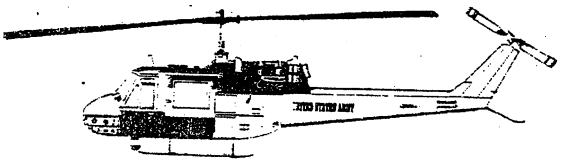
DEPOT MAINTENANCE

WORK REQUIREMENT

FOR

NINETY DEGREE GEAR BOX

PART NUMBER	NATIONAL STOCK NUMBER
204-040-012-13	1615-00-918-2677



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U.S. ARMY AVIATION AND TROOP COMMAND
1 OCTOBER 1965

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.

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. Solvent flash point must not be less than 100°F.

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. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and only then with an effective chip guarding and personnel protection equipment.

TOXIC POISONS

Lubricants may contain additives which are poisonous and may be absorbed through the skin. Avoid prolonged contact with the skin.

TEST STAND OPERATION

Test Stand shall be operated by authorized personnel only.

FLIGHT SAFETY PARTS

This manual contains procedures identifying critical characteristics of Flight Safety Parts. Critical characteristics may be identified as dimensions, tolerances, finishes, materials, assembly, 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.

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 is not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure, condition, etc., which it is essential to highlight.

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.

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Depot Maintenance
Work Requirements
No. 55-1560-127

U.S. ARMY AVIATION
AND TROOP COMMAND
1 October 1965

Depot Maintenance Work Requirements

For

NINETY DEGREE GEAR BOX
NSN 1615-00-918-2677
P/N 204-040-012-13

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find mistakes or if you know of a way to improve procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 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. INTRODUCTION. This Work Requirement is self contained within the scope of rework of Gear Box Assemblies, Part No. 204-040-012-1, 204-040-012-7 and 204-040-012-13.

1-2. PURPOSE AND SCOPE. This Work Requirement establishes the requirements for disassembly, cleaning, inspection, repair, reconditioning, rehabilitation, modification, reassembly, servicing, testing, and storage of specified equipment.

a. Parts, components, subassemblies, or assemblies found worn or defective beyond the reparable limits established by this Work Requirement will be condemned and disposed of as directed in supply provisions of the contract.

b. The repair and/or rehabilitation and reconditioning of equipment and their components specified herein shall be accomplished in accordance with specific instructions set forth in this Work Requirement. Tolerances and limits set forth herein are the minimum acceptable standards; however, the repair procedures are not mandatory if the contractor is able to develop satisfactory procedures for repair. Any repair procedures developed by the contractor shall be subject to approval by the Contracting Officer or his designated representative.

c. This Work Requirement requires repair and renovation of parts to within the dimensional and tolerance specifications noted herein.

1-3. GENERAL INFORMATION. Technical publications, pertinent to equipment set forth in this Work Requirement, have been integrated in the specific overhaul requirements outlined. Any errors or omissions found within this Work Requirement during compliance shall be reported as follows:

a. Contractors report shortcomings to Contracting Officer.

b. Army units or depots report shortcomings on DA Form 2028 to Commanding General, U.S. Army Aviation Systems Command, ATTN: AMSAV- MMD, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798.

1-4. DEFINITIONS. To avoid misinterpretation of the intent of the instructions in this Work Requirement, phrases and terms used herein which are peculiar to the equipment or its rehabilitation are defined below:

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. 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.

c. Consumable items. Parts or materials which are consumed by usage or have a one-time usage, normally losing identity upon application with, and/or assembled into, the equipment.

d. Contracting Officer. (CO) is used herein to indicate the Department of the Army individual responsible for overall administration of the contract.

e. Disassembly. As used herein, describes the operations necessary to reduce an assembly or subassembly to its separate components and parts.

f. National stock number (NSN). The National Stock Number for an item of supply consists of the applicable 4-digit Federal Supply Classification (FSC) code number, plus the applicable 7-digit Federal Item Identification Number (FIIN). The NSN code number relates the item to other like items of supply; the FIIN merely identifies the item as a unit. The NSN is incomplete unless both of these numbers are included.

g. Modification. An alteration and/or integral change affecting the configuration of the equipment or its respective parts, components, subassemblies, and assemblies.

h. Reassembly. The assembling and aligning of all subassemblies and parts into a complete assembly to effect a serviceable item of equipment.

i. 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 Work Requirement.

j. Rehabilitation. The repair, modification, or reconditioning necessary to return the equipment to a serviceable condition equivalent to new.

k. Repair. To restore a defective part, component, subassembly, or assembly to a serviceable condition in accordance with the instructions contained in this Work Requirement.

l. Servicing. The lubrication, treating, cleaning, and/or preservation necessary to maintain the equipment and/or other respective parts in serviceable condition.

m. USAAVSCOM. U.S. Army Aviation Systems Command.

n. 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 Work Requirement.

o. 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 Work Requirement 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 assure serviceable end items in accordance with the requirements of this Work Requirement.

p. Overhaul. To restore an item to a completely serviceable condition as prescribed by serviceability standards developed and published by USAAVSCOM.

1-5. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-751 and in the contract.

CHAPTER 2

GENERAL ADMINISTRATIVE REQUIREMENTS

2-1. HANDLING AND INVENTORY. The contractor shall exercise the greatest possible care to prevent damage and deterioration to Government equipment while undergoing movement, unpacking, test, and repair operations, and to prevent damage after Government acceptance. Equipment shall be stored in a controlled location approved by the Contraction Officer or his designated representative.

2-2. COMPLIANCE WITH TECHNICAL DIRECTIVES. When the Work Requirement incorporates other Army directives which in themselves require a form entry to indicate compliance, such directives are identified by title, number, and date and require applicable component form entry upon compliance. Further, when such directives are incorporated into the Work Requirement, each specific paragraph pertaining thereto is identified as being part of such directives.

2-3. QUALITY CONTROL PERSONNEL. Quality control personnel shall insure complete compliance with Quality Program and/or Inspection System Requirements specified in the contract and this Work Requirement. Any deviations from the established requirements shall be approved by the Contracting Officer or his designated representative.

2-4. DEVIATIONS AND EXCEPTIONS. When any work segment as set forth in this Depot Maintenance Work Requirement cannot be accomplished, or can be accomplished only in a manner other than specified, the contractor shall submit a Request for Action Form AMSAV-M 1379 through the Contracting Officer to AMSAT-I-MP with a copy to AMSAT-I-MDO. If the problem is publications related or requires a change to a publication, a DA Form 2028 shall also accompany the request for action. The request for action shall state the problems, the reason for urgencies, and give the following specifics:

a. Serial number (if applicable), part numbers and NSN of 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.

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

2-5. 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" warning and are inserted whenever and wherever necessary.

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 to 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 noncomforming or missing could cause failure or malfunction of the critical item.

c. The 90 degree gearbox assembly P/N 204-040-012-13 is considered a Flight Safety Part.

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

Table 2-1

FLIGHT SAFETY PART		CRITICAL CHARACTERISTIC
204-040-012 Gearbox Assembly	1.	Backlash to be 0.004 to 0.010 inch.
	2.	Installation of bearings (22, 44, Fig. 4-3) in the face to face position.
	3.	Insure the existence of grease (item 8, Table 8-1) bead 0.12 inch deep the full length of spline on coupling (39, Fig. 4-3).
	4.	Insure seal (40, Fig. 4-3) is fully seated and seal lip is free of cuts, nicks, or other installation damage.
204-040-400 Pinion	1.	Magnetic Particle Inspection.
204-040-401 Bevel Gear	1.	Magnetic Particle Inspection.
204-040-402 T/R Shaft	1.	Magnetic Particle Inspection.
	2.	Embrittlement relief bake cycle.
204-040-418 Case Assy	1.	Torque of studs.
	2.	Fluorescent Penetrant Inspection.
204-040-425 Output Sleeve	1.	Fluorescent Penetrant Inspection.
204-040-603 Inner Coupling	1.	Magnetic Particle Inspection.
	2.	Embrittlement relief bake cycle.
	3.	Nital etch inspect for grinding burns.
204-040-604 Outer Coupling	1.	Magnetic Particle Inspection.
	2.	Embrittlement relief bake cycle.
	3.	Nital etch inspect for grinding burns.

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 ninety degree gear box 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 equipment 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 TM's, TB's, or MWO's 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 equipment (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 require instructions from USAAVSCOM, ATTN: AMSAV-MMD, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798, telephone: (314) 263-1879 (AV 693-1879).

(2) If the equipment 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 equipment have been integrated, where applicable, in this Work Requirement.

b. After the gearboxes are removed from the shipping containers, the outer surface will be cleaned with cleaning solvent commercial item description (CID) A-A-711 and steam-cleaned with steam-cleaning compound (MIL-C-22542).

c. The oil will be drained from the gearbox.

WARNING

Lubricating oil may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

d. 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).

e. All gearboxes not painted with polyurethane coating (Item 9, Chapter 8) and labeled "CARC-P" will be stripped 100% as an assembly. Removal of paint from gearboxes as a whole assembly shall occur prior to any disassembly for overhaul or repair. All openings, exposed seals, exposed gaskets, etc. shall be sufficiently masked off to prevent any paint removal compound, plastic media, or any foreign matter from entering gearbox. All gearboxes stripped shall be inducted through preshop analysis (PSA) within two days after stripping takes place. All gearboxes painted with black polyurethane coating (Item 9, Chapter 8), and labeled "CARC-P" will be processed as follows:

(1) If more than 25% exterior painted area is blistered, chipped, missing, or deteriorated, strip 100% as an assembly.

(2) If 25% or less exterior area has deteriorated paint do not strip.

3-4. PRESHOP ANALYSIS. The following guidelines will be used to determine whether the gearbox can be minor repaired or requires depot overhaul.

NOTE

There should be two separately funded programs for conducting depot maintenance on gearboxes: one for accomplishing minor repair; one for depot overhaul. Using the guidelines provided in this paragraph, preshop analysis will determine if the gearbox can be inducted and processed under the minor repair program. A gearbox inducted for minor repair will also receive convenience maintenance consistent with its own inherent weaknesses and overall condition.

a. General Requirements.

(1) Review the historical data received with the ninety degree gearbox; i.e., DA Forms 2410 and 2408-20 and DD Form 1577-2.

(2) Disassemble equipment as required in order to perform a complete evaluation of the components or subassemblies to determine the repair, modification, and replacements required to return the equipment to a completely serviceable condition as specified in this Work Requirement.

(3) All disassembly and inspections will be performed in accordance with Chapter 4.

(4) All equipment shall be modified as specified in table 3-2 unless otherwise modified within the contract.

(5) Equipment removed from stock for modification only shall be disassembled by the contractor only to the extent required to accomplish the modification(s).

(6) When the equipment was removed from service for being burned and there is visible evidence that the gearbox is burned, the gearbox will be depot overhauled. If there is obvious physical mechanical damage, extent of inspection or repair will be per the evaluation in step b.

(7) When the equipment was removed from service for metal on magnetic plug, contamination, or internal failure, every effort will be made to determine the source of metal contamination or internal failure. Extent of inspection or repair will be per the evaluation in step b.

(8) If during inspection the source of metal contamination is located, refer to TM 55-1520-210-23.

(9) If the gearbox, has been dropped, inspection and repair will be in accordance with paragraph 4-10.

(10) A gearbox received with no records or historical data will be researched through AVSCOM's RCM Technical Analysis Section (sample data collecting, AOAP, etc.) for pertinent data. If none is available, the gearbox shall be completely disassembled and overhauled.

(11) A disassembly and inspection data sheet will be completed on each ninety degree gearbox overhauled or minor repaired. A copy of this data sheet will be forwarded to the following organization to be filed in the data bank:

Corpus Christi Army Depot
AVSCOM Depot Engineering and RCM Support Office
Technical Analysis Branch
ATTN: AMSAV-MRR-T (Stop 55)
Corpus Christi, TX 78419-6195

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

b. Disassembly and Inspection Procedure.

(1) Inspect the exterior of the gearbox for mechanical damage, physical damage, and evidence of leaking seals per table 3-1. Check gear backlash and record (reference paragraph 4-15.e.).

(2) Inspect the interior of the gearbox by removing the liquid sight gauge glass and inspecting the gear pattern.

(3) Remove the chip detector and check for metal particles.

(4) At the completion of the external and internal inspections and historical records review, determine the maintenance procedures to be used (depot overhaul or minor repair). In general, gearboxes with time since overhaul of 800 hours, or less, which are not covered under paragraphs 3-4a (4), 3-4a (5), 3-4a (6) (with visible evidence), 3-4a (10), or 3-4a (11) and for which the evaluation in this step does not indicate a requirement for depot overhaul, will be processed per the minor repair procedures in paragraph 3-5, rather than by depot overhaul, when the total cost of processing a gearbox in this way reflects more operational efficiency than processing the same gearbox by depot overhaul.

3-5. MINOR REPAIR. Minor repair shall be accomplished or performed in the following manner:

a. Parts or components will be repaired or replaced only as necessary to correct a known deficiency and return the ninety-degree gearbox to a serviceable status, unless otherwise noted in this paragraph.

b. The inner and outer couplings shall be removed; cleaned; inspected for cracks, chipped, worn, or pitted teeth, dimensions within allowable limits, nicks, dents, scratches, and corrosion; and repacked.

c. Remove and replace the existing coupling seals, plain encased.

d. Flush the gearbox with cleaning solvent, CID, A-A-711.

e. Re-install the inner and outer couplings.

f. Install liquid sight glass and chip detector.

g. Refill gearbox with specified lubricating oil.

h. Test gearbox in accordance with paragraph 4-16, step b.

i. Gearboxes that do not satisfy requirements specified in paragraph 4-16, step b, following adjustment, shall be completely disassembled and overhauled.

j. After test, remove liquid sight glass and inspect for acceptable gear pattern.

k. Touch-up paint and refinish in accordance with Chapter 7.

l. Operational time since new or last overhaul will be indicated on DA Form 2410 and will not change after minor repair.

3-6. DEPOT OVERHAUL. All gearboxes inducted at depot shall be depot overhauled in accordance with Chapter 4 except for gearboxes covered under paragraphs 3-4a (5) or 3-4b (4). Gearboxes processed in accordance with Chapter 4 shall carry a zero time since overhaul designation. A corresponding entry shall be made in the gearbox log.

Table 3-1. Preshop Analysis Checklist

INSPECTION POINT	CONDITION	ACTION	REMARKS	DONE
GENERAL				
Gear Box	Reason(s) for removal from service	Record:		
	Modification only	Paragraph 3-4a (5)		
	Burned	Paragraph 3-4a (6)		
	Crash damage, accident damage, hard landing, sudden stoppage	Paragraph 3-4a (7)		
	Metal on magnetic plug, contamination, internal failure	Paragraph 3-4a (8), (9)		
	Dropped	Paragraph 3-4a (10)		
	No records or historical data	Paragraph 3-4a (11)		
EXTERIOR INSPECTION				
Case Assembly	Cracks, corrosion, nicks, dents, scratches, pits, broken studs	Visual, OIP-16		
Output Sleeve	Cracks, corrosion, nicks, dents, burrs, scratches	Visual, OIP-22		
Output Shaft	Cracks, nicks, dents, or pits on spline; wear; over pin dimension of spline not within allowable limits; corrosion	Visual, OIP-29		
Input Sleeve	Cracks	Visual, OIP-1		
Nuts	Nicks, scratches	Visual; repair/ replace, OIP-1 24		
Cap Assembly	Leakage	Replace		
Output Sleeve Packing	Leakage	Replace		

Table 3-1. Preshop Analysis Checklist (Continued)

INSPECTION POINT	CONDITION	ACTION	REMARKS	DONE
Input Sleeve Packing	Leakage	Replace		
Liquid Sight Gauge Glass	Crazed, cracked, or discolored glass; leakage	Visual, OIP-20		
INTERIOR INSPECTION Gears (remove sight glass)	Gear wear patterns not within limits	Visual, OIP-28		
METAL PARTICLE CHECK Chip Detector	Metal particles	Visual, paragraph 3-4a (8), (9)		
MINOR REPAIR Gear Box	TSO 800 hours or less	Paragraphs 3-4b (4), 3-5		
Inner Coupling	Cracks; chipped or pitted teeth; over pin dimension on coupling teeth or between pin dimension on spline teeth not within allowable limits	Visual, OIP-7 remove/replace coupling seal, plain encased		
Outer Coupling	Chipped or pitted teeth, wear on face of internal teeth, cracks, nicks, dents, scratches, corrosion	Visual, OIP-6 remove/replace coupling seal, plain encased		
Gear Box	Not satisfy requirements specified in paragraph 4-16 step b	Paragraph 3-5i		
Gear Backlash	Beyond limits check; and record (paragraph 4-15.e).	Check for proper shim plates, warped gear(s) or distorted case. Replace - out-of-tolerance parts.	Degrees 0 _____ 120 _____ 240 _____ Difference between MAX.-MIN. readings	

Table 3-2. Mandatory Modifications

Modification Description		Applicability				
		Gear Box Applied			Maintenance	
Convert To	Requirements	204-040-012-1	204-040-012-7	204-040-012-13	Minor Repair	Depot Overhaul
1. Gear Box P/N 204-040-012-13	See paragraph 4-11	x	x		x	x

CHAPTER 4

DETAIL WORK REQUIREMENTS

SECTION 1 GENERAL REQUIREMENTS

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

4-1.1. GENERAL DISASSEMBLY PROCEDURE.

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

b. Check and tag shims, when applicable.

c. Separate and index all parts for reassembly in proper positions.

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 packings, etc.).

4-1.2. 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 USATSARCOM.

4-1.3. 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.

4-1.4. LUBRICATION. Lubricate parts during reassembly as required using lubricants specified in this Work Requirement.

4-1.5. 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 on equipment is prohibited.

b. If required, locally manufacture replacement data plate of any standard thickness up to and including 0.032 inch (item 15, table 8-1,) one inch wide by two inches long. Stamped data plate shall be attached with adhesive (item 16, table 8-1).

NOTE: Surfaces to be bonded must be thoroughly cleaned with solvent (item 2, 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 gear box assemblies 204-040-012-1, 204-040-012-7 and 204-040-012-13. The group assembly breakdown lists all parts in their sequence of disassembly and parts are indexed and shown on the illustration. All part numbers appearing in the Illustrated Parts Breakdown are listed in Chapter 15, part number listing, and is cross referenced to figure and index number, and approved federal stock number. Where conflict exists between part numbers and FSNs in this Work Requirement and Material Requirements List this Work Requirement shall govern.

4-3. Usable On Code. Part number applicability to gear box assemblies is indicated by a letter symbol in the USABLE ON CODE column of the group assembly parts list. When no symbol is shown, the part is used on all gear box assemblies listed in the corresponding parts list.

CODE	PART NUMBER
A	204-040-012-1
B	204-040-012-7
C	204-040-012-13
D	204-040-004-27
E	204-040-012-9
F	204-040-012-5
G	204-040-012-11

4-4. Vendor's Code. The following vendors' code with the vendor's name and address is used in the DESCRIPTION column to indicate vendors' parts:

CODE	NAME AND ADDRESS
73680	Garlock Seal Palmyra, N.Y.
76680	National Seal Division Redwood City, California
80756	Ramsey Corp. Spirlox Div. St. Louis, Missouri
83324	Rosan Inc. Newport Beach, California
97484	Technical Development Glenolden, Penn

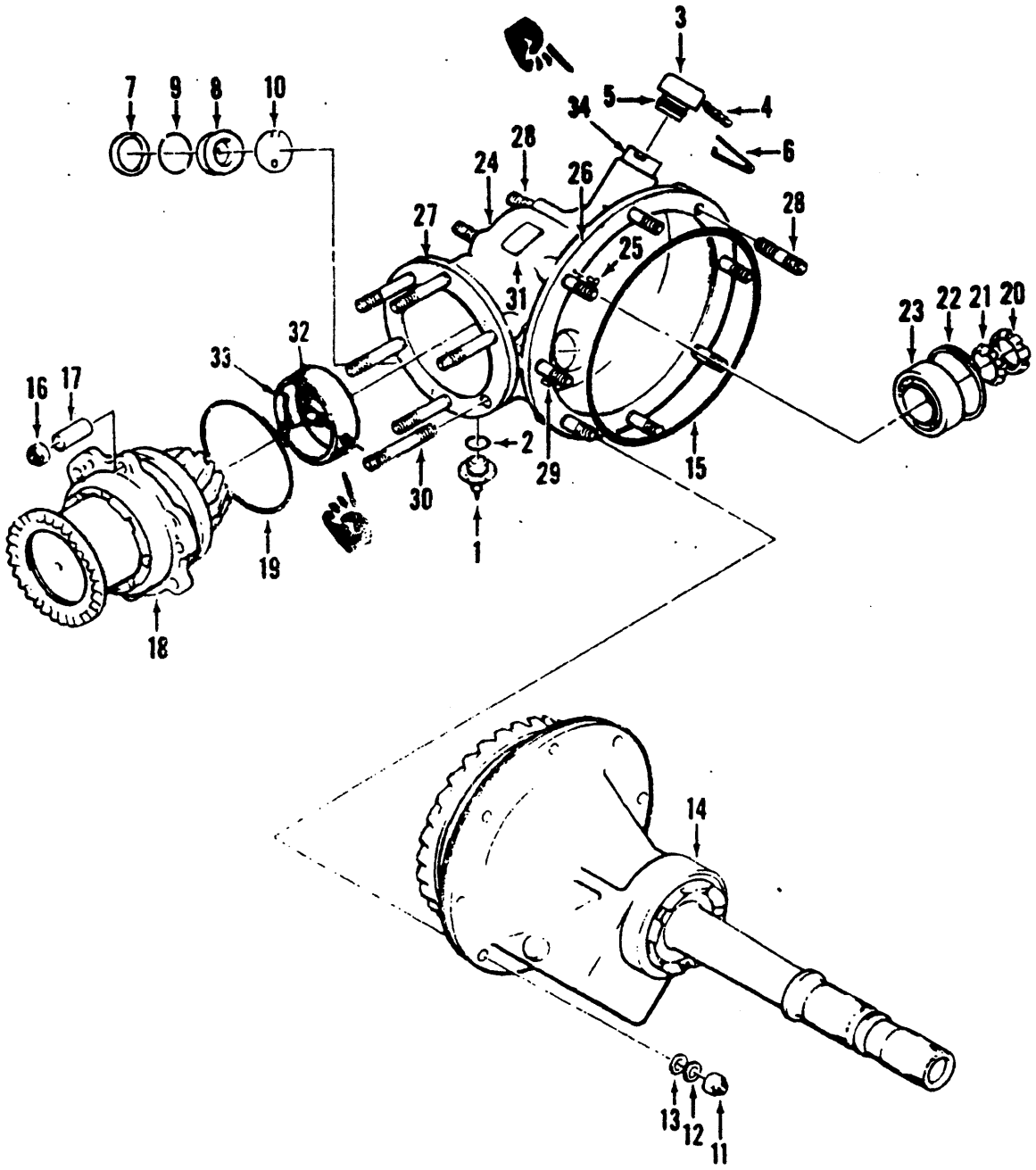

Figure 4 1. Illustrated parts breakdown

FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON A	B	C
4-1	204-040-012-1	GEAR BOX ASSEMBLY	Ref A			
	204-040-012-7	GEAR BOX ASSEMBLY	Ref B			
	204-040-012-13	GEAR BOX ASSEMBLY	Ref C			
-1	B752G	. CHIP DETECTOR, Electrical	1			
	MS29561-011	. . PACKING	1			
-2	MS35769-11	. GASKET	1			
-3	204-040-502-9	. CAP ASSEMBLY	1			
-4	NAF1088-1A4	. . CHAIN	1			
-5	MS29561-210	. . PACKING, Preformed	1			
-6	AN416-2	. PIN	1			
-7	RRT150C	. RETAINER (80756)	1			
-8	204-040-507-3	. GLASS, Liquid Sight	1	A	B	
	204-040-514-1	. GLASS, Liquid Sight	1			C
-9	MS29561-218	. PACKING, Preformed	1			
-10	204-040-508-1	. INDICATOR, Oil Level		A		
	204-040-508-9	. [illegible]			B	C
-11	MS2104214	. [illegible]				
-12	AN960-416L	. [illegible]				
-13	NAS1197-416	. [illegible]				
-14	204-040-004-27	. [illegible]		A		
	204-040-012-9	. [illegible]			B	C
-15	MS29561-259	[illegible]				
-16	AN315-5R	[illegible]				
-17	NAS43DD5-71	. [illegible]				
-18	204-040-012-5	[illegible]		A	B	
	204-040-012-11	. [illegible]			B	C
-19	MS29561-237	. [illegible]				
-20	MS172241	. [illegible]				
-21	MS172206	[illegible]				
-22	RR-204	. RETAINER, Ring	1			
-23	204-040-406-1	. BEARING, Roller	1			
-24	204-040-418-13	CASE ASSEMBLY	1			
-25	MS24693S4	SCREW	6			
-26	204-040-418-[illegible]	PLATE, Shim	1			
-27	204-040-418-1[illegible]	PLATE, Shim	1			
-28	AN[illegible]	STUD (0.003 Undersize)	11			

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FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON A B C
4-1 (CONT)				
-28	AN126018	. . STUD (Standard)	AR	
	AN126019	. . STUD (0.003 Oversize)	AR	
	AN126020	. . STUD (0.006 Oversize)	AR	
	AN126021	. . STUD (0.009 Oversize)	AR	
	AN126022	. . STUD (0.012 Oversize)	AR	
-29	AN122693	. . PIN	1	
-30	AN126419	. . STUD (0.003 Undersize)	6	
	AN126420	. . STUD (Standard)	AR	
	AN126421	. . STUD (0.003 Oversize)	AR	
	AN126422	. . STUD (0.006 Oversize)	AR	
	AN126423	. . STUD (0.009 Oversize)	AR	
	AN126424	. . STUD (0.012 Oversize)	AR	
-31	AN7510-1	. PLATE	1	
-32	MS24692-50P	. . PIN	2	
-33	204-040-417-1	. . LINER	1	
-34	204-040-506-1	. . ADAPTER	1	

FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON A	B	C
4-1	204-040-012-1	GEAR BOX ASSEMBLY	Ref A			
	204-040-012-7	GEAR BOX ASSEMBLY	Ref B			
	204-040-012-13	GEAR BOX ASSEMBLY	Ref C			
-1	B752G	. CHIP DETECTOR, Electrical	1			
	MS29561-011	. . PACKING	1			
-2	MS35769-11	. GASKET	1			
-3	204-040-502-9	. CAP ASSEMBLY	1			
-4	NAF1088-1A4	. . CHAIN	1			
-5	MS29561-210	. . PACKING, Preformed	1			
-6	AN416-2	. PIN	1			
-7	RRT150C	. RETAINER (80756)	1			
-8	204-040-507-3	. GLASS, Liquid Sight	1	A	B	
	204-040-514-1	. GLASS, Liquid Sight	1			C
-9	MS29561-218	. PACKING, Preformed	1			
-10	204-040-508-1	. INDICATOR, Oil Level	1	A		
	204-040-508-9	. INDICATOR, Oil Level	1		B	C
-11	MS21042L4	. NUT	8			
-12	AN960-416L	. WASHER (Steel)	8			
-13	NAS1197-416	. WASHER (A1 A1)	8			
-14	204-040-004-27	. QUILL ASSEMBLY (Output)	1	A		
	204-040-012-9	. QUILL ASSEMBLY (Output) (See Figure 4-2 for Detail Breakdown)	1		B	C
-15	MS29561-259	. PACKING, Preformed	1			
-16	AN315-5R	. NUT	2			
-17	NAS43DD-5-71	. SPACER	2			
-18	204-040-012-5	. QUILL ASSEMBLY (Input)	1	A	B	
	204-040-012-11	. QUILL ASSEMBLY (Input) (See Figure 4-2 for Detail Breakdown)	1		B	C
-19	MS29561-237	. PACKING, Preformed	1			
-20	MS172241	. NUT	1			
-21	MS172206	. WASHER	1			
-22	RR-204	. RETAINER, Ring	1			
-23	204-040-406-1	. BEARING, Roller	1			
-24	204-040-418-13	. CASE ASSEMBLY	1			
-25	MS24693S4	. . SCREW	6			
-26	204-040-418-7	. . PLATE, Shim	1			
-27	204-040-418-17	. . PLATE, Shim	1			
-28	AN126017	. . STUD (0.003 Undersize)	11			

FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON A B C
4-1 (CONT)				
-28	AN126018	. . STUD (Standard)	AR	
	AN126019	. . STUD (0.003 Oversize)	AR	
	AN126020	. . STUD (0.006 Oversize)	AR	
	AN126021	. . STUD (0.009 Oversize)	AR	
	AN126022	. . STUD (0.012 Oversize)	AR	
-29	AN122693	. . PIN	1	
-30	AN126419	. . STUD (0.003 Undersize)	6	
	AN126420	. . STUD (Standard)	AR	
	AN126421	. . STUD (0.003 Oversize)	AR	
	AN126422	. . STUD (0.006 Oversize)	AR	
	AN126423	. . STUD (0.009 Oversize)	AR	
	AN126424	. . STUD (0.012 Oversize)	AR	
-31	AN7510-1	. PLATE	1	
-32	MS24692-50P	. . PIN	2	
-33	204-040-417-1	. . LINER	1	
-34	204-040-506-1	. . ADAPTER	1	

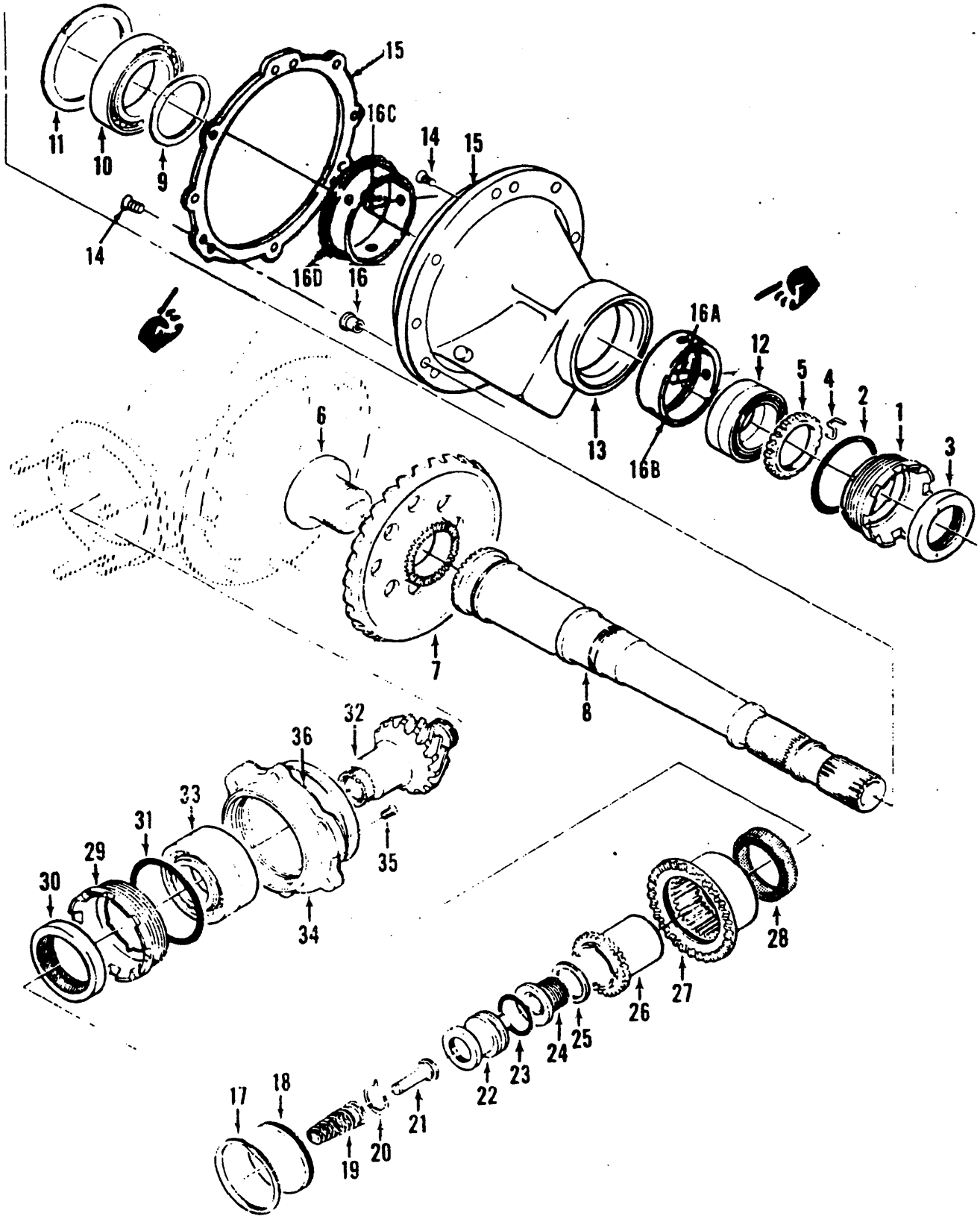


Figure 4-2. Illustrated parts breakdown

FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON D	E	F	G
4-2	204-040-004-27	QUILL ASSEMBLY (Output)	Ref D				
	204-040-012-9	QUILL ASSEMBLY (Output)	Ref E				
	204-040-012-5	QUILL ASSEMBLY (Input)	Ref F				
	204-040-012-11	QUILL ASSEMBLY (Input)	Ref G				
-1	204-040-421-1	. NUT	1	D			
	204-040-427-3	. NUT	1		E		
-2	MS29561-231	. PACKING, Preformed	1	D			
	MS29561-235	. PACKING, Preformed	1		E		
-3	20486-4	. SEAL (73680)	1	D	E		
		(Alternate)					
	60171-J19	. SEAL (76680)	1	D	E		
		(Replaced by)					
	45D171-J60	. SEAL (76680)	1	D	E		
-4	204-040-413-1	. CLIP	1	D	E		
-5	204-040-412-1	. NUT	1	D	E		
-6	204-040-405-1	. BOLT	1	D	E		
-7	204-040-401-5	. GEAR	1	D	E		
		(Alternate)					
	204-040-401-7	. GEAR	1	D	E		
-8	204-040-402-7	. SHAFT	1	D	E		
		(Alternate)					
	204-040-402-9	. SHAFT	1	D	E		
-9	RS196	. RETAINER (80756)	1	D	E		
-10	204-040-407-3	. BEARING (Roller)	1	D	E		
-11	RR314	. RETAINER (80756)	1	D	E		
-12	204-040-408-1	. BEARING (Set)	1	D			
	204-040-424-1	. BEARING (Set)	1		E		
-13	204-040-419-1	. SLEEVE ASSEMBLY	1	D			
	204-040-425-1	. SLEEVE ASSEMBLY	1		E		
*-14	MS24693S4	. . SCREW	3	D	E		
*-15	204-040-419-7	. . PLATE, Shim	1	D			
	204-040-425-5	. . PLATE, Shim	1		E		
*-16	REA-048	. . NUT, Clinch (83324)	3	D	E		
-16A	MS24692-74P	. . PIN	3				
-16B	204-040-426-1	. . ADAPTER	1				
-16C	MS24692-98P	. . PIN	3				
-16D	204-040-416-1	. . SLEEVE	1				
-17	RRT-237C	. RETAINER (80756)	1			F	G
-18	204-040-610-1	. PLATE ASSEMBLY	1			F	G
-19	204-040-608-1	. SPRING	1			F	G
-20	204-040-609-1	. SPRING, Lock	1			F	G
-21	204-040-422-1	. SPACER	1			F	G
-22	204-040-607-1	. RETAINER, Spring	1			F	G
-23	MS29561-216	. PACKING, Preformed	1			F	G
-24	204-040-612-1	. BOLT	1			F	G
-25	204-040-606-1	. WASHER	1			F	G
-26	204-040-603-5	. COUPLING (Inner)	1			F	G
		(Alternate)					
	204-040-603-7	. COUPLING (Inner)	1			F	G
-27	204-040-604-5	. COUPLING (Outer)	1			F	G
-28	204-040-611-1	. SEAL	1			F	G
-29	204-040-185-1	. NUT	1			F	
	204-040-185-3	. NUT	1				G

FIG & INDEX NO	PART NO	DESCRIPTION 1 2 3 4 5 6 7	QTY PER ASSY	USABLE ON D	 E	 F	 G
4-2 (CONT)							
-30	29486-5	. SEAL (73680) ..... (Alternate)	1			F	
	50263-J10	. SEAL (76680)	1			F	
	451858-H60	. SEAL	1				G
-31	MS29561-233	. PACKING, Preformed	1			F	G
-32	204-040-400-7	. GEAR ..... (Alternate)	1			F	G
	204-040-400-9	. GEAR	1			F	G
-33	204-040-143-1	. BEARING (Set)	1			F	G
-34	204-040-423-1	. SLEEVE ASSEMBLY	1			F	G
-34A	204-040-423-7	. SLEEVE (Alternate)	1			F	G
-35	AN507-440R5	. . SCREW	3			F	G
-36	204-040-423-5	. . PLATE, Shim	1			F	G

SECTION II DISMANTLING

Not Applicable

SECTION III DISASSEMBLY

4-5. SPECIAL INSPECTIONS. 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 magnaflux or zyglo. Any variation from required dimensions is cause for rejection of the component.

a. Check gear box for freedom of rotation and for proper backlash of gears. Backlash should not vary more than 0.002 inch when checked at different points around the gear. (Through oil filler hole.)

b. Remove quills and visually inspect gear teeth for damage and pattern for evidence of overload.

c. Visually inspect couplings for cracked or chipped teeth.

d. Inspect bearings for roughness or brinneling.

e. Inspect case, couplings, gears and sleeves by magnetic particle or fluorescent penetrant methods.

WARNING: If steps a. through e. reveal cracks or distortion, indicative of excessive loads, then the entire component shall be considered unserviceable and non-repairable. If this condition does not exist, then the component may be returned to serviceable condition by complete overhaul.

4-6. DISASSEMBLY. Disassemble gear box assemblies as described in paragraph 4-7.

CAUTION. Without damaging parts, mark mating parts so that they may be reassembled in their original positions.

4-7. NINETY DEGREE GEAR BOX. (See figure 4-3.) a. Remove chip detector (2), with gasket, from gear box case (1). Remove filler cap (3).

b. Remove nuts and washers (8). Use T101308 jack-screws through three threaded holes in output sleeve flange and pull output quill assembly from gear box case (1). Remove packing (9) from sleeve.

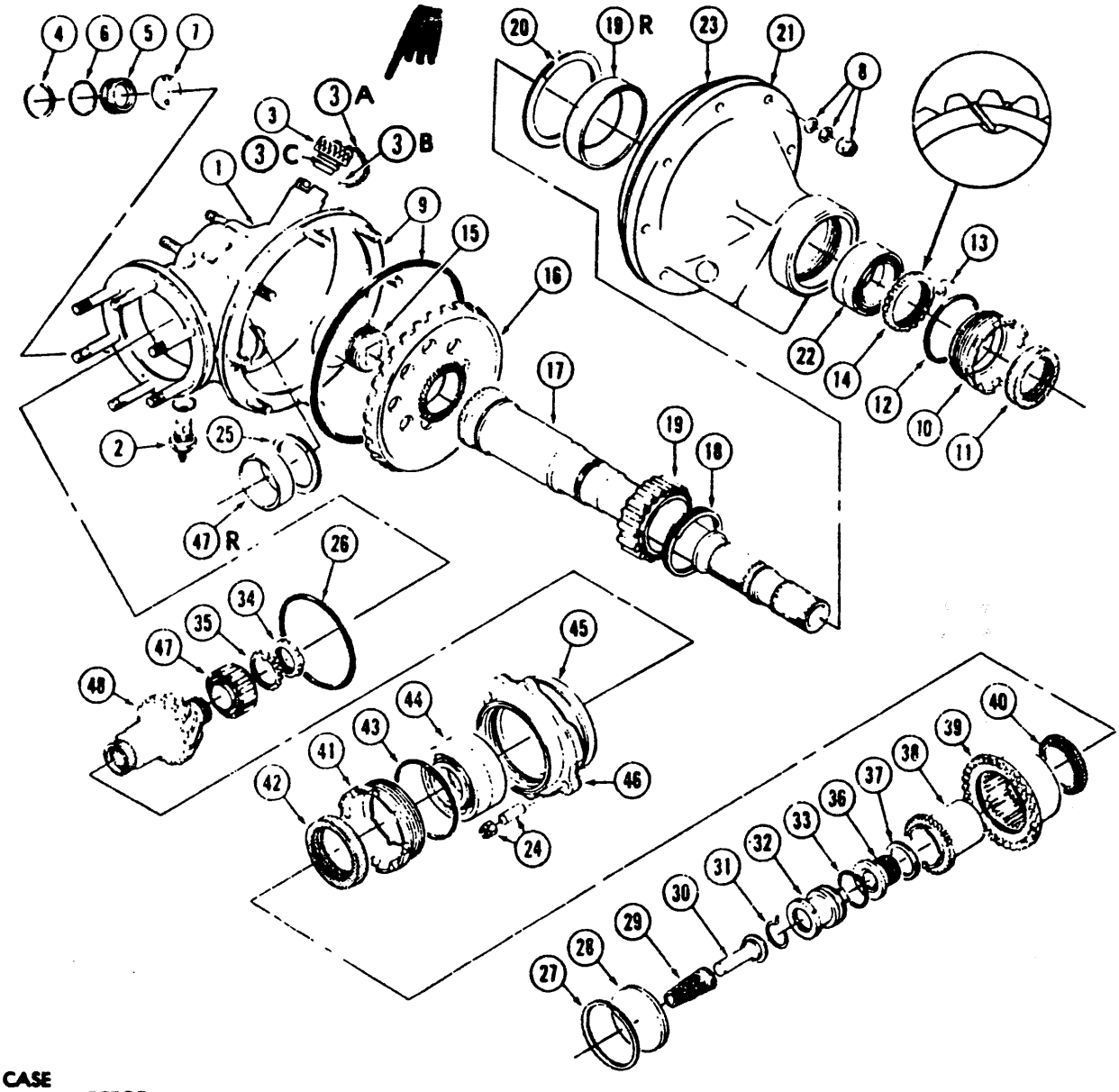
c. Remove retainer ring (4) sight glass (5) and indicator (7) from gear box case (1). Remove packing (6) from sight glass (5).

d. Cut safety wire from gear retaining bolt (15). Assemble T101365 holding fixture on gear end of quill. (See figure 4-4.)

e. Cut safety wire and use T101449 wrench to remove nut (10) from outer end of quill sleeve. Remove seal (11) and packing (12) from nut.

f. Remove locking clip (13). Use T101305 wrench and remove nut (14) from rotor shaft (17).

g. Insert a 3/4 inch square drive extension through holding fixture to loosen gear retaining bolt (15). Remove quill assembly from fixture and remove bolt (15) and gear (16). (Gear retainer bolt has a torque of 350 to 400 foot pounds.)



1. CASE
2. CHIP DETECTOR
3. FILLER CAP
3A. CHAIN
3B. PIN
3C. PACKING
4. RETAINER RING
5. SIGHT GLASS
6. PACKING
7. INDICATOR

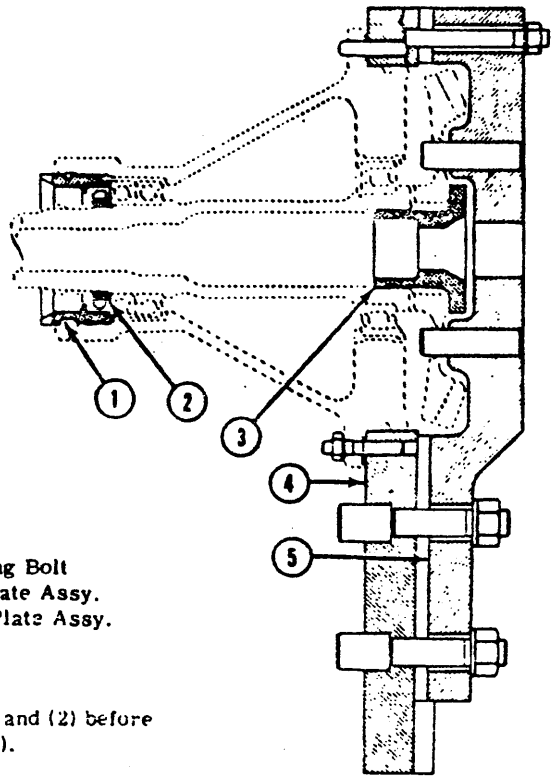
OUTPUT QUILL

8. NUT AND WASHERS
9. PACKING
10. NUT
11. SEAL
12. PACKING
13. LOCKING CLIP
14. NUT
15. BOLT
16. GEAR
17. SHAFT
18. RETAINER RING
19. BEARING
19R. BEARING OUTER RACE
20. RETAINER RING
21. OUTPUT SLEEVE
22. DUPLEX BEARING
23. SHIM PLATE

INPUT QUILL

24. NUT AND SPACER
25. RETAINER RING
26 PACKING
27. RETAINER RING
28. SEAL PLATE
29. CENTER SPRING
30. SPACER
31. LOCK SPRING
32. RETAINER PLUG
33. PACKING
34. NUT
35. WASHER
36. BOLT
37. WASHER
38. INNER COUPLING
39. OUTER COUPLING
40. SEAL
41. NUT
42. SEAL
43. PACKING
44. DUPLEX BEARING
45. INPUT SLEEVE
46. SHIM PLATE
47. ROLLER BEARING
47R. BEARING OUTER RACE
48. INPUT PINION

Figure 4-3. Disassmbled View



1. Sleeve Nut
2. Shaft Nut
3. Gear Retaining Bolt
4. T101365-3 Plate Assy.
5. T101365-15 Plate Assy.

Note
Remove nuts (1) and (2) before loosening bolt (3).

Figure 4-4. Tool usage

h. Press rotor shaft (17) (notches on shaft) out through inner end of sleeve assembly. Remove retainer ring (18) and bearing (19) from rotor shaft.

NOTE. Retainer ring (18) and retainer ring (20) must NOT be interchanged.

i. Remove retainer ring (20). Use T101333 bar and press roller bearing outer race (19R) from output sleeve (21).

j. Use T101334 bar to press duplex bearings (22) from outer end of sleeve.

NOTE: Shim plate (23) may be removed but must be reinstalled on the same sleeve. These parts are serial numbered.

k. Remove nuts and spacers (24) from studs of input quill port. Use T101338 jack-screws through three threaded holes of quill sleeve flange to pull input quill assembly from gear case. Remove packing (26) from quill sleeve.

l. Remove retainer ring (25) and roller bearing outer race (47R) from inside of case and through the output quill port of the case.

m. Remove retainer ring (27), seal plate (28), centering spring (29) and spacer (30). Disengage lock-spring (31) and remove retainer plug (32) with packing (33).

n. Using T101455 fixture to hold quill assembly install T101307 wrench to hold coupling (39). Straighten tab of lock washer (35) and loosen nut (34) on inner end of pinion. Loosen coupling retaining bolt (36) with a square drive extension. Remove T101307 wrench. Remove and separate bolt (36), washer (37) inner coupling (38) and outer coupling (39). Remove seal (40) from inboard end of outer coupling (39).

o. Use T101336 wrench to remove seal retaining nut (41). Remove seal (42) and packing (43) from nut (41).

p. Press pinion assembly out through inner end of sleeve (45). Use T101334 bar to press duplex bearings (44) from outer end of sleeve (45).

NOTE

Shim plate (46) may be removed but must be reinstalled on the same sleeve. These parts are serial numbered.

q. Remove nut (34) and washer (35). Pull roller bearing (47) from input pinion (48).

Section IV. CLEANING

4-8. CLEANING. a. Remove paint from case assembly and sleeve flange as follows:

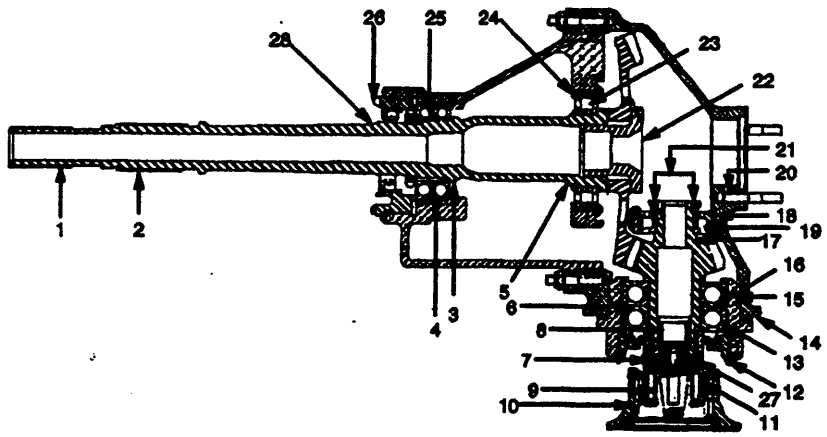
(1) Soak parts in stripper. (Item 3 or 28, Table 8-1).

(2) After paint removal, rinse parts with clean water.

b. Rinse all metal parts in dry cleaning solvent (item 2, Table 8-1).

c. Immediately after cleaning, protect all metal parts from corrosion by immersing, spraying or brushing with lubricating oil (item 4 or 4.1, Table 8-1).

4-9. IN-PROCESS INSPECTION. a. In-process inspection is an examination of component parts of disassembled ninety degree gear box assembly. The inspection is basically visual or mechanical to detect damage or wear which will affect serviceability of parts. Detailed inspection requirements for individual parts are specified in the following overhaul inspection procedures (OIP). Inspect all parts for any damage or condition that might affect their safe reuse. Detail-inspect parts showing signs of wear for service tolerances specified in applicable OIP. Also, check mating part for abnormal wear. Remove from service parts that are worn beyond allowable limits, or that cannot be repaired. When no repair is given for a part, it is considered nonrepairable, and it shall be replaced. Any component or subassembly that is repaired shall meet requirements specified in the applicable OIP. Used components and refinished parts recovered as products of disassembly will be examined 100% by the contractor to determine serviceability. If protective oil coating is removed from part during or after inspection, apply a light coat of lubricating oil (Item 4, Chapter 8) to parts for protection against rust and corrosion.



ITEM	NOMEMCLATURE		MINIMUM	MAXIMUM	REPLACE
1	Spline (Use 0.0600 Dia. Pins)				
	204-040-402-5. -7 & -9 Shaft	Over Pins	1.1550	1.1560	*1.1550
2	Spline (Use 0.0600 Dia. Pins)	Over Pins	1.3385	1.3401	1.3370
3	Shaft	OD	1.5751	1.5755	1.5749
4	Liner	ID	2.6768	2.6772	2.6775
	Bearing (25) - Shaft (3) Fit		0.0010T	0.0003T	0.0001T
	Bearing (25) - Liner (3) Fit		0.0006T	0.0002L	0.0005L
5	Shaft	OD	1.9688	1.9692	1.9686
6	Bearing-Duplex	ID	1.3777	1.3780	
		OD	2.8342	2.8346	
7	Coupling-Spline (Use 0.0720 Dia. Pins)	Between Pins	1.1251	1.1285	1.1336
8	Pinion-Spline (Use 0.0960 Dia. Pins)	Over Pins	1.3502	1.3518	1.3481
9	Bolt	Torque	80	100 ft-lbs	
10	Coupling-Teeth (Use 0.1080 Dia. Pins)	Over Pins	2.169	2.174	2.1590
11	Coupling-Spline	Max. Dept of wear 0.005 (Measure from Unworn Face of Tooth)			
12	Nut	Torque	100	150 ft-lbs	
13	Liner	ID	2.8340	2.8344	2.8347
14	Case	ID	3.6250	3.6257	3.6265 Average
15	Sleeve	OD	3.6252	3.6255	3.6247 Average
16	Shaft	OD	1.3783	1.3786	1.3780
	Bearing (6)-Shaft (16) Fit		0.0009T	0.0003T	0.0001T
	Bearing (6)-Liner (13) Fit		0.0006T	0.0002T	0.0005T
17	Shaft	OD	0.9846	0.9850	0.9844
18	Case-Liner	ID	2.0464	2.0470	2.0472
	Bearing (19)-Shaft (17) Fit		0.0009T	0.0003T	0.0001T
	Bearing (19)-Liner (18) Fit		0.0008T	0.0002L	0.0004T
19	Bearing -Roller	ID	0.9841	0.9843	
		OD	2.0468	2.0472	
20	Case	ID	1.8125	1.8130	1.8132
21	Nut	Torque	240	360 in-lbs	
22	bolt	Torque	350	400 ft-lbs	
23	Bearing-Roller	ID	1.9682	1.9685	
		OD	3.1492	3.1496	
24	Liner	ID	3.1488	3.1494	3.1497
	Bearing (23)-Shaft (5) Fit		0.0010T	0.0003T	0.0001T
	Bearing (23)-Liner (24) Fit		0.0008T	0.0002L	0.0005L
25	Bearing Duplex	ID	1.5745	1.5748	
		OD	2.6770	2.6774	
26	Nut	Torque	150	200 ft-lbs	
27	Coupling (Concentric with Item 7 Pitch Dia. within 0.002)	OD	1.591	1.597	1.5869
28	Shaft (Concentric with Items 3 Dia. within 0.002)	OD	1.435	1.441	1.424

T - Tight Fit
L - Loose Fit

* This dimension taken on the bare shaft prior to application of solid film lubricant.

Average - Take three readings around circumference and then average for final reading.

Figure 4-5. Limits Charts.

(1) Visual Inspection. Use at least a 10 power magnifying glass and amplified lighting as necessary to determine cracks. Damage indicated by visual inspection shall be verified by measurement or gage before discarding part. When cracks are indicated, do a magnetic particle or fluorescent penetrant inspection to aid the visual inspection.

(2) Mechanical Inspection. Mechanical inspection shall be done using standard inspection equipment (SIE) such as micrometers and gages. A surface table or flat surface shall be used to check for distortion of parts.

b. During inspection keep a record of the wear conditions of all parts. Tag parts which must be replaced as unfit for further service. Replace any part which has structural damage to threads.

c. A limits chart (Figure 4-5) listing critical dimensions of parts, is provided as a convenience to determine closeness of fit between mating parts. It also provides replacement dimensions as a guide for replacement of worn parts. Parts shall be checked dimensionally. Dimensional limits are for 68°F. Compensate when measuring at any other temperature.

d. Replace gears which have scoring, pitting, galling, or spalling of the gear teeth.

e. Inspect coupling wear patterns to criteria shown in figure 4-7.

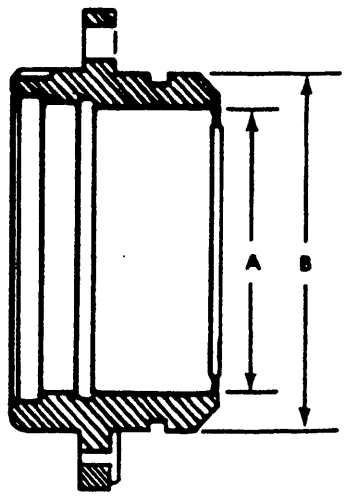
NOTE

Any nicks, scratches or pits on seal surface of male coupling is cause for rejection of the part.

OVERHAUL INSPECTION PROCEDURE: 1 PART NO. 204-040-423-1

ITEM: Sleeve Assembly, Input REFERENCE: 34-36, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Fluorescent penetrant	No cracks allowed. Replace.
2.		Nicks, dents, and scratches	SIE and visual	Rework or replace per paragraph 4-9.f.(3) and 4-10.1.(2).
3.		Loose liner	Visual and feel	Replace.
4.		Damage threads	Visual	Replace.
5.		Worn surfaces	SIE	
	A	Liner inside diameter		Replace per Item 13, Figure 4-5.
	B	Outside diameter		Replace per Item 15, Figure 4-5.



OVERHAUL INSPECTION PROCEDURE: 2 PART NO. MS172241

ITEM: Nut REFERENCE: 20, Figure 4-1

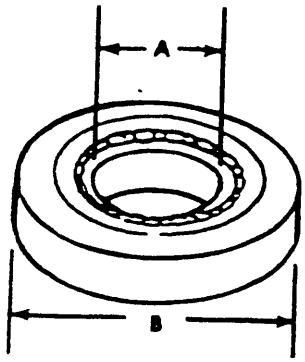
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	Replace.
2.		Damaged threads	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 3

PART NO. 204-040-406-1

ITEM: Bearing, Inner Roller

REFERENCE: 23, Figure 4-1



OVERHAUL INSPECTION PROCEDURE: 3

PART NO. 204-040-406-1

ITEM: Bearing, Inner Roller

REFERENCE: 23, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Roughness (roller and races), spalling, scoring, discoloration due to heat, pitting, brinnelling, flaking, or corrosion on rolling elements or races, or that have cracked or broken retainers, or that do not roll smoothly.	TM 55-1500-322-24 Maintenance of Aeronautical Anti-friction Bearing for Organizational, Intermediate, and Depot Maintenance Levels.	Replace bearings.
2.	A.	Inside diameter wear	SIE	Replace per Item 19, Figure 4-5.
3.	B.	Outside diameter wear	SIE	Replace per Item 19, Figure 4-5.
4.		Minor nicks, cuts, or scratches on non-functional surfaces.	Visual and SIE	Minor nicks, cuts, scratches are acceptable provided they are too small to be felt with a probe having an end radius of 0.030 inch, and provided the total affected area does not exceed 10 percent of contact area at any point.
5.		Radial internal clearance	SIE	Replace if not within limits of 0.0015 in. minimum 0.0025 in. maximum.

OVERHAUL INSPECTION PROCEDURE: 4 PART NO. 204-040-423-5

ITEM: Shim REFERENCE: 36, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Plating is damaged or worn through.	Visual	Rework per paragraph 4-10.o.(3).

OVERHAUL INSPECTION PROCEDURE: 5 PART NO. 204-040-610-1

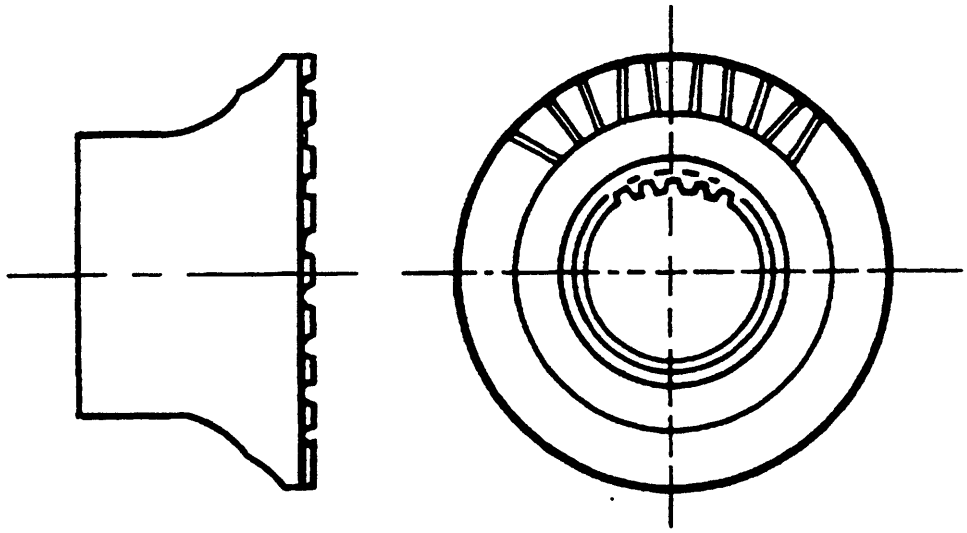
ITEM: Plate Assembly REFERENCE: 18, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Nicks, dents, and scratches on plate.	Visual and SIE	Rework per paragraph 4-10.g.
2.		Rubber seal is broken, hardened, cracked, or loosened from plate.	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 6 PART NO. 204-040-604-5

ITEM: Coupling, Outer REFERENCE: 27, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks allowed. Replace. **WARNING** **FLIGHT SAFETY PART** Any rateable inclusion greater than 1/64 inch and no closer than 1/4 inch of each other is cause for rejection. This is a critical characteristic.
2.		Spline step wear (internal)	SIE	Replace per Item 11, Figure 4-5.
3.		Nicks, dents, and scratches	Visual	Rework or replace per paragraph 4-10.m.

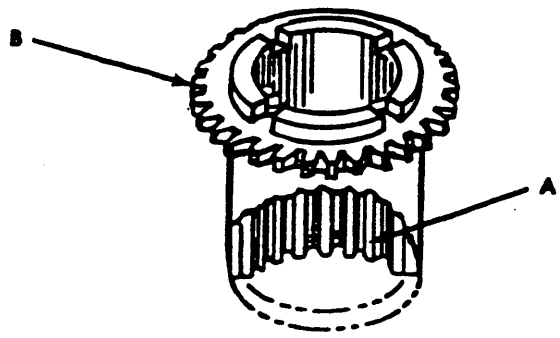


OVERHAUL INSPECTION PROCEDURE: 7

PART NO. 204-040-603-5/7

ITEM: Coupling, Inner

REFERENCE: 26, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 7 PART NO. 204-04--603-5/7

ITEM: Coupling, Inner REFERENCE: 26, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks allowed. Replace.
				WARNING **FLIGHT SAFETY PART** Any rateable inclusion greater than 1/64 inch is cause for rejection. This is a critical characteristic.
2.		Wear on outer seal mating surface	SIE	A uniform and smooth groove worn by the seal is acceptable to a minimum diameter of 1.584 inch provided the depth does not exceed 0.002 inch. If more severe damage exists, the part may be reworked in accordance with paragraph 4-10.m., otherwise replace.
3.		Nicks, dents, and scratches which would affect function of oil seal	Visual and SIE	Rework per paragraph 4-10.m.
4.	A	Spline step wear	SIE	Replace per Item 7, Figure 4-5.
5.	B	Coupling teeth wear	SIE	Replace per Item 10, Figure 4-5.
6.	B	Coupling teeth wear pattern and pitting	Visual and SIE	Replace per Figure 4-7.

OVERHAUL INSPECTION PROCEDURE: 8

PART NO. 204-040-608-1

ITEM: Spring, Helical Compression

REFERENCE: 19, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Tolerance	Apply test load to compress spring to 1.500 ± 0.010 inch overall length. Required load 5.0 ± 0.5 pounds.	Replace.
2.		Wear and mechanical damage affecting functional or structural integrity of part.	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 9

PART NO. 204-040-607-1

ITEM: Retainer, Helical Compressor

REFERENCE: 22, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Wear, nicks, dents, and scratches	Visual	Replace per paragraph 4-10.t.

OVERHAUL INSPECTION PROCEDURE: 10 PART NO. 204-040-606-1

ITEM: Washer REFERENCE: 25, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Nicks, dents, and scratches	Visual	Replace per paragraph 4-10.u.

OVERHAUL INSPECTION PROCEDURE: 11 PART NO. 204-040-422-1

ITEM: Spacer REFERENCE: 21, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Wear, nicks, dents, and scratches	Visual	Replace per paragraph 4-10.v.

OVERHAUL INSPECTION PROCEDURE: 12 PART NO. 204-040-612-1

ITEM: Bolt REFERENCE: 24, Figure 4-2

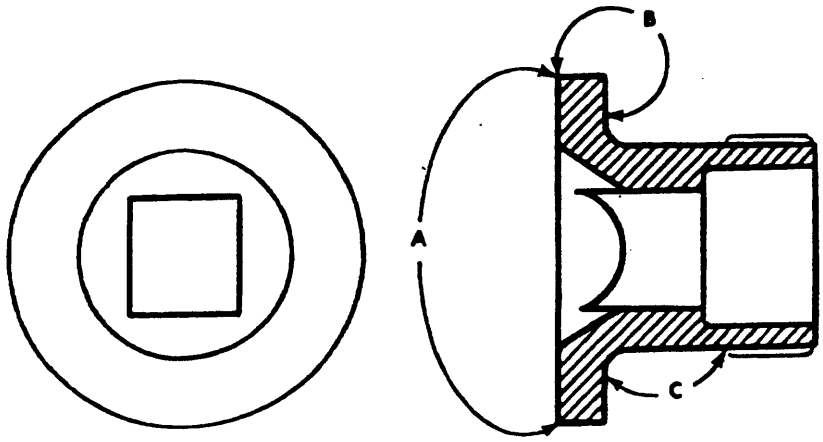
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks acceptable. Replace bolt.
2.		Damaged threads	Visual	The extent of total accumulative damage must not exceed one thread for one-half of a revolution. Rework damaged threads with a fine India stone to prevent interference with the mating threads.
3.		Nicks, dents, or scratches	Visual	
	A			Permissible to a maximum depth of 0.040 inch. Rework with fine India stone to remove any burrs.
	B			Permissible to a maximum depth of 0.030 inch. Rework with fine India stone to remove any burrs.
	C			Permissible to a maximum depth of 0.020 inch. Nicks, dents, or scratches must be polished to effect a minimum radius of ¼" and a surface finish of 32 RMS or better.

OVERHAUL INSPECTION PROCEDURE: 12

PART NO. 204-040-612-1

ITEM: Bolt

REFERENCE: 24, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 13 PART NO. 204-040-185-3

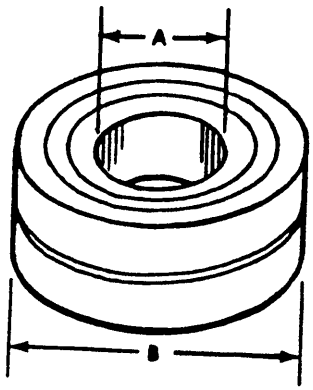
ITEM: Nut REFERENCE: 29, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Fluorescent penetrant	Replace.
2.		Damaged threads	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 14 PART NO. 212-040-143-1

ITEM: Bearing, Duplex Ball REFERENCE: 33, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Roughness (balls and races), spalling, scoring, discoloration due to heat, pitting, brinnelling, flaking or corrosion on rolling elements or races, or that have cracked or broken retainers, or that do not roll smoothly	TM 55-1500-322-24 Maintenance of Aeronautical Antifriction Bearing for Organizational, Intermediate, and Depot Maintenance Levels	Replace bearings.
2.	A	Inside diameter wear	SIE	Replace per Item 6, Figure 4-5.
3.	B	Outside diameter wear	SIE	Replace per Item 6, Figure 4-5.
4.		Minor nicks, cuts, or scratches	Visual and SIE	Minor nicks, cuts, scratches are unacceptable provided they are too small to be felt with a probe having an end radius of 0.030 inch, and provided the total affected area does not exceed 10 percent of contact area at any point.



OVERHAUL INSPECTION PROCEDURE: 15 PART NO. 204-040-400-7/9

ITEM: Pinion, Bevel Gear REFERENCE: 32, Figure 4-2

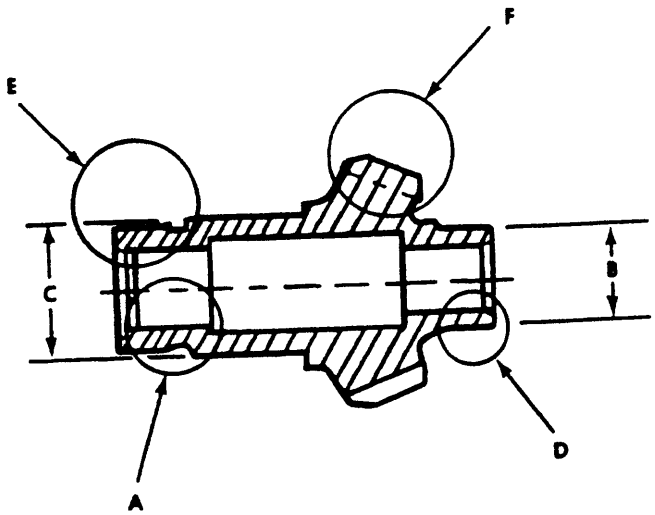
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks acceptable. Replace pinion.
2.	F	Chipped, pitted, spalled, scored, or scuffed gear teeth	Visual	Replace pinion.
3.	E	Spline step wear	SIE	Replace per Item 8, Figure 4-5.
4.	B	Outer diameter wear	SIE	Replace per Item 17, Figure 4-5.
5.	C	Outer diameter wear	SIE	Replace per Item 16, Figure 4-5.
6.	F	Wear Pattern on gear teeth	Visual	Replace per Figure 4-6.
7.		Damaged threads	Visual	
	A			Replace pinion.
	D			The extent of total accumulative damage must not exceed one thread for one half of a revolution. Rework damaged threads with fine India stone to prevent interference with mating surface.

OVERHAUL INSPECTION PROCEDURE: 15

PART NO. 204-040-400-7/9

ITEM: Pinion, Bevel Gear

REFERENCE: 32, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 16 PART NO. 204-040-418-13

ITEM: Case Assembly REFERENCE: 24-34, Figure 4-1

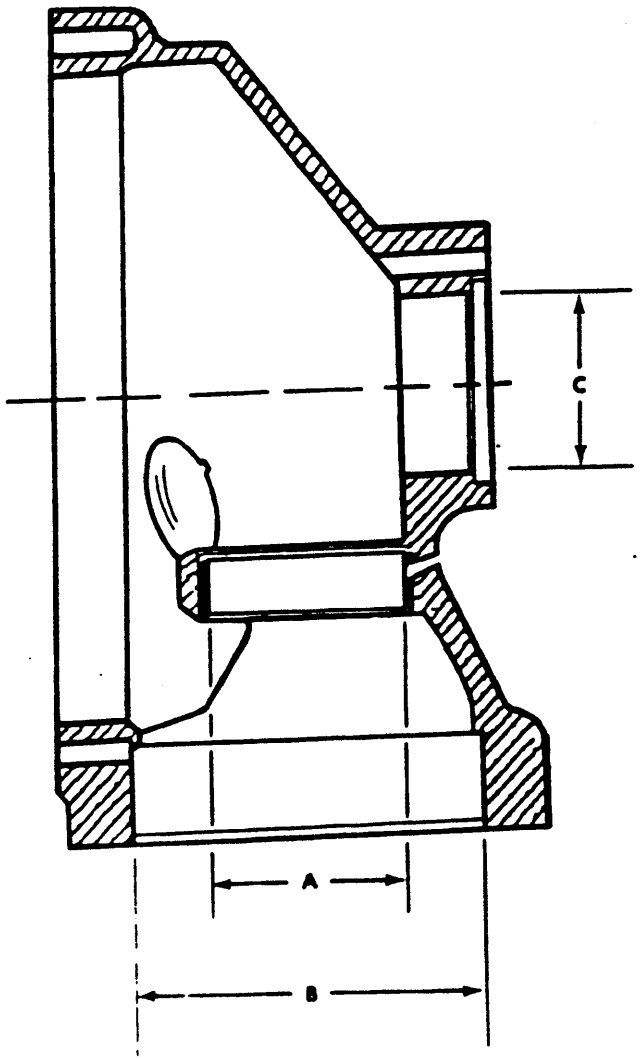
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Fluorescent penetrant	No cracks allowed. Replace case. **WARNING** **FLIGHT SAFETY PART** Accomplishment of fluorescent penetrant inspection is the critical characteristic.
2.		Corrosion	Visual and SIE	Replace per paragraph 4-9.f. (1) (2) and Figure 4-8.
3.		Loose or damaged studs	Visual, feel and SIE	Rework or replace per paragraph 4-10.i and j.
4.		Worn surfaces	SIE	
	A	Liner inside diameter		Replace per Item 18, Figure 4-5.
	B	Inside diameter		Replace per Item 14, Figure 4-5.
	C	Inside diameter		Replace per item 20, Figure 4-5.
5.		Loose liner	Visual and feel	Replace case.

OVERHAUL INSPECTION PROCEDURE: 16

PART NO. 204-040-418-13

ITEM: Case Assembly

REFERENCE: 24-34, Figure 4-1



OVERHAUL INSPECTION PROCEDURE: 17 PART NO. 207-040-418-7/17

ITEM: Shim REFERENCE: 26 & 27, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Plating is damaged or worn through.	Visual	Rework per paragraph 4-10.o.(3).

OVERHAUL INSPECTION PROCEDURE: 18

PART NO. 204-040-502-9

ITEM: Oil Filler Cap Assy

REFERENCE: 3, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Insufficient amount of aluminum wool packing	Visual	Repack per paragraph 4-9.g.

OVERHAUL INSPECTION PROCEDURE: 19

PART NO. 204-040-506-3

ITEM: Adapter, Oil Filler Cap

REFERENCE: 34, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Damaged or worn excessively	Visual	Replace by wet Zinc Chromate Primer (item 38, Table 8-1) installation of new adapter.

OVERHAUL INSPECTION PROCEDURE: 20

PART NO. 204-040-514-1

ITEM: Glass, Sight

REFERENCE: 8, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Glass cracked, crazed, discolored, or dirty	Visual	If dirty, clean with solvent (item 2, table 8-1). Otherwise, replace per paragraph 4-10.h.

OVERHAUL INSPECTION PROCEDURE: 21 PART NO. 204-040-508-1/9

ITEM: Indicator, Oil Level REFERENCE: 10, Figure 4-1

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Damage, discoloration, or peeling paint	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 22 PART NO. 204-040-425-1

ITEM: Sleeve Assembly, Output REFERENCE: 13-16D, Figure 4-2

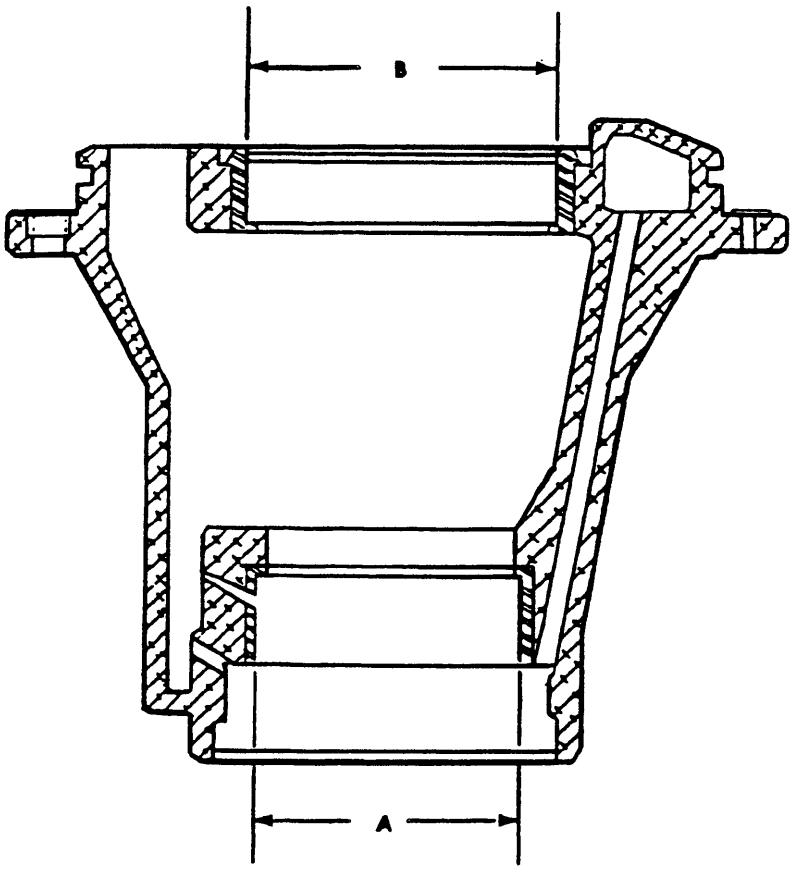
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Fluorescent penetrant	No cracks allowed. Replace. **WARNING** **FLIGHT SAFETY PART** Accomplishment of fluorescent penetrant inspection is the critical characteristic.
2.		Corrosion and damage	Visual and SIE	Rework or replace per paragraph 4-9.f. (1) (2), Figure 4-8, and paragraph 4-10.p.
3.		Loose liner	Visual and SIE	Replace.
4.		Elongated attaching holes	Visual	Replace.
5.		Damaged or loose clinch nut	Visual	Rework or replace per paragraph 4-10.w.
6.		Worn surfaces	SIE	
	A	Liner inside diameter		Replace liner per Item 4, Figure 4-5.
	B	Liner inside diameter		Replace liner per Item 24, Figure 4-5.

OVERHAUL INSPECTION PROCEDURE: 22

PART NO. 204-040-425-1

ITEM: Sleeve Assembly, Output

REFERENCE: 13-16D, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 23 PART NO. 204-040-425-5

ITEM: Shim REFERENCE: 15, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Plating is damaged or worn through	Visual	Rework per paragraph 4-10.o.(3).

OVERHAUL INSPECTION PROCEDURE: 24 PART NO. 204-040-427-3

ITEM: Nut REFERENCE: 1, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	Replace.
2.		Damaged threads	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 25 PART NO. 204-040-412-1

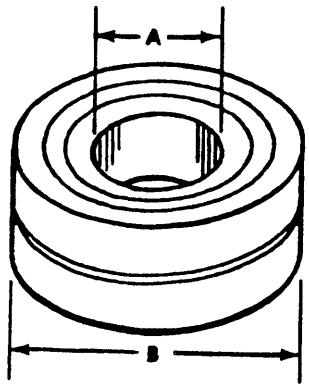
ITEM: Nut REFERENCE: 5
Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	Replace.
2.		Damaged threads	Visual	Replace.

OVERHAUL INSPECTION PROCEDURE: 26 PART NO. 204-040-424-1

ITEM: Bearing, Duplex Ball REFERENCE: 12, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Roughness (balls and races) spalling, scoring, discoloration due to heat, pitting, brinnelling, flaking or corrosion on rolling elements or races, or that have cracked or broken retainers, or that do not roll smoothly	TM 55-1500-322-24 Maintenance of Aeronautical Antifriction Bearing for Organizational, Intermediate, and Depot Maintenance Levels	Replace bearings.
2.	A	Inside diameter wear	SIE	Replace per Item 25, Figure 4-5.
3.	B	Outside diameter wear	SIE	Replace per Item 25, Figure 4-5.
4.		Minor nicks, cuts, or scratches	Visual and SIE	Minor nicks, cuts, scratches are acceptable provided they are too small to be felt with a probe having an end radius of 0.030 inch, and provided the total affected areas does not exceed 10 percent of contact area at any point.



OVERHAUL INSPECTION PROCEDURE: 27 PART NO. 204-040-405-1

ITEM: Bolt REFERENCE: 6, Figure 4-2

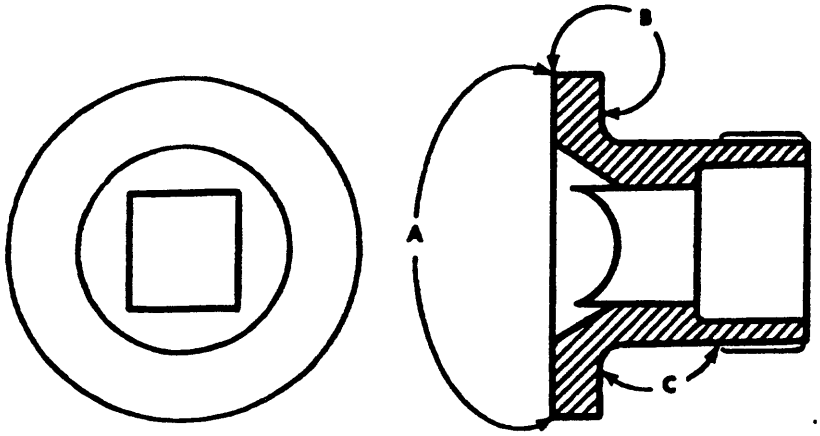
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks acceptable. Replace bolt.
2.		Damaged threads	Visual	The extent of total accumulative damage must not exceed one thread for one half of a revolution. Rework damaged threads with a fine India stone to prevent interference with the mating threads.
3.		Nicks, dents, scratches	Visual	
	A			Permissible to a maximum depth of 0.040 inch. Rework with fine India stone to remove any burrs.
	B			Permissible to a maximum depth of 0.030 inch. Rework with fine India stone to remove any burrs.
	C			Permissible to a maximum depth of 0.020 inch. Nicks, dents, or scratches must be polished to effect a minimum radius of ¼" and a surface finish of 32 RMS or better.

OVERHAUL INSPECTION PROCEDURE: 27

PART NO. 204-040-405-1

ITEM: Bolt

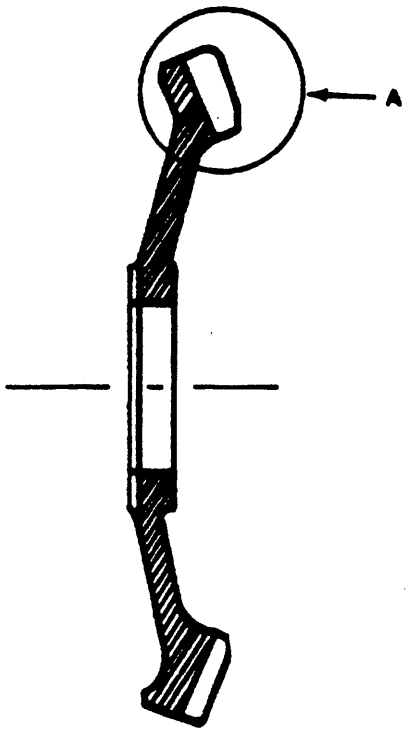
REFERENCE: 6, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 28 PART NO. 204-040-401-5/7

ITEM: Gear, Spiral Bevel REFERENCE: 7, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks acceptable. Replace gear.
2.	A	Chipped, pitted, spalled, scored, or scuffed gear teeth	SIE	Replace per para. 4-10.f.
3.	A	Wear pattern on gear teeth	Visual	Replace per Figure 4-6.



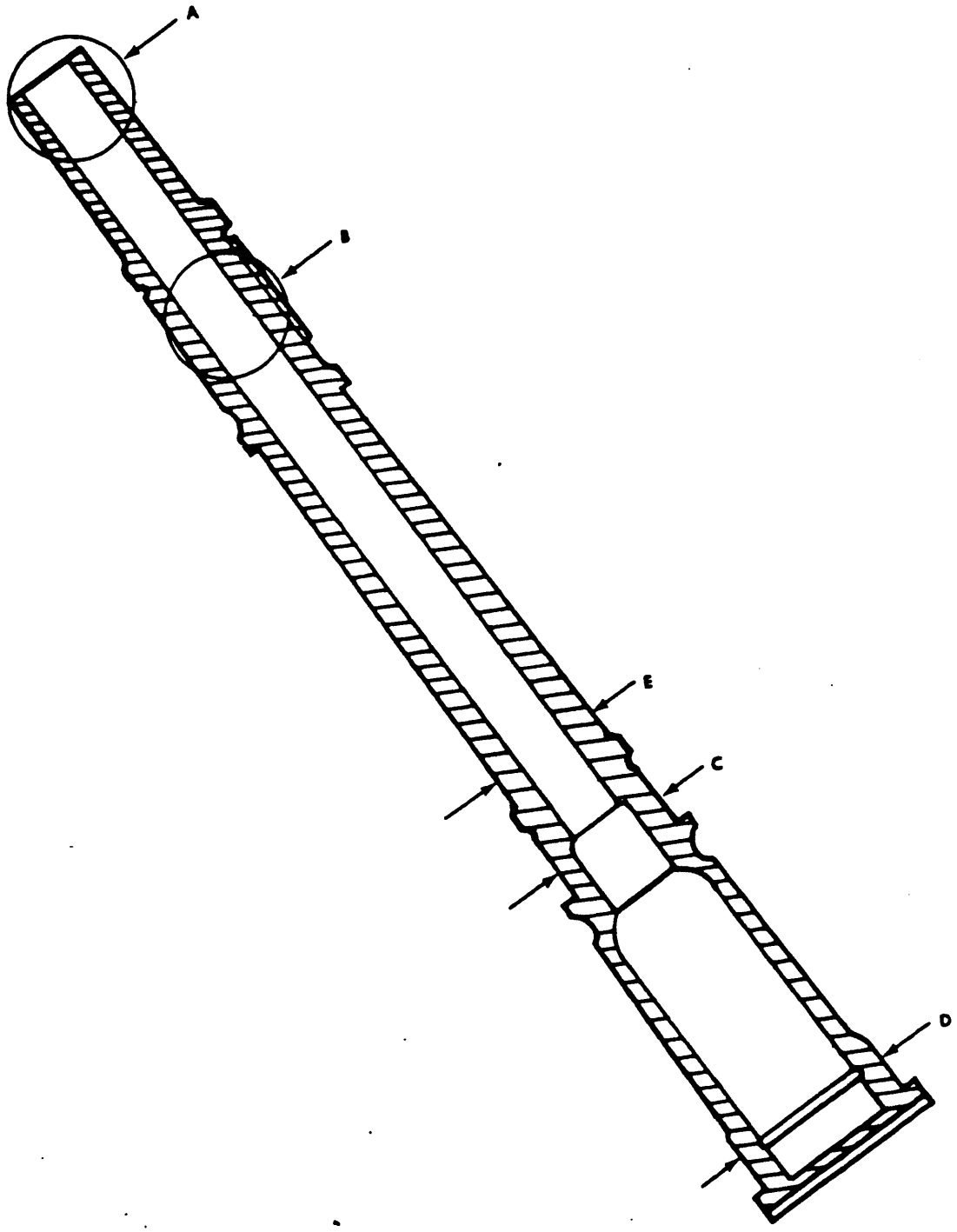
OVERHAUL INSPECTION PROCEDURE: 29 PART NO. 204-040-402-7/9

ITEM: Shaft, Tail Rotor (Output) REFERENCE: 8, Figure 4-2

NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Cracks	Magnetic particle	No cracks acceptable. Replace shaft. **WARNING** **FLIGHT SAFETY PART** Indication of 1/64 inch or greater is cause for rejection. This is a critical characteristic.
2.		Nicks, dents, scratches, pits	Visual and SIE	Replace per paragraph 4-10.n.
3.		Possible yielding of shaft from damage	SIE	Check run-out of shaft per paragraph 4-10.k.
4.		Spline step wear	SIE	
	A			Replace per Item 1, Figure 4-5.
	B			Replace per Item 2, Figure 4-5.
5.		Outside diameter wear	SIE	
	C			Rework per paragraph 4-10.n.
	D			Rework per paragraph 4-10.n.
	E			Rework seal contact area per paragraph 4-10.n. and Item 28, Figure 4-5.
6.		Damaged threads	Visual	The extent of total accumulative damage must not exceed one thread for one half of a revolution. Rework damaged threads with fine India stone to prevent interference with mating surface.

OVERHAUL INSPECTION PROCEDURE: 29 PART NO. 204-040-402-7/9

ITEM: Shaft, Tail Rotor (Output) REFERENCE: 8, Figure 4-2



OVERHAUL INSPECTION PROCEDURE: 30 PART NO. 204-040-407-3

ITEM: Bearing, Outer Roller REFERENCE: 10, Figure 4-2

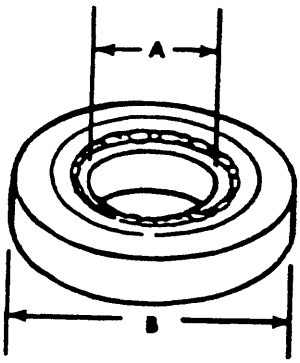
NO	REF LTR	CHARACTERISTIC	INSPECTION METHOD	REQUISITE
1.		Roughness (rollers and races) spalling, scoring, discoloration due to heat, pitting, brinnelling, flaking or corrosion on rolling elements or races, or that have cracked or broken retainers, or that do not roll smoothly	TM 5-1500-322-24 Maintenance of Aeronautical Antifriction Bearing for Organizational, Intermediate, and Depot Maintenance Levels	Replace bearings.
2.	A	Inside diameter wear	SIE	Replace per Item 23, Figure 4-5.
3.	B	Outside diameter wear	SIE	Replace per Item 23, Figure 4-5.
4.		Minor nicks, cuts, or scratches	Visual and SIE	Minor nicks, cuts, scratches are acceptable provided they are too small to be felt with a probe having an end radius of 0.030 inch, and provided the total affected areas does not exceed 10 percent of contact area at any point.
5.		Radial internal clearance	SIE	Replace if not within limit of 0.0015 in. minimum 0.0027 in. maximum.

OVERHAUL INSPECTION PROCEDURE: 30

PART NO. 204-040-407-3

ITEM: Bearing, Outer Roller

REFERENCE: 10, Figure 4-2



f. Replace case or sleeves if bearing liners are loose or evidence of corrosion exists between case or sleeves and bearing liners or if corrosion damage is in excess of the following limits. (See figure 4-8).

(1) In areas "A", "B", and "C" the maximum depth of pitting acceptable is 0.030 inch and no more than 40 percent of the area within any one inch square or more than 20 percent of the total area of any surface or diameter in these areas should be pitted. The affected area should be carefully inspected prior to the removal of corrosion products for evidence of corrosion in the threads between the case and studs. Corrosion products shall be completely removed from acceptable cases (1) and sleeves (21) by immersion in hot (190°F to 202°F) chromic acid pickle (per item 5, table 12-1) consisting of 24 ounces chromic trioxide technical (CRO_3), Federal Specification O-C-303, Type II, and enough water to make one gallon. Prepare the chromic acid solution in a lead lined steel, stainless steel, 1100 aluminum, plastic, or synthetic rubber container. Immerse parts in the solution for one to fifteen minutes. Thoroughly rinse off chromic acid solution with clean water. Repeat chromic acid bath and water rinse until all corrosion products have been removed and the metal is a bright metallic color. Excessive amounts of anions, such as chlorides, sulfates and fluorides must not be allowed to build up in the solution as they tend to coat or etch the metal rather than clean the surface. If these conditions exist, discard the solution and mix a fresh batch. After corrosion removal, the parts should be reinspected to ensure machined dimensions are maintained. Any sharp edges which would damage seals or packing during assembly should be smoothed out and parts must be treated for corrosion protection according to paragraph 4-10, o (2).

(2) Pitting around pitch change studs is acceptable up to 0.050 inch, bolts must be secure at 75 inch pounds torque. Fill pits with Devcon F2 (Item 39, Table 8-1) or equivalent. Scattered pitting is allowed in "O" ring groove, maximum depth allowed is 0.005 inches. In undesignated areas, maximum depth of pitting or damage is 0.030 inches and no more than 40 percent of the area in one square inch or 10 percent of total case area. General pitting 0.008 inches and less is allowed throughout the case. Appearance and paint application, pits that paint will not bridge shall be filled with Devcon F2 and blended to surrounding surfaces.

NOTE

Pitting that causes leaks around the packings is cause for rejection.

(3) Inspect sleeve (45) for nicks, dents, scratches or pitting on sleeve flange faces and outside diameters of sleeve not to exceed 0.050 inch depth and 20 percent of the width of any of the surfaces and no more than 0.25 inch long on any one inch of circumference of the surfaces are acceptable without rework. Clean corroded areas with aluminum wool (item 22, table 8-1) and cleaning solvent (item 2, table 8-1). Coat affected areas with alodine (item 18, table 8-1). No pitting or damage is allowed on seal and packing seating surfaces.

g. Inspect filler cap (item 3, figure 4-3) to insure vent is open and still tightly packed with aluminum wool. The proper quantity of wool will cause the washer in the center of the plug to spring back after being depressed 0.06 inch.

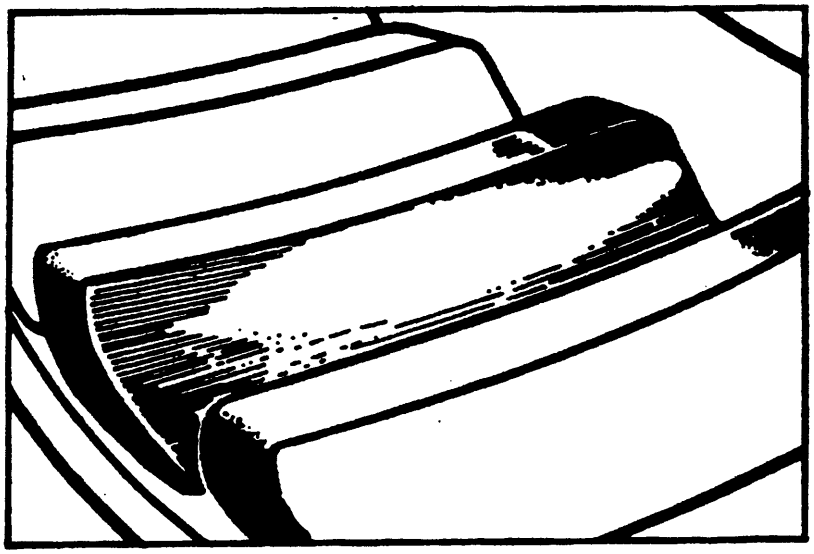
h. Inspect bearings (balls or rollers and races) for roughness. Replace bearings which are rough, spalled, scored, pitted, flaked, or corroded.

i. Refer to Table 4-1 for NDT procedures and classification typical defects found in inspection of the ninety degree gear box and to overhaul inspection procedures for detail inspection items.

j. Inspect all cases and quill sleeves during disassembly to ensure the serial number etched on the shim plate matches the serial number of the case or sleeve on which the shim plate is installed. Shim plates which are not identified or on which the markings are illegible, shall be checked in accordance with the following procedure to verify that they are of proper thickness.

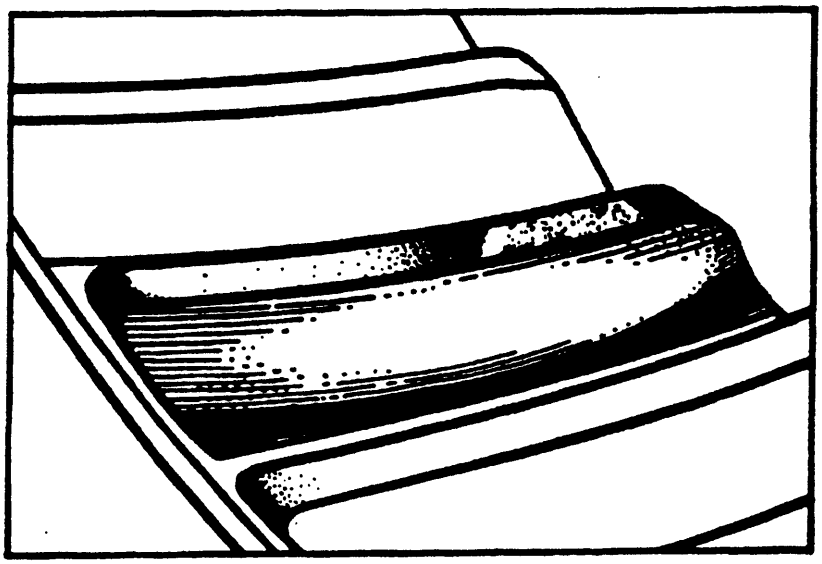
(1) Examine case or sleeve for reference dimension which should be metal stamped or vibro-etched on the part adjacent to the applicable mounting surface.

(2) Measure the shim plate thickness and adjust shim thickness to the dimensions found on the case or sleeve.



DETAIL A

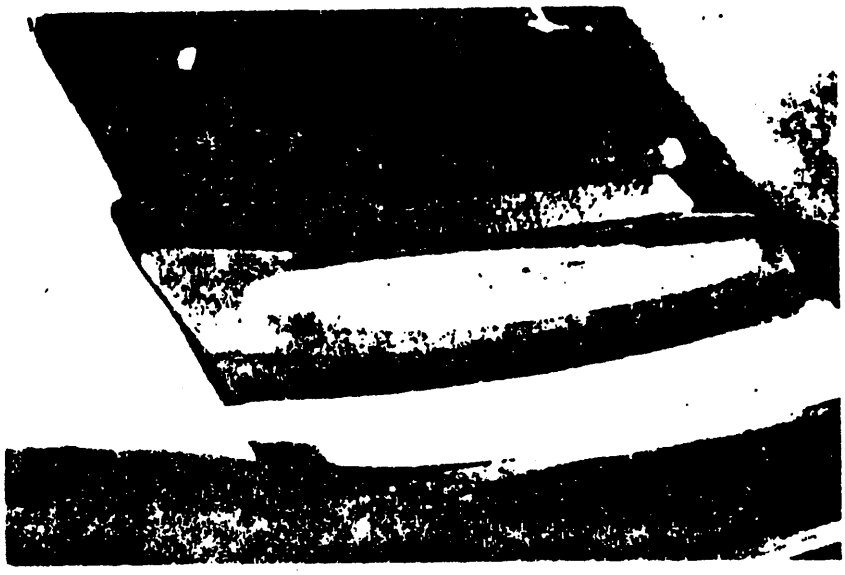
Typical shape, size and location of the 204-040-401 gear tooth pattern.



DETAIL B

Pattern is narrow back from toe but acceptable 204-040-401 gear tooth pattern.

Figure 4-6. Gear Patterns (Sheet 1 of 5).



DETAIL C

Pattern shape good, pattern is back from toe, acceptable, 204-040-401 gear tooth pattern.

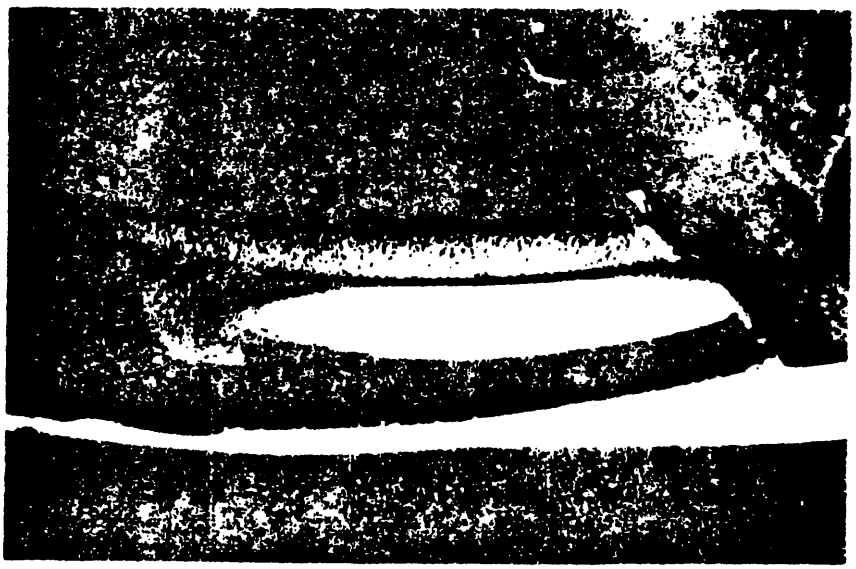
DETAIL D

This pattern is the minimum acceptable in location and shape, 206-040-401 gear with pattern.

Figure 4-6. Gear patterns (Sheet 2 of 5)

DETAIL E

Pattern too wide, too long, and running off both the toe and top. Not acceptable. 204-040-401 tooth pattern.



DETAIL F

Pattern running off top and toe. Not acceptable. 204-040-401 tooth pattern.

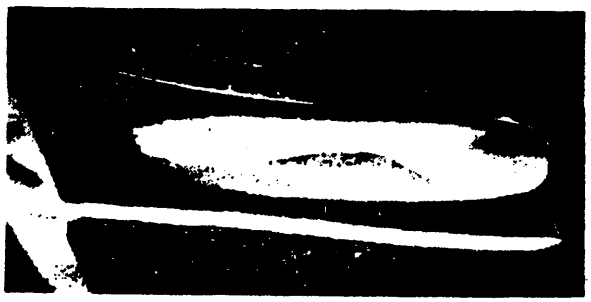
Figure 4-6. Gear patterns (Sheet 1 of 3)

DETAIL G

Pattern toe-heel location acceptable. Pattern profile too high, not acceptable. 204-040-401 tooth pattern.

DETAIL H

Pattern location on toe, not acceptable. 204-040-401 tooth pattern.



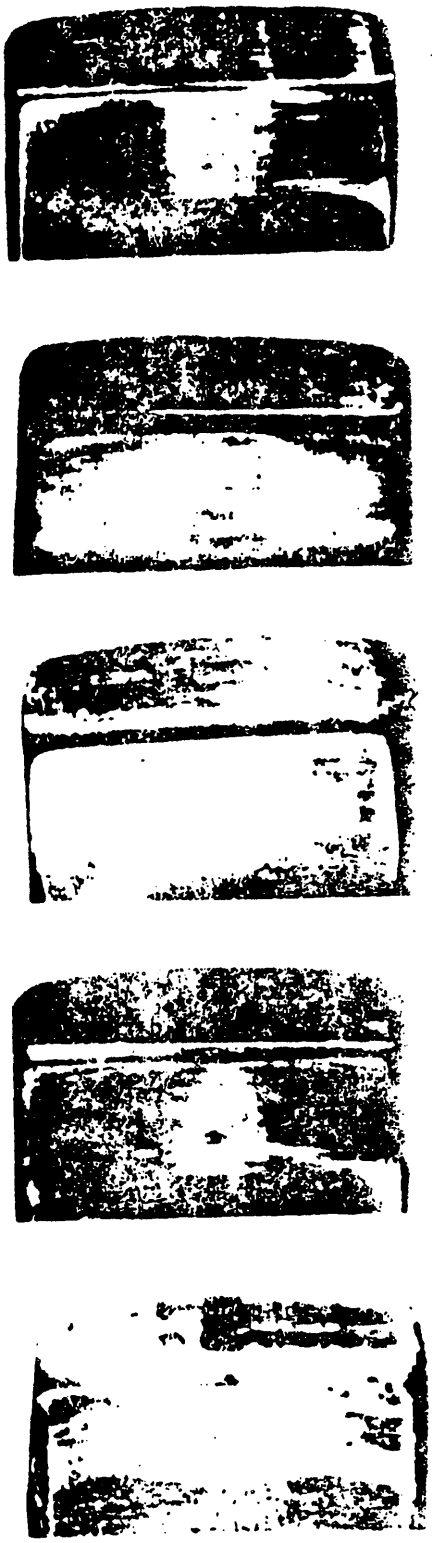
DETAIL I

Pattern is typical if gears exposed to the loads associated with turbine compressor stalls. There is light scuffing in the root area. This condition is not acceptable and both gear and pinion should be replaced.

DETAIL J

Pattern is typical of coast side of gear for the condition described in Detail I above. Not acceptable.

Figure 4-6 Gear patterns (Sheet 5 of 5).



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 0.03125 inch diameter shall be replaced.

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Coupling teeth wear patterns typical.

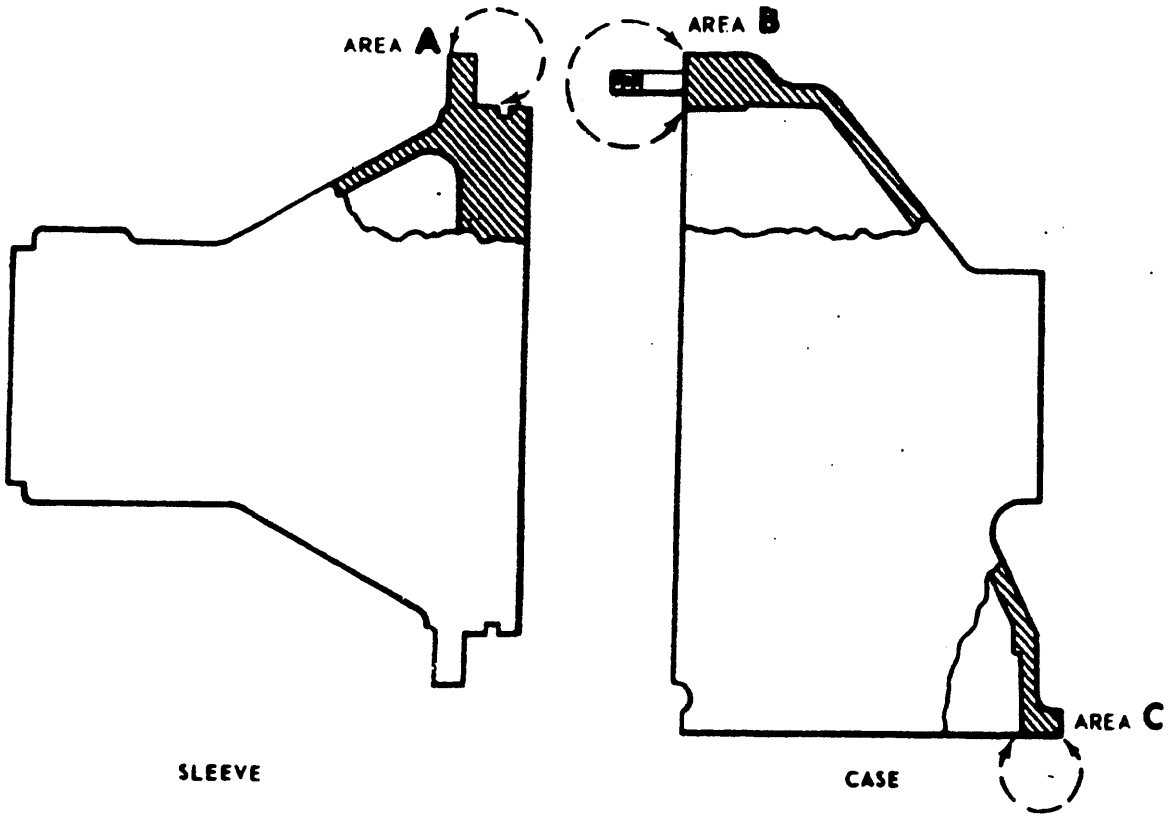


Figure 4-8. Inspection limits case and sleeve

Table 4-1. NDT Procedures and Classification of Defects

MAGNETIC PARTICLE INSPECTION

The following parts shall be inspected with wet fluorescent process using the continuous method of magnetization in accordance with MIL-I-6868. Inspect all surfaces. No cracks allowed. Inclusions of 1/64 inch or greater are not allowed.

ITEM #, FIGURE 4-3	NOMENCLATURE	SHOT AND AMPERAGE
15	Bolt	Use a 3/4 inch central conductor. Make one (1) shot at 400 amps and inspect part.
16	Bevel Gear	Use a 1 inch central conductor. Make 3 equally spaced shots (120° apart) at 3500 amps and inspect gear. Inclusions of 1/64 inch or greater are not allowed
17	Shaft	Use a 3/4 inch central conductor. Make one (1) shot at 800 amps and inspect shaft. Inclusions of 1/64 inch or greater are not allowed.
36	Bolt	Use a 1/2 inch central conductor. Make one (1) shot at 400 amps.

ITEM #, FIGURE 4-3	NOMENCLATURE	SHOT AND AMPERAGE
38	Inner Coupling	Use a 3/4 inch central conductor. Make one shot at 600 amps and inspect I.D. and O.D.
39	Outer Coupling	Use a 1 inch central conductor. Make 2 equally spaced shots (180° apart) at 1200 amps and inspect O.D. and internal splines.
48	Input Pinion	Use a 1/2 inch central conductor. Make one (1) shot at 1000 amps and inspect I.D. and O.D.

PENETRANT INSPECTION

The following parts are to be inspected with fluorescent penetrant inspection in accordance with MIL-I-6866 using a penetrant of a minimum sensitivity equal to MIL-I-25135 group VI. Inspect all surfaces. No cracks allowed.

ITEM #, FIGURE 4-3	NOMENCLATURE
1	Case
10	Nut
21	Output Sleeve
41	Nut
45	Input Sleeve

MAJOR DEFECTS

1. Cracks, scoring, pitting, nicks, distortion or discoloration of surface which could affect function or interchangeability.
2. Flaking or damage of protective coating.
3. Dimension or damaged threads essential to function.
4. All other dimensions affecting function.
5. Concentricity.

MINOR DEFECTS

100. All other cracks, scoring, pitting, nicks, distortion or discoloration.
101. Adherence and coverage of protective coatings.
102. Dimension or damage of all other threads.

All data on pages 4-18.1 thru 4-22 and Table 4-2 Deleted.

(3) The total of the above must fall within the applicable dimensional tolerance specified below:

	Part Number	Description	P/N of Shim	Required Min.	Dimension Max.
**	204-040-418-13	Case	204-040-418-7	2.6625	2.6630
			204-040-418-17	4.6015	4.6020
*	204-040-423-1	Sleeve, Input	204-040-423-5	0.9760	0.9765
**	204-040-423-1	Sleeve, Output	204-040-425-5	3.7120	3.7125

* Subtract shim thickness from dimensions found on sleeve.

**Add shim thickness to dimensions found on sleeve.

(4) If the shim plate thickness is found to be correct, the shim plate shall be identified by the applicable serial number and shim thickness using an etching acid, or by lightly vibroetching.

NOTE: All shims must be of the proper thickness and identified by the applicable serial number. Thickness of shim plates is measured after cadmium plating.

k. Inspect spring (item 29, figure 4-3) by applying a test load to compress spring to 1.500 ± .010 inches overall length. Load required shall be 5.0 ± 0.5 pounds.

Section V. REPAIR AND REPLACEMENT

4-10. REPAIR OR REPLACEMENT. a. Replace all seals, gaskets, preformed packings, cotter pins, standard hardware, retaining rings, safety locking devices and electrical chip detector.

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

c. Replace all parts that exceed allowable tolerances given in Figure 4-5.

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

e. Repair minor scratches, nicks or pits on non-critical ferrous surfaces with crocus cloth (item 5, table 8-1). Repair minor scratches, nicks or pits on noncritical aluminum and magnesium surfaces with aluminum oxide cloth (item 23, table 8-1).

f. Replace gears which have nicks, dents, pits, or scratches on the face of the teeth, which are more than 0.005 inch deep or more than 0.020 inch across in any direction and can be felt with a probe having an end radius of 0.030 inch. Minor nicks, dents, pits, or scratches on the face of the teeth which do not exceed preceding criteria may be dressed with fine India Stone (Item 6, Table 8-1).

g. Replace ball bearings that show evidence of spalling, scoring, pitting, brinelling, flaking or corrosion on rolling elements or races, or that have cracked or broken retainers, or that do not roll smoothly. Replace roller bearings that show evidence of spalling, flaking or corrosion pitting on rolling elements or races, or that have cracked or broken retainers. Minor nicks, cuts or scratches are acceptable provided they are too small to be felt with a probe having an end radius of 0.030 inch and the total affected area does not exceed 10 percent of the contact area at any point. Minor circumferential scoring is acceptable on rollers and races provided it cannot be felt with a probe having an end radius of 0.030 inch and the affected area does not exceed 10 percent of the contact area at any point.

NOTE

Duplex bearings are marked with serial numbers and must be installed in matched pairs. Assemble roller bearings with inner and outer races of same serial number.

h. Replace oil level sight glass if cracked, scratched, or discolored. Replace indicator if damaged, discolored or if paint is cracked or peeled.

WARNING

FLIGHT SAFETY PART

Installation torque of studs (28, Figure 4-1) is 50-95 inch pounds and torque of studs (30, Figure 4-1) is 100-225 inch pounds. This is a critical characteristic.

i. Remove broken, bent, damaged or loose studs. Inspect threaded hole in case.

NOTE

Apply unreduced epoxy polyamide (item 32, table 8-1) to threads of replacement studs and install to height and driving torque given in table 4-3. Ensure the installation torque of studs (28, figure 4-1) is 50-95 inch-pounds and of studs (30, figure 4-1) is 100-225 inch-pounds.

j. If stud hole threads of case show damage, repair or replace case as required. If hole threads are not damaged and proper stud height cannot be obtained with driving torque specified, use next oversize stud. Stud height is measured from face of case assembly. If corrosion or damage has not penetrated past the first tapped thread, the following rework shall apply:

(1) Machine or drill out damaged thread. Depth not to exceed one thread. Clean out diameter shall equal existent counter drill diameter.

(2) Break all sharp edges, except in the area of the threads and treat surfaces after drilling with MIL-M-3171, Type 6.

(3) Reinstall studs per paragraph 4-10i.

(4) All counter drill holes shall be filled with sealer (item 20, table 8-1) flush with top surface of case.

NOTE

Minor corrosion, .010 deep maximum, around the stud thread area shall not require rework other than corrosion treatment. Treat with MIL-M-3171 Type 6. Apply sealer (item 20, table 8-1) after treatment.

k. Check output shaft for bent shaft as follows:

(1) With 1.9692 diameter and end spline centered with line center with .001 TIR measure runout of 1.5755 diameter. Runout not to exceed .0015 TIR.

(2) Diameter 1.5755 is to be concentric within .0004 TIR with respect to diameter 1.9692.

(3) Replace if the above limits are exceeded.

l. Rework of Input Sleeve Assembly Flange (34, figure 4-2).

(1) When any of the three threaded holes are stripped or marred, install helicoil per TM 55-1500-204-23 (Series).

(2) Repair nicks, dents, scratches, or pits on outer edge of sleeve (45) flange to a depth of 0.030 inch. Rework of sleeve flange faces and outside diameters of sleeve is limited to carefully removing high spots of 0.010 inch or less and then blending into surrounding area with aluminum oxide cloth (item 23, Table 8-1). If high spots are greater than 0.010 inch, use work procedure (3) below. After rework, thoroughly clean affected area with cleaning solvent (item 2, Table 8-1) and coat areas with film (item 18, Table 8-1).

(3) Rework of outboard flange surface may be accomplished by machining. Flange may be machined to a minimum thickness of 0.280 inch, surface finish 63 RMS. Remove only that material required to remove damage.

NOTE

The underside of the sleeve flange cannot be reworked.

(4) When safety wire function cannot be achieved due to damage hole (i.e. wire has ripped out) repair as follows:

(a) Fill damaged area with Devcon 'F'.

(b) When filler is hard blend to outer contours.

(c) Re-drill safety hole within slot area approximately 1/8" to either side of original hole.

m. REPAIR OF COUPLINGS.

(1) Repair minor nicks, dents or scratches in seal contact area on inner couplings by polishing out damage and blending to surrounding surface. Seal groove wear is acceptable if groove is smooth and uniform, no more than 0.002 inch deep and to a minimum diameter of 1.584 inch.

(2) More severe damage in seal contact area of inner coupling may be reworked by grinding, provided rework gives 100% cleanup. Proceed as follows:

(a) Grind damaged seal contact area to 1.584 inch minimum diameter, extending the entire length of surface and blending with existing 0.09 to 0.12 inch radius. New diameter must be concentric with pitch diameter of internal splines within 0.002 inch TIR, and surface must be smooth, scratch-free finish.

WARNING

FLIGHT SAFETY PART

Nital etch inspection with no burns allowed is the critical characteristic.

(b) Inspect coupling by nital etch for grinding burns, none permissible.

(c) Preserve part within 30 minutes after nital etching.

(d) Inspect coupling after nital etch process by magnetic particle method.

WARNING

FLIGHT SAFETY PART

Embrittlement relief bake cycle after cadmium plating is the critical characteristic.

(e) Repair or touch-up surfaces by brush cadmium plating per MIL-STD-865 (item 21, Table 8-1). Touch-up is not to exceed 25 percent of total cadmium plated area. If over 25 percent of cadmium plating is removed restore plating per QQ-P-416, Type II, Class 3 (item 19, Table 8-1). Plating thickness to be 0.0001 to 0.0003 inches. Do not plate external teeth of inner coupling or internal splines on outer coupling. Hydrogen embrittlement relieve outer couplings (item 27, Figure 4-2) by baking at 375 ± 25 degrees F for four hours within four hours after plating. Hydrogen embrittlement relieve inner coupling (26) by baking at 275 ± 25 degrees F for five hours within four hours after plating.

Table 4-3. Stud Torque and Height

WARNING

FLIGHT SAFETY PART

Torque of studs (input and output) is critical characteristic.

PORT	STUD SIZE	STUD HEIGHT	INCH-POUNDS TORQUE
Input	5/16 inch	2.035 ± 0.010	100 to 225
Output	1/4 inch	0.970 ± 0.010	50 to 95
Pitch Change	1/4 inch	0.974 ± 0.010	85 to 95

NOTE

Repairs are permissible provided that damaged areas do not cover more than 60% of one spline, or more than 10% of total number of splines, or any two adjacent splines. If this is exceeded, replace shaft.

n. If inspection of the splines on output shaft, P/N 204-040-402, determines existence of pitting on splines, then proceed as follows: Repair nicks or other defects in working area of splines that do not exceed 0.005 inch maximum depth by dressing with a fine India Stone. Carefully remove any high spots and blend into the surrounding area. Care must be taken to remove no more than 0.001 inch from surface during repair. Replace if depth of penetration is greater than 0.005 inch. Repair nicks, dents, scratches or wear in seal area of shaft, P/N 204-040-402, by machining, grinding (mandatory for seal wear), local rework and polishing to remove damage and blending into surrounding area. Seal diameter, after rework, shall be 1.425 inch minimum and concentric within 0.002 inch. Scratches or nicks in tapererd (1.188 inch to 1.360 inch) section of shaft which do not exceed 0.015 inch in depth shall be smoothly blended and polished to remove all sharp indentations. By visual examination, minor pitting and damage inside shaft is not to exceed 0.002 inches deep, cluster pitting inside shaft is not to exceed 0.010 inches deep and/or one-quarter square inch area. Blend and polish all damaged areas; pitting and mechanical damage does not have to be completely removed. Refinish as follows:

WARNING

FLIGHT SAFETY PART

Embrittlement relief after cadmium plating is a critical characteristic.

(1) Apply brush cadmium plating per MIL-STD-865 to seal contact area. Plating thickness to be 0.0001 to 0.0003 inches. An alternate process to cadmium plating per QQ-P-416 is to apply brush cadmium plating per MIL-STD-865 to the seal contact area. Plating thickness to be 0.0001 to 0.0003 inch.

(2) Seal diameter prior to plating to have 8 to 16 RMS surface finish.

(3) The outboard end of shaft (17) to face of flange, 5.156 inches from outboard end, shall be coated with solid film lubricant. If the shaft has not been coated or if more than five percent of previous application has worn off in service, clean uncoated parts, or strip worn coating with methyl-ethyl-ketone (item 24, Table 8-1) and apply solid film lubricant (item 25, table 8-1) except allow to air cure for a minimum of thirty minutes then bake for a minimum of one hour at 275°F ± 15°F.

(4) Rework bearing journal areas using abrasive cloth (item 23, Table 8-1) or finer to remove nicks, scratches and other damage. Reference OIP 29 items C and D and Figure 4-5 items 3 and 5 respectively for limits. Repair journals if applicable as follows:

(a) Damage removal, machine diameters C and/or D in accordance with Figure 4-8.A.

(b) Inspect bearing journals for grinding burns by nital etch (MIL-STD-867).

(c) Chrome plate repair areas per QQ-C-320, Class 2.

(d) Finish grind shaft per Figure 4-8A.

o. 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:

(1) Aluminum parts shall be touched-up with brush alodine per MIL-C-5541, CLASS 2.

(2) Magnesium parts shall be touched-up per MIL-M-3171, Type VI or the entire part treated per MIL-M-3171, Type III.

(3) Cadmium plated steel parts shall be touched-up by brush cadmium plating per MIL-STD-865 or stripped and replated per QQ-P-416, Type II, CLASS 3. Touch up is not to exceed 25% of total cadmium plate area.

(4) Internal gear box components with black oxide coating (MIL-C-13924, CLASS 1) need not be reblack oxided during processing, however the black oxide coating remaining on the parts shall not be removed.

NOTE

If over 75 percent (approximately) of the black oxide coating has been removed during service or processing, it is permissible to reblack oxide the part.

(5) Gear or spline patterns are to be checked after load or green run, when black oxide is worn off the part shall have an application of Magic Bluer (item 27, Table 8-1) or equivalent in accordance with manufacturers instructions. The solution coating shall be used to obtain gear or spline patterns.

p. Rework machined surfaces of case and sleeve as follows:

(1) Rework of machined surfaces of case (1) and sleeve (21) is limited to carefully removing high spots flush to surrounding area. After rework, reinspect to ensure machined dimensions are maintained. Thoroughly clean affected area with cleaning solvent (item 2, table 8-1) and treat for corrosion protection in accordance with paragraph 4-10,o.(2).

(2) Repair nicks, scratches or pits in as cast surfaces of case (1) and sleeve (21) not exceeding criteria of paragraph 4-9,f. (2) by blending into surrounding surface. If cap chain attachment hole is case (1) is torn out, re-drill attachment hole next to previous hole. If hole can not be drilled install bracket per paragraph 4-15 on assembly to attach cap (3) and chain (3A). After repair thoroughly clean affected area with cleaning solvent (item 2, Table 8-1) and treat for corrosion in accordance with paragraph 4-10,o. (2).

q. Plate assembly (28). Nicks, dents, scratches in plate may be reworked by polishing with crocus cloth (item 5, Table 8-1) provided reworked areas do not come within 0.030 of seal and are no more than .030 deep. Reworked areas are to be treated with alodine (item 18, table 8-1).

r. If bearing case is worn (item 20, figure 4-5) beyond limits, repair as follows:

(1) Increase depth of the 2.040/2.042 inch bore from .188 to .228 inch. Drill and ream the 1.8125/1.8130 inch bore to a diameter of 1.8925/1.8930 inch maintaining existing radius and chamfers.

(2) Manufacture sleeve per figure 4-9, from Aluminum Alloy, metal bar, (item 29, Table 8-1).

(3) Install sleeve using Sealing Compound, (item 30, Table 8-1). Allow to dry five hours.

(4) Drill and ream sleeve to original dimensions.

s. Machine or use hand tools to form a 0.030 x 45° chamfer on liner P/N 204-040-417 per figure 4-10.

NOTE

The liner shall be modified without being removed from the input quill port of case assembly.

t. Retainer plug (32). Nicks, dents or scratches may be reworked by polishing with crocus cloth (item 5, Table 8-1), provided reworked areas do not come within 0.030 of packing groove and are no more than 0.030 deep. Reworked areas are to be treated with alodine (item 18, Table 8-1). Packing groove area is not to be reworked.

u. Washer (37). Nicks, dents or scratches may be reworked by polishing with crocus cloth (item 5, Table 8-1) provided that the depressions caused do not cover more than 50% of the face area and no single reworked area is larger than 5%, and is spaced by a similar area from any other reworked area. Depth of depressions is not to exceed 0.005.

v. Spacer (30). Nicks, dents, or scratches may be reworked by polishing with crocus cloth (item 5, Table 8-1) provided overall length stays within drawing limits and 0.760 dia. Seat area rework is restricted to removing protuberances. The depth of indentations and rework depressions is not to exceed 0.030.

w. Replace clinch nut (16, figure 4-2) if damaged or loose. Remove clinch nut by driving it out, using a bolt threaded into the nut, or using a drift; being careful not to damage hole in sleeve flange. Clean sleeve by vapor degreasing with trichloroethane (item 36, Table 8-1). Clean up surface of the sleeve flange to remove any raised burrs. Treat hole and any reworked areas on sleeve with chemical film (item 5, Table 12-1). If clinch nut is being replaced because of thread damage, coat new nut with unreduced epoxy-polyamide primer (item 32, Table 8-1) and drive it into place. Remove any raised burrs on sleeve flange face and touch up with chemical film (item 5, Table 12-1). If clinch nut is being replaced because it is loose, remove cadmium plating from surfaces of clinch nut that contacts the sleeve, by sanding. Wipe clinch nut and mating surfaces of the sleeve clean with methyl-ethyl-ketone solvent on clean cheese cloth. Bond clinch nut in place with adhesive (item 37, Table 8-1). Clean the excess adhesive from the threads and the surface of the sleeve flange and from the hole. Clinch nut must be at least 0.010 inch below surface of sleeve flange.

	BEFORE PLATING	PLATED SURFACE
DIAMETER C DIMENSIONS	1.949	1.9690
DIAMETER D DIMENSIONS	1.555	1.5753

Notes

1. All dimensions are ± 0.0002 inch.
2. Concentricity to be 0.001 TIR.
3. Surface finish to be 32 RMS.
4. Diameters C and D a

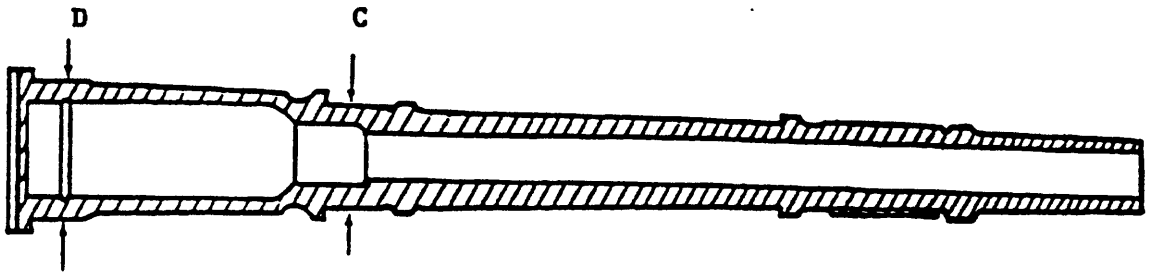
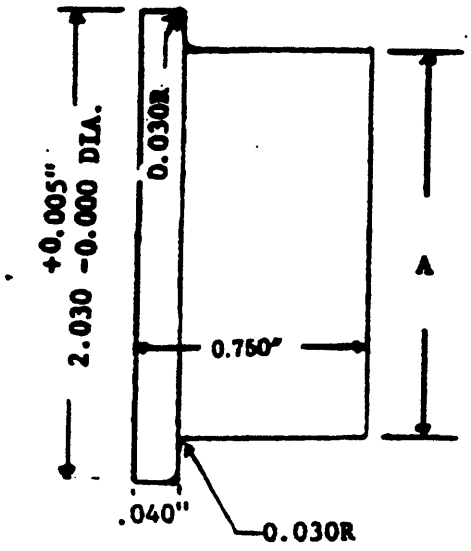


Figure 4-8.A. Shaft Repair.



NOTE A

Diameter To Be 0.0005 Greater Than Case Finish Bore For Press Fit.

MATERIAL: 6061-T6 Aluminum, QQ-A-225/8
FINISH: 125 RMS ALL OVER

Figure 4-9. Sleeve.

x. If gearbox case oil cap adapter bore is oversized up to 0.003 inch in diameter (1.1760 inch ID) gearbox case may be reworked. Apply MIL-S-8802 Class B2 or equivalent to outside diameter of oil filler cap adapter, P/N 204-040-506-3. Press adapter into gearbox case bore while sealent is wet. Wipe away excess sealent. Allow sealent to cure 72 hours before exposing to oil or testing adapter for security.

Section VI. MODIFICATION CRITERIA

4-11. Modification Criteria. Modify gear box 204-040-012-1, -7 to 204-040-012-13 by removal and replacement of parts listed. After modification, restamp identification plate a 204-040-012-13.

Modify 204-040-012-1 to 204-040-012-13

REMOVE	ITEM	FIGURE	PER ASSY	NOMENCLATURE	REPLACE WITH
204-040-507-3	8	4-1	1	Glass, Liquid Sight	204-040-514-1
204-040-508-1	10	4-1	1	Indicator, Oil Level	204-040-508-9
A758	1	4-1	1	Plug, Magnetic	B752G - Chip Detector
*204-040-004-27	14	4-1	1	Quill, (Output)	204-040-012-9
**204-040-012-5	18	4-1	1	Quill, (Input)	204-040-012-11
Modify 204-040-012-7 to 204-040-012-13					
A758	1	4-1	1	Plug, Magnetic	B752G - Chip Detector
204-040-507-3	8	4-1	1	Glass, Liquid Sight	204-040-514-1
204-040-012-5	18	4-1	1	Quill Assembly (Input)	204-040-012-11

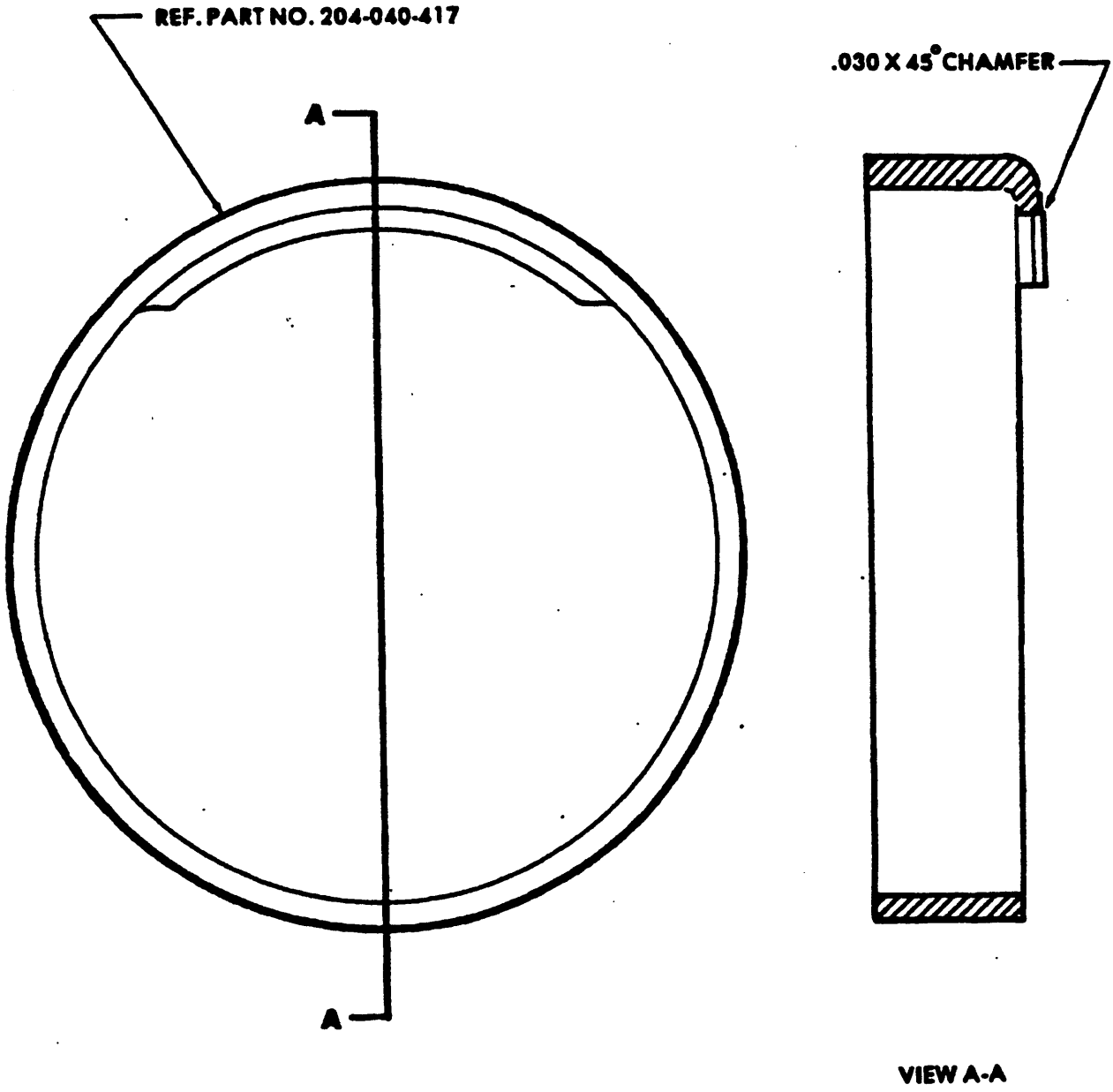


Figure 4-10. Liner

REMOVE	ITEM	FIGURE	PER ASSY	NOMENCLATURE	REPLACE WITH
*Modify 204-040-004-27 to 204-040-012.9					
204-040-421-1	1	4-2	1	Nut	204-040-427-1
MS29561-231	2	4-2	1	Packing, preformed	MS29561-235
204-040-408-1	12	4-2	1	Bearing, Duplex	204-040-424-1
204-040-419-1	13	4-2	1	Sleeve Assembly	204-040-425-1
**Modify 204-040-012-5 to 204-040-012-11					
204-040-185-1	29	4-2	1	Nut	204-040-185-3

Section VII. REASSEMBLY AND TESTING

NOTE

Prior to assembly lubricate all lips of seals with grease (item 26, Table 8-1).

4-12. Reassembly. (Input quill). (See figure 4-3).

a. Press roller bearing (47), minus outer race, on inner end of pinion (48) with serial numbered side of inner race toward threaded end of shaft. Place lockwasher (35) on shaft. Start nut (34) on shaft threads but do not attempt final tightening.

WARNING

FLIGHT SAFETY PART

Installation of bearings (44) in face to face position is the critical characteristic.

NOTE

Quality to verify correct installation of bearings, sequence of details installed, torque of nuts and lubrication of couplings in accordance with reassembly procedure.

WARNING

FLIGHT SAFETY PART

Installation of bearings (44) in face to face position is the critical characteristic.

NOTE

Both duplex bearings (44), must have matching serial numbers and must be installed in matched pairs and face-to-face.

b. Press duplex bearings (44) face-to-face into sleeve. Support sleeve assembly at inner race of duplex bearings and press pinion shaft (48) into bearings from inner side.

NOTE

Safety wiring to be in accordance with MS33540.

c. Install seal (42), with open side inward, in nut (41). Hold sleeve in T101455 plate assembly. Place packing (43) on nut (41) and tighten nut 100 to 150 foot-pounds torque with wrench T101336. Safety wire nut to sleeve.

WARNING

FLIGHT SAFETY PART

Insure seal (40) is fully seated and seal lip is free of cuts, nicks or other installation damage. This is a critical characteristic.

d. Install seal (40) in groove at small end of outer coupling (39) with seal lip toward large end of coupling. Insert a bead of grease (item 8, Table 8-1) to base of splines against seal. Slide inner coupling (38) into outer coupling with small end through seal.

NOTE

Ensure that the installed seal (40) is free of installation damage and is fully seated in the coupling (39) groove. Ensure lubricant purges through teeth at base of outer coupling to fill void area.

e. Position coupling assembly on splines of pinion shaft (48) and secure with washer (37) and bolt (36). Holding outer coupling with T101307 wrench assembly, use a square drive adapter to torque bolt 80 to 100 foot-pounds.

f. Tighten nut (34) on inner end of pinion shaft 20 to 30 foot-pounds torque. Remove wrench assembly T101307 from coupling. After tightening the nut (34), stake tangs of lock washer (35) into aligned slots of nut (34).

g. Place packing (33) on retainer plug (32). Insert plug through inner coupling into head of bolt (36). Install lock-spring (31) through hole in plug rim into a notch in end of inner coupling (38).

NOTE

Ensure that the seal of cover (28) if free of installation damage.

WARNING

FLIGHT SAFETY PART

Proper application of grease over spline teeth of outer coupling (39) is a critical characteristic.

h. Extend outer coupling (39) so that seal (40) is against teeth of inner coupling (38). Pack internal splines of outer coupling with grease (item 8, table 8-1) to a depth of 0.12 inch over top of spline teeth.

i. Install spacer (30) and large end of centering spring (29) into retainer plug (32). Place small end of centering spring on inner face boss of seal plate (28) and install plate in outer coupling. Secure plate in coupling with retaining ring (27).

j. Working through output port of gear case (1), install roller bearing outer race (47R) with the serial numbered side toward inside of case. Secure race in its housing with retainer ring (25).

WARNING

FLIGHT SAFETY PART

Installation of bearings (22) in face to face position is a critical characteristic.

NOTE

Both duplex bearings (22) must have matching serial numbers and must be installed in matched pairs and face-to-face.

4-13. Reassembly. (Output quill). (See figure 4-3).

a. Press duplex bearings (22) face-to-face into outer end of output quill sleeve (21) using T101334 on outer race bar. Use T101333 bar and press roller outer race (19R) into inner end of sleeve with serial numbered side of race toward small end of sleeve. Install retainer ring (20) to secure bearing race.

b. Press roller bearing (19) on rotor shaft (17) with serial numbered side of bearing toward small end of shaft. Secure bearing with retainer ring (18).

c. Support sleeve assembly at inner race of duplex bearings. Press rotor shaft through sleeve until duplex bearings are seated against shaft shoulder. Assemble gear (16) to end of shaft and secure with bolt (15). Assembly T101365 holding fixture to secure gear and sleeve.

d. Install nut (14) with shoulder of nut against duplex bearing inner race. Insert a 3/4 inch square drive extension through hole in fixture plate and tighten bolt 350 to 400 foot-pounds torque. Use T101305 wrench and tighten nut on shaft 30 to 40 foot-pounds torque. Install locking-clip (13) in shaft slot and over a nut spline.

e. Install seal (11) with open side inward in nut (10). Place packing (12) on nut and install in sleeve. Use T101449 wrench and tighten nut 150 to 200 foot-pounds torque. Safety wire nut to sleeve.

f. Remove T101365 holding fixture and safety wire gear retaining bolt (15) to gear (16).

4-14. Testing Quills. Hold input quill sleeve and hand turn coupling and gear assembly. There should be a very light binding of gear in sleeve caused by preload of the duplex bearings. Hold output quill sleeve and hand turn shaft. There should be a very light binding of gear in sleeve caused by pre-load of duplex bearings.

Section VIII. FINAL ASSEMBLY

4-15. Final Assembly. (See figure 4-3).

a. Heat case, and place packing (9) on inner end of output quill sleeve. Lubricate packing and mating surface with oil (item 4 or 4.1, Table 8-1) and position quill sleeve on studs of case (1). (Dowel pin aligns sleeve).

NOTE

Shim plate (23) on flange of quill sleeve must be the same serial number as output sleeve (21).

NOTE

Apply unreduced epoxy polyamide (item 32, Table 8-1) on flange of case (1) before installation of washers and nut (8) to protect against corrosion. Install washers and nut while primer is wet.

b. Secure output quill to case (1) with aluminum washer next to sleeve and steel washer next to nut (8). Tighten nuts on the eight studs evenly. Install additional aluminum washers and bracket (NSN 5340-00-983-6604) or equivalent on stud adjacent to cap chain attach hole before regular washers and nuts (8) are installed if attachment hole in case (1) was damaged beyond repair.

c. Heat input quill port of the gear case with a heat lamp. Place packing (26) on input quill sleeve, lubricate packing and mating surface of case with oil (item 4, Table 8-1) and insert quill into case. Use care to engage gear teeth and roller bearing properly to avoid damage.

NOTE

Shim plate (46) on flange of input quill sleeve must be the same serial number as input sleeve (45).

d. Secure input quill to case with spacer and nuts (24) on two opposite studs. (Spacers will be removed when gear box is installed).

WARNING

FLIGHT SAFETY PART

Backlash should be 0.004 to 0.010 inch; this is a critical characteristic.

e. Check backlash between the bevel pinion and the bevel gear in three places 120° apart. Backlash should be 0.004 to 0.010 inch, and should not vary more than 0.002 inch when checked at different locations around the gear.

CAUTION

Do not alter shim plates on quill sleeves and case to obtain correct backlash. If backlash is not within limits, parts are not dimensionally correct or are not correctly assembled.

f. Install oil level indicator disc (7). Place packing (6) on sight glass (5) lubricate packing and case port with oil (item 4 or 4.1, table 8-1) and insert sight glass in case. Secure with retainer ring (4).

NOTE

It is permissible but not required to sleeve chain with shrink tubing (NSN 5970-00-812-2967, NSN 5970-01-169-1723, or equivalent). Sleeving of cap assembly chain willl reduce paint chipping and corrosion on gearbox.

g. Install chip detector (2) with gasket in case. Torque 120 to 150 inch-pounds and safety wire to adjacent drilled case rib. Install filler cap (3) with packing and secure with chain pin to case.

Section IX. RUN-IN AND TEST

NOTE

Test apparatus and test conditions shall meet MIL-T-5955B.

4-16. RUN-IN AND TEST.

a. Preparation of gear box for run-in.

NOTE

90° gear box individual quills overhauled for spares shall not have a functional test.

(1) Manually verify existence of gear backlash.

(2) Check for free rotation of gear and pinion without binding by manually turning input shaft.

(3) Install oil temperature thermocouple probe in place of chip detector.

(4) Assemble gear box to run-in stand and hook up.

(5) Fill gear box case to indicator level with oil (item 4, Table 8-1).

b. Perform Functional Test as follows:

NOTE

A slave forty-two degree gear box may be used for this run-in.

(1) Run 90° Gear Box at torques and RPM as programmed in run cycle (Table 4-4).

(a) Monitor temperature of the oil after each step and during complete run. The maximum temperature limit for 90° gearbox is 60°F rise above ambient temperature. The maximum ambient temperature for 90° gearbox functional test is 80°F. Functional test shall be performed with a volume of 800 ± 30 CFM of air at a temperature of 70°F ± 5 F passing over the gearboxes under test.

NOTE

When 70°F cooling air is not available or not practical, maximum temperature limit for 90° gearbox is 110°F rise above ambient temperature. When ambient temperature exceeds 100°F, fans may be used to keep the 90° gearbox temperature below 210°F. Under no conditions shall the 90° gearbox temperature exceed 210°F.

(b) Stop run and investigate cause of excessive heat if temperatures exceed the limits. The above temperatures are to be used to determine or to indicate possible failure.

NOTE

After functional test, only a visual wear pattern check and visual oil check shall be accomplished. Check the wear pattern of the gears visually through the oil level sight glass hole and compare with examples shown in Figure 4-6. Wear pattern must be acceptable. Backlash check after functional test is only necessary as a troubleshooting procedure when gearbox exhibits an unacceptable gear pattern, overheats in test, becomes metal contaminated, or otherwise provides reasonable doubt as to serviceability. If a failure is indicated, disassemble the gear box and determine the cause.

(c) Upon completion of functional test, remove the 90° gearbox from test stand. Check couplings for seal leakage. Remove modified drain plug containing oil temperature thermocouple. Obtain an oil sample in accordance with TB 43-0106 and forward through proper channels for analysis by authorized oil laboratory. If notified contaminants are present, comply with laboratory recommendations.

NOTE

Paragraphs c. through j. need be accomplished only when backlash check after test is accomplished per paragraph 4-16.c.

(2) Disassemble ninety degree gearbox from machine. Drain out all oil.

CAUTION

If bearings, gears or other parts affecting operations, backlash, or gear pattern are replaced at any stage, the assembly must be functional tested and reinspected.

(3) METAL PARTICLES CONTAMINATION (Table 4-5)

(a) Description. Metal particles found on gearbox and transmission oil strainer screens, oil filters or magnetic plugs may indicate failure of an internal part of the component. The presence of metal particles, however, is not necessarily an indication that the gearbox is not serviceable. The quantity, source, form and type of metal found must be taken into consideration. The particles found may be steel, aluminum, magnesium, phenolic, or copper in various shapes and quantities. For a detailed explanation of the action made necessary by the presence of each of the possible types of particles in the gearbox, refer to table 4-5. Tin, lead, and cadmium may be in evidence in the oil, but are not a problem in small quantities.

WARNING

When any particles found are readily identifiable as fragments of gearbox parts, such as gear, nuts, bearings, oil slingers, thrust washers, snap-rings, safety wire or other components, disassemble the component and determine the problem.

(b) Identification of Metal Particles (Table 4-5). A visual inspection of color and hardness will occasionally suffice to identify the particles. When visual inspection does not positively identify the particle, the kind of particle present may be determined by a few simple tests. Equipment to perform tests includes a permanent magnet and electric soldering iron, concentrated hydrochloric (muriatic) acid and concentrated nitric acid. Proceed as follows:

1 Steel. Isolate steel particles with permanent magnet.

2 Aluminum. Determine aluminum particles by their reaction to hydrochloric acid. When a particle of aluminum is dropped into hydrochloric (muriatic) acid, it will fizz with a rapid emission of bubbles. The particles will gradually disintegrate and form a black residue.

NOTE

Since magnesium and aluminum react similarly in hydrochloric acid, when in doubt drop particle into nitric acid. Aluminum does not react noticeable in nitric acid.

3 Tin and Lead. Distinguish tin and lead by their low melting points. Clean soldering iron; heat it to about 500°F; then tin it with 50-50 solder (50 percent lead and 50 percent tin). Wipe off excess solder. Tin or lead particles dropped onto hot soldering iron will melt and fuse with the solder. Do not overheat soldering iron.

4 Copper or Bronze and Magnesium. Differentiate copper or bronze and magnesium by their respective reactions to nitric acid. When a particle of copper or bronze is dropped into nitric acid, it forms a bright green cloud in the acid. When a particle of magnesium is dropped into nitric acid it frizzes with a rapid emission of bubbles. Phenolic and aluminum do not react noticeably to nitric acid.

(c) Determining Serviceability of Gearbox.

1 Drain gearbox.

2 Flush gearbox with clean oil. Specification MIL-L-23699 or DOD-L-85734. Inspect oil for chips.

CAUTION

Note condition of packings, seals and gaskets before reinstallation of units. Replace if damaged.

3 Clean magnetic plug and reinstall.

4 Reinstall drain plug.

5 Service gearbox with proper oil.

6 Rerun steps 6 and 7 as specified in table 4-4 expect each test to last .3hr in lieu of .1hr. Drain oil into a clean container and inspect for chips. Inspect magnetic plug. If number of particles has increased, or if any particles are found which may be visually identified as chips or flakes from a bearing or gear, disassemble the gearbox, as required, to determine the extent of damage. If number of particles has decreased and only minute particles are found, continue the gearbox in service.

c. If gear pattern is unacceptable and/or possible failure exists (after functional test).

WARNING

FLIGHT SAFETY PART

Backlash should be 0.004 to 0.010 inch; this is a critical characteristic.

(1) Check backlash between bevel pinion and bevel gear in three places 120° apart. Backlash should be 0.004 to 0.010 inch, and should not vary more than 0.002 inch when checked at different locations around gear. Backlash should, also, be within 0.002 inch of reading measured before functional test.

(2) Remove the input quill assembly from the case assembly.

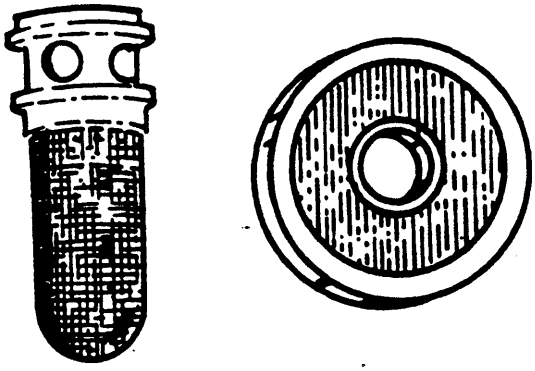
Table 4-4. Run-In Cycle for 42 Degree and 90 Degree Gear Box

STEP NO.	HOURS TO RUN	ACCUM. TIME HRS.	H.P. APPROX.	ACTUAL RPM 42°BOX	ACTUAL RPM OUTPUT 90°BOX	TORQUE IN. LBS. OUTPUT 90°BOX	TORQUE VALUE %*
1.	0.10	0.1	Min.-	2600	1000	0	0
2.	0.10	0.2	24.97	2860	1100	1430	18.8
3.	0.10	0.3	24.14	3380	1300	1170	15.4
4.	0.10	0.4	42.35	3780	1454	1835	24.1
5.	0.10	0.5	57.00	3780	1454	2470	32.5
6.	0.10	0.6	56.27	4170	1604	2210	29.0
7.	0.10	0.7	62.97	4590	1765	2210	29.0
8.	0.10	0.8	92.68	4170	1604	3640	47.0
9.	0.10	0.9	29.79	4170	1604	1170	15.4

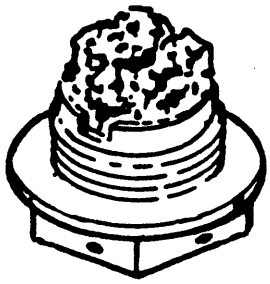
* 100% = 7610 Inch Pounds Torque

Table 4-5. Identification of Metal Particles

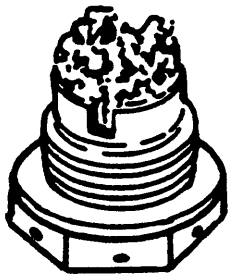
KIND OF METAL	QUANTITY AND/OR SIZE	ACTION REQUIRED	NOTES
Steel	Fuzz, fine hair-like particles (See detail B, Figure 4-10.1).	None	Result of normal wear. May have exaggerated appearance because of oil.
	Particles in splinter or granular form. (See details C and D, Figure 4-10.1).	Perform serviceability check.	Usually indicates failure.
	Thin flakes not exceeding 1/64 inch in length. Quantity not to exceed 10 flakes. See detail E, Figure 4-10.1).	Perform serviceability check.	Small quantity may not indicate bearing failure.
	More than 10 flakes not exceeding 1/64 inch in diameter and 1/4 inch in length.	Perform serviceability check.	May indicate bearing failure.
Aluminum or Magnesium	Particles in granular form or like miniature lathe turnings.	Perform serviceability check.	May be result of using these materials as mallets or drifts during assembly.
Copper (Bronze)	Particles in granular form.	Perform serviceability check.	May indicate excessive wear of bearing cages as result of bearing failure.
Phenolic		Perform inspection for source or serviceability check.	Result of the use of mallets and drifts during assembly.



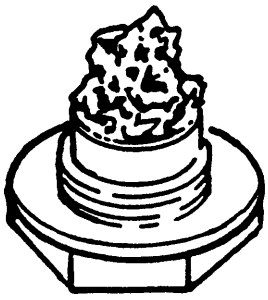
DETAIL A



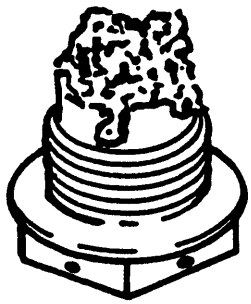
DETAIL B



DETAIL C



DETAIL D



DETAIL E

Figure 4-10.1 Identification of Metal Particles

(3) Check torque and remove the retaining nut (34) from inner end of pinion. Torque should be 240 to 360 inch-pounds. Remove washer (35) and inspect bearing race for signs of spinning.

(4) Remove the spiral retainer ring (25) and visually inspect the roller bearing race for signs of spinning.

(5) Check the wear pattern of the output bevel gear with examples shown in Figure 4-6. Wear pattern must be acceptable.

NOTE

Do not alter shim plates on quill sleeves or case to obtain correct wear pattern. If wear pattern is not acceptable, parts are not dimensionally correct or are not correctly assembled.

d. Qualify the input quill assembly.

(1) Disassemble the quill by removing the spiral retaining ring, seal plate, centering spring, spacer, lock spring, retainer plug and o-ring.

(2) Check breakaway torque of the retaining bolt (36) at 80 to 100 foot-pounds and remove bolt and washer.

(3) Remove and separate the couplings; clean out the grease and inspect teeth and splines.

(4) Check breakaway torque of the seal retaining nut (41) at 100 to 150 foot-pounds and remove nut.

(5) Inspect bearing race for signs of spinning.

WARNING

FLIGHT SAFETY PART

Proper application of grease over spline teeth of outer coupling (39) is a critical characteristic.

(6) Regrease coupling.

NOTE

Grease (item 8, table 8-1) to be hand packed to cover splines by 0.12 inch.

e. Reassembly of the input quill assembly.

(1) Install the seal retaining nut (41), seal and o-ring into the quill sleeve. Torque nut 100 to 150 foot-pounds and lockwire.

(2) Assemble the couplings together and install on pinion shaft through seal and up to bearing. Install washer and retaining bolt (36) and torque 80 to 100 foot-pounds.

(3) Install the following: Retainer plug with o-ring, lock spring, spacer, centering spring, seal plate, and spiral retaining ring.

f. Qualify the driven quill assembly.

(1) Check breakaway torque of gear retaining bolt (15) at 350 to 400 foot-pounds and remove bolt.

(2) Remove bevel gear and visually inspect teeth for excessive wear and cracks. Inspect curvic teeth on gear and shaft for signs of fretting and cracks.

(3) Check breakaway torque of sleeve nut (10) at 150 to 200 foot-pounds and remove nut. Do not remove seal unless necessary.

(4) Remove the locking clip (13) and check the breakaway torque of the shaft nut 360 to 480 inch-pounds.

(5) Visually inspect the bearing face for signs of spinning.

(6) Visually inspect splines on shaft for signs of fretting, wear, cracks and damage.

g. Reassembly of the driven quill assembly.

(1) Install the shaft nut and torque 360 to 480 inch-pounds, and safety with the lock clip.

(2) Install the sleeve nut and o-ring with seal and torque 150 to 200 foot-pounds, and safety with 0.032 inch wire.

(3) Install bevel gear with retaining bolt and torque 350 to 400 foot-pounds and safety with 0.032 inch wire.

(4) Check for free roll of shaft in the assembly.

h. Qualify the main case assembly.

(1) Clean the main case assembly in cleaning solvent (item 2, table 8-1). Inspect all crevises in case for foreign materials.

(2) Check chip detector for cleanliness; reinstall chip detector and safety together with 0.032 inch wire.

(3) Check that the data plate is properly filled out and installed.

(4) Check that the filler cap assembly is properly secured by chain to the main case assembly.

(5) Check that the gear box oil level sight gage is in proper position and that the glass is secured with packing and snap-ring retainer.

i. Reassembly of the ninety degree gear box assembly.

(1) Install in the main case assembly the spiral retainer ring (25).

(2) Install on the input pinion the lock-washer (35) and nut (34). Torque nut 240 to 360 inch-pounds and safety with washer tang.

(3) Heat case (1) with a heat lamp and install into the main case the input drive quill assembly with o-ring. Secure using spacers on studs and nuts. The spacers will be removed at installation.

(4) Heat the case with a heat lamp and install the driven gear quill assembly with packing washers and nuts. (Exercise care to engage gear teeth properly to avoid damage.)

WARNING
FLIGHT SAFETY PART

Backlash should be 0.004 to 0.010 inch. This is the critical characteristic.

j. Backlash check after buildup.

Check backlash between the drive pinion gear and the driven gear in three places. Backlash should be 0.004 to 0.010 inch. (Refer to paragraph 4-15e.)

k. Final inspection.

(1) Inspect for clearance between safety wire on driven gear retaining bolt and case (1).

(2) Inspection is completed. Gear Box is now ready for paint.

(3) Apply sealing compound (Item 1, Table 8-1) around groove where shim plates mate.

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-45607B and MIL-STD-45662 (Commercial facility) or DESCOM-R-702-1, Depot Quality System (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 contractor 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.

5-5. Quality Assurance Plan. The contractor/depot quality assurance activity shall insure compliance with MIL-I-45208A or AMC-R 702-4 which includes required quality assurance planning.

Section II. INSPECTION REQUIREMENTS

5-6. 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.

5-7. First Article Inspection/Comparison Test. The first item overhauled shall be inspected for conformance to the DMWR. If the contractor/depot has overhauled this type item for the Government within the last two years, this requirement may be waived by a written request to PA/CM.

5-8. **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 a part of the overhaul contract. The log shall contain the Maintenance Technician's comments for all parts removed; such as, parts inspected, replaced, repaired, 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. 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.

5-9. **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 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

Table 5-1. Inspection Definitions (continued)

TERM	DEFINITION	PROBABLE CAUSE
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
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

Table 5-1. Inspection Definitions (continued)

TERM	DEFINITION	PROBABLE CAUSE
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
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

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 authorization document, and the accompanying AMSAT Form 6525 (Test).

2. Output components from organic depot maintenance and overhaul (M & O) programs will be packaged in accordance with the Army Master Data File Retrieval Microform System (ARMS) 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 & 2 specify a wood container. The level of packaging shall be level A/A when a special/multi-application reusable container or wooden 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 requisitioned as required to replace missing, improper, or unserviceable containers to insure availability of container when component is returned from the overhaul maintenance facility. Waivers, deviations, container substitution must be approved by the ATCOM Packaging and Transportability Branch. Written communication should be submitted to HQ ATCOM, AMSAT-I-SDP, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. Telephone inquires may be made to Commercial (314) 263-2372 or DSN 693-2372.

3. All contractual matters shall be through the assigned Contracting Officer (KO). Technical communication should be submitted to HQ ATCOM, AMSAT-I-SDP, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. Telephone inquires may be made to Commercial (314) 263-2372 or DSN 693-2372.

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CHAPTER 7

PAINTING REQUIREMENTS

7-1. PREPARATION FOR PAINTING.

a. Clean external surface of case and flange of each sleeve.

b. Apply sealing compound (item 1, table 8-1) around sight glass, around groove where shim plates meet, around seal nuts of each quill, and in three (3) screw jack holes of input and output quills and in three (3) shim screw holes on input sleeve. An alternate process for filling jack screw holes with sealing compound, is to use nylon set screws (NSN 5305-01-222-4340) or equivalent on input and output sleeve jack screw holes (3 each).

c. Remove filler cap and chip detector plug. Mask filler cap adapter, sight glass, chip detector boss and port where pitch change assembly is installed.

d. Mask coupling, seals, shafts and exposed threads of studs. "Mask the top part of the outer flange of input quill sleeve and also the entire studs. After inserting input quill sleeve into the coupling apply sealant (item 1, table 8-1) around grooves where shim plates meet around seal nuts of each quill, in three (3) screw jack holes of input and output quills and in three (3) shim screw holes on input sleeve. Apply two (2) coats of MIL-P-23377, Type II primer to outer flange of input sleeve. Apply one coat of epoxy primer MIL-P-23377, Type II to the pitch change mating surface. Remove masking materials from top part of input sleeve and all studs. Do not paint sealant applied around input sleeve with either MIL-P-23377, Type II primer or MIL-C-46168 CARC paint".

e. Paint gear box and filler cap in accordance with Table 7-1 and 7-1B Military Specification MIL-F-18264.

f. Remove masking and reinstall parts.

Table 7-1A. Carc Painting Requirements

ITEM NAME	PAINT TYPE AND SPECIFICATION	METHOD OF APPLICATION	NO. OF COATS	NOTES
Ninety Degree Gearbox	Epoxy-polyamide Primer, Type II, MIL-P-23377	Spray	1	Spray one wet cross coat of epoxy-polyamide primer to a dry film thickness of 0.6 to 0.9 mil. Allow to air dry one hour before applying top coat.
	Polyurethane Coating, Color No. 37038 (Aircraft Black) and Color No. 37875 (Aircraft White), MIL-C-46168	Spray	2	Spray two (2) coats of black polyurethane to give a minimum dry film thickness of 1.8 mils. The second coat of black polyurethane may be

ITEM NAME	PAINT TYPE AND SPECIFICATION	METHOD OF APPLICATION	NO. OF COATS	NOTES
				applied within a few minutes after the first coat. Six hours after applying black top coat, stencil case with "CARC-P" in ½ inch letters using white polyurethane coating.
Filler Cap	Epoxy-polyamide Primer, Type II, MIL-P-23377	Brush or Spray	1	Brush or spray one wet cross coat of epoxy-polyamide primer to a dry film thickness of 0.6 to 0.9 mil. Allow to air dry one hour before applying top coat.
	Epoxy-polyamide Coating, FED STD 595, Color No. 33538 (yellow) and 37875 (white), Type I, MIL-C-22750	Brush or Spray	2	Brush or spray a mist coat of yellow epoxy top coat over epoxy primer and allow to dry 30 minutes. Follow with a wet pass of yellow epoxy top coat to a total dry film thickness of 2.0 to 2.4 mils. for the combined epoxy primer-top coat system. Apply ½ inch dia. white dot on filler cap. Use either white epoxy coating or a suitable white dot decal with an adhesive backing.
Ninety Degree Gearbox	Epoxy-polyamide Primer, MIL-P-23377	Spray	2	Exterior: Apply 0.3 to 0.6 mil dry film thickness per coat of primer, allowing each coat to dry at least one (1) hour between coats.

Table 7-1B Non-carc Painting Requirements

ITEM NAME	PAINT TYPE AND SPECIFICATION	METHOD OF APPLICATION	NO. OF COATS	NOTES
	Acrylic Lacquer, MIL-L-81352, FED STD 595, Color No. 17178 (Aluminum)	Spray	2	Exterior: Apply 0.5 to 0.7 mil dry film thickness per coat of acrylic lacquer (aluminized), allowing each coat of lacquer to dry 30 minutes between coats.
Filler Cap	Epoxy-polyamide Primer, MIL-P-23377	Brush or Spray	2	Exterior: Apply 0.3 to 0.6 mil dry film thickness per coat of primer, allowing each coat of primer to dry at least one (1) hour between coats.
	Acrylic Lacquer, MIL-L-81352, FED STD 595, Color No. 13538 (yellow) and Color No. 17875 (white)	Brush or Spray	2	Brush or spray filler cap (oil) with two (2) coats of acrylic lacquer, MIL L-81352, color (yellow) allowing each coat to dry 30 minutes between coats. Each coat applied to have a dry film thickness between 0.5 to 0.7 mils. Apply ½ inch dia. white dot on filler case and cap. Use acrylic lacquer (white) MIL-L-81352 or a suitable white dot decal with an adhesive backing.

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 which may be consumed in use or which loses its identity in an assembly.

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

ITEM NO.	NOMENCLATURE	SPECIFICATION NO.
1	Sealing Compound, Class B-2	MIL-S-8802
2	Dry Cleaning Solvent	P-D-680
3	Paint Remover for Mag, alloy, Al. alloy, and low strength steel	Type II, MIL-R-81903
4	Lubricating Oil	MIL-L-23699
4.1	Lubricating Oil	DOD-L-85734
5	Crocus Cloth	P-C-458
6	India Stone - Fine	Commercial
7	DELETED	
8	Grease	P/N 204-040-755-5 NSN 9150-00-506-8497
9	Polyurethane Coating (CARC), FED STD 595, Color No. 37038, Aircraft Black	MIL-C-46168
10	Polyurethane Coating (CARC), FED STD 595, Color No. 37875, Aircraft White	MIL-C-46168
11	Epoxy-polyamide Coating, FED STD 595, Color No. 33538, Yellow	Type I, MIL-C-22750
12	Epoxy-polyamide Coating, FED STD 595, Color No. 37875, White	Type I, MIL-C-22750
13	Preservative Compound Class 3	MIL-C-11796
14	Paper - Barrier Grade A	MIL-B-121
15	Aluminum (Sheet) Condition "O"	QQA250/8B
16	Adhesive Structural	P/N EC 2216

NOTE

Bond data plates onto housings using one of the following:

(a) Adhesives per MMM-A-132, Type I, Class 3.
(b) Adhesives per MMM-A-134.
(c) Epoxy, Metal Set A4.
(d) Adhesive EC 2216.

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

ITEM NO.	NOMENCLATURE	SPECIFICATION NO.
17	Marking Ink, Acid Etching AE No 123 or equivalent	
18	Chemical Conversion Coatings on Aluminum and Aluminum Alloys	MIL-C-5541
19	Plating Cadmium Electrodeposited	QQ-P-416
20	Sealer EC801 or equivalent	MIL-S-7502C
21	Brush Plating, Electro Deposition	MIL-STD-865
22	Aluminum Wool	MIL-A-4864
23	Aluminum Oxide Cloth 300 Grit or Finer	P-C-451, Type I, Class II
24	Methyl-Ethyl-Ketone	TT-M-261
25	Lubricant, Solid Film	MIL-L-46010
26	Grease Aircraft and Instrument	MIL-G-23827
27	Magic Bluer Swab On Birchwood Casey Co. Eden Prairie, Minn. (Or Equivalent)	
28	Paint Remover for High Strength Steel	MIL-R-81294
29	6061-T6 Aluminum Alloy Bar Stock	QQ-A-225/8
30	Retaining Compound	Loctite Compound #75
31	Polyurethane Coating	MIL-C-46168 (CARC) Color Aircraft Green
32	Epoxy-polyamide Primer	MIL-P-23377
33	Acrylic Lacquer	MIL-L-81352, Fed Std 595, Color No. 17178
34	Acrylic Lacquer	MIL-L-81352, Fed Std 595, Color No. 13538
35	Acrylic Lacquer	MIL-L-81352, Fed Std 595, Color No. 17875
36	Trichloroethane, Inhibited	O-T-620C
37	Adhesive	MMM-A-132 Type I, Class 3
38	Zinc Chromate Primer	TT-P-1757
39	Devcon F2, Epoxy Filler	8030-00-229-8740

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 insure 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 checking equipment

(1) Magnetic particle inspection equipment

(2) Fluorescent penetrant inspection equipment

(3) Magnifying glasses

(4) Micrometers

(5) Dial indicators

(6) Calipers

(7) Surface plate

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 and Equipment

PART NUMBER	NOMENCLATURE
T101305	Wrench Assembly
T101307	Wrench Assembly
T101308	Jack Screw Set
T101333	Bar
T101334	Bar
T101336	Wrench
T101338	Jack Screw Set
T101365	Holding Fixture
T101449	Wrench
T101455	Plate Assembly
204-040-003-29 GIS-1	Stand

NOTE: All above items manufactured by Bell Helicopter Company or equivalent.

CHAPTER 11

OVERHAUL INTERVAL AND RETIREMENT LIFE SCHEDULE

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

Table 11-1. Overhaul Interval and Retirement Life Schedule

ITEM NAME	PART NUMBER	OVERHAUL INTERVAL	RETIREMENT LIFE
Ninety Degree Gear Box	204-040-012-1	600 hours	
	204-040-012-7	1200 hours	
	204-040-012-13	1200 hours	

CHAPTER 12

MILITARY AND FEDERAL SPECIFICATIONS

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-6866	Inspection, Penetrant Method of
2	MIL-I-6868	Inspection Process, Magnetic Particle
3	MIL-P-116	Preservation, Methods of
4	MIL-STD-129	Marking for Shipment and Storage
5	MIL-M-3171	Magnesium Alloy, Processes for Pretreatment and prevention of Corrosion
6	MIL-T-5955B	Transmission Systems, VTOL STOL, General Requirements for
7	MIL-F-18264	Finishes: Organic, Weapons System Application and Control of
8	QQ-P-416	Plating, Cadmium Electrodeposited
9	MIL-STD-865	Brush Plating, Cadmium Electrodeposition

CHAPTER 13

REFERENCE DATA

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	MS33540	Safety Wiring And Cotter Pinning General Practices For

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

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

Table 15-1. Part Number Listing (Sheet 1 of 5)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-29	AN122693	Pin	5315-00-241-2921
4-1-28	AN126017	Stud	5307-00-637-6451
4-1-28	AN126018	Stud	5307-00-637-9970
4-1-28	AN126019	Stud	5307-00-637-5233
4-1-28	AN126020	Stud	5307-00-637-5212
4-1-28	AN126021	Stud	5307-00-637-1642
4-1-28	AN126022	Stud	5307-00-579-0458
4-1-30	AN126419	Stud	5307-00-136-4263
4-1-30	AN126420	Stud	5307-00-637-5217
4-1-30	AN126421	Stud	5307-00-271-7060
4-1-30	AN126422	Stud	5307-00-530-9125
4-1-30	AN126423	Stud	5307-00-271-7062
4-1-30	AN126424	Stud	5307-00-550-3631
4-1-16	AN315-5R	Nut	5310-00-167-1345
4-1-6	AB416-2	Pin	5315-00-223-6112
4-2-35	AN507-440R5	Screw	5305-00-151-2084
4-1-31	AN510-1	Plate	1680-00-532-2497
4-1-12	AN960-416L	Washer (Steel)	5310-00-167-0835
4-1-1	B752G	Chip Detector	1615-00-918-1893
4-1-21	MS172206	Washer	3110-00-619-6446

Table 15-1. Part Number Listing (Sheet 2 of 5)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-20	MS172241	Nut	5310-00-515-7592
4-1-11	MS21042L4	Nut	5310-00-807-1475
4-1-32	MS2469-5OP	Pin	5315-00-062-4388
4-2-16A	MS24692-74P	Pin	5315-00-060-8475
4-2-16C	MS24692-98P	Pin	5315-00-060-2826
4-1-25	MS24693S4	Screw	5305-00-957-7815
4-2-14			
4-1-1	MS29561-011	Packing	5330-00-542-1421
4-1-5	MS29561-210	Packing	5330-00-690-9594
4-2-23	MS29561-216	Packing, Preformed	5330-00-618-0334
4-1-9	MS29561-218	Packing, Preformed	5330-00-618-2516
4-2-2	MS29561-231	Packing, Preformed	5330-00-542-1476
4-1-31	MS29561-233	Packing, Preformed	5330-00-803-8120
4-2-2	MS29561-235	Packing, Preformed	5330-00-815-3508
4-1-19	MS29561-237	Packing, Preformed	5330-00-726-4153
4-1-15	MS29561-259	Packing, Preformed	5330-00-808-5796
4-1-2	MS35769-11	Gasket	5330-00-815-9489
4-1-4	NAF1088-1A4	Chain	4010-00-408-2329
4-1-13	NAS1197-416	Washer, (Al Al)	5310-00-844-5081
4-1-17	NAS43DD-5-71	Spacer	5340-00-088-0001
4-2-16	REA-048	Nut Clinch	5310-00-596-5477
4-1-7	RRT-150C	Retainer	5365-00-598-0814
4-2-17	RRT237C	Retainer	5365-00-619-0523

Table 15-1. Part Number Listing (Sheet 3 of 5)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-22	RR-204	Retainer	5365-00-550-5176
4-2-11	RR314	Retainer	5365-00-598-0991
4-2-9	RS-196	Retainer	5365-00-589-9981
4-1-14	204-040-004-27	Quill Assembly	1615-00-766-8590
4-2			
4-1	204-040-012-1	Gear Box Assembly	1560-00-474-8190
4-1-18	204-040-012-5	Quill Assembly	1615-00-893-2017
4-2			
4-1	204-040-012-7	Gear Box Assembly	1560-00-472-7305
4-1-14	204-040-012-9	Quill Assembly	1615-00-974-7726
4-2			
4-1-18	204-040-012-11	Quill Assembly	1615-00-760-3315
4-2			
4-1	204-040-012-13	Gear Box Assembly	1615-00-918-2677
4-2-33	204-040-143-1	Bearing, Set	3110-00-625-0114
4-2-29	204-040-185-1	Nut	5365-00-797-2437
4-2-29	204-040-185-3	Nut	5365-00-772-6135
4-2-32	204-040-400-7	Gear	3040-00-787-2492
4-2-32	204-040-400-9	Gear	1615-00-787-4269
4-2-7	204-040-401-5	Gear	3020-00-787-2493
4-2-7	204-040-401-7	Gear	1560-00-787-4267
4- 2-8	204-040-402-7	Shaft	1615-00-488-7632
4-2-8	204-040-402-9	Shaft	1615-00-787-4268

Table 15-1. Part Number Listing (Sheet 4 of 5)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-2-6	204-040-405-1	Bolt	5306-00-625-4609
4-1-23	204-040-406-1	Bearing	3110-00-690-8928
4-2-10	204-040-407-3	Bearing	3110-00-690-8929
4-2-12	204-040-408-1	Bearing, Set	3110-00-690-8727
4-2-5	204-040-412-1	Nut	5310-00-703-8272
4-2-4	204-040-413-1	Clip	5340-00-649-8351
4-2-16D	204-040-416-1	Sleeve	1615-00-858-8396
4-1-33	204-040-417-1	Liner	1615-00-797-6071
4-1-26	204-040-418-7	Plate, Shim	1560-00-757-5789
4-1-24	204-040-418-13	Case Assembly	1615-00-739-4574
4-1-27	204-040-418-17	Plate, Shim	1560-00-757-5787
4-2-13	204-040-419-1	Sleeve Assembly	1615-00-691-2151
4-2-15	204-040-419-7	Plate, Shim	1615-00-065-6905
4-2-1	204-040-421-1	Nut	5365-00-701-9934
4-2-21	204-040-422-1	Spacer	5315-00-778-2215
4-2-34	204-040-423-1	Sleeve Assembly	1615-00-898-1687
4-2-36	204-040-423-5	Plate, Shim	1560-00-757-5790
4-2-12	204-040-424-1	Bearing, Set	3110-00-088-3399
4-2-13	204-040-425-1	Sleeve Assembly	1615-00-972-2736
4-2-15	204-040-425-5	Plate, Shim	1560-00-075-2538
4-2-16B	204-040-426-1	Adapter	3110-00-990-0766
4-2-1	204-040-427-3	Nut	1615-00-981-3061
4-1-3	204-040-502-9	Cap Assembly	1615-00-690-7280
4-1-34	204-040-506-1	Adapter	1615-00-474-8469

Table 15-1. Part Number Listing (Sheet 5 of 5)

FIGURE AND INDEX NO.	PART NUMBER	NOMENCLATURE	NATIONAL STOCK NUMBER
4-1-10	204-040-508-1	Indicator, Oil Level	6680-00-580-0724
4-1-10	204-040-508-9	Indicator, Oil Level	1615-00-975-7131
4-1-8	204-040-514-1	Glass, Liquid Sight	6680-00-765-2855
4-2-26	204-040-603-5	Coupling	1615-00-239-3809
4-2-26	204-040-603-7	Coupling	1615-00-791-6073
4-2-27	204-040-604-5	Coupling	1615-00-701-4142
4-2-25	204-040-606-1	Washer	5340-00-691-2112
4-2-22	204-040-607-1	Retainer, Spring	1615-00-701-4143
4-2-19	204-040-608-1	Spring	1615-00-701-5659
4-2-20	204-040-609-1	Spring, Lock	5365-00-770-9347
4-2-18	204-040-610-1	Plate Assembly	1615-00-701-4144
4-2-28	204-040-611-1	Seal	1615-00-625-0132
4-2-24	204-040-612-1	Bolt	1560-00-691-2113
4-2-3	45D171-J60	Seal	5330-00-795-1315
4-2-30	451858-H60	Seal	5330-00-753-4432
4-2-3	50171-J19	Seal	5330-00-720-2168
4-2-32	204-040-400-9	Gear	1615-00-787-4269
4-2-7	204-040-401-7	Gear	1560-00-787-4267
4-2-8	204-040-402-9	Shaft	1615-00-787-4268
4-2-26	204-040-603-7	Coupling	1615-00-791-6073

APPENDIX A
NOT APPLICABLE

APPENDIX B
NOT APPLICABLE

APPENDIX C
NOT APPLICABLE

APPENDIX D

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.

For the Commander:

EUGENE J. DAVIS
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