



CREW STATION CONFIGURATION



PREPARED FOR: BRITISH AEROSPACE, KINGSTON-BROUGH DIV.
KINGSTON-UPON-THAMES, SURREY, U.K.

BY: MCDONNELL AIRCRAFT COMPANY

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FOREWORD

This report describes the AV-8B Crew Station configured for the British Royal Air Force Air Staff Requirement (ASR) No. 409. It is the result of a study performed in accordance with British Aerospace Purchase Order number AK437348 and Statement of Work AV-8-380-4049/WBS 3200. The proposed crew station arrangement has been fully evaluated in terms of pilot accommodation and work load. This crew station will give the Royal Air Force "state-of-the-art" capability with flexibility for future growth.

TABLE OF CONTENTS

	<u>PAGE</u>
1. INTRODUCTION	1
2. CREW STATION GEOMETRY	5
3. VISION AND REACH	11
4. AV-8B (RAF) KEY SYSTEMS	33
4.1 ON-BOARD OXYGEN GENERATING SYSTEM (OBOGS)	33
4.2 MULTIPURPOSE DISPLAY (MPD)	35
4.3 UPFRONT CONTROL SET (UFCS)	37
4.4 HANDS ON THROTTLE AND STICK (HOTAS) CAPABILITY	38
4.5 TORNADO REPEATER MAP SYSTEM	39
5. SIGNALS AND IMMEDIATE ACTION CONTROLS	43
5.1 WARNING, CAUTION, THREAT, AND ADVISORY SIGNALS	43
5.2 IMMEDIATE ACTION CONTROLS	45
6. INGRESS AND EGRESS	47
7. CREW STATION CONFIGURATION	49
APPENDIX A	A-1

LIST OF PAGES

TITLE PAGE
 iii through vi
 1 through 148
 A-1 through A-4

LIST OF FIGURES

<u>FIGURE NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	AV-8B CREW STATION.	1
2-1	BODY DIMENSIONS COMPARISON.	5
2-2	AV-8B (RAF) CREW STATION GENERAL ARRANGEMENT.	6
2-3	AV-8B (RAF) CREW STATION GEOMETRY	7
2-4	CREW STATION DIMENSIONS	8
2-5	MARTIN-BAKER MK-10L EJECTION SEAT	9
3-1	AV-8B (RAF) INTERIOR BINOCULAR VISIBILITY WITHOUT HEAD MOVEMENT.	12
3-2	AV-8B (RAF) INTERIOR BINOCULAR VISIBILITY WITH HEAD MOVEMENT.	13
3-3	VISION ENVELOPE FROM MONOCULAR DESIGN EYE	14
3-4	VISION ENVELOPE DESIGN EYE MOVED OUTBOARD AND DOWN.	15
3-5	APPROACH TO FORWARD LANDING SITE 1/4 NAUTICAL MILE.	16
3-6	APPROACH TO A LANDING PAD - 300 FEET.	16
3-7	SHIP APPROACH - 1/4 NAUTICAL MILE	17
3-8	SHIP APPROACH - 200 FEET ASTERN	17
3-9	SHIP APPROACH - OVER THE MARK	18
3-10	98TH PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS	20
3-11	98TH PERCENTILE FUNCTIONAL AND FINGERTIP REACH - STRETCHING AGAINST HARNESS	21
3-12	98TH PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS	22
3-13	98TH PERCENTILE MAXIMUM FUNCTIONAL AND FINGERTIP REACH - STRETCHING AGAINST HARNESS	23
3-14	50TH PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS	24
3-15	50TH PERCENTILE MAXIMUM FUNCTIONAL AND FINGERTIP REACH - STRETCHING AGAINST HARNESS	25

LIST OF FIGURES
(CONTINUED)

<u>FIGURE NO.</u>	<u>TITLE</u>	<u>PAGE</u>
3-16	50TH PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS.	26
3-17	50TH PERCENTILE MAXIMUM FUNCTIONAL AND FINGERTIP REACH - STRETCHING AGAINST HARNESS.	27
3-18	3RD PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS.	28
3-19	3RD PERCENTILE MAXIMUM FINGERTIP AND FUNCTIONAL REACH - STRETCHING AGAINST HARNESS.	29
3-20	3RD PERCENTILE FUNCTIONAL AND FINGERTIP REACH - NOT STRETCHING AGAINST HARNESS.	30
3-21	3RD PERCENTILE MAXIMUM FUNCTIONAL AND FINGERTIP REACH - STRETCHING AGAINST HARNESS.	31
4-1	ON-BOARD OXYGEN GENERATION SYSTEM.	33
4-2	OBOGS FORWARD FUSELAGE INSTALLATION.	34
4-3	MULTIPURPOSE DISPLAY	35
4-4	MPD STORES MANAGEMENT.	36
4-5	COMMUNICATION OPERATION.	37
4-6	THROTTLE AND STICK	38
4-7	TORNADO REPEATER MAP DISPLAY (TRMD)	39
4-8	AV-8B (RAF) MAIN INSTRUMENT PANEL WITH MAP	40
4-9	TORNADO REPEATER MAP DISPLAY (TRMD) DIAGRAM.	41
4-10	TORNADO REPEATER MAP DISPLAY (TRMD) INTERFACE UNIT OUTLINE.	42
4-11	INSTALLATION TORANDO REPEATER MAP DISPLAY (TRMD) INTERFACE UNIT.	42
5-1	AV-8B CREW (RAF) STATION SIGNALS	44
5-2	IMMEDIATE ACTION CONTROLS.	45
6-1	AV-8B (RAF) CREW STATION INGRESS/EGRESS.	47
7-1	AV-8B (RAF) PAGE INDEX	49
7-2	AV-8B (RAF) PANEL NOMENCLATURE	50

1. INTRODUCTION

Six years of intensive coordination between MCAIR and the USMC has optimized the crew station for the AV-8B. An effective man machine interface has been achieved utilizing the AV-8B mockup shown in Figure 1-1. Pilot workload has been reduced and weapon system effectiveness increased. Early RAF participation in this effort via the USMC AircREW Systems Advisory Panel (ASAP) was a major factor in the development of a configuration which is readily adaptable to the RAF requirements.

Direct Coordination with BAe has further refined the AV-8B (RAF) configuration to meet the RAF requirements. The full size mockup of the AV-8B (RAF) Crew Station has been used to verify data contained in this report. The mockup and this descriptive report present the standard for the AV-8B (RAF).

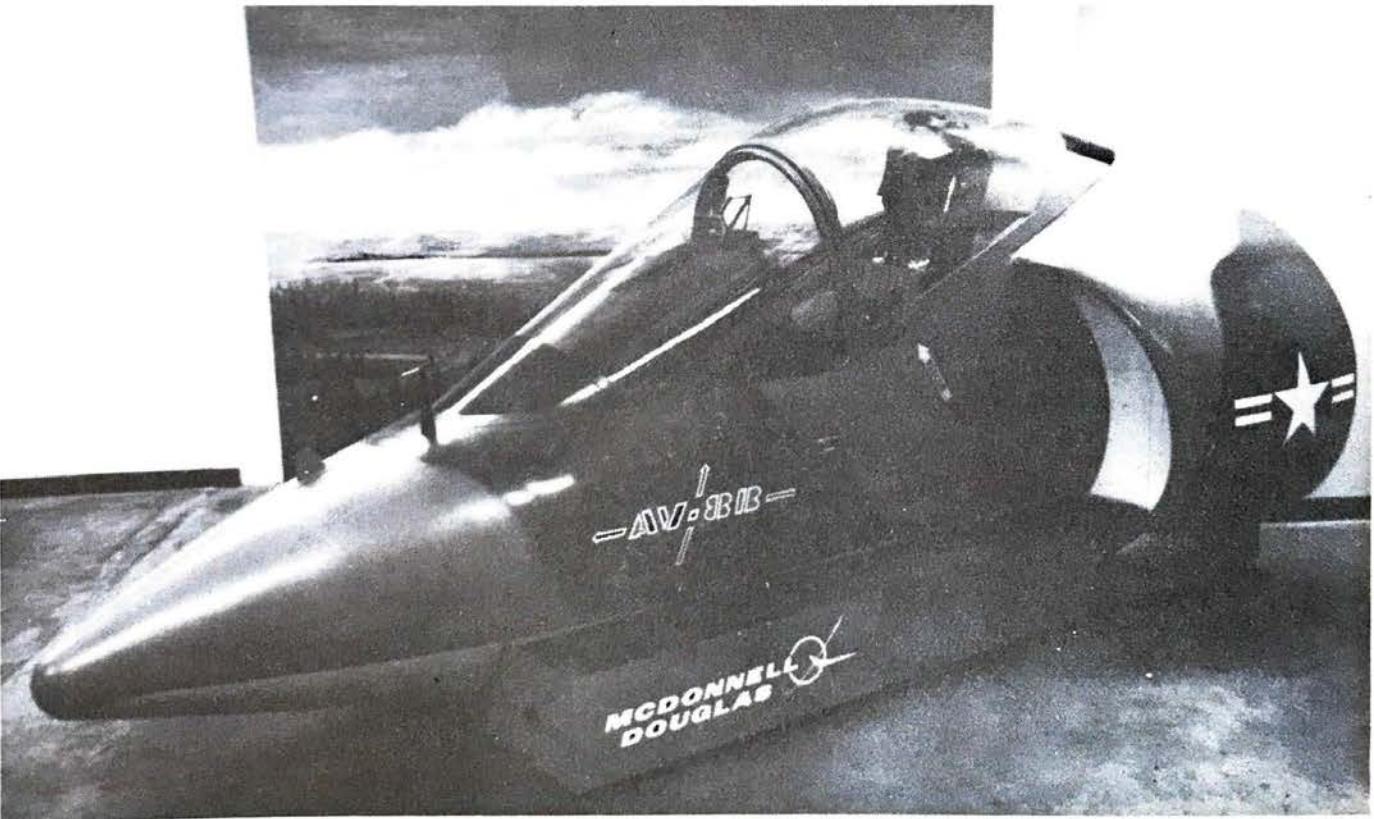


FIGURE 1-1
AV-8B CREW STATION

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The AV-8B Crew Station capitalizes on MCAIR experience from the F-15 and F-18 programs. The resulting design carefully integrates controls and displays to provide head-up operation during close-in combat. System operation has been rigorously explored by USMC Aircrew Systems Advisory Panel (ASAP) pilots, with RAF participation, in manned simulation and the configuration mockup. All mission essential information (attack symbology, sensor tracking, priority radar warning, and flight information) is presented on the head-up display (HUD).

The head-up attack philosophy is reinforced by the hands-on-throttle-and stick (HOTAS) control mechanization. During time critical operations the pilot can control the following without removing his hands from the primary controls:

- o Sensor selection
- o Sensor control
- o Weapon operation
- o Air-to-air mode selection
- o Communication control
- o Flap operation
- o Stability augmentation and attitude hold system (SAAHS) disengage

The crew station is designed to accommodate 95 percent of the pilot population for all attack/flight essential operations without requiring pilot compensation for visual or reach access to controls and displays. The key in achieving this is the combination of HOTAS and head-up-display (HUD) integration with up-front control of systems operation. This concept provides a crew station that is not sensitive to anthropometric variability. RAF aviator's body dimensions (RAE-TR-73083) and U.S. Naval aviator's body dimensions (NAEC-ACEL-533).

Dimensions which are typically emphasized in crew station design such as functional reach (control access), sitting eye height (vision), and buttock to knee length (ejection clearance) are all accommodated in the AV-8B (RAF) crew station design.

The crew station has been verified for third through ninety-eighth percentile pilots through actual evaluation of the configuration mockup. Controls and displays are arranged by function to ease the pilot's scan, resulting workload reduction has been demonstrated in manned flight simulation. Improved pilot vision is achieved by raising the design eye 10.5 inches above the GR3 eye. This raising, in conjunction with the bubble canopy and one-piece wraparound windshield, provides excellent external vision for V/STOL, air-to-ground and air-to-air operations. Non-HOTAS priority controls listed below are located for left hand operation so that the right hand is free for control stick operation:

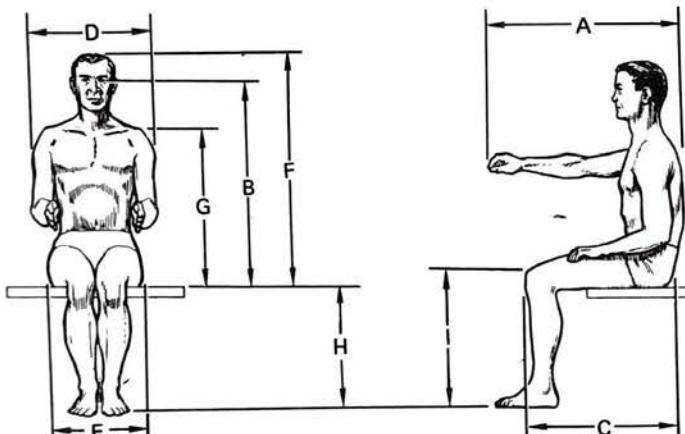
- o Master caution
- o Master arm
- o Air-to-ground mode selection
- o Up-front control (comm/nav keyboard)
- o Multi purpose display controls.

- o Landing gear operation
- o Emergency jettison
- o Canopy detonation
- o Landing gear emergency extension
- o Flare/chaff dispensing

The crew station avionics are optimized for the close air support (CAS) mission. The Angle Rate Bombing System (ARBS) of weapon delivery used in CAS and interdiction missions utilizes the dual mode (laser/TV) tracker and Stores Management System (SMS). Automatic, continuously computed, and manual air-to-ground weapon delivery modes are available, as is an effective air-to-air mode with guns and missiles. This multi-mission capability is achieved by integrating the armament and fire control functions.

2. CREW STATION GEOMETRY

The basic crew station dimensions are in accordance with MIL-STD-1333. The crew station is designed for 3rd through 98th percentile men (NAEC-ACEL-533, "Anthropometry of Naval Aviators--1964") and correlated with RAF aircrew (RAE-TR-73083, "Anthropometry Survey of 2000 Royal Air Force aircrew, 1970/1971"). Figure 2-1 is a comparison of the aviator's body dimensions as shown in these documents.



	3rd Percentile Pilot			98th Percentile Pilot		
	RAF* (in.)	U.S. Navy** (in.)	RAF Difference (in.)	RAF* (in.)	U.S. Navy** (in.)	RAF Difference (in.)
A. Functional Reach	28.96	29.07	-0.11	34.57	34.70	-0.13
B. Sitting Eye Height	30.11	29.41	0.50	34.95	34.16	0.79
C. Buttock-Knee Length	21.26	22.26	-1.00	26.13	26.24	-0.11
D. Bideltoid Breadth	16.80	17.05	-0.25	20.07	20.64	-0.57
E. Hip Breadth, Sitting	13.08	12.94	0.14	16.12	16.31	-0.19
F. Sitting Height	34.50	33.96	0.54	39.29	38.95	0.34
G. Acromial Height, Sitting	21.96	21.81	0.15	26.37	26.02	0.35
H. Stool Height	14.82	15.74	-0.92	18.50	19.09	-0.59
I. Knee Height	20.41	20.07	0.34	24.24	23.91	0.33

*RAE-TR-73083

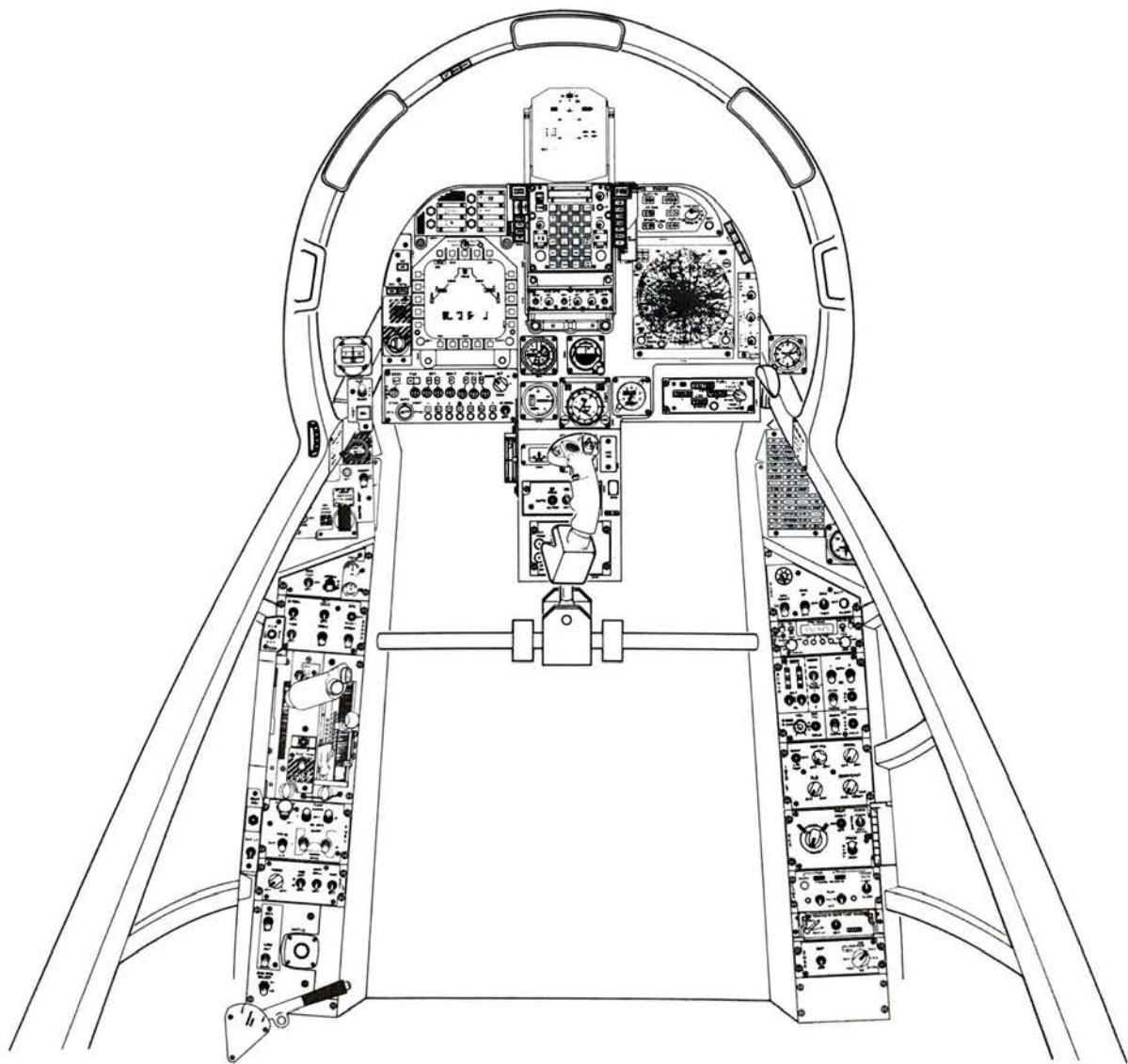
**NAEC-ACEL-533

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FIGURE 2-1
BODY DIMENSIONS COMPARISON

The AV-8B (RAF) Crew Station General Arrangement (Figure 2-2) is the result of extensive evaluations to ensure constructive use of the limited work space.

Crew station geometry and ejection seat arrangement is shown in Figure 2-3, 2-4, and 2-5.



**FIGURE 2-2
AV-8B (RAF) CREW STATION GENERAL ARRANGEMENT**

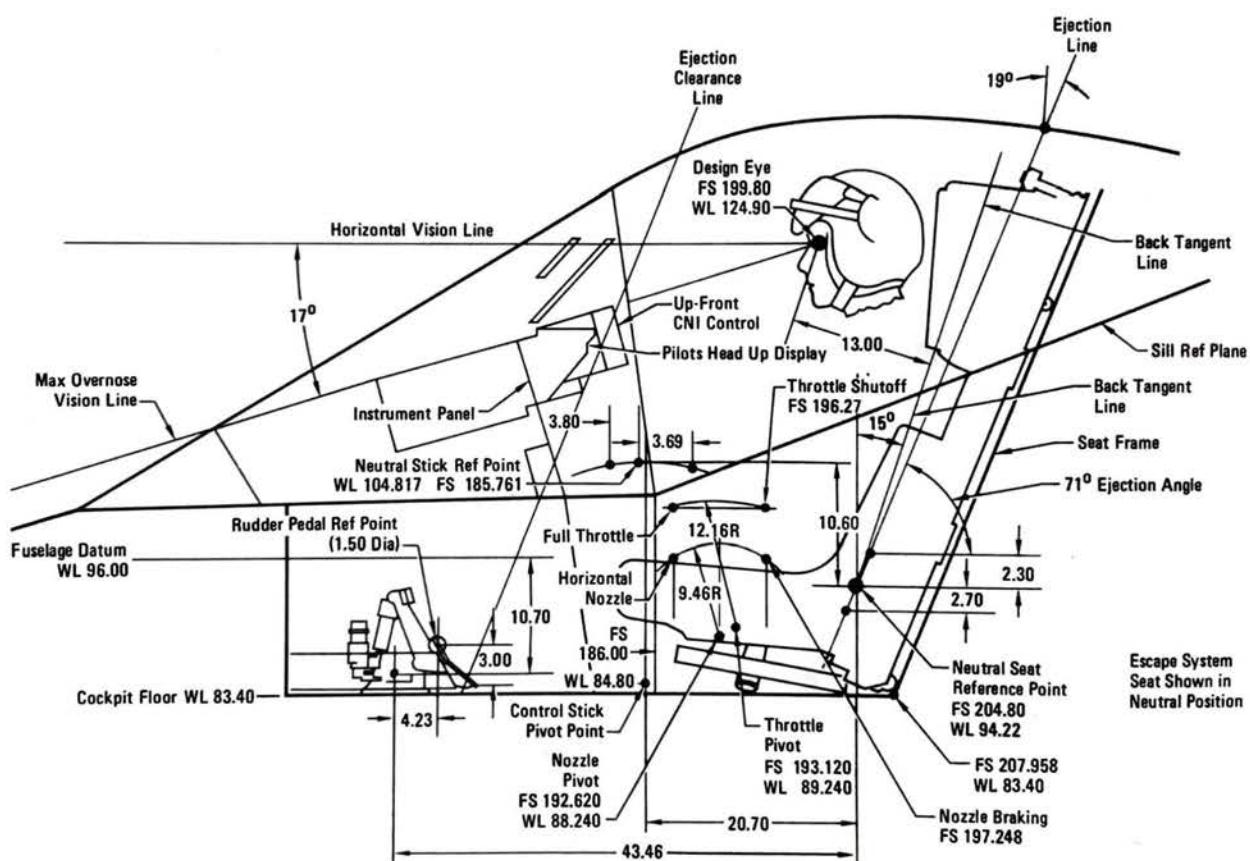


FIGURE 2-3
AV-8B (RAF) CREW STATION GEOMETRY

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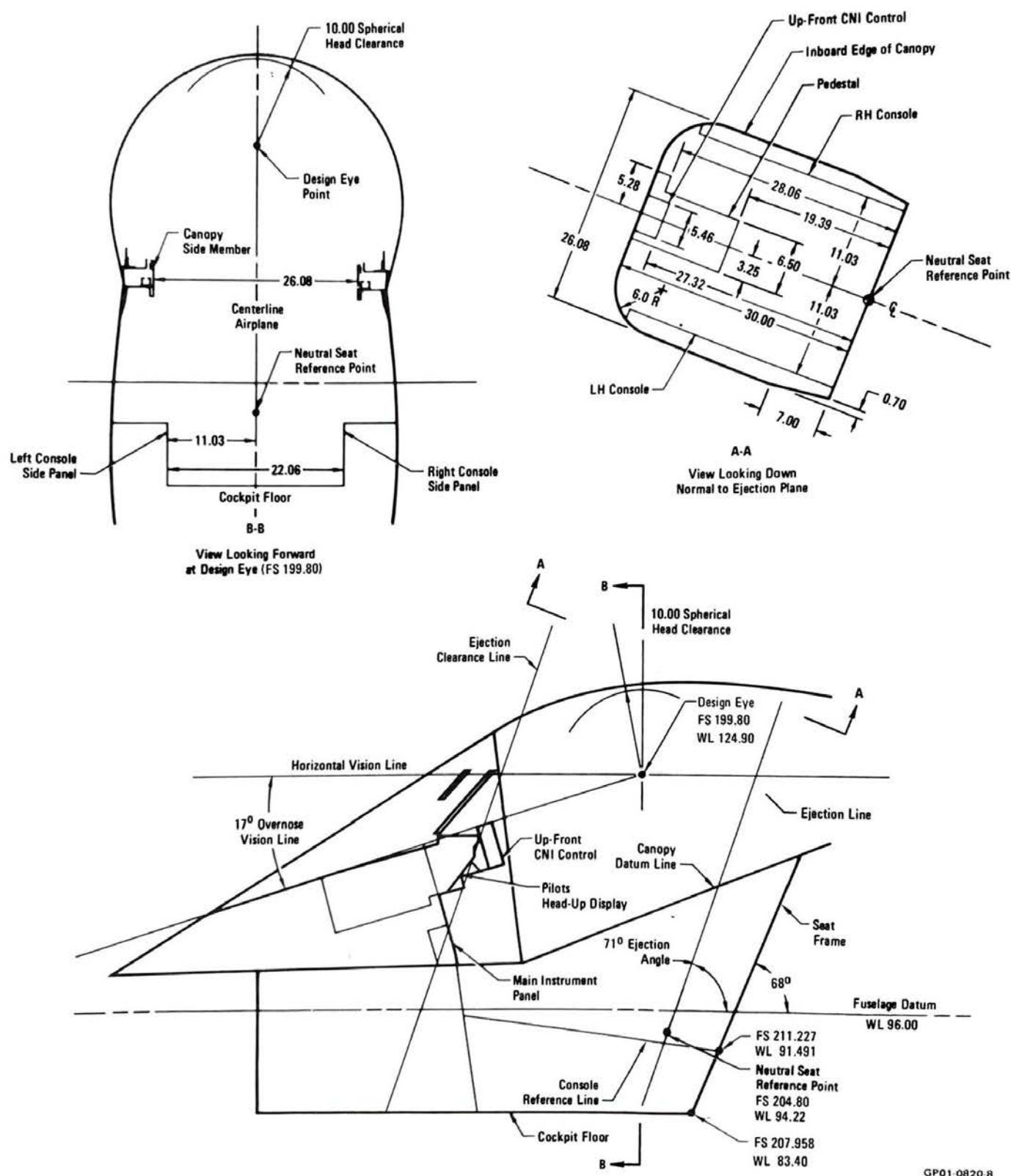
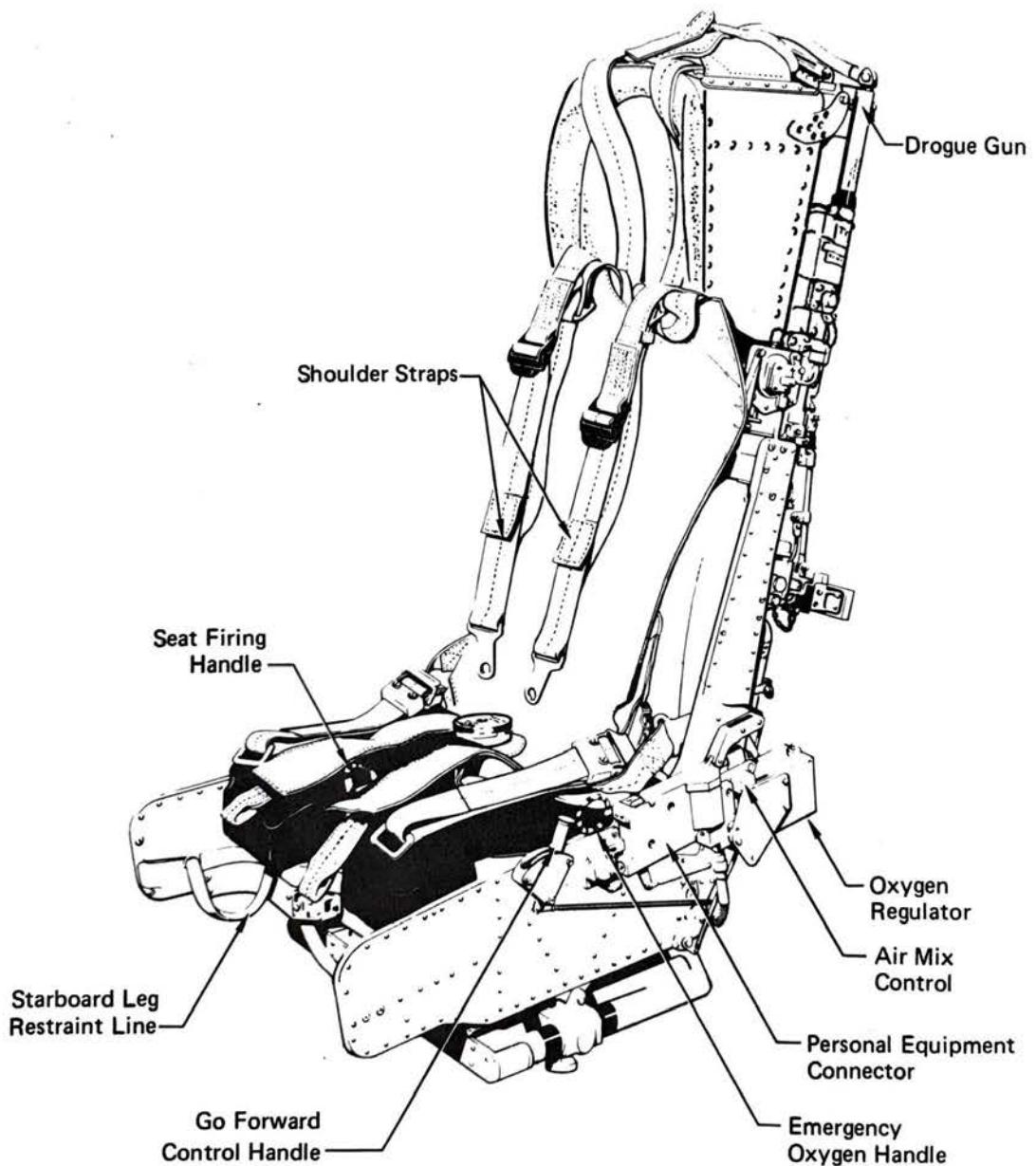


FIGURE 2-4
DETAILS THE CREW STATION DIMENSIONS



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FIGURE 2-5
MARTIN-BAKER MK-10L EJECTION SEAT

3. VISION AND REACH

Crew station development of the AV-8B included exhaustive studies of pilot vision and reach. Subjects were chosen to represent Naval Aviators from the 3rd to 98th percentile. The crew station geometry of the AV-8B (RAF) is identical to that of the AV-8B and thus the vision and reach is identical.

Two interior visibility tests were conducted. The first tested binocular vision with no head motion. The second tested head motion associated with an IFR approach. The pilots used for these tests were selected on the basis of their familiarity with the AV-8B Crew Station and their flight experience. No measurements or correction factors were required. It was only necessary to locate the pilot at the design eye location.

Figure 3-1 presents a crew station interior vision plot from the design eye without head motion. Figure 3-2 presents crew station interior vision plot from the design eye with minor vertical and lateral pilot head movement.

Figure 3-3 and 3-4 show external vision form the AV-8B (RAF).

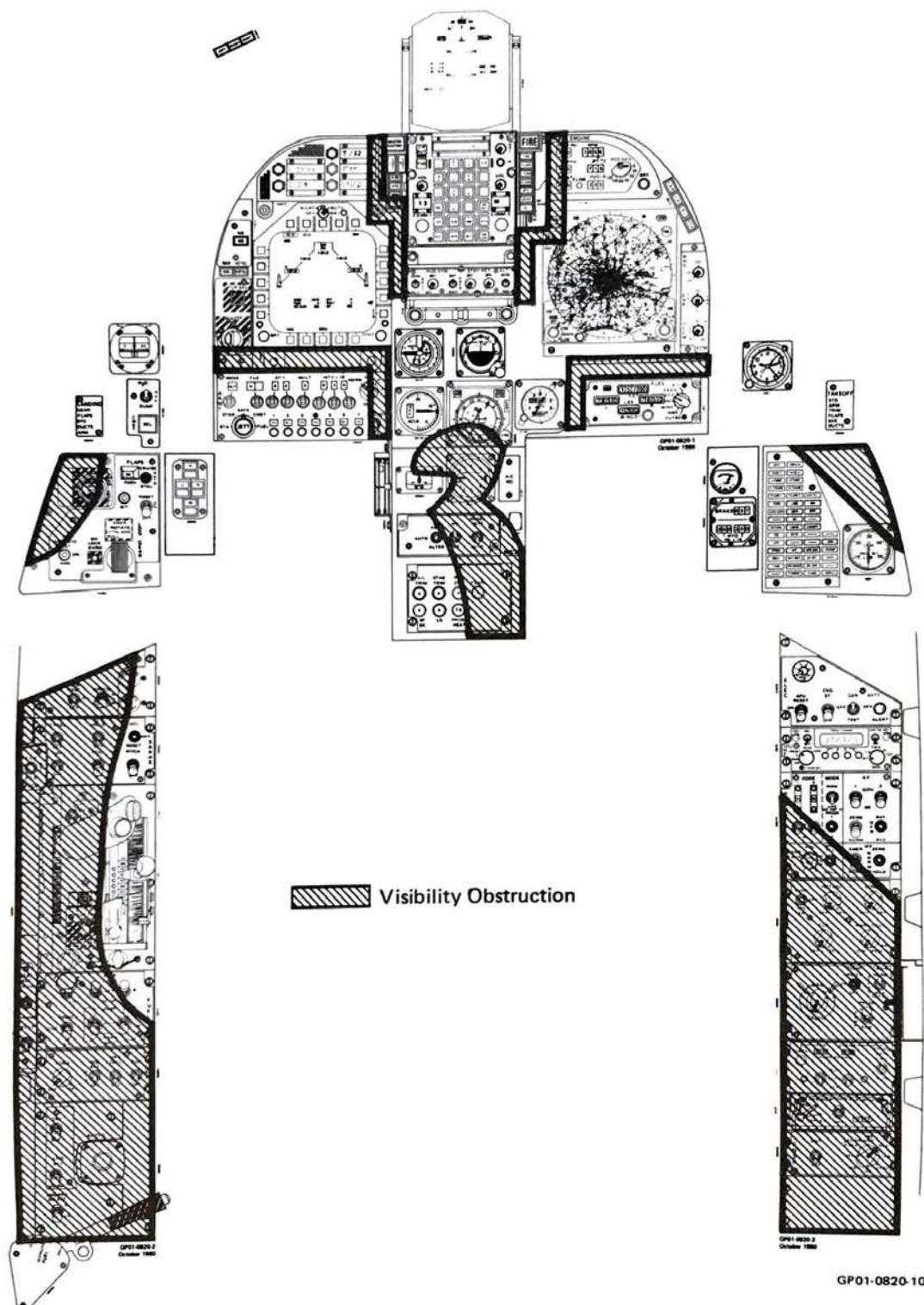


FIGURE 3-1
AV-8B(RAF) INTERIOR BINOCULAR VISIBILITY WITHOUT HEAD MOVEMENT

- Design Eye
- Without Head Movement
- Throttle at Mil Power
- Stick Neutral

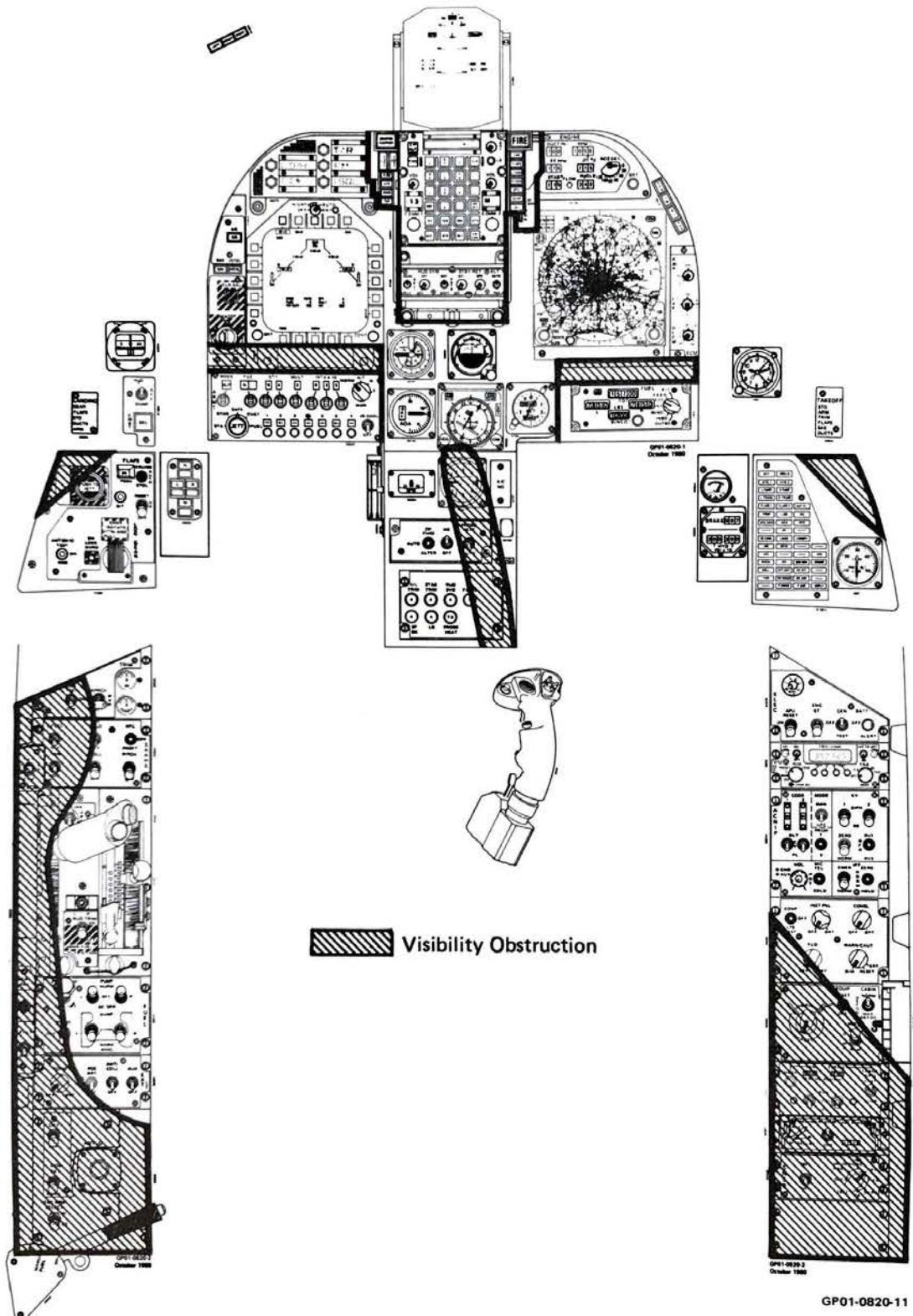


FIGURE 3-2
AV-8B(RAF) INTERIOR BINOCULAR VISIBILITY WITH HEAD MOVEMENT

- Design Eye
- With Minimum Head Movement
- Throttle at Mil Power
- Stick Neutral

3.1 EXTERNAL VISION

The AV-8B (RAF) has significantly better pilot visibility than the GR3. The improvement was obtained by elevating the crew station, providing a bubble canopy which allows greater head movement, and installing a one piece wraparound windshield which opens up the entire forward field of view.

Figure 3-3 presents the total vision envelope available from the monocular design eye. This information is plotted on an Aitoff's equal area projection of a sphere.

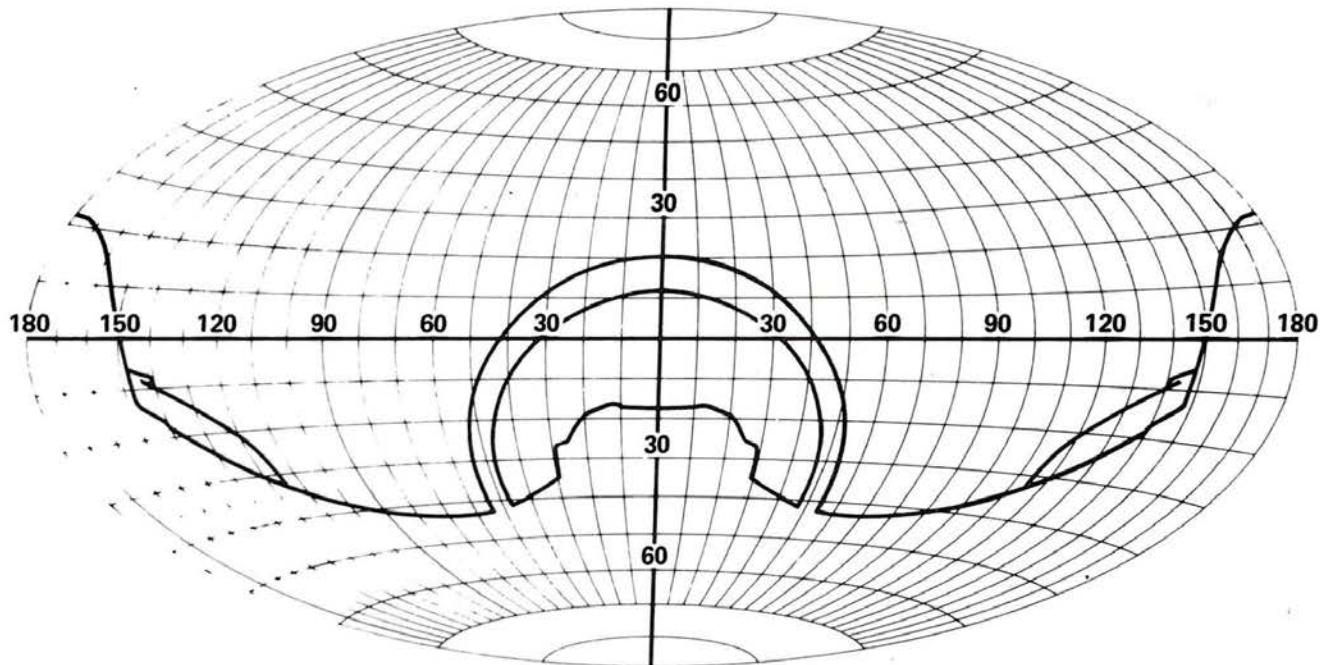
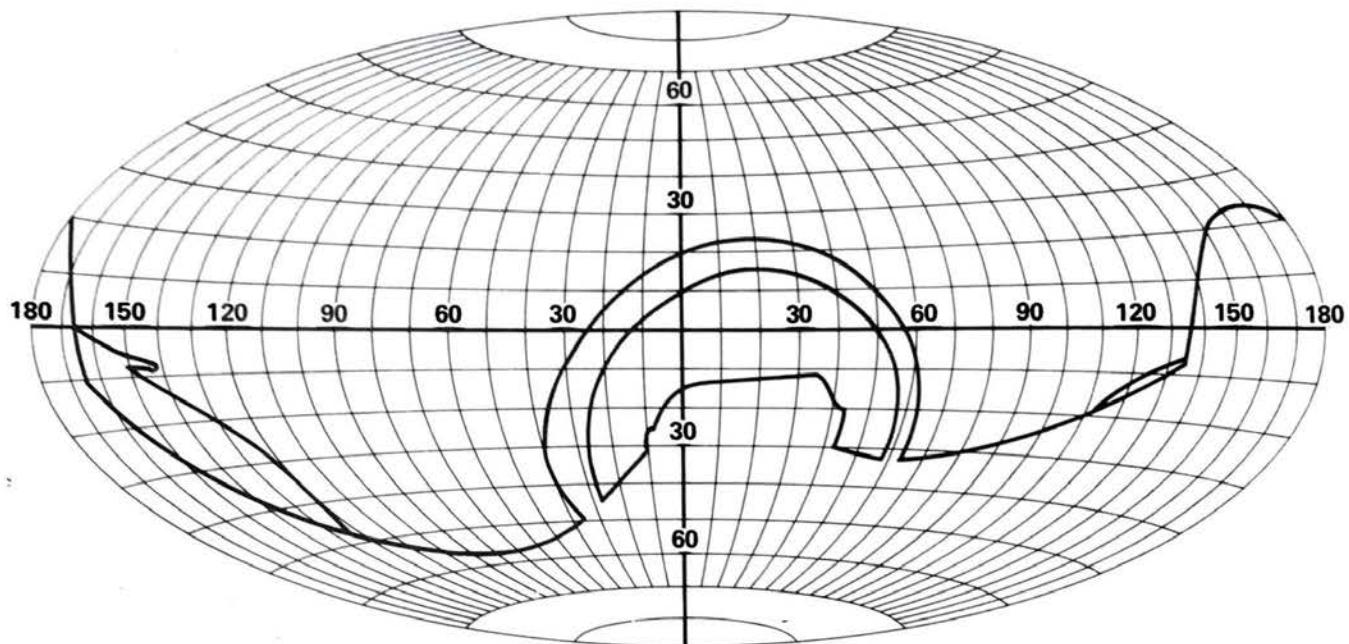


FIGURE 3-3
VISION ENVELOPE FROM MONOCULAR DESIGN EYE

Figure 3-4 shows vision envelope improvement with the design eye moved until the helmet is against the canopy. This figure shows the substantial increase available with head movement provided by the bubble-shaped canopy of the AV-8B (RAF).



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FIGURE 3-4
VISION ENVELOPE DESIGN EYE MOVED OUTBOARD AND DOWN

Landing approach visibility for the AV-8B (RAF) is presented for two conditions, approach to a forward landing site and approach to a ship. Both conditions indicate excellent vision during the approach.

Figure 3-5 and 3-6 show pilot vision on approach to a forward site. The landing pad in this presentation is 72 feet square.

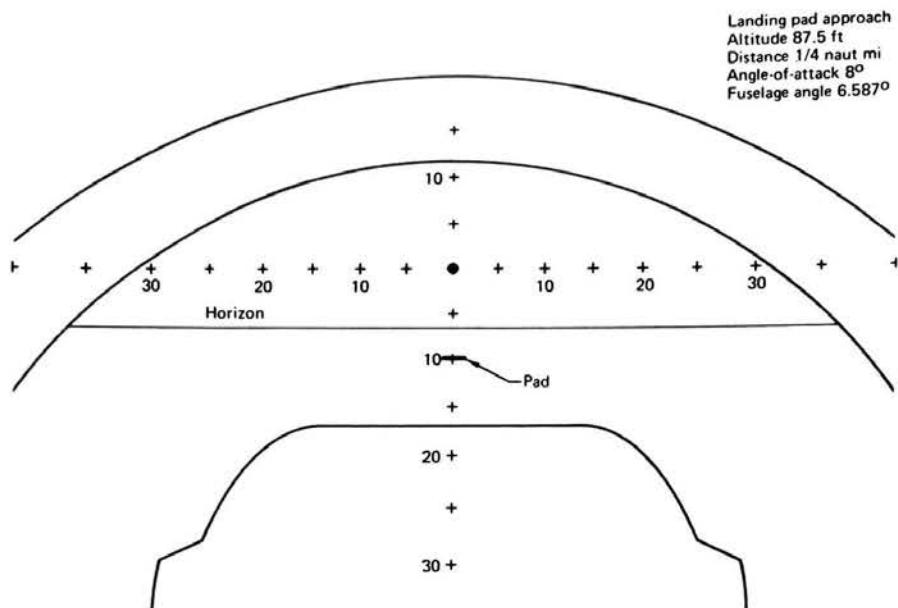


FIGURE 3-5
APPROACH TO A FORWARD LANDING SITE (FLS)
1/4 Nautical Miles

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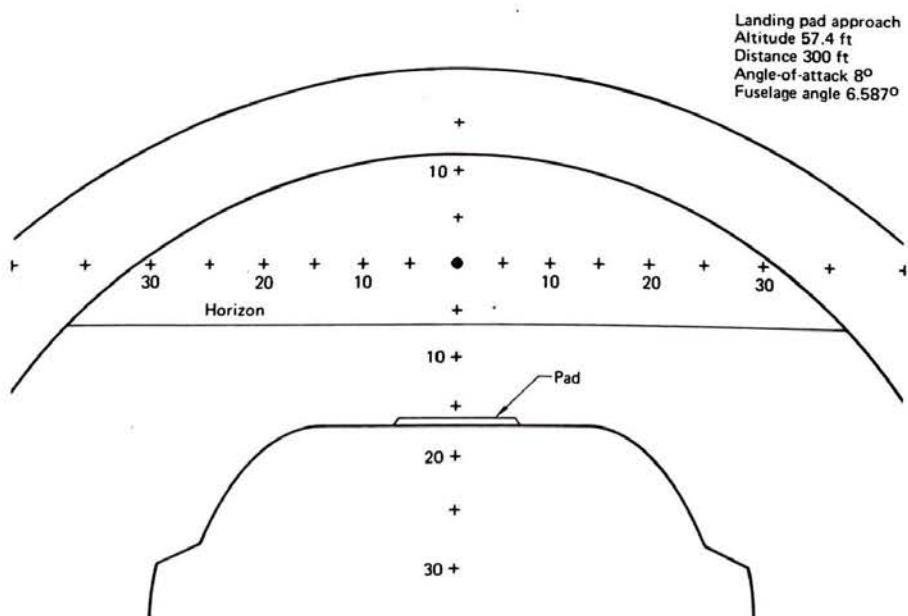


FIGURE 3-6
APPROACH TO A LANDING PAD
300 Feet

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Figure 3-7 through 3-9 present pilot vision on a 3° glideslope approach to a ship of the CV40 class. As the aircraft approaches the ship the significantly increased vision becomes apparent.

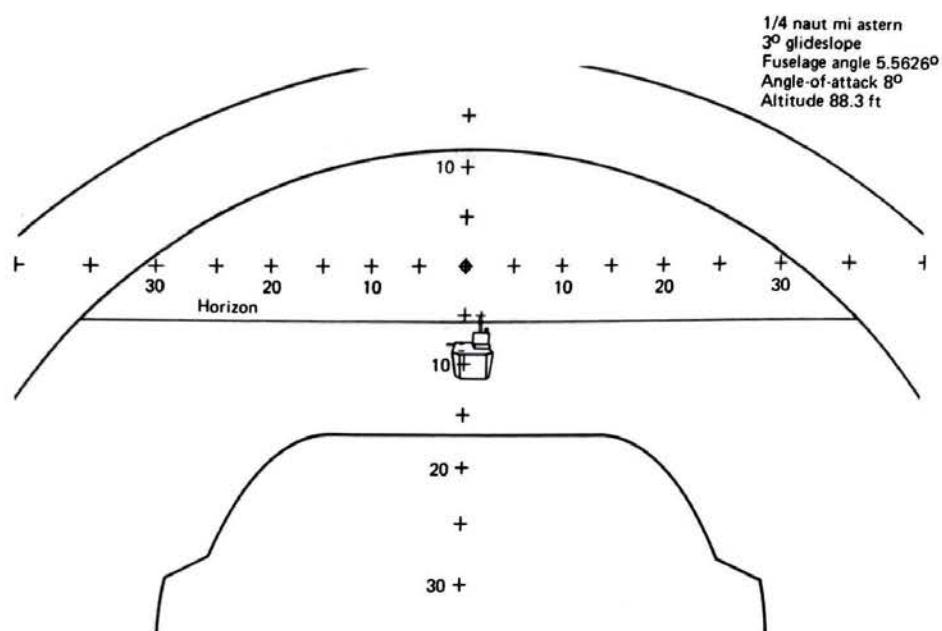
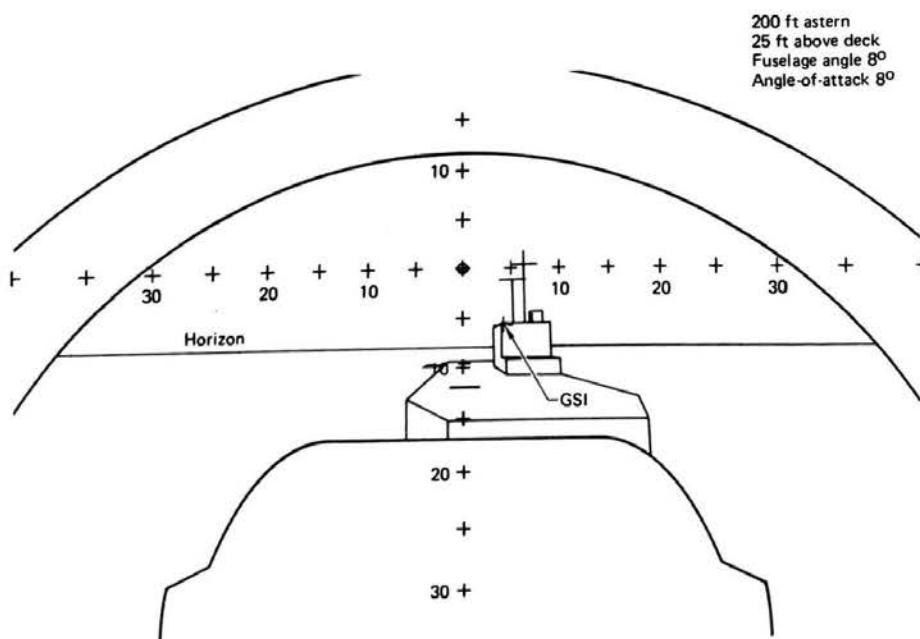


FIGURE 3-7
SHIP APPROACH
1/4 Nautical Mile



**FIGURE 3-8
SHIP APPROACH
200 Feet Astern**

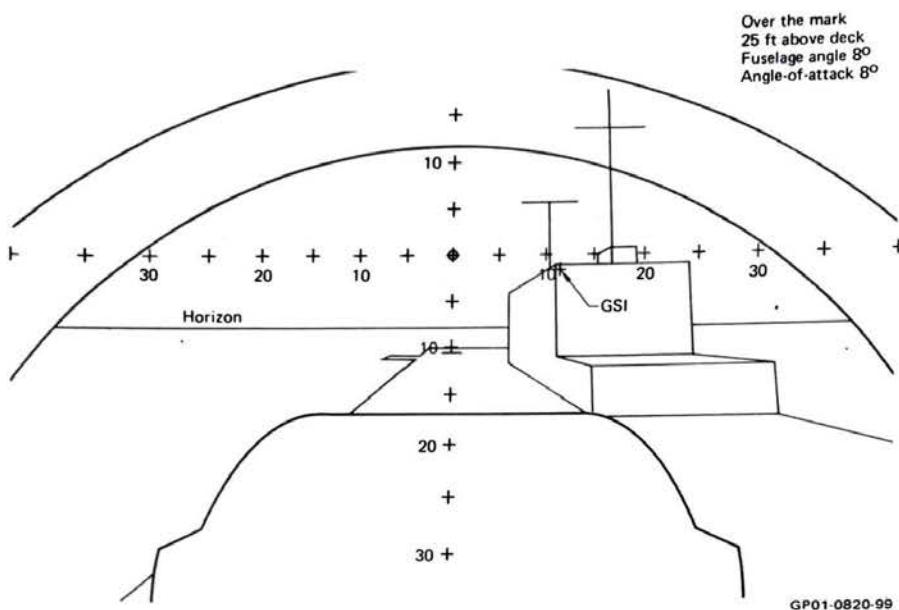


FIGURE 3-9
SHIP APPROACH OVER THE MARK

3.2 REACH

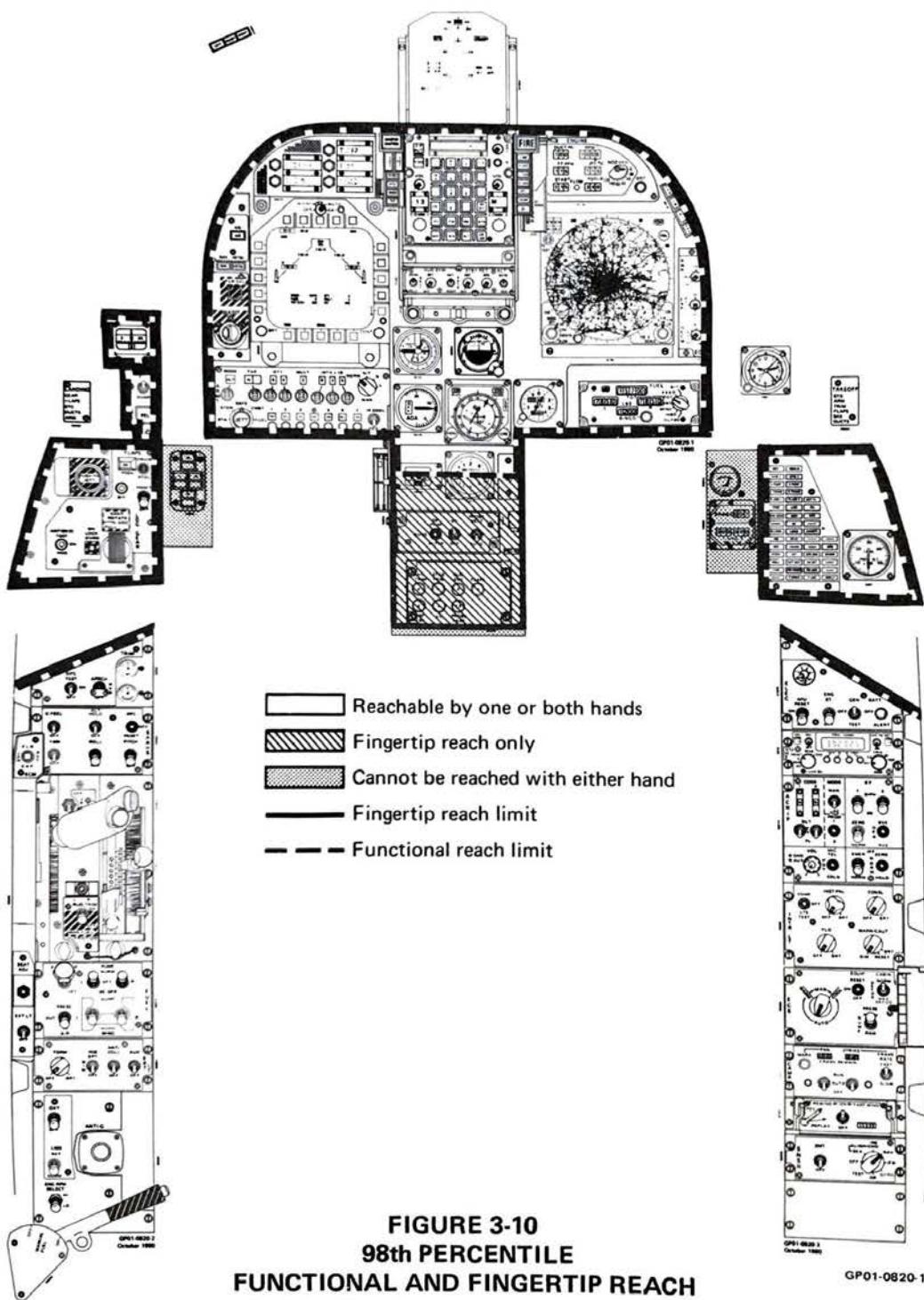
Figure 3-10 through 3-21 show reach capabilities. Subjects were clothed in standard summer flight gear and seated in the crew station so that their shoulder positions corresponded to the sitting shoulder heights for 98th, 50th, and 3rd percentile Naval aviators as defined in NAEC-ACEL-533.

The reach of the 98th percentile subject was evaluated at seat full-up and full-down positions. All crew station control surfaces were reachable by this subject when sitting at DEP (Figures 3-10 and 3-11). With the seat full-up, all controls but the lower instrument panel and pedestal panel could be reached as shown in Figures 3-12 and 3-13.

Figures 3-14 through 3-17 present 50th percentile subject reach capability at DEP and seat full-up. As shown in Figure 3-15, all crew station control surfaces are reachable by the 50th percentile subject at DEP when stretching against the locked harness.

Third percentile subject reach capability when sitting at the Design Eye Position (DEP) and with the seat full-up is shown in Figure 3-18 through 3-20. As shown in Figure 3-19, when sitting at DEP and stretching against a locked harness (Zone II), the 3rd percentile subject can reach all primary flight controls, both consoles and subpanels, and most of the Main Instrument Panel (MIP). With the seat full-up, all primary flight control can still be reached by the 3rd percentile subject from Zone II as shown in Figure 3-21. Apparent from these diagrams is the lack of symmetry between left- and right-hand reach envelopes due to variation in arm lengths.

There were no reach restrictions for any subject with an unlocked harness (Zone III).



**FIGURE 3-10
98th PERCENTILE
FUNCTIONAL AND FINGERTIP REACH**

- Design Eye Position
- Harness Locked – Not Stretching Against Harness

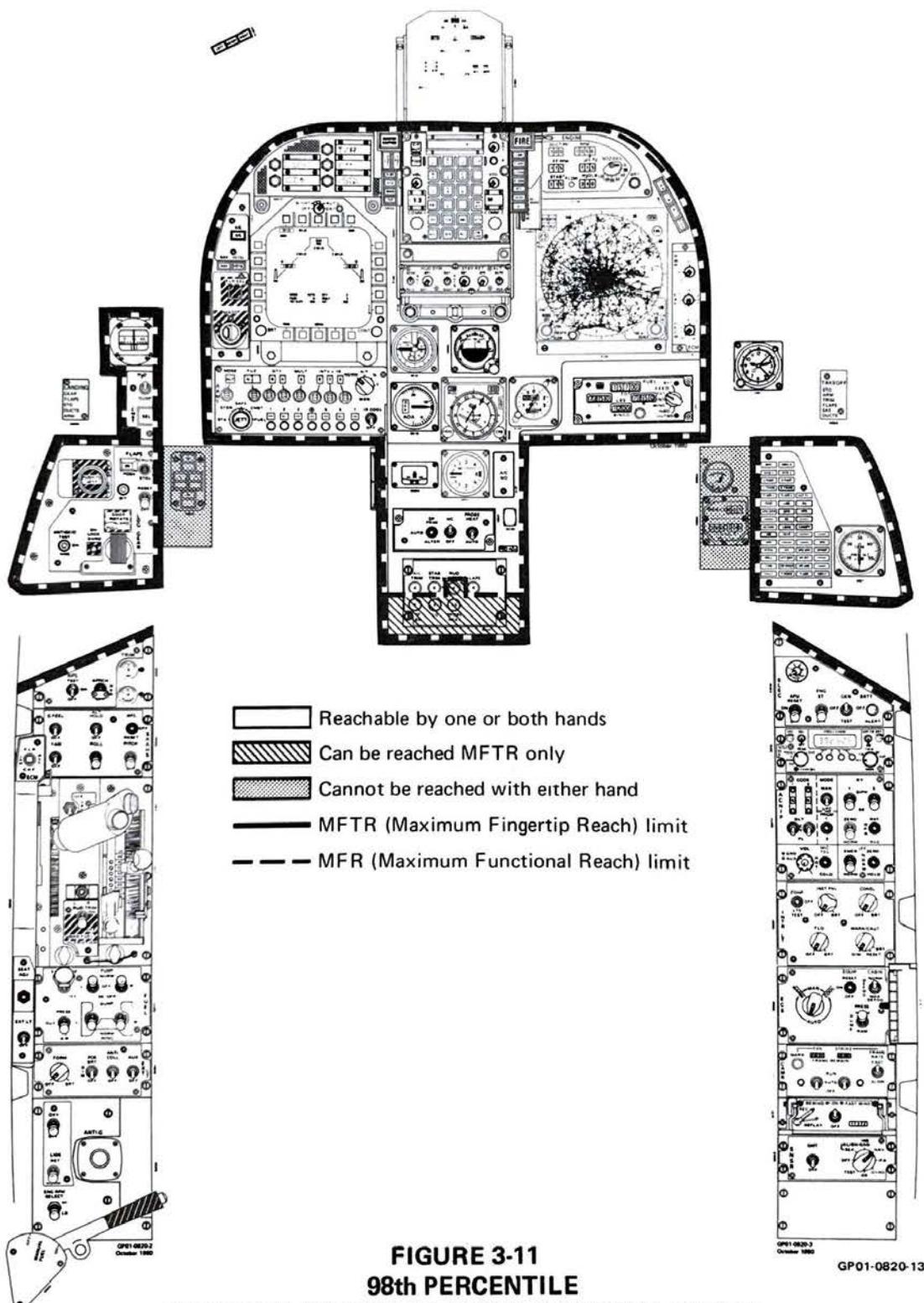
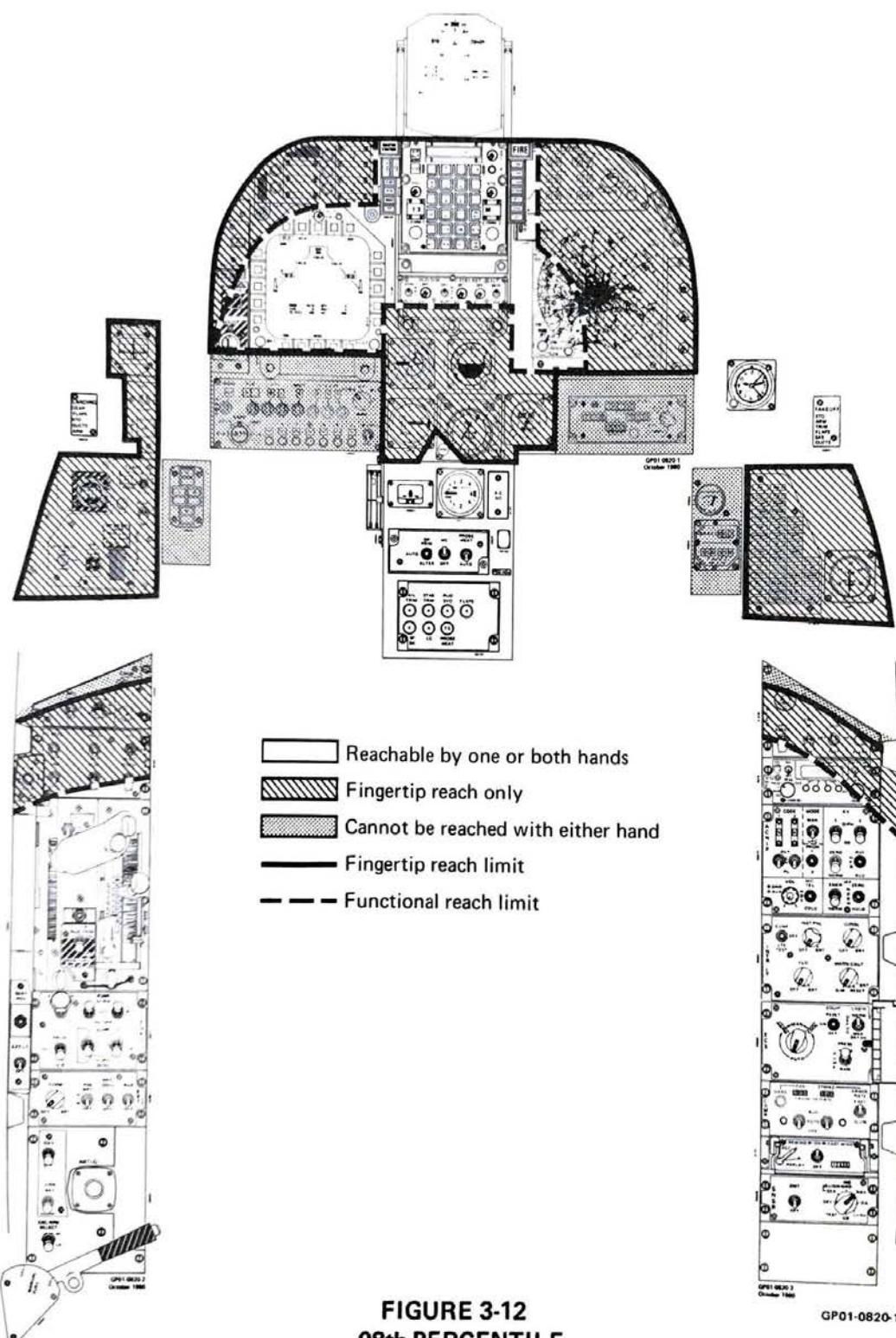


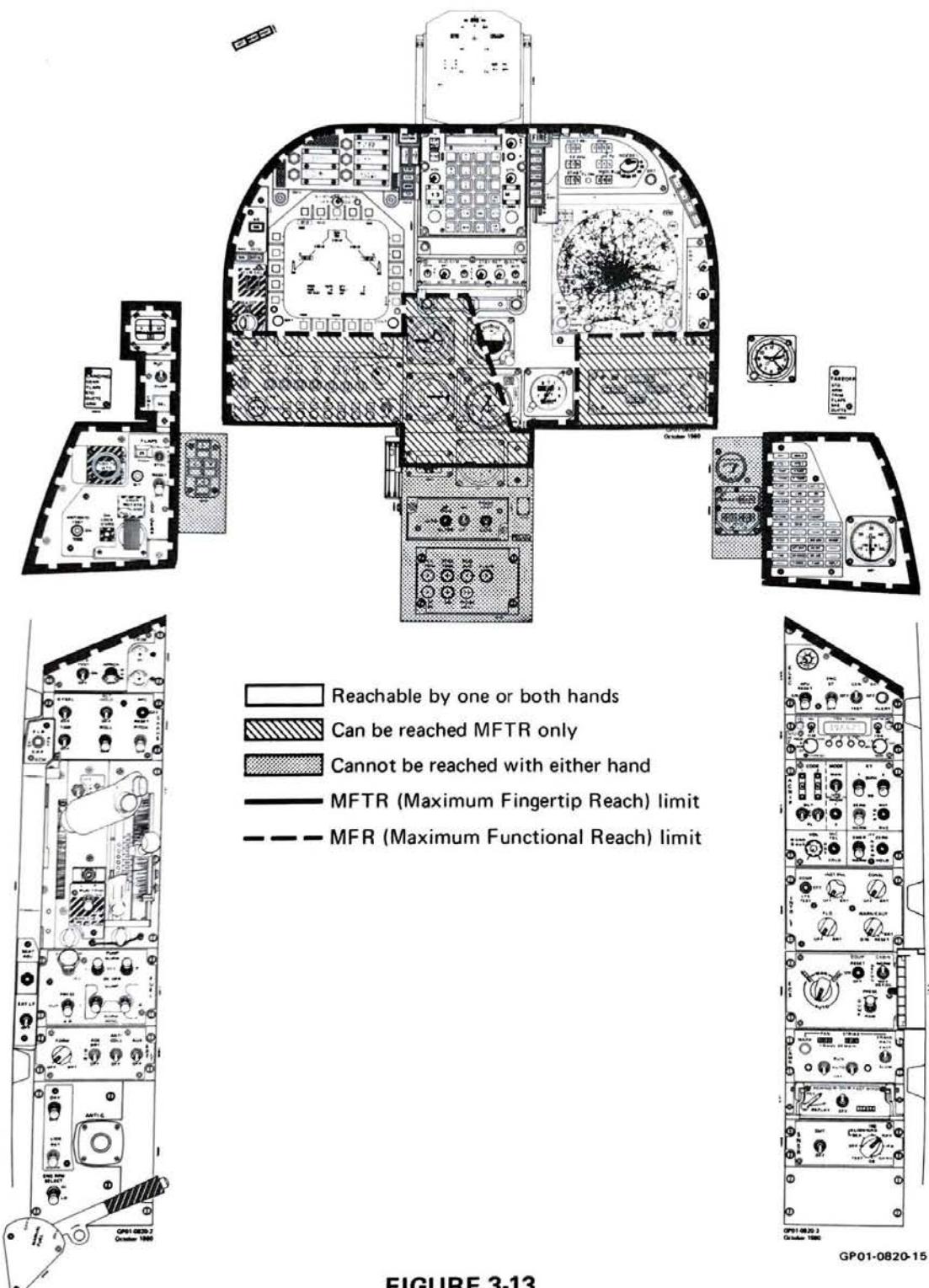
FIGURE 3-11
98th PERCENTILE
MAXIMUM FINGERTIP AND FUNCTIONAL REACH

- Design Eye Position
- Harness Locked – Stretching Against Harness



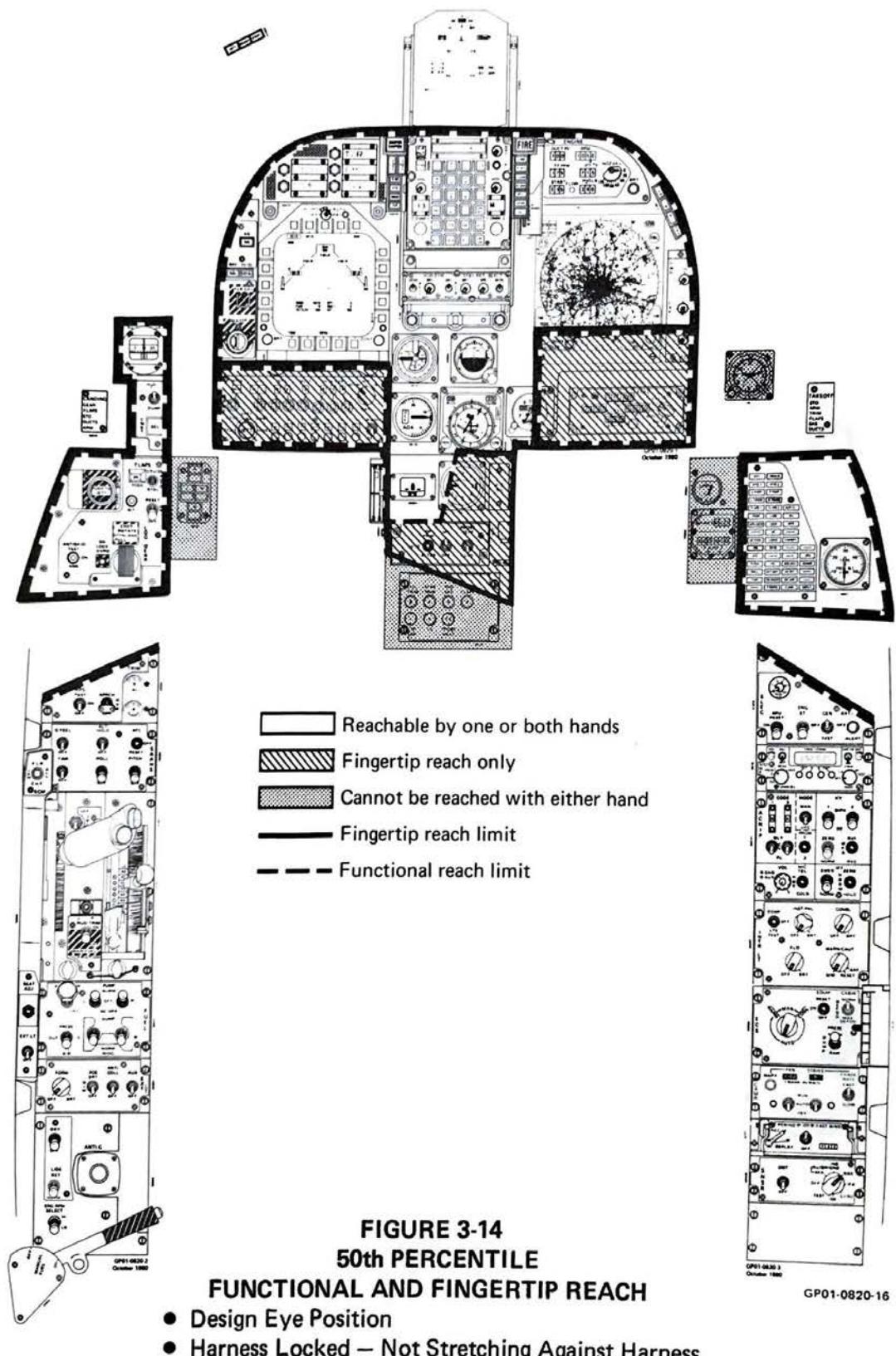
**FIGURE 3-12
98th PERCENTILE
FUNCTIONAL AND FINGERTIP REACH**

- Seat Full Up
- Harness Locked – Not Stretching Against Harness



**FIGURE 3-13
98th PERCENTILE
MAXIMUM FUNCTIONAL AND FINGERTIP REACH**

- Seat Full Up
- Harness Locked – Stretching Against Harness



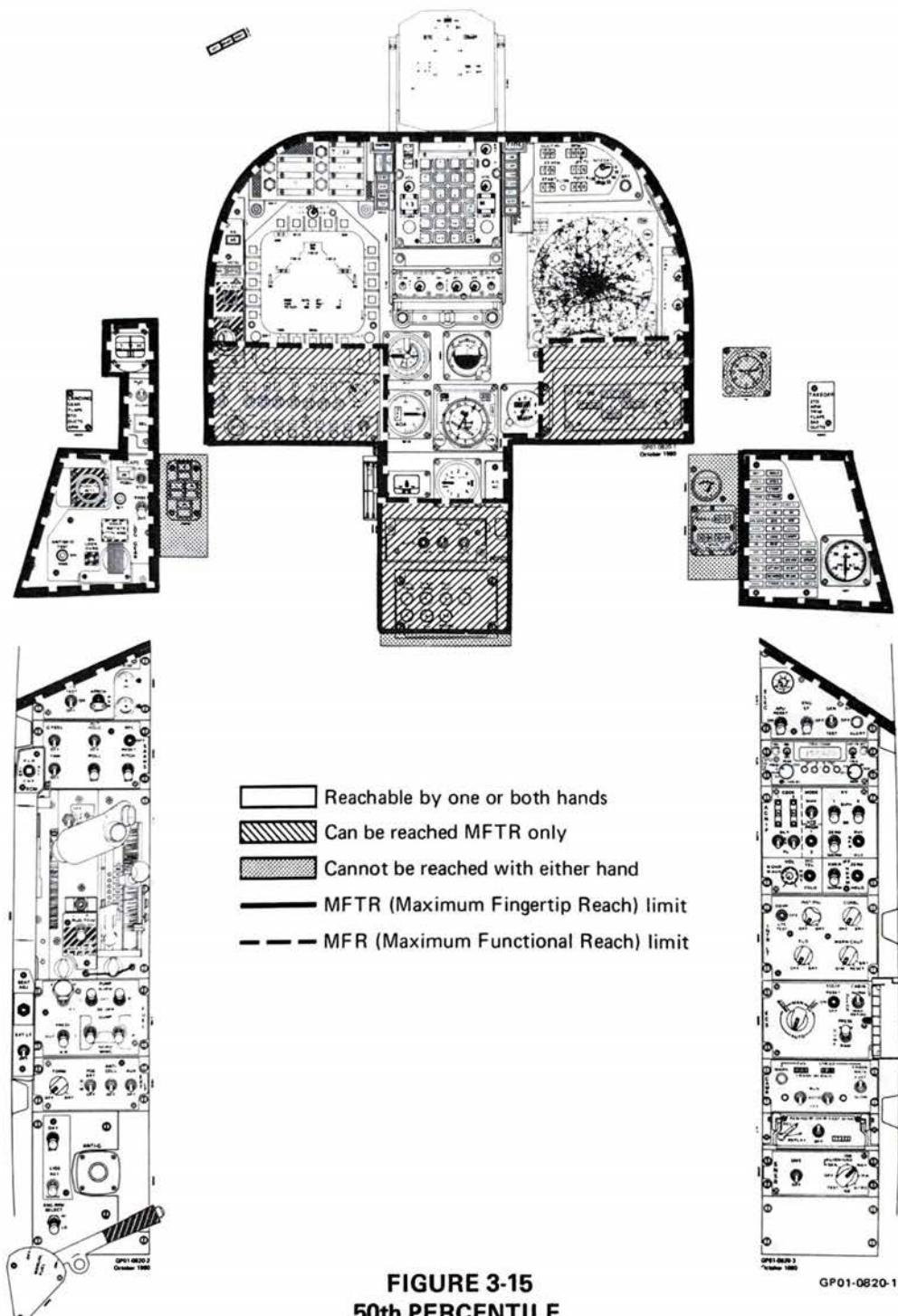


FIGURE 3-15
50th PERCENTILE
MAXIMUM FUNCTIONAL AND FINGERTIP REACH

- Design Eye Position
- Harness Locked – Stretching Against Harness

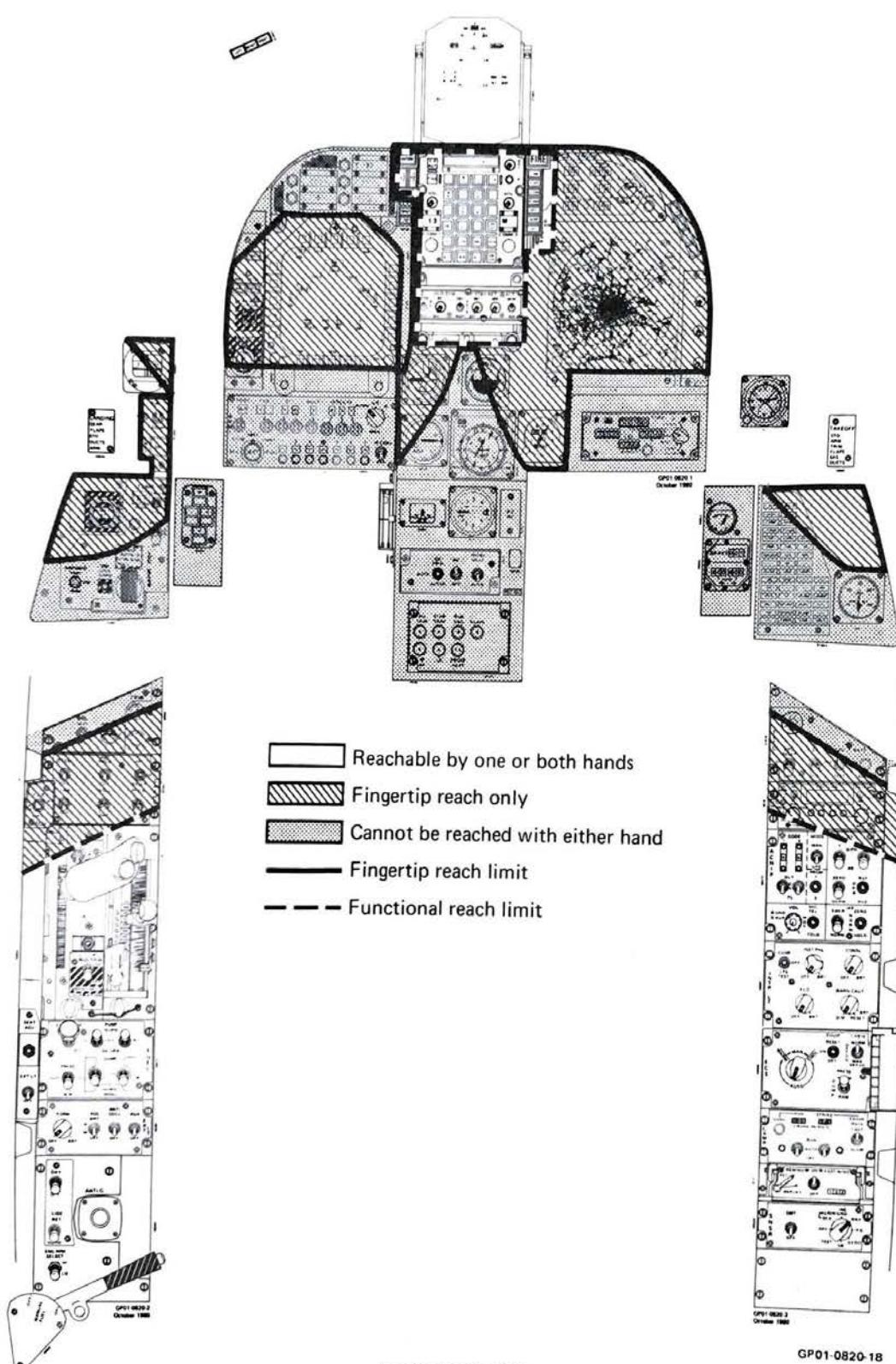


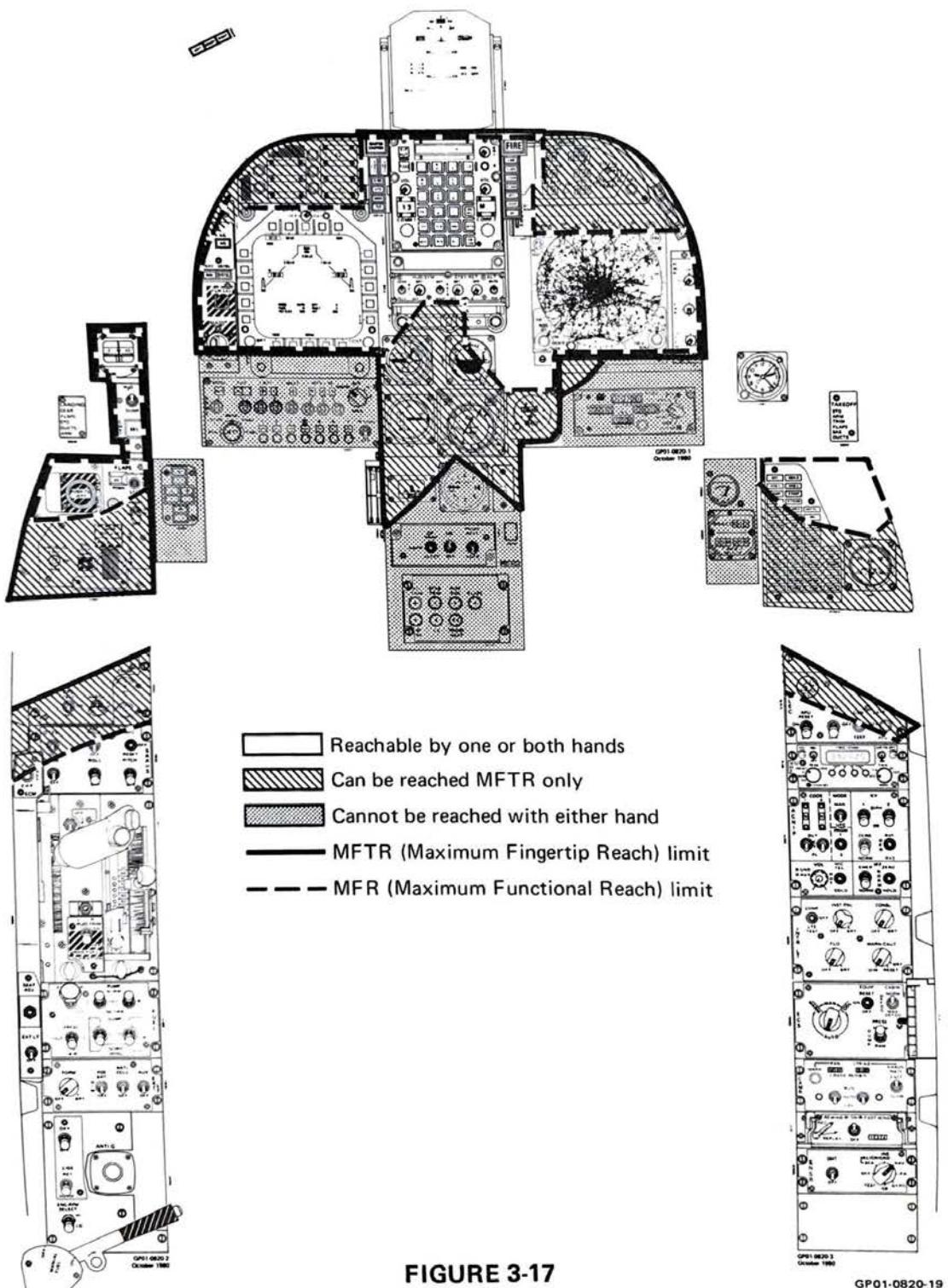
FIGURE 3-16

50th PERCENTILE

FUNCTIONAL AND FINGERTIP REACH

- Seat Full Up
- Harness Locked – Not Stretching Against Harness

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**FIGURE 3-17
50th PERCENTILE
MAXIMUM FUNCTIONAL AND FINGERTIP REACH**

- Seat Full Up
- Harness Locked – Stretching Against Harness

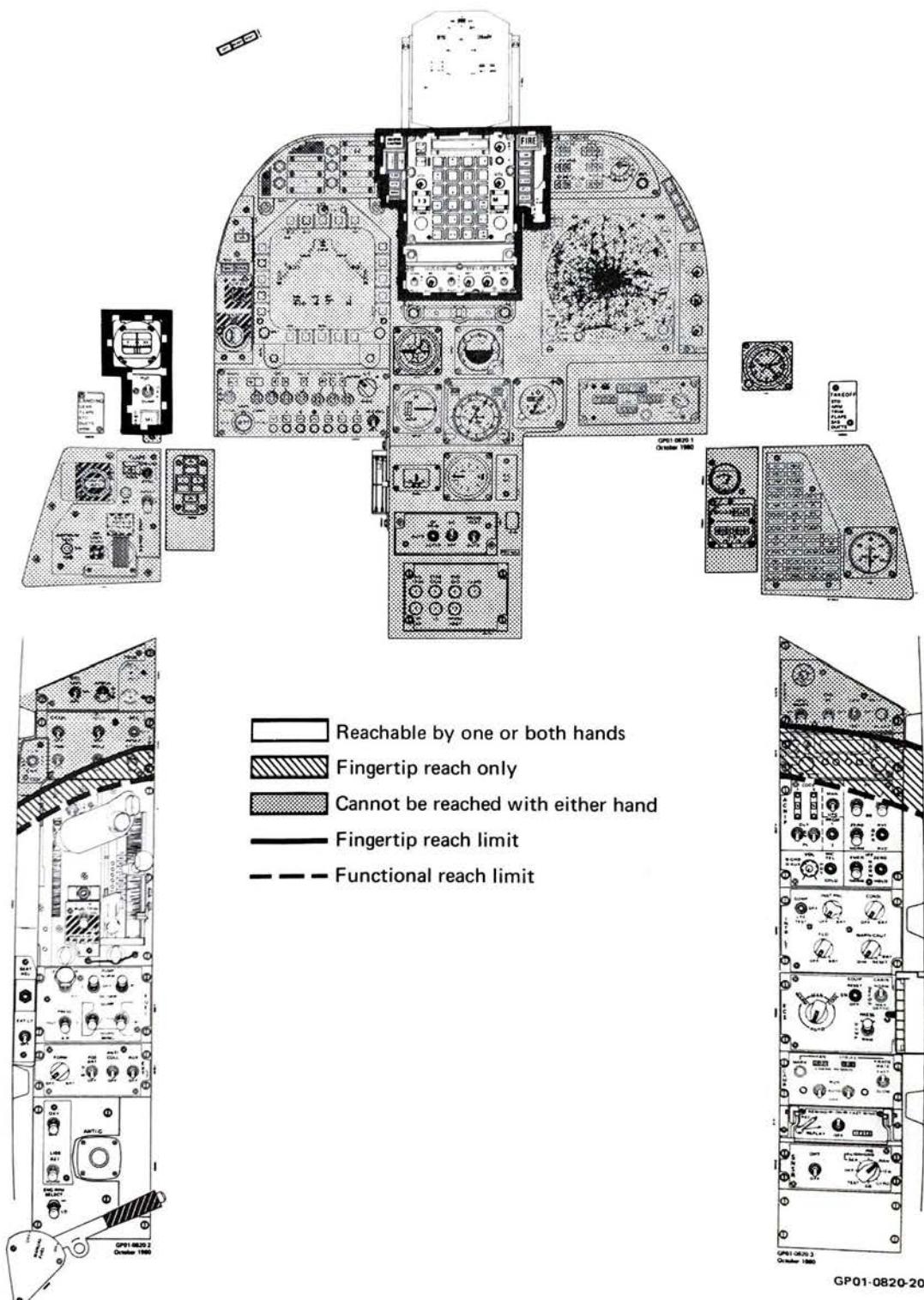


FIGURE 3-18
3rd PERCENTILE
FUNCTIONAL AND FINGERTIP REACH

- Design Eye Position
- Harness Locked — Not Stretching Against Harness

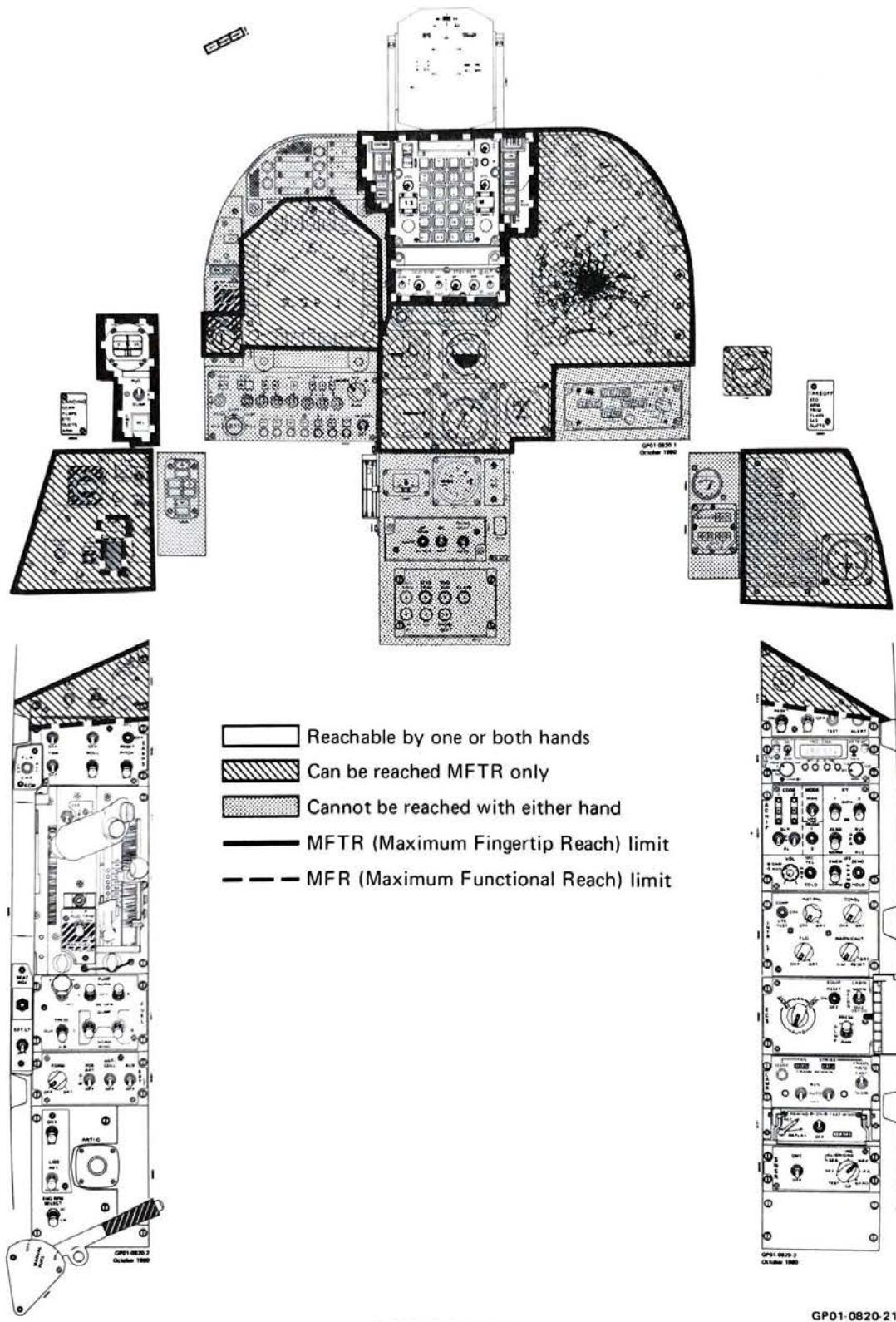


FIGURE 3-19
3rd PERCENTILE
MAXIMUM FUNCTIONAL AND FINGERTIP REACH

- Design Eye Position
- Harness Locked – Stretching Against Harness

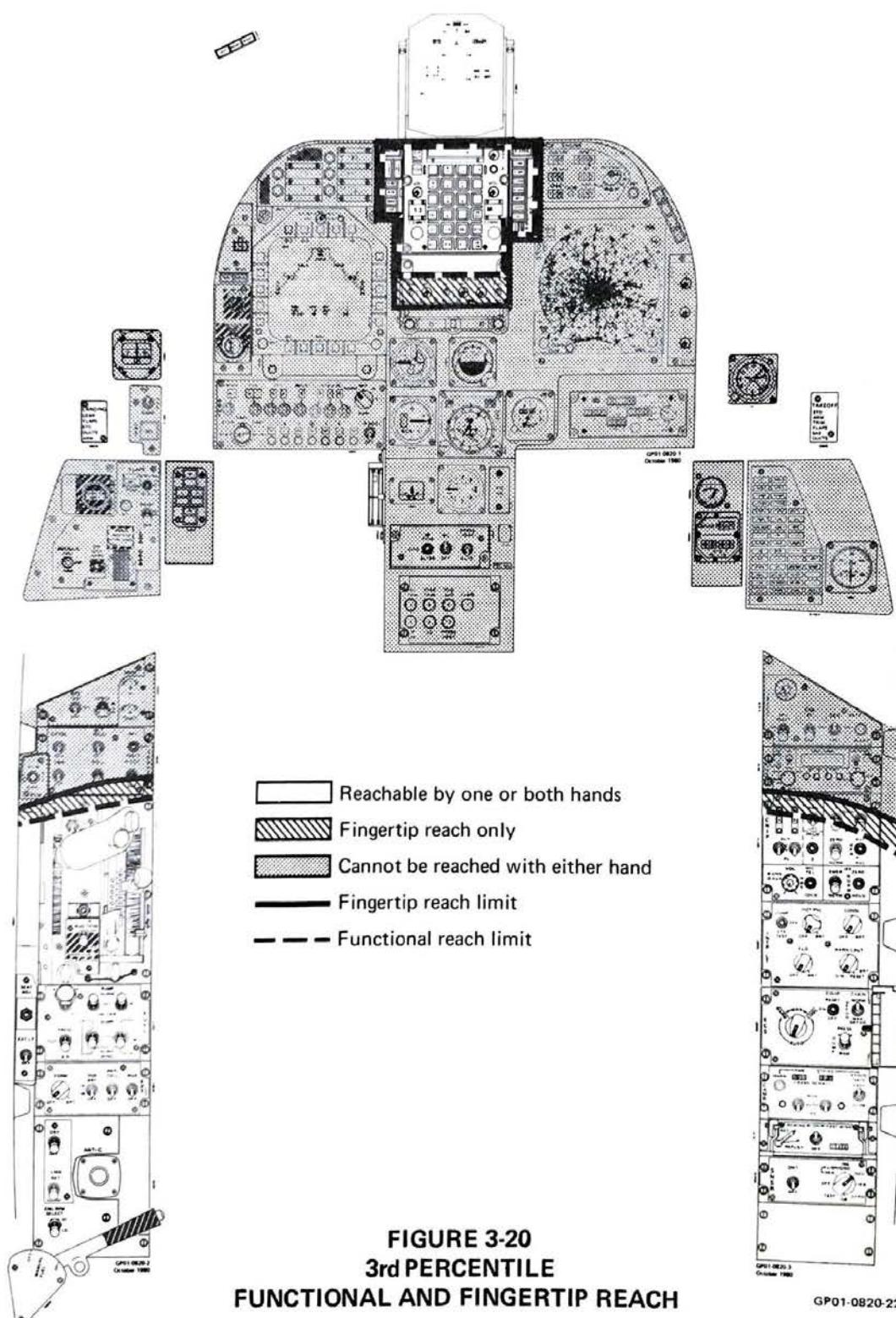


FIGURE 3-20
3rd PERCENTILE
FUNCTIONAL AND FINGERTIP REACH

- Seat Full Up
- Harness Locked – Not Stretching Against Harness

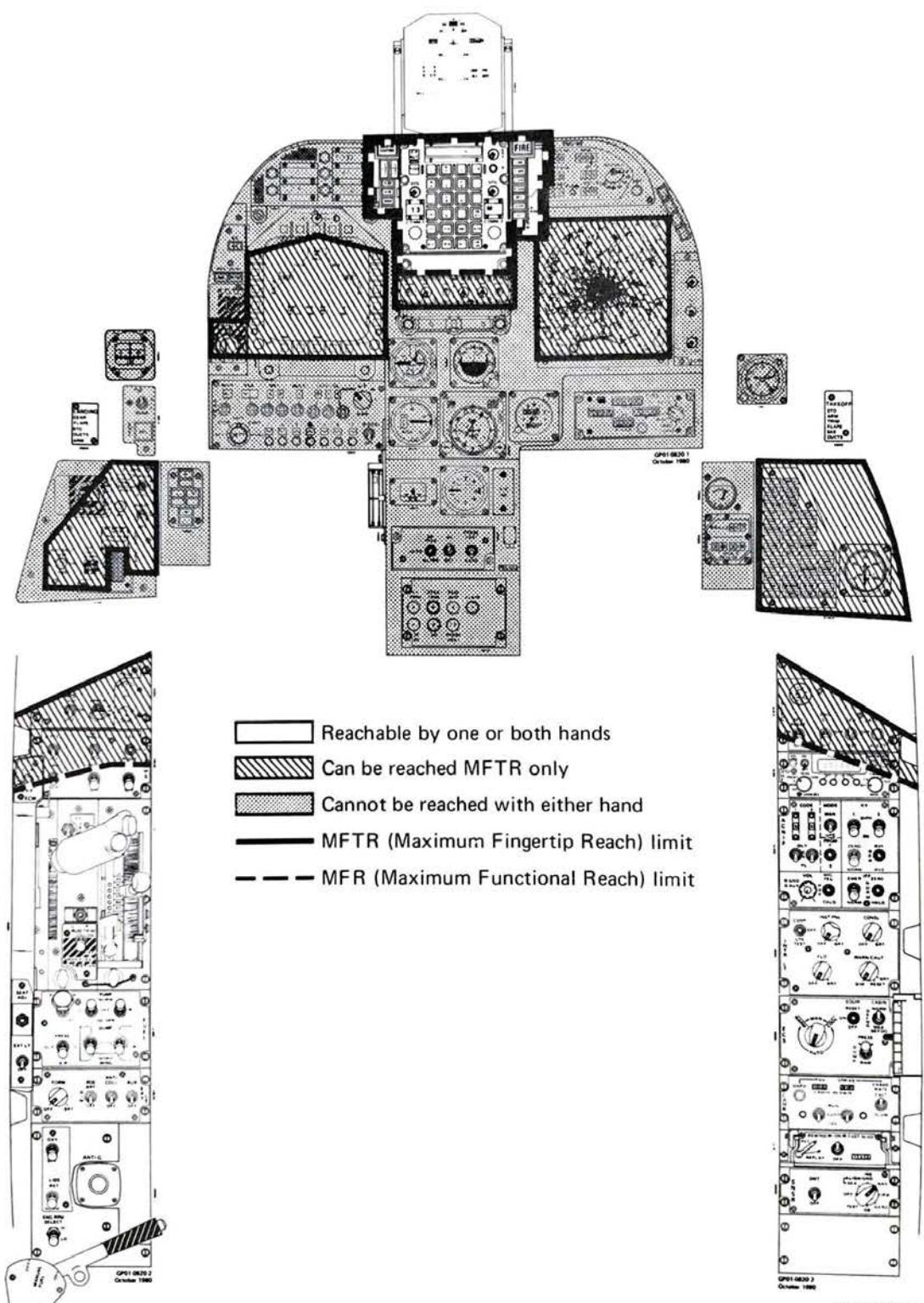


FIGURE 3-21
3rd PERCENTILE
MAXIMUM FUNCTIONAL AND FINGERTIP REACH

- Seat Full Up
- Harness Locked – Stretching Against Harness

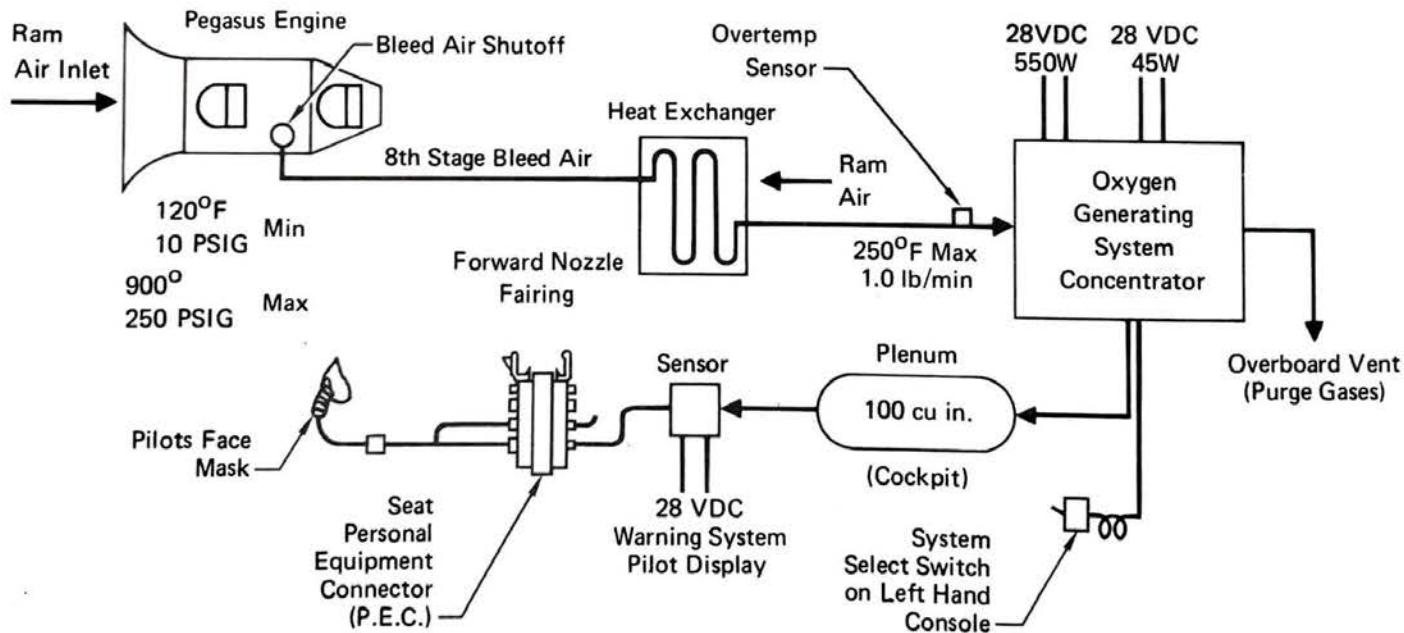
4. AV-8B (RAF) KEY SYSTEMS

Unique AV-8B (RAF) systems affecting the crew station configuration are briefly described below. There are five such systems:

- o On-Board Oxygen Generating System (OBOGS)
- o Multi-Purpose Display (MPD)
- o Up Front Control System (UFCS)
- o Hands on Throttle and Stick (HOTAS) weapon control
- o Tornado Repeater Map Display (TRMD)

4.1 ON-BOARD OXYGEN GENERATING SYSTEM (OBOGS)

The OBOGS concentrates oxygen from eighth stage engine bleed air and delivers it to the pilot at a sufficient rate to meet the requirements of his open loop breathing schedule. This system replaces the traditional liquid oxygen converter thereby diminishing the logistical support required of a liquid oxygen or bottle system after each flight. The system is illustrated schematically in Figure 4-1.



GP01-0820-24

**FIGURE 4-1
ON-BOARD OXYGEN GENERATING SYSTEM**

The major element of the OBOGS is the concentrator unit which contains molecular sieves, valves, a filter and a heater. A demand type oxygen regulator, mounted on the seat, delivers the oxygen through the pilot's personal equipment connector to the face mask.

An oxygen condition sensing device will signal the aircraft central warning system if the partial pressure of oxygen in the supply line to the pilot should fall below a predetermined minimum.

A heat exchanger in the right hand forward nozzle fairing cools the engine bleed air to the proper temperature for the OBOGS concentrator.

See Figure 4-2 for the OBOGS installation.

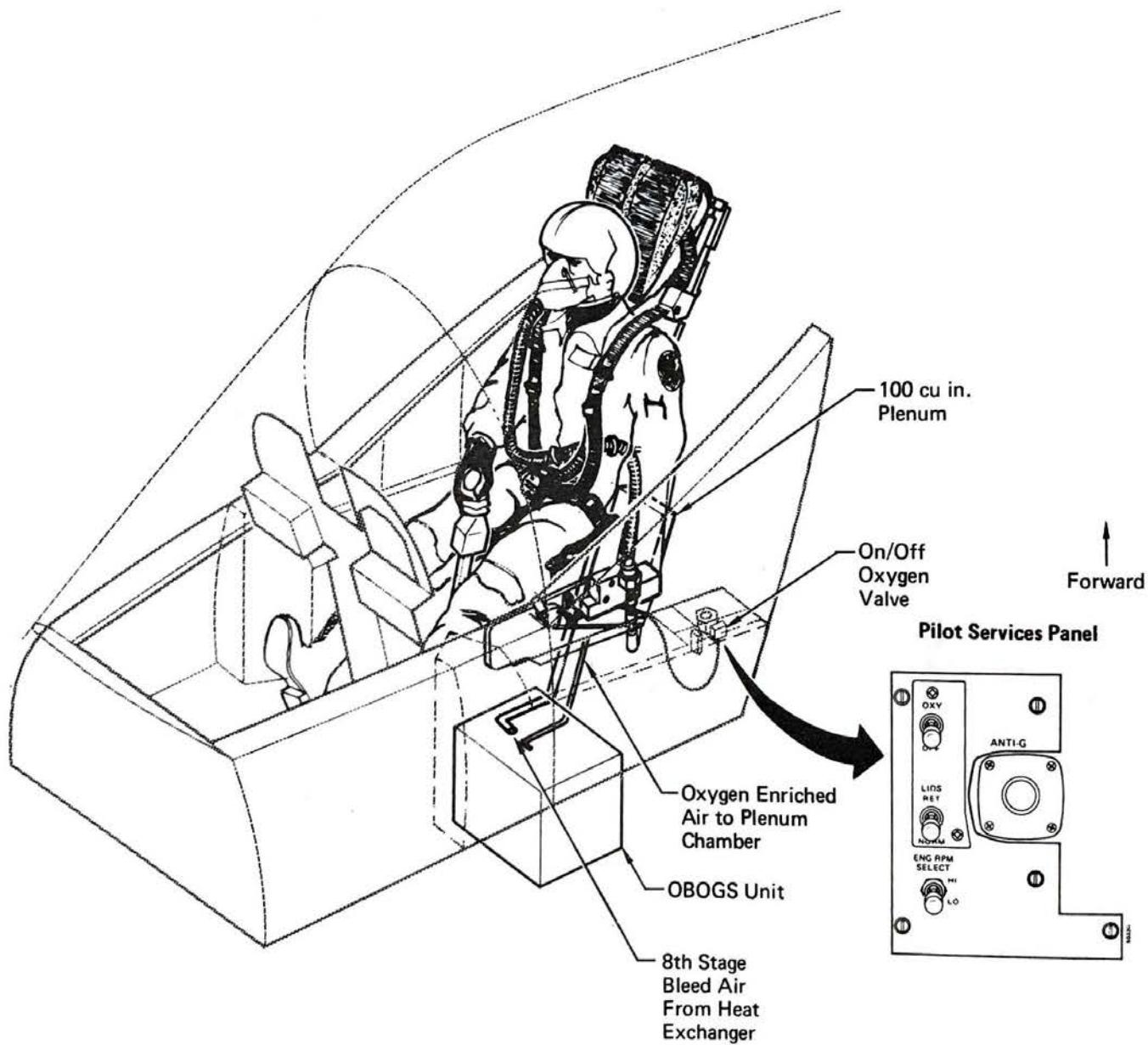


FIGURE 4-2
OBOGS FORWARD FUSELAGE INSTALLATION

4.2 MULTIPURPOSE DISPLAY (MPD)

The MPD is the primary head down display. It consists of a 5 by 5 inch Cathode Ray Tube (CRT) surrounded by 20 multifunction pushbutton switches.

The MPD is mounted on the left main instrument panel for excellent pilot vision and left hand operation while in maneuvering flight. It is equipped with automatic brightness controls and the displays are readable in high incident light. The functions are shown in Figure 4.3.

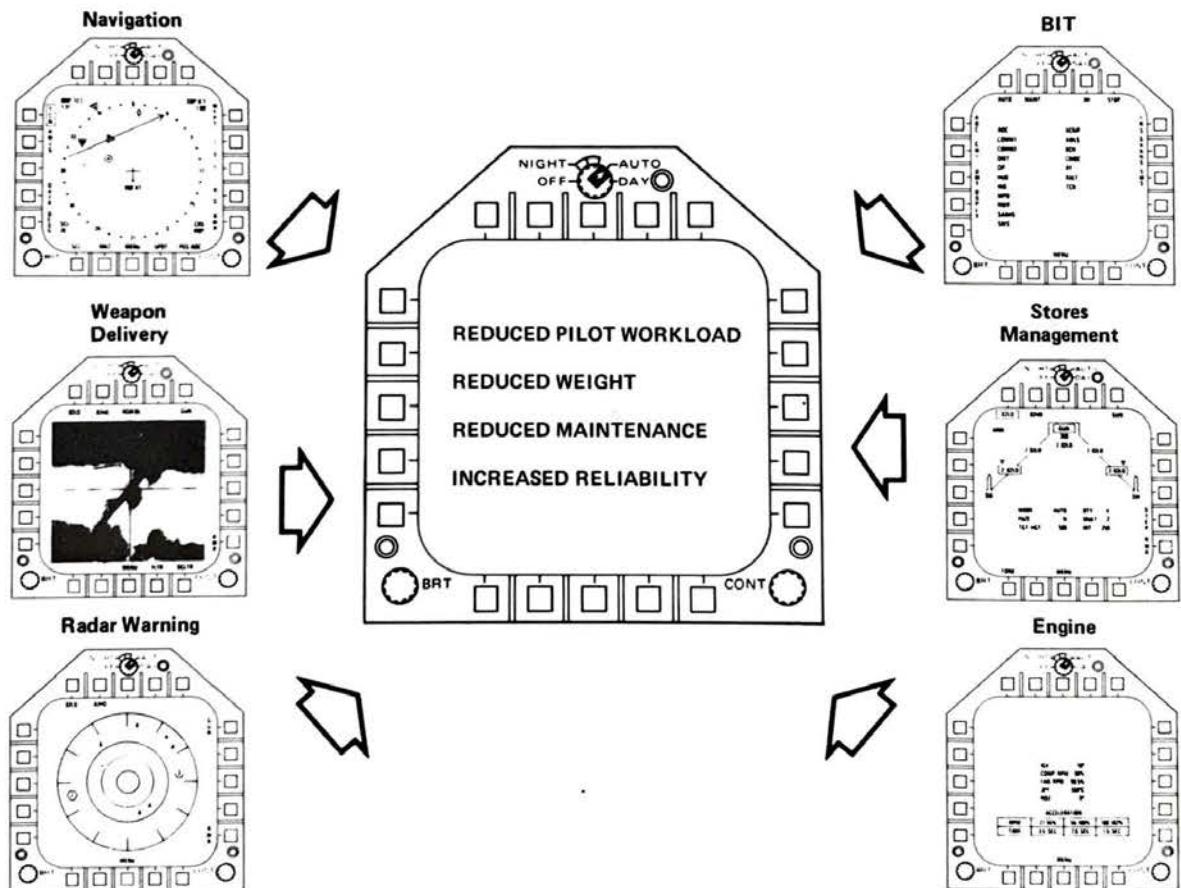


FIGURE 4-3
MULTIPURPOSE DISPLAY

GP01-0820-96

MPD mode selections are made automatically by the mission computer, or manually by the pilot who selects from a displayed menu. Specific symbology and formats continue to be developed.

In addition to being the primary head-down sensor display, the MPD is also used for navigation, stores management, BIT, and radar warning. In Figure 4-4, four MK-82 Low Drag (LD) bombs have been selected for automatic release from two wing stations. They are nose fuzed and have been programmed to release in multiples of two against a target whose elevation is 500 feet. At impact their ground separation will be 250 feet. In addition, the weapon system is shown to be armed and guns have been selected (HOT). Controls on the MPD, the UFC or the Armament Control Panel, permit the MPD Stores Management display to be easily changed to meet altered delivery requirements.

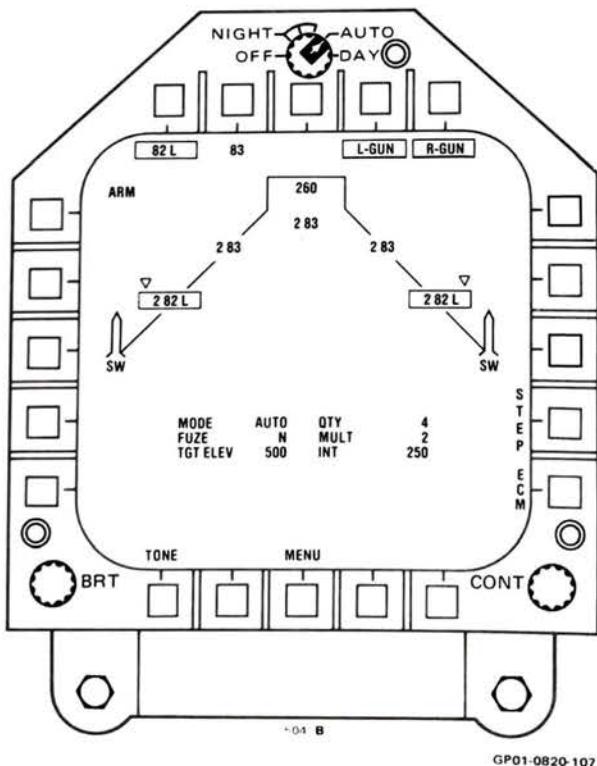
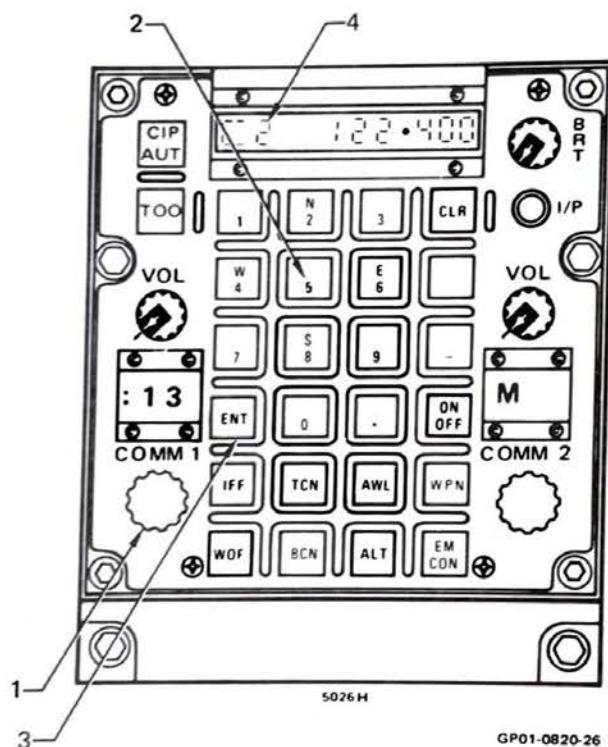


FIGURE 4-4
MPD STORES MANAGEMENT

4.3 UP FRONT CONTROL SET (UFCS)

The UFCS is comprised of an integrated control panel (ICP) and an options display unit (ODU). It provides all the controls and displays for operating the CNI equipment, NAV data insertion, and weapon programming.

Figure 4-5 is an example of an ICP operation where the stored frequency is checked and changed.



**FIGURE 4-5
COMMUNICATION OPERATION**

Stored Frequency Check

- o Press channel select (1) to read frequency of selected channel on scratch pad (4).

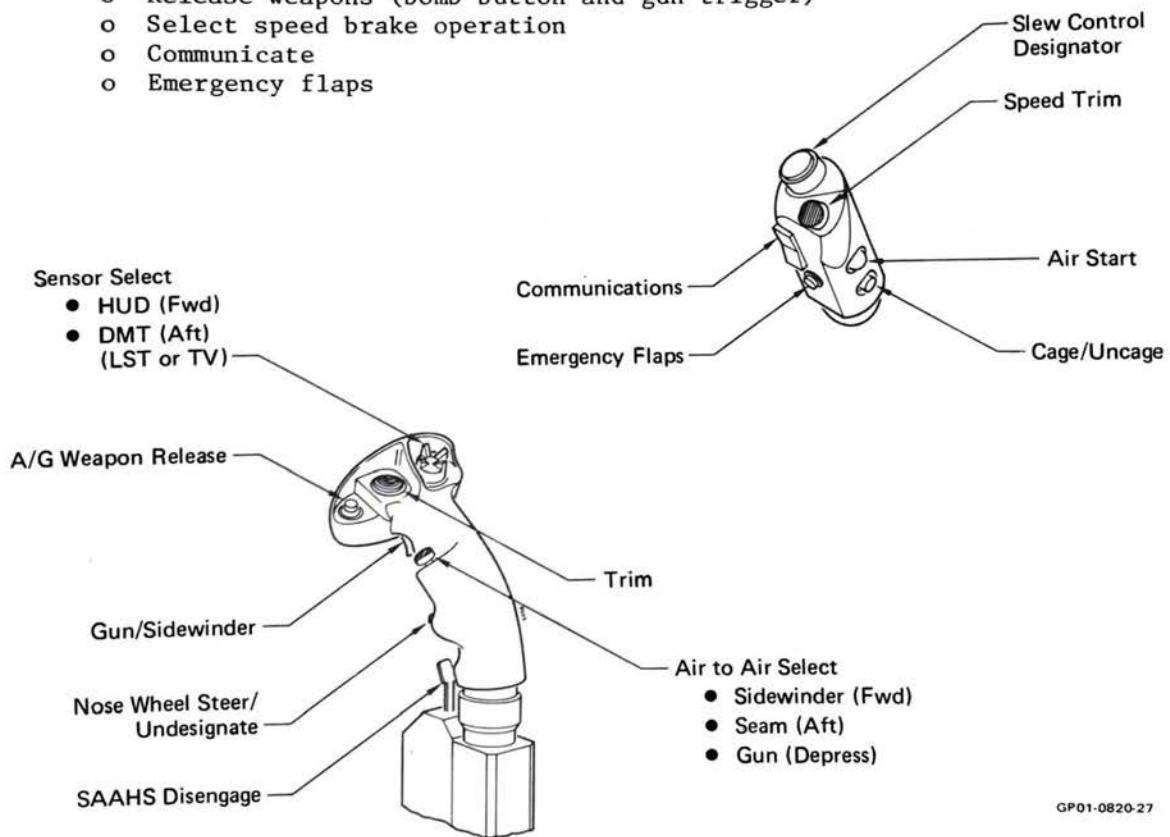
Stored Frequency Change

- o Press channel select (1) as above.
- o Enter desired frequency via keyboard (2). Frequency will appear on scratch pad (4).
- o Store new frequency by pressing ENT (3).
- o Scratch pad (4) blanks 30 seconds after last action.

4.4 HANDS ON THROTTLE AND STICK (HOTAS) CAPABILITY

The HOTAS mechanization provides the pilot with the one man operability features required during the critical ground attack phase, air-to-air combat phase, or during any transition period. Without taking his hands from the primary controls, the pilot can:

- o Select air-to-air weapons
- o Select air-to-ground sensor mode
- o Cage and uncage weapons/reticle
- o Designate targets
- o Slew sensors
- o Release weapons (bomb button and gun trigger)
- o Select speed brake operation
- o Communicate
- o Emergency flaps



**FIGURE 4-6
THROTTLE AND STICK**

At any time during flight, the pilot can enter the air-to-air mode via the air-to-air select pushbutton on the control stick handle. This immediately activates the selected weapon (Guns, Sidewinder or SEAM) and displays relevant combat data on the HUD and the MPD. Subsequent operation of the cage/uncage switch on the throttle enables control of missile or gun reticle and commands missile lock-on.

4.5 TORNADO REPEATER MAP SYSTEM (TRMS)

The AV-8B (RAF) baseline includes the Tornado Repeater moving map system. The system (Figure 4-7) presents a dynamic pictorial display of the aircraft present position and track against a full color topographical map. The map images are stored on 35mm color film which is positioned by a precise high-speed three-axis servo system. Map scales and display modes are selectable from front panel controls.

The addition of the TRMD to the AV-8B cockpit, in conjunction with a new Interface Unit (IFU) and Mission Computer (MC) software changes, will provide the AV-8B (RAF) pilot with the enhanced navigation capabilities inherent with moving map displays. Utilizing the Target Designator Control (TDC) slew control the pilot will be able to take advantage of the map slew control features of the TRMS for Inertial Navigation System (INS) update, waypoint entry, and terrain inspection.

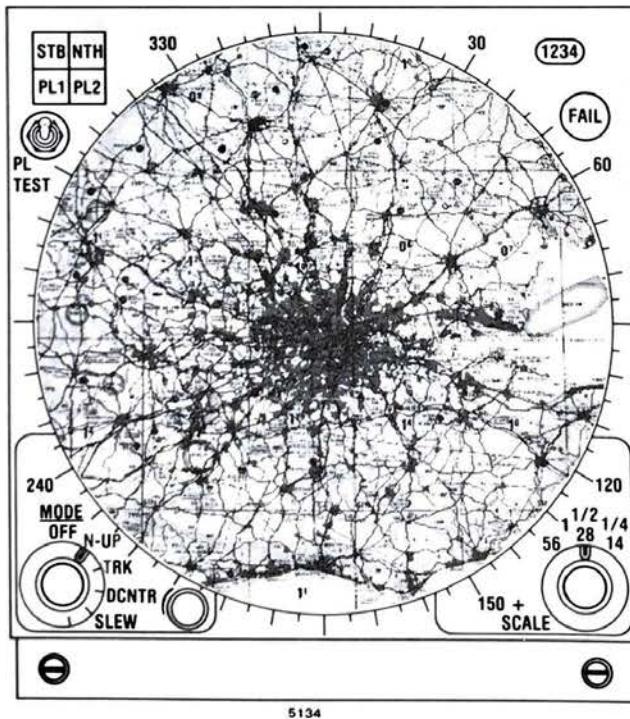


FIGURE 4-7
TORNADO REPEATER MAP DISPLAY (TRMD)

The AV-8B (RAF) crew station Main Instrument Panel (MIP) (Figure 4-8) is like that in the AV-8B with one exception, the addition of the TRMD. With this configuration all the AV-8B instruments are retained including the standby Horizontal Situation Indicator. The HSI will provide the standard head down backup navigation aids including aircraft heading.

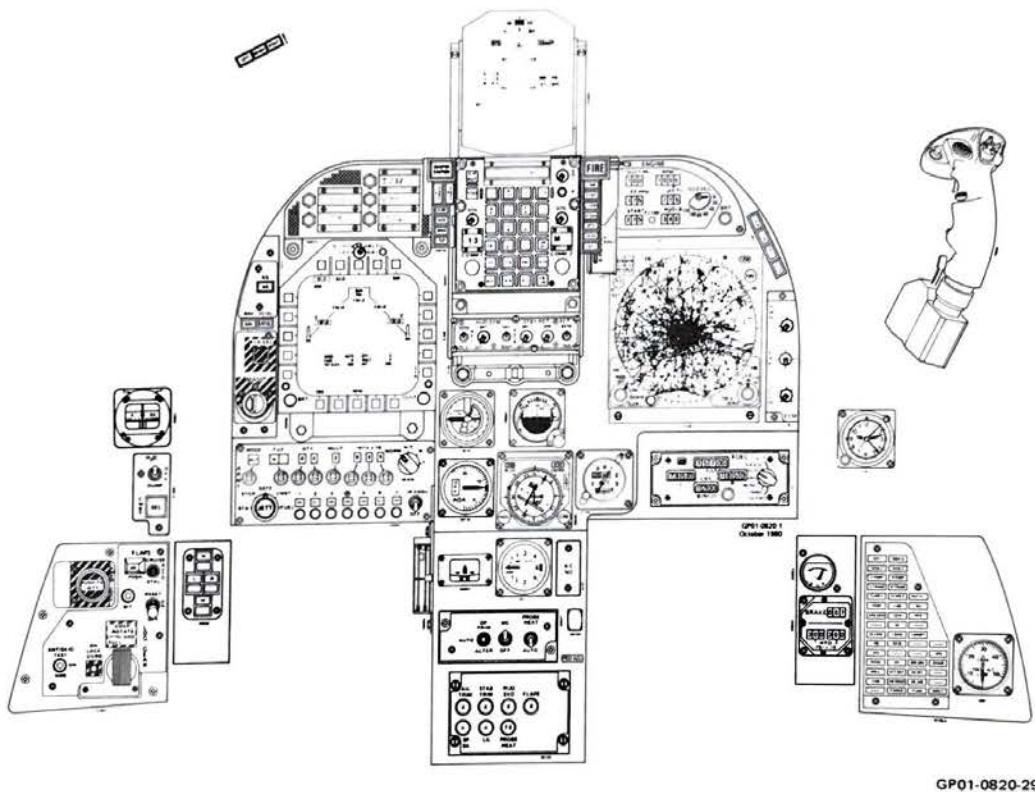


FIGURE 4-8
AV-8B (RAF) MAIN INSTRUMENT PANEL WITH MAP

The IFU will obtain the necessary digital data from the MC (Figure 4-9) for conversion to analog map drive signals. The MC software can be designed so that the data output will be in the proper map drive format for the IFU to simply perform a digital to analog conversion and route to the TRMD.

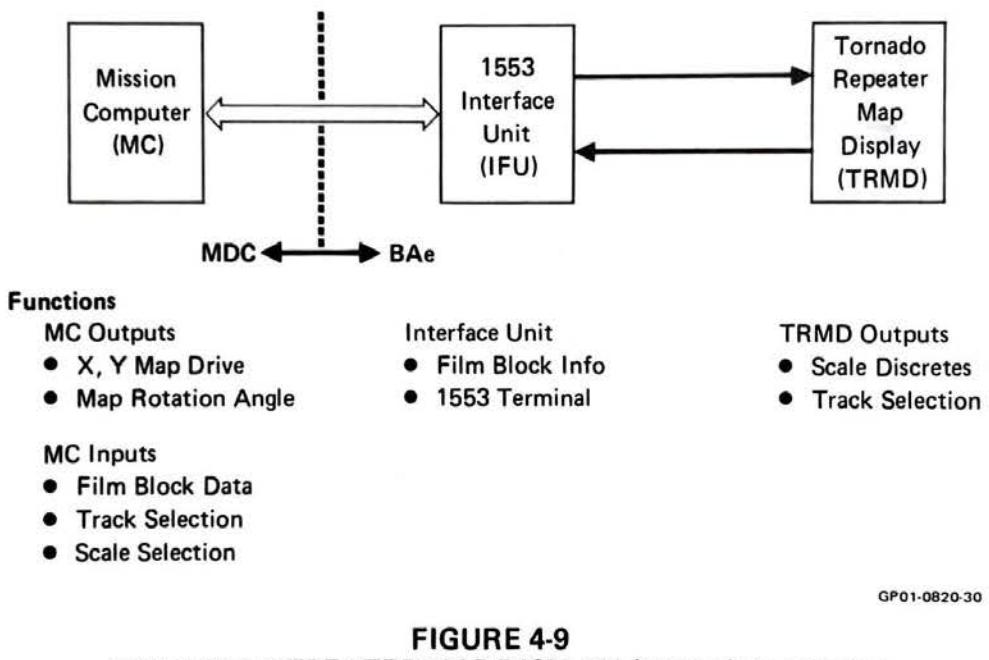


FIGURE 4-9
TORNADO REPEATER MAP DISPLAY (TRMD) DIAGRAM

The TRMD will interface with the Mission Computer (MC) through a new UK GFE Interface Unit (IFU). The IFU proposed outline and aircraft location are shown on Figures 4-10 and 4-11 respectibely.

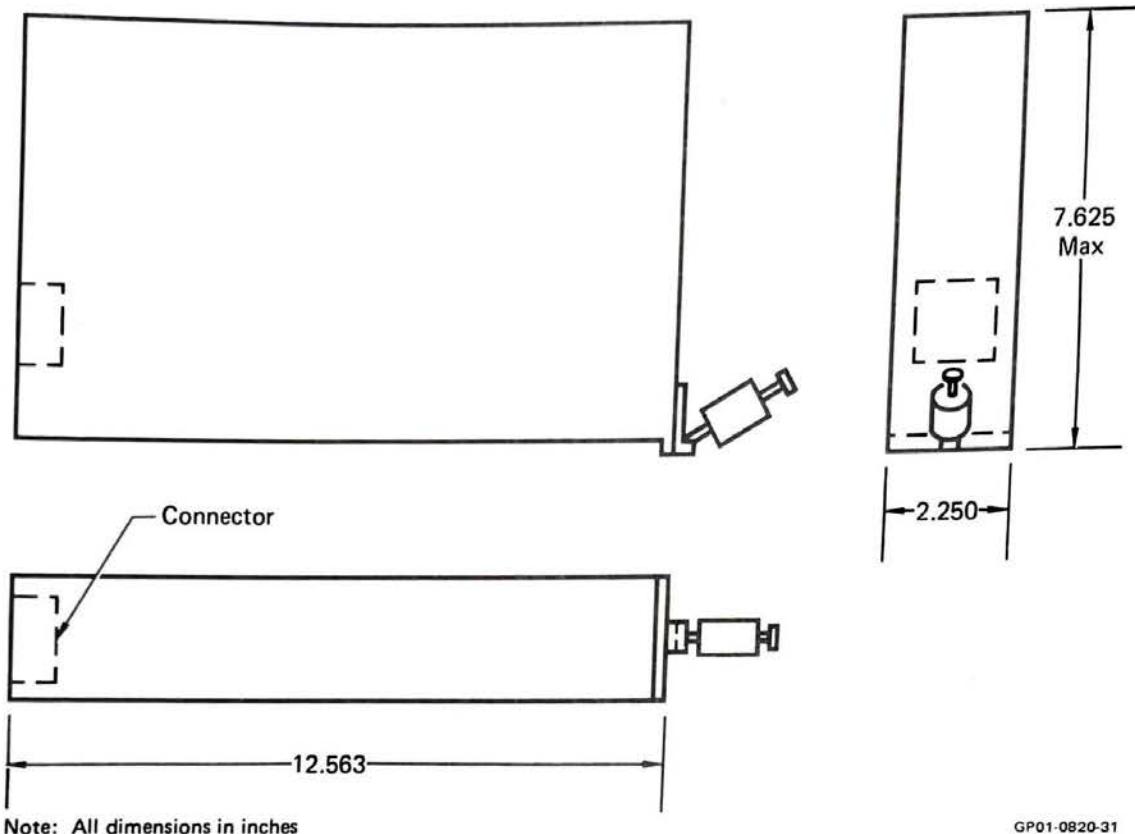


FIGURE 4-10
TORNADO REPEATER MAP DISPLAY (TRMD) INTERFACE UNIT OUTLINE

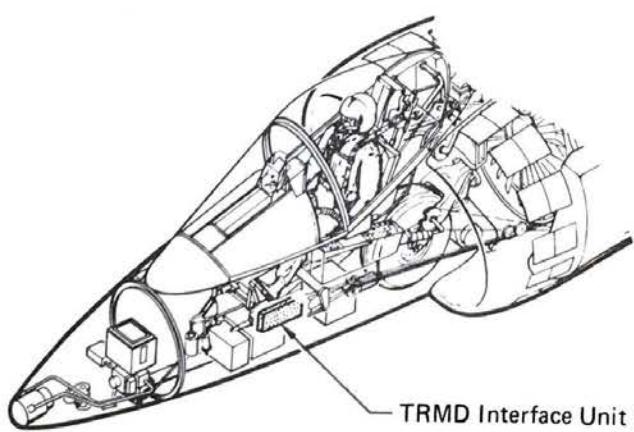


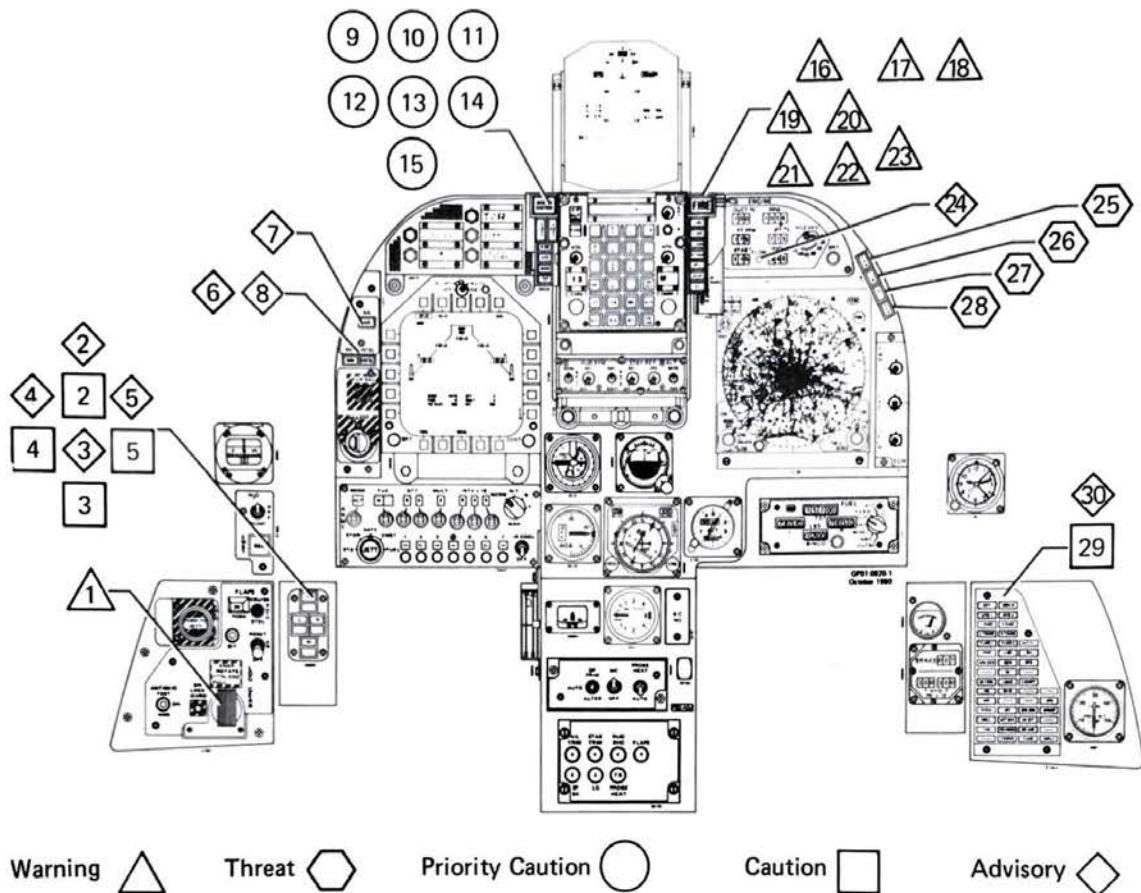
FIGURE 4-11
**INSTALLATION TORNADO REPEATER MAP DISPLAY (TRMD)
INTERFACE UNIT**

5. SIGNALS AND IMMEDIATE ACTION CONTROLS

5.1 WARNING, CAUTION, THREAT, AND ADVISORY SIGNALS

The master caution light, priority caution lights, warning/threat lights and the caution/advisory lights panel are the primary warning, caution and advisory displays. Individual lights, including gear position, mode lights, ECM and DECM lights, are also provided. The master caution light and flight essential warning and caution lights are on the DC essential bus.

Figure 5-1 on the following page lists the crew station signals.

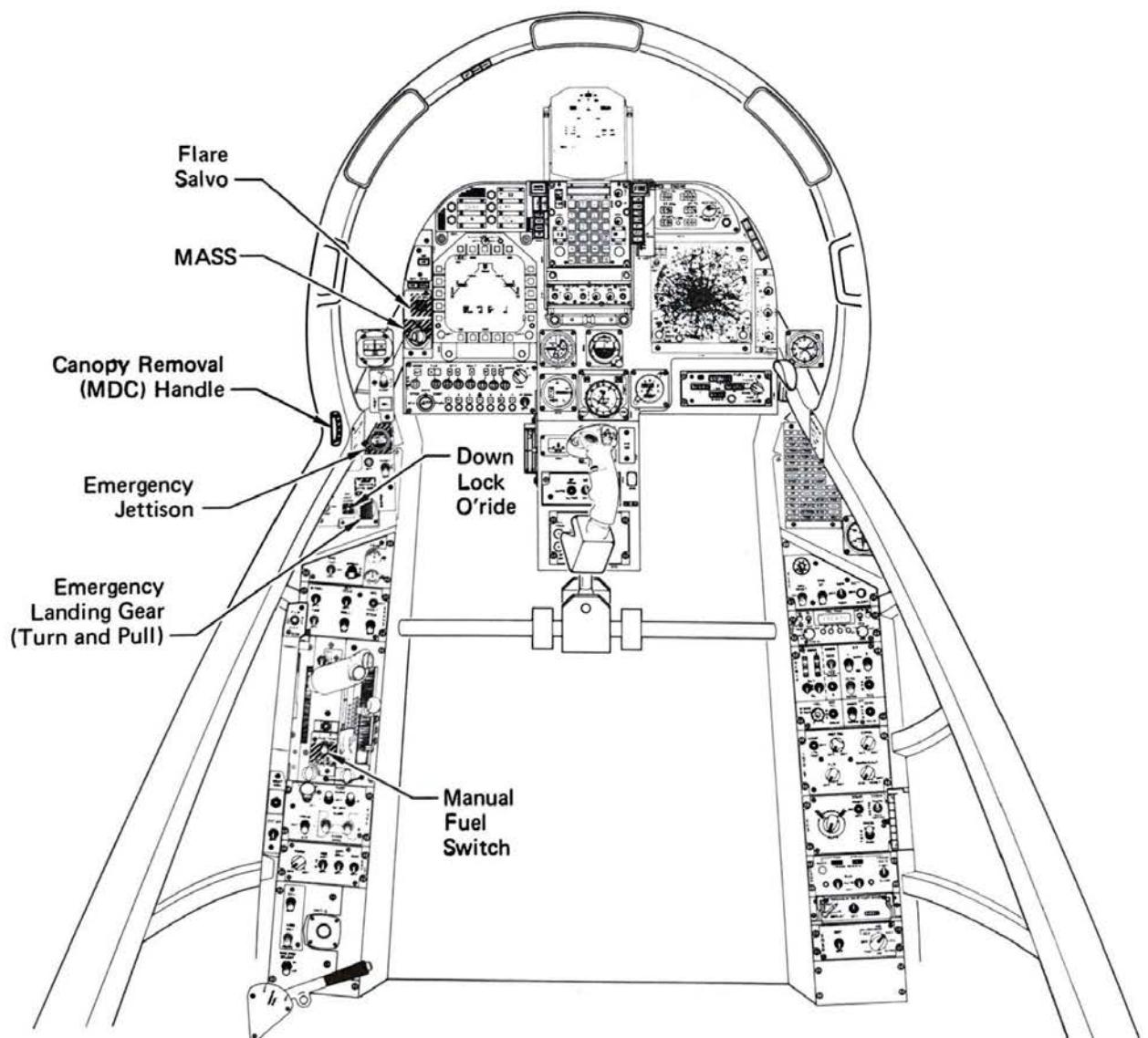


- | | |
|----------------------|---------------------------|
| 1. Ldg Gear Handle | 16. Fire |
| 2. Nose | 17. Law |
| 3. Main | 18. Flaps |
| 4. Left Outrigger | 19. L Tank |
| 5. Right Outrigger | 20. R Tank |
| 6. Nav | 21. JPTL |
| 7. A/G | 22. Gear |
| 8. VSTOL | 23. OT (Over Temp) |
| 9. Master Caution | 24. H ₂ O Flow |
| 10. L Fuel | 25. SAM |
| 11. R Fuel | 26. CW |
| 12. 15 sec | 27. AI |
| 13. Hyd | 28. AAA |
| 14. BINGO | 29. Caution |
| 15. H ₂ O | 30. Advisory |

FIGURE 5-1
AV-8B (RAF) CREW STATION SIGNALS

5.2 IMMEDIATE ACTION CONTROLS

Immediate Action Control functions are coded in accordance with MIL-STD-18012B. Their locations are shown in Figure 5-2.



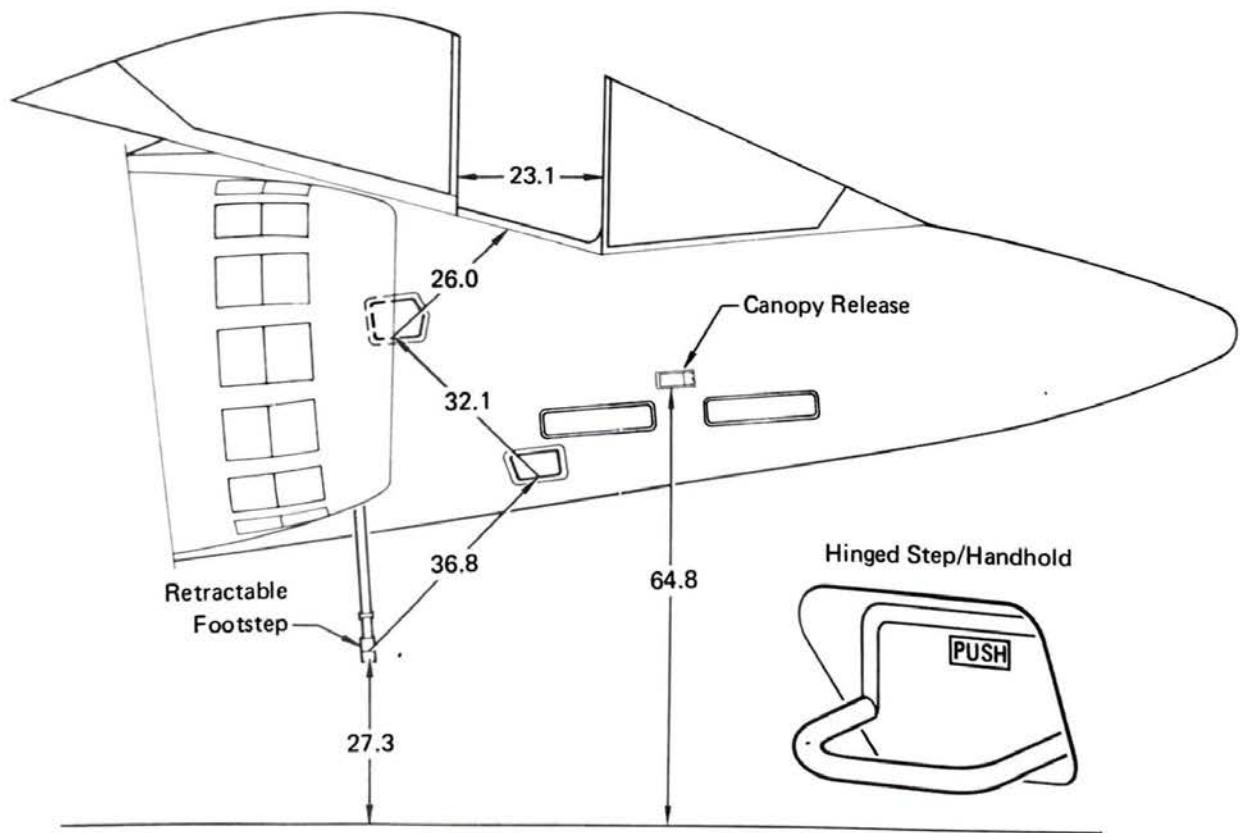
GP01-0820-34

FIGURE 5-2
IMMEDIATE ACTION CONTROLS

6. INGRESS AND EGRESS

If a GSE stand or ladder is not available, the crew station ingress/egress provisions (Figure 6-1) can be used. An extendable footstep and two hinged step/handholds are provided.

The canopy is opened from the ground by operating the external canopy release handle which unlocks the canopy, allowing it to initially travel aft 3 inches. The retractable footstep is then pulled down to fully open the canopy. The hinged step/handholds are manually deployed by pressing the push-to-release button on each step assembly, the steps are manually closed and latched by pushing them flush against the moldline. The extendable footstep is mechanically linked to the canopy on closing and retracts flush against the moldline as the canopy is pushed forward. However, canopy operation is not dependent upon footstep extension.



Note: All dimensions in inches

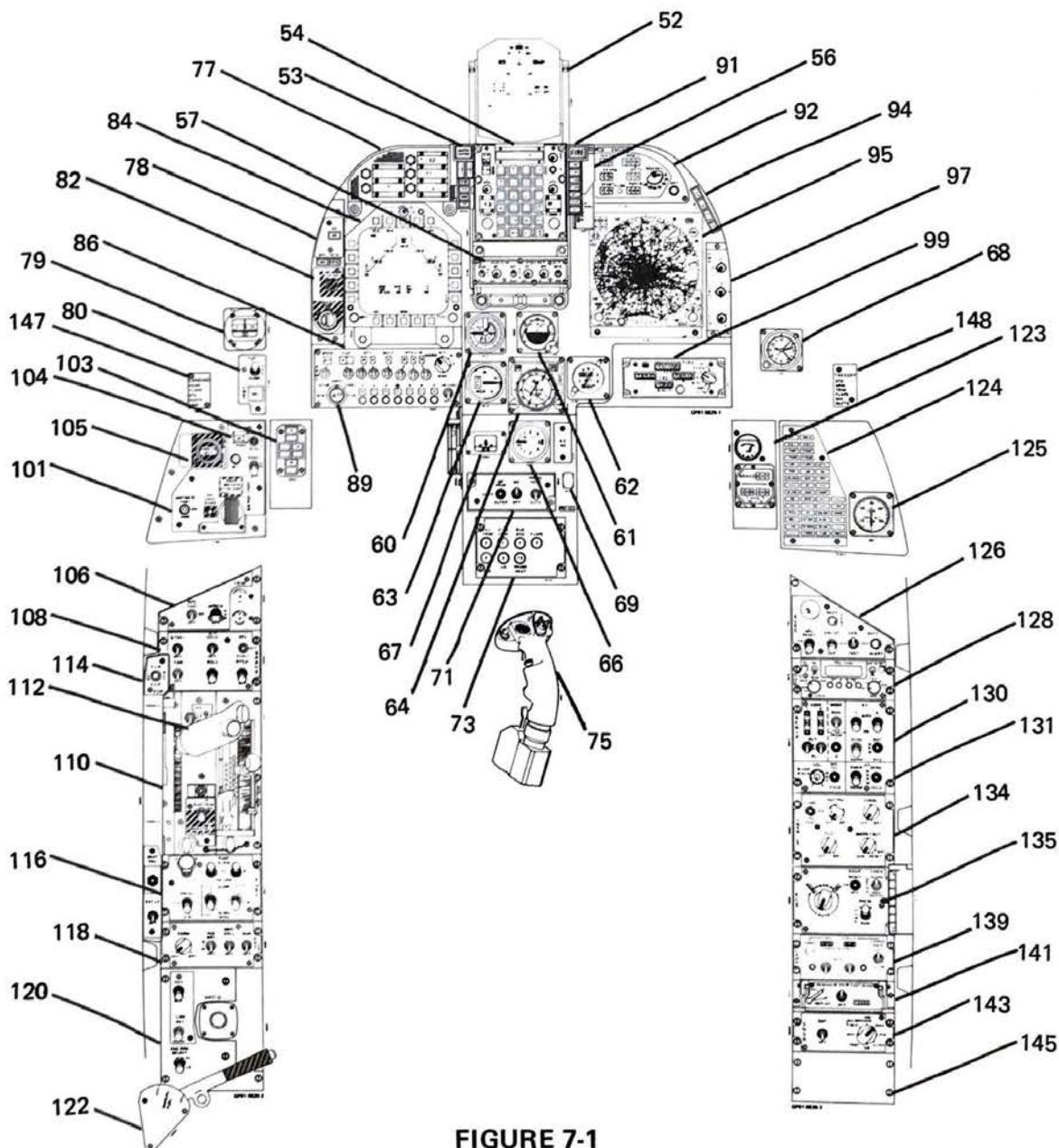
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FIGURE 6-1
AV-8B (RAF) CREW STATION INGRESS/EGRESS

7. AV-8B (RAF) CREW STATION CONFIGURATION

PANEL DESCRIPTION AND RATIONALE - The following panel description and rationale sheets describe the functions of the panel and of individual controls. The location within the crew station is also described. Specific X, Y, and Z location of the center of the panel is given for a more precise location of the panel. This X, Y, and Z location is given at the face of the panel or instrument. True distance and true viewing angle to the panel surface from Design Eye Position (DEP) are also given. The true viewing angle is created by the line of sight from the design eye with respect to the plane of the panel at the panel center.

Figure 7-1 below, identifies the page numbers where the individual panel descriptions are located. Figure 7-2 lists the panel nomenclature.



**FIGURE 7-1
AV-8B (RAF) PAGE INDEX**

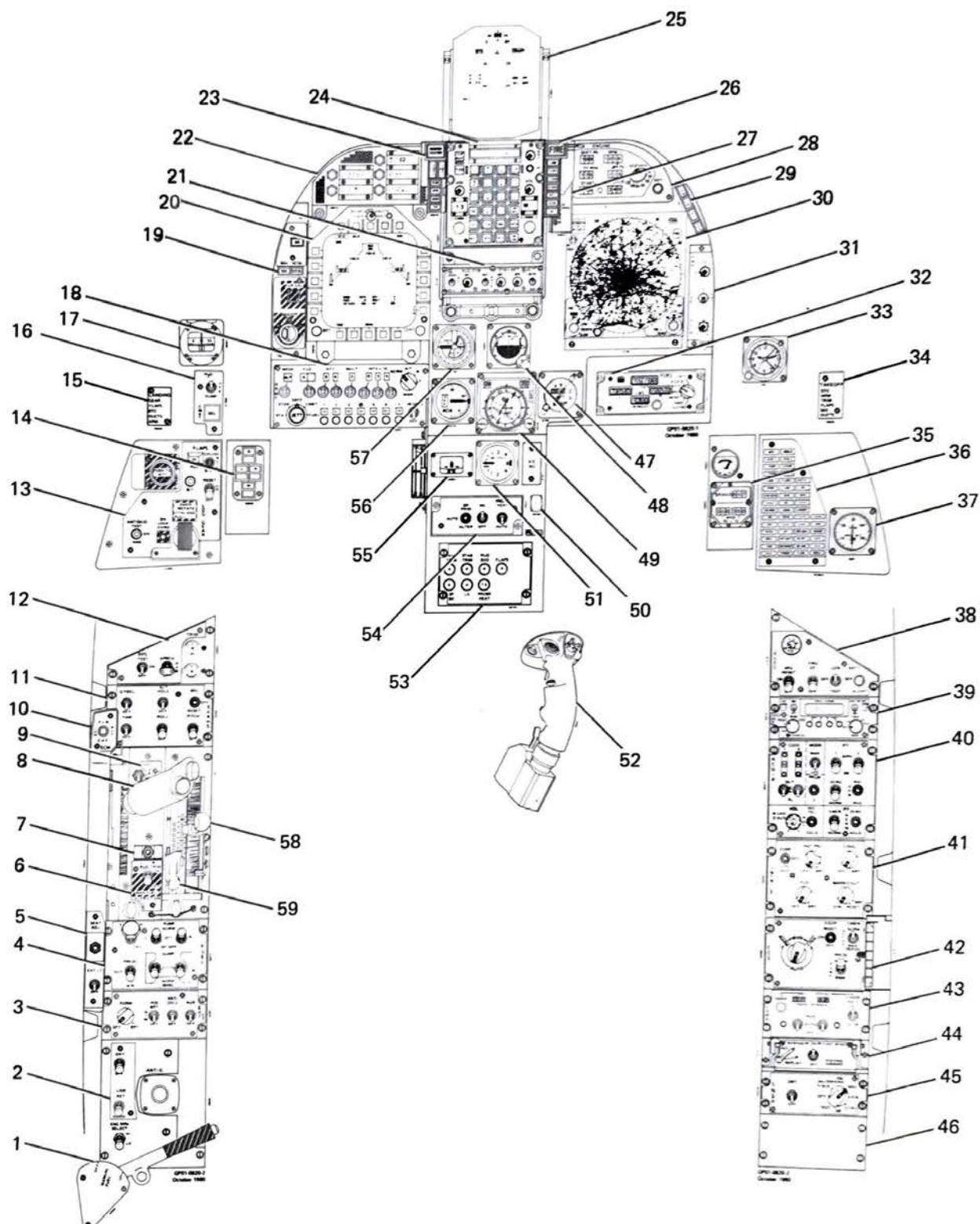
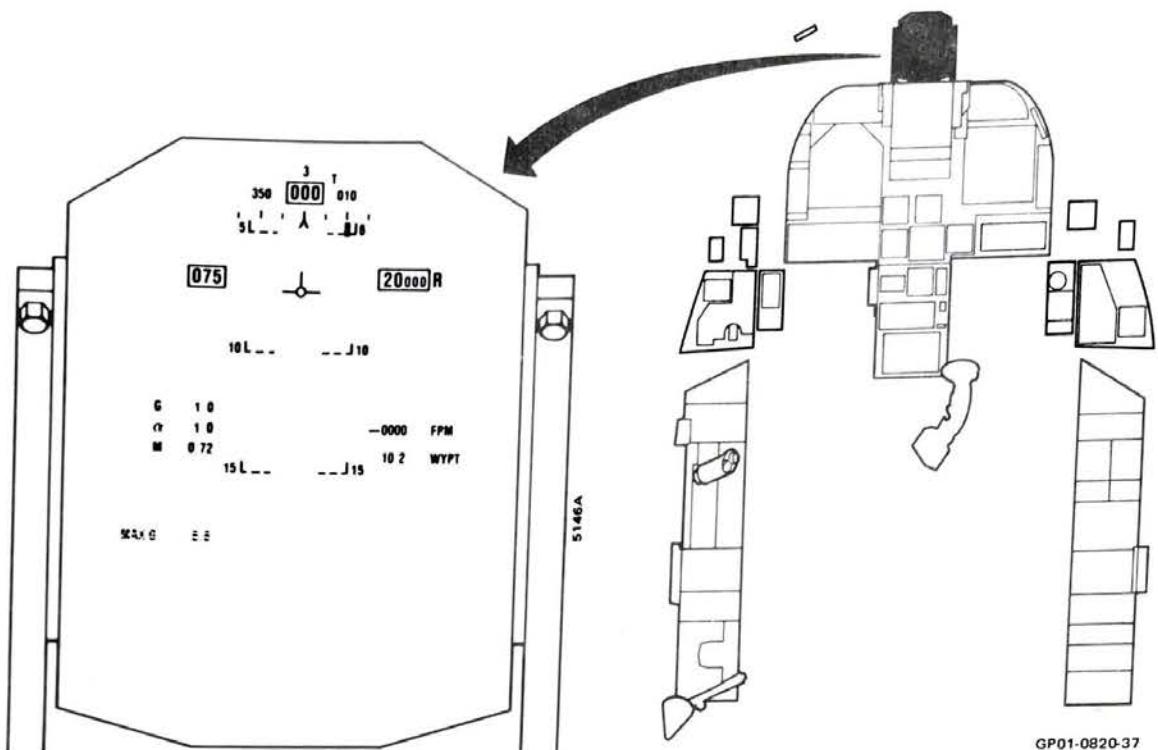


FIGURE 7-2
AV-8B (RAF) PANEL NOMENCLATURE

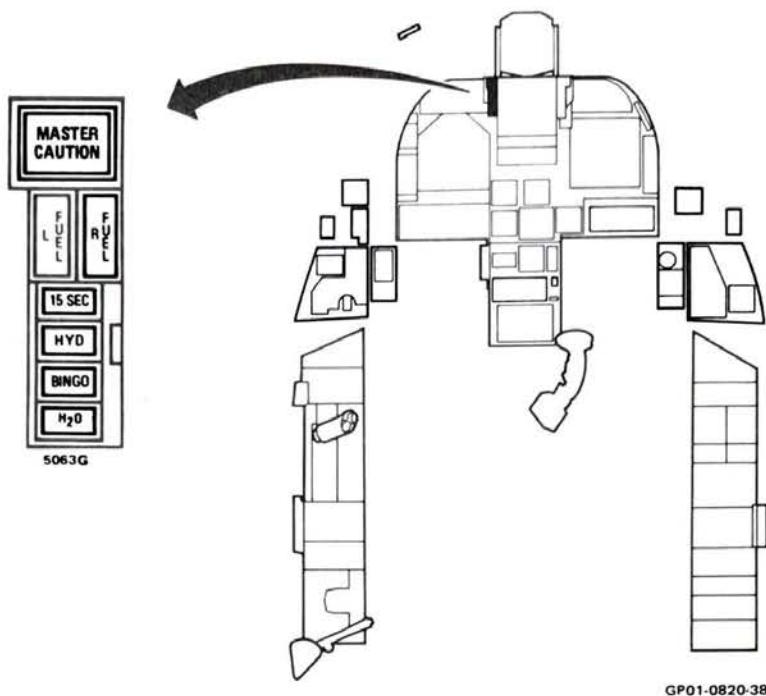
1. Manual Fuel Shutoff
2. Pilot Services Panel
 - Oxygen Valve Switch
 - Anti "G" Valve
 - Lids Override Switch
 - Engine RPM Range Selector
 - Oxygen/Communications Quick Disconnect
3. Exterior Lights Panel
 - Formation
 - Auxiliary
 - Anticollision
 - Position
4. Fuel Control Panel
 - Flow Proportioner
 - L and R Fuel Pump Switch
 - L and R Fuel Dump Switch
 - Inflight Refuel Switch
5. Arm Rest
 - Exterior Lights Master Switch
 - ECM Initiate Switch
 - Seat Adjust Switch
6. Manual Fuel Switch
7. Rudder Trim Switch
8. Throttle
 - Flaps Switch
 - Slew Control/Designator
 - Air Start Switch
 - Cage/Uncage
 - Finger Lift
 - Communication No. 1, No. 2 and Both
 - Speed Brake Switch
9. Jet Pipe Temperature Limiter Switch
10. ECM Initiate Switch
11. Stability Augmentation/Attitude Hold Panel
 - AFC on/Reset
 - Alt Switch
 - Yaw Switch
 - Pitch Switch
 - Roll Switch
 - Q Feel Switch
12. Trim Position Indicator Panel
 - Rudder Trim Indicator
 - Aileron Trim Indicator
 - Approach Light Switch
 - Shaker Test/On Switch
13. Landing Gear/Flaps Control Panel
 - Landing Gear Selector
 - Antiskid/Nose Wheel Steering Switch
 - Flaps Up/Down/Auto Switch
 - Flaps Position Indicator
 - Flap On/Off/Reset Switch
 - Down Lock Override Button
 - (BIT)
 - Emergency Jettison Switch
14. Landing Gear Position Lights
15. Landing Checklist
16. Water and Combat Thrust Panel
 - Water On/Off/Dump
 - Combat Thrust Switch
17. Magnetic Standby Compass
18. Armament Control Panel
19. Master Armament Panel
 - Master Arm Switch
 - Mode Select Switches
 - Navigation
 - Air/Ground
 - V/STOL
 - Flare Salvo Switch
20. Multipurpose Display Indicator (MPD)
21. HUD Control Panel
22. Options Display Unit
23. Priority Caution Light Panel
 - Master Caution Light
 - R and L Fuel Low
 - 15 seconds of Water
 - Hydraulics
 - Bingo
 - Water
24. Integrated Control Panel (ICP)
25. Head-Up Display (HUD)
26. Warning Light Indicator
27. HUD Camera Motion Picture
28. Engine Display Panel
 - Stabilator Position Indicator
 - Nozzle Position Indicator
 - Tachometer
 - Jet Pipe Temperature
 - Fuel Flow
 - BIT Switch
 - Duct Pressure
 - Water Quantity
 - Water Flow Light
29. Threat Lights
30. Tornado Repeater Map Display (TRMD)
31. ECM Control Panel
32. Fuel Quantity Indicator Unit
 - Fuel Quantity Indicators
 - Bingo Fuel Set
 - Indicator Select Switch
33. Clock
34. Takeoff Check List
35. Brake and Hydraulic Pressure Panel
 - Brake Pressure
 - Hydraulic Pressure System No. 1 and No. 2
36. Caution and Advisory Panel
37. Cabin Pressure Altitude Indicator
38. Electrical Control Panel
 - Battery Volts
 - Battery Switch
 - Generator Switch
 - Engine Start Switch
 - APU Switch
39. Communication Control Panel
40. Auxiliary CNI Panel (ACNIP)
41. Interior Lights Control Panel
 - Console Lights Control
 - Instrument Panel Lights Control
 - Flood Lights Control
 - Compass Light/Lights Test Switch
 - Warning/Caution Control
42. Environmental Control System Panel
 - Temperature Controller
 - Equipment Bay Cool Switch
 - Cabin Pressure/Dump Switch
 - Defog Control
43. Camera Control Panel
44. Voice Recorder
45. Sensor Control Panel
 - Dual Mode Tracker Switch
 - Inertial Navigation System Selector
46. Blank Panel
47. Standby Altimeter Indicator
48. Standby Attitude Indicator
49. Standby Horizontal Situation Indicator
50. Rudder Pedal Adjust
51. Standby Vertical Speed Indicator
52. Stick Grip
 - Air/Ground Weapon Release
 - Trim Button
 - Sensor Select
 - HUD Select (FWD)
 - Dual Mode Tracker Select (Aft)
 - Laser Search Track (1)
 - TV Search Track (2)
 - Air-to-Air Weapon Select
 - Sidewinder (Fwd)
 - SEAM (Aft)
 - Gun (Depress)
 - Nose Wheel Steer/Undesignate
 - SAAHS Disengage
 - Camera-Gun Trigger
53. Circuit Breaker Panel
54. Pedestal Miscellaneous Switch Panel
 - Display Processor
 - Mission Computer
 - Probe Heat
55. Turn and Slip Indicator
56. Standby Angle-of-Attack Indicator
57. Standby Airspeed Indicator
58. Nozzle Control
59. Nozzle Stop Lever

**FIGURE 7-2 (Continued)
AV-8B (RAF) PANEL NOMENCLATURE**

**HEAD UP DISPLAY**

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Primary flight and weapon delivery display.	Crucial display mounted in prime $\pm 15^\circ$ viewing cone.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
29.0 LB	5.50 X 7.3 X 20.00
<u>ILLUMINATION</u>	<u>LOCATION</u>
1900 fL	X BL 0.000 Y FS 179.195 Z WL 122.575
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u>
5 x 7 mr	TRUE DISTANCE 20.736 IN. TRUE ANGLE 79.44 DEG. with mid plane
<u>COLOR</u>	<u>OPERATION</u>
Green (Pl phosphor)	HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u>
	NOTES 14° X 14° Instantaneous Field-of-View

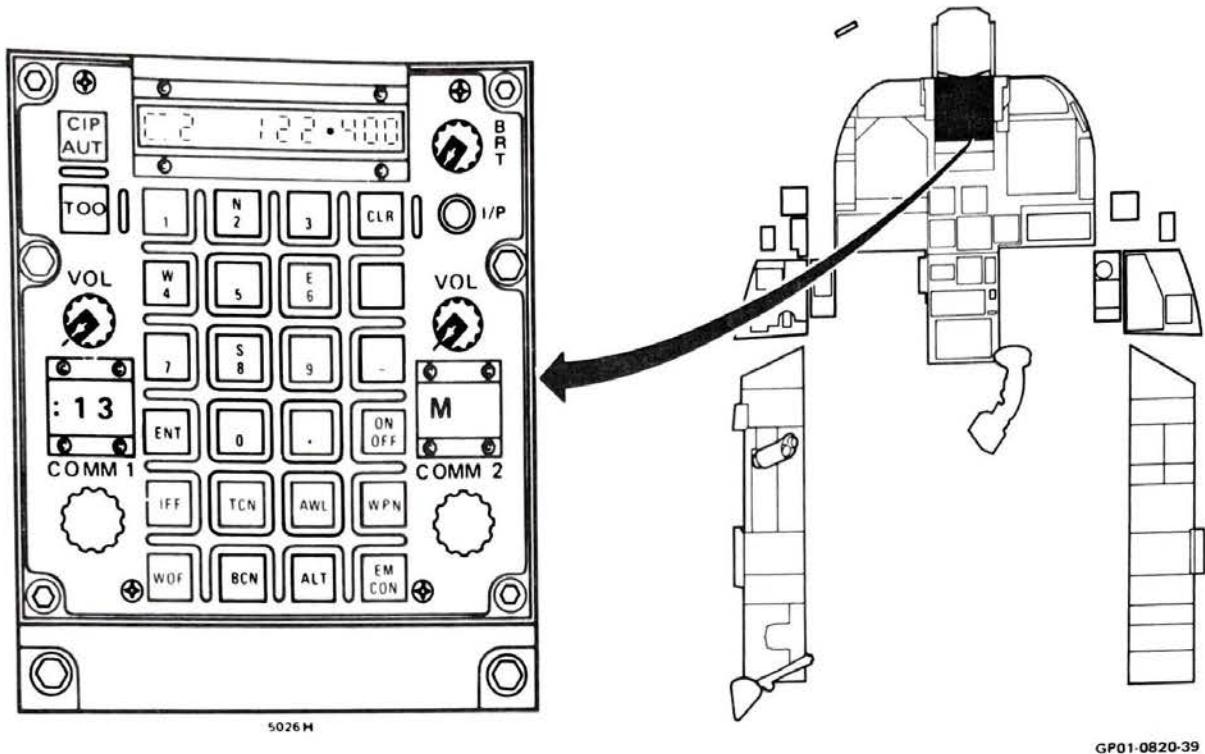
GP78 8008 79



PRIORITY CAUTION LIGHTS

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Priority Caution Indications and Master Caution (MC) Light	These high priority lights are located within a 15° cone of the pilot's forward field of vision for maximum operation benefit.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
— LB	4.10 X 1.25 X 1.55
<u>ILLUMINATION</u>	<u>LOCATION</u>
300 + 150 f1 Day 10 + 5 f1 Night	X BL 3.380 Y FS 178.894 Z WL 117.253
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u>
0.14 + 0.01 in Master Caution is 0.186 + .01 in	TRUE DISTANCE 22.515 IN. TRUE ANGLE 80.83 DEG.
<u>COLOR</u>	<u>OPERATION</u>
All Lights are Aviation Yellow Transilluminated	Left HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u>
Master Caution Force/Travel 35 + 5 oz/0.165 in	1
	<u>NOTES</u>

GP78-8008 79

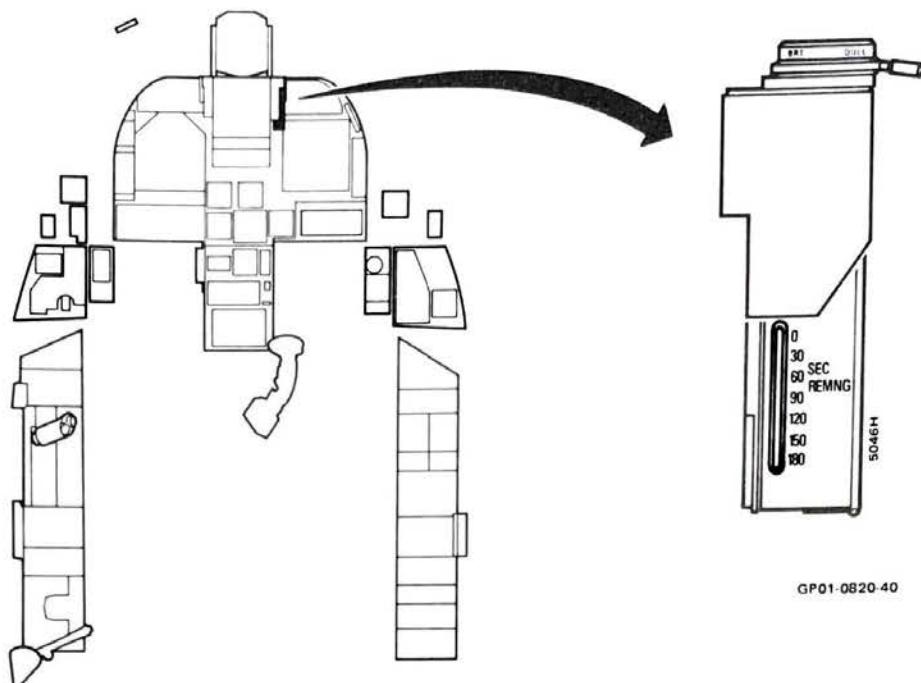


INTEGRATED CONTROL PANEL (ICP)

<u>PANEL FUNCTION</u>		<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>	
I/P	Initiates IFF ident response.	This panel is used during all phases of flight. The high, central location below HUD provides easy access while maintaining forward visibility.
VOL	Control Comm 1 and Comm 2 (dual ARC-182) volume	
COMM 1/COMM 2	Selects and displays current Comm channel.	
KEYBOARD	Permits alphanumeric data entry.	
FUNCTION SWITCHES	Switch depression selects the function, produces a sequence of options, and displays current function status on scratch pad.	
BRT	Controls brightness of the Up-Front Control Sets scratch pad, options, and channel displays.	

INTEGRATED CONTROL PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
<u>3.25</u> LB	<u>5.80</u> X <u>5.00</u> X <u>3.00</u>	X <u>BL</u> <u>0.00</u> Y <u>FS</u> <u>181.413</u> Z <u>WL</u> <u>116.199</u>	
<u>ILLUMINATION</u>	<u>DISPLAYS</u>	<u>DEP TO CENTER</u>	
<u>1.0 ± 0.5 f1</u>	<u>.187"</u>	<u>TRUE DISTANCE</u> <u>20.342</u> IN. <u>TRUE ANGLE</u> <u>81.68</u> DEG.	
<u>LEGEND SIZE</u>	<u>0.13 ± 0.01</u> in		
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
Pushbuttons - Black 37038 Knobs - Grey 36231 Display & Legends - White		<u>Both</u> HAND	<u>1</u>
<u>INDIVIDUAL CONTROLS</u>	<u>TYPE</u>	<u>FORCE</u>	<u>TRAVEL</u>
IP	Pushbutton switch (momentary on)	20-25 oz	.04 + .03 in -.00
VOL	Rotary Transformer (with on/off switch)	15oz Torque on/off switch	300°
COMM 1 AND COMM 2	Rotary, continuous 27 pos. with display push function	8-36 in.oz torque 48 oz push force	.125 in. travel on spring loaded switch
KEYBOARD	Pushbutton (momentary on)	20-25 oz	0.04 + .03 in -.00
FUNCTION SWITCHES	Pushbutton (Momentary on) Rotary Transformer	20-25 oz 5-6 oz Torque	0.1 ± .015 in 295°
NOTES			

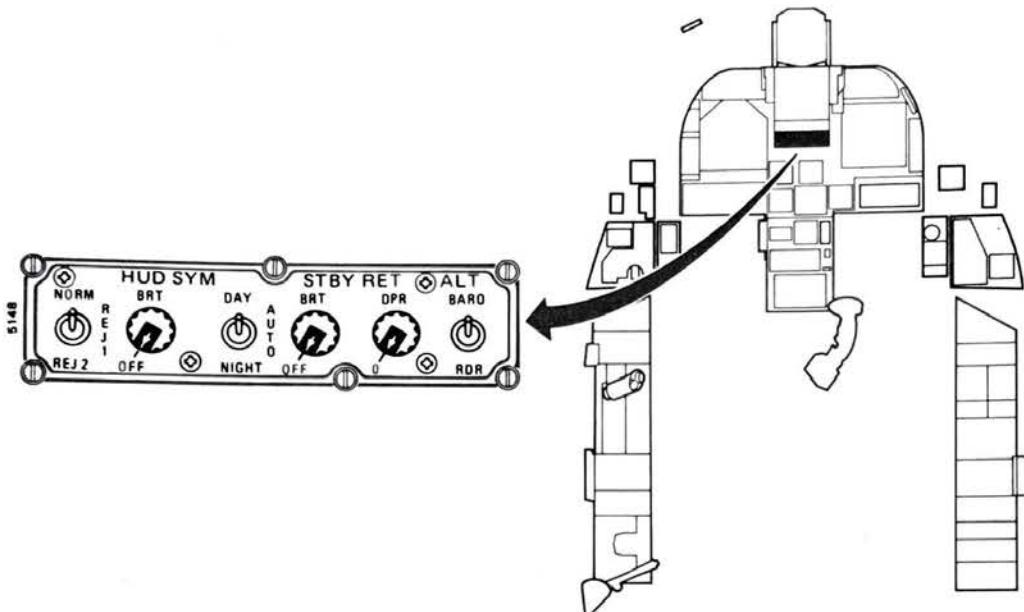


HUD CAMERA MOTION PICTURE

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Shows film remaining in camera which photographs the HUD symbology and the view through the HUD.	Located next to HUD and magazine accessible for replacement.
<u>CONTROL</u>	<u>FUNCTION</u>
FILM REMNG Gun Trigger First Detent or Bomb Button Depression	Provides film remaining in seconds based upon 16 FPS film rate. (180 SEC MAX) HUD camera film start/stop.

HUD CAMERA CONTROL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
1.5 LB	1.60 X 4.24 X 4.20	X BL	-3.225
<u>ILLUMINATION</u>		Y FS	178.915
<u>LEGEND SIZE</u>		Z WL	116.162
0.1 in		<u>DEP TO CENTER</u>	
		TRUE DISTANCE	22.868 IN.
		TRUE ANGLE	80.833 DEG.
COLOR	<u>OPERATION</u>		<u>REACH ZONE</u>
IPL WHITE	Right HAND		1
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
GUN TRIGGER	Trigger detent	Detent 1:2.25 + 0.5 lb 2:7.2+ .03 lb	.19-.25 in .38
BOMB BUTTON	Momentary Push-button	5 + 1 lb	0.10 in
NOTES			



HUD CONTROL PANEL

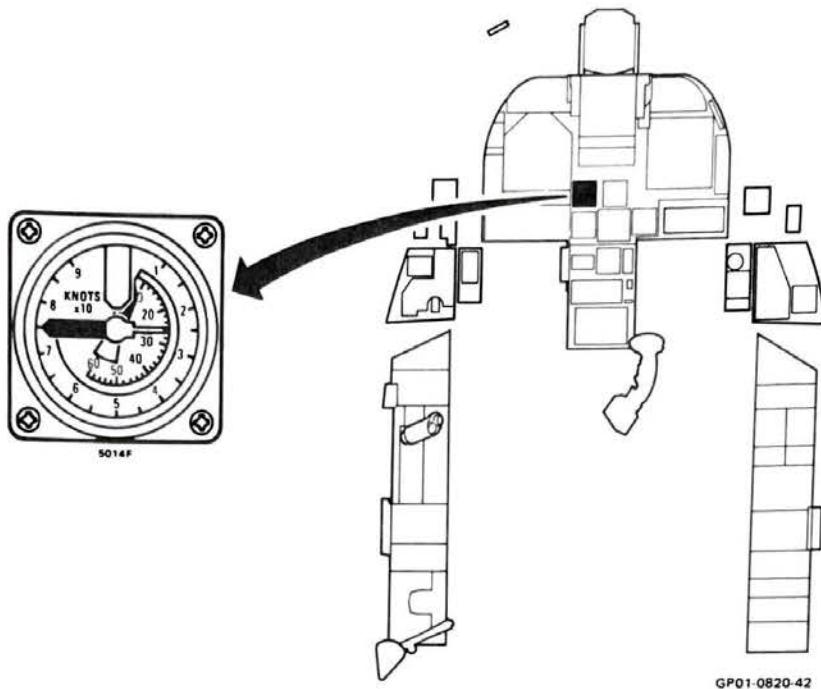
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<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Control HUD symbology.	Located for easy pilot selection.
<u>CONTROL</u>	<u>FUNCTION</u>
NORM/REJ 1/REJ 2	Enables the pilot to selectively declutter the HUD display.
SYM BRT	On-Off and brightness control for HUD.
DAY/AUTO/NIGHT	Limits HUD brightness adjustments to ranges suitable for day and night operations or permits symbology to be automatically adjusted to meet ambient conditions.
STBY RET DPR	Standby reticle depression angle up to 240 mils.
STBY RET BRT	On/Off and brightness Control for standby reticle.
ALT BARO-RDR	Selects either barometric or radar altitude for display on the HUD.

GP78 8008 78

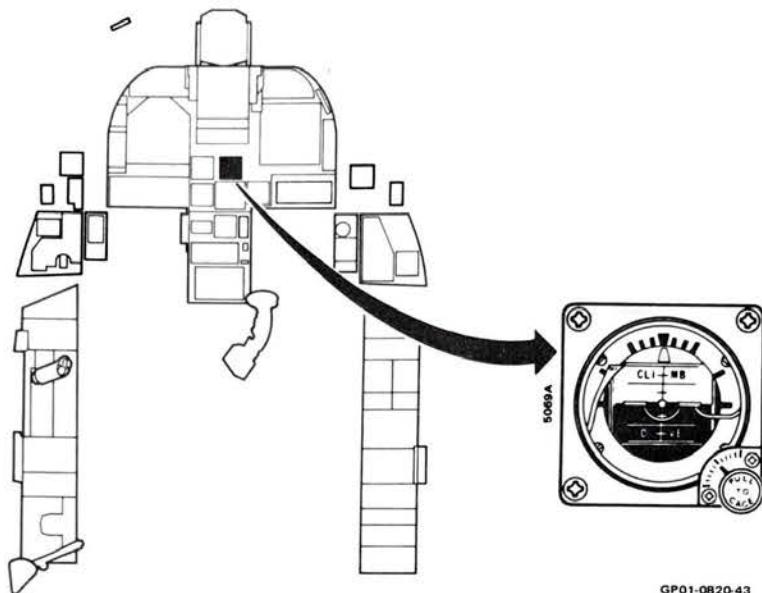
HUD CONTROL PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
2.0 LB	1.50 X 5.50 X 6.50	X BL 0.000 Y FS 179.045 Z WL 110.674	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 + 0.5 f1		TRUE DISTANCE 26.107 IN. TRUE ANGLE 72.80 DEG.	
<u>LEGEND SIZE</u>			
0.13 + 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Both HAND	1
INDIVIDUAL CONTROLS		TYPE	FORCE
REJ/NORM		3 Pos Toggle Switch	1/2 - 2 lbs*
SYM BRT		Rotary Switch and On/Off Control	16 + 6 in. oz
DAY/AUTO/NIGHT		3 Pos Toggle Switch	1/2 - 2 lbs*
STBY RET DPR		Rotary Switch	16 + 6 in. oz
STBY RET BRT		Rotary Switch and On/Off control	16 + 6 in. oz
ALT BARO/RDR		2 Pos Toggle Switch	1/2 - 2 lbs*
NOTES			
* This estimate is based on vendor marketing sheets.			



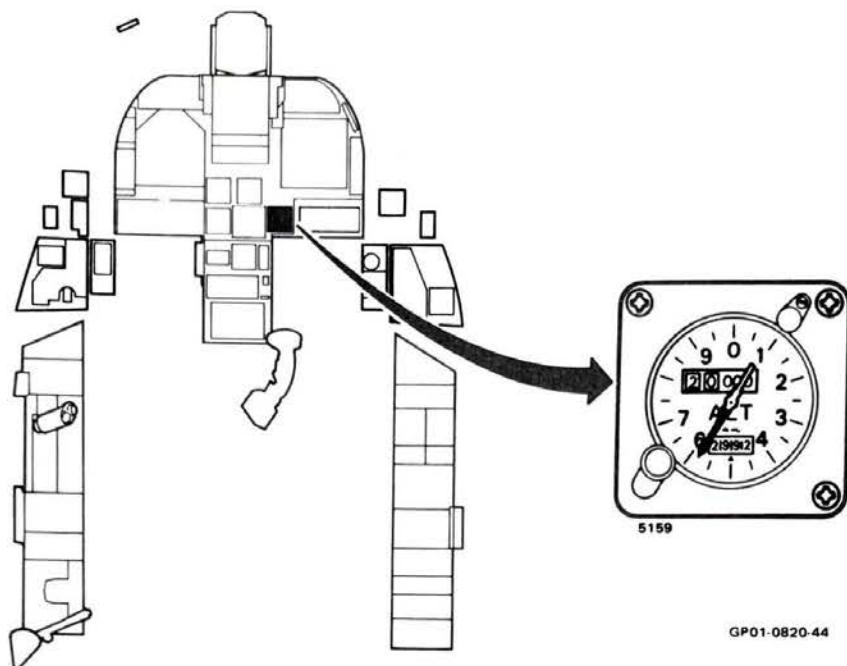
STANDBY AIRSPEED INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Standby readout of indicated air-speed.	Standby instruments are grouped under HUD for easy standby or cross check use.
<u>WEIGHT</u> 0.9 LB	<u>DIMENSIONS</u> 1.875 X 1.875 X 4.59
<u>ILLUMINATION</u> 1.0 ± 0.5 f1	<u>LOCATION</u> X BL 1.600 Y FS 176.850 Z WL 106,172
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u> TRUE DISTANCE 29.665 IN. TRUE ANGLE 67.58 DEG.
<u>COLOR</u> IPL WHITE	<u>OPERATION</u> HAND <u>REACH ZONE</u> 3
<u>RANGE/SENSITIVITY</u> 0-600 kt	<u>NOTES</u>



STANDBY ATTITUDE INDICATOR

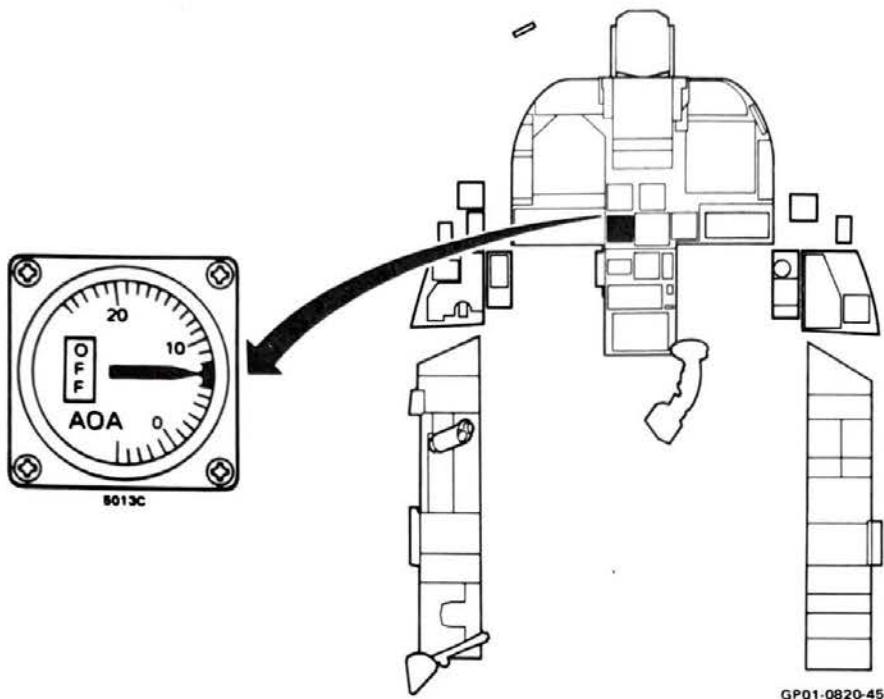
<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>	
Standby aircraft attitude indicator.	Standby instruments are grouped under HUD for easy standby or cross check use.	
<u>WEIGHT</u> 2.3 LB	<u>DIMENSIONS</u> 2.38 X 2.38 X 6.20	<u>LOCATION</u> X BL -1.000 Y FS 177.030 Z WL 106.171
<u>ILLUMINATION</u> 1.0 + 0.010 in		<u>DEP TO CENTER</u> TRUE DISTANCE 29.500 IN. TRUE ANGLE 62.98 DEG.
<u>LEGEND SIZE</u> 0.125 + 0.010 in		<u>OPERATION</u> Either HAND
<u>COLOR</u> IPL WHITE		<u>REACH ZONE</u> 3
<u>RANGE/SENSITIVITY</u>	<u>NOTES</u> AI has self contained gyro.	



STANDBY ALTIMETER INDICATOR

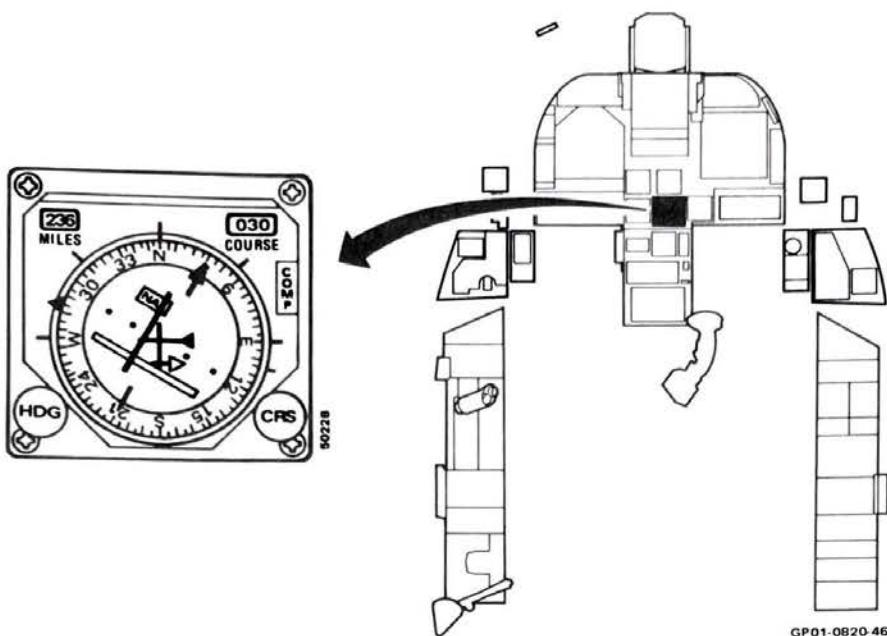
<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Standby pressure altitude indicator.	Standby instruments are grouped under the HUD for easy standby or cross check use.
<u>WEIGHT</u> 4.2 LB	<u>DIMENSIONS</u> 2.38 X 2.38 X 8.70
<u>ILLUMINATION</u> 1.0 + 5 f1	<u>LOCATION</u> X BL -3.630 Y FS 177.628 Z WL 103.628
<u>LEGEND SIZE</u> 0.187 + 0.015 in (Counter) 0.156 + 0.015 in (Dial and Baro)	<u>DEP TO CENTER</u> TRUE DISTANCE 30.968 IN. TRUE ANGLE 62.32 DEG.
<u>COLOR</u> IPL WHITE	<u>OPERATION</u> Either HAND 3
<u>RANGE/SENSITIVITY</u> 0-50,000 ft/50 ft	<u>REACH ZONE</u> <u>NOTES</u> BARO knob inputs barometric data to standby altimeter and air data computer.

GP78 8008 79



STANDBY ANGLE-OF-ATTACK INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Standby AOA indicator	Standby instruments are grouped under the HUD for easy standby use or cross check use.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
1.50 LB	2.38 X 2.38 X 6.5
<u>ILLUMINATION</u>	<u>LOCATION</u>
1.0 ± 0.5 f1	X BL 1.860 Y FS 177.669 Z WL 103.494
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u> TRUE DISTANCE 30.846 IN. TRUE ANGLE 62.75 DEG.
<u>COLOR</u>	<u>OPERATION</u> <u>REACH ZONE</u>
IPL WHITE	HAND 3
<u>RANGE/SENSITIVITY</u>	<u>NOTES</u>
-5° to 25°	Off flag appears with electrical power removal.

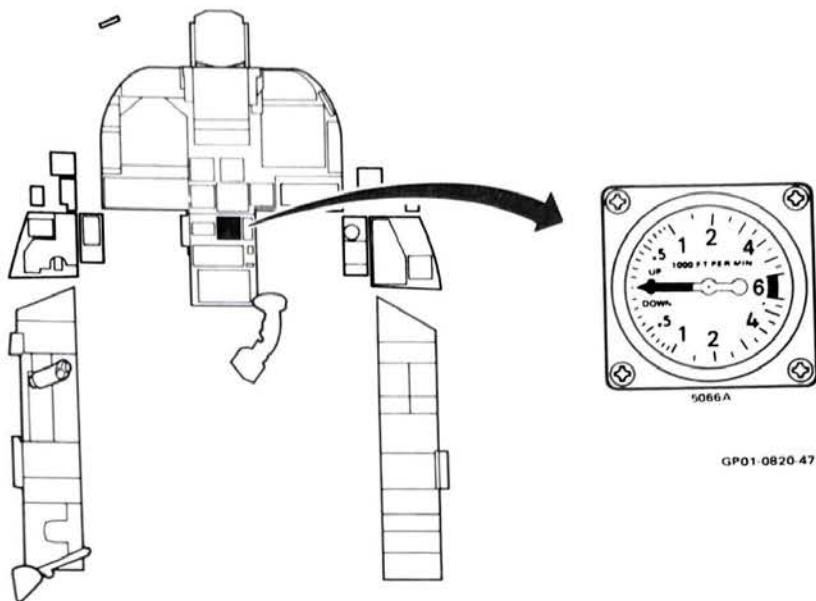


STANDBY HORIZONTAL SITUATION INDICATOR

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Standby HSI	Standby instruments are grouped under the HUD for easy standby or cross check use.
<u>CONTROL</u>	<u>FUNCTION</u>
MILES	Displays slant range to selected Tacan station.
COURSE	Displays selected course.
HDG	Rotates heading bug. Allows manual change of compass card in case of auto heading input failure (Air Data Computer)
CRS	Inputs course data to standby HSI and primary EHSI on MPD.

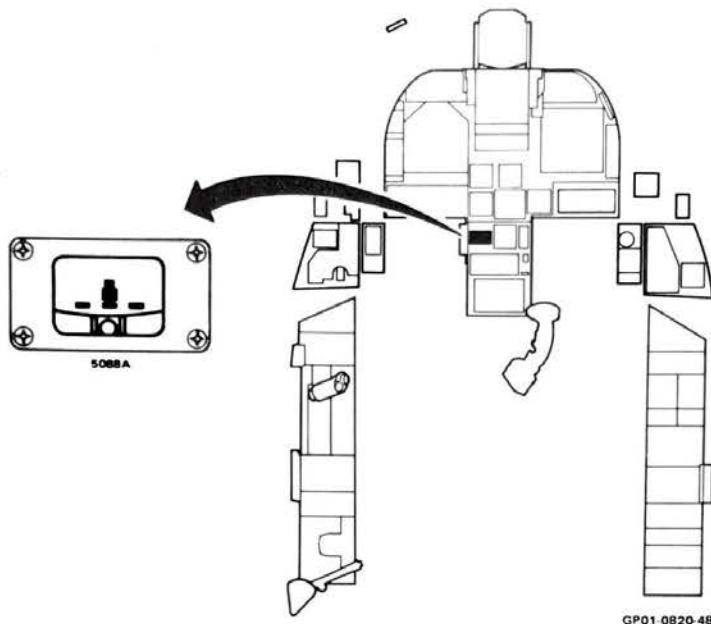
STANDBY HORIZONTAL SITUATION
INDICATOR (CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
4.2 LB	3.00 X 3.00 X 9.00	X BL -1.000	
<u>ILLUMINATION</u>		Y FS 178.034	
1.0 + 0.5 f1		Z WL 103.292	
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
		TRUE DISTANCE 30.687 IN.	
		TRUE ANGLE 62.15 DEG.	
<u>COLOR</u>	<u>OPERATION</u>	<u>REACH ZONE</u>	
IPL WHITE	Both HAND	3	
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
HDG	Rotary Continuous	20-30 in. oz	360°
CRS	Rotary Continuous	20-30 in. oz	360°
<u>NOTES</u>			



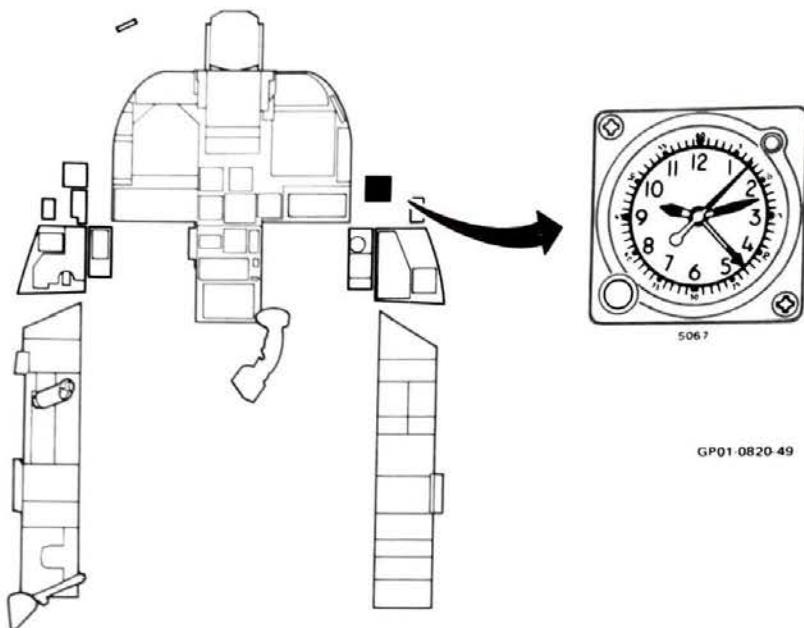
STANDBY VERTICAL SPEED INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>	
Standby VSI	Standby instruments are grouped under the HUD for easy standby or cross check use.	
<u>WEIGHT</u> 1.0 LB	<u>DIMENSIONS</u> 2.38 X 2.38 X 4.75	<u>LOCATION</u> X BL -0.803 Y FS 177.732 Z WL 98.994
<u>ILLUMINATION</u> 1.0 ± 0.5 f1		<u>DEP TO CENTER</u> TRUE DISTANCE 34.116 IN. TRUE ANGLE 51.997 DEG.
<u>LEGEND SIZE</u> 0.188 ± 0.010 in		<u>OPERATION</u> HAND
<u>COLOR</u> IPL WHITE		<u>REACH ZONE</u> —
<u>RANGE/SENSITIVITY</u> 0 ± 6000 FPM/Variable 100-500 FPM		<u>NOTES</u> —



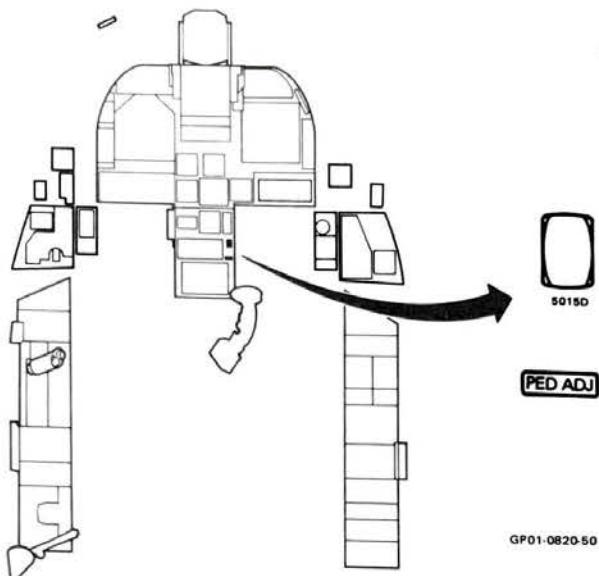
TURN AND SLIP INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Turn & Slip Indication	Standby instruments are grouped under the HUD for easy standby or cross check use.
<u>WEIGHT</u> .75 LB	<u>DIMENSIONS</u> 2.25 X 1.25 X 4.0
<u>ILLUMINATION</u> 1.0 ± 0.5 f1	<u>LOCATION</u> X BL 1.760 Y FS 177.732 Z WL 98.894
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u> TRUE DISTANCE 34.152 IN. TRUE ANGLE 51.920 DEG.
<u>COLOR</u> IPL WHITE	<u>OPERATION</u> HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u> —
	<u>NOTES</u>



CLOCK

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Time of day, elapsed time.	Located for easy viewing.
<u>WEIGHT</u> 0.4 LB	<u>DIMENSIONS</u> <u>2.38 X 2.38 X 1.75</u>
<u>ILLUMINATION</u> 1.0 + 0.5 f1	<u>LOCATION</u> X BL -13.658 Y FS 176.534 Z WL 107.650
<u>LEGEND SIZE</u> 0.150 in	<u>DEP TO CENTER</u> TRUE DISTANCE 32.022 IN. TRUE ANGLE 46.60 DEG.
<u>COLOR</u> IPL WHITE	<u>OPERATION</u> RightHAND
<u>RANGE/SENSITIVITY</u> 12 hr/1 sec	<u>REACH ZONE</u> 3
	<u>NOTES</u>

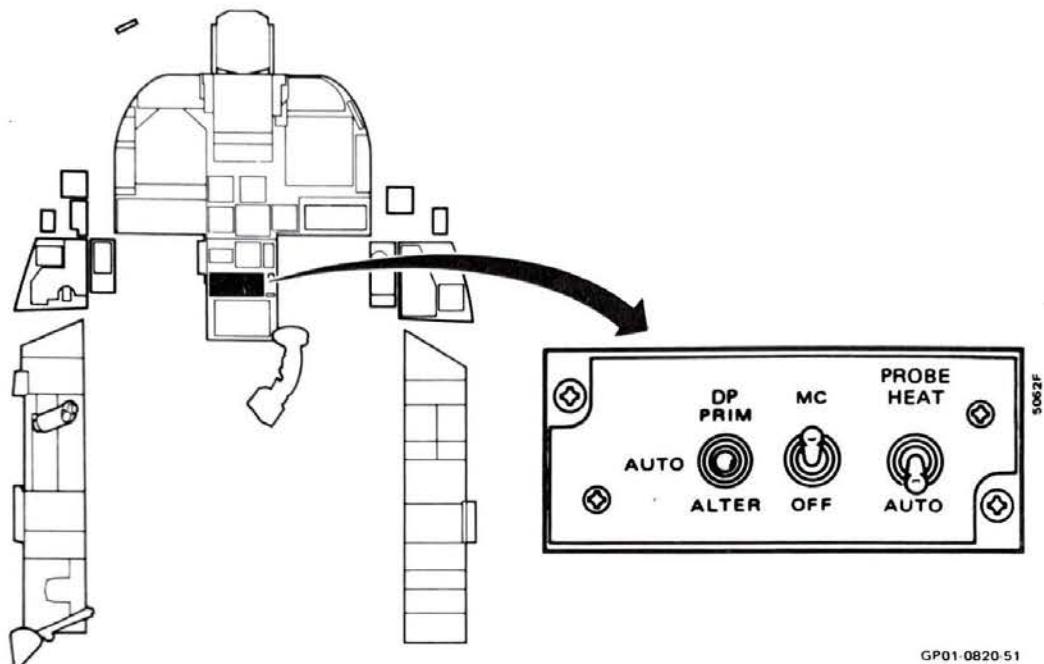


RUDDER PEDAL ADJUST

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Rudder Pedal adjustment and control.	Easily accessible with right-hand.
<u>CONTROL</u>	<u>FUNCTION</u>
RUDDER PEDALS ADJUST	When the knob is pulled the rudder pedals can be pushed forward or allowed to move aft under spring pressure. Pedals will stay as set by leg pressure when knob is released.

RUDDER PEDAL ADJUST
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
LB 2.0	X 5.0 X	X BL 3.25	
		Y FS 177.935	
<u>ILLUMINATION</u>		Z WL 97.0	
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
.13 ± 0.01 in		TRUE DISTANCE 36.5 IN.	
<u>COLOR</u>		TRUE ANGLE 51.0 DEG.	
<u>INDIVIDUAL CONTROLS</u>	<u>TYPE</u>	<u>OPERATION</u>	<u>REACH ZONE</u>
RUDDER PEDALS ADJUST	Pull knob to release and posi- tion as described.	Right HAND	3
<u>NOTES</u>			



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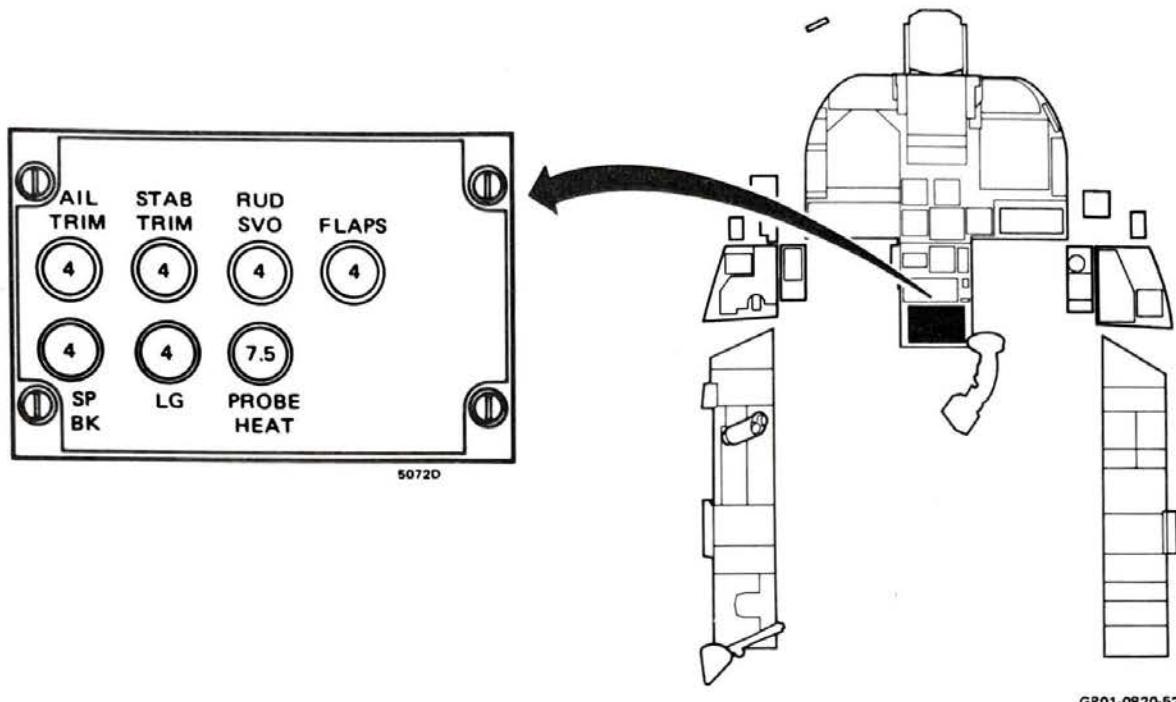
5062F

PEDESTAL MISCELLANEOUS SWITCH PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Miscellaneous Switches	Priority of use dictates location. Controls normally preset.
<u>CONTROL</u>	<u>FUNCTION</u>
MC (MC-OFF)	In the MC position the mission computer controls the MUX bus. Display processor controls MUX bus when in off position.
DP PRIM/ALT/AUTO	Allows the pilot to manually select either the primary or alternate display processor. In auto position the DP makes the selection automatically.
PROBE HEAT/AUTO	ON or AUTO control for heating elements in the pitot and AOA systems.

PEDESTAL MISCELLANEOUS SWITCH PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB <u>1.75</u> X <u>5.60</u> X <u>6.50</u>	X BL <u>.325</u> Y FS <u>177.933</u> Z WL <u>96.778</u>	
<u>ILLUMINATION</u>	<u>1.0 ± 0.5 F1.</u>		
<u>LEGEND SIZE</u>	<u>.13 ± 0.01 In.</u>		
<u>COLOR</u>	IPL WHITE	<u>OPERATION</u>	<u>REACH ZONE</u>
		<u>Either HAND</u>	<u>3</u>
INDIVIDUAL CONTROLS		TYPE	FORCE
MC		2 pos toggle switch	5 ± .13 1b
DP PRIM/ALT/AUTO		3 pos toggle switch	6 lb max
PROBE HEAT		2 pos toggle switch	5 + .13 1b 6 lb max
<u>NOTES</u>			

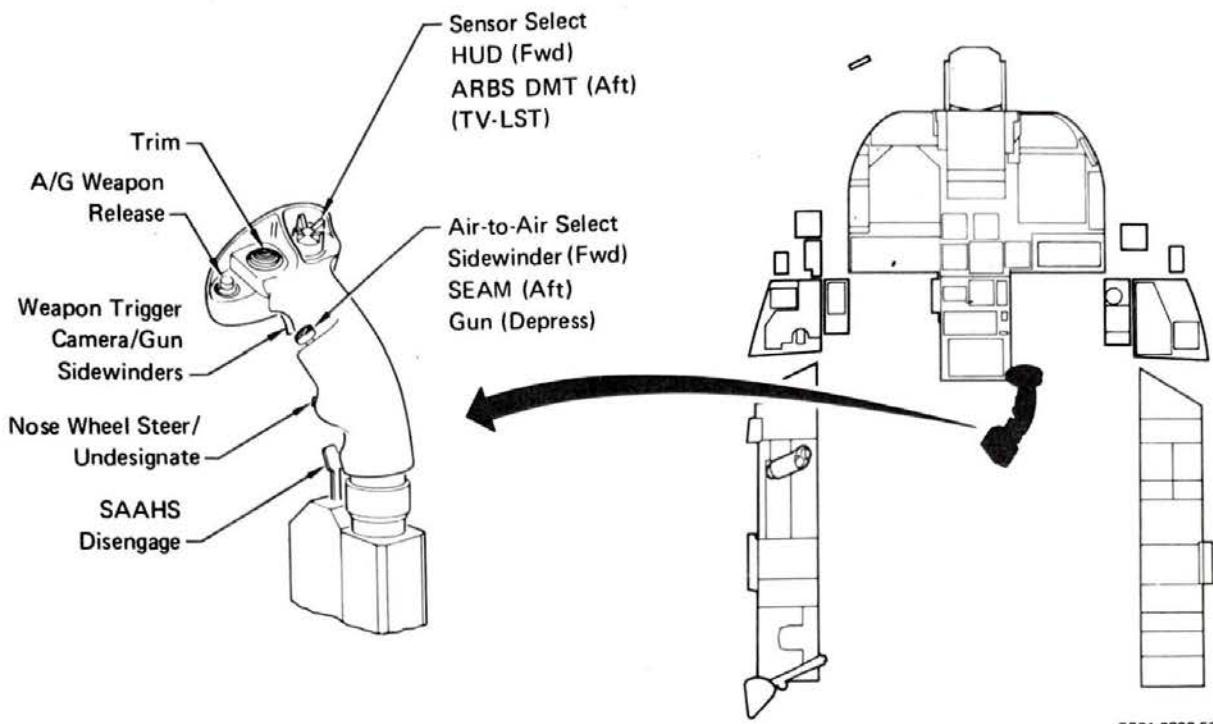


CIRCUIT BREAKER PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Circuit Breakers	Primary circuit breakers must be accessible to pilot.
<u>CONTROL</u>	<u>FUNCTION</u>
Push/Pull 4 and 7.5 amp circuit breakers.	Provide thermal overload protection. Circuit breaker is readily seen by white on exposed shaft. At night transilluminated for good visibility.

CIRCUIT BREAKER PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB <u>5.15</u> X <u>3.25</u> X <u>3.0</u>	X BL <u>.325</u> Y FS <u>178.356</u> Z WL <u>93.928</u>	
<u>ILLUMINATION</u>	<u>1.0 ± 0.5 F1.</u>		
<u>LEGEND SIZE</u>	<u>.13 ± 0.01 In.</u>		<u>TRUE DISTANCE</u> <u>37.673</u> IN. <u>TRUE ANGLE</u> <u>46.395</u> DEG.
<u>COLOR</u>	<u>WHITE LETTERING</u> <u>BLACK BACKGROUND</u>		<u>OPERATION</u> <u>REACH ZONE</u> <u>Either HAND</u> <u>3</u>
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
Push/Pull circuit breakers	Thermal	5-6 lb - out 8 lb - in	6.296 ± .01 in
NOTES			



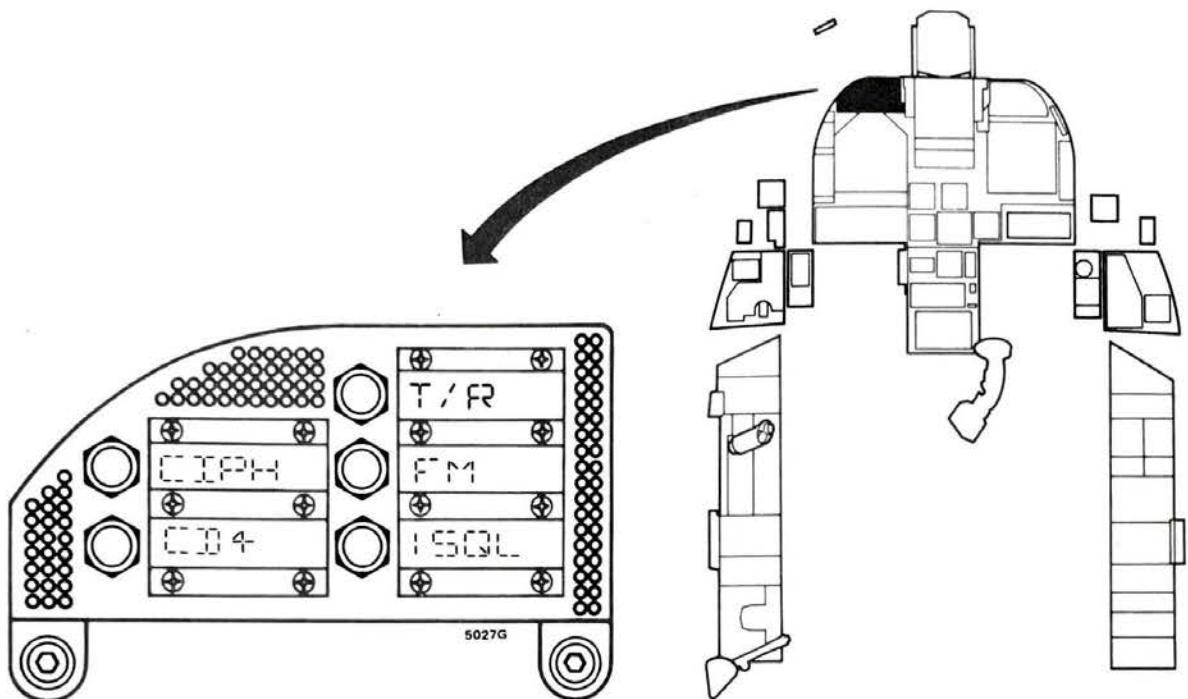
GP01-0820-53

STICK GRIP

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Primary flight attitude and weapon selection control.	This crucial control is located for complete accessibility by all pilots.
<u>CONTROL</u>	<u>FUNCTION</u>
SENSOR SELECT	Selects attack sensors for target acquisition (HUD, DMT alternate action TV-LST).
TRIM	Adjusts pitch and roll trim.
A/G WEAPON RELEASE	Enables manual or automatic air-to-ground weapon release, initiates camera operation.
WEAPON TRIGGER (CAMERA/GUN/SIDEWINDER)	Initiates HUD camera and fires fuselage gun, pylon guns, and Sidewinder.
AIR-TO-AIR SELECT	Selects guns, Sidewinder or Sidewinder - Extended Acquisition Mode 1 (SEAM).
NWS/UNDESIGNATE	Activates nosewheel steering (weight on wheels). Undesignates previously selected target.
SAAHS DISENGAGE	Immediate SAAHS disengage.

STICK GRIP
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
2.5 LB	X X	X BL .449	Y FS 185.763
<u>ILLUMINATION</u>		Z WL 104.848	
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
		TRUE DISTANCE	25.189 IN.
		TRUE ANGLE	- DEG.
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
Stick and switches are black except for Bomb release and trigger which are red.		Both HAND	1
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
SENSOR SELECT	Single pole, four throw center off, momentary (Aft position-alt action)	28 ± 8 oz	12° 30'
TRIM	4 Pos momentary switch	28 ± 8 oz	12° 30'
A/G WEAPON RELEASE	Momentary Push button	5 ± 1 lb	0.10 in
WEAPON TRIGGER (CAMERA/GUN/SIDEWINDER)	Trigger	(1) Detent 1:2.25 + 0.5 lb (2) 2:7.2+ 0.3 lb	.19-.25 in .38-.50 in
AIR-TO-AIR SELECT	Toggle/Push/Button Switch	Fwd/Aft: 2.5 ± 0.75 lb DOWN: 4.5 ± 0.7 lb	15°
NWS/Undesignate SAAHS DISENGAGE	Push Button Switch Paddle Switch	2.1 ± .4 lb 4.5 lb	.108
NOTES			

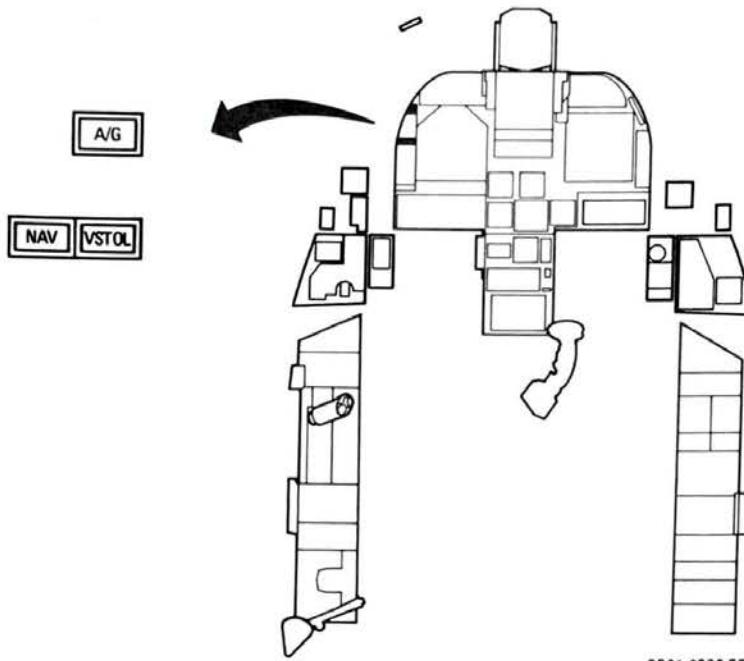


GP01-0820-54

OPTION DISPLAY UNIT (ODU)

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Displays appropriate options and permits selection.	Located adjacent to ICP for up front operation.
<u>WEIGHT</u> 5.25 LB	<u>DIMENSIONS</u> 3.00 X 6.76 X 9.1
<u>ILLUMINATION</u> 1.0 ± 0.5 f1	<u>TYPE</u> Pushbutton momentary on
<u>LEGEND SIZE</u> 0.187 in	<u>FORCE</u> 28 ± 8 oz
<u>COLOR</u> IPL WHITE	<u>TRAVEL</u> 0.045 ± .015 in
<u>RANGE/SENSITIVITY</u>	<u>OPERATION</u> Left HAND
	<u>REACH ZONE</u> 3
	<u>NOTES</u> 16 Segment Alphanumeric

GP78 8008 79



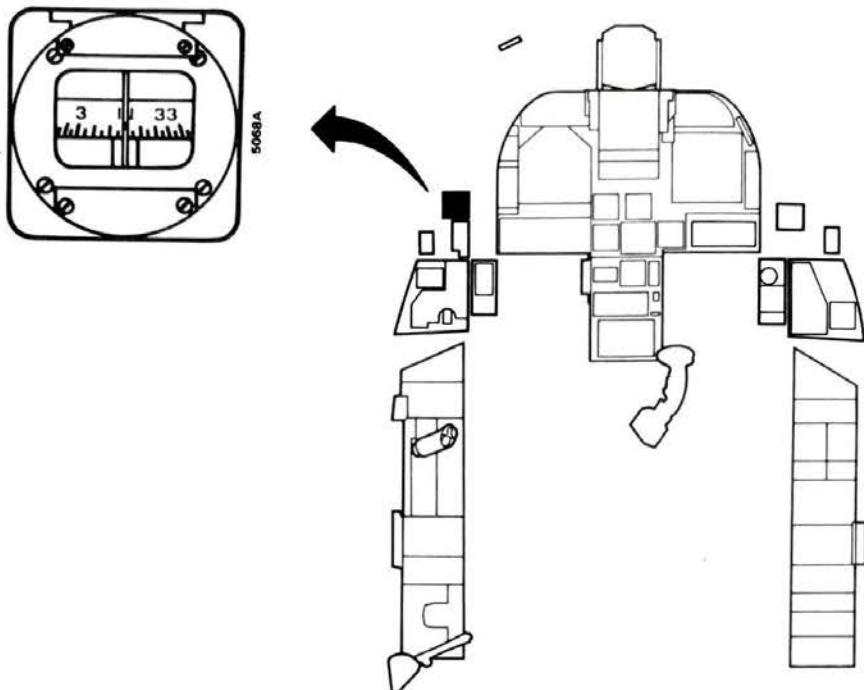
GP01-0820-55

MODE SELECT SWITCHES

<u>DISPLAY FUNCTION</u>		<u>LOCATION RATIONALE</u>	
Selects Air-to-Ground, VSTOL and Navigation master modes.		Must be easily accessible with left hand during maneuvering flight. *	
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	3.0 X 1.25 X 3.0	X BL	10.467
<u>ILLUMINATION</u>	<u>TYPE</u>	Y FS	175.573
300 + 150 f1 day 10 + 5 f1 night	Momentary Pushbutton	Z WL	110.764
<u>LEGEND SIZE</u>	<u>FORCE</u>	<u>DEP TO CENTER</u>	
0.150 in	2-5 lb	TRUE DISTANCE 30.759 IN. TRUE ANGLE 68.42 DEG.	
<u>COLOR</u>	<u>TRAVEL</u>	<u>OPERATION</u>	<u>REACH ZONE</u>
Aviation Green	0.160 + 0.031 in	Left HAND	3
<u>RANGE/SENSITIVITY</u>		<u>NOTES</u>	
A/A mode is selected via the Air-to-Air weapon selector on the stick.			

* See Page 82 for Master Arm Panel

GP78 8008 79

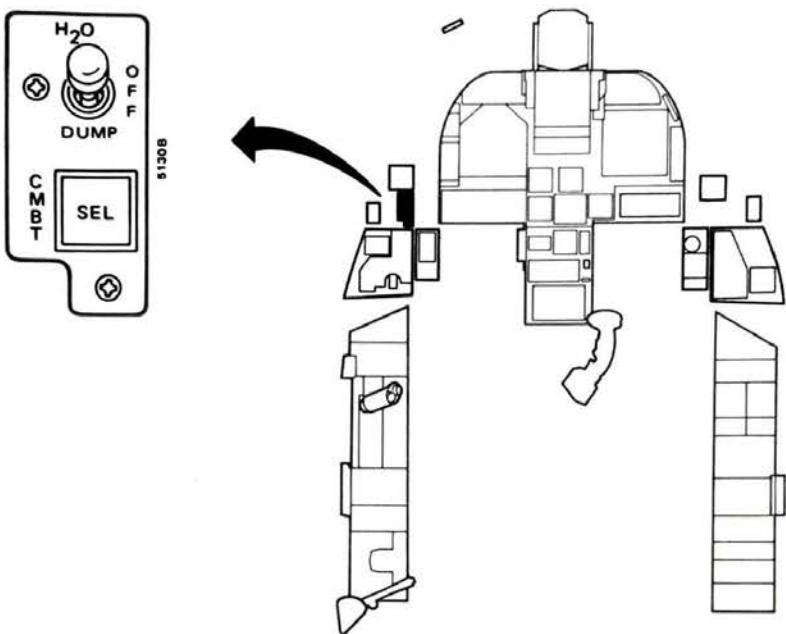


GP01-0820-56

COMPASS

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>	
Standby magnetic direction information.	Compass located for unobstructed viewing.	
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>
LB 2.38	X 2.38 X 3.25	X BL 13.658
<u>ILLUMINATION</u>		Y FS 176.534
1.0 + 0.5 f1		Z WL 107.650
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>
.187		TRUE DISTANCE 32.022 IN.
<u>COLOR</u>		TRUE ANGLE 46.60 DEG.
Blue Filtered		<u>OPERATION</u> - HAND
<u>RANGE/SENSITIVITY</u>		<u>REACH ZONE</u> -
360°		<u>NOTES</u> Fixed pointer/moving scale

GP7B 8008 79



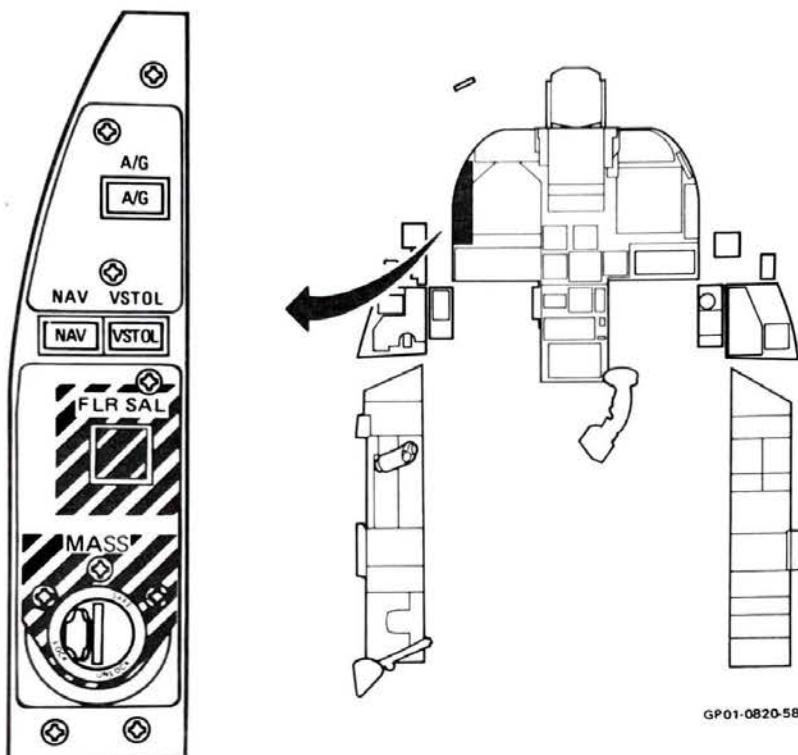
GP01-0820-57

WATER AND COMBAT THRUST PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Water injection system control	Water switch must be easily accessible to the left hand during takeoff.
<u>CONTROL</u>	<u>FUNCTION</u>
H ₂ O/OFF/DUMP CMBT Sel	Controls solenoid valve on water pump and Jettison drain valve. Combat selects allows engine temperature to reach a combat range which is higher than cruise but less than what the JPTL switch off condition would allow.

WATER AND COMBAT THRUST PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
	<u>LB</u> <u>1.25</u> <u>X</u> <u>3.5</u> <u>X</u> <u>2.0</u>	<u>X</u> <u>BL</u> <u>12.0</u> <u>Y</u> <u>FS</u> <u>177.400</u> <u>Z</u> <u>WL</u> <u>104.00</u>	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 \pm 0.5 f1		<u>TRUE DISTANCE</u> <u>33.62</u> IN.	
<u>LEGEND SIZE</u>		<u>TRUE ANGLE</u> <u>44.59</u> DEG.	
.13 \pm 0.01 in.			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		<u>Left</u> <u>HAND</u>	<u>3</u>
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
H ₂ O		3 position lever lock switch (locked out of Dump)	6 lb max (3-5 1b index)
CMBT Sel		Push button alternate action illuminated	2-5 lbs
<u>NOTES</u>			

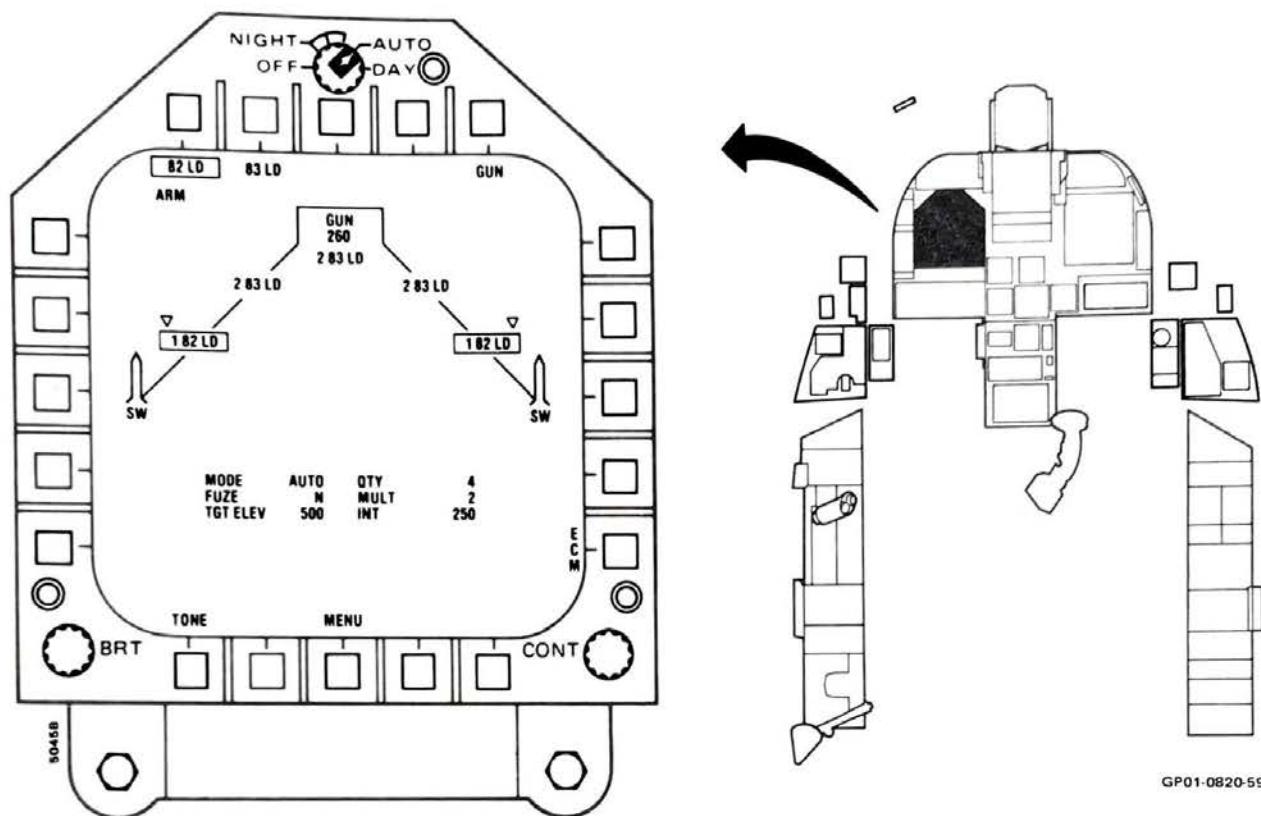


MASTER ARMAMENT PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Master Arm and Aircraft Master Mode Selection	Immediate access to Master Arm dictates left hand operation with harness locked. Other Master Mode functions are grouped nearby.
<u>CONTROL</u>	<u>FUNCTION</u>
MASS	Key locked to safe - rotary switch action from safe to live. Permits preparation of weapon release equipment.
FLR SAL	Salvos all ECM Flares. Refer to page 78 for Mode select switch data.

MASTER ARMAMENT PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB <u>1.85</u>	_____ X <u>3.75</u> X <u>6.5</u>	X BL <u>11.155</u> Y FS <u>175.711</u> Z WL <u>109.043</u>	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
<u>1.0 ± 0.5 f1</u>		<u>TRUE DISTANCE</u> <u>30.922</u> IN. <u>TRUE ANGLE</u> <u>63.50</u> DEG.	
<u>LEGEND SIZE</u>		<u>OPERATION</u> <u>REACH ZONE</u>	
<u>0.13 ± 0.01 in</u>		<u>Left</u> HAND <u>3</u>	
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
MASS		Rotary key locked Locked in Safe	--
		Safe to standby	--
		Standby to live	--
FLR SAL	Momentary push button	2-5 lbs	<u>90°</u> from lock to unlock <u>60°</u> <u>60°</u> <u>0.160 ± 0.031 in.</u>
<u>NOTES</u>			
Refer to Page 78 for Mode Select Switches			



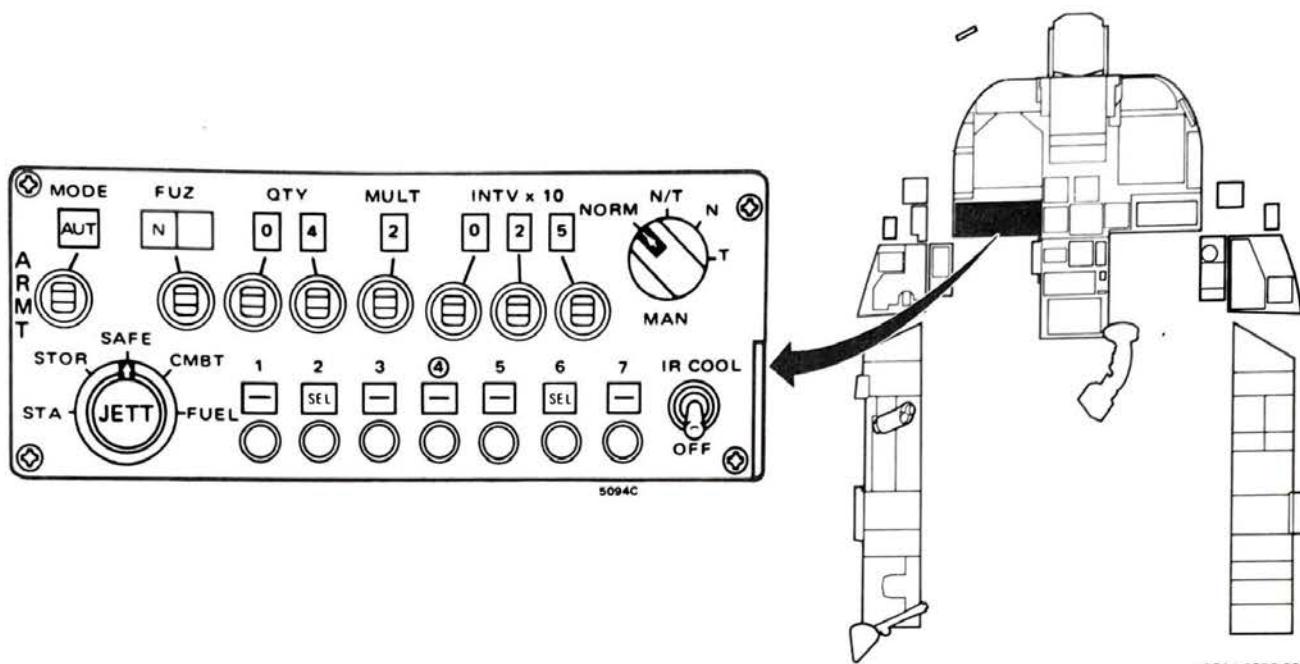
GP01-0820-59

MULTIPURPOSE DISPLAY INDICATOR

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Primary display. Used for weapon programming, sensors, navigation radar warning, BIT, inventory, and weapon select.	Requires excellent visibility and left hand operation during maneuvering.
<u>CONTROL</u>	<u>FUNCTION</u>
DAY/NIGHT/AUTO	Limits contrast and brightness adjustments to ranges for day or night operations or permits automatic adjustment to ambient conditions.
CONT	Adjust contrast.
BRT	Adjust brightness.
PERIMETER PUSHBUTTONS	Messages are electronically written on the face of the MPD adjacent to these pushbuttons. Depression informs mission computer of pilot's choice among options.

MULTIPURPOSE DISPLAY INDICATOR
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	<u>19.5</u> LB <u>7.00</u> X <u>6.70</u> X <u>15.00</u>	X BL <u>6.820</u> Y FS <u>175.589</u> Z WL <u>109.868</u>	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
<u>1.0 + 0.5 f1</u>		<u>TRUE DISTANCE</u> <u>29.302</u> IN. <u>TRUE ANGLE</u> <u>70.07</u> DEG.	
<u>LEGEND SIZE</u>			
<u>0.13 + 0.01</u> in			
COLOR		OPERATION	REACH ZONE
	IPL WHITE	<u>Left</u> HAND	<u>3</u>
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
DAY/NIGHT/AUTO	6 Pos Rotary Switch	<u>16 + 6</u> in oz	Approx 192°
CONT	Variable Trans-former	0.5-6.0 in oz	Approx 300°
BRT	Variable Trans-former	0.5-6.0 in oz	Approx 300°
Perimeter Push Buttons	Momentary Push-button	<u>25 + 5</u> oz	Max 0.062 in
NOTES			



ARMAMENT CONTROL PANEL

GP01-0820-60

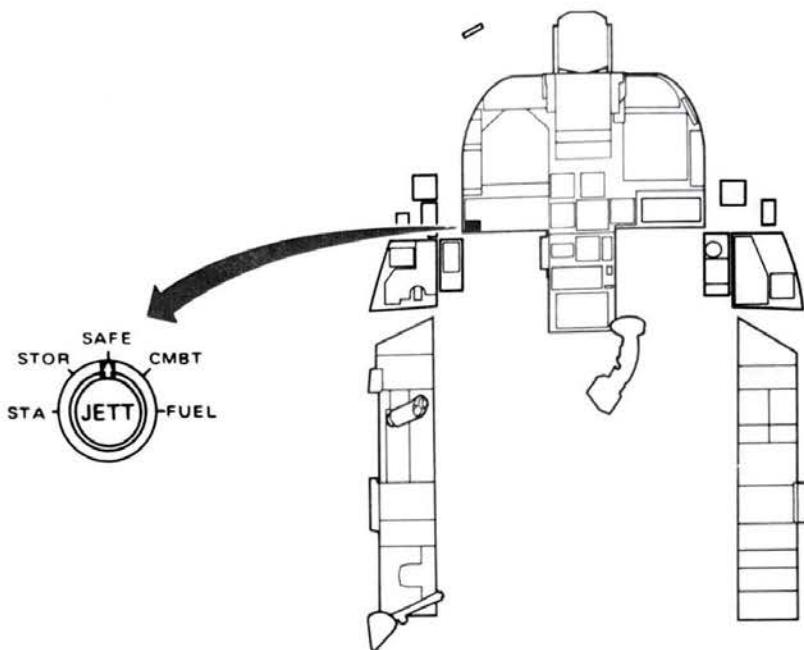
<u>PANEL FUNCTION</u>		<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>	
MODE	Displays and permits entry of weapon delivery mode - AUTO, CCIP, Depressed Sight Line (DSL), and AGM-65.	This panel requires good visibility and left hand operation.
FUZING	Displays and permits entry variable mechanical or electronic weapon fusing, or combination of each.	
QTY	Displays and permits entry of the total number of weapons to be released.	
MULT	Displays and permits entry of the number of weapons to be released simultaneously.	
INTV	Displays and permits entry of the desired weapon impact spacing across the ground (weapon release interval in DSL mode).	

ARMAMENT CONTROL PANEL
(CONTINUED)

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>
TGT HGT	Displays and permits entry of barometric target height (MSL).
STATION SELECTION (seven pushbuttons labeled OUT, INT, IN, CL, etc).	Displays station selected in AUTO/CCIP. Permits pilot station selection when in DSL or Selective Jettison is in the STA or STOR Position.
MAN	Selects back up mode and back up mechanical fuzing
IR COOL	Provides pre-cooling for Sidewinders.

ARMAMENT CONTROL PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
<u>6.1 LB</u>	<u>5.38 X 8.50 X8.00</u>	<u>X BL 7.560</u>	
<u>ILLUMINATION</u>		<u>Y FS 174.941</u>	
<u>1.0 ± 0.5 f1</u>		<u>Z WL 130.009</u>	
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
<u>0.14 ± 0.01 in</u>		<u>TRUE DISTANCE 33.975 IN.</u>	
<u>COLOR</u>		<u>TRUE ANGLE 62.63 DEG.</u>	
<u>IPL WHITE</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
		<u>Left HAND</u>	<u>3</u>
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
MODE		Activated by Spring Loaded Toggle Switch	2.5 lb
FUZING		"	"
QTY		"	"
MULT		"	"
INTV		"	"
TGT HGT		"	"
STATION SELECTION		Activated by Push-button	3.5 ± 1.5 lb
MAN		Rotary Switch	7 in lbs
IR COOL		3-display 2 Position Toggle Switch	4.5 lb
DIM		Variable Transformer	2.5 in lb
<u>NOTES</u>			
Refer to Page 89 for Jettison functions.			



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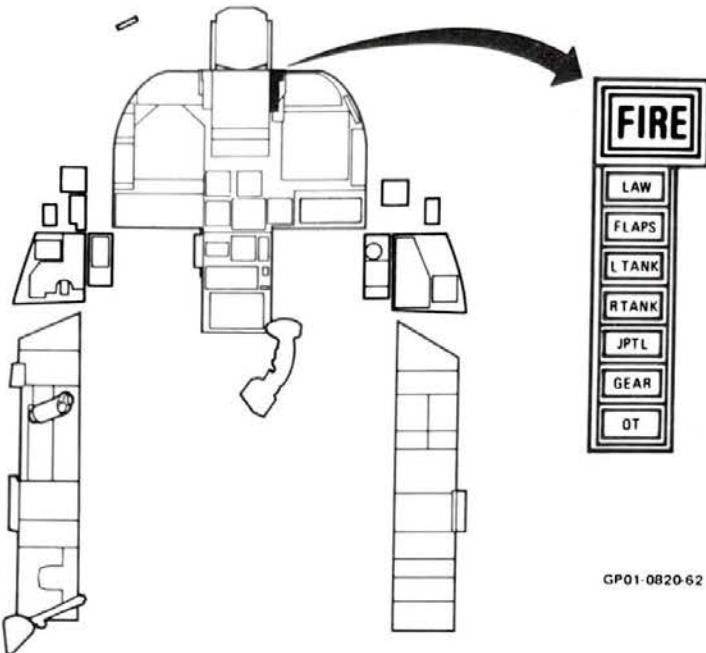
SELECTIVE JETTISON SWITCH

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Depression activates the jettisoning of the selected stations or stores.	Easily accessible and functionally located with related weapon control functions.
<u>CONTROL</u>	<u>FUNCTION</u>
SAFE	In this position the selective jettison switch circuitry is not activated.
STOR	Depression of the SEL Jettison with switch in STOR jettisons the stores from selected stations. The Triple Ejector Racks (TER) are retained.
STA	Depression of SEL Jettison with switch in STA jettisons stores from the parent rack.
CMBT	Depression of SEL Jettison with switch in CMBT jettisons all A/G ordnance. A/A weapons remain.
FUEL	Depression of the SEL Jettison with switch in FUEL jettisons all external Fuel Tanks.

GP78 8008 78

**SELECTIVE JETTISON SWITCH
(CONTINUED)**

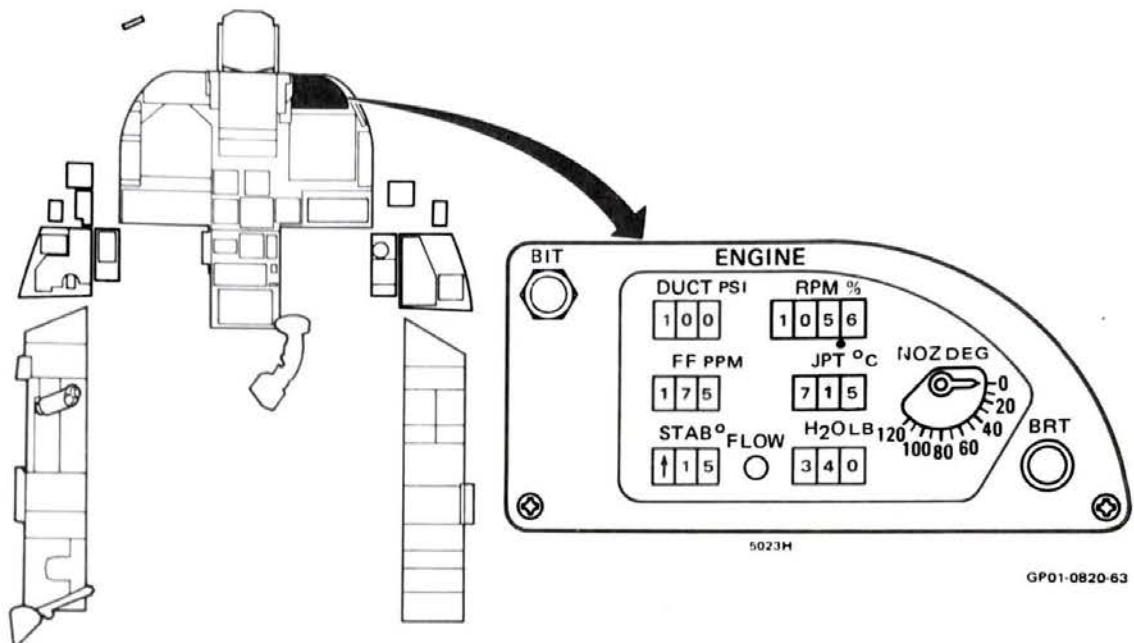
CHARACTERISTICS			
<u>WEIGHT</u>	<u>DIMENSIONS</u>		<u>LOCATION</u>
	LB 1.50 dia X 4.28 X		X BL 10.47 Y FS 176.343 Z WL 102.494
<u>ILLUMINATION</u>	1.0 + 0.5 f1		<u>DEP TO CENTER</u>
<u>LEGEND SIZE</u>	0.13 + 0.01 in		TRUE DISTANCE 34.078 IN. TRUE ANGLE 58.23 DEG.
<u>COLOR</u>	IPL WHITE		<u>OPERATION</u> <u>REACH ZONE</u>
			Left HAND 1
INDIVIDUAL CONTROLS		TYPE	FORCE
Selective Jettison Select		5 Pos Rotary Switch	Rotate: 5 in 1b 360°
Selective Jettison		Pushbutton	Push: 2.5-4.5 lb 0.25 + 0.025 in
NOTES			

**WARNING LIGHTS**

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Indicates Critical Aircraft System Status.	Significance of these indications warrants a location high in the forward field of view. Most are time critical.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
_____ LB	4.2 X 1.25 X 6.5
<u>ILLUMINATION</u>	
300 + 150 f1 Day 10 + 5 f1 Night	
<u>LEGEND SIZE</u>	<u>FIRE LIGHT IS</u>
0.140 in	0.300
<u>COLOR</u>	<u>OPERATION</u>
All lights are aviation red.	HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u>

	<u>NOTES</u>
	Transilluminated

GP78 8008-79

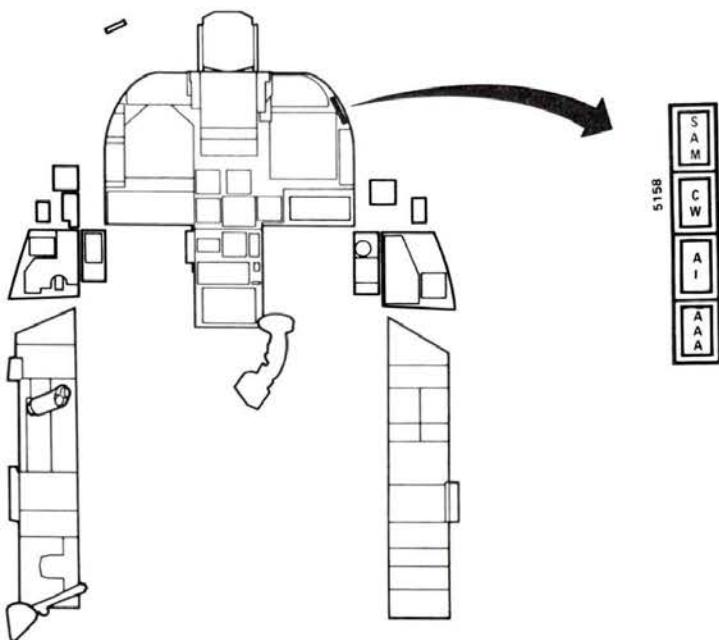


ENGINE DISPLAY PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Presents Engine Parameters, Nozzle Angle and Stabilator Position	The grouping of these displays reduces the pilot's scan pattern during critical phases of flight. The high location enhances visibility.
<u>CONTROL</u>	<u>FUNCTION</u>
RPM %	Displays N ₁ speed from 0.0% to 110.0%.
DUCT PSI	Displays reaction control duct pressure.
JPT °C	Displays exhaust gas temperature 0°C to 800°C.
FF PPM	Displays fuel flow in pounds per minute.
H ₂ O LB	Displays water quantity up to 600 lb.
H ₂ O FLOW LIGHT	Advisory light illuminates during water flow.
STAB DEG	Stabilator position indicator.
NOZ DEG	Analog display of nozzle position 0-120°.
BIT	Built-in-test for panel.
BRT	Illumination control for panel.

ENGINE DISPLAY PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
4.8 LB	3.125 X 6.75 X 8.00	X BL	-6.422
<u>ILLUMINATION</u>		Y FS	173.868
1.0 + 0.5 f1		Z WL	115.070
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
.16 + 0.01 in		TRUE DISTANCE	28.467 IN.
		TRUE ANGLE	76.44 DEG.
COLOR	<u>OPERATION</u>		<u>REACH ZONE</u>
IPL WHITE	Right HAND		2
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
RPM %	Digital Readout	N/A	N/A
H ₂ O LB	Digital Readout		
JPT °C	Digital Readout		
FF PPM	Digital Readout		
DUCT PSI	Digital Readout		
H ₂ O FLOW	Advisory Light		
NOZ DEG	Analog Pointer		
BIT	Mom. Pushbutton	20 in oz	0.2 + .002
STAB POS	Digital Readout	N/A	N/A
BRT	Variable Transformer	2.0 in 1b	240°
NOTES			
1. N ₂ can be displayed on the MPD or HUD for acceleration checks.			

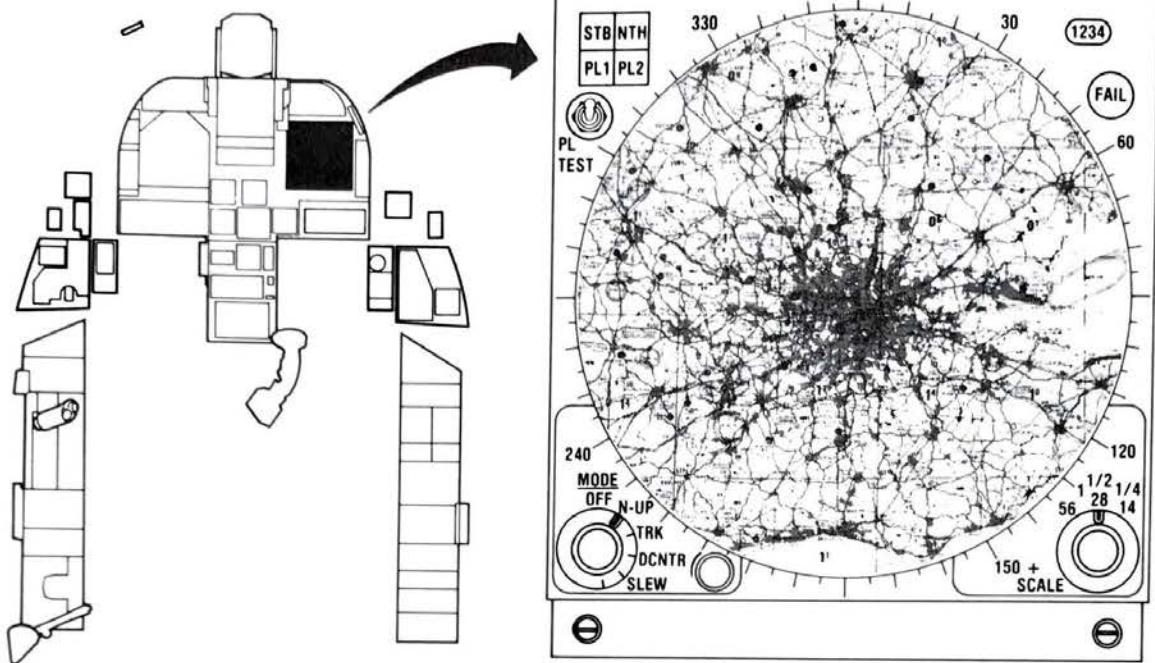


GP01-0820-108

THREAT LIGHTS

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
ECM Threat Lights	Significance of these indications warrants a location high in the forward field of view. They are time critical.
<u>WEIGHT</u> -- LB 0.5	<u>DIMENSIONS</u> X 3 X 1.5
<u>ILLUMINATION</u> 300 + 150 f1 day 10 + 5 f1 night	<u>LOCATION</u> X BL -10.138 Y FS 176.308 Z WL 113.720
<u>LEGEND SIZE</u> 0.140	<u>DEP TO CENTER</u> TRUE DISTANCE 27.921 IN. TRUE ANGLE 73.926 DEG.
<u>COLOR</u> All lights are aviation red	<u>OPERATION</u> HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u> NOTES Transilluminated

GP78 8008 79



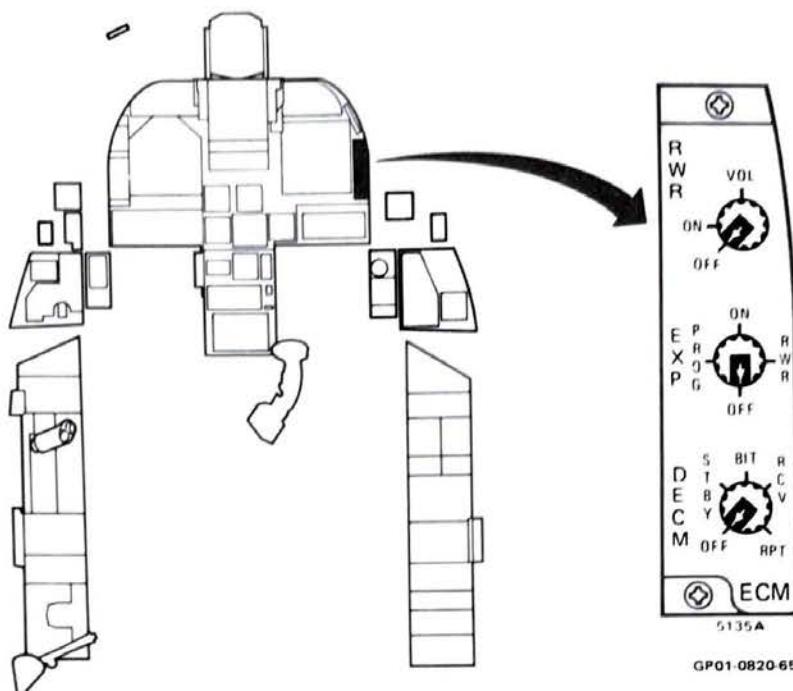
TORNADO REPEATER MAP DISPLAY (TRMD)

GP01 0820-64

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Primary display. Used for navigation.	High on the main instrument panel for easy access and excellent visibility.
<u>CONTROL</u>	<u>FUNCTION</u>
Mode	Mode select switch from off to North-up, Track, Decentered, and slew.
Test Switch	Projection lamp test switch.
Indicator	Distance to go to selected destination.
Fail Light	Illuminates at failed condition.
Scale	Map scale factors as selected.
Small Knob	Display brightness.

TORNADO REPEATER MAP DISPLAY
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
19.29 LB	6.73 X 6.73 X 13.85	X BL	-7.227
<u>ILLUMINATION</u>		Y FS	175.440
1.0 ± 0.5 f1		Z WL	109.721
<u>LEGEND SIZE</u>		DEP TO CENTER	
0.13 ± 0.01 in		TRUE DISTANCE	29.597 IN.
<u>COLOR</u>		TRUE ANGLE	69.555 DEG.
IPL WHITE		OPERATION	REACH ZONE
		Left HAND	3
INDIVIDUAL CONTROLS		TYPE	FORCE
Mode	10 position rotary		144° approx.
Test Switch	2 pos momentary toggle switch	6 in lbs max	17 ± 4°
Indicator	Distance advisory light		
Fail	Advisory light		
Scale Selector	10 position rotary		72° approx.
Knob	Varies display brightness.		270° approx.
NOTES			

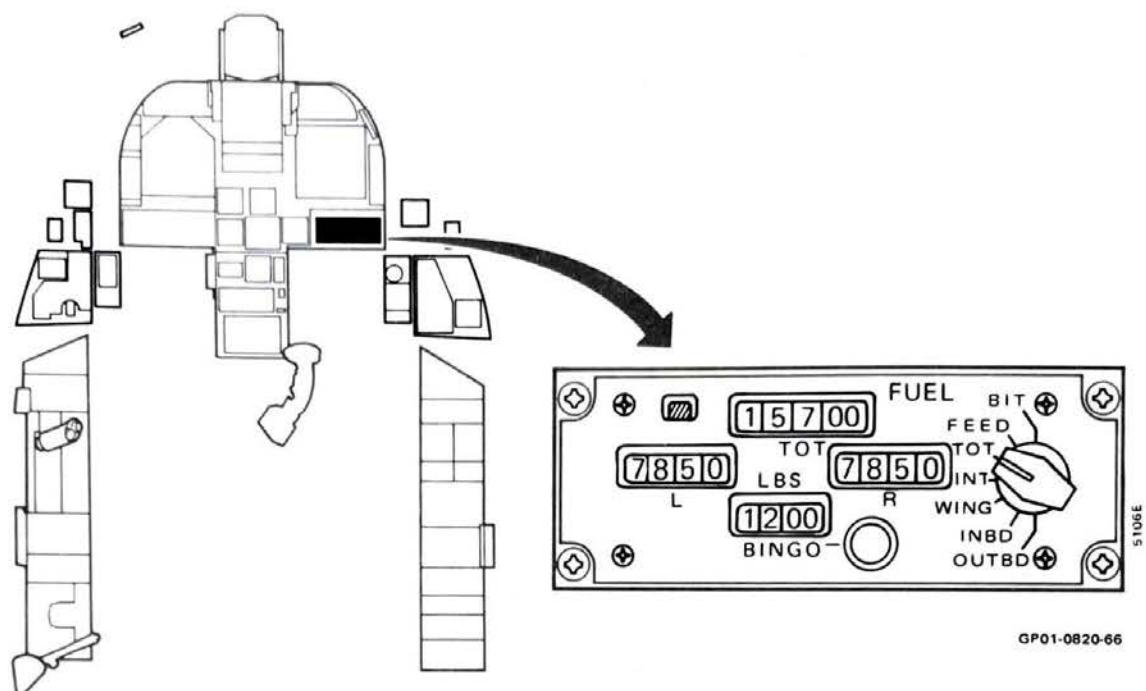


ECM PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
ECM Mode Selectors	Location permits good visibility and accessibility during flight.
<u>CONTROL</u>	<u>FUNCTION</u>
RWR	Radar warning mode and volume control variable.
EXP.	Dispenser mode control
DECM	Mode select

ECM PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
-- LB	1.5 X 5.3 X 4.0	X BL -11.155 Y FS 175.711 Z WL 109.043	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 ± 0.5 f1		TRUE DISTANCE 30.921 IN. TRUE ANGLE 63.498 DEG.	
<u>LEGEND SIZE</u>			
0.13 ± 0.01 in.			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Right HAND	1
INDIVIDUAL CONTROLS		TYPE	FORCE
RWR		Rotary switch and variable transformer	270° approx.
EXP.		Rotary switch	360°
DECM		Rotary switch	270°
<u>NOTES</u>			

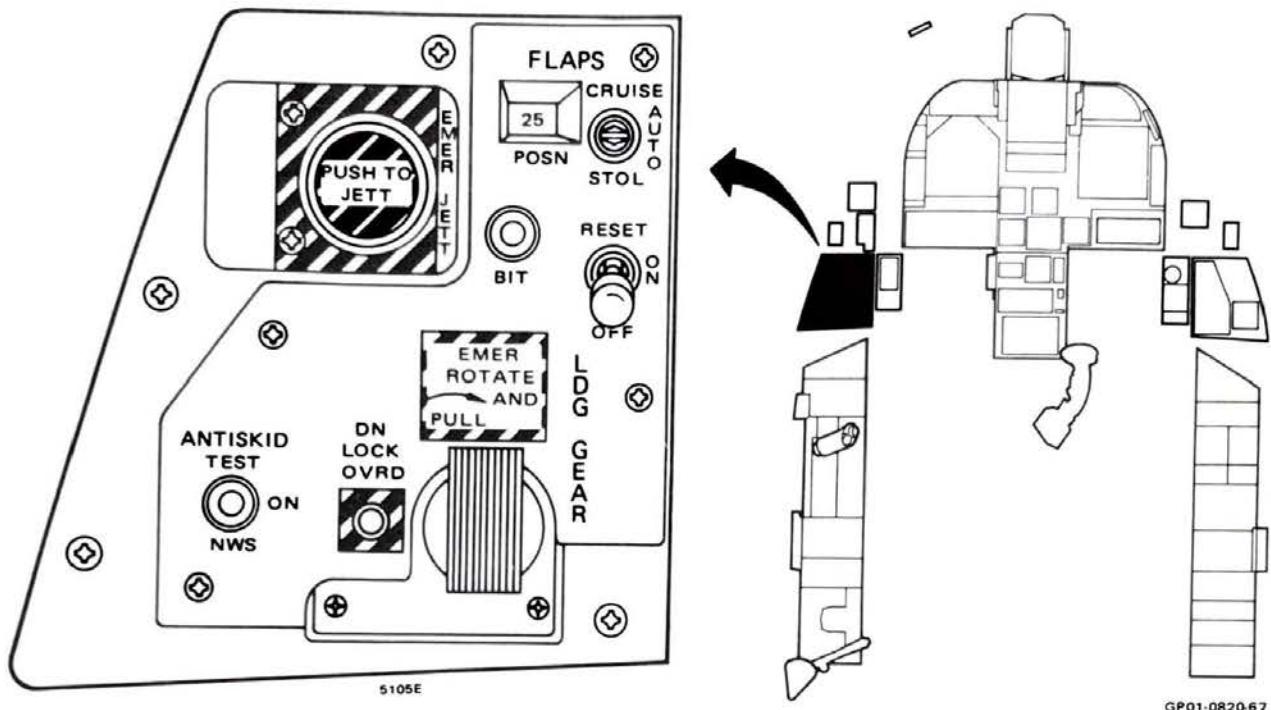


FUEL QUANTITY INDICATOR UNIT

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Digital Fuel Indication	Easily accessible and good visibility.
<u>CONTROL</u>	<u>FUNCTION</u>
TOTAL/LEFT/RIGHT	Displays total and individual tank quantity in conjunction with rotary switch position.
Rotary Selector	Selects the appropriate tanks to be displayed on right or left digital readout and initiates BIT.
BINGO	Rotation of this knob sets appropriate BINGO fuel quantity in the adjacent readout.

FUEL QUANTITY INDICATOR UNIT
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB <u>2.25</u> X <u>5.75</u> X <u>6.50</u>	X BL _____ Y FS <u>174.985</u> Z WL <u>102.866</u>	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 <u>± 0.5</u> f1		<u>TRUE DISTANCE</u> <u>34.212</u> IN. <u>TRUE ANGLE</u> <u>61.851</u> DEG.	
<u>LEGEND SIZE</u>			
0.13 <u>± 0.01</u> in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Right HAND	<u>3</u>
INDIVIDUAL CONTROLS		TYPE	FORCE
TOTAL/RIGHT/LEFT		Magnetic wheels	N/A
Rotary Selector		Modified 12 Position Knob	15 in oz
BINGO		Rotary Continuous	2-10 in oz
<u>NOTES</u>			
1. When total fuel equals BINGO setting the pilot is alerted by a caution light. 2. Fuel jettison is automatically terminated when fuel quantity reaches BINGO setting.			

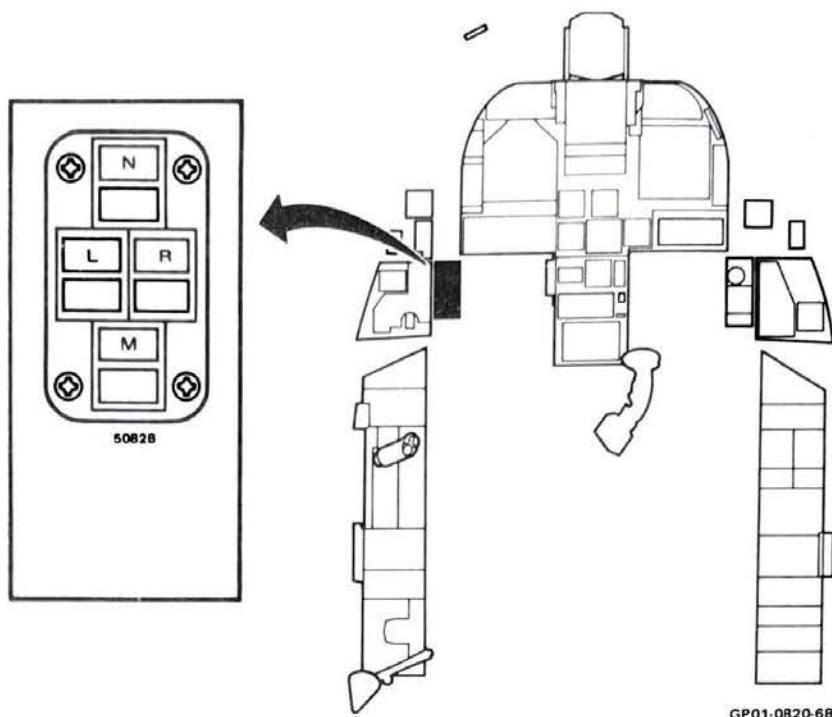


LANDING GEAR AND FLAP CONTROL PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Landing Gear and Flap Control	Left hand operation and 3rd percentile panel reach considerations dictate location.
<u>CONTROL</u>	<u>FUNCTION</u>
ANTI SKID	Tests and turns on and off anti skid system. With anti skid off nosewheel steering is automatically engaged.
DN LOCK OVRD	Overrides gear down switch that prevents the handle from being raised with the weight on the wheels.
FLAP SWITCH	Energizes and resets flap control system.
LANDING GEAR/ LDG GEAR EMER EXTENSION	Controls gear up or down depending on position. Rotate and Pull
FLAP LEVER	Controls position of trailing edge flaps.
EMER JETT BIT	Refer to Page 105 Check Gear Light

LANDING GEAR AND FLAP CONTROL PANEL
(CONTINUED)

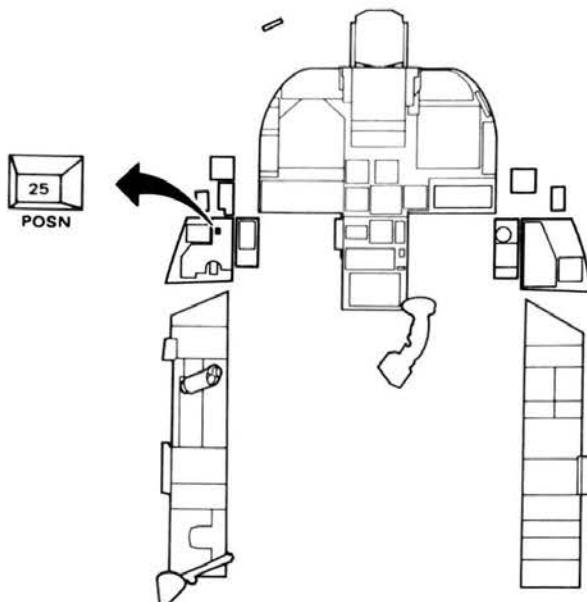
<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	_____ X _____ X _____	X BL	13.526
		Y FS	181.054
		Z WL	98.195
<u>ILLUMINATION</u>	1.0 + 0.5 f1	<u>DEP TO CENTER</u>	
<u>LEGEND SIZE</u>	0.14 + 0.01 in	<u>TRUE DISTANCE</u> 35.321 IN. <u>TRUE ANGLE</u> 59.13 DEG.	
<u>COLOR</u>	IPL WHITE	<u>OPERATION</u>	<u>REACH ZONE</u>
		Left HAND	2
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
ANTISKID/NWS		3 Pos Toggle Switch	3-5 1b
DN LOCK OVRD		Momentary Push-button	2 lb
FLAP SWITCH		3 Pos Toggle Switch	3-5 1b
LANDING GEAR	Lever		8 + 3 1b
LANDING GEAR EMER	Lever		10 - 20 1b 20 1b
FLAP LEVER	3 Pos Lever Lock Switch	3-5 1b max 6 lb max	26.5 + 5°
BIT	Momentary Push-button	20 + 0.1 oz	0.07 + 0.015
<u>NOTES</u>			
1. Rotating and pulling landing gear handle enables emergency gear extension.			



LANDING GEAR POSITION LIGHTS

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
<p>1 Top Lights - Green - Lighted Indicate Gear Down & Locked</p> <p>2 Bottom Lights Yellow Indicate Gear not in Position Selected or in Transit</p>	Located adjacent to associated gear control.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
LB 2.25	X 6.0 X 4.0
<u>ILLUMINATION</u>	<u>LOCATION</u>
300 + 150 ft day 10 + 5 f1 night	X BL 12.114 Y FS 175.540 Z WL 97.845
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u>
0.140 in	TRUE DISTANCE 38.305 IN. TRUE ANGLE 44.96 DEG.
<u>COLOR</u>	<u>OPERATION</u>
AVIATION GREEN AVIATION YELLOW	Left HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u>
	—
	<u>NOTES</u>
	Transilluminated

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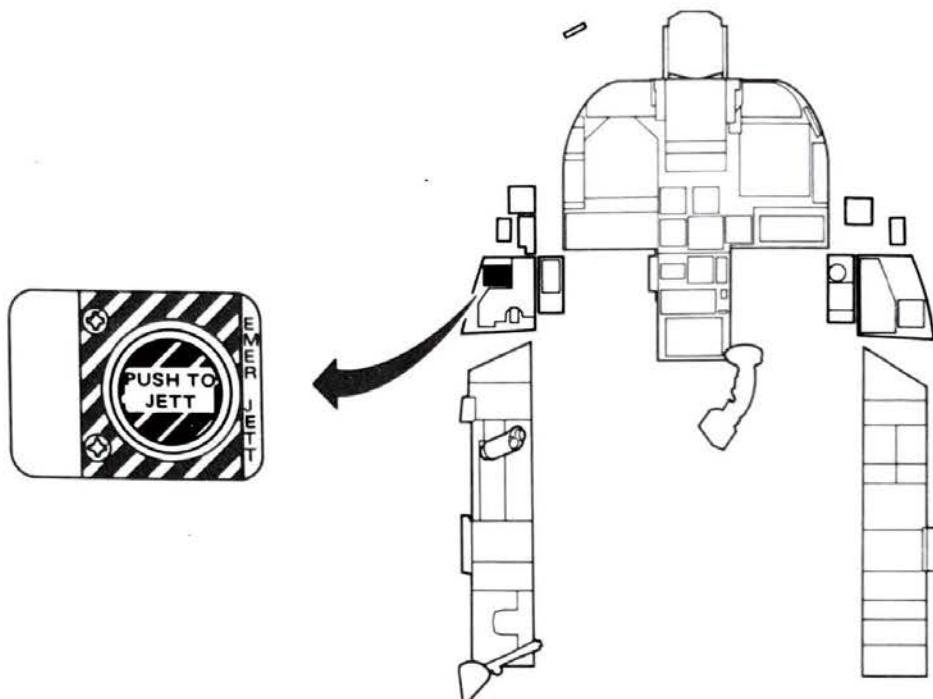


GP01-0820-69

FLAP POSITION INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>	
Indicates flap position in degrees.	Located adjacent to associated flap controls.	
<u>WEIGHT</u> ____ LB <u>DIMENSIONS</u> ____ X ____ X ____	<u>LOCATION</u> X BL 13.024 Y FS 180.048 Z WL 100.198	
<u>ILLUMINATION</u> 1.0 + 0.5 f1	<u>DEP TO CENTER</u> TRUE DISTANCE 34.204 IN. TRUE ANGLE 62.41 DEG.	
<u>LEGEND SIZE</u> 0.13	<u>OPERATION</u> ____ HAND	
<u>COLOR</u> IPL WHITE	<u>REACH ZONE</u> ____	
<u>RANGE/SENSITIVITY</u> 0 to 60° Flaps	<u>NOTES</u> Magnetic Wheel	

GP78-8008-79

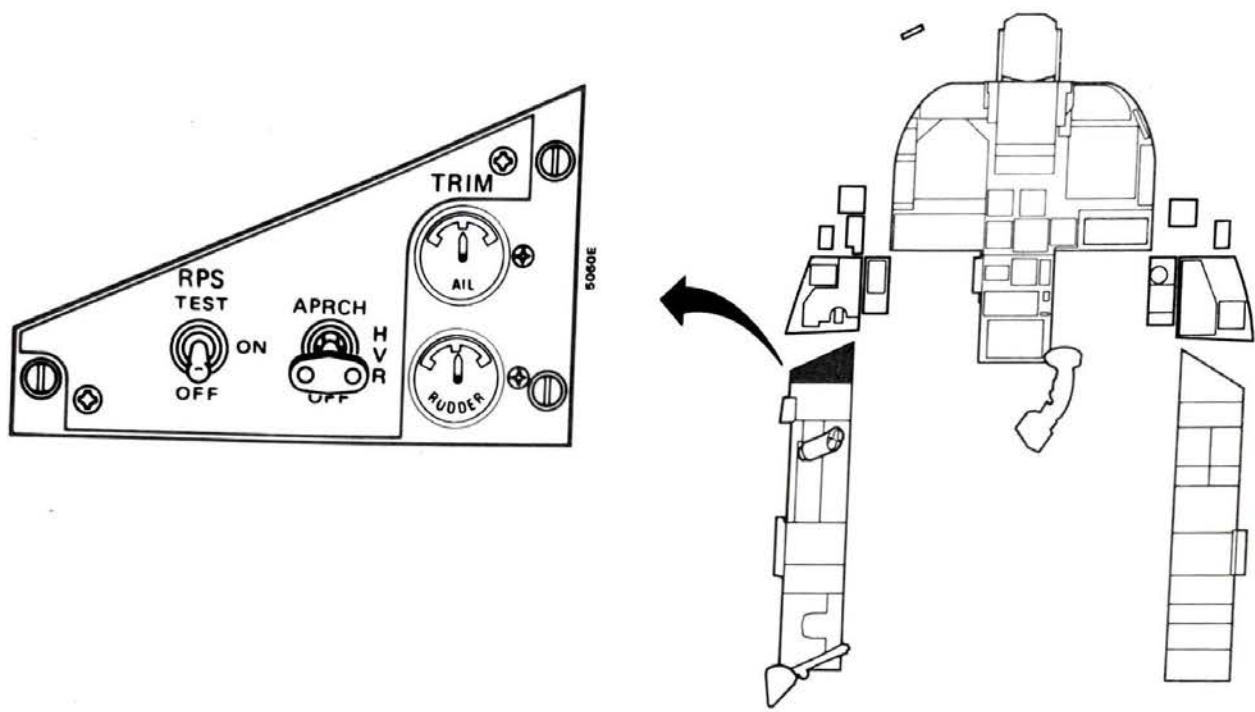


GP01 0820-70

EMERGENCY JETTISON SWITCH

<u>DISPLAY FUNCTION</u>		<u>LOCATION RATIONALE</u>	
Jettisons all external stores except pylons, fuselage gun pods and Sidewinders (station 1/7).		Must be left hand operable by the third percentile pilot while fully restrained by the harness.	
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
____ LB	X ____ X ____	X BL	14.015
<u>ILLUMINATION</u>	<u>TYPE</u>	Y FS	182.025
1.0 \pm 0.5 f1	Pushbutton momentary	Z WL	99.996
<u>LEGEND SIZE</u>	<u>FORCE</u>	<u>DEP TO CENTER</u>	
0.16 \pm 0.01 in	7 \pm 1 lb	TRUE DISTANCE 33.653 IN.	
<u>COLOR</u>	<u>TRAVEL</u>	TRUE ANGLE 59.64 DEG.	
CAUTION YELLOW	0.34 \pm 0.03 in	<u>OPERATION</u>	<u>REACH ZONE</u>
<u>RANGE/SENSITIVITY</u>		LEFT HAND	2
<u>NOTES</u>		Button is guarded recessed 0.51 \pm 0.03 in	

GP78 8008 79



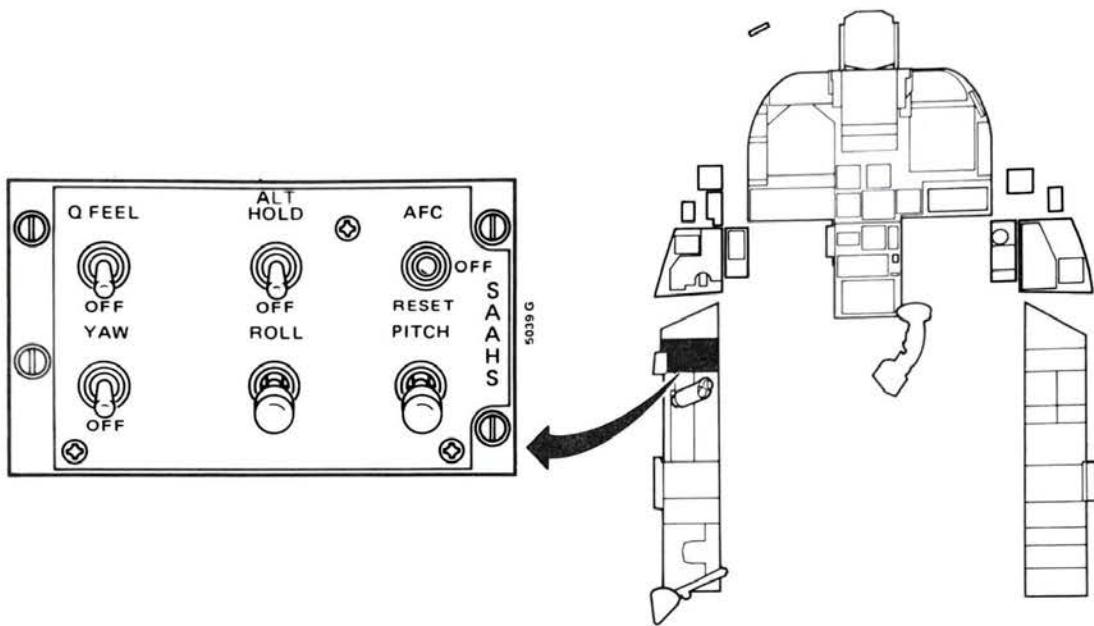
GP01-0820-71

TRIM POSITION INDICATOR PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Trim indication, rudder pedal test and approach light control.	Trim indicators require ready reference for cross check during V/STOL.
<u>CONTROL</u>	<u>FUNCTION</u>
AILERON	Trim position indicator.
RUDDER	Trim position indicator.
APRCH	Activates approach and hover lights.
RPS TEST	Yaw system warning test - shakes appropriate rudder pedal when RPS-ON rudder depressed.

TRIM POSITION INDICATOR PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
	<u>LB</u> <u>3.65</u> <u>X</u> <u>5.75</u> <u>X</u> <u>6.0</u>	<u>X</u> <u>BL</u> <u>13.905</u> <u>Y</u> <u>FS</u> <u>183.607</u> <u>Z</u> <u>WL</u> <u>94.717</u>	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 \pm 0.5 f1		<u>TRUE DISTANCE</u> <u>36.967</u> IN. <u>TRUE ANGLE</u> <u>59.08</u> DEG.	
<u>LEGEND SIZE</u>			
0.14 \pm 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		<u>Left HAND</u>	<u>2</u>
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
AIL		Fixed Scale/ Moving Pointer	N/A <u>45</u> \pm <u>10</u> $^{\circ}$
RUDDER		Fixed Scale/ Moving Pointer	N/A <u>45</u> \pm <u>10</u> $^{\circ}$
APRCH		3 Pos Toggle Switch Flat Bat Top	4-6 lb <u>26</u> \pm <u>4</u> $^{\circ}$
RPS TEST		3 Pos Toggle Switch	3-5 lb 6 lb max <u>17</u> \pm <u>4</u> $^{\circ}$
<u>NOTES</u>			



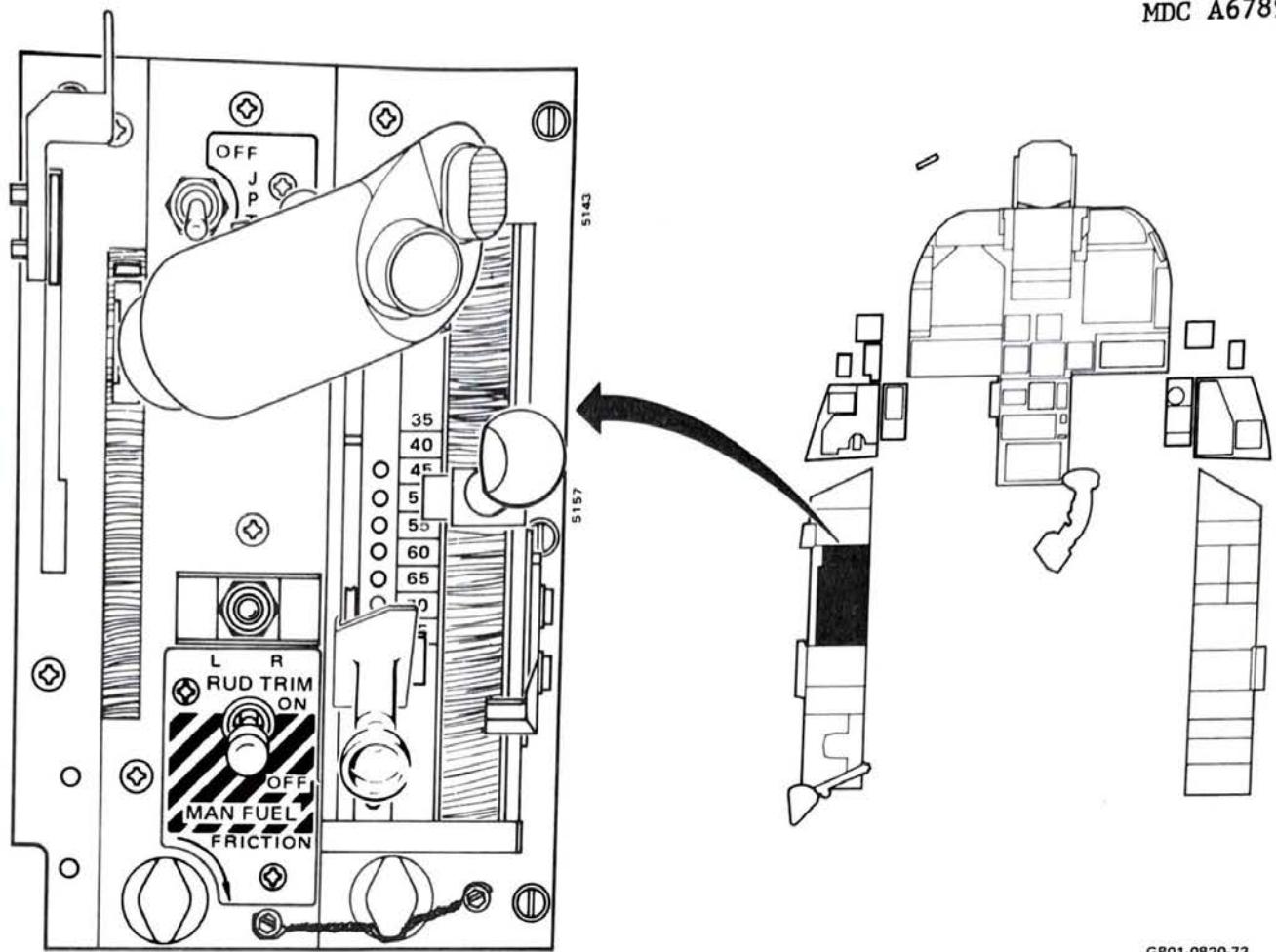
STABILITY AUGMENTATION/ATTITUDE HOLD PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Stability Augmentation and Attitude Hold Control	Although the primary SAAHS/SAS disengage is on the control stick, the autopilot panel controls require easy operation.
<u>CONTROL</u>	<u>FUNCTION</u>
Q FEEL	Provides pilot with increased stick feel force with increasing airspeed.
ALT HOLD	Engages ALT Hold (if AFC selected on)
AFC	Engages pilot relief modes except ALT HOLD (if all SAS modes selected)
YAW	SAS Yaw engage
ROLL	SAS Roll engage coupled with yaw (yaw off-roll off)
PITCH	SAS Pitch engage pitch off Att hold off

STABILITY AUGMENTATION/ATTITUDE HOLD PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB 3.38 X 5.75 X 6.50	X BL 13.905 Y FS 186.451 Z WL 94.417	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 \pm 0.5 f1		TRUE DISTANCE 36.066 IN.	
<u>LEGEND SIZE</u>		TRUE ANGLE 61.56 DEG.	
0.13 \pm 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Left HAND	3
INDIVIDUAL CONTROLS			
TYPE		FORCE	TRAVEL
Q FEEL		28 \pm 8 oz	16 \pm 1°
ALT HOLD		3 lb	17 \pm 4°
AFC		Rel: 3-5 lb	16.5 \pm 0.5°
YAW		28 \pm 8 oz	16 \pm 1°
ROLL		28 \pm 8 oz	16 \pm 1°
PITCH		Rel: 3-5 lb operates: 6 lb	16.5 \pm 0.5°
NOTES			

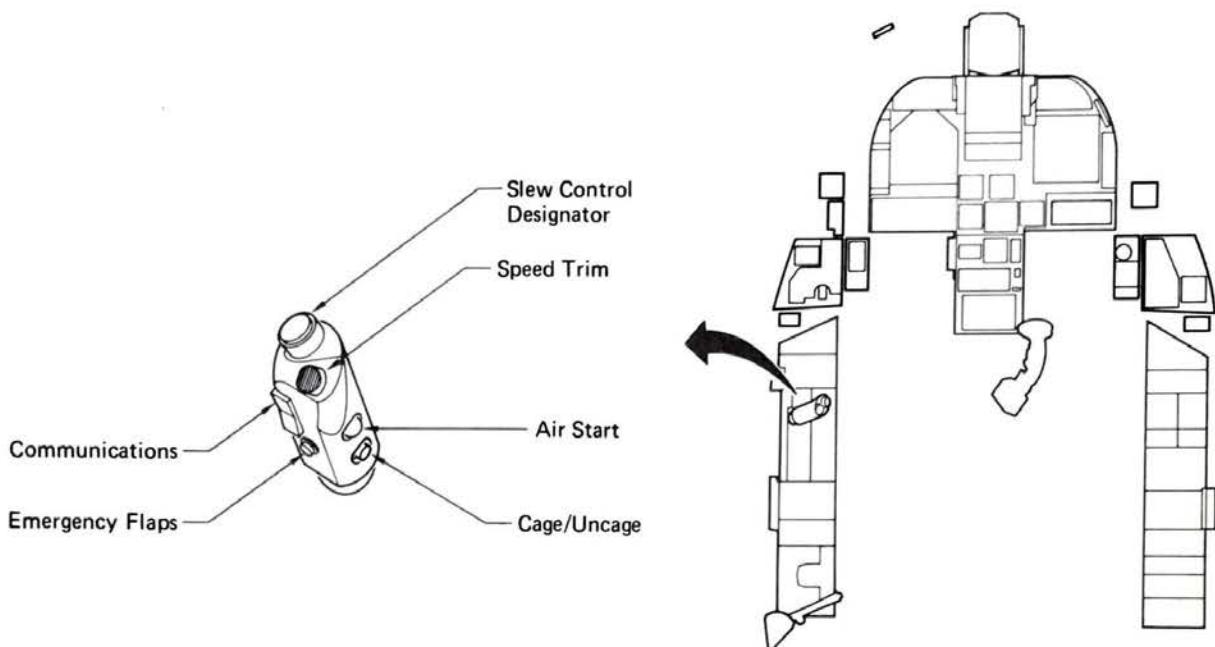


THROTTLE/NOZZLE CONTROL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Thrust management and directional control.	Conventionally located for left hand operation by 3rd through 98th percentile pilots.
<u>CONTROL</u>	<u>FUNCTION</u>
THROTTLE	Thrust Control
NOZZLE	Controls nozzle position (Thrust direction)
RUDDER TRIM	Yaw trim control
MANUAL FUEL	Allows fuel to bypass all automatic features of the fuel control unit and permits engine speed to be controlled with only the throttle.
JPTL	Jet pipe temperature limiter switch
PARKING BRAKE	Interlocked with throttle idle setting
FRICITION	Controls Throttle/Nozzle friction levels.

THROTTLE/NOZZLE CONTROL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB 9.00	X 5.75 X _____	X BL 13.905 Y FS 193.350 Z WL 93.690	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 \pm 0.5 f1		TRUE DISTANCE 34.771 IN.	
<u>LEGEND SIZE</u>		TRUE ANGLE 65.80 DEG.	
0.13 \pm 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Left HAND	2
<u>INDIVIDUAL CONTROLS</u>			
THROTTLE	Lever	4-30 1b	
NOZZLE	Lever	4-30 1b	
RUDDER TRIM	3 Pos Toggle Spring Loaded	8 lb max	36 \pm 7°
MANUAL FUEL	2 Position Lever Lock Toggle	Rel: 3-6 1b OP: 8 1b max	21.5 \pm .06°
JPTL	2 Position Toggle Switch	28 \pm 8 oz	16 \pm 1°
<u>NOTES</u>			



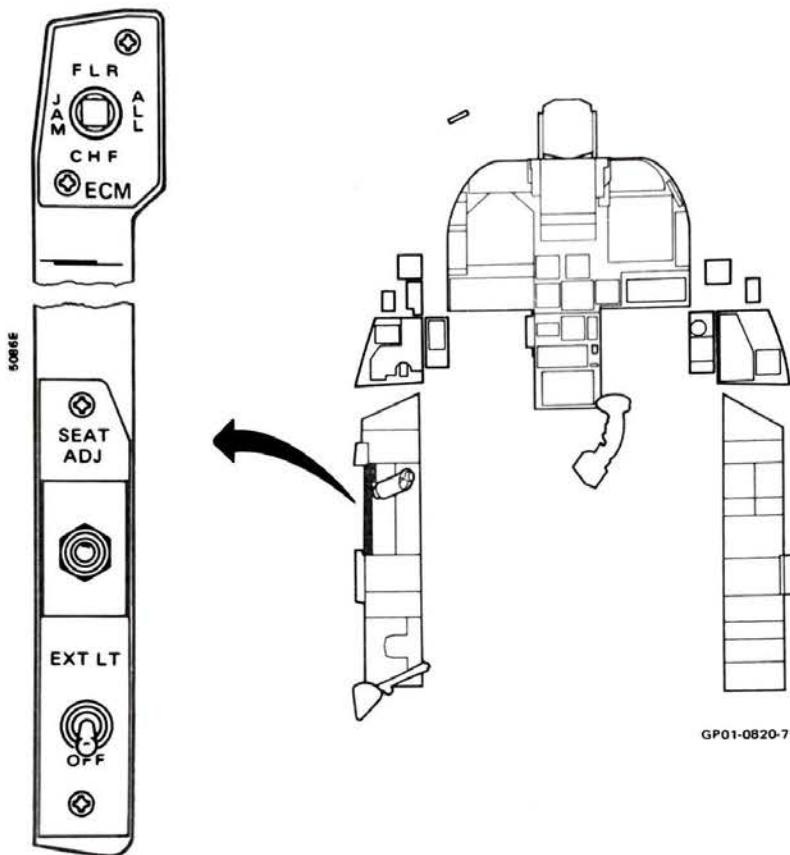
THROTTLE

GP01-0820-74

<u>PANEL FUNCTION</u>		<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>	
Thrust Control		Conventionally located for left hand operation by 3rd through 98th percentile pilots.
Communication	Selects transmission on Comm 1, 2, and both.	
Cage/Uncage	Enables control of SW and Gun reticle, commands Sidewinder Lock-on and returns AGMGS to ALIGN after break lock.	
Flaps	Actuates maneuver flaps.	
Slew Controller/ Designator	Provides X and Y outputs for sensor control. The depressed (action) position is used primarily for target designation functions.	
Airstart	Provides astart ignition while the button is pushed.	
Finger Lift	Pulling up allows the throttles to be moved to cut off.	
Speed Trim	May be used as brake or speed trim in VTOL approach or takeoff.	

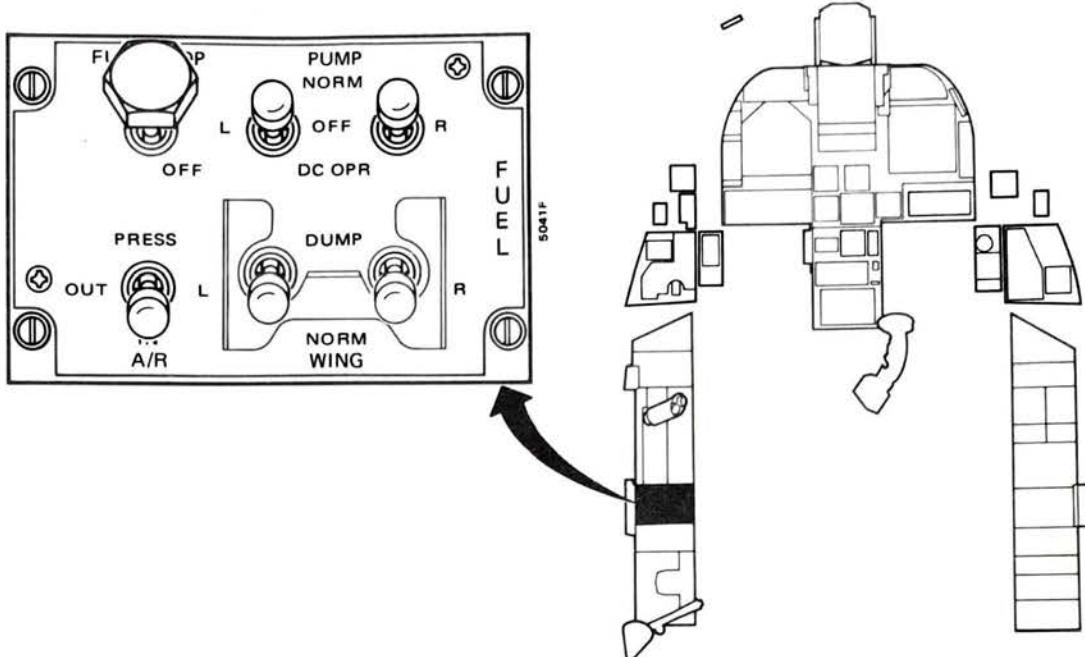
THROTTLE
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	_____ X _____ X _____	X BL _____	
<u>ILLUMINATION</u>		Y FS _____	N/A
<u>LEGEND SIZE</u>		Z WL _____	
		<u>DEP TO CENTER</u>	
		TRUE DISTANCE	N/A IN.
		TRUE ANGLE	DEG.
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
BLACK		Left HAND	1
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
Communication		4 Position rocker switch	40 \pm 16 oz
Cage/Uncage		Momentary push-button	4 \pm 1 lb
Flaps		3 Position switch	
Slew Control/Designator		Force transducer with discrete switch action	56 \pm 4 oz
Airstart		Momentary push-button	4 \pm 1 lb
Finger Lift		Lever	12 \pm 2 lb
Speed Trim		3 Pos Switch	
<u>NOTES</u>			

**ARM REST**

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Arm Rest. Selective dispensing of flares, chaff, and jammers. Seat adjust and exterior lights switch.	Located for left hand operation.
<u>CONTROL</u>	<u>FUNCTION</u>
ECM	Initiates dispensing of flares, chaff, and jammers.
SEAT ADJ	Adjusts ejection seat height.
EXT LT	Master exterior lights switch.

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
_____ LB	1.16 X 15.5 X 3.0	X	BL _____
<u>ILLUMINATION</u>		Y	FS _____
1.0 \pm 0.5 f1		Z	WL _____
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
0.13 \pm 0.01 in		TRUE DISTANCE	IN.
<u>COLOR</u>		TRUE ANGLE	DEG.
IPL WHITE		<u>OPERATION</u>	<u>REACH ZONE</u>
		Left HAND	2
INDIVIDUAL CONTROLS			
		TYPE	FORCE
ECM		3 pos toggle switch	6 in 1b max
SEAT ADJ		3 pos mom toggle switch	6 in 1b max
EXT LT		2 pos toggle switch	28 \pm 8 oz
NOTES			



GP01-0820-76

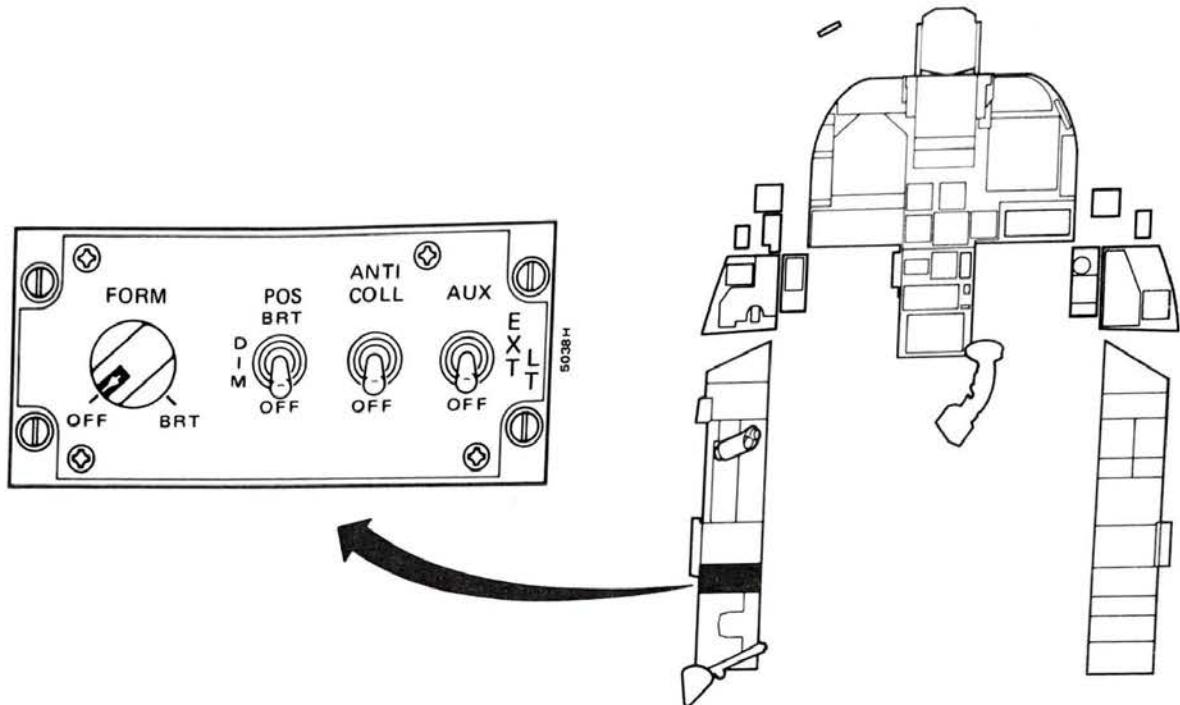
FUEL CONTROL PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Fuel system control	Location just aft of the throttle quadrant permits quick left hand access.
<u>CONTROL</u>	<u>FUNCTION</u>
FUEL FLOW	Equalizes the flow of fuel from the two feed systems.
AIR REFUEL	Extends and retracts inflight refueling probe, activates the probe light and repressurizes fuel tanks with probe.
FUEL PUMP	Selects extended normal (AC) and emergency (DC) fuel boost pump operation.
WING FUEL	Enables wing fuel jettison. Jettison is automatically terminated when fuel quantity reaches the Bingo fuel setting or wings become empty.

FUEL CONTROL PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB 3.75 X 5.75 X 6.50	X BL 13.905 Y FS 200.063 Z WL 92.982	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 ± 0.5 f1		TRUE DISTANCE 34.816 IN. TRUE ANGLE 65.63 DEG.	
<u>LEGEND SIZE</u>			
0.13 ± 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Left HAND	1
INDIVIDUAL CONTROLS		TYPE	FORCE
FUEL FLOW		2 position lever lock toggle switch	Rel: 3-6 1b OPR: 9 1b-max
AIR REFUEL		3 position lever lock toggle switch locked in RETRACT	Rel: 3-5 1b OPR: 6 1b-max
FUEL PUMP		3 position lever lock toggle switch (channel-guarded) locked out of JETT) MAG held in JETT	Rel: 3-5 1b
WING FUEL		2 position lever lock toggle switch (channel-guarded) locked out of Jett MAG held in Jett)	Rel: 3-5 lbs OPR: 6 lb-max
NOTES			



GP01-0820-77

EXTERIOR LIGHTS PANEL

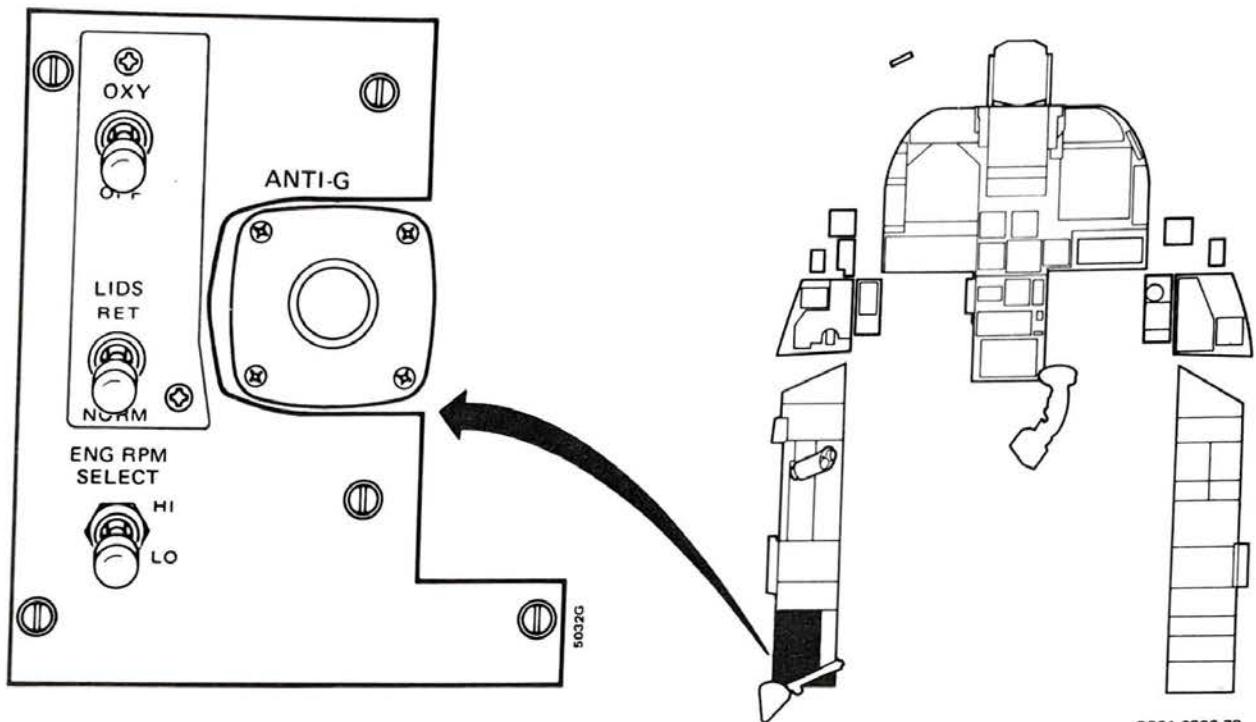
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Exterior Lights Control	Left hand operation and control accessibility.
<u>CONTROL</u>	<u>FUNCTION</u>
FORM	Activates and adjusts intensity of the formation lights.
ANTI COLL	Activates anti-collision lights.
POS	Activates and adjusts intensity of the position lights.
AUX	Activates auxillary landing lights.

EXTERIOR LIGHTS PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
_____ LB	2.62 X 5.75 X 6.50	X BL	13.905
<u>ILLUMINATION</u>		Y FS	203.233
1.0 \pm 0.5 f1		Z WL	92.648
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u>	
0.13 \pm 0.01 in		TRUE DISTANCE	35.289 IN.
<u>COLOR</u>		TRUE ANGLE	63.99 DEG.
IPL WHITE		<u>OPERATION</u>	<u>REACH ZONE</u>
		Left HAND	1
INDIVIDUAL CONTROLS		TYPE	FORCE
FORM	On-Off Variable Transformer	2.0 in 1b	260° \pm 5°
ANTI-COLL	2 Position toggle	28 \pm 8 oz	16 \pm 1 in oz
POS	On-Off toggle	2.0 lb	260° \pm 5°
AUX	On-Off toggle		
NOTES			

GP78-8008-77



PILOT SERVICES PANEL

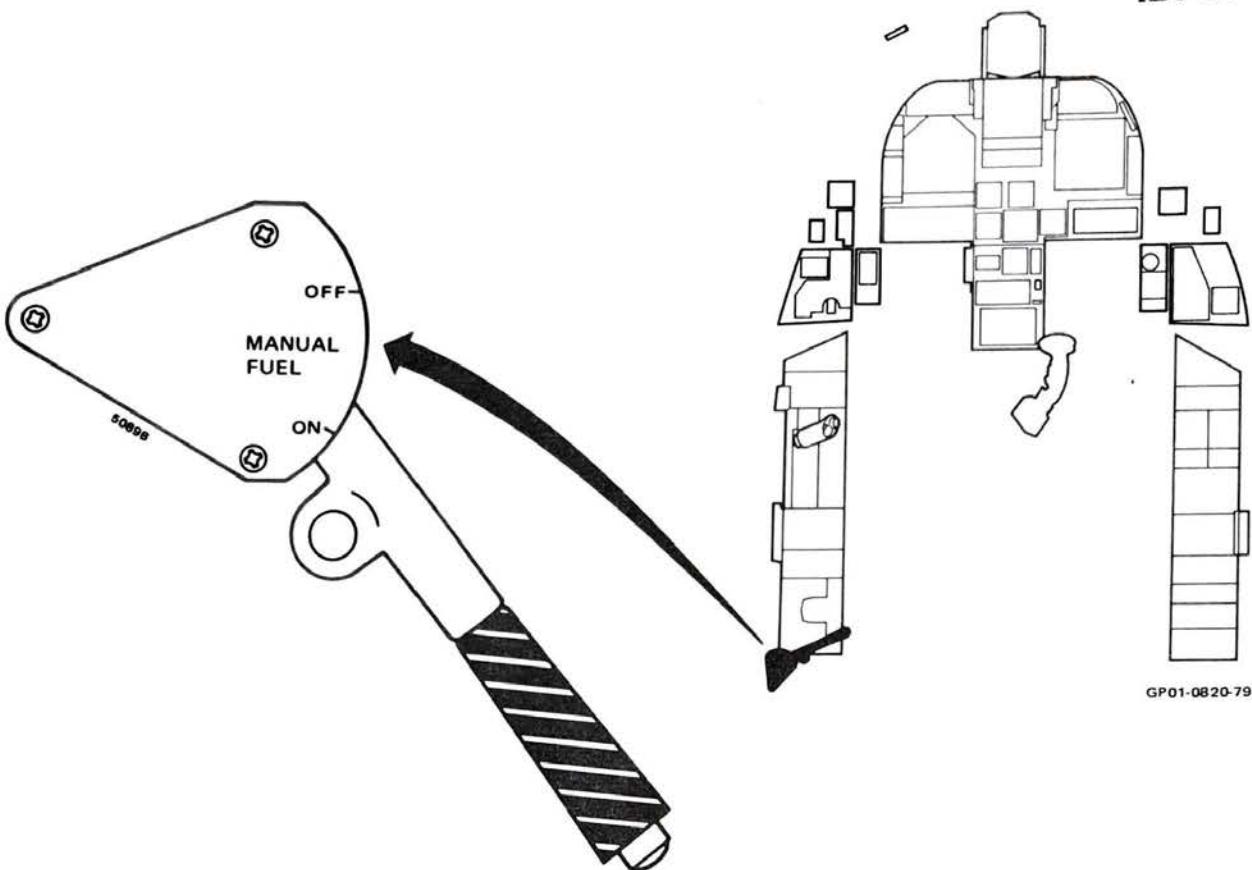
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
1. Pilot services connections and control. 2. Oxygen Control	Located to be compatible with standard personnel equipment.
<u>CONTROL</u>	<u>FUNCTION</u>
OXY ON/OFF	Oxygen flow control and OBOGS enable
Anti-G valve	Anti-G press to test
LIDS	LIDS control switch. Selects normal operation or override to retract condition.
Engine RPM Select	Allows pilot to select high or low range of engine RPM shown on indicator.

PILOT SERVICES PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB 5.00 X 5.75 X 6.50	X BL 13.905 Y FS 207.142 Z WL 92.173	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 ± 0.5 f1		TRUE DISTANCE 36.309 IN. TRUE ANGLE 61.07 DEG.	
<u>LEGEND SIZE</u>		<u>OPERATION</u>	
0.13 ± 0.01 in		Left HAND 1	
<u>COLOR</u>		<u>REACH ZONE</u>	
IPL WHITE			
INDIVIDUAL CONTROLS		TYPE	FORCE
OXY	2 position lever lock toggle switch	REL: 3-5 lb OPR: 6 lb max	16.5 ± 0.5°
Anti-G valve	Pushbutton	7 ± .06 lb	0.62 ± .1 in
LIDS	2 position lever lock toggle switch	REL: 306 lb OPR: 6 lbs max	16.5 ± 0.5°
Engine RPM Select	2 position lever lock toggle switch	REL: 3-5 lb OPR: 6 lbs max	16.5 ± 0.5°
NOTES			

GP78 8008 77

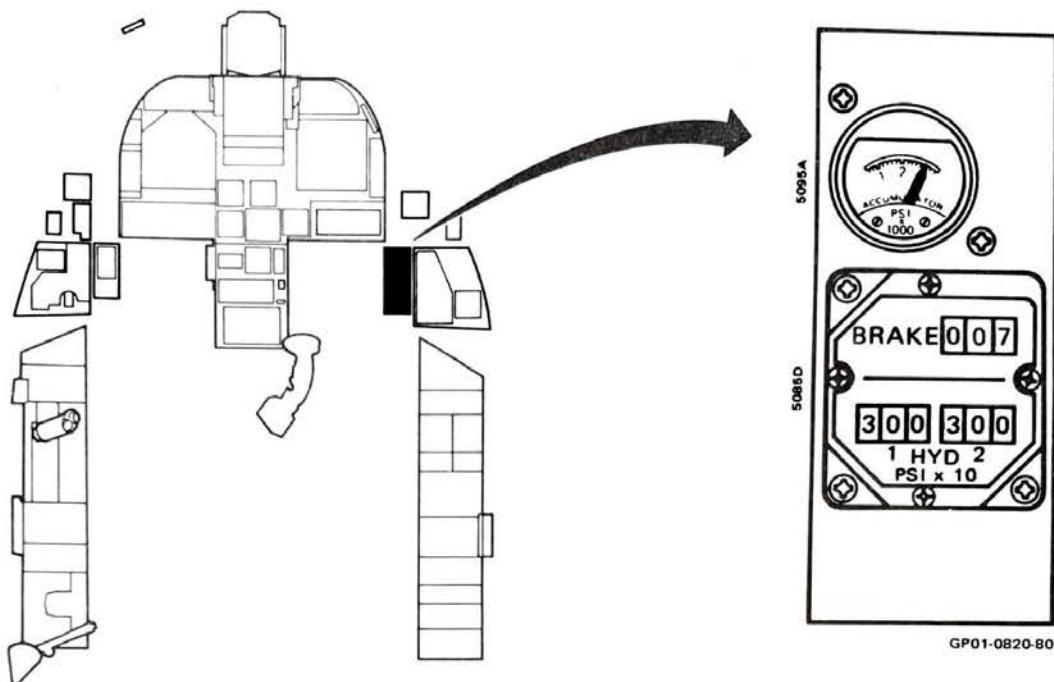


GP01-0820-79

MANUAL FUEL SHUT OFF LEVER

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Isolates the aircraft fuel system from the engine.	Located on canted bulkhead for pilot access with left hand.
<u>WEIGHT</u> LB 1.0	<u>DIMENSIONS</u> X 5.2 X 7.1
<u>ILLUMINATION</u> Lever	<u>TYPE</u> Manual Control
<u>LEGEND SIZE</u> 0.15 + 0.13 in	<u>FORCE</u> 23 lb
<u>COLOR</u> Grey-Black/Yellow	<u>TRAVEL</u> 52°
<u>RANGE/SENSITIVITY</u>	<u>OPERATION</u> Left HAND
	<u>REACH ZONE</u> 1
	<u>NOTES</u> When lever is off, engine fuel supply and fuel flow proportioner are shut off.

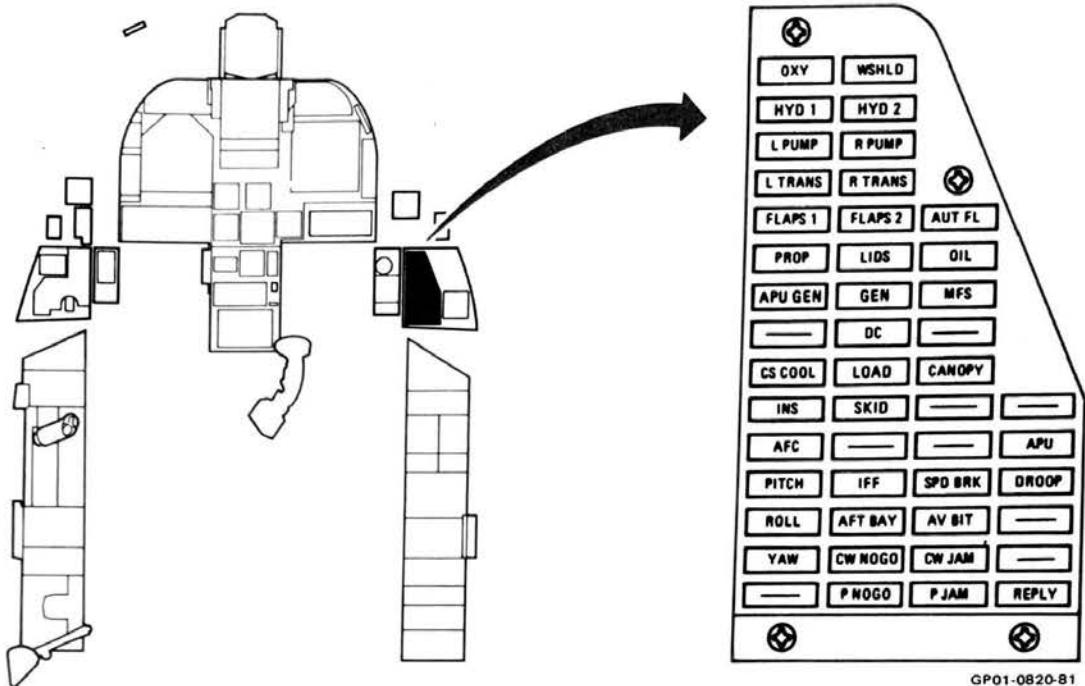
GP78 8008-79



BRAKE AND HYDRAULIC PRESSURE PANEL

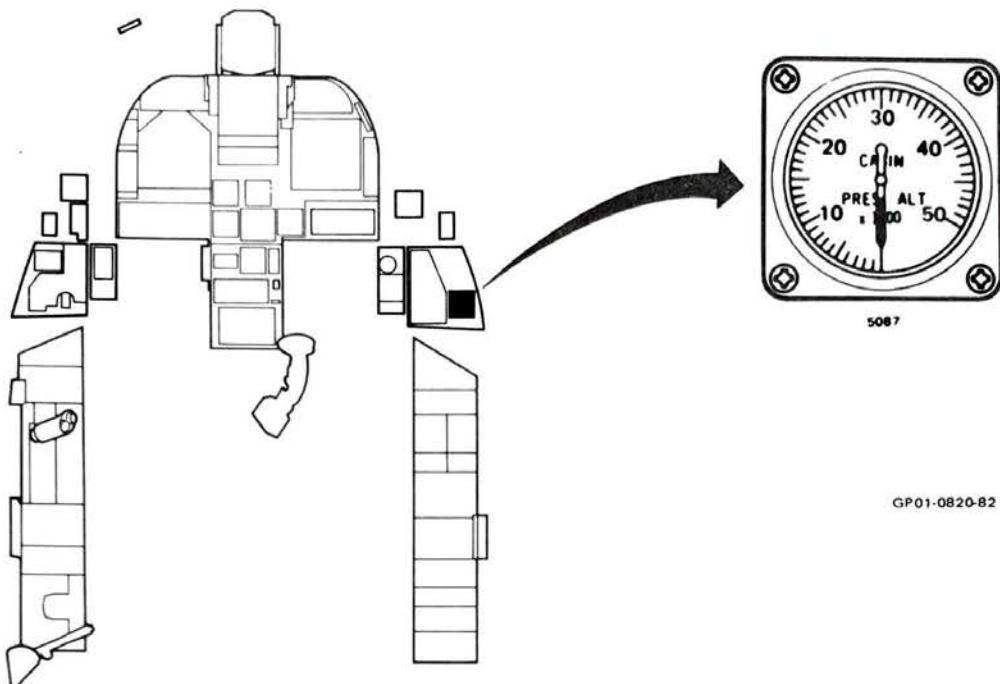
<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>	
Hydraulic pressure indication.	Location provides visibility for pilot check.	
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>
_____ LB	2.5 X 6.0 X 6.0	X BL 12.133 Y FS 176.559 Z WL 97.891
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>
1.0 + 0.5 f1		TRUE DISTANCE 37.64 IN. TRUE ANGLE 52.625 DEG.
<u>LEGEND SIZE</u>		<u>OPERATION</u>
0.14 + 0.01 in		HAND
<u>COLOR</u>		<u>REACH ZONE</u>
IPL WHITE		—
<u>RANGE/SENSITIVITY</u>	<u>NOTES</u>	

GP78-8008-79



CAUTION AND ADVISORY LIGHTS

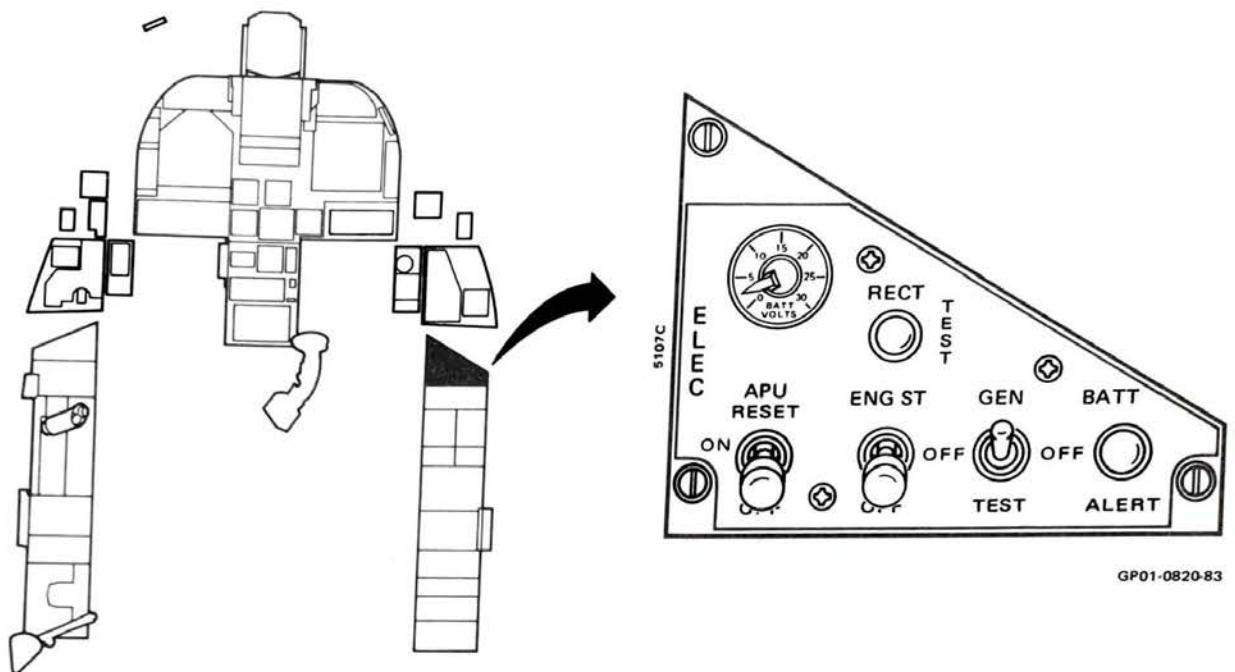
<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Displays caution, and advisory signals.	Located for easy visibility. Pilot attention is aided by the Master Caution light.
<u>WEIGHT</u> 3.0 LB	<u>DIMENSIONS</u> 3.5 X 6.75 X 6.00
<u>ILLUMINATION</u> 300 + 150 f1 10 + 5 f1 (Dimmable)	<u>LOCATION</u> X BL -13.50 Y FS 181.289 Z WL 98.044
<u>LEGEND SIZE</u> 0.14 in	<u>DEP TO CENTER</u> TRUE DISTANCE 35.168 IN. TRUE ANGLE 59.91 DEG.
<u>COLOR</u> Caution - AVIATION YELLOW Advisory - AVIATION GREEN	<u>OPERATION</u> HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u> 2
	<u>NOTES</u> Transilluminated



CABIN PRESSURE ALTITUDE INDICATOR

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>		
Crew Station Pressure Altitude Indication	Location allows adequate visibility in flight for inclusion in forward vision cone.		
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	2.38 X 2.38 X 2.0	X BL -15.293 Y FS 183.175 Z WL 95.58	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 + 0.5 f1		TRUE DISTANCE 37.008 IN. TRUE ANGLE 56.16 DEG.	
<u>LEGEND SIZE</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
COLOR		HAND	_____
IPL WHITE			
<u>RANGE/SENSITIVITY</u>		<u>NOTES</u>	
0 - 50,000 ft			

GP78 800B 79

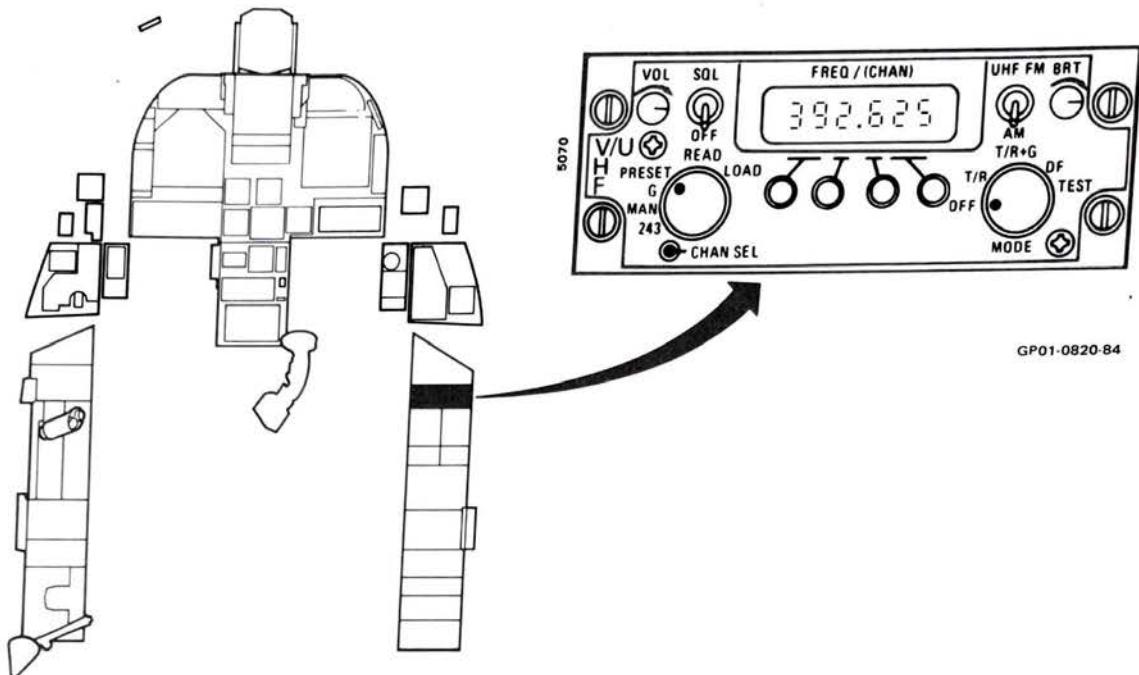


ELECTRICAL CONTROL PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Control of Electrical System.	This panel is operated primarily during ground operations but must be monitored in flight. Its location gives excellent accessibility and good visibility.
<u>CONTROL</u>	<u>FUNCTION</u>
BATT	Provides power to the normal or priority battery bus. Alert is used primarily during ground loiter.
GEN	Generator ON/OFF/Test Control
ENG ST	Starts aircraft engine.
APU	Starts APU to crank engine.
DIAL	Battery voltage indicator.
RECT	Standby Transformer Rectifier Test Switch.

ELECTRICAL CONTROL PANEL
(CONTINUED)

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
LB 4.50	X 5.75 X 6.50	X BL -13.905 Y FS 184.423 Z WL 94.631	
<u>ILLUMINATION</u> 1.0 ± 0.5 f1		<u>DEP TO CENTER</u> TRUE DISTANCE 39.688 IN. TRUE ANGLE 59.82 DEG.	
<u>LEGEND SIZE</u> 0.13 ± 0.01 in		<u>OPERATION</u> <u>Right</u> HAND 2	
<u>COLOR</u> IPL WHITE		<u>REACH ZONE</u>	
INDIVIDUAL CONTROLS		TYPE	FORCE
BATT	3 Pos Lever Lock Toggle Switch	4 ± 1 lb	38° ± 8°
GEN	3 Pos Toggle Switch Momentary to Test	3-5 lb	38° ± 8°
ENG ST	2 Pos Lever Lock Toggle Switch Momentarily held in start	4 ± 1 lb	16.5° ± 0.5°
APU	3 Pos Lever Lock Momentary to Reset	4 ± 1 lb	38° ± 8°
DIAL	Battery Volts		
RECT	Push Button Momentary to Test	20 in oz	0.2 ± .002
<u>NOTES</u>			



COMMUNICATION CONTROL PANEL

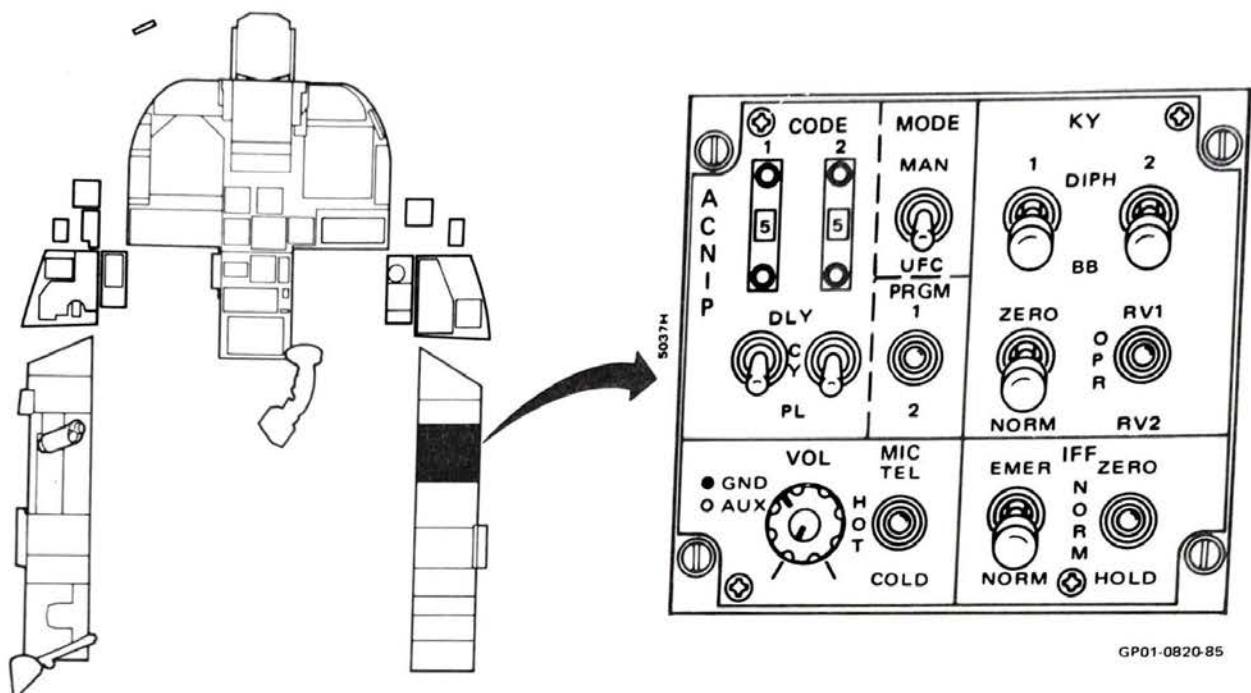
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Backup control for ARC-182 radios	Located for ease of access and high visibility.
<u>CONTROL</u>	<u>FUNCTION</u>
VOL	(Not used)
SOL	Provides receiver squelch override.
CHAN SEL	Provides ability to load, read, or select 25 preset channels. Enables guard or manual frequency selection.
UHF FM/AM	Selects and FM or AM UHF frequency.
BRT	Display brightness control.
MODE	Enables the dual ARC-182 main transmitter/receiver and guard receiver and initiates BIT.

COMMUNICATION CONTROL PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
<u>WEIGHT</u> <u>2 1/4</u> LB	<u>DIMENSIONS</u> <u>2 1/4</u> X <u>5.00</u> X <u>5 1/8</u>	<u>LOCATION</u>	
<u>ILLUMINATION</u> <u>1.0 ± 0.5 f1</u>		X BL <u>-13.905</u> Y FS <u>186.837</u> Z WL <u>94.376</u>	
<u>LEGEND SIZE</u>		<u>DEP TO CENTER</u> TRUE DISTANCE <u>35.959</u> IN. TRUE ANGLE <u>61.88</u> DEG.	
<u>COLOR</u> <u>IPL WHITE</u>		<u>OPERATION</u> <u>Right</u> HAND	<u>REACH ZONE</u> <u>2</u>
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
NOTES			

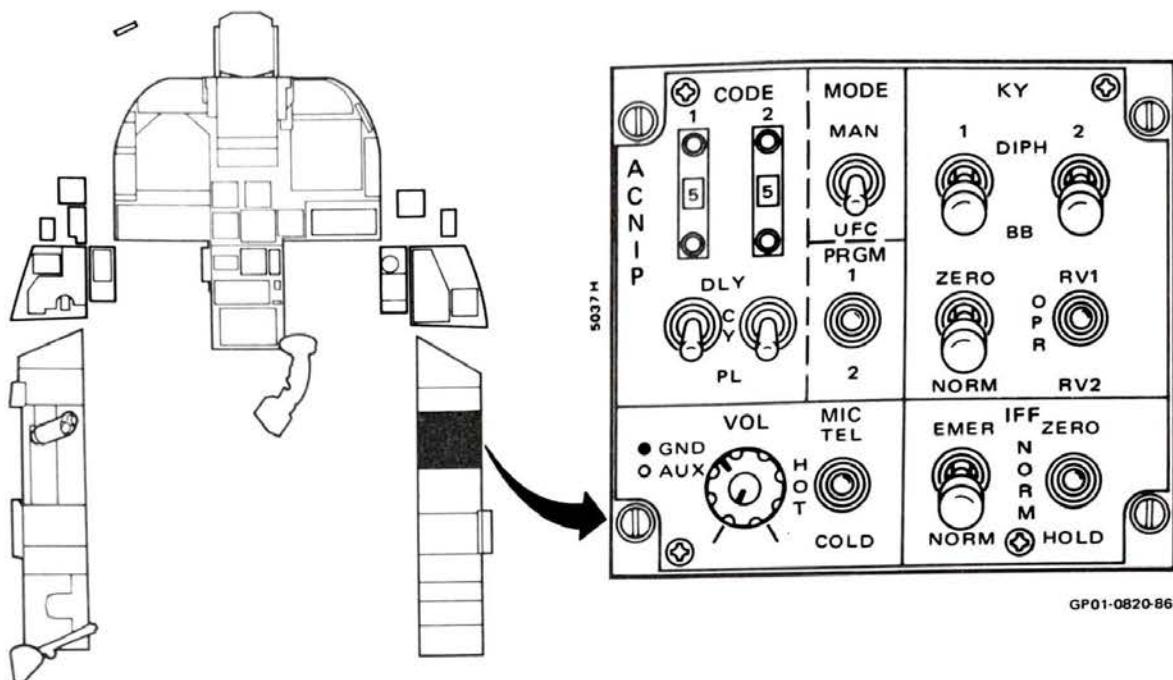
GP78-8008 77



GP01-0820-85

AUXILIARY CNI PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Performs manual secure comm control intercomm control, and hard wire IFF control functions.	Location permits easy access and excellent visibility for backup operations.
<u>CONTROL</u>	<u>FUNCTION</u>
<u>Manual Secure Comm Controls</u> <ul style="list-style-type: none"> ○ KY CODE 1 and 2 ○ PLAIN/CI/DELAY ○ MODE (MAN/UFC) ○ RADIO PRGM (1/2) ○ KY RV (1/2) ○ ZERO/NORM ○ DP/BB Switches 	<u>FUNCTION</u> <ul style="list-style-type: none"> ○ Provides manual cipher code selection for each KY ○ Provides manual mode selection for each KY. Delay position allows secure comm via a relay aircraft. ○ Transfers Comm Control from UFC to ACNIP/RCU. ○ Directs RCU control commands to selected radio. ○ Provides manual remote variable load capability. ○ Zeroizes code variables in both KY units. ○ Each switch allows selection of baseband (BB) or diphase (DP) encryption techniques when the ARC-182 radios are operating in the UHF band.



**AUXILIARY CNI PANEL
(CONTINUED)**

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>
<u>Intercomm Controls:</u> <ul style="list-style-type: none"> o Aux Volume o Gnd Volume o Mic (cold, hot, tel) <u>IFF Controls:</u> <ul style="list-style-type: none"> o EMER/Normal o Zero/Norm/Hold 	<ul style="list-style-type: none"> o Volume control for mixed audio, Sidewinder, and ICS. o Volume control for audio to ground crew. o Selects hot or cold Mic for ICS operation and provides push-to-talk for landline output. o Selects modes 1, 2, and 3 emergency codes o Zeroizes Kit-1A codes, provides normal operation or allows Kit-1A codes to be held during one ground turnaround cycle.

AUXILIARY CNI PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
6.3 LB	5.75 X 5.75 X 6.50	X BL	-13.905
<u>ILLUMINATION</u>	1.0 + 0.5 f1	Y FS	190.566
<u>LEGEND SIZE</u>	0.13 + 0.01 in	Z WL	93.983
<u>COLOR</u>		<u>DEP TO CENTER</u>	
IPL WHITE		TRUE DISTANCE	35.134 IN.
		TRUE ANGLE	64.51 DEG.
<u>INDIVIDUAL CONTROLS</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
KY Code	Thumbwheel rotary	Right HAND	2
Plain/Cipher/Delay	3 Pos Toggle		
Mode (Manual/UFC)	2 Pos Toggle		
Program (1/2)	3 Pos Toggle, Spring loaded to center		
KY RV	3 Pos toggle, Spring loaded to center		
Zero/Normal	2 Pos Toggle locked out of zero		
DP/BB Switches (2)	2 Pos Toggle		
Aux Volume	Potentiometer		
Gnd Volume	Potentiometer		
<u>NOTES</u>			

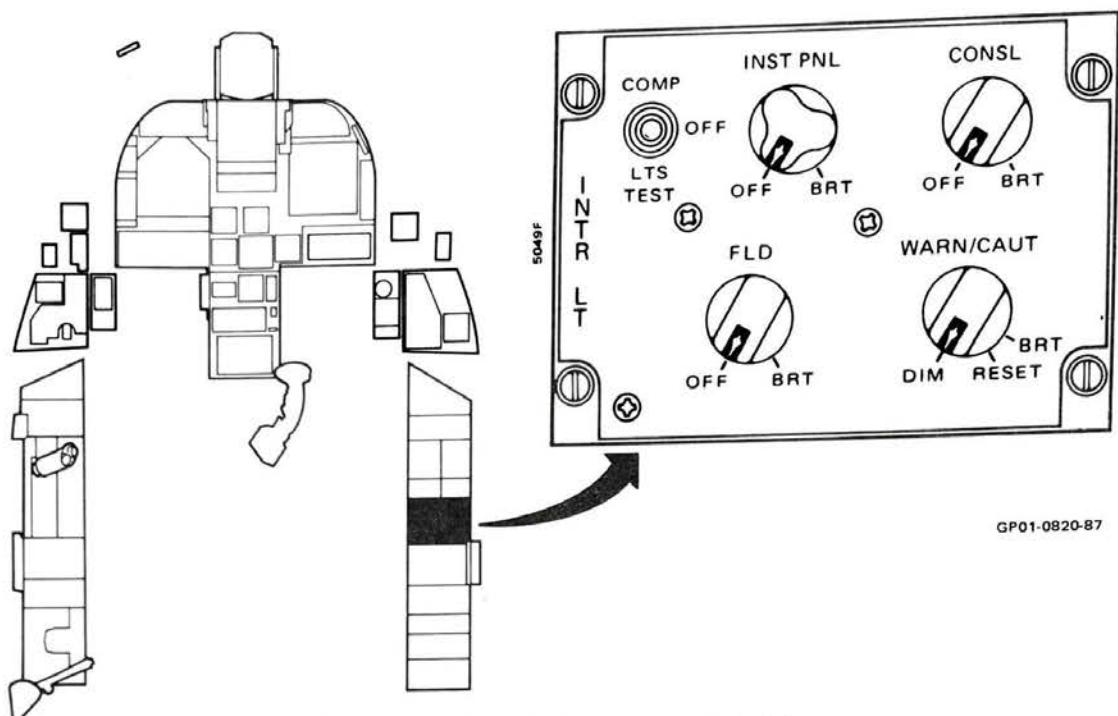
GP78 8008-77

AUXILIARY CNI PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	_____ X _____ X _____	X	BL _____
<u>ILLUMINATION</u>		Y	FS _____
<u>LEGEND SIZE</u>		Z	WL _____
<u>COLOR</u>		<u>DEP TO CENTER</u>	TRUE DISTANCE _____ IN.
		TRUE ANGLE _____	DEG.
		<u>OPERATION</u>	<u>REACH ZONE</u>
		_____ HAND	_____
INDIVIDUAL CONTROLS	TYPE	FORCE	TRAVEL
MIC (Cold, Hot, Tel) IFF EMER/NORM ZERO/NORM/HOLD	3 Pos Toggle, Momentary in Tel position only 2 Pos toggle locked out of emerg. 3 Pos Toggle locked out of zero, momentary in hold position only.		
NOTES			

GP78-8008-77



INTERIOR LIGHTS CONTROL PANEL

<u>PANEL FUNCTION</u>		<u>LOCATION RATIONALE</u>
Interior Lighting Control		Located for ease of access during night operations.
<u>CONTROL</u>		<u>FUNCTION</u>
CONSL		Varies console lighting brightness (0-5 volts)
INST PNL		Varies instrument panel brightness (0-5 volts)
FLD		Varies high intensity white flood lights from 0 to 75 ft candles minimum on consoles and instruments.
LTS TEST/COMP		Provides lamp check for all warning, alert, and advisory lights. Compass position lights standby compass.
WARN/CAUT	DIM/ BRT	Varies intensity of caution/advisory lights down from 10 ± 1 f.l. to approximately 1 f.l. Warning lights cannot be dimmed.
	RESET	Sets warning/caution/advisory lights to the night setting of 10 ± 5 f.l.

INTERIOR LIGHTS CONTROL PANEL
(CONTINUED)

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
<u>CONTROL</u>	<u>FUNCTION</u>
COMP	Standby compass light.
LTS TEST	Control and Caution and Warning Lights test.

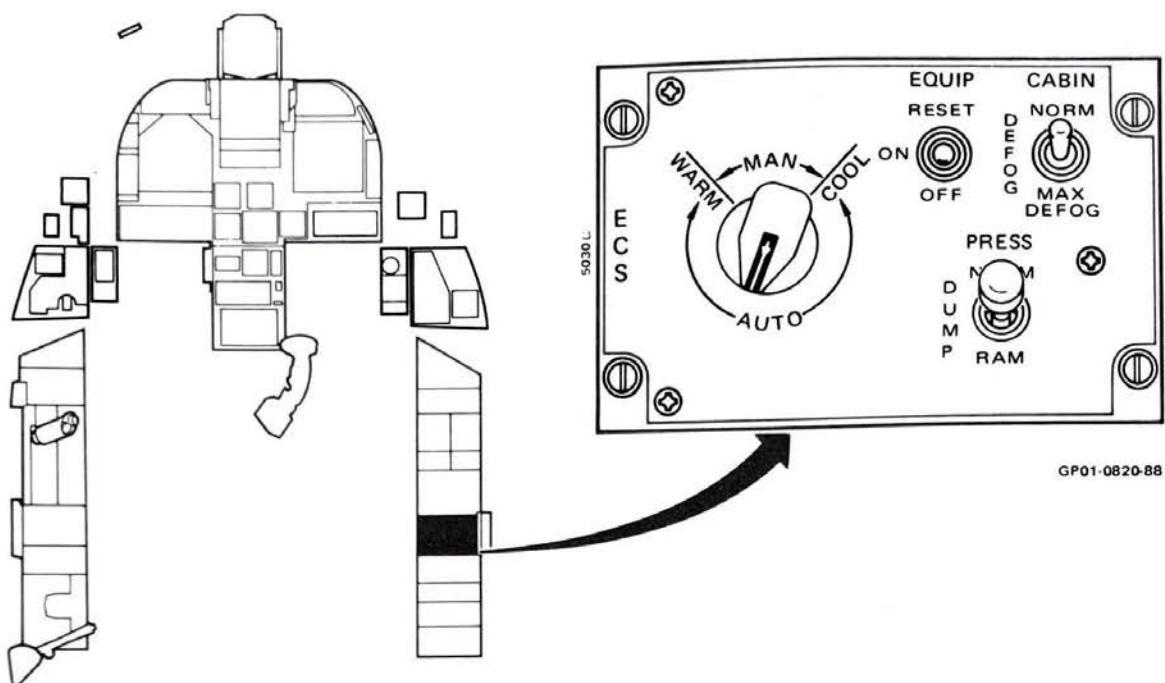
GP78-8008-78

INTERIOR LIGHTS CONTROL PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
LB	4.125 X 5.75 X 6.50	X BL -13.905 Y FS 195.228 Z WL 93.49	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 ± 0.5 f1		TRUE DISTANCE 34.651 IN.	
<u>LEGEND SIZE</u>		TRUE ANGLE 66.24 DEG.	
0.13 ± 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Right HAND	1
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
CONSL		Variable Potentiometer Transformer	2.0 in 1b
INST. PNL		Variable Potentiometer	2.0 in 1b
FLD		Variable Potentiometer	2.0 in 1b
COMP/LTS TEST		3 Pos Spring Loaded Toggle Switch	4.5 1b
WARNING/CAUT		Variable Potentiometer Transformer	2.0 in 1b
<u>NOTES</u>			
Power interruption will switch warning, caution and advisory back to day setting.			

GP78-8008 77



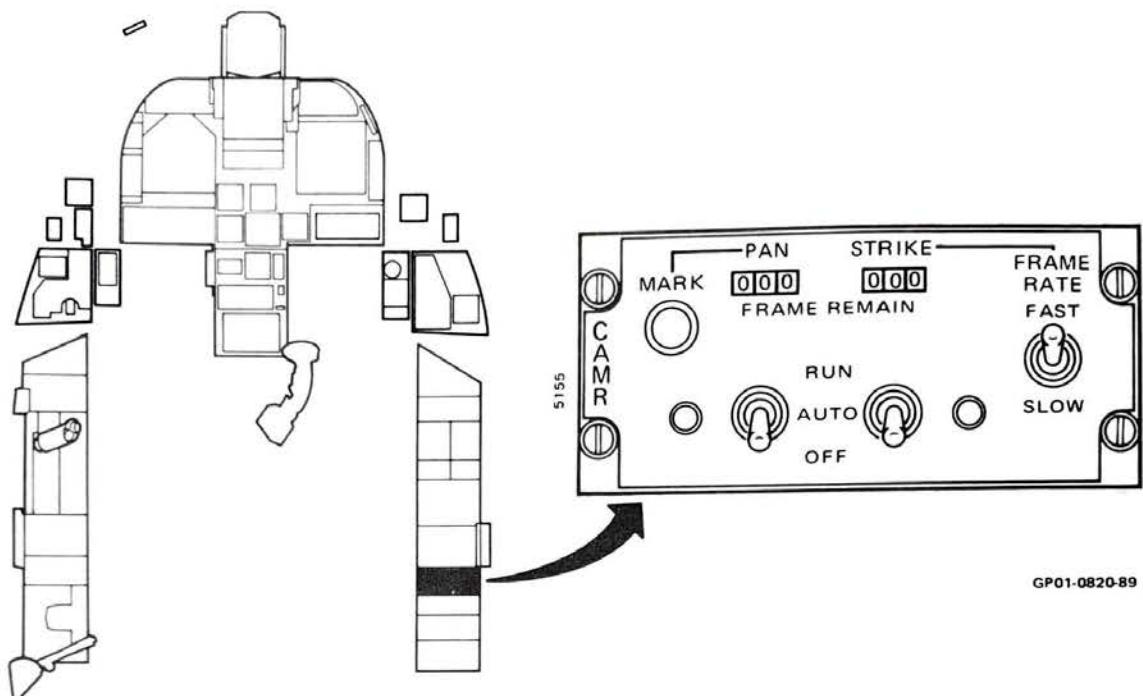
GP01-0820-88

ENVIRONMENTAL CONTROL SYSTEM PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Cabin pressure and temperature control and equipment cooling.	Located for good visibility and accessibility.
<u>CONTROL</u>	<u>FUNCTION</u>
MAN/AUTO	Permits automatic or manual selection of cabin air temperature.
CABIN	Directs air flow throughout the cockpit.
EQUIP	Turns on cooling air to the aft avionics equipment bay.
PRESS	Controls cabin pressure and ECS package ON/OFF control.

ENVIRONMENTAL CONTROL PANEL
(CONTINUED)

<u>CHARACTERISTICS</u>			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
LB <u>3.75</u>	X <u>5.75</u> X <u>6.50</u>	X BL <u>-13.905</u>	
<u>ILLUMINATION</u>			Y FS <u>199.144</u>
1.0 \pm 0.5 f1			Z WL <u>93.079</u>
<u>LEGEND SIZE</u>			<u>DEP TO CENTER</u>
0.13 \pm 0.01 in			TRUE DISTANCE <u>34.732</u> IN.
<u>COLOR</u>			TRUE ANGLE <u>65.94</u> DEG.
IPL WHITE			<u>OPERATION</u> <u>REACH ZONE</u>
			Right HAND <u>1</u>
<u>INDIVIDUAL CONTROLS</u>		<u>TYPE</u>	<u>FORCE</u>
MAN/AUTO		Rotary	28 \pm 4 oz
CABIN		3 Pos Toggle Switch	5.0 lb max
EQUIP		3 Pos Toggle Switch	3.5 \pm 1 lb
PRESS		3 Pos Toggle Lever Lock	3.5 \pm 1 lb
<u>NOTES</u>			



CAMERA CONTROL PANEL

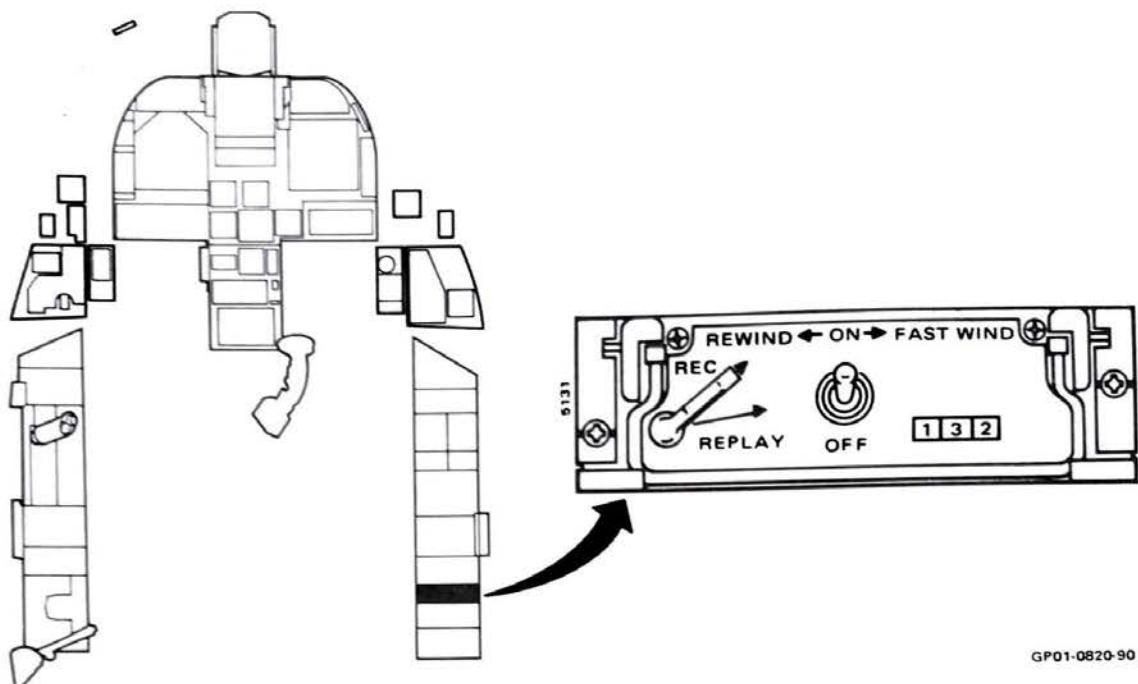
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Camera Control	Location permits good visibility and accessibility during flight.
<u>CONTROL</u>	<u>FUNCTION</u>
Mark	Marks the Pan Camera film as a special event.
Pan Frame remaining	Subtractive digital counter indicating film frames remaining.
Strike Frames remaining	Subtractive digital counter indicating film frames remaining.
Frame Rate	Selects fast or slow frame rate for the strike camera.
Strike Camera Indicator	Advisory green light illuminates at camera selection.
Strike Camera Select	Activates camera from off to auto or continuous running.
Pan Camera Select	Activates camera from off to auto or continuous running.
Pan Camera Indicator	Advisory green light illuminates at camera selection.

CAMERA CONTROL PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
	LB 2.625 X 5.75 X 6.50	X BL -13.905 Y FS 202.314 Z WL 92.745	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 + 0.5 f1		TRUE DISTANCE 35.123 IN.	
<u>LEGEND SIZE</u>		TRUE ANGLE 64.549 DEG.	
0.13 + 0.01 in			
<u>COLOR</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
IPL WHITE		Right HAND	1
INDIVIDUAL CONTROLS		TYPE	FORCE
Mark		Momentary Push-button	20 in oz
Pan Frame Remaining		Magnetic Wheels	N/A
Strike Frame Remaining		Magnetic Wheels	N/A
Frame Rate		2 Pos Toggle	4.5 lb
Strike Camera Ind.		Advisory Light	-
Strike Camera Select		3 Pos Toggle	3-5 lb 6 lbs max
Pan Camera Select		3 Pos Toggle	3-5 lb 6 lb max
Pan Camera Ind.		Advisory Light	-
NOTES			

GP78 8008-77

**VOICE RECORDER**

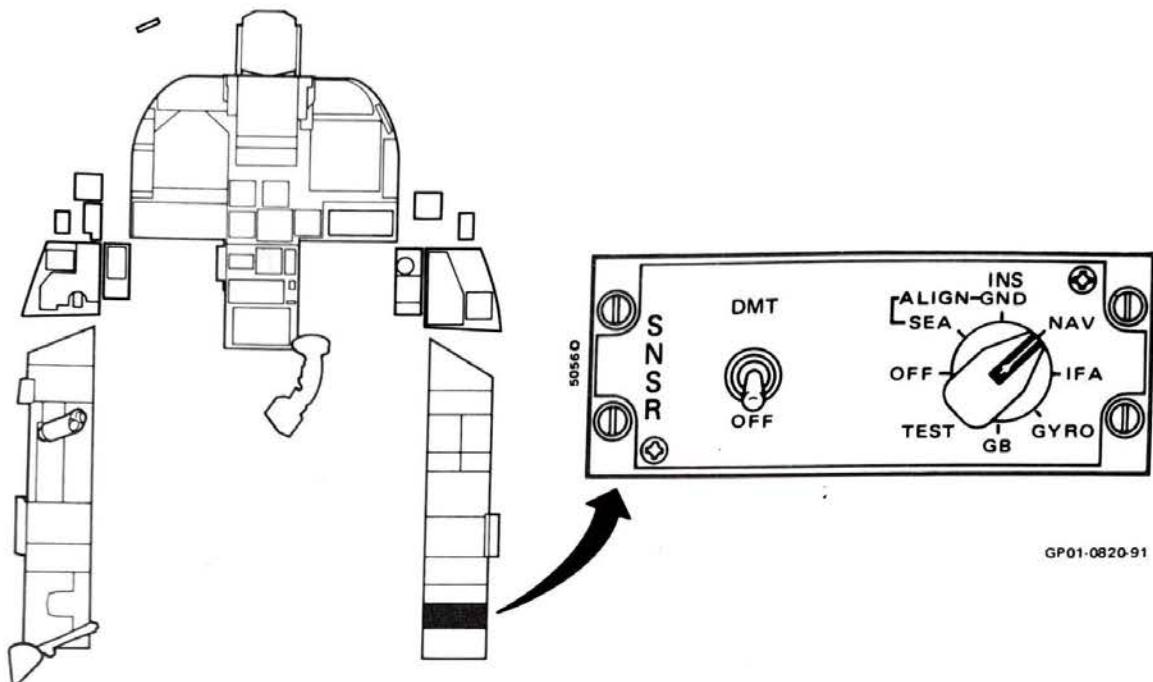
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Voice Recorder	Location permits good visibility and accessibility during flight.
<u>CONTROL</u>	<u>FUNCTION</u>
Record/Replay	Select Record or Replay of tape.
Power Switch	Provides manual control to start or stop the recorder. Also selects rewind or fast wind of tape.
Tape Remaining Counter	Indicates Tape Used.

VOICE RECORDER
(CONTINUED)

MDC A6789

CHARACTERISTICS			
WEIGHT	DIMENSIONS	LOCATION	
3.0 LB	1.7 X 5.75X 6.6	X BL -13.905 Y FS 204.120 Z WL 92.509	
<u>ILLUMINATION</u>		<u>DEP TO CENTER</u>	
1.0 + 0.5 f1		TRUE DISTANCE 35.568 IN. TRUE ANGLE 63.080 DEG.	
<u>LEGEND SIZE</u>		<u>OPERATION</u>	
0.13 + 0.01 in		<u>RIGHT</u> HAND 1	
<u>COLOR</u>		<u>REACH ZONE</u>	
WHITE			
<u>INDIVIDUAL CONTROLS</u>		TYPE	FORCE
Record/Replay		Rotary lever	30°
Power Switch		4 Position Toggle	
Tape Remaining Counter		Digital Counter	
<u>NOTES</u>			

GP78 8008 77

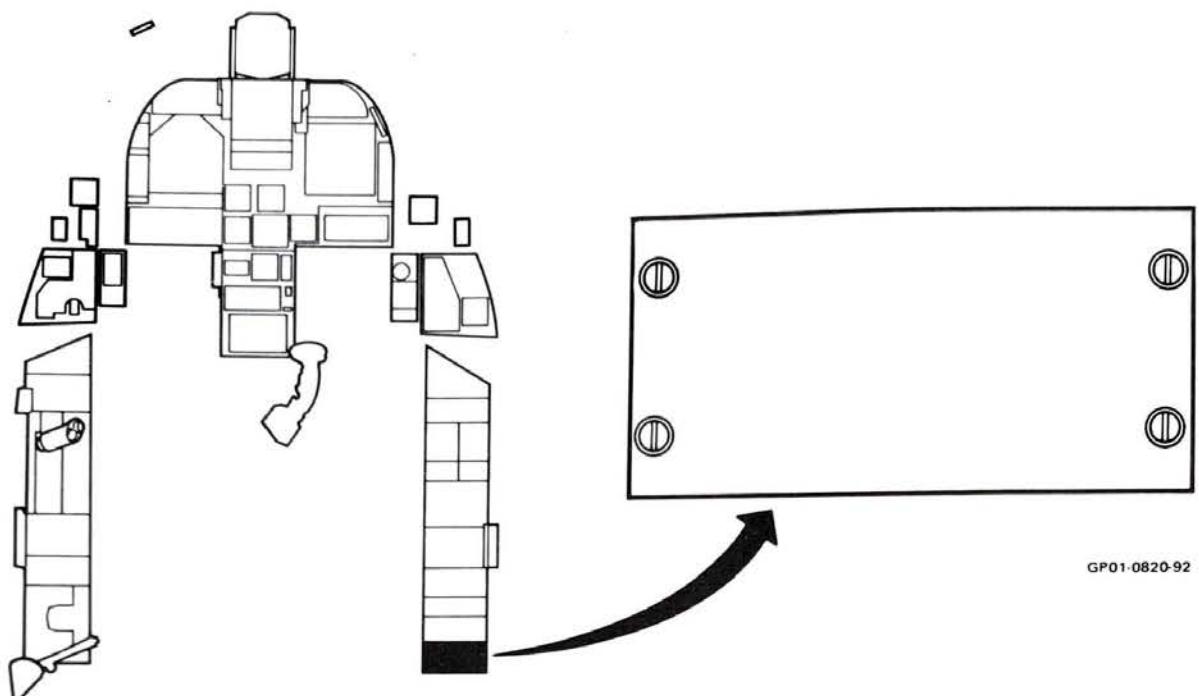


SENSOR CONTROL PANEL

<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
Sensor Control	Location permits good visibility and accessibility during flight.
<u>CONTROL</u>	<u>FUNCTION</u>
DMT	Activates the angle rate bombing system dual mode tracker.
INS	Provides manual control over the modes of operation of the inertial navigation system platform.
SEA	Sea alignment mode.
GND	Ground alignment mode.
NAV	Navigate mode.
IFA	In-flight alignment.
GYRO	GYRO mode.
GB	GYRO bias.
TEST	Initiated built in test.

**SENSOR CONTROL PANEL
(CONTINUED)**

CHARACTERISTICS			
<u>WEIGHT</u>		<u>DIMENSIONS</u>	
LB 2.25		X 5.75 X 6.50	
<u>ILLUMINATION</u>		1.0 \pm 0.5 f1	
<u>LEGEND SIZE</u>		0.13 \pm 0.01 in	
<u>COLOR</u>		<u>OPERATION</u> <u>REACH ZONE</u>	
IPL WHITE		Right HAND 1	
INDIVIDUAL CONTROLS		TYPE	FORCE
DMT		2 Pos Toggle Switch	
INS FUNCTIONS		8 Pos Rotary	
NOTES			



GP01-0820-92

BLANK PANEL

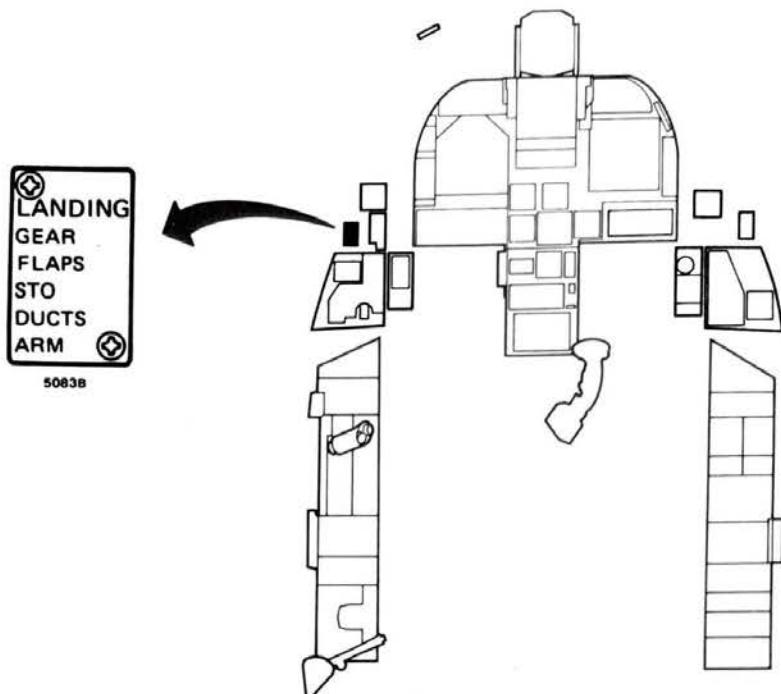
<u>PANEL FUNCTION</u>	<u>LOCATION RATIONALE</u>
SPACE RESERVED	
<u>CONTROL</u>	<u>FUNCTION</u>

BLANK PANEL
(CONTINUED)

MDC A6789

CHARACTERISTICS			
<u>WEIGHT</u>	<u>DIMENSIONS</u>	<u>LOCATION</u>	
_____ LB	X 5.75 X 6.50	X BL	-13.905
<u>ILLUMINATION</u>		Y FS	209.213
<u>LEGEND SIZE</u>		Z WL	92.017
<u>COLOR</u>		<u>DEP TO CENTER</u>	
		TRUE DISTANCE	36.921 IN.
		TRUE ANGLE	59.200 DEG.
<u>INDIVIDUAL CONTROLS</u>		<u>OPERATION</u>	<u>REACH ZONE</u>
		Right HAND	1
<u>NOTES</u>			

GP78 8008.77

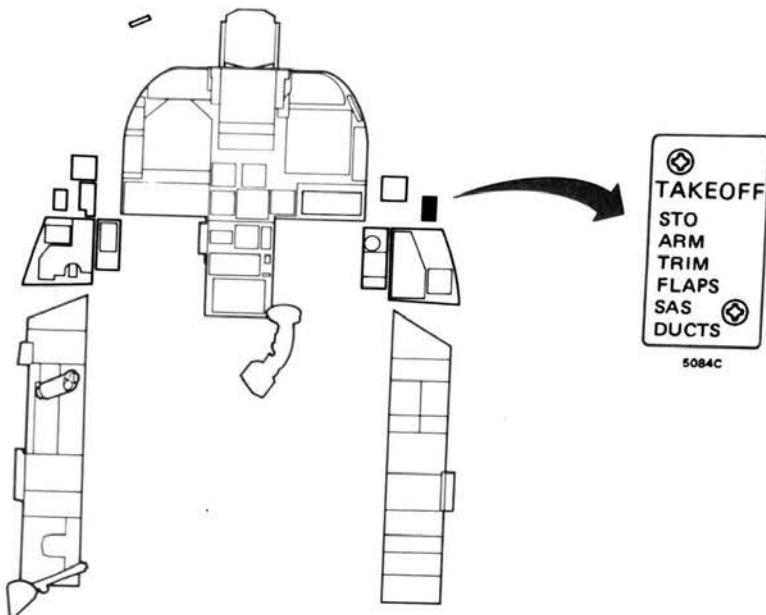


GP01-0820-109

LANDING CHECK LIST

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Check list for review of procedures	Requires good visibility but not critical for immediate action
<u>WEIGHT</u> ____ LB <u>DIMENSIONS</u> ____ 2.08 X ____ 1.34 X ____ 0.25	<u>LOCATION</u> X BL ____ 13.250 Y FS ____ 180.684 Z WL ____ 104.444
<u>ILLUMINATION</u> 1.0 ± 0.5 f1	<u>DEP TO CENTER</u> TRUE DISTANCE ____ 30.974 IN. TRUE ANGLE ____ 25.766 DEG.
<u>LEGEND SIZE</u> 0.13	<u>OPERATION</u> ____ HAND
<u>COLOR</u> IPL white	<u>REACH ZONE</u> ____
<u>RANGE/SENSITIVITY</u>	<u>NOTES</u>

GP78-8008-79



GP01-0820-110

TAKEOFF CHECK LIST

<u>DISPLAY FUNCTION</u>	<u>LOCATION RATIONALE</u>
Check list for review of procedures.	Requires good visibility but not critical for immediate action.
<u>WEIGHT</u>	<u>DIMENSIONS</u>
-- LB	2.40 X 1.30 X 0.25
<u>ILLUMINATION</u>	<u>LOCATION</u>
1.0 ± 0.5 f1	X BL -13.647 Y FS 184.128 Z WL 105.331
<u>LEGEND SIZE</u>	<u>DEP TO CENTER</u>
0.13	TRUE DISTANCE 28.544 IN. TRUE ANGLE 45.808 DEG.
<u>COLOR</u>	<u>OPERATION</u>
IPL white	HAND
<u>RANGE/SENSITIVITY</u>	<u>REACH ZONE</u>
	NOTES

GP78 8008 79

APPENDIX A

ABBREVIATIONS AND ACRONYMS

APPENDIX AABBREVIATIONS AND ACRONYMS

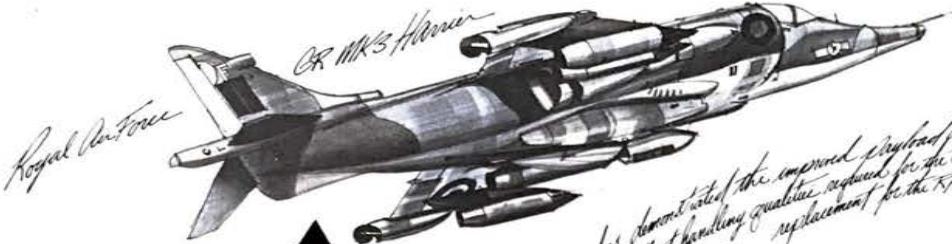
A/A	Air-to-air
AAA	Anti Aircraft Artillery
ac	Alternating Current
ACNIP	Auxiliary CNI Panel
ACP	Armament Control Panel
ADC	Air Data Computer
ADI	Attitude Director Indicator
AFC	Automatic Flight Control
A/G	Air-to-ground
AHRS	Attitude Heading Reference System
AI	Airborne Interceptor
AOA	Angle-of-attack
ARBS	Angle Rate Bombing Set
ASAP	Aircrew Systems Advisory Panel
ASPJ	Airborne Self Protection Jammer
AWCS	Airborne Weapon Control System
AWLS	All Weather Landing System
BAe	British Aerospace
BIT	Built-in Test
BL	Buttock Line or X Direction
CAS	Close Air Support
CFE	Contractor Furnished Equipment
COMM	Communication
CNI	Communication, Navigation, and Identification
CRT	Cathode Ray Tube
CU IN	Cubic Inch
CW	Continuous Wave
DC	Direct Current
DECM	Defense Electronic Counter Measure
Deg	Degrees
DEP	Design Eye Position
DMT	Dual Mode Tracker
ECM	Electronic Countermeasure
ENT	Enter
EW	Electronic Warfare
f1	Foot Lamberts
FLS	Forward Landing Site
FPM	Feet Per Minute
FS	Fuselage Station or Y Direction
FSD	Full Scale Development
ft	Feet
FWD	Forward
g	Gravitational Acceleration Unit, 32 ft/sec^2
GFE	Government Furnished Equipment
HOTAS	Hands on Throttle and Stick
Hr	Hour
HSI	Horizontal Situation Indicator
HUD	Head-up Display

ABBREVIATIONS AND ACRONYMS - (Continued)

ICP	Integrated Control Panel
IFF	Identification Friend or Foe
IFOV	Instantaneous Field of View
IFU	Interface Unit
IN.	Inch
INS	Inertial Navigation System
IOC	Initial Operational Capability
IPL	Instrument Panel Lighting
JETT	Jettison
JPTL	Jet Pipe Temperature Limiter
KIAS	Knots Indicated Airspeed
KT	Knot
LAW	Low Altitude Warning
LBS	Pounds
LIDS	Lift Improvement Devices
LOS	Line of Sight
LST	Laser Spot Tracker
M	Mach Number
MAX	Maximum
MC	Mission Computer
MCAIR	McDonnell Aircraft Company
MFR	Maximum Functional Reach
MFTR	Maximum Fintertip Reach
MIN	Minimum
MIP	Main Instrument Panel
MPC	Motion Picture Camera
MOM	Momentary
MPD	Multipurpose Display
NAV	Navigation
OBOGS	On-board Oxygen Generating System
ODU	Options Display Unit
OT	Over Temperature
OZ	Ounces
PEC	Personal Equipment Connector
POS	Position
RAF	Royal Air Force
RPM	Revolutions Per Minute
RWR	Radar Warning Receiver
SAAHS	Stability Augmentation and Attitude Hold System
SAM	Surface-to-air Missile
SAS	Stability Augmentation System
SEAM	Sidewinder Expanded Acquisition Mode
SEC	Second
STAB AUG	Stability Augmentation
STO	Short Takeoff
TACAN	Tactical Air Navigation
TDC	Target Designator Control
TER	Triple Ejector Rack
TFOV	Total Field of View

ABBREVIATIONS AND ACRONYMS - (Continued)

T/R	Transmit/Receive
TRMD	Tornado Repeater Map Display
TRMS	Tornado Repeater Map System
TV	Television
UFCP	Up-front Control Panel
UFCS	Up-front Control Set
UHF	Ultra High Frequency
UK	United Kingdom
USMC	U.S. Marine Corps
VDC	Volts Direct Current
Via	By way of
V/STOL	Vertical/short Takeoff and Landing
W	Watts
WL	Water Line or Z Direction
WRA	Weapon Replaceable Assembly



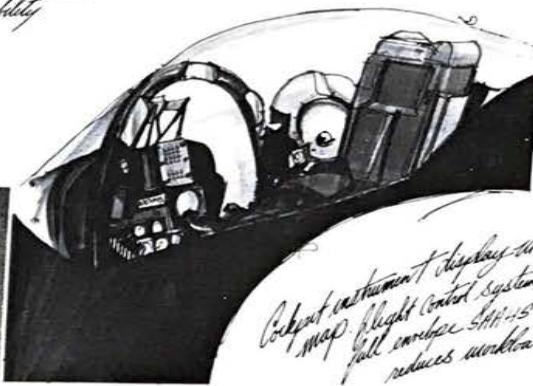
Royal Air Force

GR Mk3 Harrier

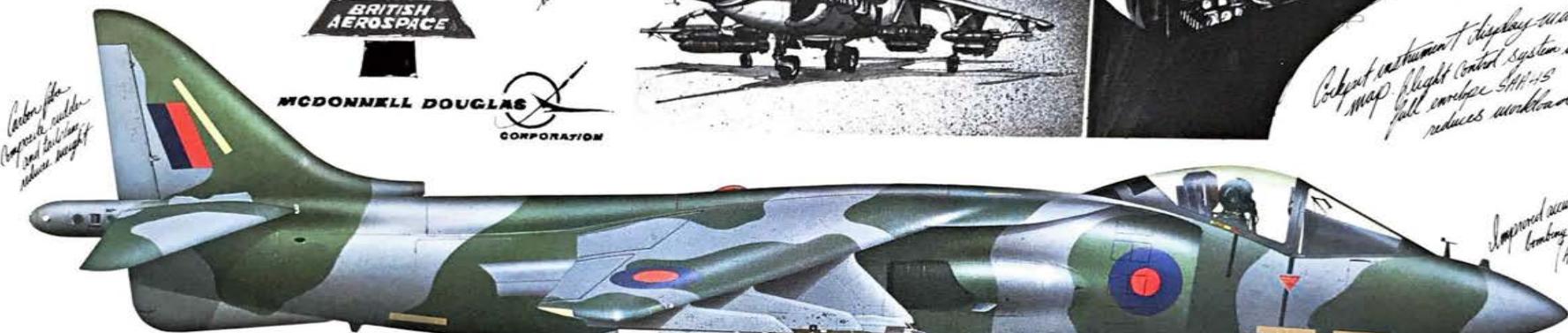
The YAV-SB has demonstrated the improved payload and range capability and greater handling qualities required for the GR Mk3 Harrier replacement for the Tornado.



MCDONNELL DOUGLAS
CORPORATION



Cockpit instrument display with moving map, flight control system with full envelope STAB-1S reduces workload.



Carbon fiber composite and glass substrate and state-of-the-art technology allow

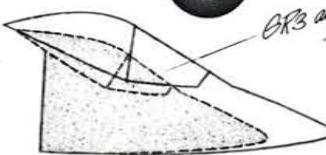
Improved accuracy bombing system (ARBS)

Carbon fiber forward fuselage - reduce weight

Left improvement frame (LIDS) increase VSTOL

GR3 and rear raised canopy with extended nose increases visibility and volume for landing

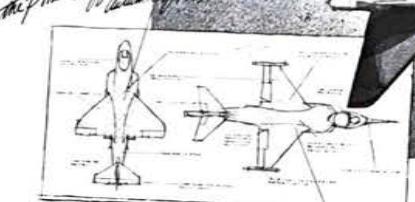
Improved air intake



Rolls-Royce 132F engine for VSTOL and in flight measurement (VTF) improved reliability and maintainability.



Full scale static test at NASA Ames proved performance goals in mind



The first prototype P1123 XFB-S first taking flying trials in October 1980.

Increased area supercritical wings incorporate high lift flap for improved SFC performance and higher aspect ratio for internal fuel capacity