

TECHNICAL BULLETIN
Bell Helicopter **TEXTRON**
A Subsidiary of Textron Inc.

No. 407-05-68
Date July 06, 2005
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DATE
REV

MODEL AFFECTED: 407

SUBJECT: 407-050-102-101 AFT CROSSTUBE ASSEMBLY,
MODIFICATION OF.

HELICOPTERS AFFECTED: Bell 407 helicopters equipped with standard low
skid gear, aft crosstube 407-050-102-101.

[Bell 407 Helicopters serial number 53499 and
subsequent will have the intent of this bulletin
completed before delivery]

COMPLIANCE: At Customer's Option.

DESCRIPTION:

It has been determined that corrosion of the aft crosstube assembly 407-050-102-101
may be attributed to moisture entering through cracks in the paint and sealant.

This bulletin provides instructions to improve corrosion protection; modify the upper
support, 400-052-006-101; lower support, 205-050-133-101 and install the T-bolt
clamps NH1008897-10 on the crosstube assembly.

APPROVAL:

The engineering design aspects of this bulletin are Transport Canada approved.

MANPOWER:

Approximately eight (8) man-hours are necessary to complete this bulletin. Man-hours
are based on hands-on time and can change due to personnel and facilities available.

MATERIALS:

Required Material:

The material that follows is necessary to complete this bulletin and can be obtained through your Bell Helicopter Textron Supply Center. Order hardware kit **CT-407-05-68** that consists of the parts that follows:

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>QUANTITY</u>
MS21141-0812P	Fastener, blind	4 (Note 1, 2)
MS21141-0813P	Fastener, blind	4 (Note 1, 2)
ABRACOR 5-PT	Kit, ACR Coating	1 (Note 3)

NOTES:

1. A Huck Rivet Pneumatic Installation tool P/N 115, 353 or 2700 with nose assembly, P/N 99-591 or equivalent is necessary to install these rivets. Cherry Textron installation tool P/N G87D may be used as an alternate with nose assembly, P/N 99-591.
2. Two different rivet lengths are provided with this kit to allow for stack-up tolerances.
3. The Abrasion and Corrosion Resistant (ACR) coating kit includes pre-measured quantities of adhesive EC2216B/A, Super Koropon primer and Acetone solvent. Mixing these pre-measured components gives exact composition of the ACR coating for the protection of the crosstube. Refer to Table 2 for preparation and application.

Conditional Replacement Part

The following parts may be required in case existing parts are found corroded beyond repair and require replacement. Parts are available from your BHT Supply Center.

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>QUANTITY</u>
400-052-006-103	SUPPORT, UPPER	1 (Note 1)
407-731-101	CLAMP, T-BOLT	2 (Note 2)
407-723-104	CROSTUBE ASSY	1 (Note 3)

NOTES:

1. Support 400-052-006-103 replaces 400-052-006-101.
2. T-bolt clamp 407-731-101 replaces 407-650-001-101 and NH1008897-10.
3. Crosstube assembly 407-723-104 replaces 407-050-102-101 and /-103.

Consumable Material:

The following material is required to accomplish this bulletin, however this material is considered consumable (bench stock) material and may not require ordering depending on the operators consumable material stock levels. This material may be obtained through your Bell Helicopter Textron Supply Center.

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>REF.NO. (NOTE 1)</u>
METHYL ETHYL KETONE	SOLVENT (MEK)	C-309 (NOTE 2)
MIL-S-8802	SEALANT	C-308
MIL-P-85582, TYI, CL2	EPOXY PRIMER	C-204 (NOTE 3)
TURCO 5351(T-5469)	PAINT REMOVER	C-436 (NOTE 5)
TT-N-95, TYII 1 GAL	NAPHTHA	C-305
MIL-C-81706 1 QT	CHEMFILM	C-100
IMRON®	POLYURETHANE ENAMEL	COMMERCIAL (DUPONT) (NOTE 4)
ACETONE GALLON	ACETONE ASTM D329	C-316
250,1.00 WIDE	FLAT BLACK TAPE	C-518

NOTES:

1. The C-XXX REF.NO., above are cross-references found in the Standard Practices Manual.
2. Where the use of MEK is prohibited, use Acetone ASTM D329 (C-316) or Aliphatic Naphtha, TT-N-95, Type II (C-305).
3. As an alternative, use Epoxy Polyamide primer per MIL-P-23377 (C-204).
4. Color and type to match your aircraft. Unless otherwise specified at delivery, standard crosstube paint is Imron® 6538U white.
5. Paint removers conforming to MIL-R-81294A or MIL-R-8633A are acceptable alternates.

SPECIAL TOOLS:

Fastener installation tool (see Material section).
 Hoist and aircraft jacks.
 Drill guide (may be made locally, see Figure 5).
 Digital angle protractor or equivalent.
 Grit blasting equipment.
 Paint Spraying Equipment.

WEIGHT AND BALANCE:

Not affected.

ELECTRICAL LOAD DATA:

Not affected.

REFERENCES:

BHT-407-MM-5, Rev.21, 16 Nov 2004, Chap. 32, Landing Gear.

BHT-ALL-SPM, Rev.1, 30 June 2004, Standard Practice Manual, Chapter 4.

BHT-ALL-SPM, Rev.1, 30 June 2004, Standard Practice Manual, Chapter 13.

PUBLICATIONS AFFECTED:

BHT-407-MM-5, Rev.21, 16 Nov 2004, Chap. 32, Landing Gear.

BHT-407-IPB, Rev.3, 06 September 2002, Chap. 32, Landing Gear.

ACCOMPLISHMENT INSTRUCTIONS:

CAUTION

SAND ONLY THE PAINT AND PRIMER. SAND ONLY PARALLEL TO THE LONGITUDINAL AXIS OF THE CROSSTUBE.

1. Remove the landing gear from the helicopter (refer to BHT-407-MM-5, Chapter 32).
2. Remove the rocker beam to get access to the upper and lower supports (refer to BHT-407-MM-5, Chapter 32).
3. Before you remove the upper and lower supports (2 and 4, Figure 1), do the steps that follow:
 - a) Using a plastic scraper and solvent, remove sealant completely from periphery of upper and lower supports.
 - b) With aluminum tape or an equivalent method, index mark the position of the left and right edges of upper support on crosstube (5).
4. Remove supports (2, 4), U-bolts (3), and T-bolt clamps (1) from crosstube. Be sure to keep the index tape markings on crosstube. Upper support may be reused if serviceable. Lower support and U-bolts will be used as work aids and then discarded. Refer to figure 1.
5. Inspect upper support (2) and T-bolt clamps (1) for corrosion and other damage as per Figure 3. Replace as required.
6. Inspect and repair the crosstube (5) in accordance with the (BHT-407-MM-5, Chap. 32, Landing Gear) and by using the procedure below:

CAUTION

POLISH OR SAND PARALLEL TO THE LONGITUDINAL AXIS OF THE CROSSTUBE.

- a) Use 180 or 220 grit sandpaper. Blend corrosion damage by hand sanding to a depth equal to two (2) times the depth of corrosion. Use a slope of 20:1 to fair the reworked area to the surface of the crosstube (5).
- b) Blend mechanical damage to a depth sufficient to remove damage. Use a slope of 20:1 to fair the reworked area to the surface of the crosstube (5).

7. Do preliminary installation of serviceable upper support 400-052-006-101, or new upper support 400-052-006-103 on a serviceable crosstube as follows:

- a) Refer to Figure 2 (sheet 2) to determine the rivet hole pattern on the upper support (2).

- NOTE -

The angle measurement for the upper support must be made while the skid gear is assembled, and the landing gear assembly is resting on a flat level surface.

- b) Zero a digital protractor or (equivalent) on the R/H skid tube. Refer to figure 2 (sheet 1). The anti-skid material on the skid can be smoothed to obtain a level surface. Place upper support (2) on crosstube using the tape index marks from step 3b) for lateral centering. Place the protractor or (equivalent) on top of the upper support and set it to an angle of $6 \pm 1/2$ degrees relative to the plane of the R/H skid tube. Refer to Figure 2 (sheet 1 section A-A). Secure upper support temporarily in place using the lower support (4) and U-bolts (3). Torque U-bolt nuts to 20 inch-pounds (2.26 Nm).

- NOTE -

Use a drill guide or workaid (Figure 5) ensure the holes are perpendicular to the surface of the support (2).

- NOTE -

Pause frequently during drilling operation to prevent overheating of the crosstube material. New drill bits are recommended and preferred during the drilling operation.

- NOTE -

Index mark the orientation of the upper support (2). If you have drilled the support with the raised part number characters on the support to the left, make sure it is oriented in the same way when the first rivet is installed.

- c) Using a #40 drill bit and suitable drill guide or workaid (Figure 5), drill four pilot holes through upper support (2) and crosstube (5). Holes will be drilled full size at a later step.
- d) Remove supports (2,4) from crosstube. Keep upper support (2) for later installation. Keep lower support (4) and U-bolts for future use as work aid.

e) Remove the tape index marks from crosstube.

8. Modify T-bolt clamps (1) as follows:

- NOTE -

If you replace T-bolt clamps NH1008897-10 with new T-bolt clamps 407-731-101 or P/N 407-650-001-101, you do not need to accomplish steps 8a) through 8e).

- NOTE -

For grit blasting of the T-bolt clamps, aluminum oxide is preferred; but sand or glass bead blasting are acceptable alternates.

- NOTE -

Removing the paint and primer from the T-bolt clamps with paint stripper (C-436) as a first step will reduce the time necessary to grit blast the clamps.

- a) Use 220 size grit to blast all surfaces of T-bolt clamps (1) except threads. Set the air pressure to 25 – 50 psi (170 – 345 kPa).
- b) Clean all grit blasted surfaces with solvent (C-309).

- NOTE -

To ensure sufficient quantities of ACR coating, plan work so that T-bolt clamps, upper support and crosstube are sprayed all in one lot. Pot life is 3 to 4 hours.

- c) Prepare mix of Abrasion and Corrosion Resistant coating (ACR coating) from adhesive EC2216, Super Koropon primer and solvent. Refer to Table 2 for mixing instructions.
- d) Apply ACR coating to the prepared surfaces of the T-bolt clamps in accordance with procedure described in Note 3 of Table 2. Apply ACR coating within 3 hours to prevent corrosion. Allow curing per options in Table 2.
- e) Identification of the clamps will be done at a later step.

9. Modify upper support (2) as follows:

- NOTE -

If you replace upper support 400-052-006-101 with a new Upper Support 400-052-006-103, you do not need to accomplish steps 9a. through 9f.

- NOTE -

For grit blasting of the upper support, aluminum oxide is preferred; but sand or glass bead blasting are acceptable alternates.

- NOTE -

Removing the paint and primer from the upper support with paint stripper (C-436) as a first step will reduce the time necessary to grit blast the support. Plug bolt hole to prevent entry of contaminants.

- a) Radius all sharp edges of support faying surfaces to 0.03 inch (0.762 mm) X 45° or .03R finish to 125 RMS.
- b) Use size 220 grit to blast all surfaces of support (2) except inside bolt hole and as shown on Figure 3. Set the air pressure to 25 – 50 psi (170 – 345 kPa).
- c) Clean support (2) with solvent (C-309) or equivalent.

- NOTE -

To ensure sufficient quantities of ACR coating, plan work so that T-bolt clamps, upper support and crosstube are sprayed in one lot. Pot life is 3 to 4 hours.

- d) Prepare mix of Abrasion and Corrosion Resistant coating (ACR coating) from adhesive EC2216, Super Koropon primer and solvent. Refer to Table 2.
- e) Apply ACR coating to the prepared surfaces of the support within three hours to prevent corrosion. Apply in accordance with procedure described in Note 3 of Table 2. Allow curing per options in Table 2.
- f) Identification of the support will be done at a later step.

10. Modify aft crosstube (5) as follows:

- a) Determine the area, 15 inches (381 mm) either side of the center of the crosstube (5), from which you will remove the paint. Refer to Figure 2 (sheet 2).

CAUTION

DO NOT GRIT BLAST CROSSTUBE. ENSURE THAT THE FOUR PILOT HOLES IN THE CROSSTUBE FOR THE SUPPORT FASTENERS ARE SEALED BEFORE YOU APPLY PAINT STRIPPER.

- b) Protect the painted surface of the crosstube (5) with aluminum tape. Plug the four pilot holes drilled in the center of the crosstube (5) to prevent entry of stripping agent inside crosstube. Remove all residual sealant from crosstube.
- c) Use chemical stripping agent (C-436) to remove the paint and primer from the surface of the crosstube (5). Do not use grit blasting on crosstube.
- d) Clean surface thoroughly with solvent and dry with clean dry shop air.
- e) Apply Alodine chemical film (C-100) to bare metal surface of crosstube. Rinse off the chemical film thoroughly with clean water. Dry with clean, dry shop air.

- NOTE -

To ensure sufficient quantities of ACR coating, spray T-bolt clamps, upper support and crosstube all in one lot. Pot life of mixture is 3 to 4 hours.

- f) Prepare mix of Abrasion and Corrosion Resistant coating (ACR coating) from adhesive EC2216, Super Koropon primer and solvent. Refer to Table 2.
- g) Apply ACR coating to the prepared surfaces of the crosstube. Refer to the procedure described in Note 3 of Table 2. Allow curing per your preferred option in Table 2.
- h) Identify modified crosstube assembly as 407-050-102-103FM. Use a vibrating stylus on the right hand side cuff immediately above the edge of the skid tube saddle. Refer to Figure 4. Prime vibroetched area and refinish as required.

11. Determine thickness of shims (if required) under support as follows:
Refer to Figure 2 (sheet 3).

- NOTE -

The following steps describe how to shim a gap between the crosstube and the support once the ACR coating has cured on both parts.

- NOTE -

No shims are required if the total gap is less than .010 inch. You may then proceed to step 12.

- NOTE -

If total gap exceeds .050 inch (.025 inch per side), contact BHT Product Support Engineering for further instructions.

- a) Locate upper support (2) over crosstube (5). Align pilot holes in both parts. Ensure support is properly oriented per note in step 7c.
- b) Use wing sheet holders (clecos), secure support (2) to crosstube (5).
- c) Record total gap (A+B) per Figure 2.
- d) If gap is more than .050 inch total both sides (.025 inch on each side), contact BHT Product Support Engineering. If gap is less than .010 inch totals both sides, shims are not required. Proceed to step 12.
- e) Position support on crosstube so that gap is evenly distributed on both sides.
- f) Make solid shims to fill gaps within -.005 inch from aluminum alloy 7075-T6 or 2024-T3 or -T4.
- g) Taper shims as required. Shim thickness after tapering to be no less than .005 inch. Refer to figure 2 (sheet 3).

- NOTE -

Identify location and orientation of each shim for future steps.

- h) Remove support from crosstube and transfer pilot holes in the support to the shims. Deburr holes.
- i) Prime shims using primer C-204 and allow curing.

12. Install new or modified upper support (2) as follows:

- a) Locate support (2) and shims over crosstube (5). Align fastener pilot holes with all parts.
- b) Use suitable size wing sheet holders, and U-bolts (3) to secure the support and shims on the crosstube. Ensure support and shims are properly oriented as determine in step 7c and 11g at all time.

- NOTE -

Pause frequently during drilling operation to prevent overheating of the crosstube material. New drill bits are recommended and preferred during the drilling operation.

CAUTION

INCREASE THE SIZE OF THE FASTENER PILOT HOLES IN TWO INTERMEDIATE INCREMENTS BEFORE DRILLING HOLES TO FINAL SIZE (STEP 12 C).

- c) Using a size "G" drill and drill guide or workaid (Figure 5), enlarge all four fasteners holes to 0.261 inch (6.62 mm) diameter. Wing sheet holder .250 inch diameter should be used at this time to hold the parts once a hole is drilled.

CAUTION

PAY SPECIAL ATTENTION TO DEBURRING THE INSIDE EDGE OF THE HOLES IN THE CROSSTUBE. BURRS THAT ARE NOT REMOVED MAY CAUSE UNACCEPTABLE STRESS CONCENTRATIONS.

- d) Remove upper support (2) and shims. Deburr all holes in crosstube (5), support (2) and shims.
- e) Determine the optimum grip length of rivet required (-12 or -13).
- f) Apply a uniform coat of sealant (C-308) to faying surfaces of crosstube (5) and support (2).
- g) Place support (2) in position and install fasteners (6) wet with sealant. Remove excess sealant squeeze-out and fair around edges.

h) Cover heads of fasteners (6) with sealant (C-308). Allow sealant to cure.

13. Install new or modified T-bolt clamps (1) as follows:

a) Apply a uniform coat of sealant (C-308) to all faying surfaces of T-bolt clamps and crosstube. Install T-bolt clamps (1) (Refer to Figure 2) while sealant is wet. Tighten T-bolt nuts no more than 5 – 10 in-lbs (0.56 – 1.12 Nm) (+ tare torque) to obtain a uniform squeeze-out of sealant.

b) Remove excess sealant squeeze-out and fair to seal all edges of clamps. Allow sealant to cure at room temperature for 24 hours.

c) Final tighten T-bolt nuts 50 – 70 in-lbs (5.6 – 7.9 Nm) (+ tare torque).

14. Apply primer C-204 to all reworked surfaces and sealant surfaces of crosstube assembly. Allow primer to dry.

15. Refinish crosstube assembly (5) with two coats of IMRON® polyurethane enamel. Paint. Use color and type to match your helicopter or #6538 White. Allow paint to cure.

16. Use an indelible ink pen and identify support (2) as 407-704-009-115 and crosstube (5) as 407-704-009-119 on the R/H side of the upper support (2).

17. Refer to BHT-407-MM-5, Chapter 32 to install rocker beam.

-NOTE-

The rocker beam has two stop bosses located at each end to maintain the beam between the fuselage fittings. The rocker beam is properly installed when the stop boss that is closest to the edge is located aft.

18. Install landing gear on helicopter (refer to BHT-407-MM-5, Chapter 32).

19. Make an entry in the helicopter Historical Records (HR) to show that this Service Bulletin is completed.

TABLE 2. Abrasion and Corrosion Resistant (ACR) Coating – Preparation and Application Instructions.

ACR COATING	POT LIFE Room Temp. (minutes)	FULL CURE Room Temp. (65-85°F)	ALTERNATE HEAT CURE (140°F)	MIXING RATIO
ABRACOR 5-PT	3 to 4 hours	16 to 24 hours	Air dry for 30 minutes followed by heat cure for 3 hours minimum at 130° to 150°F	SEE NOTE 1

NOTES:

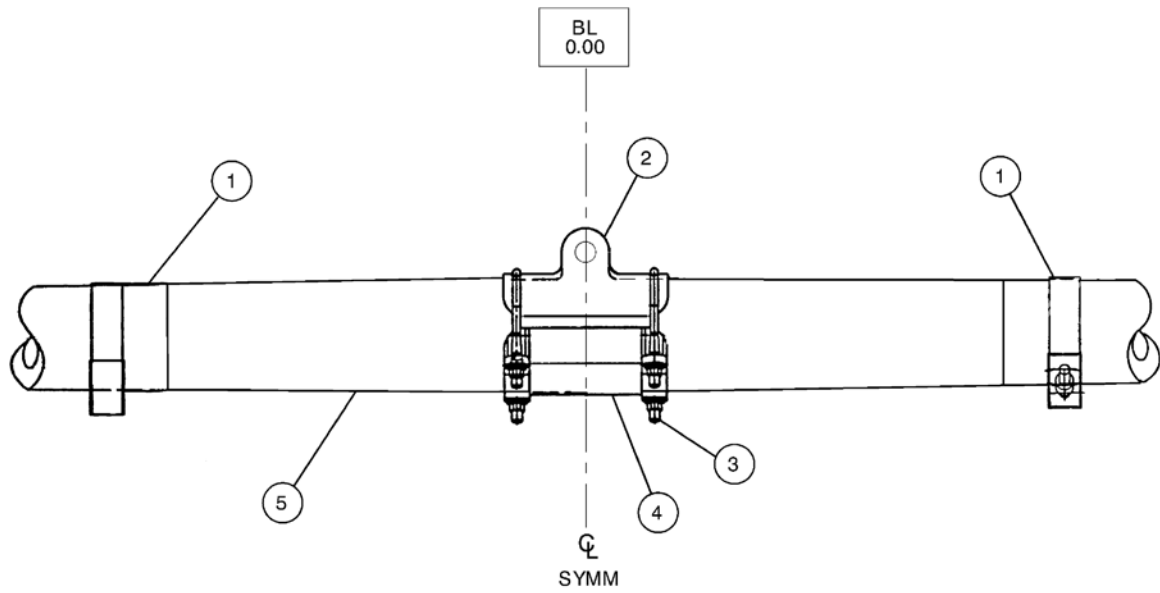
1. The five components of ACR coating kit P/N ABRACOR 5-PT are pre-measured. Mix components as follows: Do not deviate from these mixing instructions.
 - a) Thoroughly mix component A into component B of adhesive EC2216 until you get a uniform color.
 - b) Mix the two (2) components C and D of Super Koropon and add to the adhesive mixture, step a) above. Blend both mixtures thoroughly while adding all of component E (ACETONE). Obtain a uniform mixture.
 - c) The pot life of the resultant ACR is 3 to 4 hours.
2. To ensure sufficient quantities of ACR coating, plan work so that T-bolt clamps, upper support and crosstube are sprayed all at once. Pot life of mixture is 3-4 hours.
3. Apply the ACR coating as follows:
 - a) Using any suitable spray equipment, apply one uniform coat, 1.5 to 3.0 mil (0.0015 to 0.0030 inch thickness) of ACR coating. This corresponds to one full wet coat.
 - b) Allow the ACR coating to air dry (cure) for 16 to 24 hours at room temperature.
 - c) Examine the cured coating for condition and appearance. The properly cured ACR coating will be smooth, continuous and free from blisters and grainy areas.
 - d) Dry tape test all parts that have been coated with the ACR as follows:
 - 1) Apply a one (1) inch wide strip of (C-518) high adhesion tape to a selected test area. Press the tape with firm finger pressure on the test area.

- 2) Grasp one end of the tape, hold it at 90 degrees from the surface, and remove the tape in one abrupt motion.
 - 3) If a loss of adhesion occurs. Perform a dry tape test to determine the extent of the unsatisfactory adhesion area.
 - 4) If conditions and appearance of ACR coating is found serviceable on one or all of the components proceed with the installation steps 12 and 13.
 - e) If the condition or appearance of the ACR coating requires a repair, proceed with step 4 below.
4. Repair or rework small cured areas of the ACR coating as follows:

CAUTION

POLISH OR SAND ONLY PARALLEL TO THE LONGITUDINAL AXIS OF THE CROSSTUBE.

- a) Remove the coating by hand sanding. Do not damage the metal below.
- b) Fair the edges of the coating that remains.
- c) If metal has been exposed, treat bare metal with chemical film (C-100). Rinse off chemical film thoroughly with clean water. Dry with clean, dry shop air.
- d) Reapply the ACR coating. Allow curing at room temperature for 16 to 24 hours. Small areas, not more than ten (10) square inches, can be brush-coated with mixture. Allow the mixture to dry at room temperature for a minimum of eight (8) hours. As an alternative the mixture can be cured with heat - 140°F ± 10°F (60°C ± 5°C), for 3 hours minimum.
- e) Perform a dry tape test in accordance with step 3 d. above.

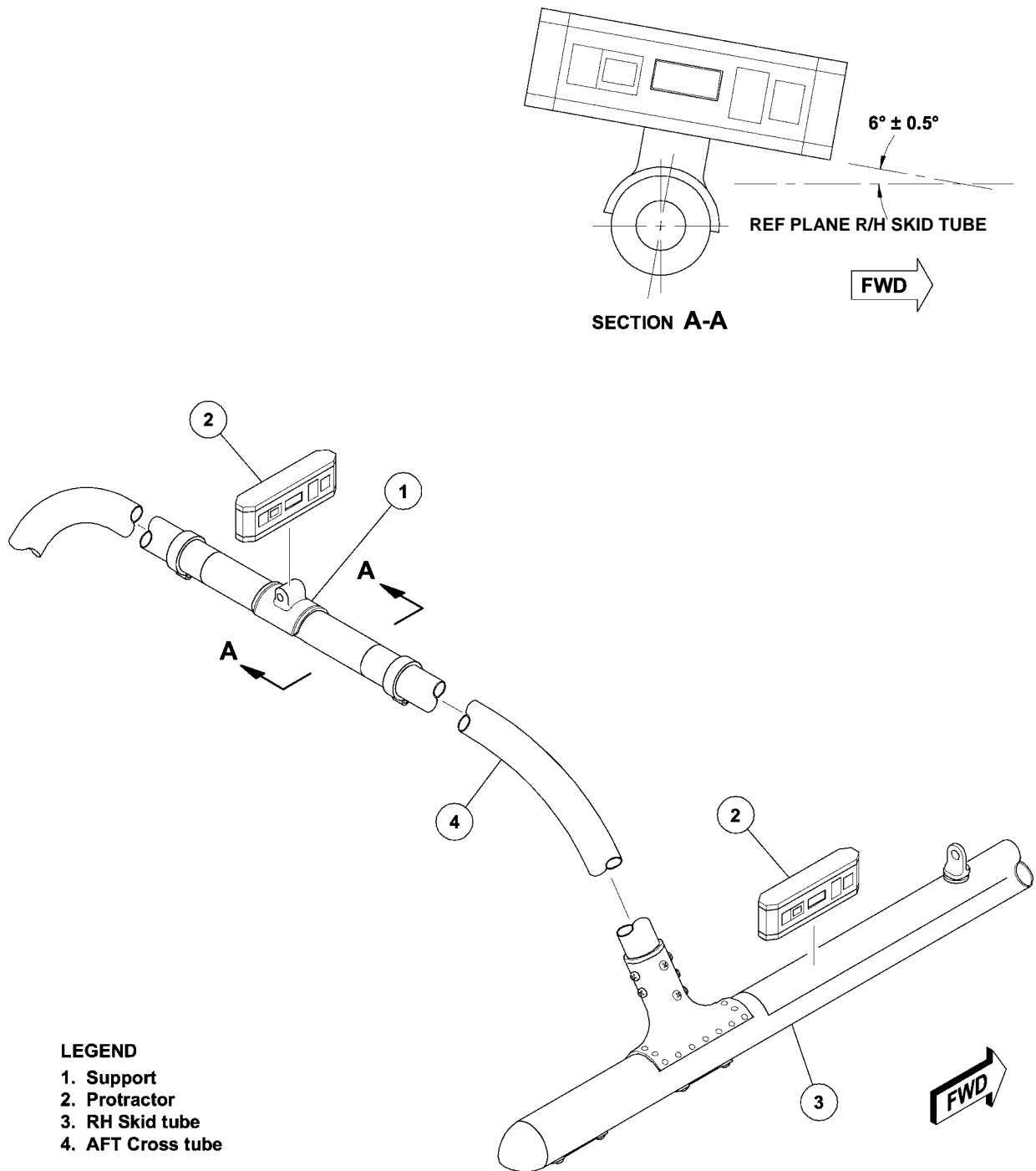


LEGEND

- 1. Clamp, T-Bolt
- 2. Support, upper
- 3. U-Bolt
- 4. Support, lower
- 5. Crosstube, assy

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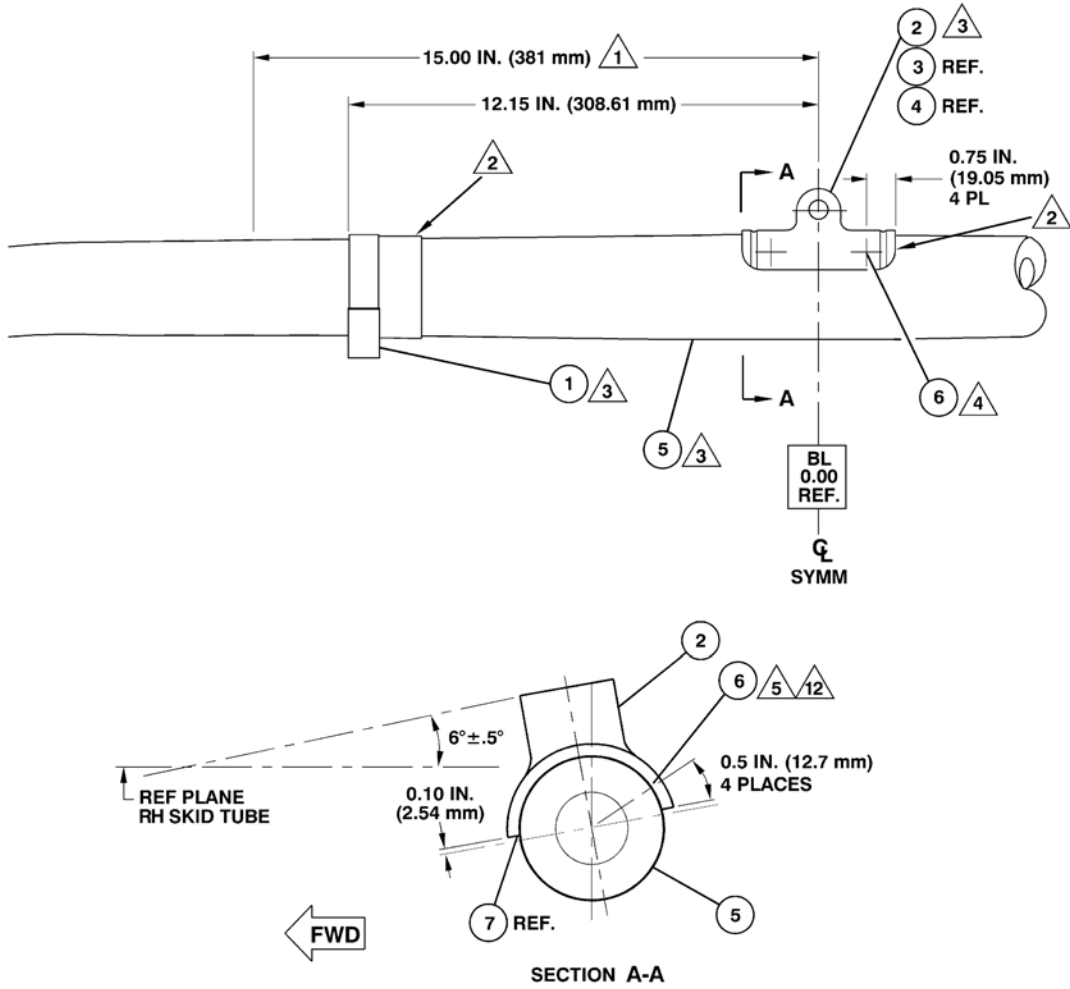
Figure 1. Aft crosstube



- LEGEND**
- 1. Support
 - 2. Protractor
 - 3. RH Skid tube
 - 4. AFT Cross tube

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Figure 2. Aft crosstube support installation (Sheet 1 of 3)

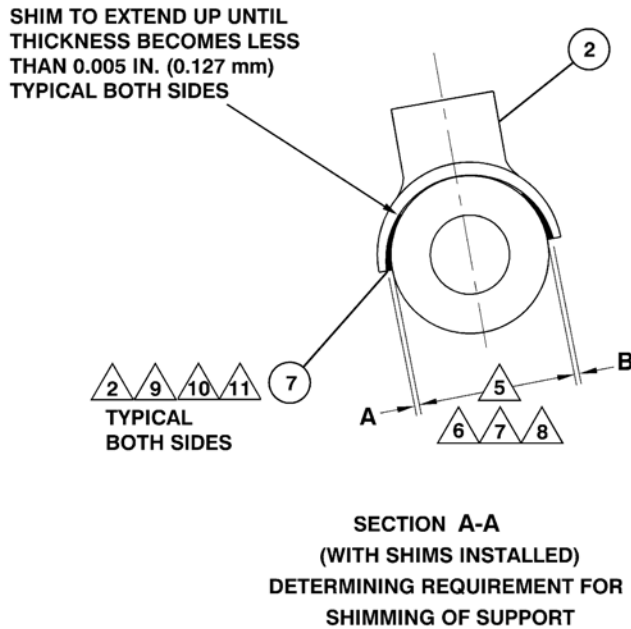


LEGEND

- 1. Clamp, T-bolt
- 2. Support, upper
- 3. U-bolt
- 4. Support, lower
- 5. Crosstube assembly
- 6. Fasteners MS21141-0812P or MS21141-0813P
- 7. Shim, locally fabricated, if and as required (see Sheet 3)

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Figure 2. Aft crosstube support installation (Sheet 2)

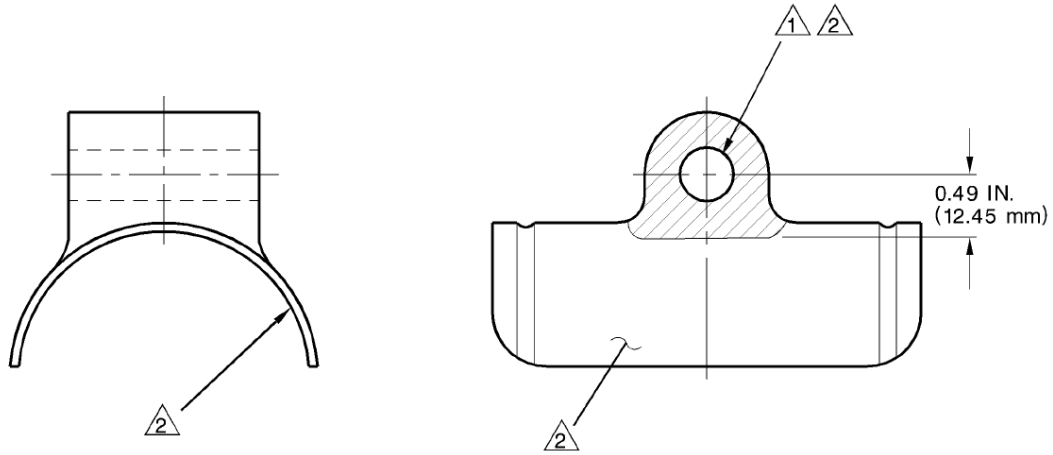


NOTES




- 1 Remove paint in this area both sides and apply ACR coating. Refer to procedure in text.
- 2 Apply sealant MIL-S-8802 (C-308) to all faying surfaces and edges.
- 3 Reidentify with indelible ink as per step 16.
- 4 Drill holes per steps 7 and 12.
- 5 Record total gap = A+B.
- 6 Shim thickness required = $\frac{A+B}{2} = T$ (on each side of support).
- 7 If total gap is less than 0.010 inch (0.254 mm), shims are not required.
- 8 If total gap is greater than 0.050 inch (1.27 mm), contact BHT Product Support Engineering for further instructions.
- 9 Fabricate taper shims locally from aluminum alloy sheet 2024-T3 or T-4 or 7075-T6. Refer to step 11. Thickness to be within 0.005 inch (0.127 mm) of gap. Thickness to be no less than 0.005 inch (0.127 mm).
- 10 Install shims (if required) and support per step 12 and Figure 2, Sheet 2 and 3.
- 11 Trim shims flush with edges of support.
- 12 Install fasteners wet with sealant C-308. Cover heads of fasteners completely with sealant C-308.

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Figure 2. Aft crosstube support shims installation (Sheet 3)



NOTES

-  Plug hole both sides during paint removal, sand blasting and recoating operations.
-  See damage limits
-  Do not apply finish paint in this area, apply only ACR coating and primer.

Upper support 400-052-006-101/-103 - Damage and Repair Limits

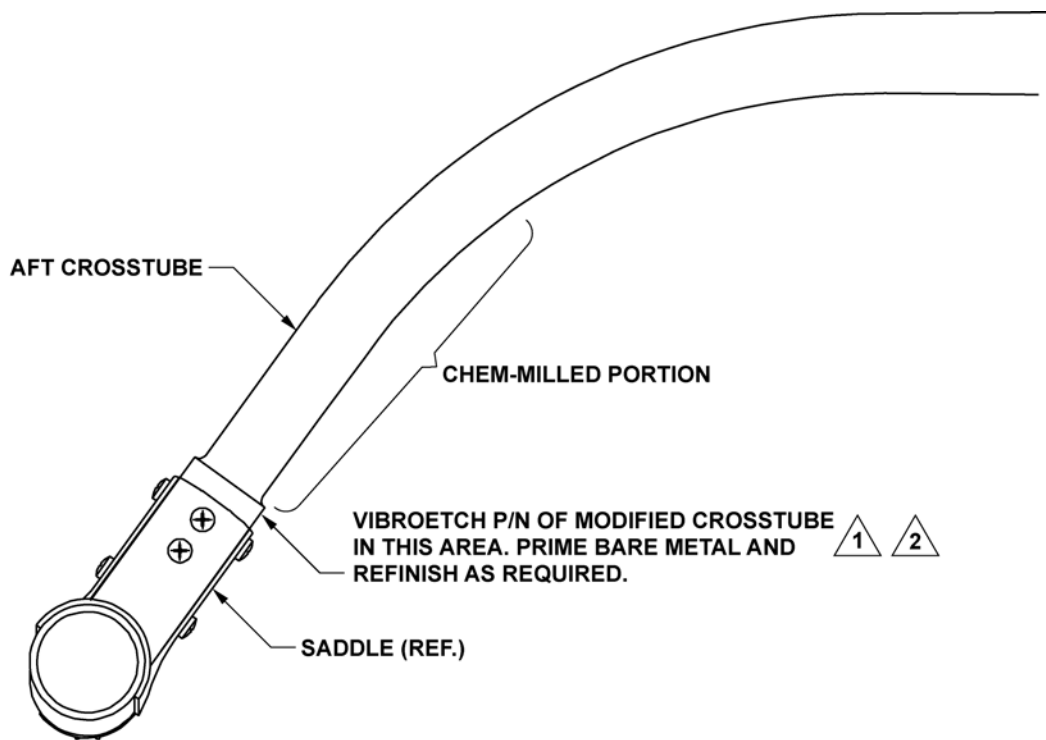
Maximum depth of damage after clean-up	0.020 IN. (0.508 mm) (mechanical or corrosion)
Maximum area per full depth repair	0.500 IN ² . (12.7 mm)
Maximum length of damage	0.750 IN. (19.05 mm)
Number of repair areas	2 per part.
Bore damage	Not to exceed 0.001 IN. (0.0254 mm) for 1/4 circumference. One repair per bore.

T-bolt clamp NH1008897-10 - Damage and Repair Limits

Maximum depth of damage after clean-up	0.008 IN. (0.203 mm) (mechanical or corrosion)
Maximum area per full depth repair	0.500 IN ² . (12.7 mm)
Maximum length of damage	0.750 IN. (19.05 mm)
Number of repair areas	3 per part.

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Figure 3. Inspection criteria

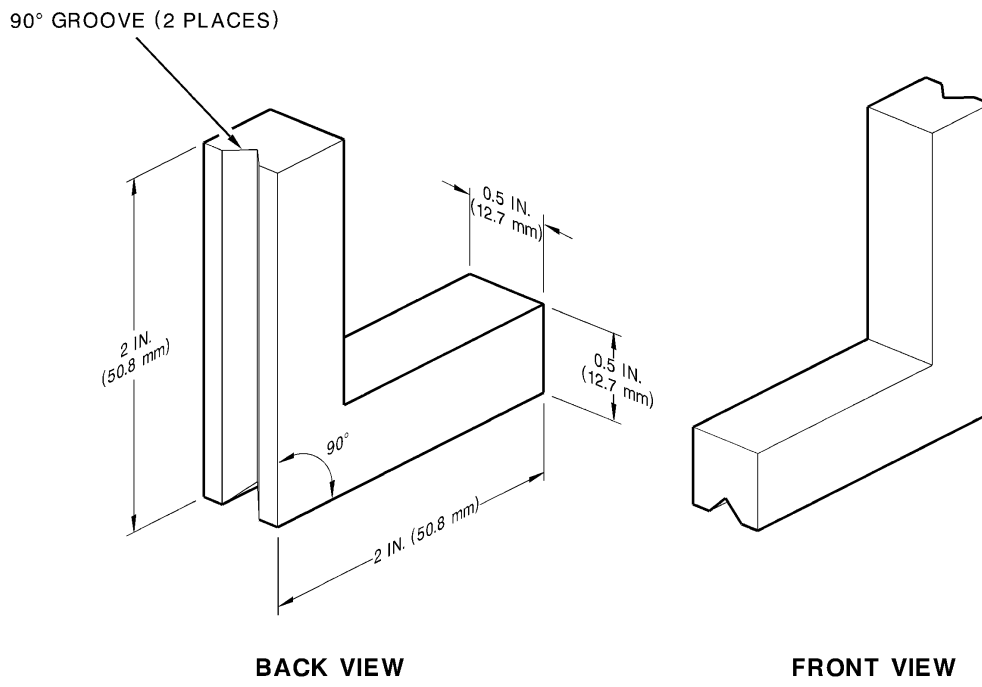


NOTES

- 1** Care should be taken to avoid damage to chem-milled portion of crosstube.
- 2** Re-identified crosstube as per step 10.

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Figure 4. Aft crosstube re-identification



LOCALLY FABRICATE FROM STEEL

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Figure 5. Workaid