P U B L I C A T I O N T R A N S M I T T A L

RR-DERBY

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DATE: Aug.30/02

V2500-A1/A5/D5 PROPULSION SYSTEMS NON-MODIFICATION SERVICE BULLETIN

This document transmits the Initial Issue of Service Bulletin EV2500-72-0419

Bulletin Initial Issue

Remove	Incorporate	Reason for change
	Pages 1 to 10 of the Service Bulletin	Initial issue
	Page 1 and 2 of Appendix 1	Initial issue
	Page 1 and 2 of Appendix 2	Initial issue

CHECK THAT ALL PREVIOUS TRANSMITTALS HAVE BEEN INCORPORATED
If any have not been received please advise Publication Services, Rolls-Royce plc, Derby, England

LIST OF EFFECTIVE PAGES

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NON-MODIFICATION SERVICE BULLETIN - ENGINE - NO. 4 COMPARTMENT OIL LOSS INVESTIGATION AND TROUBLESHOOTING GUIDE

1. Planning Information

A. Effectivity Data

(1) (For Airbus A319)

Engine Models Applicable

V2522-A5, V2524-A5, V2527M-A5 - All Engines

(2) (For Airbus A320)

Engine Models Applicable

V2500-A1 - All Engines

V2527-A5, V2527E-A5 - All Engines

(3) (For Airbus A321)

Engine Models Applicable

V2530-A5, V2533-A5 - All Engines

(4) (For Boeing MD-90)

Engine Models Applicable

V2525-D5, V2528-D5 - All Engines

B. Concurrent Requirements

There are no concurrent requirements.

C. Reason

A number of engines have been removed from service for No. 4 compartment oil leakage. The leakage source can be isolated using a troubleshooting procedure.

This Non-Modification Service Bulletin is written for the following reasons:

(1) To provide a trouble-shooting guide and suggested workscope for engines inducted into shops for oil leakage from the No. 4 compartment.

(2) To gather necessary data for root cause investigation of events and to support potential engineering changes.

NOTE: Accomplishment Instructions Actions (2.), makes the assumption that all the necessary on wing engine and aircraft troubleshooting for excessive oil loss have been complied with.

NOTE: If source of oil loss is not clearly identified from the No. 4 Bearing Compartment additional references are provided in this document to be considered for further root cause investigation.

(3) Effects of Bulletin on:

Removal/Installation: None

Disassembly/Assembly: None.

Cleaning: None.

Inspection/Check: None.

Repair: None.

Testing: None.

(4) Supplemental Information

None.

D. Description

To provide a trouble shooting guide for number 4 compartment oil loss.

E. Compliance

Category 5

Accomplish when the engine is disassembled sufficiently to afford access to the affected subassembly (i.e., modules, accessories, components, build groups) and to all affected spare subassemblies.

F. Approval Data

The part number changes and/or part modifications specified in the Accomplishment Instructions and Material Information sections of this Service Bulletin have been shown to comply with the applicable Federal Aviation Regulations and are FAA-APPROVED for the engine model(s) given.

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

G. Manpower

Estimated man-hours to incorporate the full intent of this Bulletin:

Venue	Estimated Manhours
In Service	TEC, weep tube exit inspection at bottom of TEC. 15 Minutes
At Overhaul	1 Hour

NOTE: The parts affected by this Service Bulletin are accessible at maintenance and/or overhaul.

H. Weight and Balance

Weight Change	None
Moment	No Effect
Datum	Engine Front Mount Centerline (Power Plant Station (PPS) 100)

I. Electrical Load Data

This Service Bulletin has no effect on the aircraft electrical load.

J. Software Accomplishment Summary

Not Applicable.

K. References

1. IAE V2500 Service Bulletin V2500-ENG-72-0349 (Non-Modification Service Bulletin - Engine - Inspection of V2500-A1/A5 High Pressure Turbine Stage 1 Rotor Metering Plugs for Heat Distress/Oil Wetness).

2. IAE V2500 Service Bulletin V2500-ENG-72-0408 (Non-Modification Service Bulletin - Engine - Internal Gearbox Assembly - Troubleshooting and Teardown Procedures).

3. IAE V2500 Service Bulletin V2500-ENG-72-0420 (Non-Modification Service Bulletin - Engine - No. 5 Compartment Oil Loss Troubleshooting Procedure and proposed Corrective Actions).

4. IAE V2500 Service Bulletin V2500-ENG-72-0401 (Engine - Provide Nickel Plating on the Number 4 Carbon Seal Housing Pilot Diameter).

5. IAE V2500 Service Bulletin V2500-ENG-72-0415 (Engine - Provide New Front and Rear Number 4 Bearing Ducts with Oil Drain Holes).

6. IAE V2500 Service Bulletin V2500-ENG-72-0430 (Engine - High Pressure Turbine First Stage Disk Metering Plug Replacement).

7. IAE V2500 Service Bulletin V2500-ENG-79-0083 (Engine - Oil - Replacement of 1648MK2 No. 4 Bearing Scavenge Valves - Non-Modification Service Bulletin).

8. IAE V2500 All Operators Wire No.: 1050 Issue 2 (Troubleshooting Actions for the No. 4 Bearing Scavenge Valve and High Engine Oil Consumption).

9. Internal Reference Number - 01VC417

10. ATA Locator - 72-00-00

L. Information in the Appendix

Alternate Accomplishment Instructions (No)

Progression Charts (No)

Added Data (No)

Revision to Table of Limits (No)

Inspection Procedures (No)

2. Material Information

A. Material - Price and Availability

1. There is no new material cost to do this Service Bulletin.

   Other source of oil loss issues are being investigated with the following NMSB's.

2. NMSB 72-0408 (Non-Modification Service Bulletin - Engine - Internal Gearbox Assembly - Troubleshooting and Teardown Procedures).

3. NMSB 72-0420 (Non-Modification Service Bulletin - Engine - No. 5 Compartment Oil Loss Troubleshooting Procedure and proposed Corrective Actions).

B. Industry Support Program

Not Applicable.

C. Tooling - Price and Availability

Special tools are not required to accomplish this Service Bulletin.

D. Other Material Information Data

Not Applicable.

E. Reidentified Parts

Not Applicable.

3. Accomplishment Instructions

NOTE: Follow Teardown Decision Trouble Shooting Flow Chart Appendix A (See Figure 2) With the Following Steps. Return Table to IAE Technical Services.

(1) Pre-requisite Instructions

(a) Confirmation of oil loss from No.4 compartment indicated by oil wetness at weep tube exit located at bottom of the TEC (See Figure 1). Record in Table 1 Appendix B actual findings if abnormal wetted and stained surfaces are evident. If determination is uncertain contact IAE Technical Services via the Field Representative for further instructions (Take a digital photo).

(b) If engine oil consumption is greater than 0.3 QTS/HR, follow All Operators wire 1050 issue 2 (See Reference 7).

(c) If "ENG 1 (2) BEARING 4 OIL SYS - HI PRESS" (A1/A5) or "EOAP:ENG SYS FAIL?" (D5) faults persist then carry out this NMSB.

(d) Perform Borescope inspection per Non-Modification Bulletin V2500-ENG-72-0349 and V2500-ENG-72-0430.

NOTE: If any of the above conditions are met, do not perform engine "As Received" Test and follow this NMSB troubleshooting procedure.

(2) Actions

(a) Follow the Troubleshooting flow in Appendix A (See Figure 2) and carry out the following inspections as required. Record and return findings to IAE Technical Services via PSCOMM through the local field representative.

(b) If engine oil consumption is greater than 0.3 QTS/HR, follow All Operators wire 1050 issue 2 (See Reference 7).

(c) If you pass vacuum check, perform the following investigations:

(i) Request P4 Rest Sensor Functional Test (Ref. CMM: 79-33-16) for proper pressure reading accuracy and conformity to components maintenance manual. Replace as necessary.

(ii) Inspect Interface Gasket in between the internal Scavenge Tube and Scavenge Elbow (Ref. EM: 72-42-20) for any sign of oil leakage. Take digital photos and record breakaway torque of (4) bolts. Note correct torquing procedure per Engine Manual (EM). Visually inspect scavenge elbow sealing surface for any anomalies..

(iii) Inspect No.4 Compartment Scavenge Valve (Ref. CMM: 79-23-51) for "Test as received" to Vendor (LUCAS). Provide inspection results with P/N and S/N. Replace scavenge valve if air supply leakage is observed (greater than 1.1 liters per minute) (See Reference 6).

NOTE: If results of above investigations are inconclusive, contact IAE Technical Service via local field representative for further instructions.

(d) If No. 4 compartment vacuum check failed, then proceed with engine teardown inspection and record findings in Table 1 Appendix B.

(i) Carry out the LPT Module removal (Ref. EM: 72-00-50).

(ii) Proceed with interface B inspection of the HPT module (Ref. EM: 72-00-45) and provide the HPT Nut Break Away Torque value (In tightening direction).

(iii) Carry out the HPT Module Removal (Ref. EM: 72-00-45).

(iv) Proceed with Removal of No.4 Compartment Rear Carbon Seal Housing Assembly. Visually inspect rear carbon seal for any carbon element defect, chipping, fracture, etc.? (Ref. EM:72-43-20-200).

(v) If no obvious damage is observed, perform Rear Carbon Seal Assembly Pressure Check (Ref. EM: 72-43-20).

(1) If you fail pressure check on the rear carbon seal assembly then proceed to carry out EM inspection Ref. 72-43-20 and replace details as necessary, to return to service condition.

NOTE: If incorporation of Service Bulletin V2500-ENG-72-0401 has not been accomplished, it is strongly recommended that it be done before proceeding.

(vi) Remove and inspect rear seal seat Ref. EM: 72-43-14, No.4 Bearing Ref. EM: 72-43-13, No.4 Bearing Seal Spacer Ref. EM: 72-43-12, and Front Seal Seat Ref. EM: 72-43-11.

NOTE: All abnormalities i.e.: coked or clogged oil delivery features, stack surfaces for evidence of spinning, etc. on Table 1 Appendix B.

(vii) Inspect-general visual; front Carbon Seal for any carbon element defect, chipping, fracture, etc. (Ref. 72-42-33-200).

(viii) Remove Diffuser Case Assembly out of HPC case (Ref. EM: 72-00-42).

(ix) Inspect No.4 Front Compartment Assembly and Interface Tubes using vacuum check (Ref. 72-42-00-720-053).

(x) Inspect Interface Gasket in between the Internal Scavenge Tube and Scavenging Elbow for any sign of oil leakage. Take digital photos and record breakaway torque of four (4) bolts.

(xi) Inspect No.4 Compartment Interface Tubes (Buffer Air, Oil Feed and Internal Scavenge Tubes) EM 72-42-00, for sign of air/oil leakage. Take digital pictures

(xii) If no obvious damage is observed, perform Front Carbon Seal Assembly Pressure Check (Ref. EM: 72-42-33) .

(1) If you fail pressure check on the Front Carbon Seal Assembly then proceed to carry out EM inspection Ref. 72-42-33 and replace details as necessary, to return to service condition.

NOTE: If incorporation of Service Bulletin V2500-ENG-72-0401 has not been accomplished, it is strongly recommended that it be done before proceeding.

NOTE: If results of above investigations are inconclusive, contact IAE Technical Service via local field representative for further instructions.

(xiii) Inspect for blockage Internal and External Weep Tubes (4 off) from No.4 compartment to TEC (free air passage check):

(1) Inside diffuser case: 72-42-20-040.

(2) Through diffuser strut: 72-42-20-040.

(3) From No.4 Compartment to LPT Module: 72-43-49-51.

(4) From LPT module to TEC: 72-43-49-100.

NOTE: If any evidence of oil loss is observed coming out of No.4 bearing compartment or any damage due to heat distress are noticed, it is recommended to carry out section 3 below. Contact IAE Technical Service via local field representative to report these findings.

(e) HPT Related Parts Inspection:

(i) Split rotors and provide the HPT 1-2 Seal Bore Drop dimension (Ref. EM: 72-45-00-200) (See Figure 1).

(ii) Inspect first and second stage disks for missing metering plugs, broken tangs off plugs and any distressed parts. Provide results with digital photos (Ref. EM: 72-45-10). Incorporate Service Bulletin V2500-ENG-72-0430 as applicable.

(iii) Inspect second stage disk Heat Shield for sign of heat distress, bulging and blistering of shield mostly in front of metering plug air exit area (Ref. EM: 72-35-41).

NOTE: If the HPT 1-2 Seal Drop dimension is within limits and there is no sign of heat distress on the 1st Disk Metering Plugs or the 2nd Disk Heat Shield then re-assemble HPT Rotor according to engine manual.

(iv) If the HPT 1-2 Seal Drop dimension is out of limits and/or the Metering Plugs or Heat Shield show heat distress then.

(1) Send Heat Shield to PandW for destructive temperature evaluation testing.

(2) De-blade the disks and carry out crack check inspection (FPI) on 1st and 2nd stage disk and 1-2 Seal.

NOTE: If FPI indications exist on the Disk, or the Heat Shield has confirmed over temperature, scrap 1st and 2nd disks. If the 1-2 Seal drop dimension is out of limits, then this Seal must be scrapped.

(3) Address for Return of Parts/Debris (As Required)

(a) All parts/debris for analysis to be returned F.A.O. Gary Fountain.

IAE Technical Services,

Pratt Whitney

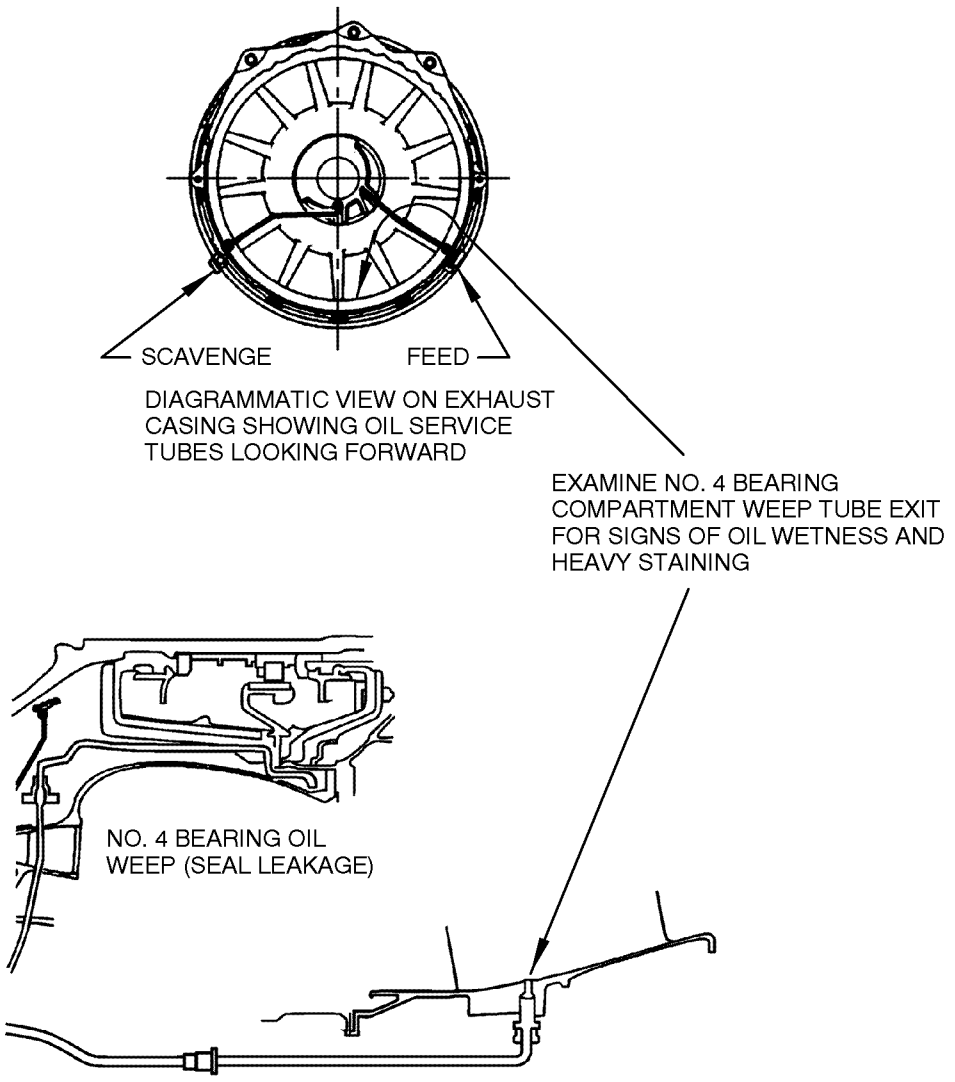
400 Main Street M/S 169-15

East Hartford Ct. 06108

USA

(4) Recording Instructions

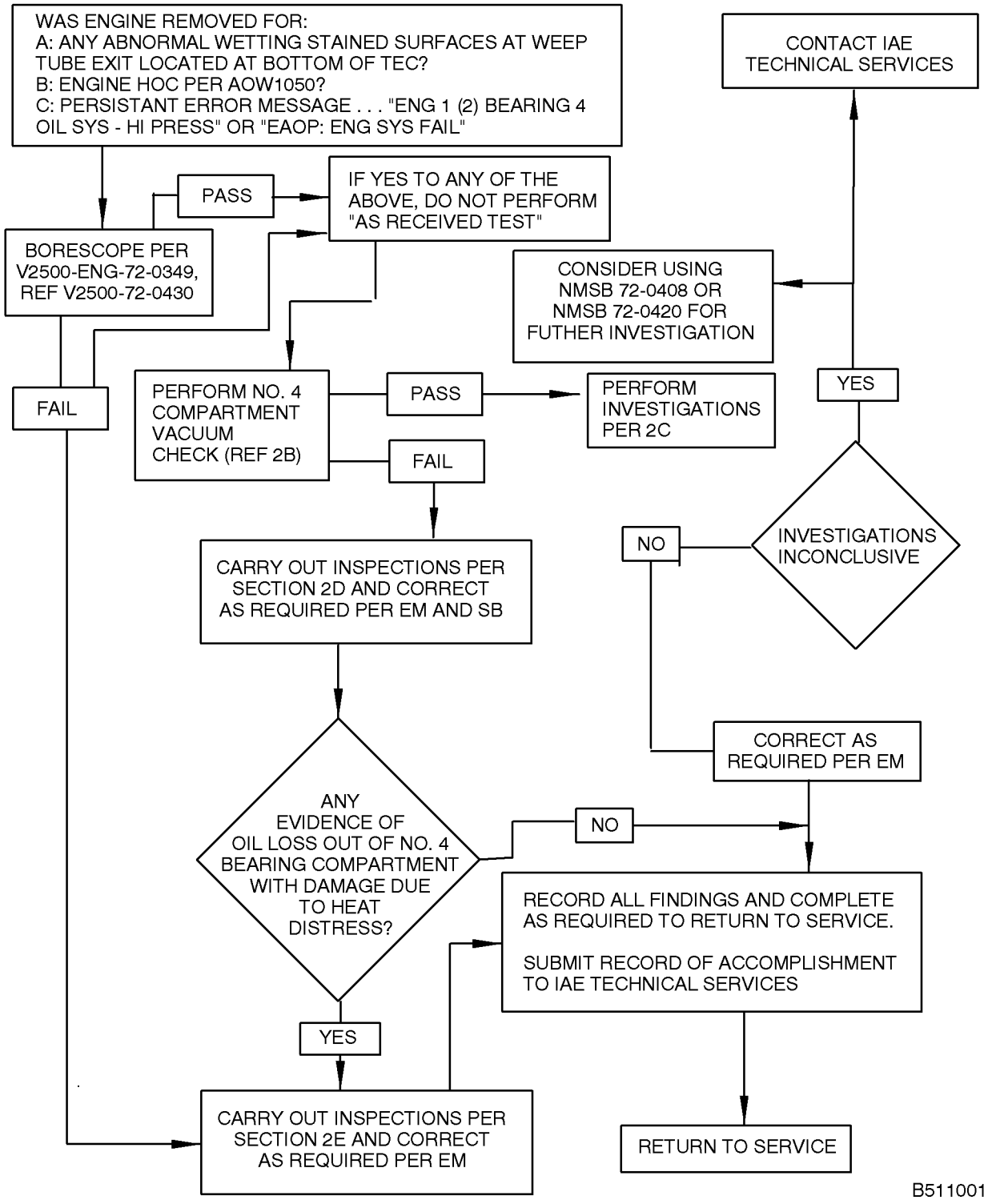
(a) A record of accomplishment is required.



Bearing Compartment Weep Tube Exit At TEC
Figure 1

APPENDIX 1

Appendix A Trouble Shooting Flow Chart



Trouble Shooting Flow Chart
Figure 2

APPENDIX 2

Appendix B Table 1

Appendix B Table 1

Appendix B Table 1		Limits/Reference	Actual Findings	Comments
1. A.	Weep tube exit at TEC; signs of wetness/staining. Take digital photos.	Yes/No		
1.B.	Oil loss greater than .3 qts./hr.	Yes/No		
1.C.	Persistent No. 4 Bearing oil system fault messages.	Yes/No		
1.D.	Perform Borescope inspection per Non-Modification Bulletin V2500-ENG-72-0349 and V2500-ENG-72-0430.	Record findings.		
2b	Pre-dissassembly, No. 4 bearing compartment.	14pph@20inHg.		
2c1	P4 rest sensor functional test.	acceptable / unacceptable		
c2	Interface gasket between No. 4 scavenge line and No. 4 scavenge elbow. Any signs of oil leakage? Poor sealing surface? Take digital photos.	Yes/No		
c3	Bench test of Scavenge valve. PN/SN required. Bench test acceptable.	Yes/No		
2D1	ACAC tubes and fittings condition/leaks/LPT condition Acceptable?	Yes/No		
d2	Record HPT nut breakaway torque value.	teardown only		
d3	HPT condition. Acceptable?	Yes/No		
d4	No. 4 Compartment Rear Carbon Seal housing assembly visual inspection findings.	Record actual.		
d5	Rear Carbon Seal assembly pressure check.	4.5cfm@80psig, 2.8cfm@25psig		
d6	No. 4 Carbon Seal seats, bearing assembly, seal spacer and front seat. Conditions acceptable.	Yes/No		
d7	Carbon element chipping/ fractures/indication.	Yes/No		

	Appendix B Table 1	Limits/Reference	Actual Findings	Comments
d9	No. 4 Front Compartment assembly and interface tubes using vacuum check.	7pph@20inHg.		
d10	Interface gasket - Internal scavenge tube and scavenge elbow/break away torque.	acceptable / unacceptable		
d11	No. 4 Compartment Buffer Air Tube.	air/oil leakage		
d11	No. 4 Compartment Oil Feed Tube.	air/oil leakage		
d11	No. 4 Compartment internal Scavenge Tube.	air/oil leakage		
d12	Front Carbon Seal assembly pressure check.	4.5cfm@80psig, 2.8cfm@25psig		
d12	If vacuum check fails, carry out EM inspection for compartment details.	4.5cfm@80psig, 2.8cfm@25psig		
d13	Internal/external weep tubes for blockage/free air passage.	Free from blockage?		
d13	Inside diffuser strut.	Yes/No		
d13	Through diffuser strut.	Yes/No		
d13	Front No. 4 compartment to LPT module.	Yes/No		
d13	From LPT module to TE. Note any oil loss and or heat distress.	Yes/No		
HPT Related Parts Inspection				
e1	HPT 1-2 Seal Bore Drop Dimension	Ref. EM 72-45-00-200		
e2	1-2 Stage disk distress (inc. broken/damaged Metering plugs).	Ref. EM 72-45-10		
e3	2 stage heat shield distress/bulging/blistering.	Ref. EM 72-35-41		
e4	As necessary FPI findings.	Out of limits?		
	1-2 Stage Seal	Yes/No		
	1 Turbine Disk	Yes/No		
	2 Turbine Disk	Yes/No		
	Other			