Engine Indicators

Dual indicating engine instruments are mounted on the engine instrument panel (figure 1-8). The manifold pressure gage is a direct reading instrument and indicates the pressure in inches Hg in each engine intake manifold. With the engines inoperative the gage readings should correspond to field barometric pressure. The tachometer is self-energizing and does not require power from the airplane's electrical system. The cylinder head temperature, carburetor air temperature, and oil temperature gages are powered by 28-volt direct current from the main bus and are calibrated in degrees centigrade. The oil pressure gage, fuel flowmeter, fuel pressure gage, and BMEP gage are 26-volt alternating-current (Magnesyn) instruments; power is obtained by placing the pilot's inverter selector switch on either #1 INV or #2 INV position. Two fuel-pressure-low warning lights, located adjacent to the fuel pressure gage, glow red when the fuel pressure for the respective engine drops below approximately 19.5 psi; these lights are powered by direct current from the main bus. The fuel flowmeter indicates in pounds per hour the rate of fuel flow from the carburetor to respective engine. The BMEP gage indicates power delivered to the propeller drive shaft. The indicated reading is calibrated in psi and is transmitted electrically from torquemeter transmitters in the front section of each engine.

NOTE

Due to the larger accessory load carried by the right engine, BMEP indicated for the left engine will normally be higher than that indicated for the right engine when power settings are equal. This is because the BMEP gage indicates only the power delivered to the propeller, not the total power developed by the engine.

PROPELLERS

Each engine is equipped with a three-blade, full-feathering, reversible pitch, Hamilton Standard Hydromatic propeller. A propeller governor on each engine automatically adjusts propeller pitch to maintain constant engine speed under varying flight conditions. Governor settings are controlled from the flight compartment. Automatic and manual feathering controls are provided.

Propeller pitch can be reversed on the ground to produce aerodynamic braking or to back the aircraft during taxi operation. Oil from the engine oil tank is used for propeller feathering and reversing. All propeller control electrical circuits are operated by direct current from the main bus.

PROPELLER SPEED CONTROL SWITCHES AND GOVERNOR LIMIT LIGHTS

Two propeller speed control switches (8, figure 1-10 and figure 1-14) are located on the pedestal quadrant to increase or decrease engine and propeller rpm by changing the propeller blade pitch. Each switch has an INC RPM (forward) position and a DEC RPM (aft) position. The switches are spring-loaded to an unmarked OFF position midway between the two operating positions. Propeller pitch change occurs at a rate that changes engine speed approximately 100 rpm per second. Reduction gearing keeps the propeller speed at 0.45 times engine speed. Low rpm and high rpm limit stops in the propeller governor limit the range of rpm change to predetermined settings. When either of the stops reaches the set limit, it closes a direct-current circuit to the corresponding amber limit light on the pilots' pedestal (6, figure 1-10). This light indicates that the high or

low rpm limit has been reached. The light remains on as long as rpm setting is kept at either limit.

Propeller Pitch Reversal

Propeller pitch may be reversed by moving the throttle aft into the reverse thrust range for aerodynamic braking during the landing roll. As the throttles are moved aft into the reverse thrust range, throttle switches actuate the propeller pitch reversing mechanism. Propeller pitch changes at the rate of 14 degrees per second and requires approximately three seconds to reach full reverse pitch of -8 degrees. Further movement aft in the reverse thrust range to the REVERSE OPEN position opens the throttles to increase engine power. As the throttles are moved forward again through the CLOSED detent, the propeller blades return to the positive pitch corresponding to the rpm setting of the governor.

REVERSE PROPELLER LATCH STOPS AND OVERRIDE INDICATOR HANDLES

Two direct-current-operated or manually operated latch stops are installed in the pedestal to prevent inadvertent movement of the throttles into reverse thrust range while the aircraft is airborne. The latch stops for the two throttles operate in unison and are spring-loaded to the locked position. When the weight of the aircraft compresses the main landing gear struts on landing, a switch on the left strut closes and withdraws the lockout solenoid. One of the reverse throttle lock handles must be pulled out manually. This allows reverse thrust to be obtained from the propellers. As the throttle is moved forward again through the closed detent, the propeller blade pitch is unreversed. The reverse throttle lock handle will automa-

NEW NEW

Figure 1-14. Propeller Controls

tically return to the unlocked position, and the propeller returns to the rpm setting of the governor.

WARNING

If the "propeller override" button is pushed in, the reverse throttle lock handle could be pulled out while airborne, and an inadvertent inflight reversal could occur.

PROPELLER-IN-REVERSE LIGHTS

Two propeller-in-reverse indicator lights (32, figure 1-8) are located on the engine instrument panel. These blue lights provide visual indication when the corresponding propeller is in reverse pitch. The lights are powered by direct current from the main bus and protection is provided through two propeller reverse control circuit breakers on the main circuit breaker panel.

Propeller Manual Feathering System.

NOTE

Feathering of the left propeller automatically disconnects the cabin compressor to reduce the right engine accessory load and increases power available to the right propeller.

MANUAL FEATHERING BUTTONS AND FEATHER BUTTON LIGHTS

Two red, push-pull type, manual feathering buttons (10, figure 1-9, and figure 1-14) are provided on the overhead switch panel for manual feathering and unfeathering of the propellers. Each button has three unmarked positions—full in, full out, and half out (normal). When a button is pushed full in, the corresponding feathering pump is started, and a holding circuit holds the button in until the feathering action is completed. A red indicator light in the button glows to indicate that the propeller is feathering. After feathering has started, the feathering cycle can be stopped by pulling the button to the half out (normal) position. If this is done before the propeller has feathered and stopped rotating, the propeller blades will return to the pitch corresponding to the rpm setting of the governor. After a propeller has been completely feathered, unfeathering is accomplished by pulling the manual feathering button full out until propeller rotation begins and then releasing the button which will automatically return to the normal, half-out position. The propeller blades then return to the pitch required to attain the rpm setting of the governor. Before unfeathering, the governor should be set to its decrease rpm (high pitch) limit by operation of the propeller speed control switch. All propeller control circuits and indicator circuits are powered by direct current from the main DC bus. NEW

FEATHERING-PUMPS-ON LIGHTS

Two amber propeller feather pump lights (26, figure 1-8), mounted on the engine instrument panel, indicate operation of the feather pump relays. NEW

Propeller Autofeathering System

The propeller autofeathering system (figure 1-15) automatically feathers a propeller in event of failure of the corresponding engine after approximately 45 in. Hg. has been applied. A reduction of torque pressure (engine failure) in one engine, while the corresponding throttle remains in the high power position, completes the circuit to the propeller feathering system. The system operates automatically by causing the appropriate manual feathering button to be magnetically drawn in

to the feathering position if engine BMEP falls to approximately 70 psi or below (allowable limits 62 to 80 psi) after the throttles have been advanced beyond a position corresponding to 45 in. Hg. sea level manifold pressure. A 1.0 ± 0.2 second time delay feature of the system prevents inadvertent autofeathering during momentary power lags. The system will not autofeather the second propeller if one propeller has already been feathered either automatically or manually, unless the system is rearmed. The system is powered by direct current from the main bus.

CAUTION

Do not rearm the autofeather system if one propeller has already feathered.

AUTOFEATHER SWITCH AND ARMED INDICATOR LIGHT

An autofeather switch, located on top of the pilots' pedestal (figure 1-14), has unmarked ON and OFF positions, and is cover-guarded in the OFF position. The switch controls direct-current power to arm the autofeather circuits. Once the system is armed, operation of the system is automatic. The switch is positioned to ON while testing the autofeather system. It must be positioned to OFF after each test and then turned to ON again to rearm the circuits. A green indicator light (figure 1-14) is provided to indicate that direct-current power is connected and the autofeather system is armed. The light comes on when the autofeather switch is turned to ON and goes out when the switch is turned to OFF. It will also go out if either propeller is manually or automatically feathered while the autofeather switch is ON.

AUTOFEATHER TEST SWITCHES

Two cover-guarded test switches (7, figure 1-10, and figure 1-14) are provided to allow testing of the

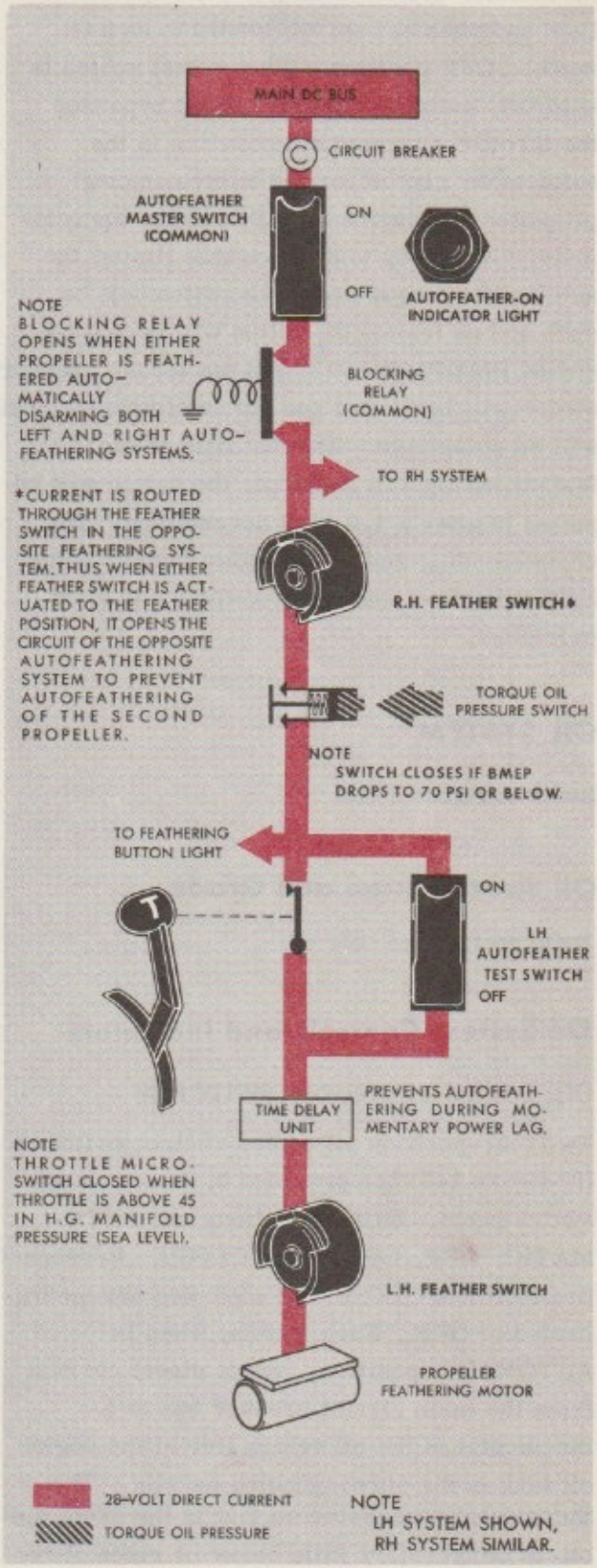

Figure 1-15. Autofeathering System