FUEL SYSTEM

The fuel system, see Figure 7-16, consists of left and right fuel tanks, crossfeed system, engine fuel system, quantity and flow instrumentation and necessary lines, controls, valves, pumps, etc., to complete the system.

FUEL TANKS

The fuel tanks are an integral portion of the sealed wet wing. Each tank supplies fuel to its respective engine for all operations except crossfeeding.

Each fuel tank contains a fuel filler, feed and vent lines, fuel quantity measuring systems, drain valves, a hopper tank, transfer ejector pumps, electric boost pumps and other required hardware to complete the system.

Each fuel tank is serviced through a flush filler located in the top outboard surface of each wing.

A combination flush fuel vent and overflow tube assembly is located on the lower surface of the wing inboard from the fuel fillers. The flush fuel vent is non-icing by design.

Fuel quantity measuring is accomplished by capacitance-type probes located in each main tank and an independent low fuel warning system.

Drain valves are provided on the lower surface of each fuel tank to remove moisture and other contaminants from the tank.

The funnel-shaped hopper is located in the inboard end of each main tank, see Figure 7-17. Transfer ejector pumps continuously flow fuel into the hopper to assure a constant fuel supply for the submerged combination main and auxiliary boost pumps.

The transfer ejector pumps, located in the forward and aft inboard end of each fuel tank, transfer fuel from the lowest points of each fuel tank to the hopper. These ejector pumps utilize existing fuel pressure in conjunction with a venturi to produce a high-volume flow. As the high pressure fuel (motive flow) is forced through the ejector orifice, a low pressure area is created at the pump inlet, drawing in a comparatively large volume of fuel and pushing it out at low pressure. Motive flow for operation of the transfer ejector pumps is continuously provided whenever the respective combination main or auxiliary boost pump is in operation. Continuous scavenging of fuel from the lowest points of each fuel tank ensures the maximum usable fuel in all normal flight attitudes.

Main and auxiliary fuel boost pumps are located in the bottom of each hopper tank, ensuring an adequate fuel supply to the selected engine(s). The main boost pump, actuated by positioning the FUEL BOOST switch to MAIN, provides fuel pressure for engine operation and motive flow for the transfer ejector pumps. Should the main boost pump fail, the pressure drop will be sensed by the auxiliary boost pump which will assume the duty of tne main boost pump. Failure of the main boost pump will be indicated by illumination of the applicable left or right AUX BOOST ON annunciator light. The auxiliary boost pump can also be actuated by positioning the FUEL BOOST switch to the AUX position.

Failure of both the main and auxiliary fuel boost pumps will raise significantly the amount of unusable fuel remaining in the respective tank. Begin crossfeed operation from the operative side before the fuel level on the inoperative side reaches 150 pounds during level coordinated flight and 300 pounds during attitudes other than level.

FUEL SYSTEM SCHEMATIC

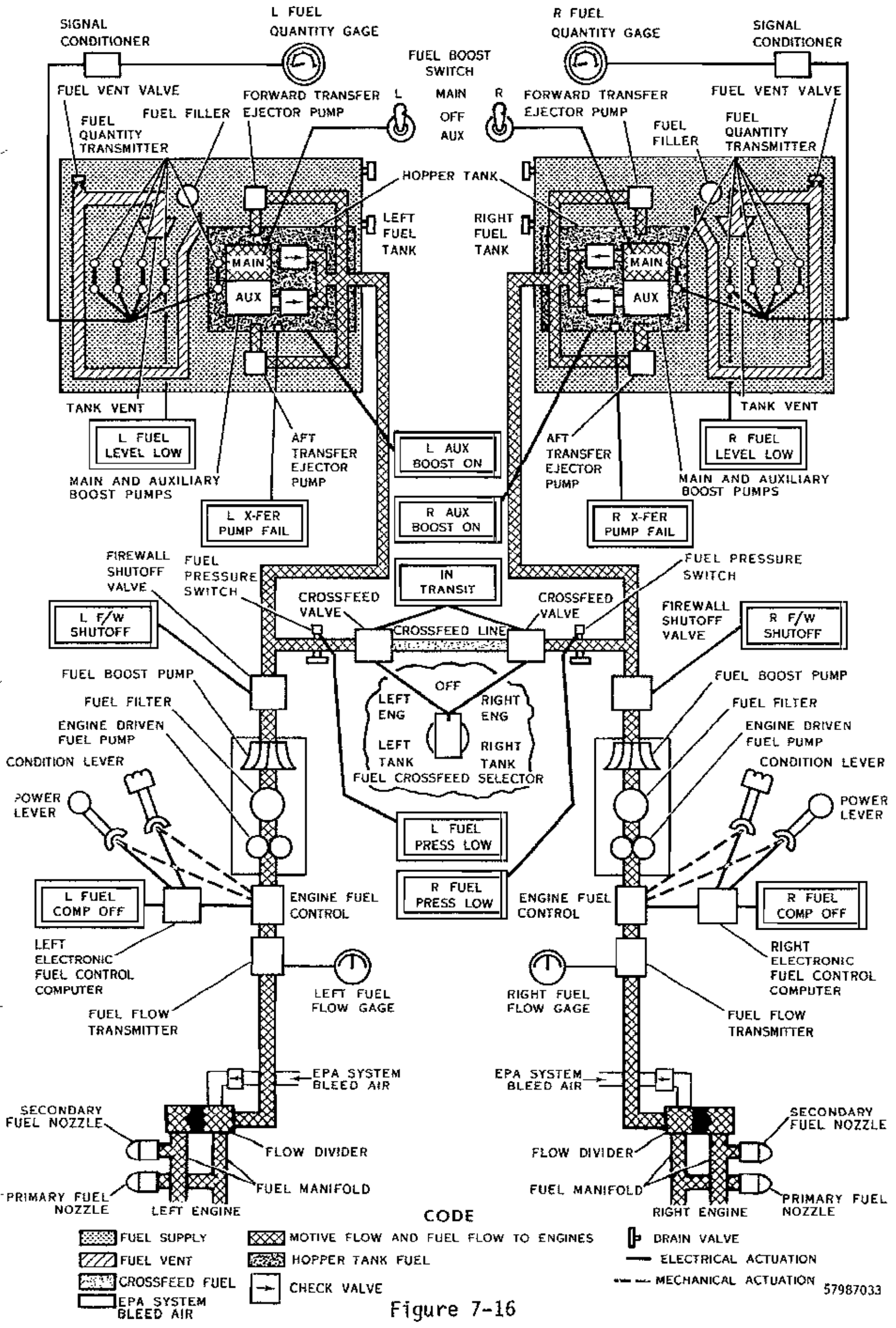


Figure 7-16

CROSSFEED SYSTEM

The crossfeed system, see Figure 7-16, consists of a single crossfeed line interconnecting each nacelle, two crossfeed valves, a 3-position crossfeed selector switch and necessary wiring and plumbing to complete the system.

When the crossfeed selector is positioned to OFF, both crossfeed valves are closed, allowing no fuel to flow from one side of the airplane to the other side. A green IN TRANSIT light adjacent to the crossfeed selector switch illuminates whenever the crossfeed valves are not fully opened or closed or do not coincide with the selector switch position.

In the LH ENG position, both engines feed from the right fuel tank. To accomplish this, both crossfeed valves are electrically opened, the left main boost pump is deenergized and the right auxiliary boost pump is energized. With both right main and right auxiliary boost pumps operating, sufficient fuel flow is available to assure continued normal operation of both engines at all power settings. Excess fuel leaving the right fuel tank and not required by the engines will be transferred to the left fuel tank. This transfer rate is normally 400 to 500 pounds per hour during the crossfeed operation.

WING FUEL HOPPER TANK SCHEMATIC

LEFT SIDE ONLY SHOWN

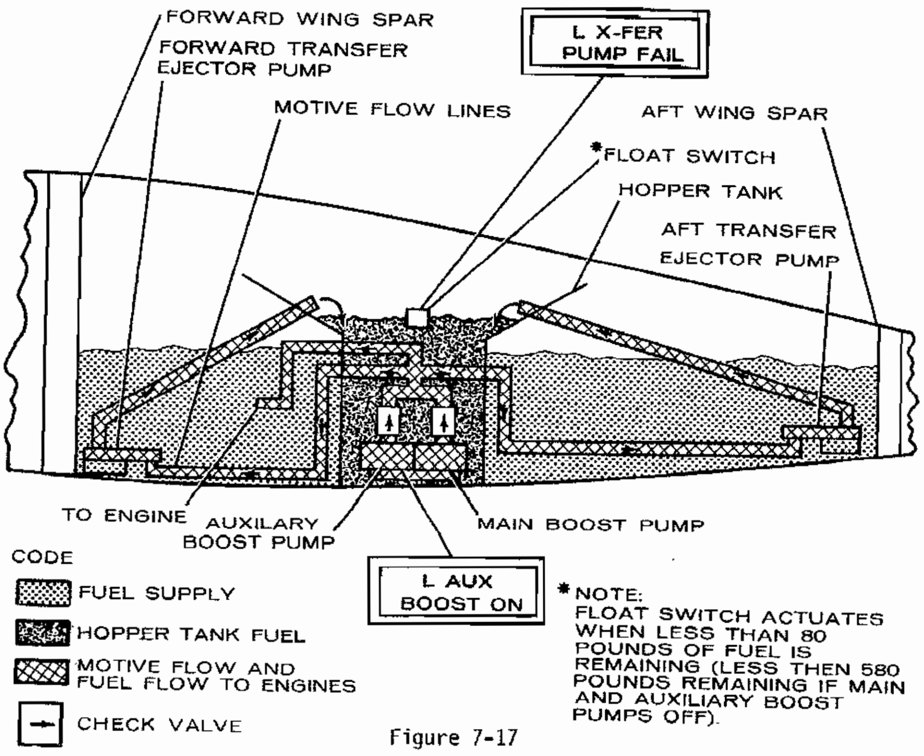


Figure 7-17

In the RH ENG position, both engines feed from the left fuel tank. To accomplish this, both crossfeed valves are electrically opened, the right main boost pump is deenergized and the left auxiliary boost pump is energized. With both left main and left auxiliary boost pumps operating, sufficient fuel flow is available to assure continued normal operation of both engines at all power settings. Excess fuel leaving the left fuel tank and not required by the engines will be transferred to the right fuel tank. This transfer rate is normally 400 to 500 pounds per hour during the crossfeed operation.

FUEL FLOW GAGES

The right and left fuel flow gages, see Figure 7-1, indicate the fuel consumption of each engine in pounds per hour. When power is removed from the gage, the needle will indicate in the OFF range.

FUEL QUANTITY GAGE

A capacitance-type fuel quantity gage, see Figure 7-1, is provided for each fuel tank. The gages are calibrated in pounds and accurately reflect the weight of fuel contained in each fuel tank. When power is removed from the gage, the needle will indicate in the OFF range.

FUEL LEVEL LOW WARNING LIGHTS

The L and R FUEL LEVEL LOW warning lights, see Figure 7-3, provide a warning when the left and/or right fuel tanks contain between 150 and 250 pounds of fuel and the main and/or auxiliary boost pumps are operating. These lights are actuated by fuel quantity transmitters located in each fuel tank. Each light operates independently from the fuel quantity indicating system.

ENGINE FUEL SYSTEM

General

The engine fuel system obtains fuel from the selected main tanks and delivers it to the engine for all phases of operation. The engine fuel and control system includes a fuel control unit, pumps, filters, flow divider and drain valve and fuel manifold and nozzle assemblies. The system provides fuel flow to satisfy the speed and power demands of the engine.

Each engine is equipped with an electronic fuel control system (normal mode operation) and a manual backup system (manual mode operation).

The fuel manifold and nozzle assemblies, mounted on the turbine plenum, deliver fuel to the combustion chamber through five primary and ten secondary fuel nozzles. The primary nozzles are for starting and initial acceleration. During all other phases of operation, fuel is provided by both primary and secondary nozzles.

The fuel flow divider and drain valve, mounted at the bottom of the turbine section, directs fuel flow to the nozzles. The valve delivers metered fuel flow to the primary nozzles during starting and maintains atomization during acceleration. When sufficient flow is provided to the primary nozzles, the fuel is bypassed to the secondary nozzles. The drain valve provides a path for purging fuel from the fuel nozzles during shutdown. An inlet filter is provided to prevent valve or nozzle blockage through all phases of operation. In the event the filter becomes clogged, fuel is bypassed around the filter to sustain engine operation.

The fuel control system incorporates a fuel pump assembly, fuel filter and fuel control assembly. The fuel control system provides filtered and metered fuel to the engine.

The engine-driven fuel pump assembly is mounted on the fuel control drive pad on the input housing assembly and is driven through a fuel control drive gear in the reduction gear system. The fuel pump assembly incorporates a high pressure pump assembly, rotary boost pump, pressure relief valve, fuel filter, filter bypass valve, and thermostatic anti-icing valve. The fuel pump assembly delivers filtered fuel to the fuel control assembly for metering.

The fuel control assembly, which is controlled by the electronic fuel computer, is attached to the rear of the fuel pump assembly and driven through the fuel pump assembly. The fuel control assembly incorporates a pressure control valve, mechanical and electrical shutoff valves, enrichment valve, overspeed governor adjustment, bypass valve adjustment and ground idle speed adjustment to control fuel flow to the engine.

The fuel filter is a component of the fuel pump assembly. Inlet fuel to the high pressure fuel pump is routed through the fuel filter to insure clean fuel through all phases of operation. In the event the filter becomes clogged, fuel is bypassed around the filter to sustain engine operation.

A sensing probe, located in the compressor inlet section, senses compressor inlet air temperature and compensates the acceleration and power fuel flow schedule for changes in inlet air temperature.

The EPA fuel purge system is installed to remove fuel from the engines during shutdown. Upon shutdown, compressed air stored in the purge canister blows out all fuel remaining in the engine downstream of the fuel control unit. This purged fuel is burned by the engine during the shutdown. The purge cycle is actuated by pressing and holding the engine stop button for five seconds. The compressed air is pressurized bleed air supplied by the engine. To charge the purge canister, the engine must have operated at 95% RPM or more since the previous shutdown.

ELECTRONIC FUEL COMPUTERS

In the engine fuel control system are two solid-state electronic fuel computers, one for each engine, located underneath the cabin floorboard aft of the copilot seat. Each computer receives the following inputs: Power requested (power lever potentiometer), RPM requested (condition lever potentiometer), engine torque (torque indicating system), engine temperature (EGT system), engine RPM (propeller governor monopole-primary input), engine RPM (fuel control monopole-secondary input), engine inlet air temperature (T2 sensor) and Mach number (ΔP/P transducer).

The computer regulates fuel flow and engine speed through output signals to the fuel control unit (fuel control torque motor) and the propeller governor (propeller governor torque motor).

The fuel computers have a self monitoring feature that automatically transfers from normal mode to manual mode in case of the following malfunctions: Loss of power lever electrical input, low voltage (automatic reset) and disagreement within the computer between the power requested and the output signal to the fuel control. This protection is restricted to specific operating ranges of the power lever and condition lever.

TRANSPONDER CONTROL PANEL

3. TEST PUSHBUTTON SWITCH - (Momentary) When pressed, selects internally generated interrogation signal to self-test equipment. Steady glow of reply lamp indicates satisfactory operation.
4. LIGHT SENSOR - Senses ambient cockpit light to automatically control intensity of reply lamp brilliance.
5. REPLY LAMP - Flashes to indicate transmission of reply pulses; glows steadily to indicate transmission of ident pulse; glows steadily with maximum brilliance during satisfactory self-test operation. (Also glows steadily during initial warmup when transponder is in standby mode.)
6. MODE A REPLY-CODE SELECTOR SWITCHES AND INDICATORS (4) - Selects and displays airplane identification code.
7. REMOTE ID SWITCH - Same as panel-mounted ID pushbutton switch.
8. OFF PUSHBUTTON SWITCH - Turns set off.
9. SBY PUSHBUTTON SWITCH - Applies warmup or standby power.
10. ON PUSHBUTTON SWITCH - Turns set on; enables Mode A operation.

Figure 7-37 (Sheet 2 of 2)

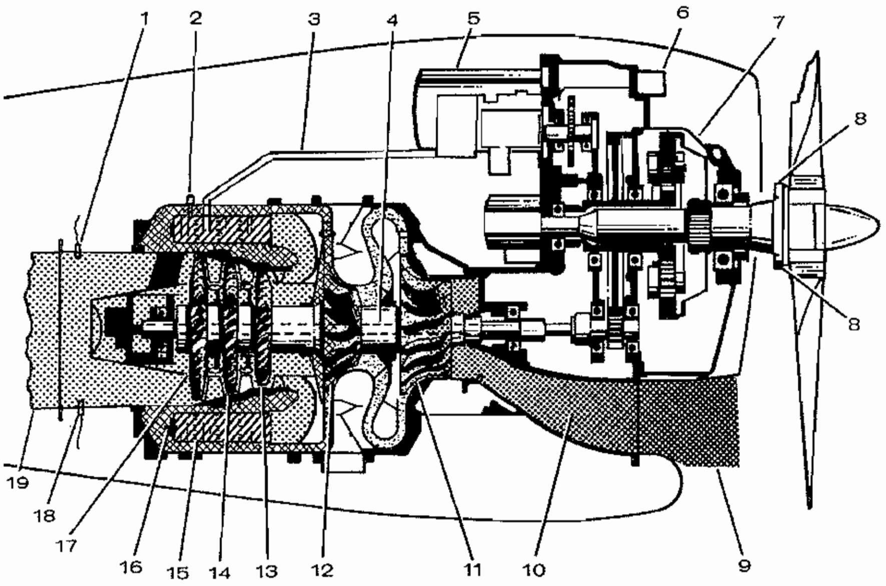
POWERPLANT SYSTEM

The airplane is equipped with two fixed-shaft turboprop engines. The engines are flat rated at 635.5 shaft horsepower each. At 100% engine RPM, the propeller operates at 2000 RPM.

The major components of the engine power section, see Figure 7-38, consist of a two-stage centrifugal compressor, an annular combustion chamber and a three-stage axial flow turbine. During operation, ambient air flows into the air inlet and into the center of the first stage centrifugal compressor. The air is decelerated and compressed as the centrifugal compressor throws the air to the outer edges of the first stage. This first stage air then flows to the second stage centrifugal compressor where the air compression process is repeated. The compressed air then flows into the plenum surrounding the combustion chamber then into the combustion chamber. Fuel is injected into the combustion chamber, mixed with the compressed air, and ignited. The ignited fuel air mixture rapidly expands with a great increase in temperature and pressure. This air then flows out of the combustion chamber through a three-stage axial flow turbine. In this manner, most of the heat and velocity energy is removed from the air and converted into rotating mechanical energy to drive the centrifugal compressor and propeller. Labyrinth seals are provided between the various turbine and compressor wheels to prevent the back flow of hot gasses from one stage to another.

As can be seen from Figure 7-38, all centrifugal compressor and axial flow turbine wheels are fixed to one through shaft; therefore, all activities mentioned above are occuring at the same time. The centrifugal compressor compresses the inflow air and the axial flow turbine rotates the shaft which rotates the compressor, etc. The majority of the power developed is used to continue this process. The remaining power is transferred from the fixed shaft to the propeller gear case and then to the propeller. The basic engine and its operation is quite simple. The complexity occurs when adding the necessary controls, instrumentation, subsystems and safety devices to assure reliable and desired operation. These items are discussed in the following paragraphs.

POWERPLANT SYSTEM



CODE

RAM AIR

RAM AIR COMPRESSED AFTER FLOWING THROUGH FIRST STAGE OF CENTRIFUGAL COMPRESSOR

FIRST STAGE COMPRESSOR AIR COMPRESSED AFTER FLOWING THROUGH SECOND STAGE OF CENTRIFUGAL COMPRESSOR

SECOND STAGE COMPRESSOR AIR IS INJECTED WITH FUEL AND IGNITED

BURNED FUEL AIR MIXTURE GREATLY EXPANDS AND ESCAPES THROUGH THE THREE STAGES OF THE AXIAL FLOW TURBINE INTO THE ENGINE TAILPIPE. THE AIR FLOWING THROUGH THE AXIAL FLOW TURBINE TURNS THE COMPRESSOR AND PROVIDES THE INPUT TO THE PROPELLER REDUCTION GEAR CASE.

1. EGT PROBE (T5)
2. IGNITOR
3. FUEL LINE
4. POWER SHAFT
5. STARTER GENERATOR
6. OIL VENT VALVE
7. PROPELLER GEAR CASE
8. PROPELLER START LOCK
9. AIR INLET
10. INLET TEMPERATURE (T2)
11. FIRST STAGE CENTRIFUGAL COMPRESSOR
12. SECOND STAGE CENTRIFUGAL COMPRESSOR
13. FIRST STAGE AXIAL FLOW TURBINE
14. SECOND STAGE AXIAL FLOW TURBINE
15. COMBUSTION CHAMBER
16. FUEL NOZZLE
17. THIRD STAGE AXIAL FLOW TURBINE
18. PRESSURE SENSOR (P5)
19. TAIL PIPE EDUCTOR

Figure 7-38

PROPELLER AND CONTROL

A hydraulically actuated, constant-speed, full-feathering propeller is an integral feature of the engine. The propeller governing system is interconnected with the negative torque sensing system (and the fuel control system electrically in normal mode). Engine oil pressure, feathering springs and propeller blade counterweights are used to set the propeller blade angles for the desired operating condition. The engine oil pressure is increased in pressure by the propeller governor and transferred to the propeller through a beta tube. The propeller counterweights and feathering spring attempt to move the propeller blades to full feather while the oil pressure attempts to move the propeller blades to reverse pitch. Propeller blade angle can thus be set as desired by use of the power and condition levers which control the amount of oil pressure exerted in the propeller hub assembly.

Before starting the engine, the propeller blades must be on the start locks. This is required to minimize propeller drag and resultant high turbine temperatures during the start. Additionally, the start locks provide the only means by which the propeller can be set for a functional check of the overspeed governor. Each propeller blade is equipped with a start lock. During shutdown, when the propeller centrifugal force is falling off, the spring-loaded start lock will move toward the hub and engage the hub locking detent if the propeller is in reverse pitch. After engine start, the centrifugal force will be greater than the spring force, therefore, the locks will attempt to retract. A high shear load between the propeller hub locking detent and the start lock will prevent the lock from being retracted. The shear load can be relieved by moving the power lever toward reverse, thus releasing the start locks.

If the propeller start locks are not engaged before starting, they can be engaged by actuating the unfeathering pump switch with the power lever in full reverse. This switch operates an electric oil pump which pumps oil from the engine sump into the propeller to move the blades toward reverse as is done on a normal shutdown. The returned oil will collect in the engine accessory gear case and will not return to the oil sump because the engine-driven oil scavenge pumps are not operating. Consequently, the engine oil level will appear low if checked at this time. Motoring the propeller approximately 5 to 10 seconds with the STARTER MOTOR switch will return this oil to the sump. This is not required if a normal start is conducted.

Feathering the propeller is achieved by dumping the oil pressure in the propeller hub assembly. This can be accomplished by stopping the engine-driven oil pump (engine shutdown) or by positioning the condition lever to EMER SHUTOFF. The EMER SHUTOFF position of the condition lever will actuate the manual fuel shutoff valve to shut down the engine and then dump the propeller oil pressure to feather the propeller.

ENGINE CONTROLS

The basic engine controls, see Figure 7-1, consist of power levers, condition levers, control lever friction locks, negative torque sensing system and a torque and temperature limiting system (optional some airplanes). A power lever and condition lever are provided for each engine. The left friction lock adjusts the friction of the power levers while the right friction lock adjusts the friction of the condition levers.

Power Levers

The power lever drives a potentiometer and a push-pull cable. Movement of the power lever adjusts the potentiometer for electronic fuel computer reference, when the engine is operating in normal mode. When the engine is operating in manual mode, the potentiometer is not functional. The push-pull cable drives the manual fuel valve in the engine compartment.

The power lever controls engine operation in the beta and propeller governing modes. Beta mode is used during ground operation only. In beta mode the propeller blade angles are controlled hydraulically by the power levers. In propeller governing mode the power lever controls fuel flow, either electrically in normal mode operation or hydromechanically in manual mode operation, and the propeller blade angles are governor controlled to maintain proper engine speed.

Normal (computer) mode operation prevents beta mode operation in flight as long as the power levers are not retarded below the flight idle position. In manual mode, L or R BETA lights may be experienced in flight idle due to the reduced fuel flow available, forcing the propellers into fine pitch against the flight idle blade angle hydraulic stops, and due to the subsequent inability to maintain propeller governing.

Prior to landing in normal (computer) mode engine operation, with the condition levers in TAKEOFF, CLIMB AND LANDING and the power lever at flight idle, engine fuel flow assumes a scheduled value to obtain predictable drag during the landing. In manual mode, the flight idle position will provide significantly more drag due to the lower fixed fuel flow scheduling (normal mode fuel is scheduled through underspeed governing by the fuel flow computer).

The power levers are never retarded below flight idle in flight. Retarding the power levers to ground idle after landing provides the hydraulic coupling necessary for beta mode operation.

Condition Levers

Each condition lever drives a potentiometer and a shutoff cable. Movement of the condition lever in the range between START AND TAXI and TAKEOFF, CLIMB AND LANDING, adjusts the electronic fuel computer speed when the engine is operating in normal mode. The shutoff cable attaches to the the fuel control manual fuel shutoff valve, the propeller feather valve and a switch for actuation of the EPA purge system. When the condition lever is in the engine's normal operating range, the shutoff cable is disengaged. Lifting the condition lever and pulling it back from the START AND TAXI position to the EMER SHUT-OFF position engages the shutoff cable and causes the engine fuel supply to be shut off, the EPA purge system to actuate and the propeller oil pressure to be dumped, allowing the propeller to feather.

As was indicated in the power lever discussion, engine speed in normal mode can be controlled by underspeed fuel scheduling (ground operations) or propeller governing (flight operations). The condition lever is used to select the RPM at which the governor will control in the normal mode.

During flight operations with the condition lever at TAKEOFF, CLIMB AND LANDING, the propeller governor will control engine speed at 100% RPM. With the condition lever at CRUISE, the propeller governor will control engine speed at 96% RPM. With the condition lever positioned between these two extremes, engine RPM will vary proportionally to condition lever position. The condition levers should not be retarded below CRUISE while in flight except to feather an engine.

When the engine is operating in flight in a manual mode (electronic fuel control inoperative), the condition levers only functions are feather and fuel shutoff. Engine speed will be controlled by the propeller governor at 100% RPM.

Negative Torque Sensing System

The negative torque sensing system operates automatically, thus no controls are provided for the pilot. Operational capability of the system should be checked before the first flight of each day. Negative torque occurs when the propeller drives the engine rather than the engine driving the propeller. When negative torque does occur, the propeller pitch will automatically increase toward the feather position to a level that will reduce the drag of the windmilling propeller. Negative torque can occur during any normal operation when the fuel flow schedule is excessively low and will not support the engine power requirements to maintain positive torque. Negative torque sensing will always occur during an engine failure before the propeller is feathered and during low altitude normal mode operation at flight idle.

Torque And Temperature Limiting System (Optional Some Airplanes)

The torque and temperature limiting system provides protection against exceeding the maximum allowable torque and EGT limits. The system consists of left side panel switches, signals from the torque and EGT sensing systems, and the electronic fuel control computers.

When the TORQUE-EGT LIMIT switches are positioned to MANUAL, maximum torque and EGT must be monitored and manually set by the pilot. When the switches are positioned to AUTO, torque and EGT signals from the torque transducers and the EGT thermocouples are supplied to the fuel computer to produce fuel scheduling that will limit torque and EGT. Torque limiting occurs as a function of engine speed, thus will vary, depending upon the condition lever position, from 1669 to 1738 foot-pounds torque as RPM varies from 100% to 96% RPM. EGT and torque limiting can occur only when the fuel computers are operational and the RPM is above 80%.

CAUTION

- Advancing the power levers in excess of one lever width beyond the initial point of torque limiting may exceed the torque limiting system capability. When operating in normal mode with torque and temperature limiting switch in AUTO, advance the power lever slightly ahead of the point where takeoff power is attained. When operating in any other configuration, advance the power lever only sufficiently to attain the appropriate torque or EGT limit. When operating in normal mode, the red line EGT marking is applicable.
- Approach torque and temperature limits slowly to avoid transient overshoots.

MINIMUM TURNING DISTANCE

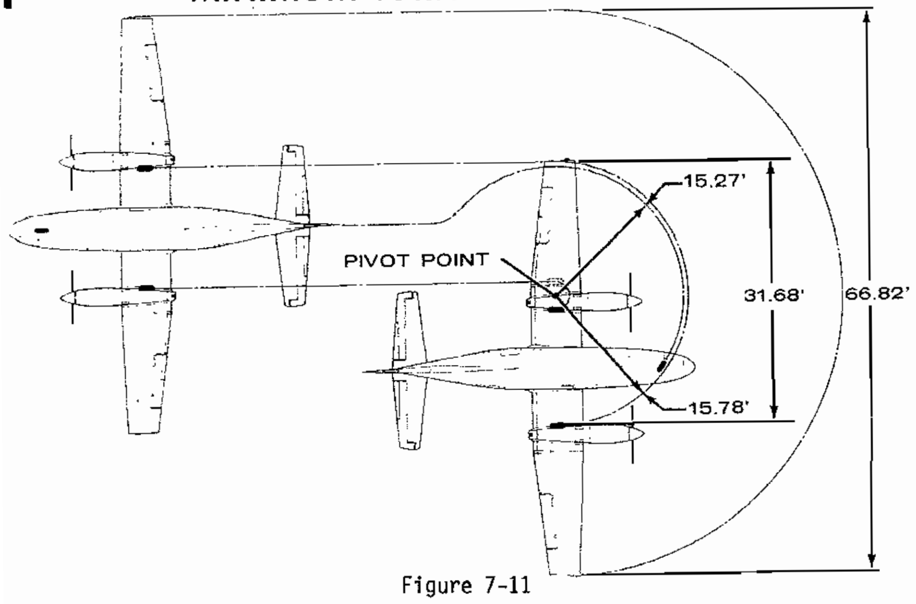


Figure 7-11

WING FLAPS SYSTEM

The wing flaps, see Figure 7-12, are the extensible Fowler type. Each wing flap (two per side) is mounted on tracks which are attached to the wing rear spar. The wing flap sections are actuated by push-pull rods attached to bell cranks in the wing. The bell cranks in each wing are interconnected with push-pull rods. Each inboard push-pull rod is attached to the center bell crank which is actuated by a hydraulic flap actuator.

The hydraulically operated flap actuator is controlled by the wing flap position switch, see Figure 7-1. This switch incorporates a preselect feature which allows the pilot to select the amount of flap extension desired. With the wing flaps set at the UP, T.O., APPR or LAND positions, the corresponding inboard wing flap extensions are 0°, 10°, 20° and 30°. The outboard wing flaps are mechanically linked to the inboard sections, extending at a slower rate. When the inboard wing flaps are fully extended (30°), the outboard wing flaps are extended 20°.

Selecting the UP, T.O., APPR or LAND position on the wing flap selector switch causes the hydraulically operated flap actuator to drive the flaps toward the selected position. When the actual flap position equals the selected position, limit switches will electrically actuate the flap control valve which stops the flow of hydraulic fluid to the hydraulic flap actuator. The wing flaps will complete the extension cycle in approximately 15 seconds with both engines operating.

Each engine's hydraulic pump supplies hydraulic pressure to actuate the wing flaps. The HYD PRESS ON indicator lights, see Figure 7-3, will remain on until the wing flaps reach their selected position. The hydraulic reservoir, located in the inboard left wing, incorporates a sight gage for checking the fluid level. The sight gage, incorporated into the reservoir

V_{MCA}	Air minimum control speed is the minimum flight speed at which the airplane is directionally and laterally controllable as determined in accordance with Federal Aviation Regulations. Airplane certification conditions include one engine becoming inoperative; not more than a 5-degree bank toward the operative engine; takeoff power on operative engine; landing gear up; flaps in takeoff position; and most critical center-of-gravity.
V_{MO}/M_{MO}	Maximum operating limit speed is the speed limit that may not be deliberately exceeded in normal flight operations. V is expressed in knots and M in Mach Number.
V_S	Stalling speed or the minimum steady flight speed at which the airplane is controllable.
V_{SO}	Stalling speed is the minimum steady flight speed at which the airplane is controllable in the landing configuration.
V_{SSE}	Intentional one engine inoperative speed is a minimum speed selected by the manufacturer for intentionally rendering one engine inoperative in flight for pilot training.
V_X	Best angle-of-climb speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.
V_Y	Best rate-of-climb speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

METEOROLOGICAL TERMINOLOGY

°C	Temperature expressed in degrees Celsius.
°F	Temperature expressed in degrees Fahrenheit.
Indicated Pressure Altitude	The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 millibars).
IOAT	Indicated outside air temperature is the temperature indicated on the pilot's outside air temperature indicator. The indication is not adjusted for instrument error or temperature compressibility effects.
ISA	International standard atmosphere in which: (1) The air is a dry perfect gas; (2) The temperature at sea level is 15° Celsius; (3) The pressure at sea level is 29.92 inches Hg. (1013.2 mb); (4) The temperature gradient from sea level to the altitude at which the temperature is -56.6°C is -1.98°C per 1000 feet.

SECTION 2
LIMITATIONS

TABLE OF CONTENTS

NO CHANGES EXCEPT:

INTRODUCTION

24 vortex generators constitute the minimum requirement. If less than 20 vortex generators are in place, or if any are damaged, the aircraft must be operated in accordance with the original Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

AIRSPEED INDICATOR TABLE:

MARKING	KIAS VALUE OR RANGE	SIGNIFICANCE
Red Radial	91	Air minimum control speed with wing flaps in T.O. position.
White Arc Wide Narrow	76 to 180 76 to 91 91 to 180	Operating speed range with wing flaps in LAND position. Lower limit is maximum weight stalling speed in landing config-uration. Upper limit is maximum speed permissible with wing flaps in LAND position. The transition point from wide to narrow arc is the stall speed with wing flaps in UP position.
Blue Radial	120	One engine inoperative best rate-of-cilmb speed with wing flaps in UP position.
Red and White Barber Pole	245 KIAS/ .55 Mach	Maximum operating speed.

97-05d

6. Airspeed - ACCELERATE to 115 KIAS.
7. Wing Flaps - UP.
8. Climb - 120 KIAS (One Engine Inoperative Best Rate-of-Climb Speed With Wing Flaps UP).
9. Trim Tabs - ADJUST.
10. Inoperative Engine.
    a. Fuel Boost Pump - CHECK MAIN if fire hazard does not exist. - OFF if fire hazard does exist.
    b. Generator - OFF.
    c. Propeller Synchrophaser - OFF (If Installed).
11. As Soon As Practical - LAND. Refer to Engine Inoperative Landing Procedure.

DECISION TO ABORT TAKEOFF (NO GO)

1. Landing Gear - CHECK DOWN. Gear down lights on.
2. Power Levers - RETARD to FLIGHT IDLE.
3. Power Levers - GRND IDLE after touchdown.
4. Brakes and Nosewheel Steering - AS REQUIRED.
5. Inoperative Engine Firewall Shutoff - PUSH to close.

ENGINE FAILURE IN FLIGHT (Speed Below V_{MCA})

1. Power Lever - RETARD as required to stop turn.
2. Aileron and Rudder - AS REQUIRED toward operative engine to maintain straight-ahead flight.
3. Pitch Attitude - LOWER NOSE to accelerate above 91 KIAS.
4. Accomplish procedures for Engine Failure During Flight (Speed Above V_{MCA}).

ENGINE FAILURE IN FLIGHT (Speed Above V_{MCA})

1. Engine Power - ADJUST as required.
2. Inoperative Engine - DETERMINE. Idle engine same side as idle foot; also, torque and EGT will be low.
    a. Condition Lever - EMER SHUT-OFF.
    b. Firewall Shutoff - PUSH to close.
3. Landing Gear - UP.
4. Wing Flaps - UP above 115 KIAS.

Before Securing Inoperative Engine:

5. Determine probable cause of engine stoppage.
6. Inoperative Engine - SECURE or ATTEMPT AIRSTART.

If Engine Is To Be Secured:

7. Inoperative Engine
    a. Fuel Boost Pump - CHECK MAIN if fire hazard does not exist. - OFF if fire hazard does exist.
    b. Generator - OFF.
    c. Propeller Synchrophaser - OFF (If Installed).
8. Operative Engine - ADJUST.
9. Trim Tabs - ADJUST to maintain bank toward operative engine.
10. Electrical Load - DECREASE if required to prevent battery discharge.
11. Fuel Crossfeed Selector - AS REQUIRED to maintain fuel balance. Do not crossfeed if fire hazard exists.
12. As Soon As Practical - LAND. Refer to Engine Inoperative Landing Procedure.