DEPOT MAINTENANCE WORK REQUIREMENT FOR

HANGER ASSEMBLY

PART NUMBER	NATIONAL STOCK NUMBER
204-040-600-9	1615-00-832-8951
204-040-600-11	1615-01-056-5365
212-040-600-7	1615-01-014-6008

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U.S. ARMY AVIATION AND TROOP COMMAND
15 NOVEMBER 1979

WARNING

PRECAUTIONARY DATA

Personnel performing operations, procedures and practices which are included or implied in this work requirement shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury, death, or destruction of material.

WARNING

An operating procedure, practice, etc., which if not correctly followed, could result in personnel injury or loss of life.

CAUTION

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

NOTE

An operating procedure, operation, etc., which is essential to highlight.

CLEANING SOLVENTS

Cleaning solvents may be toxic. Use in well ventilated areas. Avoid prolonged inhalation of fumes or direct contact with skin. Do not use solvents near open flame or in areas where very high temperatures prevail.

COMPRESSED AIR

Do not direct compressed air near or directly against skin. Do not use air under high pressure, or from a source not having a moisture trap when drying parts. Do not roll bearings with compressed air.

WARNING

HANDLING NITRIC ACID

Nitric acid is extremely dangerous. Avoid contact with skin and breathing vapors. Contact with organic materials may cause explosions.

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Insert latest changed pages; dispose of superseded pages in accordance with regulations.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	0	15 November 1979
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Change	2	30 December 1993

Total number of pages in this manual is 64 consisting of the following:

Page No.	*Change No.
Title	2
blank	0
a and b	0
A	2
[illegible] blank	0
[illegible] nd ii	2
[illegible]	2
[illegible]-2 and 1-3	1
1-4 blank	0
2-1	1
2-2 thru 2-4	0
2-5	2
2-6 blank	0
3-1	1
3-2 blank	0
4-1	0
4-2 and 4-3	2
4-4	0
4-5 and 4-6	1
4-6.1	2
4-6.2 blank	1
4-7	2
4-8	1
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Glossary-1 and Glossary-2	0
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*Zero in this column indicates an original page.

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WORK REQUIREMENT
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U.S. ARMY AVIATION
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204-040-600-11	1615-01-056-5365
212-040-600-7	1615-01-014-6008

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), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

1-1. GENERAL.

1-2. Scope. These instructions are for use by depot/contractor personnel, and apply to hanger assemblies, P/N 204-040-600-9 or -11 and P/N 212-040-600-7. (Figure 1-1)

1-3. Deviations And Exceptions. When any work segment as set forth in this depot maintenance work requirement cannot be accomplished, or can only be accomplished in a manner other than specified, for what ever reason, prior approval of the procuring activity shall be obtained by immediately submitting to the contracting officer/NMP a written notice containing the following:

a. Serial number (if applicable), part number, and NSN or affected equipment.

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

c. Reason for nonaccomplishment or deviation.

d. Action taken to correct condition causing nonaccomplishment or need for deviation.

e. Data relative to availability of parts required, if applicable.

f. Estimated man-hours required for completion.

g. Instructions and inspection required to maintain the integrity of the end item because of such omission or deviation.

1-4. Maintenance Forms And Records. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751.

1-5. DESCRIPTION AND DATA.

1-6. Description. The tail rotor driveshaft hanger assembly consists of couplings, on a short splined shaft, mounted through a single-row sealed ball bearing in a ring shaped hanger, equipped with two mounting lugs for attachment.

1-7. Data Plates.

a. Equipment Data Plate.

(1) The equipment data plate (figure 1-2) for the hanger assembly is located on the center of the hanger assembly. It will be required to relocate the equipment data plate so the overhaul data can be installed after final overhaul and finishing of hanger assembly.

(2) Remove the existing equipment plate and transfer the data to a new replacement plate part number 100-006-2 or part number 100-024-1 using 1/16 inch letters and figures.

(3) The new equipment data plate (20, figure 4-1) is to be relocated in hanger while maintaining clearance for overhaul data plate, figure 1-2. Install equipment data plate in accordance with procedures outlined in the following substep b.(3).

b. Overhaul Data Plate.

NOTE

Install overhaul data plate at first overhaul and replace at each subsequent overhaul.

Transfer all pertinent data to the new plate. Data shall not be stamped directly on any part, assembly, or item of equipment, or installed data plate.

(1) Fabricate overhaul data plate from 0.025 inch soft aluminum alloy (item 7, table 2-3), approximately 0.75 inch wide by 1.0 inch long. Deburr edges.

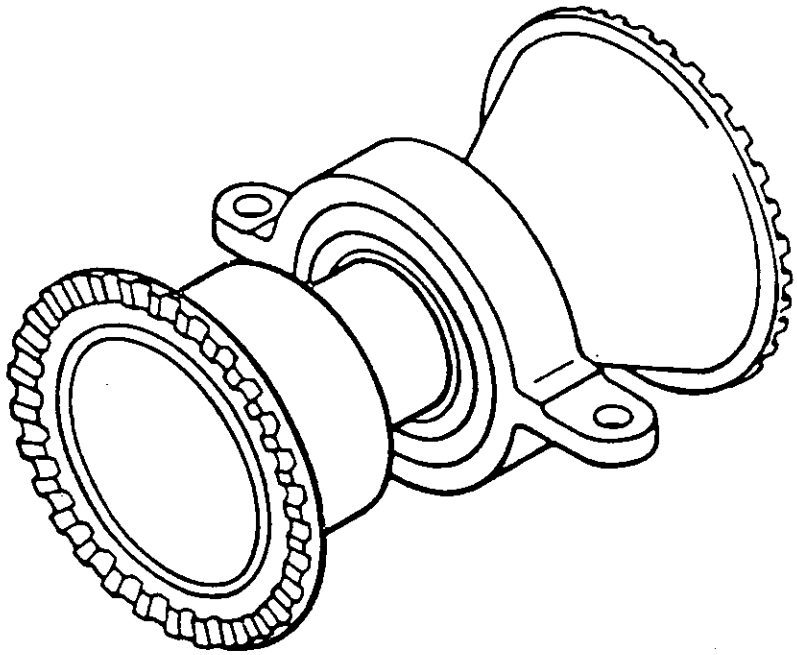

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Figure 1-1. Hanger assembly, P/N 204-040-600-9 or -11 and P/N 212-040-600-7

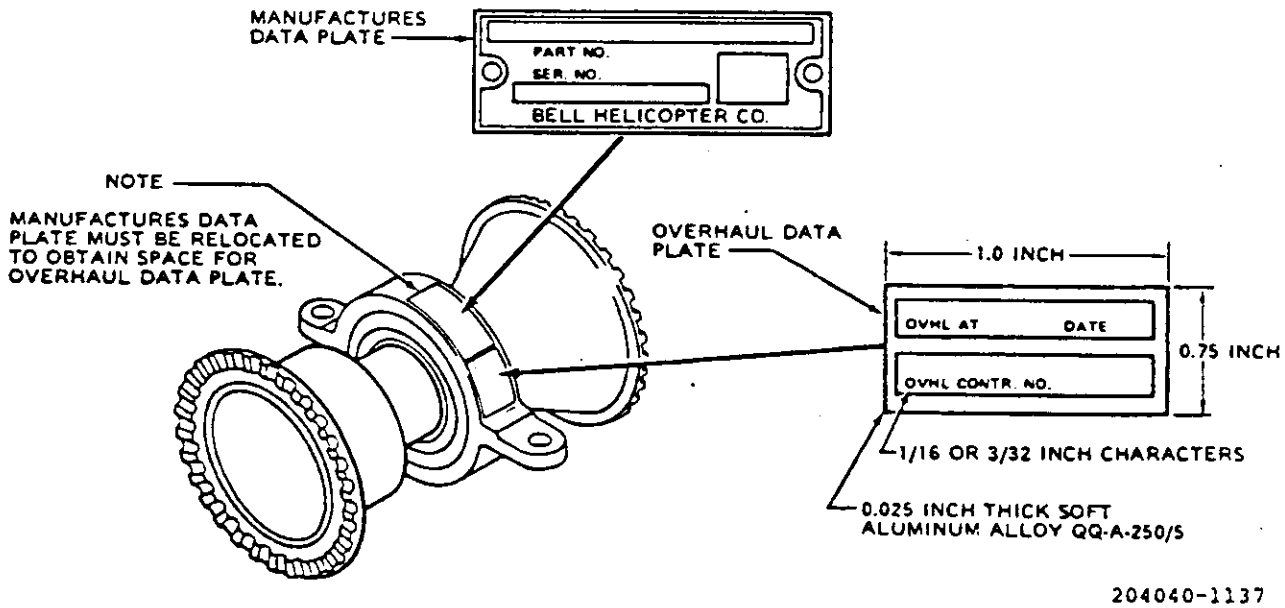

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Figure 1-2. Data plates and locations

(2) Stamp applicable data on replacement data plate using 1/16 and/or 3/32 inch characters. The following data shall be included on the plate.

OVHLAT—(Insert the name or initials of facility performing the overhaul.)

OVHL CONTR. NO. (Insert the contract number under which work is performed.)

DATE (Insert date overhaul was completed.)

(3) Install overhaul data plate adjacent to equipment data plate after final finish of hanger as follows:

(a) Abrade area on hanger assembly and faying surface of plate with 180 grit abrasive cloth (item 15).

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(b) Clean sanding residue with naphtha (item 22).

(c) Mix adhesive (item 3) 100 parts A and 22.5 parts B. Apply adhesive within 30 minutes to both faying surfaces and joint parts.

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(d) Fair out adhesive. Remove excess adhesive with MEK (item 21).

(e) Maintain firm contact pressure and cure for 24 hours at room temperature or one hour at 180 degrees F (82.2 degrees C). Edge voids are not allowed.

1-8. DIFFERENCES BETWEEN MODELS.

The differences between 212 & 204 hanger assemblies (excluding bearing) are as follows:

For P/N 212-040-600		Quantity
204-040-603-9	Coupling	1
212-040-602-1	Shaft	1
212-040-614-1	Coupling	1
204-040-617-17	Hanger	1
204-040-616-5	Plate	2

For P/N 204-040-600		Quantity
204-040-603-7 or -5	Coupling	1
204-040-602-5 or -3	Shaft	1
204-040-614-3	Coupling	1
204-040-617-5	Hanger	1
204-040-616-1 or -5	Plate	2

NOTE

204-040-617 hangers made from magnesium shall not be returned to service.

WARNING

Parts look alike and improper use or intermixing of 212 and 204 hanger parts will cause a flight safety condition. After final assembly, at minimum two different inspectors should be required to sign off on proper parts configuration.

CHAPTER 2
TECHNICAL REQUIREMENTS

2-1. FACILITIES, TOOLS, AND TEST EQUIPMENT.

2-2. Facilities. Special facilities are not required. However, facilities shall be adequate for depot maintenance and shall include a controlled location for storing equipment to prevent damage or deterioration while undergoing movement, unpacking, test, and repair operations.

2-3. Tools and Equipment.

a. Special Tools. There are no special tools required for overhaul of the hanger assemblies.

b. Equipment. Table 2-1 lists the equipment needed to accomplish the requirements of this Work Requirement.

c. Inspection and Test Equipment. Table 2-2 contains a list of inspection or test equipment used to determine conformance to the specifications and requirements of this Work Requirement.

2-4. Bulk and Expendable Materials. Table 2-3 contains a listing of bulk and expendable materials required for use in this Work Requirement.

2-5. FINITE LIFE ITEMS, TIME BETWEEN OVERHAUL (TBO) ITEMS, AND MANDATORY REPLACEMENT PARTS.

NOTE

The tail rotor driveshaft bearing hanger assembly has required overhaul periods. Refer to applicable Airframe Manual Retirement/Overhaul Schedules for these periods. There are no finite life items within the hanger assembly. Detail parts of the hanger assembly are conditional items and are qualified on an individual basis during each overhaul.

2-6. Mandatory Replacement Parts.

a. Replace all parts indicated in REPLACE AT OVERHAUL column of table 4-1.

b. Replace any part which is not reparable or within tolerances or shows evidence of failure. (Refer to table 4-1.)

c. Replace all threaded parts that have thread damage (reference bolts and nuts).

Table 2-1. Special Tools and Equipment

Nomenclature	FSN or Part No.	Reference Paragraph of Use
Cadmium Plating Machine (Selectron, Type 1520) or Equivalent	FSCM 13929	4-9

Table 2-2. Inspection and Test Equipment

Nomenclature	NSN or Part No.	Reference Paragraph of Use
Magnetic Particle Inspection Equipment	6635-00-580-9892	4-5, 4-6, 4-7, and Table 4-1
Fluorescent Penetrant Inspection Equipment	6635-00-703-7406	4-5, 4-6, 4-7, and Table 4-1
Magnifying Glasses	Commercial	4-5, 4-6
Micrometers	Commercial	4-5, 4-6
Calipers	Commercial	4-5, 4-6
Surface Plate	Commercial	4-5, 4-6
Rockwell Hardness Tester	Commercial	4-5, 4-6
Pitch Gages	Commercial	4-5, 4-6
Diameter Pin Gages, 0.0720, 0.0960, 0.1080, and 0.1309	Commercial	4-5, 4-6, and Figures 4-2 and 4-3

Table 2-3. Bulk and Expendable Materials

Item	Item Name	Specification Or Source	FSC
1.	Acrylic Lacquer, Aluminized, P-95, Color No. 17178, Federal Standard 595	MIL-L-81352	8010
2.	Acrylic Lacquer (Clear)	MIL-L-81352	8010
3.	Adhesive Epoxy, EA9309 (Two Part)	FSCM 33564 BHT Specification 299-947-125, Type I	8040
4.	Alkaline Steel Cleaner (Mextex T-103) (Alternate — Oakite 90)	FSCM 76071 FSCM 44389	6810
5.	Aluminum Oxide, Cloth, 200 Grit or Finer	PC-451, Type I, Class 2	5350

Table 2-3. Bulk and Expendable Materials (Cont)

Item	Item Name	Specification Or Source	FSC
6.	Aluminum Pigment (Powder or paste, Type I or Type II, Class A)	TT-P-320	8010
7.	Aluminum, Soft Alloy (0.025 Inch Thick)	QQ-A-250/5	
8.	Barrier Material	MIL-B-121 Grade A	8135
9.	Cadmium Plate Process Selectron, Brush (LHE Solution)	FSCM 13929 MIL-STD-865	
10.	Cheesecloth	CCC-C-440	8305
11.	Chemical Film Material (Alodine No. 1200)	MIL-C-5541A, Type II Grade C, Class 2	8030
12.	Chromate Conversion Coating, MACRO — Bronze No. 1	FSCM 76071	
13.	Cleaner, Trichloroethylene	O-T-634	6810
14.	Cleaning Compound, Alkaline Waterbase	MIL-C-25769	6850
15.	Cloth, Abrasive (Grit in Text)	P-C-451	5350
16.	Coating, Black Oxide	MIL-C-13924	
17.	Crocus Cloth	P-C-458	5350
18.	Dry Cleaning Solvent	P-D-680, Type I	6850
19.	Lubricant	204-040-755-5	9150
20.	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base	MIL-L-23699	9130
21.	Methyl-Ethyl-Ketone (M.E.K.)	TT-M-261	6810
22.	Naphtha	TT-N-95, Type II	6810
23.	Nitric Acid	O-N-350	6810
24.	Pad, Nylon Web	FSCM 76381 or FSCM 27713	

Table 2-3. Bulk and Expendable Materials (Cont)

Item	Item Name	Specification Or Source	FSC
25.	Polyamide Epoxy Primer	MIL-P-23377	8010
26.	Remover, Corrosion Preventive Fingerprint	MIL-C-15074	8030
27.	Remover, Paint	MIL-R-81294	8010
28.	Safety Solvent	O-T-620a(3)	6810
29.	Salts (Activated Black Magic)	MIL-C-13924	
30.	Stone, Fine (India)	SS-S-P-36	5345
31.	STYL1 MS1 and MS4 and Carbon Anodes	FSCM 13929 MIL-STD-865	
32.	Tack Rag	FSCM 91106	
33.	Tape, Platers	FSCM 76381 or FSCM 88301	5330
34.	Tape (Pressure Sensitive)	PPP-T-60, Type II	8135
35.	Thinner (for Acrylic Nitrocellulose Lacquer)	MIL-T-19544	6810
36.	Zinc Chromate Primer	TT-P-1757	8010

2-7. STANDARDS.

2-8. Quality of Materials. All parts and materials used for replacement or repair shall meet equipment drawings and specifications.

2-9. Electromagnetic Compatibility Standards. There are no electromagnetic compatibility standards requirements for the hanger assembly.

2-10. Wear Limits, Fits, and Tolerances. Wear limits, fits, and tolerances are integrated into the inspection, repair, and assembly procedures. All tolerances are measured in inches.

2-11. Repair Parts. Repair parts and replacement parts that are needed for overhaul are referenced in Appendix B of this DMWR.

2-12. Flight Safety Parts Program.
Parts, assemblies, or installation identified under the flight safety parts program require special handling during overhaul. Throughout the overhaul procedures, warnings appear emphasizing critical instructions to be followed. These warnings are identified as "Flight Safety Parts": Warnings are inserted whenever and wherever necessary.

Table 2-4. Flight Safety Parts/Critical Characters

Flight Safety Parts		Critical Characteristics
204-040-600	Hanger Assembly	1. Insure the existence of grease (item 19, Table 2-3) bead 0.12 inch deep the full length of spline in outer coupling (14, Fig. 4-1). 2. Insure seal (15, Fig. 4-1) is fully seated and seal lip is free of cuts, nicks, and other installation damage. 3. Torque of nut (6, Fig. 4-1) 50-70 inch-lbs and installation of cotter pin (4, Fig. 4-1).
204-040-603	Inner Coupling	1. Bake cycle after cadmium plating. 2. Magnetic particle inspection.
204-040-604	Outer Coupling	1. Bake cycle after cadmium plating. 2. Magnetic particle inspection.
204-040-614	Coupling	1. Bake cycle after cadmium plating. 2. Magnetic particle inspection.

a. A flight safety part is defined as a part, assembly, or installation procedure with one or more critical characteristics that, if not conforming to the design data or quality requirements, could result in serious injury death of crew members and/or serious damage to the helicopter.

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

c. Critical characteristics are listed in Table 2-4.

d. The hanger assembly. P/N 204-040-600, is considered a flight safety part.

CHAPTER 3
PRESHOP ANALYSIS

3-1. GENERAL.

3-2. Scope. Preshop analysis, unpacking, and cleaning instructions are provided in this chapter as a guide for examination of the incoming hanger assembly. Information obtained from this examination should be used by the overhaul facility in preparing estimates needed to determine the extent of repair and replacement needed to perform overhaul of the hanger assembly in order to make the hanger assembly a completely serviceable item. Detailed cleaning and corrosion treatment methods appear in this DMWR. Items pending performance of maintenance shall be preserved to prevent damager or deterioration.

NOTE

No magnesium hangers P/N 204-040-617 will be returned to service. They should be condemned locally and disposed of in accordance with local supply directives.

3-3. Physical Check. Remove hanger assembly from shipping container. Physically check all tags and forms attached, to determine reason for removal from service. The overhaul facility will disassemble hanger assembly in order to perform a complete evaluation of components or subassemblies and to determine repair and replacement as needed to overhaul hanger assembly as specified in this DMWR. If failure data (tags, etc.) are not available, contact the contracting officer of National Maintenance Point for instructions.

a. General Disassembly Procedures. Complete disassembly and a physical check is needed when the hanger assembly to tag overhauled was removed from service for any of the following reasons.

(1) Hanger cracked.

(2) Bearing discolored (showing evidence of overheat).

(3) Coupling(s) cracked.

(4) Smoothness, excess play, and freedom of rotation of bearing.

(5) Bearing seal damaged.

b. Required Disassembly Procedures. When it has been determined that the hanger assembly will need complete disassembly, proceed as follows:

(1) Refer to NOTES, CAUTIONS, and WARNINGS in DMWR.

(2) The parts of hanger assembly should be tagged or kept together so that wear condition of parts can be evaluated during inspection. Matched parts shall be tagged, handled, and stored together to preclude damage and to ensure reassembly and installation in their matched position.

(3) Record and tag parts that are defective with the reason for rejection.

NOTE

Exclude parts which are normally replaced at every overhaul such as cotter pin, nut, washers, bolt, rings, and seal.

(4) To ensure replacement of parts into the original hanger assembly being overhauled, tag and identify all parts.

CHAPTER 4

MAINTENANCE, OVERHAUL, AND REPAIR

4-1. IN-PROCESS INSPECTION (OVERHAUL INSPECTION PROCEDURES (OIP)).

The inspection procedures are contained in paragraph 4-4.

4-2. DISASSEMBLY.

a. Remove ring (1, figure 4-1), plate assembly (2), and spring (3) from (flexible) coupling (14).

b. Remove cotter pin (4), nut (5), washers (6 and 7), and plate (8) from bolt (12) and remove coupling (13) from shaft (18).

c. Slide coupling (9) from coupling (14) and remove coupling (9), plate (10), and washer (11) from bolt (12).

d. Press seal (15) from coupling (14). Discard seal.

e. Remove ring (16) from hanger (19) and press bearing (17), with shaft (18), from hanger (19).

f. Press shaft (18) from bearing (17).

4-3. CLEANING.

CAUTION

Corrosion removal process should be controlled, and treated parts monitored, to ensure that machined dimensions are maintained and that plating is not removed from cadmium plated parts. After corrosion removal, parts must be treated for corrosion protection. It cannot be emphasized too strongly that all corrosion products must be completely removed prior to subsequent corrosion protective treatments.

a. Clean hanger assembly parts and treat any corroded areas as follows:

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(1) Clean all parts (bearing excluded) with solvent (item 18, table 2-3). Use a nonmetallic, soft bristle brush to dislodge stubborn deposits. Rinse all parts (by vapor degreasing) with cleaner (item 13).

(2) Inspect plates (8 and 10, figure 4-1) for corrosion damage to grooved area before cleaning. No structural damage to grooved area is acceptable. (Refer to paragraph 4-5.)

CAUTION

When hanger is not scheduled for immediate refinishing, the hanger shall be given a temporary coating of lubricating oil (item 20, table 2-3 or equivalent).

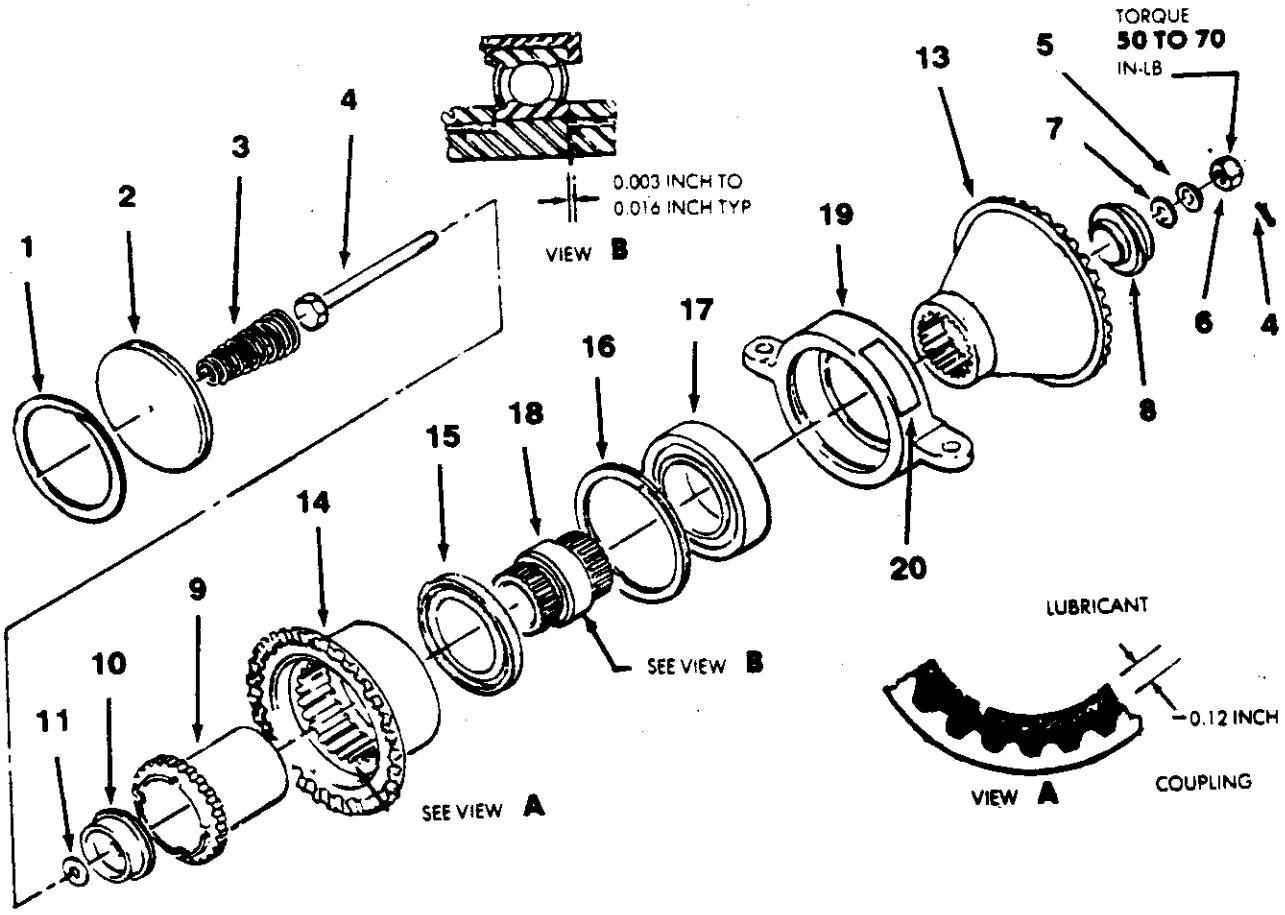
Precautionary measures must be exercised at all times to prevent corrosion. When parts are not processed immediately after cleaning, parts shall be protected from corrosion, wrapped in barrier material (item 8) and secured with tape (item 34).

b. Treat all parts to prevent corrosion after cleaning in accordance with the following procedures:

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(1) Wash all ferrous parts in a clean rinse of solvent (item 18). Drain parts on a rack.



Warning

Flight Safety Part. The presence of lubricant is a critical characteristic.

1. Ring
2. Plate assembly
3. Spring
4. Cotter pin
5. Nut
6. Washer (steel)
7. Washer (aluminum)
8. Plate
9. Coupling
10. Plate
11. Washer (aluminum)
12. Bolt
13. Coupling
14. Coupling
15. Seal
16. Ring
17. Bearing
18. Shaft
19. Hanger
20. Plate

Figure 4-1. Hanger Assembly – Disassembled.

4-5. Inspection – Conditional.

NOTE

If the accompanying records and/or physical appearance of the hanger assembly indicates the component has been subjected to an accident or incident such as, overspeed, overtorque, or sudden stoppage, accomplish the following evaluation criteria. If the part meets the requirements of the conditional inspection, proceed with normal overhaul. Reject any part(s) that exceed inspection limits.

a. Visually inspect for external damage. Particular attention will be given to both couplings (9, 13 and 14, figure 4-1) and hanger (19) for evidence of cracks.

b. Refer to table 4-1A for parts requiring magnetic particle inspection and method of magnetization.

c. Refer to table 4-1A for parts requiring fluorescent penetrant inspection.

d. If any of the above steps a. through c. reveal evidence that the hanger assembly has experienced excessive loads indicated by cracked or distorted couplings, hanger, or shaft, the part(s) shall be considered unserviceable and nonreparable. Proceed with inspection, refer to normal overhaul, paragraph 4-6.

4-6. Inspection – Normal Overhaul.

a. Visually inspect all parts for damage and wear. (Refer to table 4-1 and figures 4-2 through 4-5.) Hanger assembly parts checked in REPLACE AT OVERHAUL column of table 4-1 do not require inspection and shall be discarded and replaced with new, like items.

b. Check that free length of spring (3, figure 4-1) is under 2.00 inches but not under 1.8125 inches by compressing the spring with a suitable load to a height of 1.5 inches; the required load should be between 4.5 and 5.5 pounds. Reject spring if these requirements are not met.

c. Parts will be rejected if the exceed the maximum reparable limits specified in table 4-1 and figures 4-2 through 4-5.

d. The remarks column of table 4-1 indicates the action to be taken for each part.

e. The limits chart (figures 4-2 and 4-3) listing critical dimensions of parts, is provided as a convenience to determine closeness of fit between mating parts. It is not intended that all dimensions listed on limits chart are to be checked out as prescribed repair procedure. Parts that show evidence of excessive wear or physical damage shall be checked dimensionally.

4-7. Nondestructive Testing Acceptance Criteria.

a. Inspect parts as specified in inspection table 4-1 by magnetic particle method per MIL-STD-1949 or fluorescent penetrant method per MIL-STD-6866 and TM 43-0103.

WARNING

Flight Safety Part. Couplings (9), (13) and (14) must not exhibit any cracks or laps. Non-metallic inclusions are acceptable provided the make length of individual indications is no greater than 1/8 inch. 1/64 inch and greater are rateable. This is a critical characteristic.

b. All magnetic particle indications which reveal the presence of cracks, laps, non-metallic stringers, seams or any other line defects greater than 1/64 inch in length shall be cause for rejection.

NOTE

A line defect is any visual penetrant indication having a length to width ratio of three or more.

c. All penetrant indication of cracks, forging or rolling laps, seams, cold shuts, bursts or any other line defect shall be cause for rejection

Table 4-1. Inspection Requirements For P/N 204-040-600-9 and P/N 212-040-600-7 Hanger Assemblies

Fig. 4-1 Index No	Nomenclature	Method of Inspection			Replace at Overhaul	Typical Defects	Remarks and References
		Visual	Magnetic Particle	Pene-trant			
1	Ring				X		
2	Plate Assembly	X		X		Cracks, Corrosion, Damage to Rubber Seal	See subparagraph 4-15.a
3	Spring	X				Broken, Damaged, or Deformation.	Free length should be not more than 2.00 + 3/16 inches.
4	Cotter Pin				X		
5	Nut				X		
6	Washer				X		
7	Washer				X		
8	Plate	X		X		Wear, Cracks, Corrosion	Anodizing may be damaged on the contact areas.
9	Coupling	X	X			Cracks and Chipped Teeth (MPI), Pitted Teeth and Wear Pattern, Burrs, Nicks, and Scratches.	See figures 4-2 through 4-4 and subparagraph 4-15.c.
10	Plate	X		X		Wear, Cracks, Corrosion	Anodizing may be damaged on the contact areas.
11	Washer				X		

Table 4-1. Inspection Requirements for P/N 204-040-600-9 or -11 and P/N 212-040-600-7 Hanger Assemblies (Cont)

Fig. 4-1 Index No.	Nomenclature	Method Of Inspection			Replace at Overhaul	Typical Defects	Remarks and References
		Visual	Magnetic Particle	Penetrant			
12	Bolt				X		
13	Coupling	X	X			Cracks and Chipped Teeth (MPI), Wear (SIE), Burrs, Nicks, and Scratches.	See figures 4-2 through 4-4 and subparagraph 4-15.e.
14	Coupling	X	X			Cracks and Chipped Teeth (MPI), Teeth of Female Spline for Pitting, Wear, Burrs, Nicks, and Scratches.	See figures 4-2 through 4-4 and subparagraph 4-15.d.
15	Seal				X		
16	Ring				X		
17	Bearing	X			X		
18	Shaft	X				Cracks and Chipped Teeth (MPI), Wear (SIE), Burrs, Nicks, and Scratches.	See figures 4-2 through 4-4 and subparagraph 4-15.f.
19	Hanger	X	X			Cracks (MPI), Wear (SIE), Nicks, Scratches, Warping.	See figures 4-2 through 4-5 and subparagraph 4-15.g.

Table 4-1A. NONDESTRUCTIVE TESTING

Magnetic Particle Inspection

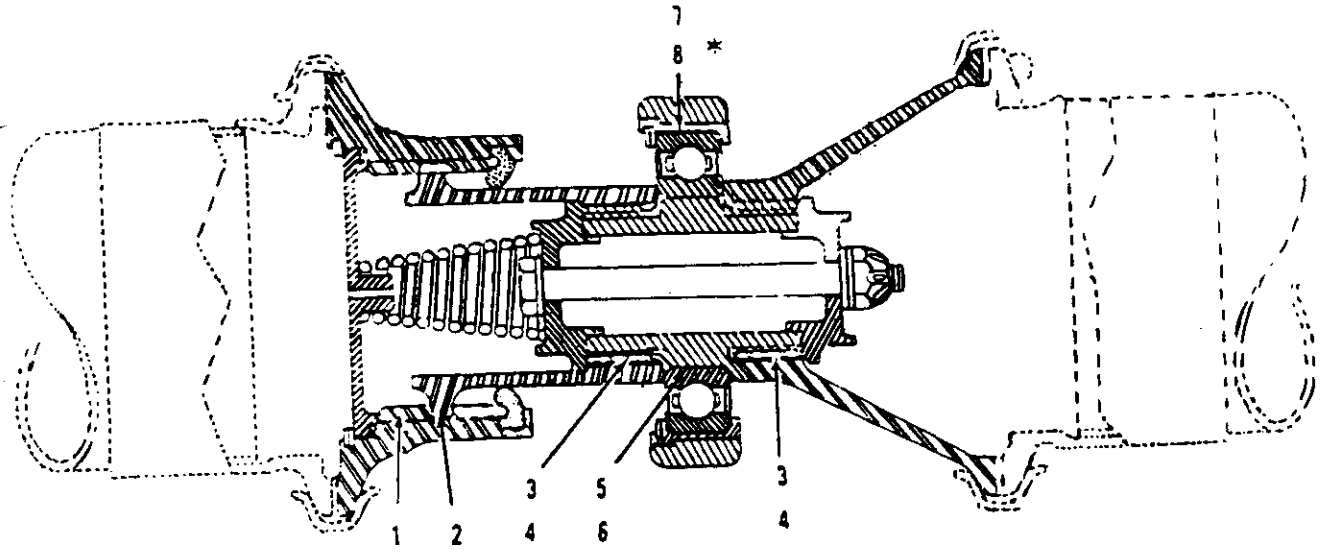
The following parts shall be inspected with the wet fluorescent magnetic particle process using the continuous method of magnetization in accordance with MIL-STD-1949. Refer to applicable figure and index number for procedures on individual parts. Inspect all surfaces. No cracks allowed.

Figure & Index No.	Nomenclature	Method of Magnetization
4-1, 9	Inner Coupling	Circular, using 3/4" central conductor, 600 amperes.
4-1, 13	Coupling	Circular, using 3/4" central conductor. Two (2) equally spaced shots (180° apart), 1000 amperes.
4-1, 14	Outer Coupling	Circular, using 1" central conductor. Two (2) equally spaced shots (180° apart), 1200 amperes.
4-1,18	Shaft	Circular, using 1/2" central conductor, 600 amperes.
4-1, 19	Hanger	Circular, using 1" central conductor. Two (2) equally spaced shots (180° apart), 800 amperes.

Penetrant Inspection

Inspect the following parts with fluorescent penetrant inspection in accordance with MIL-STD-6866 using a penetrant of a high sensitivity equal to MIL-I-25135, Type I, Level 3 or 4, Method A or D. Inspect all surfaces. No cracks allowed.

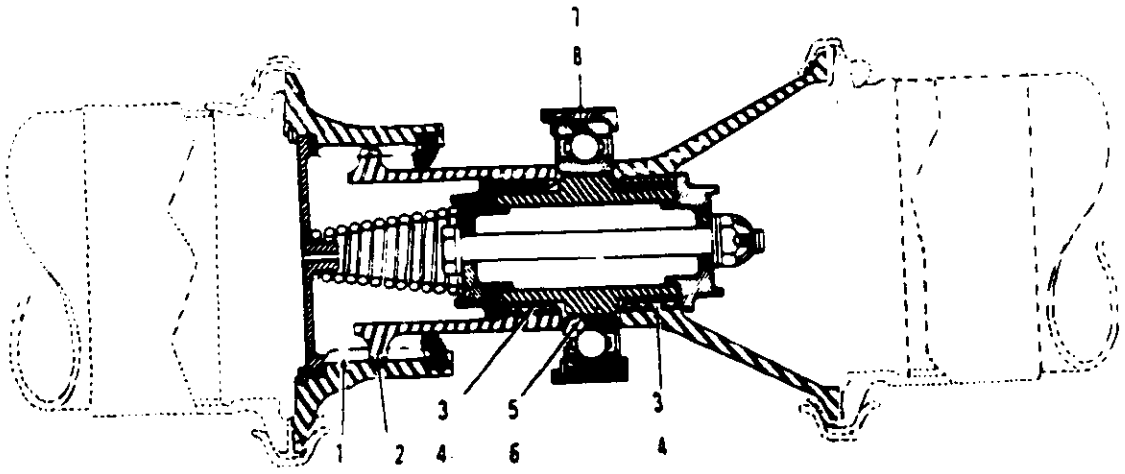
Figure & Index No.	Nomenclature
4-1, 2	Plate Assembly
4-1, 8	Plate
4-1, 10	Plate



ITEM	NOMENCLATURE		DIMENSIONS MIN. (Inches)	MAX.	REPLACE
1	Outer Coupling—Internal Spline		1.8290	1.8360	**
2	Inner Coupling—External Spline (Use 0.1080 Diameter Pins)	Over Pins	2.1690	2.1740	2.1590
3	Inner Coupling—Internal Spline (Use 0.0720 Diameter Pins)	Between Pins	1.1251	1.1285	1.1336
4	Shaft—External Spline (Use 0.0960 Diameter Pins)	Over Pins	1.3502	1.3518	1.3481
5	Shaft—Bearing Seat		1.3778	1.3784	1.3776
6	Bearing—Inside Diameter		1.3775	1.3780	1.3781
7	Bearing—Outside Diameter		2.4404	2.4409	2.4403
8	Hanger Sleeve Liner—Inside Diameter		2.4401	2.4406	2.4409

*Some P/N 204-040-617-5 hanger assemblies do not have sleeve liner.
**Maximum depth of wear 0.005 (measured from unworn face of tooth).

Figure 4-2. Hanger Assembly limits chart for P/N 204-040-600-9 or -11

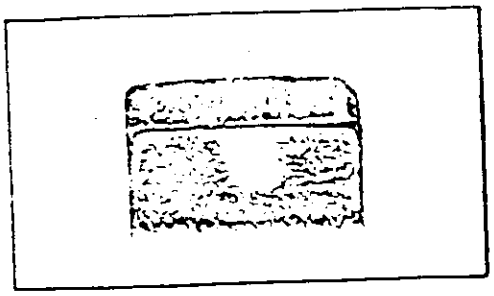


ITEM	NOMENCLATURE		DIMENSIONS MIN. (Inches)	MAX.	REPLACE
1	Outer Coupling—Internal Spline		1.8290	1.8360	*
2	Inner Coupling—External Spline (Use 0.1080 Diameter Pins)	Over Pins	2.1690	2.1740	2.1590
3	Inner Coupling—Internal Spline (Use 0.0720 Diameter Pins)	Between Pins	1.1251	1.1285	1.1336
4	Shaft—External Spline (Use 0.0960 Diameter Pins)	Over Pins	1.3502	1.3518	1.3481
5	Shaft—Bearing Seat		1.3778	1.3784	1.3776
6	Bearing—Inside Diameter		1.3775	1.3780	1.3781
7	Bearing—Outside Diameter		2.4404	2.4409	2.4403
8	Hanger Sleeve Liner—Inside Diameter		2.4401	2.4406	2.4409

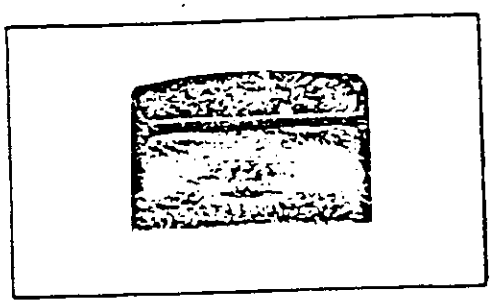
* Maximum depth of wear 0.005 (measured from unworn face of tooth).

212040-267A

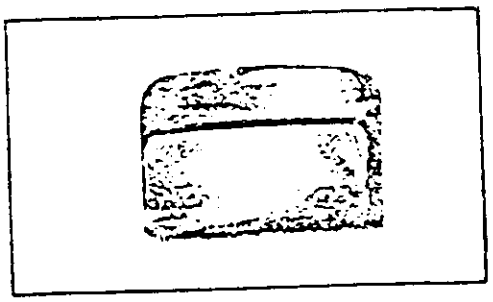
Figure 4-3 Hanger Assembly limits chart for P/N 212-040-600-7



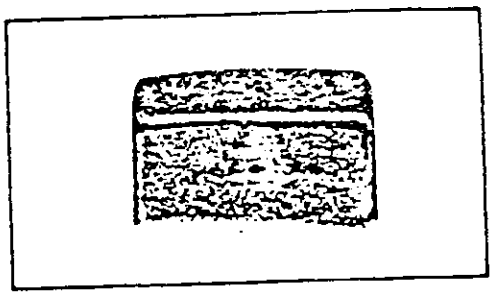
A Acceptable pattern typical of low operating time.



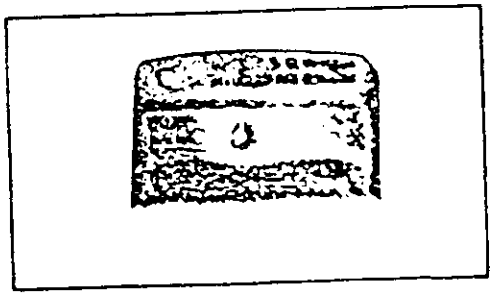
B Acceptable pattern typical of couplings which have operated with normal misalignment for a longer period of time than that shown in A.



C Acceptable pattern denoting operation at higher torque than that shown in A and B.



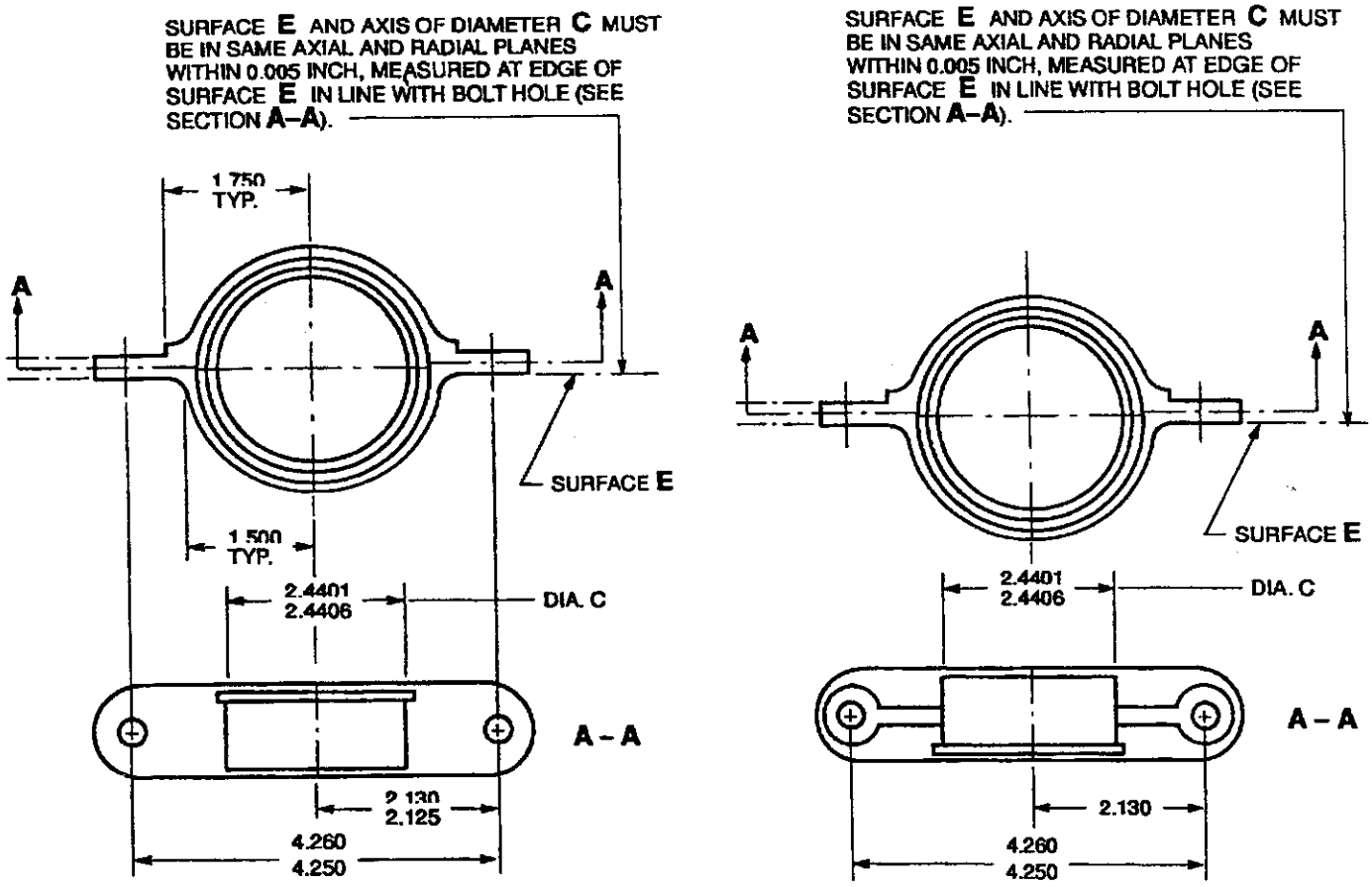
D Acceptable pattern showing a pitted tooth. This condition is acceptable on all teeth.



E Pattern shows a more severe condition of tooth pitting than that shown in D. There is no metal projecting above the normal face of the tooth, indicating that the pitted area is polishing over. This condition may exist on all teeth. Couplings with pits larger than 1/32 inch diameter should be replaced.

Figure 4-4. Coupling spline wear pattern for P/N 204-040-600-9 or -11 and P/N 212-040-600-7

NOTE
ALL DIMENSIONS ARE IN INCHES



P/N 204-040-617-5 HANGER ASSEMBLY

P/N 204-040-617-17 HANGER ASSEMBLY

Figure 4-5. Alignment Check for Hanger P/N 204-040-617-5 or -17.

4-8. Processing.

The processes required for hanger assembly components figure 4-6 listed in table 4-2 shall be accomplished when coating, or plating was removed to affect a repair or inspection. Repair or touch-up surfaces by brush cadmium plating per MIL-STD-865 and para. 4-9. Touch-up is not to exceed 25 percent of total cadmium plated area. If over 25 percent of the cadmium is removed, restore cadmium plating per QQ-P-416. Plating thickness to be 0.0001 to 0.0003 inch. Hydrogen embrittlement relieve outer couplings (14, figure 4-1) by baking at 375 ± 25 degrees F for 4 hours within 4 hours after plating. Hydrogen embrittlement relieve inner couplings (9) by baking 275 ± 25 degrees F for 5 hours within 4 hours after plating.

4-9. Brush Cadmium Plating Process

NOTE

Brush cadmium plating is used for repair and/or touch-up for metal surfaces where existing cadmium plating has been damaged or removed. Touch-up is not to exceed 25 percent of total cadmium plated area.

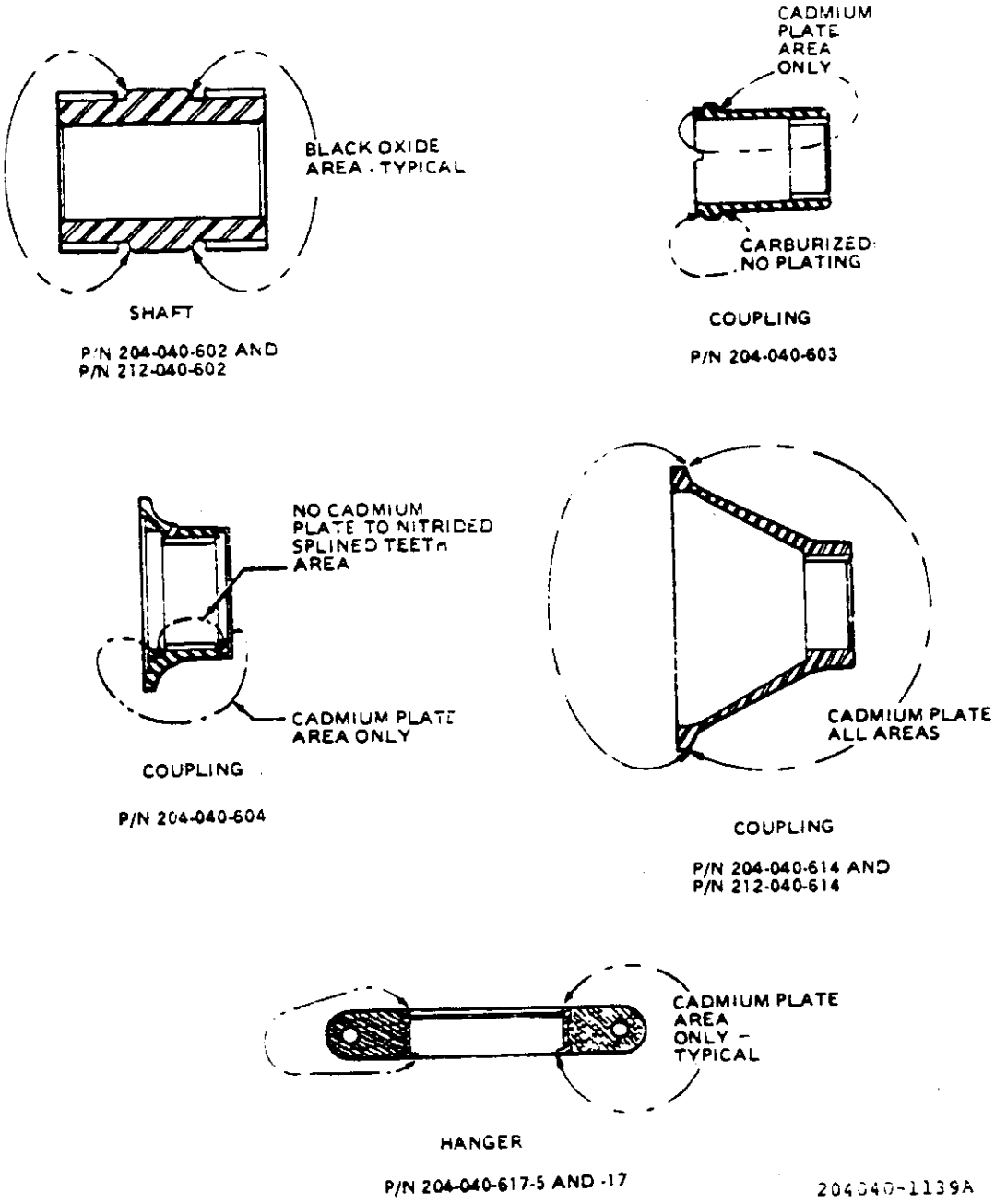


Figure 4-6. Black oxide and cadmium plated areas

Table 4-2. Process Requirements for Hanger Assemblies P/N 204-040-600-9 or -11 and P/N 212-040-600-7

Fig. and Index No.	Nomenclature	Cadmium Plate per QQ-P-416, Class 3, Type II	Black Oxide Coating	Chemical Film	Remarks
4-1-1	Ring	X			
-2	Plate Assembly			X	Anodize
-8	Plate			X	Anodize
-9	Coupling	X			
-10	Plate			X	Anodize
-13	Coupling	X			
-14	Coupling	X			
-16	Ring	X			
-18	Shaft		X		
-19	Hanger	X			

a. Equipment and Material Requirements.

(1) Power source capable of an output of 0-15 amps at 0-20 volts Vdc, with voltage control. A typical power pack (table 2-1) is required for touch-up brush cadmium plating process of hanger parts.

(2) Styli shall be the MS-1 and MS-4 rod (item 31, table 2-3) with replaceable carbon anodes.

(3) Material is LHE solution for cadmium plating (item 9) and chromate conversion coating (item 12).

b. Surface Preparation.

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(1) Remove surface contamination with cheesecloth (item 10) wetted with safety solvent (item 28). Wipe dry before solvent evaporates.

(2) Remove oxides or scale with nylon web pads (item 24).

(3) Wipe area with cheesecloth (item 10) wetted with safety solvent (item 28).

c. Procedure.

(1) Mask off surface surrounding area to be plated with tape (item 33).

(2) Make the area to be plated the cathode. Pour a small amount of the LHE solution (item 9) into a dish, or container, or beaker, and saturate the wrapped anode with the solution. Brush cadmium plate by applying the saturated anode to the area to be plated in circular or figure eight motions while applying and adjusting the voltage required of the stylus and anode being used. Continue until a uniform plate and complete coverage is obtained. Thoroughly rinse with water, or cheesecloth (item 10) wetted with water. Dry thoroughly using clean dry cloth or dry compressed air.

WARNING

Nitric acid is extremely dangerous. Avoid contact with skin or clothing. Avoid breathing fumes. Contact with organic materials may cause explosions.

(3) Apply supplementary chromate finish by swabbing or brushing for thirty seconds. The solution shall consist of 6-1/2 ounce/gallon of chromate conversion coating (item 12) and 2-3/4 ounce/gallon of nitric acid (item 23) in water. Rinse and dry thoroughly after the 30 second maximum application.

4-10. Chemical Film Treatment.

a. Surface Preparation.

(1) Scrub area to be treated using nylon web pads (item 24, table 2-3) and a solution of cleaning compound (item 14) mixed 10 to 15 percent by volume in water.

(2) Thoroughly rinse with water.

(3) Check surface for cleanliness. Atomize a mist of distilled water onto surface. If water forms a continuous film without a sudden flashout, the surface is acceptable. If the water gathers into droplets within 25 seconds, reclean and retest the surface.

b. Procedure.

WARNING

Chemical film material is extremely dangerous. Contact with combustible materials will cause explosion or fire. Avoid contact with skin or eyes.

(1) Mix brush solution 3 ounces by weight of chemical film material (item 11) or 0.5 fluid ounce of nitric acid (item 23) to one gallon of distilled or demineralized water. Mix solution thoroughly and store in plastic container.

(2) Apply solution liberally to cleaned area and allow to remain on area until the surface color ranges from a golden iridescent to brown (usually 30 seconds to one minute).

(3) Air dry surfaces, or force dry using compressed air, or clean dry cloths.

4-11. Black Oxide Treatment.

a. Equipment Required.

(1) A tank of the size capable of holding the part to be re-oxided with automatic temperature controls capable of maintaining a plus 5 degrees F (plus 3 degrees C) bath temperature variation. Additionally, an automatic cut-off is required which will shut down the heating element in the event the bath temperature exceeds 300 degrees F (149 degrees C). Rinse tanks must be equipped with a means of skimming or overflowing to remove surface contamination.

(2) Baskets or racks with iron or steel wires must be provided for immersing the parts in the black oxide solution.

(3) A compressed air source which is filtered to remove oil, moisture, and other contaminants is used to agitate the black oxide solution and dry the re-oxided parts.

(4) Coating material (item 16, table 2-3).

b. Surface Preparation.

WARNING

Cleaning materials are flammable and toxic. Avoid skin contact and breathing of solvent vapors.

(1) Remove oils and grease by vapor degreasing using cleaner (item 13) heated 188 to 193 degrees F (86 to 90 degrees C).

(2) Electrolytic clean with alkaline solution (item 4) in accordance with manufacturer's instructions. Operate the bath at six to nine volts dc with a current density of 50 to 125 amps per square foot. Follow electrolytic cleaning with a thorough water rinse.

c. Procedure.

WARNING

Avoid prolonged contact with skin and breathing vapors emitted by black oxide salts. Wear rubber gloves when handling salts. When adding water to black oxide solution, use cold water with care to prevent splattering.

(1) Mask off area not to be treated with tape (item 33).

(2) Accomplish treatment using salts (item 29) in accordance with the manufacturer's instructions.

(3) Maintain the boiling point of the black oxide bath between 280 to 300 degrees F (138 to 149 degrees C). Use water to bring the temperature within range. A greenish discoloration on part being treated indicates a too high temperature. A rusty discoloration indicates too low an operating temperature. Add sufficient salts (item 29) or boil off water until the proper temperature is attained. Treated parts made of carbon or low alloy steel will have a uniform black color with no indication of any reddish brown or green smut. Treated carburized or nitrided parts may range in color from a blue black or reddish black to black provided there is no indication of any reddish brown or green smut.

NOTE

A suitable coating of black oxide should be formed within a maximum of two hours.

CAUTION

Do not use cheesecloth or similar abrasive cloths for wiping oxided parts.

(4) Rinse the finished parts in water twice. The final rinse in hot water 200 degrees F max. (93 degrees C max.) and wipe dry with a soft clean lint-free cloth or blow dry with dry, filtered compressed air.

4-12. Touch-Up and Treatment. After repair and/or damage during overhaul, parts on which the finish has been removed by wear, chipping, scoring, scratches, dents, repair procedures, etc., shall be refinished using the following procedures as applicable.

a. Aluminum parts shall be touched up with brush chemical film in accordance with paragraph 4-10.

b. Cadmium plated steel parts shall be touched up by brush cadmium plating. (Refer to paragraph 4-9.)

c. Shaft (18, figure 4-1) shall be reblack oxided during processing. The black oxide coating remaining on the shaft shall not be removed prior to retreating. (Refer to paragraph 4-11.)

4-13. DIAGNOSTIC AND AUTOMATED TEST EQUIPMENT.

Diagnostic and automated tests such as magnetic particle and fluorescent penetrant inspections required by this DMWR reference pertinent MIL Specs for procedures. Accept/reject criteria for these tests are included in applicable inspection data.

4-14. Defective Material.

Defective materials will be disposed of as directed by contracting officer.

4-15. Repair or Replacement.

WARNING

Chemical file material is flammable and toxic. Provide adequate ventilation. Do not use near fire or open flame.

NOTE

Refer to table 4-1 for part disposition.

a. Replace plate assembly (2, figure 4-1) if rubber is broken, hardened, cracked or loose from plate. If surface is scratched, it should be cleaned using aluminum oxide cloth (item 5, table 2-3). Apply (by brush) chemical film material (item 11) on surface after rework, being careful not to submerge the rubber seal.

b. Dress splines on all couplings (9, 13 and 14) and shaft (18) with a fine India stone (item 30), if necessary, to blend out burrs, small nicks or scratches.

c. Repair coupling (9) as follows:

(1) Dress splines of coupling with fine India stone (item 30, table 2-3), if necessary. Blend out burrs, small nicks, or pits on non-critical surfaces with crocus cloth (item 17).

(2) Repair nicks, dents, scratches, or wear in the seal lip area of coupling by polishing with crocus cloth (item 17, table 2-3) to remove damage and blending into surrounding area. After rework, seal diameter shall be 1.587 inches minimum and concentric with internal spline pitch diameter within 0.002 inch.

WARNING

Flight Safety Part. The Bake cycle after cadmium plating is the critical characteristic for couplings (9), (13) and (14).

(3) Cadmium plated steel parts will be stripped per MIL-STD-871 and replated per QQ-P-416, Type II, Class 3. Damage surfaces (no more than 10 percent of surface area) may be touched up per paragraph 4-9. Do not plate external splines, see figure 4-6.

CAUTION

This carburized part shall be baked within one hour after plating per QQ-P-416 for four hours for 275 degrees, plus or minus, 15 degrees F (135 degrees plus or minus 8 degrees C).

d. Repair coupling (14) as follows:

(1) See above substep c.(1).

(2) See above substep c.(3). Do not plate internal spline teeth, see figure 4-6.

CAUTION

This nitrided part shall be baked within one hour after plating per QQ-P-416 for four hours for 385 degrees, plus or minus, 15 degrees F (196 degrees plus or minus 8 degrees C).

e. Repair coupling (13) as follows:

(1) See above substep c.(1).

WARNING

Flight Safety Part. Bake within one hour of plating per QQ-P-416 for 4 hour at 385 degrees, plus or minus, 15 degrees F (196 degrees plus or minus 8 degrees C). This is a critical characteristic.

(2) See above substep c.(3) with the exception of the last sentence.

f. Repair shaft (18) as follows:

(1) See above substep c.(1).

(2) Repair nicks, dents, scratches or pits in the bearing seat area by polishing with crocus cloth (item 17, table 2-3) to remove damage and blending into the surrounding area. Bearings eat diameter, after rework, should not be less than 1.3776 inches. Manufacturing dimensions are 1.3778 to 1.3787 inches. See figures 4-2 and 4-3.

(3) Shaft (18) has a black oxide coating (item 16), MIL-C-13924, Class I and paragraph 4-11 applied at manufacturer and need not be re-black oxidized after repairs. Re-black oxidize shaft if desired per paragraph 4-11 and figure 4-6 after repair or apply a light film of oil (item 20), or equivalent, to repaired area prior to assembly or storage.

g. Repair hanger (19) as follows:

NOTE

No magnesium hangers will be returned to service. They should be condemned locally and disposed of in accordance with local supply directives.

(1) Remove nicks and scratches on non-critical areas with crocus cloth (item 17).

(2) See above substep c.(3) with the exception of the last sentence. Do not apply cadmium plate solution to the machined bearing surface on inside of hanger and data plate.

4-16. Assembly.

WARNING

Parts look alike and improper use or intermixing of 212 and 204 hanger parts will cause a flight safety condition. After final assembly, at minimum two different inspectors should be required to sign off on proper parts configuration.

CAUTION

Press bearing (17, figure 4-1) on outer race only.

a. Press serviceable bearing (17) into hanger (19).

NOTE

Maintain 0.003 to 0.016 inch clearance from edge of bearing journal on shaft and face of inner race of bearing (typical both sides), see view B, figure 4-1.

b. Support inner race of bearing (17) and press shaft (18) into bearing.

CAUTION

Do not use 204-040-755-3 lubricant in P/N 212-040-600-7 hanger assembly. Lubricant (item 19, table 2-3) may be used in P/N's 204-040-600-9 and 212-040-600-7 hanger assemblies.

WARNING

Flight Safety Part. Seal (15) should be fully seated into groove of coupling (14) and free of cuts, nicks or any other installation damage. Insure the existence of grease (item 19, table 2-3). Bead 0.12 inch deep the full length of spline in outer coupling (14, figure 4-1). These are critical characteristics.

c. Install seal (15) into coupling (14). Make sure seal is fully seated in groove of coupling. Lubricate external splines of coupling (9) and internal splines of coupling (14) with lubricant (item 19) 0.12 inch over top of splines as shown in view A, figure 4-1. Insert coupling (9), with small end, through seal (15).

d. Install coupling (13) on shaft (18). The retaining ring must be installed on hanger (19) facing in opposite direction. Install ring (16) in groove.

WARNING

Flight Safety Part. Torque of nut (5) 50 to 70 inch pounds and existence of cotter pin (4) are the critical characteristics.

e. Assemble couplings (9 and 14) and plates (8 and 10) on ends of shaft (18). Install bolt (12), with (aluminum) washers (7 and 11) next to plates (with larger counterbore facing outboard) and (steel) washer (6) next to nut (5). Torque nut (5) 50 to 70 inch-pounds and secure nut with cotter pin (4).

NOTE

If cotter pin (4) is not engaged, one or two (steel) washers may be added under nut.

CAUTION

Do not use 204-040-755-3 lubricant in P/N 212-040-600-7 hanger assembly. Lubricant (item 19) may be used in P/N's 204-040-600-9 and 212-040-600-7 hanger assemblies.

f. Extend coupling (14) so that seal (15) is against teeth of coupling (9) and coat internal splines in coupling (14) with lubricant (item 19) to a depth of 0.12 inch over top of internal spline teeth as shown in view A, figure 4-1.

g. Place spring (3) in recess of plate (10) and on pilot of plate assembly (2), and compress to seat plate assembly (2) in coupling (14). Secure plate assembly (2) with ring (1).

4-17. Lubrication.

Refer to above paragraph 4-16, steps c. and f. and view A, figure 4-1 for lubrication instructions of hanger assembly.

4-18. Testing.

There is no testing to be performed on these hanger assemblies.

4-19. Painting, Refinishing, and Marking.

a. Touch-up exposed surfaces on hanger (figure 4-6) with brush cadmium plate. (paragraph 4-9).

b. Mark hanger assembly as outlined in paragraph 1-7.

c. Hanger and female couplings require a rectangular coating of primer per TT-P-1757.

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 and the glossary in the DMWR.

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-R702-1, 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 material 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 witht he 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.

5-8. Test Check List. A check list indicating each required test shall be included as a part of this DMWR. The list shall show name of test and test set-up (per figure if applicable). List the input readings, such as position of valves, switches, etc. List the required readings, such as time, meter readings, etc. List the accept/reject criteria for each test as applicable.

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

Table 5-1. Inspection Definitions (continued)

TERM	DEFINITION	PROBABLE CAUSE
Dent	A small smoothly rounded depression	A sharp blow or excessive pressure
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 evidence 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 mis-alignment 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. 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, and the accompanying AMSAV Form 6525 (J).

6-2. Organic Depot shall contact ATCOM Packaging and transportability Branch, HQ ATCOM, AMSAT-I-SDP, 4300 Goodfellow Blvd., St. Louis, MO 63120 for preservation and packaging requirements.

6-3. For further information, contact ATCOM Packaging and transportability Branch, HQ ATCOM, AMSAT-I-SDP, 4300 Goodfellow Blvd., St. Louis, MO 63120. All contracts or inquiries shall be through the Contracting Officer (KO).

Delete figures 6-1 and 6-2.

Appendix A. REFERENCES

NUMBER	TITLE
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-C-13924	Coating, Oxide, Black, for Ferrous Metals
MIL-C-45662A	Calibration System Requirements
MIL-C-81706	Chemical Film and Chemical Materials for Aluminum and Aluminum Alloys
MIL-G-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw
MIL-I-6866	Fluorescent Penetrant Method of Inspection
MIL-I-6868	Magnetic Particle Inspection Process
MIL-I-45607	Acquisition of Inspection Equipment
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-129	Marking for Shipment or Storage
MIL-STD-410	Qualification of Inspection Personnel (Magnetic Particle and fluorescent Penetrant)
MIL-STD-865A	Brushing Plating, Electro Deposition
DA PAM 738-751	Functional Users Manual For The Army Maintenance Management System - Aviation (TAMMS-A)
TM 1-1500-204-23	General Aircraft Maintenance Manual
TM 55-1500-335-23	Non-Destructive Inspection Methods
TM 55-1520-210-23P	Repair Parts and Special Tools
TM 55-1520-234-23P	Repair Parts and Special Tools
PQ-P-416	Plating, Cadmium, (Electro Deposition)

APPENDIX B

REPAIR PARTS AND SPECIAL TOOLS LIST

B-1. Refer to TM 55-1520-210-23P or TM 55-1520-221-23P or TM 55-1520-234-23P or TM 55-1520-236-23P for listing of repair parts to accomplish overhaul of hanger assemblies outlined in this DMWR.

B-2. There are no special tools required for accomplishing overhaul of the hanger assembly. Equipment needed for overhaul of hanger assembly are listed in Table 2-1.

GLOSSARY

A

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, or rollers skidding or sliding instead of rolling.

C

CHECK — Act of testing or verifying.

CORROSION — 1. Etching. Appears on a polished surface as a dulling of the surface, if allowed to continue, surface becomes rough and frosted in appearance. 2. Pitting. Small irregular pits or holes. Appears on surface as a white or gray powdery deposit. 3. Fretting or Erosion. Loss of material due to abrasives or chemical action. 4. Rust. Oxides formed by chemical attack.

D

DEFORMATION/DISTORTION — Loss of original contour.

DISASSEMBLY — As used herein, describes the operations necessary to reduce an assembly to its separate components and parts.

E

F

FSC — Federal Stock Class

FSCM — Federal Source Code for Manufactures

G

GALLING — Transfer to metal from one surface to another.

H

I

INSPECT — View or examine critically either visually or using prescribed method contained in this DMWR.

J

K

L

M

N

NMP — National Maintenance Point

NSN — National Stock Number

O

OVERHAUL — To restore an item to a completely serviceable condition as prescribed by serviceability standards developed and published by DRSTS-F.

P

PROCESSING — As used herein, in the series of procedures outlined in this DMWR to accomplish overhaul. This includes the restoration of finishes such as painting, plating and treatment of metal surfaces.

Q

R

REPAIR — To restore defective part, component, subassembly, or assembly to a serviceable condition in accordance with the instructions contained in this DMWR.

REPLACE — Removal and disposition of a defective part and replace the part with a new or serviceable like item.

S

SCORING — Very deep scratches caused by foreign particles between surfaces 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 or preservation necessary to maintain the equipment and other respective parts in serviceable condition.

SPALLING — Chipped or flaked surface caused by the breaking away of the hardened metal and separation of the case from the core.

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 DMWR.

TOLERANCE — The difference between two limiting sizes as a means of specifying the degree of accuracy.

U

V

W

X

Y

Z

INDEX

For the Commander:

EUGENE J. DAVIS
Colonel, GS
Chief of Staff

Official:

JOANNE M. MEYER
DA Publications Manager

FOR THE COMMANDER:

ROBERT S. YOUNG
Colonel, GS
Chief of Staff

OFFICIAL

Ray E. Pearce

RAY E. PEARCE
USAAVSCOM Equipment Publications
Control Officer

REQUEST FOR ACTION

CONTRACT NO	PRIORITY OF REQUEST	DATE OF REQUEST
	☐ URGENT ☐ ROUTINE	

TO:

THRU:

COPIES:

FROM:

POINT-OF-CONTACT:

PUBLICATION NO. AND TITLE

STATEMENT OF THE PROBLEM ☐ PUBLICATIONS PROCEDURES ☐ OTHER

(USE CONTINUATION SHEET IF NECESSARY)

REASONS FOR URGENCY

RECOMMENDED SOLUTIONS OR DISPOSITIONS

☐ DA FORM 2028 ATTACHED

(UE CONTINUATION SHEET IF NECESSARY)

TITLE	SIGNATURE	DATE

AMSAV-M Form
1 Oct 87

1379

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO. 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
DMWR 55-1615-239	15 Nov 79	Hanger Assembly

BE EXACT. PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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DRSTS-M Overprint 1, 1 Nov 80

P S --IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

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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 dekagram = 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 milliliters = .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 = 26.42 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 = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 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. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29,573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.356
pound-inches	newton-meters	.11296

To change	*To*	*Multiply by*
ounce-inches	newton-meters	.007062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C