

Gulfstream G150

AIRPLANE FLIGHT MANUAL

Section VII
Systems

FUEL SYSTEM

DESCRIPTION

Fuel system is comprised of sub-systems and associated controls:

- Fuel storage & tanks vent
- Distribution & feed
- Control & indicating
- Jettison system
- Refueling system

Approved Fuels

Approved fuel types are:

1. Commercial Kerosene per specification (Jet A & Jet A-1)
2. Commercial wide cut turbine fuel (Jet-B)
3. JP-4
4. JP-5
5. JP-8

Engine Fuel Supply

Fuel is supplied to each engine by two independent systems. Two collector tanks (boxes), located in the center part of the center tank house boost jet pumps which directly feed the engines. Motive flow for these pumps comes from engine-driven high pressure pumps. Motive flow is also supplied to two fuel transfer jet pumps in each center tank and wing tank.

One standby pump in each collector tank is used for engine start, fuel jettison and in case of boost jet pump failure.

Shutoff valves are installed on engine feed lines at the firewall. The two wing tanks and collector tank can be interconnected, through two (forward & aft respectively) interconnect valves, to enable lateral fuel balancing and crossfeed to one engine.

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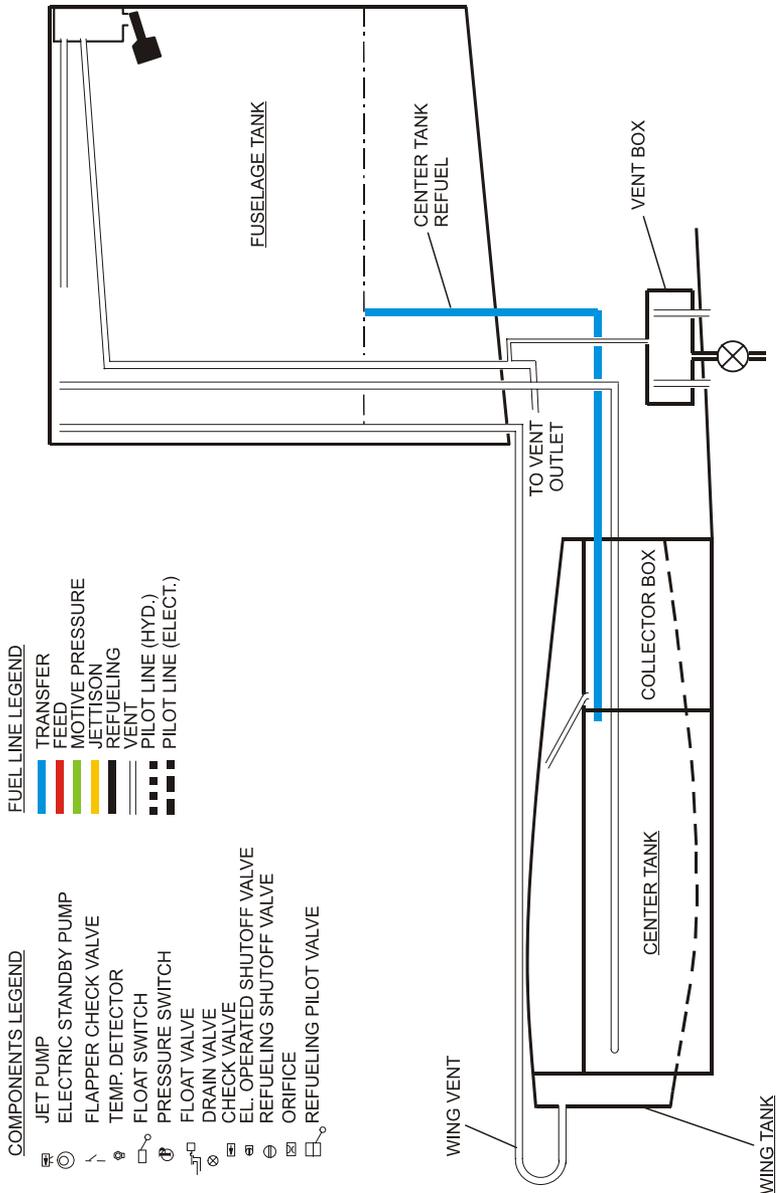


Figure 7-28-1. Fuel System - Schematic (Sheet 2 of 3)

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FUEL TANKS

The fuel tanks include two main wing tanks, one center tank and one fuselage tank. Each wing tank includes a collector box at its lowest point, which encloses the feed pumps to the engine.

Each wing tank divided into three compartments with flapper check valves, allowing the fuel to flow inboard.

The wing fuel tanks are all metal integrated with the wing torsion box. They extend outboard from rib 0 to rib 18 left and right and are contained between the front and rear wing spars. The tanks are fueled through the two left and right transfer lines. Fuel is fed from the wing tanks to the collector boxes by transfer jet pumps through flapper valve.

The fuselage tank is a bladder type, located in the fuselage, aft to the pressure bulkhead. The fuselage tank is installed in a fuel and vapor tight compartment between frame 35 and frame 43. The tank includes the vented expansion space of the entire fuel system.

The center tank is an all metal fuel tank which contains the collector boxes and is an integral part of the carry through structure (CTS). The center tank is refueled through the overflow pipe from the fuselage tank. Fuel being constantly transferred to the wing tanks by two jet transfer pumps. Two drain valves are provided.

An interconnect valve, for the wing tanks, is installed in the wing interconnect tube that is routed through the center tank.

Two collector boxes, part of the center tank, are used as sump tanks for the fuel pumps. Fuel is supplied to the collector boxes by gravity and two jet transfer pumps. The left and right collector boxes are divided by a metal partition which houses an interconnect valve.

Each collector box contains a transfer jet pump, a standby pump, drain valve, float switch, check valves, flappers, connecting pipes and electrical wiring.

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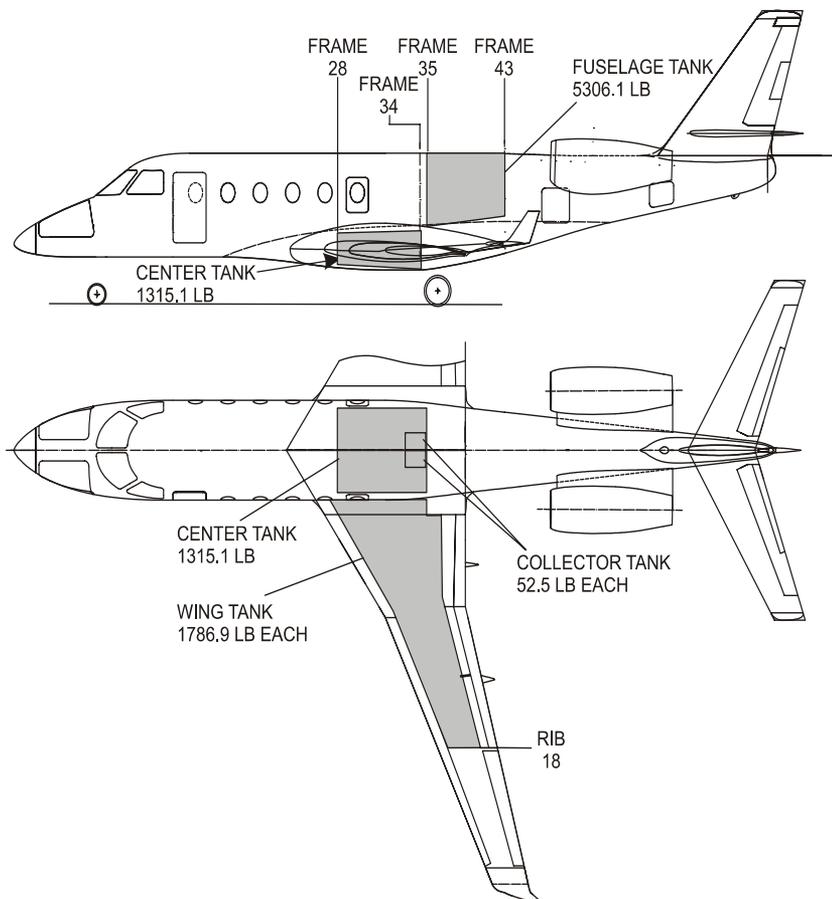


Figure 7-28-2. Fuel Tanks Arrangement

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Fuel Tanks Vent

All tanks are vented into a common expansion space in the fuselage tank.

The expansion space is vented overboard through two independent vent lines, with non icing NACA scoop outlets, positioned at each wing underside, near the wingtip.

The outboard compartments of the wing tanks are vented by float valves.

The vent system prevents overpressure in the case of failure of refueling shutoff valve or during climb, and prevents excessive negative pressure during the emergency descent.

Fuel Tank Capacities (at 6.7 lb/US gallon)

Wing tanks (each)	1786.9 lb
Collector tanks (each, within center tank)	52.5 lb
Center tank	1315.1 lb
Fuselage tank	5306.1 lb
Total fuel capacity	10,300 lb

Fuel Usage Sequence

Fuel usage sequence is intended to keep the cg within the envelope. The sequence is controlled by the center tank transfer pumps, the fuselage tank overflow stand pipe, and by the transfer lines.

Fuel is used first from the fuselage tank upper part through the stand pipe to the center tank, and through transfer pumps to the wing tanks.

Next, fuel from the center tank and the lower part of the fuselage tank is used up by the constant transfer to the wing tanks.

Last, fuel burns down from the wing tanks to the engines, with fuel from the collector box being the last.

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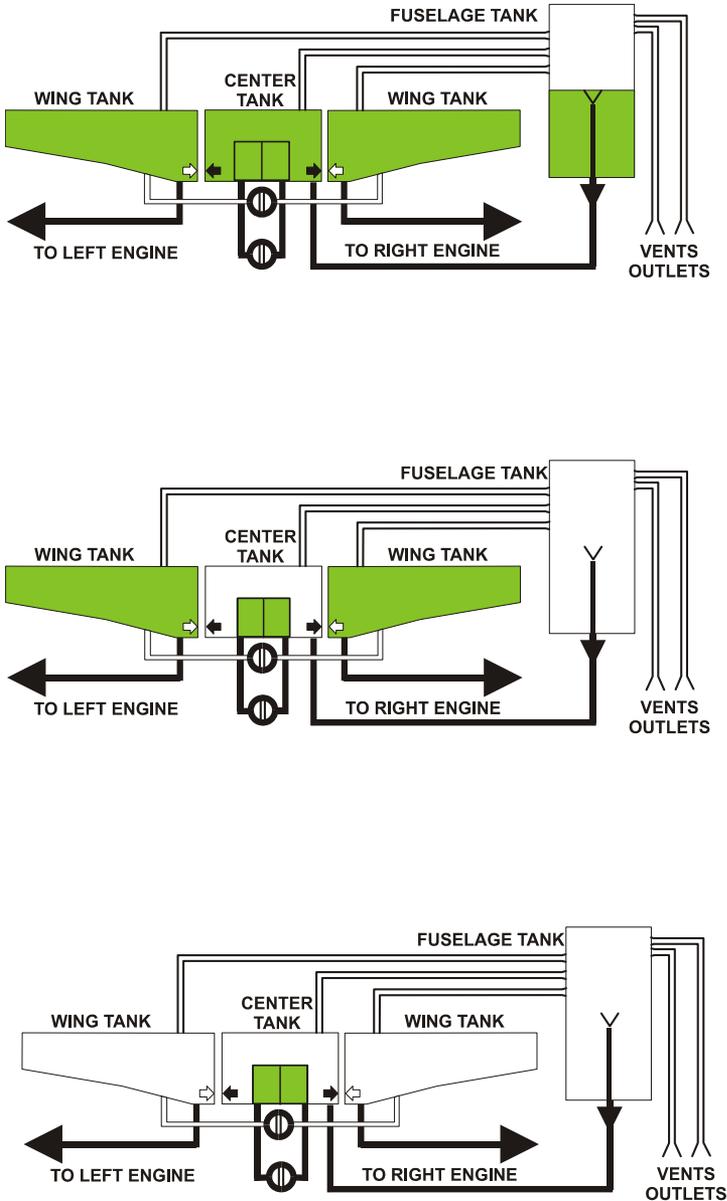


Figure 7-28-3. Fuel Usage Sequence

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FUEL TRANSFER

Fuel is transferred to the wing tank by gravity from the lower part of the fuselage tank, and by jet pump from the center tank. Excessive fuel to keep the wings last tanks to be empty.

Center tank is fed from the upper part of the fuselage tank. The collector box is fed by gravity and by the scavenging jet pumps. The motive flow to the transfer jet pumps is supplied from the discharge pressure of the boost jet pump and/or the standby pump.

Each engine is fed by boost jet pump and an electric standby pump, which are fully enclosed in the collector box. Fire shutoff valve and a pressure switch are installed at the engine inlet.

Engine Fuel Feed

Engine fuel is supplied by the boost jet pump, driven by the engine motive flow, at a required pressure and flow rate, for the entire operational envelope.

The standby pump is switched on automatically when the pressure drops at the engine inlet, when jettisoning is initiated and during engine start.

APU fuel is supplied from the right engine feed system through APU fire shutoff valve.

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REFUELING

The fuel system is provided with a single point pressure refueling and a gravity refueling port. Both fill the fuselage tank. The fuel is distributed to the remaining tanks by gravity.

The refueling sequence is the reverse of the fuel transfer sequence: wing tanks, fuselage tank lower, center tank, and fuselage tank upper. The maximum fuel level is controlled by refueling pilot valve, installed in the upper part of the fuselage tank, and establishes the expansion space of the fuel tanks.

Refueling is performed as follows:

1. Connect ground wire
2. Bond refueling nozzle to aircraft
3. Remove cap and connect refueling nozzle
4. Verify that interconnect valves are in open position
5. Place REFUEL switch in ON position
6. Pump fuel into tanks for about five seconds
7. Hold REFUEL switch in TEST position. The fuel flow must stop within about 10 seconds. If fuel flow continues, stop pressure refueling and refuel by gravity
8. If refueling has stopped, return REFUEL switch to ON position and proceed with refueling.
9. Stop refueling when the desired fuel quantity is displayed on EICAS

If refueling is not intentionally stopped, HI LEVEL annunciator comes on and refueling is automatically stopped.

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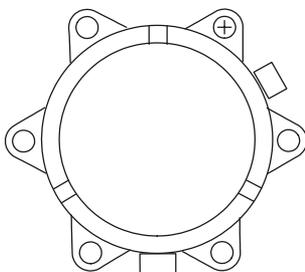
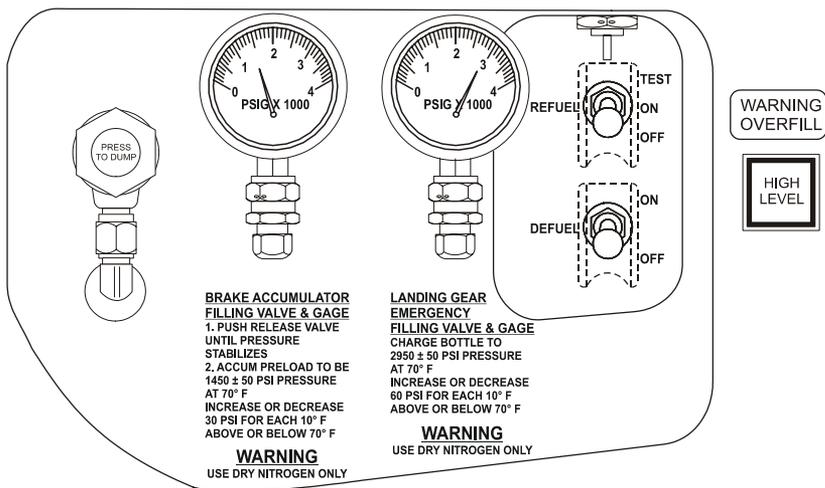
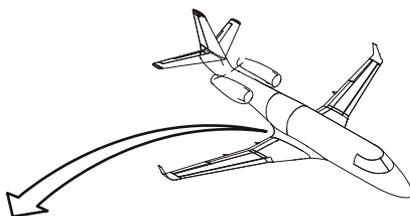


Figure 7-28-4. Refueling Panel Controls

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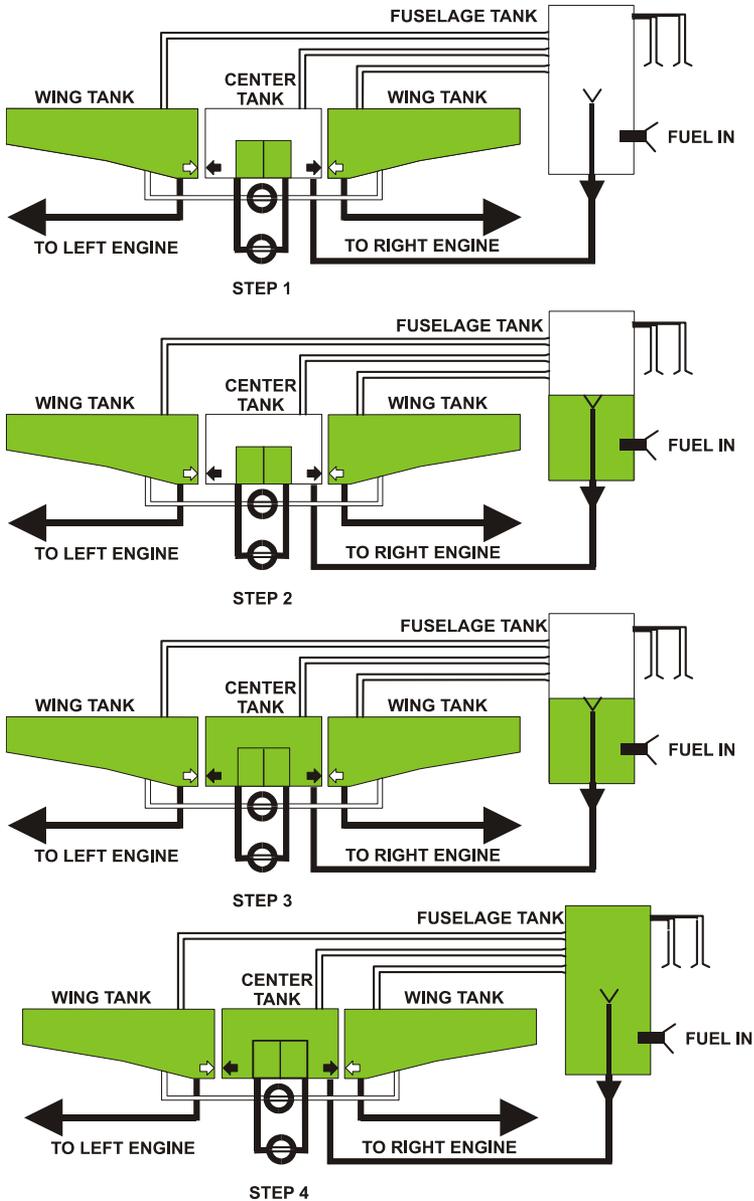


Figure 7-28-5. Pressure Fueling Sequence

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FUEL JETTISON

Fuel jettisoning is achieved by opening the jettison valve (L, R, or both, as required), and fuel is forced out by the standby pumps which come on after the JETTISON pushbutton is pressed.

Fuel jettison lines are routed from the engines feed lines, ending at jettison outlets located between aileron and flap of each wing.

Fuel jettison from each wing tank is stopped automatically when wing tank fuel level activates shutoff switch when approximately 600 lb of fuel remain in wing tank. Fuel jettison may be stopped manually when pressing the JETTISON pushbuttons to off.

For maintenance purposes only, the wing shutoff switches may be bypassed by placing the NORMAL/DEFUEL switch, on the pressure refuelling panel in DEFUEL position. Defuel is stopped automatically by the collector low level switch.

FUEL SYSTEM INDICATIONS

The fuel quantity measurement system (FQMS) measures and display the usable fuel in pounds/kilograms.

The FQMS includes capacitance type probes and fuel quantity measurement computer (FQMC) with two independent processing channels connected to the EICAS.

The FQMS monitors, measures and processes the fuel quantity, fuel levels, fuel flow and fuel temperatures levels.

APU fuel burned is not measured by the FQMS but the system assumes APU fuel consumption of 105 pph while APU is operating to account for this fact.

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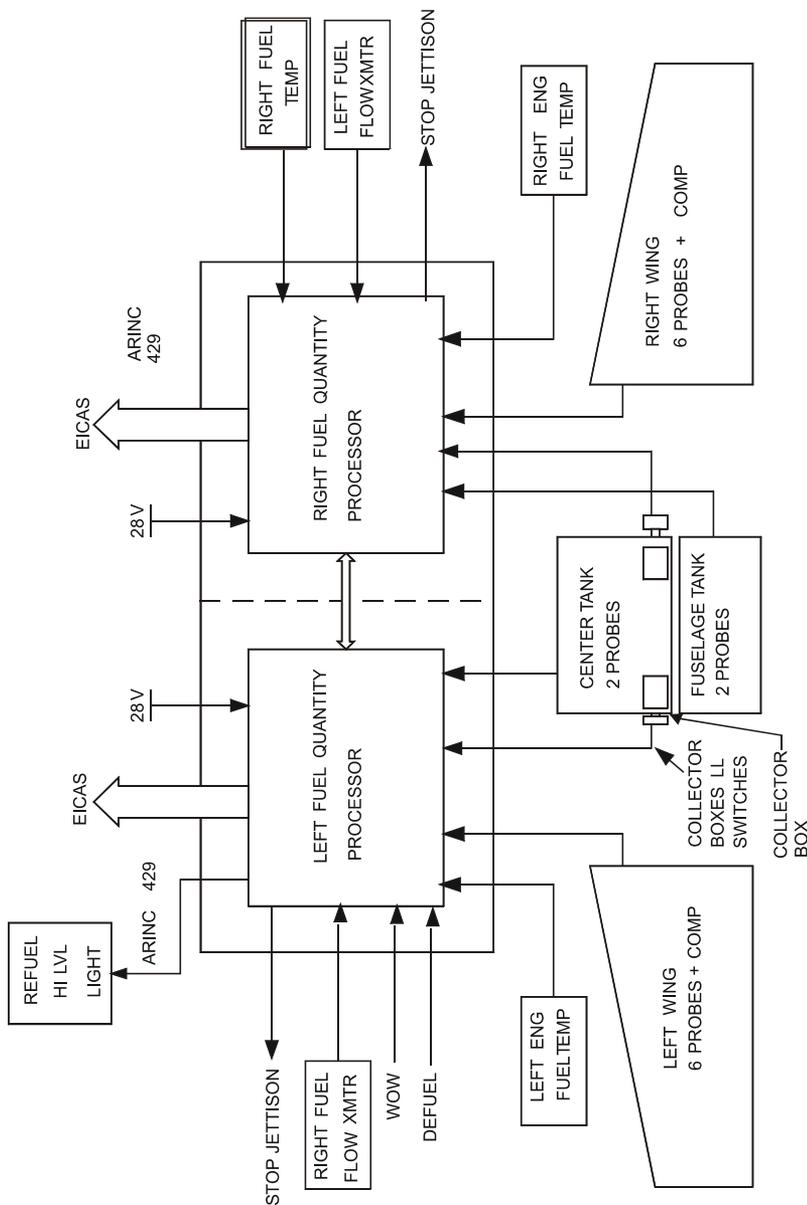


Figure 7-28-6. Fuel System Indications

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FUEL SYSTEM CONTROLS AND INDICATORS

STBY PUMP switches - Has three positions:

OFF - Standby pump is off.

AUTO - Standby pump is off, except when fuel supply pressure to the respective (L or R) engine is low; once pump comes on in AUTO position, it stays on till switched off by the pilot.

ON - Standby pump is on continuously.

INTERCONNECT switch - Has two positions:

CLOSE- Interconnect valves are closed.

OPEN - Interconnect valves are open.

JETTISON OPEN/IN TRAN pushbutton (2) - when each of these pushbutton is pressed, the respective standby pump comes on and jettison valve opens to allow fuel jettison.

REFUEL OFF pushbutton - This pushbutton is pressed to stop pressure refuelling from the cockpit.

INTERCONNECT OPEN FWD & AFT Annunciators - Both lights are on when interconnect valves are open

Warning Messages

COLLECTOR LVL LOW (L/R) - Less than 35 lb fuel in affected collector tank(s)

FUEL PRESS LOW (L/R) - If steady ON, boost jet pump has failed and automatic changeover to standby pump did not occur

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Caution Messages

BAGG/FUEL DOOR - Baggage compartment, service compartment or refueling door is unlocked

ENG FUEL TEMP HI (L/R) - Engine fuel temperature is high

ENG FUEL TEMP LOW (L/R) - Engine fuel temperature is low

FQMC FAIL (L/R) - Fuel quantity measurement computer failed

FUEL FILT BYPASS (L/R) - Fuel filter is clogged

FUEL STBY PUMP ON (L/R) - Fuel standby pump is operating.

(Comes on when: fuel pressure drops, STBY PUMP switch is ON or FUEL JETTISON pushbutton is pressed)

FUEL UNBALANCE - Asymmetry between left and right wing fuel quantity greater than 400 lb

JETT AUTO STOP INOP - Fuel jettison automatic stop unavailable

WING FUEL LVL LOW (L/R) - Low fuel quantity; (approx. 450 lb in affected wing tank)

Status Messages

FUEL FILTER BYPASS (L/R) - Respective fuel filter is clogged

FUEL QTY COMPNS FAIL - Fuel quantity indication degraded

EICAS Displays

Primary page:

L/R Wing fuel quantity

Total fuel quantity

L/R Fuel Flow

Secondary page:

Wing fuel temperature

Center (tank) fuel quantity

Fuselage (tank) fuel quantity

L/R wing fuel quantity

Total fuel quantity

Fuel Used

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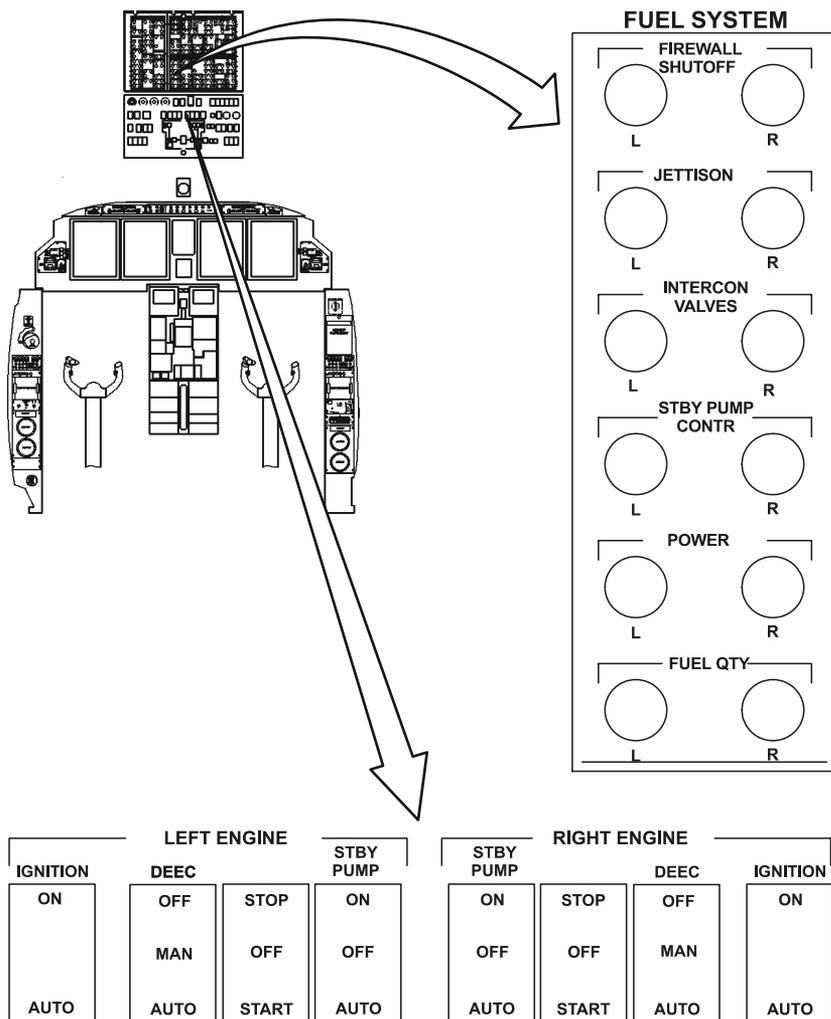


Figure 7-28-7. Fuel System Controls and Indicators
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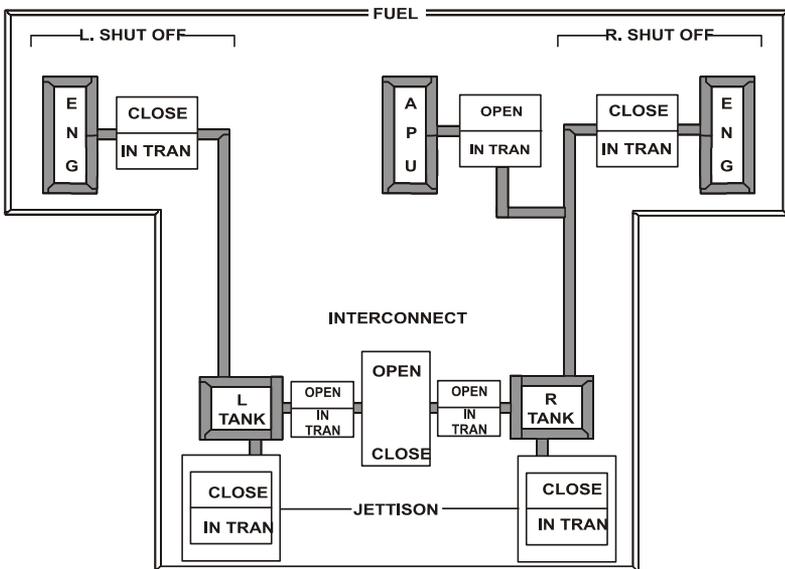
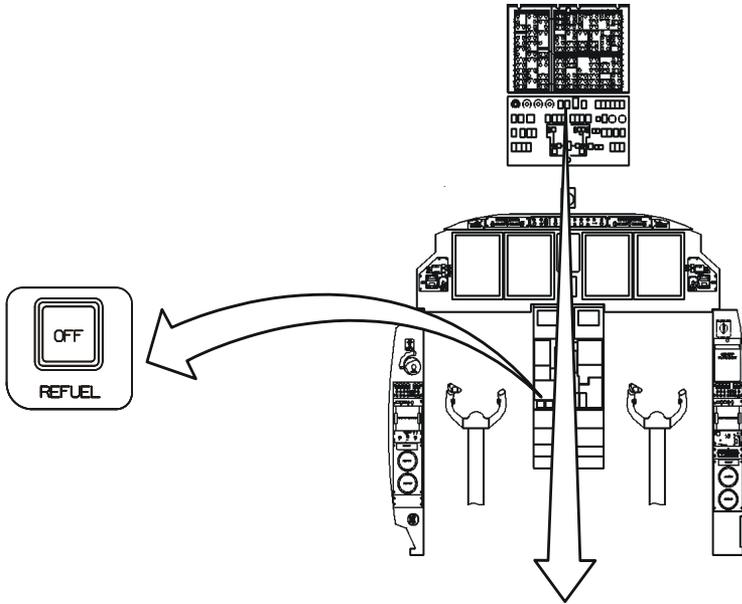


Figure 7-28-7. Fuel System Controls and Indicators
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