

SWIFT SYSTEMS UTILITIES 8

UTILITY SYSTEMS

DESCRIPTION

The utility systems include the pitot-static system, heating and ventilating system, fire detection and extinguisher system, windshield wiper installation and the cargo suspension cable installation.

PITOT-STATIC SYSTEM

The pitot-static system consists of static air lines, pitot tube, pitot pressure lines, pitot tube heater and the respective instruments mounted on the instrument panel. The pitot tubes are mounted on the nose of the helicopter and supply pitot pressure air to the airspeed indicator. The pitot tubes are heated to prevent the tube from icing over. The pitot heater is energized by a switch on the overhead console. There are two static ports, one on each side of the helicopter, just forward of the respective crew door. The static air pressure lines supply static air pressure to the altimeter, airspeed and vertical speed indicators.

VENTILATING SYSTEM

The helicopter ventilation requirements are provided by two separate systems. The passenger compartment is ventilated with outside air which enters through a scoop on the cabin roof. Outside air is ducted from the scoop to sixteen valves in the cabin roof. The air valves may be adjusted for desired volume and direction of flow of the incoming air. The pilot's compartment is ventilated with outside air which enters through two inlet ducts located on the nose below the windshield. The ventilation-defogging system is separate for the pilot and co-pilot, and uses either ram air or electrical blowers to deliver air to the windshield and outlets on each side of the instrument panel. Air intake is controlled by an actuating cable below each outlet. The vent blower is controlled by a switch on the overhead console. All the ventilating air can be used for defogging if desired, by mechanically closing the outlets on each side of the instrument panel.

HEATING SYSTEM

The basic heating system for the Model 212 helicopter uses bleed air from the compressor discharge pressure port of each power section. The bleed air is routed from the port on the gas generator case of each power section, to an electrically controlled bleed air shutoff valve at the work deck, joining into a common line below the work deck. The bleed air is then provided to the variable air mixing valve on the right side of the

helicopter, just forward of the tail boom attachment point. Outside air is drawn in by the variable air mixing valve and mixed with the bleed air to maintain a preselected temperature. The mixed air is ducted through a noise suppressor and plenum chamber, then forward under the right aft fuel cell, below the cabin floor to the air distribution valve on the right side of the helicopter, under the floor. The air distribution valve controls air to the door post outlet valves and/or forward to the crew area for heating and defrosting.

FIRE DETECTOR

Two fire detector warning lights are located in each T-handle on the instrument panel. Engine #1 and Engine #2. The lights inform the pilot of an engine fire by illumination of the lights in the appropriate T-handle. Heat sensing elements are located in each power section compartment, forward and aft, and are connected to their respective fire detector control unit. These elements are normally high resistance units at ambient air temperatures, but the resistance drops rapidly as fire occurs in the area, to provide power to illuminate the warning lights in the affected engine fire T-handle.

A smoke detector is mounted in the upper left forward portion of the baggage compartment to provide a baggage fire warning light indication in the cockpit. A baggage fire detector amplifier is located in the upper nose section compartment to provide power for illumination of the warning light on the instrument panel, when baggage compartment fire is detected.

A fire detect test switch and a baggage fire test switch are located on the instrument panel to test bulb illumination of the pull handles and the baggage fire warning lights.

POWERPLANT FIRE EXTINGUISHER

The powerplant compartment is provided with two fire extinguisher containers, MAIN and RESERVE, interconnected to discharge manifolds and tubes in each power section. Each container has two discharge outlets equipped with electrically actuated cartridges, one for Engine #1 and one for Engine #2.

If fire occurs in a power section, the detector unit will illuminate the warning light in the T-handle of the affected power section. Pulling the fire extinguisher T-handle and placing the fire extinguisher selector to MAIN or RESERVE, will discharge the main or reserve container into the affected compartment by firing the cartridge for that power section in that container.

In addition to selecting the fire extinguisher, the pull handle will close the control valve for the particle separator in the affected power section air management system, close the main fuel valve and shut-off the bleed air heater.

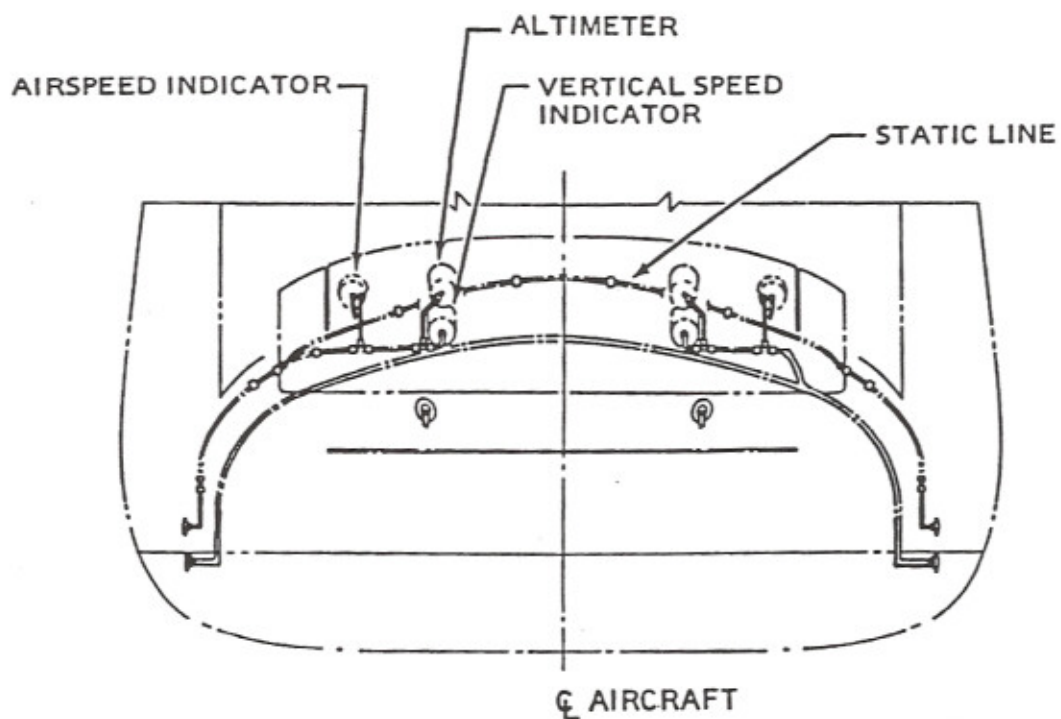
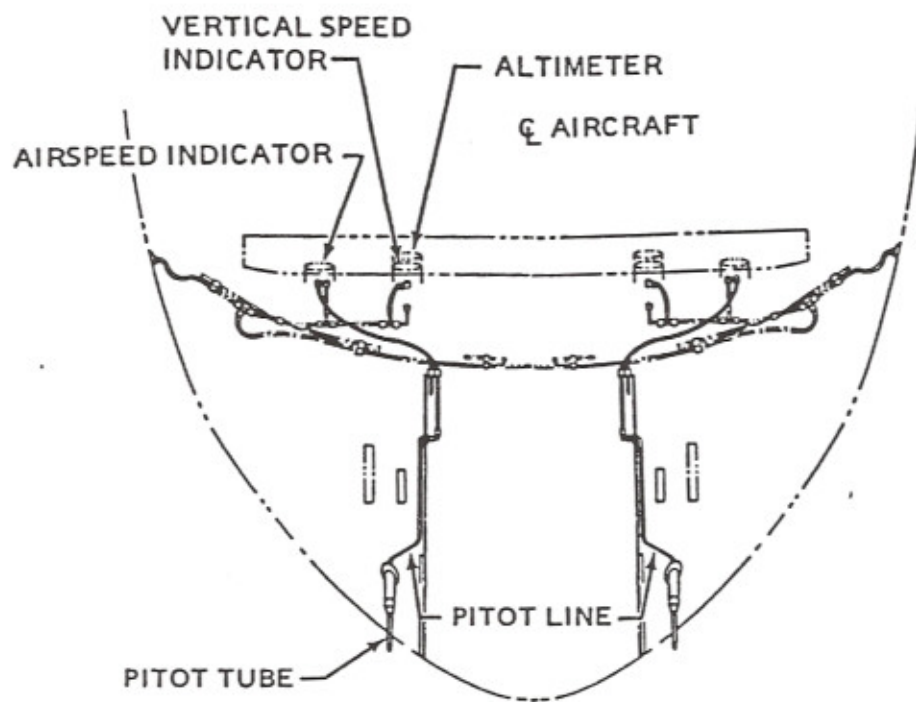
WINDSHIELD WIPER INSTALLATION

Model 212 helicopters are equipped with a windshield wiper for both the pilot and copilot. Circuit breakers in the overhead console panel protect these installations in case of malfunction. A four-position rotary switch on the miscellaneous panel of the overhead console permits operation of the wipers at low, medium or high speed. A selector switch permits operation of pilot and copilot windshield wipers separately or simultaneously.

CARGO SUSPENSION INSTALLATION

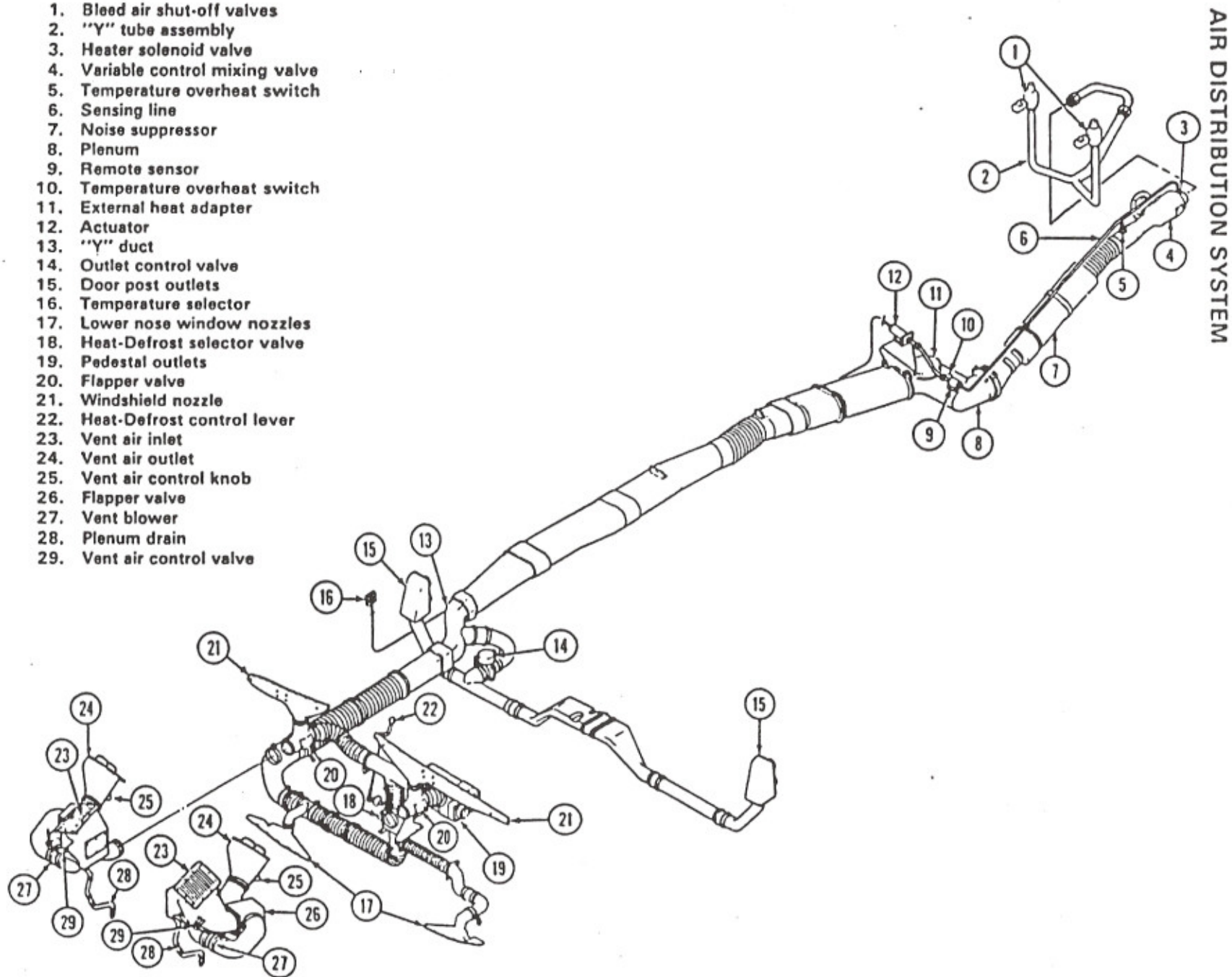
All electrical and manual release provisions for the cargo suspension system are installed as standard equipment in the Model 212 helicopter. With the addition of the external cargo suspension kit the Model 212 would have a 5000 pound external cargo capability.

Notes

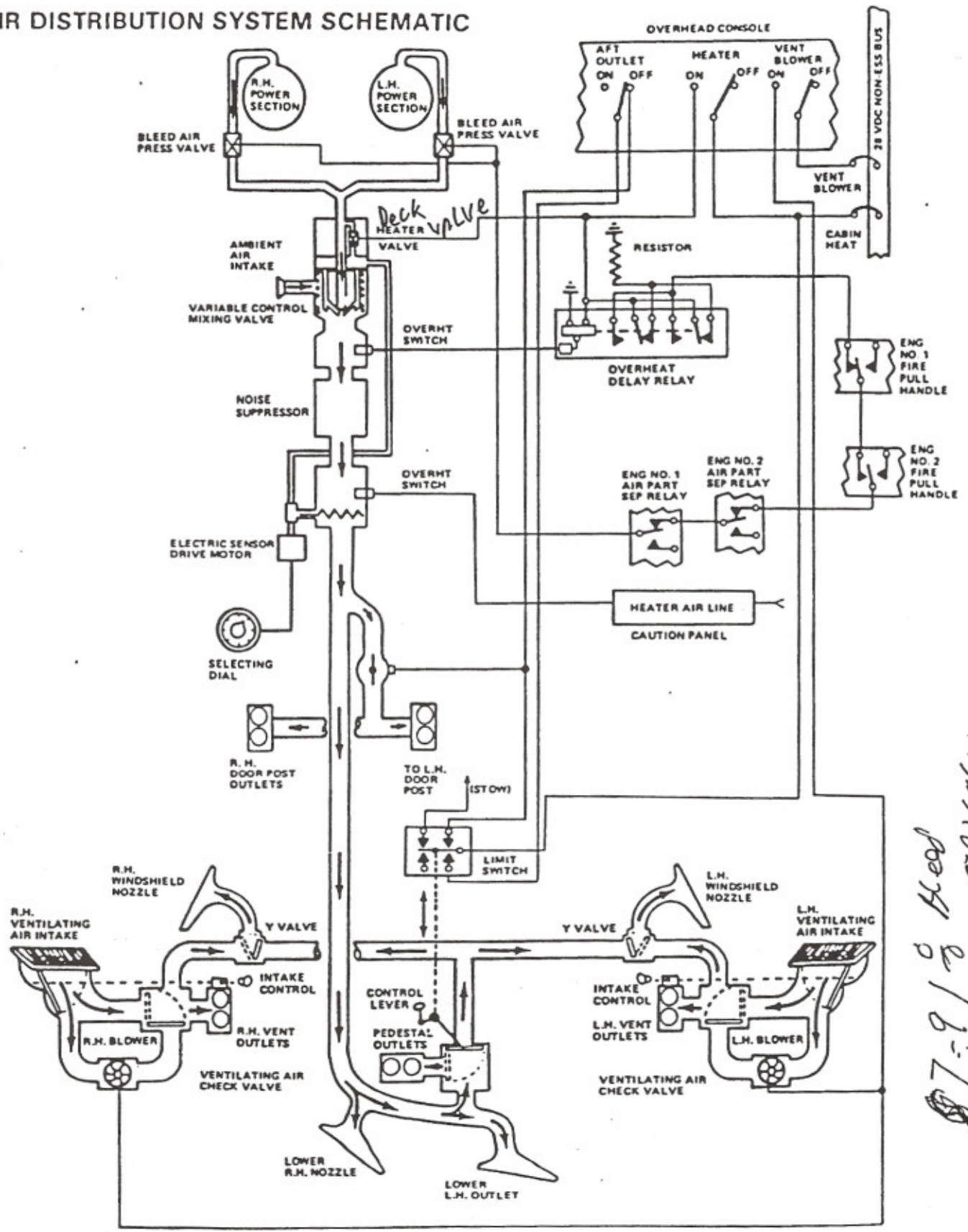


Pilot/Co-Pilot Static System

1. Bleed air shut-off valves
2. "Y" tube assembly
3. Heater solenoid valve
4. Variable control mixing valve
5. Temperature overheat switch
6. Sensing line
7. Noise suppressor
8. Plenum
9. Remote sensor
10. Temperature overheat switch
11. External heat adapter
12. Actuator
13. "Y" duct
14. Outlet control valve
15. Door post outlets
16. Temperature selector
17. Lower nose window nozzles
18. Heat-Defrost selector valve
19. Pedestal outlets
20. Flapper valve
21. Windshield nozzle
22. Heat-Defrost control lever
23. Vent air inlet
24. Vent air outlet
25. Vent air control knob
26. Flapper valve
27. Vent blower
28. Plenum drain
29. Vent air control valve



AIR DISTRIBUTION SYSTEM SCHEMATIC



7-9/8 Head AIR Valve.

HEATING AND DEFROSTING

Cabin heating and windshield defrosting is accomplished by a bleed air system. The system is controlled by switches on the overhead console, a temperature selector dial on the right door post and a control lever on the pedestal.

Compressor discharge bleed air flows through each power section bleed air shut off valve, then through a common line to a solenoid operated valve in the variable control mixing valve. Ambient air is drawn into the mixing valve and mixed with bleed air in amounts determined by a remote sensor. Should the temperature regulating mechanism fail, a mixing valve mounted overheat switch (220°F) will shut the system off to prevent overheating system ducts.

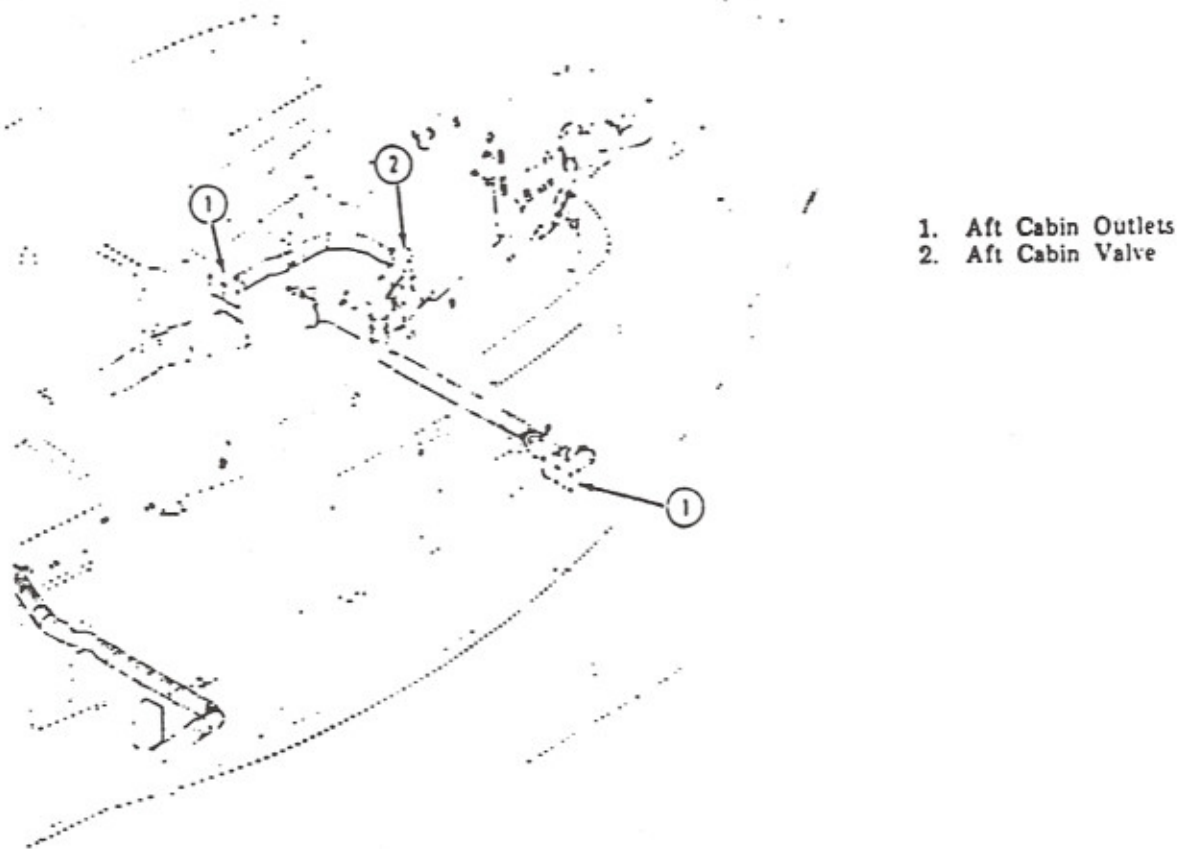
From the mixing valve, the mixed air flows through a noise suppressor to a plenum containing the remote sensor, another overheat switch and provisions for applying external heat to the system. The bi-metallic type remote sensor senses air temperature in the plenum and bleeds off or restricts sensing air controlling the mixing valve. An electrical temperature selecting dial on the right door post controls an electric actuator that repositions the sensor's bi-metallic element for temperature control. The plenum mounted overheat switch (220°F) activates the HEATER AIR LINE caution light should the temperature the plenum become excessive.

From the plenum, air flows forward to a "Y" shaped duct and is available to an outlet control valve that either shuts off or allows air flow to the left and right door post outlets. The position of this valve is normally determined by the AFT OUTLET switch on the overhead console but may be shut off by a micro switch actuated by the defrost lever linkage.

Unrestricted air flows through the "Y" duct forward to the lower windshield nozzles and to the pedestal. A heat and defroster selector valve in the pedestal is manually controlled by a lever at the right front of the pedestal. With the lever full aft, all air is directed to the pedestal outlets and none to upper windshields. Positioning the lever full forward, directs all air to the windshield nozzles and the lever linkage actuates a micro switch. The micro switch causes the outlet control valve to shut off air flow to the doorposts, thus providing maximum air for windshield defrosting.

WINTERIZATION HEATER KIT

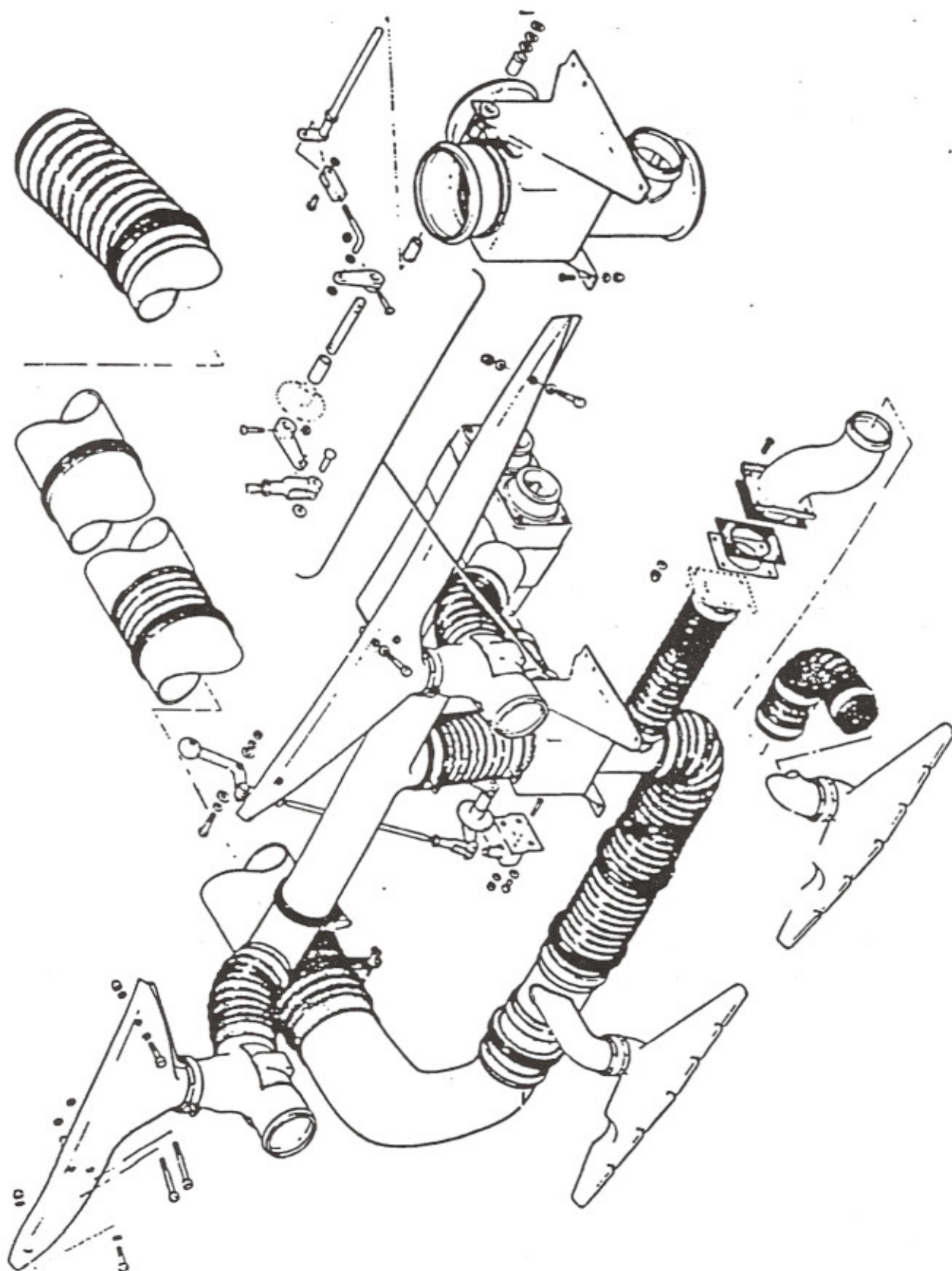
BHC 212-706-008-1



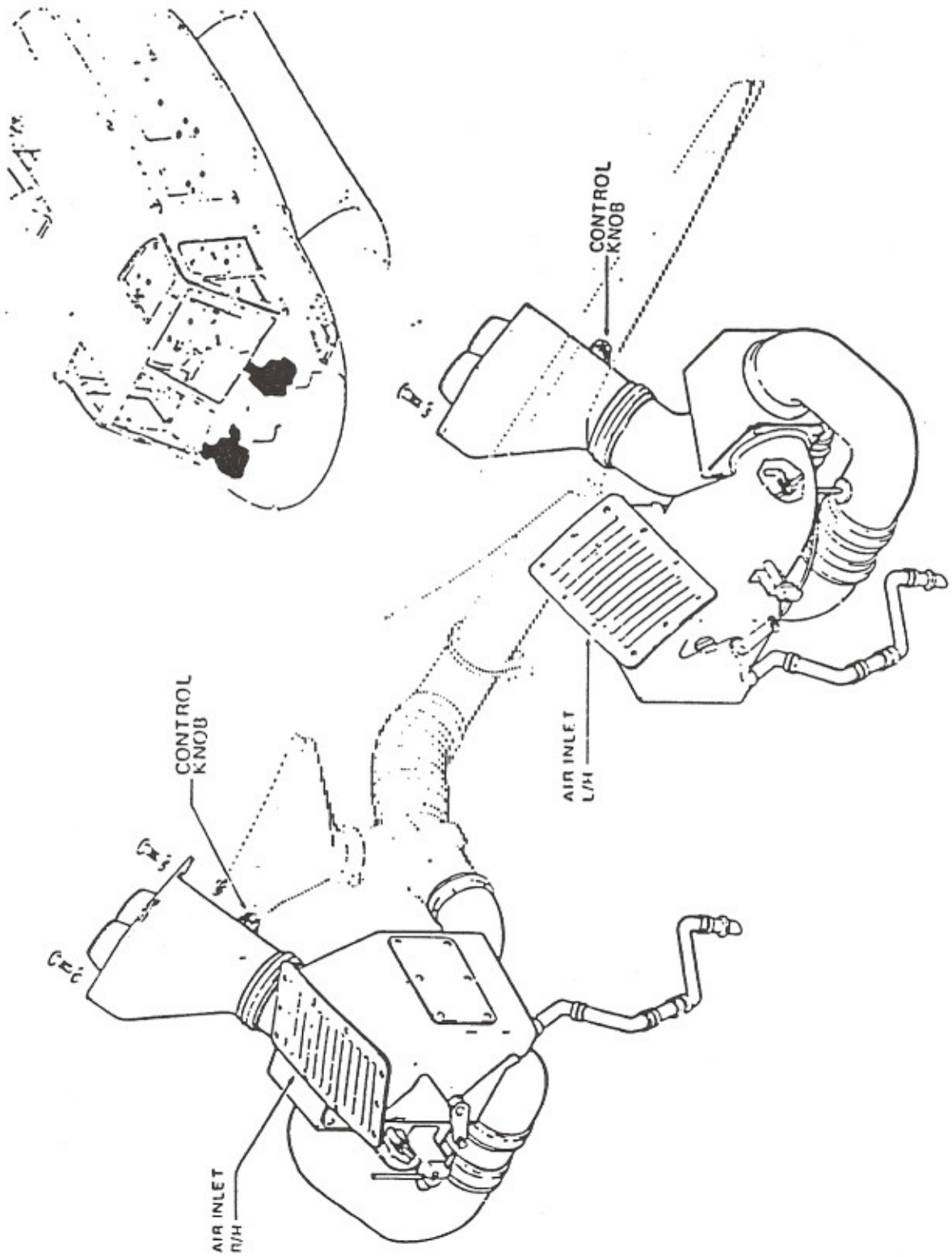
Winterization Heater

The winterization heater is the same as the basic heater system except for the addition of a higher capacity mixing valve and two aft cabin outlets, located at the base of the aft cabin bulkhead. The operation and limitations of the winterization heater are the same as for the basic heater system.

HEAT DEFROST AIR SYSTEM



CREW VENTILATION/WINDSHIELD DEFOGGING

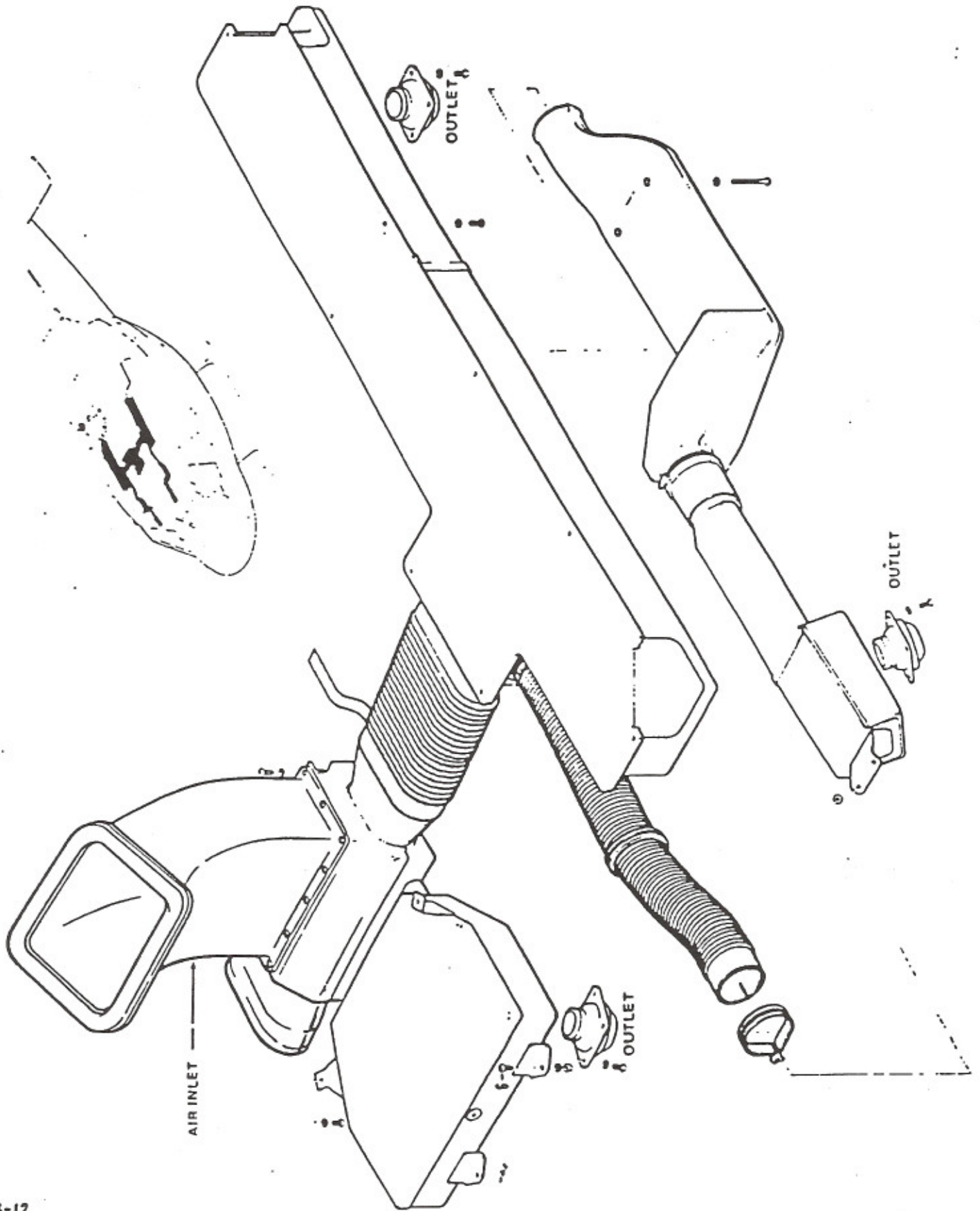


CREW VENTILATION/WINDSHIELD DEFOGGING

Two separate systems, pilots and copilots, provide for crew ventilation and windshield defogging. Outside ram air enters the systems through two grills on the nose section, right for pilot, left for copilot. Outside air flows through the grill into a plenum containing an inlet flapper valve. The flapper valve regulates inlet air flow and is positioned by a push-pull control at the crew station, "IN" is closed, OUT is open. With both flapper valves open, air flows to the upper windshield nozzles and two outlet valves located outboard of the instrument panel on each side. Forced air for ventilation and/or defogging is provided by a vent blower in each system. Both blowers are controlled by one VENT BLOWER switch on the overhead console. Flapper type valves, located inside ducts and positioned by air flow, direct either ram or blower air to outlets and prevent vent air flow into the heater ducts.

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CABIN VENTILATION



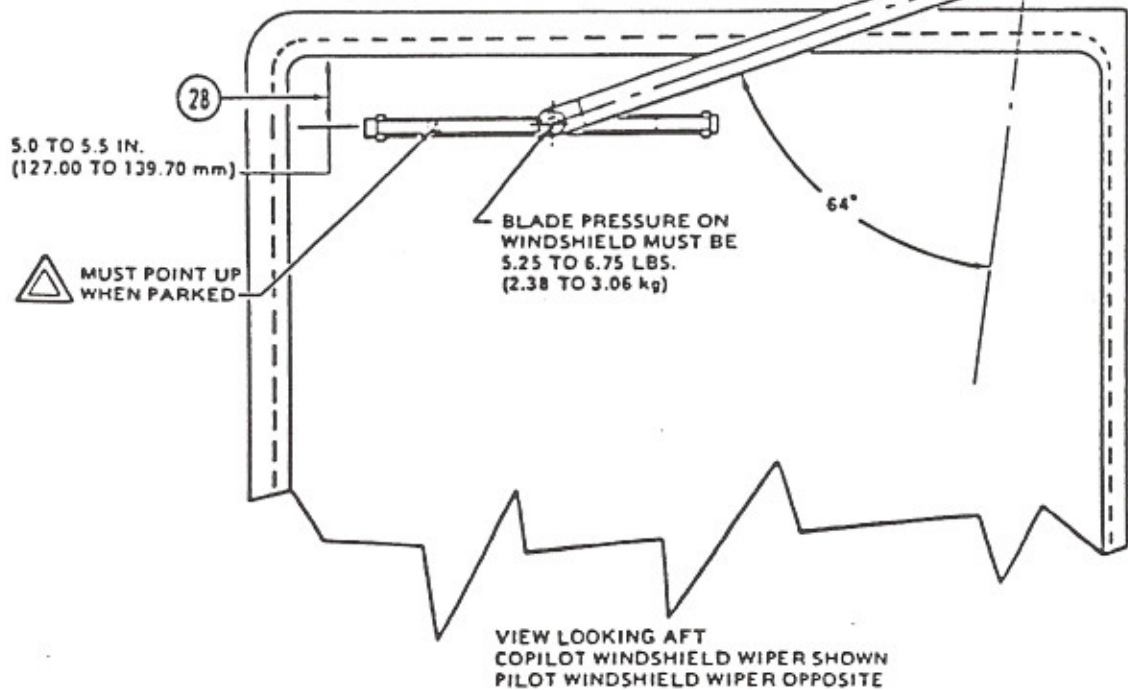
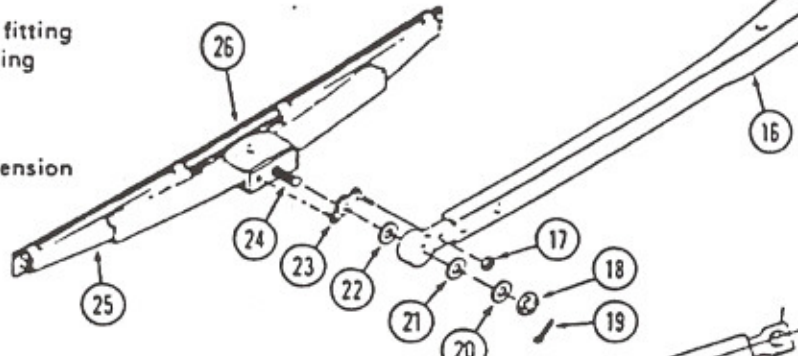
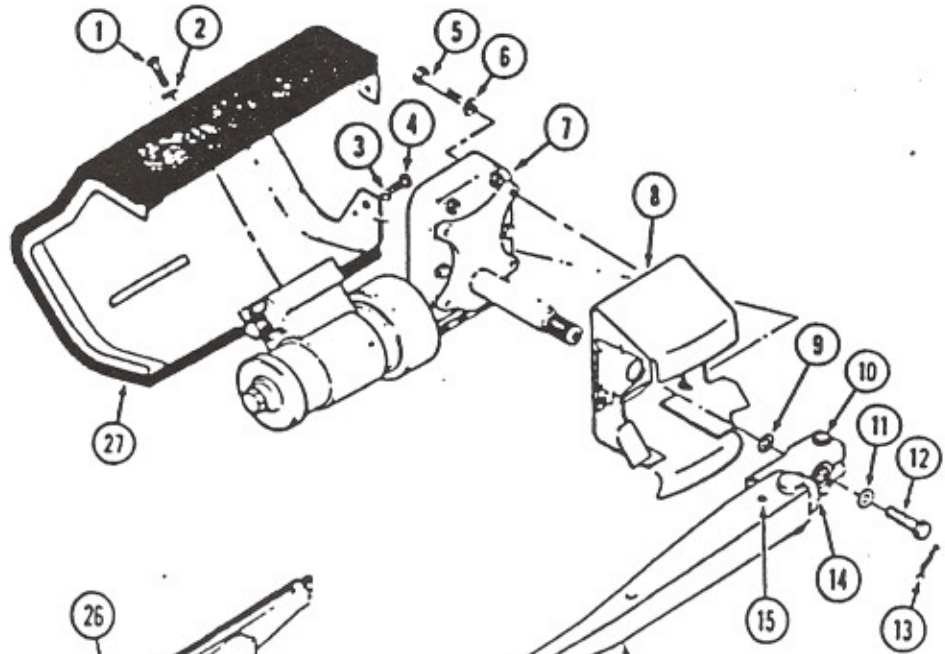
CABIN VENTILATION

The cabin interior is ventilated with ambient ram air. The ram air enters an inlet duct located inside the forward pylon fairing on the cabin roof. A plenum located under the inlet duct routes the air to three plenums, forward, left and right. Each of the three plenums have individual adjustable outlet valves, two in the forward and five in each the left and right. Air is routed forward from both the left and right plenum to the crew compartment where two outlet valves are provided for each the pilot and copilot.

Bell

WINDSHIELD WIPER INSTALLATION

1. Screw
2. Special washer
3. Special washer
4. Screw
5. Bolt
6. Thin steel washer
7. Converter and motor
8. Bracket (part of structure)
9. Split washer
10. Bolt
11. Special washer
12. Bolt
13. Lockwire
14. Tension adjustment screw
15. Retaining pin hole
16. Arm
17. Nut
18. Nut
19. Cotter pin
20. Special washer
21. Special washer
22. Special washer
23. Movable serrated fitting
24. Fixed serrated fitting
25. Wiper
26. Wiper blade
27. Head guard
28. Park position dimension



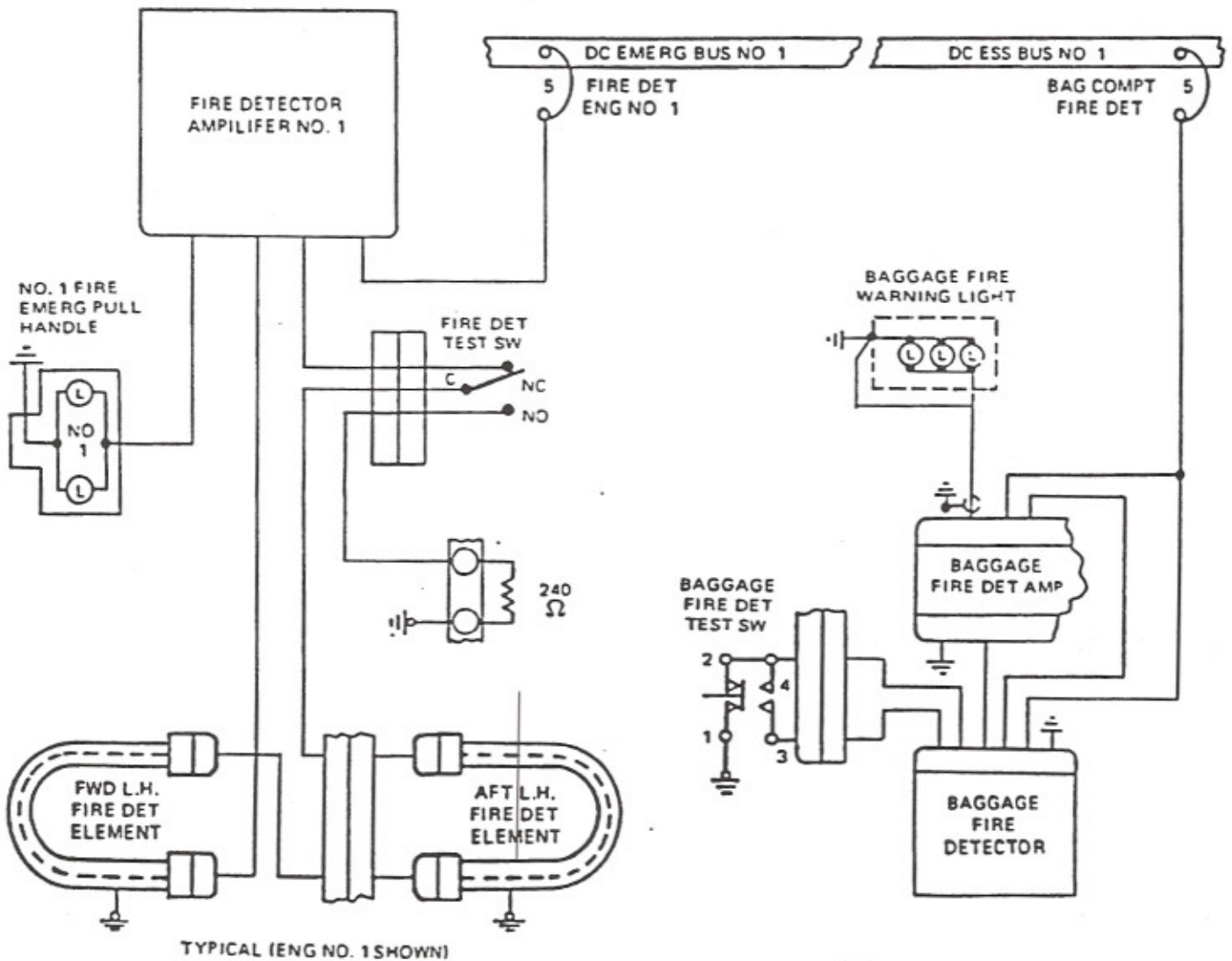
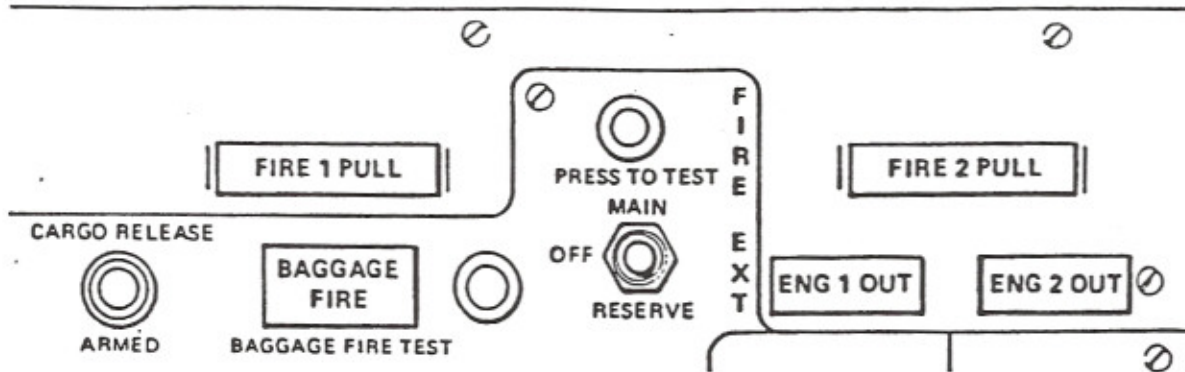
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WINDSHIELD WIPERS

The helicopter is equipped with a windshield wiper for both the pilot and copilot. Each installation consists of an electrically driven motor-converter unit, a head guard, arm and wiper assembly. The converter output shaft rotates in alternate directions causing the wiper arm and blade to move through a sixty four degree arc. The wipers are individually controlled by a separate rotary switch for the pilot and copilot. Both switches have five positions HI, MED, LO, OFF, PK and are located on the overhead console.

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FIRE AND SMOKE DETECTOR



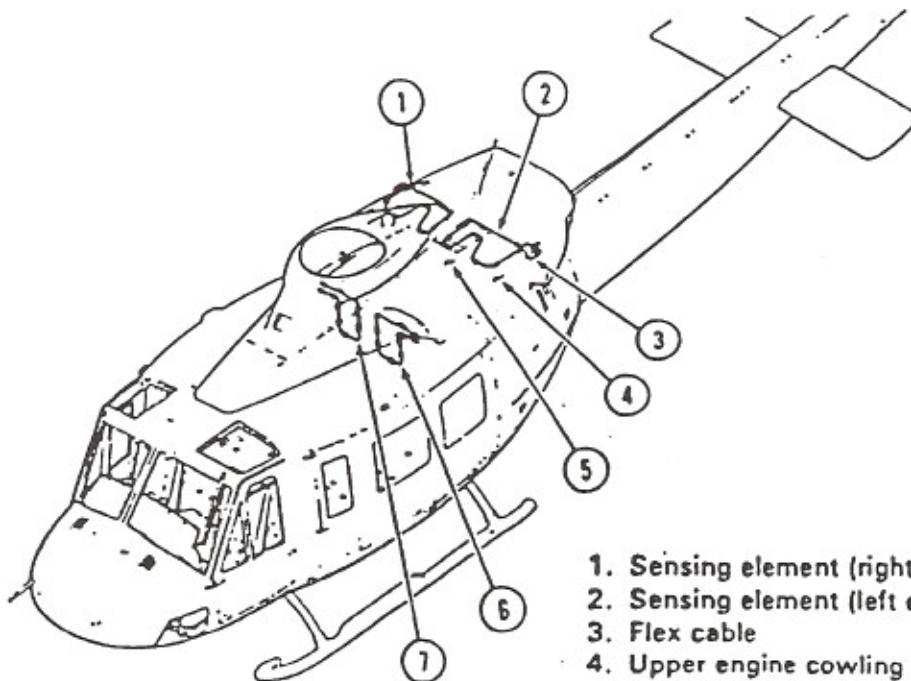
FIRE AND SMOKE DETECTION

Two fire detector warning lights are located in each FIRE PULL T-handle on the instrument panel, Engine #1 and Engine #2. The lights inform the pilot of an engine fire by illumination of the lights in the appropriate T-handle. Heat sensing elements are located in each power section compartment, forward and aft, and are connected to their respective fire detector amplifier located in the cabin roof. These elements are normally high resistance units at ambient air temperatures, but the resistance drops rapidly as temperature increases in the area, providing a low resistance for the detector amplifier which produces an output to cause the T-handle lights to illuminate.

The smoke detector is a solid state light sensitive unit located in the forward upper left area of the baggage compartment. When smoke or dust causes a refraction of light by 30% to 35% below clear air, the detector provides a signal to the detector amplifier. The amplifier, located in the helicopter nose section, will increase the signal and cause the baggage fire red warning light to flash on and off.

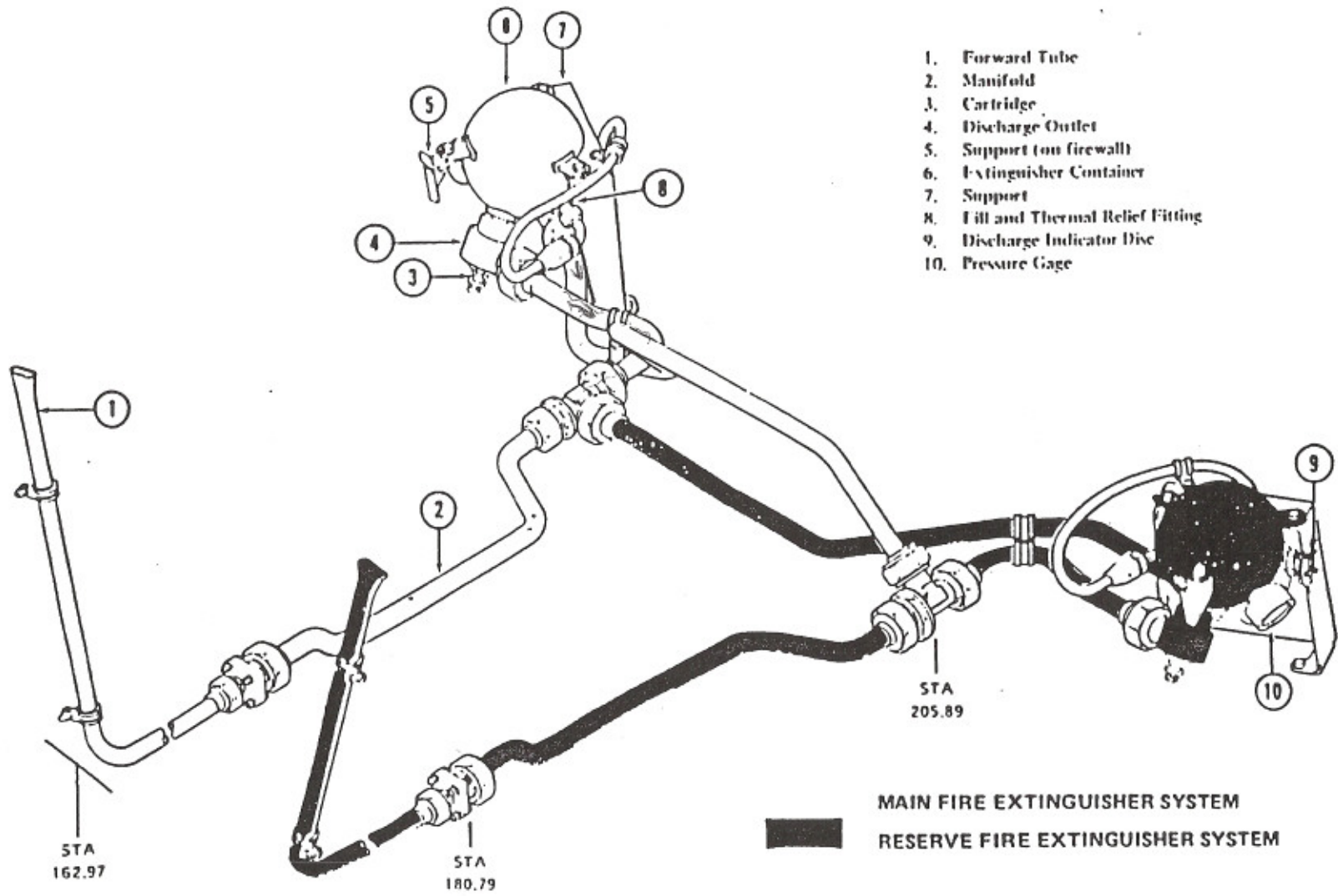
Switches are provided on the instrument panel to functionally test the systems. A single fire detect switch tests both power section detection systems and one switch tests the baggage smoke detector system.

FIRE DETECTION SENSING ELEMENTS



1. Sensing element (right engine power section top cowl)
2. Sensing element (left engine power section top cowl)
3. Flex cable
4. Upper engine cowling
5. Engine cowl top panel
6. Sensing element (left power section firewall)
7. Sensing element (right power section firewall)

Engine Fire Extinguisher Installation



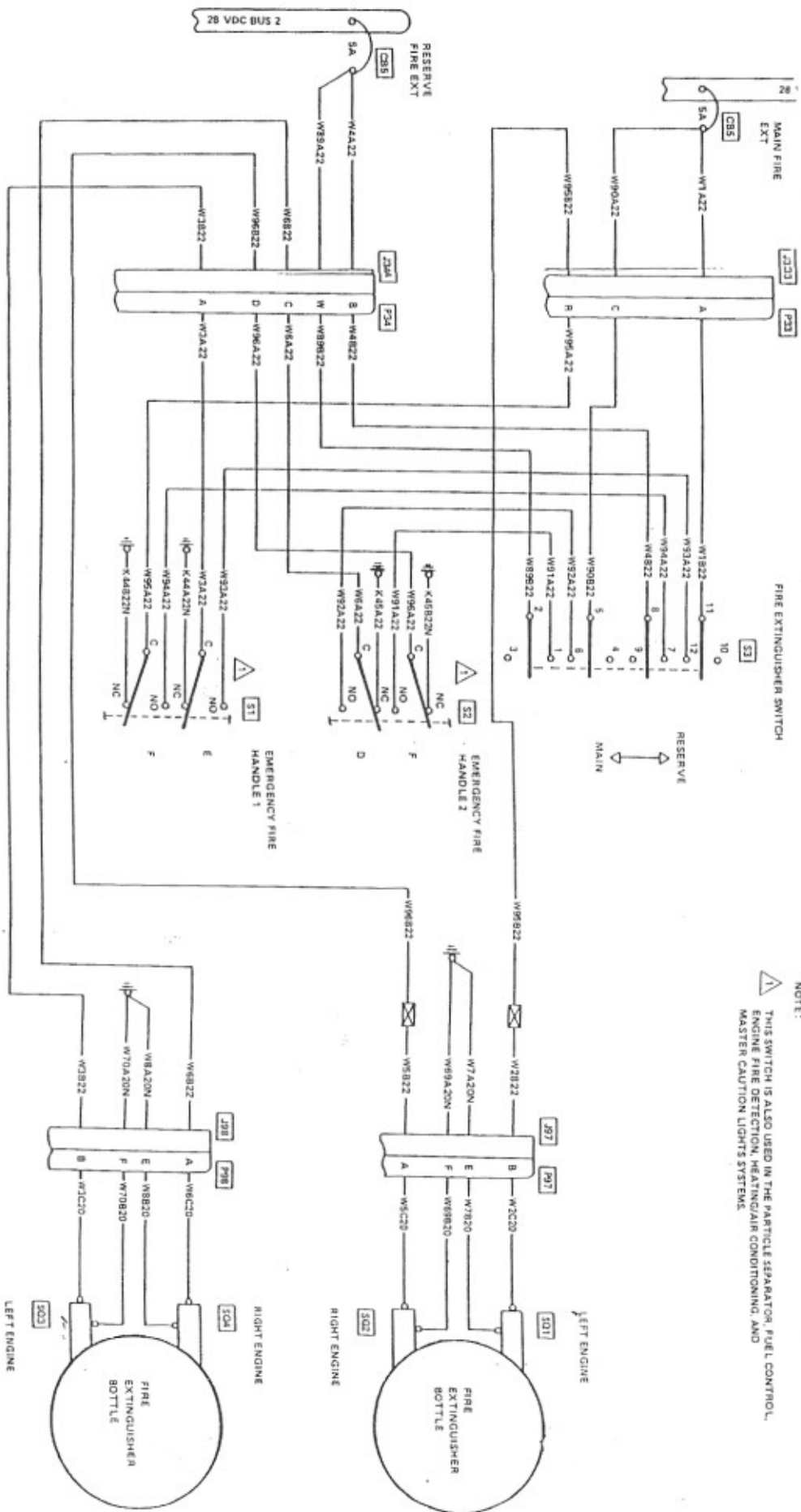
POWER PLANT FIRE EXTINGUISHER

The powerplant fire extinguisher system is provided with two containers, MAIN and RESERVE. The containers are interconnected by tubes to discharge manifolds in such a manner to allow either container to be discharged into either power section compartment. Each container is charged with approximately 2 pounds of freon and 600 psi nitrogen at standard ambient temperature. Each container has two discharge outlets equipped with electrically actuated cartridges, one for Engine #1 and one for Engine #2.

If fire occurs in a power section compartment, the detector unit will illuminate the warning light in the T-handle of the affected power section. Pulling the fire extinguisher T-handle and placing the fire extinguisher selector to MAIN or RESERVE, will discharge the main or reserve container into the affected compartment by firing the cartridge for that power section in that container.

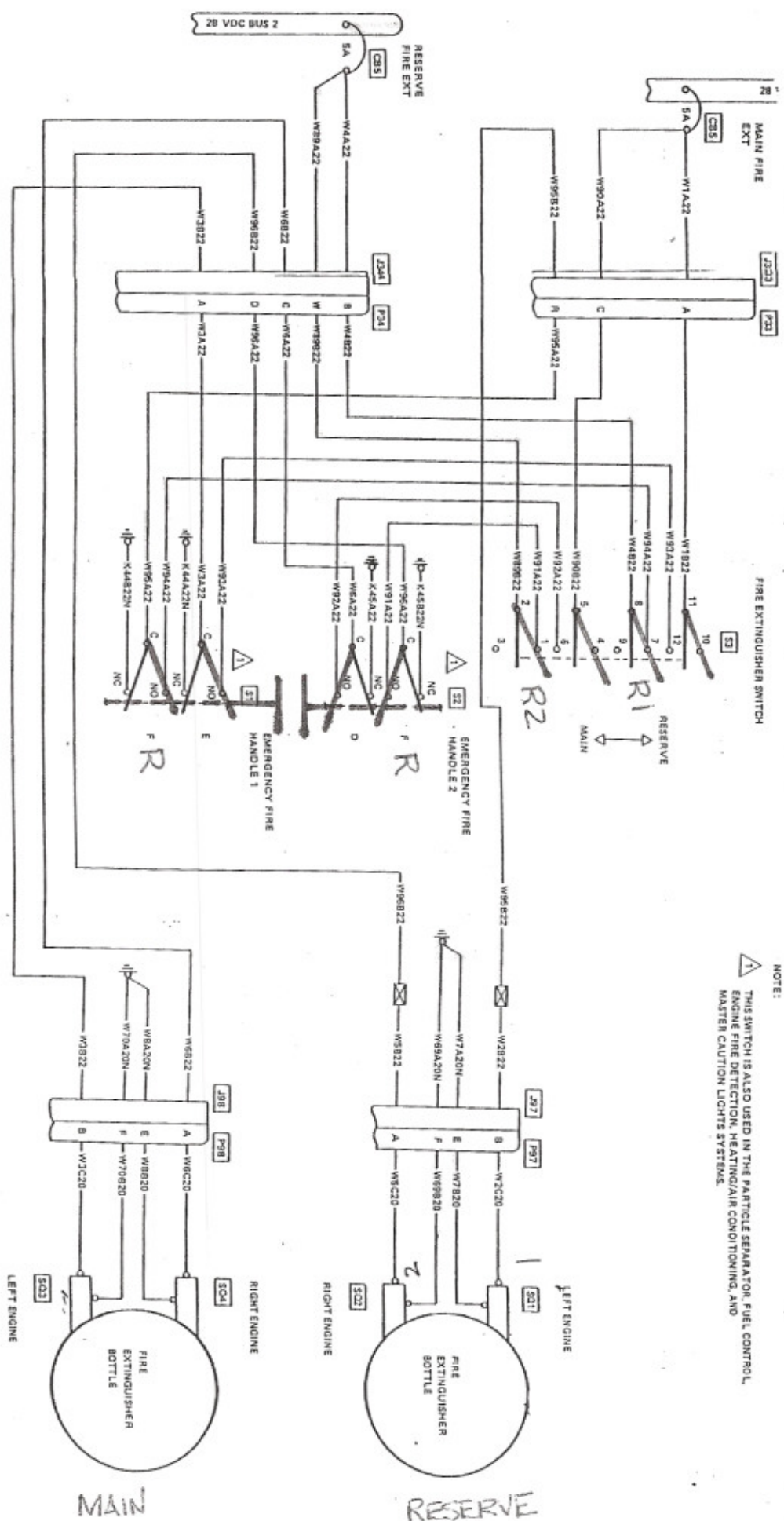
In addition to selecting the power section, the pull handle will close the fuel shut-off valve and the particle separator for the affected engine. This action will also cause the bleed air valve for both engines to close.

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NOTE: THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL, ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND MASTER CAUTION LIGHTS SYSTEMS.

DUAL ENGINE FIRE
 No.1 AND No.2 'T' HANDLES - PULLED
 SWITCH SELECT - RESERVE
 EXT. BOTTLE

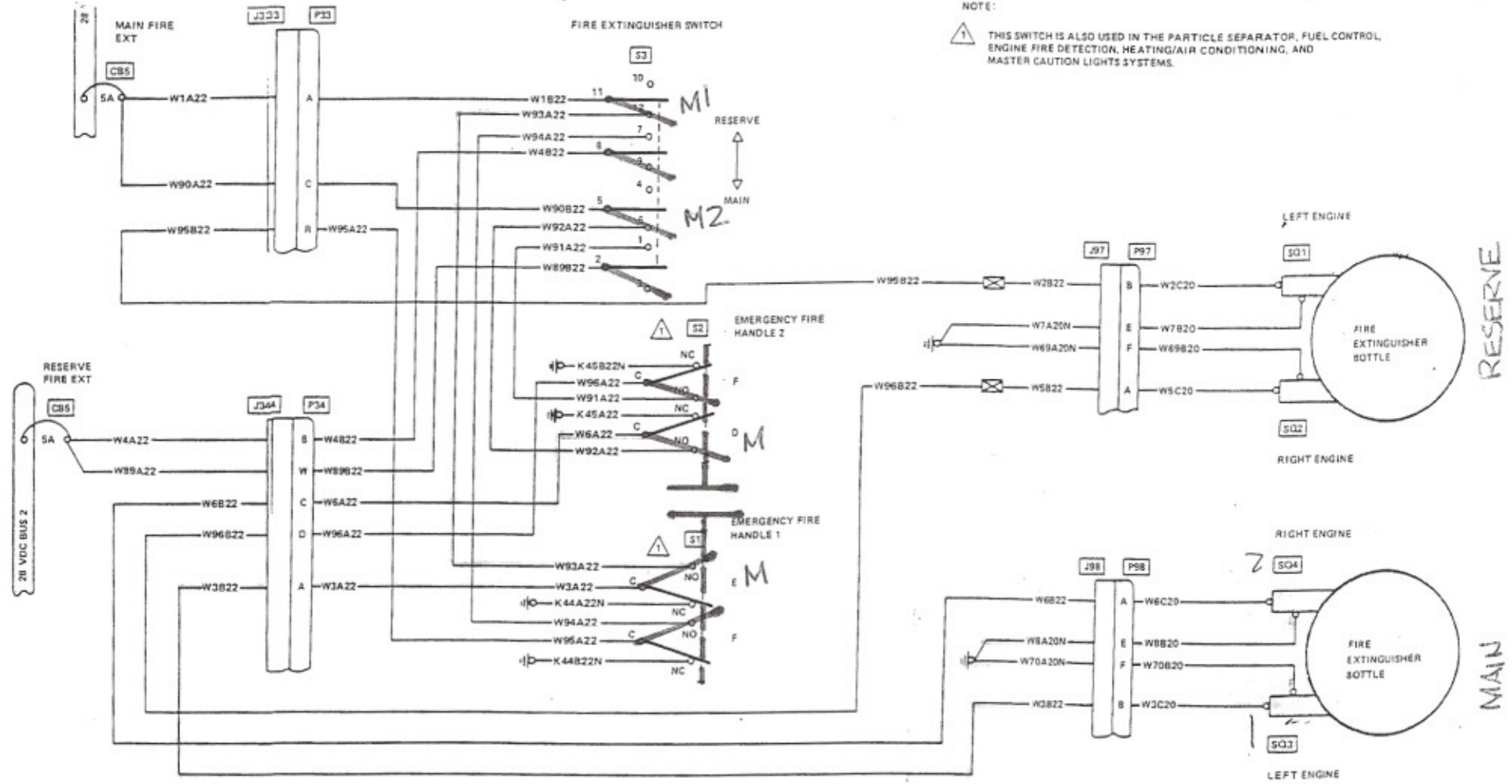


NOTE:
 THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL,
 ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND
 MASTER CAUTION LIGHTS SYSTEMS.

SQUIBS FIRE SIMULTANEOUSLY; THEREFORE
 PORTION OF BOTTLE CONTENTS IS DIRECTED
 TO ENGINE No. 1, AND PORTION OF BOTTLE CONTENTS
 IS DIRECTED TO ENGINE No. 2.

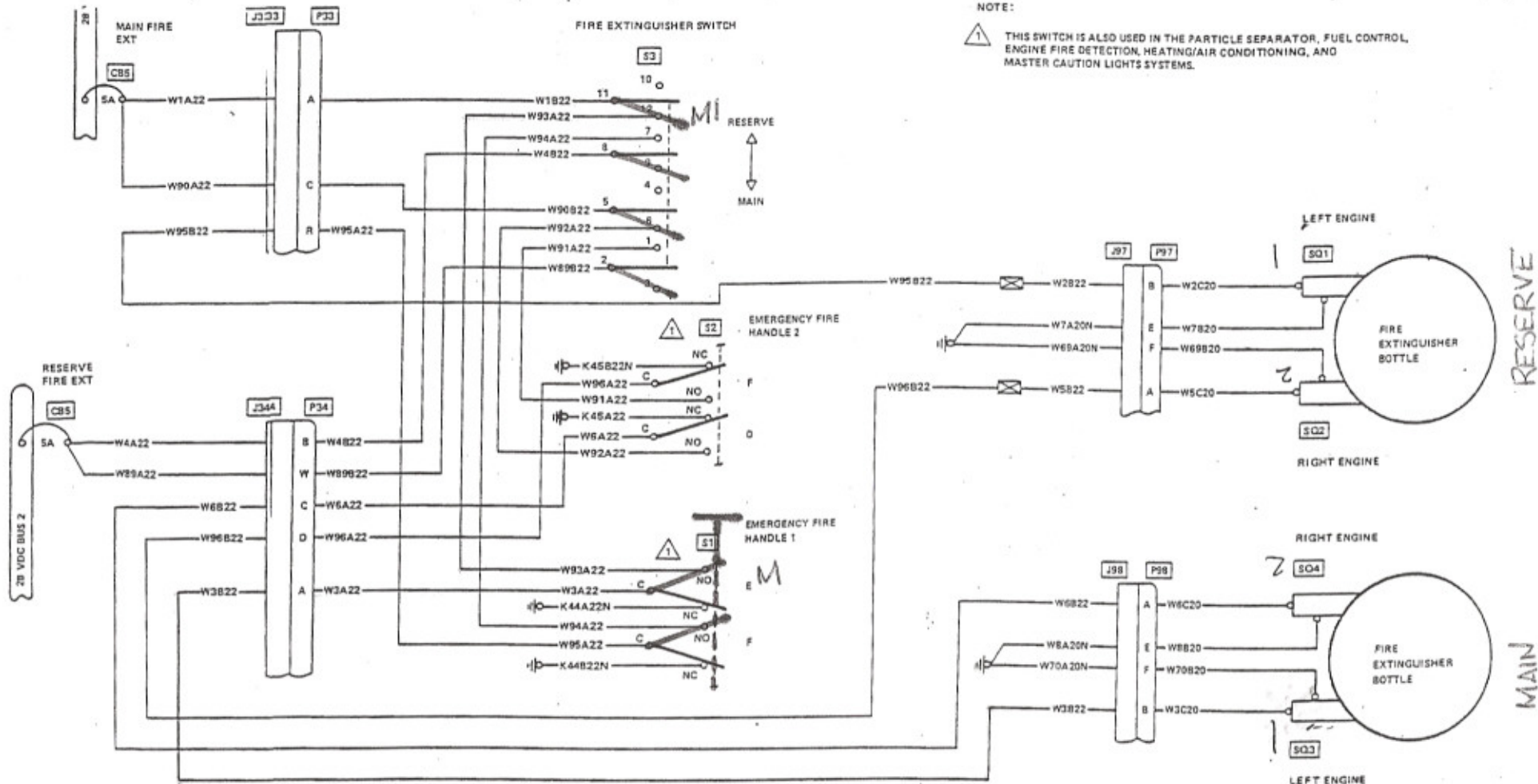
DUAL ENGINE FIRE
 NO.1 AND NO.2 'T' HANDLES - PULLED
 SWITCH SELECT - MAIN EXT. BOTTLE

NOTE:
 THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL, ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND MASTER CAUTION LIGHTS SYSTEMS.



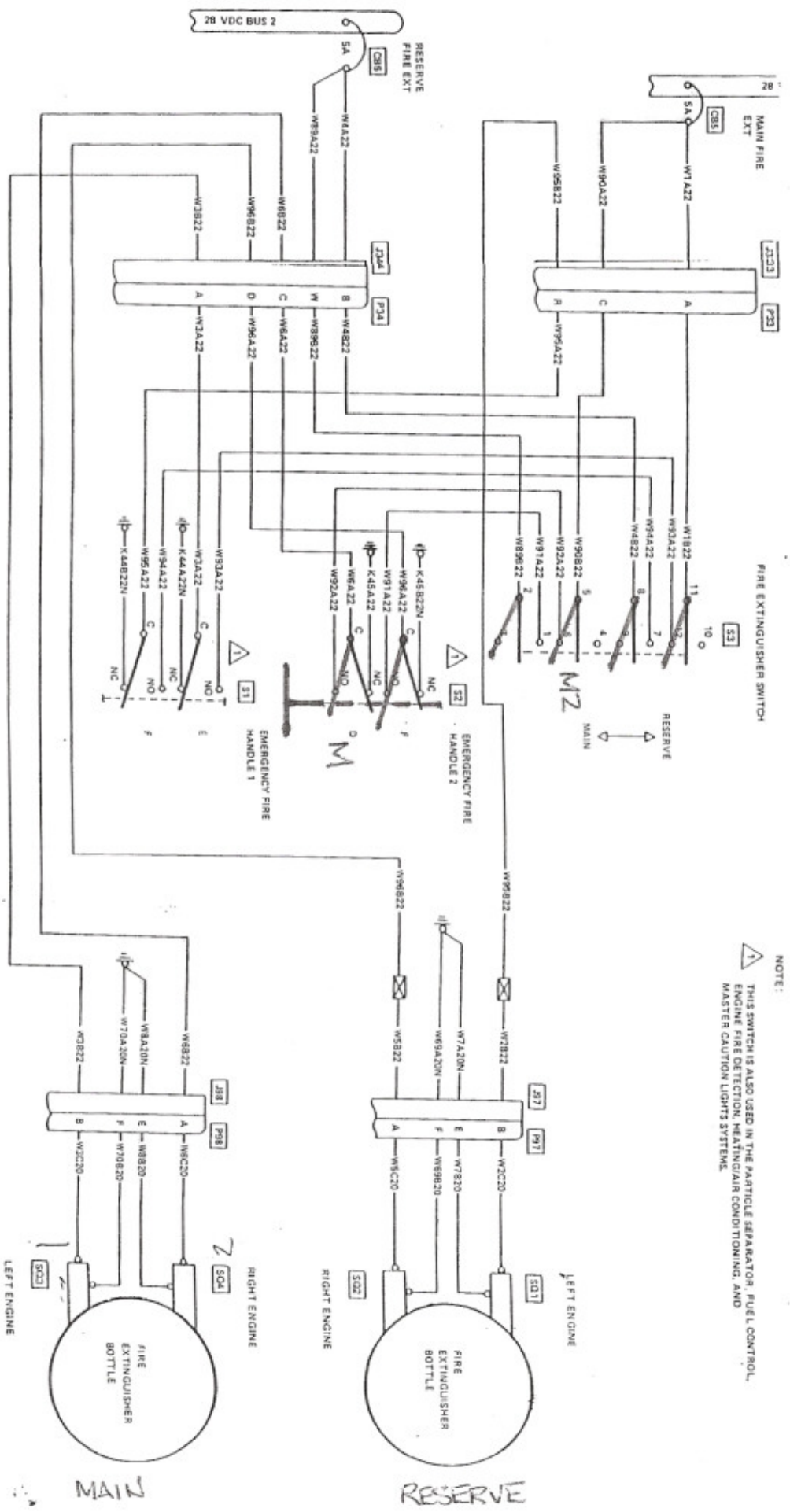
SQUIBS FIRE SIMULTANEOUSLY; THEREFORE PORTION OF BOTTLE CONTENTS IS DIRECTED TO ENGINE No.1, AND PORTION OF BOTTLE CONTENTS IS DIRECTED TO ENGINE No.2.
 RESERVE EXT. BOTTLE IS BACK-UP.

NO. 1 ENGINE FIRE
 NO. 1 'T' HANDLE-PULLED
 SWITCH SELECT - MAIN EXT. BOTTLE



NOTE:
 ⚠ THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL, ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND MASTER CAUTION LIGHTS SYSTEMS.

No.2 ENGINE FIRE
 No.2 'T' HANDLE RULED
 SWITCH SELECT—MAIN EXT. BOTTLE

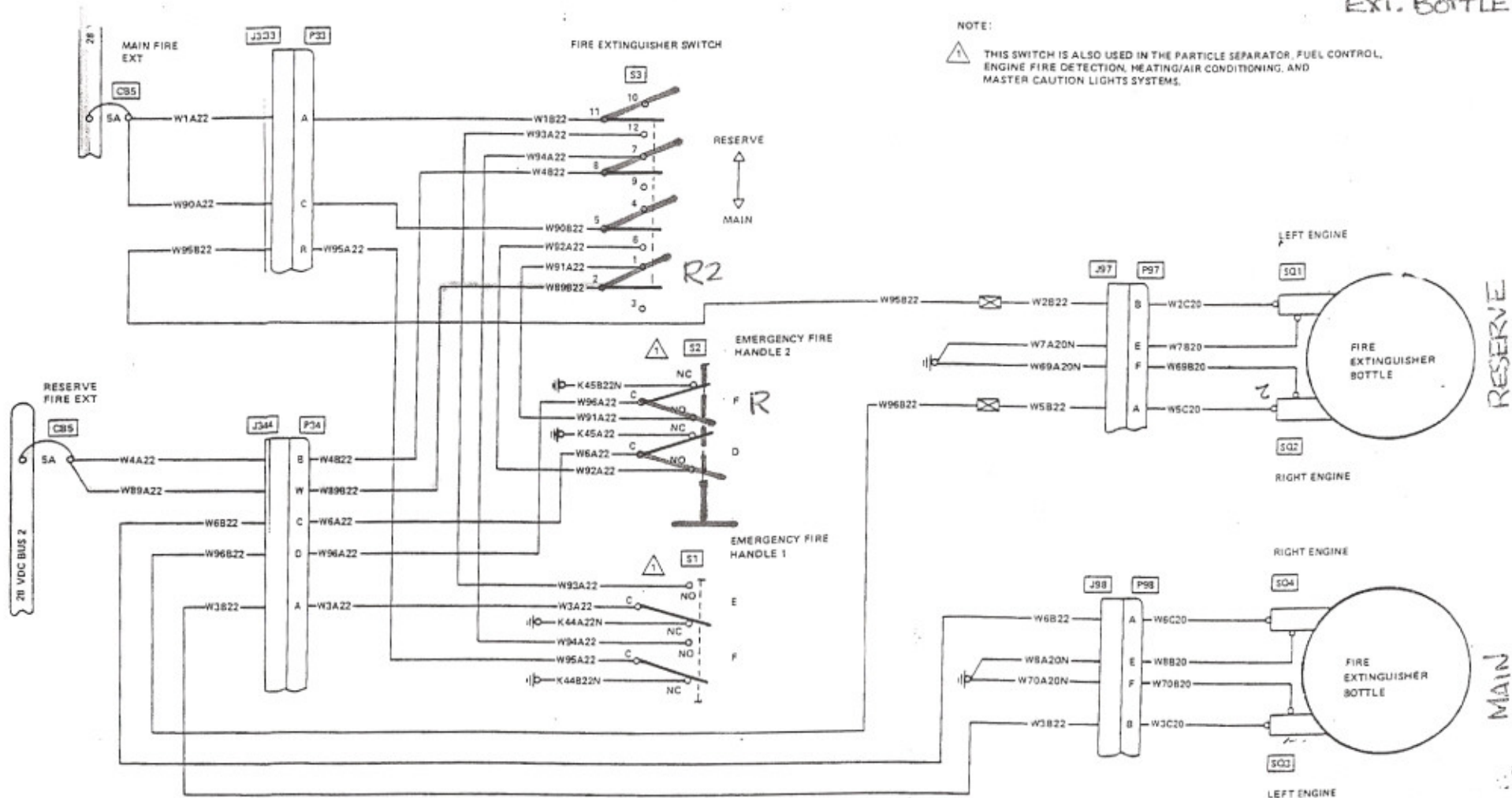


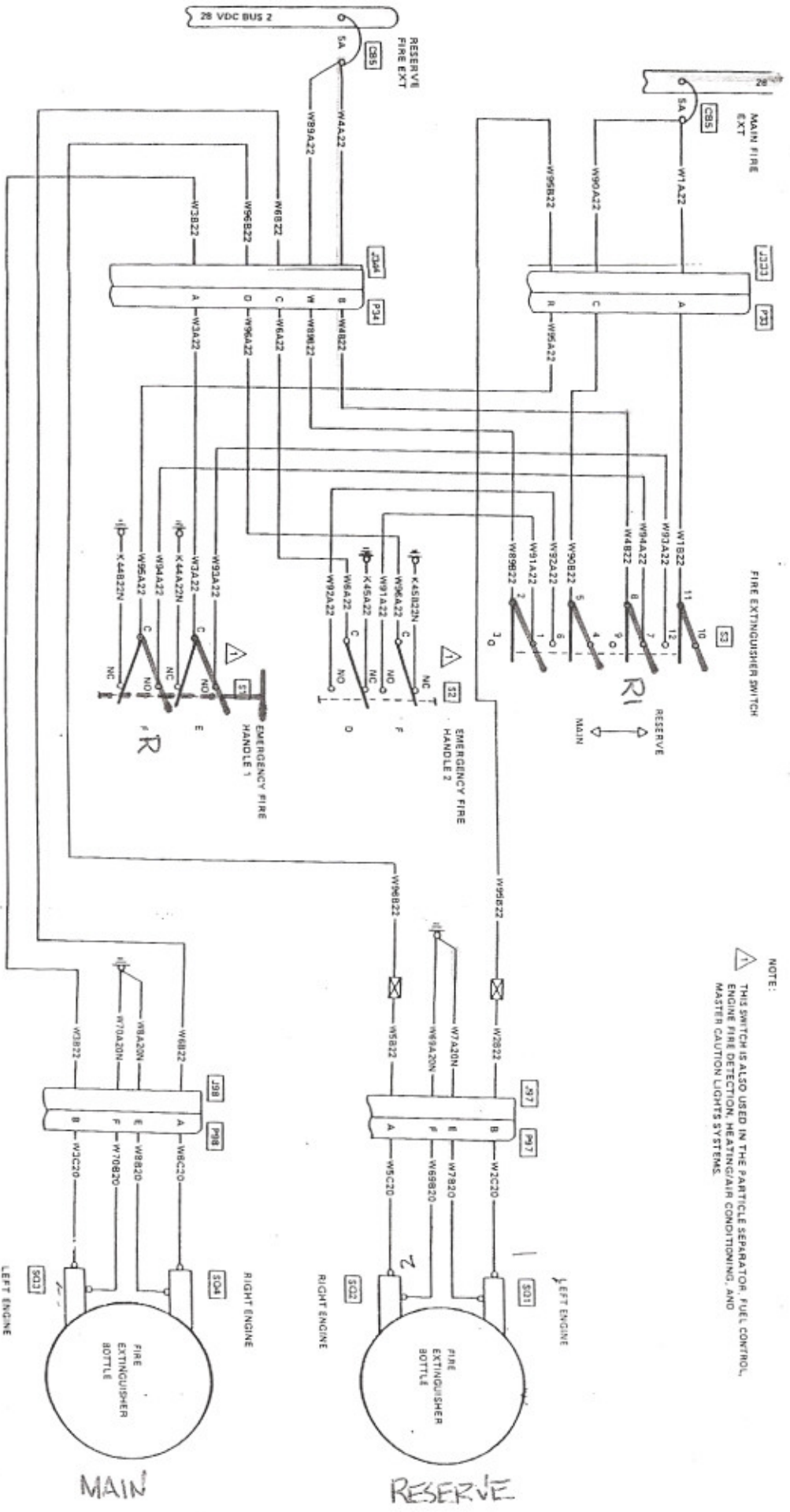
NOTE:
 THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL, ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND MASTER CAUTION LIGHTS SYSTEMS.

212-M-98-19
 212-475-021M

NO. 2 ENGINE FIRE
 NO. 2 'T' HANDLE PULLED
 SWITCH SELECT - RESERVE
 EXT. BOTTLE

NOTE:
 THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL,
 ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND
 MASTER CAUTION LIGHTS SYSTEMS.





NOTE:
 △ THIS SWITCH IS ALSO USED IN THE PARTICLE SEPARATOR, FUEL CONTROL, ENGINE FIRE DETECTION, HEATING/AIR CONDITIONING, AND MASTER CAUTION LIGHTS SYSTEMS.

NO. 1 ENGINE FIRE
 NO. 1 'T' HANDLE -- RATED
 SWITCH SELECT -- RESERVE
 EXT. BOTTLE

ROTOR BRAKE SYSTEM

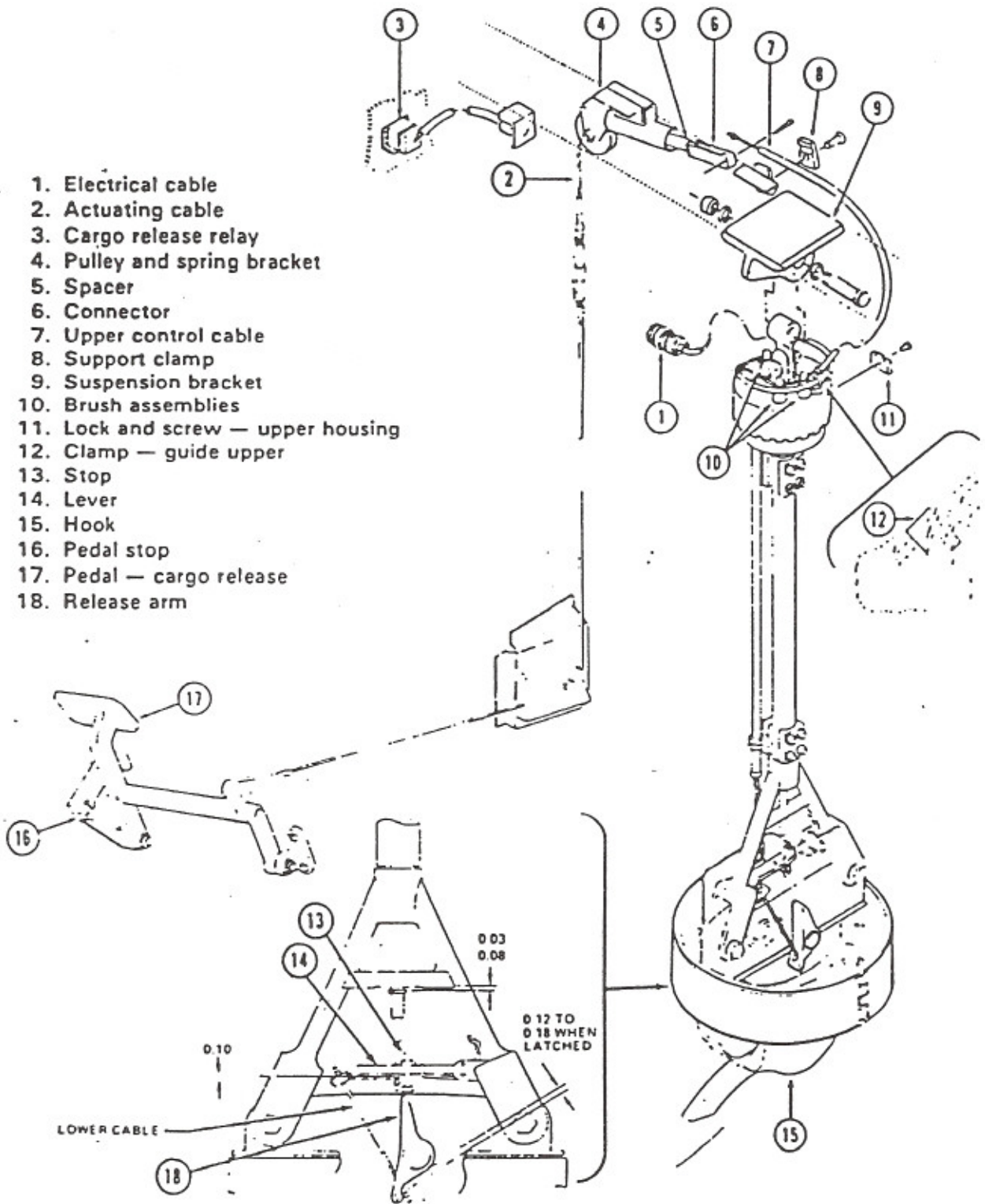
The rotor brake system, available as optional equipment, provides for rapid deceleration of the rotor after engine shut-down and a park position to prevent the rotor from windmilling under static conditions.

The system consists of a master cylinder, dual brake assembly, drive quill with a single brake disc, hydraulic lines, hoses, fittings and couplings, two caution lights, two micro switches and necessary wiring.

The master cylinder is mounted in the cabin roof above the pilots station and is serviced with hydraulic fluid from the cabin roof. Hydraulic pressure from the master cylinder causes movement of pistons in two cylinders of the brake assembly, forcing brake linings against both sides of the brake disc driven by the transmission quill gear. Two micro switches, one actuated by each piston, will cause individual ROTOR BK caution light segments to illuminate. The segments will illuminate (red) when the pistons are not fully retracted.

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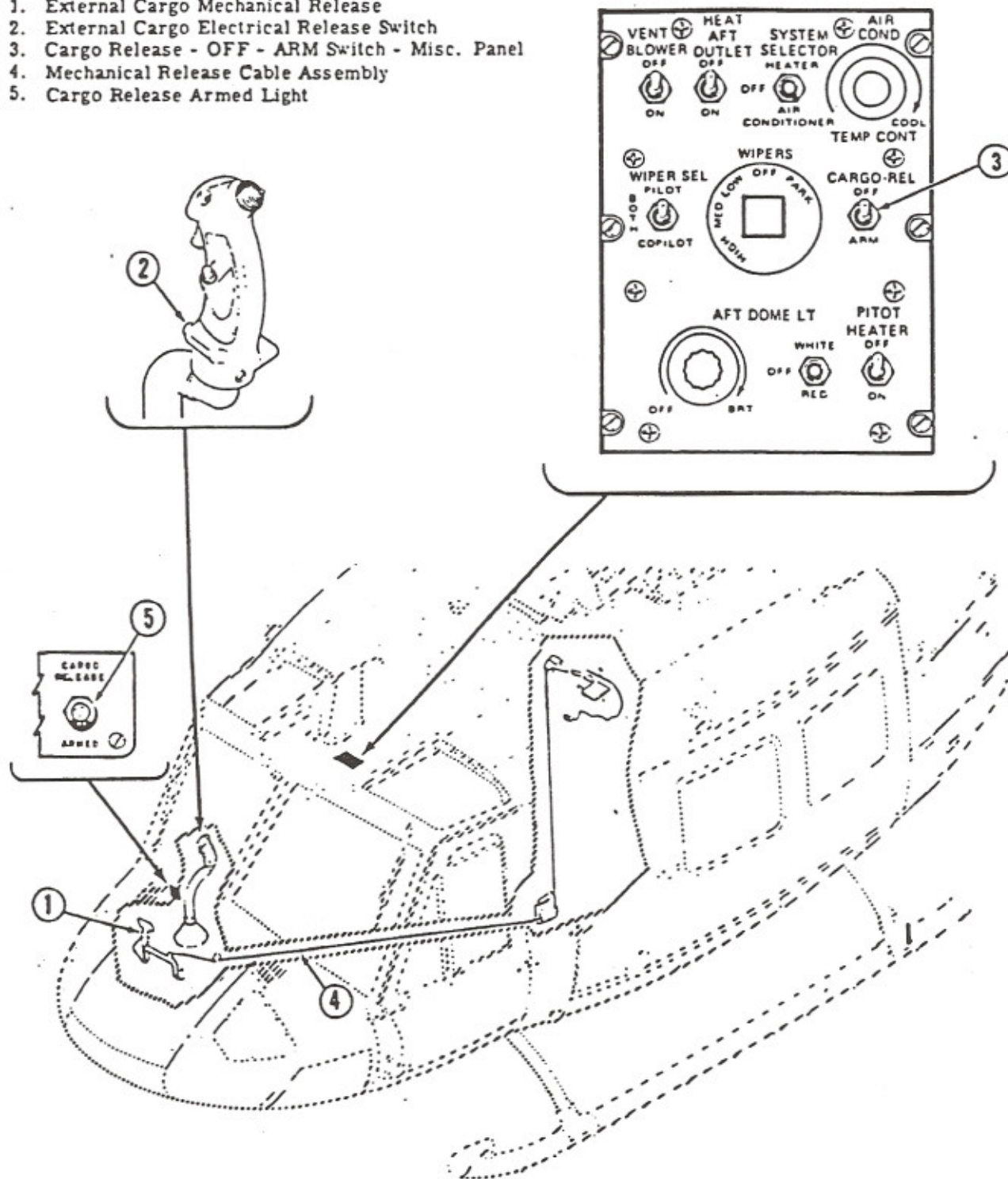
CARGO SUSPENSION INSTALLATION



1. Electrical cable
2. Actuating cable
3. Cargo release relay
4. Pulley and spring bracket
5. Spacer
6. Connector
7. Upper control cable
8. Support clamp
9. Suspension bracket
10. Brush assemblies
11. Lock and screw — upper housing
12. Clamp — guide upper
13. Stop
14. Lever
15. Hook
16. Pedal stop
17. Pedal — cargo release
18. Release arm

See ASB 412-89-46 for cargo hook warning plate.

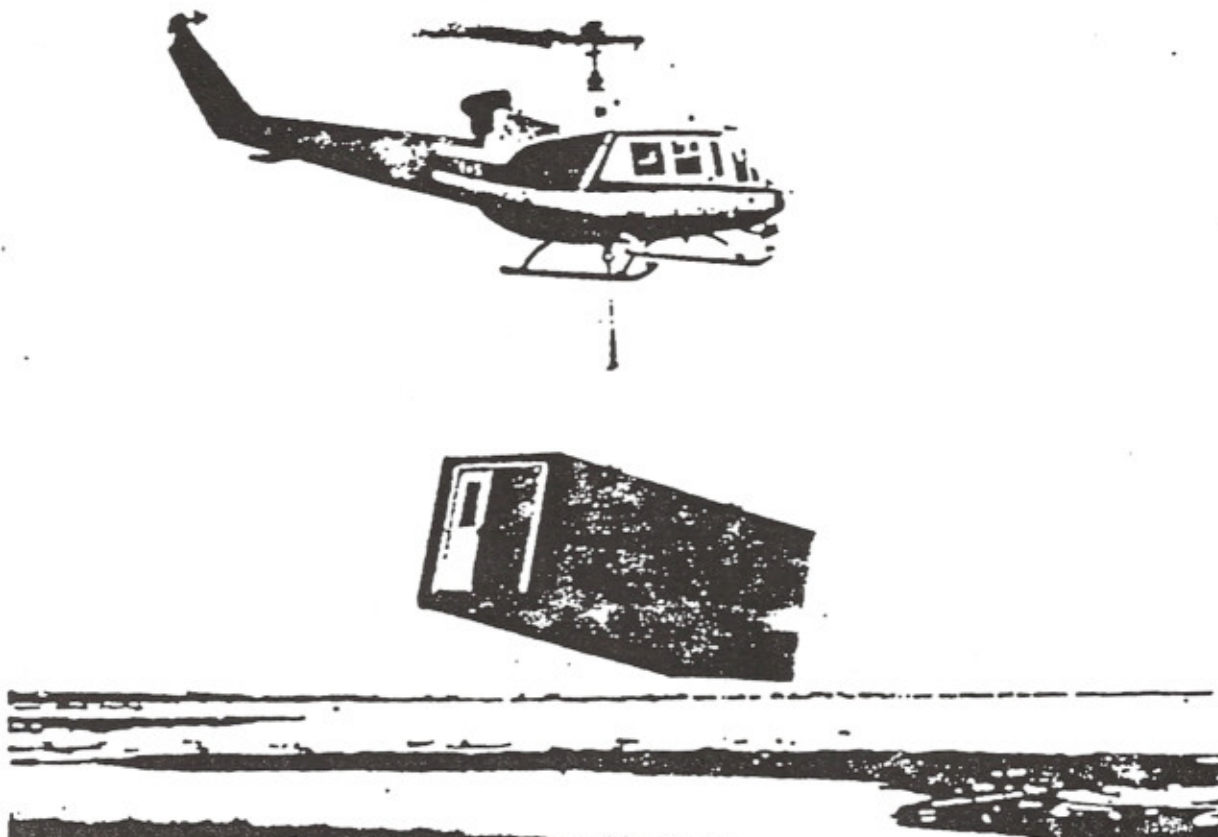
1. External Cargo Mechanical Release
2. External Cargo Electrical Release Switch
3. Cargo Release - OFF - ARM Switch - Misc. Panel
4. Mechanical Release Cable Assembly
5. Cargo Release Armed Light



Cargo Suspension Installation

EXTERNAL CARGO SUSPENSION HOOK KIT

BHC P/N 212-706-103-1



External Cargo Suspension Hook

The cargo suspension system is comprised of a 5000 pound capacity hook assembly, attached to a single point at the approximate helicopter center of gravity. The hook is attached to the lift beam in the pylon support structure below the transmission, extending through an opening in the bottom of the lower fuselage skin. The kit includes a "rubber" bumper ring around the opening to protect the edge of the lower fuselage skin.

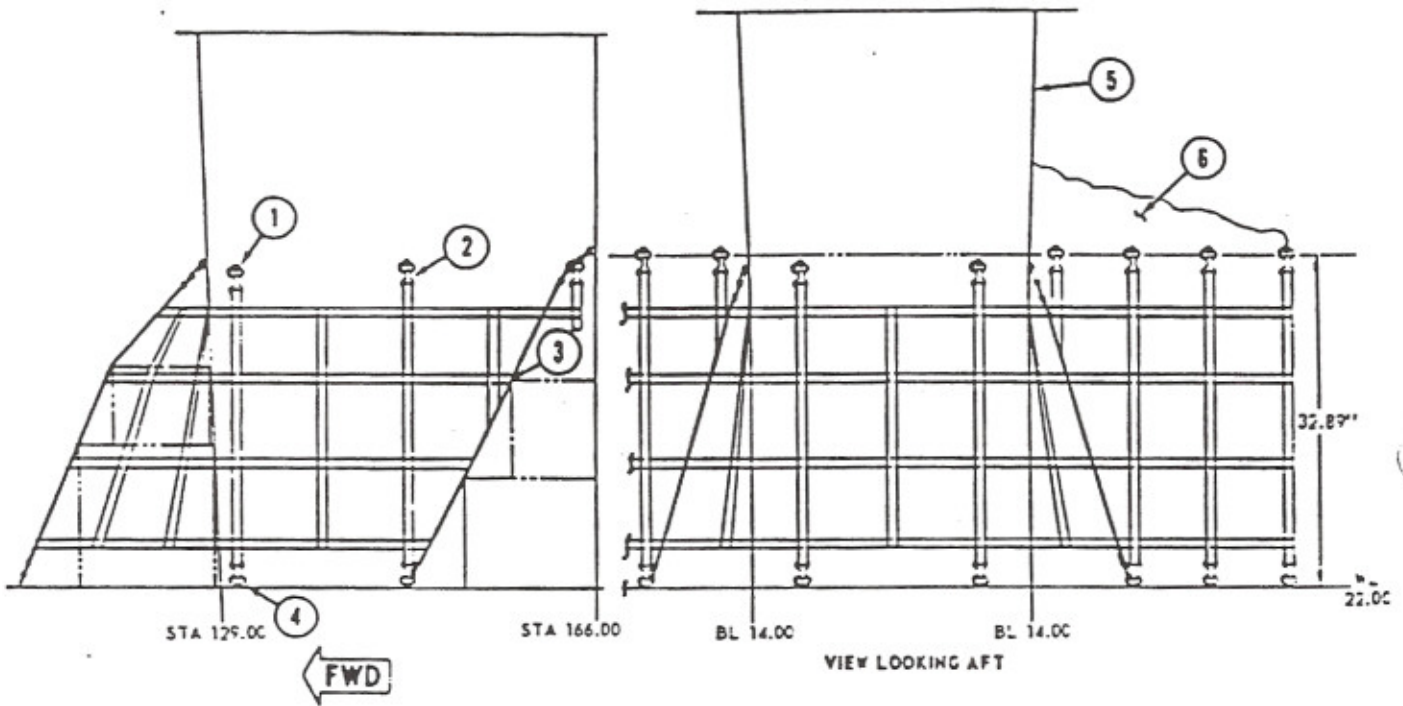
All electrical and mechanical release components are installed in the standard Model 212, and required no additional modifications to the basic airframe.

In addition to the hook assembly, the kit includes a 9" x 14" rear view mirror which attaches to the fuselage under the lower right bubble to permit pilot observation of the external sling load.

All operational and weight limitation are contained in a supplement to the current Model 212 Flight Manual.

INTERNAL CARGO RESTRAINT NET KIT
 BHC P/N 204-706-037-5

1. Ring Assy (Typ 16 places)
2. Adjustable Hooks
3. Net Assy
4. Tie Down Ring (Deck) (Ref)
5. Transmission Support Structure (Ref)
6. Aft Cabin Firewall (Ref)



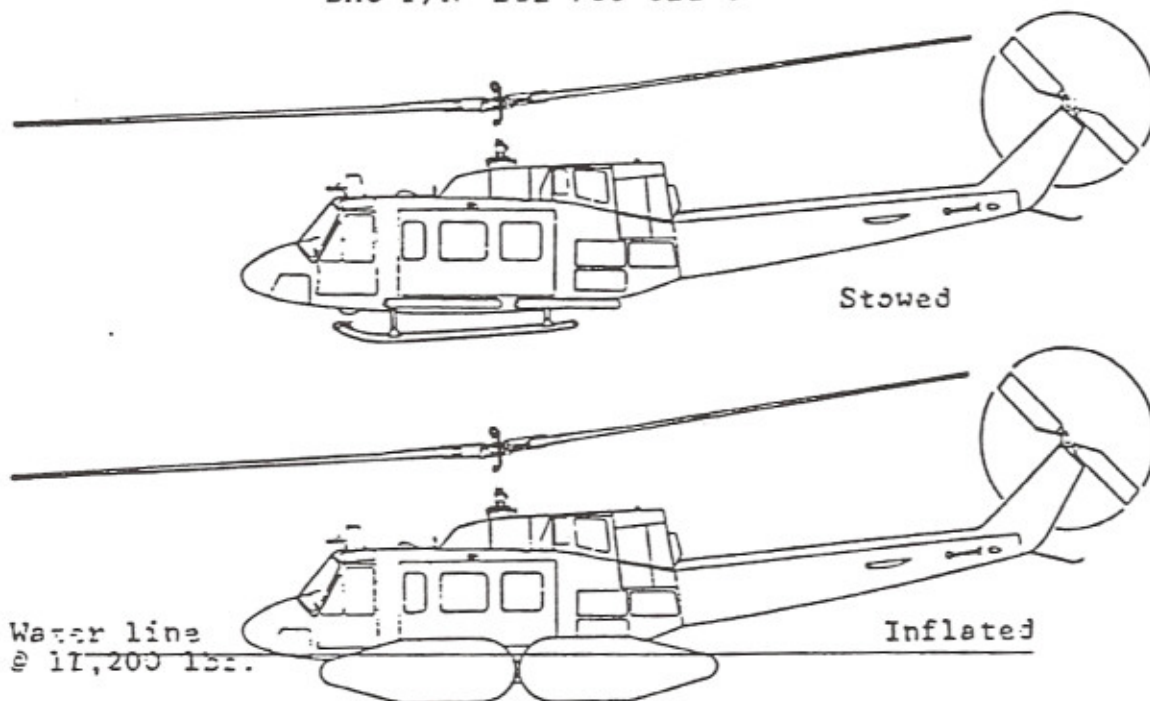
Internal Cargo Restraint Net

The cargo net and ring assembly consists of a three section prefabricated net and 16 threaded tie down rings. Each net is composed of web straps, reefing rings and adjustable rings for attaching the net to the tie down rings.

The cargo net is used for restraint and tie down of cargo in the aft portion of the passenger compartment.

EMERGENCY FLOTATION KIT

BHC P/N 212-706-021-1



MODEL 212 EMERGENCY FLOAT KIT

The intent of the emergency flotation kit is to provide ditching capabilities. This kit does not provide amphibious operations. Floats must be stowed for normal operation.

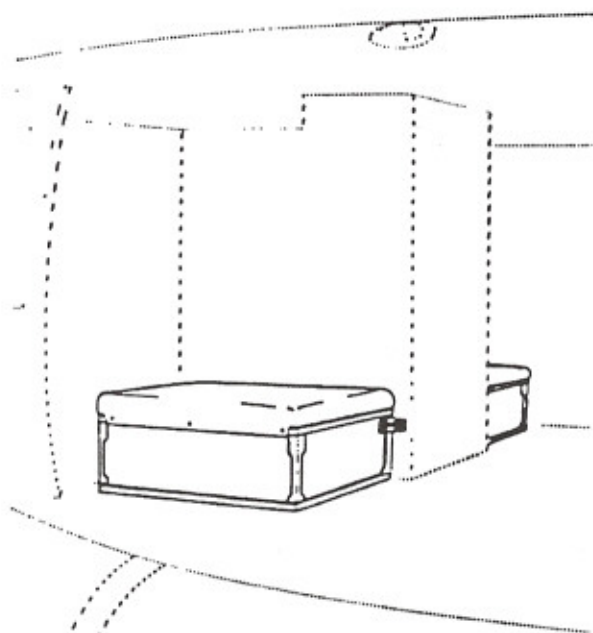
The emergency flotation gear provides approximately 140% flotation at full gross weight. With the flotation bags positioned as they are just below the cabin floor, the water stability is better than that with fixed floats installed. Provisions are made for life rafts, survival equipment and lift preservers.

This system utilizes the pop-out bag concept and consists of four bags, each bag being assembled to a separate honeycomb panel. Each float assembly is attached to the helicopter with four pins and one gas line connection, thus providing fast installation and easy removal of the kit.

Inflation of the floats is accomplished by releasing compressed nitrogen gas stored in the nose at approximately 3000 psi. A solenoid valve actuated by the pilot from the cockpit releases the gas. This system will be protected from accidental inflation by a guarded arming switch located on the panel. As a further safety feature, a mechanical override provision to open the nitrogen valve IN case of electrical failure is standard. Inflation time is approximately three to five seconds.

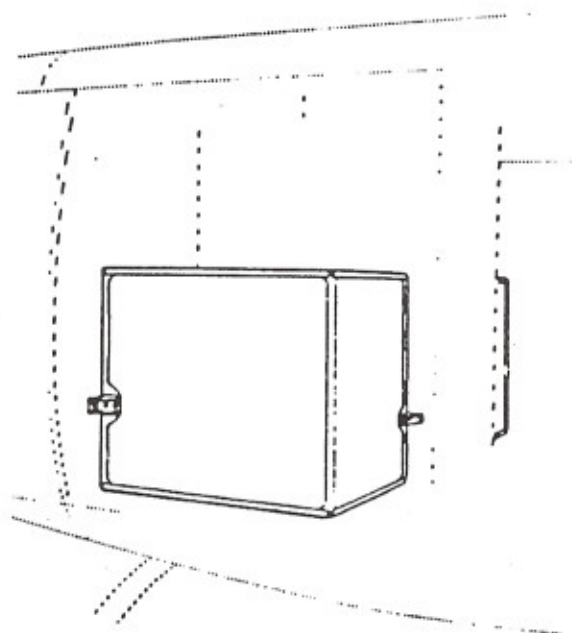
AUXILIARY FUEL TANK KITS

40 Gallon BHC P/N 205-706-044-11
180 Gallon BHC P/N 205-706-045-11



40 GALLON KIT

(Two 20-gallon seat type tanks)



180 GALLON KIT

(Two 90-gallon tanks)

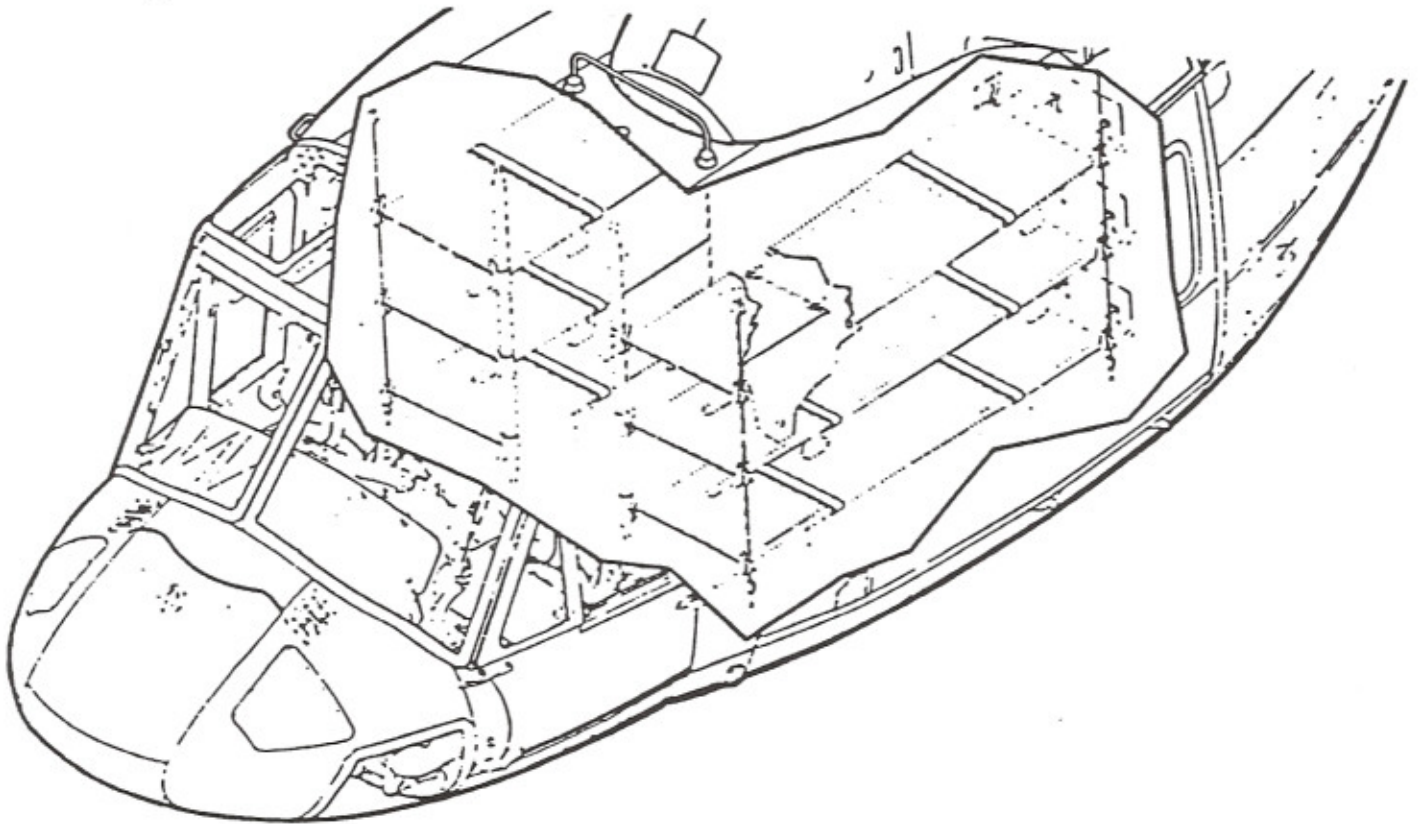
The fuel capacity of the 212 may be increased up to 85% by installation of the two 90-gallon auxiliary fuel tanks (180-gal. kit) and up to 18% without loss of the 15-place seating capacity by installation of the two 20-gallon tanks (40-gal. auxiliary fuel kit).

When installed, the auxiliary fuel tanks become an integral part of the basic fuel system and requires no additional fuel management procedures. They fill and empty through the main tanks and the fuel gauges are electrically compensated when the fuel tank kits are installed. Their location at the ship's center of gravity eliminates balancing problems.

All connections and installation attachments are by quick disconnect fittings and couplings, to provide quick change from one configuration to another;

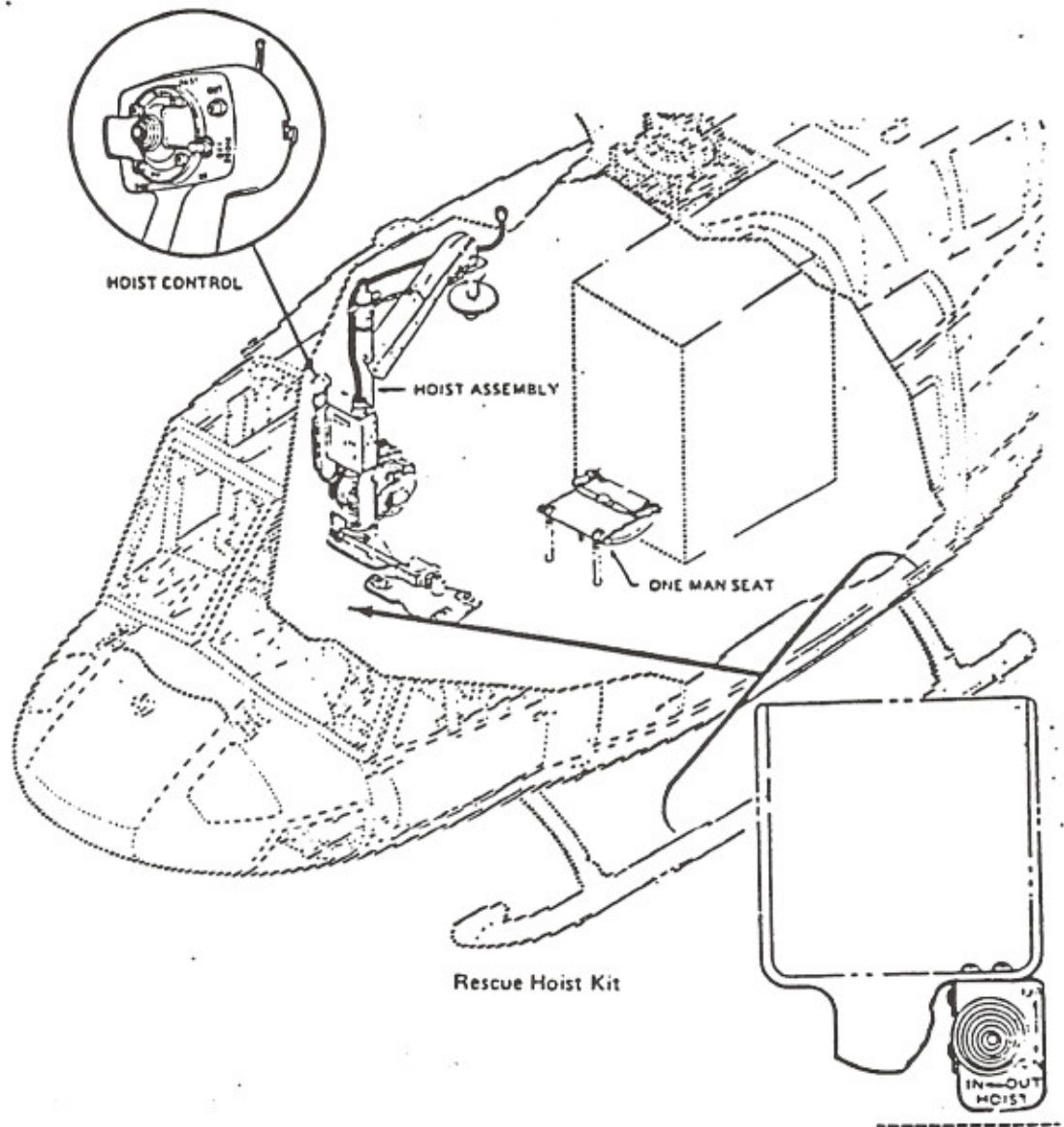
LITTERS

The litter installation kit consists of strap assemblies, stanchions, shelves, and hardware necessary for attachments. The litter cots are arranged one above the other parallel to the centerline of the helicopter. Plates attached to the aft cabin wall support the shelves at the end of the top two litter cots on both sides. Brackets attached to the outboard sides of the pylon support structure and stanchions upright between the cabin floor and cabin roof support the inboard litter cot rails. Straps attached to the cabin roof and tied to cargo hold down rings on the cabin floor support the outboard litter cot rails.



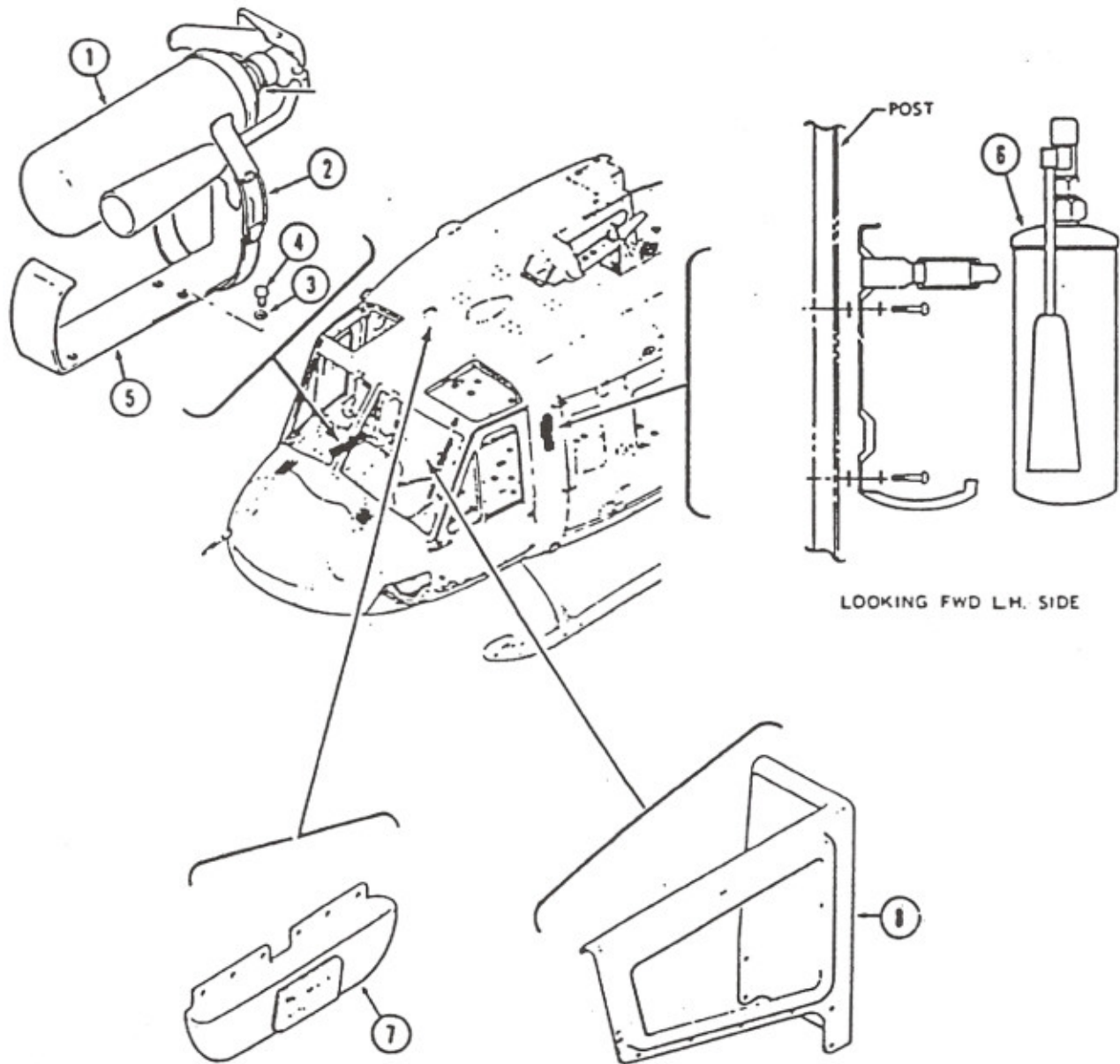
Litter Kit Installation

Notes



Bell utilizes the experience obtained from search and rescue operations of military helicopters to provide optional equipment for configuring the 212 into a specialized full time or standby search and rescue vehicle. Quick change equipment is stowed aboard the 212 for the standby search and rescue configuration.

MISCELLANEOUS EQUIPMENT



1. Fire extinguisher
2. Clamp
3. Thin steel washer
4. Screw
5. Bracket
6. Fire extinguisher
7. Overhead console guard
8. Pilot console partition