

SAFETY and FAMIL, and

C

MAINTENANCE MANAGERS

COURSE HANDOUT 10/50

THURLOW



HORNET

SECTION I

GENERAL

SECTION II

AVIONICS

SECTION III

GROUND HANDLING

SECTION IV

EMERGENCY PROCEDURES

NOTE TO READERS

These notes are designed as a study guide ONLY and are to be used in conjunction with the applicable system Hornet publications.

These notes are NOT subject to amendment and are NOT to be used in conjunction with aircraft servicing, maintenance or repair.

THIS HANDBOOK IS A TRAINING AID ONLY.

TECHNICAL PUBLICATIONS

on F/C
DI(AF)AAP 7213.006-2-742-100

- 7 Refers to Technical
- 2 Refers to Aircraft and Aerospace Vehicles
- 1 Refers to Aircraft
- 3 Refers to Fighter

.006 is the aircraft identifier
-2 is the topic identifier
-742 is the system identifier
-100 is the data item identifier
XXX-000 is the sequential identifier
-010 indicates more than one volume
-020, 030 etc

Title Page Contains

- US Navy and RAAF AT indicator
- Title of System or Topic
- Publication Data
- Change Number and Data

"A" Page Contains

- Numerical Index
- Change Data for each WP
- List of US Navy changes
- List of RAAF changes

Work Packages (WPs)

- a WP is a complex set of data or procedures
- WP 001 Alphabetical Index
- WP 002 Introduction to the Publication
- WP 003 Start of Technical Data

Description of Manuals

DI(AF)AAP 7213.006-2-GAI-000 is the general aircraft information publication and contains the following:

- Aircraft description
- Aircraft arrangement
- Danger areas and precautions
- General description of each Aircraft System
- Description of the publication system used on the Hornet Aircraft

DI(AF)AAP 7213.006-2-AML-000 is the technical document list and contains the following:

- Lists of all Technical Documents associated with the Hornet Aircraft
- AAP No's for Systems, Components, GSE and other repairables
- Title, usage, security classification, media and updating agency for each manual *ILM, DLM*

DI(AF)AAP 7213.006-2-LMM-000 is the Line Maintenance Manual and contains the following:

- operations for applying/removing electrical and hydraulic power, jacking, towing etc.
- LMM-010 - Access doors
- LMM-020 - Emergency procedures
- LMM-030 - Conditional inspections *Hard Landings*

DI(AF)AAP 7213.006-2-PCM-000 is the Plane Captains Manual and contains the following:

- Repeated tasks ie refuelling, wing fold, installations, removal of ground safety devices

DI(AF)AAP 7213.006-2-FRM-000 is the Fault Reporting Manual and contains the following:

- WP003 - Maintenance Code descriptions
- WP004 - Warning, Cautions, Advisory and fault indications
- WP005 - Fault description
- WP006 - Circuit Breaker Trips Systems
- WP007 - HVD Symbology

- WP008 - Radar Display Symbology
- WP009 - Hi Display Symbology
- WP010 - Stores Display Symbology

Some other frequently used manuals include:

DI(AF)AAP 7213.006-2-FIM-000 - Fault Isolation Manual

DI(AF)AAP 7213.006-2-FIM-100 - Memory Inspect Access

System Manual Description

DI(AF)AAP 7213.006-2-~~XXX-XXX~~

- 100 - Principles of Operation
- 200 - Testing and Troubleshooting
- 300 - System Maintenance with IPB
- 500 - System Schematics

N.B. An in-depth description of all OLM Publications can be found
in DI(AF)AAP 7213.006-2-GAI-000.

F/A-18A



SECTION I

GENERAL

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SECTION 1

GENERAL

Introduction

1001. The F/A-TF/A-18A Hornet is a twin engine strike fighter built by the McDonnell Douglas Corporation and is in service with the Royal Australian Air Force as the replacement for the Mirage IIIIO aircraft.

1002. When armed for Air-to-Air (A/A) combat, the Hornet carries two Sidewinder missiles on its wing tips and two Advanced Sparrow missiles on the fuselage stations. For attack missions, the Hornet carries Air-to-Ground (A/G) ordnance on the centre, inboard and outboard wing stations. Also, a Forward Looking Infrared and Laser Spot Tracker/Strike Camera pods in place of the fuselage mounted Sparrows. The M61A1 six-barrel 20 millimeter gun mounted in the nose can be used in both the A/A and A/G modes. Three external fuel tanks may be carried on the centreline and the inboard wing stations.

1003. Its two General Electric F404 turbofan engines, each in the 16,000-pound thrust class, give the Hornet a thrust-to-weight ratio of approximately one-to-one, a top speed of more than 1.8 times the speed of sound, and a range of more than 400 nautical miles on internally carried fuel alone. The aircraft can extend its range with external fuel tanks and, significantly, it can fly at the speed of sound on intermediate power without engaging its afterburners.

1004. In the light attack role, the Hornet, with its integrated attack sensors, offers improved navigation and target finding capability, as well as accuracy better than that of any existing fighter/attack system. In comparison with the light attack system it will replace, the Hornet's agility and power provide greater speed over target, a significantly improved loaded turn capability, and a considerable loaded thrust-to-weight ratio improvement. Because the attack Hornet is armed with a nose gun and Sidewinder missiles and can be quickly cleared of its A/G ordnance, it has a fighter capability of its own. Hornet's combat ceiling is approximately 50,000 feet.

1005. The fuselage and wings hold approximately 10,600 pounds of fuel. Use of three 300-gallon external tanks gives the aircraft a total fuel capacity of approximately 17,200 pounds for the F/A-18A.

General Aircraft Information

1006. Description. The F/A-18A is a one crew member aircraft with the TF/A-18A being a two crew member version. It is powered by two F404-GE-400 turbofan engines with afterburner. The Hornet has a variable camber mid wing with leading edge extensions. The vertical stabilizers are angled outboard 20° from the vertical. The wings have a leading and trailing edge flap system to provide the desired aircraft performance and stability characteristics. The dual rudder and rudder actuator system provides directional control during flight.

1007. Dimensions. External dimensions (Annex A) of the F/A-18A and TF/A-18A are the same except for canopy height.

1008. Materials Distribution. The airframe (Annex B) is primarily made of aluminum. Graphite/epoxy composite compound is used for many skins and doors. Titanium is also used for skins, doors and hydraulic tube assemblies. High strength steel is used in the landing and arresting gear.

Aircraft Arrangement

1009. General. The Hornet aircraft consists of the following sections (Annex C):

- a. Radome,
- b. Forward fuselage,
- c. Centre fuselage,
- d. Aft fuselage, and
- e. Wings.

1010. Radome. The radome (Annex C) is a filament wound fibreglass/epoxy shell mounted on a hinge to allow easy access to the radar set. It provides an electrically transparent window for the transmission and receiving of radar signals.

1011. Forward Fuselage. The forward fuselage (Annex C) includes:

- a. Windshield,
- b. Canopy,
- c. Cockpit,
- d. Leading Edge Extension, and
- e. Nose Landing Gear.

1012. Windshield. The one piece windshield is stretched acrylic within an aluminum frame providing the pilot with forward visibility. The frame is hinged to allow access for instrument panel servicing.

1013. Canopy. The one piece canopy is stretched acrylic attached to an aluminum frame. The Hornet canopy may be opened/closed by either manually or electrically operating the canopy actuator. The TF/A-18A canopy is 54 inches longer and 125 pounds heavier than the F/A-18A canopy.

1014. Cockpit. The F/A-18A (Annex E) has a single place cockpit. The TF/A-18A (Annex E) has a forward and rear cockpit with the forward cockpit layout being the same as the F/A-18A. These views are for familiarization only.

1015. Leading Edge Extension. The leading edge extension (LEX) is a highly swept and cambered extension of the wing leading edge, and provides added lift at high angles of attack. The boarding ladder is mounted in the left LEX (Annex C).

1016. Nose Landing Gear. The nose landing gear (NLG) shock strut

assembly provides landing, takeoff, and taxi energy absorption, and tyre/runway compliance.

1017. Centre Fuselage. The centre fuselage (Annex C) includes:

- a. Main Landing Gear,
- b. Air intake ducts,
- c. External stores stations,
- d. Fuselage fuel tanks,
- e. Aircraft Mounted Accessory Drive, and
- f. Auxillary Power Unit.

1018. Main Landing Gear. The main landing gear (MLG) is a lever design with an oleo shock absorber. The lever design provides a stable platform for aircraft carrier and shore based operations. The oleo shock absorber absorbs the energy from ground loads during landing and taxi operations.

1019. Air Intake Ducts. The air intake ducts are fixed, with a single external compression ramp. A ramp boundary layer bleed system provides the best inlet airflow during operation at supersonic speed.

1020. External Stores Stations. There are three external stores stations (Annex D) on the center fuselage, designed to carry a mix of armament, fuel and avionics. The center fuselage stations (STA) are STA 4, 5 and 6.

1021. Fuselage Fuel Tanks. All fuselage fuel tanks are bladder type tanks, supported by nylon lacing and fuel tank fittings. The motive flow fuel system can be refuelled and defuelled via a single point without external electrical power.

1022. Aircraft Mounted Accessory Drive. The aircraft mounted accessory drive (AMAD) system consists of two interchangeable gearboxes, each connected to an engine by a power transmission shaft (PTS). A hydraulic pump, motive flow fuel boost pump, generator converter unit (GCU) and air turbine starter (ATS) are mounted on the AMAD.

1023. Auxillary Power Unit. The auxillary power unit (APU) and the AMAD provide on-board power for engine starting, electrical system operation, hydraulic system operation and fuel system operation. The APU provides pneumatic power to drive the AMAD via the air turbine starter (ATS). In addition the APU provides air to the environmental control system during augmentation and ground testing.

1024. Aft Fuselage. The aft fuselage (Annex C) includes:

- a. Engines,
- b. Speed brake,
- c. Vertical stabilizers,
- d. Horizontal stabilizers, and

e. Arresting hook.

1025. Engines. The F404-GE-400 engine is a low bypass, twin spool axial flow turbofan with afterburner. The engine is made up of six modules:

- a. Fan,
- b. High pressure compressor,
- c. Combustor,
- d. High pressure turbine,
- e. Low pressure turbine, and
- f. Afterburner.

1026. The 3-stage fan (low pressure compressor) is driven by a single stage turbine. Approximately one-fourth of the fan discharge is bypassed to the afterburner for combustion or cooling. The 7-stage high pressure compressor is also driven by a single stage turbine.

1027. Fourth-stage compressor air is used by the engine anti-ice system, and seventh-stage compressor air is used in the bleed air system for the airconditioning system.

1028. A set of variable inlet guide vanes are mounted in front of both fan and compressor to direct the inlet air at the best angle for the existing engine operation.

1029. Atomized fuel and compressor discharge air are mixed and ignited in the combustor chamber. These ignited gases then pass through the High Pressure Turbine and Low Pressure Turbine and out the engine exhaust.

1030. Afterburner operation uses added atomized fuel mixed with the combustion discharge gases and the bypass fan discharge air to produce additional thrust.

1031. The electrical control assembly (ECA), variable exhaust nozzles (VEN), main fuel control (MFC) and afterburner fuel control (ABC) provide co-ordinated operation of the engine through every part of its envelope.

1032. Speed Brake. The speed brake, hinged at its forward end, is powered up and forward by a hydraulic actuator. The actuator is electrically controlled by a switch on the right power lever.

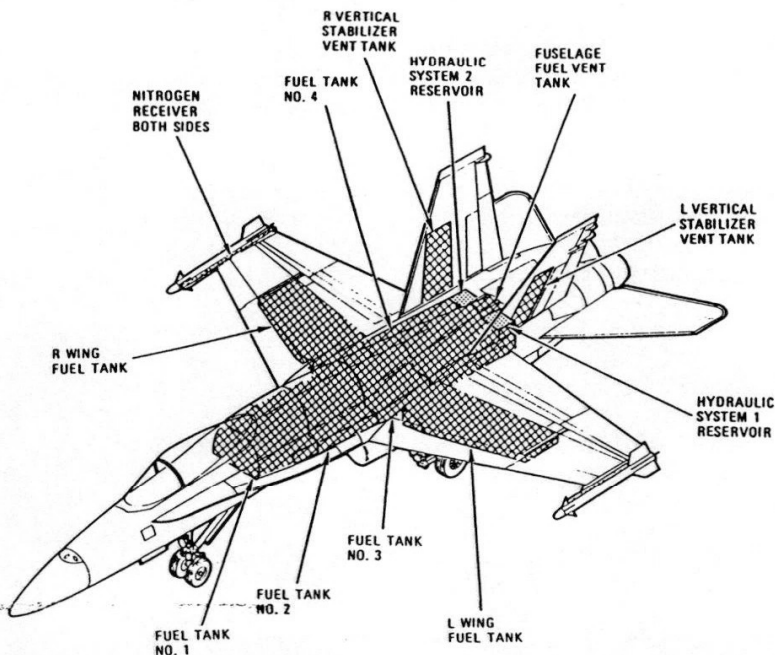
1033. Vertical Stabilizers. Two interchangeable vertical stabilizers are mounted canted 20° outboard from vertical with a 1° toe out at the leading edge. The vertical stabilizers contain in their construction the:

- a. Fuel tank vent and dump outlets;
- b. Formation, position and anticollision (strobe) lights;
- c. Electronic Countermeasures (ECM) antenna;
- d. Radar warning antenna; and
- e. Hydraulic oil cooler ram air inlet.

1034. Horizontal Stabilizers. The stabilators are attached via spindles to the aft fuselage. During normal operation, control is provided by hydraulic power and a mechanical manual mode control is provided for emergency backup.
1035. Arresting Hook. Attached to the underside of the aft fuselage is the arresting hook which incorporates a latching system for positive mechanical extension assisted by a nitrogen charge. The arresting hook is raised with hydraulic power. Primarily designed for carrier landings it is now used in the RAAF for arrested landings. When the arresting hook is lowered the hook point engages on the arrestment cable on the runway to stop the aircraft.
1036. Wings. The wings are attached to the centre fuselage by wall lugs to the main torque box. The trailing edge aft of the rear spar has mounting areas for avionics components, flap actuator, plumbing, electrical conduit and aileron control linkage.
1037. Two pylons can be mounted on the lower inboard section of each wing. They are known as STA 3 and 7 (Annex D). These stations can carry an external fuel tank air-air or air-ground stores.
1038. Two pylons can be mounted on the lower outboard section of each wing. They are known as STA 2 and 8 (Annex D). These stations can carry various air-air or air-ground weapons.
1039. The wingtips, STA 1 and 9 (Annex D), carry AIM9 sidewinder missiles on guided missile launchers attached at the wing tip.
1040. The outer section of each wing folds up (Annex A) to facilitate parking and taxiing of the aircraft. Also incorporated within each wing in the inboard section are internal fuel tanks.
1041. Walk Areas. All external surfaces except walk areas shown at Annex F are NO STEP, NO WALK areas. The flap and stabilizer area may be used for walks, provided the locks are installed. Protective covers should be used on walk areas during periods of heavy traffic. The ground protective devices are shown in DI(AF)AAP 7213.006-2-PCM-000.
1042. Minimum Structural Access Doors. Some access doors are an integral part of the aircraft structure. Any time the aircraft is subject to stress, these doors must be installed/closed. The procedures are covered in DI(AF)AAP 7213.006-2-LMM-000 and DI(AF)AAP 7213.006-2-PCM-000.





DANGER AREAS AND PRECAUTIONS

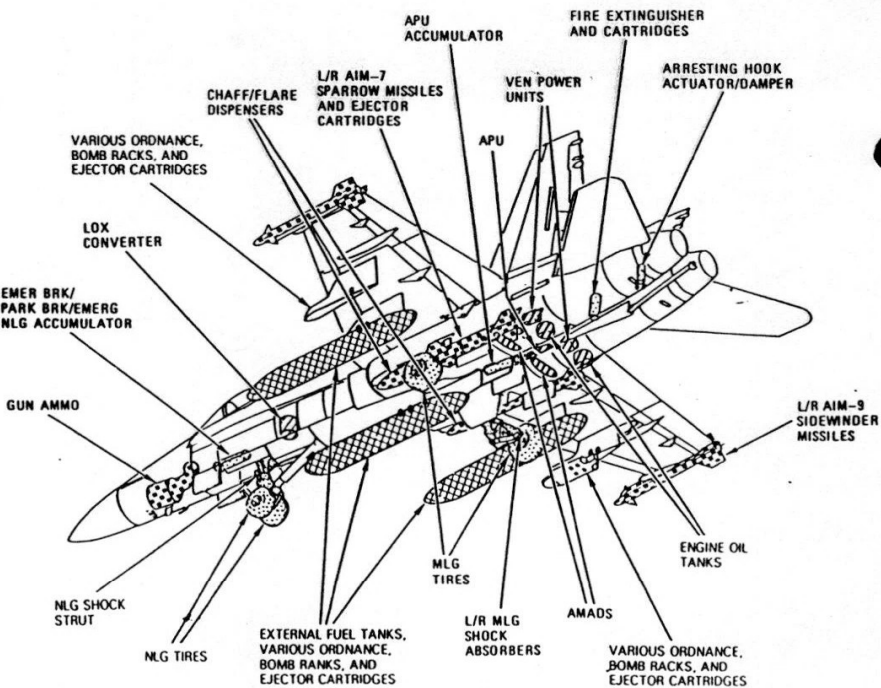
1043. Flammable Liquids, Compressed Gases, and Explosive Devices.
 Areas including reservoirs of flammable liquids, gases under pressure and explosive devices are shown below. All personnel associated with the Hornet should be aware of the hazards relating to these areas.



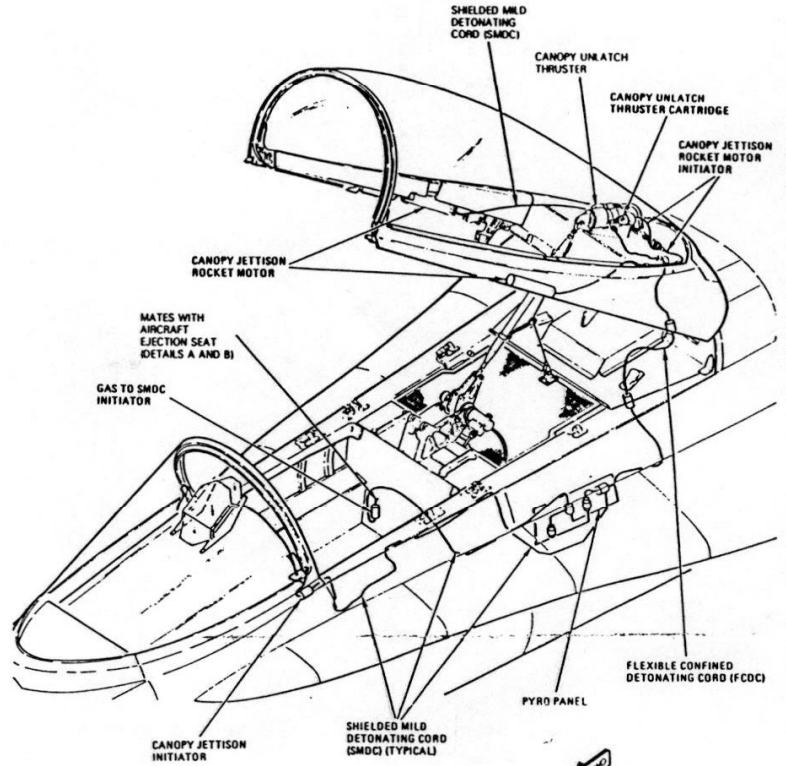
(NOTE: Contains both NITROGEN and HYDRAULIC fluid)

LEGEND

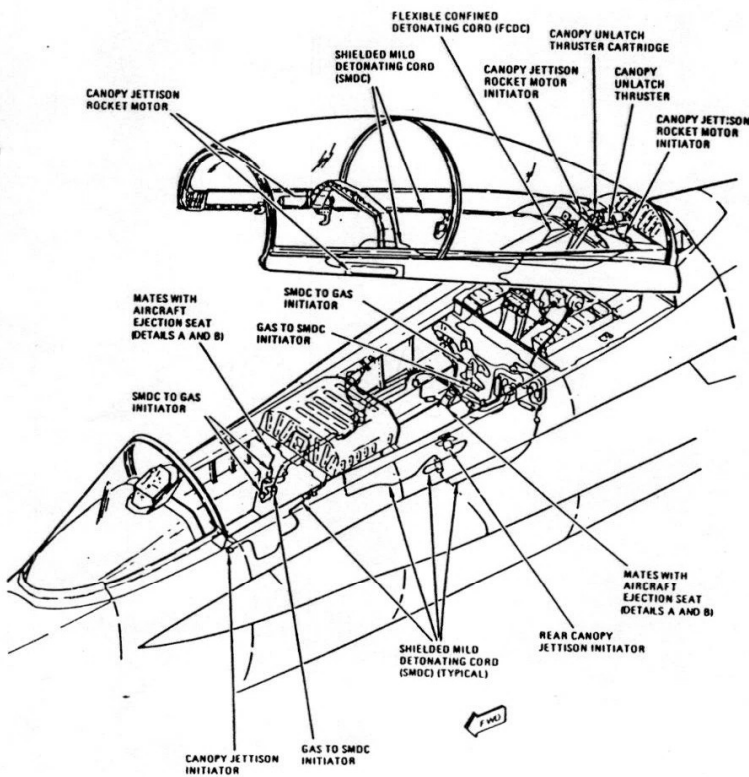
-  FUEL
-  HYDRAULIC FLUID
-  ENGINE OIL
-  LOX
-  EXPLOSIVES
-  COMPRESS GAS



1044. Canopy and Seat Explosive Devices. Many explosive devices are located in and around the crew station. The ejection seat(s) have rocket motors, initiators and controls that require special handling during ground operations. The canopy has rocket motors, initiators, thrusters and controls that also require special handling. Safety procedures are covered in DI(AF)AAP 7213.006-2-PCM-000.

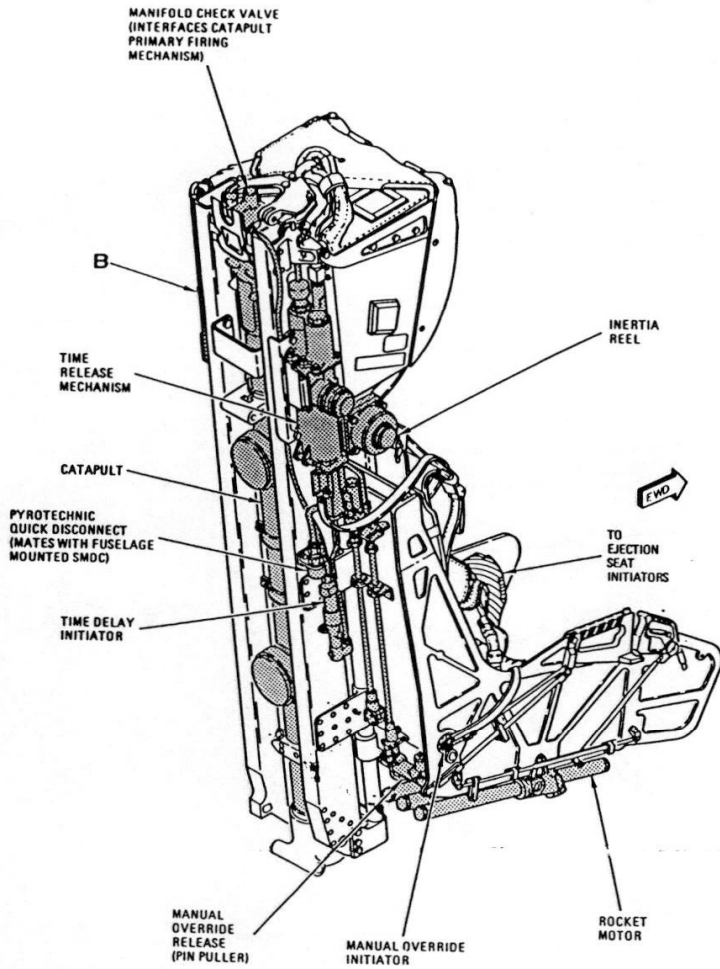


F/A-18A
(AIRCRAFT EJECTION SEAT REMOVED FOR CLARITY)



TF/A-18A
(AIRCRAFT EJECTION SEAT REMOVED FOR CLARITY)

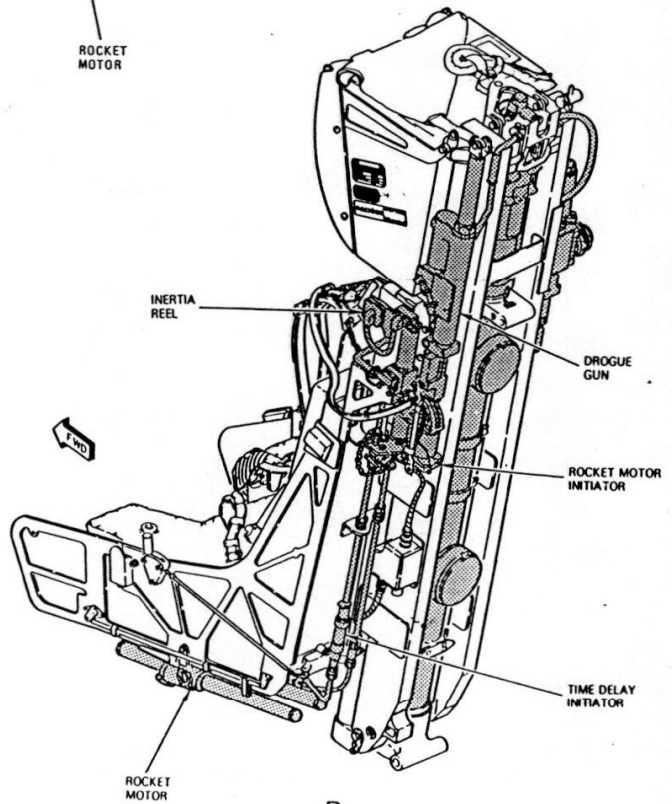
Details A and B are illustrated on page 1-8.



LEGEND

 EXPLOSIVES

A



LEGEND

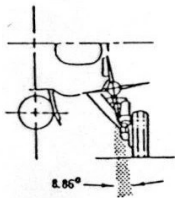
 EXPLOSIVES

B

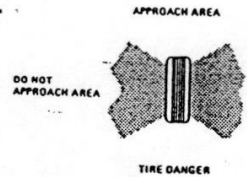
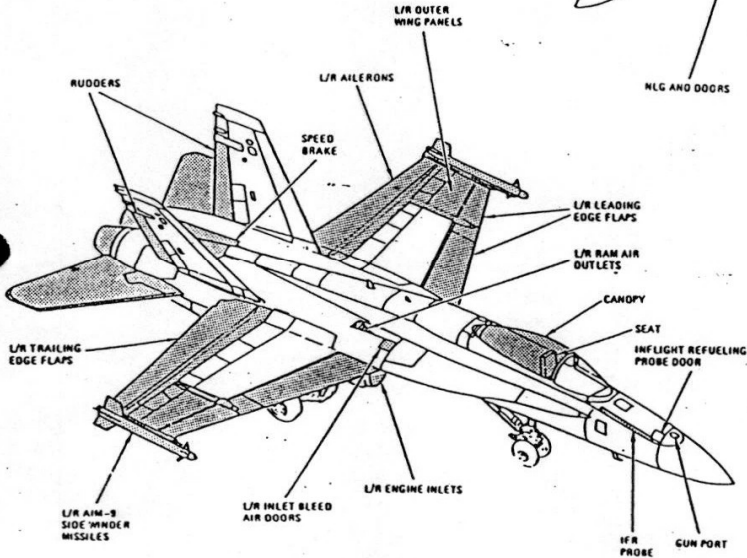
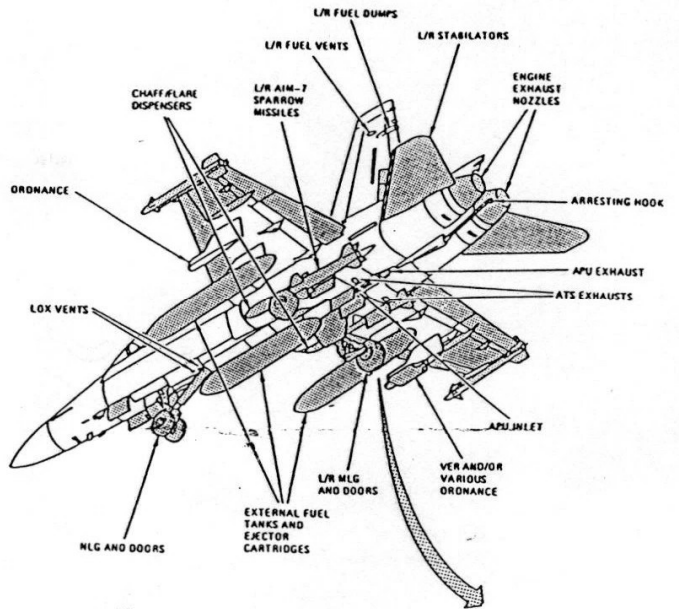
1045. Airframe and External Stores. External fuel tanks, vertical ejection racks, missile launchers and conventional/nuclear weapons loaded on wing or fuselage centreline pylons may be ejected by explosive cartridges. The areas near these devices must be treated with caution and are hazardous to personnel when electrical power is applied to the aircraft.

1046. Missile/M61A1 gun trajectories and missile exhaust areas are hazardous for personnel. An inadvertent operation of these systems can cause death or injury.

1047. Aircraft carrying munitions must be loaded, unloaded and parked in designated explosives parking areas.

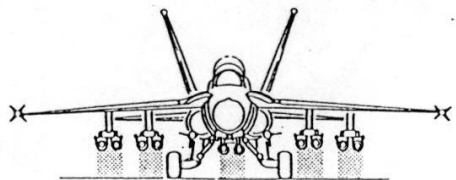


AIM-7 SPARROW FUSELAGE STATION - MISSILE EJECTION (LOOKING FORWARD)



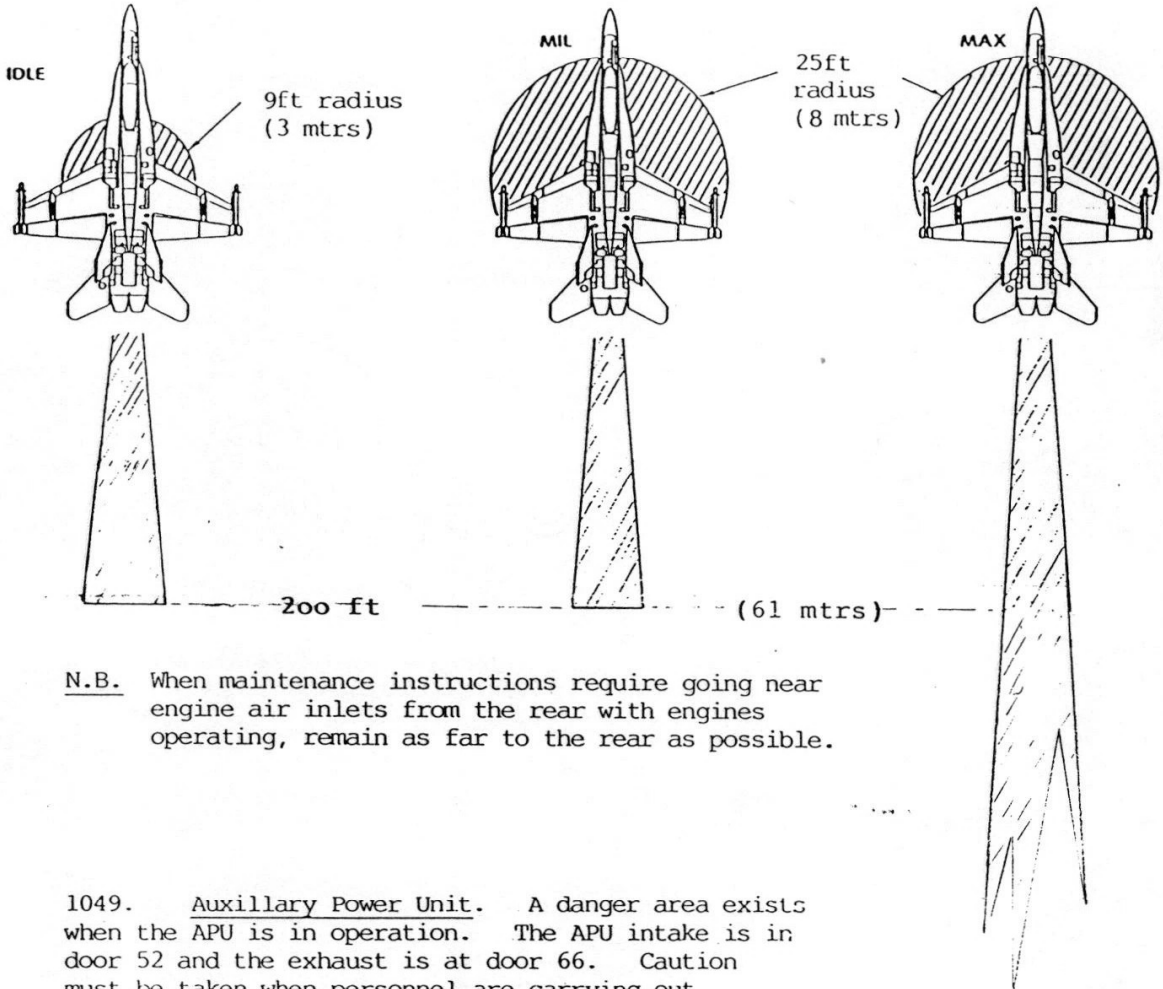
LEGEND

DANGER AREAS



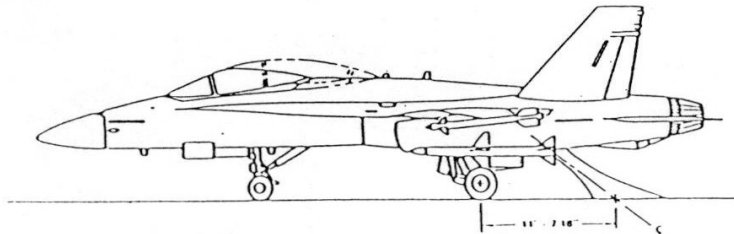
PYLON HAZARD AREAS (TYPICAL)

1048. Engine Danger Areas. Danger areas resulting from engine operation are related to exhaust velocity and temperature, air intake and noise. During ground operation of the engines, the forward and aft ends of the aircraft are danger areas. The area immediately aft of the tail pipes is hazardous for 15 mins after engine shutdown.

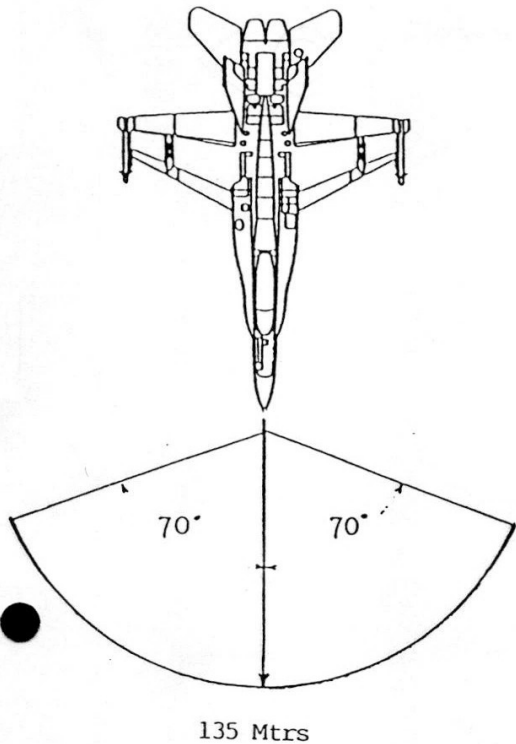


N.B. When maintenance instructions require going near engine air inlets from the rear with engines operating, remain as far to the rear as possible.

1049. Auxillary Power Unit. A danger area exists when the APU is in operation. The APU intake is in door 52 and the exhaust is at door 66. Caution must be taken when personnel are carrying out maintenance in the area of the APU intake and exhaust footprint.



LEGEND
 1 ESTIMATED VELOCITY AT
 CENTER OF EQUIPMENT - 142 MPH
 13" DIA. CIRCLE - 78 MPH
 19" DIA. CIRCLE - 24 MPH



1050. Radiation. Radar operation is the main source of radiation injury to personnel. All radio and radar transmitters are sources of radio frequency (rf) energy.

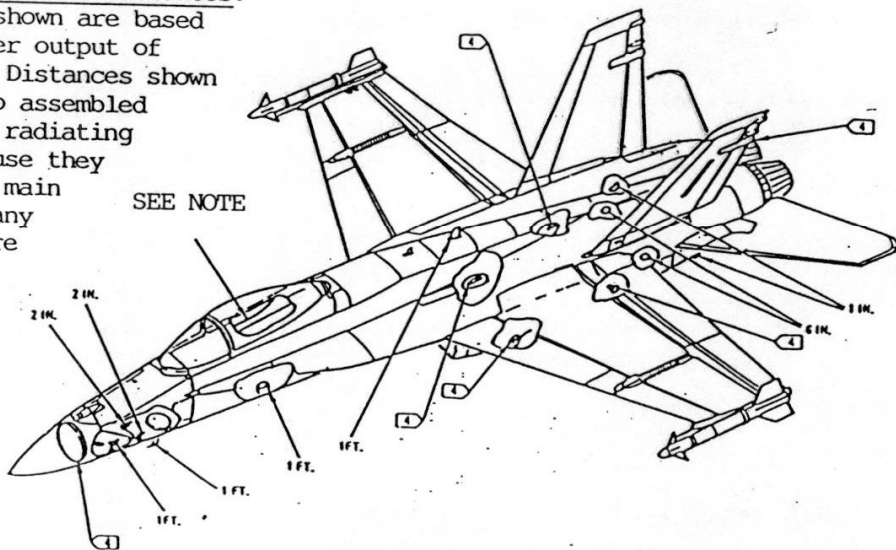
1051. Radiation Hazards.

- a. Long exposure will cause personnel injury. Warning signs must be posted.
- b. Accidental firing of electroexplosive devices (EED) can result from rf energy radiated through an opening in the EED, or conducted through the firing leads.
- c. Radiation may cause sparking between metal surfaces such as fuel hose nozzle and aircraft structure.
- d. Radiation may cause photoflash bulbs to go off, resulting in injury to personnel.

ANTENNAS

1051. Minimum Safe Distances.

All distances shown are based on maximum power output of transmitter. Distances shown do not apply to assembled EED mounted on radiating aircraft, because they are not in the main power beam of any antenna, and are normally safe.



NOTE: The HF antenna is mounted in the leading edge of the Right LEX. Minimum Safe Distance is 3 meters.

LEGEND

- 1. SAFE CLEARANCES SHOWN ARE BASED ON FIELD POWER DENSITY OF 100M/M².
- 2. UNLABELED ANTENNAS DO NOT EMIT ELECTROMAGNETIC RADIATION.
- 3. RADAR DOES NOT NORMALLY TRANSMIT WHEN WEIGHT IS ON WHEELS.
- 4. ANTENNAS WHICH DO NOT NORMALLY TRANSMIT WHEN WEIGHT IS ON WHEELS.

1052. Precautionary Measures. Personnel should not work in radiation fields of operating radar antennas.

1053. All transmitting equipment should be turned off before bringing EED into the area.

1054. Transmitters should not be operated within 500 feet of uninstalled EED.

1055. Observe the rules below when handling EED:

- a. All handling of EED must be done in an area free of rf energy.
- b. EED must be kept in containers until installation is possible.
- c. Electrical lead shorting clips on EED must not be removed until required.
- d. Electrical leads must not contact aircraft structure.
- e. Prevent unnecessary contact of electrical leads with hands. Your body will act as an antenna.
- f. Rings, watches, keys or other metallic objects must not be worn or carried in areas of rf energy.

1056. Flammable or explosive materials, in or in contact with metallic containers, are not to be left in rf energy fields.

1057. Refuelling is not to be carried out within 100 ft (31 mtrs) of operating airborne type radio or air radar equipment, or within 300ft (92 mtrs) of ground radar equipment.

1058. To prevent injury during ground maintenance, personnel should be aware of the aircraft radiation danger areas. These are:

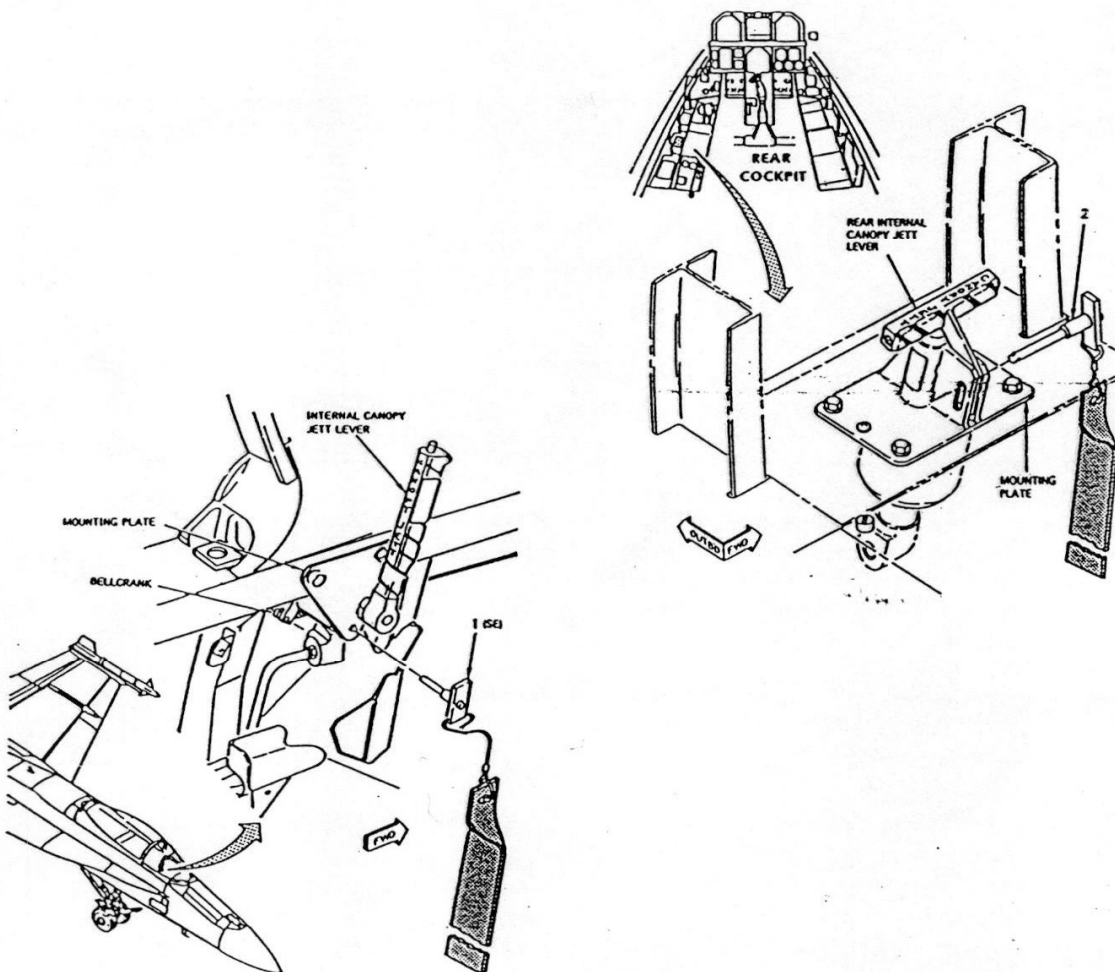
- a. Observe minimum safe distances from transmitting antenna.
- b. 135 metres in front and 70° either side of aircraft with transmitting radar.
- c. Warning signs must be posted at the extremities of the danger zone.

GROUND SAFETY DEVICES

1059. Minimum Safety Devices. Ground safety devices are required during all ground operations.

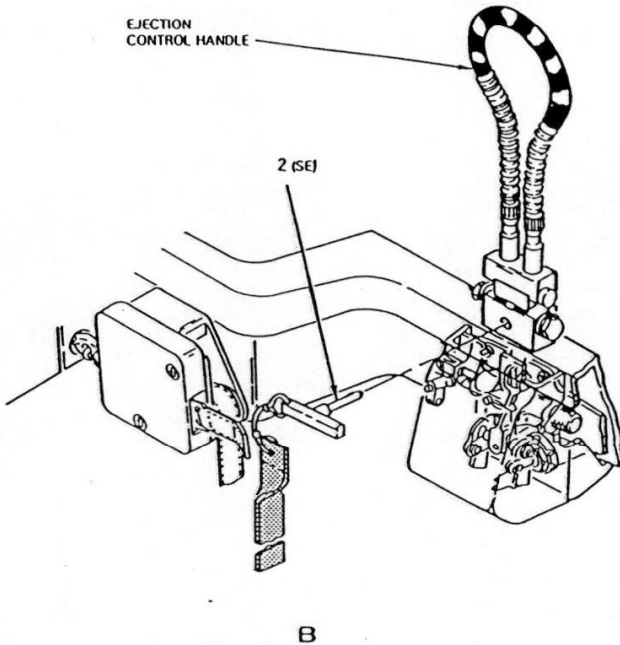
1060. Cockpit. There are two ground safety pins to be fitted in EACH cockpit, they are:

- a. ejection control handle safety pin, and
- b. canopy ejection lever safety pin.

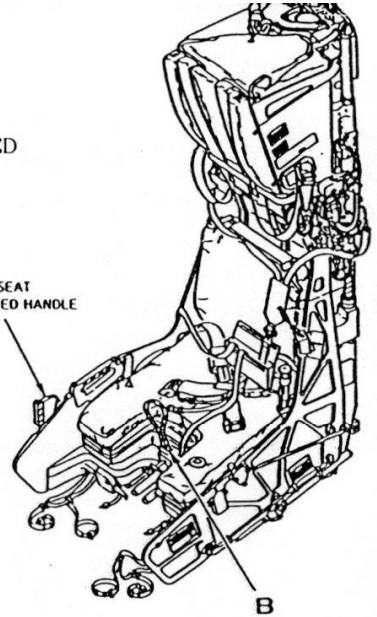
**WARNING**

To prevent injury to personnel or damage to aircraft from accidental canopy jettison, the pin must penetrate the internal CANOPY JETT lever mounting plate and initiator lever.

1061. Ejection Seat. The ejection seat SAFE/ARMED handle safeties the ejection control handle, however the ejection control handle aircraft ground safety pin must be installed to preclude accidental seat ejection.

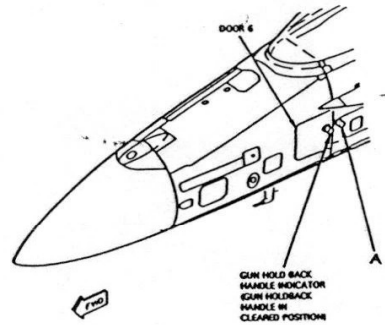
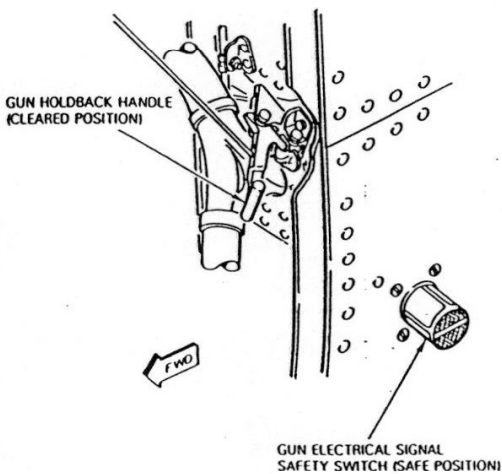


EJECTION SEAT SAFE/ARMED HANDLE



1062.- To raise the SAFE/ARMED handle, squeeze the locking lever on SAFE/ARMED handle and rotate handle up and forward to the locked SAFE position.

1063. Gun Electrical Safety Switch. This switch electrically disconnects firing circuit to 20mm gun. The switch is in safe position when pushed in, rotated counterclockwise and allowed to extend.



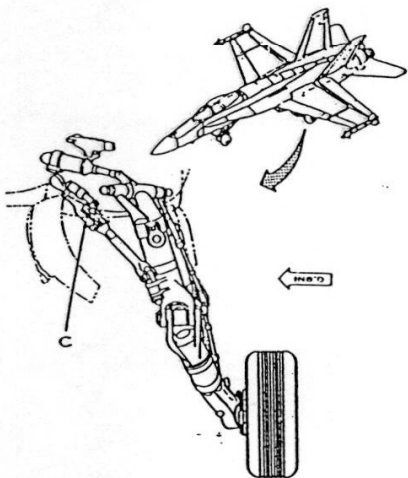
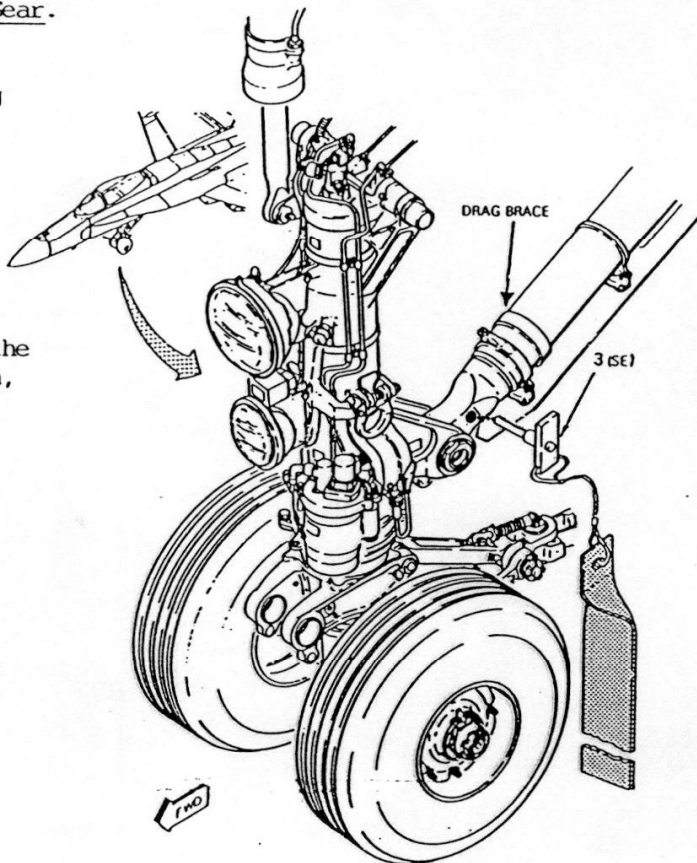
1064.- Gun Holdback Handle. This handle safeties 20mm gun by energising gun clear solenoid. The handle located inside door 6, is in cleared position when pulled out and latched.

A

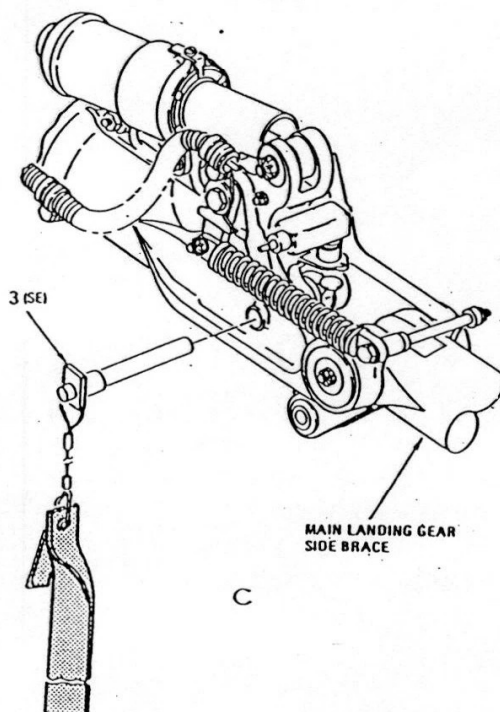
1065. Nose and Main Landing Gear.

The landing gear ground safety pin safeties the landing gear in the down position, preventing gear retraction.

1066. On the NLG the ground safety pin is inserted through the drag brace from either direction, ensuring the pin is fully home.



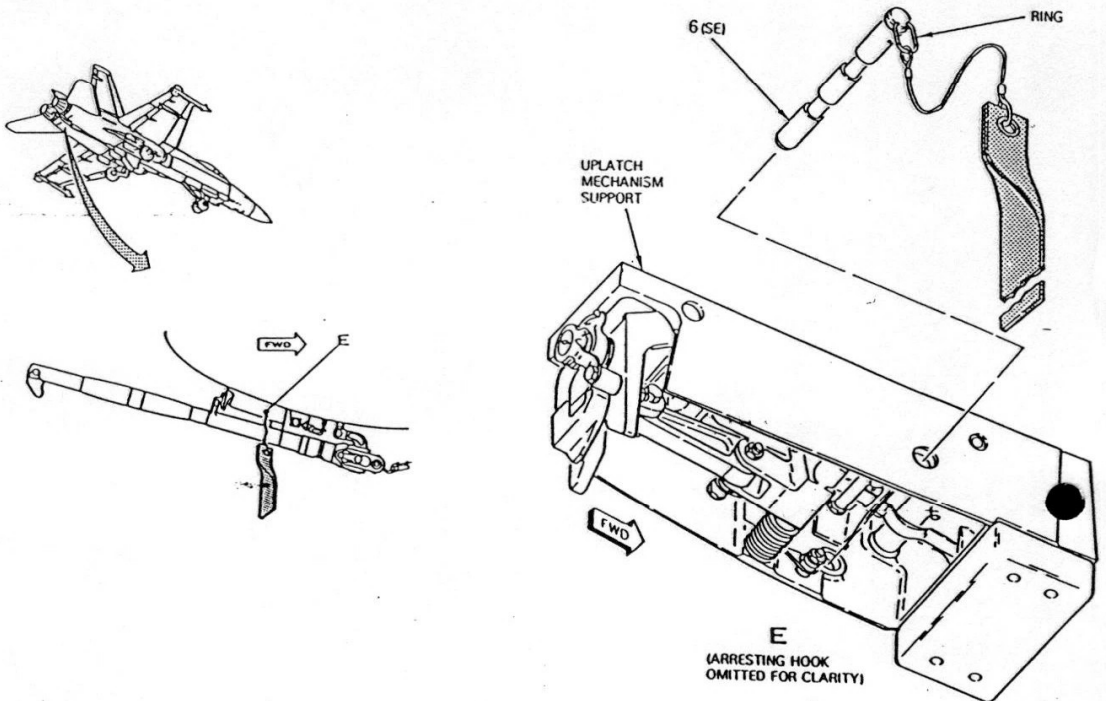
1067. For the MLG there is one ground safety pin for each side brace. The pins are to be inserted from the outboard to inboard on both the left and right MLG side braces to preclude the pins from working themselves out.



1068. Arresting Hook. To preclude accidental lowering of the arresting hook, an arresting hook aircraft ground safety pin is inserted into the arresting hook uplatch mechanism. This safeties the arresting hook into the uplatch mechanism.

WARNING

To prevent injury to personnel or damage to equipment, safety pin must be installed through both holes of the uplatch mechanism support.



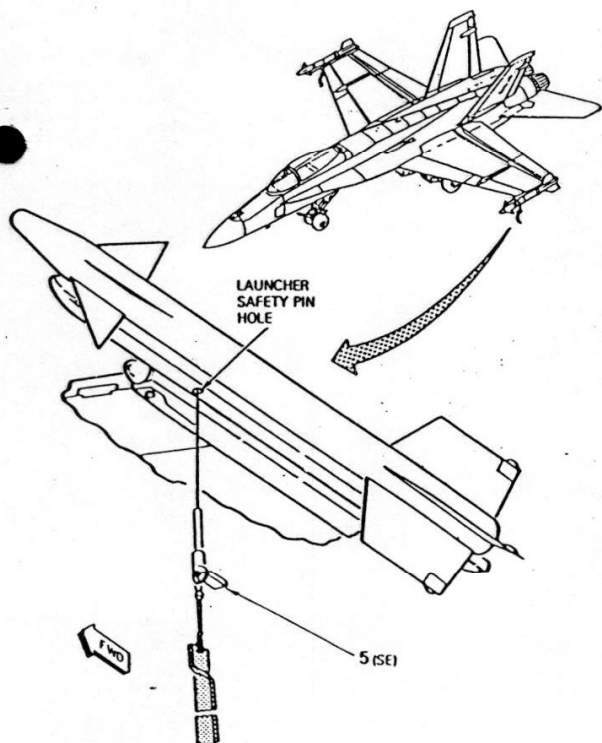
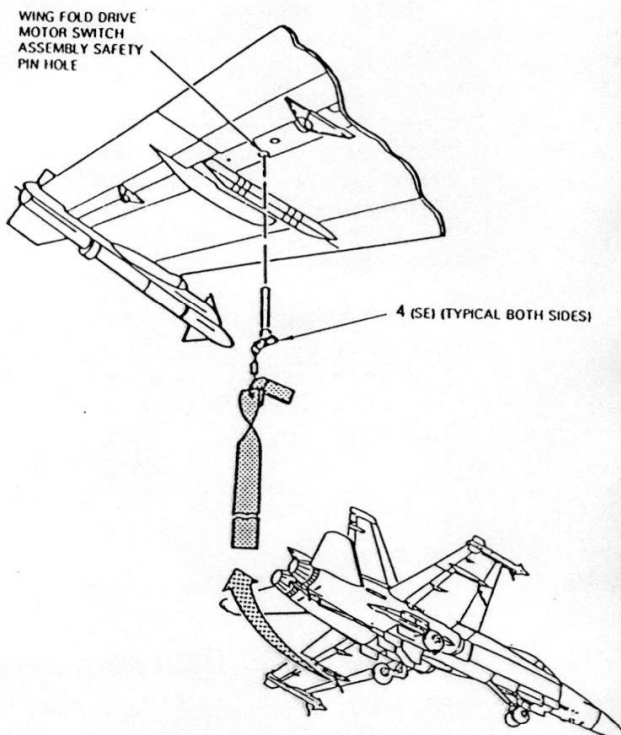
WARNING

To prevent injury to personnel or damage to equipment, force must not be used to remove safety pin. The pin cannot be removed if the arresting hook control handle is selected down.

1069. Wing Fold. To prevent accidental wing fold/spread operations, the wingfold aircraft ground safety pin is inserted into the wing fold drive motor switch assembly. This will electrically isolate the wingfold drive motor preventing electrical operation.

WARNING

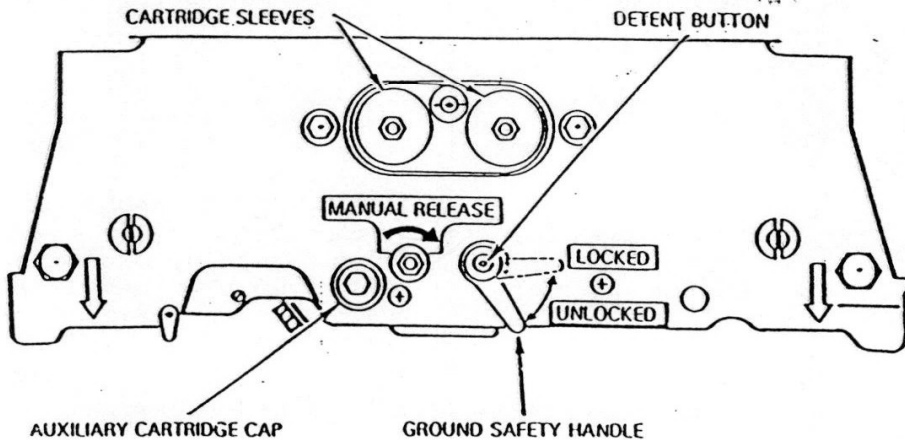
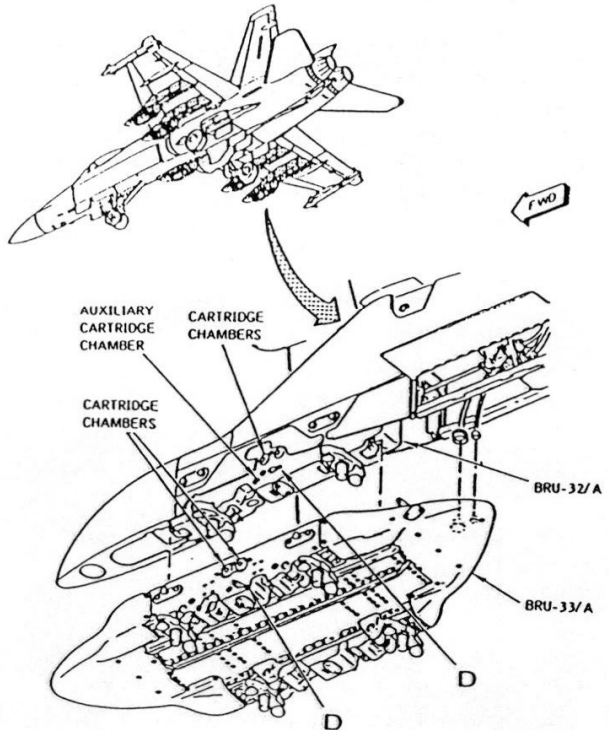
To prevent injury to personnel or damage to equipment and aircraft, the position of the cockpit control handle must agree with the wing spread or fold position.



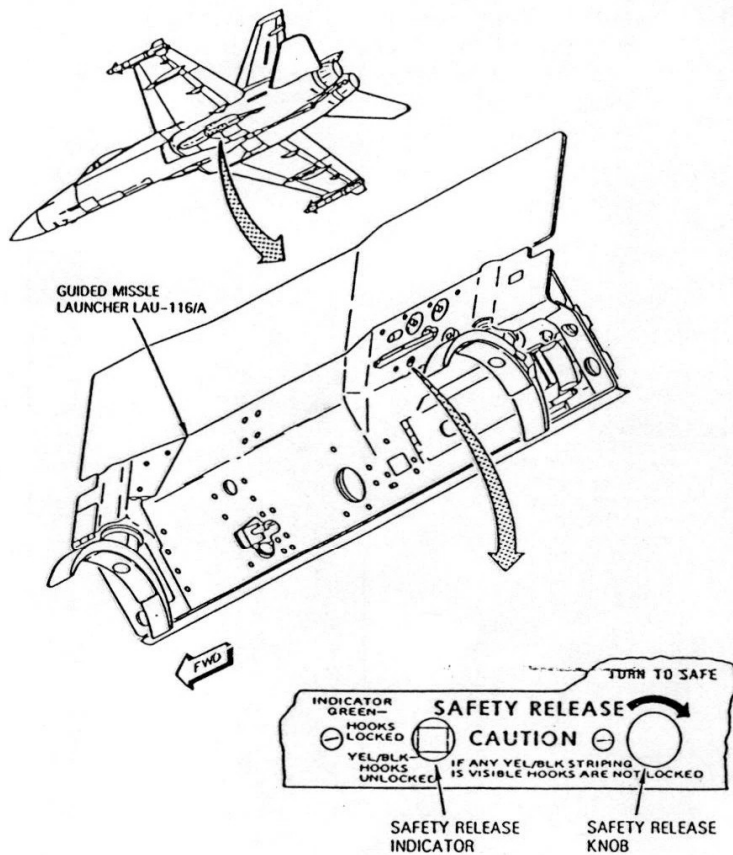
1070. AIM-9 Sidewinder. The launcher detent wrench safety pin electrically disconnects missile motor contact points from launcher power supply. The pin allows latching/unlatching of missile detent lug during missile loading. The launcher is safetied when pin is installed in launcher safety pin hole.

1071. BRU-32/A Bomb Ejector Rack Ground Safety Handle.
 The bomb ejector rack ground safety handle is used to mechanically safety the rack. The rack is safetied when the button on the handle shaft is depressed and rotated to the LOCKED position.

1072. BRU-33/A Bomb Ejector Rack Ground Safety Handle.
 As with the BRU-32/A Bomb Ejector Rack, this rack is safetied in the same way.



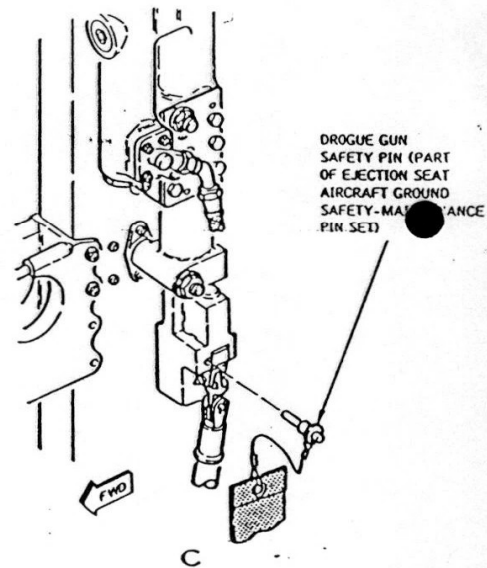
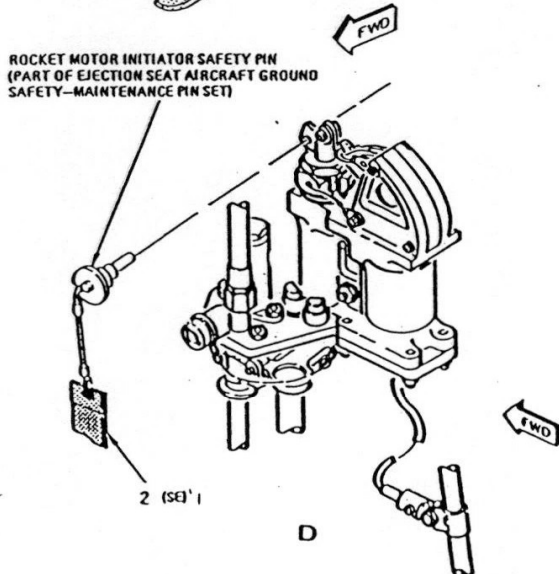
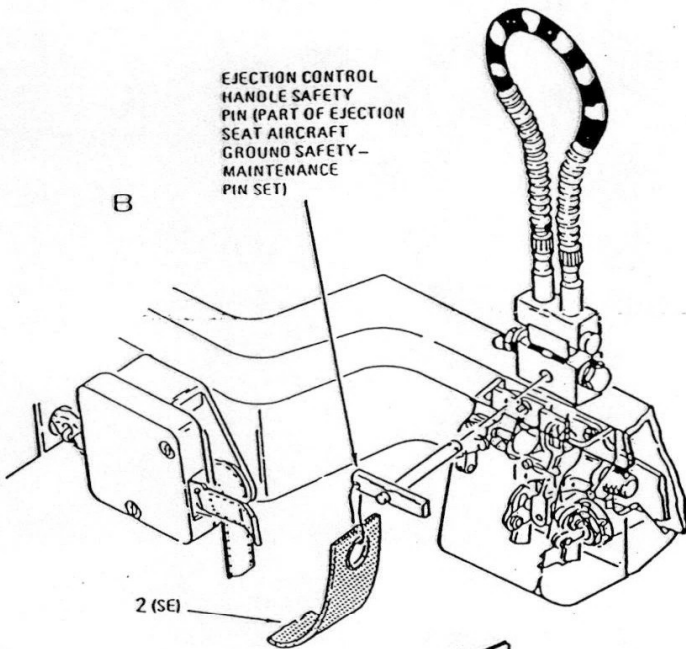
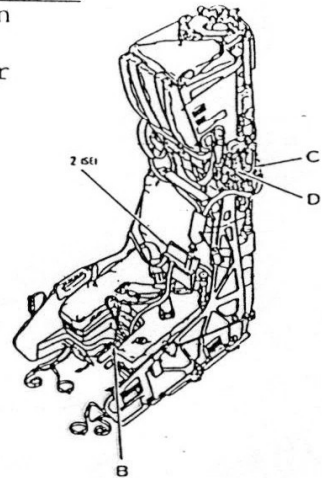
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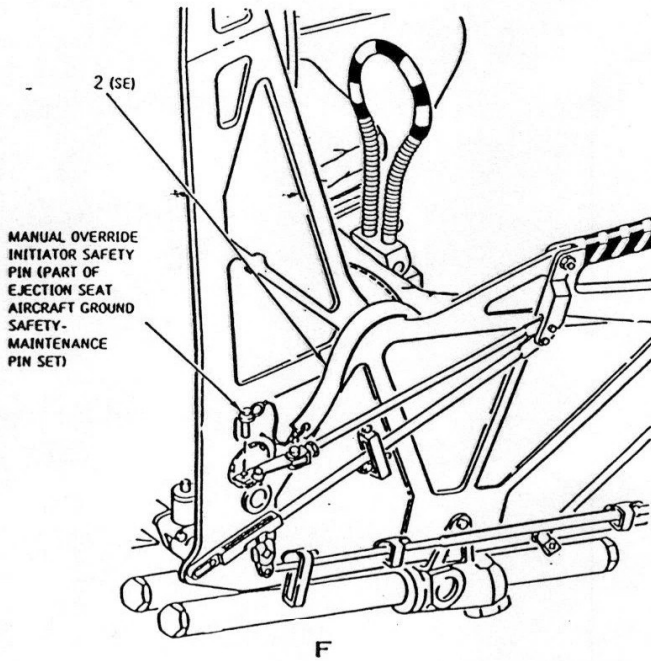
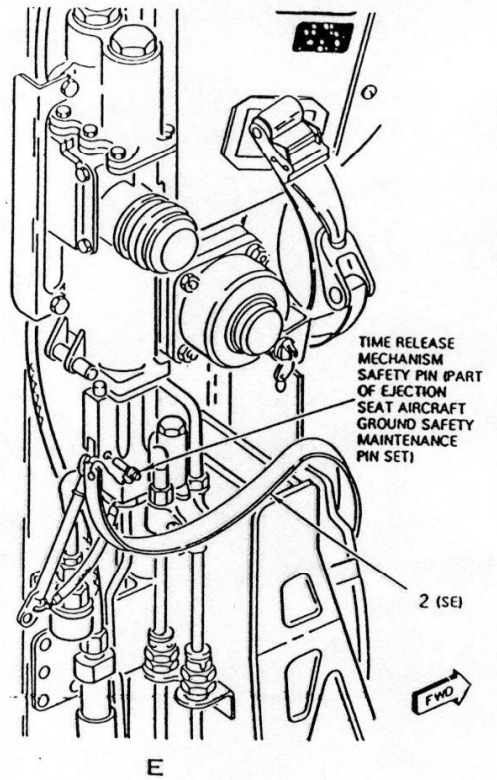
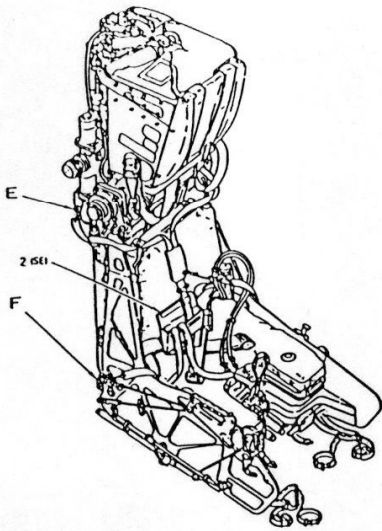


1074. LAU-116/A Guided Missile Launcher Safety Release Knob.
 The guided missile launcher safety release knob rotates the actuator mechanically to safety the launcher when hooks are closed. The launcher is safetied when safety release knob is rotated clockwise.

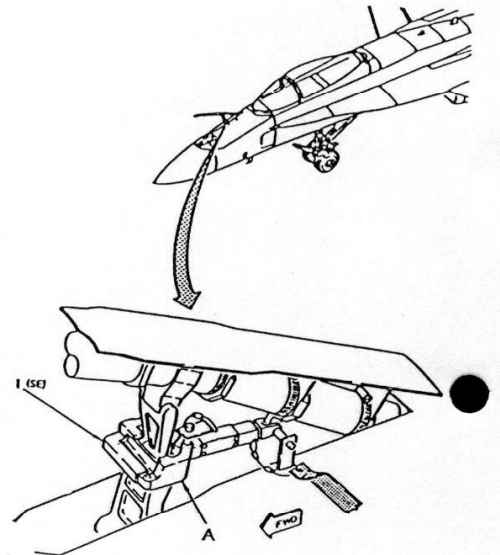
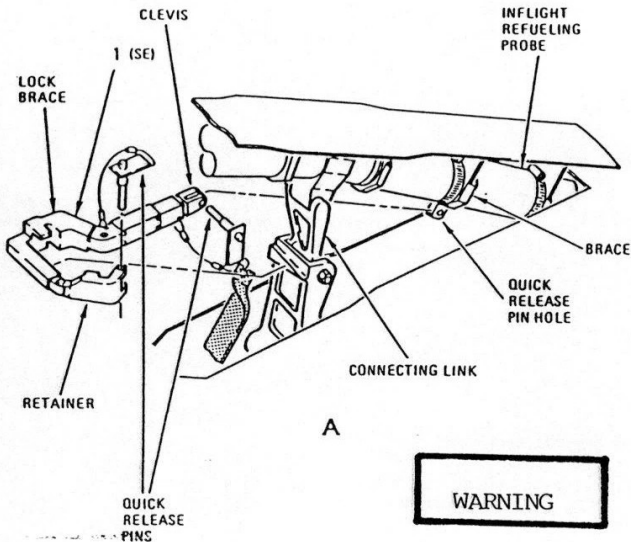
1075. Ground Safety Devices Required During Maintenance. When maintenance is to be carried out on the aircraft, certain areas require extra ground safety devices to safety the areas against personal and equipment damage.

1076. Ejection Seat Aircraft Ground Safety Maintenance Pin Set. Pin Set 2E is used to safety the ejection control handle, drogue gun, rocket motor initiator, time release mechanism and manual override initiator during maintenance on the ejection seat.



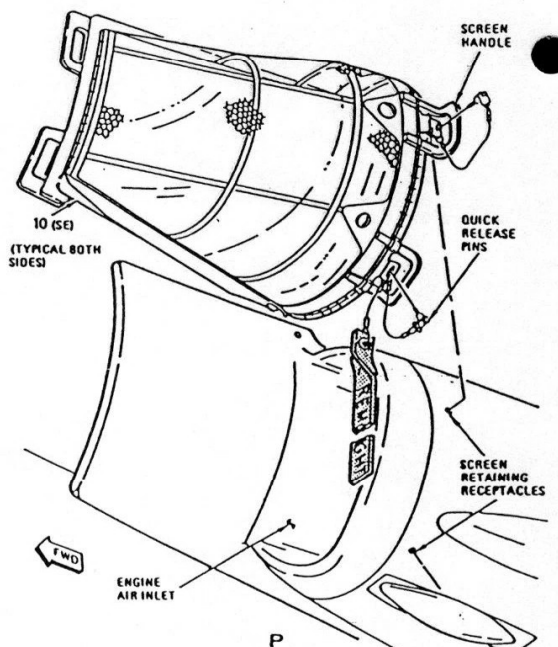


1077. Refuelling Probe Aircraft Ground Safety Lock. The lock safeties the inflight refuelling probe in the raised position during maintenance. To install the lock refer to DI(AF)AAP 7213.006-2-PCM (WP 02400).

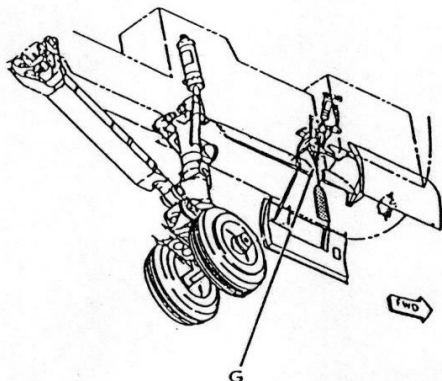


When the refuelling probe is extended the refuelling probe light will be on. To prevent damage to the refuelling probe light transformer turn the light off.

1078. Engine Inlet Aircraft Ground Servicing Screen. Two screens protect engines from physical damage during ground engine runup. To prevent interference with the screen, the laser detector-tracker-strike camera set and mounting adapter (LDT pod) must be removed prior to installation of the screen on the right side if fitted.

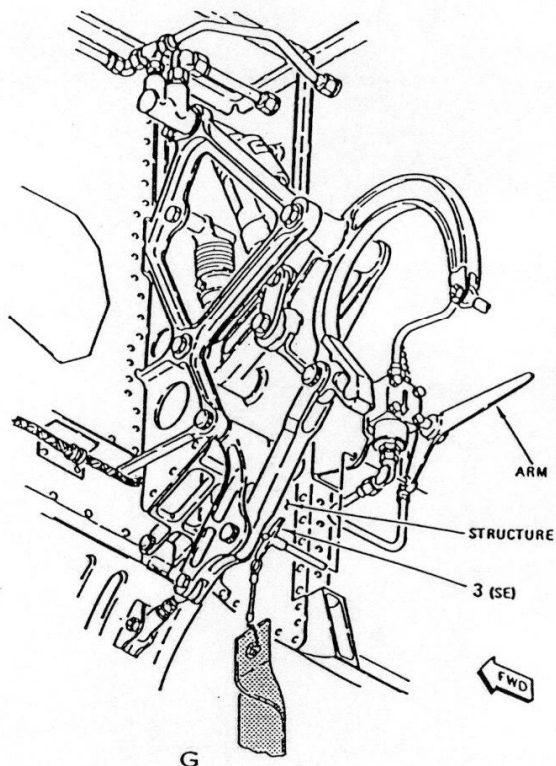


1079. Nose Landing Gear Door Aircraft Ground Safety Pin. Pin safeties NLG doors and uplock mechanism in the down position.

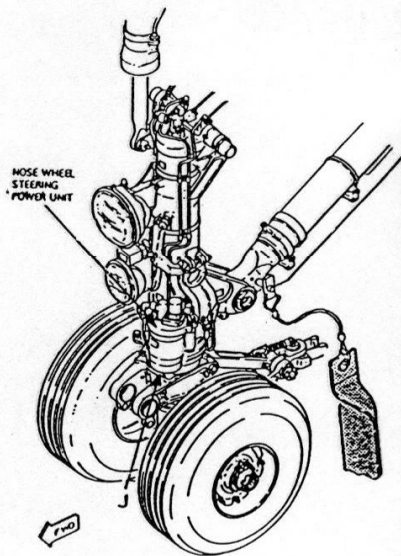
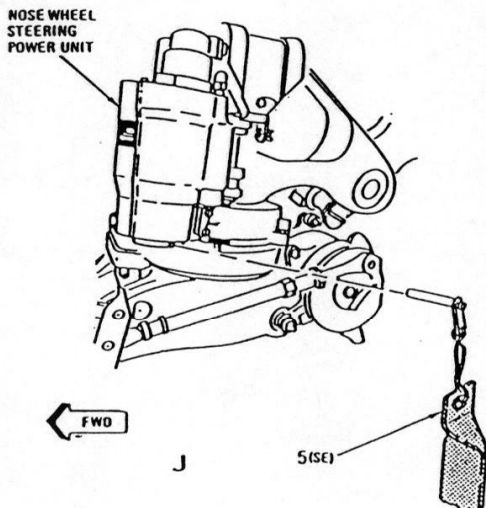


WARNING

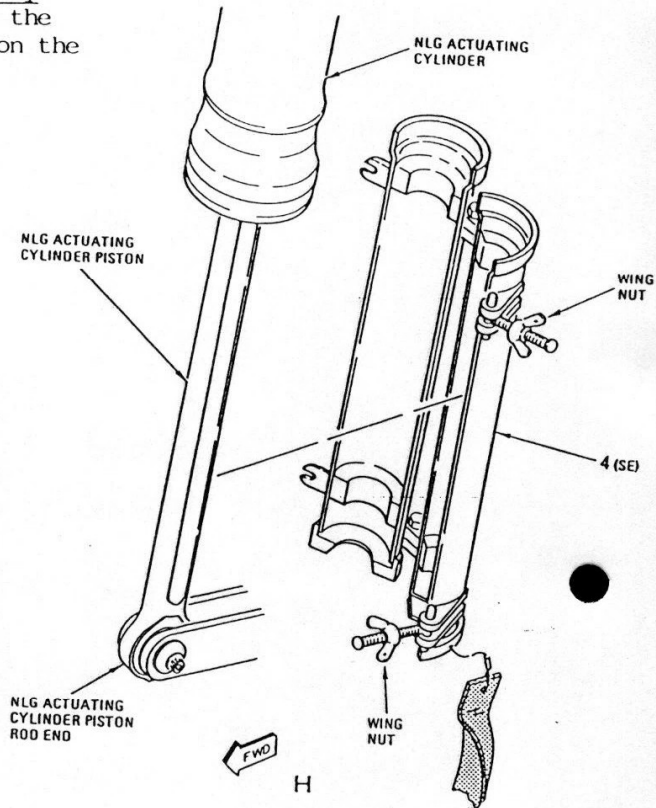
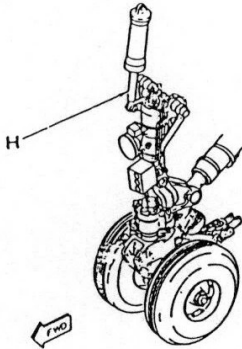
To prevent injury to personnel, the pin must not be removed while hydraulic power is applied.



1080. Nosewheel Steering Power Unit Safing. The pin when inserted into the power unit, locks the power unit preventing rotation of the nosewheel during nosewheel jacking.

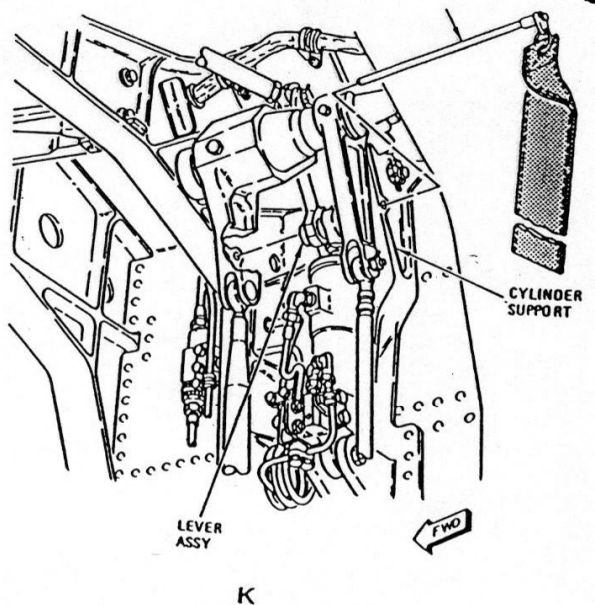
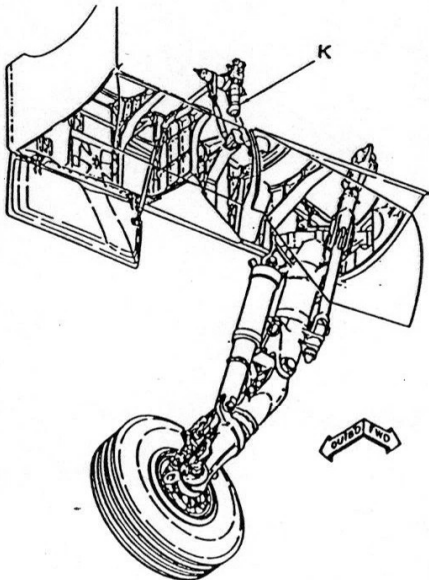


1081. Nose Landing Gear Ground Safety Lock. This lock safeties the NLG in the extended position during maintenance on the NLG or the NLG wheelwell.

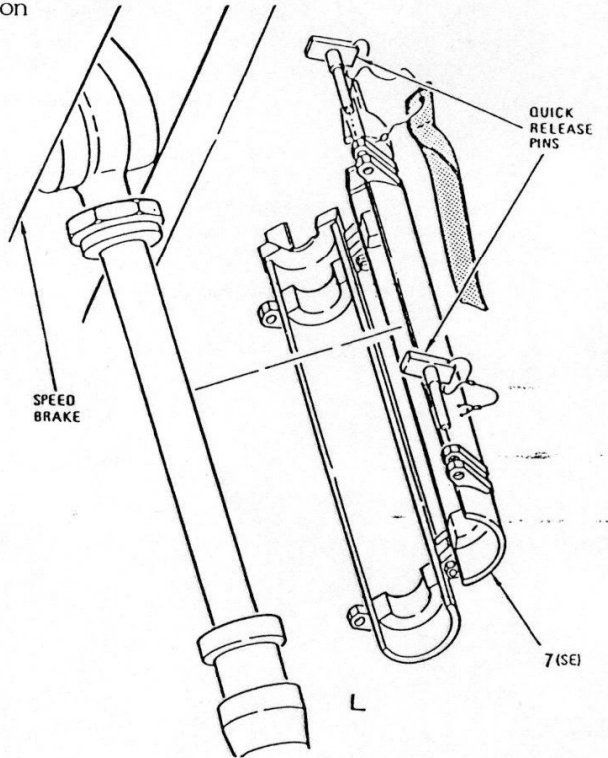
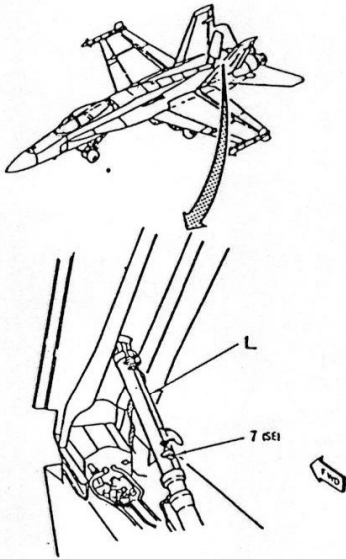


1082. DI(AF)AAP 7213.006-2-PCM-000 (WP 024 00) should be referred to when installing this lock.

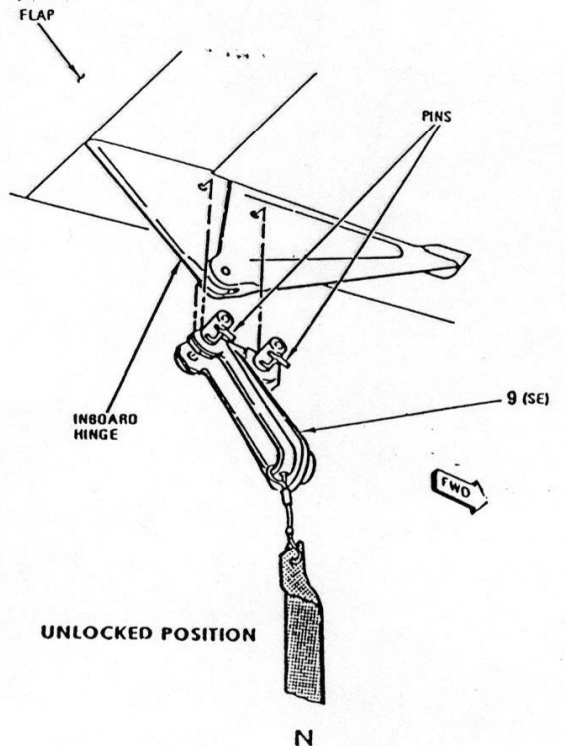
1083. Main Landing Gear Doors Aircraft Ground Safety Pin Set. The MLG door safety pin safeties the MLG doors open during maintenance in the wheelwell areas.



1084. Speedbrake Aircraft Ground Safety Lock. This safety lock is installed on the speedbrake cylinder to safety the speedbrake open during maintenance in the speedbrake well and on the speedbrake. The safety lock is installed IAW DI(AF)AAP 7213.006-2-PCM-000 (WP 024 00).



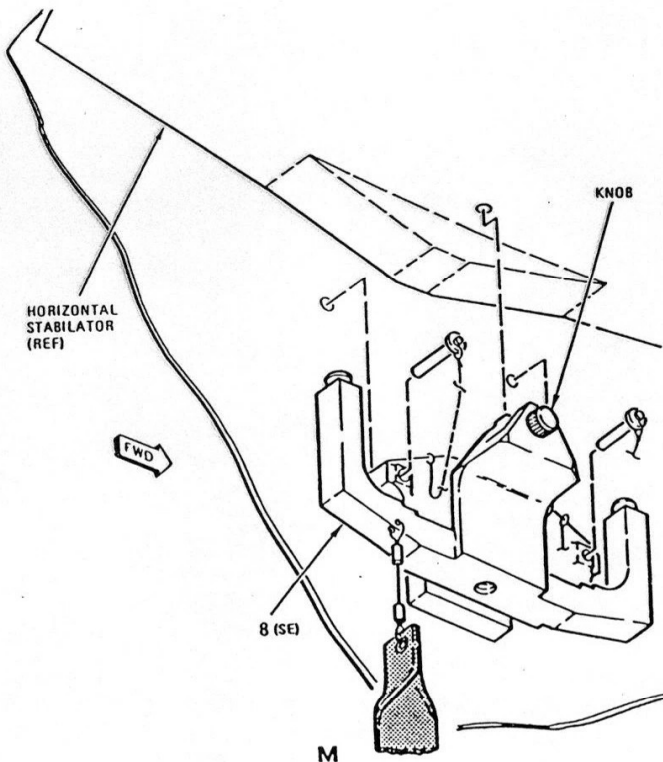
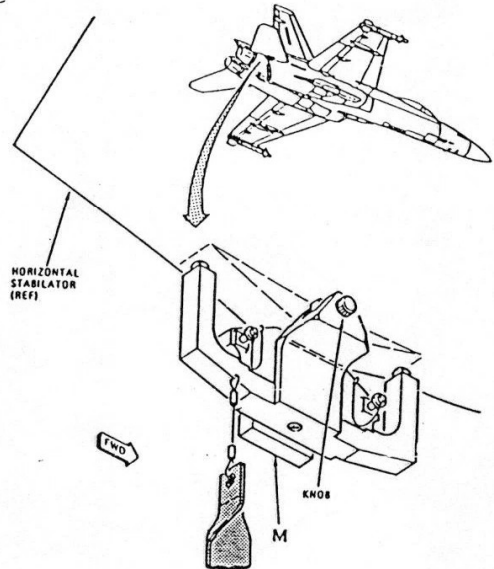
1085. Flap Control Surface Lock. The control surface lock holds the flap up in a horizontal position during engine change and other maintenance activities when personnel must stand on flap walkway.



1086. Horizontal Stabilizer Position Support.

The support holds the stabilizer in the horizontal position during engine change and other maintenance activities where personnel must stand on the stabilizer walkway.

1087. For installation of support bracket, the stabilator is positioned approximately 7.25 degrees leading edge down. Maximum weight when using the stabilator walkway is 400 pounds.



1088. Installation of Safety Devices. In all cases the DI(AF)AAP 7213.006-PCM-000 should be referred to when installing any safety devices.

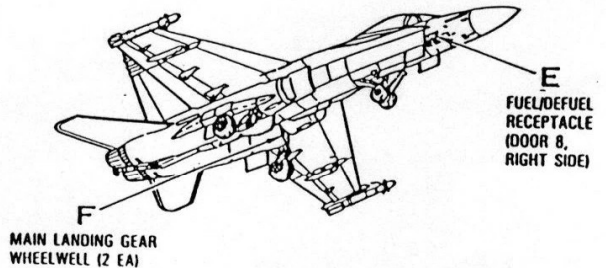
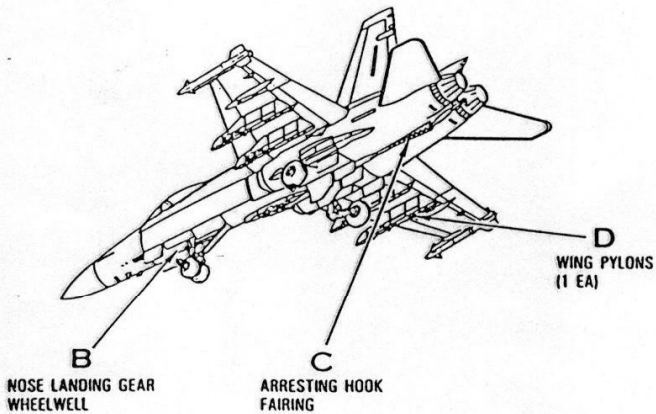
1089. Ground Protective Devices. The aircraft is fitted with many covers and blanks that constitute protective devices and the DI(AF)AAP 7213.006-PCM-000 should be referred to for their installation.

1090. Electrical (Static) Grounding.

CAUTION

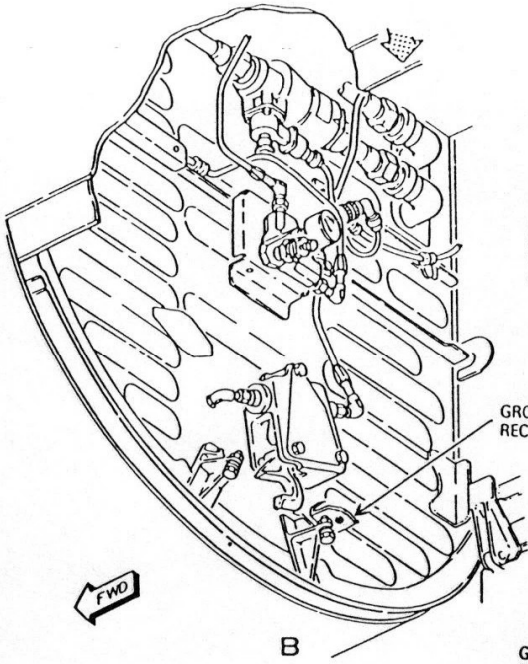
Grounding receptacles must be secure to prevent danger of electrical spark from static potential.

1091. Grounding Requirements. There are seven earthing points on the fuselage and one on the aft end of each wing pylon. Aircraft must be grounded for specific maintenance as indicated in the applicable maintenance manuals.

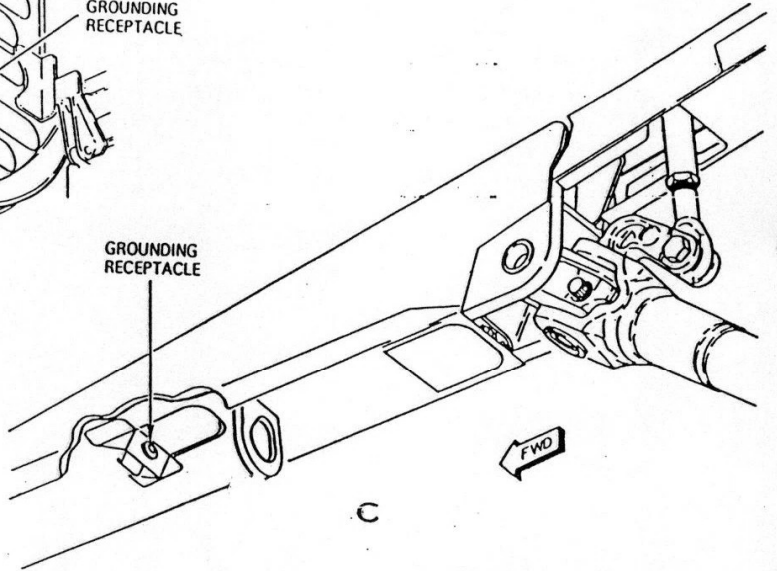


CAUTION

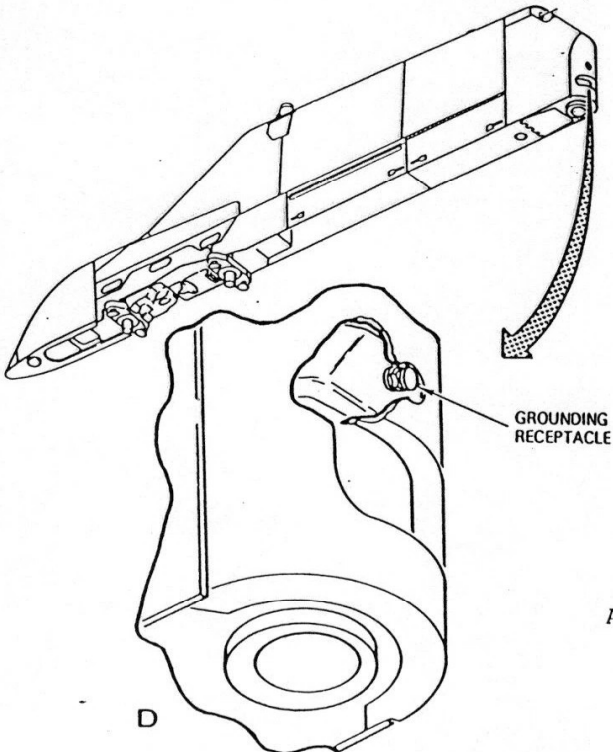
TO PREVENT DAMAGE
TO GROUND CABLE,
DO NOT USE THIS
LOCATION FOR GROUNDING
WHEN LANDING GEAR
IS CYCLED.



NLG Wheelwell

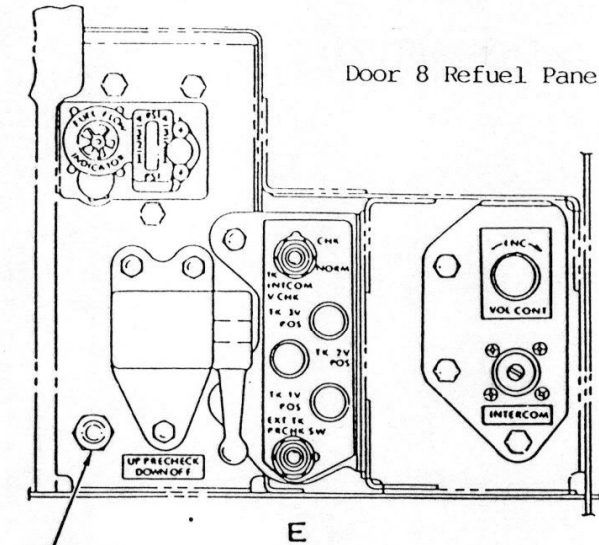


Arresting Hook Fairing



Aft section of wing pylon

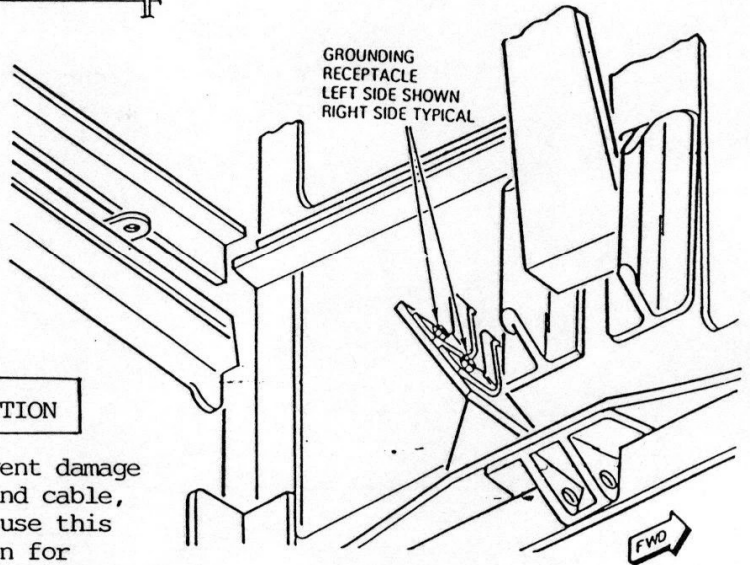
Door 8 Refuel Panel



GROUNDING RECEPTACLE

E

GROUNDING RECEPTACLE LEFT SIDE SHOWN RIGHT SIDE TYPICAL

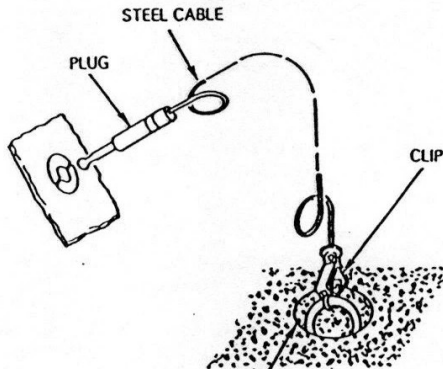


CAUTION

To prevent damage to ground cable, do not use this location for grounding when landing gear is cycled.

F

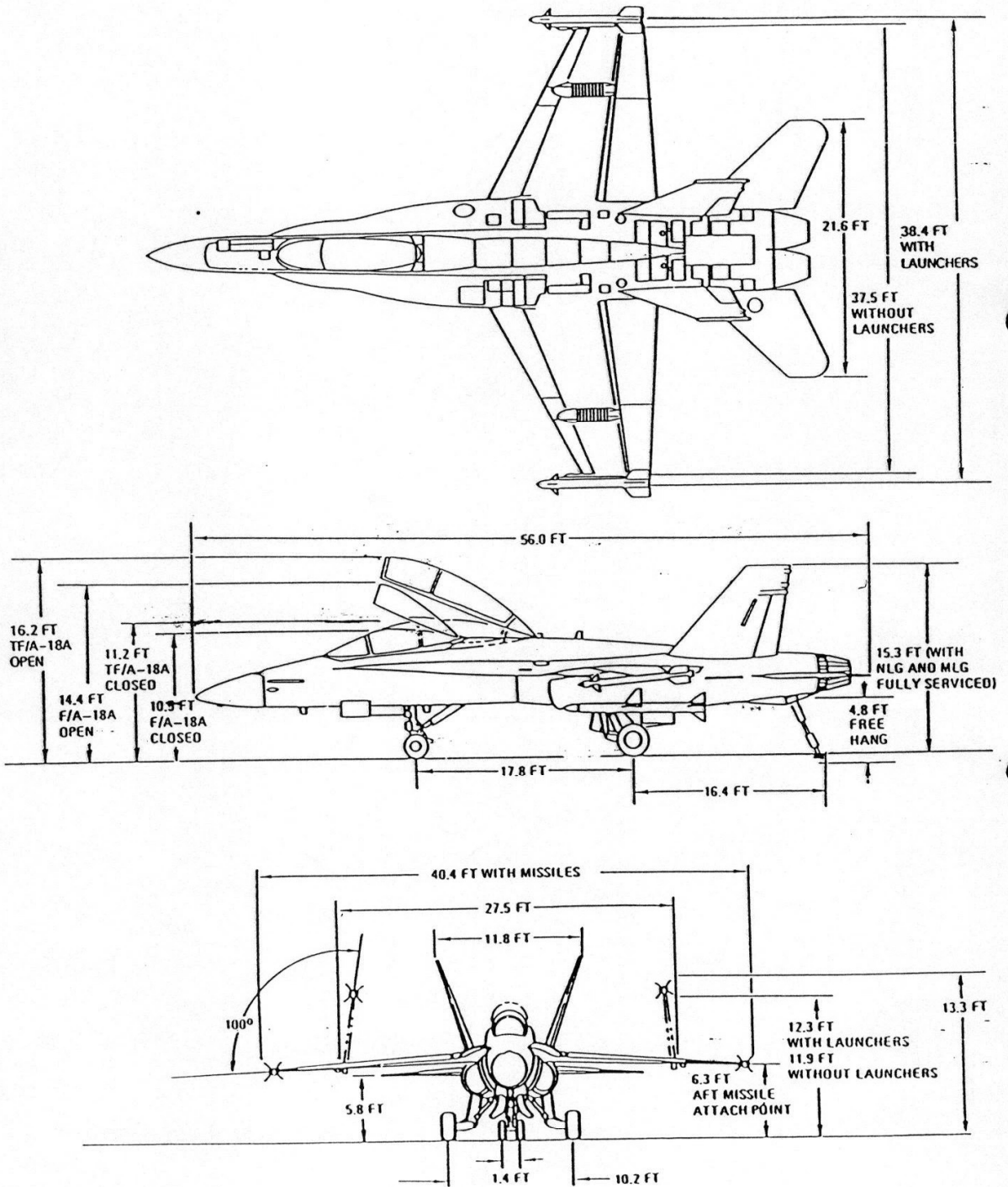
MLG Wheelwell



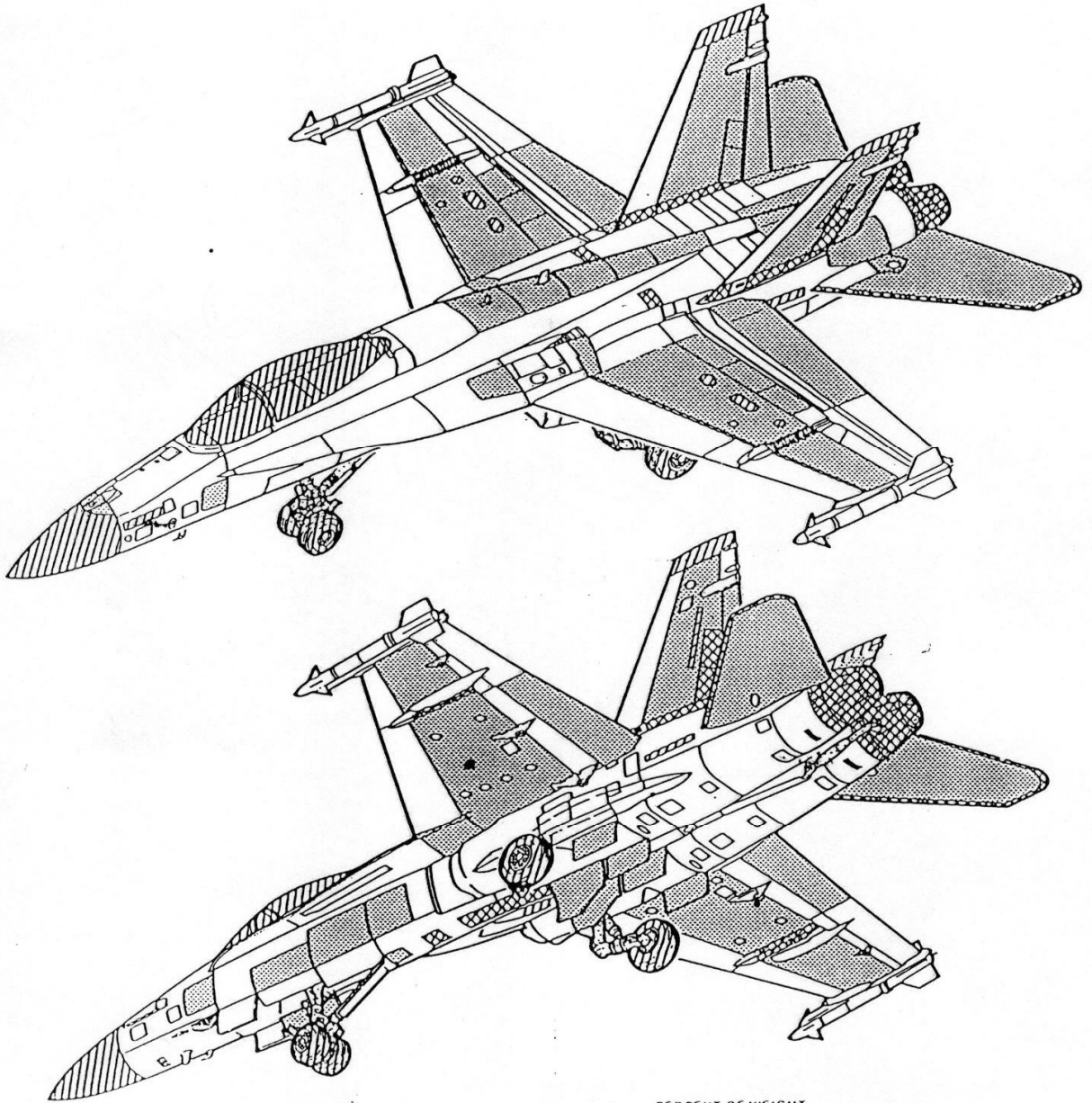
Typical Static Grounding Cable

APPROVED STATIC GROUND (TYPICAL) RESISTANCE TO GROUND 25 OHMS OR LESS






AIRCRAFT PRINCIPAL DIMENSIONS



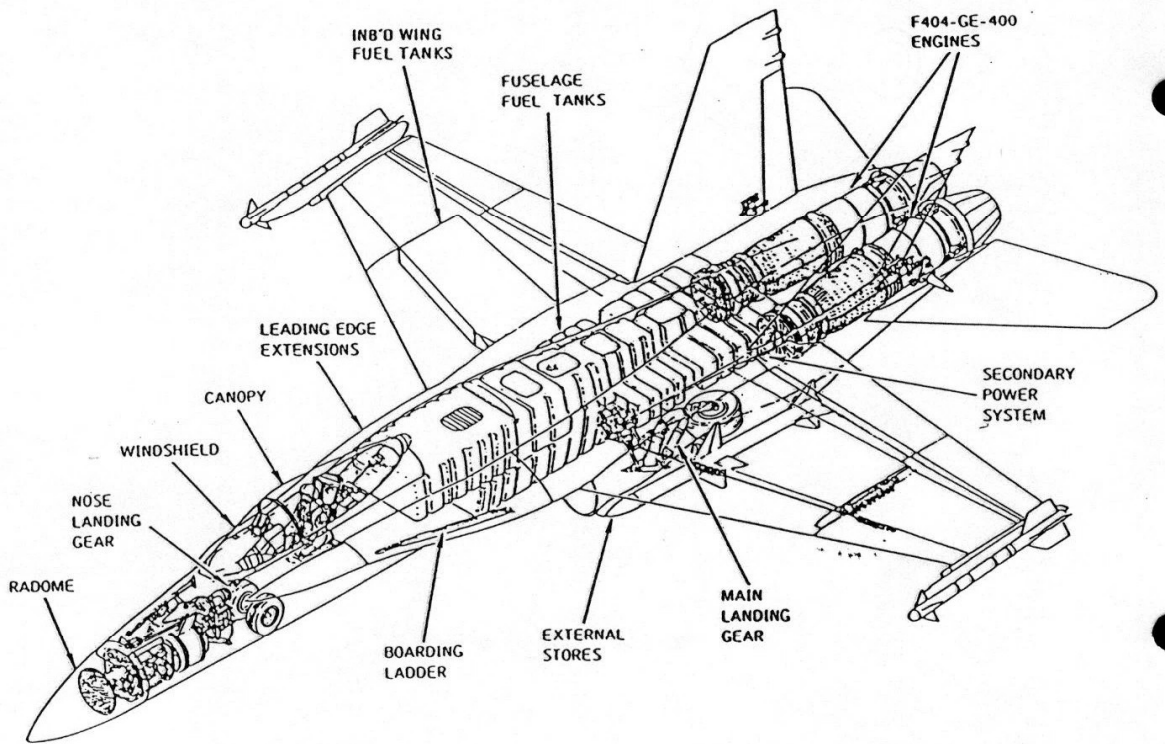
AIRCRAFT MATERIALS DISTRIBUTION



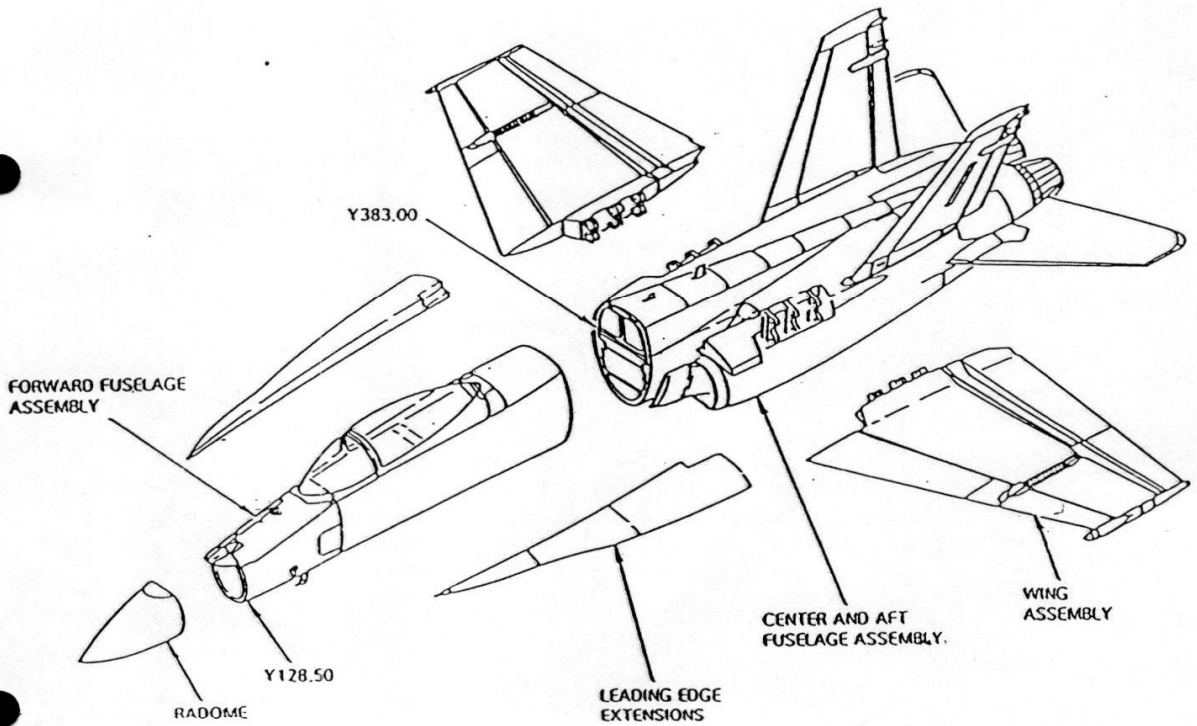
PERCENT OF WEIGHT

	ALUMINUM	50.0
	GRAPHITE/EPOXY	12.1
	TITANIUM	9.3
	STEEL	12.6
	OTHER	16.0
		<hr/> 100.0

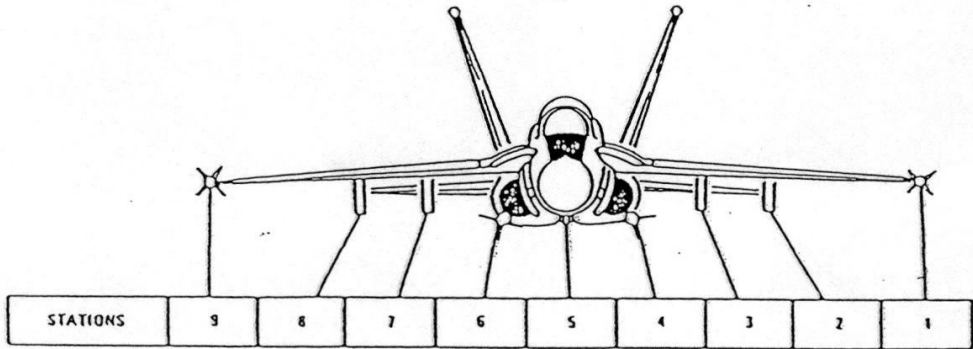
AIRCRAFT GENERAL ARRANGEMENT



AIRCRAFT GENERAL ARRANGEMENT



AIRCRAFT WEAPONS/STORES STATIONS



M61A1 AUTOMATIC GUN SYSTEMDESCRIPTION AND DATAGeneral Description

1. The M61A1 Automatic Gun System provides the pilot with the capability to fire the high performance M61A1 Automatic Gun. It is designed for installation in the nose of the RAAF Hornet Aircraft and to be loaded and unloaded using the linkless Ammunition Loading System (ALS).

2. The gun system is a palletized design consisting of:

- a. an M61A1 gun,
- b. a feed unit,
- c. an unload unit,
- d. a transfer unit,
- e. a conveyor assembly, and
- f. an ammunition storage drum.

No mechanical adjustment is required once the gun system is fitted to the aircraft.

3. A Blast Diffuser assembly supports the rotating barrels as well as providing:

- a. an exit path for the fired rounds, and
- b. deflection of the gun gases away from the windshield.

Functional Description

4. The gun system is a double-ended, single conveyor loop system incorporating controlled conveyor elements.

5. Electrical power required for the operation of the gun system is supplied by the aircraft. The trigger switch supplies 28 Vdc power to the hydraulic drive control valve solenoid to activate the drive motor and also applies approximately 330 Vdc firing voltage to P5 of the interface cable assembly.

6. When the trigger is released, 28 Vdc is applied to the clearing solenoid on the gun and the M61A1 gun automatically clears. Firing voltage to the gun is then removed after a short time delay to assure that all rounds chambered in the gun are fired. During the clearing cycle, the breech bolts and rounds rotate about the clearing cam path in the rear of the gun housing. When the ammunition supply is depleted, two last round switch sensors located within the exit unit assembly, cause the system to clear and shutdown after a short time delay to assure usage of ammunition left in the conveyor system.

7. The gun system is capable of firing a burst of any desired duration up to the capacity of the system. Following release of the trigger, the gun automatically goes into the clearing mode. During this sequence, unfired rounds are cycled through the clearing path at the aft end of the gun. Therefore, the actual number of rounds fired from a full ammunition complement will depend on the number of bursts as well as the number of rounds remaining in the conveyor assembly after last-round system shutdown. A braking function within the hydraulic drive provides the capability to stop the gun system within 0.5 seconds and therefore tends to limit the number of unfired rounds cycled after trigger release to 6-8 rounds.

PHYSICAL CHARACTERISTICS

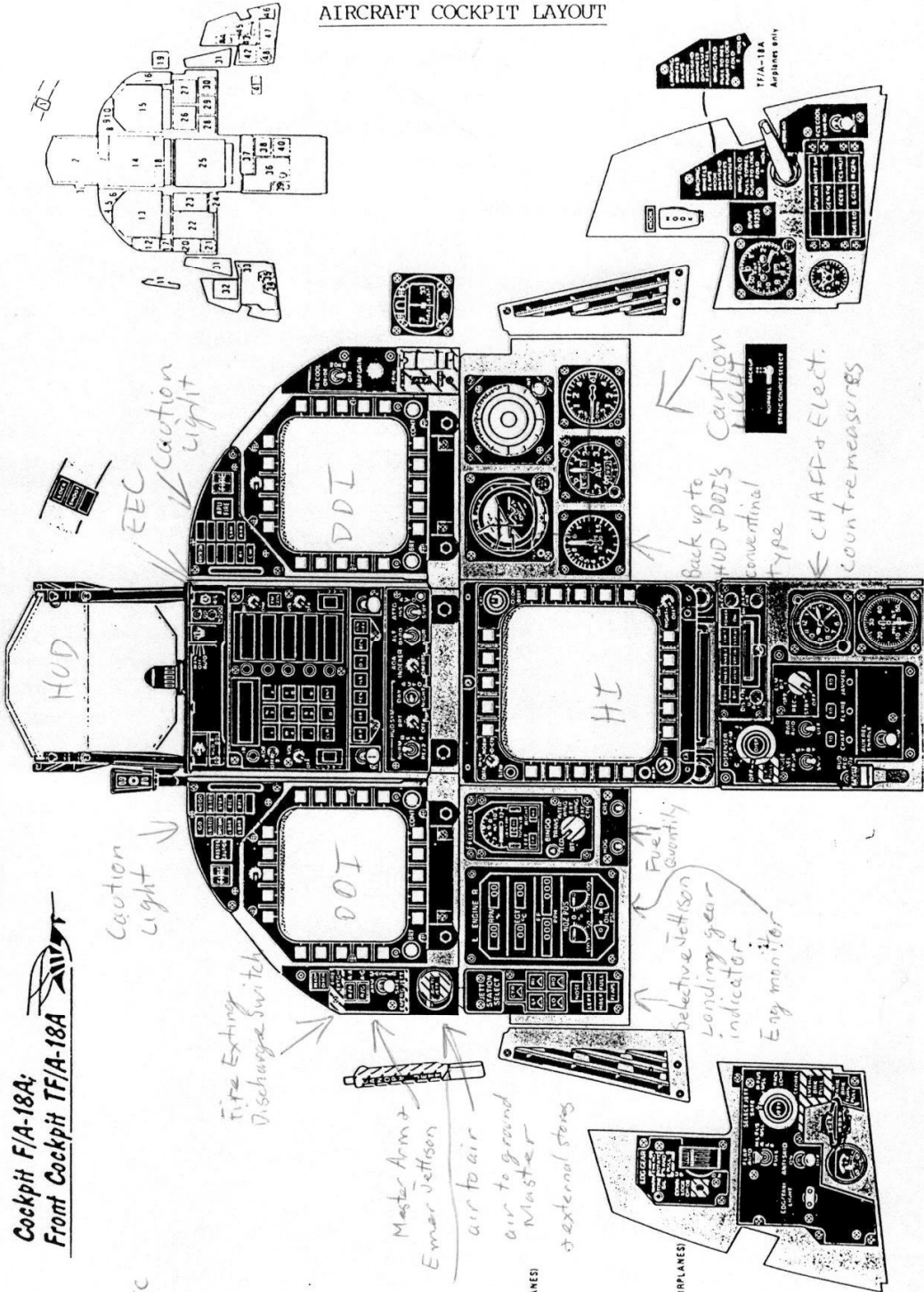
Calibre	20mm
System Weight	303 pounds (max) (without gun and ammunition)
Ammunition Capacity	578 rounds
Gun	M61A1 Automatic 20mm
Ammunition	M50 series
Firing Rate	6,000 (high rate) +500 spm -300
	4,000 (low rate) +500 spm -300 spm
Loading Rate	400 spm (max)
Feed System	Double ended, single conveyor, controlled element feeding system.
Firing Position	12 o'clock position (looking forward)
Acceleration Time	Less than 0.5 seconds
Deceleration Time	Less than 0.5 seconds
Recoil Force	Between 3,000 and 5,000 lbs
Gun Drive	Hydraulic
Operational Service Life	250,000 rounds
Reload Time (2 men)	6 minutes

ELECTRICAL CHARACTERISTICS

Hydraulic Drive Control Valve Solenoid	+28 Vdc to activate drive
Magnetic Pickup (speed sensor)	Provides electrical impulse signals or rate determined by cycling speed.
Rounds Limiter	When activated, provides a closed circuit indication to the aircraft gun system decoder after a pre-determined number of rounds have been cycled or fired for rounds fired limitation.
Last Round	Provides a closed circuit indication to the aircraft gun system decoder only when a spent case passes through the exit unit assembly.
Firing Voltage	330 Vdc from aircraft gun system decoder through interface cable assembly. This voltage is interrupted and a ground substituted in its place when the firing circuit safety switch is extended.

AIRCRAFT COCKPIT LAYOUT

Cockpit F/A-18A:
Front Cockpit TF/A-18A



1. LOCK SHOOT LIGHTS
2. HUD OFF (DDI/DSI)
3. ANGLE OF ATTACK (ANGLE) LIGHTS
4. LEFT ENGINE FIRE WARNING/EXTINGUISHER LIGHT
5. MASTER CAUTION LIGHT (VFC or EEC)
6. LEFT WARNING/CAUTION/ADVISORY LIGHTS
7. HUD VIDEO CAMERA CONTROL
8. RIGHT WARNING/CAUTION/ADVISORY LIGHTS
9. AUXILIARY POWER UNIT FIRE WARNING/EXTINGUISHER LIGHT
10. RIGHT ENGINE FIRE WARNING/EXTINGUISHER LIGHT
11. CANOPY INTERNAL JETTISON HANDLE
12. MASTER ARM PANEL
13. LEFT DIGITAL DISPLAY INDICATOR (DDI)
14. HUD CONTROL PANEL
15. RIGHT DIGITAL DISPLAY INDICATOR (DDI)
16. MAP/GAUGES/IN RECOVERY PANEL
17. EMERGENCY JETTISON BUTTON
18. HUD CONTROL
19. STANDBY MAGNETIC COMPASS
20. STATION JETTISON SELECT
21. LANDING GEAR AND FLAP POSITION LIGHTS
22. ENGINE MONITOR INDICATOR (EMI)
 - L & R RPM
 - L & R FUEL FLOW
 - L & R NOZZLE POSITION
 - L & R OIL PRESSURE
23. FUEL QUANTITY INDICATOR
24. HEADING AND COURSE SET SWITCHES
25. HORIZONTAL SCALES REFERENCE INDICATOR
26. STIMULY ATTITUDE REFERENCE INDICATOR
27. AZIMUTH INDICATOR/BLANK PANEL (SOME AIRPLANES)
28. STANDBY AIRSPEED INDICATOR
29. STANDBY ALTITUDE
30. STANDBY RATE OF CLIMB INDICATOR
31. ENVIRONMENT CONTROL LOUVERS
32. LANDING GEAR HANDLE AND WARNING TONE SILENCE BUTTON
33. SELECT JETTISON BUTTON
34. BRAKE ACCUMULATOR PRESSURE GAGE
35. EMERGENCY AND PARKING BRAKE HANDLE
36. DISPENSER/ECM PANEL
37. AWR CONTROL INDICATOR/BLANK PANEL (SOME AIRPLANES)
38. CLOCK
39. RUDDER PEDAL ADJUST LEVER
40. COCKPIT ALTITUDE
41. STING SOURCE SELECT
42. AIRCRAFT BUREAU NUMBER
43. ARRESTING HOOK HANDLE AND LIGHT
44. LANDING CHECKLIST AND WING FOLD SWITCH
45. FLIGHT COMPUTER COOL SWITCH
46. CAUTION LIGHTS PANEL (GEN TIE ON #2 PWR 162394 and up)
47. HYD 1 AND HYD 2 PRESSURE INDICATOR

EEC
Caution light

Caution light

Type Exting
Discharge Switch

Master Arm
Emer Jettison
air to air
air to ground
Master
external stors

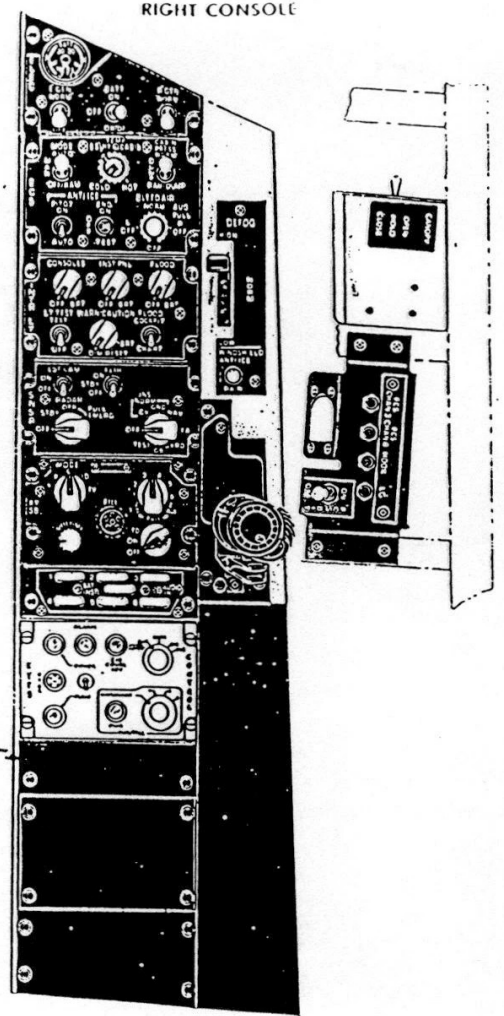
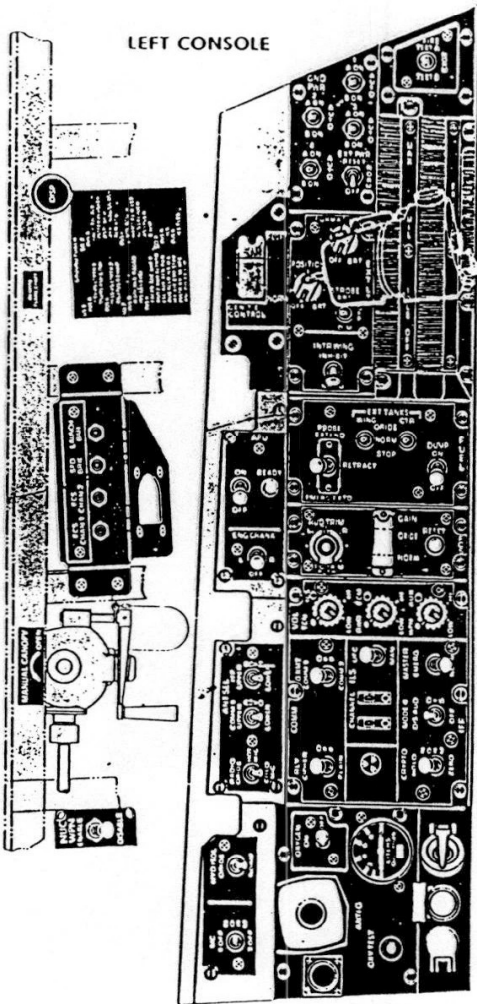
Back up to HUD + DDI's conventional type
Caution light
CHAFF + Elect. countermeasures

Fuel quantity
selective Jettison
Landing gear indicator
Eng monitor

TF/A-18A
Air Brake Only

AIRCRAFT COCKPIT LAYOUT

Cockpit F/A-18A
Front Cockpit TF/A-18A



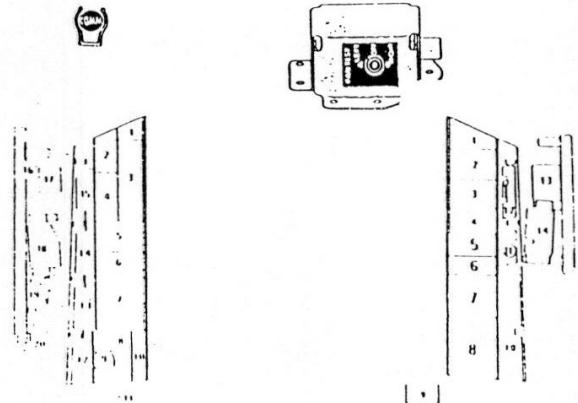
1. FIRE TEST PANEL
2. GROUND POWER PANEL
3. THROTTLE QUADRANT
4. EXTERIOR LIGHTS PANEL
5. FUEL PANEL
6. FLIGHT CONTROLS SYSTEM PANEL
7. COMMUNICATION PANEL
8. LIQUID OXYGEN QUANTITY INDICATOR
9. ANTI-C VALVE
10. PILOT SERVICES PANEL
 - ANTI-G
 - SIDE VIEW
 - OXYGEN
11. COMMUNICATION CONNECTION
12. MILITARY COMPUTER AND HYDRAULIC FUEL PANEL
13. ANTENNA SELECT PANEL

NOTE

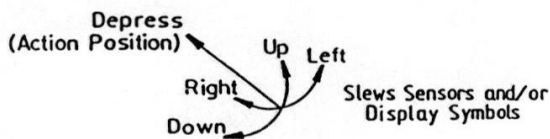
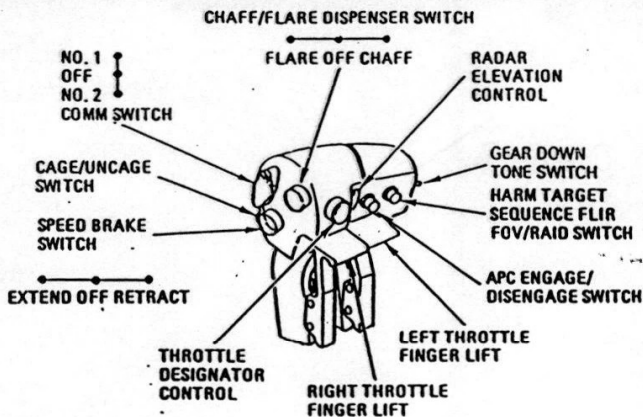
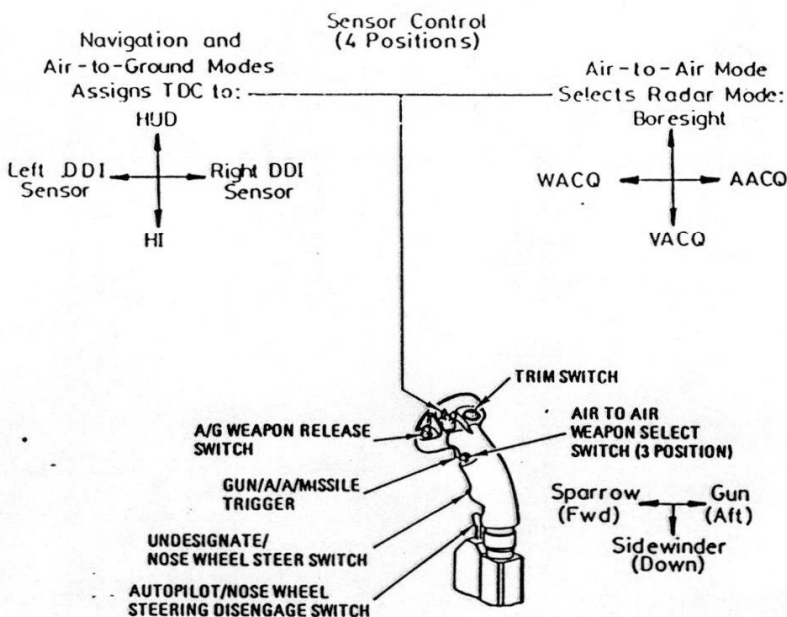
1. Radio microphone connection
2. ICAO 1820 microphone only

13. AIRCRAFT POSITION UNIT PANEL
14. GENERATOR TO CONTROL SWITCH (CAME AUTO PANEL)
15. FUEL DISCONNECT SWITCH
16. GROUND POWER DISCONNECT
17. FUEL ESSENTIAL CIRCUIT BREAKERS
18. LANDING GEAR HANDLE AND DRIVE
19. NUCLEAR WEAPONS SWITCH

1. ELECTRICAL POWER PANEL
2. ENVIRONMENT CONTROL SYSTEM PANEL
3. INTERIOR LIGHTS PANEL
4. SENSOR PANEL
5. KY58 CONTROL
6. KY75 CONTROL
7. BLANK PANEL
8. BLANK PANEL
9. FAN TEST SWITCH
10. MAP AND DATA CASE
11. UTILITY LIGHT
12. DEFENSE PANEL
13. HELICOPTER CANOPY SWITCH
14. RIGHT ESSENTIAL CIRCUIT BREAKERS

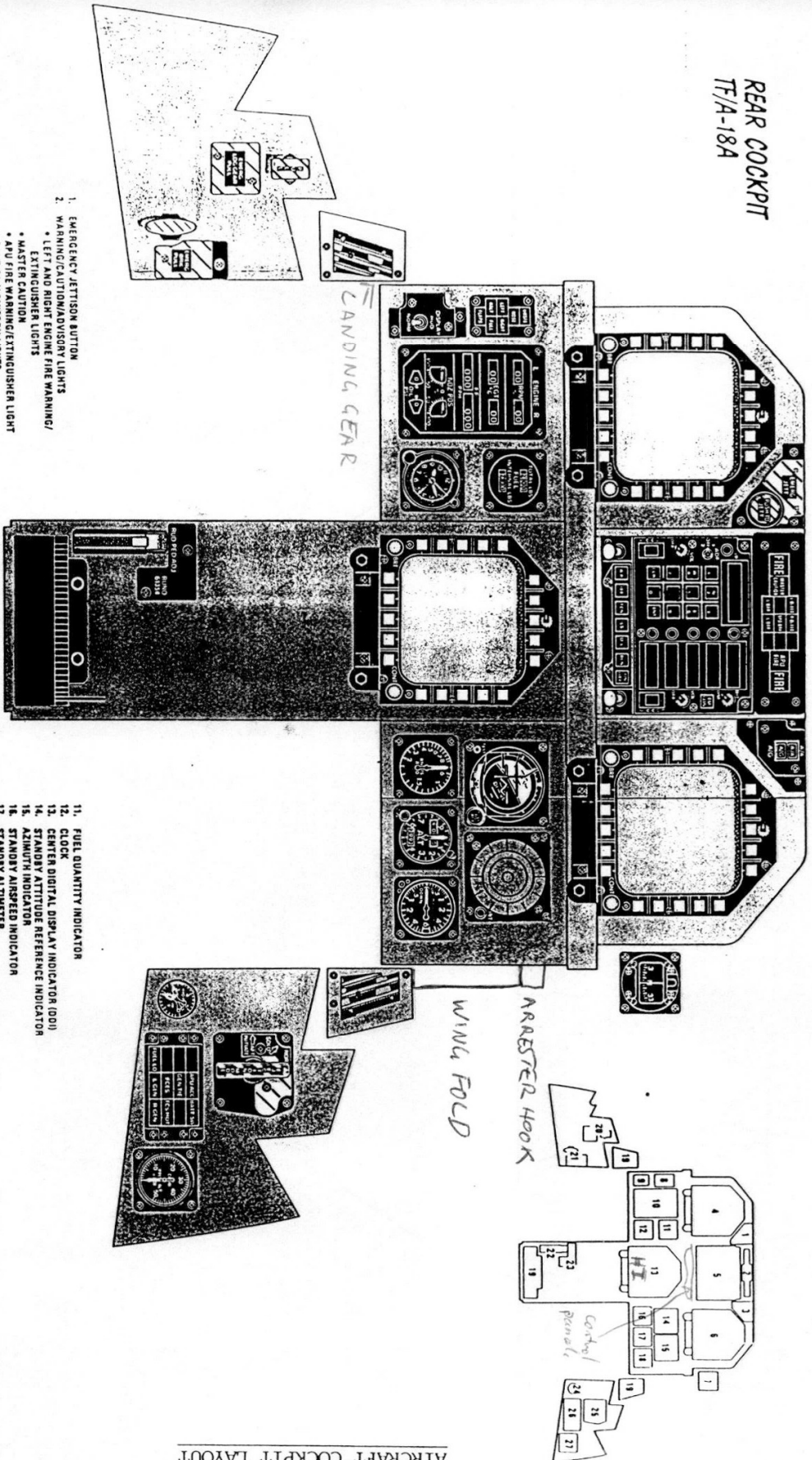


AIRCRAFT COCKPIT LAYOUT



FLIGHT CONTROL STICK AND THROTTLE SWITCHES

REAR COCKPIT
TF/A-18A



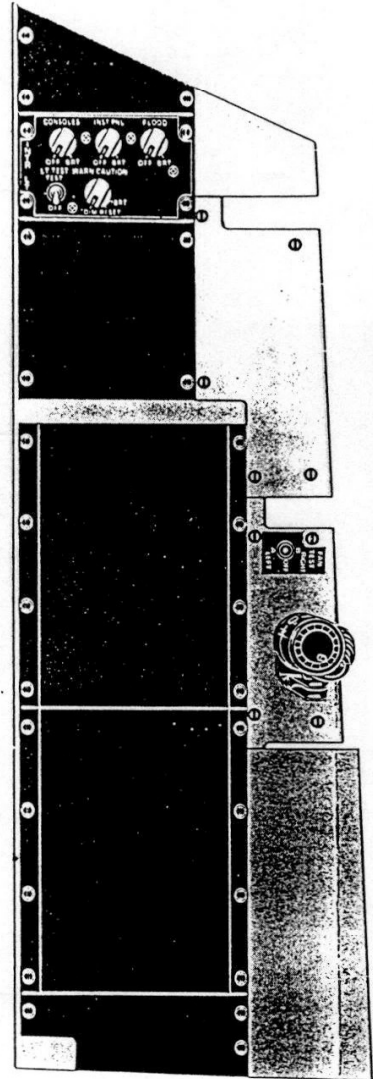
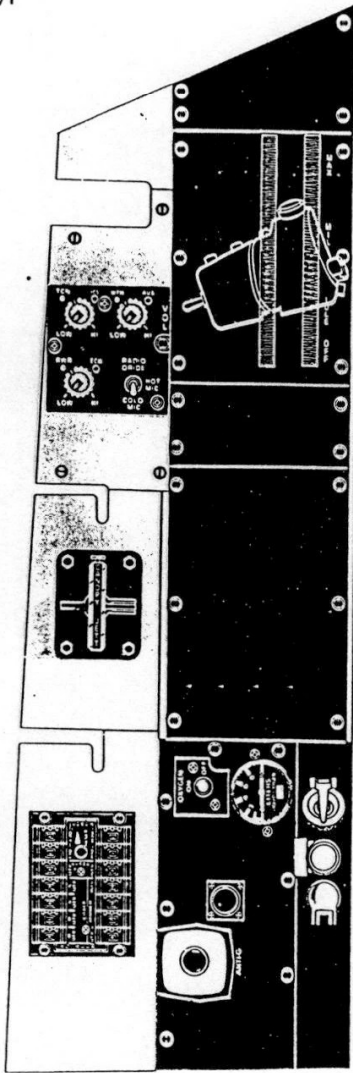
1. EMERGENCY JETTISON BUTTON
2. WARNING/CAUTION/ADVISORY LIGHTS
 - LEFT AND RIGHT ENGINE FIRE WARNING/EXTINGUISHER LIGHTS
 - MASTER CAUTION
 - APU FIRE WARNING/EXTINGUISHER LIGHT
 - CAUTION/ADVISORY LIGHTS
3. MASTER MODE PANEL
4. LEFT DIGITAL DISPLAY INDICATOR (DDI)
5. UPFRONT CONTROL PANEL
6. RIGHT DIGITAL DISPLAY INDICATOR (DDI)
7. STANDBY MAGNETIC COMPASS
8. LANDING GEAR/FLAPS POSITION INDICATORS
9. DISPLAY SELECT CONTROL
10. ENGINE MONITOR INDICATOR
 - L & R RPM
 - L & R FLOW
 - L & R NOZZLE POSITION
 - L & R OIL PRESSURE

11. FUEL QUANTITY INDICATOR
12. CLOCK
13. CENTER DIGITAL DISPLAY INDICATOR (DDI)
14. STANDBY ATTITUDE REFERENCE INDICATOR
15. AZIMUTH INDICATOR
16. STANDBY AIRSPEED INDICATOR
17. STANDBY ALTITUDE
18. STANDBY RATE OF CLIMB INDICATOR
19. ENVIRONMENT CONTROL LOUVERS
20. EMERGENCY LANDING GEAR HANDLE
21. EMERGENCY BRAKE HANDLE
22. RUDDER PEDAL ADJUST LEVER
23. AIRCRAFT BUREAU NUMBER
24. HYD 1 AND HYD 2 PRESSURE INDICATOR
25. COMMAND SELECTOR VALVE
26. CAUTION LIGHTS PANEL
27. COCKPIT ALTIMETER

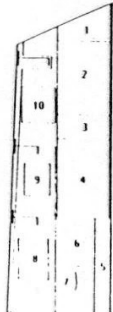
AIRCRAFT COCKPIT LAYOUT

AIRCRAFT COCKPIT LAYOUT

REAR COCKPIT
TF/A-18A

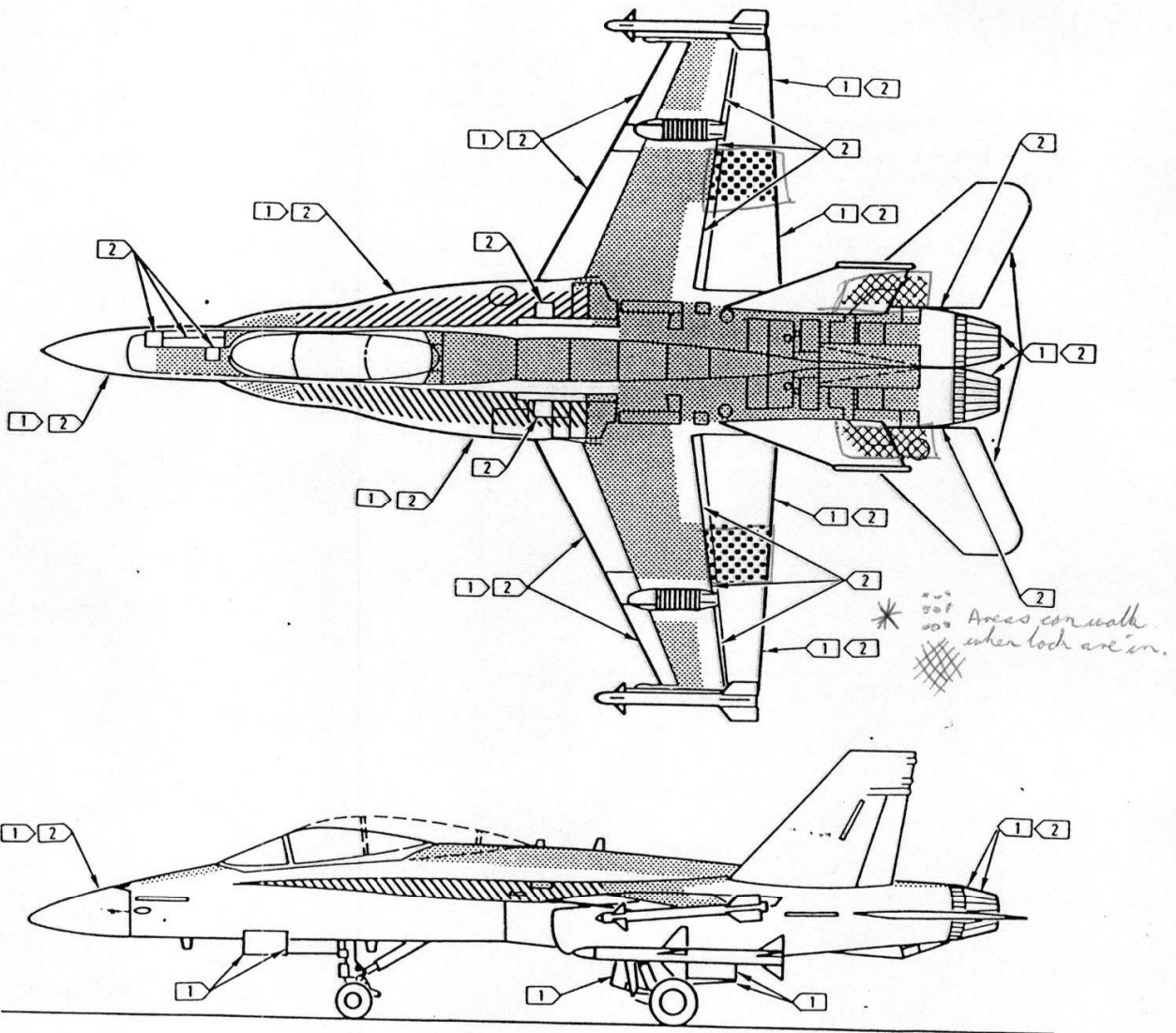


- 1 BLANK PANEL
- 2 THROTTLE QUADRANT
- 3 BLANK PANEL
- 4 BLANK PANEL
- 5 PILOT SERVICE PANEL
 - ANTI G
 - SUIT VENT
 - OXYGEN
- 6 LIQUID OXYGEN QUANTITY
- 7 ANTI G VALVE
- 8 AN/ALQ-39 PROGRAMMER
- 9 CANOPY INTERNAL JETTISON HANDLE
- 10 VOLUME CONTROL









1. BLANK PANEL
2. INTERIOR LIGHTS PANEL
3. BLANK PANEL
4. BLANK PANEL
5. BLANK PANEL
6. BLANK PANEL
7. MAP AND DATA CASE
8. UTILITY LIGHT
9. FAN TEST SWITCH
10. BLANK PANEL

AIRCRAFT WALK AREAS, STEPS AND HAND GRIPS



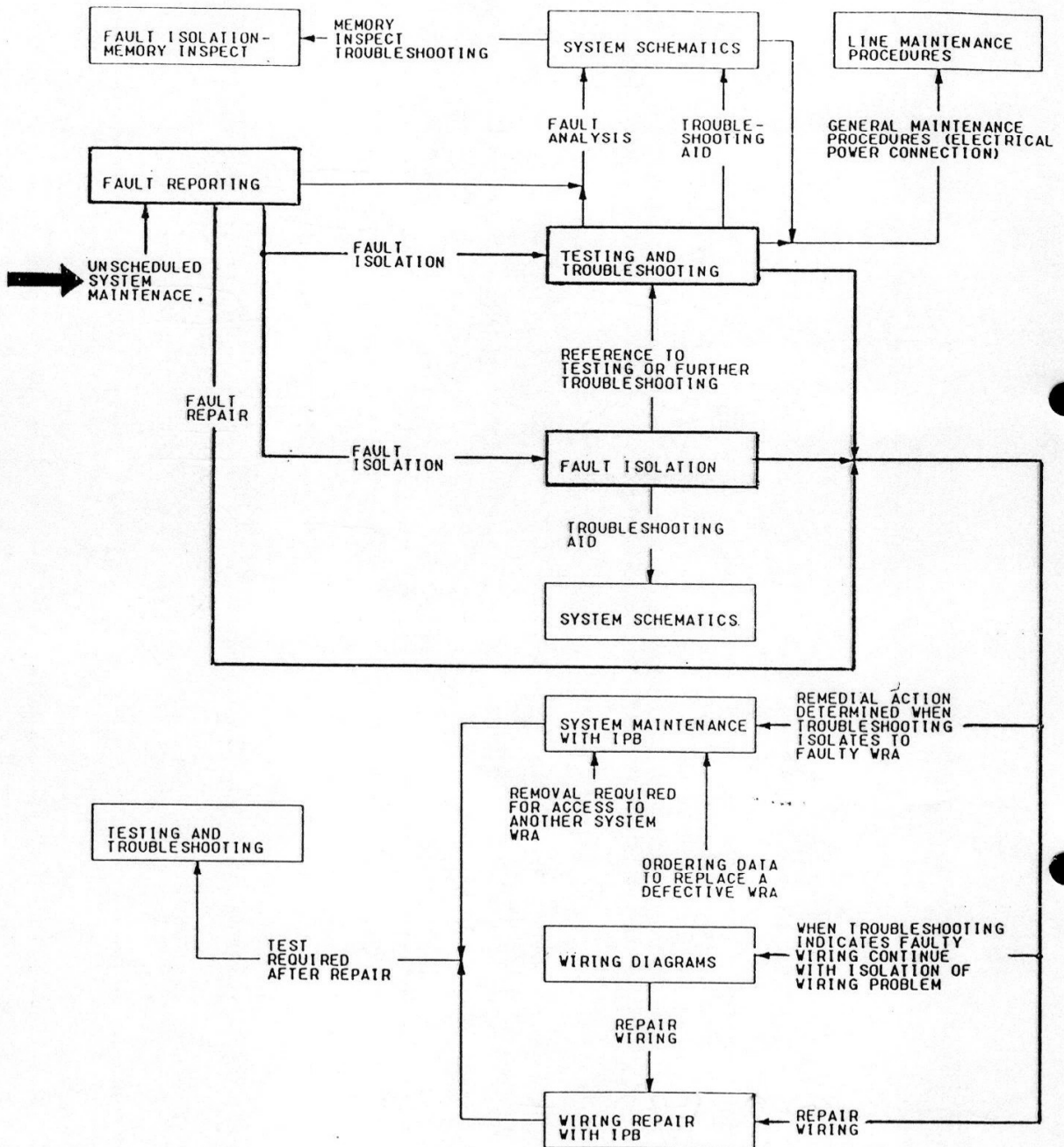
LEGEND

-  WALKWAY
-  WALKWAY WITH ANTI SKID COATING
-  WALKWAY ONLY WITH FLAP CONTROL SURFACE LOCK INSTALLED
-  WALKWAY ONLY WITH HORIZONTAL STABILIZER POSITION SUPPORT INSTALLED

-  NO PUSH AREA
-  NO STEP AREA

3 PROTECTIVE COVERS SHOULD BE USED ON WALK AREAS DURING PERIODS OF HIGH VOLUME TRAFFIC. PROTECTIVE SHOE COVERING SHOULD BE USED AT ALL OTHER TIMES.

ORGANISATIONAL MAINTENANCE MANUAL RELATIONSHIP



CRYOGENIC NITROGEN - ASSOCIATED HEALTH CONDITIONS
AND PROTECTIVE CLOTHING

Reference: A. DI(AF)AAP 6700.001 Section 3

INTRODUCTION

1. The safe handling of cryogenic nitrogen is largely a matter of knowing its properties and using common sense procedures based on that knowledge. Nitrogen vaporises or boils at -196°C and, in doing so, expands to 682 times its liquid volume. It is this extremely low temperature and rapid expansion which can cause health conditions resulting in injury or death of personnel.

2. The condition which may afflict personnel due to their close proximity to cryogenic nitrogen include:

- a. asphyxia,
- b. cold burns,
- c. frostbite,
- d. lung damage, and
- e. hypothermia.

ASPHYXIA

Symptoms

3. The first symptoms of a slight reduction of oxygen are an increase in breathing and pulse rate with impaired judgement and disturbed muscular co-ordination. With further oxygen reduction this is followed by rapid fatigue, easily aroused emotions and possibly nausea and vomiting. A more severe reduction results in the inability to move, unconsciousness and eventual death. Inhalation of pure nitrogen gas results in immediate unconsciousness.

4. It should be emphasised however, that the very first symptom of asphyxiation from nitrogen inhalation could be the inability to stand or even to crawl. This is often too late. A victim may realise he is dying but be apathetic and not care.

COLD BURNSSymptoms

5. Although discomfort may normally occur, there is sometimes no immediate pain associated with severe cold burns to the skin. Cold burns do however, cause great pain and swelling when the immediate area has thawed. Contact with frozen equipment will generally cause the exposed skin to stick fast, alerting the victim to his plight. Burns to the eyes will be made immediately obvious by the associated pain and acutely blurred vision.

FROSTBITESymptoms

6. There is usually sufficient warning by local pain whilst the freezing action is taking place, although, where freezing is more rapid, less pain may be felt in the initial stages.

7. Destruction of tissue is made less obvious by the absence of pain when the frozen stage is reached, and the tissue, although rigid, waxy and slightly yellowish, keeps its normal shape. Pain and destruction become more apparent as thawing occurs and the blood again flows freely to the effected area.

LUNG DAMAGESymptoms

8. Short exposures to the cold vapours associated with cryogenic environments will produce a similar, though more intense feeling in the chest to deep breathing on an extremely cold day. Damage to the lungs may occur if this warning is not heeded and the victim remains in the unfavourable environment.

9. Lung damage will occur most quickly where extremely low temperatures are encountered, and breathing may become painful, or may remain uncomfortable long after moving out of the cold environment.

HYPOTHERMIASymptoms

10. Hypothermia is accompanied by:
- a. a slowing of the mental and physical responses,
 - b. speech and vision difficulty,
 - c. stumbling and a general lack of balance,
 - d. irritability and unreasonable behaviour, and
 - e. varying degrees of cramp and shivering.

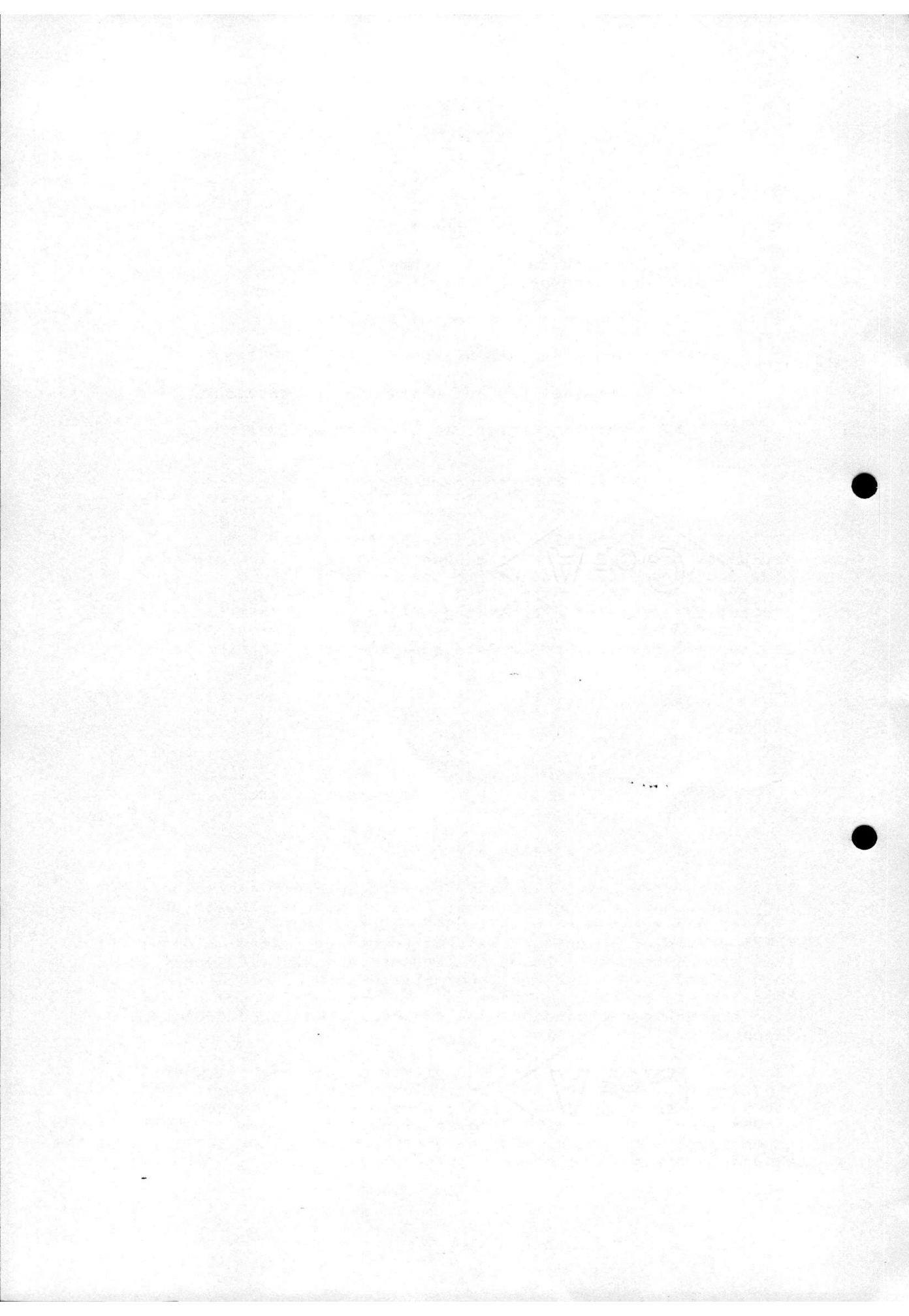
PROTECTIVE CLOTHING

11. The protective clothing and associated safety equipment required to be worn when using or working around liquid nitrogen is identical to that worn by liquid oxygen workers in the RAAF. The clothing and equipment are worn to protect the operator against the effects of the extreme cold encountered in the environment associated with cryogenic liquids and gases. Appropriate equipment and clothing to be worn include:

- a. overalls,
- b. gloves,
- c. enclosed footwear,
- d. aprons, and
- e. face shields and goggles.

12. Overalls. Clothing should completely cover the body, arms and legs and be loose fitting so that it can be removed easily in case of a liquid nitrogen spill or splash. There should be no open pockets or turned up cuffs. Trouser legs should be worn outside of footwear and sleeves should be worn rolled down. The most appropriate form of clothing of this type is overalls. These may be retained for use solely with cryogenic nitrogen as public clothing and should be kept clean and in good repair.

13. Gloves. Dry leather gloves should be worn when handling equipment and for protection against splashes. Do not wear porous gloves which may absorb liquid nitrogen. Gloves should be loose fitting to allow easy removal should cryogenic liquid splash into them. The gauntlet or cuff should be designed to prevent easy entry of fluid.



14. Footwear. Sound footwear which is impermeable to liquids and in good repair should be worn. The knee-length synthetic rubber boots which are available to oxygen workers are suitable, or plastic slip-over booties may be worn with safety shoes or ankle-length safety boots.

15. Aprons. Protective aprons may be worn as an added measure of safety from liquid splashes. These are worn by liquid oxygen workers and are available through the RAAF stores system.

16. Face Shields and Goggles. Face shields protect the facial skin and the more sensitive eyes against splashes and, to some extent against the cryogenic gas formed by the boiling of liquid nitrogen. Hoods, such as those worn by painters, should not be worn, although they protect not only the face but the whole head against liquid nitrogen splashes and are preferred to face shields by liquid oxygen users. There is a real danger that a pocket of oxygen deficient air may become trapped in the confines of the hood and increase the danger of asphyxiation. While goggles are a generally accepted minimum standard of facial protection for this type of work, they do not offer protection to any of the face but the eyes. For this reason it is not recommended that they be the sole facial protection worn, but they may be worn in conjunction with a face shield to afford an extra measure of eye protection to the wearer.

F/A-18A

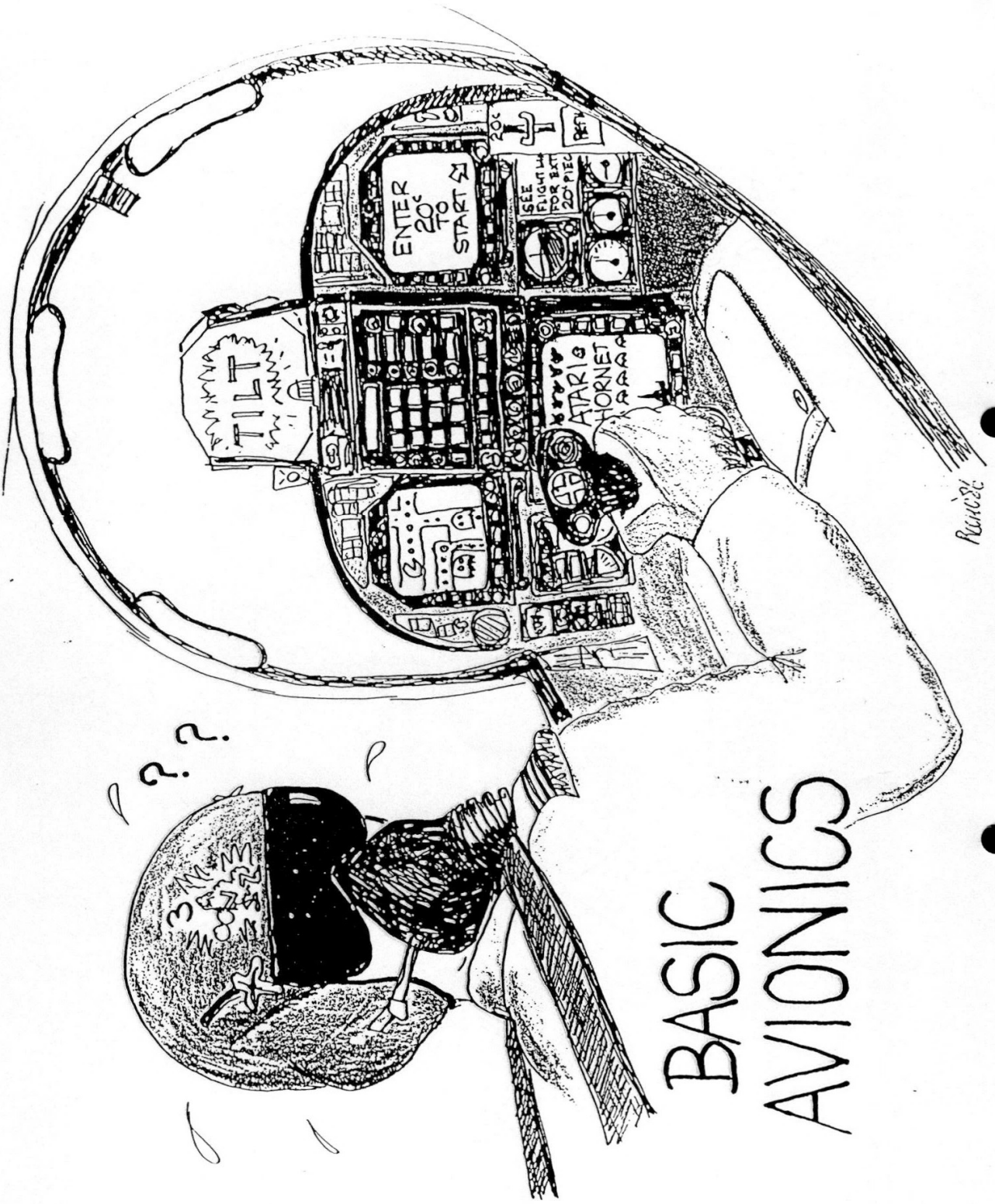


SECTION II

AVIONICS

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Controls and Displays	2-5
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Status Monitoring System	2-12
Built-In-Test	2-16
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Electromagnetic Interference	2-25
Static Electricity	2-26



Revised

BASIC AVIONICS

51

SECTION II

AVIONICS

Introduction

2001. The avionic subsystem combines the integration and automation needed for one-man operability with the redundancy required to ensure flight safety and mission success.

2002. Key features of the system include:

- a. highly integrated controls and displays (Annex E to Section 1),
- b. dual redundant digital multiplex (MUX) buses,
- c. control-by-wire primary flight control system, and
- d. extensive built-in-test (BIT) capability.

2003. A block diagram of the avionic subsystem (FIG 2-1) is shown on page 2-2. The avionic equipments are functionally arranged into nine groups, which are:

- a. Controls and Displays;
- b. Navigation and Flight Aids;
- c. Electronic Flight Control;
- d. Tactical Sensors;
- e. Stores Management System;
- f. Mission Computers;
- g. Communication, Navigation and Identification;
- h. Electronic Warfare; and
- i. Recording and Monitoring.

2004. The avionic subsystem operates under the control of two mission computers utilizing MUX buses for data transfer between the mission computers and other avionic equipment.

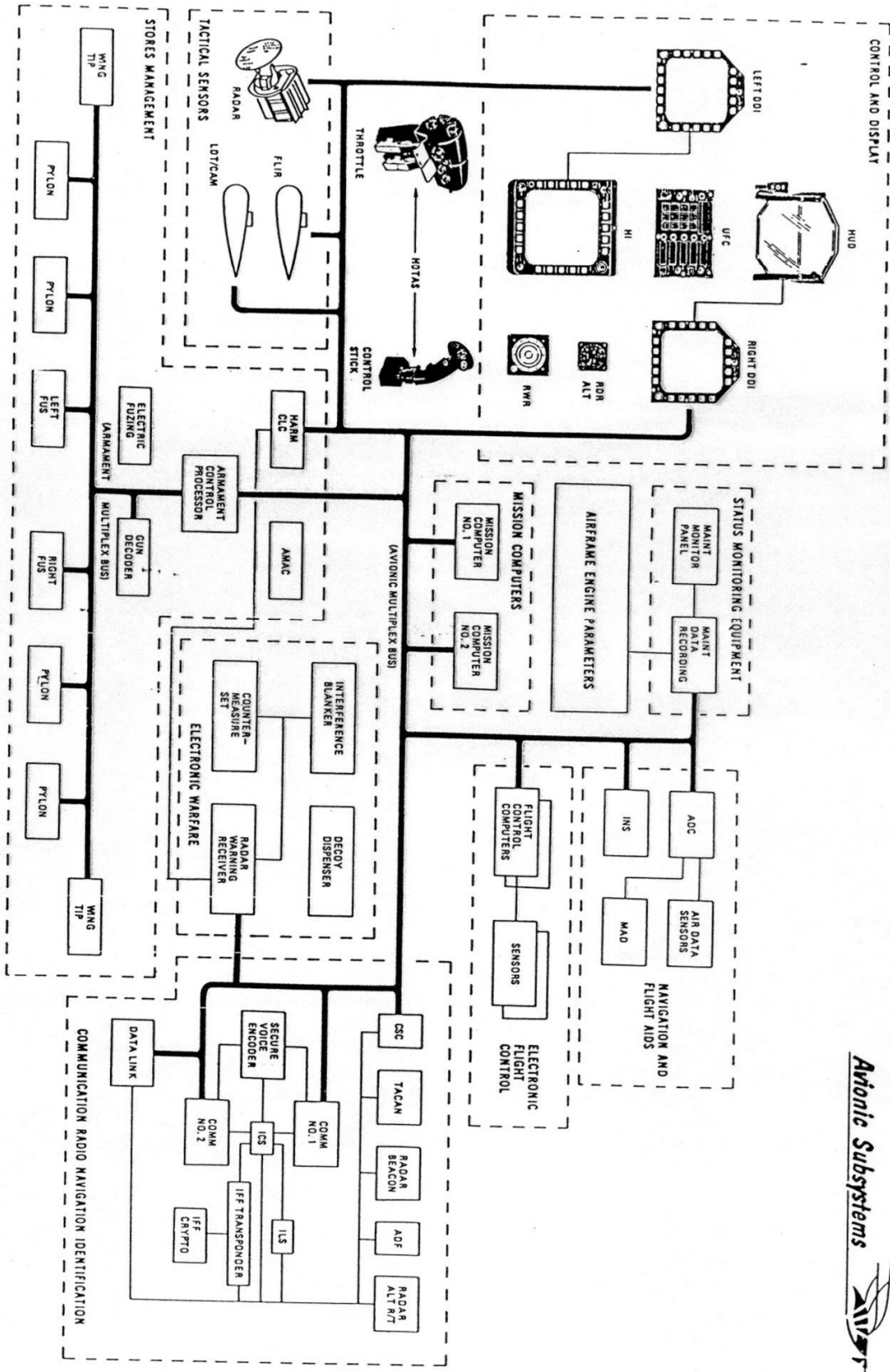


FIGURE 2-1

Mission Computers

2005. Two general purpose mission computers interconnect with primary avionic equipment via the time-multiplexed digital data communication buses. Information flow is comprised of digital messages formed by Command, data, and status words.

Student Notes

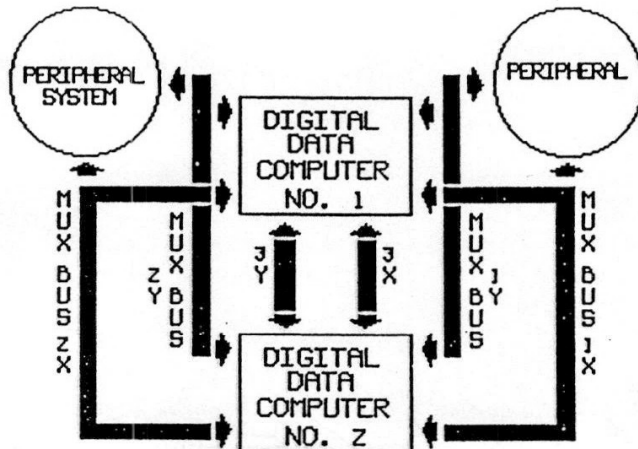


FIGURE 2-2

2006. There are three avionic MUX bus channels (FIG 2-2) with redundant paths (X and Y) for each channel. Some features of the avionics MUX buses are:

- a. each bus is monitored by the peripheral avionics on that data channel;
- b. each peripheral transmits, receives, and processes data on bus path 'X' while simultaneously monitoring bus path 'Y' for commands from either mission computer;
- c. in the event of invalid status is not received, the communication will shift to bus path 'Y' and repeat command;
- d. the data bus utilises, as a transmission medium, a shielded, twisted wire pair;
- e. the maximum cable length is 300 ft; and
- f. cables are coupled to the transmitter/receiver using centre tapped (grounded) transformers.

2007. Each Mission Computer contains 128K sixteen-bit words of programmable memory. Mission Computer No 1 (MC1), referred to as the Navigation Computer performs processing for navigation, control/display management, aircraft built-in-test (BIT), status monitoring and backup for Mission Computer No 2 (MC2). MC2 referred to as the Weapon Delivery Computer, performs processing for A/A combat, A/G attack, tactical control and display, and backup for MC1.

2008. FIG 2-3 shows the Avionic MUX bus channel interface between MC1, MC2, and avionic MUX connected equipment.

Student Notes

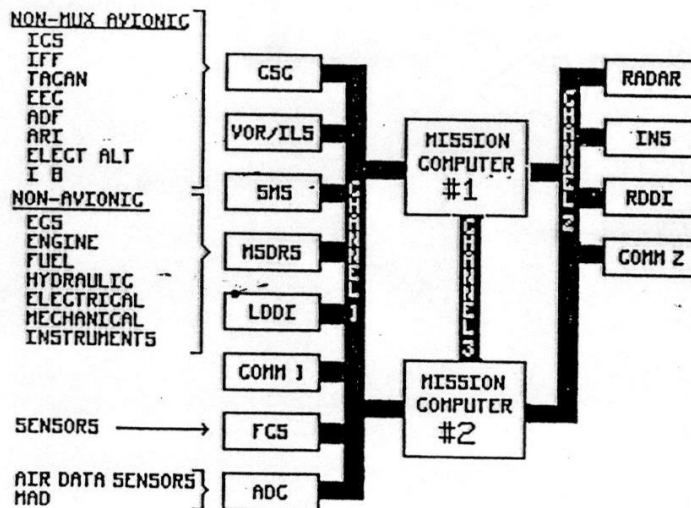


FIGURE 2-3

2009. Communication between the Avionic MUX bus and Non-MUX Avionic equipment is via the Communication System Control (CSC) commonly called the 'Control Converter'. Communication between the Avionic MUX bus and the Non-MUX Non-Avionic (hydraulic mechanical electrical) equipment is via the Signal Data Recorder in the MSDRS.

Controls and Displays

2010. The Hornet controls and displays are highly integrated to provide one-man-operability by using computer-controlled Cathode Ray Tube (CRT) displays and Hands on Throttle and Stick (HOTAS) controls to reduce pilot workload and enhance multi-mission success. The HOTAS concept utilises switches and controls on the aircraft stick controller and throttles to allow pilot control of the weapons, sensors and displays during critical manoeuvres while maintaining full control of the aircraft.

2011. Configuration. The main instrument panel of the F/A-18A (Annex E to Section 1) houses the primary displays. The TF/A-18A forward cockpit is a duplicate of its single seat version with the addition of a radio override (ORIDE) switch. The rear cockpit has duplicates of most flight controls, displays and instruments as shown in Annex E to Section 1. The rear cockpit avionics configuration for the TF/A-18A is based on 'pilot flight training' requirements.

2012. The HUD (FIG 2-4) is the primary flight instrument and during normal operation provides aircraft attitude, steering, navigation, A/A and A/G data displays. In NAV Master Mode the data displayed is used primarily for take off, navigation and landing. HUD symbology includes basic flight data, steering/landing data and advisory data.

Students Notes

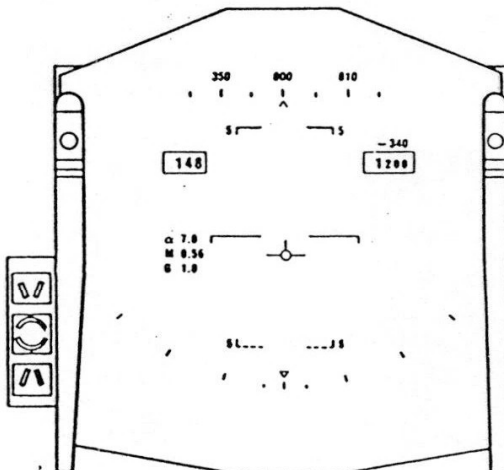


FIGURE 2-4

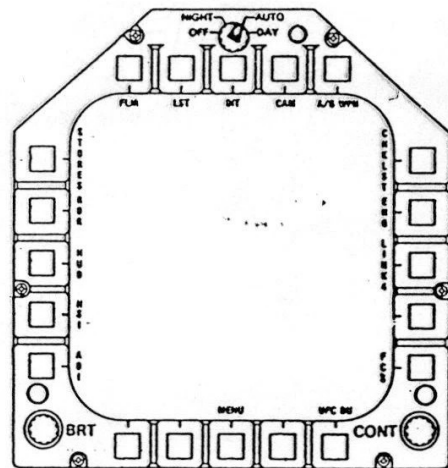
2013. The basic flight data is independent of aircraft master mode, with the exception of bank angle scale, vertical velocity and heading scale. The bank angle scale and vertical velocity are only displayed in NAV Master mode, the heading scale is moved higher on the HUD in A/A and A/G Master modes.

2014. The HUD display is modified when the landing gear is down in the NAV Master mode to give an extended horizon bar, included is an AOA indexer and a water line symbol to give pitch attitude reference. Mach number, G's and peak G's are deleted to declutter the display.

2015. The left and right DDI's (FIG 2-5) are identical and interchangeable. The displays for the left and right DDI's are selected by using the menu. The menu display is identical for both the DDI's, the desired display is selected by pressing the appropriate option.

2016. When electrical power is applied and the DDI's are selected ON, they are initialised to the last selected display before switch-off. In addition, anything that can be displayed on the LDDI can be displayed on the RDDI and vice versa. However, except for menu and the test pattern generated during BIT of the DDI's, the MC does not allow the DDI's to have the same display at the same time.

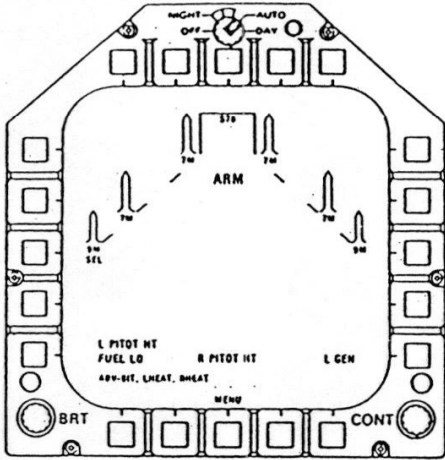
Students Notes



DDI MENU DISPLAY
Left and Right DDIs

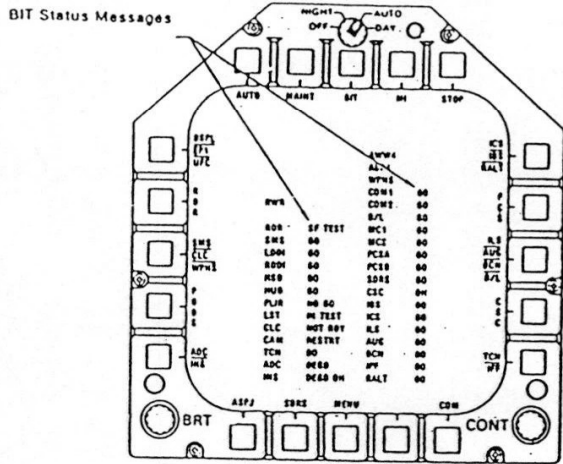
FIGURE 2-5

2017. The LDDI is primarily used for stores management. During normal operation the LDDI provides stores status (FIG 2-6), weapon video, BIT status (FIG 2-7), engine monitor and caution and advisory (FIG 2-6) displays.



CAUTION AND ADVISORY INDICATIONS ON LEFT DDI

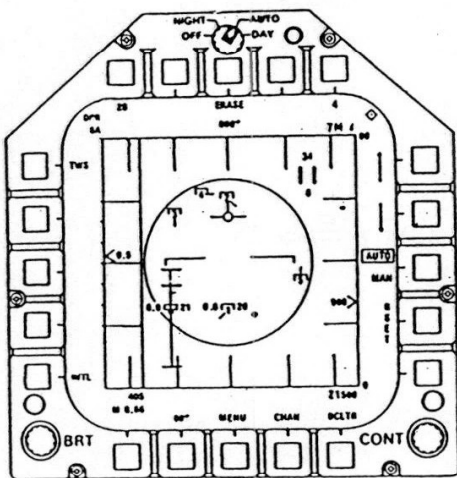
FIGURE 2-6



BIT CONTROL PANEL

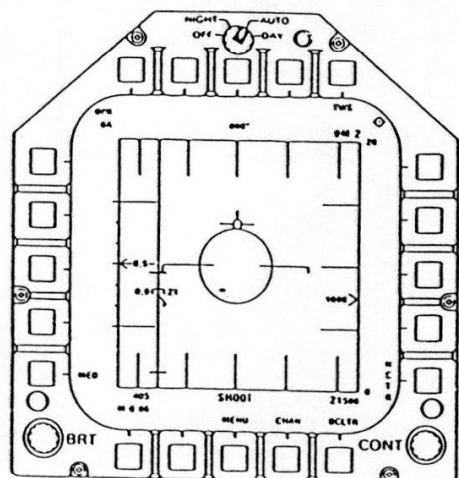
FIGURE 2-1

2018. The RDDI is primarily used for radar/sensor displays. Dependent upon aircraft master mode selected, three of the many displays that may be initialised and received on the RDDI are Track-While-Scan (FIG 2-8), Single-Target-Track (FIG 2-9) and Terrain Avoidance (FIG 2-10).



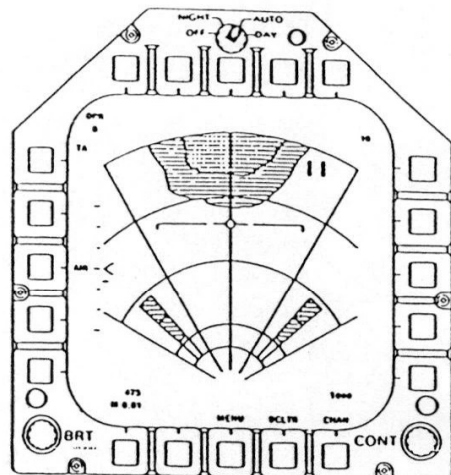
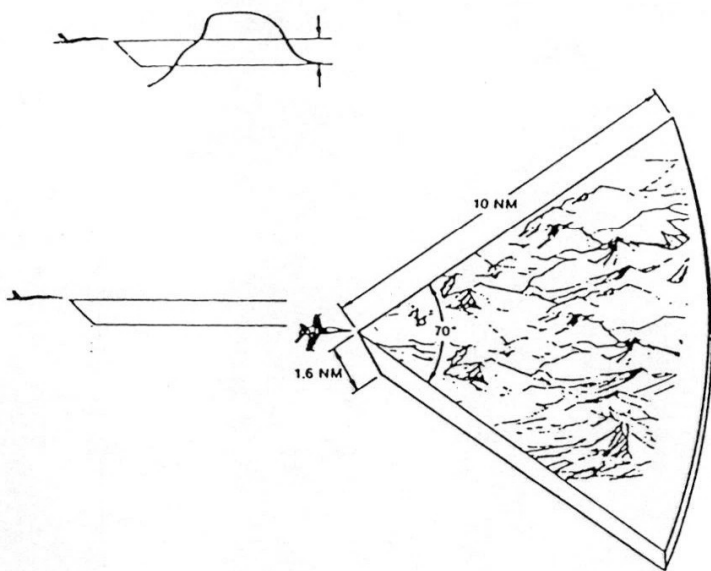
MC-COMMANDED SYMBOLOGY
TWS Format

FIGURE 2-8



SIDEWINDER STT RADAR DISPLAY

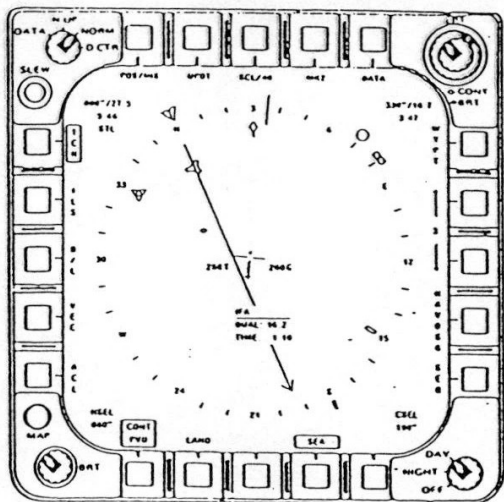
FIGURE 2-9



TERRAIN AVOIDANCE

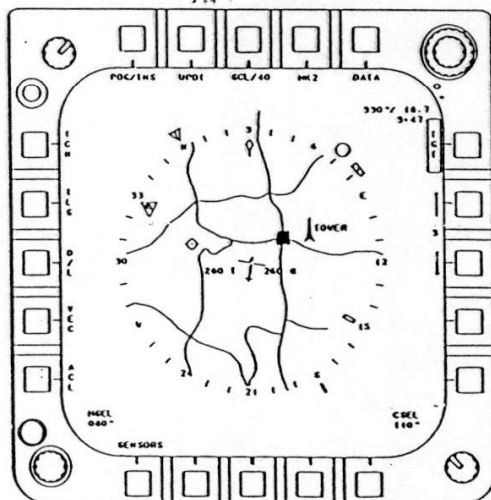
FIGURE 2-10

2019. The HI provides steering and navigation information (FIG 2-11) and has the capability of displaying a projected moving map (FIG 2-12) superimposed over the CRT display. The symbology required to make up the HI displays are produced in the LDDI under MC control. The HUD, L/RDDI's and HI make up the Multi-purpose Display Group (MDG).



INS IN-FLIGHT ALIGNMENT

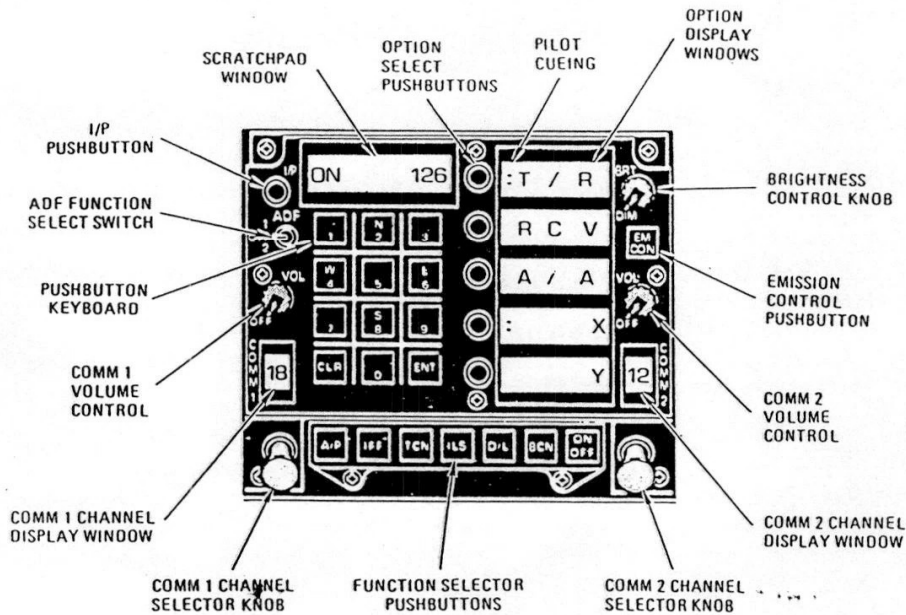
FIGURE 2-11



Moving Map Display

FIGURE 2-12

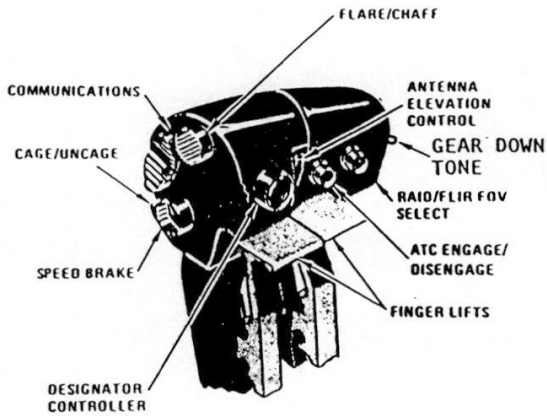
2020. The Up-Front Control (FIG 2-13), whose official nomenclature is the Electronic Equipment Control (EEC). It is mounted on the HUD above the HI (Annex E to Section 1). The UFC in conjunction with the Communication System Control (CSC) is used to select auto-pilot modes and control the IFF, TACAN, ILS, DATA LINK, HF radio, VHF/UHF radios and ADF. It is also used extensively in conjunction with the two DDI's and the HI to enter navigation, sensor and weapon delivery data.



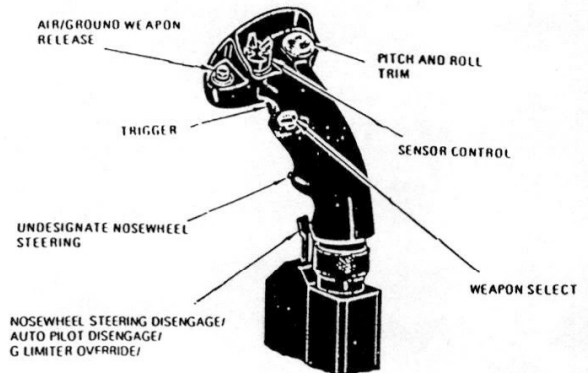
Upfront Control (UFC)

FIGURE 2-13

2021. HOTAS. The three primary HOTAS switches are the Throttle Designator Controller (TDC) on the throttle (FIG 2-14), and the Sensor Control Switch and A/A Weapon Select Switch on the pilots aircraft controller stick (FIG 2-15). In NAV and A/G Master modes, the TDC is assigned to either the HUD, HI, LDDI or RDDI by moving the Sensor Control Switch (Annex E to Section 1). In the A/A Master mode, the TDC is always assigned to the radar and the Sensor Control Switch now assigns the required sensor display (Annex E to Section 1).



THROTTLE GRIPS
FIGURE 2-14



CONTROL STICK
FIGURE 2-15

2022. Multi-purpose Display Group. The multi-purpose display group (FIG 2-16) consists of the right digital display indicator (DDI), the left DDI, the centre HI, the head-up display unit (HUD), the CRS (course) set switch, and the HDG (heading) set switch. The MDG converts information received from the mission computer system to symbology for display on the DDI's, HUD and HI and presents to the pilot, navigational data, weapon delivery steering and launch information, radar data, weapon status, aircraft attitude and equipment operational status.

2023. The HUD is an optical and electronic device that projects, in symbolic form, attack, navigation, situation and steering control information, into the pilots forward Field-of-View (FOV). The pilot can detect, acquire and lock-on a target, select and fire weapons without looking into the cockpit, this reduces his scan rate by approximately 90%.

2024. Figure 2-16 shows the interface between the MDG and avionics data flow. The L/RDDI's in forward cockpit provide backup for each other and contain symbol generators for the HI and HUD. Rear cockpit displays are relayed from front cockpit.

Students Notes



SYSTEM 04

AVIONICS FAULT TREE ANALYZER (AFTA) AN/ASM-662



DESCRIPTION:

THE AFTA IS A PORTABLE, MICROPROCESSOR CONTROLLED, GENERAL PURPOSE COMPUTER THAT PROVIDES A BUS CONTROLLER CAPABILITY. IT USES DATA GENERATED BY THE PERIODIC AND INITIATED BUILT-IN-TEST (BIT) FUNCTIONS, FUNCTIONAL DATA, AND DIAGNOSTIC ROUTINES TO PERFORM ISOLATION TO THE SRA LEVEL WITHIN MANY PRIORITY WRA'S.

USAGE:

CONNECTED TO THE AVIONICS MULTIPLEX BUS AND AIRCRAFT POWER VIA EXISTING CONNECTORS IN THE NOSE WHEEL WELL DURING ORGANIZATIONAL TESTING.

ISOLATES BIT-DETECTED WRA FAILURES TO THE FAULTY SRA WITHIN THE FOLLOWING WRA'S.

ENGINE PERFORMANCE INDICATOR	AEU-112/A
UHF/VHF COMMUNICATION SET	AN/ARC-182
ELECTRONIC EQUIPMENT CONTROL	C-10380/ASQ
CONTROL CONVERTER	C-10382/A
INERTIAL NAVIGATION UNIT	CN-1561/ASN-130A
HEAD-UP DISPLAY UNIT	AN/AVQ-26
DIGITAL DISPLAY INDICATOR	ID-1317/A
HORIZONTAL INDICATOR	IP-1350/A
COMPUTER-POWER SUPPLY	CP-1325/APG-65
RADAR RECEIVER-EXCITER	R-2089/APG-65
RADAR TARGET DATA PROCESSOR	CP-1326/APG-65
ANTENNA	AS-3254/APG-65
RADAR TRANSMITTER	T-1377/APG-65
ARMAMENT COMPUTER	CP-1342/AYQ-9
GUN ENCODER/DECODER	KY-855/AYQ-9
WING TIP ENCODER/DECODER	KY-851/AYQ-9
FUSLAGE ENCODER/DECODER	KY-854/AYQ-9
PYLON ENCODER/DECODER	KY-853/AYQ-9





USAGE (CONT.)

AVIONICS FAULT TREE ANALYZER (AFTA) (CONTINUED)



DIGITAL DATA COMPUTER	CP-1429/AYK-14
DIGITAL DISPLAY INDICATOR (REPEATER)	IP-1318/A
AIR DATA COMPUTER	CP-1334/A
ROLL-PITCH-YAW COMPUTER	CP-1330/ASM-44
SIGNAL DATA RECORDER	RO-508/ASM-612
SIGNAL DATA CONVERTER	CV-3493/ASM-612

ALSO VERIFIES BIT INDICATED FAULTS IN THE FOLLOWING WRA'S:

RECEIVER/TRANSMITTER	RT-1157A/APX-100(V)
INTERCOMMUNICATION AMPLIFIER-CONTROL	AM-6979/A
DIRECTION FINDER (UHF)	OA-8697/ARD
TACAN RECEIVER/TRANSMITTER	RT-1159/A
RECEIVER/TRANSMITTER	RT-1015(A)/APN-194(V)
INTERFERENCE BLANKER	MX-9965/A
LINEAR ELECTRICAL ACCELEROMETER	CN-1512/ASM-44
CONTROL STICK SENSOR	DT-601/ASM-44
RUDDER CONTROL	C-10423/ASM-44
RATE GYROSCOPE	CN-1511/ASM-44
AIR DATA SENSOR	DT-600/ASM-44
THROTTLE LOAD SENSOR ASSEMBLY	P/N 74A650060-1001

LOADS NEW OPERATIONAL FLIGHT PROGRAMS INTO THE MISSION COMPUTERS AND ARMAMENT COMPUTER.

ACCESSES AND DISPLAYS ENGINE LIFE USAGE INDICES INFORMATION,

EVALUATES THE INTEGRITY OF THE AVIONICS MULTIPLEX BUS AND DISPLAYS AIRCRAFT EQUIPMENT STATUS AS REPORTED TO THE MISSION COMPUTER.





AVIONICS FAULT TREE ANALYZER (AFTA) (CONTINUED)



TEST CHARACTERISTICS:

CONTROL

PROCESSORS - MICRO PROCESSOR 8085/8086
TEST LANGUAGE - PL/M/PASCAL

STIMULUS

AC MUX MIL-STD-1553
OPERATOR ACTION

PHYSICAL CHARACTERISTICS:

WEIGHT - 90 POUNDS
HEIGHT - 18 INCHES
WIDTH - 20 INCHES
DEPTH - 18 INCHES

MEASUREMENT

AC MUX MIL-STD-1553
OPERATOR OBSERVATIONS

INTERFACE

AVIONICS MULTIPLEX BUS

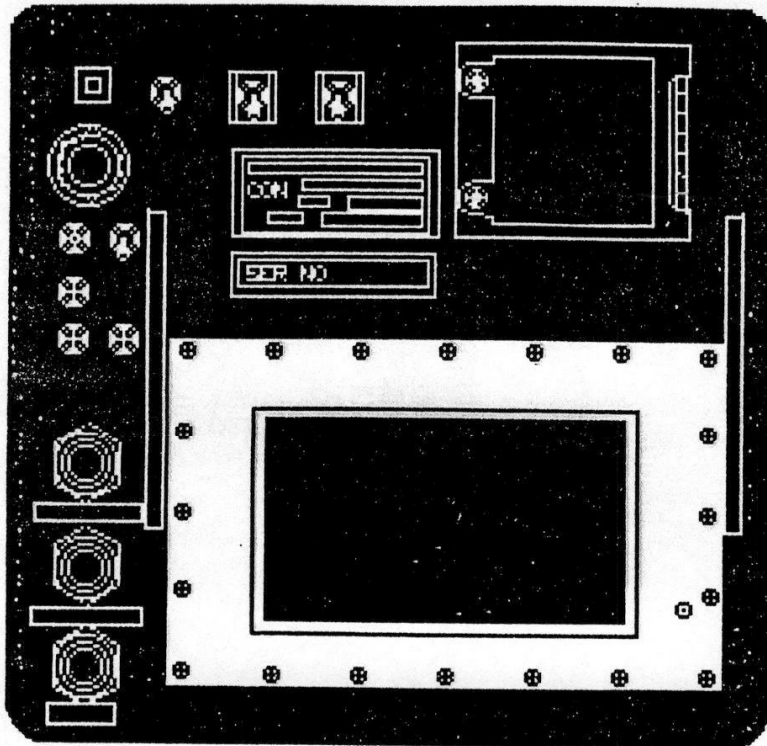
POWER REQUIREMENTS:

115 VAC 400 HZ, 3Ø

MANUFACTURER:

BRITISH AEROSPACE AUSTRALIA LTD





This is the front panel
of the AFTA, or better
known as the Operator
Panel.

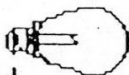
SECTION III

GROUND HANDLING

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Marshalling Signals

3-1



MAIN IDEA

MARSHALLING SIGNALS.

The use of hand signals is the safest and most effective means of communication between pilot and ground personnel during launch and recovery procedures.

Marshalling signals unique to the Hornet are identified in the AAP 7213.006-1-NFM-000.

The responsibilities of the marshaller and the procedures involved with the task, are outlined in the DI(AF) OPS 4-7.

The following presentation includes marshalling signals unique to the Hornet as well as the more important general type signals.

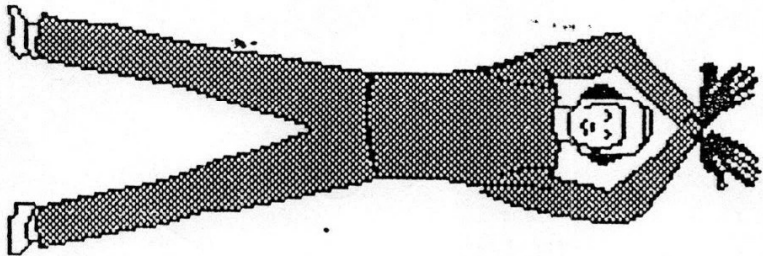
NOTE.

Not all of the signals are included.

"STOP"

Arms crossed above head.

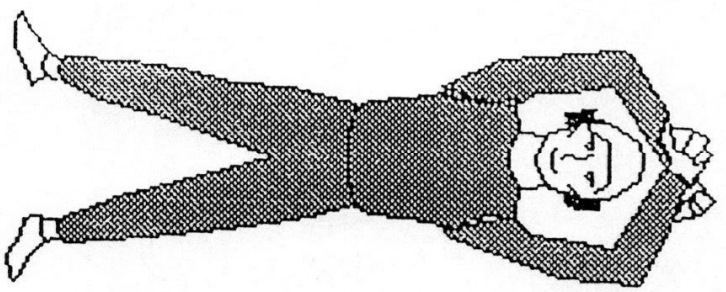
Palms facing forward.

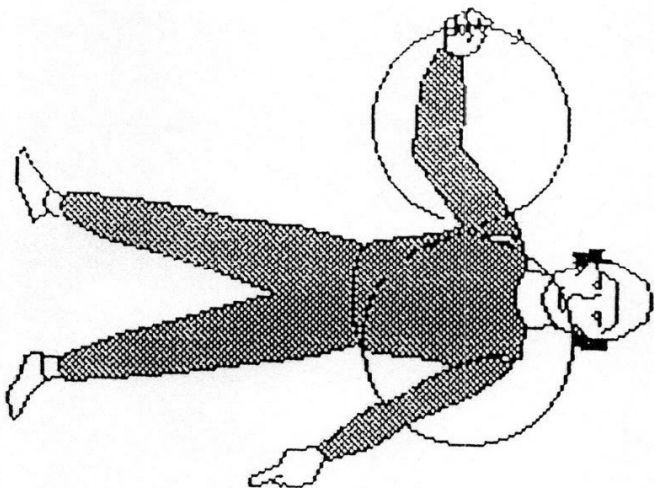


"EMERGENCY STOP"

Arms crossed above the head.

Fists clenched.



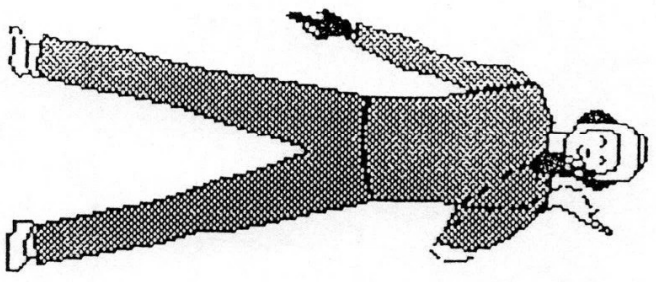


"ENGINE FIRE"

This signal is used to indicate engine or APU fires.

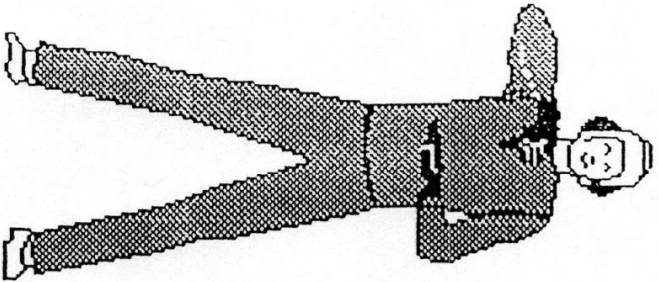
The marshaler is to point to the fire with one hand, whilst describing a large figure eight motion with the other.

"HOT BRAKES"



This signal is identified by a rapid fanning motion by one hand in front of the face.

The other hand is to be pointing at the affected wheel/brake assembly.



"ARRESTING HOOK DOWN"

Virtually the reverse of the Hook "Up" signal.

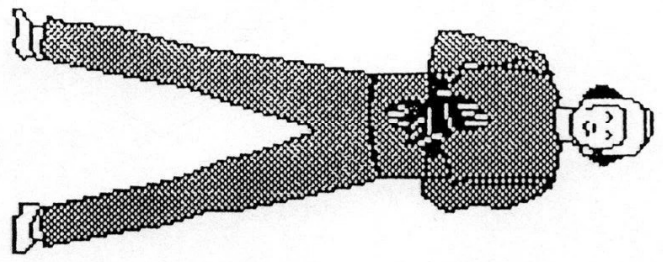
Lower the right fist suddenly with the thumb extended downward, to meet the horizontal palm of the left hand, (held in front of the body).

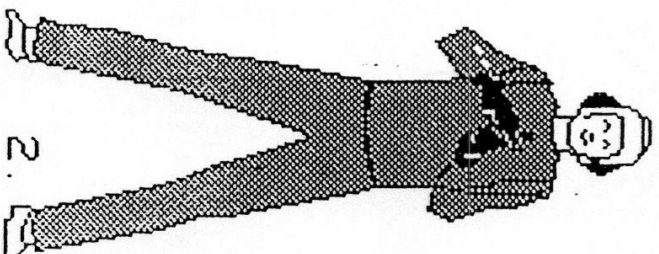
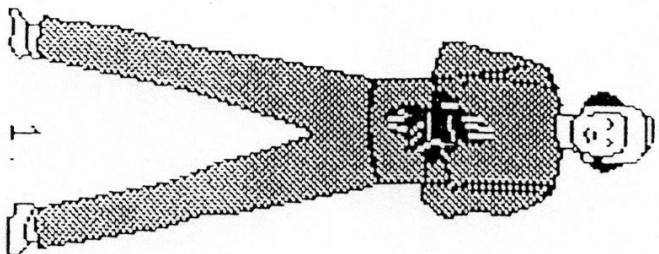
"FLAPPS FULL"

Hands flat together,

then opened wide from wrists.

Arms are in close to the body.





"HALF FLAPS"

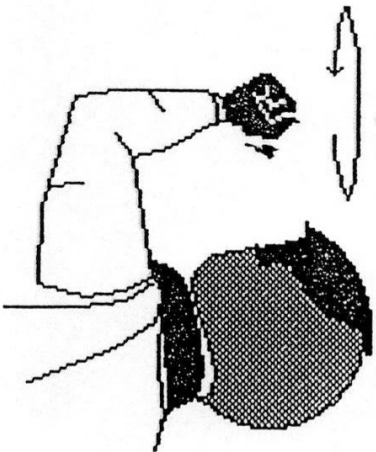
This signal actual consists of two distinct hand movements.

Flaps full signal,
followed by crossed
index fingers.

"START APU"

(PILOT)

The pilots signal is basically a clenched fist moved in a circular motion, in view of the marshaller.



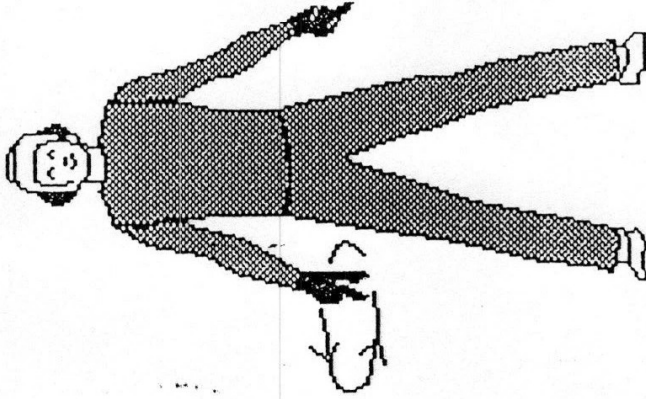
"START APU"

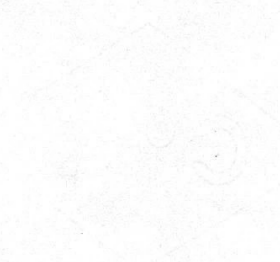
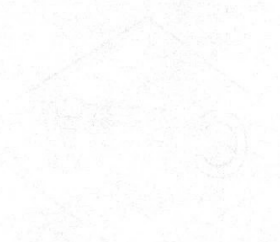
(MARSHALLER)

The marshallers signal is as follows:

With his left hand, he points to the APU exhaust.

The right hand hangs by the side and moves in a horizontal circle, with the index and middle finger pointed down.





SECTION IV

EMERGENCY PROCEDURES

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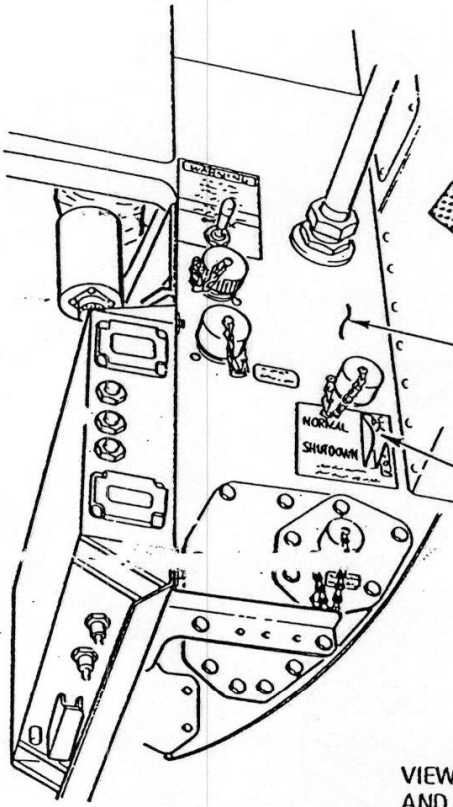
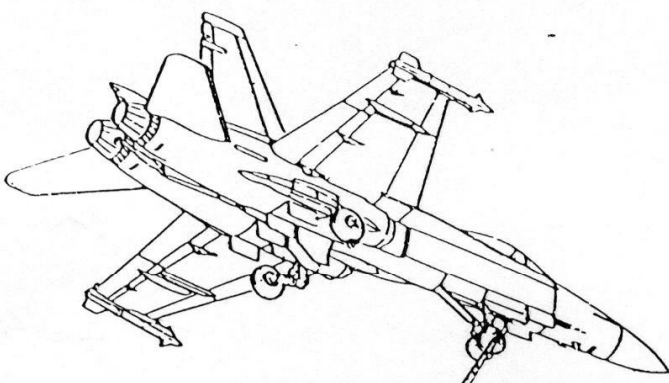
APU Emergency Shutdown Switch	4-1
Engine Fuel Shutoff Valves	4-2
Hot Brakes	4-3
Engine Bay Fire	4-4
AMAD Bay Fire	4-7
APU Fire	4-9

"EMERGENCY SHUTDOWN"APU.

WARNING

The "APU Emergency Shutdown Switch" is only to be used extreme emergency situations.

Under certain conditions, APU's have been known to have suffered massive internal failures as a result of activating this switch.

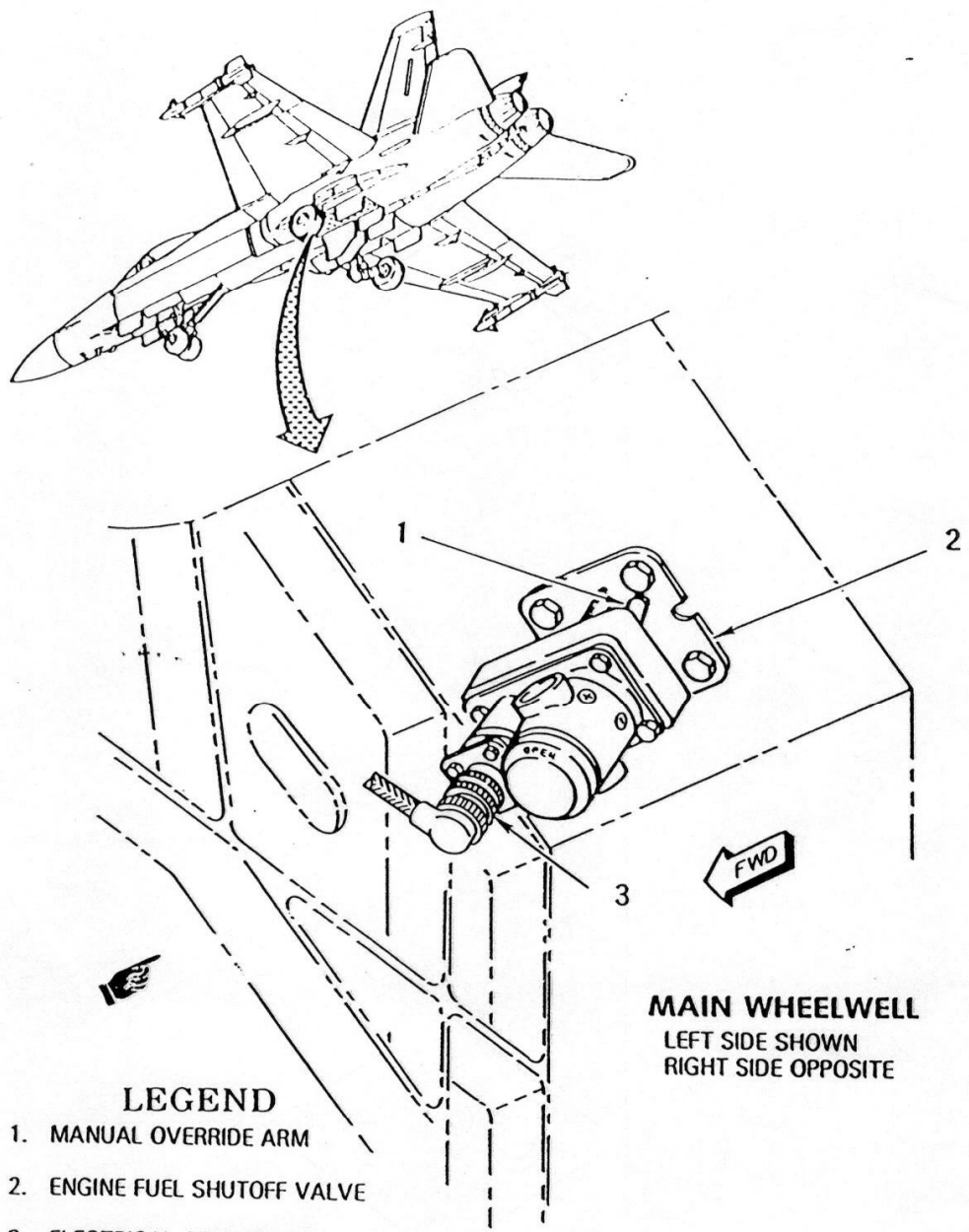


NOSE WHEELWELL
MAINTENANCE PANEL

APU EMERGENCY
SHUTDOWN SWITCH

VIEW LOOKING AFT
AND OUTBOARD NOSE
WHEELWELL, LEFT SIDE

APU Emergency Shutdown Switch



LEGEND

- 1. MANUAL OVERRIDE ARM
- 2. ENGINE FUEL SHUTOFF VALVE
- 3. ELECTRICAL CONNECTOR

MAIN WHEELWELL
LEFT SIDE SHOWN
RIGHT SIDE OPPOSITE

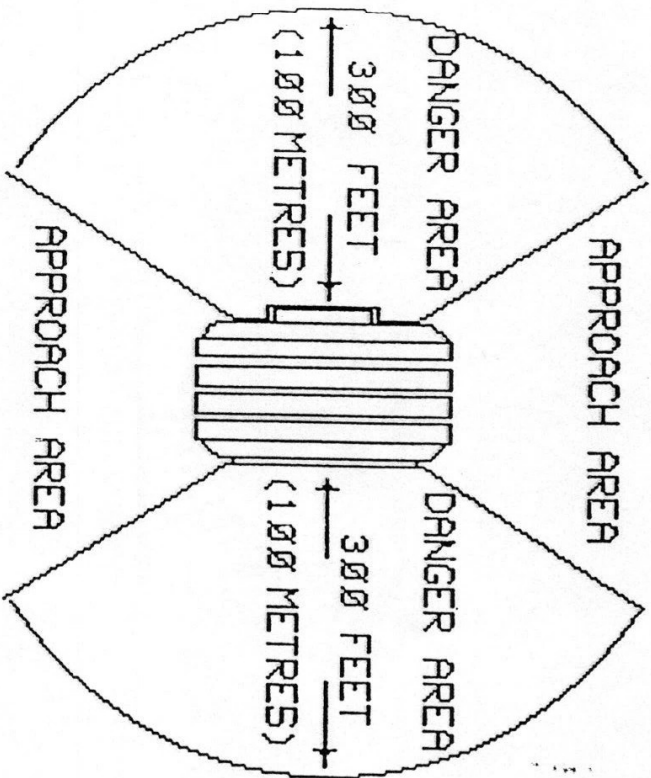
Fuel Shutoff Valves

"HOT BRAKES"

When a safe and effective means of cooling the wheel assembly is required, portable fans may be used.

WARNING

To prevent personnel injury or aircraft damage from wheel failure, do not apply CO₂, liquid or any coolant to the wheel.

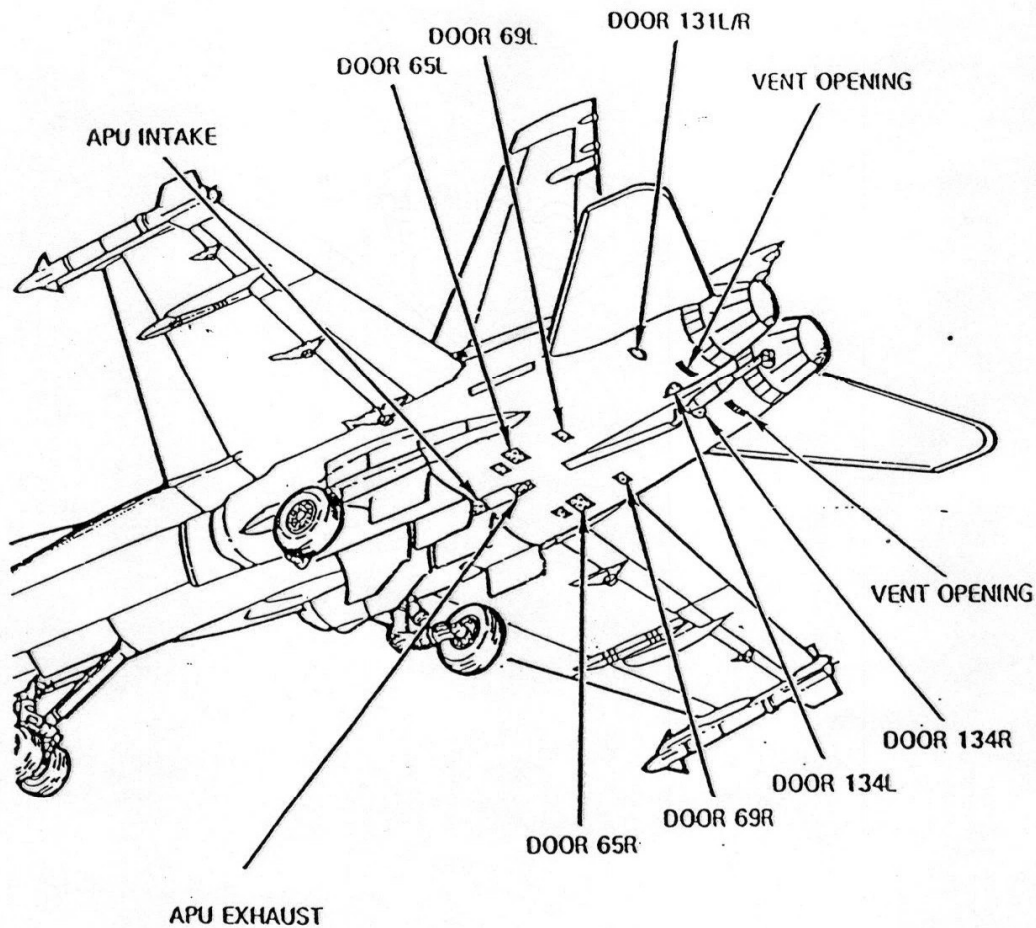


"HOT BRAKES DANGER AREA"

"ENGINE BAY FIRE"

WARNING

To prevent injury from burning fluids,
remain clear when opening doors and panels.

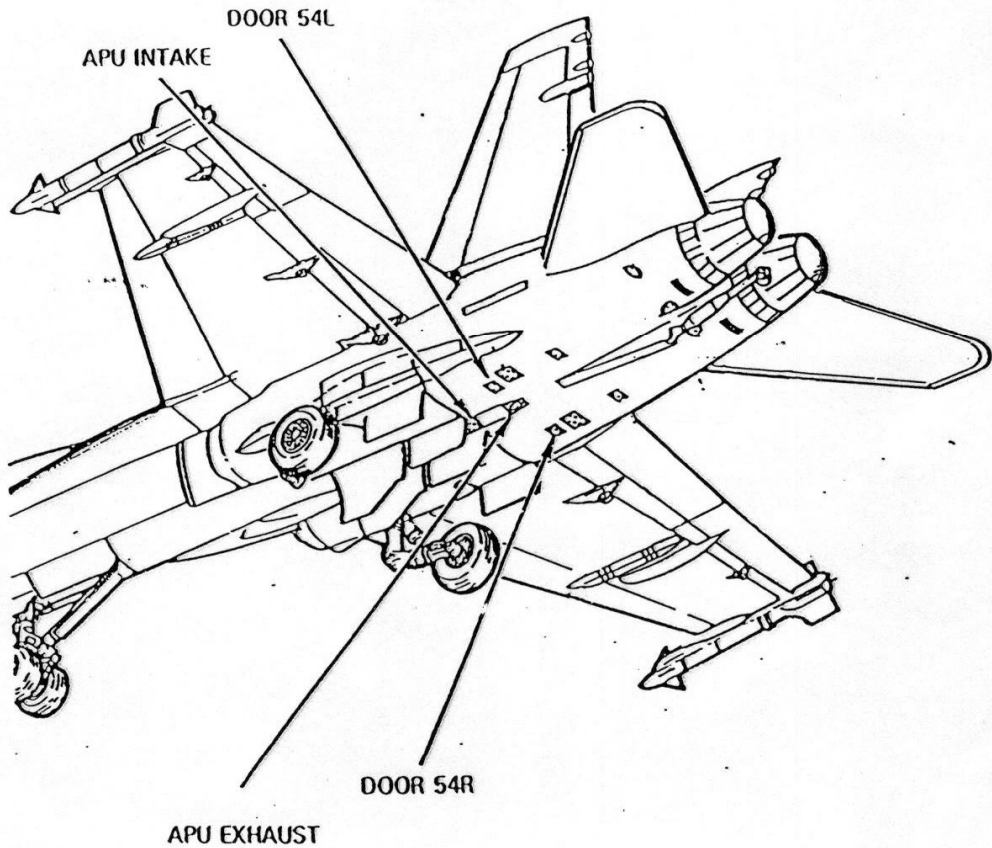


"ENGINE FIRE" ACCESS DOORS AND VENT OPENINGS

105
"AMAD BAY FIRE"

WARNING

To prevent injury from burning fluids,
remain clear when opening doors and
panels.



"AMAD FIRE" - - - ACCESS DOORS

"APU FIRE"

WARNING

To prevent injury, remain clear of the
APU exhaust.

Injection of extinguishing agent into an
operating APU may cause severe damage and
possible failure of rotating parts,
resulting in flying shrapnel.

HORNET SAFETY AND FAMILIARIZATION COURSE MAP

BLOCK 1

HANDOUT

CHARACTERISTICS
AND
CAPABILITIES

CAI

INTRODUCTION
TO CAI
10.2.1.1.2

CAI

PUBLICATIONS
PART 1
10.2.1.2.2

CAI

PUBLICATIONS
PART 2
10.2.1.3.2

CAI

PUBLICATIONS
PART 3
10.2.1.4.2

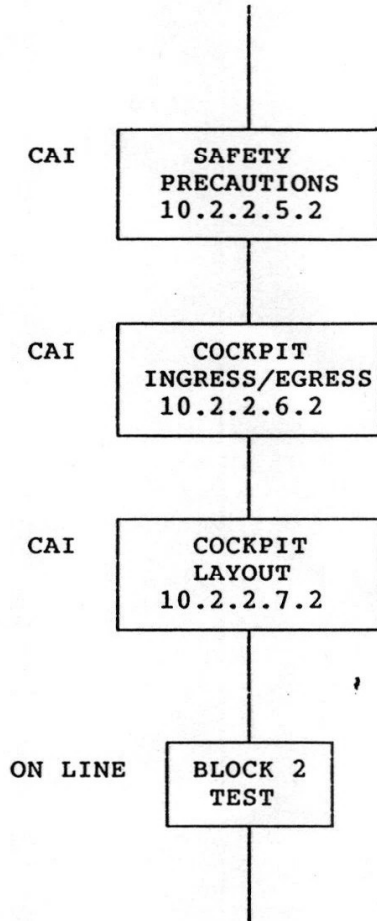
ON LINE

BLOCK 1
TEST

sect 3

122
132

BLOCK 2



BLOCK 3

CAI

ELECTRICAL POWER
SUPPLY AND
DISTRIBUTION
10.2.3.8.2 ✓

CAI

MSDRS/AFDAS
& MD & SLMS
10.2.3.16.2 ✓

* CAI

EXTERNAL POWER
APPLICATION AND REMOVAL
LESSON MASTERY TEST
10.2.3.9.2 ✓

CAI

LAUNCH
AND
RECOVERY
10.2.3.17.2

AVIONICS
SAMT

EXTERNAL POWER
SAMT
10.2.3.10.2 ✓

REFUEL/DEFUEL
10.2.3.11.2

CAI ✓

INTERACTIVE
VIDEO

VIDEO
REFUEL/DEFUEL
10.2.3.12.2

VIDEO ✓

CAI

GROUND
HANDLING
10.2.3.14.2 ✓

FLIGHT
LINE
SERVICINGS
10.2.3.15.2 ✓

REFUEL/DEFUEL
SAMT
10.2.3.13.2

FUEL
SAMT ✓

ON LINE

BLOCK 3
TEST

56 au

1. Done
2.

* Note: Lessons 10.2.3.9.2 and 10.2.3.12.2 have Lesson Mastery Tests.



BLOCK 15

AIRCRAFT

AIRCRAFT
VISIT
10.2.15.18.2

OFF LINE

REVISION
10.2.15.19.2

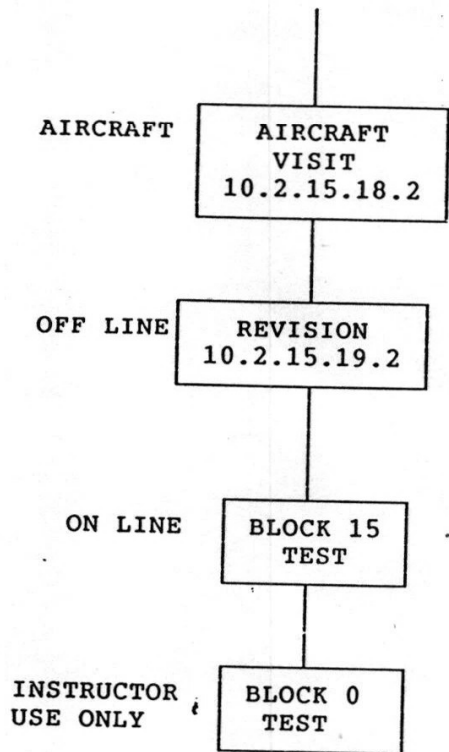
ON LINE

BLOCK 15
TEST

BLOCK 0

INSTRUCTOR
USE ONLY

BLOCK 0
TEST



UMC'S AAP 6700.001, 002 + 003

HIGH EMergny = 1min

STROBE = 10min

B/F 3Tasks

9001 + 9002 + 2001

↑
↑
anyone

↑
↑
guines

TA

Fuel

