V2500 International Aero Engines

Date: Nov.30/00

Subject: Transmittal of Revision 1 To Service Bulletin Number V25000-ENG-72-0349.

Service Bulletin Revision History:

Event	Date
Basic Issue	Apr.7/99
Revision 1	Nov.30/00

Reason For Issuance Of Revision:

(1) To incorporate IEN 99VC048A to include A5.

(2) Complete rewrite per Technical Services Engineering markup.

Effect on Prior Compliance:

None.

List of Effective Pages:

Bulletin Page No.	Rev. No.	Effective Date
1 to 10	1	Nov.30/00

V2500 International Aero Engines

SERVICE BULLETIN

Printed in Great Britain

ENGINE - INSPECTION OF V2500-A1/A5 HIGH PRESSURE TURBINE STAGE 1 ROTOR METERING PLUGS FOR HEAT DISTRESS/OIL WETNESS
(NON-MODIFICATION)

MODEL APPLICATION

V2500-A1
V2522-A5
V2524-A5
V2527-A5
V2527E-A5
V2527M-A5
V2530-A5
V2533-A5

BULLETIN INDEX LOCATOR

72-00-00

Compliance Category Code	Internal Reference No.
4	99VC048, 99VC048A

Apr.7/99
Revision 1 Nov.30/00

ENGINE - INSPECTION OF V2500-A1/A5 HIGH PRESSURE TURBINE STAGE 1 ROTOR METERING PLUGS FOR HEAT DISTRESS/OIL WETNESS
(NON-MODIFICATION)

1. Planning Information

A. Effectivity

(1) Engine: V2500-A1 Engines Before Serial No. V0362.

(2) Engine: V2500-A5 Engines Before Serial No. V10080.

B. Concurrent Requirements

None

C. Reason

(1) Background:

During certain engine windmilling conditions, it is possible for engine oil to flood the No. 4 bearing compartment and collect in the high pressure turbine near the stage 1 inner rotating airseal. Subsequent engine operation may lead to turbine distress. A borescope inspection has been developed to view the High Pressure Turbine (HPT) stage 1 rotor metering plugs for evidence of turbine distress and oil wetness.

(2) Objective:

Provide a borescope inspection procedure for the stage 1 rotor metering plugs and for oil wetness in the inner diffuser and ID tobi seal.

D. Compliance

Category 4

Accomplish at the first visit of an engine or module to a maintenance base capable of compliance with the accomplishment instructions regardless of the planned maintenance action or the reason for engine removal.

E. Approval

The 'compliance' statement and the procedures described in paragraph F. of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-Approved for the Engine Model listed.

F. Tooling - Price and Availability
The following tools are required to accomplish the Service Bulletin.

Tool No.	Qty	Description	Function	Avail
FBA-3-100	1	Machida 3mm diameter	Flexible Borescope	(1)(2)
Model HLS24	1	Welch Allyn Light Source	Provide Lighting	(1)(2)
IAE 1R18002	1	Wrench	Remove/Replace 10th Stage Tube Nut Air Valve	(1)(2)
IAE 1R18000	1	Wrench	Torque 10th Stage Tube Nut on Diffuser Case	(1)(2)
NDIP-988-GT	1	Guide Tube	Provide Borescope Positioning	(1)

(1) Indicates that tool design aperture card is currant available from IAE.
(2) Indicates that equivelant tooling may be used.

G. References

(1) The V2500 Engine Illustrated Parts Catalog, (S-V2500-1IA, S-V2500-2IA, S-V2500-2IB, S-V2500-5IA, S-V2500-5IB, S-V2500-6IA, S-V2500-6IB, S-V2500-7IA, and S-V2500-7IB), Chapter/Section 75-23-48

(2) The V2500 Engine Manual, 70-00-40, Removal-04 Subtask 72-00-40-020-093 or Installation-04 Subtask 72-00-40-420-091

(3) The V2500 Standard Practices/Processes Manual, 70-00-00

(4) The V2500 Overhaul Processes and Consumables Index.

(5) See All Operators Wire (AOW) 1046 Issue 3.

H. Action

NOTE: If the inspection for oil wetness is accomplished prior to running above idle after the In Flight Shut-down (IFSD) turbine distress can be avoided.

NOTE: Engines incorporating the longer metering plugs PN 2a2181 for the A1 or PN 2A2354 for the A5 may require engine removal for inspection, unless the inspection for oil wetness is accomplished prior to running above idle after the (IFSD).

For on wing inspection open the thrust reverser and cowl panels to gain access to the 10th Stage makeup air port and crank cover.

(1) Remove the left 10th Stage makeup air tube 26, (as viewed from the rear), see Figure 2.

(a) Disconnect the tube 26 from the diffuser case adapter and from the stage 10 to HPT air valve.

(b) Remove the bolt, the washer, the clipnut and the clip from the clip position 5771.

(c) Remove tube 26.

(2) Inspect the metering plugs with Part Number FBA-3-100 Machida 3 mm diameter Flexible borescope or equivalent.

CAUTION: THE ENGINE MUST BE COOL (BELOW 150° F) PRIOR TO INSERTING THE BORESCOPE GUIDE TUBE.

NOTE: The borescope inspection gains access to the engine through the 10th stage makeup air boss on the diffuser case. The borescope is inserted into the diffuser case inlet vane around the number 4 bearing compartment, through a hole on the number 4 bearing support near the outer flange, and through the holes (18 off) on the stage 1 inner rotating airseal, see Figure 1.

(a) Facing the 10th Stage makeup port insert the NDIP-988-GT guide tube into the 10th Stage makeup air port (see Figure 1 Location 1).

(b) Continue inserting the guide tube through the diffuser case vane (see Figure 1 Location 2) and the diffuser case bearing support cavity until positioned at the aft side of the number four bearing support cooling hole (see Figure 1 Location 3) at top dead center.

NOTE: The guide tube should feel snug when the tube is in the proper location.

(c) Insert the articulating borescope approximately 36 in. (914.4 mm) long with a diameter no larger than 0.118 inch (3 mm) through the guide tube.

NOTE: When the borescope is inserted to the end of the guide tube, the TOBI duct gang nut assembly should be visible.

(d) After locating the gang nut assembly twist the flexible borescope slightly to find the cooling holes of the number 4 bearing support (part number 2A2064), with the cooling hole in view, push the borescope towards the hole. When the tip of the borescope is at the hole articulate the borescope through the hole into the number 4 bearing compartment cavity, continue pushing the borescope until the gap of the number 4 bearing compartment and the 1st Stage HPT airseal ring is visible (Figure 1 Location 6).

(e) Insert the borescope into the gap and push beyond the 1st Stage HPT honeycomb land (Figure 1 Location 7). When the borescope is beyond the 1st Stage HPT airseal honeycomb land, look for the 1st Stage HPT knife edge airseal (part number 2A3109). This seal contains cooling holes.

WARNING: THIS IS A ROTATING PART, DO NOT ROTATE THE HPC/HPT WHILE THE BORESCOPE IS IN THIS POSITION

Articulate the borescope through the cooling hole until a metering plug is visible (Figure 1 Location 8).

NOTE: If the metering plug is not directly in view and an inspection of the metering plug can not be accomplished due to the angle of the airseal cooling hole to the metering plug, retract the borescope. With the borescope out of the cooling hole where there is no interference with rotation, slowly rotate the HPT while viewing through the borescope and align the next metering plug with a cooling hole (Figure 1 Location 9).

(f) When the metering plug is in the proper position perform a visual inspection for the presence of distress of the metering plug.

NOTE: Three different types of metering plugs may be found (see figure 3). The original plug (PN 2A0594) is a complete cylinder short plug, and is recessed into the disk. The second type plug (PN 2A1040) is segmented into four prongs and is approximately flush with the disk surface. Both of these plugs are held in place by a press fit and will be a good indicator of heat distress. The third type plug (PN 2A2181 for the A1 or PN 2A2354 for the A5) is a longer plug which is segmented into four prongs and extends beyond the disk surface. This plug is held in place by prongs and is not a good indicator of heat distress. The longer plug is found in A5 effected engines. (see figure 3)

WARNING: ENGINES WITH THE THIRD TYPE METERING PLUG (PN 2A2118 FOR THE A1 OR PN 2A2354 FOR THE A5) INSTALLED CAN NOT BE INSPECTED FOR HEAT DAMAGE. IF THE ENGINE HAS BEEN RUN ABOVE IDLE SINCE THE WINDMILL EVENT, IT MUST BE REMOVED FOR HPT INSPECTION/OVERHAUL. IF THE ENGINE HAS NOT BEEN RUN ABOVE IDLE SINCE THE WINDMILL EVENT, THE INSPECTION FOR OIL WETNESS MAY BE ACCOMPLISHED.

Once the inspection of one metering plug has been completed, retract the borescope until the until it is out of the cooling hole of the 1St Stage airseal. With the borescope out of the cooling hole where there is no interference with rotation, slowly rotate the HPT while viewing through the borescope and align the next metering plug with a cooling hole. Preform the inspection required. This technique must be accomplished on all twelve metering plugs.

(g) If any metering plugs are missing, dislodged or show signs of heat distress (missing corners, melting, burning, etc.) the engine is to be removed and disassembled to inspect/repair the HPT.

(h) Record all findings and report them to your IAE representative.

(3) Inspect for oil wetness/collection in the HPT TOBI seal.

(a) Follow steps 2(a) through 2(d).

(b) Using N2 pad on the gearbox rotate the engine through 360 degrees several times.

(c) Insert the borescope into the gap and push beyond the 1st Stage HPT honeycomb land (Figure 1 Location 6). When the borescope is beyond the 1st Stage HPT airseal honeycomb land, look for the 1st Stage HPT knife edge airseal (part number 2A3109) Figure 1 Location 8). This seal contains cooling holes(.

WARNING: THIS IS A ROTATING PART, DO NOT ROTATE THE HPC/HPT WHILE THE BORESCOPE IS IN THIS POSITION

Articulate the borescope through the cooling hole and inspect the HPT TOBI seal for evidence of oil wetness/collection.

(d) Record all findings and report them to your IAE representative. Do not run engine above idle.

(4) Inspection of rear diffuser case cavity for oil puddling.

The weep tube location in the rear diffuser case compartment (Figure 1 Location 10) must be inspected for oil wetness/collection.

(a) Follow steps 2(a) through 2(d).

(b) Push borescope to bottom dead center of the engine

(c) Locate the oil scupper line (part number 2A2495-01), look for evidence of oil wetness/collection.

(d) Record all findings and report them to your IAE representative. Do not run engine above idle.

(5) Inspection of rear diffuser case cavity(Figure 1 Location 11) for oil puddling

(a) Insert the borescope into the 10th stage makeup tube (Figure 1 Location 1) and through the vane in the diffuser case (Figure 1 Location 2)

(b) Locate the oil scupper line (part number 2A2495-01), look for evidence of oil wetness/collection.

(c) Record all findings and report them to your IAE representative. Do not run engine above idle.

(6) Any evidence of metering plug distress or a lack of a metering plug at any single location is to result in engine removal.

If no evidence of metering plug distress is found assemble the removed parts as follows:

(7) Install tube 26 , see Figure 2.

(a) Attach the tube 26 to the diffuser case adapter and the stage 10 HPT air valve.

(b) Install the clip, the clipnut, the washer and the bolt at clip position 5771. Torque the bolt to 36 to 45 Lbfin (4 to 5 Nm).

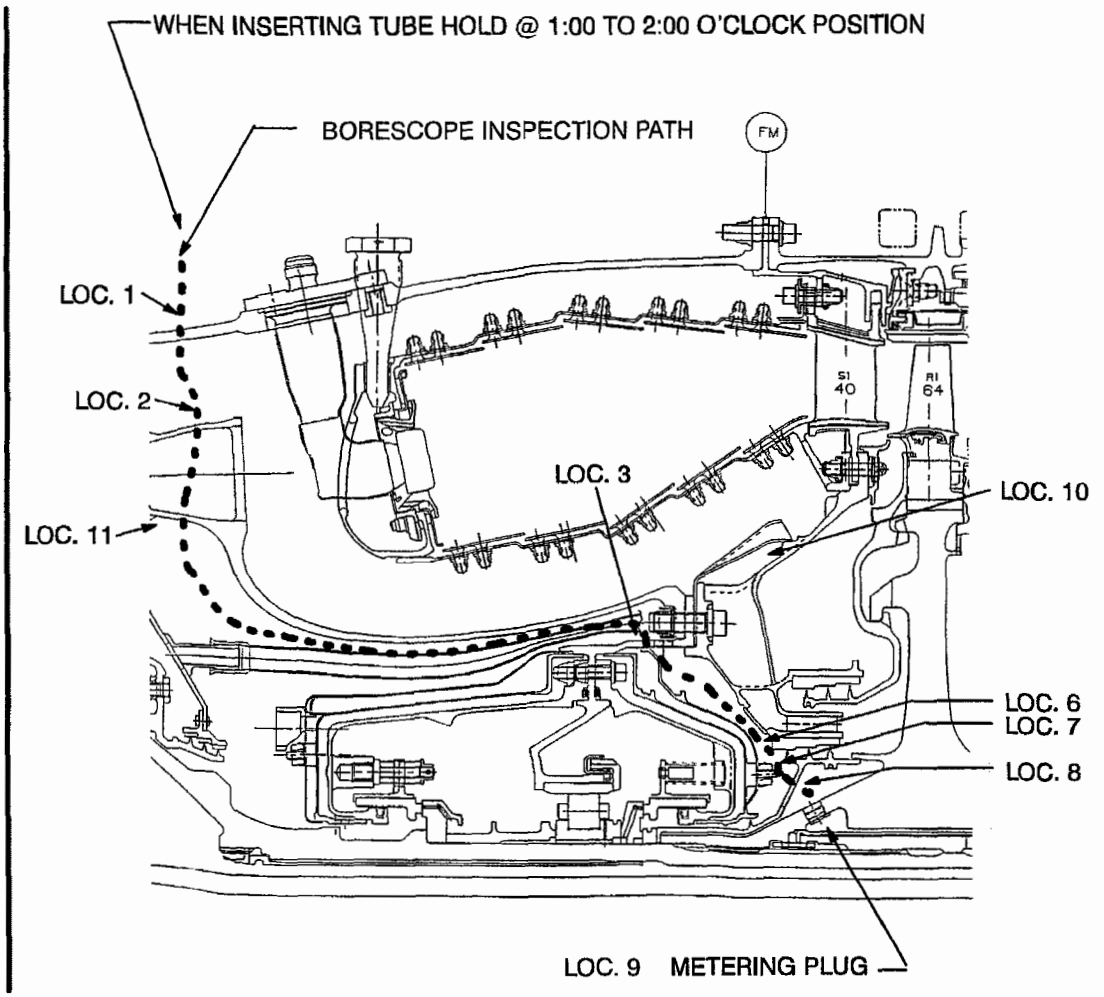
(c) Use IAE 1R18002 wrench 1 off to torque the tube nut at the stage 10 to the HPT turbine air valve to 566 to 611 Lbfin (64 to 69 Nm).

(d) Use IAE 1R18000 wrench 1 off to torque the tube nut on the diffuser case adapter to 398 to 434 Lbfin (45 to 49 Nm).

(e) Safety the tube nuts with CoMat 02-126 lockwire.

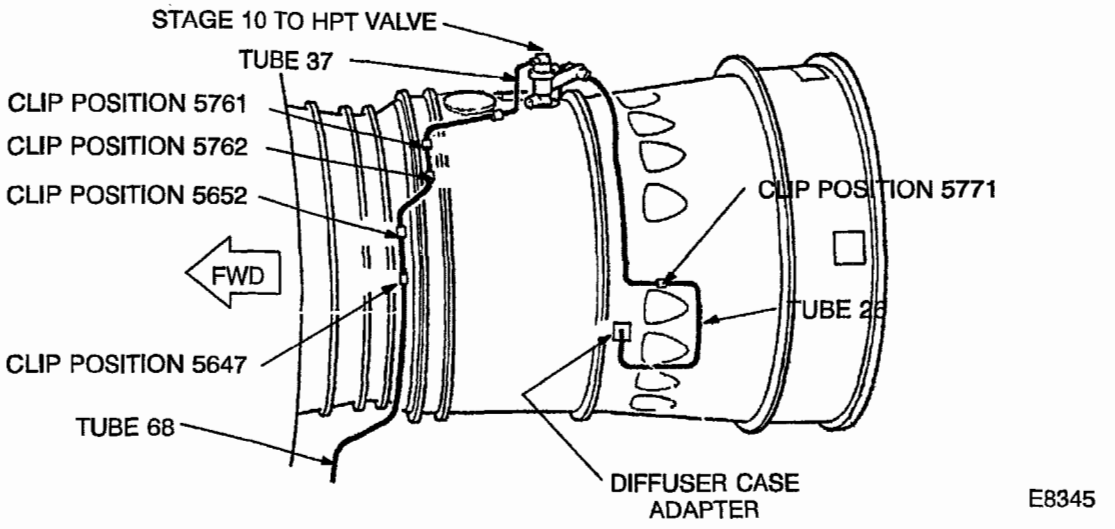
I. Recording Instructions

(1) A record of accomplishment is necessary.

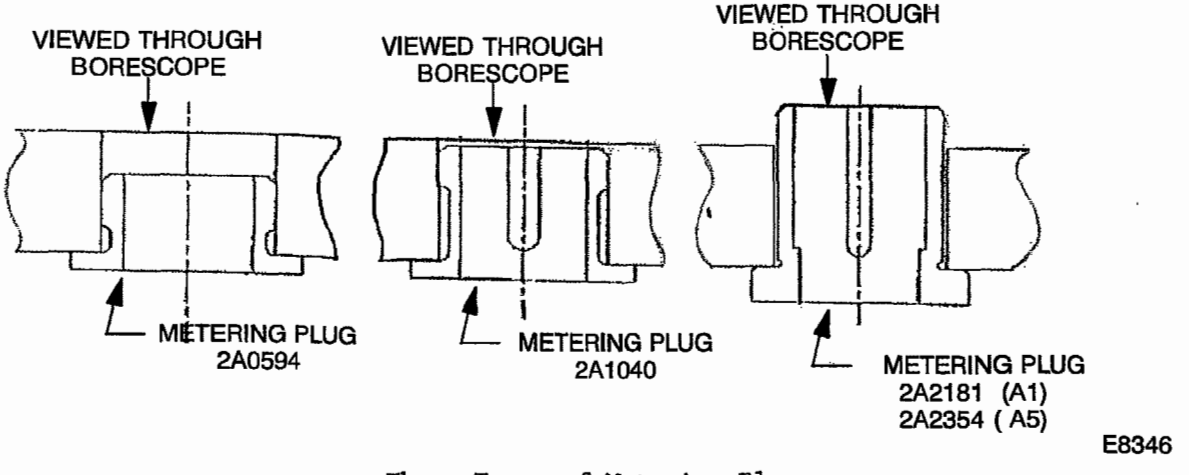


E8124A

Inspection Path For Borescope Inspection Of The HPT Stage 1 Metering Plugs
Figure 1



Location Of 10th Stage Makeup Air Tubes Left Side (As Viewed From Rear Looking Forward)
Figure 2



Three Types of Metering Plugs
Figure 3