TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE MANUAL

CH-47D HELICOPTER

This manual together with TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-6, TM 55-1520-240-23-7, TM 55-1520-240-23-9, TM 55-1520-240-23-10, TM 55-1520-240-23-11, supersedes TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-9, TM 55-1520-240-23-10, 10 May 1983, and TM 55-1520-240-23-6, 6 May 1983, including all changes.

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DEPARTMENT OF THE ARMY
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual, directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or the World Wide Web. Our fax number is: DSN 788-6546 or Commercial 256-842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028. For the World Wide Web use: https://amcom2028.redstone.army.mil.

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*This manual together with TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-6, TM 55-1520-240-23-7, TM 55-1520-240-23-9, TM 55-1520-240-23-10, TM 55-1520-240-23-11, supersedes TM 55-1520-240-23-1, TM 55-1520-240-23-2, TM 55-1520-240-23-3, TM 55-1520-240-23-4, TM 55-1520-240-23-5, TM 55-1520-240-23-7, TM 55-1520-240-23-8, TM 55-1520-240-23-9, TM 55-1520-240-23-10, 10 May 1983, and TM 55-1520-240-23-6, 6 May 1983, including all changes.

CHAPTER 10
FUEL SYSTEM

SECTION I
FUEL SYSTEM DESCRIPTION AND THEORY OF OPERATION

DESCRIPTION

The airframe fuel system supplies fuel to the two engines, the APU, and the cabin heater. Fuel is contained in six fuel pods mounted to the outside of the helicopter between sta. 189 and 438.

The system has two subsystems, left and right. The left (No. 1) system supplies fuel to the No. 1 engine and the APU. The right (No. 2) system supplies fuel to the No. 2 engine and the heater. In case of an emergency, an engine crossfeed system allows fuel from one system to supply both engines.

Each subsystem is made up of three fuel tank assemblies (forward auxiliary, main, and aft auxiliary). The auxiliary tanks act as storage before fuel is transferred to the main tanks.

The fuel system with 82 has provisions for connecting an Extended Range Fuel System (ERFS II), as described in Chapter 16, Section XV.

FUEL TANK PODS

There are three fuel tank pod structures attached to each side of the fuselage external walls. The forward auxiliary pod extends from sta. 189 to 238, the main pod from sta. 262 to 372, and the aft auxiliary pod from sta. 396 to 438. Each pod structure is hinged at its lower edge and attached to the fuselage structure by bolts and fasteners to provide rigid support for an internal fuel tank cell. Pod skin is made up of laminated honeycomb and fiberglass panels riveted to magnesium alloy bulkheads and stringers. The end bulkheads of each pod structure form the forward and aft facing walls of the intertank and end bays.

FUEL TANK CELLS

Inside each pod is a fuel tank cell. Each cell is constructed of rubber/fabric laminates, with adapters and fittings bonded into the construction of the cell to provide for the mounting of internal components, access doors, and mounting clamps. Each cell is self-sealing against 50 caliber projectiles and is crash-resistant. The tank cells are secured in the pods by bolts that are threaded into the tank supports from the exterior of the pod structure and by fuel tank components at their tank attachment points.

Fuel cells are constructed of self-sealing crashworthy material. Breakaway, self-sealing fittings are installed in each fuel line interconnecting fuel tanks to the fuselage structure. Under impact, the fittings shear or break at a designated location and seal themselves to retain fuel, thus keeping fuel spillage and postcrash fire hazard to a minimum.

Fiberglass backing boards are taped to the fuselage behind the fuel pods to protect the self-sealing feature of the cells.

FUEL TANK COMPONENTS

Each operational fuel tank contains plumbing and wiring as well as the following components:

Shutoff Valve —

All tanks have a shutoff valve mounted on the access door at the point of fuel entry. The valve closes when back pressure sensed by the high level control valve indicates that the tank is full.

High Level Control Valves —

Each fuel cell contains a high level control assembly consisting of two controllable valves (primary and secondary). When they sense that the tank is filled, they cause the closing of the shutoff valve at the tank access door.

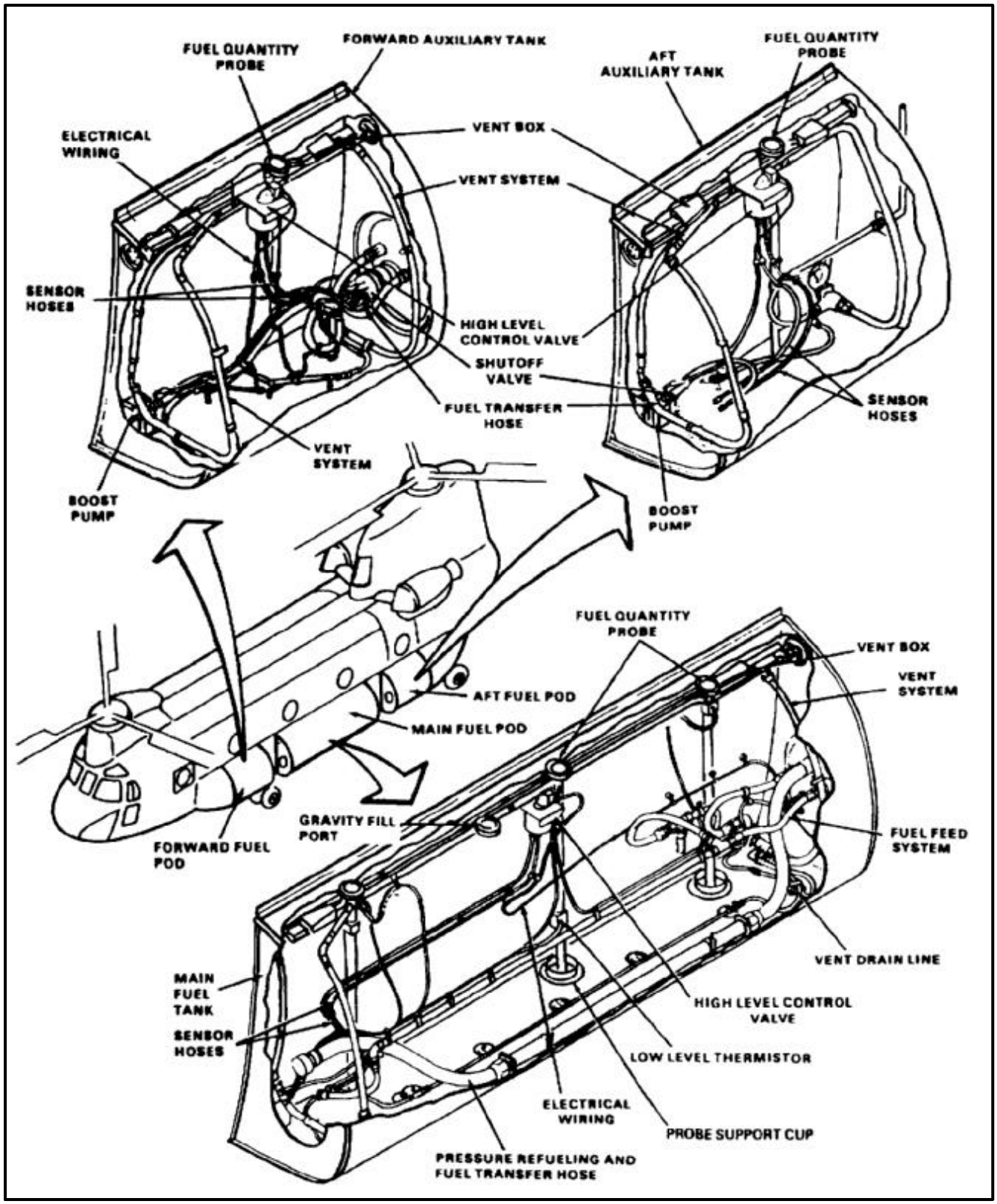
Low Level Thermistor —

Each auxiliary tank has two thermistors mounted on the fuel boost pump. They shut off the pump when the tank is empty.

Fuel Boost Pump —

Each auxiliary tank has a fuel pump to transfer fuel to the main tank. Each main tank has two pumps which supply fuel to the fuel feed lines. The pumps are fitted on brackets on the floor of the tank cell, above the drain valves. They are connected by flexible hoses to the tank internal piping.

10-1 FUEL SYSTEM (Continued) 10-1



Drain Valves —

There are two drain valves in each tank, one aft and one forward. The forward valve is a sump drain. The aft valve is a sump drain and is open to the vent system.

Vent System —

The vent system in each tank is made up of tubes and two vent boxes. The system allows outside air to enter and exit the fuel cell during refueling and fuel usage. The system also prevents fuel from spilling in the event of a rollover.

Fuel Quantity Probes —

Each fuel subsystem has a fuel quantity indicating system. Five tank quantity transmitter probes (one in each auxiliary tank and three in the main tank) provide input to the indicating system. The fuel quantity signal is directed through a seven position switch to a fuel quantity indicator on the center instrument panel. The selector enables the operator to read fuel quantity in each of the six tanks individually, or to read the total fuel quantity. Probe support cups, located on the bottom of the cell, prevent excessive movement of the fuel probes.

MAIN TANK COMPONENTS

The following components are used only in the main tanks:

Jet Pump —

A jet pump in each main tank evacuates fuel from the across helicopter pressure refueling lines into the main tank.

Vacuum Relief Check Valve —

On aircraft with a vacuum relief check valve is located in the pressure refueling bay, connected through a line to the pressure refueling receptacle. The valve is vented to atmosphere which prevents a vacuum from forming in the refueling lines during jet pump operation.

Engine Feed Suction System —

This subsystem has a bellmouth and check valve into the engine fuel feed system. If both boost pumps in a main tank fail, the engine fuel boost pump can still draw fuel from that tank through the bellmouth. Helicopter altitude must not exceed **6,000 feet** for this system to be operational.

Delta Pressure Check Valve —

A delta pressure check valve is attached to each fuel boost pump in the main tank. These check valves prevent reverse flow and suction of air if a boost pump is uncovered.

Fuel Low Level Warning System —

This system has two thermistor units (one on the center probe in each main tank), a dual control unit on the cockpit floor below the center console, and two lights on the master caution panel. The thermistors transmit a signal to the dual control unit and activate the warning lights on the caution panel when the fuel level drops below approximately **65 gallons**.

INTERTANK AREA

There are two intertank areas, forward and aft, between the three fuel pods in each subsystem. The forward intertank areas are in the front landing gear bays. They are functionally similar except that the right intertank area has a pressure refueling adapter and a control panel.

The right and left forward intertank areas each contain two check valves, five breakaway fittings, one pressure switch, a fuel vent tube from the forward fuel tank, and an evacuation line connected to the jet pump in each main tank.

The aft intertank areas are between the main fuel pod and the aft auxiliary pod. The right aft intertank area has connections to the fuselage for the heater fuel feed, a solenoid valve, No. 2 engine fuel feed and ferry fuel. The left aft intertank area has fuselage connections for APU fuel feed, No. 1 engine fuel feed, and ferry fuel. The APU fuel boost pump, solenoid valve, and APU pump drain are also located in the left aft intertank area.

Both aft intertank areas have six breakaway fittings, two check valves, two motor operated valves, one pressure switch, main tank vent tube, and plumbing.

The aft tank fuel vent tube is in the area behind the aft auxiliary tank on each side.

FUEL QUANTITY INDICATING SYSTEM

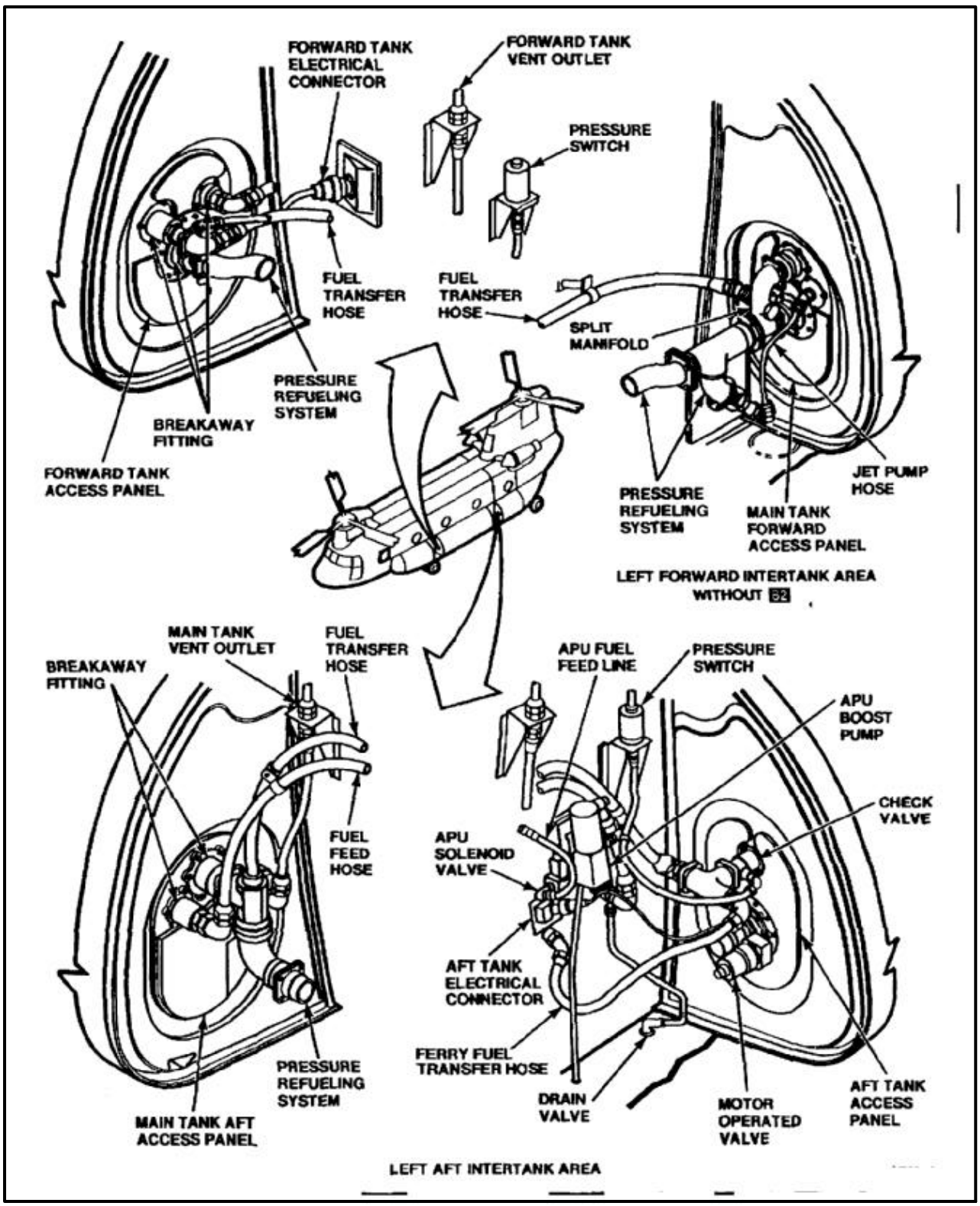
A fuel quantity selector switch and an indicator are on the center instrument panel and on the singlepoint pressure refueling panel in the right forward intertank bay area. They receive input signals from the fuel quantity probes in the fuel tanks through a switch box located in the cabin at sta. 232. The selection of which panel is in use is made at the overhead single-point fuel control panel.

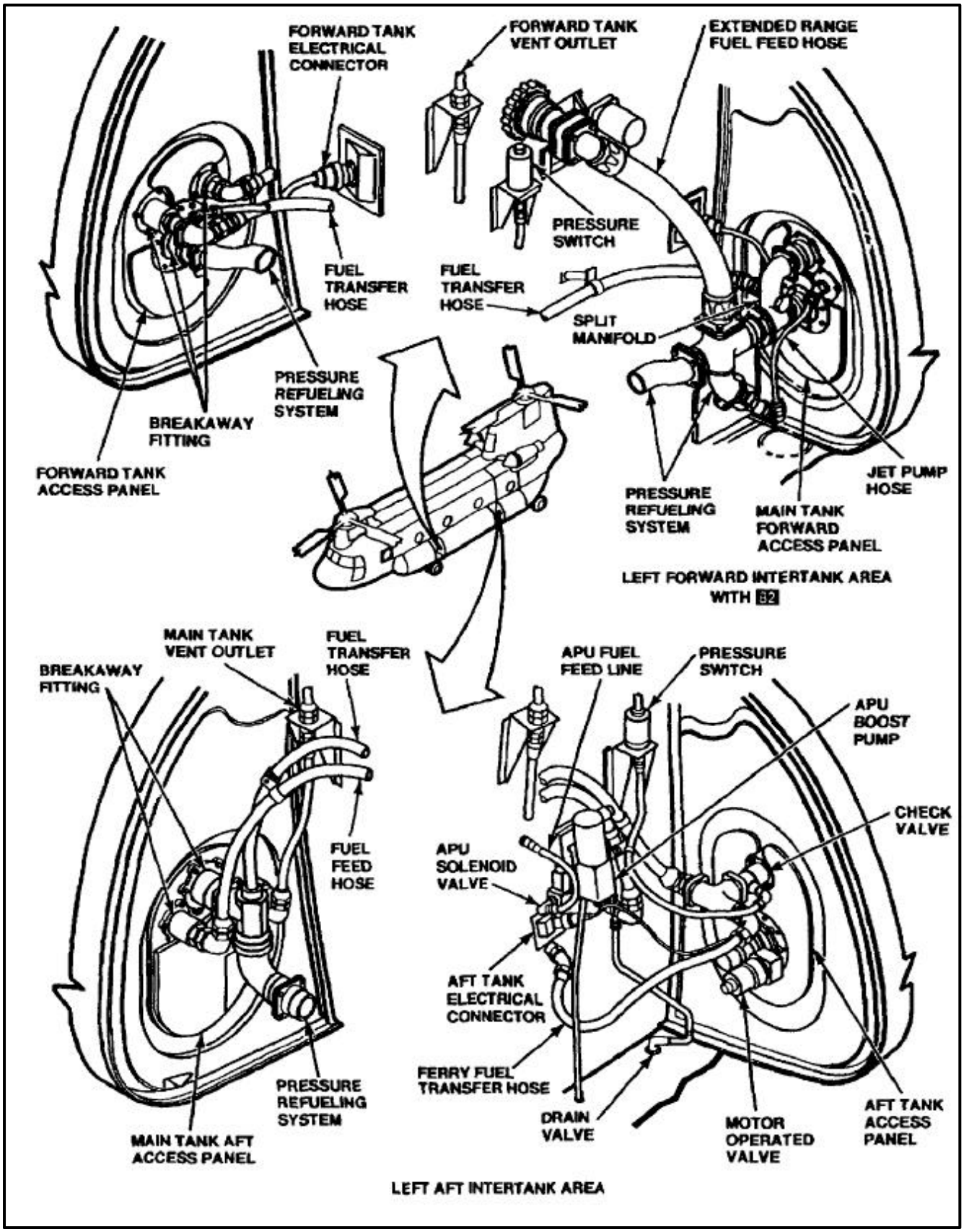
Selector Switch —

The selector switch is a seven-position rotary switch that allows the operator to choose whether the indicator will read the amount of fuel remaining in any one of the six tanks or the total fuel remaining.

Indicator —

Each indicator shows the amount of fuel, in pounds, remaining in the selected tank. Individual tank quantities are shown by a pointer. The total is shown on a digital readout.


FORWARD TANK ELECTRICAL CONNECTOR
FORWARD TANK VENT OUTLET
PRESSURE SWITCH
FUEL TRANSFER HOSE
FUEL TRANSFER HOSE
SPLIT MANIFOLD
PRESSURE REFUELING SYSTEM
BREAKAWAY FITTING
FORWARD TANK ACCESS PANEL
JET PUMP HOSE
PRESSURE REFUELING SYSTEM
MAIN TANK FORWARD ACCESS PANEL
LEFT FORWARD INTERTANK AREA WITHOUT S2
MAIN TANK VENT OUTLET
FUEL TRANSFER HOSE
BREAKAWAY FITTING
APU FUEL FEED LINE
PRESSURE SWITCH
APU BOOST PUMP
CHECK VALVE
FUEL FEED HOSE
APU SOLENOID VALVE
AFT TANK ELECTRICAL CONNECTOR
FERRY FUEL TRANSFER HOSE
PRESSURE REFUELING SYSTEM
DRAIN VALVE
MOTOR OPERATED VALVE
AFT TANK ACCESS PANEL
MAIN TANK AFT ACCESS PANEL
LEFT AFT INTERTANK AREA


FORWARD TANK ELECTRICAL CONNECTOR
FORWARD TANK VENT OUTLET
EXTENDED RANGE FUEL FEED HOSE
PRESSURE SWITCH
FUEL TRANSFER HOSE
FUEL TRANSFER HOSE
SPLIT MANIFOLD
PRESSURE REFUELING SYSTEM
BREAKAWAY FITTING
FORWARD TANK ACCESS PANEL
JET PUMP HOSE
PRESSURE REFUELING SYSTEM
MAIN TANK FORWARD ACCESS PANEL
LEFT FORWARD INTERTANK AREA WITH B2
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