

PROPELLER SYSTEM

DESCRIPTION

Each engine is equipped with a conventional three-blade, full-feathering, constant-speed, counter-weighted, reversing, variable-pitch propeller mounted on the output shaft of the reduction gearbox. The propeller pitch and speed are controlled by engine oil pressure, through single-action, engine-driven propeller governors. Centrifugal counter-weights, assisted by a feathering spring, move the blades toward the low rpm (high pitch) position and into the feathered position. Governor boosted engine oil pressure moves the propeller to the high rpm (low pitch) hydraulic stop and reverse position. The propellers have no low rpm (high pitch) stops; this allows the blades to feather after engine shutdown.

Propeller tie-down boots are provided for use on the moored airplane to prevent windmilling at zero oil pressure.

PROPELLER GOVERNORS

Two governors, a constant speed governor, and an overspeed governor, control the propeller rpm. The constant speed governor, mounted on top of the gear reduction housing, controls the propeller through its entire range. The propeller control lever operates the propeller by means of this governor. If the constant speed governor should malfunction and request more than 2200 rpm, the overspeed governor cuts in at 2288 rpm and dumps oil from the propeller to keep the rpm from exceeding approximately 2288. A solenoid, actuated by the propeller governor test switch on the pilot's left subpanel, is provided for resetting the overspeed governor to approximately 1900 to 2100 rpm for test purposes.

In the event the propeller should stick, or move too slowly during a transient condition, resulting in an overspeed situation, the pneumatic section of the primary governor acts as a "fuel topping governor" which prevents an overspeed of the power turbine thereby limiting propeller overspeed. During operation in the reverse range, the fuel topping governor is reset to approximately 95% propeller rpm before the propeller reaches a negative pitch angle. This ensures that the engine power is limited to maintain a propeller rpm somewhat less than that of the constant speed governor setting. The constant speed governor therefore will always sense an underspeed condition and direct oil pressure to the propeller servo piston to permit propeller operation in Beta and reverse ranges.

AUTOFEATHER SYSTEM

The automatic feathering system provides a means of immediately dumping oil from the propeller servo to enable the feathering spring and counterweights to start the feathering

action of the blades in the event of an engine failure. Although the system is armed by a switch on the subpanel, placarded AUTOFEATHER - ARM - OFF - TEST, the completion of the arming phase occurs when both power levers are advanced above 90% N_1 , at which time both the right and left indicator lights on the caution/advisory annunciator panel indicate a fully armed system. The annunciator panel lights are green, placarded L AUTOFEATHER and R AUTOFEATHER. The system will remain inoperative as long as either power lever is retarded below the 90% N_1 position. The system is designed for use only during take-off and landing and should be turned off when establishing cruise climb. During take-off or landing, if torqueometer oil pressure on either engine drops below a prescribed setting, the oil is dumped from the servo, the feathering spring starts the blades toward feather, and the autofeather system of the other engine is disarmed. Disarming of the autofeather portion of the operative engine is further indicated when the annunciator indicator light for that engine extinguishes.

FUEL SYSTEM

The fuel system consists of two separate systems connected by a valve-controlled crossfeed system. Total fuel usage is automatic for each engine with no tank selection required. Fuel for each engine is supplied from 5 interconnected bladder-type cells: a 38-gallon wing leading edge tank, a 23-gallon wing outboard tank, a 23-gallon wing inboard tank, a 56-gallon nacelle tank and a 44-gallon center section tank, for a total usable fuel capacity of 368 gallons. A filler opening is provided in each leading edge and nacelle cell.

The system is vented through a recessed vent coupled to a static port on the underside of the wing, adjacent to the nacelle. One vent is recessed to prevent icing. The static port is provided as a backup, should the recessed vent become plugged.

BOOST PUMPS

The primary fuel boost pump is engine driven and is mounted on a drive pad on the aft accessory section of the engine. This pump operates when the gas generator (N_1) is turning and provides sufficient fuel for start, takeoff, and all flight conditions. Operation with aviation gasoline is limited to 18,000 feet altitude, with primary fuel boost pump inoperative.

An electrically driven standby boost pump located in the bottom of each nacelle tank is provided as a backup pump should the primary fuel boost pump fail, and for use with hot aviation gasoline above 18,000 feet. For crossfeed operations, standby boost pumps are required. In the event of an inoperative standby boost pump, crossfeed can only be accomplished from the side of the operative boost pump.

Electrical power to operate the standby boost pumps is controlled by lever lock toggle switches, placarded STANDBY PUMP - ON - OFF, located on the fuel control panel. Power for either the right or the left standby boost

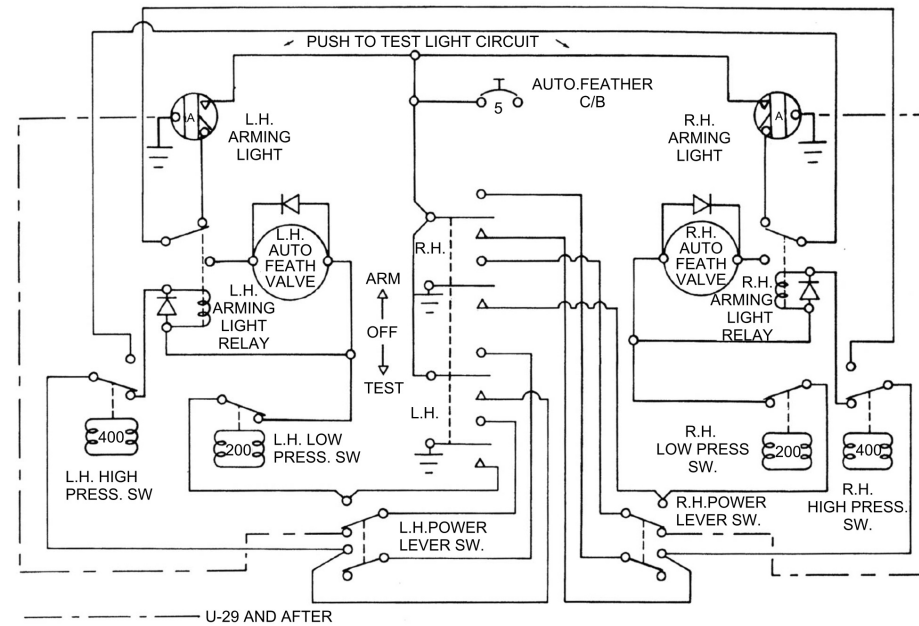
AUTOFEATHERING SYSTEM - DESCRIPTION AND OPERATION

1. Propeller Autofeathering

- A. The automatic feathering system provides a means of immediately dumping oil from the propeller governor to enable the feathering springs to start feathering the propeller blades as soon as engine torque meter oil pressure drops below 6.5 psi (approximately 200 foot-pounds of torque) at power setting of 85 to 90% N1 or greater. The system is actuated by placing the autofeather arm switch in the LEFT SUBPANEL to the ARM position. This closes the circuit breaker panel beside the copilot to the power switches mounted on a bracket in the control pedestal; however, the autofeathering system will remain inoperative as long as the power levers are retarded below the 85 to 90% N1 position. When the power levers are advanced to the 85 to 90% N1 position, a mechanical actuator connected to each power lever will close its respective switch and complete the circuit to the high and low pressure switches mounted adjacent to the torque pressure transmitter just forward and above the left hand exhaust outlet on each engine. These pressure switches monitor torque meter oil pressure. The high pressure switch is a single pole, double-throw switch that actuates under pressure exceeding 12 psi (approximately 400 foot-pounds of torque). When actuated, the LH high pressure switch provides power from its "C" contact through the RH arming relay to the RH autofeather armed light in the LH instrument panel directly above the altimeter. The RH high pressure switch is similarly hooked to its armed light in the instrument panel. The arming relay for each system is mounted on the inboard aft side of the first bulkhead forward of the firewall in each nacelle. When the torque meter oil pressure of an engine drops below 12 psi, the high pressure switch on that engine opens the circuit to the arming light relay on the opposite engine to disable the autofeather system of the latter. The high pressure switch closes the circuit through its "B" contact to the coil of its respective arming relay, which will remain de-energized as long as torque meter oil pressure exceeds 6.5 psi because of the open circuit at the "C" contact of the lower pressure switch. When torque meter oil pressure drops below 6.5 psi, a ground return for the arming light relay and the dump valve solenoid mounted on the overspeed governor is provided through the "B" contact of the low pressure switch on the affected engine. Now energized, the arming light relay breaks the circuit to the autofeather armed light of the affected engine. Current through the relay then energizes the solenoid dump valve that immediately reduces governor oil pressure to zero. This allows the feathering springs to move the propeller blades to the feathered position on the engine in which torque meter oil pressure dropped below 6.5 psi. At the same time, the autofeathering system of the other engine is disarmed through the hookup between the high pressure switches and arming light relays of the right and left hand systems. For testing purposes, the autofeather arm switch is equipped with a TEST position by which the power switches in the pedestal can be bypassed to checkout the system with the power levers retarded to below the 85 to 90% N1 position. Refer to [Figure 1](#).

Figure 1 : Sheet 1 : Auto Feather Electrical Schematic

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