

TECHNICAL BULLETIN
Bell Helicopter **TEXTRON**

A Subsidiary of Textron Inc.

No. 407-03-48

Date Oct. 29, 2003

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DATE
REV

MODEL AFFECTED: Model 407

SUBJECT: MAIN ROTOR CONE SET 407-010-114-101
SHIMMING PROCEDURE INTRODUCTION OF.

HELICOPTERS AFFECTED: Model 407 helicopters serial number 53000 through 53579.

[Model 407 helicopters serial number 53580 and subsequent will have the intent of this bulletin accomplished prior to delivery]

COMPLIANCE: At Customer's Option

DESCRIPTION:

Bell Helicopter has received some reports indicating degradation in the ride quality described as a sudden increase in main rotor 1/rev vibration levels.

Investigation has revealed that a displacement of the cone set that occurs during the main rotor hub installation was causing instability of the hub to mast joint resulting in hub shift.

Hub shift can be identified with RADS-AT data analysis and/or inspection for evidence of fretting between the 407-010-114-101 cone set inside diameter and the mast.

This Technical Bulletin introduces a cone set shimming procedure to prevent cone set displacement and a new work aid used to align the hub on the mast. It also introduces a new lubricant that replaces the current corrosion preventive compound used during the main rotor hub installation for improved corrosion protection.

APPROVAL:

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

MANPOWER:

Approximately 1.0 man-hour is required to complete this bulletin if accomplished at the next scheduled main rotor hub assembly removal. Man-hours are based on hands-on time, and may vary with personnel and facilities available.

MATERIALS:

Required Material:

The following material is required for the accomplishment of this bulletin and may be obtained through your Bell Helicopter Textron Supply Center.

<u>Part Number</u>	<u>Nomenclature</u>	<u>Quantity</u>
407-010-119-101	Peel shim (Note 1)	2 (Note 2)

Notes:

1. The peel shim is made of aluminum and has 0.003 inch laminates.
2. Two shims are required to perform this new installation procedure. However it is recommended to order spare shims in case of errors in required shims thickness calculation or peeling.

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>Reference</u>
THIXOGREASE (1)	Lubricant	C-561
AS100028	Safety wire	C-405
As100029	Safety wire	C-447
TT-N-95TYII, 1Gal	Aliphatic Naphta	C-305

Note:

1. THIXOGREASE NLGI No 2 (C-561) replaces the Corrosion Preventive Compound MIL-C-16173 Grade 2 (C-104) at all areas, except on bolts shank, indicated in the BHT-407-MM-6, Chapter 62 and in to the T.B. 407-99-16 Part II to perform the installation of the main rotor hub assembly.

SPECIAL TOOLS:

None required

WORK AID:

The use of the work aid (hub alignment tool) shown on the figure 4 is optional but recommended to avoid contact of the lower cone seat with the cone set as the hub assembly is lowered on the mast. This work aid can be locally manufactured using the instructions provided on the Figure 1 or procured from Paravion Technology Inc. under the part number T0001.

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2001 Airway Ave.
Fort Collins, CO 80524 USA
Phone: (970) 224-3898
Fax: (970) 224-3899
E-mail: paravion@paravion.com

WEIGHT AND BALANCE:

Not affected

ELECTRICAL LOAD DATA:

Not affected

REFERENCES:

BHT-407-MM Maintenance Manual Chapter 62
Technical Bulletin TB 407-99-16

PUBLICATIONS AFFECTED:

BHT-407-IPB Chapter 62

BHT-407-MM Maintenance Manual Chapter 62

ACCOMPLISHMENT INSTRUCTIONS:

1. Remove the main rotor blades and the main rotor hub assembly from the helicopter. Refer to the BHT-407-MM-6, Chapter 62.
2. Remove the 407-010-114-101 cone set from the mast and inspect for general condition. If the cone set has “flat spots” or has excessive wear on the inside diameter radius replace the cone set.
3. Use Aliphatic Naphta (C-305) and thoroughly clean the mast and the cone set to remove all Corrosion Preventive Compound.
4. Measure and calculate the thickness of the first required shim as follow:
 - a. Install the cone set on the mast and hold in place by hand as shown on the Figure 2 to close the gap on one side.
 - b. Using a caliper measure the remaining gap. Take the measurement at the center of the gap.
 - c. Divide the dimension obtained in step b. by two. This is the thickness of the first required shim.

-NOTE-

Each 407-010-119-101 shim has 0.003 inch laminates.

- d. Peel the shim to the closest dimension calculated in step c. As an example, if the calculated shim thickness required is 0.127 inch peel shim to obtain this dimension +/- 0.003 inch.
5. Measure the thickness of the second required shim as follow:

CAUTION

If is important to follow the steps below to ensure that the correct amount of shims are installed. The success of this new installation is directly related to the required shims measurement and installation. If the shims thickness is incorrect the main rotor hub assembly may still “shift” on the mast.

- a. Temporary install the cone set on the mast with two wraps of 0.040 inch safety wire (C-447). Refer to Figure 3. The 0.040 inch safety wire is used in this step only to ensure that the 407-010-114 cone set is firmly in contact with the mast and that no gap exist all around. It might also be required to use a "C" clamp to ensure that no gap exist between the mast and the cone set as shown on the Figure 3.
- b. Install the first shim in one split as shown on the Figure 3. Make sure the two cone set halves are well in contact with the first installed shim and that they are still in firm contact with the mast.
- c. Use a caliper and measure the gap between the two cone set halves in the center of the gap.
- d. Record the dimension obtained in step c. and subtracts this number by 0.003 inch. This number is the maximum amount of shims to be installed. The intent is to have a minimum loose fit of the second shim of 0.003 inch. As an example if the dimension measured in step c. is 0.128 inch the required shim thickness will be 0.125 inch. Since the shim has 0.003 inch laminates the required shim will be peeled to approximately 0.123 inch. If the dimension measured is 0.120 inch the required shim dimension is 0.117 inch. In this case the shim would need to be peeled to approximately 0.117 inch.
- e. Temporary install the second shim in the remaining gap to verify the fit. The shim should be slightly loose (0.003 inch) in the gap and the cone set should be in firm contact with the mast. Make sure that no gap exists between the cone set and the mast as indicated on the Figure 3 Note 1.
- f. Remove the cone set and the shims from the mast.

-NOTE-

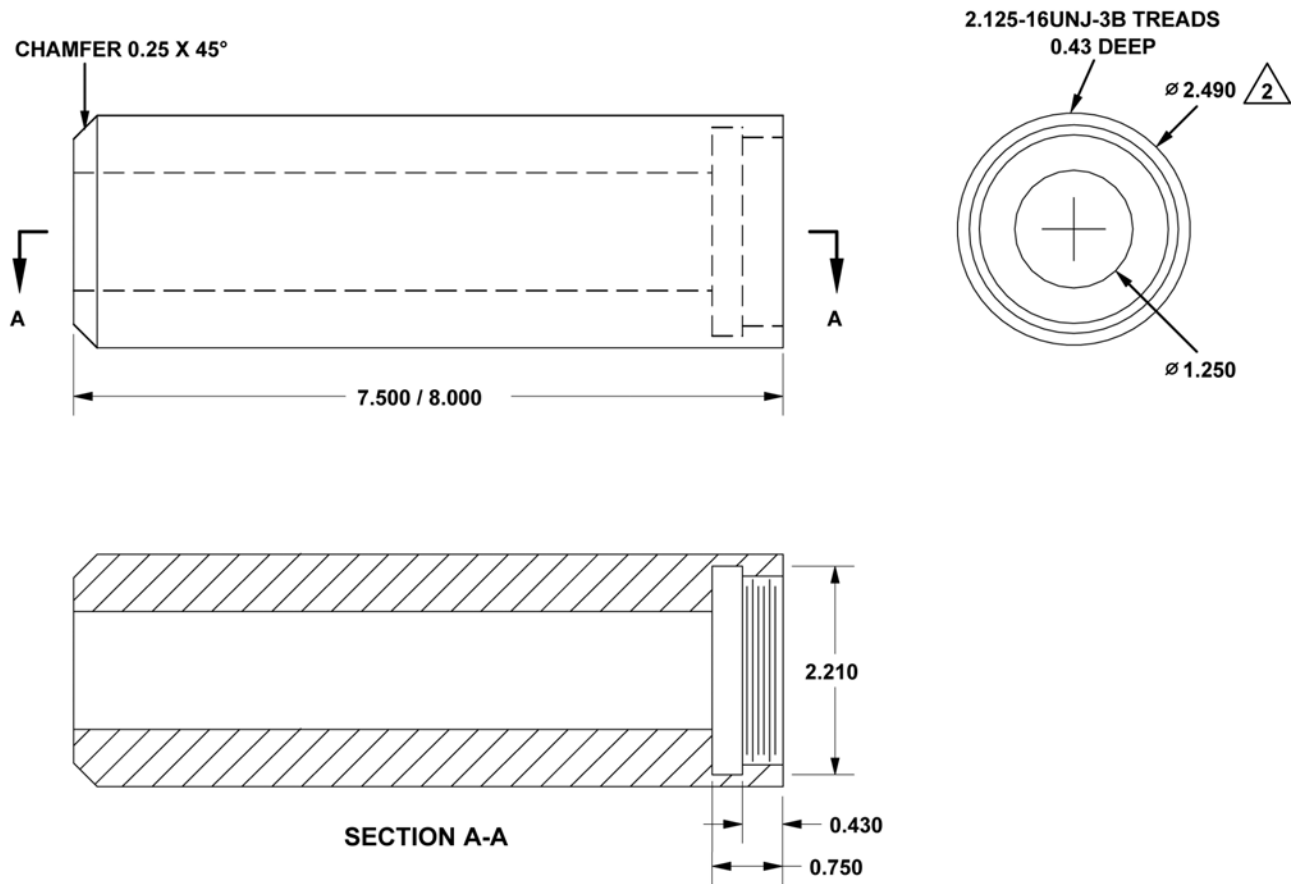
THIXOGREASE NLGI No 2 (C-561) replaces the Corrosion Preventive Compound MIL-C-16173 Grade 2 (C-104) at all areas, except on bolts shank, indicated in the BHT-407-MM-6, Chapter 62 and in to the T.B. 407-99-16 Part II to perform the installation of the main rotor hub assembly.

- g. Apply a light film of THIXOGREASE (C-561) to the inside diameter of the cone set and install on the mast with the two shims. The two shims or the cone set split line axis should be at 90 degrees with the master spline. Refer to the Figure 4 Note 1.
- h. Make sure that the cone set and the shims are firmly attached to the mast with two single wraps of 0.032 inch safety wire (C-405) and that no gap exists between the cone set and the mast as indicated on the Figure 3 Note 1.

CAUTION

Make sure the safety wires “pigtail” do not protrude from the gaps. If the safety wires “pigtail” protrude from the gaps damage to the 407-010-107 lower cone seat may occur at the next main rotor hub assembly removal.

- i. Bend the safety wires twisted ends as shown on the Figure 4 and tuck the “pigtails” as shown in detail A.
- j. After final cone set installation ensure that the cone set with the shims are firmly attached to the mast and that it is not allowed to move in any direction with light hand pressure only. If the cone set is loose on the mast redo the shimming.
- k. Install the work aid on the mast nut threads and proceed with normal main rotor hub assembly installation. Refer to the BHT-407-MM Chapter 62 or to the TB 407-99-16.



MATERIAL: ALUMINUM
6061-T6

NOTES:

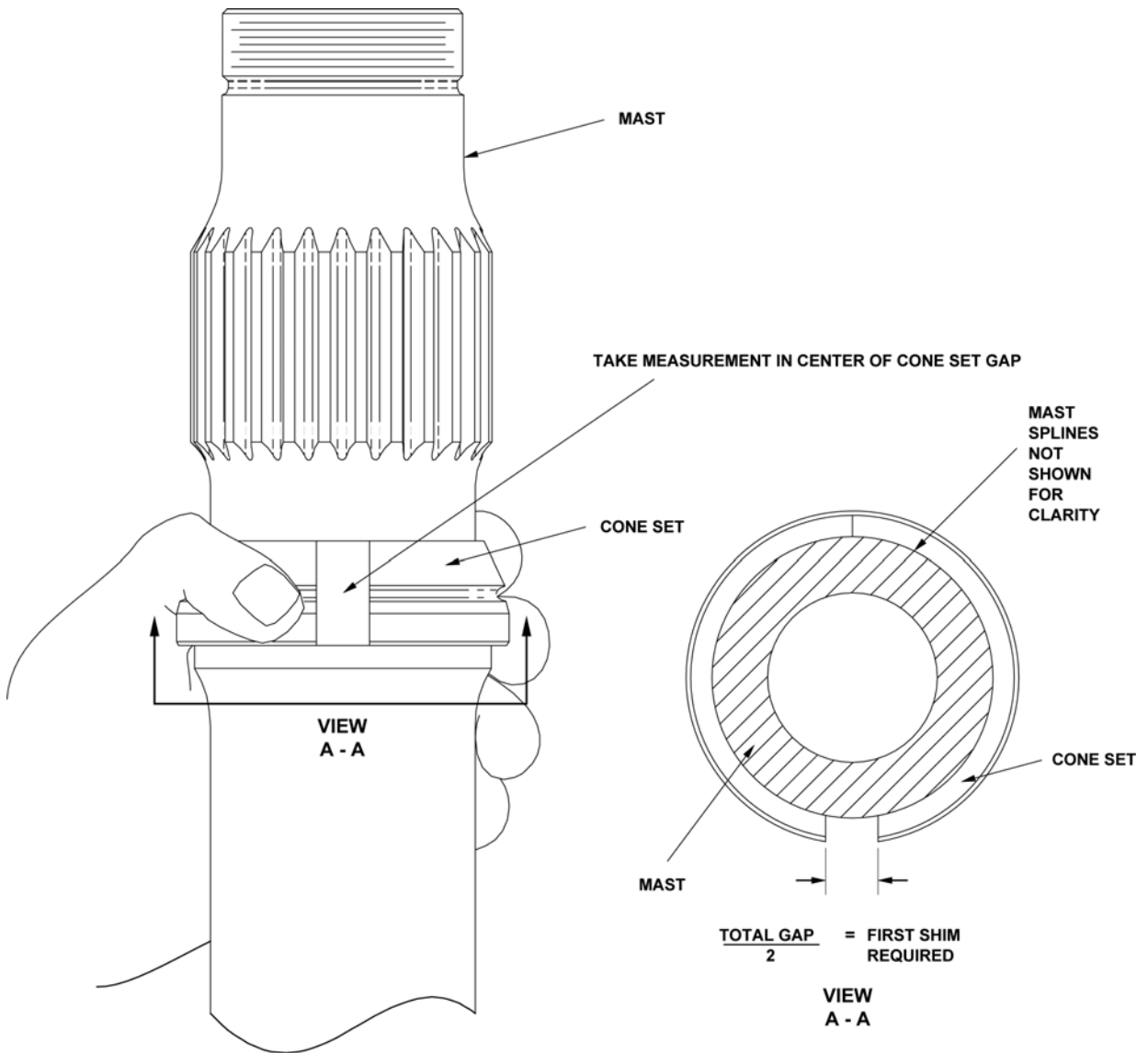
1. This work aid can be locally manufactured or procured through Paravion Technology under part number T0001.

Paravion Technology Inc.
2001 Airway avenue
Fort Collins, CO. 80524, USA.
Phone: (970) 224-3898
Fax.: (970) 224-3899
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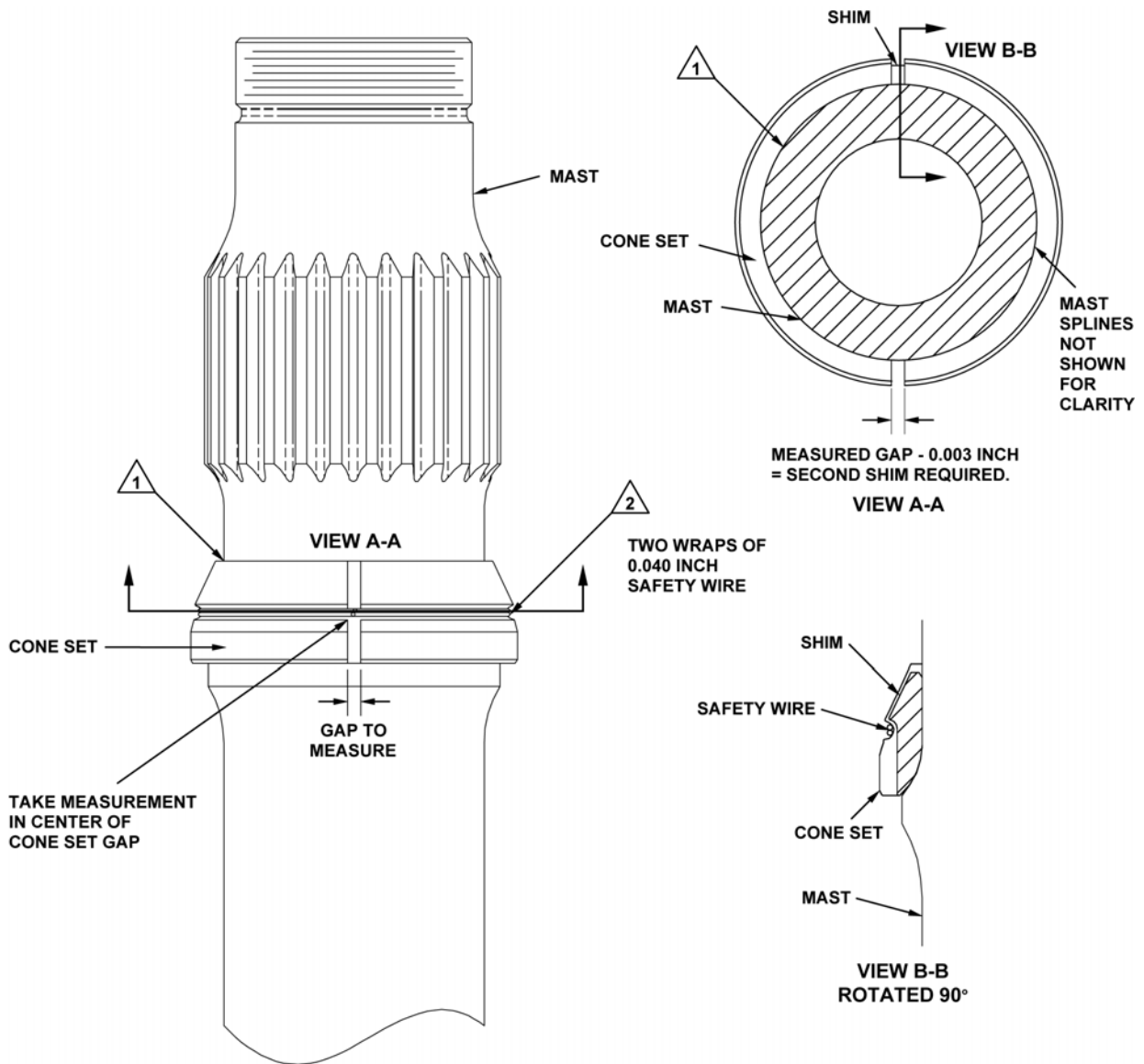
- 2** Inside diameter to outside diameter concentricity to be within 0.002 inch.

Figure 1. Work aid



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Figure 2. First shim required

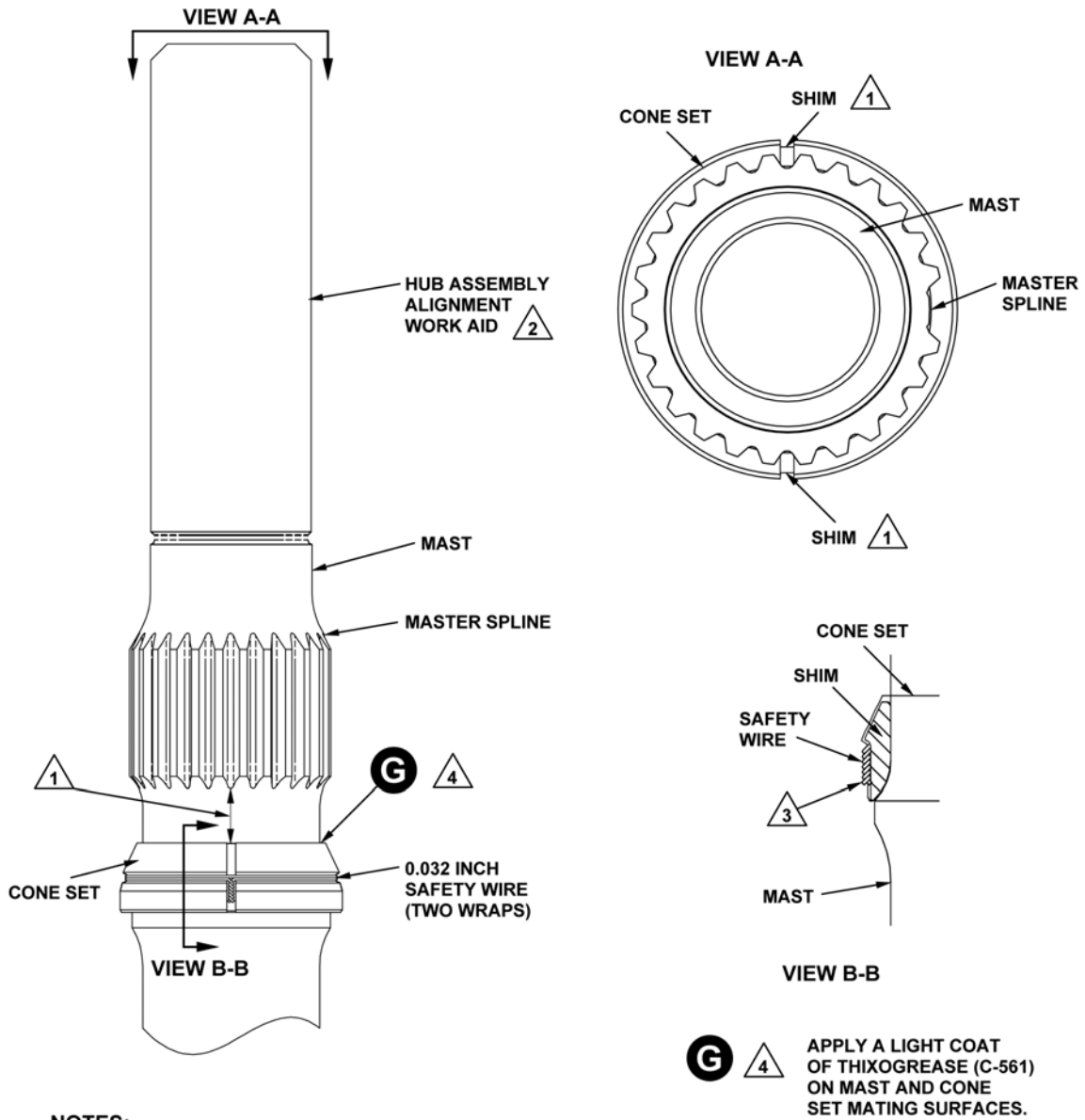


NOTES:

- 1 Make sure no gap exists between the Cone Set halves and the Mast.
- 2 Two wraps of 0.040 inch Safety Wire are used in this temporary installation to ensure a firm contact of the Cone Set on the Mast. In addition to the safety wire a "C" clamp may also be used to make sure that no gap exists as directed in note 1.

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Figure 3. Second shim required



NOTES:

- (1) Shims are to be installed at 90° to the Master Spline and inline between two splines.
- (2) Hub Alignment Work Aid can be locally manufactured or procured from Paravion Technology under part number T0001
Paravion Technology Inc.
2001 Airway avenue
Fort Collins, CO. 80524
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- (3) Make sure the Safety Wires pigtail is properly tucked in the cavity.
- (4) Thixogrease NLGI No. 2 replaces the corrosion preventive compound MIL-C-16173 Gr 2. at all locations indicated in the Maintenance Manual, Chapter 62 and the TB 407-99-16 for the main rotor hub assembly installation.

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Figure 4. Shims installation