

CHAPTER 64 — TAIL ROTOR

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TAIL ROTOR

64-1. TAIL ROTOR

The tail rotor hub and blade assembly consists of two blades and hub assembly. The blades are attached to the hub by two blade mounting bolts per blade which are inserted through spherical bearings; spherical bearings are inserted in the blade root end, on the pitch change axis. The spherical bearings permit pitch change of the blades. The pitch link assemblies attached to the pitch horn assemblies and the crosshead assembly set the pitch angle of the blade assemblies through the action of the pitch change mechanism, and flight controls. The splined trunnion assembly installed in the hub and blade assembly enables the hub and blade assembly to mount onto the gearbox splined output shaft and is attached to the shaft by a retaining nut. The splined trunnion also provides flapping axis movement for the hub and blade assembly.

The tail rotor gearbox drives the tail rotor at a speed of approximately 2550 RPM. The tail rotor assembly acts in opposition to the torque applied to the helicopter by the main rotor assembly. The tail rotor assembly provides directional control to the helicopter around

the vertical axis of the helicopter. The 206-011-819 yoke assembly of the hub is made with a 4° twist for each blade. The twist in the yoke provides additional thrust for high altitude performance.

Balancing of tail rotor blades is made possible by adding or removing balancing hardware that is attached to the balance wheel or the blade mount bolts

64-2. TAIL ROTOR — VIBRATION ANALYSIS AND TROUBLESHOOTING

NOTE

Static balancing of tail rotor may be accomplished using Marvel Mfg. Co. equipment (refer to appropriate Marvel Mfg. Co. manual and bulletins) or by using procedure in BHT-206A/B-M&O or BHT-2063-CR&O.

The vibration analysis, the possible troubles that can occur with the tail rotor, and their possible causes are examined in the tail rotor section of Chapter 18.

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TAIL ROTOR HUB AND BLADES

64-3. TAIL ROTOR HUB AND BLADES

During flight, the tail rotor hub and blades (tail rotor) counteract the torque of the main rotor. The pitch of the tail rotor blades is varied by means of the tail rotor control system. The tail rotor is mounted on the left

side of the tailboom and rotates at 2550 RPM. Figure 64-1 illustrates, unassembled, various differences of the tail rotor hub and blade assemblies. Table 64-1 illustrates various configurations and their effectivity applicable to each model.

Table 64-1. Tail Rotor Hub and Blade Configuration

	IL ROTOR HUB BLADE ASSEMBLY 206-011-810	-001	-011	-013 <u>6</u>	-117 <u>6</u>	-121	-129 <u>^</u> 2	-133 <u>6</u>	-135	-141	-149 <u>/23</u>	-155
	<u></u> HUB											
3 6	206-011-810-003	Х										
3 6	206-011-810-009		Х									
3	206-011-810-015			Х	Х							
3 6	206-011-810-119					Х						
<u></u>	206-011-810-125						Х	Х	Х			
16	206-011-810-139									Х		
	206-011-810-153										Х	Х
В	LADE (SHORT)											
<u>^2</u>	206-010-750-007	Х										
11 12 17 28	206-016-201-103				Х	Х						
12 17 28	206-016-201-115				Х							
17 25 28	206-016-201-125				Х							
26	206-016-201-133				Х							
	206-016-201-137				Х							
В	BLADE (LONG)											
10	206-016-501-001		Х									
10 13 17 28	206-016-201-001			Х								
13 17 28	206-016-201-107							Х	Х	Х		
13 17 28	206-016-201-113						Х					
17 28	206-016-201-127							Х	Х	Х		
27	206-011-201-131										Х	
	206-016-201-135											Х

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Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

	TAIL ROTOR HUB AND BLADE ASSEMBLY 206-011-810	-001	-011	-013 <u>6</u>	-117 <u>6</u>	-121	-129 <u>^</u> 2	-133 <u>6</u>	-135	-141	-149 <u>^23</u>	-155
	PITCH HORN											
<u>/2</u>	206-011-809-001	Х										
<u>\(\rightarrow \)</u>	206-011-809-005		Х	Х	Х	Х	Х	Х				
<u></u>	206-011-809-107								Х			
19	206-011-809-109									Х	Χ	Х
	BLADE BOLT											
<u>/2</u>	NAS1306-31 to -36	Х	Х									
7 20	20-057-6-34, -36, -38 and -40			Х	Х	Х	Х	Х	Х	Х	Х	Х
	WASHER											
<u>^2</u>	AN960-616L	Х	Х									
8	MS9482-12			Х	Х	Х	Х	Х	Х			
20	AN970-3									Х	Х	Х
	WASHER											
<u>/21</u>	206-011-859-101											Х
	COTTER PIN											
22	MS24665-134	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х

TAIL F	ROTOR HUB ASSEMBLY 206-011-810	-003 <u>6</u>	-009 <u>6</u>	-015	-119 <u>6</u>	-125	-139	-153
	⚠ YOKE							
<u>6</u> 29	206-011-811-001	Х						
<u>6</u> 29	206-011-811-005		Х					
<u>6</u> 30	206-011-811-009			Х				
<u>6</u> 30	206-011-811-123			Х				
<u>6</u> 30	206-011-811-125				Х			
24 31	206-011-819-101					Х		
24 32	206-011-819-105						Х	
	206-011-819-109							Х



Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

TAI	L ROTOR HUB ASSEMBLY 206-011-810	-003 <u>6</u>	-009 <u>6</u>	-015	-119 <u>6</u>	-125	-139	-153
	THRUST PLUG							
<u></u>	047-641-173-001	Х	Х	Х	Х	Х		
	206-011-862-101						Х	Х
	SHIM							
<u></u>	120-006C15-0	Х	Х	Х	Х	Х		
	206-011-861-101						Х	Х
	TRUNNION							
4	206-011-812-001	Х	Х	Х	Х	Х		
4	206-011-812-005						Х	Х
4	206-011-812-003	Х	Х	Х	Х	Х	Х	Х
	INNER RACE							
4	047-641-175-001	Х	Х	Х	Х	Х		
4	206-011-858-001						Х	Х
	HOUSING ASSEMBLY							
	206-011-814-001	Х	Х	Х	Х			
33	206-011-814-009					Х		
	206-011-814-113						Х	Х
	HOUSING							
34	206-011-814-003	Х	Х	Х	Х			
35	206-011-814-011					Х	Х	
	BEARING	Х						
<u></u>	J1212		Х	Х	Х	Х		
	B1212	Х					Х	

NOTES:

At initial installation of yoke 206-011-819 (helicopter S/N 4 through 2211), replace crosshead 206-010-741 with crosshead 206-011-855-001 or 206-011-857-001. Refer to ASB 206-86-31.

Refer to ASB 206-80-12.

For alternate shimming procedure, refer to TB 206-91-138.

Inner race 047-641-175-001 may be used to replace inner race 206-011-858-011 on trunnion assembly 206-011-812-005, provided inner race diameter does not exceed 0.751 inch (19.06 mm) after installation. Refer to TB 206-84-104.

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Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

<u>Trunnion Assembly</u>	<u>Trunnion</u>	Inner Race
206-011-812-001	206-011-812-003	047-641-175-001
206-011-812-005	206-011-812-003	206-011-858-001



6 Reidentify hub and blade assembly 206-011-810-001 to 206-011-810-121, hub assemblies 206-011-810-003/-009 to 206-011-810-119 and yoke assemblies 206-011-811-001/-005 to 206-011-811-123/-125 respectively, when used with stainless steel blade assembly 206-016-201-103. Refer to ASB 206-80-12.

In this application, 20-057-6-38 and -40 bolts can be used only on outboard bolt hole of yoke.

8 Adjacent to yoke. Refer to ASB 206-80-12.

9 Replaced by 206-011-809-109. Refer to TB 206-91-135.

10 Replaced by 206-016-201-107 blade assembly $\frac{1}{13}$.

Replaced by 206-016-201-115 blade assembly $\frac{1}{12}$.

12 Replaced by 206-016-201-125 blade assembly $\frac{1}{25}$.

13 Replaced by 206-016-201-127 blade assembly $\frac{1}{18}$.

Helicopter with Service Instruction 206-112 accomplished must use hub and blade assembly 14 206-011-810-013 or subsequent upgraded configuration.

HUB ASSEMBLY

Tail rotor hub assembly may be upgraded to the next higher dash number, or to the current production 15 configuration 206-011-810-153 as shown in Table 64-1. The -153 hub assembly may be used on all 206A/B helicopters. 206A/B serial numbers 498 and subsequent were delivered with the following hub assembly configuration:

<u>Model</u>	Serial Number	Hub Assembly
206A/B	498 through 2211	206-011-810-003
206BJRIII	2212 through 2308	206-011-810-009
206BJRIII	2309 through 3802	206-011-810-015
206BJRIII	3803 through 4149	206-011-810-125
206BJRIII	4150 through 4316	206-011-810-139
206BJRIII	4317 and subsequent	206-011-810-153

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Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

NOTES: (CONT)

HUB AND BLADE ASSEMBLY

Tail rotor hub and blade assembly may be upgraded to the next higher dash number, or to the current production configuration 206-011-810-155 as shown in this table. Tail rotor hub and blade assembly 206-011-810-117 is the latest spare replacement for 206A/B helicopters serial numbers 4 through 2211 1 206A/B helicopters S/N 498 and subsequent were delivered with the following tail rotor hub and blade assembly configuration:

<u>Model</u>	Serial Number	Hub and Blade Assembly
206A/B	498 through 2211	206-011-810-001
206A/B spare	4 through 2211	206-011-810-117
206BJRIII	2212 through 2308	206-011-810-011
206BJRIII	2309 through 3864	206-011-810-013
206BJRIII	3865 through 3901	206-011-810-129
206BJRIII	3902 through 4004	206-011-810-133
206BJRIII	4005 through 4149	206-011-810-135
206BJRIII	4150 through 4316	206-011-810-141
206BJRIII	4317 through 4593	206-011-810-149
206BJRIII	4594 and subsequent	206-011-810-155

When upgrading an assembly, identification change on the hub assembly data plate is required. Historical records must also be annotated with the new part numbers and if required, new time between overhaul or retirement lives. Partial upgrade does not qualify for data plate or historical record identification change.

- Replaced by hub assembly 206-011-810-153. Refer to TB 206-94-151.
- Refer to TB 206-94-151 for feathering bearing 206-310-105-101 replacement and configuration instruction.
- Replaced by blade assembly 206-016-201-131. Refer to TB 206-94-151 $\frac{1}{20}$.
- Pitch horn 206-011-809-001 has one cotter pin hole 0.710 to 0.730 inch (18.03 to 18.54 mm) from the stud flange. Refer to ASB 206-80-12 for modification.

Pitch horn assembly 206-011-809-005 stud length is 0.915 to 0.935 inch (23.24 to 23.75 mm) with one cotter pin hole.

Pitch horn assembly 206-011-809-107 and -109 stud length is 0.943 to 0.963 inch (23.95 to 24.46 mm) with two cotter pin holes.

Pitch horn assembly 206-011-809-109 has two machined cutouts in each lug. Refer to TB 206-91-135.

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Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

NOTES: (CONT)



To eliminate potential interference between blade bolt nuts and tail rotor counter balance washers, replace washer AN970-3 as follows:

Normal Situation:

Maximum 40 washers AN970-3, 10 per lug, five on each side (20 per horn). To achieve balance of tail rotor pedal forces, washers AN970-3 may be replaced with washers AN960JD10. Quantity and type of washers must be the same on all positions.

Potential Interference Situation:

Replace washers AN970-3 with heavier washers 206-011-859-101 or combination as shown below, to obtain balance of tail rotor pedal forces.

Mariana Orași Chara	206-011-859-101	AN970-3
Maximum Quantity per Pitch Horn Lug	0	10
(Two Lugs per Pitch Horn)	2	6
	4	0

Washer combination must be identical on both pitch horns.

Install washer 206-011-859-101 adjacent to pitch horns.



A maximum of 24 washers 206-011-859-101, six per lug, three on each side (12 per horn) may be used on pitch horn assembly. To achieve desired balance of tail rotor pedal forces as determined by flight test, it is permissible to remove or replace washer 206-011-859-101 with a combination of washer AN970-3 and/or washer AN960JD10 as required. Quantity and type of washers must be the same on all positions. Use adequate bolt length to obtain correct thread engagement.



Replaced by cotter pin MS24665-136.



Replaced by hub and blade assembly 206-011-810-155.



Refer to TB 206-94-151 for bushing replacement and configuration instruction. (Yoke 206-011-811-009 cannot be modified with 206-011-816-105 bushing, but may be used with modified blade)



Replaced by blade assembly 206-016-201-133.



Replaced by blade assembly 206-016-201-137.



Replaced by blade assembly 206-016-201-135.

28

Feather bearings 206-010-765-001 were installed on these blades at manufacture $\frac{1}{4\lambda}$.

29

Replaced by yoke assembly 206-011-811-009.

30

Replaced by yoke assembly 206-011-819-101.

31

Replaced by yoke assembly 206-011-819-105.

32

Replaced by yoke assembly 206-011-819-109.

33

Replaced by housing assembly 206-011-814-113.

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Table 64-1. Tail Rotor Hub and Blade Configuration (Cont)

NOTES: (CONT)

34

Housing 206-011-814-003 is part of housing assembly 206-011-814-001.

35

Housing 206-011-814-011 is part of housing assembly 206-011-814-009/-113.

64-4. TAIL ROTOR HUB AND BLADES — REMOVAL

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
<u> </u>	Crosshead Puller

NOTE:



Snap-on CG240 or equivalent.

- **1.** Remove nuts (8, Figure 64-1), washers (9), and bolts (14).
- 2. Remove nuts (13), cupped washer (12), and special washers (11). Remove pitch links (10).
- **3.** Remove nut (15) and washer (16). Pull crosshead (18) from control tube (24) with the use of a suitable puller. Remove pin (17) from crosshead (18) or control tube (24).

NOTE

Knurled nut and balance wheel are threaded onto the tail rotor gearbox shaft.

4. Cut and remove lockwire from knurled nut (19). Remove knurled nut and liner (7).

- **5.** On tail rotor installation 206-011-720 equipped with balance wheel (21), remove shim (20) and balance wheel.
- **6.** Straighten tabs on special washer (5) and remove nut (6). Remove special washer, static stop (4), rubber bumper (3), and shim (2). Discard special washer.

NOTE

Shim (2) serves to position static stop (4) and the positioning for tail rotor blade-to-boom clearance. If the hub and blades are to be reinstalled, identify the shim during removal for reuse during installation.

- **7.** Slide tail rotor hub and blades (1) from tail rotor gearbox output shaft and remove spacer (23).
- 8. Remove pin (26) from tail rotor gearbox shaft.

64-5. TAIL ROTOR HUB AND BLADES — CLEANING

MATERIALS REQUIRED

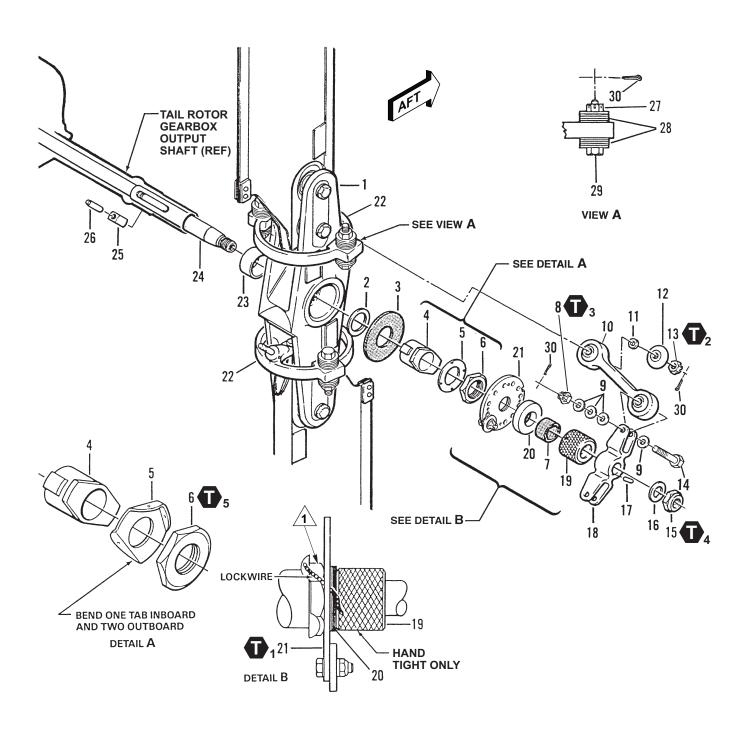
Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

1. Clean all parts with drycleaning solvent (C-304) and dry with filtered compressed air.

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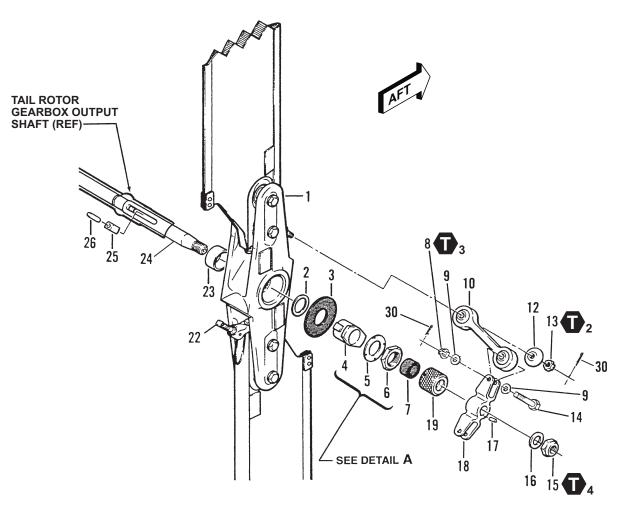


TAIL ROTOR HUB AND BLADE ASSEMBLY 206-011-810 HELICOPTERS S/N 498 AND SUBSEQUENT

206AB_MM_64_0001a

Figure 64-1. Tail Rotor Hub and Blades (Sheet 1 of 3)





206-011-700 AND 206-011-720-003
TAIL ROTOR INSTALLATION PRIOR TO BALANCE WHEEL HELICOPTERS S/N 4 THROUGH 626

206AB_MM_64_0001b

Figure 64-1. Tail Rotor Hub and Blades (Sheet 2 of 3)



- 1. Tail rotor hub and blades
- 2. Shim
- 3. Rubber bumper
- 4. Static stop
- 5. Special washer
- 6. Nut
- 7. Liner
- 8. Nut
- 9. Washer
- 10. Pitch link
- 11. Special washer
- 12. Cupped washer
- 13. Nut
- 14. Bolt
- 15. Nut
- 16. Washer
- 17. Pin
- 18. Crosshead
- 19. Knurled nut
- 20. Shim
- 21. Balance wheel
- 22. Pitch horn
- 23. Spacer
- 24. Control tube
- 25. Key
- 26. Pin
- 27. Nut 28. Washer
- 29. Bolt
- 30. Cotter pin



206-011-700 50 TO 70 IN-LBS (5.65 TO 7.90 Nm) 2 206-011-720 50 TO 60 IN-LBS (5.65 TO 6.78 Nm)

80 TO 100 IN-LBS 3 (9.04 TO 11.30 Nm)

206-011-700 100 TO 150 IN-LBS (11.30 TO 16.95 Nm) 4 206-011-720 125 IN-LBS (14.12 Nm)

580 IN-LBS 5 (65.53 Nm)

NOTE



Chamfered side of nut facing outboard.

206AB_MM_64_0001c

Figure 64-1. Tail Rotor Hub and Blades (Sheet 3 of 3)

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64-6. TAIL ROTOR HUB AND BLADES — INSPECTION AND REPAIR

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-100	Chemical Film Material
C-204	Epoxy Polyamide Primer
C-245	Polyurethane Coating
C-309	MEK
C-423	Abrasive Paper

NOTE

See Figure 64-2 through Figure 64-6 for tail rotor damage limits and refer to BHT-206B3-CR&O manual for detailed inspection and repair procedures

- 1. Inspect tail rotor blades (paragraph 64-10).
- 2. Inspect pitch link (10, Figure 64-1) for mechanical and corrosion damage. Mechanical damage shall not exceed 0.010 inch (0.254 mm) and corrosion damage shall not exceed 0.005 inch (0.127 mm). Inspect crosshead (18) for mechanical and corrosion damage. Mechanical and corrosion damage shall not exceed 0.010 inch (0.254 mm).
- **a.** Blend out acceptable damage with abrasive paper (C-423). Minimum radius of repair shall not be less than 0.05 inch (1.3 mm). One repair is permitted on each end of pitch links and two repairs to crosshead, but not on the same lug.
- **b.** Remove sanding residue with MEK (C-309) and treat repaired areas with chemical film material (C-100) (BHT-ALL-SPM).
- **c.** Refinish repaired parts with one spray coat of epoxy polyamide primer (C-204) and two spray coats

of polyurethane coating (C-245), color number 17178. Do not allow finish coats to contact bearings.

- **3.** Inspect bearings in pitch links (10) for elongated bolt holes, staking, security, binding, and wear or deterioration of bearing surfaces. Inspect bearing for axial and radial play; maximum axial play is 0.020 inch (0.508 mm) and no radial play is permitted. Replace pitch links (10) if axial and/or radial limits of bearings are exceeded.
- **4.** Inspect balance wheel (21) for visible thread damage.
- **5.** Inspect liner (7) for wear. Maximum inside diameter is 0.640 inch (16.3 mm).
- **6.** Inspect knurled nut (19) for visible thread damage.
- **7.** Inspect key (25) for wear. Minimum width is 0.285 inch (7.24 mm).

64-7. TAIL ROTOR HUB AND BLADES — INSTALLATION

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
GS18217	Propeller Protractor

MATERIALS REQUIRED

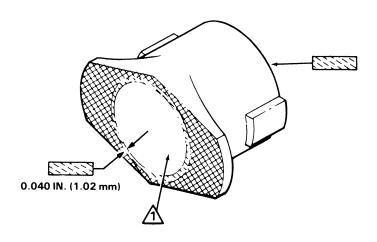
Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-405	Lockwire
C-561	Grease

1. Apply a light coating of grease (C-561) to inside diameter of spacer (23, Figure 64-1), and the splines and outboard outside diameter area of the tail rotor gearbox output shaft, not including threads. Do not apply grease to the threads of the output shaft.

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DAMAGE LOCATION SYMBOLS

TYPE OF DAMAGE	MAXIM	IUM DAMAGE AND REPA	AIR DEPTH
MECHANICAL	0.005 in. (0.127 mm) before and after repair	0.010 in. (0.254 mm) before and after repair	0.010 in. (0.254 mm) before and after repair
CORROSION	0.005 in. (0.127 mm) before and after repair	0.010 in. (0.254 mm) before and after repair	0.010 in. (0.254 mm) before and after repair
MAXIMUM AREA PER FULL DEPTH REPAIR	Not critical	One-fourth circumference	Not critical
NUMBER OF REPAIRS	Not critical	Not critical	Not critical
EDGE CHAMFER	0.020 in. (0.508 mm) by 45 degrees	0.020 in. (0.508 mm) by 45 degrees	

Bore damage not to exceed 0.005 inch (0.127 mm) for one-fourth circumference.

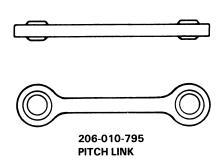
NOTE

206L4-M-64-4

Figure 64-2. Tail Rotor Static Stop Damage Limits

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DAMAGE LOCATION SYMBOL

TYPE OF DAMAGE

MAXIMUM DAMAGE AND REPAIR DEPTH

MECHANICAL

0.010 in. (0.254 mm) before and after repair

CORROSION

0.005 in. (0.127 mm) before and 0.010 in. (0.254 mm) after repair

MAXIMUM AREA PER FULL DEPTH REPAIR 0.04 sq. in. (30 sq. mm)

NUMBER OF REPAIRS

Two not adjacent

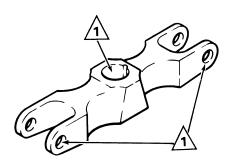
EDGE CHAMFER

0.030 in. (0.762 mm)

206L4-M-64-5

Figure 64-3. Tail Rotor Pitch Link Damage Limits





206-011-855 206-011-857 CROSSHEAD

DAMAGE LOCATION SYMBOL

0.010 SQ. IN. (6.45 SQ. mm)

TYPE OF DAMAGE MAXIMUM DAMAGE AND REPAIR DEPTH

MECHANICAL 0.010 IN. (0.25 mm) before and after repair

CORROSION 0.010 IN. (0.25 mm) before and after repair

MAXIMUM AREA PER FULL DEPTH REPAIR

FOLL DEFITT NEFAIN

NUMBER OF REPAIRS Two

EDGE CHAMFER 0.020 IN. (0.51 mm)

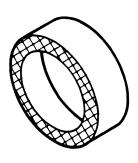
NOTE

Dore damage not to exceed 0.001 inch (0.03 mm) for one-fourth circumference.

206B3-R-64-11

Figure 64-4. Tail Rotor Crosshead Damage Limits





206-010-755 SPACER

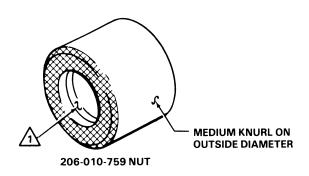
DAMAGE LOCATION SYMBOLS

	CAAAAA	
TYPE OF DAMAGE	MAXIMUM DAMAG	E AND REPAIR DEPTH
MECHANICAL	0.010 in. (0.254 mm) before and after repair	0.010 in. (0.254 mm) before and after repair
CORROSION	0.010 in. (0.254 mm) before and after repair	0.010 in. (0.254 mm) before and after repair
MAXIMUM AREA PER FULL DEPTH REPAIR	One-fourth circumference	0.2 sq. in. (130 sq. mm)
NUMBER OF REPAIRS	Not critical	Three
EDGE CHAMFER	0.015 in. (0.381 mm) by 45 degrees	0.015 in. (0.381 mm) by 45 degrees

Figure 64-5. Tail Rotor Spacer Damage Limits

206L4-M-64-7





DAMAGE LOCATION SYMBOLS

 \bowtie

MAXIMUM DAMAGE AND REPAIR DEPTH

MECHANICAL 0.020 in. (0.508 mm) before

and after repair depth of knurl

CORROSION 0.010 in. (0.254 mm) before and 0.020 in. (0.508 mm) below

> 0.020 in. (0.508 mm) after repair depth of knurl

MAXIMUM AREA PER Not critical Not critical

FULL DEPTH REPAIR

TYPE OF DAMAGE

0.020 in. (0.508 mm) below

NUMBER OF REPAIRS Not critical Not critical

EDGE CHAMFER 0.030 in. (0.762 mm) by 0.030 in. (0.762 mm) by

> 45 degrees 45 degrees

THREADS:

Depth: One-third of thread segment

Length: 0.25 in. (6.3 mm)

Number: Two

NOTE

Bore damage not to exceed 0.010 inch (0.254 mm) for one-fourth circumference.

206L4-M-64-8

Figure 64-6. Tail Rotor Bearing Nut Damage Limits

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2. Install spacer (23) against shoulder on tail rotor gearbox output shaft.

CAUTION

ENSURE PIN (26) GOES THROUGH HOLE IN KEY (25) AND REMAINS IN POSITION WHILE TAIL ROTOR HUB AND BLADE (1) AND STATIC STOP (4) ARE POSITIONED ON GEARBOX OUTPUT SHAFT.

- **3.** Align pin hole in gearbox output shaft with pinhole in key (25) and install pin (26).
- **4.** Apply a light coating of grease (C-561) to the splines of the tail rotor trunnion (32).
- **5.** Align splines of gearbox output shaft and tail rotor hub and blade assembly trunnion. Install tail rotor hub on gearbox output shaft with leading edge of top tail rotor blade facing aft.
- **6.** Apply a light coating of grease (C-561) to inside diameter of static stop (4).

NOTE

Do not install rubber bumper (3) or bend special washer (5) until correct flapping angle and tailboom clearance have been obtained as outlined in step 8 and step 19.

- 7. Install shim (2), static stop (4), special washer (5), and nut (6). Torque the nut .
- **8.** Adjust tail rotor hub and blades (1) for correct flapping angle as follows:
- **a.** Position tail rotor hub and blades (1) in vertical position and check flapping angle along pitch change axis. The pitch change axis is an extension of a line through the centers of the tail rotor blades to the attachment bolts.
- **b.** Flap tail rotor hub and blades (1) to one extreme position until tail rotor hub contacts static stop (4). Place propeller protractor (GS18217), or equivalent, adjacent to blade attachment bolts and record angle. Flap tail rotor hub and blades to opposite

extreme position until tail rotor hub contacts static stop. Measure and record angle.

- **c.** The total flapping angle must be as follows:
- Tail rotor installation 206-011-700, 12° ±1°.
 Applicable to S/N 4 through 2211 with 62 inch tail rotor blade diameter, Pre BHT-206-SI-112.
- Tail rotor installation 206-011-720, 18° to 19°. Applicable to S/N 2212 and subsequent with 65 inch tail rotor blade diameter and S/N 4 through 2211, Post BHT-206-SI-112.
- **d.** If flapping angle is not correct, adjust thickness of shim (2) as follows:
- (1) If necessary to obtain required flapping angle, and 1.0 inch (25 mm) clearance, adjust thickness of shim (2). Use only bonded laminates of shim. If a thicker shim is required, use a new shim. Laminates of shim are 0.002 inch (0.051 mm) thick.
- **9.** After correct flapping angle has been achieved, torque the nut (6) , and temporarily install rubber bumper (3) over nut (6).



DO NOT EXCEED TORQUE LIMIT • ON BALANCE WHEEL. EXCEEDING TORQUE WILL STRIP THREADS IN BALANCE WHEEL.

- **10.** On tail rotor installation 206-011-720 equipped with balance wheel (21), thread balance wheel onto tail rotor gearbox shaft against nut (6). Torque the balance wheel •
- **11.** Install liner (7) and knurled nut (19) and hand tighten onto gearbox output shaft.

NOTE

Tail rotor installations 206-011-700 A and 206-011-720-003 A do not have balance wheel (21) or shim (20) (Figure 64-1).

12. On tail rotor installation 206-011-720, adjust shim (20) as follows:



- **a.** Measure the clearance between balance wheel (21) and knurled nut (19). Record measured clearance. Remove knurled nut and liner (7).
- **b.** Adjust thickness of shim (20) to equal measured clearance to within +0.002 inch (+0.05 mm). Shims are 0.002 inch (0.05 mm) laminates with total thickness of 0.032 inch (0.81 mm). Do not exceed a maximum of 10 shims.
- **c.** Install measured shims (20), liner (7), and knurled nut (19). Tighten knurled nut hand tight only on gearbox output shaft.
- **13.** Install pin (17) in outboard end of control tube (24) and install crosshead (18) over control tube and pin. Check for proper location of pin by inserting a piece of lockwire into groove at back of crosshead.
- **14.** On outboard end of control tube (24), install washer (16) and nut (15). Torque the nut .

CAUTION

USE CORRECT PITCH LINK. CAREFULLY CHECK PART NUMBER AND LENGTH. FAILURE TO USE CORRECT PITCH LINK MAY RESULT IN DECREASED LEFT PEDAL TRAVEL, AND A RIGGING PROBLEM COULD ARISE.

- **15.** Install pitch links (10) between crosshead (18) and studs on pitch horns (22), as follows:
- **a.** Connect pitch links (10) to pitch horns (22) with special washers (11), cupped washers (12), and nuts (13). Torque the nuts and safety with cotter pins (30).
- **b.** Connect pitch links (10) to crosshead (18) with bolts (14) (heads in direction of rotation), washers (9), and nuts (8). Position washers under head of bolts and under nuts. Torque the nuts and safety with cotter pins (30).
- **16.** Check pitch change mechanism for freedom of movement with pedals through full operating range.

- **17.** Check tail rotor hub and blades (1) for freedom of movement at flapping axis. Check tail rotor blade bearings for freedom of movement.
- **18.** Check rigging of tail rotor control system (Chapter 67).
- **19.** Check tail rotor hub and blades (1) for correct tailboom clearance as follows:
- **a.** Move rubber bumper (3) so that tail rotor hub can contact static stop (4).
- **b.** Turn tail rotor hub and blades (1) to position one blade tip adjacent to tailboom. Hold right tail rotor pedal full forward against stop. Flap tail rotor hub and blades toward tailboom until tail rotor hub contacts static stop (4).
- **c.** Trailing edge of the tail rotor hub and blades (1) must clear tailboom at closest point by at least 1 inch (25.40 mm) tail rotor installation 206-011-720 **A B**, and 1.5 inches (38.10 mm) tail rotor installation 206-011-700 **A**.
- **d.** If clearance is not within tolerance, accomplish the following steps:
- (1) Remove items installed in step 9 through step 15.
- (2) Accomplish procedures specified in step step 8, substep a through step 8, substep c.
- **e.** If necessary to obtain correct flapping angle and 1.0 inch (25.40 mm) tail rotor installation 206-011-720, or 1.5 inch (38.10 mm) 206-011-700 minimum clearance between tail rotor blade and tailboom, adjust thickness of shim (2). To accomplish adjustment of shim, remove, reinstall, and torque applicable parts per instructions provided in the previous steps.
- **20.** Position rubber bumper (3) between tail rotor hub and flanges of static stop (4).
- **21.** Bend one end of special washer (5) inboard over one flat of static stop (4). At another location, bend one edge of special washer outboard over two flats of nut (6) as shown in Detail A.
- **22.** Secure knurled nut with lockwire (C-405) as shown in Detail B.

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TAIL ROTOR BLADES

64-8. TAIL ROTOR BLADES

The tail rotor blade is an all-metal assembly consisting of a stainless steel shell reinforced by a honeycomb filler and stainless steel leading edge abrasive strip. Two spherical bearings are installed in an aluminum alloy retention block to provide for pitch change movement of the blade in the tail rotor hub.

64-9. TAIL ROTOR BLADES — CLEANING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-125	Preservative Oil
C-304	Drycleaning Solvent
C-305	Aliphatic Naphtha
C-318	Cleaning Compound
C-412	Wax

NOTE

The following cleaning procedure should be accomplished each week, or more frequently if deemed necessary, to prevent corrosion, extend tail rotor blade service life, and maintain enhanced visibility.

- **1.** Wipe tail rotor blades clean with aliphatic naphtha (C-305) or drycleaning solvent (C-304).
- 2. Wash tail rotor blades with cleaning compound (C-318). Rinse with clean water and wipe dry with clean cloths.

NOTE

Use preservative oil (C-125) as an alternate for wax (C-412).

3. Coat tail rotor blade surfaces with wax (C-412). Do not use silicone type waxes. They may interfere with future repairs or refinishing.

64-10. TAIL ROTOR BLADES — INSPECTION

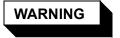
MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-317	Adhesive
C-322	Adhesive
C-323	Fairing Compound



IF A CRACK EXISTS IN ANY LOCATION, BLADE SHALL BE REPLACED. ALL DENTS SHALL BE CLOSELY INSPECTED FOR NICKS, SCRATCHES, AND CRACKS. IF NICKS OR SCRATCHES EXIST IN DENTS, AND TOTAL DEPTH IS IN EXCESS OF THAT PERMITTED, BLADE SHALL BE REPLACED. CORRODED OR DAMAGED RIVETS ON TIP BLOCK END OF BLADE SHALL BE REPLACED.



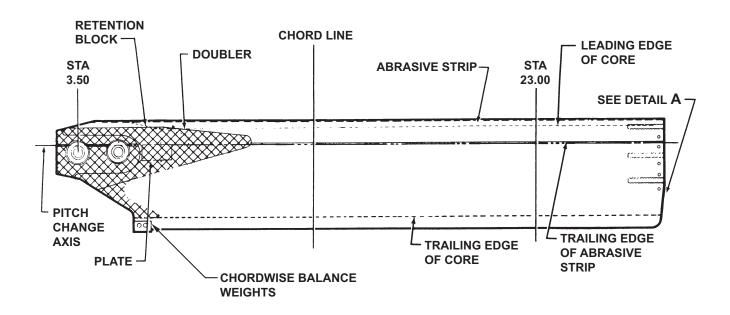
MORE STRINGENT SKIN DAMAGE LIMITS THAN PROVIDED IN STEP 1 AND STEP 2 APPLY TO TAIL ROTOR BLADES 206-016-201-131 AND -133 AFFECTED BY ASB 206-04-100. REFER TO ASB 206-04-100 FOR AFFECTED TAIL ROTOR BLADE SERIAL NUMBERS AND SPECIFIC SKIN DAMAGE LIMITS.

NOTE

Any damage in excess of that noted in the following steps, is reason to remove blade from service.

1. Skins inboard of station 23 (Figure 64-7).



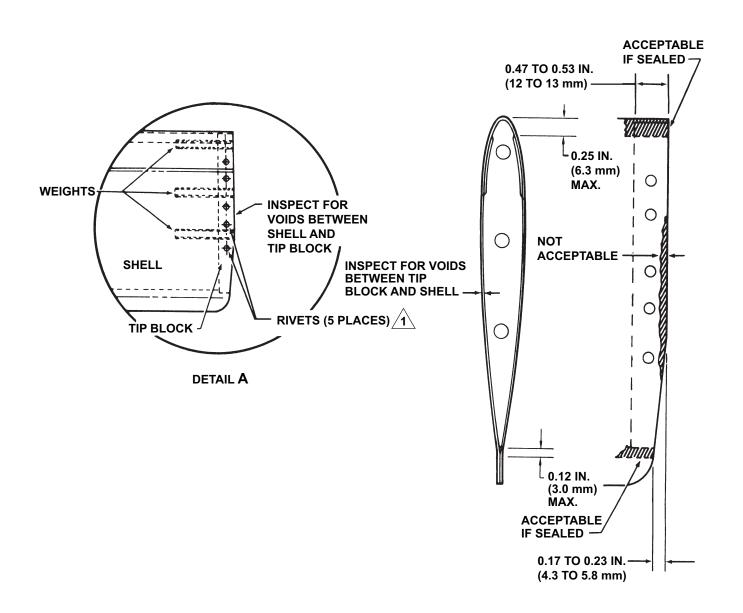


DENTS NOT ALLOWED IN THIS AREA

206_MM_64_0009a+

Figure 64-7. Tail Rotor Blade Damage Limits (Sheet 1 of 2)





NOTE



The 206-016-201-103 blade modified by ASB 206-85-28 and 206-016-201-115 blade have MS20470T4 rivets installed.

206AB_MM_64_0009b

Figure 64-7. Tail Rotor Blade Damage Limits (Sheet 2 of 2)



- **a.** All nicks and scratches not exceeding 0.001 inch (0.025 mm) deep are acceptable if polished out to a surface finish of 32 RHR or finer.
- **b.** Non-sharp dents not exceeding 0.010 inch (0.254 mm) deep are acceptable if filled and faired with fairing compound (C-323).
 - c. Sharp dents are not permitted.
- **d.** Skin deformation in the area of the chordwise balance weights is not permitted.
- 2. Outboard of station 23.
- **a.** All nicks and scratches not exceeding 0.003 inch (0.076 mm) deep are acceptable if polished out to a surface finish of 32 RHR or finer.
 - **b.** Sharp dents are not permitted.
- **c.** Non-sharp dents not exceeding 0.020 inch (0.508 mm) are acceptable if filled and faired with fairing compound (C-323).
- 3. Abrasive strip.

NOTE

If abrasive strip is cut through, ripped, or displaced to cause an abrupt discontinuity, the blade should be scrapped. If it is worn through, return to a Bell Helicopter Textron authorized blade repair facility for possible rework.

- **a.** Dents in the abrasive strip, inboard of station 13.0 in excess of 0.006 inch (0.152 mm), are not acceptable at the extreme leading edge radius.
- **b.** Other dents in the abrasive strip should be inspected to the same limits as dents in the skin (step 1 and step 2).
- **4.** Scratches, nicks, or dents in the extreme trailing edge 0.060 inch (1.524 mm) deep or less may be polished out over a distance of at least 3.0 inches (76.2 mm) each side of the damage.
- **5.** Inspect blade for corroded rivets and/or missing rivet heads.

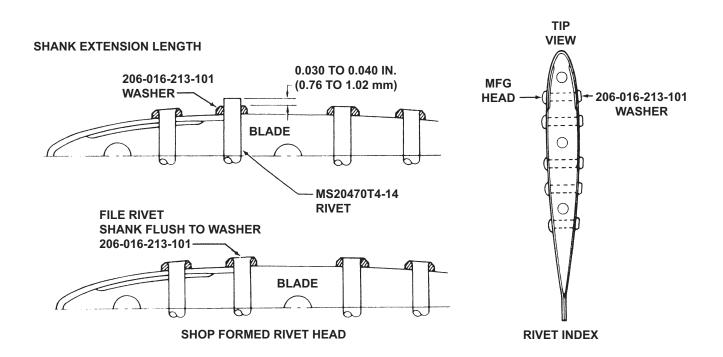
a. As applicable, install replacement rivets (Figure 64-8).

6. Void limits.

- **a.** Voids are not allowed within 0.25 inch (6.3 mm) of the trailing edge and within 0.50 inch (13 mm) of the inboard and outboard ends of the abrasive strip, except as allowed in step c and step d. Not more than 15% of the remaining area of the abrasive strip shall be void.
- **b.** At the trailing edge of the skin, a void 0.12 inch (3.0 mm) maximum in width (chordwise) is allowed. Edge voids are not acceptable.
- **c.** Voids between skin and root end retention block.
- (1) A void of 0.25 inch (6.3 mm) wide maximum at leading edge is acceptable provided it is sealed. Seal with adhesive (C-322) or adhesive (C-317). Aft edge of void must be within 0.15 inch (3.8 mm) of extreme leading edge of blade.
- (2) A void (or gap) 0.12 inch (3.0 mm) wide (chordwise) between skin and retention block at trailing edge is acceptable, provided it is sealed. Seal with adhesive (C-322) or adhesive (C-317).
- (3) Edge voids are not allowed between skin and retention block except as specified in the previous step (1) and step (2).
- **d.** Voids between skin and tip block. Inspect for voids by tapping with large coin or tapping hammer. Limits for voids between shell and tip block are as follows:
- (1) A void (or gap) 0.25 inch (6.3 mm) wide (chordwise) at leading edge is acceptable, but must be sealed. Seal with adhesive (C-322) or adhesive (C-317) (Figure 64-7). The aft edge of the void must be within 0.15 inch (3.81 mm) of the extreme leading edge of the blade.
- (2) A void (or gap) 0.12 inch (3.0 mm) wide (chordwise) between the skin and aft end of tip block is acceptable, but must be sealed. Seal with adhesive (C-322) or adhesive (C-317) (Figure 64-7).
- (3) With the exception of previous step (1) and step (2), voids between skin and the tip block that are visible at tip are unacceptable.

64-00-00





NOTE

Install replacement rivets with wet epoxy polyamide primer (C-204).

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Figure 64-8. Tail Rotor Blade Rivet Installation

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- **(4)** Any voids in excess of these limitations will require replacement of blade.
- **(5)** Any movement of tip block outboard of skin shall require replacement of blade.
- **(6)** Void in tip block area is acceptable until it reaches tip end of blade. Blade must then be replaced.
- **e.** Voids between honeycomb and skin area are not allowed.
 - f. Voids between root end doubler and skin.
 - (1) Edge voids are not allowed.
- (2) Voids not exceeding 0.50 inch (13 mm) chordwise and 1.0 inch (25 mm) spanwise are acceptable, provided 0.25 inch (6.3 mm) good edge bond exists.
- **7.** Inspect spherical bearings for damage and radial and axial wear. Replace spherical bearings if damaged, radial and axial wear exceeds limits found in BHT-ALL-SPM, or if a high frequency vibration develops in tail rotor. For bearing replacement procedure, refer to BHT-206B3-CR&O.

64-11. TAIL ROTOR BLADES — REPAIR

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-100	Chemical Film Material
C-305	Aliphatic Naphtha
C-309	MEK
C-317	Adhesive
C-318	Cleaning Compound
C-322	Adhesive
C-323	Fairing Compound
C-344	Cleaner
C-361	Adhesive Film
C-407	Abrasive Pad

MATERIALS REQUIRED (Cont)

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-423	Abrasive Paper
C-426	Masking Tape

- **1.** Sealing and bonding of voids (Figure 64-7).
- **a.** Edge voids under the abrasive strip must be sealed with adhesive film (C-361) or adhesive (C-317). Refer to BHT-ALL SPM for bonding procedures.
- **b.** Porosity in the bond line at trailing edge of the skin shall be sealed with adhesive (C-322) or adhesive (C-317).
- **c.** Voids between the skin and the root end retention block shall be sealed with adhesive (C-322) or adhesive (C-317).
- **d.** Voids between the skin and tip block shall be sealed with adhesive (C-322) or adhesive (C-317).
- **2.** Fill non-sharp dents with fairing compound (C-323).
- **3.** Polish out nicks, scratches, and corrosion as follows:
- **a.** Mask bearings and 0.125 inch (3.17 mm) of inboard edge of blade with masking tape (C-426).
- **b.** Degrease repair area with aliphatic naphtha (C-305).
- **c.** Using cloth pads soaked in MEK (C-309), strip finish from repair area. Do not remove primer from surface except in areas where the primer is cracked, deteriorated, corroded, or otherwise appears damaged. Remove primer in these areas down to bare metal using abrasive pad (C-407) or abrasive paper (C-423).
- **d.** Polish out repairable nicks, scratches, and corrosion with abrasive paper (C-423). Polish in spanwise direction only.
- **e.** Wash area with cleaning compound (C-318) and water. Rinse thoroughly with clean running water. Achieve water break-free surface, which will be



evident by a continual unbroken film of water on the surface. Air dry surface.

- **f.** If corrosion was present on aluminum butt block, apply a generous amount of cleaner (C-344) using a clean cloth or brush. Rub briskly for approximately 40 to 60 seconds.
- **g.** Rinse area thoroughly with clean running water and wipe dry with clean cloths.

NOTE

From completion of step 3, substep g and substep h, and until application of final paint finish, surfaces of repaired area are not to be handled.

- **h.** On all bare areas of the aluminum butt block surfaces, apply chemical film material (C-100).
- i. If protective paint finish is not to be applied immediately, cover surface with paper and secure with masking tape (C-426).
- **4.** Spot-refinish tail rotor blades (paragraph 64-12).

64-12. TAIL ROTOR BLADES — SPOT REFINISHING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-245	Polyurethane Coating
C-246	Epoxy Primer Coating
C-305	Aliphatic Naphtha
C-318	Cleaning Compound
C-407	Abrasive Pad
C-422	Aluminum Wool
C-423	Abrasive Paper
C-426	Masking Tape

NOTE

The following procedures are for spot repairs only.

- **1.** Degrease tail rotor blade with aliphatic naphtha (C-305) or any approved degreasing solvent.
- **2.** Burnish out any scratches, pits, etc., that are within allowable limits. Use aluminum wool (C-422) and/or very fine abrasive paper (C-423), or equivalent, on aluminum surfaces. Use coarser abrasive paper (C-423) on stainless steel spar (leading edge). Sanding is to be accomplished in a spanwise direction.
- **3.** Use abrasive pad (C-407) or equivalent, to remove all surface oxides and all aged chemical conversion coatings from all bare aluminum surfaces.
- **4.** Wash blade with cleaning compound (C-318) mixed 10% to 15% by volume with water. Achieve water break-free surface, which will be evident by continuous unbroken film of water on surface after thoroughly rinsing the soap from the surface. Allow surface to dry.

NOTE

From completion of the following step through final paint, surfaces of blades should not be handled with bare hands.

- **5.** On all bare stainless steel surfaces, apply by brush or spray one coat of epoxy primer coating (C-246) to touch up areas only (BHT-ALL-SPM, Chapter 4).
- **6.** Allow primer to air dry a minimum of 1 hour, maximum 8 hours. If 8 hours air dry is exceeded, primer must be sanded and reapplied prior to finish coat (BHT-ALL-SPM, Chapter 4).

NOTE

Painting may affect tail rotor balance. Perform tail rotor balancing, if required.

- **7.** Apply one to two finish spray coats of polyurethane coating (C-245) (BHT-ALL-SPM, Chapter 4) as follows:
- **a.** Use masking tape (C-426) to cover blade areas, as necessary, to protect from overspray.

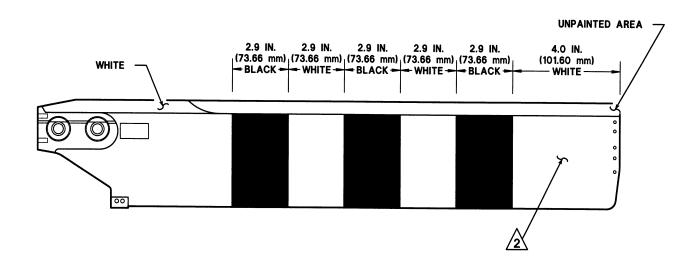
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- **b.** Use gloss white polyurethane coating (C-245), color code 17925 per FED-STD-595, for basic color (Figure 64-9).
- **c.** Use gloss black polyurethane coating (C-245), color code 17038 per FED-STD-595, for stripes (Figure 64-9).
- **d.** If necessary, restore lettering on both sides of blade near tip. Use stencil and gloss black polyurethane coating (C-245), color code 17038 per FED-STD-595 (Figure 64-9).

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NOTES

1. Dimensions in inches. Metric dimensions in millimeters for reference.



2 If lettering is missing or illegible, stencil the following on both sides of tail rotor blade tip. The letters must be 1/4 inch (6.35 mm) high. Spacing between lines must be 1/16 inch (1.59 mm).

> DO NOT USE FOR HANDLING **HELICOPTER**

> > 206A/BS-M-64-4

Figure 64-9. Tail Rotor Blade Paint Scheme