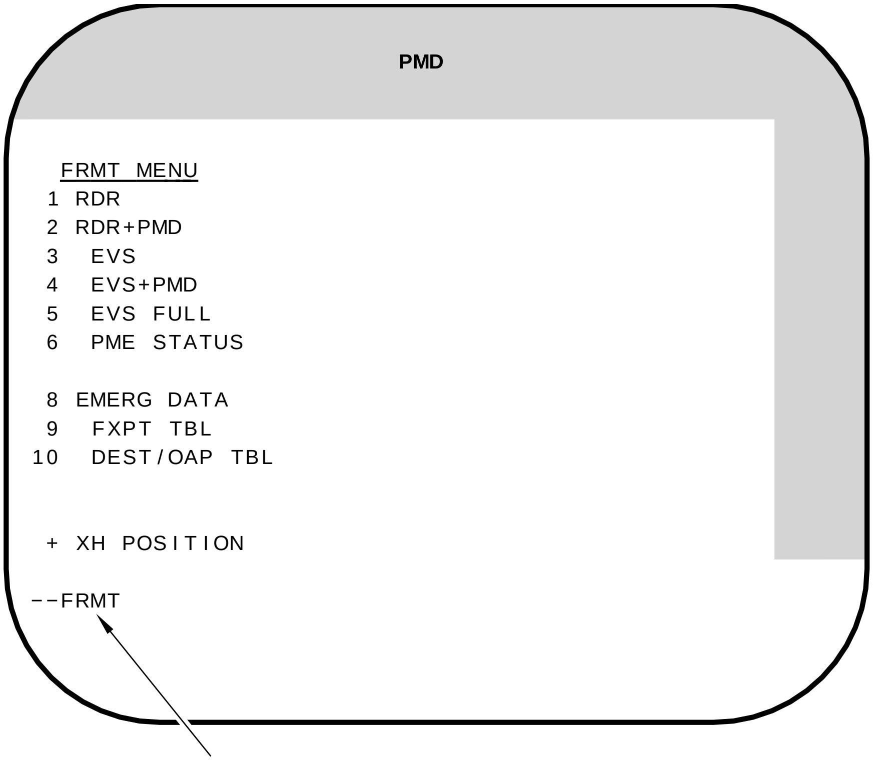


DISPLAY IDENTIFIER
(TYPICAL LOCATION ALL DISPLAY)

Figure 1A-9 (Sheet 1 of 15)

[CS]

FRMT FORMAT MENU



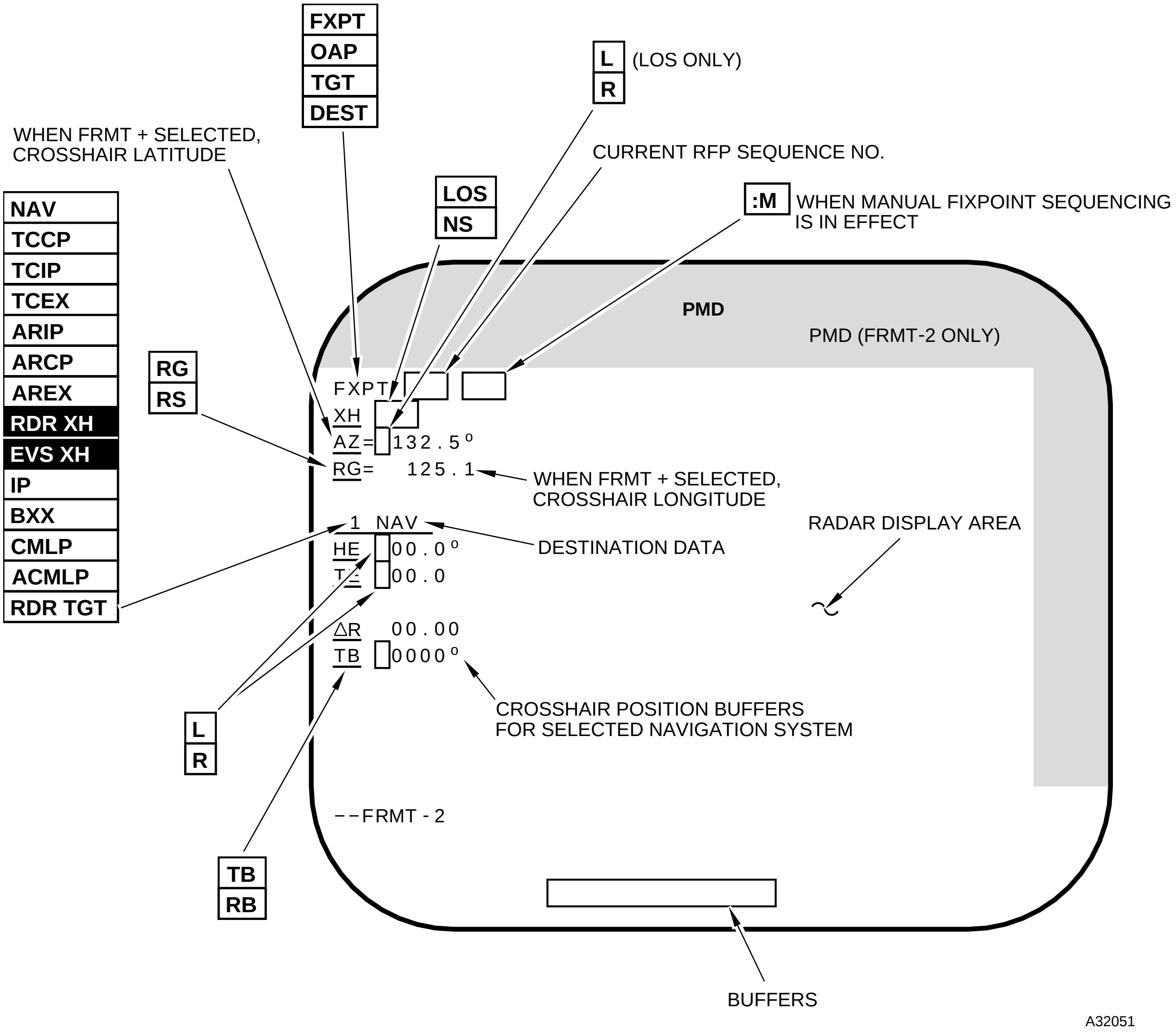
DISPLAY IDENTIFIER
(TYPICAL LOCATION ALL DISPLAY

Figure 1A-9 (Sheet 2 of 15)

Format Displays (FRMT) (Cont)

[NS]

FRMT-2 RADAR DISPLAY PLUS PRIME DATA*

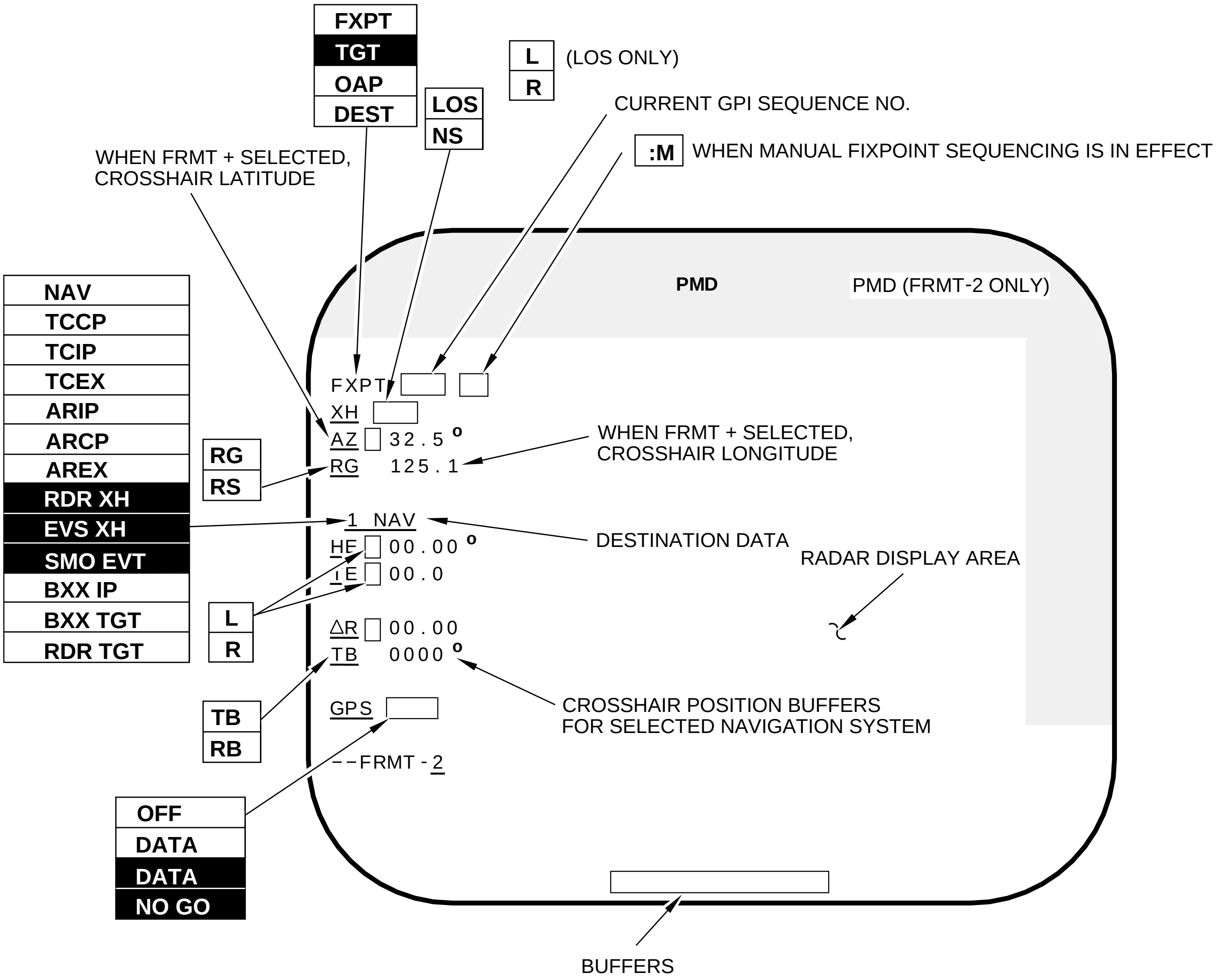


* FRMT-1, Radar Display without prime data, is not shown.

Figure 1A-9 (Sheet 3 of 15)

[CS]

FRMT-2 RADAR DISPLAY PLUS PRIME DATA*



NOTE

For the GPS DATA block: Normal video indicates GPS power ON, data valid for alternate navigation; bright video indicates GPS power ON, data valid for inertial navigation; and, reverse video indicates GPS power ON and GPS data is invalid or the FMS is going through reconfiguration loading.

A32096

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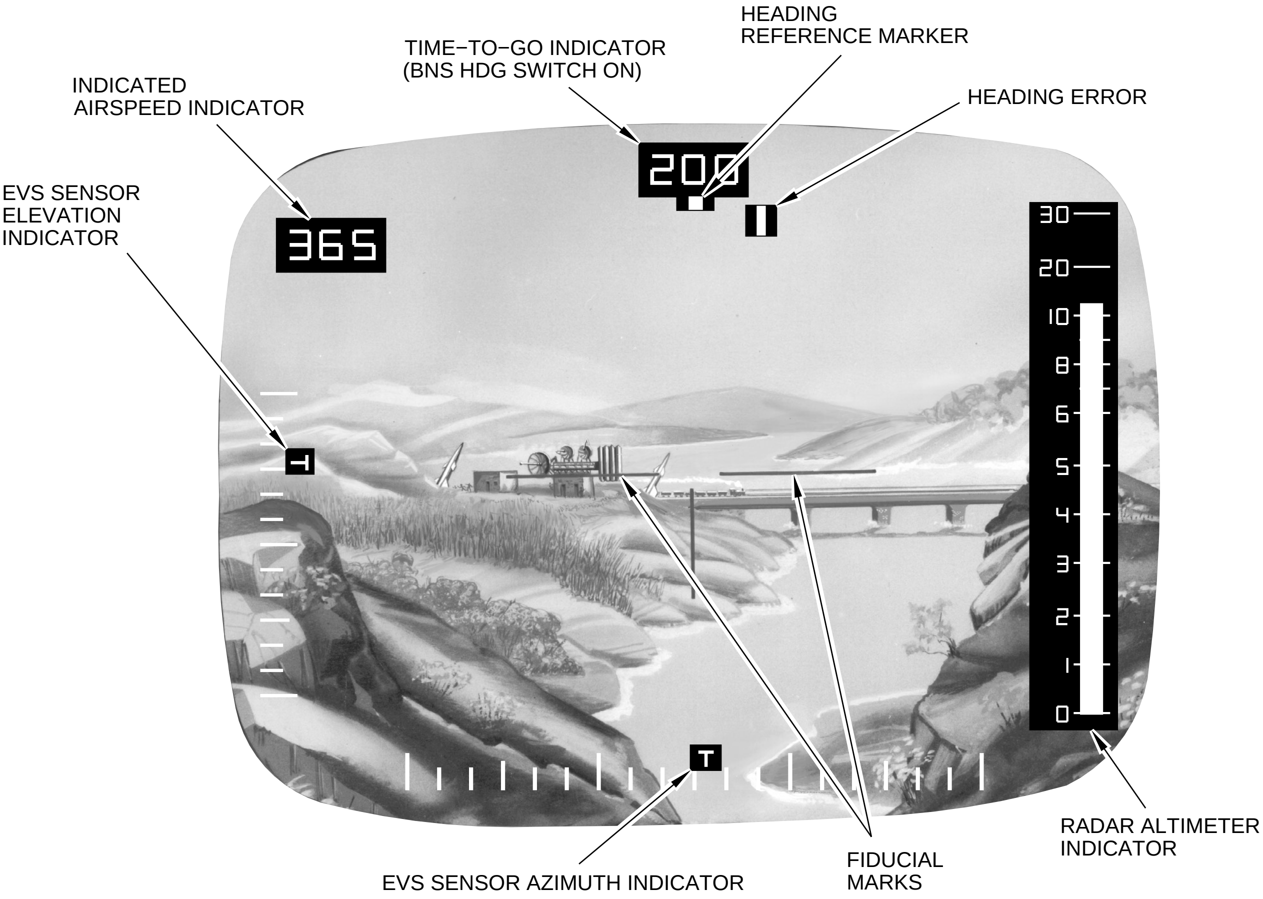
* FRMT-1, Radar Display without prime data, is not shown.

Figure 1A-9 (Sheet 4 of 15)

Format Displays (FRMT) (Cont)

[CS][NS]

FRMT-3 EVS DISPLAY

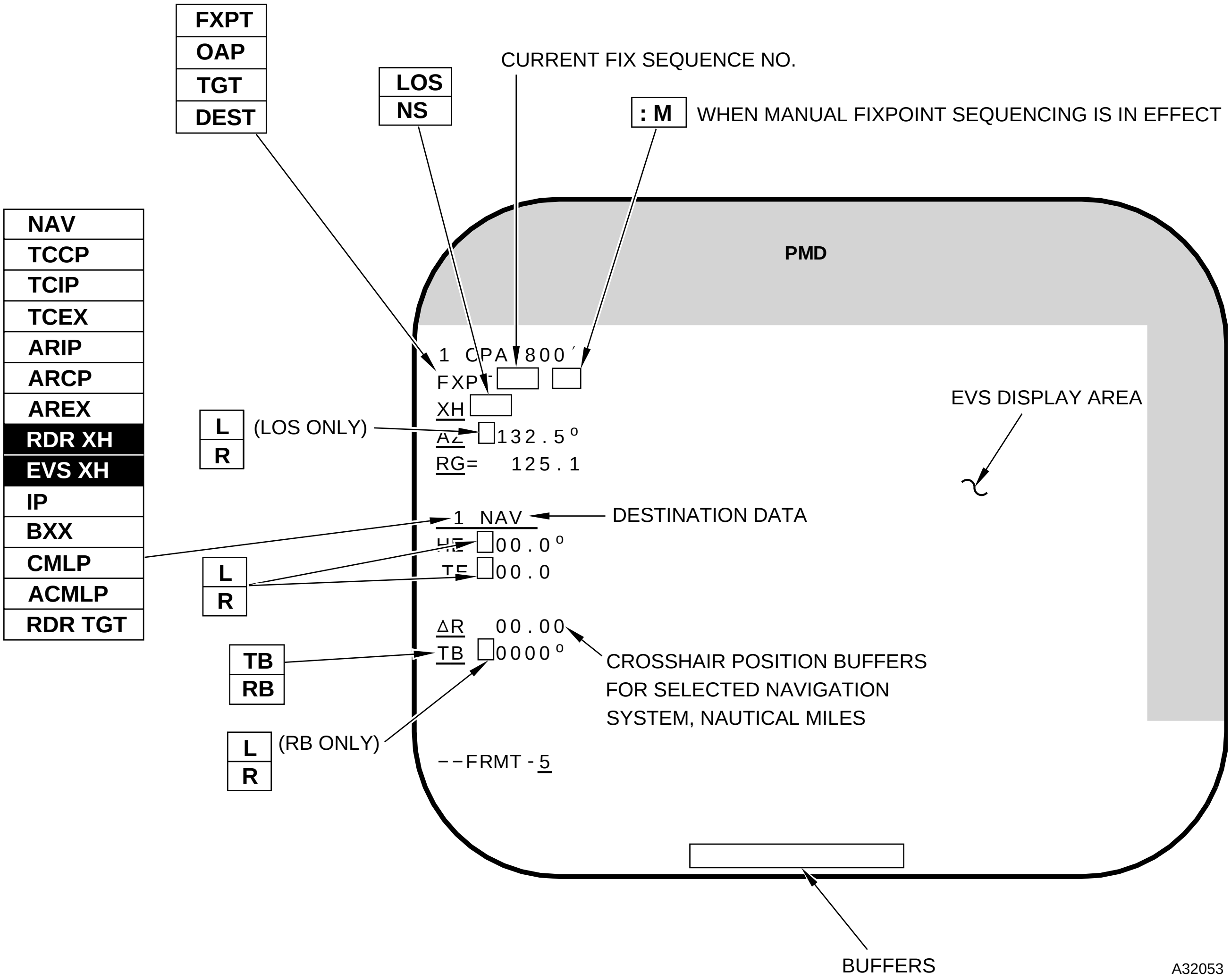


A32052

Figure 1A-9 (Sheet 5 of 15)

[NS]

FRMT-5 EVS FULL DISPLAY*



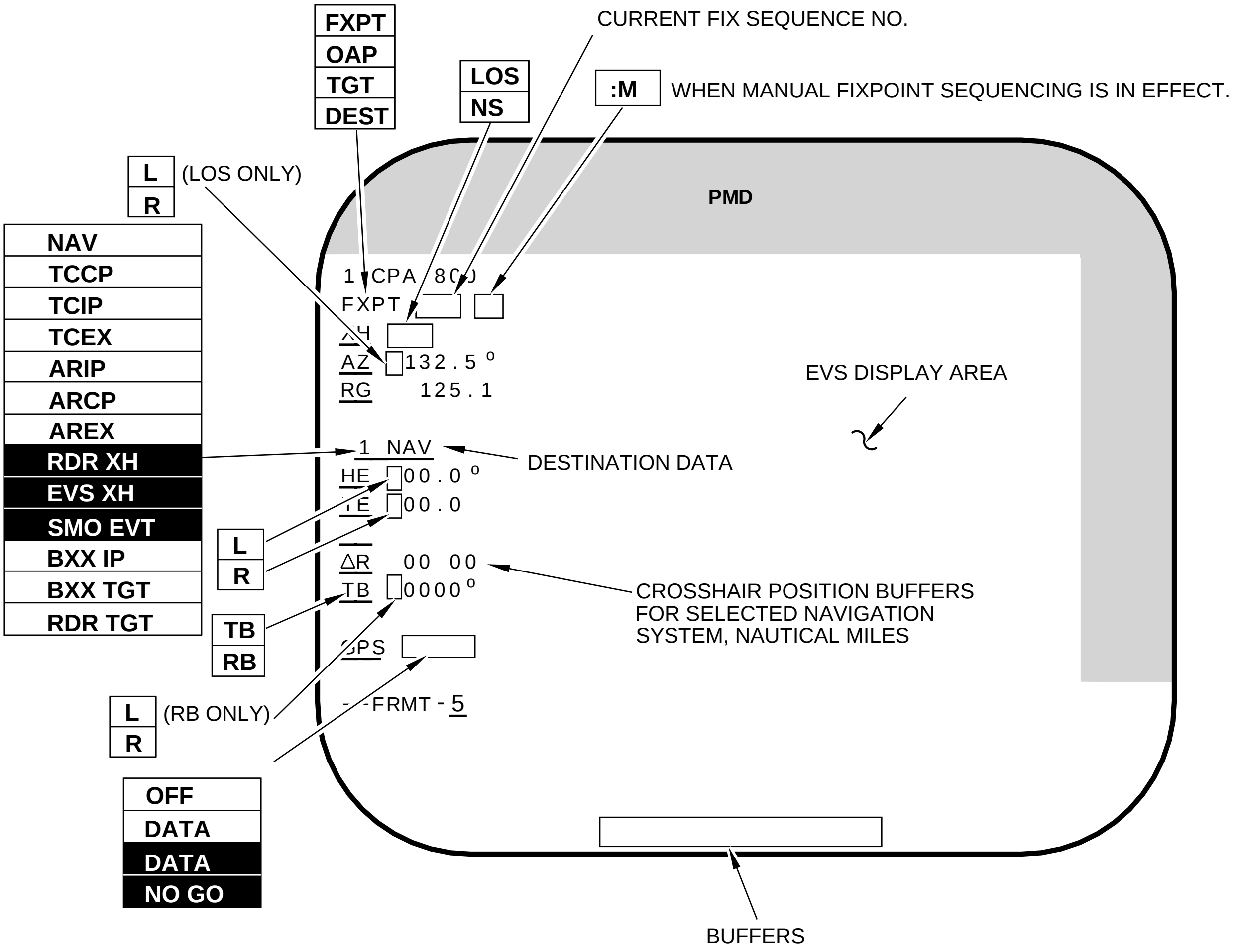
* FRMT-4, same as above except no left side data, is not shown.

Figure 1A-9 (Sheet 6 of 15)

Format Displays (FRMT) (Cont)

[CS]

FRMT-5 EVS FULL DISPLAY*



NOTE

For the GPS Data block: Normal video indicates GPS power ON, data valid for alternate navigation; bright video indicates GPS power ON, data valid for inertial navigation; and, reverse video indicates GPS power ON and GPS data is invalid or the FMS is going through reconfiguration loading.

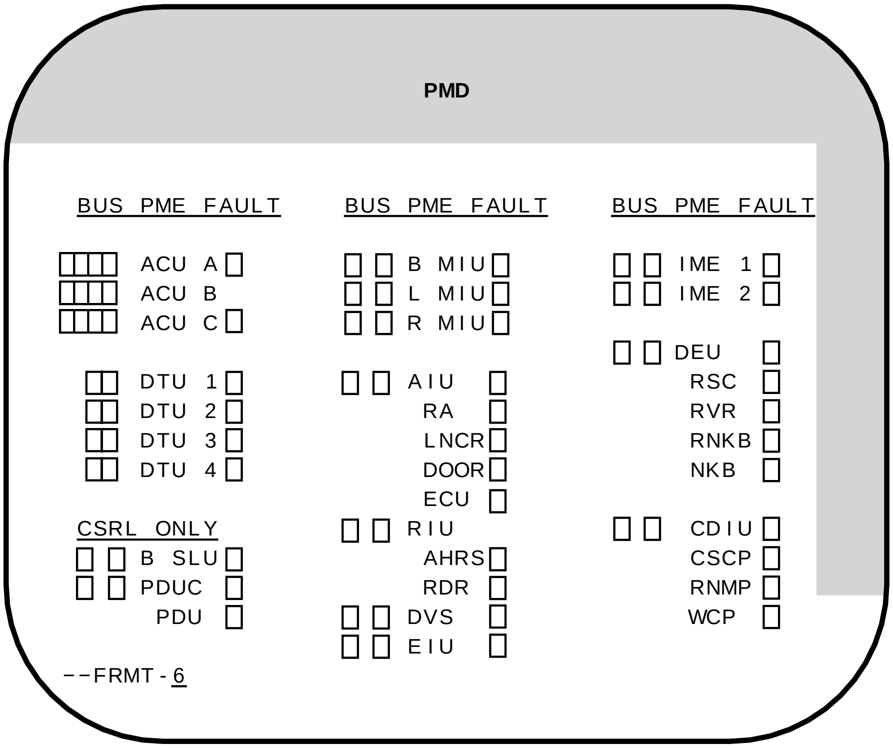
A32097

* FRMT-4, same as above except no left side data, is not shown.

Figure 1A-9 (Sheet 7 of 15)

[NS]

FRMT-6 PRIME MISSION EQUIPMENT STATUS



NOTE

- An $\boxed{X}$ in the FAULT column beside PME acronym in reverse video indicates a PME hardware fault.
- $\boxed{A}$, $\boxed{B}$, $\boxed{C}$, $\boxed{D}$, $\boxed{E}$, or $\boxed{F}$ in reverse video in the BUS column indicates a fault in the respective data bus.

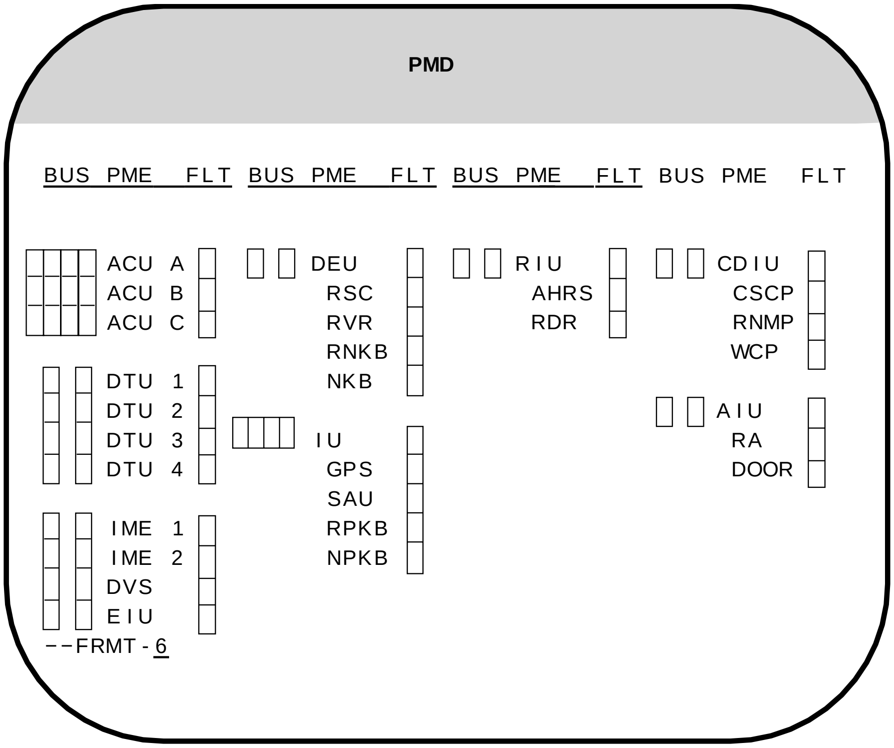
A32054

Figure 1A-9 (Sheet 8 of 15)

Format Displays (FRMT) (Cont)

[CS]

FRMT-6 PRIME MISSION EQUIPMENT STATUS



NOTE

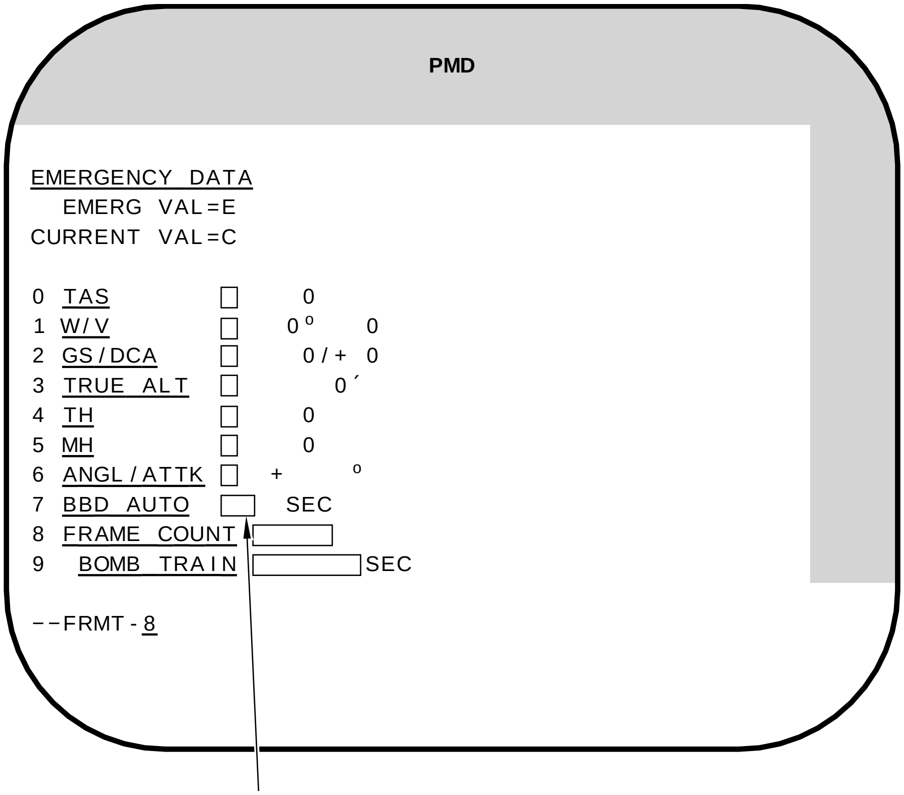
- An $\boxed{X}$ in the FAULT column beside PME acronym in reverse video indicates a PME hardware fault.
- $\boxed{A}$, $\boxed{B}$, $\boxed{C}$, $\boxed{D}$, $\boxed{E}$, or $\boxed{F}$ in reverse video in the BUS column indicates a fault in the respective data bus.

A32098

Figure 1A-9 (Sheet 9 of 15)

[NS]

FRMT-8 EMERGENCY DATA*



```
EMERGENCY DATA
  EMERG VAL=E
CURRENT VAL=C

0  TAS         ☐      0
1  W/V         ☐    0°      0
2  GS/DCA      ☐      0/+   0
3  TRUE ALT    ☐         0´
4  TH          ☐      0
5  MH          ☐      0
6  ANGL/ATTK   ☐   +        °
7  BBD AUTO    ☐    SEC
8  FRAME COUNT ☐
9   BOMB TRAIN ☐ SEC

--FRMT-8
```

BOMB DOOR OPEN TIME (PRIOR TO TTG = 0). SET TABLE FROM 0 TO 15 SECONDS

NOTE

- **C** in window when values are current OAS values.
- E in window when values are emergency values.
- Emergency values in PMD are reverse video when used for navigation.

A32055

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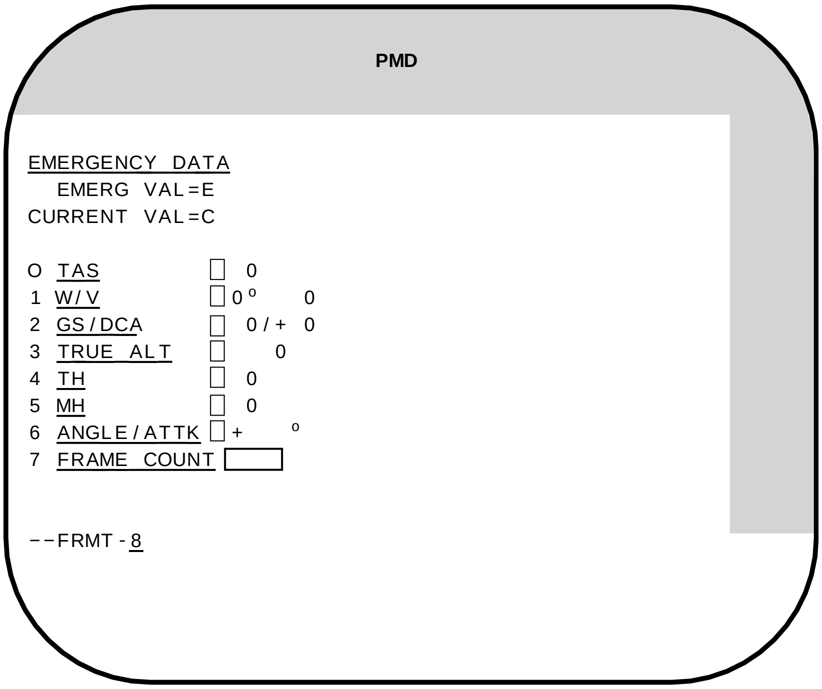
* FRMT-7, Weapon Data, is not shown. See applicable weapon manual.

Figure 1A-9 (Sheet 10 of 15)

Format Displays (FRMT) (Cont)

[CS]

FRMT-8 EMERGENCY DATA*



```
EMERGENCY DATA
  EMERG VAL=E
CURRENT VAL=C

O TAS          ☐ 0
1 W/V          ☐0°     0
2 GS/DCA       ☐ 0/+ 0
3 TRUE ALT     ☐     0
4 TH           ☐ 0
5 MH           ☐ 0
6 ANGLE/ATTK   ☐+     °
7 FRAME COUNT  ☐


--FRMT-8
```

NOTE

- C In window when values are current FCP values.
- E In window when values are emergency values.
- Emergency values in PMD are reverse video when used for navigation.

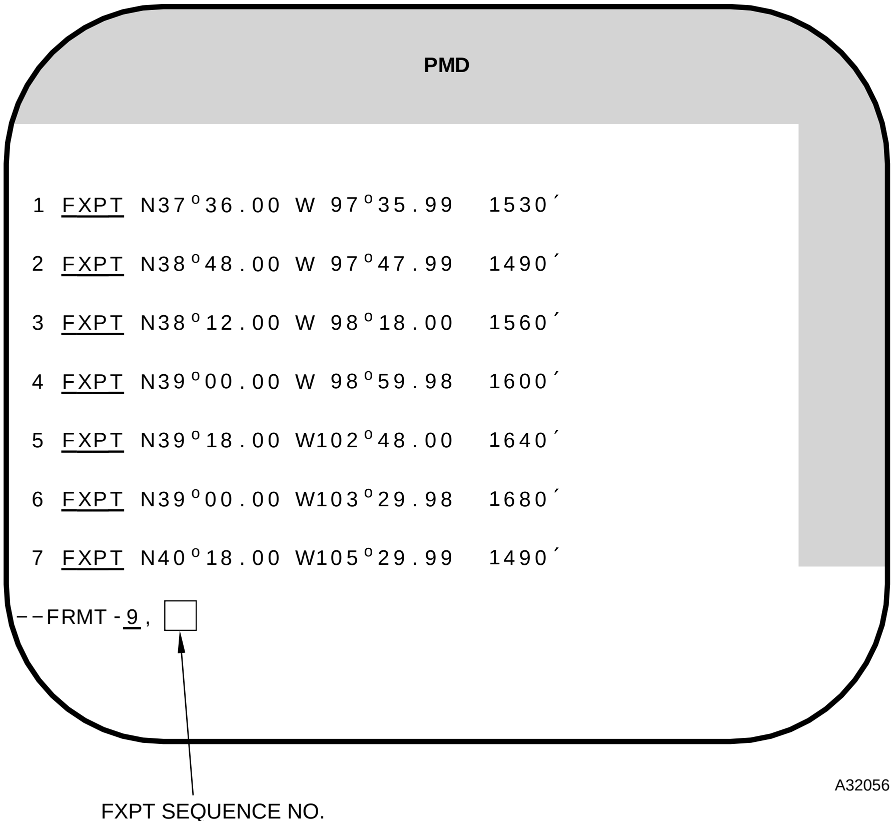
A32099

* FRMT-7, Weapon Data, is not shown. See applicable weapon manual.

Figure 1A-9 (Sheet 11 of 15)

[CS][NS]

FRMT-9 FIXPOINT TABLE



```
1 FXPT N37°36.00 W 97°35.99  1530′
2 FXPT N38°48.00 W 97°47.99  1490′
3 FXPT N38°12.00 W 98°18.00  1560′
4 FXPT N39°00.00 W 98°59.98  1600′
5 FXPT N39°18.00 W102°48.00  1640′
6 FXPT N39°00.00 W103°29.98  1680′
7 FXPT N40°18.00 W105°29.99  1490′
--FRMT-9, ☐
```

NOTE

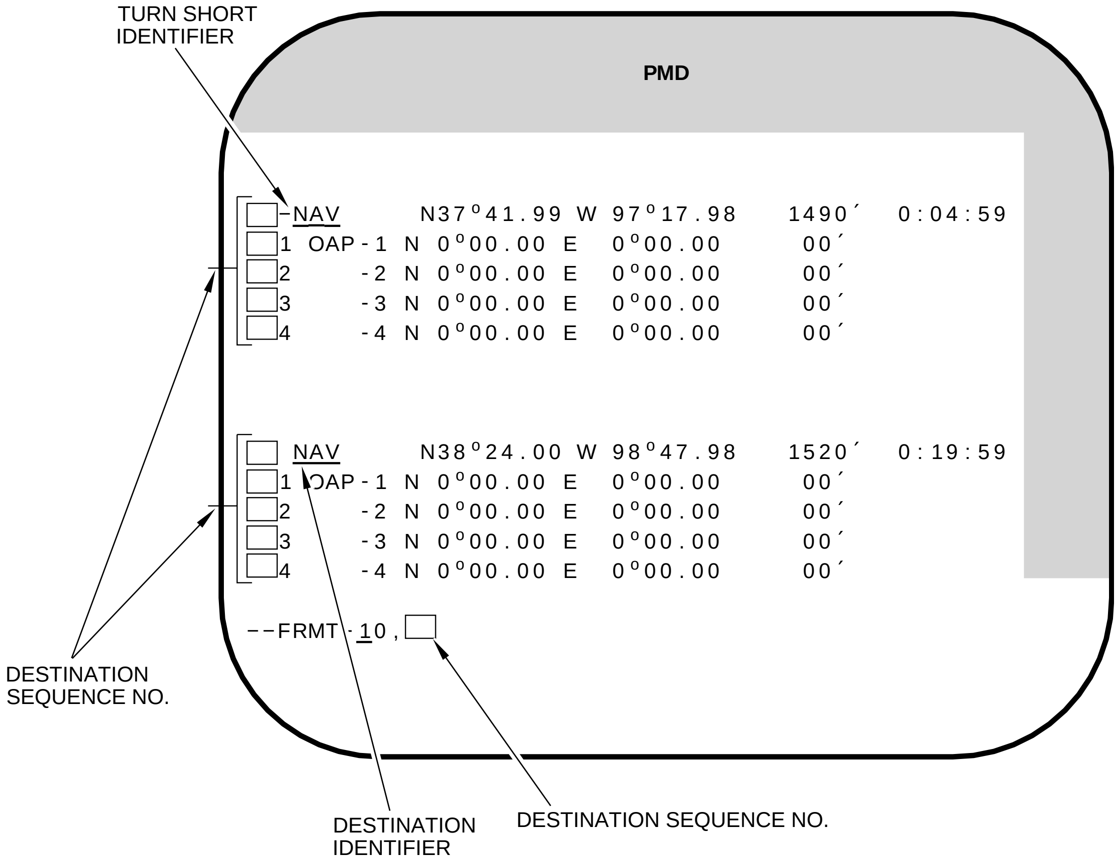
- FRMT-9 will display fixpoints 1 thru 7, if manual fixpoint sequencing is active.
- FRMT-9,NN display is the same as above, except the table begins with fixpoint NN.

Figure 1A-9 (Sheet 12 of 15)

Format Displays (FRMT) (Cont)

[NS]

FRMT-10 DESTINATION/OAP TABLE*



NAV
TCCP
TCIP
TCEX
ARIP
ARCP
AREX
RDR XH
EVS XH
IP
BXX
CMLP
ACMLP
RDR TGT

NOTE

- FRMT-10 will command the current active destination and the next sequential destination.
- FRMT-10, NN will command destination NN and the next sequential destination.

A32057

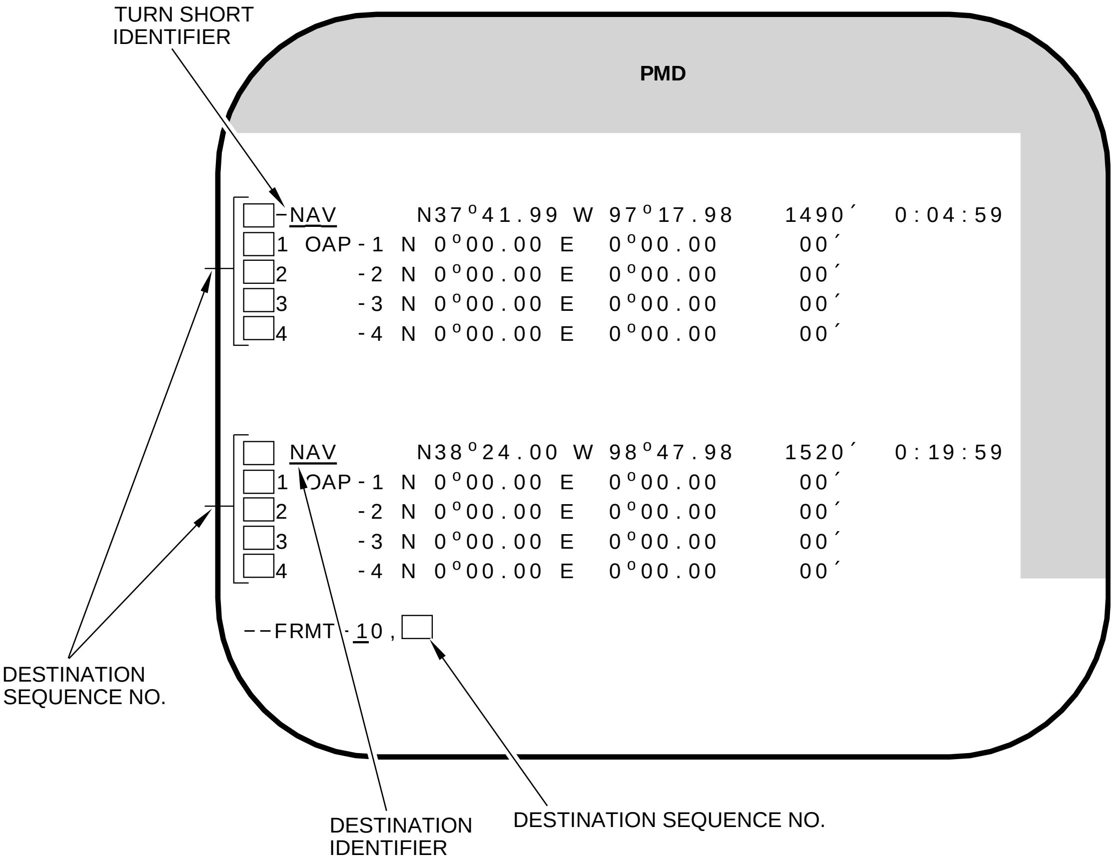
---

* FRMT-12, Gravity Weapon Target Table, is not shown. See T.O. 1B-52H-25-2.

Figure 1A-9 (Sheet 13 of 15)

[CS]

FRMT-10 DESTINATION/OAP TABLE*



```
☐-NAV       N37°41.99 W 97°17.98    1490′   0:04:59
☐1  OAP-1  N  0°00.00 E  0°00.00      00′
☐2      -2  N  0°00.00 E  0°00.00      00′
☐3      -3  N  0°00.00 E  0°00.00      00′
☐4      -4  N  0°00.00 E  0°00.00      00′

☐ NAV       N38°24.00 W 98°47.98    1520′   0:19:59
☐1  OAP-1  N  0°00.00 E  0°00.00      00′
☐2      -2  N  0°00.00 E  0°00.00      00′
☐3      -3  N  0°00.00 E  0°00.00      00′
☐4      -4  N  0°00.00 E  0°00.00      00′

--FRMT-10,☐
```

NAV
TCCP
TCIP
TCEX
ARIP
ARCP
AREX
RDR XH
EVS XH
SMO EVT
IP
BXX TGT
RDR TGT

NOTE

- FRMT-10 will command the current active destination and the next sequential destination.
- FRMT-10, NN will command destination NN and the next sequential destination.

B61023

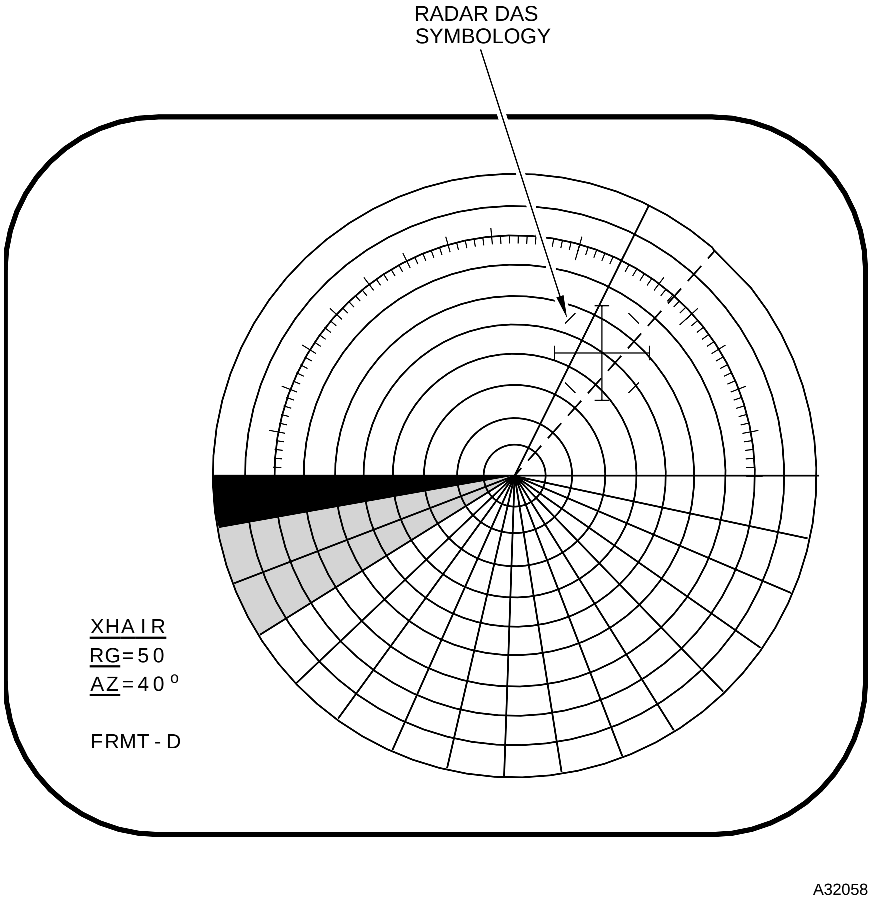
* FRMT-12, For Weapon Summary display for JASSM, see T.O. 1B-52H-34-2-8.

Figure 1A-9 (Sheet 14 of 15)

Format Displays (FRMT) (Cont)

[CS][NS]

FRMT-D RADAR SCAN CONVERTER BUILT-IN-TEST

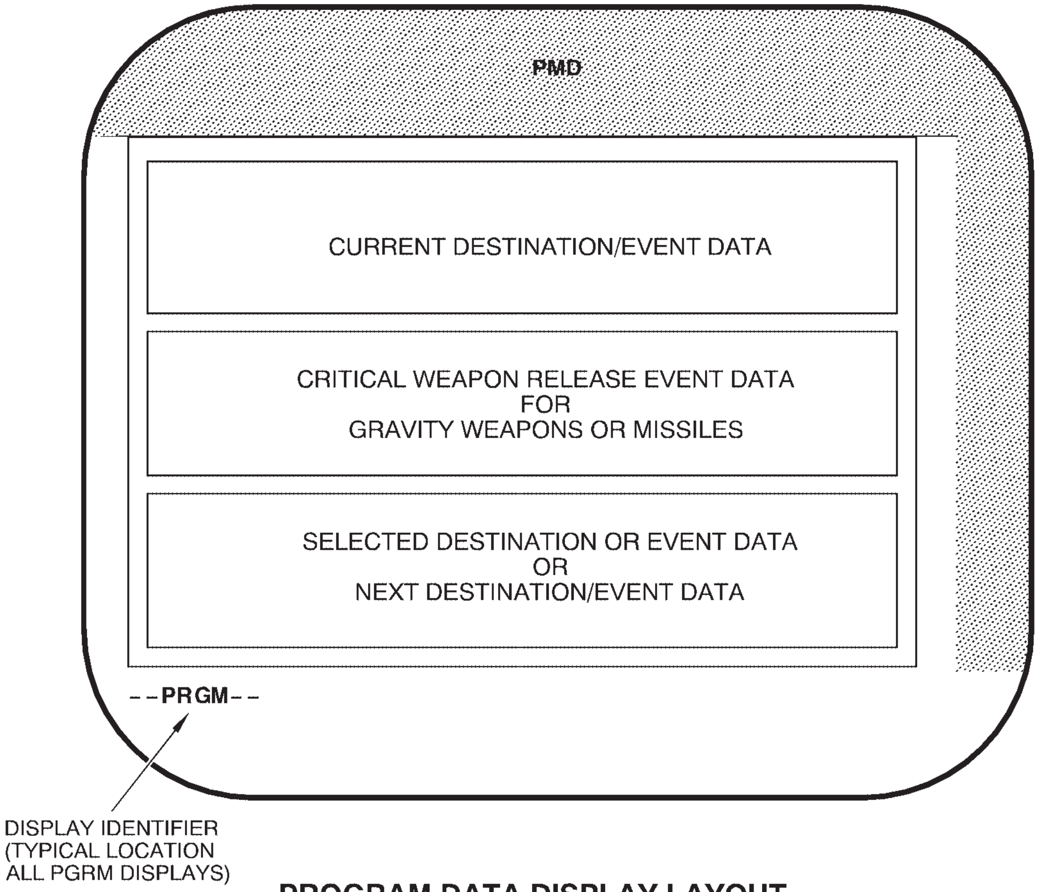


NOTE

Display shows multiple shades of gray and aids in tuning the MFD for best contrast and brightness level.

Figure 1A-9 (Sheet 15 of 15)

Program Displays (PRGM)

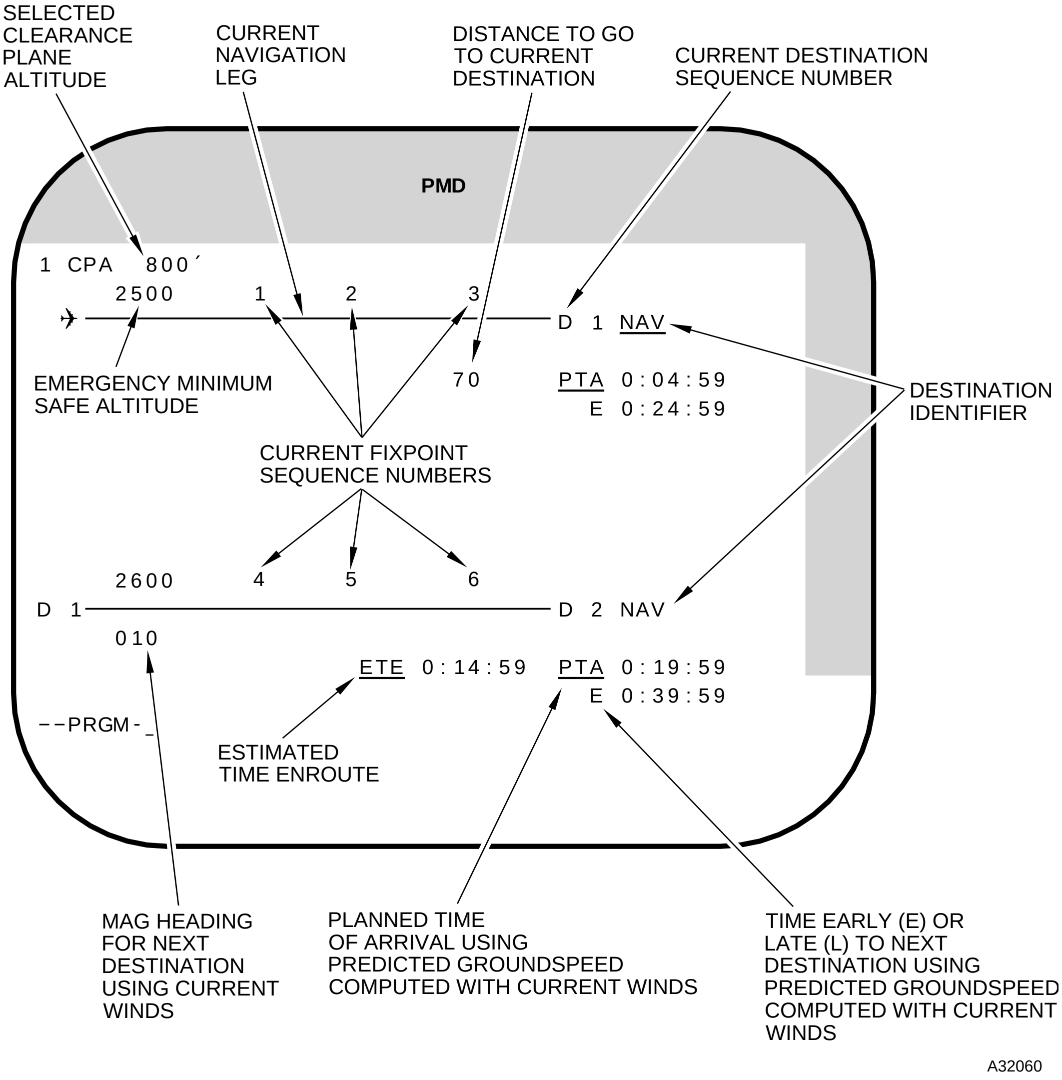


PROGRAM DATA DISPLAY LAYOUT

A32059

Figure 1A-10 (Sheet 1 of 4)

Program Displays (PRGM) (Cont)

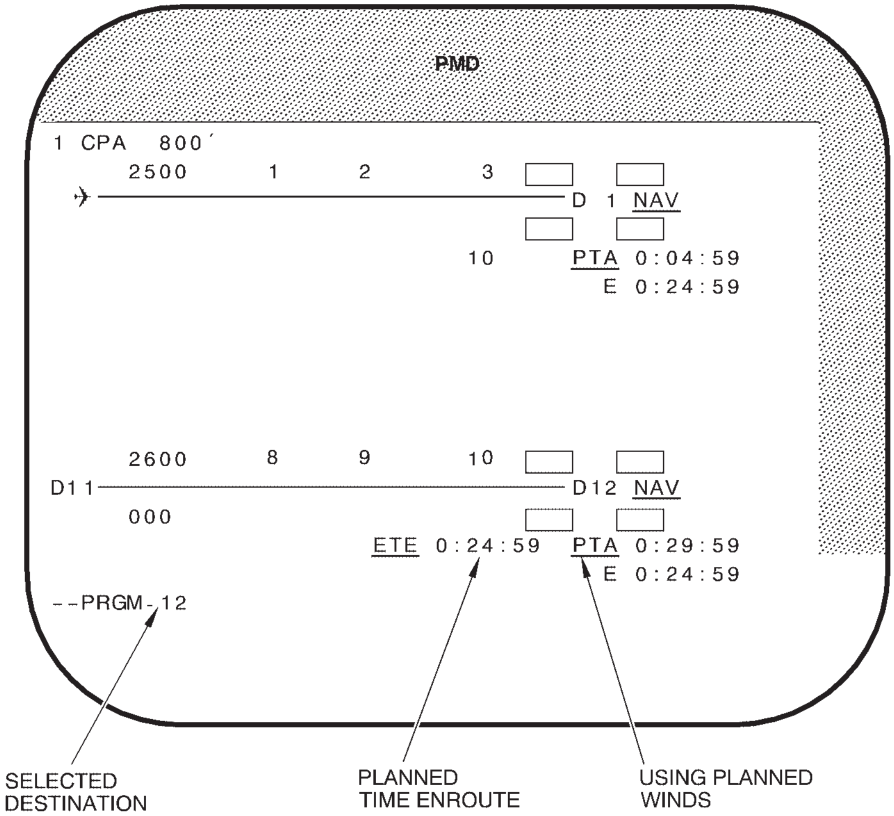


DESTINATION IDENTIFIERS

[NS]	
NAV	IP
TCCP	BXXX
TCIP	CMLP
TCEX	ACMLP
ARIP	RDR TGT
ARCP	
AREX	
RDR XH (Reverse Video)	
EVS XH (Reverse Video)	

[CS]	
NAV	BXX IP
TCCP	BXX TGT
TCIP	RDR TGT
TCEX	DATK LP
ARIP	WCMD LP
ARCP	JSOW IP
AREX	JASSM LP
RDR XH (Reverse Video)	CALCMLP
EVS XH (Reverse Video)	

Figure 1A-10 (Sheet 2 of 4)



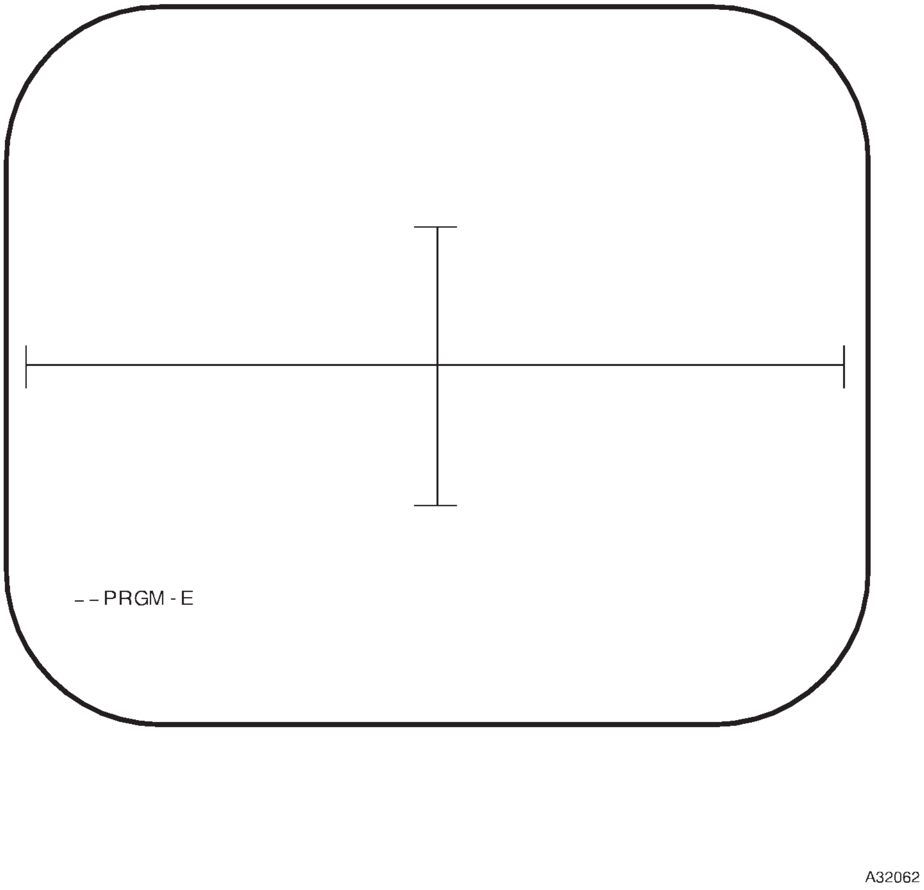
PRGM-NN SELECTED DESTINATION

NOTE

- Callouts are same as event (basic navigation) sheet 2.
- Current destination data is displayed on top line as shown in the current event display.

A32061

Figure 1A-10 (Sheet 3 of 4)



NUCLEAR PRGM-E EVS DAMAGE ASSESSMENT SYMBOLOGY

Figure 1A-10 (Sheet 4 of 4)

OAS Data Transfer Units and Computer Control

DESCRIPTION

The OAS computer equipment consists of three avionics processors, data buses, data transfer units which accommodate four data cartridges, and a computer control panel. These elements function together as the computational subsystem under control of the navigator. The computational subsystem is the brain of the OAS and performs all calculations needed for navigation and weapon delivery, all coding, decoding and communication of data, and all systems management and control functions. The avionics processors (computers) are designed to work together in a synchronized manner to accomplish all OAS tasks. The processors are designated A, B, and C. Normally, one processor handles the navigation and weapon delivery programs, a second processor handles the system control and display programs, and a third processor can be loaded with the hot spare program. For processor malfunction operation, see Abnormal Operation, Section III. The data buses, designated A, B, C, D, E, and F are collectively called a MIL-STD-1553 data bus which is the communication path for all OAS prime mission equipment. The FRMT-6 Prime Mission Equipment Status Display shows bus faults. Generally, the navigation and weapon delivery functions are accomplished on one pair of buses and the control and display functions on the others. The data transfer units (DTUs) are the magnetic tape readers and recorders. The DTUs have four cavities which accommodate tape cartridges. These cartridges contain the computer programming information, mission data information, cruise missile data, and a blank tape on which to record mission data. All computer equipment control is accomplished by the computer control panel.

CONTROLS AND INDICATORS

Data Transfer Units (DTU)

The data transfer unit (DTU) transfers information to and from storage via the magnetic tape contained within the data transfer unit cartridge. See figure 1A-12 for DTU functional information and cavity numbering information. The DTU cartridges may be loaded into any of the cavities. The system will search out the necessary information once the basic load cartridge is loaded. Figure 1A-12 gives the four kinds of data contained in the DTU cartridges: 1) The basic load program contains two kinds of programs that control system operation, Flight Computer Program (FCP) and Ground Maintenance Computer Program (GMCP). The FCP is used by the flightcrew for operation of the system as described in this manual. The GMCP is used by ground maintenance personnel and causes the system to operate in a different manner. Operation of the GMCP is not covered in Flight publications. 2) The mission data cartridge contains information on destinations, fixpoints, offset aiming points, targets, launch points, terrain correlation maps, magnetic variation data, and INS calibration data. 3) The cruise missile data cartridge contains the programming information for the appropriate cruise missile. 4) The mission data record DTUC is controlled automatically by the OAS. The OAS will rewind the record DTUC if one of the following occurs:

- The DTU containing the DTUC is turned off and then back on.
- The OAS is recycled and “PROC SYNC” is commanded.

If the record DTUC is not removed after it is rewound, all previously recorded data will be lost as the OAS writes new information to the DTUC.

NOTE

> If the mission requirements dictate the preservation of the data on the record DTUC, the navigator should remove a rewound DTUC before the OAS attempts to write further data.

The DTU cartridges are provided with small thumbscrews to retain the cartridges in the cavities. The DTU cartridges are installed and removed with DTU power off. The DTU retainer knob does not allow the DTUC to be removed with power applied to the DTUC. Rotating the knob so the flat side is parallel to the DTUC removes power from the respective DTUC and allows it to be removed from the DTU.

Computer Control Panel

The computer control panel controls all operation of the avionics processors and allows monitoring of DTU and processor functions. See figure 1A-13 for description and functional information on the computer control panel.

Computational Subsystem Data Flow

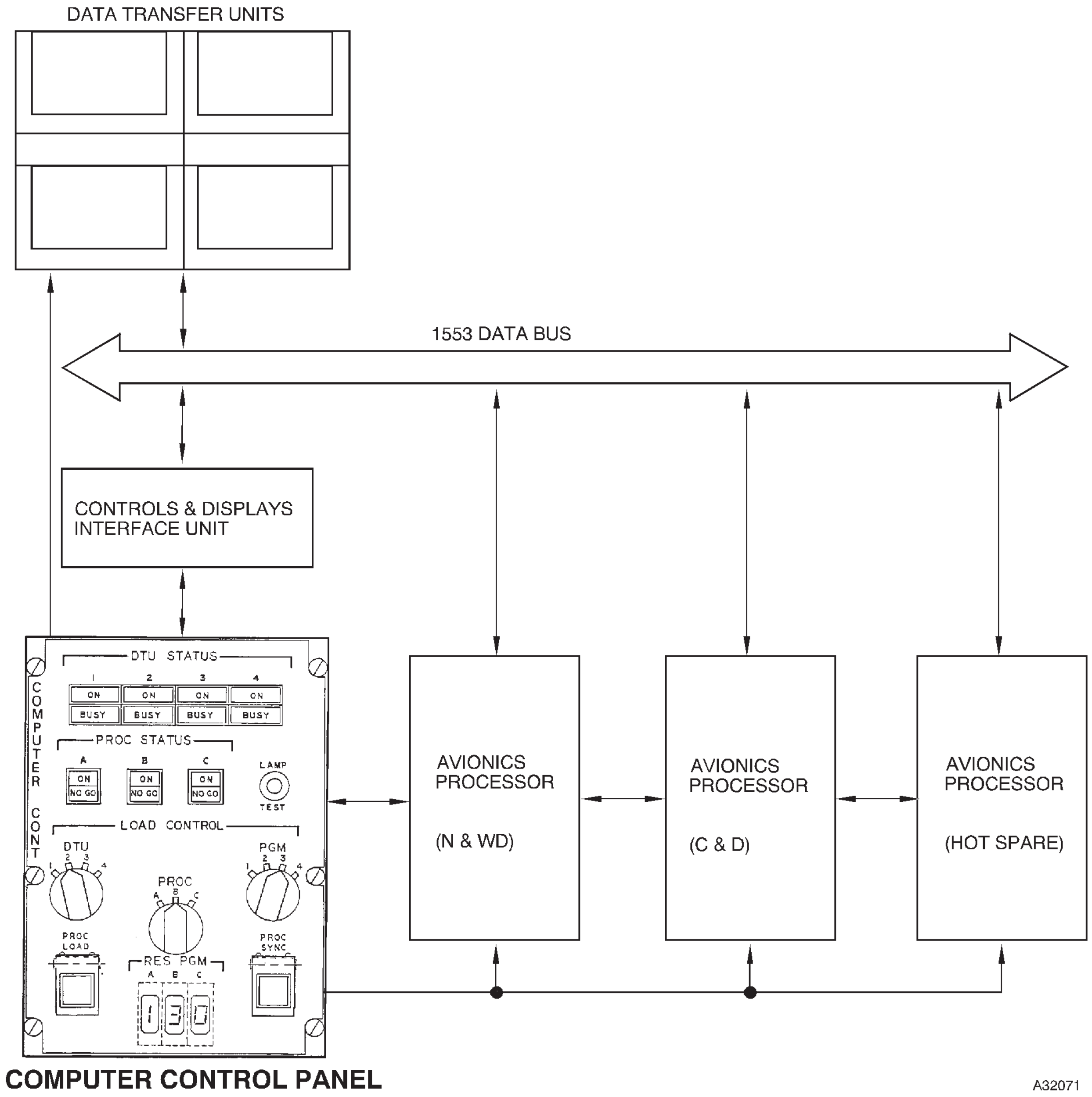


Figure 1A-11

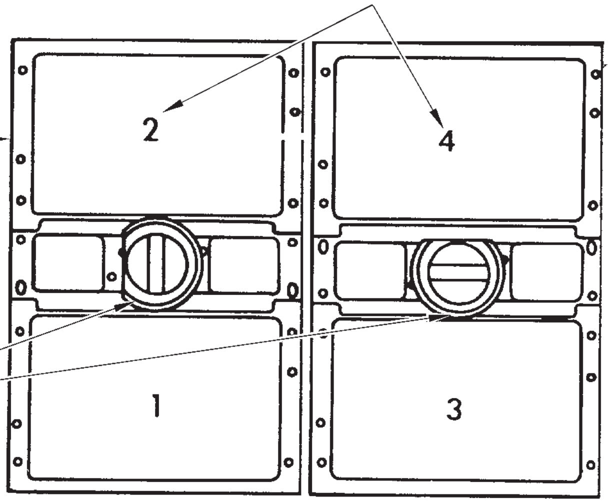
Data Transfer Unit (DTU)

DTU CAVITY NUMBERING

Two Data Transfer Units (DTU) hold four cartridges in separate cavities to store data and transfer data between the ACUs and the cartridge tapes.

DTUC Retainer Knob (2)

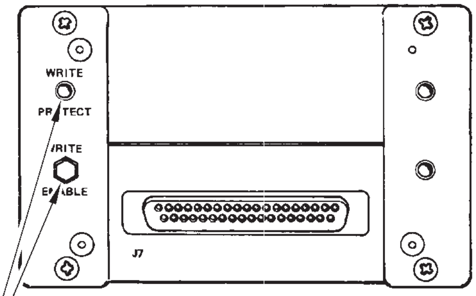
Rotating knob so flat side is parallel to the top or bottom of the DTUC removes power from respective DTUC and allows DTUC removal.



NAVIGATOR FRONT PANEL

NOTE

- DTUC's can be installed in any order. The mission data tape and cruise missile data tape should not be installed in same DTU for the most efficient operation.
- For initial loading of processors, rotate DTUC retainer knob so flat side is opposite the basic load tape. When loading is complete, rotate DTUC retainer knob so that flat side is vertical.



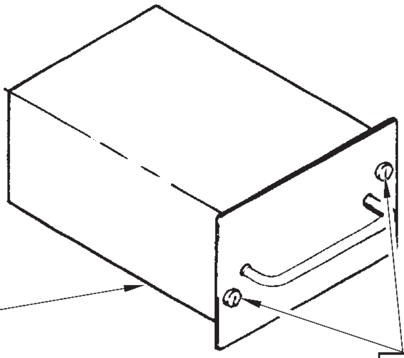
DTUC REAR VIEW

WRITE PROTECT Port

When covered prevents data recording/accidental erasure.

WRITE ENABLE Port

Allows data to be recorded on DTUC. WRITE ENABLE plug must be installed in order to write information on DTUC.



TYPICAL CARTRIDGE
Contains:
- Basic Load Program
  - Flight Computer Programs
  - Ground Maintenance Computer Program
- Mission Data Program
- Cruise Missile Data Program
- Mission Data Record Tape

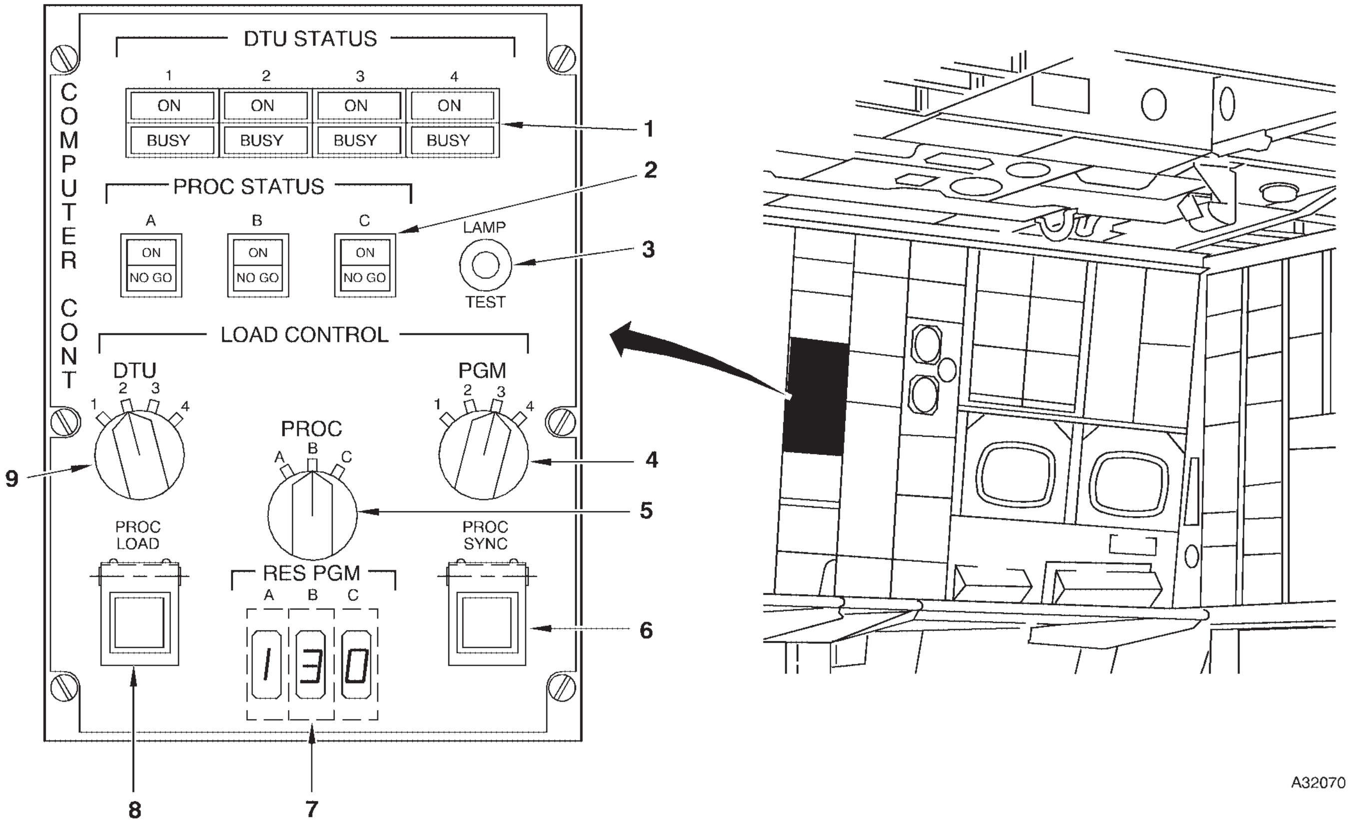
RETAINING THUMBSCREWS

The only means of securing the DTUC in the DTU.

A32069

Figure 1A-12

Computer Control Panel



1 DTU STATUS LIGHTS (4 PLACES)
2 PROCESSOR STATUS LIGHTS
3 LAMP TEST LIGHT
4 PROGRAM SELECTOR SWITCH
5 PROCESSOR SELECTOR SWITCH
6 PROCESSOR SYNCHRONIZATION SWITCH
7 RESIDENT PROGRAM DISPLAY
8 PROCESSOR LOAD SWITCH
9 DTU SELECTOR SWITCH

Figure 1A-13 (Sheet 1 of 2)

NO.	CONTROL-INDICATOR	FUNCTION
1	DTU STATUS Lights (4)	ON (green) when power is applied to DTU. BUSY (white) blinks when tape is reading, on steady while tape is rewinding.
2	Processor (PROC) STATUS Lights (3)	ON (green) when power is applied to processor. NO GO (amber) when processor has failed a BIT test either when power is initially applied or processor has failed after loading. The processor can be reset by pressing the status light to re-accomplish the self-test.
3	LAMP TEST Switch	Tests all lights on Computer Control panel.
4	Program (PGM) Selector Switch	Marked 1 thru 4 for selecting the respective program.
5	Processor (PROC) Selector Switch	Marked A, B, or C for selecting the processor to be loaded.
6	Processor Synchronization (PROC SYNC) Switch	Initializes processors.
7	Resident Program (RES PGM) Display	Indicates program number loaded in respective avionics processor. Program No. — Program 0 — No Program Loaded 1 — Nuclear 2 — Spare 3 — GMCP 4 — ICSMS FMS 5 — Spare 6 — Spare 7 — CLSF Data Erased *Program No. 5 and 6 will not display on the window. Program 7 is only displayed when the operator commands classified data erase.
8	Processor (PROC LOAD) Switch	Initiates loading of the processor selected by No. 5, PROC Selector switch.
9	DTU Selector Switch	Marked 1 thru 4 for selecting cavity from which selected processor is to be loaded.

Figure 1A-13 (Sheet 2 of 2)

SYSTEM OPERATION

The computational subsystem receives and transmits data over the MIL-STD-1553 data bus. It performs the supervisory and control functions for the OAS and performs the computations necessary for navigation, steering, gravity weapon delivery, missile alignment, and launch and terrain correlation. See figure 1A-11 for data flow between the various components. The computer control panel is used for system loading, but once it is operational the system operates under control of the FCP and the control panel is only used for monitoring.

CAUTION

> Do not attempt to operate DTUs at ambient temperatures below –40°C as damage to the DTUCs may result.

POWER UP

When OAS master power is turned on (see OAS System Configuration), power becomes available to the DTUs and the avionics processors as indicated by the green ON status lights on the computer control panel. No switching is necessary on the computer control panel. Blinking NO OAS DATA messages appear on selected MFDs.

PROGRAM LOAD

NOTE

- DTUCs can be loaded in any order. The mission data tape and cruise missile data tape should not be loaded in the same DTU for the most efficient operation.

- The mission data tape should remain installed in order to update magnetic variation. If the mission data tape DTUC must be removed for any reason, it should be reinstalled as soon as possible to update magnetic variation.

- There are two methods of loading the processor: directory program load and automatic program load. Either method is acceptable for loading nuclear or conventional. Loading time for three processors can vary depending on the type of programs being loaded, the DTUC tape position, and loading method. The following table represents loading times for three processors.

	DIRECTORY	AUTO
NUCLEAR	8 min 6 sec	7 min 15 sec
CONVENTIONAL	14 min 8 sec	14 min 21 sec

Directory Program Load

The directory program (figure 1A-14) allows the operator to selectively load programs into a specific processor. The navigation and weapons delivery (NAWD), controls and displays (CAD), and hot spare (HS) programs are loaded as desired. If one processor is no-go, NAWD and CAD programs should be loaded into the two good processors. Single processor operation is not possible. The loader function initiates loading of a processor through a directory program which displays the menu of available options. The directory program is only displayed by accomplishing steps 1 through 3 for the selected processor, and is displayed on all four MFDs. The processors are loaded as follows:

1. Install the DTUCs

2. Set the following switches on the computer control panel.
   a. PGM – 3
   b. DTU – To DTU containing FCP
   c. PROC – To processor to be loaded
   d. PROC STATUS Lights – ON, if NO-GO press to reset.

NOTE

> If a processor is NO-GO, it cannot be loaded.

3. Press PROC LOAD Switch. The directory program will be displayed on all four MFDs.

4. Enter two digit number on the keyboard. The number will be displayed in the VALID ID NO. window. If the number is erroneous, the SELECTED LOAD legend will appear in reverse video. Subsequent entries will reset the program number and SELECTED LOAD legend.

5. The following message will appear when a valid ID number is entered:
   READY TO LOAD XX YES/NO?
   XX= ID number

6. The operator must answer the question. If the answer is NO, the ID NO. and READY TO LOAD XX YES/NO? messages will be erased and await further operator action. If the answer is YES, the directory program display will erase all four MFDs and display the following message:

Loading nnnnnnnnn into PROC Y
nnnnnnnnn = program name

Y = A, B, or C

7. When the selected processor loading is complete, the appropriate number will appear in the RES PGM window. The program numbers are as follows:

WINDOW DISPLAY	MEANING
0	No Program Loaded
1	Nuclear Full-Up
2	Conventional Full-Up (Non ICSMS)
3	GMCP
4	Spare (Non-ICSMS) FMS Full-Up (ICSMS)
5	Nuclear Hot Spare
6	Conventional Hot Spare
7	Classified Data Erase

NOTE

- Random numbers may appear for processors that are not loaded.
- Window displays 5, 6, & 7 are computer generated advisories and cannot be loaded by the operator.
- When reconfiguration is complete, the back-up program numbers 5 or 6 will not be displayed. The primary program numbers 1 or 2, as applicable, will continue to be displayed.

8. Set the PROC switch to one of the remaining processors and repeat the procedure for the two remaining processors.

9. When all processors are loaded press the PROC SYNC switch.

Automatic Program Load

The OAS can automatically load the three avionics processors. Selection of the appropriate program will cause NAWD, CAD and hot spare to be loaded into the processors. The automatic program loads CAD into processor A, NAWD into processor B and hot spare into processor C, regardless of the order in which the processors are selected for loading. The PGM switch on the computer control panel (figure 1A-13) is used to select the program which is to be loaded into the processors. Program 1, commands a nuclear load; program 2 commands a conventional load; program 3 permits loading any program into any processor as described in directory program load; and program 4, loads the Ground Maintenance software.

The Automatic Program Load bypasses Directory Program Load. The MFDs will remain blank and display the appropriate numerals in the RES PGM window indicates when loading is complete. Automatic loading of all processors take approximately 6 minutes. The processors may be loaded as follows:

1. Install the DTUCs.
2. Set the following switches on the Computer Control Panel:
   a. PGM – N (N = 1 Nuclear; N = 2 Nonnuclear)
   b. DTU – To DTU containing FCP
   c. PROC – To processor to be loaded
   d. PROC STATUS lights – ON, if NO-GO press to reset

NOTE

If a processor is NO-GO, it cannot be loaded.

3. PROC LOAD Switch – Depress
The selected DTU busy light will come on and the program will load. When the processor loading is complete, the appropriate number will appear in the RES PGM window.
4. Set the PROC switch to one of the remaining processors and repeat the procedure for the remaining processors.
5. When all processors are loaded, press the PROC SYNC switch.

SHUTDOWN

Shutdown of the processors is accomplished when OAS master power is turned off during the accomplishment of the shutdown procedure given in accordance with CF-67. After OAS power is off, the DTU cartridges may be removed from the cavities using the DTUC retainer knob, by releasing the thumbscrews, and pulling on the cartridge handles.

Directory Program Display

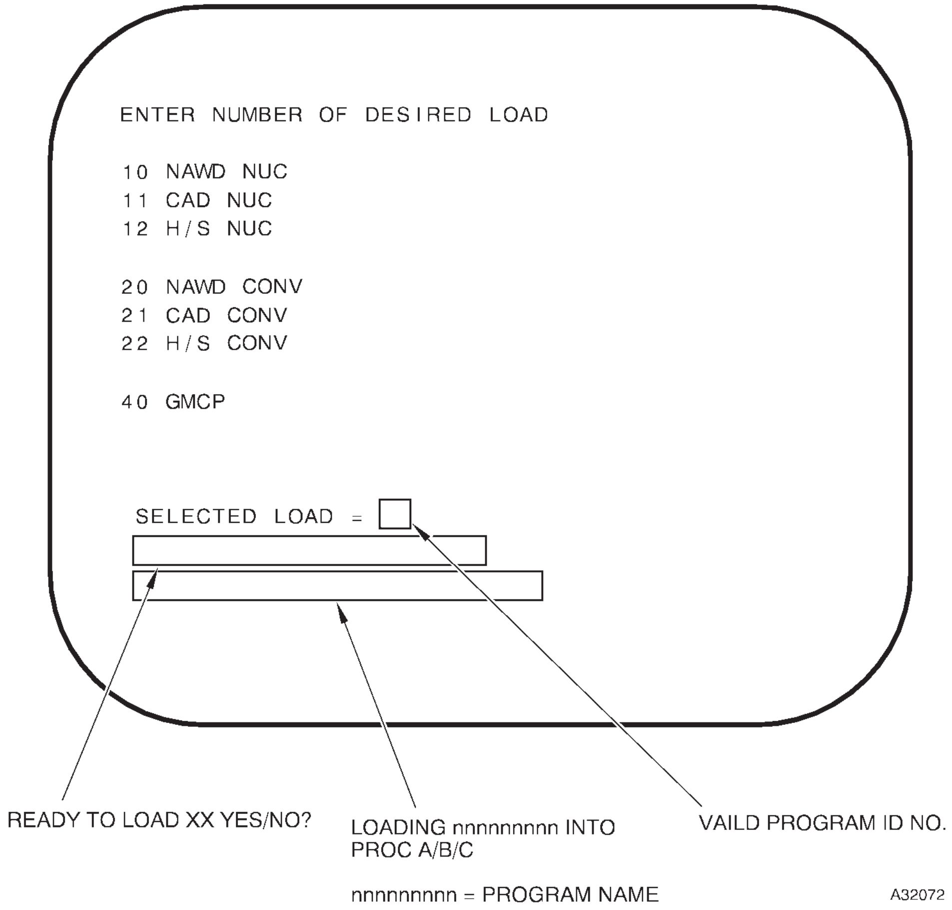


Figure 1A-14

OAS Inertial Measurement

DESCRIPTION

Two inertial navigation sets (AN/ASN-136), referred to as SPN/GEANS (Standard Precision Navigation/ Gimbaled Electrically Suspended Gyro Airborne Navigation System), are installed in the aircraft. Each INS consists of an Inertial Measurement Unit (IMU) and an Interface Electronic Unit (IEU). The IMU contains the precision inertial instruments (hollow beryllium rotor and ceramic suspension electrodes), and the circuitry associated with functions of gyro reference. The two electrically suspended gyros in the IMU maintain an inertial reference and provide stabilization (platform) of three accelerometers for measurement aircraft motion. The IEU contains power supplies, control circuits, and automatic sequencing for the IEU functions. De-spin normally occurs on aircraft power. A Rotor Support Power Adapter (RSPA) to provide power to support and de-spin its respective IMU gyro in the event ac power is lost for more than 10 seconds or both ac and dc power are lost. The INS cooling fans are controlled by thermal switches located in the IEU air inlet ducts.

POWER SUPPLY

Primary 115 volt, three-phase ac, 400 Hz power and backup 28 volt dc power are supplied through the left forward BNS overhead circuit breaker panel from circuit breakers marked NO. 1 INS and NO. 2 INS. The dc power is supplied from the right forward BNS overhead circuit breaker panel and controlled by a switch on the navigator's OAS power control panel. The two INS COOL circuit breakers in the right S/V box must be in for proper operation. The ac voltage is supplied to the IEU power supplies which provide conversion, conditioning, and distribution of required operating voltages for the IEU and IMU. Power is supplied to IEU No. 1 RSPA from the FWD battery bus and to IEU No. 2 RSPA from the AFT battery bus. The 28 vdc is applied to the cooling fans and is used as backup power to maintain continuous system operation during short-term primary ac power interruptions.

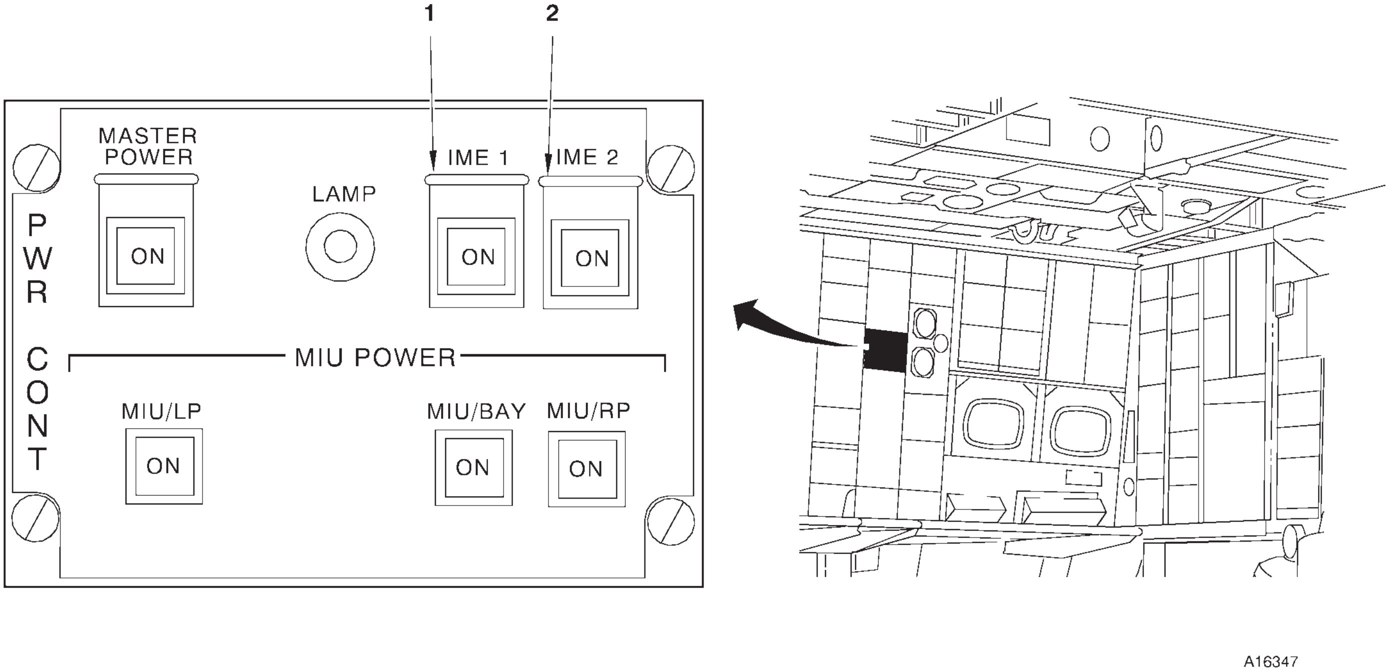
CONTROLS AND INDICATORS

The OAS power control panel, shown in figure 1A-15, contains the two IME power switches that activate the inertial navigation sets. De-spin lights are located on the IEUs as shown in figure 1A-16.

DATA FLOW

The IMUs generate data for velocity measurements used by the avionics processors for navigation calculations. The INS equipment contains all elements required to generate the basic data for navigation and attitude information. The INS is controlled by the computational subsystem software, the radar navigator and navigator keyboards, and the OAS power control panel.

Inertial Measurement Unit Power Switches

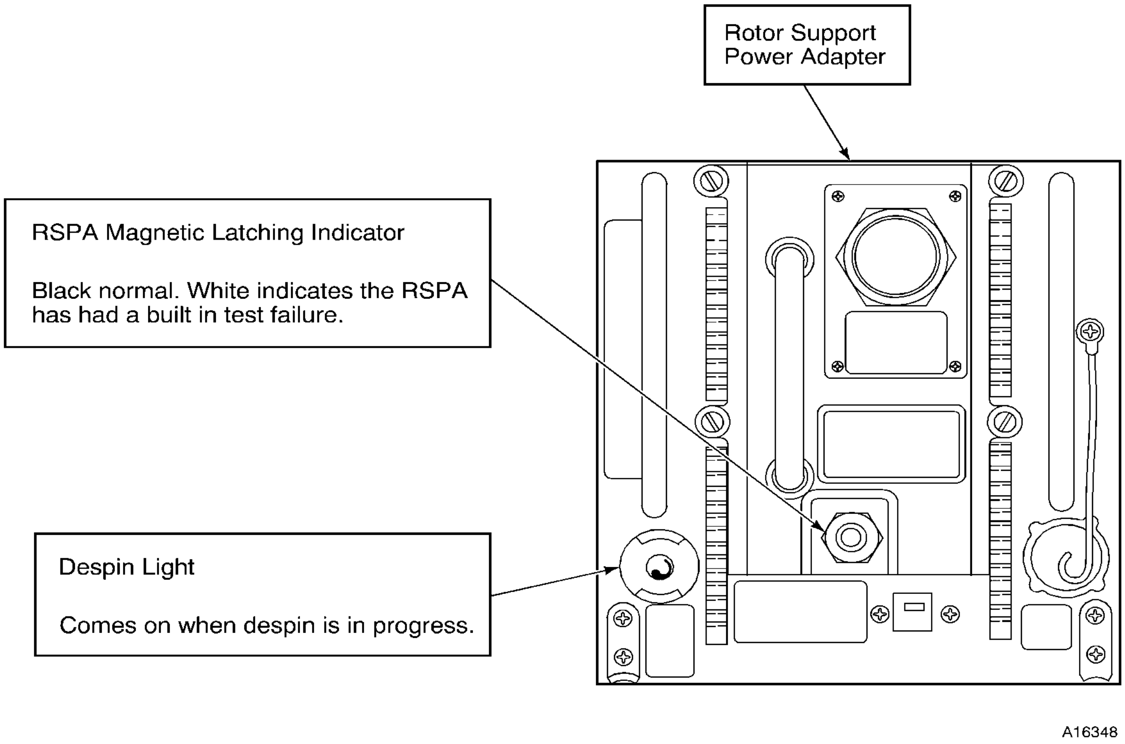


OAS POWER CONTROL PANEL

NO.	CONTROL-INDICATOR	FUNCTION
1	IME-1 Switch	The switch applies power to inertial measurement equipment (IME) No.1. Once the power has been applied, IMEs can only be turned off with CF commands. Status of power shown by ON light in the switch.
2	IME-2 Switch	This switch functions for IME-2 in the same manner as No. 1.

Figure 1A-15

Interface Electronic Unit (IEU)



Rotor Support Power Adapter

RSPA Magnetic Latching Indicator

Black normal. White indicates the RSPA has had a built in test failure.

Despin Light

Comes on when despin is in progress.

RIGHT EQUIPMENT RACK

Figure 1A-16

SYSTEM OPERATION

The operation of the INS requires loading of a nuclear or conventional program into the avionics processors. After OAS power turn-on, and synchronization of the avionics processors, power is applied to the INS via the IME switches on OAS master power panel. Once applied, the INS power will normally be removed by a shutdown sequence (CF-67) controlled by the computer. Power-on enables the INS built-in-test equipment and initiates physical coarse alignment (automatic sequencing) of the IMUs. The coarse alignment function brings the IMU from a cold power-off condition to the gyro stabilized inertial reference condition, or the operational state. The coarse alignment requires approximately 9 1/2 minutes (8 minutes 16 seconds to 14 1/2 minutes depending on temperature and rotor status at turn-on).

During air alignment, after coarse alignment is complete, or during ground alignment when fine alignment is complete, a READY message is displayed. After air alignment, the INSs will remain in the READY status for 10 minutes if no action is taken. A CF-17 or CF-27 command, as applicable, will override the air alignment hold and immediately command the INSs to enter a navigation mode.

Subsequent ground or airborne fine alignment primarily determines the alignment parameters required for processing INS platform coordinates to inertial reference (space stable) coordinates in the avionics processor. The INS physical coarse alignment is identical for both ground and air alignment. Alignment requires stabilizing data (pitch, roll, and heading) from the Attitude Heading Reference System (AHRS). INS status and navigation data can be displayed on the MFDs and will indicate to the operator when the INS is ON or OFF. When both INSs are operating, the computational subsystem utilizes the INS supplying the best data. The operator can manually select either INS as the navigation data source. The shutdown logic sequence controls the de-spin circuits to initiate a normal 5 minute gyro rotor de-spin.

Each INS can be individually shut down with a CF-16 or CF-26 command and response to the question “SHUTDOWN INS-N? YES/NO.” However, shutdown is not recommended if the IMUs are operating normally. If the INSs are shutdown using a CF-67 command and the OAS power switch is not cycled, the ground or air align commands must be used to restart the INSs.

IMU INITIALIZATION (CF-17 AND CF-27)

At the expiration of the IMU coarse alignment cycle, they will enter ready status for a period of 10 minutes. An INS-N READY advisory will appear at this time, as well as the word, READY on the CF-61 display adjacent to the INS status indicators. The operator can at any time during this 10 minute period manually command the INSs to navigate (sequence) by using the CF-17 and CF-27 command. If CF-17 and CF-27 are not used, the IMUs will sequence on their own at the expiration of the 10 minute ready period.

NOTE

- Aircraft attitude should be held stable during INS sequencing, whether done manually or automatically.
- For optimum alignment accuracy, delay insertion of the first quality fix for 5 to 10 minutes after CF-17/27 entry.

IMU Reinitialization (CF-18 and CF-28)

A procedure is available by which the prime navigation models navigation information can be used to bypass IMU restart and correct gross navigation errors in the other IMU. Before entering CF-18 or CF-28, the operator must ensure the accurate nav model is prime. For reinitialization to occur, YES must be answered to the question, INS-N REINIT? YES/NO, where N is the INS to be reinitialized. The YES response will key the prime nav model to pass position, heading, velocity, and altitude information to the reinitialized INS which will then restart navigation.

NOTE

- There is no limit to the number of times this procedure can be attempted, but several unsuccessful attempts would dictate a need for INS recycle.
- When both IMUs are to be re-initialized, CF-44A should be commanded prior to reinitialization.

TURN-ON PROCEDURES

NOTE

- Enter correct latitude prior to applying IME power.
- Unless the prime NAV model has been initialized by a FLY-TO-xx command, subsequent startup of the system will not have present position entered.

The operator will manually input navigation startup support data as follows:

- CF-61 ENTER (initialize OAS for navigation)
- CF-81, n ENTER
- UTC (universal time)
- Latitude data
- Longitude data
- Elevation data (Aircraft altitude, if inflight)
- PTA reference will be initialized at 00:00:00 and can be set to any desired destination. The operator can enter a value of PTA reference or change the destination reference at any time during the mission. The PTA reference is used for computation of ETAs to destinations.
- Month/day/year
- Clearance plane altitude (CPA) will initialize at 800 feet and can be modified from 0 to 5000 feet.
- Tail number

After CF-61 indicates IME 1 OFF and IME 2 OFF, and the avionics processors are synchronized press the IME power switches. See OAS SYSTEM CONFIGURATION for power application. The startup and shutdown sequence control is generated by the IEU in response to instructions from the avionics processor. All navigation computations and control functions are accomplished by the processors as directed by the navigator and/or radar navigator. The normal INS alignment navigation mode is air start/air align, however, ground start/air align is possible. The operator can command ground alignment via the CF-11 and CF-21 supervision commands. IME-1/2 DATA NG message(s) and an IME-1/2 fault on FRMT-6 could appear during coarse alignment. If these message(s) appear, check IME status on CF-61 display and despin light on IEU(s). If IME(s) continue alignment, these message(s) are due to rotor inversion. Acknowledge and disregard messages. After ground alignment is complete, the GND ALIGN message on CF-61 will change to READY and the aircraft can taxi after a FLY-TO command is entered.

Inertial Measurement Unit Alignment

The functions of the IMU are to detect aircraft movements and provide corresponding incremental velocity pulses and gimbal angle data to the avionics processors. The data is available following IMU coarse alignment. See OAS NAVIGATION for detailed explanation.

Radar Altimeter and Doppler Radar Systems

RADAR ALTIMETER SYSTEM (AN/APN-224)

The radar altimeter system, operated at the pilots' station, is tied in to the OAS to provide absolute altitude information for use during low altitude operation. The radar altimeters are used in conjunction with the terrain avoidance system. The radar altimeter is operated as directed in the pilots' checklist. For more information on the radar altimeter at the pilots' station refer to T.O. 1B-52H-1.

Indicating only the highest terrain within its 90° conical shaped pattern, this system will function without degrade up to 45° of pitch and roll, and 2200 fps of climb or descent. Predicted error tolerance is 3 feet or 4% of indicated altitude, whichever is greater. The digital radar altitude is displayed on FRMT-2, 4, and 5 only when the radar altimeter is operational and has completed a warmup period of approximately 1 minute. The radar altitude will not be displayed when the radar altimeter is no go. The radar altitude ribbon is displayed on FRMT-3, 4, 5, and the PRGM current event displays. The length of the ribbon is proportional to the radar altitude. A 3000 foot altitude ribbon is displayed on FRMT 3 (EVS only), and a 5000 foot ribbon is displayed on FRMT 4, 5, and PRGM displays. When the radar altitude is greater than 3000 or 5000 feet, the full ribbon will be displayed. Tie in to the OAS is through the armament interface unit to the data bus.

A modifiable clearance plane altitude (CPA) can be set using CF-61 (line 5) or modified directly on any format with a radar altimeter ribbon (except FRMT 3). The CPA can be set between 0 and 5000 feet (to nearest 10 feet), and initializes at 800 feet. Once set, the CPA will cause the radar altimeter indicator (ribbon) on FRMT-4 and 5 and the PRGM current events display to flash whenever the radar altimeter reading goes below the set CPA. The radar altimeter indicator (ribbon) displayed on FRMT 3 flashes based on the setting of the radar altimeter cursor at the pilots station.

To avoid nuisance flashing of the EVS altitude indicators, the cursor and CPA may be set up to 100 feet lower than the clearance altitude being flown.

The actual setting will be based on crew judgment and altitude. The cursor and CPA will not be set below 200 feet for TA operations. To preclude confusion when switching between FRMT-3 and 4, or 5, or to a PRGM current event display the cursor and CPA should be set to the same value.

DOPPLER RADAR SYSTEM (AN/APN-218)

The AN/APN-218 radar navigation set, referred to as the Doppler radar system, uses the Doppler principle to determine aircraft groundspeed and drift angle. This information is displayed to the navigators as groundspeed and drift correction angle. The Doppler also measures velocities (heading, drift, and vertical), and provides this data directly to the data bus. A Doppler antenna is installed on the lower centerline of the fuselage forward of the bomb doors.

POWER SUPPLY

The Doppler radar system is supplied ac power through a circuit breaker marked DOPPLER RDR on the OAS NAV portion of the auxiliary BNS circuit breaker panel.

CONTROLS AND DISPLAYS

Controls and displays for the Doppler radar system are all on the Doppler control-indicator panel at the navigators' station. For functional information on the controls and displays, see figure 1A-17.

DOPPLER RADAR SYSTEM OPERATION

The Doppler radar system is placed in operation by selecting LAND or SEA on the mode switch. The system will warm up and run the BIT test automatically during the first 90 seconds of operation, transmitting microwave energy to the surface, and measuring reflected signals to indicate the aircraft groundspeed and drift angle. The BIT test checks the LRUs in sequence and a DPLR message is displayed while the BIT test is in progress. If a malfunction occurs, the BIT stops and a number is displayed in the GS and DA display indicating which LRU failed the BIT. Pressing the test switch checks the display lights in the GS and DA windows and reinitiates the BIT from the beginning. During this BIT, numbers (1-6) flash in the GS display while the test is in progress. LRU failures are indicated in the same fashion.

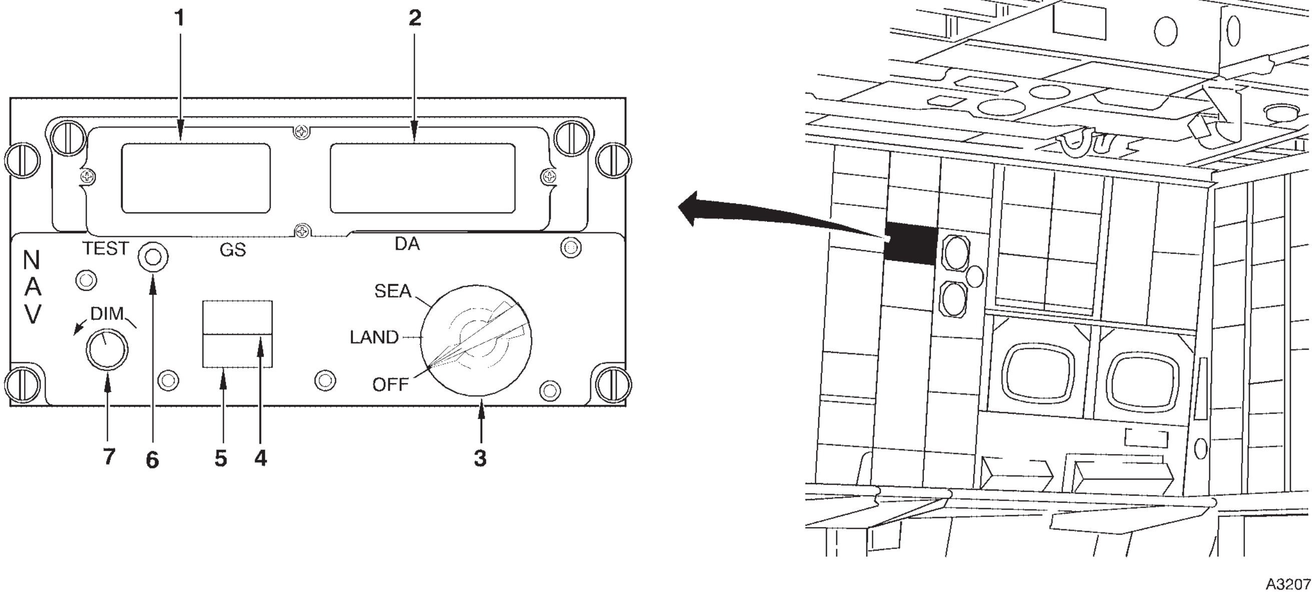
In normal operation, the system has two automatic modes of operation, normal and memory. Switching between the modes occurs automatically. When the signal to noise ratio of the radar ground echoes drops too low or the aircraft exceeds ±25° pitch and ±40° roll, the system switches to memory mode. In this mode the system displays the last good groundspeed and drift angle data it measured and the memory light is turned on. When the ground return signal to noise ratio improves sufficiently, the system switches back to normal mode, the memory light goes off, and the measured data is displayed within 15 seconds. The memory light can be expected to be on when the aircraft is stationary. The Doppler inputs become valid at 96 KTS groundspeed.

During flight over large bodies of water, the mode switch should be to the SEA position, to provide computing modifications required to account for the differences in radar reflection from water as compared to land. The system is shut down by placing the mode switch in OFF.

NOTE

> The Doppler has a tendency to lock onto the spinning fan blades on ground power and/or cooling carts. This causes the Doppler to register a groundspeed and causes the OAS initial position to move. This could cause a problem if the OAS is operating on ground power with the Doppler ON.

Doppler Control-Indicator Panel



NO.	CONTROL-INDICATOR	FUNCTION
1	Groundspeed (GS) Display	Shows the doppler computed speed in knots. During BIT check shows step number and during light check shows 888.
2	Drift Correction Angle (marked DA) Display	Shows the doppler drift correction angle in degrees. During BIT check shows diagnostic number and during light check shows +88.8.
3	Mode Switch	Used to control the doppler system. OFF turns off doppler system. LAND is used over land and provides groundspeed and drift correction angle information. SEA is used over water and provides corrections to the groundspeed for the effects of returns received from water.
4	Memory (MEM) Light	Comes on when the doppler is in memory mode.
5	Malfunction (MAL) Light	Comes on if the doppler system is defective.
6	TEST Switch	When pressed momentarily, activates the built-in-test (BIT) equipment. When held in, checks display lights and activates BIT.
7	DIM Knob	Controls illumination intensity of groundspeed and drift angle displays.

Figure 1A-17

Strategic Radar (AN/APQ-166)

DESCRIPTION

The ASQ Strategic AN/APQ-166 Radar Set Group includes the receiver-transmitter/modulator (RTM), antenna system, radar processor, display generator, and radar navigator management panel.

The radar set transmits high energy RF pulses that bounce off targets and return to the radar set group for presentation on the multifunction display as video.

POWER SOURCE

Power for the radar set is applied through circuit breakers on the right and left forward BNS overhead circuit breaker panel, the auxiliary BNS circuit breaker panel and the right S/V filter box circuit breaker panel. The voltages required for operation are 115 vac and 28 vdc.

CONTROLS AND DISPLAYS

Refer to figure 1A-18 for description of controls and indicators and figures 1A-19 thru 1A-22 for radar display formats.

RADAR VIDEO

The radar transmits RF energy pulses that are returned to the radar receiver for conversion to video that is displayed on the MFD. The object (target) that reflects the video will be displayed each time the radar antenna beam passes over it.

Ground Map Video

Ground map video is available for navigation and weather avoidance at the radar navigator’s and navigator’s stations. Range selection from 3 to 200 nm is controlled on the RNMP or through use of CF F commands. Ground map and beacon video can be displayed simultaneously by selection of the radar/beacon transmitter mode on the RNMP or with CF F. When the pilot selects a terrain avoidance stabilization mode, ground map video at the radar navigators’ and navigators’ stations will be optimum with a range selection of 25 nm or less. A decrease of video intensity will occur if ranges of 50 nm or greater are selected due to a decrease in pulse width with higher range selections (i.e., 1 ms versus 0.4 ms). When the pilot selects a TA stabilization mode, a failure warning video band should be visible from 42 to 47 nm with a 50 nm or greater range selection.

NOTE

Range selection changes by the navigation team while flying terrain avoidance will cause a momentary drop out in the pilot’s terrain trace as the transmitter changes PRF. This is normal and should not be considered a malfunction. Multiple changes in rapid succession could be distracting and should be avoided.

Terrain Avoidance (TA) Video (Pilots’ Profile Display)

The radar processor analyzes radar return signals to establish patterns of landmass below and forward of the aircraft. The computer accounts for antenna position, clearance plane setting, target range and vertical position, relative to boresight, to compute profile video. The profile video is displayed on the pilot and copilot EVS Monitor.

TYPES OF RADAR DISPLAYS

The three navigation displays are controlled by the RNMP. The terrain avoidance display is controlled by the radar control test panel. The navigation displays are PPI, DCPPI, and spotlight. Each display can be oriented either line-of-sight (LOS) or north stabilized (NS). LOS orients the display along the aircraft track and the north stabilized display orients true north at the top of the display.

Plan Position Indicator (PPI) Display

The MFD will present a plan position indicator (PPI) scan type radar display that places the aircraft in the center of the display. The size of the area is determined by the selected range which represents ground distance, in nautical miles, from center of display to the edge. When NAV markers are selected, azimuth bezel marks are displayed on the range mark at 80% of the selected range. The bezel azimuth marks are displayed every 2° at the top 180° of the MFD and every 10° on the bottom half of the MFD. In addition to the full scan display a sector scan mode, controlled by sector width knob, is provided to allow the operator to observe a particular area or radar return. In PPI sector scan, the vertex of the display remains in the center of the display.

When the sector width knob is rotated out of detent, the PPI will sector approximately 15° with the ANT speed switch in SLOW and approximately 45° with the ANT speed switch in FAST. Continued rotation of the sector width knob expands the sector to approximately 190°. Figure 1A-19 is an example of PPI display.

Displaced Center Plan Position Indicator (DCPPI) Display

The DCPPI display moves the center of the sweep to the edge of the scope as shown in figure 1A-20.

Spotlight Display

The spotlight display is shown in figure 1A-21. When spotlight is selected, map center becomes the present position of the crosshair location and remains fixed, regardless of crosshair inputs, until reselection of spotlight, at which time map center will again become crosshair position. No track or NAV markers are available in spotlight mode.

In spotlight mode, radar PRF and PW are dependent on range to X-Hair and display scale selected.

The following are known points of transition when intensity changes will occur:

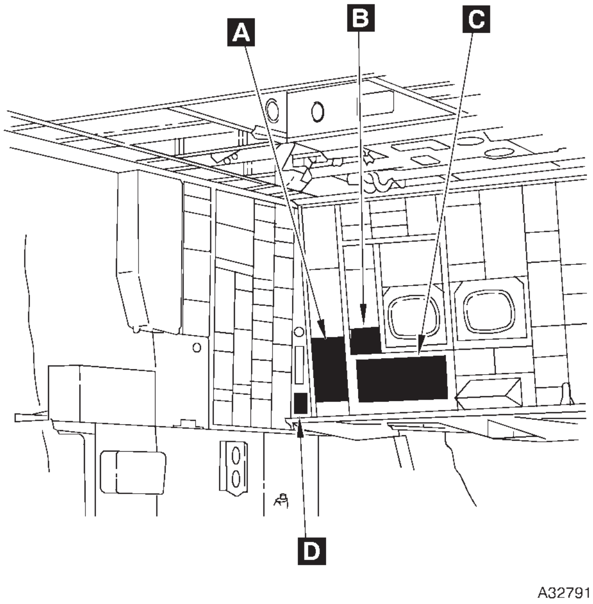
LET X = RANGE TO X-HAIR + ONE HALF RANGE SCALE SELECTED

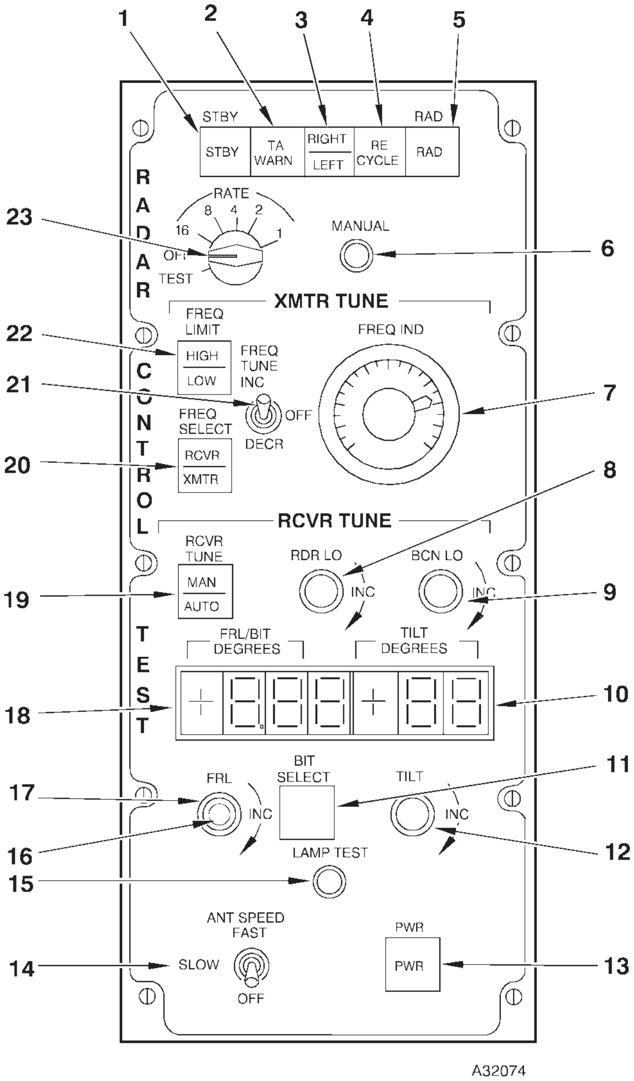
X(NM)	PRF(Hz)	PW(MS)
95	323 (±6)	2.25 (+0.25/–0.05)
Between 60 & 95	808 (±16)	1.00 (+0.1)
Between 45 & 60	1212 (±24)	1.00 (±0.1)
Between 25 & 45	1617 (±32)	0.40 (±0.1)
25	1617 (±32)	0.20 (+0.05/–0.07)

ALQ-117 TO BNS BLANKING SWITCH

The ALQ-117 to BNS blanking switch (18, figure 1-1) provides a means to disable the ALQ-172 blanking circuits in the plan video amplifier for the navigator’s video. The switch has ON--OFF positions. ON position is the normal operating position and allows the navigator’s video to be blanked during ALQ-172 transmission. OFF position provides a ground to disable the navigator’s blanking circuits and permits ALQ-172 interference to be displayed with navigator’s video.

Radar Control Panels



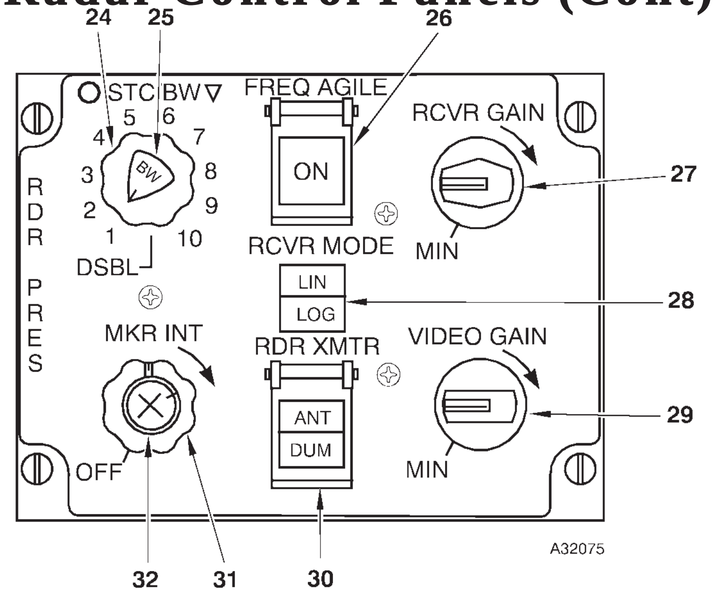


A RADAR CONTROL TEST PANEL

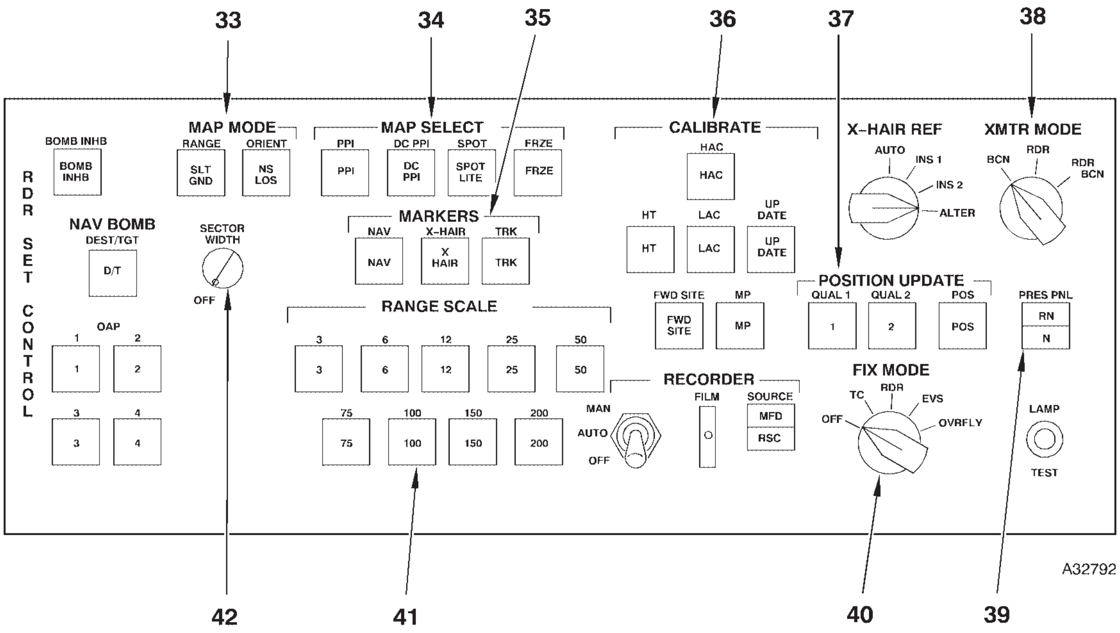
1 STANDBY SWITCH
2 TA WARNING LIGHT
3 RIGHT-LEFT SWITCH
4 RAD RECYCLE LIGHT
5 RAD SWITCH
6 MANUAL PUSHBUTTON
7 FREQUENCY INDICATOR
8 RADAR LOCAL OSCILLATOR TUNE KNOB
9 BEACON LOCAL OSCILLATOR TUNE KNOB
10 ANTENNA TILT INDICATOR
11 BIT SELECT SWITCH
12 ANTENNA TILT CONTROL KNOB
13 RADAR POWER SWITCH
14 ANTENNA SPEED SWITCH
15 LAMP TEST BUTTON
16 FRL CONTROL KNOB
17 FRL LOCKING KNOB
18 FRL/BIT INDICATOR
19 RECEIVER TUNE SWITCH
20 FREQUENCY SELECT SWITCH
21 RADAR FREQUENCY TUNE SWITCH
22 FREQUENCY LIMIT LIGHT
23 RATE SWITCH

Figure 1A-18 (Sheet 1 of 9)

Radar Control Panels (Cont)



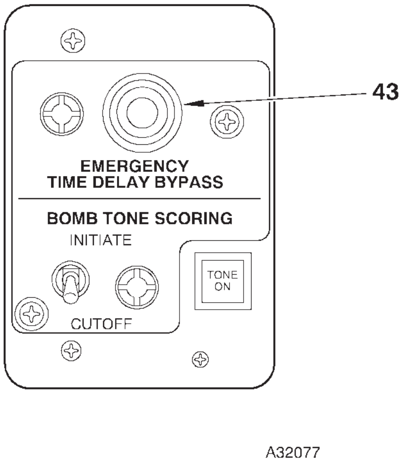
B RADAR PRESENTATION PANEL



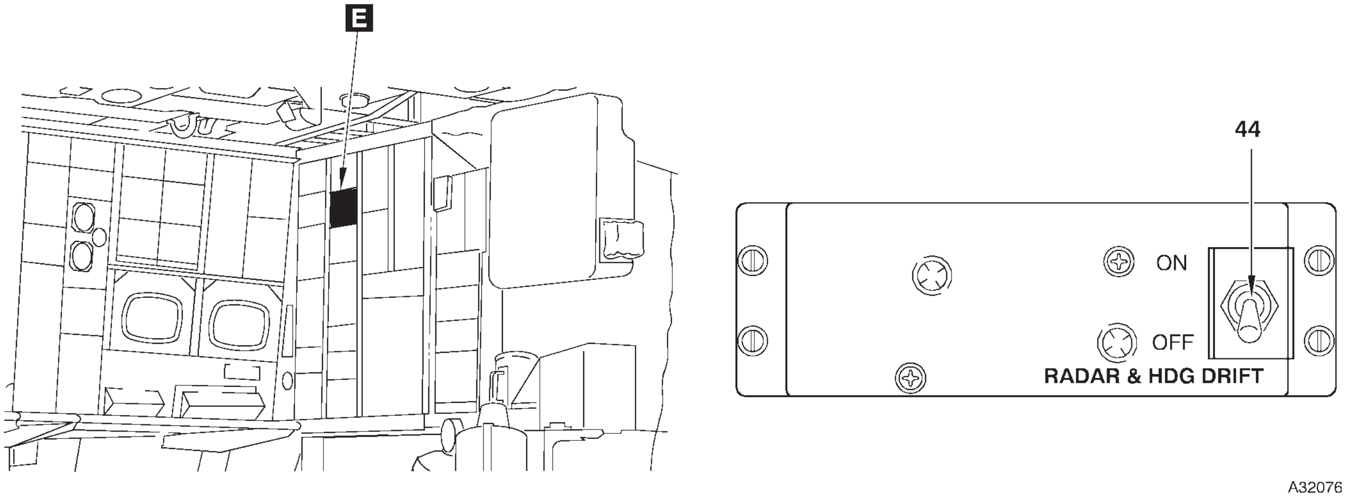
C RADAR NAVIGATOR MANAGEMENT PANEL

24 STC KNOB
25 BEAM WIDTH KNOB
26 FREQUENCY AGILE SWITCH
27 RECEIVER GAIN KNOB
28 RECEIVER MODE SWITCH
29 VIDEO GAIN KNOB
30 RADAR TRANSMITTER SWITCH
31 NAV AND TRACK MARKER INTENSITY KNOB
32 CROSSHAIR MARKER INTENSITY KNOB
33 MAP MODE SWITCHES (2)
34 MAP DISPLAY SELECT SWITCHES (4)
35 MARKER SWITCHES (3)
36 CALIBRATE SWITCHES (6)
37 POSITION UPDATE SWITCHES (3)
38 TRANSMITTER MODE SWITCH
39 PRESENTATION PANEL SELECTOR SWITCH
40 FIX MODE SELECTOR SWITCH
41 RANGE/SCALE SWITCHES (9)
42 SECTOR WIDTH KNOB

Figure 1A-18 (Sheet 2 of 9)



D EMERGENCY TIME DELAY BYPASS PANEL



E DOPPLER DRIFT CONTROL PANEL PANEL

43 EMERGENCY TIME DELAY BYPASS BUTTON

44 RADAR & HEADING DRIFT SWITCH

Figure 1A-18 (Sheet 3 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR CONTROL TEST PANEL	
1	STBY Switch	When pressed, places the transmitter in standby. The green STBY light comes on approximately 5 minutes after power application or any other time the transmitter is in standby.
2	TA WARN Light	Red light is used to indicate failure warning or when clearance plane is set below 200 feet at the pilots' station or the pilots' TA test button is pressed.
3	RIGHT-LEFT Switch	Two position push actuated switch out is left, in is right. Controls on which side frequency shifting occurs in conjunction with the rate switch.
4	RAD RECYCLE Light	Amber light comes on for 1 second when an overload condition exists, or a short term power supply interruption occurs.
5	RAD Switch	When pressed, after the standby light comes on, starts the transmitter operation. The red RAD light comes on when the transmitter is in radiate mode.
6	MANUAL Pushbutton	Initiates an incremented drive signal to the magnetron drive motor each time the pushbutton is pressed and released. The pushbutton is operational only when one of the drive rates is selected on the rate switch.
7	FREQ IND	Displays base indicated frequency in 10 MHz increments. The doghouse at 775 MHz displays the beacon frequency. **NOTE** Eight frequency bands, separated by 125 MHz, are available for strategic radar operation. Setting the frequency indicator to 125, 250, 375, 500, 625, 750, or 875 may cause the radar to shift between adjacent bands and cause the TA trace to move around. Avoid settings at or near (±10 MHz) these increments.
8	RADAR Local (LO) Oscillator TUNE Knob	Tunes the radar local oscillator when the XMTR MODE selector switch on the RNMP is set to RDR and the receiver tune switch is in MANUAL. Radar Lo can be disabled by rotating maximum clockwise.
9	Beacon (BCN) Local (LO) Oscillator TUNE Knob	Tunes the beacon local oscillator when the XMTR MODE selector switch on the RNMP is set to BCN or RDR BCN and the receiver tune switch is in MANUAL.
10	Antenna Tilt Indicator	The indicator scale is used to select the approximate tilt angle and is adjustable from –30 to +4.0.
11	BIT SELECT	Used in conjunction with the FRL/BIT indicator to display BIT information.
12	Antenna TILT Control Knob	Positions antenna in tilt. The control is bypassed during TA operation.
13	Radar PWR Switch	Two position pushbutton switch, out is off, in is on. Applies power to the radar and the green PWR light comes on when power is applied.

Figure 1A-18 (Sheet 4 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
14	ANTENNA Speed Switch	Three position lever lock switch with OFF, SLOW, and FAST positions. OFF stops antenna rotation. SLOW rotates the antenna at 8 1/2 rpm. If TA is selected the antenna will automatically change to fast rotation. FAST rotates the antenna at 20 rpm.
15	LAMP TEST Button	When the LAMP TEST button is pressed, all of the lights on the Radar Control Test panel come on. The FRL/BIT and TILT indicators should display +8.88 and +88 respectively.
16	FRL Control Knob	Used in conjunction with FRL indicator to set the FRL angle-of-attack into the system. **NOTE** Some FRL angle settings cannot be selected to the nearest hundredth of a degree. The operator must use the next high or lower value to the nearest hundredth of a degree.
17	FRL Locking Knob	CW rotation will lock FRL control knob at set position. CCW rotation unlocks the knob. **NOTE** Tightening or loosening the FRL locking knob could cause the FRL control knob to turn, changing the FRL setting. Ensure the correct FRL is still present in the FRL/BIT window after tightening or loosening the FRL locking knob.
18	FRL/BIT Indicator	Used in conjunction with the FRL adjust knob to set the FRL angle-of-attack in the system. When the BIT select switch is pressed, the FRL/BIT indicator displays the BIT test. **CAUTION** Do not attempt to set the indicator beyond +5.00° and –5.00°. **NOTE** On some aircraft, the FRL angle cannot be set beyond approximate ±4.97. This is a system characteristic, not a malfunction.
19	Receiver (RCVR) TUNE Switch	AUTO selects automatic tuning of the radar or beacon receiver. Manual (MAN) selects manual tuning of the radar or beacon receiver. **WARNING** Due to degradation of TA system accuracy, manual tuning will not be used during actual TA operations.

Figure 1A-18 (Sheet 5 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR CONTROL TEST PANEL (Cont)	
20	FREQ SELECT Switch (Push Actuated)	XMTR displays transmitter frequency on the FREQ IND meter. RCVR displays receiver frequency on the FREQ IND meter.
21	Radar Frequency (FREQ) TUNE Switch	Changes transmitter magnetron frequency when spring-loaded switch is held to DECR or INCR position.
22	FREQ LIMIT Light	HI green light comes on when transmitter magnetron is at its high frequency limit. LO green light comes on when transmitter magnetron is at its low frequency limit.
23	RATE Switch	Selects the drive rate in automatic frequency mode. It has a TEST position, an OFF position, and five selectable drive rate positions. **CAUTION** The RATE switch must be OFF prior to turning the radar power switch ON or damage to the radar receiver-transmitter can occur.
	B RADAR PRESENTATION PANEL	
24	STC Knob	Increases sensitivity time control by rotating the knob clockwise. This causes the gain of the short range returns relative to the long range returns to decrease.
25	Beam Width (BW) Knob	Is used to reduce the apparent beam width. Rotating the knob clockwise out of the detent causes the apparent beam width to progressively widen. Beam width is not operational when in the TA mode.
26	Frequency (FREQ) AGILE Switch	Provides for a continuous frequency change at a set rate and reduction of ground clutter.
27	Receiver (RCVR) GAIN Knob	Enhances the radar video target signature. Adjustment is varied to provide the smallest and sharpest returns on the radar.
28	Receiver (RCVR) Mode Switch	Changes the gain distribution to either LIN or LOG. LIN gain rate displays returns relative to their reflective energy. LOG gain rate increases the video intensity for returns at longer ranges.

Figure 1A-18 (Sheet 6 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
29	VIDEO GAIN Knob	Is used to control the brilliance of the radar returns in relation to scope background.
30	Radar Transmitter (RDR XMTR) Switch	Changes the radar output to either Antenna or Dummy Modes. ANT mode allows the radar energy to be transmitted from the antenna. DUM mode allows the radar energy to be fed into a dummy circuit.
31	Nav and Track Marker Intensity (MKR INT) Knob	Increases the intensity of both the navigation and track markers by rotating the outer knob from OFF.
32	Crosshair Marker Intensity (MKR INT) Knob	Increases the intensity of the crosshair by rotating inner knob from OFF.
	C RADAR NAVIGATOR MANAGEMENT PANEL	
33	MAP MODE Switches (2)	RANGE selects altitude compensation mode. SLT gives uncompensated linear display. GND gives altitude compensated ground range. ORIENT selects map orientation. NS gives north stabilized display. LOS gives track-up display.
34	MAP Display Select Switches (4)	PPI gives radar display with aircraft at center of display. DCPPI gives displaced center radar display with aircraft at edge of display. SPOT gives 3, 6, 12, 25, or 50 mile map display with crosshair at center of the display. FRZE causes radar display to be static.
35	Marker Switches (3)	Use individually or together. NAV gives range rings and heading marker. TRK gives dashed line signifying aircraft track. X HAIR gives a crosshair display.
36	CALIBRATE Switches (6)	Select calibration mode and command update. HAC calibrates true altitude when the radar altimeter cannot be used. LAC calibrates true altitude with the radar altimeter below 5,000 feet absolute altitude. HT enables HT correction (Height of Terrain). MP initiates Memory Point wind calibration. UPDATE enters HAC, LAC, and MP data into the computer and changes buffers. FWD SITE rapidly moves crosshairs forward 1/2 the distance of the selected range.

Figure 1A-18 (Sheet 7 of 9)

Radar Control Panels (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
	C RADAR NAVIGATOR MANAGEMENT PANEL (Cont)	
37	POSITION UPDATE Switches (3)	**NOTE** Use of these switches alters the buffers. Used to start computations for updating the navigation modules to accept or reject position fix information as selected by FIX MODE selector switch. See Position Update Switch Selection, this section. QUAL 1 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is a well defined point (highest quality). For TC, starts Kalman filter processing only. For OVRFLY, starts processing with Kalman filtering, to be used when position is most confident at lower altitudes. QUAL 2 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is less well defined (lesser quality). For TC, starts Kalman filter processing only (same as Q1). For OVRFLY, starts processing with Kalman filtering, to be used when position is less confident at higher altitudes. POS – Zeroes the buffers in all navigation models. The computations are used for steering and targeting routines.
38	Transmitter (XMTR) Mode Switch	Selects radar transmitting operational mode. BCN gives display without ground map video for use with rendezvous beacon. RDR gives radar ground map video. RDR BCN combines radar and beacon video.
39	Presentation (PRES) PNL Selector Switch	Selects RN or N panel for control of radar.
40	FIX MODE Selector Switch	Selects method of position fixing. OFF deselects previous position fixing mode, erases related messages, and zeros crosshair buffers. TC – Terrain Correlation used for position update. RDR – Radar crosshair used for position update. EVS – EVS azimuth and elevation used for position update. OVRFLY – Overfly of a known position used for position update. **NOTE** Pressing this switch displays the selected x-hair buffers on the radar navigator's FRMT-1 and FRMT-2.
41	RANGE/SCALE Switches (9)	Select range for PPI or DCPPI radar maps (RANGE light on) or scale for spotlight maps (SCALE light on). **NOTE** The SPOT and RANGE/SCALE switches do not function as indicated with some radar scan converters installed. See NORMAL OPERATION, this section, for procedures.
42	SECTOR WIDTH Knob	Controls both ground map and TA modes.

Figure 1A-18 (Sheet 8 of 9)

NO.	CONTROL-INDICATOR	FUNCTION
D EMERGENCY TIME DELAY BYPASS PANEL		
43	EMERGENCY TIME DELAY BYPASS Button	Provides emergency means of bypassing the radar warmup timer in flight should a short interruption of power occur. **CAUTION** Pressing the emergency time delay bypass button before the radar has warmed up sufficiently will burn out the radar set. The emergency time delay bypass should only be used as an emergency means of bypassing the OAS radar warmup timer and should be used only after the radar power on light has been illuminated for a minimum of 3 minutes.
E DOPPLER DRIFT CONTROL PANEL		
44	RADAR & HDG DRIFT SWITCH	ON – Normal position, drift information supplied to TA and radar systems. Orients the systems to ground track from the OAS prime NAV model. OFF – Supplies a zero drift signal to TA and radar systems, orienting the display about aircraft heading rather than ground track. Used when OAS drift value is invalid. **NOTE** Notify pilot when radar and heading drift switch is OFF.

Figure 1A-18 (Sheet 9 of 9)

PPI Radar Display

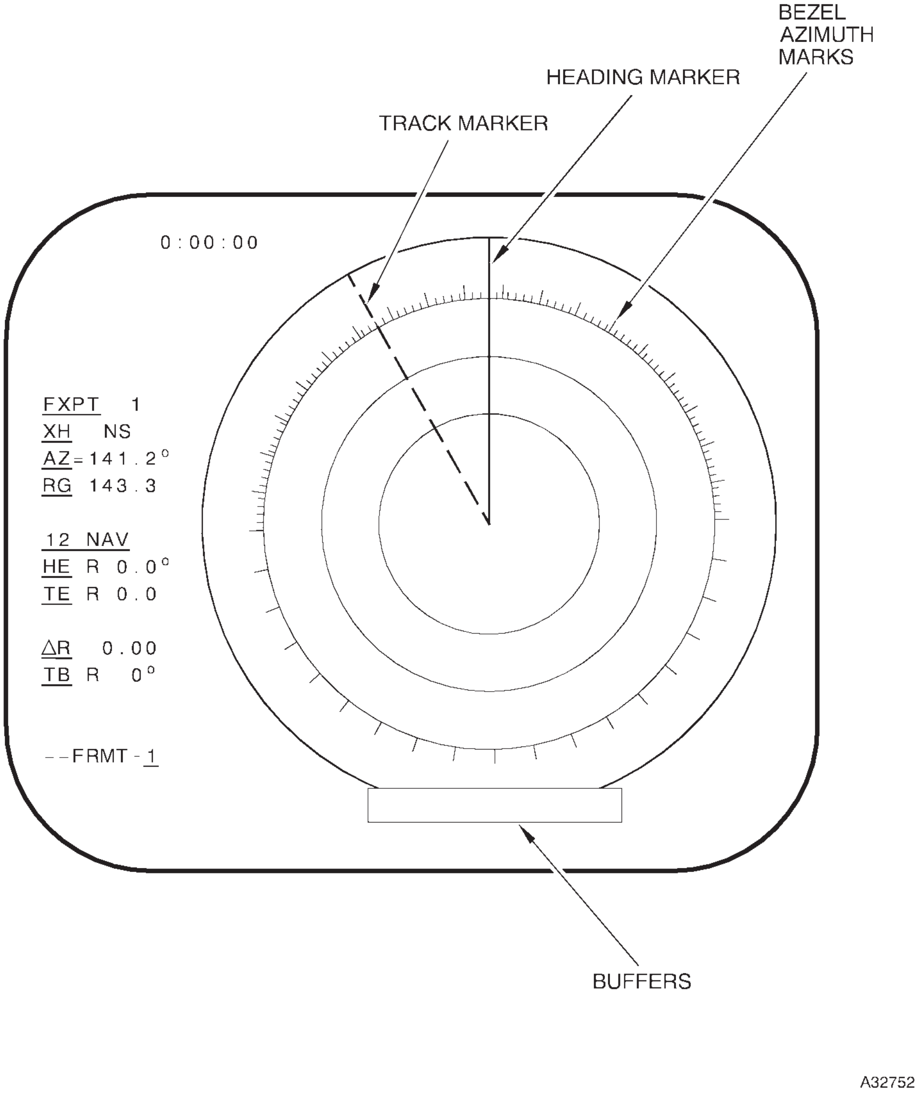


Figure 1A-19

DCPPI Radar Display

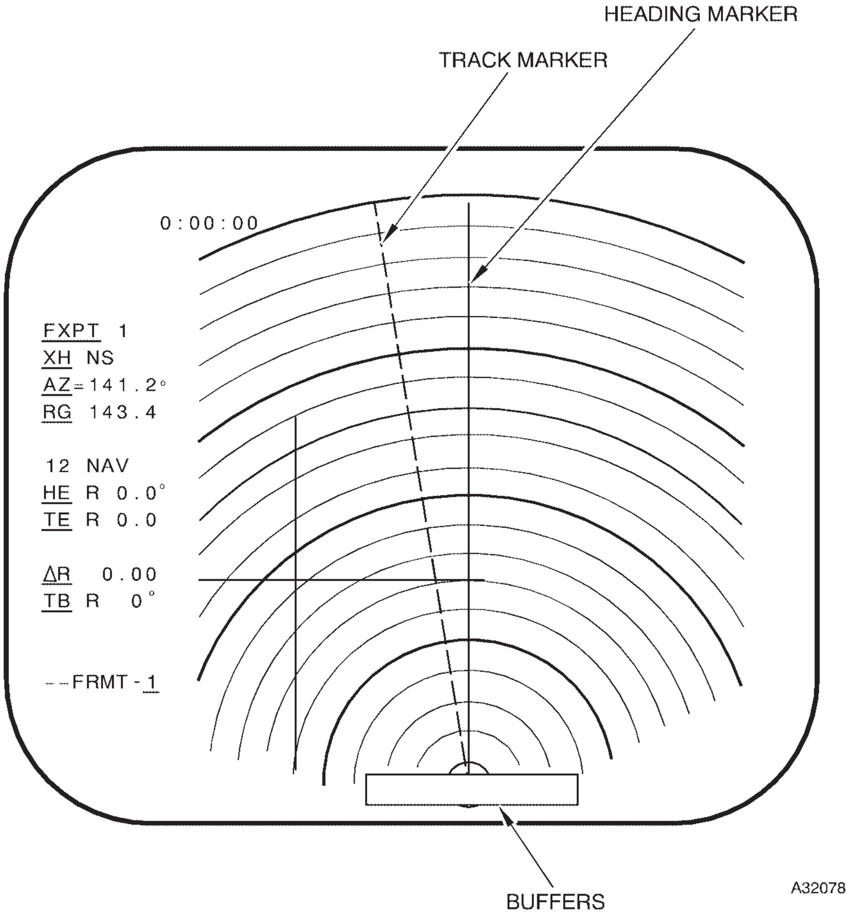
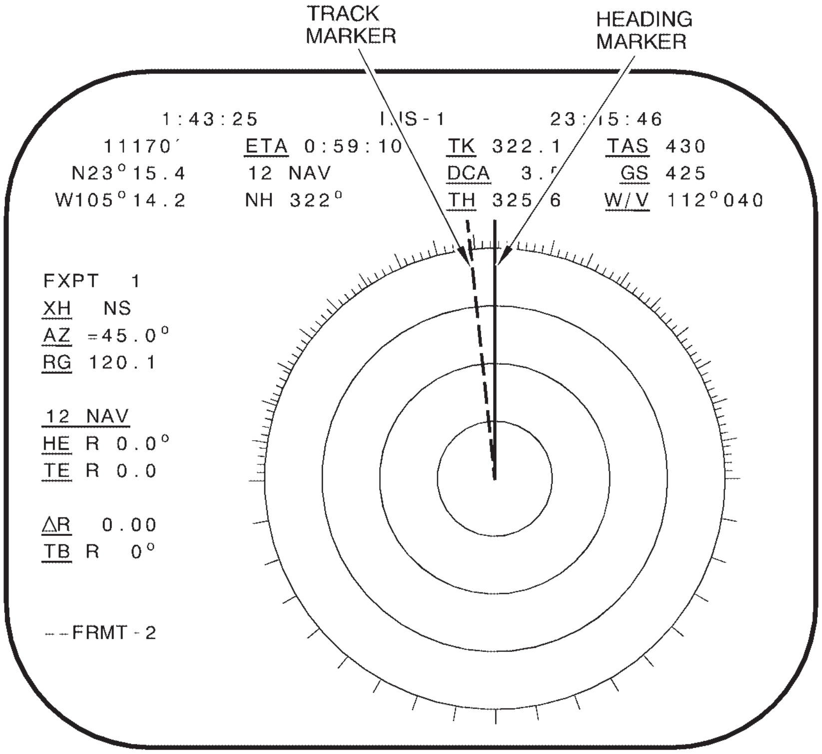
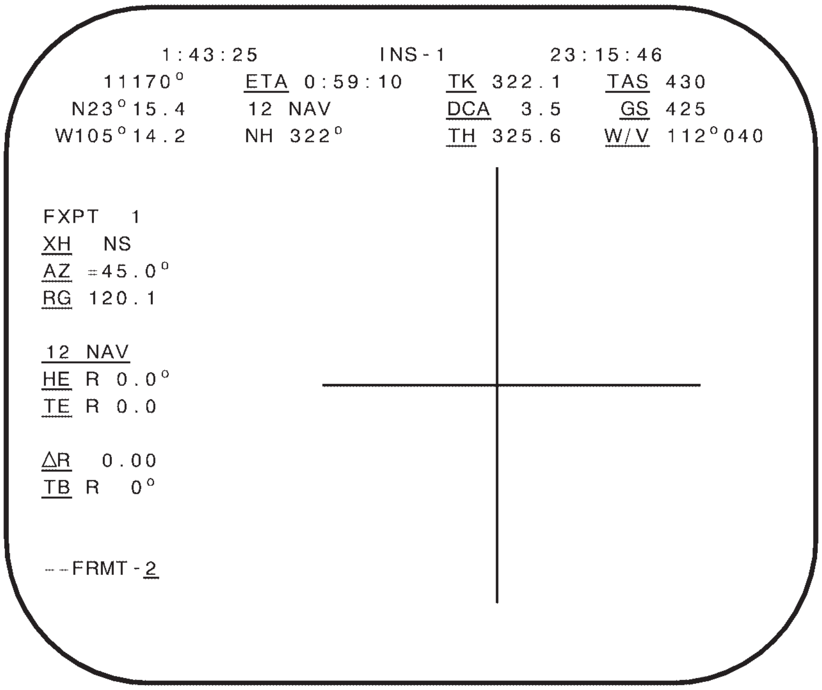


Figure 1A-20

Spotlight Radar Display



BEFORE SELECTION



AFTER SELECTION

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Figure 1A-21

TA Display

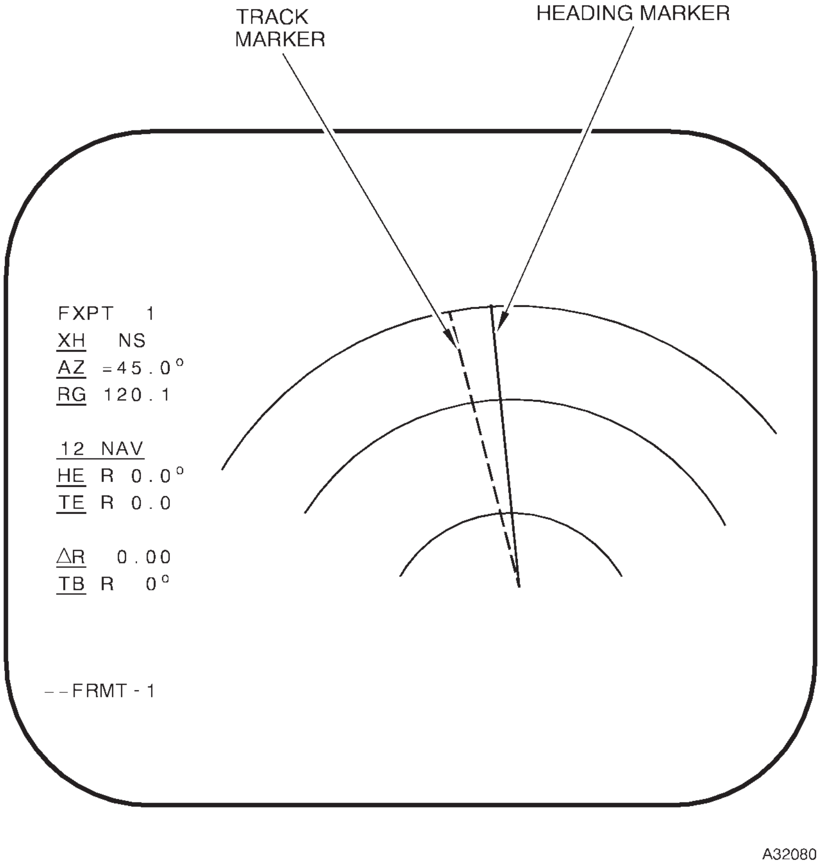


Figure 1A-22

NORMAL OPERATION

Reflected energy is picked up by the antenna and fed to the receiver for detection and MFD presentation. A ground map presentation is provided at the radar navigator's and navigator's stations in all modes of operation. When the pilot selects a TA mode of operation, height of terrain information is also provided up to 10 miles ahead of the aircraft at the pilots' station.

RADAR TURN-ON

Power to the radar set and operational capability is accomplished after OAS is turned on through the following switches:

- Radar Control Test Panel (RCTP), radar power and antenna switches on.
- Radar Pressure Control Panel, switches normal on.
- Radar Navigator Management Panel, select mode of operation.
- MFD, adjust contrast and brightness knobs for presentation.

RADAR TUNING

The following steps are to be used as a technique for tuning the radar for an optimum display. Time limitations or equipment malfunction may warrant using a variation of these steps.

1. Presentation Panel Select Switch – RN
2. RN's L MFD – Selected
3. All Knobs on Radar Presentation Panel – Full counterclockwise
4. RN's L MFD – Adjust using brightness and contrast knobs, tune video just below visibility threshold
5. Antenna Tilt Control Knob – Set –3°
6. FRMT D – Selected, check and ensure radar display has clarity for 16 shades of gray
7. FRMT 1 – Selected
8. NAV Markers Select Button – Pressed
9. Marker Intensity – Adjusted
10. RCVR MODE Switch – LIN
11. RDR XMTR Switch – ANT
12. Video Gain Knob – Full clockwise, then back off $^1/_2$ to $^3/_4$ turn
13. RCVR GAIN Knob – Full clockwise
14. Radiate Button – Pressed (when cleared)
15. Radar Presentation – Adjusted, use STC in combination with RCVR GAIN to get optimum presentation. Beam width or frequency agility, as desired, also may be used to alter presentation
16. Presentation Select Switch – NAV, navigator should tune his display using same procedures

Radar Presentation Control

The radar presentation panel (figure 1A-18) gives the radar navigator and navigator control of the apparent beam width and brightness of the video on their MFD. The video gain should be adjusted for optimum viewing prior to adjusting the receiver gain. The STC knob is used to adjust the gain of the radar beam for optimum video presentation, and is used to minimize the over–intensification of short range targets. Rotating the knob clockwise causes the gain of short range returns relative to the long range returns to be decreased to achieve a more uniform presentation over the entire range.

RECEIVER MODE

The receiver mode selection of LIN (Linear) or LOG (Logarithmic) function affects the video return as viewed on the MFD. In LIN, the gain of the return is directly proportional to its reflected energy. The LOG function enables video compression of the receiver-transmitter to enhance the weaker video returns, while stabilizing the close in video returns. Each mode selection will effect the video return.

BEAM WIDTH

The beam width control knob will adjust the apparent radar beam width to facilitate "finer" returns. Rotating the knob clockwise out of the detent causes the beam width to progressively widen to aid in radar tuning. Beam width is not operational when in TA mode.

Radar Video Freeze

The FRZE selection, on the RNMP, stops movement of the radar video display and the display remains stationary until FRZE is deselected. This selection allows additional viewing time of the display and precise positioning of the crosshairs. The crosshairs can be manually positioned, but do not drift when placed on a point. The freeze display can be selected at any time except when memory point wind calibration mode is active. The OAS ignores the freeze request under these conditions. During the freeze interval, the map mode, map select, markers, and range scale selection cannot be changed and the video display is not adjustable. The crosshair reference positions can be selected for display and evaluation during freeze. If radar and EVS track control functions are selected at the same time, the EVS crosshair is slaved to the radar crosshair. If FRZE is commanded with both track control functions selected, the EVS stops updating and appears to drift off the target when the radar display is frozen. When radar freeze is deselected, radar video is again updated to where the crosshairs are on target and, since radar and EVS are coupled, EVS will reorient to the target.

NOTE

- When freeze is selected, both inertial navigational models go into the free-inertial mode and remain in this status until FRZE is deselected. Extended operation with FRZE selected could degrade the OAS navigational capability.
- Do not manually deselect the freeze display or command another freeze display while the OAS is processing the radar position update. This action may cause the Kalman filter to reinitialize. Under this condition the Kalman filter is not synchronized with the INS Schuler cycle.
- If a QUAL fix is taken while in FRZE mode, FRZE mode will automatically be exited once the OAS has processed the fix.

Marker Generation

Markers are generated and controlled by the computers. They are used to provide range and azimuth reference relative to aircraft position.

NAV MARKERS

The nav markers consist of fixed slant or ground range markers and aircraft heading marker.

X-HAIR MARKERS

The crosshair markers consist of a vertical and horizontal crosshair. The variable range is generated following each radar pulse transmission. The intersection of the two markers comprise a crosshair that is displayed on the MFD to identify a single-point on the ground map corresponding to where the computer calculates the target location. The crosshairs can be moved using the trackball, and the size of the crosshair is determined by time since the last fix, and range selected. A large crosshair size may indicate a need for a position fix update. With DCPPI or PPI MAP MODES selected, the crosshairs should be placed on the sighting point only when the radar sweep passes through the point to ensure accurate crosshair placement on the sighting point. This problem does not exist in the spotlight mode.

TRACK MARKER

A track marker is a dashed line on the MFD that is consistent with the aircraft track angle. The length of the dash will indicate either distance or time depending on range/scale selection as follows:

RANGE/SCALE	PPI/DCPPI
3	950 ft
6	1900 ft
12	1 min
25	1 min
50	1 min
75 to 200	1 min

Range and Scale Selection

When the radar set is in PPI or DCPPI mode, the range select switches on the radar navigator management panel are enabled. Spotlight selects the scale function based on current range to crosshairs when selected. The maximum scale selection is 50. If more than 50 was selected the scale goes to 50 and reverts back to the previous range when spotlight is deselected. Only one switch can be selected at a time. The PPI range is measured from the center to the top of the display. DCPPI range is twice (X2) the PPI size. Spotlight scale is measured from edge to edge of the display. Operator can manually select spotlight scale at any time.

MAP MODE SELECTION

The range mode function on the RNMP is used for radar map altitude compensation. Slant (SLT) results in a radar map that is not compensated for altitude, therefore the video is portrayed at a distance measured directly from the aircraft to the return. Ground (GND) results in a radar map that is altitude compensated and the video represents a ground distance from the return to the aircraft.

NOTE

Crosshair displays for fix points greater than 200 nm could be displayed at ranges within the 200 nm video presentation.

Orientation Mode Selection

The two orientation modes are available for map orientation: North stabilized (NS) or line-of-sight (LOS). NS results in a North stabilized radar map. When radar, or radar and EVS control modes have been selected, the fore and aft movement of the “trackball,” located on the keyboard, will move the crosshair North or South. A left or right trackball displacement will move the crosshair West or East. LOS (line-of-sight) results in a radar map that is oriented to track up. The crosshair azimuth will be at the top of the MFD and right-left trackball movement will move the crosshair right or left. When EVS is the only mode selected, and radar is deselected, the orientation of the track control signal is automatically LOS.

Crosshair Reference Position

The crosshair reference switch and the position fix mode switch determine the position of the crosshairs on the MFD. If the position fix mode switch is OFF, the position of the crosshairs on the MFD is determined by the navigation mode selected on the crosshair reference switch. As the crosshair reference switch is rotated from position to position, the crosshairs will move on the MFD. If the position fix mode switch is not OFF, the crosshairs displayed on the MFD will always be those computed by the prime navigation model. As the crosshair reference switch is rotated from position to position, the crosshairs will not move. Rather the crosshair buffer data displayed at the bottom of the MFD will change.

Forward Sighting

Forward sighting is used to rapidly move the crosshairs ahead of the aircraft on the display to expedite crosshair placement on a point. Forward sighting is selected via the following sequence:

- Select TRACK CONTROL function RDR or EVS on keyboard.
- Select CALIBRATE function FWD SITE on RNMP. With RDR track reference selected (or both RDR and EVS), the radar crosshair will move to a new position as follows:

MAP TYPE	CROSSHAIR POSITION
DCPPI/ SPOTLIGHT	Center of radar display directly ahead of the aircraft
PPI	Directly ahead of the aircraft midway between the center of the display and the edge of the map.

If SPOTLIGHT map select function has been selected, the radar display is displaced about the crosshairs. If only the electro-optical viewing system (EVS) track reference is selected, the EVS sensor will be pointed directly ahead of the aircraft with the crosshair position at a ground range of 8 miles. The crosshairs will track in FWD SITE. FWD SITE can be deselected by selecting D/T, OAP, or a X-HAIR command.

Antenna Control

The radar antenna can be controlled in tilt and sector. The radar control test panel allows the operator to adjust the FRL angle during flight to compensate for changes in the aircraft angle-of- attack. The radar antenna tilt controls the antenna tilt for uniform ground painting at various altitudes. Sector scan is controlled by the sector width knob on the RNMP. Rotating the knob clockwise from OFF gives approximately a 15° sector scan with the ANT speed switch in SLOW and approximately 45° with the ANT speed switch in FAST about the center of the display. A sector scan of approximately 190° can be obtained with full rotation of the sector width knob. During terrain avoidance mode of operation a scan of +45° about ground track is present with sector width off or just out of detent. Rotation of sector width knob to its full clockwise position will produce a variance of the TA sector from +45° about ground track to +95° about ground track.

Navigators’ Compartment Radar Equipment

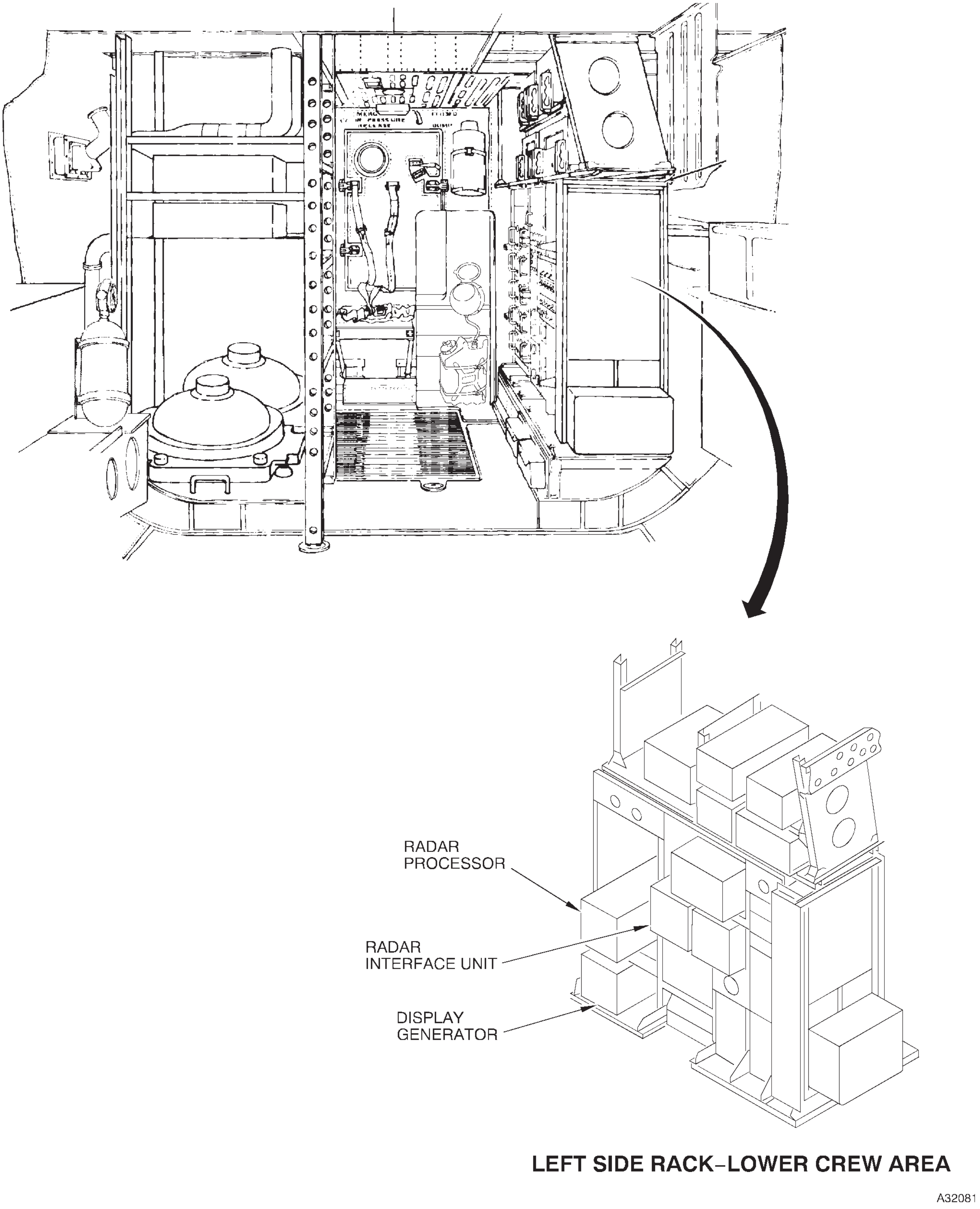


Figure 1A-23

OAS Navigation

DESCRIPTION

Data is transmitted to the avionics processors from the various interfaced subsystems by the MIL-STD-1553 data bus. The INS, Doppler velocity, ***[CS]*** GPS, and TAS sensor inputs are compared by the Kalman filter circuits, an error analysis is performed, and the best estimate of present position is computed. The present position data goes to the display electronics unit (DEU) for display in PMD. Air data inputs are interfaced with the EVS interface unit (EIU) and then sent to the avionics processors by the data bus. The OAS data flow diagrams for INS and ALTER NAV are shown in figure 1A-25 and figure 1A-26.

The navigation function provides computation of basic navigation data, steering commands, and reference for weapon delivery computations for display to the operator. It consists of three navigation models: INS-1, INS-2, and alternate navigation. INS-1 and INS-2 are identical models and the alternate navigation model provides a backup navigation capability. EVS, ***[CS]*** GPS, air data sensors, and the magnetic azimuth detector supplement the navigation inputs. True airspeed information from the pilot's pitot-static system is supplied to all three navigation models. The pitot static system also provides differential pressure to the OAS for computation of true altitude. The Kalman filters, (one in each processor), compare, analyze, and average navigation data inputs to provide an OAS best estimate of present position. Dead reckoning, steering, and position fix modes are the operating modes for the navigation function as shown in figure 1A-24. The dead reckoning mode has two operating submodes; aided-inertial is the prime submode and alternate is the backup submode. When aided-inertial cannot support navigation, OAS will automatically select alternate navigation. Direct (great circle) and centerline recovery are the two steering submodes. Four position fixes and three calibration procedures can be accomplished: radar, EVS, terrain correlation, and overfly. HAC, LAC, and memory point are the calibration procedures. The navigation and guidance subsystem is interfaced with and supported by the computational, controls and display, interface equipment, and weapon control and delivery subsystems to provide accurate control and display of navigation data.

DATA FLOW

NAVIGATION MODES

Three navigation modes are available: dead reckoning, steering, and position fix.

Dead Reckoning

The dead reckoning mode computes current aircraft position based on known starting position, course flown, and accumulated distance traveled from starting point. The two dead reckoning submodes are aided-inertial and alternate. Aided-inertial is primary except during fast reaction takeoff situations when alternate is primary. Aided inertial is selected automatically as primary when one INS completes coarse alignment. Alternate navigation is selected automatically when aided-inertial data inputs are unavailable. Alternate navigation computations are performed at the same time as aided-inertial computations to provide a ready reference in the event of aided-inertial failure. Present position is provided to the alternate navigation computations whenever a position fix is taken and every 15 minutes from the prime INS.

NOTE

MDPS computes time between points using aircraft turn radius. OAS computes the time direct without considering the time to turn, therefore, a difference could exist between the flight plan ETE and the OAS computed time-to-go.

AIDED INERTIAL

[CS] GPS Inertial, Doppler-Inertial, ***[NS]*** TAS-Inertial, and free-inertial are the aided-inertial submodes. In the aided-inertial submode, both inertial navigation set inputs, ***[CS]*** GPS inputs, Doppler inputs, and ***[NS]*** TAS inputs are compared in the Kalman filters for a best estimate of present position. ***[CS]*** GPS-Inertial submode is primary as long as GPS data is valid. When GPS is not available or invalid, the Doppler-inertial submode is primary as long as doppler data is valid. When Doppler data is invalid, either the ***[NS]*** TAS-Inertial submode or the free-inertial submode becomes primary. Alternate navigation is automatically selected if INS data is unreliable.

The aided-inertial submodes can be automatically or manually selected using the following control functions:

CF MODE	DISPLAY	RESPONSE
CF-n3	***[CS]*** GPS-NAV ***[NS]*** DPLR-NAV	Select GPS-Inertial Select Doppler-Inertial
CF-n4 ***[CS]***	DPLR-NAV	Select Doppler-Inertial
CF-n4A ***[NS]***	TAS-NAV	Select TAS-Inertial
CF-n5A	NAV	Select Inertial

n = 1 or 2.

[CS] GPS-INERTIAL

GPS-Inertial is selected when INS and GPS inputs are valid. GPS position and groundspeed are compared with the INS position and groundspeed in the Kalman filter and a present position is computed. INS present position, true heading, ground speed and GPS ground track are displayed.

NOTE

> If GPS-Inertial mode is selected manually with a CF-13 or CF-23 command, the INS goes to free-inertial mode when GPS data becomes invalid. Command CF-12 or CF-22 to allow the FCP to automatically select Doppler-Inertial mode, if the GPS fails.

[CS] GPS/AHRS

GPS-AHRS is the primary alternate navigation submode and is selected automatically when GPS and AHRS inputs are valid. GPS/AHRS can be manually selected or terminated when another navigation submode is selected or automatically when GPS or AHRS data is unreliable.

DOPPLER-INERTIAL

Doppler-Inertial is selected automatically when INS and Doppler inputs are valid and ***[CS]*** GPS is not available. Doppler-Inertial can be manually selected at any time. Doppler and INS velocities are compared in the Kalman filter and a present position is computed and displayed. The Kalman filter places more validity in the Doppler GND mode than in the SEA mode.

NOTE

> Aircraft turns in Doppler-Inertial mode help to resolve INS true heading error.

[NS] TAS-INERTIAL

TAS-Inertial is selected by the nuclear FCP when doppler data is invalid. The INS data is compared with TAS inputs in the Kalman filters and present position is estimated and displayed.

FREE-INERTIAL

Free-inertial is selected when ***[CS]*** GPS, Doppler and ***[NS]*** TAS data is invalid. No reference velocity is input to the Kalman filters and present position is computed from inertial inputs only.

ALTERNATE

Alternate navigation is backup to aided-inertial and can be manually selected by the operator. ***[CS]*** GPS/AHRS, Doppler/AHRS, TAS + wind/AHRS, and emergency are the alternate navigation submodes and can be manually or automatically selected. Velocity data and/or heading data can be manually input using FRMT-8. The alternate navigation mode can use any of nine combinations of computed and manually set inputs to navigate. These modes are automatically or manually selected using CF-3 commands. See ABNORMAL OPERATION, Section III, for alternate navigation procedures.

DOPPLER/AHRS

Doppler/AHRS is the: ***[NS]*** primary alternate navigation submode; ***[CS]*** secondary alternate navigation submode to GPS when the GPS is integrated into the OAS. Doppler/AHRS can be manually selected or terminated when another navigation submode is selected or automatically when Doppler or AHRS data is unreliable.

TAS + WINDS/AHRS

This submode is backup to Doppler/AHRS. In this mode, groundspeed is computed from TAS input and memory point winds. Groundspeed is continuously integrated to update present position. TAS + winds/AHRS is selected automatically when Doppler data is invalid in the alternate navigation submode and terminated manually by selecting another navigation submode or automatically when TAS or AHRS data is unreliable.

EMERGENCY

Emergency is selected automatically when sensor data is not available to support another navigation mode or selected manually. Emergency data is input using FRMT-8 and present position is computed from manual input data. Emergency is terminated by manually selecting another navigation submode or automatically when input data supports a higher submode if emergency was automatically selected.

Steering

The steering mode computes a desired course and transmits steering commands to fly a ground track corresponding to the computed course. Direct and centerline recovery are the two steering submodes. In direct, a great circle course is continually computed from aircraft present position to selected destination and steering commands are generated to fly this course. In centerline recovery, a great circle is computed from destination -1 to the current destination. Destination -1 is the destination just preceding the current destination. For example, if destination 8 is the current destination, centerline recovery will generate steering guidance to make good a track from destination 7 to 8. Deviations from course are detected and steering commands are computed to return the aircraft to the desired ground track and provide a corridor navigation capability. Steering submodes are selected using the following CF-7 commands:

CF MODE	RESPONSE
CF-71	Automatically selects steering mode upon application of power
CF-72	Selects direct steering
CF-73	Selects centerline recovery

The steering mode also provides the capability for a smooth transition from one course to another and flight directly over a destination. The smooth transition from one course to another is called “turn short” and the ability to fly directly over a destination is called “overfly.” Sequencing to the next destination when turn short is chosen occurs when the distance to the destination decreases to a value based on the aircraft turn radius and the required azimuth change. In overfly, the destination sequences when over the destination. Time-to-go is computed to the turn short point or to the destination if overfly is selected. Turn short is available in both direct and centerline recovery, but is not available during weapon delivery. Turn short and overfly can be modified on FRMT-10 with the MDFY function with a + to remove or a – to add the turn short identifier between the destination number and destination identifier.

Position Fix

Four position fix and three calibration procedures are available (figure 1A-27). Radar, EVS, terrain correlation, and overfly are the four position fix submodes and HAC, LAC, and memory point winds are the three calibration procedures. Detailed procedures are provided in Normal Operation, this section, except memory point winds which are described in Section III.

RADAR

Radar position fix uses radar as the primary sensor and position update is determined by radar crosshair position.

EVS

EVS uses either forward looking infrared or steerable television as the primary sensor for fixpoint position determination, and is functionally similar to the radar position fix mode except that track ball corrections are processed to steer the EVS sensor to place the checkpoint image in the center of the projected intersection of the fiducial marks.

TERRAIN CORRELATION

Terrain correlation position fix compares measured terrain relief in the fix area to a stored digitized terrain relief map to determine the position of the aircraft. Aircraft present position is determined by finding the region of a stored rectangular map that most nearly correlates with the measured strip map.

OVERFLY

Overfly submode is used for position update when a good visual point is available for overflight or to obtain a position fix when other position fixes are inoperative.

CALIBRATION

HAC, LAC, and memory point wind are the three calibration procedures.

HIGH ALTITUDE CALIBRATION

HAC is accomplished using the radar and computational software during the HAC interval to position the variable range marker on the MFD radar display. HAC is initiated by the radar navigator and the track ball is used to position the range marker on the edge of the altitude hole. Altitude is updated using slant range as the altitude above the terrain.

LOW ALTITUDE CALIBRATION

Low altitude calibration is accomplished using the radar altimeter inputs. This must be accomplished below 5000 feet AGL for radar altimeter availability. After initiation of the low altitude calibration mode, the avionics processor uses radar altitude data to compute altitude above mean sea level as the sum of terrain elevation and radar altitude and updates system altitude.

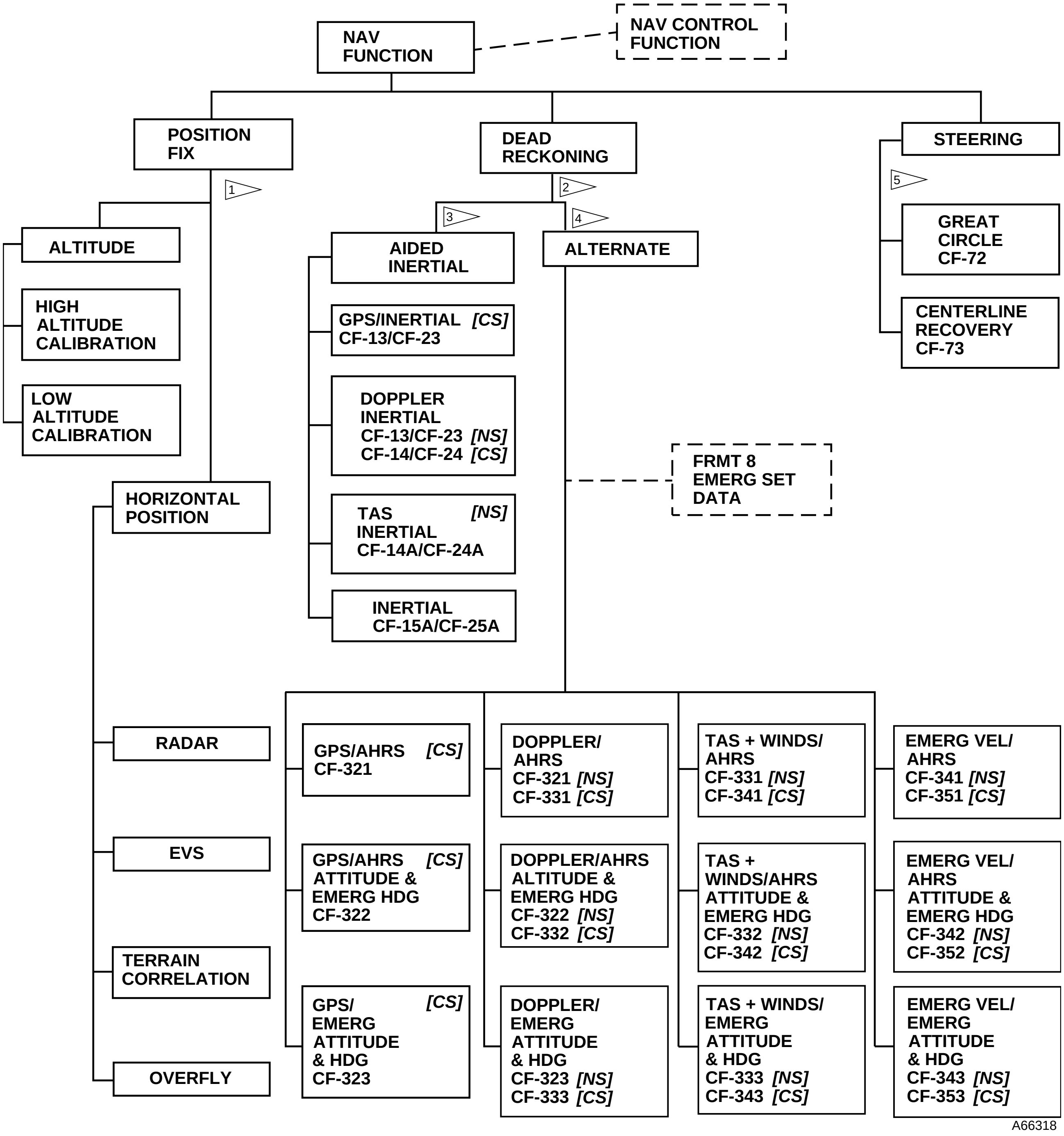
MEMORY POINT WIND CALIBRATION

Memory point wind calibration procedure is used to update winds in the alternate navigation mode when doppler data is unreliable. Wind is updated using memory point function with the radar or EVS crosshair. See ABNORMAL OPERATION, Section III, for memory point wind calibration procedures.

[NS] TANKER RENDEZVOUS FUNCTION

The OAS provides the capability to solve the point parallel rendezvous problem using CF-135. This function (CF-135) is provided by the nuclear FCP but not the ICSMS FCP. Turn range, offset distance, TTG for tanker to start turn, and slant range with a true or relative bearing to the tanker beacon is computed while in the rendezvous function. See TANKER RENDEZVOUS PROCEDURES for detailed operational procedures.

Navigation Function Tree Diagram



1 Manually selected on RNMP or through use of CF-F (ALTITUDE can be EMERG set using FRMT 8)

2 CF-41A OAS selects prime nav model (either Inertial or Alternate).

3 CF-42/43 Operator commands INS 1/2 as prime nav model.

4 CF-44A Operator commands ALTER as prime nav model. OAS will or operator can select: ***[NS]*** CF-31, 321, 331, or 343; ***[CS]*** CF-31,321, 331, 341, or 353. Operator manually selects all other ALTER sub-modes.

5 CF-71 OAS selects STEERING mode.

Figure 1A-24

OAS Data Flow to INS Diagram

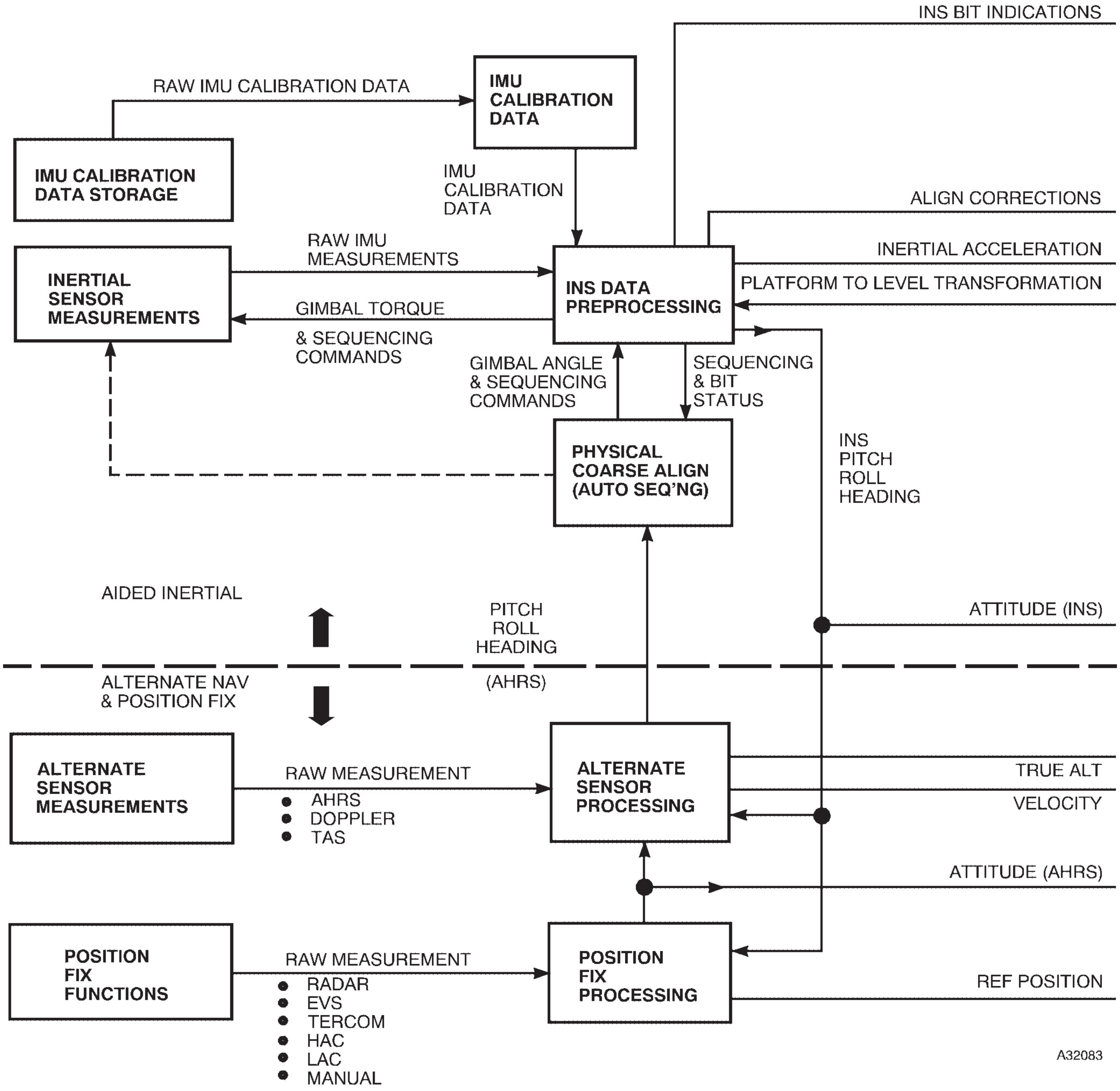


Figure 1A-25 (Sheet 1 of 2)

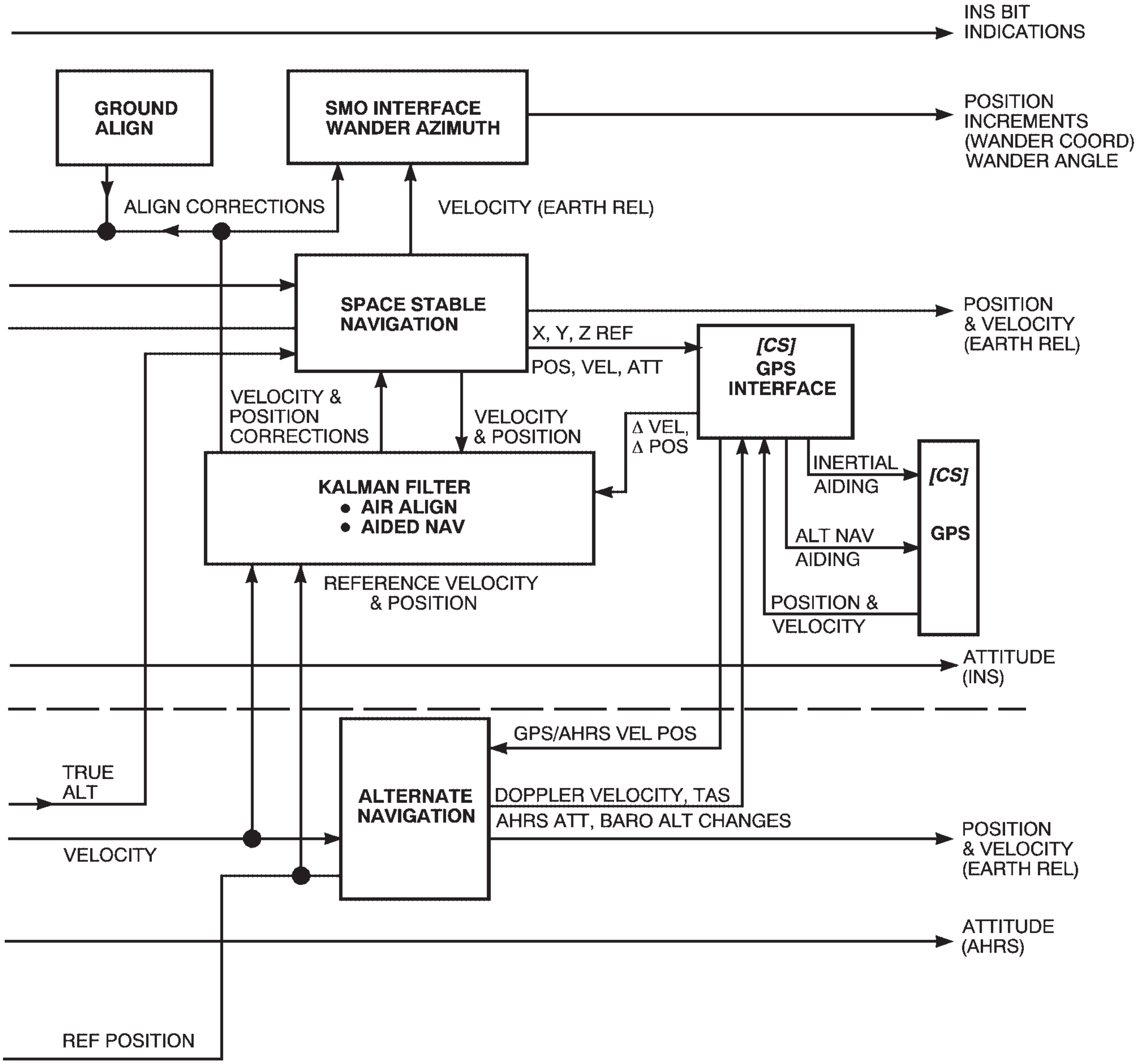


Figure 1A-25 (Sheet 2 of 2)

OAS Data Flow to ALTER NAV Diagram

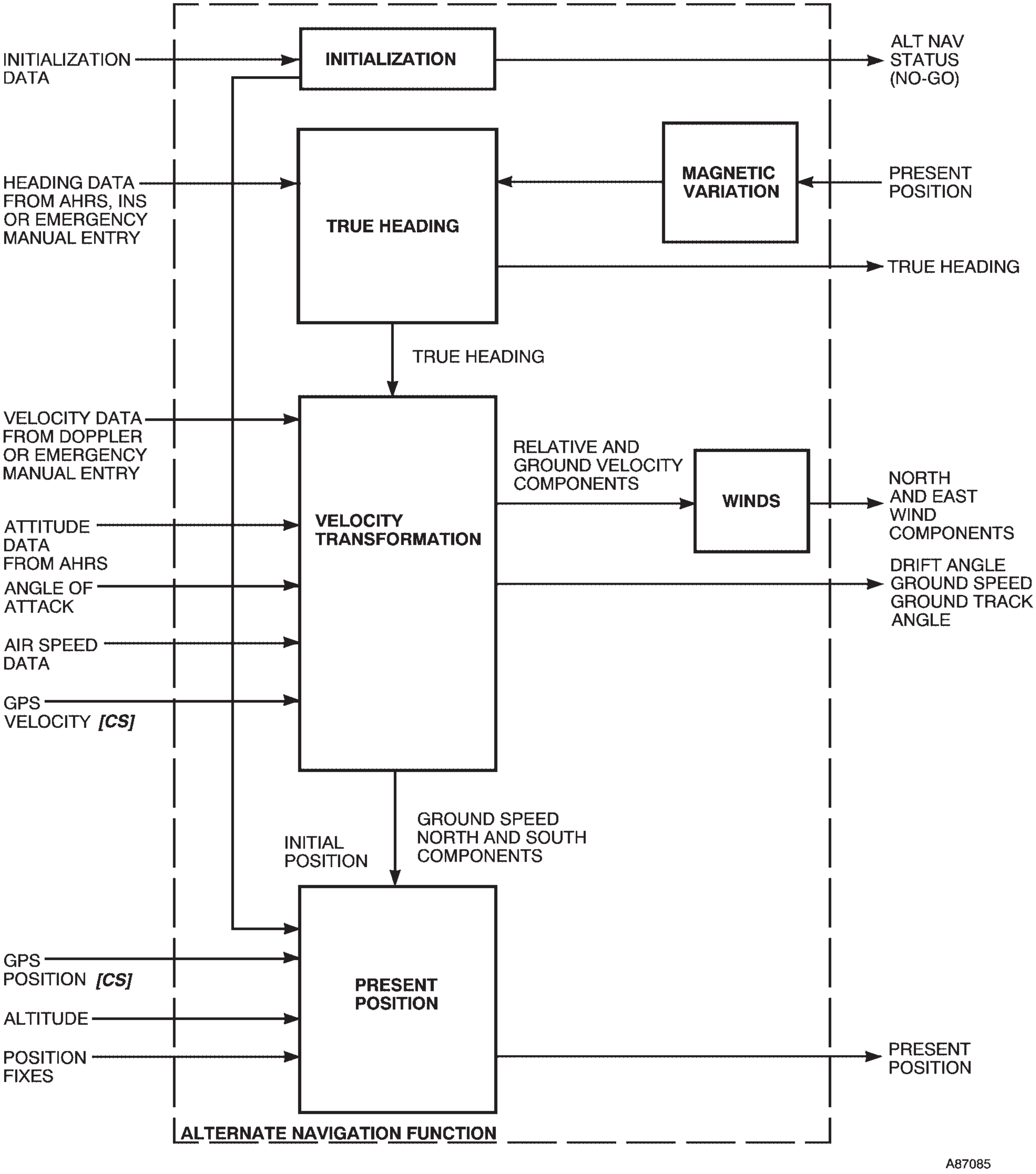
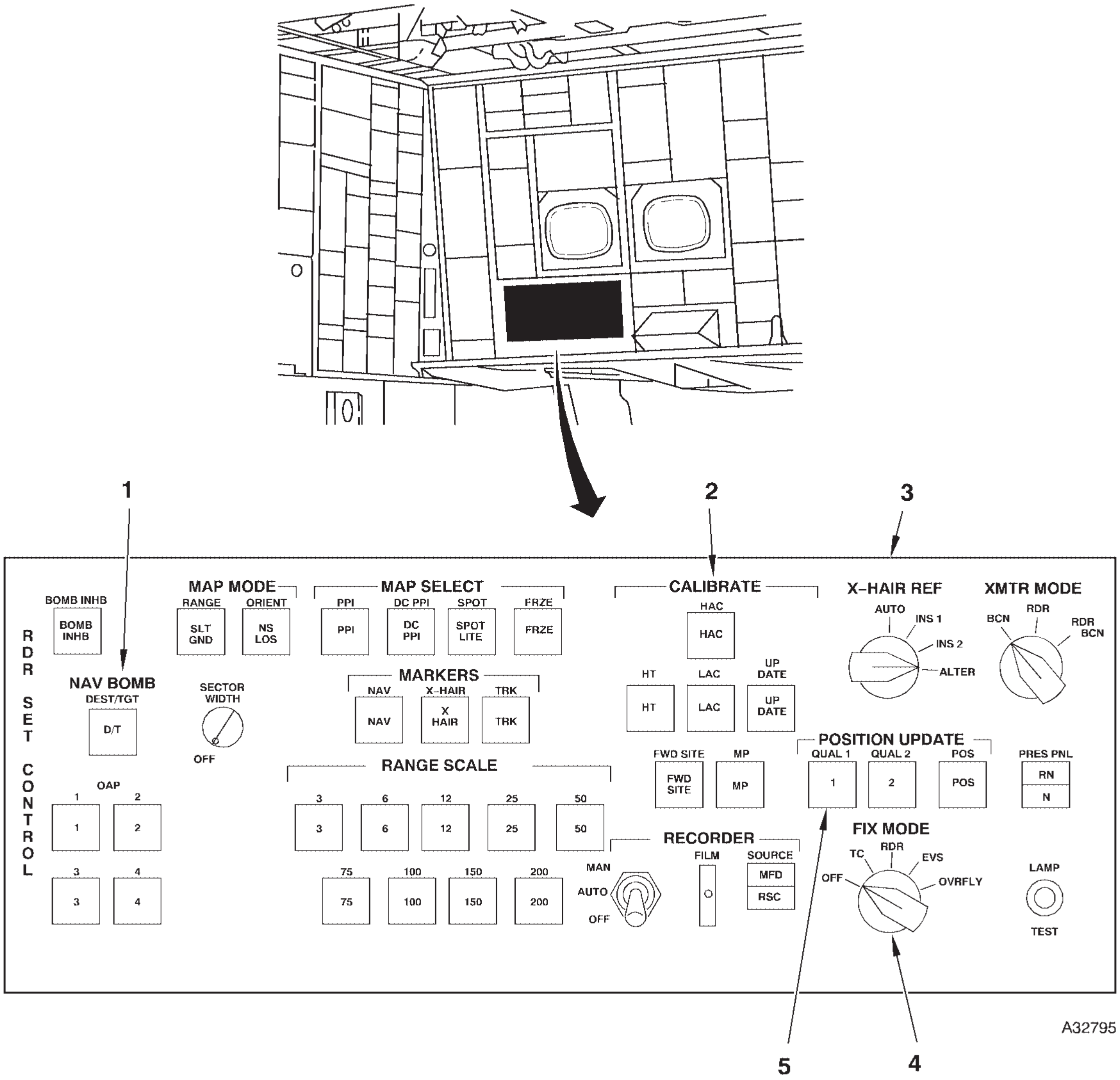


Figure 1A-26

Radar Navigator Management Panel (RNMP)

NAVIGATION FUNCTIONS



1 NAV BOMB SWITCHES (5)
2 CALIBRATE SWITCHES (6)
3 CROSSHAIR REFERENCE SWITCH
4 FIX MODE SELECTOR SWITCH
5 POSITION UPDATE SWITCHES (3)

Figure 1A-27 (Sheet 1 of 2)

Radar Navigator Management Panel (RNMP) (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
1	Destination, Target, and Offset (NAV/BOMB) Switches (5)	DEST/TGT – Used to position EVS or RDR crosshairs on the destination or target. OAP 1, 2, 3, or 4 – Position EVS or RDR crosshairs to the selected offset aiming point.
2	CALIBRATE Switches (6)	HAC – Calibrates true altitude using radar data. LAC – Calibrates true altitude using radar altimeter data. HT – Used to correct stored HT (Height of Terrain) for HAC, LAC, and MP only. MP – Used for memory point wind calibration. UPDATE – Completes a HAC, LAC, or MP update. FWD SITE – Rapidly moves crosshairs down track one half the distance of the selected range.
3	Crosshair Reference (X-HAIR REF) Switch (with fix mode selection switch OFF)	AUTO – Uses OAS selected navigation system for crosshair positioning. INS 1 – Places the crosshairs based on INS-1 present position. INS 2 – Places the crosshairs based on INS-2 present position. ALTER – Places the crosshairs based on the alternate navigation model.
4	FIX MODE Selector Switch	Selects method of position fixing. OFF deselects previous position fixing mode, erases related messages, zeros crosshair buffers. TC – Terrain Correlation used for position update. RDR – Radar crosshair used for position update. EVS – EVS azimuth and elevation used for position update. OVRFLY – Overfly of a known position used for position update.
5	POSITION UPDATE Switches (3)	Used to start computations for updating the navigation modules to accept or reject position fix information as selected by FIX MODE selector switch. QUAL 1 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is a well defined point (highest quality). For TC, starts Kalman filter processing only. For OVRFLY, starts processing with Kalman filtering, to be used when position is most confident at lower altitudes. QUAL 2 – Uses Kalman filtering to process radar or EVS crosshair position information when fixpoint is less well defined (lesser quality). For TC, starts Kalman filter processing only (same as Q1). For OVRFLY, starts processing with Kalman filtering, to be used when position is less confident at higher altitudes. POS – Zeroes the buffers in all navigation models. The computations are used for steering and targeting routines.

Figure 1A-27 (Sheet 2 of 2)

NORMAL OPERATION

Power is applied to both inertial navigation sets with the IME-1 and IME-2 switches on the OAS power panel. See Inertial Measurement, this section for INS equipment information. The OAS selects alternate navigation as the operating submode until INS coarse alignment is complete. A FLY TO command must be entered on the keyboard to start navigation.

SYSTEM MANAGEMENT AND EVALUATION

The OAS has the capability of self-management through its own monitoring and self-test programs. The OAS automatically downgrades to another submode when a failure is detected. The system can also automatically upgrade to a higher submode of operation if a malfunction is corrected. The operator monitors the system by observing the data on the MFDs and makes a decision to manually override the OAS if necessary. If a manual selection is made, the OAS will shift down to another submode if a malfunction occurs and the M (normal video on the applicable CF-1, 2, or 3 display) which indicated the original manual selection will be reverse video highlighted. If the malfunction clears, the OAS will only shift to the mode that was manually selected until the OAS is returned to AUTO mode or another mode is manually selected.

Initialization

Each INS can be initialized using the air alignment or ground alignment procedure.

GROUND ALIGNMENT

Ground alignment can be manually commanded for each INS if desired and the aircraft is not to be moved until alignment is complete. It takes from 43 minutes to 1 hour to complete ground alignment depending on the latitude and temperature. A FLY TO command must be selected to enter the aided-inertial navigation submode as the INS does not automatically enter the navigation mode upon completion of ground alignment. If the navigation mode is not selected, new solutions are computed at 6 minute intervals at latitudes below 49° and at 10 minute intervals at latitudes above 49°. If an INS is shutdown before ground alignment is complete, the ground alignment process is interrupted and an entire alignment cycle has to be completed when the INS is powered up. The INS can be powered up after de-spin is complete using a CF-11 or CF-12 command. If it is necessary to take off while the INSs are in a ground align status, enter a FLY-TO nn ENTER command or select air alignment. Failure to do so will result in degraded INS accuracy. Partial ground alignment (coarse alignment and 15 minutes), will enhance subsequent INS position resolution in air alignment mode. This can take from 24 $^1/_2$ to 29 $^1/_2$ minutes, depending on outside air temperature.

AIR ALIGNMENT (AIRBORNE)

When power is applied to the INSs, the air alignment mode is automatically entered. It takes 9 $^1/_2$ minutes to complete coarse alignment at ambient temperatures above 0°F and up to an additional 5 minutes is required at temperatures between 0° and –65°F for gyro preheat and warmup. AHRS stabilization data is required for the airborne coarse alignment. When coarse alignment is complete, the OAS enters READY status. If less than 10 minutes is desired between READY status and first fix, CF-17 and CF-27 can be used at all times. The next hour is the most critical for air alignment of the INS. Optimum alignment is dependent on the quality of fixes, not necessarily the fix pacing. Alignment fixes should be taken as necessary depending on the quality and availability of usable fixes.

NOTE

- Aircraft attitude should be held stable during INS sequencing, whether done manually or automatically.
- For optimum alignment accuracy, delay insertion of the first quality fix for 5 to 10 minutes after CF-17/27 entry.
- ***[CS]*** Commanding CF-17/27 will automatically select GPS/NAV if valid GPS data is available. The OAS will not accept manual position updates as long as GPS/NAV is selected.

AIR ALIGNMENT (ON THE GROUND)

An alternate method for bring up the IMEs prior to takeoff is an air alignment on the ground: After ALTER is commanded to PRIME (CF-44A), enter a FLY-TO command, then turn on the IMEs.

NOTE

> A FLY-TO command must precede any IME turn-on. Otherwise, the IMEs will not power up.

Ensure initial position and elevation are accurate. When the IMUs are powered they will come up in AIR ALIGN. Leave them in AIR ALIGN until sequencing. Due to the lack of velocity inputs, once the IMUs sequence they will drop to free inertial (NAV) automatically. Manually command CF-15A/25A to prevent the IMUs from exiting that mode. (As a precaution to prevent input of bad velocities, leave the Doppler off.) Place the present position in a vacant destination and command FLY-TO that destination. Place the FIX MODE SELECT SWITCH to OVERFLY and update the INSs using QUAL 1. Optimum pacing is four fixes spaced 10 minutes apart. Leave the IMUs in NAV until airborne. Evaluate the INS drift prior to takeoff. If it is excessive, leave ALTER NAV as PRIME until after takeoff and the IMUs are commanded to DOPPLER/NAV. Maintain fixing schedule on an as required basis.

NOTE

> ***[CS]*** The IMUs will automatically select GPS/NAV if valid GPS data is available after sequencing. No further manual fixing is possible as long as GPS/NAV is selected.

Prime Nav Model Selection

Three navigation models are used for computations in navigation function: INS-1, INS-2, and alternate. The INS-1 and INS-2 models are identical and prime when operating in aided-inertial and the alternate navigation model is normally backup. The prime navigation model is selected by the OAS as the best available navigation reference. The alternate model is selected as prime any time the INSs cannot support navigation. The Kalman filters select the first INS to complete coarse alignment as prime after system startup. If in an automatic selection function (CF-41A), when both INSs complete coarse alignment, the Kalman filters compare both INS data inputs for reasonableness and select the best navigation model as prime. When both INS data are unreliable the prime mission data automatically shifts to alternate. This occurs even though an aided inertial mode has been manually selected. If a navigation reference is manually selected as prime and becomes unreliable, another navigation reference must be selected. The navigation references are selected using the following CF-4 commands:

CF MODE	DISPLAY	RESPONSE
CF-41A	41A AUTO	Automatic selection of navigation reference
CF-42	42 INS-1	INS-1 as navigation reference
CF-43	43 INS-2	INS-2 as navigation reference
CF-44A	44A ALTER	Alternate navigation mode as reference

Kalman Filtering

The Kalman filters, one in each processor, perform the basic function of updating the INSs from external measurements of position and velocity. The filters perform an onboard error analysis of system performance and use the results to combine the navigation sensor data in an optimal manner. The filters operate on error differences between computed position and velocity, and externally measured position and velocity. The filters correct the navigation data error on the basis of these differences and compute a best estimate of present position. The filters are performing alternate navigation computations in the background at the same time aided-inertial computations are going on and INS position updates are scheduled to the alternate model every 15 minutes.

BUFFERS

Buffer values are the differences between crosshair position and the selected navigation reference. The buffer values change when a position update is commanded or when manual trackball inputs are incorporated. Buffer values are stored and not displayed when ***[NS]*** CF-135, FWD SITE, HAC, LAC, or MP is active.

WARNING

> In order to reset the buffer values to zero, the Fix Mode Selector Switch must be pushed in, turned to the OFF position, and then released in the OFF position. The operator may then reselect a fix mode. Reset of the buffers to zero will be verified, by displaying and evaluating the buffer values following this procedure.

DESTINATION SEQUENCING/INSERTION

If the aircraft passes within 600 feet of the current destination, or turn short point, the OAS automatically sequences to the next higher numeric destination and provides steering and TTG information. If the aircraft does not pass within 600 feet of the destination, the OAS automatically sequences to the next destination when the distance increases to 6000 feet outbound. If the aircraft misses the destination more than 6000 feet, the OAS will not automatically sequence to the next destination. In this case, the next destination must be manually selected. The operator can manually select any destination in the destination table using a FLY-TO NN ENTER. This also allows the operator to deviate from the planned route for such things as time control or weather avoidance. For example, if the operator is flying towards destination 3 and wishes to fly to destination 6 and skip 4 and 5, enter FLY-TO 6. The current destination number and information change to reflect destination 6. If the current action point (PGRM) is selected, the display is updated with destination 6 and 7 information. The destination sequencing reverts to automatic after passing destination 6. A new destination can be entered or any destination modified on FRMT-10 by using the MDFY function. If the operator wishes to fly to a fixpoint, place the crosshair on the fixpoint, and select FLY-TO + ENTER. The current destination number and identifier of PMD changes to read RDR XH or EVS XH, and no sequence number is displayed. Steering commands are generated to the computed crosshair coordinates. If the crosshair is moved off the point, steering commands will still be generated to the previous crosshair coordinates until a subsequent FLY-TO + is entered. If the operator does not update the next destination, the OAS will maintain present ground track angle until the next destination is selected.

FIXPOINT SEQUENCING/INSERTION

NOTE

> OAS crosshair can hang up when they track out of the TA Sector in manual or in automatic sequencing. This problem can be corrected by deselecting crosshair and reselecting crosshair on the RNMP.

The crosshair is sequenced automatically to the next numerical higher fixpoint or manually to a selected fixpoint if in manual fixpoint sequencing. Fixpoints are numbered sequentially from 1 to 99. Automatic fixpoint sequencing occurs under any of the following conditions:

- When the relative position of the next higher numbered fixpoint is closer to the aircraft than the current fixpoint.
- In any radar mode when the relative bearing is greater than 110° to the sighting point and the relative bearing is greater than 45° for EVS.
- If the fixpoint it is on was manually selected, it will remain on that fixpoint until manually moved or when XHAIR ENTER is actuated.

If a follow-on fixpoint does not exist, the current fixpoint remains current regardless of its position with respect to the aircraft and the sequence mode remains in automatic. The OAS automatically selects the first fixpoint when power is initially applied. Manual fixpoint sequencing is initiated and remains in the manual sequencing mode until action is taken to reenter the automatic mode. The OAS does not automatically reenter the automatic fixpoint sequence mode under any conditions except when exiting BOMB mode.

Manual fixpoint sequencing is entered or exited upon selection or deselection of the following functions:

ENTER MANUAL SEQUENCING	EXIT MANUAL SEQUENCING
HAC	HAC is deselected or HAC update is commanded via UPDATE selection
MP	MP is deselected or MP update is commanded via UPDATE selection
FWD SITE	FWD SITE mode deselected (X HAIR ENTER)
X HAIR NN ENTER X HAIR 0 ENTER	X HAIR ENTER selected
OAP-N Selected	OAP-N deselected (cannot be deselected in BOMB mode)
D/T Selected	D/T deselected (cannot be deselected in BOMB mode)
BOMB	Current destination is not a gravity target and D/T and OAP-N is deselected

Fixpoint position can be modified by manually entering new fixpoint position data on FRMT-9 using the modify function.

Position Updates

Position updates are controlled by the RNMP (figure 1A-27). Four position updates can be accomplished: radar, EVS, terrain correlation, and overfly. The FIX MODE switch selects the type of position update to be accomplished. Once a fix is taken, the Kalman filter gives a priority to the fixed based on the type of update. The priority determines how much of the fix will be used to update the navigation models. The priority given to the updates in determining order is: terrain correlation, radar, EVS, and overfly.

NOTE

> ***[CS]*** If an INS or the alternate navigation model is using GPS inputs (GPS/NAV or GPS AHRS), manual position updates will not be processed for that navigation model.

TERRAIN CORRELATION

Terrain correlation fixing data is gathered automatically by the OAS and its incorporation is under control of the operator. Since the terrain correlation position fix function is independent of the radar or EVS sighting function, the operator may perform any desired radar or EVS function except position update while a terrain correlation fix is in progress. Any position update, including HAC or LAC, terminates the terrain correlation fix. Terrain correlation uses radar altimeter data and compares it against stored elevation data. The terrain correlation position fix geometry is divided into a grid beginning at the terrain correlation control point (TCCP) and ending at the terrain correlation exit point (TCEX) and the radar altimeter data is compared along this ground track with OAS stored data. The FCI must be kept centered during the TC run for an accurate fix. If the FCI is not centered, a TC DATA message may still be displayed but if the update is incorporated, a large error will be introduced into the OAS.

If terrain correlation data is available and the radar altimeter is reliable, a TC message appears on the MFD when the current destination is a TCEX. If the TC data is not available or radar altimeter is unreliable, the TC message appears in reverse video. If the fix is reliable, a TC DATA message appears on the MFD. Set the POSITION FIX MODE switch to TC and the following message appears on the MFD:

TC Δ R = nnnn0 TB = nnn° (north up map)
TC Δ R = nnnn0 RB = nnn° (track up map)

Update is accomplished using the POSITION UPDATE switches. See POSITION UPDATE SWITCH SELECTION, this section. If fix is acceptable, present position values change to reflect update. If fix is rejected, the following message appears on the MFD:

FIX REJ - 1/2/3 ORIDE ? YES-NO

See INS FIX REJECT PROCEDURES, this section, for response. The operator can defer accomplishing a terrain correlation fix because terrain correlation data remains available until such time that another type of position fix is accomplished or additional terrain correlation fix data becomes available. Deselection of TC fix mode results in erasure of TC message.

RADAR

Radar position updates are accomplished using the radar crosshair position. The position fix mode switch has the following effect on the X HAIR reference switch and radar crosshair position.

POSITION FIX MODE	XHAIR REFERENCE/ DISPLAY DATA CHARACTERISTICS
OFF	Track control corrections and NAV position buffers will be set to zero such that rotation of the XHAIR reference from one position to another results in the radar crosshair moving on the display. All crosshair display data appearing on the bottom of the MFD will be erased.
RDR	Position buffers including track control corrections are displayed for the selected XHAIR reference. Rotation of the XHAIR reference from position to position will not cause the radar crosshair to move on the display; but the buffer data is updated to reflect the selected XHAIR reference.

Select the MFD supporting the radar display and perform a HAC or LAC if required. Locate the fixpoint on the radar display and place the FIX MODE switch to RDR. The following message appears on the bottom of the MFD:

RDR ΔR = nnnnϕ′ TB = nnn° (north up map)
RDR ΔR = nnnnϕ′ RB = xnnn° (track up map).
x = L or R

The message displays difference between the crosshair position and the selected NAV model position. The size of the crosshair is consistent with the OAS estimate of accuracy of the crosshair reference mode selected. The trackball on the keyboard is used to manually position the crosshair on the fixpoint. The radar display can be frozen for analysis of the radar display and aid in precise positioning of the crosshair. Crosshair movement is reflected in range and bearing data displayed on the MFD. Present position is updated using the RNMP POSITION UPDATE switches. See POSITION UPDATE SWITCH SELECTION, this section.

EVS

The procedures for accomplishing an EVS position fix are identical to radar position fix procedures except for the following minor differences. Select EVS on an MFD and accomplish a HAC or LAC. If a HAC cannot be accomplished due to unreliable radar, simulate a HAC by varying ΔH until the EVS crosshair stop drifting off the selected ground point. The FIX MODE select switch has the same operation in EVS as it does in RDR. The EVS position buffers (north stabilized) appear on the bottom of the MFD as follows:

EVS Δ R = nnn0’   TB = xnnn°’

Selecting line-of-sight (LOS) on the RNMP will cause the EVS position buffers to appear as follows:

EVS Δ R = nnn0’   RB = xnnn°’

NOTE

> The EVS position buffers will only be displayed on an EVS display (FRMT-3, 4 or 5).

All update fix criteria are identical to those defined for a radar position fix. See POSITION UPDATE SWITCH SELECTION, this section.

OVERFLY

The overfly position fix is used in emergency situations such as failure of the radar set or radar scan converter, and atmospheric conditions restrict EVS viewing range. To perform an overfly fix, the update point must be in the destination table. The steering mode goes to direct during the overfly position fix procedure until the overfly fix is entered by the operator. Select any MFD to support the overfly position fix. Coordinate overfly points with the pilots. If an overfly point is selected that exists in the fixpoint table, select X-HAIR-NN ENTER, zero the buffers, then command FLY-TO + ENTER. If the overfly point is not the current destination, you must command FLY-TO-XX ENTER. If the overfly point is not on either table, enter it on the destination table and command FLY-TO-XX ENTER. Position the fix mode switch to OVRFLY. The following message will be displayed on the selected MFD:

O/F Δ R = nnnnn’ TB = 000° (north up map)

O/F Δ R = nnnnn’ RB = 000° (track up map)

The buffers (ΔR) display the exact value if less than 99990’. If the buffers are more than 99990’, 99990’ is displayed until ΔR reaches 99990’ and then decreases until a position update is commanded.

The pilot advises when on top of the selected point and the operator presses one of the POSITION UPDATE switches. The corrections to present position are displayed on the selected MFD as follows:

O/F Δ R = nnnnn’ TB/RB = nnn° (north up map)

O/F Δ R = nnnnn’ RB = 000° (track up map)

If fix is rejected, see INS FIX REJECT OVERRIDE PROCEDURES, this section, for response.

Position Update Switch Selection

NOTE

> ***[CS]*** If an IMU or the alternate navigation system is using GPS inputs (GPS/NAV or GPS AHRS), manual position updates will not be processed.

The POSITION UPDATE switches are used to update OAS present position. The operator should base his decision to select one of the three switches based on the type of fixpoint. QUAL 1 should be selected if the fixpoint is a well defined point target. QUAL 2 should be selected if the fixpoint is a less defined area target. If a TC fix is being updated, selection of the QUAL switches is immaterial as the OAS determines the quality of the fix.

Selection of either QUAL switch subjects the fix data to reasonableness tests by the Kalman filter. The OAS subjects the update information to accept/reject criteria comparing inertial and Doppler data to AHRS, TAS, and other sensor data. If the fix inputs are acceptable, the Kalman filter will determine what portion of the position, velocity, and sensor calibration inputs will be integrated into the nav models. If the operator selected QUAL 1 instead of QUAL 2, the Kalman filter accepts a higher percentage of the fix data.

The QUAL 1 and QUAL 2 update switch selection should be based on factors such as operator experience, fix point familiarity, and presentation definition of the radar target The Kalman filter considers variables such as range and altitude in the weighting process. However, the operator should ensure accurate altitude and aiming prior to selection of QUAL 1 or QUAL 2. Fixing with an inaccurate HA will induce position error by skewing the range to the radar return. Additionally, the operator must consider the effects radar inherent errors have on radar return presentation and accurate cross hair placement, especially at longer ranges.

If POS is selected, system latitude and longitude change to reflect range and bearing information exactly as generated by the operator. The buffer value for the prime NAV model will be zero while POS is selected. If the POS light is on, pressing POS will deselect POS, turn the POS light off, and the existing position (updated for the time POS was selected) and position buffers prior to selecting POS will be displayed. A POS update changes position only and then only for the time POS is actually selected. Only a QUAL1/QUAL 2 update will change velocities. Selection of a QUAL switch will also deselect POS. POS update is inhibited between 60 and 0 TTG in bomb mode.

NOTE

> Because of differences in computing present position by OAS and cruise missiles, POS should not be used for cruise missile launch points.

INS Fix Reject Override Procedures

Following a QUAL 1 or QUAL 2 selection by the operator, the OAS may reject the fix inputs. It will then generate a fix override question near the bottom of the MFD.

FIX REJ – 1/2/3 ORIDE? YES-NO

1/2/3 indicates the rejecting NAV models (1 = INS 1; 2 = INS 2; 3 = Alternate NAV)

The operator must respond to the question within 60 seconds or a NO response is assumed. In this case, no updates are made to the rejecting nav models, and the message is erased. If the operator responds NO, the above action will take place immediately. If the operator answers YES, the OAS will erase the messages and store in its memory that the override action has taken place. However, no updates are made to the rejecting nav model(s). A subsequent fix attempt and override, if a second reject is experienced, must be accomplished in order to update the rejecting nav model(s).

If the operator does override on his second attempted position update, the rejecting nav model(s) will react as follows:

1. Both INSs rejected the first fix. No velocity reset is made, position is reset using radar measurements, and the Kalman filter will be adjusted to accept more of the velocity data it samples.
2. One INS accepted and one INS rejected the first fix – The rejecting INS resets its velocities to the accepting INS's and the rejecting position is reset using radar measurements.

NOTE

> When responding YES to a second fix override question, this fix will only be processed by the nav model that rejected the first fix. No velocity or position update will be made to the nav model that accepted the first fix.

Alter Nav Fix Reject Procedures

The OAS will generate the fix reject message if the alternate nav model rejected the position update. Because the alternate nav model reject occurs for position error only, the reject can be overridden immediately. If the operator decides to respond "YES" to the question, the alternate nav system position will be updated immediately.

HIGH ALTITUDE CALIBRATION

The operator can perform a high altitude radar calibration after verification of the correct H_T. Select RDR track control response on the keyboard and the MFD supporting the radar display. Position antenna tilt to full down. Then select HAC on the RNMP and the radar display automatically changes to the following:

MAP – Spotlight
MAP ORIENTATION – LOS (0° azimuth)
MAP SCALE – 3 NM
MARKERS – XH (crosshair) only
MAP MODE – SLT

The following message is displayed on the MFD.

HAC HT = ±nnnn' HA = nnnnn ΔH = 0000'

Check HAC HT against actual terrain elevation directly below the aircraft. If there is a difference, depress HT switch. A 24 HT = nnnn' will be displayed above the HAC HT. Modify - 24 - ENTER will allow the operator to change the value of the HT. Modifying the HT line will also modify the HAC HT value. Note the difference between the position of the crosshair range mark and the line of the first terrain returns and use the track control to position the crosshair range mark on the line of returns. ΔH and the new true altitude will be displayed on the MFD. The largest ΔH that can be accepted during any one update is 29,000 feet. If the new value is reasonable, enter it in the OAS using the update key on the RNMP. Selection of UPDATE causes HAC reasonableness criteria to be processed. If the OAS considers the new true altitude value to be reasonable, the new true altitude value will be used and the event will be recorded. After recording, the message will be erased and fixpoint sequencing mode will revert to automatic if automatic was active prior to initiating the HAC, and the radar will return to the display prior to the HAC. If the new altitude is not reasonable, the HA = nnnn' message will appear in reverse video. HAC may be deselected by pressing the HAC switch or selecting LAC. Deselection terminates the function, erases all messages and the HAC legend.

NOTE

HAC must be manually deselected when in TA mode.

LOW ALTITUDE CALIBRATION

The operator will select the MFD supporting the radar or EVS display to perform a low altitude calibration (LAC). Then select LAC on the RNMP and the following message appears on the selected MFD:

LAC HT = ±nnnn' HA = ±nnnn' ΔH = ±nnnn'

Verify the correct calibration terrain evaluation (H_T) (terrain elevation directly below the aircraft) and update if required. Observe the computed true altitude (HA) value, and if reasonable, press the UPDATE key. If the true altitude value is not reasonable, LAC can be terminated by pressing the LAC key. If HA is updated, the new value is displayed in PMD. In the case of radar altimeter failure, fly over flat terrain of known HT and use HAC for altitude calibration.

NOTE

- When HAC or LAC is completed, ensure the HT switch is pressed OFF.
- ***[CS]*** If an IMU or the alternate navigation system is using GPS input (GPS/NAV or GPS/AHRS) HACs or LACs will not be processed into the nav model's HA. However, the OAS maintains an HA for use by nav models not tied to GPS and this HA is updated.

[NS] Air Refueling Rendezvous Procedures

The tanker rendezvous function is initiated using the following procedures. Set up the radar display and identify the tanker beacon. Select the MFD supporting the radar display. Select FWD SITE and then enter a CF-135 command on the keyboard. The following data changes on the radar format:

Fixpoint ID = KC-135 BCN
Crosshair range and azimuth displayed

The OAS commands centerline recovery and enables automatic steering, and sets HT to aircraft MSL altitude.

NOTE

If FWD SITE is not selected prior to commanding CF-135, the current fixpoint HT is modified to the aircraft true altitude. Therefore, if the operator is going to use that fixpoint he must reinsert the proper HT after CF-135 is terminated.

Position the crosshair on the tanker beacon return and enter a crosshair on target command with the ⌖ key.

True bearing is displayed if map orientation is north up and relative bearing is displayed if map orientation is track up. Allow the beacon return to travel approximately 10 nm and reposition the crosshair on the return. Press the ⌖ key and the data on the left side of the MFD is updated and the TTG to tanker start turn and turn range is displayed as follows:

AZ xxx°

RS nnn

TR nn.n

TTG y:yy

Also, the heading error in the middle of the MFD is deleted and offset to the nearest tenth of a nautical mile is displayed as follows:

OS = nn.n

The radar crosshair position is also updated to track the estimated tanker beacon position on the radar display. If the tanker track or tanker speed changes, so that the crosshair does not accurately track the tanker, the crosshair position can be refined by repositioning the crosshair and pressing the ⌖ key. This procedure can be used as often as necessary until TTG to tanker start turn = 0 as long as 10 nautical miles elapse between each event.

NOTE

The ⌖ key should also be pressed after correct offset has been established and heading error is zero to compute an accurate TTG to tanker to start turn. Otherwise large errors may be introduced.

The tanker rendezvous function can be manually terminated at any time by the operator accomplishing the rendezvous by calling up a format number, X-HAIR ENTER, X-HAIR NN ENTER, FLY-TO-NN ENTER, FLY-TO-X-HAIR ENTER, PRGM B$^+$, D/T, or OAP-N. The operator not doing the rendezvous can terminate the function by commanding FLY-TO- NN ENTER, FLY-TO-X-HAIR ENTER, or PRGM B+. Display data will revert to the previous radar display. Automatic tracking of the tanker beacon ceases at TTG to start turn = 0 and the rendezvous function is automatically terminated at the OAS calculated tanker rollout. Upon termination, crosshair position mode, steering, and fixpoint sequence mode revert to that in effect prior to the receipt of CF-135.

NOTE

- To prevent unnecessary confusion should the OAS attempt to change prime NAV models, the best INS should be selected manually.

- For the CF-135 function to work, the coordinates of the ARIP and ARCP are physically changed on FRMT-10. Do not enter FLY-TO commands to these points unless the original MDPS coordinates are re-inserted after completion of CF-135.

Global Positioning System

DESCRIPTION

[CS] The global positioning system (GPS) provides velocity and position data to the OAS and to those integrated conventional stores management system (ICSMS) weapons requiring position update. GPS provides position updates to all three NAV models.

When aircraft GPS equipment is turned on, an estimate of present position, velocity, and time is entered. Then, the GPS equipment begins to search for and track satellites. Data received from a satellite signal basically does three things: it identifies the satellite number, locates the satellite in space, and establishes system time. The aircraft GPS receiver calculates range to the satellite by measuring the time of receipt of signal and multiplies the time by the speed of light. The result of this calculation locates the aircraft on a sphere of radius whose center is the transmitting satellite. With range to one satellite known, a range measurement is made to two other satellites. Using the three range measurements and elementary geometry, GPS equipment determines that point which is the aircraft's precise position in terms of latitude, longitude, and altitude. Range to a fourth satellite is required to determine the time offset from the user's crystal clock with respect to the GPS atomic time standard. Velocity measurement is achieved by counting the Doppler shift from GPS center frequency.

[CS] Satellite information is fed through aircraft GPS components and flows to the avionics processors for distribution to navigation and weapon delivery components. Two dead reckoning navigation submodes, aided inertial (GPS/NAV) and GPS/AHRS, serve as the prime and best alternate navigation systems, respectively. See OAS Navigation, this section, for further navigation mode explanation. Augmentation of GPS adds several avionics units and a controlled reception pattern antenna (CRPA). The CRPA is designed to convert free-space propagated GPS navigation signals into radio frequency signal voltages for routing to the antenna electronics unit (AEU). Refer to T.O. 1B-52H-1 for the CRPA location. The AEU performs special filtering and radio frequency amplification of CRPA output and provides composite signals to the receiver processor unit (RPU) and splitter amplifier unit (SAU). The RPU receives, tracks, and processes signals from the AEU and provides position, velocity, and time information to the appropriate interfaces. The RPU maintains critical memory during power interruption by using a back-up battery incorporated into the receiver. The SAU obtains radio frequency and time mark pulses and provides amplification and distribution of signals to information switching units (ISUs) (located on the heavy stores adapter beam pylons. The SAU receives power when one of the weapon interface unit switches are on. The GPS interface unit (IU) receives inputs from the programmable keyboard and RPU and relays the signals through the SAU to the pylon ISUs. The IU and RPU are located on the right equipment rack in the navigator's compartment. GPS Navigation Functions are shown in figure 1A-28.

The GPS IU also controls the TACAN Emulation function and supplies data to the Mission Route Screen/Moving Map Display, and the Destination Data Screen on the pilots' MFDs. The data available to the pilots' MFDs for different OAS configurations is shown in figure 1A-29 (Refer to T.O. 1B-52H-1 for complete description of the TACAN Emulation functions).

INTERFACE UNIT SOFTWARE (IUS) MODES OF OPERATION

[CS] The IUS is in full communication with the FMS.

- GPS data is provided for all three NAV models, GPS-equipped weapons and TACAN Emulation.
- OAS data is available for TACAN Emulation.

[NS] The IUS is not in communication with the FMS.

- GPS data is not provided for OAS navigation or weapons.
- GPS data is available for TACAN Emulation.
- OAS data is not available for TACAN Emulation.

NO OAS DATA. The IUS operates in a stand-alone configuration and some TACAN Emulation capabilities are lost.

GPS Navigation Functions

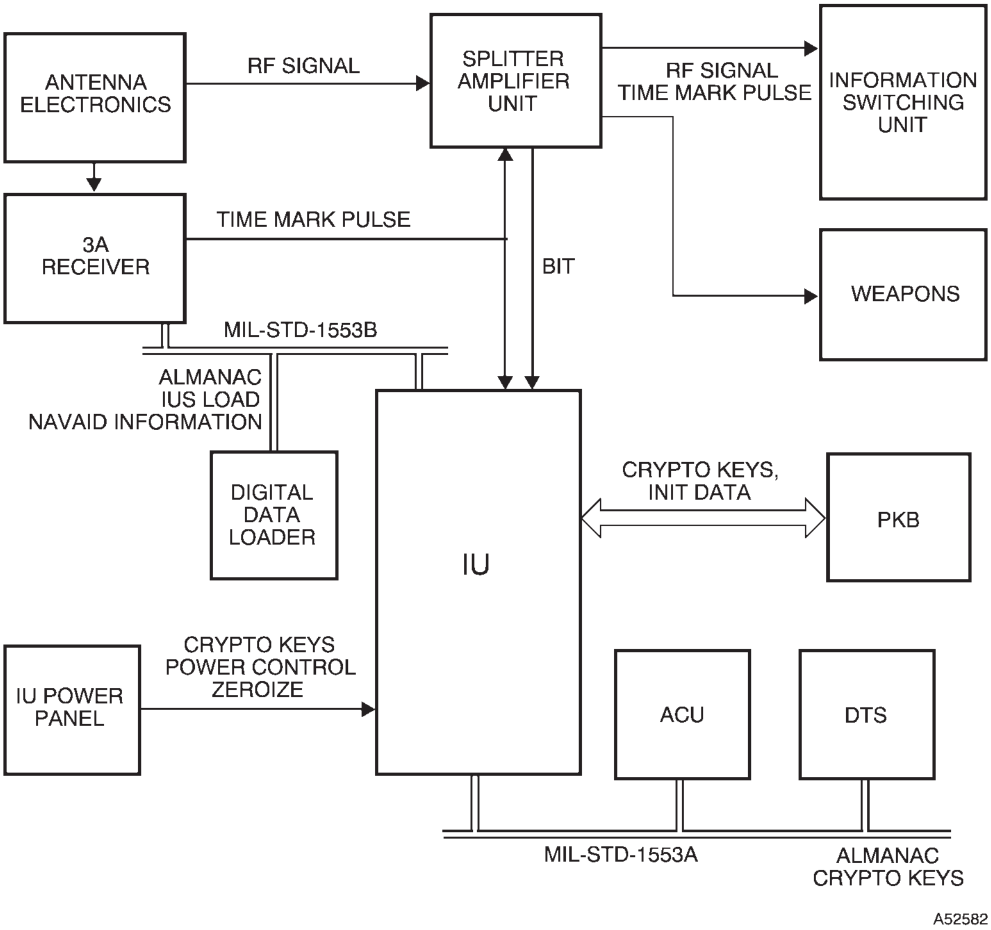


Figure 1A-28

GPS IU/TACAN Emulation Mode Data

	WITH FMS *[CS]*	WITH OAS *[NS]*	NO OAS DATA
MISSION ROUTE SCREEN/MOVING MAP DISPLAY SCREEN			❶
ANNUNCIATORS	X	X	X
ASSOCIATED NAVAID TO THE CURRENT DESTINATION (ID, CHANNEL, BEARING, AND DISTANCE)	X		
BANK STEERING COMMAND	X	X	
BULLSEYE(S)	X		
COMPASS ROSE	X	X	
CURRENT DESTINATION	X		
DESTINATIONS (NUMBER AND TYPE)	X		
DRIFT	X	X	
FILED NAVIGATION REFERENCE POINT (ID AND CHANNEL)	X		
GROUND SPEED	X	X	X
GROUND TRACK	X	X	
HEADING ERROR	X	X	
JDAM/WCMD/JASSM LAUNCH ACCEPTABILITY REGION (LAR)	X		
MAGNETIC HEADING	X	X	
NAV REFERENCE POINTS FROM DAFIF ❷	X		
SELECTED NAVAID TO THE AIRCRAFT ❷ (ID, CHANNEL, BEARING, AND DISTANCE)	X	X	X
TIME-TO-GO	X	X	
TRUE AIR SPEED	X		
WIND DIRECTION AND SPEED	X		
DESTINATION DISPLAY SCREEN			
ANNUNCIATORS	X	X	X
CURRENT DESTINATION	X		
DESTINATIONS (NUMBER AND TYPE)	X		
DRIFT	X	X	
FILED NAVIGATION REFERENCE POINT (ID, CHANNEL, BEARING AND DISTANCE)	X		
GROUND SPEED	X	X	X
GROUND TRACK	X	X	
INDICATION OF NAVIGATOR MODIFIED DESTINATIONS (MOD)	X		
MAGNETIC HEADING	X	X	
SELECTED NAVAID TO THE AIRCRAFT ❷ (ID, CHANNEL, BEARING, AND DISTANCE)	X	X	X
TRUE AIR SPEED	X		
WIND DIRECTION AND SPEED	X		

❶ MOVING MAP DISPLAY WILL DISPLAY NO OAS DATA WHEN NO SUPPORTING DATA IS AVAILABLE.

❷ AVAILABLE ONLY WITH DDLC INSERTED.

Figure 1A-29

POWER SOURCE

The GPS avionics are powered by 115 vac and 28 vdc. Information for GPS shown on OAS displays is controlled by OAS power requirements. See OAS System Configuration, this section. Initialization, GPS avionics control, and transfer of position, time, and velocity data is accomplished through the data bus. Circuit breakers for GPS controls and avionics are located on the EVS circuit breaker panel.

CONTROLS AND DISPLAYS

All GPS data is displayed on the MFD's or programmable keyboard. The OAS control function and format displays containing GPS information are shown in figures 1-8 and 1-9.

Interface Unit Control Panel

The Interface Unit Control Panel (IUCP) (figure 1A-30) located at the navigator's station provides control to power up/down the advanced guided weapons control panel (AGWCP), GPS interface unit (IU), the GPS receiver processor unit (RPU), and the programmable keyboard (PKB). It is also used to load and zeroize crypto key data. The IUCP uses 28 vdc power. Pressing the GPS/IU power switch to ON applies power to GPS avionics.

Digital Data Loader

The Digital Data Loader (DDL) (figure 1A-30) located at the navigator's side panel and is used to load the data contained in the Digital Data Loader Cartridge (DDLC) into the IU.

DIGITAL DATA LOADER CARTRIDGE

The Digital Data Loader Cartridge (DDLC) contains the following data:

- GPS Almanac Data File. (Identical to that stored in the DTUC).
- Aircraft Mission File. (Correlated with the data on the corresponding Aircraft Sortie DTUC).
- GPS Interface Unit Software (IUS) load file.
- Navaid Information File. The Navaid database contains selected data on TACAN, VOR/DME, and VORTAC stations worldwide from the Digital Aeronautical Flight Information File.

Programmable Keyboard

The programmable keyboard (PKB) provides the navigator a means of data entry and display in conjunction with the IU to perform operations required to support the integration of GPS into the ICSMS system. The PKB (figure 1A-31) consists of 20 programmable software keys with switch legends and functions. The PKB keys will accommodate two sizes of type, graphic images, and bit mapped displays. The PKB accepts data from the IU to produce the key legend displays and communicates with the IU via the serial data bus. Thus, the PKB displays navigational data from the GPS and allows manual initialization of the GPS. The PKB is mounted next to the OAS integrated keyboard (IKB) at the navigator's station.

NAVIGATION MODES

The MFD displays are shown in figures 1A-8 and 1A-9. When GPS and inertial inputs are valid, GPS/NAV is displayed. The prime navigation system, GPS/NAV, requires valid GPS inputs and one of the inertial navigation systems (INS) to be operational. For alternate navigation modes, GPS supplies velocity and position data and is always shown in normal video. With AHRS presented in normal video, AHRS provides the heading and attitude information. In GPS/AHRS, with AHRS in reverse video, AHRS provides attitude data while heading is emergency information. With EMERG in reverse video, GPS/EMERG means both heading and attitude are emergency information. When GPS is powered off, GPS OFF is displayed. The DATA light, depending on type video, shows GPS navigation mode validity. In normal video, DATA means GPS is powered on, and information is valid for alternate navigation. In bright video, DATA means GPS is powered on, and information is valid for inertial navigation. Presented in reverse video, DATA means GPS is powered on, but GPS data is invalid or the FMS is going through reconfiguration loading. When NO GO is displayed, GPS is powered on, but communication with the satellites is not established, or there is a GPS fault.

Interface Unit Controls and Indicators

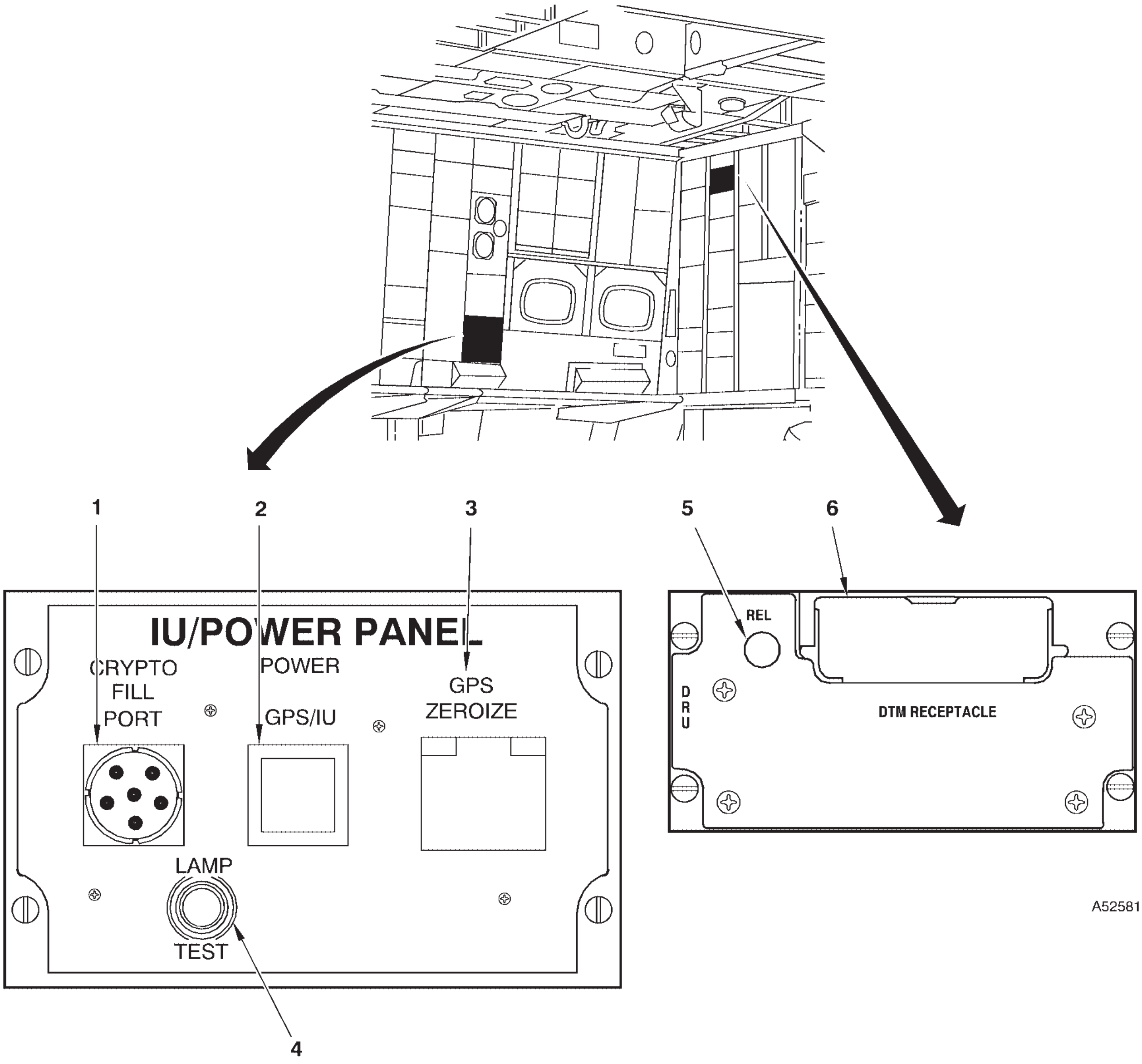


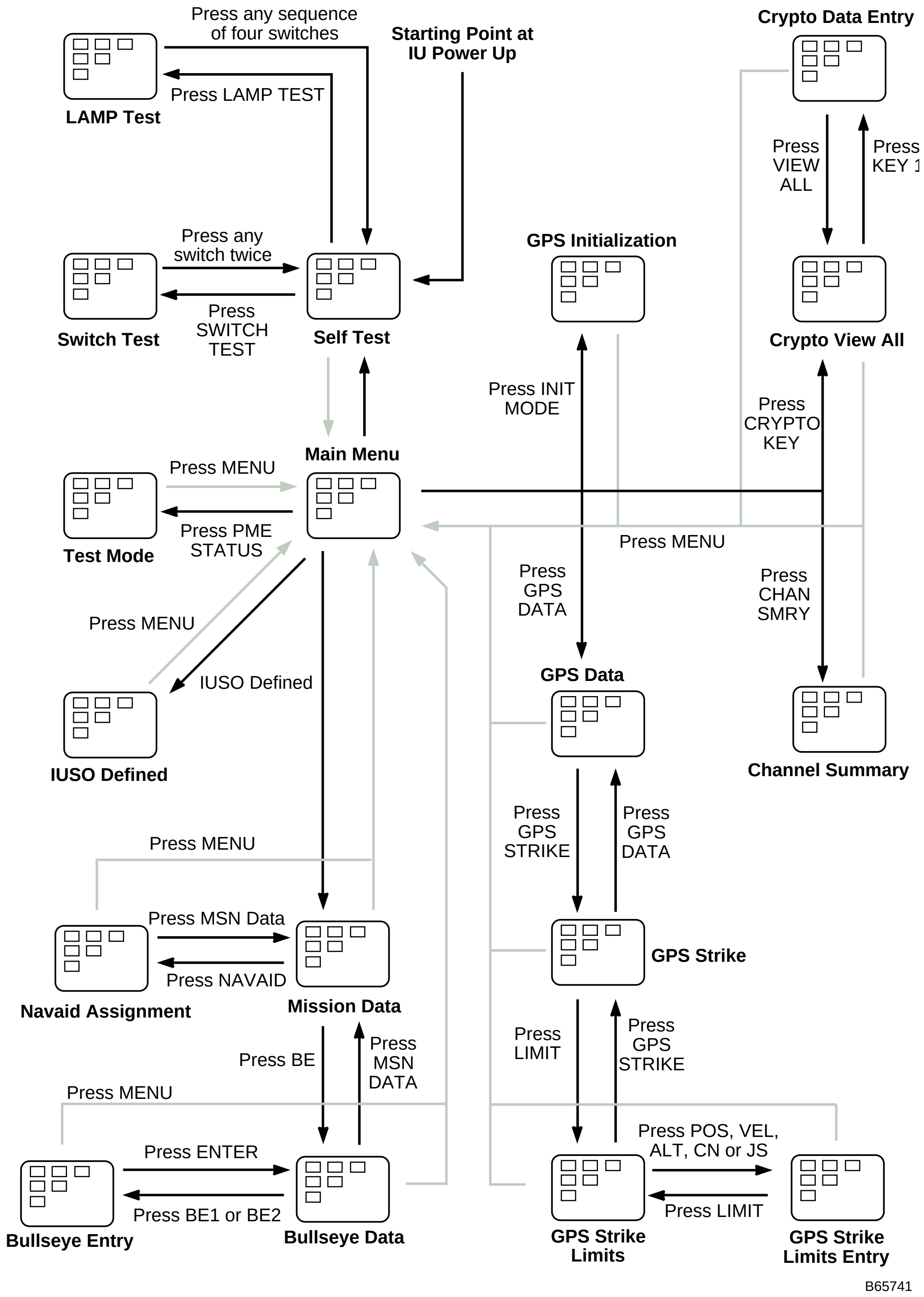
Figure 1A-30 (Sheet 1 of 2)

Interface Unit Controls and Indicators (Cont)

NO.	CONTROL-INDICATOR	FUNCTION
1	Crypto Fill Port	The port is used to connect the KYK-13 or CYZ-10 to the IU. A protective cap covers the fill port when not in use. The fill port is shown with the cap removed.
2	GPS/IU POWER Pushbutton Switch	Pressing the switch applies power to the GPS/IU. A lit light in the switch indicates power is applied to GPS/IU.
3	GPS ZEROIZE Pushbutton Switch	Pressing the switch sends a command to zeroize the GPS crypto keys. Absence or presence of Crypto Keys can be monitored in field 1 of the PKB Main Menu page. **NOTE** Once pressed the ZEROIZE switch remains depressed until pressed a second time. Pressing the switch a second time resets the switch to the non-depressed position. The switch must be reset in order to resend a zeroize command.
4	LAMP TEST Switch	Tests all lights on Interface Unit Control Panel.
5	REL (Release) Pushbutton	Pressing the button unlatches the DDLC from the slot. **NOTE** The position of the DDLC in the slot appears the same whether latched or unlatched. The DDLC must be pressed or pulled in order to determine if it is actually latched in the slot.
6	DDLC Slot	Slot for inserting the DDLC.

Figure 1A-30 (Sheet 2 of 2)

Programmable Keyboard



The above graphic represents the relationship between the pages displayed on the PKB. The gray lines represent paths back to the Main Menu page. The uppercase text in single quotes represent the legend text of the switch that the operator must press to move to a different page.

Each PKB page is covered in detail in the following sheets of this figure.

Figure 1A-31 (Sheet 1 of 50)

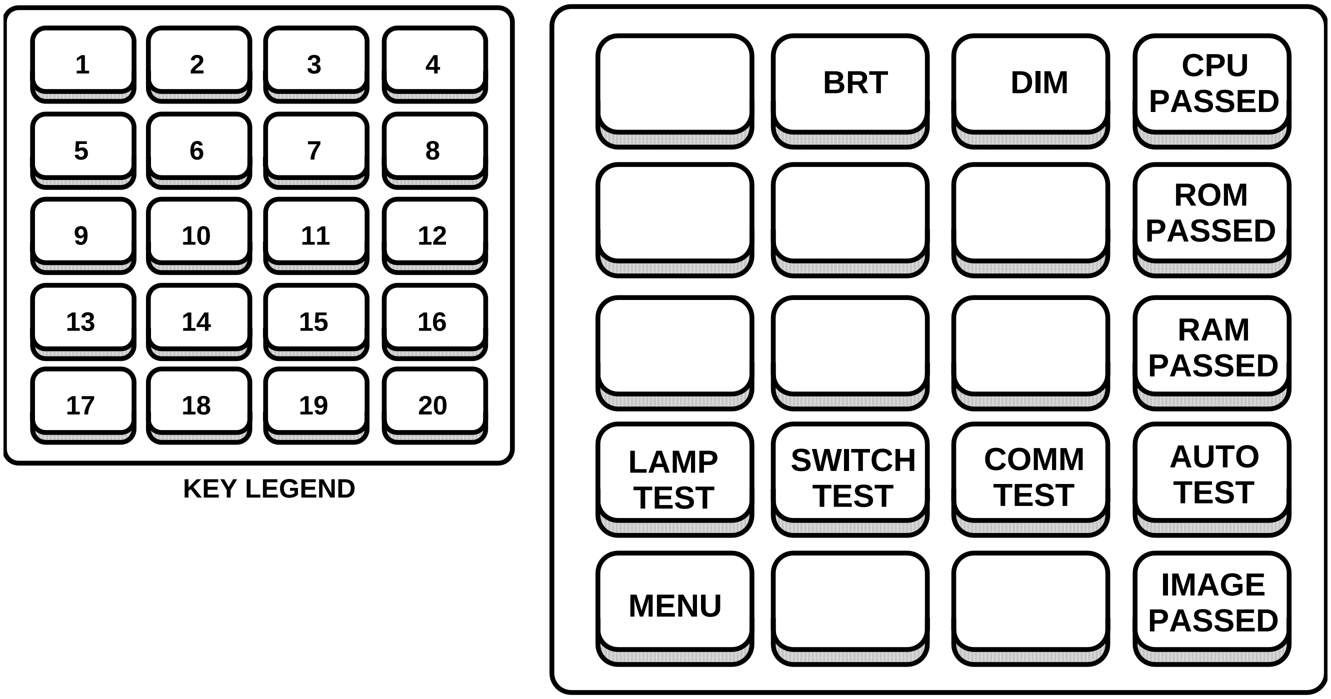
Programmable Keyboard (Cont)

Following is a list of the 17 pages that can be displayed on the PKB.

PAGE	SHEET	FUNCTION
SELF TEST	3	This page is displayed upon the application of IU power. It is used to perform various self test procedures associated with the PKB.
LAMP TEST	5	This page is used to check the operation of the pixels on each switch.
SWITCH TEST	5	This page is used to test the operation of PKB switch responses.
MAIN MENU	6	This page is used to select other pages displayed by the PKB.
GPS INITIALIZATION	8	This page is used for initializing GPS position, velocity, and time.
GPS DATA DISPLAY	11	This page is used for displaying the current position, velocity, and time as received from the GPS receiver.
GPS STRIKE	15	This page is used to display the differences (deltas) between the GPS and the INS' position, velocities and altitudes.
GPS STRIKE LIMITS	19	This page is used to display the set delta limits. The limits are used by the system as the parameter for alerting the operator of a significant difference between the GPS and INS.
GPS STRIKE LIMITS ENTRY	21	This page is used to set or change the delta limits the system will use.
CHANNEL SUMMARY	23	This page is used for displaying the satellite tracking status of the GPS receiver.
CRYPTO VIEW ALL	28	This page is used to view the last Crypto Key entries made from the PKB and the mission duration. This page is also used to aid Crypto Key entry through the Crypto Fill Port.
CRYPTO KEY DATA ENTRY	31	This page is used to enter Crypto Key data or mission duration from the PKB.
MISSION DATA DISPLAY	33	This page is used to display the current Navaid (TACAN, VOR/DME, VORTAC) assignment for a destination.
NAVAID ASSIGNMENT	37	This page is used to change the Navaid assignment of a destination.
BULLSEYE VIEW ALL	40	This page is used to display the latitude and longitude of Bullseye 1 and Bullseye 2; the range and bearing from each bullseye to the aircraft; and to select the active bullseye.
BULLSEYE DATA ENTRY	43	This page is used to set the latitude and longitude of Bullseye 1 and Bullseye 2.
TEST MODE DISPLAY	45	This page is used to display BIT results for LRUs. For selected LRUs, this page may also be used to initiate a BIT

Figure 1A-31 (Sheet 2 of 50)

SELF TEST PAGE (TYPICAL)



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The Self Test page is the first page that appears after power is applied to the IU. This page allows the operator to perform a series of tests on the PKB to ensure its proper operation. These tests include a COMM and an AUTO test. In addition to these tests, the operator may access the Lamp Test page and the Switch Test page from the Self Test Page.

KEY	CONTROL-INDICATOR	FUNCTION
1	Blank	This key is not used on the Self Test page.
2	BRT Switch	The BRT switch is used to increase the illumination of the legends on all of the PKB pages.
3	DIM Switch	The DIM switch is used to decrease the illumination of the legends on all of the PKB pages.
4	CPU PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the CPU test. PASSED is displayed If the CPU passes the test and FAILED is displayed if it fails.
5–7	Blank	These keys are not used on the Self Test page.
8	ROM PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the ROM test. PASSED is displayed If the ROM passes the test and FAILED is displayed if it fails.
9–11	Blank	These keys are not used on the Self Test page.
12	RAM PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the RAM test. PASSED is displayed If the RAM passes the test and FAILED is displayed if it fails.
13	LAMP TEST Switch	The LAMP TEST switch is used to access the Lamp Test page.
14	SWITCH TEST Switch	The SWITCH TEST switch is used to access the Switch Test page.

Figure 1A-31 (Sheet 3 of 50)

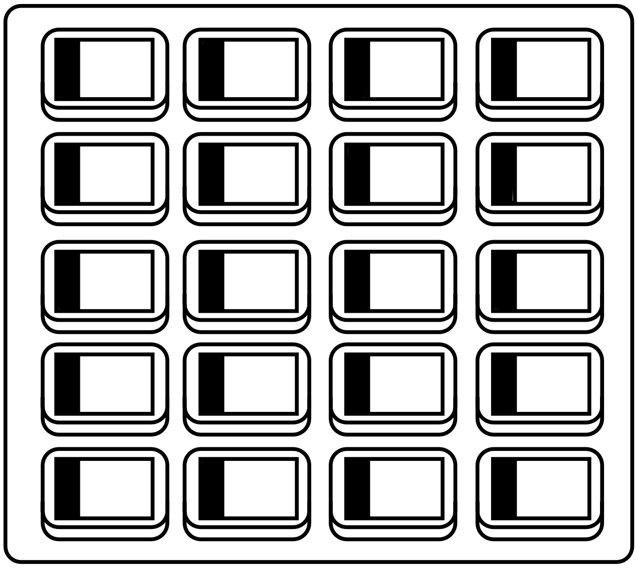
Programmable Keyboard (Cont)

SELF TEST PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
15	COMM TEST Switch	The COMM TEST switch is used to determine if communication between the PKB and the IU is healthy. When this switch is pressed, a host test request message is sent to the IU. During the test, key 19 will display IS ACTIVE. The IU then has 10 seconds to answer the test message. Upon completion of the test, key 19 will display HAS PASSED, if the test passes, or HAS FAILED, if the test fails or the IU takes longer than 10 seconds. In either case, key 19 will return to its normal state after 10 seconds.
16	AUTO TEST Switch	The AUTO TEST switch is used to perform a series of tests on the PKB. These tests include an IMAGE, ROM, RAM, and CPU test. When this switch is pressed, keys 4, 8, 12, and 20 will be used to display the results of the tests. A pass or fail status will be reported for all of the tests. If a fault condition occurs, the IU will record the fault. A fault condition does not necessarily indicate that all PKB functions will be affected. If PKB use is continued, problems may or may not be encountered depending on the nature of the failure. Display of AUTO TEST results remain for 10 seconds, then the PKB display returns to the self test display.
17	MENU Switch	This switch serves a dual purpose. The first purpose of this switch is to display the MENU legend upon the successful download of the database from the IU to the PKB. While this legend is blank, it should have no response to operator selection. Once the MENU legend is displayed, the operator may select this switch to access the Main Menu page. If the MENU legend fails to appear shortly after power has been applied to the IU, then the operator may press the COMM TEST switch to attempt to re-download the database.
18	Blank	This key is not used on the Self Test page.
19	COMM TEST Display Key	Used during the COMM TEST. During the test, the key will display IS ACTIVE. The IU then has 10 seconds to answer the test message. Upon completion of the test, the key will display HAS PASSED, if the test passes, or HAS FAILED, if the test fails or the IU takes longer than 10 seconds. In either case, key 19 will return to its normal state (blank) after 10 seconds.
20	IMAGE PASSED/ FAILED Display Key	This key, usually blank, is used only during the AUTO TEST to report the result of the IMAGE (Image RAM of the PKB) test. PASSED is displayed If the IMAGE passes the test and FAILED is displayed if it fails.

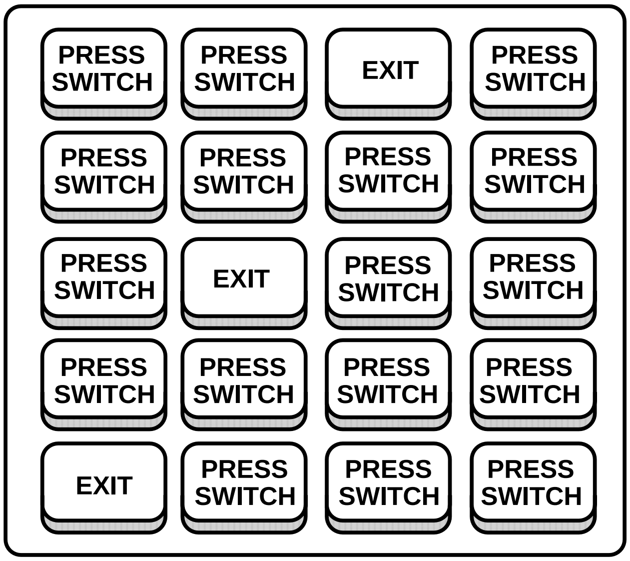
Figure 1A-31 (Sheet 4 of 50)

LAMP TEST PAGE



The Lamp Test page is used to check the operation of all of the pixels in all of the PKB switches. When the Lamp Test page is first displayed, it will look as above. This graphic shows the first of a series of four similar displays on this page. The blackened areas are illuminated pixels. When the operator selects any switch, all the keys will clear, then illuminate the second column of pixels. The operator must press any two additional switches before returning to the Self Test page. In the process of pressing three switches, four different columns of pixels will be illuminated on all keys allowing inspection of every pixel of every switch.

SWITCH TEST PAGE (TYPICAL)



PRESS SWITCH	PRESS SWITCH	EXIT	PRESS SWITCH
PRESS SWITCH	PRESS SWITCH	PRESS SWITCH	PRESS SWITCH
PRESS SWITCH	EXIT	PRESS SWITCH	PRESS SWITCH
PRESS SWITCH	PRESS SWITCH	PRESS SWITCH	PRESS SWITCH
EXIT	PRESS SWITCH	PRESS SWITCH	PRESS SWITCH

The Switch Test page is used to inspect the PKB response to the selection of a switch by the operator. Upon display of the Switch Test page, all keys will display PRESS SWITCH. When the operator selects any of the switches, the text in the key will change to EXIT, assuming the PKB acknowledged the switch selection. To thoroughly evaluate the PKB, all 20 switches should be checked.

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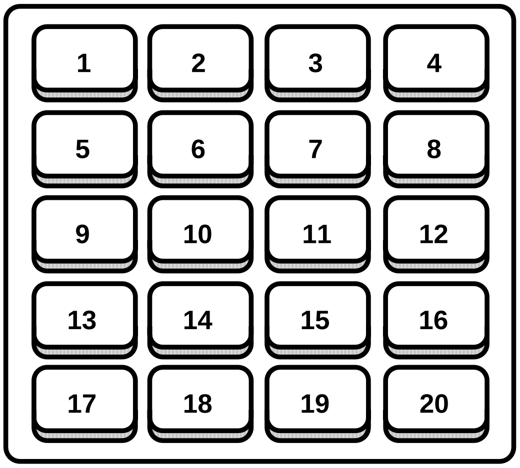
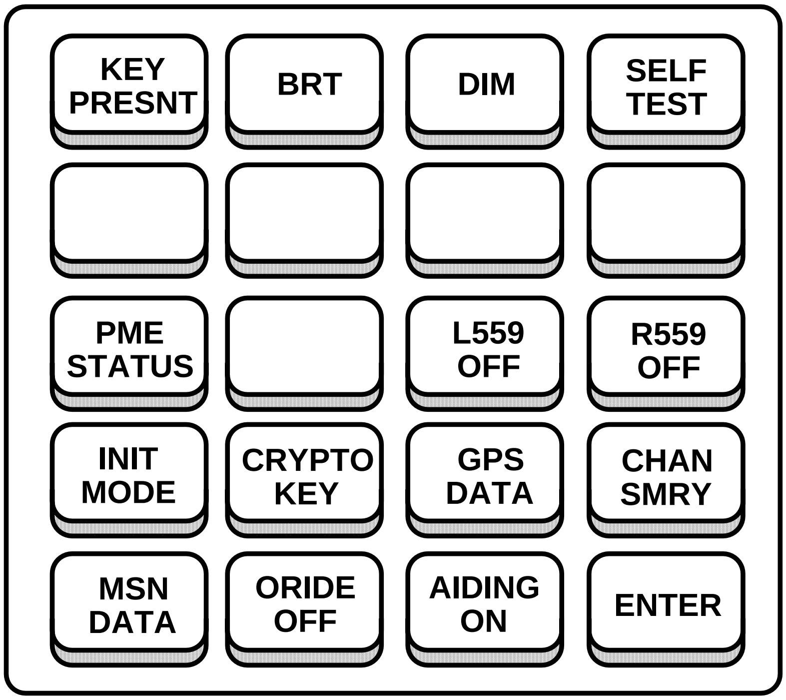
Figure 1A-31 (Sheet 5 of 50)

Programmable Keyboard (Cont)

MAIN MENU PAGE (TYPICAL)



KEY LEGEND



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The Main Menu page serves as the jumping point for accessing the majority of the pages that the PKB displays. An example of the Main Menu page is shown above. When the operator chooses a switch that blinks upon selection, it is an indication that the ENTER switch must be pressed to carry out the desired action. Blinking may be stopped by selecting the blinking switch again or by selecting a different switch.

KEY	CONTROL-INDICATOR	FUNCTION
1	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (C/A) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.
2	BRT Switch	The BRT switch is used to increase the illumination of the legends on all of the PKB pages.
3	DIM Switch	The DIM switch is used to decrease the illumination of the legends on all of the PKB pages.
4	SELF TEST Switch	The SELF TEST switch is used to access the Self Test page.
5–8	IUSO Defined Keys	These keys are reserved for use by an IUSO. If an IUSO is loaded, these switches will be available to the IUSO for accessing IUSO specific pages.
9	PME Status Switch	The PME STATUS switch is used to access the Test Mode Display page and indicate faults.
	PME STATUS	Indicates that there are no faults (past or present) awaiting operator acknowledgement.
	PME STATUS	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.

Figure 1A-31 (Sheet 6 of 50)

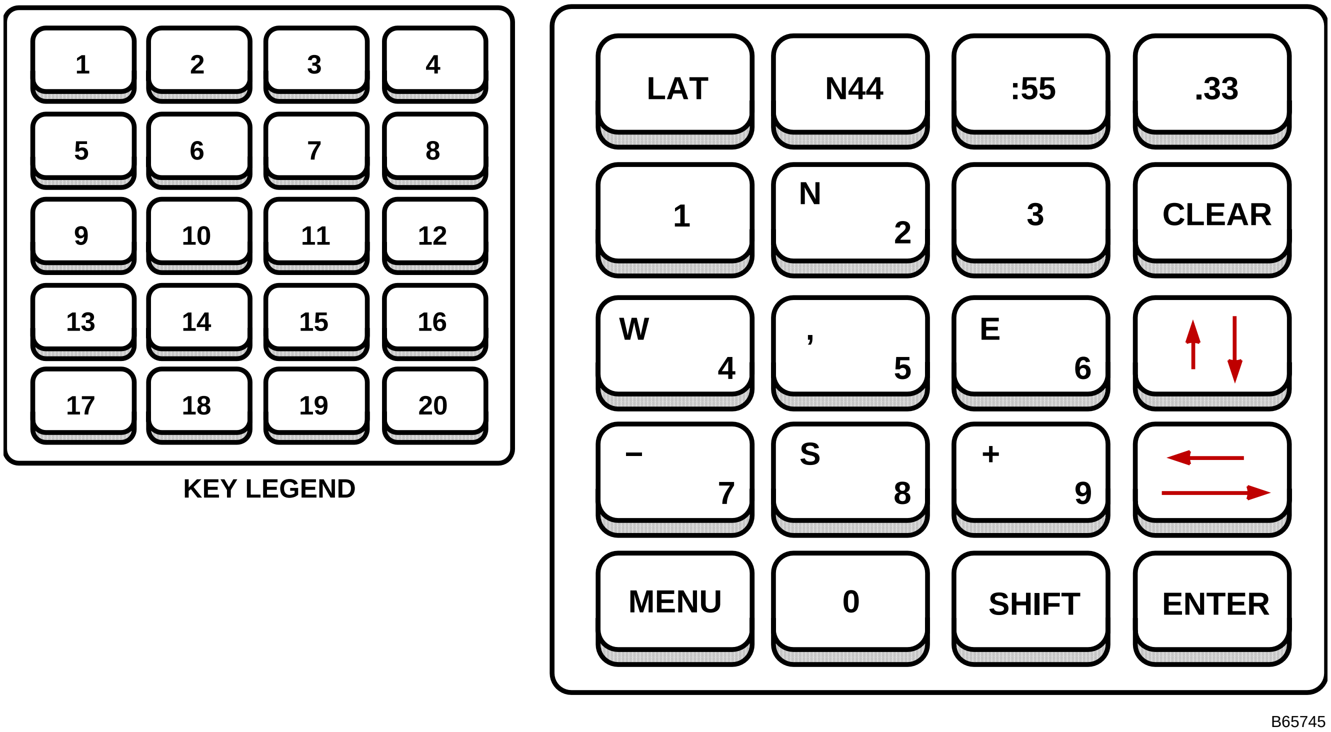
MAIN MENU PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
10	Blank	This key is not used on the Main Menu page.
11	L559 Status Switch	This switch is used for removing or applying power to the left 559 station. When power modification to the left 559 station has been inhibited by an IUSO, the legend will be underlined. When an IUSO has inhibited power modification, this switch will serve as a status switch for the power state.
	L559 OFF	L559 power is OFF. It is underlined when L559 power application is inhibited.
	L559 ON	L559 power is ON.
12	R559 Status Switch	This switch is used for removing or applying power to the right 559 station. When power modification to the right 559 station has been inhibited by an IUSO, the legend will be underlined. When an IUSO has inhibited power modification, this switch will serve as a status switch for the power state.
	R559 OFF	R559 power is OFF. It is underlined when R559 power application is inhibited.
	R559 ON	R559 power is ON.
13	INIT MODE Switch	The INIT MODE switch is used to access the GPS Initialization page.
14	CRYPTO KEY Switch	The CRYPTO KEY switch is used to access the Crypto Key View All page.
15	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
16	CHAN SMRY Switch	The CHAN SMRY switch is a dual purpose switch. It is used to access the Channel Summary page and to provide a quick reference for checking if the Jamming/Signal ratio (JS) and Carrier/Noise ratio (CN) values are within limits.
	CHAN SMRY	Indicates all JS and CN values are within limits.
	$\boxed{\text{CHAN SMRY}}$	CHAN text is displayed within a box to indicate a JS or CN value is out of limits.
17	MSN DATA Switch	The MSN DATA switch is used to access the Mission Data Display page.
18	Crypto Key Override Switch	This switch is used to allow the operator to override navigation crypto keys.
	ORIDE OFF	Indicates that the crypto keys are not being overridden. Default state.
	ORIDE ON	Indicates that the crypto keys are being overridden.
19	INS AIDING Enable/Disable Switch	This switch allows the operator to enable or disable Inertial Navigation System (INS) feedback aiding of the GPS User Equipment (UE).
	AIDING OFF	Indicates that the IUS is not providing Alt Nav and INS feedback information to the GPS UE.
	AIDING ON	Indicates that the IUS is providing Alt Nav and INS feedback information to the GPS UE. Default state.
20	ENTER Switch	The ENTER switch is used to carry out any action associated with a blinking legend. For example, if the ORIDE ON legend is blinking and the operator presses the ENTER switch, the ORIDE ON legend will toggle to ORIDE OFF. Pressing the ENTER switch while no legends are blinking will be ignored.

Figure 1A-31 (Sheet 7 of 50)

Programmable Keyboard (Cont)

GPS INITIALIZATION PAGE (TYPICAL)



The Initialization mode format provides a manual method for the operator to insert initialization data to the GPS IU. Initialization mode may be used for GPS startup or to correct erroneous data inflight. The format allows entry of latitude, longitude, altitude, date, time, groundspeed, and ground track information.

The GPS Initialization page functions by displaying one initialization field at a time. The operator is responsible for entering the proper values and pressing the ENTER switch to temporarily hold the data. Pressing the ENTER switch will automatically display the next field for entry.

NOTE

If the operator presses the up/down arrow switches without pressing the ENTER switch, any newly entered data for that field will be discarded.

When the operator is done entering all of the initialization data the SEND DATA legend is automatically displayed. If partial data is entered, the operator is required to press the up/down arrow or ENTER switches until the SEND DATA legend is displayed on switch 1. Once the SEND DATA legend is displayed, the operator needs to press this switch in order to re-initialize the GPS receiver. Pressing the ENTER switch alone will not cause the data to be sent to the GPS receiver.

If the data entry fields (keys 2–4) are displayed outlined by a box, an invalid value has been entered. Pressing any other switch, with the exception of the ENTER switch and the first four switches, will remove the box.

When the GPS Initialization page is displayed, the values displayed in the data entry fields will be the last values entered at the last re-initialization or the default values.

Figure 1A-31 (Sheet 8 of 50)

GPS INITIALIZATION PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
1	Data Field Definition/ SEND DATA Switch	Used to indicate the type of the data entry field being displayed and to indicate that all data is ready to be sent to the GPS receiver.
	LAT	The latitude data entry field is being displayed in keys 2–4.
	LONG	The longitude data entry field is being displayed in keys 2–4.
	ALT	The altitude data entry field is being displayed in key 2. Altitude displayed times 10 equals the actual altitude above Mean Sea Level (MSL).
	DATE	The date data entry field is being displayed in keys 2–4.
	TIME	The time data entry field is being displayed in keys 2–4.
	GTA	The ground track angle in degrees is being displayed in key 2.
	GS	The ground speed in knots is being displayed in key 2.
	SEND DATA	The SEND DATA switch is not a data entry field identifier. Pressing this switch will send the currently entered data to the IU for GPS re-initialization.
2	Data Field Display Key	Keys 2 through 4 are used for displaying the data entry fields for the items listed in key 1. A cursor is placed under the current character/value being modified. If an errant value is entered, the field will be outlined by a box upon pressing the ENTER switch. The box can be removed by pressing any switch other than the ENTER switch or the first four switches.
	xdd	Data Entry for Latitude x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	Data Entry for Longitude; x = E for East or W for West; ddd = 0 to 180 degrees.
	ffff	Data Entry for Altitude above Mean Sea Level (actual altitude is displayed altitude times 10); ffff = –130 to 5000.
	mm	Data Entry for Date (Month); mm =1 to 12.
	hh	Data Entry for Time (Hours); hh = 0 to 23.
	ddd	Data Entry for Ground Track Angle in degrees; ddd = 0 to 359.
	nnn	Data Entry for Ground Speed in Knots; Range nnn = 0 to 650.
3	Data Field Display Key	
	:mm	Data Entry for Latitude or Longitude minutes; mm = 0 to 59.
	dd	Data Entry for Date (Day); dd = 0 to 31.
	:mm	Data Entry for Time (Minutes); mm = 0 to 59.
4	Data Field Display Key	
	.mm	Data Entry for Latitude or Longitude hundredths of minutes; mm = 0 to .99.
	yy	Data Entry for Date (Year); yy = 0 to 99.
	:ss	Data Entry for Time (Seconds); ss = 0 to 59.
5–7	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept this default value for initialization.

Figure 1A-31 (Sheet 9 of 50)

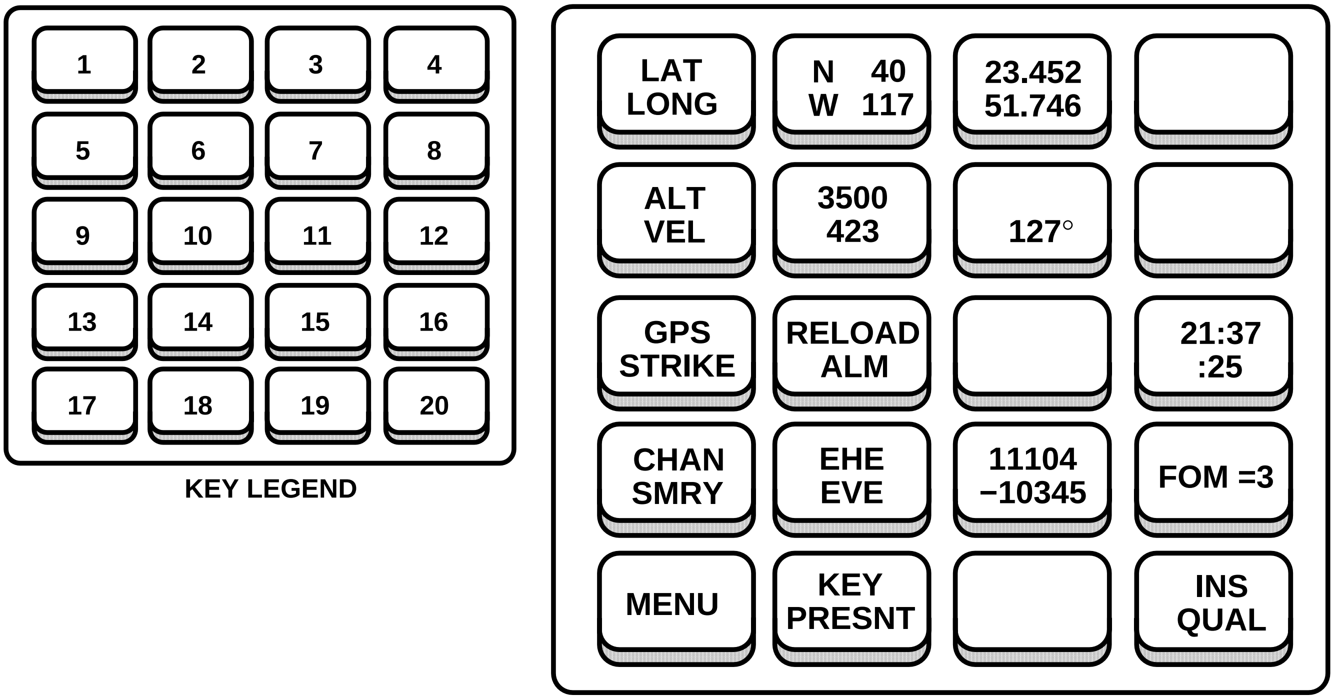
Programmable Keyboard (Cont)

GPS INITIALIZATION PAGE (TYPICAL) (CONT)

KEY	CONTROL-INDICATOR	FUNCTION
9–11	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the various data entry fields described under key 1. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry fields. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the data entry fields displayed in keys 2–4.
19	SHIFT Switch	The SHIFT switch is used to enter characters displayed in the upper left hand corner of the legends. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to accept a value displayed in the data entry field for temporary storage. The value is stored until the SEND DATA switch (see key 1) is selected. Range checks will also be made when the ENTER switch is pressed. Pressing the ENTER switch will automatically display the next data entry field.

Figure 1A-31 (Sheet 10 of 50)

GPS DATA DISPLAY PAGE (TYPICAL)



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The GPS has a stand alone capability which allows use of the GPS equipment in an unaided mode, if AIDING OFF is selected. The GPS Data Display page is used to display the current position, altitude, velocity, Estimated Horizontal Error (EHE), Estimated Vertical Error (EVE), Figure of Merit (FOM), Universal Time Coordinated (UTC), Crypto Key status, GPS fault status, and GPS/Mode Quality status.

Keys 1, 5 and 14 are static legends and only serve as tags. They indicate what kind of data is being displayed to the right of the legend. For example, the LAT LONG legend indicates that the top of keys 2–3 represent the current latitude and the bottom of the legends represent the current longitude.

Figure 1A-31 (Sheet 11 of 50)

Programmable Keyboard (Cont)

GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	LAT/LONG Legend Key	Static text to indicate that the upper portions of keys 2–3 represent latitude and the lower portions indicate longitude.
2	LAT/LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
3	LAT/LONG Minutes and Thousandths of Minutes Display Key	
	mm.mmm	Latitude (upper portion) and Longitude (lower portion) minutes; mm.mmm = 0 to 59.999.
4	Blank	This key is not used on the GPS Data Display page.
5	ALT/VEL Legend Key	Static text to indicate that the upper portion of key 6 represent aircraft altitude and the lower portion indicates aircraft velocity (ground speed). The other component of velocity, the ground track angle, is displayed in the lower portion of key 7.
6	ALT/VEL Display Key	
	ffff	(Upper Portion) Stand Alone GPS altitude above mean sea level (displayed altitude times 10 equals the actual MSL altitude); ffff = 0 to 9999.
	nnn	(Lower Portion) Stand Alone ground speed (GS); GS in knots nnn = 0 to 999.
7	Ground Track Angle Display Key	
	ddd°	(Lower Portion) Stand Alone ground track angle (GTA); ddd° = 0 to 359; GTA is blanked for GPS ground speed values less than 60 knots. The upper portion of this key is blank.
8	Blank	This key is not used on the GPS Data Display page.
9	GPS STRIKE Switch	The GPS STRIKE switch is used to access the GPS Strike page.
10	RELOAD ALM/ RELOAD NO? Switch	When RELOAD ALM is displayed, this switch is used to request a reload of almanac data by causing the GPS UE to be reinitialized. When pressed, the operator will be asked for confirmation before the almanac data reload is performed. The almanac reload confirmation request can be cancelled by pressing this switch while RELOAD NO? is displayed or by displaying another page. Reloading the almanac data blanks this switch during the GPS UE initialization. If OAS data is not available, GPS Initialization data must be entered to complete GPS UE initialization. Once GPS UE initialization completes, the RELOAD ALM legend will re-appear. **NOTE** Reloading almanac should be performed after the GPS UE has acquired and tracked at least 4 satellites for a period of at least 30 minutes. This allows the GPS UE adequate time to download an updated set of almanac data from the satellites.
11	RELOAD YES? Switch	Is displayed only during a request to reload almanac data confirmation. Pressing this switch with RELOAD YES? displayed will cause almanac data to be retrieved from the GPS UE. The almanac data reload confirmation can be cancelled by pressing switch 10 while RELOAD NO? is displayed or by displaying another page.
12	TIME Display Key	Stand Alone Universal Time Coordinated (UTC) data.
	hh:mm :ss	Displayed time is rounded to the nearest whole second; hh = 0 to 23 hours, mm = 0 to 59 minutes, and ss = 0 to 59 seconds.

Figure 1A-31 (Sheet 12 of 50)

GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
13	CHAN SMRY Switch	The CHAN SMRY switch is a dual purpose switch. It is used to access the Channel Summary page and to provide a quick reference for checking if the Jamming/Signal ratio (JS) and Carrier/Noise ratio (CN) values are within limits.
	CHAN SMRY	Indicates all JS and CN values are within limits.
	$\boxed{\begin{array}{c}\text{CHAN}\\ \text{SMRY}\end{array}}$	CHAN text is displayed within a box to indicate a JS or CN value is out of limits.
14	EHE/EVE Legend Key	Static text to indicate that the upper portion of key 15 represents the GPS Estimated Horizontal Error (EHE) and the lower portion indicates the GPS Estimated Vertical Error (EVE).
15	EHE/EVE Display Key	
	sXXXXX	(Upper Portion) EHE display in feet; s = blank for positive or – for negative.
	sYYYYY	(Lower Portion) EVE display in feet; s = blank for positive or – for negative.
16	FOM Display Key	This switch is used for displaying the Figure of Merit (FOM). A FOM number 1 to 9 is displayed as an estimate of GPS performance. A higher number indicates lower comparable system performance. A number 1 FOM displayed indicates an estimated position error of less than 25 meters. A number 9 FOM displayed indicates an estimated error in excess of 5000 meters.
	FOM = n	Stand Alone GPS Figure-of-Merit; n = 0 to 9; Default to zero.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (C/A) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.

Figure 1A-31 (Sheet 13 of 50)

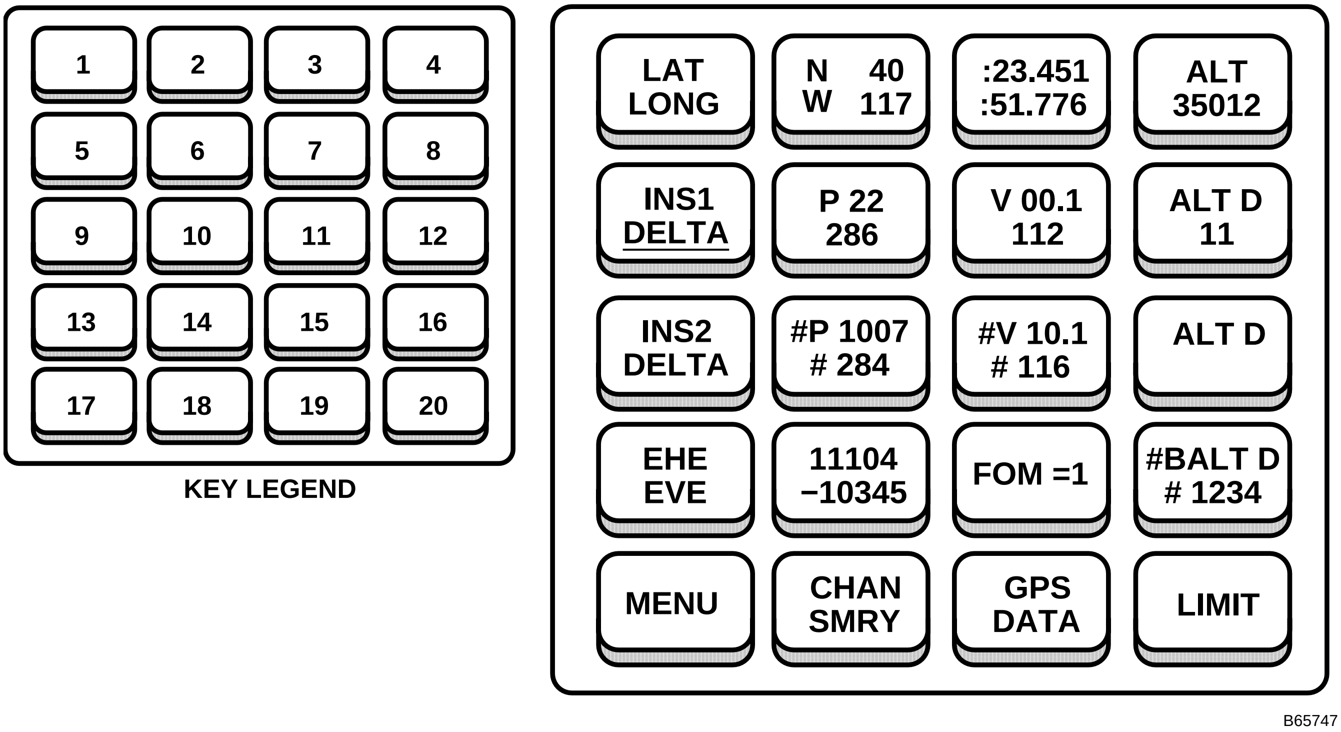
Programmable Keyboard (Cont)

GPS DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
19	GPS Fault Status Switch	This switch is used to display the GPS fault status. When a fault occurs, the type of fault will be displayed in a box, until the operator presses this switch. If there are no additional faults, the key will return to a state displaying all reported GPS LRU faults.
	AE	AE displayed in box outline when the GPS AE is faulted, until the operator acknowledges the fault by pushing the switch (priority 1). Acknowledging the fault does not clear the fault.
	RPU	RPU displayed in box outline when the GPS RPU is faulted, until the operator acknowledges the fault by pushing the switch (priority 2). Acknowledging the fault does not clear the fault.
	BATT	BATT displayed in box outline when the GPS battery is faulted, until the operator acknowledges the fault by pushing the switch (priority 3). Acknowledging the fault does not clear the fault.
	AE/RPU BATT	Displayed on IU start up and after one or more of the above GPS fault(s) has been acknowledged. While each fault exists, its associated legend, AE, RPU, and BATT, will be displayed. Displays blanks when not faulted.
20	GPS Status Key	This key is used for displaying the GPS status
	INIT REQ	Displayed when GPS receiver is requesting INIT data. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded.
	DTUC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DTUC. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded.
	DDLC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DDLC .
	COLD START	GPS receiver is requesting almanac data and IUS has failed to retrieve it from DTUC on first attempt. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded. Once almanac data is received, the IU will terminate cold start and proceed with a normal startup. **NOTE** The cold start may vary in length from 15 minutes up to an hour or more depending on the satellite configuration available at a given place and time.
	INS QUAL	Displayed when IU status indicates GPS data is good enough for an INS update.
	ALTNAV QUAL	Displayed when IU status indicates GPS data is good enough for an ALTNAV update.
	LOW QUAL	Displayed when IU status indicates GPS data is not good enough for an INS or an ALTNAV update. Can also be displayed when there is no communication with FMS.
	DATA?	Displayed when GPS does not have a valid navigation solution.

Figure 1A-31 (Sheet 14 of 50)

GPS STRIKE PAGE (TYPICAL)



Keys 1 and 13 are static legends and only serve as tags. They indicate what kind of data is being displayed to the right of the legend. For example, the LAT LONG legend indicates that the top of keys 2 and 3 represent the current latitude and the bottom of the legends represent the current longitude.

KEY	CONTROL-INDICATOR	FUNCTION
1	LAT/LONG Legend	Static text to indicate that the upper portions of keys 2 and 3 represent present position latitude and the lower portions indicate present position longitude.
2	LAT/LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
3	LAT/LONG Minutes and Thousandths of Minutes Display Key	
	mm.mmm	Latitude (upper portion) and Longitude (lower portion) minutes; mm.mmm = 0 to 59.999
4	Aircraft ALT (Altitude) Display Key	This key displays the GPS-derived aircraft MSL altitude.
	ALT	(Upper Portion) Static legend to define key.
	fffff	(Lower Portion) Stand Alone GPS altitude above mean sea level; fffff = 0 to 99999.

Figure 1A-31 (Sheet 15 of 50)

Programmable Keyboard (Cont)

GPS STRIKE PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
5	INS1 DELTA Key	Static text to indicate keys 10–12 represent the position, velocity and altitude differences (deltas) between INS1 and the GPS. Although the text on this key is static, an underlined DELTA indicates that INS1 is the prime nav model.
	INS1	(Upper Portion) Static legend to define keys 10–12 as INS1/GPS deltas.
	DELTA	(Lower Portion) Used with upper portion to define that keys 10–12 are differences between INS1 and GPS data. Non-underlined indicates INS1 is not the prime nav model.
	DELTA	(Lower Portion) Used with upper portion to define that keys 10–12 are differences between INS1 and GPS data. The underline indicates INS1 is the prime nav model.
6	INS1 – GPS Position Delta Display Key	This key displays the position difference between INS1 and the GPS. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	P nnnn	(Upper Portion) Indicates magnitude of the position difference between the GPS and INS1; P represents position, nnnn = 0 to 9999 feet.
	#P nnnn	(Upper Portion) Blinking # indication is added to the display to signify that the position difference between the GPS and INS1 exceeds set limit. P represents position, nnnn = 0 to 9999 feet.
	ddd	(Lower Portion) Indicates bearing of position difference between the GPS and INS1. Bearing is from GPS position to INS1 position; ddd = 0 to 359 degrees.
	# ddd	(Lower Portion) Blinking # indication is added to signify that the bearing to position difference between the GPS and INS1 exceeds set limit. Bearing is from GPS position to INS1 position; ddd = 0 to 359 degrees.
7	INS1 – GPS Velocity Delta Display Key	This key displays the velocity difference between INS1 and the GPS. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # sign (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	V nn.n	(Upper Portion) Indicates magnitude of the velocity difference between the GPS and INS1; V represents velocity, nn.n = 0 to 99.9 knots.
	#V nn.n	(Upper Portion) Blinking # indication is added to signify that the velocity difference between the GPS and INS1 exceeds set limit. V represents velocity, nn.n = 0 to 99.9 knots.
	ddd	(Lower Portion) Indicates bearing of velocity difference between the GPS and INS1. Bearing is from GPS to INS1; ddd = 0 to 359 degrees.
	# ddd	(Lower Portion) Blinking # indication is added to signify that the bearing of velocity difference between the GPS and INS1 exceeds set limit. Bearing is from GPS to INS1; ddd = 0 to 359 degrees.
8	ALT D (INS1 – GPS Altitude Delta) Display Key	This key displays the altitude difference between INS1 and the GPS, when INS1 is prime. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	ALT D	(Upper Portion) Static legend to define key as INS1 – GPS altitude delta.
	# ALT D	(Upper Portion) Blinking # indication is added to signify that the INS1 – GPS altitude delta exceeds set limit.
	sffff	(Lower Portion) Indicates the altitude difference between the GPS and INS1 altitude. Sign of the value stated as INS1 altitude minus GPS altitude: ffff = 0 to 9999 feet. s = blank for positive or – for negative. Display is blank if INS1 is not prime.
	# sffff	(Lower Portion) Blinking # indication is added to signify that the altitude difference between the GPS and INS1 altitude exceeds set limit. Sign of the value stated as INS1 altitude minus GPS altitude; ffff = 0 to 9999 feet. s = blank for positive or – for negative.

Figure 1A-31 (Sheet 16 of 50)

GPS STRIKE PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9	INS2 DELTA Key	Static text to indicate keys 10–12 represent the position, velocity and altitude differences (deltas) between INS2 and the GPS. Although the text on this key is static, an underlined DELTA indicates that INS2 is the prime nav model.
	INS2	(Upper Portion) Static legend to define keys 10–12 as INS2/GPS deltas.
	DELTA	(Lower Portion) Used with upper portion to define that keys 10–12 are differences between INS2 and GPS data. Non-underlined indicates INS2 is not the prime nav model.
	DELTA	(Lower Portion) Used with upper portion to define that keys 10–12 are differences between INS2 and GPS data. The underline indicates INS2 is the prime nav model.
10	INS2 – GPS Position Delta Display Key	This key displays the position difference between INS2 and the GPS. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	P nnnn	(Upper Portion) Indicates magnitude of the position difference between the GPS and INS2; P represents position, nnnn = 0 to 9999 feet.
	#P nnnn	(Upper Portion) Blinking # indication is added to the display to signify that the position difference between the GPS and INS2 exceeds set limit. P represents position, nnnn = 0 to 9999 feet.
	ddd	(Lower Portion) Indicates bearing of position difference between the GPS and INS2. Bearing is from GPS position to INS2 position; ddd = 0 to 359 degrees.
	# ddd	(Lower Portion) Blinking # indication is added to signify that the bearing to position difference between the GPS and INS2 exceeds set limit. Bearing is from GPS position to INS2 position; ddd = 0 to 359 degrees.
11	INS2 – GPS Velocity Delta Display Key	This key displays the velocity difference between INS2 and the GPS. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # sign (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	V nn.n	(Upper Portion) Indicates magnitude of the velocity difference between the GPS and INS2; V represents velocity, nn.n = 0 to 99.9 knots.
	#V nn.n	(Upper Portion) Blinking # indication is added to signify that the velocity difference between the GPS and INS2 exceeds set limit. V represents velocity, nn.n = 0 to 99.9 knots.
	ddd	(Lower Portion) Indicates bearing of velocity difference between the GPS and INS2. Bearing is from GPS to INS2; ddd = 0 to 359 degrees.
	# ddd	(Lower Portion) Blinking # indication is added to signify that the bearing of velocity difference between the GPS and INS2 exceeds set limit. Bearing is from GPS to INS2; ddd = 0 to 359 degrees.
12	ALT D (INS2 – GPS Altitude Delta) Display Key	This key displays the altitude difference between INS2 and the GPS when INS2 is prime. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	ALT D	(Upper Portion) Static legend to define key as INS 2 – GPS altitude delta.
	# ALT D	(Upper Portion) Blinking # indication is added to signify that the INS2 – GPS altitude delta exceeds set limit.
	sffff	(Lower Portion) Indicates the altitude difference between the GPS and INS2 altitude. Sign of the value stated as INS2 altitude minus GPS altitude: ffff = 0 to 9999 feet. s = blank for positive or – for negative. Display is blank if INS2 is not prime.
	# sffff	(Lower Portion) Blinking # indication is added to signify that the altitude difference between the GPS and INS2 altitude exceeds set limit. Sign of the value stated as INS2 altitude minus GPS altitude; ffff = 0 to 9999 feet. s = blank for positive or – for negative.

Figure 1A-31 (Sheet 17 of 50)

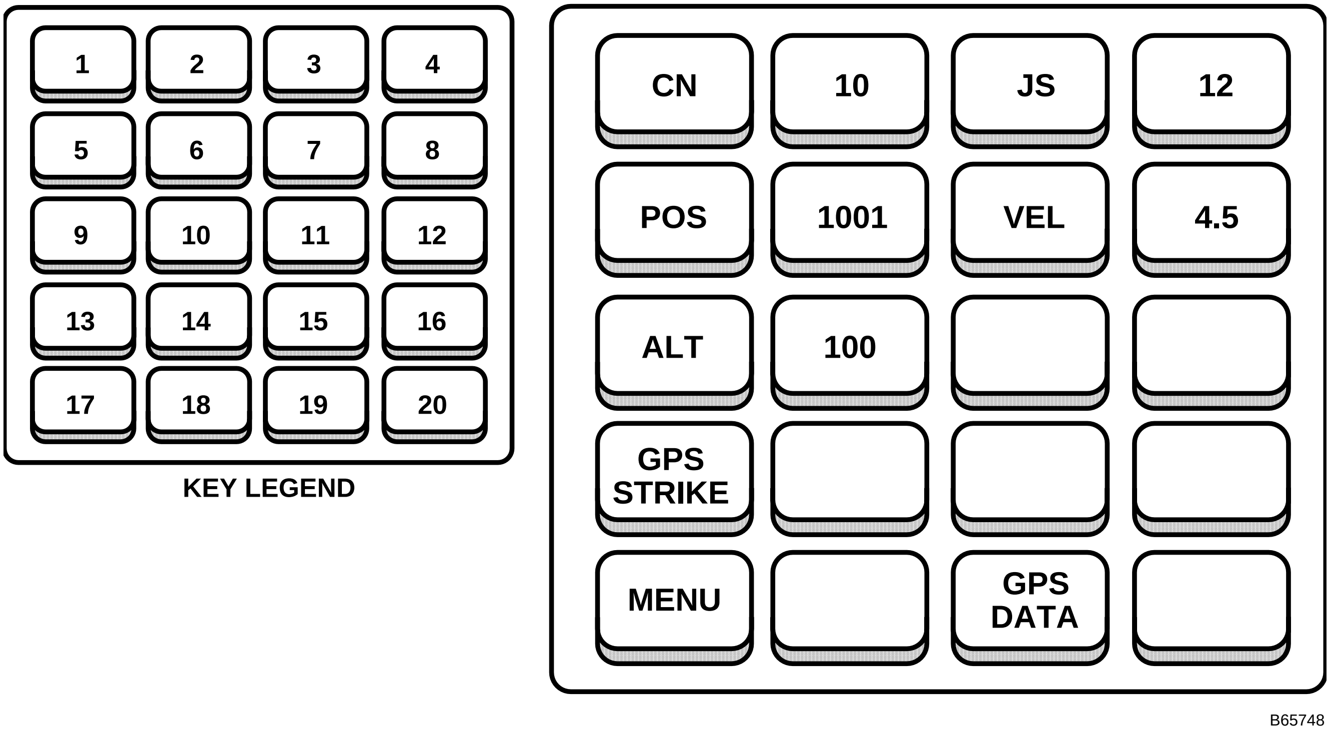
Programmable Keyboard (Cont)

GPS STRIKE PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
13	EHE/EVE Legend	Static text to indicate that the upper portion of key 14 represents the GPS Estimated Horizontal Error (EHE) and the lower portion indicates the GPS Estimated Vertical Error (EVE).
14	EHE/EVE Display Key	Displays EHE and EVE.
	sXXXXX	(Upper Portion) EHE display in feet; s = blank for positive or – for negative.
	sYYYYY	(Lower Portion) EVE display in feet; s = blank for positive or – for negative.
15	FOM Display Key	This switch is used for displaying the Figure of Merit (FOM). A FOM number 1 to 9 is displayed as an estimate of GPS performance. A higher number indicates lower comparable system performance. A number 1 FOM displayed indicates an estimated position error of less than 25 meters. A number 9 FOM displayed indicates an estimated error in excess of 5000 meters.
	FOM=n	Stand Alone GPS Figure-of-Merit; n = 0 to 9; Default to zero.
16	BALT D (Barometric – GPS Altitude Delta) Display Key	This key displays the barometric and the GPS altitude difference. It will also indicate when the difference noted is greater than the set limit by displaying a blinking # (pound sign) in front of the values in both the upper and lower portions of the key. The # will be displayed and blink at a rate of once per second, until the limit comes back into range.
	BALT D	(Upper Portion) Static legend to define key as barometric altitude delta.
	# BALT D	(Upper Portion) Blinking # indication is added to signify that the barometric – GPS altitude delta exceeds set limit.
	sffff	(Lower Portion) Indicates the altitude difference between the GPS and the barometric altitude. Sign of the value stated as barometric altitude minus GPS altitude: ffff = 0 to 9999 feet. s = blank for positive or – for negative
	# sffff	(Lower Portion) Blinking # indication is added to signify that the altitude difference between the GPS and barometric altitude exceeds set limit. Sign of the value stated as barometric altitude minus GPS altitude; ffff = 0 to 9999 feet. s = blank for positive or – for negative
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates there are no faults awaiting operator acknowledgement.
	MENU	Indicates a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	CHAN SMRY Switch	The CHAN SMRY switch is a dual purpose switch. It is used to access the Channel Summary page and to provide a quick reference for checking if the Jamming/Signal ratio (JS) and Carrier/Noise ratio (CN) values are within limits.
	CHAN SMRY	Indicates all JS and CN values are within limits.
	$\boxed{\text{CHAN SMRY}}$	CHAN text is displayed within a box to indicate a JS or CN value is out of limits.
19	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
20	LIMIT Switch	The LIMIT switch is a dual purpose switch. It is used to access the GPS Strike Limits page and to provide notification when a delta exceeds the set limit.
	LIMIT	Indicates all deltas are within limits.
	$\boxed{\text{LIMIT}}$	LIMIT text is displayed within a box to indicate a delta value is out of limits.

Figure 1A-31 (Sheet 18 of 50)

GPS STRIKE LIMITS PAGE (TYPICAL)



KEY	CONTROL-INDICATOR	FUNCTION
1	CN (Carrier/Noise ratio) Limit Switch	Dual purpose switch. It serves as a static text legend to indicate that the value in key 2 represents the set CN limit and also serves as a switch to access the GPS Strike Limit Entry page, to change the CN limit.
2	CN Limit Display Key	Displays the set CN limit.
	xx	xx = 1 – 99; Default value is set to 35.
3	JS (Jamming/Signal ratio) Limit Switch	Dual purpose switch. It serves as a static text legend to indicate that the value in key 4 represents the set JS limit and also serves as a switch to access the GPS Strike Limit Entry page, to change the JS limit.
4	JS Limit Display Key	Displays the set JS limit.
	xx	xx = 1 – 99; Default value is set to 35.
5	POS (Position Delta) Limit Switch	Dual purpose switch. It serves as a static text legend to indicate that the value in key 6 represents the set position delta limit and also serves as a switch to access the GPS Strike Limit Entry page, to change the position delta limit.
6	Position Delta Limit Display Key	Displays the set position delta limit.
	xxxx	xxxx = 1 – 9999 feet; Default value is set to 135 feet.

Figure 1A-31 (Sheet 19 of 50)

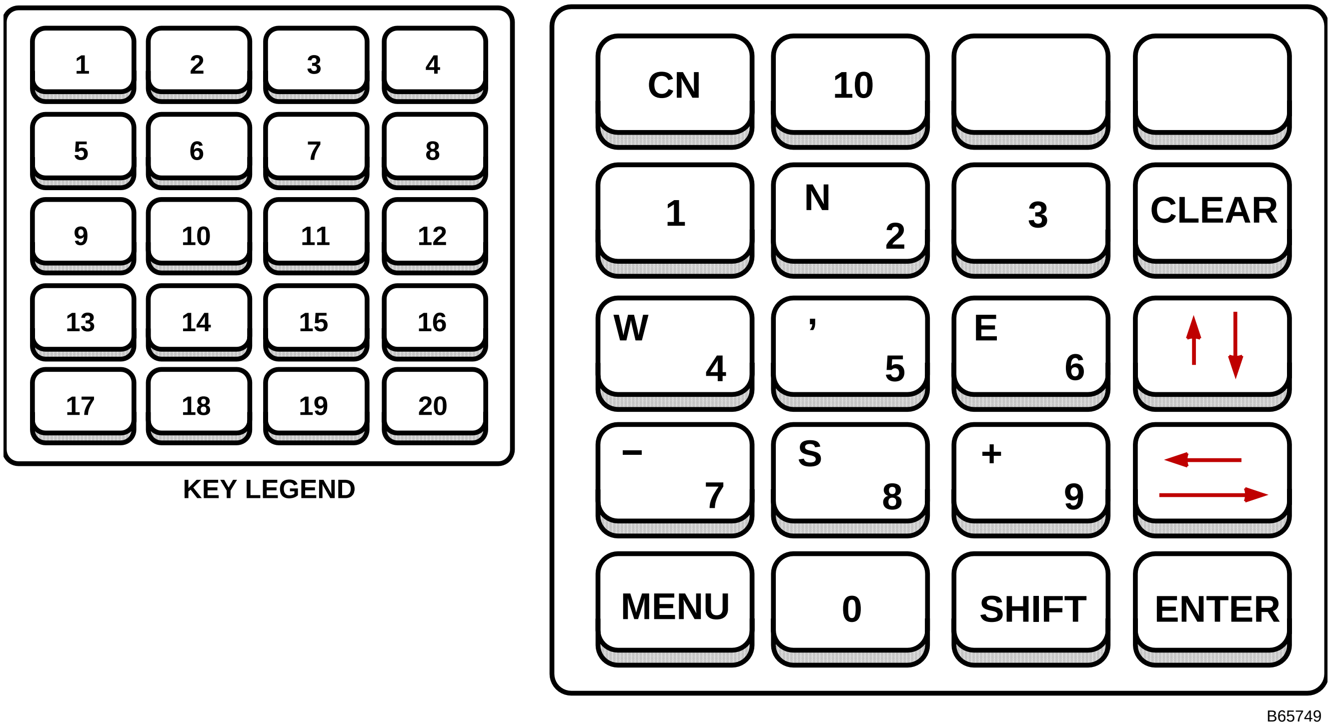
Programmable Keyboard (Cont)

GPS STRIKE LIMITS PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
7	VEL (Velocity Delta) Limit Switch	Dual purpose switch. It serves as a static text legend to indicate that the value in key 8 represents the set velocity delta limit and also serves as a switch to access the GPS Strike Limit Entry page, to change the velocity delta limit.
8	Velocity Delta Limit Display Key	Displays the set velocity delta limit.
	xx.x	xx.x = 01.1 – 99.9 knots; Default value is set to 4.5 knots.
9	ALT (Altitude Delta) Limit Switch	Dual purpose switch. It serves as a static text legend to indicate that the value in key 10 represents the set altitude delta limit and also serves as a switch to access the GPS Strike Limit Entry page, to change the altitude delta limit.
10	Altitude Delta Limit Display Key	Displays the set altitude delta limit.
	xxxx	xxxx = 1 – 9999; Default value is set to 500 feet.
11–12	Blank	These keys are not used on the Strike Limits page.
13	GPS STRIKE Switch	The GPS STRIKE switch is used to access the Strike page.
14–16	Blank	These keys are not used on the Strike Limits page.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates there are no faults awaiting operator acknowledgement.
	MENU	Indicates a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Blank	This key is not used on the Strike Limits page.
19	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
20	Blank	This key is not used on the Strike Limits page.

Figure 1A-31 (Sheet 20 of 50)

GPS STRIKE LIMITS ENTRY PAGE (TYPICAL)



KEY LEGEND

KEY	CONTROL-INDICATOR	FUNCTION
1	Limit Legend Key	Displays the legend of the limit being modified in key 2. The limit to be modified is selected by pressing the appropriate limit switch on the GPS Strike Limits page or, once the GPS Strike Limits Entry page is displayed, by using the up/down arrow key to toggle between limits.
	CN	Indicates that the carrier to noise ratio is the selected limit to modify.
	JS	Indicates that the jamming signal ratio is the selected limit to modify.
	POS	Indicates that the position delta is the selected limit to modify.
	VEL	Indicates that the velocity delta is the selected limit to modify.
	ALT	Indicates that the altitude delta is the selected limit to modify.
2	Limit Display Key	Displays the setting for the limit shown in key 1 to be modified.
	xx	For CN and JS; xx = 1 – 99; Default value is set to 35.
	xxxx	For position delta limit; xxxx = 1 – 9999 feet; Default value is set to 135 feet.
	xx.x	For velocity delta limit; xx.x = 01.1 – 99.9 knots; Default value is set to 4.5 knots.
	xxxx	For altitude delta limit; xxxx = 1 – 9999 feet; Default value is set to 500 feet.
3–4	Blank	These keys are not used on the Strike Limits Entry page.
5–7	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 2. Although selectable by using the SHIFT switch, the values in the upper left hand corner of the switches are not used on this page.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept this default value for initialization.

Figure 1A-31 (Sheet 21 of 50)

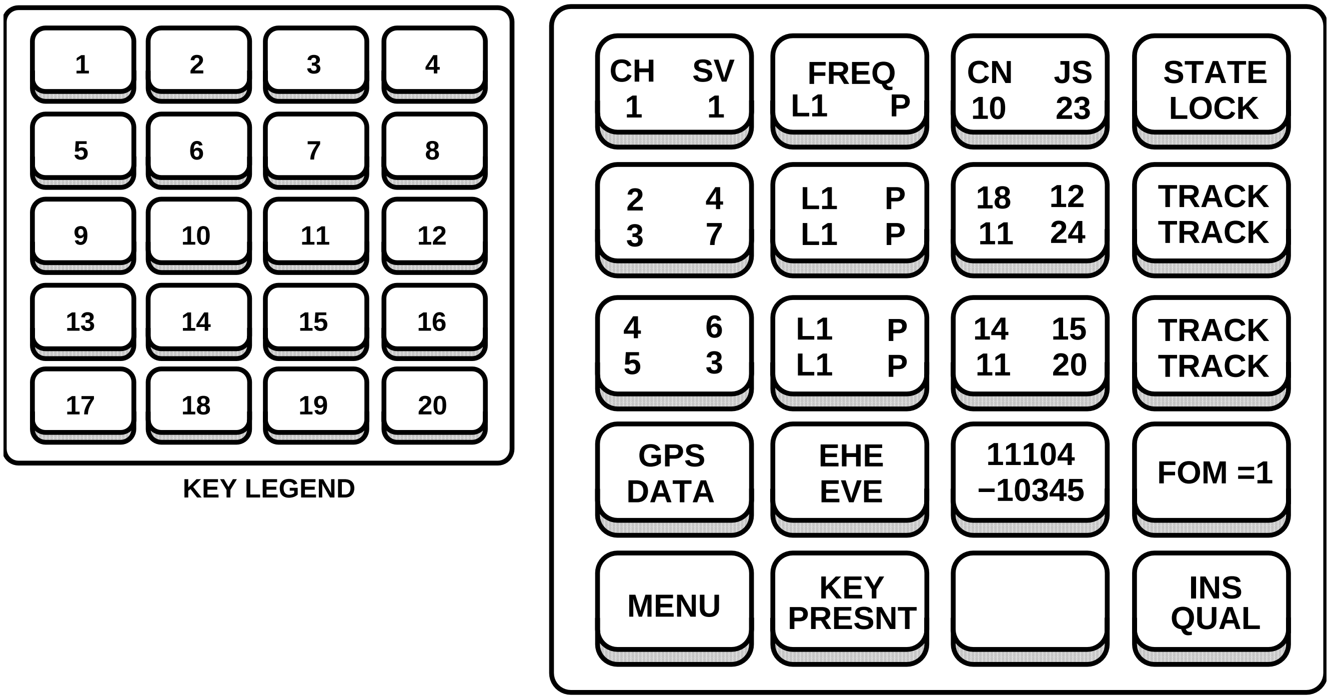
Programmable Keyboard (Cont)

GPS STRIKE LIMITS ENTRY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9–11	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in key. Although selectable by using the SHIFT switch, the values in the upper left hand corner of the switches are not used on this page.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the various data entry fields described under key 1. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 2. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry fields. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the data entry field displayed in key 2.
19	SHIFT Switch	The SHIFT switch is used to enter characters displayed in the upper left hand corner of the legends. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to accept a value displayed in the data entry field and return to the GPS Strike Limits page.

Figure 1A-31 (Sheet 22 of 50)

CHANNEL SUMMARY PAGE (TYPICAL)



KEY LEGEND

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KEY	CONTROL-INDICATOR	FUNCTION
1	Satellite CH (Channel) and SV (Satellite Vehicle ID) Display Key	Keys 1, 5 and 9 are used to display the satellite ID number that each channel is tracking. The channel is designated in the CH column and the SV ID is displayed in the SV column.
	CH SV	(Upper Portion) Static legend to designate the columns as the CH (Channel) and SV (Satellite Vehicle ID) columns.
	1 ss	(Lower Portion) 1 represents Channel number 1; ss represents the satellite number. ss = 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
2	Frequency Display Key	Keys 2, 6 and 10 are used to display the frequency and code being used for each channel.
	FREQ	(Upper Portion) Static legend to designate the column as the frequency (and code) that is being used for each channel.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 1. Fields are blank, if the channel is faulted. ff = L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate)

Figure 1A-31 (Sheet 23 of 50)

Programmable Keyboard (Cont)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
3	CN (Carrier to Noise Ratio) and JS (Jamming to Signal Ratio) Display Key	Keys 3, 7 and 11 are used to display the CN and the JS for each channel. Both ratios are displayed in dB.
	CN JS	(Upper Portion) Static legend to designate the column as the CN and the JS of each channel.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 1. Fields are blank, if the channel is faulted. nn= 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
4	Tracking STATE Display Key	Keys 4, 8 and 12 are used to display the tracking state for each channel of the GPS receiver.
	STATE	(Upper Portion) Static legend to designate the column as the tracking state that is being used for each channel.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 1. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Lower Portion) The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Lower Portion)The receiver has encountered a signal drop and is currently attempting to re-acquire the signal.
	FAULT	(Lower Portion) Displayed if channel is faulted.
5	Channels 2 and 3 SV Display Key	Key displays the satellite ID number for Channels 2 and 3. ss= 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
	2 ss	(Upper Portion) 2 represents Channel 2; ss represents the satellite number.
	3 ss	(Lower Portion) 3 represents Channel 3; ss represents the satellite number.
6	Channels 2 and 3 Frequency Display Key	Key displays the frequency and code being used for Channels 2 and 3. ff = L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate).
	ff cc	(Upper Portion) ff represents the frequency and cc represents the code being used for Channel 2. Fields are blank, if the channel is faulted.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 3. Fields are blank, if the channel is faulted.

Figure 1A-31 (Sheet 24 of 50)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
7	Channels 2 and 3 CN and JS Display Key	Key displays the CN and the JS for Channels 2 and 3. Fields are blank, if the channel is faulted. nn= 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
	nn jj	(Upper Portion) nn represents the CN and jj represents the JS for Channel 2.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 3.
8	Channels 2 and 3 Tracking STATE Display Key	Key displays the tracking state for Channels 2 and 3.
	xxxxxx	(Upper Portion) Represents the tracking state being used for Channel 2. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 3. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Upper/Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Upper/Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Upper/Lower Portion) The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Upper/Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Upper/Lower Portion) The receiver has encountered a signal drop and is currently attempting to re-acquire the signal.
	FAULT	(Upper/Lower Portion) Displayed if channel is faulted.
9	Channels 4 and 5 SV Display Key	Key displays the satellite ID number for Channels 4 and 5. ss= 1 to 32. Field is blank, if the channel is faulted. 32 is displayed for a SV of 0.
	4 ss	(Upper Portion) 4 represents Channel 4; ss represents the satellite number.
	5 ss	(Lower Portion) 5 represents Channel 5; ss represents the satellite number.
10	Channels 4 and 5 Frequency Display Key	Key displays the frequency and code being used for Channels 4 and 5. ff = L1 or L2 (L Band 1 or L Band 2); cc = P (Precision Code – receives data at a 10 Megahertz rate) or cc = CA (Course Acquisition – receives data at a 1 Megahertz rate).
	ff cc	(Upper Portion) ff represents the frequency and cc represents the code being used for Channel 4. Fields are blank, if the channel is faulted.
	ff cc	(Lower Portion) ff represents the frequency and cc represents the code being used for Channel 5. Fields are blank, if the channel is faulted.

Figure 1A-31 (Sheet 25 of 50)

Programmable Keyboard (Cont)

CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
11	Channels 4 and 5 CN and JS Display Key	Key displays the CN and the JS for Channels 4 and 5. Fields are blank, if the channel is faulted. nn = 0 to 99 dB, a measure of the relative strength of the receiver satellite signal and the noise that is also present. jj = 0 to 99 dB, alerts the operator that an interference condition is present.
	nn jj	(Upper Portion) nn represents the CN and jj represents the JS for Channel 4.
	nn jj	(Lower Portion) nn represents the CN and jj represents the JS for Channel 5.
12	Channels 4 and 5 Tracking STATE Display Key	Key displays the tracking state for Channels 4 and 5.
	xxxxxx	(Upper Portion) Represents the tracking state being used for Channel 4. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	xxxxxx	(Lower Portion) Represents the tracking state being used for Channel 5. xxxxxx = SEARCH, JAM, LOCK, TRACK, RECOV or FAULT.
	SEARCH	(Upper/Lower Portion) The tracking state is in normal acquisition mode and is currently acquiring the CA code using Doppler estimates derived from almanac data and present position, velocity, and time inputs.
	JAM	(Upper/Lower Portion) The receiver is able to maintain code lock, but is unable to maintain precision carrier tracking.
	LOCK	(Upper/Lower Portion) The receiver is able to maintain carrier lock, but makes pseudo-range and delta range measurements to a lesser accuracy.
	TRACK	(Upper/Lower Portion) The receiver is able to precisely track the carrier and and demodulate system data from the carrier.
	RECOV	(Upper/Lower Portion) The receiver has encountered a signal drop and is currently attempting to re-acquire the signal.
	FAULT	(Upper/Lower Portion) Displayed if channel is faulted.
13	GPS DATA Switch	The GPS DATA switch is used to access the GPS Data Display page.
14	EHE/EVE Legend	Static text to indicate that the upper portion of key 15 represents the GPS Estimated Horizontal Error (EHE) and the lower portion indicates the GPS Estimated Vertical Error (EVE).
15	EHE/EVE Display Key	Displays EHE and EVE.
	sXXXXX	(Upper Portion) EHE display in feet; s = blank for positive or – for negative.
	sYYYYY	(Lower Portion) EVE display in feet; s = blank for positive or – for negative.
16	FOM Display Key	This switch is used for displaying the Figure of Merit (FOM). A FOM number 1 to 9 is displayed as an estimate of GPS performance. A higher number indicates lower comparable system performance. A number 1 FOM displayed indicates an estimated position error of less than 25 meters. A number 9 FOM displayed indicates an estimated error in excess of 5000 meters.
	FOM = n	Stand Alone GPS Figure-of-Merit; n = 0 to 9; Default to zero.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.

Figure 1A-31 (Sheet 26 of 50)

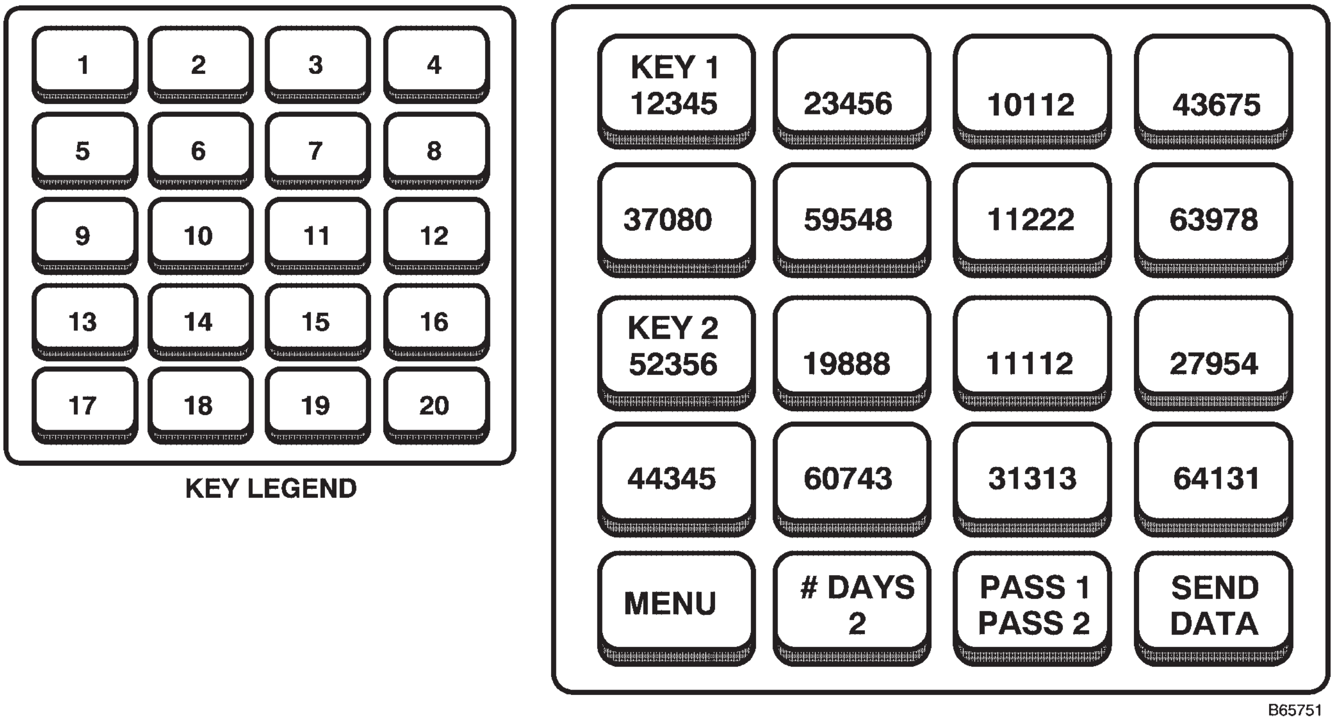
CHANNEL SUMMARY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
18	Crypto Key Status Key	This key is used to display the Crypto Key status. When the GPS receiver does not contain Crypto Keys the receiver will only be able to pick up Coarse Acquisition (CA) Code, thus reducing the accuracy of the position calculated by the GPS receiver. Verification can take up to 15 minutes after key entry.
	KEY PRESNT	Indicates IUS and GPS receiver contain a valid crypto key unless incorrect OAS data inhibits proper functioning of the GPS IU.
	KEY RCVR	Indicates GPS receiver contains a crypto key and conditions for KEY PRESNT are not met.
	NO KEY	If the PKB displays NO KEY at the completion of a training mission, then a zeroize command from the IU or CF-67 is required in order to declassify the equipment.
19	GPS Fault Status Switch	This switch is used to display the GPS fault status. When a fault occurs, the type of fault will be displayed in a box, until the operator presses this switch. If there are no additional faults, the key will return to a state displaying all reported GPS LRU faults.
	AE	AE displayed in box outline when the GPS AE is faulted, until the operator acknowledges the fault by pushing the switch (priority 1). Acknowledging the fault does not clear the fault.
	RPU	RPU displayed in box outline when the GPS RPU is faulted until the operator acknowledges the fault by pushing the switch (priority 2). Acknowledging the fault does not clear the fault.
	BATT	BATT displayed in box outline when the GPS battery is faulted until the operator acknowledges the fault by pushing the switch (priority 3). Acknowledging the fault does not clear the fault.
	AE/RPU BATT	Displayed on IU start up and after one or more of the above GPS fault(s) has been acknowledged. While each fault exists, its associated legend, AE, RPU, and BATT, will be displayed. Displays blanks when not faulted.
20	GPS Status Key	This key is used for displaying the GPS status.
	INIT REQ	Displayed when GPS receiver is requesting INIT data. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded.
	DTUC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DTUC. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded.
	DDLC ALM?	Displayed when GPS receiver is requesting almanac data and IUS is attempting to retrieve it from DDLC.
	COLD START	GPS receiver is requesting almanac data and IUS has failed to retrieve it from DTUC on first attempt. If displayed for an extended period of time, the crew member should confirm the initialization data is correct and/or the DTUC is properly loaded. Once almanac data is received, the IU will terminate cold start and proceed with a normal startup. **NOTE** The cold start may vary in length from 15 minutes up to an hour or more depending on the satellite configuration available at a given place and time.
	INS QUAL	Displayed when IU status indicates GPS data is good enough for an INS update.
	ALTNAV QUAL	Displayed when IU status indicates GPS data is good enough for an ALTNAV update.
	LOW QUAL	Displayed when IU status indicates GPS data is not good enough for an INS or an ALTNAV update. Can also be displayed when there is no communication with FMS.
	DATA?	Displayed when GPS does not have a valid navigation solution.

Figure 1A-31 (Sheet 27 of 50)

Programmable Keyboard (Cont)

CRYPTO VIEW ALL PAGE (TYPICAL)



The Crypto Key View All page is used to display the most recent set of Crypto Keys entered from the PKB. This page is also used to display the mission duration and the GPS receiver parity test in order to facilitate checking and modifying a previous input. The Crypto Key View All page can be displayed by pressing CRYPTO KEY on the Main Menu page.

Keys 1–8 are used to display the 8 components that make up the first Crypto Key. Similarly, keys 9–16 are used to display the 8 components that make up the second Crypto Key. The values displayed for these keys represent the last values entered by the operator. Selecting any of these switches will take the operator to the Crypto Key Data Entry page. The value that will be displayed on the Crypto Key Data Entry page will be the component displayed on the switch selected. In other words, if the operator wants to edit the first component of the first Crypto Key, pressing switch 1 would display the Crypto Key Data Entry page with the first component displayed for editing. Crypto Keys entered through the Crypto Fill Port will not be displayed on the PKB.

KEY	CONTROL-INDICATOR	FUNCTION
1	Crypto KEY 1 Display Switch	Key denotes that keys 1 through 8 are designated for displaying Crypto key 1 data. These switches are also used to access the associated data line on the Crypto Key Data Entry page.
	KEY 1	(Upper Portion) Static legend to designate that keys1 through 8 represent crypto KEY 1 data.
	xxxxx	(Lower Portion) Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
2–8	Crypto Key 1 Data Display Switches	
	xxxxx	Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).

Figure 1A-31 (Sheet 28 of 50)

Programmable Keyboard (Cont)

CRYPTO VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9	Crypto KEY 2 Display Switch	Key denotes that keys 9 through 16 are designated for displaying Crypto key 2 data. These switches are also used to access the associated data line on the Crypto Key Data Entry page.
	KEY 2	(Upper Portion) Static legend to designate that keys 9 through 16 represent crypto KEY 2 data.
	xxxxx	(Lower Portion) Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
10–16	Crypto Key 2 Data Display Switches	
	xxxxx	Prompt for crypto key on DATA ENTRY page, display of line input on VIEW ALL page; xxxxx = 0 to 65,535 (default is 00000).
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	#DAYS Switch	This switch is used for displaying the mission duration in days. The duration may be anywhere from 1 to 14 days in length. Pressing this switch will also display the Crypto Key Data Entry page with the mission duration field displayed for editing.
	#DAYS	(Upper Portion) Static legend to denote that this switch displays the mission duration in days.
	xx	(Lower Portion) Mission duration; xx = 1 to 14 days.
19	Crypto Key Parity Display Key/ Crypto Fill Port Data Entry Aiding Switch	This switch serves two purposes, displaying Crypto Key parity status and aiding data entry through the Crypto Fill Port.
	Crypto Key Parity Display Key	When used to display Crypto Key parity status, a pass or fail indication for each key will be reported when the operator selects the SEND DATA (key 20) switch. If the status comes back as failed, the operator may press the SEND DATA switch again after exiting and redisplaying the Crypto Key View All page. The top of the legend is reserved for displaying Crypto Key 1 parity status and the bottom for Crypto Key 2 parity status. Parity tests will appear one at a time and will complete within a nominal time of 30 seconds if two keys are being sent. If FAIL 1 and FAIL 2 are displayed, key data should be reviewed for errors, corrected if necessary, and retransmitted.
	FAIL 1	(Upper Portion) Indicates parity fail for key 1 data transferred to the GPS UE.
	FAIL 2	(Lower Portion) Indicates parity fail for key 2 data transferred to the GPS UE.
	PASS 1	(Upper Portion) Indicates parity pass for key 1 data transferred to the GPS UE.
	PASS 2	(Lower Portion) Indicates parity pass for key 2 data transferred to the GPS UE.
	Crypto Fill Port Data Entry Aiding Switch	This switch is also used to aid data entry from the Crypto Fill Port. When either a KYK-13 or CYZ-10 is detected at the Crypto Fill Port (power must be applied to the fill device), CRYPTO FILL will be displayed as an indication that Crypto Key data may be entered through the Crypto Fill Port. (Refer to the KYK-13 or CYZ-10 operator manual for instruction on selecting the key for entry.) Pressing this switch while CRYPTO FILL is displayed, will change the switch display to LOAD. Pressing the switch while LOAD is displayed will load any available Crypto Key from the Crypto Fill Port into the IU memory location specified by switch 20, CRYPTO KEY 1 or CRYPTO KEY 2.

Figure 1A-31 (Sheet 29 of 50)

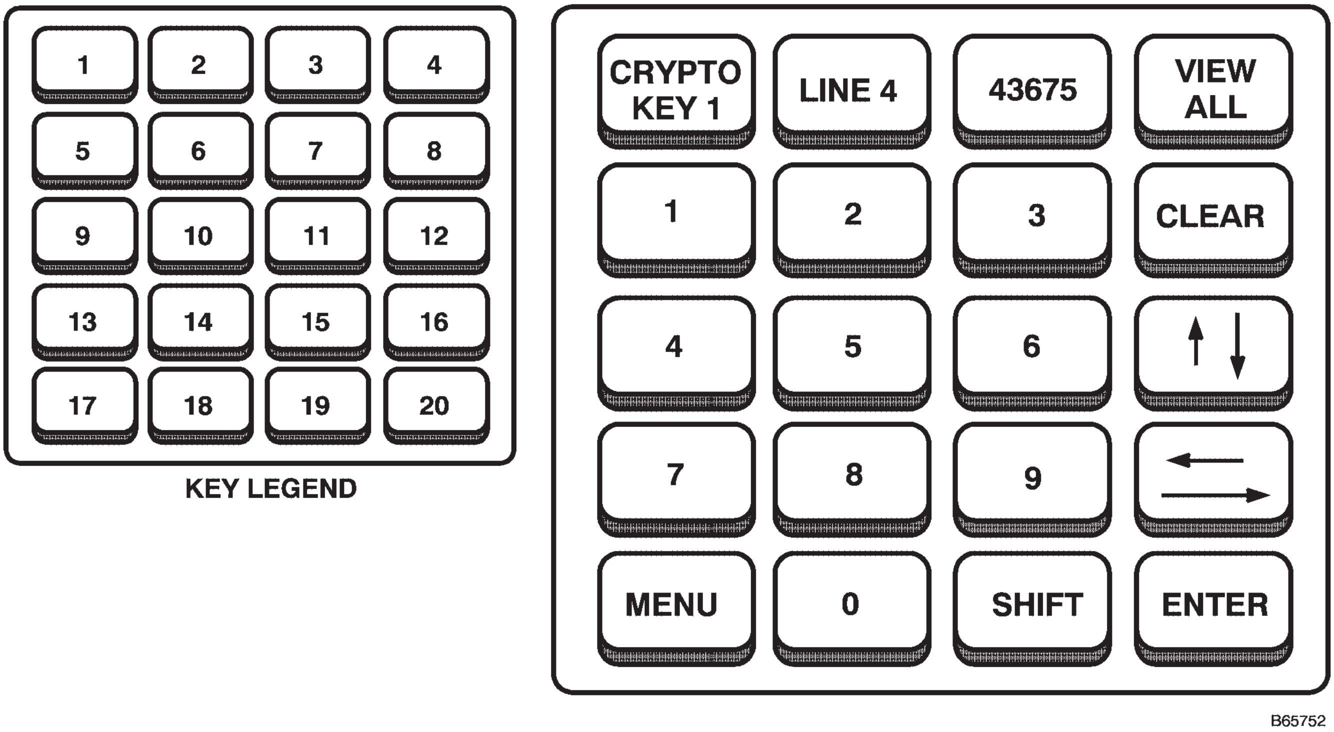
Programmable Keyboard (Cont)

CRYPTO VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
19 (Cont)	Crypto Fill Port Data Entry Aiding Switch (Cont)	With LOAD displayed, the location in IU memory may be selected with switch 20 which will read either CRYPTO KEY 1 or CRYPTO KEY 2. The IU memory location should be selected before LOAD is pressed. Any Crypto Key existing in the specified location will be overwritten when LOAD is selected. **NOTE** The CYZ-10 protocol must be set to KYK-13 in order for the CYZ-10 to be detected. Crypto Keys entered through the Crypto Fill Port will not be displayed on the PKB.
	CRYPTO FILL	Displayed when a KYK-13 or CYZ-10 is detected at the Crypto Fill Port.
	LOAD	Displayed after CRYPTO FILL has been selected. Selecting while LOAD is displayed will cause the Crypto Key to be read in from the Crypto Fill Port.
20	SEND DATA Switch/ IU Memory Location Selection Switch	This switch serves two purposes, sending Crypto Key data to the GPS receiver and specifying where to place Crypto Key data in IU memory loaded from the Crypto Fill Port.
	SEND DATA Switch	When SEND DATA is displayed, this switch is used to send the Crypto Keys to the GPS receiver. Pressing the SEND DATA switch will initiate a zeroize signal to the GPS receiver to remove any previously transmitted crypto keys for the GPS receiver. The zeroize action is then followed by the transmission of mission duration and crypto key 1 and/or crypto key 2 before beginning the crypto key verification process. After pressing this switch, the SEND DATA legend will disappear. During the period that the legend is blanked, the operator may not attempt to re-send the Crypto Keys. Between 15 and 20 seconds after the SEND DATA switch is pressed, a parity status will be displayed on switch 19. SEND DATA will not be displayed again until the Crypto Key View All page is exited and redisplayed. If SEND DATA is pressed while switch 19 is displaying CRYPTO FILL, then the Crypto Keys sent to the GPS receiver will be the keys last entered via the Crypto Fill Port. If CRYPTO FILL is not displayed, then the Crypto Keys sent to the GPS receiver will be the keys last entered via the PKB. **NOTE** When keys are sent from the Crypto Fill Port, the PKB entered keys will automatically be zeroized.
	SEND DATA	Static legend displayed when VIEW ALL page is displayed. Extinguished when selected by the operator.
	IU Memory Location Selection Switch	When loading Crypto Keys from the Crypto Fill Port, this switch is also used to specify which IU memory location to place the data into, Key 1 or Key 2. When LOAD is displayed on switch 19, switch 20 is used to cycle through the available IU memory locations, CRYPTO KEY 1 and CRYPTO KEY 2. When the desired memory location is displayed on switch 20, LOAD may be pressed to load the data from the Crypto Fill Port into the displayed memory location. After cycling through all memory locations, switch 19 and 20 will change back to CRYPTO FILL and SEND DATA respectively.
	CRYPTO KEY 1	Specifies that the Crypto Key loaded from the Crypto Fill Port is to be loaded into the Crypto Key 1 IU memory location when LOAD (switch 19) is pressed.
	CRYPTO KEY 2	Specifies that the Crypto Key loaded from the Crypto Fill Port is to be loaded into the Crypto Key 2 IU memory location when LOAD (switch 19) is pressed.

Figure 1A-31 (Sheet 30 of 50)

CRYPTO KEY DATA ENTRY PAGE (TYPICAL)



The Crypto Key Data Entry page is used for modifying the Crypto Key variables and the mission duration. The Crypto Key Data Entry page can be displayed by pressing CRYPTO KEY on the Main Menu page and then pressing any of switches 1–16 or 18 on the Crypto Key View All page.

The Crypto Key Data Entry page functions by displaying one Crypto Key component field at a time. The operator is responsible for entering the proper values and pressing the ENTER switch to temporarily hold the data. Pressing the ENTER switch will automatically display the next field for entry.

NOTE

> If the operator presses the up/down arrow switches without pressing the ENTER switch, any newly entered data for that field will be discarded.

If the data entry field (key 3) becomes outlined by a box, an invalid value has been entered and cannot be processed. Pressing any other switch, with the exception of the ENTER switch and the first three switches, will remove the outline.

Figure 1A-31 (Sheet 31 of 50)

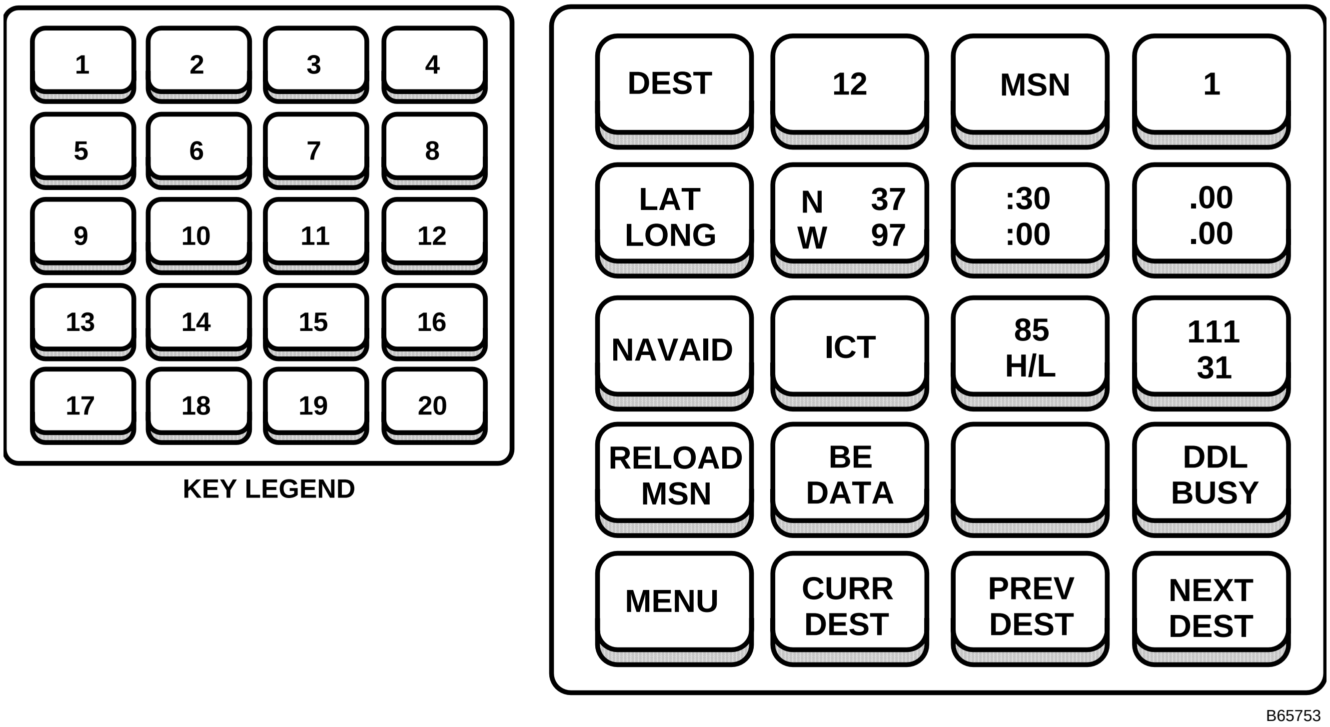
Programmable Keyboard (Cont)

CRYPTO KEY DATA ENTRY PAGE (TYPICAL)

KEY	CONTROL-INDICATOR	FUNCTION
1	Data Entry Legend Key 1	This key is used to display the type of the data entry field being modified.
	MSN LENGTH	Signifies that the mission duration edit field is being displayed in key 3.
	CRYPTO KEY n	Signifies that a Crypto Key component edit field is being displayed in key 3. n is either 1 or 2 and denotes the Crypto Key.
2	Data Entry Legend Key 2	This key is used to either display which of the eight Crypto Key components is being displayed for editing or DAYS = for mission duration editing.
	DAYS=	Prompt for Mission Duration (# of days for MSN LENGTH (key1)).
	LINE n	Prompt for Crypto Key Component data. n = 1 through 8. (line # for CRYPTO KEY n (key1)).
3	Edit Field Key	This key is used to display the edit fields for each of the key components and the mission duration. A cursor is placed under the current character/value being modified. If an errant value is entered, the field will be outlined with a box upon pressing the ENTER switch. The outline can be removed by pressing any switch, except the ENTER or the first three switches.
	xx	Prompt for Mission Duration. xx = 1 through 14 days.
	xxxxx	Prompt for Crypto Key Component data. xxxxx = 0 to 65,535.
4	VIEW ALL Switch	The VIEW ALL switch is used to access the Crypto Key View All page.
5–7	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept the default value as the component value.
9–11	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the various data entry fields described under key 1. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the data entry field displayed in key 3.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry field. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the data entry field displayed in key 3.
19	SHIFT Switch	The SHIFT switch is used to select the up and left arrow keys. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to accept the value displayed in the data entry field.

Figure 1A-31 (Sheet 32 of 50)

MISSION DATA DISPLAY PAGE (TYPICAL)



The Mission Data Display page is used to view the Navaid assignments (if any) associated with each destination. The Mission Data Display page can be displayed by pressing MSN DATA on the Main Menu page.

The operator may use this page to scroll through all of the destinations in a mission by using the NEXT DEST and PREV DEST switches and use the CURR DEST switch to return to the current destination. In addition the operator can use the BE (BULLSEYE) DATA switch to address the Bullseye View All page.

This page displays each destination one at a time along with the current mission number, the destination latitude and longitude, and the Navaid ICAO identifier, channel, range and bearing to the destination.

KEY	CONTROL-INDICATOR	FUNCTION
1	DEST (Destination) Legend Key	Static text to indicate that the display in key 2 represents the selected destination. When DEST becomes underlined (DEST), this is an indication that the destination number in key 2 represents the current destination.
2	Selected Destination Display Key	Destination numerical designation.
	ww	ww = 1 to 99. Default is 1. Blank for no Navaid assignment. ww = XH for Fly-To-Crosshair.
3	MSN Legend Key	Static text to indicate that the display in keys 4 represents the loaded mission number.
4	Mission Number Display Key	Loaded mission number.
	mm	mm = 1 to 9. Blank when no data available.
	NO MSN	Displayed when no mission data has been entered.

Figure 1A-31 (Sheet 33 of 50)

Programmable Keyboard (Cont)

MISSION DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
5	Destination LAT/ LONG Legend Key	Static text to indicate that the upper portions of keys 6 –7 represent the latitude and the lower portions indicate the longitude of the selected destination.
6	Destination LAT/ LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
7	Destination LAT/ LONG Minutes Display Key	
	:mm	Latitude (upper portion) and Longitude (lower portion) minutes; :mm = 0 to 59.
8	Destination LAT/ LONG Hundredths of Minutes Display Key	
	.mm	Latitude (upper portion) and Longitude (lower portion) hundredths of minutes; .mm = 0 to .99.
9	NAVAID Legend Key/ Switch	The NAVAID switch is used to access the Navaid Assignment page. In addition the NAVAID text on the key denotes that the data displayed in keys 10–12 represents the Navaid data assigned to the destination displayed in key 2.This legend will only be displayed if both a mission and the Navaid database have been successfully loaded and the selected destination is not a Fly-To-Destination
10	NAVAID ID Key	This switch is used to display the ICAO four letter Navaid identifier assigned to the destination displayed in key 2.
	aaaa	aaaa = The ICAO abbreviation of the Navaid station. aaaa = Blank when no Navaid is assigned.
11	Navaid Channel and Usage Code Display Key	This upper portion of this key is used to display the channel associated with the Navaid assigned to the destination displayed in key 2, while the lower portion of the key displays the usage code for the assigned Navaid.
	cccc	(Upper Portion) cccc is the channel designation for the currently assigned Navaid. Blank for no Navaid assignment.
	HIGH	(Lower Portion) Indicates assigned Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates assigned Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates assigned Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates assigned Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the assigned Navaid is assigned for use in the terminal areas.
12	Navaid Range and Bearing Display Key	This key is used to display the range and bearing from the Navaid to the destination displayed in key 2. The bearing in degrees is displayed on the top of the legend and the range is displayed on the bottom of the legend.
	ddd°	(Upper Portion) Magnetic bearing from the Navaid to the destination. ddd = 1 to 360 degrees. Blank for no Navaid assignment.
	mmm NM	(Lower Portion) Range in nautical miles from the Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM). Blank for no Navaid assignment.
	CHNL	(Lower Portion) Displayed when the range of the assigned Navaid is more than 200 NM from the destination. This occurs only when the destination’s original flight plan has been modified. If the range for the assigned Navaid was part of the original flight plan, then the actual range will be displayed as read from the DDLC.

Figure 1A-31 (Sheet 34 of 50)

Programmable Keyboard (Cont)

MISSION DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
13	RELOAD MSN Switch/RELOAD NO? Switch	This switch is used to request a reload of the mission from the DTUC and DDLC. This is particularly important when the same DTUC is removed and re-inserted. It will be necessary to press this switch to inform the IUS that the mission needs to be reloaded. The operator will be asked for confirmation before the mission reload is carried out. The mission reload confirmation request can be cancelled by pressing this switch while RELOAD NO? is displayed or by displaying another page. Once the request to reload has been confirmed, the process cannot be stopped or undone.
	RELOAD MSN	When displayed, this button is used to begin a mission reload. Confirmation is requested before the process is completed.
	RELOAD NO?	When displayed, this button is used to cancel the request to reload a mission.
14	BE DATA Switch/ RELOAD YES? Switch	This switch is used to access the Bullseye View All page, as well as being used for a confirmation during a request to reload mission data. During a request to reload mission data RELOAD YES? is displayed in place of BE DATA. Pressing this switch while RELOAD YES? is displayed will cause the IU to reload the mission data from the DDLC and DTUC. The mission reload confirmation request can be cancelled by pressing switch 13 while RELOAD NO? is displayed or by displaying another page. Once the request to reload has been confirmed, the process cannot be stopped or undone. **NOTE** When the mission is reloaded from the PKB, all modifications made through FRMT-10 using FMS will be discarded from the IU. Selecting to reload the mission from the PKB will not cause FMS to reload the mission from the DTUC. Generally, the mission will only need to be reloaded from the PKB when there is a communication failure that prevents the IU from reading in the mission data, or when a mission having the same mission number as the mission currently loaded in FMS needs to be read from the DTUC.
	BE DATA	Pressing this switch will cause the Bullseye View All page to be displayed.
	RELOAD YES?	When displayed, this button is used to confirm the request to reload a mission. **NOTE** Pressing this switch will erase all modifications to the planned mission.
15	DDLC Error Display Key	When DDLC DATA? is displayed, this is an indication that the DDLC data may be corrupted or an error has occurred in the data transfer process.
16	DDLC Status Display Key	When NO DDLC is displayed, this is an indication that the DDLC needs to be installed or is not being detected as installed. If the DDLC is installed, it may be necessary to pull out and reinsert the cartridge. When DDL BUSY is displayed, this is an indication that the DDLC is currently being read.
	DDL BUSY	Displayed when the DDLC is being accessed by the IU.
	NO DDLC	Displayed when a DDL Cartridge cannot be detected.

Figure 1A-31 (Sheet 35 of 50)

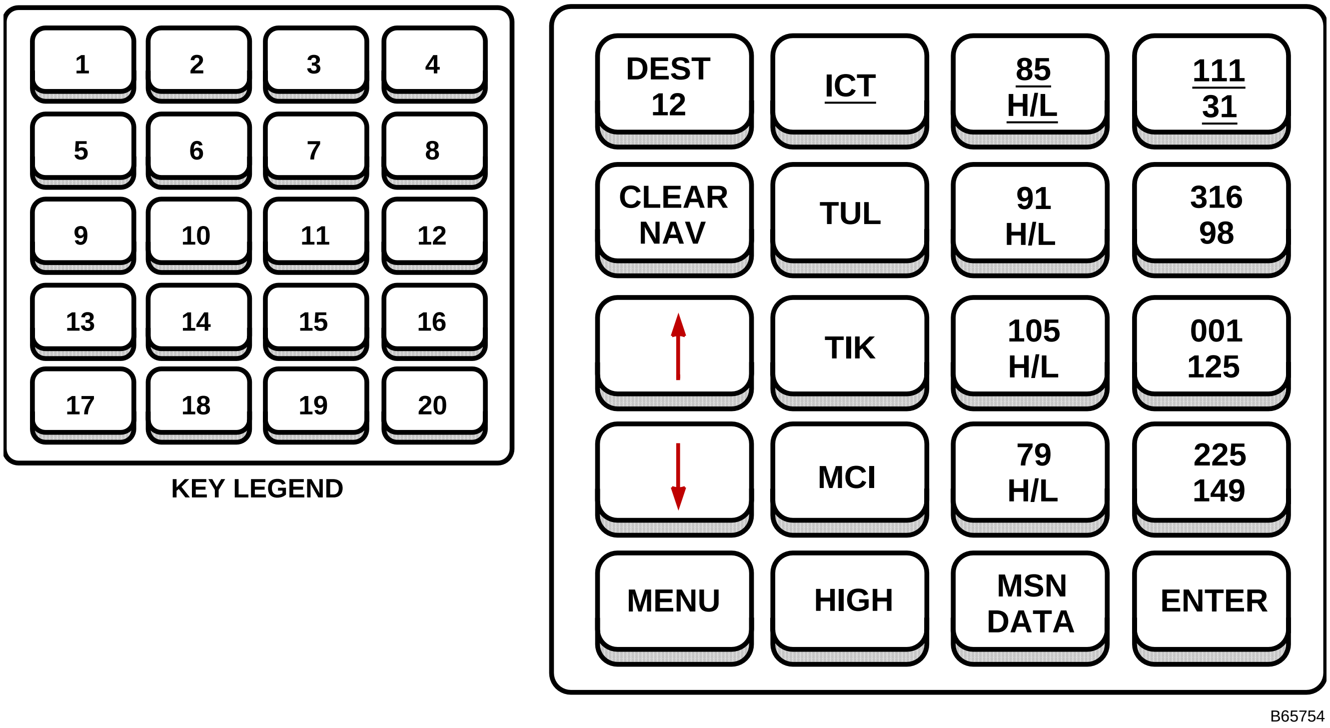
Programmable Keyboard (Cont)

MISSION DATA DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	CURR DEST (Current Destination) Switch	Pressing this switch will display the current destination in key 2 and its associated data on the rest of the page. The DEST text in key1 will become underlined to indicate that the displayed destination is the current destination.
19	PREV DEST (Next Destination) Switch	Pressing this switch will display the previous destination in the mission route. Subsequent pressing of the switch will cycle backward through the destinations in numerical order.
20	NEXT DEST (Next Destination) Switch	Pressing this switch will display the next destination in the mission route. Subsequent pressing of the switch will cycle forward through the destinations in numerical order.

Figure 1A-31 (Sheet 36 of 50)

NAVAID ASSIGNMENT PAGE (TYPICAL)



NOTE

- Arrows (keys 9 and 13) will only be displayed when there are enough Navaids within the predetermined range to warrant a scroll either up or down.
- Keys 2, 3 and 4 have an underline placed at the bottom of each item in order to separate the currently selected Navaid from the additional Navaids found to be within the predefined range.

The Navaid Assignment page is used to change the Navaid assignment for a destination. The Navaid Assignment page can be displayed by pressing MSN DATA on the Main Menu page followed by pressing NAVAID on the Mission Data Dis play page.

This page may only be displayed when both a mission and the Navaid database have been successfully loaded and the destination displayed on the Mission Data Display page is not a Fly-To-Destination. The Navaid Assignment page operates by providing the operator with a list of Navaids found to be within 200 NM. The operator may then select any Navaid in the list and assign it to the displayed destination. If a Navaid is already assigned to the displayed destination, then it will not be displayed in the list. The operator may also remove any Navaid assignment by pressing the CLEAR NAV switch followed by the ENTER switch. Pressing this switch will remove any Navaid assignment as well as place the removed Navaid back into the list for selection. It is important to note that this page can only be accessed through the Mission Data Display page.

Keys 6–8, 10–12, & 14–16 make up the list of scrollable Navaids that may be selected for assignment. The first column (keys 6, 10 & 14) displays the ICAO identifiers for the Navaids in the list. The second column (keys 7, 11, & 15) displays the channel and the usage code for the Navaids in the list. The third column (keys 8, 12, & 16) displays the range and bearing from the Navaids in the list to the destination. Navaids are sorted by increasing range from the destination. This means that the closest Navaid to the destination will always be the first Navaid in the list. Selecting any switch in a row associated with a Navaid will cause the entire row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1. Subsequently, the new Navaid will be placed in keys 2–4 and the previously assigned Navaid, if any, will be placed back into the list for selection. A selected blinking row may be deselected by selecting any switch in the same blinking row or by selecting another Navaid.

Figure 1A-31 (Sheet 37 of 50)

Programmable Keyboard (Cont)

NAVAID ASSIGNMENT PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	DEST (Destination) Key	This key displays the number of the destination that is available for modification. This destination number will be the last destination that was displayed on the Mission Data Display page. The operator may not change this value from this page. If the operator needs to change the assignment of a destination other than the displayed destination in this legend, it will be necessary to return to the Mission Data Display page and scroll through the list of destinations until the desired destination is displayed on the Mission Data Display page.
	DEST	(Upper Portion) Static legend.
	ww	(Lower Portion) Destination numerical designation. ww = 1 to 99. The selected destination number from the Mission Data Display page.
2	Current NAVAID ID Key	This switch is used to display the ICAO four letter Navaid identifier currently assigned to the destination displayed in key 1.
	aaaa	aaaa represents the ICAO abbreviation of the currently selected Navaid station, underlined to denote it is the current Navaid.
3	Current Navaid Channel and Usage Code Display Key	The upper portion of this key is used to display the channel associated with the Navaid assigned to the destination displayed in key 1, while the lower portion of the key displays the usage code for the assigned Navaid. The data in both the upper and lower portions of the key are underlined to show they are associated with the current Navaid.
	cccc	(Upper Portion) cccc is the channel designation for the currently assigned Navaid.
	HIGH	(Lower Portion) Indicates assigned Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates assigned Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates assigned Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates assigned Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the assigned Navaid is assigned for use in the terminal areas.
4	Current Navaid Range and Bearing Display Key	This key is displays the range and bearing from the current Navaid to the destination displayed in key 1. The bearing in degrees is displayed on the top of the key and the range is displayed on the bottom of the key. The data in both the upper and lower portions of the key are underlined to show they are associated with the current Navaid.
	ddd°	(Upper Portion) Magnetic bearing from the current Navaid to the destination. ddd = 1 to 360 degrees.
	mmm NM	(Lower Portion) Range in nautical miles from the current Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM).
	CHNL	(Lower Portion) Displayed when the range of the assigned Navaid is more than 200 NM from the destination. This occurs only when the destination's original flight plan has been modified. If the range for the assigned Navaid was part of the original flight plan, then the actual range will be displayed as read from the DDLC.
5	CLEAR NAV Switch	The CLEAR NAV switch is used to remove any Navaid assignment from the displayed destination. Pressing the ENTER switch (key 20) while this switch is blinking will not only remove the assignment, but will also place the Navaid back into the list of Navaids for selection. Subsequently, keys 2–4 will become blanked out, indicating there is no assignment associated with the displayed destination.
6, 10 &14	Available Navaid ID Switches	Displays the ICAO identifiers for the alternate Navaids for the destination displayed in key 1. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	aaaa	aaaa represents the ICAO abbreviation of the alternate Navaid station.

Figure 1A-31 (Sheet 38 of 50)

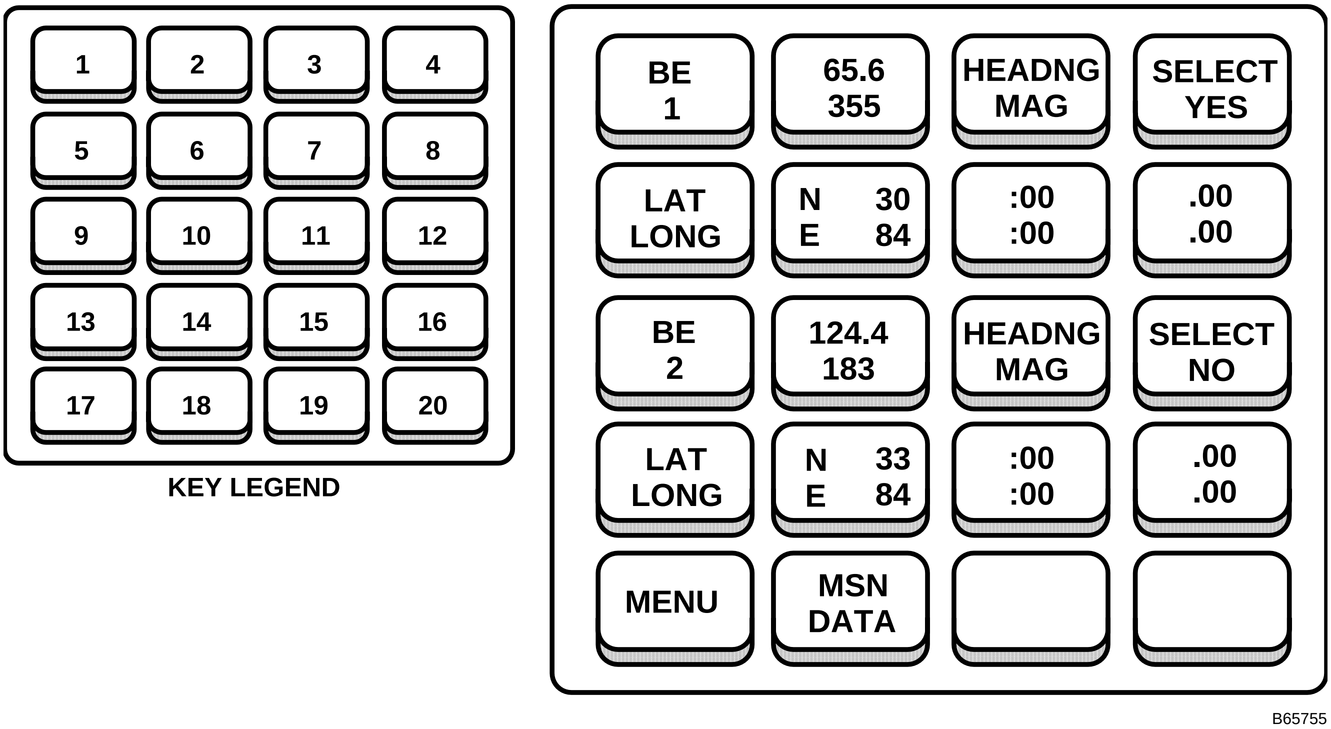
NAVAID ASSIGNMENT PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
7, 11 & 15	Alternate Navaid Channel and Usage Code Display Switches	The upper portion of this key is used to display the channel associated with the alternate Navaid for the destination displayed in key 1, while the lower portion of the key displays the usage code for the Navaid. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	cccc	(Upper Portion) cccc is the channel designation for the alternate Navaid.
	HIGH	(Lower Portion) Indicates alternate Navaid is a high power station based on the usage code.
	LOW	(Lower Portion) Indicates alternate Navaid is low power station based on the usage code.
	H/L	(Lower Portion) Indicates alternate Navaid is rated as both a high and a low power station.
	RNAV	(Lower Portion) Indicates alternate Navaid is not associated with an enroute structure. These Navaids can support either high or low airspace.
	TERM	(Lower Portion) Indicates that the alternate Navaid is assigned for use in the terminal areas.
8, 12 &16	Alternate Navaid Range and Bearing Display Switches	This key displays the range and bearing from the alternate Navaid to the destination displayed in key 1. The bearings in degrees are displayed on the top of the key and the ranges are displayed on the bottom of the key. Selecting this switch will cause all the keys associated with the Navaid on the row to start blinking. Once a row is blinking, the operator may select the ENTER switch to assign the blinking Navaid to the currently displayed destination in key 1.
	ddd°	(Upper Portion) Magnetic bearing from the alternate Navaid to the destination. ddd = 1 to 360 degrees.
	mmm NM	(Lower Portion) Range in nautical miles from the alternate Navaid to the destination. mmm = 0 to 999 Nautical Miles (NM).
9 & 13	Up and Down Arrow Switches	These two keys together allow the operator to scroll through the list of selectable Navaids. Each arrow will appear when there are Navaids either higher in the list or lower in the list respectively. When the top of the list has been reached, the up arrow will be removed as an indication. Similarly, when the bottom of the list has been reached, the down arrow will be removed as an indication.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Usage Code Filter Toggle Switch	This switch is used to toggle between the Navaids having a usage code of HIGH, LOW, or TERM.
	HIGH	Indicates that the displayed Navaids are high power stations based on the usage code. Includes Navaids with usage codes of High, RNAV, and High/Low.
	LOW	Indicates that the displayed Navaids are low power stations based on the usage code. Includes Navaids with usage codes of Low, RNAV, and High/Low.
	TERM	Indicates that the displayed Navaids are terminal stations based on the usage code. Includes Navaids with usage codes of Terminal only.
19	MSN DATA Switch	The MSN DATA switch is used to access the Mission Data Display page.
20	ENTER Switch	The ENTER switch is used to make a Navaid assignment to the displayed destination. When a selected Navaid is blinking or the CLEAR NAV key is blinking, the operator may press this switch to update the Navaid assignment for the displayed destination in key 1. If a Navaid is not selected or the CLEAR NAV key is not blinking, then pressing the ENTER switch will have no effect.

Figure 1A-31 (Sheet 39 of 50)

Programmable Keyboard (Cont)

BULLSEYE VIEW ALL PAGE (TYPICAL)



KEY	CONTROL-INDICATOR	FUNCTION
1	BE 1 (Bullseye 1) Display Switch	This is a dual purpose key. It serves as a static legend to indicate that the data displayed on keys 2 through 8 reflect Bullseye 1 information. It also serves as switch to access the Bullseye Data Entry page for Bullseye 1.
2	BE 1 Range and Bearing Display Key	This switch is used to display the range and bearing from Bullseye 1 to the aircraft.
	mmm.m	(Upper Portion) Range from BE 1 to aircraft. mmm.m = 0 to 999.9 NM.
	ddd°	(Lower Portion) Bearing from BE 1 to aircraft. ddd = 0 to 359 degrees.
3	BE 1 Heading Reference Select Switch	This switch is used to toggle the bearing reference for BE 1 between True and Magnetic.
	HEADING	(Upper Portion) Static legend to define the key as the heading reference select switch.
	MAG	(Lower Portion) Bearing referenced on key 2 is a magnetic bearing.
	TRUE	(Lower Portion) Bearing referenced on key 2 is a true bearing. Default reference.

Figure 1A-31 (Sheet 40 of 50)

BULLSEYE VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
4	BE 1 Select Switch	Switches 4 and 12 are used to toggle between Bullseye 1 and Bullseye 2, as the selected bullseye. The selected bullseye will appear on the pilots' moving map with an asterisk. The legend SELECT NO is the default. Both switches 4 and 12 selection is dependent on the selection of the other. For example: If Bullseye 1 is selected as the current selected bullseye and key 12 is pressed, key 12 changes from SELECT NO to SELECT YES and key 4 changes from SELECT YES to SELECT NO.
	SELECT	(Upper Portion) Static legend to define the key as BE 1 select switch.
	YES	(Lower Portion) Indicates BE 1 is the selected bullseye.
	NO	(Lower Portion) Indicates BE 1 is not the selected bullseye.
5	BE 1 LAT/ LONG Legend Key	Static text to indicate that the upper portions of keys 6–8 represent the latitude and the lower portions indicate the longitude of Bullseye 1.
6	BE 1 LAT/LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
7	BE 1 LAT/LONG Minutes Display Key	
	:mm	Latitude (upper portion) and Longitude (lower portion) minutes; :mm = 0 to 59.
8	BE 1 LAT/LONG Hundredths of Minutes Display Key	
	.mm	Latitude (upper portion) and Longitude (lower portion) hundredths of minutes; .mm = 0 to .99.
9	BE 2 (Bullseye 2) Display Switch	This is a dual purpose key. It serves as a static legend to indicate that the data displayed on keys 9 through 12 reflect Bullseye 2 information. It also serves as switch to access the Bullseye Data Entry page for Bullseye 2.
10	BE 2 Range and Bearing Display Key	This switch is used to display the range and bearing from Bullseye 2 to the aircraft.
	mmm.m	(Upper Portion) Range from BE 2 to aircraft. mmm.m = 0 to 999.9 NM.
	ddd°	(Lower Portion) Bearing from BE 2 to aircraft. ddd = 0 to 359 degrees.
11	BE 2 Heading Reference Select Switch	This switch is used to toggle the bearing reference for BE 2 between True and Magnetic.
	HEADING	(Upper Portion) Static legend to define the key as the heading reference select switch.
	MAG	(Lower Portion) Bearing referenced on key 10 is a magnetic bearing.
	TRUE	(Lower Portion) Bearing referenced on key 10 is a true bearing. Default reference.

Figure 1A-31 (Sheet 41 of 50)

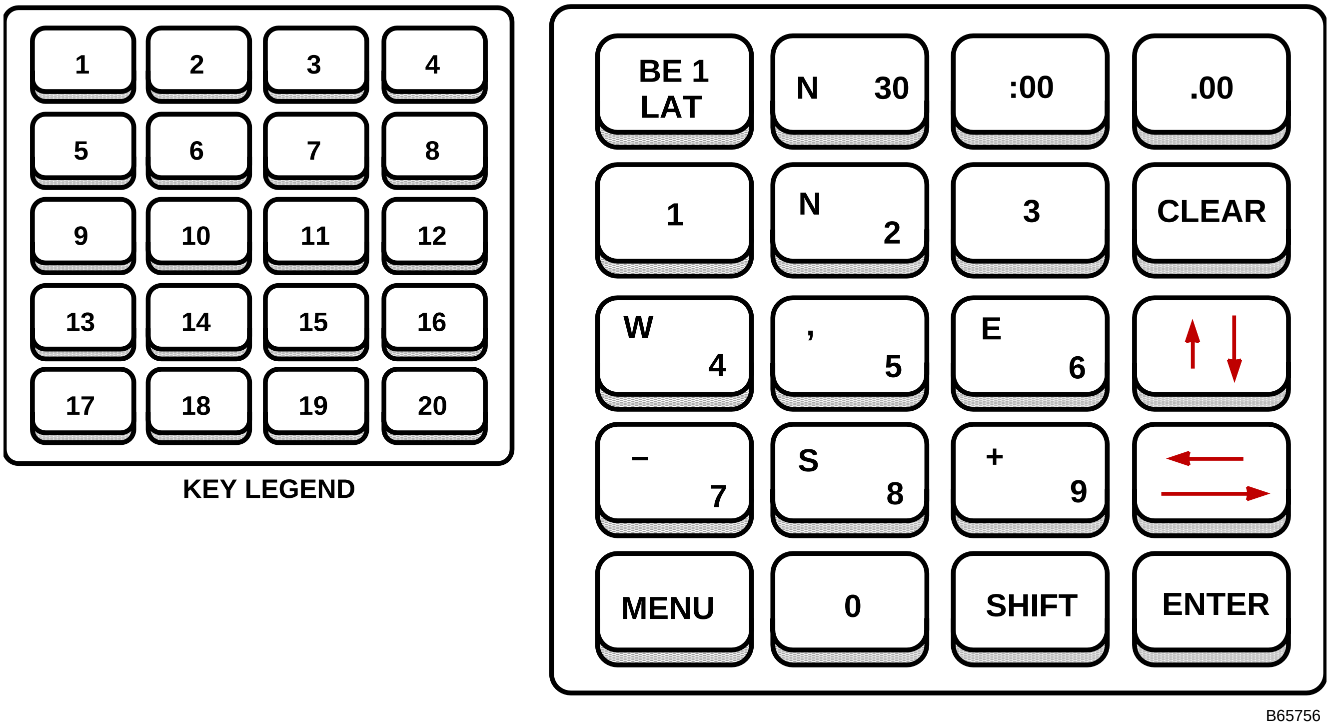
Programmable Keyboard (Cont)

BULLSEYE VIEW ALL PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
12	BE 2 Select Switch	Switches 4 and 12 are used to toggle between Bullseye 1 and Bullseye 2, as the selected bullseye. The selected bullseye will appear on the pilots' moving map with an asterisk. The legend SELECT NO is the default. Both switches 4 and 12 selection is dependent on the selection of the other. For example: If Bullseye 1 is selected as the current selected bullseye and key 12 is pressed, key 12 changes from SELECT NO to SELECT YES and key 4 changes from SELECT YES to SELECT NO.
	SELECT	(Upper Portion) Static legend to define the key as BE 2 select switch.
	YES	(Lower Portion) Indicates BE 2 is the selected bullseye.
	NO	(Lower Portion) Indicates BE 2 is not the selected bullseye.
13	BE 2 LAT/ LONG Legend Key	Static text to indicate that the upper portions of keys 14–16 represent the latitude and the lower portions indicate the longitude of Bullseye 2.
14	BE 2 LAT/LONG Degrees Display Key	
	xdd	(Upper Portion) Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	(Lower Portion) Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
15	BE 2 LAT/LONG Minutes Display Key	
	mm	Latitude (upper portion) and Longitude (lower portion) minutes; mm = 0 to 59.
16	BE 2 LAT/LONG Hundredths of Minutes Display Key	
	.mm	Latitude (upper portion) and Longitude (lower portion) hundredths of minutes;.mm = 0 to .99.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	MSN DATA Switch	The MSN DATA switch is used to access the Mission Data Display page.
19	Blank	This key is not used on the Bullseye View All page.
20	Blank	This key is not used on the Bullseye View All page.

Figure 1A-31 (Sheet 42 of 50)

BULLSEYE DATA ENTRY PAGE (TYPICAL)



The Bullseye Data Entry page is used to enter longitude and latitude for bullseye 1 and 2. The Bullseye Data Entry page can be displayed by pressing either BE 1 or BE 2 on the Bullseye View All page.

KEY	CONTROL-INDICATOR	FUNCTION
1	Bullseye Legend Key	This key is used to display longitude or latitude data entry fields being displayed for Bullseye 1 or Bullseye 2. The up/down arrow switch (key 12) is used to toggle between the bullseye's latitude and longitude.
	BE 1	(Upper Portion) Indicates that Bullseye 1 data is being displayed and can be modified.
	BE 2	(Upper Portion) Indicates that Bullseye 2 data is being displayed and can be modified.
	LAT	(Lower Portion) Indicates that the selected bullseye's latitude is displayed in keys 2–4.
	LONG	(Lower Portion) Indicates that the selected bullseye's longitude is displayed in keys 2–4.
2–4	LAT/LONG Data Display Keys	These keys are used for displaying the data entry fields for the bullseye's latitude or longitude, as defined by the lower portion of key 1. A cursor is placed under the current character/value being modified. If an errant value is entered, the field will be outlined by a box upon pressing the ENTER switch. The outline can be removed by pressing any switch other than the ENTER switch or the first four keys.
2	LAT/LONG Degrees Display Key	Displays the degrees of latitude or longitude, as defined by key 1, for the selected bullseye.
	xdd	Latitude display; x = N for North or S for South; dd = 0 to 90 degrees.
	xddd	Longitude display; x = E for East or W for West; ddd = 0 to 180 degrees.
3	LAT/LONG Minutes Display Key	Displays the minutes of latitude or longitude, as defined by key 1, for the selected bullseye.
	:mm	Latitude or longitude minutes; :mm = 0 to 59.

Figure 1A-31 (Sheet 43 of 50)

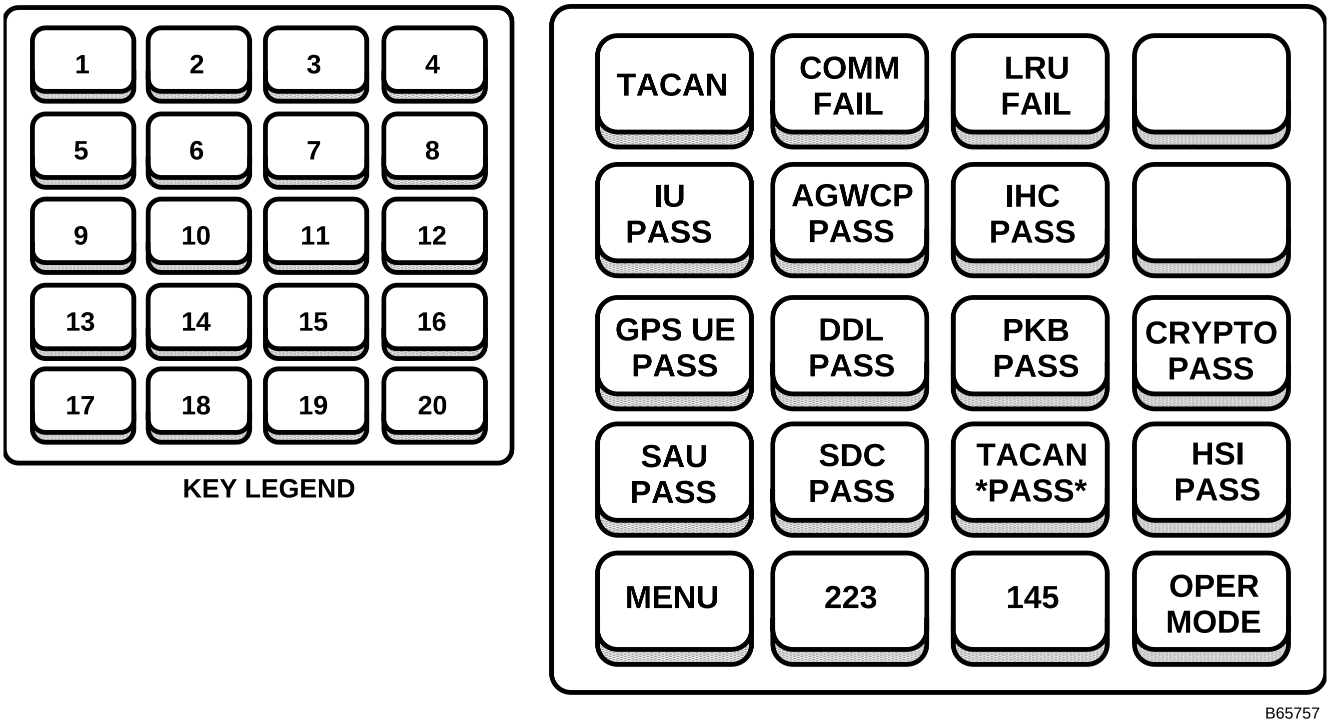
Programmable Keyboard (Cont)

BULLSEYE DATA ENTRY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
4	LAT/LONG Hundredths of Minutes Display Key	Displays the hundredths of minutes of latitude or longitude, as defined by key 1, for the selected bullseye.
	.mm	Latitude or longitude hundredths of minutes;.mm = 0 to .99.
5–7	Data Entry Switches	These switches are used for entering data into the data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
8	CLEAR Switch	The CLEAR switch is used to reset the data entry field to its default values. This will only clear the currently displayed field and still requires the selection of the ENTER switch to accept this default value.
9–11	Data Entry Switches	These switches are used for entering data into the latitude or longitude data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
12	Up/Down (Arrow) Switch	This switch is used for cycling through the latitude or longitude data entry fields. The up arrow represents the shifted state. **NOTE** If the Up/Down switch is selected before the ENTER switch is selected, any newly entered data will be discarded.
13–15	Data Entry Switches	These switches are used for entering data into the latitude or longitude data entry fields displayed in keys 2–4. If a switch has more than one value associated with it, the shifted value is placed in the upper left hand corner of the legend.
16	Left/Right (Arrow) Switch	This switch is used for moving the cursor within the data entry fields. The left arrow represents the shifted state. When the cursor reaches the end of the field, it will wrap around to the beginning of the field without changing the data entry field.
17	MENU Switch	The MENU switch is a dual purpose switch. It is used to access the Main Menu page and also indicates that a fault has occurred, that the operator has not acknowledged.
	MENU	Indicates that there are no faults awaiting operator acknowledgement.
	MENU	Indicates that a fault has occurred since the last operator acknowledgement. This condition can be cleared by proceeding to the Test Mode Display Page and acknowledging the fault.
18	Data Entry Switch	This switch is used for entering data into the latitude or longitude data entry fields displayed in keys 2–4.
19	SHIFT Switch	The SHIFT switch is used to enter characters displayed in the upper left hand corner of the legends. When in the shifted state, the SHIFT legend will be underlined. Pressing any other switch will remove the shifted state.
20	ENTER Switch	The ENTER switch is used to: accept a value displayed in the data entry field (latitude or longitude), sequence from latitude to longitude data, or return to the Bullseye View All page.

Figure 1A-31 (Sheet 44 of 50)

TEST MODE DISPLAY PAGE (TYPICAL)



The Test Mode Display, accessed by pressing PME STATUS on the Main Menu page, is used for displaying fault status for selected LRUs. The page operates in two modes: Test Mode and Operational Mode. In Test Mode, available only when the ground speed is less than 100 knots and the true air speed is less than 102 knots, the operator may initiate a BIT or request an IUS reload. In the Operational Mode only LRU fault status are provided.

This page will display asterisks on keys for LRUs, that have incurred faults, that have not been acknowledged by the operator. Faults can be acknowledged by pressing the switch associated with the designated LRU. For example, if a fault occurs in the TACAN, then key 15 will display TACAN *PASS*. The asterisks are an indication that a fault has occurred sometime in the past and has not been acknowledged by the operator. The PASS indication signifies that the TACAN passed its most recent BIT. In contrast, if the LRU is still faulted, *FAIL* will be displayed. Pressing this switch will clear the asterisks and display any unacknowledged faults that have occurred in keys 2 and 3.

Keys 2 and 3 indicate failures, however, it is the assigned LRU switch (e.g. switch 15 for the TACAN) that indicates the current LRU fault status. Therefore, it is possible that the LRU may indicate a passing condition although faults are being reported in keys 2 and 3. In this case the fault indications in keys 2 and 3 are past faults.

The operator is not required to punch off each fault associated with an LRU. For example, if 10 intermittent faults occur on a respective LRU between operator acknowledgements, then only one acknowledgement will be required. Any subsequent faults will function in the same manner. While an LRU remains faulted, it will not require further fault acknowledge ment.

Figure 1A-31 (Sheet 45 of 50)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
1	LRU Legend Key	This key is used to display the name of the LRU whose BIT status is being displayed.
	AGWCP	Indicates that the AGWCP BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	GPS UE	Indicates that the GPS UE BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	DDL	Indicates that the DDL BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	SDC	Indicates that the SDC BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	IU	Indicates that the IU BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	IHC	Indicates that the Integrated Hand Control (IHC), referred to as the Integrated Track Handle (ITH), BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	PKB	Indicates that the PKB BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	CRYPTO	Indicates that the CRYPTO BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	SAU	Indicates that the SAU BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	TACAN	Indicates that the TACAN BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
	HSI	Indicates that the HSI BIT/fault status is currently being displayed in keys 2 and 3. Any unacknowledged faults will also be displayed.
2	LRU BIT Status Key	This key displays the BIT status of the LRU designated in key 1.
	WAIT	Indicates that the LRU is processing an operator initiated BIT (IBIT).
	COMM FAIL	Indicates that a communication failure has been detected by the BIT.
	COMM ADVS	Indicates that a communication advisory has been detected by the BIT.
3	LRU Fault Status Key	This key displays the BIT fault status of the LRU designated in key 1.
	LRU FAIL	Indicates that an LRU fault has been detected by BIT.
	aa/ccc/ bbbb	Displayed only for the GPS LRU, aa = AE, bbbb = BATT, and/or ccc = RPU; displays blanks when not faulted.
4	INIT (Initiate) BIT Switch	When an LRU is available for operator initiated BIT and the page is in the Test Mode, this key will display INIT BIT. Pressing this switch while INIT BIT is displayed will initiate a BIT for the LRU displayed on key 1. Subsequently, key 2 will display WAIT, until the BIT is completed. Once the IBIT is complete, the results will be displayed in keys 2 and 3. The first BIT must complete before another BIT may be started for the same LRU.
	INIT BIT	Displayed only in Test Mode for LRUs which are available for operator initiated BIT.

Figure 1A-31 (Sheet 46 of 50)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
5	IU Fault Status Switch	This switch displays the current fault status for the Interface Unit (IU). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current IU fault status and any unacknowledged faults will be displayed on key 3.
	IU	(Upper Portion) Static legend to indicate that this is the IU Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IU faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IU faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IU fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IU fault and it and perhaps previous faults have not been acknowledged.
6	AGWCP Fault Status Switch	This switch displays the current fault status for the Advanced Guided Weapon Control Panel (AGWCP). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current AGWCP fault status and any unacknowledged faults will be displayed on key 3.
	AGWCP	(Upper Portion) Static legend to indicate that this is the AGWCP Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no AGWCP faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no AGWCP faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an AGWCP fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an AGWCP fault and it and perhaps previous faults have not been acknowledged.
7	IHC Fault Status Switch	This switch displays the current fault status for the Integrated Hand Control (IHC)/Integrated Track Handle (ITH). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current IHC fault status and any unacknowledged faults will be displayed on key 3.
	IHC	(Upper Portion) Static legend to indicate that this is the IHC Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IHC faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no IHC faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IHC fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an IHC fault and it and perhaps previous faults have not been acknowledged.
8	Blank	This key is not used on the Test Mode Display page.

Figure 1A-31 (Sheet 47 of 50)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
9	GPS UE Fault Status Switch	This switch displays the current fault status for the Global Positioning System User Equipment (GPS UE). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current GPS UE fault status and any unacknowledged faults will be displayed on key 3.
	GPS UE	(Upper Portion) Static legend to indicate that this is the GPS UE Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no GPS UE faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no GPS UE faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an GPS UE fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an GPS UE fault and it and perhaps previous faults have not been acknowledged.
	ADVS	(Lower Portion) Indicates that a battery fault or communication advisory has occurred with the GPS UE. When asterisks border the status, this indicates that a fault has occurred that has not been acknowledged yet.
	ADVS	(Lower Portion) Indicates that a battery fault or communication advisory has occurred with the GPS UE. When asterisks border the status, this indicates that a fault has occurred and it and perhaps previous faults have not been acknowledged.
10	DDL Fault Status Switch	This switch displays the current fault status for the Digital Data Loader (DDL). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current DDL fault status and any unacknowledged faults will be displayed on key 3.
	DDL	(Upper Portion) Static legend to indicate that this is the DDL Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no DDL faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no DDL faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an DDL fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an DDL fault and it and perhaps previous faults have not been acknowledged.
11	PKB Fault Status Switch	This switch displays the current fault status for the Programmable Keyboard (PKB). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current PKB fault status and any unacknowledged faults will be displayed on key 3.
	PKB	(Upper Portion) Static legend to indicate that this is the PKB Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no PKB faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no PKB faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an PKB fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an PKB fault and it and perhaps previous faults have not been acknowledged.

Figure 1A-31 (Sheet 48 of 50)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
12	CRYPTO Fault Status Switch	This switch displays the current fault status for CRYPTO. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current CRYPTO fault status and any unacknowledged faults will be displayed on key 3.
	CRYPTO	(Upper Portion) Static legend to indicate that this is the CRYPTO Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no CRYPTO faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no CRYPTO faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an CRYPTO fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an CRYPTO fault and it and perhaps previous faults have not been acknowledged.
13	SAU Fault Status Switch	This switch displays the current fault status for the Splitter Amplifier Unit (SAU). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current SAU fault status and any unacknowledged faults will be displayed on key 3.
	SAU	(Upper Portion) Static legend to indicate that this is the SAU Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SAU faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SAU faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SAU fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SAU fault and it and perhaps previous faults have not been acknowledged.
14	SDC Fault Status Switch	This switch displays the current fault status for the Signal Data Converter (SDC). If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current SDC fault status and any unacknowledged faults will be displayed on key 3.
	SDC	(Upper Portion) Static legend to indicate that this is the SDC Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SDC faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no SDC faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SDC fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an SDC fault and it and perhaps previous faults have not been acknowledged.
15	TACAN Fault Status Switch	This switch displays the current fault status for the TACAN. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current TACAN fault status and any unacknowledged faults will be displayed on key 3.
	TACAN	(Upper Portion) Static legend to indicate that this is the TACAN Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no TACAN faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no TACAN faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an TACAN fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an TACAN fault and it and perhaps previous faults have not been acknowledged.

Figure 1A-31 (Sheet 49 of 50)

Programmable Keyboard (Cont)

TEST MODE DISPLAY PAGE (TYPICAL) (Cont)

KEY	CONTROL-INDICATOR	FUNCTION
16	HSI Fault Status Switch	This switch displays the current fault status for the HSI. If asterisks are displayed on the status, then a fault has occurred that the operator has not acknowledged. The faults are acknowledged by pressing the switch. When pressed, the switch will display the current HSI fault status and any unacknowledged faults will be displayed on key 3.
	HSI	(Upper Portion) Static legend to indicate that this is the HSI Fault Status switch.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no HSI faults.
	PASS	(Lower Portion) Displayed when the fault status indicates that there are no HSI faults, however, a fault occurred that has not been acknowledged.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an HSI fault.
	FAIL	(Lower Portion) Displayed when the fault status indicates that there is an HSI fault and it and perhaps previous faults have not been acknowledged.
17	MENU Switch	The MENU switch is used to access the Menu page.
18	CPIN/RELOAD IUS Switch	In the Operational Mode, this switch is used to display up to the last three digits of the Computer Program Identification Number (CPIN). In the Test Mode this switch is used during the IUS reload process. Pressing this switch while RELOAD IUS is displayed will cause a confirmation of RELOAD NO? to be displayed on this key and RELOAD YES? to be displayed on key 19. Pressing this switch, while RELOAD NO? is displayed, will cancel the IUS reload process. This switch will have no response at any other time.
	nnn	Display of the CPIN version number. Displayed only in the Operational Mode.
	RELOAD IUS	Displayed only while in Test Mode. Pressing this switch will cause the prompt RELOAD YES? on key 19 and RELOAD NO? on key 18 for confirmation on reloading the IUS.
	RELOAD NO?	In Test Mode, this is displayed when the operator has pressed RELOAD IUS. Pressing will cancel the IUS reload process.
19	IUS Version Number/ RELOAD YES? Switch	In the Operational Mode, this switch is used to display the IUS version number. In the Test Mode this switch is used during the IUS reload process. Pressing this switch while RELOAD YES? is displayed will cause the IUS to be reloaded.
	nnn	Display of the IUS version number. Displayed only in the Operational Mode.
	RELOAD YES?	In Test Mode, this is displayed when the operator has pressed RELOAD IUS (key 18). Pressing RELOAD YES? will begin the process of reloading the IUS.
20	OPER MODE/ TEST MODE Switch	This switch is used to toggle between the IU Test and Operational Modes. The switch displays the active mode. The Operation Mode can be selected at any time, but the Test Mode can only be selected when the aircraft is on the ground and the True Air Speed is less that 102 knots and the Ground Speed is less than 100 knots. During takeoff, if the IU is in Test Mode when the aircraft leaves the ground, the IU will automatically reset to Operational Mode, but any IBIT in progress will run to completion. The mode will always return to Operational Mode when the Test Mode Display page is exited.
	OPER MODE	Indicates that the IUS is in Operational Mode.
	TEST MODE	Indicates that the IUS is in Test Mode.

Figure 1A-31 (Sheet 50 of 50)

NORMAL OPERATION

After GPS power-on and a subsequent 30 to 45 second power-on test, GPS will enter the initialization mode. The navigation software, with valid data, will place GPS into the navigation mode. Manual initialization data provides starting navigation parameters for GPS and comes from the operator and/or sensor data. The IU, after receiving valid initialization data from the flight computer program (FCP) DDLC, or PKB, will command GPS to NAV mode. Once GPS has acquired the satellites and set valid status, GPS DATA will appear on the CF-61 display. GPS status on the CF-61 display will continue to show reverse highlighted GPS DATA until valid GPS data becomes available.

Crypto Keys obtained from the PKB or Crypto Fill Port may be entered at any time. Crypto Keys entered via the PKB or Crypto Fill Port will overwrite any keys previously sent to the GPS receiver. However, Crypto Keys retrieved from the DTUC will not overwrite any keys entered through the PKB or Crypto Fill Port.

PROGRAMMABLE KEYBOARD (PKB) OPERATION

The PKB (figure 1A-31) displays stored IU data and also allows operator input. Operator data entry is accomplished by pressing the appropriate keys. The keyboard may be used for a variety of system tests, to enter GPS initialization data, select GPS DATA display, select Channel Summary display, or enter crypto information.

Power Turn-On Procedures

The GPS is turned on as follows:

1. Follow OAS/INS turn-on procedures.

2. Turn on the GPS and IU power by pressing the IU power pushbutton switch on the IUCP. GPS is fully operational when the GPS DATA block (normal or bright video) appears on the CF-61 display (figure 1-8).

Power Turn-Off Procedures

The GPS is shut down as follows:

1. Press the GPS ZEROIZE pushbutton to zeroize GPS crypto data. When NO KEY is displayed on the PKB, the data has been zeroized.

2. Turn off GPS and IU on the IUCP by pressing the pushbutton IU power switch.

3. Follow OAS/INS shutdown procedures.

PKB CONTROLLED CAPABILITIES

Verifying Proper Operation of the PKB

There are several tests which may be performed on the PKB to verify that it is operating properly. These tests are implemented using three different pages on the PKB. These pages include:

a. The Self Test Page
b. The Lamp Test Page
c. The Switch Test Page

The Self Test page allows the operator to perform a PKB self test by pressing the AUTO TEST switch. The PKB will then perform a BIT on its CPU, ROM, RAM, and display hardware. In addition to the self test, the operator can press the COMM TEST switch to verify proper communication between the IU and the PKB.

NOTE

> If AUTO TEST is pressed while a database download is in progress (before MENU is displayed) it may be necessary to press COMM TEST to continue the download after the Auto Test completes. This will be necessary only if the Auto Test exceeds 9 seconds in length.

The Lamp Test page allows the operator to perform a test on all of the pixels that are used to light the switches on the PKB.

The Switch Test page allows the operator to perform a test on all of the switches on the PKB to ensure that they are responding properly.

Verifying Proper Operation of Other Line Replaceable Units (LRU)

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch. This will display the Test Mode Display page.

c. Each LRU monitored by the IUS will be displayed on the Test Mode Display page with either a PASS, ADVS, or FAIL indication.

Status for the following LRUs is provided on the Test Mode Display page on the PKB:

(1.) IU
(2.) AGWCP
(3.) PKB
(4.) SAU
(5.) SDC
(6.) GPS UE
(7.) DDL
(8.) IHC (ITH)
(9.) Crypto Fill Port
(10.) TACAN Control Panel
(11.) HSI

Initiating Built in Tests

An operator initiated BIT may only be performed when the PKB is in Test Mode. The PKB may only be set into Test Mode if True Air Speed is less than 102 knots and Ground Speed is less than 100 knots.

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press ENTER. This will display the Test Mode Display page.

c. Press the OPER MODE switch to toggle the PKB into test mode. TEST MODE will be displayed on key 20 when in test mode.

d. Press the status switch with the name of the desired LRU. If an operator initiated BIT is allowed, INIT BIT will appear on key 4. The LRU name will also be displayed on key 1. Operator initiated BIT may be performed on the following LRUs:

  (1.) AGWCP
  (2.) GPS UE
  (3.) DDL
  (4.) SDC

e. Press INIT BIT to begin BIT for the LRU displayed on key 1. A WAIT.. indication will be displayed while the BIT is in progress.

f. When the WAIT.. indication disappears, the result of the BIT will be displayed on keys 2 & 3 of the PKB.

Multiple BIT may be run sequentially, but no more than one BIT may be run on the same LRU at any time.

Acknowledging Faults with the PKB

When a fault has been detected in the system by the IUS, the MENU legend on the PKB will change to *****MENU*****. This is an indication that a fault has occurred that has not been acknowledged. To acknowledge the fault, accomplish the following steps:

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. The LRU that faulted will be displayed with asterisks beside its status. (e.g. *PASS* or *FAIL*).

d. Press the status switch of the faulted LRU. The cause of the fault, LRU FAIL or COMM FAIL will be displayed on keys 2 and 3. The asterisks will then be removed.

If a fault is detected several times before it is acknowledged, the LRU will only need to be acknowledged once. Once a fault has been acknowledged, pressing the current fault status switch for the LRU again will display current fault status on keys 2 and 3. A new fault detection will cause the asterisks to be redisplayed.

Determining the CPIN

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. Up to the last three digits of the CPIN are displayed on key 18.

Determining the IUS Version

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. The last three digits of the IUS Version Number are displayed on key 19.

Reloading the IUS from the PKB

The IUS may be reloaded only if True Air Speed is less than 102 knots and Ground Speed is less than 100 knots.

a. From the Main Menu page, press the PME STATUS switch.

b. With PME STATUS blinking, press the ENTER switch on the Main Menu page. This will display the Test Mode Display page.

c. Press the OPER MODE switch to toggle the PKB into test mode. TEST MODE will be displayed on key 20 when in test mode.

d. Press RELOAD IUS.

e. Press RELOAD YES?.

Setting Mission Duration

Mission Duration is displayed on the Crypto Key View All page. The Mission Duration may have a value between 1 and 14 days.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch. This will display the Crypto Key View All page.

c. Press the Mission Duration switch (switch 18) to display the Crypto Key Data Entry page.

d. MSN LENGTH is displayed on key 1 when the Mission Duration is being entered through the Crypto Key Data Entry page. The value is displayed on key 3.

e. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value.

f. Press ENTER when the correct initial value has been entered.

g. When the Mission Duration has been entered, press VIEW ALL to display the Crypto Key View All page.

h. Press SEND DATA on the Crypto Key View All page to send the Mission Duration to the GPS receiver.

NOTE

Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

Providing INS Feedback Aiding

Feedback aiding of INS data to the GPS receiver can be enabled on the Main Menu page using the aiding ON/OFF switch.

a. From the Main Menu page, press the AIDING ON/OFF (switch 19).

b. With AIDING ON/OFF blinking, press the ENTER switch on the Main Menu page. This will toggle the aiding state.

Applying Power to the WBL559 Stations

a. From the Main Menu page, press the desired 559 switch (switch 11 or 12).

b. With the desired 559 legend blinking, press the ENTER switch on the Main Menu page. This will toggle the power state of the selected 559 station.

When power application has been inhibited, the keys will become underlined as an indication that the 559 power state cannot be modified and provides current status only. The power inhibit is controlled by the IUSO.

Initializing Position, Velocity, and Time

a. From the Main Menu page, press the INIT MODE switch.

b. With INIT MODE blinking, press the ENTER switch on the Main Menu page. This will display the GPS Initialization page.

c. The item being initialized will be displayed on key 1. The following items may be initialized through the GPS Initialization page:

(1.) Latitude
(2.) Longitude
(3.) Altitude (In feet x10 above mean sea level)
(4.) Date
(5.) Time
(6.) Ground Speed (In knots)
(7.) Ground Track Angle (In degrees)

d. Press the up/down arrows or ENTER to move through the list of data entry fields. The current initialization value for the each initialization item will be displayed on keys 2 through 4.

e. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value. Values requiring the selection of the SHIFT switch are displayed in the upper left hand corner of the numerical legends.

f. Press ENTER when the correct initial value has been entered.

g. When all initial values have been entered, use the up/down arrows or ENTER to scroll through the list of data entry fields until SEND DATA is displayed on key 1.

h. Press SEND DATA to send the initialization data to the GPS receiver.

The GPS receiver will re-initialize with the entered data when the SEND DATA switch is pressed. Out of range values are indicated by the presence of an outline. Out of range values are not sent to the GPS receiver and instead are replaced by the last valid value entered.

Viewing Current GPS Data

a. From the Main Menu page, press the GPS DATA switch.

b. With GPS DATA blinking, press the ENTER switch on the Main Menu page. This will display the GPS Data Display page.

The following items are displayed on the GPS Data Display page:

(1.) Latitude and Longitude.

(2.) Altitude above MSL in feet (scaled by a factor of ten) and Velocity in knots.

(3.) Ground Track Angle.

(4.) Estimated Horizontal Error (EHE) and Estimated Vertical Error (EVE) in feet.

(5.) Figure of Merit (FOM).

Evaluating GPS Performance

The Strike page provides one location to evaluate the GPS.

a. From the Main Menu page, press the GPS DATA switch.

b. With GPS DATA blinking, press the ENTER switch on the Main Menu page. This will display the GPS Data Display page

c. Press the STRIKE switch to display the Strike page.

The Strike page displays:

a. Lat/Long and Altitude

b. GPS – INS difference for position, velocity and altitude

c. Indicates when position, velocity or altitude values are out of limits

d. Prime INS when an INS is the Primary Navigation Source

e. GPS – Barometric altitude difference

f. FOM

g. EHE/EVE

h. Indicates when Channel Summary CN or JS values are out of limits

i. Fault indications

The GPS Strike Limits page can be displayed by pressing LIMITS on the GPS Strike page. The GPS Strike Limits page is used to display the out of range limits for:

a. Delta Position

b. Delta Velocity

c. Delta Altitude

d. Carrier to noise ratio

e. Jamming signal

Viewing Satellite Tracking Status

The tracking status of all five channels may be observed on the Channel Summary page.

a. From the Main Menu page, press the CHAN SMRY switch.

b. With CHAN SMRY blinking, press the ENTER switch. This will display the Channel Summary page. This page displays the following data for each channel:

(1.) Satellite Vehicle ID

(2.) Frequency (L1 or L2)

(3.) Code (P or CA)

(4.) Carrier to Noise Ratio (In dB)

(5.) Jamming to Signal Ratio (In dB)

(6.) Tracking State

Fault indications for each channel are displayed under the Tracking State. When a fault occurs the rest of the data for that channel will be blanked out.

Reloading the Mission from the PKB

A mission must be loaded into the FMS before any mission may be loaded into the IU. Generally, the mission will not have to be reloaded from the PKB as the mission is automatically loaded at IU power up and when mission number changes are detected. Reloading the mission from the PKB will cause the mission data to be read from both the DTUC and the DDLC and will also reload the Navaid database from the DDLC.

NOTE

Reloading the mission from the PKB will discard any modifications made to the mission through FRMT-10 using FMS. This will only discard modifications that are stored in the IU. This will not cause mission modifications stored in FMS to be discarded.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch. This will display the Mission Data Display page.

c. Press RELOAD MSN.

d. Press RELOAD YES?.

Generally, the mission will only need to be reloaded from the PKB when there is a communication failure that prevents the IU from reading in the mission data, or when a mission having the same mission number as the mission currently loaded in FMS needs to be read from the DTUC.

NOTE

> Reloading the mission from the PKB only reloads the mission data into the IU, it does not cause FMS to reload the mission.

Modifying Destinations when a Mission is not Loaded

FMS allows a destination to be defined/modified, without loading a mission, using FRMT-10. However, the IUS does not allow a destination to be defined without loading a mission into the IU. If a valid mission is not resident in the IU at the time of the destination modification, the IUS will not detect the modification and thus will not validate the destination's new Lat/Long.

Modifying Destinations not in the Original Flight Plan

Some missions may not utilize every available destination (e.g. only 50 of the 99 destinations may be used). The IUS treats these unused destinations as invalid and therefore does not display any information about them. However, it is possible to validate these destinations by modifying the destination's Lat/Long using FRMT-10 of the FMS. Once modified, the new destination can have a Navaid assigned to it using the PKB, but it will not be connected to any other destination in the route.

Viewing Destinations in the Current Mission from the PKB

Destinations and their associated Navaids can be viewed on the Mission Data Display page of the PKB.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch. This will display the Mission Data Display page.

The current destination is designated by underlining DEST on key 1. The operator may scroll through the list of destinations in numerical order by pressing the NEXT DEST and PREV DEST switches. If the operator reaches the end of the list, continued scrolling will wrap around to the beginning of the list and vice versa. The operator may also go directly to the Current Destination by pressing the CURR DEST switch.

The data displayed for each destination on the Mission Data Display page is:

a. Destination Latitude

b. Destination Longitude

c. Mission Number

d. Navaid Assignment (If a Navaid is assigned)

  (1.) Navaid ICAO Identifier

  (2.) Navaid Channel

  (3.) Navaid Usage Code

  (4.) Navaid Range

  (5.) Navaid Bearing (From the Navaid to the Destination)

Changing Navaid Assignments for Destinations

The operator may change the Navaid assignment for a destination using the Navaid Assignment page.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch. This will display the Mission Data Display page.

c. The mission must be loaded before mission data can be displayed or a Navaid Assignment can be made. Using the PREV DEST and NEXT DEST switches, move through the destinations in the mission until the desired destination number is displayed on key 2.

d. Press NAVAID (switch 9) to display the Navaid Assignment page. The destination for Navaid Assignment will now appear on switch 1 of the Navaid Assignment page any currently assigned Navaid will appear on keys 2–4.

e. When the Navaid Assignment page is first displayed, the Navaid database is searched for all Navaids within 200 NM of the destination's Lat/Long. The Navaids are displayed in increasing range from the destination. Navaids are also filtered by usage code. Select the appropriate usage code filter using switch 18. Following is a list of the available filters:

  (1.) LOW – includes Navaids with usage codes of Low, RNAV, and High/Low.

  (2.) HIGH – includes Navaids with usage codes of High, RNAV, and High/Low.

  (3.) TERM – includes Navaids with usage codes of Terminal.

f. If more than three Navaids are within 200 NM of the destination, up and/or down arrows will appear on switches 9 and 13. Use the up and down arrows to scroll through the list of Navaids until the Navaid for assignment is displayed.

g. Each Navaid is displayed in a row of three switches. Press any of the three switches displaying the desired Navaid data until the entire row is blinking.

h. Press ENTER.

The operator may also remove any assignment by pressing the CLEAR NAV switch in step g. instead of a Navaid in the list. If the up arrow is not shown, then the operator is at the top of the Navaid list. If the down arrow is not shown, then the operator is at the bottom of the list. A Fly-To-Crosshair destination cannot have a Navaid assigned to it.

NOTE

> The operator may not change the displayed destination from the Navaid Assignment page. The operator must return to the Mission Data Display page to select a destination for assignment modification.

Viewing and Changing Bullseye Data

The Bullseye View All page is used to view up to two bullseyes.

a. From the Main Menu page, press the MSN DATA switch.

b. With MSN DATA blinking, press the ENTER switch. This will display the Mission Data Display page.

c. Press the BE DATA switch to display the Bullseye View All page.

The Bullseye Data page is used to display bullseye data, as well as selecting the active bullseye used on the pilot/copilot's moving map display.

The Bullseye Data Entry page is displayed by pressing either the BE 1 or BE 2 switch on the Bullseye Data page. The data entry page is used to set the latitude and longitude for the selected bullseye.

CRYPTO KEYS

Crypto Keys may be entered three different ways, through the Crypto Fill Port, the DTUC, and the PKB. Keys will only be accepted after the date has been initialized. The date may be initialized either from initialization data entered on the PKB or from the FMS prime initialization data.

NOTE

> Crypto Key data will not be sent to the GPS receiver until the date has been initialized. This is because the date is required to determine the correct set of keys to use. When initializing from FMS using prime initialization data, a Fly-To must be performed before in order for the initialization data to be sent to the IU.

Crypto Keys will be retrieved from the mission DTUC when available and when Crypto Key data has not been entered from the PKB or Crypto Fill Port. Crypto Key data retrieved from the DTUC is not maintained and is therefore not recallable once the operator has modified the Crypto Key data. If the mission DTUC is not installed, then the IUS will retry acquisition of Crypto Key data from the DTUC every two minutes until the DTUC (with Crypto Key data present) is installed or until keys are obtained from the PKB or the Crypto Fill Port.

Crypto Keys obtained from the PKB or Crypto Fill Port may be entered at any time. Crypto Keys entered via the PKB or Crypto Fill Port will overwrite any keys previously sent to the GPS receiver. However, Crypto Keys retrieved from the DTUC will not overwrite any keys entered through the PKB or Crypto Fill Port.

Entering Crypto Keys through the PKB

Crypto Keys are entered through the Crypto Key Data Entry page. Each key is made up of eight components which the operator may edit one at time. Each component may have a value between 0 and 65535.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch on the Main Menu page. This will display the Crypto Key View All page.

c. Press any of the displayed Crypto Key components switches (1–16) to display the Crypto Key Data Entry page.

d. The item being initialized is displayed in keys 1 and 2. The initial value is displayed on key 3.

e. Press the up/down arrows or ENTER to move through the list of data entry fields.

f. A cursor is displayed under the character in the data entry field that is being initialized. Use the numerical switches on the page to enter the initial value.

g. Press ENTER when the correct initial value has been entered.

h. When all initial values have been entered, press VIEW ALL to display the Crypto Key View All page.

i. Make sure that all Crypto Key fill devices are disconnected from the Crypto Fill Port.

j. Press SEND DATA on the Crypto Key View All page to send the Crypto Key data to the GPS receiver.

k. Parity status for each non-zero Crypto Key will be displayed on key 19 of the Crypto Key View All page after a 15 to 20 second delay for transmission.

NOTE

Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

If the Crypto Keys fail to pass parity, the operator will need to exit the page, display the Crypto Key View All page again and resend the keys by pressing SEND DATA again.

NOTE

A Crypto Fill Port device cannot be connected to the Crypto Fill Port when sending PKB entered Crypto Keys or else the last keys entered through the Crypto Fill Port will be sent to the receiver instead of the PKB entered keys.

Entering Crypto Keys through the Crypto Fill Port

The Crypto Key View All page must be displayed to enter Crypto Keys via the Crypto Fill Port. A KYK-13 or CYZ-10 using a KYK-13 protocol may be used to enter Crypto Keys through the Crypto Fill Port. Keys entered via the Crypto Fill Port will not be displayed on the PKB.

a. From the Main Menu page, press the CRYPTO KEY switch.

b. With CRYPTO KEY blinking, press the ENTER switch on the Main Menu page. This will display the Crypto Key View All page.

c. Connect either a KYK-13 or a CYZ-10 using a KYK-13 protocol to the Crypto Fill Port.

d. Apply power to the Crypto Fill device. Upon applying power to the fill device, CRYPTO FILL will appear on key 19.

e. Select the desired key on the Crypto Fill device for entry into the IU. Refer to the KYK-13 or CYZ-10 user manual for instruction on selecting the key for entry.

f. Press CRYPTO FILL. This will display LOAD and CRYPTO KEY 1 on switches 19 and 20.

g. Select the location in IU memory to load the Crypto Key info with switch 20. Available locations are CRYPTO KEY 1 and CRYPTO KEY 2. The location displayed on switch 20 designates where the key will be placed. Selecting switch 20 will cycle through each location and then return to the CRYPTO FILL and SEND DATA legends on switches 19 and 20.

h. With the desired IU memory location displayed on switch 20, press LOAD. This will transfer data from the fill device connected to the Crypto Fill Port to IU memory. Any previous Crypto Key at the location displayed on switch 20 will be overwritten.

i. When the data transfer is complete, switches 19 and 20 will return to CRYPTO FILL and SEND DATA.

j. Repeat steps f. through i. for a second Crypto Key if desired.

k. Press SEND DATA on the Crypto Key View All page to send the Crypto Key data to the GPS receiver.

NOTE

Make sure that the Crypto Key fill devices remains powered up and connected to the Crypto Fill Port, while sending data to the GPS receiver. Leaving the fill device in this state allows the IUS to determine which set of Crypto Key data to send to the GPS receiver.

l. Parity status for each non-zero Crypto Key will be displayed on legend 19 of the Crypto Key View All page after a 15 to 20 second delay for transmission.

NOTE

Crypto Keys and Mission Duration are sent to the GPS receiver at the same time.

There are two locations in IU memory that are reserved for holding Crypto Keys entered via the Crypto Fill Port. Any Crypto Fill Port communication failures will be displayed on the Test Mode Display page. Any existing key in the chosen location will be overwritten.

NOTE

Sending Crypto Keys from the Crypto Fill Port will zeroize any keys entered via the PKB

Crypto Key Status

The Crypto Key status indicates the presence Crypto Keys in the GPS receiver. The Crypto Key status is provided on three different pages:

a. The Main Menu Page (switch 1)
b. The GPS Data Display Page (switch 18)
c. The Channel Summary Page (switch 18)

On each page, the Crypto Key status will be reported as zeroized or not present, NO KEY, as present and waiting verification, KEY RCVR, or as present and in use, KEY PRESNT.

Zeroizing Crypto Keys

Crypto Variables are zeroized through the IU Power Panel. By pressing the GPS ZEROIZE button, Crypto Keys will be removed from the GPS receiver and the IU. In addition, the Crypto Key status will change to NO KEY.

Overriding Crypto Status to Good

If it has been determined that position estimates are good enough for INS updates, then the operator may override the Crypto Data Status to good by selecting the override ON/OFF switch on the Main Menu page.

a. From the Main Menu page, press the ORIDE ON/OFF (switch 18).

b. With the ORIDE ON/OFF legend blinking, press the ENTER. This will toggle the crypto status override state.

All data on pages 1A-187 thru 1A-232, including figures 1A-32 thru 1A-34 (Deleted)

OAS Weapon Control and Delivery Subsystem

DESCRIPTION

The weapon control and delivery subsystem consists of the aircraft equipment, OAS, and weapon hardware and software required to control, monitor, and deliver gravity weapons and missiles. The subsystem provides for automatic or manual release/launch of the weapons against preselected targets or targets of opportunity. All CSRL functions are performed by OAS. For additional information on gravity nuclear weapons suspension, control and release functions refer to T.O. 1B-52H-25 series manuals. Additional information on nonnuclear gravity weapon suspension, control, and release is contained in T.O. 1B-52H-34-2-1. For additional information on missile suspension, control and launch/release functions refer their respective Aircrew Weapon Delivery Manual.

In automatic mode the OAS generates the release signal. The OAS performs all initialization, targeting, arming, monitoring, and launch functions required for the missiles. The OAS navigation subsystem provides steering to the selected release or missile launch point. In addition, the OAS monitors aircraft TAS, pitch and roll, and aircraft altitude and advises the operator through the current event program if any of these parameters are unsafe for missile launch.

BOMBING

In the bomb mode the avionics processor solves the bombing problem to determine the correct heading and proper time for bomb release. During this time, the navigation portion of OAS continues to compute the aircraft present position. Solution of the bombing problem starts with values of range to the target which have been determined from modified aircraft latitude and longitude based on target position. The processor combines this information with programmed ballistics data, altitude, desired height of burst, aircraft absolute altitude and aircraft ground velocities to determine steering commands and time-to-go to the release point (figure 1A-35). The OAS is capable of accomplishing the bomb run without operator inputs. Based on the present position in the OAS, the crosshair will be automatically positioned on the target or an offset aimpoint for the target when the system sequences, or is sequenced to the target. Using this crosshair position information, the OAS then generates steering commands and time-to-go to the release point if no operator inputs are made. At the release point, the OAS generates a release signal and will drop a weapon if the release mechanisms in the aircraft have been properly configured. The operator may refine the actual target position by using the track ball on the keyboard. Synchronous bomb release is based on the final crosshair position. Operator corrections to OAS crosshair placement are normally desired for precision bombing. The crosshair may be allowed to track the target direct or an offset aimpoint. Steering calculations to the release point however, are made as if the crosshair was tracking the target directly.

NOTE

Accurate OAS system altitude is critical for the bombing solution. Inaccurate altitude calibrations will result in weapons impacting long or short of the target. Additionally, altitude errors impact the sighting solution and cause positional errors. For low altitude bombing, LAC errors which place the system altitude below target elevation when the aircraft reaches BRL will cause the OAS to revert to a preset height above target (100 ft for conventional and 200 ft for nuclear) and an automatic release will occur.

Steering

OAS steering is designed for both general navigation and bomb delivery. In the bomb steering mode, heading calculations are adjusted for the weapon's ballistics (downrange and crossrange) so the aircraft is steered to a release point rather than the target (impact point). Once released, the weapon travels ballistically downrange and crossrange, to a point at or above the target. Both the direct and centerline recovery modes of steering are available in the bomb mode of operation. In direct steering, the OAS generates steering commands based on a continually updated track established between the aircraft present position and the release point. FCI deflections in direct steering represent only differences between the direct route to the release point and aircraft heading (track angle error). In the centerline recovery steering mode, the OAS establishes a fixed ground track between the destination immediately prior to the target and the release point. FCI deflections in this steering mode represent both track angle error and aircraft crosstrack position error. In centerline recovery steering, the OAS will first steer the aircraft back to the fixed track and then to the release point once the crosstrack position error is nullified. Because this mode of steering could require large steering (and as a result large bank angle) corrections near the release point, if the aircraft is off track, the OAS automatically changes its steering mode when it reaches a point 6000 feet from the release point. This mode change occurs in both direct and centerline recovery steering. At the point the OAS intercepts 6000 feet to release, a new release track is established between the intercept point and the release point. Based on this new track, the OAS then generates centerline recovery steering commands to the release point regardless of the steering mode selected. When the specific track from the point prior to the target (normally the IP) through release is desired, centerline recovery (CF-73) should be commanded at the IP. Turn short is not available in either bomb steering mode.

Timing

In bomb mode, the OAS Gravity Weapons Computer Program calculates the weapon impact point four times every second. This impact point is determined using the current navigation data and weapons ballistics data to calculate the weapon's time of fall, downrange, and crossrange values after release. Weapon downrange and crossrange are subtracted from the aircraft range to the target, establishing a weapon release point. The range between the aircraft and the release point is the downrange miss distance or distance to go to release. Downrange miss distance is divided by aircraft groundspeed to determine time-to-go to release (TTG).

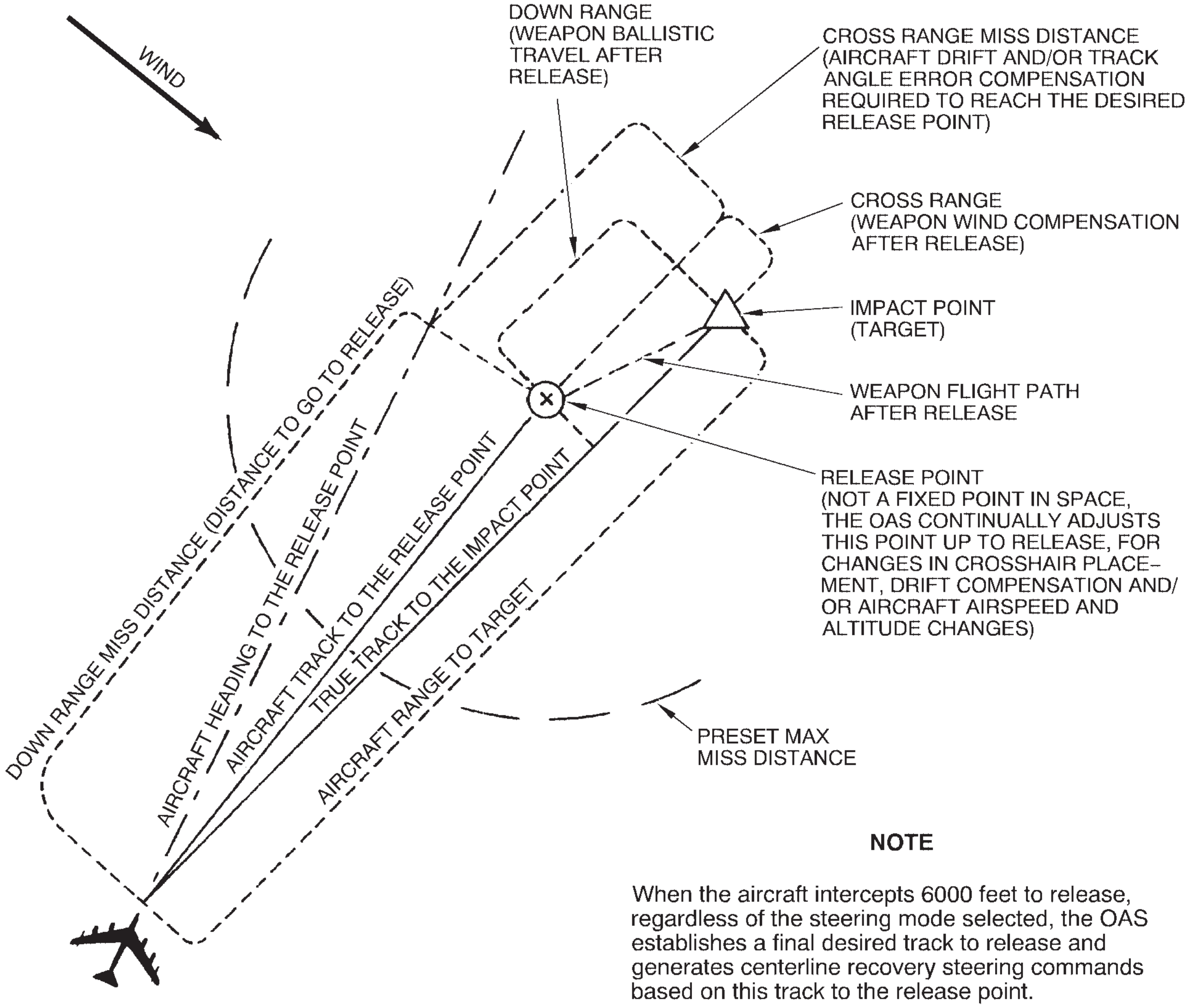
The weapon's downrange value representing the weapon's downrange travel after release will vary as aircraft airspeed and altitude change approaching the target. The weapon's crossrange value represents the weapon's lateral movement after release due to wind drift.

The crossrange miss distance represents the lateral displacement the aircraft would attain at any given point during the bomb run if aircraft heading and groundspeed were held constant for the amount of time remaining on TTG while aircraft drift, based on the current wind, was removed from the DR equation. Assuming the FCI is kept centered, as the aircraft moves downtrack toward the release point, crossrange miss distance becomes proportionately smaller as TTG decreases, with both values reaching zero at the release point. In the situation where the FCI is not centered (direct steering) or not centered with the aircraft on desired track (centerline recovery), a crossrange miss distance due to track angle error, independent of drift compensation, is generated. If the track angle error is not rectified (FCI centered) prior to release, the magnitude of the error will be reflected in a crossrange miss distance greater than zero and result in a release weapon impacting left or right of the desired impact point.

When TTG is equal to or less than 180 milliseconds (ms) and the aggregate value (resultant vector) of downrange miss distance and crossrange miss distance is less than the preset maximum miss distance, the OAS will send a release signal.

In the situation where TTG never reaches 180 ms inbound to the release point (i.e., FCI not centered), the OAS will sense when TTG stops decreasing. Since the TTG will not remain static, at the instant the OAS detects an increase in TTG, the max miss distance is checked and, if the miss distance parameter is met, the OAS sends a release signal.

Bomb Problem Solution



NOTE

When the aircraft intercepts 6000 feet to release, regardless of the steering mode selected, the OAS establishes a final desired track to release and generates centerline recovery steering commands based on this track to the release point.

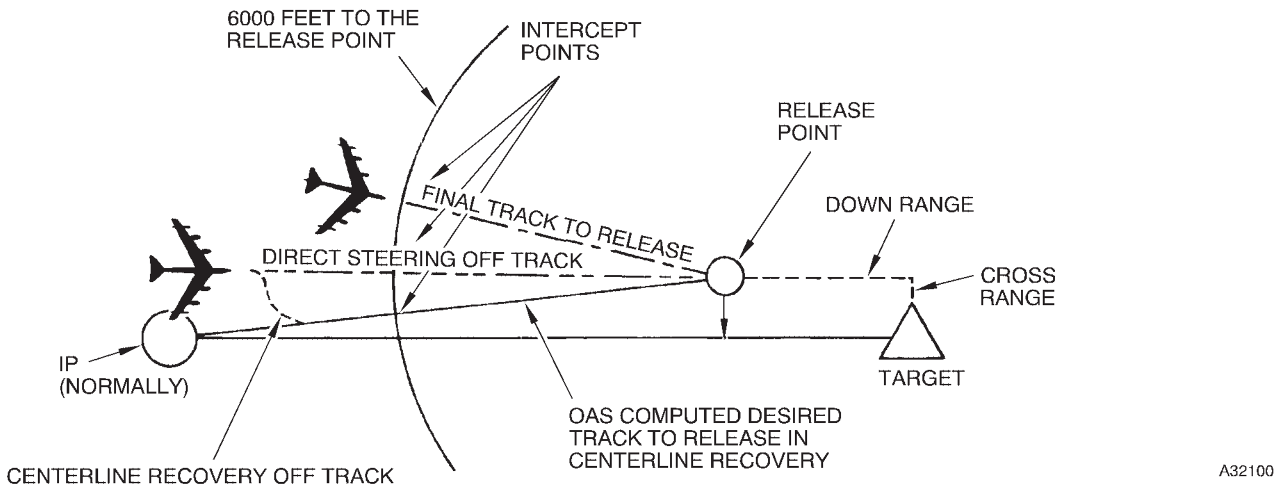


Figure 1A-35

Bomb Inhibit

The bomb inhibit switch is used to prevent automatic bomb release. Bomb inhibit must be selected prior to 1 second to go (TTG) to inhibit the OAS from sending a release command. When selected, the bomb inhibit light comes on and remains on until after TTG = 0 or bomb inhibit is deselected. Bomb inhibit can be deselected at any time up to TTG = 1. The OAS will remain in bomb mode regardless of the bomb inhibit selection. The bomb inhibit switch does not alter any OAS function except that the bomb release command is not formatted and the bomb doors will not open.

WARNING

If a bomb run is aborted select bomb inhibit and ensure bombing system switch is MANUAL. If the doors did open, they must be closed manually after selecting bomb inhibit or after the OAS has sequenced to the next destination.

NOTE

- When bomb inhibit is active, the message BOMB INHIBIT ACTIVATED will be displayed in reverse highlight on all four MFDs for 10 seconds. The message will overwrite all other messages on the line and erase all OAS advisory messages. The blinking B/I message on the PRGM display is not affected. When bomb inhibit is deselected, the OAS will not automatically display any information that was erased. In order to display any information that was previously erased, the event that caused the information to be displayed must reoccur.

- When an RIU malfunction is detected and during OAS reconfiguration, OAS enters bomb inhibit and remains in bomb inhibit. Bomb inhibit must be exited manually.

PRGM B +

PRGM B+ allows the radar crosshair position or, with the GWD SMO loaded, TGP crosshair position to become a target. The system will use TGP or radar cross hairs, as determined by the operator, using CF-536, see T.O. 1B-52H-34-2-1. When PGRM B+ is selected, BXX TGT will be displayed as the next or selected destination and the radar crosshair or TGP crosshair position becomes the target coordinates. The OAS enters BOMB mode, selects bomb inhibit, and reverts to manual fixpoint and destination sequencing, Bomb inhibit must be manually deselected to complete a weapon release. The weapon delivery parameters for the next scheduled gravity weapon target are used to support the target under the radar/TGP crosshair. Mission data must be loaded with at least one gravity target to support PRGM B+.

MAXIMUM MISS DISTANCE VALUE

A maximum miss distance value is entered on the mission data tape for each gravity target loaded on the tape. This magnitude of the maximum miss distance depends on the source used to plan and write the mission tape. If using the Mission Data Preparation System (MDPS), the mission planner can specify the maximum miss distance value. However, if the Air Force Mission Support System (AFMSS) Mission Planning System (MPS) is used to write the mission tape, the value is automatically set to 3,000 feet. In order for OAS to command an automatic release, the OAS must sense that the aircraft is within this preset distance to the release point and that time-to-go is less than or equal to 180 milliseconds. If the OAS senses the aircraft position exceeds this maximum miss distance parameter, it will inhibit an automatic release. Keeping the FCI centered during the bomb run will preclude this release inhibit function from becoming a factor for release.

POWER SUPPLY

Power is supplied through circuit breakers on the right forward BNS circuit breaker panel for the bomb system and auxiliary BNS circuit breaker panel for the OAS computers and interface units. For applicable circuit breaker information see Section III or refer to T.O. 1B-52H-1.

DATA FLOW

All control and monitor functions for the AGM-86 and AGM-129 missiles are carried out by the armament interface unit (AIU) and the missile interface unit (MIU) upon receipt of commands from the OAS power control panel, the weapon control panel, the keyboards, and the avionics processors. The automatic functions of gravity weapon delivery are performed by the RIU, AIU, and processors. The actual control and release functions for CSRL loaded gravity weapons carried out in the same manner as for missiles, with the nuclear station logic unit (NUC SLU) performing the same functions for gravity weapons as performed for missiles by the MIU.

For missiles and CSRL gravity weapons, with OAS power on and the FCP loaded, the MIU power switch on the OAS power control panel will command the AIU, thru the data bus, to apply power to the MIU/NUC SLU. After a 40 minute warm uptime, the navigator, using the weapon control panel (WCP) commands the MIU/NUC SLU to turn on power to the selected weapons. The navigator also uses the WCP, through the data bus, to issue commands to the MIU/NUC SLU for prearming functions, ejector unlock enable, pylon unlock consent, launch/release mode, manual launch/release, and selective jettison. The pylon unlock, nuclear lock/unlock, and prearm enable are hardwired switches and do not require computer program software to function. The automatic weapon functions such as environmental control, heater power, bomb door commands , and launcher rotation are controlled by the AIU. The automatic launch/release mode, when selected by the navigator on the WCP is controlled by the avionics processor. The MFDs are used by the operator to monitor navigation, weapon status, and targeting. The keyboards, along with the MFDs can be used to modify weapon targeting and in addition, to perform WCP functions, if necessary.

CONTROLS AND DISPLAYS

Operator commands to the weapons are processed and displayed by the OAS. The control panels used are shown in figure 1A-38. The keyboard is used for entering format, control function, and message commands into the computer. The WCP is used to control all power, alignment, prearming and launch/release commands and is half of the two man requirement for weapon prearming, launch/release, and pylon jettison. The lower half of the OAS power panel is used to command power application to the MIUs/NUC SLU.

Nuclear Gravity Weapon Control and Delivery Displays

The OAS system controls automatic release of gravity nuclear weapons against programmed targets. See figure 1A-40 for typical gravity nuclear weapon displays. FRMT-7 display (figure 1A-39) shows weapon status and inventory for CSRL weapons. Each gravity weapon has its own code as shown in figure 1A-37. These codes are displayed on FRMT-10 and Current Event Program Displays. For detailed functional description, refer to T.O. 1B-52H-25 series for gravity nuclear weapons.

Gravity Weapon Simulation

Gravity weapon simulation is enabled with CF-51 and CF-52. In PART SIM (CF-51) and FULL SIM (CF-52) mode, the bomb doors will open and close automatically. CSRL FULL SIM will simulate operation of the CSRL, NUC-SLU, and up to eight gravity weapons. PART SIM allows rotation of the CSRL and simulates the NUC-SLU and up to eight gravity weapons. If missiles are carried and the OTL/JTA mission word is not present or a strike mission tape is loaded, gravity weapon simulation is not possible. In any simulation mode, the DBRIC light remains off and the BDI/TG = 0 light does not come on.

Missile Control and Delivery Displays

The OAS system controls programming, prearming, and launching of ALCM (AGM-86B), CALCM (AGM-86C/D) and ACM (AGM-129) missiles, see figure 1A-42 for typical ALCM/CALCM displays, and figure 1A-43 for ACM displays. For detailed functional description of the missile controls and displays, refer to the applicable missile’s Aircrew Weapon Delivery Manual. Missile information and targeting data for these missiles is contained within the data transfer unit tapes. The mission tape contains cruise launch point information and route of flight information. A separate tape contains missile programming information. The information is loaded into an avionics processor by the operator for use by the OAS system as needed. FRMT-7 display (figure 1A-39) shows missile location, power and alignment status, and arm status. A total of 20 missiles may be depicted, eight ALCM/CALCMs on the bomb bay mounted CSRL, and 12 ALCM/CALCMs or 12 ACMs external, six on each pylon. Current event program (figure 1A-42 for ALCM, and figure 1A-43 for ACM) contains prime mission data across the top of the MFD with the remainder of the MFD divided into current destination data, critical weapon release data, and selected event or next event data. FRMT-7 and current event displays allow the operator to monitor weapon, navigation, and launch functions.

Typical Nuclear Weapon Data Flow

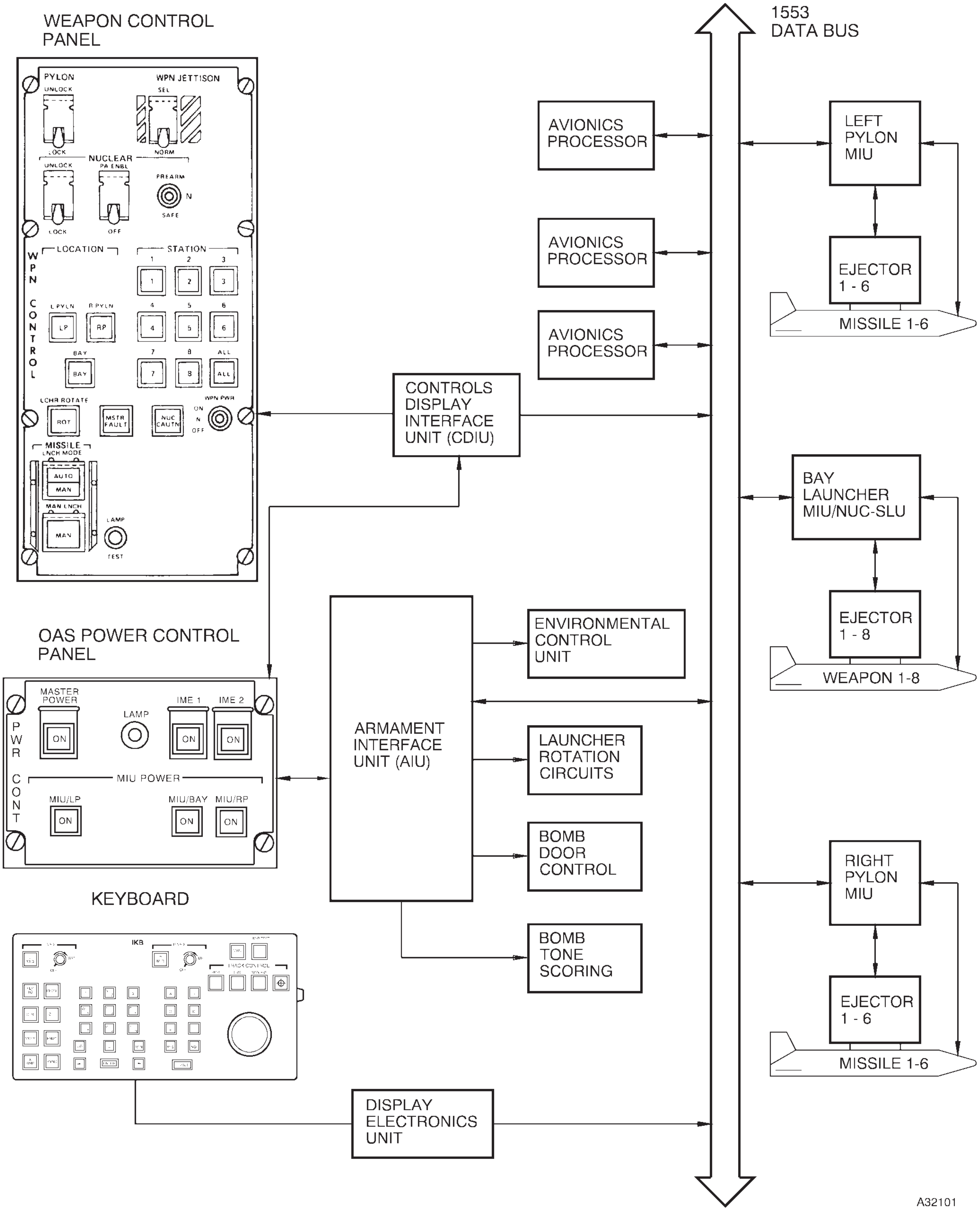


Figure 1A-36

Gravity Weapons PRGM Display Codes

OAS DISPLAY CODE	NONNUCLEAR WEAPONS
B01	MK 82
B02	MK 84
B03	MK 52*
B04	MK 55*
B05	MK 56
B06	MK 60*
B07	M117
B08	MK 82 SE/MK 36*/MK 62
B09	M117R/M117 D/DST (M117)* MK 59*
B10	MK 82 AIR
B11	MK 40*/MK 63 Mod 0 with MAU-91 Fin
B12	MK 20*
B13	CBU-52/B*
B14	CBU-58/B*, CBU-71B*
B15	MC-1*
B16	MK 83*
B17	CBU-87/B
B18	CBU-89
B19	MK 40*/MK 63 Mod 0 With MK-12 Fin
B20	MK 64 *
B21	MK 65
B22	Modifiable Ballistics
B24	GBU-10/B, A/B (MK 84 PAVEWAY I)*
B25	GBU-10C/B, D/B, E/B (MK 84 PAVEWAY II)
B26	GBU-10H/B, J/B (BLU-109 PAVEWAY II)
B27	GBU-12B/B, C/B, D/B (MK 82 PAVEWAY II)
B29	M117 AIR
B30	BDU-48*

OAS DISPLAY CODE	NUCLEAR WEAPONS
B53	B53*
B61	B61
B83	B83/B83-1

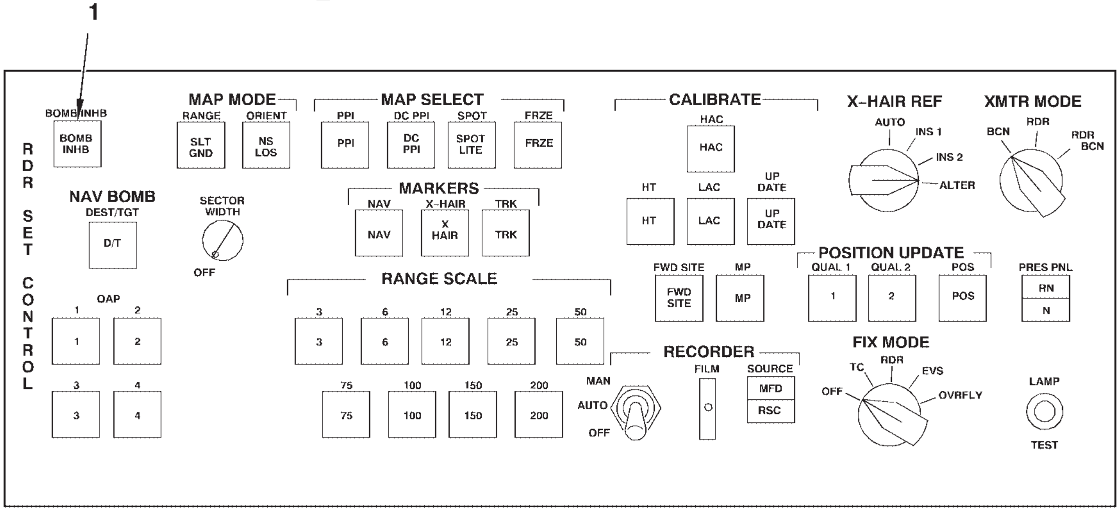
***** These weapons are no longer in the inventory.

NOTE

This table lists weapon ballistics programmed in the FCP only. Refer to T.O. 1B-52H-1 for authorized weapons. For Modifiable Ballistics codes refer to T.O. 1B-52H-34-2-1

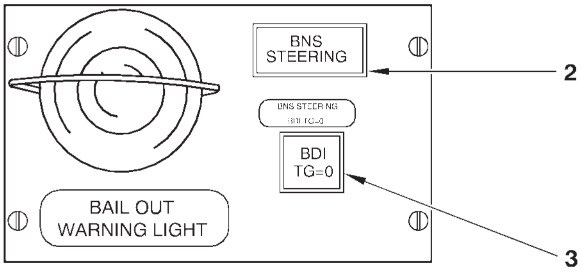
Figure 1A-37

OAS Weapon Controls and Indicators



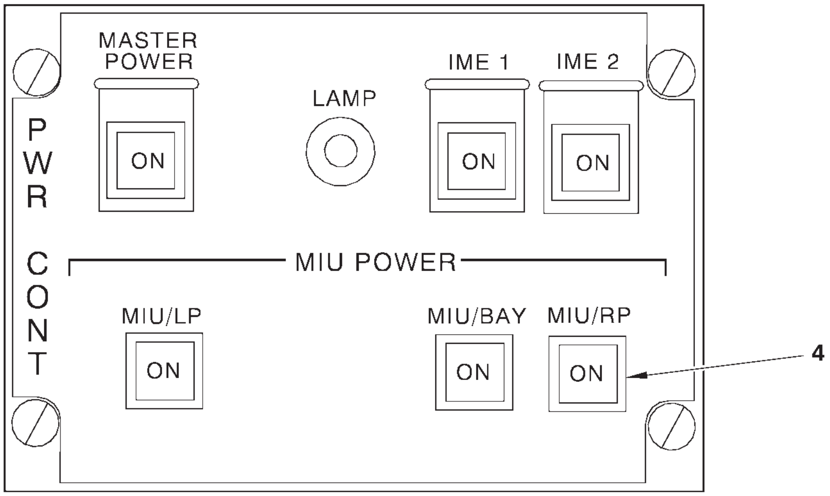
A RADAR NAVIGATOR MANAGEMENT PANEL

A32788



B BNS STEERING PANEL

A32789

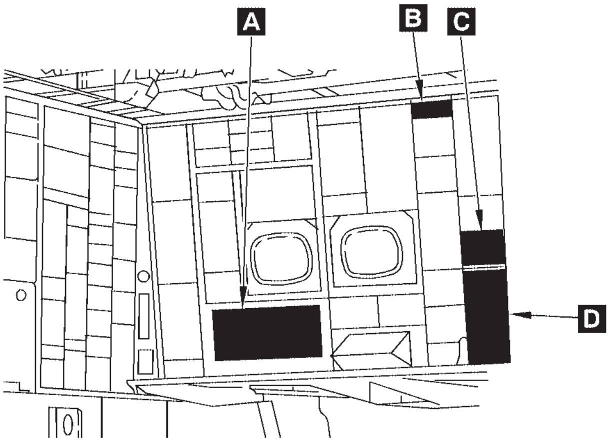


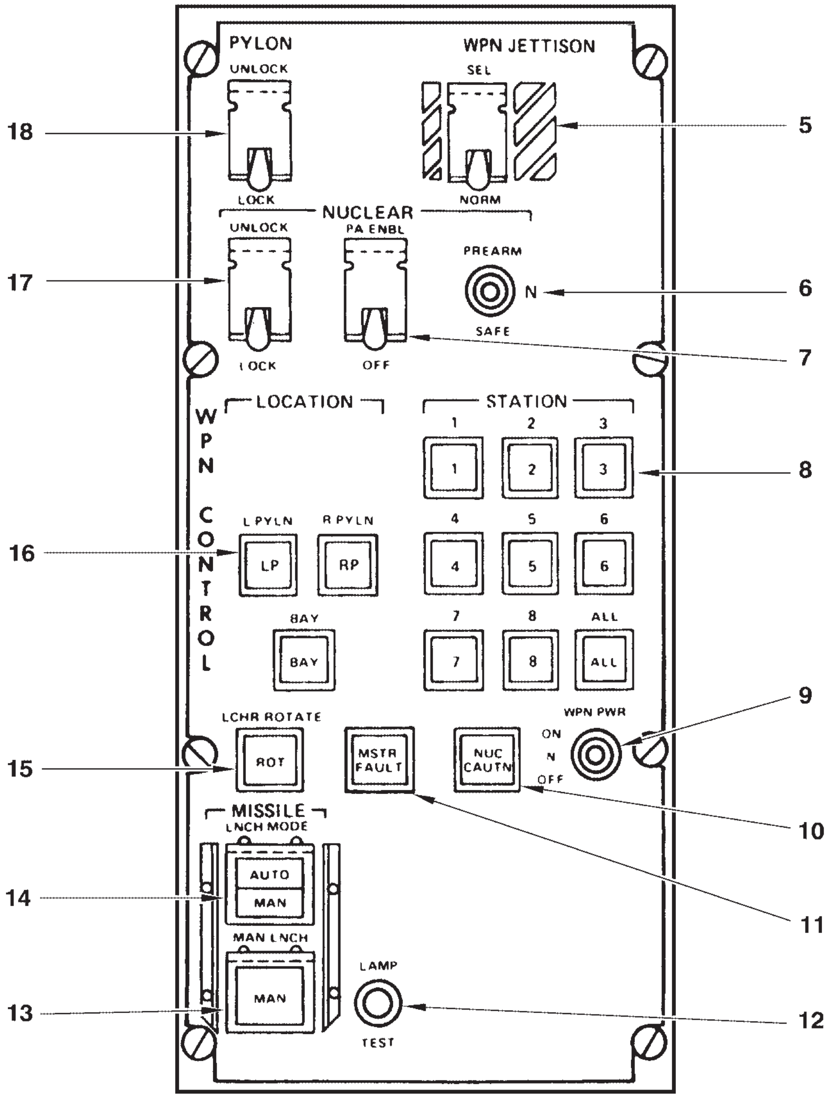
C OAS POWER CONTROL PANEL

A32790

1 BOMB INHIBIT SWITCH
2 BNS STEERING LIGHT
3 BDI TG=0 LIGHT
4 MISSILE INTERFACE UNIT POWER SWITCHES (3)

Figure 1A-38 (Sheet 1 of 4)





5	WEAPON JETTISON SELECT SWITCH
6	NUCLEAR PREARM-SAFE SWITCH
7	NUCLEAR PA ENBL-OFF SWITCH
8	STATION SWITCHES (9)
9	WEAPON POWER SWITCH
10	NUCLEAR CAUTION LIGHT
11	MASTER FAULT LIGHT
12	LAMP TEST SWITCH
13	MISSILE MANUAL LAUNCH SWITCH
14	MISSILE LAUNCH MODE SWITCH
15	LAUNCHER ROTATE SWITCH
16	LOCATION SWITCHES (3)
17	NUCLEAR LOCK-UNLOCK SWITCH
18	PYLON LOCK-UNLOCK SWITCH

D WEAPONS CONTROL PANEL

Figure 1A-38 (Sheet 2 of 4)

OAS Weapon Controls and Indicators

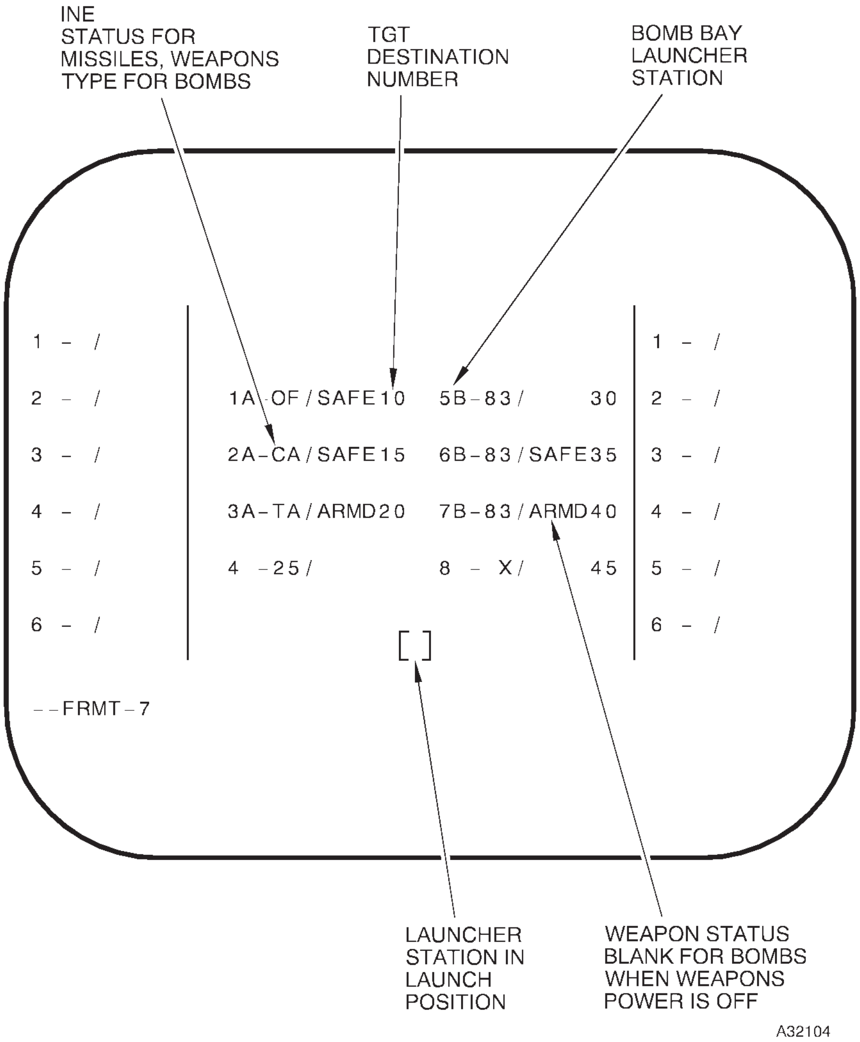
NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR NAVIGATOR MANAGEMENT PANEL	
1	BOMB INHB Switch	Inhibits the release command to the gravity weapon release circuits, preventing automatic bomb release.
	B BNS STEERING PANEL	
2	BNS STEERING (AUTOPILOT) Light	Indicates autopilot turn control selector switch is in BOMB.
3	BDI TG=0 Light	Comes on for 3 seconds when OAS sends a release pulse.
	C OAS POWER CONTROL PANEL	
4	Missile Interface Unit (MIU) POWER Switches (3)	Command power on or off to the missile interface units. MIU/LP – Commands power to the left pylon missile interface unit. MIU/BAY – Commands power to the rotary launcher missile interface unit or NUC-SLU. MIU/RP – Commands power to the right pylon missile interface unit.
	D WEAPONS CONTROL PANEL	
5	WPN JETTISON Select (SEL) Switch	Spring-loaded to NORM (off) position. Used with unlock consent from pilot's missile consent panel and WCP nuclear lock/unlock switch. SEL – Jettisons missiles selected on location and station switches.
6	NUCLEAR PREARM-SAFE Switch	Three position, spring-loaded to neutral (N). PREARM – With pilot's prearm consent and WCP prearm enable prearms missiles selected by WCP location and station switches. SAFE – Commands safe to all selected missiles.
7	NUCLEAR PA ENBL (Prearm Enable) Switch	Guarded two position switch used with pilot's consent to allow OAS controlled weapons to be prearmed.
8	STATION Switches (9)	Used with location switches to select individual missile stations (1 thru 8) or all (ALL) stations at the selected location for missile operational functions.
9	Weapon Power (WPN PWR) Switch	Three position, spring-loaded to neutral (N). ON – Commands power be applied to the missiles selected by the location and station switches on the WCP. OFF – Commands power be removed from the missiles selected by the WCP.

Figure 1A-38 (Sheet 3 of 4)

NO.	CONTROL-INDICATOR	FUNCTION
		D WEAPONS CONTROL PANEL (Cont)
10	Nuclear Caution (NUC CAUTN) Light	Indicates warhead arming fault or consent disagreement between pilot and navigator. Pressing will turn the light off and erase the message if the fault has cleared.
11	Master (MSTR) FAULT Light	Indicates a fault has occurred and more information is available on the MFD. Pressing acknowledges receipt of message, turns light off, and erases message.
12	LAMP TEST Switch	When pressed all panel lights will come on.
13	MISSILE Manual Launch (MAN LNCH) Switch	Starts the missile launch countdown if SAIR exists. Light will remain on until missile has been launched.
14	MISSILE LNCH MODE Switch	Alternately selects automatic (AUTO) or manual (MAN) launch mode and turns on respective light. MAN overrides auto and enables manual launch switch. Light also indicates OAS selected launch mode. The switch also selects the release mode of the CSRL loaded gravity weapons.
15	LCHR ROTATE (ROT) SWITCH	Used in manual launch mode to position WCP selected missile in launch position. Light remains on until launcher is in commanded position.
16	LOCATION Switches (3)	Used with station select switches to select missiles for missile operational functions. Left Pylon (LP) – Selects left pylon missiles. Right Pylon (RP) – Selects right pylon missiles. Bay Launcher (BAY) – Selects launcher missiles.
17	NUCLEAR LOCK-UNLOCK Switch	Guarded two position switch used with pilot’s consent to lock and enable unlock of missile ejectors.
18	PYLON LOCK-UNLOCK Switch	Guarded two position lever lock switch gives consent to jettison missile pylons.

Figure 1A-38 (Sheet 4 of 4)

Typical Nuclear Weapon Status and Inventory Display (FRMT-7)

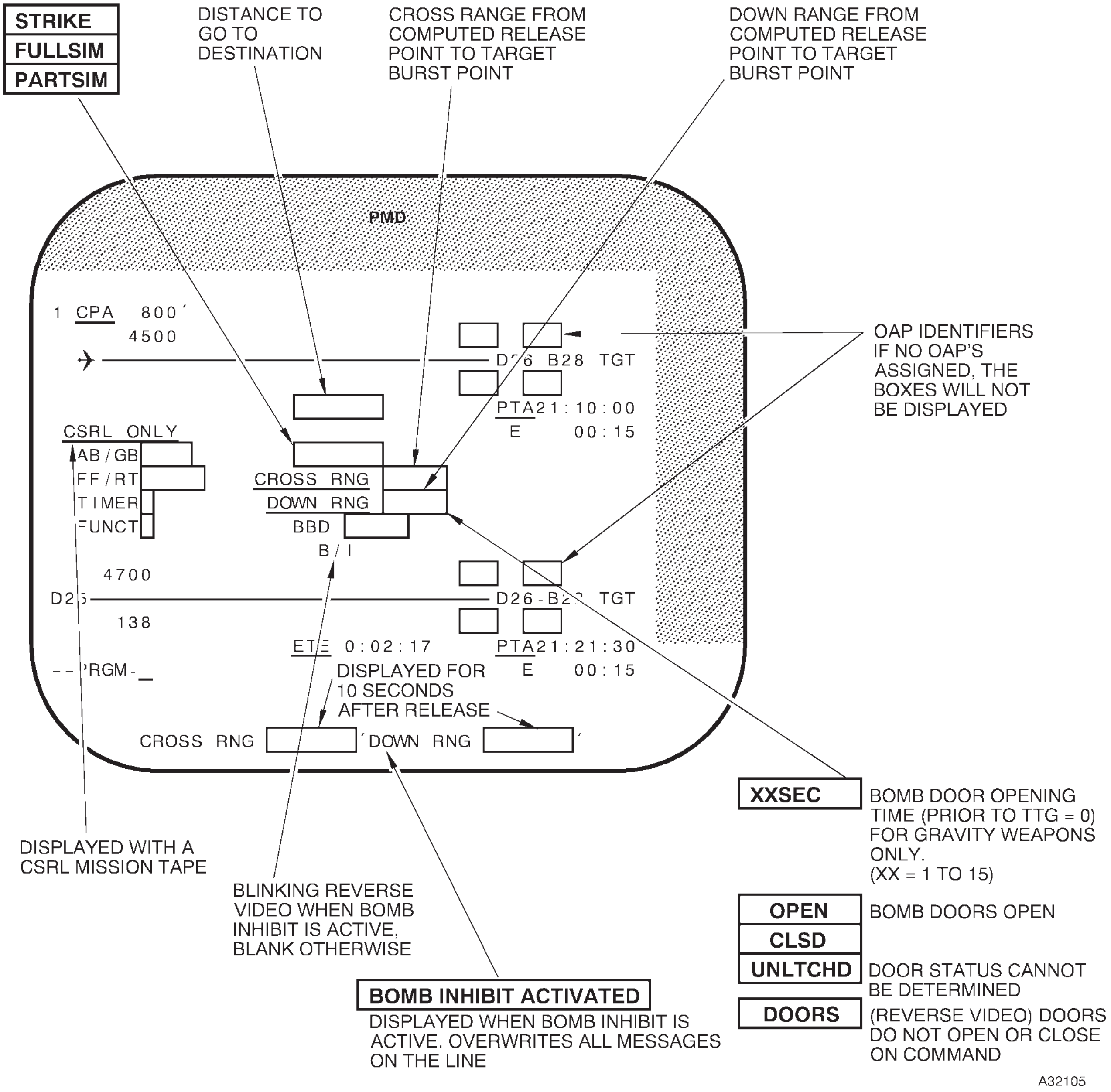


NOTE

- For description of weapon status indications refer to T.O. 1B-52H-25-2 for gravity nuclear weapons, T.O. 1B-52H-30-1 for ACM, and T.O. 1B-52H-30-4 for ALCM.
- Stations 1 thru 4 depict typical missile displays. Stations 5 thru 8 depict typical CSRL bomb displays. This mixed load is presented for display purposes only, bombs and missiles can not be mixed on CSRL.
- The launch point NO. is displayed in the INE status location after a missile is launched against its assigned launch point.
- Weapons 4 and 8 show typical post-release display.

Figure 1A-39

Nuclear Gravity Weapon Displays



STRIKE
FULLSIM
PARTSIM

DISTANCE TO GO TO DESTINATION

CROSS RANGE FROM COMPUTED RELEASE POINT TO TARGET BURST POINT

DOWN RANGE FROM COMPUTED RELEASE POINT TO TARGET BURST POINT

OAP IDENTIFIERS IF NO OAP'S ASSIGNED, THE BOXES WILL NOT BE DISPLAYED

DISPLAYED FOR 10 SECONDS AFTER RELEASE

XXSEC BOMB DOOR OPENING TIME (PRIOR TO TTG = 0) FOR GRAVITY WEAPONS ONLY. (XX = 1 TO 15)

DISPLAYED WITH A CSRL MISSION TAPE

BLINKING REVERSE VIDEO WHEN BOMB INHIBIT IS ACTIVE, BLANK OTHERWISE

OPEN BOMB DOORS OPEN

CLSD

UNLTCHD DOOR STATUS CANNOT BE DETERMINED

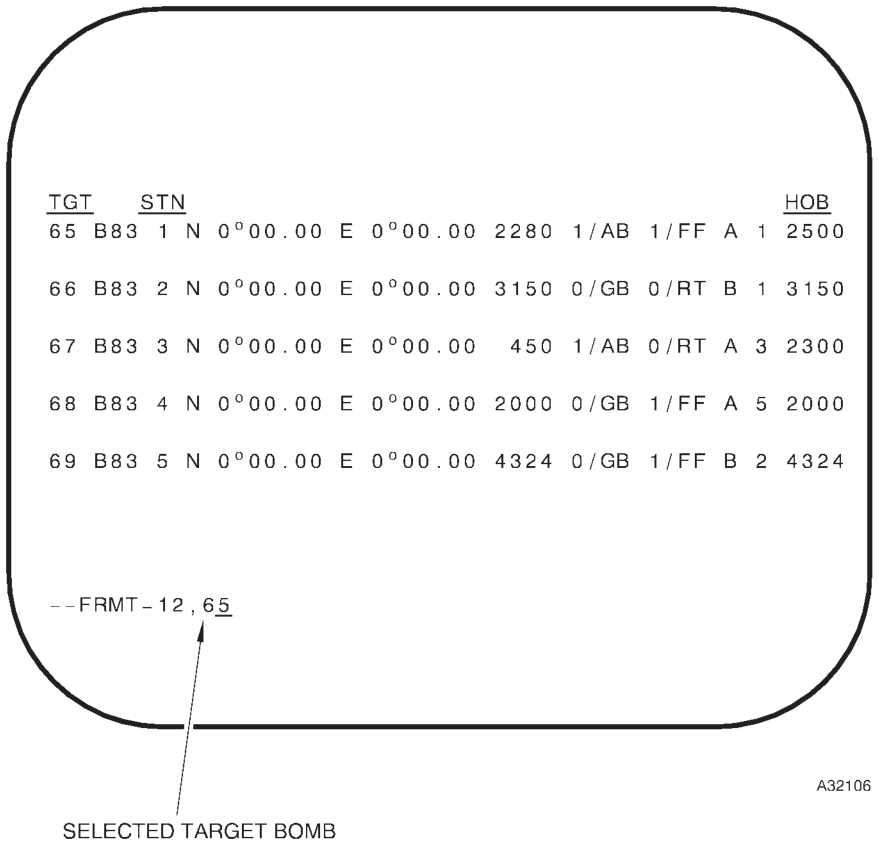
BOMB INHIBIT ACTIVATED
DISPLAYED WHEN BOMB INHIBIT IS ACTIVE. OVERWRITES ALL MESSAGES ON THE LINE

DOORS (REVERSE VIDEO) DOORS DO NOT OPEN OR CLOSE ON COMMAND

CURRENT EVENT (NUCLEAR GRAVITY WEAPON TARGET)

Figure 1A-40

Typical Nuclear Gravity Weapon Target Table (CSRL Only) (FRMT-12)



```
TGT   STN                                                HOB
65 B83 1 N 0°00.00 E 0°00.00 2280 1/AB 1/FF A 1 2500

66 B83 2 N 0°00.00 E 0°00.00 3150 0/GB 0/RT B 1 3150

67 B83 3 N 0°00.00 E 0°00.00  450 1/AB 0/RT A 3 2300

68 B83 4 N 0°00.00 E 0°00.00 2000 0/GB 1/FF A 5 2000

69 B83 5 N 0°00.00 E 0°00.00 4324 0/GB 1/FF B 2 4324



--FRMT-12,65
```

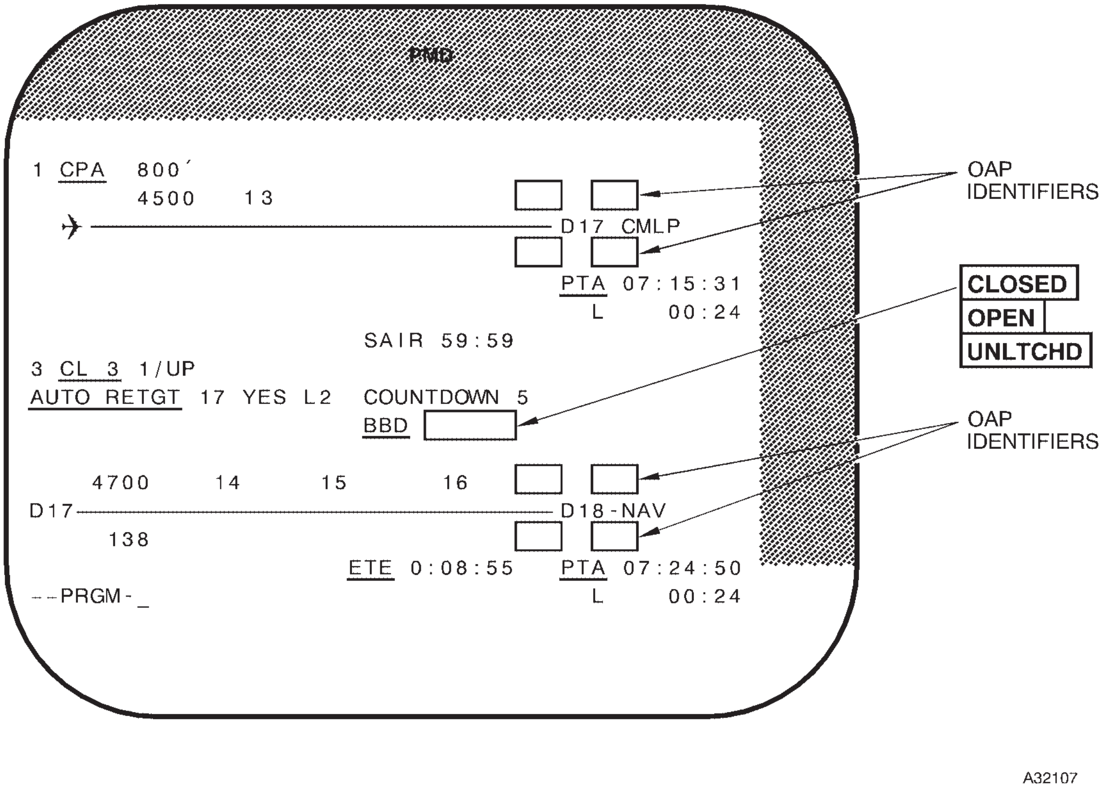
NOTE

- For description of weapon status indications refer to T.O. 1B-52H-25-2.
- While in the BOMB mode, FRMT-12 data cannot be modified.

FRMT-12, NUCLEAR GRAVITY WEAPON TARGET TABLE

Figure 1A-41

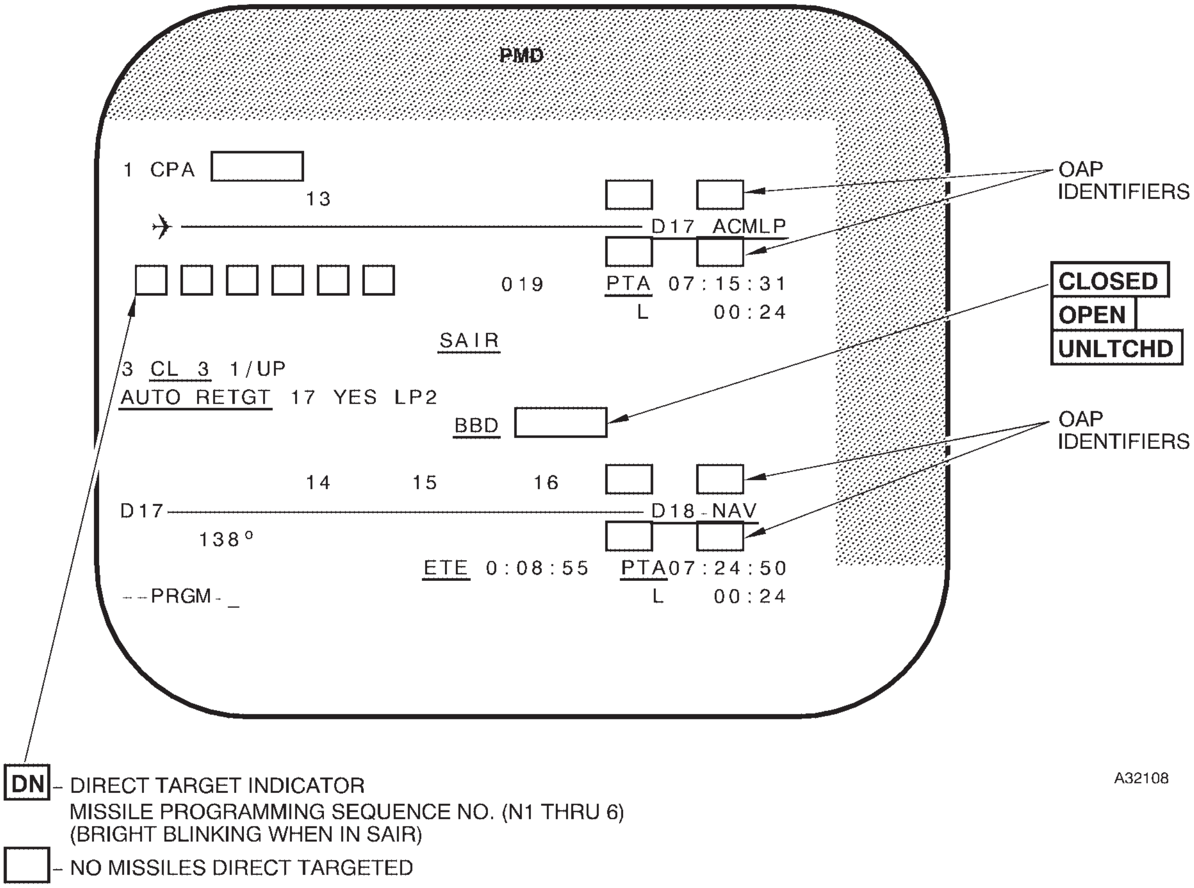
Typical ALCM Program Display



CURRENT EVENT (ALCM LAUNCH POINT)

Figure 1A-42

Typical ACM Program Display



CURRENT EVENT (ACM LAUNCH POINT)

Figure 1A-43

NORMAL OPERATION

Normal system operational procedures are contained in Section II. Weapon delivery procedures are contained in T.O. 1B-52H-25 series manuals for gravity nuclear weapons, T.O. 1B-52H-34 series for nonnuclear missiles and gravity weapons, T.O. 1B-52H-30 series for nuclear missiles. Simulated launch mode procedures are contained in T.O. 1B-52H-30 series for nuclear missiles and T.O. 1B-52H-34 series for nonnuclear missiles.

WEAPON MONITOR AND CONTROL

Missile/CSRL Bomb Monitor and Control

Monitor and control is accomplished through the use of the WCP, keyboard and the MFD, programs, missile formats, and control functions. The WCP is used to select, power, prearm, and launch the missiles. The keyboard with the MFD is used to monitor the missile/CSRL bomb status and modify missile functions. For detailed missile/CSRL bomb monitor and control procedures, refer to T.O. 1B-52H-25 series for CSRL gravity, T.O. 1B-52H-30-4 series for AGM-86B ALCM, and T.O. 1B-52H-30-1 series for AGM-129 ACM.

Nonnuclear Pylon Mounted Weapon Monitor and Control

For detailed information on pylon mounted nonnuclear weapon monitor and control procedures, refer to T.O. 1B-52H-34-2-5 for WCMD, T.O. 1B-52H-34-2-6 for JDAM, T.O. 1B-52H-34-2-7 for AGM-154 JSOW, and 1B-52H-34-2-9 for AGM-86C Conventional ALCM and AGM-86D CALCM PENETRATOR missiles.

[CS] Integrated Conventional Stores Management System

DESCRIPTION

The B-52 Integrated Conventional Stores Management System (ICSMS) provides OAS control for release or launch of nonnuclear weapons. ICSMS was developed for MIL-STD-1760 weapons but has the capability to handle standard nonnuclear weapons. The ICSMS operational computer program consists of a ground maintenance computer program (GMCP) and flight computer program (FCP). The FCP consists of the flight management system (FMS) and stores management overlay (SMO). The FMS controls navigation, radar, controls and displays, and supports the SMO. The SMO contains all weapon control delivery functions. The SMO menu can be displayed to allow the operator to select the appropriate SMO. Up to 10 SMOs can be listed on control function CF-62, the SMO Load Menu. ICSMS has the capability to handle any weapon SMO. However, the only SMO being discussed is the gravity weapon delivery (GWD) SMO which interfaces with the existing gravity weapon release system. The GWD SMO does not interface with ICSMS hardware on the aircraft or the pylon, and cannot be used for MIL-STD-1760 weapons.

Functions performed by the SMO include weapon control processing, impact point calculations, simulation processing, controls and displays processing, and built-in-test processing. To perform its required functions, the SMO interfaces with existing aircraft weapon system components, the OAS sources of navigation, steering, controls and displays processing, mission data, and with the global positioning system (GPS) hardware.

All requirements for delivery of nonnuclear weapons can be accomplished automatically using stored mission data. Mission data is entered into the OAS from the flight computer program (FCP), which contains the SMO, via the data transfer unit cartridge (DTUC), or by supplemental manual operator position inputs by use of the keyboard. Bomb mode is entered when the operator commands the aircraft to FLY-TO a target, when sequencing to a stored target as the next destination, or when the operator designates a target. While in bomb mode, impact point and Time-To-Go (TTG) are continuously calculated, using target information obtained from stored mission data as supplemented by operator input. In AUTO, bomb door opening and nonnuclear weapon release is accomplished automatically. When TTG reaches zero, the SMO issues a release signal to the bomb release system which processes the signal and directs weapon release sequencing.

The operator has the capability to enter Bomb Train Adjust Distance (BTAD) via CF-530. BTAD can be implemented to center a bomb string/stick and or to correct for any known release system bias. In addition, the operator has the option to enter modified ballistic wind on CF-53 and to review the modified winds on the CF-53 or through the PRGM-NN display.

NOTE

- The SMO will not send a release signal if bomb inhibit is selected.
- TTG on FRMT and PRGM displays, and EARLY/LATE times on PRGM displays are calculated to the release point time set on FRMT-10 or PTA on CF-61 whichever was input last.

The SMO provides the capability to perform a weapon delivery mission with simulated weapons. ICSMS has two simulation modes: PART SIM and FULL SIM. Both SIM modes allow bomb door operation. Although the SMO will not simulate weapon/rack responses, weapon/rack malfunctions, or other weapon control and monitor functions, the SMO will accomplish the following inflight operations while in the simulation mode:

- Bomb mode entry/exit
- Impact point prediction
- Bomb steering
- Bomb door control (doors must be closed manually following simulated release in partial simulation mode)
- Remote bomb site (RBS) tone cutoff
- Bomb scoring
- Weapon event recording

Operational status, weapon inventory, fault conditions, and a summary of any SMO weapon delivery program is displayed on the OAS multifunction display (MFD). The keyboard provides the operator the capability to update or modify the nonnuclear weapon delivery program in the mission data, to reassign weapons to new targets, or to vary the arming options.

CONTROLS AND DISPLAYS

The stores management formats provide the operator the method to display selected target data and weapon status on the multifunction display (MFD) and to modify weapon ballistics using the keyboard. As ICSMS uses OAS controls and displays for SMO software, only those control function (CF) displays having SMO interface elements unique to gravity weapon delivery (GWD) functions are discussed. The nonnuclear stores CF and format (FRMT) displays also show SMO unique information relating to GPS.

The directory program display allows the operator to selectively load ICSMS programs into a specific processor. When the selected processor loading is complete, the appropriate number will appear in the RES PGM window on the computer control panel. The program numbers are as follows:

WINDOW DISPLAY	PROGRAM
0	No Program Loaded
1	Nuclear Full-up
2	Spare
3	GMCP
4	ICSMS FMS
5	Spare
6	Spare
7	Classified Data Erase

NORMAL OPERATION

The ICSMS operates the same as block II OAS. Accomplish a normal OAS startup. Then select CF-62 ENTER to display the SMO menu. CF-62, N ENTER will load the selected SMO. Now the ICSMS procedures are identical to OAS procedures except as noted in this section.

SMO CONTROLS AND DISPLAYS AND NORMAL OPERATION

For information on the on the following SMOs refer to the referenced T.O.

SMO NAME	T.O. NUMBER
GRAVITY WEAPON	T.O. 1B-53H-34-2-1
WIND CORRECTED (WCMD)	T.O. 1B-53H-34-2-5
DIRECT ATTACK (JDAM)	T.O. 1B-53H-34-2-6
AGM-154 (JSOW)	T.O. 1B-53H-34-2-7
AGM-158 (JASSM)	T.O. 1B-53H-34-2-8
CALCM (AGM-86C/D)	T.O. 1B-53H-34-2-9

Airborne Video Tape Recorder

DESCRIPTION

The airborne video tape recorder (AVTR) consists of two components; the audiovisual tape recorder, located on the navigator's right side panel and the remote control unit (RCU) located on the radar navigator's front panel. The system is powered by 115 vac and is protected by a circuit breaker marked AVTR on the EVS circuit breaker panel. It will record video signals from the pilot's TA display, or radar/EVS video from the RN's left or right MFD. The recorder will also record interphone and UHF-1 radio on two audible channels. The system can be operated in a manual mode or an automatic mode (see figure 1A-44 for controls and indicators). It has an indicator group to indicate current mode of operation and amount of tape remaining. The video recorder is powered and controlled through the RCU. The video tape cassettes are loaded by the navigator and the tape is automatically threaded when the power switch on the RCU is placed on. The tape is automatically unthreaded at the end of the tape or can be unthreaded through the use of the unthread switch on the recorder at any time the STBY light is illuminated on the RCU. The system has no tape rewind capability. Tape cassettes contain sufficient tape for approximately 30 minutes of continuous recording in the manual mode. If operated in the automatic mode, the system will record for 10 seconds and then pause for 10, 20, or 30 seconds depending on the position of the delay select switch, thereby extending the recording time for a single cassette up to 2 hours.

NORMAL OPERATION

CAUTION

> Do not insert tape cassette into recorder before RCU power has been applied.

1. Place RCU mode select switch to STBY.
2. Turn RCU power switch to ON. The power-on indicator light comes on and the time display shows a random indication.
3. Insert tape cassette into recorder and close cover. The tape automatically threads and STBY light comes on.
4. Set the LED time remaining readout by setting the time remaining on the cassette (up to 30 minutes) on the time set thumbwheels and then depressing the tape time set button. LED reflects time set.
5. To record, the mode select switch must be placed to AUTO or MAN. If in AUTO, ensure the delay select switch is placed at 10, 20, or 30 as dictated by mission requirements.

CAUTION

> The RCU mode switch must be in STBY and the tape unthreaded prior to tape cassette removal.

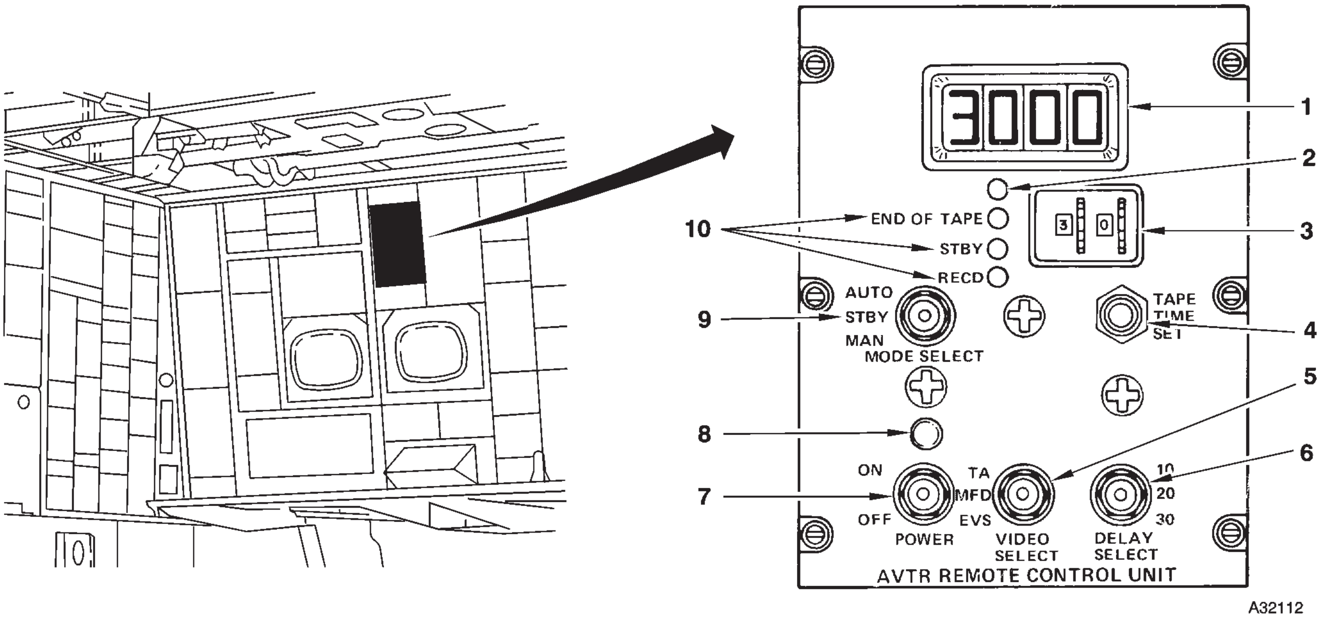
6. To remove a tape cassette, place the mode switch to STBY. If EOT light is not on, press the tape unthread switch on the recorder. Then press the cassette remove button on the recorder to remove tape.

NOTE

> The cassette remove button's function is inhibited until tape unthreading is complete.

7. Place RCU power switch OFF.

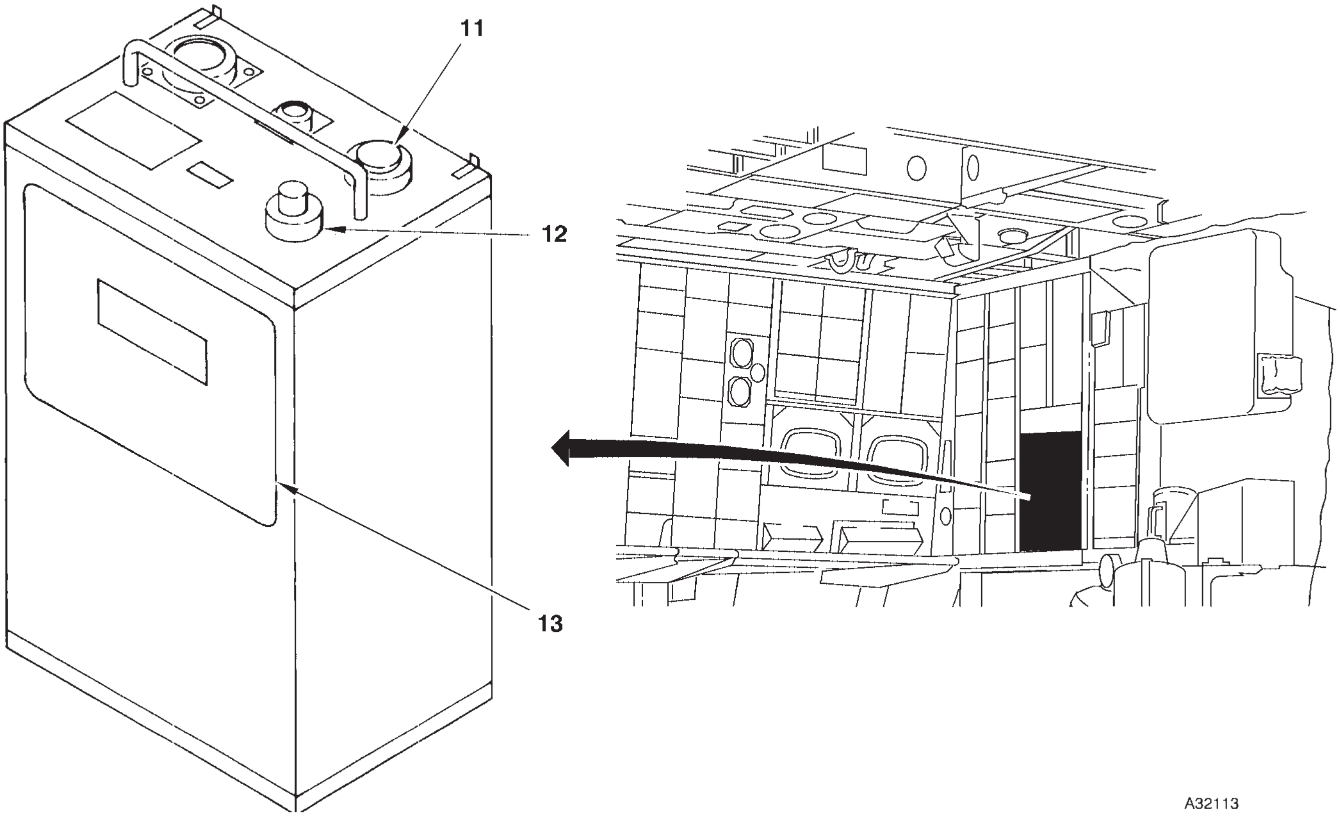
Airborne Video Tape Recorder Controls and Indicators



A AVTR REMOTE CONTROL UNIT

NO.	CONTROL-INDICATOR	FUNCTION
		A AVTR REMOTE CONTROL UNIT
1	LED Readout	Displays approximate time (minutes and seconds) remaining on tape. Recorder will not stop recording when the indicator shows 0 if there is still any unrecorded tape.
2	Photo Cell	Automatic control of LED brightness (unlabeled).
3	Time Set Thumbwheel Switches	Used in conjunction with TAPE TIME SET button to set in minutes, the LED readout.
4	TAPE TIME SET Button	Depressing button causes the time set in Time Set Thumbwheel switches to be displayed in the LED readout.
5	VIDEO SELECT Switch	TA – Selects video from pilot’s TA display for recording.
		MFD – Selects video from RN’s left MFD for recording.
		EVS – Selects video from RN’s right MFD for recording.
6	DELAY SELECT Switch	Selects the time the recorder will delay in seconds between 10-second recording sessions.
7	POWER Switch	ON – Provides power to the RCU and video recorder.
		OFF – Deenergized the AVTR system.
8	POWER ON Light	Comes on when the power switch on the RCU is placed ON.
9	MODE SELECT Switch	AUTO – Save tape feature; causes recorder to pause for selected time (10, 20, or 30 seconds) between 10 second recording sessions.
		STBY – Places recorder in standby mode if power is applied and a tape cassette is threaded in the recorder.
		MAN – Causes recorder to record continuously until end of tape.
10	Record Function Indicators	END OF TAPE – Comes on when end of tape is reached.
		STBY – Comes on when power is applied and a cassette is threaded in the recorder.
		RECD – Comes on anytime recorder is recording.

Figure 1A-44 (Sheet 1 of 2)



B AIRBORNE VIDEO TAPE RECORDER

NO.	CONTROL-INDICATOR	FUNCTION
	B AIRBORNE VIDEO TAPE RECORDER	
11	Cassette Remove Button	Opens tape loading door when pressed.
12	Tape Unthread Switch	If EOT light is not on, press to unthread tape prior to tape removal.
13	Tape Loading Door	Provides access to tape cassette.

Figure 1A-44 (Sheet 2 of 2)

OAS Video Recorder

DESCRIPTION

The OAS is provided with a video recorder under control of the radar navigator to record radar and EVS video along with other displayed system data. The recorder functions as a mission data recorder and provides film recorded data which can be utilized to reconstruct the mission and analyze system performance.

CONTROLS AND INDICATORS

Controls and indicators for the video recorder equipment are located on the RNMP at the radar navigator's station and on the video recorder unit and associated film magazine. See figure 1A-47 for control and indicator functional information on the RNMP and figure 1A-46 for control and indicator functional information on the video recorder unit and magazine.

VIDEO RECORDER

The video recorder unit (figure 1A-46) is located on top of the left equipment rack behind the radar navigator. The recorder contains a small cathode ray tube, mirrors, and a 35 mm camera which accommodates a film magazine on which the projected images are recorded. The film magazine is installed/removed through an access door in the front of the recorder. The front of the recorder also contains a record test switch and BIT indicator used primarily for maintenance.

DATA TRANSFER

The radar navigator can control which video source is desired to be recorded by actuation of the source switch. MFD position records all video and data on the radar navigator's left MFD. If radar video is not being displayed on that MFD and its recording is desired, RSC should be selected. Video being processed through the radar scan converter will be recorded. A simplified schematic of the system control and data flow is shown on figure 1A-45. During operation if the left MFD or the RSC should fail, the computer program will select the opposite source and so indicate by the respective light illumination, regardless of selected switch position.

NORMAL OPERATION

The video recorder is normally operated in an automatic mode controlled by the OAS. The recorder will shoot one frame of film when any of the following events occur:

- High Altitude Calibration
- Low Altitude Calibration
- Memory Point Wind Calibration
- Position Fix/Update
- Missile Countdown to Launch
- Bomb Countdown to Release
- Destination Update at TTG = 0
- Any Fly-To Command
- 30-Second Interval Below 5000 Feet AGL
- 2- Minute intervals Above 5000 Feet AGL

The recorder will automatically record any position fix reject messages and operating responses to these messages. The recorder will also record UTC for a radar freeze when the freeze is selected. The program will set frame numbers to 0001 when the navigator initializes UTC during the start-up procedure. The radar navigator can initiate recording at any time desired by actuating the mode switch to MAN. Actuate the mode switch to MAN for each frame.

RECORDER FILM LOADING

Film magazine loading into the video recorder is accomplished as follows:

1. Check the video recorder mode switch is in OFF.
2. Open the recorder access door and make sure the magazine lock lever is in the stowed position.
3. Insert the film magazine and rotate lock lever counterclockwise to the vertical position, ensuring the lever fits into the detent in the front of the magazine.
4. Close and latch the access door.
5. Manually reset BIT indicator on recorder by rotating it clockwise while power is on. BIT indicator remains black.
6. Actuate the record switch to TEST position five times to advance film to start position.

OPERATING MODES

The video recorder is normally operated during the entire flight. The equipment is normally operated in automatic mode to allow the OAS to command the required recording. If a special event record is desired, the radar navigator may select the manual mode to command recording.

NOTE

> Aircraft present position and true altitude are erased from the PMD display when an event is recorded.

Recorder Operation

The video recorder is placed in operation after OAS master power has been turned on by placing the video recorder mode switch to AUTO. Select the desired recording source by actuating the source switch to the appropriate position as indicated by the respective switch light being on.

RECORDER FILM REMOVAL

Film magazine removal from the recorder is accomplished as follows:

1. Check video recorder mode switch in OFF.
2. Open the recorder access door.
3. Rotate lock lever clockwise to the stowed position.
4. Pull on film magazine handle and remove from the recorder.
5. Close recorder access door.

Video Recorder Data Flow

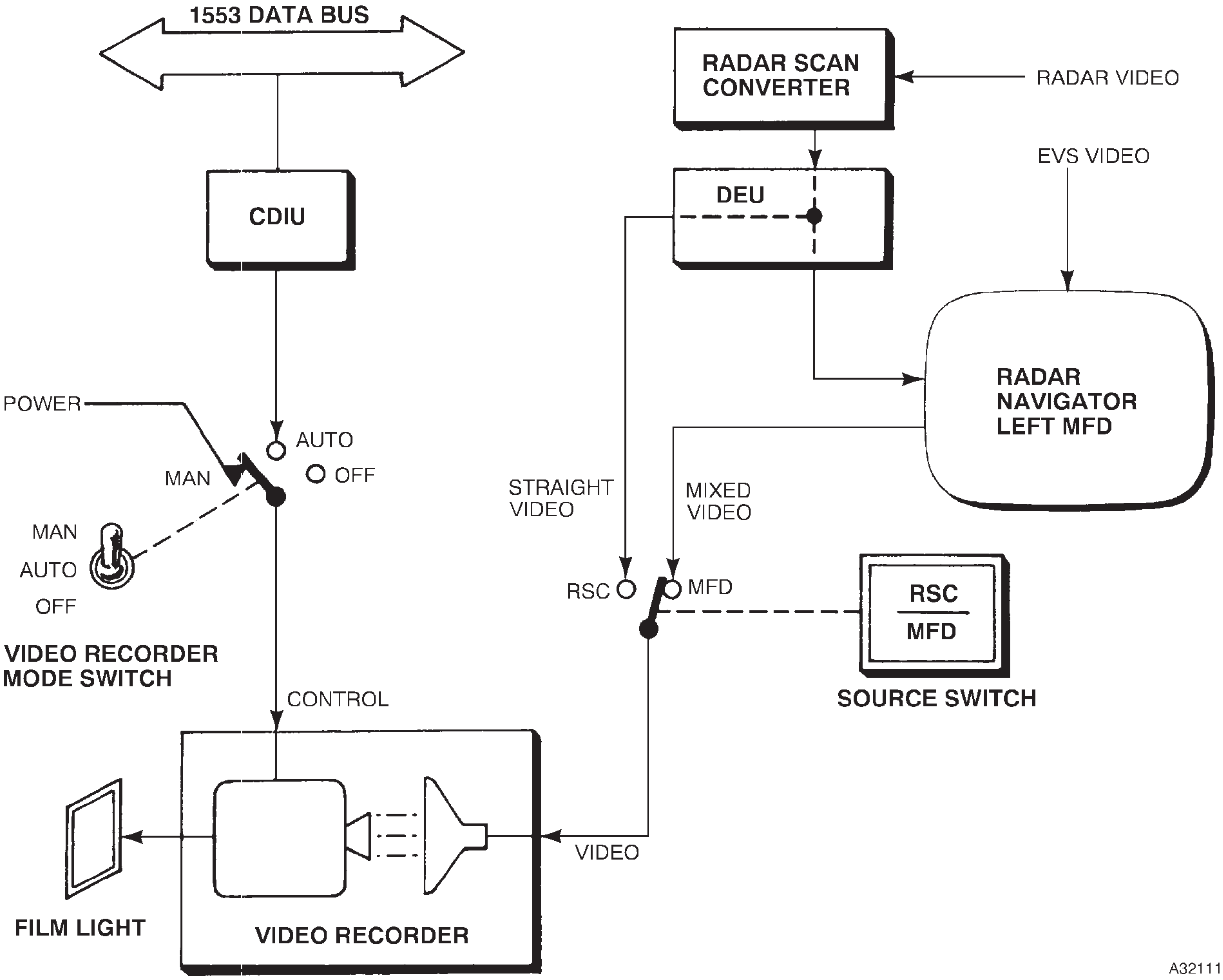
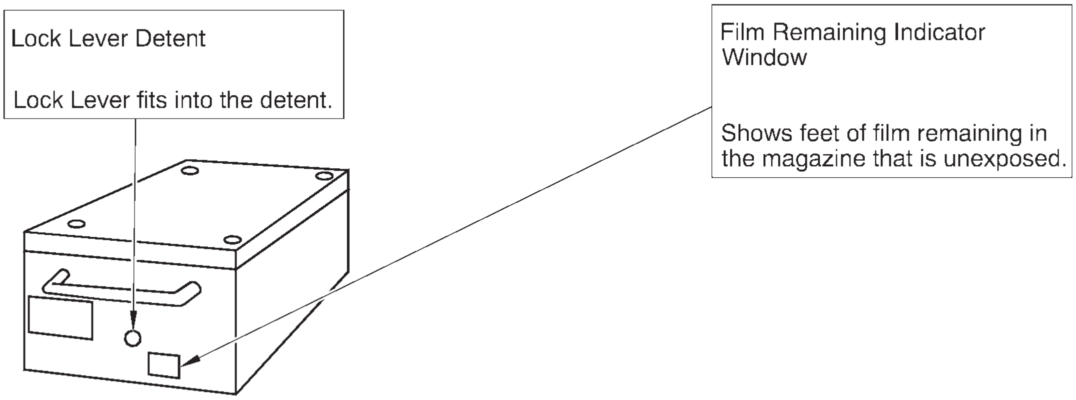


Figure 1A-45

Video Recorder

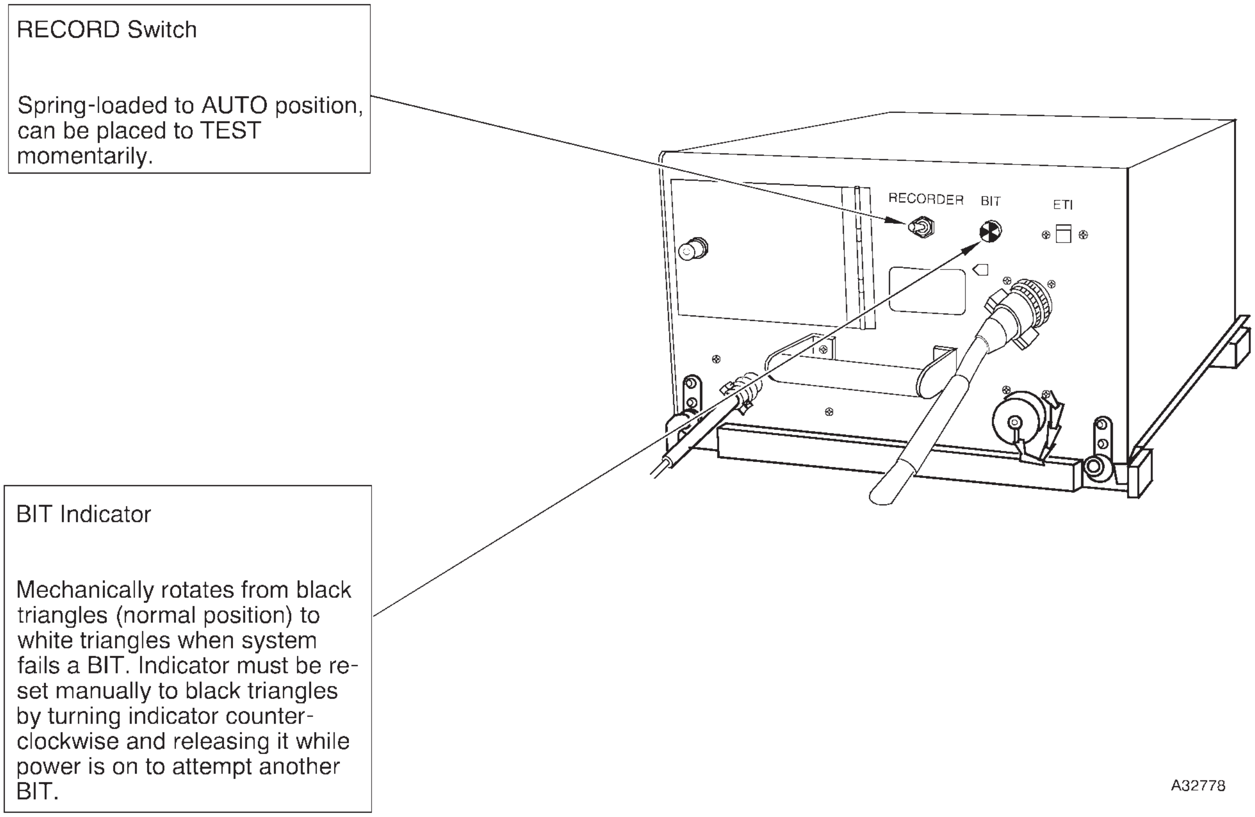


Lock Lever Detent

Lock Lever fits into the detent.

Film Remaining Indicator Window

Shows feet of film remaining in the magazine that is unexposed.



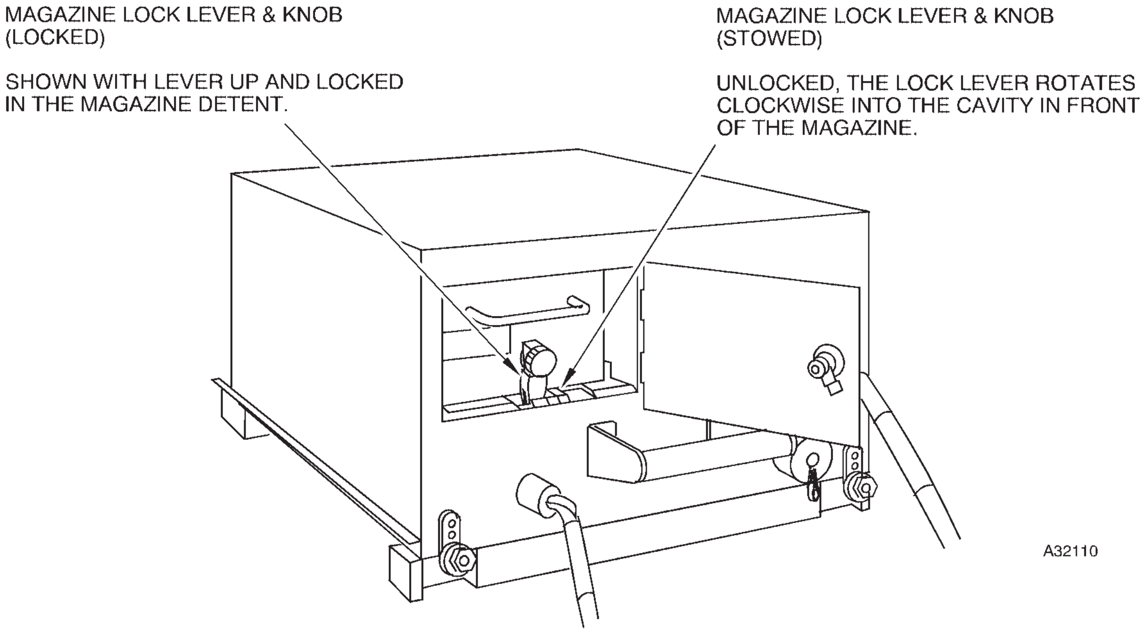
RECORD Switch

Spring-loaded to AUTO position, can be placed to TEST momentarily.

BIT Indicator

Mechanically rotates from black triangles (normal position) to white triangles when system fails a BIT. Indicator must be reset manually to black triangles by turning indicator counterclockwise and releasing it while power is on to attempt another BIT.

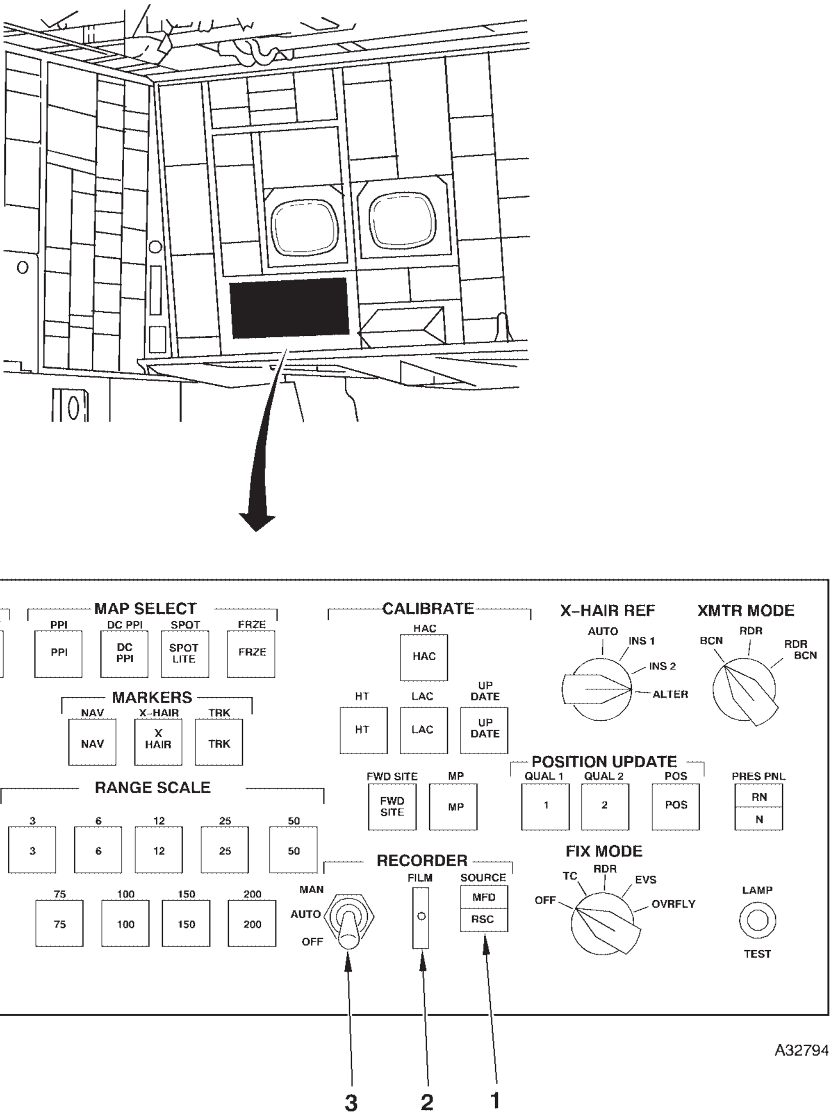
Figure 1A-46 (Sheet 1 of 2)



VIDEO RECORDER WITH FILM MAGAZINE INSTALLED

Figure 1A-46 (Sheet 2 of 2)

Video Recorder Controls



RADAR NAVIGATOR MANAGEMENT PANEL

NO.	CONTROL-INDICATOR	FUNCTION
1	SOURCE Switch	MFD mode records video from the radar navigator’s left MFD. RSC mode records video directly from the radar scan converter.
2	FILM Light	Comes on steady when the video recorder is out of film. The light may come on momentarily during manual operation due to film slack.
3	Video Recorder Mode Switch	OFF position, the recorder is off. AUTO position allows for automatic operation of the video recorder. MAN position activates the recorder each time the switch is positioned to MAN. The switch is spring-loaded to the AUTO position from MAN.

Figure 1A-47

Radar Pressurization

DESCRIPTION

Pressurization is provided during flight by the cabin pressurization and radar pressurization systems. For information relative to the cabin pressurization system, refer to T.O. 1B-52H-1, Section I. The radar pressurization unit is located in the lower forward crew compartment (figure 1A-48) and can be operated continuously, if necessary, to maintain the proper radar pressure. The high pressure system pressurizes the strategic radar waveguide. The low pressure system is deactivated. A single pressure pump, in conjunction with a low pressure cutoff valve and pressure switches, supplies the high pressure system.

CONTROLS AND INDICATORS

A radar pressure control panel marked RADAR PRESSURE is located on the navigator's side panel and has two sets of controls and indicators, one for the high pressure system and one for the low pressure system. The low pressure system controls are deactivated. Two radar low pressure lights are located on the radar navigator's front panel. See figure 1A-49 for control and indicator functional information.

NORMAL OPERATION

Normal operation of the radar pressure system is provided as follows:

1. Ensure that the radar pressure circuit breakers are in and press-to-test the indicator lights.
2. Place pressure pump control switch to NORMAL ON. Observe the applicable pump indicator light illuminated.
3. The high pressure gage should indicate in the green area after the pressure has built up and the radar pressure low light should be off.

NOTE

- The high pressure system may cycle up to 11 times per hour after reaching stability at altitude but should not operate more than 1 minute for each cycle. Excessive cycling indicates a pressure leak or malfunction.

- After the pressure pump control switches have been placed to ON, approximately 2 to 3 minutes of pump operation should be allowed to extinguish the radar pressure low light prior to suspecting a malfunction.

- High pressure readings outside the green band indicate a malfunction. See Malfunction Index, Section III.

Radar Pressurization Unit Configuration

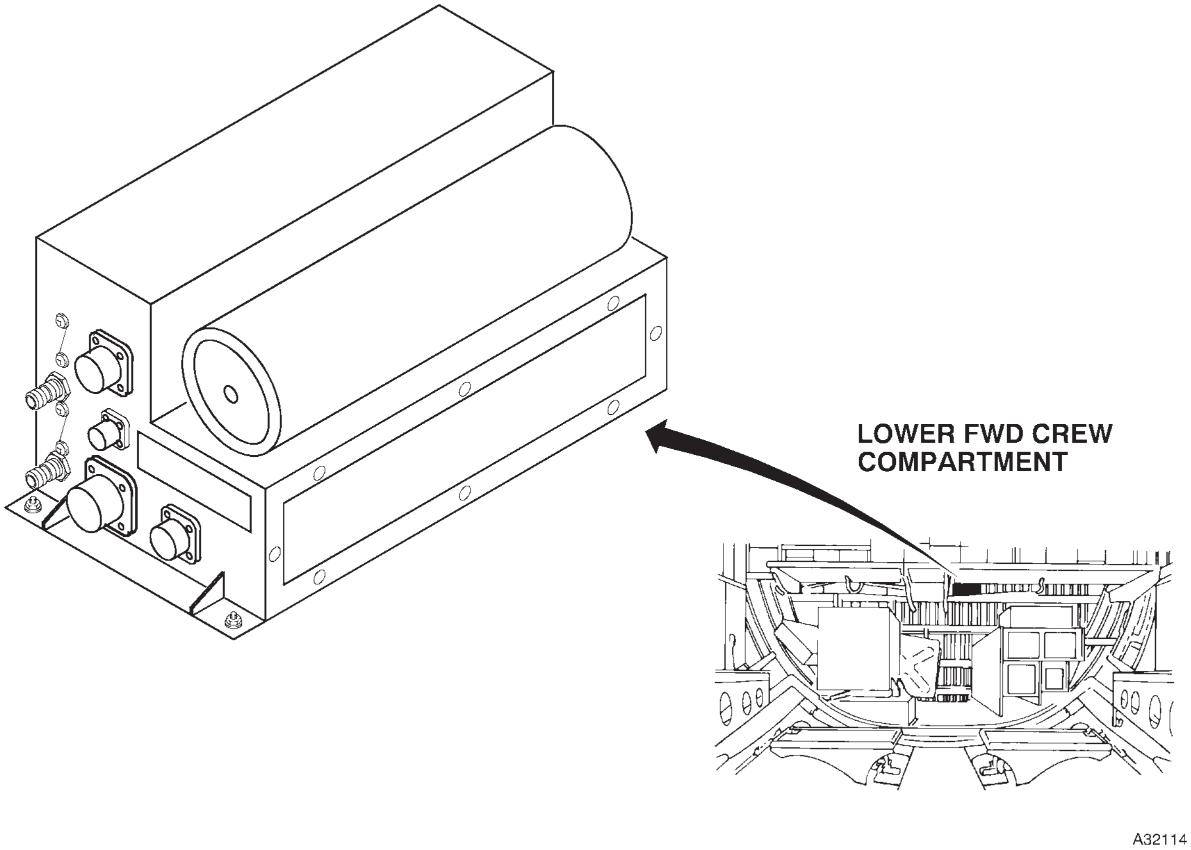
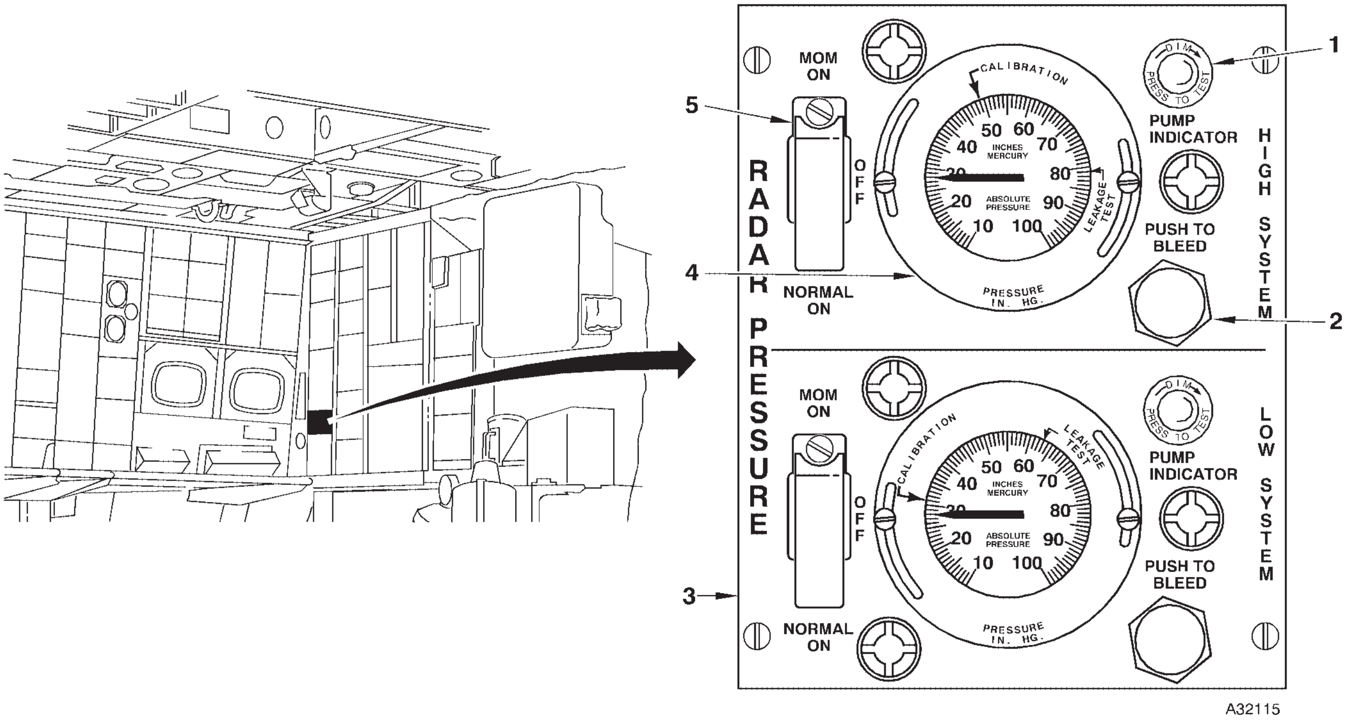


Figure 1A-48

Radar Pressurization Controls and Indicators

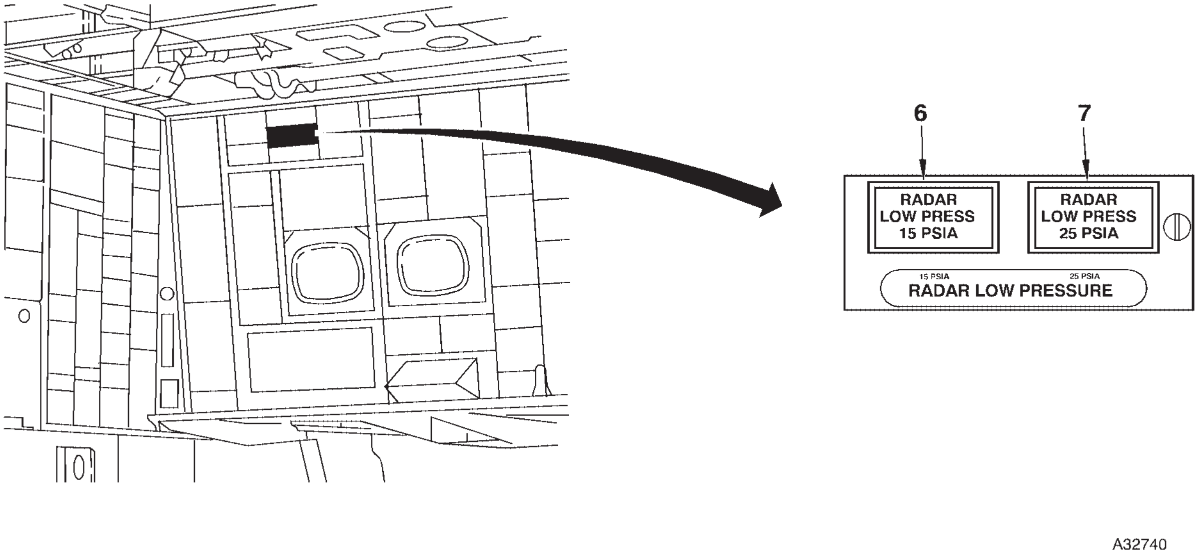


A RADAR PRESSURE CONTROL PANEL

NO.	CONTROL-INDICATOR	FUNCTION
	A RADAR PRESSURE CONTROL PANEL	
1	PUMP INDICATOR Light	A green press-to-test light will come on when the system is receiving pressurization from the pump.
2	PUSH TO BLEED Switch	Bleeds pressure from the system.
3	LOW SYSTEM	SYSTEM IS DEACTIVATED
4	Pressure Gage	Displays system pressure in inches of mercury.
5	Pressure Pump Control Switch	The switch is spring-loaded from MOM ON to OFF position and guarded to NORMAL ON. NORMAL ON – Provides automatic control of high pressure system. MOM ON – Momentary position, which when held, provides continuous operation of the pressure pump and system pressure will build as long as the switch is held. OFF – In OFF, the pump will not operate.

Figure 1A-49 (Sheet 1 of 2)

Radar Pressurization Controls and Indicators (Cont)



B RADAR LOW PRESSURE LIGHTS

NO.	CONTROL-INDICATOR	FUNCTION
	B RADAR LOW PRESSURE LIGHTS	
6	RADAR LOW 15 PSIA PRESSURE Light	The RADAR LOW PRESSURE 15 PSIA light is de-activated.
7	RADAR LOW 25 PSIA PRESSURE Light	An amber press-to-test light comes on when the radar pressure system is low. The RADAR LOW 25 PSIA light will come on when the system pressure is below 18 PSIA.

Figure 1A-49 (Sheet 2 of 2)

OAS Cooling

DESCRIPTION

The OAS requires cooling in two distinct electronic component areas as follows:

- Radome (forward)
- Remote Modules

Equipment mounted in the radome is cooled by ram air during flight and by a ground blower during ground operation. Cooling air from the air conditioning pack can also be obtained from an air cart connected to No. 2 nacelle or from an engine run. This equipment includes the avionics processors, display electronics unit, and radar scan converter.

CONTROLS AND INDICATORS

Indication of insufficient cooling to OAS equipment which may result in equipment overheat is provided by three separate indicating circuits. See figure 1A-50 for control and indicator functional information.

NORMAL OPERATION

GROUND OPERATION

During ground operation of the OAS, adequate cooling is required at all times. The ground blowers switch must always be ON during ground operation of the OAS radar. Generally, the forward radome blower will provide adequate cooling of radome-mounted equipment for any ambient temperature up to 108°F. Air from a ground air conditioning cart or from the aircraft air conditioning pack will always be required for remote modules cooling and for the power supply heat exchanger cooling.

NOTE

> When it is necessary to operate the OAS prior to engine start, the air conditioning system master switch may be placed to OFF for short periods of time, not to exceed 10 minutes during engine start.

Power to the OAS radar is automatically removed when the radome airflow low light comes on while the aircraft is on the ground.

INFLIGHT OPERATION

During flight, OAS strategic radar operation is not interrupted by actuation of any of the overheat protective circuits. The cabin airflow low light serves as a caution, but will not result in OAS radar power shutdown.

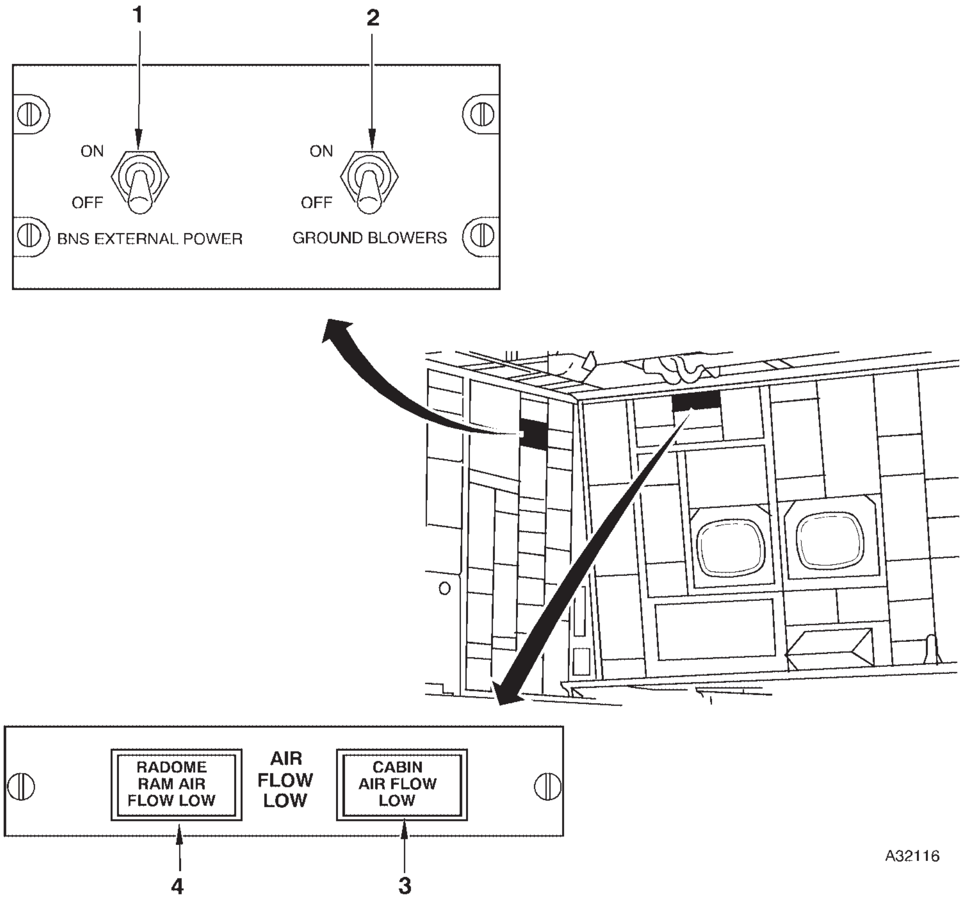
CAUTION

> The OAS equipment must be turned OFF when the cooling airflow is stopped by turning the air conditioning system master switch to OFF.

NOTE

> The OAS may remain on for short periods of time, not to exceed 10 minutes.

Cooling System Controls and Indicators



NO.	CONTROL-INDICATOR	FUNCTION
1	BNS EXTERNAL POWER Switch	OFF inflight.
2	GROUND BLOWERS Switch	ON position powers ground blowers inside the radome to cool OAS radar equipment. The switch must be on for OAS radar ground operation. Inflight, power is turned off by a squat switch when weight is off the wheels.
3	CABIN AIRFLOW LOW Light	An amber light that comes on if the cooling effect of air supplied to the remote modules rack is insufficient.
4	RADOME RAM AIR FLOW LOW Light	An amber light that comes on if the air flowing through the forward radome cooling system ducts has insufficient cooling effect.

Figure 1A-50

Air Combat Maneuvering Instrumentation (ACMI) System

DESCRIPTION

Air Combat Maneuvering Instrumentation (ACMI) systems are used on some training and test ranges to provide measurement and observation of participating aircraft on graphical display systems at ground range control and training facilities. ACMI systems enable real-time control and monitoring of air missions as well as post-mission reconstruction and debriefings. ACMI systems include four subsystems: the tracking instrumentation system (TIS), the aircraft instrumentation system (AIS), the control and computation subsystem (CCS), and the display and debriefing system (DDS). The AIS pod is the airborne subsystem of ACMI. Refer to T.O. 1-1M-34 for additional information about ACMI systems.

NOTE

> For the purposes of this manual, ACMI is used to describe any range instrumentation system including those which may have range- or contractor-specific names.

AIRCRAFT INSTRUMENTATION SYSTEM (AIS) POD

The AIS pod (figure 1A-51) enables high fidelity tracking and flight data recording for mission monitoring, reconstruction, and debriefing when B-52s are operated on specially-instrumented training and test ranges. The pod is typically constructed from an AIM-9 Sidewinder missile body shell, usually with a needle-like air data sensor at the forward end. Major components of the pod include the air data sensor and an inertial reference unit to measure flight parameters, a digital interface unit, a transponder, and a digital data link receiver and transmitter. Some pod types feature a self-contained GPS unit.

The AIS pod automatically data links selected flight parameter information such as heading, altitude, airspeed, pitch, and bank to the TIS where it is processed, recorded, and displayed on range control displays and mission debriefing systems. Each pod's data signal contains a unique identifier allowing all pod-equipped aircraft to be individually labeled and displayed on range control and debriefing system video screens.

Except for an electrical power source, AIS pods are completely self-contained and do not interface with any aircraft avionics. The pods draw both 115 volt ac and 28 volt dc power from the aircraft. Refer to T.O. 1-1M-34 for details about current AIS pod variants in use at various ACMI range complexes, and for more information on how AIS pods interface with the ground-based subsystems of ACMI systems.

The AIS pod is pylon-mounted under either wing at the 559 station hard point, which is located approximately half way between the inboard and outboard engine struts (figure 1A-51). The pod is mated to an LAU-105 launcher, which is in turn attached to adapter assemblies on the bottom of an ALE-25 pylon fitted to the airplane at wing station 559.

ALE-25 PYLON

The ALE-25 pylon (figure 1A-51) is attached to the left or right wing at the 559 station by installation of an aft mounting bracket on the underside of the wing and two bolts at the forward end of the pylon. Forward and aft launcher adapter assemblies on the bottom of the ALE-25 pylon are used to attach a LAU-105 launcher. An electrical cable routed through the pylon connects to a receptacle in the wing and to the electrical cable in the LAU-105 launcher.

LAU-105 LAUNCHER

The LAU-105 launcher (figure 1A-51) provides the mechanical and electrical interface between the ALE-25 pylon and the AIS pod.

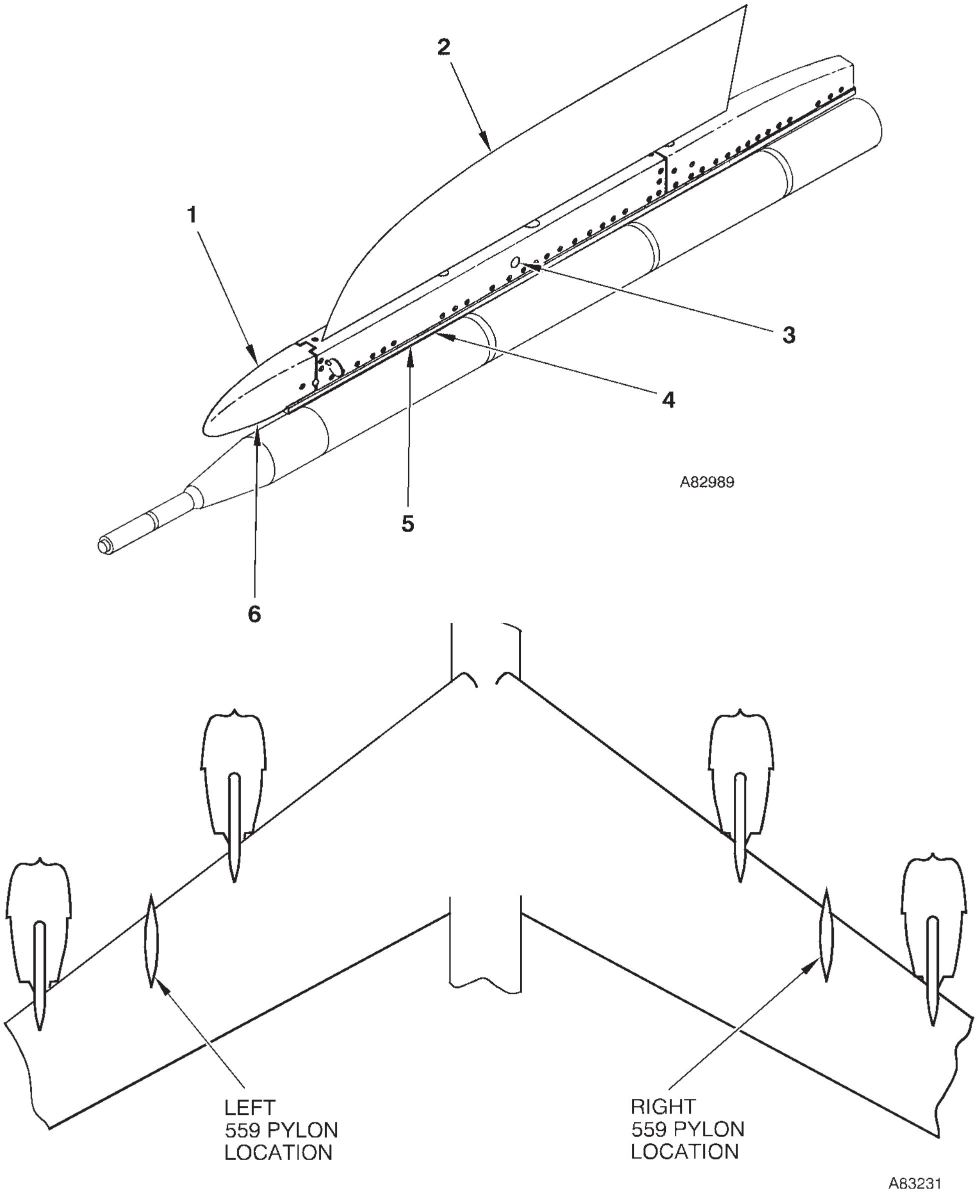
CONTROLS AND INDICATORS

Pushbuttons on the navigator's PKB (figure 1-72) control power to the AIS pod. With battery and interphone on and GPS IU power on, pressing the applicable pushbutton applies aircraft power to the pod and changes the pushbutton legend from OFF to ON. The STA 559 dc circuit breaker on the right forward BNS circuit breaker panel supplies 28 volt dc power to the pod.

NORMAL OPERATION

Aircrew operation of the AIS pod consists of a visual preflight inspection of the pylon and pod, turning power on and off at the appropriate times during the mission, and reporting aircraft, mission, and pod information to the applicable range control agency as briefed or when requested.

AIS Pod

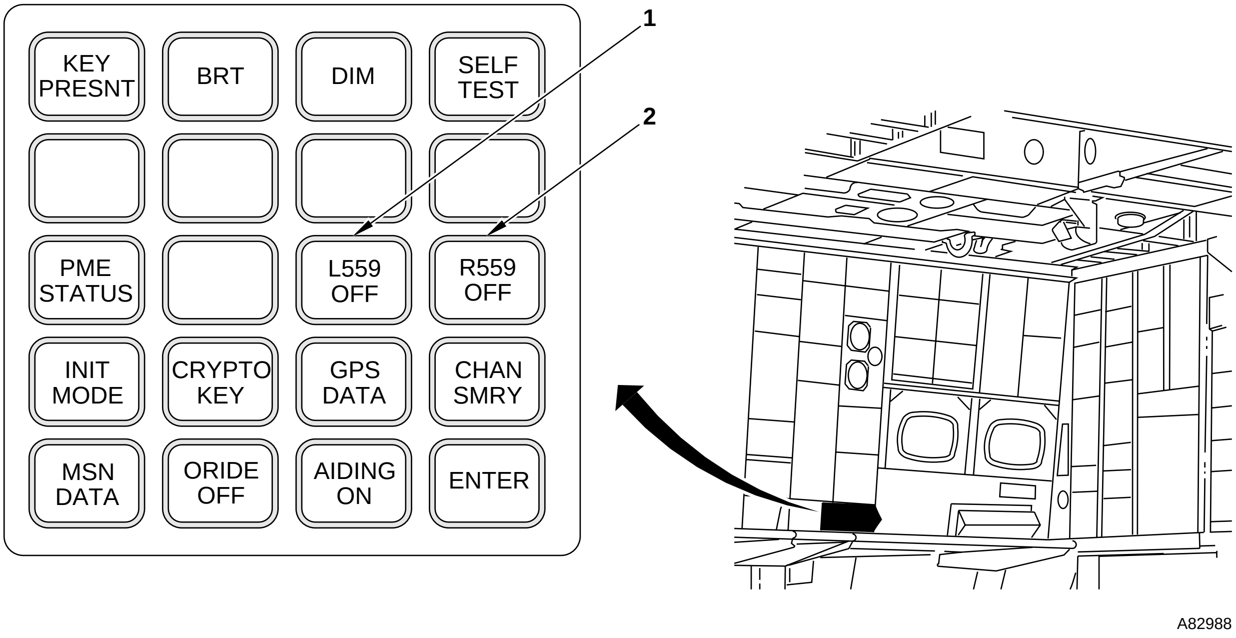


1 LAUNCHER NOSE COVER
2 559 PYLON
3 DETENT PIN
4 SNUBBER ASSEMBLY (2 PLACES)
5 POD HANGER (2 PLACES)
6 UMBILICAL CABLE

Figure 1A-51

AIS Pod Controls and Indicators

PROGRAMMABLE KEYBOARD A

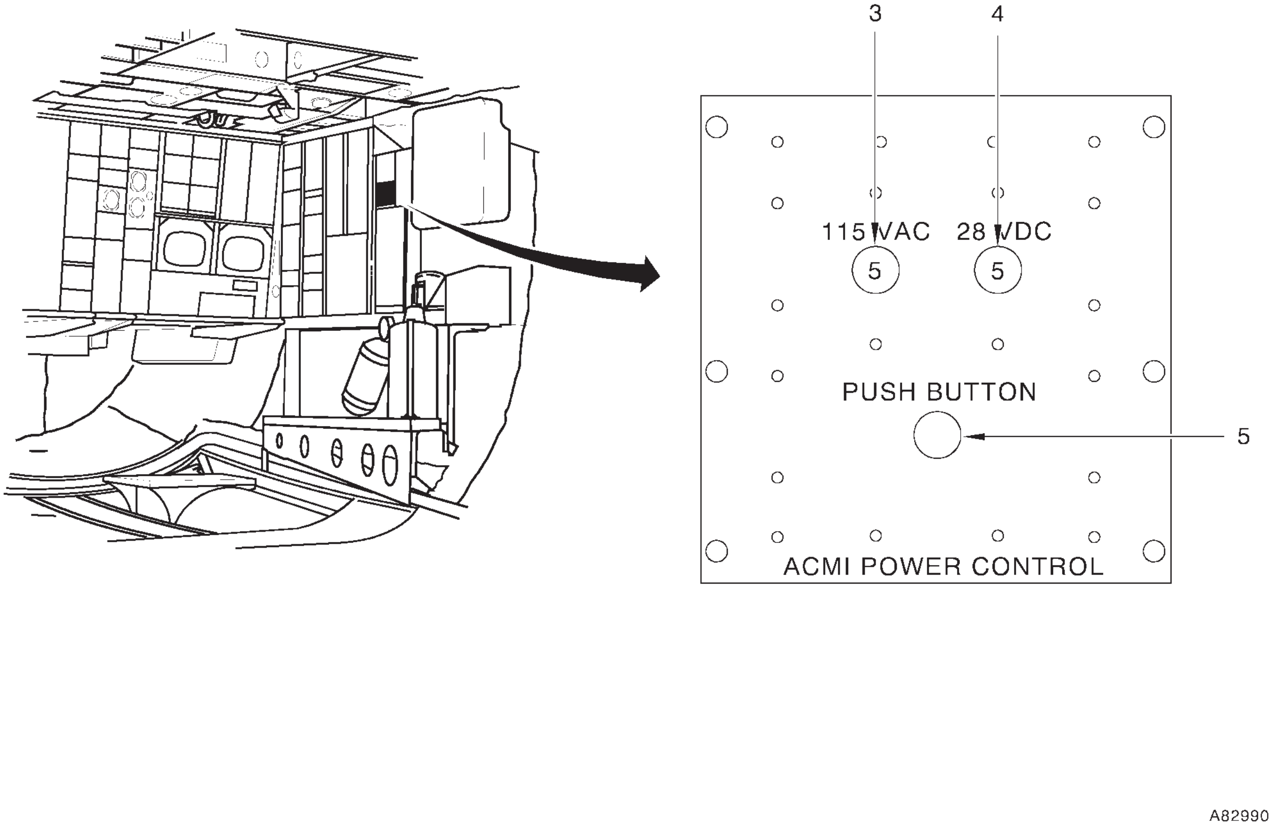


NO.	CONTROL-INDICATOR	FUNCTION
		A PROGRAMMABLE KEYBOARD
1	L559 OFF	L559 power is OFF. Underlined when L559 power application is inhibited.
	L559 ON	L559 power is ON.
2	R559 OFF	R559 power is OFF. Underlined when R559 power application is inhibited.
	R559 ON	R559 power is ON.

Figure 1A-52 (Sheet 1 of 2)

AIS Pod Controls and Indicators (Cont)

ACMI POWER CONTROL PANEL B



NO.	CONTROL-INDICATOR	FUNCTION
		B ACMI POWER CONTROL PANEL
3	115 VAC Circuit Breaker	Provides 115 volt ac power to the AIS pod.
4	28 VDC Circuit Breaker	Provides 28 volt dc power to the AIS pod.
5	PUSH BUTTON	Two-position ON/OFF pushbutton switch. When pressed to the ON position, 28 volt dc and 115 volt ac power is applied to the AIS pod and the switch lights.

Figure 1A-52 (Sheet 2 of 2)

MISSILE SYSTEM

AGM-86B

A total of 12 AGM-86B ALCMs may be loaded externally on cruise missile pylons and eight AGM-86B missiles internally on the CSRL for launch against preprogrammed targets. Each left and right underwing pylon will accommodate six missiles. Missile unlock control and missile prearm require pilot-navigator action. Other missile armament monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators. For further information, refer to T.O. 1B-52H-30-4.

AGM-86C/D

A total of 12 AGM-86C/D CALCMs may be loaded externally on cruise missile pylons and eight AGM-86C/D missiles internally on the CSRL for launch against preprogrammed targets. Each left and right underwing pylon will accommodate six missiles. Missile types cannot be mixed at a given location. Missile unlock control require pilot-navigator action. Other CALCM monitor and control functions are provided at the navigators' station. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators. For further information, refer to T.O. 1B-52H-34-2-9.

AGM-129

A total of 12 AGM-129 (ACM) missiles may be loaded externally for launch against preprogrammed targets. Each left and right underwing pylon will accommodate six missiles. Missile unlock control and missile prearm require pilot-navigator action. Other missile armament monitor and control functions are provided at the navigators' stations. Missile programming and launch are navigator responsibilities. Jettison capability is provided the pilots and navigators. For further information, refer to T.O. 1B-52H-30-1.

NONNUCLEAR WEAPON DELIVERY SYSTEM

DESCRIPTION

The nonnuclear weapon delivery system provides the aircraft with a means of carrying, selecting arming options, and releasing nonnuclear weapons. Release methods associated with the suspension systems are OAS, D-2, and jettison.

CONVENTIONAL NON-MIL-STD-1760 WEAPON DELIVERY

For non-MIL-STD-1760 weapons, normal initiation of the release sequence comes from one of two sources. Either the OAS generates the release pulse based on parameters loaded in the system when the aircraft reaches the planned bomb release point or the radar navigator can manually initiate release using the D-2 switch.

Weapons may be released from only the internal load, only the external load, or both loads may be dropped on a single target. Weapons can be released in sequence from cluster racks and external stations at a normal rate (one at a time) or at a rapid rate (three at a time internal and four at a time external MER or two at a time external HSAB).

Internal weapons are released in the rapid mode (three at a time) one from each cluster rack. External weapons are released in the rapid mode (two at a time) one from each wing.

All B-52s have a separate jettison release system which when activated will release all internal and external weapons regardless of the suspension system. All external weapons are released simultaneously at the initiation of weapons jettison.

For further information on conventional weapons and the B-52 conventional weapon release system refer to T.O. 1B-52H-34-2-1.

MIL-STD-1760 WEAPON DELIVERY INTEGRATED CONVENTIONAL STORES MANAGEMENT SYSTEM

The Integrated Conventional Stores Management System (ICSMS) provides OAS control for release or launch of nonnuclear weapons. ICSMS was developed for MIL-STD-1760 weapons and also has the capability to handle standard nonnuclear weapons. The ICSMS operational computer program consists of a ground maintenance computer program (GMCP) and flight computer program (FCP). The FCP consists of the flight management system (FMS) and stores management overlay (SMO). The FMS controls navigation, radar, controls and displays, and supports the SMO. The SMO contains all weapon control delivery functions. ICSMS modified aircraft have the capability to handle any weapon SMO.

Functions performed by the SMO include weapon control processing, release point calculations, simulation processing, controls and displays processing, and built-in-test processing, etc. To perform its required functions, the SMO interfaces with existing aircraft weapon system components, the OAS sources of navigation, steering, controls and displays processing, mission data, and with the global positioning system (GPS) hardware.

All requirements for delivery of nonnuclear weapons can be accomplished automatically using stored mission data. Mission data is entered into the OAS from the flight computer program (FCP), which contains the SMO, via the data transfer unit cartridge (DTUC), or by supplemental manual operator position inputs by use of the keyboard.

For further information on MIL-STD-1760 weapons, B-52 Integrated Conventional Stores Management System (ICSMS), and aircrew procedures refer to T.O. 1B-52H-34-2-1 and the applicable 1B-52H-34-2 series manual. Figure 1A-53 lists the 1B-52H-34-2 series manuals and the weapon types they cover.

B-52H-34 Series Weapon Delivery Manuals

WEAPON TYPE	SMO NAME	T.O. NUMBER
CONVENTIONAL NON-MIL-STD-1760 GRAVITY WEAPONS	GRAVITY WEAPON (GWD)	1B-52H-34-2-1
WIND CORRRECTED MUNITION DISPENSER (WCMD)	WIND CORRECTED	1B-52H-34-2-5
JOINT DIRECT ATTACK MUNITION (JDAM)	DIRECT ATTACK	1B-52H-34-2-6
AGM-154 JOINT STAND OFF WEAPON (JSOW)	AGM-154 (JSOW)	1B-52H-34-2-7
AGM-158 JOINT AIR-TO-SURFACE STANDOFF MISSILE (JASSM)	AGM-158 (JASSM)	1B-52H-34-2-8
AGM-86C CONVENTIONAL AIR LAUNCHED CRUISE MISSILE (CALCM) AGM-86D CONVENTIONAL AIR LAUNCHED CRUISE MISSILE - PENETRATOR (CALCM PENETRATOR)	AGM-86 (CALCM)	1B-52H-34-2-9

Figure 1A-53

NUCLEAR BOMB DELIVERY SYSTEM

DESCRIPTION

The nuclear bomb delivery system provides the aircraft with a means of carrying, prearming, and releasing nuclear gravity weapons. On most aircraft the bomb bay has provisions to carry a CRSL rotary launcher. The CSRL has the capability to carry up to eight of the same type nuclear gravity weapon.

For gravity nuclear bomb releases, a functioning OAS with a powered NUC SLU is required. Information on the bombing system is contained in T.O. 1B-52H-25-2, NUCLEAR BOMB DELIVERY BASIC INFORMATION AND OPERATING PROCEDURES. The aircrew must be familiar with this manual to ensure an adequate knowledge of the requirements, limitations, and restrictions of the system.

NUCLEAR PRACTICE BOMBS

SMU-105/C INTERFACE SIMULATOR

The SMU-105/C Interface Simulator is designed to simulate the electrical logic interface of special weapons. A SMU-105/C is used on each CSRL station a simulated weapon is desired. If a BDU drop is to be accomplished, a special cable must be connected to the aft end of the MAU-12 bomb rack in order for the SMU-105/C to respond to the release signal.

NOTE

Switch settings for various weapons are printed on the SMU-105/C.

The SMU-105/C must be used to electrically simulate actual weapons when practice munitions such as the BDU-38 are to be released. If a BDU drop is to be accomplished, a special cable must be connected to the aft end of the MAU-12 bomb rack on the CSRL in order for the SMU-105/C to respond to the release signal. All prearm and monitor functions are accomplished through the OAS. Also, the CSRL does not use the PAL system, requiring PAL to be enabled prior to flight. Therefore, S1 switches will be set to (0) and the S2 switches to (1) when B61-7 or B83 weapons are simulated. If the S2 switch is set to (0) a PAL LOCKD error message for that bomb station will be displayed on FRMT-7. For CSRL releases with practice bombs loaded, a SMU-105/C for each bomb must be installed, and only one release per station is possible without an OAS recycle.

NOTE

Switch settings for various weapons are printed on the SMU-105/C.

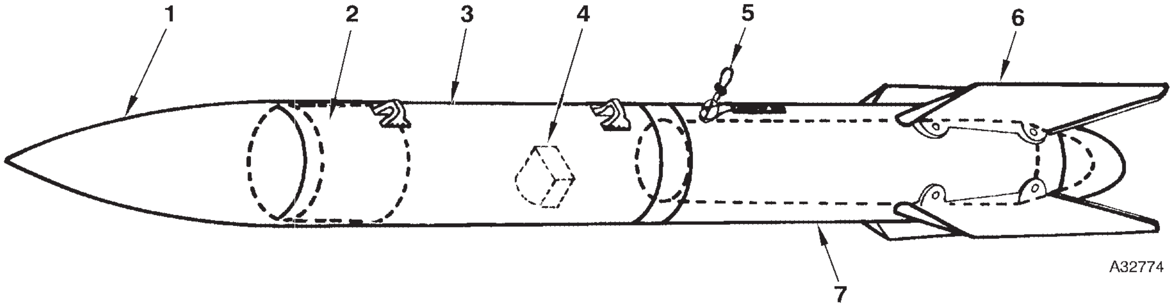
To simulate jettison with the SMU-105/C simulator installed, the aircrew will use the checklists in Section II of T.O. 1B-52H-25-2.

BDU-38/B PRACTICE BOMB

The BDU-38/B practice bomb (figure 1A-54) simulates the B61 flight characteristics by having the same configuration, weight, center of gravity, and moments of inertia. The practice bomb weighs 715 (±15) pounds, has a maximum diameter of 13.3 inches, and an overall length of 141.6 inches. The practice bomb consists of a nose section, center section, and aft section as depicted in figure 1A-54.

Release of the BDU-38/B practice bomb is accomplished through the normal or emergency aircraft bomb release circuits. As the bomb drops away from the aircraft, the pullout lanyard hardware is extracted which enables the circuit and starts the parachute delay timer. At the completion of the specified delay time the battery supplies power to activate the parachute deployment system. The timer is set by weapons maintenance personnel during installation of the battery pack. It can be set for 225, 550, or 1500 milliseconds. For B-52 carriage, the timer is set for 1500 milliseconds delay.

BDU-38/B Practice Bomb



1 NOSE SECTION
2 BALLAST
3 CENTER SECTION
4 BATTERY PACK
5 LANYARD HARDWARE
6 FINS
7 PARACHUTE DEPLOYMENT ASSEMBLY

Figure 1A-54

RENDEZVOUS RADAR AN/APN-69

DESCRIPTION

The APN-69 radar is used for in flight rendezvous. The set includes a receiver, transmitter, and a control panel which is located at the navigator's station. The beacon provides range and bearing information for an interrogating aircraft, using the radar-beacon mode of his radar, to "home" on the beacon signal. Transmissions are coded to permit positive identification between aircraft. The set operates on TR power and 118-volt single-phase ac power. A pressurization kit provides pressurization for the system waveguide. The controls for operating the pressurization kit are located at the navigator's station.

AN/APN-69 PRESSURIZATION PANEL

The APN-69 pressurization panel (see figure 1A-55), located at the navigator's station, contains an amber low pressure warning light and a two-position pressurization switch. The pressurization kit is provided with a relief valve that allows the exterior and interior pressures of the APN-69 waveguide to equalize during descent from altitude.

AN/APN-69 CONTROL PANEL

The APN-69 rendezvous radar control panel is shown in figure 1A-55.

NORMAL OPERATION

The following procedure is used to place the rendezvous radar in operation.

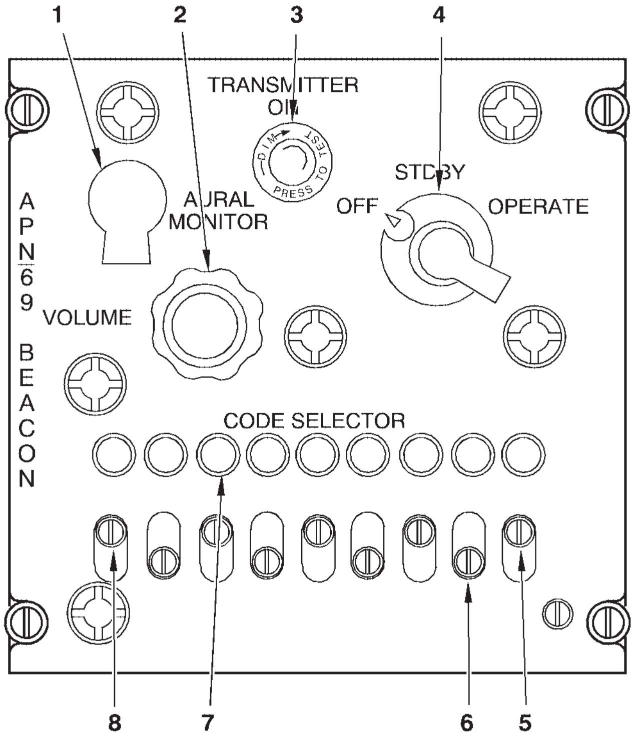
1. Place the power switch to STDBY.
2. Place pressurization switch to COMPRESSOR ON.
3. Allow approximately 3 minutes for warmup and place power switch to OPERATE. After the warmup period, the transmitter-on light will come on indicating that the set is ready for automatic operation and will reply to interrogating pulses of the proper characteristics.
4. Select code. As an example of a 3-2 code, the first (which is stationary and common to all code combinations), second, third, fifth, and sixth code selector switches would be in the up (on) position; all other code selector switches would be in the down (off) position. This would be a five-element code. Do not insert more than six code elements, including the stationary element, at one time.
5. The operation of the rendezvous radar may be monitored over the interphone by pulling the appropriate interphone mixer switch to the on position.
6. If it is desired to discontinue operation temporarily, place the power switch to STDBY. In this manner, the equipment is kept ready for immediate use.

CAUTION

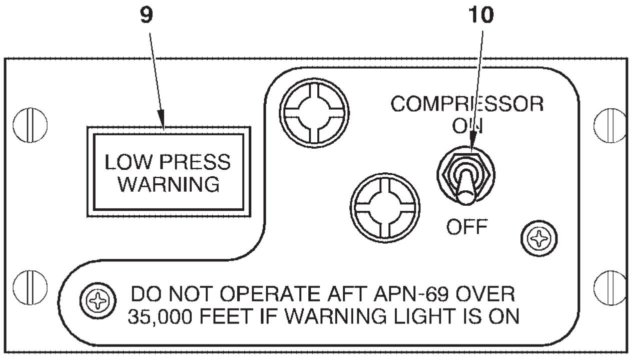
> Place power switch to STDBY, if the low pressure warning light illuminates, if above 35,000 feet pressure altitude. This will prevent damage to receiver-transmitter set.

7. To de-energize the equipment, place power switch to OFF and pressurization switch to OFF.

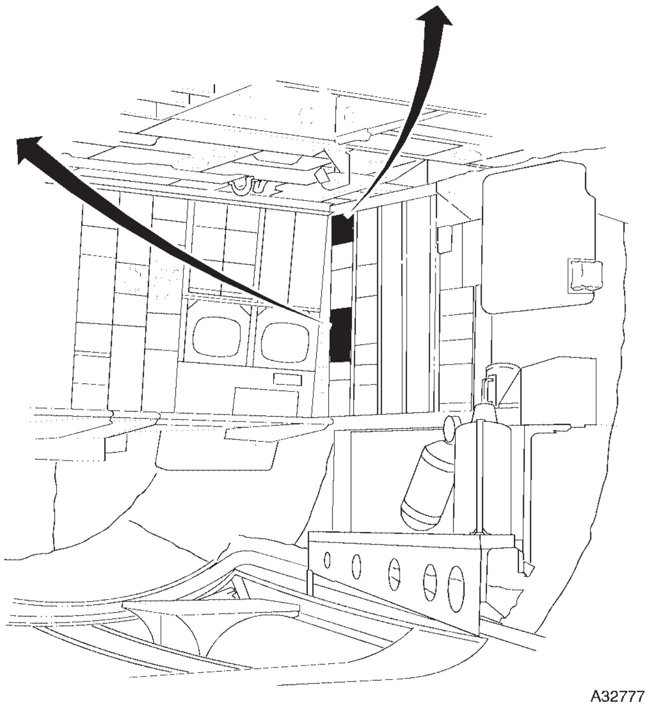
Rendezvous Radar Control Panels



A APN-69 CONTROL PANEL



B APN-69 PRESSURIZATION PANEL



1 MONITOR JACK
2 VOLUME KNOB
3 TRANSMITTER ON INDICATOR LIGHT
4 POWER SWITCH
5 CODE 9 SELECTOR SWITCH
6 CODE SELECTOR SWITCH (7 PLACES)
7 CODE SELECTOR INDICATOR LIGHTS (9 PLACES)
8 COMMON CODE SELECTOR SWITCH
9 LOW PRESSURE WARNING LIGHT
10 COMPRESSOR ON/OFF SWITCH

Figure 1A-55 (Sheet 1 of 2)

NO.	CONTROL-INDICATOR	FUNCTION
	A APN-69 CONTROL PANEL	
1	Monitor Jack	The monitor jack is used for test purposes. When a headset is connected to the jack, random noises (or periodic triggering of the system) may be heard and is indicative of set operation.
2	Volume Knob	The volume knob is used to adjust the audio signal level when monitoring the set over the interphone.
3	Transmitter On Indicator Light (green)	The green transmitter on indicator light illuminates when high voltage has been applied to the transmitter and indicates that the set is ready for operation.
4	Power Switch	A rotary-type power switch has OFF- - STDBY- -OPERATE positions. STDBY position supplies power to all system circuits except the high voltage circuits. OPERATE position completely energizes the system provided a 3-minute warmup period is observed after turning to STDBY. OFF position removes all power from the set.
5	Code 9 Selector Switch	The code 9 selector switch when set to ON causes the transmission of a special response when the OAS system is in operation.
6	Code Selector Switch (7 Places)	Seven code selector slide switches are used to set up the code combinations in the response transmission. The code element corresponding to an individual switch can be included in the reply by pulling out on the spring-loaded knob and sliding the switch to ON (up) position.
7	CODE SELECTOR Indicator Lights (9 Places)	Nine indicator lights indicate when the respective code element is included in the radar response.
8	Common CODE SELECTOR Switch	The common code selector switch corresponding to the first code element is stationary. This code element is common to all code combinations.
	B APN-69 PRESSURIZATION PANEL	
9	LOW PRESS WARNING Light (amber)	The amber low pressure warning light will illuminate if the pressure is allowed to decrease to 6.17 inches Hg (41,500 feet pressure altitude) and will remain illuminated until the pressure is returned to 8.35 inches Hg (35,000 feet pressure altitude). The illuminated low pressure warning light indicates damage to the rendezvous radar set may occur if it is operated, **CAUTION** If the warning light remains illuminated for a period of more than 15 minutes, the APN-69 pressurization switch should be placed to OFF position as the motor and pressurization pump are designed to operate not more than 15 minutes each hour.
10	COMPRESSOR ON/OFF Switch	The two-position pressurization switch with COMPRESSOR ON- -OFF positions controls a pressurization kit used to pressurize the APN-69 rendezvous radar waveguides. In normal operation, the pressurization kit holds the pressure between 7.2 and 8.88 inches Hg (38,000 and 33,000 feet pressure altitude).

Figure 1A-55 (Sheet 2 of 2)

LITENING Targeting Pod *[TP]*

DESCRIPTION

The LITENING Targeting Pod (TGP) (AN-AAQ-28) is an airborne targeting system which provides target acquisition, tracking and laser designation for an air to ground, day or night, beyond-visual-range precision strike capability.

The LITENING system supports the air-to-ground weapons delivery modes of the aircraft by optically tracking targets, ranging, providing laser designation for laser guided weapons, and laser spot detection for targets illuminated either by ground personnel or another aircraft.

It also provides enhanced situational awareness for night flight by displaying the infrared (IR) video image of the flight area on the TGP monitor.

WARNING

> The IR image is not a terrain following system and should not be used as a reference for flight. No steering cues are provided and no system integrity management is included for low level terrain following. Any terrain or obstacles in the immediate aircraft flightpath shall be able to be visually detected and manually avoided.

(ISR pod only) The LITENING ISR pod is a USAF LITENING pod with modification and additions that allow transmission of live video from the B-52 aircraft through the pod, to ground forces. This is accomplished by using the C-band transmission equipment originally from a Predator UAV that is installed in the pod. The three basic components that comprise the video link portion of the LITENING ISR pod are the Video Link LRU, the Transmitter Assembly and the Antenna.

The LITENING pod contains an infrared detector to generate video for display in the cockpit, automatic trackers for line-of-sight (LOS) stabilization, and a laser transmitter/receiver for ranging and designating targets.

The primary functions of the TGP are:

- Detect and acquire targets.
- Automatically track targets for electro-optical (EO) weapon and conventional bomb delivery.
- Provide laser range information for improved weapon delivery accuracy.

The LITENING pod also provides day and night vision of the target area using EO sensors:

- Charge coupled device (CCD) camera for day vision.
- FLIR sensor for day and night vision.

Designation and detection of ground targets using laser sensors:

- Target designation (lasing) by means of a Laser Designator and Rangefinder (LDR).
- Target detection and range finding by means of a laser spot detector and range finder.
- NVG pointing with a laser marker (LM).

Control over the LOS to which all the LITENING EO and laser sensors are pointed (LITENING TGP LOS):

- Internal slaving of the LITENING TGP LOS.
- Manual slew of LITENING TGP LOS for target search, identification, acquisition and track.
- Automatic tracking of targets received by the CCD/IR using an EO tracker. Inertial tracking is also provided.
- Automatic searching and tracking of laser spots received by the laser spot detector.

The LITENING pod provides the following sensors and designator:

FLIR – Fourth generation FLIR with three FOVs, Narrow, Wide and Super-Wide (video is 640 x 512 pixels, NARO FOV is 1° x 1°, Wide FOV is 4° x 4°, and Super-Wide is 24° x 24°); it is a high resolution thermal imaging system providing the pod with day/night attack capability. The FLIR also has a 2:1 digital zoom capability to aid in target acquisition and recognition.

CCD-TV – Charge couple device television with two FOVs (video is 768 x 494 pixels) that enhances stand-off capability during daylight operations. CCD-TV also has a 2:1 digital zoom capability to aid in target acquisition and recognition. The CCD is designed with two cameras which both have 4x digital zoom capability. One camera provides a wide angle (3.5 x 3.5 degree) field of view. The second camera provides a narrow (1 x 1 degree) field of view. The CCD assembly enhances long range target identification capabilities during daylight operations and also can be used to identify points of interest in very well lit areas at night.

(ISR pod only) ISR – The video link LRU contains a DC to DC converter, an Encoder, and a circuit card assembly that controls the video link functions. The Video Link Transmitter receives the signals generated by the Encoder, RF modulates them and passes the signal to the Video Link antenna. The antenna radiates the signals into the open air.

Laser Designator – The laser designator provides target designation for laser guided weapons delivery and active laser ranging for coordinate generation. The laser designator is a 100 milli-joule Neodymium-Yttrium Aluminum Garnet (Nd-YAG) laser with a wavelength of 1.06 microns and a beam divergence of approximately 0.4 milliradians. The laser pulse repetition frequency (PRF) may be changed as needed to allow weapon guidance in a multi-laser, multi-target environment with other designator platforms using differing PRFs.

A software training mode enables AGWCP switch actuation and integrated track handle (ITH) operation necessary for firing the combat laser and simulated weapons deliveries without actually firing the laser. The TL in the monitor is an indication of training mode operation and it will flash when the laser is commanded to fire, however no laser energy will be emitted. The laser range displayed in this mode will be calculated, not true laser range. Simulation of lasing is enabled by switching Combat mode to TRAIN (default setting), arming the laser on the A-G menu, entering a valid track mode and actuation of the ITH trigger.

LITENING Targeting Pod

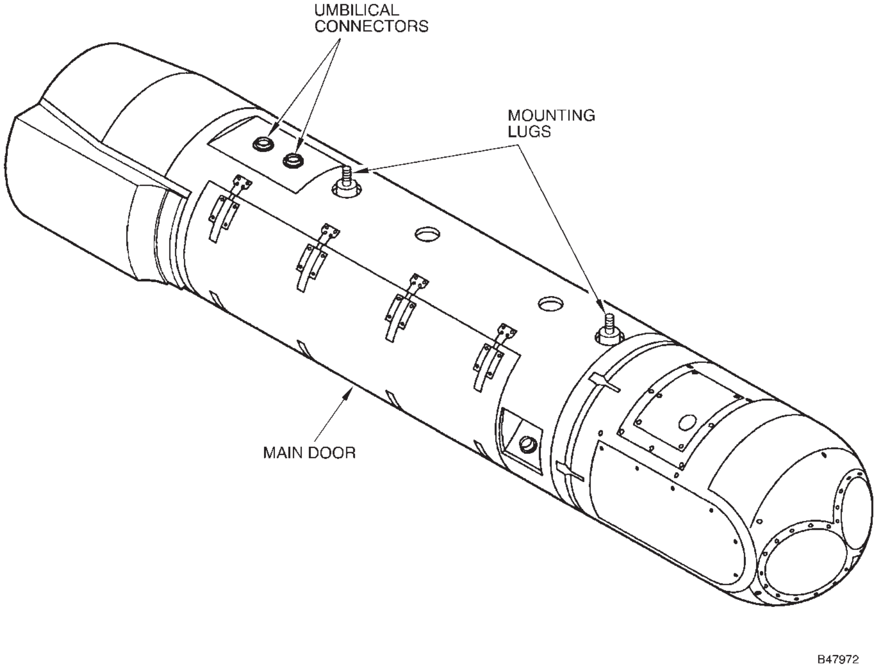


Figure 1A-56

Laser Marker – The laser marker provides laser illumination of targets during night operations. The laser marker is a 400 mW Gallenium Arsenide (GaAs) laser with a .808 micron wavelength and a beam divergence of approximately 1 milliradian. The beam flashes 3 times per second and can be seen by night vision goggles and other lowlight devices such as the B-52 STV.

LSS/T: The LSS/T feature allows the operator to search for targets which are designated by an off-board laser designator with the same characteristics as LITENING (1.064 micron wavelength). The targeting pod must be in a position to receive the reflected energy and a valid matching laser code must be entered via the AGWCP for subsequent tracking by the targeting pod. When a valid laser search code is entered, it is displayed on the AGWCP and on the right side of the monitor. Upon engagement of the LSS/T feature, the targeting pod monitor symbology freezes on the last scene, the arms of the cursor extend to the edge of the monitor, and the pod initiates a search based on field of view of the sensor. WFOV will search an area 4km x 4km centered around the TGP LOS, and NFOV searches a pattern covering an area 2.5km x 2.5km.

Inertial Navigation System – The LITENING TGP's Inertial Sensor Unit (ISU) stabilizes the sensor LOS and aligns the sensor to the aircraft.

Since the LITENING TGP has its own ISU, when the pod is in a track mode and the picture quality degrades or the pod FOV becomes masked, the TGP will go into an inertial track (INR Track) to maintain the track until the condition that caused the INR Track disappears. If the TGP cannot reacquire the original tracked target, the INR Track will continue until operator action occurs.

The LITENING TGP has four modes:

- OFF
- Stand-by (STBY)
- Air-to-Ground (A-G)
- Built-in-Test (BIT)

The A-G submodes available to the LITENING TGP are:

- Slave (Ground)
- AREA Track
- POINT Track
- INR Track
- Laser Spot Search
- Slew
- Multi-Target Cueing (MTC)

The LITENING pod installs on the right wing 559 station between the third and fourth engine nacelles. The pod is approximately 87 inches long and 16 inches in diameter and weighs approximately 465 pounds. The pod contains an interface unit, power supply, system electronics unit, IR electronics unit, and an environmental control unit (ECU).

TGP ISR Antenna

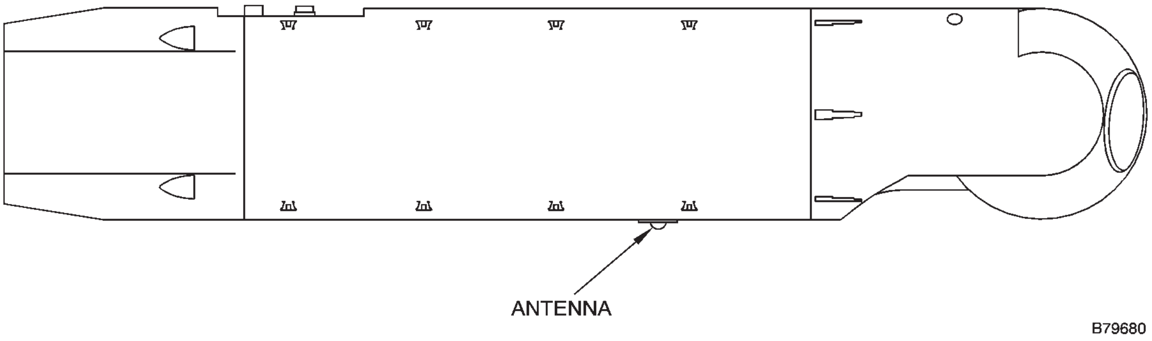


Figure 1A-56A

The TGP gimbal system provides a field-of-regard with the capability of pointing everywhere except a 30-degree half angle cone directly behind the pod. The pod can provide imagery and lasing within the field of regard except where the LOS is blocked by aircraft structure or external stores as defined by the laser mask zone (see Masking, this Section). The gimbal system is limited to ±400 degrees in roll angle, and will perform a gimbal unwind action under certain conditions prior to reaching this roll limitation.

The LITENING pod consists of three main sections:

- Forward Section – a stabilized observation system that contains three on-gimbal EO sensors (FLIR Thermal Imaging System (TIS), CCD Camera, and Laser Spot Detector), a Laser Designator, Inertial Sensor Unit (ISU), a LOS control mechanism and several components of the Environmental Control System (ECS).
- Rear Section – consists of the wired rear section and electronic units of the pod. This section provides the electrical interfaces between all pod sections and units, as well as between the pod and the aircraft. The electronic units control and support the functionality of the forward section and the environmental control unit and provide the entire functionality of the LITENING pod system.
- Environmental Control Unit (ECU) – The major part of the pod's environmental control system, which provides temperature control for the internal space of the pod.

An interface unit, power supply, system electronics unit, FLIR electronics unit, and an environmental control unit are contained within the pod. The ECU uses ambient air from an air scoop through a heat exchanger to provide cool/heated air to maintain optimal operating temperatures within the pod.

(ISR pod only) In the event that the Video Link draws an excessive amount of current, the circuit breaker is designed to turn off the Video Link before either the pod or aircraft circuit breakers are tripped. The Video Link will not transmit if the circuit breaker is tripped, though the VCR should still be able to record.

LITENING Targeting Pod Internal Structure

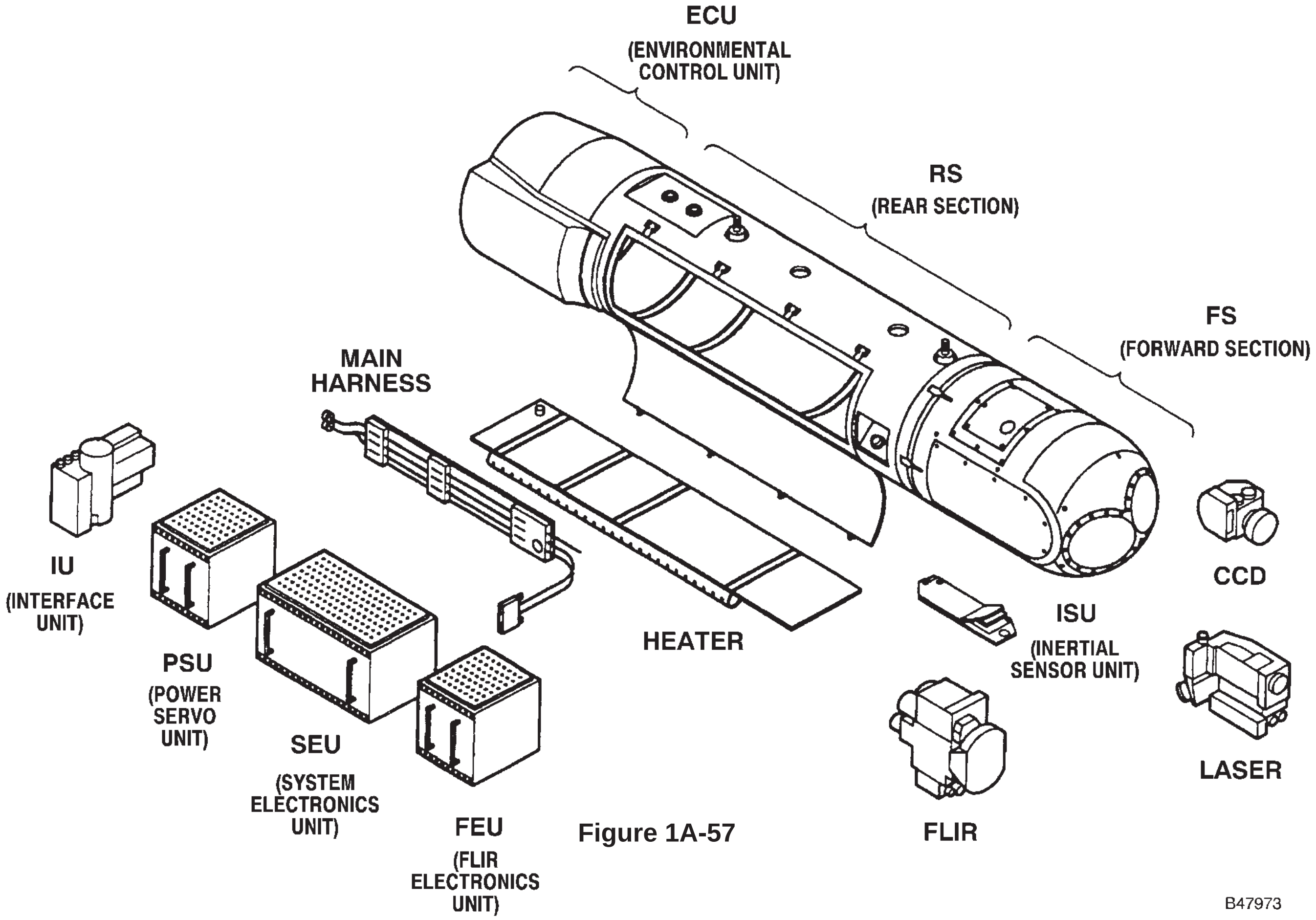


Figure 1A-57

TGP ISR Components

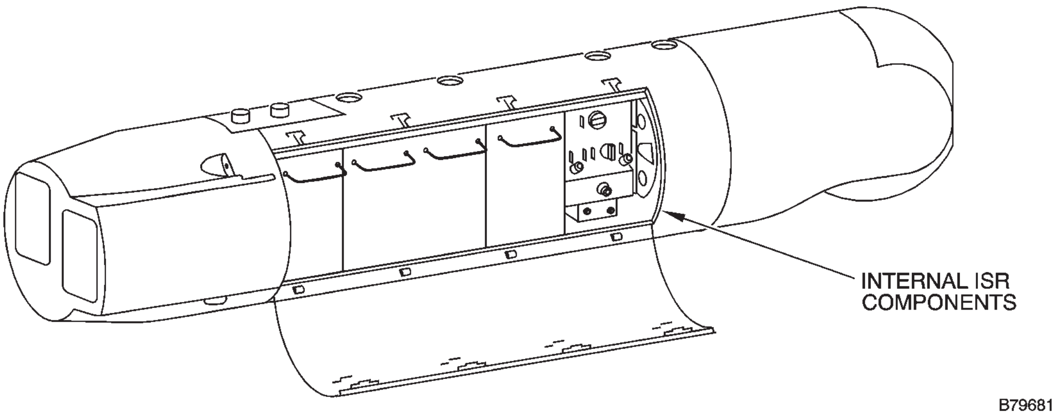


Figure 1A-57A

TGP CONTROL AND MONITORING EQUIPMENT

LITENING TGP control and monitoring are accomplished at the radar navigator's station when a TGP-coded IUS has been loaded. The OAS, in conjunction with the Interface Unit (IU) and other existing and modified aircraft equipment, provides the means for operating the TGP, allowing the radar navigator control of the pod. The IU interfaces with the Advanced Guided Weapons Control Panel (AGWCP), the Integrated Track Handle (ITH), and the monitor. TGP functions are enabled, with primary control through the Advanced Guided Weapons Control Panel (AGWCP), when the B-52 is configured with a 659-12700-1 IU (-603) and loaded with a TGP-coded IUS. This configuration allows the operator control of all TGP functions through the AGWCP, Integrated Track Handle (ITH) and Video Monitor. Integration of the TGP should not be considered a full integration since there is no unique TGP SMO or direct interface to the OAS through the Flight Management System (FMS). A TGP configured B-52 will operate with any Stores Management Overlay (SMO) load.

WARNING

When employing the TGP to target weapons or to extract target coordinates for the purpose of targeting weapons with the CALCM SMO, ensure both INSs are in GPS-aided mode. Failure to do so could result in erroneous information being sent to the weapon with a resultant weapon impact on an unintended location.

The AGWCP Logic Tree (figure 1A-58) outlines the menus and pages that are available with a TGP-configured aircraft. AGWCP control is enabled once IU power is applied. The normal TEST PAGE display is presented upon power application. From there the number 7 key indicates TGP. This indicates a successful DDLC load and is the first indication that the IU has accepted the TGP-configuration. Selecting the TGP menu key accesses the STATUS MENU, and from the STATUS MENU the operator can access all LITENING TGP menus and pages.

INTERFACE UNIT (IU)

The IU used with LITENING interfaces with the AGWCP, the ITH, and the video monitor. It also provides limited interface with the TGP. IU power application is controlled through the Interface Unit Control Panel at the navigator's station.

INTEGRATED TRACK HANDLE (ITH)

The ITH (figure 1A-59) provides the method for TGP video azimuth and elevation slew commands, allows for selection of inertial, area or point tracking, provides sensor Field of View selection, polarity selection when in FLIR, and allows the operator to designate the target using the pod's designator or marker. When enabled by commanding track, movement of the ITH grip left or right generates azimuth slew commands, and movement forward and aft generates elevation slew commands. The pod must be in one of the three tracking modes (inertial, area or point track) in order for the pod to be slewed. Track entry is accomplished by depressing the breaklock button and selecting a track mode with the thumb toggle.

ADVANCED GUIDED WEAPONS CONTROL PANEL (AGWCP)

The AGWCP (figure 1A-59) is a digital keyboard whose key functions change based upon the menu or page being displayed at the time. The AGWCP, along with the ITH, provides operator control of the TGP.

Advanced Guided Weapon Control Panel/Targeting Pod Logic Tree

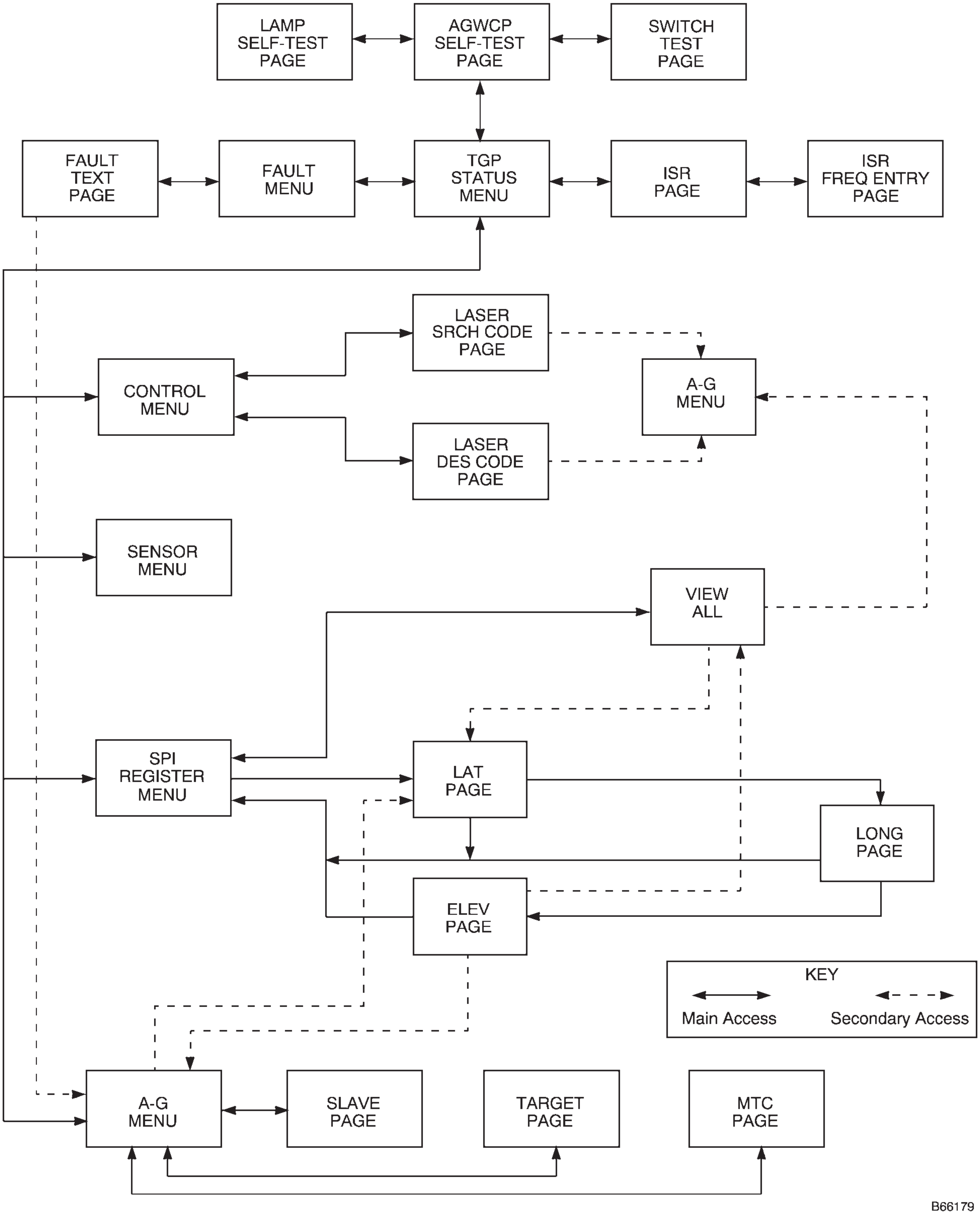
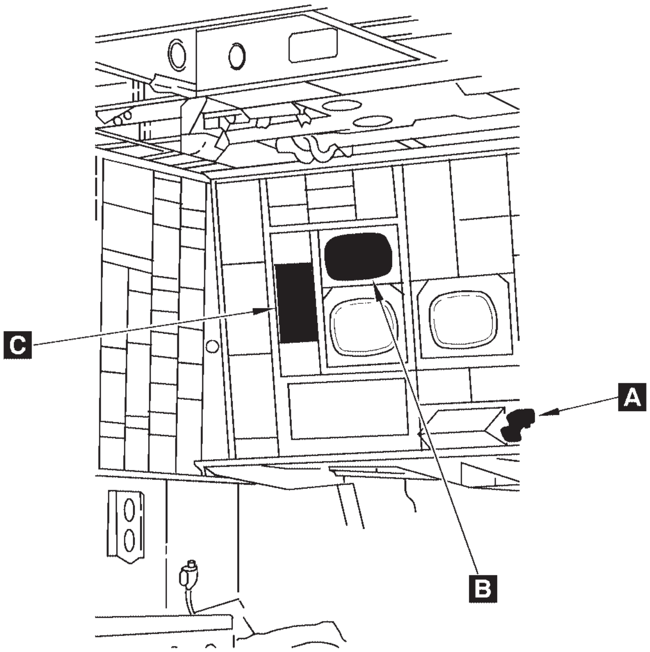
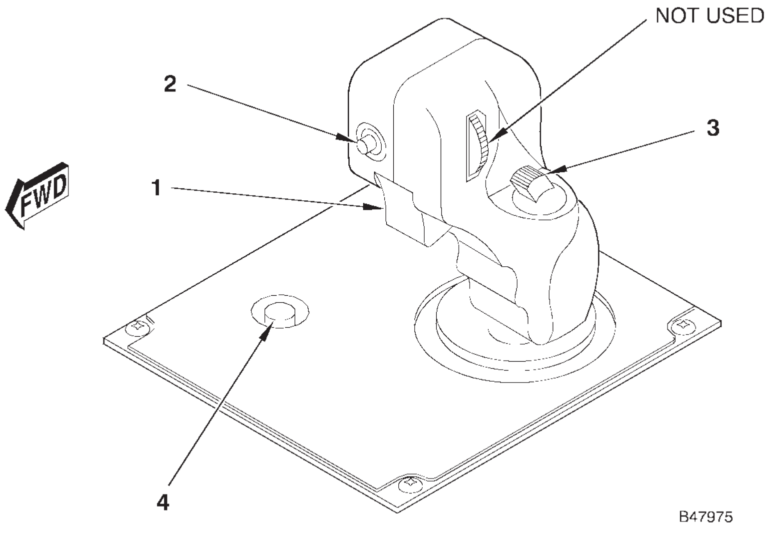


Figure 1A-58

LITENING Targeting Pod Controls and Indicators



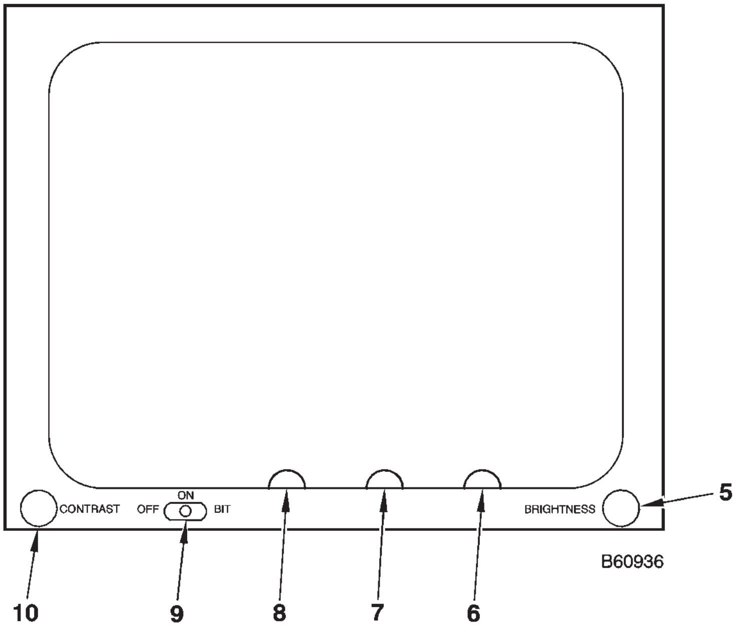
RADAR NAVIGATOR'S STATION



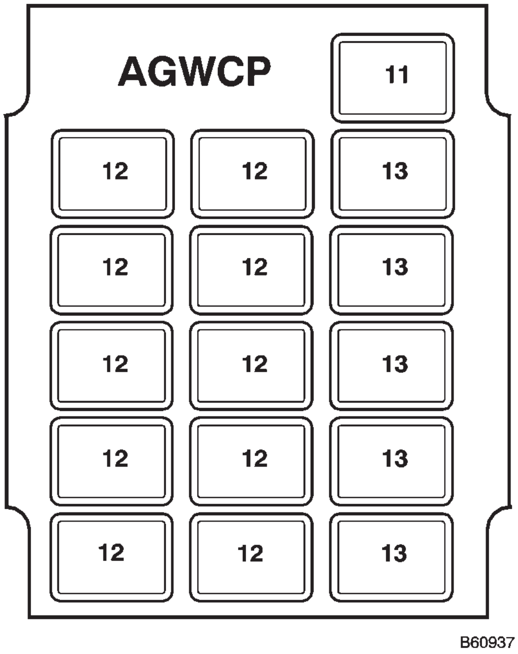
A INTEGRATED TRACK HANDLE

Figure 1A-59 (Sheet 1 of 3)

LITENING TGP Controls and Indicators (Cont)



B VIDEO MONITOR



C ADVANCED GUIDED WEAPONS CONTROL PANEL

Figure 1A-59 (Sheet 2 of 3)

NO.	CONTROL / INDICATOR	FUNCTION
	A INTEGRATED TRACK HANDLE	
1	Trigger Switch	Three-position trigger type switch, used to fire the laser or marker, depending on which has been selected/enabled on the AGWCP. When pulled in halfway and released, the half-action switch engages and enables continuous fire command. Pulling the trigger past the first stop to the second stop (full-action) and holding enables manual fire command until the trigger is released.
2	FOV Switch	A dual-function, spring-loaded, pushbutton switch.Toggles between Wide/Narrow and SW FOV when enabled. Indicator on SENSOR menu on the AGWCP reflects the current selection.
3	Thumb Toggle Switch	Two-Way (forward and aft) toggle switch with duplex functions (one click FWD/AFT and two-clicks fast FWD/AFT). <u>Primary Functions</u>: AREA TRACK, POINT TRACK, WHOT, BHOT, CCD, FLIR commands. One click FWD commands AREA TRACK. One click aft, commands POINT TRACK. Two clicks forward, toggles POLARITY. First time commands WHOT, second time commands BHOT. Two clicks aft, toggles SENSOR SELECT. First time commands CCD, second time commands FLIR. SENSOR menu on the AGWCP reflects the CCD/FLIR selection. <u>Secondary Functions</u>: GAIN, ZOOM, SYM, and FOCUS adjustments; active when operator selects GAIN, SYM, and FOCUS from the SENSOR menu or ZOOM and GAIN from the A-G menu. Use the thumb toggle to adjust these functions as required. Must deselect these functions from the appropriate menu, or switch to another page to return the thumb toggle to the primary functions. Selecting a different focus button also cancels focus.
4	Break Lock Button	Pushbutton switch, used to enter INERTIAL TRACK and break AREA or POINT TRACK mode. Also used to break lock when using LASER SPOT SEARCH and TRACK (LSS/T) mode.
	B VIDEO MONITOR	
5	BRIGHTNESS Knob	Controls the brightness of the monitor display. Moving the knob cw causes the display to brighten and moving the control ccw causes the display to dim.
6	Height Knob	Minimizes/Expands monitor video vertically. Ensure coordinate data is visible on the bottom right edge of the monitor.
7	Horizontal Hold Knob	Adjusts the monitor picture horizontally. Ensure coordinate data is visible on the bottom right edge of the monitor.
8	Vertical Hold Knob	Adjusts the monitor picture vertically.
9	Power Switch	A three-position toggle switch marked OFF -- ON -- BIT. In the OFF position, no power is applied to the monitor. In the ON position, the video picture is displayed. In BIT, the built-in-test function is accomplished.
10	CONTRAST Knob	Adjusts the contrast of the display for the sharpest picture.
	C ADVANCED GUIDED WEAPON CONTROL PANEL	
11	Pod Status Indicator	Indicates TGP status, TGP power status, the page currently being displayed, or RETURN. This is normally a display light only and not a functioning key. Blinks in all menus if an active fault is being reported.
12	Page/Function Keys	Two columns of five keys, each displaying software-generated legends for functions or modes tied to the current menu.
13	Menu Keys	One column of five keys, each displaying a menu used to access the function or page keys. Pressing one of these keys will cause that menu title to underline, indicating that the selected menu is active.

Figure 1A-59 (Sheet 3 of 3)

VIDEO MONITOR

The video monitor (figure 1A-59) displays TGP line of sight video, including FLIR and CCD, TGP symbology, and various data. The resolution scan of the monitor is 15,750 pixels, with 525 lines at 30 Hz. Figure 1A-61 defines the symbology on the video monitor in the various operating modes. The controls on the monitor include the brightness knob, power switch, contrast knob, vertical hold knob, horizontal hold knob, and height knob. The power switch is a three-position toggle switch marked OFF-ON-BIT. In the OFF position, no power is applied to the monitor. In the ON position, the video picture is displayed. In BIT, the built-in-test function is accomplished. The BIT is a nine-step linear scale display with six equally spaced horizontal lines (figure 1A-60).

Video Monitor Built-in-Test

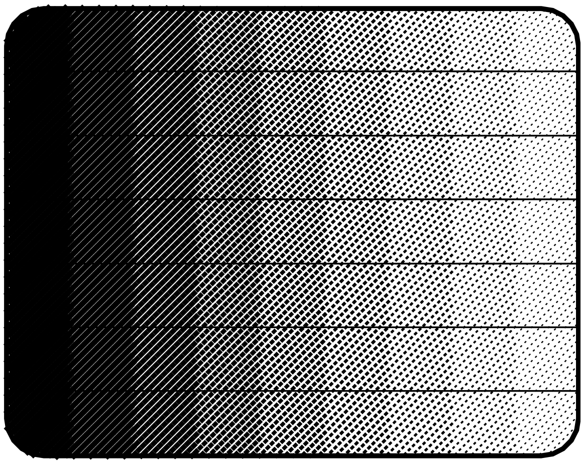

A27999

Figure 1A-60

Additional Video Monitor Symbols (AT POD ONLY)

TGP EQUIPMENT VERSION LIST

The TGP Equipment version list appears on the video for a limited time in the PBIT and the IBIT modes. An example is shown below:

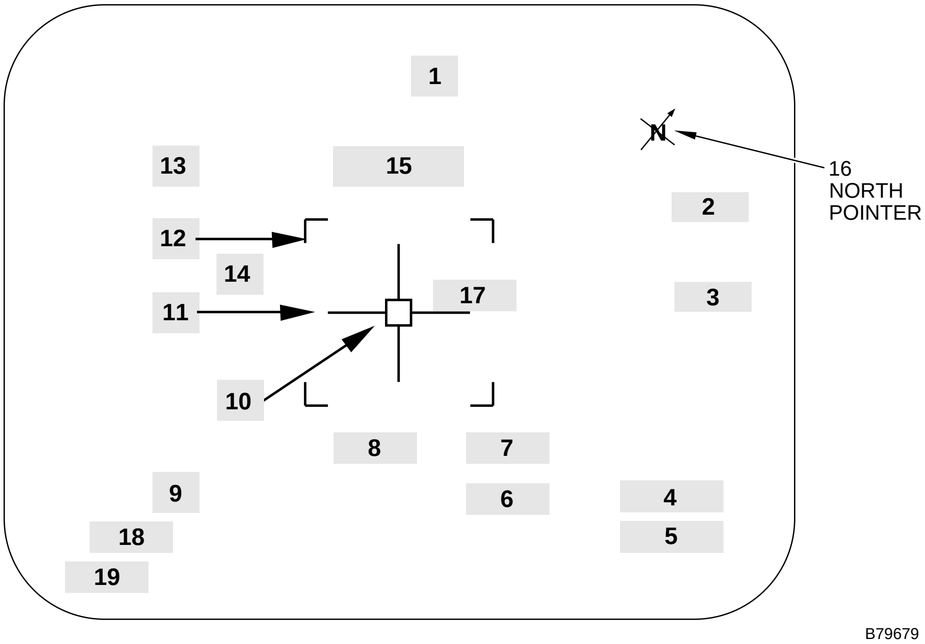
S/W VER BB58A
MSK VER 12
LSR VER 10
S/W CSM OK
A/C VER 114
FLIR VER K9 1G
SIP VER BBA1

The current TGP software version will be indicated on the SW VER line. The IU software version number is indicated on the AC VER line and is the same as on the PKB key.

CALIBRATION SYMBOL

A flashing CAL will appear in the upper left quadrant of the TGP video during a long or short calibration.

Video Monitor Displays



NO.	LEGEND	FUNCTION
1	SA Cue	Small square symbol. Represents the azimuth and elevation presentation of the TGP LOS relative to its bore sight. For example, if the TGP is looking directly in front of the aircraft, the SA cue will be at the top center of the Monitor Display. If the aircraft is overflying the SPI and the TGP is looking directly down on the SPI, the SA cue would be in the center of the display. The LOS from the center to the SA cue represents relative bearing, and distance from the center to the SA cue represents elevation (–90 degrees at the center and 0 degrees at the periphery).
2	LASER/MARKER ENABLED/DISABLED INDICATOR	Indicates whether the laser or marker has been enabled or is disabled. LM/D = Disabled, LM/E = Enabled, BOTH = Both Laser and Marker enabled.
3	Laser Spot Search (LSS) Code (NNNN)	LSS CODE. Displays LSS code label (NNNN = valid laser code). NCOD indicates corrupted software laser code tables. Laser code table must be reloaded by maintenance.
4 - 5	Target Coordinates	Target Coordinates in multiple reference systems: Lat/Long, Military Grid Reference System (MGRS) or Range/Bearing. Reference is controlled using the AGWCP. Default system is Lat/Long.
4	Latitude ((N/S) DDMMmmm) or	LATITUDE. Computed latitude at the TGP LOS point (center of cursor gap). Displays XXXXXXXX when coordinate data is not valid.
	Grid Zone/Square (GGG SS) or	Grid Zone/Square. Computed Grid Zone and Square designations of the MGRS coordinates at the TGP LOS point (center of cursor gap).
	Bearing/Range (Blank)	This area will be blank when using the Range/Bearing reference system.
5	Longitude ((E/W) DDDMMmmm) or	LONGITUDE. Computed longitude at the TGP LOS point (center of cursor gap). Displays XXXXXXXX when coordinate data is not valid.
	Easting/Northing (EEEE NNNN) or	Easting/Northing. Computed MGRS Easting/Northing for the corresponding Grid Zone and Square coordinates at the TGP LOS point (center of cursor gap).
	Bearing/Range (BBB RR)	Bearing/Range. Computed Range and Bearing to the TGP LOS point (center of cursor gap).
6	Elevation (NNNNN)	ELEVATION. Computed elevation in feet at the TGP LOS point (center of cursor gap). Displays XXXXX when elevation data is not valid.

Figure 1A-61 (Sheet 1 of 6)

Video Monitor Displays (Cont)

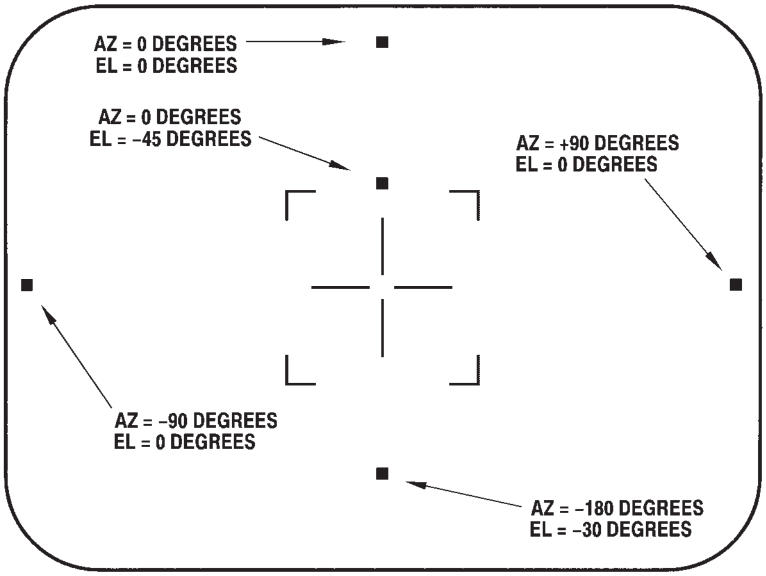
NO.	LEGEND	FUNCTION
7	Laser/Marker Indicator	Displays an L for laser or MARK for Marker when either the laser or marker has been enabled via the LASER or MARKER button on the A-G Menu. The letter flashes when the laser or marker is firing. Not present when neither is selected. Indications and definitions include: L: Laser is enabled and armed. Flashes when firing. MARK: Marker is enabled and armed. Flashes when firing. M: Laser masked. Crosshairs flash when about to enter mask zone. T: TGP laser is in training mode. TL: Laser armed in training mode. Flashes when simulating laser firing.
8	Track Status	Displays TGP track status, indicated by the following: INR – Inertial Track; selected via the INR TRACK button on the ITH. AREA – Area Track; selected via the thumb toggle on the ITH. POINT – Point Track; selected via the thumb toggle on the ITH.
9	Pod Slant Range (X NNN.n)	Pod Slant Range. Distance from the aircraft to the SPI in nautical miles (NNN.n = 000.0 to 999.9). Range is in feet in 100 ft increments if the range is less than one mile. Also displays the quality of the distance value (X), indicated by the following codes: L = Laser computed range, must be receiving valid laser energy. T = Estimated from Pod ISU, usually acquired while in a track mode. E = Estimated from Pod ISU (lower quality than T). XXX = Invalid.
10	Point-Track Cue	A box located in proximity of the cursor gap, the point-track cue indicates the area being point tracked. When point tracking a moving target the tracking box does not always bound the target.
11	Cursor	Indicates TGP aiming point, with laser, marker and sensors bore-sighted to the center of the cursor gap. Cursor dimensions can be calculated based on slant range to the SPI and zoom value. Cursor will be capped when using Marker. Cursor will extend to edges of monitor screen when in LSS/T. Flashing cursors indicate in-mask warning zone.
12	FOV Indicator	Displays the WFOV limits when in FLIR SWFOV (not available in CCD). Corners of brackets are cropped when in SWFOV. Displays NFOV limits when WFOV is selected for both FLIR and CCD. Not present when in NFOV.
13	Slew direction and pressure	Slew direction and pressure is displayed only when the pod head is moving. The format is xd, where x is the pressure (1 to 8), and d is the direction (U,D,L,R).
14	REC	The VCR is recording.
15	Gimbal Roll > or Gimbal Roll <	This warning will be displayed in the middle of the Video Monitor just above the crosshairs. This is an indication that the targeting pod turret is approaching the roll travel limit. The indication will flash when turret passes 200° of roll. The warning will display steady when the turret passes ± 240° of roll. The gimbal limit can be avoided by banking the aircraft in the direction of the direction cue or slewing the turret opposite the direction cue. If the roll limit is reached, (± 400°) the turret will automatically counter-rotate approximately 360° and re-establish the previous tracking mode on the LOS based on INR tracking information.
16	North Pointer Symbol	Indicates the relative direction of Magnetic North. Blanked when Line of Sight is above the horizon.
17	Yardstick Symbol	Indicates the distance spanned by the right crosshair. The value will display (+++++) when the value is out of range, ie., 10,000 meters/23808 feet. Dimensions value will display KM and M for Kilometers and Meters, feet designation will not be displayed. Operators should use caution when using vertical fiducials to make measurements or when estimating ground distances in the vertical axis of the TGP crosshairs.

Figure 1A-61 (Sheet 2 of 6)

NO.	LEGEND	FUNCTION
18	Transfer Alignment Quality (TXA) x TXA	Transfer Alignment Quality (x), where x is the quality value and ranges from 1 to 10. x = 1 to 3, TXA quality is good x = 4 to 6, TXA quality is degraded x = 7 to 10, TXA quality is marginal to unsatisfactory Aircraft turns will improve TXA quality.
19	FLIR Polarity	
	WHOT	TGP sensor is FLIR and polarity is white hot.
	BHOT	TGP sensor is FLIR and polarity is black hot.
	CCD	TGP sensor is CCD.

Figure 1A-61 (Sheet 3 of 6)

Video Monitor Display – Situational Awareness Cue



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Video Monitor Display – Marker Armed/Firing

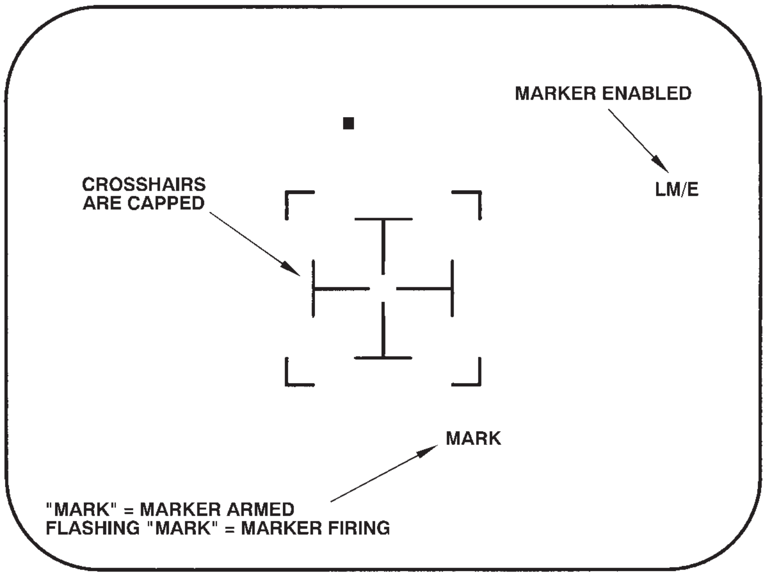

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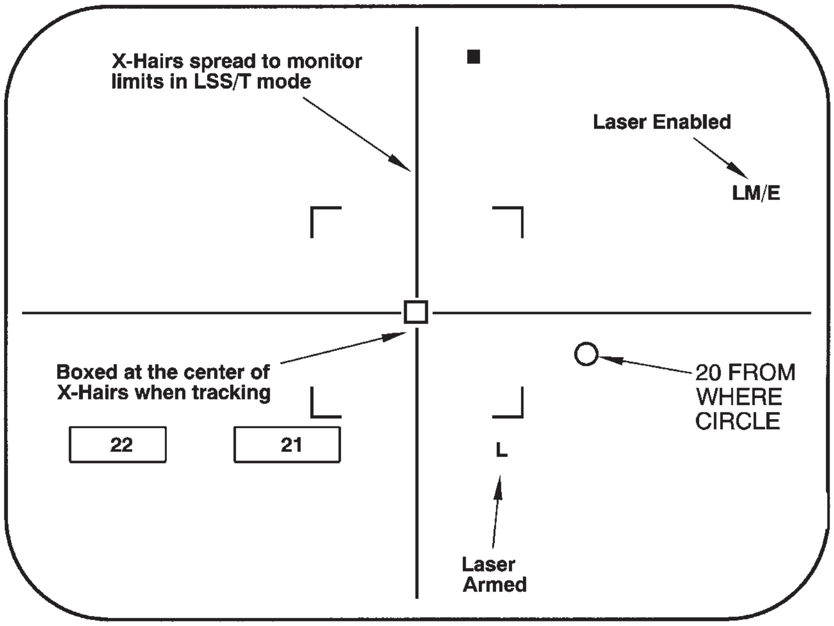
Figure 1A-61 (Sheet 4 of 6)

Video Monitor Displays (Cont)

VIDEO MONITOR DISPLAY – LASER SPOT SEARCH/TRACK INDICATIONS



VIDEO MONITOR DISPLAY – MTC MANUAL FLAGS

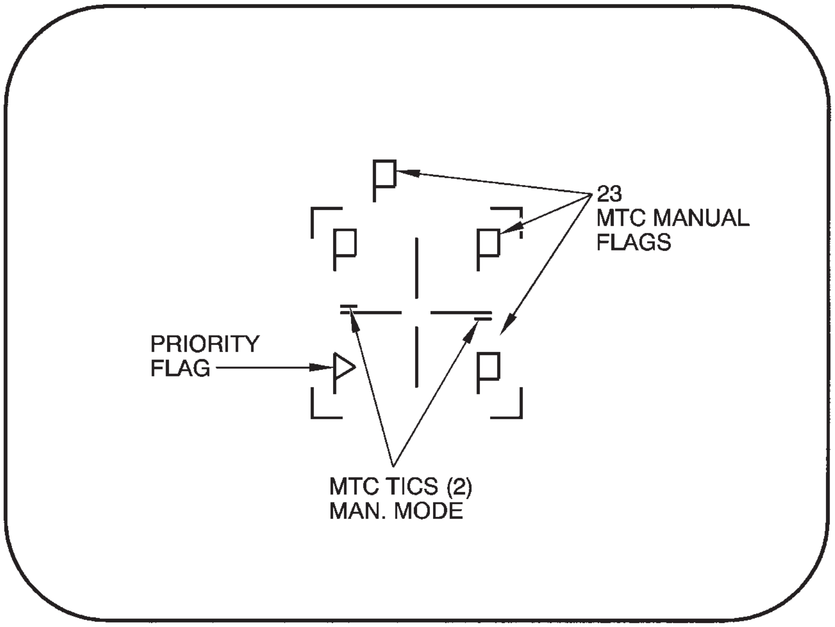


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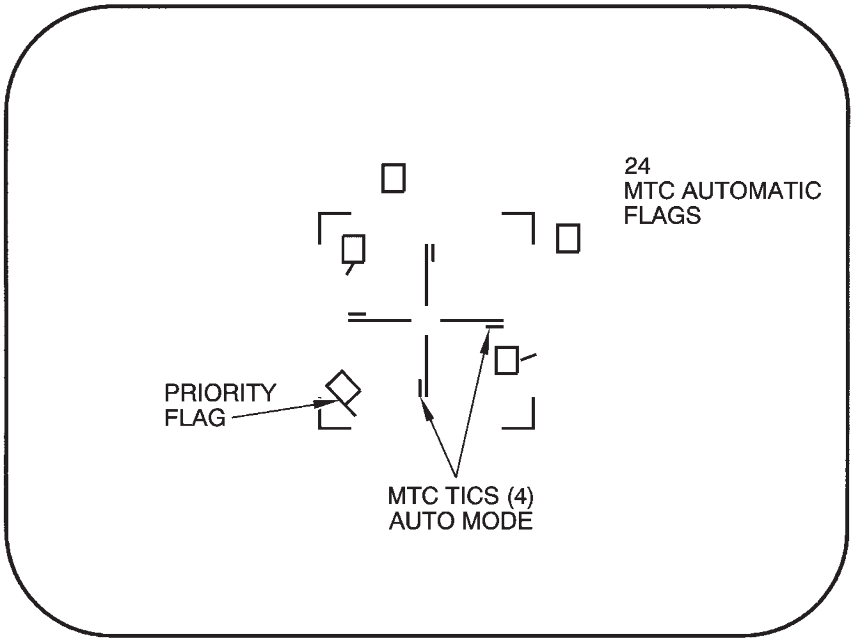
Figure 1A-61 (Sheet 5 of 6)

VIDEO MONITOR DISPLAY – MTC AUTOMATIC FLAGS



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NO.	LEGEND	FUNCTION
20	From Where Circle	Shows the Line of Sight prior to search, for 10 seconds after initiating LSS/T. It is shown an additional 10 seconds if the designator is fired within 10 seconds after leaving LSS/T. If the location is off screen, the circle will have an X at the screen edge to indicate direction.
21	Track Status	Displays track status as indicated by the following: LTRACK = Indicates active tracking of reflected laser energy which corresponds to the preset laser search code. SPOT LOST = Indicates laser energy which was previously tracked has been interrupted or terminated. TGP degrades from active laser track to INR tracking mode.
22	DETECT	Indicates the detection of laser energy within the search field of view. Video picture will remain frozen until TGP slews to the location of detected energy.
23	MTC Manual Flags	Multi-Target Cue Manual Flags can be located anywhere on the TGP video. Flags are centered with a + (plus sign) inside the flag when it first appears at the center of the field of view. A total of 10 manual flags are possible, including one priority designated flag. A new manual flag addition will invoke point track. The TGP will reject a new manual flag on top of an existing flag if a + (plus sign) is displayed in the existing flag.
24	MTC Automatic Flags	Multi-Target Cue Automatic Flags can be located anywhere on the TGP video and are added automatically per TGP criteria. A total of 5 automatic flags are possible, limited by the operator's AGWCP selection. The flag's tail indicates target speed and direction.

Figure 1A-61 (Sheet 6 of 6)

AGWCP/TGP DISPLAYS

The AGWCP/TGP displays various menus and pages for operator interface (figures 1A-62 through 1A-79). The menu currently being displayed is underlined on one of the five lower keys in the right column of the panel. The exception is the SPI menu which takes the operator directly to a page that allows modification or confirmation of System Point of Interest (SPI) coordinate data. The AGWCP/TGP display logic tree is shown in figure 1A-58 and includes the following primary menus and pages:

DISPLAY	FIGURE REFERENCE
AGWCP	
Self-Test Page	Figure 1A-62
Lamp Test Page	Figure 1A-63
Switch Test Page	Figure 1A-64
TGP	
Status Menu	Figure 1A-65
ISR Page (ISR only)	Figure 1A-66
ISR Frequency Page (ISR only)	Figure 1A-67
Fault Menu	Figure 1A-68
Fault Text Page (AT Pod Only)	Figure 1A-69
Control (CONTRL) Menu	Figure 1A-70
Designator Code/ Search Code Pages	Figure 1A-71
Sensor Menu	Figure 1A-72
Air-to-Ground (A-G) Menu	Figure 1A-73
SPI Page	Figure 1A-74
SPI View All Page	Figure 1A-75
SPI Coordinate Pages	Figure 1A-76
Slave Page	Figure 1A-77
Target Page	Figure 1A-78
MTC Page	Figure 1A-79

AGWCP SELF-TEST PAGE

The AGWCP Self-Test page is automatically displayed on the AGWCP when the panel is activated by applying power to the IU. The Self-Test page allows the operator to test the functionality of the AGWCP. This page also serves as a jumping off point for the TGP and IUSOs and allows the operator to access the Lamp Test and Switch Test pages. The Self-Test page keys and their functions are described in figure 1A-62.

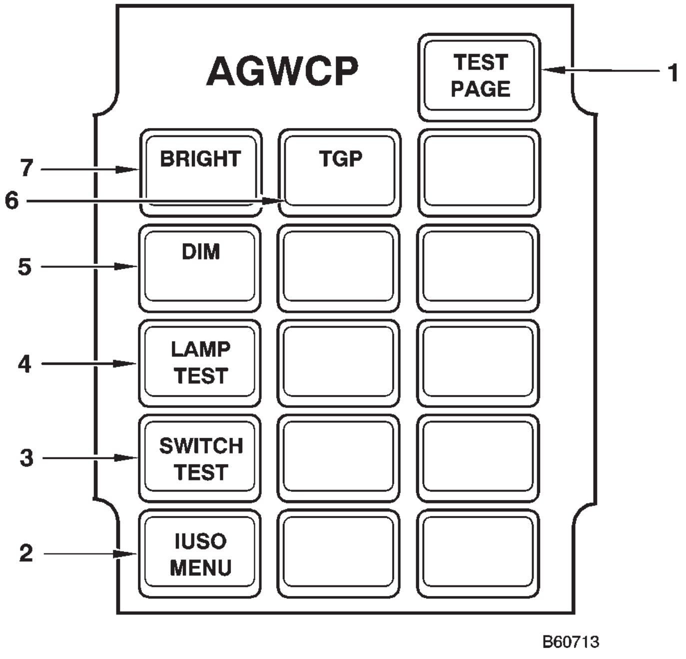
AGWCP LAMP TEST PAGE

The AGWCP Lamp Test page is used to inspect the operation of all of the keys on the AGWCP. When the AGWCP Lamp Test page is first displayed, it will appear as figure 1A-63. The blackened areas in the illustration depict illuminated pixels. These allow the operator to examine all pixels for proper illumination. Pressing any key will return the AGWCP to the Self-Test page.

AGWCP SWITCH TEST PAGE

The AGWCP Switch Test page is used to assess the response of the AGWCP to the selection of a switch by the operator. Upon display of the Switch Test page, all buttons will display the text PRESS SWITCH. When the operator selects any of the buttons, the text in the button will change to EXIT, assuming the AGWCP acknowledged the switch selection. An example of the Switch Test page after selecting buttons 5 and 10 can be found in figure 1A-64. If the user presses any button with EXIT displayed, the AGWCP will return to the SELF- TEST page.

AGWCP Self-Test Page



KEY	LEGEND	FUNCTION
1	TEST PAGE Indicator	Identifies this as the Test Page. This is a display indicator only and is not a functioning key on this page.
2	IUSO MENU Key	Pressing this key accesses the IUSO pages. If an IUSO is not loaded, this button will be blank and the switch will not respond. The text in this box is IUSO defined.
3	SWITCH TEST Selection Key	Pressing this key accesses the Switch Test page.
4	LAMP TEST Selection Key	Pressing this key accesses the Lamp Test display.
5	Dimmer Key	Pressing this key reduces the light intensity of the keys.
6	TGP Status Menu Selection Key	Pressing this key selects the TGP Status menu for display.
7	Brightness Key	Pressing this key increases the light intensity of the keys.

Figure 1A-62

AGWCP Lamp Test Page

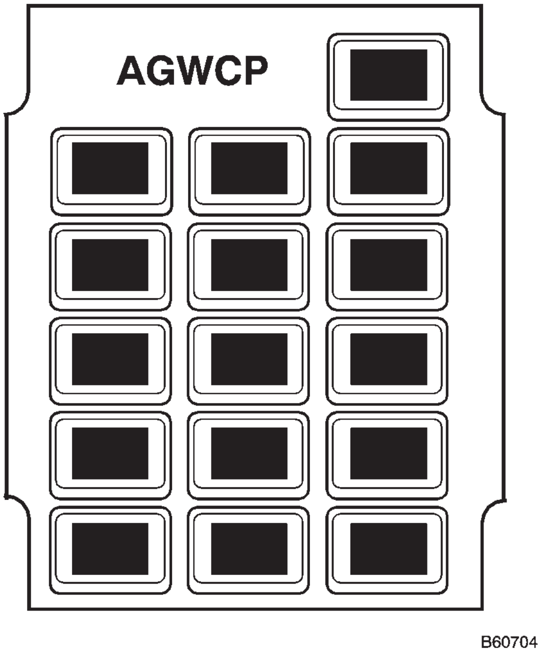


Figure 1A-63

AGWCP Switch Test Page

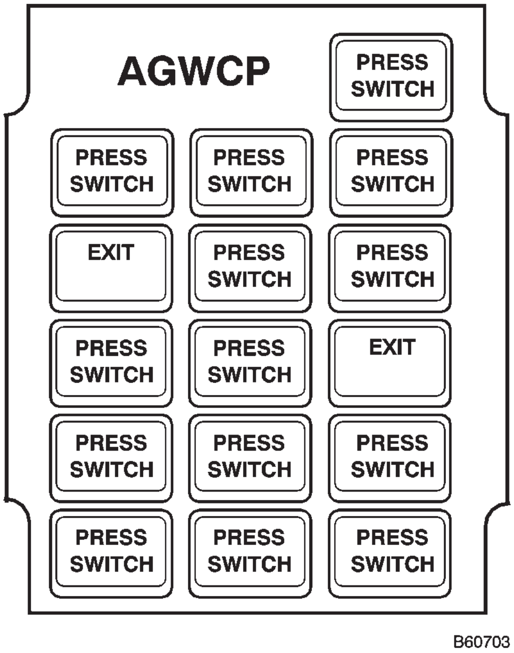


Figure 1A-64

TGP STATUS MENU

The TGP Status menu (figure 1A-65) is the start-up menu for the TGP after the pod test has completed. The TGP Status page allows the following functions to be performed by the operator:

- Apply/Remove TGP power
- Initiate TGP IBIT test
- Enter/Exit Ground mode
- Enter/Exit Service mode
- View TGP power status indication
- Enable Enhanced Imaging

The Pod Status Indicator (button 1) initially indicates STRIKE OFF. Press the Status menu POWER key to apply TGP power. POWER is underlined when power is applied and the status key indicates STBY during the TGP warm up period (2 minutes). The TGP will not complete the warm up sequence until the aircraft INS starts navigating or the TGP Ground mode is active. STBY is indicated when warm up is complete. The pod is stowed in STBY or STBY. Pressing STBY unstows the pod and the button displays TGP ON. Pressing the button again stows the pod and the button displays STBY. Additional indications include FL CAL, LSS/T and SERVCE.

To start the shut down sequence, press the POWER key. The key display changes from POWER to NO? and button next to it changes from blank to YES?. Selection of NO? returns the POWER key display to POWER. Pressing YES continues the shut down sequence. During the shut down sequence, the Status key changes from TGP ON to STBY and power is removed after 10 seconds.

The Pod Status indicator blinks in all menus and pages when a fault is being reported and stops blinking after the fault is acknowledged.

Selection of the TGP TEST key places TGP into standby mode and initiates the TGP self test. During a self test, all TGP functions are suspended. Selection will be ignored if aircraft speed is greater than 102 KTAS and 100 KGS (Knots Ground Speed). The self-test takes 3 minutes. Monitor will display normal video upon completion of the test.

The Ground Mode Selection key is used to send zero filled INS data to the TGP, which allows service mode to be selected. Selection of the Ground Mode Selection key underlines the text on the GROUND MODE button and allows the TGP to finish the power up procedure for maintenance functional checks without an INS or OAS. Ground mode requires the aircraft to be on the ground to operate. Selection will be ignored if True Air Speed is greater than 102 KTAS and Ground Speed is greater than 100 KGS.

The Service Mode key is used to place the TGP into a service mode. Service mode requires the aircraft to be on the ground and in STBY to operate. A functioning INS or the selection of Ground mode is required for Service mode. Selection will be ignored if aircraft speed is greater than 102 KTAS and 100 KGS. The TGP status will be displayed with underlined text when selected. Example: Selection of Service Mode places the TGP into service mode, underlines text on the SERVCE mode key and changes TGP status from TGP ON to SERVCE and allows the ground crew to service the TGP.

WARNING

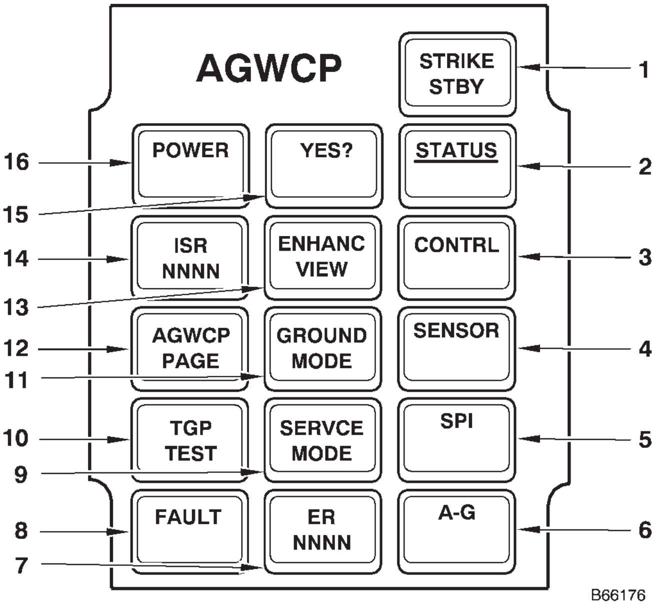
> Pod forward section turret moves with extreme force. Prior to pod turn-on and during pod operation, no person shall be in physical contact with the forward section. Failure to comply may result in death or injury to personnel and/or damage to equipment.

The ENHANC VIEW key is used to enhance the imaging of the targeting pod as an alternative to nominal imaging. This function is called the extended range function. When enabled, the function is activated when zoom values of 33-100 are used. Enabled is the default setting and shows underlined when enabled.

The OFP Indication Key displays the current TGP software version in the lower section of the key. The upper field will display ?? when targeting pod identification is unknown.

The Fault Indicator key is used to access the Fault page. The key will show underlined text (FAULT) when there are new TGP faults to be viewed.

TGP Status Menu



KEY	LEGEND	FUNCTION
1	Pod Status Indicator	
	(Upper Section of key)	
	STRIKE	Indicates TGP is in Strike mode.
	P SIM	Indicates TGP is in Partial Simulation mode.
	F SIM	Indicates TGP is in Full Simulation mode.
	(Lower Section of key)	
	OFF	No power is applied. Power button is yet to be selected or shutdown sequence is complete.
	STBY	Displayed after power button has been selected and during TGP power up sequence. TGP will not respond until power up is complete.
	<u>STBY</u>	Standby Mode. Displayed after power up cycle is complete. Key selection after <u>STBY</u> is displayed completes the TGP power up sequence. Pressing the key in <u>STBY</u> unstows the pod and the key then displays TGP ON. Pressing the key again stows the pod, and the key displays <u>STBY</u>.
	TGP ON	Displayed after selection of <u>STBY</u>. TGP is now in operational use. Selection of the POWER and then YES? key while TGP is on initiates shutdown sequence.
	FL CAL	Displayed when TGP is in FLIR calibration.
	SERVCE	Displayed when TGP is in Service mode.
	LSS/T	Displayed when TGP is performing a laser Spot Search.
2	Status Menu Selection Key	The Status menu is the initial menu present upon completion of the TGP selection on the previous page. Pressing this key selects the LITENING Status menu for display.
	STATUS	Indicates STATUS menu is not the selected menu.
	<u>STATUS</u>	Indicates STATUS menu is the selected menu.

Figure 1A-65 (Sheet 1 of 3)

KEY	LEGEND	FUNCTION
3–6	Menu Keys	Keys 3-6 are the menus (not underlined) selectable from the Status Menu.
	CONTRL	This key selects the AGWCP Control menu.
	SENSOR	This key selects the AGWCP Sensor menu.
	SPI	This key selects the AGWCP SPI page.
	A-G	This key selects the AGWCP A-G menu.
7	OFP Indication Key	
	(Upper Section of key)	
	??	Indicates TGP version is unknown.
	ER	Indicates TGP version is an ER pod (no longer used).
	AT	Indicates TGP version is an AT pod.
	(Lower Section of key)	
	(Blank)	OFP version displays blank until communications with TGP is established.
	NNNN	Displays current OFP version number. (NNNN = Alphanumeric)
8	Faults Indicator Key	Pressing this key will access the FAULTS page.
	FAULT	There are no new faults to view.
	FAULT	The underline indicates there are faults to view.
9	Service Mode Key	The SERVICE MODE key is used to place the TGP into Service mode.
	SERVICE MODE	Indicates Service mode is not enabled.
	SERVICE MODE	Indicates Service mode is enabled.
		WARNING Pod forward section turret moves with extreme force. Prior to pod turn-on and during pod operation, no person shall be in physical contact with the forward section. Failure to comply may result in death or injury to personnel and/or damage to equipment.
10	TGP TEST Key	Pressing the key commands TGP into standby and performs a self-test.
11	Ground Mode Selection Key	
	GROUND MODE	Indicates Ground mode is not enabled.
	GROUND MODE	Indicates Ground mode is enabled.
12	AGWCP PAGE Key	Press this key to return to the AGWCP Self-Test page.
13	ENHANC VIEW Key	
	ENHANC VIEW	Indicates TGP extended range is not enabled.
	ENHANC VIEW	Indicates TGP extended range is enabled.

Figure 1A-65 (Sheet 2 of 3)

TGP Status Menu (Cont)

KEY	LEGEND	FUNCTION
14	ISR Key	Used to access the ISR page. (ISR only)
	(Upper Section of key)	
	ISR	Indicates ISR capability is present in the targeting pod.
	(Blank)	Indicates ISR capability is not present in the targeting pod.
	(Lower Section of key)	
	nnnn	Indicates the ISR frequency selected for use. n = 1 to 9.
	nnnn	Indicates the ISR frequency selected for use is transmitting. n = 1 to 9.
15	Shutdown Sequence Query	
	YES?	Indicates shutdown sequence has been initiated. Selection of YES? continues the shutdown sequence.
	(Blank)	Displays blank until TGP shutdown sequence is initiated or after shutdown sequence has been completed.
16	TGP Power Key	Press POWER key to apply power. To start the shutdown sequence, press POWER, display will change from POWER to NO? and key 13 will change to YES?.
	POWER	Indicates that TGP power has not been applied or power has been removed.
	POWER	Indicates that TGP power has been applied.
	NO?	Indicates that TGP shutdown sequence has been initiated. Selection of NO? discontinues the shutdown sequence and returns key display to POWER.

Figure 1A-65 (Sheet 3 of 3)

TGP ISR MENU (AT POD - ISR ONLY)

The ISR (Intelligence, Surveillance and Reconnaissance) menu (figure 1A-66) provides the user the capability of controlling the TGP ISR functionality. The ISR menu is accessed by pressing the ISR key on the Status menu.

The ISR menu allows the following functions to be performed by the operator:

- Activation of the ISR transmitter.
- Selection of High Power or Low Power.
- Determination of the Active transmitter frequency.
- Determination of an invalid transmitter frequency.
- Accessing the ISR Frequency page.
- Return to the Status menu.

The ISR pod has two modes of operation, Low Power and High Power. Low Power is for use on the ground so as not to expose personnel to microwave radiation. High Power is used when the aircraft is airborne and the allows for greater range. When on the ground and in low power, the pod should be roughly capable of transmitting 1 mile in ideal conditions. The ISR pod contains a microwave transmitter and therefore can pose a safety hazard to personnel.

WARNING

All personnel shall remain at least one foot away from the pod antenna while the LITENING ISR pod is transmitting with weight on wheels.

TGP ISR FREQUENCY PAGE (AT POD - ISR ONLY)

The TGP ISR Frequency page (figure 1A-67) provides the user the capability of entering the desired transmitter frequency used by the TGP ISR functionality. The ISR Frequency page is accessed by pressing the ENTER FREQ switch on the ISR menu.

The LOWP/HIGHP key is used to select the transmitter output power level. Low Power is the only power level available with weight on wheels. Any time the video link is enabled, the transmitter will begin radiating at low power and after a delay begin transmitting at the higher power. If the aircraft is airborne, there will be a 30 second delay before the transmitter goes to High Power. If the Video link is enabled prior to takeoff, a 60 second delay will occur following takeoff.

NOTE

There may be a 30 second to 60 second delay after pushing the ISR Transmit key and confirming the radiate request before ground stations are capable of receiving a signal from the pod.

TGP FAULT PAGE

The TGP Fault page (figure 1A-68) is accessed through the TGP Status Menu. The operator selects this menu when FAULT is underlined on the TGP Status menu to access the faults (Pilot Fault List [PFL], Maintenance Fault List [MFL], and Communication Fault [COMM] indicating communication with the TGP has been lost).

Current active faults are designated by asterisk (*). Refer to the LITENING Targeting Pod Fault Listings, Section III for action. Acknowledge a fault by pressing the key where a fault code is indicated by an asterisk. This will clear the underlined FAULTS indication on the Status Menu. If a fault is reported and then subsequently resolved, the asterisk will be removed. Faults that are no longer active because either they have been acknowledged or the fault has been corrected, no longer display an asterisk.

NOTE

There is no fault storage capability available to the operator in the current software design. The operator must manually record all faults (permanent, transient or repaired) for debrief. Maintenance personnel have the capability to download a comprehensive historical fault listing from the TGP for in-depth malfunction analysis.

TGP FAULT TEXT DISPLAY PAGE

The Fault Text Display page (figure 1A-69) serves as a location to view fault text associated with a PFL/MFL fault. The page provides a return to the Fault page and allows access to the A-G page. The Fault Text Display page will display up to four faults per page. If more than four faults occur, use the MORE key to cycle through the displayed faults.

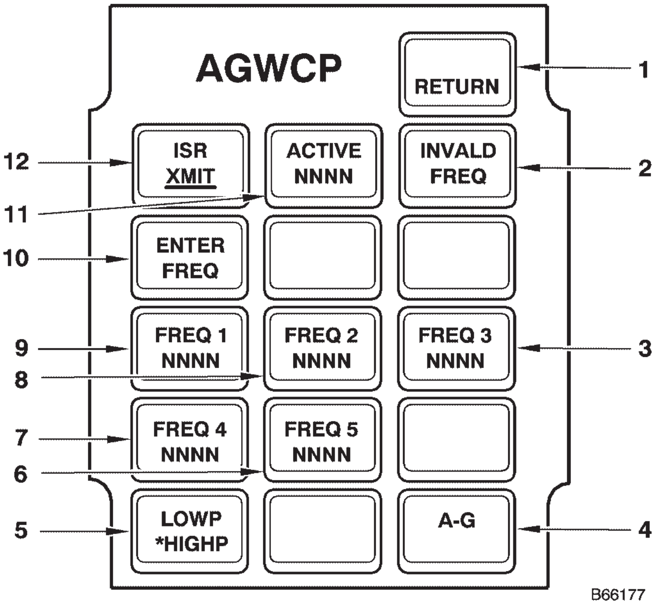
The leftmost column of buttons displays the fault, PFxx, or MFxx. The associated text for each fault will be shown in the top fields on the buttons to the right. For example; When PFL 2 fault occurs, PF02 will be displayed in the leftmost column, the text associated with a PFL 2 fault (Electronics Fail), will display ELECTR FAIL in the top fields of the two buttons to the immediate right of PF02. Due to space limitations, faults with words longer than 6 letters will be shortened. Faults with more than 2 words will wrap the third and/or fourth word into the bottom fields of the buttons on the immediate right. Definitions of faults and the text displayed can be found in LITENING Targeting Pod Fault Listings, Section III.

The RETURN key is used to return to the TGP FAULT page.

The eight Fault Text keys display the relative text for the PFL/MFL faults. The four Fault keys (keys 6) display the PFL/MFL faults, if any.

The A-G key is used to access the A-G page.

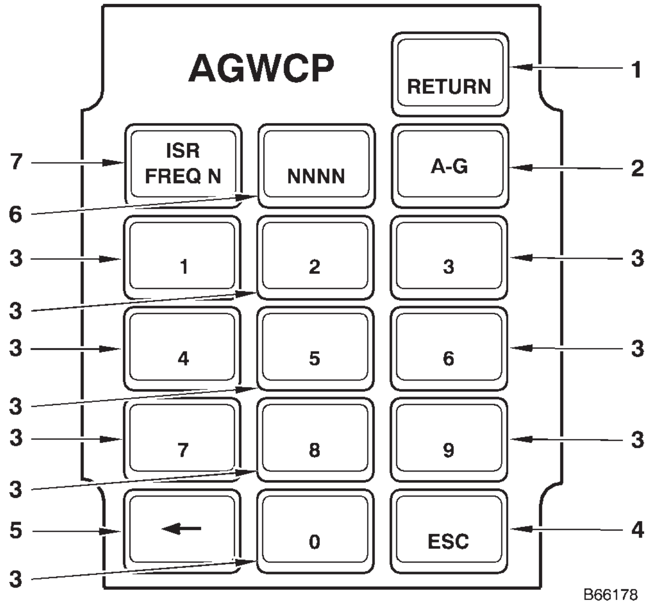
TGP ISR Menu (ISR Only)



KEY	LEGEND	FUNCTION
1	RETURN Key	Press RETURN to return to the ISR menu. This key will blink in all menus and pages when a fault is being reported and will stop blinking when the fault is acknowledged.
2	Invalid Freq Key	This key is illuminated if the entered transmitter frequency is determined to be invalid.
3, 6-9	Frequency Keys	Displays the corresponding transmitter frequency. Sends the displayed transmitter frequency to the ISR for use. Underlined if this is the current selected frequency.
4	A-G Key	This key selects the AGWCP A-G menu.
5	LOWP/HIGHP Key	This key is used to select the transmitter output power level.
10	Enter Frequency Key	Press ENTER FREQ to access the ISR Frequency page.
11	Active Frequency Key	Displays the active transmitter frequency. Valid frequency range is from 5250 to 5850. Selections outside this range will result in an invalid frequency message (illuminate the Invalid Frequency key).
	ACTIVE NNNN	Displays active transmitter frequency when underlined. N=1 to 9
12	ISR Transmit Key	Initiates the transmission of video data from the TGP on the active transmitter frequency.
	(Upper Section of key)	
	ISR	Displayed upon menu entry.
	CONFRM	Displayed up to 5 seconds after the key has been selected with weight on wheels. If the key is not selected again within the 5 seconds, the state is returned to ISR.
	(Lower Section of key)	
	XMIT	Displayed upon menu entry.
	XMIT?	Displayed for up to 5 seconds awaiting confirmation of request to radiate.
	XMIT	Displayed when transmitter is radiating.

Figure 1A-66

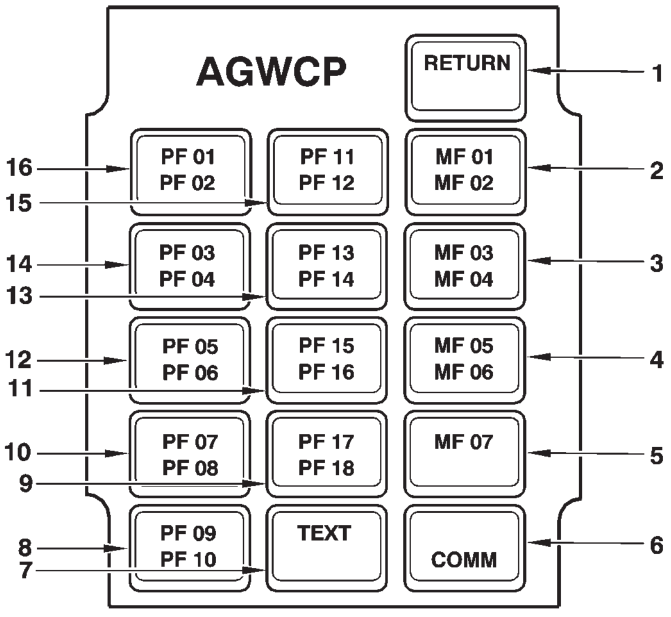
TGP ISR Frequency Page (ISR Only)



KEY	LEGEND	FUNCTION
1	RETURN Key	Press RETURN to return to the Status Menu. This key will blink in all menus and pages when a fault is being reported and will stop blinking when the fault is acknowledged.
2	A-G key	This key selects the AGWCP A-G menu.
3	Number Keys	Numbered 1 through 0 (zero), these keys are used to enter the ISR transmitter frequency.
4	ESC Key	The ESC key is used to return to the ISR Menu without saving the entered transmitter frequency.
5	Backspace Key	Left arrow key. Use this key to go backwards while entering an ISR transmitter frequency.
6	Frequency Key	Displays the transmitter frequency currently being entered.
	NNNN	Displays the frequency being entered. N=1 to 9
7	ISR FREQ Key	Initiates the transmission of video data from the TGP on the Active transmitter frequency.
	ACTIVE FREQ N	Displays the current frequency number being entered. N=1 to 5

Figure 1A-67

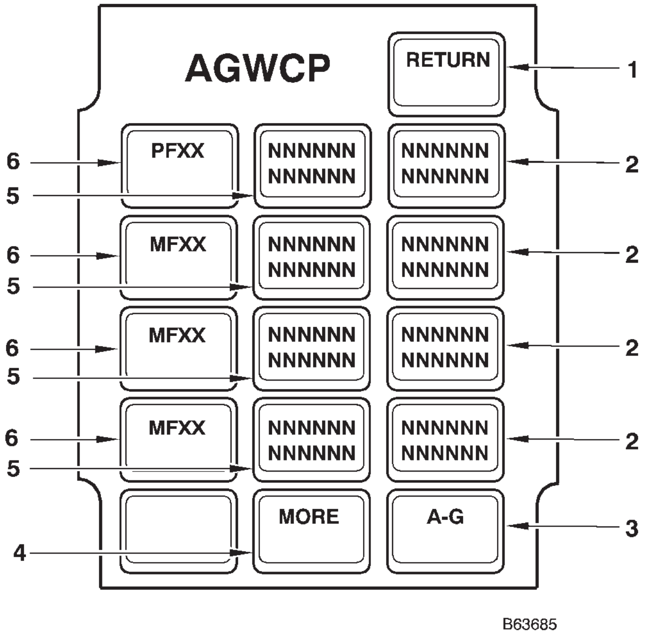
TGP Fault Page



KEY	LEGEND	FUNCTION
1	RETURN Key	Press RETURN to return to the Status Menu. This key will blink in all menus and pages when a fault is being reported and will stop blinking when the fault is acknowledged.
2–5	Maintenance Faults Listing	Keys are used to display Maintenance Fault Listings (MFL), if any.
	MFXX	Indicates that there is an MFLXX fault and has not been acknowledged. (XX = 01 to 07)
	MFXX	Indicates that there is an MFLXX fault and has been acknowledged.
	(Blank)	There is not an MFL to be displayed.
6	Communication Fault Listing	Keys are used to display Communication Faults (COMM), if any.
	COMM	Indicates that there is a COMM fault and has not been acknowledged.
	COMM	Indicates that there is a COMM fault and has been acknowledged.
	(Blank)	There is not a COMM fault to be displayed.
7	Text Key	Used to access the FAULT Text page.
8-16	Pilot Faults Listing	Keys are used to display Pilot Fault Listings (PFL), if any.
	PFXX	Indicates that there is a PFLXX fault and has not been acknowledged. (XX = 01 to 18)
	PFXX	Indicates that there is a PFLXX fault and has been acknowledged.
	(Blank)	There is not a PFL to be displayed.
16	NO FAULTS Key	Dual function key/display. Displays NO FAULTS, if there have been no faults to display on the fault page. If there have been no faults, keys 2 through 16 will be blank. If a fault is being reported, the key functions as described in the keys description above.

Figure 1A-68

TGP Fault Text Display Page



KEY	LEGEND	FUNCTION
1	RETURN Key	Press RETURN to return to the Fault Page. This key will blink in all menus and pages when a fault is being reported and will stop blinking when the fault is acknowledged.
2	Fault Text Key	Displays the relative text for the fault displayed in button 6, if any.
	NNNNNN	Text in the upper portion of the key, displays the second word (text) of the fault parameter for the relative fault displayed in button 6. Text in the lower portion of the key, displays the fourth word (text) of the fault parameter for the relative fault displayed in button 6.
	(Blank)	There is not a fault in button 6 to be displayed.
3	A-G Key	Used to access the Air to Ground page.
4	MORE Key	Used to display more faults if there are more than four faults to be displayed.
5	Fault Text Key	Displays the relative text for the fault displayed in button 6, if any.
	NNNNNN	Text in the upper portion of the key, displays the first word (text) of the fault parameter for the relative fault displayed in button 6. Text in the lower portion of the key, displays the third word (text) of the fault parameter for the relative fault displayed in button 6.
	(Blank)	There is not a fault in button 6 to be displayed.
6	Fault Key	Displays the PFL or MFL fault, if any.
	PFxx	Indicates that there is a PFL fault. The fault parameter text is displayed in the two buttons to the right.
	MFxx	Indicates that there is an MFL fault. The fault parameter text is displayed in the two buttons to the right.
	(Blank)	There is no fault to be displayed.

Figure 1A-69

TGP CONTROL MENU (CONTRL)

Pressing the CONTRL key selects the TGP Control menu (figure 1A-69) for display. The Control menu allows the following functions to be performed by the operator:

- Enter/Exit Training or Combat mode
- Activate/Deactivate Yard Stick selection
- Start/Stop TGP video recorder
- Adjust intensity of symbol/text on TGP Video Monitor
- View TGP power status indication
- Enter/Exit partial or full SIM mode
- Activate/Deactivate Target Coordinate Reference System selection (TCG)
- Toggle Grey Scale On/Off

The TGP Pod Status Indicator key initially indicates OFF until the POWER key is selected. The Status Indicator key is used to display an indication of TGP status. The key blinks when a fault is being reported and stops blinking when the fault is acknowledged.

The Combat Mode Selection key is used to select between Combat mode and Training mode. Selection of this key toggles between CMBAT and TRAIN. An asterisk indicates which mode is selected. The default mode is TRAIN. The laser will not fire in training mode.

The Sim Mode Selection key is used to select between Full SIM mode and Partial SIM mode. Selection of this key toggles between between FULL and PART. Power to the TGP must be cycled off to change modes. Attempting to toggle modes with TGP power applied will result in the key text being outlined. An asterisk indicates the mode selected.

The Strike/Sim mode selection key is used to select between Strike mode and SIM mode. Selection of this key toggles between STRIKE and SIM. Power to the TGP must be cycled off to change modes. Attempting to toggle modes with TGP power applied will result in the key text being outlined. STRIKE is the default setting.

The Grey Scale key is used to enable/disable the grey scale adjust bar on the TGP Video Monitor. The default setting is Grey Scale disabled. When Grey Scale is enabled, the text will display underlined.

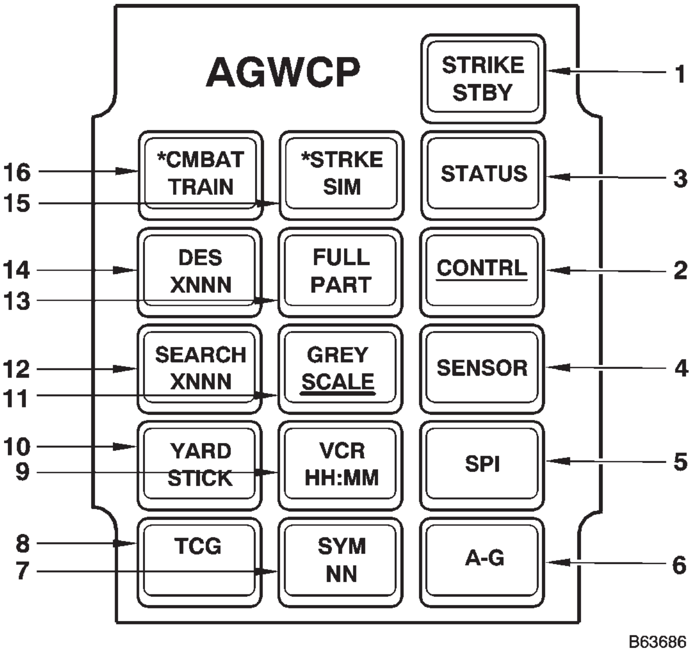
During simulation, in order to use the TGP STREAM (GWD SMO only) or SEND functions, both the TGP and the SMO must be in a SIM mode. SPI data will be marked invalid whenever the SMO is in Strike mode and the TGP is in SIM mode. Anytime the operator makes a mode change, from Strike to SIM mode or vice versa, all SPIs will be cleared. SIM mode allows the operator to perform all TGP functions as though the TGP is in Strike mode. The PART SIM mode requires that the TGP be loaded on the aircraft, FULL SIM may be used with or without an actual TGP loaded. With selection of STREAM in FULL SIM mode, SPI coordinates are simulated from a location point 20 miles in front of the aircraft, moving to the East at a rate of 10 feet per second.

TGP DESIGNATOR CODE/SEARCH CODE PAGES

The TGP Designator Code/Search Code Entry pages (figure 1A-71) serve as a location to enter/remove laser search codes and laser designator codes. The laser pages are accessed by selecting the Search Code key or the Laser Designator Code key on the CONTRL menu.

Insert designation or laser search codes from these pages. The laser code must be valid or the laser designator or marker will not be enabled and cannot be fired, and LSS/T will not function. Once a valid code has been entered, the code will be displayed on key 8 of the DES Code and Search Code pages. For designation, the code will be displayed on key 14 of the Pod Control Menu, key 15 on the A-G Menu, and on the TGP monitor. For LSS/T, the code will be displayed on key 12 on the Pod Control Menu and on the TGP monitor, and key 12 of the A-G menu.

TGP Control Menu



KEY	LEGEND	FUNCTION
1	Pod Status Indicator	
	(Upper Section of key)	
	STRIKE	Indicates TGP is in Strike mode.
	P SIM	Indicates TGP is in Partial Simulation mode.
	F SIM	Indicates TGP is in Full Simulation mode.
	(Lower Section of key)	
	OFF	No power is applied. Power switch is yet to be selected or shutdown sequence is complete.
	STBY	Displayed after power button has been selected and during TGP power up sequence. TGP will not respond until power up is complete.
	STBY	Standby Mode. Displayed after power up cycle is complete. Key selection after STBY is displayed completes the TGP power up sequence. Pressing the key in STBY unstows the pod and the key then displays TGP ON. Pressing the key again stows the pod, and the key displays STBY.
	TGP ON	Displayed after selection of STBY. TGP is now in operational use. Selection of the POWER and then YES? key while TGP is on initiates shutdown.
	FL CAL	Displayed when TGP is in FLIR calibration.
	SERVCE	Displayed when TGP is in Service mode.
	LSS/T	Displayed when TGP is performing a Laser Spot Search.
2	CONTRL Menu Selection Key	Pressing the CONTRL Menu Selection Key selects the TGP Control menu for display.
	CONTRL	Indicates CONTRL menu is not the selected menu.
	CONTRL	Indicates CONTRL menu is the selected menu.

Figure 1A-70 (Sheet 1 of 3)

TGP Control Menu (Cont)

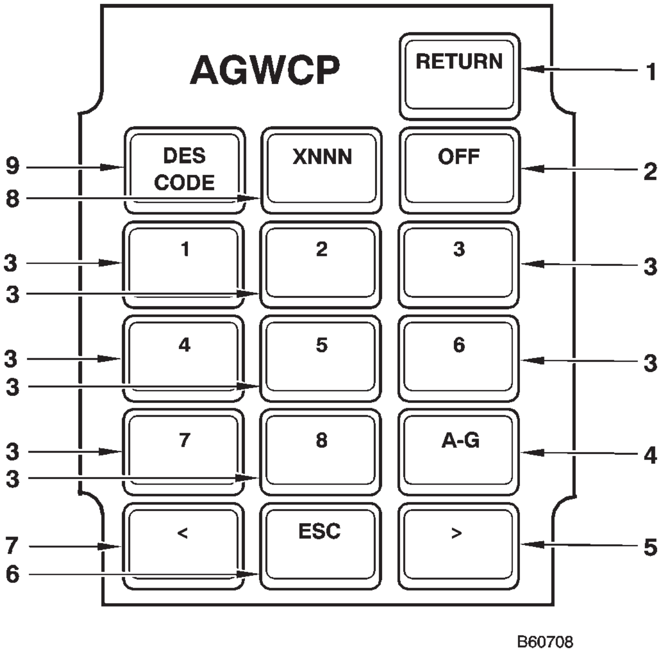
KEY	LEGEND	FUNCTION
3–6	Menu Keys	Keys 3-6 are the menus (not underlined) selectable from the Status Menu.
	STATUS	This key selects the TGP Status menu.
	SENSOR	This key selects the TGP Sensor menu.
	SPI	This key selects the TGP SPI page.
	A-G	This key selects the TGP A-G menu.
7	Symbols Key	Displays the symbols intensity value. When activated, value is underlined and allows modification using the ITH thumb switch. (NN = 0 to 15, default value is 15).
8	TCG Key	Toggles the format used to display center of view coordinates between Bearing and Range (BR), Latitude/Longitude (LL), Military Grid Reference System (MGRS), and OFF, on the TGP Video Monitor.
9	VCR Control Key	Press this key to control TGP VCR. Press to turn recorder on; press again to turn recorder off. No rewind capability. Counter works whether the VCR is installed or not.
	VCR HH:MM	Indicates video recorder is disabled. Accumulated time in hours and minutes that the TGP video recorder has been recording is displayed. (HH = 00 to 24; MM = 00 to 59)
	VCR HH:MM	Indicates video recorder is enabled. Accumulated time in hours and minutes that the TGP video recorder has been recording is displayed. (HH = 00 to 24; MM = 00 to 59)
10	Yard Stick Key	Used to toggle the yardstick function on the TGP Video monitor between feet, meters, and Off.
11	Grey Scale Key	Used to enable/disable the grey scale adjust bar on the TGP Video Monitor. The default is disabled.
	GREY SCALE	Indicates Grey Scale is disabled.
	GREY SCALE	Indicates Grey Scale is enabled
12	SEARCH CODE Key	Pressing the key accesses the laser search code entry page. Must be in STBY mode or POD ON mode for access. Field will show laser search code when entered.
	SEARCH XNNN	Valid laser code has been entered. Displays laser search code. (X = 1; N = 1 to 8).
	SEARCH OFF	Valid laser search code has not been entered.
13	SIM Mode Selection Key	Key is used to select between full and partial SIM training modes.
	*FULL PART	Indicates TGP is in full SIM mode.
	FULL *PART	Indicates TGP is in partial SIM mode.

Figure 1A-70 (Sheet 2 of 3)

KEY	LEGEND	FUNCTION
14	Laser Designator Code	Pressing the key accesses designation laser code page. Must be in STBY or POD ON to enter designation codes.
	DES XNNN	Valid laser designator code has been entered. Displays laser designator code. (X = 1 or 2; N = 1 to 8).
	DES OFF	Valid laser designator code has not been entered.
15	STRIKE/SIM Mode Selection Key	Used to toggle the TGP between Strike mode and SIM mode. Power to TGP must be cycled off to change modes.
	*STRIKE SIM	Indicates TGP is in Strike mode. Default mode.
	STRIKE *SIM	Indicates TGP is in SIM mode.
16	CMBAT Mode Selection Key	Key is used to select between CMBAT and training modes.
	*CMBAT TRAIN	Indicates CMBAT mode is entered. Laser is enabled.
	CMBAT *TRAIN	Indicates laser is in training mode. Laser cannot fire in training mode. Default mode.

Figure 1A-70 (Sheet 3 of 3)

TGP DES Code/ Search Code Pages



Access the DES CODE and SEARCH CODE pages from the TGP Control Menu.

KEY	LEGEND	FUNCTION
1	RETURN Key	The DES Code/ Search Code pages are accessed through the CONTRL menu. Press RETURN to accept the entered values and return to the CONTRL menu.
2	OFF Key	Pressing this key removes any laser code entered preventing the laser from firing, and returns the operator directly to the CONTRL menu.
3	Number Keys	Numbered 1 through 8, these keys are used to enter the laser code.
4	A-G Menu Selection Key	When selected, accesses the A-G menu.
5	Forwardspace Key	Right arrow key. Use this key to go forward while entering a laser code.
6	Escape Key	Selecting ESC abandons any entry and returns the operator to the CONTRL menu.
7	Backspace Key	Left arrow key. Use this key to go backwards while entering a laser code.
8	Laser Code Indicator	Displays the laser search code or designator code for the mode selected. Initially displays 1111 until a valid code is entered. Reverts back to 1111 indicating laser is disabled. (X = 1 or 2 for designator codes, X = 1 for search codes; N = 1 to 8).
9	Code Selection Key	Displays DES CODE or SEARCH CODE depending on which page has been entered.
	DES CODE	Displayed after DES has been selected on the CONTRL menu.
	SEARCH CODE	Displayed after SEARCH has been selected on the CONTRL menu.

Figure 1A-71

TGP SENSOR MENU

The TGP SENSOR menu (figure 1A-71) is the primary control menu for all sensor functions and serves as the primary control menu to make visual image adjustments.

The key text will appear underlined when the SENSOR menu is displayed. The Sensor page allows the following functions to be performed by the operator:

- Perform Short/Long (Forward Looking Infrared) FLIR Calibration.
- Select Narrow/Wide/Super-Wide field of view.
- Select FLIR or (Charged Coupled Device) CCD sensor.
- View TGP power status.
- TGP Nav Reset.

The Sensor page allows the following functions to be performed by the operator during FLIR sensor operation only:

- View/Edit Gain.
- Toggle Hot/Cold FLIR Integration time.
- View/Edit Focus.
- Auto Focus.
- Reset Focus.

The Pod Status Indicator key initially indicates OFF until the POWER key is selected. The Pod Status Indicator key is used to display an indication of TGP status. The key blinks when a fault is being reported and stops blinking when the fault is acknowledged.

The FLIR Integration Setting key is used to toggle between Hot or Cold integration settings (determines the length of time the IR energy is processed on the FLIR to obtain the best picture quality). Use COLD when ground temperatures are below 20^{o} C (68^{o} F) and HOT when ground temperatures are above 30^{o} C (86^{o} F). Asterisk (*) indicates active selection. Key is blank when CCD is selected.

The FLIR Manual Gain key is used to engage FLIR manual gain control. Text is underlined when active. Use the thumb toggle on the ITH to adjust. Leaving the page deselects the function. The value is displayed on the key (N = 1 thru 8). Selecting another page disables GAIN control and returns thumb toggle to primary function. The key is blank when the sensor is CCD.

The FLIR Auto Focus key enables the FLIR Auto Focus function. It is used to adjust focus on the LOS point about the center of the cursor. Normally used when tracking a point. Text is blank when the sensor is CCD.

The SW FOV Enable Key is used to toggle between SW FOV enabled and disabled. When enabled and the FLIR is selected, SW FOV is available to be selected on the FOV key and with the ITH FOV key.

The FOV key is used to toggle between WIDE (wide field of view), NARROW (narrow field of view), and SWFOV (Super wide field of view) if SWFOV is enabled and FLIR is the sensor.

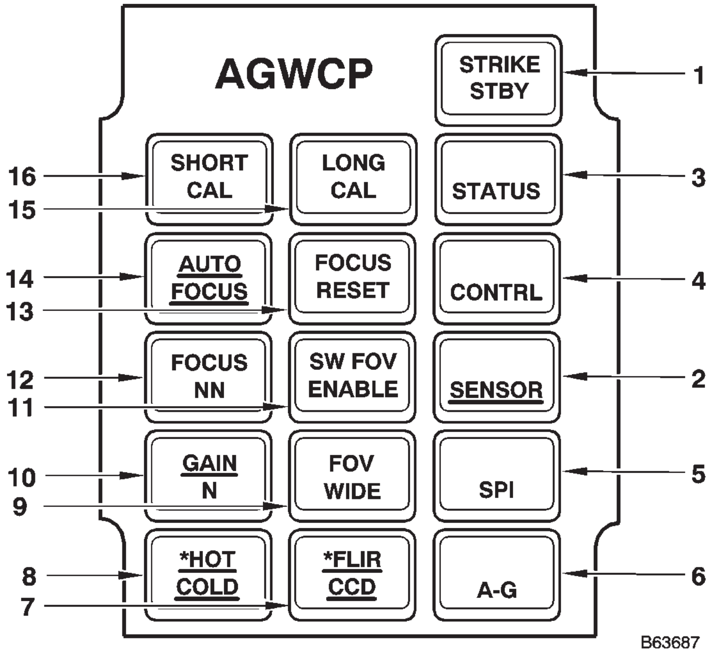
The FLIR Manual Focus key is used to engage manual FLIR focus. The text is underlined when activated. Use the thumb toggle on the ITH to adjust. (NN = 1 thru 99). Leaving the page deselects the function. The key is blank when the sensor is CCD.

The FLIR Focus Reset key will reset the FLIR focus back to the factory infinity setting. The operator can also use this key to initiate a Nav reset of the Targeting Pod by depressing the Focus Reset key while the TGP is in Standby. When a Nav reset is initiated, the TGP navigational model is reset, including the Kahlman filtering compensation. This function should be used whenever Prime nav models are switched. The message, NAV RESET is flashed momentarily on the TGP monitor after initiating a Nav reset.

The Short Calibration key is used to select short FLIR calibration to correct a degraded FLIR image. During a request for long calibration the legend will display YES? in place of SHORT CAL. Short calibration should be performed when FLIR is slightly degraded and time is not available for a long calibration. Short calibration takes approximately 30 seconds and the TGP will be put into standby mode when completed. The monitor indicates blinking CAL until the calibration is complete.

The Long Calibration Key key will initiate a FLIR long calibration to correct a severely degraded FLIR image when time is available to put the TGP in STBY for 6-9 minutes and the TGP will be put into STBY when complete. This should produce a better FLIR image than a Short Calibration. When selecting Long Calibration, button 16 changes to YES? and button 15 changes to NO?. Selecting YES? starts the calibration, and selecting NO exits this selection. The monitor indicates blinking CAL until calibration is complete. Once the request to perform the long calibration has been confirmed, the process cannot be stopped.

TGP Sensor Menu



The Sensor Menu is the primary control menu for all sensor functions.

KEY	LEGEND	FUNCTION
1	Pod Status Indicator	
	(Upper Section of key)	
	STRIKE	Indicates TGP is in Strike mode.
	P SIM	Indicates TGP is in Partial Simulation mode.
	F SIM	Indicates TGP is in Full Simulation mode.
	(Lower Section of key)	
	OFF	No power is applied. Power button is yet to be selected or shutdown sequence is complete.
	STBY	Displayed after power button has been selected and during TGP power up sequence. TGP will not respond until power up is complete.
	STBY	Standby Mode. Displayed after power up cycle is complete. Key selection after STBY is displayed completes the TGP power up sequence. Pressing the key in STBY unstows the pod and the key then displays TGP ON. Pressing the key again stows the pod, and the key displays STBY.
	TGP ON	Displayed after selection of STBY. TGP is now in operational use. Selection of the POWER and then YES? key while TGP is on initiates shutdown.
	FL CAL	Displayed when TGP is in FLIR calibration.
	SERVCE	Displayed when TGP is in Service mode.
	LSS/T	Displayed when TGP is performing a laser Spot Search.
2	Sensor Menu Selection Key	Pressing the SENSOR key selects the TGP Sensor menu for display. Indicates SENSOR when active.
	SENSOR	Indicates Sensor menu is not the active menu.
	SENSOR	Indicates Sensor menu is the active menu.

Figure 1A-72 (Sheet 1 of 3)

KEY	LEGEND	FUNCTION
3–6	Menu Keys	Keys 3-6 are the menus (not underlined) selectable from the Status Menu.
	STATUS	This key selects the TGP Status menu.
	CONTRL	This key selects the TGP Control menu.
	SPI	This key selects the TGP SPI page.
	A-G	This key selects the TGP A-G menu.
7	FLIR/CCD Key	Used to toggle between FLIR and CCD sensors. Asterisk (*) indicates active selection.
	*FLIR CCD	Indicates FLIR is selected, CCD is not selected.
	FLIR *CCD	Indicates CCD is selected, FLIR is not selected.
8	FLIR Integration Setting Key	Press this key to toggle between Hot or Cold integration settings (determines the length of time the IR energy is processed on the FLIR to obtain the best picture quality).
	*HOT COLD	Indicates integration setting HOT is selected.
	HOT *COLD	Indicates integration setting COLD is selected.
9	FOV Key	Toggles between WIDE (wide field of view) and NARROW (narrow field of view) and SW FOV (Super wide field of view) if SW FOV is enabled and FLIR is the selected sensor.
	FOV WIDE	Indicates WFOV is selected.
	FOV NARROW	Indicates NFOV is selected.
	FOV SW FOV	Indicates SW FOV is selected.
10	FLIR Manual Gain Key	Press this key to engage FLIR manual gain control. (N = 1 to 8).
	GAIN N	Indicates sensor FLIR is selected and GAIN is available for selection.
	GAIN N	Indicates sensor is FLIR and GAIN is currently selected and displays current pod value.
	(Blank)	Indicates sensor CCD is selected on button 7 and GAIN is not available for selection.
11	SW FOV Key	Key used to enable/disable SW FOV function when FLIR is the selected sensor.
	SW FOV ENABLE	Indicates SW FOV is not enabled.
	SW FOV ENABLE	Indicates SW FOV is enabled.

Figure 1A-72 (Sheet 2 of 3)

TGP Sensor Menu(Cont)

KEY	LEGEND	FUNCTION
12	FLIR Manual Focus Key	Press this key to engage FLIR manual focus. Use thumb toggle on ITH to adjust. (NN = 1 thru 99). Leaving the page deselects the adjustment function.
	FOCUS NN	Indicates sensor FLIR is selected on button 7 and manual FLIR focus is available for selection.
	FOCUS NN	Indicates sensor FLIR is selected on button 7 and manual FLIR focus is currently selected.
	(Blank)	Indicates CCD is currently selected on button 7 and manual FLIR focus is currently not available for selection.
13	Reset Focus Key	Resets FLIR Focus to the infinity setting established at the factory. Selecting Auto Focus or Manual Focus disables Focus Reset. Does not appear when CCD is selected. Can be used to perform a TGP Nav Reset when the pod is in Standby.
14	FLIR Auto Focus Key	Enables the FLIR Auto Focus function.
	AUTO FOCUS	Indicates sensor FLIR selected and Auto FLIR Focus available for selection.
	(Blank)	Indicates CCD sensor selected and Auto FLIR Focus not available for selection.
15	Long Calibration Key	
	LONG CAL	The default value. Indicates that a long calibration can be selected.
	NO?	Indicates that Long Calibration has been selected. Pressing this key while NO? is displayed will cancel the long calibration confirmation and return the display to LONG CAL.
16	Short Calibration Key	
	SHORT CAL	This is the default field. Indicates that a short calibration can be selected.
	YES?	Indicates that LONG CAL has been selected. Pressing this key while YES? is displayed will cause the TGP to perform a long calibration.

Figure 1A-72 (Sheet 3 of 3)

TGP A-G MENU

The TGP A-G menu (figure 1A-73) is the primary operating menu from which the operator accesses most of the functions required for immediate use during TGP operations. The TGP A-G page allows the following functions to be performed by the operator:

- Arm/Disarm laser and laser Marker.
- Start/Stop laser spot searches.
- Slave TGP to SMO supplied target.
- Stores location at center of TGP view into an SPI register.
- Display zoom.

The TGP A-G page allows Auto focus to be performed by the operator during FLIR sensor operation only.

The Pod Status Indicator is used to display the indication of TGP status. This button blinks in all menus and pages when a fault is being reported and stops blinking after the fault is acknowledged.

The Marker Arm key is used to arm the marker. The text is underlined when the marker is armed. Select the key again to disarm the laser marker.

WARNING

The marker is operational when armed and can be fired in both TRAIN and COMBAT.

The VIEW key is used to slave the TGP to a SMO supplied target. The lower portion (XXXXX) will display either TGT nn when the target is preplanned, B+ when the target is a GWD Target of Opportunity, Dn when a 1760 direct target or HAE?? when there is no GPS receiver. The text will be outlined when HAE?? appears. When using the GWD SMO for TGP-aided weapon deliveries, depressing the VIEW key will slave the TGP to the target coordinates plus the buffer values. If radar crosshairs are updated during bombing activity, the TGP line of sight will not be updated until the operator reactivates the VIEW key. Any subsequent buffer changes due to trackball movement will not be reflected in the TGP line of sight until after the operator depresses the VIEW key.

The SLAVE key is used to display SLAVE NN, SLAVE FAULT or SLAVE DATA?. The SLAVE NN key is used to access the Slave page and displays the SPI that the TGP is currently slaved to. The text will appear outlined whenever the advisories FAULT or DATA? appear.

The Capture key is used to display CAPTUR NNN, CAPTUR FAULT, CAPTUR DATA?, or CAPTUR FULL. The CAPTUR NN is used to store the current location at the center of the TGP field of view into the first empty SPI register. The last SPI register used by CAPTUR is displayed on this key. The text will appear outlined whenever FAULT, DATA?, or FULL appear.

NOTE

Coordinates cannot be captured and sent to the SPI when both the designator and marker are firing simultaneously. Disarm the marker to enable coordinate capture.

The FLIR Auto Focus key is used to perform an auto focus. The legend is blank when the TGP sensor is CCD.

The LSS/T (Laser Spot Search/Tracking) key is used to activate laser spot search. The indicator text is underlined when active. LSS/T will not function unless a valid laser search code has been entered. Press the key again to disable. A valid search code is displayed in the area below the LSS/T text. The monitor video freezes during a laser spot search.

The Zoom key is used to engage Zoom. The indicator is underlined when active. Use the thumb toggle on the ITH to adjust. Leaving the page deselects this function.

The Laser Arm key is used to arm the laser. The laser designator code is displayed after it has been entered. When the laser is armed, the designator code will be underlined. Reselect the key to disable.

TGP SPI PAGE

Pressing the SPI key enters the SPI register pages (figure 1A-74), analogous to entering the RFP tables in FRMT-9 of the OAS. The operator must manually enter coordinates into the registers. There are 100 total registers for storage. Each SPI Register page stores 10 SPIs that can be viewed and edited when selected. Underlined registers indicate a filled register. The SPI Register page allows the following functions to be performed by the operator:

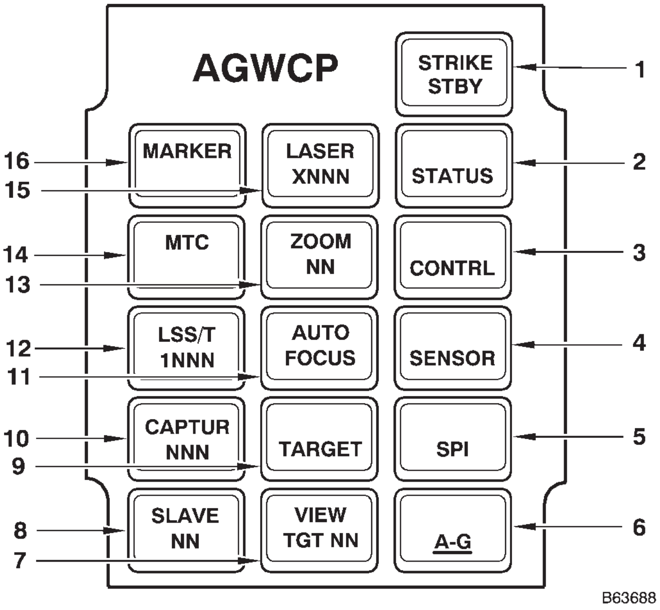
- Scroll (Back/Next) through 99 SPI registers.
- Clear a register (erase current stored values).

Pressing the Zero Register key displays the edit pages for the next empty register. The field in the lower right corner of the key displays the next available empty register (NNN = 001 to 100).

The SPI Register keys (ten buttons) are used to display the current set of 10 SPI registers available for edit. Use the BACK and NEXT keys to scroll backwards or forwards through the register pages. Selection of any one of the current SPI legends shown will display the Latitude page for that particular SPI.

Selection of the CLEAR key followed by selection of a button with a filled register deletes the data stored in that register and removes the underline from that register.

TGP A-G Menu



The TGP A-G Menu is the primary TGP operating menu, as it provides the operator access to most of the functions required for immediate use during TGP operations.

KEY	LEGEND	FUNCTION
1	Pod Status Indicator	
	(Upper Section of key)	
	STRIKE	Indicates TGP is in Strike mode.
	P SIM	Indicates TGP is in Partial Simulation mode.
	F SIM	Indicates TGP is in Full Simulation mode.
	(Lower Section of key)	
	OFF	No power is applied. Power button is yet to be selected or shutdown sequence is complete.
	STBY	Displayed after power button has been selected and during TGP power up sequence. TGP will not respond until power up is complete.
	<u>STBY</u>	Standby Mode. Displayed after power up cycle is complete. Key selection after <u>STBY</u> is displayed completes the TGP power up sequence. Pressing the key in <u>STBY</u> unstows the pod and the key then displays TGP ON. Pressing the key again stows the pod, and the key displays <u>STBY</u>.
	TGP ON	Displayed after selection of <u>STBY</u>. TGP is now in operational use. Selection of the POWER and then YES? key while TGP is on initiates shutdown.
	FL CAL	Displayed when TGP is in FLIR calibration.
	SERVCE	Displayed when TGP is in Service mode.
	LSS/T	Displayed when TGP is performing a laser Spot Search.
	TGP OFF	No power is applied. Power button is yet to be selected or shutdown sequence is complete.
	STBY	Displayed after power button has been selected and during TGP power up sequence. TGP will not respond until power up is complete.

Figure 1A-73 (Sheet 1 of 3)

KEY	LEGEND	FUNCTION
2–5	Menu Keys	Keys 2-5 are the menus (not underlined) selectable from the A-G Menu.
	STATUS	This key selects the TGP Status menu.
	CONTRL	This key selects the TGP Control menu.
	SENSOR	This key selects the TGP Sensor menu.
	SPI	This key selects the TGP SPI page.
6	A-G Menu Selection Key	Pressing the A-G key selects the A-G menu for display. Indicates <u>A-G</u> when active.
	A-G	Indicates the A-G menu is not the active menu.
	<u>A-G</u>	Indicates the A-G menu is the active menu.
7	VIEW Key	
	VIEW TGT NN	Indicates there is a preplanned target available from the SMO to be viewed by the TGP. (NN = 1 to 99)
	VIEW B+	Indicates there is a TOO available from the SMO to be viewed by the TGP.
	VIEW Dn	Indicates there is a direct target available from the SMO to be viewed by TGP. (N = 1 to 6)
	VIEW HAE??	Indicates a SMO defined target for TGP viewing contains an HAE elevation and the GPS UE is not available to perform the HAE to MSL conversion or the target location is too far away for accurate HAE to MSL conversion.
	VIEW (Blank)	Indicates that there is not a SMO defined target to be viewed.
8	Slave Key	
	SLAVE NN	Indicates that TGP has been used to slave coordinates to an SPI register. The last SPI register slaved is displayed. (NN = 1 to 100)
	SLAVE FAULT	Indicates faults for PFL/MFL or COMM has occurred or when AGWCP or ITH equipment failed. Attempt to capture SPI data will be ignored.
	SLAVE DATA??	Indicates SPI data is invalid. Attempts to capture SPI data will be ignored.
	SLAVE (Blank)	Indicates that TGP has not been used to slave coordinates to an SPI register.
9	Target Key	This key will access the TARGET page.
10	Capture Key	
	CAPTUR NNN	Indicates TGP has been used to capture coordinates to an SPI register. The last SPI register saved is displayed. (NNN = 1 to 100)
	CAPTUR FAULT	Indicates faults for PFL/MFL or COMM has occurred when AGWCP or ITH equipment failed. Attempt to capture SPI data will be ignored.
	CAPTUR DATA?	Indicates SPI data is invalid. Attempt to capture SPI data will be ignored.
	CAPTUR FULL	Indicates all registers are full. Displayed for 3 seconds following selection of the CAPTUR key.
	CAPTUR (Blank)	Indicates TGP has not been used to capture coordinates to an SPI register.

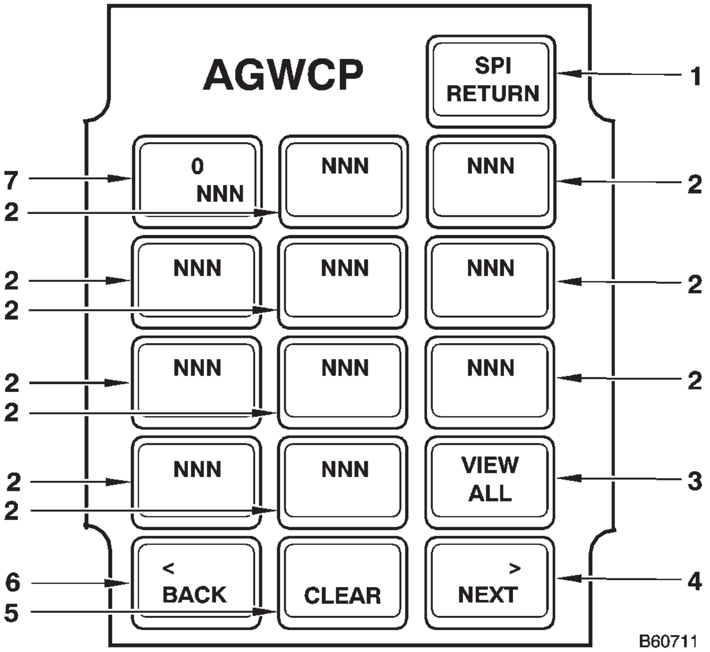
Figure 1A-73 (Sheet 2 of 3)

TGP A-G Menu (Cont)

KEY	LEGEND	FUNCTION
11	FLIR Auto Focus Key	
	AUTO FOCUS	Indicates sensor FLIR is selected on the Sensor page and auto FLIR focus is available for selection.
	(Blank)	Indicates sensor CCD is selected on the Sensor page and auto FLIR focus is not available for selection.
12	LSS/T Key	
	LSS/T 1NNN	Indicates LSS/T function is not enabled. Displays the laser search code entered.
	LSS/T 1NNN	Indicates LSS/T function is enabled. Displays the laser search code entered.
	(Blank)	Indicates a valid laser search code has not been entered.
13	Zoom Key	
	ZOOM NN	Indicates zoom modification is not enabled. (NN = 00 to 99)
	ZOOM NN	Indicates zoom modification is enabled. (NN = 00 to 99)
14	MTC Key	Used to access the Multi-Target Cueing (MTC) page.
15	Laser Arm Key	
	LASER XNNN	Indicates laser is not armed. Displays laser designator code for respective mode when entered.
	LASER XNNN	Indicates laser is armed. Displays laser designator code for respective mode when entered.
	(Blank)	Indicates laser designator code is inactive.
16	Marker Arm Key	
	MARKER	Indicates laser marker is not armed.
	MARKER	Indicates laser marker is armed.

Figure 1A-73 (Sheet 3 of 3)

TGP SPI Page



KEY	LEGEND	FUNCTION
1	SPI RETURN Key	Press the SPI RETURN key to return to the A-G menu.
2	SPI Registers	
	NNN	Indicates that that register is empty. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
	<u>NNN</u>	Indicates stored data within register. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
3	VIEW ALL Key	Press this key to access the VIEW ALL page.
4	NEXT Key	Press NEXT to scroll to the subsequent page of 10 registers.
5	CLEAR Key	Selecting CLEAR then selecting a filled register will delete the data in that register.
6	BACK Key	Press BACK to scroll to the previous page of 10 registers.
7	Zero Register Key	Pressing this key displays the edit pages for the next empty register. Number at the lower right of the key displays the next available empty register. (NNN = 1 to 100)

Figure 1A-74

TGP SPI VIEW ALL PAGE

The TGP SPI View All page (figure 1A-75) provides the ability to view 100 SPI registers, 5 at a time, and provide access to the Latitude, Longitude, Elevation and TGP A-G pages.

The SPI Coordinates keys are used to display the SPI number and its associated elevation in the first button of each row, and to display the associated SPI latitude and longitude in the two buttons directly to the right. The latitude is displayed along the top portion of the buttons and the longitude along the bottom portion of the buttons. A row of buttons will be blank if there is no data loaded in that SPI register. In addition to these buttons displaying SPI data, the middle column buttons are used to access the Latitude, Longitude and Elevation Entry pages. Example: If SPI Coordinates button 6 on row 3 is displaying SPI register ‘18’, selection of the button to the right (middle button) will start the latitude, longitude, elevation data entry process.

The Scroll keys, in addition to displaying SPI data, are also used to scroll to the subsequent and previous set of 5 SPI registers, respectively.

TGP SPI COORDINATE PAGE

The TGP SPI Coordinate (Latitude, Longitude and Elevation Entry) pages (figure 1A-76) provide the ability to enter or edit latitude, longitude and elevation for an SPI register.

The Latitude Entry page is accessed from the TGP SPI and TGP View All pages and provides access to the TGP SPI page and the Longitude Entry page.

The Longitude Entry page is accessed from the Latitude page and provides access to the TGP SPI page and the Elevation Entry page.

The Elevation Entry page is accessed from the Longitude page and provides access to the TGP A-G page and a return to the TGP SPI View All or TGP SPI pages.

The Current SPI key is used to display the SPI number and provide access to the next page in the latitude, longitude and elevation data entry sequence or a return to either the TGP SPI or TGP View All pages.

The SPI Data key, button 2, (see figure 1A-76) is used to display LAT on the latitude page, LONG on the longitude page and ELEV on the elevation page. When either the LAT or LONG page are displayed, the lower portion of the button will display the respective coordinates in degrees.

When the SPI Data key, button 2, (see figure 1A-76) displays LAT or LONG, PI Data key, button 3, will display their respective coordinates in minutes. When button 2 displays ELEV, button 3 will display the elevation in feet.

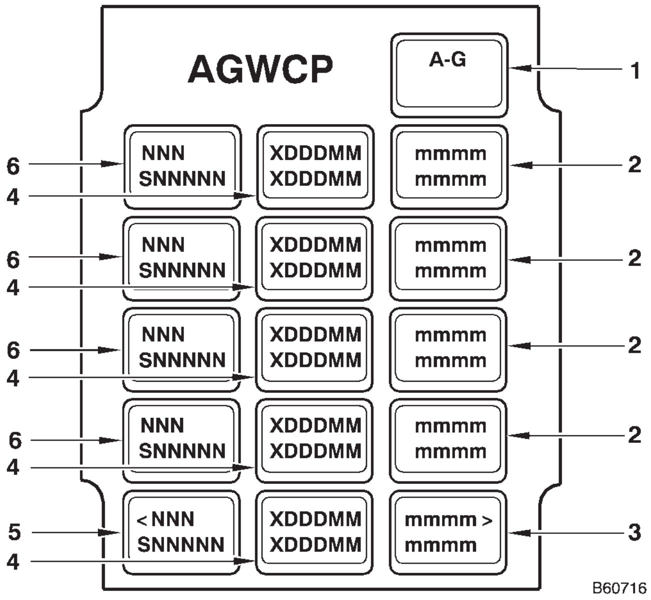
When SPI Data key, button 2, (see figure 1A-76) displays LAT or LONG, SPI Data key, button 4, will display their respective coordinates in ten thousandths of minutes. When button 2 displays ELEV, button 3 will display SPI RETURN to provide access to the Air to Ground page.

The Numbers keys are used to enter coordinate data for the latitude and longitude pages and enter elevation data for the elevation page.

The left arrow key is used to backspace while entering coordinate data.

The Escape key is used to ignore data entered and return to the TGP SPI page.

TGP SPI View All Page

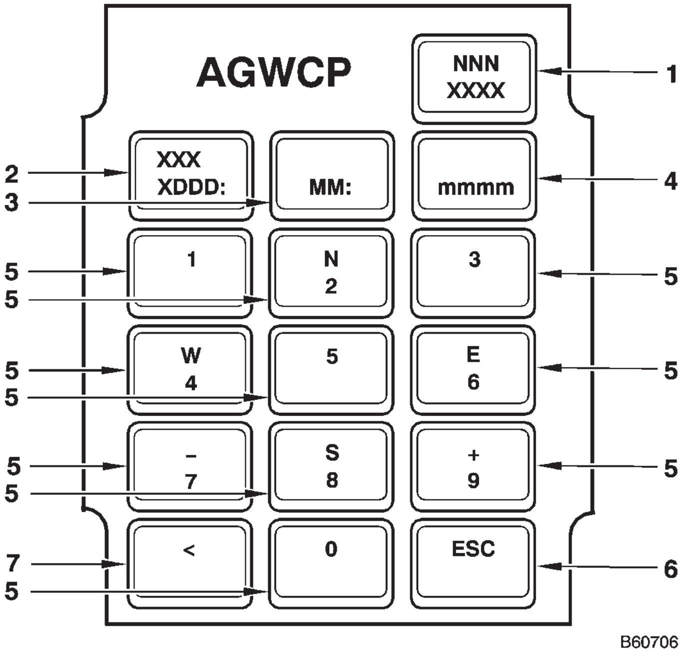


Selecting the VIEW ALL key on the SPI Menu displays 5 SPIs per page. This information can be used to confirm or copy loaded data.

KEY	LEGEND	FUNCTION
1	A-G Key	Select to return to A-G page.
2-4	SPI Coordinates Key	First Line: Displays SPI Latitude; X= N/S, DDDMM = Degrees and Minutes. mmmm = Decimal minutes. Second Line: Displays SPI Longitude; X = E/W, DDDMM = Degrees and Minutes Longitude. mmmm = Decimal minutes.
	(Blank)	Indicates register is empty.
5-6	NNN SNNNNN	First Line: Indicates the register number of a loaded SPI (NNN = 1 to 100). Second Line: Indicates elevation of the loaded SPI (S = Blank for positive, or minus (–) for negative value). (NNNNN = 00000 to 99999 in feet MSL).
	(Blank)	Indicates register is empty.
3/5	Scroll Keys	Used to scroll to the subsequent/previous set of 5 SPI registers respectively.

Figure 1A-75

TGP SPI Coordinate Page



Pressing the Lat/Long keys on the SPI page allows access to the three SPI coordinate editing pages (Latitude, Longitude, and Elevation pages), each reached in sequence.

KEY	LEGEND	FUNCTION
1	Current SPI Key	Displays SPI number currently being modified (NNN = 1 to 100). LAT/LONG Pages: XXXX = NEXT. Pressing this key steps to the next edit page (LONG or ELEV page). ELEV Page: XXXX = RETURN. Pressing this key returns the operator to the SPI main page.
2-4	SPI Data Key	XXX = LAT on the Latitude page, LONG on the Longitude page, and ELEV on the Elevation page. LAT/LONG Pages: X DDD:MM:mmmm is latitude and longitude data in degrees, minutes, and decimals of minutes, with X = N, S, E or W. Elevation Page: XXX displays as ELEV (MSL), the MM key displays elevation in feet, and the mmmm key displays A-G and returns the operator to the A-G page. (When elevation is displayed, NNNNN = 00000 to 99999).
5	Numbers Keys	LAT/LONG Pages: Used to load coordinate data. Elevation Page: Used to load elevation data. A minus (–) sign is displayed above the number 7, allowing the operator to enter an elevation below MSL.
6	Escape Key	Press this key to escape the current page and return to TGP SPI Page without saving changes.
7	Backspace Key	Left arrow key. Used to backspace while entering coordinate data.

Figure 1A-76

TGP SLAVE PAGE

The Slave page (figure 1A-77) provides the ability to store and slave an SPI. The Slave page is accessed by selecting the SLAVE key from the A-G page. The Slave page allows the following functions to be performed by the operator:

- Slave the TGP to an SPI.
- Store an SPI to an open register.
- Clear an SPI from a register.

When the Slave key on the TGP A-G menu is pressed to access the Slave page, the location (SPI) at the center of the TGP field of view is saved. The 0 key is used to transfer the saved SPI to the next empty register. This key displays the next empty register in the top half of the button. Pressing this button transfers the coordinates from register 0 into the next empty register. The text will be outlined whenever the advisories FAULT or DATA? appear in the bottom half of the button and the SLAVE function will be invalid.

NOTE

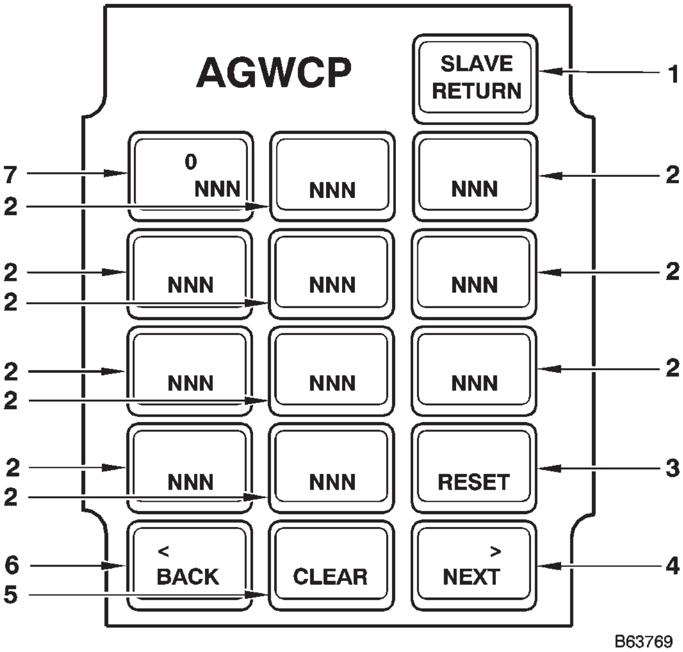
> When the FAULT or DATA? advisories are no longer active, the operator must return to the A-G page and select the Slave key to continue Slave functions.

The SPI Registers keys (ten buttons) are used to display the current set of 10 SPI registers available for viewing. These buttons are also used to slave the TGP to the SPI stored in the registers. Selecting a register that contains an SPI will slave the TGP to that SPI. Selecting a register that is empty will store the SPI in register 0 into the register selected. The BACK and NEXT keys, are used to scroll backwards or forwards through the registers.

The Reset key is used to slave the TGP back to the previous slaved register.

Selection of the CLEAR key followed by selection of a button that has a filled register deletes the data stored in that register and removes the underline from that register.

TGP Slave Page



Pressing the SLAVE key on the A-G menu opens Slave Page, basically an uneditable version of the SPI pages. Use this page to select the SPI to which the TGP is slewed.

KEY	LEGEND	FUNCTION
1	SLAVE RETURN Key	Press the SLAVE RETURN key to return to the A-G menu.
2	SPI Registers	
	NNN	Indicates the register is empty. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
	NNN	Indicates register is not empty. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
	NNN (Outlined)	Indicates stored data in register and TGP is slaved to this register. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
3	Reset Key	Press RESET to return the TGP LOS back to the previous SLAVE command. Used after slewing from a slaved SPI to return to the original aimpoint (analogous to zeroing buffers).
4	NEXT Key	Press NEXT to scroll to the subsequent page of 10 registers.
5	CLEAR Key	Selecting CLEAR then selecting a filled register will delete the data in that register.
6	BACK Key	Press BACK to scroll to the previous page of 10 registers.
7	Data Transfer Key	Pressing this key transfers computed TGP LOS coordinate/elevation data to the next open register (NNN).
	0 NNN	Displays the next available empty register. (NNN = 001 to 100)
	0 FAULT	Indicates faults for PFL/MFL or COMM has occurred or when AGWCP or ITH equipment failed. Attempt to use SPI data for targeting will be ignored.
	0 DATA?	Indicates SPI data is invalid. Attempt to use SPI data for targeting will be ignored.

Figure 1A-77

TGP TARGET PAGE

The TGP Target page (figure 1A-78) provides for the transfer of targeting data to a SMO. The TGP Target page is accessed by selecting the TARGET key from the A-G page. The TGP Target page allows the following functions to be performed by the operator:

- Send an SPI to a SMO as a target.
- Continually send (STREAM) the location at the center of the TGP field of view, to a SMO as a target.

WARNING

- While STREAM function is active, any movement of the TGP line-of-sight will change the TGP-TGT coordinates being displayed.
- Stream mode with the GWD SMO produces updating flight control indications to release weapons on real-time, updating TGP generated target coordinates. The presence of clouds, smoke or haze may affect the TGP coordinates being streamed and can result in errant weapons release by the OAS.

The RETURN key is used to return to the A-G menu.

The SPI Registers keys (ten buttons) are used to display the current set of 10 SPI registers available for viewing. Selection of a stored SPI as a target, displays the register number on the SEND SPI key. Use the BACK and NEXT keys, to scroll backwards or forwards through the registers.

The SEND SPI key is used to send the coordinates assigned to an SPI to the SMO. Start the process by selecting a stored SPI as a target or register 0, which displays the register number on the SEND SPI key, then select the SEND SPI key to transfer the data to the SMO.

NOTE

- Send SPI data will be marked invalid whenever a PFL/MFL fault occurs, or when AGWCP or ITH equipment fails.
- TGP SPI data will not be saved if the SPI elevation is below –2000 ft. MSL or above 50,000 ft. MSL.
- The function of STREAMing an SPI to a SMO target is limited to GWD SMO only. The SEND function is limited to GWD, JDAM and WCMD SMOs.

Selection of the Stream Video key (Stream mode) allows the operator to send continuously derived TGP coordinates directly to the OAS for weapons release. Stream mode gives the operator the ability to release guided and unguided gravity weapons quickly, on targets which have been positively identified by the aircrew or in conjunction with off-board sensors, designators or personnel. Stream mode is used in conjunction with PRGM B+ to place the aircraft in bomb mode against the updating coordinates provided by the TGP. PRGM B+ ballistics are based on the the first mission target that has not been released against. The following conditions must be met for Stream to function:

- TGP must be selected as the PRGM B+ sensor (CF-536 Sensor select).
- The combat laser designator must be firing and the pod must be receiving valid laser energy.
- STREAM must be selected on the AGWCP Target menu.
- PRGM B+ must be selected to place the aircraft in bomb mode.

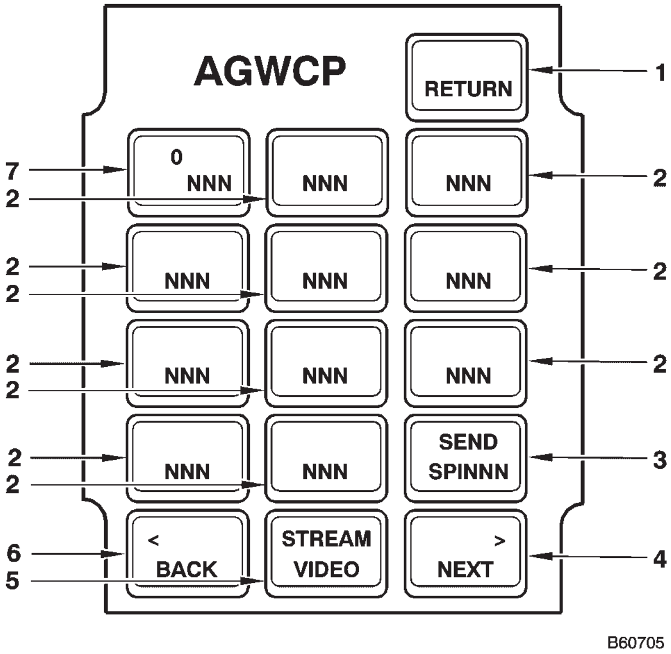
During Stream operations, any movement of the TGP line of sight will result in movement of the ballistic release point. If the operator moves the TGP line of sight coordinates at a rate greater than 50 feet per second, bomb inhibit will be activated and must be deselected to release weapons on the target. If a bomb run is aborted while using the Stream function, the operator should ensure that STREAM is deselected on the AGWCP after exiting PRGM B+.

NOTE

- Stream coordinate data will be marked invalid whenever a PFL/MFL or COMM fault occurs, or when AGWCP or ITH equipment fails.
- Deactivation of the STREAM function by either the operator or automatically by the TGP while in bomb mode will result in TGP-TGT conversion from a dynamic target to a static target. The last update received prior to STREAM deactivation becomes the target.

The Data Transfer key displays the next empty register in the bottom right portion of the button. When selected, the location at the center of the TGP field of view is stored in the next empty register and selects that register for the next Send operation. The bottom portion of the button will be outlined whenever the advisories FAULT or DATA? appear and the Target function will be invalid.

TGP Target Page



KEY	LEGEND	FUNCTION
1	RETURN Key	Press the RETURN key to return to the A-G menu.
2	SPI Registers	
	NNN	Indicates the register is empty. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
	<u>NNN</u>	Indicates register is not empty. There are 100 SPI registers that can be viewed in sets of ten on this page. (NNN = 001 to 100)
3	SEND SPI Key	Press this key to send SPI data to the SMO as a target. (NNN = 001 to 100)
4	NEXT Key	Press NEXT to scroll to the subsequent page of 10 registers.
5	Stream Video Key	(Displayed when GWD SMO is operating.)
	Video	Indicates stream video is not active.
	<u>Video</u>	Indicates stream video is active.
6	BACK Key	Press BACK to scroll to the previous page of 10 registers.
7	Data Transfer Key	Pressing this key transfers computed TGP LOS coordinate/elevation data to the next open register (NNN).
	0 NNN	Displays the next available empty register. (NNN = 001 to 100)
	0 FAULT	Indicates faults for PFL/MFL or COMM has occurred or when AGWCP or ITH equipment failed. Attempt to use SPI data for targeting will be ignored.
	0 DATA?	Indicates SPI data is invalid. Attempt to use SPI data for targeting will be ignored.

Figure 1A-78

TGP MULTI-TARGET CUEING (MTC) PAGE

The Multi-Target Cueing (MTC) page (figure 1A-78) provides the ability to manually flag targets on the TGP Video monitor. The MTC page is accessed by selecting MTC from the A-G page. The MTC page will allow and return to the A-G page.

The MTC page allows the following functions to be performed by the operator:

- Toggle between AUTO, MAN (manual) and OFF mode.
- Add/delete MTC flags, up to 10 (manual mode only).
- Set a flagged SPI as priority.
- Cycle priority among flagged SPIs.
- Command priority flagged SPI to the TGP center of view on the TGP Video monitor.
- Set number of maximum displayed SPIs up to five (auto mode only).

The RETURN key is used to return to the A-G menu.

The MTC key displays the current selected mode, AUTO, MAN (manual) or OFF.

The Center Priority (CENTER PRIOTY) key is used to center the priority flag in the TGP Video monitor.

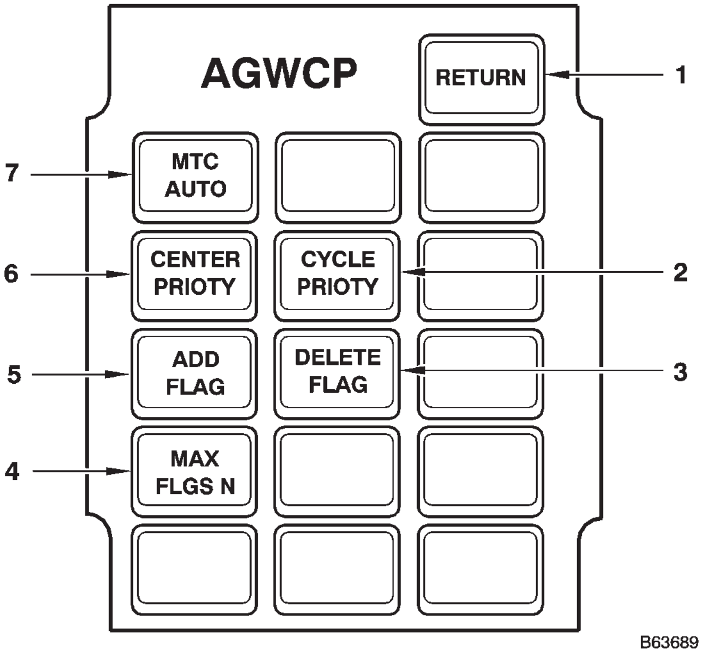
The Cycle Priority (CYCLE PRIOTY) key is used to cycle priority among the flags.

The Add Flag key is used to add manual MTC flags to the field of view on the monitor (up to 10 flags).

The Delete Flag is used to remove the flag closest to the center of the field of view and select a new priority flag.

The MAX FLAG N key (when in automatic mode) is used to cycle through the number of flags to be displayed on the TGP Video monitor. The range is from 1 to 5 with 5 being the maximum number. This function is only available when MTC is in automatic mode.

TGP MTC Page



KEY	LEGEND	FUNCTION
1	RETURN Key	Press the RETURN key to return to the A-G menu.
2	Cycle Priority Key	Used to cycle priority among flagged SPIs.
3	DELETE FLAG Key	Used to remove the flag from the current priority SPI and selects a new priority SPI.
4	MAX FLAGS N Key	In automatic mode, sets the number of flags that are to be displayed on the TGP Video monitor. N= 1 to 5.
5	ADD FLAG Key	Used to to flag the SPI currently in the center of the TGP Video monitor. This function is limited to to manual mode only with a limit of 10 flags.
6	Center Priority Key	Used to center the priority flagged SPI in the TGP Video monitor.
7	MTC Key	Displays the current MTC mode selected.
	OFF	Indicates MTC is currently off.
	AUTO	Indicates MTC is in automatic mode.
	MAN	Indicates MTC is currently in manual mode.

Figure 1A-79

TGP OPERATION

The TGP has five operational modes: SLAVE, AREA TRACK, POINT TRACK, INERTIAL TRACK (INR) and SLEW.

SLAVE: Slave mode allows the operator to slave the TGP line of sight to operator selected coordinates that have been loaded in the SPI tables. SLAVE mode is the initial pointing mode for the TGP sensors. Coordinate, elevation and range data should be considered inaccurate in SLAVE mode. Nav Arm data is incorporated into ranging calculations once a valid track mode is entered.

AREA TRACK: Area Track mode uses scene correlation techniques to track a location. Upon entering AREA TRACK, the TGP enters the target correlation sub-mode. This sub-mode monitors a small window in the center of the field-of-view. If the TGP cannot maintain track in target correlation, it automatically changes to the scene stabilization submode, which monitors up to sixteen windows (PELs) in the field-of-view to maintain the target LOS.

INERTIAL TRACK (INR): When POINT or AREA Track cannot be maintained, the TGP enters inertial mode. This mode can also be selected by the operator by selecting break lock (INR Track) on the ITH, but is usually entered due to aircraft structure, stores, clouds, or other obstructions passing through the FOV of the TGP that mask the target. INR Track maintains a LOS on the ground-stabilized point so that, when the mask condition clears, the TGP is still looking close to the previously tracked point. The TGP remains in INR until the operator reselects POINT or AREA Track, enters a SLAVE command, commands break lock, or enough scene detail is available in the picture to re-enter the last mode the TGP was in prior to entering Inertial Track mode.

POINT TRACK: Point Track mode provides tracking of single targets with well-defined contrasts, using a small field-of-view correlation tracker. It is not the same as a classical point tracker that looks for well defined edges to bound. The small FOV tracker behaves the same as area track, but will track moving targets as well as stationary targets. When point tracking a moving target, the tracking box does not always bound the target. Also, the crosshairs do not always coincide with the tracking box and generally lag in the direction of target motion. If lasing is commanded in this condition, the laser fires through the crosshairs and will not accurately designate the target.

SLEW: SLEW mode allows the operator to adjust the point of interest for the targeting pod and to conduct sensor measurements using the cursor displayed on the monitor. Movement can be initiated only after slaving the pod to an SPI, uncaging the sensor with the break lock (INR Track) button and moving the ITH from its centered position. Pressure and directional indications are provided in the upper left corner of the monitor. Large slew inputs will result in delays for computation of coordinates and elevation by the targeting pod.

WARNING

OAS crosshairs are independent of TGP crosshairs. An unintended target may be struck as a result of misleading TGP video, if correct OAS target coordinates, TGP SPI coordinates and buffer values are not confirmed.

IR CHARACTERISTICS

The FLIR in the TGP detects energy in the 3 to 5 micron region of the electromagnetic spectrum. This wavelength region is not visible to the human eye. Pod electronics convert the energy received by the detector into a video scene for display on the TGP monitor. The video displays the difference in temperature (delta T) between objects as different shades of gray.

Unlike night vision goggles, IR detectors can see in total darkness. During the day, the sun heats objects above the ground warmer than the ground. At night, the earth stays relatively warm compared to the objects that are cooled by the wind. In each case, there is a difference in temperature that can be detected. There is a short time after the sun sets and rises when the objects above ground are the same temperature as the background. This phenomenon is called thermal crossover, during which degraded FLIR performance can be expected.

IR energy penetrates smoke and haze better than the visible spectrum does, but is more adversely affected by humid conditions than the visible spectrum because water absorbs IR radiation very efficiently. Water in any form degrades the IR imagery. Rain, snow, fog, and mist cause the IR scene to fade or wash out.

IR degradation due to water vapor is directly related to the amount of moisture in the air. Relative humidity (the percent of water saturation in the air based on air temperature) is not a true measurement of how much moisture is in the air. Absolute humidity, usually measured in grams per cubic meter (g/m3), is an accurate measure of the amount of water in the air regardless of air temperature. Absolute humidity readings below 8 to 10 g/m3 provide good FLIR video. Values above 13 to 15 g/m3 degrade the IR video significantly. Given the environmental conditions and the type of target, approximate target degradation can be computed during mission planning.

The sky appears as a very cold object in the IR video. Therefore, most objects will appear hot if the sky is in the background. If tracking a target above the aircraft (i.e., on top of a hill), the object will appear hotter than the background (because the background is the sky). As the aircraft gains altitude, the background shifts to the ground behind the target. Depending on the temperature of the target, the target polarity may change because of a difference of temperature between the target and the ground versus the target and the sky. The tracker may have difficulty staying on target after this apparent polarity change, particularly in AREA track.

Hot objects in the scene will affect the gray shade of the background near the hot object. For example, if the polarity is set so that hot objects appear white and the ground is a medium shade of gray, a hot object will appear white and the ground close to the hot object will appear a little darker than the ground in the rest of the video scene. This happens because the video scene is based on temperature differences. Although the ground temperature is essentially the same, the ground near the hot object appears colder because of the higher difference in temperature.

FLIR CALIBRATION

The FLIR has the capability to perform upon command a one-point and two-point non-uniformity calibration after the FLIR camera has reached its operating temperature. Calibration (CAL) allows correction of a degraded FLIR image and can be accomplished while airborne or on the ground. During a CAL, the output of the individual detectors in the FLIR are adjusted against known temperatures to produce a uniform picture. Calibration should only be required if maintenance has been performed on the TGP (i.e. front section or FLIR electronics unit have been replaced) or if the picture is degraded. The CCD does not require calibration.

There are two types of calibrations. A long calibration (LONG CAL) adjusts the FLIR against two temperatures and takes 6 to 9 minutes. A short calibration (SHORT CAL) adjusts the FLIR against one temperature and takes approximately 30 seconds. SHORT CAL is intended to be primary calibration method if the image appears to have minor blemishes or non-uniformities that are not a result of the scene or when significant ambient temperatures occur.

NOTE

A short calibration should not be performed within 30 minutes after a long calibration. This may severely degrade the FLIR image, requiring another long calibration.

FLIR INTEGRATION TIME

The integration time setting determines the length of time the IR energy is processed on the FLIR to obtain the best picture quality (integration time is analogous to shutter speed on a camera). Integration time setting 0 (Hot) yields a processing time of 2.3 ms, while integration time setting 1 (Cold) yields a processing time of 4.6 ms. Integration settings should be changed based on the predicted target area temperatures. The recommended integration time settings are shown in figure 1A-80.

NOTE

> Calibrations for each integration setting (0/Hot and 1/Cold) must be performed to produce the best FLIR images. A LONG CAL is recommended whenever an airborne calibration is required. If time does not permit long CALs in both integration time settings, a LONG CAL should be performed on the integration time setting corresponding to the target area ground temperature. Short CALs may or may not improve the FLIR image. FLIR calibrations on the ground may also corrupt the FLIR image.

FLIR Integration Time

GROUND TEMPERATURE	INTEGRATION TIME SETTINGS
Below 20° C (68° F)	Cold (1)
20° C to 30° C	Hot or Cold
30° C (86° F) and Higher	Hot (0)

Figure 1A-80

LASER SAFETY

The Nominal Ocular Hazard Distance (NOHD) for the laser designator is 11,000 meters (5.9 NM) for unaided viewing. The NOHD for the laser marker is 183 meters (600 ft) for unaided viewing. The lasers are considered eye safe (unaided) at ranges beyond these distances for direct exposure not exceeding 10 seconds.

To enable the ITH trigger to fire the laser designator, the following conditions must be met:

- True airspeed > 100Kts.
- Combat mode selected.
- Valid laser code inserted.
- Laser armed.
- TGP not masked.
- Track mode selected.

To enable the ITH trigger to fire the laser marker, the following conditions must be met:

- True airspeed > 100Kts.
- Combat mode selected.
- Marker armed.
- TGP not masked.
- Track mode selected.

MASKING

Since the laser is not eye-safe, even for scattered/reflected energy, it is imperative that the laser beam not strike the aircraft. To accommodate this safety consideration, information on aircraft and aircraft stores is loaded into the TGP nonvolatile memory. The TGP compares current LOS to the stored aircraft data and determines if it is looking at the aircraft structure or stores. When the TGP LOS is pointed at the aircraft, laser fire is disabled.

The TGP compares current LOS to the stored mask data and determines whether the LOS is in mask or mask warning state. When the TGP LOS is pointed within the mask warning zone, the crosshairs begin to flash. Additionally, the laser indicator to the right and below the crosshairs on the TGP monitor will indicate “M”.

WARNING

> The laser is unmasked against the bomb bay doors and landing gear. When the gear is extended or the bomb bay doors are open in flight and the combat laser is fired, reflection hazards exist. The laser is disabled during ground operations.

LASER OPERATION

The TGP contains two separate lasers with distinctly separate hardware. The two lasers are referred to as the Laser Designator and the Laser Marker.

WARNING

> When in combat mode, once the laser marker/designator is armed, it can be fired.

TGP MISSION PLANNING

The purpose of this section is to provide the aircrew with data required for LITENING TGP mission planning and execution. The contents of this section reflect information currently available. Because of the various weapons capabilities and tactics, planning can vary from simple to complex. As experience with operation of the pod is accumulated, aircrew members must share the responsibility for assuring that new or improved planning procedures are incorporated in subsequent revisions.

MISSION PREPARATION

The following tasks are required for thorough LITENING TGP mission planning:

1. Target Data Collection:

Compile intelligence information and imagery of the target area. Five-meter imagery or less of the target area is preferred. For alert or on-call missions in which the general target area can be anticipated, significant terrain features or geographic references should be studied in order to build general overall situational awareness and to orient the crew to pointers which may be used to achieve positive target identification. Previously recorded video or still capture of expected target types should be studied if available. Laptop computers can be used in flight to increase situational awareness and should be loaded with the most current imagery and map data available. Tools which provide predicted weather and environmental conditions of the target area should be used in the mission brief. Aids such as Target Acquisition Weather Software and Infrared Scene Simulation Software provide expected acquisition and identification ranges based on target type and forecast conditions.

2. Target Study:

For a successful mission, a detailed target analysis must be accomplished. The crew must thoroughly study the most current imagery of the target and target area. Crewmembers must be proficient in the use of PFPS/Falcon View to aid in target area familiarization and verification. A thorough understanding of the pod’s field of view (FOV) limitations, including the affects of aircraft bank angle and pod masking, will enhance employment of the system. Tools such as PFPS Sky View should be used during study of pre-determined targets to enhance situational awareness and to provide the operator with an expected view of the target and target area before the mission. Target study will include target description (dimensions, orientation, makeup), assigned laser designation codes, weapons load-out, fusing, LGB PRF codes, and assigned ground or FAC-A frequencies, call-signs and laser marker coordination.

3. Special Instructions/Rules-of-Engagement Study:

Theater specific Special Instructions and Rules of Engagement, which outline target ID criteria and weapons release authority, should be reviewed for each mission. At a minimum, review collateral damage concerns and positive target identification requirements.

Radar Navigator/Navigator Procedures

section II

table of contents **page**

NOTE

- This section contains text and an amplified checklist. The text is divided into primary paragraphs which form the phases of a normal flight. Most of these paragraphs are followed by an amplified checklist for the particular phase of the flight. The amplified checklist is presented in a chronological form that will enable the flightcrew to complete their inspection, checks, and operation of the aircraft in an expedient yet thorough manner. The amplified checklist describes in detail the steps to be completed. Each major part has been assigned to be read by one of crewmembers, and to be accomplished by others in the crew. However, there are exceptions as some of the checklists will be read and completed silently. To show which crewmember will accomplish certain steps, the normal crew coding will be used and the code letters will appear after the response to each step. At times it may be advantageous for the navigator to accomplish certain items designated for the radar navigator and vice versa. The terms “as required,” “as desired,” “climatic,” and “cross-checked” as used in the checklist indicate equipment operation or settings which may vary according to prevailing conditions. In practice, the response to these items will be the required switch or control position or actual indicator reading. The amplified checklist has also been designed to accommodate the production of the abbreviated checklist to be used during aircraft operation.

- Some system control switches are provided with a guard, such as bombing system switch, radar pressure control switches, etc. In practice, when guarded switches are actuated, the desired toggle position will be ascertained and then the guard positioned.

PREPARATION FOR FLIGHT

FLIGHT RESTRICTIONS

All limitations imposed on the aircraft are described in Section V, OPERATING LIMITATIONS in T.O. 1B-52H-1.

FLIGHT PLANNING

The necessary fuel, airspeed, and thrust settings required to complete a proposed mission should be determined by using the operating data from Part 10 of T.O. 1B-52H-1-1.

Emissions Control

Crews and mission planners should consider and develop procedures to counter passive detection threats on combat missions. This emissions control (EMCON) plan should identify when and where specific aircraft emitters are at risk of detection and specify whether these aircraft emitters should be used. Specific OAS equipment to consider are the OAS radar, APN-69, Doppler, radar altimeter, and bomb bay/walk way lighting. Additional aircraft systems to consider are the ECM equipment, air-to-air TACAN, and IFF. See command guidance for additional EMCON considerations.

CHECKLISTS

The flight manual checklists have been designed so that they may be used for training missions with or without a bomb, for alert posture, and for combat missions which are launched from other than a ground alert posture. Ground alert checklist implementation and instructions are contained in ALERT PROCEDURES, this section.

NOTE

- For specific guidance concerning accomplishment of Weapons Preflight, see ALERT PROCEDURES, this section.
- When no bombs or missiles are loaded, safety wires and seals are not required on the associated monitor control and release system controls.
- With multiple type weapon loads, the applicable T.O. 1B-52H-34-2- series BEFORE EXTERIOR INSPECTION, EXTERIOR INSPECTION, INTERIOR INSPECTION, and AFTER ENGINE START Checklists must be accomplished for all weapons during ground operations.

Nuclear Bombs

Nuclear bomb strike mission amplified checklists appear in Section II of T.O. 1B-52H-25-2. T.O. 1B-52H-25-2CL-1, NUCLEAR BOMB DELIVERY PROCEDURES, will be maintained as a separate checklist and will be available for use as required. The following additional checklists also appear in T.O.'s 1B-52H-25-2 and 1B-52H-25-2CL-1:

- Non-Strike Procedures
- SIOP Restrike Procedures
- Emergency Procedures

Nonnuclear Weapons

Nonnuclear weapons procedures are contained in T.O. 1B-52H-34-2-1 and the associated abbreviated flightcrew checklist. Nonnuclear weapon delivery procedures (T.O. 1B-52H-34-1-2CL-1) will be maintained as a separate checklist and will be available for use as required.

JDAM/WCMD Weapons

JDAM weapon description and procedures are contained in T.O. 1B-52H-34-2-6. WCMD weapon description and procedures are contained in T.O. 1B-52H-34-2-5. Weapon delivery abbreviated checklist procedures (T.O. 1B-52H-34-2-6CL-1 for JDAM and T.O. 1B-52H-34-2-5CL-1 for WCMD) will be maintained as separate checklists and will be available for use as required.

Missiles

Missile procedures (NORMAL) have are contained in Section II of the appropriate missile delivery manual as complete checklists.

AGM-86B CHECKLISTS

The AGM-86B procedures amplified checklists appear in the B-52/AGM-86B Aircrew Weapon Delivery Manual, T.O. 1B-52H-30-4 and the associated abbreviated flightcrew checklist. AGM-86B missile delivery procedures (T.O. 1B-52H-30-1CL-1) will be maintained as a separate checklist and will be available for use as required.

AGM-86C/D CHECKLISTS

The AGM-86C/D CALCM normal and emergency procedures amplified checklists appear in the B-52/AGM-86C/D Aircrew Weapon Delivery Manual, T.O. 1B-52H-34-2-9. The CALCM normal and emergency abbreviated procedures appear in the CALCM Aircrew Abbreviated Checklist T.O. 1B-52H-34-2- 9CL-1.

AGM-129 CHECKLISTS

The AGM-129 procedures amplified checklists appear in the B-52/AGM-129 Aircrew Weapon Delivery Manual, T.O. 1B-52H-30-1 and the associated abbreviated flightcrew checklist AGM-129 missile delivery procedures (T.O. 1B-52H-30-1CL-1) will be maintained as a separate checklist and will be available for use as required.

AGM-154 JSOW CHECKLISTS

The AGM-154 JSOW procedures amplified checklists appear in the B-52/AGM-154 Aircrew Weapon Delivery Manual, T.O. 1B-52H-34-2-7. The AGM-154 normal and emergency procedures appear in the JSOW Aircrew Abbreviated Checklist T.O. 1B-52H-34-2-7CL-1.

AGM-158 JASSM CHECKLISTS

The AGM-158 JASSM normal and emergency procedures amplified checklists appear in the B-52/AGM-158 Aircrew Weapon Delivery Manual, T.O. 1B-52H-34-2-8. The JASSM normal and emergency abbreviated procedures appear in the JASSM Aircrew Abbreviated Checklist T.O. 1B-52H-34-2-8CL-1.

BOMBING PROCEDURES

Effective gravity weapon delivery requires an integrated effort by all crew members. Specific crewmember duties follow. Note that some of these procedures may be accomplished prior to the initial point (IP) to enhance crew pacing.

Radar Navigator:

- Resolve position using radar and/or GPS.
- Validate OAS velocities and altitude.
- Configure switches and OAS for release using appropriate checklists.
- Minimize emissions as dictated by mission requirements and passive detection threat status

Navigator:

- Monitor all phases of the bombrun
- Pace crew as necessary
- Advise crew of discrepancies in timing, crosshair placement, switch positions, release parameters (e.g., altitude, airspeed, track, etc.), FCI deflection, and warning indications.
- Ensure ballistics are correct
- Ensure switches and OAS are configured correctly for release using the appropriate checklists

Pilot/Copilot:

- Center FCI for release.
- Pace crew as necessary.
- Advise the offense team of any apparent timing and/or release parameter discrepancies, as required.

Release Methods

The B-52's primary bomb release method is using radar synchronous procedures. This entails using the alternate navigation system, INS, radar and/or GPS inputs to resolve the bomb release point. The synchronous checklist is accomplished by the Offense Team and the OAS generates steering cues and the release signal.

In situations when the status of the OAS precludes using radar synchronous procedures (e.g. No OAS Data, total IKB failures, etc), alternate bombing procedures can be used. Alternate bombing procedures involve determining and steering to the release point by the best means available (e.g. radar, time and heading, etc.). The alternate checklist is run by the offense team and the RN/N generate the release pulse via the D-2 switch (conventional cluster, HSABs) or the MAN LNCH switch on the WCP (nuclear CSRL). See command directives or mission specific SPINs for guidance on use of alternate procedures.

Bombing Restrictions

For training missions with live or inert munitions, refer to command guidance for restrictions.

WARNING

> The aircrew is ultimately responsible to ensure any subsequent ESS runs, camera attacks, and landings are completed without any munitions, submunitions, or release assemblies departing the aircraft.

RADAR NAVIGATOR'S AND NAVIGATOR'S NORMAL PROCEDURES

table of contents **page**

BEFORE EXTERIOR INSPECTION (POWER OFF)

WARNING

Wearing the chemical defense ensemble, including plastic boots and overcape, can cause a buildup of static electricity. For this reason, when wearing the ensemble, aircrews will ground themselves on the aircraft grounding cable prior to entry to the aircraft.

1. Ejection Trigger Ring – Stowed, pin No. 1 installed (RN-N)

   Check that ejection trigger ring is properly seated in detent.

WARNING

If the ejection trigger ring is not properly seated in the detent, call maintenance and ascertain status of arming initiator before continuing seat inspection.

2. Circuit Breaker Panels: (RN-N)
   a. Jettison Power, Normal Release, External Normal Release, & Relays Circuit Breakers – Out
   b. All Other Circuit Breakers – In
3. EVS Environmental Power Switches (3) – OFF (RN)

WARNING

Lethal voltages may exist on the FLIR turret window and the electrical cable routed to the STV turret if the switches are in the ON position when power is applied.

EXTERIOR INSPECTION (BOMB BAY INTERIOR)

WARNING

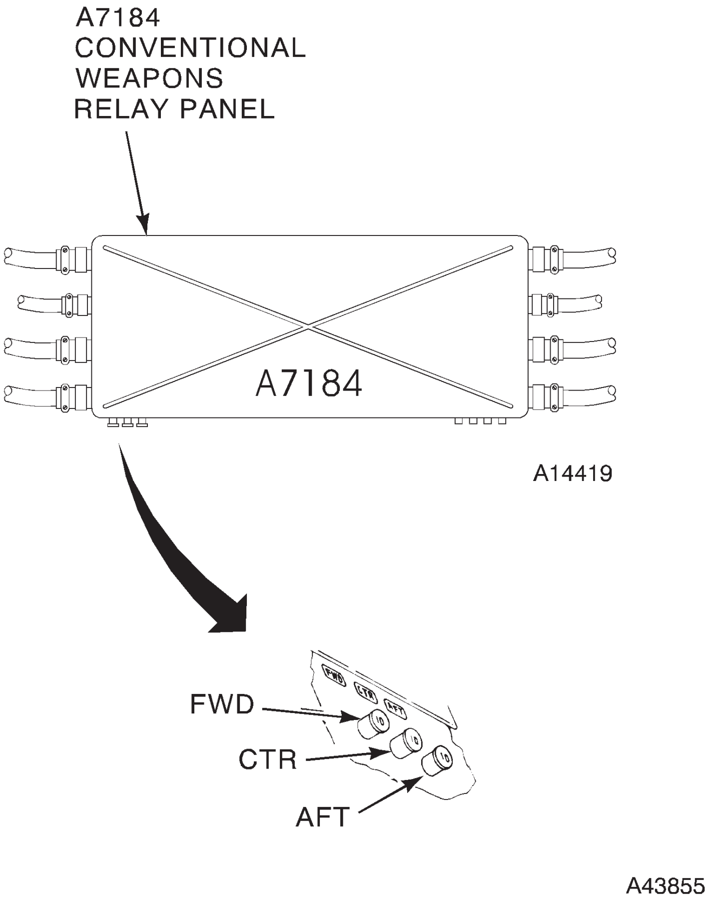
The bomb door actuator struts must be disconnected before entering the bomb bay if power is applied to the aircraft.

CAUTION

Unlatching the bomb doors using the Aft bomb door latch release cable will not be attempted with power on the aircraft.

1. Right Forward Wheel Well Conventional Weapons Relay Panel – Checked (RN/N)

   Check Conventional Weapons Relay Panel on the ceiling of the right forward wheel well. Ensure all cables are connected in the correct configuration for the racks being carried, and the AFT, CTR, and FWD circuit breakers are in. Refer to T.O. 1B-52H-34-2-1, Section I for CWRP cable configuration.



2. General Condition of Bomb Bay – Checked (RN/N)

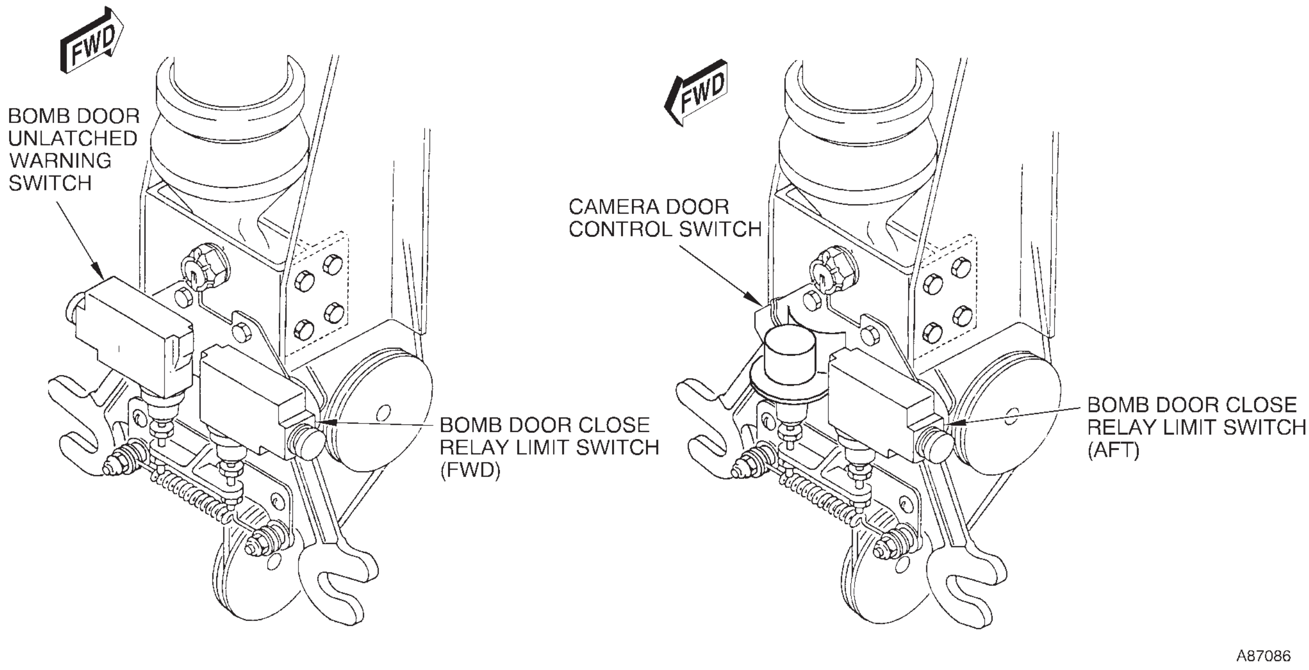
   Check for fuel and hydraulic leaks, proper stowage of bomb door actuator locks, installation of bomb door locking pins, loose objects on the walkways, one grounding wire per panel on the bomb doors, and the bomb door close limit relay switches for proper actuation. With no launcher installed, check the electrical and hydraulic connections are capped, environmental control lines are connected via the SRAM U-tube, and the data bus termination plug is installed.

3. Missile RAM Air Shutoff Valve – Checked (RN/N)

4. Bomb Bay Safety Switches – Checked (RN/N)

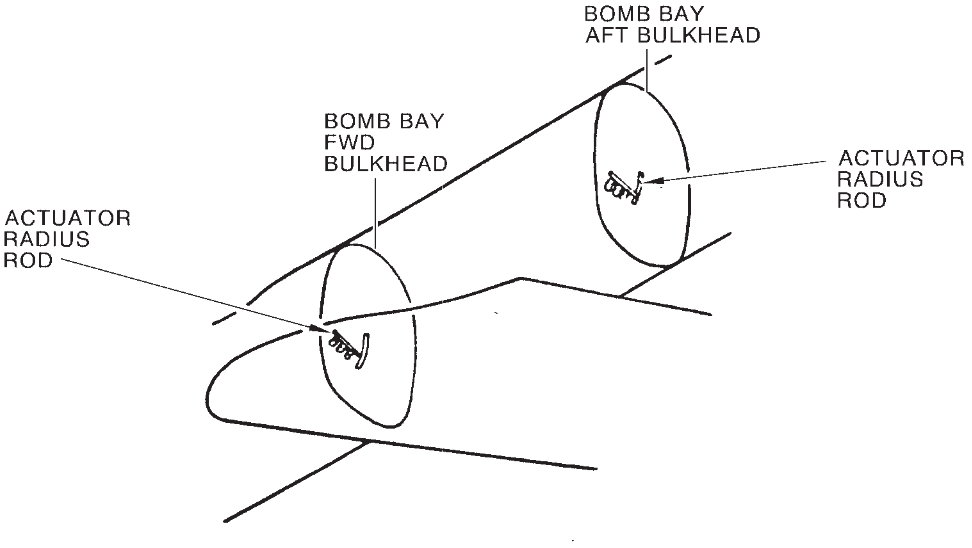
   Check that Switch Actuating Arm is not in contact with switches.

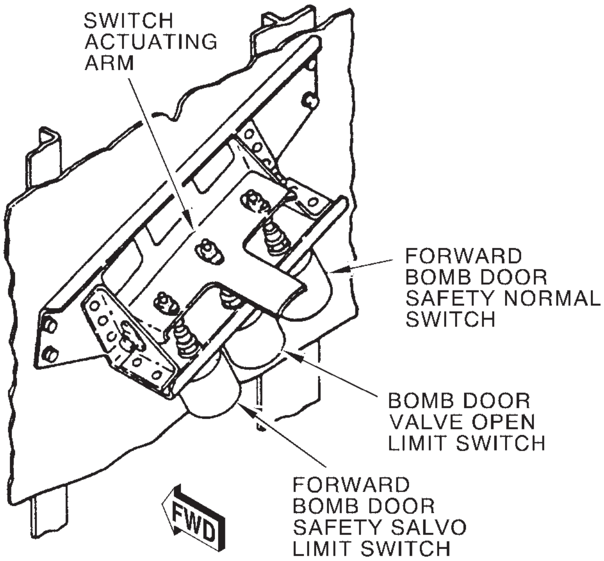
BOMB DOOR LATCH SWITCHES



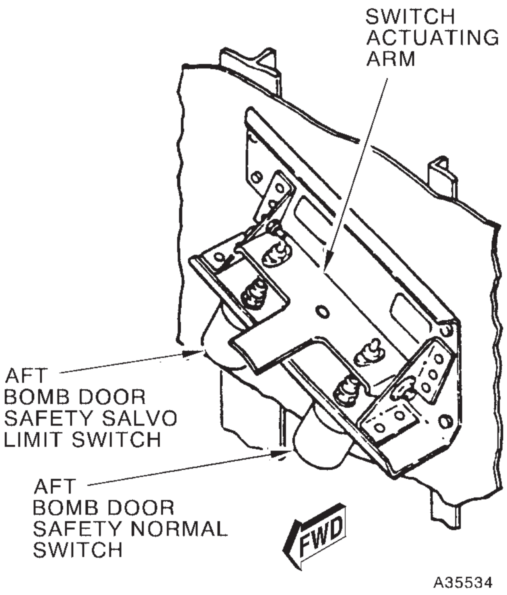
FORWARD BOMB DOOR LATCH **AFT BOMB DOOR LATCH**

BOMB DOOR SAFETY SWITCHES



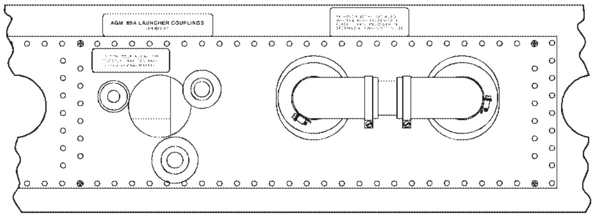


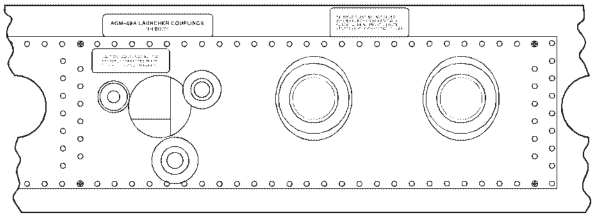
FORWARD BOMB DOOR SAFETY SWITCH



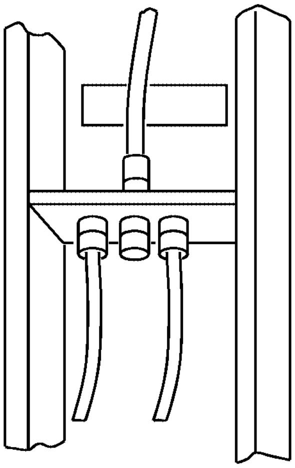
AFT BOMB DOOR SAFETY SWITCH

LAUNCHER U-TUBE ASSEMBLY

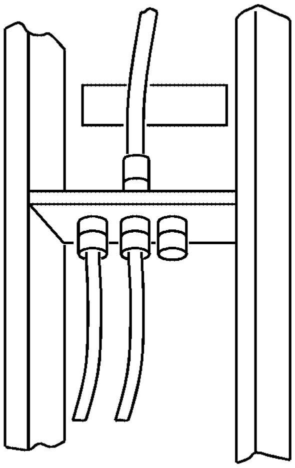




LAUNCHER U-TUBE ASSEMBLY REMOVED, SUPPLY AND RETURN LINES CAPPED



WIRE HARNESS
RECEPTACLE
DISCONNECT ASSEMBLY
(NO LAUNCHER INSTALLED)



WIRE HARNESS
RECEPTACLE
DISCONNECT ASSEMBLY
(CSRL INSTALLED)

EXTERIOR INSPECTION (AIS POD INSTALLED)

1. ALE-25 Pylon – Checked (RN/N)

   Visually check that pylon, launcher rail, and instrumentation pod are securely attached to each other and to the underside of the wing.

2. Pod Number & Location – Noted (RN/N)

   Record the pod number and location (L/R) on the aircraft for reporting to range control agency as applicable.

EXTERIOR INSPECTION (TARGETING POD INSTALLED) *[TP]*

1. Pylon – Checked (RN/N)

   Confirm general condition and note the pylon number.

2. Pod – Checked (RN/N)

   Check general condition. Confirm power and alignment umbilicals are connected, latches are closed, sway brace feet are secure, turret is free of obstruction from pylon fairings, and ECU cover is closed. Note pod serial number.

INTERIOR INSPECTION

1. Equipment – Stowed (RN-N)

WARNING

> Ensure that no equipment is stowed on or near the lower deck heating ducts and outlets, electrical wiring, or electronic equipment.

2. ***Less [AMI]*** RSPA Magnetic Latching Indicators – Checked (N)

   Black is normal. White indicates the RSPA has had a built in test failure.

3. Pressure Dump Handle – CLOSED, safetied (N)
4. Pressure Bulkhead Door – Closed, latched, unlocked, locked (alert only) (N)

   For Alert operations only, positive locked indication will be obtained by attempting to open the door with the door handle.

5. IN Oxygen Regulator – OFF and 100% Oxygen (IN not flying) (N)
6. Lower Deck Fire Extinguisher – Checked (N)

   Ensure that appropriate safety device (safety wire/seal or locking pin/lever, as applicable) is installed. Check for fully serviced pressure.

7. Portable Oxygen Bottle – Serviced and stowed (RN-N)

   Pressure should read approximately 300 psi and altitude selector knob positioned to NORM.

WARNING

> Oxygen will rapidly accelerate any ignition source, such as a spark, into a flash fire. Dirt, grease, and hand lotion all can act as a fuel to the fire. Therefore, when recharging a portable oxygen bottle, crewmembers will wear Nomex flight gloves and the helmet with visor down. These gloves should be free of oil and grease.

8. MRT Receiver: (N)
   a. Transfer Module Closeout Panel – Removed and stored
   b. Receiver Transfer Module – Installed

NOTE

> Removing the transfer module from the receiver or depressing the zeroize switch on the remote control unit or transfer module will cause the transfer module to zeroize.

INTERIOR INSPECTION (Cont)

9. **DL** Time Standard Module (TSM) – Install (if required) (N)

Typically, the TSM is installed with the power OFF. However, if the TSM is installed when power is applied, be sure to follow all removal notes and procedures before attempting to remove.

CAUTION

- The TSM is an electrostatic discharge (ESD) sensitive device. To avoid equipment damage, be sure to follow all ESD procedures when handling, installing, or removing the TSM.

- When transporting the TSM, use the container provided. To avoid equipment damage, do not touch the connector pins on the rear of the module when handling, installing or removing the TSM. Use the ring on the front of the module when installing and/or removing the TSM.

NOTE

- After installation of the TSM, when power is already applied, wait at least 15 seconds before removing the TSM from the CI. If the TSM is removed prior to the 15 second time period, data within the TSM may be corrupted, rendering the TSM inoperable.

- Do not remove the TSM during cold-start or power-up BIT. This action will disrupt the information passing between the TSM and CI and render the TSM unusable until reprogrammed on the ground via a Time-Distribution System (TDS) or a Mini Time-Distribution Subsystem (MTDS) load device.
- Do not remove the TSM during time transfer mode, BIT mode, or when the blinking mode indication (Control Indicator (CI) display, line 4) has stopped blinking for a 2 – 3 second interval during any mode of operation.
- If the TSM is replaced while in the MILSTAR or AFSAT IIM mode, the mode must be restarted to ensure correct modem operation.
- It is preferable to remove the TSM only after the CI has been powered down.
- The front panel HHM (Hand Held Module) designation has not been changed to reflect the TSM (Time Standard Module) nomenclature.
- The TSM is typically required for MILSTAR operation.

a. Control Indicator (CI) Power Switch – OFF, annunciator light off

b. TSM TEST Button – Press

Verify the TSM has been initialized (time and data have been entered) by pressing the TEST button on the front of the TSM and observing that the green LED READY light is lit. If the READY light is not lit, obtain a different TSM.

INTERIOR INSPECTION (Cont)

c. Control Indicator TSM Cover – Open

Open the CI housing by simultaneously pressing on the cover with both thumbs while pulling down on the levers located on either side of the housing.

d. TSM – Insert

Insert the TSM into the housing and push in firmly to seat unit within the housing.

e. Control Indicator TSM Cover – Closed and locked

10. IU/TACAN DDLC – Installed (N)

NOTE

The position of the DDLC in the slot appears the same whether latched or unlatched. The DDLC must be pressed or pulled in order to determine if it is actually latched in the slot.

11. ***Less [AMI]*** DTUCs – Install (N)

NOTE

DTUCs can be loaded in any order. The mission data tape and cruise missile data tape should not be loaded in same DTU for the most efficient operation.

11. ***[AMI]*** DTCs – Install (N)

Open and latch DTR access door. Slide in DTC until connections mate. Close handle on DTC to lock in place.

12. Lower Deck Spare Parachute Preflight: (RN/N)

a. Inspection Record:

(1) Inspection & Repack Date – Checked

(2) Automatic Release Time & Altitude Setting – Checked

b. Bailout Bottle Pressure & Hose Connector – Checked

c. Personal Locator Beacon Lanyard – Snapped/Unsnapped (as required)

For peacetime operations, the personal locator beacon lanyard must be configured for automatic operation. When mission requirements dictate the necessity to avoid detection and automatic actuation of the beacon is not desired, the lanyard must be configured for nonautomatic (manual) operation.

d. Parachute – Unbuckled and stowed

Spare parachute will be unbuckled and stowed in an easily accessible location.

13. Video Recorder Magazine – Installed (RN)

INTERIOR INSPECTION (Cont)

14. Ejection Seat & Escape Hatch: (RN-N)

WARNING

- Carefully check to ensure that no streamer has been torn from a maintenance safety pin, thus inadvertently leaving the pin installed.
- If a maintenance safety pin is installed, the status of the seat will be ascertained prior to removal of the pin.

a. Catapult Pin-Pull Initiator – Pin No. 4 removed, link to hatch secure

Ensure that no foreign objects or ejection seat lanyards are caught between, or are located near this link and other seat parts.

b. Drogue Parachute Arm Locking Lever & Spring – Checked

Ensure the locking lever is down and in the slot (under the safety clip).

c. Table Stowage Initiator – Checked

Inspect initiator for condition, installation, and tubing connected.

d. Drogue Parachute Support Arm Release Initiator – Checked, pin No. 5 removed

Check maintenance safety pin No. 5 removed. Inspect initiator for condition, installation, and tubing connected.

e. Manual Catapult Initiator Safety Pin-Pull Handle – Secure

Handle should be properly seated below left leg guard.

f. Initiator Tube Runs – Checked connected

Check tube runs for proper and secure connections.

g. Leg Guard Thruster Shear Pin – Checked

Check that shear pin is in place and properly holds actuator in leg guard thruster.

h. Catapult Initiator Safety Pin-Pull Cylinder – Checked

Catapult initiator safety pin must extend all the way through the catapult initiator. If pin is pulled out, initiator may have been fired.

i. Arming Initiator Control Linkage – Checked, pin No. 3 removed

Check maintenance safety pin No. 3 removed. Inspect initiator for condition, installation, and tubing connected.

j. Ankle Restraints – Checked

Inspect ankle restraints for proper operation and stow in downward position.

INTERIOR INSPECTION (Cont)

k. Emergency Escape Hatch – Secure

Check that the paint stripe on lockpin is visible beyond the shield or that the lockpin over laps the shoulder on the lockarm by 1/4 inch.

l. Table Stowage Thruster & Tubing – Checked

m. Man-Seat Separator – Checked

Ensure that the nylon man-seat separator straps are placed on the bare seat. Survival kit is then placed over man-seat separator straps.

n. Shoulder Strap Attachment Fittings – Connected

o. Inertia Reel – Checked

Check inertia reel lock for proper functioning.

p. Safety Belt Release Fittings – Connected

15. Parachute Preflight: (RN-N)

a. Inspection Record:

(1) Inspection & Repack Date – Checked

(2) Automatic Release Time & Altitude Setting – Checked

b. Personal Locator Beacon Lanyard – Snapped/Unsnapped (as required)

For peacetime operations, the personal locator beacon lanyard must be configured for automatic operation. When mission requirements dictate the necessity to avoid detection and automatic actuation of the beacon is not desired, the lanyard must be configured for nonautomatic (manual) operation.

c. Bailout Bottle Pressure & Hose Connector – Checked

d. Parachute Arming Lanyard Anchor – Installed

WARNING

Be certain that the parachute arming lanyard anchor is securely fastened in the attachment fitting on the seat. Failure to attach the lanyard anchor to the seat will necessitate manual operation after ejection.

e. Parachute Straps – Adjusted (as required)

f. UWARS - Checked

Check security of fittings.

NOTE

UWARS BIT is a maintenance function. Do not perform UWARS BIT since excessive BIT checks will degrade battery life.

INTERIOR INSPECTION (Cont)

16. Global Survival Kit: (RN-N)

    a. Kit Installed & Plunger Depressed – Checked

    b. Kit Release Handle – Checked down

    c. Mode Selector Lever – AUTO

    d. Kit Straps to Parachute – Checked and attached

    Check that attachment fittings are properly connected to the kit, the attachment straps threaded through the safety belt, and the quick-disconnect fittings are properly attached to the parachute (with release buttons on outside). Grasp each survival kit strap and perform a quick jerk to ensure a positive link between the D-Ring and the survival kit straps.

WARNING

Care must be taken to ensure that the survival kit attachment straps are properly threaded through the safety belt.

17. Oxygen System – Checked (RN-N)

    a. Regulator Diluter Lever – 100% OXYGEN

    b. Shutoff Lever – OFF

    c. Mask & Hose – Check disconnect, then reconnect

    Check for 10 to 20 pound pull for disconnect, then reconnect mask and hose.

    d. Diluter Valve – Checked

    Attempt to draw air through the oxygen mask. Ability to draw air indicates a defective diluter valve, oxygen hose, and/or connections or mask.

    e. Regulator Diluter Valve – Normal

    Place the diluter valve to NORMAL position and draw air through the mask; if unable, this would indicate that only 100% oxygen will be available.

CAUTION

When the oxygen supply shutoff lever is positioned OFF, on the CRU-73/A, the regulator diluter lever should automatically move to 100% OXYGEN position or it may only move halfway between the NORMAL and 100% OXYGEN positions. When the supply shutoff lever is positioned OFF, do not force regulator diluter lever to NORMAL as this will break the diluter lever.

NOTE

- If the diluter valve is stuck in the 100% position, this will prohibit the detection of smoke or fumes when use of normal oxygen is required.

INTERIOR INSPECTION (Cont)

- If the CRU-73A regulator is installed, the crewmember will not be able to draw air through the system with the shutoff lever OFF. The diluter lever may be moved to NORMAL with the shutoff lever OFF on some CRU-73A regulators. The diluter valve will be in the 100% oxygen position when the shutoff lever is OFF on all CRU-73A regulators.

f. Shutoff Lever – ON

g. Pressure – Checked

Pressure gage reads approximately 300 psi.

h. Emergency Toggle Lever – TEST MASK

With mask disconnected at one side of helmet, the flow indicator should indicate continuous flow.

i. Mask – Test

Attach mask to helmet and hold breath; indicator should indicate no flow.

NOTE

Flow condition may be indicated by a slight leak around the face form. If light hand pressure against the mask does not stop the flow, the mask is unacceptable.

j. Emergency Toggle Lever – NORMAL

k. Regulator Diluter Lever – NORMAL/100% (as required)

18. Interphone – Connected (RN-N)

19. PIHM Assembly – Connect (as required) (RN-N)

a. Blower – Attached and secure

Attach the blower to the blower mounting bracket. Ensure that the blower is fastened securely in the mounting bracket.

WARNING

Failure to configure the AERP System properly may result in injury or death to aircrew member while operating in a contaminated environment.

NOTE

- When seated, the crew member should configure the AERP System with the blower hose connected to ventilation inlet, aircraft oxygen hose connected to the chemical-biological canister and the crossover valve in the vertical position.
- When not seated, the crew member should configure the AERP System with aircraft oxygen hose disconnected, the blower hose connected to the chemical-biological canister, and the crossover valve in the horizontal position.

INTERIOR INSPECTION (Cont)

b. Blower Electrical Connector – Connected

Remove the dust cover from the blower electrical receptacle and connect the blower into the electrical receptacle.

c. Oxygen Regulator – Set

While holding breath, position the supply lever to ON and the emergency oxygen toggle lever to EMERGENCY.

WARNING

Hold breath until steps d. and e. are complete. This will preclude the inhaling of toxic chemicals during the changeover from blower air to the aircraft oxygen system.

d. Blower Hose – Disconnect

Disconnect the blower hose from the QD pigtail adapter.

e. Aircraft Oxygen – Connected

Connect the aircraft oxygen hose to the QD. Resume breathing.

WARNING

If signs of hypoxia occur at high altitudes, ensure the oxygen system quick disconnect (QD) fittings are properly connected and descend to a safe altitude as required.

f. Blower Hose – Connected

Route the blower hose through the strap assembly attached to the overhead floor beam, then connect to the modification kit hose assembly mounted on the outboard side of the seat.

g. Modification Kit Hose – Connected

Connect the modification kit hose to the ventilation inlet hose on the PIHM manifold.

h. Crossover Valve – Vertical

Rotate the valve to the vertical position and check that oxygen from the aircraft system is flowing into the mask and that filtered ambient air from the blower is flowing through the defog tubes.

i. Oxygen Regulator Emergency Toggle Lever – NORMAL

j. Intercom Unit – Disconnect and stow

k. PIHM Communication Cord – Connected

Connect the PIHM communication cord to the aircraft communication cord.

l. PIHM Manifold – Connected

Connect the manifold to the CRU-60/P bracket located on the parachute harness.

INTERIOR INSPECTION (Cont)

m. Emergency Oxygen Hose – Connected

Connect the emergency oxygen hose to the fitting on the manifold.

20. **DJ** Radios – Checked (N)

a. LOS Radio ARC-171(V) Check:

(1) LOS Radio Function Select Switch – BOTH

DL LOS PMT indication will appear on the control indicator display if the AFSATCOM control indicator is not Off.

Less **DL** The LOS PMT light on the SATCOM control will illuminate if SATCOM control mode selector is not in OFF/SATL.

(2) Test Initiate Selector Switch – LAMP, then OPR

After TEST FAULT light comes on, return test initiate selector to OPR.

(3) MAIN SQUELCH Switch – ON

(4) GUARD SQUELCH Switch – ON

(5) GUARD-PRESET-MANUAL Switch – As desired

(6) CHANNEL/FREQUENCY – Selected

Set CHANNEL selector switch to the desired preset frequency or manually tune the desired frequency in the FREQUENCY indicator windows.

21. Doppler Mode Switch – OFF (N)

22. Altimeter – Set (N)

Ensure that altimeter indicates within ±75 feet on a known elevation.

WARNING

When setting altimeter, special attention should be given to the altimeter to insure the 10,000 foot pointer is reading correctly.

23. EVS Video Select Switch – OFF (RN-N)

24. APN-69 Pressurization Switch – COMPRESSOR ON (N)

25. APN-69 Low Pressure Warning Light – Off, tested (N)

26. APN-69 Power Switch – OFF (code set) (N)

27. Radar Pressure Pump Control Switches (2) – Both NORMAL ON (N)

28. Radar & Heading Drift Switch – ON (N)

INTERIOR INSPECTION (Cont)

29. **DU** KY-100 Secure Voice System – Set and checked (CP-N)

NOTE

The KY-100 PRESET and the Z-AVH RCU PRESET switches must be in MAN to enable operation of the AN/ARC-210 and AN/ARC-164 radio systems. Additionally, the KY-100 Mode Switch or the Z-AVH RCU Mode switch must be in PT (depending on whichever unit has control) or jumper installed for plain text radio operations.

a. Interphone Selector Switch – On (N-CP)

b. UHF Command (AN/ARC-164 or AN/ARC-210) Radio – On, frequency tuned (as required) (CP)

c. COMSEC MODE CONTROL Panel – Set (N)

(1) PTT SELECT – DIRECT

(2) BASEBAND-DIPHASE Switch – BASEBAND

(3) KY/RAD Select – AN/ARC-164 or AN/ARC-210 (as required)

d. Z-AVH Remote Control Panel – Set (CP)

(1) PRESET Switch – MAN

(2) MODE Switch – CT

(3) DISPL & PNL Switches – Adjusted

Rotate these switches clockwise out of OFF detent positions and adjust display and panel lighting for comfortable viewing.

e. KY-100 MTU – Set (N)

(1) MODE Switch – CT

(2) PRESET Switch – MAN

The KY-100 will initiate a self-test. The display reads CLd STRT, then PSH INIT. If PUSH INIT is displayed, the KY-100 is ready to accept a key fill.

NOTE

- When power is applied, all RCU/MTU display segments and annunciators will momentarily light, followed by ON being momentarily displayed. The display will prompt the operator of the pass/fail results or if cold start procedures must be initiated.
- If at least one valid key is stored in the KY-100, the display will blank while the power-on tests are being performed. Upon successful completion, PASS will be displayed and a pass tone will be heard. If a FAIL message appears in the display, notify maintenance.

INTERIOR INSPECTION (Cont)

- Following successful completion of the power-on tests, the display will sequence as follows, depending on the MODE control switch setting.

MODE Control Switch Position	Display
PT	PT is displayed if on-line CT/CT-Only menu is set to CT. INVALId is displayed if on-line CT/CT-Only menu is set to CT-Only.
EB	INIT Eb displayed.
CT	Previously used on-line ciphertext mode displayed. The mode will correspond to the present setting of the PRESET control.
RK	Previously used on-line ciphertext mode displayed. The mode will correspond to the present setting of the PRESET control.
OFFLINE	TEST displayed.

(3) KY-100 DSPL & PNL Switches – Adjusted

Rotate these switches clockwise out of OFF detent positions and adjust display and panel lighting for comfortable viewing.

(4) Key Fill – Loaded (Quick Start)

NOTE

If no valid keys are stored in the KY-100, Cld STRT will be momentarily displayed followed by a flashing PSH INIT display. The KY-100 is now ready to accept a key fill.

(a) Fill Device (KYK-13/CYZ-10) – On

NOTE

Refer to Cold Start procedures for specific key fill device instructions.

(b) Fill Device – Connected (to KY-100 Fill Connector)

(c) Keyfill – Selected

NOTE

If a fill device is not connected to the KY-100 when the INIT button is pressed, a DEV ERR message will be displayed. If this occurs, only PT communications will be available until a traffic key is loaded.

(d) KY-100 INIT Button – Pressed

The display remains blank momentarily while the key is being loaded. At the completion of a successful load, a PASS tone is heard and the display shows KEY 1 01, PASS, then TEST. The key that was loaded is automatically stored in fill position 1.

(e) Fill Device – Off

(f) Fill Device & Cable – Disconnected

INTERIOR INSPECTION (Cont)

(5) Receiver Volume – Adjusted (as required)

Adjust the plaintext audio volume (RXPTV) and ciphertext audio volume (RXCTV) for comfortable listening levels.

NOTE

- The receiver plaintext (PT), ciphertext (CT) and sidetone volume can be adjusted when the KY-100 is in the idle state or when receiving audio communication.
- The receiver volume choices do not wrap around. A wrong pushbutton tone will be heard if the operator attempts to set a value past either extreme.
- Allowable receiver volume settings are from 0 (off) through 9 (maximum); sidetone volume settings are from 0 (off) through 4 (maximum).

(a) KY-100 MODE Switch – PT, EB, CT, or RK position (out of OFFLINE)

(b) Volume Level – Adjusted

Repeatedly press the Up or Right arrow pushbutton until the display shows either RXPTV n or RXCTV n as appropriate, where n is the current volume setting (0 through 9). To change the current volume level, press the INIT button. The current level setting will begin to flash. Repeatedly press the Up arrow to increase or the Right arrow to decrease the current level until the desired level is displayed. A pass tone will be heard each time the displayed level is increased or decreased. Press the INIT button to save the desired volume level and exit the RXPTV/RXCTV mode. Accomplish identical procedures for sidetone volume adjustment.

f. Cold Start Procedures:

(1) KY-100 PRESET Switch – MAN

(2) KY-100 MODE Switch – OFFLINE

Push the INIT button. The display will indicate TEST, which is the first off-line menu item.

(3) KY-100 Up Arrow Button – Pressed

KEY OPS (Key Operations) will be displayed.

(4) KY-100 INIT Button – Pressed

LOAd KEY will be displayed

(5) KY-100 INIT Button – Pressed

The display will indicate LOAd n, with the n flashing. The flashing n indicates the currently selected key location (1, 2, 3, 4, 5, 6, or U).

INTERIOR INSPECTION (Cont)

(6) Key Location – Selected (as required)

If the key location to be loaded is not flashing in the display, repeatedly press the up arrow or right arrow push button until the required location (1, 2, 3, 4, 5, 6, or U is displayed.

(7) Fill Device – Connected (to KY-100 fill connector)

Using the fill cable, connect the fill device to the FILL connector on the KY-100 MTU. Place the flat side of the cable connector at 12 o'clock to ensure proper alignment, then rotate the cable connector clockwise.

(8) Fill Device – On

(9) Storage Register – KYK-13 Load

(a) KYK-13 Fill Switch – Set (as required)

Set the fill switch to the storage register position containing the key to be transferred.

(9) Storage Register – CYZ-10 Load

(a) Emulation Mode (K13/K15/K18) – Selected (as required)

(b) Keymat – Selected

(c) CYZ-10 SEND Button – Press

The CYZ-10 will prompt the user to initiate on the receiving terminal (KY-100).

(10)KY-100 INIT Button – Pressed

The KY-100 display will prompt the operator with a flashing LOAd n.

NOTE

If a fill device is not connected to the KY-100 or not configured properly when the INIT button is pressed, a DEV ERR message will be displayed. If this occurs, only PT communications will be available until a traffic key is loaded.

(11)(KY-100 INIT Button – Pressed

The display will go blank momentarily while the key is being loaded. Upon completion of a successful load, a pass tone will be heard and the display will momentarily indicate KEY n, where n is the key location loaded.

NOTE

After loading Key 1, TEST will be displayed. To load the remaining keys (2, 3, 4, 5, 6, and U), repeat the steps beginning with step 29. f. (2).

(12)Fill Device – Off

(13)Fill Device & Cable – Disconnected

INTERIOR INSPECTION (Cont)

g. Wideband (VINSON) PRESET Configuration:

(1) KY-100 MODE Switch – OFFLINE

(2) PRESET Menu – Selected (using up or right arrow)

(3) KY-100 PRESET Switch – Set as desired (MAN, 1, 2, 3, 4, 5, 6)

(4) WIdEbANd – Selected

Press the KY-100 INIT button. WIdEbANd (used for AN/ARC-164 OR AN/ARC-210 LOS) or NRW-bANd (used for AN/ARC-210 SATCOM will be displayed).

If WIdEbANd is not displayed, press the INIT button. The displayed configuration will begin to flash. Press the up and right arrows simultaneously to toggle the display to WIdEbANd. Press the INIT button. WIdEbANd is now selected.

NOTE

To change a parameter value, press the up arrow pushbutton until the parameter to be modified appears. If the desired parameter value is not displayed, press the KY-100 INIT button. The displayed value will begin to flash. Press the up arrow or right arrow pushbuttons until the desired value is displayed. Press the KY-100 INIT button to select the desired value.

(5) Baseband/Di-Phase – bb (Air Force) or dP (Navy), as required

(6) Data Rate – 12 Kbps or 16 Kbps (Voice), as required

(7) Traffic Encryption Key (TEK) – TEK n (1-6) selected, as required

(8) Time Delay – Td ON or Td OFF (Normal), as required

(9) KY-100 MODE Switch – As desired (out of OFFLINE)

To exit the PRESET MENU, press the up and right arrows simultaneously or rotate the front panel MODE control out of the OFFLINE position.

h. Narrow Band PRESET Configuration:

(1) KY-100 MODE Switch – OFFLINE

(2) PRESET Menu – Selected (using up or right arrow)

(3) KY-100 PRESET Switch – Set as desired (MAN, 1, 2, 3, 4, 5, 6)

(4) NRW-bANd – Selected

Press the KY-100 INIT button. WIdEbANd (used for AN/ARC-164 OR AN/ARC-210 LOS) or NRW-bANd (used for AN/ARC-210 SATCOM) will be displayed.

If NRW-bANd is not displayed, press the INIT button. The displayed configuration will begin to flash. Press the up and right arrows simultaneously to toggle the display to NRW-bANd. Press the INIT button. NRW-bANd is now selected.

INTERIOR INSPECTION (Cont)

NOTE

> To change a parameter value, press the up arrow pushbutton until the parameter to be modified appears. If the desired parameter value is not displayed, press the KY-100 INIT button. The displayed value will begin to flash. Press the up arrow or right arrow pushbuttons until the desired value is displayed. Press the KY-100 INIT button to select the desired value.

(5) Narrowband Modem – HF (ARC-210 SATCOM DAMA Operation) or as briefed

NOTE

> Data rates of 75 bps and 150 bps can only be used when operating in the Enhanced Black Digital (bdL) mode.

(6) Data Rate – RATE 24 (ARC-210 SATCOM DAMA Operation) or as briefed

(7) Traffic Encryption Key (TEK) – TEK n (1-6) selected, as required

NOTE

> If LOS, bd, or bdL modem type was selected, no further operator action is required. If HF was selected proceed as follows:

(8) HF Mode – NT (ARC-210 SATCOM DAMA Operation) or PP (Point-to-Point)

(9) KY-100 MODE Switch – As desired (out of OFFLINE)

To exit the PRESET MENU, press the up and right arrows simultaneously or rotate the front panel MODE control out of the OFFLINE position.

i. Interface (INFC) Audio Data Procedures:

NOTE

> These procedures permit the user to select Red audio and data interface parameters for the KY-100. These include defaults, transmit/receive coupling, transmit clock selection, microphone/receiver balance selection, and data polarity sensing. The AN/ARC-164 (V) and the AN/ARC-210 (V) both use the INFC default settings (only).

(1) KY-100 MODE Switch – OFFLINE

(2) INFC Audio-Data Menu – Selected (using up or right arrow)

(3) KY-100 INIT Button – Pressed

The display will show Aud-dATA. Press the INIT button again to enter the INFC Audio-Data submenus. SET dEF will be displayed.

INTERIOR INSPECTION (Cont)

(4) Audio-Data Defaults (SET dEF) – Set

With SET dEF displayed, press the INIT button. The display will change to a flashing SET dEF. Press the INIT button again, SET dEF will stop flashing and a pass tone will be heard, indicating that the audio-data default settings have been stored in memory as follows:

Function	Default Setting
GUARD (Guard Audio)	GRd OFF
MIC (Microphone)	UNBL (Unbalanced)
BALANCE	RX UNBAL (Receiver Unbalanced)
IMPED (Impedance)	600 Ohms
DAT SENS (Data Sense)	MARK+
RX COUP (Receiver Coupling)	RXAC
TX COUP (Transmit Coupling)	TXAC
TX CLK (Transmit Clock)	J2 - U

NOTE

The default setting for Guard audio is OFF (GRd OFF). Guard audio must be set to ON (GRd ON) plaintext guard audio to be received even during ciphertext (CT) operation.

(5) Guard Audio (GUARD) – Set to GRd ON

While in INFC AUDIO-DATA, press the Up or Right arrow pushbuttons and scroll through the menu until GUARd is displayed. Press the INIT button. GRd OFF will be displayed to indicate current status of guard audio receive path is OFF.

Press the up or right arrow pushbutton to change the display to GRd ON. A pass tone will be heard when the display is changed. To store the change, press the Up and Right arrow pushbuttons simultaneously.

(6) KY-100 MODE Switch – As desired (out of OFFLINE)

j. Interface (INFC) Radio NARROWBAND (NRW-bANd) Procedures:

These procedures permit the user to select interface parameters for the Black RADIO port of the KY-100 when operating in the Narrowband configuration. These include defaults, radio transmission levels, impedance matching and Black Digital interface parameters. The AN/ARC-210 (V) uses the default settings except for the TX CLKS setting in DAMA operation.

(1) KY-100 MODE Switch – OFFLINE

(2) INFC Audio-Data Menu – Selected (using up or right arrow)

(3) INFC Radio NarrowBand Menu – Selected

Press the KY-100 INIT button. The display will show Aud-dATA. Repeatedly press the up or right arrow pushbuttons until the display shows RadiO. Press the INIT button. The display will show NRW-bANd. Press the INIT button to enter the INFC RADIO NRW-bANd submenus.

INTERIOR INSPECTION (Cont)

(4) Narrowband Radio Defaults (SET dEF) – Set

While in the NRW-bANd menu with SET dEF displayed, press the INIT button. The display will change to a flashing SET dEF. Press the INIT button again. SET dEF will stop flashing and a pass tone will be heard, indicating that the Narrowband Radio default settings have been stored in memory as follows:

Function	Default Setting
TX CLKS (Transmit Clocks)	INT CLK (Internal Clock)
TRN SEQ (Training Sequence)	6 (Frames)
TX DELAY (Transmit Delay)	135 MS
PREAM (Preamble)	STANd (Standard)
DAT SENS (Data Sense)	MARK–
CTS (Clear To Send)	OFF
MILSTAR	OFF
TX LVL (Transmit Level)	0 dBm
IMPED (Impedance)	600 Ohms
RTS/PTT (Request To Send/ Push To Talk)	RTS+PTT

NOTE

INT CLK must be set to EXTERNAL for SATCOM DAMA operation.

(5) Transmit Clock Source Selector (TX CLKS) – Set to EXT CLK

While in the INFC RADIO NRW-bANd mode, press the up or right arrow pushbuttons and scroll through the menu until TX CLKS is displayed. Press the INIT button. INT CLK will be displayed to indicate the internal clock option is displayed. Press the up or right arrow pushbutton to change the display to EXT CLK. A pass tone will be heard when the display is changed. To store the change, press the up and right arrow pushbuttons simultaneously.

(6) KY-100 MODE Switch – As desired (out of OFFLINE)

k. Interface (INFC) Radio Wideband (WIdEbANd) Procedures:

These procedures permit the user to select interface parameters for the Black RADIO port of the KY-100 when operating in the Wideband configuration. These include defaults, impedance matching, wideband phasing and clear-to-send (CTS) functions.

(1) KY-100 MODE Switch – OFFLINE

(2) INFC Audio-Data Menu – Selected

Repeatedly press the up and right arrow buttons simultaneously and scroll through the menu until INFC is displayed.

INTERIOR INSPECTION (Cont)

(3) INFC Radio Wide Band Menu – Selected

Press the KY-100 INIT button. The display will show AUd-dATA. Repeatedly press the up or right arrow pushbuttons until the display shows RadiO. Press the INIT button. The display will show NRWbANd. Press the Up or Right Arrow button, the display will show WIdE-bANd. Press the INIT button to enter the INFC RADIO WIdEbANd submenus.

(4) Wideband Radio Defaults (SET dEF) – Set

While in the WIdEbANd menu with SET dEF displayed, press the INIT button. The display will change to a flashing SET dEF. Press the INIT button again. SET dEF will stop flashing and a pass tone will be heard, indicating that the Wideband Radio default settings have been stored in memory as follows:

Function	Default Setting
IMPED (Impedance)	600 Ohms
PHASING	48MS
CTS (Clear To Send) - Baseband (bb)	OFF
CTS (Clear To Send) - Diphase (dP)	OFF

NOTE

- Phasing must be set to 98MS for use with both the AN/ARC-164(V) and AN/ARC-210(V) Radio Sets.
- The phasing sequence length menu choices (48, 98, 148, 198, 248, 298, or 348 MS) do not wrap around. A wrong pushbutton tone will be heard if the operator attempts to set a phasing sequence length past either extreme.
- If the desired phasing sequence length is not displayed, press the up arrow to increase the length or the right arrow to decrease the length. As the phasing sequence length is changed, the level indicator aural tone is heard at a rising or a falling pitch to indicate an increment or decrement level change.

(5) Wideband Phasing Selector – Set to 98MS

While in the INFC RADIO WIdEbANd mode, press the up or right arrow pushbuttons and scroll through the menu until PHASING is displayed. Press the INIT button. The display will show 48MS as the currently selected phasing sequence length. Press the up arrow to increase the length to 98MS. The level indicator aural tone will be heard at a rising pitch to indicate the increment change. To store the change, press the up and right arrow pushbuttons simultaneously.

(6) KY-100 MODE Switch – As desired (out of OFFLINE)

INTERIOR INSPECTION (Cont)

30. MRT: (N)

    a. Remote Control Unit – Checked

        (1) PWR ON/STBY Switch – STBY

        (2) TEST SYS/OFF/LAMP Switch – OFF

        (3) PTR ALL CALL/TEST – TEST

        (4) MODE ALL/AJ – ALL or AJ (as required)

        (5) COMM PLAN Thumbwheel – As required

    b. Printer – Checked

        (1) Paper Supply – Serviced (as required)

        Press the TEST FAULT/PRINT button on th MRT RCU. Paper should feed. If paper has stripes it is an indication the paper supply is low. See T.O. 1B-52H-1 for paper changing procedures.

NOTE

A Printer Fault light normally indicates a low paper condition. If after the paper is changed the light is still on, it is a hardware failure. Follow the corrective actions in Section III.

        (2) Paper Threading – Checked

        Check the pin on the paper spindle is on the right side of the spindle.

31. AFSATCOM Terminal: (N)

CAUTION

The printer must be turned on prior to the AFSATCOM control panel. Applying power to the printer after the AFSATCOM control panel has been turned on, could cause the receiver-transmitter to lock in the transmit mode.

NOTE

- Time permitting, this check will be accomplished prior to engine start; otherwise, it will be accomplished after engine start or takeoff.
- Status annunciators or bit tests faults detected during the initial 15 minutes of AFSATCOM operation are considered normal. Transmit and receive functions may not be reliable during this initial warmup period.

INTERIOR INSPECTION (Cont)

a. Printer – Checked (N)

(1) Power Switch – ON, PWR light on

(2) Illumination Switch – As desired

(3) Allowable settings are bright, dim, or off.

(4) Paper Supply – Serviced (as required)

To check paper supply, undo housing screws and open housing.

(5) Paper Feed – Checked

Push paper feed button to ensure paper feeds properly through the printer.

b. Keyboard – Checked (N)

(1) Memory Indicator – Displays small zero

(2) RESET Key – Pressed, indicators checked

All lights on keyboard will come on, word panel flashes, MEM indicator displays alternating □ and – and TEXT indicator displays alternating ✳ and [ ]. Small zero will change to a dash.

c. ***Less*** **DL** AFSATCOM Control:

(1) Lamp Test Button – Pressed, indicators checked (N)

All segments of digital display and all annunciators are illuminated.

(2) Dim-Bright Control – As desired (N)

(3) LOS Radio Preempt Check – Accomplished

(a) Mode Selector – KEY (N)

(b) LOS PMT Light – Checked (N-CP) ***Less*** **DJ** (N) **DJ**

Confirm LOS function selector switch in BOTH then position to SATL. LOS PMT light should be ON in BOTH and off in SATL.

(4) Mode Selector – BIT (N)

(a) Annunciators & Digit Display – Checked

All annunciators and digit display will light for 5 seconds.

(b) Fault Test – Completed

If no faults are present the built-in-test will take approximately 35 seconds.

INTERIOR INSPECTION (Cont)

(c) Channel Select Data – Checked

Cycle each channel select switch through its range and note that the digit display increases by one each time the associated thumbwheel increases by one. The left most alphabetic position will be displayed in numeric equivalent, i.e., (A-1, B-2, etc).

(5) MNL Check

The following check may be accomplished only while channel select data is being displayed:

(a) MNL XMT Key – Pressed (N)

(b) Type Several Characters – Typed (N)

Each input character should be printed out once by the printer. Note that RCVR BUSY indicator comes on. Wait approximately 10 seconds, four ETX's should be printed.

NOTE

Approximately 20 seconds after the last character is entered, the complete BIT cycle will repeat.

(c) LOS Function Selector – As desired (N-CP) ***Less*** **DJ** (N) **DJ**

Position LOS function selector switch as desired.

(d) Mode Selector – LOAD (N)

c. **DL** AFSATCOM Control:

(1) Control Indicator (CI) Power Switch – ON, annunciator light on

When the power switch is positioned to ON, the green annunciator light adjacent to the power switch will come on and the Power-Up BIT is initiated. Power-Up BIT is indicated by the BIT menu being displayed on the CI Display. Successful completion of BIT is indicated by the display of the Initial Top Menu Display. The Power-Up BIT takes approximately 1 minute to accomplish, if no faults are detected.

NOTE

- Do not remove TSM during cold start or Power-Up BIT. This will disrupt the information passing between the TSM and CI and render the TSM inoperative, requiring the operator to manually enter FILSG and FLSG to use either MILSTAR or AFSAT IIM modes.
- Failure of BIT will be indicated by a preempt message. A preempt message can be cleared by pressing [SHFT] then [CLR] keys on the keypad.

(2) Lights – Checked

(a) [LT] Key – Pressed

Pressing and holding the [LT] key initiates the lamp-test cycle. During the lamp-test cycle, the HHM IN and HHM RDY LEDs flash until the lamp-test cycle is complete. During the lamp-test cycle, a vertical bar sweeps horizontally (left to right) across the display. The first sweep is approximately 2 seconds. As you hold the [LT] key until the beginning of the second sweep, the subsequent sweeps will be approximately 10 seconds in duration and will enable you to check each pixel on the digit display. Release the [LT] key after the start of the second sweep. After completion of the lamp-test, depending upon the state of the TSM, the LEDs may go out and the display will return to normal.

INTERIOR INSPECTION (Cont)

(3) EAM Alarm Mode – Select (as required)

NOTE

- The EAM Mode parameter at the TOP MENU defines two different methods, NORMAL or LCC, for handling, clearing, and printing the EAM message depending upon the operating mode.
- NORMAL is the preferred mode of operation as well as the default mode at system turn-on. LCC should be avoided because in may cause the operator to miss an EAM alarm.

(4) Offline Bit Check – Accomplished

(a) LOS Radio ARC-171(V) Select Switch – SATL

(b) BIT Mode – Selected

Press the SEL key until BIT is selected in the review row. Press the SHFT then ENTR keys twice in sequence to enter BIT mode.

NOTE

The teletype check may be executed only while the Dual Modem is in BIT Mode and preempt I/O: INPUT CHARS FOR TEST appears on the AFSATCOM control display.

(c) Teletype – Checked

1. MNL XMT Key – Pressed

2. Several Characters – Typed

Ten seconds after the last character is input, four EXTs will be printed and the RCVR BUSY annunciator will flash.

NOTE

The first repetition of the BIT check is complete when RESP:001 TSTC NORMAL is displayed on the bottom of the Control Indicator display. The operator must exit BIT mode prior to the start of the second repetition, wait until the second BIT check is done, or turn the Control Indicator Power Switch OFF and back ON.

(d) Control Indicator Keypad – Checked

(e) AF1 Mode – Selected

(f) Press the SHFT key then turn the TOP M key. Press SEL key until AF1 is in view in the Review row. Press the SHFT then ENTR keys twice in sequence to enter AF1 mode.

(g) LOS Radio ARC-171(V) Select Switch – As desired

d. Keyboard:

NOTE

During the keyboard check, the message will be printed out on the printer, the AUTO XMT indicator will go off and the I/O FLT annunciator on the control panel will come on.

(1) Buffer #1 – Set (20 characters)

INTERIOR INSPECTION (Cont)

(2) Message – Typed

When 20 characters are entered, the MEM indicator will alternate 1 and F. When 20 characters are exceeded, the MEM indicator will alternate 1 and E.

(3) Buffer #1 – Set (60 characters)

(4) Message – Typed

(a) CLR MEM Key – Pressed

(b) All Characters – Typed

(c) AUTO XMT – Pressed

(d) Control Key – On

(e) Buffer to Transmit – 1

(f) Message Sent – Annunciator light on

e. **DL** Control Indicator (CI) Power Switch – OFF, annunciator light off (not applicable after generators are on line)

e. ***Less*** **DL** SATCOM Control Mode Selector – OFF (not applicable after generators are on the line)

f. Printer Power Switch – Off (not applicable after generators are on the line)

g. ***Less*** **DL** Address Enable/Disable Switch – Disable

h. ***Less*** **DL** Prepositioned Channelization & Address Settings – Set (as directed)

32. **DU** DAMA Remote Control Unit (RCU): (N)

Needed to use DAMA:

1. Monthly DAMA Access Info Letter
   – Terminal Base Address
2. KYK-13/CYZ-10 (and cable)
   – Loaded with DAMA keymat
3. Assigned Preset to use
   – Preset 1, unless briefed otherwise
4. Port to use (In AFTO 781)
   – Port 0, unless AFTO 781 states Port 1
5. Classified DAMA Msg (Crew Comm)
   (Use ONLY 25K DAMA Info)
   a. Guard List = Network number
   b. TX/RX/CC Freqs
      Uplink Freq = TX Freq
      Downlink Freq = RX/CC Freqs
   c. Config Code (usually 60)
   d. JFTOC Watch Officer DSN
      (phone patch for network problems)

DAMA RCU Fault Messages:

ALRM: No COMSEC loaded
OTAR: Over the air rekey occurred
BYP: Orderwire bypass PT mode
BIT: Modem BIT fault detected
ZERO: COMSEC is zeroized
BATT: Battery needs replaced

INTERIOR INSPECTION (Cont)

a. DAMA Crypto Keyfill

NOTE

- The DAMA Remote Control Unit (RCU) is powered once the AN/ARC-210(V) radio is turned ON.
- Upon power-up, the DAMA Remote Control Unit (RCU) displays all Liquid Crystal Display (LCD) pixels and alarm messages for 3 seconds. The power-up BIT is run when power is applied to the modem. At the completion of power-up BIT, a single System Critical message will be displayed on the RCU indicating the summarized Pass/Fail results. If the BIT is successful, the display should indicate:

:SysCritMsg	CRI
:ACK Twice	EVT
:PwrUpCmplt	1/1
:PwrUpBit:P	***

(1) <ACK> Key – Press twice

Pressing the <ACK> key twice will display the TOP menu.

(2) ZEROIZE-NORM-BATT SAVE Switch – NORM

(3) TOP Menu – Selected

If the TOP menu is not already displayed, press the <HELP/MAIN> key.

NOTE

If the BATT annunciator is illuminated in the display, call maintenance for a replacement battery.

(4) CTIC Ops – Selected

From the TOP menu, press the <5> (CTIC Ops) key, then the <ENTR> key.

(5) CTIC Fill – Selected

Press the <1> (Fill) key, then the <ENTR> key to select the CTIC Fill mode.

(6) Load Key – Selected

Press the <1> (Load Key) key, then the <ENTR> key to select the Load Key mode.

(7) CYZ-10/KYK-13 – Configured and connected

Configure either the CYZ-10 or the KYK-13 with the correct crypto orderwire key and connect it to the DAMA fill port. The DAMA crypto orderwire keys:

DAMA crypto orderwire keys:

Orderwire Key Tape Name	ID
5592 CONUS	C5592
5593 Atlantic	C5593
5596 Indian Ocean	C5596
5598 Pacific	C5598

INTERIOR INSPECTION (Cont)

(8) Keys 1 Through 8 – Loaded

To load a key, press key <1>, <2>, <3>, etc. (for the key fill location), then the <ENTR> key. As DAMA successfully loads each register, the message :CTICLoadOk, will be displayed.

If a key fails to load, a CTICLdFail message will be displayed. Press the <ACK> key to clear the fault message, then reload the key by pressing that register number key, then the <ENTR> key.

Repeat to fill all eight registers with the same keymat.

(9) TOP Menu – Selected

(10)CYZ-10/KYK-13 – Removed

Disconnect the fill device and cable from the DAMA fill port.

b. Restore DAMA Preset

(1) Preset – Selected

From the TOP menu, select the Preset menu by pressing the <4> (Preset) and <ENTR> keys.

(2) Get Preset – Selected

To restore a preset press the <1> (GetPre) key, then the <ENTR> key.

(3) Preset No. – Entered

Enter the preset number from the Comm/Mission Data card for your sortie, use #1 unless briefed otherwise. Once entered, the TOP menu will be displayed and the top line will show the message, PrstRStord, to indicate that the selected preset has been restored.
Press the <ACK> key once to clear the message.

c. Setting DAMA Parameters

(1) TOP Menu – Selected

If the TOP menu is not already displayed, press the <HELP/MAIN> key.

(2) 25K DAMA Menu – Selected

Press the <3> (25k DAMA) key, then the <ENTR> key.

(3) Cfg Parms – Selected

Press the <1> (Cfg Parms) key, then the <ENTR> key.

Check lines 2 – 9 to verify parameters match DAMA message parameters.

(4) TBA ID – Entered/Confirmed

Enter or confirm your Terminal Base Address ID. If it doesn’t match the assigned TBA, press the <2> (Id:) and the <ENTR> keys, then enter the correct data.

INTERIOR INSPECTION (Cont)

(5) Frequencies – Entered/Confirmed

Press the <3> (CfgFreq) key, then the <ENTR> key.
Verify/correct Tx, Rx, and CC frequencies from the classified DAMA message
Transmit freq = uplink freq on message
Receive and CC freqs = downlink freq on message

(6) 25K PRM Menu 2/3 – Selected

After verifying/correcting the frequencies, press the <ESC> key to return to the 25K PRM Menu, then press the down arrow to access 25K PRM page 2/3.

(7) Config Port – Checked

Press the <4> (CfgPort) key, then the <ENTR> key.
Press the <1> (Port:) key, then the <ENTR> key to go to the Configure Port sub-menu.
Press the <0> or <1> key, then the <ENTR> key to select Port 0 or 1.
Avlable (Available) should always be 1, because the port entered is available.

(8) 25K PRM Menu 2/3 – Selected

After checking/configuring the ports, press the <ESC> key twice to return to the 25K PRM Menu. Press the down arrow to access 25K PRM page 2/3.

(9) Ranging – Checked 2

For active ranging.

(10)Delay – Checked 250

The delay setting determines the timing delay for transmissions to and from the satellite in milliseconds.

(11)25K PRM Menu 3/3 – Selected

Press the down arrow to access 25K PRM page 3/3.

(12)Bypass – Checked 1

This ensures operation in the encrypted mode.

(13)GuardList – Entered/confirmed/saved

Press the <8> (Grd List) key, then the <ENTR> key.

Check that the Guard List and port number are correct. If correct, press the <ESC> key to return to the guard list menu. If not, press <1> and the <ENTR> keys. Enter the correct guard list and press the <ENTR> key, then enter the port number the guard list will be using, then press the <ENTR> key. Repeat for all guard lists to be used.

NOTE

Ensure any changes or additions made to the guard list are saved. Press the <16> (SAVE) key, then the <ENTR> key. Then press the <ESC> to return to the 25k PRM menu.

(14)TOP Menu – Selected

INTERIOR INSPECTION (Cont)

(15)Preset Menu – Selected

Press the <4> (Presets) key, then the <ENTR> key.

(16)Save Preset – Selected

Press the <2> (SavPre) key, then the <ENTR> key, to save the Preset data.

(17)Preset Number – Entered

Press the <1> key, then the <ENTR> key to save the data into Preset 1. A :PrestStord message will be displayed on the top line of the display. Press the <ACK> key once to acknowledge the message.

NOTE

To activate the DAMA network and guardlist on the ground, refer to the DAMA Activation and Call Request steps in the After Level-Off checklist.

33. DBRIC Power Switch – OFF (RN)

34. BNS External Power Switch – OFF (RN)

35. Ground Blowers Switch – OFF (RN)

36. Master Bomb Control Panel: (RN)

    a. Master Bomb Control Switch – OFF

    b. Bomb Indicator Light Switch – ON

    c. Bombing System Switch – MANUAL

    d. Lights – Checked, tested

37. **EA** PILOT EVS MONITOR INPUT Switch – NORMAL PILOT DATA, Guard down (RN)

38. ALQ-117 to BNS Blanking Switch – ON (RN)

39. D-2 Bomb Release Switch – Stowed (RN)

40. Air Outlet Knobs (RN)

    a. Upper – As desired

    b. Lower Forward – Full out

    c. Lower Aft – Full out

41. Radar Control Test Panel: (RN)

    a. Antenna Speed Switch – OFF

    b. Radar Power Switch – OFF (out position)

    c. Rate Switch – OFF

INTERIOR INSPECTION (Cont)

42. ***[TP]*** TGP Monitor Power Switch – OFF (RN)

43. AVTR Remote Control Unit: (RN)

    a. Power Switch – OFF

    b. Mode Select Switch – STBY

44. RN Management Panel: (RN)

    a. Sector Width Knob – CCW and Detent

    b. Video Recorder Mode Switch – OFF

    c. Crosshair Reference Switch – AUTO

    d. Transmitter Mode Switch – RDR

45. Air Conditioning Temperature Control Selector – AUTO (temperature as desired)

46. STV Control Panel: (RN)

    a. MLC Gain Knob – OFF

    b. Mode Switch – OFF

    c. BIT Switch – NORM

47. FLIR Control Panel: (RN)

    a. Mode Select Switch – OFF

    b. Bias and Contrast Knobs – CCW

48. Ground Locks & Bypass Keys – Six and two counted, stowed (N)

    Six locks and two keys.

49. Crew Report – Completed (RN-N)

    a. Pilot actuates the emergency alarm switch to ABANDON, switches interphone to call position, and announces, “Crew report.”

    b. The sequence for crew reporting is: N, G, EW, RN, CP, P, IN, DI, 10TH, and IP.

    c. All crewmembers will press call button and report “(crewmember’s) check complete” in sequence. Check consists of abandon signal and call operation. If a crewmember is not at his seat during the check, on return to his seat, the interphone call operation will be checked with the pilot.

50. Oxygen Regulator – OFF and 100% OXYGEN (if leaving the aircraft for an extended period of time) (RN-N)

51. Weapon Interior Inspection Checklist – Complete (if applicable) (RN-N)

    Complete the INTERIOR INSPECTION Checklist from the applicable weapons manual(s).

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE)

NOTE

- OAS processors can be loaded with ground power and cooling air by accomplishing the steps marked with a #. After aircraft power and cooling air are available re-accomplish this checklist skipping the steps marked with a # that were previously accomplished. Other equipment may be powered with ground power and cooling air as mission requirements dictate.

- If the OAS is to be ground aligned on ground power, proceed with this checklist once ground power is stabilized and cooling air for the OAS is available.

1. Radar Turn-On: (RN)

   a. Ground Blowers Switch – ON

   b. Antenna Speed Switch – Checked OFF

   c. Radar Power Switch – ON

CAUTION

The rate switch on the radar control test panel must be OFF prior to turning the radar power switch ON or damage to the radar receiver-transmitter can occur.

   d. Antenna Speed Switch – As desired

CAUTION

The antenna speed switch will remain OFF for 1 minute after application of radar power to allow the antenna position programmer to search and electronically establish its position with the antenna. Any random movement of the antenna while the antenna position programmer is searching may cause equipment damage.

   e. Receiver Tune Switch – AUTO

2. EVS Environmental Power Switches (3) – ON (RN)

CAUTION

The environmental control systems are to be operated at all times during flight to prevent condensation within the turrets, even though the sensor itself may not be turned on or a dummy sensor is installed.

3. FLIR Mode Select Switch – STBY (RN)

Select STBY to initiate system warmup to operating temperature (20 minutes). When the system reaches operating temperature, the READY light will come on indicating the system is ready for operation. The operator should then select OPR (unstowing the turret) and tune the FLIR picture.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

#4. OAS Master Power – ON (N)

NOTE

> Until the flight computer program is loaded into the processor, only formats 1 and 3 may be displayed on the MFD’s.

#5. Relays Circuit Breaker – In (N)

#6. EVS Video Select Switch – STV (RN-N)

#7. MFD’s – Adjusted (RN-N)

Call up a display on each MFD to adjust contrast and brightness. If the flight computer program is not active in the processor, only Format 1 or 3 will be available. Adjust the contrast knob fully CCW, rotate the brightness knob CW until MFD illumination is visible and then rotate CCW until MFD illumination just disappears. Rotate contrast knob until optimum presentation is obtained. Adjust the brightness control knobs on the keyboard to obtain the best possible symbol presentation on the MFD’s. Call up FRMT 3 on the right MFD.

8. STV Control Panel: (RN)

   a. Mode Switch – STBY

   Standby light should come on.

   b. FLIGHT MODE/GROUND MODE Switch – GROUND MODE

   In GROUND MODE, the STV is operated with the filter inserted in the optical path to prevent light sources such as runway lights from damaging the equipment. The position provides the lowest gain and the best possible image. The image may be noisy.

   b. ALC FULL/ALC 1/4 Switch – ALC FULL

   c. BIT Switch – NORM

   d. Mode Switch – OPR

   The operate light will come on after standby light has been on no longer than 30 seconds. View EVS MFD for normal display. Fiducial marks and preamplifier noise will be displayed.

   To improve video presentation, turn Brightness knob on MFD clockwise until desired display is obtained. An optional way to improve video presentation is to set the MLC GAIN indices 180° from OFF (detent), and then open IRIS until desired display is obtained.

9. AVTR Remote Control Unit: (RN)

   a. Power Switch – ON

   b. LED – Set

   Select time on the time set thumbwheels and press tape time set button.

   c. Delay Select Switch – Set (as required)

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

10. Press-to-Test Lights: (RN)

    a. Tone On Indicator Light – Tested

    b. Low Airflow (2), Radar Pressure Low (2) Lights – Tested

    c. Bomb Door Control Valve Lights – Tested

11. Video Recorder – Checked (RN)

NOTE

Complete after navigator has applied OAS master power.

    a. BIT Indicator – Checked black

    If BIT indicator returns to white, system failed a BIT check.

    b. Record Switch – TEST, five times

12. EVS Indicator Lights – Tested (RN)

Press lamp test switches on STV control panel, FLIR control panel, and EVS steering control panel to check all indicator lights.

13. EVS Monitor Overheat Light - Tested (if applicable) (RN-N)

14. EVS Symbols Switch – LAMP TEST, then SYMBOLS ON (RN-N)

Check BNS HDG light, numerics, and markers displayed.

#15. ***Less [AMI]*** Computer Control Panel: (N)

    a. Lamp Test Switch – Pressed, lights checked

    b. DTU Status Lights (4) – On

    c. Processor Status Lights (A, B & C) – On

    If any light is NO-GO, press all processor status lights. If unable to get all processor status lights on, refer to corrective action listed in Section III.

#15. ***[AMI]*** Computer Control Panel: (N)

    a. Lamp Test Switch – Pressed, lights checked

    b. DTU Status Lights (2) – On

    c. Processor Status Lights (A & B) – On

    If either light is NO-GO, press both processor status lights. If unable to get both processor status lights on, refer to corrective action listed in Section III.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

#16. ***Less [AMI]*** Processor Program Load (Automatic/Directory) – As desired (or briefed) (N)

NOTE

- For initial loading of processors, rotate DTUC retainer knob so flat side is opposite the basic load tape. When loading is complete, rotate DTUC retainer knob so that flat side is vertical.
- If the RES PGM display displays the appropriate number at OAS turn-on, the operator can proceed to step 17 if desired or as briefed.

Automatic Program Load

a. Computer Control Panel (Load Control):

(1) PGM Select Switch – As desired (1=nuclear 2=conventional)

(2) DTU Select Switch – Set to DTU containing FCP

(3) PROC Select Switch – Set to processor to be loaded

b. PROC LOAD Switch – Pressed

c. PROC Select Switch-Set to an unloaded processor

d. RES PGM Display – Displays selected program (when the selected processor completes loading)

The selected DTU busy light will come on and the program will load. When processor loading is complete, confirm the desired number is displayed in the RES PGM window.

NOTE

Repeat steps b, c, and d to load remaining processors.

Directory Program Load

a. Computer Control Panel (Load Control):

(1) PGM Select Switch – 3

(2) DTU Select Switch – Set to DTU containing FCP

(3) PROC Select Switch – Set to processor to be loaded

b. PROC LOAD Switch – Pressed

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

c. Program ID Number – Entered

Enter program number to be loaded with the keyboard. The program ID number will be displayed in the VALID ID No. window.

d. Loading Question – Answered YES

If the answer is NO, the program ID No. and READY TO LOAD XX YES/NO messages will be erased and awaits further operator action. If the answer is yes, the directory program display is erased from all four MFDs and the following message will be displayed.

Loading nnnnnnnnn into PROC A/B/C

nnnnnnnnn = program name.

e. PROC Select Switch – Set to an unloaded processor

f. RES PGM Display – Displays selected program (when selected processor completes loading)

The selected DTU busy light will come on and the program will load. When processor loading is complete, confirm the desired number is displayed in the RES PGM window.

NOTE

Repeat steps b, c, d, e, and f to load remaining processors.

#16. ***[AMI]*** Processor Program Load – Load, as desired (or briefed) (N)

NOTE

If the RES PGM display displays the appropriate number at OAS turn-on, the operator can proceed to step 17 if desired or as briefed.

a. CCP PROC Select Switch – Set to A

b. CCP PROC LOAD Switch – Pressed

PROC LOAD switch illuminates while the primary application loader display is loading and extinguishes when load is complete. RES PGM A Display alternates between 0 and 1 while loading and displays 0 when loading is complete. Loading takes approximately 40 seconds. NO OAS DATA message is erased from the MFD display and the Primary Application Loader Menu appears on the L MFD.

c. CF-n – Entered

“n” represents the line number of the desired application listed on the Primary Application Loader Menu. To load the OAS from non-volatile memory, select 1. To load the OAS from the active DTC, select 2 through 7, as required. LOAD APPLICATION n? YES/NO message is displayed after CF-n is entered.

d. LOAD APPLICATION n? – Select YES on IKB

LOADING PRIMARY ACU? YES/NO message is displayed after YES is selected.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

e. LOADING PRIMARY ACU? – Select YES on IKB

If FMS is to be loaded from the DTC and FMS is resident in non-volatile memory, ACU ERASE and XXX PCT CMPLT messages are displayed, and XXX increments from 0 to 100. While FMS is loading, DTC LOAD and XXX PCT CMPLT messages are displayed and XXX increments from 0 to 100. The DTC application selected in step c. will blink on the Primary Application Loader Menu while it is loading and a LOADING APPLICATION n INTO ACU A message is displayed. When FMS loading is complete, the FMS application name and version appear in both the Resident Primary Application (LOADED APPLICATION) and NVM Primary Application (ACU NVM RESIDENT) windows, the DTC application line returns to normal video, an ACU A LOADED AS PRIMARY message and a blinking NO OAS DATA message appear, and the RES PGM A indicator on the CCP displays 4.

f. CCP PROC Select Switch – Set to B

g. CCP PROC LOAD Switch – Pressed

PROC LOAD switch illuminates while the primary application loader display is loading and extinguishes when load is complete. RES PGM B Display alternates between 0 and 1 while loading and displays 0 when loading is complete. Loading takes approximately 40 seconds. NO OAS DATA message is erased from the MFD display and the Primary Application Loader Menu appears on the L MFD.

h. CF-n – Entered

“n” represents the line number of the desired application listed on the Primary Application Loader Menu. To load the OAS from non-volatile memory, select 1. To load the OAS from the active DTC, select 2 through 7, as required. LOAD APPLICATION n? YES/NO message is displayed after CF-n is entered.

i. LOAD APPLICATION n? – Select YES on IKB

LOADING PRIMARY ACU? YES/NO message is displayed after YES is selected.

j. LOADING PRIMARY ACU? – Select NO on IKB

If FMS is resident in non-volatile memory, ACU ERASE and XXX PCT CMPLT messages are displayed, and XXX increments from 0 to 100. While FMS is loading, DTC LOAD and XXX PCT CMPLT messages are displayed and XXX increments from 0 to 100. The DTC application selected in step h. will blink on the Primary Application Loader Menu while it is loading and a LOADING APPLICATION n INTO ACU B message is displayed. When FMS loading is complete the FMS application name and version appear in both the Resident Primary Application (LOADED APPLICATION) and NVM Primary Application (ACU NVM RESIDENT) windows, the DTC application line returns to normal video, an ACU B LOADED AS SECONDARY message and a blinking NO OAS DATA message appear, and the RES PGM B indicator on the CCP displays 4.

#17. PROC SYNC (Computer Control Panel) – Pressed (N)

A 2-ACU FULLUP advisory indicates both ACUs are operating normally.

18. OAS Lights – Tested (RN-N)

The radar navigator and navigator should test the lights on their respective OAS panels. Press lamp test switches on WCP and OAS power control panel. WCP and OAS power control panel lights come on. Press RN management panel lamp test switch. Check RN management panel lights and both radar presentation panel lights come on. Press keyboard lamp test switch. Keyboard lights come on.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

19. BDI TG=0 & BNS Steering Lights – Tested (N)

20. Doppler Indicator Control Panel: (N)

    a. Mode Switch – LAND

    b. Test Switch – Pressed, lights checked and BIT monitored

#21. ***Less [AMI]*** OAS Log-On: (RN/N)

    a. DTUC (CF-61) – Verified

    Verify tape identifiers.

    b. Cruise Missile Tape DTU Cavity Power – Off (if applicable)

    Remove power from the cruise missile tape DTU cavity by rotating the DTU retainer knob until the flat side of the knob is toward the cruise missile tape.

    c. B-52 Mission (CF-81,n) – Loaded

    Call up CF-8 to locate MSN identifier, if required.
    n = program number 1 thru 9, as required.

    d. (Mixed Weapons Loads) Weapons Check – Accomplished (if applicable) (RN/N)

    Complete the SMO Loading Checklist and the Weapon Check Checklist located in the applicable weapon manual.

    e. (Mixed Weapon Loads) Re-accomplish steps c. and d. to verify data for all applicable missions and each weapon type.

    f. Initialization Data (CF-61) – Entered, as required

    Wait until mission identifier on CF-61 underlines before loading data.

    g. Log-On – Recorded (N-RN)

    Request radar navigator to display CF-61 on his left MFD and record approximately four frames with MFD source selected.

NOTE

Ensure no emergency data has been previously entered on FRMT-8.

    h. IME Status Messages – OFF

    i. CF-44A – Entered

    j. FLY-TO-xx – Entered

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

#21. ***[AMI]*** OAS Log-On: (RN/N)

a. DTC (CF-61) – Verified

b. Sortie (CF-81) – Selected

On CF-81, select the desired sortie by using CF-DF/DB commands or by using a MDFY-1 command followed by the desired sortie number and ENTER. Up to eight sorties may be available.

c. B-52 Mission (CF-81,n) – Loaded

Use CF-81,n to select the desired mission where n is the mission number. Up to nine missions may be listed on the Mission Data Load display (CF-81) for each sortie.

d. SMO(s) (CF-62) – Loaded (if applicable)

Using MDFY-11, enter desired SMO number for each location: LP (Left Pylon), Bay, and RP (Right Pylon). The cursor indicates which location is being loaded. Use the arrow keys to move the cursor to the desired location.

e. Weapon Group(s) (CF-82x) – Select, as required

On CF-8, select the desired weapon group menus(s) by using CF-82x command to list available weapon groups for the SMO assigned to location x. Select desired weapon group using command CF-82n to select weapon group number x from the weapon group menu.

f. (Mixed Weapons Loads) Weapons Check – Accomplished (if applicable) (RN/N)

Complete the Weapon Check Checklist, located in the applicable weapon manual.

g. (Mixed Weapon Loads) Re-accomplish steps b. through f. to verify data for all applicable missions and each weapon type.

h. Primary SMO (CF-62x) – Selected, as required

Enter CF-62x command where x is the location (A - Left Pylon, B - Bay, C - Right Pylon) of the SMO to be assigned as primary.

i. Initialization Data (CF-61) – Entered, as required

Use MDFY-n, where n is the line number to modify. Update the data with the IKB and ENTER.

j. Log-On – Recorded (N-RN)

Request radar navigator to display CF-61 on his left MFD and record approximately four frames with MFD source selected.

NOTE

Ensure no emergency data has been previously entered on FRMT-8.

k. INU Status – Verify OFF

l. CF-44A – Entered

m. FLY-TO-xx – Entered

n. GPS/IU Power Switch – Pressed, light on (if applicable)

ON light indicates power to the GPS interface unit (IU).

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

22. IME-1 & -2 Switches – ON (if briefed) (RN)

    For all Air Align restarts CF-12/CF-22 must be entered prior to IME ON.

23. ***Less [AMI]*** IME – Ground Align (if briefed) (RN)

    Prior to entering ground alignment, ensure that no emergency data has been previously entered by checking FRMT 8.

    a. CF-11 – Entered

    b. CF-21 – Entered

    c. FLY-TO-xx – Entered (prior to taxi)

23. ***[AMI]*** INU – Ground Align (if briefed) (RN)

    Prior to entering ground alignment, ensure that no emergency data has been previously entered by checking FRMT 8.

    a. EGC:

        (1) CF-11/CF-21 – Entered

        The EGC ground alignment time will count down from nine minutes. An INU-n READY advisory indicates the EGC alignment is complete. The alignment time remaining goes to zero and the ground alignment status indicates 0.3 NM/HR. At that time, entry of FLT-TO will command the INU to enter the navigation mode (INU status – NAV).

        (2) FLY-TO-xx – Entered (prior to taxi)

    b. EIA (if briefed):

NOTE

The EIA Status window will indicate TIME OUT, if EIA is not commanded within 15 minutes of commanding the INU into a navigation mode (FLY-TO-xx) and EIA will no longer be available. Aircraft heading must change by 70 degrees or more prior to entering a CF-17/CF-27.

        (1) CF-17/CF-27 – Entered

        Following a CF-17/CF-27 command, the EIA status will be blanked, EIA will be displayed in the INU status window and :M will be displayed in the Manual Select window. The Alignment Time Remaining window will begin counting down from 6 minutes and the Ground Alignment Status window will reflect the INU alignment status. INU-n READY will be displayed as an advisory message and the INU Status window will display READY. The Alignment Time Remaining window will display zero and the Ground Alignment Status window will show 0.2 NM/HR to reflect performance for an enhanced interrupted alignment.

        (2) FLY-TO-xx – Entered (prior to taxi)

        Following a FLY-TO command, the INU will be commanded into navigation mode and NARF will be displayed in the INU Status window, as long as the aircraft is not moving and no aiding mode has been commanded. If the aircraft is moving and no aiding mode has been commanded, NAV will be displayed. If an aiding mode has been commanded, the aiding mode will be displayed in the INU Status window.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

24. GPS Power Turn-on: (N)

NOTE

- This checklist can be accomplished as soon as aircraft power is available.
- ***[CS]*** If Crypto Keys are to be loaded from the DTUC, OAS Initialization (CF-61) and FLY-TO-xx must be entered prior to applying GPS/IU power. Crypto keys may not be able to be loaded from the DTUC if a mission data DTUC without keys has been installed prior to the DTUC with Crypto keys.
- ***[AMI]*** If Crypto Keys are to be loaded from the DTC, OAS Initialization (CF-61) and FLY-TO-xx must be entered prior to applying GPS/IU power.

a. Interface Unit Control Panel (IUCP) – Checked

(1) Lamp Test Switch – Pressed

Tests all lights on the IUCP

(2) GPS/IU Power Switch – Pressed, light on

ON light indicates power to the GPS interface unit (IU).

b. Programmable Keyboard (PKB) – Checked

(1) Lights BRT/DIM – Adjusted

(2) PKB/GPS SELF TEST Page:

(a) LAMP TEST Key – Pressed, lamps checked

Pressing this key initiates a PKB lamp test. Press any key to move the lamp test one increment to the right. The fourth actuation returns the display to the SELF TEST Page.

(b) SWITCH TEST Key – Pressed, switch(es) checked

PRESS SWITCH will be illuminated on all keys upon initiation of the switch test. Pressing a key displaying PRESS SWITCH initiates a continuity check on that key. If the key passes the test, EXIT is displayed on the key. If it fails the test, PRESS SWITCH remains displayed. To exit SWITCH TEST, press a key that displays EXIT.

(c) COMM TEST Key – Pressed, status checked

Pressing the COMM TEST issues a host test command to the IU. This test is used to determine if communication between the PKB and the IU is healthy. When this key is pressed, the PKB will issue a host test request message to the IU. Upon completion of the test, key 19 will display either HAS PASSED if the test passes or HAS FAILED is the test fails. In either case, key 19 will return to its normal state after a brief delay.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(d) AUTO TEST Key – Pressed, checked completed

The AUTO TEST key performs a series of tests on the PKB. These tests include an image RAM, system random access memory (RAM), system read only memory (ROM), and micro-controller central processing unit (CPU) test. When this key is pressed, keys 4, 8, 12, and 20 will be used to display the results of these four tests. A pass or fail status will be reported for all of the tests. If a fault condition occurs, the IU will record the fault, but a fault condition does not necessarily indicate that all PKB functions will be affected. If PKB use is continued, problems may or may not be encountered depending on the nature of the failure. The test messages clear after 10 seconds.

(3) MENU Key – Pressed

(4) PME STATUS Key – Pressed

Verify all self tests on Test Mode Display Page passed.

25. GPS Initialization: (N)

NOTE

- ***[CS] [AMI]*** If the OAS and GPS are operating properly, all of the initialization data can be obtained from the OAS. If the OAS is not on or is working improperly and if no stored data is available, GPS must be initialized manually.
- ***[CS] [AMI]*** If the interface unit between OAS and GPS is not working properly, or if GPS is turned on prior to OAS power application, it is possible GPS will initialize with data that is stored from the previous flight. If GPS data is not available after several minutes, use manual initiation procedures.

a. MENU Key – Pressed

Pressing the MENU Key displays the main menu page. The operator can select any desired format from this menu page by selecting the key and then pressing ENTER.

b. AIDING ON/OFF Key – Checked ON

If AIDING ON is displayed, OAS data is fed to GPS. If AIDING OFF is displayed, OAS data is inhibited from flowing to GPS. Pressing this key causes it to blink. To actually change the key status from ON to OFF, press ENTER.

c. Manual Initialization (if required) – INIT MODE Key Selected

(1) Data – Inserted

Present position, altitude, and velocity data must be inserted manually. EX. LAT - N/Sdd:mm:nn, LONG - E/Wddd:mm:nn, ALT - CA/10, DATE - mmddyy, TIME - 24 hr clock hh:mm:ss (Zulu), ground track, ground speed

(2) SEND DATA Key – Pressed

This prompt is displayed automatically after GS is entered. Press the SEND DATA prompt to send the initialization data to GPS and begin initialization process.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

d. Crypto Key Loading:

NOTE

- If it is necessary to load crypto keys three methods are available. A separate checklist for each method follows. After loading, or if the crypto keys are present proceed to step e.
- When loading Crypto Keys through the PKB, a Crypto Fill Port device cannot be connected to the Crypto Fill Port. If a Crypto Fill Port device is connected, the last keys entered through the Crypto Fill Port will be sent to the receiver, instead of the PKB entered keys.
- ***[CS] [AMI]*** If recycling power to the GPS IU, reloading crypto will ensure FOM 1/INS Qual.

[CS] [AMI] Crypto Key Loading Using The DTUC/DTC

Crypto Key loading from the DTUC/DTC is automatic. When GPS/IU power is applied, with a DTUC/DTC containing Crypto Keys installed and powered, and OAS has been initialized with FLY-TO-xx selected, KEY RCVR will be displayed on the PKB when crypto keys are sent to the GPS receiver.

Crypto Key Loading Using CYZ-10 or KYK-13

(1) CYZ-10 and KYK-13 – Connected to IU Power Panel

Connect the CYZ-10 to the CRYPTO FILL PORT on the IU Power Panel.

(2) Crypto Fill Device Power – Applied

(3) CYZ-10 - KYK-13 Protocol – Set as required

(4) PKB (MAIN MENU Page) CRYPTO KEY – Pressed and Entered

This CRYPTO KEY (14) on the MAIN MENU page will access the CRYPTO VIEW ALL page. With the CRYPTO KEY blinking, press ENTER. When a KYK-13 is detected at the Crypto Fill Port (power must be applied to the fill device), CRYPTO FILL will be displayed on key 19 of the CRYPTO VIEW ALL page, as an indication that Crypto Key data may be entered through the Crypto Fill Port. CYZ-10 procedures are more complicated. Refer to the KYK-13 or CYZ-10 User Manual for additional instructions on key entry.

(5) PKB (CRYPTO VIEW ALL Page) CRYPTO FILL Key – Pressed

Pressing this key (19) while CRYPTO FILL is displayed, will change the key display to LOAD and key 20 will display CRYPTO KEY 1 (Key 20 can be used to toggle between CRYPTO KEY 1 and CRYPTO KEY 2).

(6) PKB LOAD Key – Pressed

Pressing this key (19), while LOAD is displayed, will load the Crypto Key from the Crypto Fill Port into the IU at CRYPTO KEY 1 memory location. The legend on key 19 will change back to CRYPTO FILL and the legend on key 20 will change to SEND DATA.

(7) CYZ-10 – Set to correct key

(8) PKB CRYPTO FILL Key – Pressed

Pressing this key (19) while CRYPTO FILL is displayed, will change the key display to LOAD and the legend on key 20 will display CRYPTO KEY 1.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(9) PKB CRYPTO KEY 1 – Pressed

Pressing CRYPTO KEY 1 (key 20) will change the legend to CRYPTO KEY 2.

(10) PKB LOAD Key – Pressed

Pressing key 19 while LOAD is displayed will load Crypto Key from the Crypto Fill Port into the IU at CRYPTO KEY 2 memory location. The legend on key 19 will change back to CRYPTO FILL and legend 20 will change to SEND DATA.

(11) PKB SEND DATA Key – Pressed

When SEND DATA is displayed, this key is used to send the Crypto Keys to the GPS receiver. The fill device must remain powered and connected to the CRYPTO FILL port while sending keys data to the GPS receiver. After pressing this key, the SEND DATA legend will disappear. During the period that the legend is blanked, the operator may not attempt to re-send the Crypto Keys. Between 15 and 20 seconds after the SEND DATA key is pressed, a parity status will be displayed on key 19. SEND DATA will not be displayed again until the Crypto Key View All page is exited and redisplayed.

Manual Crypto Key Loading Using The PKB

(1) MAIN MENU CRYPTO KEY – ENTER

(2) CRYPTO KEY VIEW ALL Page KEY 1 Switch – Pressed

(3) CRYPTO KEY DATA ENTRY Page – Key Data ENTER

(4) PKB SEND DATA Key – Pressed

When SEND DATA is displayed, this key is used to send the Crypto Keys to the GPS receiver. After pressing this key, the SEND DATA legend will disappear. During the period that the legend is blanked, the operator may not attempt to re-send the Crypto Keys. Between 15 and 20 seconds after the SEND DATA key is pressed, a parity status will be displayed on key 19. SEND DATA will not be displayed again until the Crypto Key View All page is exited and redisplayed.

e. MENU Key – Pressed

Pressing the MENU Key will display the main menu page.

f. ORIDE ON/OFF Key – ON/OFF (as required)

NOTE

If crypto data is not available, ORIDE must be ON for OAS to receive non-encrypted GPS data. Data derived by using ORIDE ON may be less accurate for navigational purposes.

If ORIDE ON is displayed, GPS operates at its most accurate level no matter what data, if any, is loaded into the crypto keys. If ORIDE OFF is displayed, valid crypto key must be entered. Pressing this key causes it to blink. To actually change the key status from ON to OFF, press ENTER.

g. KEY PRESENT – Verified

The KEY PRESENT light comes on when the crypto key is verified for the correct day. KEY RCVR will be displayed on the PKB when crypto keys are sent to the GPS receiver.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

h. Crypto Fill Device Power – Removed, if installed

i. GPS DATA Selected – DATA? Message light out, navigation data displayed

The DATA? message light comes on if no data or invalid data is received by GPS. The GPS processes all initialization data, locks-on to the satellites, and then provides navigation data. This process can take up to several minutes to complete. If the message continues to be displayed you may need to manually enter initialization data.

NOTE

SMO load must be completed after OAS processors are loaded, GPS initialized, and mission DTUC/DTC is loaded with power applied.

j. ***Less [AMI]*** Bullseye Data – Entered (as required)

Bullseye data is entered and the active bullseye is selected on the Bullseye Data Entry page. To display the Bullseye Data page from the MAIN menu, select MSN DATA, then from the MSN DATA page, select BE DATA.

26. (Deleted)

27. MRT: (N)

a. Remote Control Unit:

(1) PWR ON/STBY Switch – ON

CAUTION

The MRT will only be operated with aircraft cooling air available to the MRT receiver. Operation of the receiver without cooling air will burn up the receiver unit.

NOTE

BNS Front Panel light rheostat must be turned up to provide power to all RCU lights.

(2) TEST FAULT/PRINT Switch Indicator – On

(3) TEST GO Indicator – On

After approximately 2 minutes, TEST FAULT/PRINT light goes out and GO light remains on.

b. Printer:

(1) PWR ON Indicator – On

(2) STATUS FAULT Indicator – On

After approximately 2 minutes, STATUS FAULT light goes out.

NOTE

If STATUS FAULT light remains on, check paper supply. A STATUS FAULT light normally indicates a low paper supply condition. If paper supply is adequate or if paper is changed and the light remains on, there is a hardware failure. See MRT MALFUNCTION ANALYSIS, Section III.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(3) PPR ADV Switch – Pressed (after STATUS FAULT light goes out)

(4) Paper – Advances

(5) Message reads:

SELF TEST COMPLETE
NO FAULTS DETECTED.
SYSTEM STATUS;
FULLY OPERATIONAL

NOTE

If the TEST GO indicator fails to light, the TEST FAULT indicator or the PTR FAULT indicator is lit and the printer fails to automatically printout the system BIT status, press the TEST FAULT/PRINT switch-light to printout diagnostic results. After printer has completed the hard-copy printout, shutdown the MRT by setting the PWR ON/STBY switch to STBY.

c. Remote Control Unit:

(1) TEST SYS/OFF LAMP Switch – LAMP

All lights on remote control and printer come on, then go off.

28. AFSATCOM Terminal: (N)

CAUTION

The printer must be turned on prior to the AFSATCOM control panel. Applying power to printer after the AFSATCOM control panel has been turned on, could cause the receiver-transmitter to lock in the transmit mode.

NOTE

If data was entered into the memory while utilizing ground power, a possibility exists that a momentary interruption of power could occur when switching from ground to aircraft power which would erase the memory in the character memory unit.

a. Printer Power Switch – ON

b. **DL** AFSATCOM Control:

NOTE

The following checks are normally accomplished after aircraft engines are running and generators are on line. However, they can be accomplished with aircraft on ground power. IDLE mode should be selected prior to changing from ground to aircraft power.

(1) Control Indicator Power Switch – ON, annunciator light on.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(2) Operating Mode(s) & Variables – Selected/Modified (as required.)

(a) Top Menu – Displayed and Mode selected

To display the Top Menu, press [SHFT] then [TOP M] keys. The initial Top Menu will be displayed with the cursor positioned at the REVIEW parameter line. The Mode on the REVIEW line will blink, indicating that the parameter is modifiable. Press the [SEL] key until the desired mode is displayed and blinking. If MILSTAR mode is desired, set the NET ID and SAT ID parameters on the Top Menu to the desired values, however, you will still have to enter the rest of the MILSTAR parameters on the parameter screen.

(b) Mission Parameters – Modified (as required)

With the desired operating mode displayed on the REVIEW line, press [SHFT] [ENTR] to display the satellite parameter screen. Use the arrow (↑ ↓ ← →) keys and the [SEL] key to enter or modify the desired parameters. As you scroll down each line, note that the modifiable parameters will be flashing. Use the [SEL] key to set the desired value for each parameter. The USE parameter will be set to ACTIVE to establish it as the modem’s active mode when you press [SHFT] then [ENTR]. A list of possible mode parameters, operational status parameters, and mode preempt messages are listed in Section I of T.O. 1B-52H-1. AFSAT 1 and MILSTAR parameter setup is repeated as follows:

<u>AFSAT 1</u>

FREQ PLAN – As per communications plan
TDM SUBMODE – Normal
TX CHAN – As per communications plan
RX CHAN – As per communications plan
TDM SLOT – As per communications plan. This is needed if using TDM-1 or TDM-2 modes.

<u>MILSTAR</u>

USE – ACTIVE (default)
CONFIG – Provided from TSM
TERMINAL ID – Aircraft specific ID number as per communications plan
NET ID – As per communications plan
SAT ID – As per communications plan.
FREQ PLAN – Provided by TSM
CONTROL CHAN – Provided from TSM
RB 1 – Provided by TSM
RB 2 – Provided from TSM
RB 3 – Provided by TSM
RB 4 – Provided from TSM
U/L LOCAL CHAN – Provided by TSM
D/L LOCAL CHAN – Provided from TSM
NO GRP IDS – Set as required up to five group IDs or leave in default setting 0
WOD LOAD VIA – Press the SEL key until TSM is displayed
RB MODE – FIXED (default setting)
DUTY CYCLE – (default setting)
RADIO SILENCE – DSBL (default setting)
MSG ACK – ENBL (default setting)
RB STATUS – OK (default setting)
NETWORK LOGOUT – DSBL (default setting). Leave in DSBL until ready to log out of MILSTAR.
GRP IDS – Set the terminal IDs for each recipient of your messages (e.g. Command Post, formation members, etc.)

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(c) Operational State – Entered

After all line variables have been modified in accordance with communications plan, press the [SHFT] [ENTR] keys. This will enter the parameters into the modem, initiate the acquisition process for the satellite you have chosen and will cause the display to change to the TOP MENU display. When using MILSTAR or AFSAT IIM or MILSTAR without a functioning TSM, an additional display will direct the operator to enter the current Word-of-Day (WOD), Future Word-of-Day (FWOD) and if required, and a Rollover Time.

NOTE

- Steps (a), (b), and (c) can be repeated to modify and enter an ALTERNATE operating mode (including IDLE) into the modem for future use.
- All rollover time entries for FLSG and FILSG must be 2 digit values. Therefore, leading zeros are required.
- For MILSTAR operations, the RX Modes Status Parameter shows NO ACQ while attempting to acquire the downlink signal. When acquisition has occurred, the status change to NO SYNC until the modem obtains slot and frame synchronization. When the slot and frame are acquired the status automatically changes to OK. The TX Mode Status Parameter shows NO ACQ throughout the downlink acquisition process until the uplink acquisition process succeeds. When the transmitter has acquired the satellite, TX then changes to NO LOG. Once logged into the network , TX status change to LOG and the preempt message LOGIN OK appears on the CI display. Clear the LOGIN OK message by pressing the [SHFT] and [CLR] keys.
- Under normal conditions, the MILSTAR receiver acquisition process normally takes one (1) minute, but may take longer due to network activity. MILSTAR uplink acquisition nominally takes two (2) to three (3) minutes, but may take longer due to network activity. Total time for MILSTAR acquisition may take up to 15 minutes.

b. ***Less*** **DL** AFSATCOM Control:

NOTE

The mode selector must be in KEY when loading the AFSAT sync code and alternate frequency, LOAD when loading the LES sync code and real time, and OPR-1 when loading the time slot.

(1) Real Time – Set (as required)

(2) Sync Code – Loaded

(3) Alt Freq – Loaded (as required)

(4) Channel 1.5 Parameter – Set (as required)

(5) Time Slot – Set

(6) Mode Selector – Set (as directed)

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

29. **DU** KY-100 Secure Voice System:

a. Ciphertext & Plaintext Mode Enable Procedures

This procedure is used to configure the KY-100 for ciphertext operation only (CT ONLY) or for both ciphertext and plaintext (CT) operation. When enabled, the plaintext mode can only be used for voice communication. When this menu item is set to CT, plaintext voice can be received when the KY-100 is in the idle state or the KY-100 MODE switch is set to PT. When set to CT ONLY, and the user sets the KY-100 MODE switch to PT, the display will indicate INVALId.

(1) KY-100 MODE Switch – PT, EB, CT, or RK

(2) CT/CT ONLY – Set (as desired)

Repeatedly press the up or right arrow pushbutton until the display shows CT or CT ONLY. If the desired setting is not displayed, press the INIT button. Press the up or right arrow pushbutton to toggle the display from CT to CT ONLY or CT ONLY to CT. A pass tone will be heard when the display is toggled. To exit this menu and save the selected operating mode, press the INIT button.

b. Narrowband Ciphertext Operation – HF Modem (SATCOM Advanced Narrowband Digital Voice Terminal [ANDVT])

The HF Modem (ANDVT) supports the following Narrowband CT modes: Net Voice (NT), Point-To-Point (PP) Voice, and Net Data at 2400, 1200, 600, and 300 Bps.

NOTE

- The data rate field setting does not affect the quality of ciphertext voice transmission and reception. Ciphertext voice is always processed at 2400Bps regardless of the setting shown on the data rate field.
- The KY-100 system must be selected to ANDVT preset prior to DAMA PTT operation. Pressing the PTT button while in any DAMA mode of operation without the KY-100 being selected to a preset containing the proper parameter setup and ANDVT keys will result in a lock-up of the DAMA Modem operation. If this occurs, the ARC-210 and DAMA Modem must be powered down for 20 seconds, then powered up and DAMA operation reinitiated.

(1) KY-100 MODE Switch – CT

(2) KY-100 PRESET Switch – MAN

The previously selected manual mode settings will be displayed.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(3) Narrowband (NB) Mode – Selected

Press the INIT button. The NB (Narrowband) or WB (Wideband) annunciator will flash. If the WB annunciator is displayed, press the up arrow pushbutton to select NB.

NOTE

To change a parameter value in Narrowband or Wideband mode, press the right arrow pushbutton. The displayed value will flash. Repeatedly press the up arrow pushbutton until the proper value is displayed.

(4) Net Voice (NT) Mode – NT

(5) HF ANDVT Modem – HF

(6) Traffic Encryption Key (TEK) – 1, 2, 3, 4, 5, or 6 (as applicable)

(7) KY-100 INIT Button – Pressed

Press the INIT button to save the selected settings. A pass tone will be heard.

NOTE

- To transmit voice, press the interphone switch. Listen for full-transmitted preamble, then transmit voice to the remote station. Observe that the TX and V annunciators are displayed.
- To receive voice, release the interphone switch and listen for full received preamble from the remote station, followed by the receive voice message. Observe that the RX and V annunciators are displayed during voice reception.

c. Wideband Ciphertext Operation – Line-Of-Sight (LOS)

The Wideband VINSON configuration supports the ciphertext (CT) Voice, Analog Data and Digital Data modes at 16,000 and 12,000 Bps.

(1) KY-100 MODE Switch – CT

(2) KY-100 PRESET Switch – MAN

The previously selected manual mode settings will be displayed.

(3) Wideband (WB) Mode – Selected

Press the INIT button. The NB (Narrowband) or WB (Wideband) annunciator will flash. If the NB annunciator is displayed, press the up arrow pushbutton to select WB.

NOTE

To change a parameter value in Narrowband or Wideband mode, press the right arrow pushbutton. The displayed value will flash. Repeatedly press the up arrow pushbutton until the proper value is displayed.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

(4) Time Delay – Td or NTd (as briefed)

(5) Modem – bb or dP (as briefed)

(6) Traffic Encryption Key (TEK) – 1, 2, 3, 4, 5, or 6 (as applicable)

(7) Data Rate – 16k or 12k (as briefed)

(8) KY-100 INIT Button – Pressed

Press the INIT button to save the selected settings. A pass tone will be heard.

NOTE

- To transmit voice, press the interphone switch. Listen for full-transmitted preamble, then transmit voice to the remote station. Observe that the TX and V annunciators are displayed.
- To receive voice, release the interphone switch and listen for full received preamble from the remote station, followed by the receive voice message. Observe that the RX and V annunciators are displayed during voice reception.

d. Plaintext Voice Operation:

NOTE

- If the KY-100 is configured for CT ONLY operation, selecting the PT mode will cause INVALId to be displayed.
- Plaintext voice operation is available when the KY-100 is configured for either ciphertext or plaintext operation. Plaintext voice operation can be enabled in the Wideband (VINSON) voice modes and Narrowband (ANDVT) voice modes.

(1) KY-100 MODE Switch – PT

Verify that PT is displayed and the PT and RX annunciators are on.

(2) KY-100 PRESET Switch – Set

Select a valid Wideband (VINSON) or Narrowband (ANDVT) voice mode by setting the PRESET switch to the appropriate position (MAN or 1 through 6).

NOTE

- To transmit voice, press the interphone switch, then transmit voice to the remote station. Observe that the TX and V annunciators are displayed during voice transmission.
- To receive voice, release the interphone switch and listen for the received voice message. Observe that the RX and V annunciator is displayed during voice reception.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

30. ARC-171 Radio Function Select Switch – SATL

31. ***[TP]*** GPS/IU – Configured

NOTE

> TGP preflight checklist items may be accomplished with only ground power to the aircraft

   a. IU Power Switch – Checked on, light on (N)

   This step should be accomplished in checklist order to ensure OAS date/time stamp is received when scheduled. IU power must be applied for AGWCP operation.

   b. TGP Software Load – Confirmed (RN-N)

   Select PME STATUS on Programmable Keyboard. Check IU version. If correct version is not indicated, select OPER MODE, select RELOAD, then select YES. Confirm correct load and exit menu.

   c. R559 Power – Confirm OFF (RN-N)

   Select MAIN MENU on PKB and toggle R559 off.

32. ***[TP]*** AGWCP Power – Checked on (RN-N)

Power is applied to the AGWCP when IU power is applied.

33. ***[TP]*** TGP Monitor Power – ON (RN)

Set monitor power switch to BIT and adjust monitor (brightness, contrast, etc.) for optimum display, then switch to ON. The monitor requires up to 60 seconds for warm-up. Confirm brightness, contrast, horizontal and vertical hold, and height settings allow viewing of the entire video display area.

34. ***[TP]*** AGWCP Keyboard – Set (RN)

Set Key Light Intensity as required. Accomplish LAMP TEST and SWITCH TEST.

35. ***[TP]*** Ground Mode – Checked (As required) (RN)

   a. TGP Monitor – Set ON

   b. TGP – Selected

   Status Menu should be displayed.

   c. Ground Mode – Selected

   Ground mode button underlines.

   d. POWER – Selected

   Key #1 will change from POD OFF to STBY then <u>STBY</u> once 2-minute warm-up sequence is complete. During the 2-minute warm-up, it is normal for the monitor to flash as the pod goes through its built-in-tests. TGP remains stowed.

   e. FAULT – Selected

   f. Faults – Recorded

   g. RETURN – Selected

   h. <u>STBY</u> – Selected

   TGP will unstow in WFOV, CCD. FLIR requires approximately 5 minutes to reach operational state.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

i. Breaklock Button – Selected

j. ITH Function – Confirmed

Confirm TGP responds to slew inputs and verify thumb toggle operation by entering NFOV/WFOV, area/point track, FLIR/CCD selection and zoom inputs. Attempt autofocus after FLIR is operable. Confirm entire coordinate data set is visible on the monitor and adjust with HHold, VHold and Height controls as necessary.

k. TGP ON – Selected

l. STATUS MENU – Selected

m. FAULT – Selected

n. Faults – Recorded

o. RETURN – Selected

p. POWER – Selected

Power down TGP by selecting YES, to exit ground mode.

q. STATUS MENU – Reselected

Operator must reselect the Status menu to reacquire the Ground mode key on the Status menu.

r. GROUND MODE – Deselect

Pressing the key again takes the TGP out of ground mode.

36. ***[TP]*** TGP Power-up: (as required) (RN)

a. TGP – Selected

b. STATUS MENU – Selected

CAUTION

Do not recycle power to TGP when the true outside air temperature (OAT) is –20°C (–4° F) or less. Leave TGP power on, or descend to warmer temperatures before recycling power. TGP is not designed for OATs of –20°C (–4° F) or less without an operating environmental control system.

NOTE

The TGP environmental system was designed for powered flight if the TGP is to be employed at any time during the mission. During ferry-only flights, the TGP may remain off.

c. POWER – Selected

Key #1 will change from STRIKE/OFF to STRIKE/STBY then STRIKE/STBY once 2-minute warm-up sequence is complete. During the 2-minute warm-up, it is normal for the monitor to flash as the pod goes through its built-in-tests. TGP remains stowed.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

d. FAULT – Selected

Select FAULT, if underlined. Acknowledge faults by pressing each key that indicates a Pilot’s Fault Listing (PFL) item or Maintenance Fault Listing (MFL) item. Refer to Malfunction Analysis Table for action.

e. Faults – Recorded

f. RETURN – Selected

g. STBY – Selected

TGP will unstow in WFOV, CCD. FLIR requires approximately 5 minutes to reach operational state.

h. Pod Controls – Set

Select CONTRL switch.

(1) TRAIN – Selected

An asterisk will be displayed prior to the selected mode.

WARNING

> Ensure the COMBAT mode is not selected during ground operations. The laser is inhibited in TRAIN mode; this serves as a fail-safe to preclude inadvertent laser activation on the ground. Airspeed indications that indicate to the pod that the aircraft is not airborne further inhibit laser operations while on the ground.

(2) DES and SEARCH CODES – SET, Check

Set any valid PRF code (other than 1688) in the Search menu, to confirm proper laser code file is loaded. Laser search code should appear on the TGP monitor as selected. An invalid or corrupted laser code file is indicated by NCOD displayed on the TGP monitor. If NCOD is displayed, the TGP laser code file must be reloaded. If unable to reload, laser operations will be limited to a single PRF code of 1688. Ensure weapons code is also set to 1688.

i. FLIR Sensor – Adjusted; Focused

Select SENSOR switch, then FLIR, FOCUS, GAIN, FOCUS RESET, AUTO FOCUS as required. Adjust with thumb toggle on ITH.

j. FLIR Integration Setting – Selected (as required)

Select HOT or COLD, as required. Toggling between Hot or Cold determines the length of time IR energy is processed on the FLIR, to obtain the best picture quality (shutter speed). Use COLD when ground temperatures are below 20^o C (68^o F).

k. SW FOV ENABLE – Selected

This setting adds the SWFOV to the FOVs that are available for selection when using the FLIR.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

l. SPI Load – Accomplished (as required)

Select SPI switch to access the Register Pages. Select register to manually enter latitude, longitude and elevation.

m. FLIR Calibration – Accomplished (as required)

Calibration (Short or Long) allows the operator to correct a degraded FLIR image and can be accomplished while either airborne or on the ground. Key #1 will indicate **FL CAL**, and TGP will stow. “CAL” will be displayed on the monitor (blinking) until calibration is complete.

37. ***[TP]*** TGP – Stowed (RN)

Select STRIKE/TGP ON. TGP stows indicating STRIKE/STBY.

CAUTION

TGP will remain stowed during taxi, takeoff, approach to landing and landing. Failure to stow the pod during these conditions could cause FOD damage to the Forward Section. Ensure TGP power status indicates STBY or STBY.

38. Radar Tune-Up: (RN)

a. RCTP Lights – Tested

Press lamp test button on RCTP. All lights should come on. The FRL/BIT and TILT indicators should display +8.88 and +88.

b. BIT Select Switch – Pressed

Press the BIT select switch several times to clear any momentary fault indications. If no actual faults are present, F00 will be displayed after the momentary faults are cleared.

c. Radar Radiate Button – Pressed (after standby light illuminates)

Check clear to radiate prior to pressing button. Check that radiate light illuminates.

WARNING

- Ground operation of radar transmitters is prohibited when the B-52 is within 200 feet of:
  - (1) Weapons which are not fully assembled.
  - (2) Weapons to which continuity testers are connected.
  - (3) Weapons with open access doors.
- The radar should not be in radiate when the aircraft radar antenna is within 50 feet of personnel or 200 feet of any ground refueling operation or open fuel tank.
- The area in line with the radiation of a nonrotating radar antenna is hazardous to personnel. For this reason, do not stop the antenna while the radar is in radiate operation.

OAS, EVS, RADAR, AND RADIO TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) (Cont)

d. Radar Presentation – Adjusted

Adjust and check antenna tilt and MFD presentation.

39. OAS Bomb Door Status Check – Accomplished (RN/N)

WARNING

> Exercise caution during ground operation of bomb doors with CF-59. Ensure ground personnel are clear of bomb doors before entering the CF-59 command.

Open the bomb doors by entering CF-59 and verify that the OAS indicates doors open on the CF-5 display. Close the bomb doors by re-entering CF-59.

40. Weapon Check – Accomplished (if not previously accomplished) (RN/N)

Accomplish the applicable weapons check for each type of weapon being carried in accordance with the applicable aircrew weapons delivery manuals.

SMO/WEAPON RECONFIGURATION CHECKLIST *Less [AMI]*

NOTE

- This checklist facilitates equipment/SMO configuration changes when carrying different types of weapons or different weapon versions.
- Only Steps 1, 2, 3, and 9 need to be accomplished for changing between mixed CALCM-C and CALCM-D weapon operations.
- Ensure the correct SMO is loaded prior to accomplishing the corresponding weapons status check.

1. Weapon Control Panel LOCK/UNLOCK Switch – LOCK (RN)
2. Pilot's Munition Consent Panel LOCK/UNLOCK Switch – LOCK (P)
3. Jettison Power & Jettison Control Circuit Breakers – Out (RN)
4. FRMT-7 – Entered (RN/N)
5. Active SMO Weapon Classified Data Erase – Accomplished, if required (RN/N)

   Accomplish this step only if no further launches of these weapons are to be attempted.

   a. Location – Selected
   b. Station Selected – ALL
   c. CF-5xx – Entered
6. Active SMO Weapon Power – OFF, if not accomplished in Step 5 (RN/N)
   a. Location – Selected
   b. Station Selected – ALL
   c. Weapon Power Switch – OFF
7. Active SMO Weapon Status (FRMT-7) – Checked off
8. MIU Power Switches – Off (RN/N)
9. CF-81,n – Entered (for the next weapon event mission) (N)

   n = mission number 1 thru 9, as required. Call up CF-8 to locate MSN identifier, if required.
10. CF-62,n – Entered (for the next weapon event SMO), as required (N)

    n = SMO number 1 through 10, as briefed. Call up CF-62 to locate SMO identifier, if required. This step is not required when changing between different weapon versions that use a common SMO.
11. Next Weapon Event Applicable Weapons Checklists – Accomplished (RN/N)

    Accomplish the applicable weapons checklists starting with the AFTER ENGINE START Checklist. Proceed normally through the checklist flow.

SMO/WEAPON RECONFIGURATION CHECKLIST *[AMI]*

NOTE

- This checklist facilitates equipment/SMO configuration changes when carrying different weapon types that are not multi-SMO compatible or carrying more than one JDAM/WCMD/CALCM variant.
- Classified Data Erase, Weapon Power Off, MIU Power off, and SMO reloading may be omitted when changing between CALCM-C and CALCM-D weapons.
- Ensure the correct SMO is loaded prior to accomplishing the corresponding weapons status check.

1. Active SMO POST STRIKE/ABORT/RETAINED WEAPONS Checklist – Accomplished (RN/N)
2. MIU Power Switches – Checked off, if required (RN/N)
3. Active SMO(s) (CF-62) – Unloaded, if required (N)

   Using MDFY-11, enter 0 for each location of the active weapon SMO(s): LP (Left Pylon), Bay, and RP (Right Pylon). The cursor indicates which location is being unloaded. Use the arrow keys to move the cursor to the desired location(s).
4. Next Weapon Event Mission – Loaded (N)

   a. DTC (CF-61) – Verified

   b. Sortie (CF-81) – Selected

   Select desired sortie by using CF-DF/DB commands or by using a MDFY-1 command followed by the desired sortie number and ENTER. Up to eight sorties may be available.

   c. B-52 Mission (CF-81,n) – Loaded

   Use CF-81,n to select the desired mission where n is the mission number. Up to nine missions may be listed on the Mission Data Load display (CF-81) for each sortie.
5. Next Weapon Event SMO(s) (CF-62) – Loaded, if required (N)

   Using MDFY-11, enter the desired SMO number for each location: LP (Left Pylon), Bay, and RP (Right Pylon). The cursor indicates which location is being loaded. Use the arrow keys to move the cursor to the desired location.
6. Primary SMO (CF-62x) – Selected, as required (N)

   Enter CF-62x where x is the location of the SMO to be manually assigned as the primary SMO (A - Left Pylon, B - Bay, C - Right Pylon).
7. Weapon Group(s) (CF-82x) – Selected (CF-82,n) (N)

   On CF-8, select the desired weapon group menus(s) by using CF-82x command to list available weapon groups for the SMO assigned to location x. Select desired weapon group using command CF-82,n to select weapon group number n from the weapon group menu.
8. Next Weapon Event SMO Applicable Weapons Checklists – Accomplished (RN/N)

   Accomplish the applicable weapons checklists starting with the AFTER ENGINE START Checklist. Proceed normally through the checklist flow.

CAUTION

Monitor the low airflow warning lights during all low engine power operations. If warning indications appear see Section III for corrective action.

1. Video Recorder Mode Switch – AUTO (RN)

2. EVS Video Select Switch – FLIR (if applicable) (RN/N)

   When the READY light on the FLIR control panel is illuminated, adjust the FLIR bias and contrast knobs for optimum display (AUTO, if desired).

3. Entrance Door – Checked locked, folding grate closed (N)

   A positive lock indication will be obtained by attempting to unlatch the door with the latch unlatch handle.

4. Pressure Dump Handle – CLOSED, safetied (N)

5. FLIR Mode Selector Switch – OPR (RN)

6. APN-69 Power Switch – STBY (N)

7. AVTR Cassette – Loaded (N)

   Press cassette remove button, insert cassette, and close tape loading door.

CAUTION

Do not insert tape cassette into recorder before RCU power has been applied.

8. Altimeters – Set (N)

   Pilot, copilot, and navigator recheck their altimeters with a known elevation.

9. Takeoff Data – Reviewed (P-CP-RN-N)

   Navigator verify S_1 time during this review.

BEFORE TAKEOFF (Cont)

10. Parachute & Safety Belt – Fastened (RN-N)

WARNING

- Tighten the parachute survival kit attachment straps as tightly as possible to prevent the safety belt from inflicting facial injuries during ejection bailout.
- Ensure that the parachute arming lanyard is not entangled in the parachute harness. Lanyard entanglement could cause failure in seat separation and failure of the automatic features of the parachute.

NOTE

If it becomes necessary to leave the seat, the crewmember should open the safety belt and unbuckle the parachute harness leaving the parachute and survival kit in the seat. If the parachute is worn when leaving the seat, upon returning to the seat, it will be necessary to take it off in order to reinstall the parachute and safety belt in the seat.

11. Oxygen Regulator – As required (RN-N)

12. Bailout Bottle – Connected (RN-N)

13. Pin No. 1 – Removed (RN-N)

14. Ejection Control Trigger Ring – Unstowed (RN-N)

TAKEOFF

1. Acceleration Timing – Checked (N) (RN Backup)

   As the pilot announces “Now” at 70 knots, start the stopwatch. Announce over the interphone “Coming up on _____ seconds” approximately 3 seconds prior to S_1 time. At S_1 time, announce “Now.”

AFTER TAKEOFF

1. Thermal Curtains – Closed (SIOP only) (P-CP)

   Radar navigator notifies pilot and copilot to close thermal curtains after climb configuration is established.

   WARNING

   Failure to close thermal curtains as soon as practicable after takeoff may result in flash blindness from nuclear detonations.

2. Altitude & Airspeed – Monitored (RN-N)

   Monitor altitude and airspeed for safe margin until aircraft has attained an altitude of 5000 feet above the terrain. Advise pilot if altitude falls below a safe margin or airspeed fails to show a positive increase. Upon reaching level-off altitude minus 2000 feet, report altitude to pilot every 1000 feet and at level-off altitude. Altitude calls will be made by stating the passing altitude and the intended level-off altitude.

3. Departure/OAS – Monitored (RN-N)

   Monitor aircraft position to assure adherence to planned departure. The navigator has primary responsibility for monitoring the departure plan, altitude and airspeed. The radar navigator will assist the navigator by ensuring that all available equipment (radar, OAS, EVS, etc) is properly configured, updated/calibrated to the extent necessary to provide the navigator an accurate cross-check capability for position/altitude/airspeed monitoring and advise the navigator when equipment status is deemed unreliable/inoperative. Additionally, the radar navigator will provide assistance in departure plan, altitude, and airspeed monitoring, if required.

4. FLIGHT MODE/GROUND MODE Switch – FLIGHT MODE

5. APN-69 Power Switch – OPERATE (if required) (N)

   APN-69 should be placed in operation at takeoff whenever buddy refueling or formation tactics are to be employed.

6. Climb EPR Value – Computed (if requested) (N)

AFTER TAKEOFF (Cont)

7. ***Less [AMI]*** IME-1 & -2 Switches – ON (at planned time) (RN)

   Turn IMEs on to ensure coarse alignment is complete prior to the first planned update.

8. ***Less [AMI]*** CF-17/CF-27 – Entered (when required) (RN)

   Use the CF-17 and CF-27 commands, as applicable, when it is desired to override the 10 minute air alignment hold after the READY message is displayed and enter a NAV mode immediately.

8. ***[AMI]*** CF-12/CF-22 – Entered (when required) (RN)

   To air align an INU, enter an air alignment mode command followed by INU power application when the aircraft is flying straight and level and can remain in un-accelerated flight for approximately 10 seconds until air alignment initialization is complete.

9. ***[TP]*** CF-12/CF-22 or CF-13/CF-23 – Entered (RN)

   For TGP operations, if using a SMO other than GWD, JDAM, WCMD or JASSM, both INSs should be set to GPS-aided mode to preclude inserting altitude errors into the TGP system.

10. 12,000 Foot Oxygen Check – Completed (EW-RN-P/CP)

    a. During the climb, copilot requests an oxygen check at 12,000 feet. The sequence for oxygen report is EW officer, radar navigator, pilot/copilot. The reporting crewmember will visually check other crewmembers for alertness. He will report oxygen checks for both positions. Oxygen panel at each occupied crew position will be checked on all oxygen checks for:

       (1) Oxygen Supply Shutoff Lever – On

       (2) Regulator Diluter Lever – As required

       (3) Pressure – 300 psi

       (4) Flow Indicator – Functions normally

       (5) Emergency Toggle Lever – NORMAL

    b. EW officer, radar navigator, and pilot/copilot report, "Oxygen panels checked."

       In addition, pilot/copilot reports "Cabin altitude ______ feet."

    c. Copilot requests oxygen check at level-off and during cruise at 1 hour intervals when cabin altitude is below 12,000 feet, at 30 minute intervals when cabin altitude is 12,000 to 25,000 feet, and at no longer than 10 minute intervals when cabin altitude is above 25,000 feet. If cabin altitude is below 12,000 feet, only the pilot/copilot will report. The remaining crewmembers will check their equipment and report when complete.

AFTER TAKEOFF (Cont)

11. ***[TP]*** STRIKE/STBY – Selected (RN)

    Key #1 changes from STRIKE/STBY to STRIKE/TGP ON.

    CAUTION

    TGP should remain stowed when flying through weather to preclude moisture buildup and to avoid damage from rain and ice.

12. ***[TP]*** Sensor – Selected and adjusted (RN)

    Adjust SYM, FOCUS and GAIN, as required using the thumb toggle on ITH. Deselect when complete. Toggle FLIR/CCD switch on A-G MENU or with thumb toggle on ITH. Toggle WFOV/NFOV switch on A-G MENU or with FOV switch on ITH. Toggle WHOT/BHOT, as required with thumb toggle on ITH. Toggle AREA/POINT TRACK as required with thumb toggle on ITH. Select ZOOM on A-G MENU. Adjust with thumb toggle on ITH. Deselect when complete.

13. ***[TP]*** FLIR Calibration – Accomplished (as required) (RN)

    Calibration (Short or Long) allows the operator to correct a degraded FLIR image. Key #1 will indicate **FL CAL** (bold), and TGP will stow. “CAL” will be displayed on Monitor (blinking) until calibration is complete.

14. Altimeter – Set 29.92 (P-CP-N)

AFTER LEVEL OFF

1. Station Checks – Accomplished (RN-N)

   Radar navigator and navigator accomplish station checks at level-off, at approximately 30 minute intervals during cruise, and prior to leaving crew positions during flight. A check for system operation and proper switch settings for prevailing conditions will be made during each station check. Crewmembers will check their equipment and report if abnormal.

   Stations checks will include:

   a. Circuit Breakers and Fuses
   b. Navigation Instruments
   c. Update AHRS Latitude for Copilot (N)
   d. Check Equipment Stowage

2. OAS-Set (RN)

   Position fix/calibration procedures should be accomplished, as required, by mission events. An altitude calibration should be accomplished prior to the TAS cross-check.

3. EVS Video Select Switch – FLIR/STV, as desired

4. EVS – As Required (RN)

   Rotate the Mode Select switch from OPR to BIT-1 momentarily then back to OPR whenever image scene changes significantly (e.g., from large body of water to mountains or foliage, during climbs/descents, etc.) or FLIR video appears degraded or out of focus. This enables the system to sample and store new data for correcting non-uniformity in the imaging device output. Place FLIR mode select switch and STV mode switch to STBY whenever EVS is not used. If the EVS system is not to be used for several hours, turn FLIR mode select switch and STV mode switch to OFF.

5. True Airspeed Indicators – Cross-checked (P-CP-N)

6. **DL** AFSATCOM Terminal – Operating mode selected and monitored (as required) (N)

   Ensure the AN/ARC-171 is in Satellite. Select the Top Menu and then select the desired Operating Mode. If a mode has been previously set, activate it via the USE parameter. When in receipt of an EAM, the CI display will flash EAM and the message will print out on the printer. To clear the flashing EAM from the display, press the [SHFT] and [CLR] keys.

   To send a Manual Transmit message:

   Ensure the system is in Random Access mode on the CI display. Press the MNL XMT key on the keyboard and type your message. There is no limit on message length provided the delay between character entry is less than 10 seconds. The message will be sent 10 seconds after the last character is entered. The printer will print out four ETXs after the end of the message text. The MSG SENT light will come on. In MILSTAR, the RB MSG on the CI display should change from NONE to PEND to ACT to INPRG and back to NONE.

   To Send an Auto Transmit message:

   Press the COMP EDIT key, ensure the CONT key is on, and press the desired buffer number. Type your message on the keyboard, Only the last five characters will appear in the TEXT display as the message is being typed. Once the complete message has been typed, a technique is to then press the VRFY key to check the message before transmission. Press the AUTO XMT key. The AUTO XMT indicator will come on, Ensure the CONT key is on and press the selected buffer number. At the end of the transmission, the AUTO XMT light will go out and the MSG SENT light should come on. In MILSTAR, the RB MSG on the CI display should change from NONE to PEND to ACT to INPRG and back to NONE.

AFTER LEVEL OFF (Cont)

6. ***Less*** **DL** AFSATCOM Terminal – Monitored (as required) (N)

7. MRT – Monitored (as required) (N)

NOTE

> The following DAMA checklist steps (8. through 13.) may be done on the ground or whenever mission requirements necessitate using the DAMA modem with the ARC-210 radio.

8. **DU** DAMA Modem Activation

   a. ARC-210 Radio Switch Panel (P/CP)

      (1) Mode Switch – MAN

      Having the switch in manual will prevent DAMA modem lockup when activating the DAMA.

      (2) HPA – AUTO

      (3) Antenna Mode Select Switch – SATCOM

      (4) Antenna Select Switch – UPPER or LOWER (as required)

      Select the antenna position that corresponds to the relative position of the assigned DAMA satellite. Use the UPPER antenna position when the satellite is between 35 to 90 (± 5) degrees from the aircraft’s position. Use the LOWER antenna position when the satellite is between 0 to 35 (± 5) degrees from aircraft’s position.

      (5) Lamp Test Switch – Pressed and checked

   b. KY/RAD Switch – ARC-210 (N/RN)

   c. KY-100 Narrowband Check (N-CP)

      (1) Mode Switch – CT

      (2) Preset Switch – Set as briefed (5, 6 or MAN)

      Set preset switch to programmed ANDVT preset (5 or 6) or MAN. Confirm assigned TEK (usually 1019 or G2881) was properly filled into the storage location prescribed on the Mission Data Card.

      (3) Display – Configured for Narrowband

      Both the copilot and navigator will ensure the KY-100 is configured correctly, by checking the display reads: NT bd n (where n = assigned TEK storage register).

   d. DAMA Modem Control Unit (N)

      (1) 25K DAMA – Selected

      From the TOP menu, press the <3> (25k DAMA) key, then the <ENTR> key.

      (2) Cfg Parms – Selected

      From the 25k DAMA menu, press the <1> (CfgParms) key, then the <ENTR> key.

AFTER LEVEL OFF (Cont)

(3) Init Mode – Selected

From the CfgParms menu, press the <1> (Init Mode) key, then the <ENTR> key.

(4) Confirm – Selected

From the Init Mode menu, press the <1> (Confirm) key, then the <ENTR> key.

NOTE

- If the system appears to be locked up (nothing happens after about 30 seconds), enter <1> to cancel the initialization command and re-accomplish steps (1) through (4).
- Depending on the speed of activation onto the network, various event messages will be displayed, such as Processing, FrmLckAchd, StrUpLnkAcq, and TermOnLine, resulting in a Request RCCOW/TxmitToNCS message. These non-critical messages do not need to be acknowledged.
- When the Pt 0 Call Ack Modem Critical Message is displayed, the system is online with the DAMA network. The 25K DAMA menu now provides access to item <2> – AC Ops.

9. **DU** DAMA Modem Call Request (N)

a. 25K DAMA – Selected

From the TOP menu, press the <3> (25k DAMA) key, then the <ENTR> key.

b. AC Ops – Selected

From the 25k DAMA menu, press the <2> (AC Ops) key, then the <ENTR> key.

c. Call Request – Selected

Press the down arrow key to access page 2, then press the <4> (Call Req) key, then the <ENTR> key. The <4> (Call Req) key can be accessed from any of the four AC Ops menu pages to start the call request.

d. Number of Parties – Entered

The number of parties is the number of guard lists that will be used, usually one. At the prompt: (CallReq:>_), select the number of parties, 1 through 5, as required, then the <ENTR> key.

e. Precedence – Selected and entered

On the CallReq menu, press the <2> (Prec) key, then the <ENTR> key. At the prompt (Prec:>_), press the key selecting the precedence level 1 through 6, then the <ENTR> key. The precedence levels are:

1 = EAM	3 = Flash	5 = Priority
2 = Flash Override	4 = Immediate	6 = Routine

Enter the assigned precedence level from the classified DAMA message, then press the <ENTR> key. This list is available on the RCU by pressing the <SHFT> and <HELP> keys.

AFTER LEVEL OFF (Cont)

f. Port Number – Checked/entered

Check the port number. If required, change the number by pressing the <3> (Port) key and <ENTR> key. Port 0 is normally used for voice transmissions unless maintenance switches it and writes it up in the AFTO Form 781.

g. Guard List – Entered

Enter the assigned guard list by pressing the <4> (ID) key and <ENTR> key. If there are 2 or more parties shown on the parameter menu, there should be subsequent numbers next to the other IDs to enter those guard lists.

NOTE

If a guard list number was inadvertently omitted on the parameter menu, exit the Call Request menu by using the <ESC> key to backup one level to the Config Parameters menu. Press the <8> key and enter the guard list number and port number to be used. Then reselect the <1> (Init) key and <1> (Confirm) key. Then select <2> (AC Ops) key, <4> (Call Request) key and enter the other guard list on the Call Request menu. All current values will remain in memory, until a Send Request is initiated. Scroll through each page to verify the settings before initiating a <1> (Send Req).

h. Length and Units – Checked

Leave the length and unit values at their default settings, unless otherwise briefed. Length is the estimated time this circuit is to be used in the units selected.
0 = Indefinite Unit Values: 1 = seconds; 2 = minutes; 3 = hours; 4 = days

i. Send Request – Selected

Press the <1> (Send Req) key and <ENTR> key to initiate a conference call with the guard list. The RCU will display a series of event messages ending with the Pt 0 Conn Modem Critical Message. Press the <ACK> key twice to clear the message.

NOTE

The conference call allows all parties to communicate on the private conference call circuit. All parties on the guard list will hear each other, but anyone not on the guard list and activated into the 25K DAMA network will not hear the transmissions. BUSY will be displayed on the KY-100 and a “busy tone” will be heard on the interphone, if someone else is using the network.

j. Status Page – Selected

To access the 25K DAMA status page, press the <SHFT> key, then the <STAT> key.

k. Status Page 4 – Selected

To monitor current transmission status on Port 0, press the down arrow key to go to page 4, the Status Page for Port 0. Line 4, DCD = x, RTS = x. For DCD (Data Carrier Detect) x = 0 indicates no incoming transmissions in progress and x = 1 indicates an incoming signal to the modem. For RTS (Ready to Send) x = 0 indicates no outgoing transmissions in progress and x = 1 indicates an outgoing signal from the modem.

AFTER LEVEL OFF (Cont)

l. Microphone Button – Pressed

To check that the DAMA system is working properly after activating the guard list, press the microphone button.

m. RTS:1 – Checked

With the microphone button pressed, the RTS:0 should change to RTS:1, to indicate transmitting on the DAMA system.

NOTE

If RTS stays at 0, the modem has locked up. Perform the DAMA Modem Unlock steps to use the modem.

10. **DU** DAMA Modem – Unlock (as required) (N)

a. End Call – Accomplished

b. Stop Mode – Accomplished

c. Dedicated Mode Initialization and Stop Mode – Accomplished

d. 25K DAMA – Selected

From the TOP menu, press the <3> (25k DAMA) key, then the <ENTR> key.

e. Activation – Re-accomplished

f. Call Request – Re-accomplished

NOTE

When ready to exit the DAMA network, or need the ARC-210 for other uses, perform the End Call and Stop Mode checklist steps.

11. **DU** DAMA Modem – End Call (N)

a. 25K DAMA – Selected

Press the <3> (25k DAMA) key, then the <ENTR> key.

b. AC Ops – Selected

Press the <2> (AC Ops) key, then the <ENTR> key.

c. End Call – Selected

Press the <5> (EndCall) key, then the <ENTR> key.

d. Port to Disengage – Entered

At the prompt: (EndCall:>_), press number of the port to disengage, then the <ENTR> key. Press either the <0> or <1> key to select the port to terminate the connection on, usually Port 0. Some non-critical messages will be displayed, such as ReqstQuedatTermin and CallCmpleteReqstInitd. The messages will complete with the Pt 0 Discn Modem Critical Message. After pressing the <ACK> key twice, the Pt 0 Call Ack Modem Critical Message will be displayed. Press the <ACK> key twice again to clear the message.

AFTER LEVEL OFF (Cont)

12. **DU** DAMA Modem – Stop Mode (N)

    a. 25K DAMA – Selected

    Press the <3> (25k DAMA) key, then the <ENTR> key.

    b. AC Ops – Selected

    Press the <2> key (AC Ops), then the <ENTR> key.

    c. Stop Mode – Selected

    Press the <1> (StopMode) key, then the <ENTR> key.

    d. Stop Mode – Confirmed

    Press the <1> (Confirm) key and the <ENTR> key to initiate Stop Mode. When disconnected from the 25K DAMA network the 25KEXIT/SltsDisCon non-critical message will be displayed. Press the <ACK> key to clear the message. Now the ARC-210 radio can be used for UHF/VHF/VSAT purposes.

13. **DU** Dedicated Mode Initialization and Stop Mode (N)

    a. Top Menu – Selected

    Press the <HELP/MAIN> key and the <ENTR> key to select the Top Menu.

    b. Dedicated Mode – Selected

    Press the <1> (Dedicated) key and the <ENTR> key to select the Dedicated Mode.

    c. Init Mode – Selected

    Press the <1> (Init Mode) key and the <ENTR> key to select the Init Mode.

    d. Confirm – Selected

    Press the <1> (Confirm) key and the <ENTR> key to activate the Dedicated Mode. When connected to the Dedicated network, the system will display a Radio BIT/PASS system critical message. Press the <ACK> key twice to clear the message.

    e. Stop Mode – Selected

    Press the <2> (Stop Mode) key and the <ENTR> key to select Stop Mode.

    f. Confirm – Selected

    Press the <1> (Confirm) key and the <ENTR> key to initiate Stop Mode. When complete, the DedctdExit non-critical message will be displayed. Press the <ACK> key to clear the message.

14. INFLIGHT TA FUNCTIONAL Check – Accomplished (RN-N)

INFLIGHT TA FUNCTIONAL CHECK (RN-N)

NOTE

- This check may be accomplished prior to, in conjunction with, or after the pilots' Inflight TA Functional Check. If accomplished in conjunction with the pilots' check, accomplish step 2 when the pilot requests Navigators' Inflight TA Functional Check. Report the check COMPLETE after step 5 has been accomplished.
- Record any unusual or abnormal radar displays with the video recorder and in the AFTO 781.
- If the check is run prior to or after the pilots' check, accomplish all items and report its completion to the pilots.
- This check will be accomplished prior to conducting TA low level flight operations and preferably where a perceivable amount of drift is being indicated by the OAS prime NAV model.

1. Profile Mode – Selected (P)

   Have the pilot select a profile mode on the terrain display control panel.

2. Failure Warning Indications – Checked (RN-P-CP)

   Select 50 nm range on the RNMP and observe the failure warning video band is present between 42 and 47 nm. Range as desired, select STBY on the RCTP and check for a TA WARN light on the RCTP and at both pilot stations. Select RAD on the RCTP and observe the TA WARN light goes out at all stations.

3. TA Sector – Checked (RN)

   With the sector width knob in detent (full ccw), note the sector is approximately 90° in width (45° either side of track). Rotate the knob full cw and observe the sector expand to 180° (+20°, –0°). Sector width adjusted as desired to check radar & heading drift integration.

4. Radar & Heading Drift Switch – OFF (N)

   Check to see that the TA sector shifts from centered about the track marker to centered about the heading marker. Note where the edge of the sector appears on the azimuth bezel.

5. Radar & Heading Drift Switch – ON (N)

   Using the sector position on the azimuth bezel noted in step 4, note the sector shifts in the direction the aircraft is drifting by an amount equal to the drift displayed by the OAS prime NAV model.

6. Profile Mode Selector Switch – OFF (P)

   Report navigators' Inflight TA Functional Check complete and any discrepancies noted during the check that could affect TA operations.

AIR REFUELING PROCEDURES

RENDEZVOUS

1. Rendezvous Equipment – On at briefed time (CP, N, RN)

   Accomplish the following at least 30 minutes from planned ARCT.

   a. A/A TACAN – Set (CP)

   b. Rendezvous Beacon – On (if applicable) (N)

   c. Beacon Signal of Assigned Tanker – Identify (if applicable) (RN)

   d. Range and Bearing of Tanker – Determined (CP/RN)

2. Altimeters – 29.92 or as briefed (P-CP-N)

3. EVS Preset – Accomplished

PREPARATION FOR CONTACT

1. Tanker Position – Determined (CP-RN)

   Copilot determines the tanker position visually or on the EVS monitor. Radar Navigator determines the tanker position on the radar or on the EVS monitor. The EVS may be moved from the preset position to bring the tanker into the field of view of the sensor. Adjust the EVS bias and contrast knobs for optimum display.

2. Rendezvous Equipment – As required

   Turn off equipment if no further rendezvous are planned.

POST AIR REFUELING

1. Altimeters – Reset (if required) (P-CP-N)

BEFORE LOW LEVEL DESCENT (CP/N READS)

NOTE

For combat operations omit circled items.

1. Interior Lighting – Adjusted (P-CP)

   Adjust all interior lighting to lowest practicable level of intensity.

   WARNING

   During night operations, the use of white lighting (spotlights, flashlights, etc) can severely degrade night vision for short periods. This can critically decrease recognition of terrain obstructions and can reduce reaction time during TA operations.

2. Altimeter Settings – Obtained/Computed (CP/N)

   Training: Obtain updated forecast altimeter setting from a designated PMSV station, if possible. Combat: Compute altimeter setting(s) for descent and level-off using available data.

3. FLIR/STV Mode Switches – OPR (RN)

   When an EVS sensor is available (providing a usable display) at least one EVS display will be maintained and monitored on an MFD at either the RN's or NAV's station from the start descent point at low level route entry through initiation of climb for route exit when three or more MFD's are usable. When two or less MFD's are usable the EVS should be used to cross-check the radar display but need not be displayed continuously. In all situations the display may be deselected momentarily, when terrain clearance is not critical, to accomplish systems checks but will be reselected as soon as the check is complete.

4. MFD Control Panel MFD EVS Switch – EVS, as required (P-CP)

5. **(TA Only)** EVS – ON, TA video selected (P-CP)

   Press EVS power switch to ON. Pilot and copilot should both select the EVS sensor with the best display and select vector stabilization.

   WARNING

   EVS monitor optical filters of red color must be used on both pilot's and copilot's monitors during all TA operations at night, except when night vision goggles (NVG) are being used for low level operations.

6. **(TA Only)** Stabilization Reference Selector – FVR (P/CP)

⑦ Taxi Lights – As required (P/CP)

8. Circuit Breakers – Checked (RN-N)

BEFORE LOW LEVEL DESCENT (CP/N READS) (Cont)

9. **(TA Only)** Altimeter Calibration/Stab Modes Comparison Altitude Determined – _________feet MSL (N-P)

   Compute an altitude 800 feet above the terrain (flat and rolling) or selected terrain feature (mountainous) where planned level-off for the low level route will occur. The level-off altitude will initially be determined during mission planning and then reconfirmed inflight.

9A. **(SCA Ops)** Initial Safe Clearance Level Off Altitude Determined – __________feet MSL/AGL (N-P)

   Compute a safe clearance altitude based upon command directives and announce both the MSL and AGL altitudes. The level-off altitude will initially be determined during mission planning and then reconfirmed in flight.

10. **(TA Only)** Radar Frequency – Checked (RN)

   Ensure frequency is not set on 125 (±10) MHz or a multiple of 125 to preclude the radar receiver/transmitter from shifting between adjacent bands and affecting the TA display.

11. **(TA Only)** FRL Angle-of-Attack Indicator – Computed (N), Set (RN)

   The copilot will state the fuel weight and the navigator will compute the FRL angle for the IAS, gross weight, and airbrake position. The FRL angle-of-attack must be reset periodically due to changes in aircraft gross weight and or airspeed. The radar navigator will set the value in the RCTP.

   NOTE

   - When using FRL mode, the navigator will recompute and ensure the FRL angle is reset if the planned indicated airspeed is changed more than 10 knots and/or the gross weight changes over 20,000 pounds.
   - When using the FRL mode, the FRL angle should be reset prior to decelerating and after accelerating. This procedure will keep the error induced by changing airspeeds in the safe direction.
   - Tightening or loosening the FRL locking knob could cause the FRL control knob to turn, changing the FRL setting. Ensure the correct FRL is still present in the FRL/BIT window after tightening or loosening the FRL locking knob.
   - Airspeed control is critical during TA operation in FRL mode. Care must be taken to ensure that the airspeed used by the navigator for FRL angle computation is maintained while flying TA with FRL mode selected.

12. Starter Switches – CONT (CP)

FRL Angle Of Attack (Level Flight) Settings – Degrees

SEA LEVEL TO 20,000 FEET
NO AIRBRAKES – FLAPS UP

INDICATED AIRSPEED – KNOTS

GROSS WEIGHT – 1000 LBS

	220	240	260	280	300	320	340	360	380	390
420	+2.8	+1.6	+0.6	–0.2	–0.8	–1.3	–1.7	–2.1	–2.4	–2.5
410	+2.6	+1.4	+0.5	–0.3	–0.9	–1.4	–1.8	–2.2	–2.5	–2.6
400	+2.5	+1.3	+0.3	–0.4	–1.0	–1.5	–1.9	–2.2	–2.5	–2.6
390	+2.3	+1.1	+0.2	–0.5	–1.1	–1.6	–2.0	–2.3	–2.6	–2.7
380	+2.1	+1.0	0.0	–0.6	–1.2	–1.7	–2.0	–2.4	–2.7	–2.8
370	+1.9	+0.8	–0.1	–0.8	–1.3	–1.8	–2.1	–2.4	–2.7	–2.8
360	+1.7	+0.6	–0.2	–0.9	–1.4	–1.8	–2.2	–2.5	–2.7	–2.9
350	+1.5	+0.4	–0.3	–1.0	–1.5	–1.9	–2.3	–2.6	–2.8	–2.9
340	+1.4	+0.3	–0.5	–1.1	–1.6	–2.0	–2.3	–2.7	–2.9	–3.0
330	+1.2	+0.1	–0.6	–1.2	–1.7	–2.1	–2.4	–2.7	–2.9	–3.0
320	+1.0	0.0	–0.8	–1.3	–1.8	–2.2	–2.5	–2.8	–3.0	–3.1
310	+0.8	–0.2	–0.9	–1.5	–1.9	–2.3	–2.6	–2.9	–3.1	–3.2
300	+0.6	–0.3	–1.0	–1.6	–2.0	–2.4	–2.7	–2.9	–3.2	–3.2
290	+0.4	–0.5	–1.2	–1.7	–2.1	–2.5	–2.7	–3.0	–3.2	–3.3
280	+0.2	–0.6	–1.3	–1.8	–2.2	–2.5	2.8	–3.1	–3.3	–3.4
270	0.0	–0.7	–1.4	–1.9	–2.3	–2.6	–2.9	–3.1	–3.3	–3.4
260	–0.2	–1.0	–1.6	–2.0	–2.4	–2.7	–3.0	–3.2	–3.4	–3.5
250	–0.4	–1.1	–1.7	–2.1	–2.5	–2.8	–3.1	–3.3	–3.5	–3.5
240	–0.5	–1.3	–1.8	–2.3	–2.6	–2.9	–3.1	–3.3	–3.5	–3.6
230	–0.7	–1.4	–2.0	–2.4	–2.7	–3.0	–3.2	–3.4	–3.6	–3.6
220	–0.9	–1.6	–2.1	–2.5	–2.8	–3.1	–3.3	–3.5	–3.7	–3.7

INDICATED AIRSPEED KNOTS	**AIRBRAKE CORRECTION**	
	ADD THIS CORRECTION TO THE ANGLE OF ATTACK FROM THE TABLE	
	AIRBRAKE POSITION 2	**AIRBRAKE POSITION 4**
220	+0.3°	+0.7°
260 – 300	+0.3°	+0.6°
325 – 340	+0.3°	+0.5°
370	+0.3°	+0.4°

NOTE

- Use airbrake corrections in airbrake position 2 column when the inboard airbrake circuit breaker is pulled out and airbrake position 4 is selected per low altitude tactic.
- When flying with constant airspeed and a gross weight less than that used to compute the FRL settings, the use of airbrakes will tend to improve the accuracy of the TA system display by providing a more noseup angle of attack. At heavier gross weights, the use of airbrakes will tend to degrade the accuracy of the TA system display.
- There is no angle of attack correction required with AGM-86B wing pylons installed without missiles.
- Less than seven external AGM-86B/129 missiles or seven or more external AGM-86B/129 missiles installed on the aircraft wing pylons changes the angle of attack 0.1° and 0.2° respectively in the positive direction due to aircraft loss of lift when missiles are installed.

EXAMPLE:

If the aircraft gross weight (including 12 AGM-86B/129 missiles) is 300,000 pounds, the angle of attack value at 260 knots indicated airspeed from the chart is –1.0° then add +0.2° correction for the missiles which results in an angle of attack setting of –0.8°.

Figure 2-1

LOW LEVEL FLIGHT OPERATIONS

NOTE

The low level TA flight operations/techniques described in this section are applicable to both nuclear and nonnuclear missions.

Crew Coordination

WARNING

- TA/SCA operation without a properly operating radar altimeter is extremely hazardous. See command directives for flight restrictions.
- Due to degradation of TA system accuracy, do not allow the radar navigator to manually tune radar during the TA operational check or actual TA operations.
- Failure of the OAS radar tilt control circuitry will cause an inaccurate TA display.

NOTE

- The radar altimeter is to be used in conjunction with the TA system. It will be included in the pilots' normal instrument scanning pattern for continuous cross-check with other terrain clearance information and for observing peak passage before following a fly-down command.
- When using the FRL mode, the FRL angle should be reset prior to decelerating and after accelerating. This procedure will keep the error induced by changing airspeeds in the safe direction.
- The EVS symbology is solely for aiding the pilot during use of the EVS system. The aircraft flight instruments remain the primary flight reference.
- The pilot will notify the navigator prior to selecting FRL on the stabilization reference selector switch to ensure the FRL angle is reset.

Low level flight operations may be conducted using integrated TA-EVS equipment, TA only, EVS only, or using Safe Clearance Altitude (SCA) procedures. Crew coordination remains essentially the same. The descent to the low altitude tactic requires close monitoring by all crewmembers. Descent rates while descending to TA altitudes are dependent on visibility, radar presentation, and good judgment. During peacetime operations at night, however, pilots will limit their maximum rate of descent to 1500 fpm during descent to TA altitudes and during all actual TA operations. This may require use of a higher range gate to allow the pilot to place the HRL on the terrain trace, as discussed under TA EVS integrated flight. The radar navigator/navigator will constantly monitor any terrain that may affect the flightpath of the aircraft. During descent to TA altitude, the radar navigator will normally use a full scan presentation TA sector with 25 NM range selected. This will provide the best interpretation of radar shadows, especially narrow, high terrain such as buttes. OAS spotlight and freeze modes should not be used during the descent to low altitude, especially from IFR altitude to TA altitude.

During descent or while at TA/SCA altitudes, when hazardous terrain is observed on the radar, the radar navigator or navigator will advise the pilot of its location. Normally, only terrain forward of the aircraft between the 10 o'clock and 2 o'clock positions will be a factor, however, terrain outside of these parameters can be of concern if associated with an enroute turning point. Using EVS, the radar navigator may be able to confirm the position and size of significant terrain observed on radar. The radar navigator/navigator should announce the approximate elevation of approaching terrain. The pilot can compare the current aircraft altitude, range from the terrain, and available climb performance to make an initial determination on what distance from the terrain to initiate a climb. When the pilot observes the terrain on the TA trace, he will advise the radar navigator. The radar navigator should call terrain at 10, 6, and 3 NM or until terrain clearance is assured as observed on radar and/or the EVS. The radar navigator should not become fixated on near range terrain and fail to assess obstacles beyond the pilot's range.

After crossover is determined, the pilot may begin a descent to re-establish the clearance plane altitude. The navigator should advise the pilot of terrain elevation forward of the aircraft and the radar navigator should advise the pilot of the next significant terrain. This will aid in TA/EVS interpretation and cross-checking pressure/radar altimeter indications. The ground map presentation can normally see out as far as 35 NM ahead of the aircraft, and provides information on large obstacles and weather beyond the range selected by the pilot. Using ranges greater than 75 NM on the radar scope may result in retraces and other interference effects.

In flight, TA operation is essentially an extension of instrument flying for the pilots with the TA/EVS system. Although the pilot's TA display does not provide any direct indication of pitch and roll, an approximate indication may be obtained by the pilot noting the scan-to-scan changes in the position of the terrain trace. Frequent use of airbrakes for deceleration is not recommended. It has been found helpful to assign airspeed control (throttles) to the copilot, who then maintains the desired airspeed without further direction. The climbing portions of TA operations requires close monitoring of airspeed during flight over rough terrain. Pilots should overshoot throttle settings by early advancement to higher power settings than required, then retard throttles as required to maintain airspeed. It is especially important to maintain correct indicated airspeeds when operating in FRL stabilization mode because any reduction in airspeed causes lower than desired crossing altitude. When operating in FRL, crews should plan to maintain an average true airspeed and a constant indicated airspeed. The radar navigator must verbally clear the proposed flightpath for all turns greater than 10 degrees. When radiating, all turns will be cleared using 12 or 25 NM ranges. Blank, missing, or jagged (sawtooth) areas of the terrain may be caused by radar shadow from a large obstacle at very close range. Plan all turns so that no more than 15 degrees bank is used. Use a slow roll in rate, not to exceed 3 degrees per second. The pilot not flying the aircraft must monitor all the instruments and provide visual clearance of the aircraft. Spotlight and freeze presentations are restricted to equipment updates and bombing, and will never be used for terrain assessment or clearing turns. The radar navigator may recommend small course changes to utilize terrain cover or for weather avoidance. The pilots use the flight command indicator (FCI) as the primary heading instrument. When the FCI is not available, the pilot may use the bank steering bar as the primary heading instrument during TA operation. When the bank steering bar is used, the pilot/copilot must reset the heading marker, as required, during heading corrections or when azimuth deviations are noted on the FCI.

To reduce the crew work load, OAS steering may be used to maintain the correct aircraft heading while the pilot maintains pitch control. The navigator must monitor OAS drift values and, in the event of a malfunction, notify the pilot. The radar heading and drift switch should be placed to OFF during the memory point wind run, then it should be positioned to ON. This will realign the TA presentation about the correct ground track derived from OAS memory point winds. For subsequent wind runs, notify the pilot prior to pressing the update switch. Inform the pilot before making any changes in the radar and heading drift switch. The navigator will monitor minimum safe altitudes for each low altitude leg.

For low altitude operations, both EVS sensors should normally be configured to monitor the flight track of the aircraft. The sensor used by the pilot flying the aircraft, with TA selected on his EVS Control Panel, will automatically be positioned by the terrain avoidance system. If the navigation team wishes to monitor the alternate sensor, the navigator can position this sensor by selecting MANUAL EVS on his IKB and positioning the sensor drift angle downwind from zero azimuth and adjusting the elevation for an optimum presentation (normally zero elevation ±2°) with his track ball.

If the alternate sensor is used for a systems update or aimpoint cross-check, it should be returned to the track monitor position as soon as this activity is complete. As a technique, if both sensors are providing near equal presentations and allow the pilot not flying the aircraft a valid cross-check capability, the pilot not flying the aircraft may select the alternate sensor and TA on his EVS control panel slewing the alternate sensor to the aircraft flight vector (track) position.

TA-EVS INTEGRATED FLIGHT

During any low level environment, the radar navigator or navigator must notify the pilot when approaching any terrain that may affect the flightpath of the aircraft. During TA operations, when the radar navigator notifies the pilot that the aircraft is approaching high terrain, the pilot/copilot should select the appropriate range gate and monitor the TA trace for indications of the significant terrain. When the terrain feature is identified, both on the OAS radar and on the pilots' terrain trace, terrain position and relative height can be confirmed using the EVS sensor(s). The EVS display, in wide field of view, displays 10 to 11 degrees left and right of center while the TA display provides a 45 degree sector either side of center. Once terrain is identified on the radar scope/terrain trace/EVS monitors, the pilot should be able to determine the required rate of climb to clear the feature by raising the nose of the aircraft to place the HRL coincident with the terrain trace and allowing the vertical velocity to momentarily stabilize. Comparing this vertical velocity value with the available climb performance of the aircraft will let the crew judge the situation and either continue the climb if required, or descend back to TA altitudes until a climb is required. The pilots and navigators should compare current aircraft altitude, known or estimated terrain elevation, OAS radar presentation, and the EVS presentation to determine the proper range gate for terrain analysis. After investigation of approaching terrain, the pilot will normally return to the appropriate range gate (normally PROFILE 3) and continue flying the trace while monitoring the EVS display. Once a climb is initiated to clear an obstacle, the radar navigator can advise the pilot when the shadow sufficiently decreases and objects beyond the terrain feature can be detected on the OAS radar. Terrain crossover is confirmed by the radar altimeter reaching a minimum value and then increasing.

During turns at programmed turn points, or for terrain masking, the pilot will normally continue to fly the trace while monitoring the radar altimeter and EVS displays. You should not attempt to exceed TA system bank angle limits for the purpose of terrain masking since the TA remains the primary reference. Large bank angles may exceed the EVS coverage and prevent the radar navigator from adequately monitoring the turn on radar.

TA-ONLY CONTOUR FLIGHT

TA-only flight is similar to TA-EVS integrated flight. The primary differences include pilots' loss of the ability to visually monitor for terrain in the EVS beyond the selected TA range gate, inability to confirm climb indications commanded by the TA trace, and lack of available aids during descents from altitudes where a usable TA trace is not available to the desired clearance altitude. The lack of EVS information will mean no backup is available when the trace drops out, displays false returns, or becomes otherwise unreliable. This will require close coordination with the radar navigator in rugged terrain and increased reliance on the radar and radar altimeter.

EVS-ONLY CONTOUR FLIGHT

EVS-only contour flight is essentially an extension of visual contour flight and is used when the TA system may be unreliable. The OAS radar may or may not be available. If the OAS radar is operational, there is little difference in the procedures that the radar navigator and navigator will be using. The pilot may require additional terrain advisories since he will no longer have a ranging device other than the EVS and visual estimates.

EVS-only flight and visual contours both have a near range blind zone and requires the pilot to visualize an extension of the aircraft flightpath. The point where the flightpath would intercept the terrain/ obstacle is called the impact point or aimpoint. This is a point where obstacles remain stationary on the EVS monitor and appear to grow larger. The impact point will appear to rush toward the aircraft. EVS video expansion of the impact area becomes very prominent at near ranges. In areas of rugged terrain, the expansion of the impact area video can occur at such close ranges that a high-g maneuver is required to clear the terrain/obstacle. Sheer terrain must be monitored and clearance procedures initiated before entering the area where pilot reaction time and aircraft capabilities become critical. If the OAS radar is available, this would not present a problem as long as the pilot is aware of the approximate elevations and ranges to the terrain. Without OAS radar, navigational capability is severely degraded and the navigator must rely on constant visual cues from the copilot,and good navigational techniques to maintain route parameters. These same requirements would keep the pilots aware of flight in and near rugged terrain. Effective crew coordination is essential in order to keep the aircraft out of such potential high-g maneuvers.

NOTE

> If the angle-of-attack data from OAS is lost, the EVS may be erroneously oriented for use in EVS contour flight.

Climbs should be initiated at a range consistent with aircraft performance. As a technique, the pilot can place the bottom of the vertical fiducial mark on the top of the terrain feature to initially set the attitude, while remaining in wide field of view. The radar navigator/navigator can also use this as a reference. If the pilot maintains this relationship until approximately 3 miles, and then holding the pitch attitude until crossover, it will result in an approximately 800 foot crossover altitude. The same relationship held until approximately 2 miles will give a 500 foot crossover. This technique will normally result in a slightly flatter profile. The pilot should not make an attempt to keep the fiducial mark on top of the terrain inside of 2 miles since this will result in a very low crossing or collision. Whenever this technique is employed, care must be taken to ensure the terrain visible on the EVS continues to drop toward the bottom of the monitor. To ensure safe terrain clearance, the terrain should drop out of view at the bottom of the monitor at approximately 1 NM. See figure 2-2.

NOTE

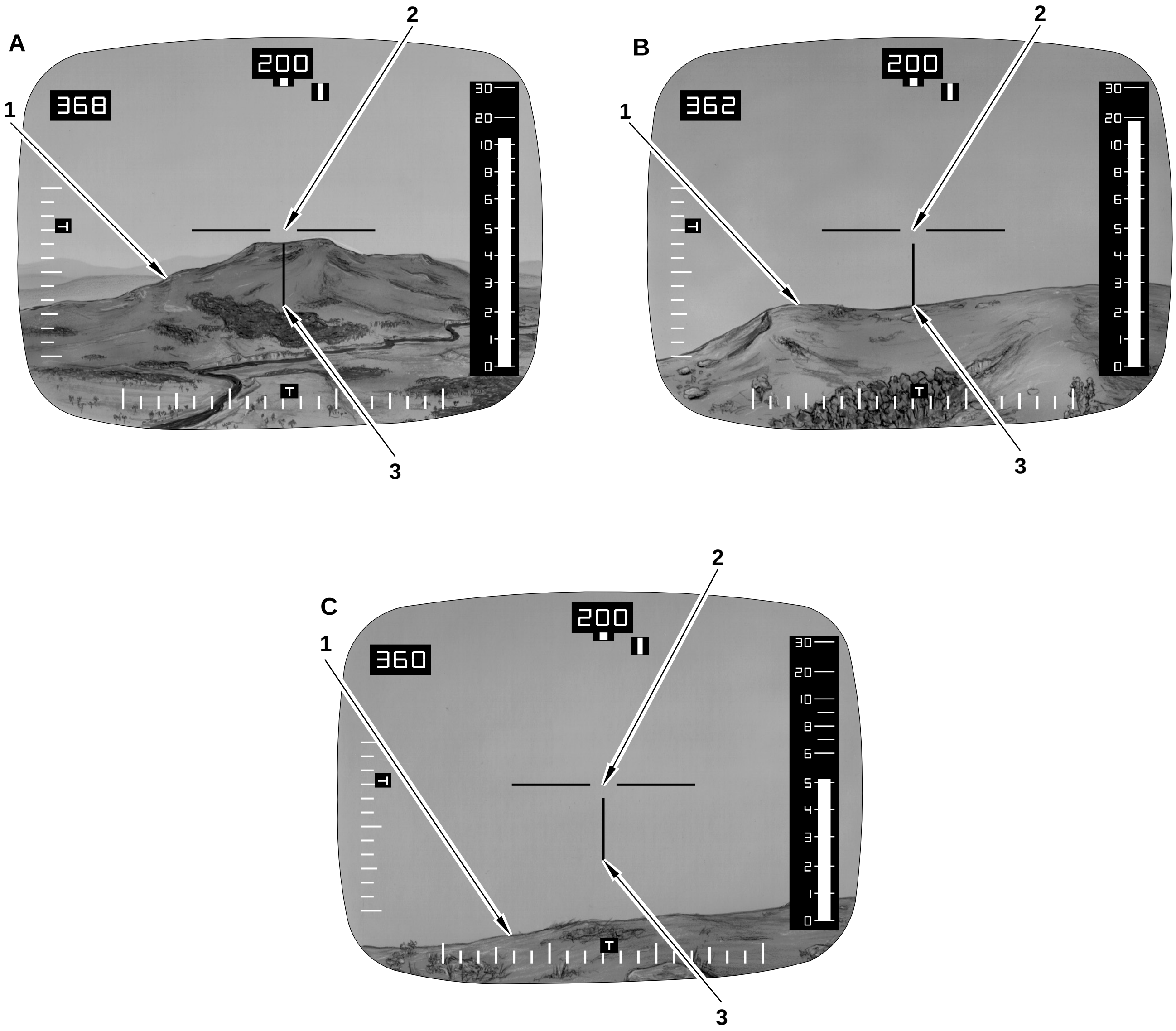
> EVS only terrain clearance can be accomplished by keeping the impact area clear of terrain obstacles and monitoring near range video for terrain obstacle movement. To assure terrain clearance, the pilot should maintain the pitch angle until near range terrain video disappears and crossover has been verified.

During EVS only descents, the pilot should gradually decrease his rate of descent as he approaches the desired clearance altitude. The EVS should not be completely filled with terrain since this would eliminate the capability to determine height of terrain at the top of the display. Detection of towers, antennas, cables, etc, by use of the EVS equipment, is not reliable and cannot be depended on. The pilot can perform a periodic check for obstacles in NFOV, which will enhance the field of view along the aircraft flightpath, but will not provide good resolution of the object until the aircraft may be too close to avoid collision.

SAFE CLEARANCE ALTITUDE (SCA) ONLY FLIGHT

Safe Clearance Altitude low level flight is conducted by flying an altitude determined during mission planning. Each leg of a low level mission will have a pre-determined SCA altitude based upon the surrounding terrain. See command guidance for further guidance.

EVS Only Sequence, Clearing High Terrain



1 − TERRAIN
2 − EVS AIM POINT
3 − FIDUCIAL MARK (Bottom of vertical mark)

A − 4 MILE RANGE
B − APPROXIMATELY 3 MILE RANGE CLIMB ATTITUDE ESTABLISHED
C − APPROXIMATELY 1 1/2 MILE RANGE, TERRAIN CONTINUES TO DROP TOWARD BOTTOM OF MONITOR

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NOTE

To ensure safe terrain clearance, the terrain should drop out of view at the bottom of the monitor at approximately 1 mile.

Figure 2-2

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS)

NOTE

For combat missions, omit circled items. Circled items may be omitted during peacetime operations IAW command guidance.

1. Altimeters – Set (P-CP-N)

   Set altimeters to station pressure immediately prior to initiating penetration or upon passing through transition altitude. ARTC furnished altimeter setting will be used if available. For combat operations, compute altimeter setting(s) for descent and level off using available data.

NOTE

Altimeter settings will be updated throughout all low level operations. The setting of a station along the route and within 100 NM of the aircraft will be used. True altitude may be used IAW command guidance.

2. **(TA Only)** Terrain Display Mode Selector – PROFILE 10 (P/CP)

NOTE

- Radar navigator and navigator will monitor radar scope presentations. The navigator will monitor all other instruments available.

- The radar navigator provides terrain assessments beyond the pilot's range. When hazardous terrain is observed, the radar navigator will continue to advise the pilot until the pilot is tracking the obstacle on his indicator.

- When flight at IFR altitude/emergency minimum safe altitude is required (prior to TA compensation), the pilots should select profile 10 with a clearance plane setting of 800 feet. After TA compensation, pilot should select profile 6 with the briefed TA clearance plane set. This TA display will provide additional altitude monitoring information.

- Terrain trace breakup with fly-up command may occur when the AN/ALQ-172 is transmitting and the TA is operated in any mode other than PRO 3.

- All descents into low level require close attention to the pressure and radar altimeter, radar display, and the EVS displays. Monitoring descents into sheer/rugged/mountainous terrain requires close attention to the radar presentation since the ability to confirm an impending collision may not occur until at close ranges when reaction time is critical.

3. **(TA Only)** Clearance Plane – Set to 800 feet (P/CP)

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

4. **(TA Only)** Radar Altimeter – Set to 800 feet (P-CP)

Set the radar altimeter when descending through 6000 feet AGL.

WARNING

TA/SCA operation without a properly operating radar altimeter is extremely hazardous. See command directives for flight restrictions.

NOTE

Pilot flying aircraft monitors TA and/or EVS display, radar altimeter, and flight instruments. The radar altimeter is to be used in conjunction with the TA system. It will be included in the pilot’s normal instrument scanning pattern for observing peak passage before following a fly down command. Pilot not flying aircraft monitors aircraft position and aircraft systems operation.

4A.**(SCA Ops)** Radar Altimeter – Set to computed initial level off altitude ___________feet (AGL) (P-CP)

Set the radar altimeter when descending through 6000 feet AGL.

WARNING

TA/SCA operation without a properly operating radar altimeter is extremely hazardous. See command directives for flight restrictions.

On training missions, continue this checklist once past the ST VFR/TA/SCA point.

5. Level Off at 800 Feet **(TA Only)** / Planned Altitude **(Non-TA Ops)** – Accomplished (P-N)

The preplaned level off altitude will be determined during mission planning. Initial level off will be accomplished at the pressure altitude, radar altitude, or terrain trace/EVS, whichever is reached first. If this level off is above the desired altitude, reevaluate the terrain using visual, TA/EVS, radar, and radar altimeter prior to continuing the descent. For flat and rolling terrain level off will be accomplished at 800 feet on the radar altimeter. For peak/ridge checks, level off at the pressure altitude which is based upon 800 feet above the designated terrain feature or point. The CP and RN will monitor level off and no response is required unless a discrepancy is detected. A lower altitude may be required for combat operations.

WARNING

- The primary duty of the pilot not flying the aircraft is to visually monitor the terrain clearance of the aircraft.
- If high terrain exists between the descent point and the level off area/feature, the navigator/radar navigator will announce the high terrain elevation to the pilot.
- If a radar shadow is unchanging, appears to lengthen, or fails to appreciably shorten with decreasing range, a dangerous condition is indicated and the radar navigator/navigator must advise the pilots.
- Due to degradation of TA system accuracy, manual tuning will not be used during actual TA operations.
- For all peacetime low level operations at night, confine descent rates to 1500 fpm or less while descending to TA altitudes and during actual TA operations.
- Commence an immediate climb to a safe altitude if any distraction is noted during any phase of low level operation.

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

⑥ AUTOPILOT – ALTITUDE HOLD (P/CP)

If turbulence prohibits the use of “Altitude Hold” but is not of such magnitude to require discontinuing low level operation, use the autopilot low level mode.

WARNING

The trim condition of the aircraft should be closely monitored during the TA compensation check. In the event of automatic trim system failure, large amounts of stabilizer trim can be compensated for by the autopilot. This can result in severe pitchdown or pitchup when either a change in attitude or power setting causes an automatic disconnect or when a manual disconnect is accomplished. To minimize the effect of an automatic trim system failure, the fore and aft position of the control column should be closely monitored. If several units of nosedown stabilizer trim and aft position of the control column are detected while flying with autopilot altitude hold engaged, be aware that autopilot disengagement by any means will cause abrupt pitchdown unless proper preventive steps are taken.

7. Low Altitude Calibrate – Accomplished (RN)

Accomplish a low altitude calibration over terrain of known elevation while in level flight. In mountainous terrain, calibration may not be possible until crossover of the selected terrain feature upon which level off was based. In this case, proceed with the checklist and update at crossover.

8. Radar Altimeter Cross-Check – Accomplished (P-N); Pressure altimeter set (P-CP-N)

The navigator will state terrain elevation. The pilot and copilot will then compare the sum of the radar altimeter indication and the terrain elevation to the pressure altimeter reading. The radar navigator and navigator will make similar comparisons of their instruments including the OAS HA value. Once the comparisons are complete the pilot and navigator will respond “Accomplished (P/N)” or with any noted discrepancy, if applicable. The copilot and radar navigator need only respond if a discrepancy is present and not acknowledged by either the pilot or navigator. Training: Make a note of the difference between the systems and write up equipment malfunctions, as required. Combat: Set computed true altitude in the pressure altimeter.

⑨ **(TA Only)** Stabilization Modes Compared – Stab modes check complete (P/CP)

NOTE

- The TA stabilization modes comparison and TA correlation will only be accomplished in a designated TA evaluation area.
- If ALTER/NAV is used as the prime NAV model and the doppler is off or unreliable, only FRL and HOR need to be compared. FVR will not receive stabilization information.
- The stabilization mode comparison is accomplished to check the FVR, FRL, and HOR (ground align) modes. The stabilization modes comparison may be accomplished separate from the FRL/FVR compensation, unless this portion of the check is being accomplished in a mountainous designated TA evaluation area at night.

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

- For night operations, a peak/ridge TA stab modes comparison and TA correlation is required prior to descent for the FRL/FVR compensation if the designated TA evaluation area is mountainous.
- For operations in mountainous areas, (day or night) a stab modes comparison and FRL/FVR compensation is not required when the TA system has been previously compensated by either flat and rolling or peak/ridge methods.
- If time and/or conditions do not allow the necessary compensation procedure to be accomplished prior to commencing the bomb run, see command directives for guidance.
- The pilot will pass all readings to the navigator during this check for recording.
- The radar navigator is responsible for monitoring terrain beyond the range selected on the pilot's EVS monitors, and will advise the pilot of hazardous terrain until the pilot is tracking the terrain on his monitors.

a. Flat and Rolling Terrain:

Select each stabilization mode and, while in each stabilization mode, adjust clearance plane until terrain trace is coincident with horizontal reference line. Record the clearance plane settings and radar altimeter readings.

b. Peak/Ridge:

(1) Comparison:

The navigator/radar navigator will advise the pilot when at 10, 6, and 3 miles. Between 9 and 6 miles, select each stabilization mode and, while in each stabilization mode, adjust the clearance plane until the terrain trace is coincident with the horizontal reference line. Record the clearance plane settings and the radar altimeter readings at crossover.

(2) Correlation:

At 6 and 3 miles, select the corresponding profile range gate and FRL stabilization mode, with the clearance plane set to 800 feet. Without further clearance plane adjustments, correlate the actual terrain trace, EVS presentation, and radar altimeter crossover. This procedure should provide the pilots with a measure of confidence in the reliability of the terrain trace. For instance, a falling terrain trace could indicate a positive tilt error, while a rising trace could indicate a negative tilt error. Additionally, a rapidly changing trace may indicate a large tilt error. Also see PEAK METHOD under TA SYSTEM OPERATIONAL CHECK, T.O. 1B-52H-1, Section I.

10. Autopilot – LOW LEVEL (P/CP)

11. **(TA Only)** Profile 3 – Selected (P/CP)

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

12. **(TA Only)** Clearance Plane Set to TA Altitude ____________Feet – Set ____________Feet (P/CP)

WARNING

- In profile 3, the clearance plane will never be set to more than 1000 feet.
- The clearance plane will never be set to a value less than 200 feet.

13. Radar Altimeter – Set ______________feet (P-CP)

To avoid nuisance flashing of the EVS radar altitude indicator, the cursor may be set up to 100 feet lower than the clearance altitude being flown. The actual setting will be based on crew judgement and altitude. The cursor will not be set below 200 feet for TA/SCA operations.

⑭. **(TA Only)** FRL Compensation – Accomplished (P-RN)

Tilt error compensation can only be accomplished using data collected in FRL stabilization mode. Fly the aircraft to establish the terrain trace coincident with the HRL. Compare the radar altimeter reading and clearance plane setting over flat and rolling terrain or peak/ridge crossing radar altimeter reading and clearance plane setting over mountainous terrain. If a difference between the radar altimeter reading and clearance plane setting exists, then proceed with one of the applicable following steps to adjust the FRL angle:

WARNING

- Large altitude errors can occur while maintaining the terrain trace coincident with the HRL if the airspeed or gross weight changes without resetting the FRL angle. If the airspeed increases or the gross weight decreases and the FRL angle is not changed, the aircraft will climb to a higher radar altitude. If the airspeed decreases and the FRL angle is not changed, the aircraft will descend to a lower radar altitude.
- If a TA system has excessive negative tilt, the terrain trace may initially command a descent well below the briefed radar altitude as the pilot is maintaining the terrain trace coincident with the HRL. If the terrain trace is obviously commanding an altitude below the briefed radar altitude, the pilot will level the aircraft and direct that the FRL angle be moved toward the positive until the terrain trace is coincident with the HRL. The pilot will then continue with the FRL compensation.
- If tilt compensation value exceeds 2 degrees, discontinue the FRL compensation and do not use FRL mode.

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

NOTE

- Each degree of FRL angle change usually results in 100 to 250 feet of altitude change after the terrain trace is reestablished on the HRL.
- Do not move the FRL angle in increments in excess of 1 degree at a time.
- An FRL/FVR compensation can be accomplished by making FRL angle/clearance plane adjustments based upon a series of peak/ridge crossings or over flat and rolling terrain. While a flat and rolling compensation may be easier to accomplish, adjustments to the FRL angle/clearance plane may be required if the terrain overflown changes from mountainous to flat and rolling or from flat and rolling to mountainous.
- The radar navigator will be responsible for monitoring altitude and position during the TA compensation checks.
- The radar navigator is responsible for monitoring terrain beyond the range selected on the pilots' EVS monitors. The radar navigator will alert the pilot when approaching the preselected compensation check area and will make a 10-mile range call. On peak compensation checks, the radar navigator will also make calls at 6 and 3 miles.
- If time and/or conditions do not allow the necessary compensation procedures to be accomplished prior to commencing the bomb run, see command directives for guidance.

a. Radar Altitude Greater Than the Clearance Plane Setting – Move the FRL angle_________ degrees toward the negative.

The pilot will instruct the radar navigator to move the FRL angle a designated increment (not to exceed 1 degree at a time) toward the negative (i.e., Pilot: "Move the FRL angle 0.5 degrees toward the negative"). After resetting the FRL angle, the terrain trace should move down slightly. The pilot will reestablish the terrain trace coincident with the HRL and once again compare the radar altimeter reading and clearance plane setting. If a difference between the radar altimeter reading and clearance plane setting exists, repeat the previous steps, as necessary. The navigator will note the number of degrees and in which direction (positive or negative) the FRL angle was moved from the chart value. The number of degrees and direction the FRL angle was moved from the chart value is the correction value and will be applied to all computed chart value FRL settings (i.e., Chart value FRL setting was +0.2 degree. The FRL angle was moved to a final setting of –1.1 degrees. The FRL angle was moved 1.3 degrees toward the negative, so 1.3 degrees toward the negative is the correction value). Record the final clearance plane setting, radar altitude, FRL angle, and the chart value FRL angle.

b. Radar Altitude Less Than the Clearance Plane Setting – Move the FRL angle ____________ degrees toward the positive

Use the same procedure as outlined in step a, except make the FRL angle corrections toward the positive and the terrain trace should move up slightly.

DESCENT, AFTER DESCENT, AND TA COMPENSATION (CP/N READS) (Cont)

15. **(TA Only)** FVR Compensation – Accomplished (P-N)

WARNING

If ALTER/NAV is used as the prime NAV model and the doppler is off or unreliable, do not compensate or use FVR for TA operations. The TA-EVS vector indicator light should be on in this situation.

Switch to FVR mode and fly the aircraft to establish the terrain trace coincident with the HRL. Adjust the clearance plane setting to fly the desired clearance plane altitude. If the clearance plane change exceeds 250 feet, discontinue use of FVR and return to FRL. Record the clearance plane setting and radar altitude.

WARNING

- If a TA system has excessive negative tilt, the terrain trace may initially command a descent well below the briefed radar altitude as the pilot is maintaining the terrain trace coincident with the HRL. If the terrain trace is obviously commanding an altitude below the briefed radar altitude, the pilot will level the aircraft and lower the clearance plane until the terrain trace is coincident with the HRL. The pilot will then continue with the FVR compensation.
- The clearance plane will never be set to a value less than 200 feet.
- In profile 3, the clearance plane will never be set to more than 1000 feet.
- Use of horizontal stabilization mode (HOR) is restricted to the stabilization modes check for peacetime TA flight operations. During combat, HOR will only be used for TA operations when FRL and FVR modes are inoperative or unreliable. HOR system limitations must be strictly observed when HOR must be used for TA flight.

NOTE

- If the terrain trace commands a fly up when FVR s selected (as opposed to FRL), then it may not be possible to adjust the clearance plane sufficiently to fly combat altitudes when in FVR mode. In this case, it is recommended that FRL mode be used.
- The pilot will notify the navigator prior to reselecting FRL on the stabilization reference selector switch to ensure the FRL angle is reset.

CLIMB AFTER LOW LEVEL

1. AVTR Mode Select Switch – STBY (as required) (RN)
2. 12,000 Foot Oxygen Check – Completed (EW-RN-P/CP)
3. Altimeter – Set 29.92 (P-CP-N)

WITHDRAWAL

Accomplish when departing enemy territory.

1. Walkway Lights Circuit Breakers – In (RN)
2. Personal Locator Beacon Lanyard – Notify crew to set as required (N)
3. Exterior Lights – As required (P)

BEFORE DESCENT

1. ***[TP]*** TGP – Stowed (RN)

   Select STRIKE/TGP ON, the TGP stows indicating STRIKE/STBY.

   CAUTION

   TGP will remain stowed during taxi, takeoff, approach to landing and landing. Failure to stow the pod during these conditions could cause FOD damage to the Forward Section. Ensure TGP power status indicates STBY or STBY.

2. FLIR/STV Mode Switches – OPR (RN)

   If FLIR was turned OFF, it may not be in a ready state for up to 20 minutes.

3. EVS Video Select Switch – FLIR/STV (RN-N)

   The radar navigator and navigator should monitor opposite sensors during penetration and for all approach and landing patterns.

4. Penetration & Approach – Reviewed (P-CP-RN-N)

   Review the planned penetration and approach. This review will include navigation aid frequencies, minimum and emergency safe altitudes, descent rates, minimums for the approach to be flown, missed approach procedures, and aerodrome sketch. As a minimum the pilot flying the approach will brief the crew on the descent rate, MDA/DH/VDP and missed approach procedures for the planned approach. Lost communications procedures will be coordinated if required. During the descent and approach, other crewmembers will back up the pilot flying and report any deviation from prescribed procedures.

5. Radar Frequency – As required (RN)

   Re-tune the radar frequency to the high end or low end of the frequency band to avoid PAR interference.

6. **DL** AFSATCOM Control – MILSTAR Mode selected (as required) (N)

7. **DU** DAMA Modem – End Call (N)

   a. 25K DAMA – Selected

      From the TOP menu, press the <3> (25k DAMA) key, then the <ENTR> key.

   b. AC Ops – Selected

      Press the <2> (AC Ops) key, then the <ENTR> key.

   c. End Call – Selected

      Press the <5> (EndCall) key, then the <ENTR> key.

BEFORE DESCENT (Cont)

d. Port to Disengage – Entered

At the prompt: (EndCall:>_), press number of the port to disengage, then the <ENTR> key. Press either the <0> or <1> key to select the port to terminate the connection on, usually Port 0. Some non-critical messages will be displayed, such as ReqstQuedatTermin and CallCmpleteReqstInitd. The messages will complete with the Pt 0 Discn Modem Critical Message. After pressing the <ACK> key twice, the Pt 0 Call Ack Modem Critical Message will be displayed. Press the <ACK> key twice again to clear the message.

8. **DU** DAMA Modem – Stop Mode (N)

a. 25K DAMA – Selected

Press the <3> (25k DAMA) key, then the <ENTR> key.

b. AC Ops – Selected

Press the <2> key (AC Ops), then the <ENTR> key.

c. Stop Mode – Selected

Press the <1> (StopMode) key, then the <ENTR> key.

d. Stop Mode – Confirmed

Press the <1> (Confirm) key and the <ENTR> key to initiate Stop Mode. When disconnected from the 25K DAMA network the 25KEXIT/SltsDisCon non-critical message will be displayed. Press the <ACK> key to clear the message. Now the ARC-210 radio can be used for UHF/VHF/VSAT purposes.

9. **DU** DAMA Modem (N)

a. ZEROIZE/NORM/BATT SAVE Switch – ZEROIZE

Toggling the ZEROIZE/NORM/BATT SAVE switch on the RCU front panel to ZEROIZE will zeroize all COMSECTRANSEC crypto-key variables. The alarm message, ZERO, is annunciated.

b. ZEROIZE/NORM/BATT SAVE Switch – BATT SAVE

Toggling the ZEROIZE/NORM/BATT SAVE Switch to BATT SAVE deletes key variables and saves on MD-13333 DAMA modem battery life.

CAUTION

Monitor the low airflow warning lights. If necessary, request that power be advanced on at least one engine (usually No. 4) to keep the cabin low airflow lights out.

1. Best Flare Speed – Computed and cross-checked with copilot (N/RN)

   This item will be re-accomplished during the approach and landing phase and for all subsequent approaches and landings (see figure 2-3).

2. Altimeter – Set (P-CP-N)

   Reset altimeter to station pressure immediately prior to initiating penetration or upon passing through transition altitude. When mission requirements dictate and current altimeter setting is not available, compute an altimeter setting using metro or inflight “D” values.

3. Initial Point – Made good (RN)

   The radar navigator will coordinate with pilot in monitoring or directing aircraft path to the VOR station or any other reference point to be used for initiating the penetration, arriving over the point on the desired heading for initial descent.

4. Penetration – Initiated (RN)

   Upon reaching point of initial penetration, the jet penetration as published in the Flight Information Publication will be initiated. Monitor or direct aircraft path over the ground and advise the pilot of any deviation from published penetration.

5. Crosshair – Positioned (RN)

   Place crosshair on the approach end of runway. Monitor aircraft path over the ground and advise pilot of any departure from prescribed penetration.

6. FLY-TO + – Entered (RN)

   Accomplish each time crosshairs are moved.

7. Traffic Pattern – Monitored or directed (RN-N)

   Monitor or direct the aircraft throughout the approach pattern being flown, advising the pilot of any deviation noted or discrepancies between the approach and airborne radar. Navigator will monitor altitude throughout the pattern.

8. FCI – Available on final approach (RN)

   Upon completing the turn onto the final approach, the radar navigator will reposition the crosshair on the approach end of the runway. If it is a directed approach, the FCI and time-to-go indicator will be used to make the final approach. If it is a monitored approach, the FCI and time-to-go indicator may be cross-checked by the pilot to determine progress on final approach.

9. Final Descent – Initiated (RN/N)

   The descent phase normally will be commenced when ground range is 8 NM from approach end of runway. Altitude should be checked at 100 seconds (1000 feet above runway) and 60 seconds (600 feet above runway). The time-to-go indicator will read zero when the aircraft is approximately 1000 feet down the runway.

Best Flare Speed (Knots IAS) Computation Table

GROSS WEIGHT	FLAPS DOWN 100%	
	BEST FLARE SPEED (AIR BRAKES NO. 4)	MINIMUM TOUCHDOWN
175,000	109	97
180,000	110	98
185,000	112	100
190,000	113	101
195,000	115	102
200,000	116	104
205,000	118	105
210,000	119	106
215,000	121	107
220,000	122	109
225,000	123	110
230,000	125	111
235,000	126	112
240,000	128	114
245,000	129	115
250,000	130	116
255,000	131	117
260,000	133	118
265,000	134	119
270,000	135	120
275,000	136	121
280,000	138	122
285,000	139	124
290,000	140	125
295,000	141	126
300,000	142	127
305,000	144	128
310,000	145	129
315,000	146	131
320,000	147	132
325,000	148	133
	BEST FLARE AIRBRAKES NO. 1	
330,000	137	134
335,000	138	135
340,000	140	136
345,000	141	137
350,000	142	138
355,000	143	139
360,000	144	141
365,000	145	142
370,000	146	143
375,000	147	144
400,000	152	146
425,000	156	151
450,000	161	155

Figure 2-3

CAUTION

Monitor the low airflow warning lights, turn equipment off if necessary.

1. Ejection Control Trigger Ring – Stowed (RN-N)
2. Pin No. 1 – Installed (RN-N)
3. Radar Standby Button – Pressed (RN)
4. STV Mode Switch – STBY (as required) (RN)

   Place the mode switch to standby during periods of darkness to avoid damage to the camera assembly.

CAUTION

Point sources of high intensity illumination, relative to the overall scene illumination, which remains stationary within the field of view of the STV, may cause damage to the STV camera assembly. During operation on the ground, precautions should be taken to eliminate stationary sources of high intensity illumination (ramp lights, reflections from objects, vehicle head lights, etc) from within the field of view prior to continued operation of the STV in the operate mode. The camera assembly is protected from this type of damage in standby mode.

5. ***Less [AMI]*** OAS Logoff/Shutdown: (N)

   a. CF-67 – Entered, left MFD

   It is necessary to answer shutdown and classified data erase questions within 60 seconds or it will be necessary to reenter CF-67. Do not answer question until messages are displayed on all four MFD's. This could take up to 20 seconds.

   b. Log-Off – Recorded (N-RN)

   Request radar navigator to display CF 67 on his left MFD and record approximately four frames with MFD selected on the source switch.

   c. IME Despin Status – Monitored

   When despin is complete, IME-X SHUTDOWN and LOGOFF COMPLETE messages are displayed, then followed by a blinking NO OAS DATA message on all four MFDs. The blinking NO OAS DATA message may take up to 20 seconds to be displayed.

   d. Classified Data Erase (if required) – Monitored

   The number 7 will appear in RES PGM windows A, B, and C on the computer control panel and CLSF DATA ERASED message followed by NO OAS DATA message is displayed.

AFTER LANDING (Cont)

5. ***[AMI]*** OAS Logoff/Shutdown: (N)

   a. CF-67 – Entered, left MFD

      SHUTDOWN FCP? YES/NO message is displayed.

      (1) SHUTDOWN FCP? – Select YES on IKB

      ERASE CLSF DATA? YES/NO message is displayed after YES is selected.

      (2) ERASE CLSF DATA? – Select YES on IKB, as required.

NOTE

If no response is entered within 120 seconds (or NO is selected), FMS termination will be performed without erasing classified data.

   LOGOFF IN PROG followed by LOGOFF COMPLETE message is displayed. The Declassification Status Display will then be displayed on all four MFD when declassification begins and will remain on after classified data is erased from the ACU.

   b. Log-Off – Recorded (N-RN)

   Record approximately four frames with MFD selected on the source switch.

   c. Classified Data Erase (if required) – Monitored

   DECLASS IN PROGRESS followed by DECLASS COMPLETE messages are displayed on the Declassification Status Display for each device (ACU A & B, DTR 1 & 2, and INU 1 & 2). The number 7 will appear in RES PGM windows A and B on the computer control panel. Finally, a blinking NO OAS DATA message is displayed in the OAS Advisory Data Area of the display.

6. APN-69 Power Switch – OFF (N)

7. APN-69 Pressurization Switch – OFF (N)

8. ***[TP]*** TGP Shutdown: (RN/N)

   a. Faults – Checked and recorded

   b. TGP Power – OFF

   c. TGP Monitor Power – OFF

9. GPS Power: (N)

   a. GPS ZEROIZE – Complete (if required)

   If required, press the GPS ZEROIZE pushbutton to zeroize GPS crypto data. When NO KEY is displayed on the PKB, the data has been zeroized. Following normal procedures, the data should have been zeroized during OAS Logoff/Shutdown.

   b. GPS ZEROIZE Pushbutton – Deselect

   The GPS ZEROIZE pushbutton when pressed latches pressed in. Press GPS ZEROIZE pushbutton a second time to unlatch the switch and allow the pushbutton to return to its unselected position.

   c. GPS/IU Power Pushbutton – Pressed, light off

AFTER LANDING (Cont)

10. **DL** AFSATCOM Terminal: (N)

a. MILSTAR LOGOUT – Complete (if required)

If operations have been conducted in MILSTAR, the Net Controller must be made aware that you have exited the net.

NOTE

- The term “logout” means that the modem is leaving the network and discontinuing uplink (transmit) processing. However, the modem continues to perform downlink (receive) processing.
- Once logout is initiated, there is no cancellation available. To log back into the network, the operator must restart MILSTAR mode from the Top Menu and reacquire the uplink.

(1) Top Menu – Display

(2) With cursor (>) at REVIEW, press [SEL] key – Pressed

Press the [SEL] key until the ACTIVE option is shown.

(3) [SHFT] then [ENTR] keys – Press

Press the [SHFT] then [ENTR] keys to review the MILSTAR parameters.

(4) NETWORK LOGOUT parameter – Selected as active parameter

Move the cursor down to NETWORK LOGOUT parameter using the [↓] key.

(5) ENBL – Selected

Change the parameter to ENBL using the [SEL] key.

(6) [SHFT] then [ENTR] keys – Press

The display returns to Top Menu with MILSTAR as the ACTIVE mode and a MILSTAR STATUS preempt message LOGOUT OK exhibited.

(7) [SHFT] then [CLR] keys – Press

Observe that for MILSTAR STATUS, the TX status changes to NO LOG to indicate that logout has occurred.

b. Control Indicator Panel – OFF

c. Printer Power Switch – OFF

AFTER LANDING (Cont)

10. ***Less*** **DL** AFSATCOM Terminal: (N)
    - a. Sync Code – Cleared
    - b. Channel Select Data – All
    - c. AFSATCOM Control Mode Selector – OFF
    - d. Address – Set 000
    - e. Printer Power Switch – OFF
11. MRT Remote Control Unit: (N)
    - a. ZEROIZE Switch – Pressed
    - b. PWR ON/STBY Switch – STBY

AFTER PARKING

1. OAS Master Power Switch – OFF (N)

CAUTION

- Do not turn OAS master power switch OFF nor turn aircraft ac power off prior to receipt of IME-X SHUTDOWN and NO OAS DATA messages since equipment damage may occur.
- The OAS, radar, and all EVS subsystems should be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

2. Doppler Mode Switch – OFF (N)

3. **DJ** UHF Line of Sight (LOS) Radio – OFF (N)

4. **DU** KY-100 Secure Voice System Shutdown: (N)

a. KY-100 PRESET Switch – MAN

NOTE

Normally, all KY-100 key fills are zeroized using the Z ALL (Zeroize ALL) MODE control switch position. If selective ZEROIZE is used, ensure all keyfill positions are zeroized after flight or proper security is available to safeguard loaded keyfills once the flight crew departs the aircraft.

b. KY-100 MODE Switch – OFFLINE

(1) ZEROED – Displayed in menu window

With ZERO displayed, press the INIT button. The display will indicate ZERO n, with the n flashing. n indicates the currently selected key location to be zeroized.

(2) Up Arrow or Right Arrow Pushbutton – Pressed (until key location to be zeroized appears in the display)

(3) KY-100 INIT Button – Pressed

A flashing ZERO n will be displayed.

AFTER PARKING (Cont)

(4) KY-100 INIT Button – Pressed

The display will go blank while the key zeroizing processing is performed. Upon completion of a successful key zeroizing, a pass tone will be heard and the display will indicate ZEROEd n, where n equals the key location.

NOTE

To zeroize additional key locations, wait until the display indicates ZERO n (with n flashing), then repeat steps (2) through (4).

(5) KY-100 MODE Switch – As desired (out of OFFLINE)

NOTE

The Z ALL (Zeroize ALL) MODE control switch position is active even when primary power is removed from the KY-100. Setting the switch to Z ALL will erase all keys stored in the KY-100. Once zeroized, only plaintext (PT) operation is permitted.

c. KY-100 MODE Selector Switch – Z ALL (pull out)

All keys stored in locations 1, 2, 3, 4, 5, 6 and U will be erased. If the KY-100 power is on when the erase procedure is performed, 1) ZEROEd will be displayed and a tone will be heard; and 2) PUSH INIT will then be displayed, prompting the user to perform cold start procedures.

d. KY-100 DSPL & PNL Switches – OFF

Rotate fully counterclockwise to the OFF positions.

e. KY-100 PRESET Switch – PWR OFF

The fill battery installed in the KY-100 will retain all keys, interface parameter settings and PRESET on-line modes when primary power is turned off.

f. Z-AVH RCU DISP & PNL Controls – OFF (CP)

Rotate fully counterclockwise to the OFF positions.

g. Z-AVH RCU PRESET Switch – PWR OFF (CP)

5. Inform Radar Navigator – OAS off (N)

6. FLIR Control Panel: (RN)

   a. Contrast and Bias Knobs – CCW

   b. Mode Select Switch – OFF

7. STV Control Panel: (RN)

   a. MLC Gain Control – OFF

   b. Mode Switch – OFF

8. EVS Video Select Switch – OFF (RN-N)

AFTER PARKING (Cont)

9. Antenna Speed Switch – OFF (RN)

10. Radar Power Switch – OFF (RN)

11. Ground Blowers Switch – OFF (RN)

12. Bomb Indicator Lights Switch – Off (RN)

13. EVS Environmental Power Switches – OFF (RN)

14. MRT Receiver: (N)

a. Transfer Module CLR ZEROIZE Indicator – White

If CLR ZEROIZE indicator is not white, press the ZEROIZE switch on the transfer module. The CLR ZEROIZE indicator turns white. If the indicator is still black, proceed to the next step.

b. Transfer Module Handle PUSH – Pressed

c. Transfer Module – Removed

If CLR ZEROIZE indicator was black, it turns white.

NOTE

Removal of the transfer module from the MRT receiver zeroizes the cryptographic variables only, the transfer module retains the classified mission data until cleared by the transfer module service set. Return the transfer module to the combat crew communication center for clearing of mission data.

d. Transfer Module Closeout Panel – Removed from storage and installed

15. AVTR Remote Control Unit: (RN-N)

a. Mode Select Switch – STBY

b. AVTR Cassette – Removed (N)

If EOT light is not on, press the tape unthread button on the video recorder, then press the cassette remove button, remove cassette, and close tape loading door.

CAUTION

The RCU Mode Select must be in STBY and the TAPE unthreaded prior to tape cassette removal.

c. Power Switch – OFF

Ensure navigator has removed video tape cassette prior to placing power switch OFF.

AFTER PARKING (Cont)

16. Inform Pilot – Radar, EVS, and OAS off (RN)

CAUTION

> The OAS, radar, and all EVS subsystems should be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

17. Both Radar Pressure Pump Control Switches – OFF (N)

18. ***Less [AMI]*** DTUCs – Removed (N)

18. ***[AMI]*** DTC(s) – Removed (N)

19. DDLC – Removed (N)

20. Ejection Seat – Position forward and up (RN-N)

21. **DL** TSM – Removed (if installed) (N)

    Remove the TSM and place in carrying case.

    a. CI OFF – Confirmed

    b. TSM Cover – Open

    c. TSM – Remove

    d. TSM Cover – Closed and latched

CAUTION

- The TSM is an electrostatic discharge (ESD) sensitive device. To avoid equipment damage, be sure to follow all ESD procedures when handling, installing, or removing the TSM.
- When transporting the TSM use the container provided. To avoid equipment damage, do not touch the connector pins on the rear of the module when handling, installing or removing the TSM. Use the ring on the front of the module when installing and/or removing the TSM.

22. FWD IFC Circuit Breaker – Out (RN)

    The forward IFC circuit breaker supplies forward battery power to the DCU-238/A. Leaving this circuit breaker in will deplete the forward battery.

AFTER PARKING (Cont)

23. PIHM Assembly – Disconnect (as required) (RN-N)

    a. PIHM Manifold – Disconnect

    Disconnect the manifold from the CRU-60/P bracket located on the parachute harness.

    b. Emergency Oxygen Hose – Disconnect

    Disconnect the emergency oxygen hose from the fitting on the manifold.

    c. Oxygen Regulator Emergency Toggle Lever – EMERGENCY

    d. Crossover Valve – Horizontal

    e. Modification Kit Hose – Disconnect

    Disconnect modification kit hose from the ventilation inlet hose on the PIHM manifold.

    f. Blower Hose – Disconnect

    Disconnect the blower hose from the modification kit hose assembly, and remove from the strap assembly attached to the overhead floor beam.

    g. Aircraft Oxygen Hose – Disconnect

    While holding breath, disconnect the aircraft oxygen hose from the QD pigtail adapter.

WARNING

> Hold breath until step h. is complete. This will preclude the inhaling of toxic chemicals during the changeover from blower air to the aircraft oxygen system.

    h. Blower Hose – Connect

    Connect blower hose to the QD. Resume breathing.

    i. Oxygen Regulator – OFF and 100% OXYGEN

    j. PIHM Communication Cord – Disconnect

    Disconnect PIHM communication cord from the aircraft communication cord.

    k. Intercom Unit – Connect

    Connect the intercom unit to the PHIM communication cord.

    l. Blower Electrical Connector – Disconnect

    Disconnect the blower from the blower electrical receptacle and replace the receptacle dust cover.

    m. Blower – Remove

    Remove the blower from the aircraft mounting bracket.

AFTER PARKING (Cont)

24. Oxygen System: (RN-N)

    a. Regulator – OFF and 100% OXYGEN

    b. Supply Hose Interphone Cord – Stowed

25. External Power Application – Monitored, (with weapons aboard, ensure external power is not applied until weapons safety pins are installed) (RN-N)

WARNING

External power will not be applied until shackle locking pins, MER/MAU-12 rack lock pins and MER electrical safety pins for each shackle/rack/weapon have been installed. (RN/N perform if qualified personnel are not available.)

NOTE

When conventional missiles are onboard standard safeing procedures for the weapon suspension system (shackles/racks/electrical safety pins) will be accomplished. When additional safeing procedures unique to that missile must be accomplished, they will be listed in the AFTER PARKING checklist for that missile.

26. Interphone – Disconnected after engines off (RN-N)

27. Video Recorder Magazine – Removed (RN)

28. Nuclear Bombs Aboard – Accomplish GROUND SAFEING checklist (T.O. 1B-52H-25-2CL-1) (weapons load team not available) (RN-N)

29. Missiles Aboard & Qualified Personnel Not Available – Accomplish MISSILE GROUND SAFEING checklist per applicable weapon manual (N/RN)

ALERT PROCEDURES

table of contents **page**

ALERT PROCEDURES (SIOP)

The normal checklists in this section are designed to permit use during alert. The additional checklists in this section are used in situations peculiar only to the alert cycle. Any time bombs/missiles are aboard, the normal two-person policy will be observed. After maintenance has declared an aircraft ready for alert and the bombs/missiles have been loaded, the aircrew will conduct an initial acceptance check. When the aircrew declares the aircraft ready for alert and the aircraft is on the alert line, it will be placed in a “cocked” configuration. The daily alert preflight will be accomplished once each 24 hours, normally at a predesignated time.

A fully loaded CSRL mated to an aircraft does not provide the crew the ability to accomplish a complete weapons preflight. Timers, baro settings, and other required preflight items are not readily accessible to the aircrew. As a result, the following procedures will be used. The munitions maintenance load team will load the weapons loaded CSRL and complete all required checks up to and including the post load check. During the post load check, the Wing Air Weapons Officer, the alternate Wing Air Weapons Officer or a designated representative (must be certified by the air weapons officer) will be called to the aircraft. These individuals will perform a weapons preflight, examine the general condition of the bomb bay, preflight the CSRL, its associated equipment, and will verify the quantity and types of weapons and the launcher number. After completing checks and preflight the individual accomplishing the required checks will make the following entry into the AFTO Form 781: A complete weapons and bomb bay preflight has been accomplished. Weapons status and settings have been verified. Upon arriving at the aircraft, the aircraft commander will check the AFTO Form 781 to ensure the required entry is in the forms. The aircrews will conduct a check of the general condition of the bomb bay, preflight the CSRL and validate the launcher number, then validate the correct number and types of weapons. During engine runs, the radar navigator will monitor the status of the weapons through Format 7. The Command Post will then be notified that the aircraft is ready to be “cocked” on alert.

During crew changeover, the BEFORE EXTERIOR INSPECTION (POWER OFF) checklist will be accomplished by the new crew. The AGM-86B EXTERIOR INSPECTION/AGM-129 EXTERIOR INSPECTION/EXTERIOR INSPECTION (BOMB BAY INTERIOR) checklist (as applicable) may be deferred until after alert force exercise when engines are started.

INSTRUCTIONS

When assuming alert duty, the pilot and copilot will check that the flash blindness goggle case seal is not broken and the cases positioned where they are readily available. Monocular eyeshields for remaining crewmembers will be positioned where they are readily available.

Security

Entrance to the designated “No Lone Zone” of a “cocked” configured aircraft will be in accordance with command directives.

Maintenance While On Alert

At any time while the aircraft is cocked, if a requirement exists to refuel (except external wing tanks), the aircrew will uncock the aircraft using the UNCOCKING checklist. Normal servicing requirements for water, oxygen, hydraulics, or pneumatics, which do not require access to the cockpit, may be accomplished on a cocked aircraft. Maintenance may be performed without uncocking, provided force timing is not degraded, power is not placed on the aircraft, access to the cockpit or bomb bay area is not required, and no electrical component is involved. When the aircraft is uncocked for maintenance refueling and the maintenance/refueling is completed, the aircraft will be recocked by the alert crew using the EXTERIOR INSPECTION checklist as applicable, INTERIOR INSPECTION checklist, and BEFORE STARTING ENGINES checklist. If other than the alert flightcrew personnel have had access to the bomb bay and or missiles during the required maintenance, the navigator’s BEFORE EXTERIOR INSPECTION and the bomb preflight and/or missile preflight inspections must also be completed.

NOTE

If the aircraft has been towed for tire rotation, etc, ensure that the ground locks and bypass keys are removed upon completion of the towing operation.

Radar Navigator and Navigator Procedures

1. AIRCRAFT AND WEAPONS ACCEPTANCE.

   a. Before Exterior Inspection.

   b. Exterior Inspection. This includes the applicable weapons preflight.

   c. Interior Inspection.

   d. OAS, EVS, and Radar Turn-On (Aircraft Power and Cooling Air Available).

   e. Before Takeoff (Navigator Only).

NOTE

- OAS, EVS, AND RADAR TURN-ON and BEFORE TAKEOFF checklists should be accomplished during the pilots, STARTING ENGINES AND BEFORE TAXIING checklist as soon as aircraft power and cooling air is available.

- Do not apply power to the IMEs during aircraft acceptance unless the IMEs were inoperative during the aircraft's last flight and maintenance ground testing has not been accomplished.

- This completes the cocking procedure for the radar navigator and the navigator. If the aircraft is uncocked for maintenance or refueling, it will be recocked using the appropriate portions of the EXTERIOR INSPECTION and the entire INTERIOR INSPECTION, and appropriate portions of the OAS, EVS, AND RADAR TURN-ON and BEFORE TAKEOFF checklists.

2. SCRAMBLE. Accomplish the appropriate SCRAMBLE checklist. Upon completion of alert scramble procedures, the navigators may recock the aircraft using their RECOCKING checklist.

NOTE

Accomplish appropriate items of the OAS, EVS, RADAR TURN-ON and BEFORE TAKEOFF checklists when time permits following Scramble and Takeoff operations.

3. DAILY ALERT PREFLIGHT. There are no specific items that are to be accomplished by the radar navigator or navigator other than those called for by the copilot on his DAILY ALERT PREFLIGHT checklist.

4. UNCOCKING. Accomplish the UNCOCKING checklist.

SCRAMBLE (RN)

1. EVS Turn-On (Immediately After Aircraft Power On and Stabilized):
    a. EVS Environmental Power Switches – ON
    b. FLIR Mode Select Switch – STBY
    c. EVS Video Select Switch – STV
    d. STV Mode Switch – OPR

    To improve video presentation, turn Brightness knob on MFD clockwise until desired display is obtained. An optional way to improve video presentation is to set the MLC GAIN indices 180° from OFF (detent), and then open IRIS until desired display is obtained.

2. Radar Turn-On (Cooling Air Available):
    a. Ground Blowers Switch – ON
    b. Antenna Speed Switch – Checked OFF
    c. Radar Power Switch – ON

CAUTION

The rate switch on the radar control test panel must be OFF prior to turning the radar power switch ON or damage to the radar receiver-transmitter can occur.

    d. Antenna Speed Switch – As desired

CAUTION

The antenna speed switch will remain OFF for 1 minute after application of radar power to allow the antenna position programmer to search and electronically establish its position with the antenna. Any random movement of the antenna while the antenna position programmer is searching may cause equipment damage.

    e. Receiver Tune Switch – AUTO

3. Video Recorder Mode Switch – AUTO (combat only)
4. EVS Video Select Switch – FLIR (if applicable)
5. AVTR Power Switch – ON (combat only)

SCRAMBLE (RN) (Cont)

6. Radar Radiate Button – Pressed (after standby light illuminates)

Check clear to radiate prior to pressing button.

WARNING

- Ground operation of radar transmitters is prohibited when the B-52 is within 200 feet of:
  - (1) Weapons which are not fully assembled.
  - (2) Weapons to which continuity testers are connected.
  - (3) Weapons with open access doors.
- The radar should not be in radiate when the aircraft radar antenna is within 50 feet of personnel or 200 feet of any ground refueling operation or open fuel tank.
- The area in line with the radiation of a non-rotating radar antenna is hazardous to personnel. For this reason, do not stop the antenna while the radar is in radiate operation.

7. Parachute & Safety Belt – Fastened

WARNING

- Tighten the parachute survival kit attachment straps as tightly as possible to prevent the safety belt from inflicting facial injuries during ejection bailout.
- Ensure that the parachute arming lanyard is not entangled in the parachute harness. Lanyard entanglement could cause failure in seat separation and failure of the automatic features of the parachute.

NOTE

If it becomes necessary to leave the seat, the crewmember should open the safety belt and unbuckle the parachute harness, leaving the parachute and survival kit in the seat. If the parachute is worn when leaving the seat, upon returning to the seat, it will be necessary to take it off in order to reinstall the parachute and safety belt in the seat.

8. Pin No. 1 – Removed

9. Ejection Control Trigger Ring – Unstowed

10. Oxygen Regulator – As required

11. Bailout Bottle – Connected

12. Acceleration Timing – Checked (backup for navigator)

As the pilot announces “Now” at 70 knots, start the stopwatch. If navigator is unable to check acceleration timing, announce over interphone “Coming up on ______seconds” approximately 3 seconds prior to S_1 time. At S_1 time, announce “Now.”

NOTE

Accomplish appropriate items of the OAS, EVS, RADAR TURN-ON and BEFORE TAKEOFF checklists when time permits following Scramble and Takeoff operations.

RECOCKING (RN)

1. EVS:
   a. Video Select Switch – OFF
   b. FLIR Mode Select Switch – OFF
   c. STV Mode Switch – OFF
   d. Environmental Power Switches – OFF
2. Radar:
   a. Standby Button – Pressed
   b. Antenna Speed Switch – OFF
   c. Rate Switch – OFF
   d. Radar Power Switch – OFF
3. Inform Pilot – Radar, EVS, and OAS off

   Coordinate with navigator to ensure OAS power is off.

   CAUTION

   The OAS, radar, and all EVS subsystems should be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.
4. Ground Blowers Switch – OFF
5. Oxygen Regulator – OFF and 100% OXYGEN
6. Ejection Control Trigger Ring – Stowed
7. Pin No. 1 – Installed
8. Weapons Preflight – Accomplished

   For SIOP, if engines were started, accomplish checklist(s) as applicable to your sortie.

NOTE

Takeoff will not be delayed for mission data and/or SMO loading.

1. Entrance Door – Checked locked, folding hatch closed
2. PDUC Power Switch – ON (if required)
3. OAS Turn-On:

   Accomplish when aircraft power and cooling air available.

   a. OAS Master Power – ON

   b. Relays Circuit Breaker – In

   c. Processor Status Lights (A, B & ***Less [AMI]*** C) – On

      If any light is NO-GO, press all processor status lights.

   d. Processor Synchronization Switch – Pressed

4. OAS Log-On:

   a. CF-61 – Entered

   b. UTC – Entered

   c. Initial Position – Checked

   d. ***[AMI]*** CF-81 – Entered

      (1) Sortie – Select

      Select desired sortie by using CF-DF/DB commands or by using a MDFY-1 command followed by the desired sortie number and ENTER.

      (2) B-52 Mission – Load

      Use CF-81,n to select the desired mission where n is the mission number.

5. Doppler Mode Switch – LAND
6. FLY-TO-xx – Entered
7. ***[AMI]*** CF-62 – Entered (if applicable)

   a. MDFY-11 – Entered

   b. SMO Number(s) – Entered

      Enter desired SMO number for each location: LP (Left Pylon), Bay, and RP (Right Pylon). The cursor indicates which location is being loaded. Use the arrow keys to move the cursor to the desired location.

8. IME-1 & -2 Switches – ON (as applicable)

SCRAMBLE (N) (Cont)

9. EVS Video Select Switch – STV

10. APN-69 Power Switch – STBY

11. Altimeters – Set

12. Parachute & Safety Belt – Fastened

WARNING

- Tighten the parachute survival kit attachment straps as tightly as possible to prevent the safety belt from inflicting facial injuries during ejection bailout.
- Ensure that the parachute arming lanyard is not entangled in the parachute harness. Lanyard entanglement could cause failure in seat separation and failure of the automatic features of the parachute.

NOTE

If it becomes necessary to leave the seat, the crewmember should open the safety belt and unbuckle the parachute harness leaving the parachute and survival kit in the seat. If the parachute is worn when leaving the seat, upon returning to the seat, it will be necessary to take it off in order to reinstall the parachute and safety belt in the seat.

13. Pin No. 1 – Removed

14. Ejection Control Trigger Ring – Unstowed

15. Oxygen Regulator – As required

16. Bailout Bottle – Connected

17. Acceleration Timing – Checked

    As the pilot announces “Now” at 70 knots, start the stopwatch. Announce over the interphone “Coming up on _____ seconds” approximately 3 seconds prior to S_1 time. At S_1 time, announce “Now.”

18. OAS Log-On Data Completion:

NOTE

- Accomplish appropriate items of the OAS, EVS, RADAR TURN-ON and BEFORE TAKEOFF checklists when time permits following Scramble and Takeoff operations.
- Accomplish the following if time permits.

a. PTA REF – Entered

b. Month/Day/Year – Entered

RECOCKING (N)

1. ***Less [AMI]*** OAS Logoff/Shutdown:

a. CF-67 – Entered, left MFD

It is necessary to answer shutdown and classified data erase questions within 60 seconds or it will be necessary to reenter CF 67. Do not answer questions until messages are displayed on all four MFD’s. This may take up to 20 seconds.

b. Shutdown OAS Answer – YES

c. Classified Data Erase Answer – NO

d. IME Despin Status – Monitored

When despin is complete, IME-X SHUTDOWN and LOGOFF COMPLETE messages are displayed, then followed by a blinking NO OAS DATA message on all four MFDs. The blinking NO OAS DATA message may take up to 20 seconds to be displayed.

e. OAS Master Power Switch – OFF

CAUTION

- Do not turn OAS master power switch OFF nor turn aircraft ac power off prior to receipt of IME-X SHUTDOWN and NO OAS DATA messages since equipment damage may occur.
- The OAS, radar, and all EVS subsystems should be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

f. Relays Circuit Breaker – Out

1. ***[AMI]*** OAS Logoff/Shutdown:

a. CF-67 – Entered, left MFD

SHUTDOWN FCP? YES/NO message is displayed.

(1) SHUTDOWN FCP? – Select YES on IKB

ERASE CLSF DATA? YES/NO message is displayed after YES is selected.

(2) ERASE CLSF DATA? – Select NO on IKB

NOTE

If no response is entered within 120 seconds (or NO is selected), FMS termination will be performed without erasing classified data.

LOGOFF IN PROG and LOGOFF COMPLETE messages are displayed followed by a blinking NO OAS DATA message on all four MFDs.

RECOCKING (N) (Cont)

b. OAS Master Power Switch – OFF

CAUTION

The OAS, radar, and all EVS subsystems should be OFF to prevent power surge damage when switching from aircraft power to external power or if aircraft power is interrupted.

c. Relays Circuit Breaker – Out

2. Doppler Mode Switch – OFF
3. Inform Radar Navigator – OAS and Doppler off
4. EVS Video Select Switch – OFF
5. APN-69 Power Switch – OFF
6. Oxygen Regulator – OFF and 100% OXYGEN
7. Ejection Control Trigger Ring – Stowed
8. Pin No. 1 – Installed
9. PDUC Power Switch – OFF
10. Pressure Bulkhead Door – Closed, latched, locked (if required)
11. ***Less [AMI]*** RSPA Magnetic Latching Indicators – Checked

    Black is normal. White indicates the RSPA has had a built in test failure.
12. Weapons Preflight – Accomplished

    For SIOP, if engines were started, accomplish checklist(s) as applicable to your sortie.

Radar Navigator/Navigator Abnormal Operations and Malfunction Analysis section III

table of contents **page**

AFSATCOM

AFSATCOM MALFUNCTION ANALYSIS

This section presents some of the malfunctions and the corrective action required, to correct or operate around the problems. There are many things that cause malfunctions in the AFSATCOM equipment, such as heat, power fluctuations, loose connections, popped circuit breakers, blown fuses, and improper procedures. Things like satellite quiet periods and being out of satellite coverage will give indications of a malfunction, but in reality it is not. As the operator, the more you know about the AFSATCOM and how to operate it, the better you can cope with the various malfunctions.

GENERAL TROUBLESHOOTING

The most probable AFSATCOM fault an operator will observe is a message not received or a message received garbled. Some faults are random errors, which can be corrected by repeating the procedure that caused the error. Equipment warmup time of approximately 5 to 15 minutes is needed in cold weather to prevent malfunctions. Other factors that cause errors and malfunctions are outside interference, such as jamming (intended and inadvertent) and adverse atmospheric conditions. Some conditions that cause malfunctions are temporary, such as loss of signal during the banking of an aircraft.

CIRCUIT BREAKERS (CB), COAXIAL CABLES AND FUSES

You need to know the location of circuit breakers, fuses, and associated equipment before you can troubleshoot malfunctions. The malfunction checklist will refer to various circuit breakers when working malfunctions. On the right load central circuit breaker panel, there are seven 5 AMP circuit breakers and one 5 AMP circuit breaker located on the Receiver/Transmitter unit. The R/T unit is located on the floor of the B-52 upper deck, under the Mode 4 equipment. The CB on the R/T unit is recessed on the front of the R/T unit itself, next to the coaxial cable connections.

If coaxial cables are loose in any way, they can cause random equipment errors. Random equipment errors refer to BIT codes that show different errors with each test. These loose connections also will cause BIT Codes 11041 and 11042. The cables can easily and safely be secured by hand on the ground or inflight, if you shut off the AFSATCOM first.

Less **DL** The Control Power Logic Box, which is located on the floor just forward of the R/T unit, has five fuses located on the front panel. These fuses are marked; F-1, F-2, F-3, F-4, and spare (SP). They control power to the printer and keyboard units. Due to system design, F-1 or F-2 will most likely be the ones to blow. They have small power amounts applied and can be changed safely inflight without problems if you shut off the AFSATCOM first.

BIT CODE MALFUNCTIONS *Less* DL

Typical malfunctions and the corrective action procedures to clear the malfunction are shown in figure 3-1. If the malfunction cannot be cleared, attempt normal operation.

BIT MESSAGES DL

Typical BIT messages and corrective action to clear the message are contained in figures 3-2.

AFSATCOM CONTROL PANEL MALFUNCTION *Less* DL

If there is no power to AFSATCOM Control Panel, check modem circuit breaker on the right load central circuit breaker panel.

AFSATCOM CONTROL INDICATOR MALFUNCTION DL

AFSATCOM control indicator fault messages and corrective action to clear the message are contained in figures 3-3 thru 3-6.

AFSATCOM BIT Code Malfunctions

Less DL

NOTE

Status annunciators or BIT test faults detected during the initial 15 minutes of AFSATCOM operation are considered normal. Transmit and receive functions may not be reliable during this initial warmup period.

BIT	CORRECTIVE ACTION	BIT CODE	CORRECTIVE ACTION
11091, 11092 11093, 11094 11101, 11122	1. Mode Selector - OFF 2. Pull and Reset AFSATCOM DC No. 1 CB 1 [1] 3. Mode Selector to BIT and re-accomplish BIT test	33322	1. Mode Selector - OFF 2. Printer Power - OFF 3. Pull and Reset AFSATCOM A, B, and C Phase CBs [1] 4. Ensure CB on receiver-transmitter has not opened. If opened, attempt RESET [2] 5. Printer Power - ON 6. Mode Selector to BIT and re-accomplish BIT test
11041, 11042	1. (Ground Operation) Call Maintenance 2. (Inflight) Annotate malfunction in AFTO Form 781		
11021	1. Mode Selector - OFF 2. Printer Power - OFF 3. Pull and Reset AFSATCOM DC No. 1 and C Phase CBs [1] 4. Printer Power - ON 5. Mode Selector to BIT and re-accomplish BIT test	33344	1. Mode Selector - OFF 2. Pull and Reset AFSATCOM No. 2 CB [1] 3. Mode Selector to BIT and re-accomplish BIT test

[1] Located on right load central circuit breaker panel.

[2] The AFSATCOM/UHF-2 receiver-transmitter unit is located on the left equipment rack under the Mode 4.

Figure 3-1

AFSATCOM BIT Messages

DL

BIT MODE PARAMETERS

PARAMETER	DEFINITION	RANGE OF VALUES
USE	Independent – Shows the current disposition of menu and parameters being reviewed. If ACTIVE, the BIT mode becomes the primary operating mode for the Dual Modem after the operator presses the [SHFT] then [ENTR] keys. If ALTERNATE, it indicates the BIT mode has been designated as the alternate operating mode for the Dual Modem.	ACTIVE or ALTERNATE Defaults to ACTIVE

BIT MODE STATUS PARAMETERS

PARAMETER	DEFINITION	RANGE OF VALUES
REPS	Indicates the number of BIT cycles (repetitions) completed	0 thru 100000
TSTC	Indicates the test configuration (TSTC) to the modem. The status is either NORMAL (where BIT is being run in a standard terminal installation) or LOOPBCK (where BIT is being run in a maintenance or bench test set up).	NORMAL or LOOPBCK

NOTE

When running BIT, all network activity and messages are not received.

Figure 3-2 (Sheet 1 of 5)

AFSATCOM BIT Messages (Cont)

DL

POWER-UP BIT TESTS & CORRECTIVE ACTION

TEST	DESCRIPTION	MODULE TESTED	CORRECTIVE ACTION
N/A	No Display on CI. Display is “dark”.	N/A	Check the following (one at a time) and re-run power-up BIT: 1. +28 Vdc power to CI (connector J2) 2. +28 Vdc power to Modem (J1 on Modem) 3. Modem front-panel circuit breaker 4. Remove and replace CI 5. Remove and replace Modem
N/A	CI Display “freezes” at start of test. Does not appear to be progressing through power-up testing.	N/A	Do the following (on at a time) and re-run power-up BIT 1. Remove and replace Modem 2. Remove and replace CI
0	CPU Test	Processor/Memory CCA (A5)	Suspected A5 CCA in Control Indicator. Replace Control Indicator.
1	RAM Test	Processor/Memory CCA (A5)	Suspected A5 CCA in Control Indicator. Replace Control Indicator.
2	ROM Checksum Test	Processor/Memory CCA (A5)	Suspected A5 CCA in Control Indicator. Replace Control Indicator.
3	Front-Panel Display RAM Test	Front Panel Display Driver CCA (A3)	Suspected A3 CCA in Control Indicator. Replace Control Indicator.
4	NVRAM Test	Multiple Interface CCA (A6)	Suspected A6 CCA in Control Indicator. Replace Control Indicator.
5	Serial Loopback Test	Telegraph Modem Interface CCA (A4) and the Processor Memory CCA (A5)	Suspected A4 CCA in Control Indicator. Replace Control Indicator.
6	Frequency Measurement Test	Telegraph Modem Interface CCA (A4)	Suspected A4 CCA in Control Indicator. Replace Control Indicator.
7	Power Converter, Over-Temp Warning Test	Power Converter Module (PS1)	Suspected PS1 module in Control Indicator. Replace Control Indicator.
8	Power Converter, Cut-Off Warning Test	Power Converter Module (PS1)	Suspected PS1 module in Control Indicator. Replace Control Indicator.

Figure 3-2 (Sheet 2 of 5)

DL

ON-LINE BIT MESSAGES & CORRECTIVE ACTION

MESSAGE	PROBABLE CAUSE	CORRECTIVE ACTION
RT FLT	Possible fault at Radio Transceiver (RT) interface.	Replace RT (Note 1)
SYN FLT	Possible fault involves Modem phase-lock loop circuitry or the Radio Transceiver may have a faulty 1 MHz oscillator.	Replace the following items, one at a time: (Note 1) 1. Modem 2. Control Indicator 3. Radio Transceiver
I/O FLT	MILSTAR Reportback (RB) Buffer overflow. The message contained more than 160 characters. Excess characters are not transmitted.	Input from the teletype to the modem ends. No operator action required to clear preempt message from the CI display. However, operator must reformat RB and reinitiate message transmission sequence if the excess characters need to be transmitted.
LOS PMT	The Radio has been preempted for Line-of-Sight (LOS) use. Typically, in an aircraft, this is due to the pilot requiring the radio for LOS use.	LOS operation in progress. No operator action required.
MEM:FPROM FLT	When entering an operating mode, a fault was detected in front-panel ROM.	Operator clears message and replaces front panel ROM. (Note 2)
MDM12:LPRAM FLT	When entering an operating mode, a fault was detected in low-power RAM.	Operator clears message and if message persists, suspect the A12 CCA within the Modem. (Note 2) Replace Modem.
TTY FLT	When entering an operating mode, there was an unsuccessful purge of end user's I/O equipment (teletype).	Operator clears message. (Note 2) Re-initialize the teletype and modem. If problem persists, replace teletype.
TX FLT	Transmit Voltage Standing Wave Ratio (VSWR) fault	Replace the following items, one at a time: (Note 1) 1. Radio Transceiver 2. Bypass Relay 3. Transfer Relay 4. Interconnecting Cables 5. Antenna
USYN FLT	Unconditional Modem synthesizer fault.	Replace Modem. (Note 1)
CI: CNVTR FLT	Control Indicator Power supply fault.	Replace Control Indicator. (Note 1)

NOTES:

1. Preempt message clears when condition changes with or without operator action.

2. Operator can clear preempt message with or without condition changing.

Figure 3-2 (Sheet 3 of 5)

AFSATCOM BIT Messages (Cont)

DL

OFF-LINE BIT MESSAGES & CORRECTIVE ACTION

NOTE

The BIT preempt messages occur when the operator has selected the Off-line BIT mode of operation (or if Off-Line BIT mode is run as a result of a failure in Power-Up BIT). These preempt messages provide information on the Dual Modem interfaces such as the Radio Transceiver (RT) as well as the various Circuit Card Assemblies within the Modem and the Control Indicator.

MESSAGE	EQUIPMENT SUSPECTED	REMOVE AND REPLACE
CI: PROC FLT	Control Indicator Processor CCA, A5	Control Indicator
CI: DISP DRV FLT	Control Indicator Display Driver CCA, A3	Control Indicator
CI: MLT INTERFACE FLT	Control Indicator Multiple Interface CCA, A6	Control Indicator
CI: DM INTERFACE FLT	Control Indicator Telegraph Modem Interface CCA, A4	Control Indicator
CI: PWR SUP FLT	Control Indicator Power Converter Assembly, PS1	Control Indicator
CI: KEYPAD FLT	Control Indicator Keypad	Control Indicator
I/O: INPUT CHARS FOR TEST (Note 3)	N/A	N/A
LOOPBCK: CLEAR TO CONT (Note 1)	N/A	N/A
MDM2: AGC FLT	Modem Video Amplifier CCA, A2	Modem
MDM4: SYNTH FLT	Modem Synthesizer CCA, A4	Modem
MDM4: 70 MHZ FLT	Modem Synthesizer CCA, A4	Modem
MDM4: RF FLT	Modem Synthesizer CCA, A4	Modem
MDM5: LOOPBACK FLT (Note 1)	Modem Timing Interface CCA, A5	Modem
MDM5: TIMING FLT (Note 2)	Modem Timing Interface CCA, A5	Modem
MDM6: D/I FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: D/I FIFO FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: SCT NORM FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: SCT MSG FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: MSTAR NORM FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: MSTAR MSG FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: WOD MSG FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM6: PRN MSG FLT	Modem Decoder/lLSG CCA, A6	Modem
MDM7: CROM FLT B	Modem Processor Memory CCA, A7	Modem
MDM7: RAM FLT B	Modem Processor Memory CCA, A7	Modem

Figure 3-2 (Sheet 4 of 5)

DL

OFF-LINE BIT MESSAGES & CORRECTIVE ACTION (Cont)

MESSAGE	EQUIPMENT SUSPECTED	REMOVE AND REPLACE
MDM8: RAM FLT A (Note 2)	Modem Processor Control CCA, A8, or Processor Arithmetic CCA, A9	Modem
MDM9: PROC FLT (Note 2)	Modem Processor Arithmetic CCA, A9, or Processor Control CCA, A8	Modem
MDM9: PROC FLT 4 (Note 2)	Modem Processor Arithmetic CCA, A9	Modem
MDM9: CROM FLT A	Modem Processor Arithmetic CCA, A9	Modem
MDM10: PWR SUP FLT (Note 2)	Modem Power Supply, A10, or Standby Clock/ Memory Module, A12	Modem
MDM12: LPRAM FLT	Modem Standby Clock/Memory Module, A12	Modem
MDM12: LPCLK FLT	Modem Standby Clock/Memory Module, A12	Modem
MEM: FPROM FLT	Memory Unit on the Modem Front Panel	Memory Unit
RT: FLT LINE ERR (Note 4)	Radio Transceiver	RT
RT: RX FLT (Note 4)	Radio Transceiver	RT
RT: TX FLT (Note 4)	Radio Transceiver	RT
RT: KEY FLT (Note 4)	Radio Transceiver	RT
TSM FLT	Time Standard Module	TSM

NOTES:

1. This test is executed in Loopback operation.

2. Detection of these faults causes the current BIT cycle to abort.

3. This preempt message is not a fault message, but rather a prompt to the operator to test the I/O (teletype) device.

4. This test is not executed in Loopback operation.

Figure 3-2 (Sheet 5 of 5)

AFSAT Messages

DL

AFSAT I MESSAGES & CORRECTIVE ACTION

NOTE

The AFSAT I preempt messages occur during the AFSAT I mode of operation. These preempt messages typically deal with a loss of signal or synchronization as well as network channel assignment conflicts.

MESSAGE	EXPLANATION	CORRECTIVE ACTION
LOSS OF SIGNAL	Loss of signal during operation. For a more detailed explanation of this message and its causes, refer to figure 3-6.	Operator clears message and/or signal is subsequently acquired. For a list of additional corrective actions. refer to figure 3-6.
SYNCH MSG MISSED	AFSAT I Synchronization message missed. For a more detailed explanation of this message and its causes, refer to figure 3-6.	Operator clears message or another synchronization message subsequently received. For a list of additional corrective actions. refer to figure 3-6.
CHAN ASSIGN CONFLICT	**NOTE** The mode of operation cannot be entered until the channel conflict is corrected. Channel Assignment conflict. For AFSAT I mode, the invalid channels and plans are: Channels 13-39 on frequency plans A-H and J-M as well as channel 01 on frequency plans N-Q.	Operator clears message then verifies channel set up. Operator should correct parameter as necessary then re-enter the mode.
CH 1.5 LOCKOUT	Channel 1.5 lockout has occurred during operation. For a more detailed explanation of this message and its causes, refer to Figure 3-6 AFSAT I MODE PROBLEMS & CORRECTIVE ACTION, SYMPTOM #2.	Operator clears message and resets the CH 1.5 LOCKOUT parameter, if desired.

Figure 3-3 (Sheet 1 of 2)

DL

AFSAT IIM MESSAGES & CORRECTIVE ACTION

NOTE

The AFSAT IIM preempt messages occur during the AFSAT IIM mode of operation. These preempt messages typically deal with a loss of signal, crypto faults, and TSM problems.

MESSAGE	EQUIPMENT SUSPECTED	CORRECTIVE ACTION
LOSS OF SIGNAL	Loss of signal during operation. For a more detailed explanation of this message and its causes, refer to figure 3-6. RX status = NO ACQ	Operator clears message and/or signal is subsequently acquired. For a list of additional corrective actions, refer to figure 3-6.
CUR LSG WOD FAULT	Current Word-of-Day (WOD) parity check failure detected when entering AFSAT IIM mode.	Operator clears message and checks WOD values.
FUT LSG WOD FAULT	Future WOD parity check failure when entering AFSAT IIM mode or at rollover time.	Operator clears message and checks FWOD values.
TSM WOD FAILURE	WOD loaded from TSM is invalid or the TSM is installed improperly.	Operator clears message, installs TSM (as required), and re-initiates mode.
TSM FLT	During operation, the TSM data is found to be invalid.	Operator clears message and replaces TSM.

Figure 3-3 (Sheet 2 of 2)

MILSTAR Messages

DL

NOTE

The MILSTAR preempt messages occur during the MILSTAR mode of operation. These preempt messages typically deal with a loss of signal, crypto faults, EAM and FDM message acknowledgments, network assignment conflicts, and TSM problems.

MESSAGE	EQUIPMENT SUSPECTED	CORRECTIVE ACTION
LOSS OF SIGNAL	Loss of signal during operation. For a more detailed explanation of this message and its causes, refer to figure 3-6.	Operator clears message and/or signal is subsequently acquired. For a list of additional corrective actions. refer to figure 3-6.
ACK EAM REQ: xxx ACK FDM REQ: xxx	EAM or FDM message number xxx received, requesting acknowledgment. **NOTE** Message number is not printed as a part of the EAM or FDM message text.	Operator clears message, which results in the following: 1. If ACK messages are enabled, queuing and sending of an ACK message. Only one message displayed at a time, with up to 3 latest messages queued. 2. If ACK messages are disabled, the ACK message is queued, but NOT sent.
LOGIN OK	Login to network is complete.	Operator clears message.
LOGOUT OK	Logout of network is complete.	Operator clears message.
CTL CHAN FAILED	Failed frame or slot synchronization on all four channels (after control channel search is complete). This message is typically followed with an RX status of BAD CTL.	Operator clears message. Check set up and configuration for the current mission. If all parameters are correct, then there may be a problem with the MILSTAR network controller, the satellite transponder. Verify information (time and WODs) within TSM is correct.
RB CANCELLED (NC)	Reportback message in progress cancelled by network controller.	Operator clears message. Operator must reinitiate message transmission sequence if another attempt at a reportback message is desired.
RB CANCELLED (OP)	Reportback message in progress cancelled by operator before finished.	Operator clears message. Operator must reinitiate message transmission sequence if another attempt at a reportback message is desired.
RB CANCELLED (MDM)	Reportback in progress cancelled by Modem (due to reportback protocol requirements) before finished.	Operator clears message. Operator must reinitiate message transmission sequence if another attempt at a reportback message is desired.

Figure 3-4 (Sheet 1 of 3)

DL

MESSAGE	EQUIPMENT SUSPECTED	CORRECTIVE ACTION
RB ACK	Network Controller is busy, Long Reportback Assignment (LRA) forthcoming.	Operator clears message and monitors progress of reportback transmission by observing the RB MSG status parameter on the Control Indicator display.
RB NO ACK	The LRA is denied by Network Controller.	Operator clears message. Operator must reinitiate message transmission sequence if another attempt at a reportback message is desired.
CUR LSG WOD FAULT	Current LSG Word-of-Day (WOD) parity check failure detected when entering MILSTAR mode.	Operator clears message and checks LSG WOD values.
FUT LSG WOD FAULT	Future LSG WOD parity check failure when entering MILSTAR mode or at rollover time.	Operator clears message and checks LSG FWOD values, if required. This fault does not halt operation if rollover is not expected during current mission.
CUR ILSG WOD FAULT	Current ILSG Word-of-Day (WOD) parity check failure detected when entering MILSTAR mode.	Operator clears message and checks ILSG WOD values.
FUT ILSG WOD FAULT	Future ILSG WOD parity check failure when entering MILSTAR mode or at rollover time.	Operator clears message and checks ILSG FWOD values, if required. This fault does not halt operation if rollover is not expected during current mission..
INVALID NET ID	The NET ID used for the configuration is not valid. The NET ID the modem is receiving from the satellite is different from the NET ID entered. Also note that the RX status shows BADNETID.	Operator clears message and re-initiates the MILSTAR mode with the correct NET ID.
CHAN ASSIGN CONFLICT	Two (or more) channel assignments are the same in the current configuration.	Operator clears message and enters the correct channel assignment(s).
RB CHAN FAILED	The Reportback channel has failed. During operation, there have been 5 unacknowledged login or reportback requests.	Operator clears message and modem continues sending login requests using the NC-assigned RB channel.
LOSS OF SLOT SYNC	During operation,150 consecutive bad slots have been detected. RX status = NO SYNC.	Operator clears message and the modem automatically recovers from this condition, and the operator takes no further action. However, if this condition persists, it may indicate the NC has failed.
U/L SYNC FAILED	During operation, the uplink time tracking has failed, the uplink coarse acquisition has failed, or the Modem has experienced an extended delay in time tracking. If not SILENT mode, the TX status = NO ACQ.	Operator clears message and takes no further action. Modem re-synchronizes and logs back into the network automatically.

Figure 3-4 (Sheet 2 of 3)

MILSTAR Messages (Cont)

DL

MESSAGE	EQUIPMENT SUSPECTED	CORRECTIVE ACTION
TSM WOD FAILURE	WOD loaded from TSM is invalid or the TSM is installed improperly.	Operator clears message and then can either: 1. Ensure the TSM is functioning, installed properly, and re-start the mode, or 2. Install a new TSM (as required), and re-start the mode, or 3. Enter WOD using CI keypad and re-start the mode. If TSM failure persists after replacement, do the following (one at a time): 1. Verify the TSM has been loaded properly by the TDS. 2. Remove and replace the CI. 3. Remove and replace the modem.
RT: OSC FAULT	RT frequency reference error greater than ± 2.5 Hz. This message only appears 15 minutes after entry into MILSTAR Mode, which allows for RT warm-up and oscillator switchover. After clearing the preempt, the modem redisplays the preempt message approximately once per minute when the oscillator reference error continues to remain greater than ± 2.5 Hz. The presence of the preempt message, with no change in RX nor TX status, indicates a degraded oscillator that exceeds the allowed limits, but can still support MILSTAR Mode operation. Corrective action should be taken at the earliest opportunity allowed by operational constraints. The presence of this preempt message, with the LOSS OF SYNCH and LOSS OF SIGNAL preempt messages as well as the RX and TX status changing to NO ACQ, indicates an oscillator failure that does not support MILSTAR Mode operation. Corrective action should be taken immediately. **NOTE** The modem and RT can still support AFSAT I and LOS Operation in the presence of a degraded or failed oscillator.	Operator clears message, then remove and replace Radio.
TSM FLT	During operation, the TSM data is found to be invalid.	Operator clears message and replaces TSM.

Figure 3-4 (Sheet 3 of 3)

Time Transfer Messages

DL

NOTE

The TIME TRANSFER preempt message occurs during the TIME TRANSFER mode of operation. This preempt message alerts the operator that the system is now ready to transfer the time parameters.

MESSAGE	EQUIPMENT SUSPECTED	CORRECTIVE ACTION
CLEAR FOR TIME XFER	The Dual Modem is ready for time transfer. When set time equals current time, the operator should initiate time transfer.	At the right time, the operator initiates time transfer action by pressing the [SHFT] then [CLR] keys.

Figure 3-5

Mode Problems & Corrective Action

DL

AFSAT I MODE PROBLEMS & CORRECTIVE ACTION

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
1	NO ACQ for RX status parameter during initial start up and acquisition	**Explanation:** If the RX status parameter does not show an ACQ after 10 or 15 seconds, it could indicate one of the following situations: 1. Satellite may not be toggling correctly on a regenerative channel. 2. The operating mode has been set up incorrectly. 3. The terminal is using CH 1.5 CONT mode for operation. 4. The terminal's antenna is outside of the satellite's footprint. 5. The environment (i.e., weather, RF interference) is preventing successful acquisition. 6. The Radio Transceiver (RT), or other terminal equipment, is not functioning. **Corrective Action:** If this situation occurs, the operator should do the following (one at a time) and try to reacquire: 1. When operating on a known TDM1 or TDM2 AFSAT I network, wait at least 6 minutes for a frame sync message before continuing with corrective actions. The satellite may not be toggling the regenerative signal correctly. When a valid frame sync message is received, the RX status changes to ACQ. 2. Verify the information within the communications plan. Ensure the frequency plan and channel assignment, and key variable parameters are correct for the current mission. 3. When using CH 1.5 CONT mode the RX status shows NO ACQ until a message is received on channel 1.5. This is normal and requires no operator action unless the 1.5 channel mode is incorrect for the mission. 4. Ensure the environment is not a factor inhibiting reception/transmission. 5. Run BIT mode to test the Dual Modem and interfacing equipment. Remove and replace the failed or suspect component.
2	1.5 CH LOCKOUT preempt during operation	**NOTE** The 1.5 channel reception is only applicable to the AFSAT I mode. To ensure reception of possible Emergency Action Messages (EAMs) on channel 1.5, the CH 1.5 LOCKOUT parameter (at the TOP MENU) should be disabled (DSBL) when starting the AFSAT I Mode. **Explanation:** If the CH 1.5 LOCKOUT preempt is observed and if the CH 1.5 status parameter shows lockout, it usually means that the modem is receiving spurious noise on the 1.5 channel which has been determined (by the modem) to be a non-valid signal. This is usually caused by an RF emitter (i.e., a satellite transponder, other radio transceivers, possibly even another aircraft, etc.) within range of the antenna that is generating an interfering signal, which is constantly occupying the modem. The modem responds to this situation by locking out the 1.5 channel noise.

Figure 3-6 (Sheet 1 of 14)

DL

AFSAT I MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
2 (Cont)	1.5 CH LOCKOUT preempt during operation	**Corrective Action:** **NOTE** The dependent parameter, CH1.5 RESET is only applicable to the AFSAT I mode and only displayed when the REVIEW parameter is ACTIVE. The channel 1.5 status in any other mode is ignored by the modem. Once the CH1.5 LOCKOUT preempt is flashing, the operator should clear th preempt and attempt to reset the channel 1.5 lockout by doing the following: 1. Press the [SHFT] then [CLR] keys to clear the CH1.5 LOCKOUT preempt message. 2. Since the AFSAT I Mode is ACTIVE, move the cursor (>) to the CH1.5 LOCKOUT parameter using the [↓] key. 3. Press the [SEL] key until RESET is shown and then press the [SHFT] then [ENTR] keys to reset the channel 1.5 submode. 4. Press [SHFT] then [ENTR] keys again to clear mode menu and return to the active AFSAT I display/TOP MENU.
3	Line of Sight (LOS) preempt LOSPMT	**Explanation:** **NOTE** Symptoms #4, #5, and #6 may also occur during a LOSPMT event. Also note that symptom #1 may be seen when the LOS event is complete and the modem is attempting to reacquire. This usually occurs when the pilot takes control of the Radio Transceiver (RT) for line-of-sight operation. When the LOS transmission is complete, the pilot returns the radio to Dual Modem’s control and the modem attempts to re-establish communication using the last known operating mode. Note that re-establishing communication takes as long as the initial acquisition process. **Corrective Action:** None required.
4	RX status changes to NO ACQ during operation (usually followed by a LOSS OF SIGNAL message, see Symptom 5)	**Explanation:** 1. This usually occurs when something has momentarily interrupted the satellite to terminal communications link. This may be caused by the aircraft making a turn and the antenna losing acquisition, during a refueling operation, or perhaps the satellite transponder has been turned off. For more information, see Symptom #5, also. 2. This also may occur at the completion of a message received when the terminal is using CH 1.5 CONT mode. This is normal and requires no operator action unless the channel 1.5 mode is incorrect for the mission. **Corrective Action:** Typically, the operator should just wait for the Dual Modem and the terminal equipment to reacquire in their own time. Note that re-establishing communication takes as long as the initial acquisition process. If the status does not show ACQ within a reasonable amount of time (within 10 minutes), the operator should refer to the corrective actions listed in Symptom #1 of this table.

Figure 3-6 (Sheet 2 of 14)

Mode Problems & Corrective Action (Cont)

DL

AFSAT I MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
5	LOSS OF SIGNAL preempt during operation	**Explanation:** This usually occurs when something has interrupted the satellite to terminal communications link. In the case of the AFSAT I regenerative channel frequency plans (where energy is always supposed to be present), the satellite provides two signals to the modem. If one of the signals is interrupted, the modem can still operate and maintain a signal lock. However, if both signals are interrupted for a few seconds, the modem recognizes a LOSS OF SIGNAL. If the signal loss is momentary, the modem reacquires the lost satellite signal and continues to operate. If the signal loss is 10 minutes or more, there may be a problem with the satellite, the network controller, or the Radio Transceiver. **Corrective Action:** Typically, the operator should just wait for the Dual Modem and the terminal equipment to reacquire in their own time. If the RX status does not show ACQ within 10 minutes, the operator should refer to the corrective actions listed in Symptom #1 of this table.
6	SYNC MSG MISSED preempt during operation	**Explanation:** There are two ways the Dual Modem (and terminal) can miss the AFSAT I TDM1 or TDM2 frame synchronization message: 1. The modem may be receiving a test message at the time of the expected frame synchronization message, or 2. The satellite or Network Controller (NC) may not be sending the frame sync message. **Corrective Action:** If this situation occurs, the operator should do the following: 1. Clear the preempt and wait for another frame sync message (approximately 6 minutes apart). 2. Check the modem set-up parameters, if condition persists for more than 4 frames (more than 24 minutes).

Figure 3-6 (Sheet 3 of 14)

AFSAT IIM MODE PROBLEMS & CORRECTIVE ACTION

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
1	NO ACQ for RX status parameter during initial start up and downlink acquisition	**Explanation:** If the RX status parameter does not show an ACQ after 15 minutes (60 seconds nominal), it could indicate one of the following situations: 1. The operating mode has been set up incorrectly. 2. The TSM is not functioning properly. 3. The terminal's antenna is outside of the satellite's footprint. 4. The wrong satellite is being used for the current mission. 5. The environment (i.e., weather, RF interference) is preventing successful acquisition. 6. The Radio Transceiver (RT), or other terminal equipment, is not functioning. **Corrective Action:** If this situation occurs, the operator should do the following (one at a time) and try to reacquire: 1. Verify the information within the communications plan. Ensure the hopping bandwidth, the WOD information, and the rollover parameters are correct. 2. Verify TSM is operating properly. Refer to corrective actions listed for Symptom #3. 3. Ensure the environment is not a factor inhibiting reception/transmission. 4. Run BIT mode to test the Dual Modem and interfacing equipment. Remove and replace the failed or suspect component.
2	TSM status parameter shows ABSNT	**Explanation:** If the TSM status parameter shows ABSNT, it means the TSM has not been detected within the Control Indicator housing. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM in accordance with instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.
3	TSM status parameter shows INOPR	**Explanation:** If the TSM status parameter shows INOPR, it means the TSM may not be functioning properly. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM in accordance with instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.

Figure 3-6 (Sheet 4 of 14)

Mode Problems & Corrective Action (Cont)

DL

AFSAT IIM MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
4	TSM status parameter shows CHGNG	**Explanation:** If the TSM status parameter shows CHGNG, it means the TSM is currently charging from the Control Indicator. This occurs when the Control Indicator is applying a full charge to the TSM until a +17.2 Vdc (maximum charge) is achieved. Once the maximum charge is detected, the Control Indicator then applies a “trickle” charge to the TSM to maintain a constant charge. Note that even when the TSM is charging, it is still fully operational for the mission. **Corrective Action:** No operator corrective action required unless the TSM status changes to INOPR. If the operator suspects the TSM to be faulty, the operator should refer to the corrective actions listed in Symptom #3 of this table.
5	Line of Sight (LOS) preempt (LOSPMT)	**Explanation:** **NOTE** Symptoms #6 and #7 may also occur during a LOSPMT event. Also note that symptom #1 may be seen when the LOS event is complete and the modem is attempting to re-acquire. This usually occurs when the pilot takes control of the Radio Transceiver (RT) for line-of-sight operation. When the LOS transmission is complete, the pilot returns the radio to Dual Modem’s control and the modem attempts to re-establish communication using the last known operating mode. Note that re-establishing communication takes as long as the initial acquisition process. **Correction Action:** None required.
6	RX status changes to NO ACQ during operation	**Explanation:** 1. This usually occurs when something has momentarily interrupted the satellite terminal communication link and is usually accompanied by LOSS OF SIGNAL message. This may be caused by the aircraft making a turn and the antenna losing acquisition, during a refueling operation, or perhaps the satellite transponder has been turned off. 2. May occur if WOD rollover times are incorrect. **Corrective Action:** Typically, the operator should just wait for the Dual Modem and the terminal equipment to reacquire in their own time. Note that re-establishing communication takes as long as the initial acquisition process. If not in LOS mode and the status does not show ACQ within a reasonable amount of time (within 15 minutes), the operator should do the following: 1. Verify WOD rollover time are correct for the mission. 2. Refer to the corrective actions listed in Symptom #1 of this table.

Figure 3-6 (Sheet 5 of 14)

AFSAT IIM MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
7	LOSS OF SIGNAL preempt during operation	**Explanation:** A LOSS OF SIGNAL during operation means the terminal's antenna (and Dual Modem) does NOT detect any RF energy. Possible causes of this situation are: 1. The satellite transponder is turned off. 2. The aircraft is making a turn, which causes a lack of RF energy at the antenna. 3. The environment (i.e., the weather, other RF interference) is preventing reception of RF energy. 4. The Radio Transceiver is not functioning properly. 5. The WOD rollover times are incorrect. **Corrective Action:** The operator should check the WOD rollover times and if further action is required, see symptom #1 of this table.
8	LOSS OF SLOT SYNC & LOSS OF SIGNAL preempt during operation	**Explanation:** If this occurs approximately 15-20 minutes after the equipment (RT) has been powered up, and the AFSAT IIM downlink acquisition has occurred (RX:OK), it may indicate a problem with one of the oscillators within the RT. **Corrective Action:** The operator clears the message and takes no further action. The Modem automatically re-syncs and re-starts the current mode.
9	MDM 6: D/I FLT preempt during operation	**Explanation:** Modem A6 Decoder/ILSG CCA not read/write ready. **Corrective Action:** The operator clears the messages and does the following based on the downlink status: 1. If the fault occurs and downlink is not lost, and if the fault persists (i.e., the preempt returns 3 or more times within 5 minutes), suspect the A6 CCA within the Modem. 2. If the fault occurs and downlink is lost, execute off-line BIT and replace equipment as directed in the off-line BIT Messages and Corrective Actions (Figure 3-2). If no faults are found by the off-line BIT, return to mode.

Figure 3-6 (Sheet 6 of 14)

Mode Problems & Corrective Action (Cont)

DL

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
1	NO ACQ for RX status parameter during initial start up and downlink acquisition.	**NOTE** When corrective action(s) is taken and there aren't any set-up or equipment failures discovered (i.e., RX: BAD CTL or the NC is not functioning), re-enter the MILSTAR mode and the modem automatically attempts LOGIN when the error condition (NC is back online) is corrected (no operator intervention needed). **Explanation:** If the RX status parameter still shows a NO ACQ after 15 minutes maximum (nominally 60 seconds), it could indicate one of the following situations: 1. The RT has not completed its 15 minute power warm-up period. (Refer to T.O. 1B-52H-1 for an explanation of the RT warm-up.) 2. The operating mode has been set up incorrectly. 3. The TSM is not functioning properly. 4. The terminal's antenna is outside of the satellite's footprint. 5. The wrong satellite is being used for the current information. 6. The environment (i.e., weather, RF interference) is preventing successful uplink acquisition probing. 7. The Radio Transceiver (RT), or other terminal equipment, is not functioning. **Corrective Action:** If this situation occurs, the operator should do the following (one at a time) and try to reacquire: 1. Verify the information within the communications plan. Ensure the network ID, satellite ID, frequency plan, channel assignment, etc. parameters are correct for the current mission. Re-start the MILSTAR Mode as needed, when all parameters have been verified/re-entered. 2. Verify the TSM is operating properly. Refer to corrective actions listed in Symptom #7. 3. Ensure the environment is not a factor inhibiting reception. 4. Run BIT mode to test the Dual Modem and interfacing equipment. Remove and replace the failed or suspect component. 5. Remove and replace the AFSAT CI Driver/Amplifier.
2	NO SYNC for RX status during initial start up and acquisition	**Explanation:** If the RX status parameter remains at NO SYNC for more than 60 seconds, it indicates the MILSTAR control channel is not functioning properly. The modem recognizes a valid bit sync, but the frame slot data are not valid. **Corrective Action:** If this situation occurs, the operator should do the following (one at a time) and try to reacquire: 1. Check the MILSTAR configuration for the correct operating parameters. 2. Ensure the TSM being used is functioning properly. Refer to the corrective actions listed in Symptom #7 of this table.

Figure 3-6 (Sheet 7 of 14)

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
3	BAD CTL for RX status during initial start up and acquisition	**Explanation:** If the RX status parameter shows BAD CTL, it indicates none of the control channels available for operation are functioning. **Corrective Action:** The modem has automatically searched all control channels and not found an “operating” Control Channel. However, the modem will continue to search for another “operating” Control Channel. If none are found or the Control Channels are not functioning, the operator should do the following (one at a time): 1. Check the MILSTAR configuration for the correct operating parameters. 2. Run off-line BIT to check status of the Radio Transceiver and its interfaces.
4	NO ACQ for TX status parameter during initial start up and uplink acquisition **NOTE** This applies only after RX status shows OK.	**Explanation:** This is normal during the downlink and frame sync process; however, if the TX status parameter still shows a NO ACQ after 15 minutes, it could indicate one of the following situations: 1. The environment (i.e., weather, RF interference) is preventing successful uplink acquisition probing. 2. The RT or faulty terminal relays are preventing successful acquisition probing. 3. The network’s Local Channel is faulty or missing. 4. The uplink (ILSG) WOD/WOM is not correct. **Corrective Action:** If this situation occurs, the operator should do the following (one at a time) and try to reacquire: 1. Verify the information within the MILSTAR communications plan. Ensure the local channel and ILSG WOD/WOM parameters are correct for this mission. 2. Run BIT mode to test the Dual Modem and interfacing equipment. Remove and replace the failed or suspect component. 3. Ensure the environment is not a factor inhibiting transmission.
5	NO LOG for TX status during initial start up and acquisition.	**NOTE** The mode automatically continues to attempt login. **Explanation:** If the TX status parameter remains at NO LOG for more than 15 minutes, it could indicate one of the following situations: 1. The reportback (RB) channel assignment is incorrect. 2. The Network Controller (NC) is not responding to login requests or the NC has delayed login requests. **Corrective Action:** If this situation occurs, the operator should verify the RB CHAN assignment is correct.

Figure 3-6 (Sheet 8 of 14)

Mode Problems & Corrective Action (Cont)

DL

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
6	TSM status parameter shows ABSNT	**Explanation:** If the TSM status parameter shows ABSNT, it means the TSM has not been detected within the Control Indicator housing. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM in accordance with the instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.
7	TSM status parameter INOPR	**Explanation:** If the TSM status parameter shows INOPR, it means the TSM may not be functioning properly. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM IAW the instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front Of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.
8	TSM status parameter shows CHGNG	**Explanation:** If the TSM status parameter shows CHGNG, it means the TSM is currently charging from the Control Indicator. This occurs when the Control Indicator is applying a full charge to the TSM until a +1 7.2 Vdc (maximum charge) is achieved. Once the maximum charge is detected, the Control Indicator then applies a “trickle” charge to the TSM to maintain a constant charge. Note that even when the TSM is charging, it is still fully operational for the mission. **Corrective Action:** No operator corrective action required unless the TSM status changes to INOPR. If the operator suspects the TSM to be faulty, the operator should refer to the corrective actions listed in Symptom #7 of this table.

Figure 3-6 (Sheet 9 of 14)

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
9	Line of Sight (LOS) preempt LOSPMT	**Explanation:** **NOTE** Symptoms #10, 11, and #12 may also occur during a LOSPMT event. Also note that symptom #1 may be seen when the LOS event is complete and the modem is attempting to re-acquire. 1. This usually occurs when the pilot takes control of the Radio Transceiver (RT) for line-of-sight operation. When the LOS transmission is complete, the pilot returns the radio to Dual Modem's control and the modem attempts to re-establish communication using the last known operating mode. Note that re-establishing communication takes as long as the initial acquisition process. 2. Note that the modem automatically cancels all RB MSG and RB ACK protocols during LOS operation. **Corrective Action:** When the RB MSG protocol is cancelled, the operator need to re-initiate RB message traffic after modem reestablishes communications. RB ACKs cannot be recovered.
10	RX status changes to NO ACQ during operation	**Explanation:** 1. This usually occurs when something has momentarily interrupted the satellite to terminal communications link. This may be caused by the aircraft making a turn and the antenna losing acquisition, during a refueling operation, or perhaps the satellite transponder has been turned off. For more information, see Symptoms #9 and #12, also. 2. May occur if WOD rollover times are incorrect. 3. Note that the modem automatically cancels all RB MSG and RB ACK protocols. **Corrective Action:** Typically, the operator should just wait for the Dual Modem and the terminal equipment to reacquire in their own time. Note that re-establishing communication takes as long as the initial acquisition process. If not in LOS mode and the status does not show ACQ within a reasonable amount of time (within 10 minutes), the operator should do the following: 1. Verify WOD rollover time are correct for the mission. 2. When the RB MSG protocol is cancelled, the operator needs to re-initiate RB message traffic after modem reestablishes communications. Note that RB ACKs cannot be recovered. 3. Refer to the corrective actions listed in Symptom #1 of this table.

Figure 3-6 (Sheet 10 of 14)

Mode Problems & Corrective Action (Cont)

DL

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
11	TX status changes to NO ACQ during operation.	**Explanation:** 1. This usually occurs when something has interrupted the uplink and this interruption is detected by the modem due to a lack of response by the NC. Prior to the TX status changing to NO ACQ, there is usually a preempt message of: U/L SYNC FAIL and then TX status changes to NO LOG. This is an indication that the NC has failed to respond to 5 requests by the modem. For more information, see Symptoms #9 and #12, also. 2. Note that the modem automatically cancels all RB MSG and RB ACK protocol. **Corrective Action:** If the terminal has not been logged off (by either the operator or the NC), the operator should allow the Dual Modem and the terminal equipment to reacquire communication. Note that re-establishing communication takes as long as the initial acquisition process. If the status does not show NO LOG or LOG within a reasonable amount of time (within 15 minutes), the operator should do the following: 1. Refer to the corrective actions listed in Symptom #4 of this table. 2. When the RB MSG protocol is cancelled, the operator needs to re-initiate RB message traffic after modem reestablishes communications. Note that RB ACKs cannot be recovered.
12	LOSS OF SIGNAL	**Explanation:** A LOSS OF SIGNAL during operation means the terminal's antenna (and Dual Modem) does NOT detect any RF energy. Possible causes of this situation are: 1. The satellite transponder is turned off. 2. The aircraft is making a turn, which causes a lack of RF energy at the antenna. 3. The environment (i.e., the weather, other RF interference) is preventing reception of RF energy. 4. The Radio Transceiver is not functioning properly. 5. The WOD rollover times are incorrect. **Corrective Action:** The operator should check the WOD rollover times and if further action is required, see symptom #1 of this table.
13	RX status shows BADNETID	**Explanation:** Usually accompanied by a preempt message of: INVALID NET ID. This status is usually due to either an invalid SAT ID or NET ID entered by the operator or by the network of interest not being active. **Corrective Action:** To correct this, the operator verifies/enters valid NET ID and CONTROL CHAN parameters, and restarts the MILSTAR Mode doing the following: 1. Press the [SHFT] then [CLR] keys to clear the preempt message. 2. From the TOP MENU, access the MILSTAR Mode menu, re-enter a valid NET ID and/or CONTROL CHAN value, as other parameter changes required for the mission. 3. When finished entering all MILSTAR parameters, press the [SHFT] then [ENTR] keys to restart the MILSTAR Mode.

Figure 3-6 (Sheet 11 of 14)

MILSTAR MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
14	MDM 6: D/I/FLT preempt message displayed	**Explanation:** Indicates the Modem's A6 (Decoder/ILSG) CCA may not be functioning properly. May also observe the LOSS OF SIGNAL preempt at the same time. 1. Potential RF problem affecting the Modem's message-processing performance. 2. Potential A6 CCA (within the modem) hardware failure. **Corrective Action:** Operator clears the message and does the following: 1. If fault message persists (i.e., preempt displays 3 times or more within 5 minutes), suspect the Modem's A6 CCA, run off-line BIT and if faults are found, remove and replace the faulty component.
15	LOSS OF SLOT SYNC & LOSS OF SIGNAL preempt during operation	**Explanation:** If this occurs approximately 15-20 minutes after the equipment (RT) has been powered up, and the AFSAT IIM downlink acquisition has occurred (RX:OK), it may indicate a problem with one of the oscillators within the RT. **Corrective Action:** The operator clears the message and takes no further action. The Modem automatically re-syncs and re-starts the current mode.
16	DENIED for TX status parameter during initial start-up and acquisition.	**Explanation:** The Network Controller (NC) has denied the Modem's request to log into the network. The NC only allows login by those terminals (Terminal IDs) on the operational list and will deny access to terminals not on the list. Consequently, the Modem does not automatically re-attempt logging into the network. The operator must re-initiate logging in by re-starting the MILSTAR Mode. **Corrective Action:** 1. Verify the information within the MILSTAR communications plan and ensure the Terminal ID is accurate and entered correctly. 2. Once all parameters have been verified/re-entered, re-start MILSTAR Mode, as needed.

Figure 3-6 (Sheet 12 of 14)

Mode Problems & Corrective Action (Cont)

DL

TIME TRANSFER MODE PROBLEMS & CORRECTIVE ACTION

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
1	TIME status parameter shows ERROR	**Explanation:** If the TIME status parameter shows ERROR, it means there was a problem in the time transfer process (if transferred from the MDM or TSM) or the TSM may not be functioning properly. **Corrective Action:** The operator should do the following: **NOTE** Manually transferring time using the OPER option is not recommended due to a greater margin of error with regards to accuracy, especially when using the AFSAT IIM or MILSTAR modes of operation. Since timing accuracy is necessary for proper operation with a satellite, the TSM option is highly recommended. 1. Try the time transfer process again. If transferring from MDM, there may be problems with time accuracy. Be sure the time is accurate when entering the mode. 2. If using a TSM for time transfer, do the following: a. If the TSM is suspect, remove the TSM in accordance with instructions in the AFTER PARKING Checklist in Section II. b. Test the TSM using the test button on the front of the TSM after removal of TSM from Control Indicator. If the green TEST LED does not light, the TSM is not functioning. c. Obtain a new TSM to continue operation. 3. Test the Dual Modem (and TSM) using off-line BIT.
2	TSM status parameter shows ABSNT	**Explanation:** If the TSM status parameter shows ABSNT, it means the TSM has not been detected within the Control Indicator housing. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM in accordance with instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.

Figure 3-6 (Sheet 13 of 14)

DL

TIME TRANSFER MODE PROBLEMS & CORRECTIVE ACTION (Cont)

SYMPTOM #	SYMPTOM OR PROBLEM	EXPLANATION AND OPERATOR ACTION
3	TSM status parameter shows INOPR	**Explanation:** If the TSM status parameter shows INOPR, it means the TSM may not be functioning properly. **Corrective Action:** If a TSM is used for this mission, the operator should do the following: 1. Ensure the TSM is correctly installed within the Control Indicator housing. 2. If the TSM is suspect, remove the TSM in accordance with instructions in the AFTER PARKING Checklist in Section II. 3. Test the TSM using the test button on the front of the TSM after removal from the Control Indicator. If the green TEST LED does not light, the TSM is not functioning. 4. Obtain a new TSM to continue operation. 5. If the TSM is installed properly, the operator should then test the Dual Modem (and TSM) using off-line BIT.
4	TSM status parameter shows CHGNG	**Explanation:** If the TSM status parameter shows CHGNG, it means the TSM is currently charging from the Control Indicator. This occurs when the Control Indicator is applying a full charge to the TSM until a +17.2 Vdc (maximum charge) is achieved. Once the maximum charge is detected, the Control Indicator then applies a “trickle” charge to the TSM to maintain a constant charge. Note that even when the TSM is charging, it is still fully operational for the mission. **Corrective Action:** No operator corrective action required unless the TSM status changes to INOPR. If the operator suspects the TSM to be faulty, the operator should refer to the corrective actions listed in Symptom #3 of this table.

Figure 3-6 (Sheet 14 of 14)

PRINTER AND KEYBOARD MALFUNCTIONS

The printer and keyboard malfunctions and corrective steps are listed in figure 3-7. They are very susceptible to temperature problems, so ensure an adequate warmup period is allowed in cold weather. A warmup period or equipment reset will usually cure problems with this equipment. A blow fuse in the Control Power Logic Box will also render your printer and keyboard powerless.

Printer and Keyboard Malfunctions

<table>
<tr><th>INDICATION AND CORRECTIVE ACTIONS</th><th>CORRECTIVE-ACTION STEPS</th></tr>
<tr><td colspan="2">NOTE
Accomplish steps in order.</td></tr>
<tr><td>1. Unable to load any mode or character through keyboard. Accomplish steps e, a, b, i, and j
2. Reverse feed of printer. Accomplish steps a, b, c, i, and j
3. Printer runs away or prints unintelligible characters. Accomplish steps a, b, i, and j
4. Printer chatters and line feeds. Accomplish steps a thru j
5. No printer ready light. Check bulb; accomplish steps a, e, and j
6. No power to printer. Accomplish step k</td><td>a. Mode Selector - OFF
b. Printer Power - OFF
c. Remove paper (if line feeding)
d. Printer Power - ON
e. Allow 5 minutes warmup (less if printer ready light illuminates)
f. Depress (CR) key
g. Printer Power - OFF (minimum of 5 seconds)
h. Manually reset printer head
i. Printer Power - ON
j. Mode Selector - ON
k. Check fuse on control power supply logic box</td></tr>
</table>

NOTE

If malfunctions continue, attempt to clear problem later in flight. Utilize AFSATCOM if possible.

Figure 3-7

Fault Light Malfunctions

NOTE

If FLT light remains on when LOS Radio is placed to OFF or SATL, the following procedures will apply:

INDICATION	CORRECTIVE ACTION
RCV FLT, XMT FLT I/O FLT	1. If a BIT code is associated with the light, refer to BIT code malfunction chart 2. If no BIT code is displayed, depress and release display control button. If FLT light illuminates again within a few seconds, continue to next step 3. Position mode selector to LOAD and then back to OPR-1. If FLT light illuminates again within a few seconds, continue to next step 4. Recycle satellite plan thumbwheel switch. If FLT light illuminates again within a few seconds, continue to next step 5. Turn mode selector and printer to OFF. Pull and reset AFSATCOM A, B, and C Phase circuit breakers. Turn printer to ON and mode selector to OPR-1 6. If FLT light remains illuminated, attempt normal operation of AFSATCOM

NOTE

- If the LOS radio is set to MAIN, BOTH or ADF, and AFSATCOM mode selector is set to OPR-1, the RCV FLT light will illuminate intermittently.
- If the RCV FLT light is illuminated, but no BIT code is displayed, this could indicate that the satellite is not operating or the aircraft is not within satellite coverage.
- If transmission is in doubt, it can be verified by observing No. 1 trace on the ALR-20 while transmitting.

Figure 3-8

CSS

MALFUNCTION ANALYSIS

Malfunction analysis by the aircrew is limited to a power and bulb and code reentry. Specific analysis for a persistent malfunction will be performed by a CSS custodian.

Ground Operations – Radar Navigator

1. System Power – Checked

   Ensure that power is on the aircraft and the CODED SWITCH circuit breaker is in.

2. LAMP TEST Button – Pressed

   If any light fails to illuminate, replace the bulb.

3. Sum Code – Reentered

   Wait 3 minutes after initial sum code entry, then rotate thumbwheels again to the sum code.

4. OPER/MON Switch – OPER

5. If Abnormal Indication Persists – Request CSS custodians

   Call Command Post and request CSS custodians

Inflight Operations

If a malfunction is noted during enabling, perform the following:

1. CODED SWITCH Circuit Breaker – In

2. LAMP TEST Button – Pressed

   If any light fails to illuminate, replace the bulb.

3. Enable Code – Reentered

   Wait 3 minutes after initial enable code entry, then rotate thumbwheels again to the enable code.

4. OPER/MON Switch – OPER

5. If Malfunction Persists – Refer to command giidance.

   Reenter code after observing a 3-minute wait period

NOTE

Several CSS enablings may be attempted. Once the system is enabled the aircrew cannot disenable the system in flight by repeated code entry.

6. OPER/MON Switch – OPER

Doppler Radar System

ABNORMAL OPERATION

There are no procedures for abnormal operation of the Doppler radar system. When abnormal system operation or failure is indicated by the malfunction light and/or the bit advisories given in the following paragraph, it will be necessary to disregard the Doppler system and accomplish navigation techniques working around the Doppler. The Doppler may be cycled from an operating mode to OFF and back to an operating mode to clear erroneous Doppler inputs to the INSs/INUs. This may cause an erroneous present position computation especially while the aircraft is taxiing. Using this technique will cause the Doppler velocity inputs to go to 0 velocity. See OAS NAVIGATION ABNORMAL OPERATION, this section.

EVS Malfunctions

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
Loss of Symbols on All MFD's	Pull and reseat symbol signal generator	Intermittent connection	EVS Symbology
LVPS Light On	1. Recycle FLIR power switch 2. If LVPS light remains on, turn FLIR system off	● LVPS not actuated ● LVPS inoperative	FLIR
FLIR REFR Light On	Check circuit breakers on EVS circuit breaker panel	Circuit breaker not set	FLIR
STV Malfunction Light On	Recycle STV with switch to off and back on	Switch contacts or relay not activated	STV
STV Video Flashes	Use MLC gain adjust	Video signal below gain control threshold	STV
No Power to FLIR Control Panel	Recycle FLIR environmental air switch	Air switch intermittent	FLIR
No Panel Light or Press-to-Test Indications	Recycle dimmer controls	Dimmer control not adjusted properly	Panel lights
No Video or Symbols One MFD	Pull and reseat MFD	● Intermittent connection ● Bad MFD	EVS display at affected station
All MFD's Unusable (Jittery)	1. Depress alter synch button on EVS steering control panel 2. Pull and reseat video distribution unit	● Intermittent connection ● Video distribution unit	EVS
Partial Stowage of Either EVS Turret	Pull and reset CB for applicable system	Equipment failure	EVS
MFD Does Not Come Up After 2 Minute Warmup	1. Recycle MFD power switch off and on several times 2. Pull and reseat MFD	● Bad MFD ● Power problem	EVS
EVS Wash Light Comes On Without Being Selected	Pull and reseat servo control unit located behind RN's seat	Servo control unit	EVS while malfunction exists

Figure 3-9

Global Positioning System

ABNORMAL OPERATION

Since GPS equipment is independent of OAS being operational, loss of OAS will not result in loss of GPS; however, GPS information will not display on MFDs, if OAS is inoperative or if nuclear (Block II) software is loaded. For maximum navigation accuracy, GPS aircraft avionics require signals from four satellites of the orbiting satellite field positioned to provide receivers with position, time, and velocity data. Degradation will occur, if less than four satellites provide access and/or accurate data.

[CS][AMI] The OAS built-in-test (BIT) processing determines GPS faults and malfunctions. Thus, GPS abnormalities will be presented on OAS multifunction displays (MFD). When an advisory occurs, the operator may locate the corresponding advisory information in figures 3-10 and 3-11.

GPS/TACAN EMULATION ABNORMAL OPERATION

Malfunctions and abnormal operations of IU/TACAN Emulation are indicated at the Pilots' station on the HSI/ADI and the EVS monitor when in MFD mode. Most errors and failures also have associated fault messages which are displayed on the Programmable Keyboard (PKB) at the Navigator's station. Since many of the conditions share MFD messages, the pilots' GPS IU/TACAN Emulation Abnormal Operations/Fault Table figure 3-12 will first define the condition, describe the indications which appear to the pilots, the corrective action, the probable cause, and the capabilities lost. The Navigators' IU/TACAN faults indicated by PKB messages appear in figure 3-11 and are presented in the normal Fault Indication - Corrective Action - Possible Cause - Capability Lost table format.

GPS BIT Advisory Malfunction Analysis *[CS]*

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
ALMANAC DATA	Reload DTUC.	No almanac data in the receiver.	GPS lost.
CKEY ALERT	Monitor; Enter crypto key data via PKB.	Daily key will expire in 2 hours.	Degraded GPS accuracy in 2 hours.
DAILY KEY	Enter crypto key data via PKB.	GPS daily key does not verify.	Degraded GPS accuracy.
GPS	Maintenance action.	GPS hardware NO-GO.	GPS lost.
GPS DATA	Reload DTUC/continue loading DTUC.	GPS data is invalid or FMS is reconfiguration loading.	Degraded GPS accuracy.
INSUF Keys	Enter crypto key data via PKB.	Insufficient GPS keys for mission duration.	Degraded GPS accuracy.
IU	Reload DTUC.	IU NO-GO.	GPS lost.
NPKB	Maintenance action.	PKB NO-GO.	Operator unable to input on PKB.
SAU	Maintenance action.	SAU NO-GO.	GPS data to ICSMS stores lost.
ZEROIZE FAIL	Press IUCP ZEROIZE switch again.	GPS key failed to erase.	Classified crypto data remains in IU and receiver-processor.

NOTE

- Fault Indications are displayed on row 22 of the MFDs in reverse highlight.
- The operator may reload DTUCs, manually insert crypto key data, check circuit breakers, or re-accomplish switch actuation (if applicable) to correct GPS faults; otherwise, ground maintenance action is required.

Figure 3-10 (Sheet 1 of 3)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
ALMANAC DATA	1. Ensure the B-52 mission DTC is installed. 2. The carrier aircraft will attempt to acquire the satellites without almanac data (Cold Start). This may require up to 15 minutes.	GPS Interface Unit (IU) status indicates almanac data is unavailable.	1. B-52 will not be able to accomplish GPS aided navigation. 2. GPS data will not be provided to weapons.
CKEY ALERT	If keys will expire prior to mission completion, update keys through the IU PKB.	GPS Interface Unit (IU) status indicates the SA/AS keys in the GPS receiver will expire within two hours.	Degraded GPS accuracy in two hours.
DAILY KEY	1. Verify the correct date was input on CF-61. 2. If current keys are not available on the DTC, load crypto keys from crypto fill port or enter keys through the IU PKB.	1. GPS Interface Unit (IU) status indicates crypto keys are required. 2. An incorrect date was input on CF-61.	Degraded GPS accuracy.
GPS	1. Check the following circuit breakers on the EVS CIRCUIT BREAKER PANEL: a. 115V AC-PHASE A – GPS INTFC UNIT PRIME b. 115V AC-PHASE A – GPS INTFC UNIT FILL-IN c. 115V AC-PHASE B – GPS INTFC UNIT PRIME d. 115V AC-PHASE B – GPS INTFC UNIT FILL-IN e. 115V AC-PHASE C – GPS INTFC UNIT PRIME f. 115V AC-PHASE C – GPS INTFC UNIT FILL-IN g. 115V AC-PHASE C – GPS RCVR h. DC POWER – INTFC UNIT i. DC POWER – INTFC UNIT CONT PNL Pull and reset circuit breakers, if required. 2. FMS will automatically select the next best navigation mode.	GPS Interface Unit (IU) status indicates a GPS failure.	Loss of GPS aided navigation.
GPS DATA	1. If aircraft is banking, wait for aircraft to complete maneuver. 2. Determine GPS data validity and Figure of Merit (FOM) on the IU PKB. 3. FMS will automatically select the next best navigation mode.	GPS Interface Unit (IU) status indicates GPS navigation data is not suitable for navigational aiding.	Degraded GPS accuracy.
GPS READY	Acknowledge advisory message.	GPS Interface Unit (IU) status indicates GPS navigation data is suitable for navigational aiding.	Normal operation.

Figure 3-10 (Sheet 2 of 3)

GPS BIT Advisory Malfunction Analysis (Cont) *[AMI]*

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
INSUF KEYS	1. Determine mission duration from the GPS crypto key page at the IU PKB. 2. If the mission duration is equal to one, continue as normal. 3. If the mission duration is greater than one day, reenter a mission duration of one day through the IU PKB crypto key page.	GPS Interface Unit (IU) status indicates the SA/AS keys provided do not cover the entered mission duration.	Degraded GPS accuracy.
IU	1. Cycle GPS/IU power at the Interface Unit/Power Panel (IU/PP). 2. Determine IU fault status from FRMT-6.	GPS Interface Unit (IU) status indicates a failure of the GPS IU or communication with the GPS IU has failed after successful communication had been established.	Loss of GPS aided navigation.
NPKB	1. Check “DC POWER – RDR NAV PRGM KYBD” circuit breaker on the EVS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. If a SMO is currently loaded, proceed as follows: a. If FRMT-7 crypto key status window indicates crypto keys are available (window is blank), proceed as normal. b. If FRMT-7 crypto key status window indicates crypto keys are not available (window indicates reverse highlighted “NO KEYS”) and keys are available in the B-52 mission: (1). Ensure Data Transfer Cartridge (DTC) contains B-52 mission data. (2). Zeroize GPS receiver on the Interface Unit/Power Panel (IU/PP). (3). Cycle GPS/IU power on the IU/PP.	GPS Interface Unit (IU) status indicates a failure of the Navigator’s Programmable Keyboard (NPKB).	Loss of key data entry capability.
SAU	1. The SAU is not required for B-52 navigation. 2. Determine SAU fault status from FRMT-6. 3. Check for associated weapon faults in applicable weapon manuals.	GPS Interface Unit (IU) status indicates a failure of the Splitter Amplifier Unit (SAU).	GPS data to Integrated Conventional Stores Management System (ICSMS) weapons is lost.
ZEROIZE FAIL	1. Reselect GPS Zeroize at the IU/Power Panel (IU/PP). 2. Treat IU and GPS receiver as crypto classified.	GPS Interface Unit (IU) status indicates an attempt to zeroize keys in the GPS receiver has failed.	Classified crypto data remains in IU and receiver-processor.

Figure 3-10 (Sheet 3 of 3)

Navigator's GPS IU/TACAN Malfunction Analysis

PKB FAULT MESSAGE	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
DDL BUSY Mission Data Display Page	If the PKB indicates **DDL BUSY** for more than 2 minutes, Navigator should perform IBIT test on the DDL if on the ground. Otherwise, remove the DDLC from its receptacle for approximately 1 minute then reinstall the cartridge back in the receptacle.	May be normal operation or could indicate interface problem.	System unable to support HSI and Situational Displays.
DDL FAIL Test Mode Display Page	1. Check DDL to ensure DDLC is installed correctly. 2. Check PKB PME status page for fault indication. 3. Load spare DDLC into DDL. 4. If on the ground, initiate a Built-In-Test (BIT) on DDL in test mode from PKB PME status page. 5. Cycle power on DDL by resetting "DC POWER - DDL PWR" circuit breaker on the EVS CIRCUIT BREAKER PANEL.	1. DDL receptacle has failed. 2. DDLC has failed. 3. Bus communication failure with the DDL.	Unable to access DDLC data or data is unreliable. HSI and Navaid information on situational screens cannot be supported.
DDLC DATA? Mission Data Display Page	1. Verify proper cartridge is installed. IU should try to request the same block of data several times before declaring a failure. 2. Load spare DDLC.	Data block requested from DDLC did not pass the checksum test, NAVAID file not found, almanac data corrupted on DDLC, cartridge table of contents corrupted, or partition directory file corrupted.	Data cannot be used to support GPS HSI parameters, situational awareness screens, and reloading IUS.
FOM>6	Attempt to re-acquire the GPS constellation.	FOM is greater than 6 and GPS error estimates for degraded GPS Data.	Degraded GPS.
GPS FAIL Test Mode Display Page and specific GPS LRU fail indication on GPS Data Display and Channel Summary Pages	1. Check MFD for GPS message. 2. Select GPS Data Page to determine which GPS component failed. 3. Check "GPS RCVR" circuit breaker on EVS CIRCUIT BREAKER PANEL. 4. If on the ground, initiate BIT on DDL in test mode from PKB PME status page.	No communication with the GPS receiver or the GPS receiver has failed.	GPS data is not available/unreliable.

Figure 3-11 (Sheet 1 of 3)

Navigator's GPS IU/TACAN Malfunction Analysis (Cont)

PKB FAULT MESSAGE	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
HSI Test Mode Display Page	1. Check for TACAN fail indication on PKB Test page. If so, check that TACAN control panel is on when in GPS navigation mode. 2. Check "AN/ARN-118(V) AC and DC" circuit breakers on LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL.	HSI fault, synchro/Digital conversion fault, wiring, IUS course data validity check failed, or TACAN control panel is off when in GPS navigation mode.	No valid to-from or course Deviation on HSI.
HSI & **TACAN** Test Mode Display Page	Pilot - Turn the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is set to TACAN and the TACAN Control Mode switch is set to OFF.	Unable to support GPS HSI parameters. Some situational awareness data will not be available.
IU FAIL	1. Check for IU messages on the MFD. 2. ***[AMI]*** Determine IU status from FRMT-6 display. 3. Check IU circuit breakers on EVS CIRCUIT BREAKER PANEL. 4. Recycle IU/GPS power.	IUS failed BIT or Bus communication failure.	GPS and IU functions lost.
KEY RCVR Main Menu, GPS Data Display, and Channel Summary Pages	If the message remains on for more than 5 minutes, reload crypto keys from crypto fill port or enter keys through PKB.	Available Crypto Keys were not validated by the GPS.	Required GPS accuracy jeopardized. Weapon launches may require overrides and/or operate in degraded mode.
MENU not displayed	Press COMM TEST on the PKB Self Test Page. If the COMM TEST passes, then the database download will restart.	The database that is sent to the PKB upon power up failed three consecutive transmissions.	Unable to access PKB pages.
Less [AMI] **MSN DATA** & **DDLC DATA** Mission Data Display Page	Verify proper DDLC/DTUC cartridges are installed.	DDLC and DTUC data are not correlated.	No associated Navaids unless manually assigned/ entered on PKB.

Figure 3-11 (Sheet 2 of 3)

PKB FAULT MESSAGE	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
NO DDLC Mission Data Display Page	1. Reinstall DDLC in DDL. 2. Install backup DDLC in DDL.	DDLC not installed or improperly installed.	Unable to support GPS HSI parameters, situational awareness screens, and reloading IUS. Also the IU will not be able to provide Almanac data to the GPS Receiver. IU should get almanac data from the DTUC; ***[AMI]*** DTC.
NO KEY Main Menu, GPS Data Display, and Channel Summary Pages	1. Renter crypto key through PKB or crypto fill port. 2. FMS will indicate DTUC; ***[AMI]*** DTC, fail if crypto in corrupted on the DTUC; ***[AMI]*** DTC.	No Key entered on PKB or no crypto data load received from the fill port, or DTUC; ***[AMI]*** DTC. Crypto key may be corrupted or the DTUC; ***[AMI]*** DTC, is unable to load IU and GPS receiver.	Required GPS accuracy jeopardized. Weapon launches may require overrides and/or operate in degraded mode.
NO MSN Mission Data Display Page	1. IU should try to request the same data several times before declaring a failure. 2. ***[AMI]*** Check DTR status on FRMT-6. 3. Reload mission data. 4. Reload mission data with backup DTUC; ***[AMI]*** DTC.	Data record requested from DTUC; ***[AMI]*** DTC, did not pass the checksum test. Unable to access data on DTUC; ***[AMI]*** DTC. No ACU communication. Cyclic data is not available to the IU. DTU; ***[AMI]*** DTR, may have failed. MIL-STD-1553 bus communication failure.	Crypto Key, B-52 Mission Data may not be available. Cannot monitor changes initiated by the navigator on the IKB. Cannot pickup TAS, headings, winds, current destination or FCI data.
	Less [AMI] None - Normal operation for Block II Software Load.	***Less [AMI]*** Block II operational software loaded.	***Less [AMI]*** Information on the Situational Awareness screens is limited to Navaids only. HSI GPS display parameters unaffected.
SDC FAIL Test Mode Display Page	1. Initiate TACAN self test from TACAN control panel. Record results from distance indication on HSI. 2. Cycle power to the SDC by turning TACAN mode switch to OFF then back to T/R.	Signal Data Converter (SDC) failed BIT. Communication failure between the SDC and IU.	TACAN and TACAN Emulation functions are unreliable. HSI and ADI displays cannot be supported in GPS mode.
SEARCH Channel Summary Page	Continue operation until satellites acquired.	GPS receiver is acquiring satellites. If IU could not provide the almanac data to the receiver acquisition time will be extended. The GPS receiver will continue to acquire satellites.	TACAN Emulation mode is not functional.
TACAN FAIL Test Mode Display Page	1. Turn navigation select mode to GPS and change TACAN control mode to either REC or T/R. 2. Initiate TACAN from TACAN control panel.	No communication with the TACAN Control Panel. Unable to communicate with the TACAN system.	Unable to select Navaid for TACAN or GPS modes.
TACAN fault	Turn the NAV Select Mode switch to GPS position and change the TACAN Control Mode switch to either REC or T/R.	The NAV select mode is set to TACAN and the TACAN Control Mode switch is set to OFF.	Unable to support GPS HSI parameters. Some situational awareness data will not be available.

Figure 3-11 (Sheet 3 of 3)

Pilots' GPS IU/TACAN Abnormal Operations/ Fault Table

ABNORMAL OPERATING CONDITIONS

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
No DDLC (Digital Data Loader Cartridge)	In GPS Mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero, To/From flag set To and Bearing Pointer Rotating.	No impact if additional data is not required from the DDLC. If data is required from the DDLC then: Destination Data Screen: Blanks where associated Navaids would be, **NAVAID DATA** in GPS Emulated TACAN field. Mission Route Screen: **NAVAID DATA** in GPS Emulated TACAN field, ***Less [AMI]*** **NO MISSION DATA** or ***[AMI]*** **NO NAVAID ASSIGNED** in associated Navaid field, No Navaids or route displayed.	Verify DDL Cartridge is properly loaded.	DDL Cartridge not installed or improperly installed.	Unable to support GPS HSI parameters, situational awareness screens, and reloading IUS. Also the IU will not be able to provide Almanac data to the GPS Receiver. The IU should get almanac data from DTUC; ***[AMI]*** DTC
DDLC Data Corrupted or **Unable to access DDLC Navaid Information**	In GPS Mode Nav Invalid Flag on ADI, Range Flag on HSI.	Destination Data Screen: Blanks where associated Navaids would be, **NAVAID DATA** in GPS Emulated TACAN field. Mission Route Screen: **NAVAID DATA** in GPS Emulated TACAN field, ***Less [AMI]*** **NO MISSION DATA** or ***[AMI]*** **NO NAVAID ASSIGNED** in associated Navaid field, No Navaids or route displayed.	The navigator should verify proper cartridge is installed. The IU should try to request the same block of data several times before declaring a failure.	Data block requested from DDLC did not pass the checksum test, Navaid file not found, Almanac Data Corrupted on DDLC, Cartridge Table of Contents Corrupted, or Partition Directory File Corrupted.	Data cannot be used to support GPS HSI parameters, situational awareness screens, and reloading IUS.
DTUC; *[AMI]* DTC, Data Corrupted or **unable to access mission data from DTUC; *[AMI]* DTC**	No Impact.	Destination Data Screen: Blanks where associated Navaids would be Mission Route Screen: **NO MISSION DATA** in associated Navaid field, No route displayed.	IU should try to request the same block of data several times before declaring a failure.	Data record requested from DTUC; ***[AMI]*** DTC, did not pass the checksum test.	Crypto Key, B-52 Mission Data may not be available.
Invalid Crypto Variable	No indication unless data accuracies degraded. See **GPS Errors Excessive.**	No indication unless data accuracies degraded. See **GPS Errors Excessive.**	Check the Crypto Key source and re-start GPS.	Available Crypto Keys were not validated by the GPS.	Required GPS accuracy jeopardized. Weapon launches may require overrides and/or operate in degraded mode.

Figure 3-12 (Sheet 1 of 8)

ABNORMAL OPERATING CONDITIONS (Cont)

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
No Crypto Variable	No indication unless data accuracies degraded. See **GPS Errors Excessive.**	No indication unless data accuracies degraded. See **GPS Errors Excessive.**	Check the Crypto Key source and reload/reenter Crypto keys.	No Key entered on PKB, no Crypto data load received from the fill port, or DTUC. FMS will indicate DTUC fail if crypto key is corrupted on the DTUC; ***[AMI]*** DTC	Required GPS accuracy jeopardized. Weapon launches may require overrides and/or operate in degraded mode.
Less [AMI] **Mission on DDLC does not match DTUC Mission** or **DDLC Mission Data is Corrupted**	HSI & ADI Operates normally.	Destination Data Screen:Blanks where associated Navaids would be. Mission Route Screen: **NO MISSION DATA** in associated Navaid field, No route displayed.	Verify proper DDLC/ DTUC cartridges are installed.	DDLC and DTUC data are not correlated.	No associated Navaids unless manually assigned/ entered on PKB.
DAFIF is Out of Date	HSI & ADI Operates normally.	Destination Data Screen: **NAVAID DATE** in the annunciator field Mission Route Screen: **NAVAID DATE** in the annunciator field.	Load up to date data.	Data stored on DDLC or ***[AMI]*** DTC was derived from DAFIF version that is out of date.	Navaids recognized by FAA may not agree with those in the system (added or deleted) or Navaid data does not agree (Lat, Long, Mag Var, etc.).
GPS Receiver Acquiring Satellites	In GPS Mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero, TO/FROM flag indicates TO and Bearing Pointer Rotating.	When less than 4 satellites are available...Destination Data Screen: **GPS DATA** in the GPS Emulated TACAN field Mission Route Screen: **GPS DATA** in the GPS Emulated TACAN field.	Continue operation until satellites acquired.	Normal operation. If IU could not provide the Almanac data to the receiver acquisition time will be extended. The GPS receiver will continue to acquire satellites.	TACAN Emulation mode is not functional.
GPS – Air to Air Modes	ADI Nav Invalid Flag set, HSI distance flag set, Course Deviation set to 0, TO/FROM flag indicates TO, Bearing Pointer rotating.	Destination Data Screen: **CHANNEL** in the GPS Emulated TACAN field Mission Route Screen: **CHANNEL** in the GPS Emulated TACAN field, No selected TACAN identified on map.	Turn the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is set to GPS and the TACAN Control Mode switch is set to either A/A REC or A/A T/R mode.	Unable to support GPS HSI parameters. Selected Navaid data cannot be obtained. Some situational awareness data will not be available.

Figure 3-12 (Sheet 2 of 8)

Pilots' GPS IU/TACAN Abnormal Operations/ Fault Table (Cont)

ABNORMAL OPERATING CONDITIONS (Cont)

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
IU Reading Data from DDLC	No impact if additional data is not required from the DDLC. In GPS mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	No impact if additional data is not required from the DDLC. If data is required from the DDLC then, Destination Data Screen: Blanks where associated Navaids would be, **NAVAID DATA** in GPS Emulated TACAN field. Mission Route Screen: **NAVAID DATA** in GPS Emulated TACAN field, ***Less [AMI]*** **NO MISSION DATA** or ***[AMI]*** **NO NAVAID ASSIGNED**, in associated Navaid field, No Navaids or route displayed.	If the PKB indicates **DDL BUSY** for more than 2 minutes, Navigator should perform IBIT test on the DDL if on the ground. Otherwise, remove the DDLC from its receptacle for approximately 1 minute then reinstall the cartridge back in the receptacle.	May be normal operation or could indicate interface problem.	System unable to support HSI and Situational Displays.
TACAN Channel Out of Range (Greater than 200 NM)	In GPS Mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero, TO/FROM flag indicates TO and Bearing Pointer Rotating.	Destination Data Screen: **CHANNEL** in the GPS Emulated TACAN field Mission Route Screen: **CHANNEL** in the GPS Emulated TACAN field, No selected TACAN identified on map.	Select a Navaid that is within range or wait until selected Navaid is in range.	In GPS mode and the selected (tuned) TACAN channel is out of range or the A/C flies out of range (greater than 200 NM).	System will not compute range/bearing to selected station.
Selected channel has Multiple Navaids in the data base with the same channel and both are within 200 NM of the A/C current position	In GPS Mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero, TO/FROM flag indicates TO and Bearing Pointer Rotating.	Destination Data Screen: **CONFLICT** in the GPS Emulated TACAN field Mission Route Screen: **CONFLICT** in the GPS Emulated TACAN field, No selected TACAN identified on map.	Select a different Navaid.	Data base contains Navaids with the same channel that are close to each other (within 400 NM).	IUS is unable to determine which Navaid is selected.
Less [AMI] **Nuclear Mission Load**	HSI/ADI displays not affected.	Destination Data Screen: **NO MISSION DATA** where Destination List would be Mission Route Screen: **NO MISSION DATA** in associated Navaid field, No route displayed.	None - Normal operation for Block II Software Load.	Block II operational software loaded.	Information on the Situational Awareness screens is limited to Navaids only. HSI GPS display parameters unaffected.

Figure 3-12 (Sheet 3 of 8)

ABNORMAL OPERATING CONDITIONS (Cont)

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
No Selected Course	If the SDC is not faulted and in GPS mode Nav Invalid Flag on ADI, Range Flag on HSI, Course Deviation to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	No Impact.	Ensure TACAN Control Panel is turned on.	HSI fault, synchro/ Digital conversion fault, wiring.	No valid to–from or course Deviation on HSI.
TACAN Navigation Mode	Operates normally.	Destination Data Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field Mission Route Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field, no selected TACAN identified on map.	Turn the NAV Select Mode switch to GPS position.	The NAV Select Mode is set to TACAN and the TACAN Control Mode switch is set to either REC or T/R mode.	The MFD will not provide GPS emulated Range and Bearing data.
TACAN Air to Air Modes	Operates normally.	Destination Data Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field Mission Route Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field, no selected TACAN identified on map.	Turn the NAV Select Mode switch to GPS position and change the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is set to TACAN and the TACAN Control Mode switch is set to either A/A REC or A/A T/R mode.	The MFD will not provide GPS emulated Range and Bearing data and selected Navaid will not be displayed on map window.
TACAN Control Panel is off when in TACAN Navigation Mode	ADI Nav Invalid Flag set, HSI distance flag set, Course Deviation set to 0, TO/FROM flag indicates TO.	Destination Data Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field Mission Route Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field, no selected TACAN identified on map.	Turn the NAV Select Mode switch to GPS position and change the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is set to TACAN and the TACAN Control Mode switch is set to OFF.	Unable to support GPS HSI parameters. Some situational awareness data will not be available.
TACAN Control Panel is off when in GPS Navigation Mode	ADI Nav Invalid Flag set, HSI distance flag set, Course Deviation set to 0, TO/FROM flag indicates TO.	Destination Data Screen: **CHANNEL** in the GPS Emulated TACAN field Mission Route Screen: **CHANNEL** in the GPS Emulated TACAN field, No selected TACAN identified on map.	Turn the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is set to GPS and the TACAN Control Mode switch is set to OFF.	Unable to support GPS HSI parameters. Some situational awareness data will not be available.

Figure 3-12 (Sheet 4 of 8)

Pilots' GPS IU/TACAN Abnormal Operations/ Fault Table (Cont)

ABNORMAL OPERATING CONDITIONS (Cont)

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
Not in GPS or TACAN Navigation Mode	No Impact.	Destination Data Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field Mission Route Screen: **NOT IN GPS MODE** in the GPS Emulated TACAN field, No selected TACAN identified on map.	Turn the NAV Select Mode switch to GPS position and change the TACAN Control Mode switch to either REC or T/R position.	The NAV Select Mode is NOT set to GPS or TACAN mode.	Unable to support GPS HSI parameters. Some situational awareness data will not be available.
GPS Errors Excessive	Nav Invalid Flag set when FOM and Errors exceed allowed limit.	Destination Data Screen: **GPS DATA** in the GPS Emulated TACAN field Mission Route Screen: **GPS DATA** in the GPS Emulated TACAN field.	Navigator should attempt to re-acquire the GPS constellation.	FOM is greater than 6 and GPS error estimates for degraded GPS Data.	Degraded GPS.
Cone of Confusion	In GPS modes NAV invalid flag set. Course deviation should go to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	No Impact.	None - Normal operation.	Distance to Navaid less than 0.236 NM.	Bearing errors exceed required limits.

Figure 3-12 (Sheet 5 of 8)

SYSTEM FAULT CONDITIONS

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
IU Fail – BIT fault(s)	In GPS modes if TACAN Emulation function affected NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO. Otherwise normal if not affected by failure.	Display normal unless affected by failure.		IU BIT FAULT.	Dependent on function affected.
IU Fail – CPU failure	In GPS modes if TACAN Emulation function affected NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO.	NOT AVAILABLE.	Navigator should cycle IU power.	IU won’t come up due to hardware failure or no power. May or may not get an FMS failure indication depending on whether or not the IU is capable of informing FMS of the failure.	No IU function is supported.
IU Fail – No IUS	In GPS modes if TACAN Emulation function affected NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO.	NOT AVAILABLE.	Navigator should reload IUS.	Bad Software load and no DDLC is available. Degraded 1553 communication with FMS.	No IU function is supported.
SDC Fail	In GPS modes NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO if the SDC is capable.	No Impact.	Cycle TACAN power.	The SDC BIT detected a fail and set the fail discrete to IU.	TACAN and TACAN Emulation functions are questionable.
GPS Receiver Fail	In GPS modes NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO.	Destination Data Screen: **GPS DATA** in the GPS Emulated TACAN field. Mission Route Screen: **GPS DATA** in the GPS Emulated TACAN field.		GPS receiver set fail bit in 1553 message to IU.	GPS data is unreliable.

Figure 3-12 (Sheet 6 of 8)

Pilots' GPS IU/TACAN Abnormal Operations/ Fault Table (Cont)

COMMUNICATION FAILURE SYSTEM FAULT CONDITIONS

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
No ACU Communication	HSI & ADI should be functional.	Destination Data Screen: **NO OAS DATA** in the middle of screen, TAS: N/A, WIND: N/A , DRIFT: N/A, HDG: N/A. Mission Route Screen: **NO OAS DATA** in the middle of map display TAS: N/A, WIND: N/A, FCI: Blank, Heading: Blank, No Time-To-Go, **NO MISSION DATA**, no declutter status.		No Communication with the OAS.	Cannot monitor changes initiated by the navigator on the IKB. Cannot pick up TAS, Heading, Winds, Current Destination, or FCI Data.
DDLR or DDLC Fail or no communication with DDL	In GPS modes, if data not available to support calculations, NAV invalid flag and distance flag set. Course deviation should go to zero and the TO/FROM flag indicates TO. Otherwise normal, if not affected by failure.	No impact if additional data is not required from the DDLC. If data is required from the DDLC then: Destination Data Screen: Blanks where associated Navaids would be, **NAVAID DATA** in GPS Emulated TACAN field, Mission Route Screen: **NAVAID DATA** in GPS Emulated TACAN field, **NO MISSION DATA** in associated Navaid field, No Navaids or route displayed.		No Communication with the DDLC.	Unable to access DDLC data or data is unreliable. HSI and Navaid information on situational screens cannot be supported.
No Communication with GPS Receiver	In GPS modes NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	Destination Data Screen: **GPS DATA** in the GPS Emulated TACAN field. Mission Route Screen: **GPS DATA** in the GPS Emulated TACAN field.		No communication with GPS Receiver.	GPS data is not available.
No Communication with SDC	In GPS modes NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	Not Impacted.		No Communication with the Signal Data Converter.	HSI/ADI displays cannot be supported in GPS Mode.
No Communication with TACAN Control Panel	In GPS modes NAV invalid flag and distance flag set. Course deviation should go to zero and TO/FROM flag indicates TO and Bearing Pointer Rotating.	Destination Data Screen: **CHANNEL** in the GPS Emulated TACAN field. Mission Route Screen: **CHANNEL** in the GPS Emulated TACAN field, No selected TACAN identified on map.		No communication with the TACAN Control Panel.	Unable to select Navaid for TACAN or GPS modes.

Figure 3-12 (Sheet 7 of 8)

OPERATOR INITIATED SELF TEST CONDITIONS

CONDITION	HSI/ADI INDICATION	MFD INDICATION	CORRECTIVE ACTION	PROBABLE CAUSE	CAPABILITY LOST/ LIMITATIONS
Operator Initiated Self Test on TACAN control	Deviation bar moves left and right 1 dot, range indicator switches between invalid and 234 NM, Bearing Pointer rotates from 45 degrees to 180 degrees (relative to the compass rose).	No Impact.	N.A. Normal Operation, Wait until Self Test Complete (approx 30 sec).	Operator Initiated Self Test via TACAN control Head.	HSI bearing pointer will rotate, range indication is fixed to invalid or 234, and flags are set.
Operator Initiated Self Test on SDC from the PKB	Deviation bar moves left and right 1 dot, range indicator switches between invalid and 234 NM, Bearing Pointer rotates from 45 degrees to 180 degrees (relative to the compass rose).	No Impact.	N. A. Normal Operation, Wait until Self Test Complete (approx 20 minutes or until disabled).	Operator Initiated Self Test via SDC switch, when TACAN Control IBIT has been selected or requested by the IU via the SDC ARINC bus.	HSI bearing pointer will rotate, range indication is fixed to invalid or 234, and flags are set. Limited to Ground operation only.

Figure 3-12 (Sheet 8 of 8)

[CS] Integrated Conventional Stores Management System

ABNORMAL OPERATION

BIT ADVISORIES

The BIT function of the weapon delivery SMO will provide fault data display and data recording capabilities for SMO-unique or SMO-critical faults in conjunction with the FMS BIT function and its associated displays and recording functions. The BIT function of the weapon delivery SMO will indicate SMO-unique equipment failure on FRMT-6, provide equipment fault status information to the operator by using master faults, collect and record pertinent data in case of SMO-unique or SMO-critical equipment failure, and request event recording of sequencing to an IP, bomb mode entry/exit, or simulation mode entry/exit.

FAULT DATA DISPLAY

The weapon delivery SMO will display fault data in the OAS advisory window of the MFD and illuminate the MSTR FLT indicator on the weapon control panel in the event a fault occurs. After the operator acknowledges the master fault by pressing the MSTR FLT button, the weapon delivery SMO will respond by erasing the fault message from the displays and extinguishing the “MSTR FLT” indicator.

KY-100 ERROR MESSAGE DISPLAYS

DU

Figure 3-13 lists the error messages displayed on the Z-AVH Remoter Control and the KY-100 MTU. In addition to the message, the meaning of the message and its corrective action are also listed.

KY-100 Error Message Displays

DU

ERROR DISPLAY	MEANING AND CORRECTIVE ACTION
AbORT	The AbORT message indicates that a transmission has been preempted during MILSTAR voice operation in the Narrowband Black Digital mode. The abort message is accompanied by a repeating tone. Release the PTT switch and retry the transmission. When the CTS (Clear To Send) option is selected (188 or SW GND) it indicates that the CTS signal at J1-c of the RADIO connector has deactivated before the user has released the PTT switch.
bAd KEY	The bAd KEY message indicates a incorrect or corrupted key is selected. Select the proper key and retry the call. If the call fails again, perform an off-line test and alarm check. If necessary reload the key.
bAd CLK	The bAd CLK message indicates no clock signal is present in Narrowband (ANDVT) Black Digital mode. Retry operation. If the operation still fails, notify maintenance.
bAd EbM	The bAd EBM message indicates the user has attempted to enter the EB (Emergency Backup) mode with a corrupted or non-existent EB key. Load a valid EB key.
bUZY	The bUZY message indicates the terminal is in the Narrowband Black Digital mode with the MILSTAR option set to OFF. The Signal Present input at J1-M of the RADIO connector is active. A single depression of the PTT switch will result in a bUZY message. A double depression of the PTT will override the Signal Present indication and cause a transmit condition which may interfere with a co-channel user.
CM bAT	The CM bAT message indicates the Fill battery is low. The battery should be replaced.
COMM ERR	The COMM ERR message indicates a communication error has occurred between the Modem and the COMSEC PWAs. Perform an off-line AUTO test. If test fails notify maintenance.
CONF ERR	The CONF ERR messages indicates a terminal configuration error. In Wideband (VINSON) modes, operating with the EB key, selecting the red data operation will result in a configuration error.
dEV ERR	The dEV ERR message indicates a fill device error. The fill device is improperly configured during a COMSEC operation involving the FILL connector. Causes include: improperly connected fill cable, invalid key at the selected location, fill device in wrong mode (especially the OFF position), more than one key selected on the NCD when only one is required, a malfunctioning fill device, etc.

Figure 3-13 (Sheet 1 of 3)

KY-100 Error Message Displays (Cont)

DU

ERROR DISPLAY	MEANING AND CORRECTIVE ACTION
Eb ERR	The Eb ERR messages indicates that the COMSEC subsystem received a command restricted command while in the EB mode. Perform an off-line AUTO test. If the test fails, turn the unit off then back on and repeat the test. If the test still fails, notify maintenance.
ER RK	The ER RK messages indicates the terminal has received a signal with a preamble indicating that the message is a rekeying message, however the MODE control is not in the RK position. This message can also occur if the preamble is received improperly due to a noisy receive signal or a poor clock in Black Digital mode.
FAIL bIO	The FAIL bIO message indicates a failed Black I/O test. Notify maintenance.
FAIL CM	The FAIL CM message indicates a possible COMSEC fault has been detected. Perform off-line AUTO tests. If the tests pass, resume normal operation. If a failure is detected, notify maintenance.
FAIL CMA	The FAIL CMA message indicates a failed COMSEC A PWA test. Operation will be restricted to plaintext voice only or off-line modes depending on the severity of the failure.
FAIL CMb	The FAIL CMb message indicates a failed COMSEC B PWA test. Operation will be restricted to plaintext voice only or off-line modes depending on the severity of the failure.
FAILEd	The FAILEd message indicates a failed menu lock or unlock operation. Attempt the operation again. If the operation still fails, turn off the KY-100 and remove the Fill battery is low. The battery should be replaced and the terminal should be reinitialized.
FAIL FP	The FAIL FP message indicates a failed front panel test. Notify maintenance.
FAIL KEY	The FAIL KEY message indicates a incorrect or corrupted key is selected. Select the proper key and retry the call. If the call fails again, perform an off-line test and alarm check. If necessary reload the key. This message can also occur if the preamble is improperly received due to a noisy receive signal or poor clock in Black Digital mode.
FAIL MP	The FAIL MP message indicates a failed Modem Processor PWA test. Notify maintenance.
FAIL RCU	The FAIL RCU message indicates a failed Z-AVH Remote Control Unit (RCU) test. Notify maintenance.
FAIL RIO	The FAIL RIO message indicates a failed Red I/O PWA test. Notify maintenance.
FAIL VP	The FAIL VP message indicates a failed Voice Processor PWA test. Notify maintenance.
INVALId	The INVALId message indicates the user has selected PT mode with the MODE switch and the terminal configured for CT ONLY operation. Using the on-line CT/CT ONLY menu, select CT.
NO KEY	The NO KEY message indicates not valid keys (traffic or unique) are present.

Figure 3-13 (Sheet 2 of 3)

KY-100 Error Message Displays (Cont)

DU

ERROR DISPLAY	MEANING AND CORRECTIVE ACTION
NO TEK	The NO TEK message indicates the selected TEK location does not contain a valid TEK. Load a valid key in the location or select another key location. A different key location can be selected using the on-line menus with PRESET control in the MAN position or by selecting a different preprogrammed PRESET position.
PT ONLY	The PT ONLY messages indicates Plain Text only mode. The terminal has experienced a COMSEC failure or does not contain a valid TEK. Perform an off-line AUTO test to clear the condition. If the terminal is zeroized, load a TEK. If the condition cannot be cleared, operate the terminal in the PT mode. Notify maintenance.
PUL ZALL	The PUL ZALL message indicates to the operator to PULL Z ALL (select the Z ALL position on the MODE switch).
RCV NG	The RCV NG indicates a signal has been received, but the preamble is corrupted due to a noisy signal or poor external clock in Black Digital modes. When using the EB key, the reception of a digital data or rekey transmission will cause the RCV NG message.
RMV NCD	The RMV NG message indicates the user has improperly configured the NCD during and NCD related operation. Turn off and remove the NCD, check the key location if appropriate, then reconnect the NCD and repeat the operation.
TX NG	The TX NG message indicates the transmit operation has failed. In Narrowband modes operating with the EB key, application of digital PPT (J2-T) will cause the TX NG message.

Figure 3-13 (Sheet 3 of 3)

LITENING Targeting Pod Fault Listings *[TP]*

Pilot Fault Listings (PFL)

PFL	FAULT TEXT	EFFECT	REMARKS
1	Not Used		
2	ELECTR FAIL	Total loss of pod function	Continue, if no problems observed.
3	POWER SUPPLY FAIL	Loss of at least one power supply or 3-Phase frequency problem	Stow TGP and cycle TGP power, if problems are observed.
4	TRACKR FAIL	Tracker problems	Continue, if no problems observed.
5	INERTL SENSOR FAIL	Pointing/Track problems	Continue, if no problems observed.
6	VIDEO INTRFC FAIL	Loss of video synchronizations	Continue, if no problems observed.
7	CCD FAIL	Loss of one/both CCD FOV’S video	Continue, if no problems observed.
8	FLIR FAIL	Loss of FLIR video	Continue, if no problems observed.
9	LASER DESGNTR FAIL	No laser designator	Laser inoperative. Confirm laser is disabled. Do not use.
10	PIM MODULE FAIL	Loss of PIM codes	Do not use PIM coding
11	LASER DESGNTR ENERGY LEVEL	Laser low energy emission	Laser may not have enough energy to guide.
12	LASER SPOT DTECTR FAIL	No SPOT DETECTION	LSS/T inoperative.
13	LASER RANGE FINDNG FAIL	No RANGE FINDING	RANGING inoperative.
14	LASER BORE SIGHT FAIL	Loss of laser boresight parameters Laser may not be aligned with cursors	Confirm laser is disabled. Do not use.
15	ENVRON CONTRL UNIT FAIL	Loss of ECS control or Loss of one of the ECU elements	Problem at low altitude only.
16	SERVO SYSTEM FAIL	Loss/degraded Servo system	Continue, if no problems observed.
17	LOW PRESUR FRONT SECT	Low pressure. Cannot operate the laser	Laser inoperative. Descend to lower altitude. Confirm laser is disabled. Do not use laser.
18	IR MARKER FAIL	Loss of IR MARKER	Confirm IR MARKER is disabled. Do not use IR MARKER.
19	POD IS OVER HEATING	High temperature in pod	Climb to higher altitude. Usually occurs at low altitude. If problem persists, shut down TGP.

Figure 3-14 (Sheet 1 of 2)

LITENING Targeting Pod Fault Listings (Cont) *[TP]*

Maintenance Fault Listings (MFL)

MFL	FAULT TEXT	EFFECT	REMARKS
1	FRONT SECT DEGRAD	Front Section	
2	SYSTEM ELECTR UNIT DEGRAD	SEU	
3	FLIR ELECTR UNIT DEGRAD	FEU.	Continue if no problems observed.
4	POWER SERVO UNIT DEGRAD	PSU	Continue if no problems observed.
5	INTERFC UNIT DEGRAD	IU	
6	ENVIRON CONTROL UNIT DEGRAD	ECU	Problem at low altitude only.
7	HUMIDT HIGH FRONT SECT	Front Section	Replace desiccant bag.

Figure 3-14 (Sheet 2 of 2)

Miniature Receive Terminal (MRT)

MALFUNCTION ANALYSIS

The MRT contains diagnostic fault detection and isolation capability. This Built-In-Test (BIT) is capable of operating in two different modes which are off-line fault diagnostics and on-line performance monitoring and fault detection.

The off-line diagnostics take approximately 2 minutes to run and are initiated at power on or when the TEST SYS/OFF/LAMP switch on the RCU is set to SYS. When an off-line test is initiated the TEST GO and FAULT/PRINT indicators light and remain lit, and normal system operation is interrupted until the BIT test is completed. The off-line diagnostics results in a complete functional test of the receiver, testing of the TE and TM antennas, individual self tests of the transfer module and the printer, and the operational status of the RCU is checked and verified. An out of tolerance condition initiates fault isolation routines within the diagnostics that will isolate the failure to the line repairable unit (receiver, transfer module, printer, RCU, TE antenna or TM antenna). The RCU TEST FAULT/PRINT indicator will remain lit and pressing the TEST FAULT/PRINT indicator will cause the printer to print out the results.

The on-line diagnostics are continuously running in the background during system operation. These are non-interfering tests to ensure that the system operates. They include ROM checksum tests, RAM tests, power supply and phase-lock loop monitoring and printer BIT tests. If any of the tests fail, a flag is set in the diagnostics program which will cause the receiver to run a full BIT diagnostic during the next idle period of operation.

The printer will perform an on-line diagnostic BIT test when the printer SELF TEST switch indicator is pressed. The test will result in a test message printout and, if a fault exists, the STATUS FAULT indicator will light.

GENERAL TROUBLESHOOTING

The most probable MRT faults an operator will observe will be no message printed with MSG received light on or printer is out of paper.

NOTE

> A Printer Fault Light normally indicates a low paper condition. If after the paper is changed the light is still on, it is a hardware failure.

Other factors that cause errors and malfunctions are outside interference and adverse atmospheric conditions. Some conditions that cause malfunctions are temporary, such as loss of signal during banking of the aircraft.

Loose coaxial cable connectors or power cable connectors will cause erroneous fault indications and incorrect BIT test results.

NOTE

> Ensure the BNS Front Panel light rheostat is rotated fully clockwise to provide power to all RCU lights. Failure to do so will result in a false BIT indication.

All circuit breakers are located on the A178, AUXILIARY BNS circuit breaker panel. Circuit breakers for the MRT RCU and printer are 2.5 amps each. The RCU circuit breaker is labeled MINITR REC TERM CONT and the printer circuit breaker is labeled MINITR REC TERM PTR. The circuit breakers for the receiver are 115V ac 3-phase 2.5 AMP The receiver circuit breakers are labeled MINITR REC TERM RCVR ϕA, ϕB and ϕC.

BIT Printout and Malfunctions

Sample BIT printouts are shown in figure 3-15. A description of the BIT printout is shown in figure 3-16. Typical malfunctions and corrective action procedures to clear the malfunction are shown in figure 3-17. If the malfunction cannot be cleared, attempt to re-initiate normal operation.

MRT Sample BIT Printout

1	SELF TEST COMPLETE NO FAULTS DETECTED. SYSTEM STATUS: FULLY OPERATIONAL
2	SELF TEST COMPLETE FAULTS DETECTED: RECEIVER ANALOG SECTION OTHER POSSIBLE CAUSE: NONE SYSTEM STATUS: DEGRADED
3	TEST ABORTED FAULTS DETECTED: RCU OTHER POSSIBLE CAUSE: RECEIVER
4	FAULTS DETECTED: TM OTHER POSSIBLE CAUSE: RECEIVER SYSTEM STATUS: INOPERATIVE

Figure 3-15

MRT BIT Printout

BIT PRINTOUT	DESCRIPTION
*U*U	Universal asynchronous receiver/transmitter test characters.
SELF TEST COMPLETE	Indicates all BIT tests have been run.
TEST ABORTED	Indicates all BIT testing stopped due to a major fault.
NO FAULTS DETECTED	Indicates all BIT tests passed.
PRINTER LOW ON PAPER	Indicates printer has less than a quarter roll of paper remaining.
FAULTS DETECTED:	Printed out with each fault detected.
RECEIVER	Receiver is defective.
RECEIVER ANALOG SECTION	Receiver has a fault in the signal receiving section.
RECEIVER DIGITAL SECTION	Receiver has a fault in the signal processing section.
RCU	Remote control unit is defective or not connected.
PRINTER	Printer has failed internal self test or is off-line.
TM	Transfer module has failed internal self test, has an incorrect checksum or is not connected.
TM ZEROIZED	Crypto key has been zeroized in the transfer module.
TE LEFT ANTENNA	TE left antenna or path defective.
TE RIGHT ANTENNA	TE right antenna or path defective.
TM ANTENNA	TM forward/aft or left/right antenna or path defective.
TE ANTENNA CABLING PROBLEM	TE antenna cables or connections incorrectly installed, possible reversed TE antenna phase.
NONE	Used to indicate no other possible cause for a fault. **NOTE** In the case of a suspected signal path problem, the receiver will be flagged as the secondary candidate for the fault.
OTHER POSSIBLE CAUSE	Indicates another reason for the previous BIT fault. See FAULTS DETECTED for printouts and description of printouts.
SYSTEM STATUS:	Printed before the system operational status.
FULLY OPERATIONAL	Indicates the MRT is operational.
DEGRADED	Indicates the MRT is working but not fully operational.
INOPERATIVE	Indicates the MRT has one or more major faults.

Figure 3-16

MRT BIT Malfunctions

NOTE

Accomplish steps in order.

BIT MALFUNCTIONS	CORRECTIVE ACTION STEPS
FAULTS DETECTED/OTHER	1. Remote control unit PWR ON/STBY switch – STBY
POSSIBLE CAUSE:	2. Pull and reset MINITR REC TERM RCVR ϕA, ϕB, and ϕC CBs [1]
RECEIVER – Accomplish steps 1, 2, 10, and 11	3. Pull and Reset MINITR REC TERM PTR and MRT PNL LTS CB s [1]
RECEIVER ANALOG SECTION – Accomplish steps 1, 2, 10, and 11	4. Pull and Reset MINITR REC TERM CONT and MRT PNL LTS CBs [1]
RECEIVER DIGITAL SECTION – Accomplish steps 1, 2, 10, and 11	5. Check MRT printer door for security and paper for quantity
RCU – Accomplish steps 1, 4, 10, and 11	6. Check MRT receiver for installation and security of transfer module [2]
PRINTER – Accomplish steps 1, 3, 5, 10, and 11	7. Check transfer module CLR indicator – White - zeroized; Black - loaded
TM – Accomplish steps 1, 6, 10, and 11	8. If CLR indicator – White, annotate malfunction in AFTO FORM 781
TM ZEROIZED – Accomplish steps 1, 6, 7, 8, 9,	9. If CLR indicator – Black, remote control unit PWR ON/STBY switch – ON
TE LEFT ANTENNA – Accomplish steps 12 and 13	10. Remote control PWR ON/STBY switch – ON
TE RIGHT ANTENNA – Accomplish steps 12 and 13	11. MRT BIT test is automatically accomplished when PWR switch is placed to ON
TM ANTENNA – Accomplish steps 12 and 13	12. Reaccomplish BIT test to confirm malfunction
TE ANTENNA CABLING PROBLEM – Accomplish steps 12 and 13	13. Annotate confirmed or intermittent malfunction in AFTO FORM 781

[1] Located on the AUX BNS circuit breaker panel

[2] MRT receiver is located on the left equipment rack in the Navigators’ compartment

Figure 3-17

OAS Configuration

ABNORMAL OPERATION

Less [AMI] POWER INTERRUPTION PROCEDURES

Preflight – External Power Applied

If external power fails after OAS turn-on procedures have been accomplished to the point of applying IME power, but the IMU gyros have not started to spin-up during either air or ground alignment), accomplish the following:

1. Re-apply external power.
2. Re-accomplish OAS, EVS, and RADAR TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) PROCEDURES, Section II.

If external power fails after IMU gyros have started spin-up during an alignment procedure or the INSs have completed alignment and a navigation mode has been entered, accomplish the following:

1. Monitor each despin light on the respective IEU. A 5 minute despin cycle occurs on both IMUs using the respective rotor support battery. The despin light goes off when the despin cycle is complete.
2. Re-apply external power.

CAUTION

The IMU can be restarted after one shutdown. A 5 minute wait is required after receiving the SHUTDOWN message. If an IMU is shut down again within 2 hours of the last restart, the IMU will remain off with cooling air for 2 hours before a restart can be attempted.

3. Re-accomplish OAS, EVS, and RADAR TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) PROCEDURES when despin is complete.
4. Check FRMT-6 for PME status.

NOTE

The mission can be flown using ALTER navigation mode depending on mission priorities, however, missiles cannot be launched.

If only one IME can be powered up, the mission can be flown normally using the aided-inertial navigation mode. There will be no IME backup if the operational IME fails.

Inflight

If ac power is interrupted for more than 10 seconds, or an ac and dc power interruption occurs simultaneously to the OAS, either by aircraft power failure or inadvertently turning off the OAS power switch, accomplish the following:

1. The IMUs despin using their respective rotor support battery power. The despin continues on battery power even though aircraft power is reapplied during the despin cycle. Monitor each despin light on its respective IEU until despin light goes off. The normal despin cycle is 5 minutes.
2. Accomplish OAS, EVS, and RADAR TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) PROCEDURES after aircraft power is reapplied and despin is complete. If one IME can be powered up and the other one cannot, the mission can be continued normally after the IME has completed air alignment. When the OAS is powered up after power has been restored, the OAS enters the alternate navigation mode automatically. If either IME can be powered up, the OAS will automatically shift to the aided-inertial mode when air alignment is complete.

[AMI] POWER INTERRUPTION PROCEDURES

CAUTION

> Inadvertent OAS power shutdown, prior to properly shutting down the ACUs, will result in continuously powered INUs. The status of the INUs are not monitored after OAS shutdown. Attempt re-power of the OAS and perform proper ACU shutdown procedures. If conditions prevent re-powering the OAS, pull NO.1 and NO.2 INS DC B/U circuit breakers (RLC/F29 and LLC/F6) and the NO.1 and NO.2 INS AC PWR circuit breakers (LFBNS/A2 and LFBNS/B4) to prevent continuous operation of the INUs. Failure to remove power from the INUs could result in damage to the INUs after ECS shutdown.

Preflight – External Power Applied

If external power fails after OAS turn-on procedures have been performed, accomplish the following:

1. Re-apply external power.
2. Re-accomplish OAS, EVS, and RADAR TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) PROCEDURES, Section II.
3. If necessary, restart each INU by pressing each respective IME power switch.

Inflight

If ac power is interrupted for more than 10 seconds, or an ac and dc power interruption occurs simultaneously to the OAS, either by aircraft power failure or inadvertently turning off the OAS power switch, accomplish OAS, EVS, and RADAR TURN-ON (AIRCRAFT POWER AND COOLING AIR AVAILABLE) PROCEDURES after aircraft power is reapplied.

If the INUs were operating prior to loss of OAS power, they will remain powered and operating. When OAS power is restored, the OAS enters the alternate navigation mode automatically. If either INU is navigating, the OAS will automatically shift to an aided-inertial mode.

OAS BIT Advisory Malfunction Index

NOTE

The OAS BIT advisory malfunction index does not cover all the possibilities for cockpit trouble or ordinary fuse and circuit breaker failures. Before using this index, ensure that all system switches are in the proper positions and that correct operating procedures are being employed. After determining that a malfunction exists, check circuit breaker panels for tripped circuit breakers, BIT indications, advisory messages on MFD, system status on FRMT-6, and check for illuminated indicator or warning lights.

BIT ADVISORIES

The OAS contains a Built-In-Test (BIT) processing function to determine failures in the prime mission equipment (PME). When an item of PME experiences a malfunction an advisory will appear on all MFD's in the advisory message area. The BIT malfunction index in figures 3-18 for both ***[AMI]*** and ***Less [AMI*** shows the location for the appropriate malfunction analysis. When an advisory occurs, the operator may locate the corresponding advisory information on the appropriate sheet of figure 3-18.

OAS CIRCUIT BREAKERS

OAS circuit breaker are listed in figure 3-22. The circuit breaker panels and locations are shown in figure 3-26 and T.O. 1B-52H-1.

BIT Advisory Malfunction Index
Less [AMI]

FAULT INDICATION	FIGURE 3-18, SHEET NO.
ACU-A SELF TST	Sheet 4
ACU-B SELF TST	Sheet 4
ACU-C SELF TST	Sheet 4
AHRS	Sheet 4
AHRS DATA	Sheet 4
AIU	Sheet 5
BAY CONFIG	Sheet 5
CDIU	Sheet 5
CSCP	Sheet 6
DEU	Sheet 6
DPLR	Sheet 6
DPLR DATA	Sheet 6
DTU N, N = 1,2,3,4	Sheet 7
DTU N, HARD ERROR	Sheet 7
DTU N, PROT ERROR	Sheet 7
DTU N, SOFT ERROR	Sheet 7
DTU N, EOT	Sheet 7
EIU	Sheet 7
EMP	Sheet 7
H/S NOGO	Sheet 8
IME 1	Sheet 8
IME 2	Sheet 8
IME 1, DATA	Sheet 8
IME 2, DATA	Sheet 8
INS-N READY, N = 1, 2	Sheet 8
INS-N SPINDN A/C, N = 1, 2	Sheet 8
INS-N SIPNDN BAT, N = 1, 2	Sheet 9
NKB	Sheet 9
NO OAS DATA	Sheet 9
PDU	Sheet 9
PDUC	Sheet 9
PWR TRANS	Sheet 9
RADAR	Sheet 9
RDR ALT	Sheet 10
RDR ALT DATA	Sheet 10
RNKB	Sheet 10
RIU DATA	Sheet 10
RNMP	Sheet 10
RSC	Sheet 11
STEER	Sheet 11
TAS, W/V	Sheet 11
TAS W/V, ALT	Sheet 11
VID RCDR	Sheet 11
WCP	Sheet 11

* Messages for EMP events and power transients will be displayed when the faults occur. The fault will clear automatically when the condition causing the fault clears. The message has to be acknowledged to clear display.

Figure 3-18 (Sheet 1 of 25)

BIT Fault Advisory Malfunction Index
[AMI]

FAULT INDICATION	FIGURE 3-18, SHEET NO.
PRIMARY APPLICATION LOADER ERROR MESSAGES	
DEU ERROR	Sheet 12
DTRn 1553	Sheet 12
DTRn COM	Sheet 12
DTRn FC	Sheet 13
LOAD ERROR	Sheet 13
FMS FAULTS	
ACU-A SELF TST	Sheet 14
ACU-B SELF TST	Sheet 14
AHRS	Sheet 14
AIU	Sheet 15
CDIU	Sheet 15
CLAPAR LD FAIL	Sheet 15
CSCP	Sheet 16
DEU	Sheet 16
DOORS	Sheet 16
DPLR	Sheet 16
DTR-n	Sheet 16
DTR-n BAD DTC	Sheet 17
EIU	Sheet 17
INU-n	Sheet 17
INU-n HALTED	Sheet 18
MDATA FAIL	Sheet 18
NKB	Sheet 18
NVM FLT RCD	Sheet 18
RADAR	Sheet 19
RDR ALT	Sheet 20
RDR ALT DATA	Sheet 20
RIU	Sheet 20
RNKB	Sheet 20
RNMP	Sheet 20
RSC	Sheet 21
SMO LOAD FAILED	Sheet 21
STEER	Sheet 21
SUP APP LD FAIL	Sheet 21
TAS, W/V, ALT	Sheet 21
VID RCDR	Sheet 21
WCP	Sheet 21

Figure 3-18 (Sheet 2 of 25)

BIT Fault Advisory Malfunction Index (Cont)
[AMI]

FAULT INDICATION	FIGURE 3-18, SHEET NO.
FMS ADVISORIES	
2-ACU FULLUP	Sheet 22
AHRS DATA	Sheet 22
DOV LD FAIL	Sheet 22
DPLR DATA	Sheet 22
DTR-n DTC FULL	Sheet 22
INU-n DATA	Sheet 22
INU-n DECLASS	Sheet 22
INU-n DEG NAV RDY	Sheet 22
INU-n EGC ABORT	Sheet 22
INU-n ILLGL CMD	Sheet 23
INU-n READY	Sheet 23
MDATA COMPLETE	Sheet 23
MDATA LOADING	Sheet 23
NO OAS DATA	Sheet 24
NVM FLT RCD	Sheet 24
SMO CHANGE CMPLT	Sheet 25
SMO LD REQUIRED	Sheet 25
SMO LOAD CHANGE	Sheet 25
SUP APP LD CMPLT	Sheet 25

Figure 3-18 (Sheet 3 of 25)

Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
ACU-A SELF TST	1. Before PROC SYNC a. Press PROC STATUS light to clear NO-GO. b. Cycle OAS power switch to OFF and then to ON if IME power has not been applied. 2. After PROC SYNC a. OAS may reconfigure. See reconfiguration, this section. If processor does not reconfigure, continue operation b. If the processor loaded with the hot spare program is NO-GO, and AP A goes NO-GO the remaining processor will also shut down.	ACU-A fails self-test	No capability is lost while two processors remain operational. Reconfiguration capability is lost. See Re-configuration, this section.
ACU-B SELF TST	Same as ACU A SELF TST	ACU B fails self-test	Same as ACU A SELF TST
ACU-C SELF TST	Same as ACU A SELF TST	ACU C fails self-test	Same as ACU A SELF TST
AHRS	1. Advise the pilot and copilot 2. Check auxiliary BNS circuit breaker panel, OAS NAV AHRS 3. Check FRMT-6 (PME STATUS) to determine bus fault or associated equipment fault 4. Use INS heading if available 5. If INS heading unavailable, accomplish alternate true heading calibration 6. If unable to accomplish alternate true heading calibration, manually enter true heading using FRMT-8 7. If AHRS is lost in some phases of INS alignment, manually enter true heading using FRMT-8	● Data bus response ● Navigational functional elements ● Slaved mode ● Attitude data invalid ● Heading data invalid ● Directional gyro modes	● Alternate navigation references ● Doppler/AHRS ● TAS + winds/AHRS ● AHRS heading ● HSI heading indication
AHRS DATA	1. Advise the pilot and copilot 2. Check FRMT-6 (PME STATUS) to determine bus fault or associated equipment fault 3. Use INS heading if available 4. If INS heading is unavailable, accomplish alternate true heading calibration 5. If unable to accomplish alternate true heading calibration, manually enter true heading using FRMT-8 6. If AHRS is in compass mode, the operator must manually enter the ALTER NAV heading on FRMT-8	● Data bus response ● Navigational functional elements ● Attitude data invalid ● Heading data invalid	● Alternate navigation references ● Doppler/AHRS ● TAS + winds/AHRS ● AHRS heading ● HSI heading indication

Figure 3-18 (Sheet 4 of 25)

BIT Advisory Malfunction Analysis (Cont)
Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
AIU	1. Check AIU circuit breaker on the right SV filter box circuit breaker panel 2. Pull and reset AIU circuit breaker on right SV filter box circuit breaker panel. 3. Refer to command guidance	● Equipment fault	● Missile launch or jettison ● Pylon jettison CM ● ECU ● Launcher rotation ● Missile hydraulic power ● MIU power ● OAS bomb door operation (missiles) ● Pylon EED power ● RBS tone cutoff ● Radar altimeter input to OAS ● Radar Altimeter Bomb Door Status ● Launcher Motion Status ● AC power Status for L,R ● Pylons ● ECU Power Status Environment Go/NoGo ● Monitor ● Tail Warning GS ● ECU Power & Heater ● Bomb Door Open/Close ● MIU/WIU Heater Pwr ● MIU/WIU AC Pwr
BAY CONFIG	1. None	● Discrepancy between mission data tape stores message and actual weapon loaded on CSRL	● (To be determined)
CDIU	1. Check the right S/V filter box circuit breaker panel, CDIU circuit breaker, and reset if necessary 2. Work around CF-E or CF-F commands listed for the WCP and RNMP fault indications are applicable to this fault.	● BIT ● Equipment malfunction	● Computational subsystem control ● RNMP ● WCP ● OAS power control panel ● Consent switches - Pilot and RN ● Power Cont. Pph Lights - IME,MIU,Launcher

Figure 3-18 (Sheet 5 of 25)

Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
CSCP	1. Check two CONTR PNL DC circuit breakers on AUX BNS circuit breaker panel marked NORM and ALT 2. If the circuit breakers are in, no operator corrective action possible; do not recycle OAS	● Logic circuits in the computer control panel	● Power ON/OFF logic to each AP ● Indication of ON/OFF power status ● Maintenance of GO/NO-GO status ● Initiation of AP synchronization ● Individual initiation of computer program load for each AP ● Indication of program resident in each AP ● Selection of DTU from which to load stored program ● Indication of DTU power status
DEU	1. Pull and reset left forward overhead BNS circuit breaker panel DEU 1 and DEU 2 2. Check right S/V filter box circuit breaker panel DEU 1 and DEU 2 circuit breakers 3. Select EVS or RDR video (one will be inoperative) 4. Select left or right MFD (one will be inoperative) 5. Utilize radar navigator's or navigator's keyboard (one will be inoperative)	● No. 1 or No. 2 symbol generator ● No. 1 or No. 2 power supply ● No. 1 or No. 2 processor memory ● BIT	● MFD display formats ● DAS symbology ● Selection of radar or EVS video ● Video recording ● Processing capability for alphanumeric and symbology display, also keyboard I/O bus data
DPLR	1. Check auxiliary BNS circuit breaker panel, OAS NAV Doppler RDR 2. Recycle Doppler 3. Navigation reference will switch to TAS +winds/AHRS if operating in alternate navigation and TAS inertial if in aided inertial and the navigation submode is automatically selected	● BIT ● DVS inoperative ● GSDI inoperative	● Doppler velocity input ● Doppler-inertial navigation submode ● Doppler/AHRS navigation submode
DPLR DATA	1. Select FRMT-6 ENTER to display PME status 2. Use memory point procedures or manually insert winds using format 8 3. Select FRMT-8 (alternate data display) to modify navigation data via MDFY --- ENTER of appropriate line number	● BIT ● Heading velocity invalid ● Drift velocity invalid ● Vertical velocity invalid	● Alternate navigation mode data ● Doppler

Figure 3-18 (Sheet 6 of 25)

BIT Advisory Malfunction Analysis (Cont)
Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
DTU N N = 1, 2, 3, 4	1. Check auxiliary BNS circuit breaker panel OAS COMPUTATIONAL DTU PWR NO. 1 2. Check DTU 1 circuit breaker on right S/V filter box circuit breaker panel 3. Check FRMT 6 for DTU status 4. Attempt to load DTU N tape through other DTUs	● Tape cartridge inoperative ● Cartridge mount inoperative	● No capability lost if desired cartridge is accepted by another mount
DTU-N HARD ERROR	1. Load cartridge in another mount to determine if cartridge mount is at fault	● DTU cartridge mount malfunction	● DTU, if fault cannot be corrected
DTU-N PROT ERROR	1. Get another tape cartridge and reload	● Hardware/Read software write error count	
DTU N SOFT ERROR N = 1, 2, 3, 4	1. For cruise missile data load, check for launch point sequence number under line on FRMT-7 2. Check the indicators and control switches on the CSCP 3. Attempt to load DTU N through other DTUs 4. Attempt to get another tape if possible	● Incomplete record ● Buffer size exceeded ● Read error ● Conflict of commands ● Invalid command ● Self-test ● End of tape ● For cruise missile data load: TBD	● If malfunction cartridge does not operate in another mount, the cartridge is defective ● For ALCM/ACM DATA LOAD, if launch point sequence numbers under line signifying load completion/validation: none. If normal indications are not present on FRMT 7, continue with corrective action
DTU N EOT N = 1, 2, 3, 4	1. Replace tape cartridge. Insert cartridge in another DTU. Obtain new tape if possible	● The tape cartridge fails to accept rewind command	● DTUC
EIU	1. Pull and reset EVS IU circuit breaker. If fault does not clear, no further corrective action is possible to the EIU 2. Manually enter altitude and airspeed values using FRMT-8	● EIU hardware on air data sensor failure.	● Computed values of altitude, airspeed, temperature, static and differential pressure STV NFOV/WFOV ● FLIR ● Video select modes ● Heading Error ● Time to go
EMP	1. None, wait until EMP clears	● Electromagnetic event detected	● System affected by EMP, EMP has to clear to get system capability back.

Figure 3-18 (Sheet 7 of 25)

Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
H/S NO GO	1. Before PROC SYNC, reset hot spare processor and reload using the directory program	● Hot spare processor failed	● If hot spare processor cannot be loaded, operation continues in the full-up mode.
IME 1	1. Check left forward overhead BNS circuit breaker panel, NO 1 INS 2. Check circuit breaker NO 1 INS cool on the right S/V filter box circuit breaker panel 3. Select FRMT-6 and confirm IME 1 indicates a fault and CF-4 to confirm INS 2 or ALTER has been selected as prime 4. If an INS despin occurred using the rotor support battery, an under voltage condition could exist, which would inhibit restart. The rotor support battery will have to be changed before a restart can be accomplished	● Bit ● AHRS ● Inertial sensors ● IMU ● Accelerometer bias ● Gyro drift ● IEU ● Voltage	● INS 1
IME 2	1. Check left forward overhead BNS circuit breaker panel, NO 2 INS 2. Check circuit breaker NO 2 COOL on the right S/V filter box circuit breaker panel 3. Select FRMT-6 and confirm IME 2 indicates a fault and CF-4 to confirm INS 1 or ALTER has been selected as prime 4. If an INS despin occurred using the rotor support battery, an under voltage condition could exist, which would inhibit restart. The rotor support battery will have to be changed before a restart can be accomplished	● Same as IME 1	● INS 2
IME 1 DATA	1. Select FRMT-6 ENTER to confirm INS 2 has been selected as navigational reference, and IME 1 indicates data bus fault	● Same as IME 1 ● Unreasonable data ● Kalman filter data ● Space stable navigation data	● INS 1
IME 2 DATA	1. Select FRMT-6 ENTER to confirm INS 1 has been selected as navigational reference, and IME 2 indicates data bus fault	● Same as IME 1 data	● INS 2
INS-N SPINDN A/C (N = 1, 2)	1. None, INS can be restarted if no malfunction is present	● INS entered the spin-down mode on aircraft power	● INS N

Figure 3-18 (Sheet 8 of 25)

BIT Advisory Malfunction Analysis (Cont)
Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
INS-N SPINDN BATT (N = 1, 2)	1. None, INS can be restarted if rotor support battery voltage is not low and no other malfunction is present 2. Rotor support battery should be checked and changed as necessary to preclude a low voltage condition and an INS restart	● INS entered spindown on rotor support battery	● INS N
LNCHR	1. Acknowledge 2. Attempt launcher rotation	● Rotary launcher malfunction	● Missile launch/bomb release not possible from bay launcher
NKB	1. The radar navigator's keyboard will be used for data and track control, and function select	● Equipment fault ● DEU malfunction	● Navigator's capability to select mode of video display and operation via the IKB
NO OAS DATA	1. See No OAS Data Operation, this section	● Two or more processors no-go	● OAS
PDU	1. Attempt to rotate launcher to desired position. If unable, cycle LAUNCHER HYDRAULIC switch to OFF and then to ON 2. Wait 5 seconds for PDUC reset/initialization to complete. 3. Re-attempt to rotate launcher 4. Reapply power to NUC SLU	● Hydraulic system switched from primary system to right body system ● PDU failure	● CSRL if both hydraulic systems on PDU failed
PDUC	● Check PDUC power ON ● Recycle PDUC ● Reapply power to NUC SLU	● Software/power fault ● NUC SLU power fault	● CSRL, if unable to rotate launcher
PWR TRANS	1. None	● Electrical power transient detected	● None
RADAR	1. Check auxiliary BNS circuit breaker panel and radar malfunction analysis procedures 2. If video is present on the MFD, check the radar navigator management panel for operational mode selection capabilities 3. If video is not present, recheck, reset, and manipulate the following: ● Radar power control panel: – Change frequency ● Radar presentation panel: Frequency agile switch RCVR mode LIN/LOG switch RDR XMTR ANT/DUM switch	● Erratic AFC ● RF output power low ● Receiver inoperative ● Modulator inoperative ● Transmitter inoperative ● Antenna malfunction ● Linear/logarithmic ● amplifier ● Manual tuning (except frequency agile mode) ● Frequency agile mode erratic ● RIU failure	● Terrain avoidance mode ● Radar fix mode ● Radar track ● Calibrate function ● Radar navigation

Figure 3-18 (Sheet 9 of 25)

Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
RDR ALT	1. Check auxiliary BNS circuit breaker panel, OAS NAV RDR ALT 2. Use radar HAC to input correct altitude 3. MDFY 3 ENTER on FRMT-8 and manually input altitude if HAC cannot be accomplished	● Radar altitude indicator failure ● Antenna malfunction ● Power interruption ● Performance below acceptable level ● Self-test	● Radar height indicator ● Terrain correlation ● Low altitude calibration
RDR ALT DATA	(To Be Determined)	(To Be Determined)	● Radar height indicator ● Terrain correlation ● Low altitude calibration ● No auto missile launch capability. Refer to OAS/ MISSILE SYSTEM FAULTS in T.O. 1B-52H-30-1 for AGM-129 ACM or T.O. 1B-52H-30-4 for AGM-86B ALCM.
RIU	1. Pull and reset circuit breaker on right S/V filter box 2. Use alternate bombing checklist (GWD SMO) 3. Take radar position updates only during straight and level flight. 4. Refer to command guidance	● Hardware failure ● Data bus failure	● Radar control function on the RNMP ● Radar antenna stabilization ● Autopilot tie in to OAS AHRS input to OAS ● OAS bomb door control (GWD SMO) ● Synchronous bomb release (GWD SMO) ● Limit aircraft maneuvers to less than ±8 pitch and ±5° roll during position fixes
RNKB	1. The navigator's keyboard will be used for data and track control, and function select	● Equipment fault ● DEU malfunction	● Radar navigator's capability to select mode of video display and operation via the IKB
RNMP	1. Check left forward overhead BNS circuit breaker panel, CONTROLS AND DISPLAYS RDR MGMT PNL circuit breaker in and RDR MGT circuit breaker on right S/V filter box in 2. See RNMP work-around procedures this section.	● Equipment malfunction	● Radar navigator's management panel

Figure 3-18 (Sheet 10 of 25)

BIT Advisory Malfunction Analysis (Cont)
Less [AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
RSC	1. Check RSC circuit breaker in the right S/V filter box circuit breaker panel 2. Check RSC circuit breaker on AUX BNS circuit breaker panel	● Equipment failure	● Usable radar presentation
STEER	1. Manually input true heading using FRMT-8	● Insufficient data available for OAS to generate steering data output	● Automatic steering command
TAS, W/V, ALT	1. Determine if TAS or ALT sensor failed 2. Enter TAS or ALT as appropriate using FRMT-8.	● TAS sensor invalid ● True ALT sensor invalid	● True airspeed ● True altitude reference
VID RCDR	1. Check left forward overhead BNS circuit breaker panel CONTROL AND DISPLAYS V RCDR 2. Check right S/V filter box circuit breaker panel VID RCDR 3. Check recorder switches ON RNMP 4. Check bit indicator located on the video recorder unit 5. Check condition of loaded film magazine	● Film advance mechanism ● Scan failure ● Film status ● Video presence ● CRT display ● Sync	● Mission data recording
WCP	1. Check left forward overhead BNS circuit breaker panel, CONTROLS AND DISPLAYS WPN CONTR PNL 2. Check right S/V filter box circuit breaker panel WCP 3. See appropriate weapons delivery manual for WCP work-around	● Equipment fault	● Weapons control panel

Figure 3-18 (Sheet 11 of 25)

BIT Advisory Malfunction Analysis (Cont)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
PRIMARY APPLICATION LOADER ERROR MESSAGES			
DEU ERROR	1. Check “CONTROLS AND DISPLAYS - DEU AC NO. 1” and “CONTROLS AND DISPLAYS - DEU AC NO. 2” circuit breakers on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Check “DEU 1” and “DEU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required.	A Display Electronics Unit (DEU) error has been detected.	Possible loss of the following: 1. Multifunction Display (MFD) display formats. 2. Processing capability for alphanumeric and symbology display and keyboard I/O bus data.
DTRn 1553	1. If a “DTRn FC” fault also exists: a. Check “DTU PWR NO. 1” and “DTU PWR NO. 2” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. b. Check “DTU 1” and “DTU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Reload the Primary Application Loader by selecting PROC LOAD and verify if communication error still exists. 3. If a single DTR has failed, install DTC in the alternate DTR, and reload the Primary Application Loader by selecting PROC LOAD. Verify if communications error for alternate DTR exists. 4. If fault persists for both DTRs, attempt primary application load with the DTC installed in a DTR. If load completes, system may be operated with Fibre Channel communications only. 5. If a “DTRn FC” fault also exists, abort mission.	Communication with Data Transfer Receptacle (DTR) n is not possible on the MIL-STD-1553 bus interface.	Data contained on the Data Transfer Cartridge (DTC) in DTR n cannot be transferred to the Avionics Control Unit (ACU) via the MIL-STD-1553 bus.
DTRn COM	1. Check “DTU PWR NO. 1” and “DTU PWR NO. 2” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check “DTU 1” and “DTU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. If a single DTR has failed, install DTC in the alternate DTR and reload the Primary Application Loader by selecting PROC LOAD. 4. If both DTRs fail, abort mission.	Communication with DTR n is not possible on either the fibre channel interface or the MIL-STD-1553 bus interface.	Data contained on the DTC in DTR n cannot be transferred to the ACU.

Figure 3-18 (Sheet 12 of 25)

BIT Advisory Malfunction Analysis (Cont)
[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
PRIMARY APPLICATION LOADER ERROR MESSAGES (Cont)			
DTRn FC	1. If a “DTRn 1553” fault also exists: a. Check “DTU PWR NO. 1” and “DTU PWR NO. 2” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. b. Check “DTU 1” and “DTU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Reload the Primary Application Loader by selecting PROC LOAD and verify if communication error still exists. 3. If a single DTR has failed, install DTC in the alternate DTR, and reload the Primary Application Loader by selecting PROC LOAD. Verify if communications error for alternate DTR exists. 4. If fault persists for both DTRs, attempt primary application load with the DTC installed in a DTR. If load completes, system may be operated with Fibre Channel communications only. 5. If “DTRn 1553” fault also exists, abort mission.	Communication with DTR n is not possible on the fibre channel interface.	Data contained on the DTC in DTR n cannot be transferred to the ACU via the fibre channel cable.
LOAD ERROR	1. Remove Data Transfer Cartridge (DTC) and re-install in Data Transfer Receptacle (DTR), re-load the Primary Application Loader by selecting PROC LOAD and attempt to load primary application again. 2. Verify if the same error occurs with the DTC in the alternate DTR. 3. If both DTRs fail, abort mission, re-install primary application on DTC, and retry application load.	An error occurred while loading the selected primary application.	Inability to load primary application into the Avionics Control Unit (ACU) for execution.

Figure 3-18 (Sheet 13 of 25)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
	FMS FAULTS		
ACU-A SELF TST	1. Check the following circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL: a. OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅A b. OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅B c. OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅C d. OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅A e. OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅B f. OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅C Pull and reset circuit breakers, if required. 2. Check “ACU 1” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. OAS may reconfigure. If processor does not reconfigure, continue operation.	ACU-A has failed or was not operational when PROC SYNC was selected.	Loss of ACU-A. No reconfiguration capability.
ACU-B SELF TST	1. Check the following circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL: a. OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅A b. OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅B c. OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅C d. OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅A e. OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅B f. OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅C Pull and reset circuit breakers, if required. 2. Check “ACU 2” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. OAS may reconfigure. If processor does not reconfigure, continue operation.	ACU-B has failed or was not operational when PROC SYNC was selected.	Loss of ACU-B. No reconfiguration capability.
AHRS	1. Check “OAS NAV - AHRS ∅A”, “OAS NAV - AHRS ∅B”, “OAS NAV - AHRS ∅C” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Advise the Pilot and Copilot.	Radar Interface Unit (RIU) status indicates a failure of the AHRS.	1. Loss of AHRS data will result in the loss of the Pilot’s primary heading reference and primary pitch and roll reference for the HSI and the ADI. 2. No heading information for Inertial Navigation Unit (INU) alignment or Alternate Navigation.

Figure 3-18 (Sheet 14 of 25)

BIT Advisory Malfunction Analysis (Cont)
[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
AIU	1. Check “OAS INTERFACE - ARMT IU - NORM AC”, “OAS INTERFACE - ARMT IU - DC”, and “OAS INTERFACE - ARMT IU - ALT AC” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Check “AIU” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required.	Armament Interface Unit (AIU) status indicates an AIU failure or communication with the AIU has failed.	Possible loss of any or all of the following: 1. Missile launch or jettison, pylon jettison. 2. ECU. 3. Launcher rotation. 4. Missile hydraulic power. 5. MIU power. 6. WIU power. 7. OAS bomb bay door operation. 8. Pylon EED power for missiles. 9. RBS Tone Cutoff.
CDIU	1. Check “CONTROLS AND DISPLAYS - IU NORM AC” and “CONTROLS AND DISPLAYS - IU ALT AC” circuit breakers on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Check “CDIU” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. Use CF-E (WCP BACKUP) and CF-F (RNMP BACKUP) through the IKB, as necessary.	Control Display Interface Unit (CDIU) status indicates a CDIU failure or communication with the CDIU has failed.	Possible loss of any or all of the following: 1. Computational Subsystem Control. 2. RNMP. 3. WCP. 4. OAS Power Control Panel.
CLAPAR LOAD FAIL	Remove and re-apply DTC power using the DTC handle or insert a back-up DTC or insert the DTC into the other DTR. **NOTE** Classified parameters are not loaded when a mission is loaded. Loading of classified parameters is initiated as soon as a DTC is available. If successful, they are not read again until the FMS is reloaded.	Loading of the classified parameters from the DTC has failed.	The classified parameters provide information about the characteristics of the radar and are used to determine the amount of the measured error that will be accepted. Weapons requiring classified parameters will not launch because ranging cannot be performed.

Figure 3-18 (Sheet 15 of 25)

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
CSCP	1. Check “OAS COMPUTATIONAL CONTR PNL DC NORM” and “OAS COMPUTATIONAL CONTR PNL DC ALT” circuit breakers on the AUX BNS CIRCUIT BREAKER PANEL. If the circuit breakers are in, no operator corrective action is required; DO NOT RECYCLE OAS. 2. Abort if necessary for ACU load.	Control Display Interface Unit (CDIU) status indicates a failure of the Computational Subsystem Control Panel (CSCP), also known as Computer Control Panel (CCP).	Possible loss of any or all of the following: 1. Power ON/OFF logic to each ACU. 2. Indications of ACU power ON/OFF status. 3. Maintenance of Go/No-Go status. 4. Initiation of ACU synchronization. 5. Computer program loading for each ACU. 6. Indication of program resident in each ACU. 7. Indication of Data Transfer Receptacle (DTR) power status.
DEU	1. Check “CONTROLS AND DISPLAYS - DEU AC NO. 1” and “CONTROLS AND DISPLAYS - DEU AC NO. 2” circuit breakers on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Check “DEU 1” and “DEU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required.	Display Electronics Unit (DEU) status indicates a failure of the DEU or communication with the DEU has failed.	Possible loss of any or all of the following: 1. MFD display formats. 2. DAS symbology. 3. Selection of EVS or radar video. 4. Video recording. 5. Processing capability for alphanumeric and symbology display and keyboard I/O bus data.
DOORS	1. Manually operate doors with CF-59 command via the IKB, if not in launch countdown. 2. Manually operate doors via the Master Bomb Control Panel. 3. Manually operate doors via the Pilot’s BOMB DOOR switch.	Armament Interface Unit (AIU) status indicates that the bomb bay doors are not in the commanded position after they have had time to reach the commanded position.	Bay weapons are inhibited from launch or jettison.
DPLR	1. Check “OAS NAV - DOPPLER RDR” circuit breaker on AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Cycle Doppler power. 3. If fault persists, Doppler aided navigation may not be possible.	Doppler Velocity Sensor (DVS) status indicates a failure of the Doppler radar.	Possible loss of any or all of the following: 1. Doppler velocity input. 2. Doppler Inertial navigation. 3. Doppler/AHRS navigation.
DTR-n	1. Check “DTU PWR NO. 1” and “DTU PWR NO. 2” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check “DTU 1” and “DTU 2” circuit breakers on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. If a single DTR has failed, verify DTC is in the working DTR. 4. If both DTRs fail, data cannot be loaded.	Data Transfer Receptacle (DTR) n status indicates a hardware error has been detected or communication with DTR-n has failed.	No capability lost if the second DTR is functioning..

Figure 3-18 (Sheet 16 of 25)

BIT Advisory Malfunction Analysis (Cont) *[AMI]*

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
DTR-n BAD DTC	1. Remove and replace the DTC with another DTC. 2. Install the DTC in the other DTR. 3. If the fault persists, data cannot be loaded from the failed DTC.	The data contained in the Data Transfer Cartridge (DTC) in Data Transfer Receptacle (DTR) n is either corrupted or is not formatted correctly.	The data contained on DTC n cannot be read into the ACUs.
EIU	1. Check “OAS INTERFACE - EVS IU - AC” and “OAS INTERFACE - EVS IU - DC” circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check “EIU” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required.	EVS Interface Unit (EIU) status indicates an EIU failure or communication with the EIU has failed.	Possible loss of any of the following: 1. Free air temperature, differential pressure, & static pressure resulting in loss of True Airspeed & True Altitude. 2. Ability to select STV, FLIR, or FLIR Reverse on the EVS Video Select Panels. 3. STV and FLIR NFOV capability, 4. Azimuth and Elevation LOS markers on EVS display. 5. TTG and Heading Error markers on pilot’s FCI and Moving Map Display (with EVS selected on MFD control). 6. TTG, Heading Error, and Radar Altitude on EVS display.
INU-n	1. Check “NO. 1 INS AC PWR” or “NO. 2 INS AC PWR” circuit breakers, as appropriate, on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull, wait ten seconds, then reset circuit breaker, if required. 2. Check the ”NO. 1 INS DC B/U POWER” circuit breaker on the RIGHT LOAD CENTRAL CIRCUIT BREAKER PANEL or the “NO. 2 INS DC B/U POWER” circuit breaker on the LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL, as appropriate. Pull and reset circuit breaker, if required. 3. Verify FMS automatically selects the best remaining navigation mode.	Inertial Navigation Unit (INU) n status indicates a failure of INU n, communication with INU n has failed, or communication with INU n has yet to be established.	1. If one INU fails, the FMS will automatically select the other INU to aid navigation. 2. If both INUs fail, alignment data will no longer be available.

Figure 3-18 (Sheet 17 of 25)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
INU-n HALTED	1. Check “NO. 1 INS AC PWR” or “NO. 2 INS AC PWR” circuit breakers, as appropriate, on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Verify FMS automatically selects the best remaining navigation mode.	Inertial Navigation Unit (INU) n bus status word indicates a subsystem failure.	1. If one INU fails, the FMS will automatically select the other INU to aid navigation. 2. If both INUs fail, inertial navigation data will no longer be available.
MDATA FAIL	1. Re-attempt B-52 mission data load. 2. Determine DTR status from FRMT-6 display. 3. If fault persists, attempt loading the DTC in the other DTR.	Loading of the selected mission from the DTC has failed.	Carrier mission data is not available.
NKB	1. If one IKB has failed, perform tasks at useable station. 2. If both IKBs fail, operators have no interface with the OAS.	Display Electronics Unit (DEU) status indicates a failure of the Navigator’s Integrated Keyboard (NKB).	1. Loss of Navigator’s IKB inputs. 2. Failure of one IKB will result in a heavier workload for the useable station and no new MFD displays can be selected at the Navigator’s station. 3. Loss of both IKBs will result in loss of IKB command control and no MFD changes.
NVM FLT RCD	Notify ground crew of condition following flight.	The Non-Volatile Memory (NVM) in the primary ACU that is allocated to fault recording is 95% or more used.	Normal Operation.

Figure 3-18 (Sheet 18 of 25)

BIT Advisory Malfunction Analysis (Cont) *[AMI]*

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
RADAR	1. Check the following circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL: a. STRATEGIC RADAR - RADAR ANT ∅A b. STRATEGIC RADAR - RADAR ANT ∅B c. STRATEGIC RADAR - RADAR ANT ∅C d. STRATEGIC RADAR - DISPLAY GEN ∅A, ∅B, ∅C e. STRATEGIC RADAR - ANT ELEX UNIT ∅A f. STRATEGIC RADAR - ANT ELEX UNIT ∅B g. STRATEGIC RADAR - ANT ELEX UNIT ∅C h. STRATEGIC RADAR - R-T MODULATOR ∅A, ∅B, ∅C i. POWER ON DC - RADAR TIME DELAY j. POWER ON DC - DISP GEN k. POWER ON DC - RADAR PROC l. POWER ON DC - R-T MOD m. POWER ON DC - ANT ELEX UNIT n. POWER ON DC - ANT o. STRATEGIC RADAR - R-T MOD p. STRATEGIC RADAR - RADAR CONTROL q. STRATEGIC RADAR - ACR ANT r. STRATEGIC RADAR - ANT ELEC UNIT s. RADOME GROUND COOL – BLOWER ∅A t. RADOME GROUND COOL – BLOWER ∅B u. RADOME GROUND COOL – BLOWER ∅C v. RADOME GROUND COOL – CONTR w. OVERHEAT CONTR x. RDR PRESS - DC y. RDR PRESS - AC z. RADAR CONTL PNL aa. BLANKING AMPL ab. RADAR PROC ∅A, ∅B, ∅C ac. AN/APN-69 PRESS CONTR Pull and reset circuit breaker, if required. 2. Check the “PROGRAMMER ANT. POSITION” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required.	Radar Interface Unit (RIU) indicates that the radar is not functional.	Loss of radar fix mode, radar track, forward-looking radar altitude calibration functions, and radar navigation.

Figure 3-18 (Sheet 19 of 25)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
RDR ALT	1. Check "OAS NAV - RDR ALTM" circuit breaker on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Advise pilot and copilot. 3. Manual launch mode may be required for weapons.	Armament Interface Unit (AIU) status indicates a failure of the radar altimeter.	1. Loss of low altitude calibrations. 2. The automatic launch mode for weapons may be inhibited.
RDR ALT DATA	1. Advise pilot and copilot. 2. Check "OAS NAV RDR ALTM" circuit breaker on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. Manual launch mode may be required for weapons.	Armament Interface Unit (AIU) status indicates that the radar altimeter data is not valid.	1. Loss of low altitude calibrations. 2. The automatic launch mode for weapons may be inhibited.
RIU	1. Check "OAS INTERFACE - RDR IU - AC" and "OAS INTERFACE - RDR IU - DC" circuit breakers on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if required. 2. Check "RIU" circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required.	Radar Interface Unit (RIU) status indicates an RIU failure or communication with the RIU has failed.	1. Loss of radar capability. 2. Loss of autopilot communication with OAS. 3. Loss of AHRS input to OAS. 4. Loss of AOA input to OAS. 5. Aircraft maneuvers should be limited to less than ±8° pitch and ±5° roll during position fixes.
RNKB	1. If one IKB has failed, perform tasks at useable station. 2. If both IKBs fail, operators have no interface with the OAS.	Display Electronics Unit (DEU) status indicates a failure of the RN's Integrated Keyboard (RNKB).	1. Loss of Radar Navigator's IKB inputs. 2. Failure of one IKB will result in a heavier workload for the useable station and no new MFD displays can be selected at the Radar Navigator's station. 3. Loss of both IKBs will result in loss of IKB command control and no MFD changes.
RNMP	1. Check "CONTROLS AND DISPLAYS - RDR MGT PNL" on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check "RDR MGT" circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 3. Use CF-F (RNMP BACKUP) through the IKBs.	Control Display Interface Unit (CDIU) status indicates a failure of the Radar Navigator Management Panel (RNMP).	Loss of radar control, position fix control, calibration functions, and video recorder control, through the RNMP.

Figure 3-18 (Sheet 20 of 25)

BIT Advisory Malfunction Analysis (Cont) *[AMI]*

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS FAULTS (Cont)			
RSC	1. Check “OAS NAV - RDR SCAN CONV” circuit breaker on the AUXILIARY BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check “RSC” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required.	Display Electronics Unit (DEU) status data indicates a failure of the Radar Scan Converter (RSC).	Radar image may be unusable.
SMO LOAD FAILED	1. Remove and reinstall the DTC. 2. Determine DTR fault status on FRMT-6. 3. Reload SMO. 4. If failure persists, insert DTC in other DTR.	A Stores Management Overlay (SMO) load operation has failed.	Loss of mission and weapon control/delivery capability.
STEER	Enter a FLY-TO command.	Insufficient data is available to compute steering commands.	Loss of automatic steering capability.
SUP APP LD FAIL	1. Enter CF–6 to review Flight Computer Program (FCP) Applications that have been loaded. Requested FCP support applications that failed to load will be displayed in Reverse Highlight. If there are no FCP support applications displayed, then the directory could not be read and FMS could not determine which applications were present on the DTC. 2. Reload FMS if no support applications were loaded or the support application that failed to load is required for the mission.	1. One or more support applications have failed to load. 2. The directory on the DTC containing the support applications could not be opened.	The requested support application will not be available. **NOTE** CSP is required to load any SMO.
TAS, W/V, ALT	1. Determine if TAS and/or ALT sensor is invalid. 2. Enter TAS and/or ALT, as appropriate, using FRMT-8.	Air data is not reasonable. **NOTE** Air data is always unreasonable when the aircraft is not flying.	Loss of true airspeed and/or true altitude reference.
VID RCDR	1. Check “CONTROLS AND DISPLAYS - V RCDR - DC” and “CONTROLS AND DISPLAYS - V RCDR - AC” circuit breakers on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breakers, if necessary. 2. Check “VID RCDR” circuit breaker on the RIGHT SV FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if necessary. 3. Check BIT indicator on video recorder. 4. Check condition of loaded film magazine.	Display Electronics Unit (DEU) status indicates a failure of the video recorder.	Loss of video recording capability.
WCP	1. Check “CONTROLS AND DISPLAYS - WPN CONT PNL” circuit breaker on the LEFT FORWARD BNS CIRCUIT BREAKER PANEL. Pull and reset circuit breaker, if required. 2. Check “WCP” circuit breaker on the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL. Pull and reset circuit, if required. 3. Use CF-E Commands (WCP BACKUP) through the IKBs.	Control Display Interface Unit (CDIU) status indicates a failure of the Weapon Control Panel (WCP).	1. Loss of weapon system control through the WCP. 2. May not be able to launch or jettison weapons due to lack of Unlock Consent monitor status.

Figure 3-18 (Sheet 21 of 25)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS ADVISORIES			
2-ACU FULLUP	Acknowledge the advisory.	Both ACUs are operating when the system was started.	ACUs are operating normally.
AHRS DATA	1. Advise the Pilot and Copilot. 2. At least one INU must be aligned to proceed. Flight data and weapon alignment data are not available otherwise.	Attitude Heading Reference System (AHRS) data is not reasonable.	Loss of Alternate Navigation references (Doppler/AHRS, TAS + Winds/AHRS, AHRS Heading, HSI heading indication).
DOV LD FAIL	1. Remove and reinstall the DTC in the same Data Transfer Receptacle (DTR). 2. Remove and reinstall the DTC in the other DTR. 3. Remove and replace the DTC with another DTC.	An attempt to read Deflection of Vertical (DoV) data from the Data Transfer Cartridge (DTC) has failed since the last successful attempt to read DoV data.	DoV data used by the INU may not be correct.
DPLR DATA	1. The FMS will automatically select the best remaining navigation mode, if necessary. 2. The operator can manually select navigation mode and aiding source.	Doppler data is unreasonable and the aircraft is not in a 10° or greater roll.	Possible loss of any or all of the following: 1. Alternate navigation mode data. 2. Doppler.
DTR-n DTC FULL	Install another DTC with identical mission data.	The storage allocated to flight data recording in the Data Transfer Cartridge (DTC) in Data Transfer Receptacle (DTR) n is full.	No additional flight data will be recorded until a DTC with available storage is inserted in place of the full DTC.
INU-n DATA	Enter a FLY-TO command.	The operator has not indicated that position data required to initialize INU n is available by entering a FLY-TO command.	Loss of INU-n.
INU-n DECLASS	INU must be treated as though it contains classified data. Notify ground crew of condition.	Inertial Navigation Unit (INU) n failed to indicate zeroize complete prior to termination of bus communication.	INU may contain classified data.
INUn DEG NAV RDY	Acknowledge advisory message.	Minimal Enhanced Gyrocompass (EGC) alignment is complete for INU n.	Normal operation.
INUn EGC ABORT	Complete EGC alignment.	The aircraft was moved before a degraded navigation solution was available from INU n. A degraded navigation solution is available from INU n when the advisory INU-n DEG NAV RDY is displayed.	Inertial navigation data will not be available.

Figure 3-18 (Sheet 22 of 25)

BIT Advisory Malfunction Analysis (Cont)
[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS ADVISORIES (Cont)			
INU-n ILLEGL CMD	Recycle power to the affected INU.	Inertial Navigation Unit n has indicated that it has received a command that is not appropriate for the current mode.	The command will not be processed and INU performance may be degraded.
INU-n READY	Acknowledge advisory message.	Inertial Navigation Unit (INU) n has completed Enhanced Gyrocompass (EGC) or Enhanced Interrupted Alignment (EIA) ground alignment.	Normal operation.
MDATA COMPLETE	Acknowledge the advisory message.	The selected mission has been successfully loaded from the Data Transfer Cartridge (DTC).	Normal operation.
MDATA LOADING	Acknowledge the advisory message.	The selected mission is being loaded from the Data Transfer Cartridge (DTC).	Normal operation.

Figure 3-18 (Sheet 23 of 25)

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
	FMS ADVISORIES (Cont)		
NO OAS DATA	1. If the Primary Application Loader has completed operating and PROC SYNC has not yet been commanded, this advisory will be displayed and is a normal operation. Selecting PROC SYNC will clear the advisory. 2. If one or both ACUs were operating normally prior to the display of this advisory, check the following circuit breakers, but DO NOT RESET ANY CIRCUIT BREAKERS. Please note if any circuit breakers were not fully seated. A. On the AUXILIARY BNS CIRCUIT BREAKER PANEL: OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅A OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅B OAS COMPUTATIONAL - PROCESSOR NO. 1 - NORM PWR ∅C OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅A OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅B OAS COMPUTATIONAL - PROCESSOR NO. 1 - ALT PWR ∅C OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅A OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅B OAS COMPUTATIONAL - PROCESSOR NO. 2 - NORM PWR ∅C OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅A OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅B OAS COMPUTATIONAL - PROCESSOR NO. 2 - ALT PWR ∅C B. On the RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL: ACU 1 ACU 2 3. If system shutdown or emergency classified erase was commanded, this advisory will be displayed and is a normal operation.	Both ACUs have failed.	Loss of ACUs will prohibit system operation.
NVM FLT RCD	Notify ground crew following flight.	The Non-Volatile Memory (NVM) in the primary ACU that is allocated to fault recording is 50% or more used, but less than 95% used.	Non-Volatile Memory allocated to fault recording is now at or less than 50% of capacity. An NVM FLT RCD fault will be displayed when capacity reaches 95%.

Figure 3-18 (Sheet 24 of 25)

BIT Advisory Malfunction Analysis (Cont)

[AMI]

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
FMS ADVISORIES (Cont)			
SMO CHANGE CMPLT	Acknowledge the advisory message.	A Stores Management Overlay (SMO) load and/or unload operation has completed successfully.	Normal operation.
SMO LD REQUIRED	1. Determine if the destination is the desired destination. 2. Load/reload SMO.	The Stores Management Overlay (SMO) associated with the next SMO event identified by the resident carrier mission is not resident in the ACU.	Next mission event cannot be accomplished without the appropriate SMO loaded.
SMO LOAD CHANGE	Acknowledge advisory message.	A Stores Management Overlay (SMO) load and/or unload operation is in progress.	Normal operation.
SUP APP LD CMPLT	Acknowledge advisory message.	Loading of the requested support application has completed successfully.	Normal operation.

Figure 3-18 (Sheet 25 of 25)

OAS Cooling

ABNORMAL OPERATION

During flight, the low airflow lights caution of a condition that will eventually result in equipment overheat. However, due to system thermal lag, the lights will come on approximately 10 to 15 minutes before damage to system components can occur. Therefore, temporary conditions which cause a light to come on (such as cutting back throttles during normal descent) need not be of concern. However, if a caution light comes on during normal operation and cannot be extinguished, the radar navigator must decide whether to shut down the system or continue operation at the expense of possible equipment damage depending on importance of the mission and what portion of the mission is being accomplished. Normally, it is considered safe to operate the system for 10 minutes with an airflow low light on.

An ECU message may be displayed if the throttles are retarded. Refer to applicable weapon manual for malfunction analysis.

For corrective procedure, see the appropriate indication given below. Cooling malfunction analysis and corrective procedures are presented based on the indication displayed to the navigators.

Cooling Malfunction Analysis

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
Cabin Airflow Low Warning Light On	1. Confirm engine No. 3 or No. 4 thrust is 85%. 2. Adjust cabin temperature to lower setting. 3. Push in upper air outlet knob.	● Improper aircraft engine thrust. ● Improper temperature control.	Cabin airflow.
Radome Ram Airflow Low Light On	1. Confirm Ground Blowers switch is in ON. 2. Fly lower aircraft altitude. 3. Limit use of radar system. 4. See ABNORMAL OPERATION, this section.	● Outside temperature. ● Inadequate cooling airflow.	Radar operation.

Figure 3-19

CABIN AIRFLOW LOW LIGHT ON

Ground Operation

If the cabin low airflow light comes on during runup and taxi, power should be advanced on engine 3 or 4 to 85% or higher to supply additional bleed air to the air conditioning pack.

Flight Operation

In the event of a cabin airflow low light indication in flight, the following corrective action may be taken to increase cooling airflow:

- Ensure that engine 3 or 4 is operating at 85% or higher.
- Set cabin temperature control to cool.
- Decrease airflow at all crew stations.
- Place the master air conditioning switch to RAM (in the event of air conditioning pack failure).

If none of these corrective actions will eliminate the light indication, it is possible that a malfunction of the protective circuit is the cause of the indication. If an actual low airflow condition persists, the OAS electronic equipment should be turned off unless mission requirements justify possible damage to equipment.

RADOME RAM AIRFLOW LOW LIGHT ON

The only corrective action for this light indication is to fly at a lower altitude. If it is not possible to extinguish the light, the radar should be turned off unless mission requirements justify possible damage to equipment.

ELECTRONIC EQUIPMENT COOLING AT HIGH ALTITUDE

Altitude has a direct bearing on operation of the air conditioning pack. With the aircraft at high altitudes (above 40,000 feet), it may be necessary to accomplish a check of the following items in order to keep the cabin airflow low warning light extinguished. The check may also be used to determine that a system malfunction does not exist when erratic temperature control is experienced.

1. Throttle setting for engines 3 and 4:

If possible, sufficient thrust to provide adequate airflow for electronic equipment cooling should be maintained (depending on the flight condition) on these engines.

2. Position of the cabin temperature selectors:

If it is necessary to maintain low thrust settings on engines 3 and 4, it will also be necessary to maintain a low cabin temperature setting.

3. Position of air outlet controls:

The air outlets will not need to be completely closed, but any reduction of airflow for crew outlets will tend to build up back pressure and furnish more air for electronic equipment cooling.

NOTE

All of the previously mentioned items should be checked before determining that an actual malfunction of the system exists.

[AMI] ACU OVER TEMPERATURE AND SHUTDOWN

If an ACU becomes over-temperature, the FMS will command power removal from the affected ACU unless the operator overrides the shutdown. The operator can also command the FMS to shutdown either ACU.

If an ACU indicates an over-temperature condition, one of the following questions will be displayed, depending upon which ACU is over temperature:

PRM ACU OT: ORIDE SHUTDN? Y/N

if the primary ACU is over temperature, or:

SEC ACU OT: ORIDE SHUTDN? Y/N

if the secondary ACU is over temperature. The time remaining until the over-temperature ACU will be shut down is displayed on FRMT-6 until until a YES or NO response is entered.

To prevent shutdown of the specified ACU, the operator must select the YES switch on either IKB within 120 seconds. If YES is selected, the FMS allows the specified ACU to continue operating without interruption. Selecting the NO switch on either IKB or not responding within 120 seconds will result in the specified ACU being shutdown by the FMS, if the ACU is still over temperature. If the ACU is no longer over temperature, it will continue operating without interruption.

WARNING

Do not operate the ACU in an over temperature condition for more than 10 minutes to prevent a possible fire hazard or damage to the ACU.

CAUTION

Should inadvertent OAS power shutdown occur prior to properly shutting down the ACUs, the result is continuously powered INUs. The status of the INUs are not monitored after OAS shutdown. Attempt re-power of the OAS and perform proper ACU shutdown procedures. In conditions where the OAS cannot be re-powered, pull the NO. 1 and NO. 2 INS DC B/U circuit breakers and the NO. 1 and NO. 2 INS AC PWR circuit breakers to prevent continuous operation of the INUs. Failure to shutdown the INUs could lead to equipment damage after ECS shutdown.

If the primary ACU is shutdown, the secondary ACU will be reconfigured as the primary ACU if the secondary ACU is operating. If the secondary ACU is shutdown, the primary ACU will continue operating without interruption unless it also is over temperature.

The operator can initiate ACU shutdown anytime by entering a CF-69A command for primary ACU shutdown or a CF-69B command for secondary ACU shutdown. When the primary ACU is shutdown, the secondary ACU is reconfigured to become the primary ACU if it is operational.

OAS Data Transfer Units/System and Computer Control

Less [AMI] ABNORMAL OPERATION

DATA TRANSFER UNIT (DTU) MALFUNCTIONS

Failure to transfer information from a data transfer unit cartridge (DTUC) to the processors may be caused by complete DTU failure, DTU cavity failure, or a bad DTUC. Procedures outlined here are for when ground maintenance assistance is not available.

DTU CAVITY

If a single DTU cavity has failed, switch the OCP tape with the DTUC in that cavity after processor loading, SMO loading and GPS power application. The OCP will be of no further use.

DTU

If an entire DTU fails and the loss of two cavities occurs, use the following procedures:

1. For OAS and GPS turn-on, place the OCP and mission tapes on the good side, load the processors, B-52 mission and SMO, and apply power to the GPS.
2. Inflight, replace the OCP with the flight data recorder (FDR) tape to record navigation and fault data. Keep the mission tape loaded to maintain current magnetic variation. After an INS is selected as the primary reference, the mission tape may be removed if necessary.
3. For weapons that use a weapon tape, replace the FDR with the weapon tape prior to weapon targeting, retargeting and flex-targeting. After targeting is complete, replace the FDR tape to record weapon events.

NOTE

The mission data tape and the weapon data tape should not be loaded in the same DTU for the most efficient operation.

SINGLE DTU CAVITY OPERATION

If only one DTU cavity is functional, use the following procedures:

1. Use the OCP tape for processor loading, GPS power application and SMO loading.
2. Use the mission tape for B-52 mission loading and for alternate navigation until an INS is selected as the prime navigation reference.
3. Use the weapon tape for weapon targeting, retargeting and flex targeting.
4. Use the FDR to record weapon events.

FCP

The Nuclear OCP tape contains the Nuclear FCP. The ICSMS OCP contains the ICSMS FCP, Interface Unit Software (IUS), weapon Software Management Overlays (SMOs) and other weapons tables. If the FCP cannot be read, NO OAS DATA operation is the only work around available. If the IUS cannot be read, GPS operation is lost. If the required SMO and weapon tables cannot be read, the associated weapons cannot be programmed and released.

FAULT DATA TAPE

Failure of this tape will not affect OAS operations. (If the OAS is recycled inflight, remove and replace the fault data tape with spare if available. Recycle will cause the tape to rewind and overprint previously recorded data.)

ALCM/ACM TAPE

If the ALCM/ACM tape fails to load, ALCMs/ACMs can be powered, but they cannot be programmed or launched.

MISSION TAPE

If the mission tape cannot be read, magnetic variation cannot be calculated. Use Alternate True Heading Calibration to determine true heading for the alternate navigation model before INS alignment. Magnetic variation is not needed for navigation after an INS is selected as the primary navigation reference, however, prime mission data (MH) will not be correctly computed. The following mission functions are available after OAS turn-on:

1. Destination Table. Destinations 1 thru 95 can be loaded using FRMT-10. Unless modified on FRMT-10, all early/late and PTA indications other than current destination will be in error. The OAP table is not available.
2. Gravity Weapon Table. Destinations 96 thru 99 are available for gravity weapons.
3. Fixpoint Table. All points are available. Latitude, longitude, and elevation must be inserted using FRMT 9. HOR defaults to 000.
4. ALCM/ACM. Without a mission tape it is not possible to program, target, or launch ALCMs/ ACMs.

PROCESSOR NO-GO

During initial OAS turn-on, if one or more processors indicate NO-GO, use the following procedures to get ON indications.

1. One or more processor indicator lights is NO-GO, press the indicator lights to see if they will change to ON.
2. If pressing a single NO-GO processor does not bring it to ON, try pressing all three lights at the same time.
3. If unable to bring a NO-GO processor up with one or two others on, make the remaining processor(s) NO-GO (zero load), then press all three lights at the same time.
4. If an ON processor fails to default to NO-GO with the switch, command that processor to read an empty DTU cavity (zero load). Once all processors are NO-GO, press the indicator switches at the same time.
5. If still unable to get all processor status lights on, turn OAS Master Power OFF, then back ON.
6. If these steps fail, contact maintenance.

NOTE

During initial OAS turn-on, if a resident program display indicates 3, it may not be possible to load the OCP. To clear the program, make that processor NO-GO, then bring it back to ON. The resident program will go to 0 and OCP loading can continue.

PROCESSOR SHUTDOWN

If a processor begins to function improperly in flight, its own self-test procedures power it down.

Reconfiguration

Two modes of operation are available: 3-processor full-up and 2-processor full-up. In the 3-processor full-up mode, all three processors are go. If the processor loaded with NAWD or CAD no-go's, the processor loaded with the hot spare program takes control and operation continues in the 2-processor full-up mode. If one of the two remaining processors no-go's, only a NO OAS DATA configuration is available as there is no single processor operation.

The OAS may be operated in a 2-processor full-up mode with only two operational processors and is loaded with NAWD and CAD respectively. The hot spare program is not loaded. If one of the two processors no-go's, the OAS must be reinitialized, as there is no single processor operation.

NOTE

Two processor full-up operation, when three processors are available should only be used when time constraints preclude loading the hot spare program.

The non-critical functions temporarily lost during reconfiguration are:

- Terrain correlation
- Any DTU recording function
- Damage Assessment Strike function
- Automatic video recording
- EVS position (EVS crosshair is slaved to radar crosshair).
- Flex Targeting
- Weapon Delivery Power Recording
- Bomb/Missile Scoring
- BIT Recording
- Ground Alignment
- SIM Modes

NOTE

- There is a maximum 3 minute waiting period before all non-critical functions are restored.
- When reconfiguration occurs, bomb inhibit is entered and the missile launch mode reverts to manual. Ensure that these switches are correctly repositioned for subsequent bombing/missile activity.
- When reconfiguration occurs, cruise missile targeting ceases and must be reinitiated after receiving a RECONFG COMPLETE message.

Failure To Erase Classified Data

When a processor no-go's, it is impossible to erase the processor's classified contents using OAS controls on the aircraft. Upon landing with a shutdown avionics processor, notify command post so that the processor may be removed from the aircraft for further maintenance action.

ERASURE OF CLASSIFIED DATA (CF-64)

NOTE

UTC must be entered prior to CF-64, if not previously entered.

Classified data may be erased using CF-64 without going through the normal shutdown sequence (CF-67). This procedure bypasses the normal IMU de-spin timer and starts the classified data erase immediately. Command CF-64 ENTER and the classified erase question is displayed on the MFD. Answer the question YES and classified data erase begins. It is not recommended to use CF-64 in flight with IMUs running as the processors are dumped and the IMUs do not receive a shutdown command and continue to run. The IMUs can be manually shut down by pulling the three AC PWR circuit breakers for INS 1 and INS 2. Each INS will then despin on aircraft power and not use the rotor support battery. Turn OAS master power switch OFF when despin is complete. Turning OAS master power OFF prior to pulling the circuit breakers will cause a battery despin.

[AMI] ABNORMAL OPERATION

DATA TRANSFER SYSTEM (DTS) MALFUNCTIONS

Failure to transfer information from a data transfer cartridge (DTC) to the processors may be caused by complete DTR failure or a bad DTC. Procedures outlined here are for when ground maintenance assistance is not available.

DTR

If a DTR fails, place the DTC in the other DTR and close the DTC handle.

FCP

If the FCP is unavailable in the ACU non-volatile memory and fails to load from the Primary Application Loader on the DTC, NO OAS data operation is the only work around available.

ALCM/ACM Files

If the ALCM/ACM file on the DTC fails to load, ALCMs/ACMs can be powered, but they cannot be programmed or launched.

Mission Files

If the mission DTC cannot be read, magnetic variation and deflection of vertical are not available. If air alignment of the INUs is required and magnetic variation is not available, use the best available true heading (i.e. GPS, Alternate True Heading Calibration, etc) for the alternate navigation model before INU alignment. After an INU is aligned and selected as the primary navigation reference, magnetic variation is not needed for navigation, however prime mission data (MH) will not be correctly computed.

With the loss of deflection of vertical calculations, the B-52 Kalman filter adjusts for an expected higher error in gravity calculations and reasonable performance can still be expected. GPS or Doppler aided INUs should perform normally while receiving updates every 6 seconds. INUs in free inertial (NAV mode) are susceptible to larger Schuler oscillations and higher drift rates, especially when flying over areas with large gravity deflections. During and for a short time after turns, there may be transient errors in velocity and position before the GPS or Doppler updates can damp out the accumulated errors. For example, turns of 100 second duration may accumulate 100 feet of error from GPS position, but the error should be reduced to a few feet within the next 100 seconds.

If the mission files on a DTC cannot be read, the following capabilities are still available once the OCP is loaded.

1. Destination Table. Destinations 1 thru 95 can be loaded using FRMT-10. Unless modified on FRMT-10, all early/late and PTA indications other than current destination will be in error. The OAP table is not available.
2. Gravity Weapon Table. Destinations 96 thru 99 are available for gravity weapons.
3. Fixpoint Table. All points are available. Latitude, longitude, and elevation must be inserted using FRMT-9. HOR defaults to 000.
4. ALCM/ACM. Without a mission file it is not possible to program, target, or launch ALCMs/ ACMs.

PROCESSOR NO-GO

During initial OAS turn-on, if one or both processors indicate NO-GO, use the following procedures to get ON indications.

1. One or both processor indicator lights is NO-GO, press the indicator lights to see if they will change to ON.
2. If still unable to get both processor status lights on, turn OAS Master Power OFF, then back ON.
3. If these steps fail, contact maintenance.

PROCESSOR SHUTDOWN

If a processor begins to function improperly in flight, its own self-test procedures power it down.

Reconfiguration

If the primary ACU no-go's, then the secondary ACU takes control and becomes the primary ACU. If both ACUs no-go, then the OAS must be re–initialized.

The non-critical functions temporarily lost during reconfiguration are:

- Terrain correlation
- Any DTC recording function
- Damage Assessment Strike function
- Automatic video recording
- EVS position (EVS crosshair is slaved to radar crosshair).
- Flex Targeting
- Weapon Delivery Power Recording
- Bomb/Missile Scoring
- BIT Recording
- Ground Alignment
- SIM Modes

NOTE

- There is a maximum 3 minute waiting period before all non-critical functions are restored.
- When reconfiguration occurs, bomb inhibit is entered and the missile launch mode reverts to manual. Ensure that these switches are correctly repositioned for subsequent bombing/missile activity.
- When reconfiguration occurs, cruise missile targeting ceases and must be reinitiated after receiving a RECONFG COMPLETE message.

The following subsections describe the OAS control and display capabilities and processes that are affected when reconfiguration occurs (i.e. the backup ACU takes over the functions of the primary ACU).

CONTROL AND DISPLAY (C&D) COMMANDS

Reconfiguration aborts or interrupts various OAS processes, and therefore may require OAS C&D commands to be re-entered after reconfiguration occurs to restart them, or to ensure that CSP controlled conditions are set as desired. All OAS C&D commands continue to function, and are available for entry immediately after a reconfiguration is complete.

PCP COMMANDS

It is necessary to wait for reconfiguration to complete before using the switches on the PCP. If the equipment at a location is powering on when reconfiguration occurs, and the power-on sequence aborts, then the appropriate switch needs to be set to the non-pressed position then set back to the depressed position to restart the power-on process for that location.

WCP COMMANDS

It is necessary to wait for reconfiguration to complete before using the switches on the WCP.

- Reconfiguration clears all Location/Station selections. They must be reselected.
- If a Weapon Power On or Off request was in-progress when a reconfiguration occurred, the operator must check via SMO MFD display(s) for the current weapon power status, to determine if a Weapon Power On or Off request needs to be re-issued.
- If a Weapon Prearm or Safe request was in-progress when a reconfiguration occurred, the operator must check via SMO MFD display(s) for the current weapon prearm/safe status, to determine if a Prearm or Safe request needs to be re-issued.
- If a Weapon Selective Jettison request was in-progress when a reconfiguration occurred, the operator must check via SMO MFD display(s) for the current weapon jettison status, to determine if a Weapon Selective Jettison request needs to be re-issued.
- The Launcher Rotation light remains as it was prior to reconfiguration, unless it was illuminated and the SMO requests OAS to extinguish it (e.g. the rotation was aborted due to reconfiguration).
- Reconfiguration causes the Launch Mode to be set to manual.
- The Manual Launch light remains as it was prior to reconfiguration, unless it was illuminated and the SMO requests OAS to extinguish it (e.g. the launch was aborted due to reconfiguration).
- The Nuclear Unlock/Lock switch position is not affected by reconfiguration. The Unlock Consent status remains as it was prior to reconfiguration.

Inflight Failure of Both ACUs

If both ACUs fail inflight, the INU(s) and GPS will continue to operate and recovery of the system with correct present position and altitude is possible.

1. Re-apply ACU power and reload the FMS and mission data. If the INU(s) are still operating, CHK DATA will be displayed in the INU status window on CF, CF-1 and CF-2.
2. Enter the UTC, initial latitude, longitude and altitude on CF-61.
3. Command FLY-TO the next destination.

Following the FLY-TO command, the FMS will determine if the INU(s) and GPS are already navigating and, if they are, will use the INU(s)' (GPS-Aided) present position and altitude.

- If the INUs are not operating but the GPS is, the alternate navigation system will initially use the CF-61 data, then transition to GPS-Aided.
- If the INUs and GPS are not operating, the alternate navigation system will use the CF-61 data.
- If the GPS is not operating, the INU(s) and alternate navigation system will use the INU(s)' latitude and longitude and the CF-61 set altitude.

NOTE

> If the GPS is not operating and the initial altitude is not set on CF-61 prior to the first FLY–TO command, the altitude for the INU(s) and alternate navigation system can only be input by emergency setting it on FRMT-8, then updating it with HACs.

Failure To Erase Classified Data

When a processor no-go's, it is impossible to erase the processor's classified contents using OAS controls on the aircraft. Upon landing with a shutdown avionics processor, notify command post so that the processor may be removed from the aircraft for further maintenance action.

ERASURE OF CLASSIFIED DATA (CF-64)

NOTE

> UTC must be entered prior to CF-64, if not previously entered.

Classified data may be erased using CF-64 without going through the normal shutdown sequence (CF-67). First, remove any DTC. Then, command CF-64 ENTER and the classified erase question is displayed on the MFD. Answer the question YES and classified data erase begins. The INUs contain no classified data when powered off. Each ACU will be erased if on and not in a no-go status.

OAS Inertial Measurement

Less [AMI] ABNORMAL OPERATION

IMU STATUS WITH TWO OR MORE NO GO PROCESSORS

Should two or more processors fail (no OAS data) prior to the completion of coarse alignment, the IMUs will automatically despin on available power (aircraft or battery). A 2 to 5 minute delay in beginning the despin may be expected and the despin cycle must be complete prior to attempting an IMU restart. Once the IMUs have sequenced to a navigation mode, if two or more ACUs no go, the IMUs remain spun up. Once two or more processors are reloaded and PROC SYNC is depressed, IMUs will enter AIR ALIGN mode. When a FLY-TO command is entered, the IMUs will enter READY status and can be manually sequenced using CF-17/27 or will sequence automatically after 10 minutes of READY status. If at least a two processor reload is not possible, IMUs must be despun using IMU MANUAL SHUTDOWN procedures.

IMU RESTART

The IMUs can be powered up provided that the IMU self-protection logic permits, after an operator initiated shutdown. If the IMUs were shutdown with a CF-67 command, they can be restarted using the IME power switches. If the IMUs were shutdown with CF-16/26 command, they have to be restarted with a CF-11/21 or CF-12/22 command.

CAUTION

- The IMU can be restarted after one shutdown. A 5-minute wait is required after receiving the SHUTDOWN message. If an IMU is shut down again within 2 hours of the last restart, the IMU will remain off with cooling air for 2 hours before a restart can be attempted.
- If the IMUs are recycled in less time than those times specified, severe damage to the IMU will occur. This damage may render the IMUs inoperative.

NOTE

If both IMUs are rapidly recycled before the cause of misalignment is corrected, failure of the IMUs is likely to occur again. If both IMUs require a recycle, it is highly recommended that the IMUs be recycled one at a time. If both IMUs are rapidly recycled and do fail, the operator will have to wait 2 hours in the Alter System until the IMUs have cooled down prior to the next recycle.

IMU FAILURE

In the event of an IMU failure, the other unit will automatically become the prime inertial navigation reference, and the operator will observe the IMU fault message in the lower right corner of the MFD. If the remaining IMU fails, the OAS will select alternate navigation mode.

IMU MANUAL SHUTDOWN

When all processors are no-go and a CF-67 command has not been entered, both IMUs will continue to run. The IMUs can be manually shut down by pulling the three AC PWR circuit breakers for INS 1 and INS 2. Each INS will then despin on aircraft power and will not use the rotor support battery. If IMU despin is initiated by pulling the AC PWR circuit breakers actual IMU despin can be delayed up to 4 minutes and will be indicated by illumination of the IMU despin light. IMU despin is complete when the IMU despin light goes out.

NOTE

- If the OAS goes to a NO OAS DATA status prior to the completion of coarse alignment, the IMU(s) will automatically despin on available power (aircraft or battery). Once coarse alignment is complete and the OAS goes to a NO OAS DATA status, the IMU(s) will continue to run so long as the OAS power switch is not turned OFF and AC power is not lost or DC power is available and AC power is not lost for more than 10 seconds.
- Once coarse alignment is complete, should two or more processors no go, the IMU(s) will remain spun up. When two or more processors are reloaded and the synchronization button is pressed, the IMU(s) will enter AIR ALIGN. When a FLY-TO command is entered, the IMU(s) will enter READY status and can be manually sequenced using CF-17/27 or will sequence automatically after 10 minutes of READY status.

IMU UNCOMMANDED SHUTDOWN

Should the OAS shutdown an IMU, it may be possible to reapply power to that system. Check the appropriate control function display (CF-1 or CF-2) and determine actual IMU status. If the IMU status does not indicate OFF, i.e., SPINDOWN or SHUTDOWN, it may be necessary to insert a shutdown command (CF-16/26), followed by an air align command (CF-12/22) before IMU power can be re-applied.

[AMI] ABNORMAL OPERATION

INU FAILS TO POWER ON

If an INU fails to power on when commanded:

1. Ensure the INU's AC and DC circuit breakers are set (NO. 1 INS AC PWR on the Left Forward BNS circuit breaker panel and NO. 1 INS DC B/U POWER on the Left Load Central circuit breaker panel; NO. 2 INS AC PWR on the Left Forward BNS circuit breaker panel and NO. 2 INS DC B/U POWER on the Left Load Central circuit breaker panel).
2. If the circuit breakers are set, pull the INU's AC circuit breaker on the Left Forward BNS circuit breaker for 20 seconds.
3. Reset the circuit breaker.
4. Re-attempt INU power on.

INU STATUS WITH TWO NO GO PROCESSORS

Once processors are reloaded and PROC SYNC is pressed, INUs will return to the state they were at before the processor failed.

INU RESTART

The INUs can be powered up provided that the INU self-protection logic permits, after an operator initiated shutdown. If the INUs were shutdown with a CF-67 command, they can be restarted using the IME power switches. If the INUs were shutdown with CF-16/26 command, they have to be restarted with a CF-11/21 or CF-12/22 command.

INU FAILURE

In the event of an INU failure, the other unit will automatically become the prime inertial navigation reference, and the operator will observe the INU fault message in the lower right corner of the MFD. If the remaining INU fails, the OAS will select alternate navigation mode.

INU MANUAL SHUTDOWN

When both processors are no-go and a CF-67 command has not been entered, both INUs will continue to run. The INUs can be manually shut down by pulling the No. 1 and No. 2 INS DC B/U circuit breakers and the No. 1 and No. 2 INS AC PWR circuit breakers.

CAUTION

> Inadvertent OAS power shutdown, prior to properly shutting down the ACUs, will result in continuously powered INUs. The status of the INUs are not monitored after OAS shutdown. Attempt re-power of the OAS and perform proper ACU shutdown procedures. If conditions prevent re-powering the OAS, pull NO.1 and NO.2 INS DC B/U circuit breakers (RLC/F29 and LLC/F6) and the NO.1 and NO.2 INS AC PWR circuit breakers (LFBNS/A2 and LFBNS/B4) to prevent continuous operation of the INUs. Failure to remove power from the INUs could result in damage to the INUs after ECS shutdown.

NOTE

> Once coarse alignment is complete, should one or both processors no go, the INU(s) will remain operational. When one or both processors are reloaded and the synchronization button is pressed, the INU(s) will enter AIR ALIGN. When a FLY-TO command is entered, the INU(s) will enter READY status and can be manually sequenced using CF-17/27 or will sequence automatically after 10 minutes of READY status.

INU UNCOMMANDED SHUTDOWN

Should the OAS shutdown an INU, it may be possible to re-apply power to that system. Check the appropriate control function display (CF-1 or CF-2) and determine actual INU status. If the INU status does not indicate OFF, i.e. DECLASS or CHK-DATA, it may be necessary to insert a shutdown command (CF-16/26), followed by an air align command (CF-12/22) before INU power can be re-applied.

OAS Keyboards and Multifunction Displays

ABNORMAL OPERATION

Failure of a keyboard or an MFD should not present a major problem during OAS operation since there are two keyboards and four MFD's. Failure of all avionics processors will prevent all program, all format (except FRMT-1 and FRMT-3), and most control function operations of the keyboards and MFD's. See NO OAS DATA OPERATION, this section, for additional information.

BIT ADVISORIES

The OAS built-in-test system will monitor the MFD's and the keyboards along with other control panels and controls and display equipment and provide advisories on the MFD's. See figure 3-17 for a malfunction index of the BIT advisories.

NO OAS DATA OPERATION

If OAS power is on, without the avionic processors operational, such as during startup or during processor malfunction, a blinking, NO OAS DATA, advisory is displayed on the selected MFDs. When the message key is pressed, the advisory will go steady, but remain on the MFDs, as long as there is no processor operating. If the system was operating prior to receipt of the NO OAS DATA advisory, the displays will remain frozen on the MFDs including the alphanumerics until another display is selected. The selectable displays are shown in figure 3-20. If operating with a radar display, the display will revert to a 25 NM PPI uncorrected ground map format with LOS (TH) at the top of the MFD. The ground track marker will move to coincide with the heading marker at zero azimuth. If radar is not displayed, it may be selected with a FRMT-1 command.

Only the following keyboard inputs are functional:

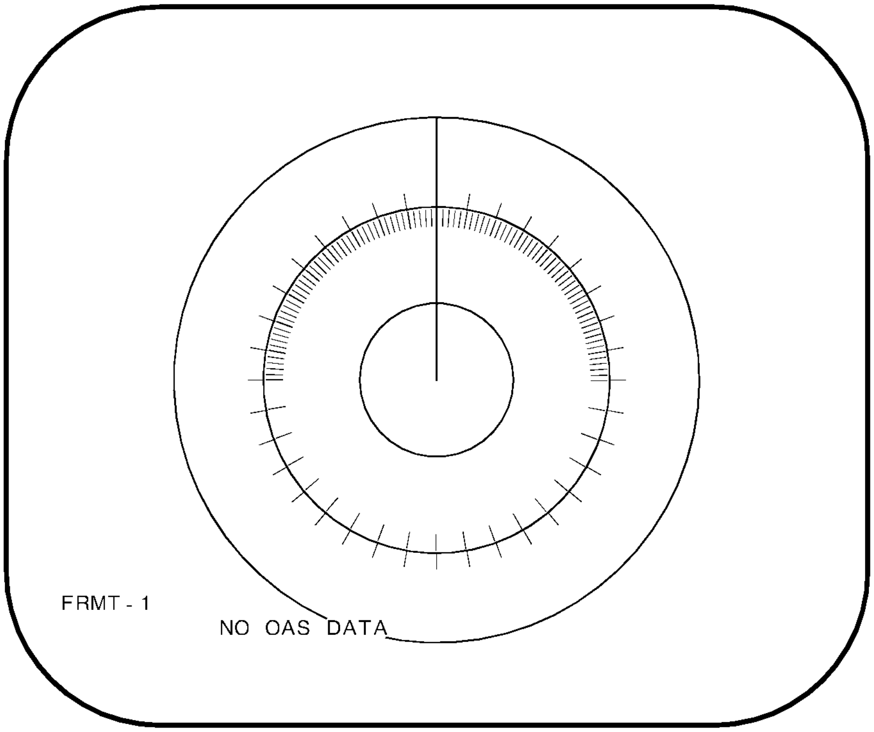
- Left and right MFD selection.
- FRMT-1 ENTER – Gives radar video only display, no alphanumerics, LOS on selected MFD. Range is as selected below.
- FRMT-3 ENTER – Gives an EVS video only display, no alphanumerics. Deselecting the BNS HDG switch on the EVS VIDEO SELECT panel during NO OAS DATA operations will leave a partial heading marker that is driven by the pilot's heading bug. By having the pilot/copilot set the heading bug to the planned heading and deselecting the FCI, the navigator can monitor heading deviations from the planned heading. The exact deviation is not measurable without asking the pilots for their current heading.
- CF-A ENTER – Gives a means to manually key in altitude above terrain for use in radar ground map display altitude compensation. A display ALT = appears on the data entry line of the MFD. A five digit value of altitude may be keyed in and displayed.
- CF-B ENTER – Gives a means of moving the ground track marker up to 90° either side of the heading marker. The track marker is moved by means of the track ball.
- CF-C ENTER – Gives a means of keying in a value of offset for offset fixed angle bombing up to 20 nautical miles. When entered, the display OS = +000 will appear on the data entry line of the MFD. A four character value of offset including + or - in tenths of a nautical mile may be entered to position the heading marker the entered distance left (+) or right (–) of and parallel to the track marker.

The operator can select range during FRMT-1 operation by using CF-A (altitude) in conjunction with CF-C (offset) as follows:

- Altitude less than 5000 feet, any value of offset of 20 or less gives 25 NM ground map.
- Altitude equal to or above 5000 feet, offset = 0 gives 75 NM ground map.
- Altitude equal to or above 5000 feet, offsets greater than 0 up to 20 give 75 NM slant range map.
- During NO OAS DATA operation, there is no status information for the IMUs/INUs.

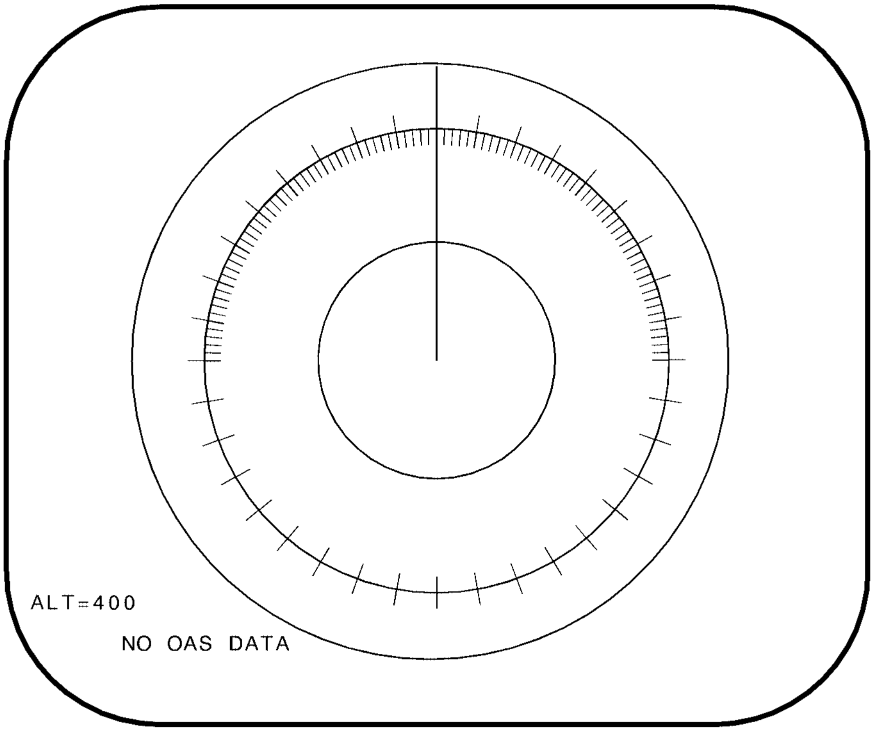
The video recorder can be operated using the MAN switch. When the OAS is in a NO OAS DATA operational mode, the OAS will automatically select a display range of 25 NM for display of the radar video. If an altitude of 5000 feet or greater is selected a failure warning ring will be displayed on the radar video display at a range of approximately 62 to 67 NM. This failure warning ring is a normal consequence of the current OAS system mechanization.

NO OAS DATA Displays



FRMT 1 INITIAL DEFAULT DISPLAY

Figure 3-20 (Sheet 1 of 6)

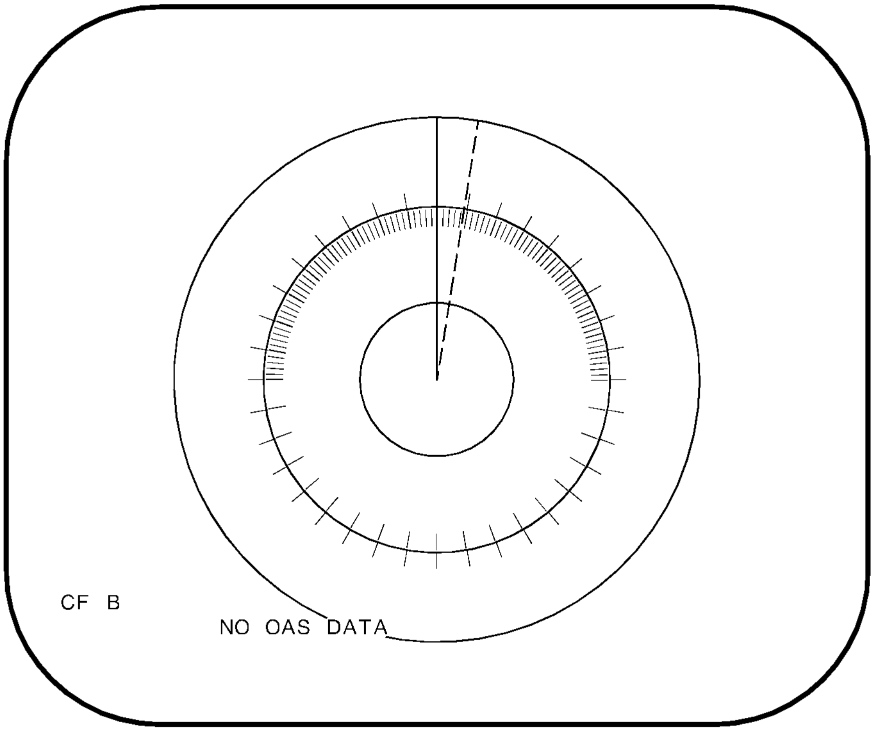


CF A MANUALLY SELECTED ALTITUDE

A32064

Figure 3-20 (Sheet 2 of 6)

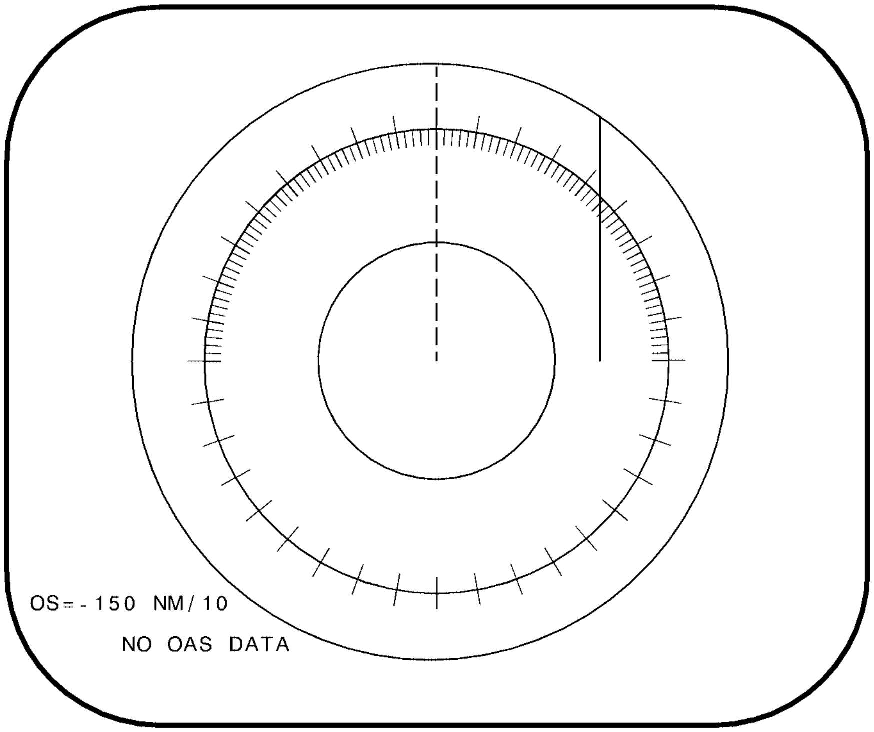
NO OAS DATA Displays (Cont)



CF B GROUND TRACK MARKER PLACEMENT

A32065

Figure 3-20 (Sheet 3 of 6)

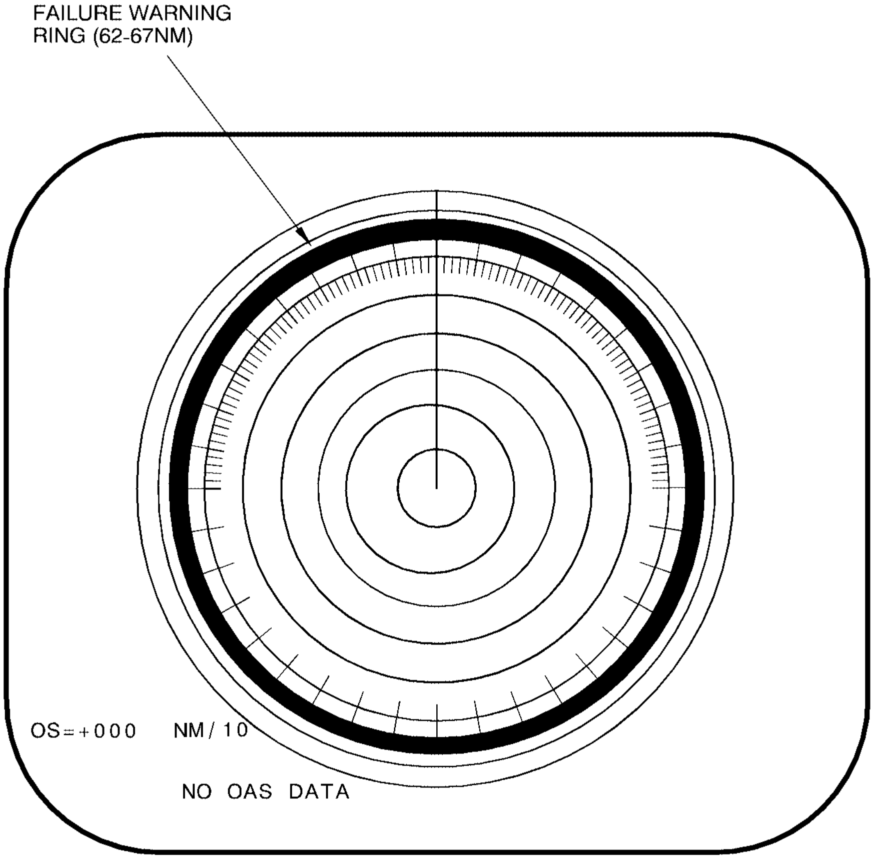


CF C ALTITUDE LESS THAN 5000 FEET WITH OFFSET

A32066

Figure 3-20 (Sheet 4 of 6)

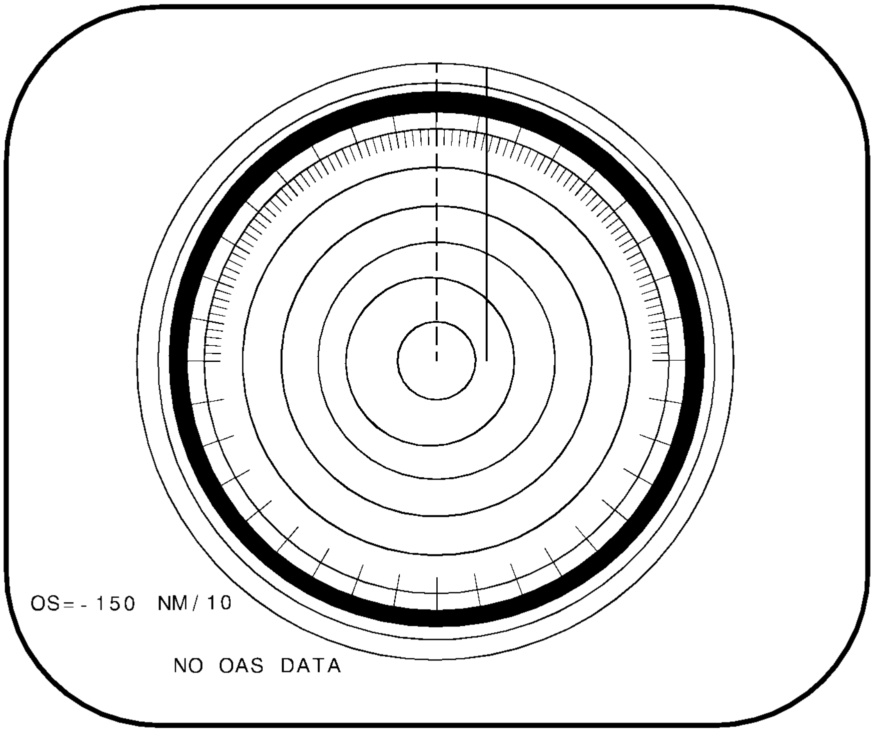
NO OAS DATA Displays (Cont)



CF C ALTITUDE MORE THAN 5000 FEET, NO OFFSET

A32067

Figure 3-20 (Sheet 5 of 6)



CF C ALTITUDE MORE THAN 5000 FEET, WITH OFFSET

A32068

Figure 3-20 (Sheet 6 of 6)

RNMP WORK–AROUND PROCEDURES

CF-F provides a means for the operator to work around a total or partial failure of the RNMP. These failures may be either switch failures or software driven failures. In either case, the OAS will treat CF-F commands as if they had originated from the RNMP regardless of GO/NO-GO status of the RNMP. Several functions on the RNMP are not replaced by CF-F. These are listed below with the appropriate action or consequence:

- SECTOR WIDTH – Hard wired, not affected.
- BOMB INHB – Replaced on CF-F
- DEST/TGT and OAP – Use X-HAIR function on keyboards. Use X-HAIR 0 for DEST/TGT and X-HAIR NNN for OAPs.
- MARKERS – Replaced on CF-F
- RECORDER – Defaults to AUTO
- MFD/RSC – Defaults to RSC
- LAC – Replaced on CF-F
- FWD SITE – Not replaced.
- X-HAIR REF – Defaults to AUTO
- PRES PANEL – Hard wired, not affected

After failure of the RNMP, select CF-F function on either keyboard. The selected MFD will display the CF-F menu as shown in figure 3-21. This allows you to use the keyboard to manually input data normally input by the RNMP. For example, to select 25 nm range, type F25 on the keyboard. The radar will display a 25 nm range and F25 will be underlined. The active selection will always be underlined. Deselection of certain modes requires reentry of the same code. For example, to deselect FREEZE, you must reenter F16. HT, HAC, and MP are similar. The remaining CF-F codes are one time entries to either select a function or command an action such as update.

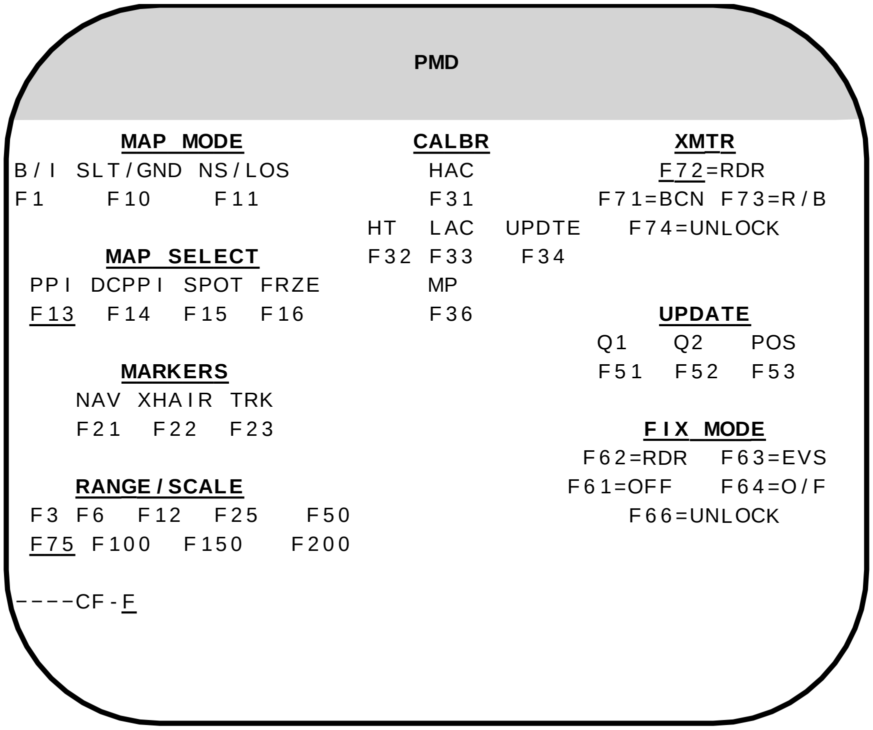
NOTE

- When selecting BCN, RDR, or RDR/BCN, the XMTR MODE selector switch must be set to the appropriate position when commanding CF-F71, CF-F72, or CF-F73 due to the mechanization of the OAS.

- ***Less [AMI]*** If CF-F was used to position the XMTR or FIX mode switches, command F66 and/or F74 prior to exiting CF-F to ensure the RNMP switches are returned to normal operation.

- ***[AMI]*** If CF-F was used to position the XMTR or FIX mode switches, command F74 and/or F65 prior to exiting CF-F to ensure the RNMP switches are returned to normal operation.

Less [AMI] RNMP Backup Display – (CF-F)



```
                              PMD

      MAP MODE                  CALBR                 XMTR
B/I  SLT/GND  NS/LOS              HAC                F72=RDR
F1     F10      F11               F31           F71=BCN  F73=R/B
                              HT  LAC  UPDTE      F74=UNLOCK
     MAP SELECT               F32 F33   F34
 PPI  DCPPI  SPOT  FRZE           MP
 F13   F14    F15   F16           F36                UPDATE
                                                Q1    Q2    POS
      MARKERS                                   F51   F52   F53
   NAV  XHAIR  TRK
   F21   F22   F23                                 FIX MODE
                                               F62=RDR   F63=EVS
   RANGE/SCALE                                F61=OFF   F64=O/F
 F3  F6   F12   F25    F50                        F66=UNLOCK
 F75  F100   F150    F200

----CF-F
```

A32776

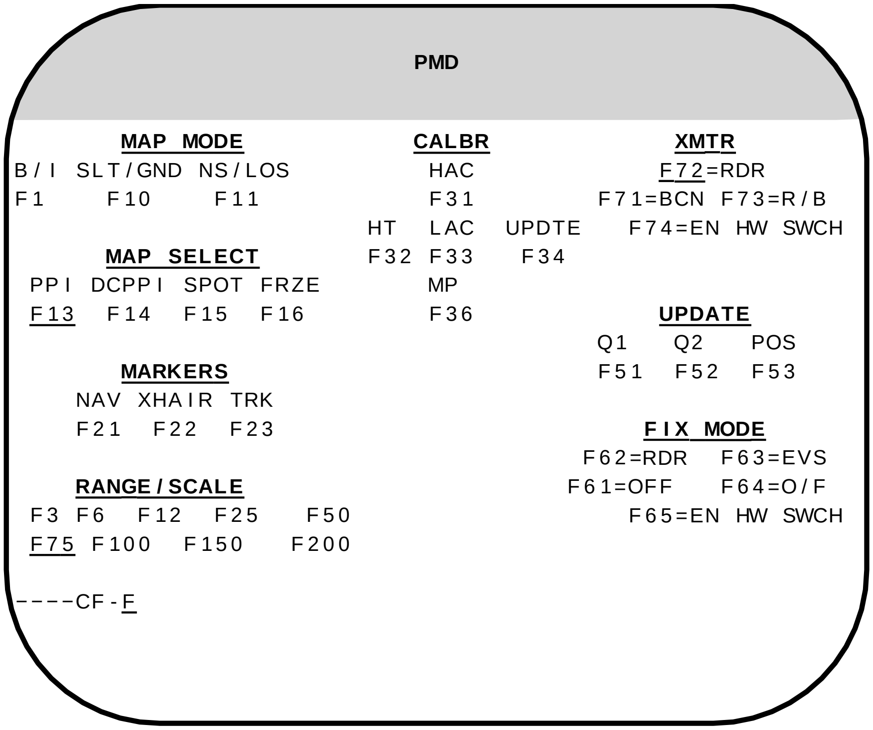
CF-F RNMP BACKUP DISPLAY

NOTE

- The active mode or switch position will be underlined.
- When selecting BCN, RDR, or RDR/BCN the XMTR mode selector switch must be set to the appropriate position when commanding CF-F71, CF-F72, or CF-F73 due to the mechanization of the OAS.
- To ensure normal operation of the XMTR and FIX MODE functions of the RNMP, command F66 and F74 prior to exiting CF-F.

Figure 3-21 (Sheet 1 of 2)

[AMI] RNMP Backup Display – (CF-F)



```
                                     PMD

            MAP  MODE              CALBR                 XMTR
B/I  SLT/GND  NS/LOS                HAC                 F72=RDR
F1     F10      F11                 F31            F71=BCN  F73=R/B
                               HT   LAC   UPDTE       F74=EN  HW  SWCH
          MAP  SELECT          F32  F33    F34
 PPI  DCPPI  SPOT  FRZE             MP
 F13   F14    F15   F16             F36                 UPDATE
                                                   Q1     Q2     POS
            MARKERS                                F51    F52    F53
     NAV  XHAIR  TRK
     F21   F22   F23                                   FIX  MODE
                                                 F62=RDR    F63=EVS
     RANGE/SCALE                                F61=OFF    F64=O/F
 F3  F6   F12   F25    F50                            F65=EN  HW  SWCH
 F75  F100   F150   F200

----CF-F
```

B36999

CF-F RNMP BACKUP DISPLAY

NOTE

- The active mode or switch position will be underlined.
- When selecting BCN, RDR, or RDR/BCN the XMTR mode selector switch must be set to the appropriate position when commanding CF-F71, CF-F72, or CF-F73 due to the mechanization of the OAS.
- To ensure normal operation of the XMTR and FIX MODE functions of the RNMP, command F74 and F65 prior to exiting CF-F.

Figure 3-21 (Sheet 2 of 2)

OAS Navigation

ABNORMAL OPERATION

Abnormal operating procedures are used when the navigation data inputs cannot support the aided-inertial submode.

CAUTION

- ***[CS][AMI]*** When significant INS/INU or GPS position errors are present, the Kalman filters may be rejecting GPS data even when the GPS displays INS/INU quality and a low FOM. This condition affects the accuracy of navigation and weapon delivery. If radar position buffers indicate significant position differences on radar aim points, select the other INS/INU if it is not affected or the alternate navigation reference and re-initialize the affected INS/INU. If the condition persists, recycle and re-initialize the GPS.
- ***[CS][AMI]*** Inaccurate INS/INU true heading may persist in GPS-Inertial mode. This condition affects bombing accuracy. If INS drift correction angle differs significantly from Doppler DCA, select Doppler-Inertial mode and complete several steep turns to resolve INS/INU true heading error, then reselect GPS-Inertial mode.

Less *[AMI]* ALTERNATE NAVIGATION

[NS] Alternate navigation is selected automatically by the OAS when both INSs are NO GO or can be manually selected by the operator. Nine submodes are available in alternate navigation. Three submodes; Doppler/AHRS, TAS + winds/AHRS, Emergency are selected in descending order by the OAS, if operating in the AUTO mode or can be manually selected by the operator. The other six submodes can use any combination of emergency velocity input, and emergency heading input or emergency attitude data, and must be manually selected by the operator.

[CS] Alternate navigation is selected automatically by the OAS when both INSs are NO GO or can be manually selected by the operator. 12 submodes are available in alternate navigation. Four submodes; GPS/AHRS, Doppler/AHRS, TAS + winds/AHRS, Emergency are selected in descending order by the OAS, if operating in the AUTO mode or can be manually selected by the operator. The other eight submodes can use any combination of emergency velocity input, and emergency heading input or emergency attitude data, and must be manually selected by the operator.

[CS]

CF COMMAND	RESPONSE
CF-31	Automatically selects best alternate submode when OAS power applied or can be manually selected.
CF-321	GPS/AHRS
CF-322	GPS/AHRS ATT+ EMERG HDG
CF-323	GPS/EMERG
CF-331	DOPPLER/AHRS
CF-332	DOPPLER/AHRS ATT + EMERG HDG
CF-333	DOPPLER/EMERG
CF-341	TAS + WINDS/AHRS
CF-342	TAS + WINDS/AHRS ATT+ EMERG HDG
CF-343	TAS + WINDS/EMERG
CF-351	EMERG/AHRS
CF-352	EMERG/AHRS ATT + EMERG HDG
CF-353	EMERG/EMERG
CF-36	Alternate present position synchronized with PMD. Comes up NO upon application of aircraft power. Has to be modified to YES for present position to automatically synchronize with PMD with only one operating INS.

[NS]

CF COMMAND	RESPONSE
CF-31	Automatically selects best alternate submode when OAS power applied or can be manually selected.
CF-321	DOPPLER/AHRS
CF-322	DOPPLER/AHRS ATT + EMERG HDG
CF-323	DOPPLER/EMERG
CF-331	TAS + WINDS/AHRS
CF-332	TAS + WINDS/AHRS ATT+ EMERG HDG
CF-333	TAS + WINDS/EMERG
CF-341	EMERG/AHRS
CF-342	EMERG/AHRS ATT + EMERG HDG
CF-343	EMERG/EMERG
CF-35	Alternate present position synchronized with PMD. Comes up NO upon application of aircraft power. Has to be modified to YES for present position to automatically synchronize with PMD with only one operating INS.

GPS inputs ***[CS]***/Doppler velocity, and AHRS heading and attitude are used if the inputs are valid. Alternate navigation uses GPS ***[CS]***, Doppler, TAS + winds, or a manually input velocity value and uses AHRS for heading and attitude references and then manual inputs for heading if the AHRS fails. If the AHRS attitude inputs are NO GO, the OAS assumes zero pitch and roll values. When TAS + winds is the active velocity input while in alternate navigation, the system uses the last computed wind. This wind does not change until it is updated either by a memory point wind or a manually entered wind using FRMT-8. Alternate navigation is automatically updated every 15 minutes by the prime navigation system when both INS's are operational and the aided inertial mode is prime. If one INS is down, alternate position fix update has to be commanded by the operator using CF-35/CF-36 ***[CS]***. The operator has to update the alternate position when the alternate mode is prime. The OAS automatically selects the best alternate navigation submode, if another alternate navigation submode has not been manually selected. If an alternate navigation submode was manually selected, another submode has to be selected in the event of sensor failure.

Emergency data is manually input using FRMT-8 when a CF-3 submode requires emergency data. See ALTERNATE NAVIGATION DATA INPUT procedures, this section, for data input procedures.

[AMI] ALTERNATE NAVIGATION

Alternate navigation is selected automatically when aided-inertial data inputs are unavailable or it can be manually selected by the operator. Alternate navigation computations are performed at the same time as aided-inertial computations to provide a ready reference in the event of aided-inertial failure. Present position is provided to the alternate navigation computations whenever a position fix is taken and every 15 minutes from the prime INS when the following conditions exist:

- Alternate navigation present position synchronization is enabled.
- Alternate navigation is not using GPS position and velocity data.
- Alternate navigation is not the prime navigation system.

Alternate navigation present position synchronization is disabled when the system is started.

The alternate navigation operating mode and commands can be observed on the Alternate Navigation Supervision menu, CF-3, as follows:

CF COMMAND	RESPONSE
CF-31	Automatically selects best alternate submode
CF-321	GPS VEL/AHRS HDG
CF-322	GPS VEL/EMERG HDG
CF-331	DPLR VEL/AHRS HDG
CF-332	DPLR VEL/EMERG HDG
CF-341	TAS+W/V VEL/AHRS HDG
CF-342	TAS+W/V VEL/EMERG HDG
CF-351	EMERG VEL/AHRS HDG
CF-352	EMERG VEL/EMERG HDG
CF-36	Alternate present position synchronized with prime INU present position

Emergency data is manually input using FRMT-8 when a CF-3 submode requires emergency data. See ALTERNATE NAVIGATION DATA INPUT procedures, this section, for data input procedures.

For a complete description of alternate navigation see NAVIGATION AND STEERING, Section I.

BIT ADVISORIES

The BIT function interface handles monitoring of status data and provides data for fault message displays and fault recordings. The BIT fault messages appear near the bottom of the MFD's in reverse video highlight and the MSG light on the keyboard comes on. Press the MSG key to acknowledge the message, the MSG light goes out, and the message is erased from the MFD. Select FRMT-6 to check primary mission equipment and FRMT-8 to check emergency navigation data inputs. The navigation inputs are discussed in the ALTERNATE NAVIGATION DATA INPUTS paragraph in this section.

The equipment faults related to the navigation function are listed as follows:

DISPLAY DATA FORMAT	CONDITION
AHRS DATA	AHRS Data NO Go
ACU-A SELF TST	Avionics Processor-A NO GO
ACU-B SELF TST	Avionics Processor-B NO GO
Less [AMI] ACU-C SELF TST	Avionics Processor-C NO GO
RNMP	RNMP NO GO
STEER	Steering NO GO
TAS, W/V, ALT	True Airspeed, Altitude NO GO

MALFUNCTION ANALYSIS AND CORRECTION

AHRS DATA

True heading or attitude data is unreliable. Operation in the aided-inertial mode is not affected. Heading and stabilization references are lost in alternate navigation. A true heading value has to be entered using FRMT-8. Angle-of-attack value has to be entered using FRMT-8. Pitch and roll values go to 0° pitch and roll with reference to the fuselage reference line. Pitch stabilization can be manually changed by an AOA value on FRMT-8. The angle-of-attack value is obtained from the FRL chart. The attitude reference is only valid when the aircraft is straight and level.

ACU-A SELF-TST

Processor A has failed self-test. Press PROC STATUS light to clear no-go, if prior to PROC SYNC. Check reconfiguration status after PROC SYNC.

ACU-B SELF-TST

Processor B has failed self-test. Press PROC STATUS light to clear no-go, if prior to PROC SYNC. Check reconfiguration status after PROC SYNC.

Less [AMI] ACU-C SELF-TST

Processor C has failed self-test. Press PROC STATUS light to clear no-go, if prior to PROC SYNC. Check reconfiguration status after PROC SYNC.

RNMP

The RNMP senses an electrical power malfunction and all management functions are affected. Use CF-F functions on the emergency OAS supervision menu to manually command the functions serviced by the RNMP.

STEER

Track angle error and crosstrack position error are used to compute steering commands in centerline recovery and only track angle error is used to compute the steering command in direct. If either data value is not available, the OAS sets steering outputs to zero and generates the STEER message.

TAS, W/V, ALT

The TAS or altitude sensor has malfunctioned. Wind direction and velocity data also becomes invalid when the TAS data is invalid. If the pitot-static system has malfunctioned causing an unreliable TAS and HA value, the TAS, W/V, ALT message will not be displayed. Enter TAS using FRMT-8. If the altitude reference data is invalid, accomplish a HAC to update true altitude. If the HAC is invalid, enter altitude using FRMT-8.

ALTERNATE NAVIGATION DATA INPUTS

FRMT-8 is used to manually input navigation data needed to solve navigation problems. The data can be manually input by the keyboard:

DATA	UNITS	FRMT-8 SYMBOL
*True Airspeed	Knots	TAS
*Wind Direction/ Speed	Degrees/Knots	W/V
*Groundspeed/Drift Correction Angle	Knots/Degrees	GS/DCA
True Altitude	Feet	True ALT
True Heading	Degrees	TH
Magnetic Heading	Degrees	MH
Angle-of-Attack	Degrees	ANGL/ATTK

*How to enter Emergency (EMER) TAS, EMER GS/DCA, and EMER W/V data on FRMT-8:

1. The operator may manually enter, update, or deselect EMER TAS or EMER GS/DCA any time in any order.

2. The OAS will not accept an EMER W/V entry unless EMER TAS has been set first.

3. Once EMER TAS has been set: The operator may manually enter, update, or deselect either EMER GS/DCA or EMER W/V. However, EMER GS/DCA and EMER W/V cannot be set simultaneously.

If the operator sets EMER GS/DCA, the OAS will compute a resultant W/V based on the components of EMER TAS and EMER GS/DCA. Likewise, if the operator sets an EMER W/V, the OAS will compute a resultant GS/DCA. If the operator has previously set EMER GS/DCA and attempts to set W/V, when he enters the W/V value, the OAS will deselect EMER GS/DCA. Conversely, if EMER W/V was previously set, entering GS/DCA deselects EMER W/V.

Once values are set using the FRMT-8 display, they do not change unless a new value is inserted or is referenced back to the computed value when sensor data is detected to be reliable. An example of how FRMT-8 is used is shown below for the failure of true airspeed data. Failure of TAS also makes wind data invalid. Both MFD's display the following message in reverse video near the bottom of the MFD:

TAS, W/V, ALT

Press FRMT-8 ENTER on the keyboard to command the emergency data display on the MFD and press the MSG key on the keyboard to acknowledge the message.

The MDFY function is used to change TAS values. MDFY 0, ENTER moves the TAS data line to the bottom of the MFD and the cursor appears under the first number and must be backspaced to the letter. Modify the TAS with Ennn ENTER command. A valid input moves the TAS data back up to line 0 on the display and the E is highlighted in reverse video. TAS and W/V values are updated in the PMD block and appear in reverse video. If an unreasonable value of TAS is entered, the TAS data line remains at the bottom of the MFD and the cursor appears following the letter E. The operator may revert back to the computed TAS only when the condition causing the no-go clears. The operator has to determine when the sensor fault has cleared and enter MDFY 0, then ENTER C. The TAS value then reverts back to the computed value. The other data parameters are entered using the same procedures. The attitude line cannot be modified. The attitude stabilization values go to zero pitch and roll and the radar antenna locks to the fuselage reference line. Angle-of-attack input is used in the navigation model and air data elements to compute mach and true airspeed. If the angle-of-attack computer is no-go, refer to the Aircraft Body Angle-of-Attack-Level Flight chart for angle-of-attack value. The emergency angle-of-attack value does not affect radar antenna stabilization or tilt. The operator still has to set tilt manually if pitch stabilization has malfunctioned.

Memory Point Wind Calibration

Memory point wind correction can be accomplished when in ALTER navigation by computing wind direction and speed based on track control inputs. For Nuclear OCP the reference switch must be in ALTER and the FIX MODE Switch must be OFF. Select the MFD supporting radar or EVS display and verify HT and correct if required. Accomplish a low or high altitude calibration as required. Initiate manual fixpoint sequencing by selecting X-HAIR NN ENTER. Place the crosshair on a sighting point with the track control. Press the MP switch on the RNMP and the following message appears on the bottom of the selected MFD:

MP HT = ±xxxx′ W = xxx°nnn Δ = xxx° nnn

When the crosshair drifts off the sighting point, place crosshair back on the point. The crosshair drift stops if the correction is good. If not, repeat the procedure until the drift stops. The message at the bottom of the MFD reflects correction and new W/V values. The winds are updated by pressing the UPDATE switch on the RN management panel. If the operator does not wish to use the data, he presses the MP switch and exits the mode. In either case, the MP legend is erased, the W and Δ messages are erased and the fixpoint sequence mode returns to the mode selected prior to entering the MP mode.

Alternate True Heading Calibration

An alternate true heading calibration can be accomplished any time when in ALTER navigation or crosshair reference switch is in ALTER and FIX-MODE switch is OFF using any radar or EVS display. Select DG mode for AHRS, display ALTER PMD, and select two fixpoints or OAPs which are separated in range and azimuth. The wider the azimuth separation, the more precise the calibration. Identify the two fixpoints on the radar or EVS. The calibration can be accomplished using either sensor, or a combination of both. Command X-HAIR N_1, N_2 ENTER, and check that the crosshair moves to the vicinity of GPI N_1. The data display changes on the MFD as follows:

Upper left corner of MFD: nnn FXPT (or OAP)
Bottom of MFD: HDG CAL

Position crosshair on GPI N_1 and select ⊕. The crosshair immediately moves to a point in the vicinity of GPI N_2 and the sequence number changes and the bottom message will read:

HDG CAL = Δ ±00.0°

Now position the crosshair on GPI N_2, the message will display heading correction. A “+” indicates positive heading correction and a “–” indicates negative heading correction. Select ⊕ on the keyboard and the crosshair will rotate back to N_1 and the MFD displays the following question:

UPDATE HDG? YES-NO

The question must be answered or track control inputs are ignored until the question is answered or 60 seconds has expired, in which case NO is assumed. If you select YES, on the keyboard, the alternate navigation true heading is updated and the question will be erased. The procedure can be repeated at this time, if desired. If the answer is NO, the function is terminated. The function can be reentered by repeating the procedure. The mode can also be terminated by pressing any CALIBRATE or NAV/BOMB switch on the RNMP, selecting or commanding X-HAIR ENTER or X-HAIR NN ENTER on the keyboard. Data is erased when the mode is terminated.

NOTE

- If AHRS is returned to the slaved mode, AHRS syncs to the slaved heading, and the alternate true heading correction does not remain in the system.
- HDG CAL does not update pilots heading reference.

OAS Video Recorder

ABNORMAL OPERATION

Certain system conditions may require special procedures to continue operation of the video recorder. Indication of these conditions is given by BIT advisories and the corrective procedures are given below.

BIT ADVISORIES

The OAS built-in-test system monitors the performance of the video recorder system. The functions/conditions monitored by the BIT system are:

- Power Supply Failure
- CRT Display Failure
- Scan Failure
- Video Presence
- Improper Film Advance
- Film Status (out of film, breakage, no magazine installed)

The BIT indicator on the video recorder unit provides an indication of film conditions within the recorder unit as follows:

- End of film or film breakage
- Film magazine not installed
- Improper film advance

The recorder can operate under a no OAS data condition by setting the video recorder mode switch to MANUAL each time an event is to be recorder.

MALFUNCTION ANALYSIS AND CORRECTION

The corrective procedures for malfunctions of the video recorder system are categorized according to the type of indication displayed to the radar navigator.

FILM LIGHT ON

Remove film magazine and install spare magazine.

VID RCDR INDICATION ON MFD

On receipt of the VID RCDR advisory on the advisory line of the MFD, the radar navigator should accomplish the following (accomplishing the items at his position first before checking the recorder on the equipment rack):

1. Check the ac and dc circuit breakers on the left forward BNS circuit breaker panel and the VID RCDR circuit breaker on the right S/V filter box.
2. If video is not being displayed on either MFD, select a display on left MFD. If video displayed is not satisfactory, adjust EVS or radar video.
3. Check BIT indicator on recorder unit. If the indicator shows black, the malfunction is probably in the automatic mode control circuits. If the BIT indicator shows white segments, remove film magazine and install spare magazine.
4. Check equipment status on PME display (FRMT-6). Operation may only be possible in manual mode.

OAS Weapon Control and Delivery Subsystem

ABNORMAL OPERATION

BIT ADVISORIES

The OAS built-in-test monitors and displays detected OAS system and missile faults. The faults are indicated by the master fault light coming on, and are displayed on the MFD's in the form of a fault message in reverse video near the bottom of the MFD. Refer to T.O. 1B-52H-30-1 and T.O. 1B-52H-30-4 for nuclear caution and master fault advisories.

GRAVITY WEAPON ABNORMAL RELEASE AND JETTISON PROCEDURES

Procedures for abnormal release and/or jettison are found in T.O. 1B-52H-25 series for nuclear weapons or T.O. 1B-52H-34 series for nonnuclear weapons.

MISSILE JETTISON

Missile jettison requires unlock consent between the pilot and navigator. If unlock consent exists, the navigator may jettison any or all remaining missiles by selecting location(s) (LP, RP, BAY) and station(s) (1 thru 8, ALL) and placing his WPN JETTISON switch to SEL.

Procedures and considerations for jettison of missiles are contained in T.O. 1B-52H-30-1 (ACM); 1B-52H-30-4 (ALCM); and T.O. 1B-52H-34 series (nonnuclear munitions/missiles).

OVERRIDE MISSILE WARMUP TIMERS

MIU power must be on for 40 minutes before missile power can be applied, unless CF-54, warmup timer override command is entered. CF-54 will override 35 minutes of the 40 minute warmup timer. Even with CF-54 entered, missile power will not be accepted if missile temperature is not within limits. Refer to T.O. 1B-52H-30-1, T.O. 1B-52H -30-4 and T.O. 1B-52H-34-2-9 for further explanation.

NOTE

- Do not use CF-54 for initial power application.
- Do not issue the command BIT data block until after receiving FINE ALIGN COMPLETE indication in instances where the guidance set temperature could be cold soaked below –55°F. If not done, the RAS BIT may give a failure indication.

OVERRIDE MISSILE AND CSRL GRAVITY WEAPON PREARM (CF-512)

Prearm override (CF-512) allows the OAS to launch a missile without the warhead status in ARMD. This allows the system to work around a malfunction and launch a missile that is SAFE, NTSF, or one with no warhead status. Missile prearm must have been attempted twice and failed before CF-512 will be accepted by the OAS. For CSRL Gravity Weapons CF-512 may be used any time necessary. When accepted, a reverse video OVRD will appear in the warhead status block on FRMT-7. Prearm override allows the crew to launch a missile or release a gravity weapon with an unknown prearm status rather than jettisoning it. The override status applies only to the current weapon event. When the event is completed or deselected, the OAS will deselect prearm override.

Less [AMI] WEAPON CONTROL PANEL ABNORMAL PROCEDURES

An advisory WCP on the MFD’s indicates malfunction on the WCP. The operator will use CF-E to backup actions accomplished on the WCP. This will allow the operator to work around certain failures which disable the WCP and OAS power control panel. The operators may use keyboard entries to perform functions mechanized on these panels at anytime regardless of the panels go/no-go status. The OAS will treat the keyboard command as if it had originated from the WCP or OAS power panel. Three functions are not available on the CF-E method. These are “hardwired,” that is, not accomplished by the software through the computer. The functions are pylon lock/unlock, nuclear lock/unlock, and prearm enable. These functions are marked (HW) at the corresponding positions on the display as those switches are on the panel. The display is laid out in basically the same arrangement as the panel. To accomplish a backup action for the malfunctioning panel switch, the operator enters the symbols associated with the switch on the keyboard in the same sequence that normal switch operation would occur. The switch symbols for location, station, missile launch mode, and MIU power are entered again to obtain the opposite action. For example, to power the left pylon MIU, the power status should be checked off by noting the word OFF is underlined for MIU PWR, LP on the CF-E display. Select CF-E9A and ENTER on the keyboard, the underline will move from OFF and ON indicating power has been applied to the left pylon MIU. To remove power from the left pylon MIU, CF-E9A is selected and entered a second time. When the power has been removed, the underline will move from ON to OFF on the CF-E display.

Weapon power is selected with the letter E and deselected with the letter D. To power the left pylon No. 1 missile, for example, assuming MIU power is already on, select CF-E3A and ENTER on the keyboard. LP on the location section of the CF-E display will be underlined. Select CF-E41 and ENTER on the keyboard. LP and 1 on station section of the display will be underlined indicating left pylon No. 1 missile is selected. Select CF-E6 on the keyboard. When the ENTER key is pressed, the line under the LP and 1 will disappear and the OAS will send a command to the left pylon MIU to power missile No. 1. If more than one missile is to be powered individually, the procedure must be accomplished for each missile within the 90-second missile power application time limit. The procedure for removing power from a missile is much the same. The missile location and station is selected in the same manner, but CF-D6 instead of CF-E6 is entered to command weapon power off. With weapon jettison, prearm, safe, and manual launch, the desired function occurs on the selected missile when the switch symbols are entered.

NOTE

- CF-E has no effect on the WCP or OAS power panel and can be used in conjunction with the panels to operate the system. If CF-E is used to turn on MIU, CF-E must also be used to remove power from that MIU.
- With a total WCP failure prior to activation of hardware functions, missile launch or jettison, and pylon jettison is not possible.

[AMI] WEAPON CONTROL PANEL ABNORMAL PROCEDURES

The Weapon Control Panel /Power Control Panel Display, CF-E (figure 3-22), identifies commands that can be entered from an IKB that have the same effect as activating the corresponding Weapon Control Panel or Power Control Panel switch. This allows the operator to work around certain failures which disable the WCP and OAS PCP. The operators may use keyboard entries to perform functions mechanized on these panels at anytime regardless of the panels go/no-go status. The OAS will treat the keyboard command as if it had originated from the WCP or OAS power panel.

To accomplish a backup action for the malfunctioning panel switch, the operator enters the command associated with the switch on the keyboard in the same sequence that normal switch operation would occur. See table 3-1 for switch commands. The switch commands for location, station, missile launch mode, and MIU power are entered again to obtain the opposite action. For example, to power the left pylon MIU, the power status should be checked off by noting the word OFF is underlined for MIU PWR, LP on the CF-E display. Select CF-E9A and ENTER on the keyboard, the underline will move from OFF and ON indicating power has been applied to the left pylon MIU. To remove power from the left pylon MIU, CF-E9A is selected and entered a second time. When the power has been removed, the underline will move from ON to OFF on the CF-E display. The operator commands the FMS to resume responding to the PCP switches and ignore the IKB backup input by entering a CF-E9D (Enable Hardwire Switch, EN HW SWCH) command.

NOTE

- CF-E has no effect on the WCP or OAS power panel and can be used in conjunction with the panels to operate the system. If CF-E is used to turn on MIU, CF-E must also be used to remove power from that MIU.
- With a total WCP failure prior to activation of hardware functions, missile launch or jettison, and pylon jettison is not possible.

WCP/PCP Backup Commands

CF-E Command	Corresponding WCP/PCP Switch
CF-EE1	MSL JETTISON SEL
CF-E2A	PREARM
CF-E2B	SAFE
CF-E6A	MSL PWR ON
CF-E6B	MSL PWR OFF
CF-E7	MISSILE LNCH MODE (AUTO/MAN)
CF-ECD	MISSILE MAN LNCH
CF-E9A	MIU/LP
CF-E9B	MIU/BAY
CF-E9C	MIU/RP
CF-E9D	No corresponding switch. See note.
CF-E10	LCHR ROTATE
CF-E11	MSTR FAULT
CF-E12	NUC CAUTN

NOTE

To ensure normal operation of the Power Control Panel MIU Power switches, command E9D, EN HW SWCH (Enable Hardwire Switch), prior to exiting CF-E.

Table 3-1

The CF-E3 command initiates an alternate means of selecting store locations and stations. The process for selecting store locations and stations after the Weapon Control Panel/Power Control Panel Backup Command menu is displayed on an MFD and that MFD is the selected MFD for the associated IKB is described below. All other backup commands can be entered with or without the Weapon Control Panel/Power Control Panel Backup Command menu displayed.

The process of selecting locations and stations from the Weapon Control Panel/Power Control Panel Backup Command menu is as follows assuming that no locations or stations are currently selected.

A. Enter CF-E3.

B. Insert the appropriate character to select or deselect a location or station or to leave the current selection unchanged using the IKB.

  1. Insert an “A” to select the location or station under which the cursor is placed.
  2. Press the right arrow key to advance the cursor to the next location or station leaving the current selection unchanged.
  3. Press the left arrow key to return the cursor to a previous location or station selection.
  4. Press the RTN key to return the cursor to the left pylon location selection.
  5. Insert a “0” to deselect a location or station that was previously selected.

C. Each “A” and each “0” that is inserted will be displayed on the command line. For example, with the left pylon and stations 2 and 5 selected, the display appears as follows:

```
      LP  BAY  RP   ALL 1  2  3  4  5  6  7  8
CF-E3 A   0    0    0   0  A  0  0  A  0  0  0
```

The cursor will be advanced to the next modifiable character space after each entry if another modifiable character space is displayed.

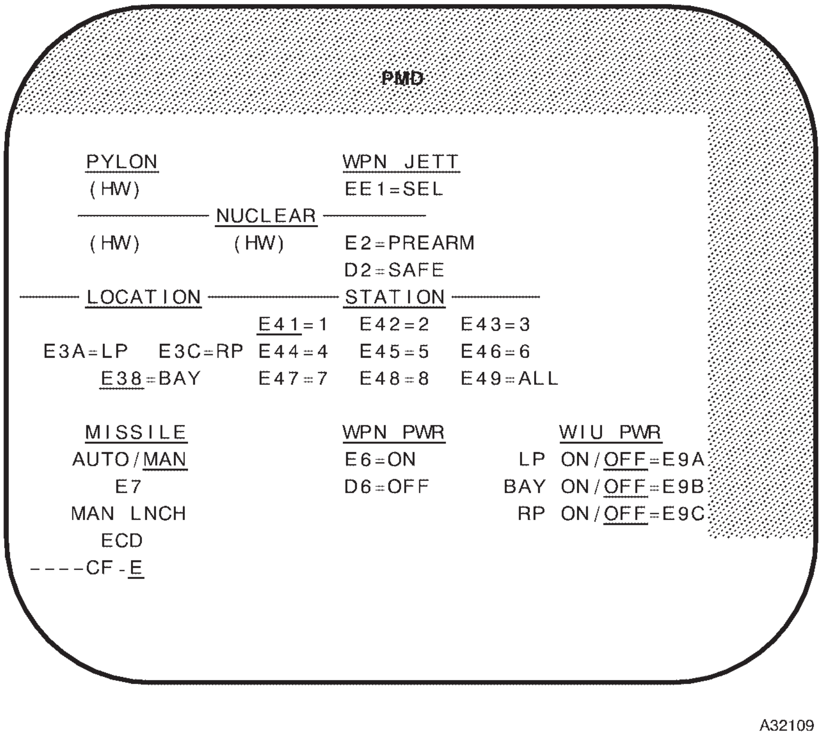
D. Press the ENTER key.

  1. The display will be updated to show the selected locations and stations in bright underline video as:

```
      LP  BAY  RP   ALL 1  2  3  4  5  6  7  8
CF-E3 A   0    0    0   0  A  0  0  A  0  0  0
```

E. To alter selections, enter CF-E3, insert a “0” to deselect and an “A” to select altered location and station identifiers and then press ENTER. Any other entry will be displayed on the command row in reverse video and none of the selections or de-selections will be accepted.

Weapon Control Panel Backup Display (CF-E)
Less [AMI]



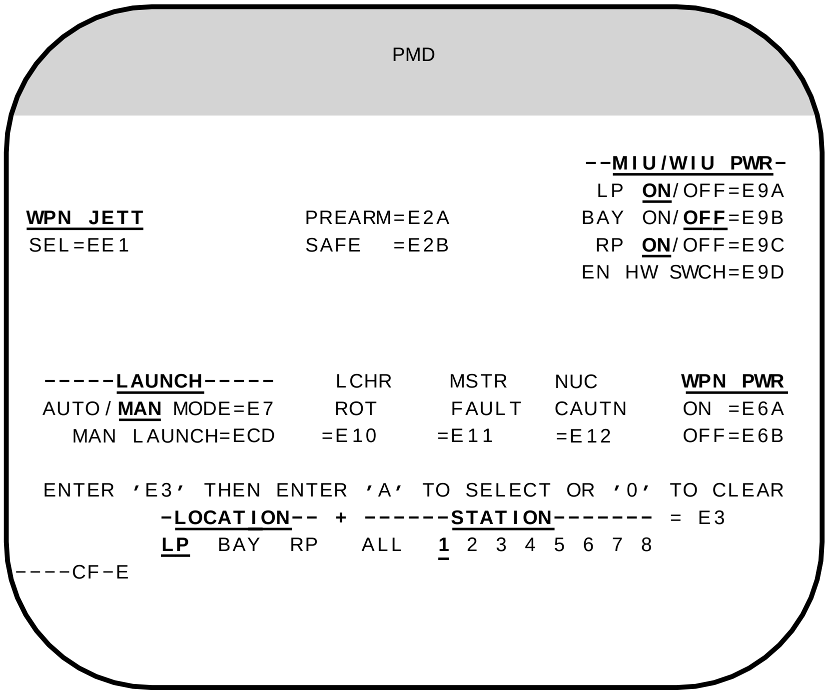
```
        PYLON                 WPN  JETT
        (HW)                  EE1=SEL
      ───────── NUCLEAR ───────
        (HW)        (HW)      E2=PREARM
                              D2=SAFE
 ──── LOCATION ──────────── STATION ──────
                   E41=1     E42=2     E43=3
 E3A=LP   E3C=RP   E44=4     E45=5     E46=6
     E38=BAY       E47=7     E48=8     E49=ALL

        MISSILE               WPN  PWR        WIU  PWR
      AUTO/MAN                E6=ON         LP  ON/OFF=E9A
         E7                   D6=OFF       BAY  ON/OFF=E9B
      MAN  LNCH                             RP  ON/OFF=E9C
         ECD
 ----CF-E
```

NOTE

- The active function for CF-E 3, 4, 7, and 9 is underlined
- CF-E has no effect on the WCP or OAS power panel and can be used in conjunction with the panels to operate the system.
- The acronyms MIU and WIU are used interchangeably.

Figure 3-22 (Sheet 1 of 2)

[AMI]



```
                                   PMD

                                                            --MIU/WIU PWR-
                                                            LP  ON/OFF=E9A
WPN JETT                 PREARM=E2A                        BAY  ON/OFF=E9B
SEL=EE1                  SAFE   =E2B                        RP  ON/OFF=E9C
                                                          EN HW SWCH=E9D



  -----LAUNCH-----       LCHR      MSTR      NUC        WPN PWR
  AUTO/MAN MODE=E7       ROT       FAULT     CAUTN      ON  =E6A
    MAN LAUNCH=ECD      =E10      =E11      =E12        OFF=E6B

  ENTER 'E3' THEN ENTER 'A' TO SELECT OR '0' TO CLEAR
          -LOCATION-- + ------STATION------- = E3
          LP  BAY  RP   ALL   1 2 3 4 5 6 7 8
----CF-E
```

NOTE

To ensure normal operation of the Power Control Panel MIU Power switches, command E9D, EN HW SWCH (Enable Hardwire Switch), prior to exiting CF-E.

Figure 3-22 (Sheet 2 of 2)

Radar

ABNORMAL OPERATION

BUILT-IN-TEST

A built-in-test (BIT) function is provided to check any failure of the Line Replaceable Unit (LRUs). The BIT is initiated by pressing the BIT switch. The code of the failed LRU will be displayed in the FRL/BIT indicator window. F00 will be displayed for no failure. The LRU failure codes are listed as follows:

LRU Failure Code:	LRU
F00	No Failure
F01	Antenna
F02	R/T Modulator
F03	Radar Processor
F04	Display Generator
F05	Antenna Position Programmer

A RADAR message is also displayed on the MFDs when one of the LRUs fails the BIT.

NOTE

When power is applied on the RCTP, the radar system runs a series of BITs while the system is warming up. Momentary failure indications will be detected and stored in the system during this period. If the BIT select button is actuated during the period between power application and the radar standby light coming on, a series of failure codes will be displayed. However, each code should disappear with re-actuation of the BIT select switch until F00 is displayed if no actual failure is present.

TRANSMITTER OVERLOAD CONDITION

The radiate recycle light flashes for 1 second when an overload condition exists, or a short term power supply interruption occurs. If several of these conditions occur in a short period of time, the radar may return to a power on status (STBY and RAD lights will be out). The operator must wait for the 5 minute power on warmup cycle for the STBY light to come on before pressing the RAD button.

RADAR AND BEACON MANUAL TUNING

WARNING

Due to degradation of TA system accuracy, manual tuning will not be used during actual TA operations.

1. Radar Tuning.
   a. Select AUTO RCVR TUNE on RTCP.
   b. Set frequency to 500.
   c. Set XMTR MODE to RDR.
   d. Select FREQ Select to RCVR on RCTP.
   e. Select MAN RCVR TUNE on RCTP.
   f. Rotate RDR LO knob full CW.
   g. Slowly rotate RDR LO knob CCW until video appears.
2. Beacon Tuning.
   a. Select AUTO RCVR TUNE on RTCP.
   b. Set frequency to 710.
   c. Set XMTR MODE to BCN or RDR BCN.
   d. Set FREQ SELECT to RCVR on RTCP.
   e. Select MAN RCVR TUNE on RTCP.
   f. Rotate BCN LO knob full CW.
   g. Rotate BCN LO knob slowly CCW, until video appears.

Radar Pressurization

ABNORMAL OPERATION

Abnormal operation of the radar pressurization system is influenced by the type of radar pressurization unit installed. Whenever a radar pressurization malfunction is encountered, radar pressure low light illuminated, or excessive radar pressure pump operation, determine which type radar pressurization unit is on the aircraft by referring to the radar pressurization system descriptions in Section I of this manual. If the unit is a continuous duty (Great Lakes) type, the pump can be allowed to operate full time with no damage to equipment as long as the radar pressure low light remains off. If the unit is an intermittent duty (Lear-Romec) type, the pump can be allowed to operate only 15 minutes per hour intermittent duty and can be expected to fail if operated more than 30 minutes per hour.

MALFUNCTION ANALYSIS AND CORRECTION

If a pressurization malfunction is suspected during ground operation, call qualified personnel to correct the problem prior to flight.

If a radar pressurization problem is identified once airborne, operator actions are limited to preventing collateral equipment damage by turning the pressurization equipment OFF.

A possibility exists that a leaking pressurization system which is unable to maintain proper pressurization at high altitudes (i.e., radar pressure low light illuminated or excessive intermittent-duty pump operation) may be capable of maintaining proper pressurization at a lower altitude (higher ambient pressure). If the pressure pump was turned OFF and the OAS radar was turned to STANDBY at high altitude due to a malfunctioning radar pressurization system, the pressurization pump may be turned back on provided the aircraft has descended to an altitude with a significantly higher ambient pressure (i.e., a descent of 10,000 feet or more). If the pump appears to be capable of maintaining pressurization at the lower altitude, i.e., the radar pressure low light extinguishes and the pressure pump operates within tolerances, the OAS radar may be returned to RADIATE. If the radar pressure low light cannot be extinguished or the intermittent-duty pump exceeds the 15 minute per hour operation limitation, the operation of the OAS radar should be limited to situations where the lack of a radar display poses greater risk than equipment damage such as weather penetration or operational mission requirements.

CAUTION

- If the OAS high pressure radar pressure low light illuminates during ground or flight operations, the OAS radar will be placed in STANDBY and radar pressure pump control switch will be turned off.
- If the intermittent-duty pressure pump operates more than 15 minutes per hour, the OAS radar will be placed in STANDBY and radar pressure pump control switch will be turned off.

Pressurization Malfunction Analysis

FAULT INDICATION	CORRECTIVE ACTION	POSSIBLE CAUSES	CAPABILITY LOST/LIMITATION
Radar Low Pressure Lights	See MAFUNCTION ANALYSIS AND CORRECTION text above.	• Pressure pump • Pressure leaks	Radar set pressurization

Figure 3-23

Navigation/Weapon Delivery Systems Circuit Breakers

Offensive Avionics System (OAS) Circuit Protection and Location

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Computational Subsystem			
Bus Control	OAS BUS CONTR	RFBNS/B31	Left TR
Control Power Source for DTUs and Processors	OAS COMPUTATIONAL –		
	CONTR PNL DC – ALT	AUXBNS/G6	Left TR
	CONTR PNL DC – NORM	AUXBNS/G5	Rt. TR
Control Power Distribution for DTUs and Processors	ACU NO. 1	RTSV/T2	Left TR
	ACU NO. 2	RTSV/D1	Rt. TR
	Less [AMI] ACU NO. 3	RTSV/I2	Left TR
	DTU NO. 1	RTSV/A2	Left TR
	DTU NO. 2	RTSV/J1	Rt. TR
DTU Main Power	OAS COMPUTATIONAL –		
	DTU PWR – NO. 1	AUXBNS/E5	AC Bus 3
	DTU PWR – NO. 2	AUXBNS/E6	AC Bus 5
Processor Main Power	OAS COMPUTATIONAL –		
	PROCESSOR NO. 1		
	ALT PWR Ø A	AUXBNS/E8	AC Bus 5
	ALT PWR Ø B	AUXBNS/F8	AC Bus 5
	ALT PWR Ø C	AUXBNS/G8	AC Bus 5
	PROCESSOR NO. 1		
	NORM PWR Ø A	AUXBNS/E7	AC Bus 3
	NORM PWR Ø B	AUXBNS/F7	AC Bus 3
	NORM PWR Ø C	AUXBNS/G7	AC Bus 3
	PROCESSOR NO. 2		
	ALT PWR Ø A	AUXBNS/E10	AC Bus 3
	ALT PWR Ø B	AUXBNS/F10	AC Bus 3
	ALT PWR Ø C	AUXBNS/G10	AC Bus 3
	PROCESSOR NO. 2		
	NORM PWR Ø A	AUXBNS/E9	AC Bus 5
	NORM PWR Ø B	AUXBNS/F9	AC Bus 5
	NORM PWR Ø C	AUXBNS/G9	AC Bus 5
	Less [AMI] PROCESSOR NO. 3		
	ALT PWR Ø A	AUXBNS/E12	AC Bus 5
	ALT PWR Ø B	AUXBNS/F12	AC Bus 5
	ALT PWR Ø C	AUXBNS/G12	AC Bus 5
	Less [AMI] PROCESSOR NO. 3		
	NORM PWR Ø A	AUXBNS/E11	AC Bus 3
	NORM PWR Ø B	AUXBNS/F11	AC Bus 3
	NORM PWR Ø C	AUXBNS/G11	AC Bus 3

Figure 3-24 (Sheet 1 of 6)

Offensive Avionics System (OAS) Circuit Protection and Location (Cont)

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Controls and Displays Subsystem			
Airborne Video Tape Recorder	115V AC-PHASE B – AVTR	EVS/G3	AC Bus 5
Display Electronics Unit	CONTROLS AND DISPLAYS –		
	DEU AC NO. 1	LFBNS/A17	AC Bus 3
	DEU AC NO. 2	LFBNS/B17	AC Bus 3
	DEU 1	RTSV/C2	Left TR
	DEU 2	RTSV/I1	Rt. TR
Multifunction Displays	CONTROLS AND DISPLAYS –		
	MF DISPLAY –		
	NAV AC	LFBNS/A13	AC Bus 3
	NAV DC	LFBNS/A15	Rt. TR
	R-N AC	LFBNS/A14	AC Bus 3
	R-N DC	LFBNS/A16	Rt. TR
	N MFD	RTSV/D2	Left TR
	R/N MFD	RTSV/E2	Left TR
OAS Power Control	POWER –		
	NO. 1 OAS	RFBNS/B32	Left TR
	NO. 2 MSTR	RFBNS/B33	Rt. TR
Radar Presentation Panel	NAV PRES PANEL	RTSV/E1	Rt. TR
	RDR/NAV PRES PNL	RTSV/F1	Rt. TR
Radar Scan Converter	OAS NAV – RDR SCAN CONV	AUXBNS/E1	AC Bus 3
	RSC	RTSV/G2	Left TR
RN Management Panel	CONTROLS AND DISPLAYS –		
	RDR MGT PNL	LFBNS/B16	Rt. TR
	RDR MGT	RTSV/H1	Rt. TR
Video Recorder	CONTROLS AND DISPLAYS –		
	V RCDR –		
	AC	LFBNS/A12	AC Bus 3
	DC	LFBNS/A11	Rt .TR
	VID RCDR	RTSV/K2	Left TR
Weapon Control Panel	CONTROLS AND DISPLAYS –		
	WPN CONT PNL	LFBNS/B15	Rt. TR
	WCP	RTSV/G1	Rt. TR

Figure 3-24 (Sheet 2 of 6)

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ①	POWER SOURCE
Interface Subsystem			
Armament Interface Unit (AIU)	OAS INTERFACE – ARMT IU –		
	ALT AC	AUXBNS/G4	AC Bus 3
	DC	AUXBNS/F4	Rt. TR
	NORM AC	AUXBNS/E4	AC Bus 3
	AIU	RTSV/B1	Rt. TR
BNS Interface	BNS PRESS XDCR	RFBNS/A19	Left TR
	BNS TIME TO GO	RFBNS/A18	Left TR
Controls and Displays	CONTROLS AND DISPLAYS –		
	IU ALT AC	LFBNS/B13	AC Bus 3
	IU NORM AC	LFBNS/B12	AC Bus 3
	CDIU	RTSV/F2	Left TR
EVS Interface Unit (EIU)	OAS INTERFACE – EVS IU –		
	AC	AUXBNS/E2	AC Bus 3
	DC	AUXBNS/F2	Rt. TR
	EIU	RTSV/C1	Rt. TR
Radar Interface Unit (RIU)	OAS INTERFACE – RDR IU –		
	AC	AUXBNS/E3	AC Bus 3
	DC	AUXBNS/F3	Rt. TR
	RIU	RTSV/B2	Left TR
Navigational Subsystem			
Doppler Radar	OAS NAV –		
	DOPPLER RDR	AUXBNS/D4	AC Bus 3
Global Positioning System			
GPS Interface Unit Power	115V AC-PHASE A –		
	GPS INTFC UNIT FILL-IN	EVS/C4	AC Bus 5
	GPS INTFC UNIT PRIME	EVS/B4	AC Bus 1
	115V AC-PHASE B –		
	GPS INTFC UNIT FILL-IN	EVS/G4	AC Bus 5
	GPS INTFC UNIT PRIME	EVS/F4	AC Bus 1
	115V AC-PHASE C –		
	GPS INTFC UNIT FILL-IN	EVS/K4	AC Bus 5
	GPS INTFC UNIT PRIME	EVS/J4	AC Bus 1
	DC POWER –		
	INTFC UNIT	EVS/T4	Left TR
	INTFC UNIT CONT PNL	EVS/U4	Left TR
GPS Receiver Power	115V AC-PHASE C –		
	GPS RCVR	EVS/L4	AC Bus 1
Programmable Keyboard	DC POWER –		
	RDR NAV PRGM KYBD	EVS/R4	Left TR
Digital Data Loader	DC POWER –		
	DDL PWR	EVS/S4	Left TR

Figure 3-24 (Sheet 3 of 6)

Offensive Avionics System (OAS) Circuit Protection and Location (Cont)

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Navigational Subsystem (Cont)			
Less [AMI] INU No. 1	NO. 1 INS -		
Main Power	AC PWR Ø A	LFBNS/A1	AC Bus 3
	AC PWR Ø B	LFBNS/A2	AC Bus 3
	AC PWR Ø C	LFBNS/A3	AC Bus 3
	DC ALT PWR	LFBNS/A10	Rt. TR
Power for Cooling Fan	FAN Ø A	LFBNS/A7	AC Bus 3
	FAN Ø B	LFBNS/A8	AC Bus 3
	FAN Ø C	LFBNS/A9	AC Bus 3
Power for Heater	HEATER Ø A	LFBNS/A4	AC Bus 3
	HEATER Ø B	LFBNS/A5	AC Bus 3
	HEATER Ø C	LFBNS/A6	AC Bus 3
INS No. 1 Backup DC Power	AFT BATTERY POWER – RSPA PWR 24 V IEU 1	LLC/F6	Aft Batt.
INS No. 1 Cooling Control Power	NO. 1 INS COOL	RTSV/A1	Rt. TR
Less [AMI] INU No. 2	NO. 2 INS -		
Power	AC PWR Ø A	LFBNS/B1	AC Bus 3
	AC PWR Ø B	LFBNS/B2	AC Bus 3
	AC PWR Ø C	LFBNS/B3	AC Bus 3
	DC ALT PWR	LFBNS/B10	Rt. TR
Power for Cooling Fan	FAN Ø A	LFBNS/B7	AC Bus 5
	FAN Ø B	LFBNS/B8	AC Bus 5
	FAN Ø C	LFBNS/B9	AC Bus 5
Power for Heater	HEATER Ø A	LFBNS/B4	AC Bus 5
	HEATER Ø B	LFBNS/B5	AC Bus 5
	HEATER Ø C	LFBNS/B6	AC Bus 5
INS No. 2 Backup DC Power	FWD BATTERY POWER – RSPA PWR 24 V IEU 2	RLC/F29	Fwd Batt.
INS No. 2 Cooling Control Power	NO. 2 INS COOL	RTSV/H2	Left TR
[AMI] INU No. 1			
Main Power	NO. 1 INS AC PWR	LFBNS/A2	AC Bus 3
INU No. 1 Backup DC Power	NO. 1 INS DC B/U POWER	RLC/F29	Fwd Batt.
[AMI] INU No. 2			
Main Power	NO. 2 INS AC PWR	LFBNS/B4	AC Bus 5
INU No. 2 Backup DC Power	NO. 2 INS DC B/U POWER	LLC/F6	Aft Batt.
Radar Altimeter	OAS NAV – RDR ALTM	AUXBNS/D5	AC Bus 3

Figure 3-24 (Sheet 4 of 6)

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Strategic Radar Subsystem			
Antenna	PROGRAMMER ANT. POSITION	RTSV/K1	Rt. TR
	PWR ON DC		
	ANT	AUXBNS/B6	AC Bus 3
	ANT ELEX UNIT	AUXBNS/B5	AC Bus 3
	STRATEGIC RADAR –		
	ACR ANT	AUXBNS/B13	AC Bus 3
	ANT ELEX UNIT	AUXBNS/B14	AC Bus 3
	ANT ELEX UNIT Ø A	AUXBNS/A7	AC Bus 3
	ANT ELEX UNIT Ø B	AUXBNS/A8	AC Bus 3
	ANT ELEX UNIT Ø C	AUXBNS/A9	AC Bus 3
	RADAR ANT Ø A	AUXBNS/A1	AC Bus 3
	RADAR ANT Ø B	AUXBNS/A2	AC Bus 3
	RADAR ANT Ø C	AUXBNS/A3	AC Bus 3
Controls and Displays Processor	BLANKING AMPL	AUXBNS/C9	AC Bus 3
	PWR ON DC –		
	DISP GEN	AUXBNS/B2	AC Bus 3
	RADAR PROC	AUXBNS/B3	AC Bus 3
	RADAR TIME DELAY	AUXBNS/B1	AC Bus 3
	RADAR CONTL PNL	AUXBNS/C8	AC Bus 3
	RADAR PROC Ø A, Ø B, Ø C	AUXBNS/C11	AC Bus 3
	STRATEGIC RADAR –		
	DISPLAY GEN Ø A, Ø B, Ø C	AUXBNS/A5	AC Bus 3
	RADAR CONTROL	AUXBNS/B12	AC Bus 3
Cooling (Low Airflow Lights and Blowers)	OVERHEAT CONTR	AUXBNS/C5	Left TR
	RADOME GROUND COOL –		
	BLOWER Ø A	AUXBNS/C1	AC Bus 3
	BLOWER Ø B	AUXBNS/C2	AC Bus 3
	BLOWER Ø C	AUXBNS/C3	AC Bus 3
	CONTR	AUXBNS/C4	Left TR
Radar Pressurization	RDR PRESS – AC	AUXBNS/C7	AC Bus 3
	RDR PRESS – DC	AUXBNS/C6	Left TR
Radar Transponder (AN/APN-69)	OAS NAV – AN/APN-69 PRESS CONTR	AUXBNS/D6	Left TR
R-T Unit	PWR ON DC		
	R-T MOD	AUXBNS/B4	AC Bus 3
	STRATEGIC RADAR –		
	R-T MOD	AUXBNS/B10	AC Bus 3
	R-T MODULATOR Ø A, Ø B, Ø C	AUXBNS/A11	AC Bus 3

Figure 3-24 (Sheet 5 of 6)

Offensive Avionics System (OAS) Circuit Protection and Location (Cont)

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Test Receptacles			
OAS	TEST RECEPTACLES –		
	AFT OAS AC	ABNS/B8	AC Bus 3
	AFT OAS DC	ABNS/B7	Left TR
	FWD OAS AC	ABNS/B10	AC Bus 3
	FWD OAS DC	ABNS/B9	Left TR
IFF	TEST RECEPTACLES –		
	IFF AC	ABNS/B12	AC Bus 3
	IFF DC	ABNS/B11	Left TR

❶ The definitions for the acronyms used to designate the circuit breaker panel names are as shown in the following list. The locator code is the row and column location of the circuit breaker as marked on the circuit breaker panel depictions shown in the CIRCUIT BREAKER PANELS figure, under the ELECTRICAL POWER SYSTEMS subsection in Section I.

ABNS	AFT BNS CIRCUIT BREAKER PANEL	LLC	LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL
AUXBNS	AUXILIARY BNS CIRCUIT BREAKER PANEL	RLC	RIGHT LOAD CENTRAL CIRCUIT BREAKER PANEL
EVS	EVS CIRCUIT BREAKER PANEL	RTSV	RIGHT S/V FILTER BOX
LFBNS	LEFT FORWARD BNS CIRCUIT BREAKER PANEL		

Figure 3-24 (Sheet 6 of 6)

Bombing System Circuit Protection and Location

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ①	POWER SOURCE
Aft Weapon	BOMB SYSTEM – AFT ALT WEAPON –		
	IFC	ABNS/A26	Fwd Batt.
	PARA STATIC LINE CONTR	ABNS/A27	Rt. TR
	T-249 TESTER PANEL LIGHTS	ABNS/A25	AC Bus 3
Coded Switch	BOMB SYSTEM –		
	CODED SWITCH SET	ABNS/A24	Rt. TR
CSRL Circuit Protection – See Rotary Launcher Hydraulics, below.			
External Conventional	BOMB SYSTEM – EXTERNAL CONVENTIONAL –		
	ARM	ABNS/B16	Left TR
	EXTERNAL CONTROL	ABNS/B20	Left TR
Forward Weapon	BOMB SYSTEM – FWD ALT WEAPON –		
	IFC	ABNS/B26	Fwd Batt.
	PARA STATIC LINE CONTR	ABNS/B27	Left TR
	T-249 TESTER PANEL LIGHTS	ABNS/B25	AC Bus 3
Indicator Lights	BOMB SYSTEM –		
	IND LIGHTS WPN REL	ABNS/A15	Left TR
Jettison Control	BOMB SYSTEM – JETTISON –		
	CONTR	RFBNS/B18	Aft Batt.
	PWR	RFBNS/B19	Aft Batt.
Rack Select	BOMB SYSTEM –		
	SPL WPN RACK SELECT	ABNS/A16	Left TR
Rotary Launcher Hydraulics			
Hydraulic Selector Switch	AGM 69A HYD CONTROL	LLC/E27	Left TR
Power Pump Low Pressure Light	HYDRAULIC PACKAGE – PRESSURE – WARN LT	PCBP/C2	Left TR
PDUC Power Switch	CSRL PDUC	Navigator's Side Panel	Left TR
Weapon Release	BOMB SYSTEM –		
	NORMAL RELEASE	RFBNS/B20	Left TR
	BOMB SYSTEM – EXTERNAL CONVENTIONAL –		
	NORMAL RELEASE	ABNS/B15	Left TR

① The definitions for the acronyms used to designate the circuit breaker panel names are as shown in the following list. The locator code is the row and column location of the circuit breaker as marked on the circuit breaker panel depictions shown in the CIRCUIT BREAKER PANELS figure, under the ELECTRICAL POWER SYSTEMS subsection in Section I.

ABNS	AFT BNS CIRCUIT BREAKER PANEL	RFBNS	RIGHT FORWARD BNS CIRCUIT BREAKER PANEL

Figure 3-25

Bomb Door System Circuit Protection and Location

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ❶	POWER SOURCE
Bomb Door Close Timer	BOMB SYSTEM – BOMB DOOR CONTROL – BNS TIMER DOOR CLOSE	ABNS/A17	Left TR
Bomb Door Control Valve Lights	BOMB SYSTEM – BOMB DOOR CONTROL – VALVE CHECK	ABNS/A18	Left TR
Bomb Door Control Valves and Switches	BOMB SYSTEM – DOOR CONTROL –		
	AFT MAIN VALVE	RFBNS/B24	Rt. ESS
	FWD EMER VALVE	RFBNS/B22	Left ESS
	FWD MAIN VALVE	RFBNS/B23	Rt. ESS
	RELAYS	RFBNS/B25	Rt. ESS
Bomb Door Emergency Opening During Jettison Sequence	BOMB SYSTEM – JETTISON –		
	CONTR	RFBNS/B18	Aft Batt.
	PWR	RFBNS/B19	Aft Batt.
Bomb Door Limit Safety Switches for Jettison Sequence	MISCELLANEOUS – GAM-72 GEAR JETTISON & AGM-69A	PCBP/E23	Aft Batt.
Bomb Door System Indicators			
Bomb Doors Not Latched Light	BOMB SYSTEM – BOMB DOOR CONTROL – POS IND	ABNS/A20	Left TR
Bomb Doors Open Light	BOMB SYSTEM – BOMB DOOR CONTROL – HOLD OPEN	ABNS/A19	Left TR

❶ The definitions for the acronyms used to designate the circuit breaker panel names are as shown in the following list. The locator code is the row and column location of the circuit breaker as marked on the circuit breaker panel depictions shown in the CIRCUIT BREAKER PANELS figure, under the ELECTRICAL POWER SYSTEMS subsection in Section I.

ABNS	AFT BNS CIRCUIT BREAKER PANEL
PCBP	PILOT'S CIRCUIT BREAKER PANEL
RFBNS	RIGHT FORWARD BNS CIRCUIT BREAKER PANEL

Figure 3-26

Missile System Circuit Protection and Location

EQUIPMENT	CIRCUIT BREAKER TITLE	CB PANEL/ LOCATOR CODE ①	POWER SOURCE
CSRL Circuit Protection – See Rotary Launcher Hydraulics, figure 3-25.			
Pylon Jettison	MISCELLANEOUS – GAM-72 GEAR JETTISON AGM-69A	PCBP/E23	Aft Batt.
	MISCELLANEOUS – LEFT PYLON JETTISON CONTROL	PCBP/E19	Rt. TR
	MISCELLANEOUS – RIGHT PYLON JETTISON CONTROL	PCBP/E20	Rt. TR

① The definitions for the acronyms used to designate the circuit breaker panel names are as shown in the following list. The locator code is the row and column location of the circuit breaker as marked on the circuit breaker panel depictions shown in the CIRCUIT BREAKER PANELS figure, under the ELECTRICAL POWER SYSTEMS subsection in Section I.

PCBP	PILOT’S CIRCUIT BREAKER PANEL	LFBNS	LEFT FORWARD BNS CIRCUIT BREAKER PANEL
ABNS	AFT BNS CIRCUIT BREAKER PANEL	LLC	LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL
AUXBNS	AUXILIARY BNS CIRCUIT BREAKER PANEL	RLC	RIGHT LOAD CENTRAL CIRCUIT BREAKER PANEL
EVS	EVS CIRCUIT BREAKER PANEL	RTSV	RIGHT S/V FILTER BOX
RFBNS	RIGHT FORWARD BNS CIRCUIT BREAKER PANEL		

Figure 3-27

Circuit Breaker Panels

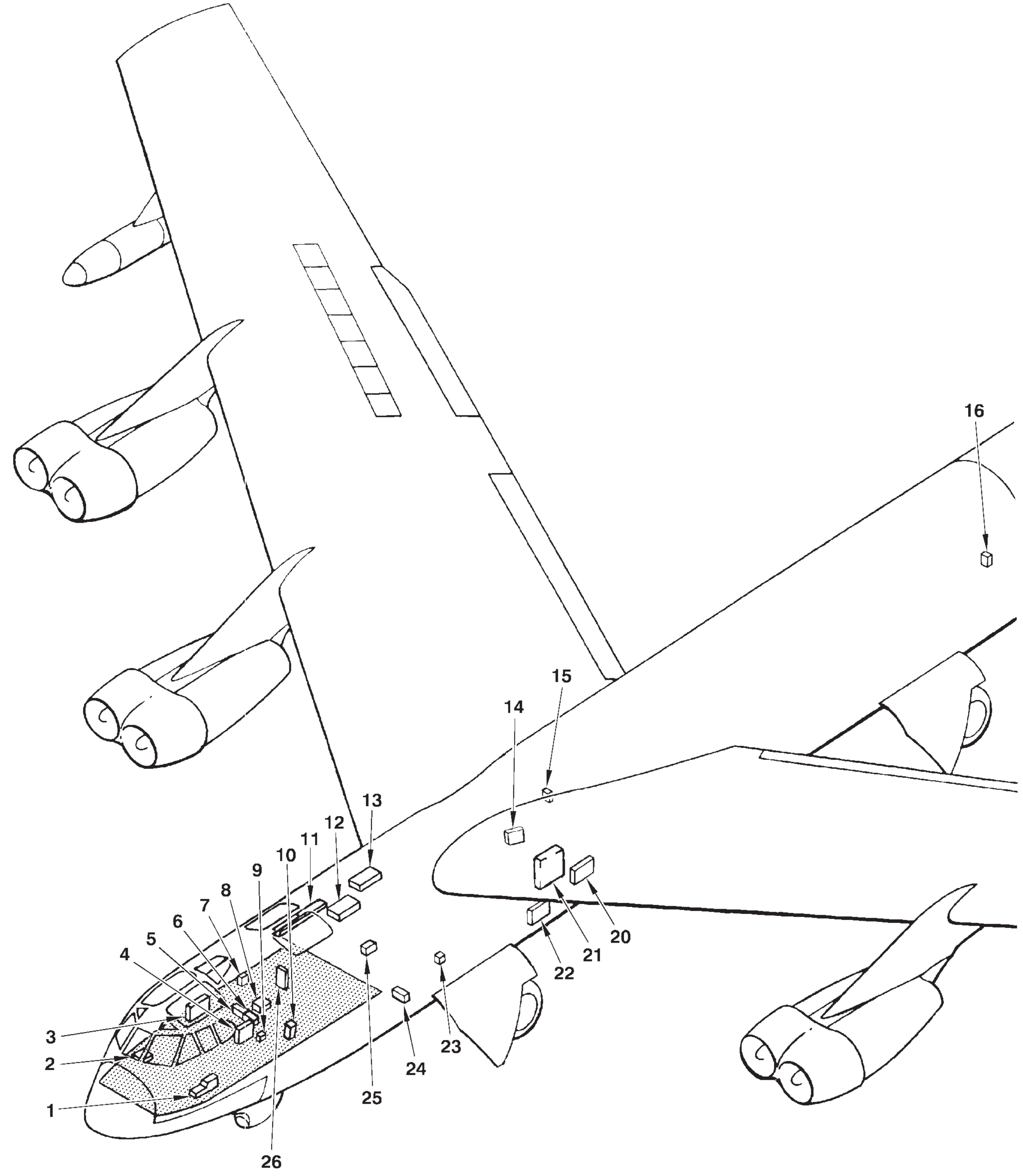
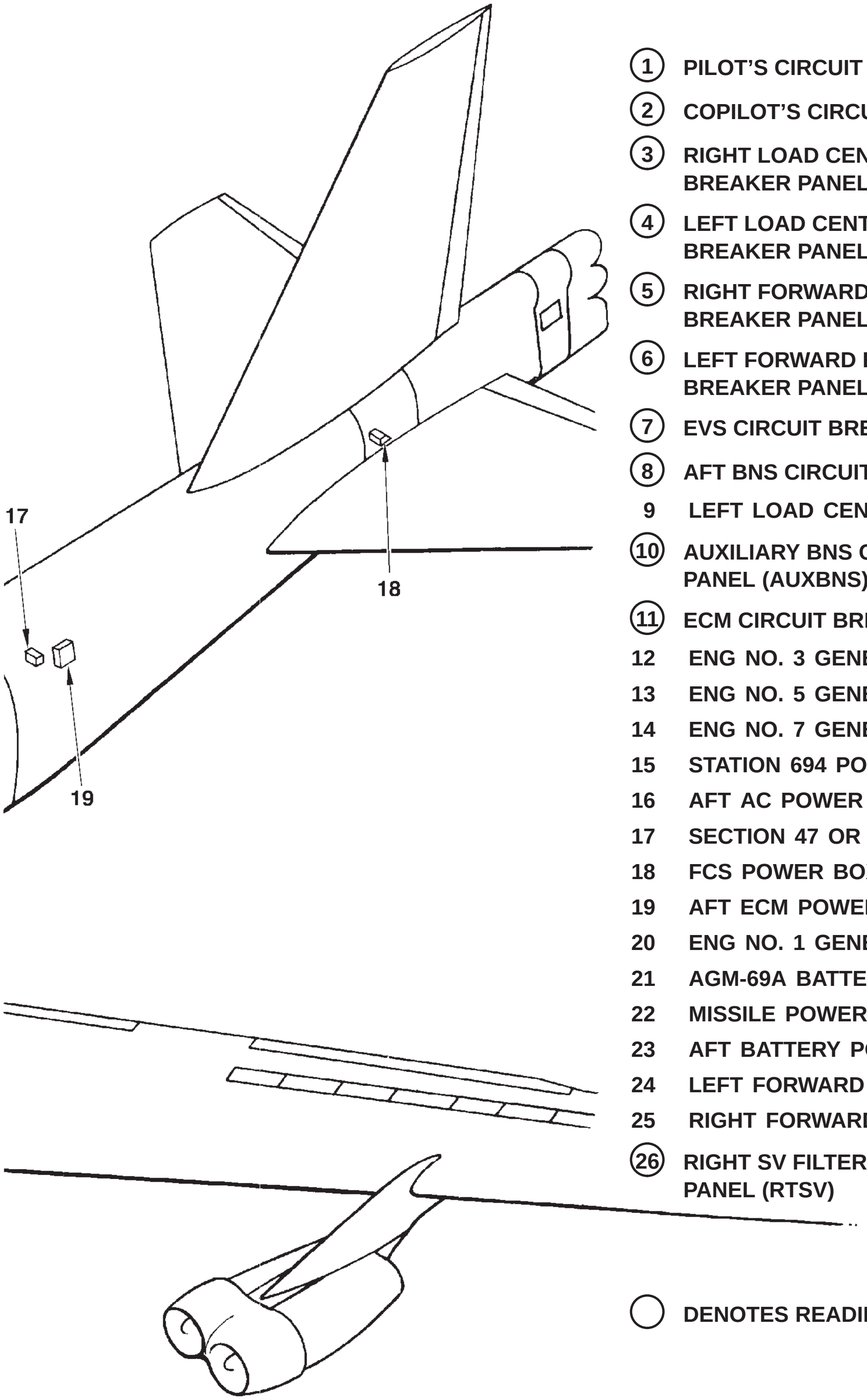


Figure 3-28 (Sheet 1 of 22)



①	PILOT'S CIRCUIT BREAKER PANEL (PCBP)
②	COPILOT'S CIRCUIT BREAKER PANEL (CPCBP)
③	RIGHT LOAD CENTRAL (RLC) CIRCUIT BREAKER PANEL
④	LEFT LOAD CENTRAL (LLC) CIRCUIT BREAKER PANEL
⑤	RIGHT FORWARD BNS (RFBNS) CIRCUIT BREAKER PANEL
⑥	LEFT FORWARD BNS (LFBNS) CIRCUIT BREAKER PANEL
⑦	EVS CIRCUIT BREAKER PANEL (EVS)
⑧	AFT BNS CIRCUIT BREAKER PANEL (ABNS)
9	LEFT LOAD CENTRAL FUSE INSTALLATION
⑩	AUXILIARY BNS CIRCUIT BREAKER PANEL (AUXBNS)
⑪	ECM CIRCUIT BREAKER PANEL (ECM)
12	ENG NO. 3 GENERATOR POWER BOX
13	ENG NO. 5 GENERATOR POWER BOX
14	ENG NO. 7 GENERATOR POWER BOX
15	STATION 694 POWER PANEL
16	AFT AC POWER BOX
17	SECTION 47 OR AFT DC POWER BOX
18	FCS POWER BOX
19	AFT ECM POWER BOX
20	ENG NO. 1 GENERATOR POWER BOX
21	AGM-69A BATTERY POWER BOX
22	MISSILE POWER DISTRIBUTION BOX
23	AFT BATTERY POWER BOX
24	LEFT FORWARD DC POWER BOX
25	RIGHT FORWARD DC POWER BOX
㉖	RIGHT SV FILTER BOX CIRCUIT BREAKER PANEL (RTSV)

○ DENOTES READILY ACCESSIBLE PANELS

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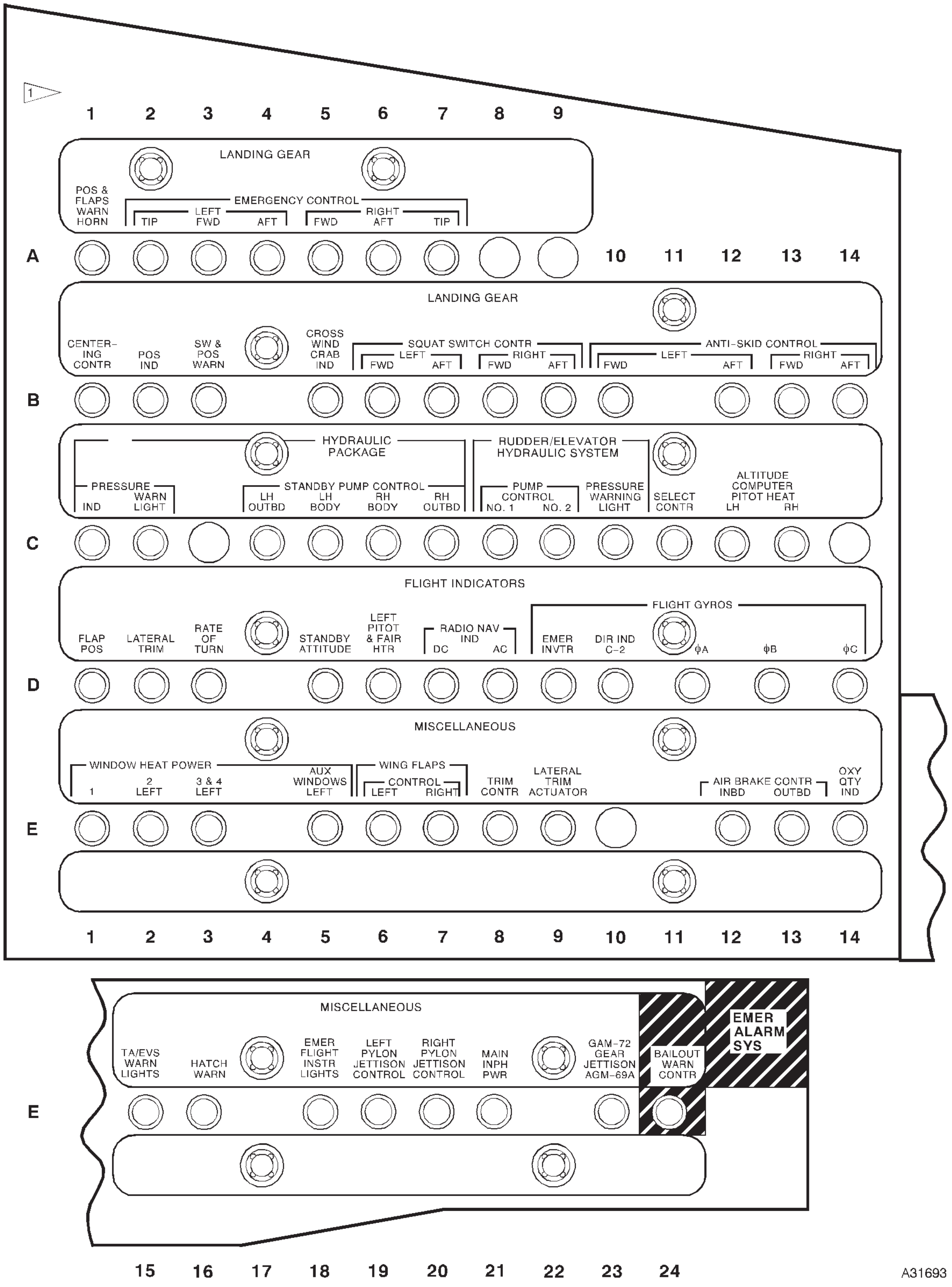
Figure 3-28 (Sheet 2 of 22)

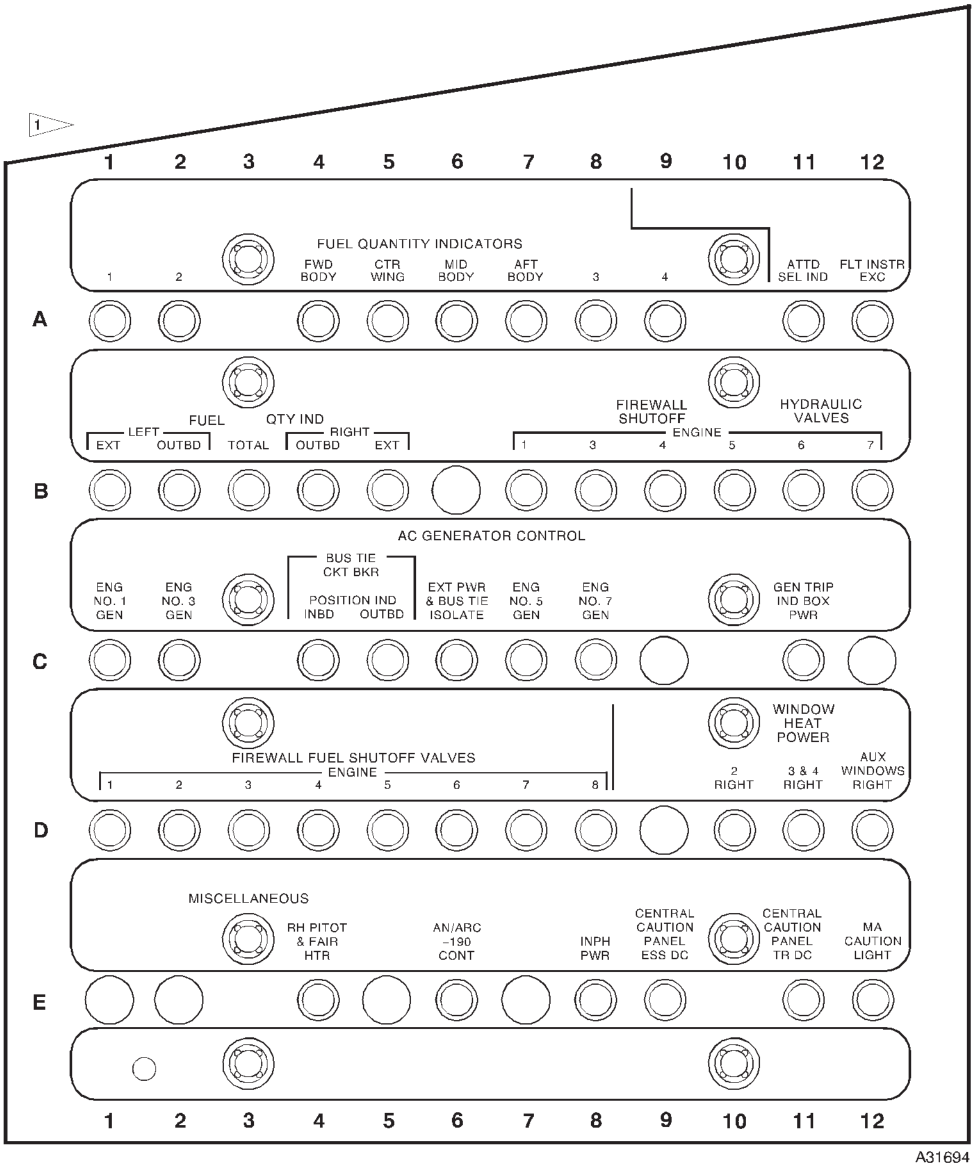
Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

① PILOT'S CIRCUIT BREAKER PANEL (PCBP) (TYPICAL)

Figure 3-28 (Sheet 3 of 22)

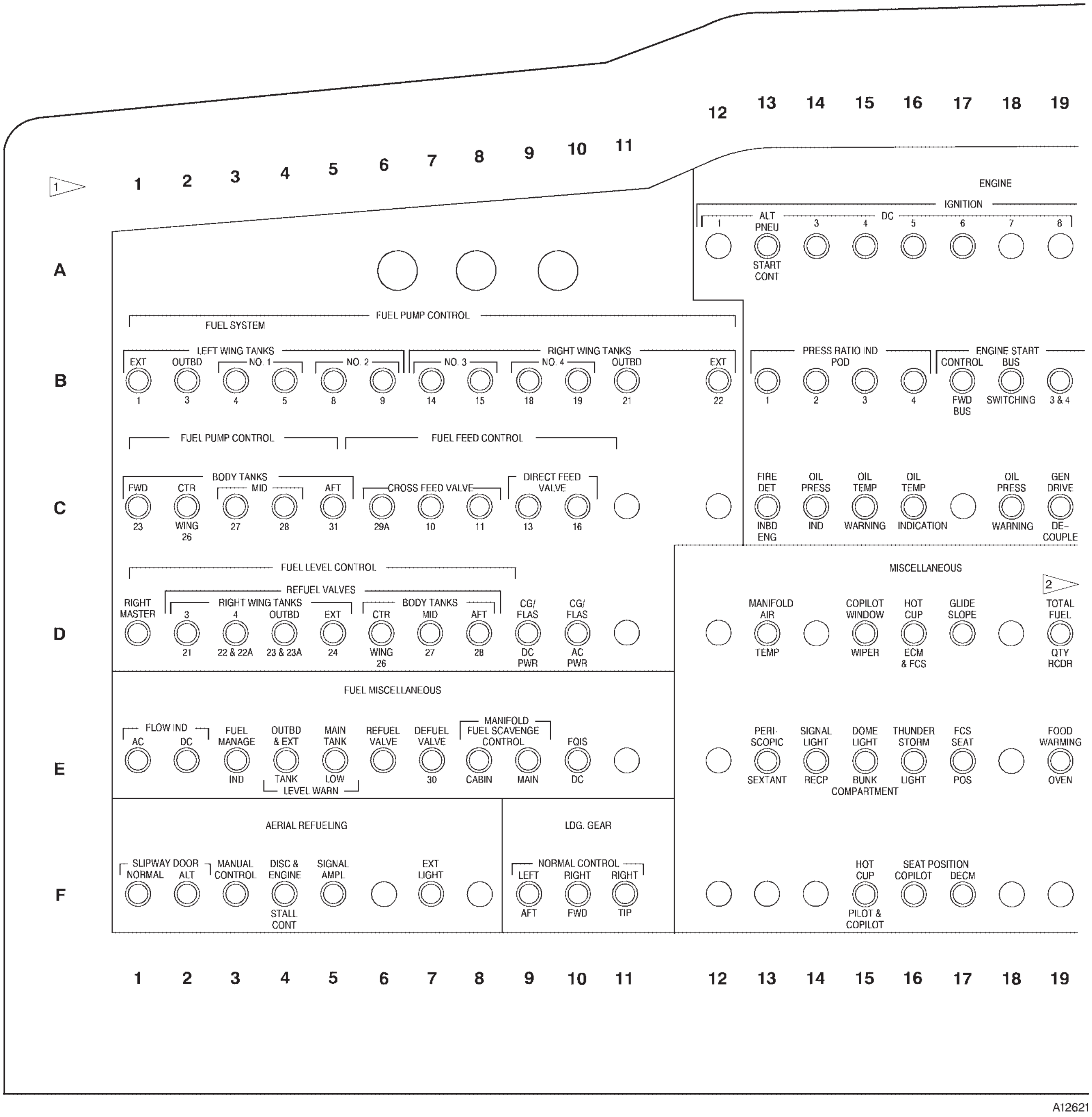


1 Locator code system is for reference only; aircraft does not have these markings.

② **COPILOT'S CIRCUIT BREAKER PANEL (CPCBP) (TYPICAL)**

Figure 3-28 (Sheet 4 of 22)

Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

2 Power for flight loads data recorder (some airplanes).

③ ***Less [AMI]*** **RIGHT LOAD CENTRAL CIRCUIT BREAKER PANEL (RLC) (TYPICAL)**

Figure 3-28 (Sheet 5 of 22)

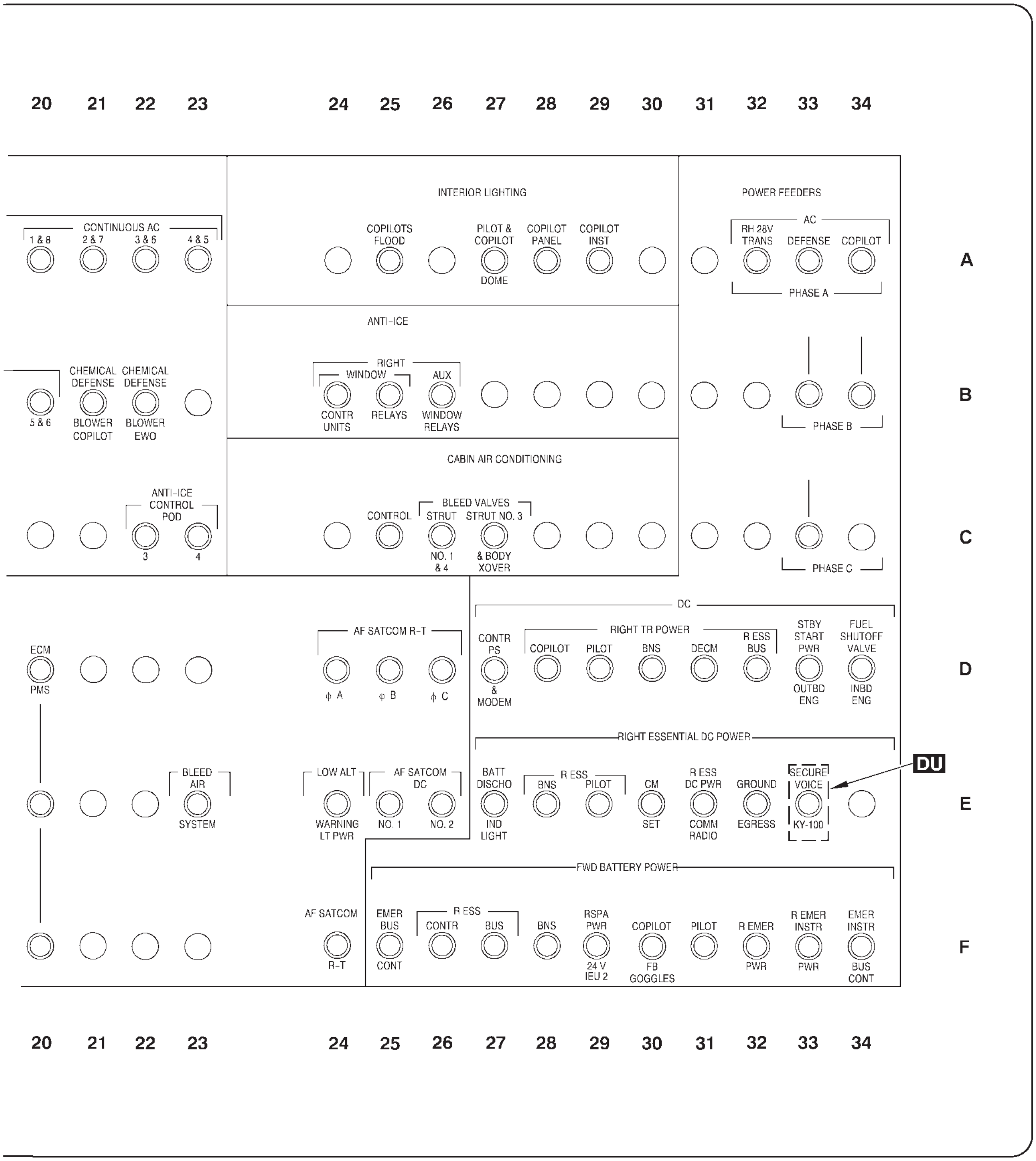


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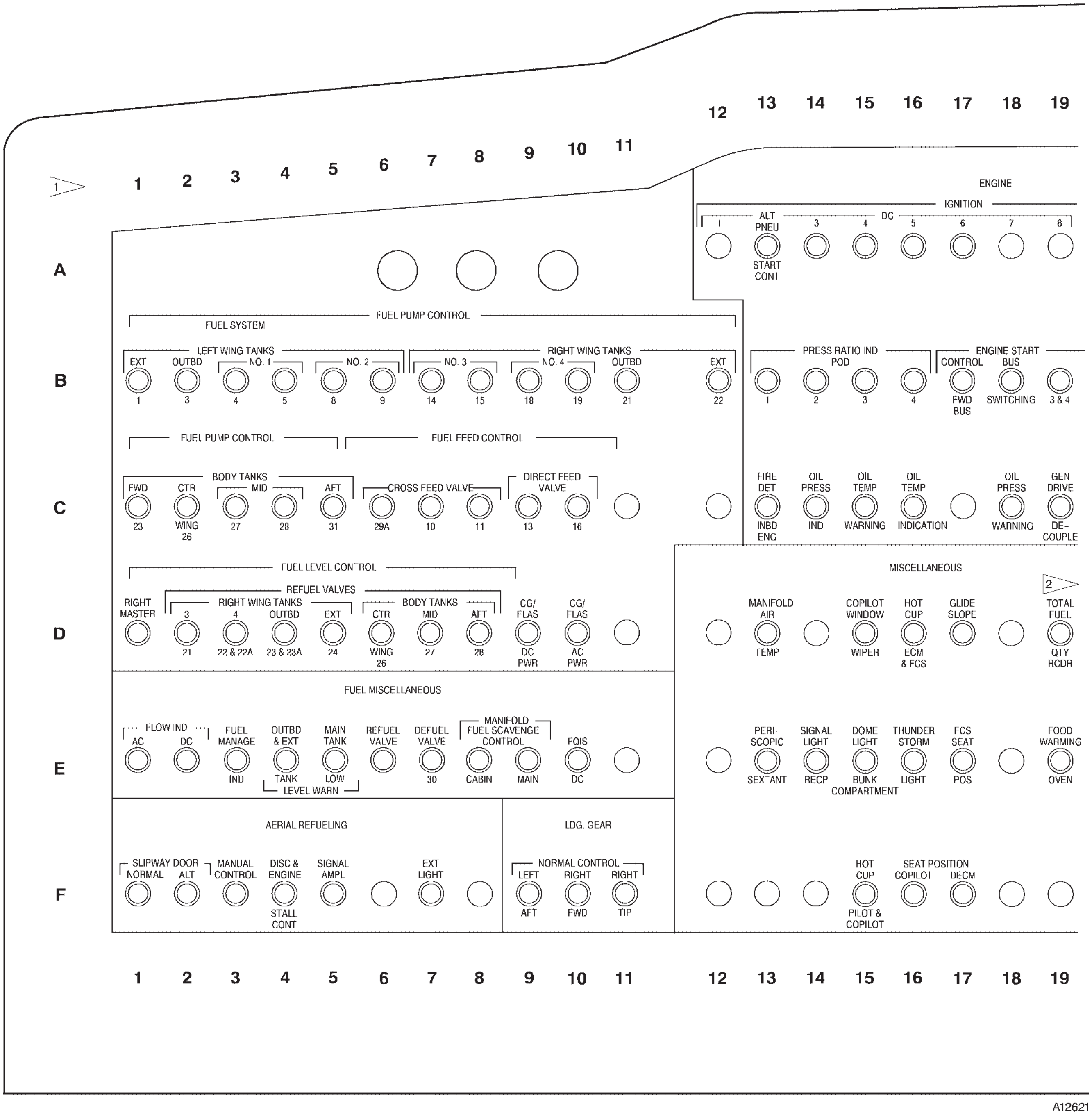
Figure 3-28 (Sheet 6 of 22)

Circuit Breaker Panels (Cont)

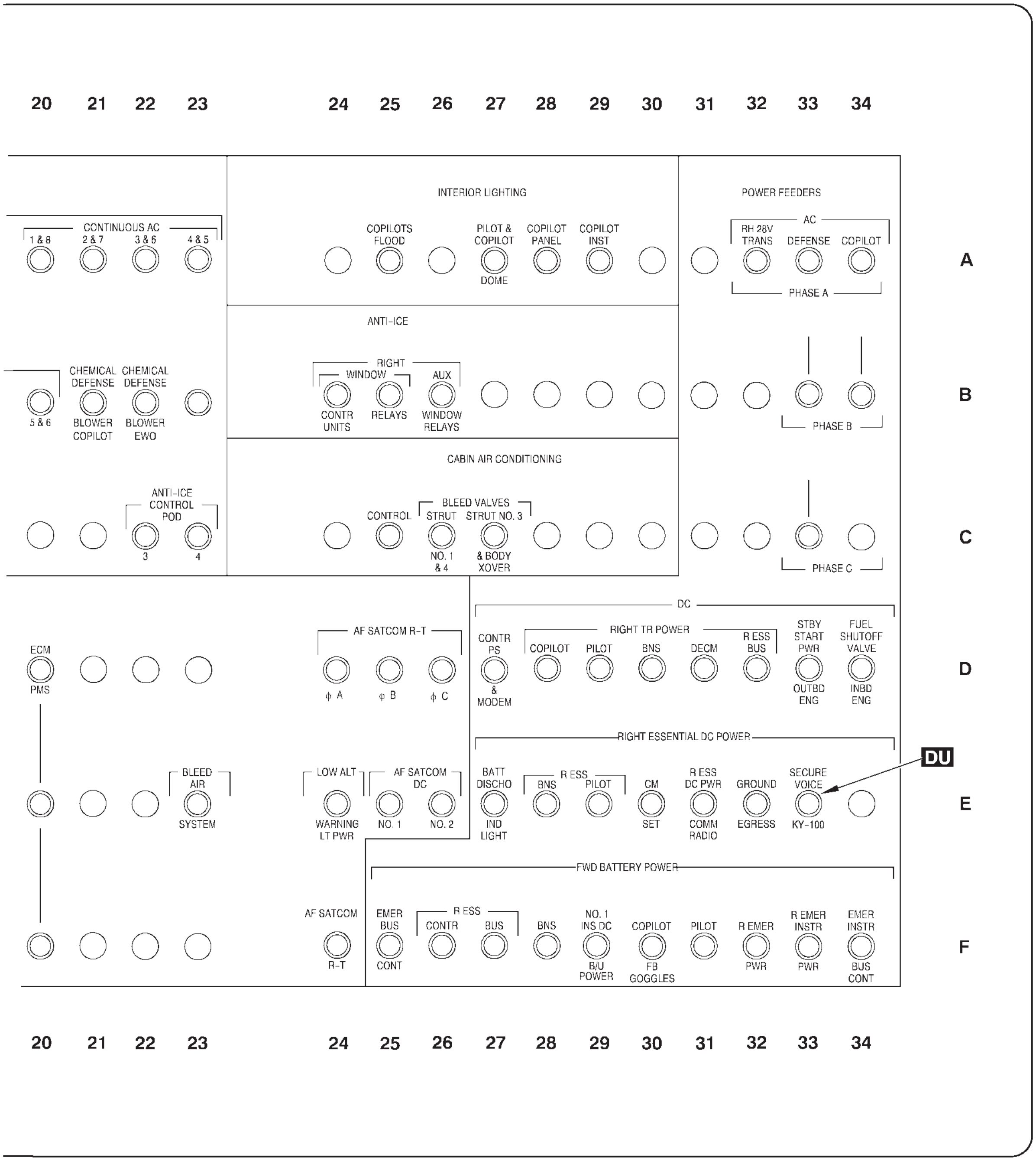


[1] Locator code system is for reference only; aircraft does not have these markings.

[2] Power for flight loads data recorder (some airplanes).

③ *[AMI]* **RIGHT LOAD CENTRAL CIRCUIT BREAKER PANEL (RLC) (TYPICAL)**

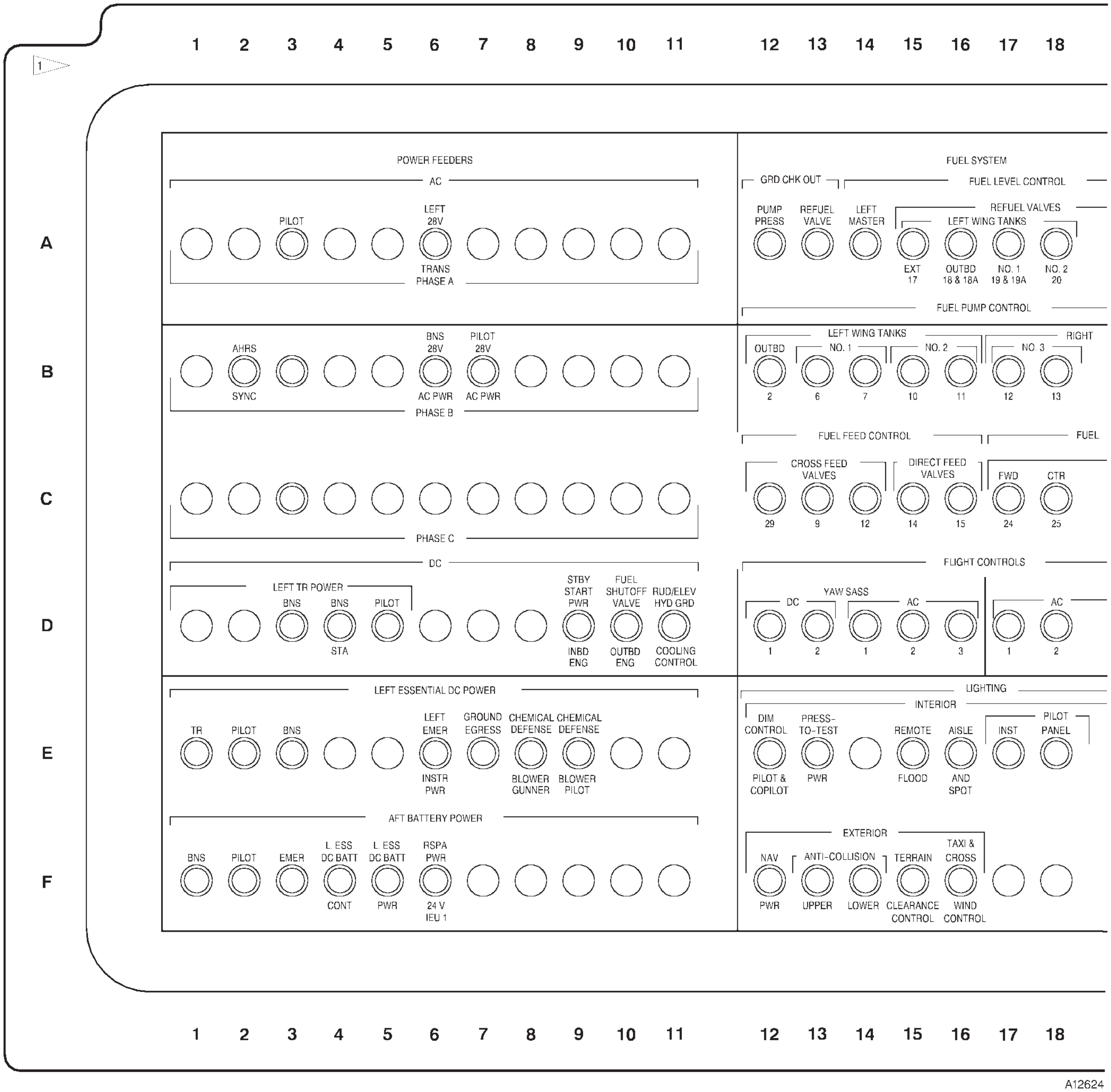
Figure 3-28 (Sheet 7 of 22)



B19176

Figure 3-28 (Sheet 8 of 22)

Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

④ *Less [AMI]* **LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL (LLC) (TYPICAL)**

Figure 3-28 (Sheet 9 of 22)

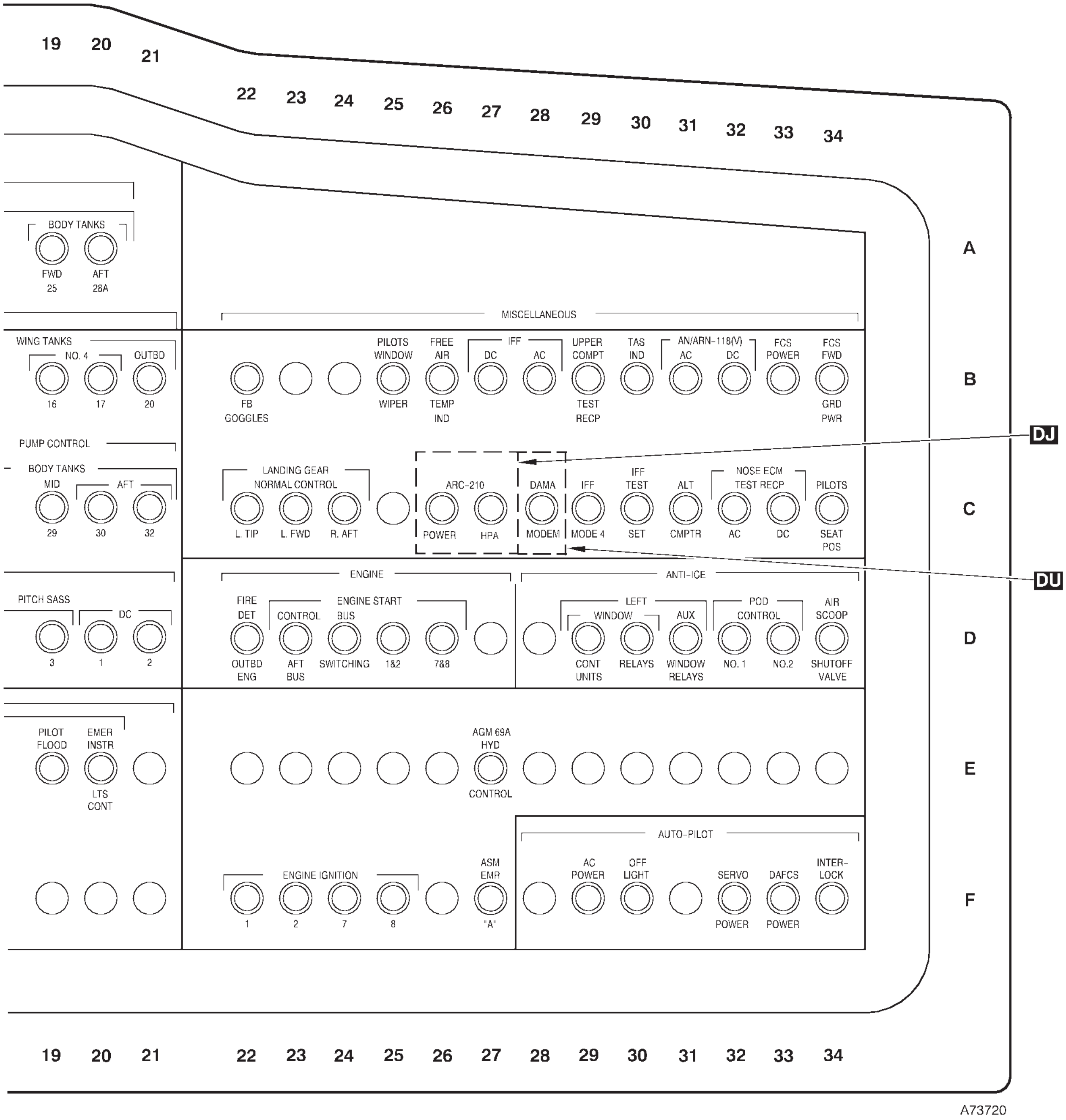
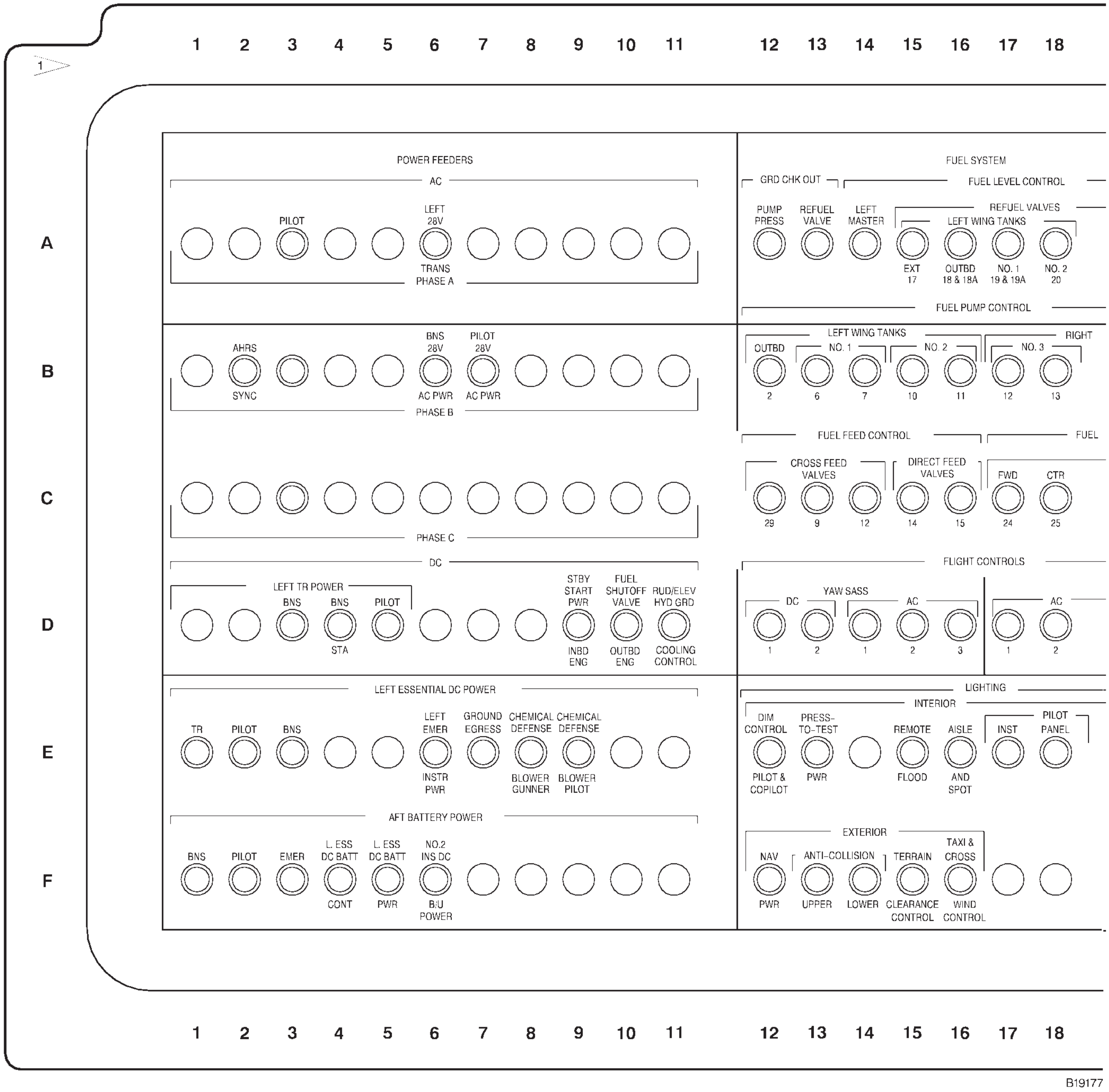


Figure 3-28 (Sheet 10 of 22)

Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

④ *[AMI]* LEFT LOAD CENTRAL CIRCUIT BREAKER PANEL (LLC) (TYPICAL)

Figure 3-28 (Sheet 11 of 22)

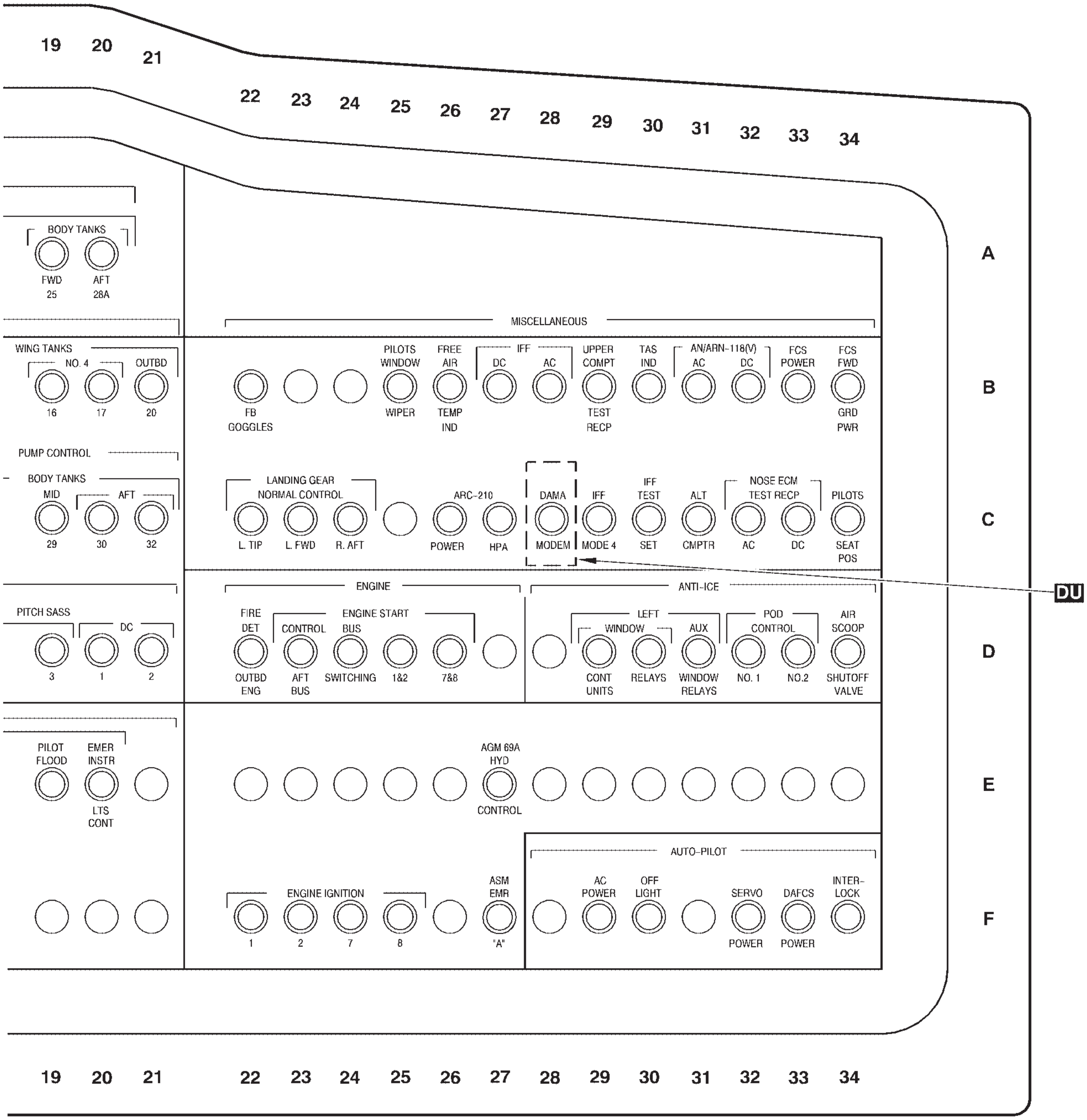
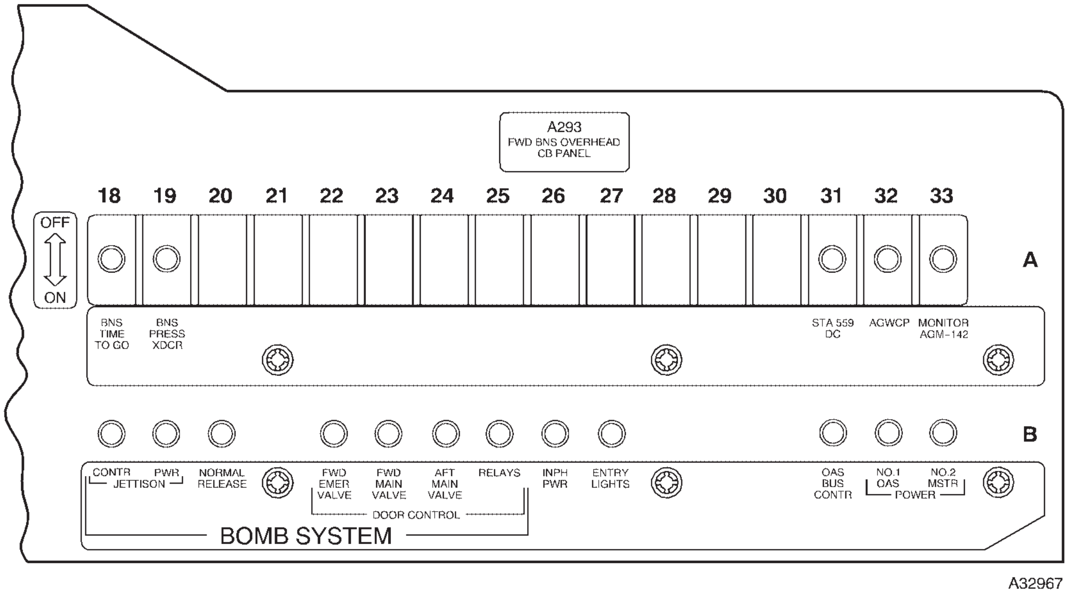
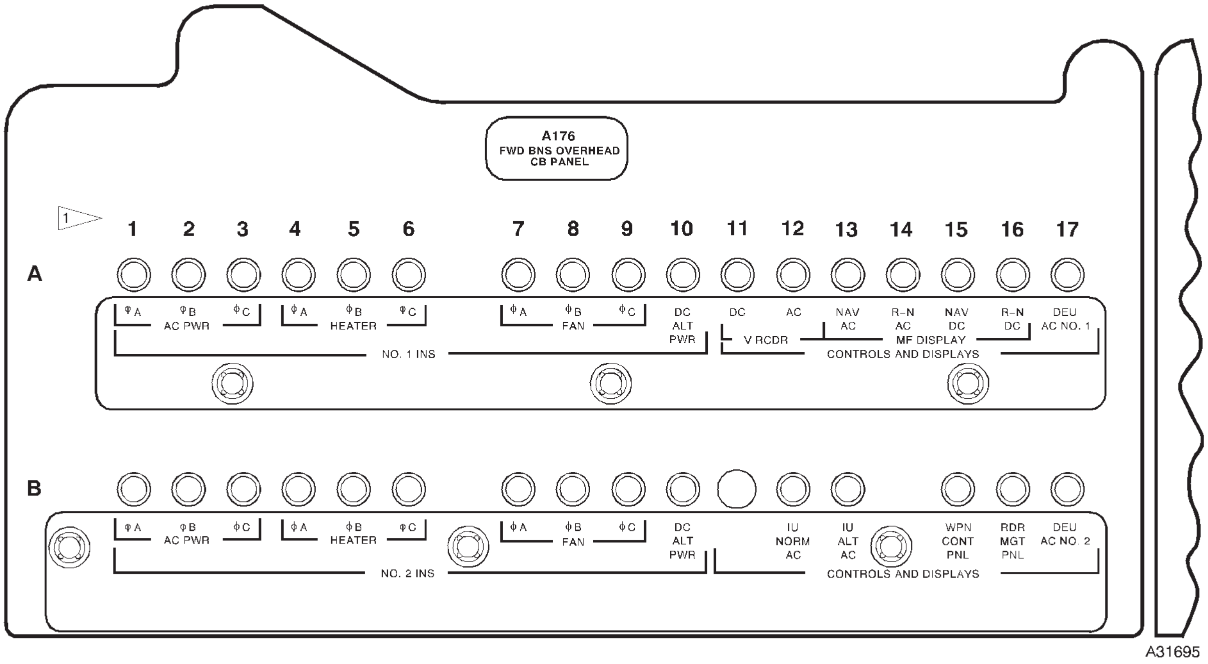


Figure 3-28 (Sheet 12 of 22)

Circuit Breaker Panels (Cont)



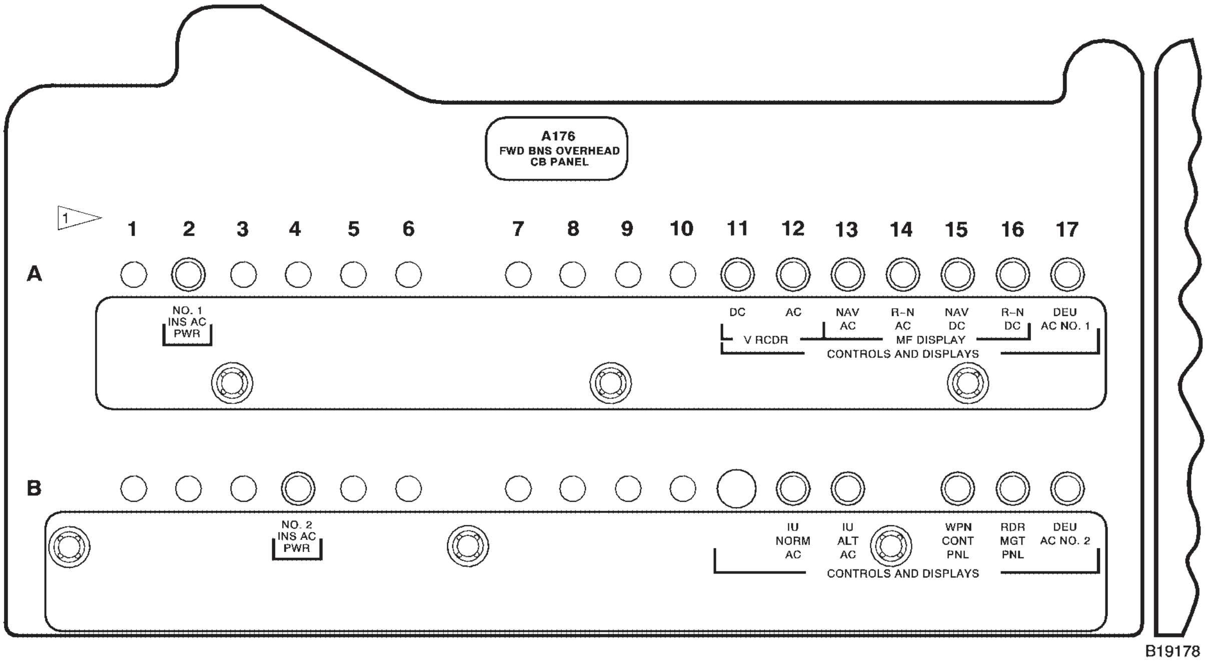
⑤ **RIGHT FORWARD BNS CIRCUIT BREAKER PANEL (RFBNS) (TYPICAL)**



1 Locator code system is for reference only; aircraft does not have these markings.

⑥ ***Less [AMI]*** **LEFT FORWARD BNS CIRCUIT BREAKER PANEL (LFBNS) (TYPICAL)**

Figure 3-28 (Sheet 13 of 22)

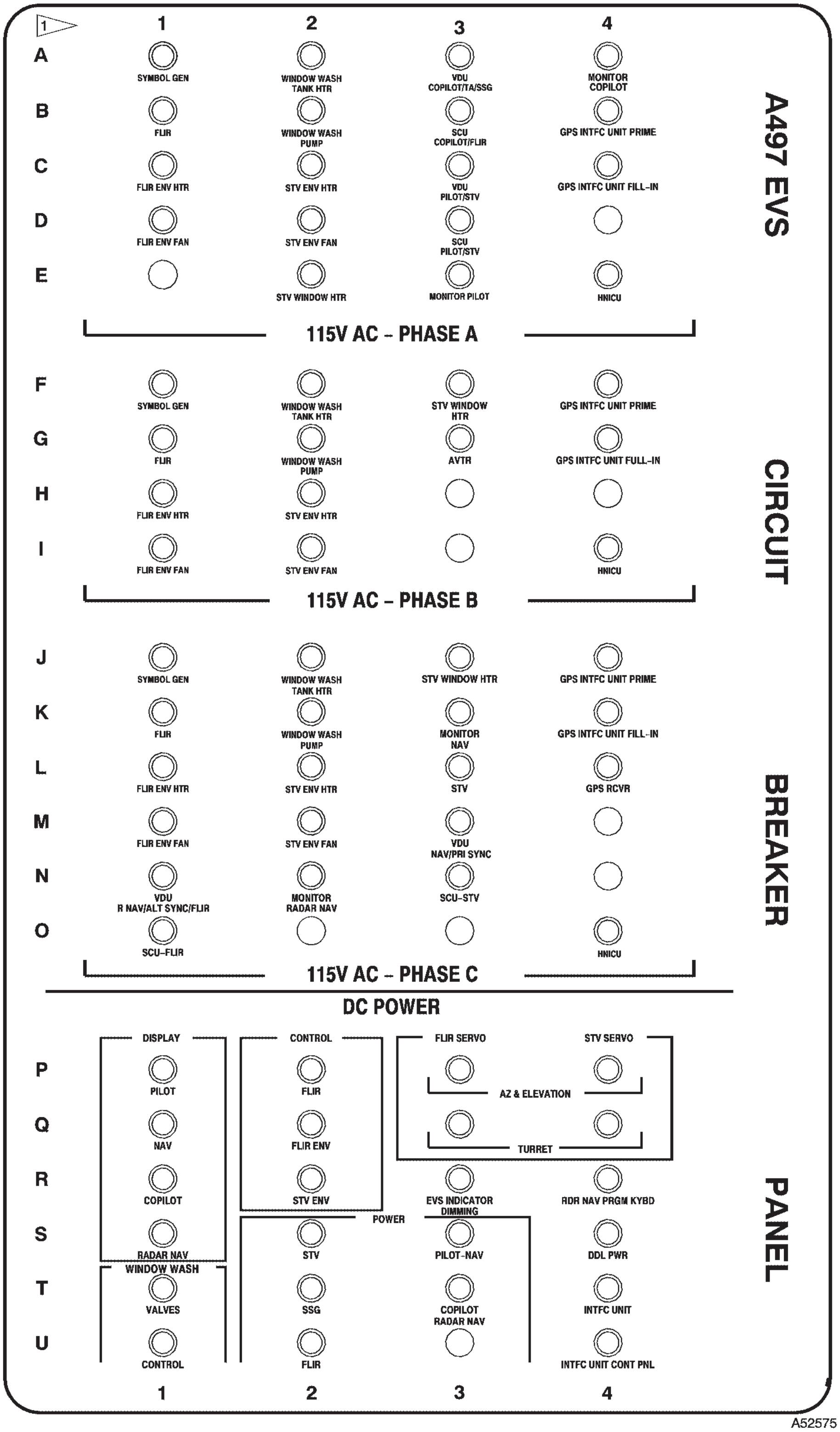


1 Locator code system is for reference only; aircraft does not have these markings.

⑥ *[AMI]* **LEFT FORWARD BNS CIRCUIT BREAKER PANEL (LFBNS) (TYPICAL)**

Figure 3-28 (Sheet 14 of 22)

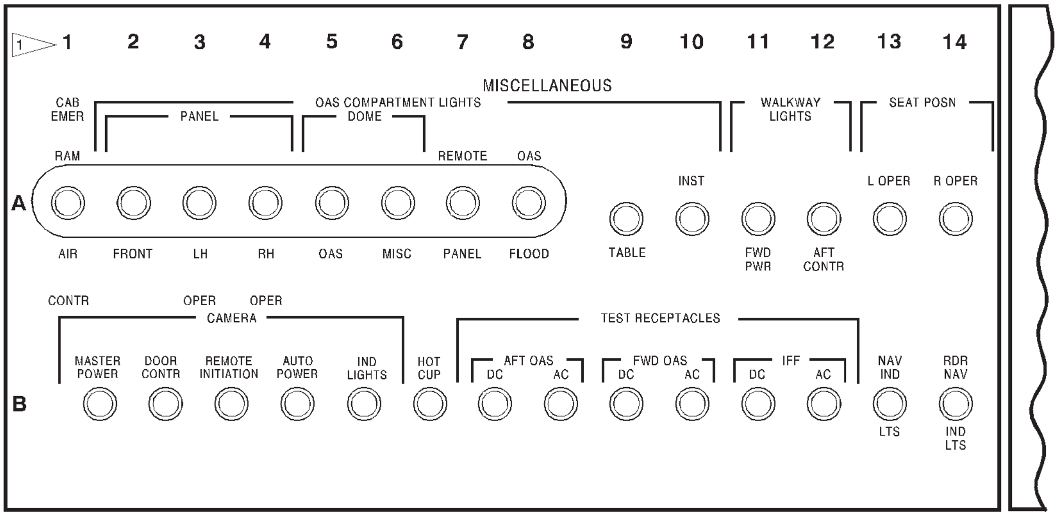
Circuit Breaker Panels (Cont)

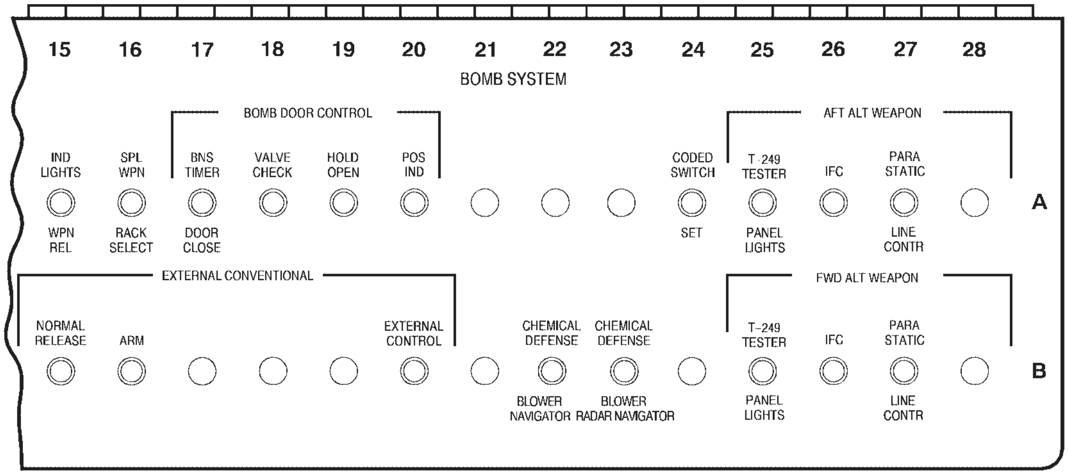


1 Locator code system is for reference only; aircraft does not have these markings.

⑦ EVS CIRCUIT BREAKER PANEL (EVS) (TYPICAL)

Figure 3-28 (Sheet 15 of 22)



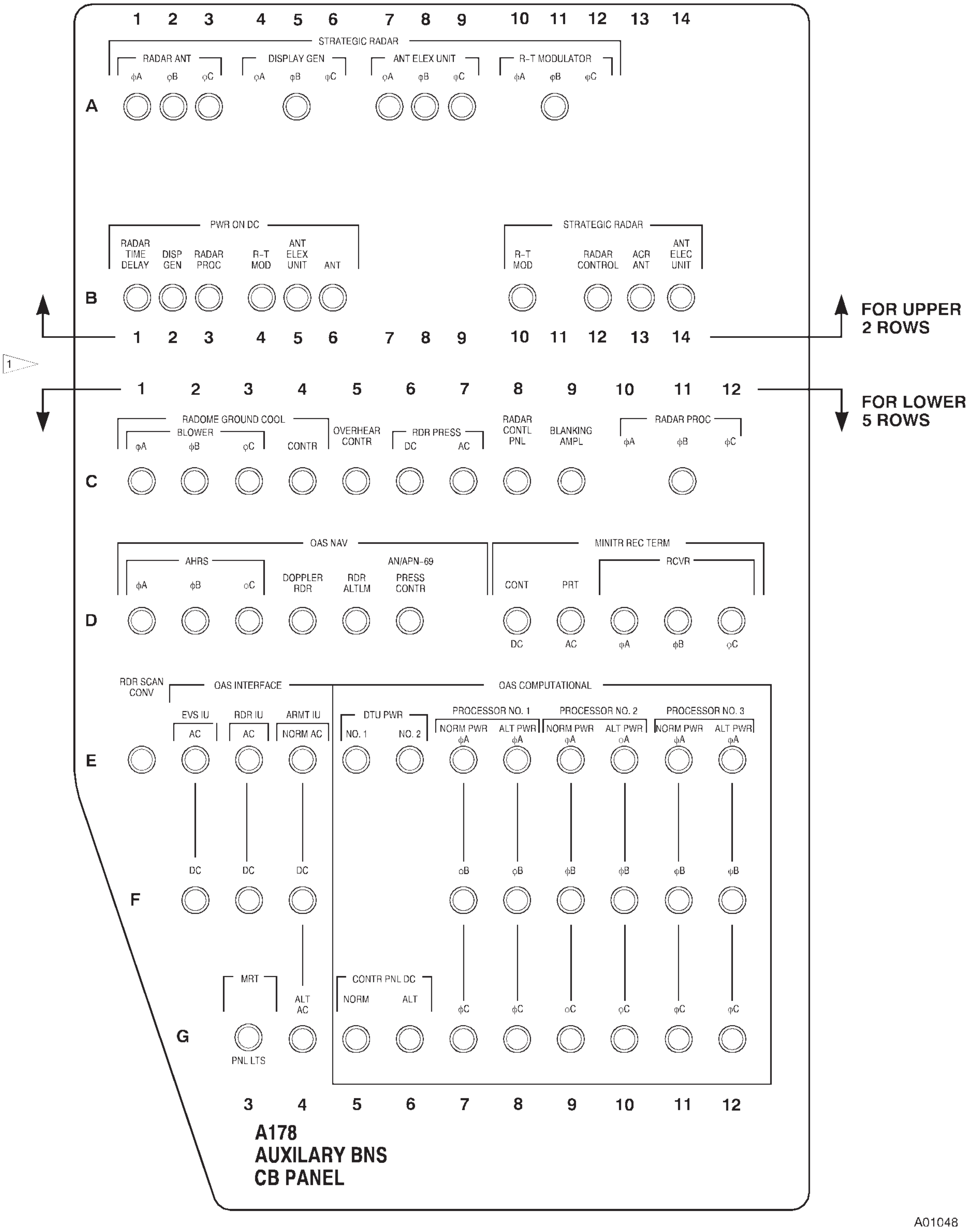


1 Locator code system is for reference only; aircraft does not have these markings.

⑧ AFT BNS CIRCUIT BREAKER PANEL (ABNS) (TYPICAL)

Figure 3-28 (Sheet 16 of 22)

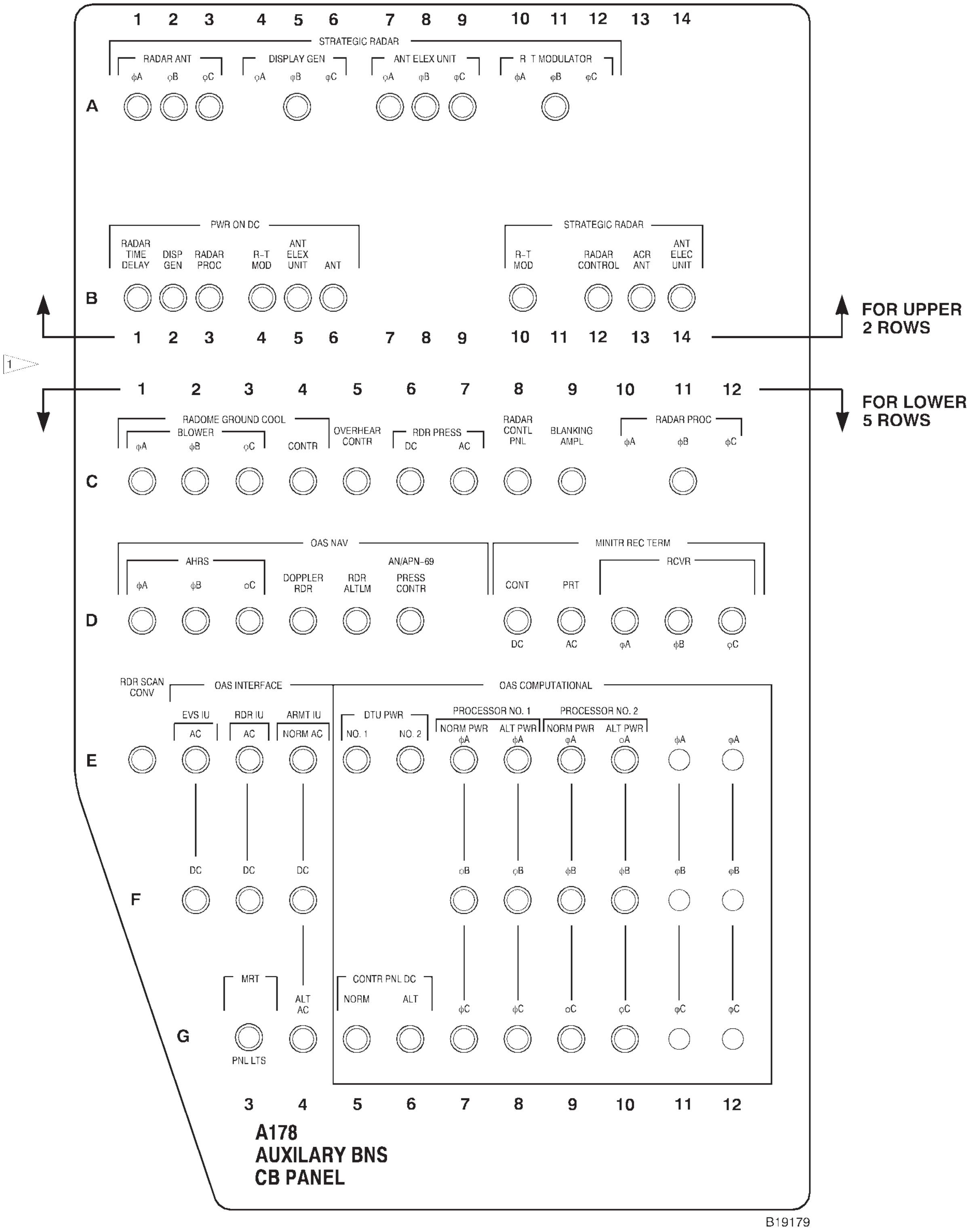
Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

⑩ *Less [AMI]* AUXILIARY BNS CIRCUIT BREAKER PANEL (AUXBNS) (TYPICAL)

Figure 3-28 (Sheet 17 of 22)

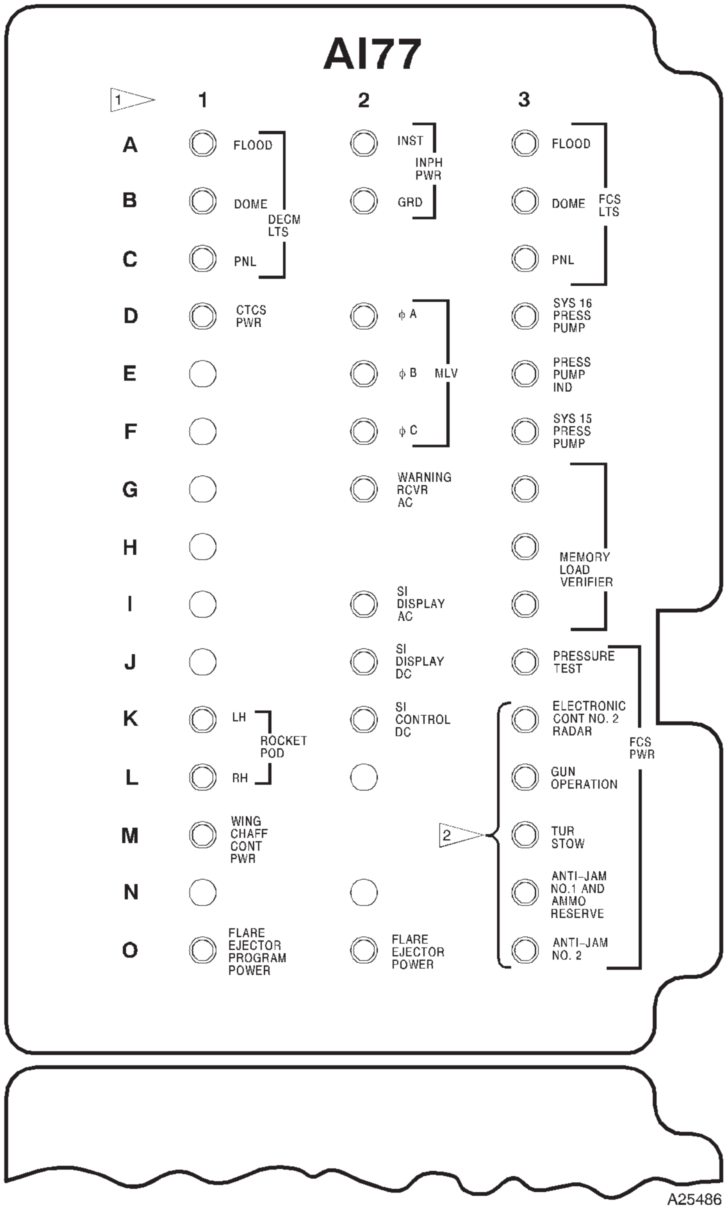


1 Locator code system is for reference only; aircraft does not have these markings.

⑩ ***[AMI]*** **AUXILIARY BNS CIRCUIT BREAKER PANEL (AUXBNS) (TYPICAL)**

Figure 3-28 (Sheet 18 of 22)

Circuit Breaker Panels (Cont)

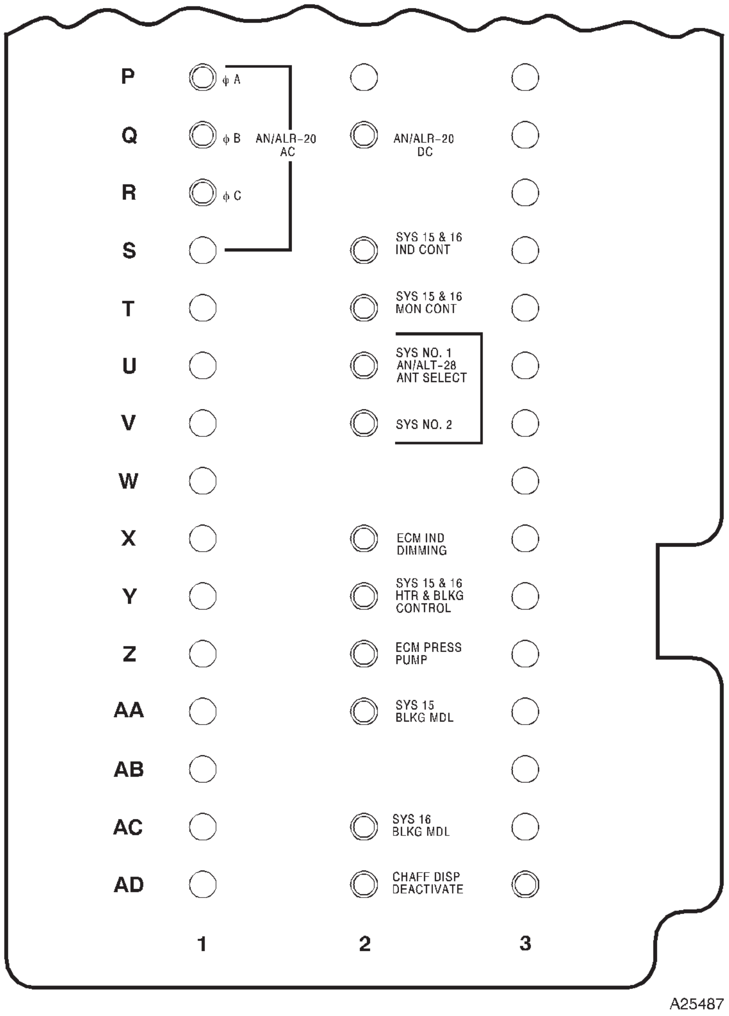


1 Locator code system is for reference only; aircraft does not have these markings.

2 These circuit breakers have been deactivated.

⑪ **ECM CIRCUIT BREAKER PANEL (ECM) (TYPICAL)**

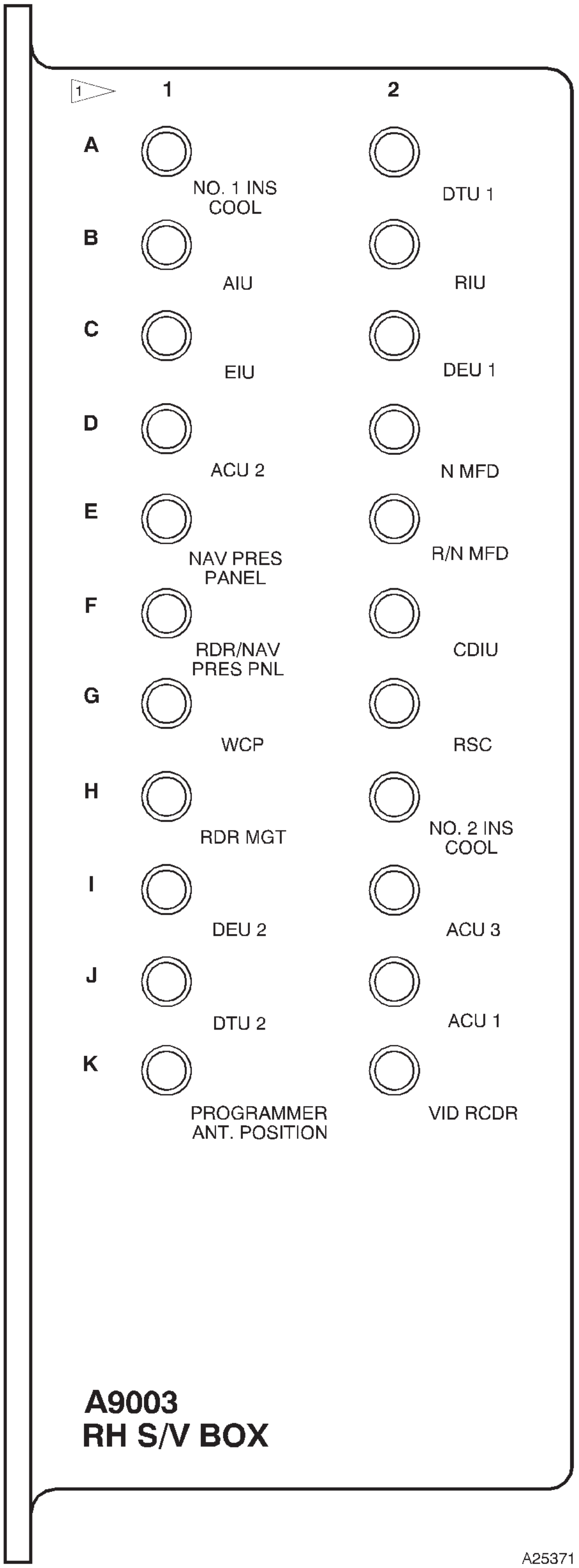
Figure 3-28 (Sheet 19 of 22)



⑪ ECM CIRCUIT BREAKER PANEL (ECM) (TYPICAL) (Cont)

Figure 3-28 (Sheet 20 of 22)

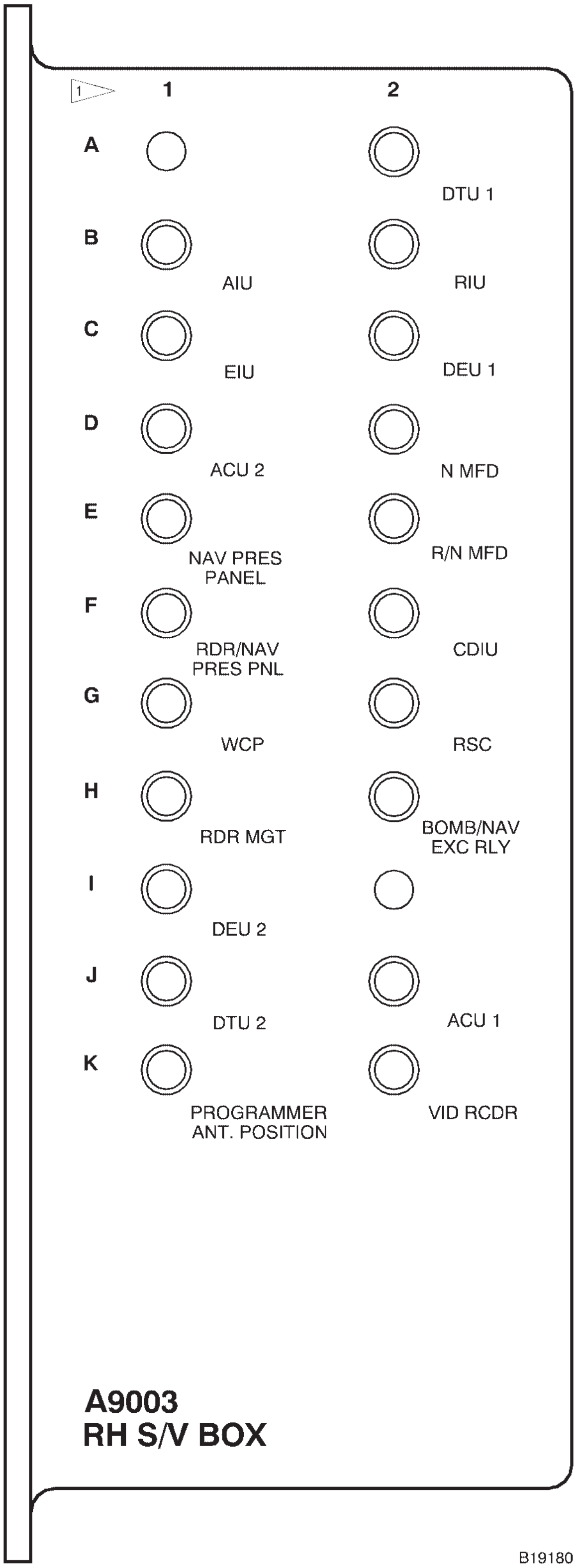
Circuit Breaker Panels (Cont)



1 Locator code system is for reference only; aircraft does not have these markings.

㉖ *Less [AMI]* **RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL (RTSV) (TYPICAL)**

Figure 3-28 (Sheet 21 of 22)



1 Locator code system is for reference only; aircraft does not have these markings.

B19180

㉖ *[AMI]* **RIGHT S/V FILTER BOX CIRCUIT BREAKER PANEL (RTSV) (TYPICAL)**

Figure 3-28 (Sheet 22 of 22)

Glossary

AC	Alternating Current
ACC	Accelerate
ACFT	Aircraft
ACM	Advanced Cruise Missile
ACMI	Air Combat Maneuvering Instrumentation
ACMLP	Advanced Cruise Missile Launch Point
ACTL	Actual
ACU	Avionics Control Unit (Avionics Processor)
ADI	Attitude Director Indicator
AEU	Antenna Electronic Unit
AF1	AFSAT I
AF2M	AFSAT IIM
A-G	Air to Ground
AFSATCOM	Air Force Satellite Communications
AGC	Automatic Gain Control
AGM	Air to Ground Missile
AGWCP	Advanced Guide Weapons Control Panel
AHRS	Attitude Heading Reference System
AIS	Aircraft Instrumentation System
AIU	Armament Interface Unit
ALCM	Air Launched Cruise Missile
ALT	Altitude
ALTR	Alternate
AMI	Avionics Midlife Improvement
AMP	Amplitude
AMPL	Amplifier
ANGL	Angle
ANT	Antenna
AOA	Angle-of-Attack
AP	Avionics Processor
APU	Avionics Processor Unit
AR	Air Refueling
ARCP	Air Refueling Control Point
AREX	Air Refueling Exit
ARIP	Air Refueling Initial Point
ARMD	Armed
ATA	Actual Time of Arrival
ATE	Actual Time Enroute
ATTK	Attack
AUTO	Automatic
AUX	Auxiliary
AZ	Azimuth
AZXH	Azimuth Crosshair
BARO	Barometric
BATT	Battery
BAY	Bomb Bay
BBD	Bomb Bay Door
BCN	Beacon
BHOT	Black Hot
BIT	Built-In-Test
BITE	Built-In-Test Equipment
BLK	Block
BNS	Bomb Navigation System
BMJCP	Bomb Bay and Missile Jettison Control Panel
BR	Bomb Release
BTAD	Bomb Train Adjust Distance
CA	Coarse Alignment
CAD	Controls and Displays
CAL	Calibrate
CAUTN	Caution
CB	Circuit Breaker
C/D	Control Display
CDIU	Control Display Interface Unit
CF	Control Function
CHGNG	Charging
CHK	Check
CI	Control-Indicator
CILSG	Current Improved Linear Sequence Generator
CL	Class
CL RCVY	Centerline Recovery
CLR	Clear
CLSD	Closed
CLSF	Classified
CLSG	Current Linear Sequence Generator
CM	Cruise Missile
CMI	Cruise Missile Integration
CMLP	Cruise Missile Launch Point
CMPTR	Computer
COMM	Communications
CONTL	Control
CONTR	Controller
COUNTDWN	Countdown
CP	Control Point
CPIN	Computer Program Identification Number
CROM	Checksum (test for) Read-Only Memory
CRPA	Controlled Reception Pattern Antenna
CRT	Cathode Ray Tube
CSCP	Computational Subsystem Control Panel
CSP	Common Stores Processing
CSRL	Common Strategic Rotary Launcher

D/A	Drift Angle
D/ILSG	Decoder/Improved Linear Sequence Generator
DAFIF	Digital Aeronautical Flight Information File
DAMA	Demand Assigned Multiple Access
DAS	Damage Assessment Strike
DC	Direct Current
DCA	Drift Correction Angle
DCPPI	Displaced Center Plan Position Indicator
DEC	Decelerate
DDL	Digital Data Loader
DDLC	Digital Data Loader Cartridge
DEST	Destination
DET	Detect
DEU	Display Electronic Unit
DG	Directional Gyroscope
DL	Downlink
DLVY	Delivery
DM	Dual Modem
DOORS	Doors (Bomb Bay)
DOV	Deflection of Vertical
DPLR	Doppler
DSBL	Disable
DTC	Data Transfer Cartridge
DTR	Data Transfer Receptacle
DTS	Data Transfer System
DTU	Data Transfer Unit
D/T	Destination/Target
DUM	Dummy
DVS	Doppler Velocity Sensor
E	Early
EAM	Emergency Action Messages
ECS	Environmental Control System
ECU	Environmental Control Unit
EGC	Enhanced Gyrocompass Mode
EHE	Estimated Horizontal Error
EIA	Enhanced Interrupted Alignment
EIU	EVS Interface Unit
EL	Elevation
EMERG	Emergency
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EMT	Elapsed Mission Time
ENBL	Enable
ENV	Environment
EO	Electro-Optical
EOT	End of Tape
ESD	Electrostatic Discharge
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
EVE	Estimated Vertical Error
EVS	Electro-Optical Viewing System
EW	Electronic Warfare
EX	Exit
EXT	Exit
FA	Fine Align
FC	Fibre Channel
FCP	Flight Computer Program
FCS	Flight Control System
FDM	Force Direction Message or Frequency-Division Multiplex
FILSG	Future Improved Linear Sequence Generator
FLIR	Forward Looking Infrared Radar
FLSG	Future Linear Sequence Generator
FLT	Flight
FMS	Flight Management System
FOM	Figure Of Merit
FOV	Field of View
FPROM	Front-Panel Programmable Read-Only Memory
FREQ AGILE	Frequency Agility
FRMT	Format
FRZE	Freeze
FWD	Forward
FWOD	Future Word-of-Day
FXPT	Fixpoint
GM	Ground Map
GMCP	Ground Maintenance Computer Program
GPI	Ground Position Indicator
GPS	Global Positioning System
GND	Ground
GS	Groundspeed
GSI	Groundspeed Indicator
GSDI	Groundspeed Drift Indicator
GWD	Gravity Weapon Delivery
GYRO	Gyroscope
HA	True Altitude
HAC	High Altitude Calibration
HDG	Heading
HE	Heading Error
HHM	Hand-Hand Module
HOR	Horizontal
HSI	Horizontal Situation Indicator
H_T	Height Terrain Elevation
HTR	Heater
HUNG	Hung Store (Missile)
HV	High Voltage

IC	Integrated Circuit
ICSMS	Integrated Conventional Stores Management System
ID	Identifier
IEU	Interface Electronic Unit
IF	Intermediate Frequency
IKB	Integrated Keyboard
ILSG	Improved Linear Sequence Generator
IME	Inertial Measuring Equipment
IMU	Inertial Measuring Unit
IND	Indicator
INU	Inertial Navigation Unit
INHIB	Inhibit
INIT	Initialize
INR	Inertial
INS	Inertial Navigation Set/System
INSTM	Instrument
I/O	Input/Output
IP	Initial Point
IR	Infrared
ISU	Inertial Sensor Unit
ITH	Integrated Track Handle
IU	Interface Unit
IUCP	Interface Unit Control Panel
IUS	Interface Unit Software
IUSO	Interface Unit Software Overlay
JETT	Jettison
KALMAN	Kalman Filter
KBD	Keyboard
KGS	Knots Ground Speed
KLM	Kalman Filter
KNTS	Knots
L	Late
LAC	Low Altitude Calibrate
LAT	Latitude
LCC	Launch Control Center
LCKOT	Lockout
LDR	Laser Designator and Rangefinder
LF	Low Frequency
LGA	Login Acknowledgment
LGI	Login Initiation
LH	Left-Hand
LIN	Linear
LKD	Locked
LM	Laser Marker
LNCH	Launch
LO	Low
LOC	Location
LOCKD	Locked
LOG	Logarithmic
LONG	Longitude
LOS	Line of Sight
LOSPMT	Line of Sight Preempt
LP	Left Pylon
LPRAM	Low-Power Random-Access Memory
LRU	Line Replaceable Unit
LSG	Linear Sequence Generator
LSS/T	Laser Spot Search and Track
LT	Lamp Test
LTS	Lights
LVL	Level
LVPS	Low Voltage Power Supply
M	Manual
MACR	Modified Advanced Capability Radar (OAS Radar)
MAD	Magnetic Azimuth Detector
MAG	Magnetic
MAL	Malfunction
MAN	Manual
MAX	Maximum
MDFY	Modify
MDM	Modem
MEM	Memory
MEM PT	Memory Point
MFD	Multifunction Display
MFL	Maintenance Fault Listing
MGMT	Management
MHI	Magnetic Heading Indicator
MIL STD	Military Standard
MIN	Minimum
MISN	Mission
MIT	Missile Interface Test
MIU	Missile Interface Unit
MKR	Marker
MOD	Modification
MOM	Momentary
MP	Memory Point
MRT	Miniature Receive Terminal
MSG	Message
MSL	Mean Sea Level
MSN	Mission
MSTR	Master

NARF	Navigation Alignment Refining Feature
NARO	Narrow
NAV	Navigation, Navigator
NAWC	Navigation and Weapon Control
NAWD	Navigation and Weapon Delivery
NC	Network Controller
NFOV	Narrow Field Of View
NG	No Go
NKB	Navigator Keyboard
NM	Nautical Mile
NOHD	Nominal Ocular Hazard Distance
NS	North Stabilized
NTIK	Nontactical Instrument Kit
NTSF	Not Safe
NVG	Night Vision Goggles
NVM	Non-Volatile Memory
NVRAM	Non-Volatile Random-Access Memory
NUC	Nuclear
OAP	Offset Aimpoint
OAS	Offensive Avionics System
OC	Operational Computer
OCP	Operational Computer Programs
ODI	Offensive-Defensive Interface
OF	Off
OPER	Operator
ORIDE	Override
OS	Offset
OSC	Oscillator
PAR	Precision Approach Radar
PCP	Power Control Panel
PDU	Power Drive Unit
PDUC	Power Drive Unit Control
PFL	Pilot Fault Listing
PKB	Programmable Keyboard
PMD	Prime Mission Data
PME	Prime Mission Equipment
PMT	Preempt
PNL	Panel
POS	Position
PP	Present Position
PPI	Plan Position Indicator
PRF	Pulse Recurrence Frequency or Pulse Repetition Frequency
PRGM	Program
PRN	Print
PROC	Processor
PROM	Programmable Read-Only Memory
PROT	Protect
PTA	Planned Time of Arrival
PTE	Planned Time Enroute
PWR	Power
Q Fix	Quality Fix
QUAL	Quality/Qualification
RA	Radar Altimeter
RB	Report Back/Relative Bearing
RBS	Radar Bomb Scoring
RCD	Record
RCDR	Recorder
RCU	Remote Control Unit
RCVR	Receiver
RDR	Radar
RDZ	Rendezvous
RDY	Ready
REF	Reference
REL/RLS	Reliable/Release
REPS	Repetitions
RES	Residual
REJ	Reject
RETGT	Retarget
RF	Radio Frequency
RG	Range (Ground)
RH	Right-Hand
RIU	Radar Interface Unit
RN	Radar Navigator
RNG	Range
RNKB	Radar Navigator Keyboard
RNMP	Radar Navigator Management Panel
ROM	Read Only Memory
RP	Right Pylon
RPP	Radar Presentation Panel
RPU	GPS Receiver Processor Unit
RS	Range Slant
RSC	Radar Scan Converter
RSPA	Rotor Support Power Adapter
R/T-M	Radar-Transmitter Modulator

SA	Situational Awareness
SAF	Safe
SAIR	Safe and In Range
SAR	Status, Acknowledge, and Request
SAU	Splitter Amplifier Unit
SCT	Single Channel Transponder
SEL	Select
SIT	System Interface Test
SIM	Simulate
SLT	Slant
SLU	Station Logic Unit
SMO	Stores Management Overlay
SPI	System Point of Interest
SPN/GEANS	Standard Precision Navigator/ Gimbaled Electrically Suspended Gyro Airborne Navigation System
SPOT LITE	Spot Light
SRI	Sequential Report Back Information
STAB	Stabilized
STC	Sensitivity Time Control
STV	Steerable Television
SUPV	Supervision
STEER	Steering (Navigation)
S/V	Survivability/Vulnerability
SW	Switch
SYNC	Synchronization
SYNTH or SYN	Synthesizer
TX	Transmitter
TA	Terrain Avoidance
TAS	True Airspeed
TB	True Bearing
TBL	Table
TC	Terrain Correlation
TCCP	Terrain Correlation Checkpoint
TCIP	Terrain Correlation Initial Point
TCEX	Terrain Correlation Exit
TDM	Time-Division Multiplex
TDS	Time Distributing System
TE	Track Error
TEMP	Temperature
TGP	Targeting Pod
TGT	Target
TH	True Heading
TK	Track
T/P	Turn Point
TR	Tanker, Transformer-Rectifier
TRANS	Transfer
TRK	Track
TRNG	Training
TSM	Time Standard Module
TSTC	Test Configuration
TTG	Time to Go
TTGS	Time to Go Tanker Start Turn Maneuver
TX	Transmit
UC	Upper Corner
UE	User Equipment
UTC	Universal Coordinated Time
UL	Uplink/Upper Left
UR	Upper Right
UNCMD	Uncommanded
UNLK	Unlock
V, v	Velocity Volts
VAC/Vac	Volts Alternating Current
VAR	Variable
VDC/Vdc	Volts Direct Current
VFR	Visual Flight Rules
VID RCDR	Video Recorder
VG	Vertical Gyroscope
VV	Vertical Velocity
WCE	Weapon Control Equipment
WCP	Weapon Control Panel
WCS	Weapon Control System
WHOT	White Hot
WIU	Weapon Interface Unit
WOD	Word-of-Day
WOM	Word-of-Month (same as WOD)
WPA	Weapon Personality Adapter
WPN	Weapon
WPN JETT	Weapon Jettison
W/V	Wind/Velocity
XH	Crosshair
X-HAIR	Crosshair
XMTR/XMIT	Transmitter/Transmit
X RANGE	Crossrange
XTE	Crosshair Track Error
XFR	Transfer

FUNCTIONAL VS OFFICIAL NOMENCLATURE

Components of the Offensive Avionics System and associated tie-in are listed below by functional nomenclature, used in system displays, and panel nomenclature, versus official nomenclature. The functional nomenclature is used in this manual and related flight publications when referring to these components.

FUNCTIONAL NOMENCLATURE	OFFICIAL NOMENCLATURE
Offensive Avionics System (OAS)	Offensive Avionics System, AN/ASQ-176
Attitude Heading Reference System (AHRS)	Gyroscope Set, Attitude-Heading, AN/ASN-134
Computational Subsystem (CS) ***Less [AMI]***	Computer Set, Ballistics, AN/AYQ-10
Avionics Processor	Control Unit, Avionics, C-10778/AYQ-10
Data Transfer Control Unit (DTCU)	Control, Transmitter, C-10771/ASK-7
Data Transfer Unit (DTU)	Transfer Set Data, AN/ASK-7
Data Transfer Unit Cartridge (DTUC)	Transport, Magnetic Tape, RD-464/ASK-7
Data Transfer Unit Cartridge Mount	Mounting Base, Electrical Equipment, MT-6110/ASK-7
Controls and Displays (CAD)	Control-Display Set AN/ASQ-175
Computer Control Panel (CCP)	Control, Computer C-10723/ASQ-175
Display Electronics Unit (DEU)	Computer, Digital, CP-1397/ASQ-175
Keyboard	Console, Input-Output, Digital Computer OJ-478/ASQ-175
Multifunction Display (MFD)	Indicator, Multifunction Display, 1P-1362/ASQ-175
OAS Power Control Panel	Control, Power Supply C-10770/ASQ-175
Radar Scan Converter (RSC)	Converter, Signal Data, CV-3625/ASQ-175
Radar Navigator Management Panel (RNMP)	Control, Radar Set, C-10720/ASQ-175
Radar Presentation Panel	Control-Indicator, C-10721/ASQ-175
Video Recorder	Recorder, Video, RO-523/ASQ-175
Weapon Control Panel (WCP)	Control Panel, Weapon, C-10722/ASQ-175
Doppler Radar System (DVS)	Radar Navigation Set (AN/APN-218)
Global Positioning System (GPS)	Global Positioning System, AN/ARN-151(V)
Programmable Keyboard	Keyboard, Data Entry, KY-920/A
Interface Unit Control Panel	Panel, Control Electronics, C-12043
Inertial Navigation System (INS) ***Less [AMI]***	Navigation Set, Inertial, AN/ASN-136
Inertial Electronic Unit (IEU)	Interface Electronic Unit, J-3689/ASN-136
Inertial Measurement Unit (IMU)	Inertial Measurement Unit, MX-10142/ASN-136
Inertial Navigation Unit (INU) ***[AMI]***	Navigation Unit, Inertial, CN-1711/A

FUNCTIONAL VS OFFICIAL NOMENCLATURE (Cont)

FUNCTIONAL NOMENCLATURE	OFFICIAL NOMENCLATURE
OAS Radar	Radar Set AN/APQ-166
Antenna Assembly	Antenna AS-3652/APQ-166
Antenna Electronics Unit	Programmer, Antenna Position MX-10512/APQ-166
Radar Control Test Panel	Control, Radar Set C-11309/APQ-166
Receiver-Transmitter Modulator	Receiver-Transmitter, Radar RT-1441/APQ-166
Radar Processor	Converter, Signal Data CV-3823/APQ-166
Terrain Display Control Panel	Control, Display Panel C-11310/APQ-166
Display Generator	Converter, Signal Data CV-3824/APQ-166
Interface Units	Digital Data Set AN/AYK-17
Armament Interface Unit (AIU)	Converter, Signal Data CV-3623/AYK-17
Controls and Displays Interface Unit (CDIU)	Converter, Signal Data CV-3624/AYK-17
Data Bus Coupler, Dual (DDBC)	Coupler, Digital Data CU-2261/AYK-17
Data Bus Coupler, Quad (QDBC)	Coupler, Digital Data CU-2663/AYK-17
Data Bus Coupler, Single (SDBC)	Coupler, Digital Data CU-2260/AYK-17
Data Bus Coupler, Triple (TDBC)	Coupler, Digital Data CU-2262/AYK-17
EVS Interface Unit (EIU)	Converter, Signal Data CV-3622/AYK-17
Radar Interface Unit (RIU)	Converter, Signal Data CV-3627/AYK-17
Radar Altimeter (RA)	Altimeter Set, Electronic, AN/APN-224
Targeting Pod (TGP)	Control-Monitor Set AN/AWQ-3
Advanced Guided Weapon Control Panel (AGWCP)	Decoder-Receiver, KY-874/AWQ-3 Control-Interface Unit, Weapon, CD-13/ACQ-7
Display Unit	
Integrated Track Handle (ITH)	
Weapon Control and Delivery	
Missile Interface Unit (MIU)	
Weapon Interface Unit (WIU)	

ALPHABETICAL INDEX