SERVICE BULLETIN REVISION NOTICE

NON-MODIFICATION SERVICE BULLETIN — ENGINE — HIGH PRESSURE (HP) COMPRESSOR STAGE 3 TO 8 COMPRESSOR DRUM — EDDY CURRENT INSPECTION (ECI)

Turbojet Engine Service Bulletin No. V2500-ENG-72-0625 Revision No. 1 dated October 8, 2014.

Revision History

Original Issue September 20, 2011

Revision 1 dated October 8, 2014

Reason for the Revision

To revise the Engine Effectivity in the Planning Information section.

To add Service Bulletin No. V2500-ENG-72-0637 and delete Service Bulletin No. V2500-ENG-72-0608 in the References section.

To add Material Data Table for A1/A5/D5 Engine models.

To revise the hours in Manpower.

To revise the Tooling Price and Availability section.

To revise the Accomplishment Instructions.

To revise the graphics.

Effect of Revision on Prior Compliance

None.

This is a Complete Revision (Not Applicable to the SGML version)

The format of this Service Bulletin has been changed from previous versions. This revision shows flow bars and the revision date on the bottom of every page. Technical changes incorporated in this revision are marked with revision bars. The contents are in accordance with the list of effective pages.

MODEL APPLICATION

V2500-A1, V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5, V2525-D5, V2528-D5

BULLETIN ISSUE SEQUENCE

V2500 Series 72-0625

Page	Revision No.	Date
1 thru 32	1	October 8/14

A copy of this Revision Notice and any future revision notices must be filed as a permanent record with your copy of the subject bulletin.

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V2500-A1, V2522-A5, V2524-A5, V2527-A5, V2527E-A5, V2527M-A5, V2530-A5, V2533-A5, V2525-D5, V2528-D5

BULLETIN ISSUE SEQUENCE

V2500 Series 72-0625

ATA NUMBER

72-41-11

Compliance Category

8

Summary

The purpose of this Service Bulletin is to do an eddy current inspection of the HP compressor Stage 3 to 8 drum, at the Stage 7 to 8 disk internal cavity during overhaul. Crack indications were highlighted during a crack inspection of the HP compressor Stage 7 to 8 disc internal cavity. An Airworthiness Directive (AD) requires repetitive Ultrasonic Inspection (USI).

Planning Information

Effectivity Data

Engine Models Applicable

V2500-A1
Applicable High Pressure (HP) Compressor Stage 3 to 8 Drum Part Numbers:
PN 6A2030, PN 6A2355, PN 6A2455, PN 6A2645, PN 6A3508, PN 6A3648, PN 6A3934, PN 6A3936, PN 6A4189, PN 6A5467, PN 6A5592, PN 6A5594, PN 6A5659, PN 6A6473, PN 6A7379, PN 6A7380, PN 6A7382, PN 6A7384, PN 6A7385, PN 6A7401, PN 6A8236, PN 6A8318, PN 6A8350, PN 6B1379, PN 6B1380, PN 6B1381, PN 6B1382, PN 6B1383, PN 6B1384, PN 6B81401, PN 6B1402, PN 6B1403 and PN 6B1406.

V2522-A5, V2524-A5, V2527M-A5, V2527-A5, V2527E-A5, V2530-A5, V2533-A5
Applicable High Pressure (HP) Compressor Stage 3 to 8 Drum Part Numbers:
PN 6A4182, PN 6A4900, PN 6A5467, PN 6A6473, PN 6A7383, PN 6A7384, PN 6A7385, PN 6A7401, PN 6A7705, PN 6A8316, PN 6B1379, PN 6B1380, PN 6B1384, PN 6B1385, PN 6B1386, PN 6B1387, PN 6B1391; PN 6B1392, PN 6B1393, PN 6B1404 and PN 6B1405.

V2525-D5, V2528-D5
Applicable High Pressure (HP) Compressor Stage 3 to 8 Drum Part Numbers:
PN 6A4182, PN 6A4900, PN 6A5467, PN 6A6473, PN 6A7383, PN 6A7384, PN 6A7385, PN 6A7401, PN 6A7705, PN 6A8316, PN 6B1379, PN 6B1380, PN 6B1384, PN 6B1385, PN 6B1386, PN 6B1387 and PN 6B1404.

NOTE: This Non-Modification Service Bulletin provides an Eddy Current Inspection procedure which allows the delay of the ultrasonic inspection as instructed in Reference 8, Service Bulletin V2500-ENG-72-0615.

Concurrent Requirements

There are no concurrent requirements.

Reason

1. Condition: Crack indications have been found on the High Pressure (HP) compressor Stage 3 to 8 drums during overhaul.
2. Background: Crack indications were highlighted during a crack inspection of the HP compressor Stage 7 to 8 disc internal cavity. An Airworthiness Directive (AD) requires repetitive Ultrasonic Inspection (USI). The intent of this Non-Modification Service Bulletin is to minimize the on-wing burden associated with the AD for the affected engines.
3. Objective: To do an eddy current inspection of the HP compressor Stage 3 to 8 drum, at the Stage 7 to 8 disk internal cavity during overhaul.
4. Substantiation: Crack indications have been found on the HP compressor Stage 3 to 8 drum assembly during overhaul . An Eddy Current Inspection has been developed

which is capable of detecting cracks at overhaul more accurately and minimizes the variability of detection between overhaul shops.

5. Effects of Bulletin on:

   (a) Removal/Installation: Not affected.

   (b) Disassembly/Assembly: Not affected.

   (c) Cleaning: Not affected.

   (d) Inspection/Check: Not affected.

   (e) Repair: Not affected.

   (f) Testing: Not affected.

6. Supplemental Information

   None.

Description

This Non-Modification Service Bulletin introduces an Eddy Current Inspection procedure for the use of UniWest Eddy Current Equipment or equivalent upon approval by IAE to accomplish and record an inspection for the HP compressor Stage 3 to 8 drum assemblies for V2500-A1/A5/D5 engines.

Compliance

Category 8

Accomplish based upon experience with the prior configuration.

Approval Data

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.

Manpower

1. In Service

   ..... Not Applicable.

2. At Overhaul

   For the Eddy Current inspection 4.0

   NOTE: The inspection defined in this Non-Modification Service Bulletin must only be carried out by personnel qualified in eddy current inspections to the appropriate national standard (EN4179, NAS 410 or equivalent) at level 2 or higher.

Weight and Balance

1. Weight Change

   None.

2. Moment Arm

   No Effect.

3. Datum

Engine Front Mount Centerline (Power Plant Station (PPS) 100)

Electrical Load Data

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

Software Accomplishment Summary

Not Applicable.

References

NOTE: In 2014 IAE converted the V2500 Technical Publications to a new system. As a result of the conversion, some manuals were consolidated. All manuals received new P&W part numbers. To facilitate the use of this Service Bulletin, a Technical Publications conversion table is provided in the Appendix.

1. ATA Locator — 72-41-11, 72-41-12.
2. V2500 Standard Practices and Processes, P&W Ref. PN 2A4414, Chapter/Section 70-10-00.
3. V2500-A1 Series Illustrated Parts Catalog, P&W Ref. PN 2A4427, Chapter/Section 72-41-11.
4. V2500-A5 Series Illustrated Parts Catalog, P&W Ref. PN 2A4428, Chapter/Section 72-41-11.
5. V2500-D5, Series Illustrated Parts Catalog, P&W Ref. PN 2A4426, Chapter/Section 72-41-11.
6. V2500 A1/A5 Series Engine Manual, P&W Ref. PN 2A4407,, Chapter/Section 72-00-40, 72-41-00 and 72-41-11.
7. V2500-D5 Series Engine Manual, P&W Ref. PN 2A4416, Chapter/Section 72-00-40, 72-41-00 and 72-41-11.
8. IAE V2500 Service Bulletin V2500-ENG-72-0615 (Non-Modification Service Bulletin — Engine — High Pressure (HP) Compressor — Stage 3 To 8 Compressor Drum — Stress Corrosion Cracking).
9. IAE V2500 Service Bulletin V2500-ENG-72-0637 (Non-Modification Service Bulletin — Engine — High Pressure (HP) Compressor — Enhanced Fluorescent Penetrant Inspection (FPI)).
10. UniWest ETC-2000 Operators Manual.
11. Overhaul Processes and Consumables Index.

Other Publications Affected

1. None.

Interchangeability of Parts

Not Applicable.

Information in the Appendix

Alternate Accomplishment Instructions (No)

Progression Charts (No)

Added Data (Yes)

Revision to Table of Limits (No)

Inspection Procedures (No)

Material Information

Material — Price and Availability

1. There is no new material cost to do this Service Bulletin when the part modification procedure is used.
2. There is no kit provided to do this Service Bulletin.
3. Part availability information is provided in material data Instructions — Disposition.

Industry Support Program

Not Applicable.

Tooling — Price and Availability

Equipment required to accomplish Eddy Current Inspection:

ITEM	TOOL NUMBER (UniWest)	DESCRIPTION
IAE2R19916	99997	UniWest kit, consists of:
IAE2R19919A	83666A	ETC-2000 Scan Plan Rev 5.0 for type 1 and type 2 drums (Software on CD)
!AE2R19918	ETC-5201	Part-Mount
N/A	ETC-5229	Probe-Arm
N/A	ETC-5208	Probe-Holder
IAE2R19917	ETC-2518	Probe
N/A	72246	Kit Case
IAE2R19915	ETC-5230	Reference Standard Assembly which consists of 72175 Reference Standard (IAE2R19914) 72176 Reference Standard Holder

NOTE: Equivalent tooling can be used upon approval by IAE.

NOTE: The UniWest ETC equipment that follows is required to accomplish this inspection, but is NOT part of the tooling provided by IAE:

TOOL NUMBER (Uniwest)	DESCRIPTION
ETC-2000	Scanner System
ETC Program	Revision 4.12 or higher; operating under Windows XP
PSDISPLAY	Data view program, Rev. 1.61 or higher
US-450	Eddy Current instrument with program ELAB Rev. 2.4, or equivalent instrument (ETC compatible), with appropriate cabling and adapters

TOOL NUMBER (Uniwest)	DESCRIPTION
ETC-2230	Downtube
ETC-2236	M-Axis actuator 9-inch or ETC-2225 M-Axis actuator 21-inch or ETC-2447 M-Axis actuator 15-inch
94126	M-Axis drive cable
ETC-5025	Part-Stand
ETC-5030	Calibration-Stand
ETC-2222	M-Axis extension
ETC-2133	Ball-Slide assembly
ETC-2217	Zeroing Tool
ETC-5200	M-Axis Dial Indicator mount
The items that follow from ETC-2210/2210A Maintenance kit:	
96113	Dial Indicator (0.001 accuracy or better)
96114	Dial Indicator Swivel adapter
96103	Allen Wrench set
E0894	Kapton tape 0.25 in. wide, 0.0035 in. thick (CoMat 02-390) or equivalent
N/A	Scissors, Philips-head screwdriver, small machinists square, aircraft approved marker (CoMat 01-121)

Reidentified Parts

Not Applicable.

Other Material Information Data

Not Applicable.

Accomplishment Instructions

1. Inspection Instructions

A. General

(1) This Non-Modification Service Bulletin provides the eddy current inspection procedure for the inspection of the HP compressor Stages 3 to 8 drum, Stage 7 to 8 disk inner internal cavity.

(2) In order to obtain the maximum grace periods in accordance with Reference 8, Non-Modification Service Bulletin V2500-ENG-72-0615, the Eddy Current Inspection must be accomplished subsequently to a special enhanced cleaning procedure in accordance with the Reference 6 or Reference 7, Engine Manual, TASK 72-41-11-110-001 and a binocular and fluorescent penetrant inspection in accordance with Reference 9, Non-Modification Service Bulletin V2500-ENG-72-0637.

(3) The inspection zones are shown in Figure 1. There are two geometry variants of the drum, Type 1 and Type 2. To accommodate these variants two separate scanplans, Type 1 and Type 2 are provided on CD-ROM as part of kit IAE2R19916. The drum part numbers for these variants are listed in Figure 2.

(4) It is possible that weld spatter can be found on the HP compressor Stage 3 to 8 drum, Stage 6 to 7 disk internal cavity inspection Zones. Eddy current inspection will result in response signals from cracks, material deposits, pitting and weld spatter as well as background noise signals from the drum material.

Material deposits and pitting occur predominantly in an axial orientation aligned with the bolt holes on the face of the drum. Weld spatter occurs randomly, primarily in Zones 1 and 2 (Refer to Figure 3).

(5) Before inspection, make a note of the position of blade slot number 1 (identified by vibro marking). Use an aircraft approved marker to put a line on the face of the drum in line with the slot. This index line will be used to position the drum on the Baseplate of the ETC-2000 scanner system.

Label the bolt hole in line with the index line or the closest counterclockwise bolt hole with a 1. Number all the other bolt holes counterclockwise from 2 to 34 (Refer to Figure 3).

(6) Make sure that a rejected drum is disposed in line with the individual overhaul shop procedure.

B. Borescope Inspection

(1) Visually inspect Zones 1 to 4 for weld spatter, use standard borescope inspection tooling (Refer to Figure 3).

NOTE: Weld spatter will cause signals during eddy current inspection. The borescope inspection and a record of the areas where weld spatter is found helps to understand the eddy current response signals. Weld spatter can damage the eddy current probe.

NOTE: For borescope inspection it is not necessary to place the drum on the baseplate of the ETC-2000 scanner system.

C. Eddy Current Inspection

(1) General

(a) Make sure you are using ETC-Program Version 4.12 or higher with the Microscan feature.

NOTE: If installation or update to this Version is required, follow the instructions provided with the program CD-ROM.

(b) Scanplan Installation: Scanplans are a series of commands that once loaded and executed in the ETC-Program make the ETC-2000 system perform a specific inspection.

If you had a previous version of the V2500 drum scanplans installed rename the folder on the ETC computer's C: drive from "V2500-drum" to "old-V2500-drum" or burn the folder to a CD and remove it from the ETC computer's hard drive.

Install the new scanplans by inserting the CD labeled "V2500 Drum Rev. 5-Scanplans" and copy the folder "V2500-Drum-R5" to the C: drive of the ETC computer.

(c) The ETC program will collect data at a circumferential sampling distance of 0.004 in. (0.10 mm) and index along the inspection contours at 0.008 in. (0.20 mm) or less. The surface speed is set at 4 in. (101.6 mm)/second.

(d) The system will be calibrated on a 0.75 mm long x 0.4 mm deep x 0.1 mm wide (0.030 x 0.016 x 0.004 in.) EDM notch to a vertical signal response as specified on the calibration card provided with the reference standard (approx 2 V peak-to-peak). The reject gate will be set automatically by the scanplan to 1.0 V. Any drum with a signal indication of 1.0 V or larger is to be considered suspect.

(e) Two scanplans are provided for each type of drum. TYPEx-FULL scans each Zone in sequence with overlap between the Zones (x is 1 or 2). TYPEx-SELECT provides the means to inspect each zone individually.

(f) Only one scanplan is used for Pre and Post-calibration. During Pre-calibration you will adjust the gain and rotation settings according to the calibration value given on the calibration card. During Post-calibration you only verify the calibration voltage. If the Post-calibration voltage value is not within the range specified, the Pre-calibration and inspection must be repeated.

(g) Do not change the tape on the probe between Pre-calibration, Inspection and Post-calibration. If the drum shows excessive or large weld spatter you may have to change tape between Zones. Use TYPEx-SELECT and scan each Zone individually, performing Pre and Post-calibrations between tape changes.

(2) System Preparation and Initial Setup

(a) Make sure the recess in the Baseplate of the ETC-2000 scanner system, the bottom of the ETC-5025 Part-Stand, the bottom of the ETC-5030 Calibration Stand and the bottom of the ETC-5201 Part-Mount are clean and free of burrs or debris.

(b) Align the ETC-System flatness and concentricity (Refer to the ETC-2000 Operators Manual, Section 3 or the Addendum). For this inspection, checking the System's flatness and concentricity on the face of an actual drum is recommended. A flatness of +/– 0.005 in. (0.13 mm) is sufficient. For concentricity it is usually sufficient to gently move the drum on the

ETC-5201 Part-Mount once both are placed on the Baseplate of the ETC-2000 scanner system; a concentricity of +/– 0.020 in. (0.5 mm) (0.040 TIR) is sufficient for this inspection.

(c) Turn on the ETC-2000 controller, ETC computer and the US-450 Eddy Current instrument and let them warm up for a minimum of 15 minutes.

(d) Start the ELAB program and click on ”Start". Set the frequency to 2 MHz, the gain to 46dB, the rotation to 240 degrees and the X and Y sensitivities to 0.5 V/Div since this makes the Pre-calibration faster. Make sure the waveform is set to "Sine".

(e) Start the ETC program and log on.

(f) In the ETC program, under "File" - "Preferences" make sure the M-Axis is selected as "Radial Axis" and the "Data Acquisition Type" is set to "Position-Based".

(g) Make sure which type of drum you are inspecting (Refer to Figure 2). Write the PN and SN. You will use these as file names when saving the data during the inspection scans.

NOTE: In the following scanplan descriptions, scanplan prompts are identified by single ’quotes’; ETC program tabs or buttons are identified by "quotation marks" and ETC program windows are in UPPER CASE whenever possible.

(3) Set the ETC-2000 Scanner Zero Position

CAUTION: BEFORE RUNNING SCANS, THE SYSTEM ZERO MUST BE SET. ALL SCANNER MOTIONS ARE RELATIVE TO THIS ZERO. IF THIS ZERO POSITION IS NOT SET ACCURATELY, THE PROBE MAY NOT BE POSITIONED CORRECTLY. THIS MAY RESULT IN AN INACCURATE INSPECTION, A DAMAGED PROBE OR A DAMAGED DRUM.

CAUTION: IF DURING ANY PART OF THE INSPECTION PROCESS, THE PROBE IS CRASHED INTO THE DRUM OR ANY PART OF THE ETC-2000 SYSTEM, THE SYSTEM MUST BE RE-ALIGNED AND THE ZERO SETTING PROCEDURE MUST BE REPEATED.

(a) Setup

1 Attach the Downtube ETC-2230 to the scanner (Refer to Figure 4). Attach the M-Axis actuator to the down tube. Attach the Ball-Slide assembly ETC-2133 to the M-Axis extension ETC-2222 and attach both to the M-Axis carriage. Insert the ETC-2217 Zeroing Tool into the Ball-Slide assembly and secure it with the two thumb screws. Make sure the Zeroing Tool is flush against the bottom of the Ball-Slide assembly. Set the Ball-Slide assembly to zero degrees (Vertical).

2 Put the Part-Stand ETC-5025 into the recess of the Baseplate of the ETC-2000 scanner system and lock it in place. Set the Calibration Stand in the third set of holes from the recess and lock it in place (Refer to Figure 5).

(b) Set-Zero Procedure

1 Click on "File" in the ETC-Program and open the folder C:\V2500-Drum-R5\Scanplan. Click on scanplan "SET-ZERO.SCN", open it and execute/run ("Run") it.

2 The program will prompt you with 'Move tool tip to part stand surface'. Click "OK" to activate joystick.

3 Use the joystick to position the tip of the Zeroing Tool at the centre of the cross hairs on the top surface of the Part-Stand ETC-5025 (Refer to Figure 6). Jog the X-Axis down until the bottom edge of the index line of the Zeroing Tool aligns with the bottom edge of the Line Labeled "1" of the Ball-Slide assembly then release the joystick control. If you need to repeat this step, answer "Yes" to 'Loop Again?'.

CAUTION: THIS ALIGNMENT SETS THE VERTICAL X-AXIS AND RADIAL M-AXIS POSITIONS AND IS CRITICAL.

4 'Move tool tip to vertical line on the calibration stand'. Click "OK" to activate the joystick. Gently drive the X-Axis up and rotate the Ball-Slide assembly to plus 90 degrees (horizontal, pointing away from the M-Axis motor). Jog the axes until the Zeroing Tool points at the vertical line of the Calibration-Stand ETC-5030 then release the joystick control. If you need to repeat this step, answer "Yes" to 'Loop again?'.

NOTE: This alignment sets the circumferential C-Axis position. It is sufficient to point anywhere on the line vertically. The Zeroing Tool only needs to point at the line and should not be pressed into the Calibration Stand.

5 'Move scanner to ZERO position'. Click "OK". The scanner will now move the axes to right of the baseplate and set the correct zero position.

6 'Set ZERO complete'. Click. "OK". The Set-Zero procedure is complete. Close the scanplan.

7 Remove the Zeroing Tool ETC-2217, the Ball-Slide assembly ETC-2133, the M-Axis extension ETC-2222 and the Part Stand ETC-5025.

(4) Pre-Calibration

(a) Setup

1 Visually inspect the Probe ETC-2518 for damage and replace it if damage is found.

2 Apply two layers of Kapton tape to the face of the probe head to protect the sensor coil. Make sure the probe head can still move freely.

3 Attach Reference Standard assembly ETC-5230 containing the Reference Standard 72175 I IAE2R19914 to the top of the Calibration Stand with the two shoulder bolts provided. Place the Calibration Stand in the second set of holes from the recess in the Baseplate of the ETC-2000 scanner system (Refer to Figure 7). Make sure the Calibration Card provided with the Reference Standard is available.

4 Attach the Probe holder ETC-5208 to the M-Axis carriage (Refer to Figure 8).

5 Slide the shaft of the Probe Arm ETC-5229 into the bottom slot of the Probe Holder ETC-5208 so that the probe points in the direction of the M-Axis, away from the motor. Make sure the tab of the Probe Arm is flush into the slot of the Probe Holder and tighten the two thumb screws.

6 Connect the probe cable to the appropriate receptacle in the Downtube.

NOTE: Do not disconnect the probe cable between the Pre-calibration and Post-calibration.

(b) Pre-Calibration Procedure

1 Click on "file" in the ETC Program and open the folder C:\V2500-Drum-R5\Scanplan.

2 Click on scanplan "CAL-ETC2518.SCN", open it and "Run" it. The message that follows will appear on the screen:

'Position the Calibration Stand in the second set of holes on the baseplate. Click OK to continue.' Make sure of the above and click "OK".

3 'ETC-5230 with Calibration Standard in place? Click "OK" if yes'. Click "OK" if all is set up.

4 'Move the probe to calibration scan start position'. Click "OK" and the scanner will move the probe to the start position of the calibration scan, to the right of the centre EDM notch in the outer radius of the Stage 8 cavity of the reference standard.

5 'Run calibration scan'. Click "OK". The scanplan will now set up the instrument parameters and perform the calibration scan. Observe the real time signal shown on the ELAB program screen: It must go vertical to an amplitude of approximately 2 V (4 scale divisions) peak to peak.

6 At the end of the scan you will be asked to save the data file. In the open window, browse to folder "C:\V2500-Drum-R5\Data", open it and create a new folder named with the drum part number, serial number and date e.g. "6A7402-RA096-2013-03-13". Open this folder and save the data as "PreCal.dat". You can create any other folder structure as long as you know how to find the data and report files later. Use the same folder during the inspection to save inspection data and reports.

7 After you saved the Pre-Calibration data the calibration prompt window opens, allowing you to "Calibrate", "Verify" or "Continue". Click on "Calibrate" then enter the voltage stated on the Calibration Card, the gain value shown on the ELAB screen and the rotation value shown on the ELAB screen in the appropriate boxes of the Target Voltage Window.

NOTE: The Calibration Card is supplied with the Reference Standard and lists a voltage range, e.g. 2.4 V – 2.6 V. Use the centre value e.g. 2.5 V for the Pre-calibration voltage.

8 Click "OK" to continue. The scanplan will now calculate new values for gain and rotation and set up the instrument. Answer "Yes" to 'Loop again'.

9 The scanplan will now re-scan the EDM notch in the Reference Standard. At the end of the scan, save the data again (overwrite the

PreCal.dat file) and click on "Verify" on the Calibration Prompt Window. "Verify" calculates the signal amplitude and location index of the EDM notch and displays these on the screen.

If the voltage falls in the range stated on the Calibration Card and the index is between 10 and 20 and the signal on the ELAB screen is almost vertical, the calibration is successful. Click "OK", then "Continue".

NOTE: If the voltage is NOT in the range stated on the Calibration Card, click "OK", then "Calibrate" and repeat Steps 1.C.(4) (b) 1 to 1.C.(4) (b) 9.

If the Index is NOT between 10 and 20, zero the system again. Continue with Step 1.C.(3).

10 After you click "Continue" and do not need to repeat the calibration scan, click on "No" to 'Loop again'.

11 'Move probe to ZERO position'. Click "OK" to move the probe back to the zero position.

12 'Calibration complete'. The Pre-calibration is complete; close the scanplan.

NOTE: If a satisfactory Pre-calibration cannot be achieved, select another probe, then set up all fixtures for Pre-calibration again and repeat the calibration scan. If this is not satisfactory, contact your supervisor.

13 If the Pre-calibration is satisfactory, release the Probe Arm ETC-5229 from the Probe Holder ETC-5208 and insert it on the rear side of the Probe holder ETC-5208 (Refer to Figure 9) or suspend it safely from the M-Axis.

14 Remove the Calibration Stand with the Reference Standard assembly from the baseplate of the ETC-2000 scanner system.

CAUTION: DO NOT DISCONNECT THE PROBE CABLE.

(5) Inspection

(a) Setup

1 Release the pin that holds the Horizontal Arm of the ETC-2000 at the rear of the vertical tube and move the arm carefully to the right.

2 Clean the recess in the Baseplate of the ETC-2000 scanner system, then place the part Mount ETC-5201 into the recess. Install the V2500 HP compressor Stage 3 to 8 drum on to the Part Mount (Refer to Figure 10). Return the Horizontal Arm back to its centre position and lock it in place.

3 Position the drum so that the index line (hole number 1) points towards the right of the ETC-2000 platform (circumferential zero, zero degree location). The inspection report will list all indications in degrees in reference to this position.

4 Two scanplans are provided for drums of Type 1 and Type 2: TYPE1-FULL.SCN, TYPE1-SELECT.SCN, TYPE2-FULL.SCN and TYPE2-SELECT.SCN.

The TYPEx-FULL scanplans scan each Zone in sequence (x is 1 or 2). Scanplans TYPEx-SELECT allow individual Zones to be scanned.

5 Find which type of drum you are inspecting and use Figure 2 to find the correct scanplan.

(b) Inspection Procedure-TYPEx-FULL

1 Click. on "File" in the ETC program and open the folder C:\V2500-Drum-R5\Scanplan. Select the correct scanplan. TYPE1-FULL or TYPE2-FULL, open it and "Run" it. The scanplan will prompt you with the message that follows:

2 'Setup system per procedure. Press Ok when system ready'. Make sure everything is in place as shown in Figures 9 and 10 and click "OK".

3 A report window opens. Complete the report form and save the file in the data folder created during Pre-calibration. Save the file as e.g. "Run1.txt". This file will contain the final evaluation information and will serve as the Inspection Report.

4 'Make sure the probe can not impact the drum or M-Axis. Click OK to move M-Axis in'. Make sure that the Probe Arm cannot impact the drum when the M-Axis moves it towards the centre of the drum and down, then click "OK". The system will move the M-Axis inwards and slightly downwards.

5 Remove the Probe Arm ETC-5229 and Probe Holder ETC-5208 from the M-Axis. Slide the shaft of the Probe Arm into the bottom of the Probe holder, align the tabs and tighten the two thumbscrews (Refer to Figure 11).

CAREFULLY install the Probe Arm with the probe into the space between Stage 8 and Stage 7 of the drum and connect the Probe Holder to the M-Axis carriage (Refer to Figure 11).

6 'Attach probe and ETC-5208 to M-Axis. Click OK to move probe'. Once the probe assembly is in place inside the drum, click "OK". The system will move the probe to a starting position.

7 'Click OK to move probe to Zone 1-Outer Radius'. Click "OK". The system will position the probe at the start of Zone 1 and zero the system automatically. Make sure the "ELAB" screen is cleared. At this time use a borescope to view the probe position, if desired.

8 'Click OK to run scan in Zone 1-Outer Radius'. The system will now scan Zone 1 upwards. During this scan you should see a noise signal response from the material that Looks like an oval ball of string about 0.5 scale divisions in diameter (the size may vary depending on drum type and the surface condition of zone 1).

NOTE: If you do not observe a noise ball there is an issue with the probe, the instrument or the system. Press E-stop. Release the E-stop and jog the probe out of the drum. Consult your supervisor.

9 You may also observe signal responses from weld spatter, material changes, pitting, cracks or other flaws.

10 Once the scan of Zone 1 is complete a window opens asking you to save the data. Save the data in the data folder you created during Pre-calibration and name it e.g. "Run1-Zone1.dat".

11 After you save the data, the program will evaluate it and record all indications above 1.0 V. When the program prompts you to save the evaluation record (It defaults to calling the file e.g. "Run1-Zone1.txt"), click on e.g. file "Run1.txt" instead. This will attach the evaluation results to the report file.

NOTE: If the evaluation process sends a message to the screen "Excessive number of indications", there are too many indications to list in the report record. Make a note and add this to the report manually later using programs Wordpad or Notepad.

12 ”Zone 1 scan complete. Click OK to move probe’. Click "OK" to move the probe to its starting position inside the drum.

13 ’Click OK to move probe to Zone 2-Chamfer’. Click "OK" to move the probe to the start of Zone 2.

14 ’Click OK to run scan in Zone 2-Chamfer’. Click "OK" to scan Zone 2. Proceed as above to save the data file (e.g. as "Run1-one2.dat") and the evaluation results (e.g. in file "Run1.txt").

15 ’Zone 2 scan complete. Click OK to move probe’. Click "OK" to move the probe to its starting position inside the drum.

16 ’Click OK to move probe to Zone 3-Inner Radius’. Click "OK" to move the probe to the start of Zone 3.

17 ’Click OK to run scan in Zone 3-Inner Radius’. Click "OK" and proceed as above.

a ’Zone 3 scan complete. Click OK to move probe’ Click "OK".

18 ’Click OK to move probe to Zone 4-Web’. Click "OK" to move the probe to the start of Zone 4.

19 ’Click OK to run scan in Zone 4-Web’. Click "OK" and proceed as above.

a ’Zone 4 scan complete. Click OK to move probe’ Click "OK".

NOTE: Microscan will inspect this Zone in two steps.

20 ’Press ok to move probe to removal point’ Click "OK". The system will move the probe to a location which allows you to remove the probe assembly out of the drum. The joystick is activated in order to ease removal.

CAUTION: DO NOT DISCONNECT THE PROBE CABLE

21 When the probe assembly is removed from the drum attach it to the M-Axis as shown in Figure 9.

22 ’PROBE REMOVED? Press OK to continue’. Click "OK" if all parts of the probe are removed from the drum.

CAUTION: DO NOT CLICK "OK" UNTIL ALL PARTS OF THE PROBE ARE REMOVED FROM DRUM. THE DRUM, PROBE ASSEMBLY AND THE ETC-2000 SYSTEM CAN BE DAMAGED.

23 'Move all axes to ZERO position'. Click "OK". The system will move all axes to the systems zero.

24 'Inspection complete. Click OK, then close the scanplan'. Click "OK" and close the scanplan.

(c) Inspection Procedure-TYPEx-SELECT (Optional)

1 The scan motions are identical to TYPEx-FULL, you can Leave out inspecting Zones or repeat ('Loop') any Zone multiple times.

2 The scanplan is more complex. Run it without a probe or Probe Arm connected, i.e. in "air", to gain experience before running it in a drum.

(6) Evaluation and Report Generation

(a) Open a new I blank scanplan and activate the joystick. Disable X and M motions, allow only C.

(b) Locate the report file, e.g. "Run1.txt", and open it with program Wordpad or Notepad (supplied with Windows XP).

(c) The report file will list the indications observed. Next to the first WINDOWING REPORT line add label "-Zone 1". Add "- Zone 2" to the next WINDOWING REPORT line etc.

(d) If an excessive number of indications were found during the inspection run, add the label "Excessive indications" to the report form.

(e) If no indications are listed in the WINDOWING REPORT add — ACCEPT to the Accept I Reject line, or else add-REJECT.

(f) The windowing report list the circumferential location of an indication under the column labeled Scan (°). The next two columns list the vertical (X) and radial (R) locations and the last column lists the amplitude (peak-to-peak) in volts.

(g) Locations that are at about the same circumference and X and R belong to the same flaw (the ETC program does not do pattern recognition to group indications into one "flaw").

(h) Use the joystick to rotate the M-Axis to the angle listed under column Scan (°) and mark the face of the drum with a line and a Z1 for Zone 1. Repeat this step for all four Zones.

(i) Save and close the report file. Print the report file for documentation purposes.

(j) You can use program "PSDISPLAY" to assist you in correlating, grouping and evaluating indications.

(7) Post-Calibration

(a) Remove the drum from the ETC-2000 system and set the system up as described in Step 1. C. (4).-Pre-Calibration.

(b) Run the scanplan 'CAL-ETC2518.SCN' as described in the section "Pre-Calibration". Save the data file in the data folder you created under the name "PostCal.dat". On the verification window do not click on "Calibrate" but click on "Verify" instead and read the voltage displayed.

(c) If the voltage shown in the verification window is in the range of values Listed on the Calibration Card the inspection is successful.

(d) If the voltage is Less than the Low value on the Calibration Card the inspection MUST be repeated.

(e) If the voltage is higher than the high value on the Calibration Card you may have over-inspected the drum; consult your supervisor.

NOTE: Replace the tape on the probe only AFTER a Post-calibration.

D. Acceptance and Rejection of HP Compressor 3-8 Drum

NOTE: A report will be generated by the software that shows all signals above 1.0 V. Use this report and "PSDISPLAY" to review the inspection results.

(1) Accept drums which do not produce signals with a voltage of 1.0 V or above.

(2) Accept drums with signals with a voltage of 1.0 V or higher if the following applies:

(a) The location of the indication can be correlated to weld spatter.

(3) Examine any remaining signals above 1.0 V which cannot be correlated to weld spatter for false positive

(a) Use local cleaning as per Reference 2, Standard Practice Manual, TASK 70-10-00-100-501.

OR

Special Clean the drum in accordance with Reference 6 or Reference 7, Engine Manual, TASK 72-41-11-110-001.

(b) Examine the drum again, repeat Steps 1.C.(1) to 1.C.(7).

(c) Reject the drum if there are signals above 1.0 V.

2. Recording Instructions

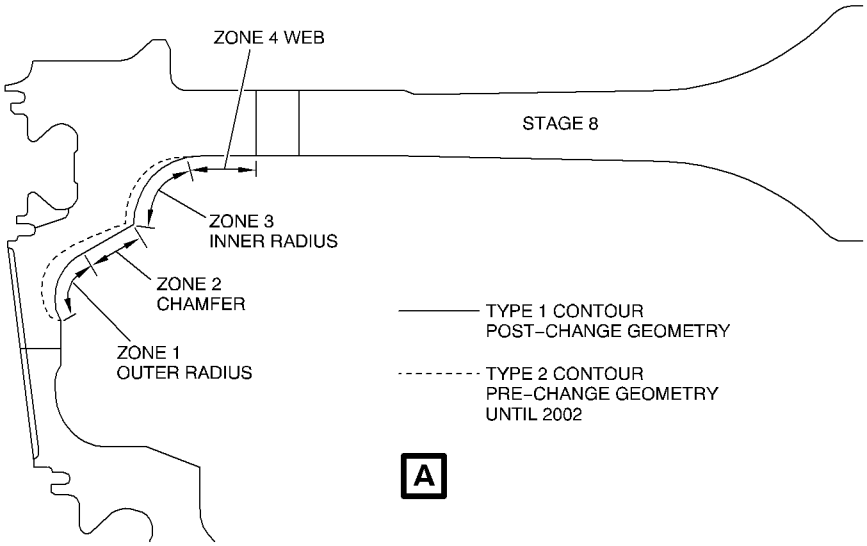
A. Record the Inspection Results in the Accomplishment Proforma.

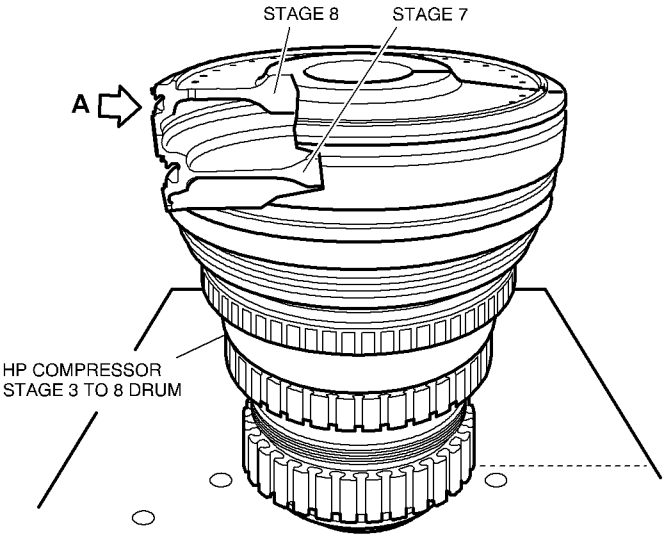
B. Print out the "Run1.txt" file and provide the print out to the local IAE Technical Representative.

C. Record the accomplishment of Non-Modification Service Bulletin V2500-ENG-72-0625 in the applicable engine records.

D. Inform the local IAE office that Non-Modification Service Bulletin V2500-ENG-72-0625 has been accomplished and provide the completed Accomplishment Proforma, Inspection Report, .dat and .txt files.

NOTE: The Local IAE Technical Representative will record the accomplishment of this Non-Modification Service Bulletin V2500-ENG-72-0625 in the IAE V-Live System.





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INSPECTION ZONES OF STAGE 7 – 8 INTERNAL CAVITY
FIGURE 1

TYPE 1		TYPE 2	
ASSY. PART NO.	DRUM PART NO.	ASSY. PART NO.	DRUM PART NO.
6A7705	6A7706	6A2030	6A1872
6A8236	6A7706	6A2355	6A2356
6A8316	6A8317	6A2455	6A2456
6A8318	6A8317	6A2645	6A2646
6A8350	6A8351	6A3508	6A3509
6B1385	6A7706	6A3648	6A3649
6B1386	6A8317	6A3934	6A3935
6B1392	6A7706	6A3936	6A3937
6B1393	6A8317	6A4182	6A4183
6B1401	6A7706	6A4189	6A4190
6B1402	6A8351	6A4900	6A4929
6B1403	6A8317	6A5467	6A5468
6B1404	6A8317	6A5592	6A5593
6B1405	6A8317	6A5594	6A5595
6B1406	6A8317	6A5659	6A5660
		6A6473	6A6474
		6A7379	6A5595
		6A7380	6A5593
		6A7382	6A5660
		6A7383	6A4929
		6A7384	6A5468
		6A7385	6A6474
		6A7401	6A7402
		6B1379	6A5468
		6B1380	6A6474
		6B1381	6A5595
		6B1382	6A5593
		6B1383	6A5660
		6B1384	6A7402
		6B1387	6A4929
		6B1390	6A3649
		6B1391	6A7402

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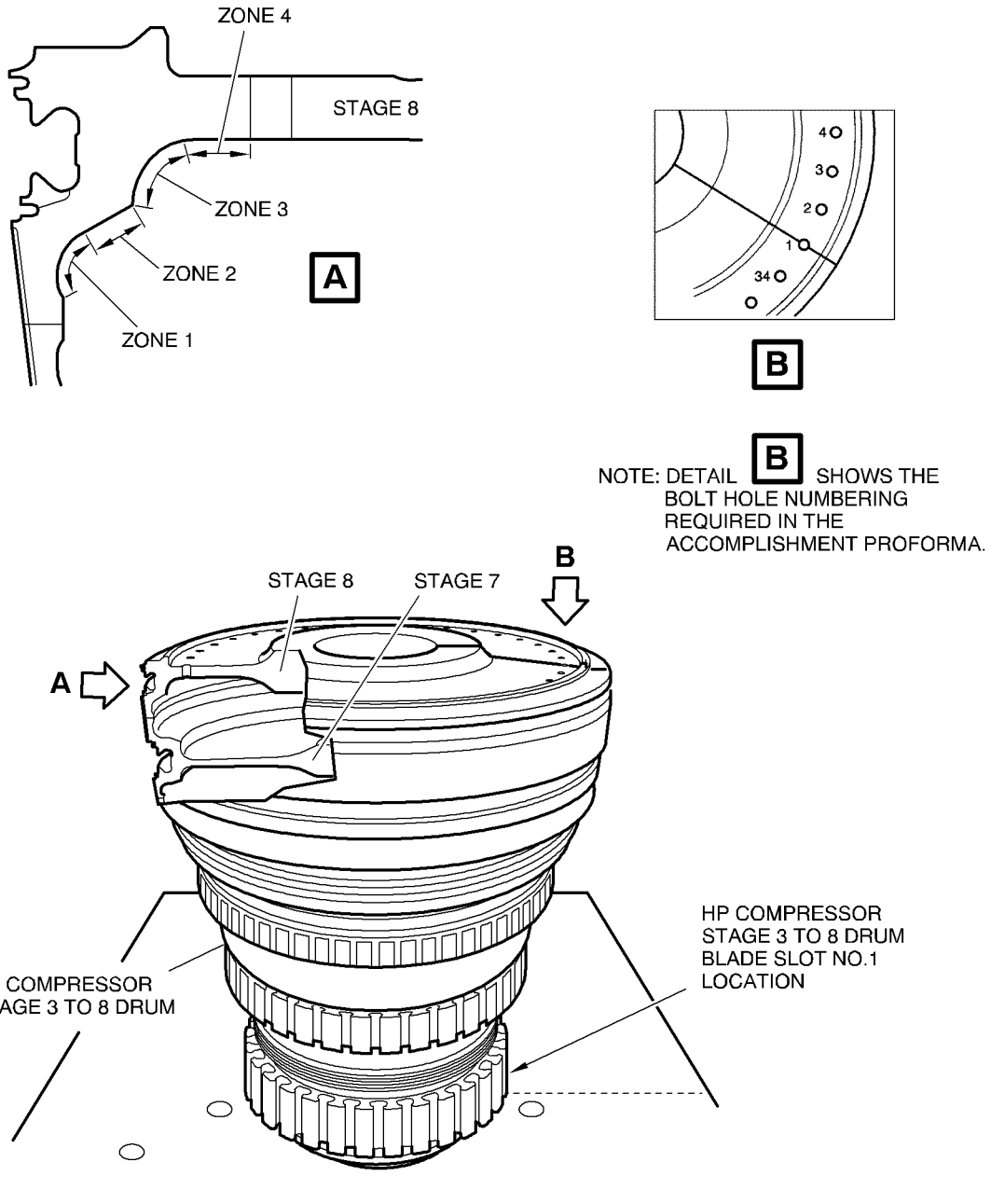
V2500 HP COMPRESSOR DRUM GEOMETRY VARIANTS
FIGURE 2



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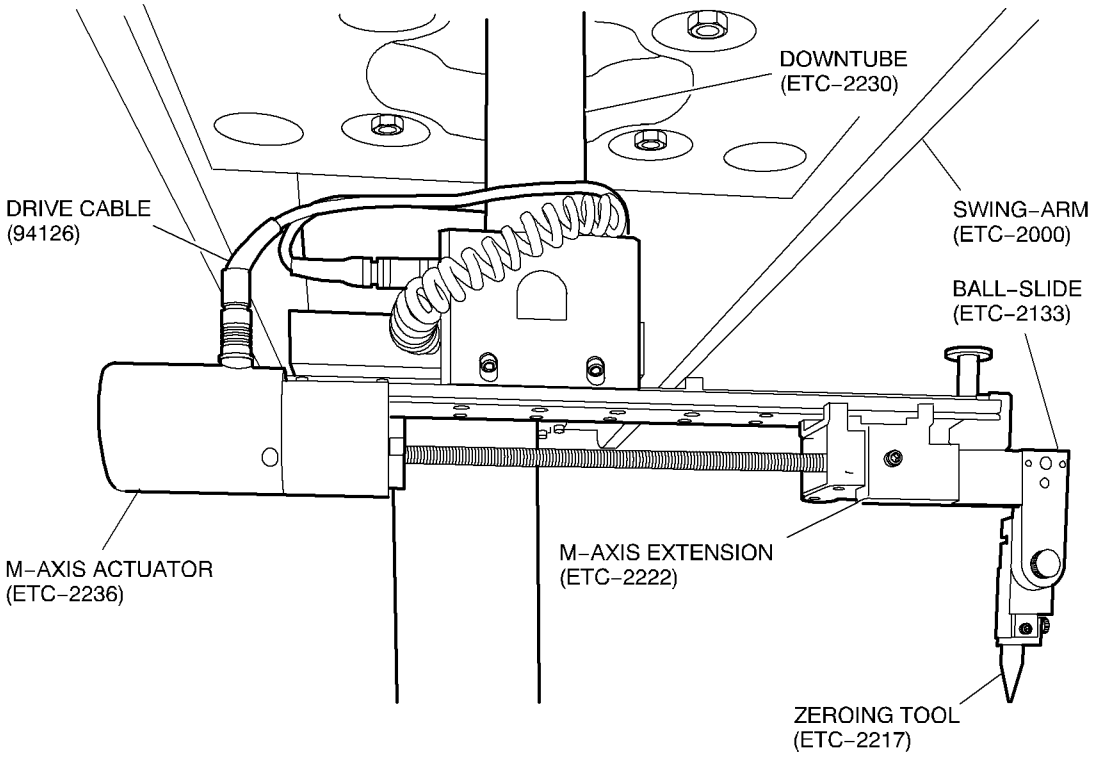
BORESCOPE INSPECTION
FIGURE 3



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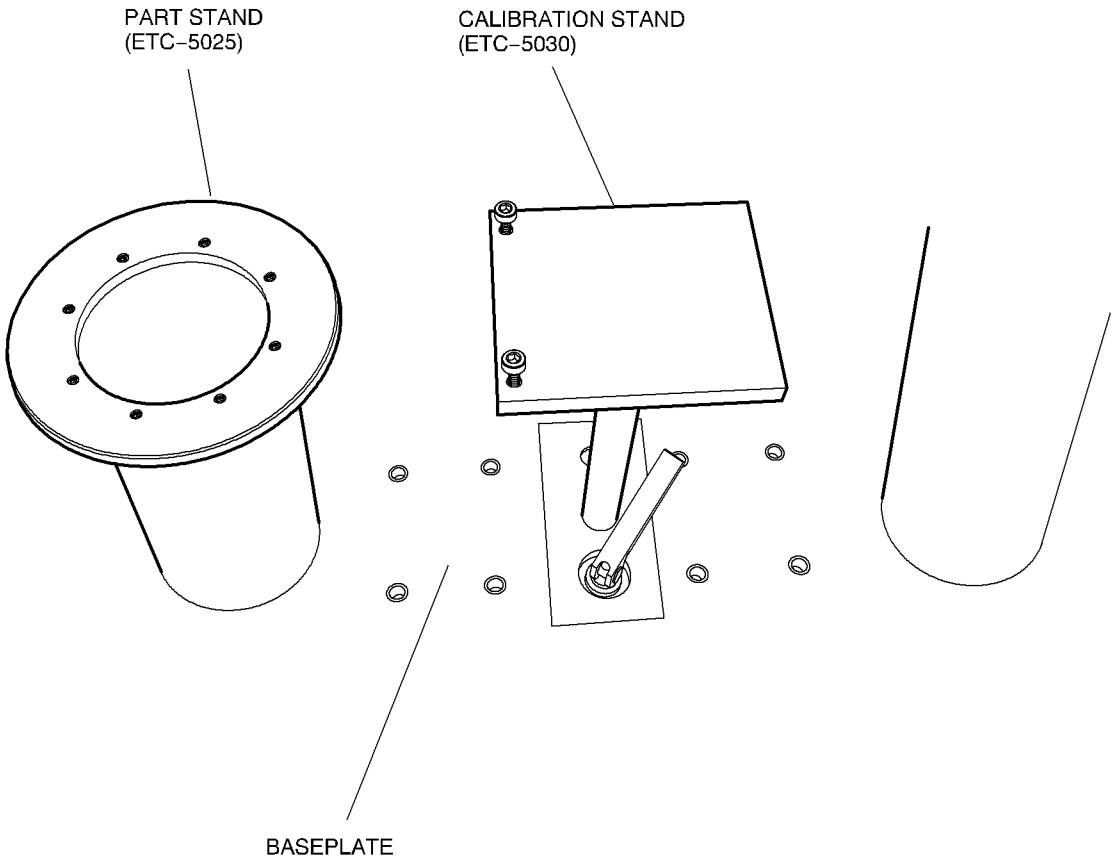
M-AXIS ASSEMBLY FOR SET-ZERO PROCEDURE
FIGURE 4



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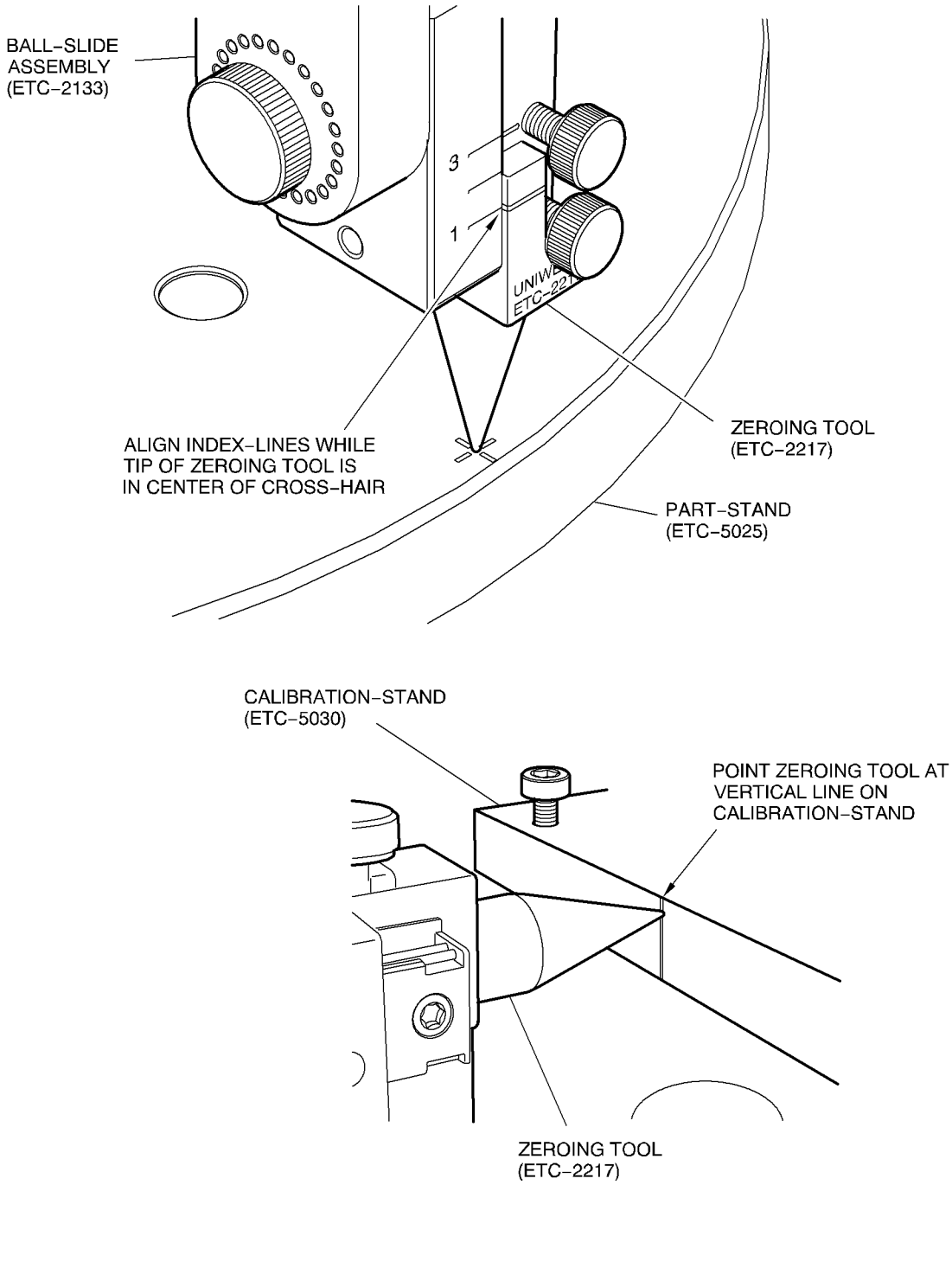
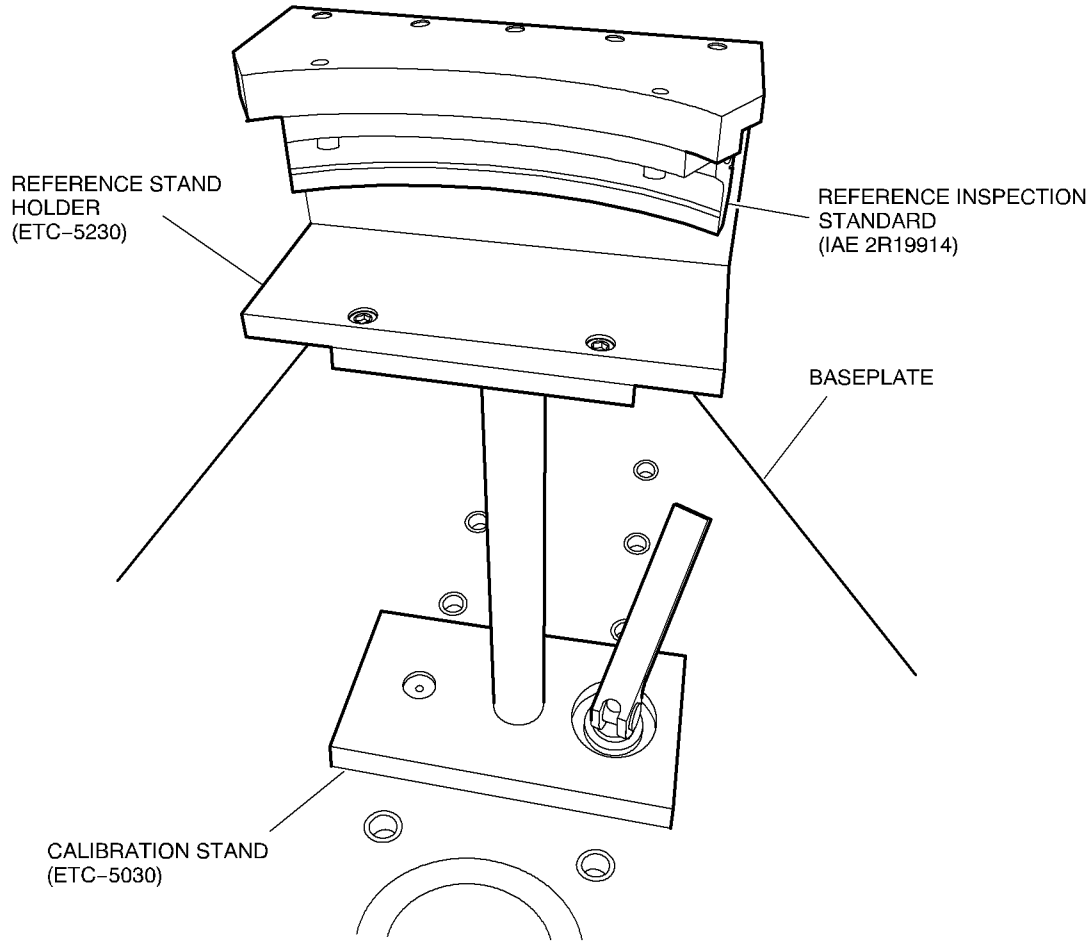
POSITION OF CALIBRATION STAND FOR SET-ZERO PROCEDURE
FIGURE 5



SET-ZERO LOCATIONS ON PART-STAND AND CALIBRATION-STAND
FIGURE 6



NOTE: FOR CALIBRATION, THE SECOND SET OF HOLES IN THE ETC–2000 BASEPLATE IS USED.

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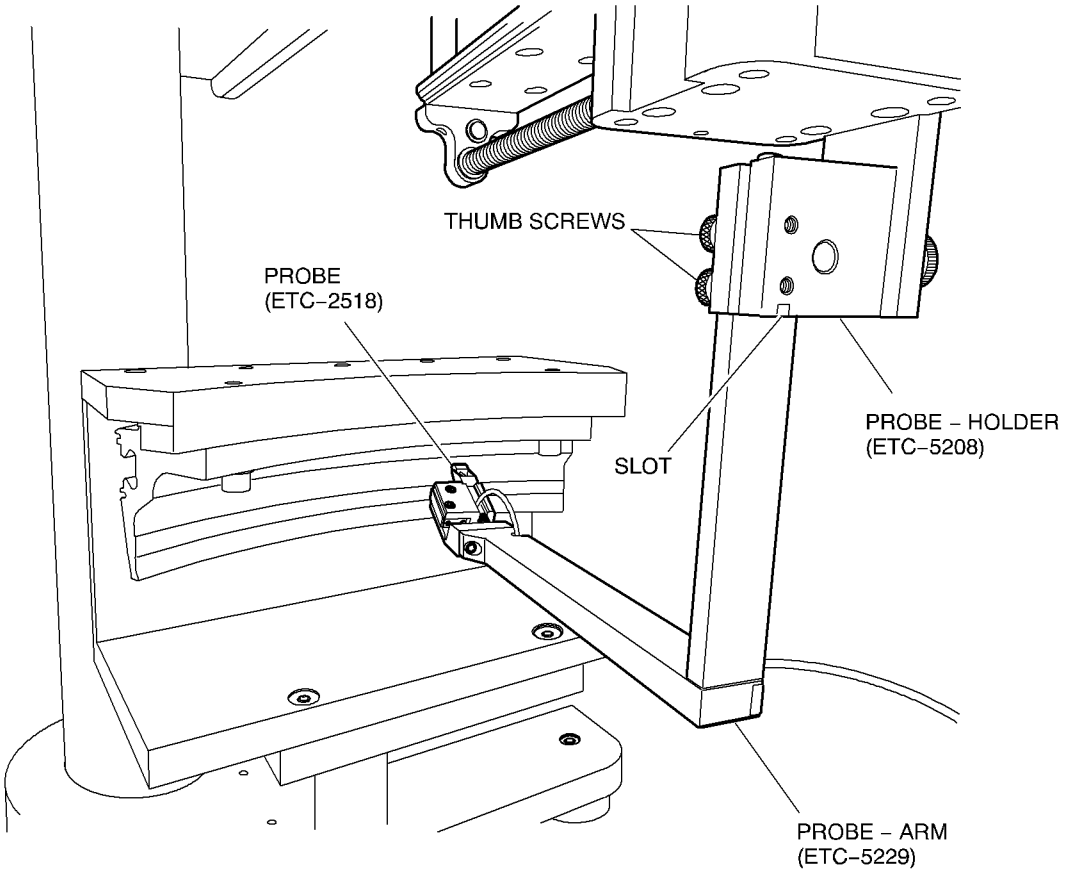
REFERENCE STANDARD HOLDER ETC-5230 MOUNTED ON CALIBRATION-STAND ETC-5030
FIGURE 7



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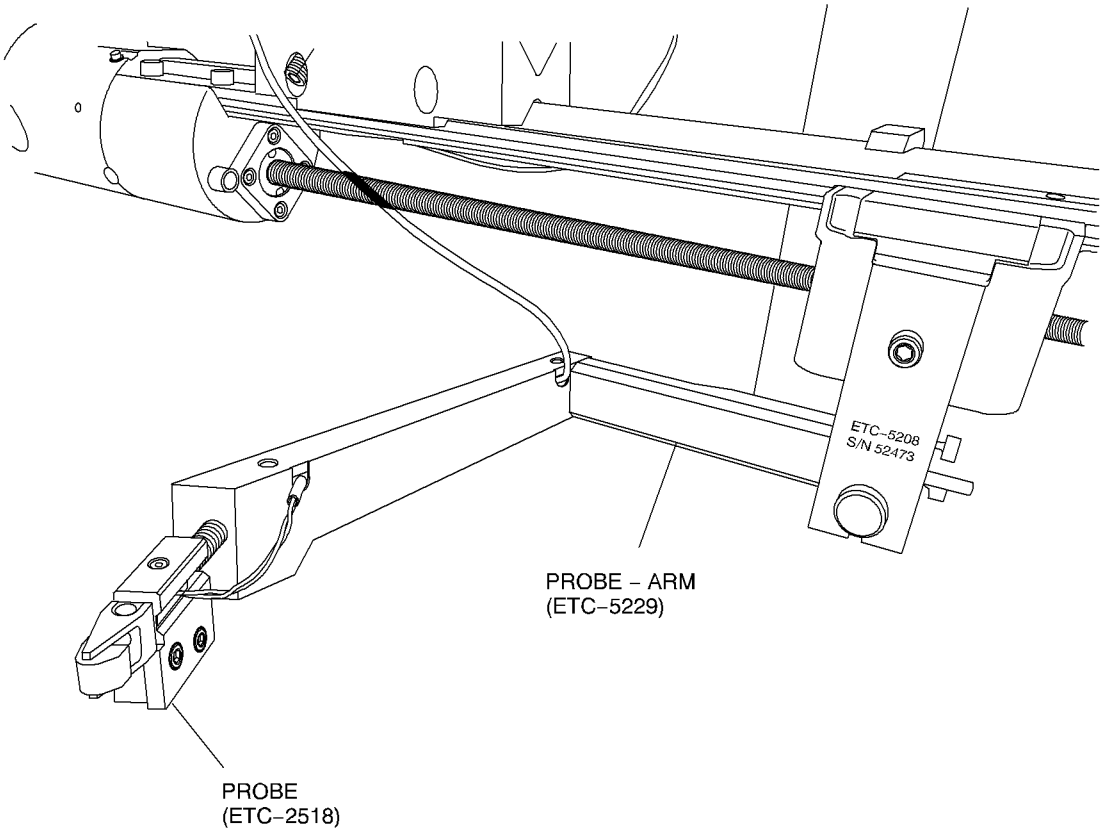
PROBE-ARM ETC-5229 MOUNTED ON TO PROBE-HOLDER ETC-5208
FIGURE 8



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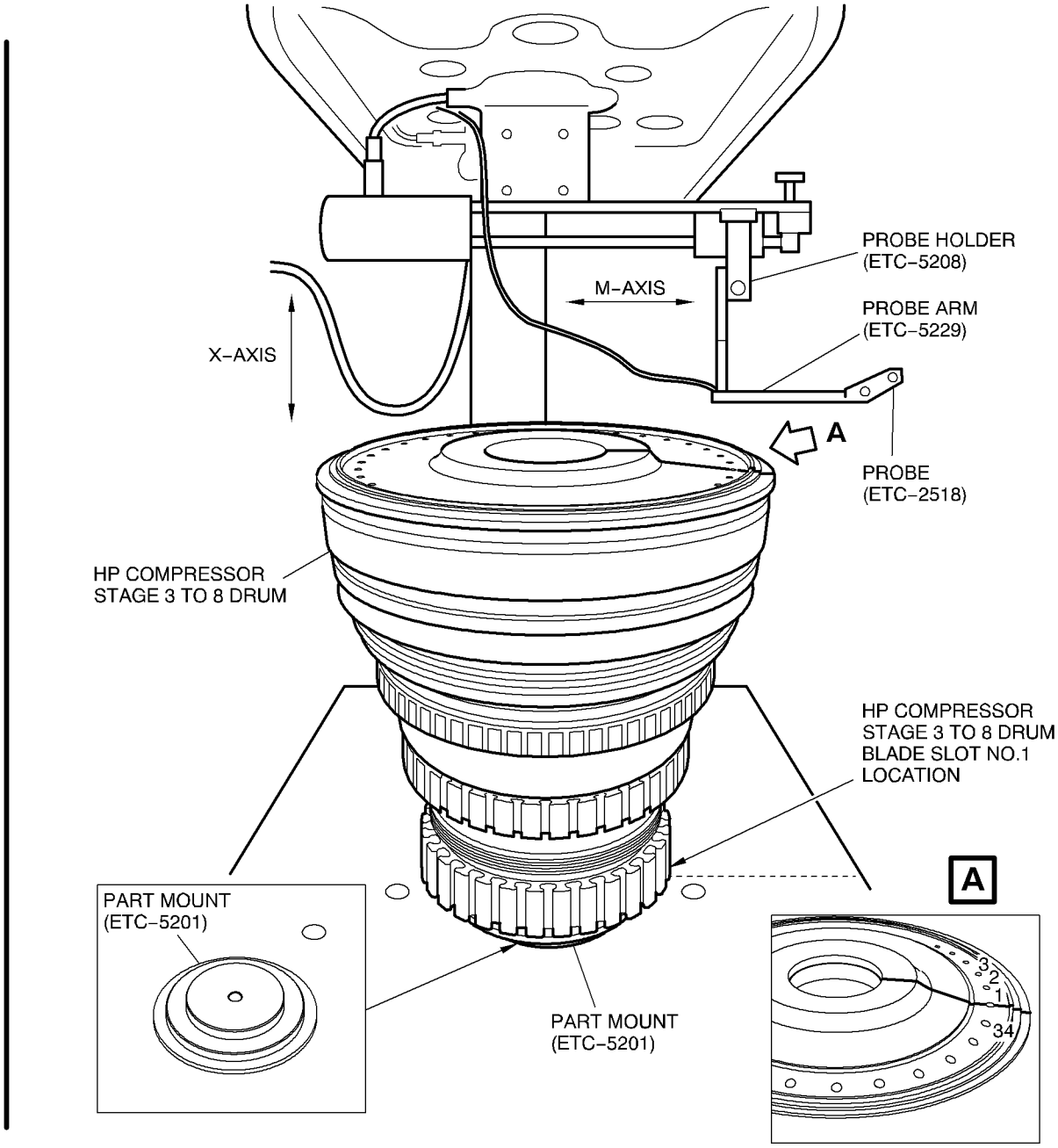
PROBE-ARM ETC-5229 ATTACHMENT AFTER CALIBRATION
FIGURE 9



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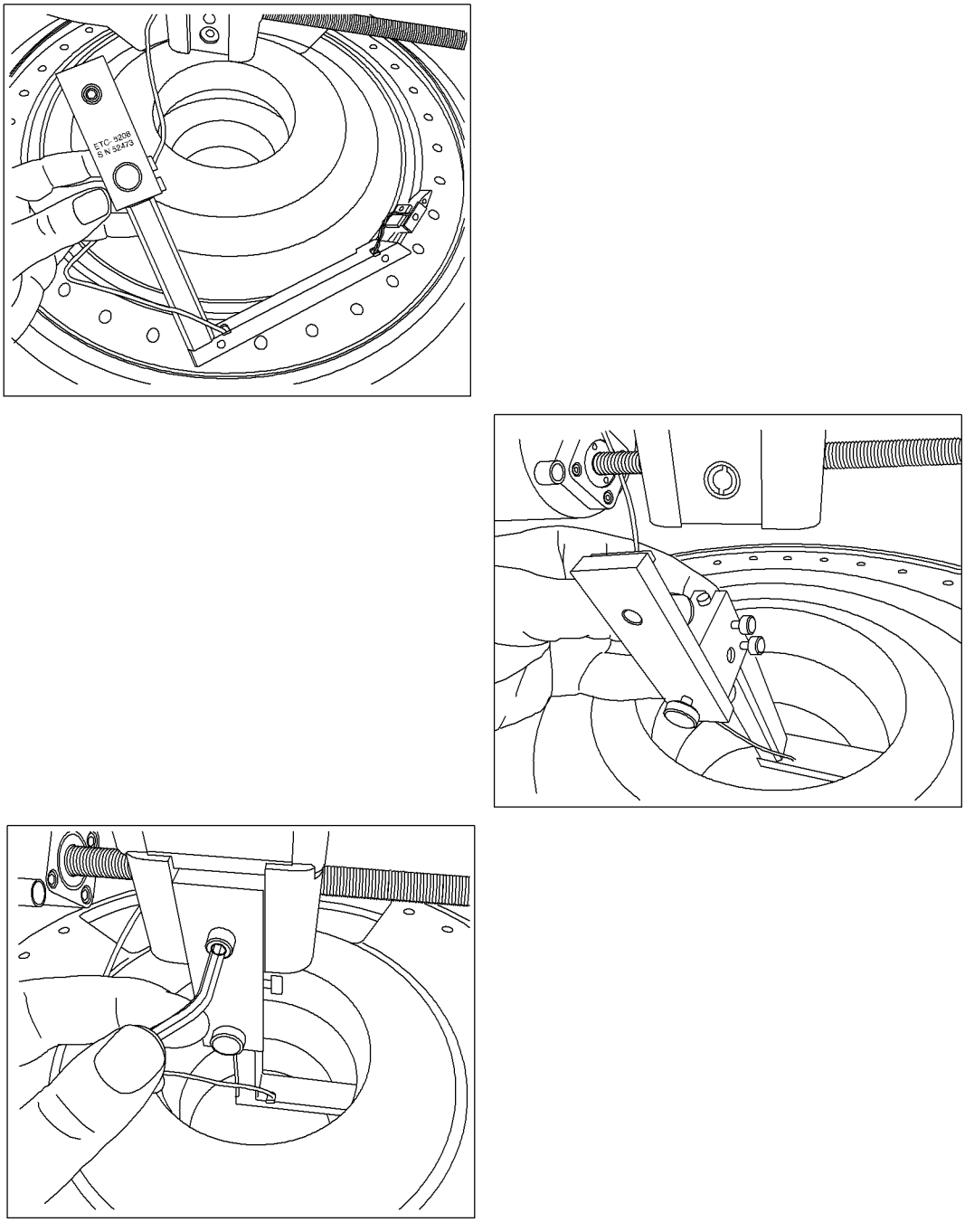
DRUM IN POSITION ON ETC-2000 BASEPLATE
FIGURE 10



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INSTALLATION OF PROBE IN V2500 HP COMPRESSOR STAGE 3 TO 8 DRUM
FIGURE 11

ENGINE – HIGH PRESSURE (HP) COMPRESSOR STAGE 3 TO 8 COMPRESSOR DRUM – EDDY CURRENT INSPECTION (ECI)

CUSTOMER NAME: _____ 3–8 DRUM P/N: _____ CALIBRATION PIECE P/N: _____

ESN: _____ 3–8 DRUM S/N: _____ CALIBRATION PIECE S/N: _____

3–8 DRUM CSN: _____ INSTRUMENT NAME: _____

3–8 DRUM TSN: _____ INSTRUMENT S/N: _____

PROBE S/N:	LP FILTER:	PHASE:
PROBE P/N:	HP FILTER:	GAIN:
	FREQUENCY:	

BOLT HOLE (NO.1 EQUATES TO ST3 BLADE SLOT No.1)	MAXIMUM SIGNAL AMPLITUDE (V)				SPATTER (YES/NO)	COMMENT
	ZONE 1	ZONE 2	ZONE 3	ZONE 4		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

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ACCOMPLISHMENT PROFORMA
FIGURE 12, SHEET 1

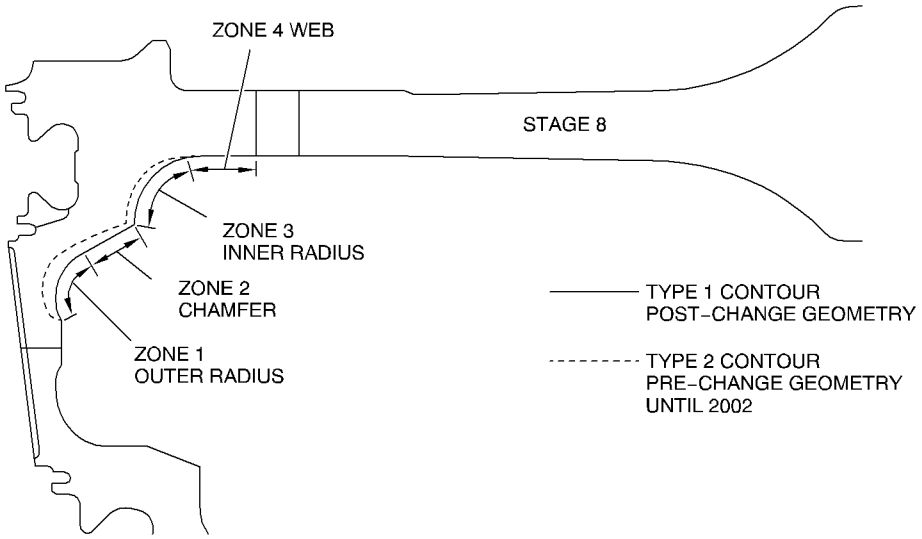
BOLT HOLE (NO.1 EQUATES TO ST3 BLADE SLOT No.1)	MAXIMUM SIGNAL AMPLITUDE (V)				SPATTER (YES/NO)	COMMENT
	ZONE 1	ZONE 2	ZONE 3	ZONE 4		
25						
26						
27						
28						
29						
30						
31						
32						
33						
34						

INSPECTION RESULT:	ACCEPTABLE ☐	NOT ACCEPTABLE ☐

SIGNATURE: _____ NAME: _____ DATE: _____

NOTE: INFORM THE LOCAL IAE OFFICE THAT NON–MODIFICATION SERVICE BULLETIN V2500–ENG–72–0625 HAS BEEN ACCOMPLISHED AND PROVIDE THE COMPLETED INSPECTION REPROT., .dat and .txt FILES.

THE LOCAL IAE TECHNICAL REPRESENTATIVE WILL RECORD THE ACCOMPLISHMENT OF THIS NON–MODIFICATION SERVICE BULLETIN V2500–ENG–72–0625 IN THE IAE V–LIVE SYSTEM.



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ACCOMPLISHMENT PROFORMA
FIGURE 12, SHEET 2

Appendix

Added Data

Internal Reference Information

Revision No.	Reference Document	Origination
Original	EC11VR581	ARO/IEL
1	EC11VR581A	ARO/IEL

Number values shown in parentheses adjacent to U.S. values are International System of units (SI) equivalents.

NOTE: In 2014 IAE converted the V2500 Technical Publications to a new system. As a result of the conversion, some manuals were consolidated. All manuals received new P&W part numbers. To facilitate the use of this Service Bulletin, the following Technical Publications cross reference table is provided.

Technical Publications Cross Reference Table

Publication	Engine Model(s)	IAE IETM Pub Ref	P&W Part Number
ENGINE MANUAL — A1, A5	All	E-V2500-1IA	2A4407
CMM-EHC — A1, A5	All	EHC-V2500-1IA	2A4409
CMM-FN — A1, A5	All	FN-V2500-1IA	2A4410
CMM-MMC — A1, A5	All	MECH-V2500-1IA	2A4411
CMM-THD — A1, A5	All	THD-V2500-1IA	2A4412
TLM — A1, A5	All	T-V2500-1IA	2A4408
ENGINE MANUAL — D5	All	E-V2500-3IA	2A4416
CMM-EHC — D5	All	EHC-V2500-31A	2A4418
CMM-FN — D5	All	FN-V2500-3IA	2A4419
CMM-MMC — D5	All	MECH-V2500-3IA	2A4420
CMM-THD — D5	All	THD-V2500-3IA	2A4423
TLM	All	T-V2500-3IA	2A4417
SPPM (SPM) — D5	All	SPP-V2500-1IA	2A4414
EIPC — A1	V2500-A1102Q00	S-V2500-1IA	2A4427

Publication	Engine Model(s)	IAE IETM Pub Ref	P&W Part Number
EIPC — A5	V2522/V2524/V2527M-AQ02	S-V2500-6IA	2A4428
	V2522/V2524/V2527M-AQ03	S-V2500-6IB	
	V2522/V2524/V2527M-SQ02	S-V2500-6SA	
	V2522/V2524/V2527M-SQ03	S-V2500-6SB	
	V2522/V2524/V2527M-SQ04	S-V2500-6NA	
	V2522/V2524/V2527M-SQ05	S-V2500-6NB	
	V2527/V2527E-AQ02	S-V2500-7IA	
	V2527/V2527E-AQ03	S-V2500-7IB	
	V2527/V2527E-SQ02	S-V2500-7SA	
	V2527/V2527E-SQ03	S-V2500-7SB	
	V2527/V2527E-SQ04	S-V2500-7NA	
	V2527/V2527E-SQ05	S-V2500-7NB	
	V2530-AQ02	S-V2500-2IA	
	V2530-AQ03	S-V2500-2IB	
	V2530-SQ02	S-V2500-2SA	
	V2530-SQ03	S-V2500-2SB	
	V2530-SQ04	S-V2500-2NA	
	V2530-SQ05	S-V2500-2NB	
	V2533-AQ02	S-V2500-5IA	
	V2533-AQ03	S-V2500-5IB	
	V2533-SQ02	S-V2500-5SA	
	V2533-SQ03	S-V2500-5SB	
	V2533-SQ04	S-V2500-5NA	
	V2533-SQ05	S-V2500-5NB	
EIPC — D5	V2525/V2528-AQ02	S-V2500-3IA	2A4426
	V2525/V2528-AQ03	S-V2500-3IB	
	V2525/V2528-AQ04	S-V2500-3IC	