



SERVICE BULLETIN

DATE: 22 AUGUST 1980

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PERIODIC INSPECTIONS AND BONDING PROCEDURE – TAIL ROTOR DRIVE FORK ELASTOMERIC TEETER BEARINGS, PN 369A1724

1. PLANNING INFORMATION

A. MODELS AFFECTED:

All 500D Model 369D Helicopters equipped with PN 369D21610 Four Bladed Tail Rotor Installation

B. PREFACE:

Part I of this Service Information Notice lists a procedure for a periodic inspection of the subject elastomeric teeter bearings used with the four bladed tail rotor installation, to check for permissible wear and for proper bond between the concentric metal cones and the elastomer rings of the bearing assemblies. A "short method" balance check of the tail rotor assembly is utilized in Part I of this Notice. Part II of this Notice provides instructions for "long method" balance check of the tail rotor assembly to be used if more than 15 grams of tip balance weight is necessary on any one blade. Part III of this Notice lists a pilot's preflight inspection to determine if debonding has occurred and Part IV defines a method whereby the bearings may be rebonded in the field.

C. TIME OF COMPLIANCE:

Part I shall be accomplished at each and every 300-Hour Periodic Inspection Interval. Part II shall be accomplished dependent on the results of Part I. Part III shall be accomplished during pilot's preflight inspection. Part IV shall be accomplished if debond of bearings is noted when accomplishing Parts I, II or III.

D. FAA APPROVAL:

FAA/DER APPROVED

E. WEIGHT AND BALANCE:

Weight and balance not affected

F. REFERENCE:

500D Basic HMI-Volume I, Issued 15 September 1976; Revision No. 3, 15 March 1979
500D Basic HMI-Volume II, Issued 12 September 1976; Revision No. 2, 1 November 1978

G. PARTS LIST:

PARTS LIST			
Nomenclature	Part No.	Qty.	Source
Shim Kit	90-369A1717	1	HH
Washer, adjusting	HS306-225L	AR	HH

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H. MATERIALS:

MATERIALS	
Nomenclature	Source
Primer, EA9210	
Adhesive, EA9314	
Scouring Pad, Scotchbrite or equiv.	3M Mfg Co.
Cleaner, Comet or equiv.	Commercial
Glass Cloth, No. 108 Fabric scrim	Commercial

I. TOOLS AND EQUIPMENT:

TOOLS AND EQUIPMENT	
Nomenclature	Source
Balance Kit, Tail Rotor	Chadwick-Helmuth Inc.
Oven – Alt. Heat Lamp – 0° to 500° F Temp. Range	Commercial

2. GENERAL INFORMATION

All data currently in Vol I and II of the HMI, relating to the tail rotor applies to the two bladed rotor system only. Complete data covering the four bladed system will be added at the next major revision to the HMI. Prior to that revision, inspection of the blades may be accomplished in accordance with the current HMI data but inspection of the elastomeric bearings shall be accomplished in accordance with this notice.

The following information is applicable to components of the four bladed tail rotor as related to the overhaul and limited life tables in Vol II.

OVERHAUL

Tail rotor transmission PN 369D25300 1800 hours

LIMITED LIFE

Tail rotor blade PN 369D21615 10,000 hours

Tail rotor transmission housing PN 369D25301 16,640 hours

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3. PART I – 300 HOUR PERIODIC INSPECTION PROCEDURE

a. Measure flapping resistance of the inboard and outboard blades, using a spring scale attached within 1.00 inch inboard of the blade tip. (See Figure 1.)

1. Tail rotor pedals in full left position.
2. Record spring scale value when blade tip is 3.00 inches from the zero load position. Record for both inboard and outboard directions (pulling 90° to the plane of rotation).
3. The load measured at the tip with 3.00 inches deflection from the zero load position should be 1.5 lbs to 5.0 lbs.

NOTE: If the measured loads are not within the above limits, the bearings of the applicable inboard, or outboard blade set must be replaced.

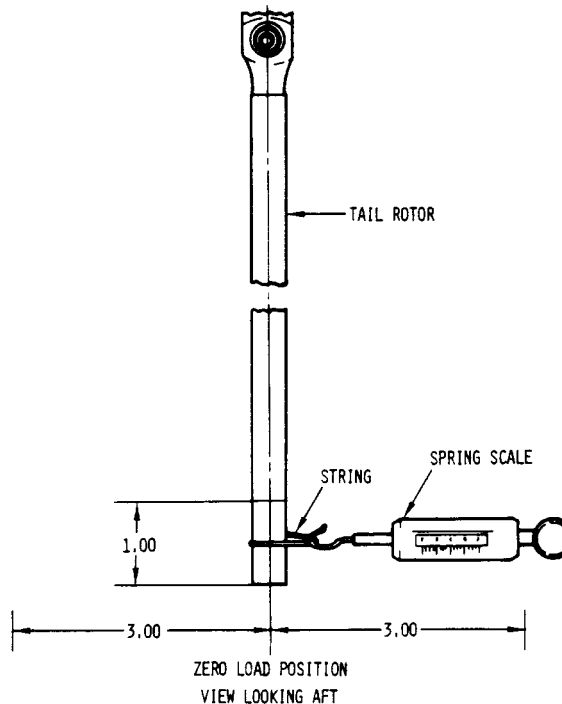


Figure 1. Measurement of Blade Flapping Resistance

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b. Perform balance check of tail rotor assembly (short method) as follows:

1. Mount accelerometer as noted in the Chadwick-Helmuth Operation and Service Handbook for two-bladed tail rotor system into the gearbox breather plug.
2. Connect accelerometer and balancer DC power cables as noted in the Chadwick-Helmuth Operations and Service Handbook.
3. Apply a retro-reflective target material on blade root fitting one blade of the outboard tail rotor assembly.
4. Connect cables and instruments and adjust settings as noted in Chadwick-Helmuth Handbook, except set "RPM TUNE" dial to 172 (1720 rpm, 80% N₂) for initial balancing.
5. Direct strobe at tail rotor and adjust per Chadwick-Helmuth instructions for "VERIFY TUNE".
6. Initially balance the tail rotor (at 80% N₂) until vibration level is 0.1 IPS (0.85 MIL) or less as follows:
 - (a) Add weights to blade tips only. Divide weights as necessary between the two lower blades to make the total weight vector in the downward direction. (See Figure 2.)

NOTE: If more than 15 grams of tip weight (including screw) is necessary on any one blade, use the "long method" balance procedure per Part II of this Notice.

7. After the initial balance, reset "RPM TUNE" dial to 221 (2210 rpm, 103% N₂) for final balancing. Direct strobe at tail rotor and adjust per Chadwick-Helmuth instructions for "VERIFY TUNE". Apply the same method used for initial balance in step 6 above, to balance until vibration level is 0.1 IPS (0.85 MIL) or less.

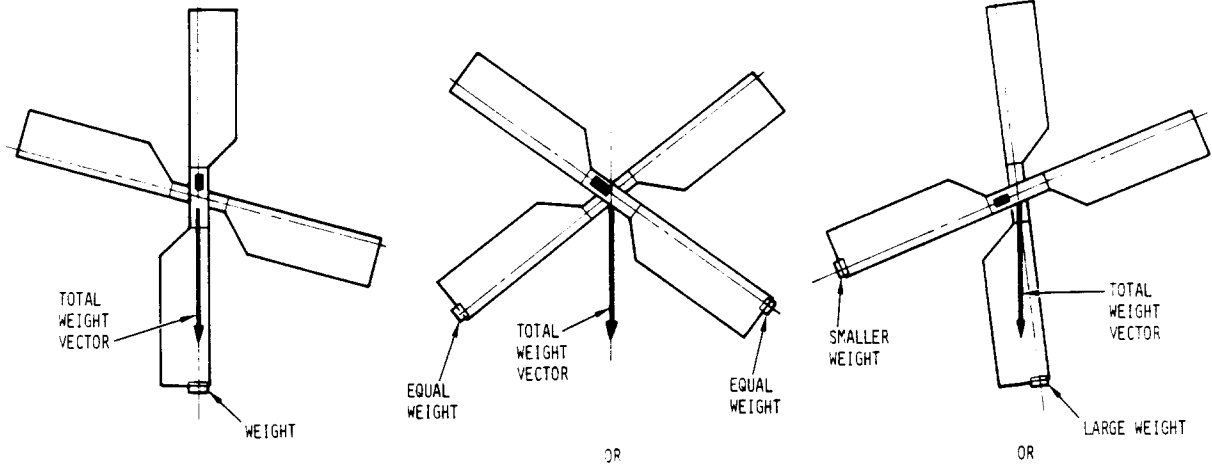
c. Record compliance with this Service Information Notice in Compliance Record of helicopter Log Book.

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NOTE:
IF WHEN ADDING WEIGHTS OUT OF BALANCE VIBRATION
LEVEL INCREASES, ADD WEIGHTS TO THE TOP BLADE OR BLADES.

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Figure 2. Strobe Pattern As Seen When Directed At Tail Rotor

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4. PART II – “LONG METHOD” BALANCE CHECK OF TAIL ROTOR ASSEMBLY

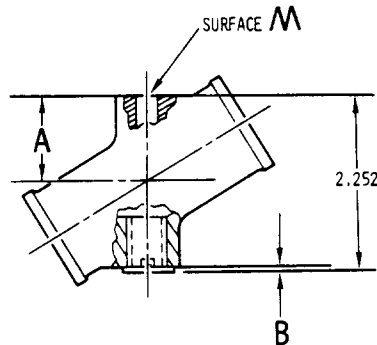
a. Prior to performing “long method” balance check of tail rotor assembly, disassemble hub and drive fork assemblies and perform the following:

1. Determine the number of 369A1717-3 thru -91 shims required to center the hub (Typ for inboard and outboard Hub Assy).

a) After torquing 369A1604 thread bushing to 55-65 inch-lbs, measure dim A on hub and calculate shim thickness B using formula

$$B = 2.252 - (2 \times A)$$

b) If $(2 \times A)$ is greater than 2.252 add shim B as shown. If $(2 \times A)$ is less than 2.252 add shim B to surface M.



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Figure 3. Centering of Tail Rotor Hub and Drive Fork

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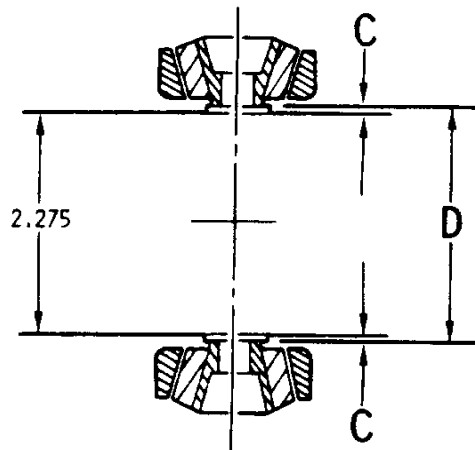
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2. Determine 369A1717-3 thru -91 shims required to preload elastomeric bearing.

a) Measure distance D on fork assembly and calculate thickness of shim C using formula

$$C = \frac{D - 2.275}{2}$$

b) Install shim C on both sides of fork as shown in Figure 4.



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Figure 4. Preload of Elastomeric Bearings

c) Install hub assembly to fork using shims B and C as shown in Figure 5.

b. Reinstall inboard tail rotor hub and drive fork assembly and inboard tail rotor blade assembly on helicopter.

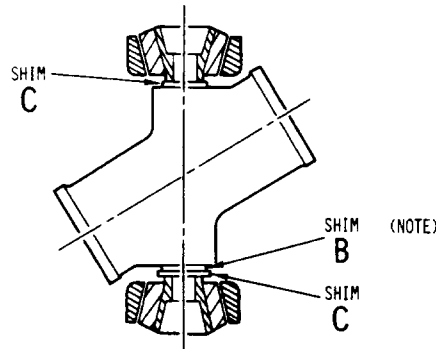
c. Perform “long method” balance check of tail rotor assembly as follows:

1. With outboard blade removed, balance inboard blade by adjusting tip weights and HS306-225L washers at pitch arm bolt to achieve 0.10 IPS (0.85 MIL) or less vibration level at 2100 rpm (input shaft of gear box). This corresponds to a tail rotor rpm of 2168.

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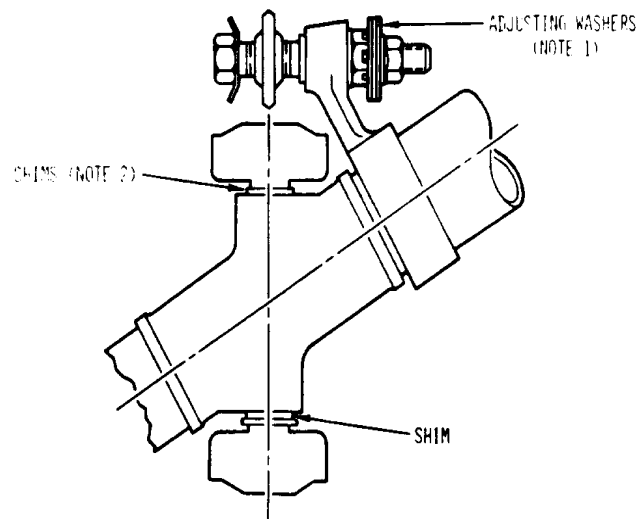
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Figure 5. Hub and Fork Installation



NOTES:

1. MAXIMUM ALLOWABLE NUMBER OF WASHERS AT PITCH ARM BOLT IS 32. WHENEVER THIS LIMIT IS REACHED AND REQUIRED BALANCE CANNOT BE MET, SHIFT THE CENTER OF THE HUB BY TRANSFERRING SHIMS THICKNESS OF 0.010 FROM PITCH ARM SIDE TO THE OPPOSITE SIDE AS SHOWN AND RECHECK BALANCE, STARTING FROM ZERO WASHERS.
2. REMOVE 0.010 THICK SHIM FROM PITCH ARM SIDE AND TRANSFER THE SHIM TO THE OPPOSITE SIDE.

Figure 6. Long Method Balance Check - Inboard Blade Only

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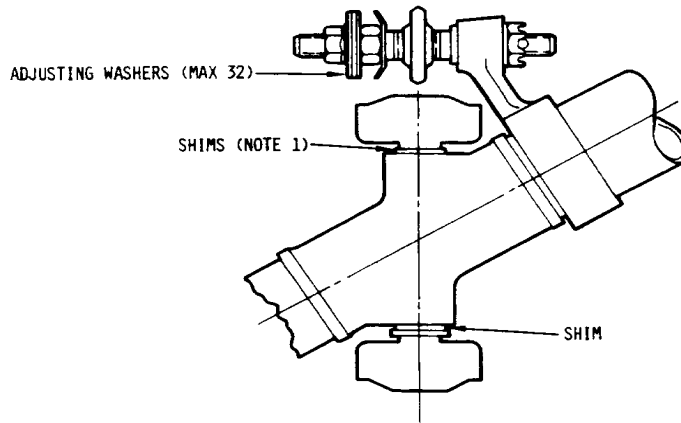
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2. Install outboard blade and hub assembly; check balance of outboard blades by adjusting weights to obtain 0.10 IPS (0.85 MIL) vibration level or less, using the same method as used for inboard blade balancing, except as shown in Figure 7 below.

3. After balancing, color code blades with lacquer per TT-L-32, Color blue No. 15102 and green No. 14187, per Fed-Std-595. Dots to be 0.12 to 0.18 inch diameter and dashes to be 0.11 x 0.38 to 0.50 length.



NOTES:

1. REMOVE 0.010 THICK SHIM FROM PITCH ARM SIDE AND TRANSFER THE SHIM TO THE OPPOSITE SIDE.
2. DURING BALANCING OF OUTBOARD BLADES, WEIGHTS ON INBOARD BLADES MUST NOT BE CHANGED.

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Figure 7. Long Method Balance Check - Outboard Blade Only

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5. PART III. PILOT'S PREFLIGHT INSPECTION

General. Prior to flight, the pilot shall inspect the elastomeric bearing in accordance with the following procedure. This inspection is in addition to those items of inspection currently stated in the preflight inspection for the tail rotor, controls, and transmission.

a. Visual check for failure between the metal cones and the elastomeric elements in the bearing assembly, as follows:

1. Apply a teetering force by hand (stop to stop) to both sets of rotor blades in succession.
2. Visually inspect four elastomeric radial molded ridges on each bearing outer face as teetering takes place.

NOTE: If ridges assume a continuous curved shape when fully deflected, the bearing is intact. Discontinuity in molded ridges indicates bearing failure. No shape change is explained under b.

b. Visually check for bond failure between the bearing and the tail rotor fork as follows.

1. Repeat step a. 1 above, and observe bearing outer cage for relative motion to fork.

NOTE: There should be no apparent motion between the cage and fork. Observed motion indicates bond failure.

c. Visually check bearing for general condition.

NOTE: Evidence of light swelling, pock marks and crumbs are surface conditions and are not indications of bearing failure.



If bond or elastomer failure is noted per steps a and b, rebond bearings per Part IV. If the aircraft is operating from a remote location, a flight not to exceed 3 hours duration, may be made back to base. During the flight avoid rapid turns and minimize hover maneuvering.

6. PART IV. ELASTOMERIC BEARING REBONDING PROCEDURE

General. Rebonding of the elastomeric bearing assembly shall be accomplished per the following:

a. Abrade outer metal surface of bearing with wet Scotchbrite (or equivalent) and Comet cleanser (or equivalent). Rinse with distilled water and dry.

b. Prime laying surface with EA9210 primer by brushing 'or spraying and air dry for minimum of 30 minutes at ambient temperature. Cure primer one hour minimum at $100^{\circ} \pm 10^{\circ}$ F.

NOTE: A heat lamp may be used.

c. Repeat above procedure in the bearing area of fork.

d. Mask all non-laying surfaces with masking tape for protection from excessive adhesive and to expedite clean up.

e. Apply mixed EA9314 adhesive to faying surfaces. Place one ply of 108 glass fabric scrim cloth on faying surface of bearing. Insert bearing in to fork. Align, using 1/4-inch diameter bolt and cure for one hour minimum at $200^{\circ} \pm 10^{\circ}$ F. Alternate cure is 24 hours at ambient temperature. (See Figure 8.)

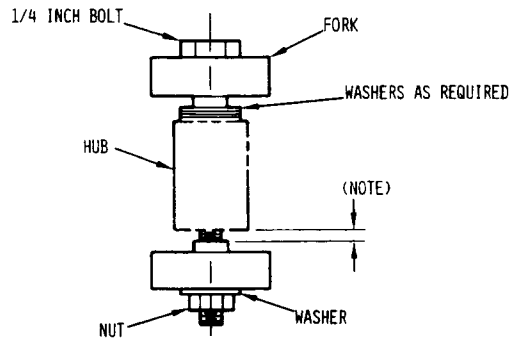
NOTE: Spring loading is required to maintain force during cure.

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NOTE:
SECURE CLEARANCE OF .0047-.0027
AND TORQUE TEETERING NUT UNTIL
SPACER SITS ON BEARING.

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Figure 8. Bonding Set Up

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ERRATA

Hughes Service Information Notice No. DN-73 dated 22 August 1980.

Change Page 8 of 12 as Follows:

Change Note 1 to read ... Maximum allowable number of washers at pitch arm bolt is 23.(was 32)

Change Page 9 of 12 as Follows:

Change drawing callout to read....Adjusting washers (Max 23) was 32.

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