DMWR 55-1560-196

DEPOT MAINTENANCE WORK REQUIREMENT

FOR

MAIN ROTOR HUB

PART NUMBER	NATIONAL STOCK NUMBER
204-012-101-5	1615-00-833-1556
204-012-101-19	1615-00-213-7261
204-012-101-31	1615-01-056-4550
204-012-101-137	1615-01-261-0570
204-012-101-139	1615-01-237-0512
204-012-101-141	1615-01-270-2982

THIS PUBLICATION IS A REPRINT OF DMWR 55-1560-196, DATED 1 DECEMBER 1965, INCLUDING CHANGE 1THROUGH 28.

This publication is not available through U.S. Army Publication Distribution Centers. It must be obtained from U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000.

US ARMY AVIATION
AND MISSILE COMMAND
1 DECEMBER 1965

WARNING

PRECAUTIONARY DATA

Personnel performing instructions involving operating procedures and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of warnings and precautionary information may cause injury, death, and or an aborted mission.

WARNING

Operating procedure, practice, etc., which, if not followed; could result in personnel injury or loss of life.

CAUTION

Operating procedure, practice, etc., which if not strictly observed; could result in damage to or destruction of equipment.

NOTE

Operating procedure, condition, etc., which is essential to highlight.

HANDLING CLEANING AGENTS

Solvent, Federal Specification P–D–680, Type II, Isopropyl Alcohol, Federal Specification TT–I–735, and DS–108, Military Specification MIL–I–25135.Methyl–Ethyl–Ketone, Federal Specification TT–M–261, are flammable and toxic. Use in well ventilated area away from flame or hot surface. Solvents with flash point greater than 100F (38C) should be used. However, solvents with flash point less than 100 F may be specified. Consult the material safety data sheet for solvent flash point. Avoid solvent contact with skin. Breathing fumes may cause injury to personnel. If skin becomes irritated after use of solvent, wash area thoroughly with soap and water. If irritation persists, consult a physician.

USE OF COMPRESSED AIR TO DRY PARTS

Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and only with effective chip gaurding and personnel protective equipment. Do not exceed 25 psi nozzle pressure when drying parts by blowing them off with compressed air. Do not direct compressed air against skin.

HANDLING CHEMICAL FILM SOLUTION

Brush alodine solution is extremely dangerous, containing oxidizing ingredients which can react with combustible materials such as solvents and paint thinners to cause fire or explosion. Store solution in shaded area, away from flammable organic liquids.

WARNING

FLIGHT SAFETY PARTS

This manual contains procedures identifying critical characteristics of flight safety parts. Critical characteristics may be identified as dimensions, tolerances, finishes, materials, assemblies, or inspection procedures. Some processes may require qualified sources. Flight safety parts indicating a maximum allowable limit shall not be continued in use when limits have been exceeded. These parts must be replaced.

CHANGE

NO. 28

U.S. ARMY AVIATION AND
MISSILE COMMAND
Redstone Arsenal, AL 35898-5000
12 May 2004

Depot Maintenance Work Requirement

for

MAIN ROTOR HUB

PART NUMBER	NATIONAL STOCK NUMBER
204-012-101-5	1615-00-833-1556
204-012-101-19	1615-00-213-7621
204-012-101-31	1615-01-056-4550
204-012-101-137	1615-01-261-0570
204-012-101-139	1615-01-237-0512
204-012-101-141	1615-01-270-2982

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

DMWR 55-1560-196, DATED 1 DECEMBER 1965, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove Pages	Insert Pages
A and B	A and B
2-3/(2-4 blank)	2-3/(2-4 blank)
4-5 and 4-6	4-5 and 4-6
4-13 and 4-14	4-13 and 4-14
4-29 and 4-30	4-29 and 4-30
4-34C and 4-34D	4-34C and 4-34D
4-35 through 4-38	4-35 through 4-38
4-38E/(4-38F blank)	4-38E/(4-38F blank)
8-1 and 8-2	8-1 and 8-2

2. Retain this sheet in front of manual for reference purposes.

FOR THE COMMANDER:

JOHN B. SMITH
Colonel, QM
Chief of Staff

OFFICIAL:

Richard E. Turner

RICHARD E. TURNER
Deputy Director
Integrated Materiel Management Center

LIST OF EFFECTIVE PAGES

Insert latest changed pages. Dispose of superseded pages in accordance with regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original	1 December 1965
Change 1	1 November 1966
Change 2	1 June 1967
Change 3	15 November 1967
Change 4	1 May 1968
Change 5	15 November 1969
Change 6	15 December 1972
Change 7	15 March 1974
Change 8	15 January 1975
Change 9	1 November 1975
Change 10	1 April 1976
Change 11	14 August 1978
Change 12	1 June 1979
Change 13	15 November 1979
Change 14	1 September 1980
Change 15	1 June 1982
Change 16	30 June 1985
Change 17	15 March 1988
Change 18	9 November 1988
Change 19	31 July 1989
Change 20	16 January 1990
Change 21	30 May 1990
Change 22	27 November 1990
Change 23	30 September 1992
Change 24	31 August 1993
Change 25	1 September 1994
Change 26	16 January 1995
Change 27	21 February 2003
Change 28	12 May 2004

Page No.	*Change No.
Title	27
Blank	0
a	27
b blank	24
A and B	28
i and ii	27
1-1 and 1-2	24
2-1 and 2-2	24
2-3	28
2-4 blank	24
3-1 through 3-5	17
3-6 blank	17
4-1 and 4-2	17
4-2A	17
4-2B	26
4-3	27
4-4	26
4-5	28
4-6	23
4-7 and 4-8	26
4-9 and 4-10	17
4-10A	26
4-10B blank	17
4-11	27
4-12	0
4-13	26
4-14	28
4-15	15
4-16	0
4-17	23
4-18	18
4-18A	24
4-18B through 4-18D	23
4-19	15
4-20	24
4-21	0
4-22	27
4-22A and 4-22B	24
4-22B.1	27
4-22B.2 blank	24
4-22C	26
4-22D blank	26
4-23	0
4-24	15
4-24A	10
4-24B	17
4-24C	18
4-24D	27

*Zero in this column indicates an original page.

LIST OF EFFECTIVE PAGES (CON'T)

Page No.	*Change No.
4-25	24
4-26	27
4-27	26
4-28	27
4-28A	24
4-28B blank	24
4-29	28
4-30	27
4-30A	27
4-30B blank	26
4-31	26
4-32 and 4-33	24
4-34	27
4-34A and 4-34B	26
4-34B.1	27
4-34B.2 blank	26
4-34C and 4-34D	28
4-34E	26
4-34F	24
4-34F.1	26
4-34F.2	24
4-34G through 4-34K	23
4-35	28
4-36	24
4-36A	26
4-36B	23
4-36C through 4-36H	17
4-36H.A and 4-36H.B	23
4-36H.B.A	27
4-36H.B.B blank	24
4-36J and 4-35K	27
4-37	24
4-38	28
4-38A	27
4-38B	21
4-38C	17
4-38D	20
4-38E	28
4-38F blank	26
4-39	24
4-40	12
4-41	17
4-42	12
4-42A	24
4-42B	18
4-42C and 4-42D	21
4-43 and 4-44	12
4-45	26
4-46 blank	26

Page No.	*Change No.
5-1 through 5-4	24
6-1	27
6-2 blank	19
7-1	19
7-2 blank	0
8-1	28
8-2 and 8-3	27
8-4 blank	23
9-1	1
9-2 blank	0
10-1 and 10-2	0
11-1	17
11-2 blank	0
12-1 through 12-3	27
12-4 blank	27
13-1	27
13-2 blank	0
14-1	1
14-2 blank	0
15-1 through 15-4	26
A-1 through A-4	27
B-1	27
B-2 blank	20
C-1	27
C-2 blank	24
D-1	27
D-2 blank	27
Glossary 1 through Glossary 4	15

*Zero in this column indicates an original page.

Depot Maintenance
Work Requirement
No. 55-1560-196

US ARMY AVIATION
AND MISSILE COMMAND
1 December 1965

DEPOT MAINTENANCE WORK REQUIREMENT FOR MAIN ROTOR HUB

PART NUMBER	NATIONAL STOCK NUMBER
204-012-101-5	1615-00-833-1556
204-012-101-19	1615-00-213-7261
204-012-101-31	1615-01-056-4550
204-012-101-137	1615-01-261-0570
204-012-101-139	1615-01-237-0512
204-012-101-141	1615-01-270-2982

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual directly to: Commander, US Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or World Wide Web. Our fax number is: DSN 788-6546 or Commercial 256-842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028. For the World Wide Web, use: https//amcom2028.redstone.army.mil.

ENVIRONMENTAL/HAZARDOUS MATERIAL INFORMATION

This document has been reviewed for the presence of Class I Ozone Depleting Chemicals. As of 15 Dec 1995, the status is: All references to Class I Ozone Depleting Chemicals have been removed from this document by substitution with chemicals that do not cause atmospheric ozone depletion.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TABLE OF CONTENTS

		Page
Chapter 1	INTRODUCTION	1-1
Section I	General	1-1
Section II	Description, Data Plates, and Tabulated Data	1-1
Chapter 2	REQUIREMENTS	2-1
Section I	General	2-1
Section II	Mandatory Replacement Parts, Critical Safety Items, Repair Parts,And Modifications	2-1
Section III	Standards	2-1
Chapter 3	PRESHOP ANALYSIS	3-1
Chapter 4	DETAIL WORK REQUIREMENTS	4-1
Section I	General Requirements	4-1
Section II	Dismantling (NA)	4-2

TABLE OF CONTENTS (Cont)

Section III	Disassembly	4-9
Section IV	Cleaning	4-14
Section V	Repair and Replacement	4-30

TABLE OF CONTENTS (Cont)

Section III	Disassembly	4-9
Section IV	Cleaning	4-14
Section V	Repair and Replacement	4-30
Section VI	Modification Criteria	4-35
Section VII	Reassembly and Testing of Subassemblies	4-36
Section VII	Final Assembly	4-38
Section IX	Run-In and Test Procedures	4-45
Chapter 5	QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS	5-1
Chapter 6	PACKAGING	6-1
Chapter 7	MAINTENANCE OF FORMS AND RECORDS	7-1
Chapter 8	CONSUMABLE MATERIALS	8-1
Chapter 9	TECHNICAL FACILITIES REQUIREMENTS	9-1
Chapter 10	TOOLS AND EQUIPMENT	10-1
Chapter 11	OVERHAUL INTERVAL AND RETIREMENT LIFE SCHEDULE	11-1
Chapter 12	MILITARY AND FEDERAL SPECIFICATIONS	12-1
Chapter 13	REFERENCE DATA	13-1
Chapter 14	KIT DATA	14-1
Chapter 15	PART NUMBER LISTING	15-1
APPENDIX A	REFERENCES	A-1
APPENDIX B	MODIFICATIONS	B-1
APPENDIX C	DEPOT MOBILIZATION REQUIREMENTS	C-1
APPENDIX D	PAINTING REQUIREMENTS	D-1
GLOSSARY		Glossary-1

CHAPTER 1

INTRODUCTION

1-1. INTRODUCTION. This Work Requirement (WR) contains information regarding overhaul of Main Rotor Hub Assembly, Part No. 204-012-101-5, -19, -31, -137, -139, and -141.

1-2. PURPOSE AND SCOPE. This WR establishes requirements for disassembly, cleaning, Inspection, rejection, repair, reconditioning, rehabilitation, modification, reassembly, servicing, balancing and storage of Main Rotor Hub Assembly.

a. Parts, components, subassemblies, or assemblies found worn or defective beyound repairable limits established by this WR will be rejected.

b. Finite Life Parts that are time expired will be condemned, mutilated, and disposed of as scrap.

c. Repair, rehabilitation, and reconditioning of equipment and components specified herein shall be accomplished in accordance with specific instructiins in this WR. Tolerances and limits herein are minimum acceptable standards that permit acceptance rather than rejection of parts. Replacement of rejected parts is not mandatory if the Contractor is able to develope satisfactory procedures for repair. Any repair procedure developed by the Contractor shall subject to approval by Contracting Officer or the designated representative.

d. This WR requires repair and renovation of parts within demension and tolerance specifications noted herein.

NOTE

Itenm having allowable wear limits, will have applicable tolerances of that wear specified herein. Items with noticable wear not covered by tolerance shall be rejected.

1-3. DISCRIPTION. The Main Rotor Hub Assembly.connects the helicopter blades to the Mast Assembly. Blabe grips rotates on yoke spindles through roller bearings to provide pitch change of the blades. The hub is attached to the mast through a trunnion which permits flapping through pillow block bearings.

1-4. FINAL INSPECTION. Final inspection consists of assuring Main Rotor Hub Assembly is aligned, grips are spaced and balanced equally correct both spanwise and cordwise, and that records are properly annotated. For final acceptance inspection refer to Chapter 4, Section 8.

1-5. DEVIATIONS AND EXCEPTIONS. When any work segment set forth in this Depot Maintenance Work Requirement cannot be accomplished or can be accomplished only in a maner other than specified, the contrector shall submit a Request for Depot Engineering Support (AMSAT-I-M Form 1379, located in back of this manual), through Contracting Officer to AMSAT-I-MED with a copy to AMSAT-I-SB. Request shall state problems, reason for urgency, and give specified list below:

a. Serial Number (SN), if applicable, Part Number (PN), and National Stock Number (NSN) of affected equipment.

b. Work elements which will not be completed or which will not be accomplished as specified.

c. Reason for non accomplishment or deviation.

d. Action to correct condition causing non accomplishment or need for deviation.

e. Data relitive to non avialability of parts required, if applicable.

f. estimated man-hours.

g. Instruction and inspection required to maintain integrity of end item because of omission or deviation.

CHAPTER 2

REQUIREMENTS

Section I. GENERAL

2-1. FACILITIES. Refer to Chapter 9.

2-2. SPECIAL TOOLS AND EQUIPMENT. Refer to Chapter 10.

Section II. MANDATORY REPLACEMENT PARTS, CRITICAL SAFETY ITEMS, REPAIR PARTS, AND MODIFICATIONS

2-3. QUALITY OF PARTS. Parts and materials used for replacement, repair, or modification shall meet equipment drawings and specifications.

2-4. WEAR LIMITS, FITS, AND TOLERANCES. Wear limits, fits, and tolerances throughout this DMWR shall be complied with unless otherwise stated in the contract/work directive.

2-5. MANDITORY REPLACEMENT PARTS. Not applicable.

Section III. STANDARDS

2-6. FLIGHT SAFETY PARTS PROGRAM. Parts, assemblies, or installations identified under the Flight Safety Parts Program require special handling during overhaul. Throughout the overhaul procedures, wamings appear emphasizing critical instructions to be followed. These warnings are identified as "Flight Safety Part" wamings and are inserted when ever and wherever necessary.

a. Flight Safety Part is defined as a part, assembly, or installation procedure with one or more critical characteristic that, if not conforming to desing data or quality requirements, could result in serious injury, death of crew members and/or serious damage to the helicopter.

b. Acritical characteristic in any dimension, tolerancd, finish, material, manufacturing, assembly,or inspection process or other feature which, if nonconforming or missing could cause failure or malfunction of critical item.

c. Critical characteristics are listed in Table 2-1.

Table 2-1. Flight Safety Parts

Item No. Figure No.	Part Number	Nomenclature	Critical Characteristic
43, Fig. 4-2	204-011-102-17	Yoke Assembly	a. Hardness check. b. Bake cycle after cadmium plating. c. Magnetic Particle Inspection.
27, Fig. 4-2	204-011-105-1	Trunion Assembly	a. Bake cycle after cadimium pliting. b. Magnetic Particle Inspection.
26, Fig. 4-2	204-011-108-3	Pillow Block	Hardness check.
19, Fig. 4-1	204-011-116-1	Nut	a. Bake cycle after cadimium plating. b. Maximum diameter (3.4477). c. Pitch diameter (3.4650). d. "No-Go" gage 3 turns maximum.
87, Fig. 4-1	204-011-120-7	Pitch Horn	Hardness check.
Fig. 4-1	204-011-121-5/113	Grip Assembly	Shotpeening.
25, Fig. 4-2	204-011-135-3	Bushing	a. Hardness check. b. Nitar Etch Inspection.
14, Fig 4-1	204-011-143-1	Barrel	a. Magnetic Particle Inspection. b. Minimum minor diameter of the 1 1/2-18 UNF thread (1.4913). c. Minimum minor diameter of the 1 1/2-12 UNF thread (1.4886). d. Bake cycle after cadimium plating.
4, Fig. 4-1	204-011-151-7	Bolt	a. Magnetic Particle Inspection. b. Bake cycle after cadimium plating. c. Nital Etch Inspection.
12, Fig. 4-1	204-011-179-1	Clevis	a. Hardness check. b. Bake cycle after cadimium plating. c. Maximum minor diameter of the 1 1/2-12 UNF-3B thread (1.4198).
11, Fig. 4-1	204-011-180-1	Fitting	a. Hardness check. b. Bake cycle after cadimium plating. c. Maximum minor diameter of the 1/2-8 UNF-3B thread (1.4480).
18, Fig. 4-1	204-010-526-1	Lock	Proper installation.
17, Fig. 4-1	204-011-149-1	Clamp	Proper installation.

Table 2-1. Flight Safety Parts (Continued).

Item No. Figure No.	Part Number	Nomenclature	Critical Characteristic
75, Fig. 4-1	204-012-102-5	Fitting Assembly	a. Hardness check. b. Bake cycle after cadmium plating.
70, Fig 4-1	204-012-103-1	Fitting	a. Hardness check. b. Bake cycle after cadmium plating.
77, Fig. 4-1	204-012-122-5 204–310–101–101	Strap Set	Preload of strap.
65, Fig 4-1	204-012-104-5	Pin	a. Nital Etch Inspection. b. Hardness check.

NOTE

Manufacturing critical characteristics such as hardness check, nital etch inspection, and pitch diameter need not be verified at overhaul unless discrepancy is suspected or directed to by DMWR.

CHAPTER 3
PRESHOP ANALYSIS

3-1. PURPOSE. The purpose of preshop analysis is to determine, prior to the beginning of depot maintenance and at the highest assembly level possible, the extent of repair, modification, or part replacement required to return the main rotor hub assembly to a completely serviceable condition, as specified herein, and to prepare estimates of work and parts required for performing the depot maintenance. If inspection at the highest level of assembly is precluded by missing, damaged, or diagnosed defective assemblies, consideration will be given to techniques that would allow continued inspection at that level. If this is not possible, inspection will proceed at the next lower level. A preshop analysis checklist will be used to record the results of the analysis and any required maintenance. All safety of flight and mandatory inspections and/or modifications will be accomplished.

3-2. INSPECTION OF FORMS. a. The contractor will physically check all tags and forms attached to the main rotor hub assembly to determine:

(1) Reason for removal from service. Record reason and any other helpful data on the preshop analysis checklist, table 3-1.

(2) Open items of work on delayed discrepancies, including any Time Compliance TMs, TBs, or MWOs not accomplished.

b. Unless otherwise prescribed, the following procedures will be adhered to in the event operating hour history of the component or its integral fatigue life parts is unknown.

(1) When the main rotor hub assembly (time change or retirement interval item) is received for overhaul, repair, or modification(s) and total hours since last overhaul or modification(s) or total operating time is not available, every effort shall be made to obtain this information from the shipping activity. In the event the time cannot be obtained, the contractor shall request instructions for USAAVSCOM, ATTN: AMSAV-MMD, 4300 Goodfellow Boulevard, St. Louis, Mo 63120-1798, telephone: (314) 263-1879 (AV 693-1879).

(2) If the main rotor hub assembly received for overhaul, repair or modification(s) contains integral finite fatigue life parts and total operating time of these parts is not available, the contractor shall request instructions from USAAVSCOM, ATTN: AMSAV-MMD, 4300 Goodfellow Boulevard, St. Louis, Mo 63120-1798, telephone: (314) 263-1879 (AV 693-1879).

3-3. CLEANING AND CORROSION TREATMENT. a. Detail methods to be used for cleaning and corrosion treatment of the main rotor hub assembly have been integrated, where applicable, in this Work Requirement.

b. Immediately after disassembled parts are cleaned and are not immediately processed, utmost care shall be exercised to prevent damage or deterioration, due to corrosion or decay. If inspection is delayed, apply temporary preservative (MIL-C-16173 Class II).

3-4. PRESHOP ANALYSIS. The following guidelines will be used to determine whether the hub assembly can be minor repaired or requires complete disassembly and overhaul.

NOTE: There should be two separately funded programs for conducting depot maintenance on hubs: one for accomplishing minor repair, one for complete disassembly and overhaul. Using the guidelines provided in this paragraph, preshop analysis will determine if the hub can be inducted and processed under the minor repair program. A hub inducted for minor repair will also receive convenience maintenance consistent with its most frequent service generated discrepancies and overall condition.

a. Disassemble main rotor hub assembly as required in order to perform a complete evaluation of the components or sub-assemblies to determine the repair, modification, and replacements required to return the main rotor hub assembly to a completely serviceable condition as specified in this Work Requirement.

b. All main rotor hub assemblies shall be modified as specified in table 3-2 unless otherwise specified within the contact.

c. Main rotor hub assemblies removed from stock for modification only shall be disassembled by the contractor only to the extent required to accomplish the modification(s).

d. If records or physical appearance of hub indicates the component has been subjected to an accident, or sudden stoppage, complete disassembly and overhaul are required.

e. Hub assemblies which meet the serviceability requirements of DMWR 55-1520-210 will be candidates for processing per the minor repair procedures of paragraph 3-5, rather than by complete disassembly and overhaul, when the total cost of processing a hub in this way reflects more operational efficiency than processing the same hub by complete disassembly and overhaul.

f. The results of preshop analysis will be recorded on a copy of the preshop analysis checklist, table 3-1.

3-5. MINOR REPAIR. Minor repair shall be accomplished or performed in accordance with Task 04-08-03 of DMWR 55-1520-210 (see table 3-1). Operational time since new or last overhaul will be indicated on DA Form 2410 and will not change after minor repair.

3-6. COMPLETE DISASSEMBLY AND OVERHAUL. All hubs inducted at depot shall be completely disassembled and overhauled in accordance with Chapter 4 except for hubs covered under paragraph 3-4, steps c or e. Hubs processed in accordance with Chapter 4 shall carry a zero time since overhaul designation. A corresponding entry shall be made in the hub log.

Table 3-1. Preshop Analysis Checklist

INSPECTION POINT	CONDITION	ACTION	REMARKS	DONE
GENERAL				
Hub Assembly	Reason for removal from service	Record:		
	Modification only	Paragraph 3-4c		
	Accident, sudden stoppage	Paragraph 3-4d		
	Meet serviceability standards	DMWR 55-1520-210; paragraph 3-4e, 3-5 of this DMWR		
MINOR REPAIR (Per Task 04-09-03 of DMWR 55-1520-210)				
Oil Seals and Sight Glasses	Deleted			
Grip	Nicks, scratches, sharp dents, scoring corrosion, pits, cracks, I.D. of blade retention bolt hole and drag brace bolt hole bushings worn beyond allowable limits, wear of protective paint on grip tangs	Visual, table 4-2		
Yoke	Scratches, dents, corrosion, cracks	Visual, table 4-2		
Blade Bolt	Nicks, scratches, bend, corrosion, cracks, wear of protective coating on body diameter	Visual, table 4-2		

Table 3-1. Preshop Analysis Checklist (Cont)

INSPECTION POINT	CONDITION	ACTION	REMARKS	DONE
Drag Brace Bolt	Scratches, bend, cracks, wear of protective coating on body diameter	Visual, table 4-2		
Trunnion	Nicks, scratches, dents, corrosion, pits, cracks	Visual, table 4-2		
Drag Brace	Scratches, dents, corrosion, pits cracks, ID of fitting clevis bolt hole or barrel OD worn beyond acceptable limits	Visual, table 4-2		
Pitch Horn	Nicks, scratches, sharp dents, deformation, corrosion, cracks, elongation of bolt holes	Visual, table 4-2		
Pillow Block	Nicks, scratches, sharp dents, corrosion, cracks	Visual, table 4-2		
Strap Fittings	Mechanical and corrosion damage, cracks	Visual, table 4-2		
Sight Glass and Reservoir Covers	Deleted			
Reservoir Plates	Deleted			
Grip Retainer Nut	Cracks, scratches	Visual, table 4-2		
Plate Assembly Hub Moment Spring	Corrosion, damage wear	Visual, table 4-2		

Table 3-2. Mandatory Modifications

Modification Description		Applicability						
		Hub Applied 204-012-101-					Maintenance	
Convert To	Requirements	5	19	31	137	139	Minor Repair	Complete Disassembly & Overhaul
1. Hub Assembly P/N 204-012-101-141	See Section VI of Chapter 4	X	X	X	X	X		X

CHAPTER 4

DETAIL WORK REQUIREMENTS

Section I General Requirements

4-1. SCOPE. This chapter contains specific overhaul instructions, including dismantling, disassembly, cleaning, repair and replacement, modification criteria, reassembly and testing of assemblies, final reassembly and run-in and test procedures.

4-1A. GENERAL DISASSEMBLY PROCEDURE.

a. Check and record gear pattern and backlash, when applicable.

b. Check and tag shims, when applicable.

c. Separate parts. Maintain bearing components (races, rollers, etc.) in matched sets.

d. Record and tag parts that are defective with reason for rejection. (Exclude parts which are normally replaced at every overhaul such as gaskets, preformed packing, etc.).

4-1B. GENERAL REPAIR, REPLACEMENT, AND/OR MODIFICATION CRITERIA. a. Repair or replace as applicable any parts which are not within tolerances or show evidence of failure by measurement or special inspection methods specified herein.

b. Replace all parts that have scratches or galls too deep to be repaired as specified herein.

c. Replace all seals such as gaskets, preformed packings, etc., with new serviceable items.

d. When specific tolerances and/or repairs are not specified herein, replace all gears having galls, scratches, or burrs which would cause binding.

e. Replace all defective bearings.

f. Welding shall not be accomplished on equipment in areas other than specified by this Work Requirement or authorized by USAAVSCOM.

4-1C. GENERAL REASSEMBLY PROCEDURE. General precautions shall be adhered to during reassembly to insure that all internal parts have been properly installed and necessary tolerance checks performed.

4-1D. LUBRICATION. Lubricate parts during reassembly as required using lubricants specified in this Work Requirement.

4-1E. STAMPING AND/OR REPLACEMENT OF DATA PLATE. When applicable to provide a convenient record of overhaul or modification and operating time that will at all times accompany equipment, stamping shall be done as follows:

a. The stamping of equipment data plates shall include initials of the facility performing the overhaul or modification, date of overhaul or modifications, and part number. Total operating time since new shall be included if applicable. The data shall be stamped on the data plate using letters and figures 1/8 inch high, placed in the area adjacent to the manufacturer's data. In the event overhaul or modification has exceeded stamping spaces on the data plate, the plate shall be replaced and all pertinent data will be transferred to the new plate.

CAUTION: Stamping directly on the surface, or installed data plate of any assembly or item of equipment is prohibited.

b. If required, locally manufacture replacement data plate of any standard thickness up to and including 0.032 inch (Item 1, Table 8-1) one inch wide by two inches long. Stamped data plate shall be attached with adhesive, (Item 2, Table 8-1).

NOTE: Surfaces to be bonded must be thoroughly cleaned with solvent, (Item 3, Table 8-1).

4-2. ILLUSTRATED PARTS BREAKDOWN. This illustrated parts breakdown is composed of a group assembly parts list and illustrations (figure 4-1 and 4-2) in exploded form to provide complete identification for all parts comprising the main rotor hub assemblies 204-012-101-5, -19, -31, -137, -139 and -141. The group assembly breakdown lists all parts in their sequence of disassembly and parts are indexed and shown on the illustration.

4-3. USABLE ON CODE. Part number applicability to main rotor hub assemblies is indicated by a letter or symbol on the Usable on Code Column. When no symbol is shown, the part is used on all main rotor hub assemblies listed in the corresponding parts list.

CODE	PART NUMBER
A	204-012-101-137
B	204-012-101-5
C	204-012-101-19
D	204-012-101-31
E	204-012-101-139
F	204-012-101-141

4-4. VENDORS CODE. The following vendors code, with the vendors name and address, is used in the Description Column to indicate vendors parts.

CODE	MANUFACTURER
32033	Johns Mansville Sales Corporation New York 16, N.Y.
70270	Alemite Division Steward Warner Corporation Chicago 14, Illinois
72962	Elastic Stop Nut Corporation of America Union, N.J., or equivalent
83324	Rosan, Inc. Newport Beach, California
86579	Precision Rubber Products Corporation Dayton, Ohio
97820	W.S. Shamban and Company Culver City, California

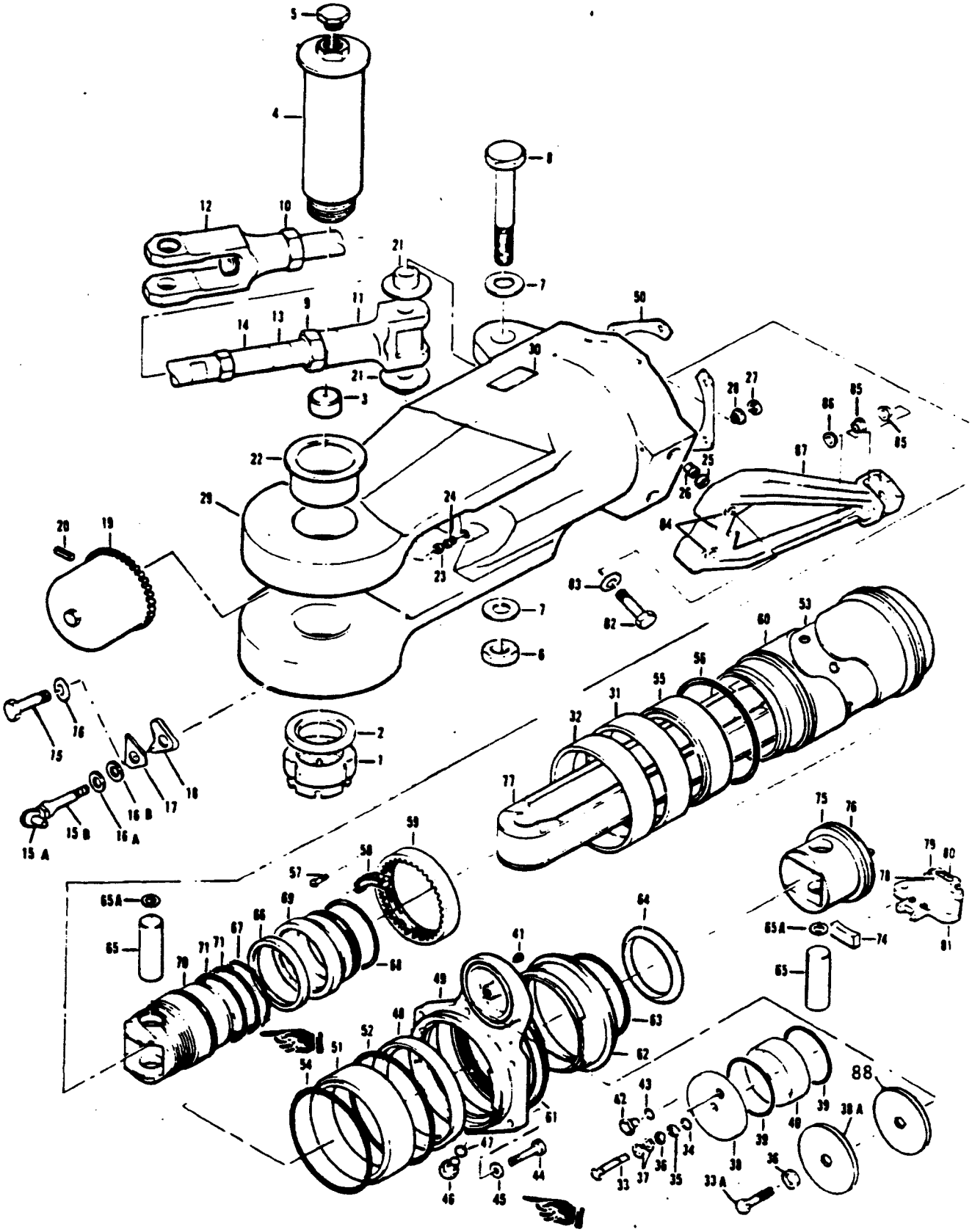


Figure 4-1. Main Rotor Hub-Outboard Section

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USEABLE ON A	B	C	D	E	F
4-1	204-012-101-137	HUB ASSY	Ref	A					
	204-012-101-5	HUB ASSY	Ref		B				
	204-012-101-19	HUB ASSY	Ref			C			
	204-012-101-31	HUB ASSY	Ref				D		
	204-012-101-139	HUB ASSY	Ref					E	
	204-012-101-141	HUB ASSY	Ref						F
-1	204-011-153-1	. NUT	2						
-2	204-011-152-1	. WASHER	2						
-3	Deleted								
-4	204-011-151-1	.. BOLT	2						
-5	AN814-10L	. PLUG	2						
-6	MS21245L14	. NUT	2						
-7	AN960-1416	. WASHER	4						
-8	204-011-166-3	. BOLT	2						
-9	204-011-144-1	.. NUT	2						
-10	204-011-144-3	.. NUT	4						
-11	204-011-180-1	.. FITTING	2						
-12	204-011-179-1	.. CLEVIS	2						
-13	204-011-146-3	... DECAL	1						
-14	204-011-143-1	... BARREL	1						
-15	AN4H7A	. BOLT	2	A	B	C	D		
-15A	MS15001-4	. GREASE FITTING	2					E	F
-15B	204-612-001-101	. BOLT (NAS624-8 Modified, Fig 4-13D)	2					E	F
-16	AN960-416	. WASHER	2	A	B	C	D		
-16A	MS20002C4	. WASHER	2					E	F
-16B	AN960-416L	. WASHER	2					E	F
-17	204-011-149-1	. CLAMP	2						
-18	204-010-526-1	. LOCK	2						
-19	204-011-116-1	. NUT	2						
-20	204-011-158-3	. KEY	2						
-21	NAS6606H27	.. BUSHING	2						
-22	204-010-413-29	.. BUSHING	2						
-23	RL28SB8	.. LOCKRING (83324)	1						
-24	RD206SB8	.. INSERT (83324)	1						
-25	RL38SB9	.. LOCKRING (83324)	2						
-26	RD208SB8	.. INSERST (83324)	2						
-27	RL33SB9	.. LOCKRING (83324)	6						
-29	RAD207SB9	.. INSERT (83324)	6						
-29	204-011-121-5	.. GRIP ASSY	1	A	B	C	D		
	204-011-121-113	.. GRIP ASSY	1					E	F
-30	100-024-1	.. PLATE IDENT	1						
-31	204-011-129-1	.. LINER	1						
-32	204-011-130-1	.. LINER	1						
-33	AN4H15A	. BOLT	2	A	B	C	D		
-33A	AN4H-5A	. BOLT	2					E	F
-34	MS29561-010	. PACKING, Preformed	2	A	B	C	D		
	M83248-1-010	. PACKING, Preformed	2	A	B	C	D		
-35	AN960PD416	. WASHER	2	A	B	C	D		
-36	AN960-416L	. WASHER	2	A	B	C	D		

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USEABLE ON A	B	C	D	E	F
4-1									
-37	MS35338-44	. WASHER	4	A	B	C	D		
-38	204-010-507-1	. COVER	2	A	B	C	D		
-38A	204-012-127-101	. DISC	2					E	F
-39	MS29561-234	. PACKING, Preformed	4	A	B	C	D		
	M83248-1-234	. PACKING, Preformed	4						
-40	204-010-506-1	. SIGHT GLASS	2	A	B	C	D		
-41	47200	. FITTING RELIEF (95879)	2						
-42	MS24391D6L	. PLUG	2	A	B	C	D		
-43	NAS617-6	. PACKING, Preformed	2	A	B	C	D		
	M83248-1-014	. PACKING, Preformed	2						
-44	AN5H10A	. BOLT	12						
-45	AN960PD516	. WASHER	12						
-46	MS24391D5L	. PLUG	2						
-47	NAS617-5	. PACKING, Preformed	2						
	M83248-1-013	. PACKING, Preformed	2						
-48	204-011-126-1	.. RING	1						
-49	204--11-125-5	.. PLATE	1						
-50	204-011-162-1	. SHIM	8						
-51	204-011-111-1	. BEARING	2						
-52	MS29561-258	. PACKING, Preformed	2						
	M83248-1-258	. PACKING, Preformed	2						
-53	204-011-160-1	. SPACER	2						
-54	160-1487	. PACKING, Preformed (86579)	2		B	D			
	M83248-1-160	. PACKING, Preformed	2	A			D	E	F
-55	204-011-112-1	. BEARING	2						
-56	159-1487	. PACKING, Preformed (86579)	2		B	C			
	M83248-1-159	. PACKING, Preformed	2	A			D	E	F
-57	AN503-8-10	. SCREW	4						
-58	204-012-113-3	. LOCKPLATE	2						
-59	204-012-106-1	. NUT	2						
-60	204-011-159-1	. SPACER	2						
-61	204-011-131-5	. SEAL	2						
-62	204-012-116-1	. Radius Ring	2		B				F
	204-012-116-3	. Radius Ring	2	A		C	D	E	
-63	MS29561-248	. PACKING, Preformed	2		B	C			
	M83248-1-248	. PACKING, Preformed	2	A			D	E	F
-64	204-011-123-1	. RING	2						
-65	204-012-104-5	. PIN	4						
-65A	AN960PD816L	. WASHER	4						
-66	S32979-341G99	. PACKING, Preformed	2						
-67	MS29561-341	. PACKING, Preformed Repl by S32979-341G99	2		B	C			
	M83248-1-341	. PACKING, Preformed Repl by S32979-341G99	2				D		
-68	MS29561-238	. PACKING, Preformed	2		B	C			
	M83248-1-238	. PACKING, Preformed	2	A			D	E	F
-69	204-012-107-1	. SEAL SLEEVE	2						
-70	204-012-103-1	. FITTING	2						

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON A	B	C	D	E	F
4-1									
-71	MS29561-237	. PACKING, Preformed	4		B	C			
	M83248-1-237	. PACKING, Preformed	4	A			D	E	F
-74	204-012-108–1	. . STOP	2						
-75	204-012-102-5	. FITTING	2						
-76	MS29561-240	. PACKING, Preformed	2		B	C			
	M83248-1-240	. PACKING, Preformed	2	A			D	E	F
-77	204-012-122-5	. STRAP SET	2						
	204–310–101–101	. CONNECTING LINK, RIGID (Alternate)	2						
		NOTE Use similar part number sets							
-77A	204-012-105–1	. STOP ASSEMBLY	2		B	C	D	E	
-78	MS16562-199	. . PIN	1		B	C	D	E	
-79	204-012-110–1	. . BOLT	1		B	C	D	E	
-80	204-012-109–1	. . WORM, GEAR	1		B	C	D	E	
-81	204-012-105–5	. . STOP	1		B	C	D	E	
-82	NAS6606H27	. BOLT	4						
-83	AN960-616	. WASHER	4						
-84	204-010-170–5	. . BUSHING	2						
-85	204-010-170–7	. . BUSHING	2						
-86	204-010-170–9	. . BUSHING	1						
-87	204-011-120-5	. . PITCH HORN	1						
-88	GRHB2	. . GASKET	2						

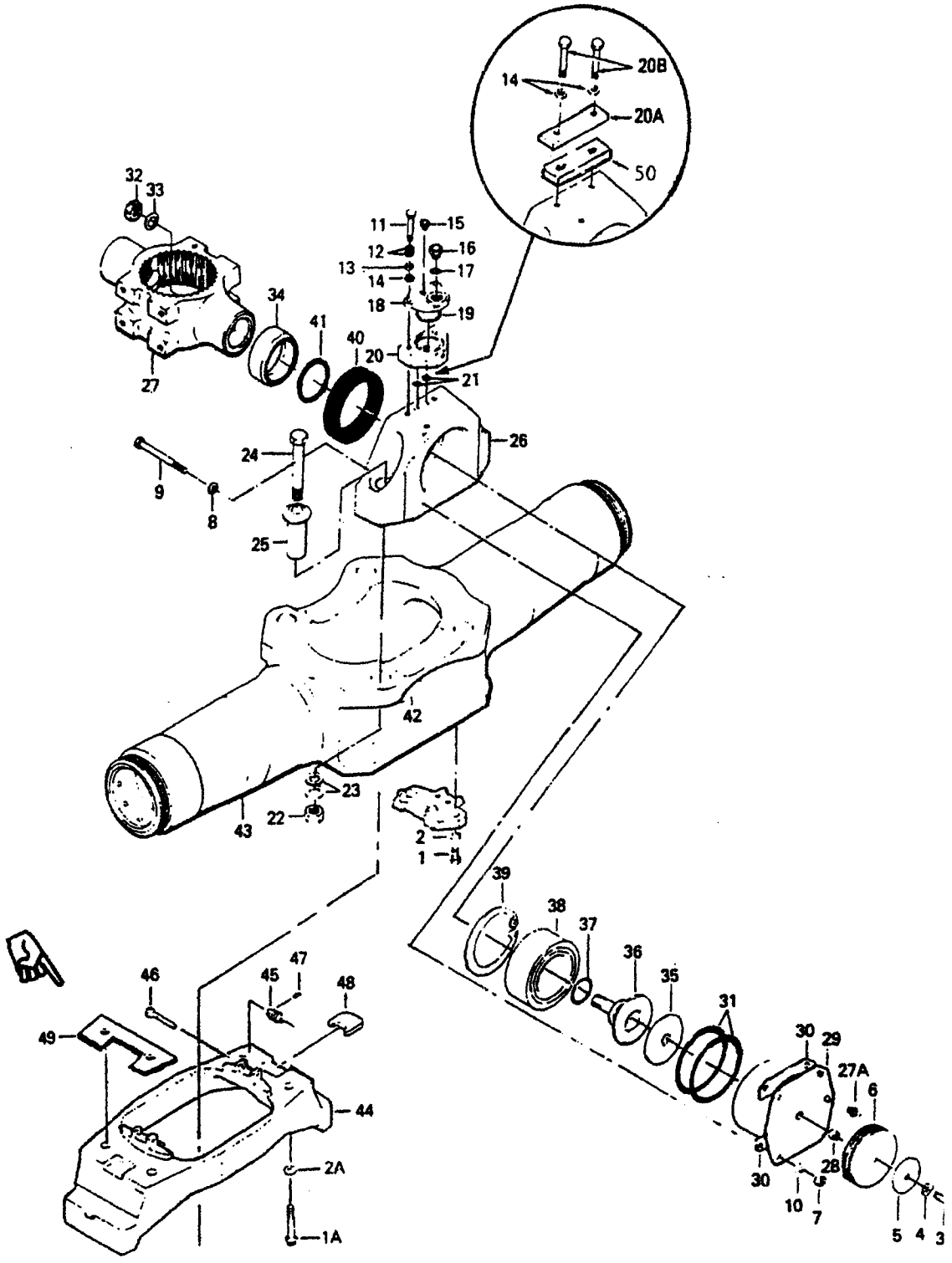


Figure 4-2. Main Rotor Hub - Inboard Section.

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USEABLE ON A	B	C	D	E	F
4-2	204-012-101-137	HUB ASSEMBLY	Ref	A					
	204-012-101-5	HUB ASSEMBLY	Ref		B				
	204-012-101-19	HUB ASSEMBLY	Ref			C			
	204-012-101-31	HUB ASSEMBLY	Ref				D		
	204-012-101-139	HUB ASSEMBLY	Ref					E	
	204-012-101-141	HUB ASSEMBLY	Ref						F
-1	AN6H6A	.BOLT	4		B	C	D	E	
-1A	MS21250H06006	.BOLT	4	A					F
-2	AN960PD616	.WASHER	4		B	C	D	E	
		ONE OF THE FOLLOWING LISTED BOLTS, AN6-5A THRU AN6-13A OF THE REQUIRED LENGTH MUST BE SELECTED FOR ATTACHMENT OF WASHERS TO OBTAIN CHORD-WISE BALANCE							
-2A	140-007-25S20A4	.WASHER	4	A					F
-3	AN6H5	.BOLT	1						
-3	AN6-6A	.BOLT							
-3	AN6H7	.BOLT							
-3	AH6H10	.BOLT							
-3	AH6H11	.BOLT							
-3	AH6H12	.BOLT							
-3	AH6H13	.BOLT							
-4	AN960-616	.WASHER	1						
-5	MS63040-6	.WASHER	16						
-6	204-011-150-1	.WEIGHT	16						
-7	MS21042L5	.NUT	8						
-8	AN960PD516	.WASHER	8						
-9	AN5H31	.BOLT	8						
-10	AN960-516L	.WASHER	8						
-11	AN4H15A	.BOLT	4	A	B	C	D		
-12	MS 35338-44	.WASHER	8	A	B	C	D		
-13	AN960-416L	.WASHER	4	A	B	C	D		
-14	AN960-PD416	.WASHER	4						
-15	47200 (MS35670-2)	.FITTING, Relief (95879)	2	A	B	C	D		
-16	AN814-5DL	PLUG	2	A	B	C	D		
-17	NAS617-5	.PACKING, Preformed	2		B	C			
	M83248-1-013	.PACKING, Preformed	2	A			D		
-18	204-010-529-1	.COVER	2	A	B	C	D		
-19	MS29561-220	.PACKING, Preformed	2		B	C			
	M83248-1-220	.PACKING, Preformed	2		B	C			
-20	204-010-191-1	.RESERVOIR	2	A	B	C	D		
-20A	204-012-129-101	.PLATE	2					E	F
-20B	AN4H3A	.BOLT	4					E	F
-21	MS29561-011	.PACKING, Preformed	4		B	C			
	M83248-1-011	.PACKING, Preformed	4	A			D		
-22	EB080	.NUT (72962)	4		B	C		E	

FIG. & INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USEABLE ON A	B	C	D	E	F
4-2									
	NAS1758L8	. NUT	4	A					F
-23	AN960-816	. WASHER	4		B	C	D	E	
	140-007-33S28-3	WASHER	4	A					F
-24	204-011-1713	. BOLT	4		B	C	D	E	
	NAS1785-8-44	. BOLT	4	A					F
	MS14181-08044	. BOLT	1						F
-25	204-011-135-3	. BUSHING	4						
-26	204-011-108-3	. BLOCK, PILLOW	2						
-27	204-011-105-1	. TRUNNION ASSY	1						
	204-011-122-1	. LINER ASSY	2	A	B	C	D		
-27A	NAS516-1A	.. FITTING-GREASE	1					E	F
-28	3591-6CNX3/8	.. INSERT (91767)	1						
-29	204-011-122-5	.. LINER ASSY	1					E	F
-30	204-011-147-1	. SHIM	8						
-31	MS29561-240	. PACKING, Preformed	4		B	C			
	M83248-1-240	. PACKING, Preformed	4	A			D	E	F
-32	MS21245-L8	. NUT	2						
-33	AN 960C816	. WASHER	2						
-34	204-011-148-1	. RING, Radius	2						
-35	204-011-133-1	. WASHER, Thrust	2						
-36	204-011-134-1	. LOCK	2						
-37	MS29561-218	. PACKING, Preformed	2		B	C			
	M83248-1-218	. PACKING, Preformed	2				D	E	F
-38	204-011-110-3	. BEARING	2						
-39	MS16625-134-6	. RING	2						
-40	204-011-132-1	. SEAL	2						
-41	035-1487	. PACKING, Preformed (86579)	2		B	C			
	M83248-1-035	. PACKING, Preformed	2	A			D	E	F
-42	AN7510-1 (100-024-1)	. PLATE	1						
-43	204-011-102-17	. YOKE ASSY	1						
-44	204-011-207-101	. PLATE ASSY	1	A					F
-45	204-012-109-001	. GEAR, WORM	2	A					F
-46	204-012-110-1	. BOLT	2	A					F
-47	MS171462	. PIN, SPRING	2	A					F
-48	204-011-211-101	. KEY	2	A					F
-49	204-011-213-101	. SHIM	2	A					F
-50	GRHB-1	. GASKET	2						

Section II Dismantling (NA)

Section III Disassembly

4-5. DISASSEMBLY. Disassemble the main rotor hub as described in paragraph 4-6 and illustrated in Figure 4-3. Disassembly of one side only is outlined, the opposite side is disassembled in the same manner.

NOTE

Before starting disassembly procedure of hub, refer to Chapter 6 paragraph 6-3 for removal of hub assembly from container.

4-6. PROCEDURE.

a. Position adapter plate T101421 on build-up bench T101356 with flat surface of plate down.

b. Place main rotor hub on build-up bench and install main rotor hub grip positioning links T101402 (2).

c. Deleted.

c1. Remove bolts (18), plate assy (23), shims (23A), and stop (59).

d. Deleted.

e. Remove nut (10), washer (11) and retention bolt (12) from grip (29). Remove plug (94) in retention bolt (12) allowing removal of balance weights.

f. Cut lockwire and remove bolt (13), washer (14), clamp (15), and lock (16) from grip (29).

(1) Suggest using tool SWE12627 for removal of (17).

g. Cut lockwire, remove bolts (27), washer and pitch horn (28) from grip (29).

(Suggest replacing bolts (27) with longer bolts, adapting locally fabricated puller support plate and using Standard Puller for removal of pitch horn (28).

h. Remove key (19) and pin (20).

CAUTION

If radius ring (P/N 204-012-116-3) is installed, grip is free to slip from yoke.

i. Rotate grips, remove nut (2) and washer (3) from bottom of drag brace bolt (4). (This nut has 125 to 150 foot-pounds torque). Pull bolt (4) and washer (3). Remove drag brace assembly (5, 6, 7, 8 and 9).

j. Back off nut (5), nut (6), remove fitting (7), clevis (8), nut (6) from barrel (9).

k. Remove fitting (21) and packings (22) from outboard end of strap (26).

(Suggest using acorn nut (17) for attaching to fitting (21) for removal).

NOTE

Refer to Chapter 11 for pin (20), outboard fitting (21), inboard fitting (24) and strap (26) retirement.

1. Press grip (29) assembly inboard and rotate approximately ninety degrees counter-clockwise to release grip from radius ring (55). Pull grip (29) from yoke (64) spindle.

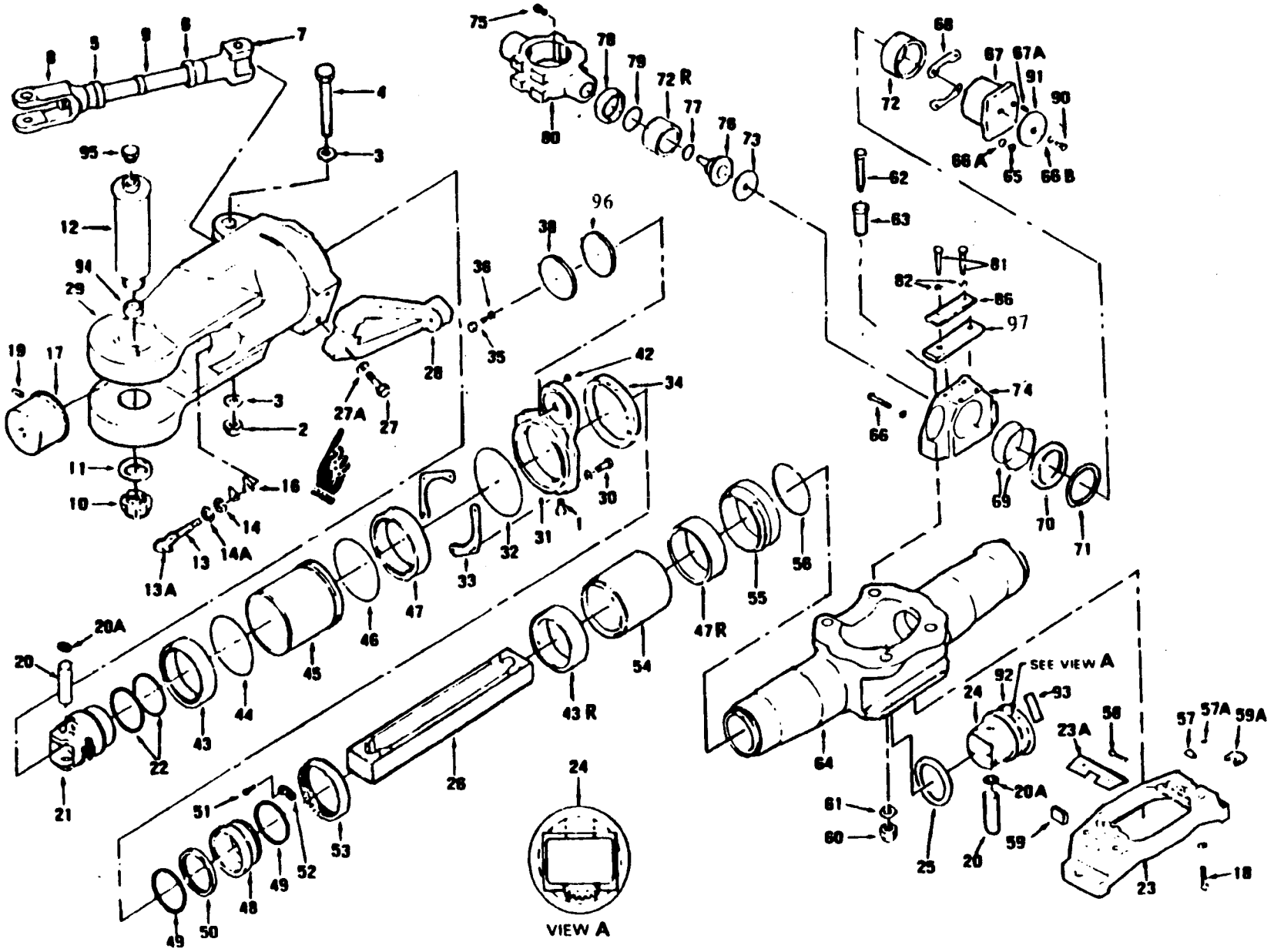


Figure 4 3 Main Rotor Head - Disassembled View

1. Drain Plug
2. Nut
3. Washer
4. Bolt
5. Nut
6. Nut
7. Fitting
8. Clevis
9. Barrel
10. Nut
11. Washer
12. Blade Bolt
13. Bolt
13A. Fitting-Grease
14. Washer
14A. Washer
15. Clamp
16. Lock
17. Nut
18. Bolt
19. Key
20. Pin
20A. Washer
21. Fitting Outboard
22. Packing Preformed
23. Plate Assy
23A. Shim
24. Fitting Inboard
25. Back-Up Ring
26. Strap Set
27. Bolt
27A. Washer
28. Horn
29. Grip
30. Bolt
31. Plate
32. Packing, Preformed
33. Shim
34. Seal
35. Bolt
36. Washer
37. Deleted
38. Cover-Disc
39. Deleted
40. Deleted
41. Deleted
42. Fitting Relief
43. Bearing Outer
43R. Inner Race
44. Packing Preformed
45. Spacer Outer
46. Packing Preformed
47. Bearing Inner
47R. Inner Race
48. Seal Sleeve
49. Packing Preformed
50. Channel Seal
51. Screw
52. Lockplate
53. Nut
54. Spacer Inner
55. Shield Assy
56. Packing Preformed
57. Worm Gear
57A. Pin
58. Bolt
59. Stop 59A. Key
60. Nut
61. Washer
62. Bolt
63. Bushing
64. Yoke
65. Nut
66. Bolt
67. Liner
67A. Fitting Grease
68. Shim
69. Packing Preformed
70. Seal
71. Lock Ring
72. Bearing
72R. Inner Race
73. Thrust Washer
74. Pillow Block
75. Nut
76. Lock
77. Packing Preformed
78. Radius Ring
79. Packing Preformed
80. Trunnion
81. Bolt
82. Washers
83. Deleted
84. Deleted
85. Deleted
86. Plate
87. Deleted
88. Deleted
89. Deleted
90. Bolt
91. Weight
92. Packing Preformed
93. Plate
94.
95. Plug
96. Gasket
97. Gasket

Figure 4-3. Main rotor head disassembled view (Sheet 2 of 2)

m. Cut lockwire, remove bolts (30), washers and plate assembly (31) from inboard end of grip (29). Remove packing (32), shims (33), and seal (34) from plate (31).

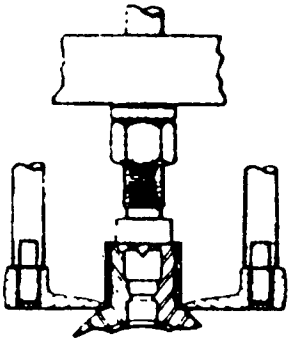
n. Position bearing removal plate T101405 in outboard end of grip and press bearing (43), spacer (45) and bearing (47) from grip (29). Refer to figure 4-4 for tool usage. Remove packings (44) and packing (46) from each end of spacer (45).

NOTE: Bearing (43) and inner race (43R) are a matched set. Bearing (47) and inner race (47R) are a matched set. Each bearing must be reinstalled with the inner race from which it is removed.

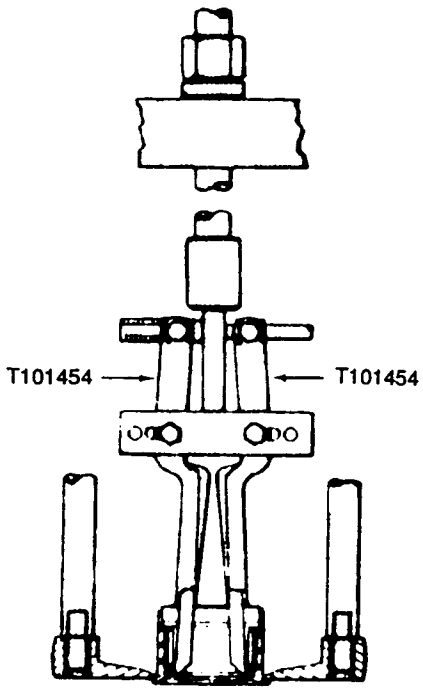
o. Pull seal sleeve (48) with packings (49) and seal (50) from end of yoke spindle. Separate seal sleeve.

p. Cut lockwire and remove screws (51) and lockplate (52) from yoke spindle.

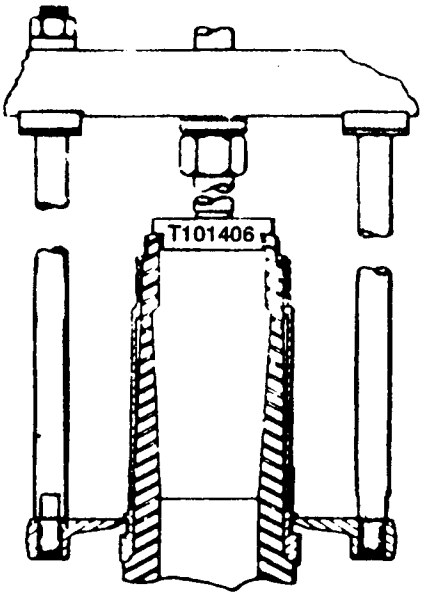
q. Use wrench adapter 67SPL-12757-0114 (See Figure 4-4A) and remove nut (53).



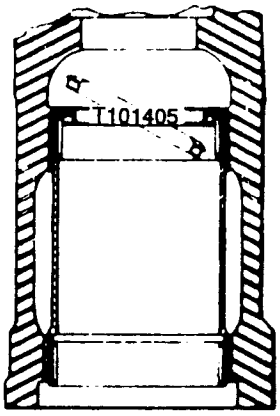
Removal of ring and bearing inner race from trunnion



Removal of pillow block bearing outer race from liner



Removal of radius ring, bearing inner races and inner spacer from yoke



Removal of bearing outer races and outer spacer from grip

Figure 4-4. Tool usage - disassembly

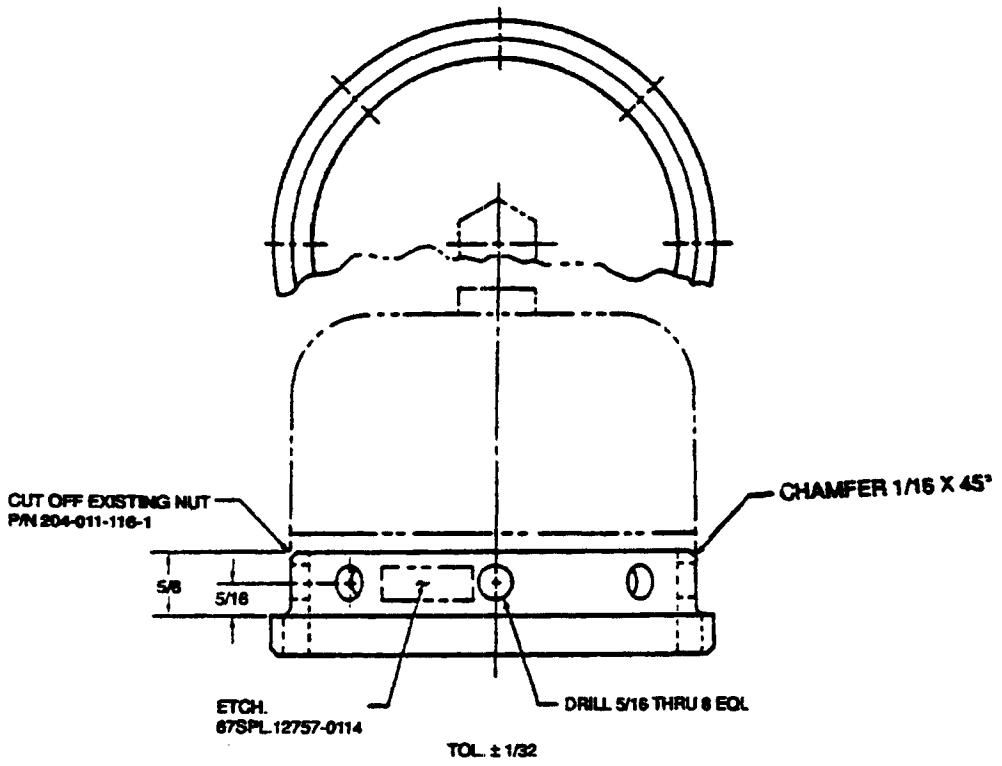


Figure 4-4A. Wrench Adapter.

r. Remove inner bearing race (43R), spacer (54), inner bearing race (47R), shield assy (55) and packing (56) from yoke (64). Normally this can be accomplished with the aid of a tool made from an unserviceable plate assembly (31) and a rubber or leather mallet.

NOTE

If the bearings, spacer or radius ring cannot be removed in this manner, accomplish steps y through acat this time and use T101406 standard puller (figure 4-4) for removal.

s. Remove nuts (60), washers (61), and bolts (62). (4 each).

NOTE

Bolts (62) shall be discarded and demilitarized after removal. This pertains to bolt NAS 1785-8-44 only. Bolt, (P/N MS14181-08044) may be reused if within inspection limits.

t. Free pillow blocks by tapping with rubber mallet. Lift pillow blocks and trunnion from yoke (64). Use a nonmetallic drift, tap bushings (63) from yoke (64).

u. Remove bolt (90), washer and weights (91) from liner (67).

v. Remove nuts (65), washers and bolts (66) from liner (67). Remove liner (67) and shims (68) from pillow block (74). Remove packing (69) from pillow block (74) and remove seal (70), lockring (71) and bearing (72) from liner (67). Use T1011457 puller jams (figure 4-4) to pull bearing (72) from liner (67). Remove thrust washer (73).

w. Remove nut (75) and washer. Pull lock (76) and packing (77) from trunnion spindle.

NOTE

Nut (75) has a torque of 100 to 140 inch-pounds.

x. Separate packing (77) from lock (76). Use standard puller and remove radius ring (78), packing (79) and bearing race (72R) from trunnion (80) spindle.
(Keep bearing with its proper race).

y. Remove hub assembly from buildup bench.
(Place yoke upside down on bench).

z. Deleted.

aa. Using a long drift placed in the end of strap letting it come in contact with inboard fitting lip, (Not on the pin). Tap lightly with mallet, driving until inboard fitting (24) is centered in yoke.

ab. Slide backup ring (25) outboard to clear pin (20). Remove pin (20) from fitting. Remove fitting (24) and backup ring from center of yoke. Pull strap (26) outboard through grip (29).

ac. Remove pressed in plate (93) from inboard fitting (24).

NOTE

Record total time on side of straps with indelible ink pen. Vibro-etch total time on strap fittings. Vibro-etch serial number and dash number of part number (i.e. P/N-1 or P/N-5) on grips.

SECTION IV. Cleaning

4-7. CLEANING. Clean all parts which are to be reused in main rotor hub assemblies as follows:

WARNING

Cleaning operation shall be performed in areas with adequate ventilation and no open flames, high temperatures or winds.

Clean parts using solvent (item 3, table 8-1), DS 108 (item 39, table 8-1), Positron (item 41, table 8-1) or Electron item 42, table 8-1). To facilitate drying, rinse with Isopropyl alcohol (item 40, table 8-1). Or dry with air circulation at 125 degress F for five minutes minimum.

a. Paint Removal. Chemically strip painted parts using remover (item 45, table 8-1).

WARNING

Avoid prolonged or repeated breathing of solvent vapors.

b. Dry parts with filtered, compressed air, do not allow bearings to rotate while drying.

NOTE

Compressed air must be clean, free from oil, dirt, foreign matter and must be dry.

4-8. SPECIAL INSPECTION.

a. If upon receipt of accompanying records and/or physical appearance of component indicates the component has been subjected to an accident or incident outside the realm of normal usage, the following evaluation criteria should be accomplished to disposition the component. Should the component meet the requirements, proceed with normal overhaul, including magnetic particle or fluorescent penetrant methods in accordance with table 12-1. Any variation from required dimension is cause for rejection of the part.

b. Evaluation criteria established for main rotor hub assembly.

(1) Carefully inspect all components visually for any apparent damage or abnormal appearance.

NOTE

Refer to Chapter 11 for retirement of other components not covered in 4-8b.

INSPECTION POINT: Inspect or witness and verify all dimensions and surface checks (all steps in paragraph 4-8).

(2) Dimensionally check for indications of permanent deformation or damage to:

(a) Grip assembly, P/N 204-011-121 (figure 4-5).

1. Inspect pitch horn bolt hole counterbores for elongation. Reject grip if TIR exceeds 0.0050 inch.

$$\frac{4.502}{4.506}$$

2. Check 4.506 dimension between surfaces M1 and M2.

NOTE: Dimension 4.502/4.506 may change as a result of shot peening surfaces M1 and M2. Warpage limits due to peening is .010 above 4.506 and 010 below 4.502 measured at centerline of holes. Maximum acceptable dimension between surfaces M1 and M2 is 4.492/4.516.

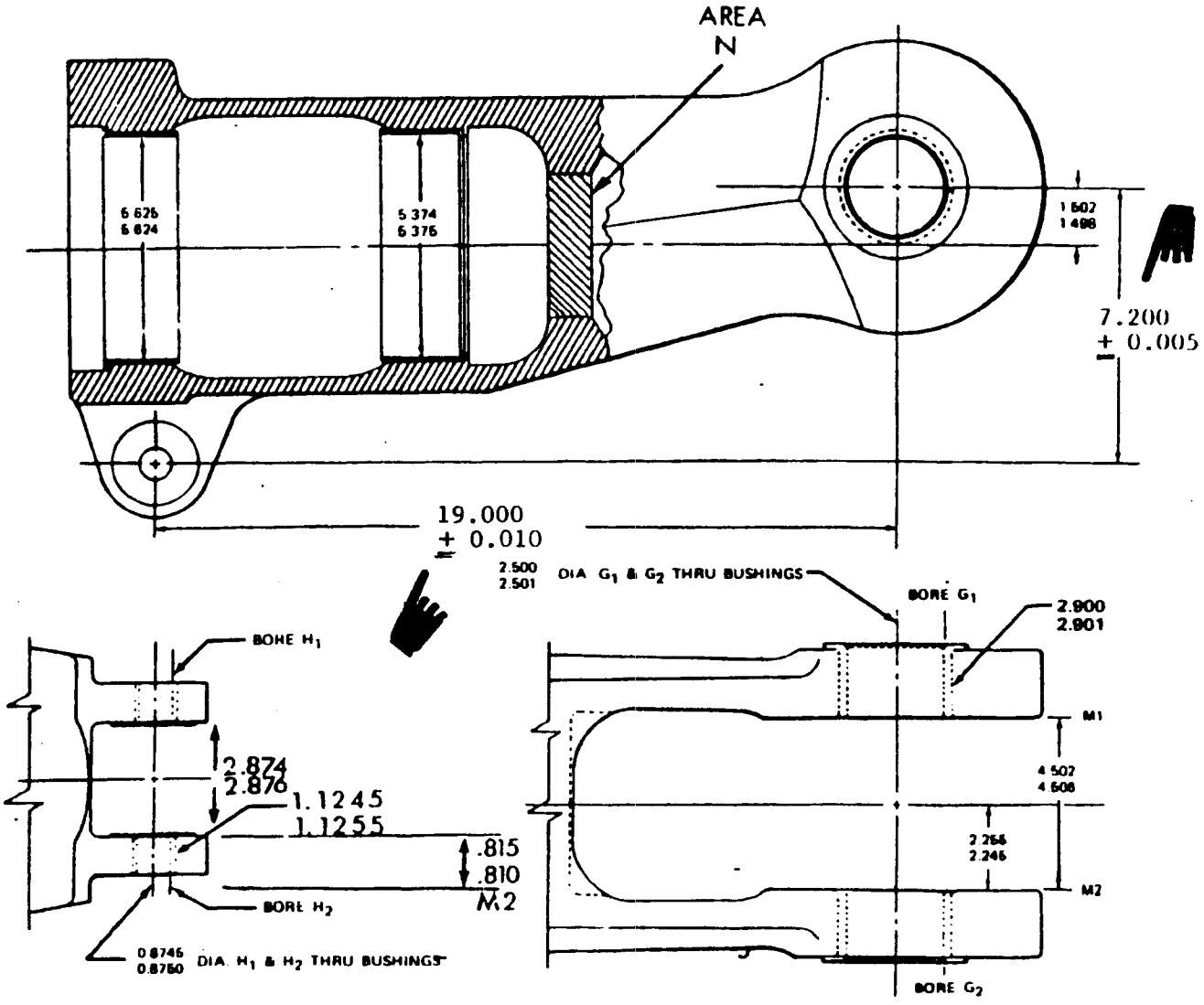


Figure 4-5. Grip assembly - special inspection

3. If egging (elongation) of diameter of G1 and G2 exceeds 0.0015 inch, remove bushing and check egging of hole in grip. Egging of the hole in the grip in excess of 0.0015 inch, is cause for grip rejection.

4. If egging (elongation) of diameter of H1 and H2 exceeds 0.0015 inch, remove bushing and check egging of hole in grip. Egging of the hole in the grip in excess of 0.0015 inch is cause for grip rejection.

NOTE: Bushing looseness is cause for grip rejection. Pulled, loose, or missing, pitch horn attachment locking and insert is cause for grip rejection.

(b) Yoke assembly, Part Number 204-011-102 (Figure 4-6).

1. Diameters "K" must be parallel with "E" center lines within 0.0002 inch/inch.

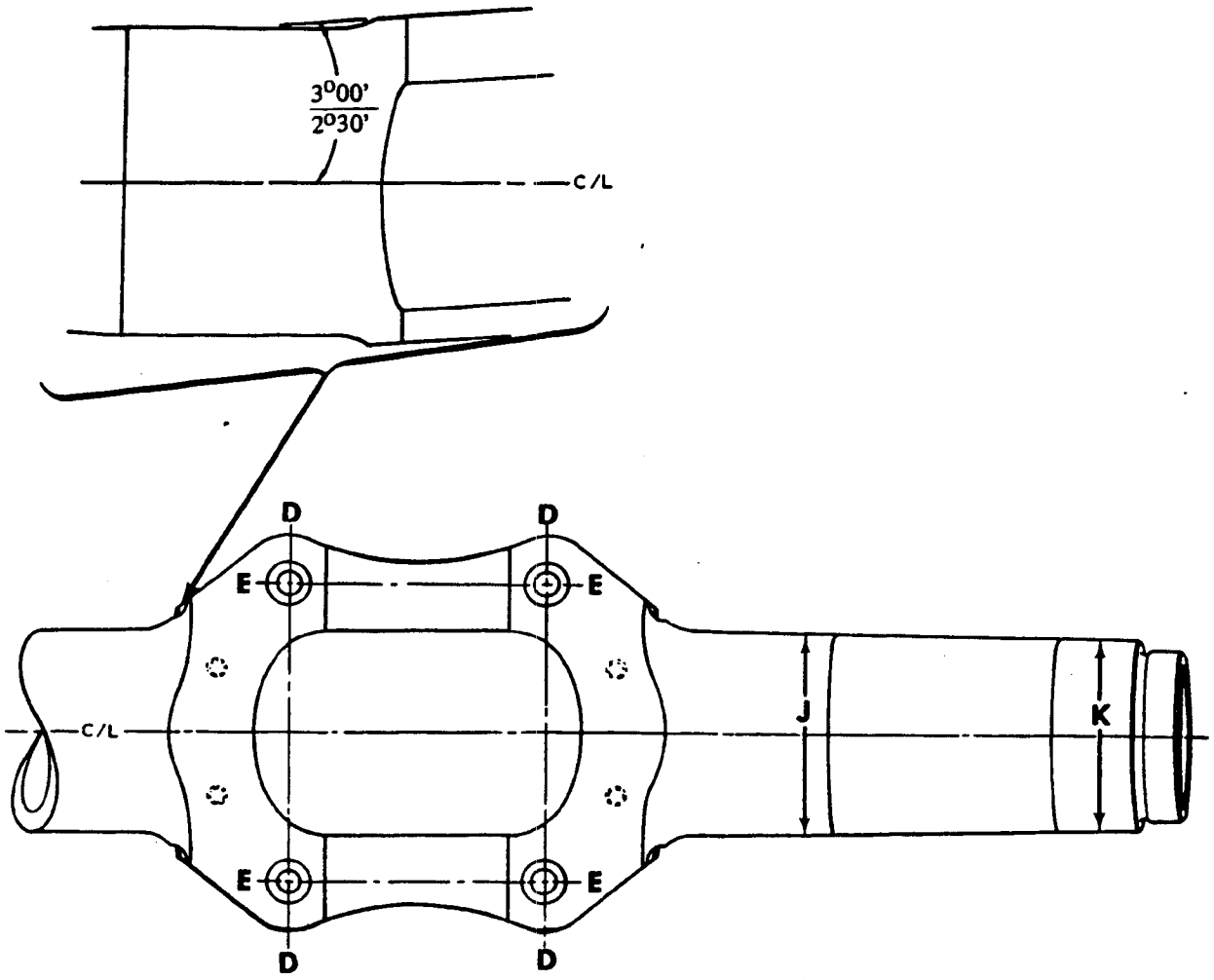


Figure 4-6. Yoke assembly –special inspection

2. Precone angles to be 3°00'/2°30' and equal within 0°5'.

3. Egging of bushing holes, in yoke, in excess of 0.0010 is not acceptable. Repair per para. 4-23.c.

(c) Pitch horn assy. P/N 204-011-120-5 (See figure 4-6A).

1. Check $\frac{.3743}{.3748}$ dimension at A.

2. Check $\frac{.688}{.690}$ dimension at B.

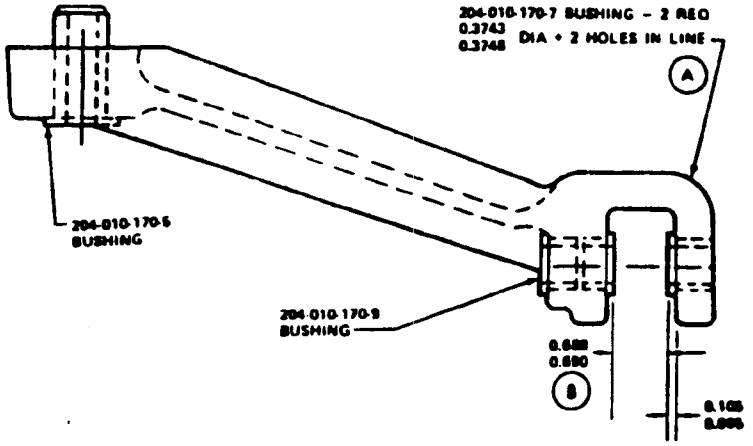


Figure 4-6A. Pitch horn assembly—main rotor

(d) Main retention bolt, part No. 204-011-151 (figure 4-7).

1. Full length of diameter $\frac{2.4992}{2.4999}$ to be concentric within 0.002/inch T.I.R. to diameter $\frac{3.211}{3.210}$.

(e) Main rotor trunnion, part No. 204-011-105 (figure 4-8). Check concentricity of diameter "D" with diameter "B". Must be concentric within 0.003 T.I.R.

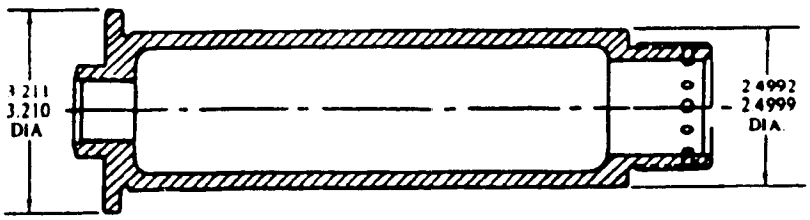


Figure 4-7. Main retention bolt—special inspection

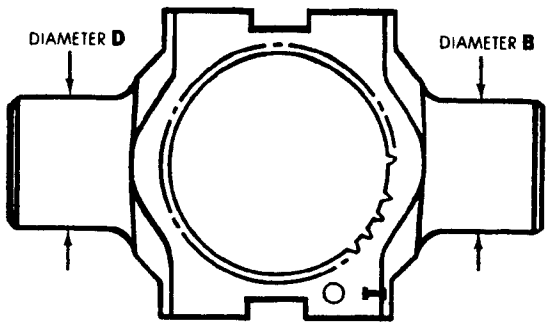


Figure 4-8. Main rotor trunnion special inpection

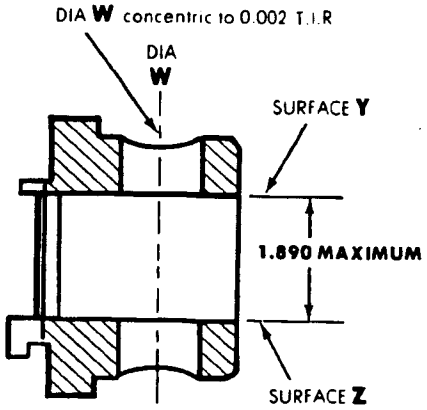
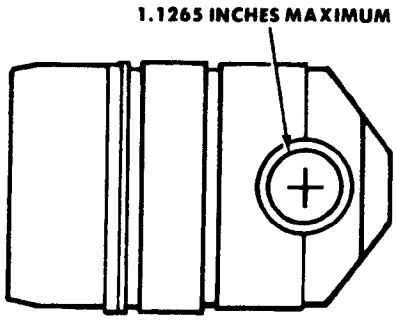


Figure 4-9. Strap fitting (inboard) - special inspection



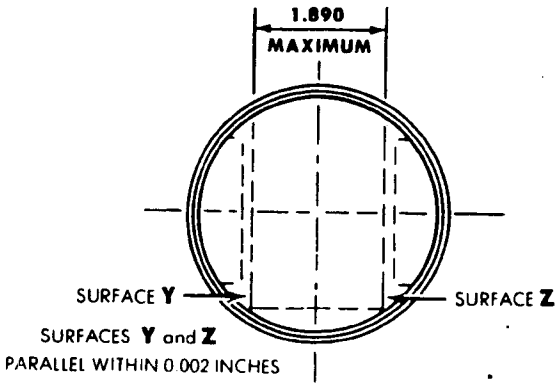


Figure 4-10 Strap fitting (outboard) - special inspection

DEPOT MAINTENANCE WORK REQUIREMENT FOR
MAIN ROTOR HUB

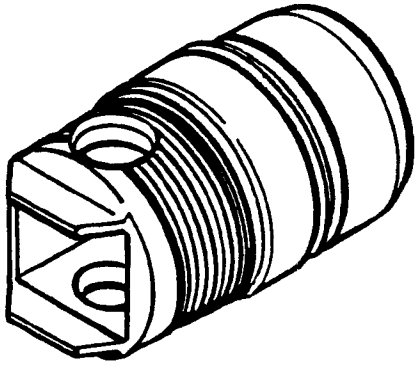


Figure 4-10A. Main Rotor Hub (sheet 1 of 2)

TYPE OF DAMAGE	MAXIMUM DEPTHS AND REPAIRS ALLOWED
NICK, SCRATCHES AND CORROSION	0.005 IN BEFORE AND AFTER REPAIR
MAXIMUM AREA PER FULL DEPTH REPAIR	0.5 SQ. IN.
NUMBER OF REPAIRS	ONE INSIDE ONE OUTSIDE
EDGE CHAMFER	0.020 IN
THREAD DAMAGE DEPTH LENGTH NUMBER	 ONE-QUARTER OF THREAD ONE HALF INCH ONE
STRAP PIN HOLE MIN REPAIR RADIUS	0.0005 FOR 1/4 CIRCUMFERENCE 0.25
CRACKS: HOLES DIAMETER FINISH FOR ATTACHING PIN	NONE ALLOWED 1.1271 DIAMETER BEFORE CADMIUM PLATE 1.1265 DIAMETER AFTER CADMIUM PLATE

RESTRICTIONS:

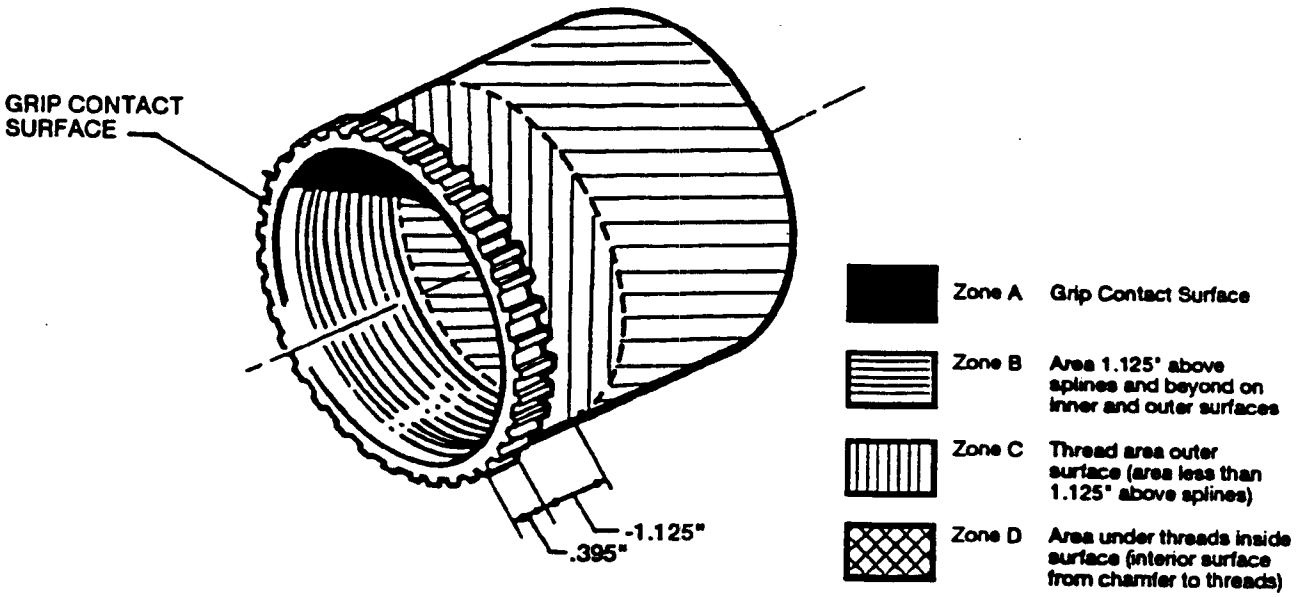
1. NO SHARP SCRATCHES, NICKS OR CORROSION PITS WILL REMAIN AFTER REWORK.
2. GLASS BEADING MAY BE USED TO REMOVE SUPERFICIAL CORROSION AND CORROSION PRODUCT AFTER ANY REQUIRED NONDESTRUCTIVE INSPECTION.
3. O-RING GROOVES SHALL HAVE A CONTINUOUS SEALING SURFACE.

APPLICATION:

1. ALL NICKS, SCRATCHES AND CORROSION PITS SHALL BE POLISHED LOCALLY WITH CROCUS CLOTH/FINE EMERY CLOTH/FINE INDIA STONE TO SMOOTH AND BLEND DAMAGE REMOVING MINIMUM AMOUNT OF MATERIAL.

Figure 4-10A. Main Rotor Hub (Sheet 2 of 2)

STANDARD REPAIR CRITERIA FOR NUT



TYPE OF DAMAGE	DAMAGE AREA MAXIMUM DEPTHS AND REPAIR AREAS AFTER REPAIR		
	SPLINES	HEX NUT	SURFACE
MECHANICAL DAMAGE DENTS, SCRATCHES	.020 IN.	MUST FIT INSTALLATION TOOL	0.01IN.
CORROSION PITTING:	.020IN.	NOT CRITICAL	NOTE 6
MAXIMUM AREA PER FULL DEPTH REPAIR:	.16SQ. IN.	NOT CRITICAL	NOTE 7
NUMBER OF REPAIRS:	1/SPLINE 3 SPLINES	NOT CRITICAL	NOTE 3
EDGE CHAMFER:	.030 IN.	.030 IN.	.030 IN.
CRACKS ---------- NONE ALLOWED ----------			

Figure 4-10B. Nut — Main Rotor Retention Strap (Sheet 1 of 2)

CR204-0054 STANDARD REPAIR CRITERIA FOR NUT

TYPE OF DAMAGE

THREAD DAMAGE

DEPTH: ONE THIRD OF THREAD
LENGTH: ONE HALF INCH
NUMBER: TWO PER SEGMENT

NOTE:

1. FOR MECHANICAL DAMAGE, NICKS AND SCRATCHES: SMOOTH EDGES OF NICKS USING FINE INDIA STONE. REWORKED AREAS USING BRUSH CADMIUM PLATING PER BPS 4312 OR PARAGRAPH 4-14i (1) (a). OMIT FINISH ON THREAD DAMAGE.

2. FOR SUPERFICIAL CORROSION NOT EXCEEDING 10% OF THE SURFACE AREA, REMOVE CORROSION USING CROCUS CLOTH OR FINE EMERY CLOTH. REFINISH USING BRUSH CADMIUM PLATING PER BPS 4312 OR PARAGRAPH 4-14i (1) (a).

3. FOR SUPERFICIAL CORROSION EXCEEDING 10% OF THE SURFACE AREA. REMOVE CORROSION USING GLASS BEADS PER BPS 4343 (AFTER REQUIRED NDT). CADMIUM PLATE PER BPS 4006 OR PARAGRAPH 4-14i (l) (c) 1.

4. CORROSION POTS WILL BE REWORKED WITH FINE ROTARY STONE/FINE INDIA STONE/FINE EMERY CLOTH TO SMOOTH AND BLEND PIT REMOVING MINIMUM MATERIAL.

5. NO SHARP SCRATCHES, NICKS, DENTS OR CORROSION POTS SHALL REMAIN AFTER REWORK.

6. (a) RESURFACING UP TO .005" IS PERMISSABLE ON GRIP CONTACT SURFACE; HOWEVER, SQUARENESS MUST BE MAINTAINED.

   (b) CORROSION PITTING 1.125" ABOVE SPLINES AND BEYOND ON INNER AND OUTER SURFACE NOT CRITICAL BUT MUST BE REMOVED. MAXIMUM DEPTH SHOULD NOT EXCEED .030 IN.

   (c) CORROSION PITTING THREAD AREA (LESS THAN 1.125" ABOVE SPLINES) OUTSIDE SURFACE MAXIMUM DEPTH NO GREATER THAN .010 IN. CORROSION PITTING UNDER THREADS INSIDE SURFACE MAXIMUM DEPTH .010 IN.

7. MAXIMUM AREA PER FULL DEPTH REPAIR:

   (a) .25 SQ. IN. IN THREAD AREA (LESS THAN 1.125" ABOVE SPLINES) OUTER SURFACE.

   (b) .25 SQ. IN. IN AREA UNDER THREADS INSIDE SURFACE.

   (c) NOT CRITICAL IN AREA 1.125" ABOVE THREADS AND BEYOND ON INSIDE AND OUTSIDE SURFACES.

Figure 4-10B. Nut Main Rotor Retention Strap Sheet (2 of 2).

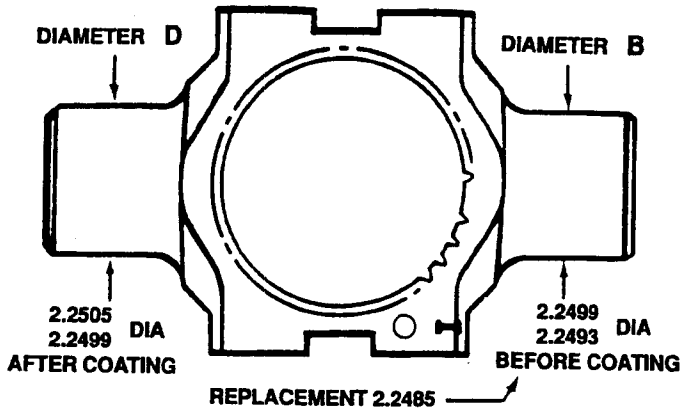


Figure 4-11. Limits Chart — Main Rotor Trunnion

(1) Strap fitting, part No. 204-012-102 (figure 4-9) and part No. 204-012-103 (figure 4-10).

1. Surface "Y" and "Z" parallel within 0.002 inch.

2. Maximum elongation of pin holes is .0005 inch. Maximum diameter is 1.1265 inches.

3. Dimension between surfaces "Y" and "Z" to be 1.890 maximum.

NOTE: Components not conforming to the above requirements should be replaced.

(g) Deleted.

(h) Deleted.

4-9. INSPECTION. a. Arrange all detail parts of the main rotor hub in inspection area in sequence of disassembly. Inspect bearings for smoothness. Inspect yoke spindle and trunnion spindle for scratches and damage. If any part shows indications of excessive wear, or is not within tolerance, check mating part for abnormal wear. (Refer to figures 4-11 and 4-12.)

b. During inspection, keep a record of the wear condition of all parts. Tag parts which must be replaced as unfit for further service.

NOTE: Yoke spindles retention bolts and trunnion spindles have a dri-lube elec film which must be removed prior to magnetic inspection. The shot-peened area will leave an excess amount of magnetic particles at inspection. Replace dri-lube film (item 4, table 8-1) after inspection.

NOTE: Quality Control personnel will ensure that the inspections set forth in table 4-2 have been performed correctly and that the assemblies conform to all requirements established in Section IV and Section V.

c. Deleted.

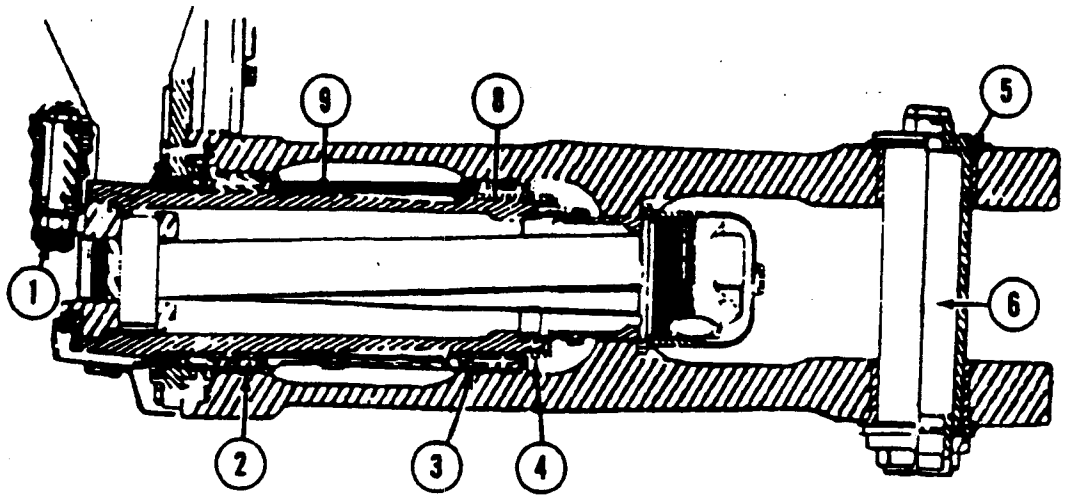
d. Deleted.

e. Refer to table 4-1 for NDT procedures and classification of typical defects found in inspection of the main rotor hub and to table 4-2 for a listing of detail inspection items.

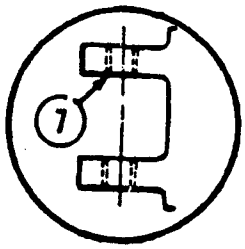
4-10. PROCEDURE: MAGNETIC PARTICLE INSPECTION. (See figure 4-13.) Each part shall be inspected by all the following steps using the wet continuous method conforming to table 12-1. The length of any indications may be determined by residual method of magnetization.

a. Deleted.

b. Deleted.



ROTOR HUB



ITEM	NOMENCLATURE		MIN.	MAX	REPLACE
1	Nut (Torque)		77	79 ft/lb	
2	Liner	ID	5.624	5.625	5.631
3	Liner	ID	5.374	5.375	5.381
4	Nut (Torque)			170 ft/lbs	
5	Bushing	ID	2.501	2.502	2.504
6	Bolt (Blade Retaining)	OD	2.992	2.4999*	2.4982
7	Bushing (Drag Brace)	ID	0.8745	0.8750	0.876
8	Spindle (Yoke)	OD	4.5000	4.5013*	4.495**
9	Spindle (Yoke)	OD	4.7500	4.7513*	4.745**

* Coated
** Before applying solid lubricant

Figure 4-12. Limits chart — main rotor grip

c. Deleted.

INSPECTION POINT Inspector verify demagnetization of parts.

WARNING

FLIGHT SAFETY PART

Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.

4-11. ACCEPTANCE CRITERIA MAIN ROTOR HUB YOKE (See figure 4-13.) a. Indications interpreted as cracks, seams, laps, shuts, or bursts are cause for rejection regardless of size or location.

b. Indications of stringers or non-metallic inclusions will be acceptable provided they are within all the following limits:

(1) Indication of defects forming an angle greater than 10 degrees to direction of longitudinal axis are cause for rejection.

(2) Indication of defects parallel to longitudinal axis within 10 degrees are acceptable when the length does not exceed the following:

(a) Region A 1/2 inch

(b) Region B 11/8 inch

(c) Region C no limit

(3) Total length of an inclusion extending from one region into another shall not exceed the total length allowed in either region.

(4) All areas of yoke, except region A and B shall be treated as region C.

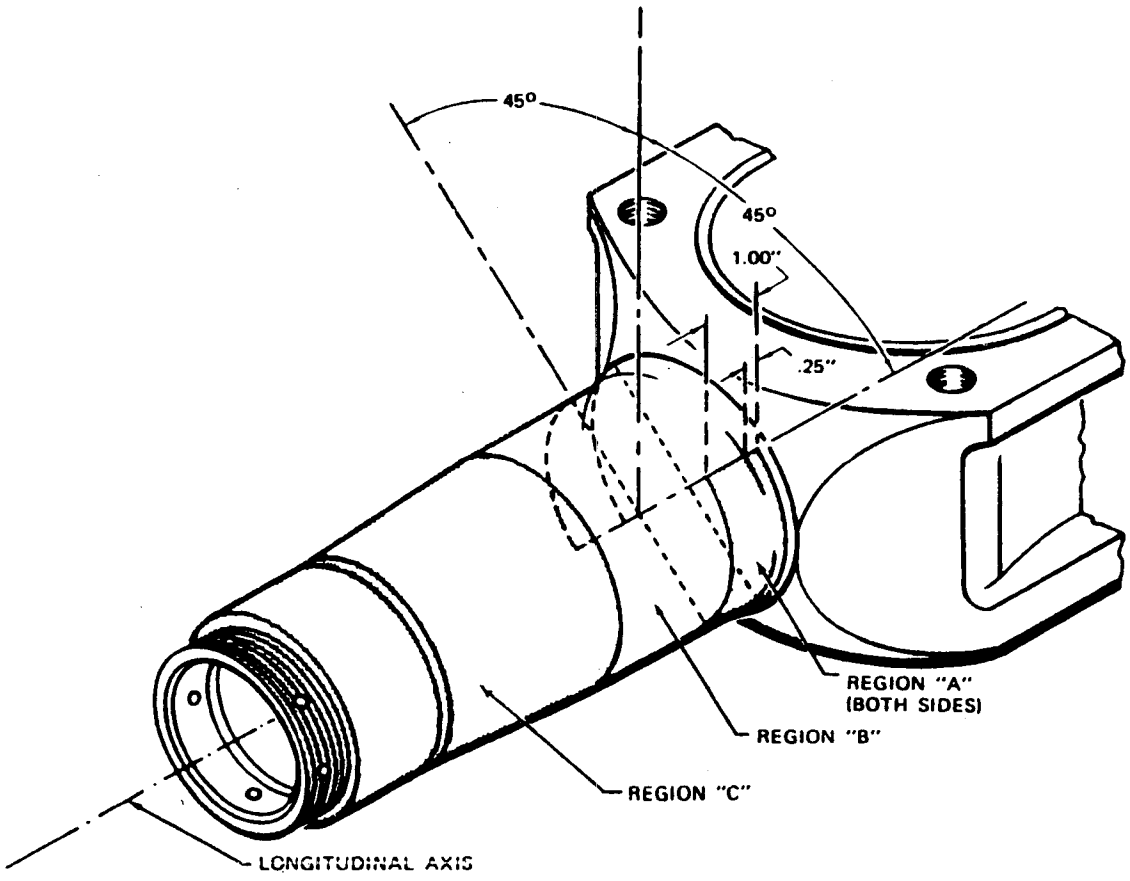


Figure 4-13. Magnetic inspection main rotor yoke (typical)

4-12. INSPECTION REQUIREMENTS OF STRAP (item 26, figure 4-3). a. Visually inspect for broken wires protruding through the urethane cover at the corners. A maximum of 50 loose ends is permissible at each of the corners (400 total).

b. Inspect strap for bulging of the cross section. Bulges within 4 inches of the ends are normal; however, bulges outside these areas may not exceed 0.06 inch above the normal straight contour.

c. Cracks in the urethane coating are acceptable provided the wires are not visible.

d. Delamination of the urethane coating from the bushings in the area of the urethane wedges is acceptable. However, displacement of the bushings from their normal position is cause for rejection. Note: Exposure of wire in delaminated area is acceptable.

e. A permanent twist is acceptable.

f. Strap stiffness may vary from strap to strap when flexed in an unloaded condition. This is not a valid inspection to determine strap condition and therefore is no cause for rejection.

g. Oil contamination resulting in swelling/severe deterioration of the urethane coating is cause for rejection. If oil has come in contact with the strap but no swelling/deterioration is evident, the strap shall be cleaned with P-D-680 and continued in service.

h. Inspect bushings for cracks using a 10 power glass. No cracks are permitted

i. Inspect bushings for fretting corrosion. A maximum of 0.005 inch in depth for 25 percent of total area is allowed on bushing flange surfaces. A maximum of 0.002 inch in depth is allowed for 25 percent of the total bushing bore surfaces.

4-12.1. PILLOW BLOCK (74, Figure 4-3). Inspect pillow block in accordance with figure 4-13da.

Table 4-1. NDT Procedures and Classification of Defects

Magnetic Particle Inspection

Magnetic inspection compound (item 44, table 8-1) maybe used as a temporary preservative prior to and after magnetic particle inspection. The following parts shall be inspected with the wet fluorescent process using the continuous method of magnetization in accordance with MIL-I-1949. Inspect all surfaces. No cracks allowed.

ITEM #, Fig 4-3	NOMENCLATURE	SHOT
4	BOLT	Coil shot, lay part flat in coil, make one (1) shot at 6500 amp turns and inspect bolt.
5	NUT	Use a 3/4" central conductor, make one (1) shot at 400 amps and inspect O.D. and I.D.
6	NUT	Same as Nut #5.

Table 4- l. NDT Procedures and Classification of Defects (Cont)

Item #, Fig. 4-3	NOMENCLATURE	SHOT
	Magnetic Particle Inspection (Cont)	
	WARNING **FLIGHT SAFETY PART** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
7	FITTING	Use a 3/4" central conductor, make one (1) shot at 500 amps and inspect part. Coil shot, lay part flat in coil, make one (1) shot at 10,000 amp turns and inspect. Rotate part 90° for second shot and inspect part.
	WARNING **FLIGHT SAFETY PART** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
8	CLEVIS	Use a 3/4" central conductor, through clevis bolt end, make one (1) shot at 500 amps and inspect clevis. Remove and place conductor through barrel hole and make one (1) shot at 500 amps and inspect O.D. and I.D.
	WARNING **FLIGHT SAFETY PART** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
9	BARREL	Use a 3/4" central conductor, make one (1) shot at 500 amps and inspect barrel. Coil shot, lay part flat in coil, make one (1) shot at 4000 amp turns and inspect part.
10	NUT	Use a 3/4" central conductor, make one (1) shot at 300 amps and inspect part.
11	WASHER	Use a 1" central conductor, make one (1) shot at 2500 amps and inspect washer.

Table 4- l. NDT Procedures and Classification of Defects (Cont)

Item #, Fig. 4-3	NOMENCLATURE	SHOT
	Magnetic Particle Inspection (Cont)	
	WARNING **FLIGHT SAFETY PART** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
12	BOLT ASSEMBLY	Use a 3/4" central conductor, make one (1) shot at 1500 amps and inspect O.D. and I.D. of blade bolt. Coil shot, lay part flat in coil, make one (1) shot at 8500 amp turns and inspect O.D. and I.D.
17	NUT	Coil shot, lay part in coil with spending down, make two shots at 15,000 amp turns, rotate part 90° between shots.
20	PIN	Coil shot, lay part flat in coil, make one (1) shot at 17,500 amp turns and inspect part.
21	OUTBOARD FITTING	Use a 1" central conductor through pin holes make one (1) shot at 400 amps and inspect part. Make second series of shots through T-T strap hole, make two shots (180° apart) at 1500 amps. Coil shot, lay part flat in coil, make one (1) shot at 15,000 amp turns.
24	INBOARD FITTING	Use a 1" central conductor through pin holes make one (1) shot at 500 amps and inspect part. Make second series of shots through T-T strap hole, make two shots (180° apart) at 3000 amps.
27	BOLT	Coil shot, lay flat in coil make one (1) shot at 4000 amp turns, remove and inspect bolt.
53	NUT	Use a 2" central conductor, make one (1) shot at 1000 amps and inspect O.D. and I.D.
62	DELETED	

Table 4-1. NDT Procedures and Classification of Defects (Cont)

Magnetic Particle Inspection (Cont)		
ITEM #, Fig 4-3	NOMENCLATURE	SHOT
63	BUSHING	Use a 1/2" central conductor, make one (1) shot at 500 amps and inspect part. Coil shot, lay flat in coil, make one (1) shot at 12,500 amp turns, remove and inspect.
	WARNING **FLIGHT SAFETY PARTS** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
64	YOKE	Use a 2" central conductor, 48" long, make one (1) shot at 2000 amps and inspect shaft portion. Make two shots (180° apart) at 4000 amps, and inspect mount attachments. Coil shot, close to inside of coil, make one shot at 7500 amp turns to inspect the mount attachments. Make two shots at 16,000 amp turns over each of the shaft ends, inspect shaft portions.
78	RADIUS RING	Use a 1" central conductor, make one (1) shot at 1500 amps and inspect part.
	WARNING **FLIGHT SAFETY PARTS** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.	
80	TRUNNION	Use a 3/8" central conductor, make one (1) shot at 1500 amps and inspect shaft portion. Remove and use a 2" central conductor, make one (1) shot at 1500 amps and inspect O.D. and I.D. of part.

Penetrant Inspection

The following parts are to be inspected with fluorescent penetrant inspection in accordance with MIL-I-6866B using a penetrant of a sensitivity equal to MIL-I-25135 group VI. Parts requiring fluorescent penetrant inspection shall be cleaned prior to inspection using DS-108 (item 39, table 8-1), positron (item 41, table 8-1) or electron (item 42, table 8-1) to remove surface contamination. To facilitate drying, rinse with isopropyl alcohol (item 40, table 8-1) or dry with air circulation at 125 degrees F to 135 degrees F for five minutes minimum. Parts must be visibly dry prior to applying penetrant. Inspect all surfaces. No cracks allowed.

28 PITCH HORN

29 GRIP

Table 4-1. NDT Procedures and Classification of Defects (Cont)

Penetrant Inspection (Cont)	
EM #, Fig. 4-3	NOMENCLATURE
31	PLATE ASSEMBLY
38	COVER
62	BOLT (P/N MS14181-08044)
74	PILLOW BLOCK

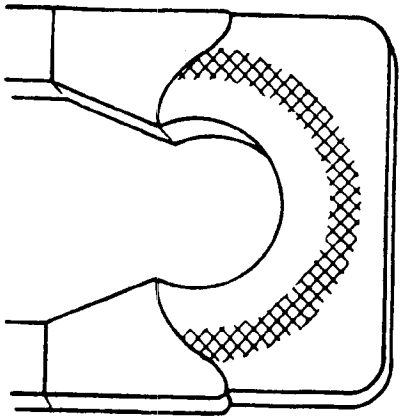
MAJOR DEFECTS

1. Cracks, breaks, dents, scratches, corrosion or distortion which cannot be repaired within limits.
2. Wear beyond specified limits.
3. Crossed or stripped threads.
4. Surfaces not square or parallel within limitations.

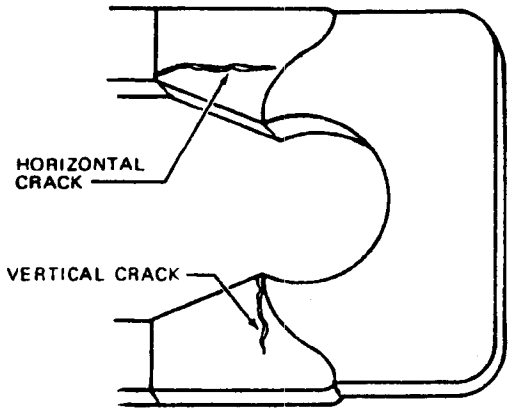
   Surfaces out-of-round or tapered beyond limitations.
6. Overheating, fatigue, false brinelling, or defective parts of bearing assemblies.

MINOR DEFECTS

1. Nicks, dents, scratches, or corrosion correctable within limits.
2. Surface defects or roughness correctable within limits.
3. Small scratches, pits, or dents on bearing assemblies within limits.



VIEW **A**



VIEW **B**

Figure 4-13A. Strap assembly

MAXIMUM ALLOWABLE DAMAGE - MAIN ROTOR GRIPS

AREA	DEPTH (IN.)	LENGTH (IN.)	
A (Barrel)	0.060	3.5	
B (Outside surfaces of blade tangs and drag brace tangs)		GRIP	DRAG BRACE
a. Inboard of bolt hole	0.060	3.4	0.5
b. Between bolt hole and edge of tang	0.060	1.2	0.4
c. Between inside and outside tang surface	0.060	0.5	0.5
C (Inside surfaces of blade tangs and drag brace tangs)			
a. Inboard of bolt hole	0.020	3.4	0.5
b. Between bolt hole and edge of tang	0.020	1.2	0.4
D (Inner surfaces of bushings - circumference)	0.010	1.9	0.6

NOTE: If rework limits for Area D are exceeded, replace bushing in accordance with paragraph 4-16a.

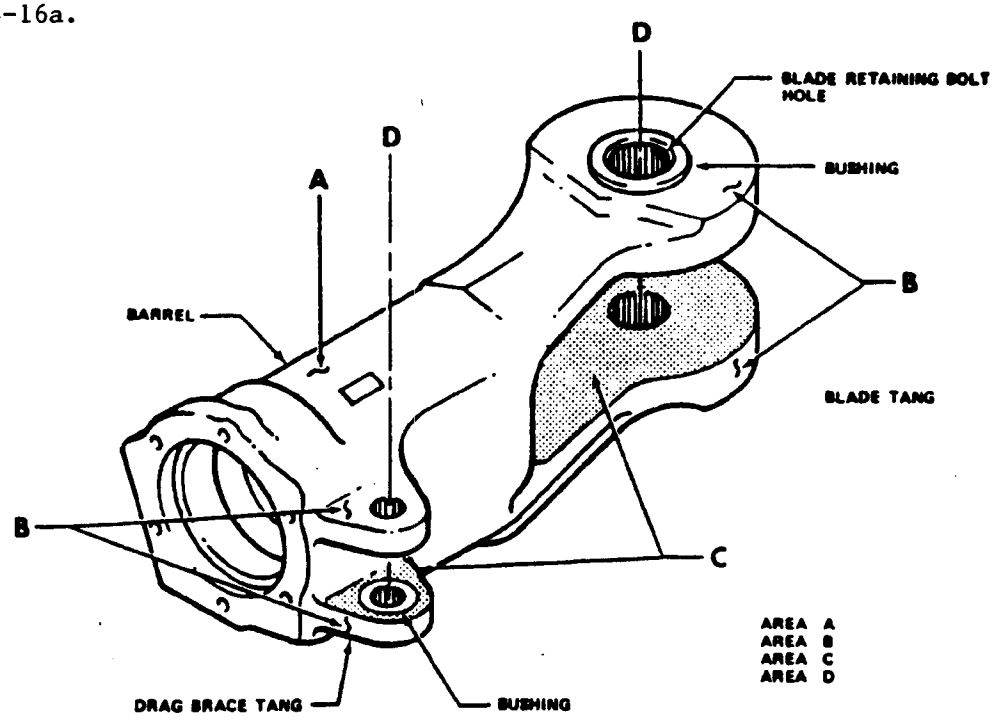
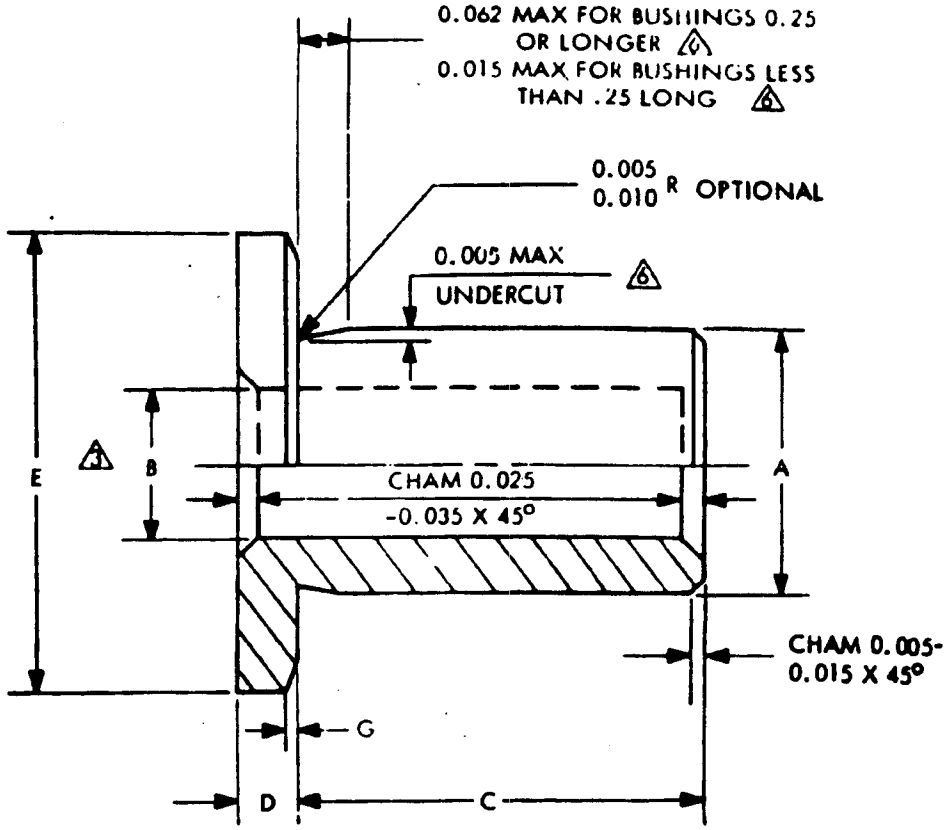


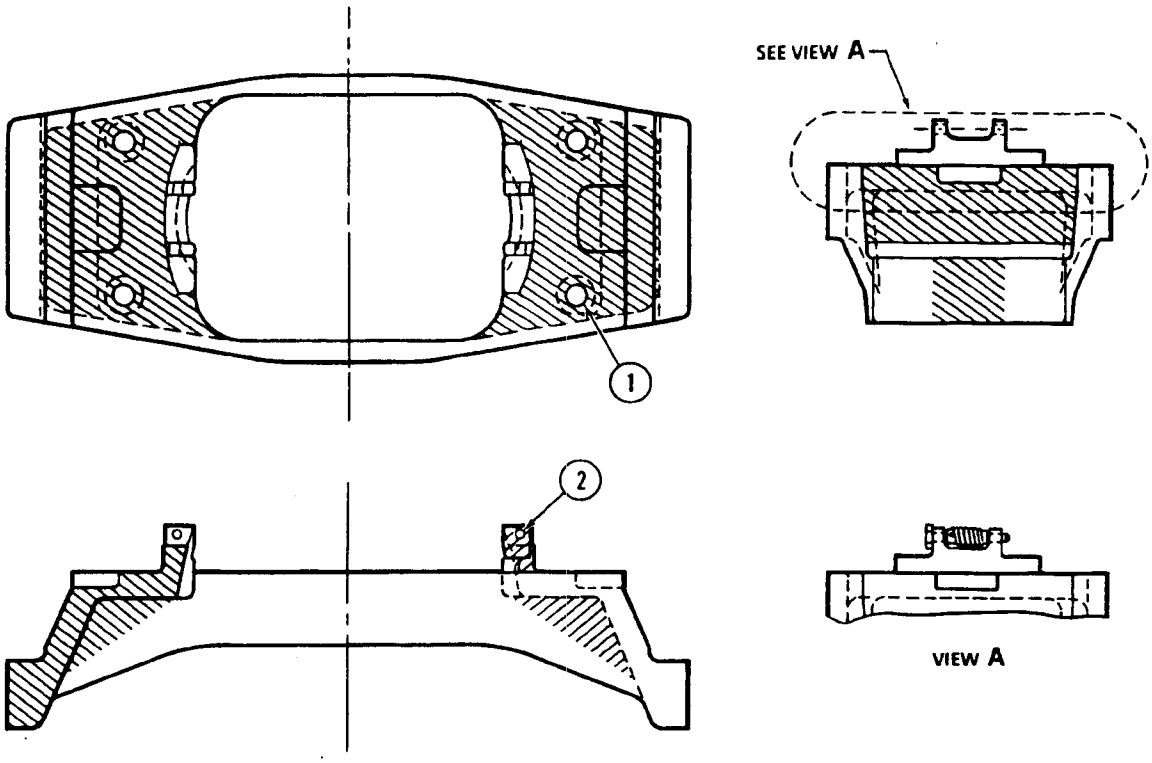
Figure 4-13B. Main rotor grip – inspection diagram



BUSHING P/N	DIMENSIONS						
	A	B	C	D	E	F	G
CR 204-4-1	1.1380 1.1375	0.859	0.990 0.980	0.100	2.180	---	0.010 0.015
CR 204-4-3	1.1680 1.1675	0.859	0.990 0.980	0.100	2.180	---	0.010 0.015
CR 204-4-5	1.1880 1.1875	0.859	0.990 0.980	0.100	2.180	---	0.010 0.015
CR 204-26-1	2.9250 2.9245	2.470	1.740 1.730	0.125 0.124	3.650	0.090R	---
CR 204-26-3	2.9450 2.9445	2.470	1.740 1.730	0.125 0.124	3.650	0.090R	---
CR 204-26-5	2.9650 2.9645	2.470	1.740 1.730	0.125 0.124	3.650	0.090R	---

NOTES:
1. MANUFACTURE FROM STEEL ROD - 4130, MIL-S-6758 STEEL ROD - 4140, MIL-S-5626, OR STEEL ROD - 4340, MIL-S-5000 WITH A TENSILE STRENGTH OF 125-145 KSI.
2. BREAK EDGES 0.002 - 0.010 EXCEPT AS NOTED.
3. FLASH CAD PLATE PERMISSIBLE ON DIA B.
4. INSIDE & OUTSIDE DIA MUST BE PARALLEL & CONCENTRIC WITHIN .003 T. I. R..
5. ALL DIMENSIONS TO BE MET AFTER PLATING.
6. IF FULL RADIUS IS REQUIRED INSTEAD OF RELIEF AS SHOWN, SEE COLUMN F FOR RADIUS DIM..
7. FOR CR 204-26-1/3/5, 3-3/4 DIA X 3/4 WALL 4130 TUBING PER AMS 6371 MAY BE USED IN LIEU OF SPECIFIED ROD.
8. CADIUM PLATE IN ACCORDANCE WITH QQ-P-416 CLASS II, TYPE II.

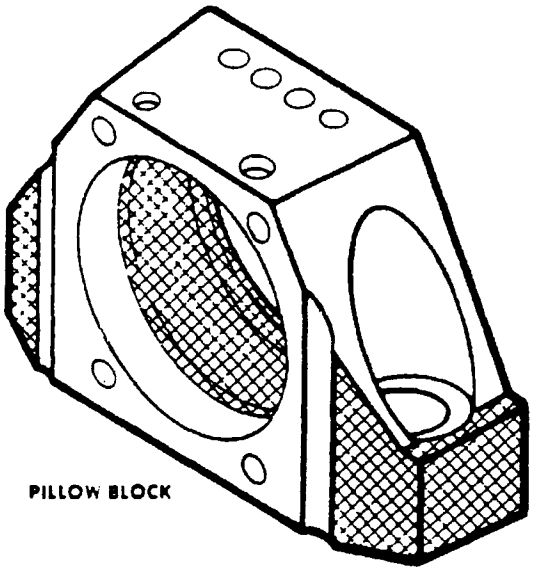
Figure 4-13C. Main Rotor Grip Repair Bushings



204-011-207-101 PLATE ASSY

TYPE OF DAMAGE NICKS, SCRATCHES, SHARP DENTS	DAMAGE AREA REPAIR SYMBOLS	
	MAXIMUM DEPTH AND REPAIR AREAS ALLOWED	
MAXIMUM DAMAGE DEPTH (MECHANICAL)	0.020 IN.	0.035 IN.
MAXIMUM AREA OF FULL-DEPTH REPAIR	0.50 SQ. IN.	0.75 SQ. IN.
MAXIMUM EDGE CHAMFER	0.050 SQ. IN.	0.100 SQ. IN.
MAXIMUM NUMBER OF REPAIRS	TWO PER AREA	NOT CRITICAL
MAXIMUM ACCEPTABLE HOLE DIAMETER	(1) 0.430 IN.	
	(2) 0.196 IN.	
CORROSION DAMAGE	0.010 IN.	0.020 IN.
MINIMUM COUNTERBORE THICKNESS	(1) 0.375 IN.	

Figure 4-13D. Plate Assembly — Damage Limits



DAMAGE AREA REPAIR SYMBOLS

TYPE OF DAMAGE	MAXIMUM DEPTH AND REPAIR AREAS ALLOWED	
NICKS, SCRATCHES, SHARP DENTS	0.020 IN. BEFORE AND AFTER REPAIR	0.040 IN. BEFORE AND AFTER REPAIR
CORROSION	0.010 IN. BEFORE REPAIR 0.020 IN. AFTER REPAIR	0.020 IN. BEFORE REPAIR 0.040 IN. AFTER REPAIR
AREA OF FULL DEPTH REPAIR	0.10 SQ. IN.	0.25 SQ. IN.
NUMBER OF REPAIR AREAS	ONE PER SEGMENT	NOT CRITICAL
BOLT HOLE DAMAGE	0.001 INCH FOR ONE-FOURTH CIRCUMFERENCE	

NOTE:

1. All edges may be rediused or chamfered 0.060 inch to remove nicks and dents.
2. Repair areas should not overlap.
3. No cracks allowed.

Figure 4-13DA. Inspection Limits - Pillow Block

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 1 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
				WARNING **FLIGHT SAFETY PART** Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.					
4-3	12	Bolt Assembly	2, 3	Wear of protective coating on body diameter Cracks	Visual, Magnetic Particle	100	Corrosion	Visual	2-Para 4-9b 100-Para 4-7a (3)-Para 4-21b(3)
4-3	7	Fitting	2	Wear of protective paint on face	Visual				2-Para 4-17
			1	Cracks	Magnetic Particle				1-Para 4-9e
4-3	8	Clevis	2	Wear of protective paint on face	Visual				Chapter 11 2-Para 4-17
			1	Cracks	Magnetic Particle				1-Para 4-9e
4-3	28	Pitch Horn				100	Nicks or Dents	Visual	100-Para 4-13d
			1	Cracks	Fluorescent Penetrant				1-Para 4-9e Chapter 11

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 2 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
				WARNING					
				FLIGHT SAFETY PART					
				Maximum minor diameter and "no-go" gage installing 3 turns maximum are critical characteristics.					
4-3	17	Nut	1	Threads Galled	Visual				1-Para 4-14b
4-3	20	Pin	1	Cracked or Broken	Magnetic Particle	100	Worn Surface	Visual	1-Para 4-9e 100-Para 4-14c
4-3	21	Outboard Fitting	1	Threads Galled	Visual	100	Corrosion	Visual	Chapter 11 1-Para 4-14b 100-Para 4-7a Chapter 11

*SIE - Standard Inspection Equipment

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 3 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
			1	Cracked	Magnetic Particle				1-Para 4-9c
4-3	29	Grip	1	I.D. of Bearing Liners Worn Beyond Allow-able Limits	*SIE	100	Nicks or Dents or Corrosion	Visual	1-Para 4-8b (2)(a) 100-Para 4-7a Para 4-13d Chapter 11
			1	Cracks	Fluorescent Penetrant				1-Para 4-9e.
			2	Wear of Protec-tive Paint on Grip Tangs	Visual				2-Para 4-17
			1	I.D. of Blade Bolt Bushing Worn Beyond Allowable Limits	*SIE				1-Para 4-8b (2)(a)
4-3	31	Plate Assembly	1	Cracked	Fluorescent Penetrant				1-Para 4-9e
			2	Worn Beyond Allowable Limits	Visual				2-Para 4-23A
4-3	33	Shim	1	Laminates Curled	Visual				1-Para 4-13b
4-3	38	Disc	1	Cracked	Fluorescent Penetrant				1-Para 4-9e.
4-3	40								

*SIE - Standard Inspection Equipment

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 4 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
4-3	43	Bearing	1	Broken Rollers I.D. of Outer Race Spalled	Visual				1-Para 4-14b Para 4-14g
4-3	43R	Bearing, Inner Race	1	O.D. Spalled	Visual	100	I.D. Discolored Signs of Race Turning on Yoke	Visual	1-Para 4-14g 100-Para 4-14g
4-3	47	Bearing	1	Broken Rollers I.D. of Outer Race Spalled	Visual				1-Para 4-14g
4-3	47R	Bearing, Inner Race	1	O.D. Spalled	Visual	100	I.D. Discolored Signs of Race Turning on Yoke	Visual	1-Para 4-14g 100-Para 4-14g
4-3	24	Inboard Fitting	1	Cracked	Magnetic Particle				1-Para 4-9e
4-3	25	Ring	1	Distortion due to Poor Disassembly Methods	Visual				Chapter 11 1-Para 4-14b
		Strap Assembly	1	Damage	Visual				Chapter 11
4-3	23	Plate Assembly, Hub Moment Spring	1	Corrosion, Damage, Wear	Visual				Figure 4-13B
4-3	62	Bolt	1	Cracked	Visual				
4-3	62	Bolt	2	Corrosion, Damage, Wear	Visual				2-Para 4-15(c)

*SIE - Standard Inspection Equipment

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 5 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
4-3	74	Pillow Block	1	Cracked	Fluorescent Penetrant				1-Para 4-9e
4-3	78	Radius Ring	1	O.D. Worn Signs of	Visual				1-Para 4-14e
4-3	72	Bearing	1	Broken Rollers	Visual				1 -Para 4-14b
4-3	72R	Bearing, Inner Race	1	O.D. Spalled	Visual	100	I.D. Discol-ored Signs of Race Turning on Trunnion	Visual	1-Para 4-14g 100-Para 4-14g
				WARNING FLIGHT SAFETY PART Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.					
4-3	80	Trunnion	1	Bearing Seat Scored When Inner Race Was Removed	Visual				1-Para 4-13d Para 4-13g Para 4-8 b(2)(d)
			1	Cracks	Magnetic Particle				1-Para 4-9e

*SIE - Standard Inspection Equipment

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 6 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
4-3	84	Deleted							
4-3		Deleted							
				WARNING					
				FLIGHT SAFETY PART					
				Magnetic particle inspection acceptance criteria is a critical characteristic. No cracks allowed.					
4-3	64	Yoke	1	Bearing Seat Worn Beyond Allowable Limits	*SIE				1-Para 4-8b (2) (b) Chapter 11

*SIE - Standard Inspection Equipment

Table 4-2. Detail Inspection Requirements After Cleaning (Sheet 7 of 7)

FIG NO.	INDEX NO.	NOMENCLATURE	REF NO.	MAJOR DEFECTS	METHOD OF INSPECTION	REF NO.	MINOR DEFECTS	METHOD OF INSPECTION	REMARKS
			6	Bend Beyond Geometric Limits					6-Para 4-8b(2)(b)
			1	Cracks	Magnetic Particle				1-Para 4-9e
4-3	55	Ring	1	O.D. Worn Signs of Seal Rubbing	Visual				1-Para 4-13b
4-3	63	Bushing	1	Cracked	Magnetic Particle				1-Para 4-9e
4-3	50	Channel Seal	5	Sealing Surface Worn	Visual				5-Para 4-8b(2)(b)
4-3	4	Bolt	1	Cracks	Magnetic Particle				1-Para4-9e
4-3	10	Nut	1	Cracks	Magnetic Particle				1-Para 4-9e
4-3	17	Nut	1	Cracks	Magnetic Particle				1-Para 4-9e
4-3		Deleted							
4-3	27	Bolt	1	Cracks	Magnetic Particle				1-Para 4-9e
4-3	53	Nut	1	Cracks	Magnetic Particle				1-Para 4-9e

*SIE - Standard Inspection Equipment

SECTION V. Repair and Replacement

4-13. REPAIR AND REPLACEMENT. Hub components shall be repaired or replaced, as applicable, in accordance with the instructions contained in this section or as required by paragraph 4-8.

NOTE

Refer to figures 4-1 and 4-2 for part numbers of items to be replaced.

NOTE

All repaired parts shall be reinspected.

4-14. GENERAL REPAIR AND REPLACEMENT.

a. Replace all seals, gaskets and preformed packing on reassembly.

b. Replace parts that are cracked, broken, warped, distorted, or have malformed threads.

c. Replace all parts that exceed allowable limits given in figures 4-11 and 4-12.

d. Replace nicked, pitted, scratched, or dented parts that are impractical to repair.

e. Repair minor scratches, nicks or pits on non-critical surfaces with crocus cloth (item 5, table 8-1).

f. Minor nicks, burrs, or scratches on splines may be dressed with fine India stone (item 6, table 8-1), keeping within tolerances.

g. Replace bearings that show evidence of brinelling, spalling and discoloration from overheating or that do not operate smoothly.

NOTE

All bearings are marked with vendor and Bell number. Assemble roller bearings with inner and outer races of vendor and Bell numbers on same side (surface).

h. Deleted.

i. Parts on which the finish has been damaged or removed by wear, chipping, scoring, scratches, dents or rework procedures, shall be refinished using the following procedures as applicable. Surfaces requiring or replacement of solid film lubricant coating shall be coated per item 4, table 8-1.

(1) Cadmium finished surfaces shall be treated as follows:

(a) Cadmium plated steel surfaces heat treated to 160,000 PSI, requiring repair on less than 10% of the plated surface shall be touched up by brush Cadmium plating per MIL-STD-865 item 10, table 12-1.

(b) Cadmium finished steel surfaces heat treated above 160,000 PSI, requiring repair on less than 10% of the plated area shall be touched up by brush Cadmium plating per MIL-STD-865 item 10, table 12-1, paragraph 5.5.4.6 with selectron Cadmium LHE, except clean as follows:

1. Remove oils, greases, and shop contamination by wiping with cheesecloth (item 23, table 8-1) wetted with solvent (item 38, table 8-1). Wipe dry with a clean cloth before the solvent evaporates.

2. Remove any existing oxides or scale using Scotch-Brite (item 25, table 8-1)

3. Wipe surfaces with cheesecloth (item 23, table 8-1) wetted with solvent (item 38, table 8-1). Wipe dry before solvent evaporates.

4. Surfaces that cannot be effectively cleaned by mechanical methods may be electro-cleaned with alkaline electroclean solution code SCM 410 per MIL-STD-865 item 10, table 12-1. Make the part the anode. Electrocleaning shall be held to a bare minimum. Rinse thoroughly with cold water.

(c) Cadmium plated steel surfaces requiring repair on more than 10% of the plated area shall be stripped and replated or coated as follows:

1. Parts heat treated to 160,000 PSI shall be cadmium plated per QQ-P-416C, item 8, table 12-1, class 2, type II.

2. Strap retention pins (item 2, figure 4-3) and pillow block bushing (item 63, figure 4-3) shall be coated per MIL-C-8837 item 11, table 12-1, class 2, type II.

3. All parts treated above 160,000 PSI may be vacuum coated per MIL-C-8837 item 11, table 12-1, class 2, type II.

4. An alternate method to subparagraph 3.above is cadmium plate per QQ-P-416C item 8, table 12-1, class 2, type II except parts heat treated 160,000 to 180,000 PSI shall be baked within one hour after plating for four hours minimum at 385 ±15°F. Parts heat treated above 180,000 PSI shall be baked within one hour after plating for 23 hours minimum at 385 ±15°F. Parts heat treated 160,000 to 180,000 PSI are fitting (11, figure 4-1) , clevis (12), drag brace barrel (14), nut (19), strap fitting (70), fitting assembly (75), and trunnion (27, figure 4-2). Parts heat treated above 180,000 PSI are blade bolt (4, figure 4-1) and main rotor yoke (43, figure 4-2).

NOTE

Clevis (12, Figure 4-1) may have the threads cadmium plated to enhance corrosion protection. Installation torque will not significantly be effected. The installation of the clevis is based upon a dimensional measurement and not torque.

(d) Ion vapor deposition of aluminum (IVD AL) for the following parts. IVD AL (MIL-C-83488) has been determined to be an alternate process for CD plating per QQ-P-416C or MIL-STD-865. Process parts in accordance to MIL-C-83488 type II class 3. Parts having a tensile strength of less than 165 KSI are not susceptible to hydrogen embrittlement if chemically stripped. Parts that have (*) are over 165 KSI and require a bake cycle after being chemically stripped. Parts with IVD AL may be chemically stripped using caustic solution (MIL-C-14460) or mechanically stripped using glass bead or other abrasive blasting material.

NOMENCLATURE	P/N	ITEM, FIGURE
Liner Assy	204-011-122-105	27, FIG 4-2

(2) Aluminum surfaces requiring repair shall be treated with a chemical conversion coating (item 27, table 8-1).

(3) Surfaces requiring repair or replacement of solid film lubricant coatings shall be coated per MIL-L-8937A.

4-15. BOLTS.

a. Remove broken or bent bolts. Remove bolts with damaged threads. Replace dry lube (item 8-1, table NO TAG) by bond or spray application.

b. Replace rozans with damaged threads as follows:

(1) Remove damaged rozan from grip by using easy-out tool.

(2) Remove damaged rozan from grip by drilling the rozan with largest drill bit without drilling grip. Collapse drilled rozan and remove.

(3) Install new rozan as follows:

(a) Screw insert into grip.

(b) Twist lock ring between insert serration and grip serration.

(c) Press lock ring flush with grip surface.

c. For bolt (24, figure 4-2) P/N MS14181-08044 only, the bolts may be re-used provided the shank and threads are not damaged. No repair is authorized. Passivate bolts per QQ-P-35.

4-16 MAIN ROTOR GRIP.

NOTE: Liners (item 31 and 32, figure 4-1) may be re-used if removed for shotpeening inside of grip. Mark alignment of each liner. Heat grip, temperature not to exceed 200°F, and press liners from grip. Used liners may only be re-used on grips from which it was removed; Additionally the liners must be in a serviceable condition. The liners shall not exceed the installed replace dimension in figure 4-12, and an interference fit must still exist between the grip and liners.

a. Replace damaged bushings and liners, or bushings and liners worn beyond limits of figure 4-12 as follows:.

(1) Removal: Hold grip and mill bushing or liner wall to paper thin and collapse bushing or liner.

NOTE: Main retention bolt bushing wall thickness will be approximately 0.202 inch. Drag brace bushing wall thickness will be approximately 0.126 inch. Liner wall thicknesses will be approximately 0.122 inch.

NOTE: If grip bushing holes are beyond allowable limits of figure 4-5, refer to Paragraph 4-16D for rework procedure.

CAUTION: Do not damage bushing or liner seats during removal.

(2) Replacement: Use a heat oven and bake grip to a maximum of 200°F (93.3°C). Hold heat forty-five minutes. Chill bushings and/or liners to minus 100°F (73°C) if necessary to ease installation. Position a gage block 4.504 inches thick between tangs of grip and press bushing into grip. If gap between bushing or liner flanges exceed 0.002 inch, press with 20 tons maximum pressure using a piloted tool. Machine outboard liner to flange, and through bushings and inboard liner to diameters and dimensions shown in figure 4-5 and Figure 4-12, 4.504 inch dimension between tangs to be held during machining. Protective coatings or bushings damaged during installation/subsequent machining shall be touched up by brush LHE cadmium plating in accordance with paragraph 4-14i (1,b).

b. Corrosion/Damage Rework.

(1) Surface corrosion may be removed from grip interior and exterior surface by glass bead blasting in accordance with MIL-STD-1504. Blasting shall be accomplished using size 10 glass beads and a pressure of 30-40 PSI. Seal area "N" (figure 4-5), bearing liners, bushings and rozan inserts shall be masked off for protection during the blasting operation.

NOTE: Light corrosion on bearing liners and bushings may be polished out by using crocus cloth (Item 5, Table 8-1).

(2) Corrosion, pits, dents and/or scratched shall be smoothly blended into surrounding area. The maximum length and depth of rework shall not exceed limits specified in figure 4-13B. The maximum area which may be reworked to remove corrosion pits, nicks, dents and scratches shall not exceed the following limits:

AREA (figure 4-13B	PERCENTAGE OF AREA
A	25%
B*	5%
C	5%
D**	5%

* Rework of 10% of area B on upper blade tang is allowable.
** 5% of any one quadrant and not more than 10% of total area.

(3) Corrosion and other damage located on the internal bore shall be blended into the surrounding area. General surface corrosion up to 0.010 inch deep and/or isolated corrosion pitting up to 0.020 inch deep is to be blended to twice the depth of damage. (The maximum depth of rework shall not exceed 0.040 inch for corrosion pitting or 0.020 inch for surface corrosion).

(3) The outboard strap fitting bore shall not exceed 3.630 inches maximum after rework.

NOTE

The surface finish on rework areas shall be on the highest possible quality since these are fatigue critical areas. Surface finish in Area D shall be 32 RMS or better. Surface finishes in all other areas must be 125 RMS or better.

c. Surface corrosion or pits on the seal surface identified as N on ref fig 4-5 may be removed by polishing. Maximum diameter of reworked surface shall be 3.637 inches. Reworked surface shall be treated per MIL-C-5541. Type 1, Class 1.

d. Rework damaged grip bolt bushing holes in accordance with the following instructions:

NOTE

The depth of damage and the minimum amount to clean-up will determine the below listed Application to accomplish. Insure only minimum rework is accomplished to allow for further repair if required.

(1) Blade Retention Bolt Bushing Holes.

Application "A": To be used when total surface rework does not exceed 0.020 inch beyond drawing diameter.

(a) Machine damaged 2.900/2.901 inch dia. 2 holes in line before peening, to 2.920/2.921 inch dia., 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 2.920/2.921 inch dia. holes. Shot size 330 intensity 0.010-.014A2, coverage 98%, finish not to exceed 200 RMS. (Do not finish machine after peening.)

(c) Install the CR 204-26-1 bushings in lieu of the 204-010-413-29 bushings in accordance with Paragraph 4-16a instructions.

Application "B": To be used when the total surface rework is greater than 0.020 inch but does not exceed 0.040 beyond drawing diameter.

(a) Machine damaged 2.900/2.901 inch dia., 2 holes in line before peening, to 2.940/2.941 inch dia., 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 2.940/2.941 inch dia. holes in accordance with Paragraph 4-16d (1) (b).

(c) Install the CR 204-26-3 bushing in lieu of the 204-010-413-29 bushing in accordance with Paragraph 4-16a instructions.

Application "C": To be used when total surface rework is greater than 0.040 inch but does not exceed 0.060 inch beyond drawing diameter.

(a) Machine damaged 2.900/2.901 inch dia. holes in line before peening, to 2.960/2.961 inch dia., 2 holes in line before peening, to 2.960/2.961 inch dia., 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 2.960/2.961 dia. holes in accordance with Paragraph 4-16d (1) (b).

(c) Install the CR 204-26-5 bushing in lieu of the 204-010-413-29 bushing in accordance with Paragraph 4-16a instructions.

(2) Drag Brace Bolt Bushing Holes.

Application "A": To be used when total surface rework does not exceed 0.010 inch beyond drawing diameter.

(a) Machine damaged 1.1245/1.1255 inch diameter, 2 holes in line before peening, to 1.1345/1.1355 inch diameter, 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 1.1345/1.1355 inch diameter holes in accordance with Paragraph 4-16d (1) (b).

(c) Install the CR 204-4-1 bushings in lieu of the 204-010-413-27 bushings in accordance with Paragraph 4-16a instructions.

Application "B": To be used when total surface rework is greater than 0.010 inch but does not exceed 0.040 inch beyond drawing diameter.

(a) Machine damaged 1.1245/1.1255 inch diameter, 2 holes in line before peening, to 1.1645/1.1655 inch diameter, 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 1.1645/1.1655 inch diameter holes in accordance with Paragraph 4-16d (1) (b).

(c) Install the CR 204-4-3 bushings in lieu of the 204-010-413-27 bushings in accordance with Paragraph 4-16a instructions.

Application "C": To be used when total surface rework is greater than 0.040 inch but does not exceed 0.060 inch beyond drawing diameter.

(a) Machine damaged 1.1245/1.1255 inch diameter, 2 holes in line before peening, to 1.1845/1.1855 inch diameter, 2 holes in line before peening.

WARNING

The accomplishment of shot peening, 98 percent coverage, intensity .010 - .014A2 with 330 shot size is the criticial characteristic.

(b) Shot peen 1.1845/1.1855 inch diameter holes in accordance with Paragraph 4-16d (1) (b).

(c) Install the CR 204-4-5 bushings in lieu of the 204-010-413 bushings in accordance with Paragraph 4-16a instructions.

(3) Repair Bushings.

NOTE

Repair bushings to be locally manufactured, in accordance with figure 4-13c.

NOTE

Ink stamp the part number (i.e. CR 204--) as applicable, on the special bushing. The accompanying aircraft paperwork must reflect the accomplished deviation.

e. Grip Tang Repair. Grips with corrosion pits on inside tang surfaces not exceeding 0.010 inch depth may be repaired as follows:

(1) Fabricate grip tang buffer in accordance with figure 4-13DA.B.

(2) Machine pitted inside tang surface in accordance with figure 4-13DA.C.

(3) Shot peen machined surface in accordance with MIL-S-13165 using shot size 330, intensity 0.010- 0.014A, 100 percent coverage.

(4) Treat repair surface with chemical conversion coating (27, Table 8-1).

(5) Prime treated surface with one coat epoxy primer (36, Table 8-1).

(6) Use 80 grit abrasive paper or equivalent to roughen the buffer surface before bonding. Clean newly fabricated buffer by wet vapor blasting.

(7) Install buffer on repair surface of grip in accordance with figure 4-13DA.D. Bond buffer to repair surface with adhesive (37, Table 8-1) or equivalent. Buffer to be centered on bore within 0.030 inch. Seal and fair edges of buffer with adhesive (37, Table 8-1). The buffer pad straight edge shall be parallel within 1.5 degrees to straight edge of tang surface. Process temperature not to exceed 200°F.

WARNING

Naphtha is combustible-do not use near welding areas, open flames or on hot surfaces. Avoid prolonged or repeated contact with liquid. Contact of skin with liquid can cause irritation and dermatitis. Inhalation of vapors can cause irritation, giddiness, and drowsiness. If liquid contacts eyes, flush eyes thoroughly with water. If there is any prolonged skin contact, wash contacted area with soap and water.

(8) After bonding, decontaminate surface with naphtha (38, Table 8-1) or equivalent and dry with compressed air. Light sanding to roughen the surface is permissible. Paint grip and buffer pad per para. 5-1.

NOTE

Dimension 4.502/4.506 inch may change as a result of shot peening. Warpage limits due to peening is 0.010 above 4.506 inch and 0.010 below 4.502 inch measured at centerline of bolts. Maximum acceptable dimension between tang surface is 4.492/4.516 inches.

(9) Identify grip by vibro-etching the letter R after last digit of part number on grip. Vibro-etching shall be done after machining operation.

f. Surface corrosion and damage located on the inboard seal surface (reference inside diameter 6.250/6.253 inch) may be removed by polishing. Maximum diameter of rework surface shall be treated per MIC-C-5541, Type 1, Class 1.

g. Grip slot and relief hole repair, (figure 4-13DA.1).

(1) Trim inner edge of slot even with the surrounding surface, providing a slot width dimension not to exceed 0.326 inch. Chamfer and blend all edges not to exceed 0.040 inch to remove nicks and dents.

(2) Minor nicks and scratches on the surrounding surfaces may be cleaned up 0.020 inch in depth provided generous radii are maintained. Repaired areas must be kept to a minimum and blended areas between repair surfaces and original surfaces must be smooth.

(3) Apply chemical conversion coating (item 27, Table 8-1) to all reworked areas.

(4) Should slot dimension of 0.326 inch be exceeded proceed as follows:(a)

(a) If slot width exceeds 0.326 inch, it is permissible to increase the width to a maximum of 0.360 inch.

(b) Using adhesive (item 21, Table 8-1) bond one or two strips of aluminum alloy sheet stock 2024-T3 to the inner face(s) and recut slot width dimension to 0.313 to 0.316 inch, adhering to nominal centerline dimension of 0.157 inch. An acceptable alternate procedure is to use adhesive without use of aluminum sheet stock and machine per instructions.

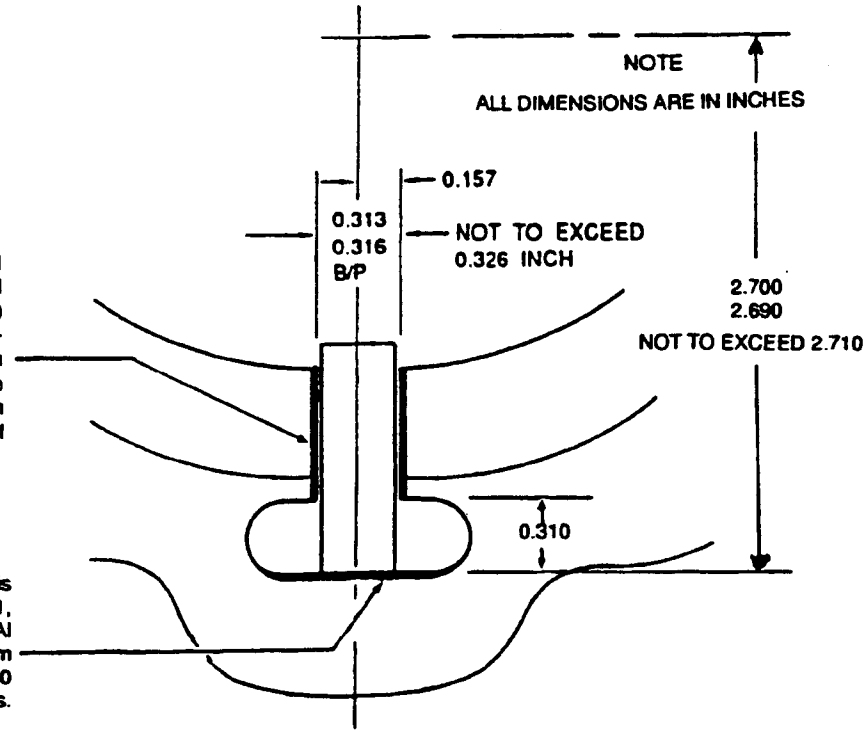
(c) Maintain base of slot radius 0.005 to 0.015 inch typical.

(5) Should oval dimension of 2.710 inch be exceeded proceed as follows:

(a) To assure key (20, fig. 4-1) retains proper engagement, if oval slot width depth exceeds 2.710 inches, increase width to 2.750 inches and bond a strip of aluminum alloy sheet stock 2024-T3 to the outboard face of slot using adhesive (item 21, table 8-1) and recut slot to 2.690 to 2.700 inches.

NOTE

Maintain base of slot radius 0.005 to 0.015 inch typical.



Notes:
1. Rework on width does not need to be accomplished if width does not exceed 0.326 inch. The total shim thickness not to exceed 0.050 inch and maximum width allowed during cleanup is 0.360 inch.
2. Rework on oval dimension does not need to be accomplished if oval dimension does not exceed centerline dimension of 2.710 inches. The shim thickness is limited to 0.050 inch and maximum rework dimension from centerline is 2.750 inches.
3. Repair damage in the bottom of the keyway slot by blending. At least 75 percent of the keyway slot is to be in serviceable condition (having a maximum depth of 0.320 inch).

Figure 4-13DA.1 Grip Slot and Relief Hole Repair

4-17. PITCH HORN.

a. Replace bushings that are loose or out of round. Bushings in the control end of pitch horn, P/N 204-010-170-7,-9, shall be replaced if the I.D. of the bushing exceeds 0.3750 inch.

b. Removal procedure:

(1) Bushings in the pitch horn base (mating with grip) may be pressed out.

(2) Bushings in the control end of pitch horn: The single bushing is pressed out first then a drift may be used to tap out the one of the duel bushings. The remaining bushing may be pressed out.

c. Installation procedures:

(1) Thoroughly clean pitch horn with solvent (Item 3, Table 8-1) chill bushings and press into pitch horn.

(2) Bushing in control end if horn must be line drilled 0.3743 to 0.3748 inch after installation, bushings in base end require no drilling.

d. The outside diameter of bushing, P/N 204-010-170-5, shall be 0.6865 inch minimum. If bushing requires replacement repair as follows:

(1) Press out defective bushing.

(2) Clean pitch horn with solvent (Item 3, Table 8-1).

(3) Chill bushings and press bushings wet with primer (Item 8, Table 8-1) into pitch horn.

4-18. SURFACE TREATMENT.

a. The contact faces of the drag brace fitting (7, figure 4-3) and the mating tang surfaces on grip (29) shall be painted (Item 12 or 19, Table 8-1), color 37038 per FED STD 595, before assembly.

b. Drag brace fitting (7) and clevis (8) need not be stripped and re-cadmium plated if subsequently epoxy painted. The interior surface of drag brace barrel shall be wiped with corrosion preventive compound (Item 13, Table 8-1).

c. The mating surfaces of grip and pitch horn shall not be epoxy painted. Apply a coat of primer (Item 8, Table 8-1) to each of the surfaces and assemble while wet.

d. The surfaces of pillow block (74) shall be anodized (Item 20, Table 8-1) Type I, Class 1. (Do not epoxy paint.)

4-19. RADIUS RING. (78, figure 4-3).

a. Polish the outside diameter to remove wear grooves due to seal contact. Seal polish marks less than .0005 inch in depth shall not require removal by polishing the surface.

b. After polishing the outside diameter shall be 2.8095 inches minimum, and with a surface finish provided by using 320 grit or finer abrasive paper (32 RMS or better).

c. Passivate to remove surface contaminants and to enhance corrosion resistance. Finish per MIL-C-53072(MR).

4-20. SHIELD ASSEMBLY. (55, figure 4-3).

a. Inspection. Visually inspect the shield assembly for the following:

(1) Pits, nicks, and scratches.

(2) Scoring or grooving of seal area.

(3) Dust shield for security.

(4) Any other visible defects.

NOTE

Any defect which affects the sealing capability of the shield assembly is cause for rejection.

b. Rebonding of the dust shield to the radius ring shall be accomplished as follows:

(1) Vapor degrease dust shield and radius ring.

(2) Clean radius ring surface by lightly abrading with 320 grit or finer abrasive paper. Wipe clean with cloth moistened with dry cleaning solvent. (Item 3, Table 8-1.) Wipe with clean dry cloth.

(3) Abrade shield with a wire brush or 80 grip abrasive paper. Wipe clean with cloth moistened with dry cleaning solvent (Item 3, Table 8-1). Wipe with clean dry cloth.

(4) Apply adhesive (item 26, table 8-1 or equivalent) to mating surface of both shield and ring.

(5) Apply a light pressure and cure for 24 hours at room temperature.

(6) Seal I.D. of shield, bridge gap between shield and machined breakout with EA934 adhesive (item 26, table 8-1).

4-21. BLADE BOLTS. (12, figure 4-3).

a. Cleaning. Remove solid film lubricant.

b. Inspection.

(1) Visually inspect the blade bolt for the following:

(a) Corrosion, pits, nicks, and other damage on bolt threads or head not to exceed 0.010 inch deep. Rework per paragraph 4-14.

(b) Repair shank of bolt for corrosion pits, nicks, and other damage less than 0.0005 inch deep per paragraph 4-21.c(1) (for bolts not plated or coated). Bolts with corrosion pits, nicks, and other damage on the shank deeper than 0.0005 inch but less than 0.005 inch, repair per paragraph 4-21.c(2) (for bolts not plated or coated). Previously chrome plated or tungsten carbide coated shanks not to have corrosion pits or other damage into the base metal or greater than 0.060 inch wide. Remove burrs and sharp edges as needed (complete removal of defects not required). Minor chips in the coating near the bolt head or threads are allowed. Blend defects as needed.

(2) Dimensionally check per figure 4-12, item 6, minimum wear limit.

WARNING

Flight Safety Part critical characteristics magnetic particle inspection of the bolt.

(3) Magnetic particle inspection using procedures in table 4-1. Reject bolt if defects or cracks are found.

c. Repair. Blade bolts which are corroded in the shank area shall be repaired as follows:

WARNING

Nital Etch is a flight safety part critical characteristic.

WARNING

Flight Safety Part critical characteristics magnetic particle inspection of the bolt.

(1) Blade bolts which are not pitted deeper than 0.0005 inch shall be repaired as follows:

(a) Grind shank diameter to 2.4988/2.4983 inches.

(b) Magnetic particle inspection per MIL-I-6868.

WARNING

If parts require complete recadmium plating the critical characteristic is to bake within 1 hour of plating of 375 - 385°F for 23 hours minimum.

(b.1). Inspect for grinding burns per MIL-STD-867. Bake at 375 ± 25 degrees F for 4 hours within 4 hours after etching.

(c) Cadmium plate shank per QQ-P-416C, Type II. Diameter after plating to be 2.4993/2.4988 inch.

(d) Apply solid film lubricant (heat cured) per paragraph 4-21d.

(2) Blade bolts which have surface damage in excess of 0.0005 inch.

(a) Machine bolt shank to 2.4925/2.4900 to remove surface defects. Surface finish shall be 125 RMS or better, no tool rings permitted. Blade bolts which have previously been chrome plated or tungsten carbide coated may have the shank machined to 2.4900/2.4875 inch for re-application of coating.

WARNING

Flight Safety Part critical characteristics magnetic particle inspection of the bolt.

(b) Magnetic particle inspect per MIL-I-6868.

(c) Inspect for grinding burns per MIL-STD-867. Bake at 375 ± 25 Degrees F for 4 hours with in 4 hours after etching.

WARNING

Nital etch is a flight safety prat critical characteristic.

(d) Deleted.

(e) Deleted.

(f) The preparation, cleaning, masking, quality requirements and spraying of coating shall be in accordance with specification AMS 2437 and the following:

(1) Mask as necessary to protect adjacent areas during abrasive blasting and metal spray application. No over spray allowed on threads and faying surface (underside) of bolt.

(2) To improve the adhesion of metal spray coating, the shank shall be grit blasted to roughen the surface, per MIL-A-21380 Grade A or B, direct pressure 55 psig maximum.

NOTE

Personnel/operator competence requirements shall be in accordance with specification AMS 2437.

(3) An operation control sheet patterned after typical sheet, AMS 2437 is mandatory.

(4) Coating properties shall conform to and be equivalent to Table 1 and Table 2 requirements for coating designation AMS 2437.

(5) Micro-examination shall be performed (AMS 2437, paragraph 3.7.5) Porosity shall be less than 5%. Unmelted particles shall be less than 5%.

(6) All instrumentation used in compliance with this document shall be calibrated and controlled in accordance with MIL-C-45662 requirements with all standards used traceable to National Bureau Standards.

(g) Preheat part before spraying, 250°F (121°C) maximum. Apply tungsten carbide plus cobalt binder coating to the shank O.D. of blade bolt per AMS 2437 using argon or argon/helium mixture at a velocity of at least 1600 fps. Temperature of part during spraying to be held below 300°F (149°C).

(h) Seal the as deposited carbide coating using sealer MIL-C-82594. (Coricone Corp or equal). When required the coating may be cleaned before sealing using a solvent (i.e., FED SPEC TT-M-261).

(i) Grind the coated shank O.D. to 2.4993/2.4988 inches. Surface finish 63 RMS maximum. Use of diamond wheel with flood cooling is required. Thickness of coating after grind to be 0.003 inch minimum. Seal the coated areas after finish grind (or lapping) in accordance with paragraph (h) above. Restore chamfer 0.060 in. x 15 on lower end of shank.

(l) An alternate procedure to tungsten carbide coating (steps f thru i) is to chrome plate per QQ-C-320 Class 2, 0.010 inch over finish diameter. Machine grind the chrome on the shank O.D. to 2.4993/2.4988 inches. Surface finish 63 RMS or better.

WARNING

Relief bake within 1 hour of plating at 375-385°F for 23 hours minimum is the critical characteristic.

(j) Cadmium plate the bolt head and threads. per QQ-P-416, Class 2, Type II Flash cadmium on I.D. and edges of tungsten carbide coating is permissible. (Alternate—vacuum deposit cadmium plate per MILL-C-8837, Class 2, Type II).

(k) Clean the shank surface and apply solid film lubricant and cure per MILL-L-46010A, except no requirement to phosphate, passivate sand or grit blasting surface before lube coating. Maximum shank diameter after lube coating to be 2.4999 inches. Lubricant film thickness to be 0.0003 to 0.0006 inch. Air dry lube coating at least 30 minutes, then bake for 2 hours at 300°F.

(l) Coat the bolt I.D. with corrosion preventive compound, MILL-L-11796, Class 3 or MILL-C-16173, Grade 2 or 3.

(m) To identify the tungsten carbide coated bolts, vibroetch the letter "W" on head of bolt, 0.005 inch maximum depth.

d. Lubrication. Blade bolts on which the solid film lubricant is worn off and which are in otherwise serviceable condition shall be coated with solid film lubricant as follows:

(1) Remove remaining solid film lubricant by honing (dry or vapor).

(2) Bolt shank diameter to be 2.4993/2.4988 inches before coating.

(3) Apply solid film lubricant (item 4, table 8-1) to the bolt, shank diameter after coating to be 2.4999/2.4992 inches

NOTE

Dry lubricant coat thickness to be 0.0004 inch minimum.

e. Blade bolts which are pitted deeper than 0.005 inch on the inside diameter shall be rejected. Corrosion pitting on the inside diameter of the blade bolts which is not deeper than 0.005 inch may be polished out. Pitting less than 0.005 inch deep located on the plug (3, figure 4-1) mating area is not to be polished out so as to maintain a secure fit between the bolt and plug. Apply two coats of epoxy polyamide primer (MIL-P-23377) or equivalent to inside diameter of blade bolt. After primer is dry, coat inside diameter with corrosion preventative compound (18A, Table 8-1) or equivalent.

4-22. TRUNNION (80, figure 4-3).

a. Refinish trunnion in accordance with paragraph 4-14.

WARNING

The cadmium plate bake cycle within 1 hour of plating at 375-385°F for 4 hours minimum is the critical characteristic.

b. Parts requiring stripping, reaccomplish cadmium plating of trunnion spindles 0.34 inch over print demention (2.86 inch) from centerline of spindle diameter to end of plate surface. New dimension shall be 3.20 inch

c. Stabilizer bar support mounting face shall be considered separately when determining repair of plated surfaces per paragraph 4-14.

d. Rework trunnion damage as follows:

1. Nicked and dented splines may be cleaned up to one fourth of spline depth for one half the length of the spline. Up to three (3) splines may be reworked.

2. Minor scores and scratches not exceeding 0.002 inch in depth may be polished out.

3. Maximum depth corrosion and mechanical damage in cone area next to splines shall be 0.005 inch before and after repair.

Mechanical and corrosion thread damage exceeding limits in Figure 4-11 may be repaired by installing helical threaded insert, P/N MS124698, per TM 1-1500-204-23 Series. No more than two bolt thread repairs are allowed per segment (side).

4-22A. Liner (67, Figure 4-3).

a. Maximum ID of liner is 3.501 inches.

b. Rework inside thrust washer contact surface of liner if worn or roughned as follows:

1. Clean up surface to a finish of 125 microinches, maximum.

2. Diameter of rework area, 2.70 + 0.10 - 0.00 inches with 0.020 minimum radius around circumference.

3. Maximum recess depth shall be 0.015 inch.

4. Remove minimum amount of material required to clean up surface.

c. Cadmium plate outside surface per QQ-P-416, Class 2, Type II. Inside surface shall no t be plated, however, plating over-run on inside is permissible to any extent.

4-23. Main Rotor Yoke (64, Figure 4-3).

a. Corrosion and pits in inboard area of strap cavity and where sleeve P/N 204-012-107-1 contacts outboard of yoke, may be reworked as follows:

1. The O.D. under radius ring may be reworked to a minimum of - 0.010 inches from print dimension on the diameter

2. The I.D.s except for "O' ring seats, may be reworked to a maximum of + 0.020 inches from print dimensions on the diameter.

3. The I.D. at "O" ring seats and last CTBR may be reworked to a maximum of + 0.010 inches from print dimension on the diameter.

b. Corrosion and pits inside yoke spindle may be reworked to extent allowed in paragraph 4-14e.

c. Repair damaged yoke bushing holes as follows:

1. Bore damaged bushing hole to depth of existing hole (approximately 0.780 inch depth), see Figure 4-13DA.E. If damage is present, Machine bushing hole a maximum of 0.810 inch depth, if damage is still present, reject yoke.

NOTE

Bushing hole need only be machined to depth of existing hole (approximately 0.780 inch depth) to allow more base metal to remaine; provided, installed bushing maintaines flush to 0.005 inch below surface.

2. Manufacture bushing, see Figure 4-13DA.F. If additiional material was removed from bottom of bore, an additional length bushing will be required to provide flush to 0.015 inch surface fit.

3. Shotpeen bore hole per MIL-S-13165, intensity 0.008 - 0.014A2, coverage 98% minimum with S280-S330 shot or equivalent. Over spray permitted on adjacent surfaces. Maintain required dimension after peening, it is permissible to machine lop, or hone peened surfaces 0.001 inch maximum per surface. Do not grind.

4. Brush apply cadmium plate bore hole per MIL-STD-865.

5. Install bushing flush to 0.015 inch below surface.

6. Finish machine bushing to 1.0000/1.0005 inch, 63 RMS finish, and chamfer 45 degrees by 0.050 inch deep. See Figure 4-13DA.G. Maintain original concentricities.

4-23A. Deleted

4-23B. Grip Plate Assembly (31, Figure 4-3).

a. Chafing damage by dust shield is permissible up to the following limits:

1. Drain Boss area: maximum depth of 0.150 inch.

2. Exterior surface of oil passage: Maximum depth of 0.035 inch.

b. No clean-up of chafing damage required.

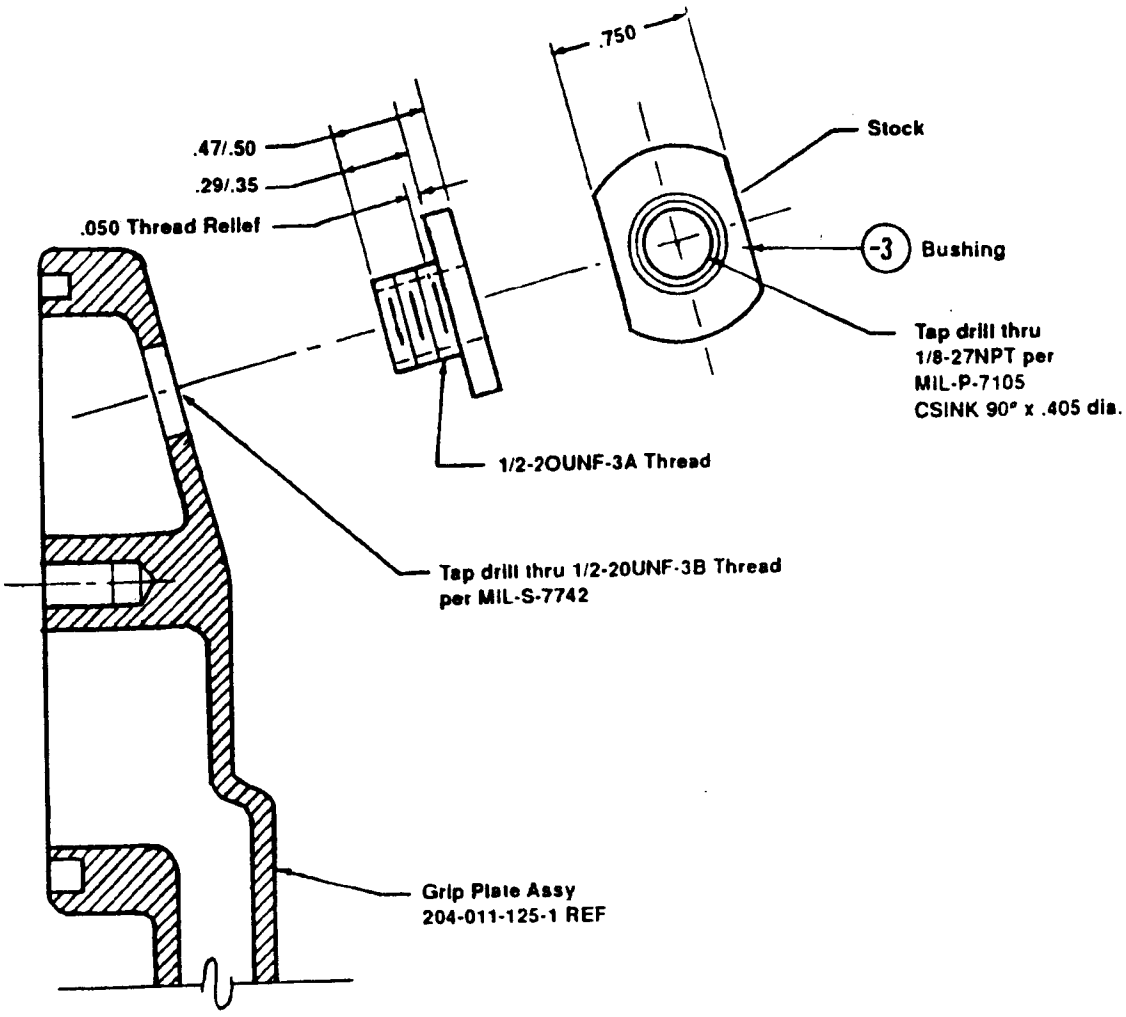
c. Treat damaged area with chemical conversion coating (item 27, Table 8-1).

d. Plate assembly with damaged threads for 1/8 inch pipe thread relief fitting (42-Figure 4-3) shall be repaired, see Figure 4-13DA.A.

e. Crack on "o" ring groove outer flange wall of plate assembly not exceeding 0.125 inch in depth and not over 0.625 inch in length may be repaired as follows:

1. Remove minimum amount of metal around crack and smoothly blend surronding area.

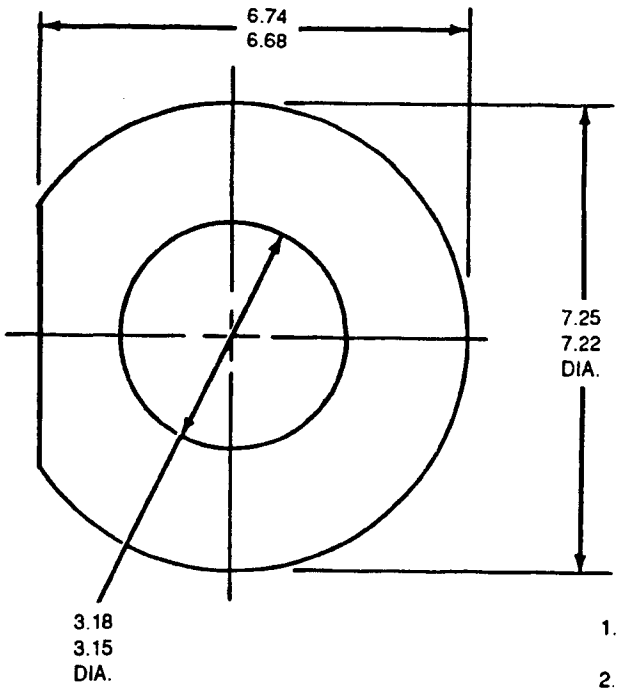
2. Traet repaired surface with Chemical conversion coating (item 27, Table 8-1).



Notes:

1. **Bushing P/N CR204-1-3, 1.0 inch dia stock, 4130 steel per MIL-S-6758, Cond. C-2, 125,000 psi max.**
2. **Cadmium plate bushing per QQ-P-416, Class 2, Type II.**
3. **Install bushing with Sealant, MIL-S-22473, Grade A.**
4. **After instl. apply bead of Sealant, MIL-S-8802, B-2 around bushing head.**

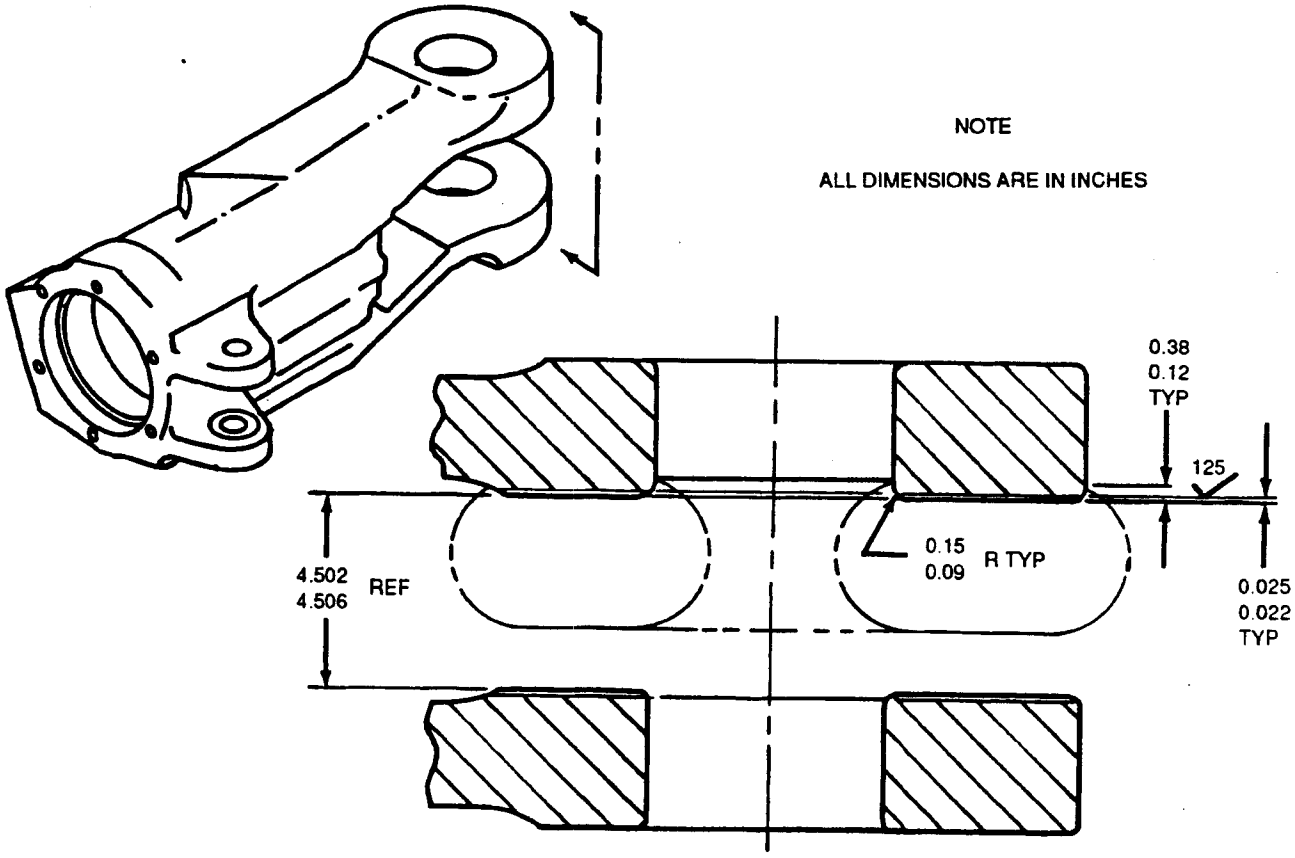
Figure 4-13DA.A Thread Repair for Relief Fitting



NOTES

1. MATERIAL: CRES TYPE 301 IN ACCORDANCE WITH MIL-S-5059.
2. CONDITION: 1/4 HARD.
3. THICKNESS: 0.020 INCH.
4. DEBURR EDGES.
5. ALL DIMENSIONS ARE IN INCHES.

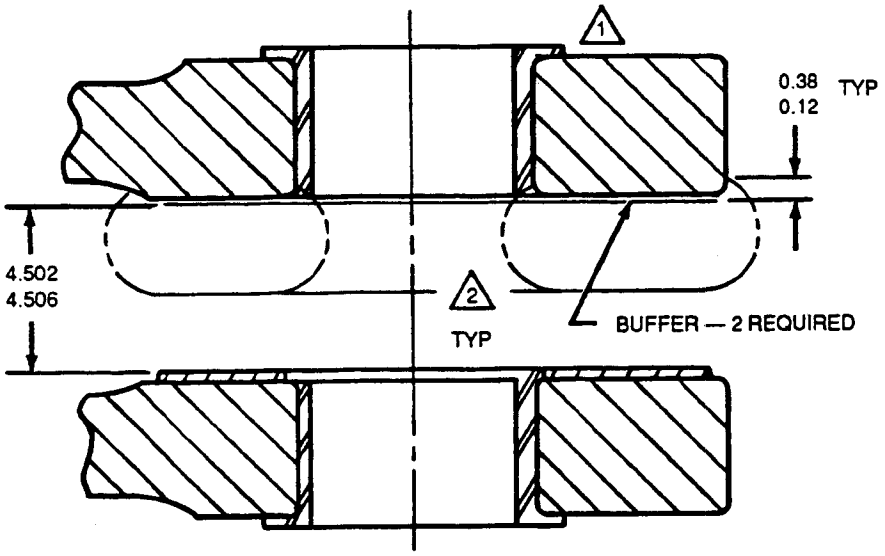
Figure 4-13DA.B Buffer Pad Fabrication



NOTE

ALL DIMENSIONS ARE IN INCHES

Figure 4-13DA.C Grip Machining



NOTES

1. 204-010-413-29 BUSHING (2 REQUIRED).
2. 2.500/2.501 DIAMETER "G 1" AND "G 2" THROUGH BUSHINGS.
3. MAINTAIN ORIGINAL GEOMETRIC RELATIONSHIP.
4. ALL DIMENSIONS ARE IN INCHES.

Figure 4-13DA.D Buffer Pad Installation

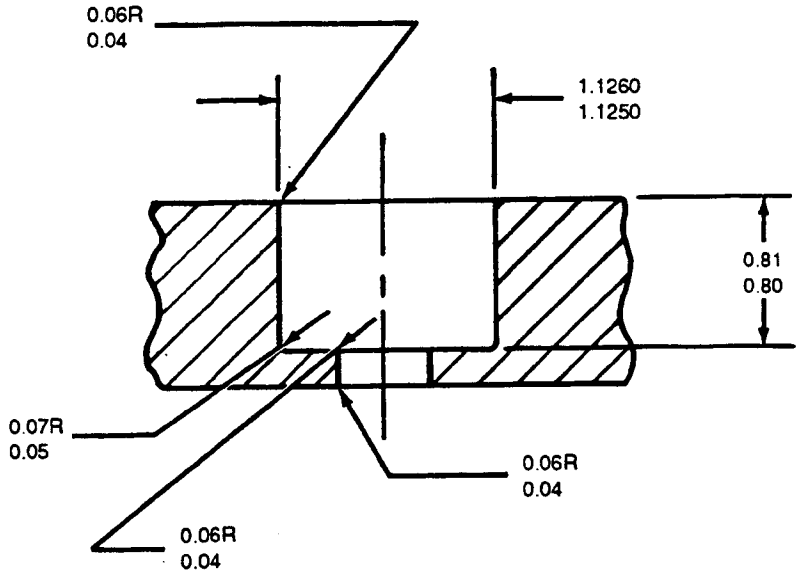
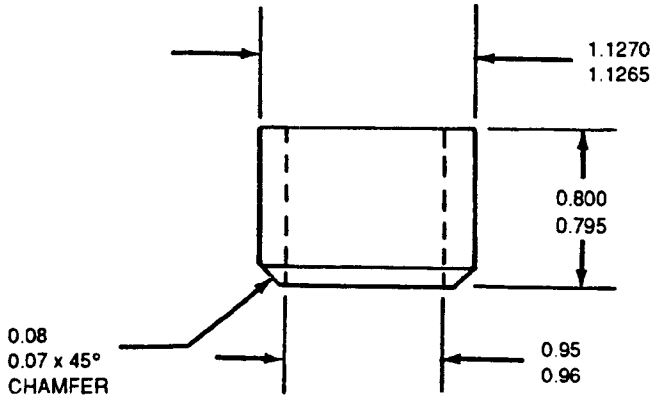


Figure 4-13DA.E Yoke Rework

DMWR 55-1560-196



MATERIAL: 17-4PH CRES
AMS-5643 PRECIPITATION HARDEN TO 170-200 KSI
AND PASSIVATE

Figure 4-13DA.F Bushing

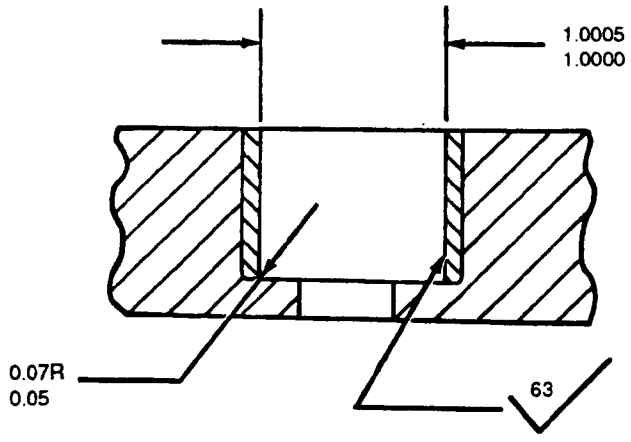


Figure 4-13DA.G Bushing Installation

4-24. STRAP FITTING. (21, figure 4-3).

WARNING

If parts require complete re-cadmium plating the bake cycle within 1 hour of plating at 375-385°F for 4 hours minimum is critical characteristic.

a. Fittings with surface corrosion or pitting shall be reworked as follows:

(1) Minimum allowable dimension of seal area is 3.489 diameter. The minimum amount of rework necessary to clean up the surface shall be accomplished.

(2) Use 320 to 400 grit abrasive paper to provide surface finish. (8-32 RMS).

(3) Light polishing with 240 grit abrasive paper may be used to blend out scratches from the pinhole and surrounding area.

(4) Remove corrosion on unplated tapered surface using a wire brush and corrosion removing and metal conditioning compound (item 30, table 8-1).

b. If required, rework the four outboard corners of fitting, formed by surfaces Y and Z and the surfaces between Y and Z (Figure 4-10) by providing a 0.09 minimum radius at each corner.

(1) Minimum amount of material necessary shall be removed, with sharp edges and burrs removed.

(2) After rework, reinspect fitting by magnetic particle procedures in Table 4-1.

4-25. DRAG BRACE BARREL. (14, figure 4-1).

a. The minimum allowable barrel O.D. is 1.270 inches.

b. Surface damage and corrosion pits, not exceeding 0.005 inch in depth, may be reworked and blended into the surrounding area.

c. If required, wire brush I.D. and threaded areas to remove surface corrosion.

d. Outer surface finish is 125 RMS.

e. Minimum amount of rework necessary to clean up surfaces shall be accomplished.

WARNING

If parts require complete re-cadmium plating the bake cycle within 1 hour of plating at 375-385 degrees F for 4 hours minimum is the critical characteristic.

f. Treat surfaces in accordance with paragraphs 4-14i and 4-18b. (Flash cadmium plate exterior surface).

4-25.1 Yoke Nut. (59, figure 4-1).

a. Inspect for damage threads. Stripped or crossed threads is cause for rejection.

b. Inspect for nicks or burrs. Nicks and burrs shall be smoothly blended.

c. Inspect nut for edge step wear. remove minimum amount of material using a polishing lathe or equivalent as necessary to remove the step. minimum acceptable dimensions 0.755 inch.

d. Inspect locking splines for damage. Blend out damage. Re-passivation after rework of nut is not required.

SECTION VI. Modification Criteria

4-26. MODIFICATION CRITERIA. (Refer to Appendix A).

a. Deleted.

b. Deleted.

c. Hub Assembly 204-012-101-5 on Shield Assembly 204-012-116-3 are installed shall be reidentified as P/N 204-012-101-19.

d. Deleted.

e. Hub Assembly 204-012-101-19, shall be upgraded to 204-012-101-31 configuration by servicing with MIL-L-46152 or MIL-L-2104 Grade 30 oil.

f. Modify Hub Assembly 204-012-101-5, -19, -31 and 137 to 204-012-101-139 by accomplishing the following:

1. Modify Bolt, NAS624-8 (See figure 4-13D).

2 Modify Grip, 204-011-121-5 (See figure 4-13E). Apply alodine 1200 solution to reworked areas.

3. Fabricate two plates, (See figure 4-13F). Apply alodine 1200, prime using MIL-P-23377C and paint using 37038 after completion. Rubber stamp with P/N 204-012-129-101.

4. Install plates in lieu of reservoir, P/N 204-010-191-1 with bolts, AN4H-3A, and washers, AN960-416. Lockwire bolt heads with 0.032 inch wire.

5. Modify two liners, P/N 204-011-122-1, (See figure 4-13G). Reidentify parts with new P/N 204--11-122-105.

6.. Fabricate two each disc, (See figure 4-13H). Apply alodine 1200 to reworked area. Prime with MIL-P-23377C and paint using 37038, after completion. Identify part with P/N 204-012-127-101.

7. Install disc in lieu of oil reservoir cover, P/N 204-010-507-1, with bolts, AN4H-5A, and washers, AN960-416. Lockwire bolt heads with 0.032 inch wire.

8. Modify two each pillow block seals, (See figure 4-13J).

NOTE

Use care during trimming to avoid damage to sealing surface. Trimming lip is to allow grease purge during lubrication.

9. During reassembly; hand pack all bearings, grip and yoke cavities and etc., using grease MIL-G-81322 prior to and during installation.

10. Apply grease, MIL-G-81322, in areas where manual now requires oil during assembly.

NOTE

Pillow block seal is installed with spring to the outside (Reverse of normal installation).

11. Reversr pillow block seal P/N 204-011-132-1, during installation. (See Figure 4-13K).

(12) During reassembly, prior to installation of strap retainer lock, PN 204-010-520-1, install modified bolt with washer PN MS20002 C4 chamfer (towards head of bolt) and grease fitting (see fig. 4-13D and 4-13k).

(13) Purge lubricate grips with hand grease gun using grease, MIL-G-81322, until grease purges through relief fitting. PN G47200, located on grip plate, PN 204-011-125-5.

(14) Safety grease fitting with .032 wire to lock, if necessary, a steel washer may be used to adjust angle for ease of lubrication.

(15) Purge lubricate pillow blocks with hand grease gun, using grease MIL-G-81322, until grease purges past previously reversed pillow block seals, PN 204-011-132-1 (reference Figure 4-13K)

(16) After complete reassembly of the main rotor hub assembly, place information for lubrication requirements in the remarks, block 8 of DA Form 2408-16 (with red ink) as follows: After installing main rotor grease hub on aircraft, ground run for 5 minutes at 100% and after shutdown, purge hub with grease until grease passes through grip plate relief fittings and trunnion seals. After first FLT., purge lubricate again. After 10 FLT hrs. purge again, and each 50 FLT hrs again.

g. Hub Assemblies PN 204-012-101-5, -19, -31, -137, -139 shall be upgraded to PN 204-012-101-141 by replacement of the following:

(1) Replace pillow block mounting hardware with MS14181-08044 bolts, and MS14182108 nuts if hub spring plate PN 204-011-207-101 is installed.

(2) Remove static stops PN 204-012-105-1 and replace with plate assembly PN 204-011-207-101 and associated hardware.

h. Modify all grips, PN 204-011-121, not identified with the suffix "P" after the serial number as follows:

(1) Remove liners (31, 32, fig 4-1) per para. 4-16.a.

NOTE

Shotpeening of the grip inside bore is a FSP critical characteristic.

(2) Shotpeen inside bore of grip as shown in figure 4-13P.

(3) Install new liners (31; 32, figure 4-1) per paragraph 4-16.a.

(4) To identify a shotpeened grip, vibroetch or impression stamp the letter "P" at the end of the serial number of the grip data plate.

PERFORM THE FOLLOWING STEPS MODIFY BOLT:

1. DRILL ALL THE WAY THROUGH BOLT WITH A #40 DRILL.
2. DRILL HEAD OF BOLT APPROXIMATELY 0.25 INCH DEEP WITH A #3 DRILL. HOLE SHOULD NOT EXCEED 0.27 INCHES IN DEPTH.
3. THREAD HOLE WITH A 1/4-28UNF-3B BOTTOM TAP TO DEPTH OF APPROXIMATELY 0.20 INCH.
4. INSTALL GREASE FITTING, P/N MS15001-4. TORQUE 50 TO 70 INCH POUNDS.

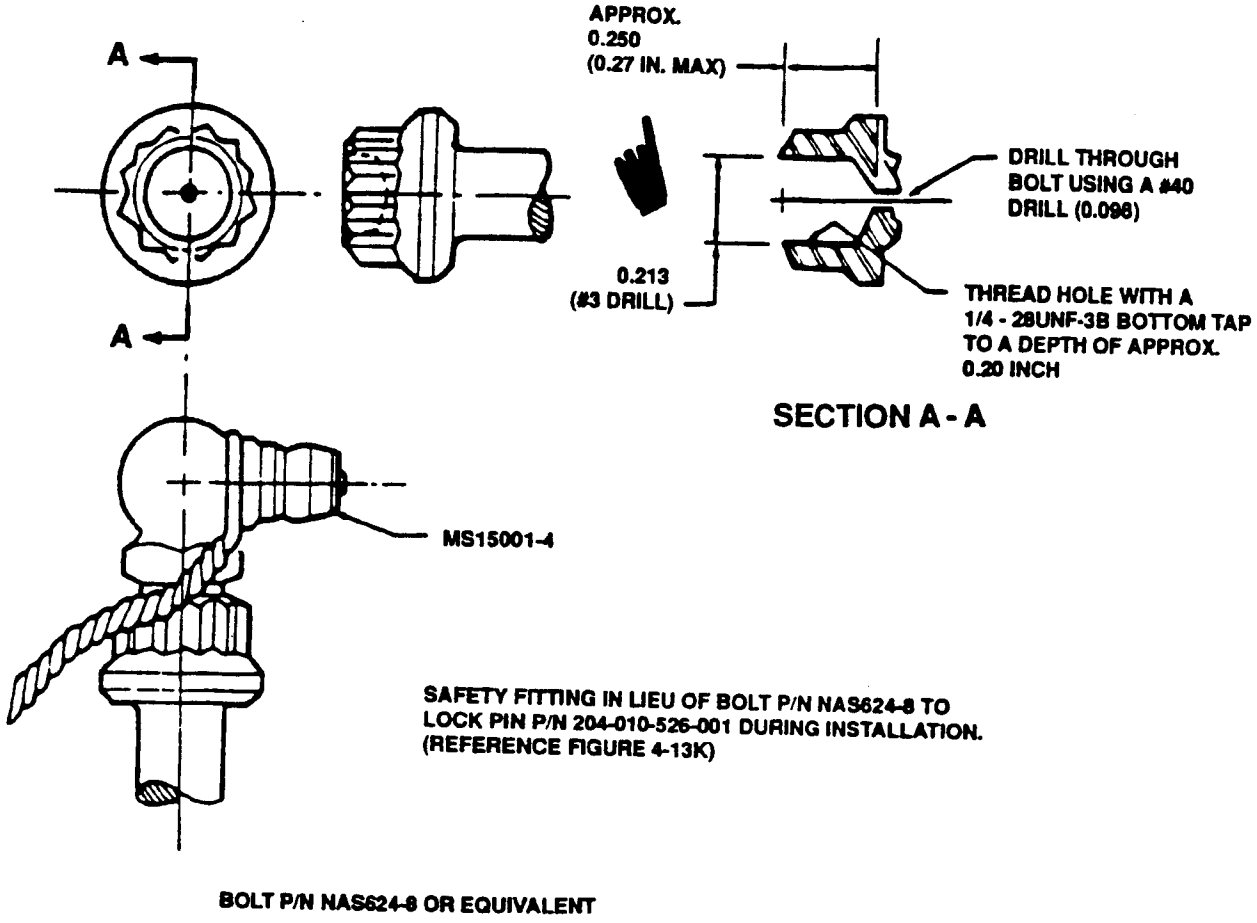


Figure 4-13DB Bolt Modification.

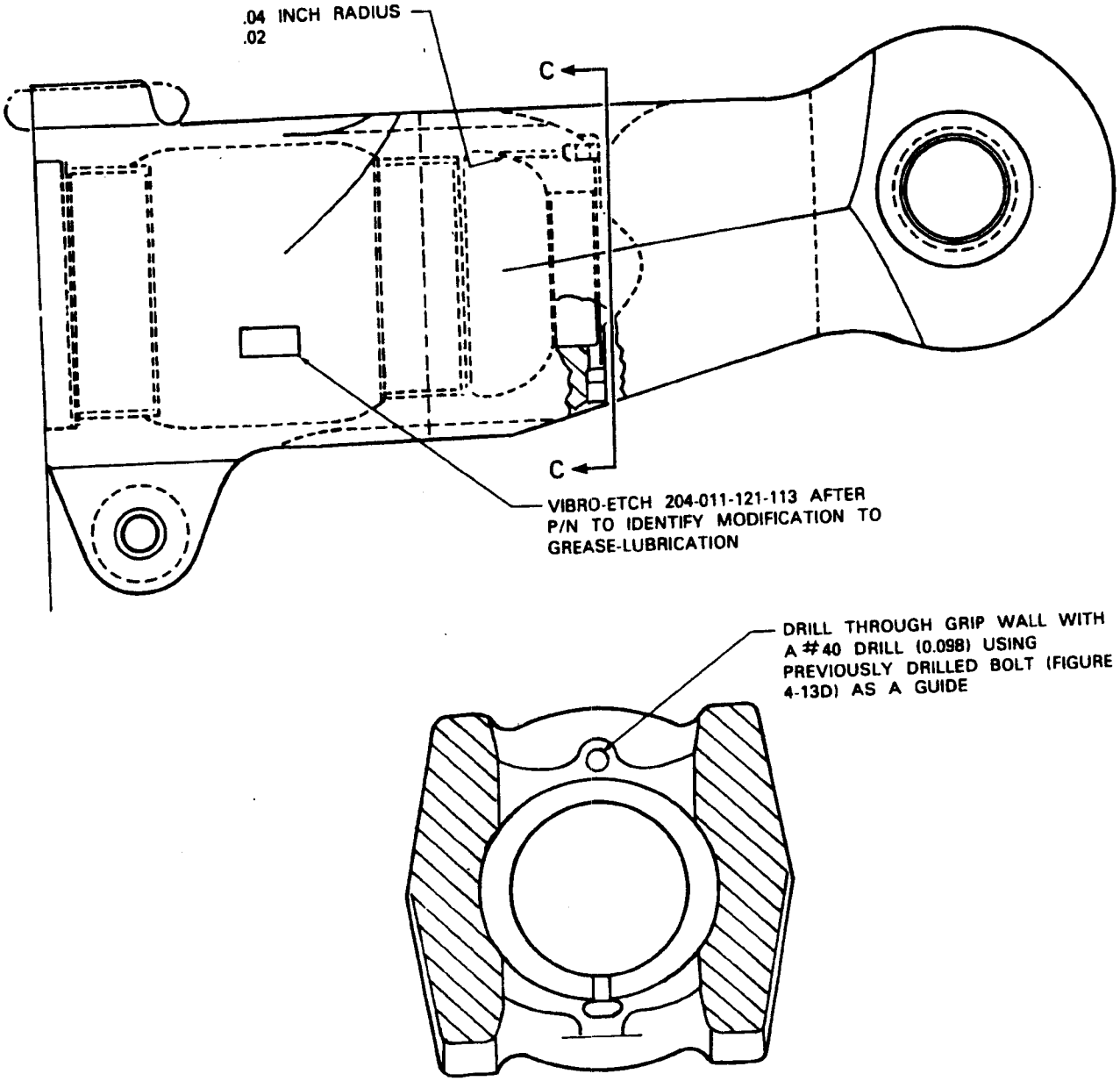
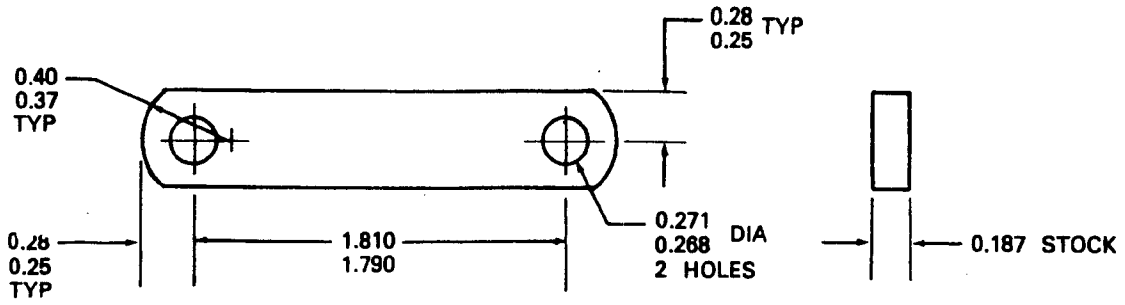


Figure 4-13E. Grip Modification.

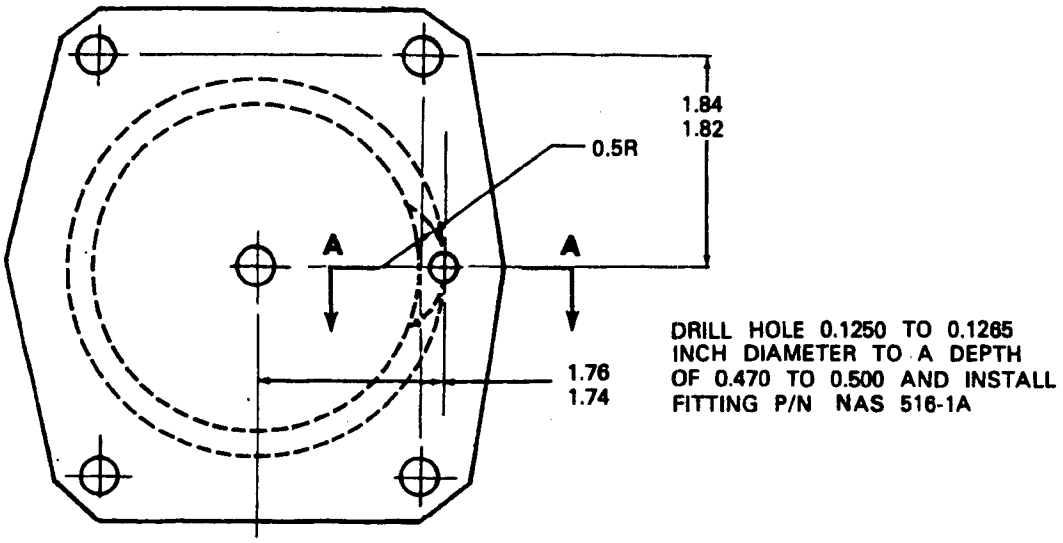
FABRICATE TWO EACH PLATE AS SHOWN



MATL: 2024-T3 OR T4 ALUM/ANY SPEC
FINISH: ALODINE

Figure 4-13F. Plate Fabrication (P/N 204-012-129-101)

MODIFICATION TWO EACH 204-011-122-001 AS SHOWN



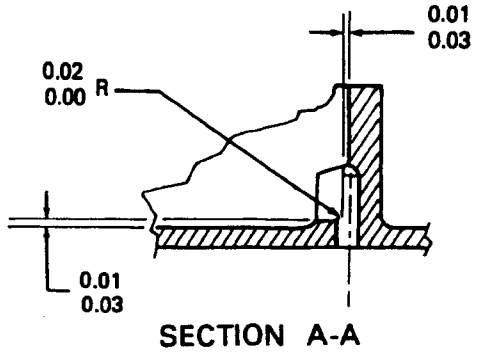
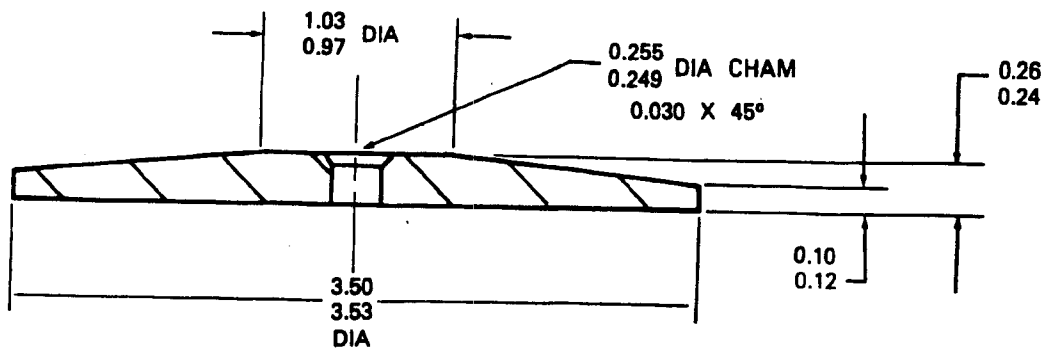


Figure 4-13G. Liner Modification.

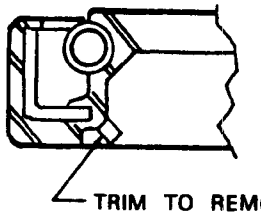
FABRICATE TWO EACH DISC AS SHOWN



MATL: 2024T3 OR T4 ALUM/ANY SPEC
FINISH : ALODINE
MICROFINISH: 63

Figure 4-13H. Disc Fabrication (P/N 204-012-127-101)

MODIFY TWO EACH 204-011-132-001 AS SHOWN



TAKE PARTICULAR CARE DURING LIP TRIMMING TO AVOID DAMAGE TO SEALING SURFACE. TRIMMING OF LIP IS TO ALLOW GREASE TO PURGE OUT DURING LUBRICATION.

Figure 4-13J. Pillow Block Seal Modification.

1. FITTING P/N MS15001-4
2. BOLT P/N NAS624-8
3. WASHER P/N MS20002C4
4. WASHER P/N AN960-416L
5. CLAMP P/N 204-011-149-001
6. LOCK P/N 204-010-526-001

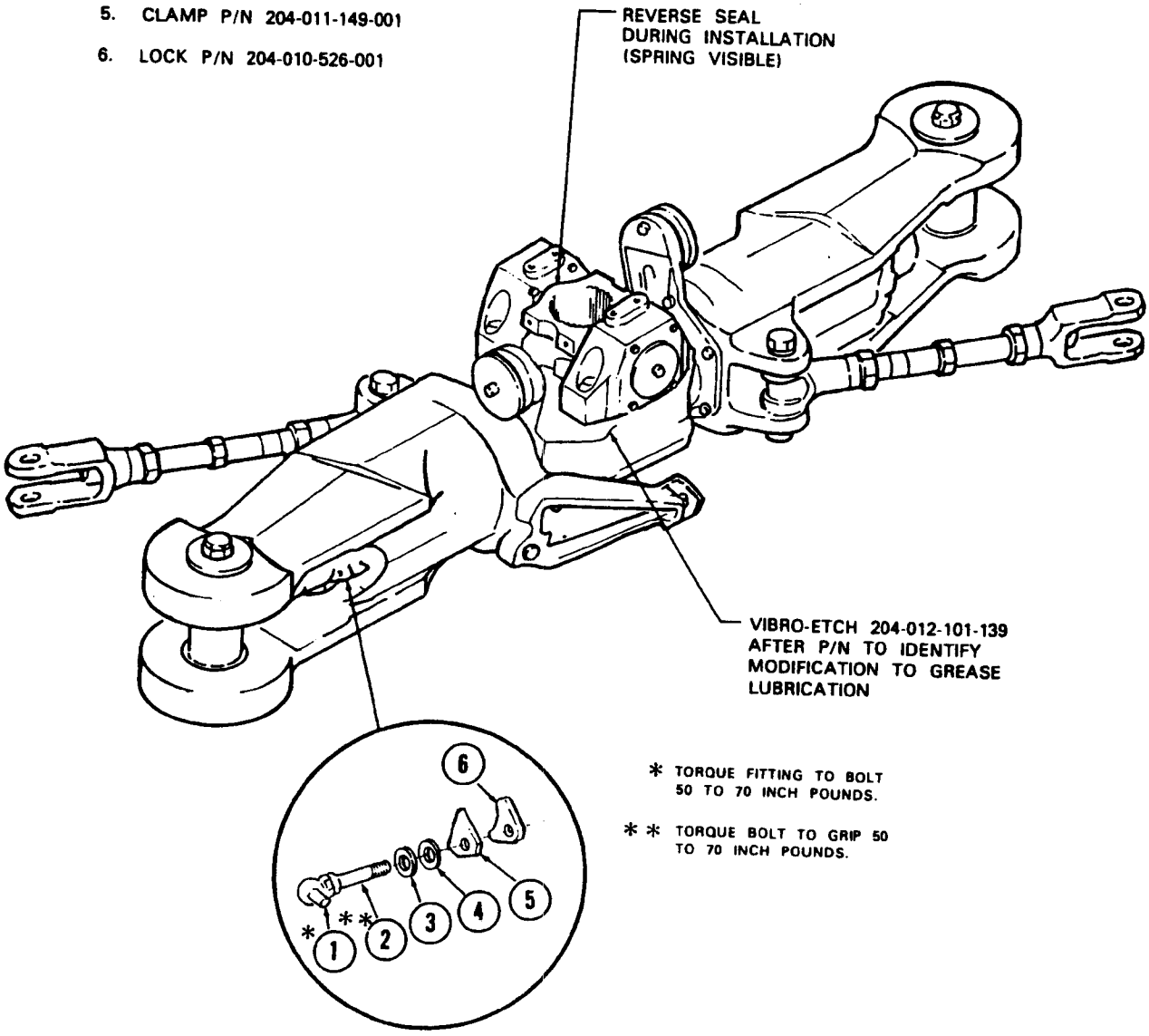
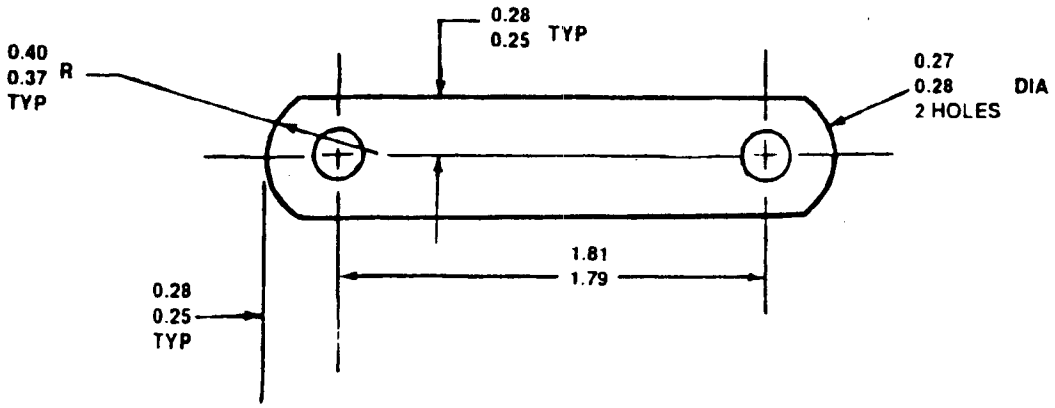
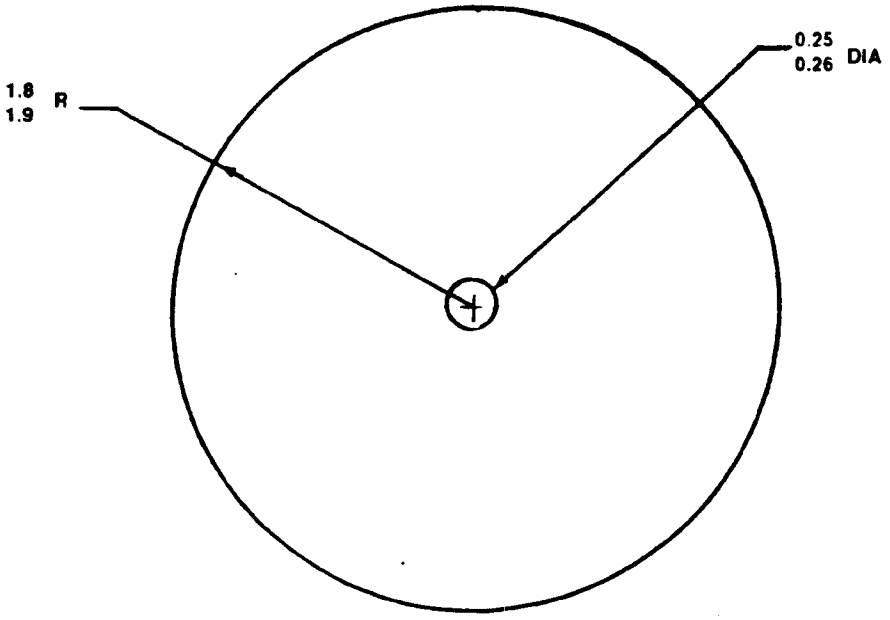


Figure 4-13K. Grease Fitting Installation.



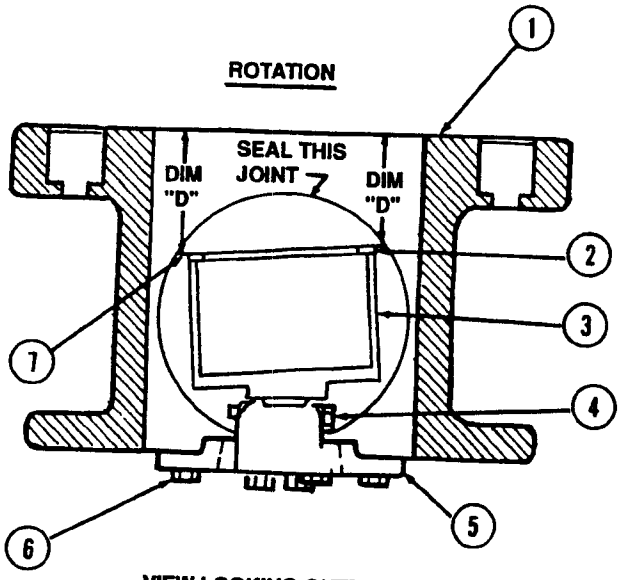
PART NUMBER: GRHB-1
FABRICATE FROM: GASKET MATERIAL, MIL-C-6183, 0.0157 OR 0.0313 INCH THICK, NSN 5330-00-054-1450

FIGURE 4-13L **Gasket GRHB-1.**



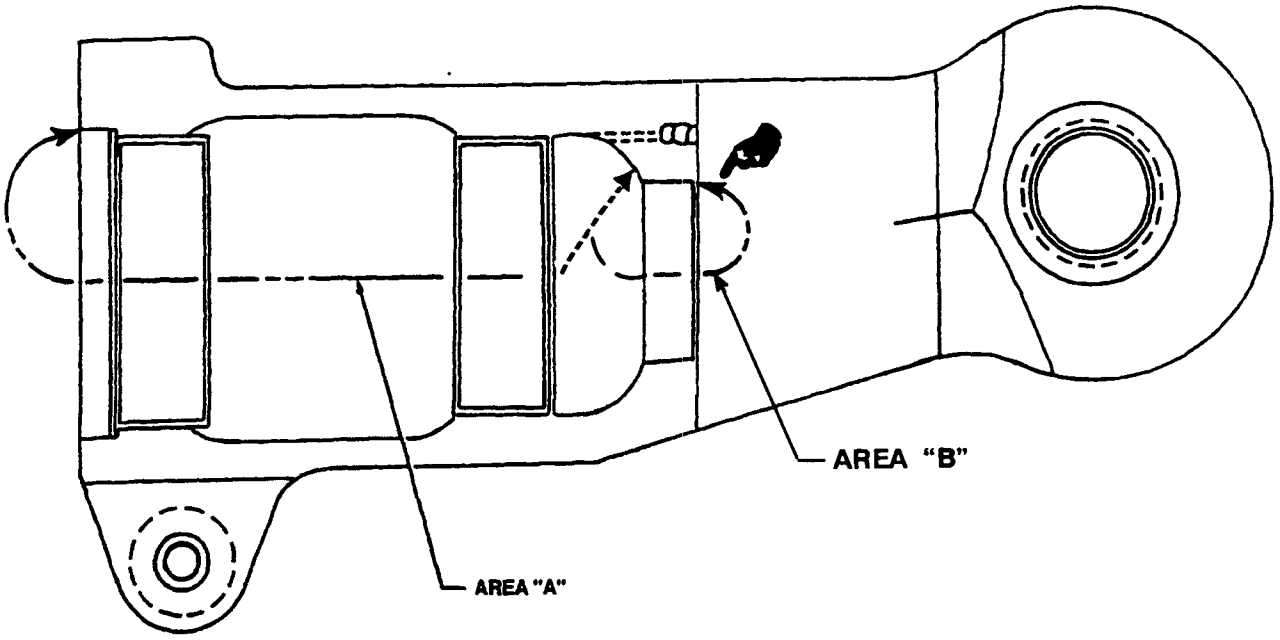
PART NUMBER: GRHB-2
FABRICATE FROM: GASKET MATERIAL, MIL-C-6183, 0.0157 OR 0.0313 INCH THICK, NSN 5330-00-054-1450

FIGURE 4-13M **Gasket GRHB-2.**



1. MAIN ROTOR YOKE
2. TAB (TRAILING EDGE)
3. INBOARD STRAP FITTING
4. WORM SCREW
5. STATIC STOP
6. BOLT (2)
7. TAB (LEADING EDGE)

Figure 4-13N. Collective Pitch Retention Strap Adjustment



WARNING

Shotpeening of grip inside bore is a FSP critical characteristic.

NOTES

1. Liners (31, 32, figure NO TAG) are to be removed before shotpeening.
2. Break all sharp edges 0.03–0.05 inch radius in Area A prior to shotpeening.
3. Shotpeen Area A per MIL-S-13165 using cast steel shot, shot size 280–330, 100% coverage, overspray permitted, intensity 0.010 to 0.014 A.
4. After shotpeening glass bead clean all surfaces and holes using glass beads per MIL-G-9954.
5. Shotpeen Area B per MIL-S-13165 using cast steel shot, shot size 280–330, with 98% coverage, overspray permitted, intensity 0.006 to 0.010 A2, surface finish not to exceed 200 RMS. (Do not machine finish after peening).

Figure 4-13P. Shotpeening Inside Bore of Grip

Section VII Reassembly and Testing of Subassemblies

4-27. REASSEMBLY GRIP. (Figure 4-3). a. Position grip (29) tangs down on a suitable bench. Lubricate O.D. of bearing (43) with oil item 28, table 8-1 and press bearing (43) into grip (29). Place packing (44) on outboard end and packing (46) on inboard end of spacer (45) slide spacer into grip firmly against outboard bearing. Press inboard bearing (47) into grip firm against spacer.

NOTE: Bearing installed with smooth edge outboard.

INSPECTION POINT: Inspect seating of bearings.

b. Position plate (31) flat side down on bench. Install disc (38), and attaching bolt (35), with washer (36). Torque bolt 18 to 20 inch-pounds.

INSPECTION POINT: Inspector verify torque of bolts.

c. Verify bearings are installed in location as removed in paragraph 4-6n. Inspect seating of bearings.

Table 4-3. Standard Torque
TORQUE VALUES
IN INCH-POUNDS

STANDARD NUTS, BOLTS, AND SCREWS			
BOLT,STUD OR SCREW SIZE	WRENCH SIZE	TENSION-TYPE NUTS AN310 AND AN365	SHEAR-TYPE NUTS AN320 AND AN364
8-36	11/32	12-15	7-9
10-32	3/8	20-25	12-25
1/4-28	7/16	50-70	30-40
5/16-24	1/2	100-140	60-85
3/8-24	9/16	160-190	95-110
7/16-20	5/8	450-500	270-300
1/2-20	3/4	480-690	290-410
9/16-18	7/8	800-1000	480-600
5/8-16	15/16	1100-1300	660-780
3/4-16	1-1/16	2300-2500	1300-1500
7/8-14	1-1/4	2500-3000	1500-1800
1-14	1-7/16	3700-5500	2200-3300

NOTE: All torque values are standard unless otherwise specified.

NOTE: Apply lubricant (item 9, table 8-1) to lips of all seals before they are installed unless otherwise stated.

d.Install plate assembly (31) on grip.Tighten bolts (30) snug and measure gap between grip and face plate. Remove plate and install packing (32) and shins (33) to give 0.003 to 0.007 clamp up on bearings. Install seal (34) on inboard side of plate (31) with adhesi· (item 16, table 8-1). The exposed edge seal (34) that mates with the plate is sealed in with sealant (item 18, table 8-1) reinstall plate assembly (31) and secure with bolts (30) and washers. Intall drain plug (1) Lockwire drain plug (1) and two bottom bolts (30). Lockwire remaining bolts (30) in pairs.

CAUTION: Sealant shall not cover lubrication ports in plate assembly(33).

INSPECTION POINT: Inspector check and verify gap dimensions, shim thickness and lockwire.

4-28. REASSEMBLY - PILLOW BLOCK AND TRUNNION. (Figure 4-3). a. Install packing (79) in radius ring (78) and press on trunnion (80). Press bearing inner race (72R) on trunnion tight against ring. Place packing (77), on lock (76) and install on trunnion (80) spindle. Install washer and nut (75) and torque 100 to 140 inch-pounds. Coat bores of trunnion spindles with corrosion preventive compound (item 13, table 8-1) before installing lock (76).

NOTE: Install bearing inner race with smooth side inboard.

b.Press bearing (72) into liner (67). Secure with retainer ring (71) and install seal (70). Position packings (69) in pillow block (74) and press lin er assembly into blocks and secure (not tight) with four bolts (66), washers and nuts (65). Install bolt heads inboard with washer under head and washer under nut.

NOTE: Shims (68) will not be installed until alignment operation, (step a thru d in paragraph 4-35) are completed.

c. Position pillow block outboard side down, drop thrust washer (73) through liner bearing.

d. Press trunnion assembly into liner.

INSPECTION POINT: Inspector will witness and verify packing and seal installation,torque and safetying procedures,lubrication, matching and fitting of bearings and parts in reassembly of pillow block and trunnion.Inspector shall verify that bolt (62) is new and shows no evidence of prior use. Ensure bolt MS14181-08044is installed.

NOTE: Repeat paragraph 4-28a through 4-28d for opposite side of trunnion.

4-29. TRUNNION ASSEMBLY TO YOKE. (Figure 4-3). (without hub spring plate assembly installed).

a. Hold trunnion assembly secure and mount on yoke with bushings (63) and bolts (62), washers (61) and nuts (60). Apply wet zinc chromate primer to interface of trunnion assembly and yoke prior to assembly.

NOTE

Install bolts (62) with two washers (61) under nuts (60). Tighten nuts to specified torque. If full depth of threads on bolt (62) do not show through nut (60), remove one washer (61) and retorque.

b. Tighten nuts (60) to a torque of 77 to 79 foot-pounds.

NOTE

To prevent loss of torque on bolts (62), remove top coat and primer paint from pillow block mating area of new yokes (64) prior to wet zinc chromate primer (item 8, table 8-1) application prior to installation of pillow block (74) on yoke (64). Base of pillow block (74) and O.D. of bushing (63) to be zinc chromate primer coated (item 8, table 8-1) and installed wet.

INSPECTION POINT: Inspector witness and verify priming and torque.

4-29.1 TRUNNION ASSEMBLY TO YOKE. (Figure 4-3) (with hub spring plate PN204-011-207-101 installed).

a. Hold trunnion assembly, secure and mount on yoke with bushings (63) and bolts (62) washers (61) and nuts (60).

b. Coat bolts (62), shank only with corrosion preventive compound (item 18B, table 8-1, no substitute) when replacing bolts that had evidence of the nut bottoming out, use two washers under the nut and ensure one full depth thread shows through the nut.

c. Install bolt (62) with washer(s) (61) and nut (60) and torque to 65-80 ft. lb.

d. After bolts are installed, apply a small bead of sealing compound (18) around the base of the bolt head, the washer(s) and the interface between the bushing sleeve and the yoke (PN 204-011-102-1).

NOTE

Sealing compound is required to prevent moisture from entering the bolt cavity. To prevent loss of torque on bolts (62), remove top coat and primer paint from pillow block mating area of new yokes (64) prior to wet zinc chromate primer (item 8, table 8-1) application prior to installation of pillow block (74) on yoke (64). Base of pillow block (74) and O.D. of bushings (63) to be zinc chromated (8) and installed wet.

INSPECTION POINT: Inspector will witness priming, application of CPC and torquing of pillow block bolts.

SECTION VIII. Final Assembly

4-30. STRAP ASSEMBLY TO YOKE. (Figure 4-3).

a. Place yoke on bench with trunnion side down.

b. Coat I.D. of yoke assembly with lubricant (item 10, table 8-1).

INSPECTION POINT: Verify straps (26) have at least 1100 hrs. remaining time.

NOTE

Use similar part number sets.

c. Insert strap (26) through spindle from outboard end. Place back-up ring (25) over strap end in center of yoke (64) with flat surface inboard. Install fitting (24) on inboard end of strap with gear quadrant up. Insert pin (20) and slide back-up ring (25) on fitting (24) tight against shoulder of fitting. Coat cavity of spindle and mating surface of back-up ring and inboard fitting with lubricant (item 10, table 8-1). Press fitting and strap assembly into cavity of yoke spindle.

4-31. Deleted.

4-31A. Final Assembly.

a. Determine shim (23A, Figure 4-3) thickness for installation of plate assy (23) to yoke (64) as follows:

NOTE

Stops (59) and Keys (59A) do not have to be installed while determining shim thickness.

(1) Hand tighten bolts (18) in plate assembly (23) making sure worm screw bottoms out on rack. Gradually tighten bolts in a criss cross ("X") pattern to 10 inch-pounds. Measure gap between yoke (64) and plate assembly (23) at each bolt location. Record each measurement being careful to keep the measurements for the red and white ends separate. Mark plate assembly orientation and remove plate assembly (23).

(2) Gap measurement between yoke and plate assembly may not be equal to end-to-end and side-to-side. Proper shimming of the plate assembly requires shims for the red and white ends to be calculated separately. This could result in a different shim thickness between the red and white ends.

(3) Average the two measurements taken for the red end. Subtract 0.008 - 0.012 inch from that average. Peel shim (23A) to this thickness. This will provide the required 0.008 - 0.012 inch pinch fit on the red end. Repeat this procedure for the white end. Using a grease pencil, mark the shims "RED" and "WHITE".

b. Install plate assembly (23) as follows:

(1) Coat mating surfaces of key (59A), shank of bolts (18), and shim (23A) with corrosion preventative compound (item 18A, table 8-1).

(2) Position each key (59A) in yoke and temporarily secure in place.

(3) Position shim (23A) on plate assy (23). Typical two places.

NOTE

If longer bolts were used as alignment aids during plate installation, they must be removed and replaced with the new bolts and washers (18).

(4) Apply a wet epoxy primer (item 36, table8-1) to shim mating surfaces on bottom side of yoke (64).

(5) While primer still wet, install plate assembly (23) to main rotor yoke (64) with bolts and washers (18).

NOTE

Check that worm teeth of static stop are engaged and stops in slot of radius.

(6) Torque bolts (18) to 180 to 210 inch-pounds.

(7) Verify worm gear (57) will not turn when a torque load of 10 inch-pounds is applied to the head of the worm gear. If worm gear turns remove bolts (18), re-shim by increasing pinch fit. Then verify worm gear will not turn with a torque load of 10 inch-pounds.

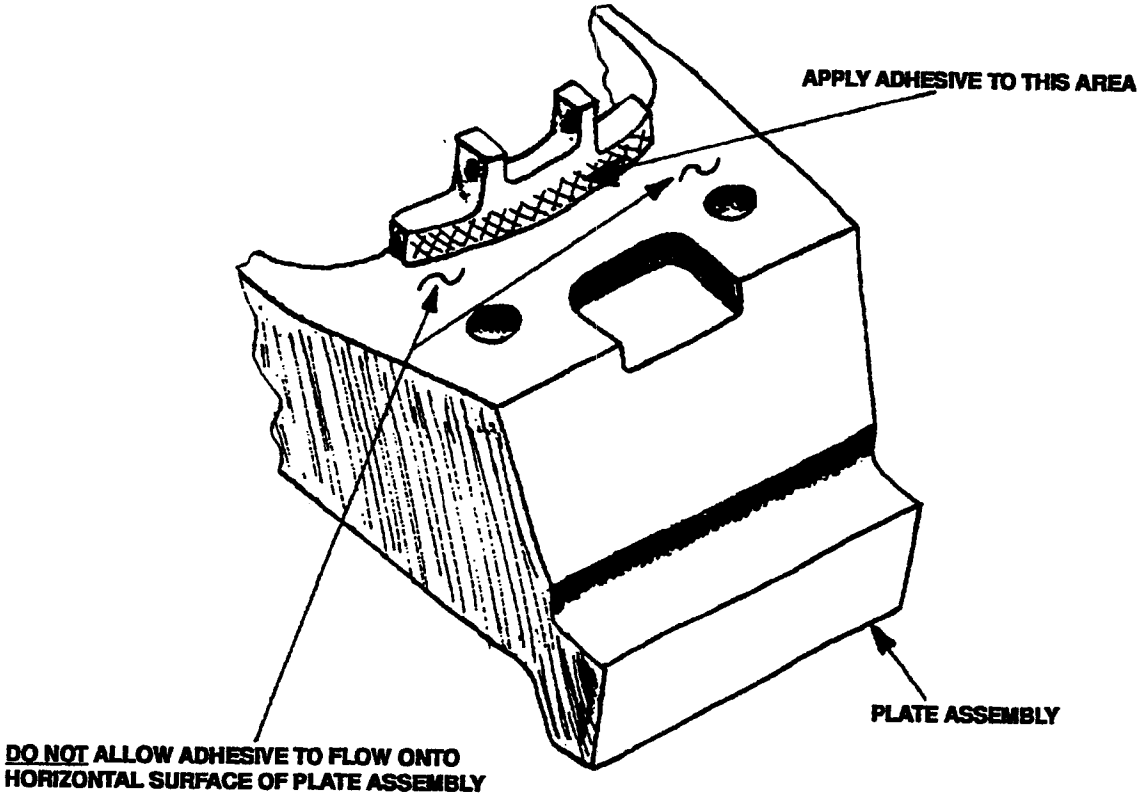


Figure 4-13Q. Plate Assembly - Application of Adhesive

NOTE

Check that worm gears (57) are engaged with rack and that stop is in slot of radius.

(8) Recheck position of inboard strap fitting. If in proper position, lockwire bolts (18).

INSPECTION POINT: Inspect, verify that worm gear does not turn using 10 - 15 inch pounds of force.

4-32. SHIELD ASSEMBLY, BEARING RACES AND SPACER TO YOKE.

a. Install packing (56) in shield assembly (55) and apply lubricant (item 10, table 8-1) to inside diameter of shield assembly (55).

b. Place shield assembly (55) with packing (56) on yoke spindle so that shield assembly mates radius of spindle assembly.

NOTE

Hub shall be configured with shield assemblies of the same part number.

NOTE

Repeat paragraph 4-32a. through 4-32b. for opposite side of yoke.

c. Position yoke on build-up bench T101356, (TRUNNION MATING SURFACE UP).

d. Apply lubricant (item 10, table 8-1) to inside diameter of bearing inner races both inboard and outboard and to yoke spindle bearing seats.

e. Tap bearing inner race (47R) on spindle tight against shield assembly (55). Slide inner spacer (54) on spindle and outer bearing inner race (43R) next to step of spacer.

NOTE

Inner races (47R and 43R) are installed with smooth edge facing outboard.

f. Install nut (53) using wrench adapter 67SPL12757-0114 on spindle, torque 85 to 170 foot-pounds, tap nut with a non-metallic hammer to seat bearing races, spacer and shield assembly. Retorque 85 to 70 foot pounds. Back off nut (53) to give 0.005 to 0.15 inches clearance between nut and inner race of bearing.

g. Install lockplate (52) and secure with two screws (51) on spindle end. Secure screws with lockwire (item 11, table 8-1).

NOTE

Lockplate may be installed on spindle of yoke with either face next to spindle to allow alignment with screw holes in spindle end.

INSPECTION POINT: Inspection verify torque, retorque, clearance and lockwire.

h. Install packings (49) channel seal (50) in seal sleeve (48) per figure 4-14A.

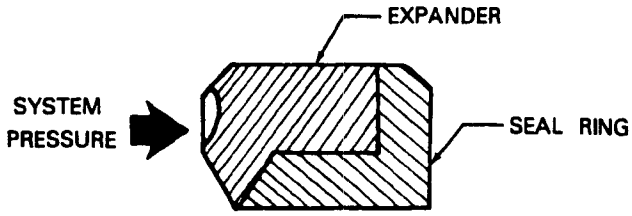
i. Apply a thin layer of sealant (18), Table 8-1, to yoke spindle on the area that mates with the seal sleeve (48). To seat seal sleeve on spindle, tap seal sleeve with a nonmetallic mallet. Allow sealant to cure. See figure 4-14B.

NOTE

Repeat para 4-32c thru 4-32i for opposite side of yoke.

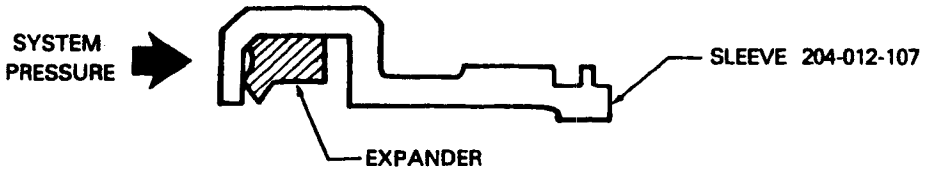
WARNING

Seal Sleeve (48) should be properly seated against Yoke Spindle. Failure to do so may result in subsequent damage and lubricant leakage.



LIPS OF EXPANDER MUST FACE PRESSURE SIDE

TO INSTALL HATSEAL II IN GLAND PROCEED AS FOLLOWS



STEP 1. INSTALL THE EXPANDER IN GROOVE AND POSITION TOWARD PRESSURE SIDE OF GROOVE

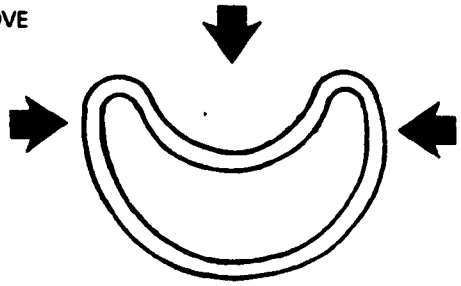
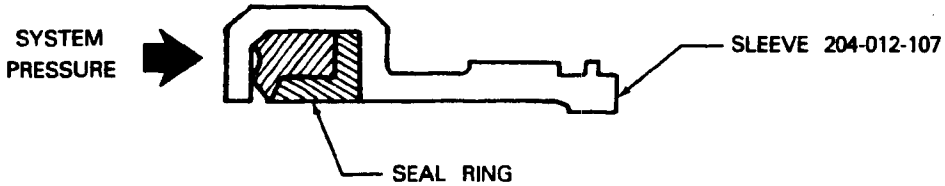


FIG. 1



STEP 2. AFTER FITTING EXPANDER IN GROOVE, FOLD SEAL RING AS SHOWN IN FIG. 1 AND INSTALL IN GROOVE ON LOW PRESSURE SIDE OF EXPANDER

Figure 4-14A.
Seal, Installation

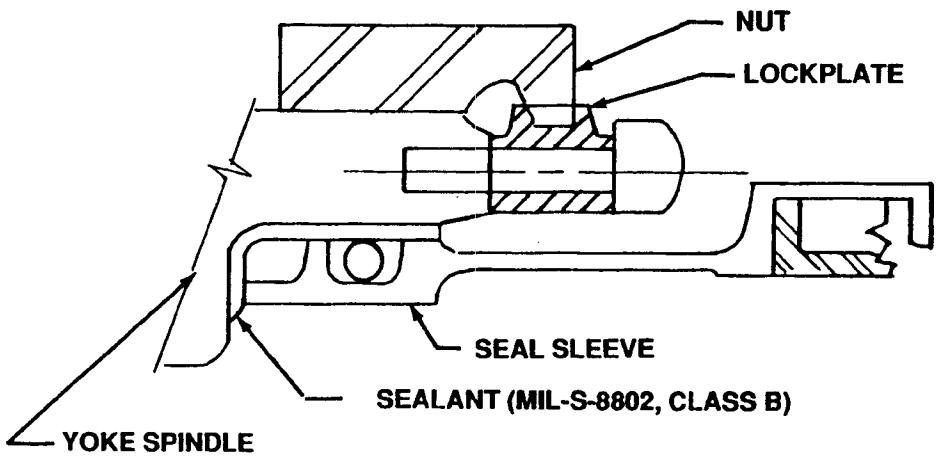


Figure 4-14B Installation of Seal Sleeve

4-33. GRIP ASSEMBLY TO YOKE ASSEMBLY (Figure 4-3).

a. Position grip assembly (29) on yoke spindle with tangs of grip approximately vertical. Press grip inboard and rotate 90 degrees to lock grip to ring (55).

NOTE

If radius ring (P/N 204-012-116-3) is installed, grip does not lock to ring. Use caution until strap pin is installed.

b. Place packing (22) on outboard fitting (21) and install on outboard end of strap (26). Install pin (20). Insert key (19) into grip (29) and fitting (21).

CAUTION

Exercise care to avoid damage to "O" rings during installation.

c. Coat internal surface of nut (17) except for threads, with corrosion preventive compound (item 18B, table 8-1). Coat threads of nut (17) with anti-seize compound. Install nut (17), (Final setting of nut (17) will be accomplished in stretch procedures). Temporarily install lock (16), clamp (15), washer (14) and bolt (13). To provide 0.010 to 0.040 pinch on nut, place thin washers under lock.

WARNING

If the strap is inadvertently rotated beyond 60° during processing of the main rotor hub, the retention strap shall be replaced.

NOTE

Repeat paragraph 4-33a. through c. for opposite side of yoke.

INSPECTION POINT: Inspector will witness and verify paragraph 4-33a. through c.

4-34. ASSEMBLY OF PITCH HORN and DRAG BRACE TO GRIP.

WARNING

Proper lockwiring of the bolts (27) is the critical characteristic.

NOTE

Do not apply CPC to bolt threads. Proper lockwiring of bolts (27) is the critical characteristic.

a. Apply zinc chromate primer (item 8, table 8-1) to mating surfaces of horn assembly (28) and install horn (28) on grip (29). Apply CPC (C18C) to bolt (27) and secure with bolts (27) and washers (27A). Torque bolts to 160 to 190 inch-pounds.

b. Install link T101402, temporarily.

c. Assemble nut (5) and (6) on barrel (9) and install fitting (7) and clevis (8).

NOTE

Install clevis (8) onto (9) with 4 to 6 threads showing and adjust fitting (7) to obtain 19 inch length measuring from center line of holes in fitting and clevis. Final adjustment will be made during stretch.

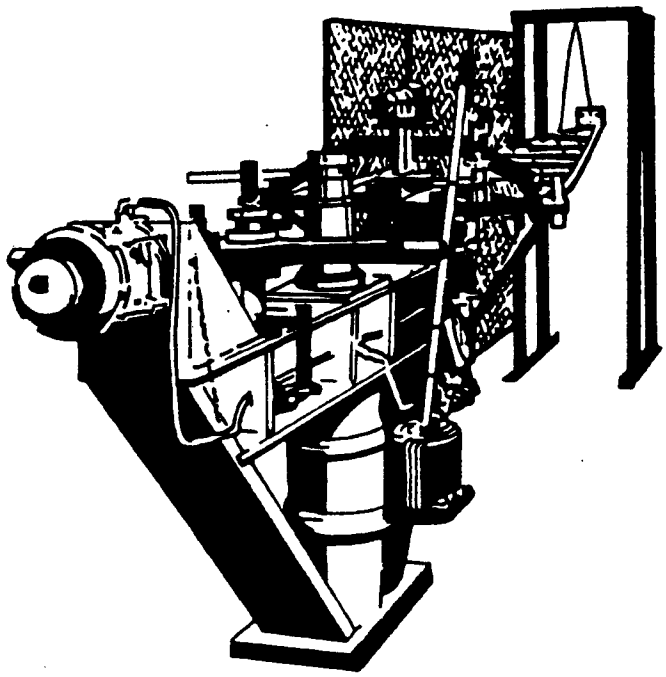
d. Install drag brace assembly to grip using bolt (4), washers (3) and nut (2). Install snug but do not torque.

NOTE

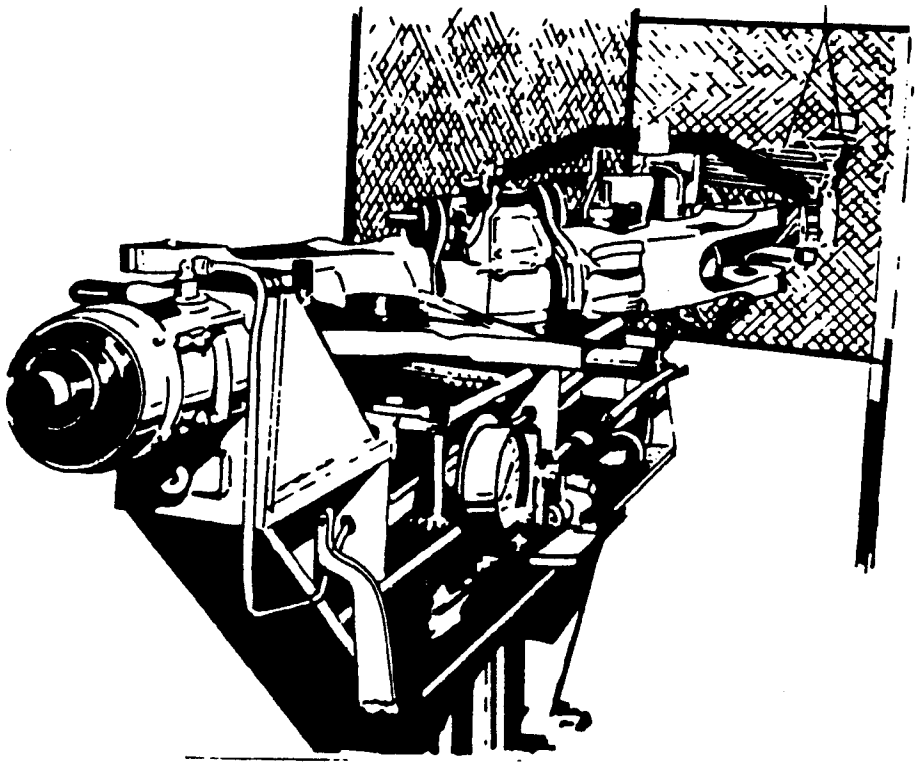
Repeat steps 4-34a through 4-34d for opposite side.

4-35. ALIGNMENT. (figure 4-14).

a. Place hub assembly into suitable alignment fixture, P/N 204-011-101-AAT-2-ID (Figure 4-14) , 204-012-101-3ASA-1-ID or equivalent.



Stretch Fixture-204-011-101-1ASA-1-1D



Stretch Fixture -204-011-101-1ASA-1-1D with Hub Installed

Figure 4-15. Stretch Fixture

b. Check to be sure that trunnion is properly centered. Trunnion must be centered within 0.003 inch.

c. Remove washers and nuts (65). Pull bolts (66) sufficient to clear for shim (68) insertion.

d. Insert shims as necessary to give 0.000 to 0.006 pinch up on trunnion on both sides. Push bolts (66) through shim and liner flanges. Install washers and nuts (65) and torque 100 to 140 inch-pounds. Install bolt heads inboard with washer under head and washer under nut.

INSPECTION POINT: Inspector check and verify shim adjustment, trunnion alignment and torque.

4-36. STRETCH. (Figure 4-15). a. Place hub assembly in suitable test fixture, P/N 204-011-101-ASA-1-1D, 204-012-101-3ASA-1D or equivalent.

b. Remove grip positioning links and level both ends of fixture. Insure that grips are feathered zero degrees with respect to the trunnion and 2° 30' to 3° 00' up spanwise (precone) when compared to trunnion.

c. Set gage bar to grip length master and then check distance to bolt holes (12) from center line of hub 28.000 inches plus or minus 0.010 inch prior to applying load. Make adjustment as necessary to hold 28.000 inches plus or minus 0.010 inch.

INSPECTION POINT: Inspector verify steps a,b,c.

d. Apply a tension load of 10 tons through the blade center of gravity and release. Recheck 28.000±.010 inches dimension. Readjust as necessary by removing lock (16) and adjusting nut (17).

e. Set drag brace assembly to same dimension as grip. (Ref 28.000±0.010 inches).

NOTE: Torque jamnuts to 650-800 inch-pounds.

f. Apply a tension load of 40 tons and hold for approximately five minutes then release load.

NOTE: Check that both ends of fixture are level.

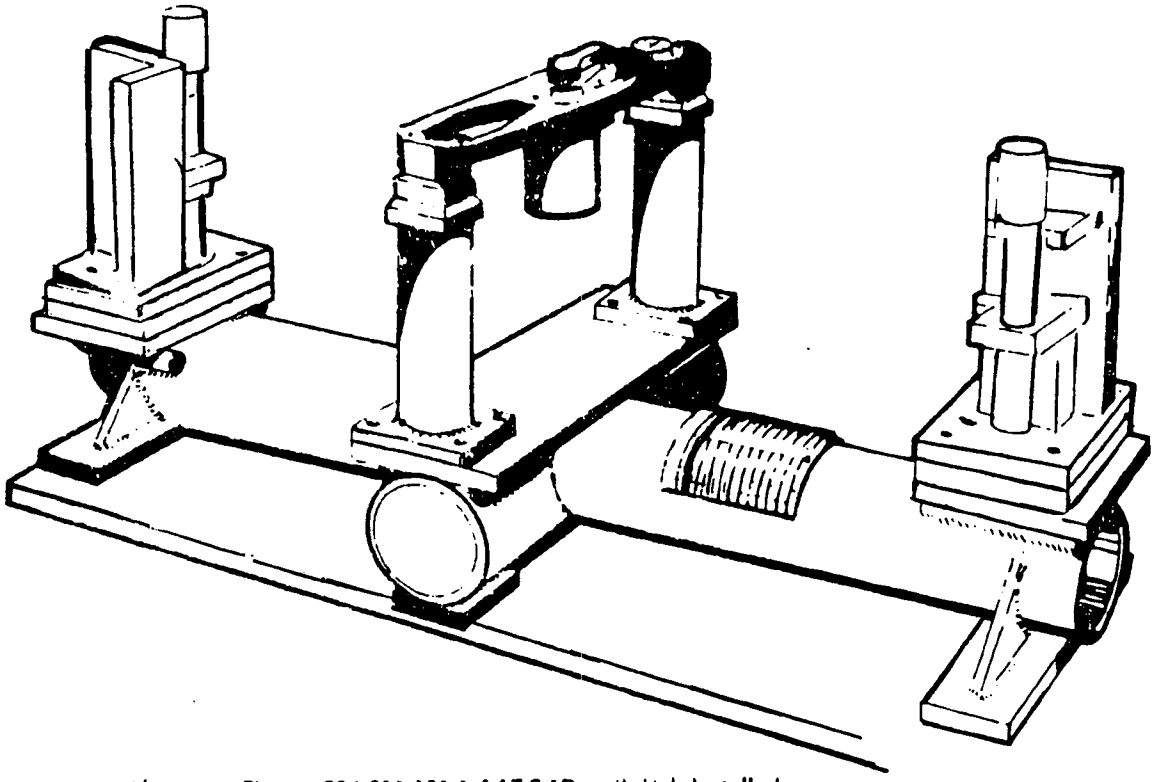
g. Apply a tension load of 30 tons and re-level both ends.

h. Check grip distances to center line of hub and set equal to plus or minus 0.002 inch.

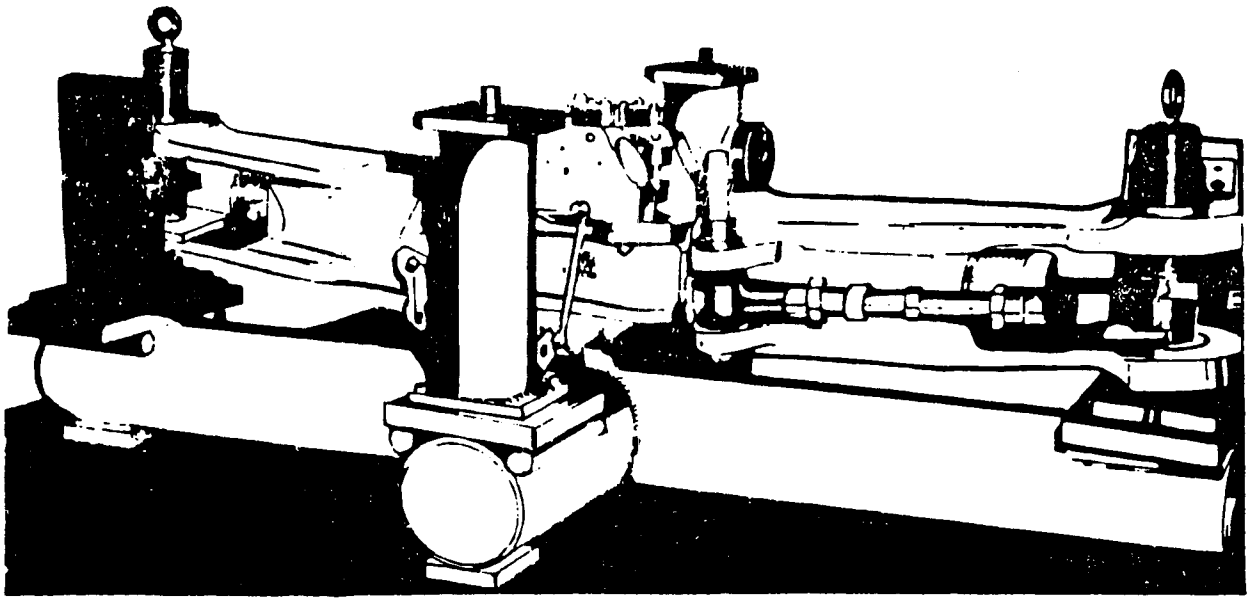
NOTE: If tolerance is not met, release pressure and adjust acorn nut(s) until tolerance is met. Repeat paragraph 4-36, steps g. and h.

i. Recheck drag brace assembly settings and set equal to plus or minus 0.002 inch and the same as the grip dimension to plus 0.000 inch or minus 0.002 inch.

NOTE: After final drag brace adjustment, no barrel threads shall extend beyond locknut.



Alignment Fixture-204-011-101-1 AAT-2-1D with Hub Installed.



Alignment Fixture-204-011-101-1 AAT-2-1D

Figure 4-14. Alignment Fixture.

WARNING

Proper installation of lock (16, figure 4-3), clamp (15, figure 4-3) and the lockwiring of bolt (13, figure 4-3) is the critical characteristic.

j. Secure lock (16, figure 4-3) and safety with wire (Item 11, table 8-1).

INSPECTION POINT: Inspector verify steps e, f, g, h, i, and j.

4-37. PAINTING (Figure 4-3).

NOTE

Any aluminum parts which require deoxidizing prior to painting shall have all high strength steel parts either removed or properly masked prior to the deoxidizing process.

NOTE

The listed items may be painted prior to assembly, however, ensure that the coating is sound after assembly and any necessary touch-up is done prior to balancing.

NOTE

Do not apply paint, other than wet zinc chromate primer to interface of trunnion assembly and yoke.

a. External surfaces of the following parts shall be painted (Item 12, table 8-1) after assembly but before balancing:

(1) Grip assemblies.

(2) Pitch horns.

(3) Drag brace clevis.

(4) Drag brace fitting.

(5) Grip retention (acorn) nut.

b. The following surfaces of the hub shall not be painted:

(1) Mating surfaces of Items (1), (2), (3) and (6) of paragraph 4-37a.

(2) Inboard section between seals (34).

(3) Deleted.

(4) Drag brace barrel (9) and nuts (5, 6).

(5) Flanges of blade bolt bushings, both top and bottom grip tangs.

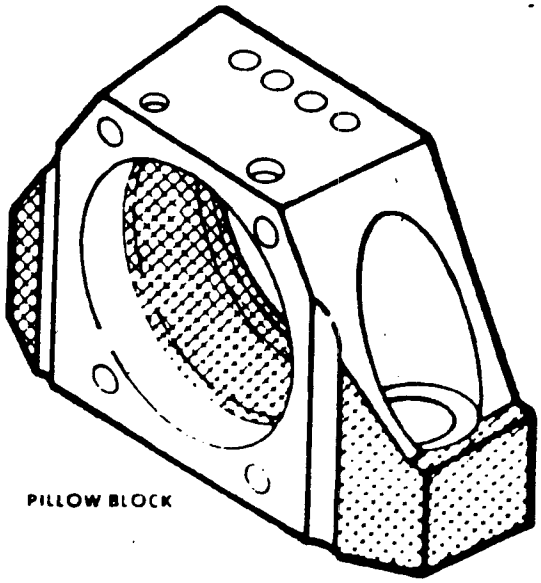
(6) Bolt and bushing holes and exposed threads of barrel (9) and bolt (4).

c. Paint will be in accordance with TM 55-1500-345-23, Painting and Marking of Army Aircraft.

d. All Corrosion Control will be in accordance with TM 55-1500-243-23, Corrosion Control for Army Aircraft.

4-38. BLADE BOLT INSTALLATION. Press plug (94, figure 4-3) in blade bolt (12) using zinc chromate primer (Item 8, table 8-1) on mating surfaces. Install blade bolts (12), washer (11), and nut (10) blade grip.

4-39. BALANCING MAIN ROTOR HUB. (See figures 4-16 and 4-17). a. Assembly hoist support structure (7A050) kit (figure 4-17) with 2398 vertical spacer sleeves in elbows to provide additional hoist arm length. Install one spacer in the vertical section of each elbow prior to installation of vertical tube.



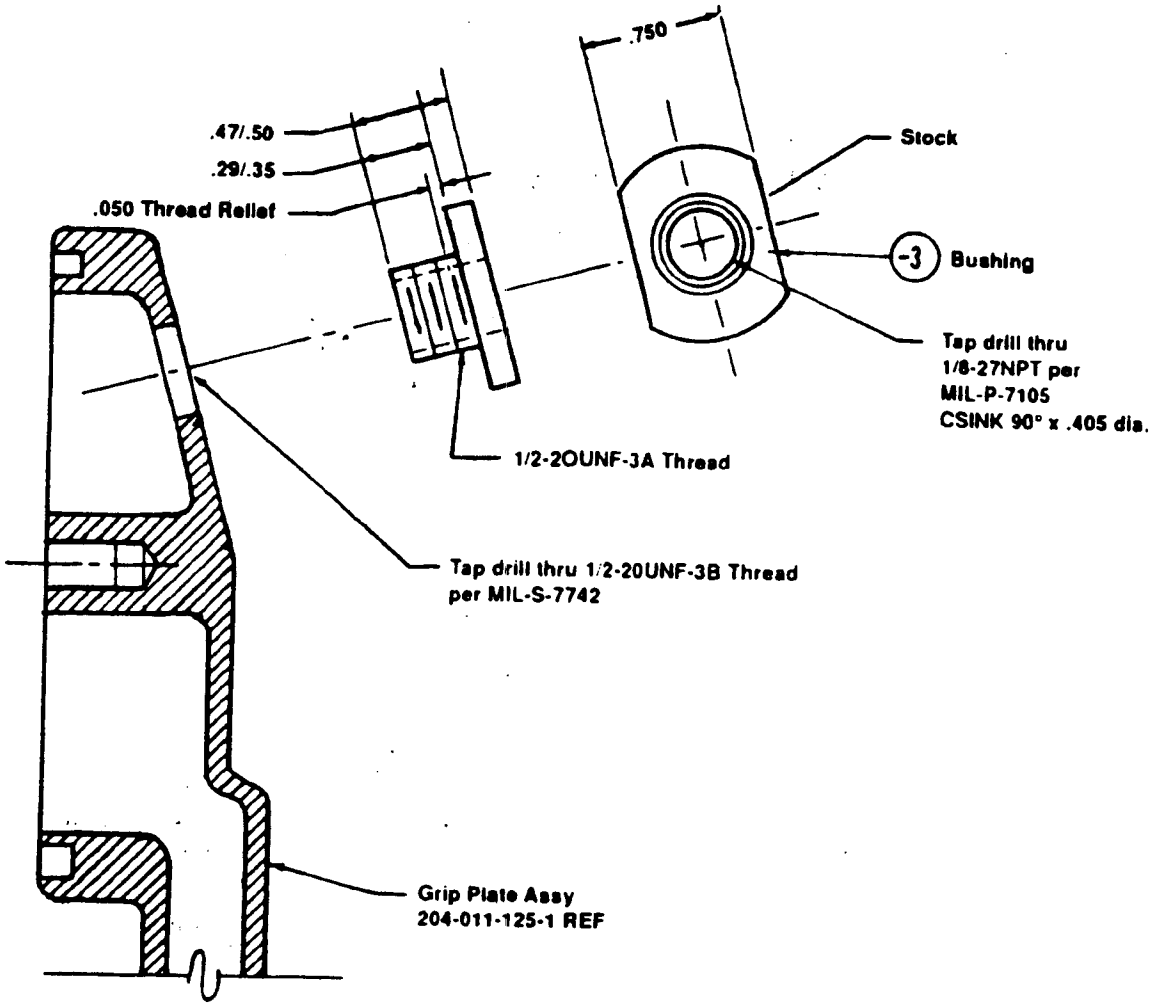
DAMAGE AREA REPAIR SYMBOLS

TYPE OF DAMAGE	MAXIMUM DEPTH AND REPAIR AREAS ALLOWED	
NICKS, SCRATCHES, SHARP DENTS	0.020 IN. BEFORE AND AFTER REPAIR	0.040 IN. BEFORE AND AFTER REPAIR
CORROSION	0.010 IN. BEFORE REPAIR 0.020 IN. AFTER REPAIR	0.020 IN. BEFORE REPAIR 0.040 IN. AFTER REPAIR
AREA OF FULL DEPTH REPAIR	0.10 SQ. IN.	0.25 SQ. IN.
NUMBER OF REPAIR AREAS	ONE PER SEGMENT	NOT CRITICAL
BOLT HOLE DAMAGE	0.001 INCH FOR ONE-FOURTH CIRCUMFERENCE	

NOTE:

1. All edges may be rediused or chamfered 0.060 inch to remove nicks and dents.
2. Repair areas should not overlap.
3. No cracks allowed.

Figure 4-13DA. Inspection Limits - Pillow Block



Notes:

1. Bushing P/N CR204-1-3, 1.0 inch dia stock, 4130 steel per MIL-S-6758, Cond. C-2, 125,000 psi max.
2. Cadmium plate bushing per QQ-P-416, Class 2, Type II.
3. Install bushing with Sealant, MIL-S-22473, Grade A.
4. After instl. apply bead of Sealant, MIL-S-8802, B-2 around bushing head.

Figure 4-13DA.A Thread Repair for Relief Fitting

b. Center fixture (11) on work stand (7A050) kit.

c. Install sleeve (1) over top of fixture (11) and seat sleeve on upper shoulder of fixture's centered projection.

d. Install adapter (6) heavy end downward, over top of fixture (11) and seat on top of sleeve (1). Lock adapter in this position by tightening adapter setscrew (2) using 1/8 inch hex wrench.

e. Carefully lower rotor hub assembly (7) over fixture (11), aligning inside diameter of splined trunnion with piloting diameter of adapter (6) and ensuring that cone surface of splined trunnion seats firmly on cone surface of adapter (6).

f. Install pitch positioning locks and adjust blade grips to symmetrical pitch position. To accomplish this, place bubble protractor on flat top surface of rotor hub across the grip pitch axis; adjust protractor to center bubble. Transfer protractor keeping it in same transverse position, to bottom inside surface of either blade grip fork and align protractor base with the transverse milled line in the fork surface. Adjust grip pitch to again center protractor bubble. Transfer protractor in same transverse position to opposite grip fork and repeat grip adjustment.

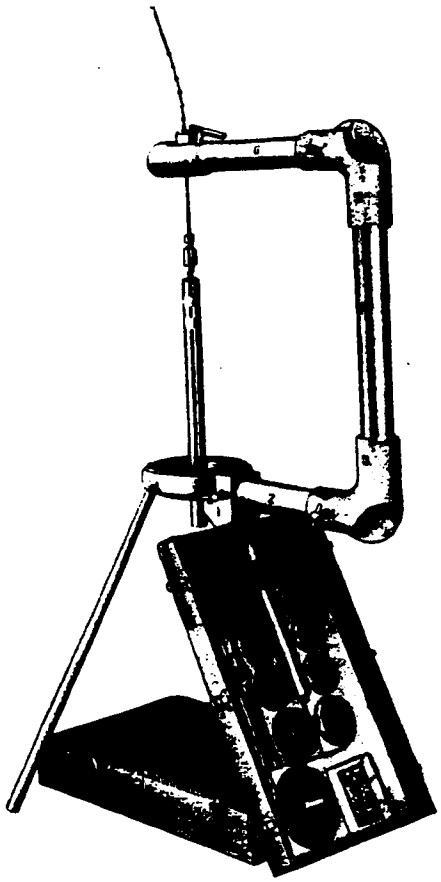


Figure 4–16. Balancing assembly

g. Using non-metallic mallet, tap heads of rotor blade retention bolts to ensure blade grips are fully seated in their radially outward position.

NOTE: Spot clean hub assembly with dry cleaning solvent (item 3, table 8-1).

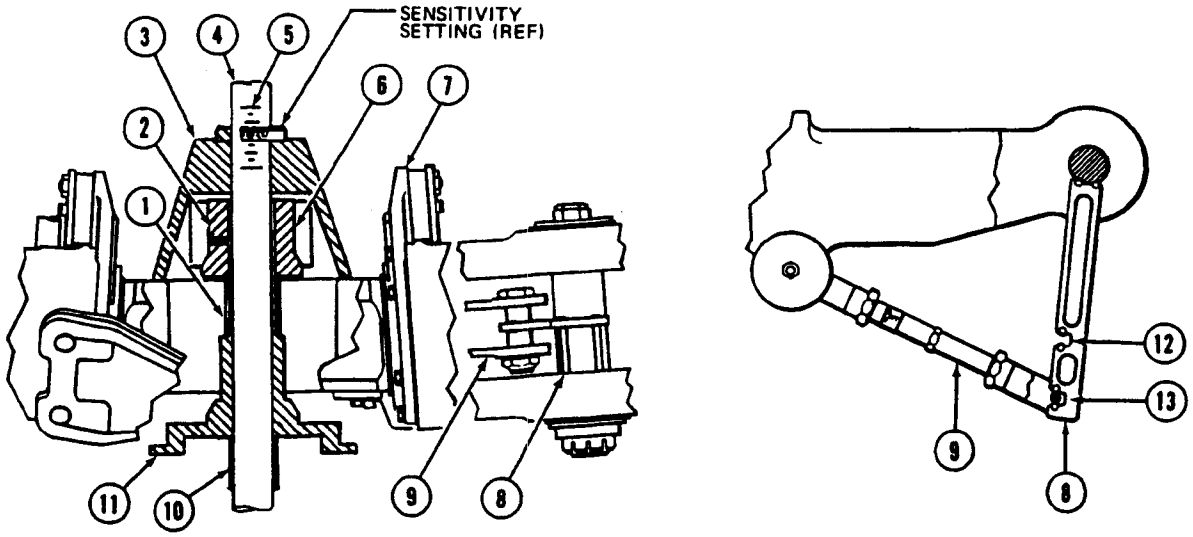
h. Install yoke (3), legs downward, over top end of arbor (4) and position so that top surface of its locking collar (sensitivity setting reference) (figure 4-17) aligns with arbor scale (5) at 14-3/4 inches. Lock yoke (3) firmly in this position on arbor with its lock screw.

i. Install arbor (4) downward through rotor trunnion and fixture (11) assembly, seating both yoke (3) legs firmly on flat top surface of rotor hub, in line with blade grip pitch axis.

j. Install 2215 hand wheel in bottom end of arbor and tighten to clamp yoke (3) firmly against top surface of rotor hub.

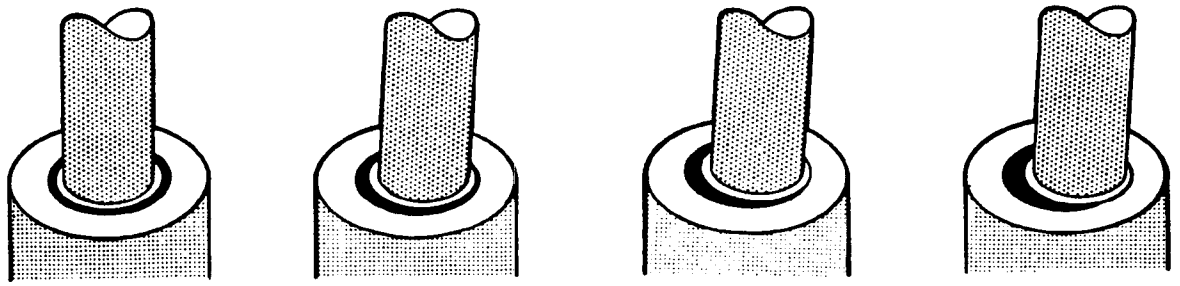
k. Using gage (8) as illustrated, adjust rotor hub drag brace struts to symmetrical angular position.

l. Install quick-disconnect assembly with 3/16 inch cable on arbor (4) suspension rod-end and engage cable in lifting plate of hydraulic pump assembly. Hoist entire assembly approximately 1-1/4 inch off work stand. Ensure that suspended assembly is free from interference with work stand and other objects and note balance condition indicated by black indicator disc at top end of arbor. (Refer to figure 4-18.)



1. Sleeve (2467, 7HEL054 Kit)
2. Adapter Set Screw
3. Yoke (2589, 7HEL061 Kit)
4. Balancing Arbor (2259, 7A050 Kit)
5. Arbor Scale
6. Adapter (2588, 7HEL061 Kit)
7. Rotor Hub Assembly
8. Drag Strut Positioning Gage (2486, 7HEL061 Kit)
9. Drag Strut
10. Spacer (7A050 Kit)
11. Fixture (2337, 7HEL054 Kit)
12. Gage Inner Position
13. Gage Outer Position

Figure 4-17. Balancing main rotor hub



VIEW A
INDICATOR CIRCLES CONCENTRIC (ASSEMBLY IN PERFECT BALANCE)

VIEW B
INDICATOR CIRCLES SLIGHTLY ECCENTRIC (ASSEMBLY SLIGHTLY OUT OF BALANCE BUT WITHIN ALLOWABLE UNBALANCE TOLERANCE)

VIEW C
INDICATOR CIRCLES TANGENT (ASSEMBLY OUT OF BALANCE TO MAXIMUM ALLOWABLE UNBALANCE TOLERANCE)

VIEW D
INDICATOR CIRCLES OVERLAPPING (ASSEMBLY OUT OF BALANCE BEYOND ALLOWABLE UNBALANCE TOLERANCE)

Figure 4-18. Interpretation – balance indication

4-40. APPLICATION OF BALANCE CORRECTIONS.

a. Balance hub spanwise by removing retention bolt plug and inserting lead wire slugs into cavity of blade retention bolt to achieve balance within limits of tool.

b. Balance hub chordwise by attaching weights (91, figure 4-3) and small washer, is required, to pillow block liner with washer and bolt (90). A maximum of 16 weights may be attached with an AN bolt (90) of sufficient length of secure weights to bolts.

c. Install plugs (95, figure 4-3) in blade bolts, and safety with wire (11, table 8-1).

d. Identify parts to maintain their respective positions. Identify main rotor hub parts with 1/2 inch diameter dots located in a conspicuous place on each part using lacquer, Federal Specification TT-L-32, gloss red color #11136 and gloss white color #17875, per Federal Specification 595. Color coding will be as follows: Looking down on main rotor hub with trunnion master spline towards same side as operator, color mark RED to the right and WHITE to the left. The minimum parts to be coded are the grip, retention bolt, pitch horn, and drag brace (clevis).

INSPECTION POINT: Inspect and verify balance, safety wiring of plugs.

4-41. FINAL ASSEMBLY AND SERVICING. (Figure 4-3). Place hub assembly on bench T101356.

a. Torque drag brace bolts 125 to 150 foot-pounds.

b. Deleted.

c. Deleted.

c1. Install grease fitting (13A), grease fitting (67A), plate (86) with gasket (97) and disc cover (38) with gasket (9

d. Deleted.

d1. Service hub assembly with grease (item 31, table 8-1). Refer to paragraph 4-26f, steps 13 thru 16.

e. Deleted

f. Insure that hub grip positioning links, T101402 (2) are installed.

g. Apply sealing compound (item 18, Table 8-1) between grip (29, figure 4-3) and plate (31) on upper surface only

Section IX. Run-In and Test Procedures

Not applicable

CHAPTER 5

QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Section I. GENERAL

5-1. Responsibility. The contractor depot quality assurance activity is responsible for the performance of the inspections specified in the DMWR. The contractor/depot may utilize their own facilities or any commercial laboratory acceptable to the procuring activity/commodity manager (PA/CM). The PA/CM reserves the right to perform any of the inspections specified in the DMWR, when such inspections are necessary to assure that supplies or services conform to the prescribed requirements.

5-2. Quality Assurance Terms and Definitions. For quality assurance terms and definitions refer to MIL-STD-109.

5-3. Inspection and Test Equipment. The overhaul facility is responsible for acquisitions, maintenance, calibration, and disposition of all inspection and test equipment. Test equipment to be used by AMC (Army) elements will be acquired in accordance with AR 750-43 and AMC Supplement 1 to AR 750-43. All instrumentation and inspection equipment used in compliance with this DMWR shall be calibrated and controlled in accordance with MIL-I-45607 and MIL-STD-45662 (Commercial facility) or DESCOM-R 702-1, Depot Quality Systems (Army facility), with all standards traceable to the National Bureau of Standards. Descriptions of inspecting and measuring equipment are left to the discretion of the overhauling facility to be considered as good shop practice.

5-4. Certification of Personnel, Materials, and Processes. The contractor/depot QA activity shall be responsible for ascertaining and certifying personnel skills, equipment, and materiel meet the requirements of the work to be accomplished. Unless otherwise specified in the contract or by PA/CM representative, the contractor/depot QA activity shall provide the PA/CM with statements or other evidence that specifications for such special processes as welding, nondestructive testing, plating, and the like, have been complied with. Personnel performing magnetic particle and penetrant tests shall be certified in accordance with MIL-STD-410.

Section II. INSPECTION REQUIREMENTS

5-5. General.

a. Quality Inspectors (QI) are required to witness all tests and those inspections which are marked "QI" or otherwise designated by the PA/CM.

b. The Maintenance Technicians shall inspect, check, and determine the conditions of all other areas to insure compliance with the DMWR.

5-6. Product Verification Audit. A product verification audit may be performed in accordance with AVSCOM-R 702-1 on one of the first five items produced to verify compliance with the DMWR and contractual terms.

5-7. In-Process and Acceptance Inspections.

a. Used components and refinished parts recovered as products of disassembly shall be examined 100% by the contractor/depot, to determine serviceability. A copy of this log shall be submitted to the PA/CM as part of the overhaul contract. The log shall contain the Maintenance Technician's comments for all parts, removed; such as, parts inspected, replaced, inspected by QI, tested by NDI, modified by MWO, or other notes or actions.

b. Diagnostic and nondestructive tests such as magnetic particle, penetrant, radiographic, and ultrasonic inspections as required by this DMWR shall be in accordance with referenced military specifications, and AVSCOM AA-STD-1 and AA-STD-2 where not otherwise specified. A qualified QI shall either perform or witness these tests.

c. A list of inspection definitions, Table 5-1, are included at the end of this chapter. Accept and reject criteria for these inspections and unique repair methods are found in applicable areas of this DMWR.

Table 5-1. Inspection Definitions

TERM	DEFINITION	PROBABLE CAUSE
Abrasion	Roughened surface, varying from light to severe	Foreign material present between moving parts
Bend	Any change in the in-intended configuration	Application of severe or excessive force
Break	Separation of part	Severe force, pressure or overload
Burn	Loss of metal	Excessive heat
Burnishing	The smoothing of a metal surface by mechanical action, but without loss of material. Generally found on plain bearing surfaces. Surface discoloration is sometimes present around outer edges of burnished area NOTE Normal burnishing from operational service is not detrimental if coverage approximates the carrying load and if there is no evidence of burns.	Excessive heat
Burr	A rough edge or sharp projection	Impact from foreign object, or poor machining
Chipping	Breaking away of small metallic particles	Heavy impact of foreign object
Corrosion	Surface chemical action that results in surface discoloration, a layer of oxide, rust, and removal of surface metal	Improper corrosion preventive procedures and excessive moisture
Crack	A break in material	Severe stress from overloading or shock; possible extension of a scratch
Dent	A small smoothly rounded depression	A sharp blow or excessive pressure

Table 5-1. Inspection Definitions (continued)

TERM	DEFINITION	PROBABLE CAUSE
Distortion	A change from original shape	Application of severe heat or irregular forces
Erosion	Wearing away of metal	Hot gases, corrosive liquids, or grit
Fatigue failure	Sharp indentions, cracks toolmarks, and inclusions that result in progressive yielding of one or more local areas	Cyclic stress. As stress is repeated, cracks develop, then spread, usually from surfaces (or near surface) of the particular section. Finally, so little sound material remains that normal stress on part exceeds strength of the remaining material. This type of failure is not caused by metal crystalization. This condition can easily be determined by visual inspection of part. Striations will be evidenced by several lines, more or less concentric. The center (or focus) of lines indicates origin of the failure
Flaking	Loose particles of metal or evidence of surface covering removal	Imperfect bond or severe load
Fracture	See break	
Gouging	Removal of surface metal. Typified by rough and deep depressions	Protruding objects, misalignment
Heat oxidizing	Characterized by a discoloring film Color varies from yellow to brown and blue to purple	High temperature operation
Indenting	Cavities with smooth bottoms and sides. Occurs on rolling contact surfaces of bearing components	Loose or foreign particles rolling between rotating elements of a bearing
Nick	A sharp-bottomed depression that may have rough outer edges	Dropping, banging
Off-square or misalignment of Anti-Friction Bearing	Indicated by retainer deterioration, retainer bore erosion, and gouged retainer rolling element pockets of the inner and outer race. Two distinct rolling element paths may be seen on the race where off-square conditions exist	Caused by rolling element speed variation, which jams rolling elements into separator pockets

Table 5-1. Inspection Definitions (continued)

TERM	DEFINITION	PROBABLE CAUSE
Pitting	Small indentions in a surface	Chemical pitting: Oxidation of surface or electrolytic action. Mechanical pitting: Chipping of loaded surfaces caused by improper clearances and overloading, and by pressure of foreign material
Scoring	Deep scratch following path of part travel	Result of localized lubrication breakdown between sliding surfaces
Scraping	A furrow	Rubbing with any hard, or rough pointed object
Scratch	A very shallow furrow or irregularity, usually longer than wide	Movement of a sharp object across the surface
Seizure	Fusion or binding of two adjacent surfaces preventing continued movement	Improper lubrication or wear
Stripped thread	Thread of a nut, stud, bolt, or screw damaged by tearing away part of thread	Improper installation or thread pitch or size
Tear	Parting of parent material	Excess tension, caused by an external force
Wear	Slow removal of parent material. Frequently, wear is not visible to the naked eye	Result of abrasive substances contacting rolling surfaces, and acting as a lapping compound

CHAPTER 6
PACKAGING

6-1. Output components will be preserved, packed, and marked in accordance with the Delivery Order/Contract, Depot Maintenance Interservice Support Agreement (DMISA), Statement of Work (SOW), Memorandum of Agreement, or other authorized document. Overhaul will not be considered complete until the output component is properly packaged.

6-2. Output components from organic depot maintenance and overhaul (M & O) programs will be packaged in accordance with the FEDLOG Packaging File and marked in accordance with MIL–STD 129. Components for which a special or multi–application container is specified will be packed in the assigned container. All other components will be packaged level A/B unless weight and dimension requirements of MIL–STD 2073–1 and –2 specify a wooden container. The level of packaging shall be level A/A when a special/multi–application reusable container is specified. When components are received at the overhaul maintenance facility, the container will be inspected for serviceability in accordance with Chapter 2, TB 55–8100–200–24. Containers will be requisitioned as required to replace missing, improper, or unserviceable containers to insure availability of container when the component is returned from the overhaul maintenance facility. Waivers, deviations, container substitution must be approved by the AMCOM Packaging Branch. Written communcation should be submitted to HQ, AMCOM, AMSAM–MMC–LS–DP, Redstone Arsenal, AL 35898–5230. Telephone inquiries may be made to Commercial (256) 842–8665 or DSN 788–8665.

6-3. All contractual matters shall be submitted through the assigned Contracting Officer (KO). Technical communication should be submitted to HQ AMCOM AMSAM-MMC-LS-DP, Redstone Arsenal, AL 35898–5230. Telephone inquires may be made to commercial (256) 842–8665 or DSN 788–8665.

CHAPTER 7

MAINTENANCE OF FORMS AND RECORDS

MAINTENANCE OF FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751.

CHAPTER 8
CONSUMABLE MATERIALS

8-1. Table 8-1 contains a listing of the consumable materials required for use in this Work Requirement. Consumable materials are that equipment and/or supply items identified as that which may be consumed in use or which loses its identity in an assembly.

Table 8-1. Consumable Materials.

ITEM NO.	NOMENCLATURE	SPECIFICATION NUMBER
1	Soft Aluminum Plate	QQA250/8B
2	Adhesive Structural	P/N EC 2216, FMC 76381
3	Degreasing Solvent	MIL-PRF-680 TYPE II, NSN 6850–01–474–2316
4	Dry Lube	MIL-L-46010
5	Crocus Cloth	P-C-458
6	India Stone Fine	SS-S-736B
7	Deleted	
8	Primer, Zinc Chromate	MIL-P-8585
9	Lubricant	MIL-G-23827
10	Grease	FS3451, FSCM71984, FS1281
11	Safety Wire	AN995-C32 or MS20995-C32
12	Catalyzed, Epoxy Paint	MIL-C-22750A
13	Preservative Compound, Class 3	MIL-C-11796
14	Deleted	
15	Deleted	
16	Adhesive, PROSEAL 706	MIL-S-8784
17	Deleted	
18	Sealant 890	MIL-S-8802, Class b
18A	Corrosion Preventive Compound	MIL-C-16173D Grade 1 (81349)
18B	Corrosion Preventive Compound	MIL-C-11796
18C	Corrosion Preventive Compound, Solvent Cutback Cold Application	MIL-C-16173, Grade 2

Table 8-1. Consumable Materials. (Sheet 2 of 3)

ITEM NO.	NOMENCLATURE	SPECIFICATION NUMBER
19	Acrylic Lacquer	MIL-L-19537
20	Anodic Coating	MIL-A-8625
21	Deleted	
22	Anti-Seize Compound	TT-S-00580B 8030-209-8005
23	Cloth, Cheesecloth, Cotton, Bleached	Alternate of MIL-C-16173 Grade I
24	Deleted	
25	Scotch-Brite, Type A, Grade Very Fine FMC76381 (or equivalent)	
26	Adhesive Aerospace Specification No. P/N EA934 FMC 12405 (or equivalent)	
27	Chemical conversion coating	MIL-C-81706 Class 1A, Form III
28	Lubricating Oil Grade 30	MIL-L-46152 or MIL-L-2104
29	Deleted	
30	Corrosion Removing and Metal Conditioning Compound	MIL-C-10578C
31	Grease (Aeroshell 22 or Mobil 28)	MIL-G-81322 9150 00 944 8953
32	Deleted	
33	Alodine (1200)	MIL-C-81706 8030-00-142-9272
34	Aluminum Stock (¼ x 3-½ inch and 3/16 x 2-½inch)	2024T3 9535 00 982 2717 2024T4 9535 00 500 4283

Table 8-1. Consumable Materials (Sheet 3 of 3)

ITEM NO.	NOMENCLATURE	SPECIFICATION NUMBER
35	Mold release	8030-01-064-4951
36	Primer, epoxy	8010-00-229-4813 MIL-P-301-1857
37	Adhesive EA9309.3	8040-01-301-1857
38	Naphtha	TT-N-95
39	Cleaning Solvent, General Purpose DS-108	7930-01-367-0996 MIL-I-25135
40	Isopropyl Alcohol, TT1735	6810-00-855-6160
41	Positron	6850-01-412-0028
42	Electron	6850-01-375-5553
43	Breakthrough, Cleaner	6850-01-378-0666 ADTM D235 TYPE II, Class C
44	Magnetic Inspection Compound	6850-01-196-5472
45	Paint Remover	8010-01-374-4336 MIL-R-83936, TYPE III

CHAPTER 9

TECHNICAL FACILITIES REQUIREMENTS

The Contractor's facilities shall be equipped to perform all phases of operation prescribed by this Work Requirement.

CHAPTER 10

TOOLS AND EQUIPMENT

10-1. TOOLS AND EQUIPMENT. A tools and equipment checklist is outlined herein to provide a convenient list of tools and equipment considered essential for the requirements of this Work Requirement. This list is primarily intended to be a ready reference list for the Contracting Officer in determining if the required tools and equipment are available, without a detailed reference to specific manufacturer, model, type part number, etc. Possession of all the items listed is not to be construed as mandatory. It is the contractor's responsibility to choose tools and equipment which are adequate and appropriate to accomplish all job functions in a competent and efficient manner. Conversely, possession of all of the itemized tools and equipment will not necessarily ensure approval of a contractor.

10-2. COMMON TOOLS AND EQUIPMENT. a. Handling equipment.

b. Disassembly and reassembly equipment.

c. Arbor press and adapters.

d. Cleaning and processing equipment.

e. Quality and tolerance check equipment.

(1) Magnetic particle inspection equipment.

(2) Fluorescent penetrant inspection equipment.

(3) Magnifying glasses.

(4) Micrometers.

(5) Dial indicators.

(6) Calipers.

f. Identification and marking equipment.

g. Miscellaneous equipment.

10-3. SPECIAL TOOLS AND EQUIPMENT. Listed in table 10-1 are the special tools and equipment needed to accomplish the requirements of this Work Requirement. This table lists the tools by part number, nomenclature, and typical manufacturer. Possession of all of the tools listed is not to be construed as mandatory, when the contractor may have similar tools on the facility or can locally purchase or manufacture adequate tools to accomplish all job functions in a competent and efficient manner.

Table 10-1. Special tools

PART NUMBER	NOMENCLATURE
T101356	Bench - Assembly - Build-up Main Rotor
T101402	Link (2)
T101405	Plate - Bearing Removal Main Rotor Grip
T101406	Plate - Removal Yoke Bearing
T101421	Plate - Adapter Build-up Bench
T101454	Puller - Jaw - Trunnion Bearing
204-001-101-1 AAT-2-1D	Alignment
204-011-101-1 ASA-1-1D	Stretch
NOTE: Above items manufactured by Bell Helicopter Company or equivalent.	
7A050 Kit	Propeller Balancing
7HEL054 Kit	Rotor Hub Piloting
7HEL061 Kit	Main Rotor Balancing Adapter
NOTE: Above items manufactured by Marvel Manufacturing Co., or equivalent.	
68 SAVAE-D-0012-2	Seal and Bearing Installation Tool
68 SAVAE-D-0012-4	
NOTE: Above items are manufactured by ARADMAC.	
67SPL-12757-0114	Wrench Adapter
NOTE: Above item locally manufactured.	

CHAPTER 11

OVERHAUL INTERVAL AND RETIREMENT LIFE SCHEDULE

11-1. Table 11-1 lists those items which have an established operating interval before they are overhauled or retired from service.

NOTE: Integral finite fatigue life parts shall not be reinstalled if the operating time remaining on these parts is less than Time Between Overhaul or Retirement Life interval of the component.

Table 11-1. Overhaul interval and retirement life schedule

ITEM NAME	PART NO.	OVERHAUL INTERVAL HOURS	RETIREMENT LIFE HOURS
Main Rotor Hub	204-012-101-137	1200	
Main Rotor Hub	204-012-101-5	1200	
Main Rotor Hub	204-012-101-19	1200	
Main Rotor Hub	204-012-101-31	1200	
Main Rotor Hub	204-012-101-139	1200	
Main Rotor Hub	204-012-101-141	1200	
*Inboard Strap Fitting	204-012-102-1		2400
*Outboard Strap Fitting	204-012-103-1		2400
*Strap Pin	204-012-104-1		2400
*Strap Pin	204-012-104-5		2400
*Strap Assy	204-012-112-5		2400
*Inboard Strap Fitting	204-012-102-5		2400
Drag Brace	204-011-142-3		3600
Clevis	204-011-179-1		3600
Plate Assembly	204-011-207-105		5000

*Denotes components of major assembly and must not exceed hours as indicated.

11-2. If the total time on Hub components is unknown and all methods of obtaining this data have been exhausted, then the TSN of the Hub shall be considered to be the TSN of the component.

CHAPTER 12
MILITARY AND FEDERAL SPECIFICATIONS

12-1. Table 12-1 lists Military and Federal Specifications used in the performance of this Work Requirement.

Table 12-1. Military and federal specifications

ITEM NO.	SPECIFICATION NUMBER	TITLE
1.	MIL-I-6866B	Inspection - Penetrant Method of
2.	MIL-I-1949	Inspection Process Magnetic Particle
3.	Deleted	
4.	Deleted	
5.	MIL-STD-410B	Inspection Personnel, Magnetic Particle and Penetrant
6.	MIL-C-5541B	Chemicals Films and Chemical Film Materials for Aluminum and Aluminum Alloys
7.	MIL-L-8937A	Lubricant, Solid Film Heat Cured
8.	Deleted	
9.	MIL-STD-171B Change 1	Finishing of Metal and Wood Surfaces
10.	Deleted	
11.	Deleted	
12.	MIL-STD-1504	Abrasive Blasting
13.	AVSCOM AA-STD-1	Quality Assurance Criteria fpr Magnetic Particle Inspection
14.	AVSCOM AA-STD-2	Quality Assurance Criteria fpr Penetrant Inspection
15.	MIL-C-83488	Aluminum, Ion Vapor Deposited
16.	MIL-S-13165	Shot Peening of Metal Parts
17.	MIL-I-6868	Magnetic Particle Inspection Process
18.	MIL-A-21380	Grain Abrasive

ITEM NO.	SPECIFICATION NUMBER	TITLE
19.	MIL-C-45662	Calibration System Requirements
20.	MIL-STD-109	Quality Assurance Terms and Definitions
21.	MIL-STD-45662	
22.	MIL-I-45607	Inspection Equipment Acquisition, Maintenance and Disposition of
23.	AMS 6371	
24.	AMS 2437	Coating, Plasma Spray Deposition
25.	AMS 2437-3	
26.	BPS 4312	Selective Brush Cadium Plating
27.	BPS 4343	Mechanical Cleaning of Metals
28.	BPS 4006	Plating, Cadium (Electrodeposited)
29.	MIL-I-25135	
30.	MIL-S-675B	
31.	MIL-S-5626	Bar Metal
32.	MIL-S-5000	Bar Metal
33.	FED STD 595	Colors used in Government
34.	Bell SAS 1024	Standard Method and Acceptance Criteria for Magnetic Particle Inspection
35.	QQ-C-320	Chromium Plating (Electrodeposited)
36.	MIL-L-46010A	Lubricant, Solid Film
37.	MIL-S-6758	Bar Metal
38.	MIL-P-23377C	

ITEM NO.	SPECIFICATION NUMBER	TITLE
39.	MIL-G-9954	Grain Abrasive
40.	FED SPEC 595	
41.	QQ-P-35	
42.	Bell SAS 1035	Standard Method and Acceptance Criteria for Magnetic Particle Inspection

CHAPTER 13
REFERENCE DATA

13-1. Table 13-1 lists all publications other than Military and Federal Specifications used in the performance of this Work Requirement.

Table 13-1. Reference data

ITEM NO	PUBLICATION NUMBER	TITLE
1.	TM 38-750	Army Equipment Record Procedures
2.	AMSAT-I-M Form 1379	Request for Depot Engineering Support
3.	DA Form 2410	Component Removal and Repair/Overhaul Record
4.	DA Form 2408-16	
5.	AMSAV Form 6525(J)	
6.	TM 1-1500-204-23	General Aircraft Maintenance Manual
7.	TM 55-1500-345-23	Painting and Marking of Army Aircraft
8.	TM 55-1500-243-23	Corrosion Control for Army Aircraft
9.	DESCOM-R 702-1	Depot Quality System
10.	AVSCOM-R 702-1	Product Verification Audit Requirements
11.	AMC Supplement 1 to AR 750-43	
12.	AR 750-43	Test, Measurement and Diagnostic Equipment, Including Prognostic Equipment and Calibration Test/Measurement Equipment
13.	DA PAM 738-751	The Army Maintenance Management System - Aviation (TAMMS-A)
14.	DMWR 55-1520-210	Aircraft Depot Maintenance Work Requirement

CHAPTER 14

KIT DATA

14-1. Identification of kits and other supply parts which may be required during overhaul is contained in separate supply documents normally accompanying this Work Requirement, such as Material Requirements List (MRL). Government Furnished Equipment (GFE) List, or Contractor Furnished Equipment (CFE) List.

CHAPTER 15
PART NUMBER LISTING

15-1. Table 15-1 contains a listing of part numbers to serve as a reference to aid in properly relating manufacture's part number to approved National Stock Number.

Table 15-1. Part number listing (Sheet 1 of 4)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-20B	AN4-3A	Bolt	5603-182-2014
4-1-33A	AN4H5A	Bolt	5306-182-2016
4-1-15	AN4H7A	Bolt	5306-292-8252
4-1-33	AN4H15A	Bolt	5306-182-1963
4-2-11			
4-2-9	AN5H31	Bolt	5306-180-2724
4-1-44	AN5H10A	Bolt	5306-180-2749
4-1-57	AN503-8-10	Screw	5305-271-7778
4-2-3	AN6H10	Bolt	5306-638-5775
4-2-3	AN6H11	Bolt	5306-638-4834
4-2-3	AN6H12	Bolt	5306-281-9995
4-2-3	AN6H13	Bolt	5310-638-5760
4-2-3	AN6H5	Bolt	5306-638-7511
4-2-3	AN6-6A	Bolt	5306-616-1224
4-2-3	AN6H7	Bolt	5306-637-8591
4-2-1	AN6H6A	Bolt	5306-638-5828
4-1-82	AN6H22A	Bolt	5306-638-5765
4-2-42	AH7510-1	Plate	9905-00-532-2497
4-2-16	AN814-5DL	Plug	4730-278-4994
4-1-42	MS24391D16L	Plug	5365-845-3502
4-1-5	AN814-101	Plug	5365-287-0106
4-1-7	AN960-1416	Washer	5310-167-0827
4-1-16	AN960-416	Washer	5310-141-1795
4-1-16B	AN960-416L	Washer	5310-167-0835
4-1-36	AN960-416L	Washer	
4-2-13	AN960-416L	Washer	
4-2-10	AN960-516L	Washer	5310-167-0836
4-1-83	AN960-616	Washer	5310-167-0821
4-2-4	AN960-616	Washer	
4-2-23	AN960-816	Washer	5310-167-0823
4-2-33	AN960-816	Washer	
4-1-35	AN960PD416	Washer	5310-187-2354
4-1-73			
4-2-14	AN960PD416	Washer	
4-1-45	AN960PD516	Washer	5310-187-2399
4-2-8	AN960PD516	Washer	
4-2-2	AN960PD616	Washer	5310-187-2400
4-1-65A	AN960PD816L	Washer	5310-184-8976
4-1-76	M83248-1-240	Packing, Preformed	
4-2-5	MS63040-6	Washer	5310-167-0768
4-2-24	MS14181-08044	Bolt	5306-01-300-0423
4-2-23A	AN960C816	Washer	5310-00-300-0423

Table 15-1. Part number listing (Sheet 2 of 4)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-2-23B	AN960C816L	Washer	5310-00-306-3167
4-2-22	MS14182L08	Nut	5310-01-300-0426
4-1-15A	MS15001-4	Grease Fitting	4730-050-4207
4-1-78	MS16562-199	Pin	
4-2-47	MS171462	Pin, Spring	5315-598-9857
4-1-16A	MS20002C4	Washer	5310-596-1766
4-1-46	MS24391-D5L	Plug	
4-1-34	MS29561-010	Packing	5310-846-0502
4-2-21	MS29561-011	Packing, Preformed	5330-882-6874
4-2-37	MS29561-218	Packing, Preformed	5330-618-2516
4-2-19	MS29561-220	Packing, Preformed	5330-618-2514
4-1-39	MS29561-234	Packing, Preformed	5330-542-1422
4-1-71	MS29561-237	Packing, Preformed	5330-726-4153
4-1-68	MS29561-238	Packing, Preformed	5330-806-4171
4-2-31	MS29561-240	Packing, Preformed	5330-725-0758
4-1-76	MS29561-240	Packing, Preformed	
4-1-63	MS29561-248	Packing, Preformed	5330-726-1236
4-1-52	MS29561-258	Packing, Preformed	5330-811-3281
4-1-67	MS29561-341	Packing, Preformed	5330-580-5936
4-1-37	MS35338-44	Washer	
4-2-12	MS35338-44	Washer	5310-582-5965
4-1-6	MS21245L14	Nut	5310-445-5336
4-2-27A	NAS516-1A	Fitting, Grease	4730-01-077-4893
4-2-32	NAS1022A8	Nut	5310-582-9819
4-1-47	NAS617-5	Packing, Preformed	5330-584-0150
4-2-17	NAS617-5	Packing, Preformed	
4-1-43	NAS617-6	Packing, Preformed	5330-576-9925
4-1-55B	NAS624-8	Bolt (See Fig. 4-13D)	5306-685-2006
4-2-39	MS16625-1346	Ring	5340-664-8889
4-2-7	MS21042L5	Nut	5310-807-1476
4-1-28	RAD207SB9	Insert	5340-286-2465
4-1-24	RD206SB8	Insert	5340-200-2362
4-1-26	RD208SB8	Insert	5340-710-9416
4-1-23	RD28SB8	Lockring	5365-682-5877
4-1-27	RD33SB9	Lockring	5365-735-0196
4-1-25	RD38SB9	Lockring	5365-382-6607
4-1-66	S32979-341G99	Packing, Preformed	
4-2-41	035-1487	Packing, Preformed	5330-691-6342
4-1-30	100-024-1	Plate, Ident.	9905-060-2034
4-2-2A	140-007-25S20A4	Washer	5310-01-291-6567
4-1-56	159-1487	Packing, Preformed	5330-691-6345
4-1-54	160-1487	Packing, Preformed	5330-691-6361
4-1-84	204-010-170-5	Bushing	3120-837-1527
4-1-85	204-010-170-7	Bushing	3120-839-5863
4-1-86	204-010-170-9	Bushing	3120-984-5761
4-1-21	204-010-413-27	Bushing	3120-848-6976
4-1-22	204-010-413-29	Bushing	3120-848-6977

Table 15-1. Part number listing (Sheet 3 of 4)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-38	204-010-507-1	Cover	1615-624-6723
4-1-18	204-010-526-1	Lock	1615-670-2959
4-2-18	204-010-529-1	Cover	1615-633-0828
4-2-43	204-011-102-17	Yoke Assembly	1560-757-2905
4-2-27	204-011-105-1	Trunnion Assembly	1615-474-9224
4-2-26	204-011-108-1	Block, Pillow	1615-00-406-7717
4-2-38	204-011-110-3	Bearing	3110-897-3803
4-1-51	204-011-111-1	Bearing	3110-446-7575
4-1-55	204-011-112-1	Bearing	3110-474-9232
4-1-19	204-011-116-1	Nut	1615-474-9240
4-1-87	204-011-120-5	Pitch Horn	1615-085-3887
4-1-29	204-011-121-113	Grip Assembly	1651-446-7576
4-1	204-011-121-5	Grip Assembly	
4-2-27	204-011-122-1	Liner Assembly	1615-474-9146
4-2-29	204-011-122-5	Liner Assembly	
4-1-64	204-011-123-1	Ring	1615-446-6372
4-1-49	204-011-125-5	Plate	1615-01-041-7058
4-1-48	204-011-126-1	Ring	5340-446-6375
4-1-31	204-011-129-1	Bushing	3120-446-6376
4-1-32	204-011-130-1	Liner	1615-898-0045
4-1-61	204-011-131-5	Seal	5330-753-4409
4-2-40	204-011-132-1	Seal	5330-758-3672
4-2-35	204-011-133-1	Washer, Thrust	5330-446-6377
4-2-36	204-011-134-1	Lock	1615-898-0046
4-2-25	204-011-135-3	Bushing	1615-954-6363
4-1-11	204-011-141-1	Fitting	1615-716-8568
4-1-12	204-011-142-3	Clevis	5340-839-3935
4-1-14	204-011-143-3	Barrel	
4-1-19	204-011-144-1	Nut	1560-830-9734
4-1-10	204-011-144-3	Nut	1560-830-9735
4-1-13	204-011-146-1	Decal	1615-969-4270
4-2-30	204-011-147-1	Shim	1615-758-3674
4-2-34	204-011-148-1	Ring, Radius	1615-446-6378
4-1-17	204-011-149-1	Clamp	1560-758-3675
4-2-6	204-011-150-1	Weight	1615-868-2754
4-1-4	204-011-151-1	Bolt	1615-830-9736
4-1-2	204-011-152-1	Washer	5310-839-0972
4-1-1	204-011-153-1	Nut	5310-830-9737
4-1-20	204-011-158-3	Key	5315-142-2341
4-1-60	204-011-159-1	Spacer	1615-898-0048
4-1-53	204-011-160-1	Spacer	1615-446-6379
4-1-50	204-011-162-1	Shim	1615-758-3676
4-1-8	204-011-166-3	Bolt	5306-768-7506
4-2-24	MS14181-08044	Bolt	5306-01-300-0423
4-1-12	204-011-179-1	Clevis	5340-157-7846
4-1-11	204-011-180-1	Fitting	1615-230-3886
4-2-44	204-011-207-105	Plate Assembly	5340-01-286-0636
4-1	204-012-101-141	Hub Assembly	1615-01-270-2982
4-2	204-012-101-141	Hub Assembly	

Table 15-1. Part number listing (Sheet 4 of 4)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1	204-012-101-5	Hub Assembly	1615-833-1556
4-1	204-012-101-19	Hub Assembly	1615-213-7261
4-1	204-012-101-31	Hub Assembly	1615-01-056-4550
4-1	204-012-101-137	Hub Assembly	1615-01-261-0570
4-1	204-012-101-139	Hub Assembly	1615-01-237-0512
4-1-76	204-012-102-5	Fitting Assembly	1615-848-4888
4-1-70	204-012-103-1	Fitting	
4-1-65	204-012-104-5	Pin	5315-834-1418
4-1-81	204-012-105-1	Stop Assembly	1560-200-7815
4-1-81	204-012-105-5	Stop	
4-1-59	204-012-106-1	Nut	5310-142-2449
4-1-69	204-012-107-1	Seal Sleeve	1615-200-8060
4-1-74	204-012-108-1	Stop	1560-757-1469
4-1-80	204-012-109-1	Worm, Gear	3020-225-5086
4-1-79	204-012-110-1	Bolt	5306-795-9861
4-1-77	204-012-112-5	Strap Set	1615-01-063-4016
4-1-58	204-012-113-3	Lockplate	1615-757-4857
4-1-62	204-012-116-3	Shield	1615-201-3782
4-1-15B	204-612-001-101	Bolt	NAS624-8 Modified per figure 4-13D
4-2-28	3591-6CNX3/8	Insert	5340-836-2943
4-1-41	47200	Fitting, Relief	4730-540-1411
4-2-15	47200	Fitting, Relief	
4-1-38A	204-012-127-101	Disc (Fabricate per figure 4-13H)	
4-2-20A	204-012-129-101	Plate (Fabricate per figure 4-13F)	

APPENDIX A

REFERENCES

A-1 GENERAL.

This appendix contains a list of all official publications referenced in this DMWR.:

A-2 REFERENCES.

FORMS

AMSAT-I-M Form 1379	Request for Depot Engineering Support
DA Form 2410	Component Removal and Repair/Overhaul Record

TECHNICAL MANUALS/BULLETINS

DMWR 55-1520-210	Aircraft Depot Maintenance Work Requirement
MWO 55-1520-242-50-1	Hub Moment Spring and Hub Restraint Retrofit Kit UH-1H/V
MWO 55-1615-258-50-1	To provide modification Instructions for Main Rotor Hub to convert to Grease Lubrication
TB 55-8100-200-24	Maintenance of Specialized Reuseable Containers for Aircraft Equipment
TM 1-1500-204-23	General Aircraft Maintenance Manual
TM 55-1500-243-23	Corrosion Control for Army Aircraft
TM 55-1500-345-23	Painting and Marking of Army Aircraft

SPECIFICATIONS/STANDARDS

AMS 2437	Coating, Plasma Spray Deposition
Bell SAS 1024	Standard Method and Acceptance Criteria for Magnetic Particle Inspection
Bell SAS 1035	Standard Method and Acceptance Criteria for Magnetic Particle Inspection
BPS 4006	Plating, Cadium (Electrodeposited)
BPS 4312	Selective Brush Cadmium Plating
BPS 4343	Mechanical Cleaning of Metals
FED STD 595	Colors used in Government
MIL-A-21380	Grain Abrasive
MIL-B-121	Barrier Material
MIL-B-131	Barrier Material

MIL-C-6183 ..... Cork and Rubber Sheet

MIL-C-8837 ..... Coating, Classification and Inspection of

MIL-C-10578C ..... Corrosion Removing Compound

MIL-C-11796 ..... Corrosion Preventive Compound

MIL-C-14460 ..... Corrosion Removing Compound

MIL-C-16173 ..... Corrosion Preventive Compound

MIL-C-22750A ..... Epoxy Coating

MIL-C-22750B ..... Epoxy Coating

MIL-C-45662 ..... Calibration System Requirements

MIL-C-53072 ..... Chemical Agent Resistant Coating

MIL-C-81706 ..... Corrosion Resistant Coating

MIL-C-82594 ..... Corrosion Preventive Compound

MIL-C-83488 ..... Aluminum, Ion Vapor Deposited

MIL-D-3464 ..... Desiccant

MIL-G-9954 ..... Grain Abrasive

MIL-G-23827 ..... Grease Aircraft

MIL-G-81322 ..... Grease Aircraft

MIL-I-1949 ..... Inspection Process Magnetic Particle

MIL-I-6866 ..... Inspection-Penetrant Method of

MIL-I-6868 ..... Magnetic Particle Inspection Process

MIL-I-25135 ..... Inspection Material, Penetrant

MIL-I-45607 ..... Inspection Equipment, Acquisition, Maintenance and Disposition of

MIL-L-2104 ..... Lubricating Oil, Engine

MIL-L-19537 ..... Lacquer: Acrylic-Nitrocellulose Gloss

MIL-L-23699 ..... Lubricating Oil, Aircraft

MIL-L-46010A ..... Lubricant, Solid Film

MIL-L-46152 ..... Lubricating Oil, Engine

MIL-L-81352 ..... Lacquer

MIL-P-8585 ..... Primer Coating

MIL-P-23377 ..... Epoxy Primer Coating

MIL-S-5000	Bar Metal
MIL-S-5626	Bar Metal
MIL-S-6758	Bar Metal
MIL-S-8784	Sealing Compound
MIL-S-8802	Sealing Compound
MIL-S-13165	Shot Peening of Metal Parts
MIL-S-22473	Sealing Compound
MIL-STD-129	Marking for Shipment or Storage
MIL-STD-865	Selective Brush Plating, Electrodeposition
MIL-STD-1504	Abrasive Blasting
MIL-STD-2073-1	DOD Material, Procedures for Development and Application of Packaging Requirements
MIL-STD-2073-2	DOD Material, Procedures for Development and Application of Packaging Requirements
P-C-458	Cloth Abrasive
P-D-680	Solvent, Dry Cleaning
QQA250/8B	Aluminium
QQ-C-320	Chromium Plating (Electrodeposited)
QQ-P-35	
QQ-P-416	Plating, Cadium (Electrodeposited)
TT-I-735	Isopropyl Alcohol
TT-N-95	Naphtha, Aliphatic

QUALITY CONTROL/QUALITY ASSURANCE DOCUMENTS

AVSCOM AA-STD-1	Quality Assurance Criteria for Magnetic Particle inspection
AVSCOM AA-STD-2	Quality Assurance Criteria for Penetrant Inspection
AVSCOM-R702-1	Product Verification Audit Requirements
DESCOM-R702-1	Depot Quality System

REGULATIONS

AR 750-43	Test, Measurement and Diagnostic Equipment, Including Prognostic Equipment and Calibration Test/Measurement Equipment

DA PAMPHLETS

DA PAM 25-30 ..... Consolidated Index of Army Publications and Blank Forms

DA PAM 738-751 ..... The Army Maintenance Management System - Aviation (TAMMS-A)

APPENDIX B
MODIFICATIONS

MODIFICATION WORK ORDER (MWO)	TITLE	ECP/ PIP	KIT PART NUMBER	STOCK NUMBER
55-1520-242-50-1	Hub Moment Spring and Hub Restraint Retrofit Kit UH-1H/V	C-013-UH-1 1-84-01-1329	205-704-087-105	1560-01-237-0516
55-1615-258-50-1	To provide modification Instructions for Main Rotor Hub to convert to Grease Lubrication.	UH-1H-1380 1-87-01-1336	NONE (See MWO for parts required and modification)	NONE

APPENDIX C
DEPOT MOBILIZATION REQUIREMENTS

Under a state of mobilization, the procuring activity may elect to:

1. Eliminate the minor repair stipulation in the Preshop Analysis Section of the DMWR. This will require all items to be overhauled, maximizing the longevity of such items but requiring full turnaround time during depot maintenance.

2. Extend the operating hour ceiling, which is currently stipulated in the Preshop Analysis Section, for accomplishing minor repair. This will assure a quicker turnaround during depot maintenance but will not maximize longevity."

APPENDIX D
PAINTING REQUIREMENTS

Components of the main rotor hub assembly will remain unpainted except as specified in paragraphs 4-18, 4-37, and Table D-1.

Table D-1. Painting Requirements

ITEM NAME	PAINT TYPE & SPECIFICATION	METHOD OF APPLICATION	NO. OF COATS	NOTES
Hub Assembly	Epoxy Primer MIL-P-23377B	Brush or Spray	1	Allow to air-dry about 1 hour.
	Epoxy coating MIL-C-22750B Color 37038 per FED STD 595	Brush or Spray	2	Air-dry at room temperature about 24 hours.
Grip Drag Brace Tang & Fitting (7)	Top Coating MIL-C-22750B or MIL-L-19537	Brush	1	

GLOSSARY

A

ALIGN - To perform precise adjustment and bring into correct relative position, specified variable elements of an item to cause optimum performance.

ASSEMBLY - A group of two or more physically connected and related parts, which is capable of disassembly, and when combined with other assemblies and parts, creates a component.

B

BRINELLING - Surface depressions produced by a severe blow, extremely heavy pressure, roller skidding, or sliding instead of rolling.

C

COMPONENT - A group of physically connected assemblies and parts, which is capable of independent operation but may be externally controlled, or derives its power from another source and, when combined with other components, assemblies, and/or parts forms a functional group or end item.

CONSUMABLE ITEMS - Parts or materials which are consumed by usage, normally losing identity upon application with, and/or assembled into the equipment.

CONTRACTING OFFICER (CO) - Is used herein to indicate the Department of the Army individual responsible for overall administration of the contract.

D

DISASSEMBLY - As used herein, describes the operations necessary to reduce an assembly to its separate components and parts.

E

F

FEDERAL STOCK NUMBER (FSN) - The Federal Stock Number for an item of supply consists of the applicable four digit Federal Supply Classification (FSC) code number, plus the applicable seven digit Federal Item Identification Number (FIIN). The FSC code number relates the item to other like items of supply; the FIIN merely identifies the item as a unit. The FSN is incomplete unless both of these numbers are included.

G

GALLING - Aggravated condition of wear, generally caused by rubbing action with little or no lubrication.

H, I, J, K, L,

M

MODIFICATION - An alteration and/or integral change affecting the configuration of the equipment or its respective parts, components, subassemblies, and assemblies.

N

NON-STANDARD REPAIR - A non-standard repair is one that for purposes of expediency restores some but not all of the necessary original design properties. Non-standard repairs shall be eliminated by application of standard repair or by parts replacement at time of overhaul.

O

OVERHAUL - To restore an item to a completely serviceable conditon as prescribed by serviceability standards developed and published by USAAVSCOM.

P

PITTING - Small holes or indentations, generally caused by rust, corrosion, high compressive stresses, or metal to metal pounding.

Q

QUALITY AUDIT - A teardown inspection and evaluation of an overhauled and/or modified item for the purpose of Government verification that all work directed in the WR has been properly accomplished, and to establish the continued effectiveness of the contractor's quality control system including workmanship, materials used, and repair procedures. The quality audit shall include correction of any deficiencies, reassembly, test, and calibration to ensure serviceable and items in accordance with the requirements of this WR.

R

REASSEMBLY - The assembling and aligning of all subassemblies and parts into a complete assembly to effect a serviceable item of equipment.

REBUILD - To restore an item to a standard as near as possible to the original or new condition in appearance, performance and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts, replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications and subsequent reassembly of the time.

RECONDITION - As used herein, means the disassembly, cleaning, treating, lubrication, repair and/or replacement of defective parts or components, and reassembly in accordance with the instructions contained in this WR.

REHABILITATION - The repair, modification, or reconditioning necessary to return the equipment to a serviceable condition equivalent to new.

REJECT - As used herein, means to select, identify, and set aside as unsatisfactory for use as is.

REPAIR - To restore a defective part, component, subassembly, or assembly to a serviceable condition in accordance with the instructions contained in this WR.

REWORK - Same as rebuild.

S

SCORING - Very deep scratches caused by foreign particles between sufaces that are moving or between one moving and one stationary surface. Scores follow the travel direction of the part.

SCRATCHING - Narrow shallow lines resulting from movement of foreign particles across a surface.

SERVICING - The lubrication, treating, cleaning, and/or preservation necessary to maintain the equipment and/or respective parts in serviceable condition.

SPALLING - Chipped or flaked surface caused by the breaking away of the hardened surface layer of the metal. A surface fatigue condition which occurs from the undermining of the case hardened metal and separation of the case from the core.

STANDARD REPAIR - A standard repair is one that permanently restores (without impairing) the original design properties or functions of damaged or deteriorated parts. Repaired parts must exhibit airworthiness at least equal to original design parts. The original primary design properties are:

a. Balance (static/dynamic)

b. Conductivity

c. Corrosion resistance

d. Durability

e. Fatigue resistance

f. Fireproof capability

g. Fire resistance

h. Fungus proof capability

i. Fungus resistance

j. Inspection intervals

k. Inspection procedures

l. Interchangeability or fitment

m. Moisture proof capability

n. Moisture resistance

o. Permeability

p. Porosity

q. Smoothness

r. Stiffness

s. Strength

t. Weight

These primary design properties may or may not be of equal importance for each part. Other design factors and features such as appearance, styling, serviceability, etc, influence part design in a secondary capacity.

T

TEST - As used herein, is the testing of equipment using shop test equipment to determine that the unit functions properly within the limits set forth in this WR.

U

USAAVSCOM - US Army Aviation Systems Command.

V, W, X, Y, Z

FOR THE COMMANDER:

BRIAN L. THOM
Colonel, AV
Chief of Staff

Official:

JOANNE M. MEYER
DA Publications Manager

These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@wherever.army.mil>
To: 2028@redstone.army.mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter FName:*** Joe
14. *Submitter MName:* T
15. ***Submitter LName:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (*reverse*) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE 8/30/02
TO: (*Forward to proponent of publication or form*)(*Include ZIP Code*) Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM-MMC-MA-NP R eds t one A r s enal, AL 35898	FROM: (*Activity and location*)(*Include ZIP Code*) MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565	

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 9-1005-433-24	16 Sep 2002	Organizational, Direct Support, And General Support Maintenance Manual for Machine Gun, .50 Caliber M3P and M3P Machine Gun Electrical Test Set Used On Avenger Air Defense Weapon System

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Corrective Action column should identify a different WP number.

* *Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788-1234	

TO: (*Forward direct to addressee listed in publication*)	FROM: (*Activity and location) (Include ZIP Code*)	DATE
Commander, U.S. Army Aviation and Missile Command ATTN: AMSAM-MMC-MA-NP R eds t one A r s enal, AL 35898	MSG, Jane Q. Doe 1234 Any Street Nowhere Town, AL 34565	8/30/02

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks [illegible]dations, or suggestions for improvement of publications and blank forms[illegible]ional bla[illegible]heets may be used if more space is needed.*)

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
MSG, Jane Q. Doe, SFC	788-1234	

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.	Use Part II (*reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/ Supply Manuals (SC/SM)	DATE
TO: (*Forward to proponent of publication or form)(Include ZIP Code)*	FROM: (*Activity and location)(Include ZIP Code)*	

PART 1 – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON

** Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/ AUTOVON, PLUS EXTENSION	SIGNATURE

TO: (*Forward direct to addressee listed in publication*)	**FROM:** (*Activity and location) (Include ZIP Code)*	**DATE**

PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS (*Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

The Metric System and Equivalents

Linear Measure

1 centimeter= 10 millimeters = .39 inch
1 decimeter= 10 centimeters= 3.94 inches
1 meter= 10 decimeters= 39.37 inches
1 dekameter = 10 meters= 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams =.15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekegram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 militers = .34 fl. ounce
1 deciliter = 10 centiliters= 3.38 fl. ounces
1 liter = 10 deciliters= 33.81 fl. ounces
1 dekaliter = 10 liters= 2.64 gallons
1 hectoliter = 10 dekaliters = 27.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq centimeter= 100 sq. millimeters = .155 sq. inch
1 sq decimeter= 100 sq. centimeters = 125.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. dekameters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. decimeters = 61.02 cu. inches
1 cu. meter= 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multuply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	Inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

° F Fahrenheit Temperature 5/9 (after subtracting 32) Celsius Temperature ° C