



C-141
QUALIFICATION
COURSE

AIRCRAFT
SYSTEMS
STUDY BOOK

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C-141 AIRCRAFT SYSTEMS STUDY BOOK

This study book has been reviewed and is approved for use in the C-141 aircrew member qualification courses. It is a supplemental reference for you to keep. It will provide you study material to help you understand and assimilate our classroom instruction.

We have attempted to omit all superfluous data and present you with a simple, condensed text of the aircraft systems, component units, and their operation. It will provide a valuable source of interesting and readable information, compiled expressly for you as a flight crew member.

NOTE

It must be understood that technical orders and other official directives supersede this guide when the information contained herein conflicts.

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INTRODUCTION

The Lockheed C-141B Starlifter is a modern jet aircraft, designed primarily for transporting cargo. Powered by four Pratt and Whitney TF33 turbofan engines, rated at 20,250 pounds of thrust each, the aircraft can transport approximately 70,000 pounds of cargo. The aircraft is 168 feet 4 inches long with a 160-foot wing span. The cargo compartment may be loaded with thirteen pallets, or configured to accommodate aft-facing seats, side-facing seats, or aeromedical evacuation of litter patients.

Design features include a fully pressurized and air conditioned flight station and cargo compartment. Cargo loading is straight in from the rear, over an adjustable ramp. Personnel loading is through troop doors on each side of the fuselage aft of the center wing section or over the cargo ramp. The single high wing is fully cantilevered and swept back at a 25-degree angle. With air refueling capability, the aircraft range is limited only by mechanical and human limitations. A high "T" tail provides improved operating characteristics and simplified cargo loading. The fully retractable, tricycle landing gear consists of dual nose wheel assembly mounted under the forward fuselage and two dual-tandem main gear assemblies mounted in pods attached to each side of the fuselage. Deceleration on the ground is accomplished by eight multiple disc-type wheel brakes with full antiskid protection and reverse thrust provisions on each of the four engines. The flight station contains provision for a normal crew and relief crew. Facilities include a crew lavatory and galley.

An auxiliary power unit (APU), mounted in the left main gear pod, furnishes air for the aircraft pneumatic systems and drives an AC generator to supply an alternate source of electrical power. The APU is operational only on the ground and allows the aircraft to operate independent of ground support equipment when necessary.

Conventional, fully powered controls provide aircraft maneuverability while airborne. Control about the roll axis is provided by ailerons mounted on the outboard trailing edge of each wing. Primary and backup power for the ailerons is supplied by aircraft hydraulic systems. Emergency operation is possible by mechanically operated booster trim tabs, which are part of the ailerons. Control about the yaw axis is by a rudder attached to the trailing edge of the vertical fin, powered by aircraft hydraulic systems. Control of the pitch axis is by an elevator mounted on the trailing edge of the horizontal stabilizer, which also is powered by aircraft hydraulic systems.

Fowler-type wing flaps on the wing trailing edge, and spoilers mounted on upper and lower wing surface of each wing serve to decrease aircraft speed and increase the angle of descent. On the ground these units assist the wheel brakes and thrust reversers in minimizing ground roll.

All-weather flying capability is ensured by wing and engine anti-ice, horizontal stabilizer de-ice, windshield heat, and rain removal provision. In addition to a complex avionics system, the aircraft is equipped with an all-weather landing system (AWLS) that permits landing with extremely limited visibility.

SECTION I

AIRCRAFT GENERAL

SECTION I AIRCRAFT GENERAL

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Chapter 1

THE AIRCRAFT

General Description

The C-141B Starlifter is a long-range, high-speed, high-altitude, swept-wing monoplane, designed for use as a heavy logistic transport. The designed ramp gross weight of the aircraft is normally 325,000 pounds. Refer to the dash one for emergency war planning (EWP) limits.

Cargo Compartment

The C-141's value as a strategic cargo transport is its design for straight-in aft loading. Also, by design, the large unobstructed cargo compartment was built to be fully compatible with the Air Force 463L materials handling system.

Up to 13 standard 463L pallets may be loaded quickly. Alternate configurations will accommodate 166 troops in aft-facing seats, 200 troops or 155 paratroops in side-facing seats, or 103 litter patients, and 14 additional seats for attendants or ambulatory patients.

Figures do not include two (2) loadmasters.

NOTE

Aircraft limited to 200 troops due to present oxygen system.

Engine Fire/Overheat and Pylon Fire/Overheat Detection System (Figures 1-7 thru 1-15)

Engine or pylon fire/overheat system consists of pneumatically sealed heat detector elements filled with pressurized helium. The pneumatic detector operates on gas law principles; gas pressure within the sensor tubes increases with a rise in temperature. Each detector element is connected to an engine fire control module (box) located in the right underdeck area. The engine fire control detector elements are mounted on each of the two fwd and two aft cowl doors. These four detector elements are wired electrically parallel, so the fire control module can receive the signal and actuate the illumination of Master Fire/Overheat warning lights on the pilots' instrument panels and a light in the fire handle of the affected engine. The fire control module also actuates an audible tone on the flight station loudspeaker, plus the pilot's, copilot's, jump seat's and flight engineer's headsets. The pylon detector element is also electrically connected to this fire control module to activate the same fire warning and engine control handle lights alternately. No audible tone is sounded with the flashing pylon fire/overheat signal.

The pylon fire/overheat detector element is six feet long and is activated by an average temperature of 400 degrees F. It has a discrete temperature rating of 950 degrees F. The discrete rating is based on an intense temperature in a very small area of the sensing element, usually no more than 10% of its length. This discrete rating is well below the flame temperature.

The forward cowl door elements are fifteen feet long and are activated by an average temperature of 350 degrees F., with a discrete rating of 1,050 degrees F.

The aft cowl door elements are thirty-five feet long and are activated by an average temperature of 500 degrees F., with a discrete temperature of 1,050 degrees F.

This detection system is powered by the ISOLATED DC BUS with the exception of the audible tone which receives power from an AC BUS.

The distinction between a fire and an overheat is determined by retarding the throttle of the affected engine. If the lights extinguish within the allotted ten seconds, it can be assumed that it was an overheat. If the indication continues, we must assume it is an engine/pylon fire.

Four fire warning test switches are located on the pilot's control pedestal for the purpose of testing the engine fire/overheat systems in flight or on the ground. Either test checks for detector integrity and continuity of inter-connecting wiring. Circuit protection and power are received from the ISOLATED DC BUS.

APU Fire Detection and Warning System

An APU fire is detected by a single, continuous temperature sensing inconel loop. The fire detector control box is located in the right underdeck area. The APU fire detection system will not indicate an overheat condition.

A fire in the APU compartment will cause a visual warning to be displayed on the flight engineer's panel, the pilot's annunciator panel, and on the APU fire control panel, which is aft of the crew entry door. At the same time, an audible warning will be sounded through the flight station loudspeaker and the pilot's, copilot's, observer's, and flight engineer's headsets.

Protection and power for this system comes from Main AC Bus No. 4 and Isolated DC Bus.

The bailout alarm will also sound, if any door in the door warning system is open, and the APU control switch is in RUN.

The audible signal may be silenced by an audible fire alarm silence button on the pilots' emergency engine shutdown panel. This button will not silence the bailout alarm.

Fire Extinguishing System

The fire extinguishing system provides fire protection for zone 1 (combustion and turbine section), zone 2 (accessory section) of each power plant nacelle, and for the APU compartment. Two dual outlet fire extinguisher agent containers and associated plumbing are mounted in the pylon aft fairing of each outboard pylon. Each system provides fire protection for the inboard and outboard engines on its respective side of the aircraft. Each system can provide two discharges to one nacelle or one discharge to each nacelle. Access to the containers and valves is provided through panels in the pylon fairing. The APU fire bottle, located in the left wheel well, provides a single discharge to the APU compartment. The agent used is dibromodifluoromethane (DB). (Figure 1-3)

An agent discharge button is located behind each engine's fire control handle. Each fire extinguisher container is discharged by the use of an electrically operated explosive squib cartridge. Electrical power is supplied by both the Isolated DC Bus and Main DC Bus, providing a parallel protective circuit. Between the fire control handles for each wing (engines 1 and 2 and engines 3 and 4) is a bottle selector switch, which will allow the selection of the alternate extinguisher container for that system usage if a second application of agent is necessary.

To discharge the APU extinguisher, the APU fire control handle must be pulled before the adjacent discharge switch is armed. Actuation of the discharge switch then routes isolated DC power to the explosive squib.

Portable Fire Extinguishers

Six hand fire extinguishers are provided on the aircraft. One extinguisher is in the flight station under the auxiliary crew seat. Five are in the cargo compartment: two immediately aft of the crew entrance door, two immediately forward of the left-hand troop door and another is approximately midway down the cargo compartment on the right-hand side. The hand operated fire extinguishers are serviced with halon.

Smoke Detection System

The smoke detector circuit comprises six detectors in the cargo compartment and left underdeck area, an amplifier, test selector switch and warning lights. Essentially, the detectors are composed of a light and a photocell. The light is shielded so the beam is parallel with the face of the photocell. As long as the air is clear, the light beam cannot reach the photocell. If the ability of the air in the detector to transmit light is reduced by 30 percent, as in a fire, light will be reflected to the photocell and a signal sent to the amplifier. The amplifier is in the forward right-hand underdeck area. The amplifier will then send the signal to the CARGO SMOKE lights on the flight engineer's panel and the annunciator panel. The test switch mounted on the flight engineer's panel will illuminate a test light, which shines perpendicular to the photocell and is wired in series with the detector light. Illumination of this light will then cause a signal to be sent to the amplifier and warning lights.

Chapter 2

OXYGEN SYSTEM

(Figures 1-17, 1-18)

The aircraft is equipped with two independent liquid oxygen systems, one for the crew and one for personnel in the cargo compartment.

Crew System

Crew oxygen is supplied from a 25-liter converter with normal system pressure of 290-430 psi. The system contains the converter, nine diluter demand automatic pressure breathing regulators, two heat exchangers, a manual shutoff valve, five recharger hoses, five portable oxygen units, an oxygen quantity indicator and test switch, and a low-quantity warning light.

The portable oxygen units for the crew system are located with one in the latrine and the other four on the flight station. Two recharger hoses are on the flight station, one in the latrine, one on the bulkhead outside the latrine and one beside the crew entrance door.

Oxygen Converter

The 25-liter converter for the crew system is located on the left side of the nose wheel well. It serves the purpose of storing the liquid oxygen and converting it to a gaseous oxygen for breathing.

WAIT 30 MINUTES AFTER SERVICING.

Heat Exchanger

As the oxygen warms to temperatures above -297°F in the converter, it changes to a gas. The gas is routed from the converter to a heat exchanger, where it is warmed by compartment air flowing over the coils. The heat exchanger is located between the flight station floor and the top of the nose wheel well in the under-deck area. Since the heat exchanger does not warm the oxygen sufficiently for breathing, it is routed through a second heat exchanger located above the crew rest platform in the cargo compartment. This warms the oxygen to breathing temperature.

Manual Shutoff Valve

The manual shutoff valve is in the nose wheel well near the converter. The control, a handwheel, is just aft of the pilot's side console. The purpose of the manual shutoff valve is to isolate the oxygen supply system from the distribution system in case of a cabin fire or a downstream leak.

Crew Oxygen Regulators

The crew oxygen system has nine regulators. An oxygen regulator is at each crew station, lower bunk seat and the two auxiliary crew seats. The regulators are diluter-demand, pressure-breathing regulators.

Each oxygen regulator control panel contains an ON-OFF switch, a two-position diluter switch, a three-position emergency switch, a 0 to 500 psi pressure gage and a flow indicator.

The ON-OFF supply switch serves as a means of shutting off oxygen at each regulator to prevent waste. The oxygen diluter switch allows the crew member to select 100% oxygen or the normal air/oxygen diluter function of the regulator.

The emergency lever, in the EMERGENCY position, causes oxygen to bypass the regulator section and supply pure oxygen at a continuous positive pressure. In the NORMAL position, it allows regulated oxygen flow. The TEST MASK position provides a positive pressure for the purpose of testing the fit of the mask.

Troop System

The troop system is a removable, continuous-flow, liquid oxygen system that operates from a supply pressure of 300 psi. The system operates through two regulators that automatically begin metering oxygen at 12,500 to 14,000 feet cabin altitude and shuts off oxygen flow when cabin altitude drops below 11,500 feet. The system also has a manual override switch that will bypass automatic operation of the regulators and supply oxygen at any cabin altitude. The troop system consists of a removable liquid oxygen supply kit, a permanently installed distribution system, and a removable distribution kit. (Figure 1-18)

Removable Liquid Oxygen Supply Kit

The removable supply kit consists of a converter pallet assembly and a regulator panel assembly.

The converter pallet assembly is installed in the forward section of the right main wheel pod. Mounted on the pallet assembly are two 75-liter oxygen converters, two heat exchangers, and two fill-buildup-vent valves.

The two converters are connected in parallel. As the liquid oxygen changes to gas, it flows through its respective heat exchanger on the pallet to the troop oxygen panel, which is mounted inside the cargo compartment.

Regulator Panel

Essentially, the regulator panel consists of two continuous-flow regulators, four heat exchangers, a pressure sensing switch, troop oxygen panel, and a therapeutic oxygen manual shutoff valve.

The two continuous-flow regulators are connected in parallel with the converters to allow both or either to supply oxygen automatically. Distribution pressure ranges from 29 psi at low cabin altitudes, to 69 psi at high cabin altitudes. If one regulator fails, the other will supply the maximum oxygen flow required. The regulators automatically begin oxygen flow at a cabin altitude of 12,500 - 14,000 feet and automatically close at 11,500 feet cabin altitude. There is a manual override switch on each regulator to allow the oxygen to be turned on at any cabin altitude.

Each regulator also contains a pressure-operated oxygen ON indicator that indicates the regulator has been turned on, either manually or automatically.

The four heat exchangers mounted adjacent to the regulators use cabin air circulating around them to warm the oxygen to breathing temperature.

When oxygen starts to flow through either regulator, it will actuate the pressure sensing switch. When actuated, the pressure sensing switch will cause the warning horn to sound, the cargo compartment dome lights to come on bright, and the OXYGEN ON indicator light to come on.

The troop oxygen control panel is mounted on the lower center of the regulator panel. The quantity indicators read quantity of liquid oxygen in the converters. The push-to-test button, when actuated, will cause its respective quantity gage to rotate counterclockwise until it indicates 7.5 liters, at which time the LOX QTY LOW light will come on. When the button is released, the gage will return to normal, and the warning light will go out. The two-position toggle switch, labeled OXY LIGHTS AND HORN NORMAL and TEST, is used to test the oxygen indicator lights and warning horn. The horn shutoff button is used to silence the horn after it has indicated oxygen flow.

Troop oxygen masks are of an airline plastic type.

The therapeutic oxygen manual shutoff valve provides a means of using oxygen from the troop system to supply a special oxygen system for litter patients and, when open, charges the manifold for the aft cargo compartment recharger hoses.

NOTE

Passenger oxygen systems are designed to provide oxygen during emergency depressurization only. The passenger oxygen is mixed with ambient cabin air in the mask. If the ambient air includes smoke and fumes, passenger oxygen masks should not be used. Oxygen masks do not provide protection from smoke and fumes.

Chapter 3

FUEL SYSTEM

Introduction

This is a ten-tank, wet-wing, integral manifold fuel system. The four main tanks, four auxiliary tanks, and two extended range tanks hold 153,352 pounds of usable fuel. The fuel system is capable of supplying any engine from any tank, transferring fuel from any tank to any other tank in flight or on the ground, air refueling, single point refueling and jettisoning.

Fuel Tank Vent System (Figures 1-19, 1-20)

The fuel vent system protects the aircraft fuel tanks from excessive internal or external pressures that could cause structural damage. Should a refueling valve fail open, the fuel vent system has the capacity to handle the overflow. All the fuel tanks are vented by a fuel vent line with an upturned bellmouth inlet near the inboard side of each tank. Two vent boxes are located in each system: one is an inboard vent box, the other is an outboard vent box. Fuel vent boxes are separately sealed compartments in the aft inboard corner of the outboard main fuel tank and the extended range tank. The vent boxes are interconnected by vent lines, and the outboard vent box is vented to the atmosphere by a standpipe. The outboard vent box vents the outboard auxiliary and outboard main tanks. The inboard vent box vents the inboard auxiliary and inboard main tanks. The extended range tank is vented to the interconnecting vent box vent line. Fuel that enters the vent boxes is trapped. To prevent this fuel from building up and venting overboard, ejectors are installed that scavenge this fuel and return it to the main tanks.

Fuel Tank Construction (Figures 1-19 thru 1-22)Main Tanks

Each main tank contains a small compartment in the outboard section, called a surge box. The surge boxes in No. 1 and No. 4 main tanks will hold 250 gallons each. The surge boxes in No. 2 and No. 3 main tanks hold 120 gallons each. The main tank surge boxes house the primary and secondary booster pumps, and ensure a supply of fuel to the booster pumps during aircraft maneuvers. When the quantity in the surge boxes drops below 50%, it will cause the SUMP LOW light on the fuel management panel to illuminate.

Auxiliary Tanks

Auxiliary tanks contain partial surge boxes and house the primary booster pump. The partial surge boxes serve the same function as the main tank surge boxes but do not actuate a SUMP LOW light.

Extended Range Tanks

Extended range tanks do not have surge boxes but do have bulkheads that divide the tanks into compartments. The bulkheads have one-way flapper valves on the bottom of the bulkhead to allow fuel to flow from the inboard to the outboard side. This ensures a supply of fuel to the two booster pumps in the outboard section. The top of the bulkhead also is open to allow free passage of air and vapors in both directions for proper ventilation.

Booster Pumps (Figure 1-25)

There are two booster pumps in each tank. The outboard pumps in the main and auxiliary tanks are called primary pumps, and the inboard pumps are called secondary pumps. The pumps in the extended range tanks are called inboard and outboard pumps, and are in the outboard compartment of the tanks.

Main tank booster pumps are rated at 23,700 pounds per hour (pph) at 6 psi. Auxiliary and extended range tank booster pumps are rated at 17,000 pph at 31 psi. Each pumping element consists of a 115/200-volt, 3-phase AC motor with an impeller and a 400°F thermal switch for overheat protection. The biggest difference between main tank pumps and auxiliary and extended range tank pumps is the design of the impeller.

Control of the fuel booster pumps is as follows:

Main tank primary - 3 Phase Essential AC powered, 3 Phase Essential AC controlled

Main tank secondary - 3 Phase Essential AC powered, C phase control

Auxiliary tank primary and secondary - 3 Phase Main AC powered, Main DC control

Extended range tank inboard and outboard - 3 Phase Main AC powered, Main DC control

Main tank booster pumps are not interchangeable with auxiliary and extended range tanks' booster pumps.

Ejectors (Figures 1-22, 1-24)

There are 26 ejectors installed in the aircraft fuel system. Their primary purpose is to scavenge fuel from low spots within the tanks and return it to the surge boxes or to the outboard compartment of the extended range tank, reducing the amount of unusable fuel. Ejectors are jet-pumps, activated by fuel flow from the tank booster pumps.

CONTROL VALVES

Crossfeed Valves

There are four crossfeed valves -- one for each engine. They are DC motor-driven valves powered from the Isolated DC Bus. Their function is to connect the cross-wing manifold to the engine and main tanks.

These valves are located on the aft wing beam and can be manually operated if necessary.

Separation Valves

There are three separation valves: left, center, and right. They are DC motor-driven valves, powered from the Isolated DC Bus. They divide the manifold into four sections. The center separation valve has a thermal relief feature, but the left and right separation valves do not.

The left and right separation valves are on the aft wing beam and can be manually operated if necessary. The center separation valve is in the center wing dry bay area and can also be operated manually.

Manual Fuel Shutoff Valves

Four shutoff valves are located on the front wing beam. They are mechanically controlled by a cable linkage to the fire control handles. They also provide thermal relief protection for the engine side of the valve when the valve is in the closed position. (Figure 1-9)

Fuel Level Control (Refueling Valves) (Figures 1-26, 1-27)

Each of the integral fuel tanks contains a fuel level control valve which is designed to control the level of fuel to which the tanks may be filled during single point refueling, aerial refueling, or fuel transfer. Each valve will automatically shut off the fuel flow to its respective tank when the predetermined fuel level is reached. In addition, each valve may also be controlled electrically by the flight engineer to shut off fuel flow at any selected level.

The valve operation is designed as fail-safe closed, electrically controlled, and operated to the OPEN or CLOSE position by incoming fuel pressure and flow.

The electrical control of the valve is by means of an individual tank refuel switch on the flight engineer's fuel management panel. The normal position of the switch is CLOSED, except during single point refueling, aerial refueling or fuel transfer. During a tank refueling operation, the refuel switch may be in either the OPEN PRI or OPEN SEC positions.

Each fuel level control valve consists of a valve body, a dual piston type inlet valve, dual pilot valves with associated floats and controlling solenoids, and a thermal relief valve. The valve closure rate is designed to limit, to a safe pressure, surges that would damage the refuel manifolds or the cross-ship manifold. The dual pilot valves operate independently of each other to control opening and closing of the control valve. The function of the pilot valves is to control the force of balance across the inlet valve. If both valves are seated, the fuel pressure on top of the valve pistons will hold the inlet valve closed. The seating action may be caused by the floats if the tank is at its designed full level or both solenoids are deenergized by the refuel switch being in the CLOSED position. However, if either solenoid is energized and the tank is less than full, the pilot valve will move to the OPEN position. The result is that the greater of the two forces is now on the bottom of the inlet valve, causing it to move to the OPEN position.

Each of the solenoids on the fuel level control valve is energized by DC power from either the Main DC Bus No. 1 or the Main DC Bus No. 2. Each of the primary solenoids is energized from the Main DC Bus No. 2, and each of the secondary solenoids is energized from the Main DC Bus No. 1.

The solenoids are referred to as primary and secondary and are individually energized by positioning the refuel switch on the flight engineer's panel to either the OPEN PRI or OPEN SEC position; placing the refuel switch in either position will schedule the valve to open. When the refuel switch is in the CLOSED position, both solenoids are deenergized, causing the extension of the solenoid plungers, which will raise the floats and position the poppet valve in its orifice. This assures that the inlet valve will remain closed any time the fuel manifold is pressurized, thus preventing accidental fuel transfer into the respective tank. A spring in the valve body exerts sufficient force on the inlet valve to ensure that it will remain closed whenever the cross-ship fuel manifold is not pressurized.

Jettison Valves

Two Main DC motor-operated control valves connect the jettison lines to the wing fuel manifold. One is in each wing. During the jettison operation, fuel is jettisoned through its respective wing valve.

Ground Isolation Valve

The Main DC operated ground isolation valve is in the center wing section in the refueling line between the single point refueling adapters and wing fuel manifold. This valve is opened and closed by a switch on the flight engineer's fuel management panel, marked GRD ISO VALVE. This valve must be open during ground refueling and defueling operations.

SPR Drain Pump and Drain Valve

The fuel line drain switch is located on the fuel management panel and has three positions: "A/R," "OFF," and "SPR." The aerial refueling manifold drain system consists of a drain line containing a motor-operated valve and connecting the aerial refueling manifold to the No. 3 main fuel tank. The ground refueling manifold incorporates, at its upper end, an isolation valve for closing off this line when single point refueling is not in use. A drain pump, located in the single point refueling manifold drain line, pumps fuel from the SPR manifold to the No. 3 main tank after a ground refueling operation.

When the switch is placed in the "A/R" position, power is supplied to open the aerial refuel manifold drain valve. Fuel from the aerial refuel manifold is pumped into the No. 3 main tank through a jet pump ejector. One or both of the No. 3 main tank boost pumps must be energized for the ejector to operate. When the line drain switch is placed to SPR, power is supplied to energize the SPR drain valve and the SPR drain pump. Fuel from the ground refuel manifold is pumped back into the No. 3 main tank. The line drain switch receives 28V DC power from the main DC Bus No. 2, through the FUEL DRAIN PUMP and VALVES circuit breaker located on the flight engineer's No. 4 circuit breaker panel.

FUEL WARNING LIGHTS

Sump Low Warning Lights

A SUMP LOW warning light, over each main tank fuel quantity indicator, goes ON to show that the fuel level in the corresponding main tank surge box is below the 50-percent level. These lights are controlled by thermistor-type sensing elements attached to the tank units in the surge boxes.

Booster Pump Pressure Low Lights

A single PRESS LOW warning light is located directly above the booster pump switches for each main tank. These PRESS LOW lights will illuminate when the booster pump switches are in the ON position and the fuel pressure drops below normal operating pressure. There are two PRESS LOW warning lights for each auxiliary tank and extended range tank. They are located directly above their respective booster pump switches. These PRESS LOW lights will illuminate only when their respective booster pump switch is ON and the fuel pressure drops below normal operating pressure.

Fuel Jettison Stop Pump Lights

Four jettison STOP PUMP warning lights are on the fuel management panel. These lights operate through the jettison switches, the outboard auxiliary tank fuel quantity indicators, and the booster pump switches. During normal jettisoning, the STOP PUMP lights will illuminate when the quantity in the outboard auxiliary tank drops to 5,500 pounds.

As a management tool, this allows the engineer visual indications that the fuel remaining behind the outboard engine is approximately equal to the quantity behind the inboard engines.

FUEL FEED SYSTEM

Main Tank to Engine

The only valve between the main tanks and their respective engines is the manual shutoff valve, which is controlled by the fire control handle and is normally open. Should the main tank booster pumps fail, the engines can suction-feed only from the main tanks through a bypass valve in the main tank booster pump scroll housings.

Auxiliary or Extended Range Tank to Engine

Fuel feed from the auxiliary tanks to their respective engines is from the tank booster pumps to the manifold, then through a crossfeed valve to the engine.

Tank to Tank

Fuel may be transferred from tank to tank by pressurizing the manifold with the booster pumps in the tank from which fuel is being transferred, and opening the refueling valve for the tank receiving the fuel.

Fuel Pressure Indication

Fuel pressure indication is taken from the manifold between the left separation valve and center separation valve. It is used primarily during preflight to check pumps and valve operation.

Refueling System (Figures 1-28, 1-29)

Ground refueling operations are normally accomplished through the single-point refueling receptacles. When facilities for single-point refueling are not available, the tanks can be refueled individually through filler openings in the wing upper surfaces.

Aerial Refueling is accomplished through the Universal Aerial Refueling Receptacle Slipway Installation (UARRSI). Fuel is distributed to the cross-wing manifold through the air refueling manifold and the left and right air refuel isolation valves. Maximum transfer rate from tanker to receiver is 5,900 ppm.

Maximum Allowable Fuel Unbalance

The maximum allowable fuel unbalance for landing configuration between opposite pairs of tanks (other tanks remain balanced) is:

Outboard main tanks	2,700 pounds
Outboard aux tanks	4,000 pounds
Extended range tanks	6,500 pounds
Inboard main and aux tanks	16,000 pounds

Chapter 4

A/R SYSTEM GENERAL DESCRIPTION AND OPERATION

(Figures 1-30 thru 1-40)

The C-141B aerial refueling system provides a means of refueling any or all of the fuel tanks from a boom-type tanker aircraft. The system is capable of receiving 5,900 pounds per minute, at a boom nozzle pressure of 50 psi, while filling all tanks simultaneously. In addition, the C-141B aircraft has reverse refueling capability which allows fuel to be pumped through the aerial system to the tanker aircraft at 1,600 pounds per minute.

The aerial refueling system components may be divided into two groups:

1. Those that are directly related to the receiving and movement of fuel.
2. The controls and means of indication of system operation available to the crew.

The components involved with the movement of fuel consist of a Universal Aerial Refueling Receptacle Slipway Installation (UARRSI), installed in an external fairing on the top centerline of the aircraft, just aft of the pilot's station; a four-inch diameter refueling manifold; a refuel drain valve and two refueling isolation valves. The four-inch diameter manifold is routed under the fairing, external of the fuselage pressure skin, to a "Y" fitting inside the center wing dry bay. A three-inch diameter line is routed from each branch of the "Y" fitting, through an aerial refueling isolation valve, and connects each branch into the fuel system cross-ship manifold with one on each side of the cross-ship manifold center separation valve.

UNIVERSAL AERIAL REFUELING
RECEPTACLE SLIPWAY INSTALLATION (UARRSI)

The UARRSI is a self-contained unit which includes a housing, combination door and slipway, refueling receptacle, door actuating cylinder, boom latch cylinder, signal amplifier, boom contact switch and boom latch switch.

Hydraulic Subsystem

The slipway door is opened by a hydraulic actuating cylinder which is actuated by the aerial refueling door control handle. The handle is located in the overhead trim directly above the flight engineer's seat. The handle has a detent lock in both the OPEN and CLOSED positions to prevent inadvertent operation. The door is opened by pulling the handle inboard to override the detent, then down approximately two inches to the stop. This unlocks the door lock and manually opens a hydraulic valve which allows pressure from No. 2 hydraulic system to pressurize the door open actuator, causing the door to move to the OPEN position.

The door is closed by pulling the handle inboard to override the detent, then pushing the handle up. The door will not close without hydraulic pressure. The slipway door mechanism is spring-loaded, so that the door will be opened by the spring in the event hydraulic power is not available to the UARRSI.

Slipway Assembly

The slipway assembly contains a hydraulically actuated, two-position door designed to protect and streamline the refuel receptacle when in the CLOSED position; it forms the bottom of the slipway assembly when in the OPEN position. The door is hinged at the forward edge and opens downward into the slipway pan.

The door will actuate two switches as it moves to either the FULL OPEN or CLOSED positions. One of these is the door open switch, which has two positions: OPEN AND LOCKED, and CLOSED. When the slipway door is fully OPEN, the switch is repositioned to the OPEN AND LOCKED position. The function of the switch is to complete a circuit from the signal amplifier to the ready lights when the door is fully open.

The second switch associated with the door is the closed/locked switch. This switch also has two positions: CLOSED/LOCKED and UNLOCKED. In the CLOSED/LOCKED position, the switch will break the circuit to the door-unlocked light, which is an indication to the flight engineer that the door is fully CLOSED AND LOCKED. The UNLOCKED position completes a circuit to the door-unlocked light. In addition, if the mode select switch is in the OVERRIDE position, it functions as part of the circuit to illuminate the ready lights.

Receptacle Assembly

The aerial refueling receptacle is exposed when the UARRSI slipway door is opened and is funnel-shaped to facilitate entry of the flying boom nozzle of the tanker aircraft. A spring-loaded closed fuel shutoff valve, in the receptacle, is opened by the physical insertion of the boom. When open, this valve permits fuel to flow from the boom through the receptacle into the air refuel manifold. The receptacle contains a hydraulically-operated toggle-latching mechanism designed to hold the boom nozzle in place during the fuel transfer operation. An induction coil is mounted on the receptacle so that it will mate with a similar coil on the boom nozzle of the tanker aircraft when fully engaged and latched. Pulses are received and transmitted through the coil to position relays in the signal amplifier of both aircraft. In addition, the induction coils serve as a security interphone communications link between the two aircraft when the boom and receptacle are connected during fuel delivery.

There are two switches mounted in the receptacle which are designed to transmit signals from the signal amplifier. One of the switches is the contact switch. In the NO CONTACT position, the switch will complete a circuit to the disconnect lights as the boom nozzle is withdrawn. In the CONTACT position, the switch will complete a circuit to energize the latch control valve. The second switch is the latch switch and has two contact points. The first set allows power through the signal amplifier, in addition to the induction coil. The second set completes a circuit to the latched lights through the signal amplifier.

During normal operation, the latches are held in the disengaged position by spring forces. Hydraulic pressure to the latch cylinder is shut off by the manual door control valve when it is in the DOOR CLOSED position. In order to drive the latches to the LATCHED position, two separate actions must take place. First, the door control valve must be actuated to the OPEN position, which ports system pressure to both sides of the latch cylinder. Next, the boom nozzle must be fully inserted into the receptacle in order to actuate the contact switch. As this switch is repositioned from the NO CONTACT to the CONTACT position, a circuit is completed from the signal amplifier to the latch control valve solenoid, which drives the latch control valve to shut off pressure to the unlatched side of the latch cylinder. The resulting force imbalance across the cylinder is sufficient to drive the latches to the fully ENGAGED position with the boom. The latch cylinder will continue to hold the latches in the engaged position until the circuit to the latch control valve is broken by the signal amplifier during the disconnect phase of operation.

Aerial Refuel Master Switch

The aerial refuel master switch is located on the aerial refuel section of the flight engineer's fuel management panel. It is used to provide power for the aerial refuel system operation. The switch has two positions: ON and OFF. The ON position will supply power to the aerial refuel signal amplifier, the receptacle slipway lights, fairing lights and wing leading edge lights dimming transformers. It also removes power from the aerial refueling/throttle switch control relay and controls power to the receptacle fairing and slipway lights. The switch receives 28V DC power from the Main DC Bus No. 1 through the aerial refueling control circuit breaker.

Mode Select Switch

The mode select switch is located in the aerial refuel section of the flight engineer's fuel management panel. The switch has two positions: NORMAL and OVERRIDE. When the switch is placed to normal position, it is an integral part of the power circuit from the aerial refueling control circuit breaker through the master switch and reset switch to the signal amplifier. When the switch is placed to the OVERRIDE position, power bypasses the signal amplifier and completes a circuit to the override relay and the amber override light.

The function of the override position of the switch is to permit continued operation of the aerial refuel system, in the event the normal means through the signal amplifier is lost. By energizing the override relay, the normal circuits through the slipway door actuated switches and the receptacle contact and latch switches can be utilized.

Aerial Refuel Isolation Valve Switches

Two aerial refuel isolation valve switches are located on the AERIAL REFUEL portion of the fuel management panel. The switches control the left and right aerial refuel isolation valves through which fuel flows to the left and right wing tanks. The left and right valves and switches receive 28V DC power from the Main DC Buses No. 1 and No. 2 through circuit breakers on the flight engineer's No. 4 circuit breaker panel.

Aerial Refuel Disconnect Switches

The pilot and copilot have a disconnect switch on the throttles. These same switches are used for the automatic throttle system. Their function is changed to disconnect the switches by a relay deenergized when the aerial refuel master switch is ON. Pressing either of the disconnect switches removes power from the boom latch solenoid and thereby effects a disconnect. A backup disconnect can be initiated by placing the aerial refuel master switch to OFF, or by pressing the reset button.

Reset Switch

The reset switch is a two-position, pushbutton-type switch in the aerial refuel section of the flight engineer's fuel management panel. The switch is spring-loaded to the NORMAL CLOSED position. As such, it becomes an integral part of the power circuit from the aerial refueling control circuit breaker to the signal amplifier. However, this condition is dependent on the mode select switch being in the normal position. The switch is designed to be depressed briefly when the inflight refueling operation ends.

The effect of the flight engineer depressing the reset switch is an interruption of the power circuit to the signal amplifier, ensuring that the toggle latches remain in a released position until the boom has been completely withdrawn from the receptacle.

Depressing the switch also resets or recycles the signal amplifier to the disconnect mode when a rehookup to the tanker is desired.

Door Unlocked Light

The DOOR UNLOCKED light, on the aerial refuel section of the flight engineer's fuel management panel, is designed to illuminate whenever the aerial refuel receptacle door is not locked. The power circuit to the light is controlled through the receptacle closed/locked switch in the UNLOCKED position. The light receives 28V DC power from the Main DC Bus No. 1 through the aerial refueling control circuit breaker. This light is wired directly to the circuit breaker and works independently of the other switches.

Aerial Refuel Override Lights

There are three OVERRIDE lights associated with the aerial refuel system. One is on the aerial refuel section of the flight engineer's fuel management panel, two on the pilot's and copilot's overhead panel. The OVERRIDE lights are powered through the aerial refuel control circuit breaker, master switch, mode select switch (in the OVERRIDE position), and the deenergized aerial refuel throttle switch control relay. These lights will illuminate when the aerial refuel system is being operated in the override mode without the signal amplifier in the circuit.

Aerial Refuel Ready Lights

There are three READY lights associated with the aerial refuel system. One is on the flight engineer's fuel management panel, the other two on the pilot's and copilot's overhead panel. In the normal mode of system operation, the lights are powered from the signal amplifier through the door open switch in the OPEN and LOCKED position.

In the override mode of operation, the lights are powered through the mode select switch, the energized override relay, the reset relay, contact switch, door closed/locked switch, disconnect relay, and another set of contacts of the override relay. The lights indicate, when illuminated, that the aerial refueling slipway door is opened and locked and that the signal amplifier is in the READY mode.

Aerial Refuel Latched Lights

There are three LATCHED lights associated with the aerial refuel system. One is on the flight engineer's fuel management panel, and two are on the pilot's and copilot's overhead panel. In the normal mode of system operation, the lights are powered from the signal amplifier, through the deenergized override relay, and the receptacle latch switch in the LATCHED position. These lights will illuminate when the tanker boom is latched in the receptacle.

In the override mode of operation, the lights are powered from the aerial refueling control circuit breaker through the master switch and the mode select switch, the energized override relay, and the receptacle latch switch in the LATCHED position.

Aerial Refuel Disconnect Lights

There are three DISCONNECT lights associated with the aerial refuel system. One is on the aerial refuel section of the flight engineer's panel and the other two are located on the pilot's and copilot's overhead panel. In the normal mode of operation, the lights are powered from the signal amplifier through the receptacle contact switch in the NO CONTACT position. In the override mode of operation, the lights are powered from the aerial refueling control circuit breaker, through the master and the mode select switches, the energized override and disconnect relays, and the receptacle contact switch in the NO CONTACT position. These lights will illuminate when the tanker boom is disconnected from refueling receptacle and will remain illuminated until the system is reset or the master switch is placed in the OFF position.

Chapter 5

LIGHTING

(Figure 1-41)

Exterior LightsLanding Lights

A sealed beam landing light is mounted on the bottom of each wing, between the engine pylons. Each light is controlled by two switches on the pilot's overhead panel -- a switch marked RET - OFF - EXT and a light control switch. Either light may be stopped between its extended and retracted positions by moving its respective RET - OFF - EXT switch to OFF. The left or right light control switch turns its respective light ON or OFF. A LANDING LIGHT EXTENDED caution light, on the overhead panel, will come on any time either landing light is not in the fully retracted position.

Formation Lights

Nine formation lights are installed on the aircraft: Three on each wing, and three on the fuselage top, aft of the wing. All are controlled by a three position formation light switch marked DIM, OFF and BRIGHT.

Navigation Lights

The navigation light system consists of three, two-bulb light assemblies. A red light is on the left wing tip, a green light is on the right wing tip, and a white light is on the tail cone. These lights do not flash, but are illuminated continuously. The navigation lights are controlled by a two-position ON-OFF switch.

Anti-Collision Lights

The anti-collision lights system consists of three rotating anti-collision lights. One is on top of the fuselage in line with the wing, one on the bottom of the fuselage on the same line, and one on the upper surface of the horizontal stabilizer.

The lights are controlled by a three-position switch, LOWER-OFF-ALL, which allows the top light to be turned off during inflight refueling.

Taxi Lights

Two taxi lights are mounted on the inside of each main landing gear door. Operation of these four lights is controlled by one ON-OFF switch on the pilot's overhead panel. In addition, there is an interconnect between this switch and the wing leading edge lights, so that when the taxi lights are turned on the wing leading edge lights are also turned on.

Wing Leading Edge Lights

A light is installed on each side of the fuselage in a position that will illuminate the engine pylons and the leading edge of each wing. A wing leading edge light switch, installed on the overhead panel, allows these lights to be turned ON independently of the taxi lights. These lights may also be controlled by a rheostat on the flight engineer's AR lighting panel, when the AR MASTER switch is on.

Wheel Well Lights

One wheel well light is installed in each wheel well for illumination of the landing-gear-down lock. Each light is controlled individually by its respective wheel well light switch. The wheel well light switches are adjacent to each landing gear observation window.

UARRSI Lights

UARRSI lighting is provided by three fairing lights and twelve slipway lights. The fairing lights are on the forward fuselage just ahead of the UARRSI fairing. They are controlled from the flight engineer's air refueling lighting panel as long as the AR MASTER switch is on. Six slipway lights on each side of the slipway are also controlled from the flight engineer's panel providing the AR MASTER switch is on.

Interior Lights

Interior lighting is achieved by use of many individual lighting systems. Flight station lighting consists of instrument lights, instrument panel lights, and utility lights at each of the crew stations. Lighting is also available in the lavatory, underdeck areas, aft crawlway, and vertical stabilizer tunnel. General illumination throughout the flight station and cargo compartment is provided by overhead dome lights.

Emergency Exit Lights

Provisions for eleven emergency exit lights are installed in the aircraft -- one at each emergency exit and at the crew and troop doors. Each emergency exit light contains batteries for independent operation. They are charged by aircraft electrical power.

A three-position (TEST, ARM, and EXTING) EMER EXIT switch on the pilots' overhead panel and two inertia switches, just aft of the crew entrance door, are the only controls for the system.

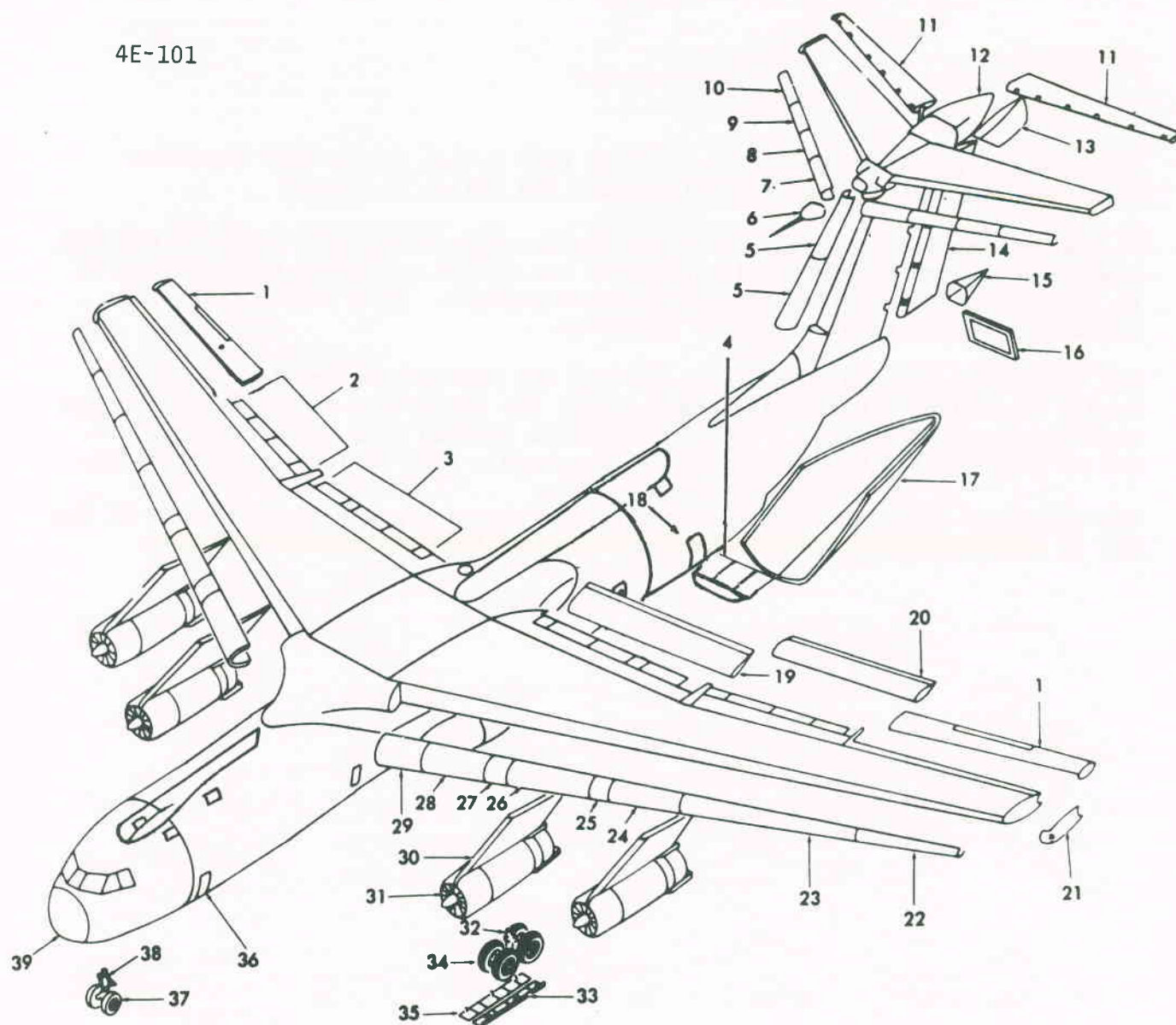
The EMER EXIT switch is springloaded to the ARM position. With the switch in this position, loss of electrical power to main DC Bus No. 1 or a sudden deceleration causes the lights to illuminate with power from the internal batteries. The lights will extinguish when power is restored or the inertia switches are reset. Resetting of the inertia switch is accomplished by a reset switch on the inertia switch housing.

The lights are tested by placing the EMER EXIT switch to the TEST position. When released, spring tension will return the switch to "ARM."

To prevent continuous operation of the lights after electrical power is removed, momentarily place the EMER EXIT switch to the EXTING position, then release it to the ARM position prior to removing battery power. This extinguishes the lights and rearms them for normal operation.

The lights can be made portable by pulling the red release handle. When the handle is pulled, a quick disconnect severs the electrical connections, and the light remains illuminated. Once the light is removed from the receptacle, it can be extinguished by placing the release handle back to its normal position.

The emergency exit lights receive arming and charging power from the Main DC Bus No. 1; the extinguishing circuits receive power from the Isolated DC Bus.



INDEX NO.	NOMENCLATURE	LBS.	INDEX NO.	NOMENCLATURE	LBS.
1.	AILERON.....	524	20.	OUTBOARD FLAP.....	666
2.	UPPER OUTBOARD SPOILERS..... UP TO APPROX 33		21.	WING TIP.....	22
	LOWER OUTBOARD SPOILERS..... UP TO APPROX 15		22.	OUTBOARD WING LEADING EDGE.....	88
3.	UPPER INBOARD SPOILERS..... UP TO APPROX 50		23.	OUTBOARD WING LEADING EDGE.....	106
	LOWER INBOARD SPOILERS..... UP TO APPROX 17		24.	OUTBOARD WING LEADING EDGE.....	132
4.	CARGO RAMP.....	975	25.	OUTBOARD WING LEADING EDGE.....	38
5.	VERTICAL STABILIZER LEADING EDGE.....	14	26.	OUTBOARD WING LEADING EDGE.....	140
6.	HF ANTENNA.....	32	27.	INBOARD WING LEADING EDGE.....	46
7.	HORIZONTAL STABILIZER LEADING EDGE.....	23	28.	INBOARD WING LEADING EDGE.....	93
8.	HORIZONTAL STABILIZER LEADING EDGE.....	21	29.	INBOARD WING LEADING EDGE.....	104
9.	HORIZONTAL STABILIZER LEADING EDGE.....	19	30.	PYLON.....	700
10.	HORIZONTAL STABILIZER LEADING EDGE.....	17	31.	POWER PACKAGE (DRAINED).....	6700
11.	ELEVATOR.....	384	32.	MAIN LANDING GEAR (INCL TIRES).....	3900
12.	LORAN ANTENNA.....	8	33.	OUTBOARD MAIN LANDING GEAR DOOR.....	61
13.	FAIRING.....	29	34.	MLG WHEEL AND TIRE ASSEMBLY.....	486
14.	RUDDER.....	222	35.	INBOARD MAIN LANDING GEAR DOOR.....	18
15.	TAIL CONE.....	35	36.	CREW DOOR.....	50
16.	PRESSURE DOOR.....	290	37.	NLG WHEEL AND TIRE ASSEMBLY.....	135
17.	PETAL DOOR (ONE SIDE ONLY).....	375	38.	NOSE LANDING GEAR (INCL TIRES).....	900
18.	TROOP DOORS (2).....	86	39.	RADOME.....	60
19.	INBOARD FLAP.....	1016			

Major Component Weights

Figure 1-1

ACCESS FOR EMPENNAGE MAINTENANCE

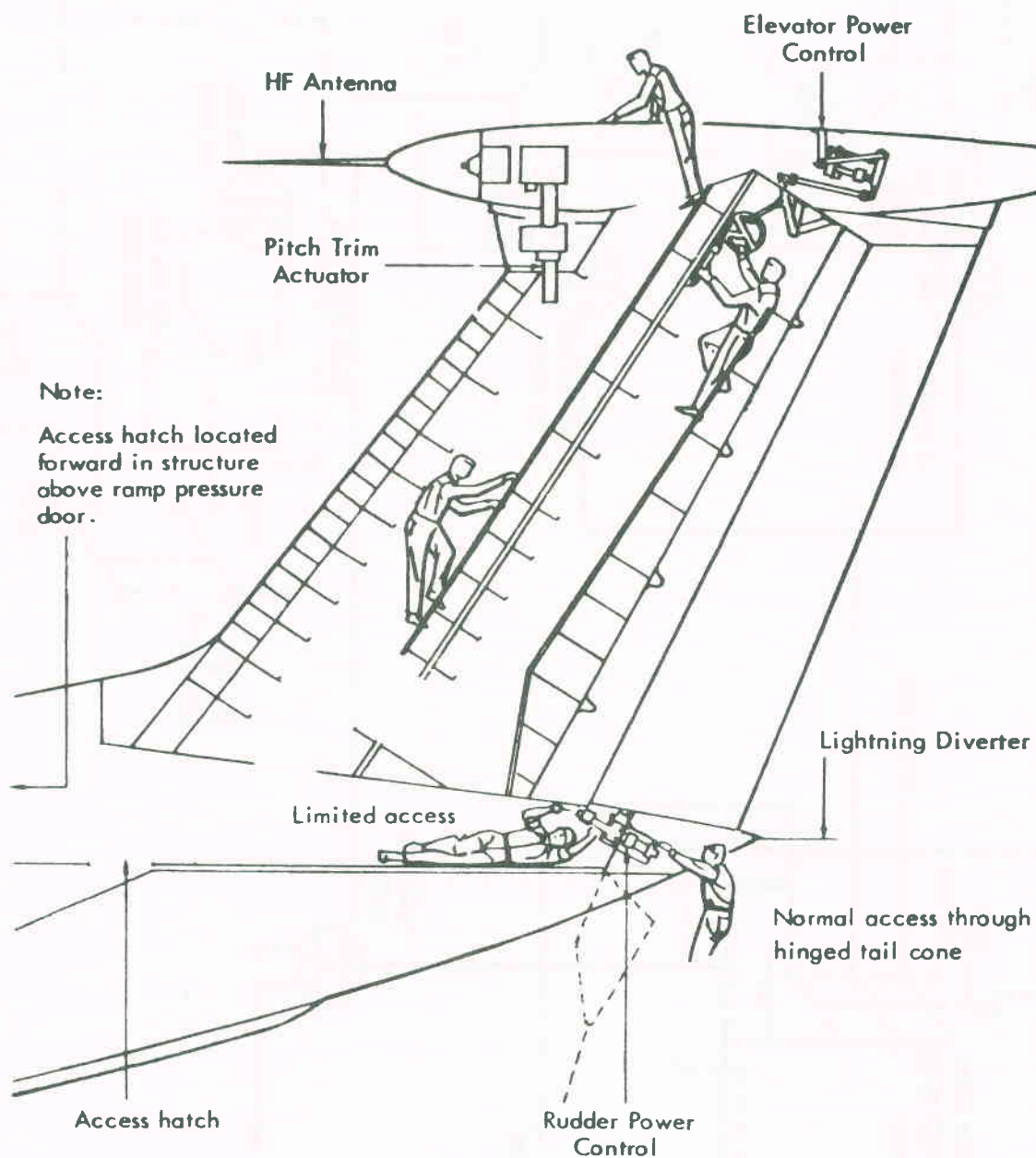


Figure 1-2

DOOR WARNING AND INDICATING SYSTEM

1 OF 3

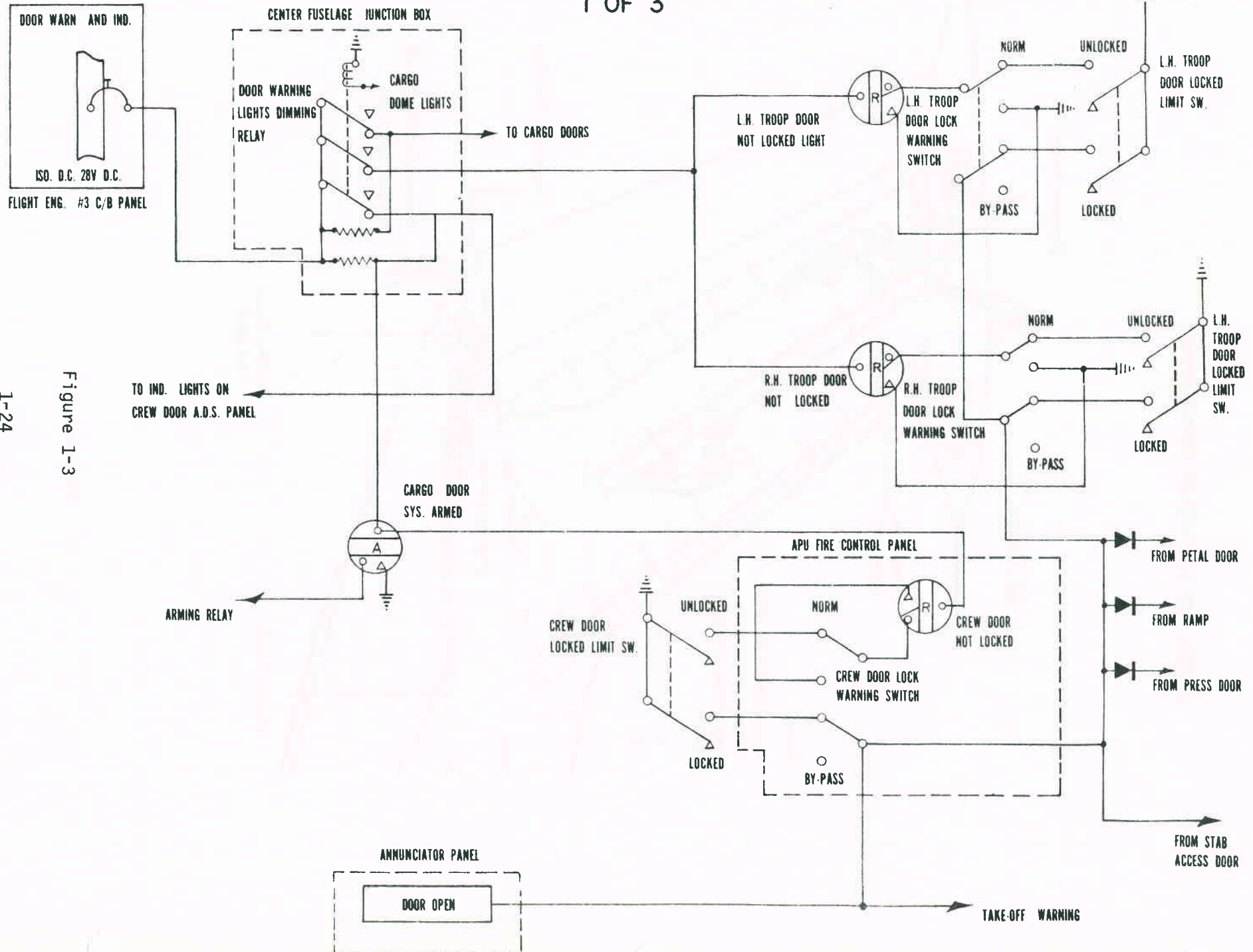


Figure 1-3

1-24

DOOR WARNING AND INDICATING SYSTEM

2 OF 3

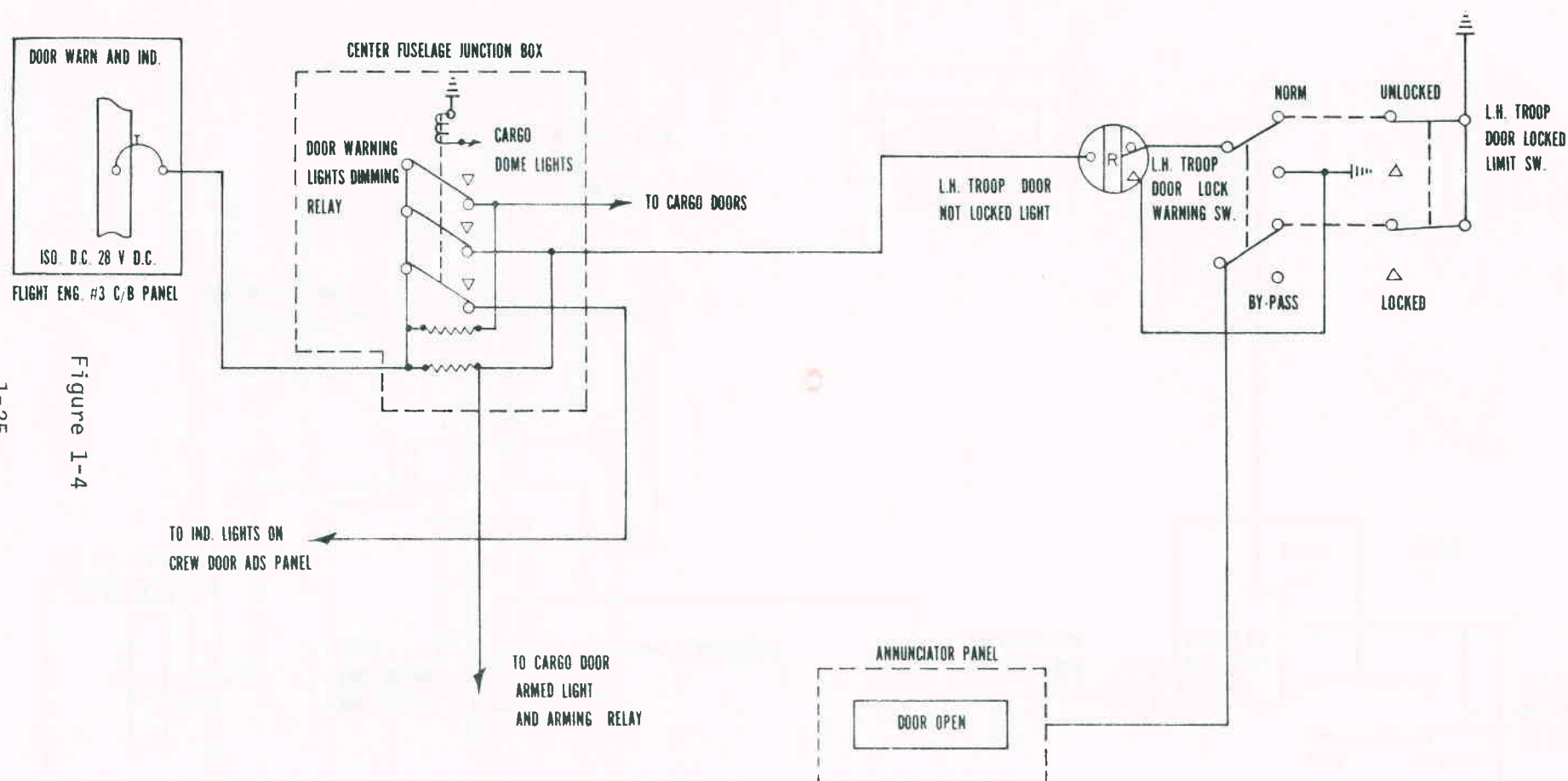


Figure 1-4

DOOR WARNING AND INDICATING SYSTEM

3 OF 3

4E-101

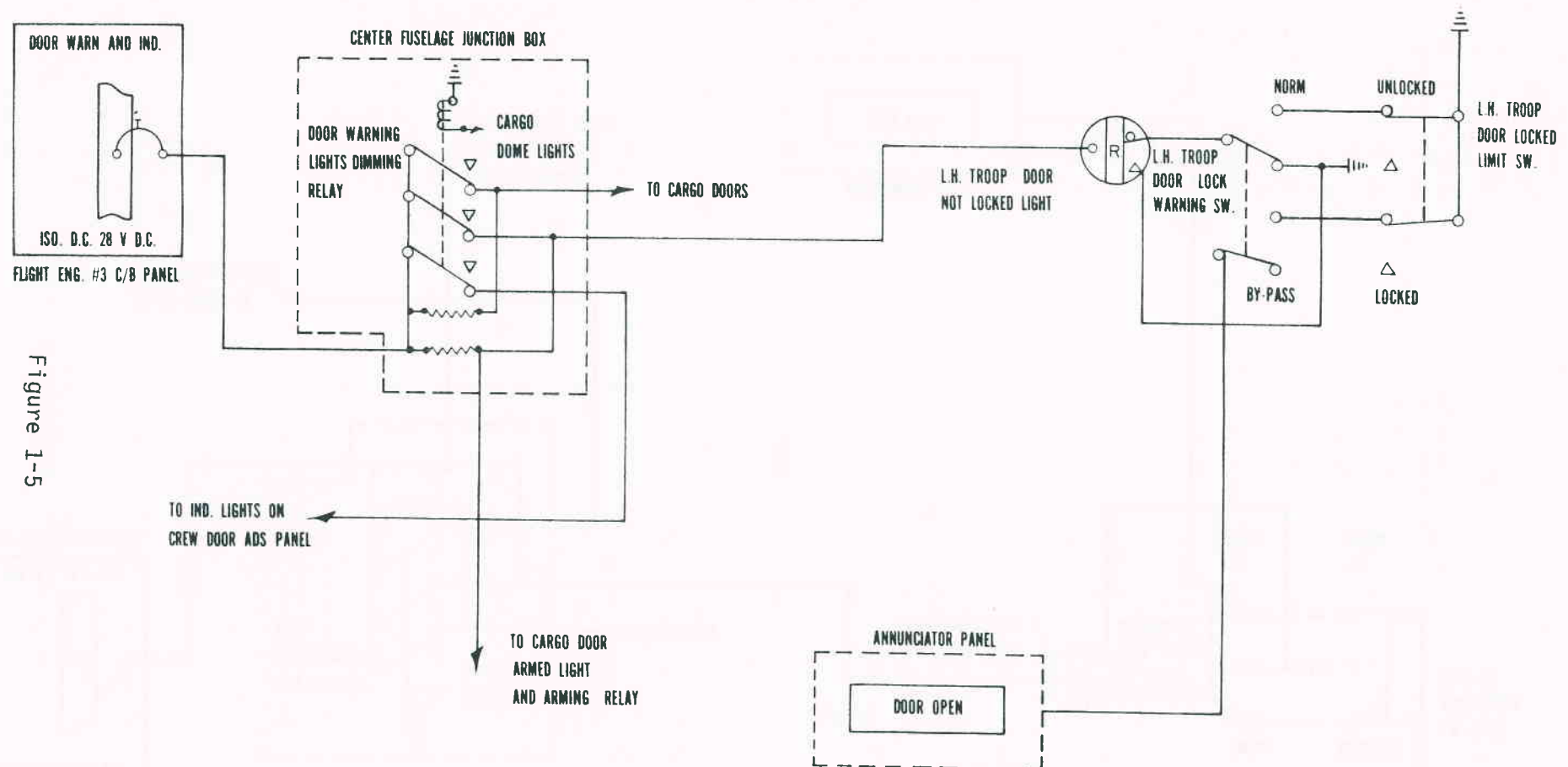


Figure 1-5

TAKE OFF LIGHT SCHEMATIC

4E-101

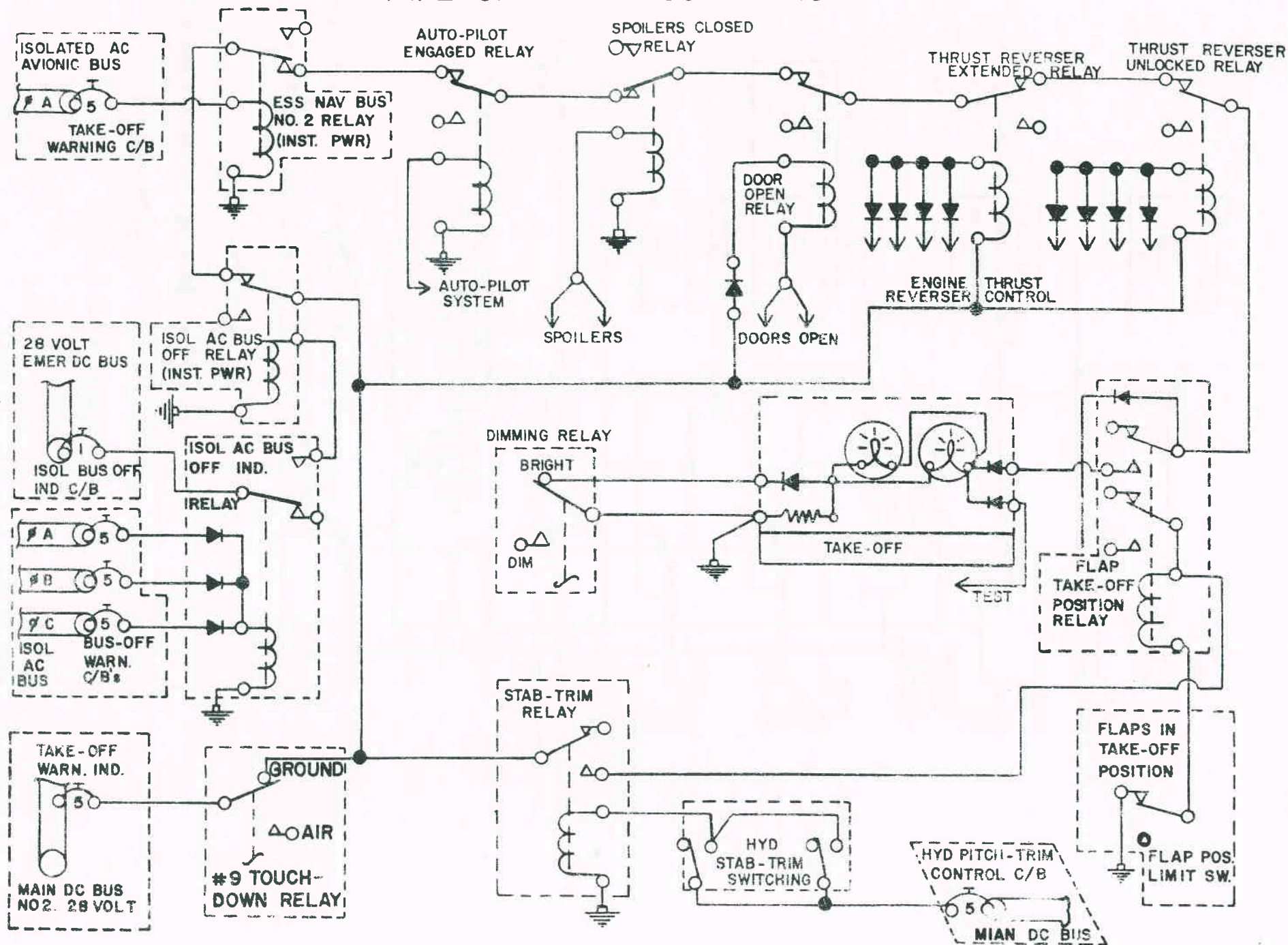
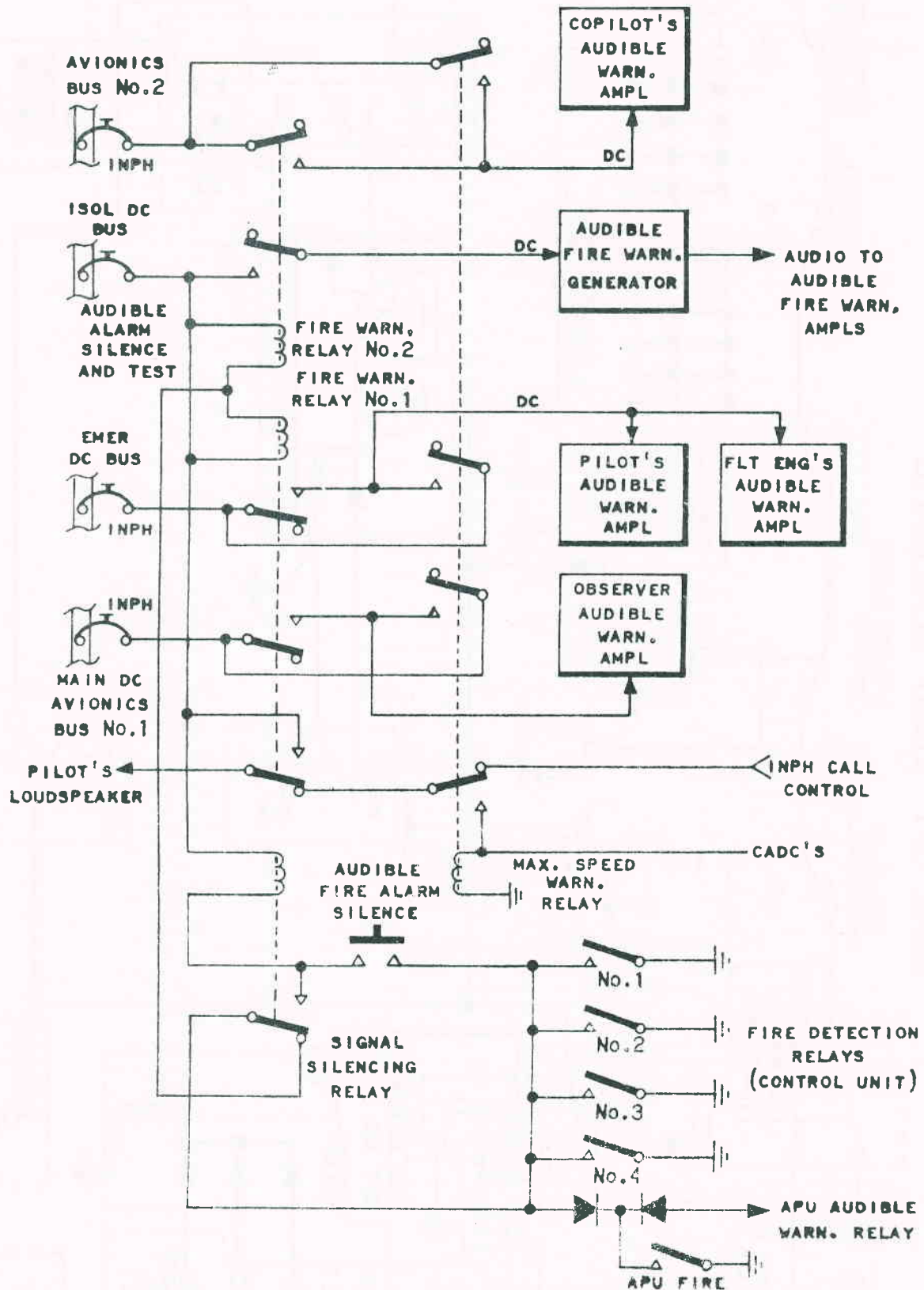
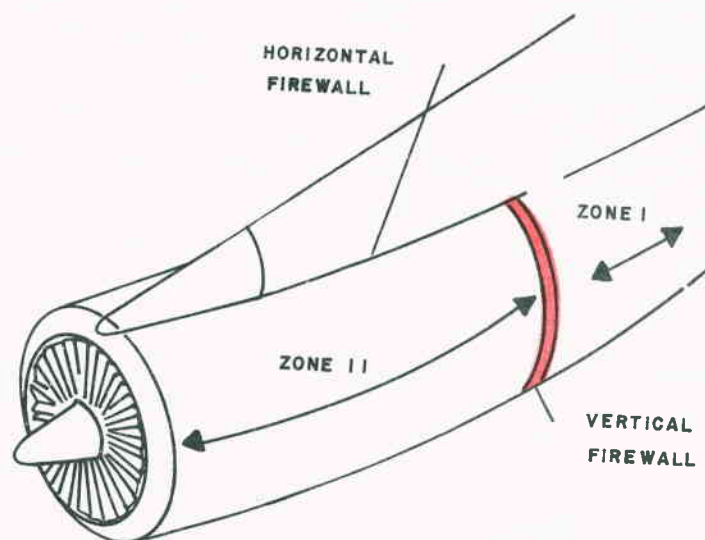


Figure 1-6
1-27

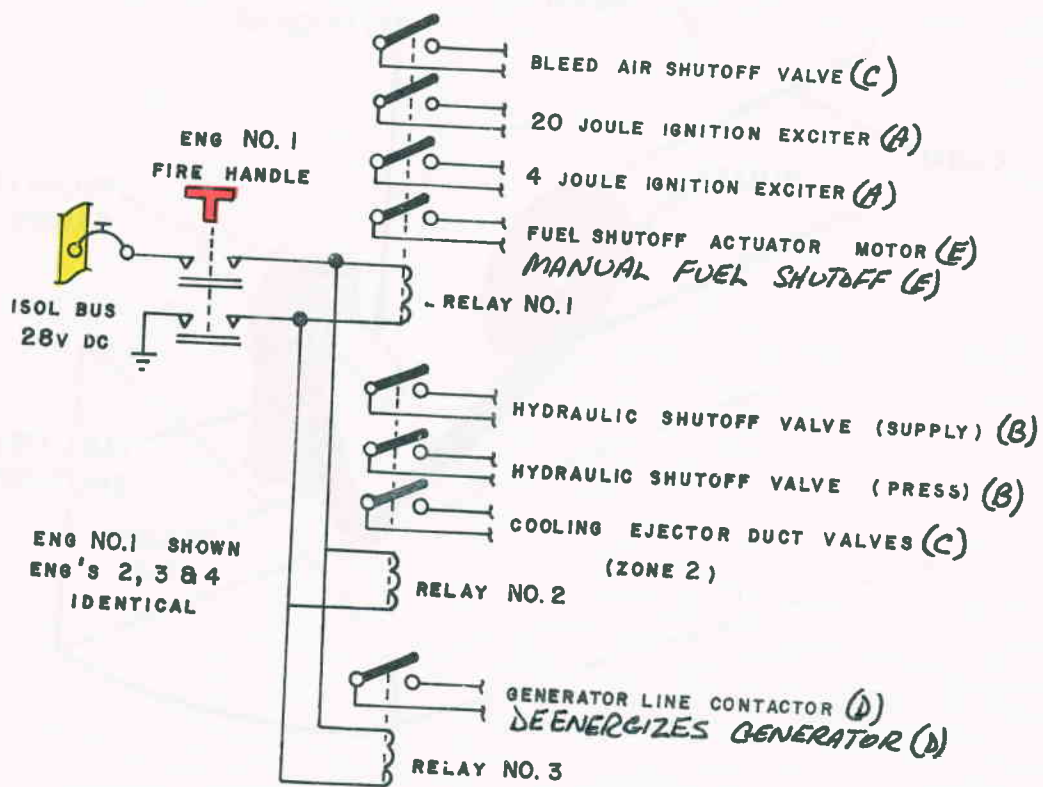


AUDIBLE WARNING RELAY CIRCUITS

Figure 1-7

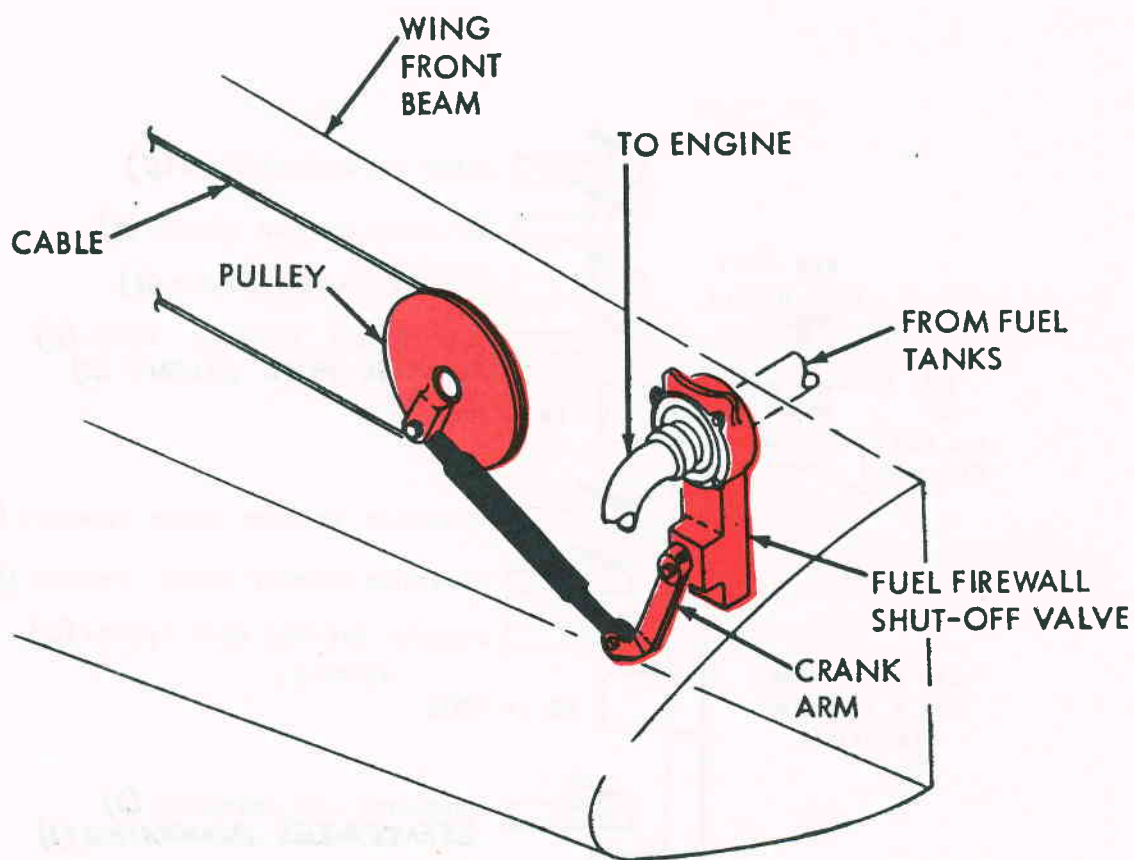


ENGINE FIREWALLS



ENGINE FIRE ISOLATION SYSTEM CIRCUIT SCHEMATIC

Figure 1-8



MANUAL FUEL SHUTOFF VALVE
Figure 1-9

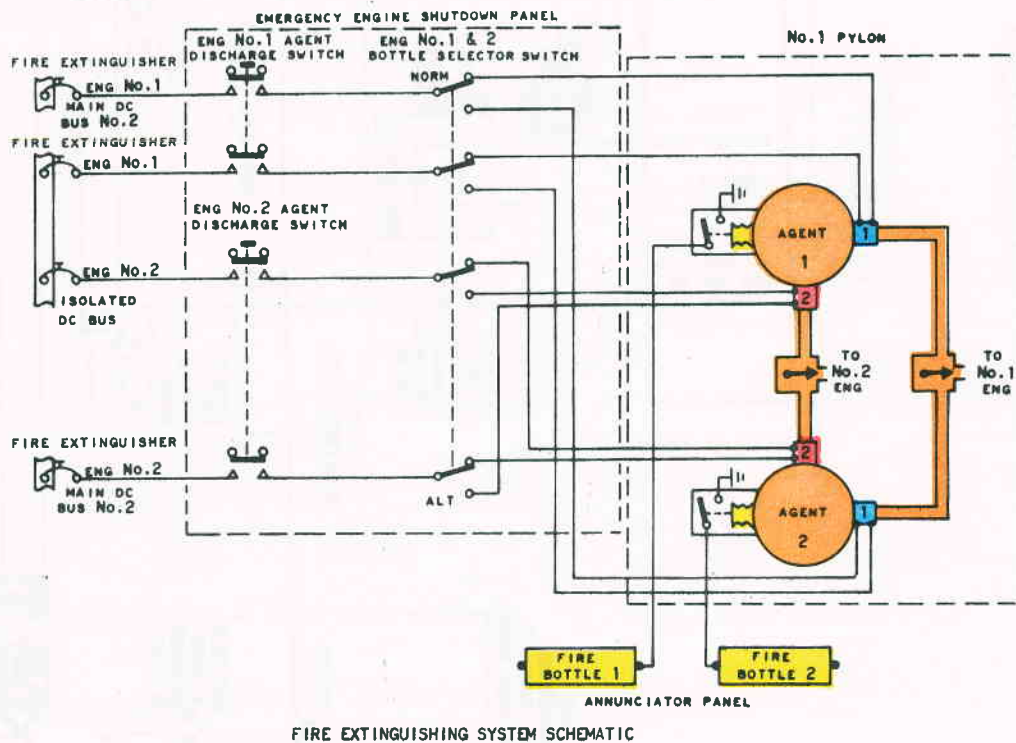
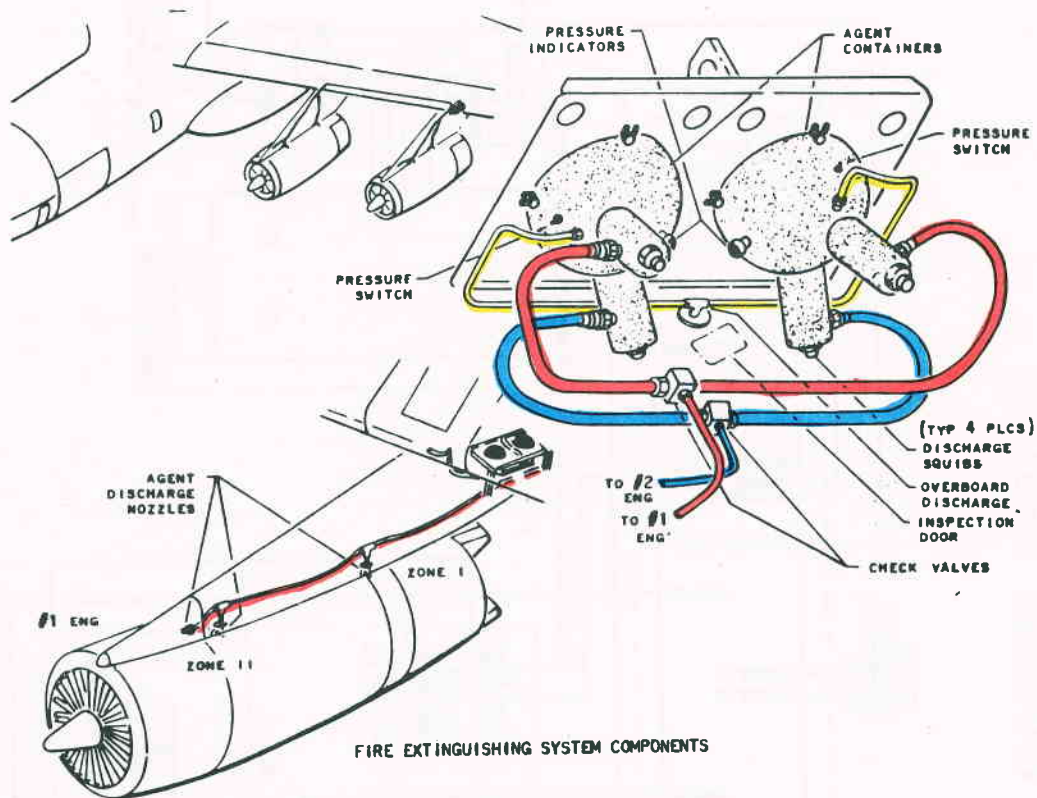


Figure 1-10

ENGINE FIRE AND PYLON OVERHEAT WARNING SYSTEM

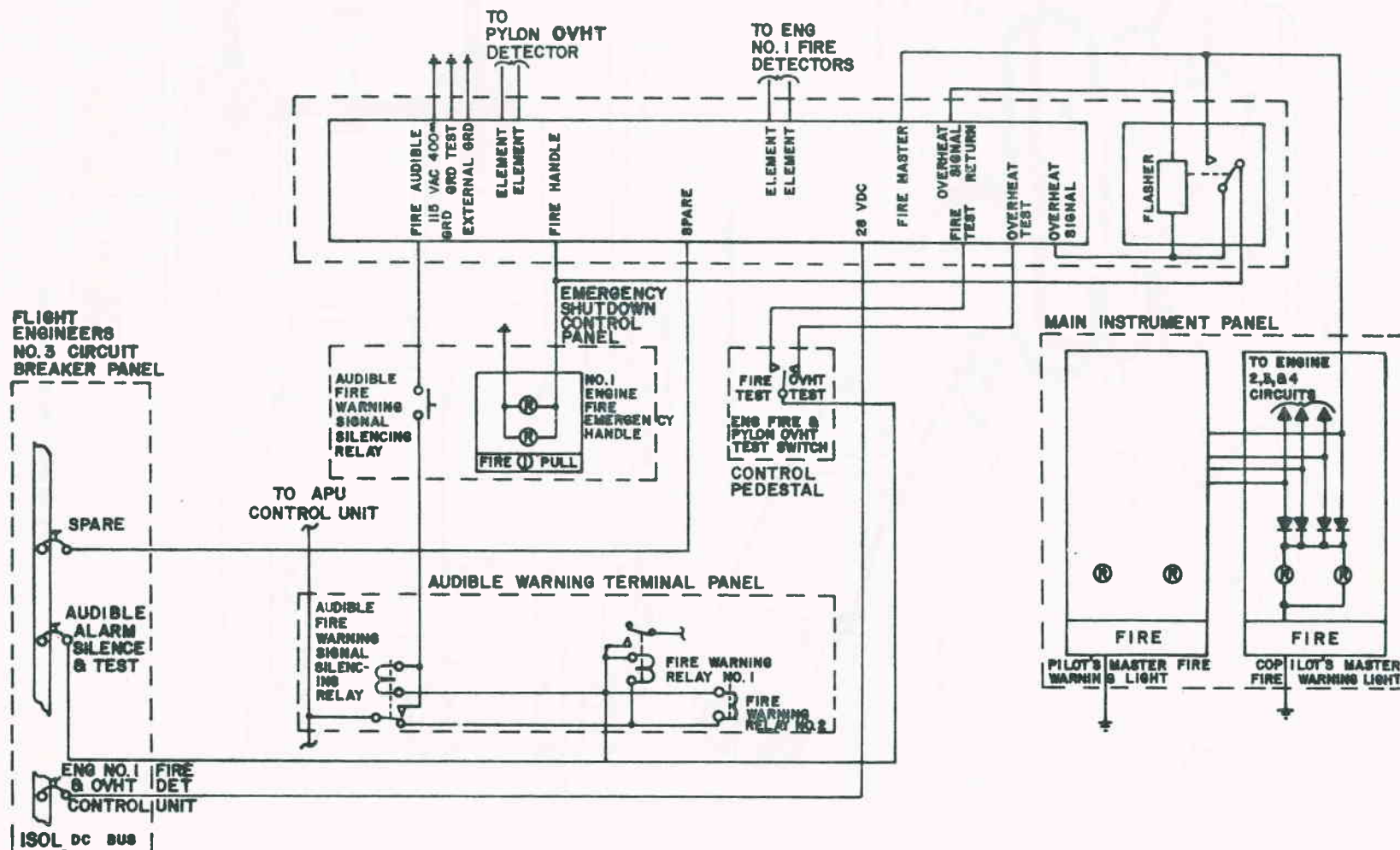


Figure 1-11
1-32

PYLON NO. 1 OVERHEAT DETECTOR

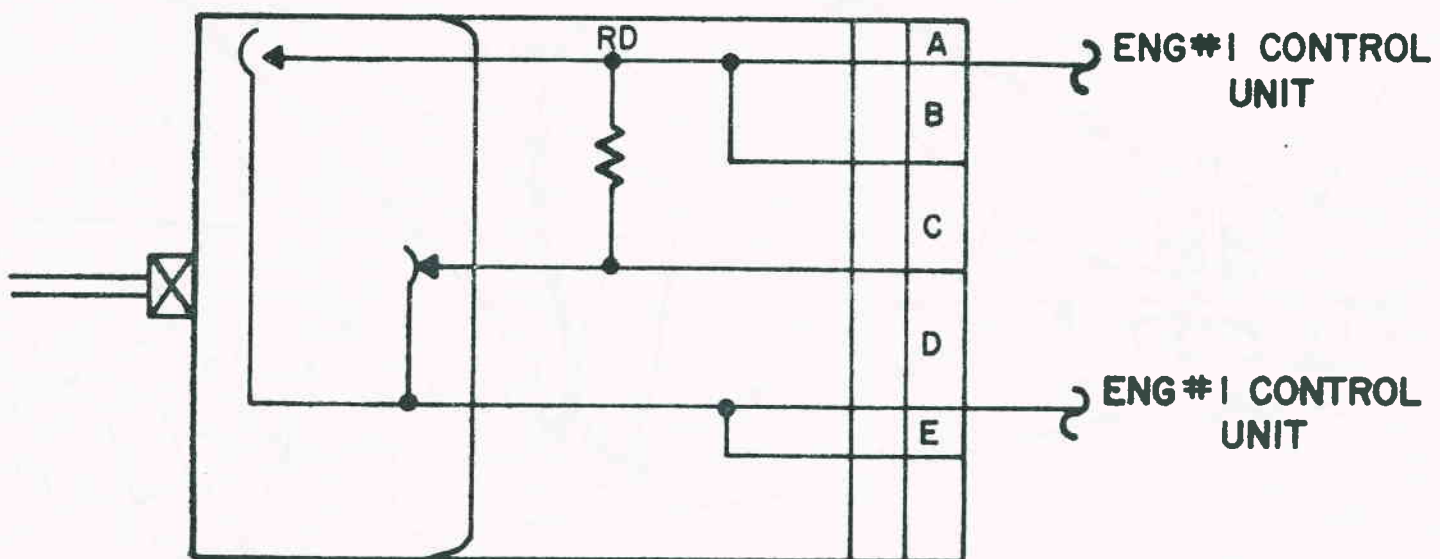


Figure 1-12
1-33

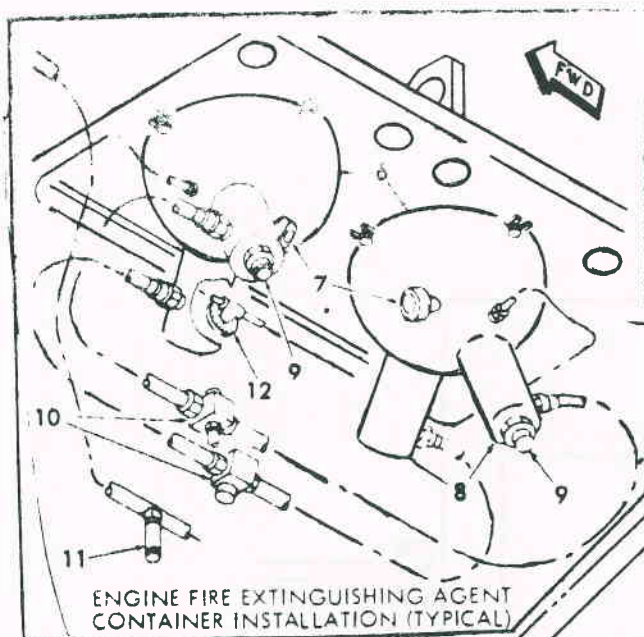
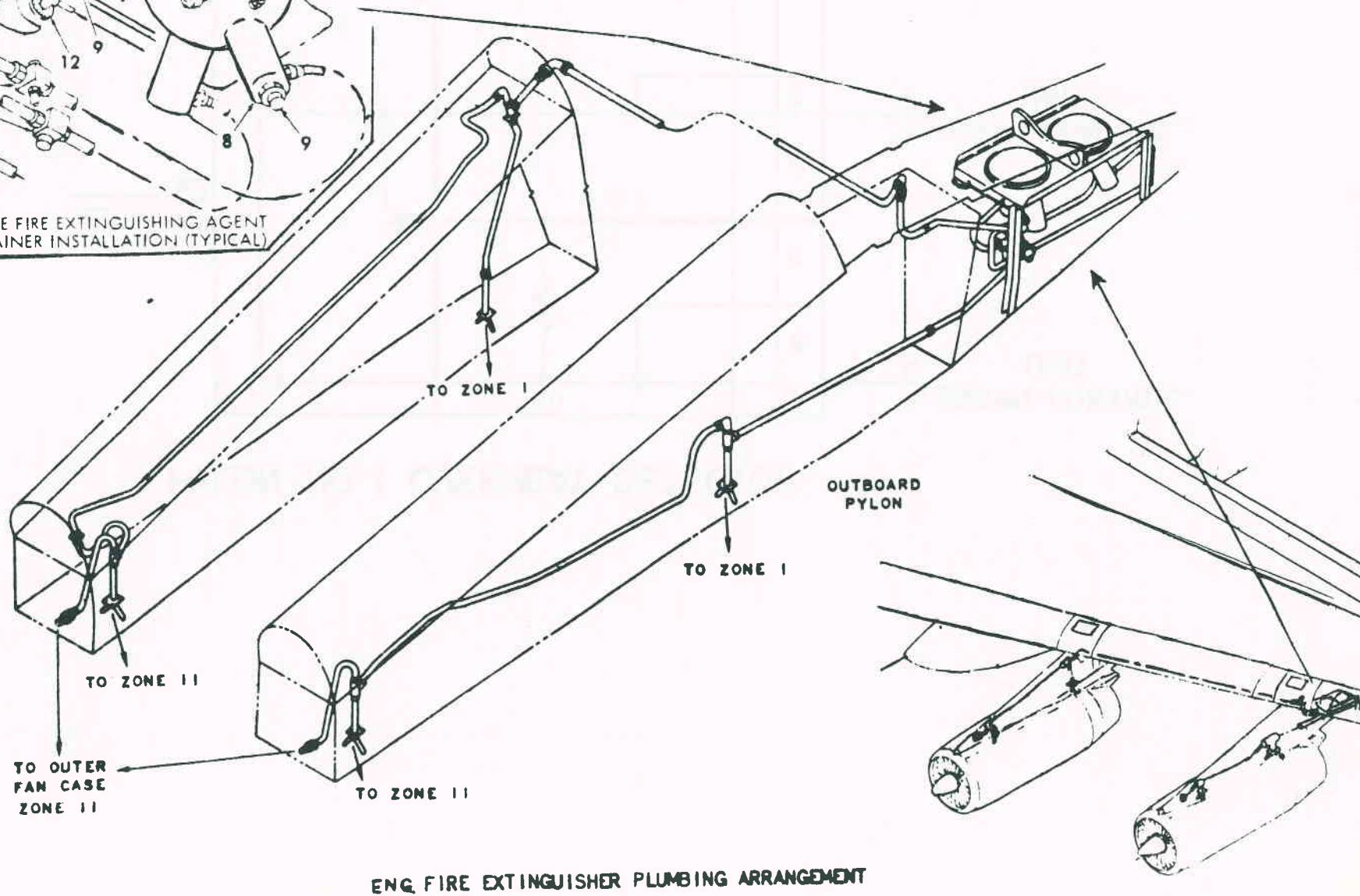
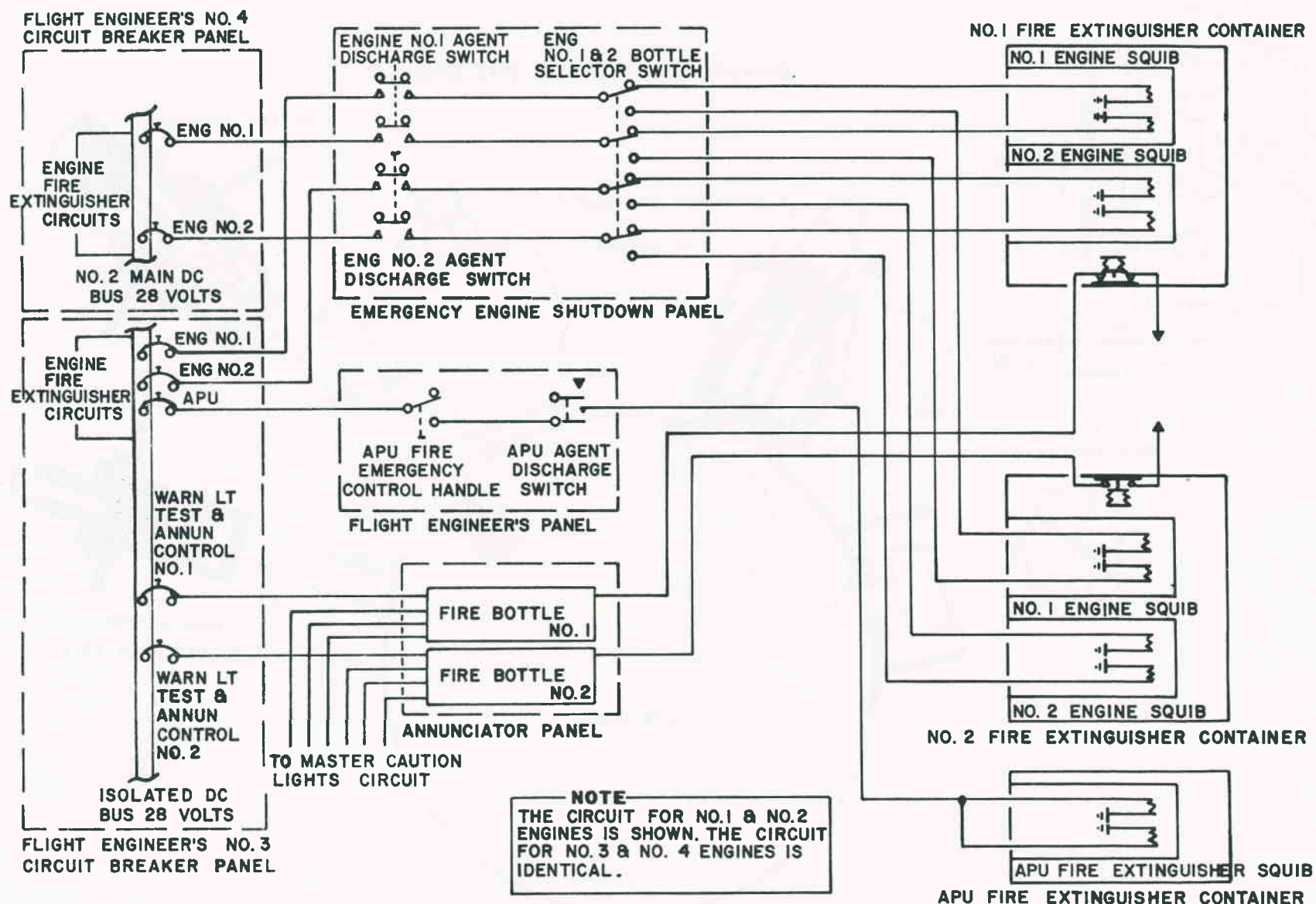


Figure 1-13

1-34





**ENGINE & APU FIRE EXTINGUISHING
SYSTEM SCHEMATIC DIAGRAM**

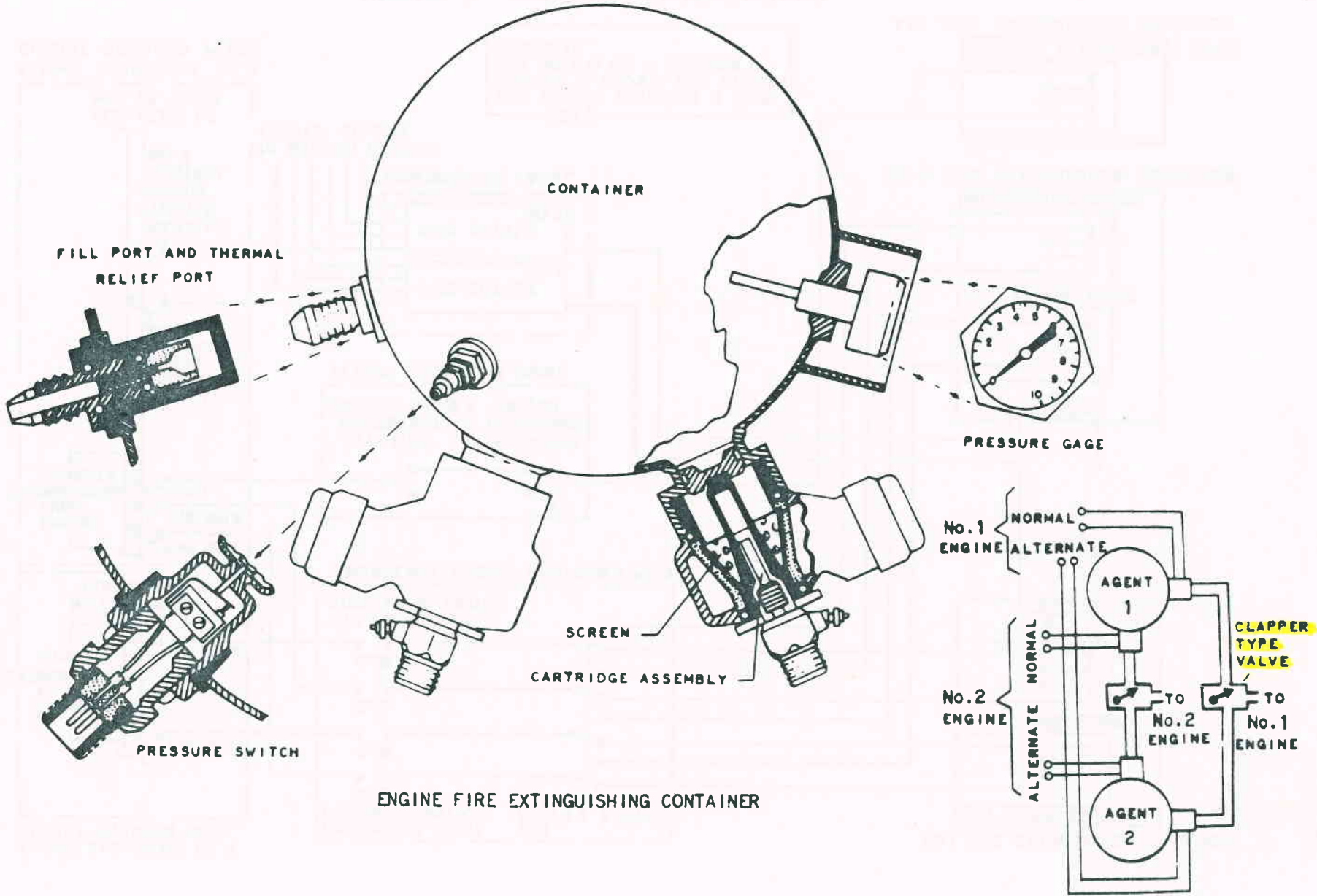
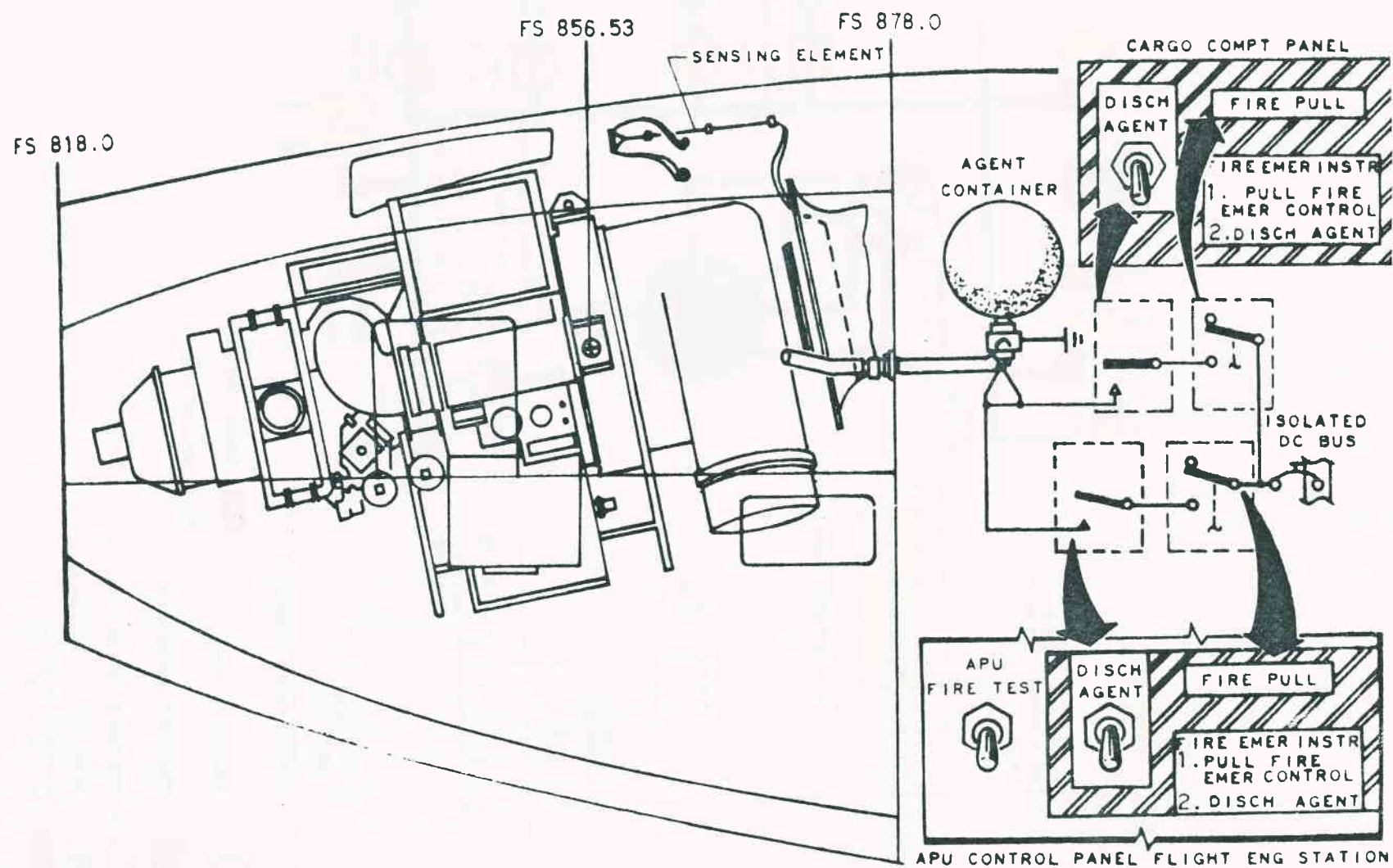
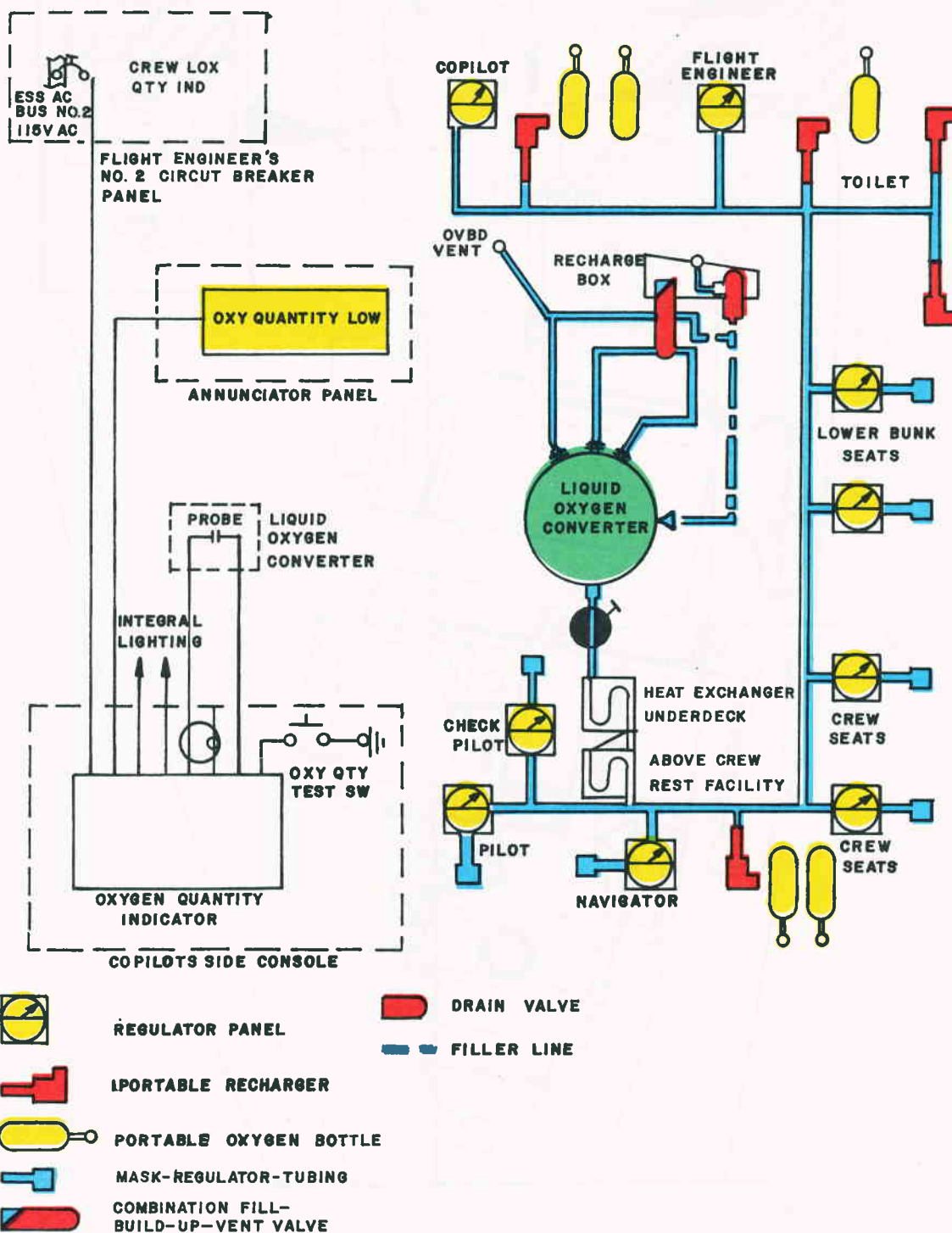


Figure 1-15

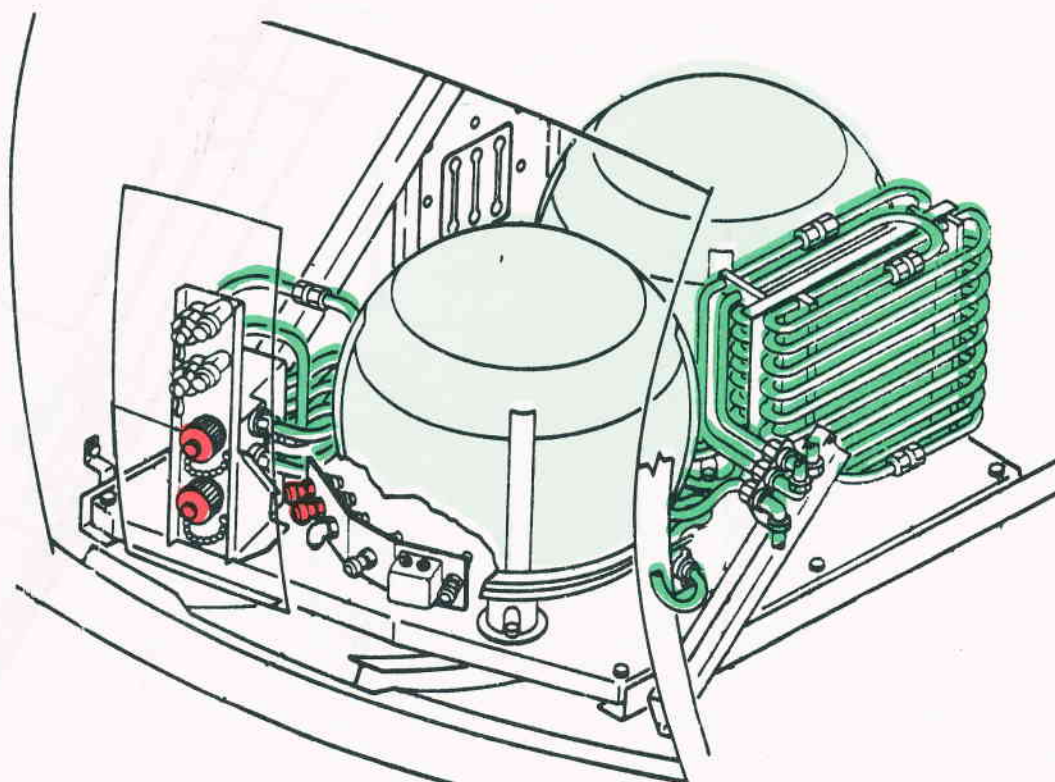
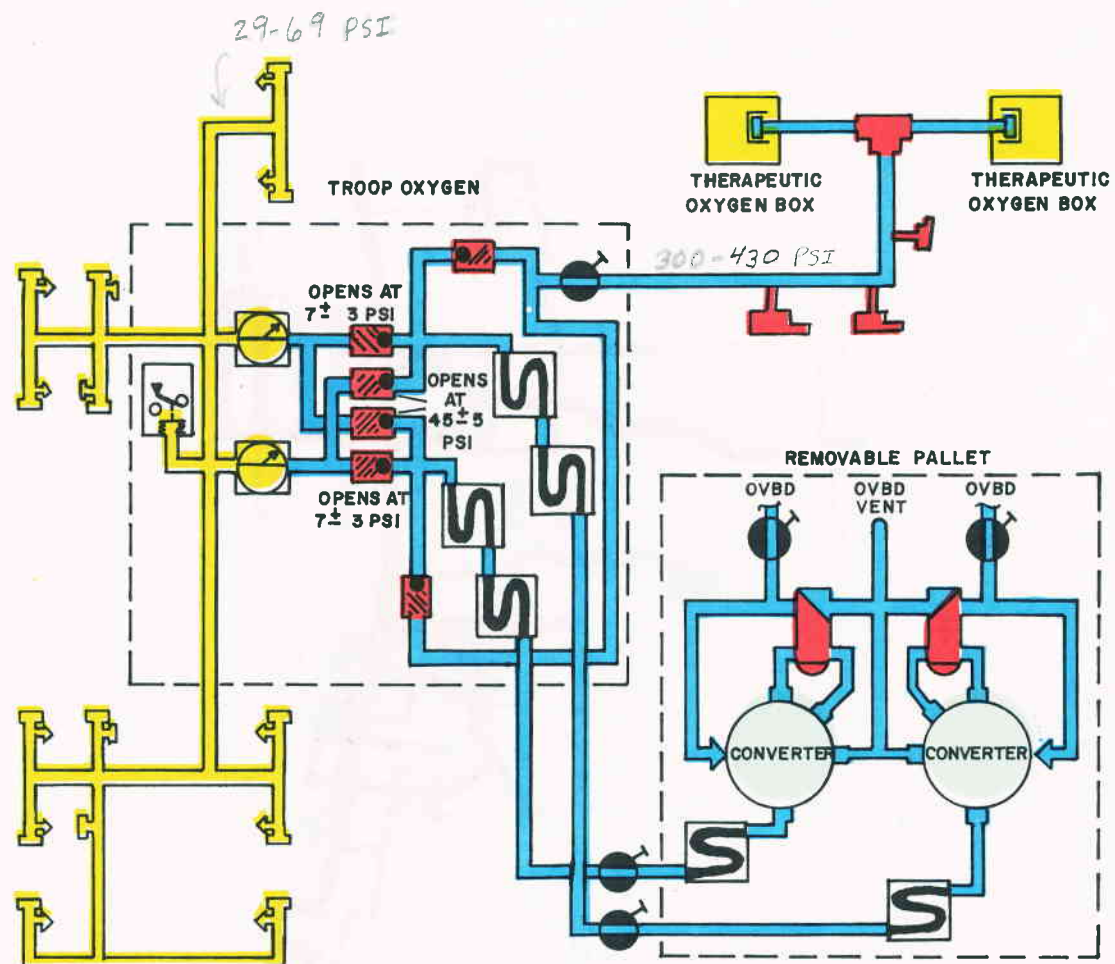


APU FIRE EXTINGUISHING
SCHEMATIC AND COMPONENT LOCATIONS

Figure 1-16



CREW OXYGEN SYSTEM SCHEMATIC DIAGRAM
Figure 1-17



TROOP OXYGEN SYSTEM
Figure 1-18

C-141B FUEL SYSTEM

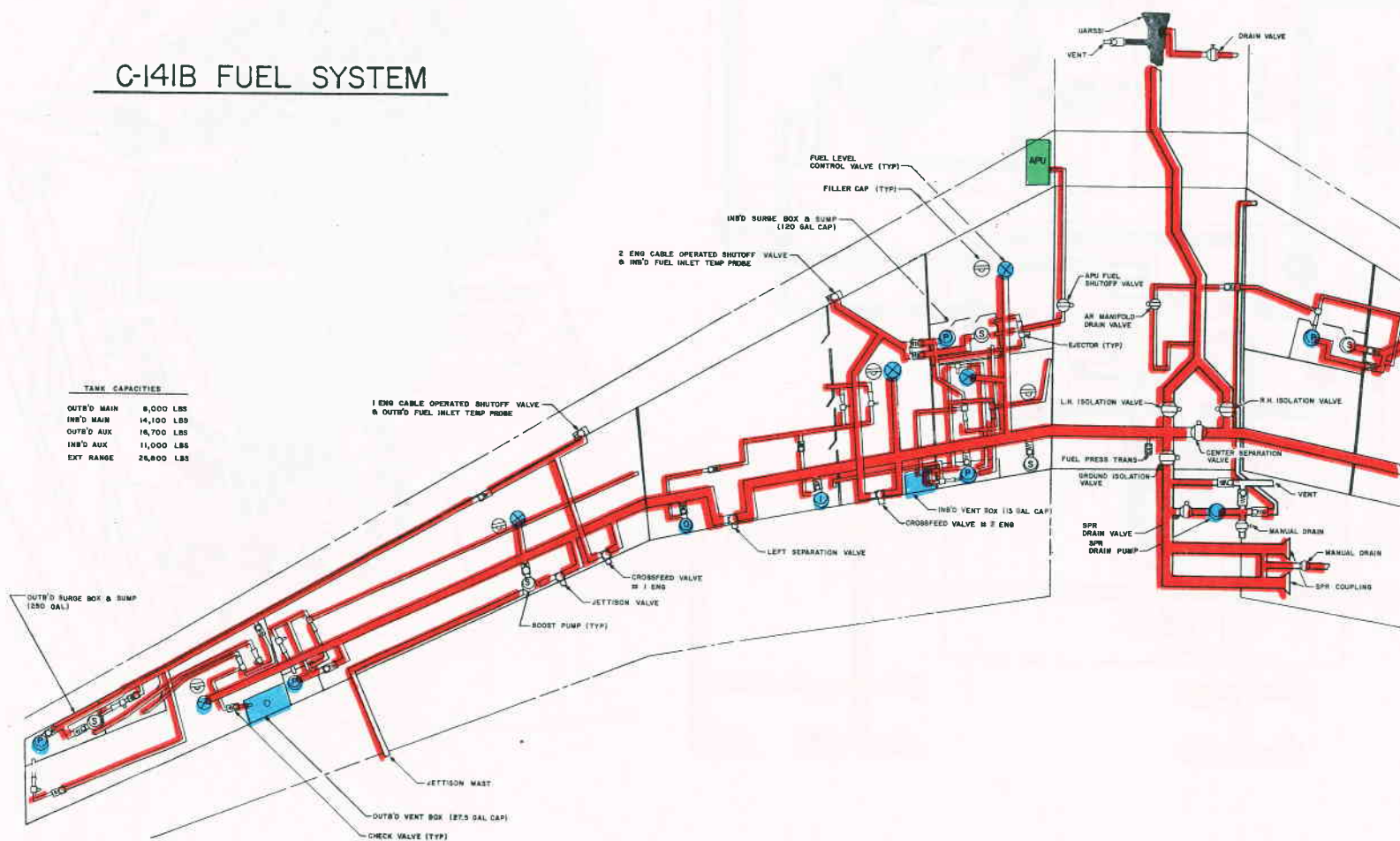


Figure 1-19

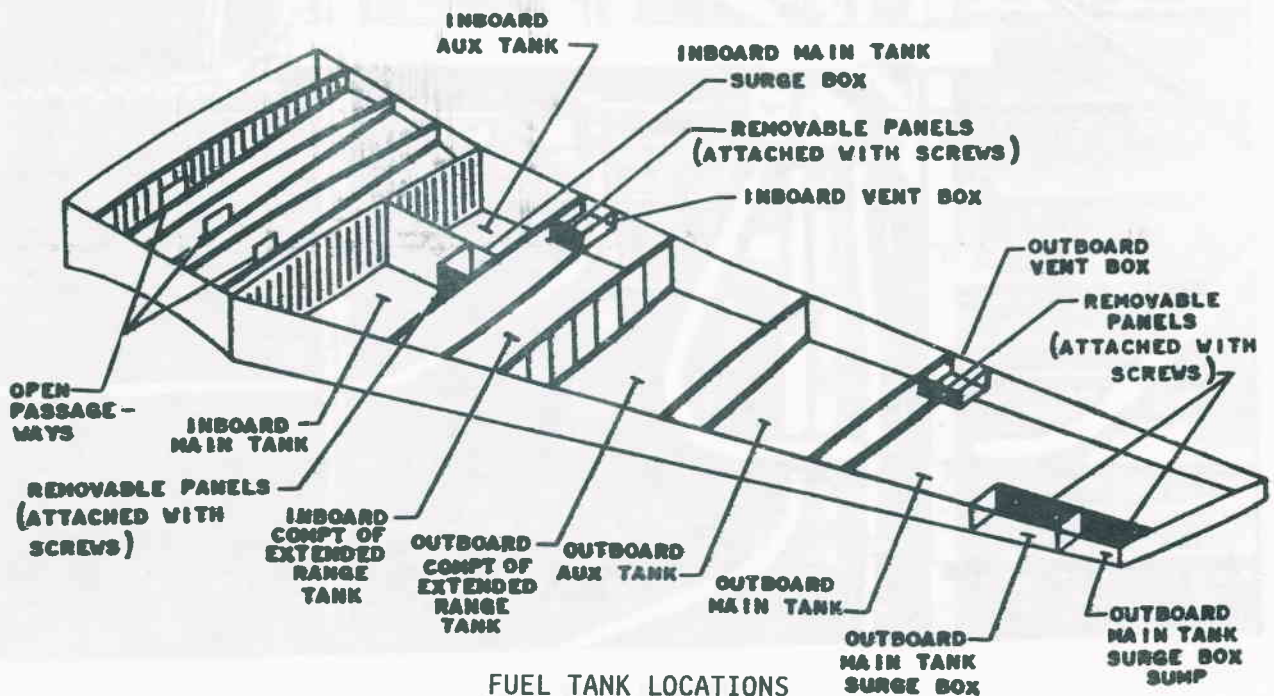
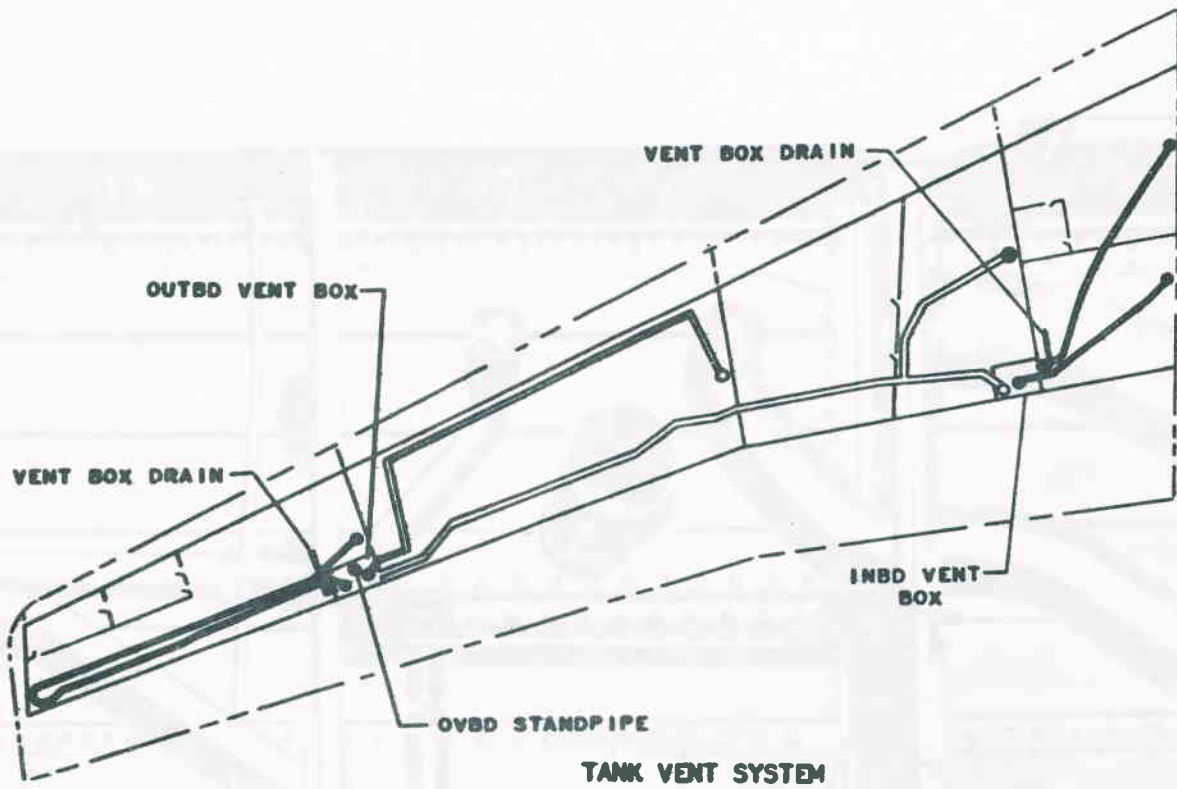
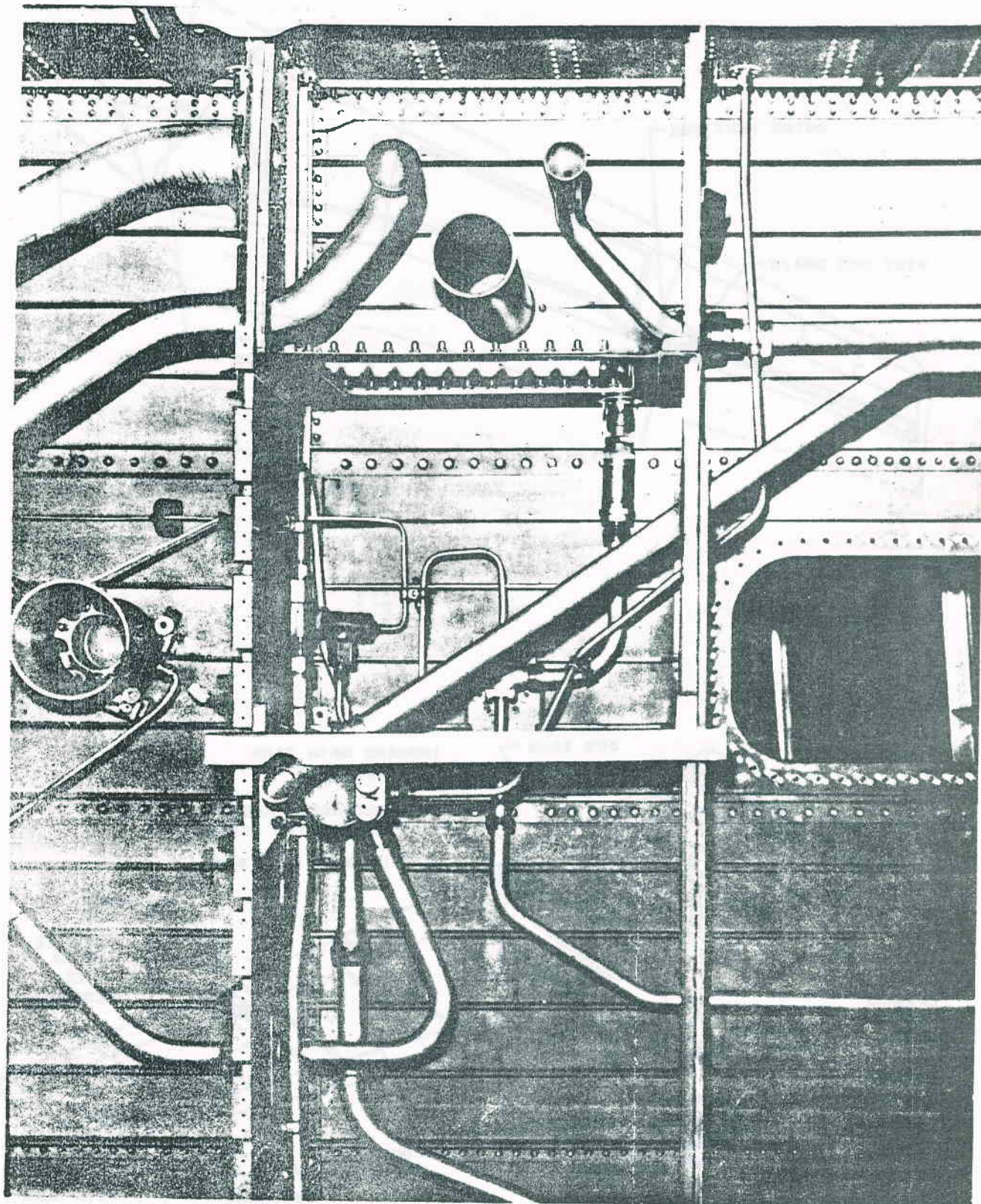
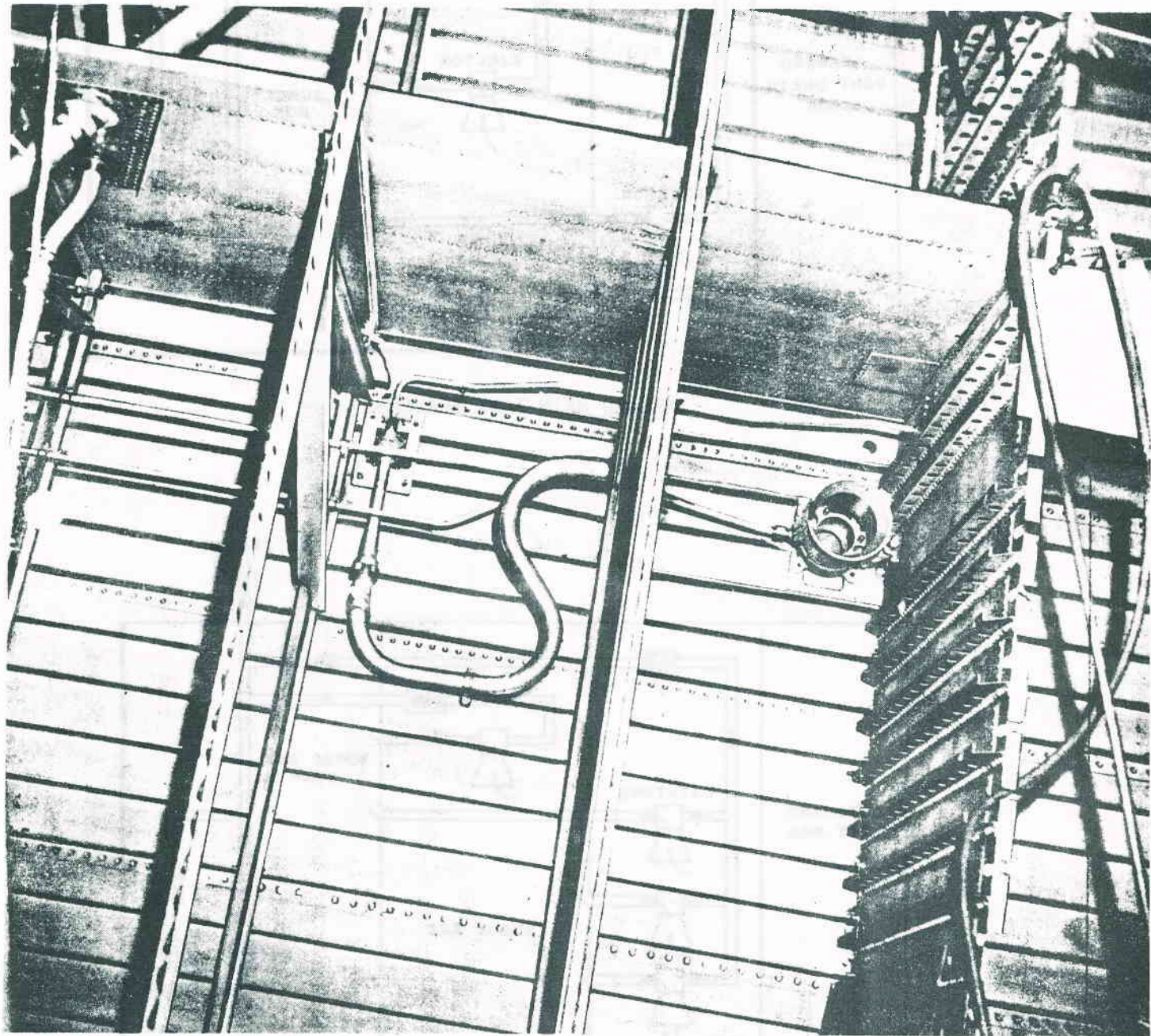


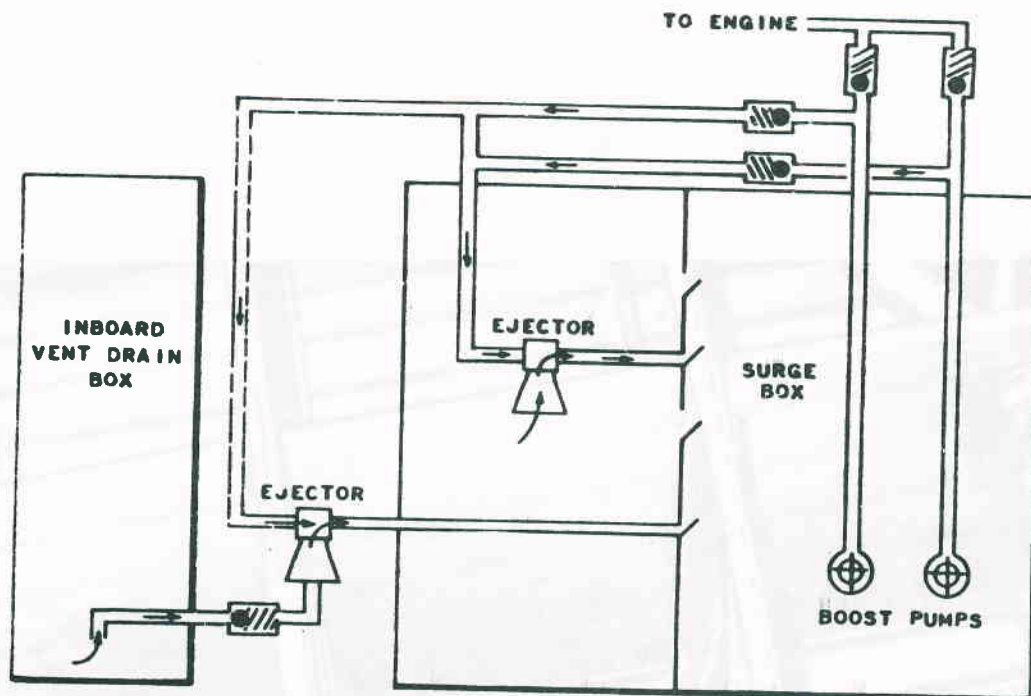
Figure 1-20



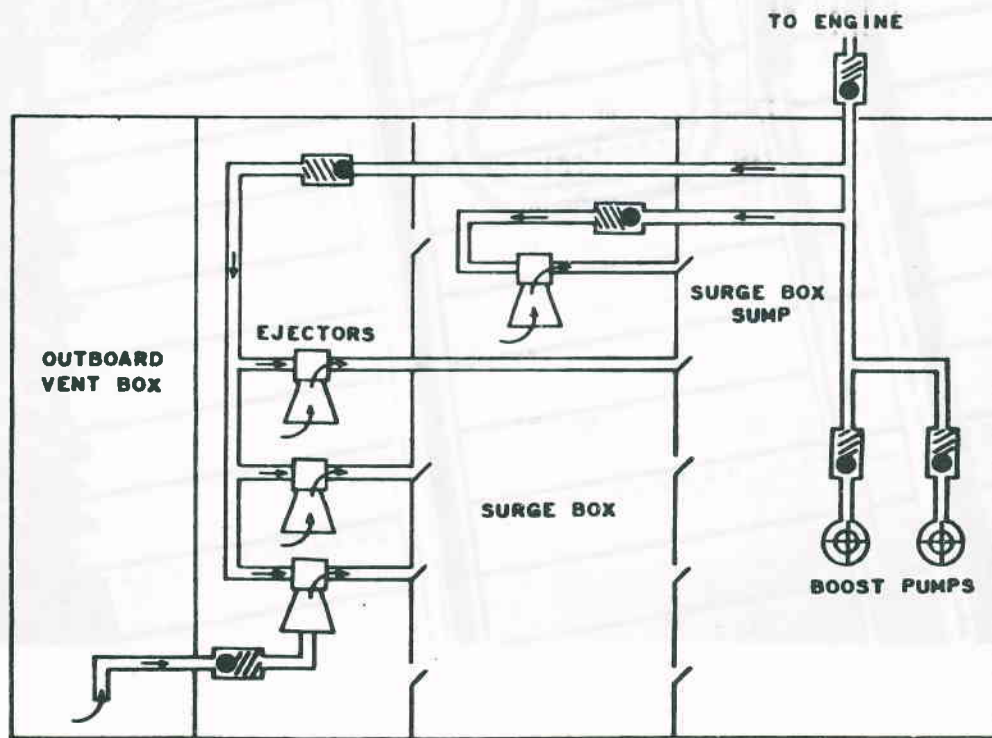
OUTBOARD VENT BOX
Figure 1-21



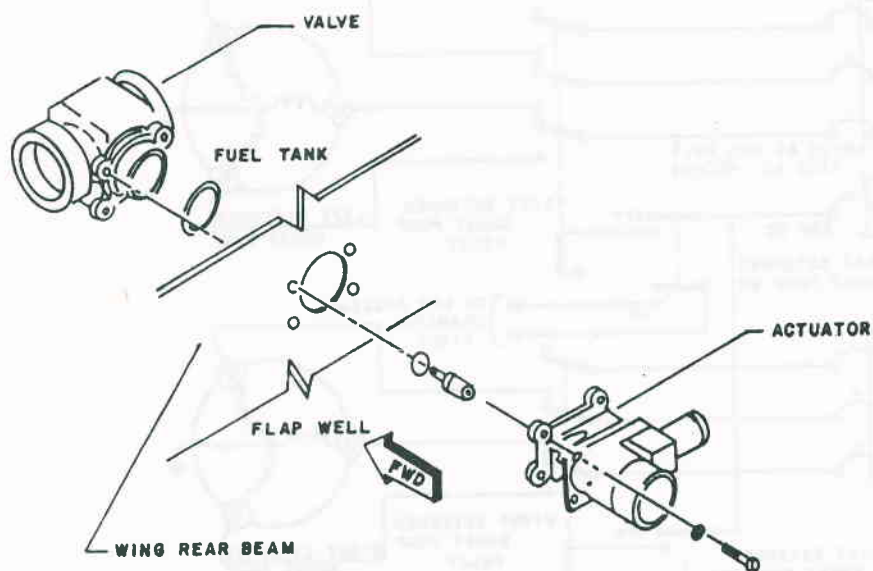
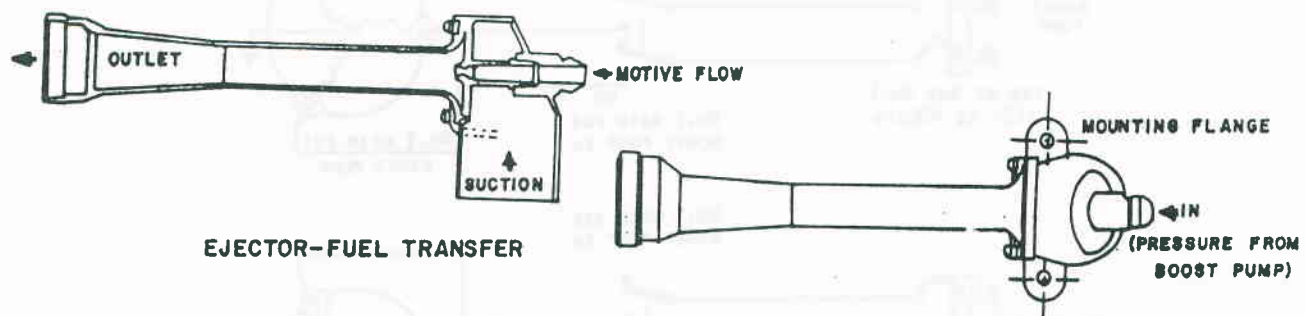
MAIN TANK PUMP HOUSING AND EJECTOR
Figure 1-22



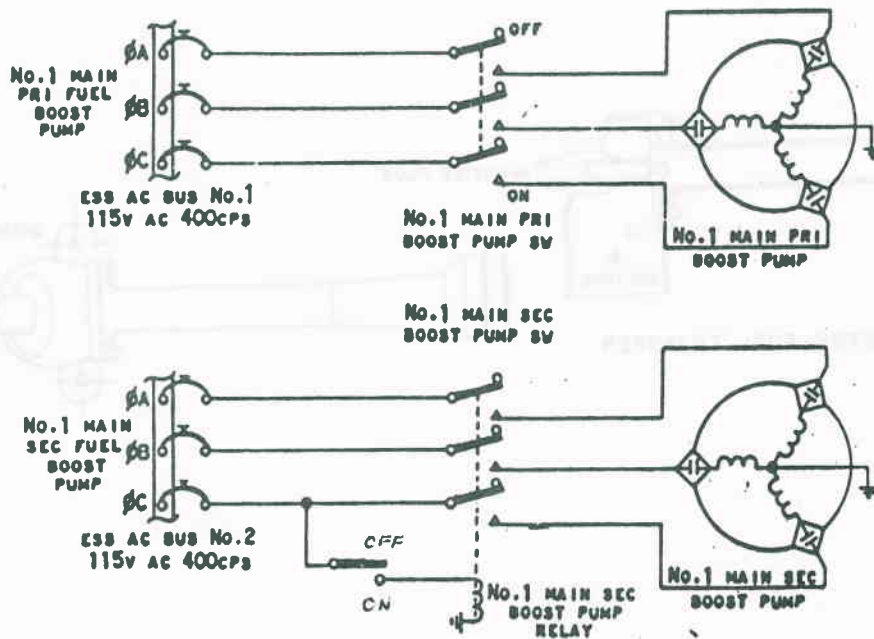
INBOARD MAIN TANK SCAVENGE



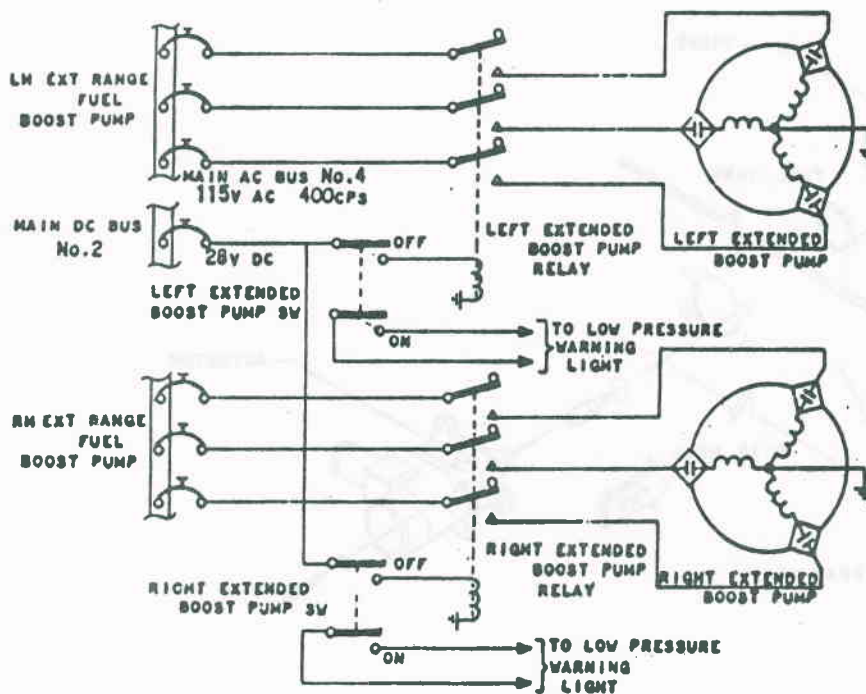
OUTBOARD MAIN TANK SCAVENGE
Figure 1-23



FUEL SYSTEM VALVE (TYPICAL)
Figure 1-24



TYPICAL MAIN TANK BOOST PUMP CONTROL



TYPICAL EXTENDED RANGE TANK BOOST PUMP CIRCUIT

Figure 1-25

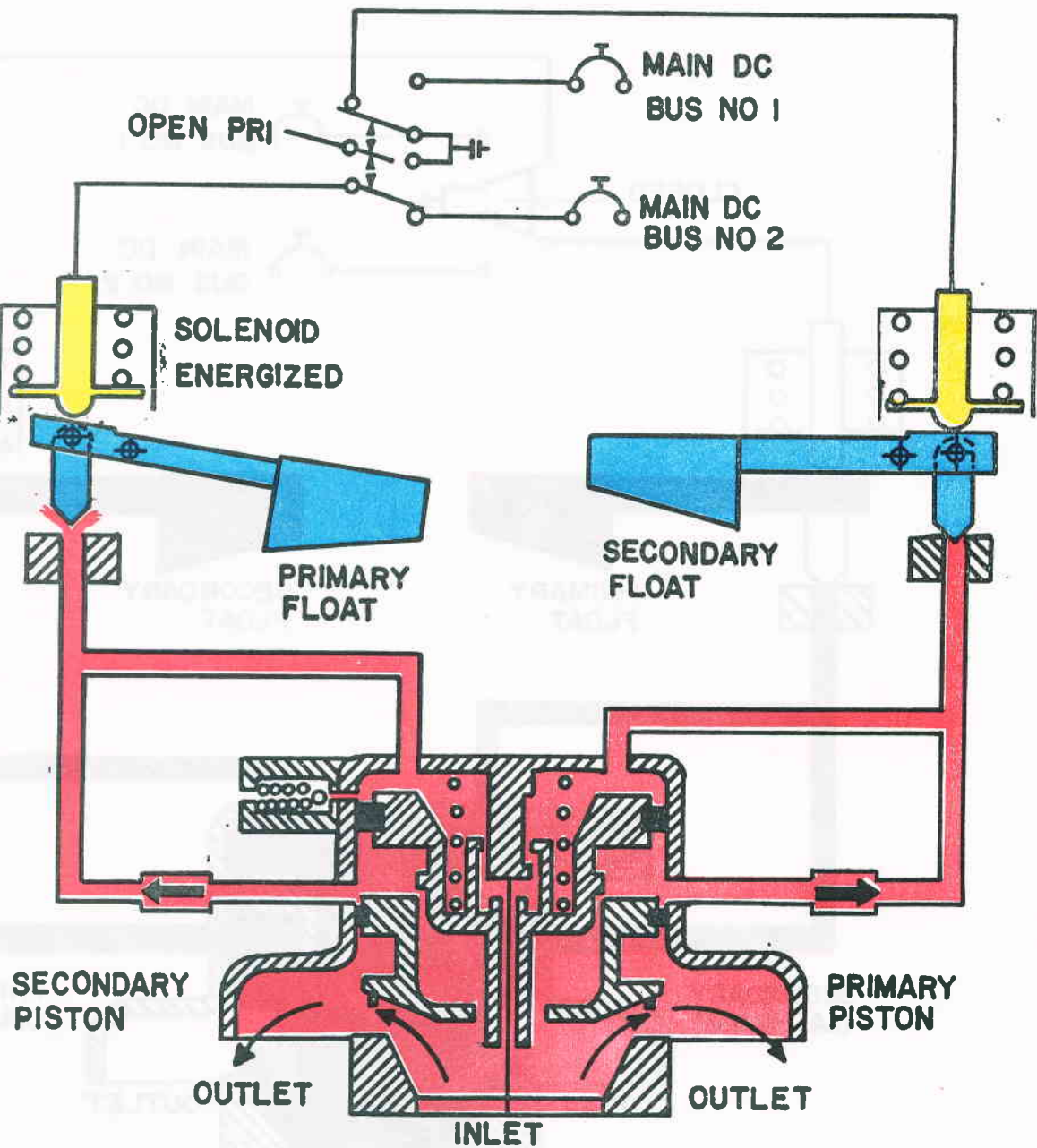


Figure 1-26

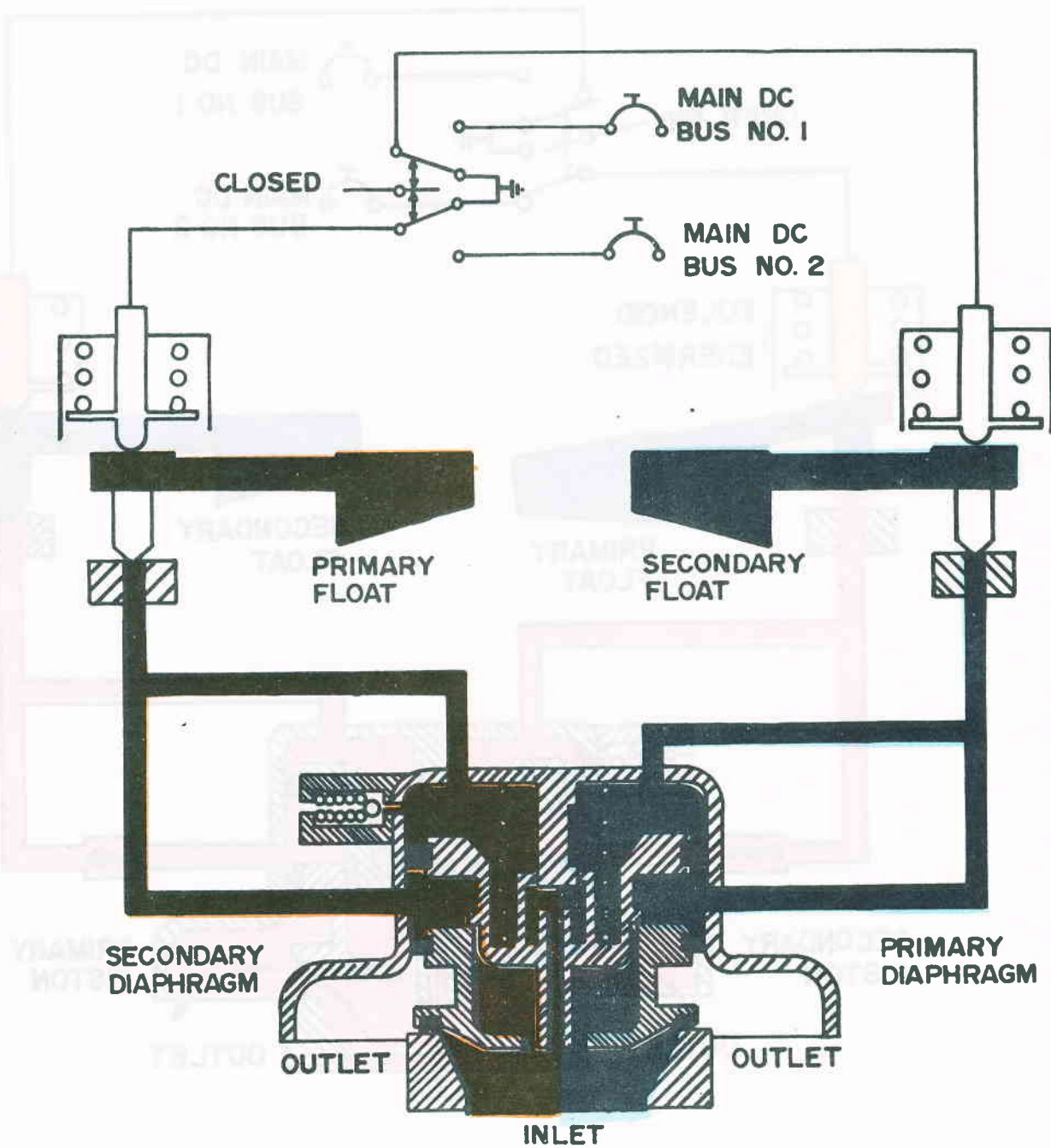
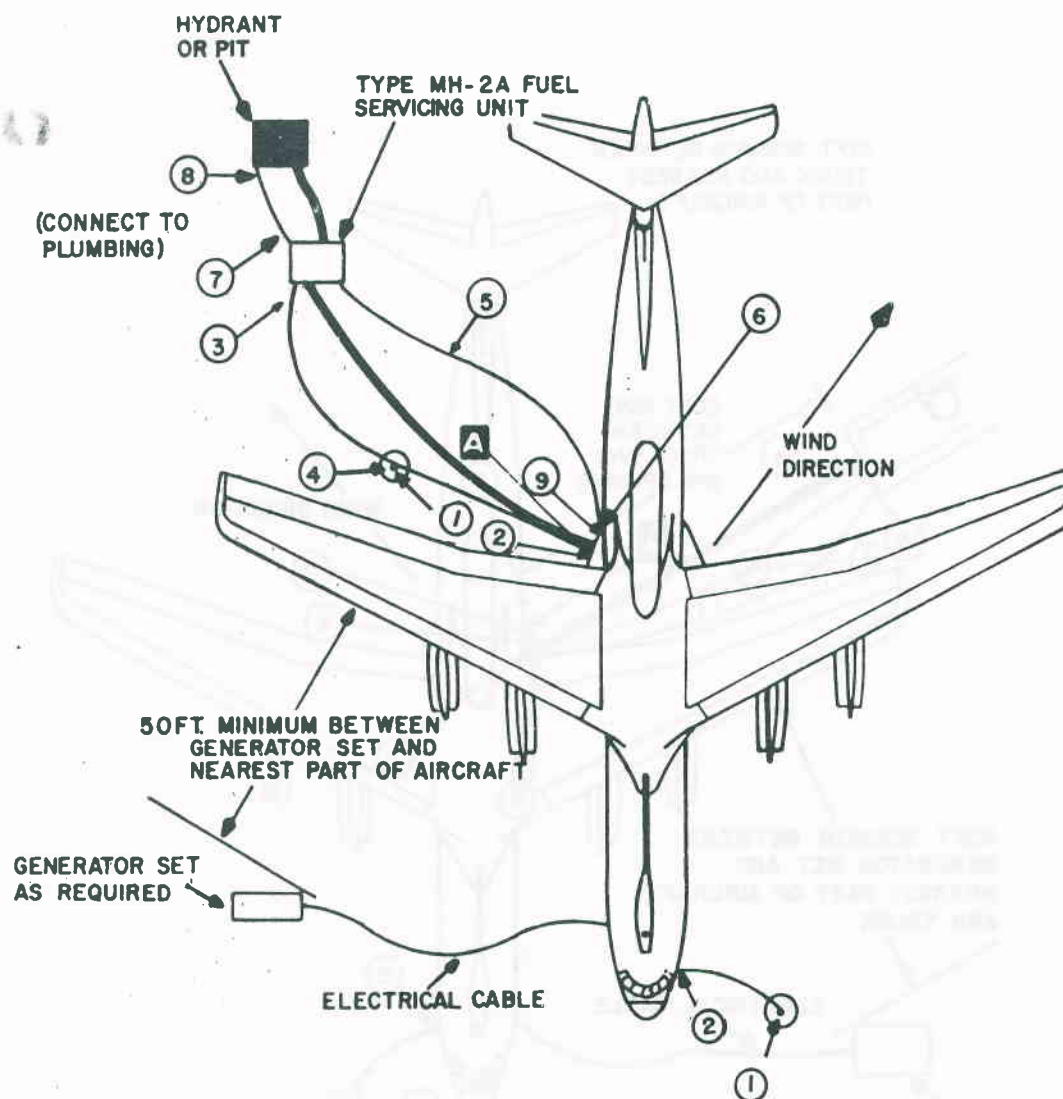


Figure 1-27

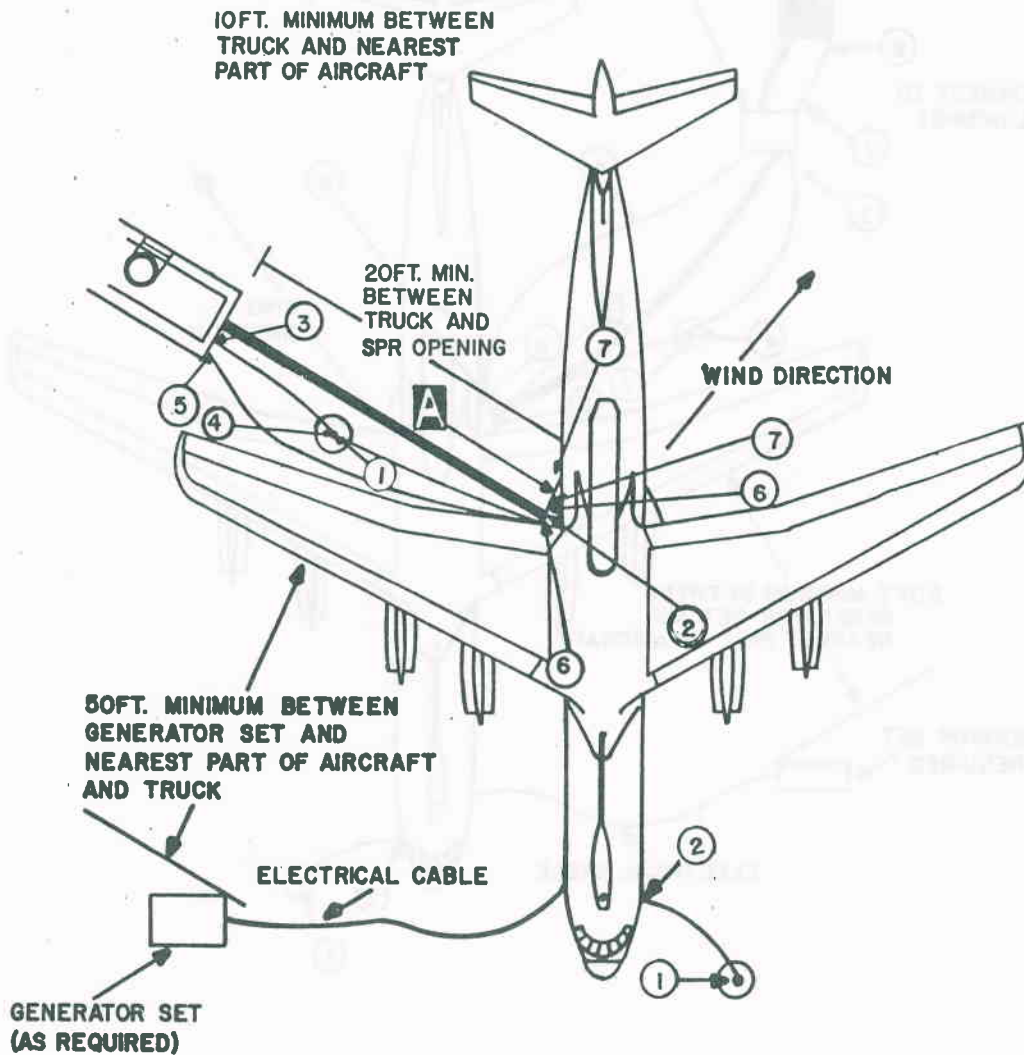


GROUND SEQUENCE

- ① TO ② GROUND TO AIRCRAFT (2 PLACES)
- ③ TO ④ MH-2A TO SAME GROUND AS AIRCRAFT
- ⑤ TO ⑥ MH-2A TO AIRCRAFT
- ⑦ TO ⑧ MH-2A TO HYDRANT OR PIT
- ⑨ NOZZLE TO AIRCRAFT BEFORE SPR. CAP IS REMOVED

GROUNDING WHEN USING HYDRANT OR PIT (SPR. MANIFOLD FUELING)
SUGGESTED HOOKUP FOR FUELING OPERATION

Figure 1-28



GROUND SEQUENCE

- ① TO ② GROUND TO AIRCRAFT (2 PLACES)
- ③ TO ④ TRUCK OR TRUCKS TO SAME EARTH GROUND AS AIRCRAFT
- ⑤ TO ⑥ TRUCKS OR TRUCK TO AIRCRAFT
- ⑦ SPR HOSE NOZZLE BONDING WIRE TO AIRCRAFT BEFORE SPR FILLER CAP REMOVED

GROUNDING WHEN USING TRUCK (SPR MANIFOLD FUELING)
SUGGESTED HOOKUP FOR FUELING OPERATION

Figure 1-29

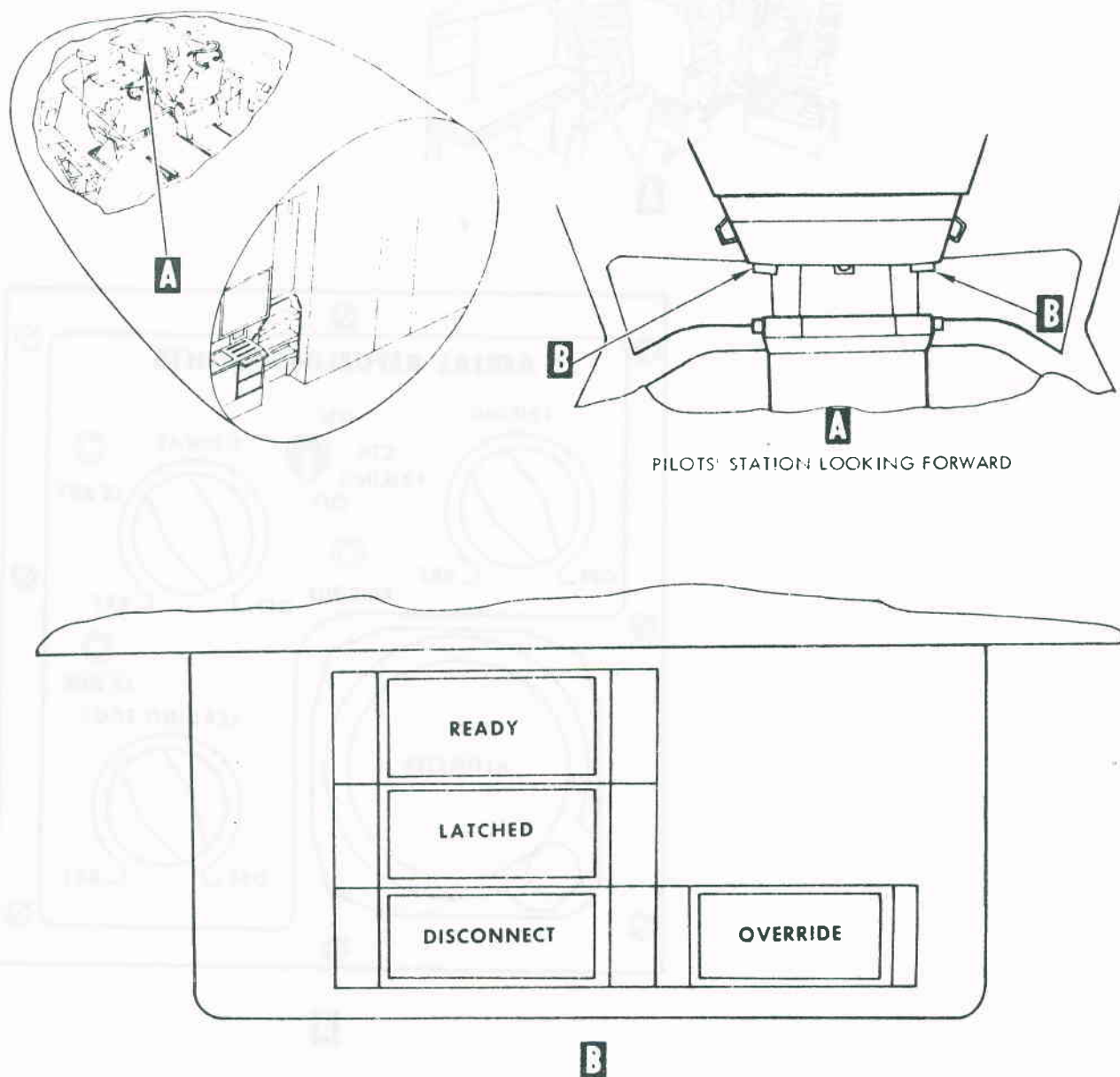
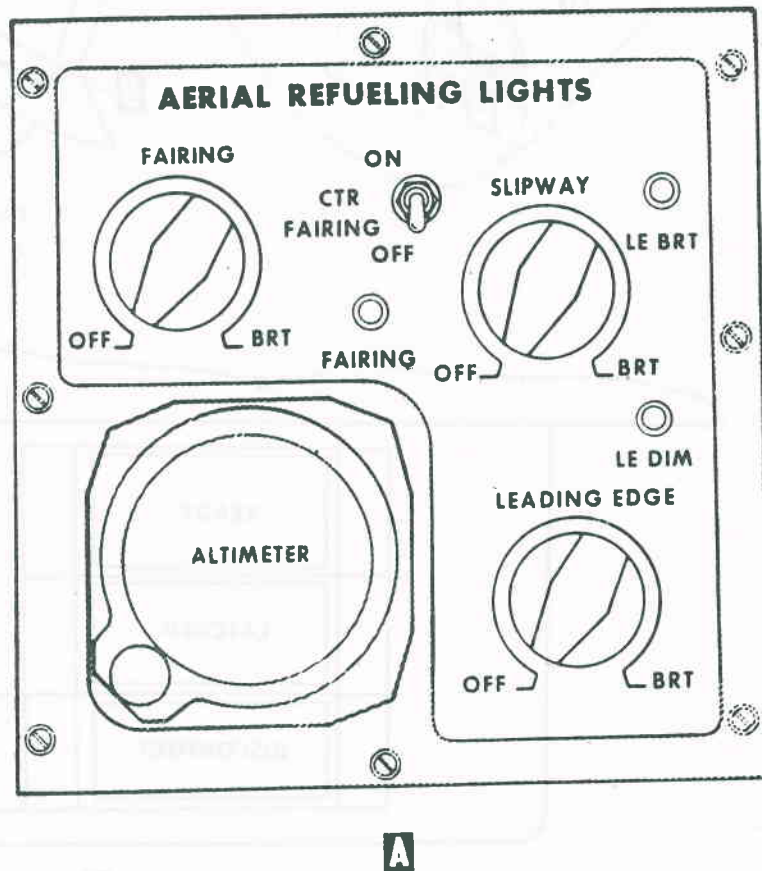
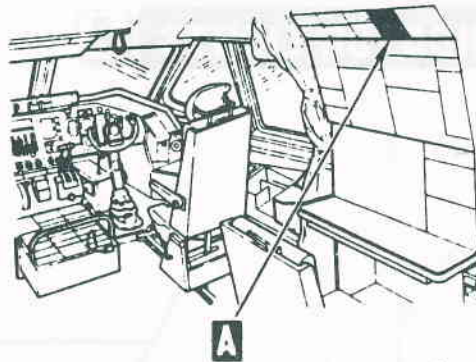
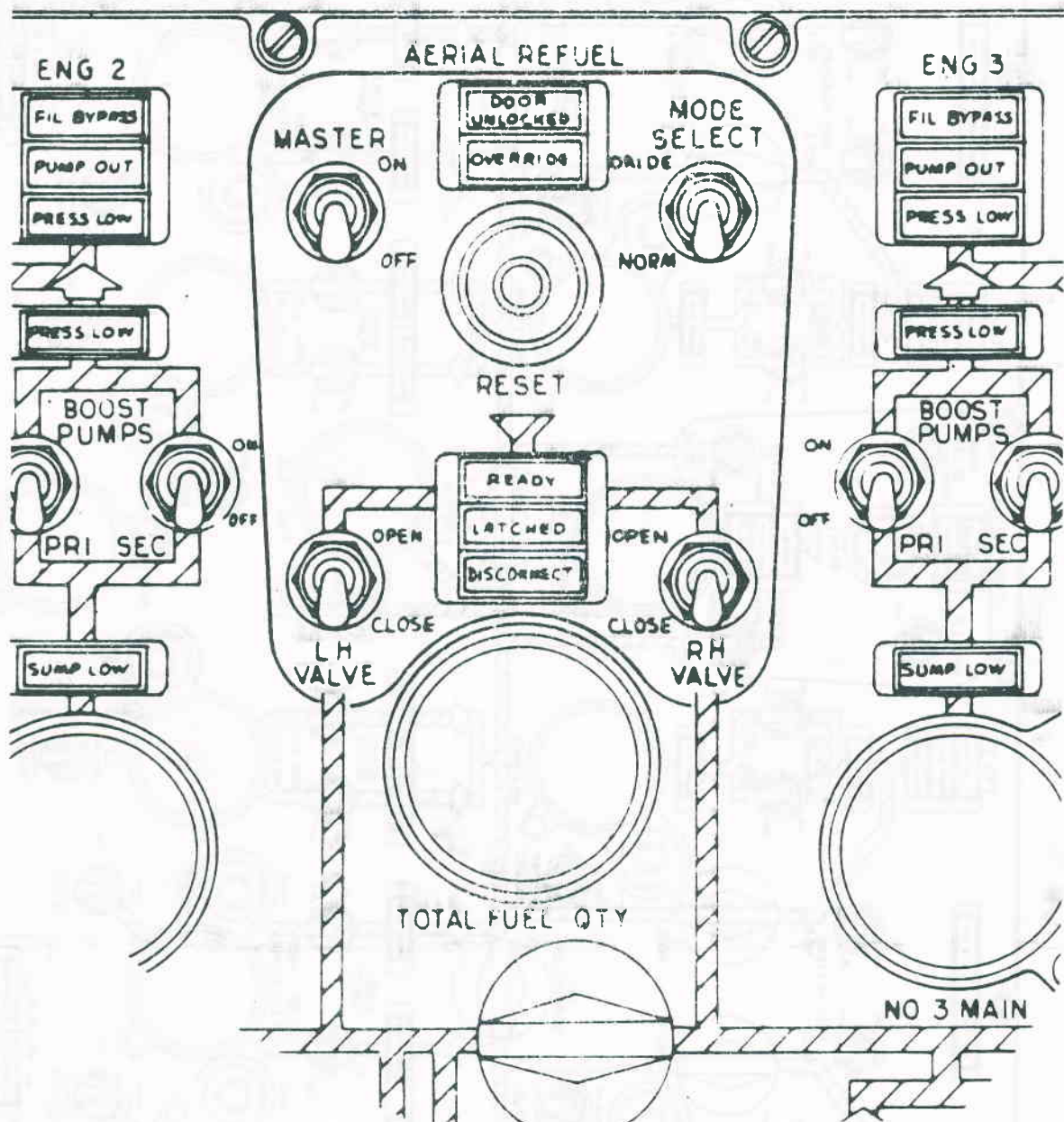
AERIAL REFUELING INDICATOR LIGHTS **B**

Figure 1-30



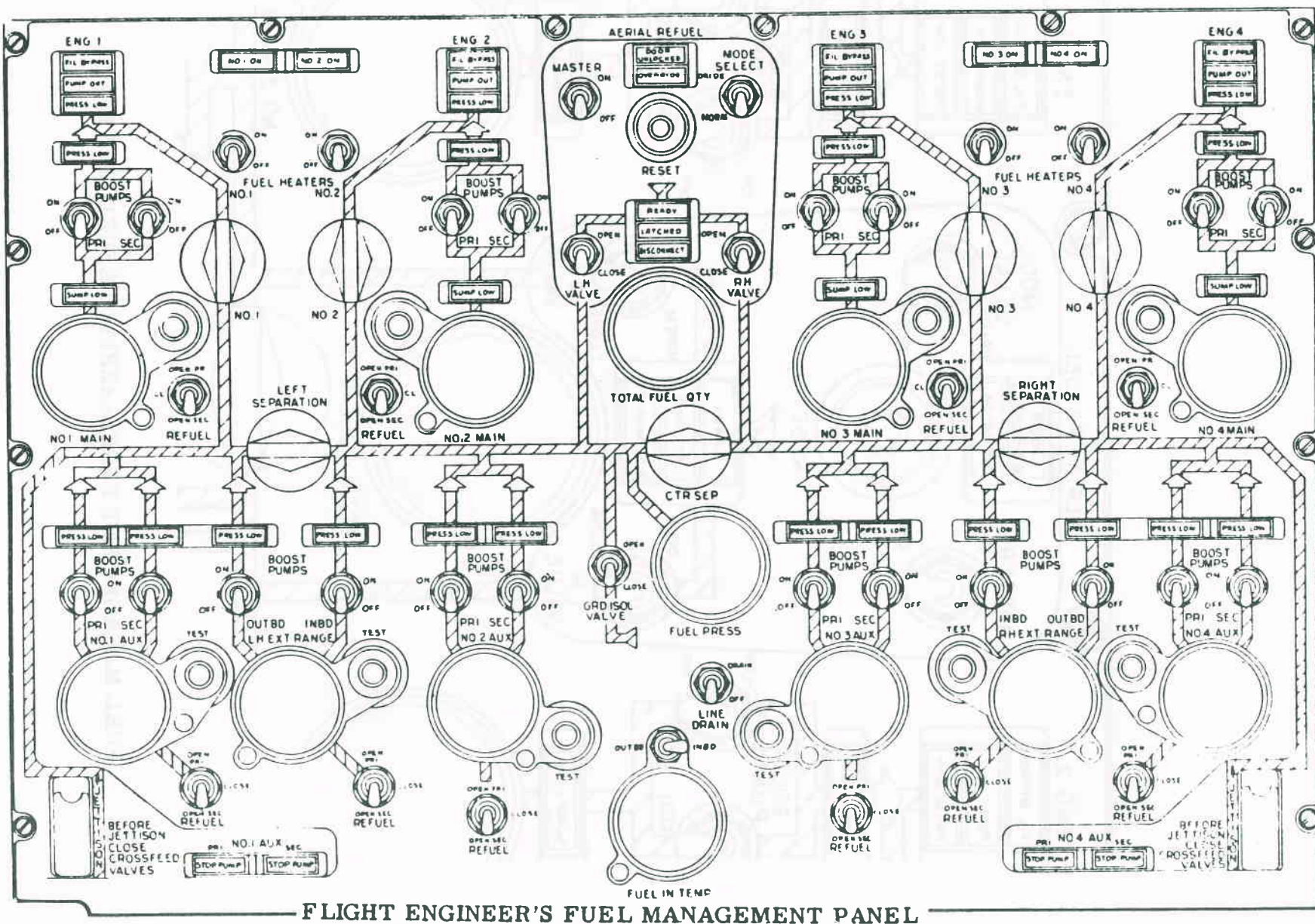
AERIAL REFUELING LIGHTS CONTROL PANEL

Figure 1-31



FUEL MANAGEMENT PANEL-AERIAL REFUEL SECTION

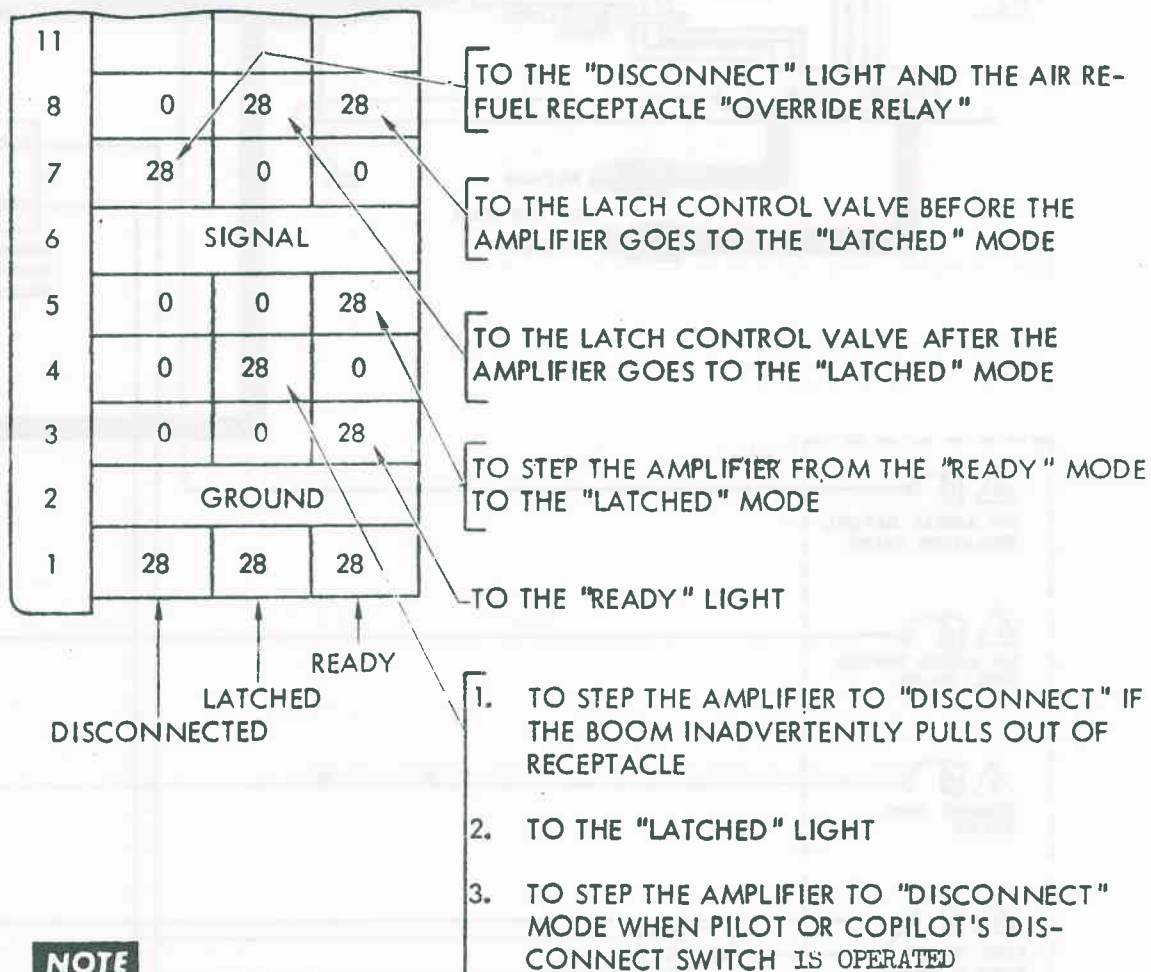
Figure 1-32



FLIGHT ENGINEER'S FUEL MANAGEMENT PANEL

Figure 1-33

AERIAL REFUEL SIGNAL AMPLIFIER

**NOTE**

28 DENOTES 28V DC OUTPUT POWER SUPPLY.

Figure 1-34

AERIAL REFUELING SYSTEM B

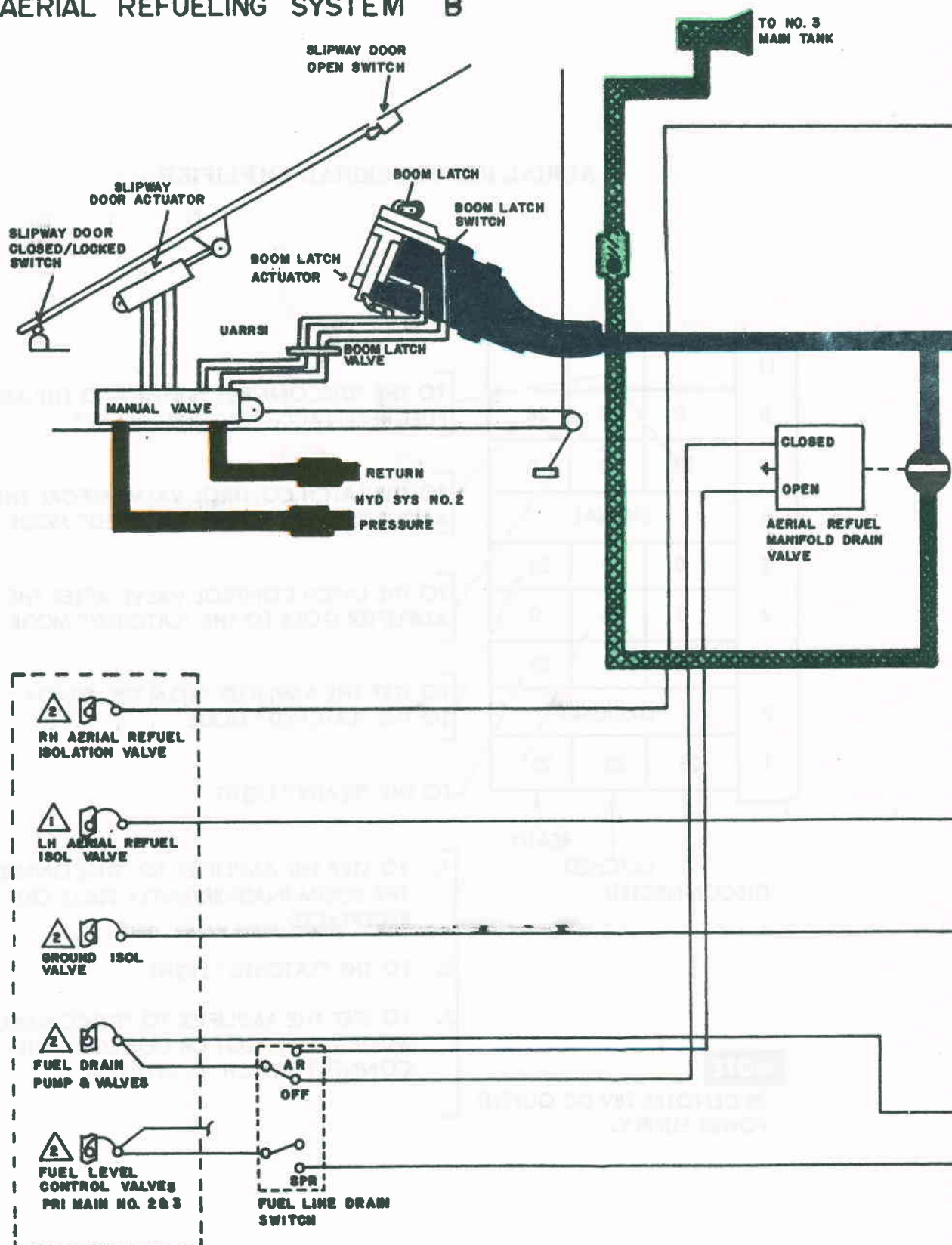
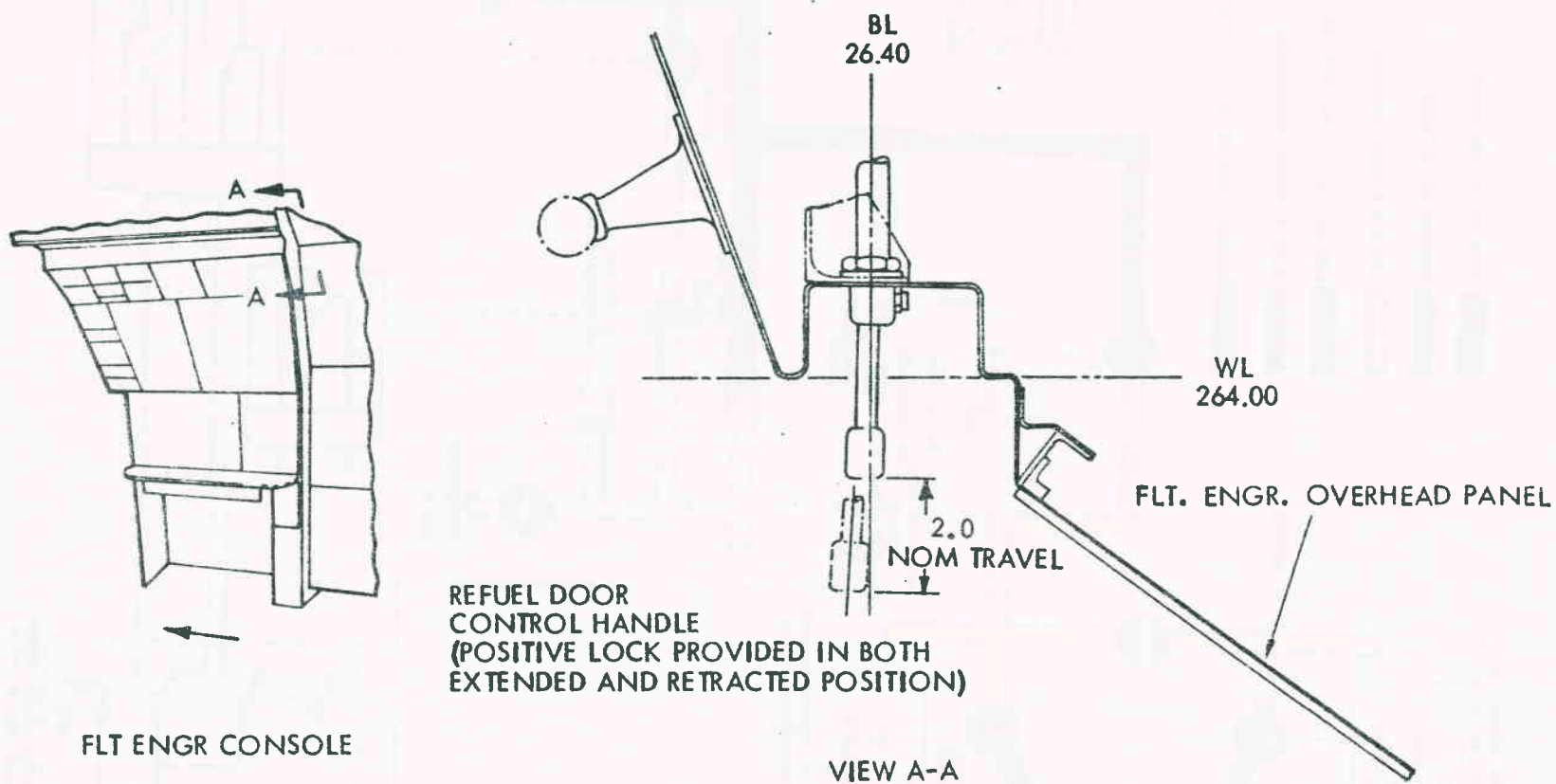


Figure 1-35



IN-FLIGHT REFUEL DOOR CONTROL HANDLE

Figure 1-36

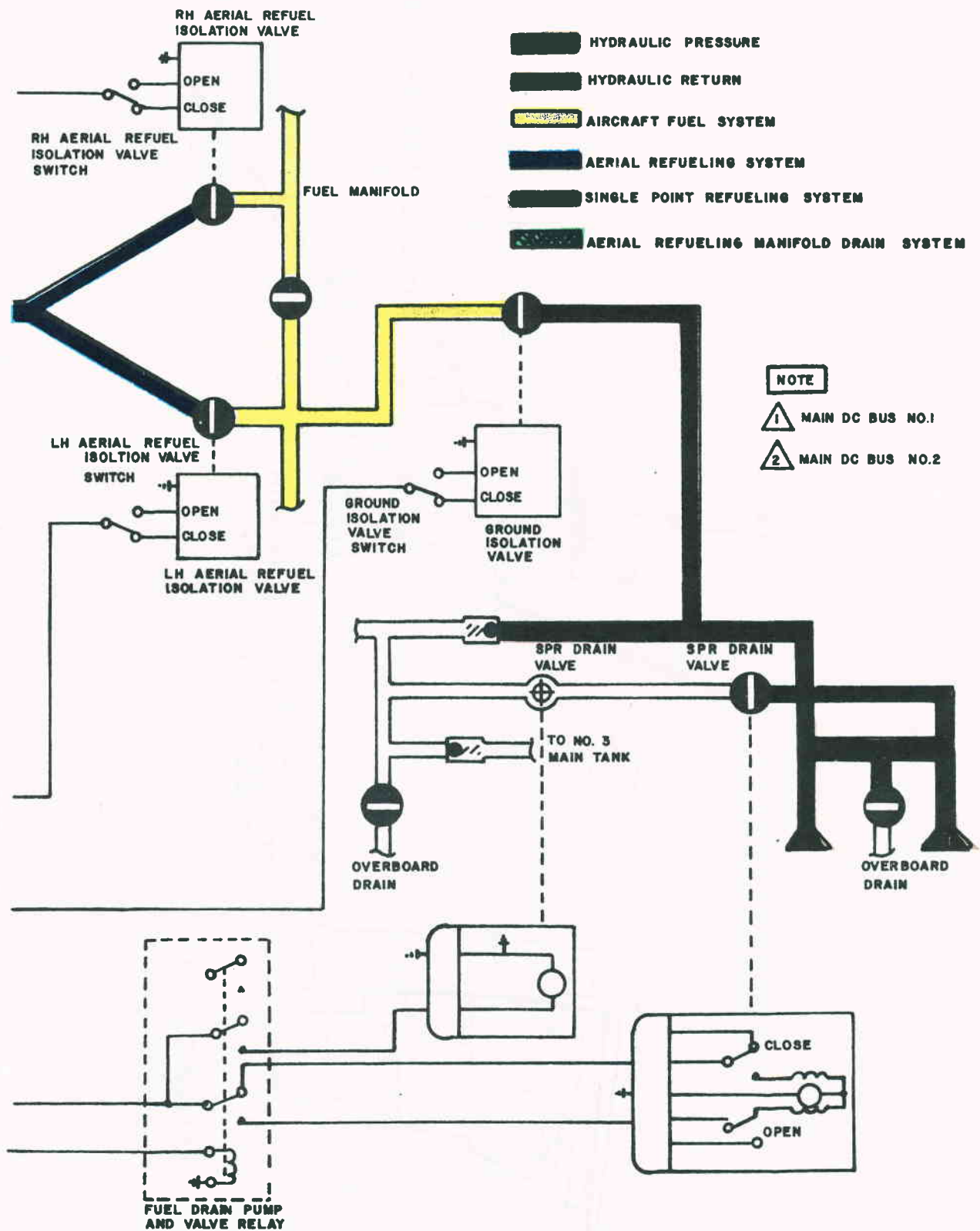


Figure 1-37

N OF FLUID MOVEMENT

DIRECTION OF FLUID MOVEMENT
 ← DIRECTION OF MECHINAL TRAVEL
 ■ 2 SYSTEM PRESS
 ▨ 2 SYSTEM RETURN

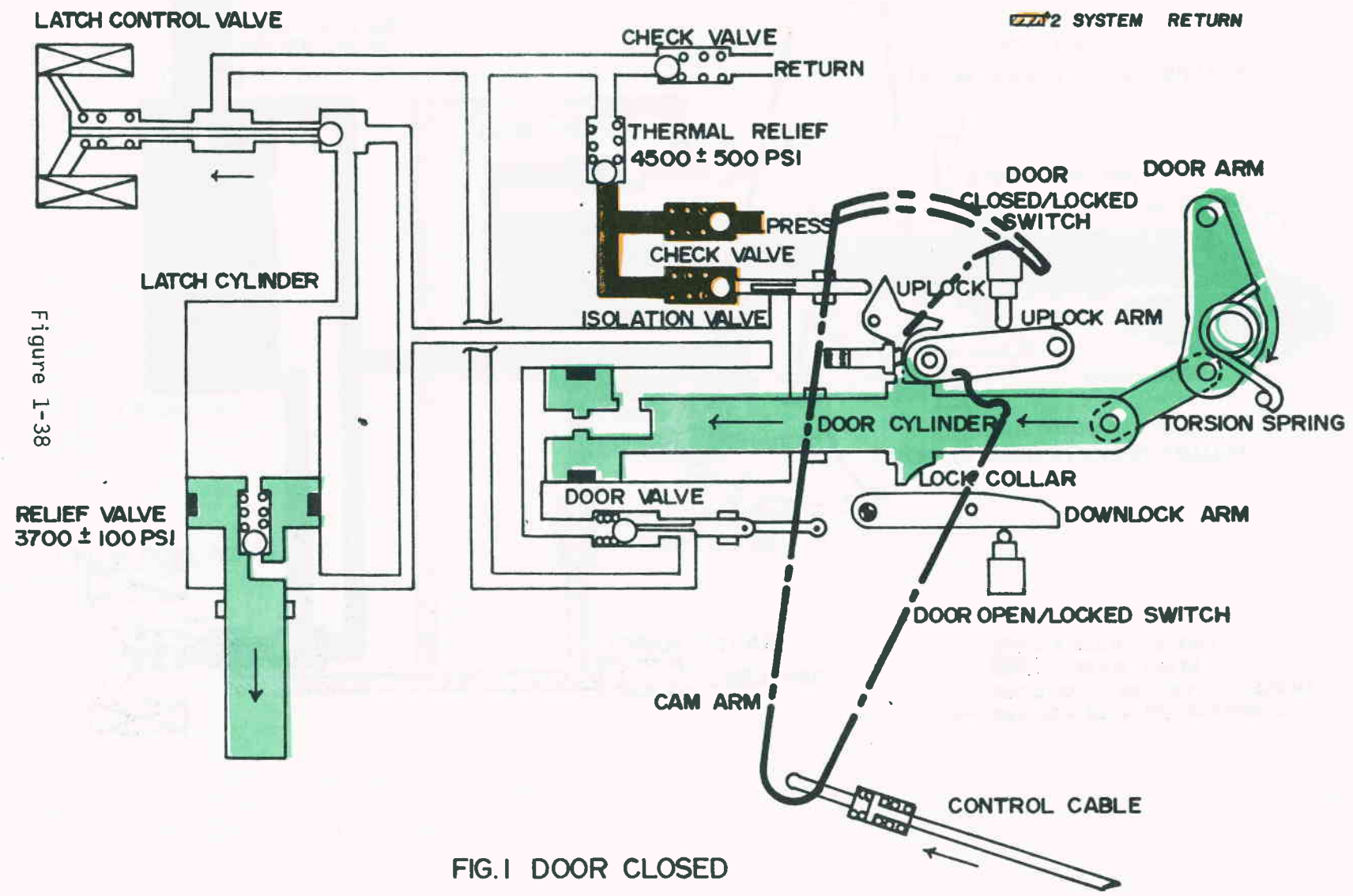


FIG. I DOOR CLOSED

Figure 1-38

1-59

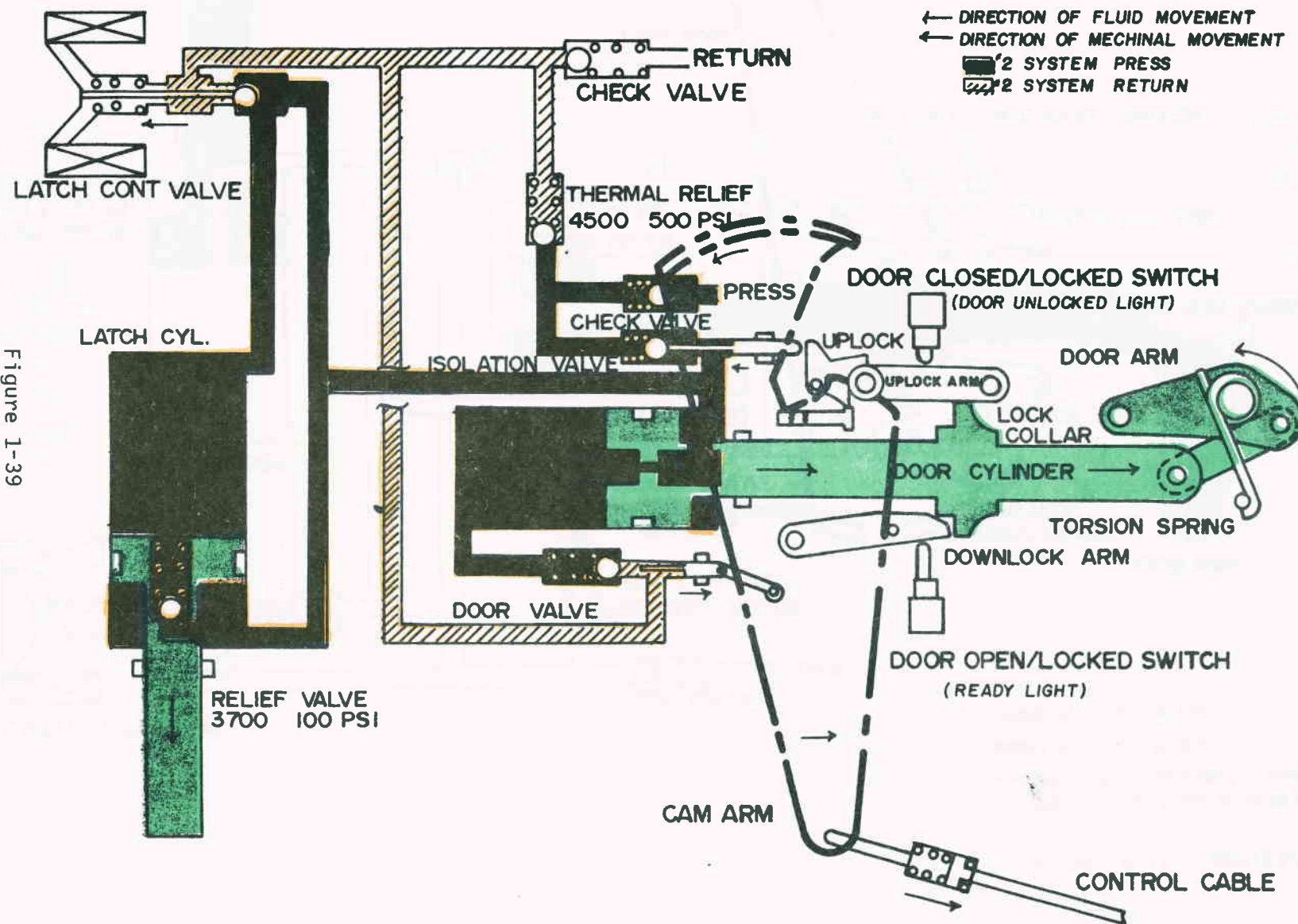


FIG. 2 DOOR OPEN

Figure 1-39

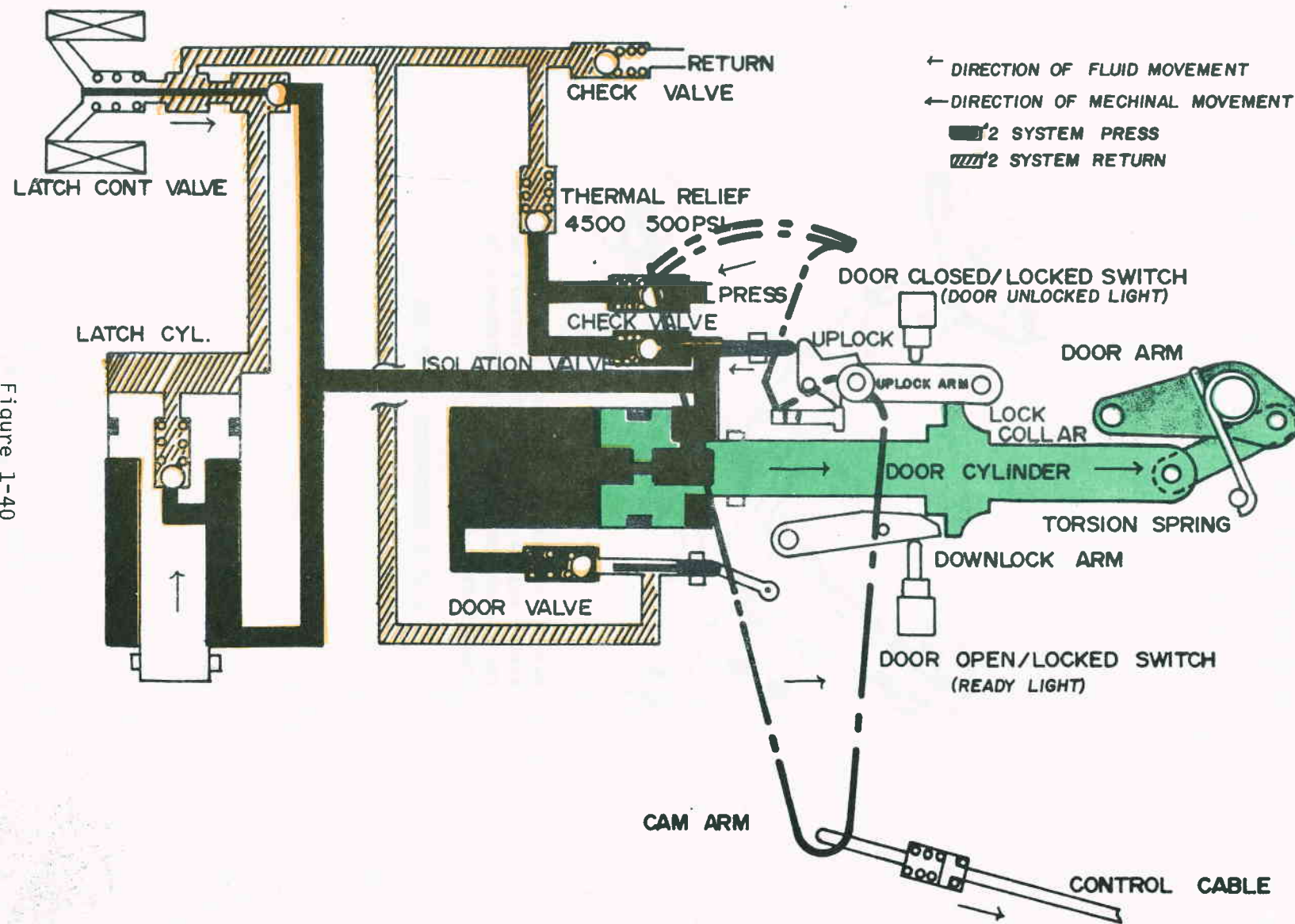
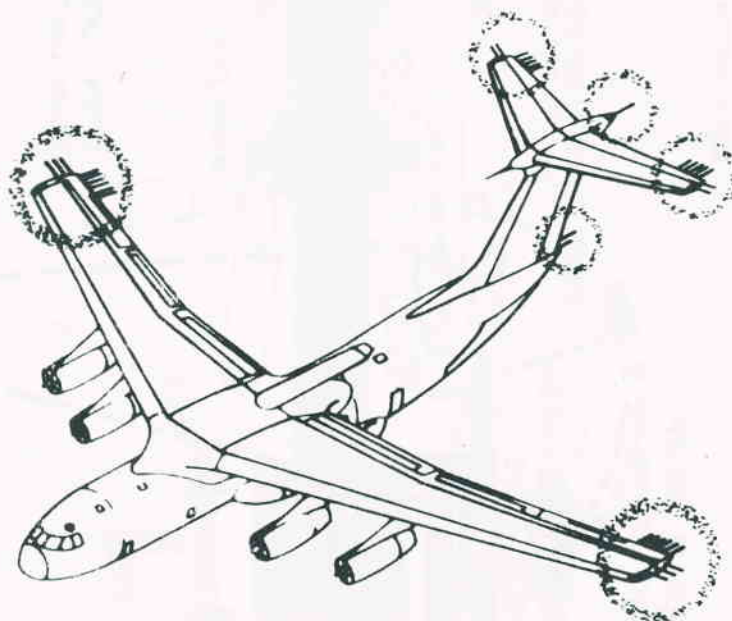


FIG. 3 DOOR OPEN/BOOM LATCHED

Figure 1-40

1-61



NOTE:

**THIRTY FIVE STATIC DISCHARGERS DISSIPATE
STATIC ELECTRICITY FROM THE AIRCRAFT INTO
THE ATMOSPHERE REDUCING INTERFERENCE TO
RADIO RECEPTION.**

STATIC DISCHARGER LOCATIONS

Figure 1-41