

B737 NG



Fuel

Introduction

The fuel system supplies fuel to the engines and the APU. Fuel is contained in three tanks located within the wings and wing center section.

Fuel Feed

Both engines are normally pressure fed from the center tank until the center tank quantity decreases to near zero. The engines are normally then pressure fed from their respective main tanks. Check valves are located throughout the fuel system to ensure the proper direction of fuel flow and to prevent transfer of fuel between tanks.

Fuel Pumps

Each fuel tank uses two AC powered fuel pumps which are cooled and lubricated by fuel passing through the pump. Center tank pumps produce higher pressure than main tank pumps. This ensures that center tank fuel is used before main tank fuel, even though all fuel pumps are operating. Individual pressure sensors monitor the output pressure of each pump.

[Option - with Center Tank Fuel Pump Auto-shutoff]

Each center tank pump will automatically shut off, after a short delay, when that pump's sensor detects low output pressure.

Note: Fuel pump LOW PRESSURE lights may flicker when tank quantity is low and the airplane is in a climb, descent, or on the ground with a nose-down attitude.

Suction Feed

When main tank fuel pump pressure is low, each engine can draw fuel from its corresponding main tank through a suction feed line that bypasses the pumps. As the airplane climbs, dissolved air is released from the fuel in the tank due to the decrease in air pressure. This air may collect in the suction feed line and restrict fuel flow. At high altitude, thrust deterioration or engine flameout may occur as a result of the fuel flow reduction.

The dissolved air in the fuel tank will eventually deplete after reaching cruise altitude. The depletion time is dependent upon airplane altitude, fuel temperature, and type of fuel. Once the dissolved air is depleted, the engine may be capable of suction feed operation at cruise power.

The main tank bypass valves may also be used for suction defueling.

Fuel Crossfeed

The engine fuel manifolds are interconnected by use of the crossfeed valve. The valve is DC motor operated from the battery bus.

Fuel pressure can be provided from a main tank with operating fuel pumps to both engines by opening the fuel crossfeed valve. Continued crossfeed use will result in a progressive fuel imbalance.

Fuel Shutoff Valves

Spar fuel shutoff valves are located at the engine–mounting wing stations. The valves are DC motor operated from the hot battery bus. The engine fuel shutoff valves are fuel actuated, solenoid controlled valves powered from the battery bus. Both the spar fuel shutoff valve and the engine fuel shutoff valve close whenever their respective engine fire warning switch is pulled or engine start lever is placed to CUTOFF.

Center Tank Fuel Scavenge Jet Pump

With the main tank fuel pump No. 1 FWD Switch ON, the center tank fuel scavenge jet pump operates automatically to transfer any remaining center tank fuel to main tank No. 1. Fuel transfer begins when main tank No. 1 quantity is about one-half. Once the fuel scavenge process begins, it continues for the remainder of the flight.

Fuel Temperature

The FUEL TEMP indicator located on the fuel control panel displays fuel temperature. A sensor in main tank No. 1 allows monitoring of fuel temperature. The temperature indicating system uses AC electrical power.

APU Fuel Feed

When AC fuel pumps are operating, fuel for the APU is supplied from the left side of the fuel manifold. If the AC fuel pumps are not operating, fuel is suction fed from main tank No. 1.

[Option - APU DC Fuel Pump]

A DC operated APU fuel boost pump is installed to ensure positive fuel pressure to the APU fuel control unit. During APU start and operation, the pump operates automatically when the APU fuel control unit senses low fuel pressure. The pump shuts off automatically when an AC fuel pump pressurizes the fuel manifold.

Fuel Quantity Indication

The fuel quantity indication system calculates the usable fuel quantity in each tank. The fuel quantity in each tank is displayed on the upper display unit and on the fueling station panel.

[Option - Fuel Densitometer]

The system provides a correction for variance in fuel density.

Fueling/Defueling/Ground Transfer

Rapid fueling and defueling is accomplished at the single-point pressure fueling station in the right wing. The fueling station is also used for the ground transfer of fuel between tanks.

The manual defueling valve, located outboard of engine No. 2, interconnects the engine feed system and the fueling station. It is opened for defueling and tank to tank transfer operations.

A shutoff system is used during fueling to automatically close the fueling valve in each fuel tank when the tank is full.

Fuel Tank Location and Capacities (Usable Fuel)

Main tanks No. 1 and No. 2 are integral with the wing structure. The center tank lies between the wing roots within the fuselage area and extends out into the wing structure.

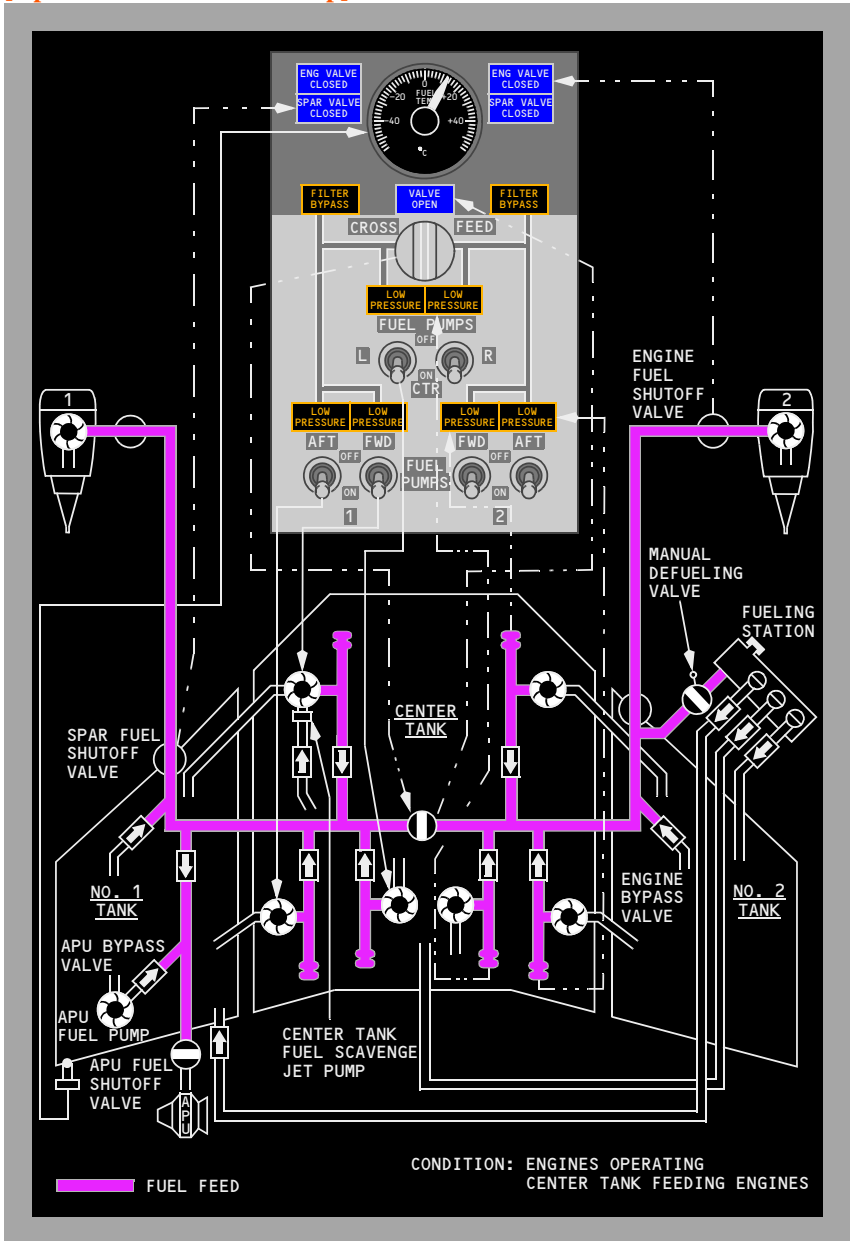
These figures represent approximate amounts of usable fuel. The appropriate weight and balance control and loading manual gives exact figures for all conditions.

TANK	GALLONS	POUNDS*	LITERS	KILOGRAMS*
NO. 1	1,288	8,630	4,876	3,915
NO. 2	1,288	8,630	4,876	3,915
CENTER	4,299	28,803	16,273	13,066
TOTAL	6,875	46,063	26,025	20,896

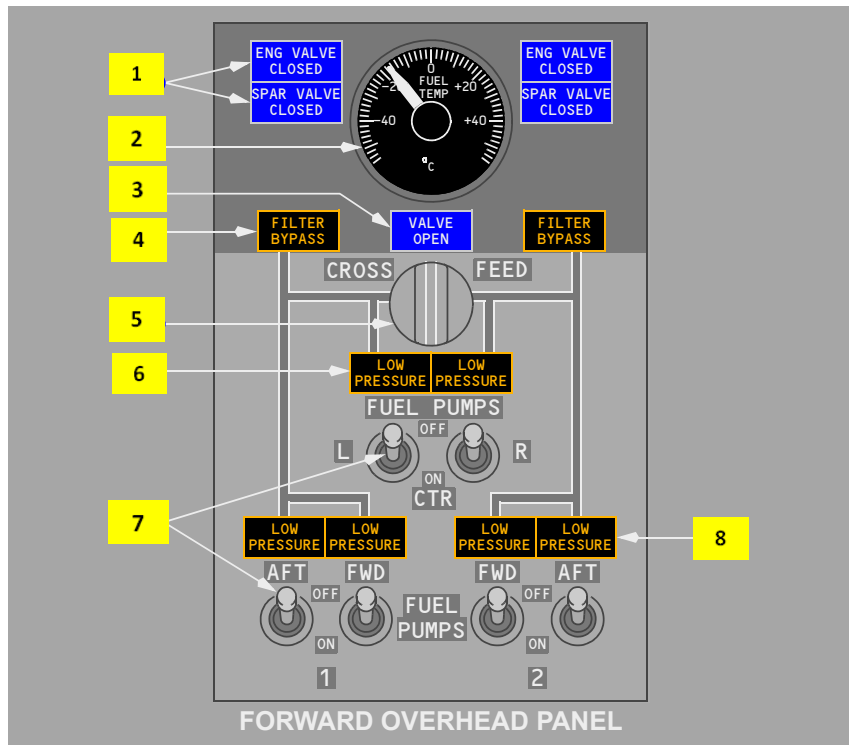
*Usable fuel at level attitude, fuel density = 6.7 pounds per U.S. Gallon/0.8029 kilograms per liter.

Fuel Schematic

[Option - APU DC Fuel Pump]



Fuel Control Panel



1 Engine Valve Closed (ENG VALVE CLOSED) and SPAR VALVE CLOSED Lights

Extinguished – related engine or spar fuel shutoff valve is open.

Illuminated (blue) –

- bright – related engine or spar fuel shutoff valve is in transit, or valve position and engine start lever or engine fire warning switch disagree.
- dim – related engine or spar fuel shutoff valve is closed.

2 FUEL Temperature (TEMP) Indicator

Indicates fuel temperature in No. 1 tank.

3 Crossfeed VALVE OPEN Light

Extinguished – crossfeed valve is closed.

Illuminated (blue) –

- bright – crossfeed valve is in transit, or valve position and CROSSFEED selector disagree.
- dim – crossfeed valve is open.

4 FILTER BYPASS Lights

Extinguished – fuel filter operating normally.

Illuminated (amber) – impending fuel filter bypass due to a contaminated filter.

5 CROSSFEED Selector

Controls fuel crossfeed valve.

Closed – isolates engine No. 1 and No. 2 fuel feed lines.

Open – connects engine No. 1 and No. 2 fuel feed lines.

6 Center Tank FUEL PUMP LOW PRESSURE Lights

[Option - without Center Tank Fuel Pump Auto-shutoff]

Illuminated (amber) – fuel pump output pressure is low and FUEL PUMP switch is ON.

Note: With both Center (CTR) tank FUEL PUMP switches ON, illumination of both LOW PRESSURE lights illuminate MASTER CAUTION and FUEL system annunciator lights. Illumination of one LOW PRESSURE light illuminates MASTER CAUTION and FUEL system annunciator lights on MASTER CAUTION light recall.

Note: With one CTR tank FUEL PUMP switch OFF, illumination of opposite CTR tank LOW PRESSURE light illuminates the MASTER CAUTION and FUEL system annunciator lights.

Extinguished – fuel pump output pressure is normal, or FUEL PUMP switch is OFF.

6 Center Tank FUEL PUMP LOW PRESSURE Lights

[Option - with Center Tank Fuel Pump Auto-shutoff]

Illuminated (amber) – fuel pump output pressure is low and FUEL PUMP switch is ON.

Note: With the Center (CTR) tank FUEL PUMP switches ON, continuous illumination of one LOW PRESSURE light for 10 seconds illuminates MASTER CAUTION and FUEL system annunciator lights.

Extinguished – fuel pump output pressure is normal, or FUEL PUMP switch is OFF.

7 FUEL PUMP Switches

ON – activates fuel pump.

OFF – deactivates fuel pump.

[Option - with Center Tank Fuel Pump Auto-shutoff]

Note: When a center tank fuel pump switch is set to OFF, the auto shutoff logic for that pump is reset. When the center tank fuel pump switch is set to ON after being OFF, the pump will again activate until the switch is set to OFF or auto shutoff logic deactivates it.

8 Main Tank FUEL PUMP LOW PRESSURE Lights

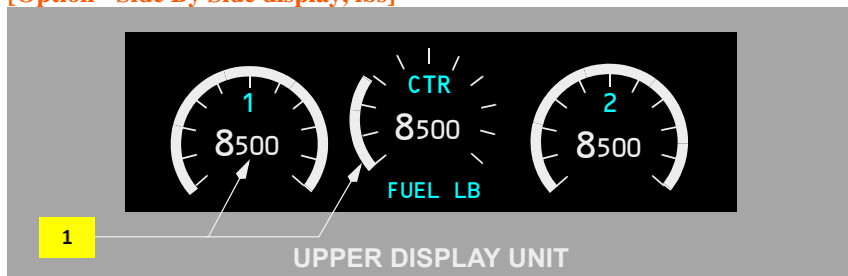
Illuminated (amber) – fuel pump output pressure is low, or FUEL PUMP switch is OFF.

Note: Two LOW PRESSURE lights illuminated in same tank illuminate MASTER CAUTION and FUEL system annunciator lights. One LOW PRESSURE light causes MASTER CAUTION and FUEL system annunciator lights to illuminate on MASTER CAUTION light recall.

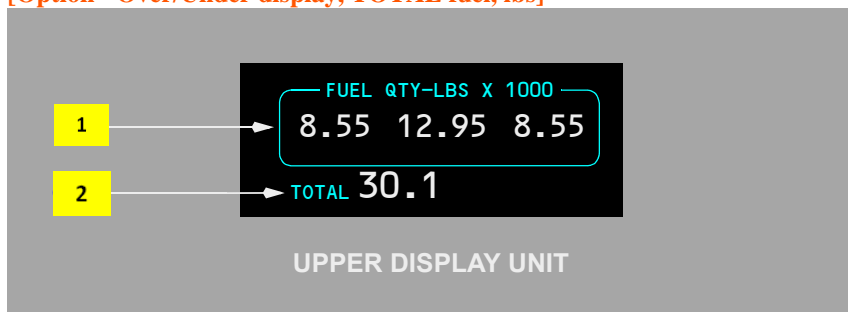
Extinguished – fuel pump output pressure is normal.

Fuel Quantity Indications

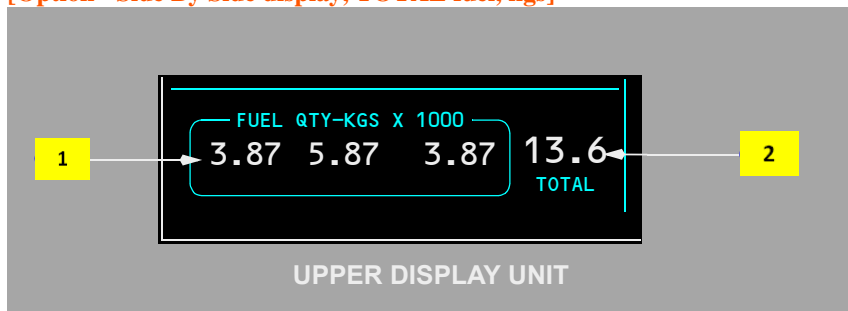
[Option - Side By Side display, lbs]



[Option - Over/Under display, TOTAL fuel, lbs]



[Option - Side By Side display, TOTAL fuel, kgs]



1 FUEL Quantity Indicators

Displayed (white) – indicates usable fuel in related tank:

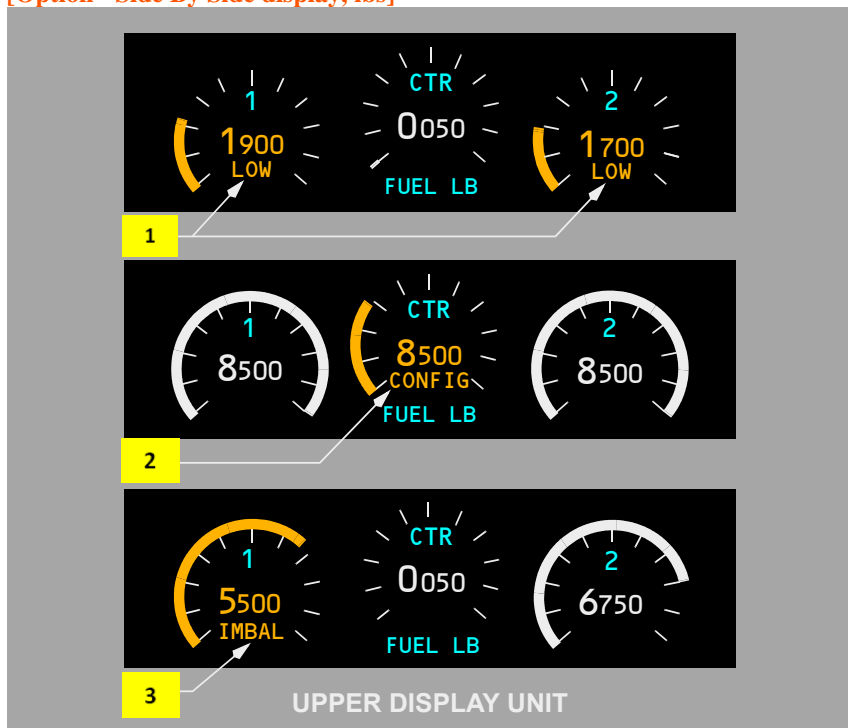
- standby AC power is required.

2 Total Fuel Quantity Indicator

Displayed (white) - indicates total useable fuel.

Fuel Alert Indications

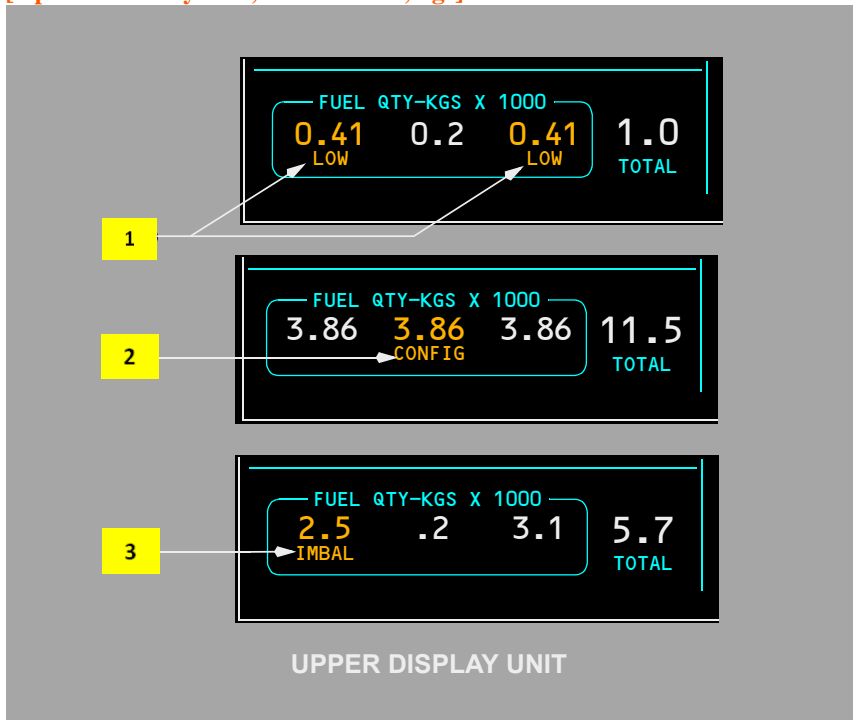
[Option - Side By Side display, lbs]



[Option - Over/Under display, TOTAL fuel, lbs]



[Option - Side by Side, TOTAL fuel, kgs]



1 Fuel LOW Alert

Displayed (amber) –

- fuel quantity less than 2000 lbs/907 kg in related main tank
- display remains until fuel tank quantity is increased to 2500 lbs/1134 kgs

[Option - LOW Alert below 1000 lbs/453 kgs]

- fuel quantity less than 1000 lbs/453 kg in related main tank
- display remains until fuel tank quantity is increased to 1250 lbs/567 kgs

The fuel quantity digits on tank(s) with low fuel quantity turn amber.

2 Fuel Configuration (CONFIG) Alert

Displayed (amber) –

- either engine running
- center fuel tank quantity greater than 1600 lbs/726 kgs; and

[Option - CONFIG Alert Prior to L/N 1494]

- both center fuel tank pumps producing low or no pressure

[Option - CONFIG Alert, L/N 1494 and On]

- both center fuel tank pump switches positioned OFF

The quantity digits on the center tank fuel quantity indicator turn amber.

Display remains until –

- both engines not running
- center fuel tank quantity less than 800 lbs/363 kgs

[Option - CONFIG Alert Prior To L/N 1494]

- one center fuel tank pump producing high pressure

[Option - CONFIG Alert, L/N 1494 and On]

- one center fuel tank pump switch ON

The quantity digits on the center tank fuel quantity indicator return to normal.

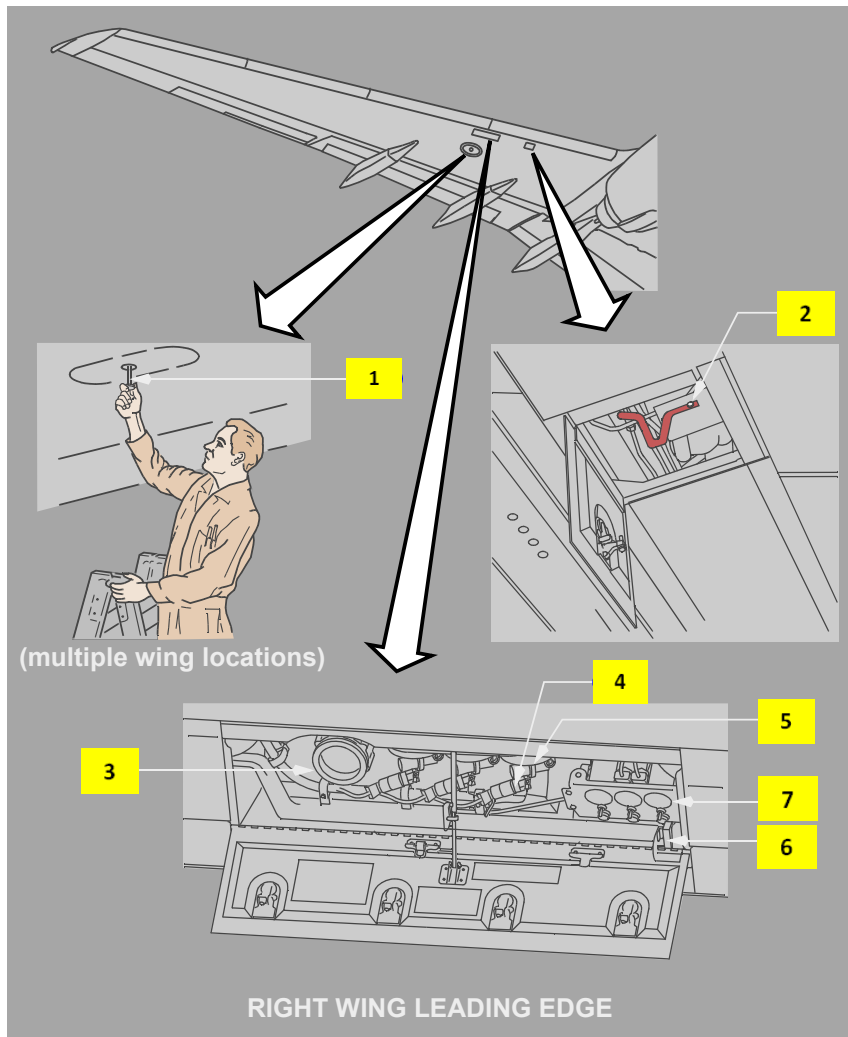
3 Fuel Imbalance (IMBAL) Alert

Displayed (amber) –

- main tanks differ by more than 1000 lbs/453 kgs
- displayed below main tank with lower fuel quantity
- inhibited when airplane is on ground
- inhibited by fuel LOW indication when both indications exist
- displayed until imbalance is reduced to 200 lbs/91 kgs

The fuel quantity digits on tank with lower fuel quantity turn amber.

Fueling / Defueling / Measurement



1 Fuel Measuring Stick

Allows comparison of fuel quantity or weight as determined from measuring stick reading and fuel weight indicated by fuel quantity indicators:

- six fuel measuring sticks are installed in each main tank and four are installed in center tank
- reading is obtained by withdrawing measuring stick from tank and latching it magnetically to an internal float. Fuel depth is read where stick passes through wing skin.

2 Manual Defueling Valve

Open – interconnects engine feed system and fueling station for:

- defueling
- ground transfer of fuel.

Closed – isolates engine feed system from fueling station.

3 Fueling Receptacle

Hose connection receptacle for single point fueling.

4 Solenoid Override

Mechanically opens solenoid operated valve. Fuel valve opens if fuel pressure is available.

5 Fueling Valves

With the battery switch ON, and the refueling door open, fuel pressure opens valve.

6 Refueling Power Control Relay

Door closed – proximity sensor deactivates power to fueling system.

Door open – the fueling system is powered and panel lights illuminate.

7 Test Gages & Fueling Panel

Test Gages and Fueling Panel

[Option - lbs]



[Option - Fuel Quantity Selector, kg]



8 FUELING INDICATION TEST SWITCH

(spring-loaded to OFF position)

TEST GAGES – checks operation of fuel quantity indicators.

FUEL DOOR SWITCH BYPASS – energizes fueling panel if refueling power control relay fails.

9 Fueling VALVE POSITION LIGHTS

Extinguished –

- fueling valve switch is OPEN and related tank is full
- fueling valve switch is CLOSED.

Illuminated (blue) – fueling valve switch is OPEN and related tank is not full.

10 Fueling Valve Switches

OPEN – energizes fueling valve in related tank.

CLOSED – de-energizes fueling valve in related tank.

11 FUEL Quantity (QTY) Indicators

Indicates total usable fuel tank quantity in related tank.

12 Fuel Quantity Selectors

[Option]

Rotate – sets total fuel quantity desired in related tank.



Limitations

Fuel System

The use of Wide Cut Fuels per Class B of GE Specification D50TF2, JP-4 or Jet B, is prohibited.

Maximum tank fuel temperature: 49°C.

Minimum inflight tank fuel temperature: 3°C above the freezing point of the fuel being used or -43°C, whichever is higher.

Fuel Balance

Lateral imbalance between main tanks 1 and 2 must be scheduled to be zero.

Random fuel imbalance must not exceed 1000 lbs / 453 kgs for taxi, takeoff, flight or landing.

Fuel Loading

Main tanks 1 and 2 must be full if center tank contains more than 1000 lbs / 453 kgs.