# Temporary Maintenance Instruction
# TMI109-475 Rev C

## Beam Assy STA4010.0 to STA4460.0 – Special repair procedures

A109E,A109S
Helicopters

*The technical content of this document is approved under the authority of DOA nr. EASA.21J.005.*

*The present TMI will be evaluated for its introduction in the standard set of Technical Publication.*
*If no further notice is received, the present document expires on: 2025-10-01.*

2024-10-01

## Introduction

The purpose of this TMI is to provide repair procedures for the Engine Beam Assy installed between STA4010.0 and STA4460.0.

All the information reported in the subsequent pages will be updated at the first favourable occasion inside applicable IETPs.

# Beam Assy STA4010.0 to STA4460.0 – Special repair procedures

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## *References*

*Table 1 References*

| Data Module | Data Module/Technical Publication |
|---|---|
| 1. 0B-A-00-20-00-00A-120A-A * | HELICOPTER SAFETY – MAKE THE HELICOPTER SAFE FOR MAINTENANCE |
| 2. 0B-A-71-02-01-00A-520A-A * | NUMBER 1 ENGINE - REMOVE PROCEDURES |
| 3. 0B-A-71-02-01-00A-720A-A * | NUMBER 1 ENGINE - INSTALL PROCEDURES |
| 4. 0B-A-71-02-02-00A-720A-A * | NUMBER 2 ENGINE - REMOVE PROCEDURES |
| 5. 0B-A-71-02-02-00A-720A-A * | NUMBER 2 ENGINE - INSTALL PROCEDURES |
| 6. 0B-A-28-12-02-00A-520A-A * | RIGHT AUXILIARY TANK - REMOVE PROCEDURES |
| 7. 0B-A-28-12-02-00A-720A-A * | RIGHT AUXILIARY TANK - INSTALL PROCEDURES |
| 8. 0B-A-28-12-01-00A-520A-A * | LEFT AUXILIARY TANK - REMOVE PROCEDURES |
| 9. 0B-A-28-12-01-00A-720A-A * | LEFT AUXILIARY TANK - INSTALL PROCEDURES |
| 10. 0B-A-28-11-01-00A-520A-A * | TOP TANK – REMOVE PROCEDURES |
| 11. 0B-A-28-11-01-00A-720A-A * | TOP TANK – INSTALL PROCEDURES |
| 12. 0B-A-71-31-02-00A-720A-A * | LONGITUDINAL FIREWALL – REMOVE PROCEDURES |
| 13. 0B-A-71-31-02-00A-720A-A * | LONGITUDINAL FIREWALL – INSTALL PROCEDURES |
| 14. 0B-A-71-21-01-00A-520A-A * | NUMBER 1 ENGINE BIPOD - REMOVE PROCEDURES |
| 15. 0B-A-71-21-01-00A-720A-A * | NUMBER 1 ENGINE BIPOD - INSTALL PROCEDURES |
| 16. 0B-A-71-21-02-00A-520A-A * | NUMBER 2 ENGINE BIPOD - REMOVE PROCEDURES |
| 17. 0B-A-71-21-02-00A-720A-A * | NUMBER 2 ENGINE BIPOD - INSTALL PROCEDURES |

| | |
|---|---|
| 18. 0B-A-63-11-01-00A-720A-A * | NUMBER 1 DRIVE SHAFT - INSTALL PROCEDURES |
| 19. 0B-A-63-11-02-00A-720A-A * | NUMBER 2 DRIVE SHAFT - INSTALL PROCEDURES |
| 20. 0B-A-63-11-01-00A-520A-A * | NUMBER 1 DRIVE SHAFT - REMOVE PROCEDURES |
| 21. 0B-A-63-11-02-00A-520A-A * | NUMBER 2 DRIVE SHAFT - REMOVE PROCEDURES |
| 22. SRM Section 03-03-03 | APPLICATION OF POLYAMIDE EPOXY PRIMER |
| 23. SRM Section 03-15-0 | RIVET PATTERN DISCREPANCIES |
| 24. SK109-398 | BEAM ASSY REPAIR STA 4010 .0 - STA 4460.0 |
| 25. AW DRAWING - 109-0322-39 | INST PARATIA ALLA STA 4010.0 |
| 26. AW DRAWING - 109-0322-44 | STA 4460.0 BULKHEAD INSTALL |
| 27. AW DRAWING - 109-0322-47 | ASS.CENTINA ALLA BL 250,0 |
| 28. AW DRAWING - 109-0322-46 | INSTL RIPIANO LA 1020.0 |
| 29. AW DRAWING - 109-0326-10 | INST.COPERTURA SUP.VANO TRASMISSIONE |
| 30. AW DRAWING - 109-0329-30 | ASSIEME PARTE SUPERIORE |
| 31. AW DRAWING - 109-0329-33 | ASSIEME PARTE SUP. ORD. 4010 |
| 32. AW DRAWING - 109-0329-35 | INSTL ROOF COVERING FWD |
| 33. AW DRAWING - 109-0641-17 | INSTL PARATIA LONG PARAFIAMMA FISSA |

* Applicable to A109S/AW109SP Helicopters. For the other helicopter models refer to the applicable Section or Data Module of the Maintenance Manual.

## *Preliminary requirements*

## Required conditions

*Table 2 Required conditions*

| Condition | Data Module/Technical Publication |
|---|---|
| The helicopter must be safe for maintenance | 0B-A-00-20-00-00A-120A-A* |
| The number 1 engine must be removed | 0B-A-71-02-01-00A-520A-A * |
| The number 2 engine must be removed | 0B-A-71-02-02-00A-520A-A * |
| The left auxiliary tank must be removed | 0B-A-28-12-01-00A-520A-A * |
| The right auxiliary tank must be removed | 0B-A-28-12-02-00A-520A-A * |
| The top tank must be removed | 0B-A-28-11-01-00A-520A-A * |
| The longitudinal firewall must be removed | 0B-A-71-31-02-00A-520A-A * |

* Applicable to A109S/AW109SP Helicopters. For the other helicopter models refer to the applicable Section or Data Module of the Maintenance Manual.

## Support equipment

*Table 3 Support equipment*

| Nomenclature | Identification No. | Qty |
|---|---|---|
| 1. Drive Shaft Alignment Tool | 109-3901-18-101 | 1 |
| 2. Platform | Local Supply | 1 |

## Supplies

*Table 4 Supplies*

| Nomenclature | Identification No. | Qty |
|---|---|---|
| 1. Sealing compound-Naftoseal MC-780 | C282 (*) | A.R. |
| 2. Solvent | C511 (*) | A.R. |

| | | |
|---|---|---|
| 3. Aliphatic naphta | C059 (*) | A.R. |
| 4. Cloth, soft lint-free | C011 (*) | A.R. |
| 5. Epoxy primer-MIL-PRF-23377 | C446 (*) | A.R. |
| 6. Epoxy primer- EA9309 | C527 (*) | A.R. |
| 7. Sealing Compound- Proseal 890 B2 | C148 (*) | A.R. |
| 8. Aluminum Sheet 2024 T3 0.64mm (0.025”) | AMS-QQ-A-250/5 | A.R. |
| 9. Stainless Steel 301 ¼ HD 0.81mm (0.032”) | AMS5517 | A.R. |
| 10. Stainless Steel 301 ¼ HD 0.51mm (0.020”) | AMS5517 | A.R. |
| 11. Rivet, Solid | MS20470E5 (**) | A.R. |
| 12. Rivet, Solid | MS20470AD4 (**) | A.R. |
| 13. Rivet, Solid | MS20615-4M (**)(***) | A.R. |
| 14. Rivet, Solid | MS20615-3M (**) | A.R. |
| 15. Rivet, Solid | NAS9201B-4 (**) | A.R. |
| 16. Rivet,Solid | MS20470AD3 (**) | A.R. |
| 17. HI-LOK Pin | HL20PB5-5 | A.R. |
| 18. HI-LOK Pin | HL19PB5-5 | A.R. |
| 19. HI-LOK Collar | HL70-5 | A.R. |
| 20. HI-LOK Collar | HL86-5 | A.R. |
| 21. Spring Hangar | 999-0500-69-1 | A.R. |
| 22. Washer | NAS1149DN316K | A.R. |

(*) Refer to the Applicable Material Data Information Publication Publication – Numerical Index
(**) Length to be determined in accordance to the required grip, alternative part number in accordance to the applicable SRM Section.
(***) NAS1738M4 and NAS9310M-4 are accepatable alternates for MS20615-4M

## Spares

*Table 5 Spares*

| Nomenclature | Identification No. | Qty |
|---|---|---|
| Beam Assy | 109-0326-10-174A1 | 1 |
| FWD Bracket | 109-0326-10-135 | 1 |
| FWD Fitting | 109-0325-98-101 | 1 |
| AFT Fitting | 109-0325-99-101 | 1 |

## Safety conditions

### WARNING

**The consumables that follow are dangerous materials. Before you do this procedure, make sure that you know all the safety precautions and first aid instructions for these materials:**

- **Sealing compound (Supply Ref. 1)**
- **Solvent (Supply Ref. 2)**
- **Aliphatic naphta (Supply Ref. 3)**
- **Epoxy primer (Supply Ref. 5)**

**Refer to 0B-A-00-50-00-00A-074A-D (*)**

## *Procedure*

**Note**

(*) Applicable to A109S Helicopters. For A109E helicopter models refer to the applicable Section or Data Module of the Maintenance Manual.

**Note**

All the instructions that follow must be carried out in accordance with the A119/A109 SERIES-SRM.

**Note**

Use oversized rivets if the holes for rivets are not correct. Refer to A119/A109 SERIES-SRM

1. Remove panel assy 109-0329-52 to gain better access to the work area (Figure 1).

2. Cut out a rectangular section from the skin of the shelf assy 109-0322-46 between STA4010.0 and STA4460.0 as shown in Figure 2 & Figure 3.

**Note**

When performing the cut, ensure sufficient material remains for the added rivet row and required edge distance (Figure 10 &11).

3. Remove and retain central stringer P/N: 109-0322-46-07 shown in Figure 3.

4. Carefully remove beam assy 109-0326-10-174 drilling out all associated rivets and HI-LOKS (Figure 4).

5. Inspect beam assy 109-0326-10-174 for the presence of cracks, corrosion or any additional damage.

**Note**

If damage on beam assembly is found, stop work and contact manufacturing

6. Clean the area where beam assy was installed in aircraft structure using Solvent (Supply Ref. 2) or Aliphatic Naphta (Supply Ref. 3). Let the Solvent dry at ambient temperature.

7. Visually inspect the area for the presence of cracks, corrosion, elongated holes and additional damage. (ref Figure 4).

8. Cut and remove center section of upper angle 109-0329-33-107 as shown in Figure 5.

9. Splice new center section of upper angle 109-0329-33-107 as shown in Figure 6. (Supplies Ref.9)

10. Install tapered shim under stiffener as shown in Figure 7.

11. Install butt straps (Supplies Ref. 9) ensuring 3 rivets for each side on one flange and 4 rivets for each side on the other remaining flange as shown in Figure 7.

12. Splice angle 109-0641-17-127 as shown in Figure 8 & Figure 9. (Supplies Ref.10 for both splice & strap)

13. Install the new box beam 109-0326-10-174 as shown in Figure 12 to Figure 15.

**Note**

In order to place the beam between the bulkheads, partial disassembling of beam components will be necessary. Reassembly is to be done IAW REF[29]; sheet 30.

**Note**

If the pilot holes of the aft and/fwd fitting do not match the existing hole in the structure follow the procedure in Appendix A.

**Note**

Instead of replacing the entire beam, the damage parts of the beam can be replaced and/or locally fabricated; beam reassembly s to be done IAW Ref [29],sheet 30.

14. Close the cutout on the shelf assy 109-0322-46-301 in accordance with instruction provided in Figure 10 & 11. (Supplies Ref. 8)

15. Reinstall Spring Hangar P/N: 999-0500-69-1 with washer P/N: NAS1149DN316K and rivets P/N: MS20470AD3 in countermarked locations (Figure10).

16. Apply primer, paint & seal as required.

17. Install the left and right engines. Refer to 0B-A-71-02-01-00A-720A-A and 0B-A-71-02-02-00A-720A-A.

18. Install the left engine drive shaft. Refer to 0B-A-63-11-01-00A-720A-A.

19. Install the alignment tool (Support equipment Ref. 1) on the left engine drive shaft, at the main transmission side, as follows:

19.1. Install the plate (1, Figure 16) on the engine drive shaft removing two bolts and installing two bolts of adequate length.

19.2. Install the two nylon shells (2, Figure 16) on the drive shaft. Do not tighten the four screws.

19.3. Install the dial gauge, provided with the tool, on the plate (3, Figure 16) with the related screws.

19.4. Install the plate (4, Figure 16) on top of the shell (2, Figure 16) with the related screws.

19.5. Attach the plate (3, Figure 16) to the plate (4, Figure 16) and adjust the distance of the dial gauge from the plate (1, Figure 16) adding washers between plate (3, Figure 16) and plate (4, Figure 16) in order to have an active reading.

19.6. Tighten the screws that connect the two shells (2, Figure 16).

19.7. Rotate the engine drive shaft 360° around its axis and check the dial gauge stays inside its working range and that the plate (4, Figure 16) does not interfere with the engine drive shaft.

**Note**

Make sure that all hardware is properly tightened in order to avoid false reading.

19.8. Rotate the engine drive shaft 360° around its axis and determine the position where the dial gauge provides its minimum reading.

**Note**

The dial gauge provided with the alignment tool provides positive readings when compressed.

19.9. Set the dial gauge to zero in correspondence of the position determined as the maximum extension of the dial gauge (minimum reading). Rotate the engine drive shaft 360° around its axis and check that the dial gauge reads zero always in the same position.

19.10. Fill in the Table of Figure 17 the value “0.00” in correspondence of 135°.

19.11. Repeat the reading at intervals of 45° clockwise looking forward. Record the reading in the Table of Figure 17.

19.12. If any of the recorded values fall outside the respective limit, proceed as follows:

19.12.1. Determine the direction the engine must be moved to bring the readings within the limits. Refer to the Table of Figure 19 to determine the adjustment.

19.12.2. Lift the engine through the upper lifting point and remove the related fitting hardware to allow a proper shimming to be added or removed depending on the necessity.

**WARNING**

**AS THE ENGINE DRIVE SHAFT IS STILL CONNECTED, LIMIT ENGINE MOVEMENTS AS MUCH AS POSSIBLE.**

**Note**

Act on one engine support at the time and evaluate the effects on the alignment to allow proper adjustment.

19.12.3. Vary the shim thickness and check the effects on the engine flange on the dial gauge turning shaft around the 360°.

19.12.4. Once determined the proper shim dimension, remove the engine drive shaft. Ref. to 0B-A-63-11-01-00A-520A-A.

19.12.5. Install the shim under the related support and secure the related hardware.

19.12.6. Install the left engine drive shaft. Refer to 0B-A-63-11-01-00A-720A-A.

19.12.7. Repeat steps 19.1 to 19.12.

20. If alignment is acceptable, proceed with the right engine alignment.

21. Install the alignment tool (Support equipment Ref. 1) on the right engine drive shaft, at the engine side, as follows:

21.1. Install the plate (1, Figure 16) on the engine drive shaft removing two bolts and installing two bolts of adequate length.

21.2. This step is applicable only to A109S helicopters. Remove the FMM from the engine. Ref. to the applicable Engine Maintenance Manual.

21.3. Install the two nylon shells (2, Figure 16) on the drive shaft. Do not tighten the four screws.

21.4. Install the dial gauge, provided with the tool, on the plate (3, Figure 16) with the related screws.

21.5. Install the plate (4, Figure 16) on top of the shell (2, Figure 16) with the related screws.

21.6. Attach the plate (3, Figure 16) to the plate (4, Figure 16) and adjust the distance of the dial gauge from the plate (1, Figure 16) adding washers between plate (3, Figure 16) and plate (4, Figure 16) in order to have an active reading.

21.7. Tighten the screws that connect the two shells (2, Figure 16).

21.8. Rotate the engine drive shaft 360° around its axis and check the dial gauge stays inside its working range and that the plate (4, Figure 16) does not interfere with the engine drive shaft.

**Note**

Make sure that all hardware is properly tightened in order to avoid false reading.

21.9. Rotate the engine drive shaft 360° around its axis and determine the position where the dial gauge provides its minimum reading.

**Note**

The dial gauge provided with the alignment tool provides positive readings when compressed.

21.10. Set the dial gauge to zero in correspondence of the position determined as the maximum extension of the dial gauge (minimum reading). Rotate the engine drive shaft 360° around its axis and check that the dial gauge reads zero always in the same position.

21.11. Fill in the Table of Figure 18 the value “0.00” in correspondence of 315°.

21.12. Repeat the reading at intervals of 45° clockwise looking forward. Record the reading in the Table of Figure 18.

21.13. If any of the recorded values fall outside the respective limit, proceed as follows:

21.13.1. Determine the direction the engine must be moved to bring the readings within the limits. Refer to the Table of Figure 19 to determine the adjustment.

21.13.2. Lift the engine through the upper lifting point and remove the related fitting hardware to allow a proper shimming to be added or removed depending on the necessity.

**WARNING**

**AS THE ENGINE DRIVE SHAFT IS STILL CONNECTED, LIMIT AS MUCH AS POSSIBLE THE ENGINE MOVEMENTS.**

**Note**

Act on one engine support at the time and evaluate the effects on the alignment to allow proper adjustment.

21.13.3. Vary the shim thickness and check the effects on the engine flange on the dial gauge turning shaft around the 360°.

21.13.4. Once determined the proper shim dimension, remove the engine drive shaft. Ref. to 0B-A-63-11-01-00A-520A-A.

21.13.5. Install the shim under the related support and secure the related hardware.

21.13.6. Install the engine drive shaft. Ref. to 0B-A-63-11-01-00A-720A-A.

21.13.7. Repeat steps 21.1 to 21.13

21.13.8. This step is applicable only to A109S helicopters. Install the Fuel Management Module on the engine. Ref. to the applicable Engine Maintenance Manual.

22. If alignment is acceptable, proceed with the right engine alignment. Do step 16.

23. Record the final value of shims in aircraft logbook.

## *Requirements after job completion*

1. Remove all the tools and the other items from the work area. Make sure that the work area is clean.
2. From the passenger cabin, install the cover panel fitted on top of the auxiliary fuel tanks bay.
3. Install the Top Tank. Ref. to 0B-A-28-11-01-00A-720A-A.
4. Install the Left auxiliary tank. Ref. to 0B-A-28-12-01-00A-720A-A.
5. Install the Right auxiliary Tank. Ref. to 0B-A-28-12-02-00A-720A-A.

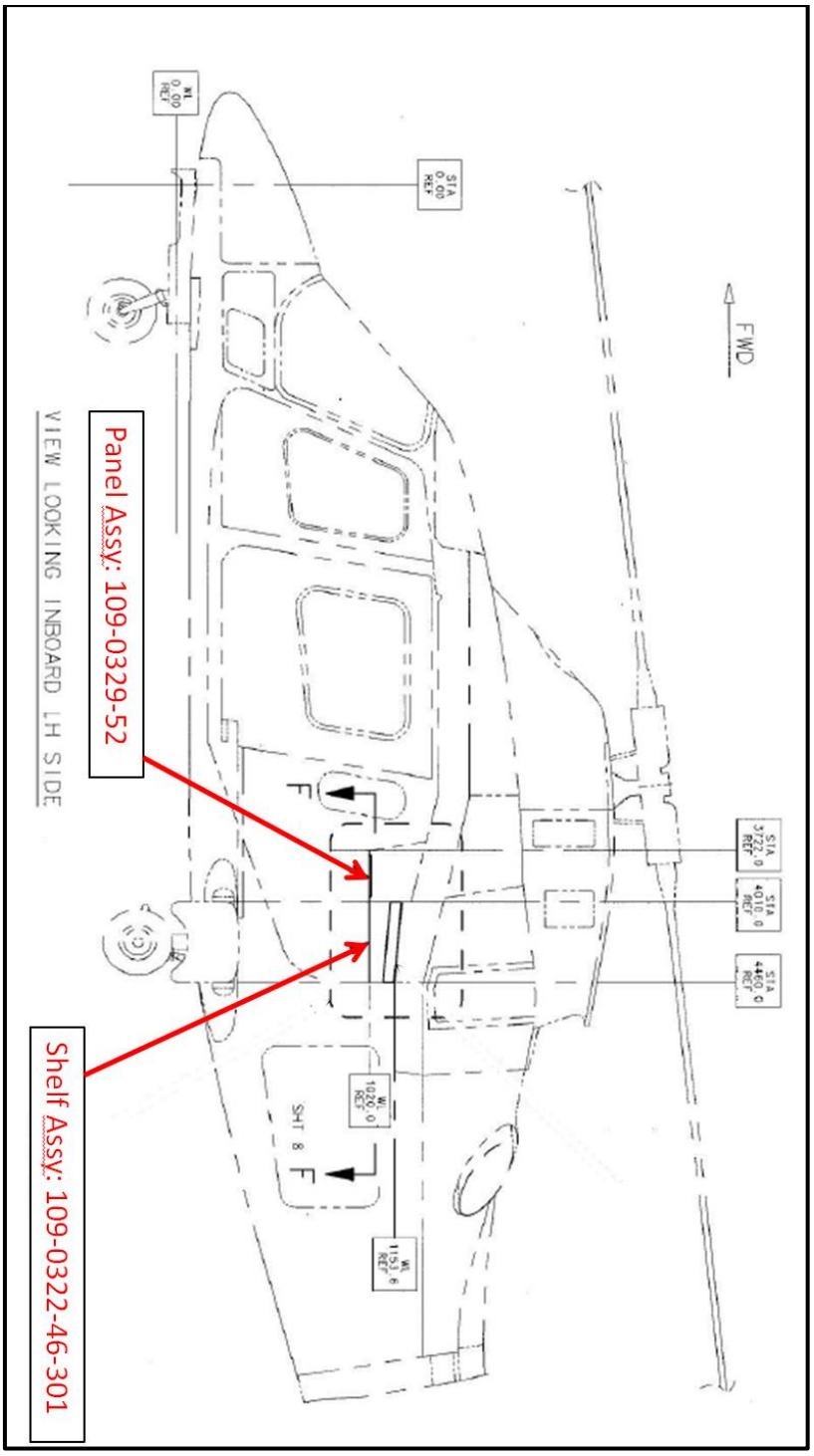



*Figure 1 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

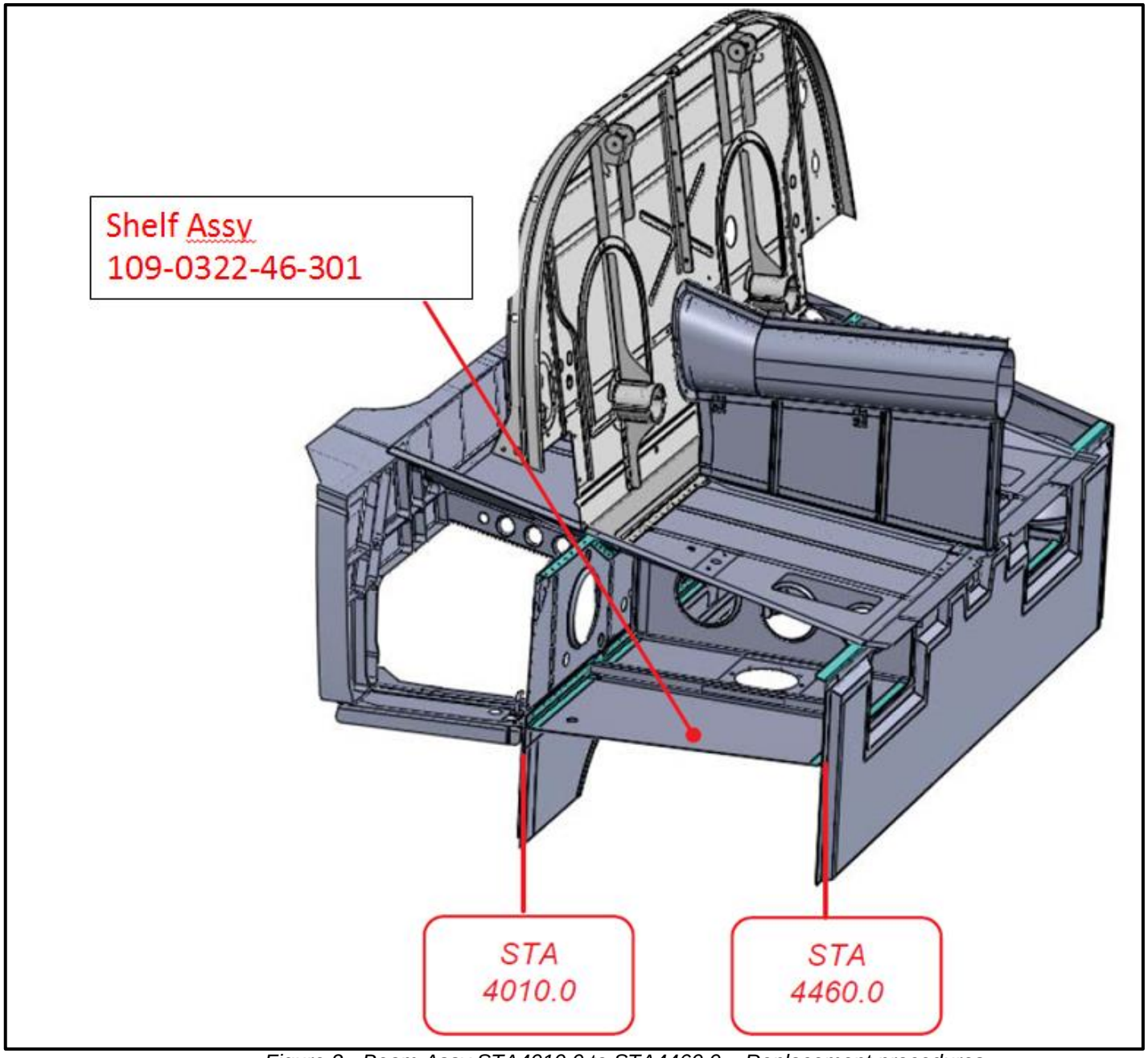



*Figure 2 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

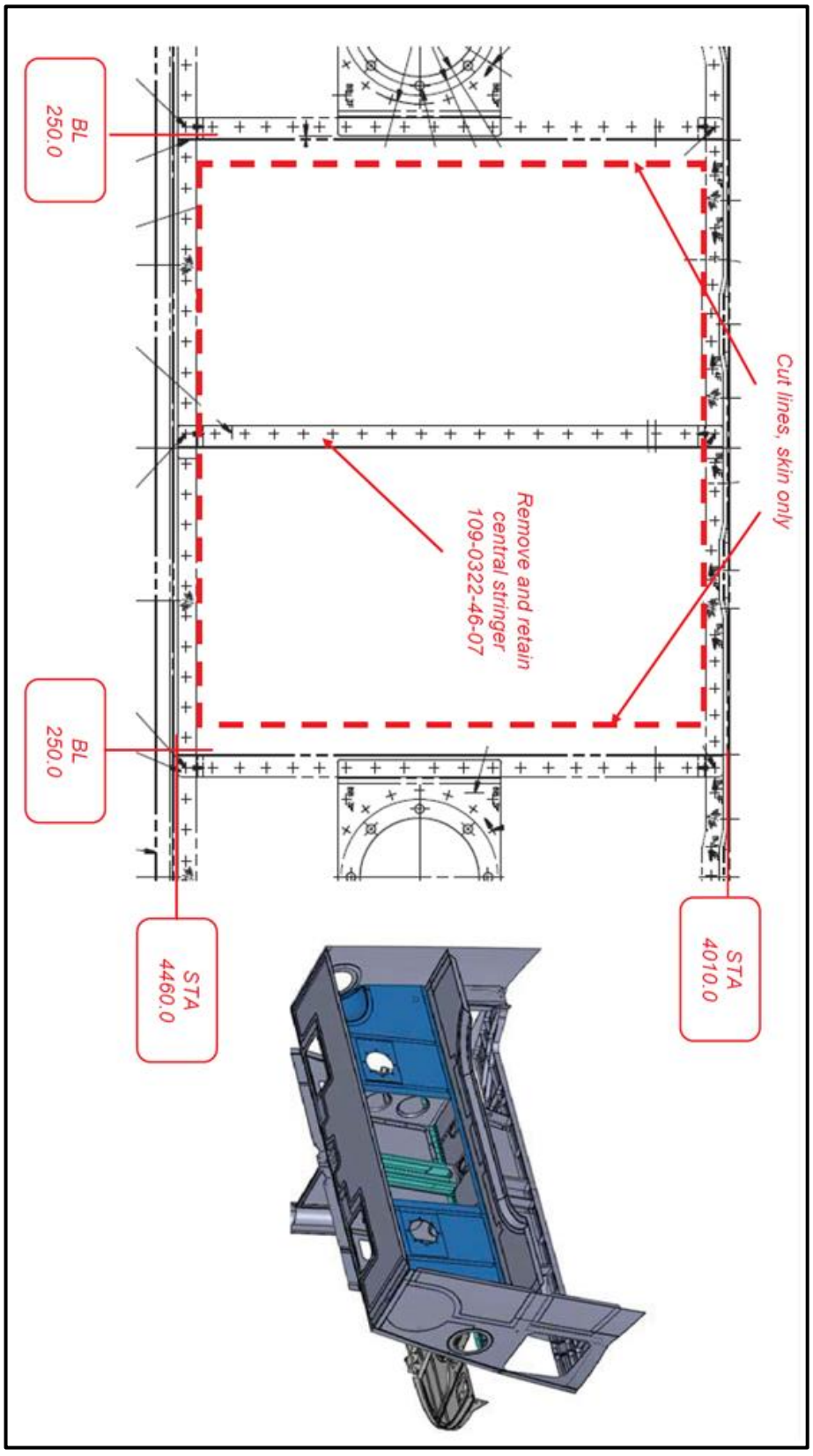



*Figure 3 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

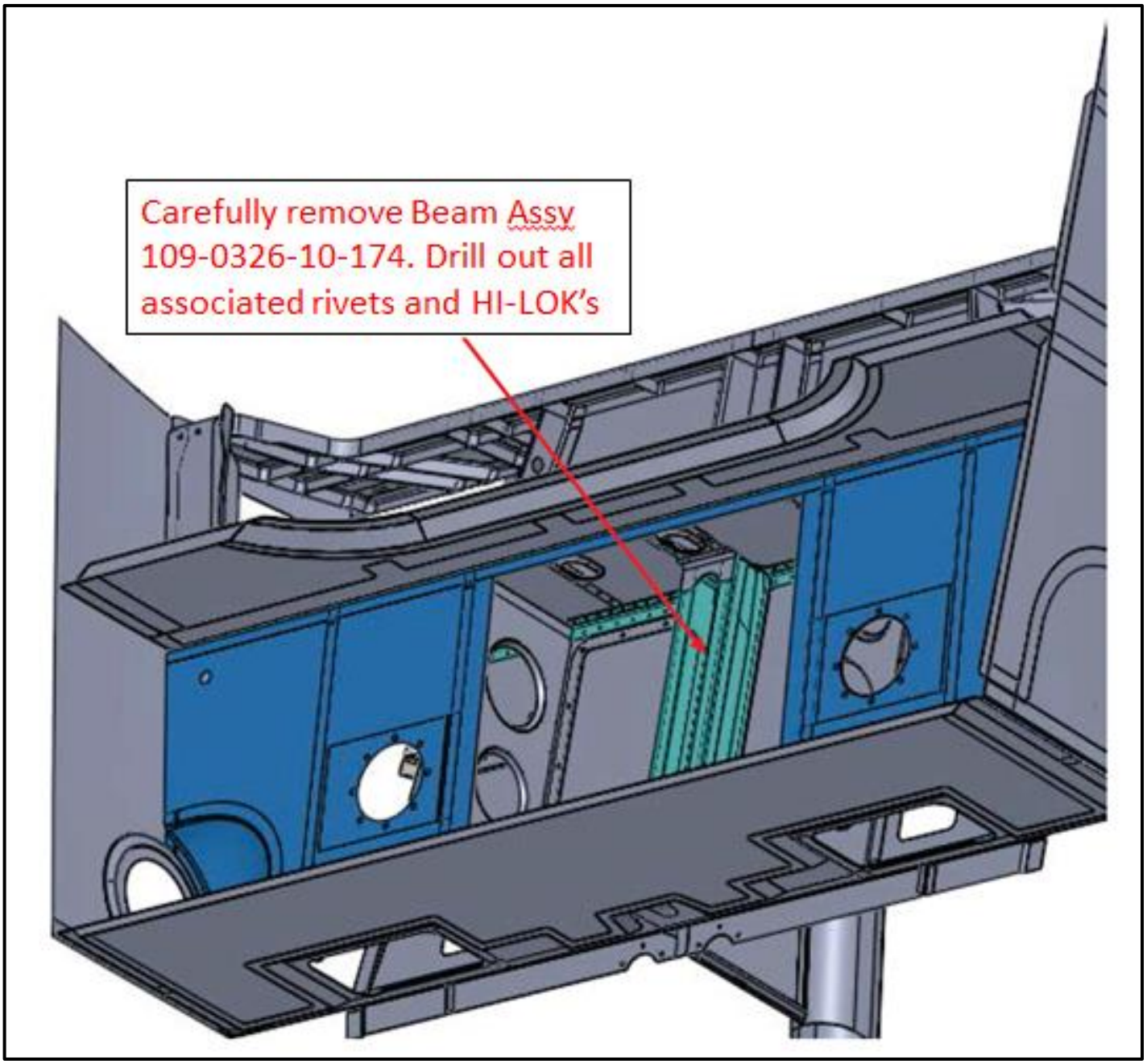



*Figure 4 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

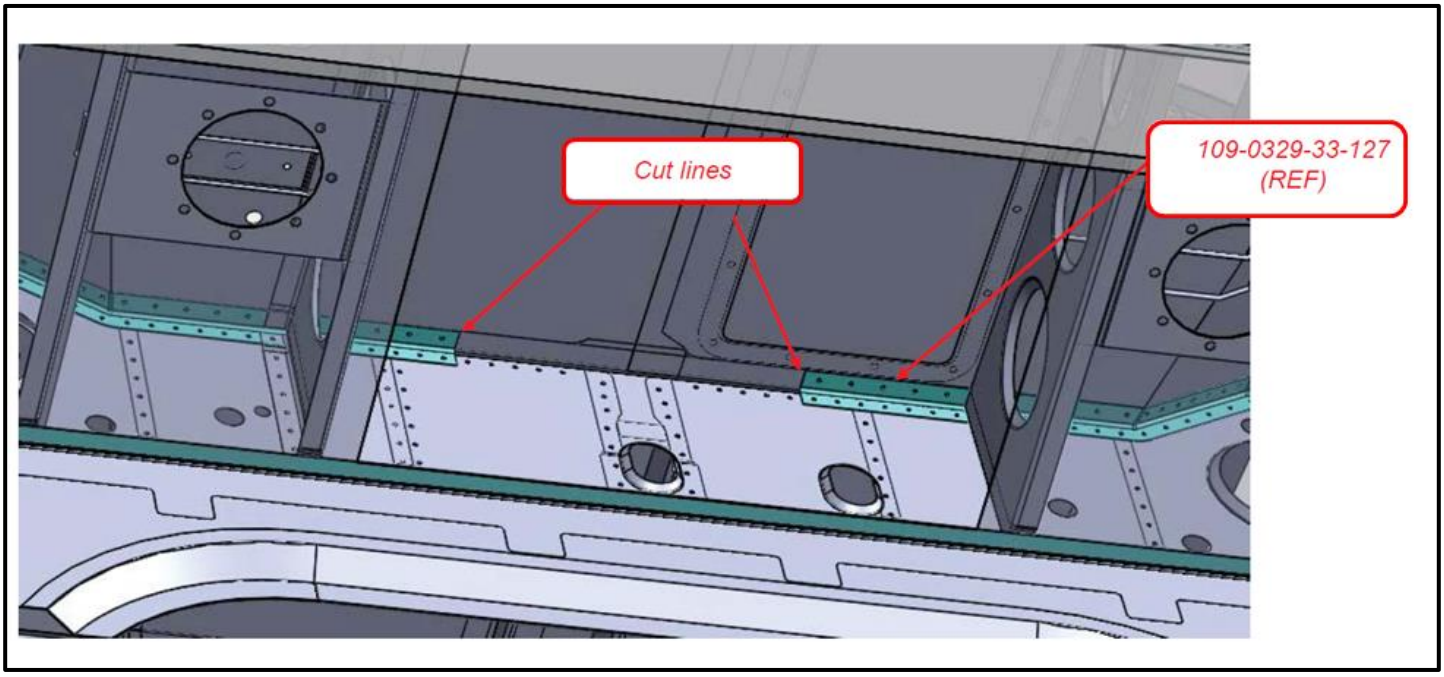



*Figure 5 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

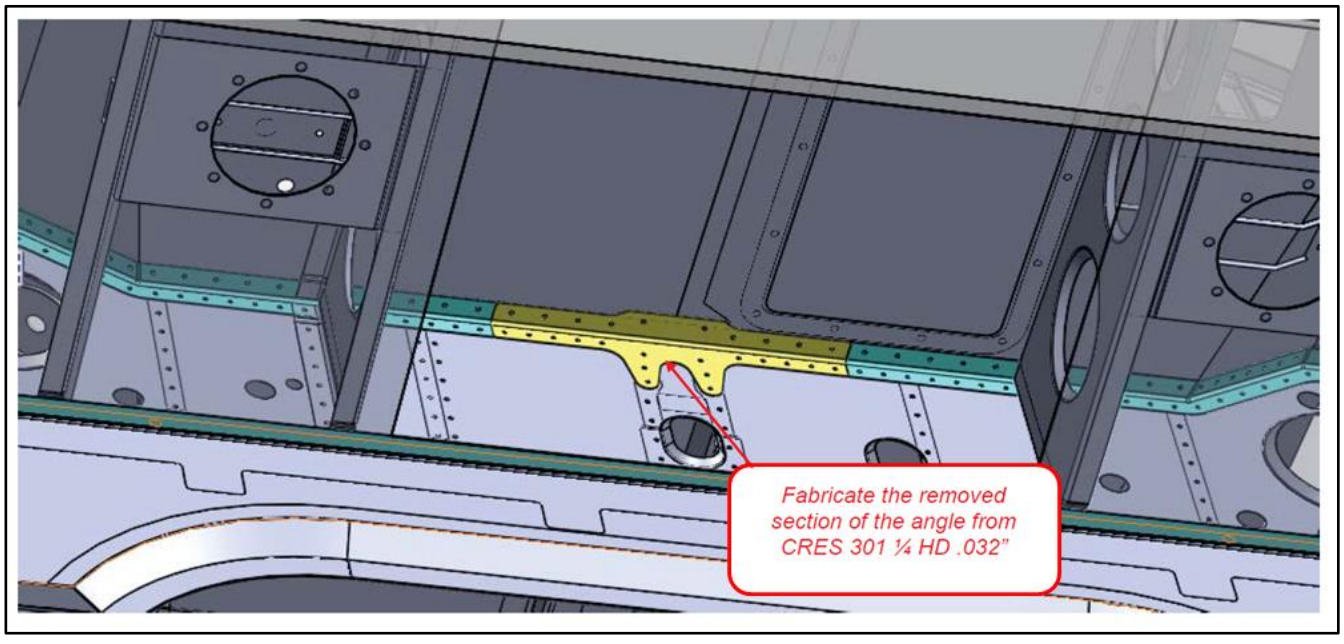



*Figure 6 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

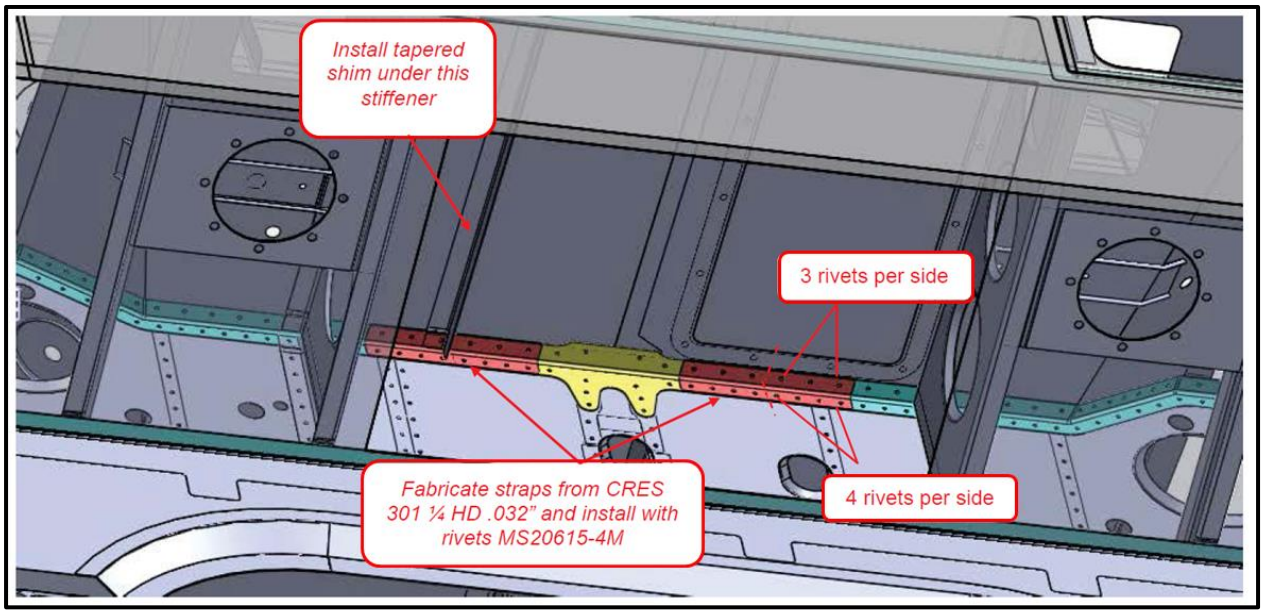



*Figure 7 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

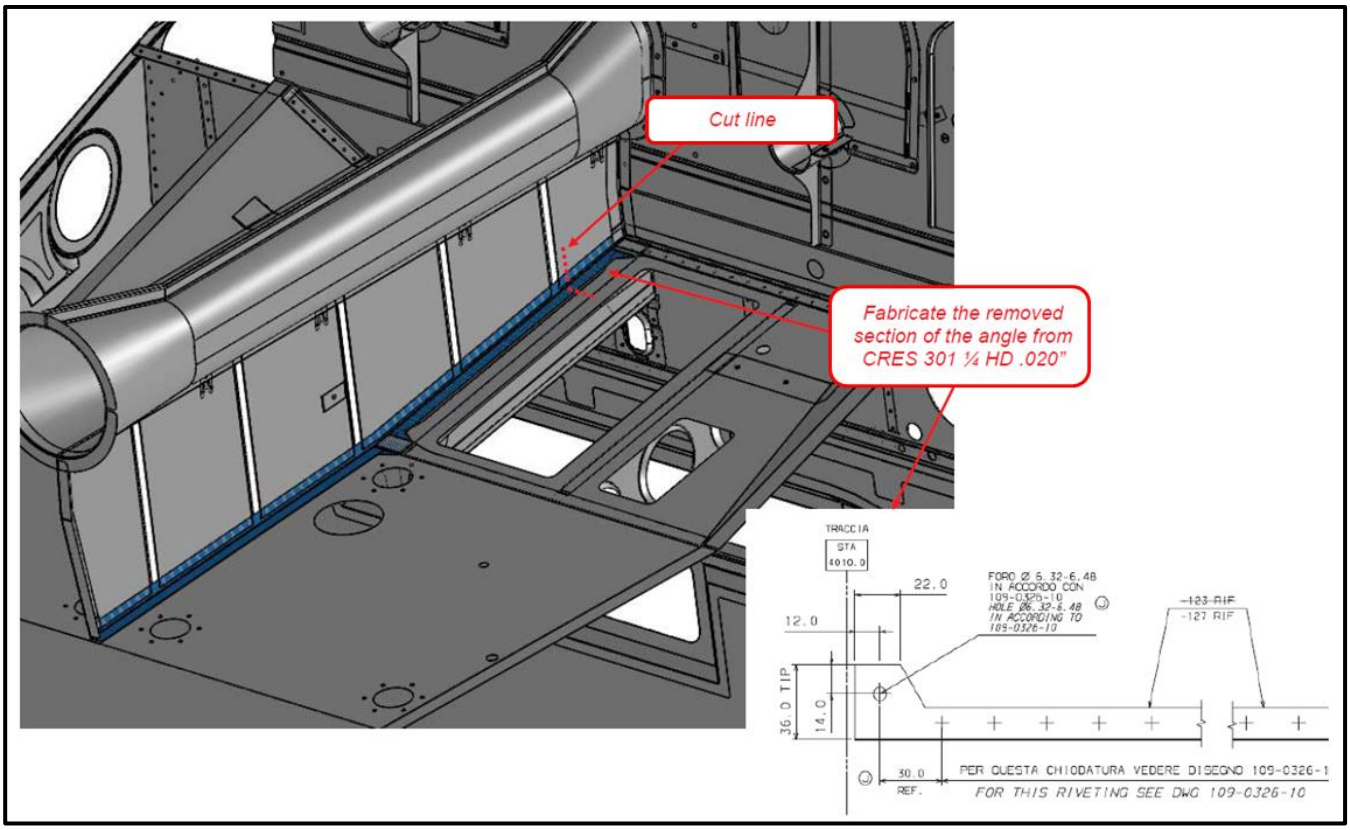



*Figure 8 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

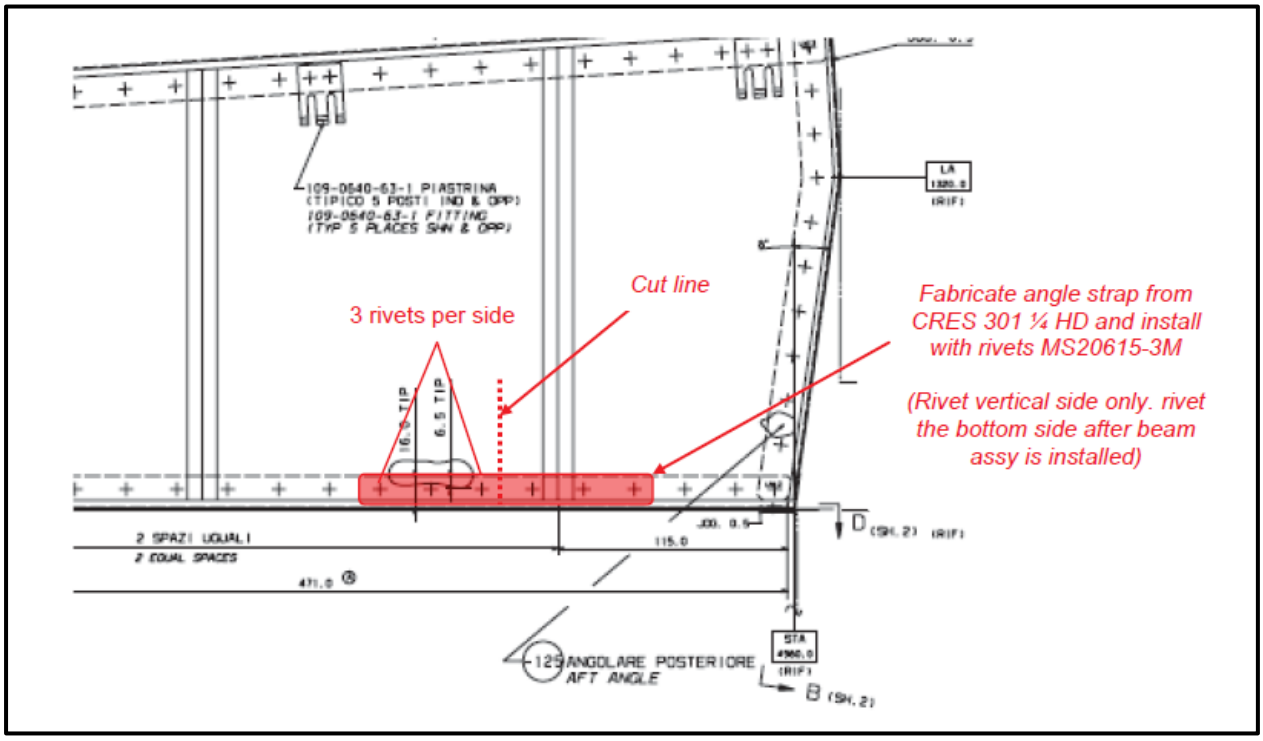



*Figure 9 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

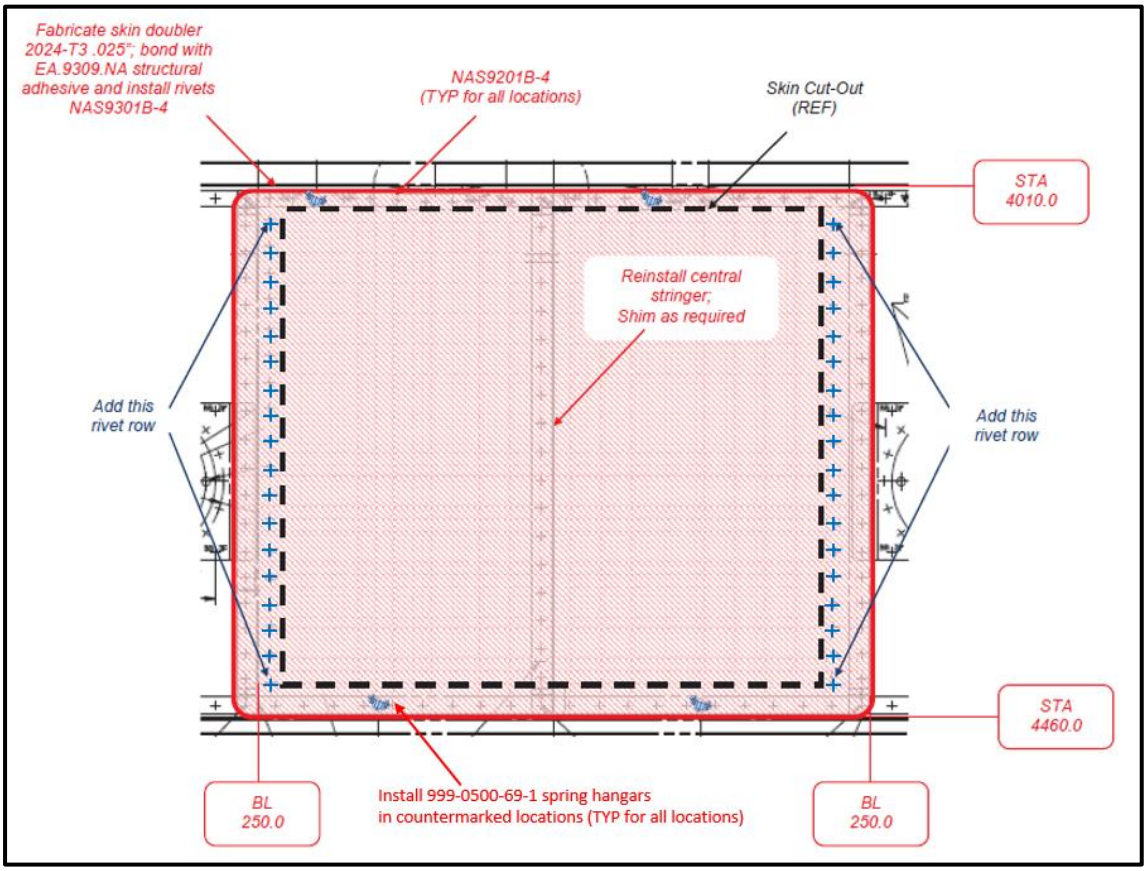



*Figure 10 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

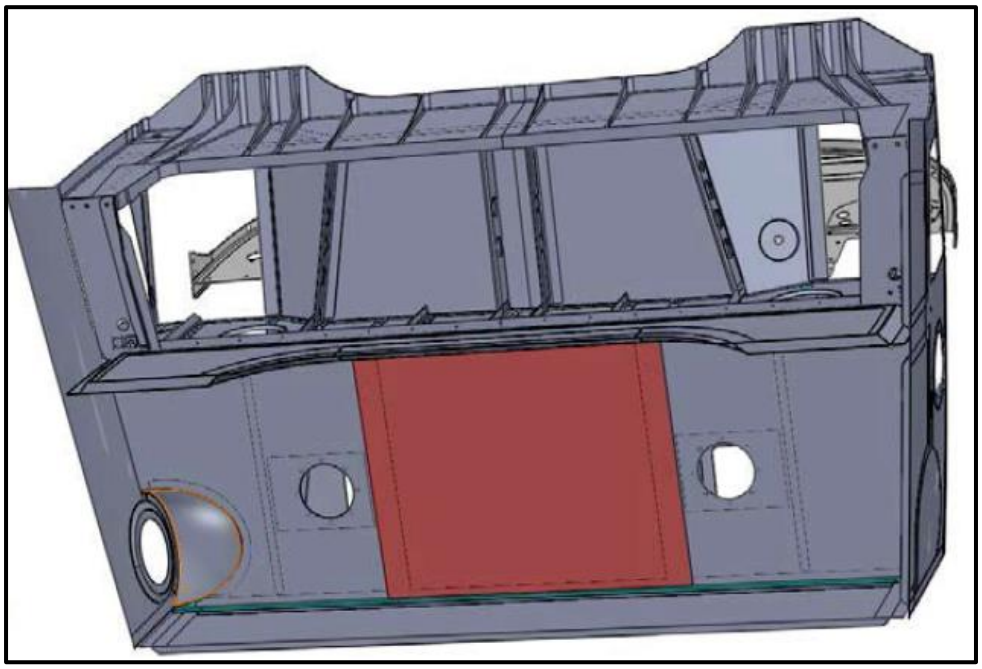


*Figure 11 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

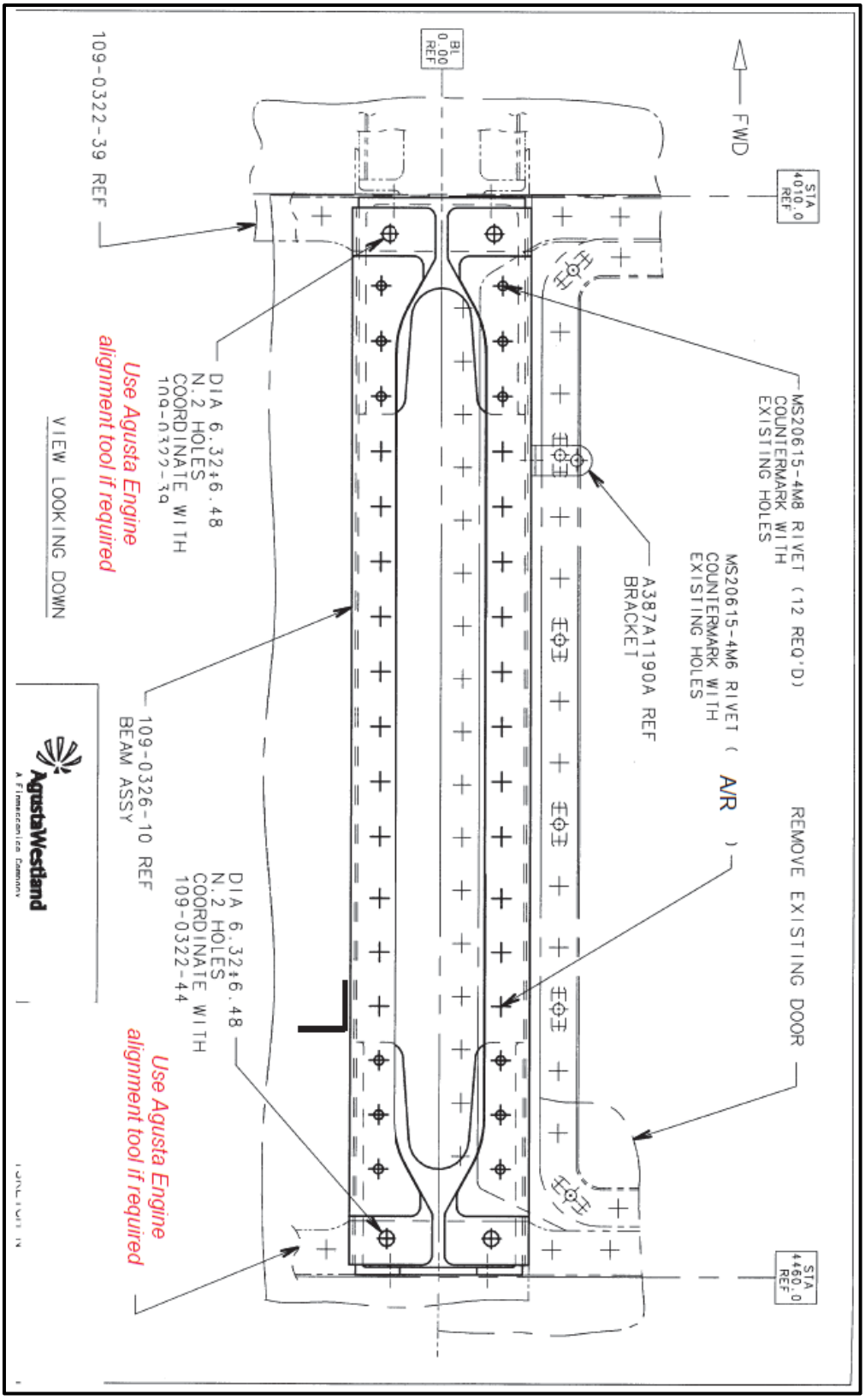



*Figure 12 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

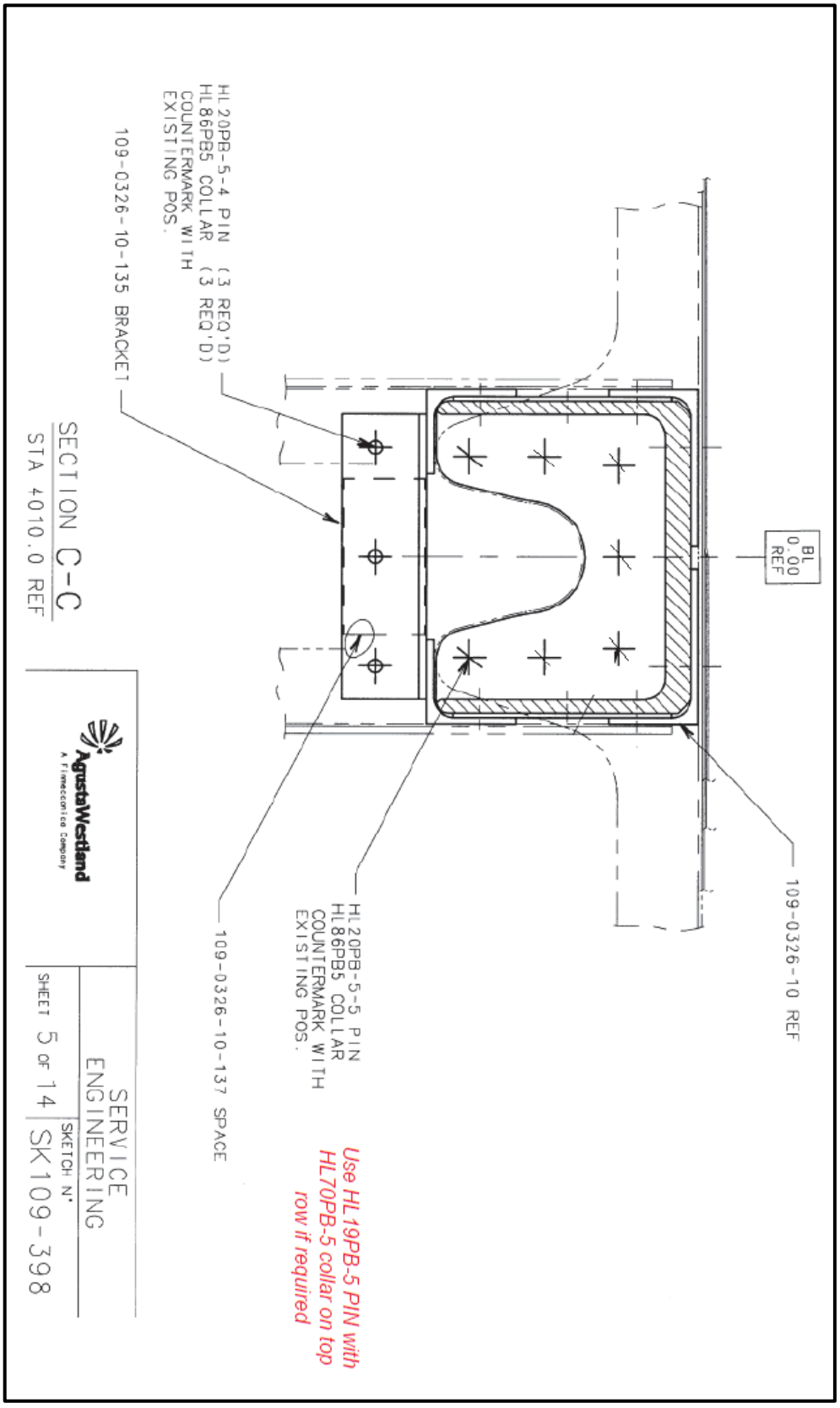



*Figure 13 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

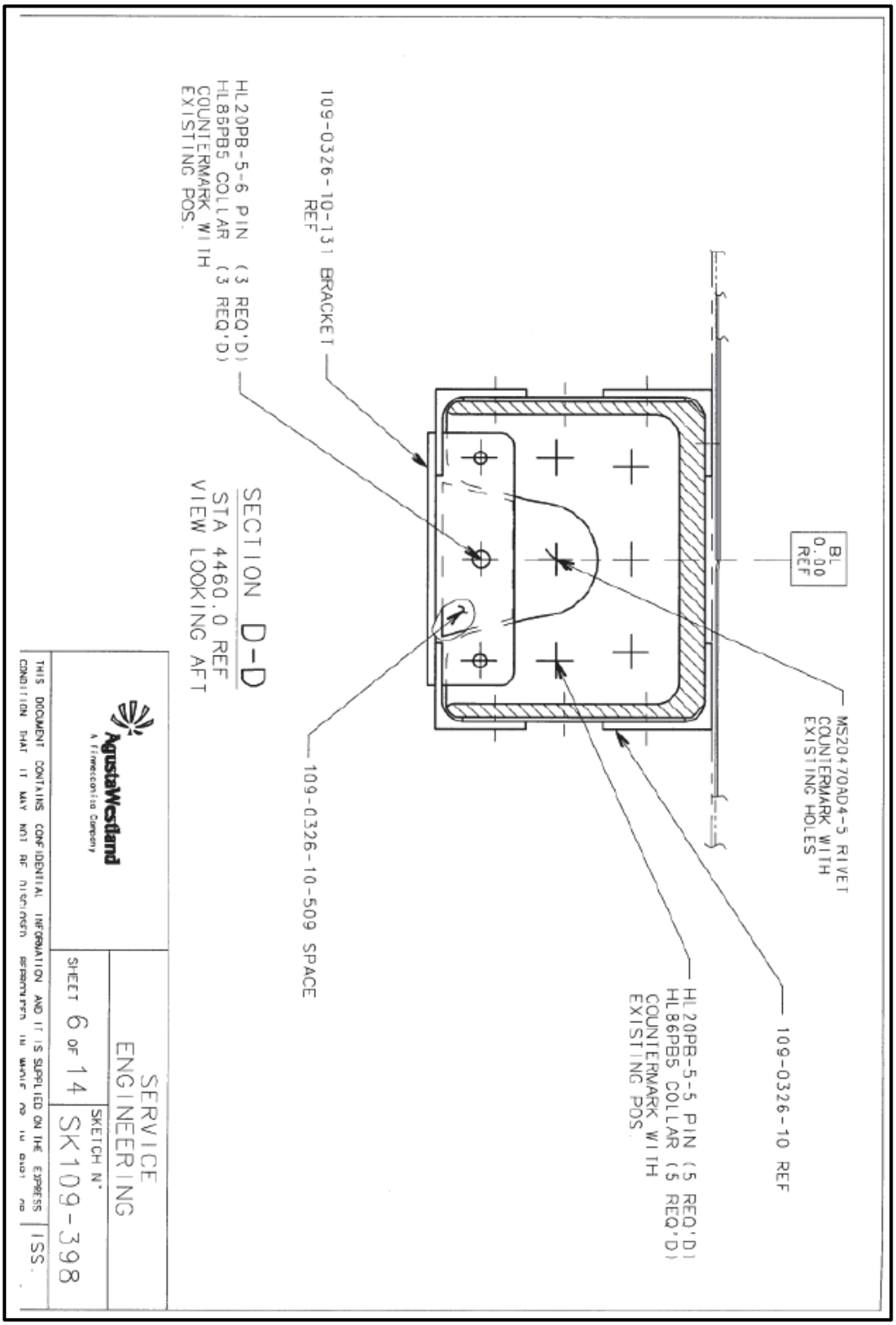



*Figure 14 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

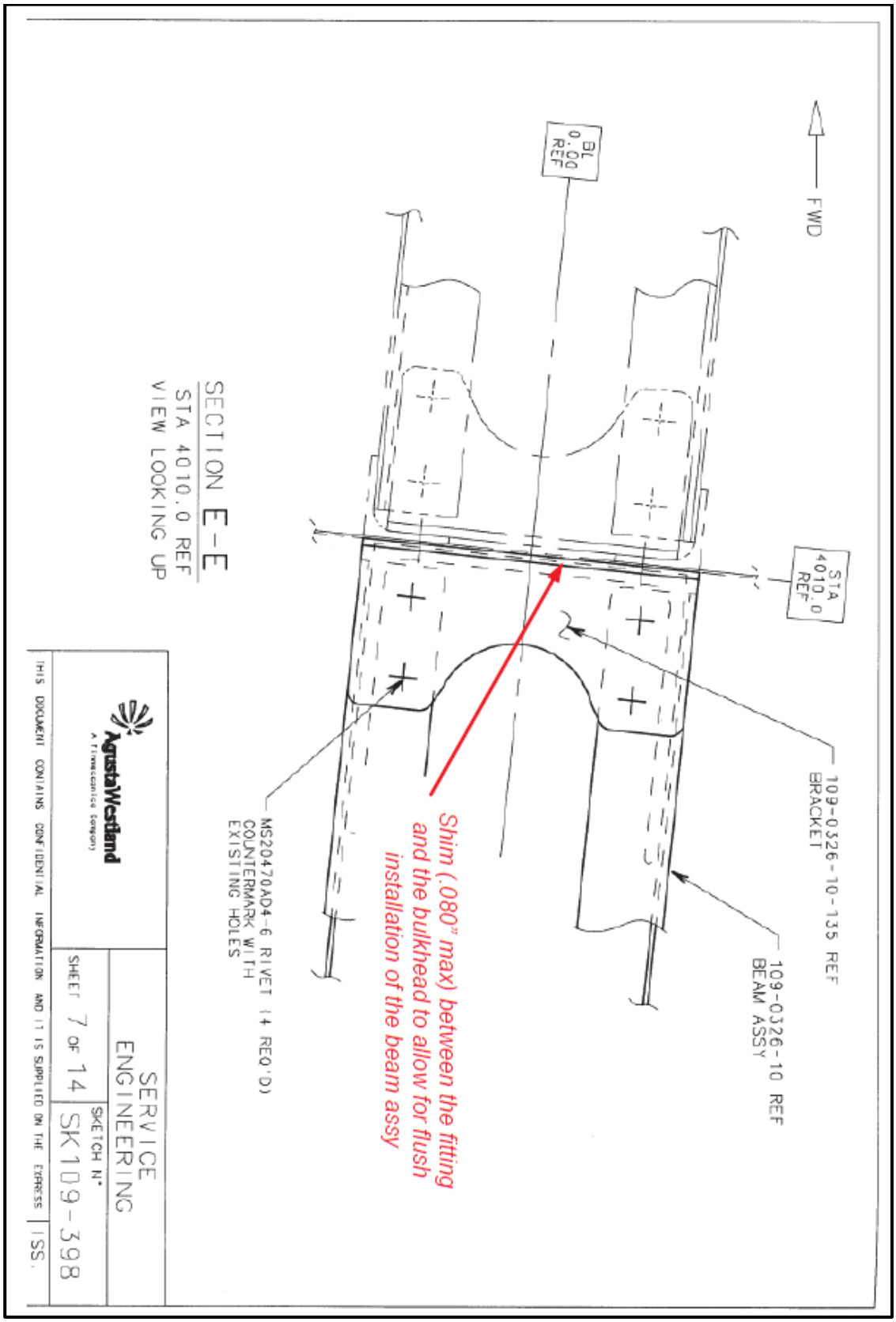



*Figure 15 - Beam Assy STA4010.0 to STA4460.0 – Replacement procedures*

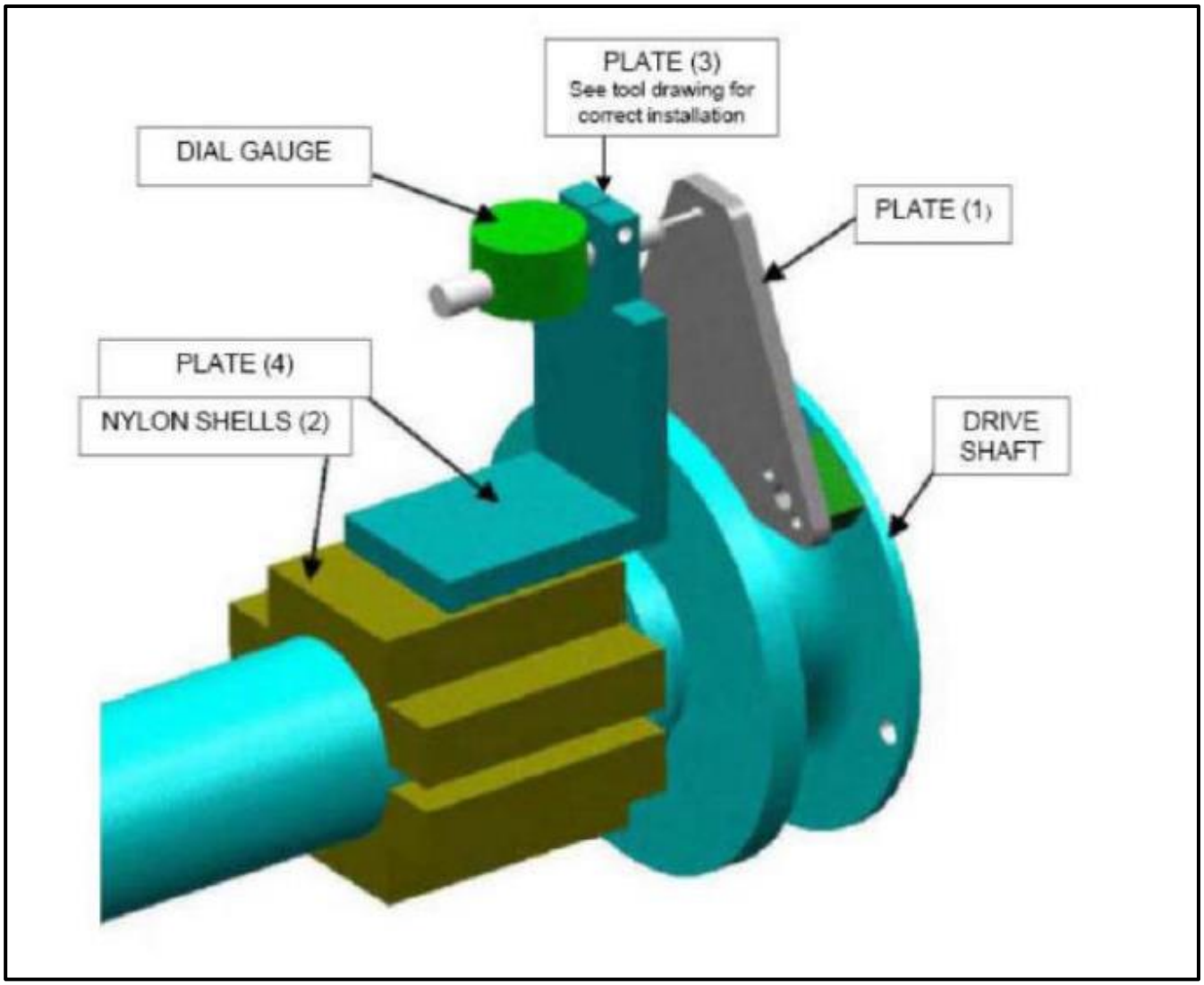
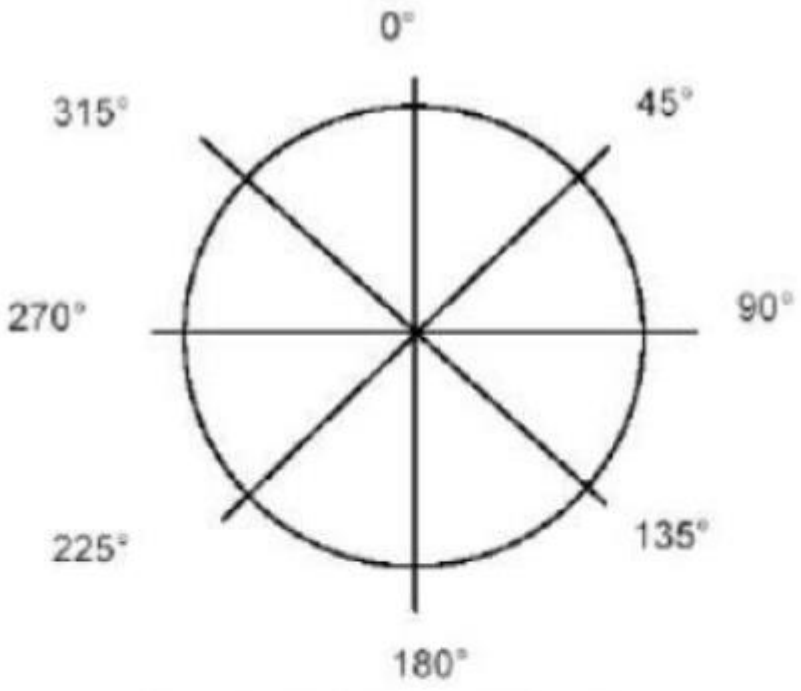



*Figure 16 - Beam Assy STA4010.0 to STA4460.0 – Engine Drive Shaft Alignment Tool*

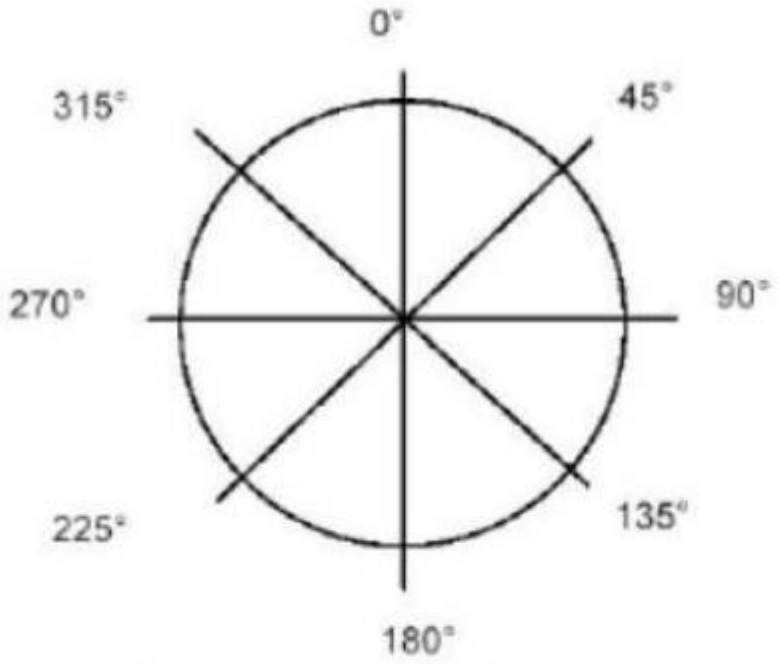



VIEW LOOKING FORWARD

| ANGLE | NOMINAL DISTANCES (mm) | DIAL GAUGE READINGS (mm) | READING LIMITS (mm) | |
|---|---|---|---|---|
| | | | Min | max |
| 0 | 1.270 | | 0.475 | 2.065 |
| 45 | 0.570 | | -0.225 | 1.365 |
| 90 | 0.050 | | -0.745 | 0.845 |
| 135 | 0.000 | | -0.795 | 0.795 |
| 180 | 0.460 | | -0.335 | 1.255 |
| 225 | 1.150 | | 0.355 | 1.945 |
| 270 | 1.680 | | 0.885 | 2.475 |
| 315 | 1.730 | | 0.935 | 2.525 |

TABLE 1 – DRIVESHAFT ALIGNMENT CHECK - TRANSMISSION SIDE

*Figure 17 - Beam Assy STA4010.0 to STA4460.0 – Engine Drive Shaft Alignment Chart*




VIEW LOOKING FORWARD

(if looking aft, towards engine flange, readings shall be taken counterclockwise)

| ANGLE | NOMINAL DISTANCES (mm) | DIAL GAUGE READINGS (mm) | READING LIMITS (mm) | |
|---|---|---|---|---|
| | | | min | max |
| 0 | 0.480 | | -0.335 | 1.255 |
| 45 | 1.150 | | 0.355 | 1.945 |
| 90 | 1.680 | | 0.885 | 2.475 |
| 135 | 1.730 | | 0.935 | 2.525 |
| 180 | 1.270 | | 0.475 | 2.065 |
| 225 | 0.570 | | -0.225 | 1.365 |
| 270 | 0.050 | | -0.745 | 0.845 |
| 315 | 0.000 | | -0.795 | 0.795 |

TABLE 2 – DRIVESHAFT ALIGNMENT CHECK - ENGINE SIDE

*Figure 18 - Beam Assy STA4010.0 to STA4460.0 – Engine Drive Shaft Alignment Chart*

| Action | Result |
|---|---|
| If you add shims under the **AFT Mount**… | …the engine pitches its nose down |
| If you remove shims under the **AFT Mount**… | …the engine pitches its nose up |
| If you add shims under the **OUTBD Mount**… | …the engine pitches its nose up and inboard |
| If you remove shims under the **OUTBD Mount**… | …the engine pitches its nose down and outboard |
| If you add shims under the **FWD Bipod Mount**… | …the engine pitches its nose up and inboard |
| If you remove shims under the **FWD Bipod Mount**… | …the engine pitches its nose down and outboard |
| If you add shims under the **AFT Bipod Mount**… | …the engine pitches its nose up and outboard |
| If you remove shims under the **AFT Bipod Mount**… | …the engine pitches its nose down and inboard |

*Figure 19 - Beam Assy STA4010.0 to STA4460.0 – Engine Alignment Check*

# ***Appendix A***

1. Remove the fwd and aft fitting from the new box beam 109-0326-10-174A1 drilling out the associated rivets.

   **Note**

   In order to place the beam between the bulkheads, partial disassembling of beam components will be necessary. Reassembly is to be done IAW REF[29]; sheet 30.

2. Discard the fittings
3. Install new fwd and aft fittings (109-0325-98-101 and 109-0325-99-101) on the beam using solid rivets MS20470E5 (see figures below); where solid rivets are difficult to install use blind rivets NAS9310M-5; install rivets wet with proseal.