G550 Fuel System
The fuel system consists of two wing tanks, which store all fuel and feed the engines and APU via low pressure, electrically-driven boost pumps.

\[ 41,300 \text{ lbs} \]

At \( 60^\circ \text{F} \) and a fuel density of \( 6.767 \text{ lbs/gallon} \)
IT MAY BE POSSIBLE TO UPLOAD FUEL QUANTITIES IN EXCESS OF:

≥ 41,300 lbs

This is permitted at or below:

1) Maximum Ramp Weight:

91,400 lbs

2) Maximum Takeoff Weight (MTOW):

91,000 lbs

3) Loaded aircraft is within C.G. limit
- Refueling:
  - Single point pressure refueling (35-55 psi)
  - Overwing gravity refueling

- There are six compartments in each wing tank connected by baffles which prevent large C.G. changes due to fuel movement.

- Fuel tanks are fully vented to provide positive internal pressure.

- Fuel shut off to the engines is via the fire handles.
FUEL HOPPER

SEGREGATED FUEL TANK WITHIN WING TANK

- **190 gallons / 1,283 lbs**
- CONTAINS THE HYD FLUID-TO-FUEL HEAT EXCHANGER

KEPT FULL VIA:
- FLAPPER-TYPE VALVES (GRAVITY)
- EJECTOR PUMPS WHICH USE MOTIVE FLOW FROM FUEL BOOST PUMP PRESSURE

< **650 lbs in hopper** = C L-R FUEL LEVEL LOW C
**Boost Pumps**

Provide low pressure fuel to the engines and APU.

- DC-powered, interchangeable, brushless boost pumps.
- Boost pumps can be accessed via the wheelwell and are submerged inside the hoppers.
Without boost pump pressure the engines will:

A) < 20,000' = suction feed
B) > 20,000' = run erratically and flameout

- Boost pump switch (indications)

**L Hopper**

- L Main Pump
- L Alternate Pump
- L Main DC
- L ESS DC
- Off

**R Hopper**

- R Main Pump
- R Alternate Pump
- R Main DC
- R ESS DC

Pump switches pressed in and operating (blank)

Pump switch pushed out and unpowered

R Alt Fuel Pump Fail

Pump switch pressed in and failed (blank)
FUEL SHUTOFF VALVES

- Engines:
  1. Fire Handles
  2. Fire Handles Valve position indicator:
     (inspected on external preflight inspection)

   - Open
   - Closed

   Wheelwell
   (Aft Wall)

   L ALT L MAIN
   R MAIN R ALT

   X INTER TANK VALVE
   X CROSSFLOW VALVE

---

g550_fuel_system 8 / 26

11/29/17
- APU:

1. APU switchlight

2. APU fuel shutoff valve:
   (There is no visible indication of valve position)

If the APU is operating, pressing the APU switchlight will shutdown the APU immediately.
(Not recommended)
HEATED FUEL RETURN SYSTEM (HFRS)

FADEC controlled

ON @ 0°C

3 gallons/minute

OFF @ +10°C

USES HOT ENGINE oil (FUEL COOLED Oil COOLER)

FUEL/Oil
HEAT exchanger = FCOC

HEATED FUEL AT 50°C is sent from FMUS

HOT ENGINE oil is cooled while COLD fuel in
  The wing tanks is warmed up
Prevents gelling during prolonged high altitude operations.

Jet A fuel has a freezing point of $-40^\circ C$ ($-40^\circ F$).

Manually deselected on descent to prevent dislodged ice crystals in the fuel lines from blocking the filters and possibly flammimg out the engines.

**Heated fuel return is inhibited when:**

A. Crossflow valve is open
B. Low fuel condition
C. Low fuel pressure
D. High fuel burn rate ($> 2,250$ pph)
E. Fuel temp $\geq 10^\circ C$
F. Fire handle pulled
G. Engine run switch off
Hydraulic fluid–fuel HEAT EXCHANGERS

HEAT EXCHANGER UNIT IS LOCATED INSIDE THE OFFSIDE FUEL HOPPER

HOT hydraulic fluid flows continuously through the heat exchanger and is cooled while COLD fuel in the hopper is warmed up.
Engine Fuel System

- Metered fuel from tank's boost pumps to fuel nozzles
- Introduction of fuel is controlled by FADEC
- Low (LP) and High (HP) pressure pumps are driven by engines' accessory gearbox
- FCOC extracts heat from hot engine oil
- LP pump can suction feed the engine ≤ 20,000'
**APU Fuel Supply**

Fuel is normally supplied from the left fuel manifold but can also be supplied from the right manifold by temporarily opening the crossflow valve.

![Diagram of APU fuel supply](image)

- **L manifold**
  - To APU

- **R manifold**
  - To APU

- **Crossflow Valve Open**

- **Fuel Crossflow Valve Open**
Fuel Unbalance Arrows

- 1900
- 900
- 1000
- 2500
- 1500
- 1000
- 5000
- 2000
- 3000

Appears $\rightarrow = 100 \text{ lbs}$

Full scale $\leftarrow = 500 \text{ lbs}$

Full scale turns amber $\sqrt{\text{ }} = 1000 \text{ lbs}$

Note: Higher side higher arrow $\uparrow$

Maximum Fuel Imbalance

Inflight $= 2000 \text{ lbs}$

Takeoff $= 1000 \text{ lbs}$
**Balancing Fuel: Method 1: Inter Tank**

1. Autopilot on, level flight
2. Apply 2-3 units rudder trim towards the heavy wing

3. Open inter tank valve and monitor fuel progress

4. Close inter tank valve when within 100 lbs or so

5. Retrim rudder
Balancing fuel. Method 2: Crossflow

1. **Open** crossflow valve

2. **Turn OFF** boost pumps, one at a time, on light wing

3. **Turn ON** boost pumps

4. **Close** crossflow valve when within 100 lbs or so
- The crossflow valve has a five (5) minute timer to alert the crew that it is still open. The CAS message turns **amber** (caution) and a double-chime aural tone will sound.

- The crossflow valve on the fuel synoptic page will also turn amber.

- After reassessing the status of the fuel imbalance, the crew should then reset the timer by cycling the crossflow valve closed and then, if required, open it again.
HMG Operations

ESS AC

E-INV

L ESS DC

R ESS DC

AUX TRU

L Standby AC

HMG GEN

GCU

HMG

R Standby AC

Emergency

When operating with the HMG, only the following fuel system components remain operative:

Inter-Tank Valve

L ESS DC

L Main Boost pump

L ESS DC

X-Flow Valve

LESS DC

R Main Boost pump

R ESS DC
Limitations

- Zero Fuel Gross Weight: **54,500 lbs**

**ZFW C.G. Envelope**

Fueled airplane C.G. must then remain within C.G. por:
- Taxi
- Takeoff
- In flight
- Landing

- Weather Radar Off - Fueling Operations

- During fueling operations the truck and the aircraft must be bonded
- **Maximum Fuel Imbalance**:

  * Inflight = 2,000 lbs
  * Proceed with balancing before imbalance ≥ 1,000 lbs

- Takeoff = 1,000 lbs

- Gravity Refueling
  - 2,000 lbs
- **Fuel Tank Temperature:**

-54°C to +54°C

-35°C to -36°C

-31°C to -31°C

-**Engine Fuel Temperature:**

- Max: +165°C (15 minutes)
- Max: +140°C
- Min: -40°C
If fuel tank temperature $\leq -30^\circ C$ and fuel remaining $\leq 5,000$ lbs =

Descend to altitude where SAT $-60^\circ C$ or warmer and maintain MO 0.80 or greater

\[
\begin{align*}
&\text{SAT} \\
&\quad -70^\circ C \\
&\quad -65^\circ C \\
&\quad -60^\circ C \\
&\quad -55^\circ C \\
\end{align*}
\]
**Fuel Density**

- "Aircraft range is determined by fuel weight, not volume."
- At 60°F and a fuel density of 6.767 lbs/USG, the maximum capacity of 41,300 lbs is achieved.
- The FQMS includes a densitometer which automatically compensates for density effects and correctly displays the actual fuel weight.
- Temperature also has an effect on fuel weight. For every 10°F there is a reduction of 200 lbs.

![Graph showing the relationship between density and fuel temperature.](image-url)
Questions, comments or errors?
ivan.luciani@gmail.com

Thank you!