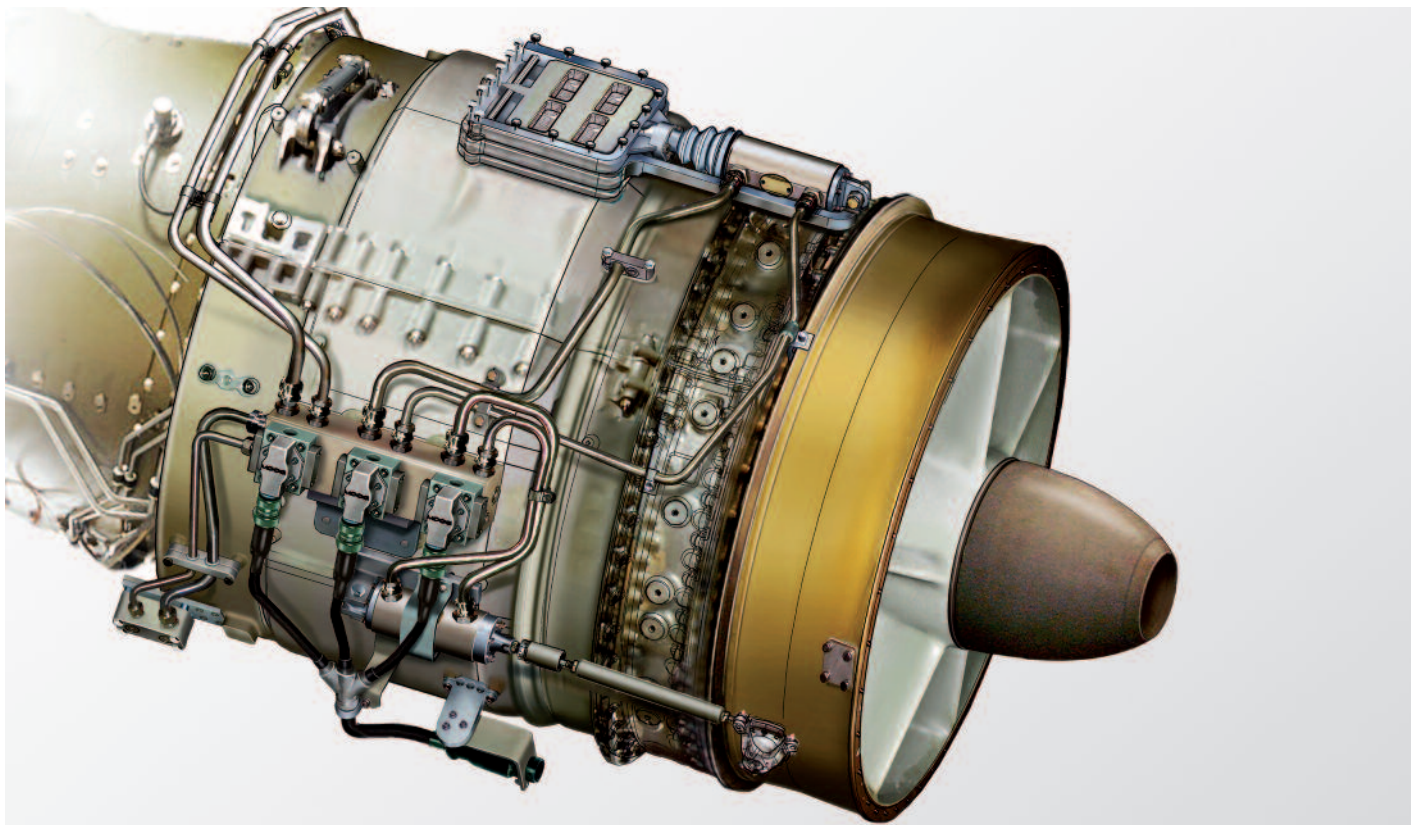


ES2009 Avon closed loop VIGV control upgrade – Mod 5030

Eliminate the possibility of compressor surge and increase operational efficiency



Engineered solution purpose

This engineered solution achieves improved control of the VIGV and Bleed Valves by providing closed loop control and electronic switching utilising state of the art controls technology to replace the current mechanical systems.

Benefits

- Electronically schedules VIGV's and bleed valves against a non-dimensional speed to give better accuracy and no drift.
- By eliminating VIGV drift, efficiency is maintained and the possibility of compressor surge is removed.
- Improved safety – the need to enter the gas turbine enclosure to validate VIGV position and BOV settings during engine operation is no longer required.
- Elimination of time-consuming regular maintenance of P2 'open loop' system, 1-2 hours downtime every 2-3 weeks.
- Improvement in reliability, availability and maintainability.

Applicability

All in-service marks of Avon controlled by a digital control system and employing oil as the hydraulic medium.

Technical description

- The existing air pressure operated open loop control system can be susceptible to drift arising from changing conditions within the gas generator compressor. This system is replaced by an electronic system that uses the non-dimensional speed parameter (N/RT) to close loop control the VIGV position schedule and to operate the BOVs at pre-programmed set points.
- The modification also replaces obsolete hydraulic actuators with commercial off the shelf (COTS) items.

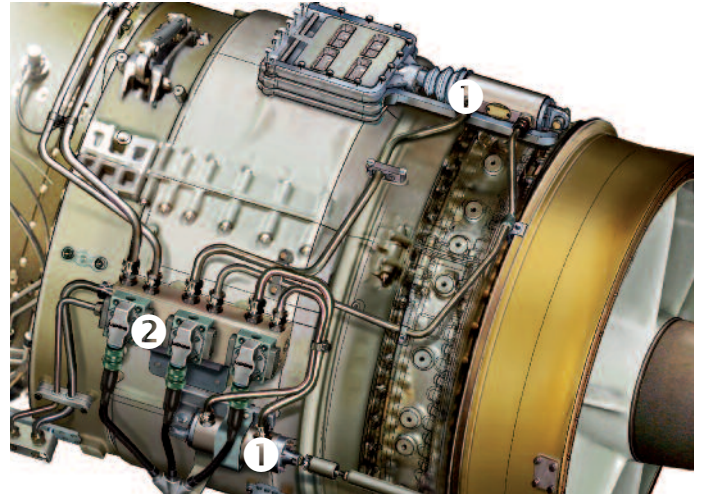
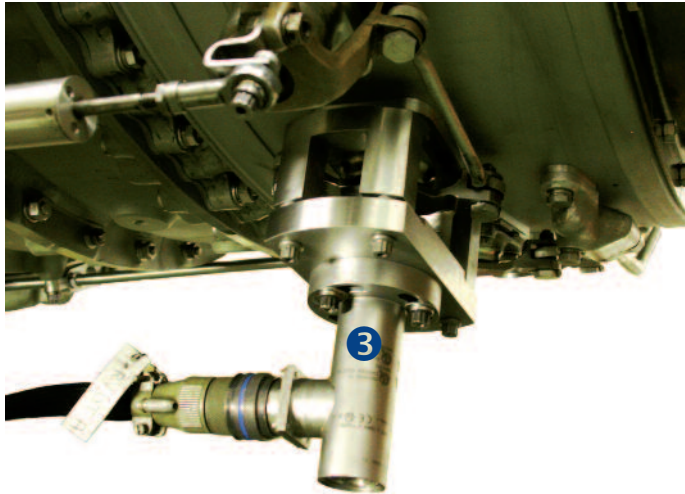
Scope of work

At Overhaul

- Replace VIGV ram and BOV hydraulic actuators
- Install RVDT Mod
- Install engine mounted Solenoid valves
- Install electrical harness and modified hydraulic pipe work

At Site

- On-site Scope Inspection
- Controls modification
- Installation of in-field wiring



Mandatory Accompanying Mod

- Installation of the RVDT (Mod 5027)
- Can only operate in conjunction with digital control system

Bill of Materials

- 3 off hydraulic actuators ①
- 3 off solenoid valves ②
- RVDT (Mod 5027) ③
- Control system modification (software and interface card)
- Wiring

Experience

This modification shares the same control system design and some of the components used in a similar modification on the RB211 where it has been installed in over 150 engines and has accumulated in total over 13 million operating hours. The RVDT has approx 1.8 million hours experience on RB211.

Complementary upgrades

- Controls Upgrade
- Instrumentation Upgrade
- New Speed Measuring System (Mod 5033)
- Upgraded GG Turbine – Avon 200 (Mod 5020)

Undertaken

At overhaul and site



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