NAVAIR 01-40AVD-1P

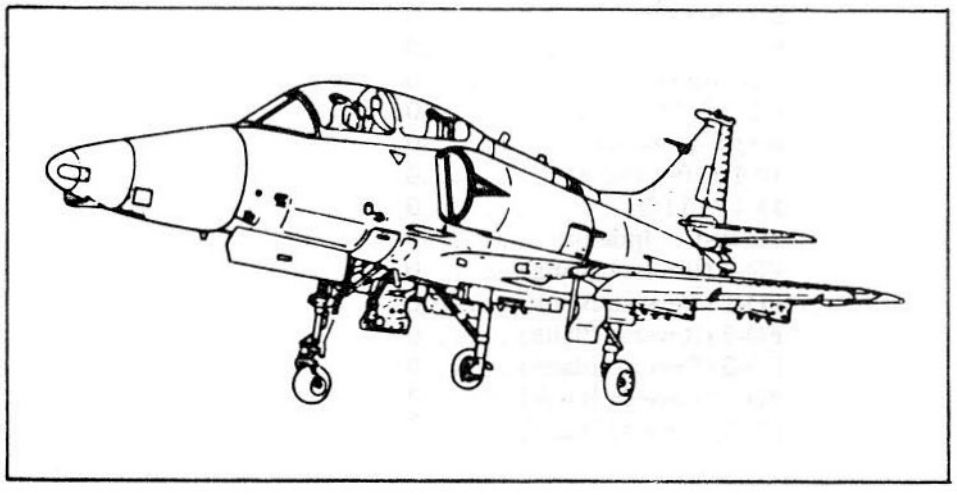
PARTIAL NATOPS FLIGHT MANUAL

NAVY MODEL

OA-4M

AIRCRAFT

THIS PUBLICATION IS INCOMPLETE WITHOUT TA-4F/TA-4J NATOPS MANUAL (NAVAIR 01-40AVD-1)



ISSUED BY AUTHORITY OF THE CHIEF OF NAVAL OPERATIONS
AND UNDER THE DIRECTION OF THE COMMANDER,
NAVAL AIR SYSTEMS COMMAND

1 FEBRUARY 1981

LIST OF EFFECTIVE PAGES

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INTERIM CHANGE SUMMARY

The following Interim Changes have been canceled or previously incorporated in this manual:

INTERIM CHANGE NUMBER(S)	REMARKS/PURPOSE

The following Interim Changes have been incorporated in this Change/Revision:

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INTERIM CHANGE NUMBER	ORIGINATOR/DATE (or DATE/TIME GROUP)	PAGES AFFECTED	REMARKS/PURPOSE

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D.C. 20350

1 February 1981

LETTER OF PROMULGATION

1. The Naval Air Training and Operating Procedures Standardization Program (NATOPS) is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft accident rate. Standardization, based on professional knowledge and experience, provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative, but rather to aid the Commanding Officer in increasing his unit's combat potential without reducing his command prestige or responsibility.

2. This manual standardizes ground and flight procedures but does not include tactical doctrine. Compliance with the stipulated manual procedure is mandatory except as authorized herein. In order to remain effective, NATOPS must be dynamic and stimulate rather than suppress individual thinking. Since aviation is a continuing, progressive profession, it is both desirable and necessary that new ideas and new techniques be expeditiously evaluated and incorporated if proven to be sound. To this end, Commanding Officers of aviation units are authorized to modify procedures contained herein, in accordance with the waiver provisions established by OPNAVINST 3510.9 series, for the purpose of assessing new ideas prior to initiating recommendations for permanent changes. This manual is prepared and kept current by the users in order to achieve maximum readiness and safety in the most efficient and economical manner. Should conflict exist between the training and operating procedures found in this manual and those found in other publications, this manual will govern.

3. Checklists and other pertinent extracts from this publication necessary to normal operations and training should be made and may be carried in Naval Aircraft for use therein. It is forbidden to make copies of this entire publication or major portions thereof without specific authority of the Chief of Naval Operations.

W. L. McDONALD
Vice Admiral, USN
Deputy Chief of Naval Operations
(Air Warfare)

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FOREWORD

SCOPE

The NATOPS Flight Manual is issued by the authority of the Chief of Naval Operations and under the direction of Commander, Naval Air Systems Command in conjunction with the Naval Air Training and Operating Procedures Standardization (NATOPS) Program. This manual contains information on all aircraft systems, performance data, and operating procedures required for safe and effective operations. However, it is not a substitute for sound judgement. Compound emergencies, available facilities, adverse weather or terrain, or considerations affecting the lives and property of others may require modification of the procedures contained herein. Read this manual from cover to cover. It's your responsibility to have a complete knowledge of its contents.

APPLICABLE PUBLICATIONS

The following applicable publications complement this manual:

NAVAIR 01-40AVD-1, TA-4F/J Flight Manual
NAVAIR 01-40AVD-1B, TA-4F/J Pilot's Pocket Checklist
NAVAIR 01-40AVD-1F, A-4E/F, TA-4F/J Functional Checkflight Checklist

HOW TO GET COPIES

Each flight crewmember is entitled to personal copies of the NATOPS Flight Manual and appropriate applicable publications.

Automatic Distribution

To receive future changes and revisions to this manual or any other NAVAIR aeronautical publication automatically, a unit must be established on an automatic distribution list maintained by the Naval Air Technical Services Facility (NATSF). To become established on the list or to change existing NAVAIR publication requirements, a unit must submit the appropriate tables from NAVAIR 00-25DRT-1 (Naval Aeronautic Publications Automatic Distribution Requirement Tables) to NATSF, Code 321, 700 Robbins Avenue Philadelphia, PA 19111. Publication requirements should be reviewed periodically and each time requirements change, a new NAVAIR 00-25DRT-1 should be submitted. NAVAIR 00-25DRT-1 only provides for future issues of basic, changes, or revisions and will not generate supply action for the issuance of publications from stock. For additional instructions, refer to NAVAIRINST 5605.4 series and Introduction to Navy Stocklist of Publications and Forms NAVSUP Publication 2002 (S/N 0535-LP-004-0001).

Additional Copies

Additional copies of this manual and changes thereto may be procured by submitting DD Form 1348 to NAVPUBFORMCEN Philadelphia in accordance with Introduction to Navy Stocklist of Publications and Forms NAVSUP Publication 2002.

UPDATING THE MANUAL

To ensure that the manual contains the latest procedures and information, NATOPS review conferences are held in accordance with OPNAVINST 3510.9 series.

CHANGE RECOMMENDATIONS

Recommended changes to this manual or other NATOPS publications may be submitted by anyone in accordance with OPNAVINST 3510.9 series.

Routine change recommendations are submitted directly to the Model Manager on OPNAV Form 3500-22 shown on the next page. The address of the Model Manager of this aircraft is:

Commanding Officer
MAG 13
MCAS El Toro
Santa Ana, California 92709

NATOPS/TACTICAL CHANGE RECOMMENDATION
OPNAV FORM 3500/22 (5-69) 0107-722-2002

DATE

TO BE FILLED IN BY ORIGINATOR AND FORWARDED TO MODEL MANAGER

FROM (originator)	Unit
TO (Model Manager)	Unit

Complete Name of Manual/Checklist	Revision Date	Change Date	Section/Chapter	Page	Paragraph

Recommendation (be specific)

☐ CHECK IF CONTINUED ON BACK

Justification

Signature	Rank	Title

Address of Unit or Command

TO BE FILLED IN BY MODEL MANAGER *(Return to Originator)*

FROM	DATE

TO

REFERENCE
(a) Your Change Recommendation Dated _____

☐ Your change recommendation dated _____ is acknowledged. It will be held for action of the review conference planned for _____ to be held at _____

☐ Your change recommendation is reclassified URGENT and forwarded for approval to _____ _____ by my DTG _____.

/S/ _____ MODEL MANAGER. | _____ AIRCRAFT

Change recommendations of an URGENT nature (safety of flight, etc.,) should be submitted directly to the NATOPS Advisory Group Member in the chain of command by priority message.

YOUR RESPONSIBILITY

NATOPS Flight Manuals are kept current through an active manual change program. Any corrections, additions, or constructive suggestions for improvement of its content should be submitted by routine or urgent change recommendation, as appropriate, at once.

NATOPS FLIGHT MANUAL INTERIM CHANGES

Flight Manual Interim Changes are changes or corrections to the NATOPS Flight Manuals promulgated by CNO or NAVAIRSYSCOM. Interim Changes are issued either as printed pages, or as a naval message. The Interim Change Summary page is provided as a record of all interim changes. Upon receipt of a change or revision, the custodian of the manual should check the updated Interim Change Summary to ascertain that all outstanding interim changes have been either incorporated or canceled; those not incorporated shall be recorded as outstanding in the section provided.

CHANGE SYMBOLS

Revised text is indicated by a black vertical line in either margin of the page, adjacent to the affected text, like the one printed next to this paragraph. The change symbol identifies the addition of either new information, a changed procedure, the correction of an error, or a rephrasing of the previous material.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to "WARNINGS", "CAUTIONS", and "NOTES" found through the manual.

WARNING

An operating procedure, practice, or condition, etc., which may result in injury or death if not carefully observed or followed.

CAUTION

An operating procedure, practice, or condition, etc., which may result in damage to equipment if not carefully observed or followed.

Note

An operating procedure, practice, or condition, etc., which is essential to emphasize.

WORDING

The concept of word usage and intended meaning which has been adhered to in preparing this Manual is as follows:

"Shall" has been used only when application of a procedure is mandatory.

"Should" has been used only when application of a procedure is recommended.

"May" and "need not" have been used only when application of a procedure is optional.

"Will" has been used only to indicated futurity, never to indicate any degree of requirement for application of a procedure.

"Land immediately" is self expanatory.

"Land as soon as possible" means land at the first site at which a safe landing can be made.

"Land as soon as practicable" means extended flight is not recommended. The landing site and duration of flight is at the discretion of the pilot in command.

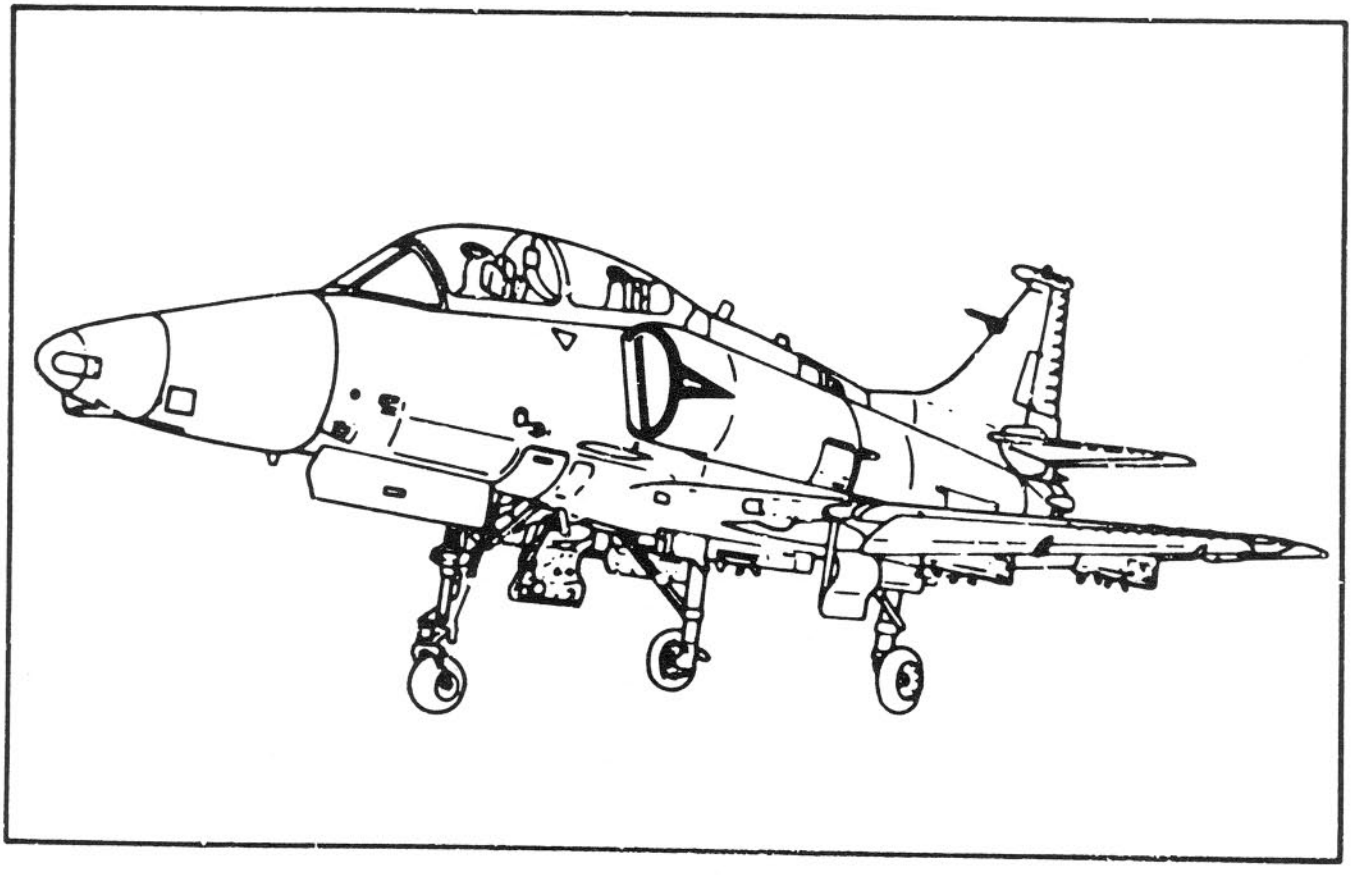


Figure 1-0. OA-4M Aircraft

SECTION I
THE AIRCRAFT

TABLE OF CONTENTS

PART I
GENERAL DESCRIPTION

INTRODUCTION

This partial technical manual is applicable to the OA-4M aircraft.

This publication must be used in conjunction with the TA-4F/J NATOPS Flight Manual. The partial manual incorporates only those items which are peculiar to the OA-4M aircraft. Therefore the TA-4F/J manual will be the source of technical information for those systems retaining their original configuration as well as information concerning standard practices.

DESCRIPTION

The Navy Model OA-4M Skyhawk (figure 1-0) is a two-place, light-weight, high-performance aircraft with a modified delta planform wing. The aircraft is powered by a P&WA J52-P-8A/B (9300 pounds sea level static thrust rating) gas turbine engine.

The OA-4M was designed as a high-performance Tactical Air Coordinator (airborne) aircraft capable of operating from shore bases. The aircraft has two seats in tandem for missions which are best conducted by two crewmembers.

The aircraft mounts two 20mm guns internally, and carries a variety of external stores. The average total operating weight of the OA-4M is 13,139 pounds.

Figure 1-1 shows the aircraft general arrangement. Cockpit instrument panels and consoles are shown in figures 1-2 through 1-10.

COCKPITS

The following is a list of switches, instruments, and equipment not duplicated in the cockpits:

Front Cockpit Only

LABS Timer

LABS Light

LAWS Light

GUN SIGHT OFF-BRT Control Knob

ALQ-126 Switches

ALE-39 Switches

ALR-45C Switches

MASTER Armament OFF-ON Switch

STATIONS READY-OFF Switches

Sidewinder Coolant ON-OFF Switch

WALLEYE/SHRIKE Mode Select Switch

Function Selector OFF-ROCKETS-GM UNARM-SPRAY TANK-LABS-BOMBS & GM ARM-CMPTR Switch

Bomb ARM Selector NOSE & TAIL-OFF-TAIL Switch

Guns READY-SAFE Switch

Pilots Advisory Lights

Ejection Control Selector Valve

FAA Beacon APX-72

Compass Control Panel

AFCS Control Panel

AFCS Preflight Panel

JATO JETTISON Switch

JATO ARM-OFF Switch

JATO PUSH-TO-FIRE Switch

THROTTLE FRICTION AND LOCK CONTROL

APC Control Panel

All Exterior Light Switches

Air Conditioning FWD and AFT OFF-ON Switches

Air Conditioning PRESS NORMAL-RAM Switch

Aft Cockpit Only

Radio Transmit Select Switch (XMIT)

ARC-114 Control Panel

IP-936/AYQ Video Monitor

Figures 1-2 through 1-10 show cockpit instrument panels, consoles, and glare shields.

GENERAL ARRANGEMENT

The OA-4M aircraft has been modified to provide enhanced ECM and communications capabilities. Figure 1-1 illustrates the external modifications which have been made to accomodate the added systems. While the added systems are similar to components installed on other A-4 series aircraft, many are not interchangeable. Reference to appropriate technical manuals is necessary to provide dimensions or characteristics.

CANOPY FAIRING

The canopy fairing (figure 1-11) fairs the canopy to the upper avionics compartment and houses the main brake gear reservoir, the fuselage fuel tank scupper, and the canopy hinges. The fairing has removable panels on each side for access, which are identified as hinge covers.

UPPER AVIONICS COMPARTMENT

The upper avionics compartment is installed on top of the fuselage and extends from the canopy aft fairing to the VHF/FM antenna as shown in figure 1-12.

COMMUNICATIONS AND ASSOCIATED ELECTRONIC EQUIPMENT

All antenna locations are shown in figure 1-1. Major units of equipment include two AN/ARC-159 (V) UHF communications systems and an AN/ARN-118 (TACAN) Radio Navigation System.

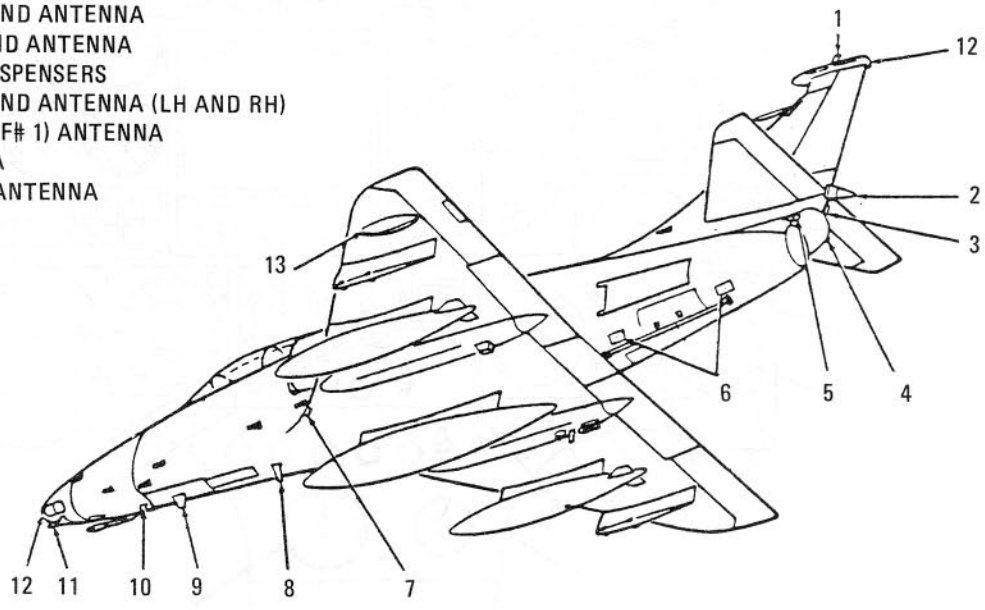
COCKPIT ARRANGEMENT

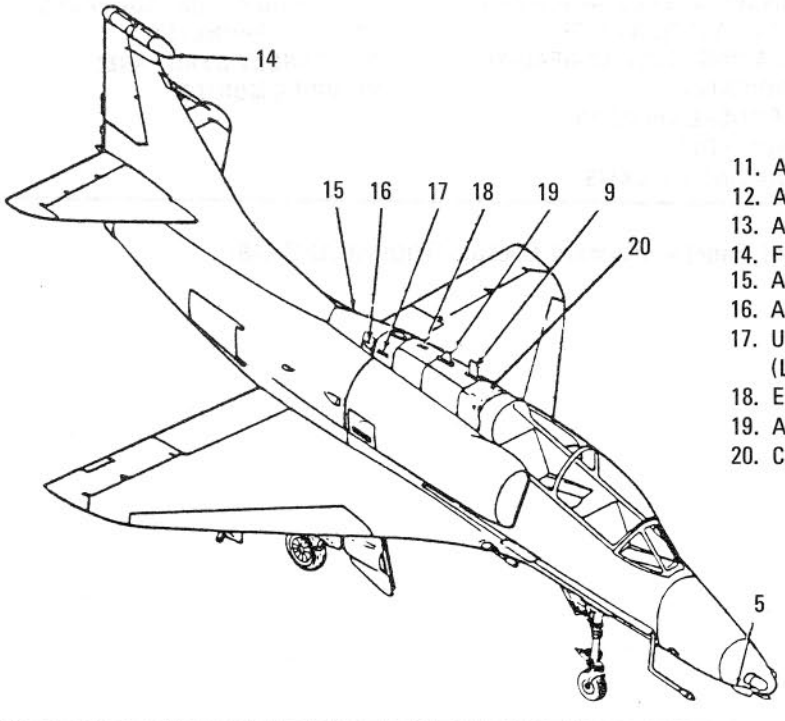
The OA-4M cockpits have been modified to accomodate the added ECM and communications equipment and to facilitate the modified role of the aircraft. Figures 1-2 through 1-10 illustrate the modified cockpit arrangements. Operation of the new systems is discussed in Part 2 of this Section.

Armor Provisions

The aircraft is equipped with provisions for armor plate adjacent to the cockpit. The forward windshield panel is bullet- and flak-resistant. The aft pilot's head armor plate, Part Number 5827473-9, can be installed in the OA-4M aft cockpit.

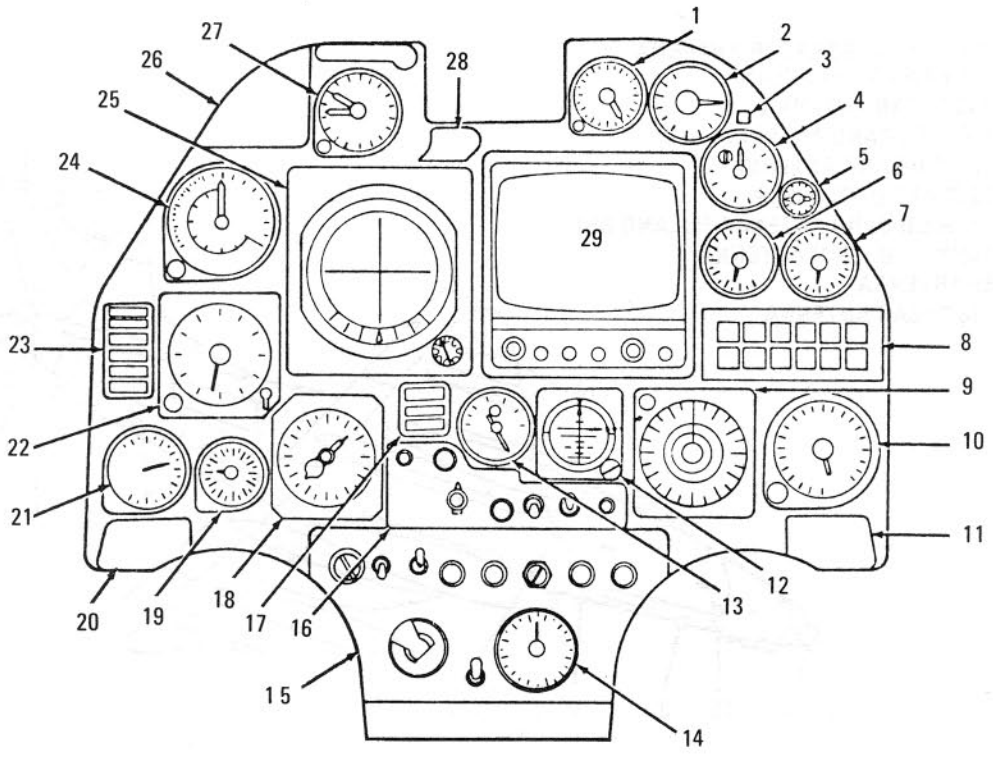
1. AN/APN-154(V) RADAR BEACON ANTENNA
2. AN/ALQ-126 LOW-BAND ANTENNA
3. AN/ARN-118 TACAN ANTENNA
4. AN/ALQ-126 HIGH-BAND ANTENNA
5. AN/ALQ-126 MID-BAND ANTENNA
6. AN/ALE-39 CHAFF DISPENSERS
7. AN/ALQ-126 HIGH-BAND ANTENNA (LH AND RH)
8. AN/ARC-159(V) 1 (UHF# 1) ANTENNA
9. AN/ALR-50 ANTENNA
10. AN/ARN-118 TACAN ANTENNA





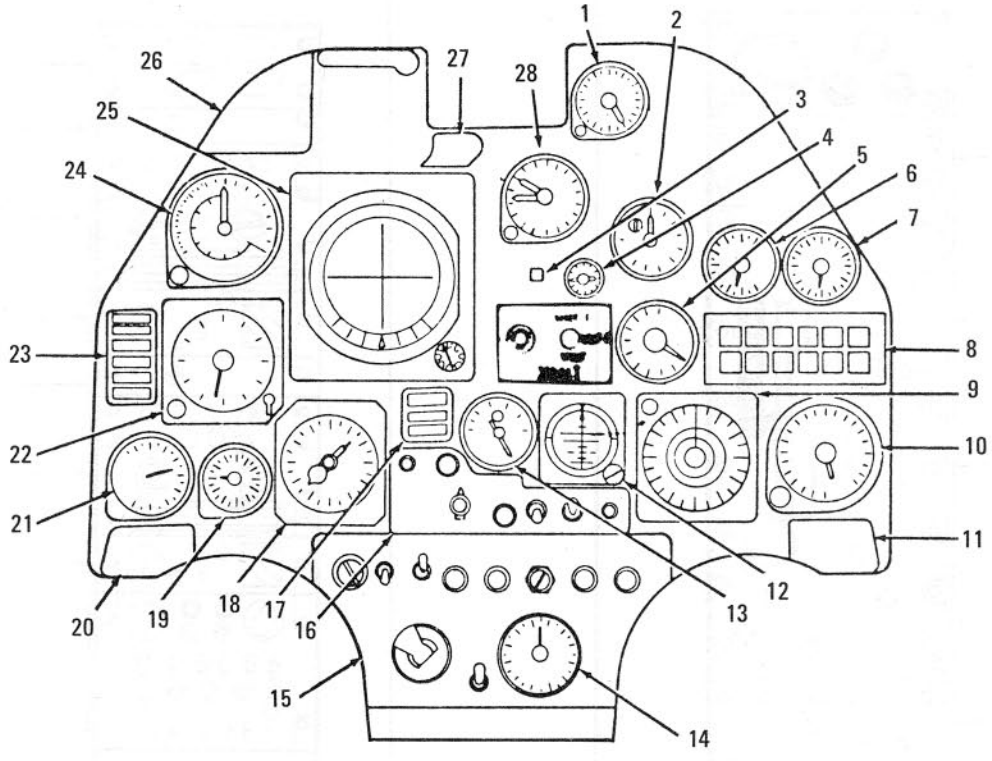
11. AN/ALQ-126 LOW BAND ANTENNA
12. AN/ALR-45 DF ANTENNA (LH AND RH)
13. AN/APN-141/-194 RADAR ALTIMETER ANTENNA
14. FIN TIP POD
15. AN/ARC-114 VHF ANTENNA
16. AIR INTAKE (LH AND RH)
17. UPPER AVIONICS COMPARTMENT VENTS (LH AND RH)
18. ENGINE OVERBOARD BLEED DUCT
19. AN/ARC-159(V) 5 (UHF#2) ANTENNA
20. CANOPY FAIRING

Figure 1-1. General Arrangement



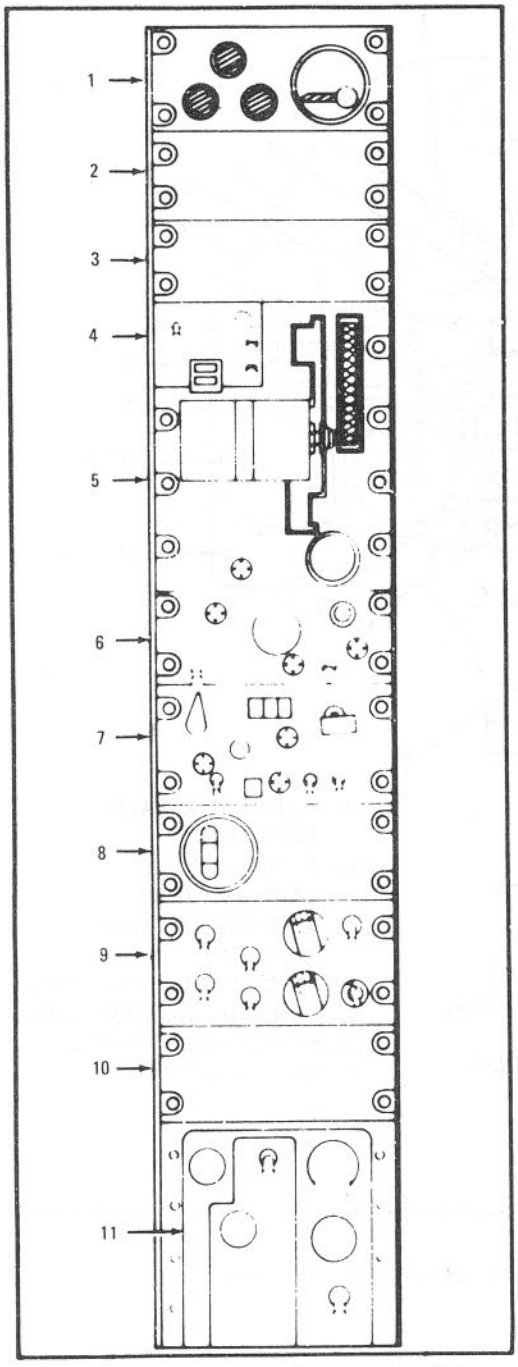
1. ENGINE PRESSURE RATIO INDICATOR
2. EXHAUST GAS TEMPERATURE INDICATOR
3. LOW OIL LEVEL INDICATOR
4. TACHOMETER
5. ENGINE OIL PRESSURE INDICATOR
6. FUEL FLOWMETER
7. FUEL QUANTITY INDICATOR
8. TDU PANEL (ALR-45)
9. AZIMUTH INDICATOR (ALR-45)
10. RADAR ALTIMETER
11. TAKEOFF CHECKLIST
12. STANDBY ATTITUDE INDICATOR
13. LIQUID OXYGEN QUANTITY INDICATOR
14. CABIN PRESSURE ALTIMETER
15. ARMAMENT CONTROL PANEL
16. MISCELLANEOUS SWITCH PANEL
17. PILOT ADVISORY LIGHTS
18. BEARING-DISTANCE-HEADING INDICATOR
19. VERTICAL VELOCITY INDICATOR
20. LANDING CHECKLIST
21. ANGLE OF ATTACK INDICATOR
22. ALTIMETER
23. CAUTION PANEL
24. AIRSPEED AND MACH INDICATOR
25. ALL ALTITUDE INDICATOR
26. GUNSIGHT CONTROL PANEL
27. ACCELEROMETER
28. STANDBY GYRO PANEL
29. VIDEO MONITOR

Figure 1-2. Instrument Panel — Forward Cockpit (Without AFC 618)



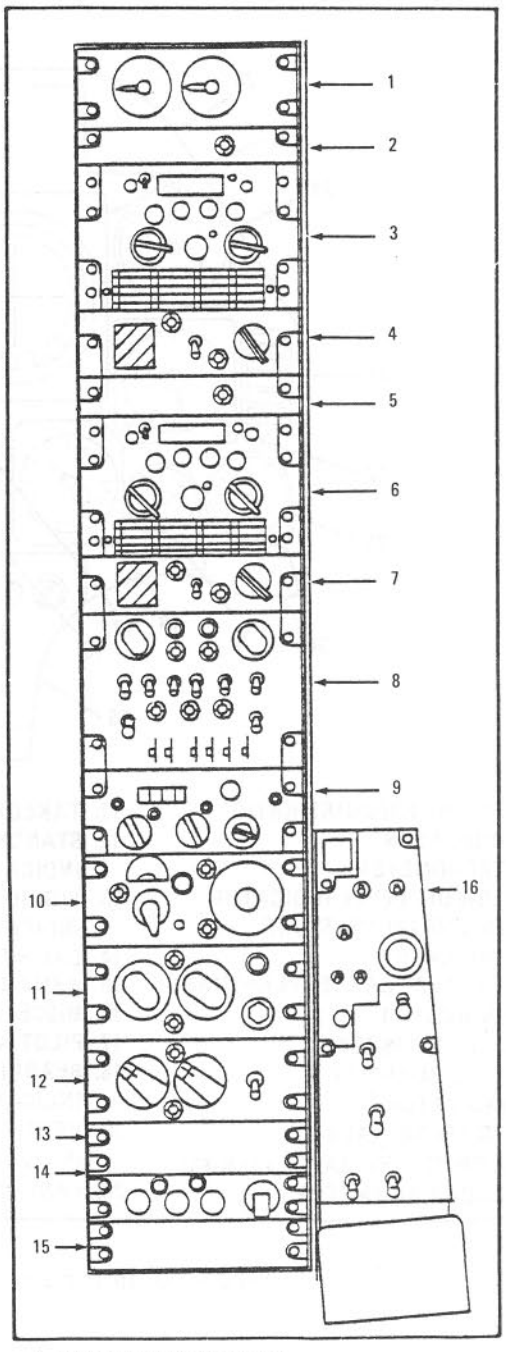
1. ENGINE PRESSURE RATIO INDICATOR
2. TACHOMETER
3. LOW OIL LEVEL INDICATOR
4. ENGINE OIL PRESSURE INDICATOR
5. EXHAUST GAS TEMPERATURE INDICATOR
6. FUEL FLOWMETER
7. FUEL QUANTITY INDICATOR
8. TDU PANEL (ALR-45)
9. AZIMUTH INDICATOR (ALR-45)
10. RADAR ALTIMETER
11. TAKEOFF CHECKLIST
12. STANDBY ATTITUDE INDICATOR
13. LIQUID OXYGEN QUANTITY INDICATOR
14. CABIN PRESSURE ALTIMETER
15. ARMAMENT CONTROL PANEL
16. MISCELLANEOUS SWITCH PANEL
17. PILOT ADVISORY LIGHTS
18. BEARING-DISTANCE-HEADING INDICATOR
19. VERTICAL VELOCITY INDICATOR
20. LANDING CHECKLIST
21. ANGLE OF ATTACK INDICATOR
22. ALTIMETER
23. CAUTION PANEL
24. AIRSPEED AND MACH INDICATOR
25. ALL ALTITUDE INDICATOR
26. GUNSIGHT CONTROL PANEL
27. STANDBY GYRO PANEL
28. ACCELEROMETER

Figure 1-3. Instrument Panel — Forward Cockpit (With AFC 618)



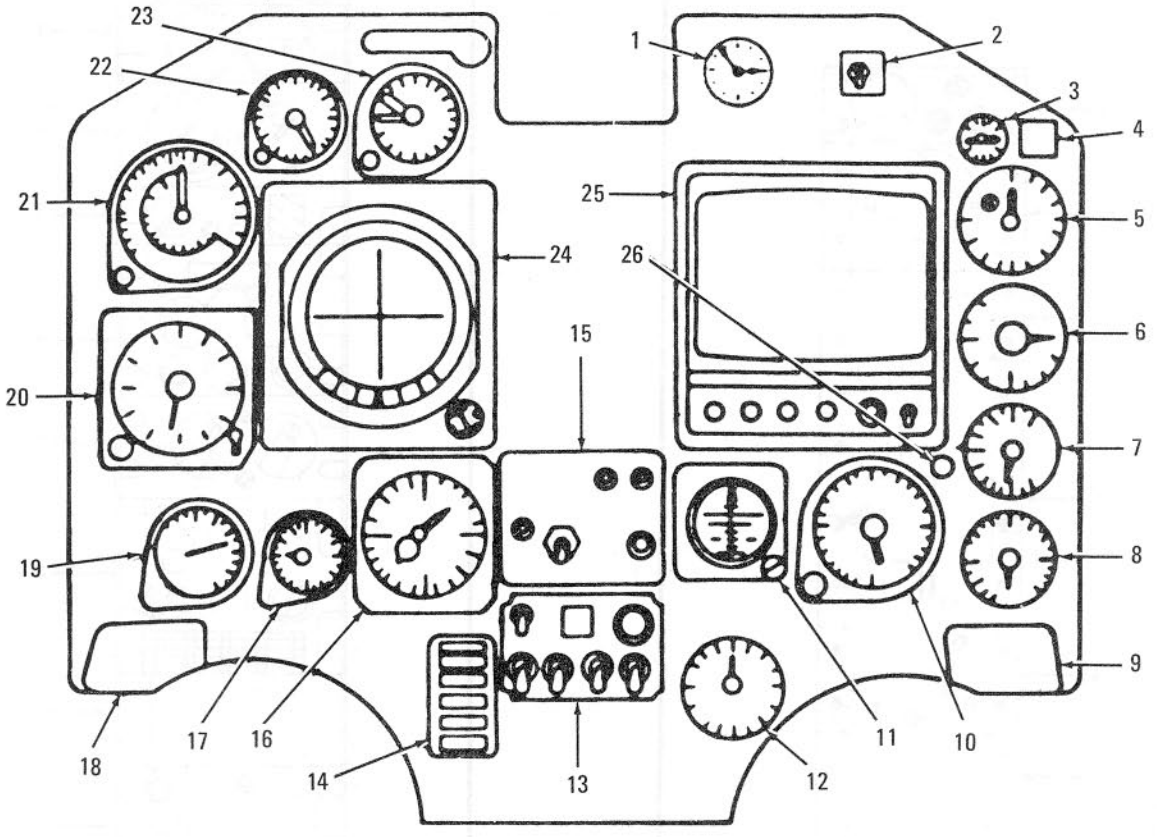
1. WHEEL AND FLAPS POSITION INDICATOR PANEL
2. INFLIGHT REFUELING PANEL OR DCU/7SA PANEL
3. GUN POD OR WEAPON CONTROL PANEL
4. JATO, STEERING, AND SPOILER CONTROL PANEL
5. THROTTLE QUADRANT
6. ENGINE CONTROL PANEL
7. AFCS CONTROL PANEL
8. LABS TIMER PANEL
9. GROUND CONTROL BOMBING SYSTEM PANEL
10. BULLPUP STOWAGE PANEL
11. AIRCREW SERVICE PANEL

Figure 1-4. Left Hand Console — Forward Cockpit



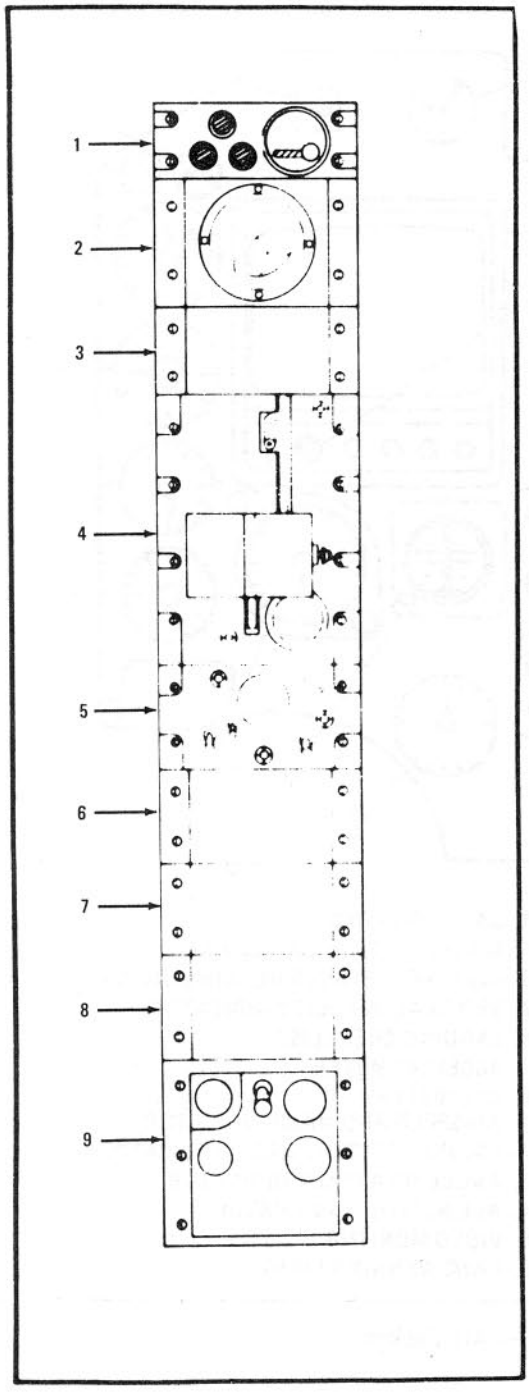
1. TRIM POSITION INDICATOR
2. UHF NO. 1 ADVISORY PANEL
3. UHF NO. 1 RADIO CONTROL PANEL (ARC-159(V) 1
4. JULIET KY-28 CONTROL PANEL (UHF NO. 1)
5. UHF NO. 2 ADVISORY PANEL
6. UHF NO. 2 RADIO CONTROL PANEL (ARC-159(V) 5
7. JULIET KY-28 CONTROL PANEL (UHF NO. 2)
8. IFF CONTROL PANEL (APX-64)
9. TACAN CONTROL PANEL (ARN 118)
10. COMPASS CONTROL PANEL
11. AUXILIARY UHF CONTROL PANEL (ARR-69)
12. INTERIOR LIGHTS CONTROL PANEL
13. AFCS GUARD PANEL
14. AFCS TEST PANEL
15. BLANK
16. ICS, RADIO, AND MISCELLANEOUS SWITCH PANEL

Figure 1-5. Right Hand Console — Forward Cockpit



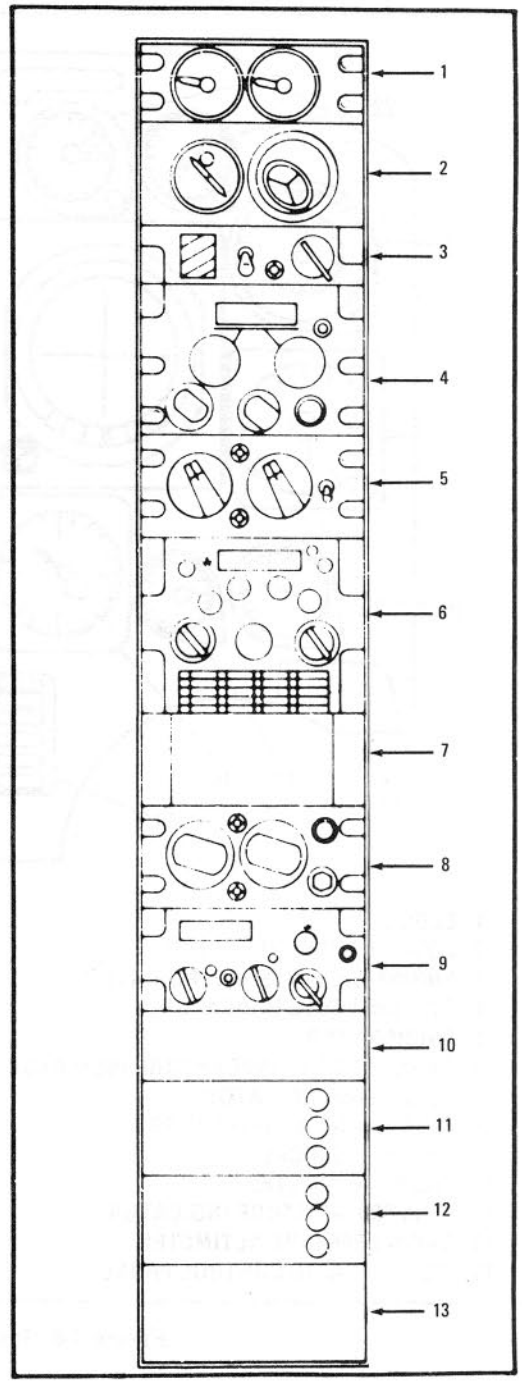
1. CLOCK
2. COMBAT LIGHTING SWITCH
3. ENGINE OIL PRESSURE INDICATOR
4. LOW OIL LEVEL INDICATOR
5. TACHOMETER
6. EXHAUST GAS TEMPERATURE INDICATOR
7. FUEL FLOW INDICATOR
8. FUEL QUANTITY INDICATOR
9. TAKEOFF CHECKLIST
10. RADAR ALTIMETER
11. STANDBY ATTITUDE INDICATOR
12. CABIN PRESSURE ALTIMETER
13. ICS AND RADIO CONTROL PANEL
14. CAUTION PANEL
15. MISCELLANEOUS SWITCH PANEL
16. BEARING-DISTANCE-HEADING INDICATOR
17. VERTICAL VELOCITY INDICATOR
18. LANDING CHECKLIST
19. ACCELEROMETER
20. ALTIMETER
21. AIRSPEED AND MACH INDICATOR
22. ENGINE PRESSURE RATIO INDICATOR
23. ANGLE OF ATTACK INDICATOR
24. ALL ATTITUDE INDICATOR
25. VIDEO MONITOR
26. LAWS WARNING LIGHT

Figure 1-6. Instrument Panel — Aft Cockpit



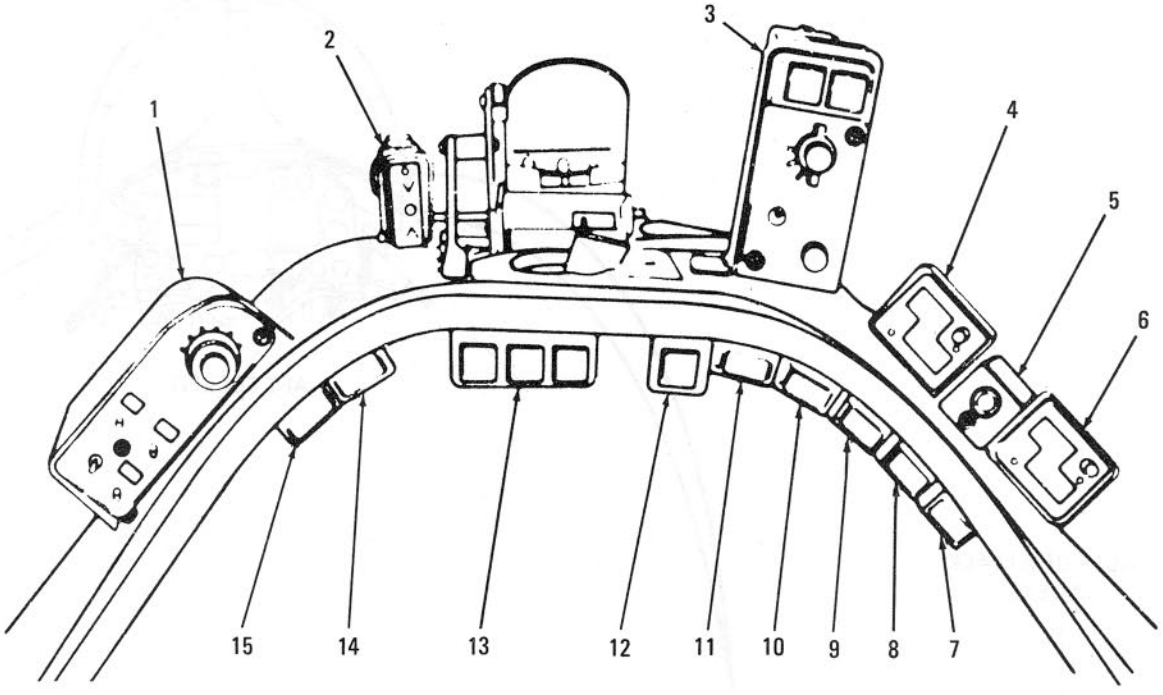
1. WHEELS AND FLAPS POSITION INDICATOR
2. AIR CONDITIONING PANEL
3. BLANK
4. THROTTLE QUADRANT
5. ENGINE CONTROL PANEL
6. AFCS RECEPTACLE STORAGE PANEL
7. BLANK
8. BLANK
9. AIRCREW SERVICE PANEL

Figure 1-7. Left Hand Console — Aft Cockpit



1. TRIM POSITION INDICATOR PANEL
2. OXYGEN AND SIR CONDITIONING PANEL
3. JULIET KY-28 (VHF)
4. VHF RADIO CONTROL PANEL (ARC-114)
5. INTERIOR LIGHTS CONTROL PANEL
6. UHF NO. 2 RADIO CONTROL PANEL (ARC-159(V) 5
7. TEST RECEPTACLE STOWAGE PANEL
8. AUXILIARY UHF CONTROL PANEL (ARR-69)
9. TACAN CONTROL PANEL (ARN-118)
10. MIC INTERFACE PANEL
11. ICS AMPLIFIER PANEL
12. ICS AMPLIFIER PANEL
13. BLANK

Figure 1-8. Right Hand Console — Aft Cockpit



1. AN/ALE-39 CONSOLE
2. ANGLE OF ATTACK INDEX LIGHT
3. ECM CONSOLE
4. UHF NO. 1 REMOTE FREQUENCY INDICATOR
5. UHF NO. 1 AND NO. 2 RFI IN IDENTIFICATION LIGHTS
6. UHF NO. 2 REMOTE FREQUENCY INDICATOR
7. FIRE WARNING LIGHT
8. IFF INDICATOR LIGHT
9. CANOPY UNLOCKED INDICATOR LIGHT
10. LAWS INDICATOR LIGHT
11. LABS INDICATOR LIGHT
12. UHF-1, UHF-2, VHF/FM TRANSMIT SELECT INDICATOR LIGHTS
13. AN/ALR-45 INDICATOR LIGHTS
14. LANDING GEAR WARNING LIGHT
15. LOW FUEL WARNING LIGHT

Figure 1-9. Glareshield — Forward Cockpit

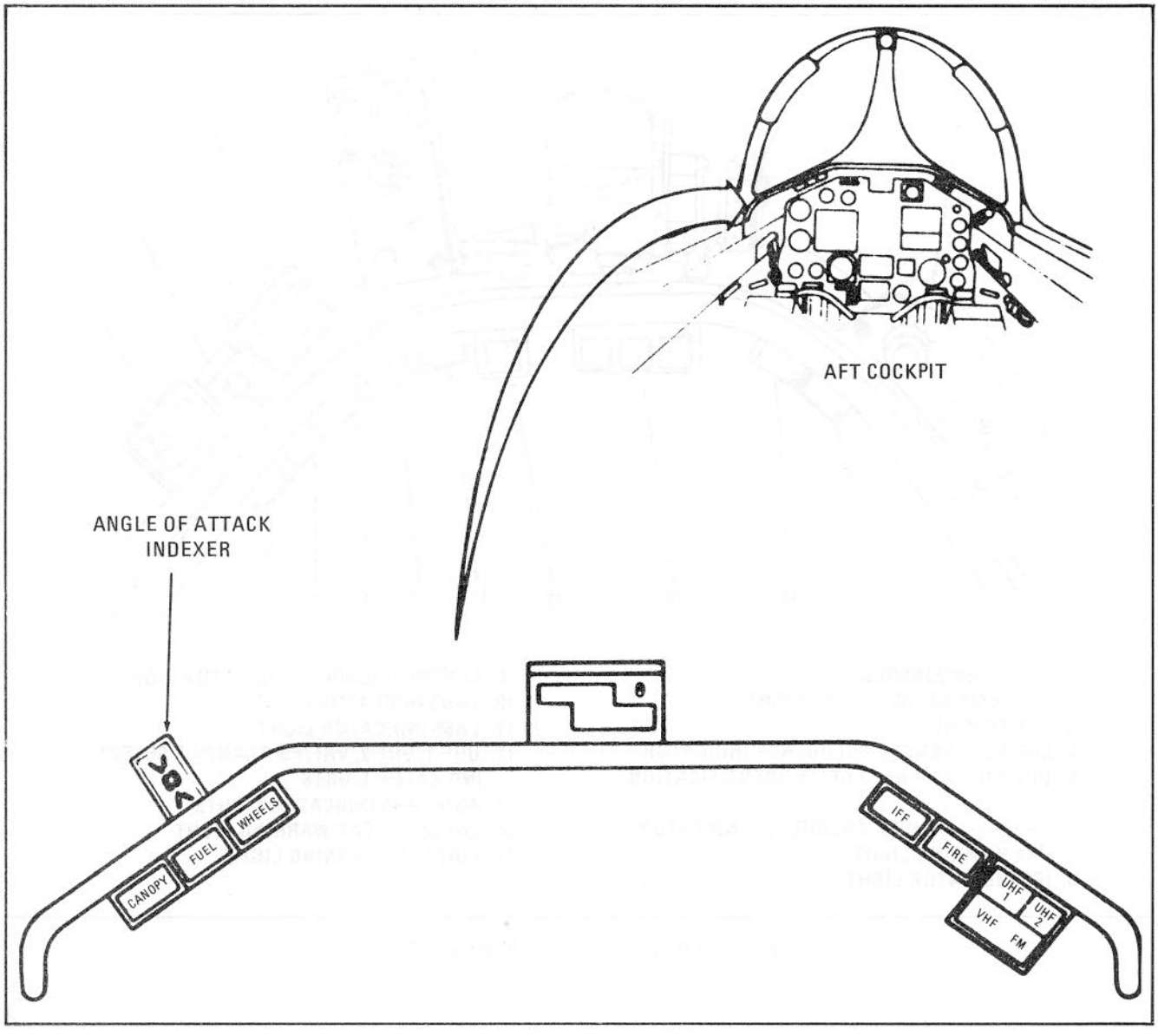


Figure 1-10. Glareshield — Aft Cockpit

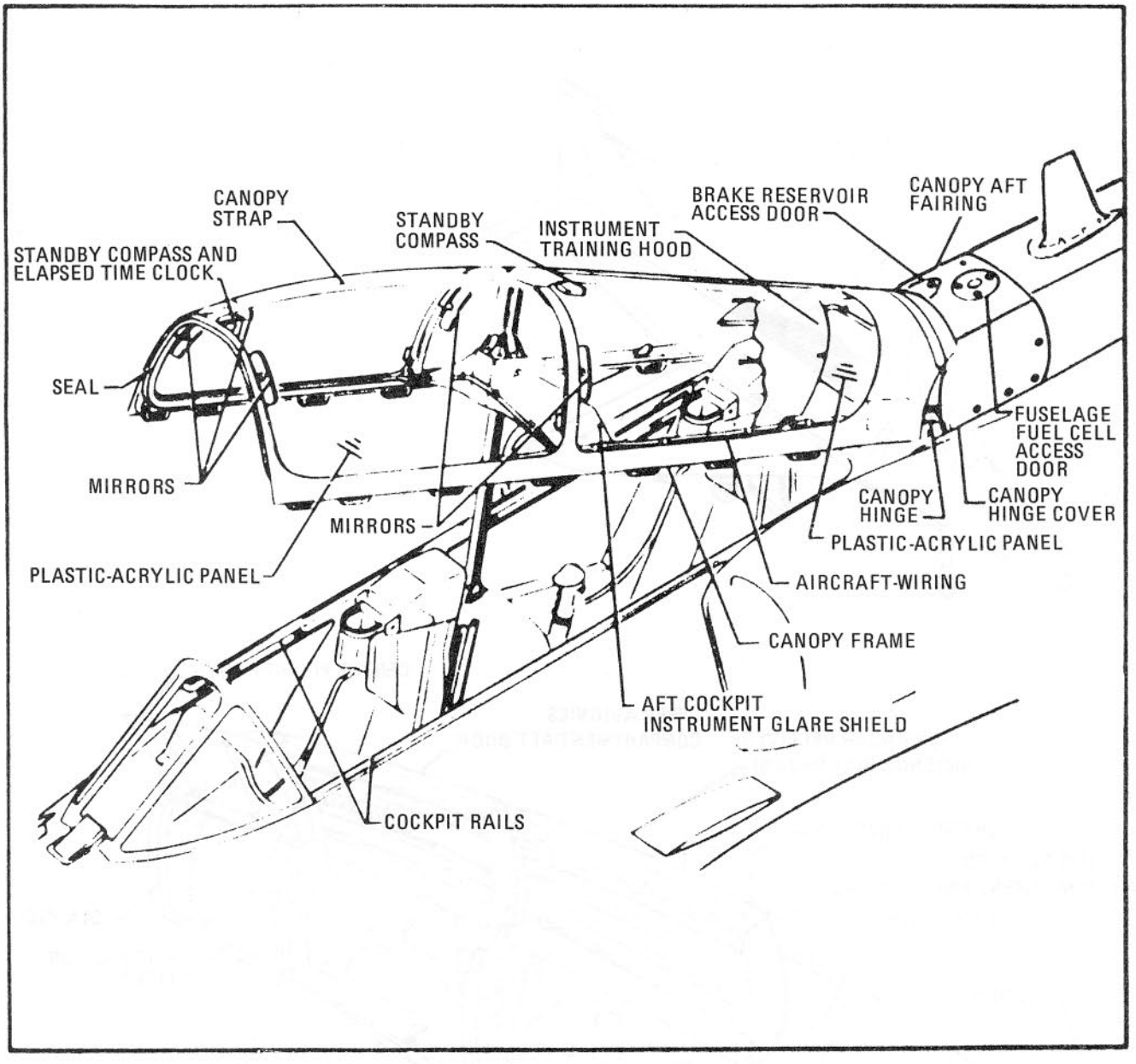


Figure 1-11. Canopy and Canopy Fairing

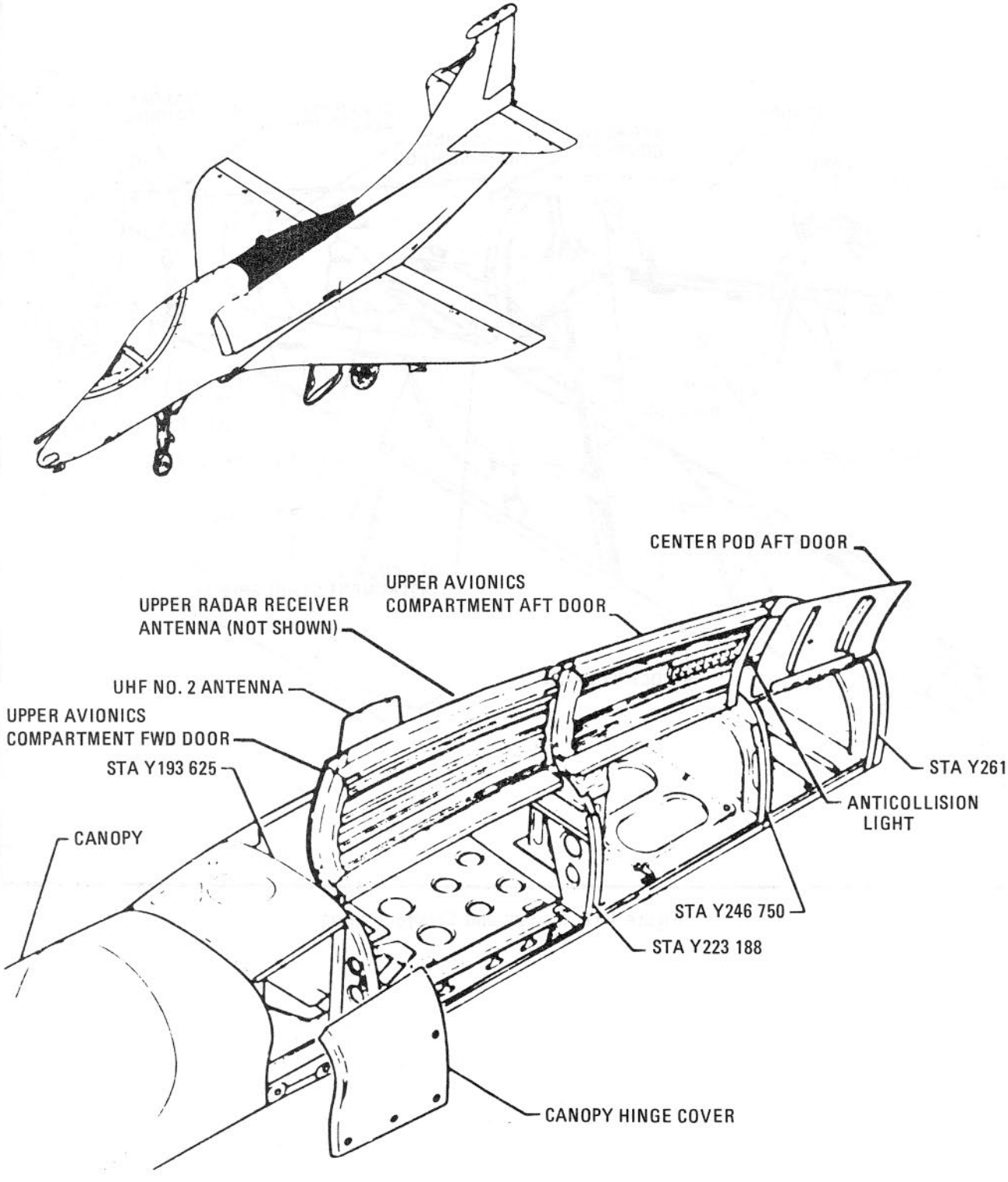


Figure 1-12. Upper Avionics Compartment

PART 2
SYSTEMS

INTERCOMMUNICATION SYSTEM (ICS)

The intercommunication system (ICS) provides communication between the forward and aft cockpits, and functions in the same manner as in the TA-4F/J. However, the ICS switch locations are different in the OA-4M due to modification and relocation of the ICS and radio control panel as described below.

The ICS and radio contol panel is mounted on the right console in the forward cockpit and in the lower center section of the instrument panel in the aft cockpit (figures 1-5 and 1-6). Both control panels are identical with the exception of the XMIT select switch, which is removed from the forward cockpit ICS and radio control panel and mounted on the center of the forward instrument panel (figure 1-3). The ICS and radio control panel contains the following controls:

Communications/navigation radio control selector (RAD CONT)

Normal/alternate select switch (HDST-NORM/ALT)

Microphone hot/cold switch (MIC HOT/COLD)

Nav Pac/TACAN on/off switch (NAV-TAC/OFF).

Auxiliary receiver on/off switch (AUX REC/OFF).

Radio transmit select switch (XMIT) (rear cockpit only).

ICS volume control (ICS).

Radio volume control (RAD).

RADIO SYSTEMS

The OA-4M contains three separate and distinct radio systems which interface only through the individual cockpit ICS/COMM amplifiers and throttle radio transmit switch. These systems are termed the UHF-1, UHF-2, and VHF/FM systems. The UHF-1 and UHF-2 systems utilize individual ARC-159(V) transceivers, the VHF/FM system utilizes the ARC-114 transceiver. Individual descriptions and operations of these radios and associated systems are discussed below.

ARC-159(V) UHF Radio Operation

The ARC-159(V) UHF system is energized by placing the transceiver control function selector switch from OFF position to MAIN or BOTH. The mode selector switch is placed to PRESET if one of the 20 preset channels is to be used, and the PRESET knob rotated to the desired channel number. The channel number selected will appear on the indicator in the fourth- or fifth-digit position. The remaining readout positions will be blank. To identify the frequency, place the mode selector switch to READ position and the indicator readout will display the preset frequency for the channel selected. Manual selection of a frequency is accomplished by placing the mode selector switch in MANUAL position and rotating the four manual frequency selector knobs until the desired frequency appears on the indicator. If the function selector switch has been placed in the BOTH position instead of MAIN, the separate guard receiver will be monitored in addition to the other channel or frequency selected.

The volume of received audio signals is controlled by the volume (VOL) control on the ARC-159(V) transceiver control panel. The squelch circuit can be disabled by placing the squelch (SQ) switch in the OFF position, improving receiver sensitivity to weak signals.

The ARC-159(V) UHF radio communication system is capable of transmitting and receiving on any one of 7000 frequencies, spaced at 25-kilohertz intervals in the 225.000 to 399.750 megahertz UHF band. Any one of 20-preset channels may be preselected when the panel mode selector switch is in the PRESET position. Placing the mode selector switch in the MANUAL position transfers frequency selection to the four manual frequency selector knobs. Reading clockwise, the first knob controls the first two digits of the frequency in 10-megahertz steps from 22 to 39. The second knob provides steps of one megahertz from 0 through 9. The third knob provides steps of one-tenth megahertz, and the fourth knob provides steps of 25 kilohertz.

Placing the ARC-159(V) selector switch in BOTH position monitors the audio from the guard receiver and the main UHF receiver simultaneously, unless transmitting.

The guard channel can be used for emergency transmission and reception by placing the mode selector

switch in GUARD position. The transceiver automatically tunes to guard frequency and displays 243.0 megahertz on the indicator.

The ARC-159(V) UHF system uses two antennas (figure 1-1), an ADF antenna for direction finding, and a blade antenna for normal communication. The blade antenna is omnidirectional and is used for receiving and transmitting UHF communication signals.

Automatic direction finding (ADF) on received signals is accomplished by placing the ARC-159(V) function selector switch in the ADF position.

In the ARC-159(V) UHF communication system, if the Juliet 28 UHF security system is installed and operating, all audio signals pass through and are acted upon by the security system prior to being transmitted from the aircraft or being relayed (received) to the pilot's headset.

ARC-159(V) UHF transceiver operating controls and functions are presented in figures 1-13 and 1-14.

OPERATION

UHF NO. 1 SYSTEM - FORWARD COCKPIT. The UHF No. 1 system in the forward cockpit consists of an AN/ARC-159(V) transceiver located on the forward right-hand console of the forward cockpit, and a remote frequency indicator located on the right side above the glare shield (figure 1-9). The ADF position on the function selector switch is not used by UHF No. 1 system. If the function selector switch is placed in ADF position, the main and guard receivers are disabled. The UHF No. 1 system operates completely separate from the UHF No. 2 system.

UHF NO. 1 SYSTEM - REAR COCKPIT. The UHF No. 1 system in the rear cockpit consists of a Remote Frequency Indicator (RFI) located above the center glare shield, and a UHF No. 1 volume switch located on the lower center of the instrument panel.

UHF NO. 2 SYSTEM. The UHF No. 2 system consists of the following components: an AN/ARC-159(V) 5 radio receiver-transmitter, two C-9946 control panels, a D38491-1 junction box, a 01-22-03531 UHF communication antenna, and two intercommunication system (ICS) control panels.

The UHF No. 2 system can be controlled and various frequencies selected from either cockpit; however, control is possible from only one cockpit at a time. Control of the UHF No. 2 system is indicated by the square control button labeled RAD CONT. The square button is located on the ICS and radio control panel and is part of the ICS system. If the FWD light is visible in the square control button, the forward cockpit has control of the UHF No. 2 system. An AFT light indicates aft cockpit control. Either pilot can take control of the UHF No.2 system by pressing the square control button; neither can prevent the other from assuming control. The UHF No. 2 system is independent of the UHF No. 1 and FM systems; it operates identically to the AN/ARC-51A UHF communication system in the TA-4F/J aircraft.

UHF NO. 2 - FORWARD COCKPIT. The forward cockpit contains a C-9946 control panel located in the center of the right-hand console, an ICS/radio control panel located on the outboard right-hand console, and a remote frequency indicator located above the glare shield on the right side (figure 1-14).

UHF NO. 2 - REAR COCKPIT. The aft cockpit contains a C-9946 control panel located in the center of the right-hand console and an ICS/radio control panel located on the lower center of the instrument panel.

RADIO TRANSMIT SELECT SWITCH (XMIT). The radio transmit select switch (XMIT) is a three-position toggle switch (labeled UHF-1, UHF-2, and VHF/FM) which controls the radio on which each respective cockpit transmits. Each XMIT switch is independent and cannot be controlled from the other cockpit. The XMIT switches are located on the center of the instrument panel in the forward cockpit and on the ICS/radio control panel in the rear cockpit. Indicator lights below the right glare shield lip in each cockpit show the XMIT select switch position in the respective cockpit. Figure 1-15 shows radio cockpit functions.

Security Equipment

Security equipment (Juliet 28-UHF) is supplementary to the UHF. The security equipment control panel is located on the right console. Power for the security equipment is supplied by the 28 vdc primary bus. Any further descripition of the security equipment or its function is above the security classification of this manual.

ARC-114 VHF/FM Radio Communication System

The system provides secure voice (Juliet 28 - VHF) and clear voice point-to-point communications. Frequency modulated (FM) radio communications are in the very-high-frequency (VHF) range of 30.00 to 75.95 MHz.

The ARC-114 VHF/FM radio communications system includes an ARC-114 VHF/FM transceiver, the Juliet 28 (VHF) control, the UHF/VHF communication control assembly, the Juliet 28 security unit, the VHF antenna coupler, and a VHF antenna. The system operates on any one of 920 available channels spaced in 50 kHz increments

throughout the frequency range. Discussion of secure voice Juliet 28 - VHF is limited due to the classification of this manual.

ARC-114 VHF/FM TRANSCEIVER CONTROL

The ARC-114 VHF/FM transceiver control panel located on the right console in the aft cockpit only controls four ARC-114 VHF/FM functional capabilities as placarded on the transceiver function switch. The functions are: T/R (transmit/receiver), T/R GUARD, HOMING, and RETRAN (retransmit). Homing and retransmit capabilities are not utilized.

The system is activated by placing the XMIT switch, located in either cockpit, in the VHF position and selecting the desired transceiver function on the transceiver function switch.

TRANSMIT OPERATION. During transmit operation of the T/R function, clear voice audio is applied through the UHF/VHF communication control assembly to the transmitter. In secure voice mode, audio is applied through the UHF/VHF communication control assembly to the Juliet 28-VHF unit and then secure voice audio is applied to the transmitter.

The main receiver generates a 150-Hz tone which is superimposed on the transmitted audio and provides a receiver tone-squelch-breaking signal for the receiving station. During the secure voice mode, a tone disablement signal from the Juliet 28-VHF unit enters the transmitter to prevent transmission of the 150-Hz tone.

The ARC-114A transceiver (figure 1-16) is an improved ARC-114 and operates in the same manner except that the SQUELCH preset (screwdriver) adjustment slot on the ARC-114 transceiver control panel is replaced with a three-position SQUELCH control knob to enable the pilot to control the squelch function. The three SQUELCH control knob positions are labeled NOISE, OFF, and TONE. In OFF position the squelch function is deactivated.

When in NOISE position, the squelch is activated when broad-band noise is present in the audio. In TONE position only those signals that include the appropriate 150-Hz output will be received. All aircraft with the ARC-114A installed have the capability of transmitting the 150-Hz signal. To receive a transmission from an aircraft with TONE capability (150 Hz output), the receiving aircraft must be in TONE position. To transmit to an aircraft with TONE capability (150-Hz output) the squelch control does not have to be in TONE position.

Tuning controls the carrier frequency. The output carrier is frequency modulated by the modulating signal from the transmitter. Depressing the microphone switch initiates the transmit control signal from the UHF/VHF communication control assembly which is then applied to the transmit relay solenoid activating the transmitter RF power amplifier and furnishing RF modulated-carrier output to the VHF antenna coupler.

The VHF antenna coupler functions during transmit and receive modes to compensate for varying terminal impedance of the VHF antenna over the 30.00 to 75.95 MHz band. RF output from the VHF antenna coupler is connected to the omnidirectional VHF antenna. Both the coupler and antenna are located aft in the upper avionics compartment.

During transmit operation the transmitter applies a sidetone signal through the audio amplifier and communications control assembly to the pilot's headset. A loss of output power, low output power, or a high voltage standing wave ratio at the transmitter will remove the sidetone signal from the pilot's headset. Presence of an audible signal in the pilot's headset, during transmission, is an indication of proper transmit operation.

RECEIVE OPERATION. During receive operation of the T/R function, the main receiver is coupled through the VHF antenna coupler and applied to the guard receiver. During this mode of operation, the guard receiver is deenergized and the RF signal passes through the guard receiver multi-coupler to the main receiver.

The tuning control applies control voltage to the main receiver and a bandswitch signal to the VHF antenna coupler. The tuning control also applies a switched dc steering voltage and a preset lines voltage that is used to adjust the local oscillator output frequency.

Mixing of the amplified RF input frequency, 30.00 to 75.95 MHz and the local oscillator frequency, 39.90 to 85.85 MHz, results in generation of an intermediate frequency of 9.9 MHz. The intermediate frequency is amplified and demodulated to provide an audio signal that, applied to the audio amplifier, passes through the communication control assembly to the pilot's headset. During secure voice mode operation, audio amplifier output is processed by the Juliet 28-VHF unit and passed through the communication control assembly to the pilot's headset.

During normal receiver operation with the noise level below a predetermined level set by the main receiver SQUELCH control, the noise squelch circuit is enabled and main receiver audio outputs are applied to the audio amplifier.

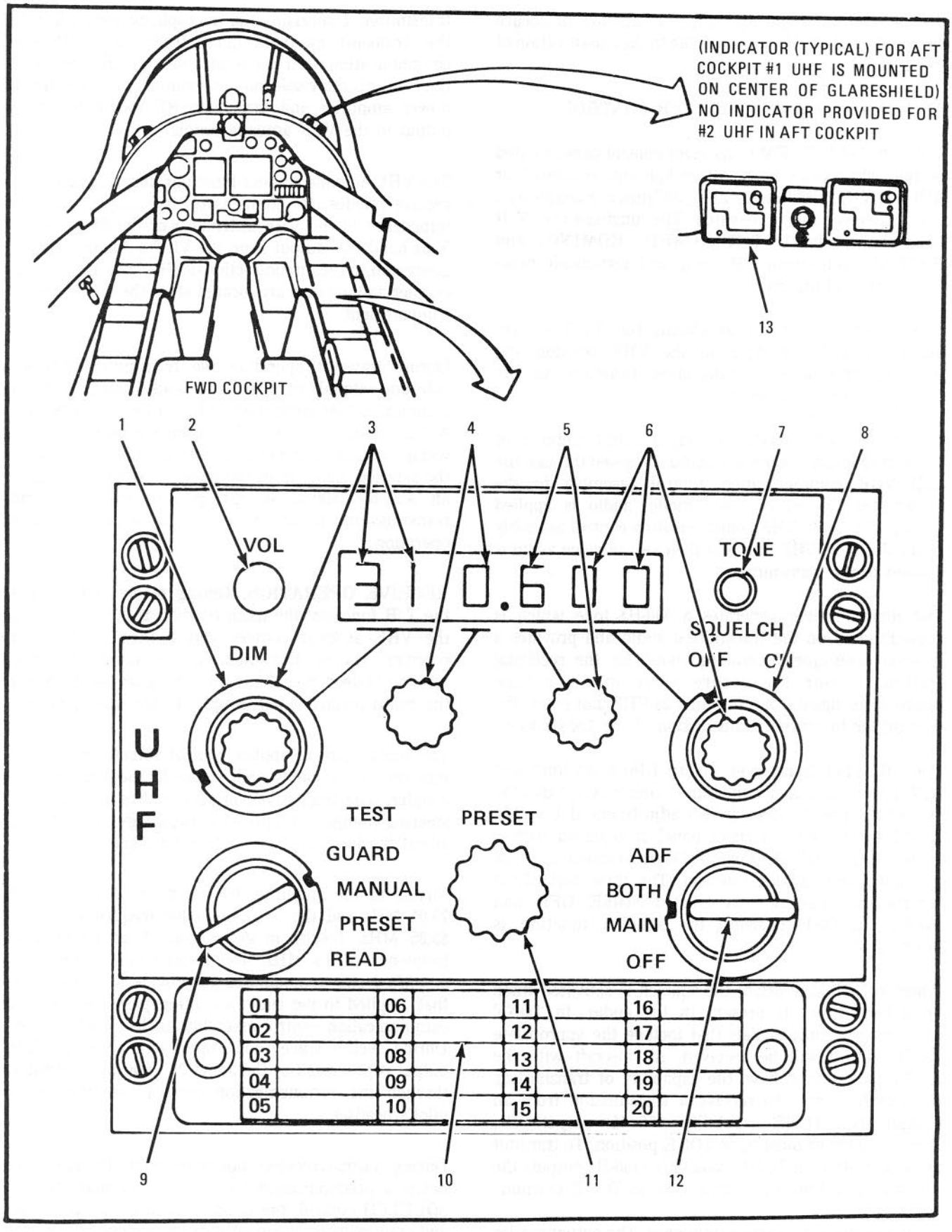


Figure 1-13. Radio Set AN/ARC-159 (V) 1, #1 UHF, Operating Controls and Indicators (Sheet 1 of 2)

Item No.	Control	Description	Function
1	DIM-TEST	Wafer switch	Adjusts light intensity of readout. Tests readout when switch is set to TEST.
2	VOL	Potentiometer	Adjusts audio output level.
3	Frequency	Wafer switch and readout	Selects and indicates 100-MHz and 10-MHz frequency increments during manual operation.
4	Frequency	Wafer switch and readout	Selects and indicates 1-MHz frequency increment during manual operation.
5	Frequency	Wafer switch and readout	Selects and indicates 0.1-MHz frequency increments during manual operation.
6	Frequency	Wafer switch and readout	Selects and indicates 00-, 25-, 50-, and 75-kHz frequency increments during manual operation.
7	TONE	Momentary contact pushbutton switch	Modulates transmitted signal with 1020-Hz tone.
8	SQUELCH	Wafer switch	Enables or disables main receiver squelch.
9	Mode selector	Wafer switch	
	GUARD		Tunes receiver-transmitter to guard frequency Displays guard frequency on readout.
	MANUAL		Permits manual selection of frequency. Selected frequency is displayed on readout.
	PRESET		Permits selection of any of 20 preset channels. Displays selected channel number on readout in fourth and/or fifth-digit position.
	READ		Displays frequency of selected preset channel on readout.
10	Chart	Operating frequency chart	Provides semipermanent record of preset frequencies.
11	PRESET	Memory drum switch assembly	Preset channel selector. Sets channel when mode selector is in PRESET.
12	Function selector	Wafer switch	
	OFF		Turns off power to receiver-transmitter.
	MAIN		Selects normal receiver and transmit operation. Transmitter is keyed by microphone push-to-talk switch.
	BOTH		Enables guard receiver in addition to functions described for MAIN.
	ADF		Disabled on UHF #1.
13	ID-2053/ARC-159(V) Indicator	Readout	Indicates frequency of selected channel on UHF #1.

Figure 1-13. Radio Set AN/ARC-159 (V) 1, #1 UHF, Operating Controls and Indicators (Sheet 2 of 2)

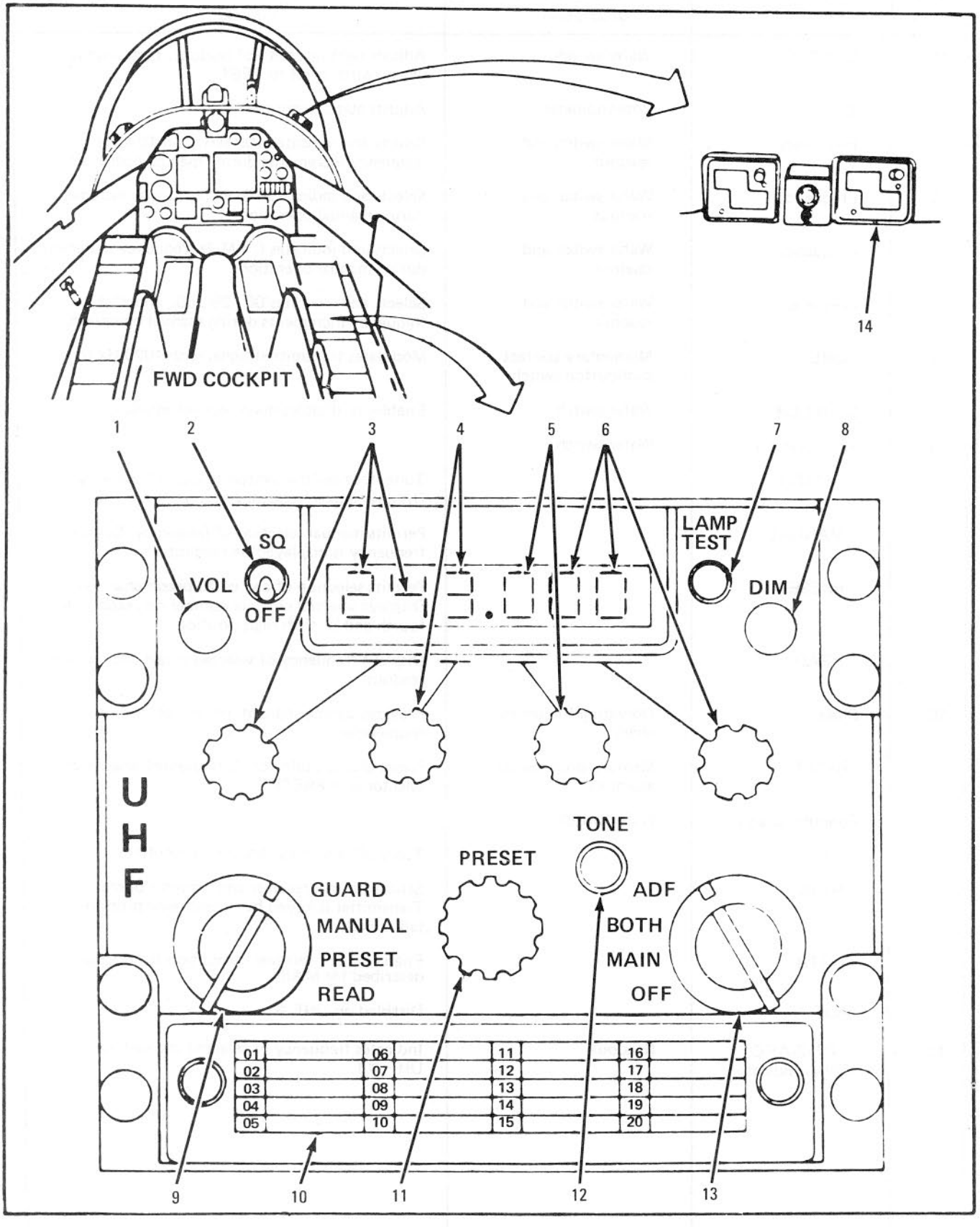


Figure 1-14. C9946/ARC-159(V) 5, #2 UHF Operating Controls and Indicators (Sheet 1 of 2)

Item No.	Control/Indicator	Description	Function
1	VOL	Potentiometer	Adjusts audio output level.
2	SQ/OFF	Toggle switch	Enables main receiver squelch in SQ position. Disables main receiver squelch in OFF position.
3	Frequency	Wafer switch and readout	Selects and indicates 100- and 10-MHz frequency increments during manual operation.
4	Frequency	Wafer switch and readout	Selects and indicates 1-MHz frequency increments during manual operation.
5	Frequency	Wafer switch and readout	Selects and indicates 0.1-MHz frequency increments during manual operation.
6	Frequency	Wafer switch and readout	Selects and indicates 25- and 50-kHz frequency increments during manual operation.
7	LAMP TEST	Momentary contact pushbutton switch	Tests readouts.
8	DIM	Rheostat	Adjusts light intensity of readouts.
9	Function selector	Wafer switch	
	OFF		Turns off primary power to remote control and associated radio.
	MAIN		Turns on primary power, enables transmitter and main receiver. Transmitter is keyed by microphone push-to-talk switch or TONE pushbutton.
	BOTH		Enables guard receiver in addition to functions described for MAIN.
	ADF		Enables associated automatic direction-finding equipment in addition to both main and guard receivers.
10	TONE	Momentary contact pushbutton switch	Keys transmitter and modulates carrier with 1020-Hz tone.
11	PRESET	Memory drum switch assembly	Preset channel selector. Sets channel when mode selector is set to PRESET or READ.
12	Chart	Operating frequency chart	Provides semipermanent record of preset frequencies.
13	Mode selector	Wafer switch	
	GUARD		Tunes associated radio to guard frequency. Causes guard frequency to be displayed on readouts.
	MANUAL		Permits manual selection of operating frequency of associated radio.
	PRESET		Permits selection of any of 20 preset channels. Causes number of selected channel to appear in 3rd and/or 4th-digit position.
	READ		Causes frequency of selected preset channel to be displayed on readouts.
14	ID-2053/ARC-159(V) Indicator	Readout	Indicates frequency of selected channel on UHF #2.

Figure 1-14. C9946/ARC-159(V) 5, #2 UHF Operating Controls and Indicators (Sheet 2 of 2)

RADIO	UHF-1		UHF-2		FM	
COCKPIT	FRONT	REAR	FRONT	REAR	FRONT	REAR
FUNCTION						
TRANSMIT	YES	YES	YES	YES	YES	YES
RECEIVE	YES	YES	YES	YES	YES	YES
SET FREQ	YES	NO	YES	YES	NO	YES
VOL CONT	YES	YES	YES	YES	YES	YES
FREQ READOUT	YES*	YES*	YES*	YES	NO	YES
*- - RFI						

Figure 1-15. Radio Cockpit Functions

T/R GUARD. When the transceiver function switch is set to T/R GUARD, the transmitter and main receiver sections operate as described in transmit and receive operation. The guard receiver is activated and is fixed tuned to receive RF signals on 40.50 MHz. Description of the guard receiver is functionally similar, except for frequencies, to that of the main receiver.

ARC-114 VHF/FM RADIO OPERATION

1. UHF/VHF communication control panel ..... VHF, OFF TOGGLE SWITCH SET TO VHF

2. Transceiver mode selector switch ..... T/R OR T/R GUARD (fixed tuned)

3. Juliet 28-VHF (if installed) Plain/Cipher switch ..... SET TO P (clear voice)

Note

For operation in C position (security mode) refer to AVB No. 181.

4. Select desired frequency with manual selector knob

5. Squelch control knob ..... NOISE OR TONE (ARC-114A only) (AS DESIRED)

NAVIGATION SYSTEM

The primary navigation system for the OA-4M is the ARN-118(V) tacan. The description and operation of the system is as follows.

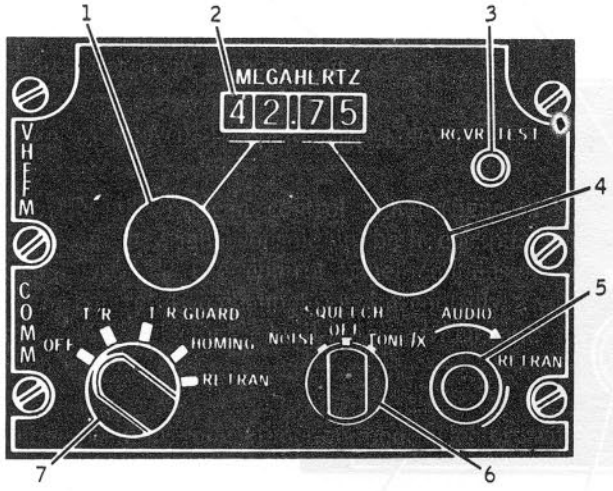
Tacan Bearing Distance System (ARN-118(V))

The ARN-118(V) Tacan bearing distance system provides operational modes for indications of bearing and slant range up to 275 nautical miles to a selected VORTAC facility, or to a surface or airborne tacan beacon. A mode is also provided for slant range distance indications to another similarly equipped aircraft, and if the other aircraft is equipped with bearing transmitting equipment, bearing indications to the other aircraft will be displayed. Serious problems such as 40-degree lockon error, echo tracking, and long search cycles, are eliminated in the ARN-118(V) system. The elimination of these problems increases confidence in operation of the ARN-118(V) system and ensures accurate navigational information for detemining flight paths and approaches.

Note

A-4 aircraft are not presently equipped with bearing transmitting equipment.

The system provides a self test of the system that is manually initiated by depressing a built-in-test switch located on the tacan control panel. The ARN-118(V) also contains an automatic self-test function that causes the



1. FREQUENCY SELECTOR (LEFT TWO DIGITS)
2. FREQUENCY DISPLAY
3. RECEIVER TEST BUTTON
4. FREQUENCY SELECTOR (RIGHT TWO DIGITS)
5. AUDIO LEVEL CONTROL
6. SQUELCH CONTROL KNOB
7. TRANSCEIVER OFF/FUNCTION CONTROL

FA1-275

Figure 1-16. ARC-114A Transceiver Control Panel

system to be tested automatically when the tacan beacon is lost. The automatic self-test checks the system for proper operation to determine if the signal loss was due to a system malfunction. If there is a system malfunction, the TEST indicator on the tacan control panel lights at the end of the automatic self-test cycle.

Major components of the ARN-118(V) tacan system include a receiver-transmitter unit with required accessories, two antennas (same antenna as ARN-84 and ARN-52), a tacan control panel in each cockpit, a tacan antenna switch in each cockpit, and a tacan control switch/indicator in each cockpit.

TACAN CONTROL PANEL (ARN-118(V))

The ARN-118(V) tacan control panel (figure 1-17) is located on the right console in both cockpits and is labeled TACAN. The control panel contains a mode selector control, two channel selector controls, a volume control, X-Y selector, a built-in-test switch, and a test indicator light.

The five-position, rotary function mode selector switch is marked with positions OFF, REC, T/R, A/A, and A/A T/R. The function of each position is as follows:

OFF — Power is not applied to tacan system.

REC — RECEIVE MODE: tacan system determines bearing from the aircraft to the selected tacan station. Bearing to the station is displayed on the BDHI by the No. 2 pointer. Station identification signal is received. No distance is calculated.

T/R — TRANSMIT AND RECEIVE MODE: In addition to the functions of REC position, tacan system determines slant range from the aircraft to the selected tacan station. Distance to the station in nautical miles is displayed in the range window on the BDHI.

A/A REC — AIR-TO-AIR RECEIVE MODE: Tacan system receives bearing information from a suitably-equipped, cooperating aircraft and calculates the relative bearing to the cooperating aircraft. No distance information is available.

A/A T/R — AIR-TO-AIR TRANSMIT-RECEIVE MODE: Tacan system receives both distance and bearing information from a suitably-equipped, cooperating aircraft and calculates the slant-range distance and relative bearing of the aircraft. If the aircraft is not equipped with bearing transmitting capabilities, only distance information is received and slant-range distance to the aircraft is calculated.

Additional control switches located on the ARN-118(V) control panel are:

CHANNEL selectors — Selects desired tacan channel that is displayed in the CHANNEL digital display.

X-Y selector — Selects either X or Y channel. When X mode is selected, the basic 126 channels for tacan operation are provided. When Y mode is selected, an additional 126 channels are provided.

Note

At the present time only "X" type tacan stations are in operation. Selecting a "Y" station erroneously will result in an apparent tacan system failure with no azimuth or DME lock-on.

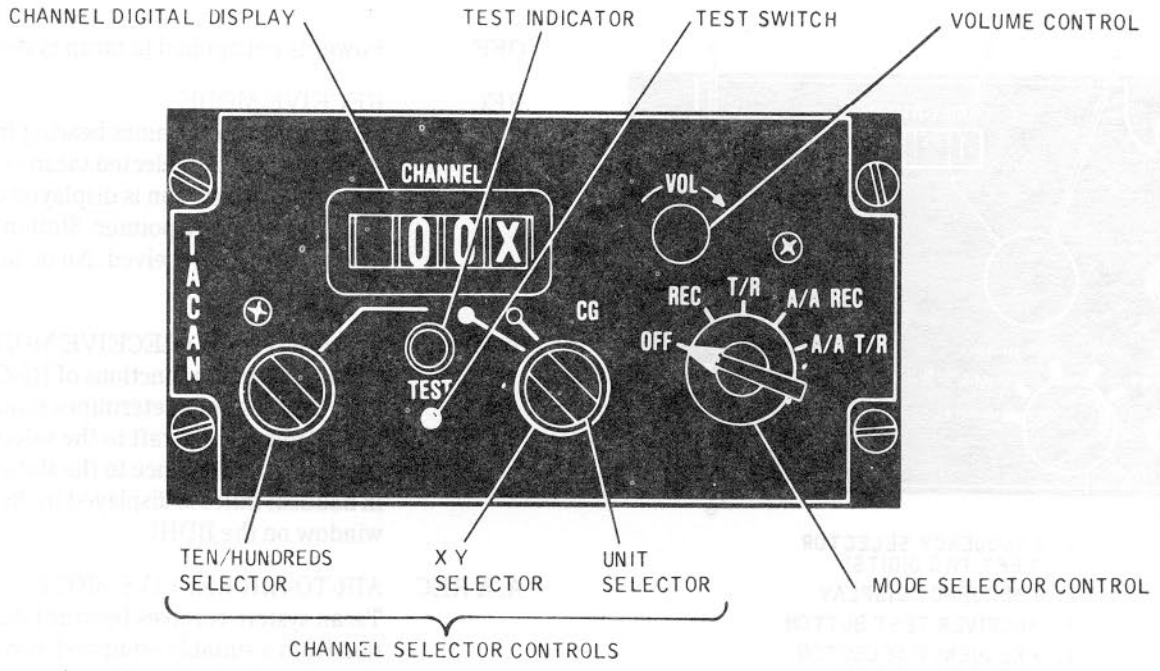


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Figure 1-17. ARN-118(V) TACAN Control Panel

Units selector	Selects units digit of desired channel.
Tens/ hundreds selector	Selects tens and/or hundreds digit of desired channel.
CHANNEL digital display	Displays selected tacan channel.
VOL control	Varies level of audio identification signal.
TEST switch	Initiates system self-test.
TEST indicator	Lights when a malfunction occurs during MANUAL self-test or automatic self-test. Flashes at start of self-test cycle to check indicator lamp.

PREFLIGHT CHECK

On all flights, perform the preflight check before takeoff to ensure that the ARN-118(V) tacan system is operating correctly and will provide accurate navigational information.

1. Set tacan control mode selector to T/R.

2. Wait 90 seconds for receiver-transmitter warmup.

3. Momentarily depress tacan control TEST switch and at the same time observe BDHI and tacan control for the following indications:

a. Tacan control TEST indicator momentarily flashes, indicating that the indicator is operational.

b. BDHI bearing pointer may slew to 270 degrees for a nominal 7 seconds.

Note

The indications in step c occur for a nominal 15 seconds.

c. BDHI DME window indication is 000.0 ±0.5, and bearing pointer indicates 180 ± 3 degrees. A distance indication of 300.0 is equal to negative 0.01 nmi and a distance indication of 399.5 is equal to negative 0.5 nmi. The 300.0 to 399.5 indications in the MILES window are not malfunctions, but an indication of negative distance.

d. Observe tacan control TEST indicator. If indicator light comes on during the test and remains on, there is a malfunction in the ARN-118(V) system and all distance and bearing information should be disregarded until the malfunction is corrected.

In the A/A REC mode, the ARN-118(V) calculates the relative bearing to a suitably-equipped, cooperating aircraft. Any number of aircraft can receive bearing information from one aircraft.

Note

- In all tacan systems there is the possibility of interference from IFF, transponder, and DME signals when operating in the air-to-air modes. To minimize the possibility of interference, it is recommended that Y channels be used and that channels 1 through 11, 58 through 74, and 121 through 126 be avoided.

- In A/A operation between two aircraft the channels must be separated by exactly 63 channels i. e., No. 1 aircraft is set to channel 29, No. 2 aircraft is set at channel 92. Both aircraft must then select A/A mode on the tacan function switch with the range between aircraft being displayed on the DME indicator.

TACAN ANTENNA SWITCH

The three-position tacan antenna switches (figures 1-5 and 1-8) are located on the outboard right console of each cockpit. The purpose of the switch is to enable the pilot to utilize the forward or aft antenna. The switch is labeled AUTO, FWD, and AFT. The AUTO position enables automatic selection of the antenna that permits station lock-on.

OPERATION OF TACAN SYSTEM
(ARN-118(V))

For normal tacan system operation proceed as follows:

1. X-Y selector X

2. Channel selector controls . . . . . SET

3. Mode selector control . . . . . REC

Note

When mode selector control is moved from the OFF position, a 90-second warmup period in REC position is required before selecting another mode.

4. After 90-second warmup
mode selector control . . . . . .T/R

5. Self test . . . . . PRESS

6. Station identification signal will be audible in headset. Volume can be adjusted by using VOL control.

Note

When cochannel interference occurs in the T/R mode, one audio identification signal may be clear and readable while the second identification signal is garbled. The garbled identification signal alerts the pilot that range information is being received from one tacan beacon and an audio identification signal is being received from another tacan beacon. The garbled identification signal remains until both the distance information and a single clear audio identification signal are received from the same tacan beacon. When any garbled information is received, all information displayed is unreliable and should not be used.

7. BDHI NAV COMPUTER
TACAN-NAVPAC switch . . . . . .TACAN

8. Magnetic bearing to station will be displayed on BDHI No. 2 pointer.

9. Slant range distance to station in nautical miles is displayed in range window on BDHI.

RADAR ALTIMETER SYSTEM

The OA-4M aircraft may utilize either the APN-141 or the APN-194 radar altimeter. The APN-194 is installed during modification and is the preferred equipment. the APN-194 differs from the APN-141 primarily in increased use of solid state components; it is generally more accurate, more reliable, and easier to maintain. All cockpit indications, operations, and antenna locations are essentially identical for both systems. The description and operation of each system is discussed below.

APN-141 Radar Altimeter

The APN-141 radar altimeter employs the pulse radar technique to furnish accurate instantaneous altitude information to the pilot from 0 to 5000 feet terrain clearance. Aircraft height is determined by measuring the elapsed transit time of a radar pulse, that is converted directly to altitude in feet and displayed on the cockpit indicator. The indicator dial face is marked in 10-foot increments up to 200 feet, 50-foot increments from 200 to 600 feet, 100-foot increments from 600 to 2000 feet, and

500-foot increments from 2000 to 5000 feet. A control knob on the front of the indicator controls power to the indicator and is used for setting the low-limit indexer. It also provides for preflight and in-flight test of the equipment with a push-to-test type control knob feature. Refer to LOW ALTITUDE WARNING SYSTEM (LAWS) for information regarding low-limit indexer. An OFF flag on the indicator face appears when signal strength becomes inadequate to provide reliable altitude information, when power to the system is lost, or when the system is turned OFF. This push-to-test operation should result in the needle moving from the masked portion of the indicator dial to 50+5, -10 feet, with associated LAWS indications present if the indexer has been set and the needle rotates through the selected altitude.

CAUTION

Leave APN-141 radar altimeter in OFF position until power is applied to aircraft and return equipment to OFF before power is removed.

Note

At altitudes above 5000 feet terrain clearance, OFF flag will appear and pointer will move behind masked portion of indicator dial. Pointer will resume normal operation when aircraft descends below 5000 feet.

The radar altimeter operates normally during 50-degree angles of climb or dive and 30-degree angles of bank right or left. Beyond these points, the indications on the radar altimeter become unreliable but will resume normal operation when the aircraft returns to normal flight.

APN-194 Radar Altimeter

The APN-194 radar altimeter system (FO-2) is a high resolution pulse radar that indicates absolute clearance over land or water from 0 to 5000 feet. The absolute clearance is determined by measuring the elapsed transmit time of a radar pulse that is converted to altitude in feet. The system includes a receiver-transmitter, two identical antennas, and an indicator. The receiver-transmitter and the two antennas are located outboard under the left wing.

The radar altimeter indicator displays altitude, controls system power, and provides an adjustable low altitude warning function for visual and aural low altitude warning. System self-test is also initiated from the indicator.

The scale on the indicator is 0 to 5000 feet. Scale graduations are as follows: 10-foot increments from 0 to 200 feet; 50-foot increments from 200 to 600 feet; 100-foot increments from 600 to 2000 feet; 500-foot increments from 2000 to 5000 feet. A rotating pointer is read against the scale for altitude indications. An OFF flag on the face of the indicator appears when signal strength becomes inadequate for reliable altitude information, when power to the system is lost, or when the system is turned off.

Note

At altitudes above 5000 feet terrain clearance, the OFF flag will appear and the pointer will move behind the masked portion of the indicator scale. The pointer will resume normal operation, and the OFF flag will disappear from view, when the aircraft descends below 5000 feet terrain clearance.

A multipurpose control knob is located on the lower left corner of the indicator. Whe the knob is rotated to move the low-limit index marker to 0, power to the system is off and the OFF flag will appear. To apply power to the system, the knob is rotated to move the low-limit index marker to an altitude greater than 0. Approximately 2 minutes is required for system warmup. When system warmup is completed, the OFF flag disappears from view.

CAUTION

Leave APN-194 radar altimeter system off until power is applied to aircraft, and return system to off before power is removed.

The control knob is also used to set the low-level index marker to a desired altitude for low altitude visual and aural warning. When the pointer moves below the altitude of the preset index marker the red low altitude warning system (LAWS) light, located on the glareshield comes on, and an aural-warning tone is activated for 2 seconds at a 2-Hz repetition rate.

For preflight or inflight self-test, the control knob is pushed in. To indicate satisfactory system operation the indicator will read 100 ±10 feet and the green self-test indicator light, located on the indicator face to the left and slightly below center, comes on.

The radar altimeter displays reliable indications with aircraft attitudes that do not exceed a 50-degree angle of

climb or dive and a 30-degree angle of right or left bank. Beyond these parameters, radar altimeter indications become unreliable, but reliable indications will resume when the aircraft attitudes return within the parameters.

Low Altitude Warning System (LAWS)

The low altitude warning system consists of a cockpit warning light and an aural-warning tone operated with the APN-141 or APN-194 radar altimeter.

When the APN-141 or APN-194 indicator needle moves below the preset indexer altitude, the low-limit warning light and aural-warning tone are activated for 2 seconds.

The altitude warning tone is an alternating 700-to 1700-Hz tone monitored through the pilot's headset at a 2-Hz repetition rate. A reliability warning signal of the same frequency range (but with 8-Hz repetition rate) is also provided. The reliability warning signals sounds for 2 seconds whenever the APN-141 or APN-194 acquires or loses lock-on.

PART 3
AIRCRAFT SERVICING

Part 3 (Aircraft Servicing) of the TA-4F/J NATOPS Manual applies to the OA-4M with the following exception.

MAIN GEAR BRAKE RESERVOIR

The main gear brake reservoir assembly is installed within the aft canopy fairing and is serviced by removing the brake reservoir cover (figure 1-18). Brake fluid quantity in the reservoir may be determined by sighting through the window in the right-hand canopy hinge cover

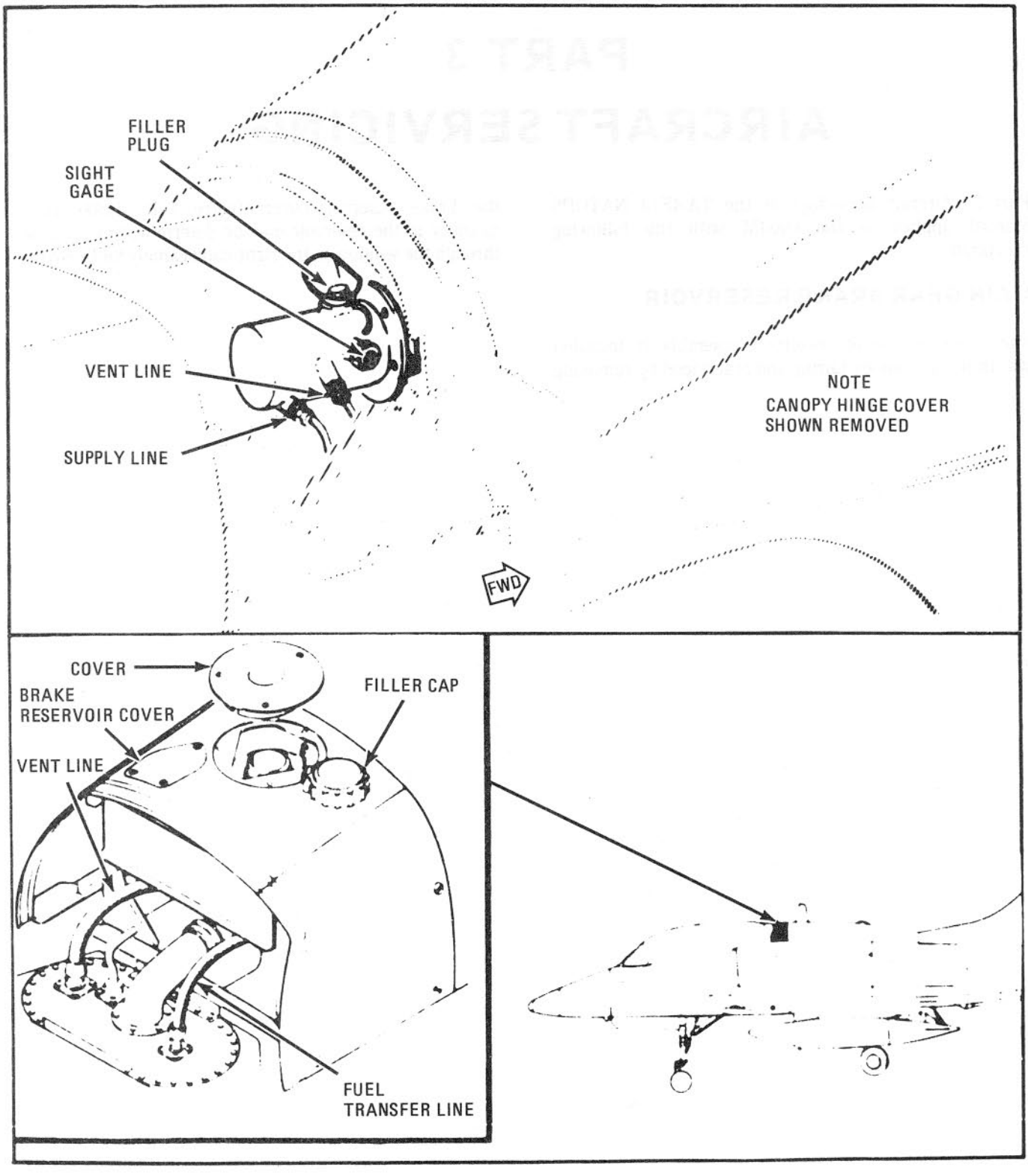


Figure 1-18. Main Gear Brake Reservoir

PART 4
OPERATING LIMITATIONS

Part 4 (Operating Limitations) of the TA-4F/J NATOPS Manual applies to the OA-4M, with the exception that the OA-4M is not approved for carrier operations.

SECTION II
INDOCTRINATION

Section II (Indoctrination) of the TA-4F/J NATOPS Manual applies to the OA-4M. The only exception is with respect to carrier procedures delineated for the TA-4F/J, which are not approved for the OA-4M.

SECTION III
NORMAL PROCEDURES

Section III (Normal Procedures) of the TA-4F/J NATOPS Manual applies to the OA-4M. The only exceptions are turning on the additional radio and electronic countermeasures equipment, described in other sections of this manual. In addition, the Carrier-Based Procedures do not apply.

SECTION IV
FLIGHT CHARACTERISTICS AND FLIGHT PROCEDURES

Section IV (Flight Characteristics and Flight Procedures) of the TA-4F/J NATOPS Manual applies to the OA-4M.

Note

- The exact drag index of the OA-4M has not been determined. When this is accomplished the angle of attack relationship charts may vary slightly from the TA-4F/J charts.
- At optimum angle of attack in the landing configuration the airspeed indicator may read between 10 and 15 knots higher than the recommended airspeed.

SECTION V
EMERGENCY PROCEDURES

Section V (Emergency Procedures) of the TA-4F/J NATOPS Manual applies to the OA-4M.

SECTION VI
ALL-WEATHER OPERATION

Section VI (All-Weather Operation) of the TA-4F/J NATOPS Manual applies to the OA-4M.

SECTION VII
COMMUNICATION PROCEDURES

Section VII (Communication Procedures) of the TA-4F/J NATOPS Manual applies to the OA-4M.

SECTION VIII
ARMAMENT SYSTEMS

TABLE OF CONTENTS

ARMAMENT EQUIPMENT

General

This section describes only the armament equipment peculiar to the OA-4M. The OA-4M contains provisions for the following armament systems: Shrike/Shrike Improved Display System, Walleye, and Sidewinder. This section contains only basic descriptions and switchology. A complete description of the aircraft weapons system is contained in NAVAIR 01-40AV-1T, A-4/TA-4 Tactical Manual.

Walleye/Shrike Mode Select Switch

The Walleye/Shrike mode select switch (figure 8-1) located on the miscellaneous switch panel, controls the audio tone volume level and mode of visual display operation in the Walleye/Shrike environment. The switch positions are identified as ADI, NORM, CONT, NORM and TEST. The letters VOL appear on the volume control knob. The Shrike/Sidewinder audio tone level to the pilot's headset is controlled by the VOL control knob. (Refer to NAVAIR 01-40AV-IT for additional information).

IP-936/AYQ VIDEO MONITOR

The video Monitor is located in the aft cockpit to the right of center on the instrument panel (figure 1-6). The Video Monitor provides Walleye display received from the Walleye weapon. The composite video signal displays a television picture of the target area. Superimposed on the display of the target area is a tracking gate. The Video Monitor enables the pilot to locate the target relative to the tracking gate and to update the track point.

The Video Monitor has five operating controls and an indicator light on the front panel. The power switch is a two-position toggle switch used to turn the Video Monitor on and off. The power switch incorporates the CRAB (cage retainer and boresighting) function switch that cages the Walleye weapon seeker in one station while another station is being used.

The vertical hold, identified "V", is used to stabilize the picture vertically. The horizontal hold, identified "H", is used to stabilize the picture horizontally. Brightness and contrast, identified "B" and "C" respectively, are used to adjust the video monitor display for the clearest picture. The WPN RDY (weapon ready) indicator light comes on when the Walleye weapon has switched from aircraft power to internal weapon power. The indicator light has a press-to-test feature.

Walleye and Shrike delivery procedures are outlined in NAVAIR 01-40AV-1T.

AIM-9D (Sidewinder) Air to Air Guided Missile System

The Sidewinder guided missile system provides power for control and release of the AIM-9D Sidewinder guided missile. The AIM-9D Sidewinder guided missile is a supersonic air-to-air homing missile that uses an infrared (IR) guidance system. The missile is propelled by a solid propellant rocket motor and contains a high explosive warhead. The AIM-9D is provided with nitrogen coolant to the control and guidance bus through two 10-ampere fuses located on terminal panel 22. The fuses are identified as STA 1 sidewinder and STA 5 sidewinder. The Sidewinder guided missile system consists of the following components:

Sidewinder coolant switch

LAU-7/A guided missile launcher

Missile launcher adapter

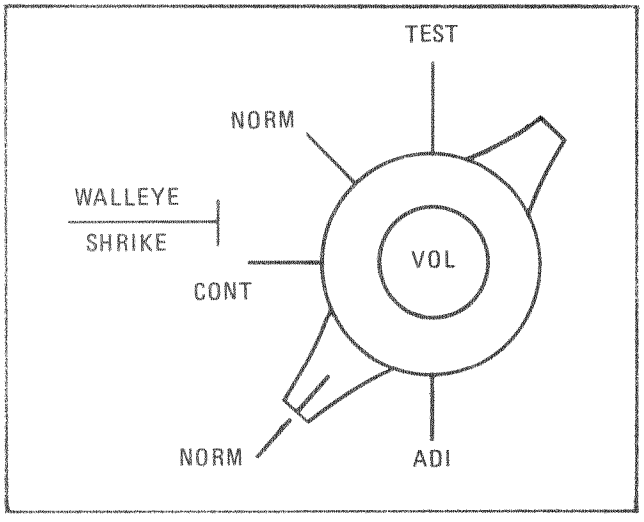


Figure 8-1. Walleye/Shrike Mode Select Switch

The Sidewinder guided missile is energized when the MASTER armament switch is placed to ON and station 1 or station 5 STATIONS selector switch is placed to READY or to the ON position. When the missile is locked on target, a tone is audible in the pilot's headset. The volume of the tone is controlled by the volume control, labeled VOL, located on the armament panel. To complete the firing circuit, the armament selector switch is placed to BOMBS & GM ARM and the bomb release switch is pressed. When the firing circuit is energized, the gas generator (servo) grain in the missile is ignited. When the missile generator has reached a satisfactory level, the firing relay in the LAU-7/A guided missile launcher is closed and power is applied to the contact buttons on the missile motor. Power to the rear contact button fires the missile motor, and power to the front contact button energizes the influence fuze in the warhead. When the missile motor reaches sufficient thrust, the missile overrides the launcher detent and leaves the launcher.

SIDEWINDER COOLANT SWITCH

The Sidewinder coolant switch is an ON-OFF switch that controls the flow of nitrogen coolant to the Sidewinder guided missile. The Sidewinder coolant switch is located on the armament panel and is identified as SW COOL.

LAU-7/A GUIDED MISSILE LAUNCHER

The LAU-7/A guided missile launcher (figure 8-2) provides suspension and release for the Sidewinder guided missile. The major internal components consist of a power supply, a mechanism assembly (retains missile during captive flight, catapult takeoff, and arrested landings), and a nitrogen receiver assembly for the AIM-9D Sidewinder missile coolant. A safety pin prevents accidental firing of the missile motor while the aircraft is on the ground. The LAU-7/A launcher is attached to the outboard Aero 20A-1 ejector rack by means of an ADU-229/E missile launcher adapter. On launchers reworked per AAC 537-11, a hold-down detent pin has been added to eliminate inadvertant release of missiles during catapult and arrested landings.

ADU-229/E MISSILE LAUNCHER ADAPTER

The ADU-229/E missile launcher adapter (figure 8-2) is used to adapt the LAU-7/A guided missile launcher to the outboard Aero 20A-1 ejector racks. Attachment of the ADU-229/E missile launcher adapter to the ejector rack is provided by two suspension lugs on 14-inch centers. Mechanical attachment of the ADU-229/E adapter and the LAU-7/A launcher is provided by two swivel nuts positioned on 30-inch centers to mate with the missile launcher mounting bolts. Electrical connection to the LAU-7/A guided missile launcher is made by an electrical connector located aft of the forward swivel nut.

SPECIAL ELECTRONIC EQUIPMENT

Special electronic equipment used in the OA-4M includes:

ALQ-126 Countermeasures System

ALR-50B Radar Receiver System

ALE-39 Countermeasures and Chaff Dispensing System

ALR-45C Homing and Warning System

Some of the special electronic systems use common components and some systems use components of electronic systems not discussed in this section. Each special electronic system is discussed separately insofar as classification allows. Refer to NAVAIR 01-40AV-IT for additional information:

ALQ-126(V) Countermeasures System

Operating controls for the ALQ-126(V) countermeasures system are located on the ECM console (figure 8-3).

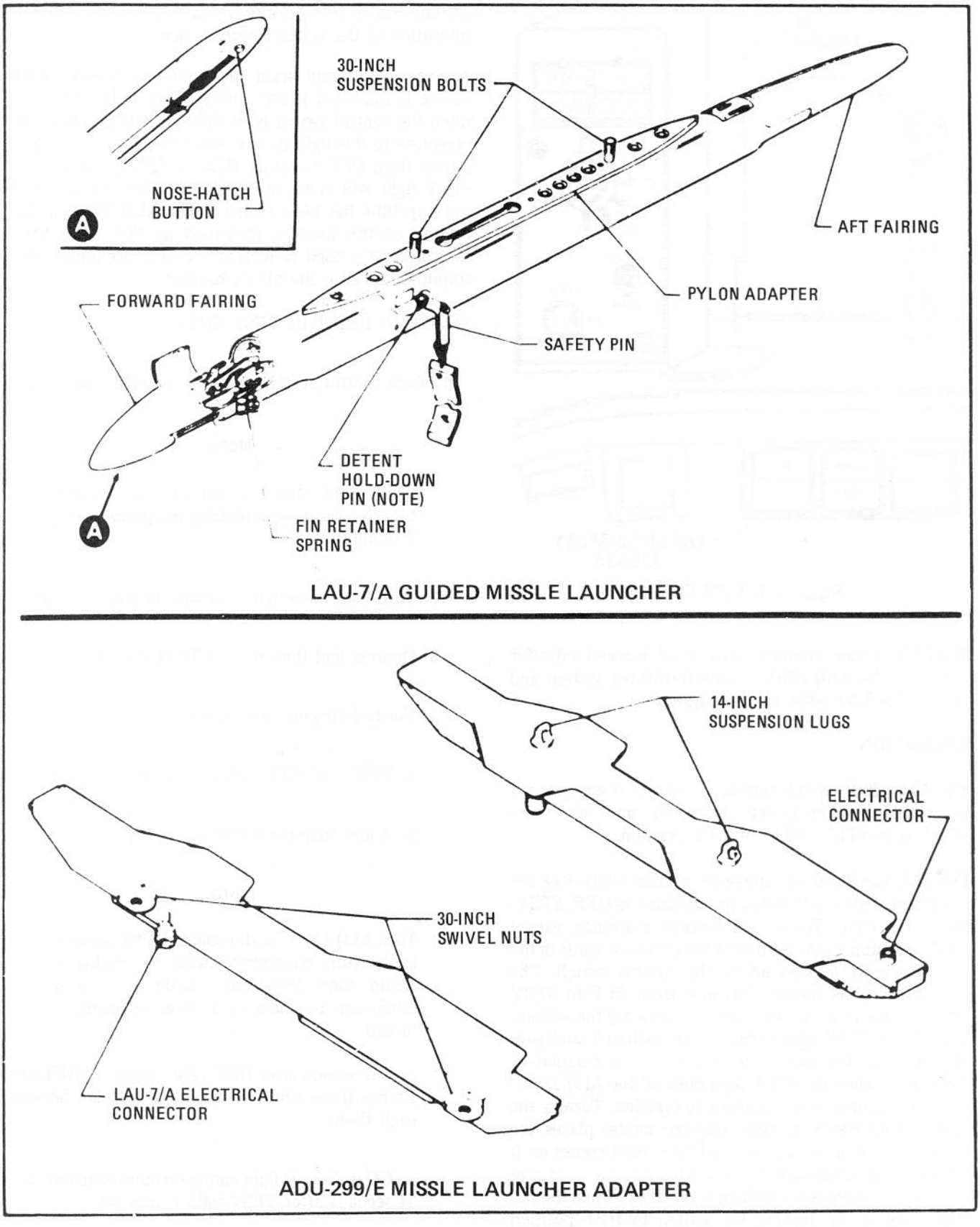


Figure 8-2. LAU-7A Guided Missile Launcher and ADU-299/E Missile Launcher Adapter

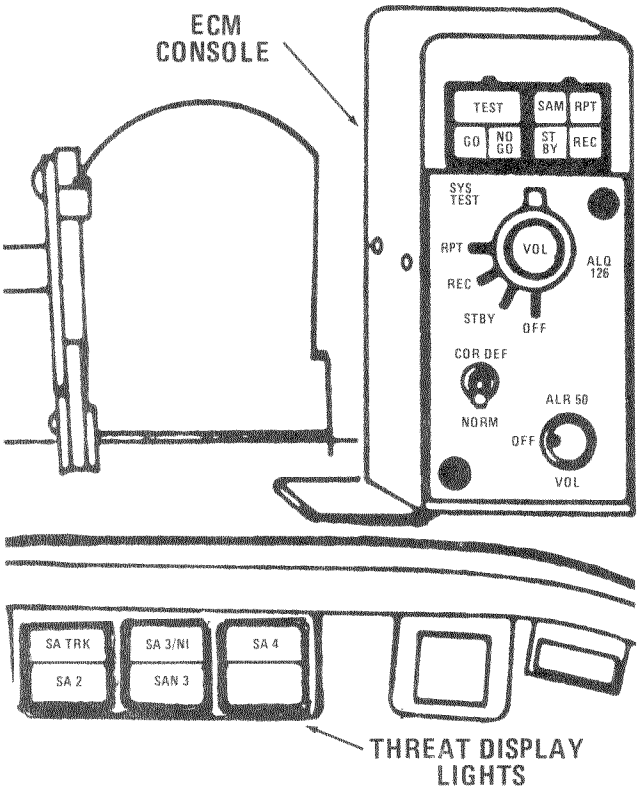


Figure 8-3. ECM Console

The ECM console contains control switches and indicator lights for the ALQ-126(V) countermeasures system and the ALR-50B(V) radar receiver system.

OPERATION

The ALQ-126(V) countermeasures system is energized if the circuit breaker is set (depressed) and the rotary switch is in STBY, REC, or RPT position.

The ALQ-126(V) countermeasures system control switch is a rotary switch with positions identified as OFF, STBY, REC, and RPT. The switch position markings, except OFF, are duplicated on three of the indicator lights in the light assembly located above the control switch. The control switch is turned clockwise from OFF to STBY (standby mode) as the first step in operating the system. The amber STBY light comes on immediately and goes off after a warmup time-delay of approximately 3 minutes. When the STBY light goes off the ALQ-126(V) countermeasures system is ready to function. Turning the switch from STBY to REC (receive mode) places the system in operation, and the red REC light comes on if certain radar signals are received. The red REC light goes off when the signals are no longer received. When the red REC light is on, turning the switch to RPT position (repeat mode) causes the green RPT light to come on, if the ALQ-126(V) is responding, at the same time that the red REC light is on. The ALQ-126(V) countermeasures system has a test feature to give a GO or NO GO indication of the system performance.

An excessive current drain, blown fuse, or power circuit failure is indicated if the amber STBY light comes on when the control switch is in REC or RPT position. An exception to this indication is when the control switch is turned from OFF to either REC or RPT position. The STBY light will come on, indicating that the required warmup time has been violated. The ALQ-126(V) audio volume control knob is identified as VOL. The VOL control knob is used to increase or decrease audio tone amplitude level to the pilot's headset.

ALQ-126(V) BUILT IN TEST (BIT)

1. Turn control switch clockwise to STBY position.

Note

STBY light comes on immediately and goes off after warmup time-delay of approximately 3 minutes.

2. Turn control switch clockwise to REC position.

3. Depress and then release TEST switch.

4. Verify following indications:

   a. TEST and REC lights come on.

   b. Audio tone is present.

Note

Turn ALQ-126(V) audio volume (VOL) control knob from counterclockwise to clockwise. Audio tone amplitude should vary from minimum to maximum level as knob is turned.

   c. One second after REC light comes on, RPT light flashes three times (1-second time delay between each flash).

   d. GO or NO GO light comes on approximately 28 to 34 seconds after TEST light comes on.

   e. Audio tone ceases, REC light goes off in approximately 5 seconds.

5. Depress TEST switch (TEST light off) to return system to normal.

The ALQ-126(V) countermeasures system receiver transmitter is housed within the upper avionics pod (FO-3). The receiver-transmitter contains circuitry for analysis of received signal characteristics and automatic deception technique selection. The countermeasures system uses three high-band antennas, two midband antennas, and two low-band antennas. Refer to NAVAIR 01-40AV-IT for classified information concerning the ALQ-126(V) countermeasures system.

ALR-50B(V) Radar Receiver System

The system provides the pilot with visual and aural threat warning indications. Major components of the system include the ECM console, receiver, and two antennas (FO-4). The ECM console includes a volume control switch and three indicators. The volume control switch positions are identified as OFF and VOL. The ALR-50B(V) radar receiver is installed in the upper avionics pod.

CAUTION

To prevent damage to ALR-50B(V) radar receiver system, it must be turned on any time tacan is in the T/R or A/A modes of operation.

OPERATION

No warmup time is required for system operation. Under certain threat conditions, the ALR-50B(V) radar receiver system will cause the threat warning indicator light(s) to come on and the aural warning tone will be heard in pilot's headset. The threat warning indicator light(s) will go off and the aural warning tone will not be heard when the threat signals are no longer received.

Note

Segment of threat warning indicator lights also functions with ALR-45C(V) homing and warning system.

When the volume control switch is turned clockwise from the OFF position an aural warning signal tone can be heard in the pilot's headset if a threat signal is received. The volume control switch allows the pilot to manually adjust the audio level to the headset.

ALR-50B(V) BIT test is initiated when the TEST switch, located above the ALQ-126(V) mode selector control switch, is depressed and ALR-50B(V) power is on. The equipment responds with missile launch aural tone to the pilot's headset, flashing of three threat warning indicator lights on the ALR-45C(V)/ALR-50B(V) display panel and one threat warning indicator light identified as SAM. Upon completion of BIT test, depress TEST switch (TEST light off) to return system to normal.

The ALE-39 countermeasures and chaff dispensing system has a warning receiver override two-position switch, identified as OFF and WR AUTO CHAFF. In OFF position the switch disconnects the interface circuit in the control unit from automatic ALR-45C(V) and ALR-50B(V) warning receiver output. In WR AUTO CHAFF position, the ALE-39 will automatically dispense one program of chaff for a 30-second cycle provided the ALE-39 payload selector switch is in any position but OFF or SF. Further information on ALE-39 automatic chaff dispensing is presented in this section as part of the ALE-39 Countermeasures and Chaff Dispensing System. Refer to NAVAIR 01-40AV-1T for additional information concerning the ALR-50B(V) radar receiver system.

ALE-39 Countermeasures and Chaff Dispensing System

The ALE-39 countermeasures and chaff dispensing system provides self-protection against enemy radar and air and ground-launched missiles by dispensing expendable chaff, flares, or jammer payloads into the atmosphere while the aircraft is airborne.

The selectively dispensed payloads confuse, jam, or lessen the effectiveness of enemy radar or heat seeking missiles. The ALE-39 countermeasures and chaff dispensing system consists of the following components (FO-5):

ALE-39 Programmer

ALE-29A Dispenser Unit (2)

ALE-29A Dispenser Housing (2)

ALE-39 Sequencer Switch (2)

ALE-39 Control Console

ALE-39 Subtractive Counter Indicator (3)

ALE-39 Control Relay

Chaff Pin and Flag Switch (Disarm Switch).

Other components used but not part of the ALE-39 countermeasures and chaff dispensing system include:

JATO Control Relay

Catapult Handgrip

Retraction Release Relay No. 3

ALR-45C(V) and ALR-50B(V) Warning Receivers.

OPERATION

The ALE-39 countermeasures and chaff dispensing system receives power from the monitored 28-vdc bus (FO-1). When the aircraft is airborne, retraction release relay No. 3 is automatically deenergized and the 28 vdc is available to fire the cartridge selected by the programmer and sequencer switch.

ALE-39 PROGRAMMER

Electronic control of the dispensing modes is accomplished by the programmmer. The programmer may be activated on the ground by turning on the ALE-39 select switch. Selections include the number of bursts and salvos and intervals during the firing operation. Chaff firing waveform is shown in figure 8-4. The parameters are selected before takeoff to meet mission requirements. A master RESET switch on the programmer is operated to initially condition the logic, and reset all sequencer switches to fully loaded positions. Each time power is removed from the system and reapplied, a master reset signal is applied to the logic only. Functions of the programmer switches are listed in figure 8-5. Priority of firing same type loads is L10, L20, R10, and R20. The payload is ejected in a sequence established by the programmer (FO-5.) Both dispenser units can be loaded with all three types of payloads. Each dispenser unit holds 30 payloads, and each dispenser unit is partitioned into two sections. After loading the dispenser unit(s), the loading personnel set the programmer load switches to indicate which type of load is in each of the four sections. If the left 10 is loaded with chaff, the L10 switch will be positioned to C, indicating chaff. Each of the four switches (L10, L20, R10, and R20) has three possible positions. One position indicates chaff (C), the second flare (F), and the third jammer (J). Figure 8-6 lists the programmer parameters in programmed mode.

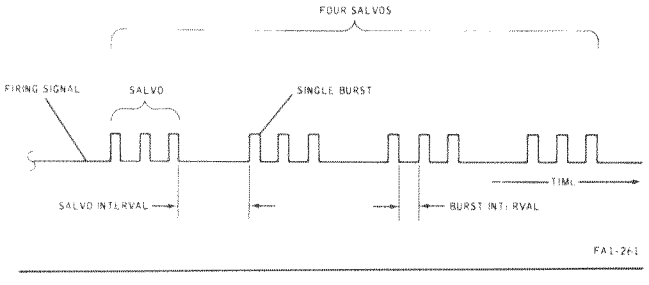


Figure 8-4. Chaff Firing Waveform

ALE-29A DISPENSER UNITS

The ALE-29A dispenser units are used in the ALE-39 countermeasures and chaff dispensing system. Each dispenser unit has a capacity of 30 payload packages, will accomodate all three types of payloads, and is partitioned into two sections by the respective sequencer switch. The right dispenser sections are identified as R10 (right 10) and R20 (right 20). The left dispenser sections are identified as L10 (left 10) and L20 (left 20). R10 and L10 include partitions 1 through 10 and R20 and L20 include partitions 11 through 30. When the dispenser unit is loaded, a payload package consisting of a payload in a plastic or metal sleeve, with a retainer, is inserted into each of the 30 holes. The loaded dispenser is then installed and secured in the dispenser housing. The payload is ejected from each sleeve by gas pressure generated when the impulse cartridge is electrically initiated by a firing impulse.

ALE-39 SEQUENCER SWITCHES

Two sequencer switches (left and right) receive stepping pulses from the programmer and sequentially provide high-current pulses that fire each of the squibs in the discharge tubes of the left and right payload dispenser modules. Each sequencer is divided into two banks. On bank contains 10-stepper switch positions; the other bank contains 20 positions. The left sequencer switch is mounted on the left dispenser unit and the right sequencer switch is mounted on the right dispenser unit. The left sequencer switch controls the left 10 (L10) and left 20 (L20) discharge tubes of the left dispenser unit. The right sequencer switch controls the right dispenser unit in the same order.

ALE-39 CONTROL CONSOLE

Operation of the ALE-39 countermeasures and chaff dispensing system is controlled by the ALE-39 control console (figure 8-7). The console supplies power to the system and controls the selection of single or programmed dispensing. By use of the console the pilot can also rapidly dispense all flares remaining in the dispenser unit(s) before landing by pulling out the select switch and rotating it to SF (PULL) (salvo flare) position. Functions of the ALE-39 control console are listed in figure 8-8.

Switch	Position	Function
CHAFF B-QTY		Selects number of chaff bursts defining one salvo (figure 8-7B).
	1	One burst defines salvo.
	2	Two bursts define salvo.
	3	Three bursts define salvo.
	4	Four bursts define salvo.
	C	Bursts will fire continuously.
	R	Random number of bursts define salvo. This random number will be at least four but not more than six.
CHAFF B-INTV		Selects time interval between chaff bursts of each salvo.
	.1	0.125 second between chaff bursts.
	.2	0.25 second between chaff bursts.
	.5	0.50 second between chaff bursts.
	.7	0.75 second between chaff bursts.
	1.0	1.0 second between chaff bursts.
	R	Burst interval is random. First three bursts of first salvo will be 0.125 second apart, with additional quantities of 1, 2, or 3 bursts being fired at random time intervals of either 0.25, 0.50, 0.75, 1.00, 1.50, 2.00, 3.00, or 4.00 seconds whenever burst quantity control is at R or C. When burst interval is set at R and burst quantity control is not on R or C, a single chaff payload is dispensed.
CHAFF S-QTY		Selects number of chaff salvos required to end programed sequence.
	1	One salvo is fired in one programed sequence.
	2	Two salvos are fired in one programed sequence.
	4	Four salvos are fired in one programed sequence.
	6	Six salvos are fired in one programed sequence.
	8	Eight salvos are fired in one programed sequence.
	10	Ten salvos are fired in one programed sequence.
	15	Fifteen salvos are fired in one programed sequence.
CHAFF S-INTV		Selects time interval between chaff salvos.
	2	Two seconds from last salvo to first burst of next salvo.
	4	Four seconds from last salvo to first burst of next salvo.
	6	Six seconds from last salvo to first burst of next salvo.
	8	Eight seconds from last salvo to first burst of next salvo.
	10	Ten seconds from last salvo to first burst of next salvo.
FLARE-QTY		Selects number of flare bursts required to end flare programed sequence.
	2	Two bursts are fired in one programed sequence.
	3	Three bursts are fired in one programed sequence.
	4	Four bursts are fired in one programed sequence.
	6	Six bursts are fired in one programed sequence.
	8	Eight bursts are fired in one programed sequence.
	10	Ten bursts are fired in one programed sequence.
		NOTE: If flare-multiple has been selected, a multiple fire will be counted as one burst.

Figure 8-5. Programmer Control Functions (Sheet 1 of 2)

Switch	Position	Function
LOAD-L10		Indicates payload loaded in L10 dispenser.
	C	Chaff is in L10.
	F	Flares are in L10.
	J	Jammers are in L10.
LOAD-L20		Indicates payload loaded in L20 dispenser.
	C	Chaff is in L20.
	F	Flares are in L20.
	J	Jammers are in L20.
RESET	Initiate for 3 seconds minimum.	Clears all registers and counters in programer and resets sequencer switches. NOTE: Once system is in operation and a few payloads have been fired, operator may reset without returning sequencer switches to initial positions by turning PAYLOAD SELECTOR control switch on control unit OFF momentarily. If programer is in middle of programed sequence when RESET switch is depressed, remaining sequence will be canceled and sequencer switches reset to home position.
LOAD-R20		Indicates payload loaded in R20 dispenser.
	C	Chaff is in R20.
	F	Flares are in R20.
	J	Jammers are in R20.
LOAD-R10		Indicates payload loaded in R10 dispenser.
	C	Chaff is in R10.
	F	Flares are in R10.
	J	Jammers are in R10.
FLARE-INTV		Selects time interval in seconds between flare bursts during flare programed firing sequence.
	2	Two seconds.
	4	Four seconds.
	6	Six seconds.
	8	Eight seconds.
	10	Ten seconds.
JAMMER-INTV	Three switches	These three switches select time interval in seconds between jammer bursts when in programed sequence. Example:
	010	10 seconds.
	120	120 seconds.
	215	215 seconds.
		NOTE: Time selected can be varied in 1-second intervals; from 1 second (001) to 299 seconds. When interval is 000, only one payload will be dispensed.
JAMMER-QTY		Selects number of jammer bursts required to end jammer programed sequence.
	1	One burst required to end jammer programed sequence.
	2	Two bursts required to end jammer programed sequence.
	3	Three bursts required to end jammer programed sequence.
	4	Four bursts required to end jammer programed sequence.

Figure 8-5. Programmer Control Functions (Sheet 2 of 2)

Type of Payloads	Chaff	Flares	Jammer
Burst (1)	1 2 3 4 C (2) R (3)	2 3 4 6 8 10	 2 3 4
Burst intervals (seconds)	0.125 0.25 0.5 0.75 1.0 R (3)	2 (4) 4 6 8 10	1 to 299 (5)
Salvos (6)	1 2 4 6 8 10 15	None	None
Salvo intervals	2 4 6 8 10	None	None

Notes

1. Individual ejection of one payload
2. Continuous
3. Random
4. Rapid fire sequency capable of being engaged from control console is provided to eject all flares sequentially
5. Burst intervals are variable in 1-second increments between 1 and 299 seconds with accuracy of ±5 percent.
6. Single sequence of burst.

Figure 8-6. Programmer Parameters in Programed Mode

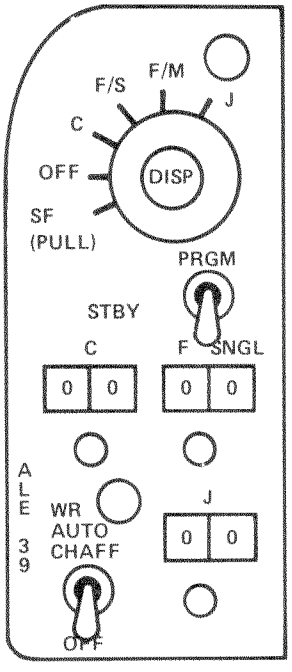


Figure 8-7. AN/ALE-39 Control Console

ALE-39 AUTOMATIC CHAFF DISPENSING

One ALE-39 programmed chaff sequence will automatically be dispensed when the following conditions are met:

1. ALR-45 or ALR-50 warning receiver detects an ML (missile launch) condition.

2. ALE-39 payload selector control switch (figure 8-7) is in any position but OFF or SF. (See figure 8-8).

3. ALE-39 warning receiver override switch is placed in WR AUTO CHAFF position (figure 8-7).

When automatic dispensing of programmed chaff is initiated by an ALR-45 or ALR-50 warning receiver ML signal, the programmed sequence must be completed before another programmed sequence can be initiated. In addition, a repeat delay circuit operated with the warning receiver prevents automatic chaff actuation more often than 30 seconds from the start of the first automatic programmed chaff sequence. Should the initial ML warning signal persist, the automatic programmed chaff sequence will repeat and continue to do so until the ML threat no longer exists, or until the chaff dispenser tubes are empty. When the initial ML threat no longer exists, automatic programmed chaff dispensing will again be initiated when another ML threat signal is received by either warning receiver.

Simultaneously, during automatic chaff dispensing, the pilot may manually dispense additional single bursts of chaff in the normal manner by actuating the thumb-slide button, located on the catapult handgrip, to the JATO-CHAFF (momentary) position (FO-5). Programmed countermeasures packages may also be dispensed manually, during automatic programmed chaff dispensing, by the pilot selecting the desired position on the payload selector control switch and then pressing the DISP control switch.

The three ALE-39 subtractive counter indicators provide the pilot a visual indication of the number of chaff, flare, or jammer payloads remaining in the dispenser units. The respective counters are set by the knob on each counter to indicate the payload loaded in the dispensers. As packages are dispensed, the respective counter subtracts them from the total payload setting and indicates the number of packages left for use.

ALE-39 CHAFF CONTROL RELAY

The ALE-39 chaff control relay is used to transfer the JATO-CHAFF FLARE switch (catapult handgrip) wiring from the JATO firing system to the ALE-39 countermeasures and chaff dispensing system. The chaff control relay also applies 28-vdc power to the chaff dispensing system. With the ALE-39 select switch in the desired dispensing position, and weight off the landing gear, chaff and flares may be dispensed with the thumb-slide button switch on the catapult handgrip. The forward position (JATO-CHAFF) is used for manual dispensing of chaff and the aft position (FLARE) is used for manual dispensing of flares.

Note

For JATO firing, the ALE-39 select switch must be in OFF position.

CHAFF PIN AND FLAG SWITCH
(DISARM SWITCH)

The chaff pin and flag switch is located forward of the dispenser units. When the chaff pin and flag is inserted into the switch, 28-vdc chaff firing power is removed from the chaff dispensing units. The chaff pin and flag switch is a single-throw microswitch that breaks the circuit between the programmer control and the sequencer switches.

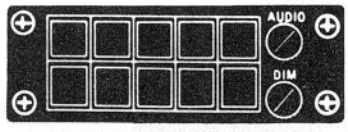
Switch/Indicator/Control	Description/Function
Subtractive counter indicator	CHAFF – Indicates number of chaff payloads remaining in dispensers. FLARE – Indicates number of flare payloads remaining in dispensers. JAMMER – Indicates number of jammer payloads remaining in dispensers.
PAYLOAD SELECTOR control switch with momentary DISP switch.	DISP switch is depressed to initiate selected dispensing sequence and operates with MODE SELECT switch. PAYLOAD SELECTOR control switch is a single six-position rotary switch that facilitates selection of payload type to be dispensed as follows: SF (PULL) – Guarded pull-to-turn position that provides capability for rapid firing of all flares in sequential firing fashion with time of 0.125 second between firing. (It is not required to depress DISP switch.) OFF-In OFF position power is not supplied to programmer and control units. Primary power is supplied in all other switch positions. C – Actuates programer chaff dispensing sequence, single or programed. F/S – Flare single position actuates programer single flare, single or programed dispensing sequence. F/M – Flare multiple position actuates programer multiple flare, single or programed dispensing sequence. J – Jammer position actuates programer jammer dispensing sequence, single or programer.
MODE SELECT switch	Single, momentary, long-throw, positive action, three-position toggle switch. Operates with PAYLOAD SELECTOR control switch. SNGL – In this position and DISP switch depressed, a single burst of the respective payload is dispensed within 0.075 second. Single mode can be initiated while programed dispensing sequence is in operation by selecting SNGL and depressing DISP switch. PRGM – In this position and DISP switch depressed, programed sequence command for payload selected at PAYLOAD SELECTOR control switch is entered into programer. Programer controls rates and quantities of appropriate payload until dispensing program is completed. Once programed dispensing sequence is initiated, sequence must be completed before another programed dispensing sequence for same type payload can be initiated. Programed sequence can be overlayed by manually initiated single burst; then programed sequence resumes. STBY – Neutral position.
JATO-CHAFF FLARE switch	Single-pole momentary switch located on catapult handgrip, left cockpit rail, forward of throttle. Switch functions independently of payload selected on PAYLOAD SELECTOR control switch.
Warning receiver override switch	Two-position toggle switch placarded OFF and WR AUTO CHAFF. Switch is used to disconnect interface circuit in control unit from automatic ALR-50B(V) warning receiver input. In WR AUTO CHAFF position, interface circuit creates CHAFF-AUTO fire command code when initiated by warning receiver. A repeat delay circuit operated with WARNING RCVR prevents CHAFF-AUTO code from being generated more often than 30 seconds apart.

Figure 8-8. Control Console Functions

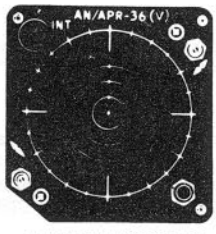
ALR-45C (V) Homing and Warning System

The system provides the pilot with visual and aural threat warning indications. Cockpit components of the system are shown in figure 8-9 and are located on the right side of the forward cockpit instrument panel.

The operating controls for the ALR-45C(V) homing and warning system include a threat display unit and an azimuth indicator (scope). The threat display control panel includes a volume control switch identified as AUDIO, a light dimming switch identified as DIM, and indicators that provide a visual and coded signal display of the threats.



THREAT DISPLAY CONTROL PANEL (ALR-45 C(V))



AZIMUTH INDICATOR

Figure 8-9. ALR-45C Components

OPERATION

A two-minute warmup time under standard conditions (up to 5 minutes under extreme service conditions; MIL-R 81676A) is required for system operation. Under certain threat conditions, the ALR-45C(V) homing and warning system will cause threat warning indicator light(s) to come on. The threat warning indicator light(s) will go off when the threat signals are no longer received.

Note

ALR-45C(V) homing and warning system also uses a segment of the ALR-50B(V) radar (alert) receiver system threat warning indicator lights for display of threat.

The AUDIO switch is used to increase or decrease audio tone amplitude level to the pilot's headset. The INT control, located on the upper left-hand corner of the azimuth indicator, can be manually adjusted to obtain the most comfortable viewing level of the strobe. When several threats are displayed simultaneously and a missile launch condition exists, the lesser priority threat(s) will be blanked from display by placing the correlation switch in normal (NORM) position. Refer to NAVAIR 01-40AV-IT for additional information concerning the ALR-45C(V) homing and warning system.

SECTION IX
FLIGHT CREW COORDINATION

At a minimum, a positive ICS call will be made between cockpits whenever:

1. The canopy is moved.
2. The PRESS TO TEST switch is pressed.
3. The external fuel switch is pressed.
4. Control of the aircraft is passed.
5. Control of the radios or navigation is passed.
6. The headknocker is moved.

At a future date and upon further evaluations, this section will be expanded.

SECTION X
NATOPS EVALUATION

The NATOPS evaluation remains the same as in the TA-4F/J NATOPS manual, except that some of the questions in the question bank do not pertain to the OA-4M. OA-4M questions will be added to the NATOPS questions bank at a future date.

SECTION XI
PERFORMANCE DATA

PERFORMANCE

Performance characteristics, charts, and calculations for the OA-4M are essentially the same as found in the TA-4F/J NATOPS manual. While the performance is similar the TA-4F, the slightly higher weight of the OA-4M must be taken into account when calculating performance data. Especially critical areas include:

1. Inflight AOA/airspeed calculations.
2. Rolling "G" limitations.
3. Maximum landing weights for field arrestments and minimum descent landings.
4. Takeoff performance.

Drag Count Index

The drag count index for a clean TA-4F/J aircraft is zero. This includes the drag of the centerline pylon but no guns or wing pylons. The drag count index of the OA-4M is slightly higher than zero, but has not been determined at the time of this publication. The drag indexes and weights for all external stores and pylons remain the same.

Weight

The difference between a fully combat configured TA-4F and an OA-4M (both containing full ECM equipment and pilot armor) is approximately 200 pounds. While this is not a significant difference, the weights of individual aircraft may be varied to a substantially greater degree by the inclusion or deletion of various components. The following partial list of component weights will aid in computing individual aircraft weights. Aircraft basic empty weights may vary and may be found in the weight and balance log for each individual aircraft.

20mm guns (2)	174 lbs
ALQ-126	180 lbs
Pilot armor	274 lbs
ALE-39	33 lbs
ALR-45	23 lbs
ALR-50	14 lbs

Limitations

All flight limitations are the same as for the TA-4F aircraft except as listed below.

Landing

When computing fuel requirements for landing, pilots must be aware of the increased aircraft weight. The OA-4M has a reduced margin between empty weight and maximum allowable weights for both field arrested landings and flared field landings.

The maximum gross weight for field arrested landings in the OA-4M is the same as for the TA-4F (14,500 pounds). For long field arrested landings and flared field landings the limit is 16,000 pounds. There are no weight related restrictions below these limits.

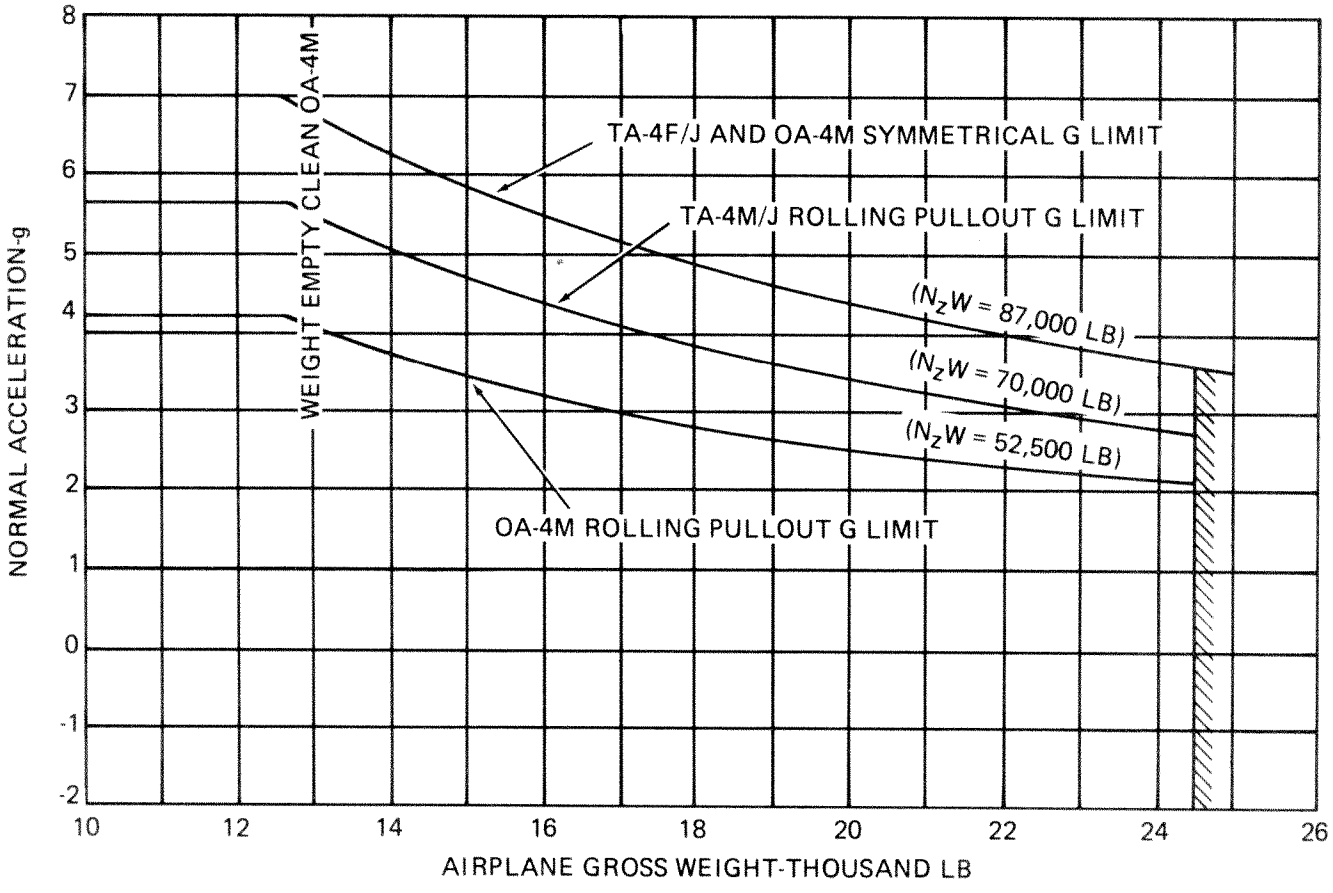


Figure 11-1. Model OA-4M Structural Envelope

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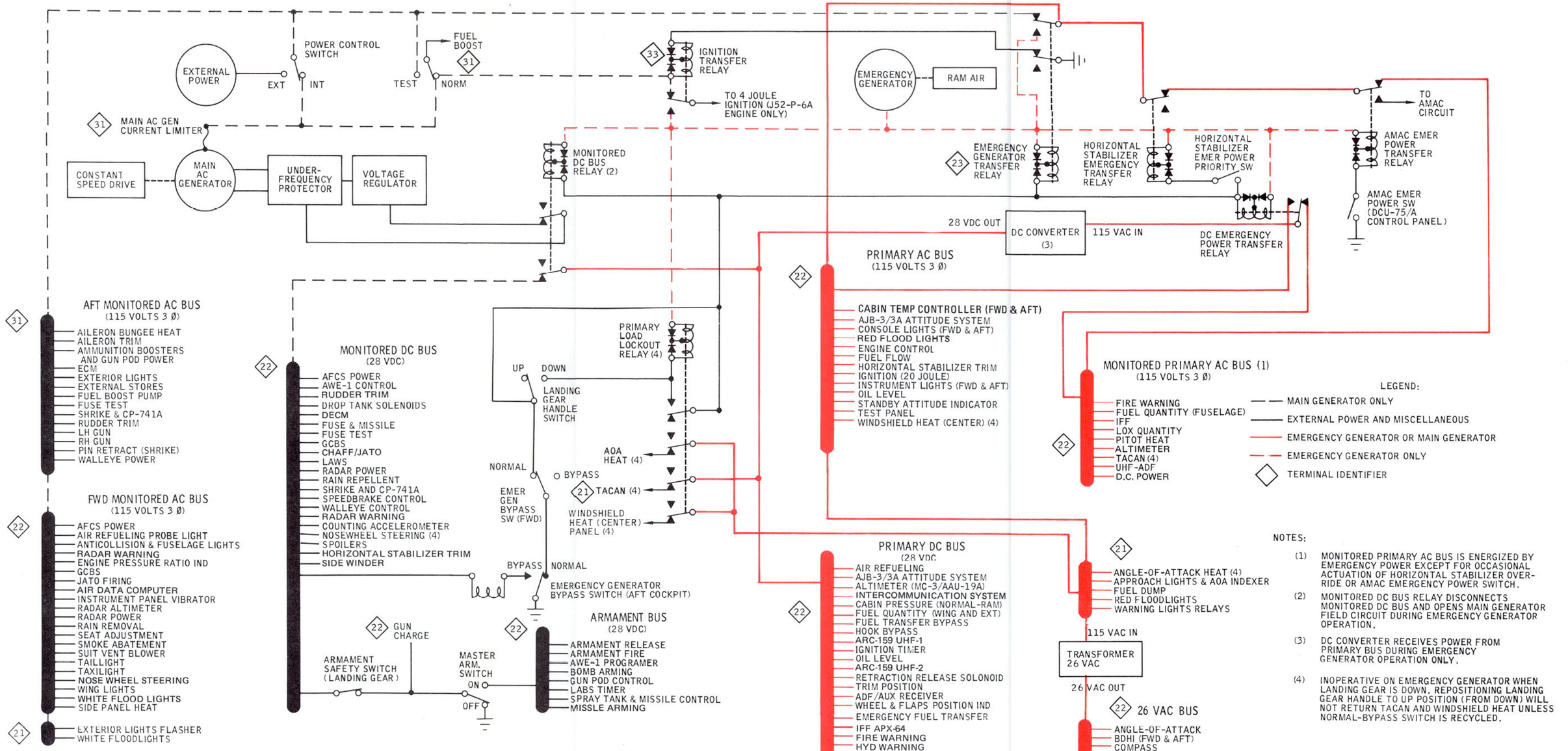


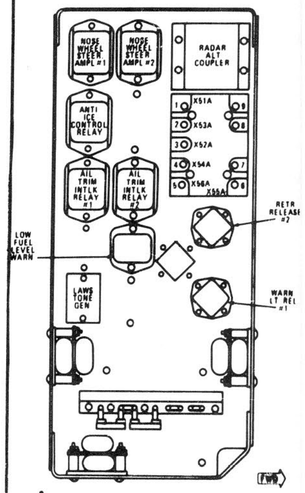
NOTES:

(1) MONITORED PRIMARY AC BUS IS ENERGIZED BY EMERGENCY POWER EXCEPT FOR OCCASIONAL ACTUATION OF HORIZONTAL STABILIZER OVERRIDE OR AMAC EMERGENCY POWER SWITCH.

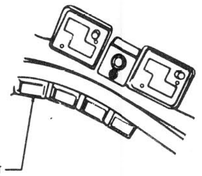
(2) MONITORED DC BUS RELAY DISCONNECTS MONITORED DC BUS AND OPENS MAIN GENERATOR FIELD CIRCUIT DURING EMERGENCY GENERATOR OPERATION.

(3) DC CONVERTER RECEIVES POWER FROM PRIMARY BUS DURING EMERGENCY GENERATOR OPERATION ONLY.

(4) INOPERATIVE ON EMERGENCY GENERATOR WHEN LANDING GEAR IS DOWN. REPOSITIONING LANDING GEAR HANDLE TO UP POSITION (FROM DOWN) WILL NOT RETURN TACAN AND WINDSHIELD HEAT UNLESS NORMAL-BYPASS SWITCH IS RECYCLED.



A TERMINAL PANEL 25



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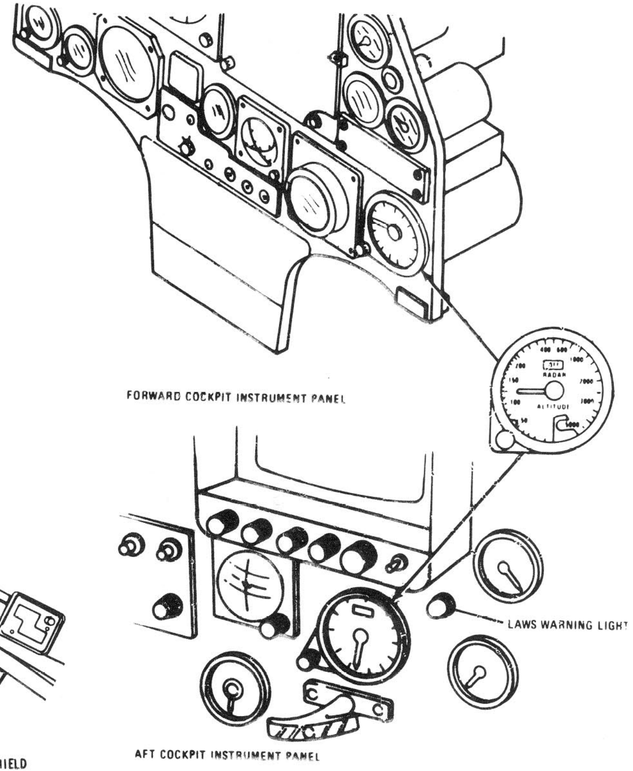
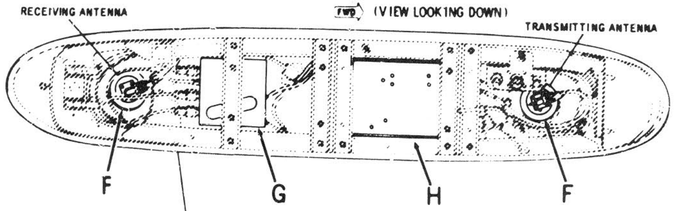
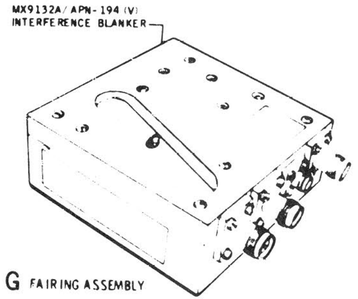


D INSTRUMENT PANEL



E UNDERSIDE, LH WING

F FAIRING ASSEMBLY



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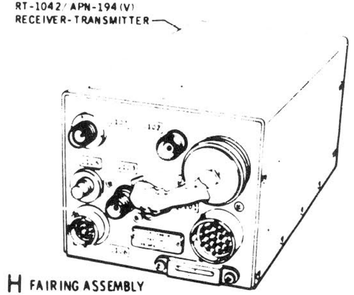

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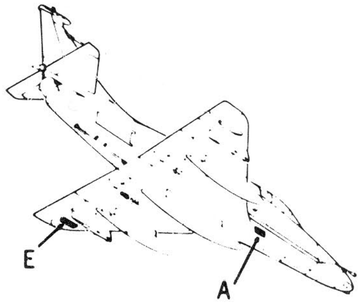
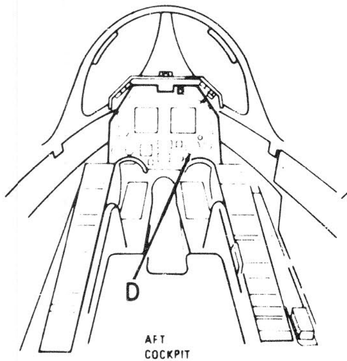
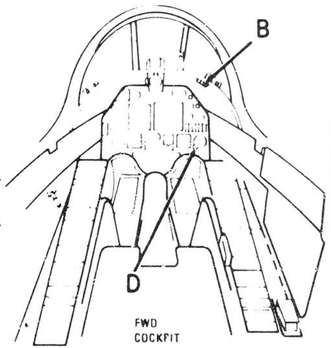
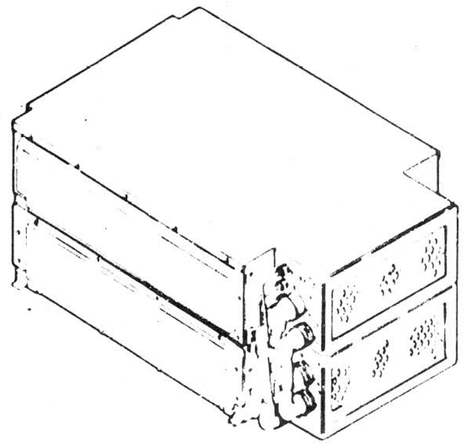
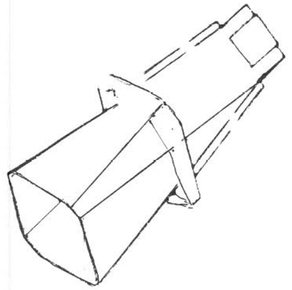




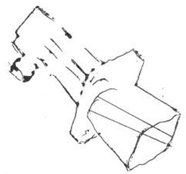




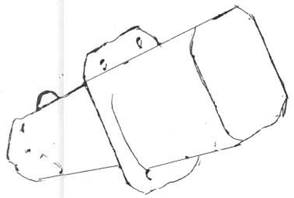
A RT 1079/ALQ 126(V) RECEIVER TRANSMITTER



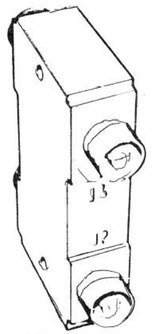
B AFT MID BAND ANTENNA



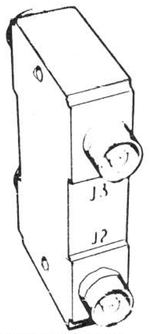
C AFT HIGH BAND ANTENNA



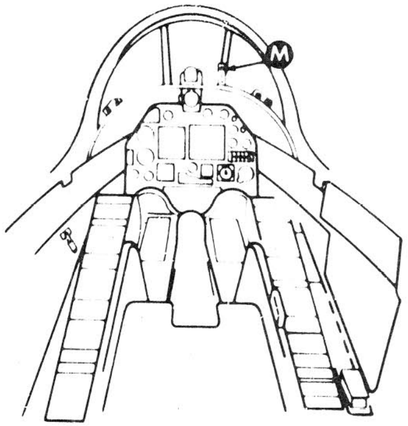
D FORWARD MID BAND ANTENNA



E MID BAND COUPLER



F LOW BAND COUPLER



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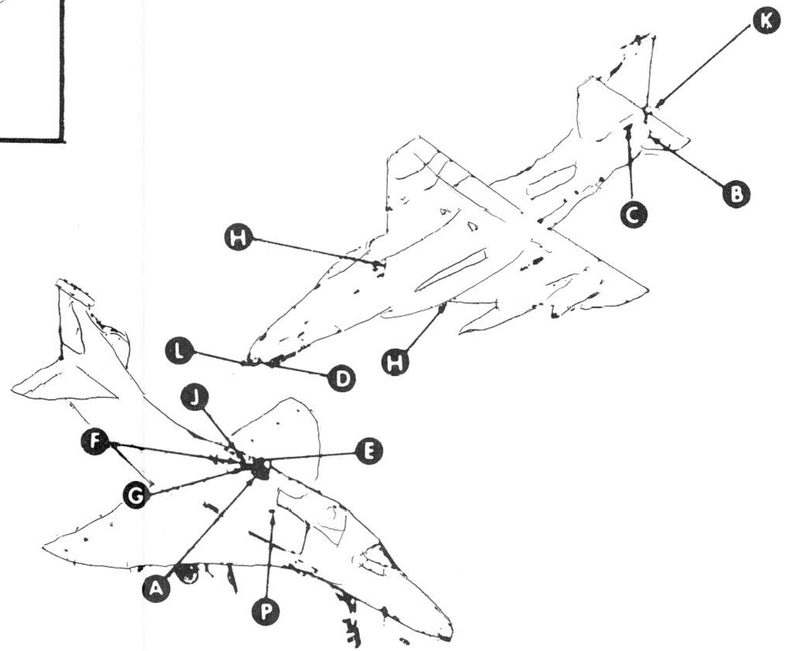

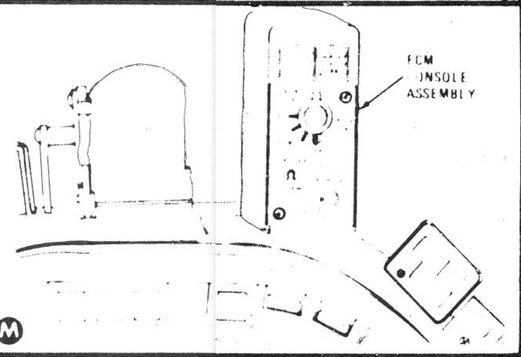

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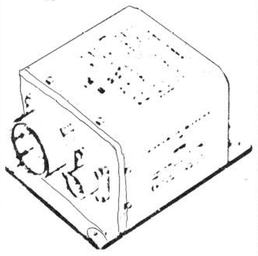

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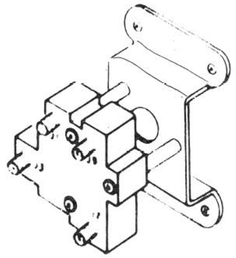
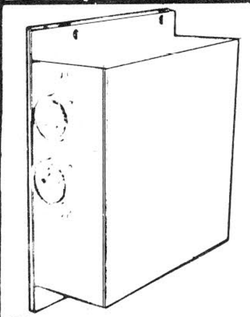


G HIGH BAND COUPLER/ POWER DIVIDER

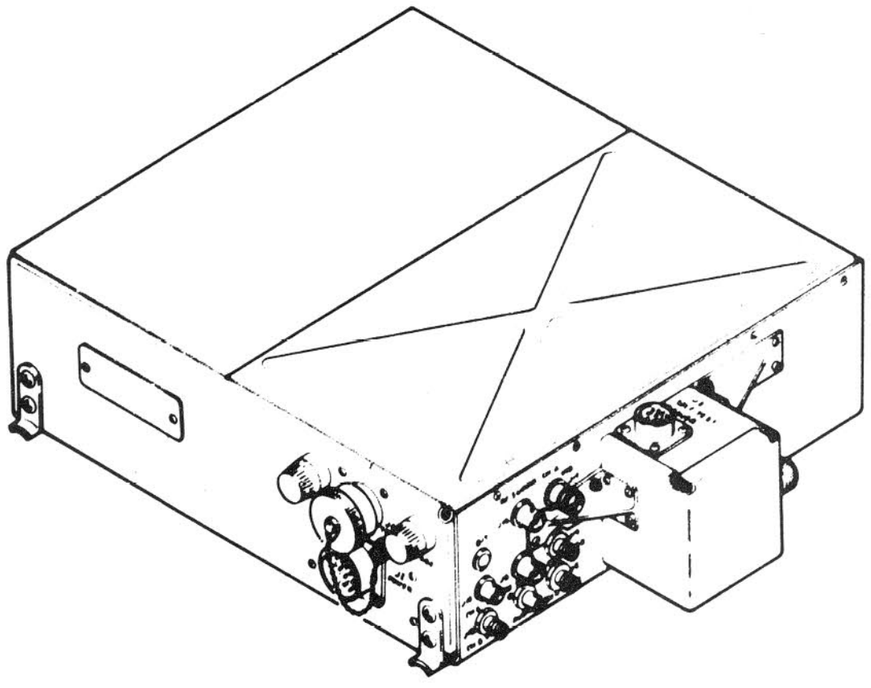
L FORWARD LOW BAND ANTENNA

K AFT LOW BAND ANTENNA

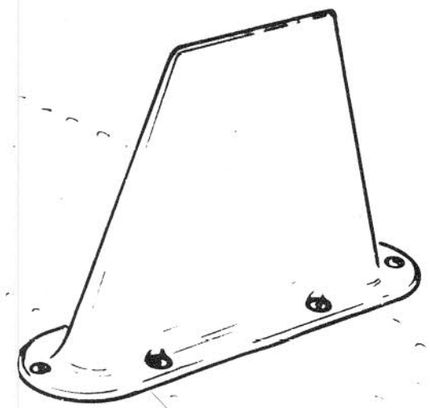


J ECM LIGHT DRIVER ADAPTER

H FORWARD HIGH BAND ANTENNA (TYPICAL)



B R-1764B/ALR-50(V) RADAR RECEIVER



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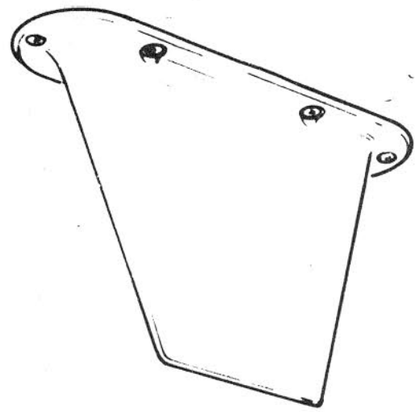

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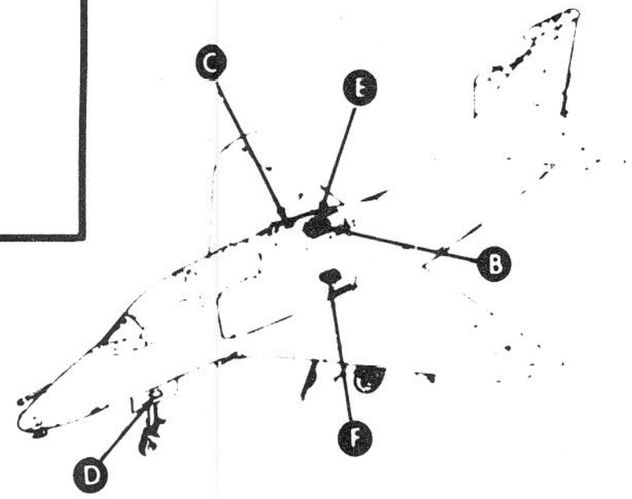
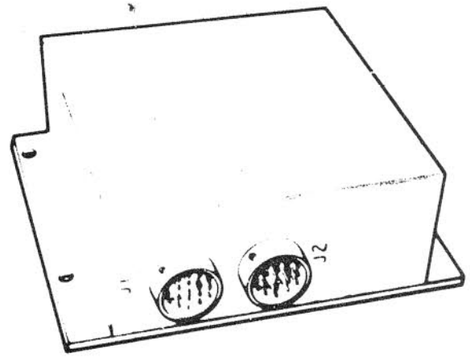
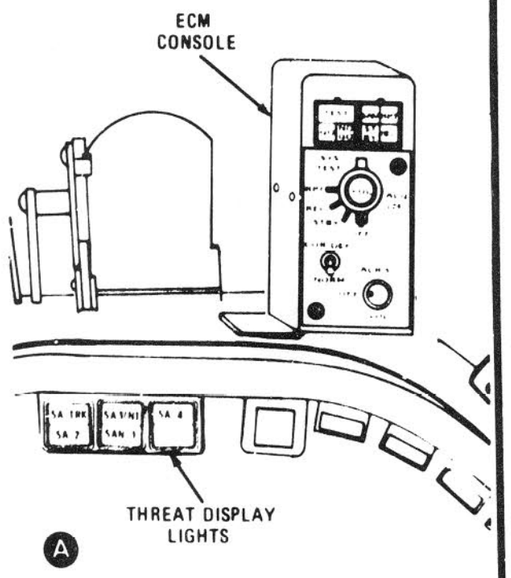




E ECM LIGHT DRIVER ADAPTER



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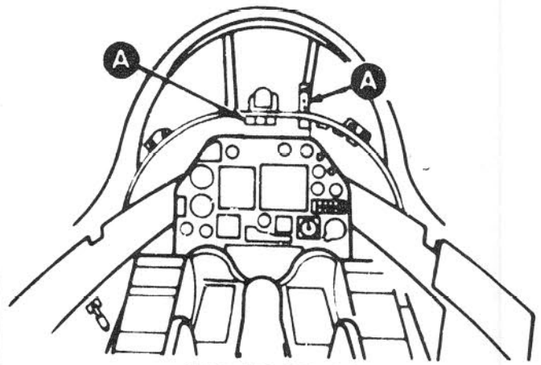

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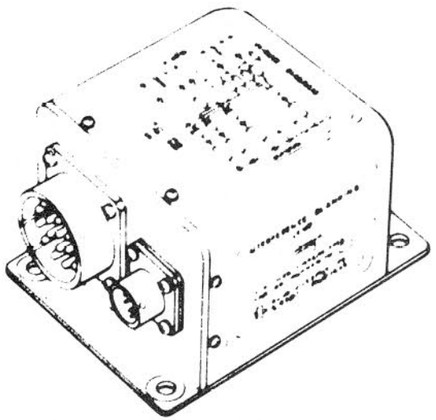

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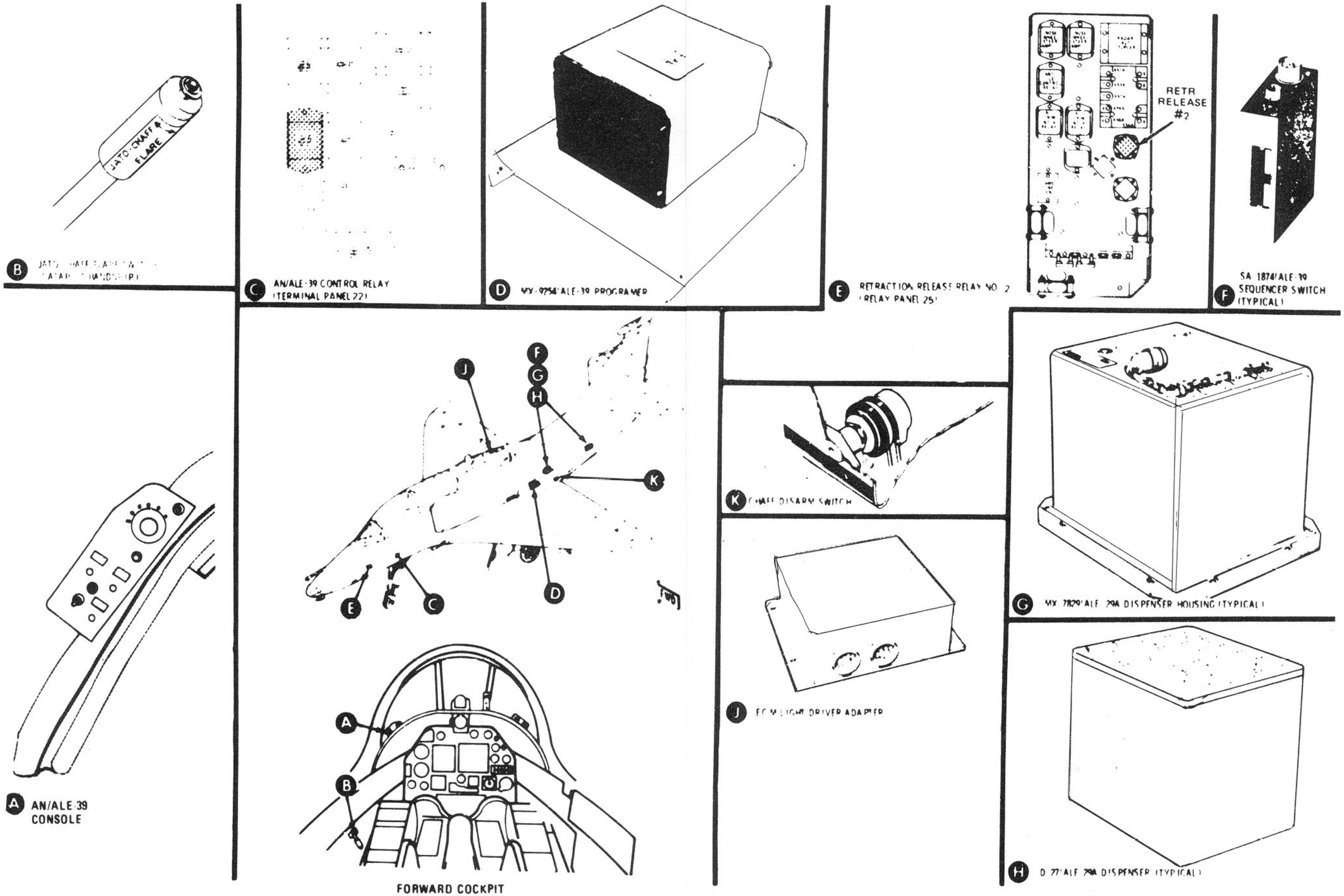

A AN/ALE-39 CONSOLE

B JATO CHAFF FLARE SWITCH (CATAPULT HANDGRIP)

C AN/ALE-39 CONTROL RELAY (TERMINAL PANEL 22)

D MX-9254/ALE-39 PROGRAMER

E RETRACTION RELEASE RELAY NO. 2 (RELAY PANEL 25)

F SA 1874/ALE-39 SEQUENCER SWITCH (TYPICAL)

G MX 7829/ALE 29A DISPENSER HOUSING (TYPICAL)

H D 27/ALE 29A DISPENSER (TYPICAL)

J ECM LIGHT DRIVER ADAPTER

K CHAFF DISARM SWITCH