News for TFE731 Engine Operators ● Deliver to Flight Dept.

DUNCAN INTELLIGENCE

● Edited by Doug Alleman & Jon Dodson ● Fall 2001

Characteristics of the TFE731 at Idle

By Doug Alleman

One of the more frequently asked questions about the TFE731 is "Why does idle RPM vary from day-to-day?" Idle RPM is determined by the EEC/DEEC and not by a mechanical setting in the Fuel Control Unit (FCU). It is based on a predetermined idle thrust requirement that is programmed into the EEC/DEEC. Typically, idle thrust is set at 250 pounds on a standard day at sea level. It will be somewhat less at airports above sea level and temperatures above ISA. Mass airflow through the engine will vary from day-to-day with changes in temperature and pressure altitude. Sensed by the PT2TT2 probe, this information is transmitted to the EEC/DEEC, which is also sensing many other parameters within the engine. RPM of the engine is then adjusted by the electronic control to provide the required thrust.

The question that usually follows is "Why does idle RPM change when switching the EEC/DEEC from Auto to Manual?" Keeping in mind the explanation above, idle rpm in manual mode is the result of an internal fuel control cam setting that is not adjustable. It provides a given fuel flow, not a specific thrust, for that cam setting and the engine will usually accelerate or decelerate slightly from the RPM seen in the Auto mode. The critical element a pilot is looking for in manual mode is a stabilized idle RPM between 20%-40% N1.

A third question that may follow is "Why does idle RPM occasionally fluctuate 2-3% with the EEC/DEEC ON?" Again, keeping in mind the answer to the first question, the EEC/DEEC is continually trying to maintain the required idle thrust. This can typically be accomplished with fuel flowing through the primary fuel nozzles only. At certain temperatures and pressure altitudes the fuel flow required to maintain that thrust might be enough to open the flow divider sending fuel to the secondary fuel nozzles. This may cause the engine to accelerate above the RPM required to provide idle thrust. The EEC/DEEC will sense this and reduce fuel flow enough to close the flow divider, causing the engine to decelerate. The engine may then repeat this same condition. It is not harmful to the engine and if the pilot finds this condition distracting, it can usually be remedied by advancing the power lever slightly above position.

Engine Servicing, Best Practices

By Craig Bohling

TFE731 engines have demonstrated an ability to "hide" oil leading to over-servicing of the engine oil. To observe proper engine oil quantity, run the engine at a high power setting until the engine oil temperature is in the normal range. After shut down, check the oil level at 30 minutes +/-5 minutes. It should be between full and one quart low. At no time should the oil level be above full. No harm to the engine will occur if maintained at the one-quart-low level. Do not service the oil if it was checked outside of the 30-minute time limit.

TFE731 N1 Overshoot

By Craig Bohling

Due to the two-speed design and N2 control utilized with the TFE731, a minor N1 overshoot of 1-3% for 15-30 seconds during engine acceleration to takeoff power is typical. The degree of overshoot is affected by the Electronic Engine Control (EEC) trim accuracy and the rate of power lever advancement. N1 overshoot was taken into consideration during certification of the engine and is not cause for concern provided the Aircraft Flight Manual N1/N2 and transient ITT limitations are not exceeded. In order to reduce the amount of overshoot, a reduction in the rate of power lever advancement should be considered.