CHAPTER 65 — TAIL ROTOR DRIVE SYSTEM

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FIGURES

TABLES

TAIL ROTOR DRIVE SYSTEM

65-1. TAIL ROTOR DRIVE SYSTEM.

The tail rotor drive system provides a means of transmitting power from the transmission to the tail rotor. The tail rotor drive system includes the following components: tail rotor driveshaft, oil cooler blower, and tail rotor gearbox.

65-2. ALLOWABLE LEAKAGE RATES FOR COMPONENTS.

Table 65-1 presents a measurement of allowable leakage rates which may be used in conjunction with tail rotor drive system troubleshooting.

Table 65-1. Maximum allowable leakage for tail rotor drive system components

COMPONENT	TYPE	LEAKAGE RATE
Tail Rotor Gearbox	Static	Input quill leakage shall not exceed 2 drops per minute. Total leakage at all sources must not exceed 6 drops per minute.
	Dynamic	50 percent of normal sight gage oil level indication per 3 hours of operating time.

65-3. TROUBLESHOOTING.

Figures 65-1 and 65-2 provide troubleshooting procedures for the tail rotor drive system. Included are indication of troubles, probable causes, and corrective actions to be taken. The troubleshooting tables should be used along with the general information and other sources of information such as: Transmission oil system schematic, electrical wiring diagrams, operational checks, serviceability checks, and other detailed procedures in this and other chapters of the manual.

65-4. TAIL ROTOR DRIVESHAFT.

Refer to figure 65-1 for troubleshooting the tail rotor driveshaft and oil cooler blower.

65-5. TAIL ROTOR GEARBOX.

Refer to figure 65-2 for troubleshooting tail rotor gearbox. For corrective action to be taken for oil contamination, metal particles, and serviceability checks refer to paragraphs 65-6 and 65-8.

NOTE

Gearbox normal operating temperature may be as high as 170 to 180°F (77 to 82°C). Maximum allowable operating temperature is 212°F (100°C).

65-6. OIL CONTAMINATION.

Particles of foreign material found in tail rotor gearbox electric chip detectors or in oil drained from system may indicate that parts have failed. They are not necessarily an indication that the component is no longer serviceable (figure 65-3). The quantity, source, form, type of material found, and service history of component must be taken into consideration. The service time accumulated since new or since overhaul, previous failures, and type of operation are important factors in determining further serviceability of component. The parts may be steel, silver, aluminum, magnesium, bronze, or phenolic. Procedure for identification of foreign material is described in the steps following.

WARNING

WHEN FOREIGN PARTICLES ARE LARGE ENOUGH TO BE IDENTIFIED AS PART OF A COMPONENT OF THE TAIL ROTOR GEARBOX, REPLACE THE GEARBOX.

WHEN SMALL AMOUNTS OF METAL PARTICLES ARE FOUND IN TAIL ROTOR GEARBOX COMPONENTS, OR THERE IS SOME DOUBT ABOUT THE SUITABILITY OF THE COMPONENT FOR CONTINUED SERVICE, PERFORM A SERVICEABILITY CHECK (PARAGRAPH 65-8). SERVICEABILITY CHECKS ARE A SPECIFIC REQUIREMENT WHEN DIRECTED IN THE TROUBLESHOOTING PROCEDURES.

1. Identify foreign particles found in tail rotor gearbox oil by inspecting particles visually (figure 65-3). If particles cannot be recognized by certain characteristics, such as color, hardness, etc., perform tests outlined in steps 2. through 6.

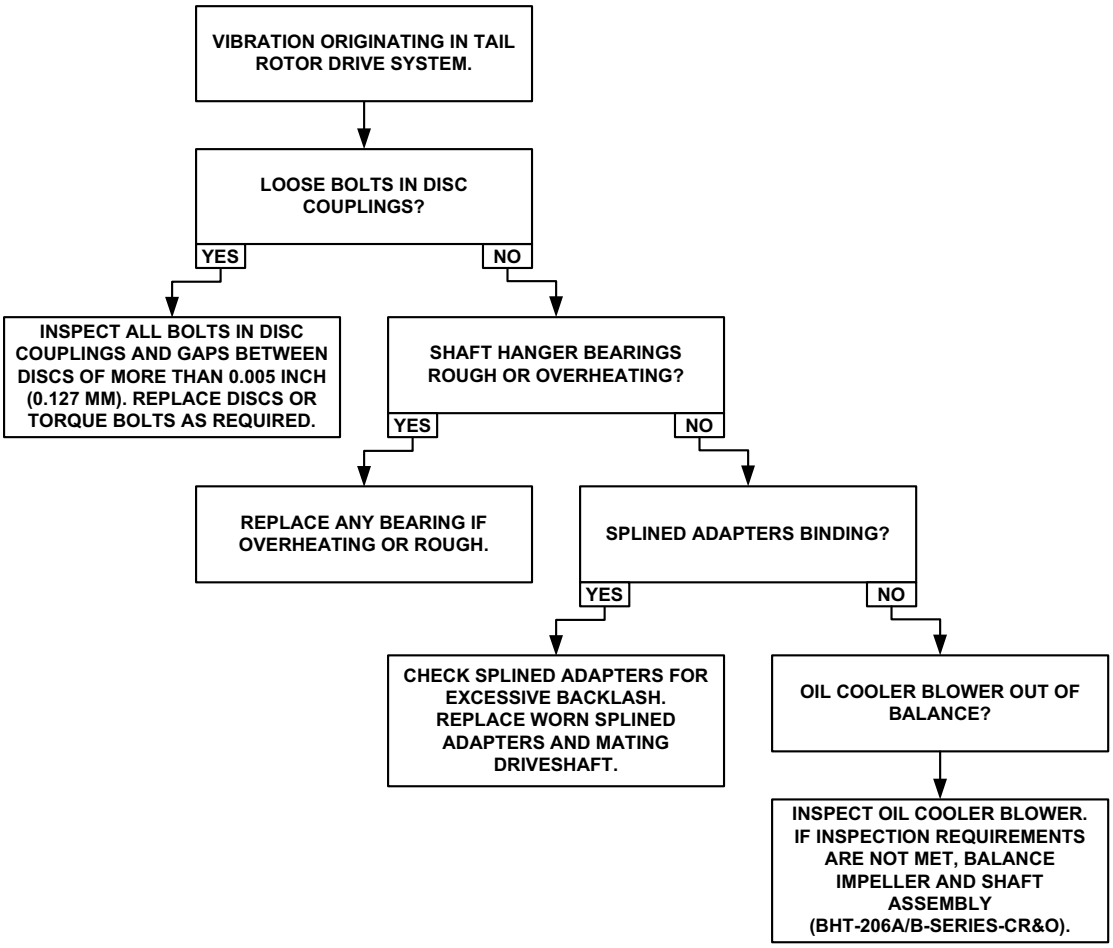

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Figure 65-1. Tail Rotor Driveshaft Troubleshooting

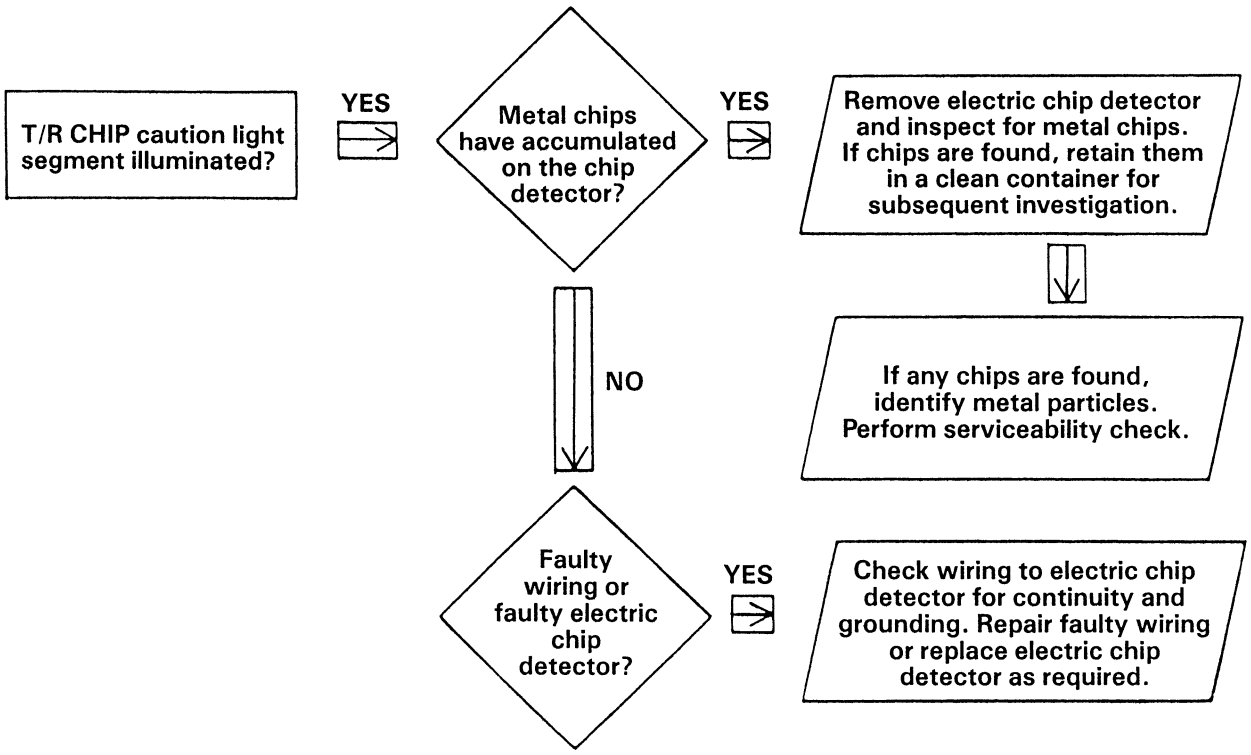

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Figure 65-2. Tail rotor gearbox troubleshooting (Sheet 1 of 2)

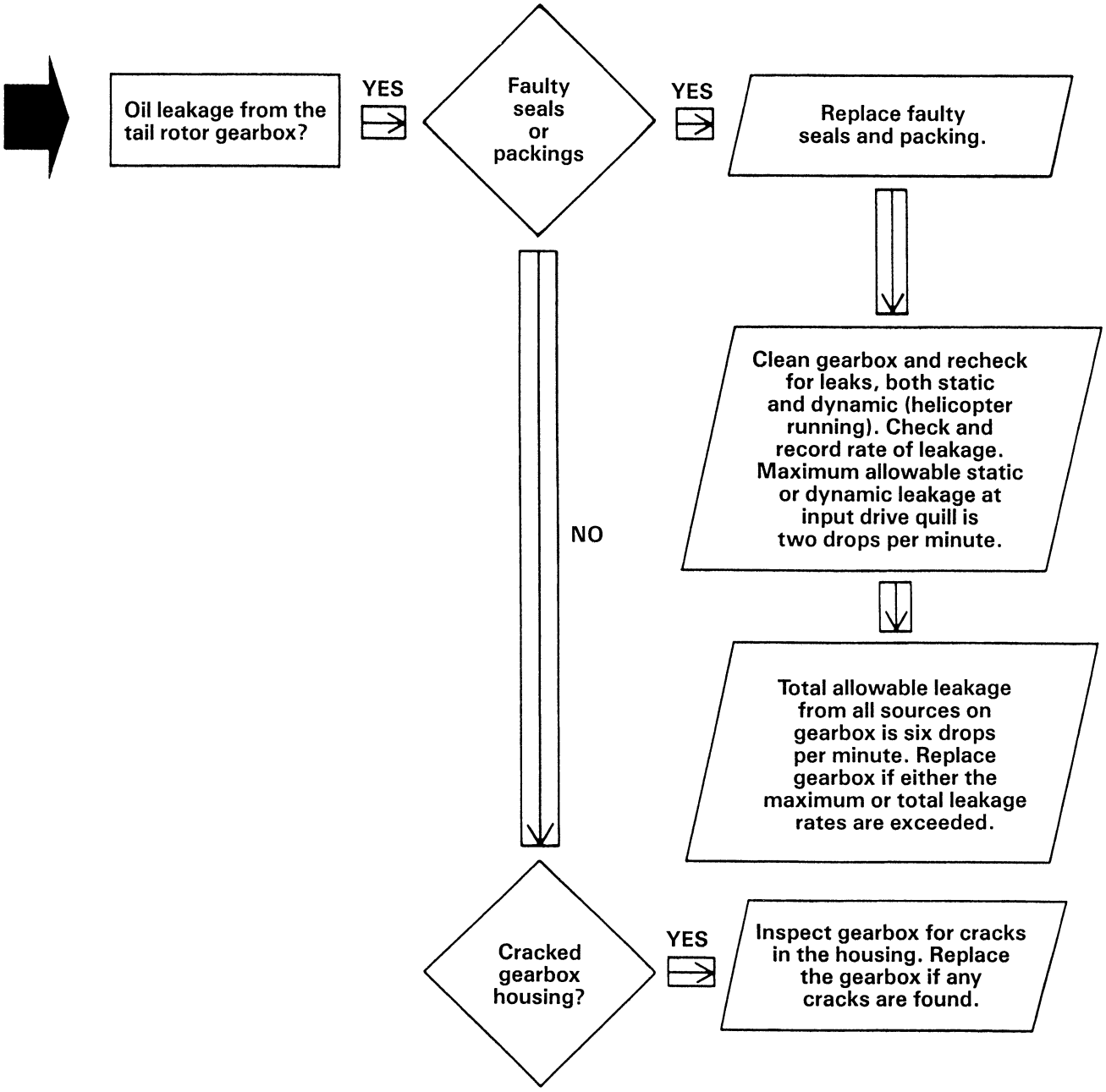

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Figure 65-2. Tail rotor gearbox troubleshooting (Sheet 2)

ANALYSIS OF DRIVE SYSTEM CHIP DETECTOR DEBRIS

The following information provides evaluation of contamination found on the drive system chip detectors.

It is impossible to depict the shapes of all possible particulates, especially those particles not generated within a gearbox, as a result of component wear or failure. However, the following basic assumptions will permit a rather accurate assessment of any debris found, even though the particles may be severely distorted as a result of passing through gear meshes.

DESCRIPTION:

1. Material from the surfaces of gear teeth or rolling element bearings is quite hard. Particles broken from these surfaces may have razor-sharp edges but rarely have sharp pointed ends. With few exceptions, surfaces of such particles will not appear smeared (as if cut by a shear) under magnification; a grainy appearance on the fracture surfaces is more common.

   When damaged by passing through gear meshes, these hard particles tend to break up with relatively little deformation.

2. Foreign ferrous material introduced into gearboxes is often much softer than the surfaces of gear teeth and bearings. The same is true of most nongear and nonbearing components within gearboxes. The softer materials are usually quite ductile and malleable, i.e., particles from such materials can be readily bent or rolled into a wide range of shapes without fracturing.

   Fragments of the softer material are capable of being torn or sheared from the parent component without suffering brittle fracture (easily broken or snapped). Instead, during separation the fragments are distorted and stretched such that they often exhibit surfaces that appear stretched. Ends of soft material fragments are often sharp-pointed; the ductile nature of the material permits such a condition.

   Each type of debris has been identified as significant debris or insignificant debris at the beginning of the explanation of significance to aid in troubleshooting.

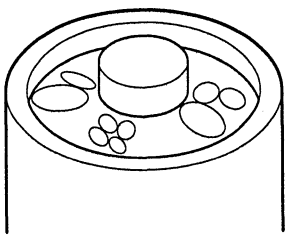
TYPICAL APPEARANCE	DESCRIPTION	SIGNIFICANCE
	A few moderately-sized and/or numerous small nearly flat flakes: Under magnification one side of flakes appears very smooth. Flakes are silvery in color with an occasional black side. Common term for this condition is flakes.	(SIGNIFICANT DEBRIS) This is a classic indication of rolling element bearing failure. Although less common, this can also indicate spalling of gear teeth. REPLACE GEARBOX

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Figure 65-3. Particle contamination of tail rotor gearbox oil (Sheet 1 of 3)

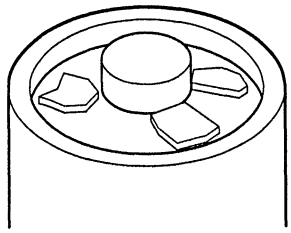
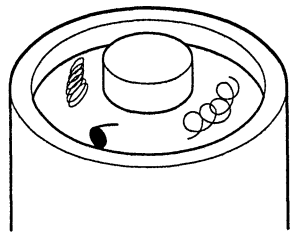
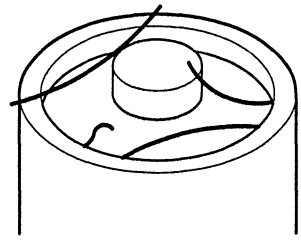
TYPICAL APPEARANCE	DESCRIPTION	SIGNIFICANCE
	Irregularly shaped ferrous chunks of various sizes and shapes: Under magnification one or more sides of particle appears rough and grainy. Color of particles is silvery-gray often with one or more sides black. This condition has no common term.	(SIGNIFICANT DEBRIS) Existence of this type of debris most likely indicates gear and/or bearing damage within the drive system component. REPLACE GEARBOX
	Spiral curls or comma-shaped particles: When examined under magnification, particles are often smooth and shiny on their convex surfaces and quite rough on the other surfaces and edges. Color of particles is usually dull gray on rough surfaces. Common term for condition is manufacturing debris.	(INSIGNIFICANT DEBRIS) Particles are fragments of chips or shavings produced during the machining of ferrous components. Such contamination is often introduced into the drive system components on tools, during dusting operations within the component assembly area using compressed air. No corrective action is required following discovery of such material.
	Hair-like ferrous debris: May have rectangular or triangular cross sections. Generally 0.030 inch (0.76 mm) or less in thickness. Length may range from 0.100 inch (2.54 mm) to over 1.00 inch (25.40 mm). Color of debris is usually light gray although one or more sides may have a black appearance. Common term for condition is hairs.	(INSIGNIFICANT DEBRIS) Debris commonly are scrapings, produced as components, and are interference-fitted together during assembly of the drive system components. Debris of this general shape is also produced, after long term operation, at the corners of wear surfaces of such parts as transmission planetary supports. This type debris can be introduced into the component during periodic servicing. Hairs can appear on chip detectors at any point in the life of the drive system component. However, discovery of such material does not necessitate any corrective action.

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Figure 65-3. Particle contamination of tail rotor gearbox oil (Sheet 2)

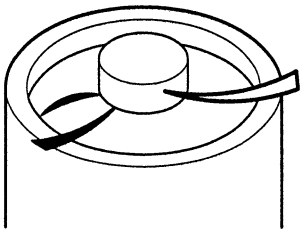
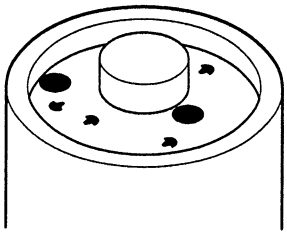
TYPICAL APPEARANCE	DESCRIPTION	SIGNIFICANCE
	Irregular shaped ferrous particles: Usually triangular in cross sections. Often spike like in appearance. Under magnification, one side of triangular section will usually appear sheared. Color may be silvery-gray or black with one or more silver sides. Existence of two or more particles of this type on a chip detector at any one time is rare. Common term for condition is manufacturing debris.	(INSIGNIFICANT DEBRIS) Particles of this type are commonly the result of tool slippage during assembly of the drive system component. An example would be the sliver of metal torn from the edge of a screw slot as a screwdriver blade slips out of place. This type of debris would most likely appear during the first 50 hours of operation following component assembly or extensive maintenance. No corrective actions are required following discovery of such material.
	Tiny whisker-like particles or groups of dark microscopic particles: When removed with tape or paper towel, apparently-large chips disappear into a black smudge. Common term for condition is smudge or fuzz.	(INSIGNIFICANT DEBRIS) Generally microscopic wear particles produced by normal wear within drive system component. Particles are often grouped by the field of the chip detector magnet to assume the shape of apparently large chips. Such material is common in gearboxes having several hundred operating hours. In such cases, this condition does not necessitate corrective action. Appearance of this type of debris in relatively new or recently-overhauled gearboxes may indicate bearing or gear micropitting. In such cases detector should be inspected more frequently for signs of progressing damage.

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Figure 65-3. Particle contamination of tail rotor gearbox oil (Sheet 3)

2. The following equipment is required to perform tests:

a. Permanent magnet.

b. Fifty percent by volume of nitric acid (C-432) and water solution.

c. Five percent by weight sodium chloride and water solution.

d. Hydrochloric (muriatic) acid (C-431).

e. Test tube.

3. Check particles with permanent magnet. The magnet will attract steel particles only.

4. Place a small quantity of 50 percent nitric acid (C-432) and water solution in a test tube and add a particle of material to be tested.

a. If particle does not dissolve, warm solution slightly.

b. If particle dissolves after warming, add a few drops of 5 percent sodium chloride solution.

c. If white precipitate forms in the test tube, particle being tested is silver.

5. Place a small amount of hydrochloric (muriatic) acid (C-431) in a test tube and add a particle of the material to be tested.

a. If the solution releases bubbles rapidly or particle disintegrates, and a black residue forms, particle being tested is probably aluminum or magnesium.

NOTE

Phenolic and aluminum do not react noticeably in nitric acid.

b. Place a small amount of nitric acid (C-432) in a test tube and add a second particle of the same material. If there is no reaction with nitric acid, particle is probably aluminum.

6. Differentiate between copper, bronze, and magnesium as follows:

a. Place a small amount of nitric acid (C-432) in a test tube and add a particle of the material to be tested.

(1) If a bright green color is formed in acid, the particle is copper or bronze.

(2) If there is a rapid emission of bubbles when the particle is dropped in acid, the particle is probably magnesium.

b. Take corrective action for contamination of tail rotor gearbox (figure 65-4).

65-7. OIL SERVICING DRAIN HOSES.

To obtain oil drain hoses for tail rotor gearbox with B-3225C, chip detector, determine drain hose length desired in inches, and order DB-3225L drain hose (where L = length in inches).

NOTE

The drain hoses come in a standard length of 24 inches (609.60 mm). Longer length drain hoses may be obtained when ordering by adding a dash number to the drain hose part number. The dash number equals the length of hose desired in inches. Example: A DB3225-50 drain hose would be 50 inches (127.00 mm) in length.

65-8. SERVICEABILITY CHECK.

1. Drain lubricating oil from tail rotor gearbox and collect oil in a clean container (Chapter 12).

2. Inspect, clean, and install electric chip detector and self-closing valve.

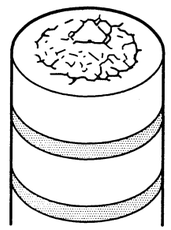
3. Inspect drained oil for metal particles. If any particles are found, identify and perform corrective action (paragraph 65-5).

4. Flush tail rotor gearbox with clean lubricating oil (C-010 or C-011). Use one quart (0.95 liter) minimum.

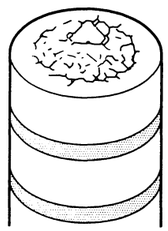
5. Fill tail rotor gearbox to proper level (Chapter 12).

6. Prepare helicopter for ground runup. Ground run helicopter for one hour (refer to applicable JetRanger Flight Manual) and accomplish the following at completion of run.

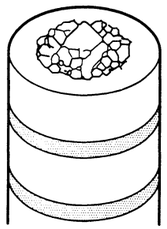
a. Remove electrical chip detector and inspect for metal particles (step 3).



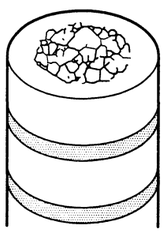
DETAIL A



DETAIL B



DETAIL C



DETAIL D

STEEL

Detail A

Fuzz, fine hair-like particles.

Result of normal wear may have exaggerated appearance because of oil.

Detail B and C

Particles in splinter or granular form.

Usually indicates failure of gear or bearing.

YES

Perform serviceability check. Replace tail rotor gearbox if neccessary.

Detail D

Thin flakes not exceeding 1/64 inch (0.40 mm) in thickness and 1/16 inch (1.59 mm) in length. Quantity not to exceed 10 flakes.

STEEL CONTAMINATION

Small quantity may not indicate bearing failure.

YES

Perform serviceability check. Replace tail rotor gearbox if necessary.

More than 10 flakes not exceeding 1/64 inch (0.40 mm) in diameter and 1/4 inch (6.35 mm) in length.

Usually indicates failure of gear or bearing.

YES

Replace tail rotor gearbox as applicable.

CAUTION

WHEN SMALL AMOUNTS OF METAL PARTICLES ARE FOUND IN TAIL ROTOR GEARBOX COMPONENTS OR THERE IS SOME DOUBT ABOUT THE SUITABILITY OF THE COMPONENT FOR CONTINUED SERVICE, A SERVICEABILITY CHECK SHALL BE CONDUCTED. SERVICEABILITY CHECKS ARE A SPECIFIC REQUIREMENT WHEN DIRECTED IN THE TROUBLESHOOTING PROCEDURES OF THIS FIGURE.

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Figure 65-4. Corrective action for contamination found in tail rotor gearbox (Sheet 1 of 2)

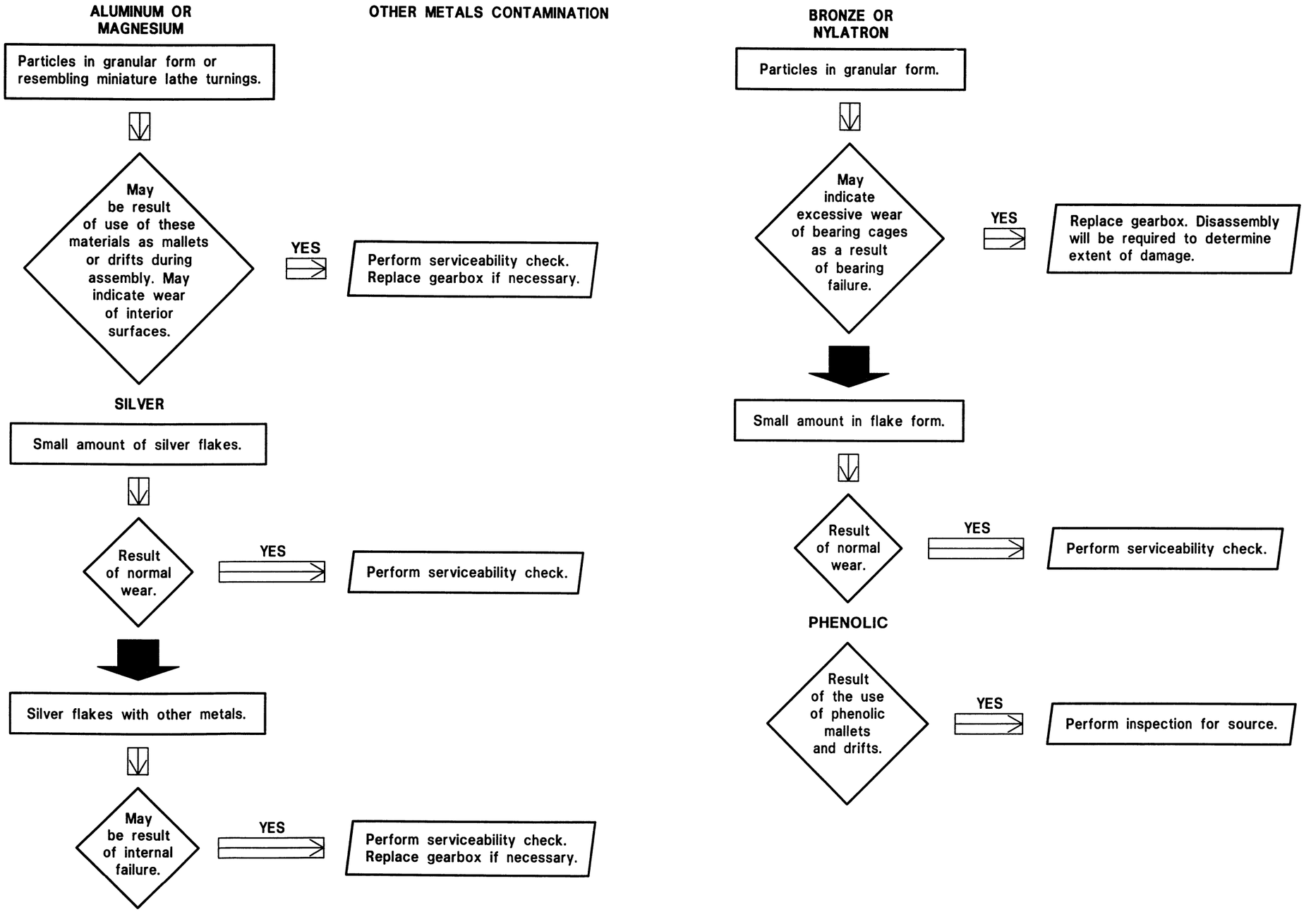


Figure 65-4. Corrective action for contamination found in tail rotor gearbox (Sheet 2)

b. Drain lubricating oil from tail rotor gearbox and collect oil in a clean container (Chapter 12).

c. Inspect lubricating oil for foreign material (step 3).

d. If this inspection is being conducted because of metal particle contamination and the number of metal particles has increased or if any particles are found which are large enough to be identified as chips, from a gear or bearing, replace tail rotor gearbox. If the number of particles has decreased and only minute particles are found, release tail rotor gearbox for continued operation.

OIL COOLER BLOWER

65-9. OIL COOLER BLOWER.

The oil cooler blower assembly is mounted on the upper structure, aft of the aft firewall and is driven by the tail rotor driveshaft. The squirrel cage type impeller is mounted on a flanged shaft which is mounted in bearing hangers. The oil cooler shaft connects to the forward and aft short tail rotor shafts and is part of the tail rotor drive system. The oil cooler blower provides cooling air for the engine oil system, transmission oil system, and the hydraulic system. The engine oil cooler mounts above the blower housing while a flexible duct conveys cooling air forward to the transmission oil cooler and the hydraulic reservoir.

65-10. REMOVAL.

1. Open engine side panels and remove aft fairing to gain access to oil cooler blower assembly (Chapter 71).

2. Remove forward and aft short tail rotor driveshafts attached to each end of oil cooler shaft (17, figure 65-5) and splined adapters (paragraph 65-17).

3. Drain engine oil tank and remove engine oil cooler, oil fittings and lines, flexible air duct, and other components as required to provide clearance for removal of oil cooler blower assembly (Chapter 79).

4. Remove four nuts (8), washers (7), and screws (1) from bearing cover (matched set) (2), gaskets (3), aft firewall (4), and forward bearing hanger (5).

5. Remove two mounting bolts (9) and washers (10 and 11) from base of forward bearing hanger (5).

6. Remove four mounting bolts (20) and washers (21 and 22) from base of aft bearing hanger (18).

7. Remove four mounting bolts (12) and washers (13 and 14) from blower housing (15).

8. Remove oil cooler blower assembly from helicopter.

9. Temporarily install mounting bolts (9, 12, and 20) to prevent repositioning of shims and loss of bolts on deck. If a shim is loose, bond in place with adhesive (C-317) in accordance with bonding procedures contained in BHT-ALL-SPM.

65-11. CLEANING.

CAUTION

DO NOT ALLOW SOLVENT TO CONTACT HANGER BEARINGS AND DO NOT WIPE LIP OF SEAL.

Clean oil cooler blower assembly with solvent (C-304) and dry with filtered compressed air.

65-12. INSPECTION AND REPAIR.

NOTE

For disassembly, inspection and repair, and assembly procedures of oil cooler blower assembly, refer to BHT-206A/B-SERIES-CR&O manual.

For dye penetrant inspection of impeller (16, figure 65-5), (206-061-432-031 impeller only), refer to BHT-206A/B-SERIES-CR&O manual.

1. Perform visual inspection of oil cooler blower assembly for cracks, mechanical damage, and corrosion.

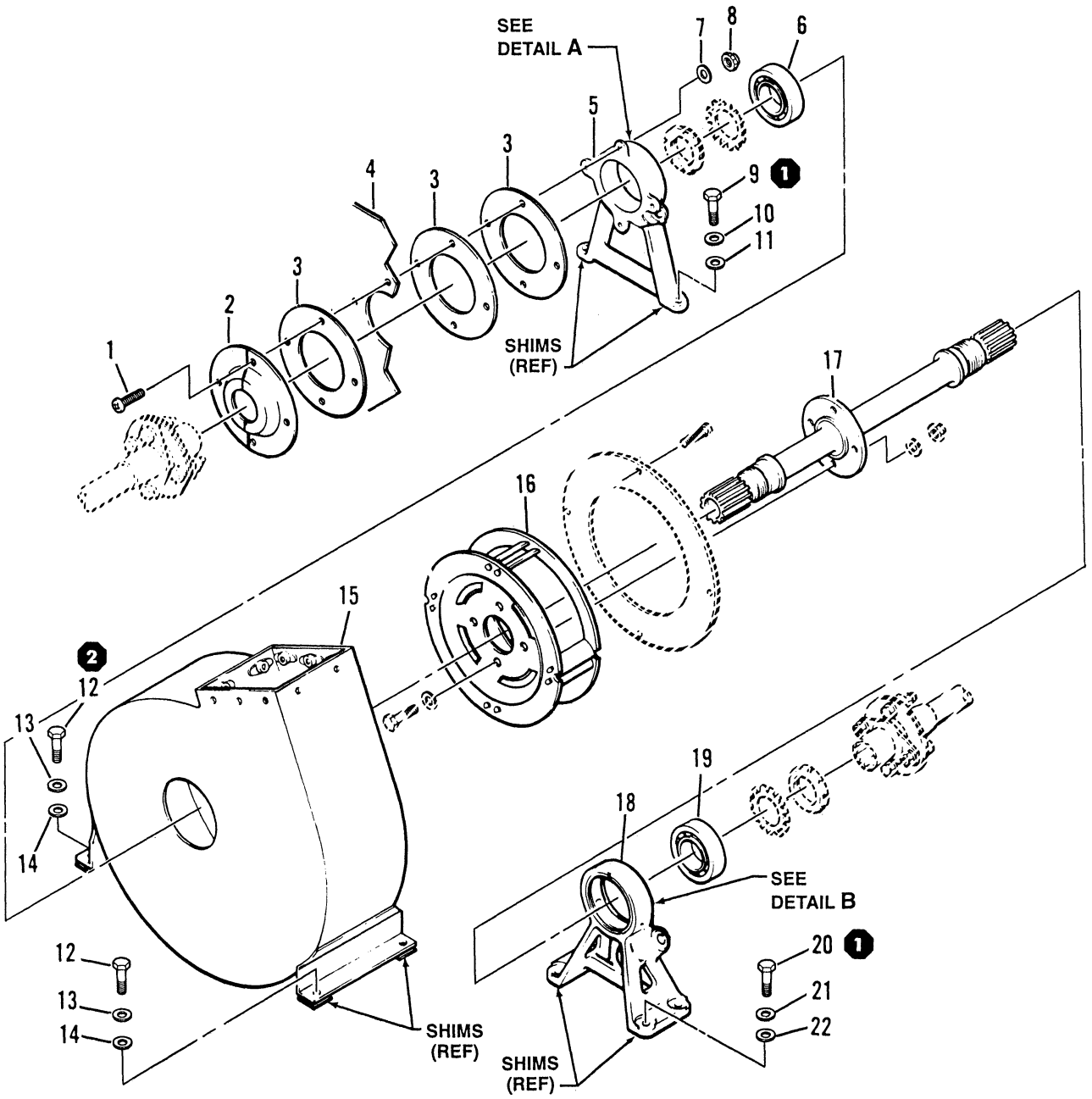
2. If any defects are detected or suspected, perform necessary inspection and repair procedures (BHT-206A/B-SERIES-CR&O).

CAUTION

WHEN REPLACING BEARINGS, USE BEARINGS THAT HAVE BEEN IN STORAGE IN SEALED PROTECTIVE PACKAGE AND IN STORAGE LESS THAN 3 YEARS.

3. Visually inspect nonremovable rubber seal on hanger bearings (6 and 19, figure 65-5) for deterioration and deformation. Bearings with seals torn at four lubrication points that allow excessive grease squeeze-out should be replaced. Bearings with seals rotating should be replaced.

4. Inspect hanger bearings (6 and 19) for evidence of overheating, an excessive grease leakage. Signs of overheating are discoloration or damage to seals; black grease ejected or liquefied from the beaing indicates overheating.



1. Screw
2. Bearing cover
3. Gasket
4. Aft firewall
5. Forward bearing hanger
6. Bearing
7. Washer
8. Nut
9. Bolt
10. Thin steel washer
11. Aluminum washer
12. Bolt
13. Steel washer
14. Aluminum washer
15. Blower housing
16. Impeller
17. Oil cooler shaft
18. Aft bearing hanger
19. Bearing
20. Bolt
21. Thin steel washer
22. Aluminum washer

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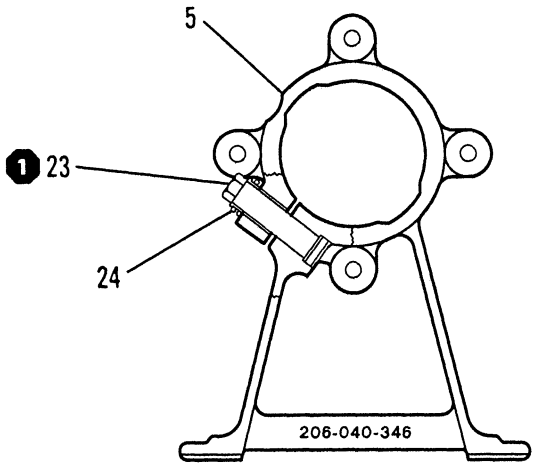
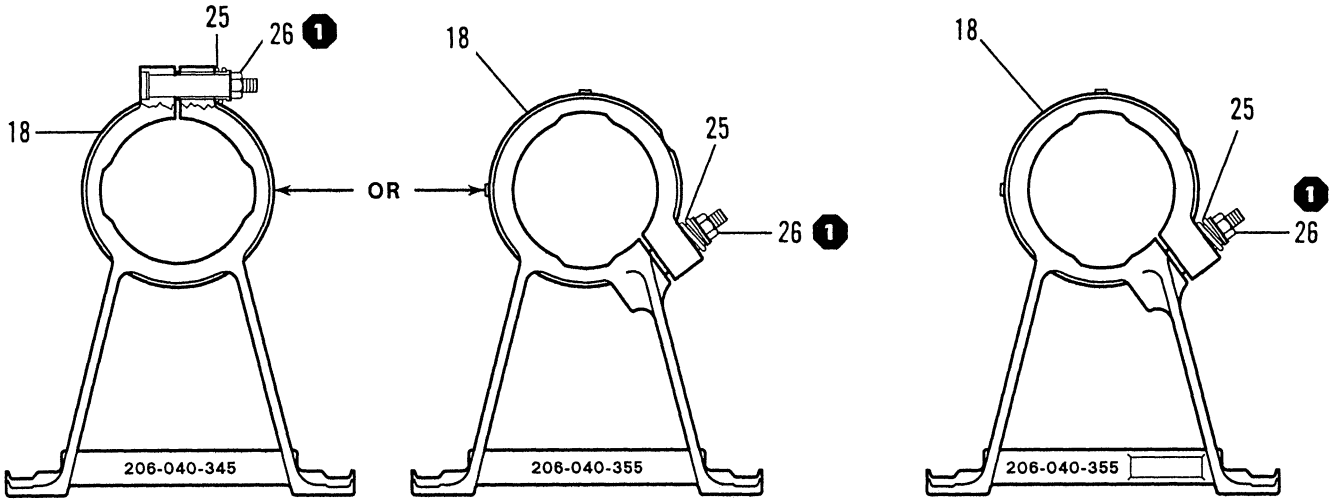
Figure 65-5. Oil cooler blower assembly (Sheet 1 of 2)



FORWARD BEARING HANGER

DETAIL A



HELICOPTERS 914 THRU 2211

HELICOPTERS 2212 AND SUBSEQUENT

AFT BEARING HANGER

DETAIL B

23. Nut
24. Spring
25. Spring
26. Nut

1 50 TO 70 IN-LBS (5.65 TO 7.91 Nm)

2 20 TO 25 IN-LBS (2.26 TO 2.82 Nm)

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Figure 65-5. Oil cooler blower assembly (Sheet 2)

5. Inspect bearings (6 and 19) for roughness after a flight while bearings are warm. Roughness may be felt with light hand pressure applied to shafts while turning tail rotor and driveshaft by hand. If shaft has been disassembled from helicopter roll bearings by hand, and check for smooth rotation witout excessive play.

6. Replace bearings if bearings are still rough after 5 hours of operation whether bearings show signs of overheating or not.

7. Inspect bearings (6 and 19) for obvious signs of corrosion. Corrosion may be recognized by black or reddish rust.

8. If there is any doubt of bearing serviceability, replace bearing.

65-13. INSTALLATION.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Cold Cylinder Probe

CAUTION

SINCE DIFFERENT DASH NUMBERED HANGER ASSEMBLIES LOOK ALIKE AND ARE INTERCHANGEABLE THERE IS A DIMENSIONAL DIFFERENCE IN HANGER HEIGHT WHICH WILL RESULT IN TAIL ROTOR DRIVESHAFT MISALIGNMENT, BEARING LOADING PROBLEMS AND DISTORTED/CRACKED DISC ASSEMBLIES. VERIFY COMPLETE PART NUMBER OF THE REPLACEMENT HANGER ASSEMBLY PRIOR TO INSTALLATION.

NOTE

Shims are bonded to the oil cooler blower support deck to provide alignment of the tail rotor driveshaft. Exercise care not to disturb shims during installation of oil cooler blower, forward hanger, and aft hanger.

1. Place two gaskets (3, figure 65-5) over end of blower shaft (17) next to forward bearing hanger (5).

2. Position oil cooler blower assembly in place over shims on deck. Install four mounting bolts (12) with steel washers (13) under boltheads, and aluminum washers (14) in contact with oil cooler blower housing (15). Torque bolts (12) (T).

3. Position forward bearing hanger (5) over shims on deck. Install two mounting bolts (9) with thin steel washers (10) under boltheads, and aluminum washers (11) in contact with bearing hanger. Do not torque bolts (9) at this time.

NOTE

A deflection of the aft firewall (4) of 0.094 inch (2.38 mm) is allowable when securing bearing cover (2), gaskets (3), and forward bearing hanger (5) to the firewall. One of two gaskets on aft side of firewall can be removed to the forward side of firewall to assist in obtaining allowable deflection limits.

Bearing cover (2) (matched set) provides access to bearing (6) in forward bearing hanger (5) for lubrication.

4. Position one gasket (3) on forward side of aft firewall (4), align and position two gaskets (3) (the two gaskets placed on blower shaft in step 1.) on aft side of firewall.

5. Position bearing cover (2) on forward side of aft firewall (4). Install four screws (1) through bearing cover, gasket (3), aft firewall (4), two gaskets (3), and forward bearing hanger (5). Install four washers (7) and secure with four nuts (8).

6. Tighten forward bearing hanger mount bolts (9) (T).

7. Position aft bearing hanger (18) over shims on deck. Loosely install four mounting bolts (20), with thin steel washers (21) under boltheads, and aluminum washers (22) in contact with bearing hanger.

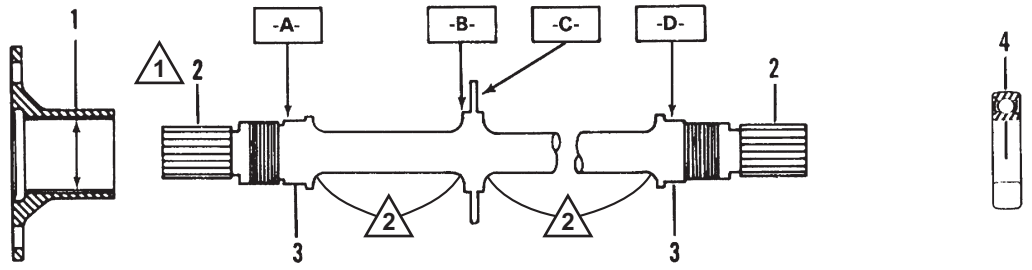
NOTE

If contact between surfaces is not within 0.005 inch (0.13 mm) tolerance limits, rework surface to obtain acceptable tolerance limits for both legs of bearing hanger.

8. Exert downward pressure onto top of aft bearing hanger (18) sufficiently to establish contact between mounting legs of bearing hanger and deck.

9. Torque aft bearing hanger mount bolts (20) (T).

10. With firm hand pressure, rotate oil cooler blower shaft (17) to ensure impeller (16) has adequate clearance inside blower housing (15).



ITEM	NOMENCLATURE	LOCATION	MINIMUM		MAXIMUM	
			IN.	mm	IN.	mm
1	Slip adapter (between 0.1200 inch (3.048 mm) diameter pins)	ID	—	—	0.7414	18.8316
2	Spline - impeller shaft (over 0.1200 inch (3.048 mm) diameter pins)	OD	1.1025	28.0035	— (1)	—
3	Bearing seat - impeller shaft	OD	1.1803	29.9796	1.1816	29.9914
2/3	Impeller shaft runout inspection (TIR with shaft mounted on centers)					
	Surface	-A-	—	—	0.0006	0.0152
	Surface	-B-	—	—	0.0016	0.0406
	Surface	-C-	—	—	0.0018	0.0457
	Surface	-D-	—	—	0.0006	0.0152
4	Sealed bearing	ID	1.1807	29.9898	1.1815	30.0101
		OD	2.1637	54.9580	2.1657	55.0088

NOTES

(1) Dress out wear step between worn and unworn areas of spline teeth with fine India stone (C-464), or equivalent, to form a smooth transition.

(2) Mechanical damage up to 0.002 inch (0.050 mm) deep shall be polished out, provided that material removal does not exceed 0.003 inch (0.076 mm).

Corrosion damage shall be polished out, provided that material removal does not exceed 0.002 inch (0.050 mm).

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Figure 65-5A. Oil Cooler Impeller Shaft Wear Limits

11. Check centering of oil cooler blower assembly as follows:

a. Align centerline of blower housing (15) with helicopter centerline BL 0.00 within 0.030 inch (0.76 mm). Shim underneath oil cooler blower housing to attain vertical alignment.

b. Forward and aft bearing hangers (5 and 18) must be centered along common axis bores of bearings (6 and 19) within 1° angularity.

12. Install splined coupling adapters on each end of oil cooler shaft. Lubricate splines with a thin film of grease (C-561) (paragraph 65-20).

13. Install forward and aft short tail rotor driveshafts (paragraph 65-20).

14. Install oil cooler oil lines, air duct, and other components removed for access to oil cooler blower assembly (Chapter 71).

15. Service oil cooler with approved lubricating oil (Chapter 12).

16. Tighten hanger clamping nuts (23 and 26).

17. Prepare helicopter for ground run (refer to applicable JetRanger Flight Manual) and accomplish the following:

WARNING

DO NOT GRASP FORWARD AND/OR AFT SHORT SHAFTS DURING GROUND RUN OR ROTOR COASTDOWN.

CAUTION

DO NOT EXCEED 1 MINUTE RUNUP OR BEARINGS MAY SPIN EXCESSIVELY IN HANGERS.

a. Prior to run-up, lubricate forward and aft bearings until grease purges past seals (Chapter 12). Loosen hanger clamping nuts (23 and 26) until all preload is removed from springs (24 and 25) and springs can be turned by hand, then using non-sharp tool in split-line of each hanger, pry open slightly and move bearing slightly by hand to ensure freedom. Remove tool from hanger. Run-up helicopter 60 to 62% rotor RPM for 45 seconds to 1 minute. Refer to applicable JetRanger Flight Manual. Start timing when rotor starts turning. Shut down helicopter and tighten nuts (23 and 26) T. Wipe off any grease from outside of bearing.

CAUTION

CLEAN WITH DRY CLOTHS USING CAUTION NOT TO WIPE DIRT OR EXPELLED LUBRICANT UNDER BEARING SEAL AND INTO BEARING.

b. Ground run helicopter for 15 minutes (refer to applicable JetRanger Flight Manual) and check bearings in forward and aft hangers (5 and 18) for signs of overheating. Maximum recommended bearing operating temperature is 185°F (85°C). A new bearing may run to 275°F (135°C) for the initial 15 to 20 hours of operation. If bearings are running hot, inspect at frequent intervals until 20 hours of operation have elapsed. If bearing temperature has not stabilized after this time, replace bearing (BHT-206A/B-SERIES-CR&O).

NOTE

A cold cylinder probe may be used to provide a precise measurement of bearing temperature.

c. Check oil cooler for leakage (Chapter 79).

18. After helicopter ground run and bearing hanger adjustment, accomplish the following:

a. Torque forward and aft hanger (5 and 18) mounting bolts (9 and 20) T.

b. Secure forward hanger (5) mounting bolts (9) to legs of hanger with lockwire.

c. Secure aft hanger (18) mounting bolts (20) to legs of hanger with lockwire.

CAUTION

EXERCISE CAUTION TO PREVENT CORROSION PREVENTIVE COMPOUND (C-101) FROM CONTACTING FORWARD BEARING HANGER BEARING GREASE SEAL.

19. After final check of bearing hanger mounting bolts, bearing clamp bolts and lockwiring, a thin coating of corrosion preventive compound (C-101) shall be applied to aft side of forward hanger (5). The areas to be coated are edges of bearing clamping surface and exposed edges of bearing outer race. While these areas are being coated, caution shall be exercised to prevent compound from contacting bearing grease seal. Also, apply a coating of corrosion preventive compound (C-101) to forward and aft bearing hanger springs (24 and 25) and area.

20. Install cowling (Chapter 71).

TAIL ROTOR DRIVESHAFTS

65-14. TAIL ROTOR DRIVESHAFTS.

On helicopters S/N 4 through 1251, the tail rotor driveshaft is made up of the following sections: forward short shaft, oil cooler blower shaft, aft short shaft, and the long shaft. Steel laminated flexible couplings requiring no lubrication are used to connect the shaft sections and the tail rotor gearbox. The long tail rotor driveshaft is designed to have a bend in the shaft between the first and second, and second and third bearing supports.

On helicopters S/N 1252 and subsequent, the tail rotor driveshaft is made up of the following sections: forward short shaft, oil cooler blower shaft, aft short shaft, and tail rotor driveshaft segments. Steel laminated flexible couplings requiring no lubrication are used to connect the shaft sections and the tail rotor gearbox.

65-15. TROUBLESHOOTING.

See figure 65-1 for troubleshooting the tail rotor driveshaft system.

65-16. FORWARD AND AFT SHORT SHAFTS.

The forward short shaft and aft short shaft are located on either side of the oil cooler blower assembly. The forward short shaft is constructed of steel and is connected to the aft end of the freewheeling assembly and forward end of the oil cooler blower shaft by splined adapters and steel laminated flexible couplings. The aft short shaft is constructed of aluminum alloy and is connected to the aft end of the oil cooler blower shaft and to the long tail rotor driveshaft or to the first tail rotor driveshaft segment by splined adapters and steel laminated flexible couplings.

65-17. REMOVAL.

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL ASSEMBLY EXCEPT AS NOTED IN PARAGRAPH 65-19.

1. Open engine side panels and remove aft fairing (Chapter 71).

2. Remove forward short shaft (3, figure 65-6) and aft short shaft (6) by removing, from both ends of shaft, two diametrically opposed bolts (15), beveled washers (16 and 18), thin steel washers (19), and nuts (20). It is recommended that disc assembly (17) remain installed on shafts.

3. If disc assembly (17) must be removed, remove from both ends of shaft(s), two nuts (14), washers (13, 12, and 11), and bolts (10). Reinstall hardware as an aid during installation and to maintain disc assembly stackup.

4. Remove three splined adapters (2, 8, and 9) from aft end of freewheeling driveshaft (1), aft end of blower shaft (4), and forward end of blower shaft (4).

NOTE

On helicopters S/N 1252 and subsequent, the splined adapter (22) is an integral part of the segmented tail rotor driveshaft and is not normally removed when the aft short shaft is removed.

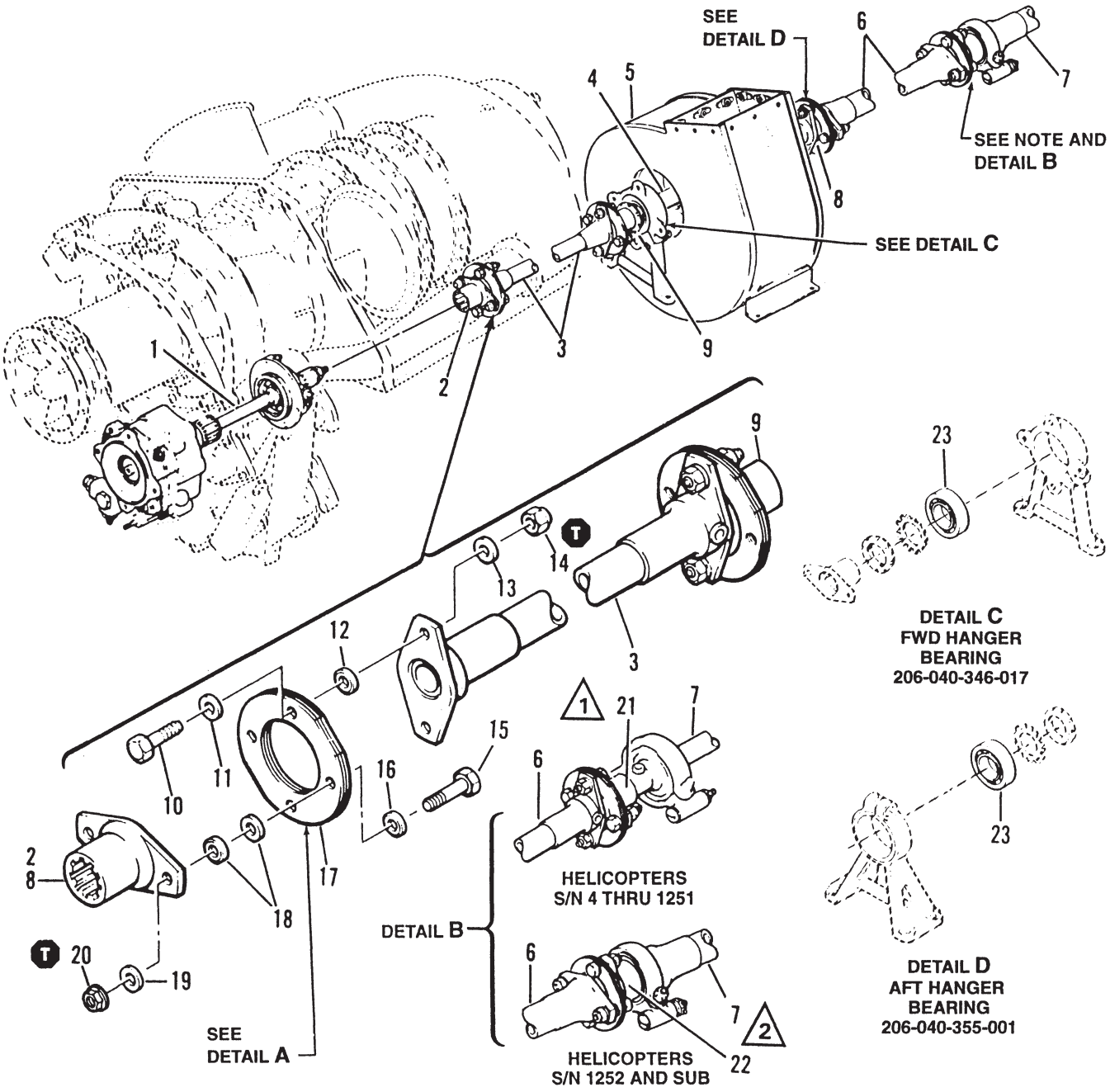
5. On helicopters S/N 4 through 1251, remove splined adapter (21) from long tail rotor driveshaft.

65-18. CLEANING.

CAUTION

DO NOT ALLOW SOLVENT TO CONTACT HANGER BEARINGS. SOLVENT MAY CAUSE DAMAGE.

Clean forward and aft short shafts (3 and 6, figure 65-6) with solvent (C-304) and dry with filtered compressed air.



1. Freewheeling shaft
2. Splined adapter
3. Forward short shaft (steel)
4. Blower shaft
5. Blower assembly
6. Aft short shaft
7. Long tail rotor driveshaft or segmented tail rotor driveshaft
8. Splined adapter
9. Splined adapter
10. Bolt
11. Beveled washer
12. Beveled washer
13. Thin steel washer
14. Nut
15. Bolt
16. Beveled washer
17. Disc assembly
18. Beveled washer
19. Thin steel washer
20. Nut
21. Splined adapter
22. Splined adapter
23. Hanger bearing

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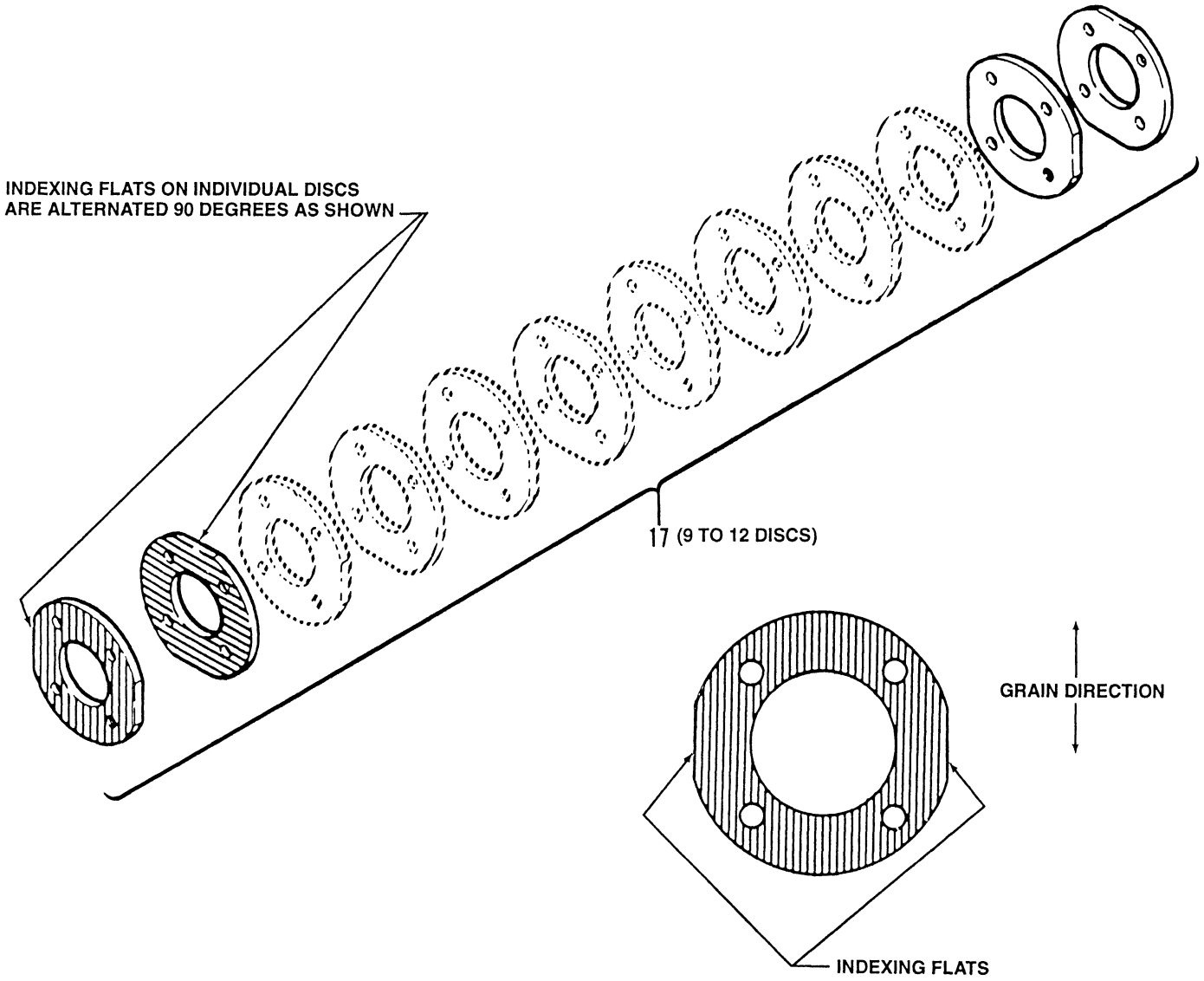
Figure 65-6. Forward and Aft Short Tail Rotor Driveshafts (Sheet 1 of 2)



DETAIL A
DISC ASSEMBLY
(TYPICAL 5 PLACES) △1
(TYPICAL 9 PLACES) △2

NOTES

△1 Long tail rotor driveshaft on helicopters S/N 4 through 1251.

△2 Segmented tail rotor driveshaft on helicopters S/N 1252 and subsequent.

(T) 50 TO 70 IN-LBS (5.65 TO 7.91 Nm)

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Figure 65-6. Forward and aft short tail rotor driveshafts (Sheet 2)

65-19. FORWARD AND AFT SHORT SHAFTS — INSPECTION AND REPAIR

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-423	Abrasive Paper
C-464	India Stone

1. Inspect forward and aft short shafts (3 and 6, Figure 65-6) for scratches and damage (Figure 65-6A and Figure 65-6B). Surface of shaft (steel or aluminum) to be smooth and unmarred. Replace shaft if it exceeds the following limits:

a. Scratches up to 0.002 inch (0.05 mm) deep around entire circumference may be blended out using fine abrasive paper (C-423) or fine India stone (C-464). Maximum stock removal not to exceed 0.003 inch (0.08 mm).

b. Scratches up to 0.005 inch (0.13 mm) deep, axial or circumferential, but not longer than 25% of circumference may be blended out using 600 grit abrasive paper (C-423) or fine India stone (C-464). Maximum material removal not to exceed 0.006 inch (0.15 mm).

c. Corrosion pitting must be polished out using 600 grit abrasive paper (C-423). Maximum depth of material removal after cleanup shall not exceed 0.006 inch (0.15 mm).

1A. Inspect aft short shaft (6) in accordance with the following substeps and Figure 65-6B.

a. Any damage or repair to anodized finished surfaces requires touch-up with chemical film treatment (BHT-ALL-SPM).

b. Touch up clear protective coating if repair required removal of coating (paragraph 65-31).

c. Inspect bond line (Detail D) using a 10X magnifying glass. If bond line area exhibits damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.

d. Inspect bond line (Surface A, Area E) using a 10X magnifying glass. If bond line area exhibits damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.

e. Inspect end stopper (Surface A, Area F) using a 10X magnifying glass. If end stopper area exhibits damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.

NOTE

Aft short shaft 206-040-330 has no end stoppers.

f. Inspect inside diameter of aft short shaft 206-040-330 using a bright light. If shaft inner diameter exhibits any corrosion or mechanical damage, the shaft shall be considered unserviceable and non-repairable.

2. Check adapter flanges on each end of steel forward short shaft (3). Check runout at adapter flange bolt. If flanges are not square within 0.004 inch (0.10 mm), replace shaft.

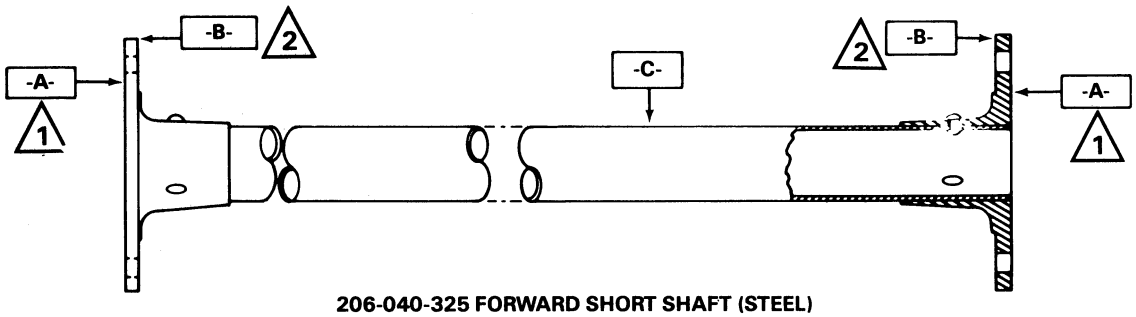
3. Check adapter flanges on each end of aluminum aft short shaft (6). Check runout at a point on adapter flange 1.0 inch (25.40 mm) from center of adapter. If flange is not square with axis of shaft within 0.002 inch (0.05 mm), replace shaft.

4. Inspect splined adapters (2, 8, 9, and 21) for chips, cracks, and wear. Replace splined adapters which have damaged splines, chips, or cracks.

CAUTION

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION. DISC SHOULD NOT BE CHANGED FROM ORIGINAL ASSEMBLY, EXCEPT AS NOTED IN THE FOLLOWING STEP.

5. Inspect coupling disc assembly (17) as follows:



206-040-325 FORWARD SHORT SHAFT (STEEL)

DAMAGE LOCATION SYMBOLS

-A- -B- -C-

TYPE OF DAMAGE	MAXIMUM DAMAGE AND REPAIR DEPTH
MECHANICAL	Mechanical damage up to 0.002 inch (0.051 mm) deep around entire circumference shall be polished out, provide that stock removal does not exceed 0.003 inch (0.076 mm). Mechanical damage up to 0.005 inch (0.127 mm) deep, axial or circumferential but not longer than 25 percent of circumference, shall be polished out, provided that stock removal does not exceed 0.006 inch (0.152 mm).
CORROSION	When corrosion damage is removed from diameter -C- and surfaces -A- and -B- , caution must be used to ensure that 0.002 to 0.004 inch (0.051 to 0.102 mm) (T.I.R.) runout of surface is not exceeded. Corrosion damage shall be polished out, provided that stock removal does not exceed 0.006 inch (0.152 mm).
EDGE CHAMFER	Edge damage shall be removed from surfaces -A- and -B- by using a chamfer of 0.030 inch (0.762 mm) by 40 to 50 degrees, whose total length when polished to existing surface shall not exceed 0.50 inch (12.70 mm) provided that no more than two such repairs are located in the same quadrant of the flange adapter.

NOTES

1. Surfaces -A- must be square with centerline of driveshaft within 0.004 inch (0.102 mm) T.I.R.
2. Surfaces -B- must be parallel with surfaces -A- within 0.005 inch (0.127 mm).

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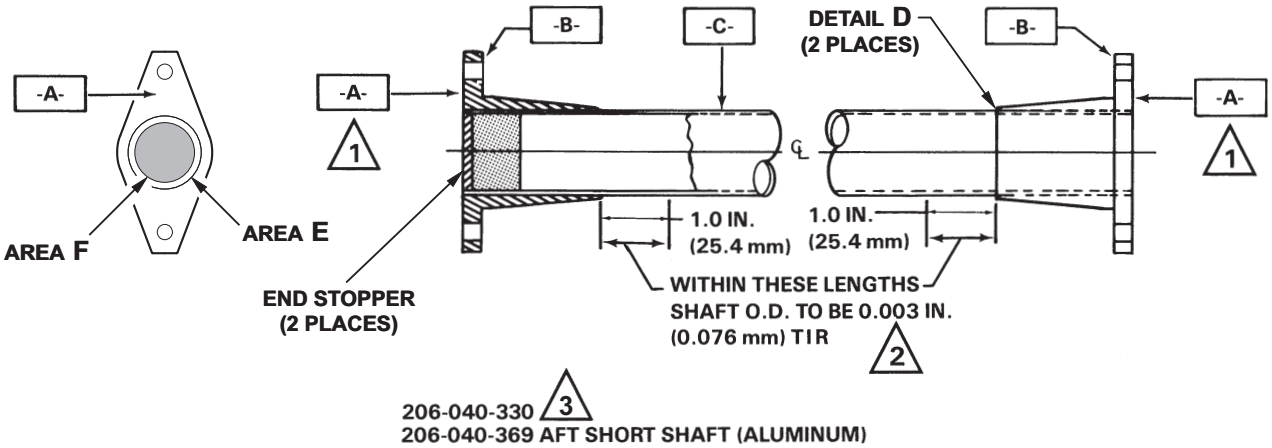
Figure 65-6A. Forward Short Shaft Damage Limits



DAMAGE LOCATION SYMBOLS

[- A-] [- B-] [- C-]

MAXIMUM DAMAGE AND REPAIR DEPTH

MECHANICAL	**Mechanical damage up to 0.002 inch (0.051 mm) deep around entire circumference shall be polished out, provided that stock removal does not exceed 0.003 inch (0.076 mm).** **Mechanical damage up to 0.005 inch (0.127 mm) deep, axial or circumferential but not longer than 25% of circumference, shall be polished out provided that stock removal does not exceed 0.006 inch (0.152 mm).**
CORROSION	**When corrosion damage is removed from diameter [- C-] and surfaces [- A-] and [- B-] , caution must be used to ensure that 0.004 inch (0.102 mm) (TIR) runnout of surface is not exceeded.** **Corrosion damage shall be polished out provided that stock removal does not exceed 0.006 inch (0.152 mm).**
EDGE CHAMFER	**Edge damage shall be removed from surfaces [- A-] and [- B-] by using a chamfer of 0.030 inch (0.762 mm) by 40 to 50°, whose total length, when polished to existing surface, shall not exceed 0.50 inch (12.70 mm) provided that no more than two such repairs are located in the same quadrant of the flange adapter.**
BOND LINE AND END STOPPERS	**Cracked or missing adhesive, or evidence of corrosion is not allowed.**

NOTES

1. **Surfaces [- A-] must be square with centerline of driveshaft within 0.002 inch (0.051 mm) TIR.**
2. **Surface [- B-] runout must be within 0.003 inch (0.076 mm) TIR.**
3. **Aft short shaft 206-040-330 does not have end stoppers.**

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Figure 65-6B. Aft Short Shaft Damage Limits

a. Check disc assembly (17) for cracks, wear, or damage.

b. The disc assembly (17) should be kept as an assembly; however, unserviceable discs may be replaced with new discs, as required, provided the assembled disc assembly is within 0.115 to 0.127 inch (2.92 to 3.23 mm) thick. Disc packs vary from 9 to 12 plates, and each plate varies between 0.010 to 0.014 inch (0.25 to 0.36 mm) thick.

c. Inspect discs for fretting and corrosion (Figure 65-6C).

d. When disc assembly (17, Figure 65-6) is installed, check for gaps between discs. Gaps of more than 0.005 inch (0.127 mm) are not acceptable. If gaps are excessive, loosen nuts (14 and 20) and rotate disc assembly back and forth, and uniformly torque nuts T. If any gaps exist that exceed 0.005 (0.127 mm), replace disc assembly.

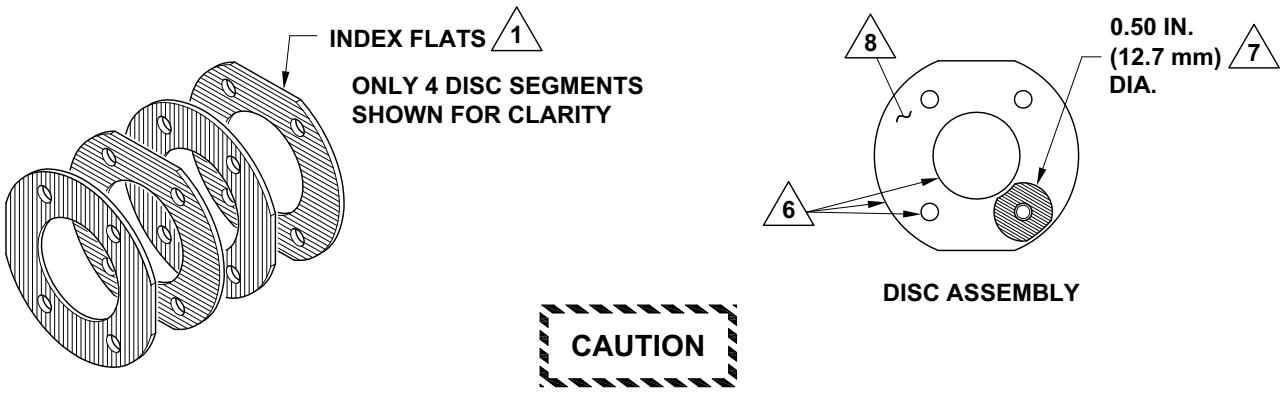
6. Visually inspect nonremovable rubber seal on hanger bearing (23) for deterioration and deformation. Bearings with seals torn at four lubrication points that allow excessive grease squeeze-out should be replaced. Bearings with seals rotating should be replaced.

7. Inspect hanger bearing (23) for evidence of overheating, and excessive grease leakage. Signs of overheating are discoloration or damage to seals. Black grease ejected or liquified from the bearing indicates bearing overheating.

8. Prior to run-up, lubricate hanger bearings (23) until grease purges past seals.

9. Ground run helicopter for 15 minutes and check bearings for signs of overheating.

10. If there is any doubt of bearing overheating, check bearing temperature with the use of a cold cylinder probe. The maximum recommended operating temperature is 185°F (85°C). A new bearing may run 275°F (135°C) maximum for the initial 15 to 20 hours of



CAUTION

MAKE SURE THAT THE ORDER IN WHICH THE DISC SEGMENTS ARE STACKED DOES NOT CHANGE AFTER THE COUPLING DISC PACK HAS OPERATED.

NOTES

1. **The grain of the disc segment is parallel to the index flats. Make sure that the index flats on each disc segment are turned 90° from the disc segment before and the disc segment after in the disc pack.**

2. **A coupling disc pack is 0.115 to 0.127 inch (2.92 to 3.22 mm) thick. A coupling disc pack has 9 to 12 disc segments. Each disc segment is 0.010 to 0.014 inch (0.254 to 0.355 mm) thick.**

3. **Use solvent (C-304) to clean grease and oil from each disc segment.**

4. **Soak the coupling disc pack in cleaner (C-344), or use a soft rubber eraser to clean fretting corrosion.**

5. **Cracks, nicks, and scratches are not permitted.**

6. **No fretting damage is permitted in less than 0.050 inch (1.270 mm) from an edge.**

7. **Discard disc segments that have fretting corrosion of more than 0.001 inch (0.025 mm) deep and on more than 40% of the area (4 places each side). Damage of 0.001 inch (0.025 mm) can be felt with a 0.010 inch (0.254 mm) spherical radius probe.**

8. **Random light fretting corrosion is permitted if corrosion is not on more than 5% of each quadrant, and each pitted area is not more than 0.005 inch (0.127 mm) in diameter and 0.001 inch (0.025 mm) in depth. Damage of 0.001 inch (0.025 mm) can be felt with a 0.010 inch (0.254 mm) spherical radius probe.**

9. **The only repair possible on the coupling disc packs is the replacement of the disc segment(s). Replace a damaged disc segment as follows:**
   a. **Replace an unserviceable disc segment with a new disc segment. A new disc segment is a segment that has not been operated on a helicopter.**
   b. **You can replace more than one of the disc segments.**
   c. **To replace a disc segment, put the new disc(s) in the center of the disc pack. Do not put the new disc(s) at the ends of the disc pack.** 1

10. **When disc assembly is installed, check for gaps between discs. Gaps of more than 0.005 inch (0.127 mm) are not acceptable. If gaps are excessive, loosen nuts and rotate disc assembly back and forth, and uniformly tighten nuts to required torque. If any gaps exist which exceed 0.005 inch (0.127 mm), replace disc assembly.**

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Figure 65-6C. Coupling Disc Packs — Inspection and Repair

operation. If bearing is running hot, inspect at frequent intervals until 20 hours of operation has lapsed. If bearing temperature has not stabilized after this time, replace bearing.

11. Inspect bearings (23) for roughness after a flight while bearings are warm. Roughness may be felt with light hand pressure applied to shafts while turning tail rotor and driveshaft by hand. If shaft has been disassembled from helicopter, roll bearings by hand and check for smooth rotation without excessive play.

12. Replace bearings if bearings are still rough after 5 hours of operation whether bearings show signs of overheating or not.

13. Inspect bearings (23) for obvious signs of corrosion. Corrosion may be recognized by black or reddish rust.

CAUTION

WHEN REPLACING BEARINGS, USE BEARINGS THAT HAVE BEEN IN STORAGE IN SEALED PROTECTIVE PACKAGE AND IN STORAGE LESS THAN 3 YEARS.

14. If there is any doubt of bearing serviceability, replace bearings

65-20. FORWARD AND AFT SHORT SHAFTS — INSTALLATION

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
–	Cold Cylinder Probe

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-561	Grease

CAUTION

AS APPLICABLE TO HELICOPTERS S/N 4523 AND SUBSEQUENT AND HELICOPTERS POST TB 206-06-186, ANY TIME ONE OR ALL OF THE RIVETED TAIL ROTOR SEGMENTED DRIVESHAFTS 206-040-385-105/109 OR THE RIVETED AFT SHORT SHAFT 206-040-383-101 (OR SUBSEQUENT PART NUMBERS) ARE INSTALLED, ROTOR BRAKE DISC 9440904 (OR SUBSEQUENT PART NUMBER) SHALL BE INSTALLED TO REDUCE THE EFFECT OF TORTIONAL LOADS DUE TO THE STIFFNESS OF THE RIVETED SHAFTS. INSTALLATION OF ROTOR BRAKE KITS BHT-206-SI-63 (SINGLE CALIPER) OR BHT-206-SI-105 (DUAL CALIPER), AS APPLICABLE, MEET THE ROTOR BRAKE DISC REQUIREMENT.

CAUTION

ON HELICOPTERS S/N 1252 THROUGH 4004, THE BONDED AFT SHORT SHAFT (6, FIGURE 65-6) IS SHORTER THAN THE REPLACEMENT RIVETED AFT SHORT SHAFT. TO MAINTAIN PROPER FIT AND CONFIGURATION WHEN BONDED AFT SHORT SHAFT OR BONDED TAIL ROTOR SEGMENTED DRIVESHAFT (7) ARE REPLACED WITH RIVETED SHAFTS IN ACCORDANCE WITH TB 206-06-186, RIVETED AFT SHORT SHAFT 206-040-383-101, RIVETED TAIL ROTOR SEGMENTED DRIVESHAFT 206-040-385-105, AND ADAPTER (22) 206-040-363-101 (OR SUBSEQUENT PART NUMBERS) SHALL BE INSTALLED TOGETHER. INTERMIXING OF BONDED AND RIVETED SHAFTS AT LOCATIONS (6 AND 7) IS NOT PERMITTED.

NOTE

On helicopters S/N 4005 through 4522 and 5101 through 5267, the bonded aft short

shaft (6) and bonded tail rotor segmented driveshafts (7) may be intermixed with riveted shafts (6 and 7) in accordance with TB 206-06-186.

1. Apply a thin film of grease (C-561) to external splines of freewheel shaft (1) and to each end of blower shaft (4). On helicopters S/N 4 through 1251, apply grease (C-561) to external splines of long tail rotor driveshaft (7). Also apply grease (C-561) to internal splined adapters (2, 8, 9, and 21).

NOTE

On helicopters S/N 1252 and subsequent, the long tail rotor driveshaft system has been replaced by a five section tail rotor driveshaft system. Splined adapter (22) as used on helicopters S/N 1252 and subsequent is part of the forward tail rotor driveshaft segment and is not normally removed when the aft short shaft is removed.

2. Install splined adapters (2, 8, and 9) on freewheel shaft (1) and on each end of blower shaft (4). On helicopters S/N 4 through 1251, install splined adapter (21) on forward end of long tail rotor driveshaft (7).

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISC SHOULD NOT BE CHANGED FROM ORIGINAL ASSEMBLY, EXCEPT AS NOTED IN PARAGRAPH 65-19.

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION. DISC SHOULD NOT BE CHANGED FROM ORIGINAL ASSEMBLY EXCEPT AS NOTED IN PARAGRAPH 65-19.

BEVELED WASHERS MUST BE INSTALLED WITH ROUNDED EDGE SIDE CONTACTING DISC ASSEMBLIES AND QUANTITIES MUST BE EQUAL AT 180° POSITIONS.

ONLY THE GRIP PORTION (UNTHREADED) OF BOLTS IS PERMITTED TO CONTACT DISC ASSEMBLIES AND BOLT LENGTHS MUST BE EQUAL AT 180° POSITIONS AND A MINIMUM OF TWO THREADS SHALL PROTRUDE BEYOND THE NUT.

3. If removed, install disc assemblies (17) to both ends of forward short shaft (3) as follows:

a. Make sure all disc assemblies are assembled as shown in Figure 65-6, Detail A, and preceding caution statements.

b. Position disc assemblies to flanged end of shafts and install two diametrically opposed bolts (10), beveled washers (11 and 12), thin steel washers (13), and nuts (14) T .

4. Carefully position forward short shaft (3) between splined adapters (2 and 9) and aft short shaft (6) between splined adapter (8) and splined adapter (21 or 22) on forward end of first tail rotor driveshaft segment or long tail rotor driveshaft (7). Connect shafts to adapters as follows:

a. Align open bolt holes in disc assemblies (17) to bolt holes in mating splined adapters (2, 8, and 9) and splined adapter on first tail rotor driveshaft segment or long tail rotor driveshaft (7).

b. Install two diametrically opposed bolts (15), beveled washers (16 and 18), thin steel washers (19), and nuts (20). Observe preceding caution statements and install beveled washers (18) back to back. Torque nuts T .

c. Inspect all disc assemblies for distortion resulting in gaps between the individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts (14 and 20) and rotate disc assembly back and forth and uniformly torque nuts T . Recheck gaps and if gaps are still excessive, replace unserviceable discs and repeat step.

5. Apply corrosion protective coating to aft short shaft (6) (paragraph 65-31).

6. Close engine side panels and install aft fairing (Chapter 71).

65-21. LONG TAIL ROTOR DRIVESHAFT

The long tail rotor driveshaft consists of an aluminum driveshaft with five bearing hangers. The driveshaft extends along the top of the tailboom connected between the aft short shaft and the tail rotor gearbox.

65-22. LONG TAIL ROTOR DRIVESHAFT — REMOVAL

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISC SHOULD NOT BE CHANGED FROM ORIGINAL STACKUP EXCEPT AS NOTED IN PARAGRAPH 65-19, STEP 5.

1. Remove tail rotor driveshaft cover (Chapter 53).

2. Remove two diametrically opposed bolts (3, Figure 65-7), beveled washers (4), steel washers (7), and nuts (8) from coupling at each end of long tail rotor driveshaft (13). Leave laminated disc assembled on shaft adapter (2) and on input pinion adapter (36).

3. Remove two cotter pins (39), nuts (21), aluminum washers (22), and screws (25), attaching each of the five bearing hangers (16) to hanger brackets (24) mounted along top center of tailboom. Remove long tail rotor driveshaft (13) with bearing hangers from tailboom.

4. Remove splined adapter (6) from long tail rotor driveshaft (13) and splined adapter (36) from input pinion shaft (35).

5. Check security of bonding between splined fitting (9) and forward end of long tail rotor driveshaft (13) by attempting to twist splined fitting on end of driveshaft. Also place thumb on head of pin (10) and rotate pin in its hole on driveshaft. If pin is tight in hole and will not torque with thumb pressure, remove pin and check for failure of bond between fitting and end of driveshaft. Replace driveshaft if bond has failed.

6. Repeat procedure in step 4. Check security of bonding between shaft adapter (37) and long tail rotor driveshaft (13) on opposite end of driveshaft.

7. Remove cotter pin (12), aluminum washer (11), and pin (10) from long tail rotor driveshaft (13).

8. Clean all abrasive matter from driveshaft to prevent scratching driveshaft during removal. Add a coating of HR lubricant (available from Holland-Rantoscal, Inc., 393 7th Avenue, New York, NY 10001) or talcum powder to driveshaft. If lubricant becomes dry add a small amount of water.

CAUTION

DO NOT REMOVE BEARING HANGER (16) FROM BEARING (14) WHILE ON SHAFT.

9. Remove five bearing hangers (16) with bearings (14) and bearing collars (15) from long tail rotor driveshaft (13).

10. Remove nuts (17), spacers (18), and springs (19) from bearing hangers (16).

11. Rotate bearings (14) 90° to notches in bearing hangers (16) and remove bearings. Remove and discard bearing collars (15).

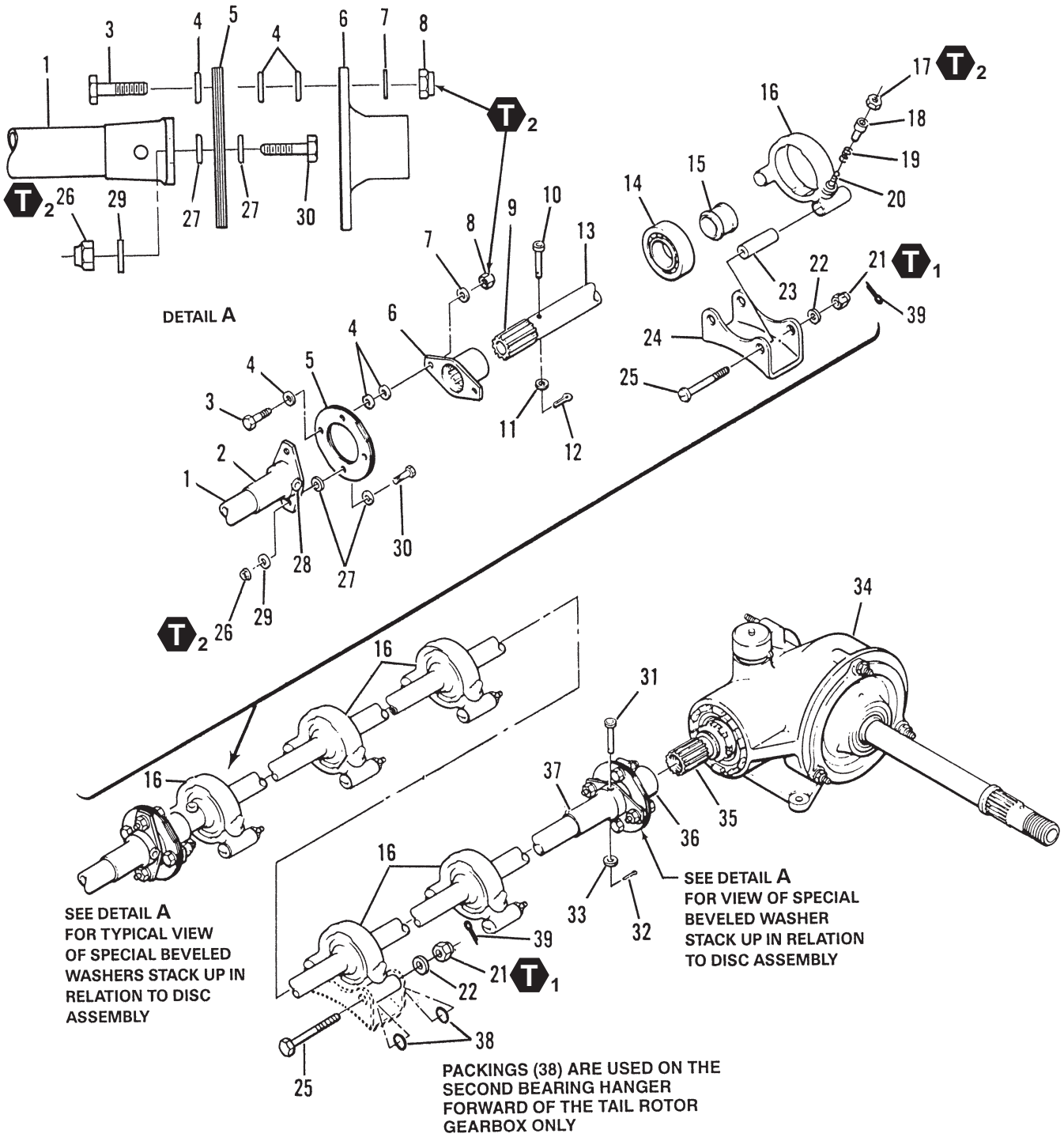

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Figure 65-7. Long Tail Rotor Driveshaft (Sheet 1 of 2)

1. Aft short shaft
2. Shaft adapter
3. Bolt
4. Beveled washer
5. Disc assembly
6. Splined adapter
7. Steel washer
8. Nut
9. Splined fitting
10. Pin
11. Aluminum washer
12. Cotter pin
13. Long tail rotor driveshaft
14. Bearing
15. Bearing collar
16. Bearing hanger
17. Nut
18. Spacer
19. Spring
20. Bolt
21. Nut
22. Aluminum washer
23. Bushing
24. Hanger bracket
25. Screw
26. Nut
27. Beveled washers
28. Pin, washer and cotter pin
29. Thin steel washer
30. Bolt
31. Pin
32. Cotter pin
33. Aluminum washer
34. Tail rotor gearbox
35. Input pinion shaft
36. Input pinion adapter
37. Shaft adapter (bonded)
38. Packings
39. Cotter pin

T1 30 TO 45 IN-LBS (3.39 TO 5.08 Nm)

T2 50 TO 70 IN-LBS (5.65 TO 7.91 Nm)

206AB_MM_65_0007b

Figure 65-7. Long Tail Rotor Driveshaft (Sheet 2 of 2)

65-23. LONG TAIL ROTOR DRIVESHAFT — CLEANING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

CAUTION

DO NOT ALLOW DRYCLEANING SOLVENT (C-304) TO CONTACT SEALED BEARINGS, AND DO NOT WIPE GREASE FROM BEARING SEALS. WIPING GREASE FROM SEALS MAY PUSH FOREIGN MATERIAL INTO BEARINGS.

1. Clean long tail rotor driveshaft (13, Figure 65-7) with drycleaning solvent (C-304) and dry with filtered compressed air.

65-24. LONG TAIL ROTOR DRIVESHAFT — INSPECTION AND REPAIR

1. Inspect long tail rotor driveshaft (13, Figure 65-7) and assembly for mechanical and corrosion damage (Figure 65-7A).

2. Inspect coupling disc assembly (5) on each end of driveshaft as follows:

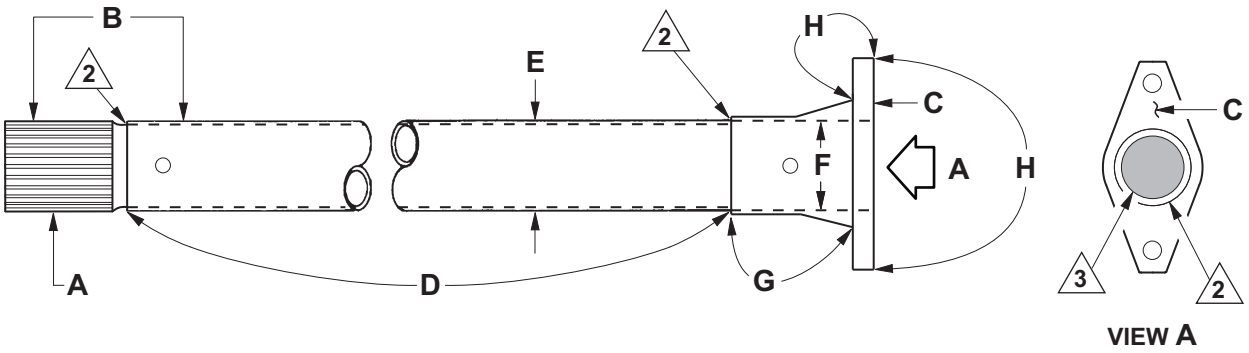
a. Check disc assembly (5) for cracks, wear, or damage.

b. The disc assembly (5) should be kept as an assembly; however, unserviceable discs may be replaced with new discs, as required, provided the assembled disc assembly is within 0.115 to 0.127 inch (2.92 to 3.23 mm) thick. Disc assemblies vary from 9 to 12 discs and each disc varies between 0.010 to 0.014 inch (0.25 to 0.36 mm) thick.

c. Inspect discs for fretting and corrosion (Figure 65-6C).

d. When disc assembly is installed, check for gaps between discs. Gaps of more than 0.005 inch (0.127 mm) are not acceptable. If gaps are excessive, loosen nuts (8 and 26) and rotate disc assembly back and forth, and uniformly torque nuts (T). If any gaps exist that exceed 0.005 (0.127 mm), replace disc assembly.

3. Visually inspect nonremovable rubber seal on hanger bearing (14) for deterioration and deformation. Bearings with seals torn at four lubrication points that allow excessive grease squeeze-out should be replaced. Bearings with seals rotating should be replaced.



LONG TAIL ROTOR DRIVESHAFT (206-040-330-001)
MATERIAL: ALUMINUM

NO.	REF LTR	CHARACTERISTIC	INSPECTION METHOD	LIMIT	
1.	A	Wear	Measure	Use 0.1200 inch (3.048 mm) diameter pins to check spline wear. Minimum over pin diameter 1.1025 inches (28.003 mm).	1
2.	B	TIR	Measure	Check runnout of splined fitting to outside diameter of shaft (within 2.0 inches (50.8 mm) from forward end of shaft, not fitting). Must not exceed 0.004 inch (0.102 mm) TIR including parallelism.	
3.	C	TIR	Measure	Flange face to be square with axis of shaft assembly. Measure runout at a point on flange adapter 1 inch (25.4 mm) from center of adapter. Must not exceed 0.002 inch (0.051 mm) TIR before and after repair.	
4.	D	Mechanical/corrosion damage	Measure	Surface of shaft to be smooth and unmarred. Scratches up to 0.002 inch (0.051 mm) deep around the entire circumference may be blended out using No. 600 abrasive paper (C-423) or India stone (C-464). Maximum stock removal not to exceed 0.003 inch (0.076 mm). Scratches up to 0.005 inch (0.127 mm) deep, axial or circumferential, but no longer than 25% of circumference, may be blended out using No. 600 grit abrasive paper (C-423) or India stone (C-464). Maximum stock removal not to exceed 0.006 inch (0.152 mm).	5

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Figure 65-7A. Long Tail Rotor Driveshaft Damage Limits (Sheet 1 of 2)

NO.	REF LTR	CHARACTERISTIC	INSPECTION METHOD	LIMIT	
5.	E	Wear	Measure	Maximum wear on diameter beneath bearing collar is 0.006 inch (0.152 mm). Determined by measuring the difference of the diameter in the worn and unworn areas.	
6.	F	Mechanical/corrosion damage	Visual	None permitted.	4
7.	G	Mechanical/corrosion damage	Visual	None permitted.	
8.	H	Mechanical damage	Measure	0.002 inch (0.051 mm) up to 25% of area.	5
9.	H	Corrosion damage	Visual	Only superficial corrosion removable with abrasive pad (C-407).	5

NOTES

1. Dress out wear step between worn and unworn areas of spline teeth with India stone (C-464) or equivalent to form a smooth transition.
2. Inspect bond line using 10X magnifying glass. If bond line area exhibits damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.
3. Inspect end stopper using 10X magnifying glass. If end stopper area exhibits damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.
4. Inspect inside diameter of shaft using a bright light. If inside diameter exhibits any mechanical or corrosion damage, the shaft shall be considered unserviceable and non-repairable.
5. Apply chemical film material (C-100) treatment to all repaired and bare aluminum surfaces (BHT-ALL-SPM).

206AB_MM_65_0011b

Figure 65-7A. Long Tail Rotor Driveshaft Damage Limits (Sheet 2 of 2)

4. Inspect hanger bearing (14) for evidence of overheating and excessive grease leakage. Signs of overheating are discoloration, damage to seals; black grease ejected or liquefied from the bearing indicates bearing overheating.

5. Inspect bearings (14) for roughness after a flight while bearings are warm. Roughness may be felt with light hand pressure applied to shafts while turning tail rotor and driveshaft by hand. If shaft has been disassembled from helicopter, roll bearings by hand and check for smooth rotation without excessive play.

6. Replace bearings if they are still rough after 5 hours of operation whether bearings show overheating or not.

7. Inspect bearings (14) for obvious signs of corrosion. Corrosion may be recognized by black or reddish rust.

CAUTION

WHEN REPLACING BEARINGS, USE BEARINGS THAT HAVE BEEN IN STORAGE IN SEALED PROTECTIVE PACKAGE AND IN STORAGE LESS THAN 3 YEARS.

8. If there is any doubt of bearing serviceability, replace bearings.

65-25. LONG TAIL ROTOR DRIVESHAFT — INSTALLATION

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
—	Cold Cylinder Probe

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-104	Corrosion Preventive Compound

MATERIALS REQUIRED (Cont)

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-561	Grease

1. Apply a thin film of corrosion preventive compound (C-104) to shank of bolts (20, Figure 65-7), springs (19), spacers (18), and outside diameter of bearings (14). Apply a thin film of corrosion preventive compound (C-104) to inside mating surfaces of bearing hangers (16). Do not allow corrosion preventive compound to contact bearing seals.

2. Hold bearing (14) 90° to notches in bearing hanger (16) and insert bearing halfway through hanger, then rotate bearing halfway through hanger, then rotate bearing into same plane of hanger. Assemble the four remaining bearings into hangers.

CAUTION

MAKE SURE THAT ONLY SPACERS MEASURING 0.545 TO 0.550 INCH (13.84 TO 13.97 MM) IN LENGTH FROM FLANGED END ARE USED IN THE FIVE BEARING HANGERS (FIGURE 65-8).

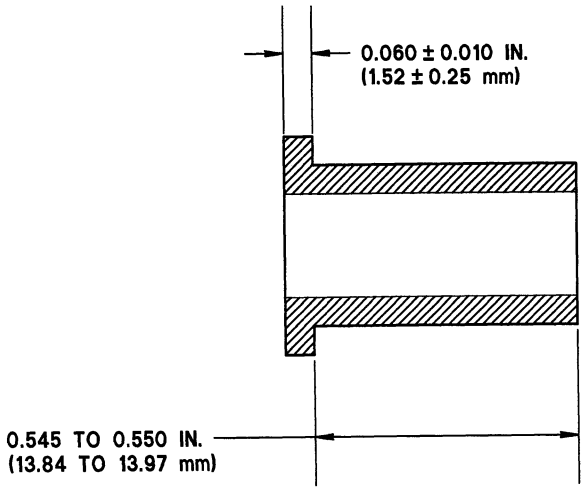
3. In each of the five bearing hangers (16, Figure 65-7) install springs (19), spacers (18), and nuts (17) T .

4. Insert new rubber bearing collars (15) inside each bearing (14).

5. Position bearing hanger (16) assemblies on long tail rotor driveshaft (13) as follows:

a. Insert packing in radius groove between splined fitting (9) and forward end of long tail rotor driveshaft (13) to prevent rubber bearing collars (15) from catching in groove while being installed. Remove pin (10) if not previously accomplished.

b. Clean shaft thoroughly. Apply HR lubricant or talcum powder to shaft with a clean cloth to aid in installing bearing assemblies. If lubricant or jelly becomes dry add a small amount of water.



206-040-351-001
SPACER

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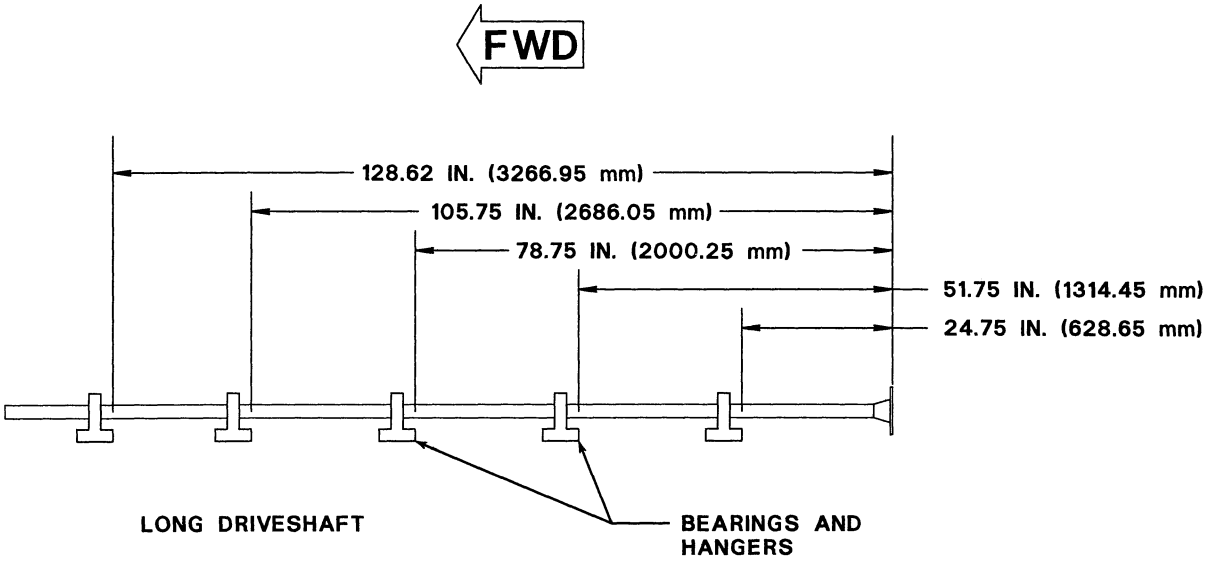
Figure 65-8. Spacer



POSITION BEARINGS ON DRIVESHAFT AT LOCATIONS SHOWN PRIOR TO INSTALLATION OF DRIVESHAFT ON HELICOPTER.

206A/BS-M-65-9

Figure 65-9. Dimensions for initial bearing installation on long tail rotor driveshaft

c. Position each bearing hanger assembly on driveshaft to dimensions shown in Figure 65-9, and corresponding with hanger bracket (24, Figure 65-7) on top of helicopter tailboom. Bearing hangers shall be installed with clamp side to left side of tailboom.

d. Remove packing from radius groove and wipe driveshaft dry.

e. Install pins (10 and 31) and secure with aluminum washers (11 and 33) and cotter pins (12 and 32).

f. Apply a film of grease (C-561) to splines of splined fitting (9) and input pinion shaft (35). Also apply grease to mating splines of splined adapter (6), input pinion splined adapter (36), and install adapters.

6. Position long tail rotor driveshaft (13) along top of tailboom and insert bearing hangers (16) in hanger brackets (24). Install two bushings (23) in each bearing hanger and insert two screws (25) in each. Do not install aluminum washers (22), nuts (21), or packings (38) at this time.

CAUTION

ONLY THE GRIP PORTION (UNTHREADED) OF BOLTS ARE PERMITTED TO CONTACT DISC ASSEMBLIES AND BOLT LENGTHS MUST BE EQUAL AT 180° POSITIONS.

7. Install two diametrically opposed bolts (3) in forward and aft disc assemblies.

8. Install beveled washers (4) with rounded edge side in contact with disc assembly (5) and flange of splined adapter (6) and input pinion adapter (36).

9. Install thin steel washers (7) on aft side of adapters and install nuts (8) T .

10. Inspect all disc assemblies (5) for distortion resulting in gaps between individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts (8 and 26), rotate disc back and forth, and uniformly tighten nuts (8 and 26) T . Recheck gaps. If gaps still exceed limit, replace disc or disc assembly (5) (paragraph 65-20, step 3).

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL PACK EXCEPT AS NOTED IN PARAGRAPH 65-19, STEP 5.

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC PACK ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION.

INSTALL BEVELED WASHERS EXACTLY AS DESCRIBED AND ILLUSTRATED WITH ROUNDED EDGE SIDE IN CONTACT WITH DISC ASSEMBLY OR FLANGE OF ADAPTERS. FAILURE TO COMPLY MAY RESULT IN DISC FAILURE.

11. Position the five bearing hangers (16) to obtain 0.110 to 0.170 inch (2.79 to 4.32 mm) dimension between end of input pinion adapter (36) and shoulder on input pinion shaft (35) on tail rotor gearbox (34). Also position each bearing hanger (16) to center in hanger brackets (24) , within 0.060 inch (1.52 mm) of center (Figure 65-10).

12. Check centering of each bearing collar (15, Figure 65-7) and bearing (14) to the long tail rotor driveshaft as follows:

a. Remove screws (25) and bushings (23) on one bearing hanger (16) at a time.

b. Install a dial indicator on the bearing to be checked, as illustrated in Figure 65-11. The box section illustrated below the bearing hanger in this photograph simulates the tailboom. Note that the dial indicator plunger is contacting the top portion of the hanger rim. Adjust the dial indicator support so the dial indicator plunger is preloaded to give plus or minus runout reading when the shaft is rotated.

c. Place on bushing (23, figure 65-7) or other suitable support between one ear of bearing hanger (16) and tailboom and at right angles to drives haft. This will prevent hanger from turning but will permit hanger to wobble if collar and bearing inner race are not positioned square to shaft.

d. Direct assistant to grasp driveshaft about 48 inches (1219.20 mm) away from bearing being checked and rotate the shaft toward the bushing placed under the bearing hanger. Observe the dial indicator. If the bearing inner race and collar are positioned square to the long tail rotor driveshaft (13) within 0.004 inch (0.10 mm) indicated runout, the bearing inner race and collar position is satisfactory. If dial indicator runout is in excess of this limit, reposition the bearing collar (15) on the shaft.

e. After bearing and collar are positioned square with shaft within limits, install two bushings (23) and screws (25). Repeat this procedure to check centering of remaining four bearings and collars.

f. Check for 0.110 to 0.170 inch (2.79 to 4.32 mm) dimension at input pinion adapter (36) and shoulder of input pinion shaft (35) after completion of bearing collar centering check.

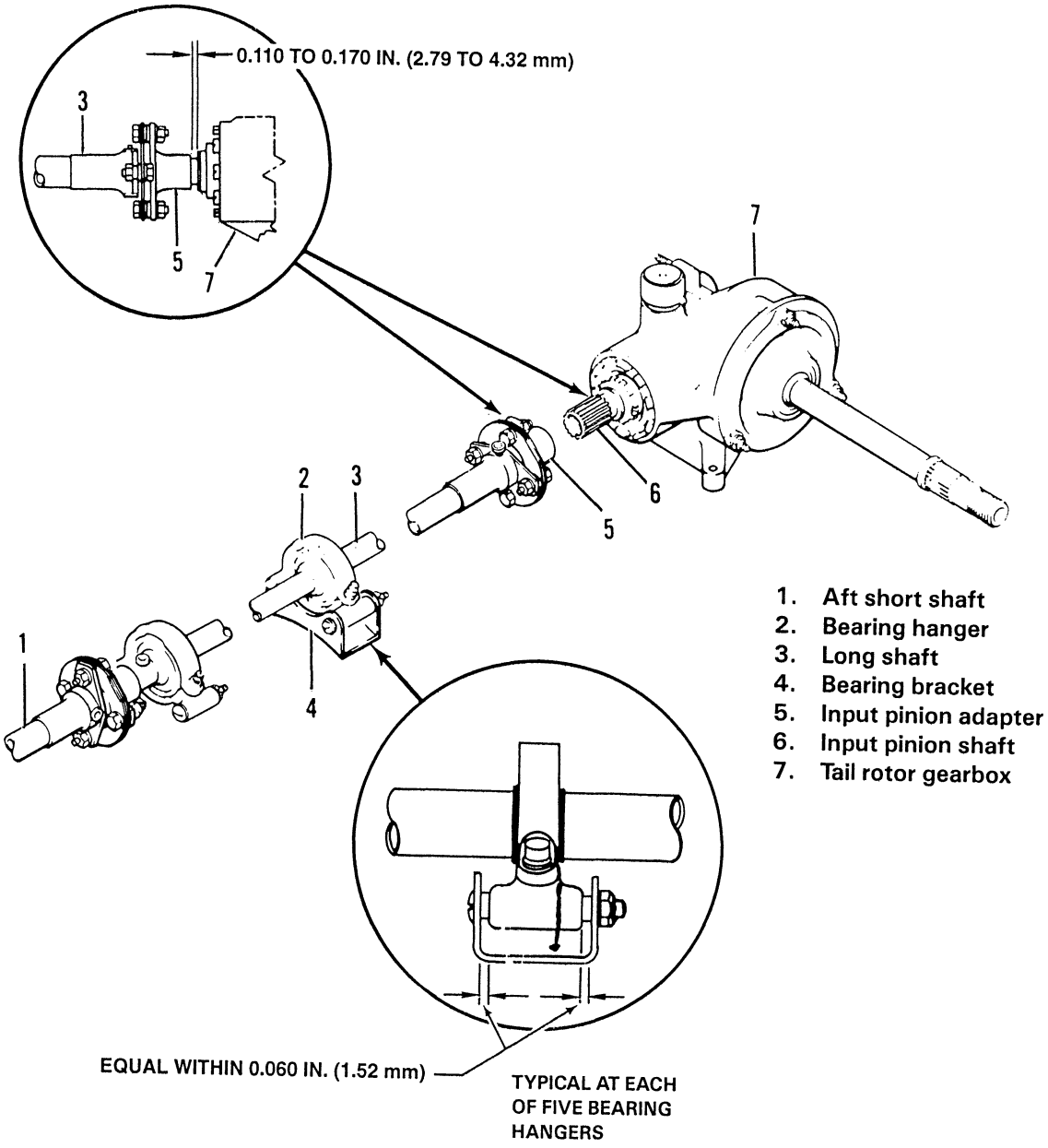


Figure 65-10. Long tail rotor driveshaft bearing hanger position check (typical)

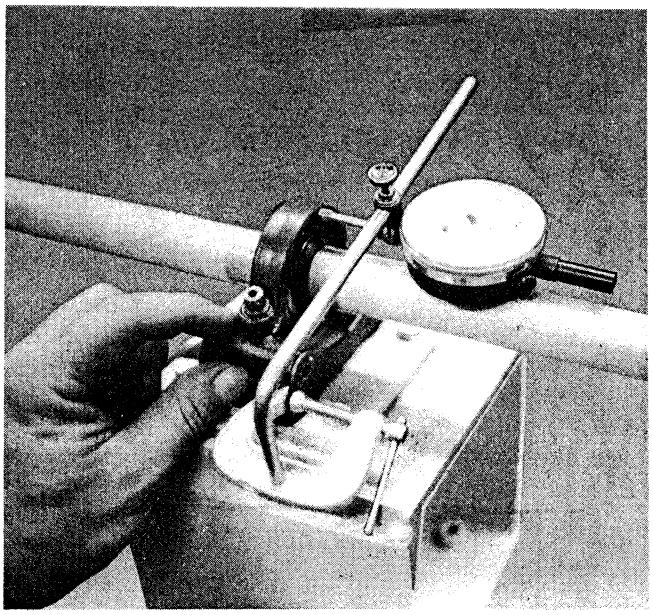


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Figure 65-11. Dial indicator attachment

g. Install four packings (38), two on each bushing (23) (forward and aft) of the second bearing hanger (16) forward of tail rotor gearbox (34).

NOTE

Packings (38) installed in the preceding step are used at the second bearing hanger forward of tail rotor gearbox only.

h. Install aluminum washers (22) and nuts (21) on screws (25). Tighten nuts (21) (T) and secure with cotter pins (39).

NOTE

Additional washers may be used if screw is too long for proper cotter pin installation.

13. Tighten nuts (8 and 26) (T).

14. Prepare helicopter for ground runup and accomplish the following:

WARNING

DO NOT GRASP TAIL ROTOR DRIVESHAFT DURING GROUND RUN OR ROTOR COASTDOWN.

CAUTION

DO NOT EXCEED ONE MINUTE RUNUP OR BEARINGS MAY SPIN EXCESSIVELY IN HANGERS.

a. Prior to runup, lubricate bearings until grease purges past seals (Chapter 12). Loosen hanger clamping nuts (17) until all preload is removed from springs (19) and springs can be turned by hand, then using non-sharp tool in split line of hanger, pry open slightly and move bearing (14) slightly by hand to ensure freedom. Remove tool from bearing hanger (16). Run up helicopter to 60 to 62 percent rotor rpm for 45 seconds to one minute. (Refer to applicable JetRanger Flight Manual.) Start timing when rotor starts turning. Shut down and torque nuts (17) (T). Wipe off any grease from outside of bearings.

CAUTION

CLEAN WITH DRY CLOTHS USING CAUTION NOT TO WIPE DIRT OR EXPELLED LUBRICANT UNDER BEARING SEAL AND INTO BEARING.

b. Ground run helicopter for 15 minutes and check bearings (14) for signs of overheating. Refer to applicable JetRanger Flight Manual. Maximum recommended operating temperature is 185°F (85°C). A new bearing may run 275°F (135°C) maximum for the initial 15 to 20 hours of operation. If bearings are running hot, inspect at frequent intervals until 20 hours of operation have elapsed. If bearing temperature has not stabilized after this time, replace bearing. Refer to BHT-206A/B-SERIES-CR&O manual for additional bearing inspection data.

NOTE

A cold cylinder probe may be used to provide precise measurement of bearing temperature.

15. Check runout of long tail rotor driveshaft (13) with a dial indicator after ground run-up. Runout within 1.0 inch (25.40 mm) of bearings centerline must not exceed 0.006 inch (0.15 mm) TIR. Runout midway between each bearing hanger must not exceed 0.010 inch (0.16 mm) TIR.

16. Apply corrosion preventive compound (C-101) to tail rotor drive (paragraph 65-31).

17. Install tail rotor driveshaft cover (Chapter 53).

18. Do a torque check of the disc pack coupling (5, Figure 65-7) attaching hardware 10 to 25 flight hours after each installation (Chapter 5).

65-26. SEGMENTED TAIL ROTOR DRIVESHAFTS

The tail rotor driveshaft consists of five segments (2 and 3, Figure 65-12) and extends along the top of the tailboom.

65-27. SEGMENTED TAIL ROTOR DRIVESHAFTS — REMOVAL

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL STACKUP EXCEPT AS NOTED IN PARAGRAPH 65-19, STEP 5.

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC PACK ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION.

ONLY GRIP PORTION (UNTHREADED) OF BOLTS ARE PERMITTED TO CONTACT DISC ASSEMBLIES AND BOLT LENGTHS MUST BE EQUAL AT 180° POSITIONS. SINCE DIFFERENT LENGTH BOLTS ARE USED, ENSURE BOLT THREADS DO NOT BOTTOM OUT.

1. Remove tail rotor driveshaft cover and tail rotor gearbox fairing (Chapter 53).

2. Remove two diametrically opposed bolts (6, Figure 65-12), thin steel washers (10), beveled washers (7), and nuts (11) from each of the five coupling assemblies for the forward tail rotor driveshaft segment (2) and the four aft tail rotor driveshaft segments (3) (Detail A). Leave the laminated disc assemblies (8) bolted to flange adapters (27) on the end of each shaft segment, and the short shaft (1).

3. Remove two diametrically opposed bolts (39), beveled washers (38), thin steel washers (36), and nuts (35) from input pinion adapter (34) at tail rotor gearbox (4) (Detail C).

4. Remove tail rotor driveshaft segments as follows:

a. Remove cotter pins (23), nuts (24), and thin aluminum washers (25) from all screws (26).

b. Remove screws (26) and lift tail rotor driveshaft segment (3), packings (19), aluminum

washers (22), and bushings (20) from tailboom at station 282.73.

c. Remove screws (26) and lift aft tail rotor driveshaft segment (3), aluminum washers (22), and bushings (40) from tailboom at stations 205.93, 228.79, 255.77, and 309.67.

5. Remove the forward tail rotor driveshaft segment (2) from tailboom.

NOTE

The forward tail rotor driveshaft segment (2) is not interchangeable with the four aft tail rotor driveshaft segments (3).

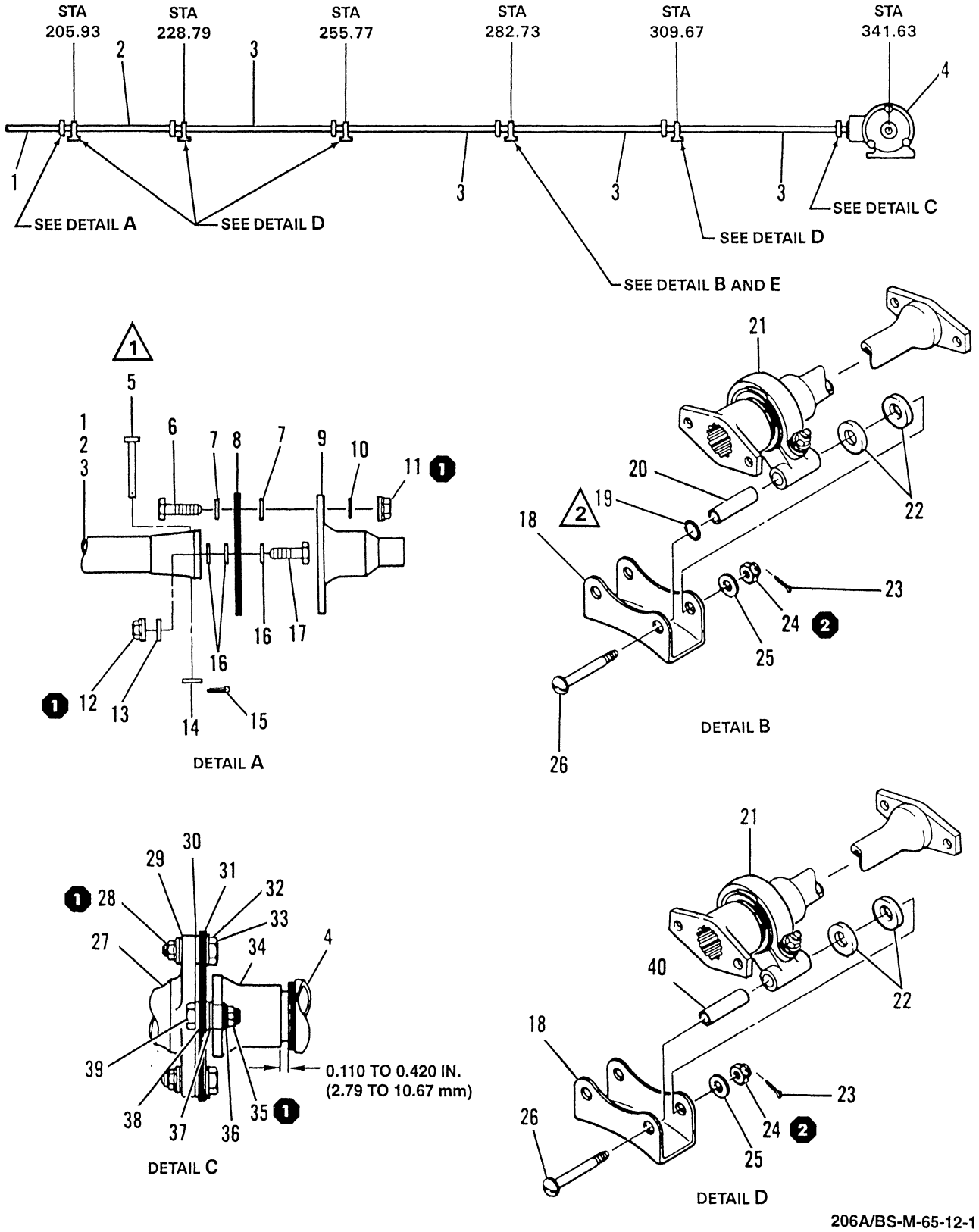
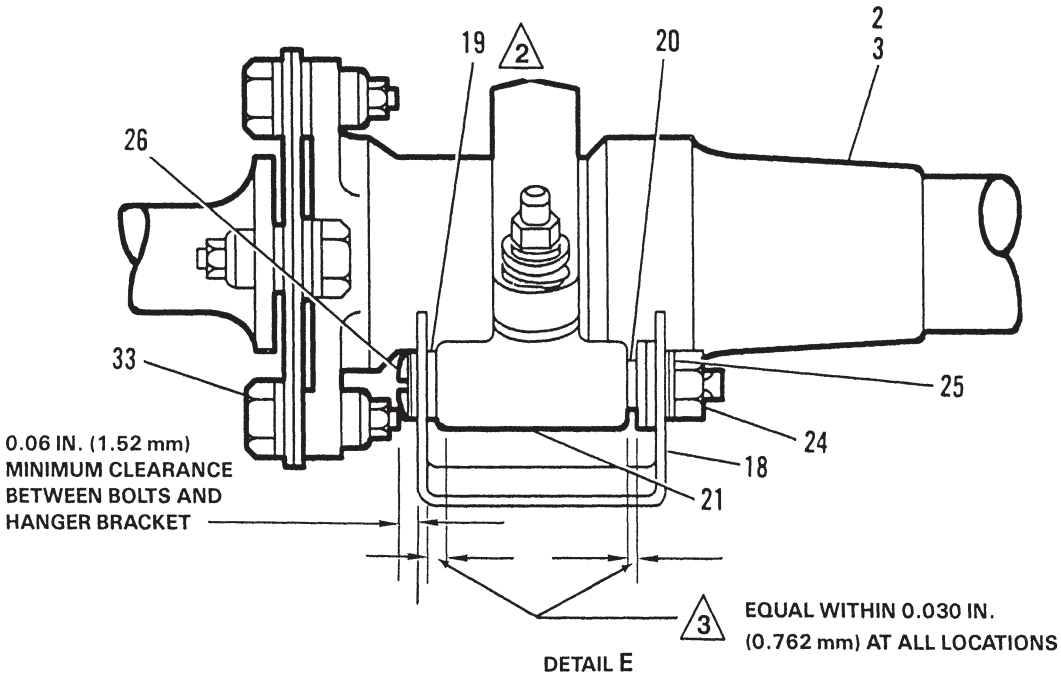


Figure 65-12. Segmented tail rotor driveshafts (Sheet 1 of 2)



1. Aft short shaft
2. Forward tail rotor driveshaft segment
3. Aft tail rotor driveshaft segments (4 reqd)
4. Tail rotor gearbox
5. Pin
6. Bolt
7. Beveled washer
8. Disc assembly
9. Splined adapter
10. Thin steel washer
11. Nut
12. Nut
13. Thin steel washer
14. Aluminum washer
15. Cotter pin
16. Beveled washer
17. Bolt
18. Hanger bracket
19. Packing
20. Bushing
21. Bearing hanger
22. Aluminum washers
23. Cotter pin
24. Nut
25. Thin aluminum washer
26. Screw
27. Flange adapter (bonded)
28. Nut
29. Thin steel washer
30. Beveled washer
31. Disc assembly
32. Beveled washer
33. Bolt
34. Input pinion adapter
35. Nut
36. Thin steel washer
37. Beveled washer
38. Beveled washer
39. Bolt
40. Bushing

NOTES

1. Pin (5) aluminum washer (14), and cotter pin (15) are only installed in short shaft (1).
2. Packings (19) are only installed at station 282.73.
3. Disregard packing (19) width when centering bearing hanger (21) in hanger bracket (18).
- ❶ 50 to 70 IN-LBS (5.65 to 7.91 Nm)
- ❷ 30 to 45 IN-LBS (3.39 to 5.08 Nm)

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Figure 65-12. Segmented Tail Rotor Driveshafts (Sheet 2 of 2)

6. For disassembly of the forward and aft tail rotor driveshaft segments (2 and 3), refer to the BHT-206A/B-M&O or BHT-206B3-CR&O as applicable.

65-28. SEGMENTED TAIL ROTOR DRIVESHAFTS — CLEANING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

1. Clean segmented tail rotor driveshaft segments (2 and 3, Figure 65-12) with drycleaning solvent (C-304).

2. Dry with filtered compressed air.

65-29. SEGMENTED TAIL ROTOR DRIVESHAFTS — INSPECTION AND REPAIR

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
T101511	Spline Wrench
Commercial	Hypodermic Needle
Commercial	Stud Remover and Setter Tool
Commercial	Vee Blocks (Qty 2)
Commercial	Veterinary Syringe

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-001	Grease
C-100	Chemical Film Material
C-108	Cadmium Plating Solution
C-423	Abrasive Paper
C-464	India Stone

1. Thoroughly clean segmented tail rotor driveshaft parts (paragraph 65-28).

NOTE

Limit charts are provided to show the required fit between mating parts. It is not intended that all dimensions listed on limit charts be checked as a prescribed overhaul procedure; however, parts that show evidence of wear or physical damage must be checked dimensionally.

2. Inspect plate (3, Figure 65-13), coupling adapter (4), sealed bearing (5), hanger (6), spacer (11), and spring (12) dimensionally and replace parts that do not fall within inspection limits (Figure 65-13A).

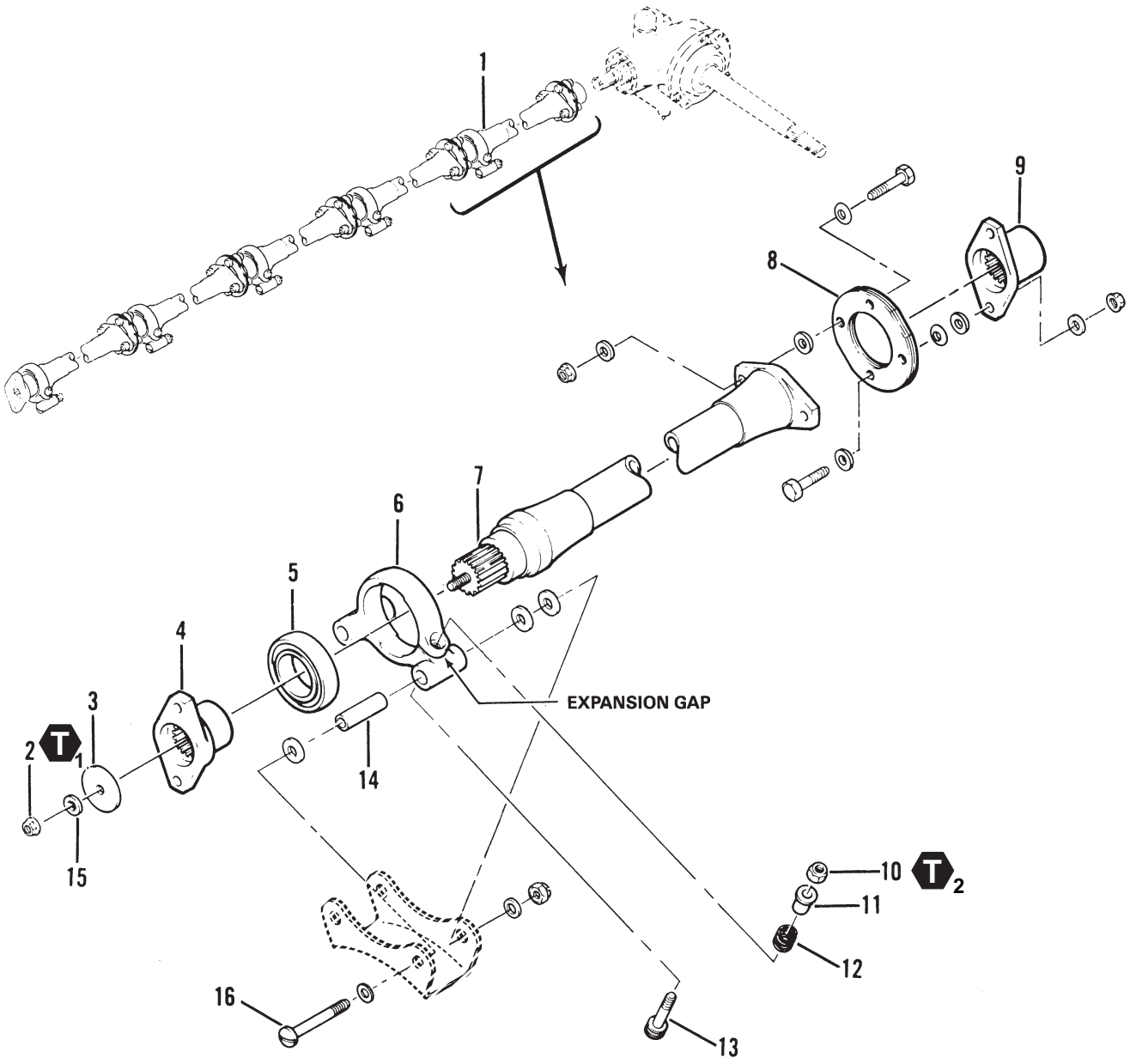
3. If driveshaft (7, Figure 65-13) is a bonded segment, inspect for wear, mechanical damage, and corrosion damage (Figure 65-13A and Figure 65-13B). Replace driveshaft if it does not fall within inspection or repair limits.

4. If driveshaft (7, Figure 65-13) is a riveted segment, inspect for wear, mechanical damage, and corrosion damage (Figure 65-13C). Replace driveshaft if it does not fall within inspection or repair limits.

5. Visually inspect coupling adapter (4, Figure 65-13) and hanger (6) for mechanical and corrosion damage (Figure 65-13D and Figure 65-13E).

6. Repair acceptable damage to coupling adapter (4), hanger (6), and driveshaft (7) as follows:

a. Polish out acceptable damage with 400 or 600 grit abrasive paper (C-423).



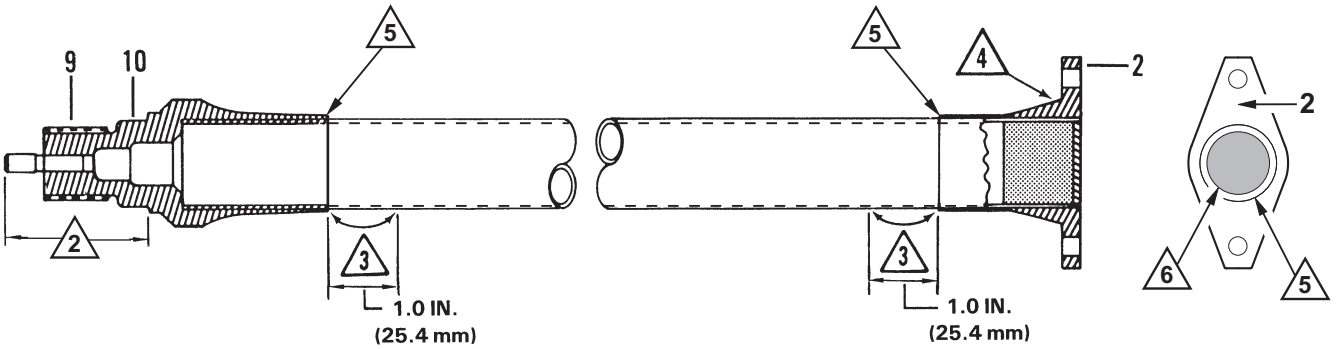
1. Tail rotor driveshaft segment (5)
2. Nut
3. Plate
4. Coupling adapter
5. Sealed bearing
6. Hanger
7. Driveshaft
8. Disc assembly (Thomas coupling)
9. Slip adapter
10. Nut
11. Spacer
12. Spring
13. Clinch bolt
14. Bushing
15. Thin steel washer
16. Screw

T1 30 TO 50 IN-LBS (3.39 TO 5.65 Nm)

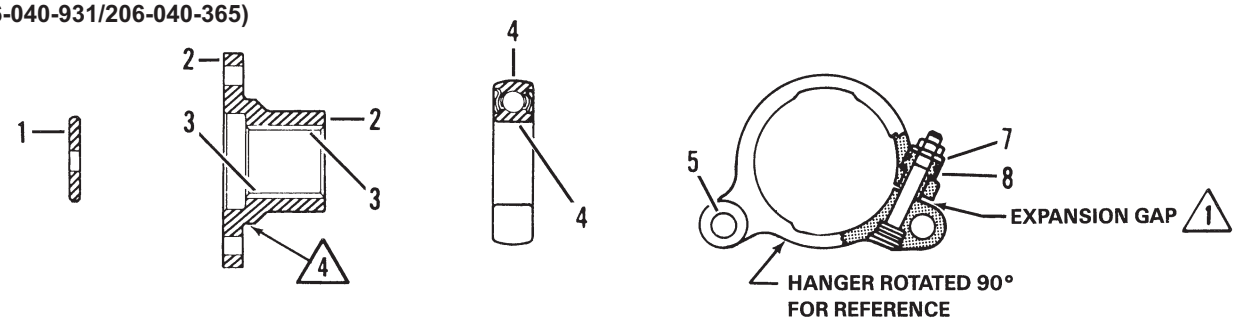
T2 50 TO 70 IN-LBS (5.65 TO 7.91 Nm)

206AB_MM_65_0013

Figure 65-13. Segmented Tail Rotor Driveshaft Assembly



BONDED SEGMENTED SHAFT
(206-040-931/206-040-365)



NUMBER	DESCRIPTION	LOCATION	MINIMUM		MAXIMUM	
			IN.	mm	IN.	mm
1.	Washer - adapter	Thickness	0.080	2.032	0.110	2.794
2.	Adapter - coupling (TIR)	Flange	—	—	0.004	0.102
3.	Adapter - coupling (between 0.1200 inch diameter pins)	ID	—	—	0.7414	18.8316
4.	Bearing - sealed	ID	1.1807	29.9898	1.1815	30.0101
		OD	2.1637	54.9580	2.1657	55.0088
5.	Hanger - bushing hole	ID	0.3775	9.5885	0.3810	9.6774
	bushing (not shown)	ID	0.2505	6.3627	0.2515	6.3881
		OD	0.3755	9.5377	0.3765	9.5631
6.	Hanger-spherical diameter	ID	2.1649	54.9885	2.1670	55.0418
7.	Spacer	Length	0.545	13.843	0.550	13.970
8.	Spring	Free height	0.346	8.788	—	—
	Compression load 60 ± 10 pounds (± 0.010 inch)	Test height	0.255	6.477	—	—
	Compression load 50 pounds (± 0.010 inch)	Working height	0.250	6.350	—	—
9.	Driveshaft - splines (over 0.1200 inch diameter pins)	OD	1.1070	28.1178	—	—
10.	Driveshaft - bearing seat	OD	1.1803	29.9796	1.1810	29.9974
	Seat (TIR) 3	—	—	—	0.003	0.076
	Shoulder (TIR) 3	—	—	—	0.003	0.076

206AB_MM_65_0014a_c01+

Figure 65-13A. Segmented Tail Rotor Driveshaft (Bonded) — Wear Limits (Sheet 1 of 2)

NOTES

1. **Before measuring inside spherical diameter of hanger, set expansion gap at 0.0600 to 0.0605 inch (1.5240 to 1.5367 mm).**

2. **2.161 inches (54.889 mm) for shaft assembly 206-040-931 and 2.059 inches (52.299 mm) for shaft assembly 206-040-365.**

3. **Mount driveshaft in Vee blocks between the two indicated areas. Runout of bearing seat, bearing seat shoulder, and adapter flange are not to exceed specified limits.**

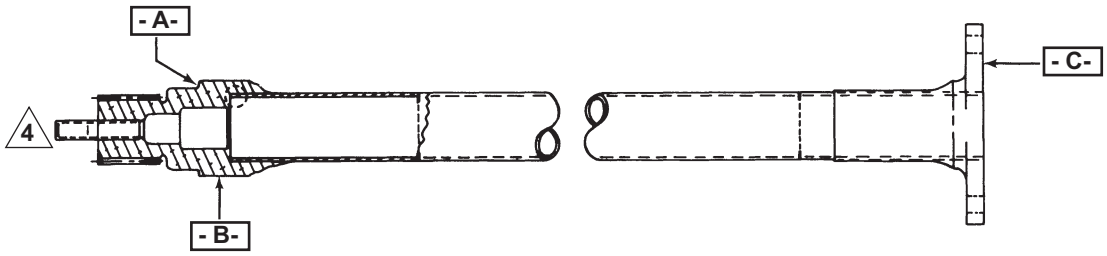
4. **Runout measurement of flanges to be taken 1.0 inch (25.4 mm) from centerline.**

5. **Inspect bond line using 10X magnifiying glass. If bond line area shows damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.**

6. **Inspect end stopper using 10X magnifiying glass. If end stopper area shows damage such as cracked or missing adhesive, or evidence of corrosion, the shaft shall be considered unserviceable and non-repairable.**

206AB_MM_65_0014b_c01+

Figure 65-13A. Segmented Tail Rotor Driveshaft (Bonded) — Wear Limits (Sheet 2 of 2)



TAIL ROTOR DRIVESHAFT
(206-040-931 AND 206-040-365)

DAMAGE LOCATION SYMBOLS

- A- - B- - C-

TYPE OF DAMAGE	MAXIMUM DAMAGE AND REPAIR DEPTH
MECHANICAL	Mechanical damage up to 0.002 inch (0.051 mm) deep around entire circumference may be polished out, provided stock removal does not exceed 0.003 inch (0.076 mm) and TIR runout limits are not exceeded (Figure 65-13A). Mechanical damage up to 0.005 inch (0.127 mm) deep, axial or circumferential, not longer than 25% of the circumference shall be polished out, provided that stock removal does not exceed 0.006 inch (0.152 mm) and TIR runout limits are not exceeded (Figure 65-13A).
CORROSION	When corrosion damage is removed from diameter - A- , and surfaces - B- and - C- , caution must be used to ensure that TIR runout limits of surfaces are not exceeded (Figure 65-13A). Corrosion damage shall be polished out, provided maximum depth of stock removal for cleanup does not exceed 0.006 inch (0.152 mm).
EDGE CHAMFER	Damage shall be removed from corners using a chamfer of 0.030 inch (0.762 mm) by 40 to 50°, whose total length, when polished to the existing surface, shall not exceed 0.50 inch (12.70 mm), provided that no more than two such repairs are located in the same quadrant of the shaft.

206AB_MM_65_0017a

Figure 65-13B. Segmented Tail Rotor Driveshaft (Bonded) — Damage Limits (Sheet 1 of 2)

NOTES

1. Polish out acceptable damage with 400 to 600 grit abrasive paper (C-423) or India stone (C-464).

2. Apply chemical film material (C-100) treatment to all repaired and bare aluminum surfaces (BHT-ALL-SPM).

3. When damage is removed from driveshaft bearing seat, mating shoulder area, or flanges, caution must be used to ensure that runout of surfaces does not exceed limits specified in Figure 65-13A.

4. Inspect stud for damaged threads, distortion, or looseness. If stud requires replacement, secure T101511 spline wrench in shop vise as a holding fixture. Install driveshaft adapter into fixture and remove stud using a stud remover and setter tool.

   a. If stud or stud hole damage is noted, install next oversize stud (provided 0.003 inch (0.076 mm) increments), but not exceeding a stud AN125963 through AN125968 (BHT-206A/B-SERIES-IPB).

CAUTION

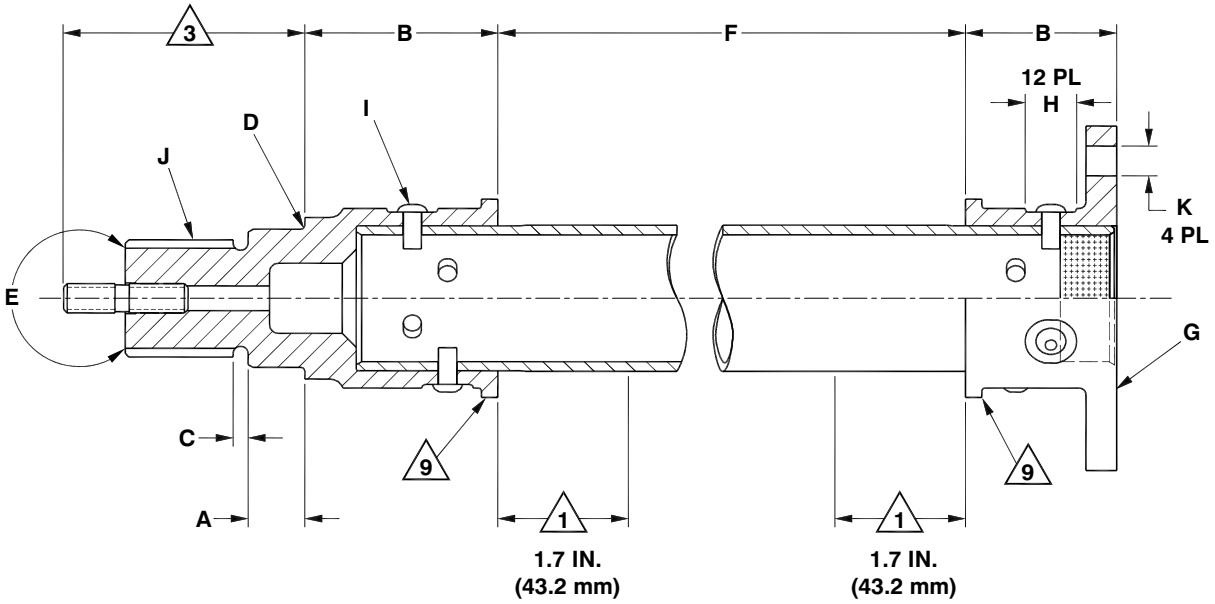
CORROSION DAMAGE TO STUDS AND DRIVESHAFT MAY BE CRITICAL AND COULD AFFECT FUNCTION AND STRUCTURAL INTEGRITY.

   b. After removal of damaged stud, examine the threaded stud hole and the stud for corrosion. No corrosion is permitted past first thread. Discard the shaft if corrosion is present in the threaded stud hole. Discard the stud if it is corroded.

   c. Set replacement stud with zinc chromate primer (C-201). Using a stud remover and setter tool, torque stud 50 to 95 inch-pounds (6 to 10 Nm) with a projection of 2.161 inches (54.889 mm) for shaft assembly 206-040-931 and 2.059 inches (52.299 mm) for shaft assembly 206-040-365 from inboard flange of sealed bearing inner race (Figure 65-13A, 2).

206AB_MM_65_0017b_c01

Figure 65-13B. Segmented Tail Rotor Driveshaft (Bonded) — Damage Limits (Sheet 2 of 2)



RIVETED SEGMENTED SHAFT
(206-040-385)

NO	REF LTR	DESCRIPTION	CHARACTERISTIC	INSPECTION METHOD	LIMITS
1.	A	Bearing journal	Corrosion		Only superficial corrosion, removable with abrasive pad (C-407).
2.	A	Bearing journal	Mechanical	Measure	0.005 inch (0.127 mm) up to 0.250 inch (6.35 mm) long must be polished to remove all raised material.
3.	A	Bearing journal	Wear	Measure	1.1803 inches (29.979 mm) minimum. Signs of bearing spinning are not acceptable.
4.	B	Adapter external diameter	Corrosion/ mechanical	Measure	0.005 inch (0.127 mm) up to 50% of the circumference.
5.	B	Adapter flange	Corrosion/ mechanical	Measure	Maximum chamfer to remove the damage is 0.030 inch (0.762 mm) X 40 to 45° up to 0.50 inch (12.700 mm) (no more than two per quadrant).
6.	C	Spline relief	Corrosion		Only superficial corrosion, removable with abrasive pad (C-407).

206AB_MM_65_0018a

Figure 65-13C. Segmented Tail Rotor Driveshaft (Riveted) — Wear and Damage Limits (Sheet 1 of 3)

NO	REF LTR	DESCRIPTION	CHARACTERISTIC	INSPECTION METHOD	LIMITS
7.	C	Spline relief	Mechanical	Measure	0.002 inch (0.051 mm) may be blended smooth.
8.	D	Shoulder	Corrosion/mechanical	Measure	0.001 inch (0.025 mm) up to 25% of the circumference.
9.	E	Spline adapter end face	Corrosion/mechanical	Measure	0.010 inch (0.254 mm), remove all raised material.
10.	F	Tube outside diameter	Corrosion/mechanical	Measure	0.005 inch (0.127 mm) to 25% of the circumference. 0.002 inch (0.051 mm) up to 100% of the circumference. 2
11.	G	Flange adapter end face	Corrosion		Only superficial corrosion, removable with abrasive pad.
12.	G	Flange adapter end face	Mechanical	Measure	0.002 inch (0.051 mm) up to 25% of area.
13.	G	Adapter faces	TIR	Measure	TIR done with the shaft mounted on V-blocks. Maximum of 0.004 inch (0.102 mm). 1
14.	H	Rivet spotface	Corrosion/mechanical	Visual	None adjacent to rivet head. 0.005 inch (0.127 mm) of the remaining spotface.
15.	I	Rivets	Loose rivets		None allowed. 7
16.	J	Spline-measure over 0.1200 inch (3.048 mm) diameter pin	Wear	Measure	1.107 inches (28.117 mm) minimum. 5
17.	J	Spline-sides, roots, and ends of teeth	Corrosion/mechanical	Visual	Light, superficial that can be polished out by hand with the use of a fine stainless steel wool or abrasive pad (C-407). 6
18.	K	Fastener hole	Wear	Measure	Maximum of 0.2530 inch (6.426 mm) diameter.

206AB_MM_65_0018b

Figure 65-13C. Segmented Tail Rotor Driveshaft (Riveted) — Wear and Damage Limits (Sheet 2 of 3)

NOTES

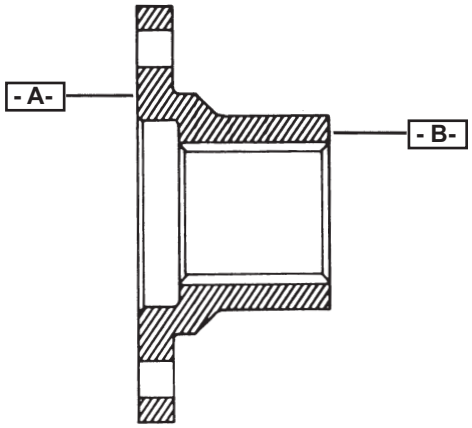
1. **Prior to mounting the shaft on V-blocks at the two indicated areas, paint must be removed from those areas. Measure the TIR at the bearing seat shoulder and the adapter flange. The shaft must be discarded if the measurement exceeds one of the dimensions that follow :**

A	**Bearing seat**	**0.001 inch (0.025 mm) TIR**
D	**Bearing seal shoulder**	**0.004 inch (0.102 mm) TIR**
G	**Adapter flange**	**0.004 inch (0.102 mm) TIR**

2. **Surface of the tube must be smooth and unmarred. Scratches can be polished out so the minimum outside diameter is not less than 1.235 inches (31.370 mm).**
3. **Replace a stud that is distorted, loose, or with threads that are damaged. If the stud is loose, replace it with an oversize stud. Examine the threaded stud hole and the stud for corrosion. No corrosion is permitted past first thread. Discard the shaft if corrosion is present in the threaded stud hole. Discard the stud if it is corroded. Install the replacement stud with unreduced zinc chromate primer (C-201) or epoxy polyamide primer (C-204). The height of the stud as measured in the figure is 2.049 to 2.069 inches (52.045 to 52.553 mm) when it is torqued at 50 to 95 inch-pounds (5.65 to 10.74 Nm).**
4. **Refer to BHT-ALL-SPM for the procedures to chemically film treat the repaired area.**
5. **Examine the spline teeth for signs of a wear step. Discard the shaft if you can feel a wear step with a 0.030 inch (0.762 mm) spherical radius probe.**
6. **Refer to the CSSD-PSE-87-001 to do the repairs.**
7. **Replacement of the rivets is not permitted.**
8. **Make repairs with a 0.25 inch (6.35 mm) minimum radius and a 32 RMS surface finish.**
9. **When damaged material must be removed from the balancing rim, remove an equal amount of material on the same rim, at 180° opposite to the repair area.**
10. **Remove two times the depth of the corrosion to repair a corroded surface. The limits shown are after the repair is completed.**

206AB_MM_65_0018c

Figure 65-13C. Segmented Tail Rotor Driveshaft (Riveted) — Wear and Damage Limits (Sheet 3 of 3)



COUPLING ADAPTER
206-040-363

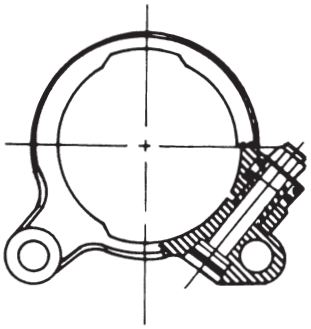
DAMAGE LOCATION SYMBOLS

- A- **- B-**

TYPE OF DAMAGE	MAXIMUM DAMAGE AND REPAIR DEPTH
MECHANICAL	Scratches up to 0.005 inch (0.127 mm) deep around the entire circumference may be polished out, provided stock removal does not exceed 0.007 inch (0.178 mm). Scratches up to 0.010 inch (0.254 mm) deep, axial or circumferential, not longer than 25% of circumference may be polished out, provided stock removal does not exceed 0.012 inch (0.305 mm).
CORROSION	When corrosion damage is removed from surfaces - A- and - B-, caution must be used to ensure that 0.002 to 0.004 inch (0.051 to 0.102 mm) (TIR) runout of flange surfaces is not exceeded. Corrosion damage shall be polished out, provided maximum depth of stock removal for cleanup shall not exceed 0.010 inch (0.254 mm).
EDGE CHAMFER	Damage shall be removed from corners using a chamfer of 0.030 inch (0.762 mm) by 40 to 50°, whose total length, when polished to existing surface shall not exceed 0.50 inch (12.70 mm), provided that no more than two such repairs are located in the same quadrant on the adapter.

206AB_MM_65_0015

Figure 65-13D. Coupling Adapter Damage Limits



HANGER
206-040-344-005

TYPE OF DAMAGE	MAXIMUM DAMAGE AND REPAIR DEPTH
MECHANICAL	Mechanical damage up to 0.003 inch (0.076 mm) deep located on the spherical (ID) surface of the hanger shall be polished out, provided that stock removal does not exceed 0.004 inch (0.102 mm).
CORROSION	Corrosion damage shall be removed from the exterior surfaces of the hanger, provided that stock removal does not exceed 0.010 inch (0.254 mm).
EDGE CHAMFER	Edge damage shall be removed from corners and edges using a chamfer of 0.030 inch (0.762 mm) by 40 to 50°, whose total length, when polished to the existing surface, shall not exceed 0.50 inch (12.70 mm), provided that no more than two such repairs are located in the same quadrant of the hanger.

206AB_MM_65_0016

Figure 65-13E. Hanger Damage Limits

b. Apply chemical film material (C-100) treatment to all repaired and bare aluminum surfaces (BHT-ALL-SPM).

c. Apply brush cadmium plating solution (C-108) to repaired steel surfaces (BHT-ALL-SPM).

7. Inspect sealed bearings (5) as follows:

a. Inspect sealed bearing (5) for evidence of overheating and excessive grease leakage. Signs of overheating are discoloration, damage to seals, and black grease ejected or liquified from the bearing.

b. If installed, inspect sealed bearings (5) for roughness after a flight while bearings are warm. Roughness may be felt with light hand pressure applied to shafts while turning tail rotor and driveshaft by hand. If shaft has been disassembled from helicopter, roll bearings by hand and check for smooth rotation without excessive play. Replace bearings if they are still rough after 5 hours of operation whether they show signs of overheating or not.

c. Visually inspect non-removable rubber seal for deterioration. Seals torn at four lubrication points that allow excessive grease to squeeze out should be replaced. Bearings with rotating seals should be replaced.

d. If there is any doubt of bearing serviceability, replace bearing.

e. Lubricate bearings that are to remain in service using a 6 cubic centimeter (cc) LC veterinary syringe and 18 gauge hypodermic needle. Inject 0.5 to 0.7 cc of grease (C-001) into one of the holes in bearing seal plate. If hypodermic needle does not fully enter seal and bearing, remove needle and rotate inner race of bearing to clear bearing ball cage and reinsert and inject bearing. Needle should be purged prior to each use and external surface of needle lubricated to prevent unnecessary tearing of seal. Wipe excess grease from exterior of bearing.

8. Inspect inside spherical diameter of bearing hangers (6) and bushings (14) for wear or damage as follows:

a. Check expansion gap on hangers (6) for a dimension of 0.0600 to 0.0605 inch (1.5240 to 1.5367 mm) (Figure 65-13A, △1). If expansion gap is less than 0.0600 inch (1.5240 mm), insert a 0.0600 to 0.0605 inch (1.5240 to 1.5367 mm) shim. If gap is greater than 0.0605 inch (1.5367 mm), reinstall spring (12, Figure 65-13), spacer (11), and nut (10). Tighten nut until dimension at expansion gap is set to 0.0600 to 0.0605 inch (1.5240 to 1.5367 mm).

b. Inside spherical diameter of hangers (6) is not to exceed 2.1670 inches (55.0418 mm).

c. Any damage through hard anodize finish on bushings (14) or which exceeds wear limits in Figure 65-13A requires bushing replacement.

9. Inspect slip adapter (9, Figure 65-13) for chips, cracks, and damaged splines. Inspect splines for wear (Figure 65-5A). Polish out minor burrs and nicks with a fine India stone (C-464).

10. Inspect coupling disc packs (Figure 65-6C).

65-30. SEGMENTED TAIL ROTOR DRIVESHAFTS — INSTALLATION

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
–	Cold Cylinder Probe

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-104	Corrosion Preventive Compound
C-561	Grease

CAUTION

AS APPLICABLE TO HELICOPTERS S/N 4523 AND SUBSEQUENT AND HELICOPTERS POST TB 206-06-186, ANYTIME ONE OR ALL OF THE RIVETED TAIL ROTOR SEGMENTED DRIVESHAFTS 206-040-385-105/109 OR THE RIVETED AFT SHORT SHAFT 206-040-383-101 (OR SUBSEQUENT P/N'S) ARE INSTALLED, ROTOR BRAKE DISC 9440904 (OR SUBSEQUENT P/N) SHALL BE INSTALLED TO REDUCE THE EFFECT OF TORTIONAL LOADS DUE TO THE STIFFNESS OF THE RIVETED SHAFTS. INSTALLATION OF ROTOR BRAKE KITS BHT-206-SI-63 (SINGLE CALIPER) OR BHT-206-SI-105 (DUAL CALIPER), AS APPLICABLE, MEET THE ROTOR BRAKE DISC REQUIREMENT.

CAUTION

ON HELICOPTERS S/N 1252 THROUGH 4004, THE BONDED AFT SHORT SHAFT (1, FIGURE 65-12) IS SHORTER THAN THE REPLACEMENT RIVETED AFT SHORT SHAFT (1). TO MAINTAIN PROPER FIT AND CONFIGURATION WHEN BONDED AFT SHORT SHAFT (1) OR BONDED TAIL ROTOR SEGMENTED DRIVESHAFT (2) ARE REPLACED WITH RIVETED SHAFTS IN ACCORDANCE WITH TB 206-06-186, RIVETED AFT SHORT SHAFT (1) 206-040-383-101, RIVETED TAIL ROTOR SEGMENTED DRIVESHAFT (2) 206-040-385-105, AND ADAPTER (9) 206-040-363-101 (OR SUBSEQUENT P/N'S) SHALL BE INSTALLED TOGETHER. INTERMIXING OF BONDED AND RIVETED SHAFTS AT LOCATIONS (1 AND 2) IS NOT PERMITTED. INTERMIXING IS PERMITTED AT LOCATIONS (3).

NOTE

On helicopters S/N 4005 through 4522 and S/N 5101 through 5267, the bonded aft short shaft (1) and bonded tail rotor segmented driveshafts (2 and 3) may be intermixed with riveted shafts (1, 2, and 3) in accordance with TB 206-06-186.

1. Apply a light film of corrosion preventive compound (C-104) (as noted), to the following parts surfaces prior to assembly of shaft segments.

a. Bearing seat surface on bonded shaft adapters (8, Figure 65-13).

b. Inside and outside races of sealed bearings (5). Do not allow compound to contact bearing seals.

c. Inside diameter of bearing hangers (6) at bearing outer race mating surface.

d. Grip clinch bolts (12), springs (11), and spacers (10).

e. Inboard surface of plates (3) that will mate with splined adapters (4).

2. Assemble tail rotor driveshaft segment as follows:

a. Hold sealed bearing (5) 90° to notches in bearing hanger (6) and insert bearing halfway through hanger, then rotate bearing into place in hanger.

CAUTION

MAKE SURE SPACERS MEASURING 0.545 TO 0.550 INCH (13.84 TO 13.97 MM) IN LENGTH FROM FLANGED END TO END OF SPACER ARE USED. (FIGURE 65-8).

b. Install spring (11) and spacer (10) and loosely install nut (9) on clinch bolt (12). Nut may be torqued, if required, to maintain bearing and hanger centering. Do not exceed torque limits on nut (T).

c. Press bearing and hanger assembly onto shaft adapter (8) until inner race of bearings is seated flush and square; clamp side will be to the left side of tailboom.

d. Apply a light film of grease (C-561) to internal surfaces of splined adapters (4) and external splines of shaft adapters (8).

e. Install splined adapter (4) on each shaft adapter (8) (angular orientation of shaft is not important) and seat with hand pressure. Install plate (3), steel washer (3), and nut (1) (T) on stud (7).

f. Assemble the remaining four driveshaft segments.

3. Install pin (5, Figure 65-12) through short shaft (1), if removed. Secure with aluminum washer (14) and cotter pin (15).

4. Install bushings (40) into bearing hanger (21, Detail D). Place two aluminum washers (22) on aft end of each bushing (40). Position tail rotor driveshaft segment, bushings, and washers into hanger bracket (18) at station 205.93. Install screws (26), thin aluminum washers (25), and nuts (24) (T). Secure cotter pin (23).

5. Apply grease (C-561) to splines of input pinion adapter (34) and input pinion of tail rotor gearbox (4) and install input pinion adapter on input pinion shaft of tail rotor gearbox.

6. Install remaining tail rotor driveshaft segments at stations 228.79, 255.77 and 309.67 per step 4.

7. Install tail rotor driveshaft segment at station 282.73 as follows:

a. Install bushings (20) into bearing hanger (21). Place packing (19) on forward end of each bushing (20, Detail B).

b. Place two aluminum washers (22) on aft end of each bushing (20). Position tail rotor driveshaft segment, bushings, packings, and washers into hanger bracket (18) at station 282.73.

c. Install screws (26), thin aluminum washers (25), and nuts (24) (T) and install cotter pins (23).

8. Install disc assemblies (8) and center bearing hangers (21) in hanger brackets (18) within 0.030 inch (0.76 mm) as follows:

CAUTION

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL PACK (PARAGRAPH 65-19, STEP 5).

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC PACK ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION.

ONLY THE GRIP PORTION (UNTHREADED) OF BOLTS ARE PERMITTED TO CONTACT DISC ASSEMBLIES AND BOLT LENGTHS MUST BE EQUAL AT 180° POSITIONS.

a. Position disc assembly (8) between flanges of adapters and install diametrically opposed bolts (6) with thin steel washers (10), beveled washers (7), and nuts (11) as shown in Detail A. Check that rounded edge side of beveled washers (7) are contacting disc. Torque nuts (T) .

b. Install diametrically opposed bolts (17), then steel washers (13), beveled washers (16), and nuts (12) as shown in Detail A. Check that rounded edge side of beveled washers (16) are contacting disc side and flange of forward adapter. Torque nuts (12) (T) . Inspect disc assemblies for distortion resulting in gaps between the individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with the feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts (11 and 12), rotate disc back and forth, and uniformly tighten nuts (11 and 12) (T) . Check gaps. If gaps still exceed limit, replace disc or disc pack (paragraph 65-19, step 5).

CAUTION

BEVELED WASHERS MUST BE INSTALLED WITH ROUNDED EDGE SIDE CONTACTING DISC PACKS AND QUANTITIES MUST BE EQUAL AT 180° POSITIONS.

ONLY THE GRIP PORTION (UNTHREADED) OF BOLTS IS PERMITTED TO CONTACT DISC PACKS AND BOLT LENGTHS MUST BE EQUAL AT 180° POSITIONS.

c. Check centering of bearing hanger (21) in hanger bracket (18), to be centered within 0.030 inch (0.76 mm). Refer to Detail E, for typical bearing hanger position check. If bearing hanger is not centered, add or remove beveled washer at adjoining coupling assembly to center hanger as follows:

(1) One beveled washer (16) may be removed adjacent to the flange adapter (27) to align bearing hanger (21). Beveled washer quantities must be equal at 180° positions. Remaining beveled washers must have rounded edge side in contact with the disc assembly (8). Torque nuts (12) (T) . Check bearing hanger centering.

(2) One beveled washer (7) may be added at this location to align bearing hanger (21). Beveled washer quantities must be equal at 180° positions. Beveled washers must have rounded edge side in contact with disc assembly (8), the added beveled washer must have rounded edge side in contact with flange of splined adapter (9). Torque nuts (11) (T) . Check bearing hanger centering.

d. Repeat step c on the remaining four aft tail rotor driveshaft segments (3). Check all hanger bearings (21) for centering within 0.030 inch (0.76 mm).

9. Install aft disc assembly (31) between last aft tail rotor driveshaft segment (3) and input pinion adapter (34) as follows:

a. Install two diametrically opposed bolts (33), with thin steel washers (29), beveled washers (30 and 32), and nuts (28). Check that rounded edge side of beveled washers (30 and 32) are contacting disc assembly (31) and bolt heads are adjacent to disc assembly. Torque nuts (28) (T) .

b. Install diametrically opposed bolts (39), beveled washers (37 and 38), thin steel washers (36), and nuts (35). Check that rounded edge side of beveled washers (37 and 38) are contacting disc assembly (31) and flange of input pinion adapter (34), and that bolt heads are adjacent to disc assembly. Torque nuts (35) (T) . Inspect disc assemblies for distortion resulting in gaps between the individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with the feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts (28 and 35), rotate disc back and forth, and uniformly tighten nuts (28 and 35) (T) . Recheck gaps. If gaps still exceed limits, replace disc or disc pack (paragraph 65-19, step 5).

c. Check for a clearance of 0.110 to 0.420 inch (2.79 to 10.67 mm) from end of input pinion adapter (34) to shoulder on input pinion shaft of tail rotor gearbox (4). Refer to Detail C. If required clearance is

not available, add or remove beveled washers as required at disc assembly (31) as follows:

(1) One beveled washer (37) may be removed at this location. Beveled washer quantities must be equal at 180° positions. Remaining beveled washers must have rounded edge side of contact with the disc assembly (31). Torque nuts (35) T .

(2) One beveled washer (30) may be added at this location. Beveled washer quantities must be equal at 180° positions. Beveled washers must have rounded edge side in contact with disc assembly (31), and added beveled washer must have rounded edge side in contact with flange of flange adapter (27). Torque nuts (28) T . Check adapter clearance.

10. Refer to applicable JetRanger Flight Manual and prepare helicopter for ground run-up and accomplish the following:

WARNING

DO NOT GRASP TAIL ROTOR DRIVESHAFT DURING GROUND RUN OR ROTOR COASTDOWN.

CAUTION

DO NOT EXCEED ONE MINUTE RUN-UP OR BEARINGS MAY SPIN EXCESSIVELY IN HANGERS.

a. Prior to run-up, lubricate bearings until grease purges past seals (Chapter 12). Loosen hanger clamping nuts (9, Figure 65-13) until all preload is removed from springs (11) and springs can be turned by hand. Using non-sharp tool in split line of hanger, pry open slightly and move bearing slightly by hand to ensure freedom. Remove tool from hanger. Run up helicopter to 60 to 62% rotor RPM for 45 seconds to 1 minute. Start timing when rotor starts turning. Shut down and torque nuts (9) T. Wipe off any grease from outside of bearing (5). Refer to applicable JetRanger Flight Manual.

CAUTION

CLEAN WITH DRY CLOTHS USING CAUTION NOT TO WIPE DIRT OR EXPELLED LUBRICANT UNDER BEARING SEAL AND INTO BEARING.

b. Ground run helicopter for 15 minutes and check sealed bearings (5) for signs of overheating. Refer to applicable JetRanger Flight Manual for engine operation. Maximum recommended operating temperature is 185°F (85°C). A new bearing may run 275°F (135°C) maximum for the initial 15 to 20 hours of operation. If bearings are running hot, inspect at frequent intervals until 20 hours of operation have elapsed. If bearing temperature has not stabilized at this time, replace bearings. Refer to BHT-206A/B-SERIES-CR&O manual for additional bearing inspection data.

NOTE

A cold cylinder probe may be used to provide a precise measurement of bearing temperature.

11. Apply protective coating to tail rotor driveshaft segments. Refer to paragraph 65-31.

12. Install tail rotor driveshaft cover and tail rotor gearbox fairing (Chapter 53).

13. Do a torque check of the disc pack coupling (8 and 31, Figure 65-12) attaching hardware 10 to 25 flight hours after each installation (Chapter 5).

65-31. APPLICATION OF CORROSION PROTECTIVE COATING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-101	Corrosion Protective Compound
C-203	Lacquer
C-205	Thinner
C-305	Aliphatic Naphtha

NOTE

Corrosion protective compound (C-101) is to be applied to the aft short tail rotor driveshaft, the long tail rotor driveshaft, and to tail rotor driveshaft segments assemblies after installation.

1. Before applying corrosion preventive compound (C-101), thoroughly clean driveshafts with a cloth saturated with aliphatic naphtha (C-305). Wipe surface dry with a clean cloth before the solvent evaporates.

2. Mask off all bearings, bearing collars, and disc assemblies with masking tape.

3. Mix 1 part of lacquer (C-203) to 1.5 to 2 parts thinner (C-205) and apply as follows:

a. Spray: Apply a wet spray coat approximately 6 to 8 inches (152.40 to 203.2 mm) from surface. After 15 to 30 minutes drying time, apply a second coat in the same manner as the first coat was applied.

b. Brush: Apply using a fine hair brush (camel or ox hair, not nylon) and paint brush lacquer coating quickly over the surface overlapping the previous strokes, but not reworking the entire coated area. After 30 minutes drying time, apply a second coat in the same manner as the first coat was applied.

4. Curing of protective coating may be accomplished as follows:

a. After second coat is applied, full cure can be obtained in a maximum drying time of 48 hours at ambient room temperature.

b. After second coat is applied, accelerated curing can be accomplished by air drying for 30 minutes, then heat lamp bake at 150°F (66°C) for 2 hours.

c. Remove masking tape.

5. After curing, the coating shall be smooth and uniform over entire surface with no area of shafting uncoated. Coating shall have a dry film thickness of 1.2 mils to 2.0 mils. Areas found to be uncoated may be repaired in accordance with step 6.

CAUTION

DO NOT SAND THROUGH ANODIZED SURFACE DURING SPOT REPAIR.

6. Isolated areas of non-adhesion shall be refinished by feathering the isolated areas with No. 400 grit sandpaper or finer. Wipe areas with aliphatic naphtha (C-305) and refinish in accordance with step 3.

7. Apply paint index marks to the five bearing inner races, across bearing collars and onto driveshaft. Also apply index marks from bearing outer race.

NOTE

B **B3** Paint index marks are not required unless desired on helicopters S/N 1252 and subsequent.

8. Apply corrosion preventive compound (C-101) to joints where hanger bearing outer race contacts hanger. Do not allow corrosion preventive compound to contact bearing seals.

TAIL ROTOR GEARBOX

65-32. TAIL ROTOR GEARBOX ASSEMBLY.

The tail rotor gearbox contains 90 degree spiral bevel gears providing a speed reduction of 2.35 to 1.0. The bevel gear quill assemblies are designed to controlled dimensions to provide interchangeable replacement of shaft assemblies without shimming. The housing is a magnesium casting attached to the fuselage structure with four studs. A breather type filler cap, magnetic drain plug and oil level sight gage are accessible from ground level (figures 65-14 and 65-15).

65-33. REMOVAL — 206-040-400-003 TAIL ROTOR GEARBOX.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
T102103	Dehydrator

1. Remove fairing to gain access to tail rotor gearbox. Refer to Chapter 53.

2. Drain tail rotor gearbox (Chapter 12).

3. Remove tail rotor hub and blade assembly (26, figure 65-14) Refer to Chapter 64.

4. Disconnect electrical lead to electric chip detector (34).

5. Remove two diametrically opposed bolts (1), beveled washers (2), thin steel washers (3), and nuts (4), that attach input pinion adapter (31) to disc assembly (32), from aft long tail rotor driveshaft (33).

6. Slide input pinion adapter (31) aft for tail rotor gearbox removal.

7. Remove bolt (28) connecting pitch change control tube (30) to lower tail rotor bellcrank (29).

8. Remove bolt (6) that secures lower bellcrank (29) to pitch change assembly (7).

9. Remove nut (27) and washer (19) from mounting stud at aft left corner of tail rotor gearbox (21). Remove three mounting bolts (18), six washers (19), three aluminum washers (20) and three nuts (27).

10. Lift up on tail rotor gearbox (21) and disengage lower bellcrank (29). Remove gearbox from tail boom with pitch change mechanism attached.

11. Check four spacer washers or aluminum angle and two spacer washers on tailboom at gearbox mounting point for secure bonding to tailboom. If a washer or washers are loose, retain for bonding (paragraph 65-37).

12. Remove and store filler cap (15). Install T102103 dehydrator.

NOTE

An appropriate log book entry shall be made upon installation of dehydrator.

65-34. REMOVAL — 206-040-400-005 AND SUBSEQUENT TAIL ROTOR GEARBOX.

1. Remove fairing to gain access to tail rotor gearbox (Chapter 53).

2. Drain tail rotor gearbox (Chapter 12).

3. Remove tail rotor hub and blade assembly (30, figure 65-15). Refer to Chapter 64.

4. Disconnect electrical lead to electric chip detector (33).

5. Remove two diametrically opposed bolts (3), beveled washers (4), thin steel washers (7), and nuts (8) that attach input pinion adapter (6) to disc assembly (5) from aft long tail rotor driveshaft (1), or aft tail rotor driveshaft segment (2).

6. Slide input pinion adapter (6) aft for tail rotor gearbox removal.

7. Remove lower bolt connecting pitch change lever (10) to control rod (11, detail A).

8. Remove nuts (32) and steel washers (31) from gearbox mounting studs by reaching through opening in tailboom.

9. Remove tail rotor gearbox (25) from tailboom with pitch change mechanism attached.

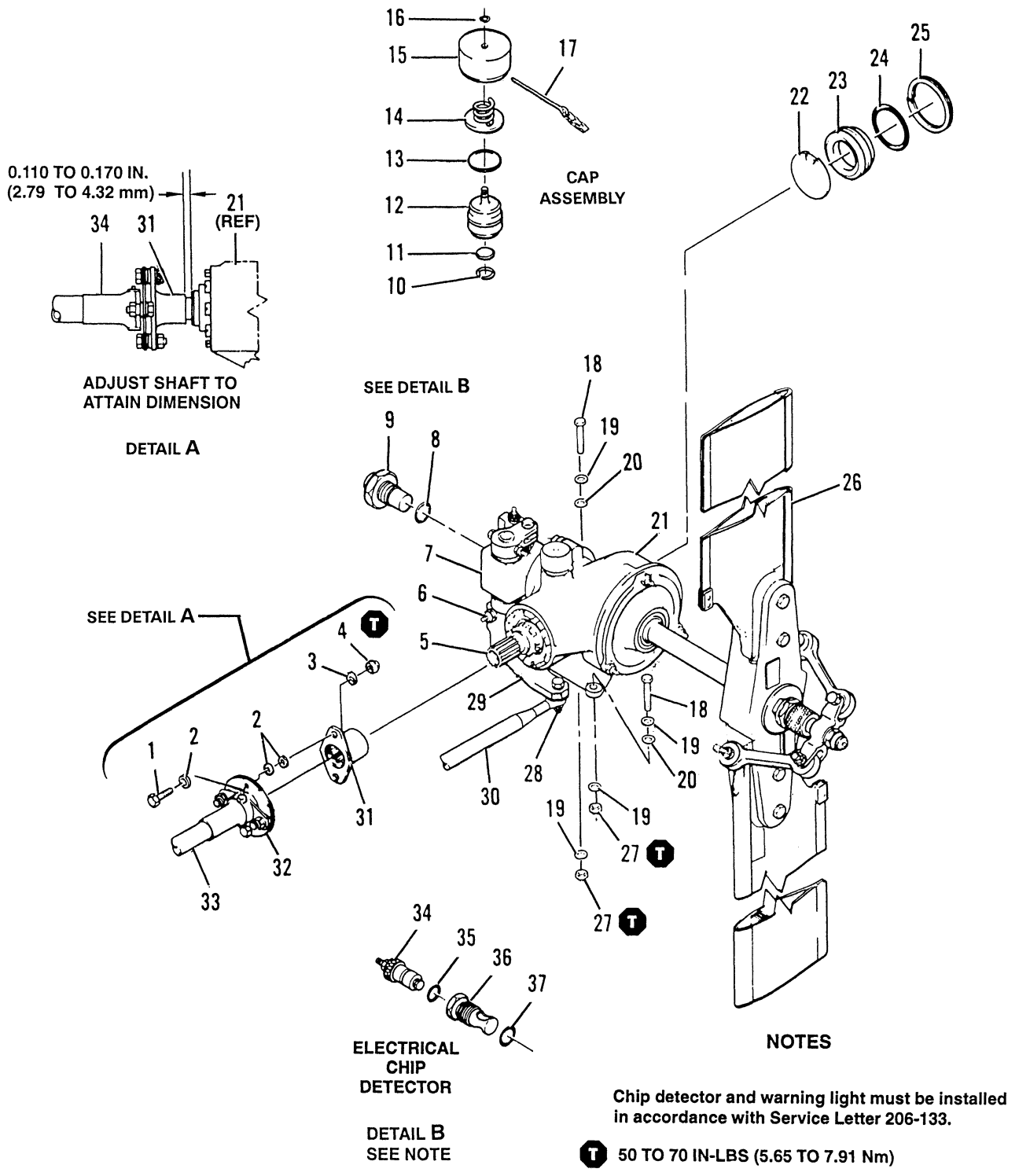


Figure 65-14. 206-040-400-003 Tail rotor gearbox (Sheet 1 of 2)

1. Bolt
2. Beveled washer
3. Steel washer
4. Nut
5. Input pinion shaft
6. Bolt
7. Pitch change assembly
8. Packing
9. Drain plug
10. Retainer ring
11. Washer
12. Plug
13. Packing
14. Spring assembly
15. Cap
16. Ring
17. Pin
18. Bolt
19. Washer
20. Aluminum washer
21. Tail rotor gearbox
22. Indicator
23. Sight glass
24. Packing
25. Retainer ring
26. Tail rotor hub and blade assembly
27. Nut
28. Bolt
29. Bellcrank
30. Pitch change control tube
31. Input pinion adapter
32. Disc assembly
33. Long tail rotor driveshaft
34. Electric chip detector
35. Packing
36. Self-closing valve
37. Packing

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Figure 65-14. 206-040-400-003 Tail rotor gearbox (Sheet 2)

10. Check the two spacer washers and aluminum angle on tailboom at gearbox mounting point for secure bonding to tailboom.

a. If a washer or washers are loose, retain for bonding (paragraph 65-37).

NOTE

B3 Later dash numbers (-147 and subsequent) tailbooms include a one piece casting tail cone with machined surface.

b. Remove and store filler cap assembly (14) and install T102103 dehydrator.

NOTE

An appropriate log book entry shall be made upon installation of dehydrator.

65-35. CLEANING.

1. Clean tail rotor gearbox with solvent (C-304).

2. Do not allow solvent to contact seals or rod end bearings.

65-36. INSPECTION.

1. Inspect tail rotor gearbox for leaking seals, cracks, security, and metal contamination.

NOTE

Total static or dynamic input drive quill leakage must not exceed 2 drops per minute. Total gearbox leakage at all sources must not exceed 6 drops per minute.

2. Inspect filler cap assembly for proper locking and security.

3. Inspect tail rotor gearbox oil for evidence of water. When water is present, the oil has a dirty, milky appearance. If this condition is present or suspected, drain, flush, and reservice.

4. Inspect sight glass for discoloration. Glass is considered serviceable if oil level can be verified.

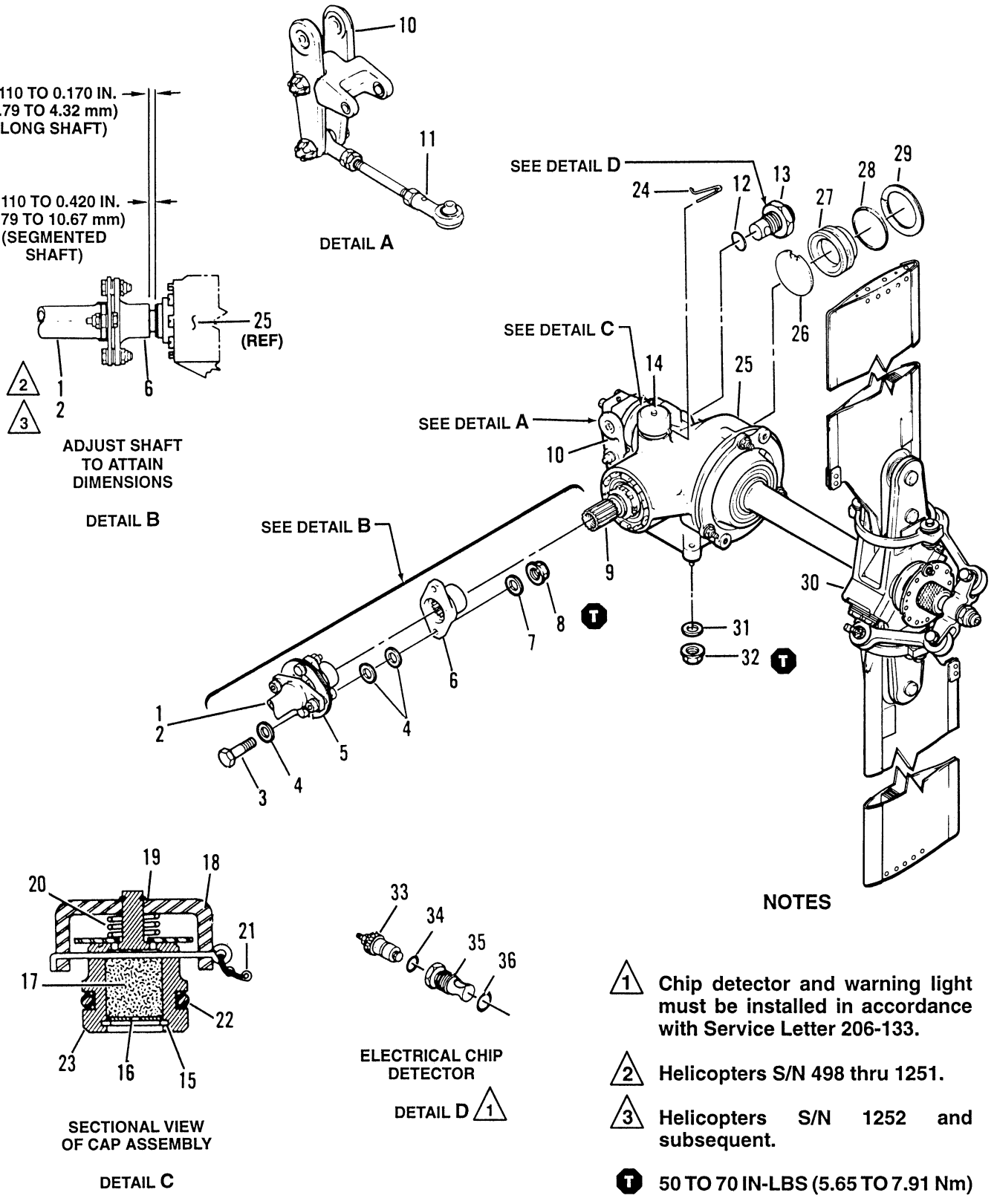

Figure 65-15. 206-040-400-005 And subsequent tail rotor gearbox (Sheet 1 of 2)

1. Long tail rotor driveshaft
2. Aft tail rotor driveshaft segment
3. Bolt
4. Beveled washer
5. Disc assembly
6. Input pinion adapter
7. Thin steel washer
8. Nut
9. Input pinion shaft
10. Pitch change lever
11. Control rod
12. Packing
13. Drain plug
14. Filler cap assembly
15. Retainer ring
16. Washer
17. Aluminum wool
18. Cap
19. Retainer ring
20. Spring assembly
21. Pin and chain
22. Packing
23. Plug
24. Safety retaining ring
25. Tail rotor gearbox
26. Indicator
27. Sight glass
28. Packing
29. Retaining ring
30. Tail rotor hub and blade assembly
31. Steel washer
32. Nut
33. Electric chip detector
34. Packing
35. Self-closing valve
36. Packing

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Figure 65-15. 206-040-400-005 And subsequent tail rotor gearbox (Sheet 2)

5. Inspect tail rotor gearbox output shaft for axial and radial play. Axial play should be negligible. Total radial play not to exceed 0.003 inch (0.08 mm) when measured 1.0 inches (25.40 mm) outboard of seal. If axial play is noted, the gearbox should be disassembled to determine the cause.

6. B3 On helicopter S/N 4005 and subsequent, inspect dowel pin holes on tailboom for elongation, and dowel pins on tail rotor gearbox for condition.

7. Inspect magnetic drain plug or chip detector for serviceability (paragraph 65-5).

8. For overhaul and detailed inspection refer to BHT-206A/B-SERIES-CR&O manual.

65-37. BONDING — TAIL ROTOR GEARBOX MOUNTING SPACERS.

1. Check tail rotor gearbox mounting area on tailboom to ensure that:

NOTE

Helicopters S/N 498 and subsequent do not have washers bonded in place on forward lugs of tailboom. Install antichafe tape (C-455) only.

a. A Two washers are bonded in place where tail rotor gearbox forward lugs rest on surface of forward aluminum angle.

b. Two washers are bonded in place where tail rotor gearbox aft lugs rest on tailboom. Helicopters S/N 154 through 1251.

2. Position gearbox on tailboom and check that gearbox rests evenly on all four points. If any washers are missing, proceed as follows:

a. Fabricate a plate from sheet metal approximately 0.5 inch (12.70 mm) thick, the same size as the tail rotor gearbox base, with true surface over the entire face. Drill four holes in plate to match gearbox mounting holes.

b. Remove paint to bare metal to 1.0 inch (25.40 mm) diameter area around mounting boltholes where parts are missing or loose. Use sandpaper or paint remover (C-435).

c. Clean area paint where paint was removed with methyl-ethyl-ketone (MEK) (C-309).

d. Apply double-faced tape around mounting hole(s) on bottom of metal plate to hold washer(s) in position and to keep plate from being bonded to washer(s).

e. **A** **B** Attach washer(s) in position on plate to match mounting area on tailboom and apply a maximum 0.006 to 0.012 inch (0.15 to 0.30 mm) thickness film of adhesive (C-317) to exposed surface of washer(s). **B3** Attach washer(s) in position on plate to match mounting area on tailboom and apply a maximum 0.020 inch (0.51 mm) thickness film of adhesive (C-317) to exposed surface of washer(s).

f. Align and position plate on tailboom.

g. Coat four bolts with petrolatum (C-008), and install to align washers and plate. Do not install nuts on bolts, but place a 10-pound (4.5-kg) weight on plate, and allow adhesive (C-317) to cure for 24 hours.

h. Allow adhesive to cure and remove bolts and first plate.

i. Fabricate a second plate from sheet metal approximately 0.25 inch thick (6.35 mm) and approximately 2 inches (50.80 mm) larger than first plate, with a true surface over its entire face. Attach a sheet of No. 320 grit sandpaper to surface plate.

j. Draw sandpaper side of second plate over washer(s) in short smooth strokes until a flat, solid contact is made at all four points.

k. Position first metal plate on washers to check for plate contact at all four points. Plate must not rock.

NOTE

The top surfaces of bonded washers with barrier tape installed must be in the same plane within 0.002 (0.05 mm) and parallel within 0.001 inch (0.03 mm) across their diameter.

l. Install barrier tape (C-430) to surface of bonded washers.

65-38. TAIL ROTOR GEARBOX (206-040-400-003) — INSTALLATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-561	Grease

NOTE

Remove dehydrator (T102103), if installed. Install filler cap (15, Figure 65-14).

1. Position tail rotor gearbox (21) to bonded spacer washers and angle on tailboom. Secure with three bolts (18), seven washers (19), three aluminum washers (20) and four nuts (27) **T** .

2. Apply a thin film of grease (C-561) to mating splines of input pinion adapter (31) and input pinion shaft (5). Position adapter on shaft.

3. Connect input pinion adapter (31), disc assembly (32), and long tail rotor driveshaft (33) as follows:

CAUTION

INSTALL BEVELED WASHERS EXACTLY AS DESCRIBED AND ILLUSTRATED WITH ROUNDED EDGE SIDE TOWARD DISC ASSEMBLY AND FLANGE OF INPUT PINION ADAPTER. FAILURE TO COMPLY MAY RESULT IN DISC FAILURE.

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL PACK EXCEPT AS NOTED IN PARAGRAPH 65-19, STEP 5.

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC PACK ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION.

a. Install two diametrically opposed bolts (1) with bolt heads forward and one beveled washer (2) under each bolt head. Position two beveled washers between disc assembly (32) and flange of input pinion adapter (31). Install steel washers (3) on aft side of adapter and secure with nuts (4) (T). Inspect all disc assemblies for distortion resulting in gaps between the individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with the feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts, rotate disc back and forth, and uniformly tighten nuts (T). Check gaps. If gaps still exceed limit, replace disc or disc pack (paragraph 65-19, step 5).

b. Check that 0.110 to 0.170 inch (2.79 to 4.32 mm) clearance is available between aft end of input pinion adapter (31) and shoulder of input pinion shaft (5) at tail rotor gearbox (21). If required clearance is not available proceed as follows:

(1) Reposition long tail rotor driveshaft (33) forward to obtain the required 0.110 to 0.170 inch (2.79 to 4.32 mm) (paragraph 65-25).

(2) Check that each bearing hanger is centered in hanger brackets within 0.060 inch (1.52 mm) after repositioning shaft and obtaining clearance (Figure 65-10).

4. Install and connect pitch change mechanism by reinstalling removed items (BHT 206-AB-SERIES-CR&O).

5. Install tail rotor hub and blade assembly (26) (Chapter 64).

6. Perform tail rotor gearbox operational check (paragraph 65-40).

7. Install fairing on tail rotor gearbox (Chapter 53).

8. Service gearbox (Chapter 12)

9. Do a torque check of the tail rotor gearbox attachment nuts (27) 10 to 25 flight hours after each installation (Chapter 5).

65-39. TAIL ROTOR GEARBOX (206-040-402 AND 206-040-400-005 AND SUBSEQUENT) — INSTALLATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-561	Grease

NOTE

Remove dehydrator (T102103) and install filler cap assembly (14, Figure 65-15), if installed.

1. Position tail rotor gearbox (25) to bonded spacer washers and angle on tailboom. Secure with steel washers (31) and nuts (32). Torque the nuts (T).

NOTE

B3 On helicopters S/N 4005 and subsequent, align dowel pins with holes in tailboom.

2. Apply a thin film of grease (C-561) to the mating splines of input pinion adapter (6) and input pinion shaft (9). Position adapter on shaft.

3. Connect input pinion adapter (6), disc assembly (5), and long tail rotor driveshaft (1) or aft tail rotor driveshaft segment (2) as follows:

CAUTION

INSTALL BEVELED WASHERS EXACTLY AS DESCRIBED AND ILLUSTRATED WITH ROUNDED EDGE SIDE TOWARD DISC ASSEMBLY AND FLANGE OF INPUT PINION ADAPTER. FAILURE TO COMPLY MAY RESULT IN DISC FAILURE.

AFTER A DISC ASSEMBLY HAS BEEN RUN ON A HELICOPTER, DISCS SHOULD NOT BE CHANGED FROM ORIGINAL PACK EXCEPT AS NOTED IN PARAGRAPH 65-19, STEP 5.

THE GRAIN OF EACH DISC RUNS PARALLEL TO THE INDEXING FLAT EDGES. WHEN ASSEMBLING DISC PACK ASSEMBLY, IT IS NECESSARY TO ALTERNATE INDEXING FLATS TO OBTAIN ALTERNATE GRAIN DIRECTION.

a. Install two diametrically opposed bolts (3) with bolt heads adjacent to disc assembly (5) and one beveled washer (4) under each bolt head. Position two beveled washers between disc assembly and flange of input pinion adapter (6). Install thin steel washers (7) on aft side of adapter and secure with nuts (8) (T). Inspect all disc assemblies for distortion resulting in gaps between the individual discs. If any gaps are detected by visual examination, measure gaps with a feeler gauge. Use caution and avoid making gaps wider with the feeler gauge. Maximum allowable gap is 0.005 inch (0.127 mm). If any gaps are found that exceed this limit, loosen nuts, rotate disc back and forth, and uniformly tighten nuts (T). Recheck gaps. If gaps still exceed limit, replace disc or disc pack (paragraph 65-19, step 5).

b. Check that clearance is available between aft end of input pinion adapter (6) and shoulder of input pinion shaft (9) as specified in Detail B. If required clearance is not available proceed as follows:

(1) For helicopters with clamp type hanger bearings incorporating springs, reposition long tail rotor driveshaft forward for required clearance and centering of bearing hangers in hanger brackets within 0.060 inch (1.52 mm) (paragraph 65-25 and Figure 65-10).

(2) For helicopters with segmented tail rotor driveshafts, reposition input pinion adapter (6, Figure 65-15) by adding or subtracting beveled washers (4) to connecting disc assembly (5) (paragraph 65-30).

4. Install and connect pitch change mechanism by installing removed items (Chapter 64).

5. Service tail rotor gearbox with approved lubricating oil (Chapter 12).

6. Install tail rotor hub and blade assembly (30) (Chapter 64).

7. Perform tail rotor gearbox operational check (paragraph 65-40).

8. Install fairing on tail rotor gearbox (Chapter 53).

9. Do a torque check of the tail rotor gearbox attachment nuts (32) 10 to 25 flight hours after each installation (Chapter 5).

65-40. TAIL ROTOR GEARBOX — OPERATIONAL CHECK

1. Perform ground run-in cycle for 20 minutes. Refer to applicable JetRanger Flight Manual.

2. After shutdown accomplish the following requirements:

a. Remove and inspect electric chip detector for metal particles (paragraph 65-42 and paragraph 65-43). If metal particles are found, investigate to determine cause.

b. Visually inspect oil at sight gauge for discoloration and contamination.

c. Inspect tail rotor gearbox for oil leaks.

d. Install electric chip detector (paragraph 65-44).

65-41. ELECTRIC CHIP DETECTOR ASSEMBLY

One electric chip detector assembly is installed in the tail rotor gearbox. The electric chip detector assembly is made up of one self-closing valve and an electric chip detector.

The electric chip detector consists of a self-locking bayonet probe with a permanent magnet at the end. Free ferrous metal particles in the oil will be attracted to the magnet and when sufficient metal is attracted to complete the circuit between pole and ground, the T/R CHIP detector segment on the caution panel will illuminate.

The self-closing valve automatically closes and prevents loss of oil when the electric chip detector is removed for inspection. The self-closing valve also serves as a drain plug.

65-42. ELECTRIC CHIP DETECTOR ASSEMBLY — REMOVAL

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

1. Disconnect electrical lead from electric chip detector (5, Figure 65-16).

CAUTION

ROUGH HANDLING OF CHIP DETECTORS AND THE ELECTRICAL CONNECTOR IS THE MAJOR CAUSE OF FAILURE AND OF FALSE INDICATIONS IN THE CAUTION LIGHT SYSTEM.

2. Press electric chip detector (5) in toward tail rotor gearbox (1), turn counterclockwise, and remove from self-closing valve (3). Inspect electric chip detector (5) immediately for metal particles. If any particles are found, place them in a clean container and retain until inspection is completed.

3. Inspect self-closing valve (3) for leakage while still installed in tail rotor gearbox after electric chip detector is removed.

4. If it becomes necessary to drain oil from gearbox for any reason, refer to Chapter 12.

65-43. ELECTRIC CHIP DETECTOR ASSEMBLY — INSPECTION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

1. Inspect electric chip detector (5, Figure 65-16) immediately on removal from tail rotor gearbox (1). If any particles are present, make further investigation as outlined in paragraph 65-6.

2. Remove and discard packings (2 and 4).

3. Clean electric chip detector (5) and self-closing valve (3) with drycleaning solvent (C-304).

4. Inspect electric chip detector (5) for stripped or damaged bayonet pins. Inspect self-closing valve (3) for damaged threads.

5. Functional check T/R chip detector segment electrical circuit as follows:

a. Turn BATT switch ON. Press-to-test switch and release. All caution segments should illuminate. Refer to applicable JetRanger Flight Manual.

b. Short across probe on electric chip detector (5) to gearcase. Observe that T/R CHIP detector segment illuminates.

65-44. ELECTRIC CHIP DETECTOR ASSEMBLY — INSTALLATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

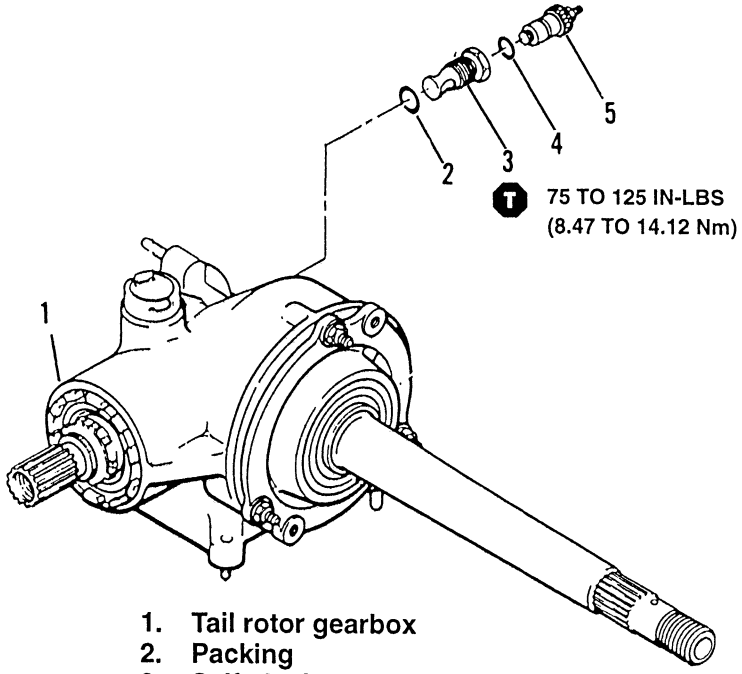
NUMBER	NOMENCLATURE
C-010	Lubricating Oil
C-405	Lockwire

1. Lubricate new packings (2 and 4) with approved lubricating oil (C-010) (Chapter 12).

2. Position new packing (2) on self-closing valve (3) and install in tail rotor gearbox (1). Torque self-closing valve T. Secure self-closing valve to case of tail rotor gearbox with lockwire (C-405).

3. Position new packing (4) on chip detector (5) and insert into self-closing valve (3). Turn clockwise to lock in place. Attach electrical leads to chip detector).

4. Fill tail rotor gearbox (1) to proper level with approved lubricating oil (Chapter 12). Check for oil leaks on first ground run.



1. Tail rotor gearbox
2. Packing
3. Self-closing valve
4. Packing
5. Chip detector

206A/BS-M-65-16

Figure 65-16. Tail Rotor Gearbox External Components