

FUEL SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The fuel system consists of two vented, integral fuel tanks (one in each wing), fuel reservoir, two selector valves, fuel strainer, electrically operated auxiliary fuel (boost) pump, and ejector pump (both pumps are submerged in the fuel reservoir). For a fuel system schematic refer to the related illustration that follows:
 - (1) For Airplane 208B2197 and Airplanes 208B5000 and On with the PT6A-140 engine installed, refer to Figure 1 for a fuel system .
 - (2) For Airplanes 208B0001 thru 208B2196 and Airplanes 208B2198 thru 208B4999 with the PT6A-114/PT6A-114A engine installed, refer to Figure 1 for a fuel system .

2. Description and Operation

- A. Fuel flows from the tanks through two fuel tank shut-off valves in each tank. The valves are mechanically controlled by two fuel selectors in the overhead console. The selectors are labeled: LEFT TANK ON, OFF and RIGHT TANK ON, OFF. Left or right fuel tank, or both at the same time may be selected. In normal operation both tanks should be selected, however, in level cruise flight, fuel may be supplied from either left or right tank.
- B. Fuel flows by gravity from each tank to the fuel reservoir, located under the floorboard at the lowest point in the fuel system. The ejector boost pump and auxiliary electric fuel pump are located in the fuel reservoir. The fuel pumps are submerged in fuel, which helps prevent pump cavitation. Fuel is pumped from the reservoir through the fuel manifold into the engine by the ejector boost pump or auxiliary fuel pump. The ejector boost pump is driven by motive fuel flow from the engine fuel control unit. If the ejector boost pump should fail, the auxiliary electric fuel pump will automatically energize and supply fuel to the engine. The auxiliary electric fuel pump is also utilized to supply fuel to the engine during starts.
- C. A firewall shutoff valve is provided to isolate the fuel supply from engine compartment in case of fire. The manually operated shutoff valve control knob is located on the control pedestal.
- D. For Airplanes 208B0001 thru 208B2196 and Airplanes 208B2198 thru 208B4999 with the PT6A-114/PT6A-114A engine installed, a fuel filter is located on the firewall downstream of the shutoff valve. A red warning button is located on top of the filter. If the button is "popped up", the filter screen is clogged, and fuel is forced to bypass the filter. Do not fly the airplane until after the source of fuel contamination is discovered and eliminated.
- E. The fuel is then routed through the fuel heater and engine-driven fuel pump. The engine-driven pump delivers fuel, under pressure to the engine fuel filter. The engine fuel filter routes the fuel to a flow divider which distributes the fuel to 14 fuel nozzles in the combustion chamber of the engine.
- F. Excessive fuel accumulated during the engine shutdown is routed as follows:
 - (1) For Airplanes 20800001 and On, and Airplanes 208B0001 thru 208B2196, and 208B2198 thru 208B4999 with PT6A-114/PT6A-114A engines, excessive fuel, accumulated during the engine shutdown, drains into a fire proof EPA fuel reservoir can on the engine side of the firewall. The reservoir must be drained daily or it could overflow on the ground.
 - (2) For Airplane 208B2197 and Airplanes 208B5000 and On with PT6A-140 engine, have a fuel ecology system installed that recycles unused excessive fuel back to the fuel system during the next engine run.
- G. The fuel system is vented by two vent valves attached to lines running from each tank outboard to the wing tips, then aft to wing trailing edge. Fuel reservoir is vented to each fuel tank. Complete blockage of the vent system will result in zero fuel flow to engine.
- H. The auxiliary (boost) fuel pump switch is located on left sidewall switch and circuit breaker panel, and labeled as follows: FUEL BOOST OFF, NORM and ON. When the switch is in NORM position, auxiliary fuel pump is armed and will operate anytime fuel manifold pressure drops below 4.75 psi. Place the switch in ON position for engine starting and continuous operation of auxiliary fuel pump.
 - (1) For Airplane 208B2197 and Airplanes 208B5000 and On with PT6A-140 engines. When the switch is in NORM position the motive flow shutoff-valve (MFSOV) opens. There is a two second delay fuel pump delay relay that keeps the boost pump operating to allow the motive fuel pump to built pressure. Once the motive flow is established the residual fuel is removed from the fuel ecology tank.
- I. Fuel quantity is measured by four fuel quantity transmitters in each tank (one inboard, one center inboard, one center outboard, and one outboard) and indicated by two electrically operated fuel quantity indicators located on the instrument panel. The indicators are calibrated in pounds and gallons. For Airplanes 20800500 and On and Airplanes 208B2000 and On an empty fuel tank is indicated by the fuel gage indicator showing at the red line on the Multifunction Display (MFD)

engine display fuel quantity indicator. For Airplanes 20800001 thru 20800499, and Airplanes 208B0001 thru 208B1999, an empty fuel tank is indicated by a red line and the letter E.

- J. For airplane 208B2197, airplanes 208B5272 and on, and airplanes 208B5000 thru 208B5271 incorporating CAB-34-03, with the PT6A-140 engine installed, the Fuel-Oil Heat Exchanger (FOHE) has a temperature probe (UN042) installed on the outlet that will activate a FUEL TEMP LOW Crew Alert System (CAS) message. The message will display on the Primary Flight Display (PFD) when the probe indicates the fuel temperature is 41°F (5°C) or less. For additional information on maintenance of the fuel temperature probe, refer to this Chapter, Fuel Temperature Probe - Removal and Installation. For additional information on troubleshooting for the CAS FUEL TEMP LOW message, refer to Fuel System - Troubleshooting, Fuel Temperature System (PT6A-140).
- K. Airplanes 20800500 and On and Airplanes 208B2000 and On show fuel level crew alert system (CAS) messages on the Primary Flight Display (PFD). In addition, if a fuel selector is selected to the OFF position an OFF message will show next to the applicable fuel quantity display and a warning horns sound. Refer to Table 1.

Table 1. Fuel System Related CAS Messages

CAS Message	Color	CAS Message description
RSVR FUEL LOW	RED	RSVR FUEL LOW Indicates the fuel level in the reservoir tank is approximately one-half or less. There is adequate fuel in the fuel reservoir for approximately 3 minutes of maximum continuous power or approximately 9 minutes at idle power.
FUEL SELECT OFF	RED	Indicates left and right fuel selectors are both OFF at any time, or left fuel selector is OFF when right tank is low, or right fuel selector is OFF when the left tank is low; or that either left or right selectors are OFF when starter switch is ON. It can also indicate that the FUEL SEL WARN circuit breaker has been pulled.
L FUEL LEVEL LOW	AMBER	Indicates fuel quantity in the left fuel tank is 25 gallons (170 lbs) or less.
R FUEL LEVEL LOW	AMBER	Indicates fuel quantity in the right fuel tank is 25 gallons (170 lbs) or less.
L-R FUEL LEVEL LOW	AMBER	Indicates fuel quantity in both the left and right fuel tanks is 25 gallons (170 lbs) or less.
FUEL BOOST ON	AMBER	Indicates the auxiliary fuel boost pump is operating.
FUEL PRESS LOW	AMBER	Indicates fuel pressure in the fuel manifold assembly is below 4.75 psi.
FUEL TEMP LOW	AMBER	Indicates fuel temperature is 41°F (5°C) or less.

- L. Airplanes 20800001 thru 2080499, and Airplanes 208B0001 thru 208B1999, have amber and red fuel system condition warning lights that are located on the annunciator panel. Two amber lights (one for each fuel tank) are labeled, LEFT FUEL LOW and RIGHT FUEL LOW. Each of the lights come on when the fuel level of it respective tank reaches 25 gallons, +5 or 5 gallons. An annunciator light (red), placarded RESERVOIR FUEL LOW comes on when fuel level in the reservoir drops below 2.15 to 1.95 gallons. An annunciator light (amber), placarded FUEL PRESSURE LOW comes on when the fuel manifold pressure drops below 4.75 psi.
- M. An additional fuel selectors off warning system is incorporated to alert pilot if one or both of the fuel tank selectors are left in the OFF position inadvertently. The system includes redundant warning horns, a red annunciator light labeled FUEL

SELECT OFF, actuation switches, and miscellaneous electrical hardware. The dual aural warning system is powered through the START CONT circuit breaker with a FUEL SEL WARN circuit breaker that you cannot manually disengage, installed in series to protect the integrity of the start system. The annunciator is powered from the ANNUN PANEL circuit breaker.

- N. The fuel system has drain valves to examine the fuel and remove contamination from the system. The fuel must be drained and examined before the first flight of the day, and after each refueling.

NOTE: **Do not drain fuel on asphalt or concrete surfaces.**

- (1) For Airplanes 20800001 and On, and Airplanes 208B0001 thru 208B2196, and 208B2198 thru 208B4999 engines. An EPA approved fuel reservoir can is installed on the front left side of the firewall to catch residual fuel after the engine shutdown. Before the first flight of the day, use the drain valve on the bottom of the cowling to empty the EPA fuel reservoir can into an appropriate container.
- (2) For Airplane 208B2197 and Airplanes 208B5000 and On with PT6A-140 engines. These airplanes have a fuel ecology tank installed that replaces the EPA fuel reservoir can. There is no drain associated with the ecology tank.

Figure 1 : Sheet 1 : Fuel System Schematic

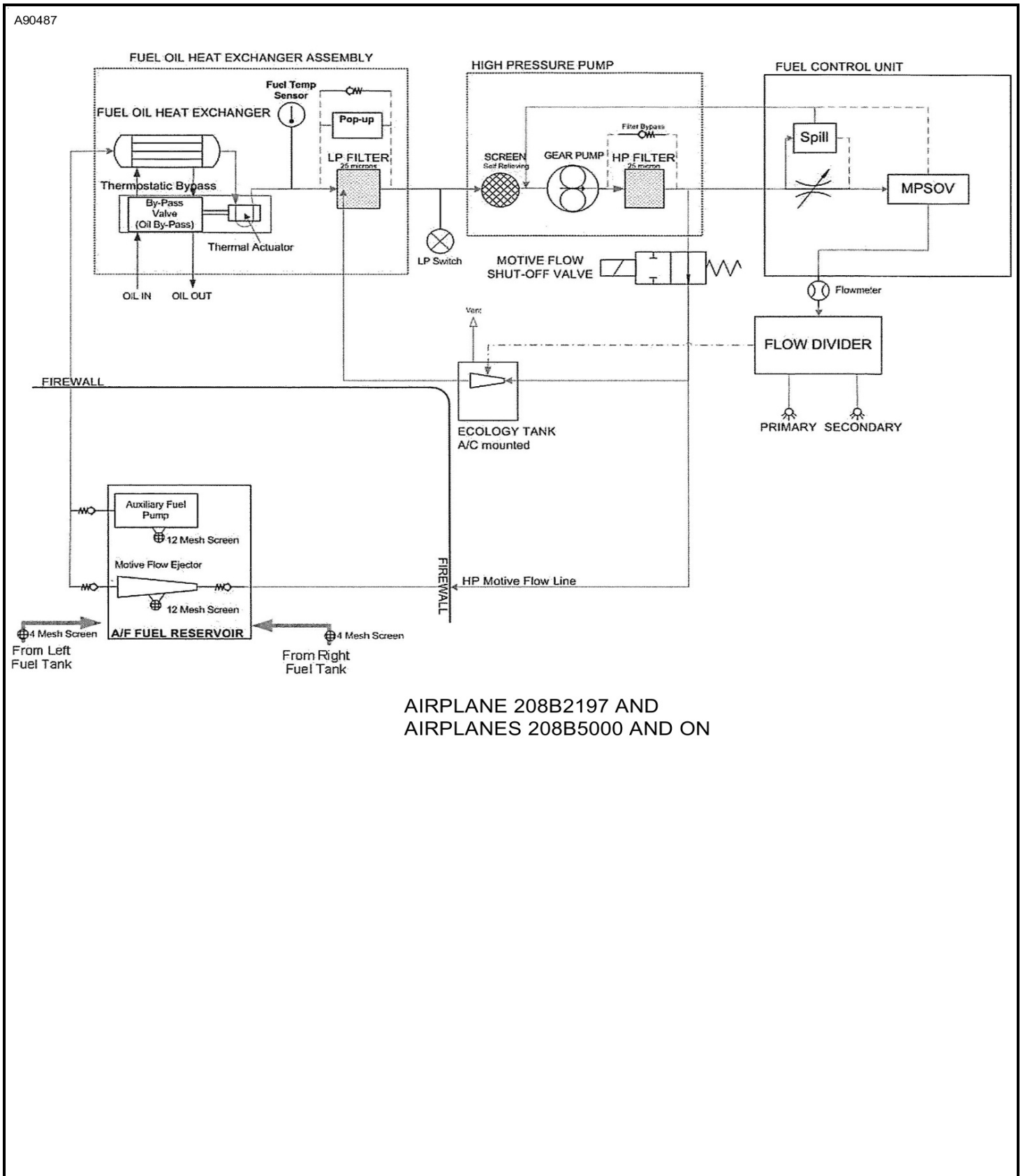


Figure 1 : Sheet 2 : Fuel System Schematic

