NEGATIVE TORQUE SYSTEM (NTS)

A turbine engine, for it's given size and weight, develops considerable horsepower. It's propeller can produce considerable drag.

With a twin engine aircraft in a single engine condition, the ability of the aircraft to cope with resultant asymetrical drag is largely determined by the relative proportions and strength of the vertical tail surfaces. To assist in combating the high asymetrical drag forces when power is lost on one side, and prior to propeller feathering, the TPE 331-47 engine is equipped with a negative torque sensor system. (NTS)

This system is an intergal part of the engine. It's purpose is to limit the negative torque that is developed by the propeller as a result of fuel interruption or engine failure. As engine torque, sensed by the torque sensor, becomes more negative than approximately minus 25 SHP, the negative pressure automatically actuates the feather valve to dump the propeller oil to the engine case thereby allowing the propeller blades to cycle toward the feather position. Because of the rapid feather rate, a small increase in blade angle generally causes the torque to momentarily become positive and thereby recycle the system. The NTS is also called upon to control the motoring torque during an airstart.

A test system incorporated in the propeller control system permits the pilot to check the operation of the negative torque sensing system prior to the first flight of each days operation. With the AIR START-GROUND START switch in the AIR START position, so that the starter will not be activated, and the IGNITION FUEL switch off, the unfeathering pump is energized by holding the START-STOP switch in the START position. The propeller oil system provides no escape for the oil entering it from the unfeathering pump and the NTS will actuate, turning on the NTS (BETA) light. Oil will also flow through the metering valve of the NTS pressure regulator; however, since there is not yet any negative torque applied to the rear train, the torque sensor valve will be open, preventing pressure from rising against the feathering valve.

When the AIR START - GROUND START switch is placed to the GROUND START position and the starter energized by the START-STOP switch, the high initial torque applied to the gear train by the starter generator causes the torque sensor valve to close its bleed port, and oil pressure will rise against the feathering valve. This will dump the pressure to the propeller oil line, and the NTS light is turned off by the pressure switch, completing the NTS check.

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