FUEL DISTRIBUTION - DESCRIPTION AND OPERATION

1. Description and Operation

A. The engine fuel system consists of an fuel-oil-heat-exchanger (FOHE), an engine-driven fuel pump, a fuel control unit, a flow divider and dump valve, a dual fuel manifold with 14 simplex nozzles (114, -114A engines), or 14 duplex nozzles (-140 engines), a fuel flow indicator system, and two fuel drain lines. The system provides fuel flow to satisfy the speed and power demands of the engine. Fuel from the airplane fuel reservoir is delivered to the FOHE which utilizes heat from the engine lubricating oil system to preheat fuel before it is delivered to the fuel control unit. A fuel temperature-sensing oil bypass valve regulates fuel temperature by either allowing oil to flow through heater circuit or bypass it to engine oil tank.

NOTE: There is a fuel temperature probe (UN042) installed on the outlet of the FOHE (airplanes 208B2197, 208B5272 & On, and 208B5000 thru 208B5271 incorporating CAB-34-03) on the PT6A-140 to provide an alert to the crew if the fuel temperature sensing oil bypass valve fails to regulate fuel temperature.

B. Fuel from fuel-oil-heat-exchanger (FOHE) then enters engine-driven fuel pump chamber through a 74-micron inlet screen. The inlet screen is spring-loaded and should it become blocked, the increase in differential pressure will overcome the spring and allow unfiltered fuel to flow into pump chamber. The pump increases fuel pressure and delivers it to fuel control unit via a 10-micron filter in pump outlet. A bypass valve and cored passages in pump body enables unfiltered high pressure fuel to flow to fuel control unit in the event outlet filter becomes blocked.

C. The fuel control unit consists of a fuel metering section, a temperature compensating section, and a gas generator (N_g) pneumatic governor. The fuel control unit determines the proper fuel schedule to provide power required as established by power lever input. This is accomplished by controlling speed of compressor turbine. The temperature compensating section alters the acceleration fuel schedule to compensate for fuel density differences at different fuel temperatures, especially during engine start. The temperature compensator alters the acceleration fuel schedule of fuel control unit to compensate for variations in compressor inlet air temperature. Engine characteristics vary with changes in inlet air temperature, and the acceleration fuel schedule must, in turn, be altered to prevent compressor stall and/or excessive turbine temperatures. The power turbine governor, located in propeller governor housing, provides power turbine overspeed protection in the event of propeller governor failure. This is accomplished by limiting fuel to gas generator. During reverse thrust operation, maximum power turbine speed is controlled by power turbine governor.

D. The flow divider schedules the metered fuel, from fuel control unit, between primary and secondary fuel manifolds. On the -114 and 114A engines, the fuel manifold and nozzle assemblies deliver fuel to the combustion chamber through ten primary and four secondary simplex fuel nozzles. During engine start, metered fuel is delivered initially to the primary nozzles, with secondary nozzles cutting in above a preset value. All nozzles are operative at idle and above. On the -140 engine, the fuel manifold and nozzle assemblies deliver fuel to the combustion chamber through fourteen duplex fuel nozzles. During engine start, metered fuel is delivered initially to the primary side of the duplex nozzles, with the secondary side cutting in above a preset value.

E. For Airplane 208B2197 and Airplanes 208B5000 and On, the fuel ecology tank collects the remaining fuel from the nozzles and plumbing at engine shutdown. Once the motive flow is established during the next engine run, the flow will automatically drain this residual fuel and return it back to the engine for combustion during the next engine run.

F. For Airplanes 20800001 and On, and Airplanes 208B0001 thru 208B2196, and 208B2198 thru 208B4999, when the fuel cutoff valve in the fuel control unit closes during engine shutdown, both primary and secondary manifolds are connected to a dump valve port and the residual fuel in the manifolds drains into the EPA fuel reservoir can that is attached to the firewall.

NOTE: For more data applicable to the airplane engine fuel components not included in this chapter, refer to the Pratt & Whitney maintenance manual listed in the List of Publications in the front of this manual. For proper fuel grades and specifications, refer to Chapter 12, Fuel - Servicing.