TM 9-2520-215-34
MARINE CORPS TM 07769B-34/7

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

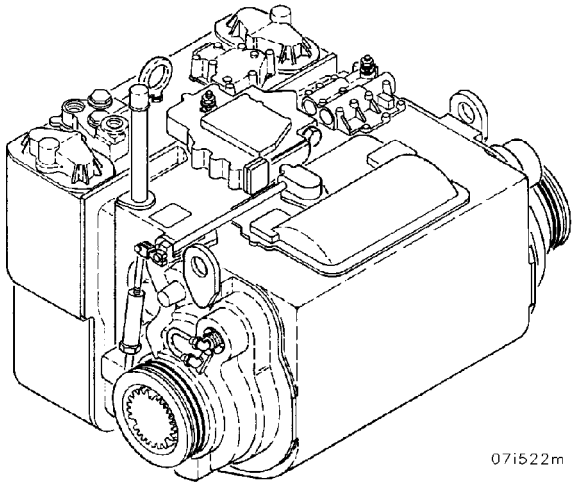
CROSS-DRIVE TRANSMISSION ASSEMBLY

(11649999)
(MODEL XT-1410-4)

COMPOSED OF:
CENTER SECTION ASSEMBLY W/CONTAINER
(2520-00-140-7526)

OUTPUT REDUCTION, LEFT-HAND ASSEMBLY W/CONTAINER
(2520-00-896-9020)

OUTPUT REDUCTION, RIGHT-HAND ASSEMBLY W/CONTAINER
(2520-00-896-9021)



Supersedeure Notice: This manual supersedes TM 9-2520-215-34 dated 01 January 02, including all changes..
Distribution Statement A: Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 2005

WARNING SUMMARY

WARNING

CARBON MONOXIDE POISONING IS DEADLY

Carbon monoxide is a colorless, odorless, DEADLY POISONOUS gas and when breathed deprives the body of oxygen and causes SUFFOCATION. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure.

The following precautions MUST be followed to ensure personnel are safe whenever the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

DO NOT operate personnel heater or engine of vehicle in enclosed area without adequate ventilation.

DO NOT idle engine for long periods without ventilator blower operation. If tactical situation permits, open hatches.

DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

NEVER sleep in a vehicle when the heater is operating or engine is idling.

BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY EVACUATE AND VENTILATE the area. Affected personnel treatment shall be: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration as described in FM 4-25.11 and get medical attention.

BE AWARE; neither the gas particulate filter unit nor field protection mask for nuclear-biological-chemical protection will protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION

WARNING

Cover is spring loaded. Depress against spring pressure during removal to prevent injury.

WARNING

DRY-CLEANING SOLVENT

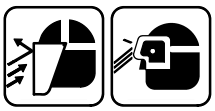
Dry-cleaning solvent (P-D-680) used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat. Do not smoke when using solvent. Failure to do so could cause SERIOUS INJURY. If you become dizzy while using cleaning solvent, get fresh air immediately, and if necessary, get medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately, and obtain medical aid (ref. FM 4-25.11).

WARNING

FASTENERS AND ATTACHING HARDWARE HAZARD

Always use the same fastener part number (or equivalent) when replacing fasteners. Do not risk using a fastener of less quality; do not mix metric and inch (customary) fasteners. Mismatched or incorrect fasteners can result in damage, malfunction, or injury.

WARNING



COMPRESSED AIR HAZARD

Compressed air used for cleaning purposes will not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

WARNING

ADHESIVE HAZARDS

Adhesive causes immediate bonding on contact with eyes, skin, or clothing and also gives off harmful vapors. Wear protective goggles and use it in a well-ventilated area. If adhesive gets in eyes, try to keep eyes open; flush eyes with water for 15 minutes and get immediate medical attention.
Adhesive sealant MIL-S-46163 can damage your eyes. Wear your safety goggles/glasses when using; avoid contact with eyes. If sealant contacts eyes, flush eyes with water and get immediate medical attention.

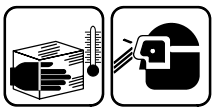
WARNING

Fuel and oil are slippery and can cause falls. To avoid injury, wipe up spilled fuel or oil with rags.

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working around the transmission or other major components. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING



FIRE EXTINGUISHING SYSTEM HAZARDS

Fire bottles can discharge and injure personnel. Insert antirecoil plugs, lock pins, and cotter pins before working on or near bottles.

CO^2 can cause frostbite or eye injury. Wear protective clothing and goggles to avoid contact. If CO^2 contacts hands, hold hands under armpits or in warm water until warmed. If CO^2 contacts eyes, flush with large amounts of water and get medical attention immediately.

WARNING

FALLING EQUIPMENT HAZARDS

Never crawl under equipment when performing maintenance unless equipment is securely blocked. Equipment may fall and cause serious injury or death to personnel.

Keep clear of equipment when it is being raised or lowered. Equipment may fall and cause serious injury or death to personnel.

Do not work on any item supported by lift jacks or hoist. Always use blocks or proper stands to support the item prior to work. Equipment may fall and cause serious injury or death to personnel.

Do not allow heavy components to swing while suspended by a lifting device. Equipment may strike personnel and cause injury.

Exercise extreme caution when working near a cable or chain under tension. A snapped cable, shifting or swinging load may result in injury or death to personnel.

All personnel must stand clear during lifting operations. A swinging or shifting load may cause injury or death to personnel.

Unless otherwise specified, perform all maintenance procedures with all equipment lowered to the ground, transmission in neutral, parking/emergency brake applied, and engine stopped to prevent possible injury to personnel due to falling equipment or rolling vehicle (ref FM 4-25.11).

WARNING

Use care when removing snap and retaining rings. Snap and retaining rings are under tension and act as projectiles when released and could cause severe eye injury.

Use care when cutting lockwire. Lockwire can act as projectile when cut and could cause severe eye injury.

WARNING

Use tongs or gloves when handling chilled parts or dry ice to prevent injury.

DESTROY SUPERSEDED DATA

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: This manual supersedes TM 9-2520-215-34 dated 01 January 2002

Date of issue for original work packages are:

Original 31 December 2005

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 22 AND TOTAL NUMBER OF WORK PACKAGES IS 89 CONSISTING OF THE FOLLOWING:

Page/WP No.	*Change No.	Page/WP No.	*Change No.
WP 0073 00 (6 Pages)	0		
WP 0074 00 (20 Pages)	0		
WP 0075 00 (6 Pages)	0		
WP 0076 00 (8 Pages)	0		
WP 0077 00 (12 Pages)	0		
WP 0078 00 (14 Pages)	0		
WP 0079 00 (8 Pages)	0		
WP 0080 00 (6 Pages)	0		
WP 0081 00 (6 Pages)	0		
WP 0082 00 (2 Pages)	0		
WP 0083 00 (2 Pages)	0		
Chapter 7 Title Page	0		
WP 0084 00 (2 Pages)	0		
WP 0085 00 (2 Pages)	0		
WP 0086 00 (2 Pages)	0		
WP 0087 00 (6 Pages)	0		
WP 0087 00 (4 Pages)	0		
WP 0088 00 (2 Pages)	0		
WP 0089 00 (4 Pages)	0		
Glossary-1 (2 Pages)	0		
Index-1 (4 Pages)	0		
2028 Sample	0		
2028 (3 copies)	0		
Conversion (2 Pages)	0		
Transmittal (2 Pages)	0		
Measurement Page	0		
Blank	0		

*Zero in this column indicates an original page

TM 9-2520-215-34
MARINE CORPS TM 07769B-34/7

HEADQUARTERS
DEPARTMENT OF THE ARMY
U.S. MARINE CORPS
WASHINGTON, D.C., 31 DECEMBER 2005

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REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications) through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is https://aeps.ria.army.mil. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ON-LINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter or DA Form 2028 direct to: Technical Publication Information Office, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726. A reply will be furnished directly to you.

Distribution Statement A: - Approved for public release; distribution is unlimited.

TABLE OF CONTENTS

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TABLE OF CONTENTS - Continued

HOW TO USE THIS MANUAL

This manual was designed to provide you with the information you will need to maintain the XT-1410-4 Cross-Drive Transmission.

The information contained in this manual is presented in chapters and work packages. Each chapter is divided into work packages to cover the disassembly, repair, and assembly of the transmission and its components. Where references are made to tables, figures, and work packages, refer to those portions of the text.

To find information relating to a specific component or system:

Determine the specific name or function of the component/system.
Find the name or function in the Index Listing, located in the back of this manual.
Refer to appropriate work package(s) called out in the Index Listing.

To find information pertaining to a broader range of information (such as transmission troubleshooting, component repair, and component descriptions):

Identify the desired topic.
Find the general topic in the Table of Contents, located in the front of this manual.
Refer to appropriate work package(s) called out in the Table of Contents.

IMPORTANT

You must read and understand this manual BEFORE working on the XT-1410-4 Cross-Drive Transmission.

MAINTENANCE

Maintenance procedures are to be performed in the sequence shown in the text and illustrations. Step 1 must be performed before step 2 and so on.

Equipment illustrations use numbers to identify parts of the system/components.

Throughout this manual the words WARNING, CAUTION, and NOTE will appear. There is a reason for every one of them.

WARNING

A warning is used to alert the user to hazardous operating and maintenance procedures, practices, conditions, statements, etc. that may result in injury to or DEATH of personnel if not strictly observed.

CAUTION

A caution is used to alert the user to hazardous operating and maintenance procedures, practices, conditions, statements, etc. that may result in damage to or destruction of equipment or of mission effectiveness if not observed.

NOTE

A note is used to inform the user of essential information which is of special interest or importance or will aid the user in performing a job.

GENERAL INFORMATION 0001 00

THIS WORK PACKAGE COVERS:
General Information

SCOPE

Type of Manual: Direct Support and General Support Maintenance.

Model number and equipment name: XT-1410-4 Cross-Drive Transmission.

Purpose of Equipment: Transmission for M88A1 and M88A2 providing forward, reverse and left and right steer.

MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management Systems (TAMMS) Users Manual as contained in the Maintenance Management Update.

Accidents involving injury to personnel or damage to materiel will be reported on DA Form 285 (Accident Reporting) in accordance with AR 385-40.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your XT-1410-4 transmission needs improvement, let us know. Send us an Equipment Improvement Recommendation (EIR). You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put your suggestion on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Tank-automotive and Armament Command, ATTN: AMSTA-QRT, Warren, MI 48397-5000. We will send you a reply.

EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST (EIR/MD) AND EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE SUMMARY (EIR/MS)

The quarterly equipment Improvement Report and Maintenance Digest, TB 43-0001-39 series, contains valuable field information on the equipment covered in this manual. The information in the TB 43-0001-39 series is compiled from some of the Equipment Improvement Reports that you prepared on the vehicles covered in this manual. Many of these articles result from comments, suggestions, and improvement recommendations that you submitted in the EIR program. The TB 43-0001-39 series contains information on equipment improvements, minor alterations, proposed Modification Work Orders (MWOs), warranties (if applicable), actions taken on some of your DA Form 2028s (Recommended Changes to Publications), and advance information on proposed changes that may affect this manual.

The information will help you in doing your job better and will help in keeping you advised of the latest changes.

CORROSION PREVENTION AND CONTROL

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problem with the HRV be reported so that improvements can be made to prevent the problem in the future. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using SF 368 (Product Quality Deficiency Report). Use of keywords such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem. SF 368 should be submitted to the address specified in DA PAM 750-8.

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this manual. If quality of material requirements are not stated in this manual, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the subject equipment.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-6 for procedures on how to destroy the M88A1.

Below are some general guidelines to follow in destruction of equipment to prevent enemy use.

Destruction of the vehicle and equipment, when subject to capture or abandonment in a combat zone, will be undertaken only when such action is necessary in accordance with orders of, or policy established by, the Army commander.

In general, destruction of essential parts, followed by burning, will usually be sufficient to render the vehicle and equipment useless. Time is usually critical.

Materiel must be damaged so that it cannot be restored to usable condition by either repair or cannibalization. If lack of time or personnel prevents destruction of all parts, give priority to destruction of parts hardest to replace. It is important that the same parts be destroyed on all vehicles to prevent construction of one complete vehicle from several damaged ones.

For information and conditions under which destruction of XT-1410-4 Cross-Drive Transmission should be undertaken to prevent enemy use, and for other methods of destruction, refer to TM 9-2350-256-20 and TM 750-244-6.

The procedure outlined below requires the use of demolition materials and explosives, which normally may not be authorized items of issue to the using organization. The issue of these and related materials and conditions under which destruction will be effected are command decisions in each case, according to the tactical situation.

Varying degrees of damage to the armament and other equipment may be expected. Incidental complete destruction of the entire vehicle requires that applicable parts of the procedures in TM 9-2350-256-20 be coordinated for the destruction of the vehicle as listed below.

1. Remove and empty portable fire extinguishers and discharge the fixed fire extinguisher system.
2. Smash all vital elements such as auxiliary power unit, batteries, switches, instruments, hydraulic valves, coupling devices, mechanical transmission, hydraulic pumps, and all accessible engine and transmission components. Slash hydraulic lines and electrical cables and harnesses.
3. Drain the fuel and hydraulic oil tanks or puncture them as near the bottom as possible.
4. For the engine compartment, transmission, tracks, winches and boom, prepare eleven 2-pound demolition charges, using 1-pound TNT blocks or equivalent together with the necessary detonating cord to make up the required charges. Place the charges as follows:
   - Set the first charge on the accessory drive housing at the forward end of the engine.
   - Set the second and third charges on the engine, one on the left side and one on the right side.
   - Set the fourth charge between the engine and the transmission.
   - Set the fifth and sixth charges on the track driving sprockets, one on the left side and one on the right side.
   - Set the seventh charge on the main winch gear case.
   - Set the eighth and ninth charges on the base of the hoisting boom at the boom crank arms, one on the left side and one on the right side.
   - Set the tenth and eleventh charges on the hoisting boom stayline crankarms, one on the left side and one on the right side.
   - Connect all eleven charges for simultaneous detonation with detonating cord.
5. Provide for dual priming to minimize the possibility of a misfire. For complete details on the use of demolition materials and methods of priming and detonating demolition charges, refer to FM 5-250. Training and careful planning are essential. The danger area is estimated to be 500 yards; elapsed time is approximately 10 minutes.

PREPARATION FOR STORAGE OR SHIPMENT

Basic requirements for administrative storage are covered in TM 740–90–1. When materiel is inactivated for a limited time (not to exceed 90 days), it will be processed in accordance with TM 740–90–1.

The preferred storage site for the vehicle is in a dry, covered shed. When it is necessary to store materiel outdoors, to protect it from the elements storage shall be prescribed in SB–740–98–1 and TM 743–200.

WARRANTY INFORMATION

No particular warranty specifically pertains to the XT–1410–4 Cross–Drive Transmission.

NOMENCLATURE CROSS–REFERENCE LIST

Nomenclature in this manual was chosen in accordance with the terms used for provisioning as they appear in the Repair Parts and Special Tools List (RPSTL) and Maintenance Allocation Chart (MAC) TM 9–2350–256–20. A few tools and components are, however, referred to by names more common than those in the RPSTL. In many cases it is a shorter name for the same component.

OFFICIAL PROVISIONING NOMENCLATURE	MORE COMMON NAME
Gauge rod	Dipstick, bayonet gauge
Safety wire	Lockwire
Socket head screw key	Hex key

LIST OF ABBREVIATIONS

KPA	Kilopascals
PSI	Pounds per Square Inch
AEPS	Army Electronic Product Support
MWO	Modification Work Order
EIR	Equipment Improvement Report
EIR/MS	Equipment Improvement Report and Maintenance Summary
EIR/MD	Equipment Improvement Report and Maintenance Digest
TAMMS	The Army Maintenance Management Systems
CPC	Corrosion Prevention and Control
HRV	Heavy Recovery Vehicle
MAC	Maintenance Allocation Chart
RPSTL	Repair Parts and Special Tools List
QDR	Quality Deficiency Report
MTOE	Modified Table of Organization and Equipment
CTA	Certified Table of Allowances
APPROX	Approximate
GAL	Gallon
RPM	Revolutions per Minute
LB – FT	Pound–Feet

LIST OF ABBREVIATIONS - Continued

FT	Foot/Feet
LB - IN	Pounds-Inches
BORE O.D.	Bore Outer Diameter
BORE I.D.	Bore Inner Diameter
MIN	Minimum
UNC	Unified Coarse
UNF	Unified Fine

QUALITY ASSURANCE (QA)

No particular quality assurance manual pertains specifically to the XT-1410-4 Cross-Drive Transmission.

Defective material received through the supply system should be reported on Quality Deficiency Report (QDR) SF 368.

Instructions for preparing QDRs are provided in AR 702-7, Reporting of Quality Deficiency Data. QDRs should be mailed directly to:

Commander
US Army Tank-automotive and Armament Command
ATTN: AMSTA QTR
Warren, MI 48397-5000

A reply will be furnished directly to you.

COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970 or CTA 8-100, as applicable to your unit.

The tool kit (box) assigned to the mechanic (on a 1 per mechanic-by-MOS basis) shall be identified in the individual maintenance paragraphs by nomenclature, item number, and work package. No tool in the kit shall be further identified. Other tools required for performance of all tasks for the maintenance levels covered in the manual shall be identified in the setup and shall be referenced to the Tool Identification List, WP 0088 00. "Other tools" includes tools which are part of components of shop sets authorized to sections/teams; tools authorized by RPSTL and CTA 50-970; special and fabricated tools and items of TMDE.

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools and equipment listed and illustrated in TM 9-2350-215-34P are the only special tools and equipment necessary to perform operations described in this manual. TM 9-2350-215-34P is the authority for requisitioning special tools and equipment for supporting maintenance use. All special tools required in this technical manual are listed in WP 0088 00 of this manual. Fabricated tools are identified in the initial setup; manufacturing instructions for fabricated tools are found in WP 0089 00.

REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list covering Direct Support and General Support maintenance for this equipment (TM 9-2350-215-34P). All mandatory replacement parts identified in the initial setup are listed in WP 0087 00 of this manual.

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END OF WORK PACKAGE

CHAPTER 1

DESCRIPTION AND THEORY OF OPERATION

EQUIPMENT DESCRIPTION AND DATA 0002 00

THIS WORK PACKAGE COVERS:
Equipment Description and Data

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

The XT-1410-4 transmission is the X-type. This means that the drive is delivered to left and right outputs. The transmission includes a torque converter with automatic lockup clutch, three forward and one reverse range gear and clutch groups, a cross shaft and bevel drive gears, two steer clutches and planetary gear sets, steer drive gearing and two output reduction gear assemblies with brakes. Three forward speeds and one reverse speed are selected manually.

HYDRAULIC SYSTEM

The hydraulic system, because of its importance to the operation of the transmission, should be studied carefully and understood. There are eight hydraulic system schematic illustrations which show the various oil circuits and positions of valves and other moving components in WP 0005 00.

These schematic diagrams parallel the torque path schematic views in WP 0005 00. The hydraulic schematic views illustrate what happens hydraulically, while the torque schematic diagrams illustrate what happens mechanically.

The complete hydraulic system is shown in WP 0005 00**.**

Torque Converter and Lockup Drive. Drive from the vehicle engine to the transmission range gearing is either hydraulic (torque converter) or mechanical (lockup) clutch engaged. Lockup drive is obtainable only when transmission is operating in intermediate and high range.

OIL LEVELS

The hydraulic system is designed so that after the vehicle has been operated for a short time, two distinct oil levels are established in the transmission. One oil level is in the output gear compartment and is comparatively low (WP 0005 00). The other is in the transmission sump. The purpose of having two oil levels is to provide sufficient volume of oil in reserve while maintaining the most efficient level of oil in the operating section of the transmission.

Two levels exist because air, as well as oil, is constantly being delivered to the output gear compartment of the transmission. This creates a constant air pressure which acts upon the oil in the output gear compartment. The air comes from two sources: from the scavenge pump, which pumps a mixture of oil and air from the converter housing, and from the brake coolant pump, which pumps air during periods when the brakes are released. The air accumulates above the oil in the gear compartment and forces the oil level down and through a passage in a wall separating the gear compartment from the oil sump. When the oil reaches its proper level, excess air escapes into the sump and returns to the scavenge pump.

DIFFERENCES BETWEEN MODELS

This TM covers XT-1410-4 Transmission only.

TRANSMISSION OIL

The use of the proper oil and attention to keeping the oil clean are of major importance. The proper oil level must be maintained in the transmission to obtain maximum performance. Check the oil level regularly. Clean filters at specified intervals. Be very careful that no foreign matter enters the transmission at any time. When changing or adding oil, refer to Oil Specification and Lubrication Order (LO 9-2350-256-12).

END OF WORK PACKAGE

LOCATIONS AND DESCRIPTION 0003 00

THIS WORK PACKAGE COVERS:

Locations and Description of Major Components

LOCATIONS AND DESCRIPTION OF MAJOR COMPONENTS.

The XT-1410-4 transmission contains the following major components. They are keyed to Major Transmission Components. The transmission consists of:

Torque Converter Housing. The torque converter housing is cast iron and is the front member of the transmission. It has an engine flange at the front and its rear surfaces bolts to the transmission housing. It houses and supports the lockup clutch, torque converter, input-pump drive gears, and input-pressure and scavenge pumps. Its rear side supports the high and intermediate range clutches. Its top provides for mounting the oil filters, steer pressure regulating valve, and the cooler bypass, lubrication, and converter pressure regulating valve, and the cooler bypass, lubrication, and converter pressure regulator valve assembly.

Transmission Housing. The transmission housing is cast iron. It houses and supports the range gearing, low and reverse range clutches, output bevel gears, steer gears, and drive shaft. The transmission services both oil sump and oil reservoir. The oil sump is the area in which oil is maintained at the most efficient level for transmission operation. The reservoir is an area separated from the sump and serving, as its name implies, to hold a reservoir of oil. The front of the housing provides the mounting surface for the torque converter housing. The top surface provides for mounting main and steer control valves and inspection and access cover. The side of the housing provides for mounting the right and left steer clutch housing assemblies.

Steer Clutch Housing Assemblies. Each steer clutch consists of:

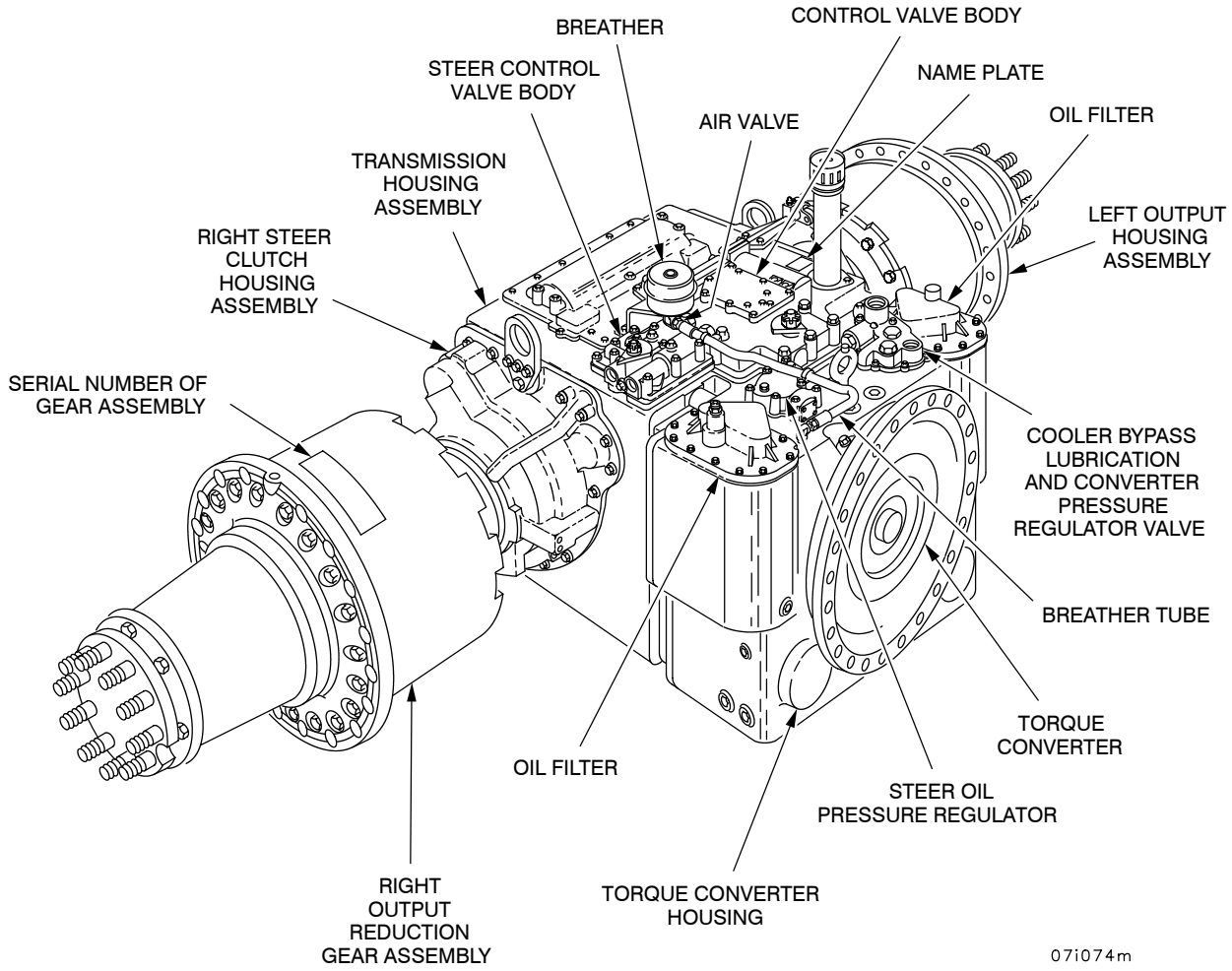
Internal splined clutch plates
External splined clutch plates piston
Piston
Clutch apply ring
Pressure plate
Drive gear
Hub
Housing assembly

The housing mounts onto the sides of the transmission housing. The transmission housings also serve as a mounting for the output reduction gear assemblies:

Coupling assembly
Sun gear
Carrier assembly
Ring gear
Output shaft
Damper assembly
Internal splined brake plates
External splined brake plates
Brake movable cam ring assembly
Saddle
Brake housing
Output reduction housing

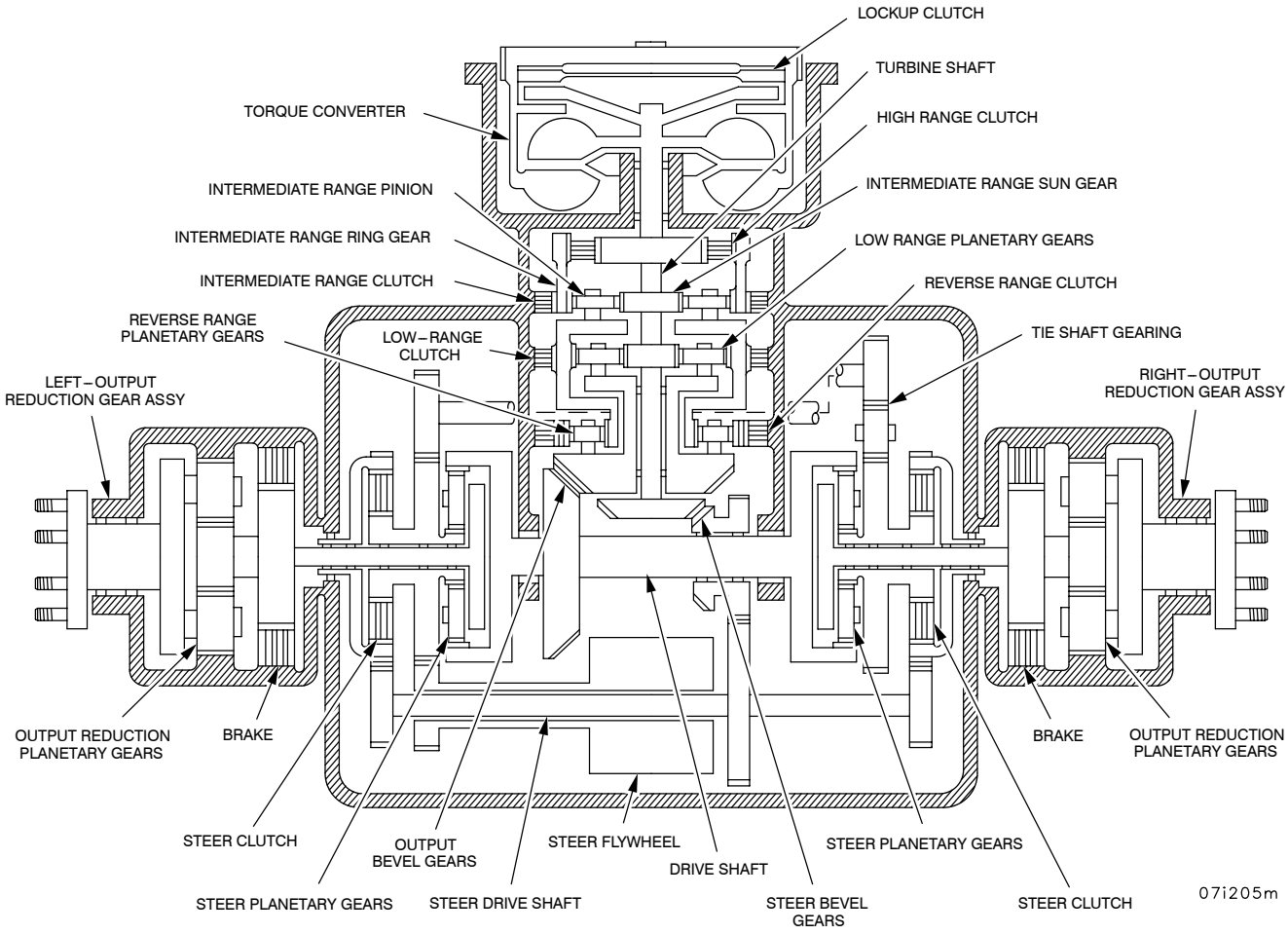
LOCATIONS AND DESCRIPTION – CONTINUED 0003 00

LOCATIONS AND DESCRIPTION OF MAJOR COMPONENTS – Continued



Major External Components

LOCATIONS AND DESCRIPTION OF MAJOR COMPONENTS – Continued



Major Internal Components

END OF WORK PACKAGE

EQUIPMENT DATA 0004 00

THIS WORK PACKAGE COVERS:
XT-1410-4 Data

XT-1410-4

Manufacturer ..... Detroit Diesel Allison Division, GMC
Model (transmission) XT-1410-4
Type (transmission) ..... X-type, torque converter, lockup clutch, Planetary gear, manual shift
Weight, dry:
- Total ..... 6611 lbs. (approx.)
- Center section ..... 4125 lbs.
- Output reduction gear assemblies ..... 2486 lbs. (1243 lbs. each)

Overall dimension (center sections and output assemblies):
- Length ..... 41.17 inches (approx.)
- Height ..... 31.30 inches
- Width (between output reduction gear assembly mountings) ..... 74.00 inches
- Width (between back sprocket hub mounting faces) 106.37

Suspension ..... Front bolts to engine; output reduction gear assemblies' port to hull
Model or Serial Number locations:
- Output reduction gearing ..... at top of brake (left and right) housings

Rating:
- Maximum input torque ..... 1725 lb-ft
- Maximum input speed ..... 2400 rpm
- Maximum net input horsepower 800

Rotation input (viewing front of transmission) clockwise output (viewing right of transmission):
- Forward range ..... Clockwise
- Reverse range ..... Counterclockwise

Drive ranges (manually selected) ..... Low, Intermediate, High, and Reverse
Torque converter ..... 4-element, single stage, poly-phase, with automatic lockup clutch
Control (range selection, steering, and brakes):
- External ..... Mechanical
- Internal (except brakes) ..... Hydraulic

Drive range control ..... Multiple disk clutch
Clutches (engaged) ..... Oil pressure
Clutches (released) ..... Spring pressure
Brakes (service and parking) ..... Multiplate, wet, mechanically applied sintered bronze on steel
Gearing (constant mesh throughout):
- Range gearing ..... Straight-cut spur, planetary type
- Drive bevel ..... Spiral bevel
- Steer ..... Straight-cut spur
- Output reduction ..... Straight-cut spur, planetary type

Torque multiplication ratios:
- Torque converter (maximum at stall) 3.7:1

Range gear:
- Low range 4.57:1
- Intermediate range 2.14:1
- High range 1.00:1
- Reverse range 4.95:1

Drive bevel gear ratio 1.088:1
Steer planetary ratio 1.35:1
Output reduction gear ratio 4.63:1
Total torque ratio range:
- Low range stall 115.00:1
- High range lockup 6.80:1

EQUIPMENT DATE - CONTINUED 0004 00

XT-1410-4 - Continued

Steering:
- Type . . . . . Regenerative, double-differential, pivot in neutral

Ratios (one output to opposite output):
- High range 1.25:1
- Intermediate range 1.629:1
- Low range 3.08:1

Cooling . . . . . Oil

Oil Pumps:
- Number . . . . . 6 (in three assemblies)
- Type . . . . . Spur gear, positive displacement

Oil System:
- Capacity, initial fill . . . . . 27 US gal.
- Capacity, refill . . . . . 17 US gal.
- Oil specification . . . . . CAT TD TO Grade 10
- Filters (four elements) . . . . . Convoluted, replaceable

Control Pressures (1000 rpm input, brakes applied):
- Main - in neutral: high and intermediate ranges . . . . . 120 to 180 psi
- Main - in low and reverse ranges . . . . . 275 to 380 psi
- Low range clutch apply . . . . . 275 to 380 psi
- Intermediate range clutch apply . . . . . 120 to 180 psi
- High range clutch apply . . . . . 120 to 180 psi
- Lockup clutch apply . . . . . 120 to 180 psi
- Full steer clutch apply . . . . . 105 to 120 psi
- Brake cooling supply . . . . . not regulated by psi

Lubrication pressure . . . . . 5 to 30 psi

Governor pressure at 2000 rpm of turbine . . . . . 30 to 35 psi

Downshift inhibitor limits (vehicle rpm):
- High to intermediate speed . . . . . 1150 to 1400 rpm
- Low to reverse speed . . . . . 1000 to 1400 rpm

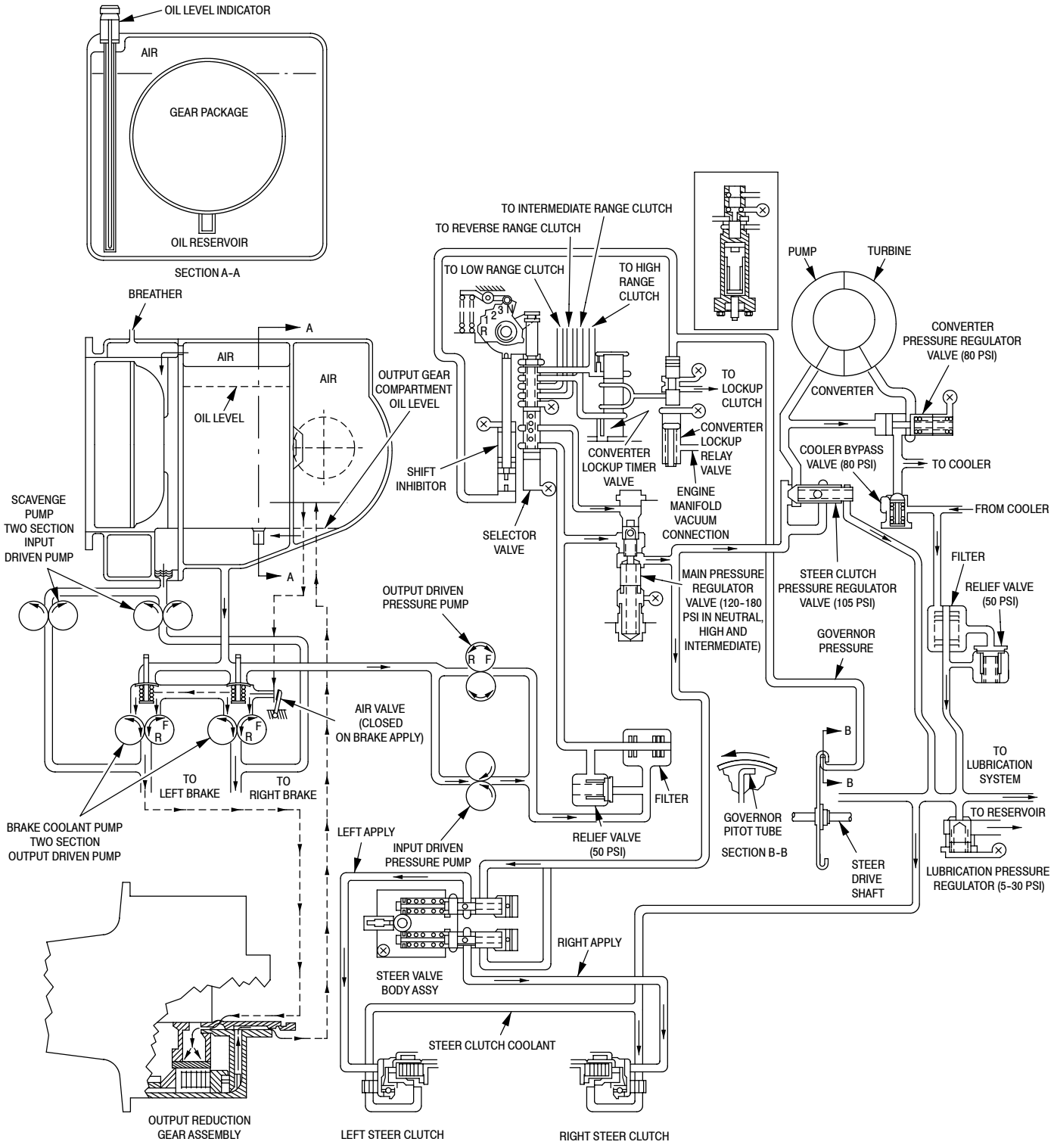
END OF WORK PACKAGE

THEORY OF OPERATION 0005 00

THIS WORK PACKAGE COVERS:

Equipment Operation and Description

HYDRAULIC SYSTEM



Hydraulic System Schematic View

07i207m

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Neutral Converter Drive, No Steer

NOTE

Refer to Torque Path in Neutral Converter Drive, No Steer Schematic View for the torque path through the transmission.

Normal oil flow lubricating the pump drive gear train accumulates in the lower cavities of the torque converter housing when the engine is running and the input scavenge pump and oil pressure are in operation. The two-section scavenge pump picks up the oil (along with air) and pumps it to the output reduction gear where it lubricates the brakes and gearing. The same oil and air then return to the transmission at the output gear compartment.

Oil from the sump lubricates the brakes coolant pump, output-driven pressure pump, and the input-driven pressure pump. Only the input-driven pressure pump and scavenge pump are rotating while the vehicle is not moving, so only the input-pressure pump is supplying pressure.

Oil pumped by the input-driven pump flows through a pair of filters to the main pressure regulator valve and to the range selector valve. There is a relief valve parallel to the filters, which opens only if the filters are clogged.

The main pressure regulator valve moves down to a position in which oil pressure into the regulator balances the spring pressure pushing upwards on the valve. A passage connecting the range selector valve at the top of the main pressure regulator valve supplies additional main pressure to act upon the valve and push it downward. This result in a lower main pressure in neutral (and intermediate and high ranges). In neutral, main pressure is blocked at the range selector valve except for the passage to the top of the main pressure regulator valve mentioned above.

Excess oil from the main pressure regulator valves flow to the steer clutch pressure regulator valve and to the steer valves. The steer clutch pressure regulator valve moves to the right and permits oil flow to the torque converter and, when pump volume is sufficient, through bypass ports to the lubrication system. In the no steer position, no oil passes through the steer valves.

Oil to the torque converter branches off to the right and actuates the converter pressure regulator valve. This valve regulates the oil flow to the converter at 80 psi. Any excess oil bypasses the converter and is directed by the converter pressure regulator valve to the oil cooler. The remainder of the oil flows through the converter and then to the cooler circuit. A relief valve parallels the cooler circuit but opens only if the cooler is clogged or cannot handle the volume of flow directed to it.

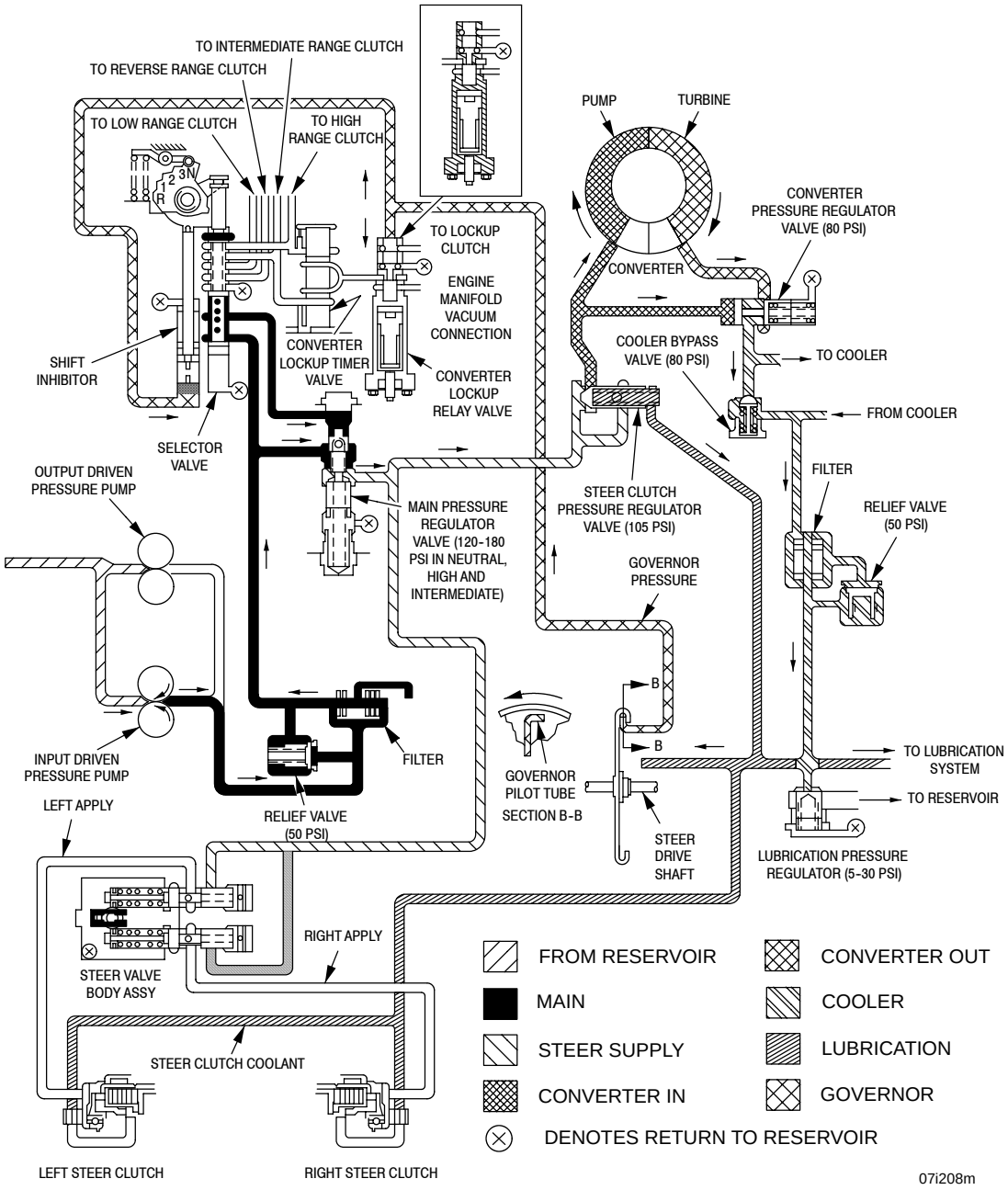
From the cooler, oil passes through a pair of filters and to the lubrication regulator valve. A relief valve parallels this line but opens only if the filter is clogged. Excess oil beyond that required to maintain lubrication pressure returns to transmission reservoir.

In addition to supplying lubricating oil to the steer clutch lubrication valve and other points in the transmission, the lubrication circuit supplies the governor with oil. The pilot type (or fluid velocity type) governor produces a pressure which is proportional to the speed of a rotating, oil filled ring. This pressure actuates the shift inhibitor and lockup relay valve. However, in neutral operation, these components have no function.

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Neutral Converter Drive, No Steer – Continued

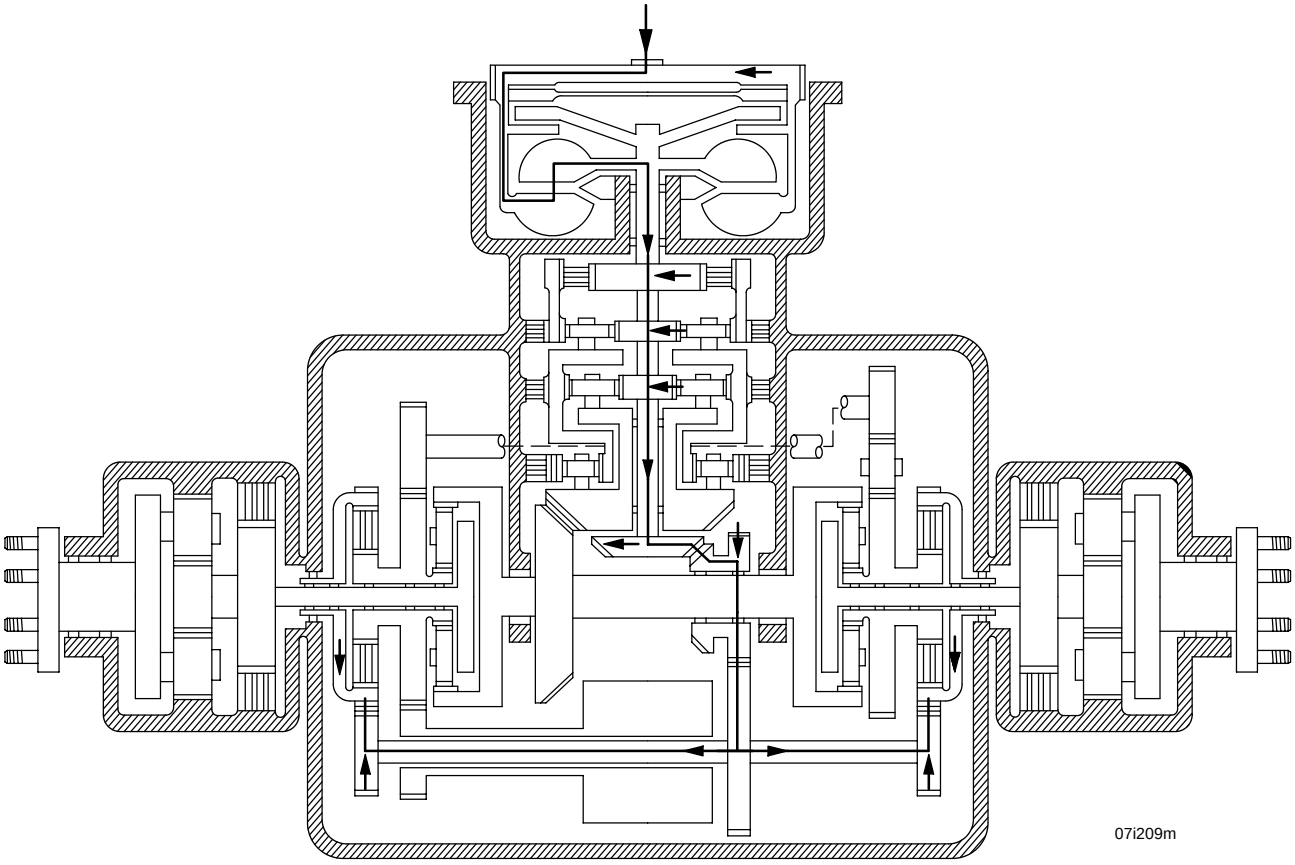


Hydraulic System, Neutral, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Neutral Converter Drive, No Steer – Continued



Torque Path in Neutral, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Low Range, Converter Drive, No Steer

NOTE

Refer to Torque Path in Neutral Converter Drive, No Steer Schematic View for the torque path through the transmission.

When in low range, converter drive, no steer, the hydraulic system functions as described above except that the following additional circuits are opened (or closed) to the action of the oil flow and pressure:

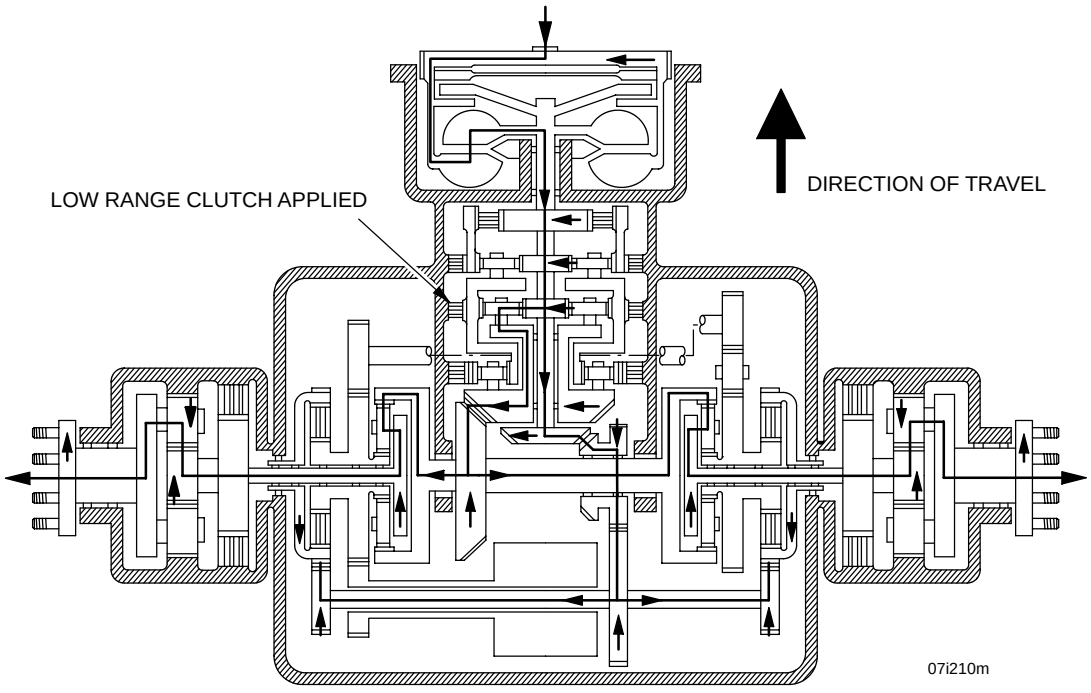
The range selector valve directs oil to the low range clutch.
The output-driven brake coolant and pressure pump operates, since the vehicle is moving in a forward direction.
With the range selector valve in the low range position, the line from the range selector valve to the top of the main pressure regulator valve is exhausted.
Oil pressure from the range selector valve applies the low range clutch.

The output-driven brake coolant pump draws air when the brakes are released. It pumps the air through the output reduction gear assemblies and then to the transmission gear compartment. The output-driven pressure pump assists the input-driven pump in supplying oil to the system.

When the range selector valve is in the low range position, the passage between the selector valve and the top of the main pressure regulator valve is open to the exhaust. With no pressure acting on the top of the main pressure regulator valve, the valve does move. This results in increased main pressure.

Governor pressure, if output speed is great enough, will raise the shift inhibitor valve. This will push the shift inhibitor into the path of the lugs on the range selector inner lever. Refer to Equipment Data Downshift Inhibitor limits. In this position, the inhibitor prevents the range from being shifted manually to reverse range. However, upshifts to intermediate or high range, or a shift to neutral, can be made.

Governor pressure will actuate the lockup relay valve. However, since no pressure is available to lockup in low range, the lockup relay valve has no function.

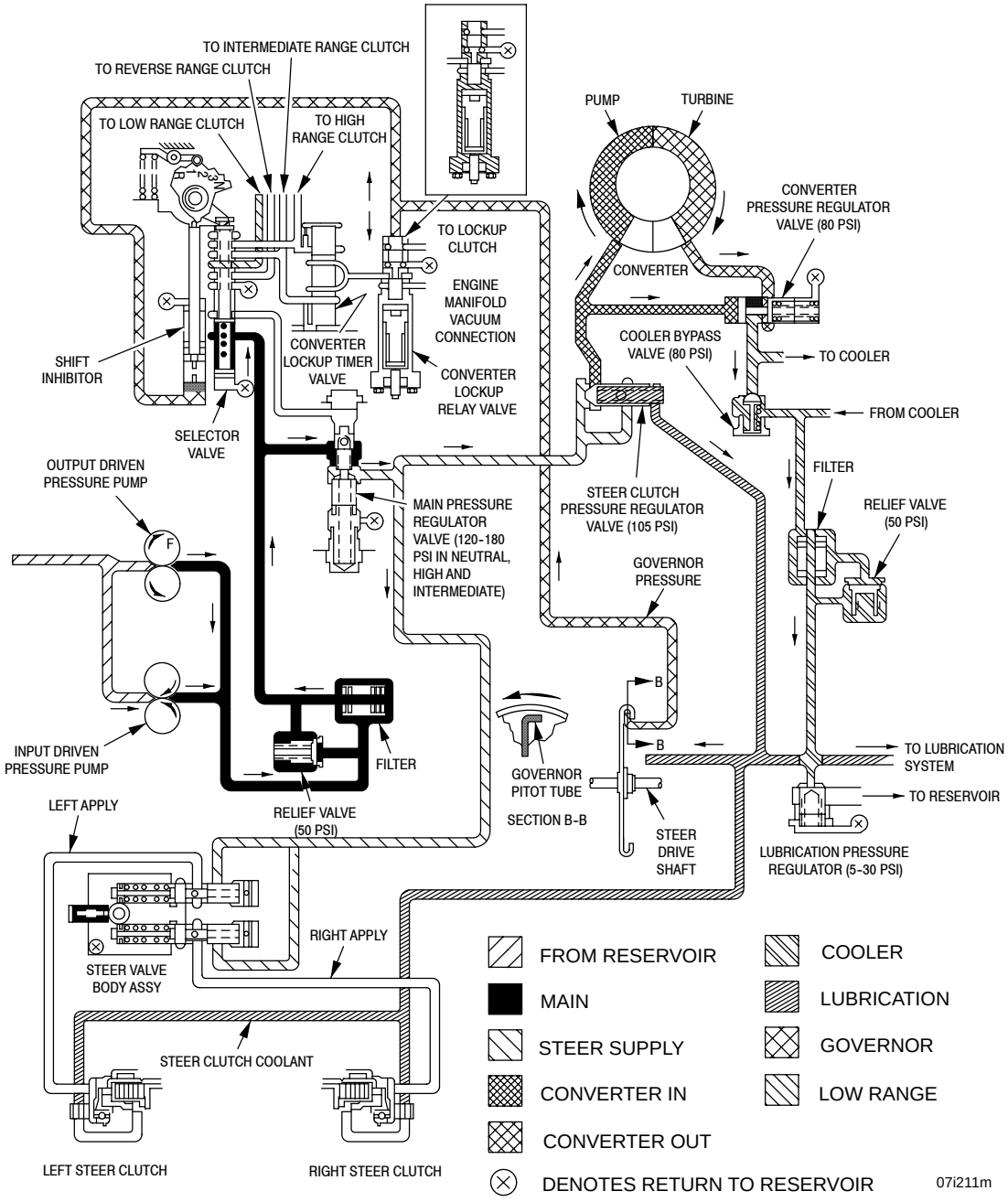


Torque Path in Low Range, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System In Low Range, Converter Drive, No Steer – Continued



Hydraulic System, Low Range, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Intermediate Range, Lockup Drive, No Steer

NOTE

Refer to Torque Path in Intermediate Range, Lockup Drive, No Steer Schematic View for the torque path through the transmission.

When in high range, lockup drive, left steer, the system functions as described in this work package except that the following additional circuits are opened (or closed) to the action of oil flow and pressure:

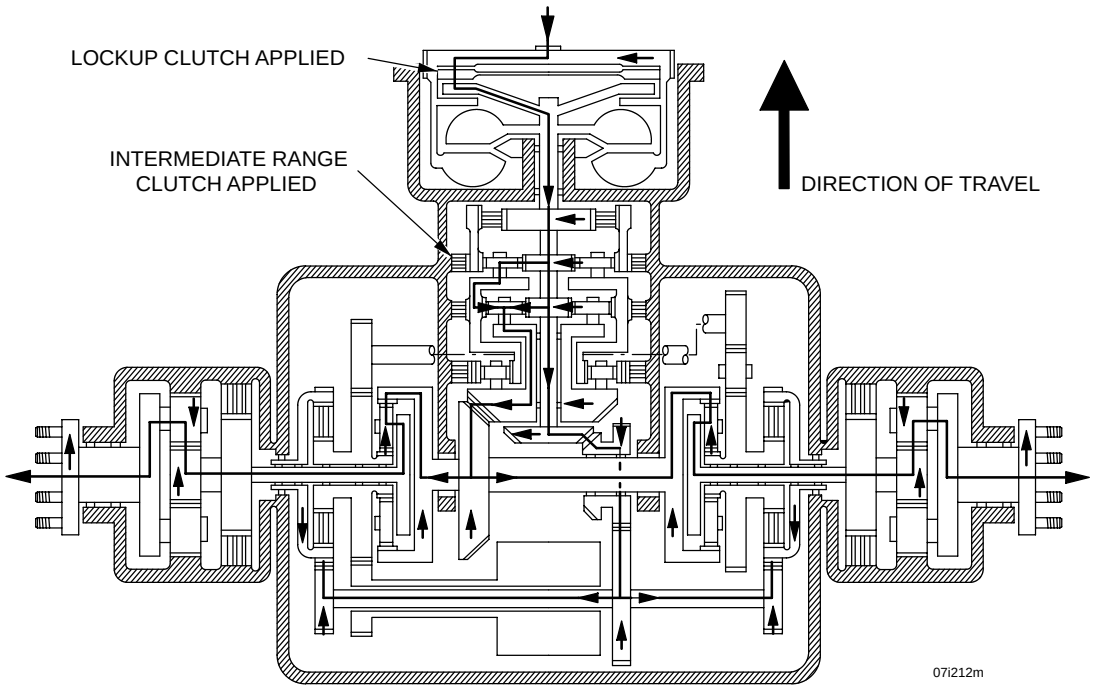
The range selector valve directs pressure to the intermediate range clutch, through the converter lockup timer and relay valves, and into the lockup clutch.

When the vehicle is moving forward the output-driven brake coolant and pressure pump operates.

Oil pressure from the range selector valve applies the intermediate range clutch. The output-driven brake coolant pump draws air when brakes are released. The air is pumped through the output reduction gear assemblies into the transmission gear compartment. The output-driven pressure pump assists the input-driven pump in supplying oil to the system.

A throttle controlled lever pivots on a lug at the top of the relay valve cover. When the engine throttle opens, the plunger compresses a spring against a relay valve. When the vehicle is operating in intermediate or high range, the relay valve controls the engagement and release of the lockup clutch. Governor pressure is exerted against the end of the valve. When governor pressure is great enough to overcome the force of the spring, the lockup clutch engages. The position of the throttle will determine the vehicle speed at which lockup occurs. At closed throttle, lockup will occur at a lower speed; at open throttle, lockup will occur at a higher speed.

In intermediate range, the shift inhibitor will prevent a downshift to low range (or reverse range) until vehicle speed is reduced to a safe level.

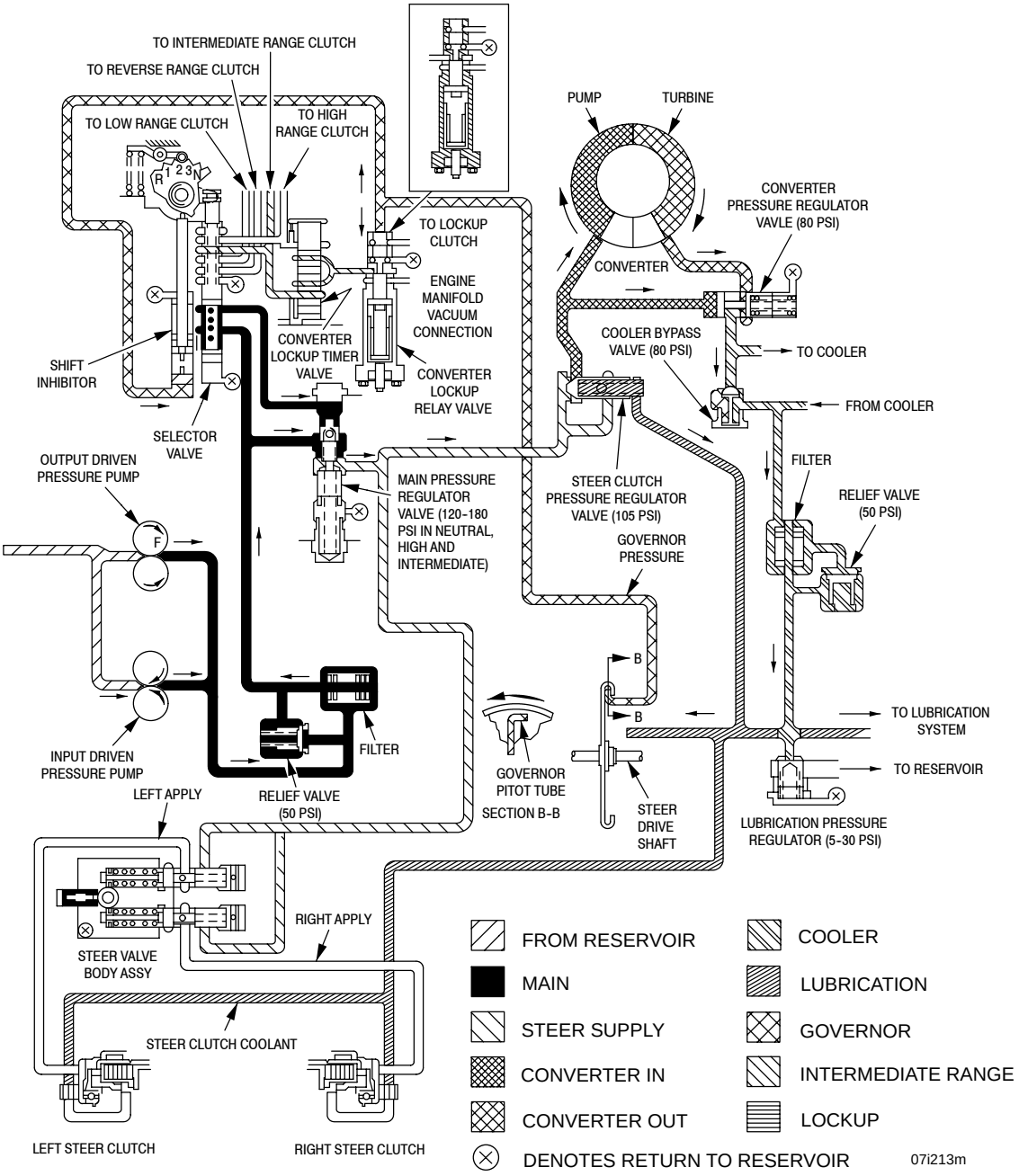


Torque Path in Intermediate Range, Lockup Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System In Intermediate Range, Lockup Drive, No Steer – Continued



Hydraulic System, Intermediate Range, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

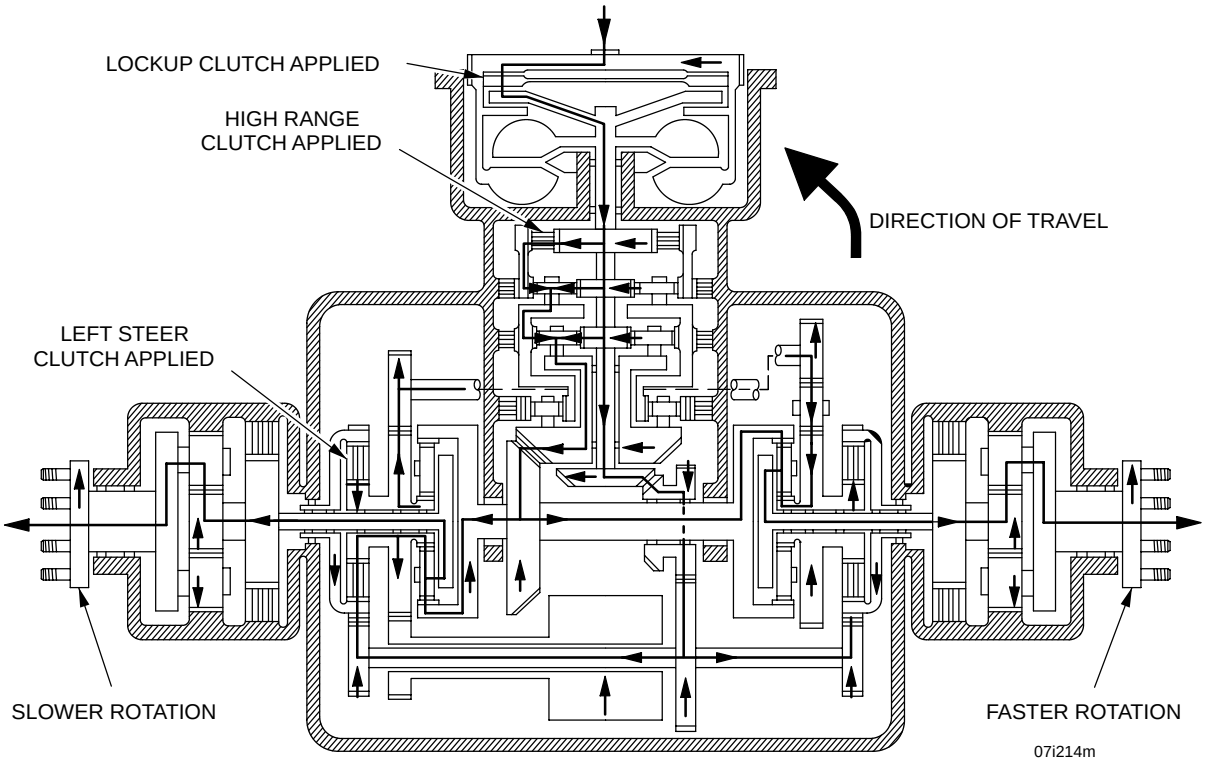
Action of Hydraulic System in High Range, Lockup Drive, Left Steer

NOTE

Refer to Torque Path in High Range, Left Steer Schematic View for the torque path through the transmission.

When in high range, lockup drive, left steer, the system is the same as described for intermediate range operation, above. The only difference is that the range selector valve directs pressure to the high range clutch instead of the intermediate range clutch. The converter lockup valve is controlled by throttle position. Refer to description in intermediate range operation.

In high range, the shift inhibitor will prevent a downshift to intermediate range (or low and reverse range) until vehicle speed is reduced to a safe level.

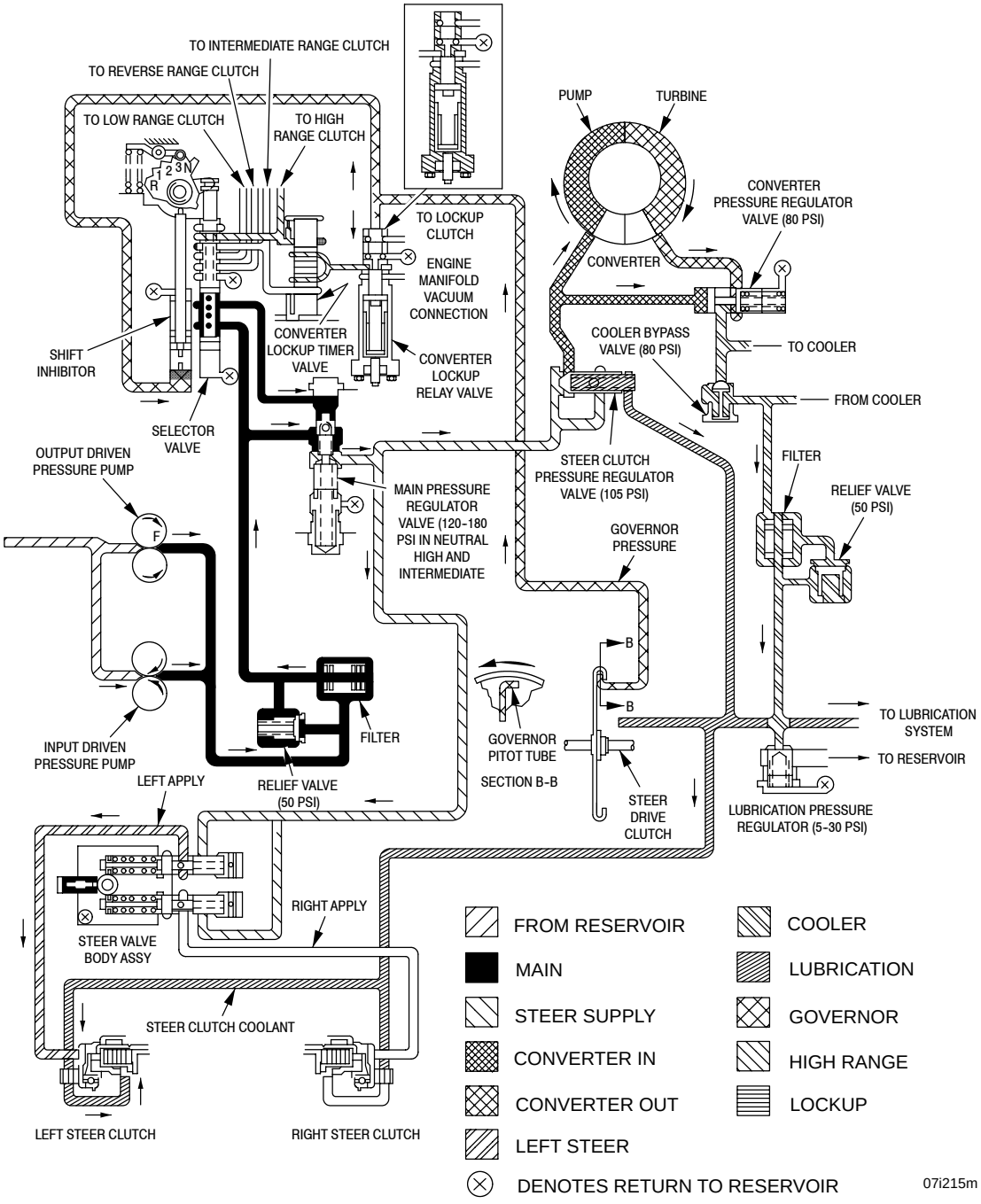


Torque Path in High Range, Lockup Drive, Left Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in High Range, Lockup Drive, Left Steer – Continued



Hydraulic System, High Range, Left Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Reverse Range, Converter Drive, No Steer

NOTE

Refer to Torque Path in Reverse Range, Converter Drive, No Steer Schematic View and Hydraulic System, Reverse Range, No Steer Schematic View.

In reverse range, the hydraulic system functions as described in neutral range operation. The only differences are:

The reverse range clutch is applied.

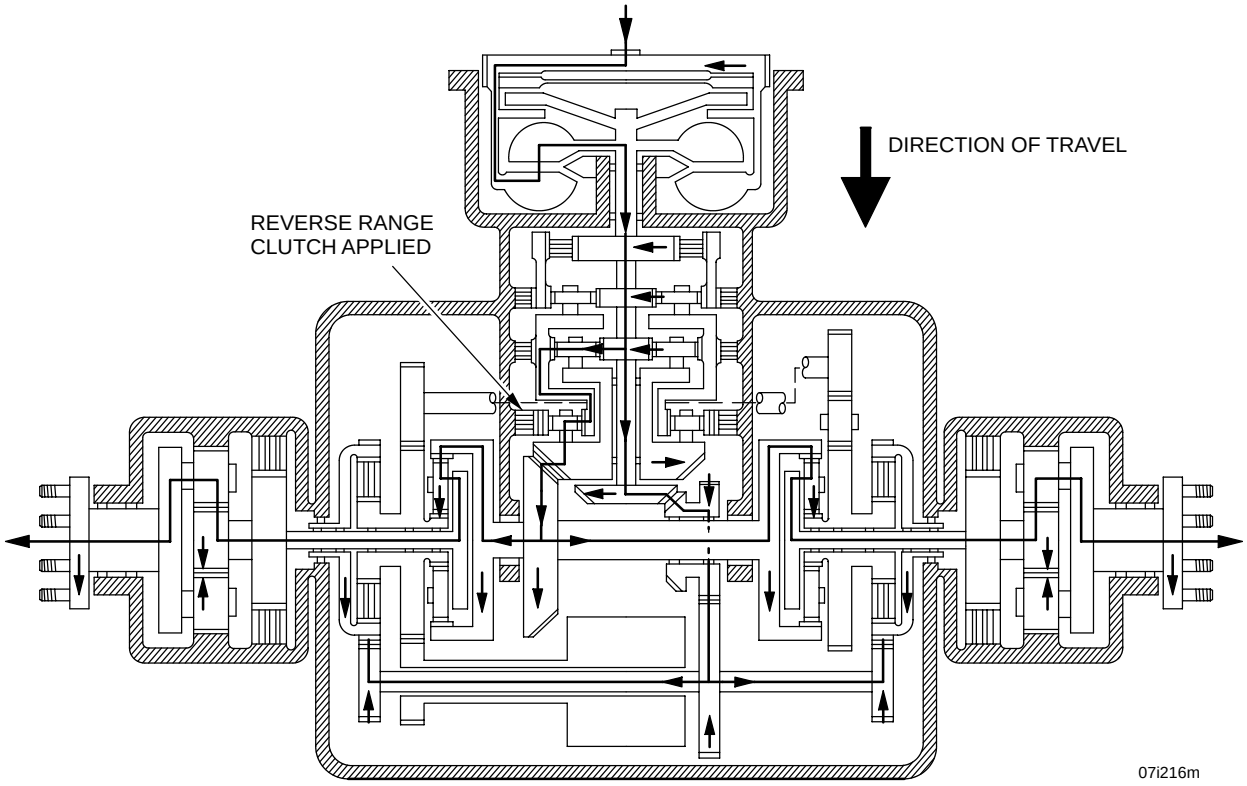
The out pressure and brake coolant pumps operate in a reverse direction. The oil passage from the range selector to the top of the main pressure regulator valve is exhausted.

When the range selector valve directs pressure to the reverse range clutch, lockup cannot occur. Therefore, although the throttle position may actuate the lockup relay valve, the valve will have no function.

The brake coolant pump reverse rotation draws air (or air/oil mixture) from the lines leading to the output reduction gear assemblies. The air or mixture is discharged at the air valve, which is open when brakes are released. This loss is negligible.

The output-driven pressure pump reverse rotation reallocates a small portion of the oil pumped by the input-driven pump.

When the line at the top of the main pressure regulator valve is exhausted, main pressure is higher, as it is during low range. The shift inhibitor will prevent a shift to any other range, above certain output speeds. Refer to Downshift Inhibitor Limits.

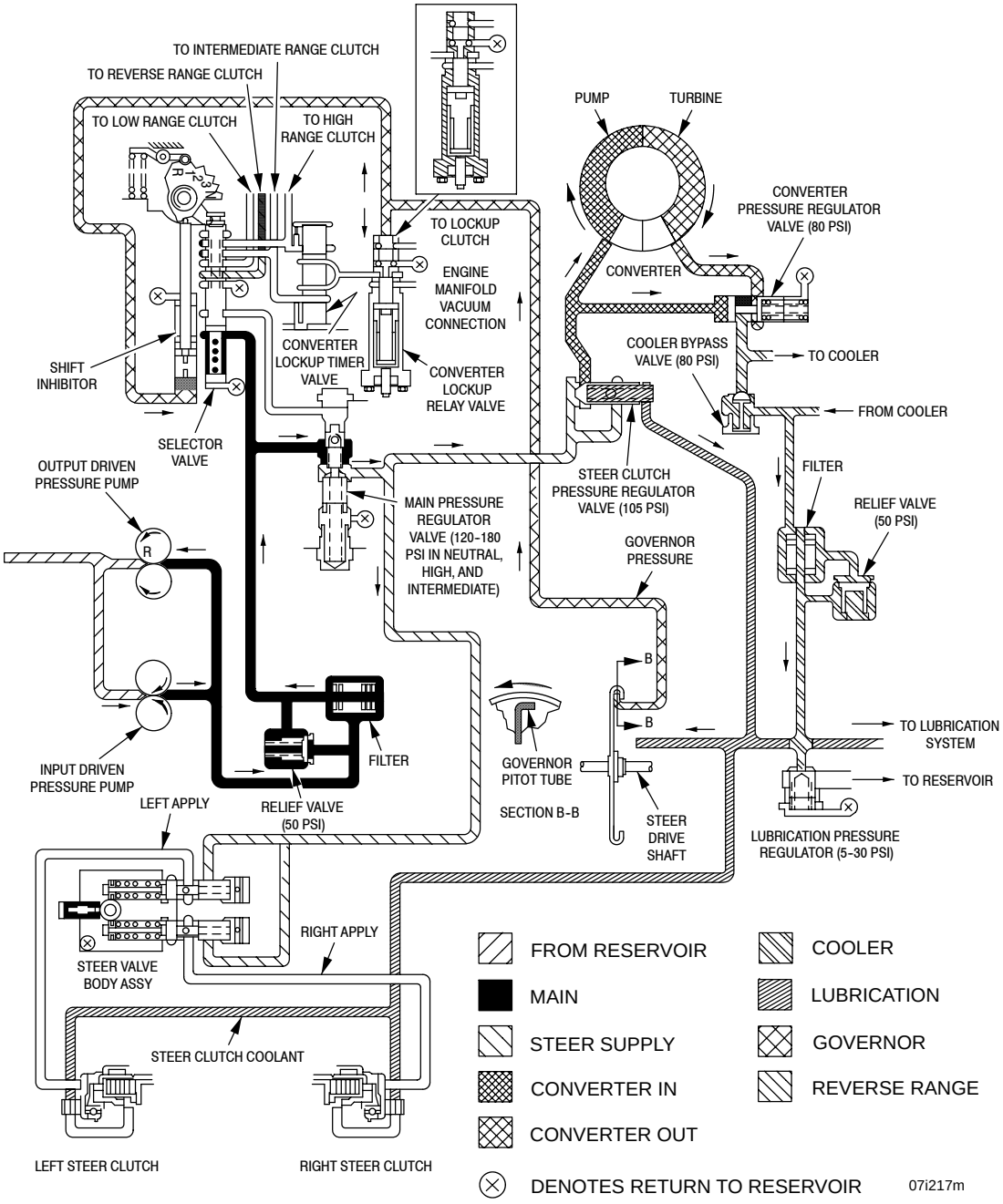


Torque Path in Reverse Range, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Reverse Range, Converter Drive, No Steer – Continued



Hydraulic System, Reverse Range, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Neutral, Converter Drive, Right Steer

NOTE

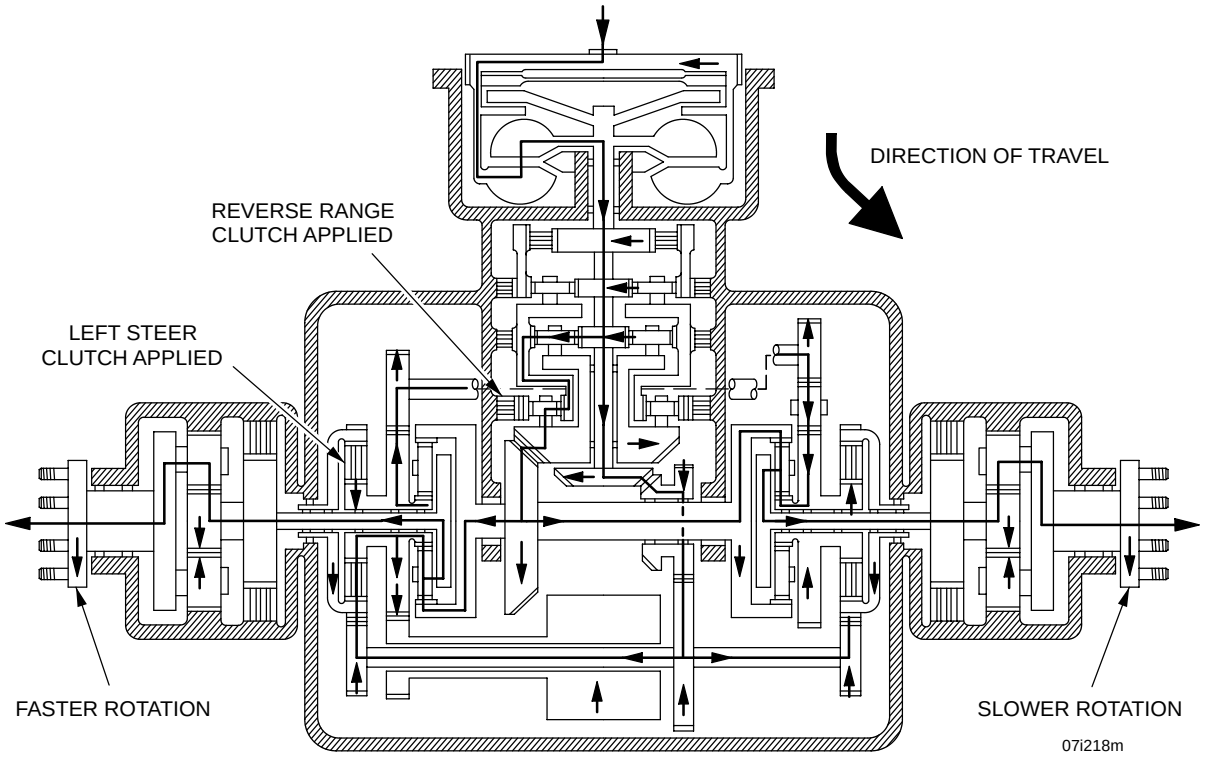
Refer to Torque Path in Reverse Range, Converter Drive, Right Steer Schematic View for torque path through the transmission.

The description for neutral range operation applies to this paragraph. The only differences are that pressure is not blocked at the steer control valve, and the lubrication pressure is not blocked at the right steer clutch.

At the steer control valve, the right (lower) valve moves to the right, while the left (upper) valve moves to the left. The movement of the left valve to the left has no effect. Steer pressure remains blocked at that point. However, the movement of the right valve to the right allows pressure to be directed to the right steer clutch. When pressure enters the central area of the steer valve, it flows to the area at the right end of the valve. This pressure opposes rightward movement, regulating the pressure flowing to the right steer clutch. Thus a limited rightward movement of the steer control will result in a limited steer apply pressure. Further movement will increase the applied pressure.

Partial to full steer is available. The degree of steer is proportional to the movement of the vehicle steer control. In partial steer, the steer clutch is slipping but operating. In full steer, clutch is completely applied and there is no slippage.

When the right steer clutch is applied, the right steer clutch lubrication valve opens. This permits lubricating oil to flow over steer clutch plates.

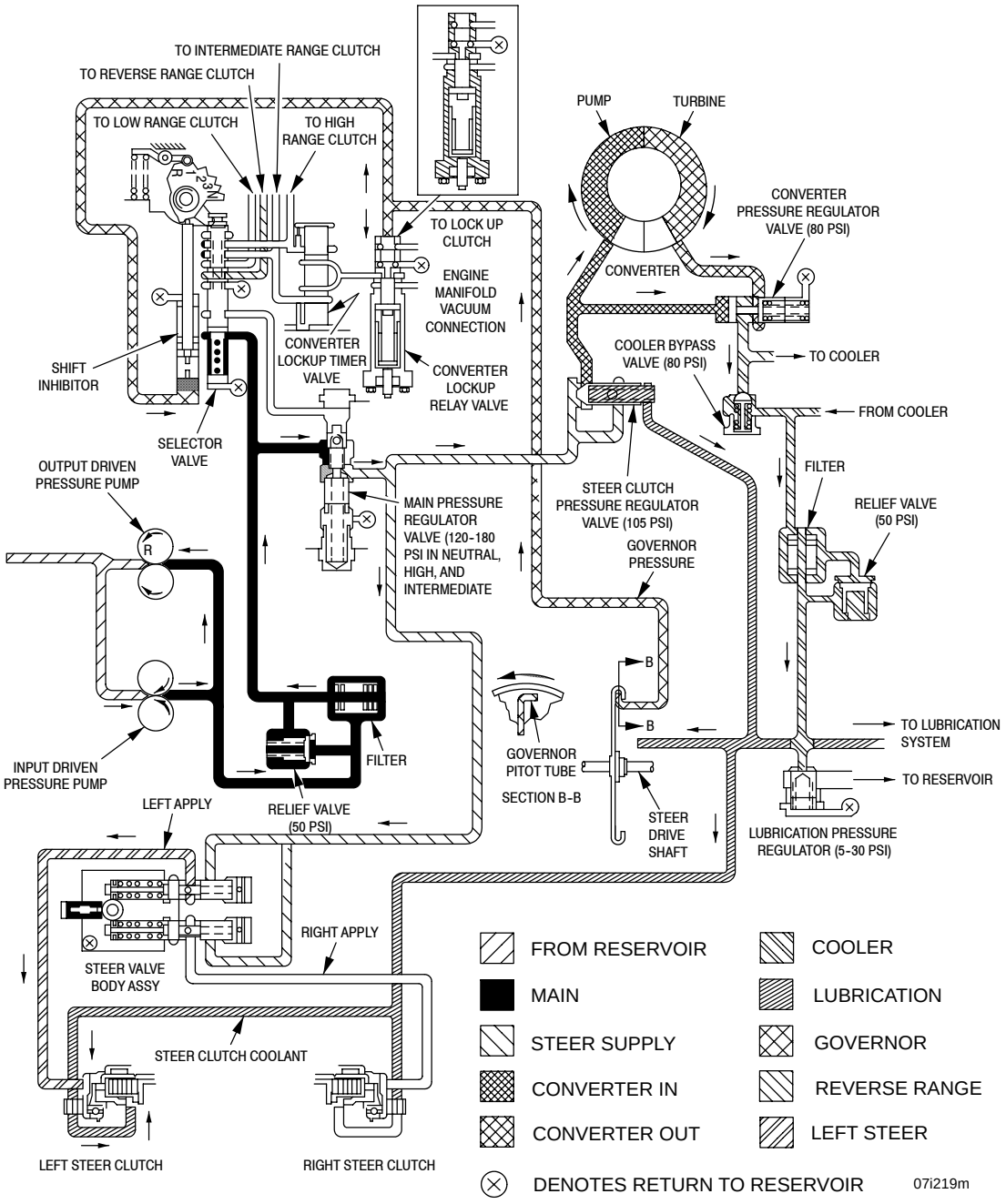


Torque Path in Reverse Range, Converter Drive, Right Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Neutral, Converter Drive, Right Steer – Continued



Hydraulic System, Reverse Range, Right Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

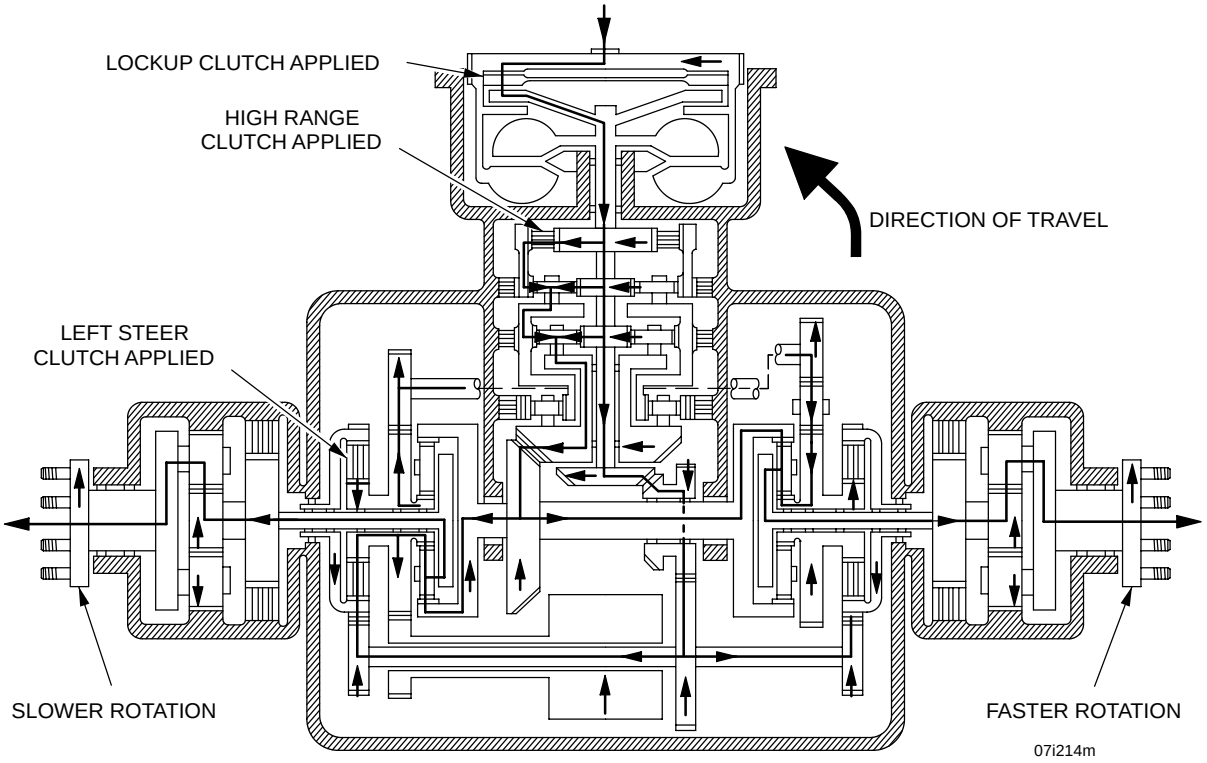
HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in High Range, Lockup Drive, Left Steer

NOTE

Refer to Torque Path in High Range, Lockup Drive Left Steer Schematic View for torque path through the transmission and the Action of Hydraulic System in High Range, Lockup Drive, Left Steer Schematic View. The description of hydraulic system in high range, lockup drive, no steer applies to this paragraph. The only differences are that the steer pressure is not blocked at the steer valve and lubrication pressure is not blocked at the left steer clutch.

The description in the action of the hydraulic system in neutral, converter drive, right steer applies to this paragraph. The only differences are that reference to “left” and “right” must be reversed, as well as references to “upper” and “lower.”

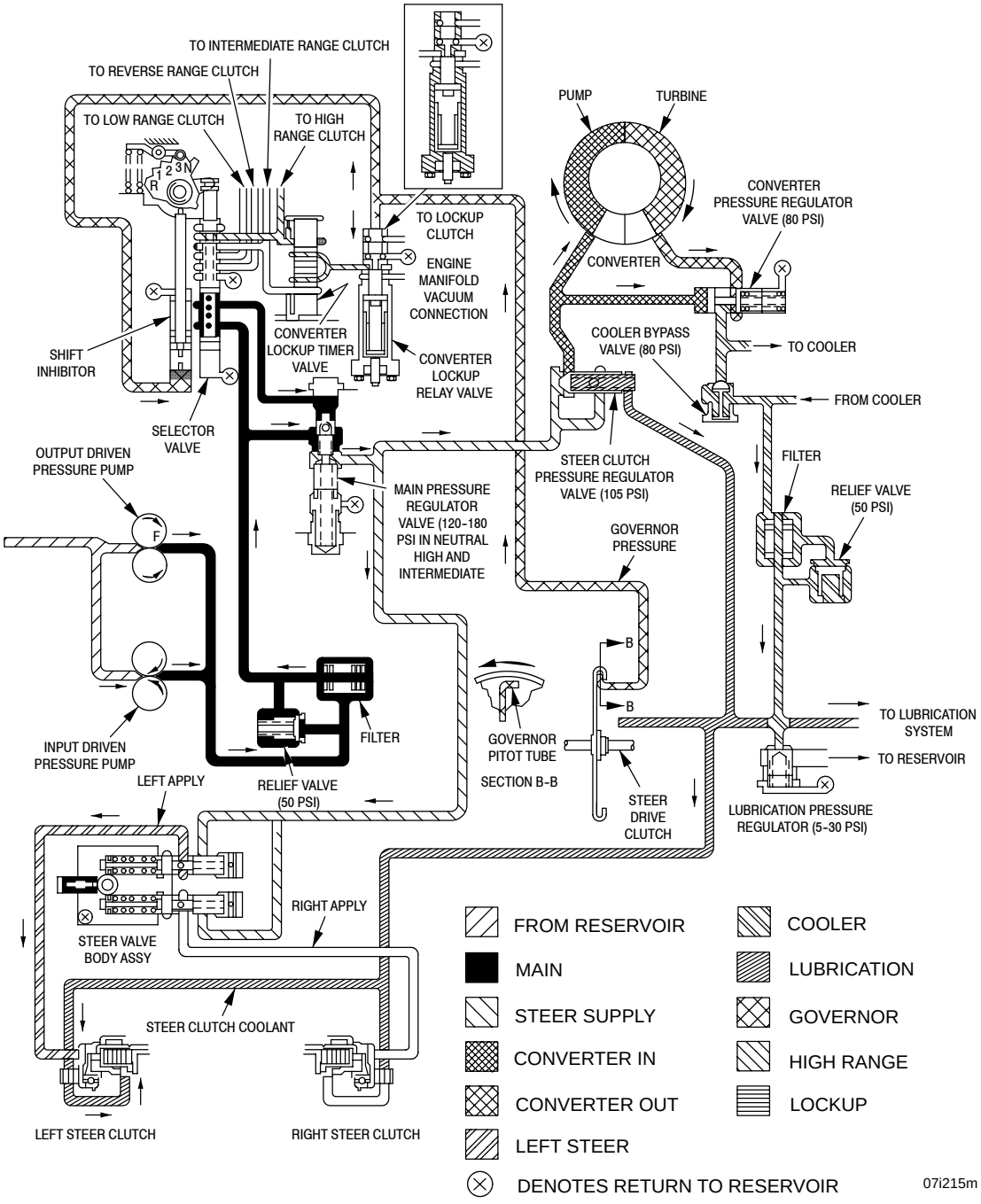


Torque Path in High Range, Lockup Drive, Left Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in High Range, Lockup Drive, Left Steer – Continued



Hydraulic System, High Range, Left Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

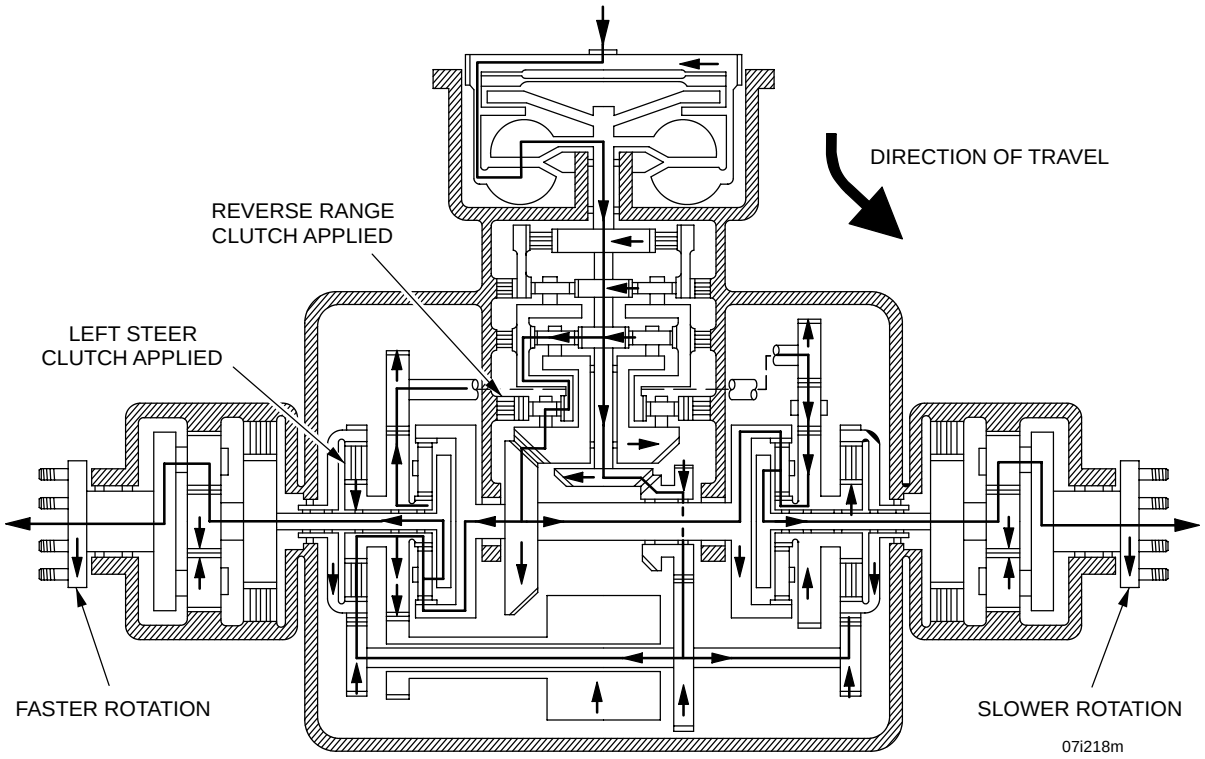
Action of Hydraulic System in Reverse Range, Converter Drive, Right Steer

NOTE

Refer to Torque Path in Reverse Range, Converter Drive, Right Steer and Torque Path in High Range, Lockup Drive Left Steer Schematic Views.

Refer to Action of Hydraulic System in Reverse Range, Converter Drive, No Steer and Action of Hydraulic System in High Range, Lockup Drive, Left Steer Schematic Views above.

Right and left steer actions are reversible.

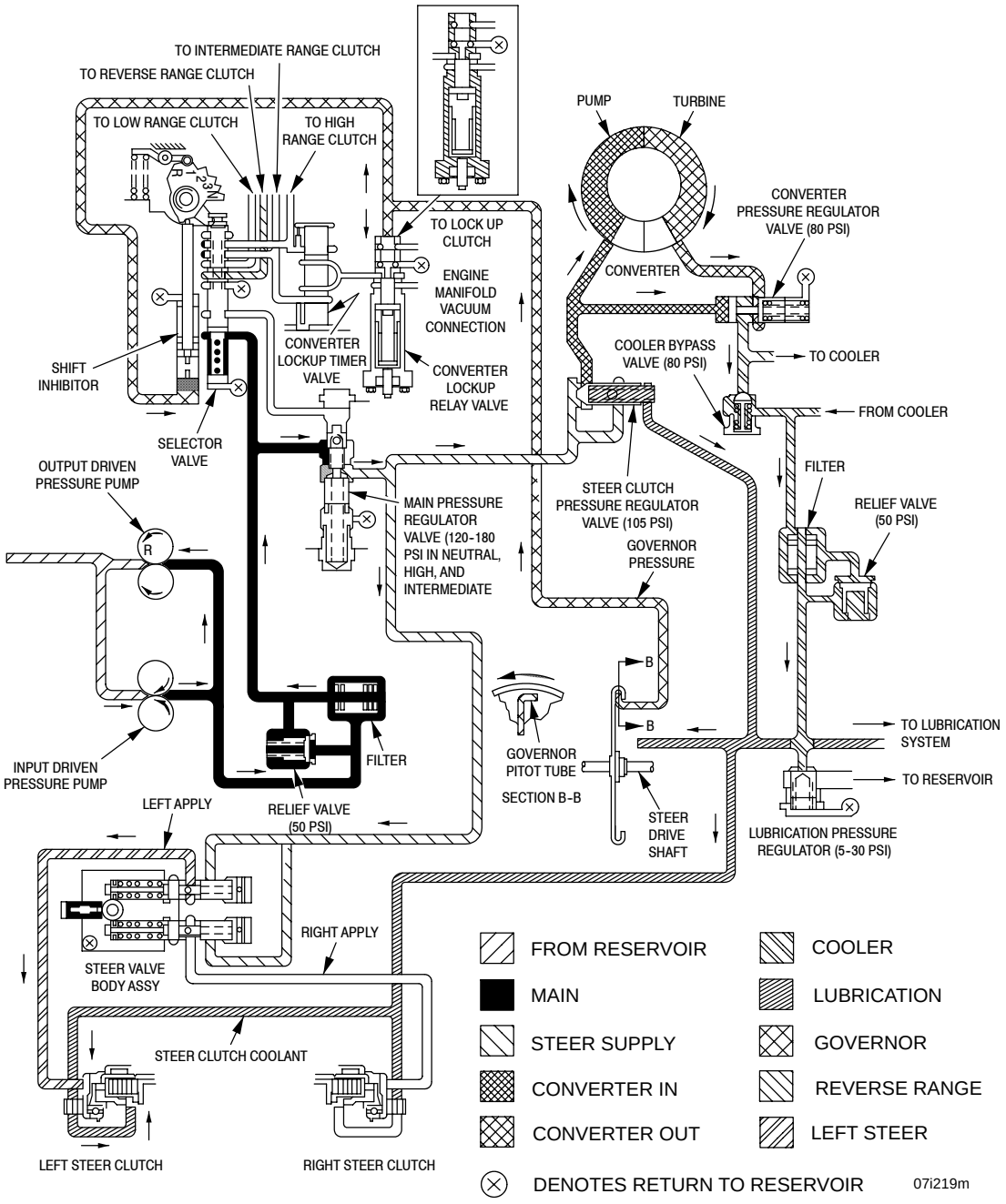


Torque Path in Reverse Range, Converter Drive, Right Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

HYDRAULIC SYSTEM – Continued

Action of Hydraulic System in Reverse Range, Converter Drive, Right Steer – Continued



Hydraulic System, Reverse Range, Right Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION

The major components of the transmission through which power flows are shown in this work package. The following schematic views identify only those components engaged for the conditions stated. Arrows on components indicate the torque path from input to output. Larger arrows near the schematic views indicate the direction of travel in a straight path or steering to the right or left.

In all gear or steer conditions, input torque is transmitted from the vehicle engine to the range gearing by hydraulic or mechanical means. When the power flow line leads to the torque converter pump and then through the turbine, the drive is hydraulic (through the torque converter) and the lockup clutch is released. When the power flow line passes through the lockup clutch, the drive is mechanical (lockup clutch engaged).

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Neutral, Converter Drive, No Steer

NOTE

Refer to Torque Path in Neutral, Converter Drive, No Steer and the Action of Hydraulic System In Neutral, Converter Drive, No Steer.

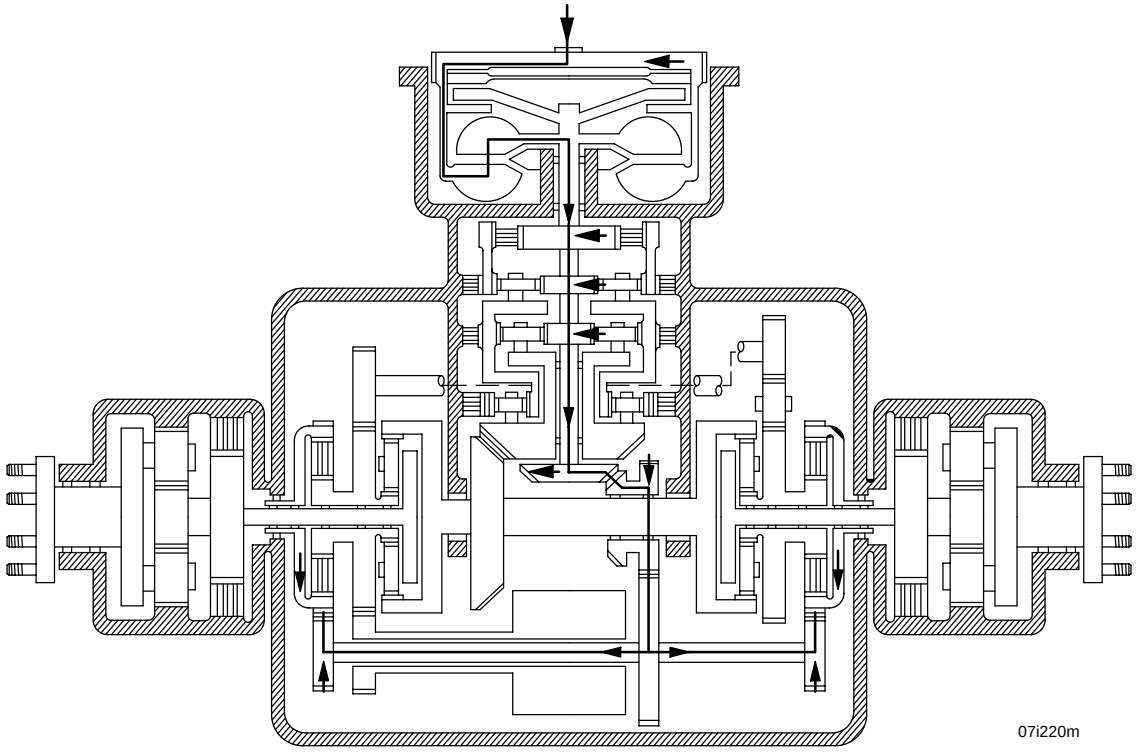
In neutral, the engine delivers torque to the transmission through the torque converter. Lockup cannot occur. No clutch is engaged but the torque converter turbine shaft is driven by the action of the torque converter when engine speed is sufficient. However, when engine speed is low, torque action is not sufficient to rotate the turbine or the turbine shaft.

NOTE

Pivot steer is the ability of a vehicle to turn about its center without traveling in either a forward or reverse direction. This results when the vehicle tracks move in the opposite directions at equal speeds.

In addition to its connection with the drive ranges, through the range clutches, the turbine shaft connects to the steer system and rotates the right and left steer clutch drive gears. This makes “pivot steer” available in neutral.

If steer is not applied, the steer clutches are released and the steer clutch drive gears rotate freely when the vehicle is accelerated.



Torque Path in Neutral, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Low Range, Converter Drive, No Steer

NOTE

Refer to Torque Path in Low Range, Converter Drive, No Steer Schematic View and Action of Hydraulic System, Low Range, Converter Drive, No Steer Schematic View.

When in low range, converter drive, no steer, the torque path is as described above, except that the low-range clutch is engaged and the transmission of torque is extended as outlined below.

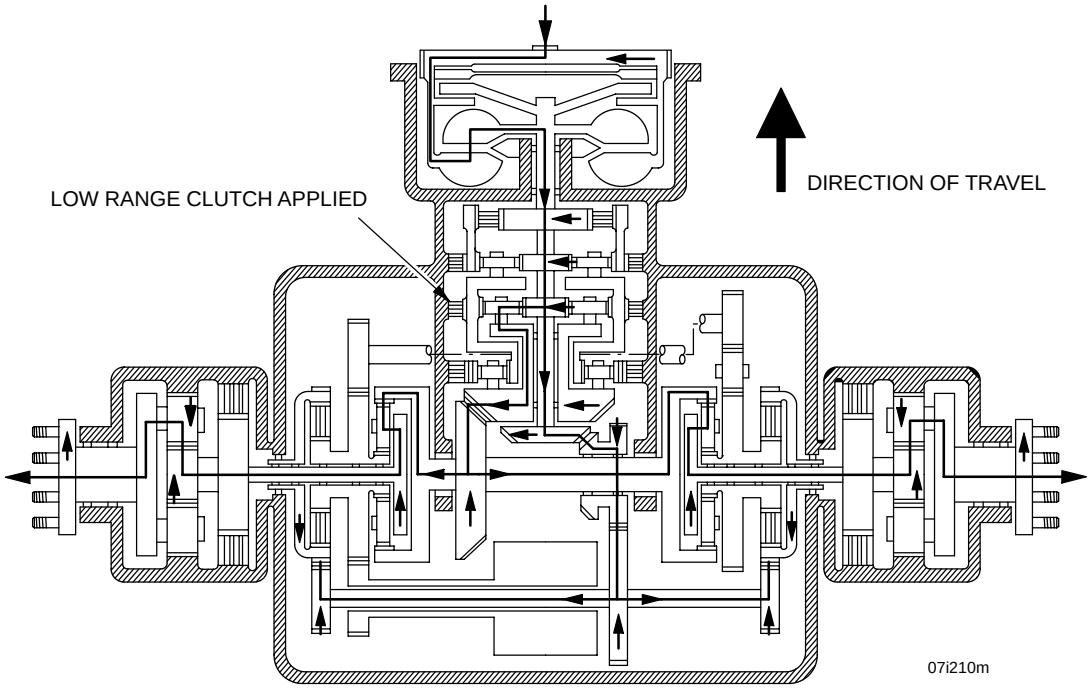
When the low range clutch is engaged, the low range planetary ring gear is held stationary. The ring gear becomes the reaction member of the low range gear set. The low range sun gear, being splined to the turbine shaft, rotates. The sun gear rotates the pinion gears and in turn, the low range carrier.

The low range carrier is splined to the output bevel drive gear. The carrier rotates the gear, which, in turn, rotates the output bevel driven gear. The driven gear is splined to the output drive shaft, which in turn is splined to the steer planetary ring gears. Both ring gears rotate.

The reaction members in the steer planetaries are the sun gears. The sun gears are stationary during straight travel because the tendency of each to rotate is opposed by the tendency of the other to rotate in the opposite direction. Both are prevented from rotating in the same direction by the steer tie shaft, tie shaft pinions, and tie shaft idler. These are meshed with gears connected to the steer planetary sun gears.

The steer planetary ring gears cause the pinion gears to rotate about the stationary sun gears. The steer planetary carrier, to which the pinions are mounted, connects to the output reduction sun gear. The output reduction planetary ring gears are stationary at all times. Accordingly, the output reduction planetary pinions are forced to rotate within the ring gears. The carriers are splined to the output shafts, which rotate and drive the vehicle track sprockets.

In addition to the torque multiplication ratio of the torque converter, the speed reduction ratios of the low range planetary, output bevel gears planetaries, and output reduction gears determine the final torque and speed reduction ratios available at the vehicle track sprocket. All of these ratios are listed in this work package.



Torque Path in Low Range, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Intermediate Range, Lockup Drive, No Steer

NOTE

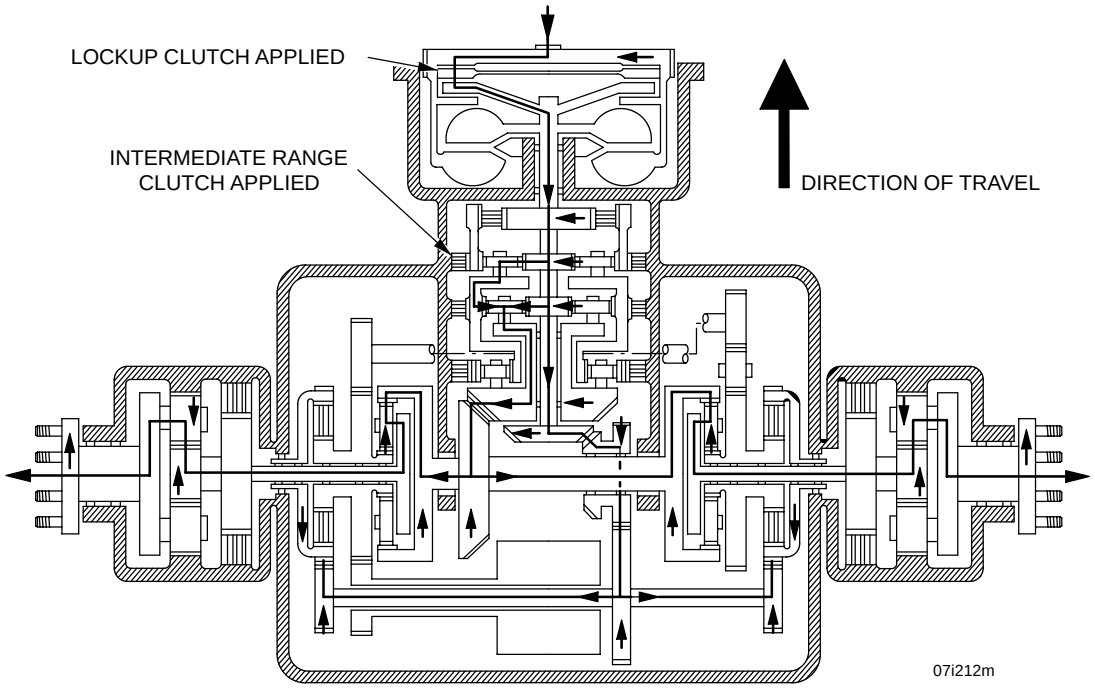
Refer to Torque Path in Intermediate Range, Lockup Drive, No Steer Schematic View and the Action of the Hydraulic System in Intermediate Range, Lockup Drive, No Steer Schematic View.

When in intermediate range, lockup drive, no steer, the engine transmits torque to the turbine shaft through the lockup clutch. The action of the steer gear system is as described in Torque Path in Low Range, Converter Drive, No Steer.

The intermediate range clutch holds the intermediate planetary ring stationary. The intermediate planetary sun gear, being splined to the turbine shaft, rotates and forces the intermediate pinions to rotate within the ring. The intermediate range planetary carrier, to which the pinions are attached, rotates. The low range planetary ring gear is connected to the intermediate range carrier and also rotates.

The combination of rotating speed of the low range sun gear transmits torque. The torque is then transmitted through the low range pinion to the low range planetary carrier.

The combination of two planetaries to secure a final speed ratio is called compounding. The steer clutches are released. The outer members' clutches are freely driven by the converter turbine shaft bevel gearing, steer cross shaft, and spur gearing. Refer to this work package for ratios of the gears involved in intermediate range operation.



Torque Path in Intermediate Range, Lockup Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in High Range, Lockup, No Steer

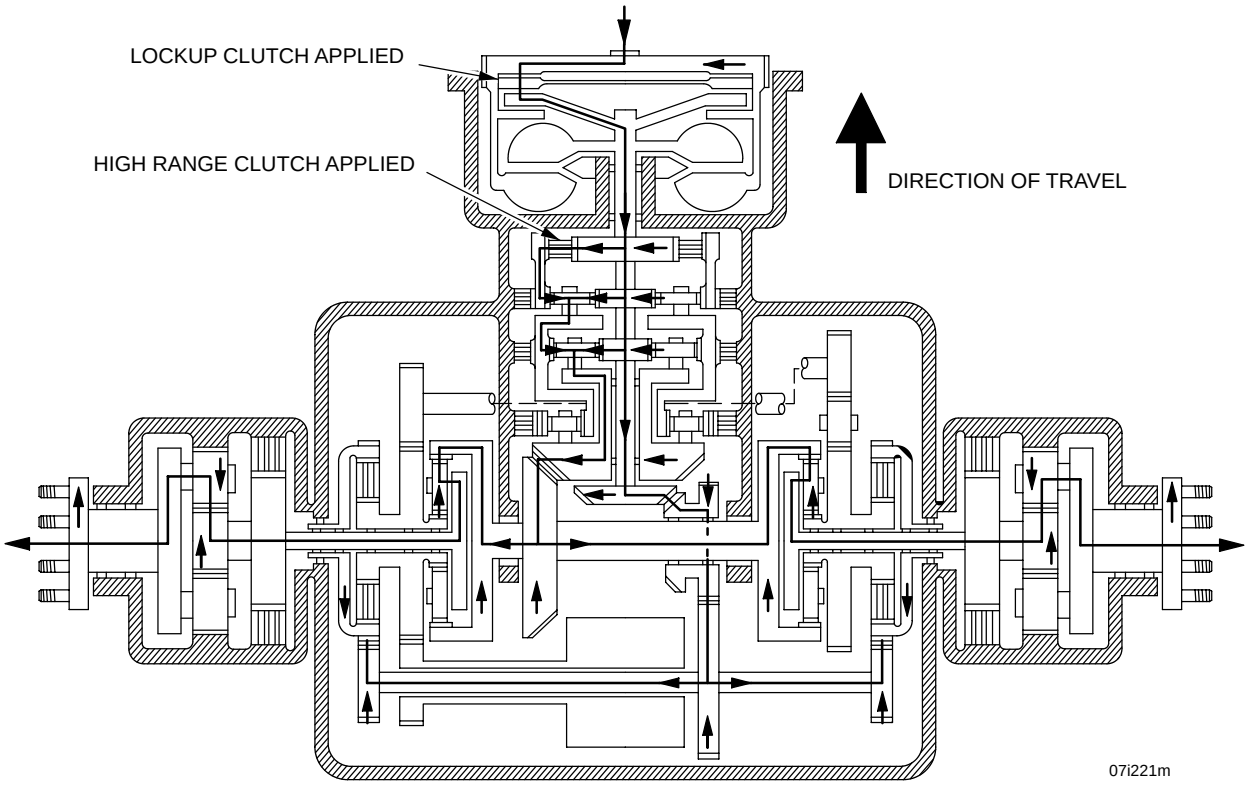
NOTE

Refer to Torque Path in High Range, Lockup Drive, No Steer and Action of Hydraulic System, High Range, No Steer Schematic Views.

When in high range lockup drive, no steer, the engine transmits torque to the turbine shaft through the lockup clutch. The intermediate range clutch holds the intermediate planetary ring gear stationary. The intermediate planetary sun gear, being applied to the turbine shaft, rotates and forces the intermediate pinions to rotate within the ring gear. The intermediate range planetary carrier, to which the pinions are attached, rotates. The low range planetary ring gear is connected to the intermediate range carrier and also rotates.

The high range clutch is engaged, locking the intermediate range planetary ring gear to the high range clutch hub. The hub is splined to the turbine shaft. The ring gear rotates as a unit with the turbine shaft and hub. The intermediate and low range planetary sun gears also are splined to the turbine shaft.

The entire group rotates as a unit, since there cannot be any relative motion of the intermediate and low range planetary components. The torque path through the remainder of the transmission is as described in Torque Path in Low Range, Converter Drive, No Steer. Refer to this work package for the ratios of the gears involved in high range operation.

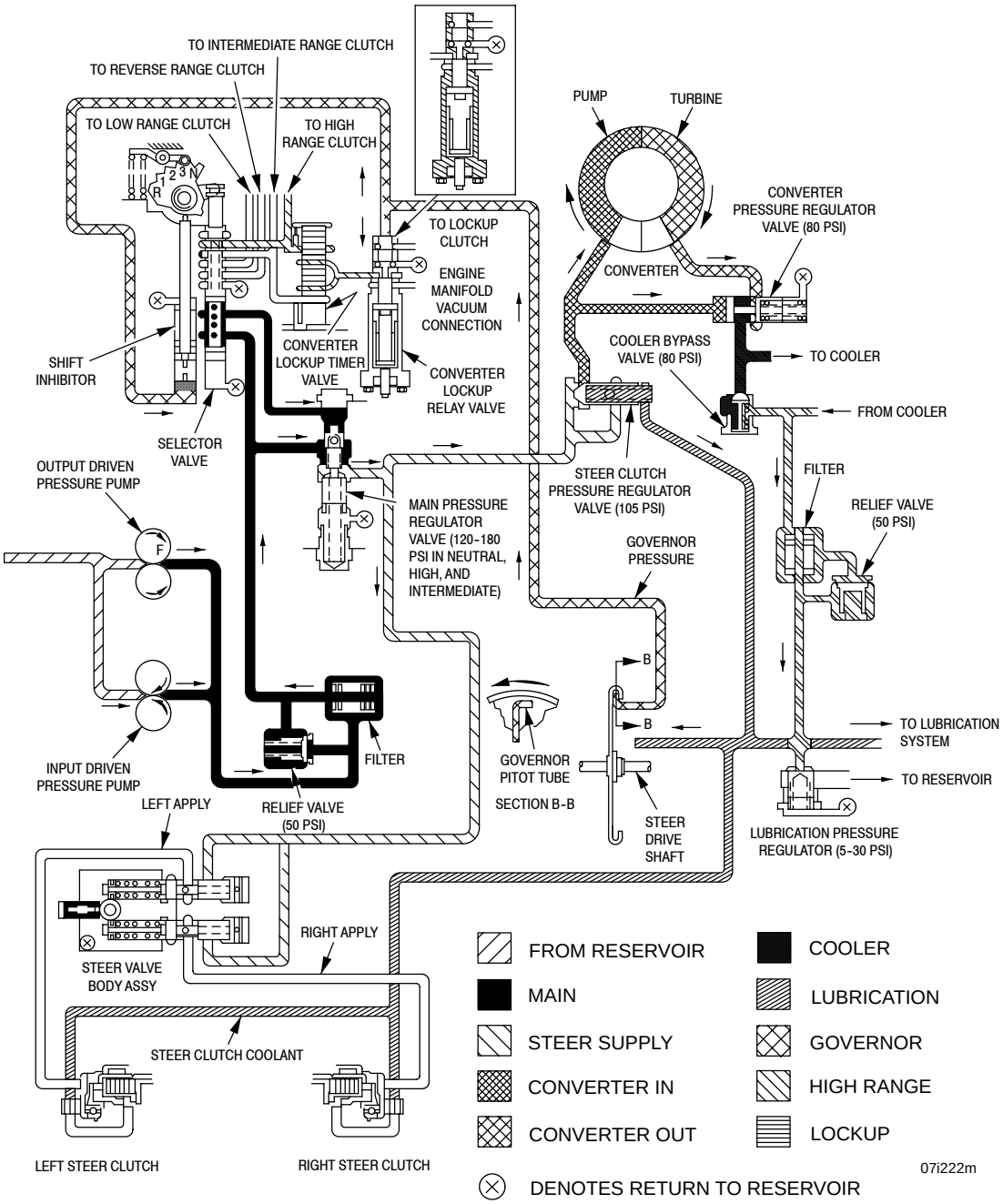


Torque Path in High Range, Lockup Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in High Range, Lockup, No Steer – Continued



Hydraulic System, High Range, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Reverse Range, Converter Drive, No Steer

NOTE

Refer to Torque Path in Reverse Range, Converter Drive, No Steer Schematic View and Action of the Hydraulic System in Reverse Range, Converter Drive, No Steer Schematic Views.

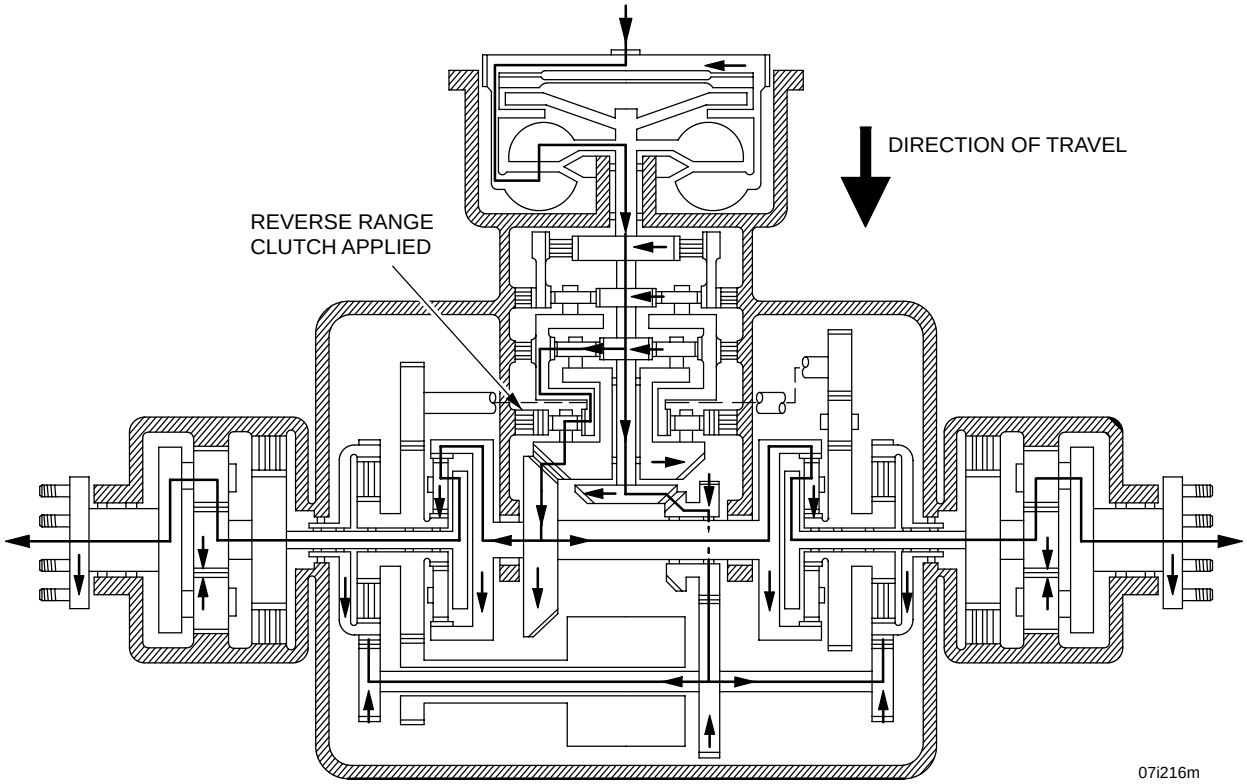
When in reverse range, converter drive, no steer, the engine transmits torque to the turbine shaft hydraulically, through the converter. The action of the steer gear system is as described in Torque Path in Low Range, Converter Drive, No Steer.

The reverse range clutch is engaged, locking the reverse range planetary ring gear in a stationary position. In reverse range, two planetary gear sets are compounded to obtain reverse. These are low range and reverse range.

The primary driving member of this compound arrangement is the low range sun gear. The reaction member in the low range planetary is the carrier. The driven member is the low range ring gear. The reverse range sun gear is connected to the low range ring gear and is the driving member in the reverse range planetary. The reaction driven member is the carrier, of which the pinions and output bevel drive gear are components.

Reverse rotation actually occurs in the low range planetary while speed is further reduced in the reverse range planetary.

The torque path through the remainder of the transmission is as described in Torque Path in Low Range, Converter Drive, No Steer. Refer to this work package for the ratios of the gears involved in the reverse range operation.



Torque Path in Reverse Range, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Neutral, Converter Drive, Right Steer

NOTE

Refer to Torque Path in Neutral, Converter Drive, No Steer and Hydraulic System, Neutral, Converter Drive, Right Steer Schematic Views.

Refer to Torque Path in Neutral, Converter Drive, No Steer for the explanation of conditions in neutral. The explanations below are expanded to included steer action in neutral.

To obtain steer in neutral, the engine speed must be sufficient to cause rotation of the turbine (by converter action). When the converter shaft rotates, the steer gear train rotates. Thus, counterclockwise rotation is imparted to both right and left steer clutch drive gears.

The right steer clutch is engaged, locking the right steer planetary sun gear to the steer clutch drive gear. This causes the sun gear to rotate counterclockwise also.

An idler gear, in mesh with the right tie shaft drive gear and tie shaft pinion, rotates clockwise. This drives the tie shaft counterclockwise. A pinion at the left end of the tie shaft, in mesh with the left tie shaft drive gear, rotates the left tie shaft drive gear and left steer planetary sun gear clockwise.

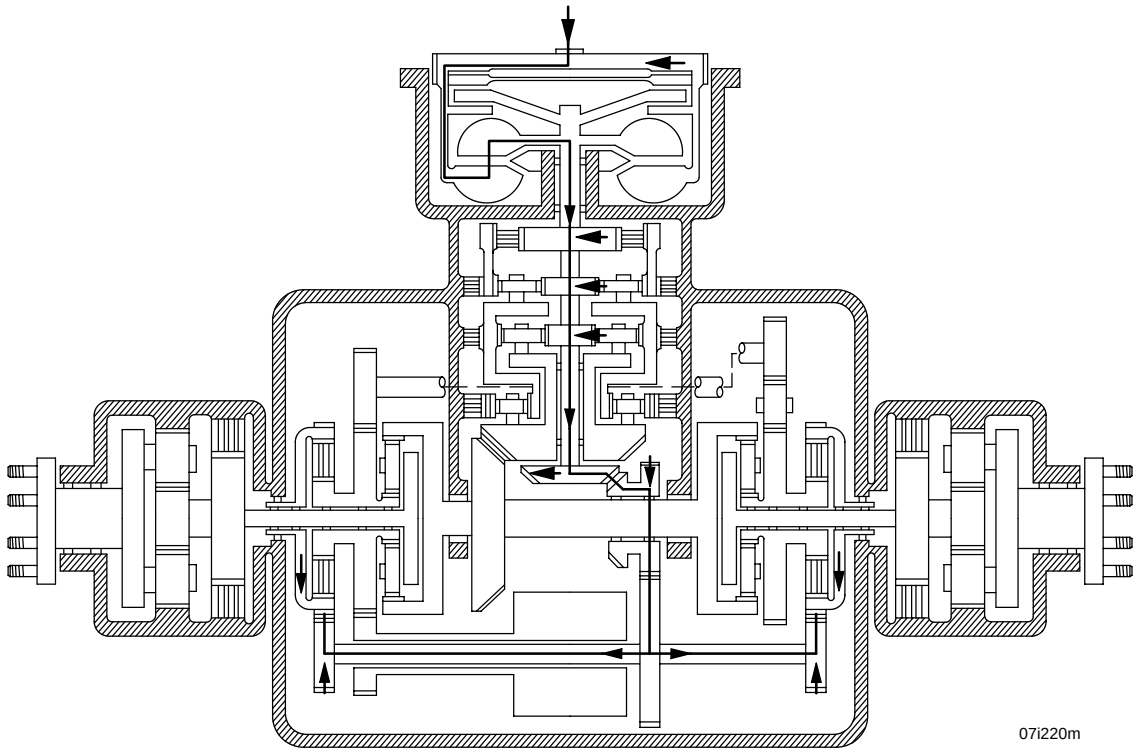
The right and left steer planetary sun gears rotate in opposite directions instead of remaining stationary as they do in straight travel. In neutral, the steer planetary ring gears are stationary. They become reaction members while the normally stationary sun gears become the driving members.

Since the right steer planetary sun gear rotates counterclockwise, the carrier is also forced to rotate counterclockwise, within the stationary ring gear. This causes the transmission output to rotate counterclockwise, driving the right vehicle track in reverse. The left output steer sun gear rotates clockwise, causing the output rotation at the left side to be clockwise. The left vehicle track is driven forward. The tendency of the right and left steer planetary ring gears to rotate is canceled. This happens because the gears are splined to the driven bevel gear shaft and their reactions are in opposite directions.

In neutral steer, the vehicle will pivot around its center without forward or reverse movement.

Refer to this work package for the ratios involved in neutral steer.

THEORY OF OPERATION - CONTINUED 0005 00



Torque Path in Neutral, Converter Drive, No Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in High Range, Lockup Drive, Left Steer

NOTE

Refer to Torque Path in High Range, Lockup Drive, Left Steer and Hydraulic System, High Range, Lockup Drive, Left Steer Schematic Views.

Refer to Torque Path in High Range, Lockup Drive, No Steer for the action of the high range gearing. Steer action in high range is described in the following paragraphs.

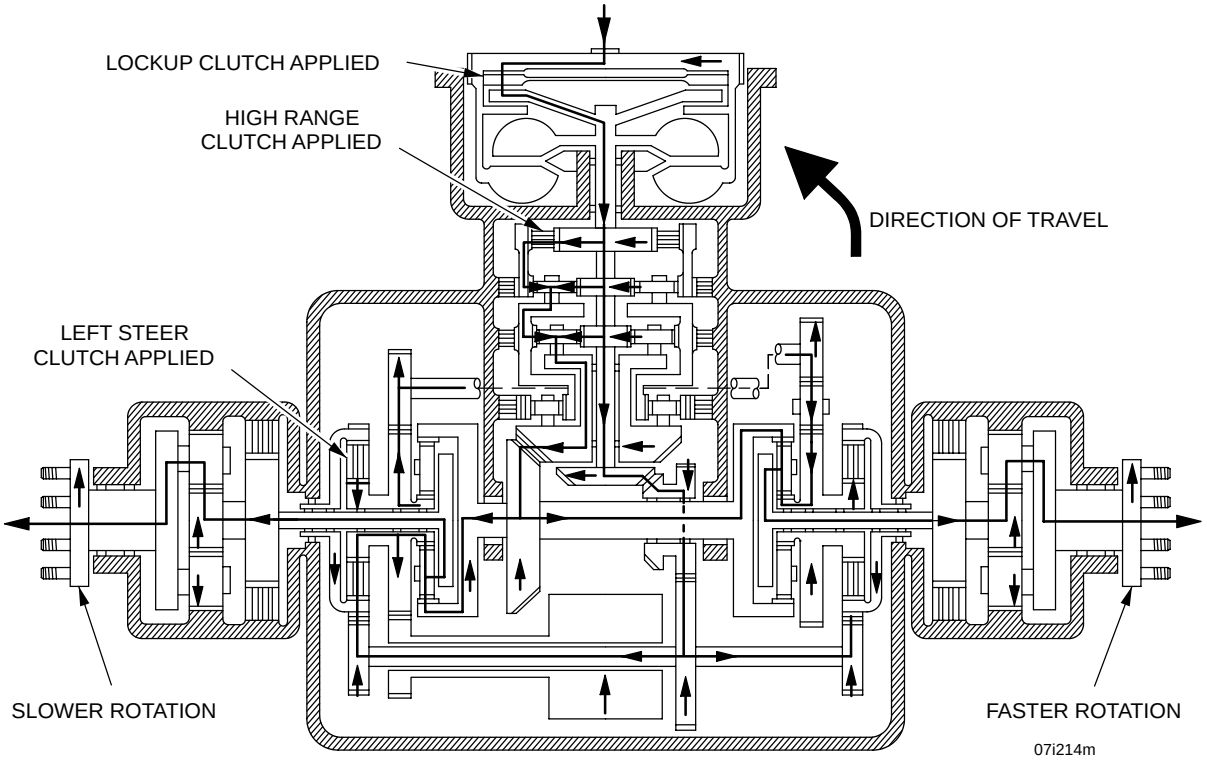
In every steer condition, counterclockwise rotation is delivered to both right and left steer clutch drive gears. These gears are driven by the train of gears including the steer bevel gear splined to the turbine shaft.

During left steer in high range, the left steer clutch is engaged. This causes the left steer planetary sun gear and left tie steer clutch drive gear to rotate counterclockwise as does the left steer clutch drive gear. The right tie shaft drive gear and right steer planetary sun gear are driven clockwise by the tie shaft and the tie shaft idler.

The counterclockwise rotation of the left steer planetary sun gear causes a reduction in the speed of the left transmission output. The clockwise rotation of the right sun gear causes an increase in the speed of the right transmission output. Thus, the vehicle steers towards the side on which track is moving slower. In left steer, the right steer clutch is released.

The steer flywheel is simply a stabilizer for the steering system. In straight travel, it is stationary and tends to remain stationary due to inertia. This damps out any tendency of the output sun gears to oscillate during straight travel. During steer, the flywheel rotates and its inertia smoothes out the application or release of steer. Jerking and violent transition to or from the steer condition is prevented.

Refer to this work package for the gear ratios involved in high range steer.



Torque Path in High Range, Lockup Drive, Left Steer Schematic View

THEORY OF OPERATION - CONTINUED 0005 00

TORQUE PATHS THROUGH TRANSMISSION – Continued

Torque Path in Reverse Range, Converter Drive, Right Steer

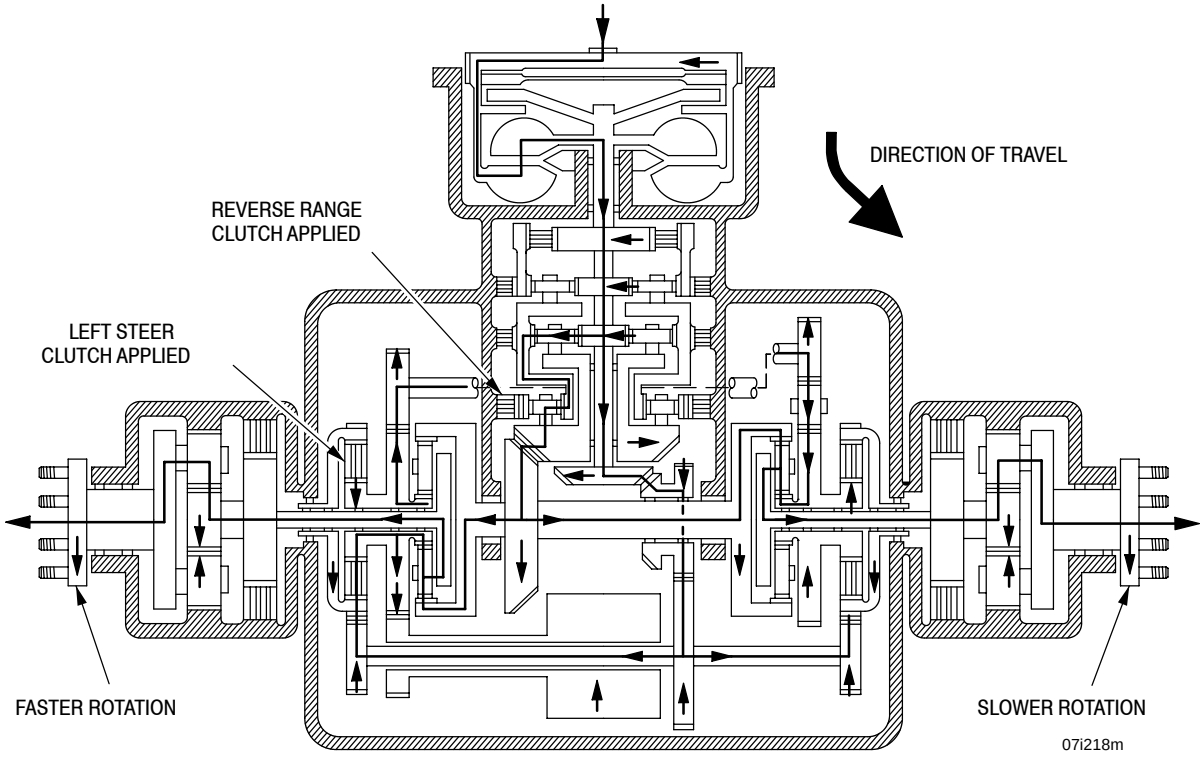
NOTE

Refer to Torque Path in Reverse Range, Converter Drive, Right Steer and Hydraulic System, Reverse Range, Converter Drive, Right Steer Schematic Views.

Refer to Torque Path in Reverse Range, Converter Drive, No Steer for the action of range gearing in reverse range. Steer action in reverse is described in the following paragraphs.

As in all steer conditions, counterclockwise rotation is delivered to the right and left steer-clutch drive gears by the steer gear system. Unlike steer in forward ranges, the steer clutch opposite the side toward which steer is desired must be applied. Thus, for right steer in reverse, the left steer clutch must be engaged. This is because both the ring gear and sun gear turn in the same direction in reverse operation. Thus, the transmission output speed is increased at that side and decreased at the opposite side. Steer is always towards the side at which output speed is lower, regardless of vehicle direction. The steer flywheel functions are explained in Torque Path in High Range, Lockup Drive, Left Steer.

Refer to this work package for the gear ratios involved in reverse range steer.



Torque Path in Reverse Range, Converter Drive, Right Steer Schematic View

END OF WORK PACKAGE

CHAPTER 2

TROUBLESHOOTING PROCEDURES

TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX

0006 00

THIS WORK PACKAGE COVERS:

Troubleshooting Instructions, Troubleshooting Sample, and Quick Guide to Troubleshooting (Symptom/Malfunction) Index

TROUBLESHOOTING INSTRUCTIONS

The transmission is a mechanically and hydraulically operated, oil cooled transmission. Power to operate the transmission is delivered from the engine through a transfer assembly.

The transmission has five gears, three forward, neutral, and reverse. Once power is provided to the transmission, it delivers this power to the drive sprockets through an output shaft, universal joints, and the final drives. The final drive reduces the transmission power and provides this reduced power to the sprocket and hubs.

The transmission also serves as the vehicle steering mechanism.

This work package contains troubleshooting or malfunction information and tests for locating and correcting most of the trouble, which may develop in transmissions. Each malfunction or trouble symptom for an individual component, unit, or system is followed by a list of tests or inspections. These tests or inspections are necessary to determine probable cause and suggested corrected actions to remedy the malfunction.

This manual cannot list all possible malfunctions that may occur or all tests or inspections and corrective action.

This work package contains a “Quick Guide to Troubleshooting (Symptom/Malfunction) Index”. The Quick Guide to Troubleshooting (Symptom/Malfunction) Index is the master reference table for locating troubleshooting information. The guide contains a list of various malfunctions, which may occur during operation or inspection and provides a reference to the troubleshooting information or a solution. The troubleshooting work packages provide step-by-step instructions for isolating and correcting malfunctions.

WARNING

Throughout troubleshooting of the transmission, when installed in vehicle, personnel will come in contact with the vehicle electrical system or electrical components. Be certain vehicle MASTER switch is OFF between every step unless otherwise directed. Remove all jewelry and metal objects when working on the electrical system to prevent injury due to electrical shock.

TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX 0006 00

TROUBLESHOOTING SAMPLE

To effectively troubleshoot the transmission follow these steps:

a. Determine the symptom.

b. Locate the symptom (1) in the Quick Guide to Troubleshooting (Symptom/Malfunction) Index.

c. Locate the troubleshooting work package (2) for your symptom.

d. Turn to the procedure (3) identified in the Quick Guide to Troubleshooting (Symptom/Malfunction) Index.

e. Study the function description, pictorial view, and/or schematic located in the particular system overview work package.

f. Perform the corrective action (4) as required by troubleshooting procedure (3).

g. Verify that the corrective action eliminated the symptom.

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX -CONTINUED

SYMPTOM ← 1	ACTION OR WP REF
CONVERTER WILL NOT GO INTO LOCKUP IN HIGH OR INTERMIEDATE RANGES	WP 0011 00 ← 2

CONVERTER WILL NOT GO INTO LOCKUP IN HIGH OR INTERMEDIATE RANGES ← 3 0011 00

THIS WORK PACKAGE COVERS:

Converter Will Not Go Into Lockup in High or Intermediate Ranges

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

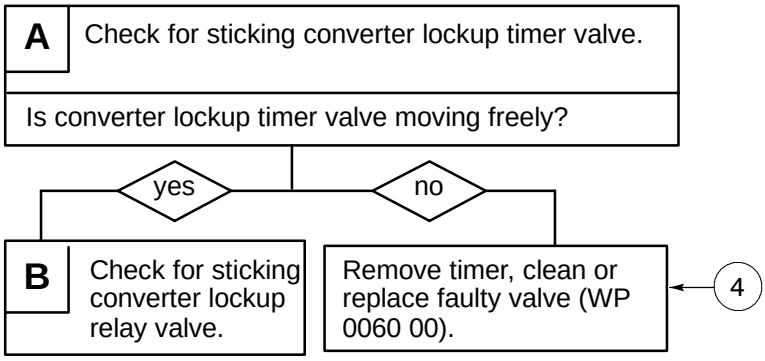
Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



TROUBLESHOOTING INSTRUCTIONS AND QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX 0006 00

QUICK GUIDE TO TROUBLESHOOTING (SYMPTOM/MALFUNCTION) INDEX

SYMPTOM	WORK PACKAGE
TRANSMISSION WILL NOT OPERATE IN ANY RANGE	WP 0007 00
TRANSMISSION WILL OPERATE IN ONE RANGE ONLY REGARDLESS OF SHIFT CONTROL POSITION	WP 0008 00
TRANSMISSION OPERATES IN ALL RANGES EXCEPT ONE	WP 0009 00
EXCESSIVE OIL TEMPERATURE (ABOVE 285 DEGREES F)	WP 0010 00
CONVERTER WILL NOT GO INTO LOCKUP IN HIGH OR INTERMEDIATE RANGES	WP 0011 00
CONVERTER GOES INTO OR OUT OF LOCKUP AT IMPROPER SPEEDS	WP 0012 00
TRANSMISSION CANNOT BE DOWNSHIFTED FROM HIGH OR INTERMEDIATE RANGE, OR SHIFTED FROM REVERSE RANGE TO NEUTRAL, OR FROM FIRST RANGE TO REVERSE WHILE VEHICLE IS NOT MOVING	WP 0013 00
TRANSMISSION SHIFT SELECTOR VALVE WILL NOT MOVE	WP 0014 00
VEHICLE STEERS PROPERLY IN ONLY ONE DIRECTION	WP 0015 00
STEER CLUTCH GRABS	WP 0016 00
BRAKES DO NOT STOP VEHICLE SATISFACTORILY	WP 0017 00

If any problem is not listed or cannot be corrected through troubleshooting, notify next higher level of maintenance.

END OF WORK PACKAGE

TRANSMISSION WILL NOT OPERATE IN ANY RANGE 0007 00

THIS WORK PACKAGE COVERS:

Transmission Will Not Operate in Any Range

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

References

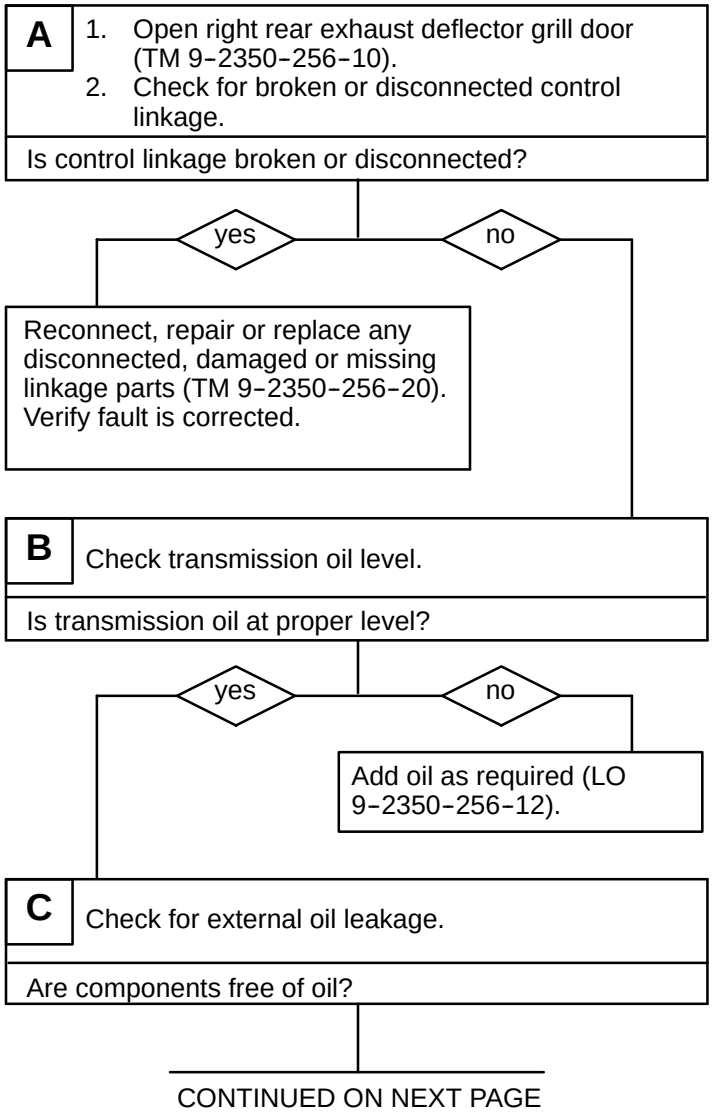
TM 9-2350-256-10

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



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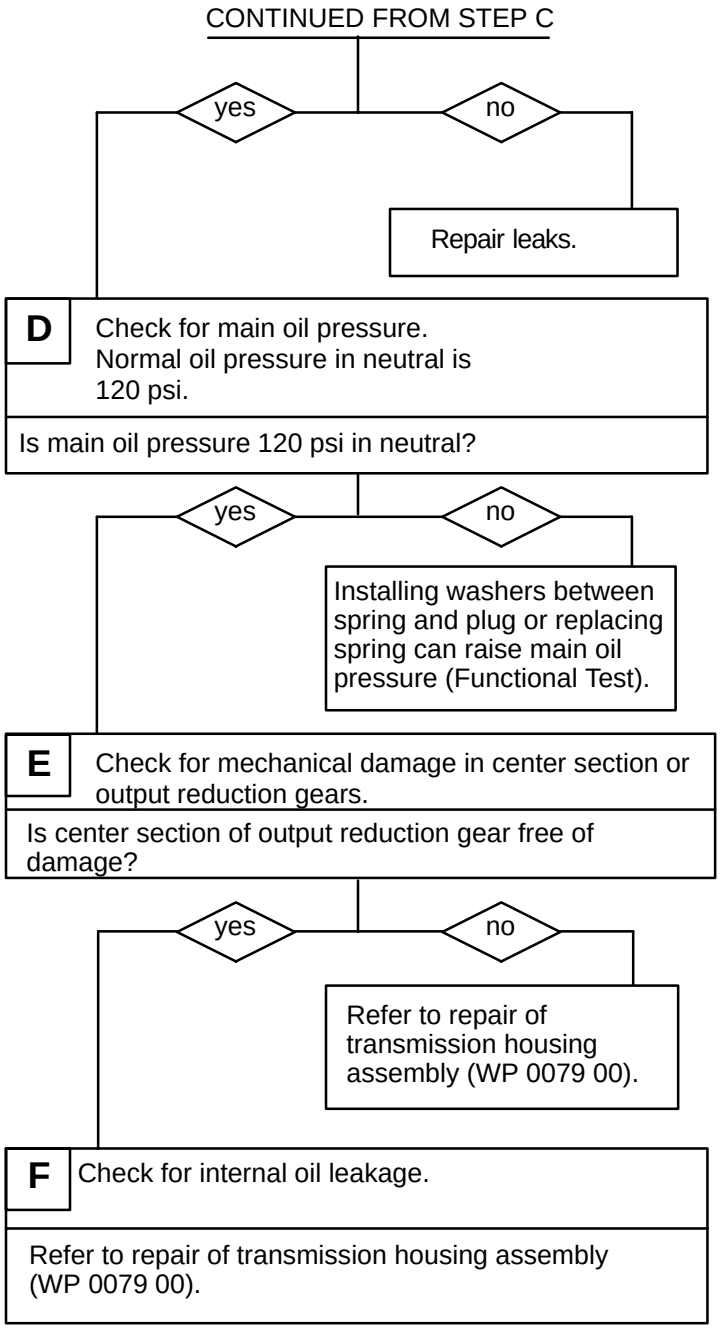
TRANSMISSION WILL NOT OPERATE IN ANY RANGE - CONTINUED 0007 00



END OF WORK PACKAGE

TRANSMISSION WILL OPERATE IN ONE RANGE ONLY REGARDLESS OF SHIFT CONTROL POSITION 0008 00

THIS WORK PACKAGE COVERS:

Transmission Will Operate in One Range Only Regardless of Shift Control Position

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

References

TM 9-2350-256-10
TM 9-2350-256-20

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

A

1. Open right rear exhaust deflector grill door (TM 9-2350-256-10).
2. Check for disconnected or damaged shift linkage.

Connect or repair linkage (TM 9-2350-256-20).

END OF WORK PACKAGE

TRANSMISSION OPERATES IN ALL RANGES EXCEPT ONE 0009 00

THIS WORK PACKAGE COVERS:

Transmission Operates in All Ranges Except One

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

A	Check for clutch failure in range which does not operate.
Overhaul of transmission housing assembly (WP 0079 00).	

END OF WORK PACKAGE

EXCESSIVE OIL TEMPERATURE (ABOVE 285 DEGREES F) 0010 00

THIS WORK PACKAGE COVERS:

Excessive Oil Temperature (Above 285 Degrees F)

INITIAL SETUP:

Tools and Special Tools

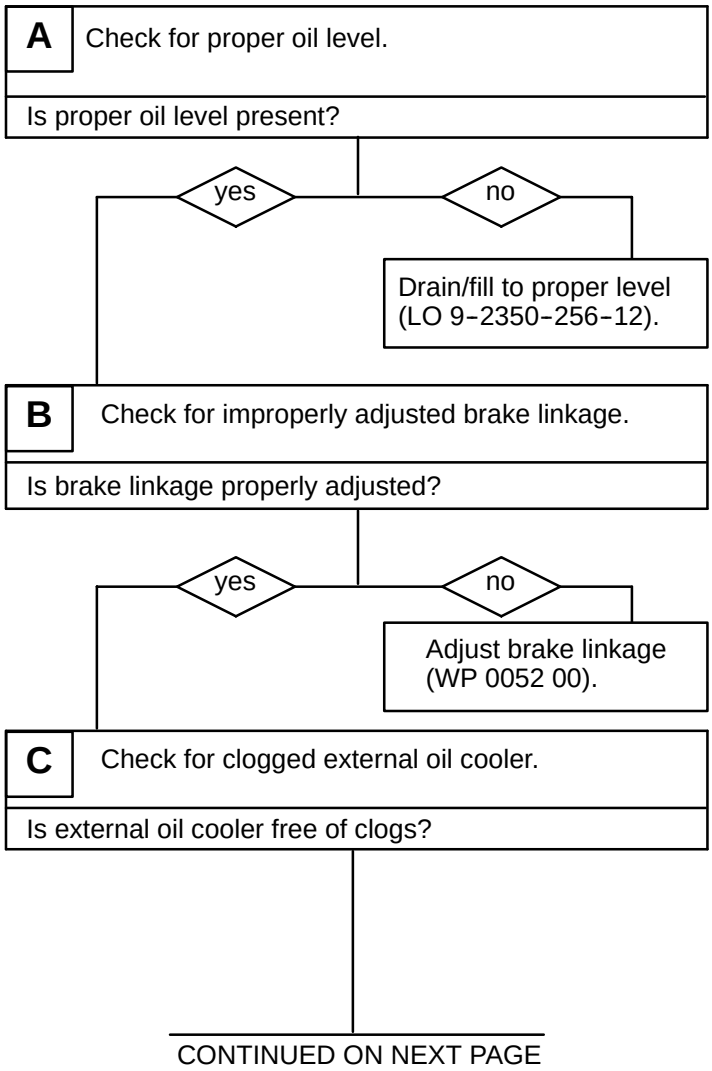
General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



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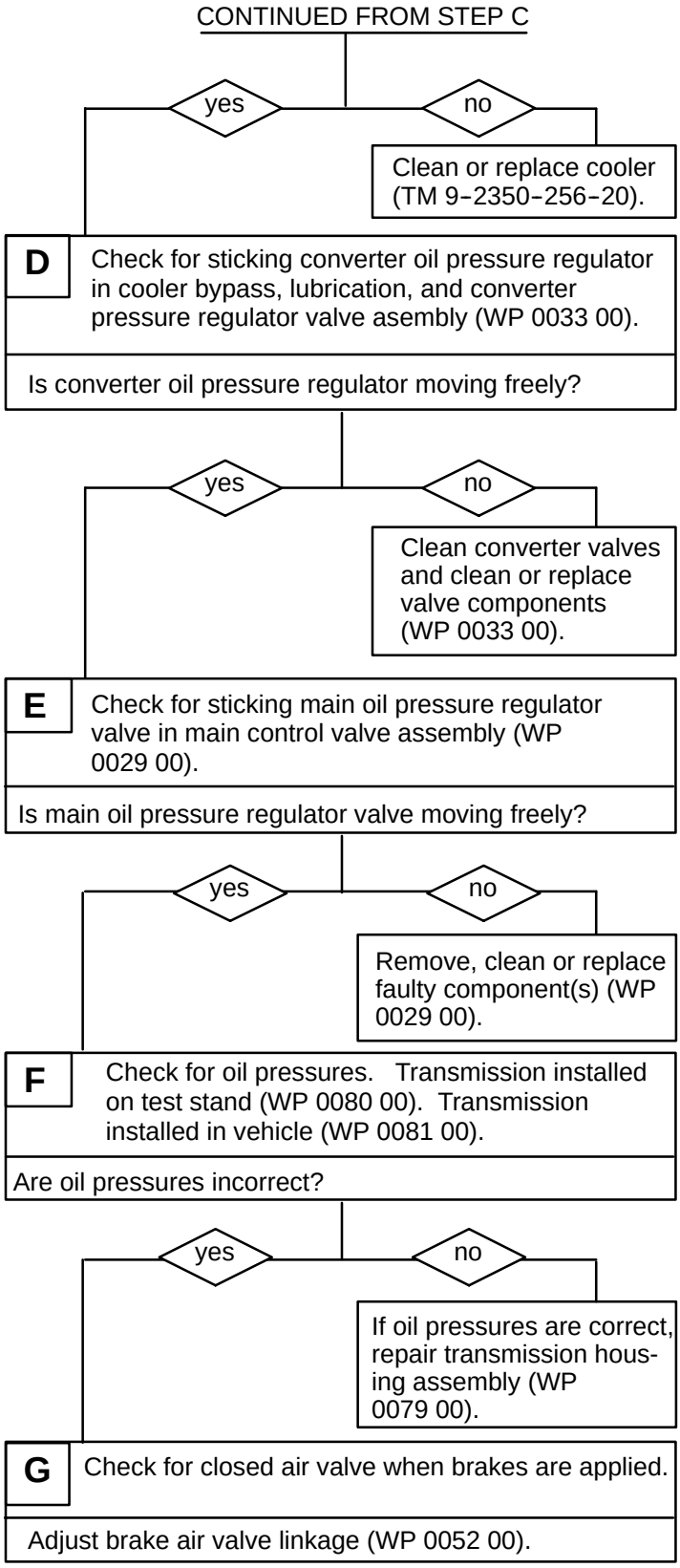
EXCESSIVE OIL TEMPERATURE (ABOVE 285 DEGREES F) – CONTINUED 0010 00



END OF WORK PACKAGE

CONVERTER WILL NOT GO INTO LOCKUP IN HIGH OR INTERMEDIATE RANGES

0011 00

THIS WORK PACKAGE COVERS:

Converter Will Not Go Into Lockup in High or Intermediate Ranges

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

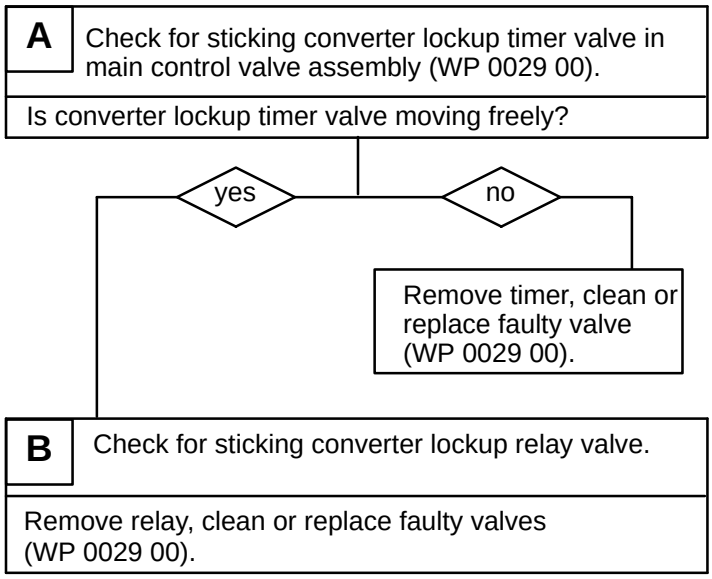
Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

CONVERTER GOES INTO OR OUT OF LOCKUP AT IMPROPER SPEEDS 0012 00

THIS WORK PACKAGE COVERS:

Converter Goes Into or Out of Lockup at Improper Speeds

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

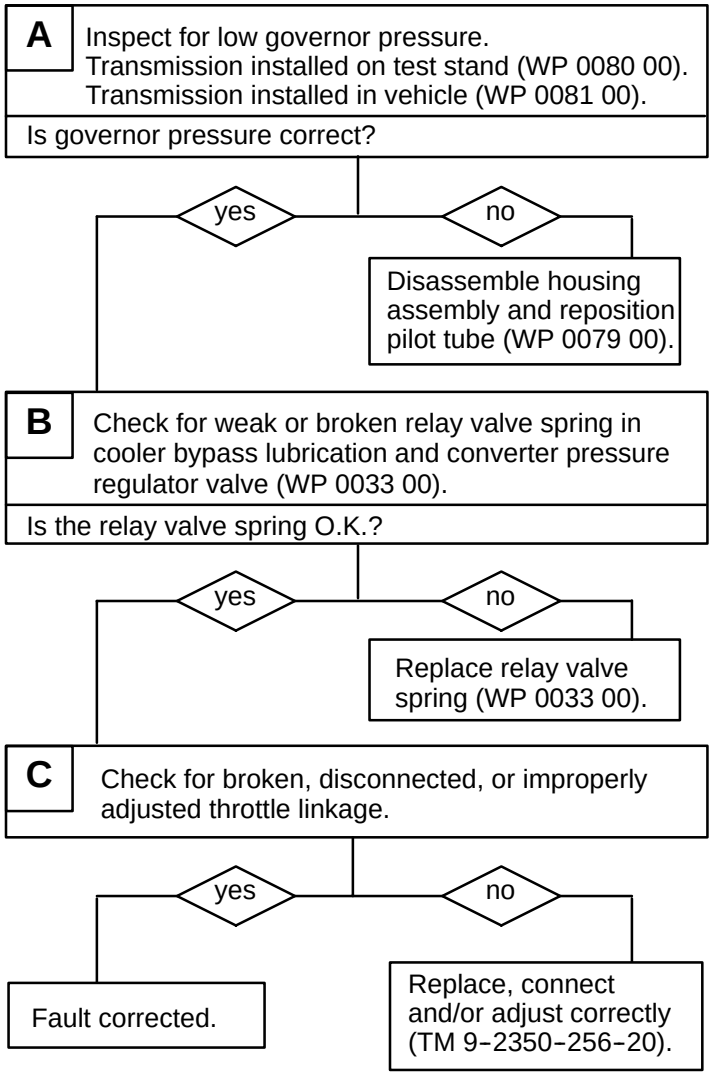
Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

TRANSMISSION CANNOT BE DOWNSHIFTED FROM HIGH OR INTERMEDIATE RANGE, OR SHIFTED FROM REVERSE RANGE TO NEUTRAL, OR FROM FIRST RANGE TO REVERSE WHILE VEHICLE IS NOT MOVING

0013 00

THIS WORK PACKAGE COVERS:

Transmission Cannot Be Downshifted From High or Intermediate Range, or Shifted From Reverse Range to Neutral, or From First Range to Reverse While Vehicle is Not Moving

INITIAL SETUP:

Tools and Special Tools

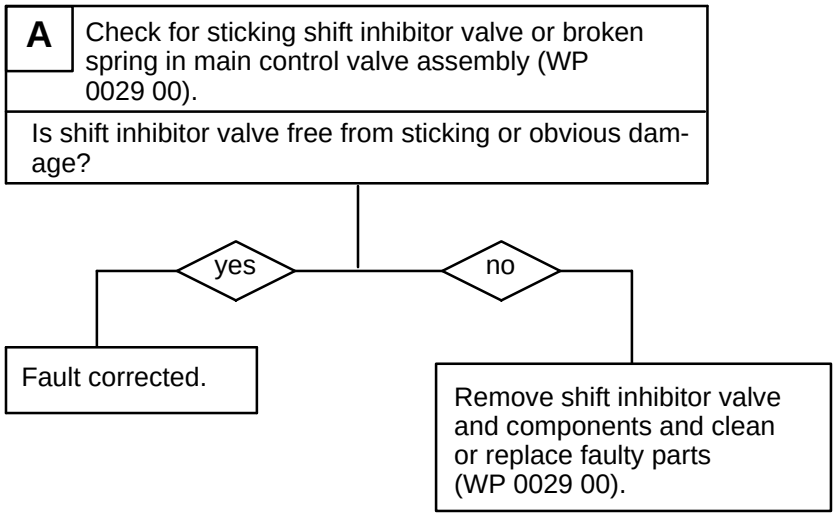
General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

TRANSMISSION SHIFT SELECTOR VALVE WILL NOT MOVE 0014 00

THIS WORK PACKAGE COVERS:

Transmission Shift Selector Valve Will Not Move

INITIAL SETUP:

Tools and Special Tools

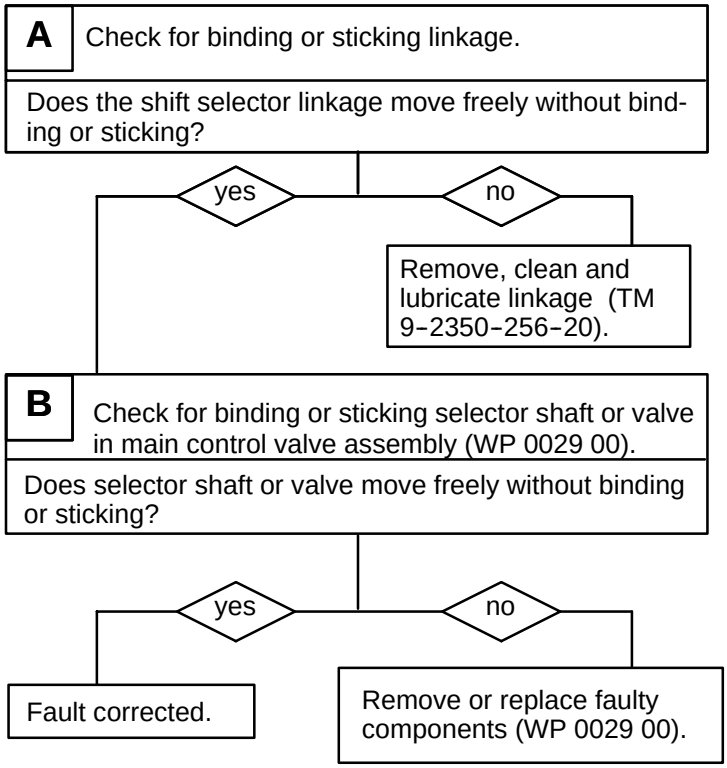
General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

VEHICLE STEERS PROPERLY IN ONLY ONE DIRECTION 0015 00

THIS WORK PACKAGE COVERS:

Vehicle Steers Properly in Only One Direction

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

A

1. Check steer clutch.
2. Apply pressure on the side which does not steer properly.
3. Adjust steer linkage if necessary (WP 0082 00).

Did steer linkage require adjustment?

yes

Fault corrected.

no

1. If linkage adjustment is correct, clean or replace faulty steer valve components in steer control valve assembly (WP 0027 00).
2. Remove and repair faulty steer clutch components in steer clutch housing assembly (WP 0039 00).

END OF WORK PACKAGE

STEER CLUTCH GRABS 0016 00

THIS WORK PACKAGE COVERS:

Steer Clutch Grabs

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

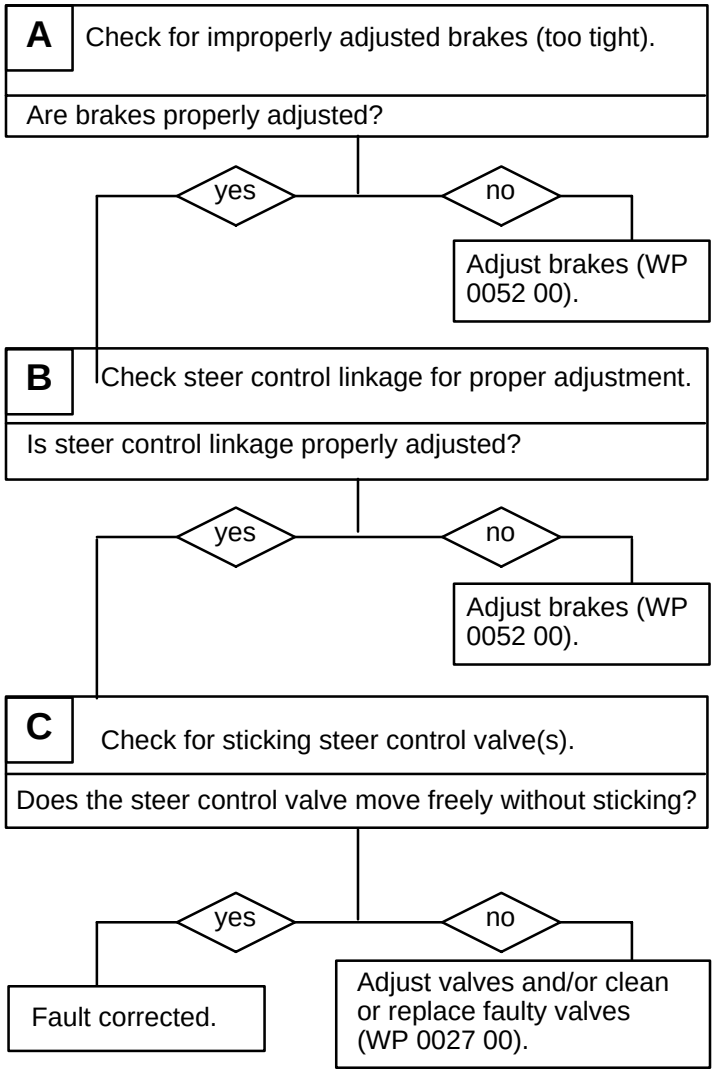
Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

BRAKES DO NOT STOP VEHICLE SATISFACTORILY 0017 00

THIS WORK PACKAGE COVERS:

Brakes Do Not Stop Vehicle Satisfactorily

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

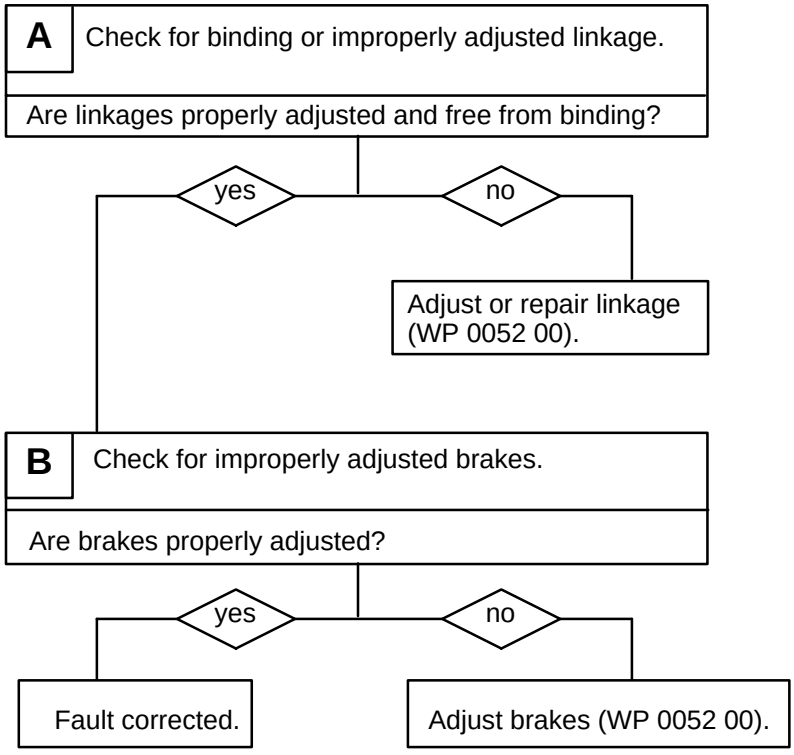
Vehicle MASTER switch OFF (TM 9-2350-256-10)

Personnel Required

Two

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.



END OF WORK PACKAGE

CHAPTER 3

GENERAL MAINTENANCE

GENERAL MAINTENANCE INSTRUCTIONS 0018 00

THIS WORK PACKAGE COVERS:

General Maintenance Instructions

GENERAL

This work package presents instructions and information needed to keep the XT-1410-4 series transmission and components in good repair. These instructions provide a step-by-step, item-by-item, illustrated text describing the XT-1410-4 transmission, components services and maintenance.

The maintenance functions described in this work package are limited to those functions authorized by the Maintenance Allocation Chart (MAC) for Direct and General Support Maintenance level activities. If maintenance is needed on any equipment or components that are not discussed in this work package, notify Depot maintenance.

DISASSEMBLY AND ASSEMBLY PROCEDURES

Complete disassembly of a component is not always necessary to make a required repair or replacement. Good judgment should be used to keep disassembly operations to a minimum.

In disassembling a unit, first follow basic inspection procedures, then remove only necessary components and subassemblies. These components may then be reduced, as necessary, into individual parts.

During disassembly, tag critical parts such as shims, bearings and electrical harnesses and leads, to facilitate reassembly. This is especially important for electrical equipment if circuit number tags are illegible or missing.

CAUTION

Never scribe-mark bearing surfaces.

Mark gears on mating teeth by scribe marks, or with dye, indelible ink or paint to be certain of correct positioning at assembly. The use of chalk or crayon for marking should be avoided because of lack of permanence.

During assembly, subassemblies should be assembled first, combined into major components where possible, and then installed to form a complete component.

Records to provide repair and replacement data and statistics should be carefully prepared and maintained according to DA PAM 750-8.

REPLACEMENT OF PARTS

Cotter pins, locking wires, lockwashers, packings, seals, strips and gaskets should be discarded at transmission disassembly. New parts should always be supplied to replace such items.

Care must be used to avoid damage to transmission components during disassembly, cleaning, inspection, repair and assembly. Nicks, scratches and dents caused by careless handling may cause oil leakage or improper functioning. This may result in transmission failure. All defective parts must be replaced. Heavy components should be handled with slings and hooks. Blocking the transmission for support in various positions is of special importance from a safety standpoint, as well as for prevention of damage.

All bolts, nuts and screws must be installed at the prescribed torque tightness to ensure proper assembly. Use of a torque wrench and careful attention to prescribed torque will help prevent distortion, oil leaks and stripped threads. All standard torquing requirements for bolts, screws and nuts are listed in WP 0087 00. When special requirements apply, they will be included in the text.

GENERAL MAINTENANCE INSTRUCTIONS – CONTINUED 0018 00

CLEANING PROCEDURES

Cleanliness is of major importance in servicing the transmission. All components must be cleaned thoroughly and kept clean throughout the repair process. The presence of dirt can cause malfunction and possible failure of the transmission.

WARNING

Extreme care must be taken to observe all warnings in the front of this manual. Hazardous chemicals, tools and processes will be used throughout this manual. Failure to observe warnings can cause serious injury or death.

Every component must be cleaned thoroughly after the transmission is disassembled. Cleaning is necessary to ensure effective inspection for wear, damage and serviceability of components.

Abrasives, files, scrapers, wire brushes and sharp tools should never be used on surfaces where finish is important to the operation or sealing of parts, except where specifically recommended.

Gum or varnish deposits may be removed by soaking in dry-cleaning solvent and using a soft bristle brush. Crocus cloth may be used to remove minor surface irregularities. Lapping compound may be used, if required, in valve body bores to prevent valves from sticking. Clean thoroughly to remove compound after use.

A soft wire brush (brass or copper) may be used to clean oil passages. Always flush such passages thoroughly after cleaning.

If steam cleaning is used, dry the cleaned parts immediately with compressed air and apply a film of oil to prevent rusting. Never use lye or caustic substances which will corrode or etch metal surfaces.

Do not clean the lubricant from new bearings. Keep new bearings wrapped until they are to be installed. Soak bearings, which have been in service in dry-cleaning solvent to loosen deposits of dirt. Do not spin the bearing during cleaning or drying. After cleaning, turn the bearing by hand and note any evidence of grit. Clean them again if grit is present. Refer to TM 9-214 for further information on cleaning bearings.

GENERAL MAINTENANCE INSTRUCTIONS – CONTINUED 0018 00

VISUAL INSPECTION AND MINOR REPAIR PROCEDURES

Castings, Forgings, and Machined Surfaces

Inspect all castings and forgings for breaks, cracks, and wear or scoring that would impair serviceability. Remove nicks and small surface irregularities with crocus cloth (item 2, WP 0085 00) or a soft honing stone.

Inspect all oil passages for obstructions and dirt. Reclean passages if necessary.

Inspect mounting faces for nicks, scratches and scores. Remove minor defects with crocus cloth (item 2, WP 0085 00) or a soft stone. Replace any parts in which defects which cannot be corrected will impair the operation of the transmission.

NOTE

A new tap will cut oversize threads. If threads are stripped, discard the part unless it can be repaired satisfactorily by installing an insert.

Inspect threaded openings for damaged threads. Chase damaged threads with used tap of correct size.

Replace housings or other cast parts that are cracked or broken.

Roller or Ball Bearing

Refer to TM 9-214 for proper cleaning and inspection procedures.

Needle-Type Roller Bearing

NOTE

Do not remove needle bearing unless replacement is necessary. Removal usually results in the destruction of the bearing.

Inspect the bearing for free and smooth reaction, broken or missing rollers, and tightness of fit in bore. If defects are found, replace the bearing using the proper replacement.

Bushings, Bushing-Type Bearings, and Thrust Washers

NOTE

Do not remove bushings and bushing-type bearings unless replacement is necessary. Removal usually damages these parts.

Inspect bushing and bushing type bearing for size, scoring and out-of-roundness. Deeply scored or worn parts should be discarded.

CAUTION

If it is necessary to cut out a bushing, do not damage the bore into which it fits.

Remove bushings and bushing-type bearings by using a puller or a press when possible. Bushings in blind holes may require removal by sawing or using a narrow cape chisel.

Inspect thrust washers for wear, distortion, scores and burrs. Replace parts that are worn, scored, or deformed.

GENERAL MAINTENANCE INSTRUCTIONS – CONTINUED 0018 00

VISUAL INSPECTION AND MINOR REPAIR PROCEDURES - CONTINUED

Oil Seals, Preformed Packings, and Gaskets

Replace all seal rings.

Replace all composition-type seal rings or packings.

NOTE

Removal of a seal will usually damage it.

Replace all lip-type seals.

Replace all flat-type gaskets.

Gears

Inspect gears for burrs, wear, pitting, and broken teeth. Remove burrs using a soft honing stone. Replace gears that are excessively worn or pitted.

Inspect bores of planetary pinions for wear and pitting of gearing contact area. Replace defective pinions.

Splined Parts

Inspect splined parts for twisted or broken splines, burrs, and excessive wear. Replace defective parts.

Clutch Plates

Inspect bronze-face steel plates for:

Burrs
Embedded metal particles
Severely pitted faces
Excessive wear
Cracks
Distortion
Damaged spline teeth

Remove burrs using a soft honing stone. Replace otherwise defective plates.

Inspect steel plates for:

Scoring
Excessive wear
Embedded metal
Cracks
Breaks
Damaged spline teeth

Remove burrs using a soft honing stone. Replace otherwise defective plates.

GENERAL MAINTENANCE INSTRUCTIONS – CONTINUED 0018 00

VISUAL INSPECTION AND MINOR REPAIR PROCEDURES - Continued

Threaded Parts

Inspect all threaded parts for stripped or damaged threads and burrs.

NOTE

Chase threads with a used tap or die. A new tap may cut oversize threads, while a new die may cut undersize threads.

Replace all parts which have stripped threads or damage which cannot be repaired by chasing the threads with a tap or die of the proper size.

Snap Rings

Replace all snap rings.

Springs

Inspect springs for:

Wear
Distortion
Breaks
Evidence of overheating
Loss of tension or compression

Replace defective springs.

Shafts and Spindles

Inspect shafts and spindles for:

Excessive wear
Bending
Scores
Cracks
Burrs
Obstructed oil passages

GENERAL MAINTENANCE INSTRUCTIONS – CONTINUED 0018 00

SCREW THREAD INSERTS (ONE PIECE TYPE).

When determined feasible by inspection, damaged threads should be repaired by rethreading, use of thread restorer, tap die, or by “chasing” on lathe.

Tapping holes for screw thread inserts that have mutilated threads may be repaired by drilling and tapping hole oversize and installing larger inserts or by filling tapped hole by welding, redrilling and tapping hole to original size.

Refer to Table 1 for drill size and depth.

Table 1. Thread Inserts: Drill Size And Depth

THREAD INSERT		INSERT HOLE REPAIR SIZE		REMOVAL DRILL	
Internal Threads	External Threads	TAP DRILL Diameter	COUNTERSINK Diameter	Diameter	Drilling Depth
10-24 10/32	3/8-16	Q (0.332)	25/64	9/32	1/4
1/4-20	7/16-14	X	29/64	11/32	1/4
1/4-28		(0.397)			
5/16-18	1/2-13	29/64	33/64	13/32	1/4
5/16-24					
3/8-16	9/16-12	33/64	37/64	15/32	1/4
3/8-24					
7/16-14	5/8-11	37/64	41/64	17/32	1/4
7/16-20					
1/2-13	11/16-11	41/64	45/64	19/32	1/4
1/2-20					

WARNING

Use the following procedure to remove and install screw thread inserts:

1. Drill thread insert. Refer to Table 1 for drill size and depth.
2. Deflect keys inward and break off.
3. Remove remainder of thread insert with a screw extractor.
4. Install screw thread insert until 0.010 to 0.030 in. (0.25 to 0.76 mm) below surface of plate.
5. Drive keys flush in with plate.

END OF WORK PACKAGE

REPAIR STANDARDS 0019 00

THIS WORK PACKAGE COVERS:

Repair Standards

FIT AND WEAR LIMITS

Data covering fit and wear limits is given in each work package. Points of measurement are indicated in the Check Points column in each work package.

T-TIGHT; L-LOOSE

Check Points column includes the manufacture dimensions and tolerances and fits of mating parts. T denotes a tight (interference) fit; L denotes a loose (clearance) fit.

MEANING OF WEAR LIMIT

Wear limits indicate dimension to which a part may wear before it is replaced. Normally, any part not worn beyond its wear limit will be approved for continued service if it is not otherwise damaged.

STANDARD TORQUE LISTING

Standard torques to which bolts, nuts, and screws are to be tightened are listed in WP 0086 00. These are normal values. Any special torque values are listed in the work package text pertinent to applicable parts.

END OF WORK PACKAGE

CHAPTER 4

SHIMMING AND GEAR SETTING PROCEDURES

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER 0020 00

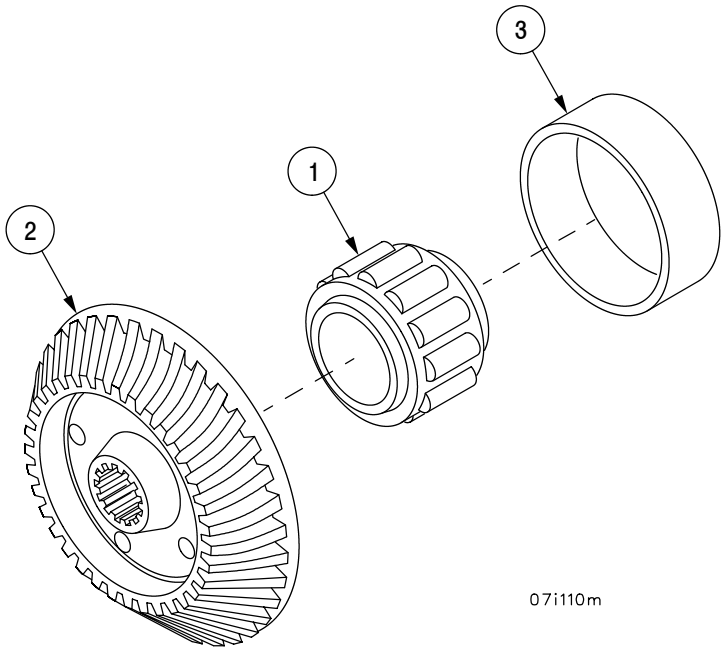
THIS WORK PACKAGE COVERS:

Determining Nominal Shims for Output Bevel Driven Gear Bearing Retainer

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER

1. If original shim pack thickness is not known, or if certain new parts have replaced original parts, the nominal shim thickness must be calculated, as outlined below:
2. Replacement of any of the following components may affect shim pack dimension required:

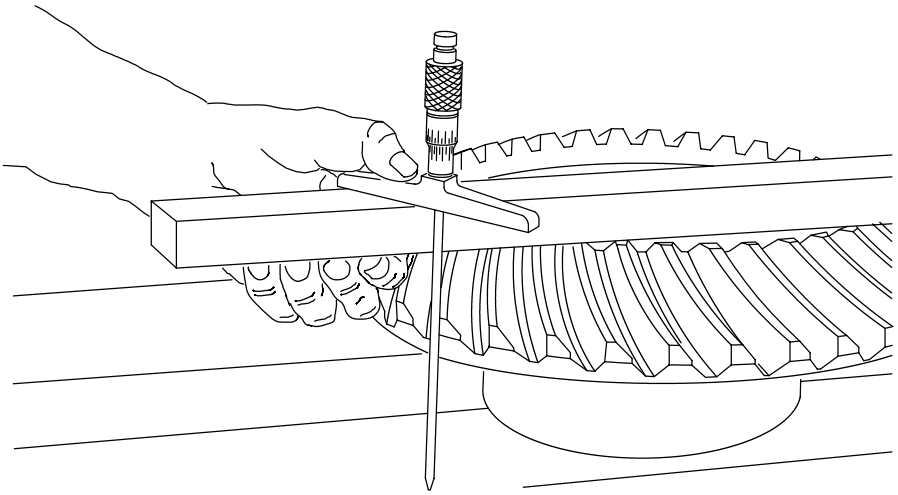
   Bearing retainer
   Transmission housing
   Roller bearing assembly
   Output bevel driven gear
3. Install bearing inner race (1) into hub of output bevel driven gear (2). Install outer race (3) on inner race.



DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – CONTINUED 0020 00

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – Continued

4. Measure and record dimension indicated by Y on Figure 1. A method of making this measurement is shown. Note that thickness of parallel bar must be subtracted from measurement obtained by depth micrometer to find Y dimension.



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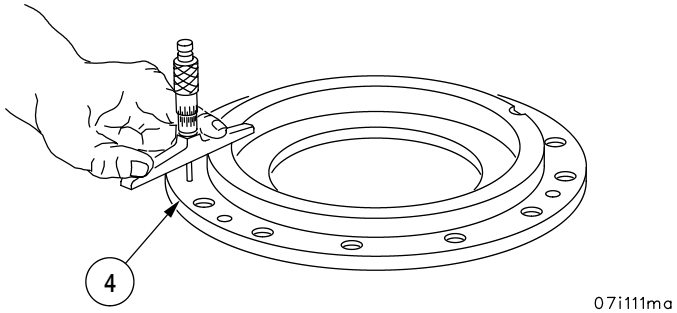
5. Measure and record dimension indicated by Z on Figure 1. Hold depth micrometer on retainer (4) surface.



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6. Record dimension indicated by MD on Figure 1. This dimension is etched on output bevel driven gear.

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – CONTINUED 0020 00

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – Continued

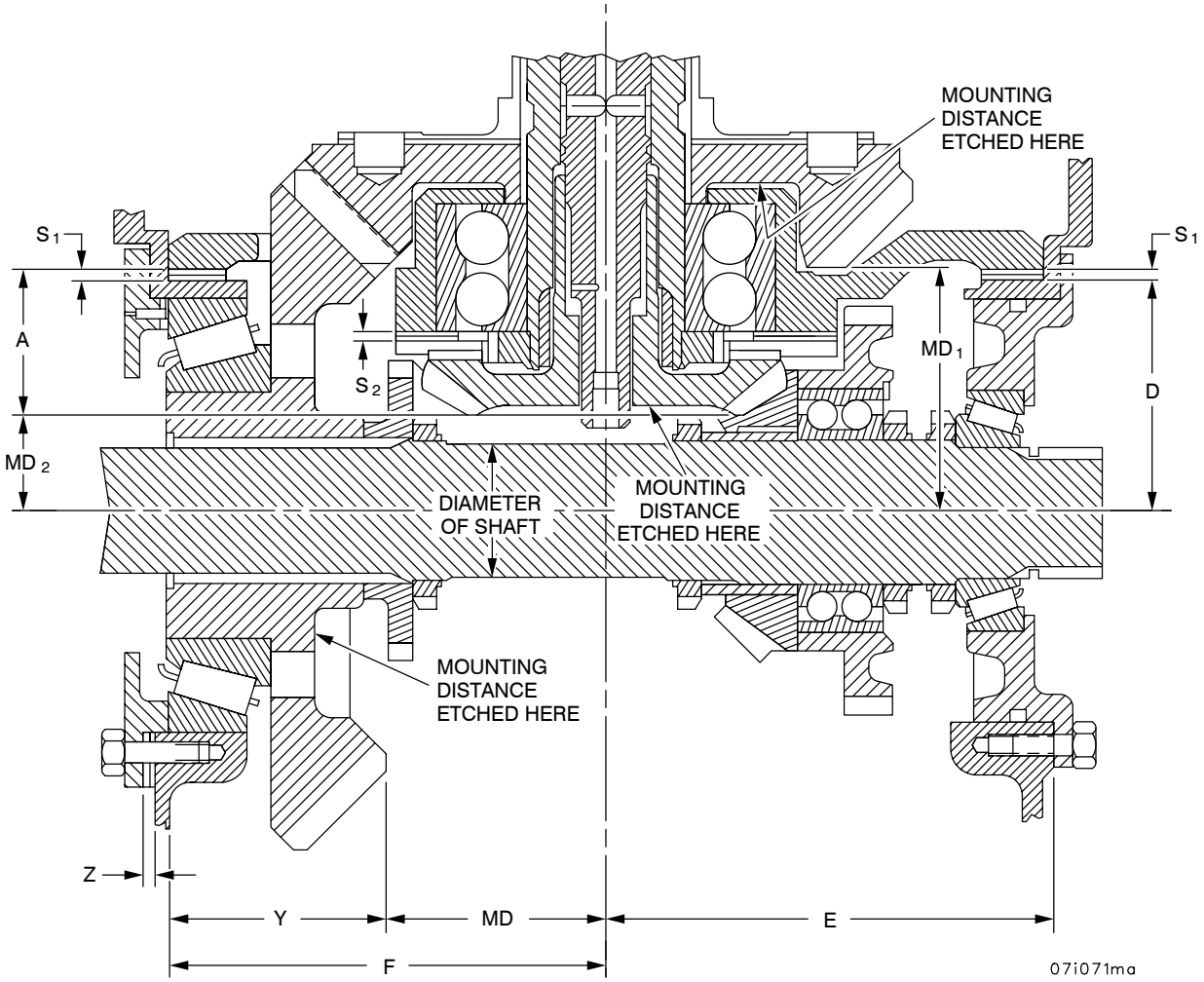


Figure 1. Shimming and Gear Setting Dimensions for XT-1410-4 Transmission

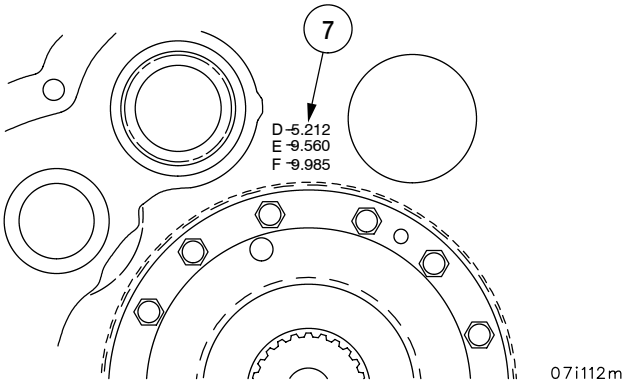
DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – CONTINUED 0020 00

DETERMINING NOMINAL SHIMS FOR OUTPUT BEVEL DRIVEN GEAR BEARING RETAINER – Continued

NOTE

Record measurement from housing being used because each housing is stamped with its specific dimension.

7. Record dimension indicated by F on Figure 1. This dimension is stamped on a web (7) at the left side of the transmission housing.



8. Determine nominal shim pack thickness by substituting dimensions recorded in 4 through 7, above, for Y, Z, MD and F in the following formula: (MD + Y + Z) – F = nominal shim pack thickness.
9. Assemble output drive shaft as outlined on WP 0077 00.
10. Install assembled drive shaft group (and brake coolant pump assembly) into transmission as outlined on WP 0075 00.

END OF WORK PACKAGE

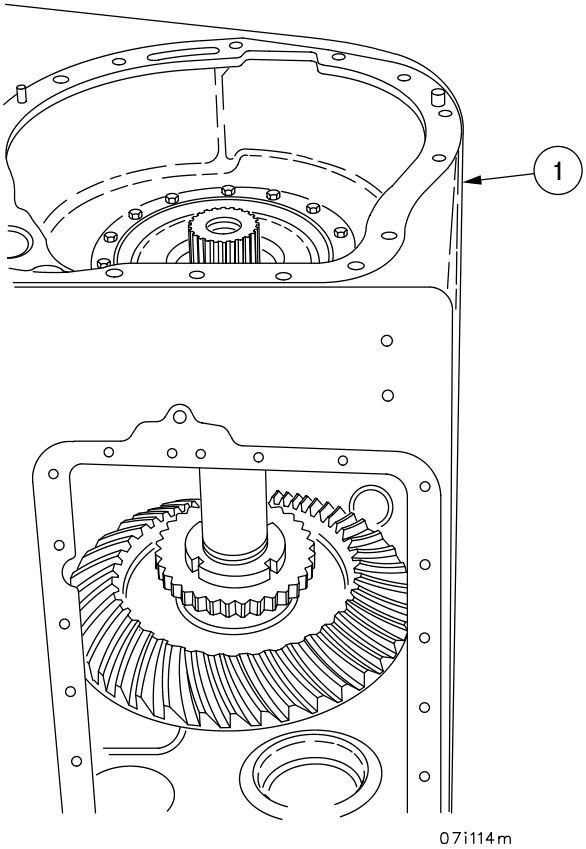
ADJUSTING DRIVE SHAFT PRELOAD 0021 00

THIS WORK PACKAGE COVERS:

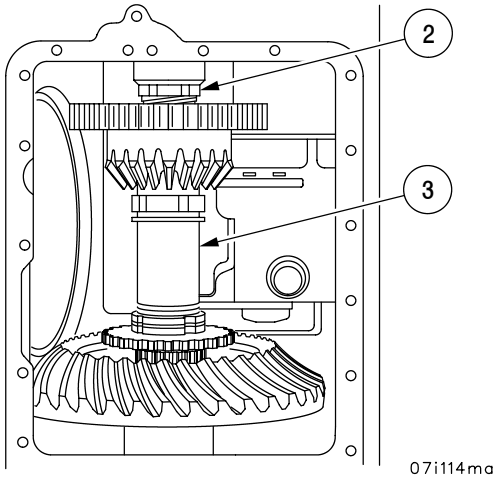
Adjusting Drive Shaft Preload

ADJUSTING DRIVE SHAFT PRELOAD

1. Position transmission housing (1) as shown.



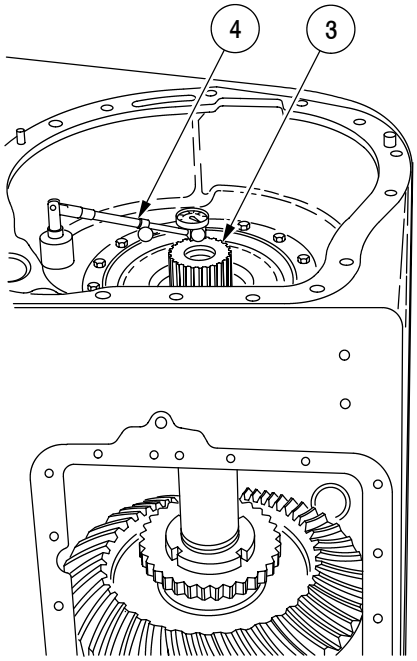
2. Tighten uppermost spanner nut (2) against right drive shaft bearing until all endplay in drive shaft (3) is eliminated.



ADJUSTING DRIVE SHAFT PRELOAD – CONTINUED 0021 00

ADJUSTING DRIVE SHAFT PRELOAD – Continued

3. Check endplay of drive shaft (3). Use dial indicator (4) to check endplay.



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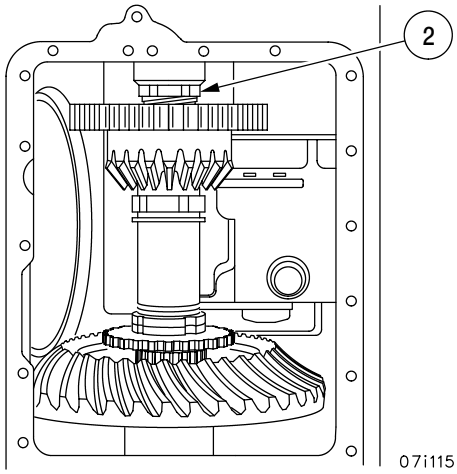
NOTE

Tap inner race of right drive shaft bearing down against spanner nut while backing off nut.

4. After all endplay is eliminated, back off spanner nut (2) (tightened in Step 2 above) until 0.002 to 0.005 inch endplay can be measured.



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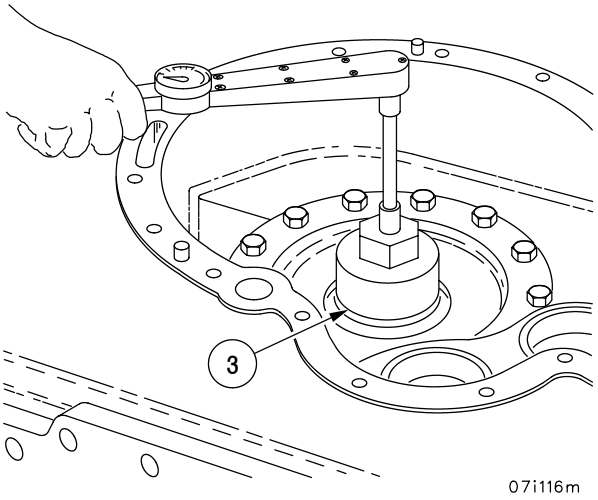
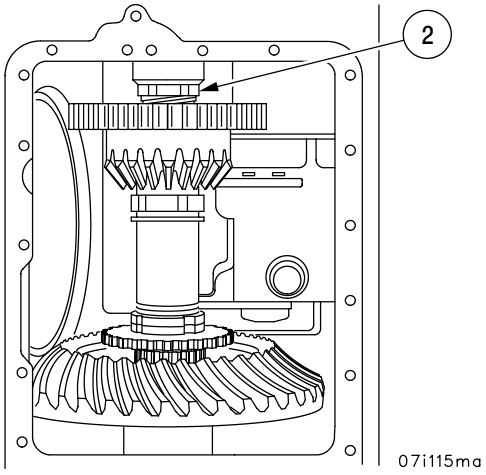
ADJUSTING DRIVE SHAFT PRELOAD – CONTINUED 0021 00

ADJUSTING DRIVE SHAFT PRELOAD – Continued

5. Using an inch-pound wrench (item 23, WP 0088 00) and splined wrench (item 19, WP 0088 00), rotate drive shaft (3) slowly and record torque required to rotate it.



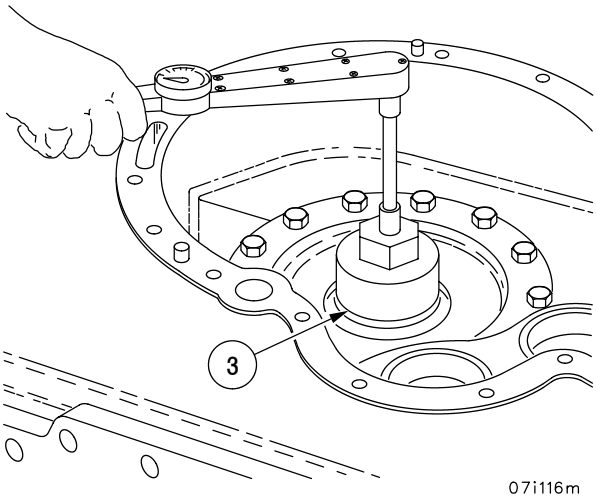
6. Gradually retighten spanner nut (2) against right bearing until all endplay is eliminated. Continue tightening spanner nut until hole in nut which is closest to slot in drive shaft aligns with slot.



ADJUSTING DRIVE SHAFT PRELOAD – CONTINUED 0021 00

ADJUSTING DRIVE SHAFT PRELOAD – Continued

7. Recheck torque required to rotate drive shaft (3) slowly. If torque does not exceed free-rolling torque by 15 lb-in (1.7 N•m), back spanner nut off to next closest locking position. (Do not install lockring in the spanner at this time.)



END OF WORK PACKAGE

DETERMINING NOMINAL SHIMS FOR TRANSMISSION MAIN BEARING SUPPORT 0022 00

THIS WORK PACKAGE COVERS:

Determining Nominal Shims for Transmission Main Bearing Support

DETERMINING NOMINAL SHIMS FOR TRANSMISSION MAIN BEARING SUPPORT

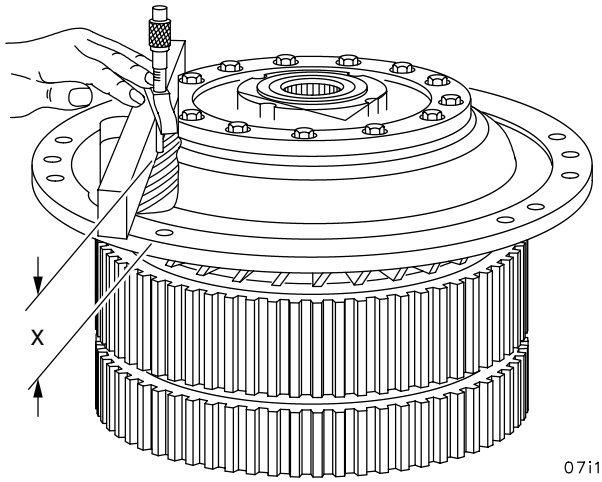
1. If original shim pack thickness is not known, or if certain new parts have replaced original parts, nominal shim thickness must be calculated as outlined below:
2. Replacement of any of the following components may affect shim pack dimension required:

   Transmission main bearing support
   Output bevel gear set

NOTE

MD1 (Mounting Distance) is etched on output bevel drive gear and must be recorded before gear is installed in this group.

3. Assemble low and reverse range planetary carrier assemblies as outlined on WP 0074 00.
4. Measure and record dimension indicated by X shown below. Note that micrometer depth gauge must be subtracted from the height of the parallel bar to find dimension X.



5. Record dimension indicated by MD1 on Figure 1 of WP 0020 00. This dimension was etched on output bevel drive gear and was recorded during rebuild of low and reverse range planetary carrier assemblies (WP 0074 00).

NOTE

Record dimension from housing being used; each housing is stamped with its specific dimensions.

6. Record dimension, which is indicated by D on Figure 1 of WP 0020 00. This dimension is stamped on a web at left side of transmission housing.

DETERMINING NOMINAL SHIMS FOR TRANSMISSION MAIN BEARING SUPPORT – CONTINUED 0022 00

DETERMINING NOMINAL SHIMS FOR TRANSMISSION MAIN BEARING SUPPORT – Continued

7. Determine nominal shim pack thickness by substituting dimensions recorded in Steps 4 through 6, above, for X, MD1 and D in the following formula: (MD1 + X) – D = nominal shim pack thickness. Select proper combination of shims to equal this shim pack thickness.

NOTE

Do not install steer bevel drive gear at this time. When correct output bevel gear backlash and gear tooth patterns are obtained, carrier group will be removed to install steer bevel drive gear and its shims.

8. Install shims and low and reverse range planetary carrier assemblies group as outlined in WP 0074 00.

END OF WORK PACKAGE

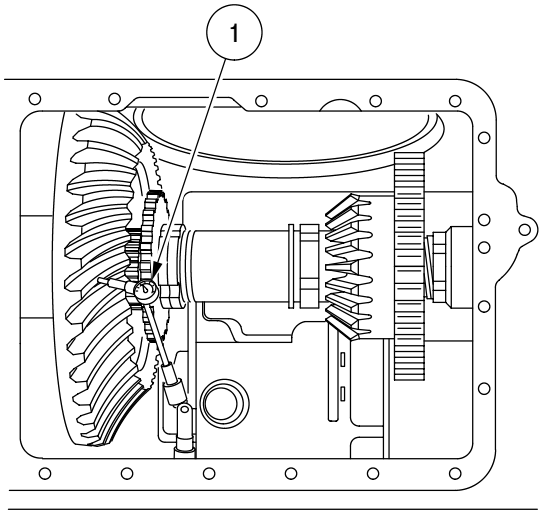
ADJUSTING OUTPUT BEVEL GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN 0023 00

THIS WORK PACKAGE COVERS:

Adjusting Output Bevel Gear Backlash and Gear Tooth Contact Pattern

ADJUSTING OUTPUT BEVEL GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN

1. At this point, the backlash should be approximately what is etched on output bevel driven gear.
2. Check backlash by locking drive gear and checking with a dial indicator (1).



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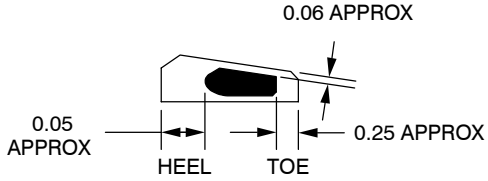
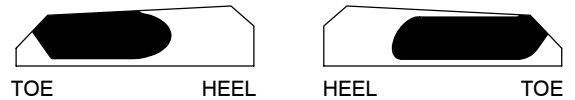
3. Check gear tooth contact pattern by lightly coating both sides of three or four teeth on driven gear with a mixture of red lead and oil. Using a flat stick, pry drive gear up by pivoting stick on drive shaft. Apply enough leverage to snub rotation of drive gear. Simultaneously, run coated teeth on driven gear into mesh with drive gear teeth. Reverse rotation to make pattern on other side of teeth. Compare contact pattern with those here.



GEAR TOOTH MESH PATTERN DESIRED FOR STEER BEVEL DRIVE GEAR WHEN MATED WITH DRIVEN GEAR (BOTH SIDES OF TOOTH).



GEAR TOOTH MESH PATTERNS DESIRED FOR OUTPUT BEVEL DRIVE GEAR WHEN MATED WITH DRIVEN GEAR.

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ADJUSTING OUTPUT BEVEL GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN – CONTINUED 0023 00

ADJUSTING OUTPUT BEVEL GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN – Continued

NOTE

If shims at left bearing retainer are changed, drive shaft preload must be readjusted at next operation.

4. If backlash or tooth contact pattern is not correct, shims must be removed or added at left bearing retainer, at main bearing support, or at both locations.
5. When correct bearing preload, backlash, and gear tooth contacts are established, record the actual thickness of shim pack used at main bearing support. This dimension is required for calculating steer bevel gear shim thickness.

END OF WORK PACKAGE

DETERMINING NOMINAL SHIM FOR STEER BEVEL DRIVE GEAR 0024 00

THIS WORK PACKAGE COVERS:

Determining Nominal Shim for Steer Bevel Drive Gear

DETERMINING NOMINAL SHIM FOR STEER BEVEL DRIVE GEAR

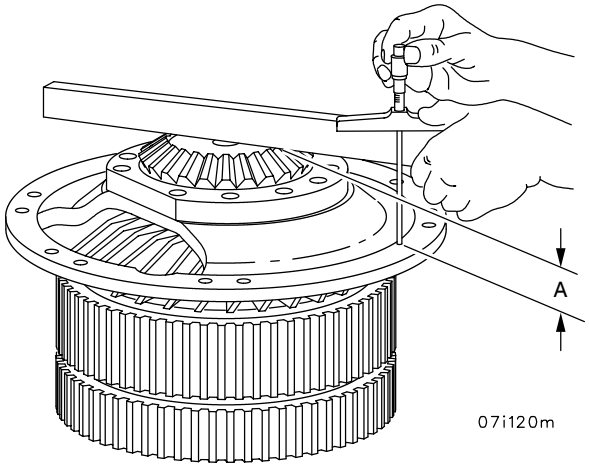
1. If original shim pack thickness is not known, or if certain new parts have replaced original parts, nominal shim thickness must be calculated as outlined below:
2. Replacement of any of the following components may effect shim pack thickness:

   Transmission housing
   Transmission main support bearing support
   Transmission main support bearing
   Output bevel gear
   Steer-drive bevel gear set
   Thrust washer
   Main bearing retainer
3. Remove low and reverse range planetary carrier assemblies from transmission housing (WP 0074 00).
4. Record dimension indicated by MD2 on Figure 1 of WP 0020 00. This dimension is etched on steer bevel drive gear.

NOTE

Record backlash dimension etched on this gear for use below.

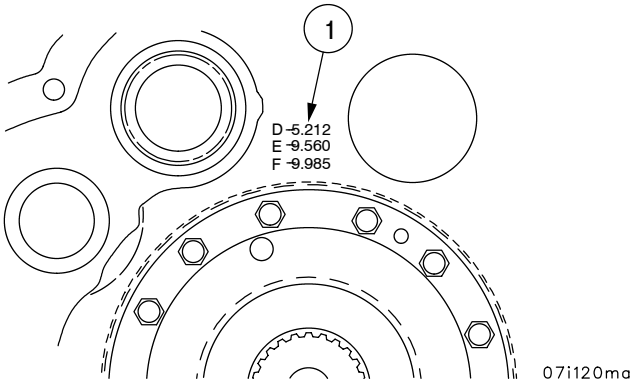
5. Measure and record dimension indicated by A on Figure 1 of WP 0020 00. When this measurement is made, main bearing retainer is installed without any shims and thrust washer is in its place. Thickness of parallel bar must be subtracted from micrometer depth gage reading to obtain dimension A.



DETERMINING NOMINAL SHIM FOR STEER BEVEL DRIVE GEAR – CONTINUED 0024 00

DETERMINING NOMINAL SHIM FOR STEER BEVEL DRIVE GEAR – Continued

6. Record dimension indicated by D on Figure 1 of WP 0020 00. This dimension is stamped in housing (1).



7. Record actual shim dimension used for main bearing support (WP 0022 00).
8. Calculate nominal shim required by substituting dimensions recorded in Steps 4 through 7, above, for MD2, D, and actual S1 in formula:

   (D + actual S1) – (MD2 + A) = nominal S2. Select proper combination of shims to equal the required shim pack thickness.

CAUTION

Before bolting assembly down tightly, be certain that steer bevel drive gear is positioned toward right side of transmission, far enough to prevent interference with drive gear.

9. Install nominal shim pack and install low and reverse range planetary carrier assembly (with bevel gear and thrust washer) into transmission housing. Follow procedures in WP 0074 00.

END OF WORK PACKAGE

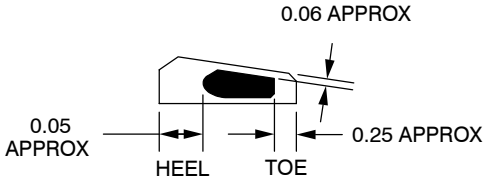
ADJUSTING STEER BEVEL DRIVE GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN 0025 00

THIS WORK PACKAGE COVERS:

Adjusting Steer Bevel Drive Gear Backlash and Gear Tooth Contact Pattern

ADJUSTING STEER BEVEL DRIVE GEAR BACKLASH AND GEAR TOOTH CONTACT PATTERN

1. Adjust backlash of steer bevel gear set by adjusting spanner nuts at both sides of driven gear on drive shaft. Backlash should be adjusted to that etched on the steer bevel drive gear (recorded in WP 0024 00).
2. Lightly coat three or four teeth of driven gear with a mixture of red lead and oil.
3. Using a flat stick, pry drive gear up by pivoting stick on drive shaft. Apply enough leverage to snub rotation of drive gear. Run painted teeth of driven gear into mesh with drive gear. Reverse rotation to mark both sides of teeth. Check gear tooth contact pattern produced with desired pattern below.



GEAR TOOTH MESH PATTERN DESIRED FOR STEER BEVEL DRIVE GEAR WHEN MATED WITH DRIVEN GEAR (BOTH SIDES OF TOOTH).

CONVEX SIDE OF TOOTH CONCAVE SIDE OF TOOTH

GEAR TOOTH MESH PATTERNS DESIRED FOR OUTPUT BEVEL DRIVE GEAR WHEN MATED WITH DRIVEN GEAR.

07i118m

4. If necessary, adjust shim pack to obtain proper gear tooth contact pattern.

NOTE

Backlash must be readjusted as next step when shim pack is changed. Refer to Step 1.

5. For steer bevel gears etched with a backlash adjustment in 0.018 to 0.022 inch range, this is final setting. For those in 0.006 to 0.012 inch range, readjust backlash (after gear tooth contact pattern is satisfactory) to 0.018 inch.
6. Install remaining three lockrings on spanner nuts on drive shaft. Be certain that inner ends of rings are seated in slots in shaft. Lockring tails (viewed from right side of transmission) wrap counterclockwise around spanner nuts. Stake edges of ring grooves at several points to retain rings.

END OF WORK PACKAGE

CHAPTER 5

DIRECT SUPPORT MAINTENANCE

STEER CONTROL VALVE ASSEMBLY REPLACEMENT 0026 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Parts kit (item 5, WP 0088 00)
Suitable lifting device
Lifting sling (item 12, WP 0088 00)

Materials/Parts

Lockwasher (2) (item 99, WP 0087 00)
Gasket (item 32, WP 0087 00)
Gasket (item 33, WP 0087 00)
Self-locking bolt (item 109, WP 0087 00)
Self-locking bolt (2) (item 110, WP 0087 00)

Personnel Required

Two

References

TM 9-2350-256-20
LO 9-2350-256-12

Equipment Conditions

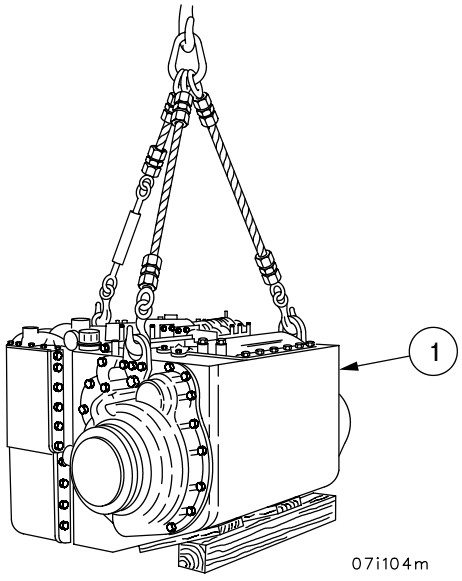
Transmission removed (TM 9-2350-256-20)
Transmission cleaned and drained (LO 9-2350-256-12)

NOTE

Install parts kit to prevent transmission oil leakage during handling.

REMOVAL

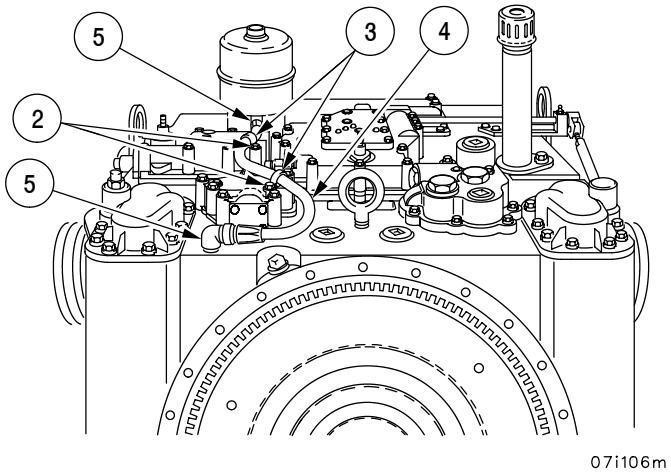
1. Using a suitable lifting device and lifting sling, position transmission assembly (1) on bench or disassembly table.



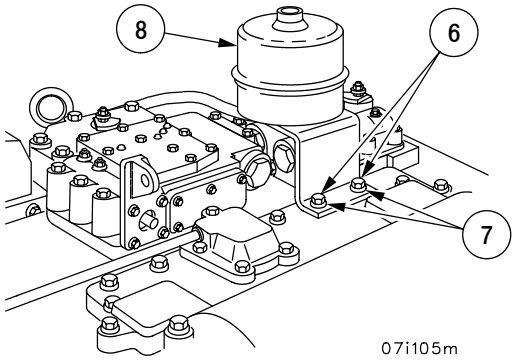
STEER CONTROL VALVE ASSEMBLY REPLACEMENT – CONTINUED 0026 00

REMOVAL – Continued

2. Remove two bolts (2), two clamps (3), hose assembly (4), and two elbows (5).



3. Remove two self-locking bolts (6), two lockwashers (7), and breather assembly (8). Discard lockwashers and self-locking bolts.



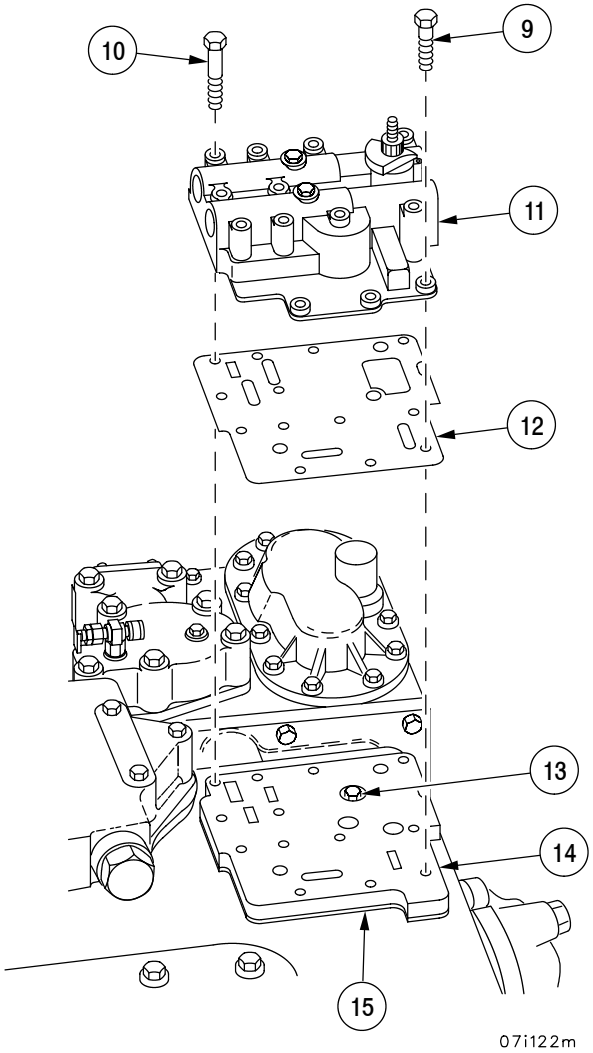
STEER CONTROL VALVE ASSEMBLY REPLACEMENT – CONTINUED 0026 00

REMOVAL – Continued

4. Remove three bolts (9), 10 bolts (10), steer control valve body assembly (11), and gasket (12). Discard gasket.
5. Remove self-locking bolt (13), steer valve body plate (14) and gasket (15). Discard gasket and self-locking bolt.

INSTALLATION

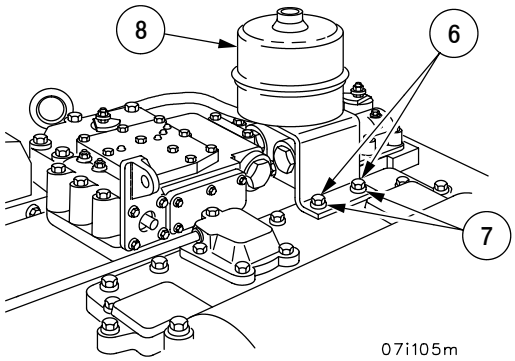
1. Align new gasket (15) and steer valve body plate (14) and install new self-locking bolt (13).
2. Align new gasket (12) and steer control valve body assembly (11) and install 10 bolts (10) and three bolts (9).



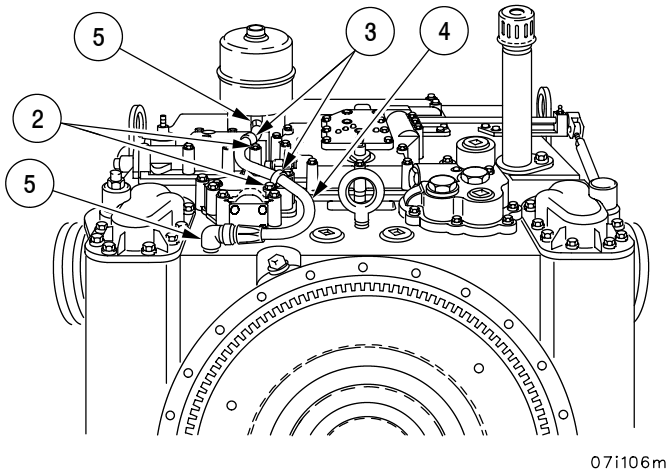
STEER CONTROL VALVE ASSEMBLY REPLACEMENT – CONTINUED 0026 00

INSTALLATION – Continued

3. Install breather assembly (8), two new self-locking bolts (6), and two new lockwashers (7).



4. Install two elbows (5) and hose assembly (4). Secure hose assembly (4) with two clamps (3) and two bolts (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install transmission in vehicle
(TM 9-2350-256-20)
Service transmission (LO 9-2350-256-12)

END OF WORK PACKAGE

STEER CONTROL VALVE ASSEMBLY REPAIR 0027 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Torque wrench (item 23, WP 0088 00)

Materials/Parts

Retaining ring (item 56, WP 0087 00)
Retaining ring (4) (item 87, WP 0087 00)
Preformed packing (3) (item 61, WP 0087 00)
Preformed packing (2) (item 13, WP 0087 00)

Materials/Parts - Continued

Gasket (2) (item 57, WP 0087 00)
Sealing compound (item 1, WP 0085 00)
Self-locking nut (2) (item 95, WP 0087 00)

Equipment Conditions

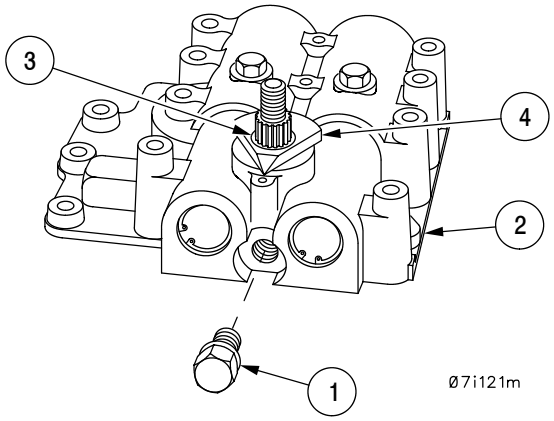
Steer control valve assembly removed (WP 0026 00)

DISASSEMBLY

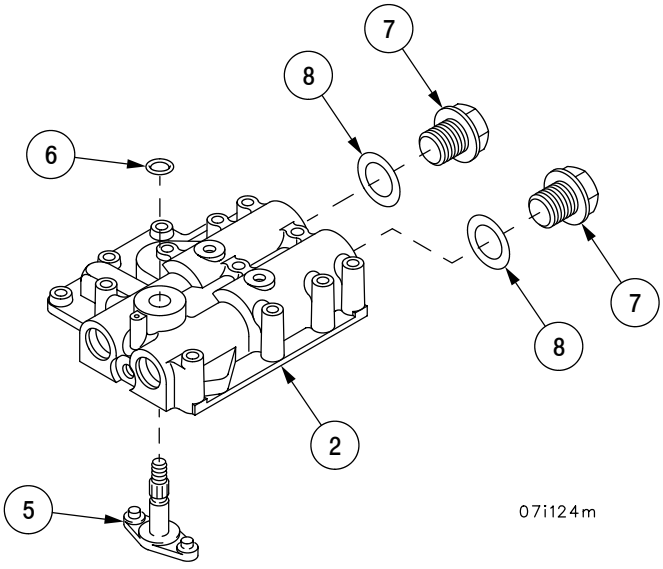
NOTE

Do not disassemble detent plug assembly. If plug or ball is damaged or if spring tension is weak, replace entire unit.

1. Remove steer detent plug assembly (1) from steer control valve body (2). Remove retaining ring (3) and steer position indicator (4). Discard retaining ring.



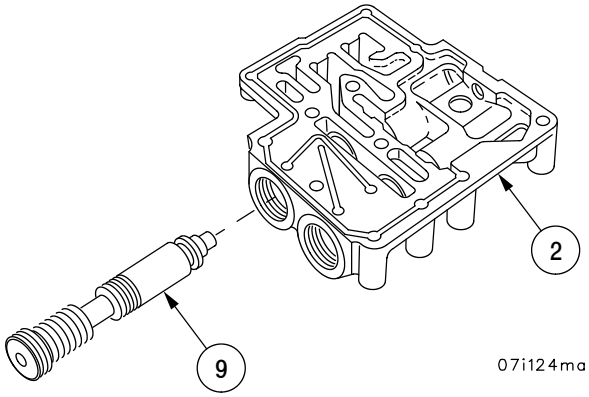
2. Remove steer lever shaft (5) and preformed packing (6) from steer control valve body (2). Remove two plugs (7) and two annular gaskets (8). Discard preformed packing and annular gaskets.



STEER CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0027 00

DISASSEMBLY – Continued

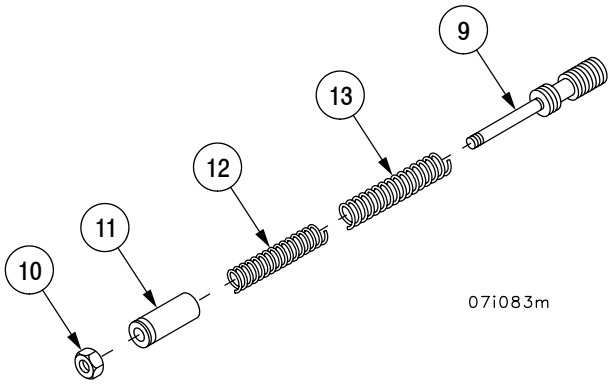
3. Remove two steer control valves (9) from steer control valve body (2).



NOTE

Do not disassemble valve assemblies unless parts replacement is necessary. Perform Step 4 or 5 only if replacement is necessary.

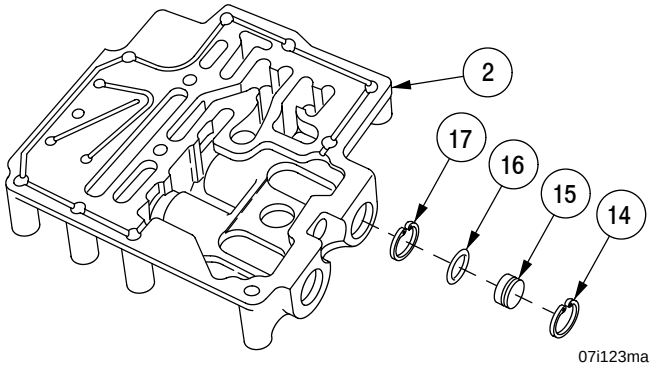
4. Remove nut (10), detent plunger (11) and two inner and two outer steer control compression springs (12 and 13) from each steer control valve (9).



NOTE

Do not remove inner retaining rings from steer control valve body unless replacement is necessary.

5. Remove two outer retaining rings (14), two plugs (15) and two seals (16) from steer control valve body (2). Remove two inner retaining rings (17), if necessary. Discard seals and retaining rings, if removed.



STEER CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0027 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection.

FIT AND WEAR LIMITS

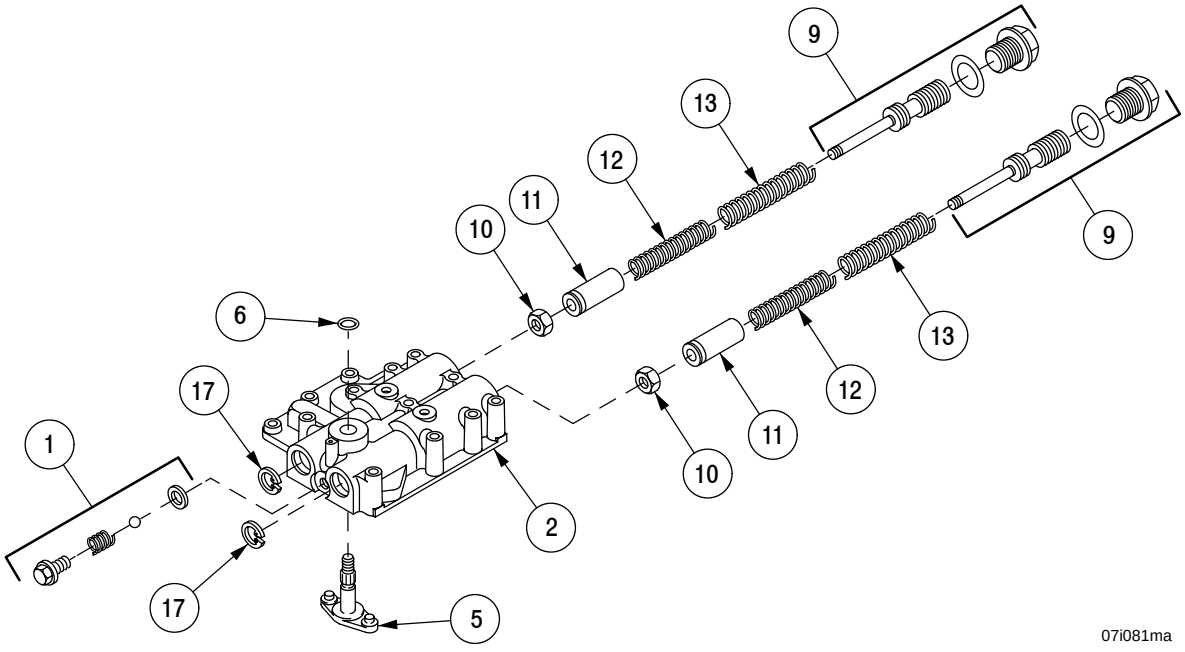
Check the following parts to the dimensions listed. Replace if not within specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Outer compression spring	Free length Length under 65.9 to 72.9 pounds load	2.134 in. 1.545 in.
Inner compression spring	Free length Length under 31.0 to 34.2 pounds load	1.730 in. 1.408 in.
Steer control valve	Valve OD Clearance fit in valve body	0.9980 to 0.9985 in. 0.0010 to 0.0040 in.
Steer control valve body	Valve bore ID Clearance fit in valve in valve body bore **NOTE** Wear is permitted on either the valve or valve body as long as the clearance fit is within 0.0045 inch.	0.9995 to 1.0005 in. 0.0010 to 0.0040 in.

STEER CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0027 00

ASSEMBLY

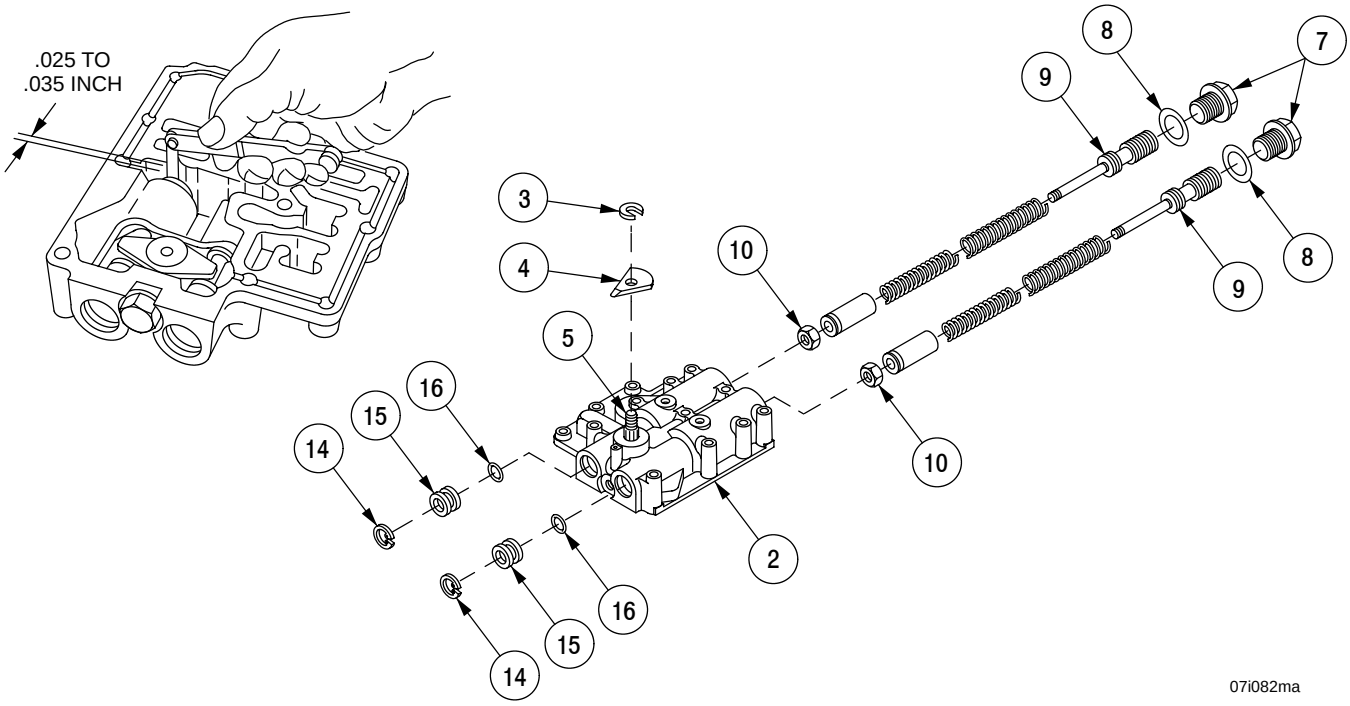
1. Install two new inner retaining rings (17) in steer control valve body (2).
2. Install inner and outer steer control compression springs (12 and 13), detent plunger (11), and jam nut (10) on each steer control valve (9). Temporarily adjust jam nut (10), but do not lock it.
3. Install two steer control valves (9) in steer control valve body (2).
4. Install new preformed packing (6) in steer control valve body (2). Seat preformed packing (6) in groove in steer level shaft (5) bore.
5. Install steer control level shaft (5), making certain the two pins in the shaft engage the slots in the two detent plungers (11), on the valve assemblies (9).
6. Install steer detent plug assembly (1). Torque plug to 40 to 50 lb-ft (54.2 to 67.8 N•m).



STEER CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0027 00

ASSEMBLY – Continued

7. With the valve (5) in the neutral position and the detent ball seated in the central groove of the steer lever shaft, adjust the steer valve detent plunger nuts to obtain a 0.025 to 0.035 inch clearance at the point shown. Lock the nuts (10) to the valve stems by peening the inside diameters of the nuts against the flattened sides of the valve stems.
8. Install steer position indicator (4) and new external retaining ring (3) on steer control lever shaft (5).
9. Install two new annular gaskets (8) and two plugs (7). Torque plugs to 90 to 100 ft-lb (122 to 135.6 N•m).
10. Install two new preformed packings (16) on two plugs (15) and install in steer control valve body (2).
11. Secure plugs (15) in steer control valve body (2) with two new outer retaining rings (14).



NOTE

FOLLOW-ON MAINTENANCE:
Install steer control valve assembly
(WP 0026 00)

END OF WORK PACKAGE

MAIN CONTROL VALVE ASSEMBLY REPLACEMENT 0028 00

THIS WORK PACKAGE COVERS:
Removal, Installation

INITIAL SETUP:

Tools and Special Tools
General mechanic's tool kit (item 1, WP 0088 00)

Materials/Parts
Gasket (item 40, WP 0087 00)

Equipment Conditions
Transmission removed
(TM 9-2350-256-20)
Transmission cleaned and drained
(LO 9-2350-256-12)

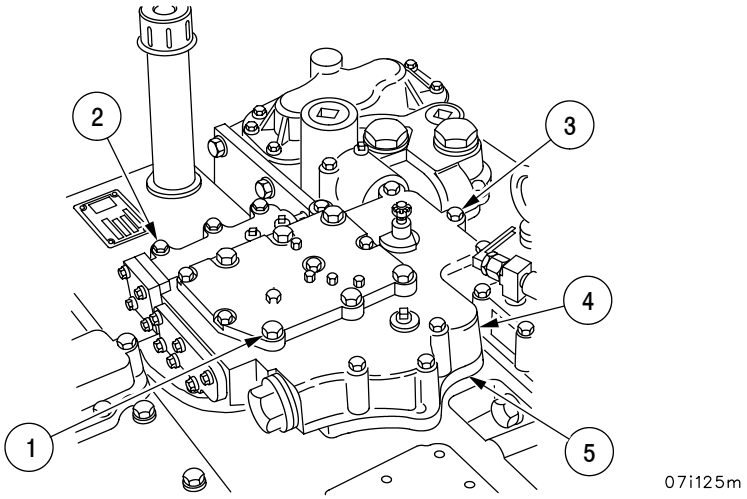
References
TM 9-2350-256-20
LO 9-2350-256-12

REMOVAL

Remove six bolts (1), seven bolts (2), three bolts (3), transmission main control valve assembly (4), and gasket (5). Discard gasket.

INSTALLATION

Install new gasket (5) and transmission main control valve assembly (4) with six bolts (1), seven bolts (2), and three bolts (3).



NOTE

FOLLOW-ON MAINTENANCE:
Install transmission in vehicle
(TM 9-2350-256-20)
Service transmission (LO 9-2350-256-12)

END OF WORK PACKAGE

MAIN CONTROL VALVE ASSEMBLY REPAIR 0029 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Equipment Conditions

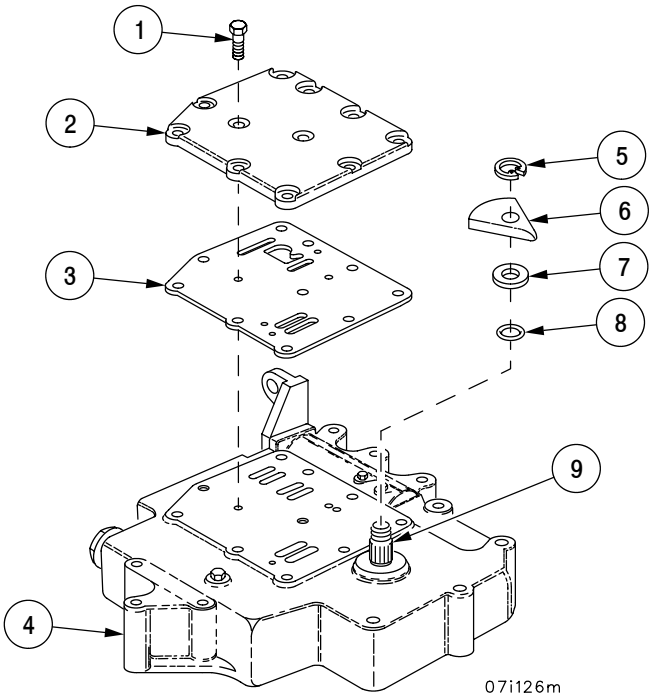
Main control valve assembly removed (WP 0028 00)

Materials/Parts

Retaining ring (item 56, WP 0087 00)
Retaining ring (item 91, WP 0087 00)
Gasket (item 63, WP 0087 00)
Gasket (item 57, WP 0087 00)
Gasket (item 62, WP 0087 00)
Gasket (item 46, WP 0087 00)
Preformed packing (item 96, WP 0087 00)
Lockwasher (6) (item 97, WP 0087 00)
Self-locking bolt (5) (item 104, WP 0087 00)

DISASSEMBLY

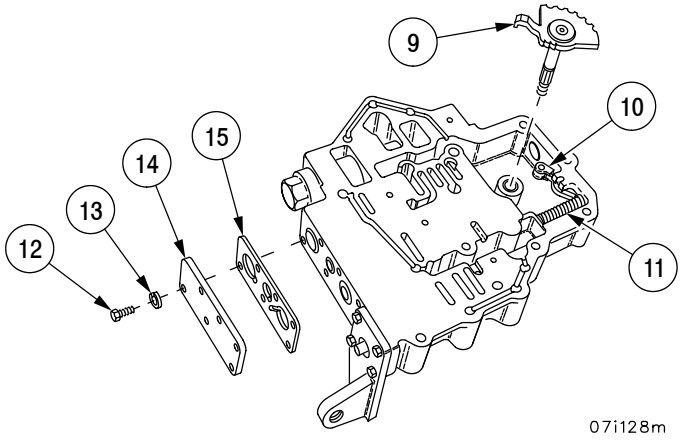
1. Remove five self-locking bolts (1), cover (2), and gasket (3) from control valve body assembly (4). Remove external snap ring (5), shift position indicator (6), thrust washer (7), and gasket (8) from range selector lever (9). Discard snap ring, gaskets and self-locking bolts.



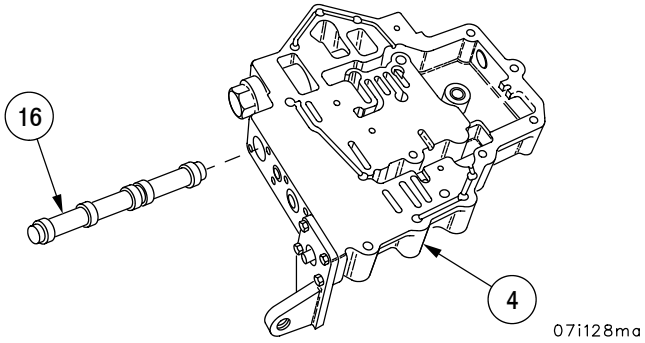
MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

DISASSEMBLY – Continued

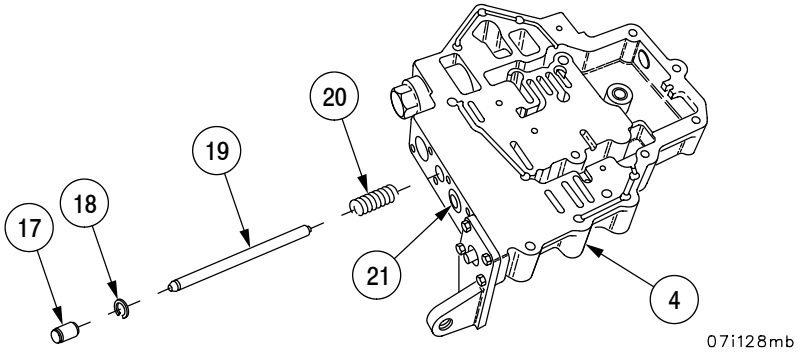
2. Remove range selector lever (9), selector lever detent assembly (10) and detent spring (11). Remove six cap screws (12) and six lockwashers (13), selector valve cover (14) and gasket (15). Discard lockwashers and gasket.



3. Remove range selector valve assembly (16) from control valve body assembly (4). Do not remove ball which is staked into end of valve assembly.



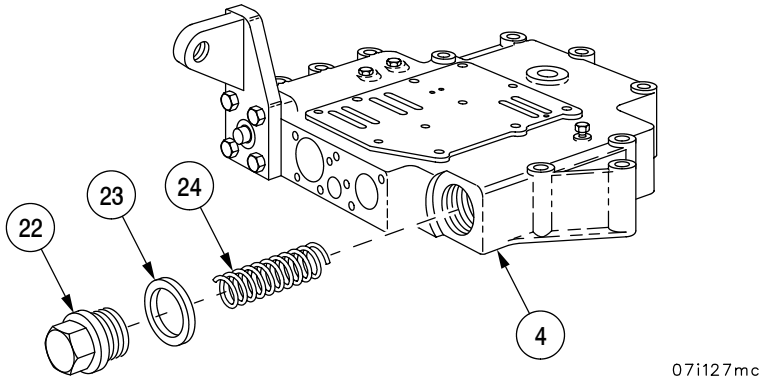
4. Remove shift inhibitor valve (17), snap ring (18), plunger (19), spring (20) and lockup timer valve (21) from control valve body assembly (4). Discard snap ring.



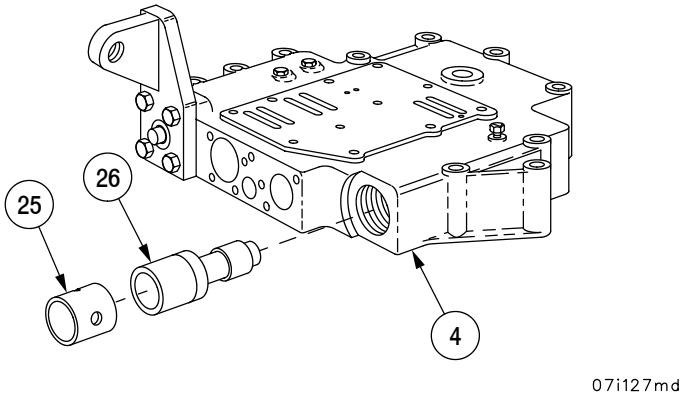
MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

DISASSEMBLY – Continued

5. Remove main oil pressure regulator valve plug (22) with any spacer washers, copper gasket (23) and spring (24) from control valve body assembly (4).



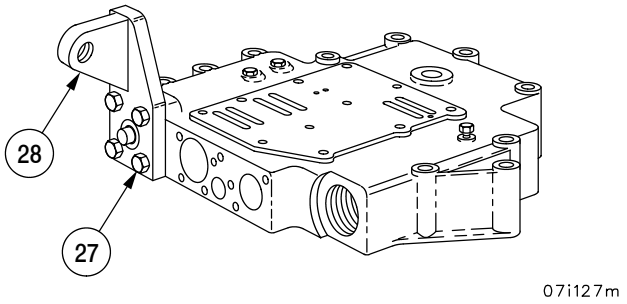
6. Remove main oil pressure regulator valve stop sleeve (25) and valve (26) from control valve body assembly (4).



MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

DISASSEMBLY – Continued

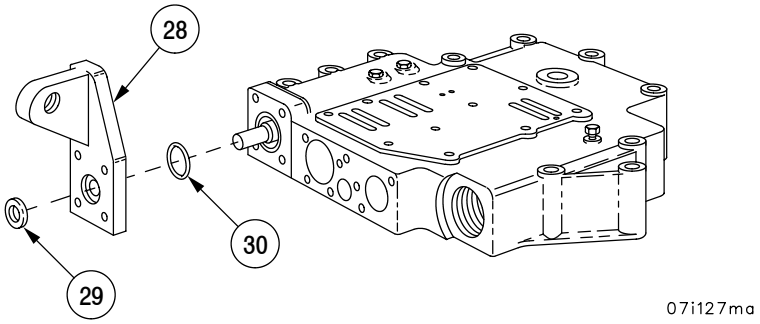
7. Remove four bolts (27) while holding governor relay valve cover (28) against spring pressure.



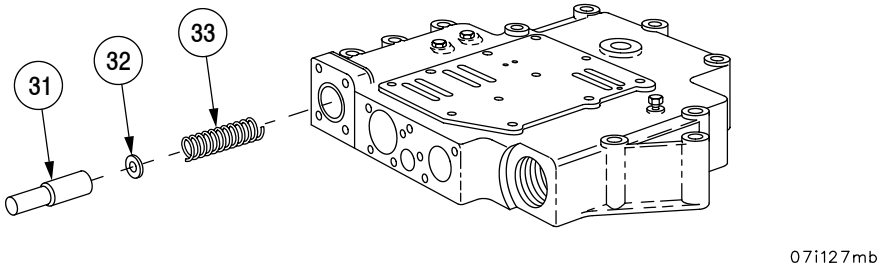
NOTE

Remove plunger seal only if replacement is necessary.

8. Remove governor relay valve cover (28), cover seal (30) and plunger seal (29). Discard seals.



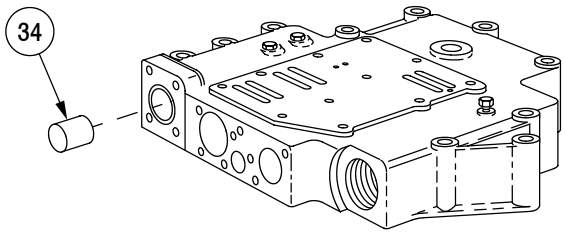
9. Remove plunger (31), spacer washer (32) and governor relay valve spring (33).



MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

DISASSEMBLY – Continued

10. Remove governor relay stop (34).



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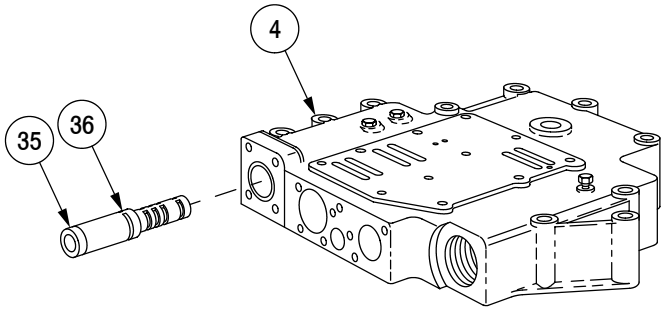
11. Remove governor relay valve (35) and valve sleeve (36) as a unit from control valve body (4).



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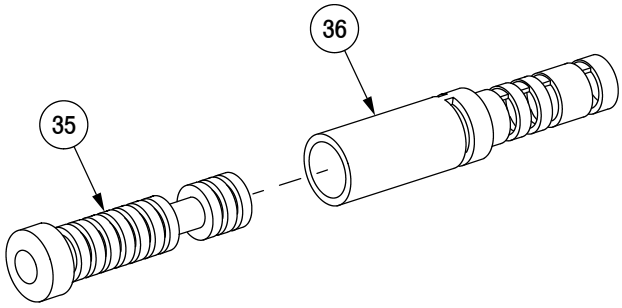
12. Remove governor relay valve (35) from sleeve (36).



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CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

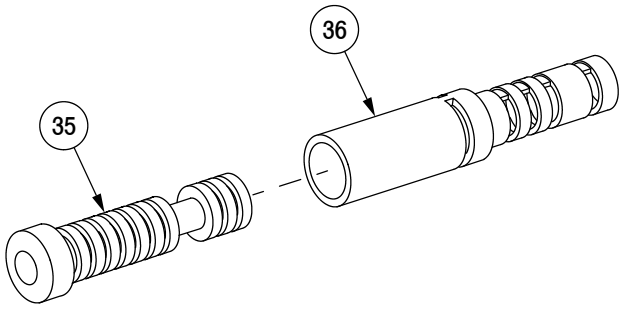
Check the following parts to the dimensions listed. Replaced if not within dimensions specified.

PART NUMBER	CHECK POINTS	ACCEPTABLE LIMITS
Needle bearing	Inside diameter to shaft Press fit to housing bore	0.6245 to 0.6250 in. .8120 to 0.8130 in.
Control valve body	Selector rod bearing bore Range selector valve bore Selector valve clearance fit in bore Shift inhibitor valve bore Shift inhibitor valve clearance in bore Lockup timer valve bore • Clearance fit in bore Large oil pressure regulator valve bore • Clearance fit in bore Small oil pressure regulator valve bore • Clearance fit in bore	0.8120 to 0.8130 in. 0.9995 to 1.0005 in. 0.0010 to 0.0025 in. 0.7495 to 0.7505 in. 0.0010 to 0.0025 in. 1.3120 to 1.3130 in. 0.0010 to 0.0025 in 1.3745 to 1.3755 in 0.0010 to 0.0025 in. 1.0307 to 1.0317 in 0.0010 to 0.0040 in.
Shift inhibitor spring	Free length Under 5.22 ± 0.11 pound load	3.58 in. 2.55 in.
Shift inhibitor plunger	Outside diameter • Clearance fit in bore	0.4345 to 0.4350 in. 0.0030 to 0.0185 in.
Shift inhibitor valve	Outside diameter • Clearance fit in bore	0.7480 to 0.7485 in. 0.0010 to 0.0025 in.
Range selector valve	Outside diameter • Clearance fit in bore	0.9980 to 0.9995 in 0.0010 to 0.0025 in.
Main oil pressure regulator valve	Large outside diameter Small outside diameter • Clearance fit in bore	1.3730 to 1.3735 in. 1.0292 to 1.0297 in. 0.0010 to 0.0025 in.
Helical compression spring	Free length Under 295 to 361 pound load	5.590 in. 4.575 in.
Range selector lever	Bearing surface outer diameter	0.6245 to 0.6250 in.
Sleeve bushing	Outside diameter Inside diameter	1.2750 to 1.2755 in. 0.9995 to 1.0000 in.
Detent plunger	Largest outside diameter	0.9985 to 0.9980 in.
Compression spring	Free length Length under 7.56 ± 0.4 pound load	2.625 in. 2.125 in.
Governor relay valve	Larger outside diameter Intermediate outside diameter Small outside diameter	1.190 in. 0.8445 to 0.8450 in. 0.8261 to 0.8266
Governor relay valve sleeve	Large inside diameter Small inside diameter	1.2760 to 1.2770 0.8276 to 0.8286 in.

MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

ASSEMBLY

1. Install governor relay valve (35), smaller end first, into valve sleeve (36).



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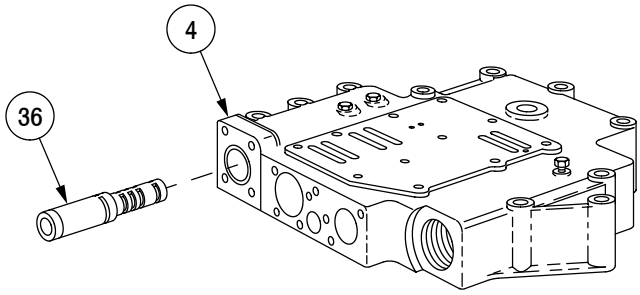
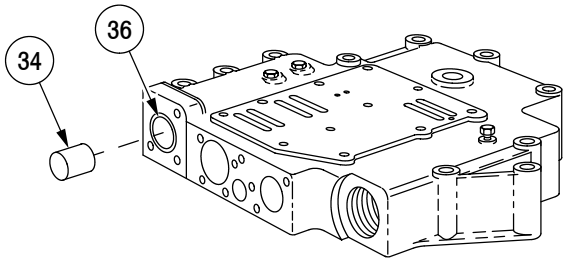
2. Install valve sleeve (36) into control valve body (4).



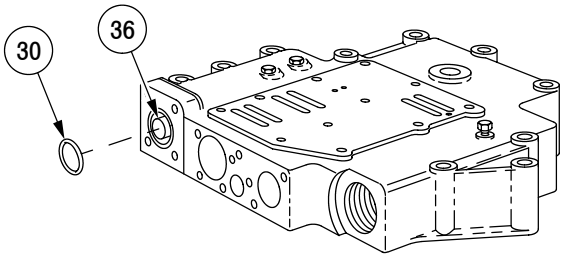
07i127mh

3. Install governor relay stop (34) into valve sleeve (36).



07i127mi

4. Install new cover seal (30) into recess around projecting end of governor sleeve (36).

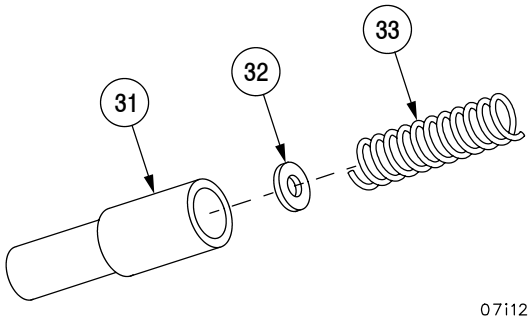


07i127mj

MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

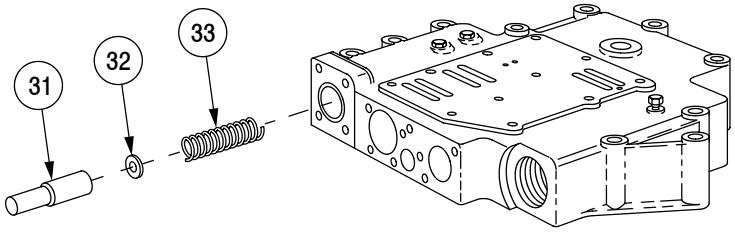
ASSEMBLY – Continued

5. Install spacer washer (32) into the recessed end of the plunger (31). Install governor relay valve spring (33) into plunger (31) to retain washers.



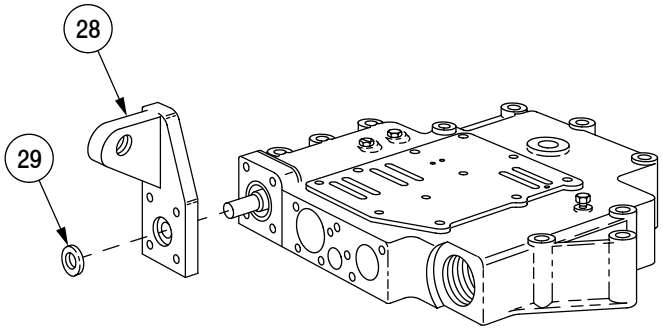
07i127mk

6. Install plunger (31), with spacer washer (32) and governor relay valve spring (33), spring–end first, into valve stop bore.



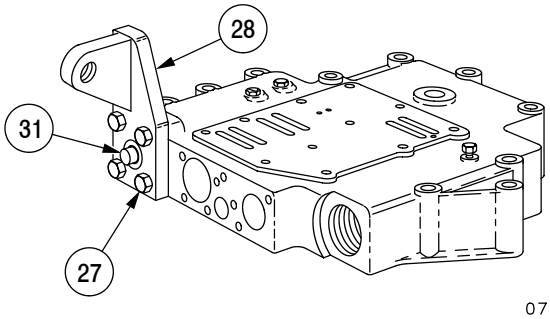
07i127mb

7. Install new plunger seal (29), if removed, sealing lip first, into counterbore of governor relay valve cover (28). Press seal until it bottoms lightly in cover.



07i127ml

8. Install governor relay valve cover (28) over projecting stem of plunger (31). Align cover so that threaded lug is up. Compress cover against spring pressure and install four bolts (27). Torque evenly to 9 to 11 lb–ft (12.2 to 14.9 N•m)

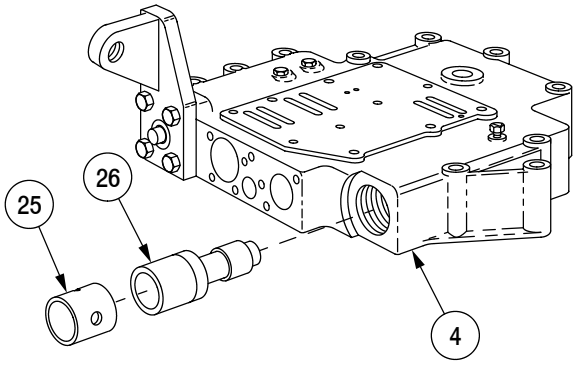


07i127mm

MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

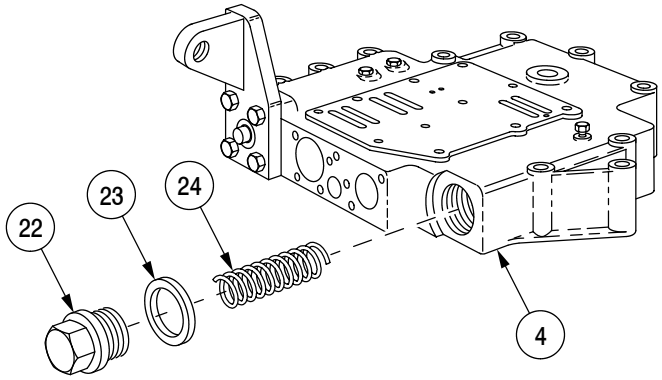
ASSEMBLY – Continued

9. Install main oil pressure regulator valve (26) and sleeve (25) in control valve body assembly (4).



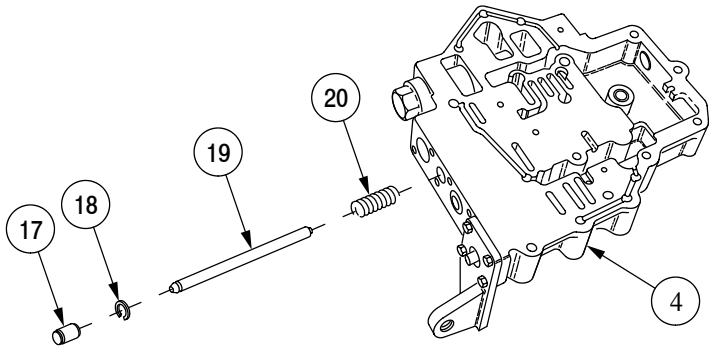
07i127md

10. Install spring (24), spacer washers (if used), copper gasket (23), and main oil pressure regulator valve plug (22) into control valve body assembly (4).



07i127mc

11. Install new snap ring (18) plunger (19) and insert shift inhibitor spring (20), plunger (19) and shift inhibitor valve (17) into control valve body assembly (4).

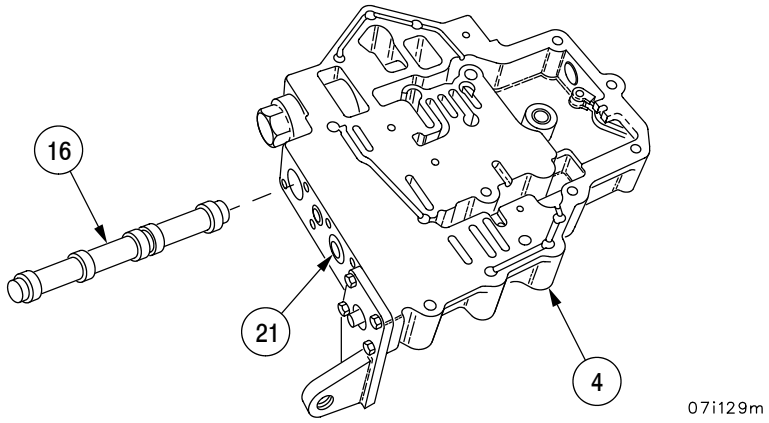


07i127mn

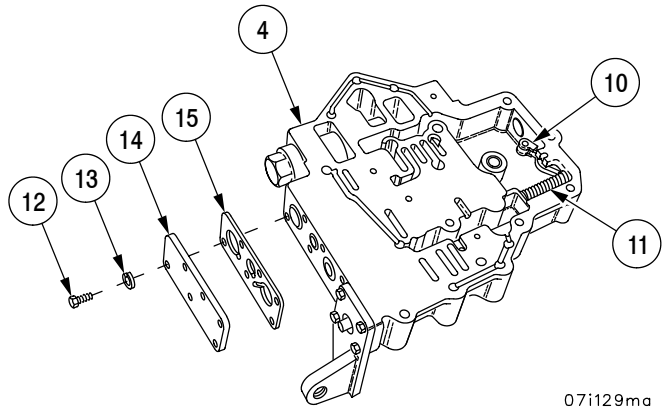
MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

ASSEMBLY – Continued

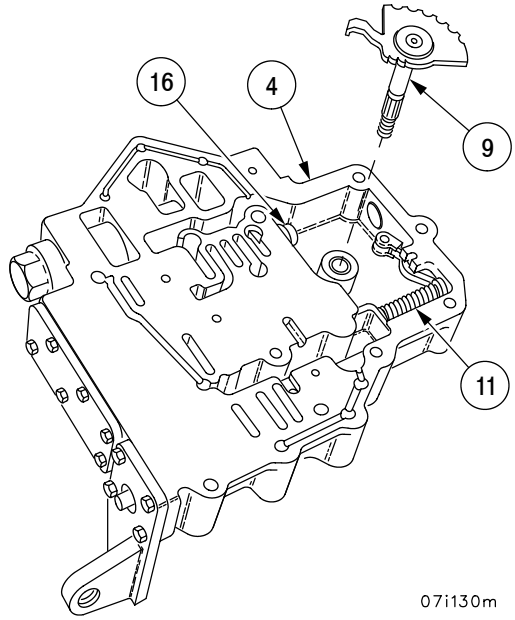
12. Install range selector valve assembly (16), ball end outward, into control valve body assembly (4). Install lockup timer valve (21).



13. Install selector valve cover (14), new gasket (15), six cap screws (12) and six new lockwashers (13). Install selector lever detent assembly (10) and detent spring (11) in control valve body assembly (4).



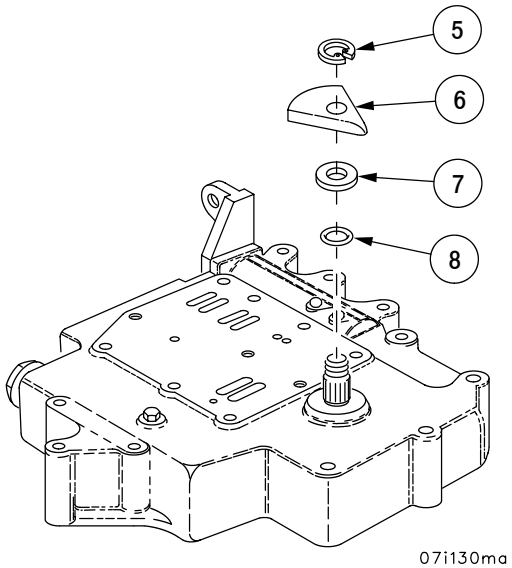
14. Insert range selector lever (9) into control valve body assembly (4). Compress the detent spring (11) with a screwdriver when aligning lever with range selector valve assembly (16).



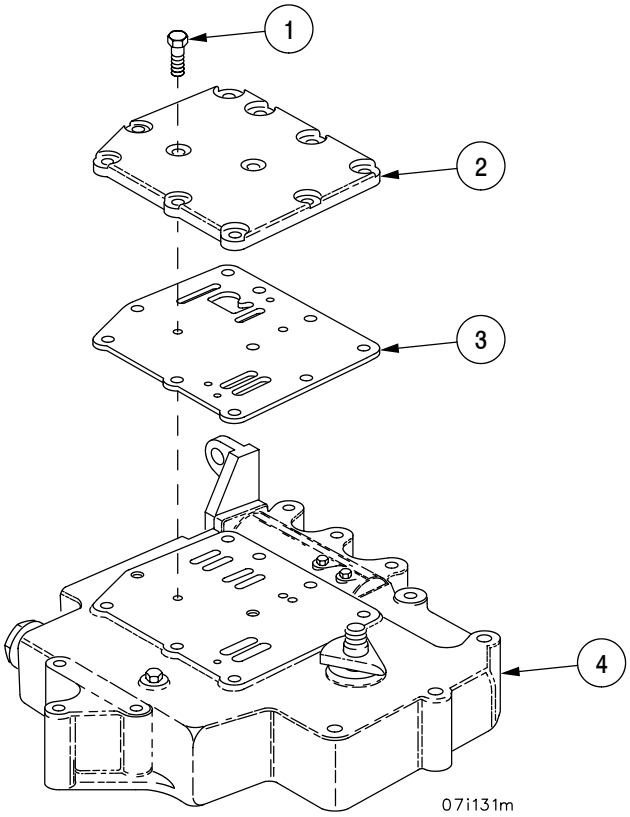
MAIN CONTROL VALVE ASSEMBLY REPAIR – CONTINUED 0029 00

ASSEMBLY – Continued

15. Install seal ring (8), thrust washer (7), shift position indicator (6) and new snap ring (5).



16. Install cover (2) and new gasket (3) on control valve body assembly (4). Install five new self locking-bolts (1). Torque self-locking bolts to 17 to 20 lb-ft (23.1 to 27.1 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install main control assembly
(WP 0028 00)

END OF WORK PACKAGE

STEER OIL PRESSURE REGULATOR VALVE BODY ASSEMBLY REPLACEMENT 0030 00

THIS WORK PACKAGE COVERS:
Removal, Installation

INITIAL SETUP:

Tools and Special Tools
General mechanic's tool kit (item 1, WP 0088 00)

Materials/Parts
Self-locking bolt (item104, WP 0087 00)
Self-locking bolt (7) (item 110, WP 0087 00)

Materials/Parts – Continued
Gasket (item 12, WP 0087 00)
Gasket (item 33, WP 0087 00)

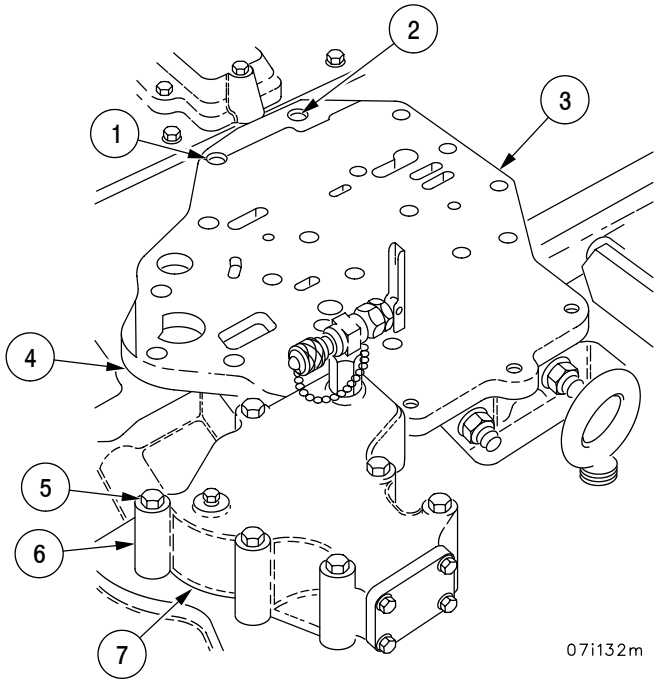
Equipment Conditions
Main control valve assembly removed (WP 0028 00)

REMOVAL

1. Remove self-locking bolt (1), bolt (2), plate (3) and gasket (4). Discard self-locking bolt and gasket.
2. Remove seven self-locking bolts (5), steer oil pressure regulator valve body assembly (6) and gasket (7). Discard self-locking bolts and gasket.

INSTALLATION

1. Install steer oil pressure regulator valve body assembly (6) with new gasket (7) and seven new self-locking bolts (5).
2. Install plate (3) with new gasket (4), bolt (2) and new self-locking bolt (1).



NOTE

FOLLOW-ON MAINTENANCE:
Install main control valve assembly
(WP 0028 00)

END OF WORK PACKAGE

STEER OIL PRESSURE REGULATOR VALVE BODY ASSEMBLY REPAIR 0031 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

Gasket (item 35, WP 0087 00)
Lockwasher (4) (item 98, WP 0087 00)

Equipment Conditions

Steer oil pressure regulator valve body removed (WP 0030 00)

DISASSEMBLY

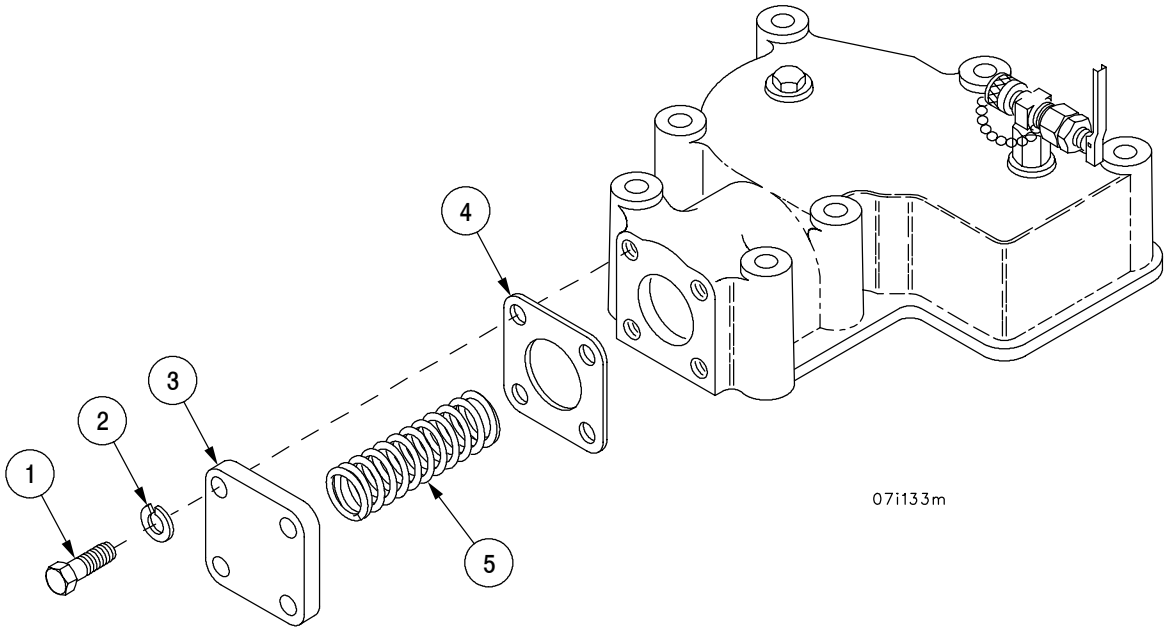
WARNING

Cover is spring-loaded. Depress against spring pressure during removal to prevent injury.

NOTE

Retain any adjusting spacers which may be installed between the cover and spring.

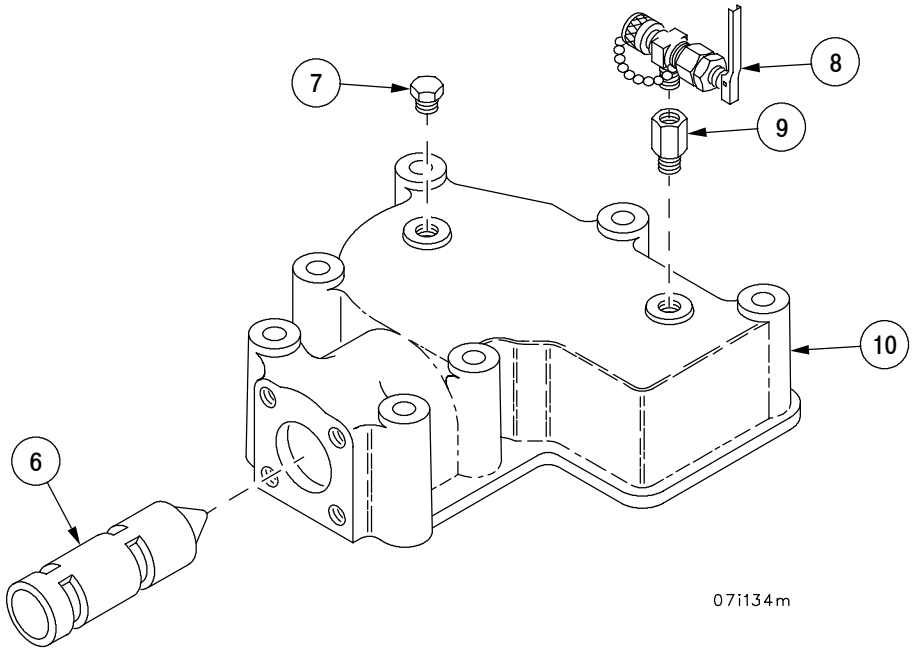
1. Remove four screws (1), four lockwashers (2), steer oil pressure regulator valve body cover (3), gasket (4) and spring (5). Discard lockwashers and gasket.



STEER OIL PRESSURE REGULATOR VALVE BODY ASSEMBLY REPAIR – CONTINUED 0031 00

DISASSEMBLY – Continued

2. Remove steer oil pressure regulator valve (6), plug (7), sampling valve (8) and adapter (9) from valve body assembly (10).



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

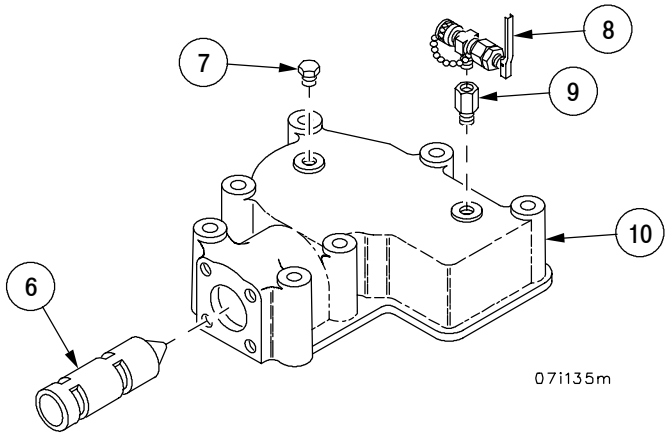
FIT AND WEAR LIMITS

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Valve body	Valve bore ID Clearance fit valve in bore	1.3745 to 1.3755 in. 0.0010 to 0.0025 in.
Valve	Valve OD Clearance fit in bore	1.3730 to 1.3735 in. 0.0010 to 0.0025 in.
Spring	Free length Length under 148.2 to 163.8 pound load	5.981 in. 4.167 in.

STEER OIL PRESSURE REGULATOR VALVE BODY ASSEMBLY REPAIR – CONTINUED 0031 00

ASSEMBLY

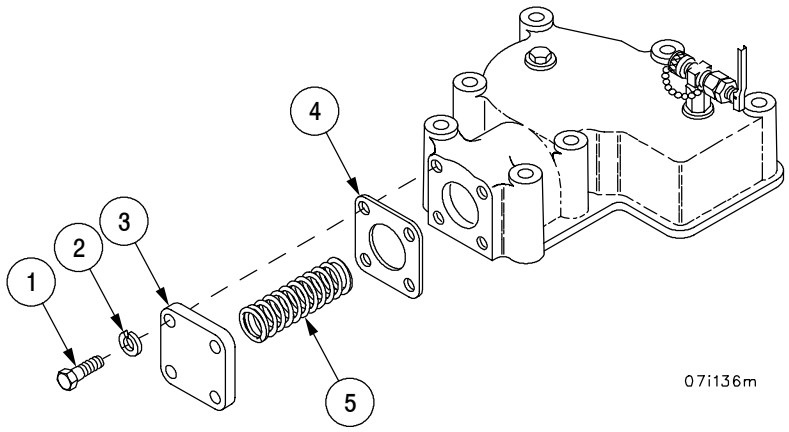
1. Install plug (7), steer pressure regulator valve (6), sampling valve (8) and adapter (9) in valve body assembly (10).



NOTE

Replace adjusting spacers removed during disassembly.

2. Install spring (5), steer oil pressure regulator valve body cover (3) and new gasket (4) with four screws (1) and four new lockwashers (2). Torque bolts to 13 to 16 lb-ft (17.6 to 21.7 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install steer oil pressure regulator valve body (WP 0030 00)

END OF WORK PACKAGE

COOLER BYPASS, LUBRICATION, AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPLACEMENT

0032 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Main control valve assembly removed (WP 0028 00)

Materials/Parts

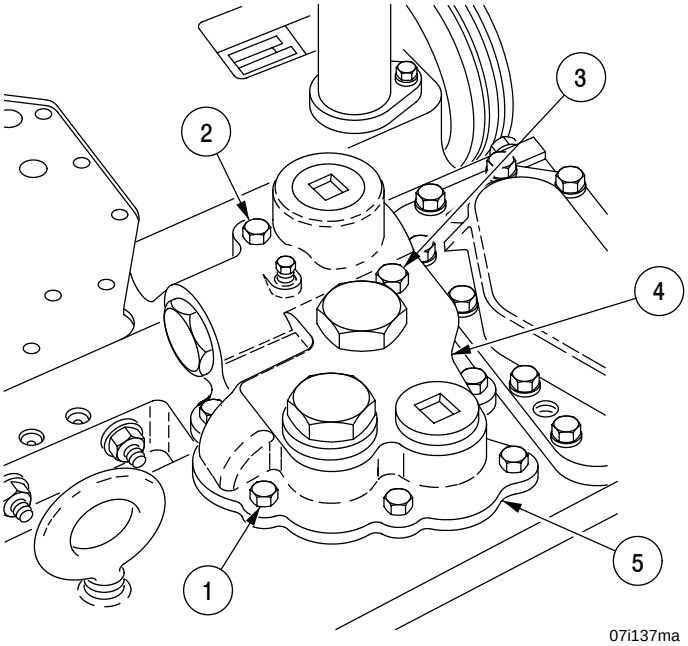
Lockwasher (7) (item 99, WP 0087 00)
Gasket (item 36, WP 0087 00)

REMOVAL

Remove five bolts (1), bolt (2), bolt (3), cooler bypass lubrication and condenser pressure regulator valve body (4), and gasket (5). Discard gasket and lockwashers.

INSTALLATION

Install cooler bypass lubrication and condenser pressure regulator valve body (4) and new gasket (5) with five bolts (1), bolt (2), and bolt (3).



NOTE

FOLLOW-ON MAINTENANCE:
Install main control valve assembly
(WP 0028 00)

END OF WORK PACKAGE

COOLER BYPASS, LUBRICATION, AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR 0033 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Materials/Parts

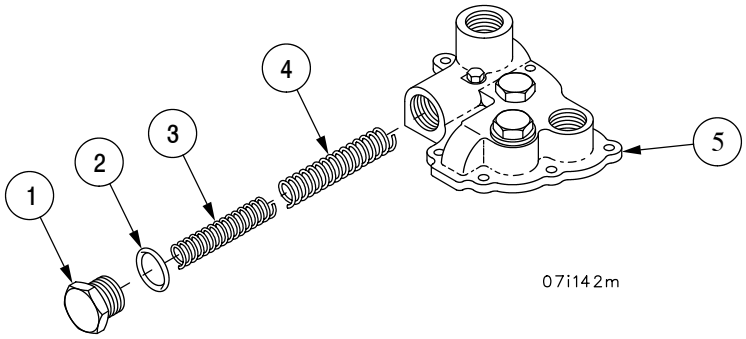
Preformed packing (2) (item 12, WP 0087 00)
Spacer ring (item 60, WP 0087 00)

Equipment Conditions

Cooler bypass, lubrication and converter pressure regulator valve assembly removed (WP 0032 00)

DISASSEMBLY

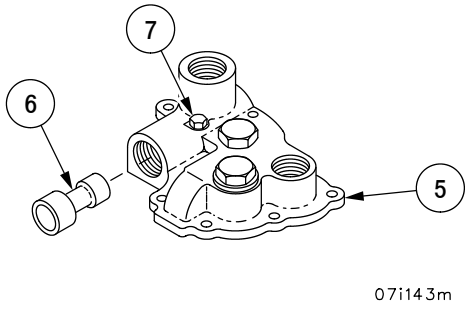
1. Remove machine thread plug (1), performed packing (2) and inner (3) and outer (4) springs from valve body (5). Discard preformed packing.



NOTE

Do not remove hexagon head pipe plug unless necessary for cleaning or replacement.

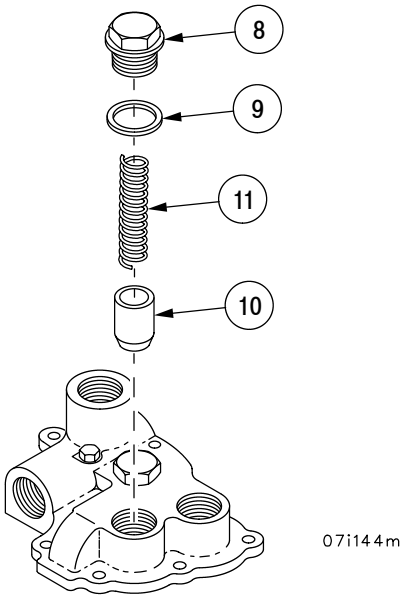
2. Remove converter oil pressure regulator valve (6) from valve body (5). Remove hexagon head pipe plug (7) if necessary.



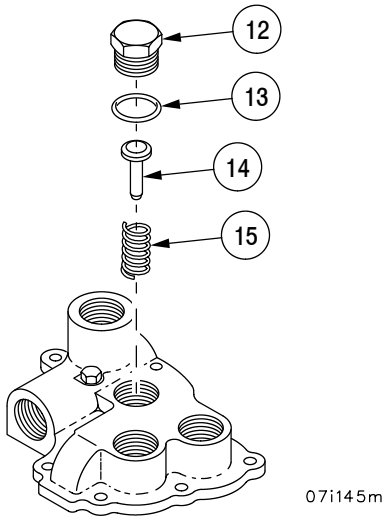
COOLER BYPASS, LUBRICATION, AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR – CONTINUED 0033 00

DISASSEMBLY – Continued

3. Remove lubrication oil pressure regulator valve plug (8), spacer ring (9), lubrication oil pressure regulator valve (10), and spring (11). Discard copper gasket.



4. Remove cooler bypass valve plug (12), preformed packing (13), cooler bypass valve guide (14) and valve spring (15). Discard preformed packing.

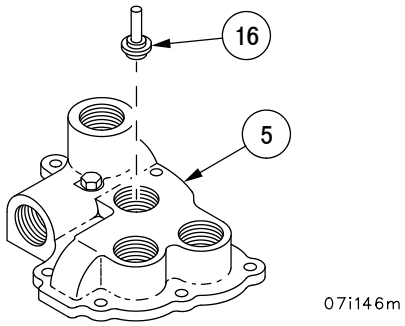


COOLER BYPASS, LUBRICATION AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR – CONTINUED

0033 00

DISASSEMBLY – Continued

5. Remove cooler bypass valve (16) from valve body (5).



CLEANING

See WP 0018 00 for cleaning procedure.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

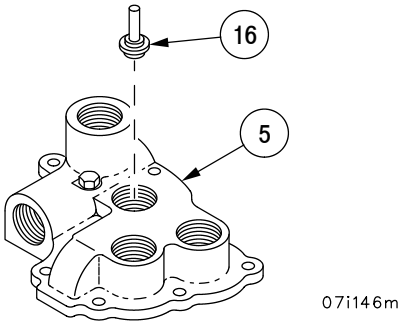
Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Converter oil pressure regulator valve helical compression inner spring	Free length Length under 46 to 56 pound load	3.998 in. 2.400 in.
Converter oil pressure regulator valve helical compression outer spring	Free length Length under 66 to 80 pound load	4.237 in. 2.400 in.
Converter oil pressure regulator valve	Outside diameter (2 places) Clearance fit in valve body Maximum clearance between valve and valve body	1.3730 to 1.3735 in. 0.0010 to 0.0025 in. 0.0045 in.
Cooler bypass valve helical compression spring	Free length Length under 72 to 88 pound load	2.033 in. 1.500 in.
Lubrication oil pressure regulator valve helical compression spring	Free length Length under 13.5 to 16.5 pound load	2.892 in. 2.000 in
Valve body	Inside diameter of converter oil pressure regulator valve hose	1.3745 to 1.3755 in

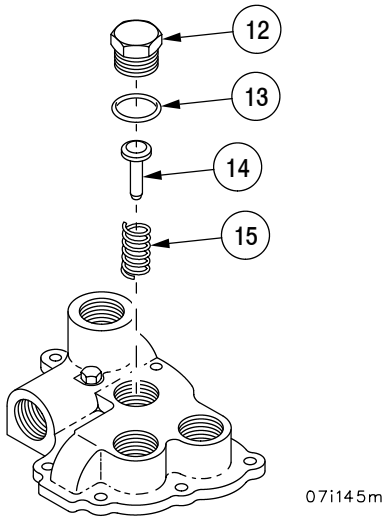
COOLER BYPASS, LUBRICATION AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR – CONTINUED 0033 00

ASSEMBLY

1. Install cooler bypass valve (16) in valve body (5).



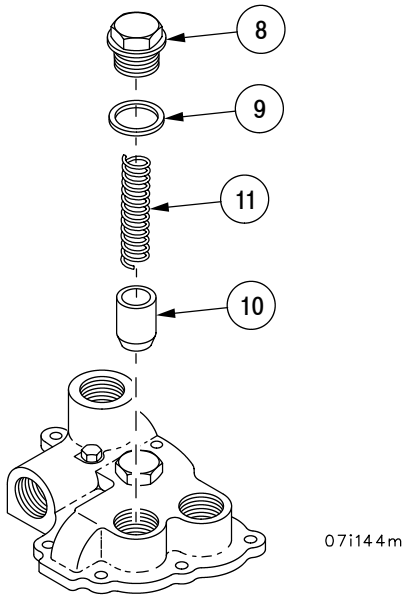
2. Install valve spring (15), cooler bypass valve guide (14), and cooler bypass valve plug (12) with new performed packing (13).



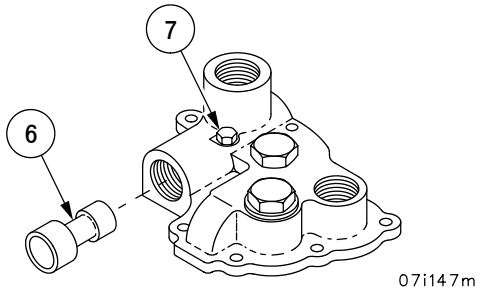
COOLER BYPASS, LUBRICATION AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR – CONTINUED 0033 00

ASSEMBLY – Continued

3. Install lubrication oil pressure regulator valve (10), spring (11), and lubrication oil pressure regulator valve plug (8) with new spacer ring (9).



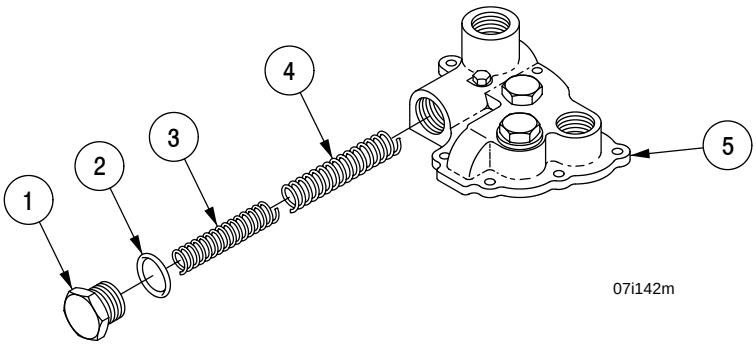
4. Install hexagon head pipe plug (7), if removed, and converter oil pressure regulator valve (6).



COOLER BYPASS, LUBRICATION AND CONVERTER PRESSURE REGULATOR VALVE ASSEMBLY REPAIR – CONTINUED 0033 00

ASSEMBLY – Continued

5. Install inner (3) and outer (4) springs and machine thread plug (1) with new preformed packing (2) in valve body (5).



NOTE

FOLLOW-ON MAINTENANCE:
Install cooler bypass, lubrication, and converter pressure regulator valve assembly (WP 0032 00)

END OF WORK PACKAGE

TRANSMISSION OIL FILTERS REPLACEMENT 0034 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Suitable container (1.0 gal min cap)

Materials/Parts

Lockwasher (24) (item 99, WP 0087 00)
Gasket (2) (item 2, WP 0087 00)
Filter element (4) (item 78, WP 0087 00)
Dry-cleaning solvent (item 3, WP 0085 00)
Petrolatum lubricant (item 9, WP 0085 00)
Lubricant (item 5, WP 0085 00)

Equipment Conditions

Transmission removed from vehicle (TM 9-2350-256-20)
Transmission breather tube removed (WP 0026 00)
For maintenance of right side transmission filters only

References

TM 9-2350-256-20

NOTE

There are two sets of transmission filters; one set on each side of the transmission. This task removes only one set of filters from one side of transmission.

TRANSMISSION OIL FILTERS REPLACEMENT - CONTINUED 0034 00

REMOVAL

1. Remove 12 screws (1) and 12 lockwashers (2) from transmission filter head (3). Discard lockwashers.

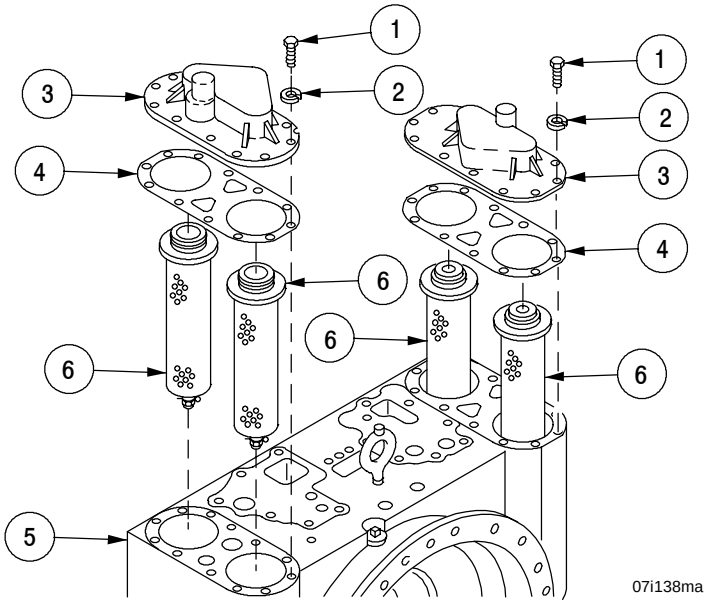
CAUTION

Do not attempt to pry the transmission oil filter head off of the transmission with a screwdriver or other such items; damage to mating surfaces could occur.

2. Use two screws (1) as jackscrews to remove transmission filter head (3) and gasket (4) from transmission (5). Discard gasket.
3. Remove two filter elements (6) from transmission (5). Discard filter elements.

WARNING

4. Clean all components with dry-cleaning solvent, remove any residual gasket material from mating surfaces.



TRANSMISSION OIL FILTERS REPLACEMENT - CONTINUED 0034 00

INSTALLATION

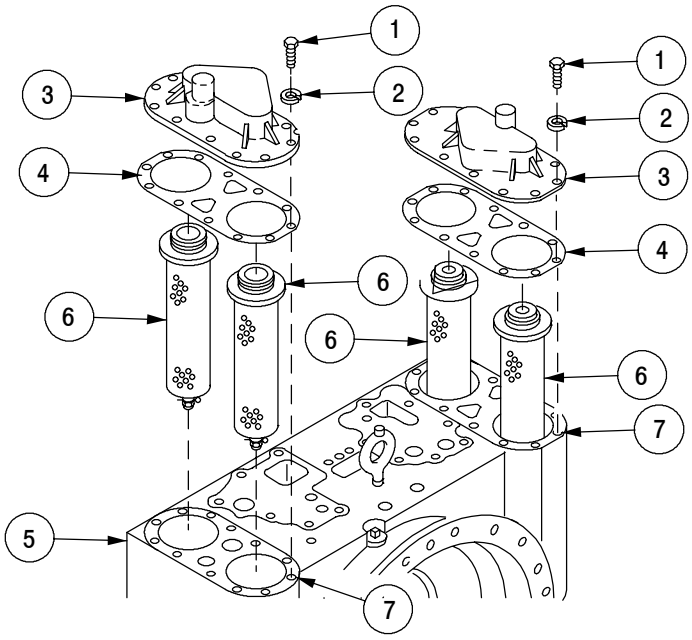
WARNING

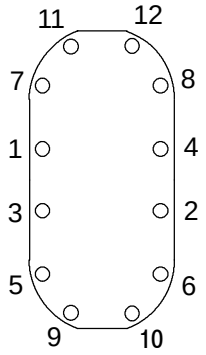
1. Clean 12 screws (1) and 12 transmission screw holes (7) with dry-cleaning solvent.
2. Install two new filter elements (6) in transmission (5).
3. Apply lubricant (item 5, WP 0085 00) to threads of 12 screws.
4. Install new gasket (4) and transmission filter head (3) on transmission (5) with 12 screws (1) and 12 new lockwashers (2). Torque 12 screws to 25 to 31 ft-lb (33.9 to 42 N•m) in accordance with torque sequence diagram.

WARNING

Oil sprayed from improperly installed oil filter head assembly can cause fire in engine compartment.

5. Verify torque to specific limit on each of 12 screws (1). If any screws (1) move during recheck, repeat torque process.





TORQUE SEQUENCE DIAGRAM

07i139ma

NOTE

FOLLOW ON MAINTENANCE:
Install transmission filter switch, (TM 9-2350-256-20), if removed
Install transmission breather tube (WP 0026 00), if removed
Install transmission in vehicle (TM9-2350-256-20)

END OF WORK PACKAGE

TRANSMISSION OIL FILTERS REPAIR 0035 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
C-clamp (Item 32, WP 0088 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

Retaining ring (item 88, WP 0087 00)
Dry-cleaning solvent (item 3, WP 0085 00)

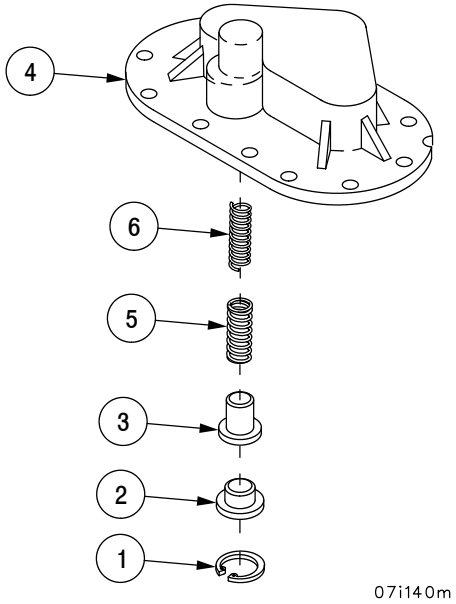
Equipment Conditions

Transmission filter head removed (WP 0034 00)

DISASSEMBLY

WARNING

1. Remove retaining ring (1), relief valve seat (2) and relief valve (3) from transmission filter head (4) using C-clamp and retaining ring pliers. Discard retaining ring.
2. Remove outer compression spring (5) and inner compression spring (6) from transmission filter head (4).



TRANSMISSION OIL FILTERS REPAIR - CONTINUED 0035 00

CLEANING

WARNING

1. Clean all components with dry-cleaning solvent. Remove any residual gasket material from mating surfaces.
2. See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

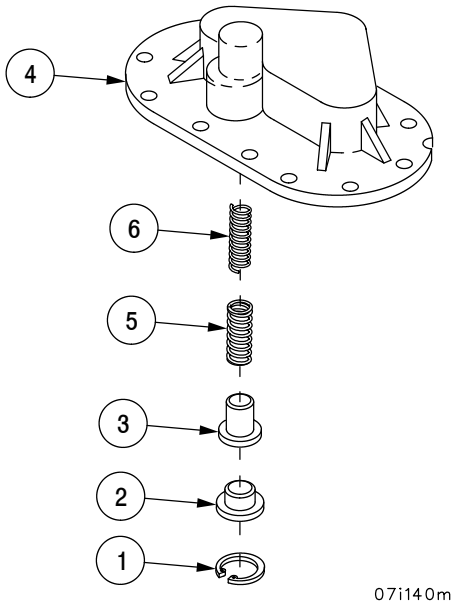
Check the following parts to the dimensions listed. Replace if not within specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Inner helical compression spring	Free length	2.937 in.
Outer helical compression spring	Length under 26 to 30 pound load	2.400 in.
	Free length	2.937 in.
	Length under 37 to 43 pound load	2.400 in.

TRANSMISSION OIL FILTERS REPAIR - CONTINUED 0035 00

ASSEMBLY

1. Install inner compression spring (6) in outer compression spring (5).
2. Install outer compression spring (5) in transmission filter head (4).
3. Install relief valve (3), relief valve seat (2), and new retaining ring (1) in transmission filter head (4) using C-clamp and retaining ring pliers.



NOTE

FOLLOW-ON MAINTENANCE:
Install transmission filter head (WP 0034 00)

END OF WORK PACKAGE

BRAKE AIR VALVE ASSEMBLY, RELATED LINKAGE, AND INSPECTION PLATE REPLACEMENT 0036 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Materials/Parts

Retaining ring (item 88, WP 0087 00)
Lockwasher (27) (item 99, WP 0087 00)
Lockwasher (2) (item 101, WP 0087 00)
Gasket (item 49, WP 0087 00)
Gasket (item 1, WP 0087 00)
Self-locking bolt (item 105, WP 0087 00)
Self-locking bolt (2) (item 106, WP 0087 00)

Equipment Conditions

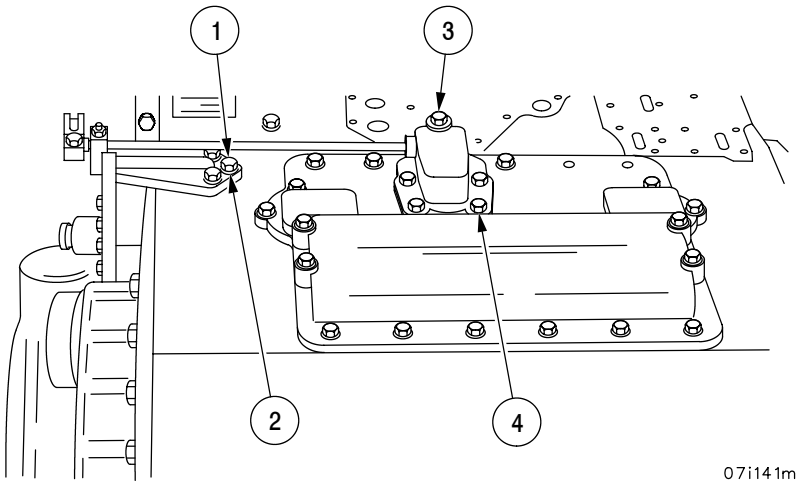
Transmission removed from vehicle (TM 9-2350-256-20)
Breather assembly removed (WP 0026 00)

References

TM 9-2350-256-20

REMOVAL

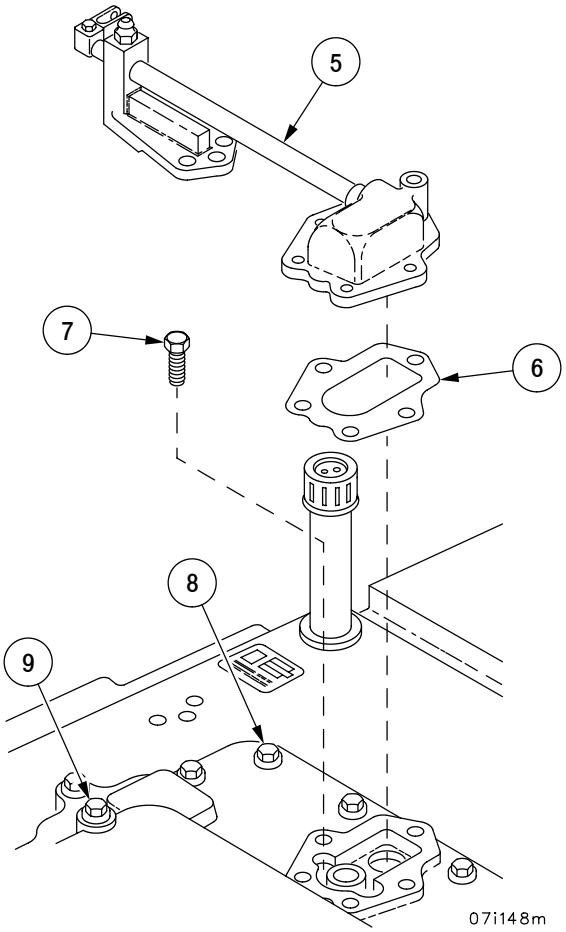
1. Remove three bolts (1), three lockwashers (2), self-locking bolt (3), and four bolts (4). Discard lockwashers and self-locking bolt.

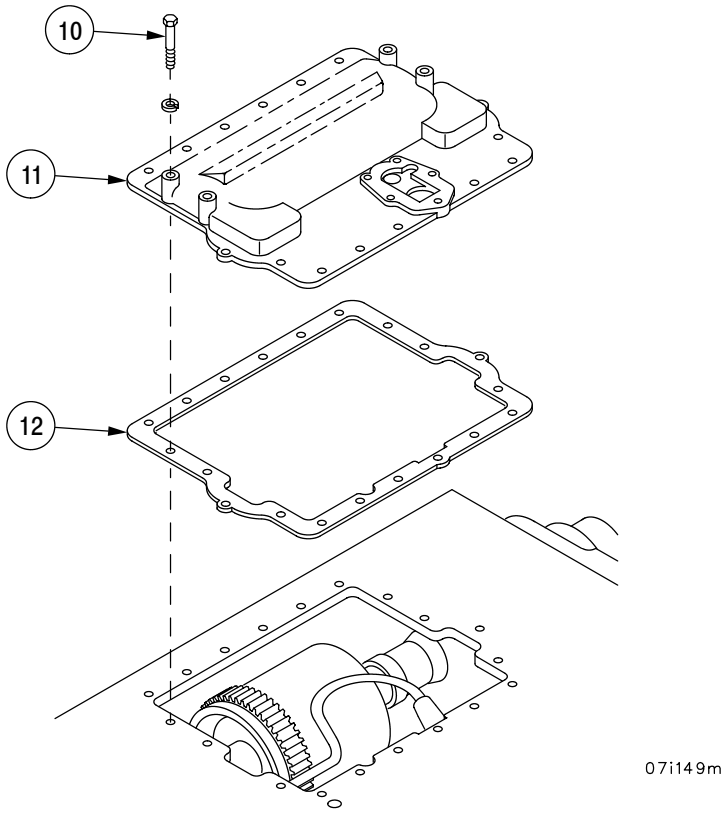


BRAKE AIR VALVE ASSEMBLY, RELATED LINKAGE, AND INSPECTION PLATE REPLACEMENT – CONTINUED 0036 00

REMOVAL – Continued

2. Remove brake air valve and shaft (5), gasket (6) and two air tube bolts (7). Remove 11 bolts (8) and two bolts (9) with 13 lockwashers, and two self-locking bolts (10). Discard lockwashers, gasket, and self-locking bolts.
3. Remove inspection hole cover (11) and gasket (12). Discard gasket.

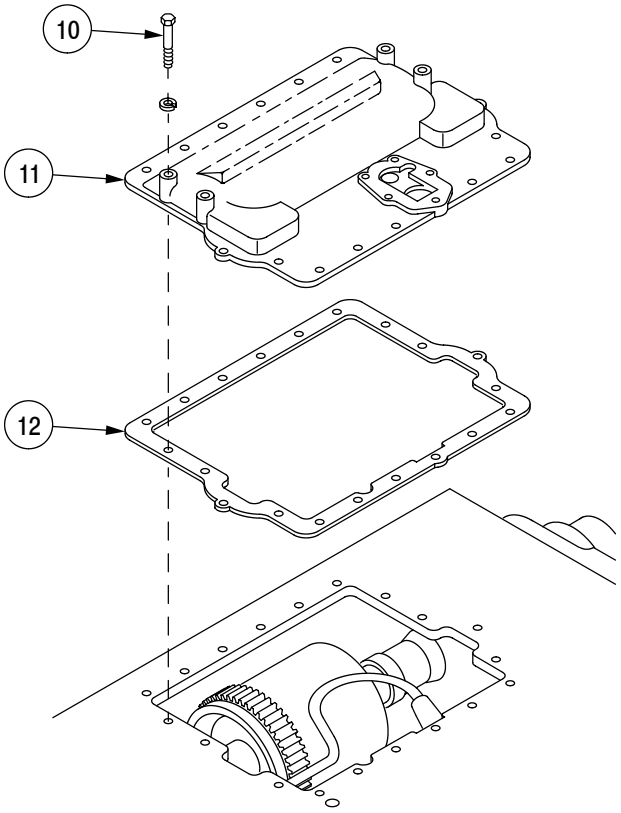


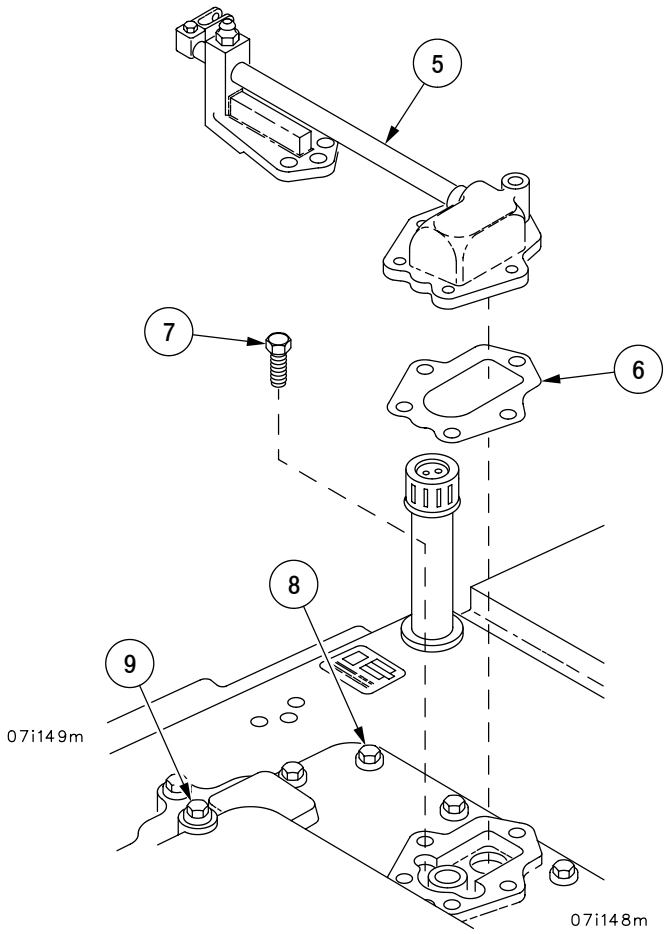


BRAKE AIR VALVE ASSEMBLY, RELATED LINKAGE, AND INSPECTION PLATE REPLACEMENT – CONTINUED 0036 00

INSTALLATION

1. Install inspection hole cover (11) and new gasket (12).
2. Install 11 bolts (8) and two bolts (9) with 13 new lockwashers and two new self-locking bolts (10). Install brake air valve and shaft (5), new gasket (6), and two air tube bolts (7).

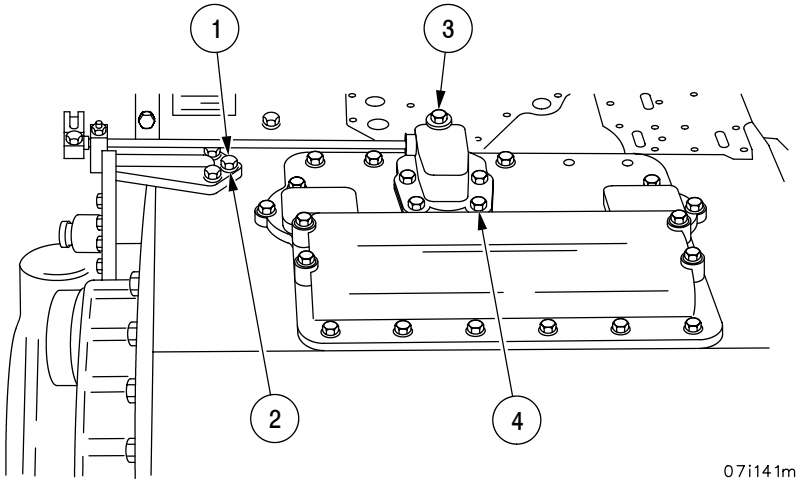




BRAKE AIR VALVE ASSEMBLY, RELATED LINKAGE, AND INSPECTION PLATE REPLACEMENT – CONTINUED 0036 00

INSTALLATION – Continued

3. Install three bolts (1), three new lockwashers (2), new self-locking bolt (3), and four bolts (4).



NOTE

FOLLOW-ON MAINTENANCE:
Install breather assembly (WP 0026 00)
Install transmission in vehicle
(TM 9-2350-256-20)

END OF WORK PACKAGE

BRAKE AIR VALVE ASSEMBLY AND RELATED LINKAGE REPAIR 0037 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Vise (item 29, WP 0088 00)
Soft-jaw caps (item 33, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

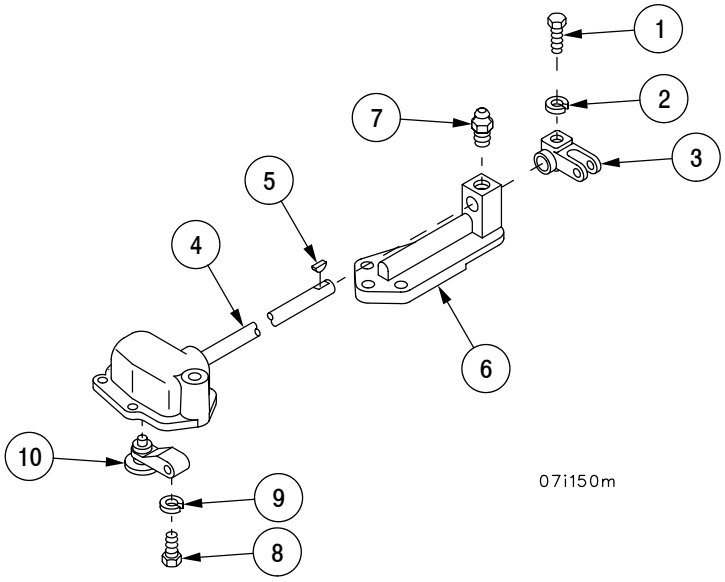
Lockwasher (2) (item 99, WP 0087 00)
Gasket (item 49, WP 0087 00)
Seal (item 77, WP 0087 00)

Equipment Conditions

Brake air valve assembly removed (WP 0036 00)

DISASSEMBLY

1. Remove cap screw (1) and lockwasher (2) from brake air valve linkage lever (3) and remove lever (3) from brake air valve linkage shaft (4). Remove key (5) and brake air valve linkage bracket (6) from shaft (4). Remove lubrication fitting (7) from bracket (6). Remove cap screw (8) and lockwasher (9) from brake air valve assembly (10). Discard lockwasher.



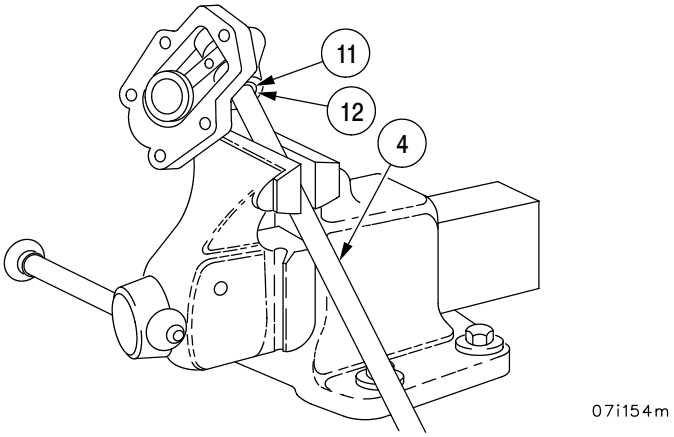
BRAKE AIR VALVE ASSEMBLY AND RELATED LINKAGE REPAIR – CONTINUED 0037 00

DISASSEMBLY – Continued

NOTE

Step 2 must be done to prevent the key at the air valve assembly end from damaging the oil seal when shaft is removed.

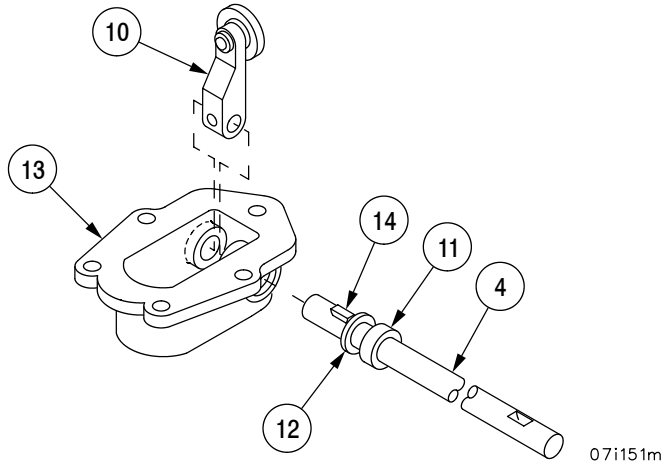
2. Place air valve linkage shaft (4) in a vise with soft jaws and, using a small drift and hammer, remove oil seal (11) and retainer (12). Discard oil seal.



NOTE

Do not disassemble brake air valve assembly. If parts replacement is necessary, replace entire valve assembly.

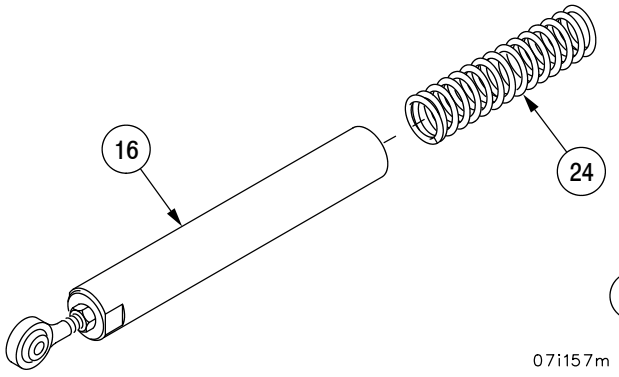
3. Remove brake air valve linkage shaft (4) and brake air valve assembly (10) from brake air valve body (13). Remove key (14), retainer (12), and oil seal (11) from shaft (4). Discard oil seal.

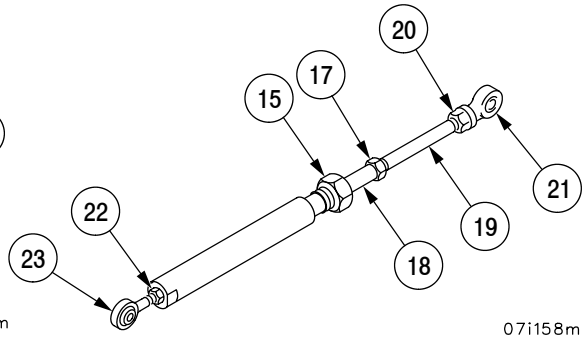


BRAKE AIR VALVE ASSEMBLY AND RELATED LINKAGE REPAIR – CONTINUED 0037 00

DISASSEMBLY – Continued

4. Unscrew linkage rod plunger stop (15) from rod plunger sleeve (16) and remove stop (15) and its attached parts. Loosen nut (17) and remove from linkage rod plunger (18). Remove linkage rod plunger stop (15) from brake air valve linkage rod (19). Loosen nut (20) and remove lower rod end (21) from brake air valve linkage rod (19). Remove two nuts (17 and 20) from linkage rod (19).
5. Loosen nut (22) and remove upper rod end (23) from rod plunger sleeve (16). Remove compression spring (24) from sleeve (16).





CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

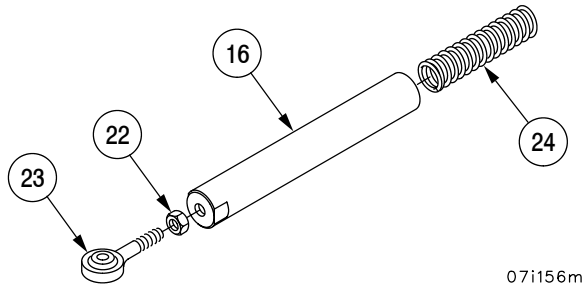
Check the following part to the dimension listed. Replace if not within specified dimension.

PART NAME	CHECK POINT	ACCEPTABLE LIMITS
Rod plunger spring	Free length Length under 28.4 to 34.8 pound load	4.832 in. 2.894 in.

BRAKE AIR VALVE ASSEMBLY AND RELATED LINKAGE REPAIR – CONTINUED 0037 00

ASSEMBLY

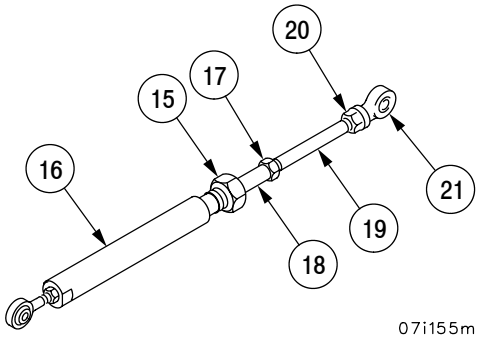
1. Install two nuts (17 and 20) on the brake air valve linkage rod (19) and a third nut (22) on the upper rod end (23).



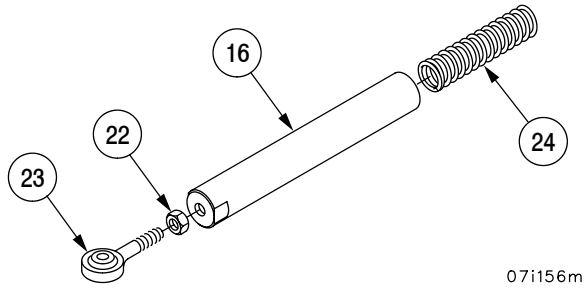
NOTE

Adjustment of these nuts will be made during brake air valve linkage adjustment. Refer to WP 0052 00.

2. Install lower rod end (21) on brake air valve linkage rod (19). Install linkage rod plunger stop (15) on linkage rod plunger (18) and install linkage rod (19).



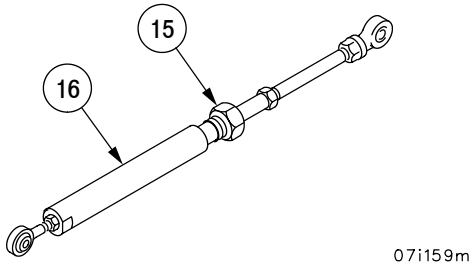
3. Install compression spring (24) in rod plunger sleeve (16).



BRAKE AIR VALVE ASSEMBLY AND RELATED LINKAGE REPAIR – CONTINUED 0037 00

ASSEMBLY – Continued

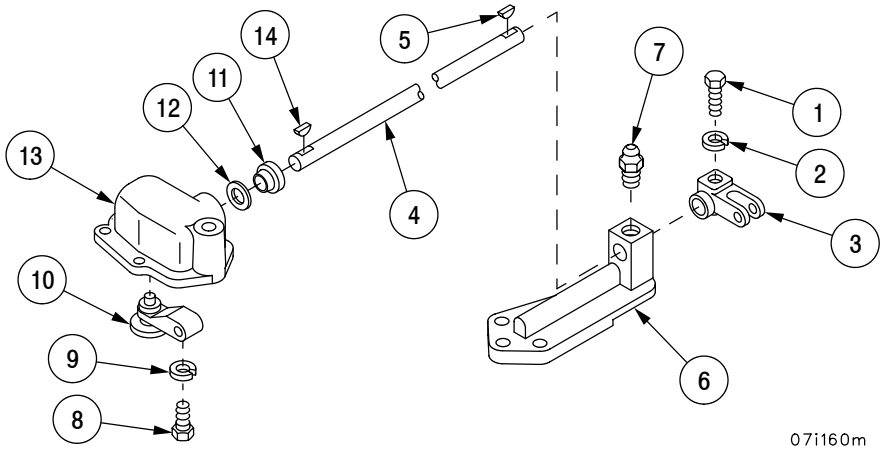
4. Install and fasten linkage rod plunger stop (15) into sleeve (16).



NOTE

Make certain key enters slot in brake air valve.

5. Install new oil seal (11), retainer (12), and key (14) on brake air valve linkage shaft (4). Position brake air valve assembly (10) in the brake air valve body (13). Install the linkage shaft with new oil seal (11), retainer (12), and key (14) through the brake air valve body (13) and into the brake air valve assembly (10).
6. Install cap screw (8) and lockwasher (9) in the brake air valve assembly (10). Torque screw to 26 to 32 ft-lb (32.3 to 43.4 N•m).
7. Using a hammer and soft drift, seat retainer (12) and oil seal (11) in brake air valve body (13).
8. Install lubrication fitting (7) in brake air valve linkage bracket (6). Install key (5) on brake air valve linkage shaft (4) and install brake air valve linkage lever (3) on shaft (4).
9. Install cap screw (1) and lockwasher (2) on brake air valve linkage lever (3). Torque screw to 26 to 32 ft-lb (32.3 to 43.4 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install brake air valve assembly
(WP 0036 00)

END OF WORK PACKAGE

STEER CLUTCH HOUSING ASSEMBLY REPLACEMENT 0038 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Hoist (2000 lb lifting capacity min)
Torque wrench (item 26, WP 0088 00)

Materials/Parts

Lockwasher (18) (item 100, WP 0087 00)
Gasket (item 38, WP 0087 00) (right side)
Gasket (item 53, WP 0087 00) (left side)

Equipment Conditions

Steer control valve assembly removed (WP 0026 00)
Inspection plate and gasket removed (WP 0036 00)

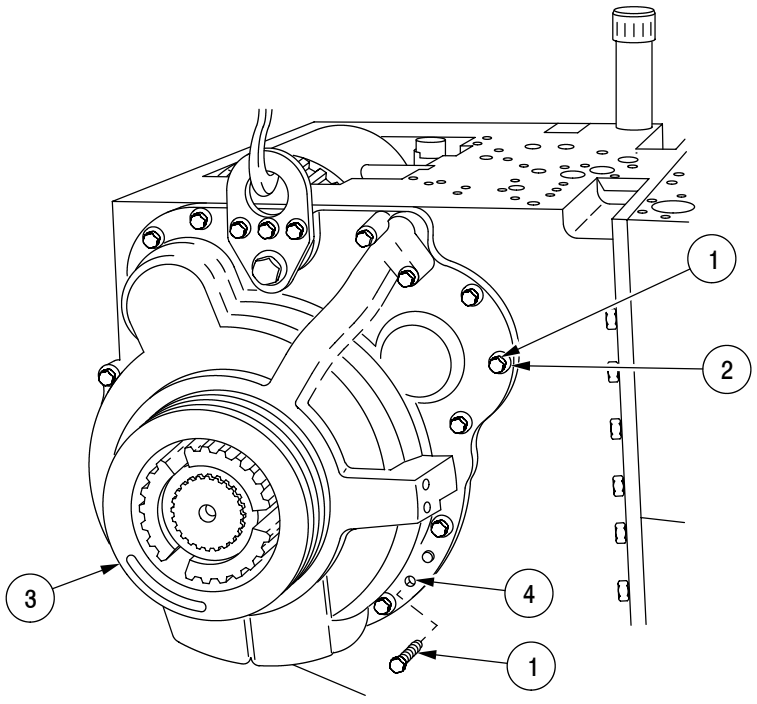
NOTE

There are two steer clutch housing assemblies, left and right. Both steer clutch assemblies are removed and installed in the same manner. These procedures show the right steer clutch housing assembly only. Differences will be noted.

Note the quantity, size, and location of hardware during removal to aid in installation.

REMOVAL

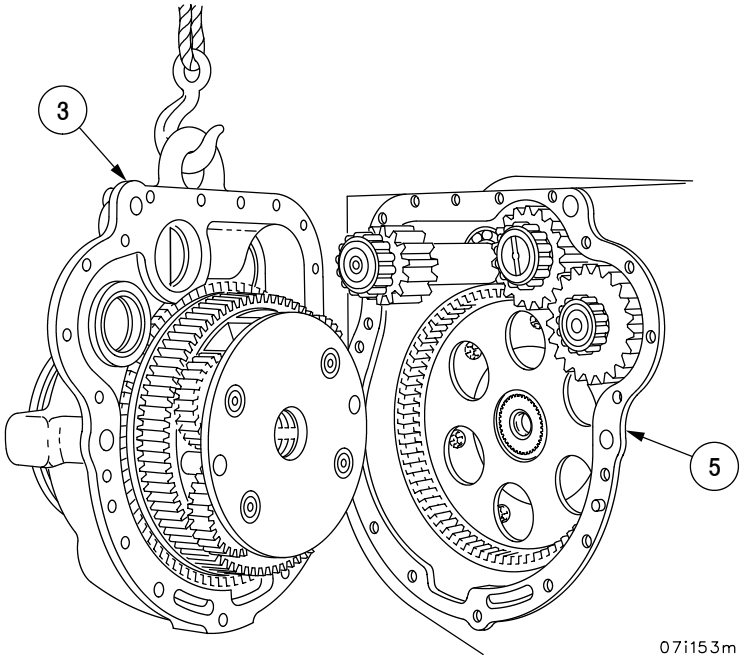
1. Attach hoist and remove 19 mounting bolts (1) and 18 lockwashers (2) from right steer clutch housing (3). Install two mounting bolts (1) as jacking screws into threaded holes (4). Loosen right steer clutch housing (3) from transmission by tightening jacking screws (1). Discard lockwashers.



STEER CLUTCH HOUSING ASSEMBLY REPLACEMENT – CONTINUED 0038 00

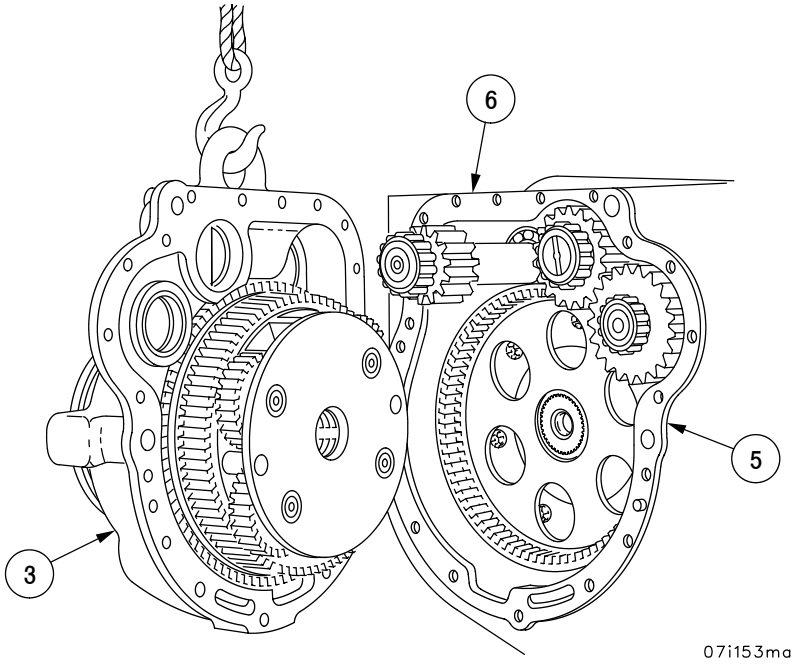
REMOVAL – Continued

2. Remove right steer clutch housing assembly (3) and gasket (5). Discard gasket.



INSTALLATION

1. Using a hoist, align the right steer clutch housing assembly (3) and new gasket (5) to transmission (6).



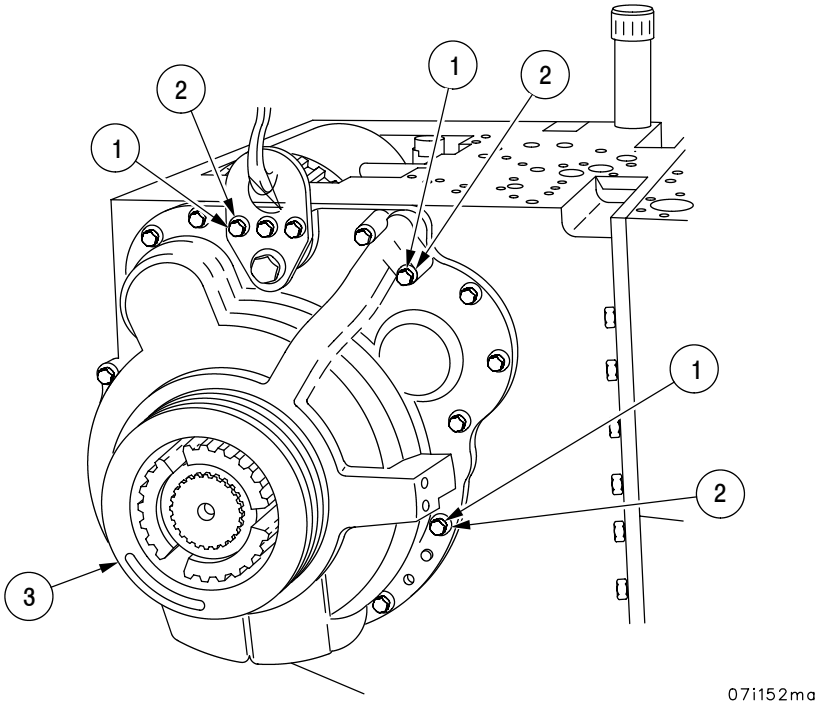
STEER CLUTCH HOUSING ASSEMBLY REPLACEMENT – CONTINUED 0038 00

INSTALLATION – Continued

NOTE

Mounting bolts securing the left steer clutch housing assembly are tightened to 32 to 38 lb–ft torque (43.4 to 51.5 N•m). Mounting bolts securing the right steer clutch assembly are torqued to 67 to 80 lb–ft (90.9 to 108.5 N•m)

2. Install two ½ –13 x 3 –1/4 bolts (1) three ½ –13 x 2 – 3/4 bolts (1), and install 14 remaining bolts (1), and 18 new lockwashers (2) into right steer–clutch housing (3). Torque mounting bolts to 67 to 80 lb–ft (90.9 to 108.5 N•m)



NOTE

FOLLOW–ON MAINTENANCE:
Install inspection plate and gasket (WP 0036 00)
Install steer control valve assembly (WP 0026 00)

END OF WORK PACKAGE

STEER CLUTCH HOUSING ASSEMBLY REPAIR 0039 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Electric hand drill (item 30, WP 0088 00)
Drill set twist (item 31, WP 0088 00)
Arbor press, hand (item 20, WP 0088 00)
Eyebolt (item 25, WP 0088 00)
Hammer, hand (item 35, WP 0088 00)
Welder's gloves (item 34, WP 0088 00)
Torque wrench (0-600 lb-ft) (item 26, WP 0088 00)
Torque wrench (0-175 lb-ft) (item 22, WP 0088 00)
Compressor assembly (item 3, WP 0088 00)

Materials/Parts

White lead (item 13, WP 0085 00)
Oil soluble grease (item 4, WP 0085 00)
Preformed packing (item 23, WP 0087 00)
Preformed packing (item 47, WP 0087 00)
Woodblock (item 6, WP 0085 00)
Preformed packing (item 24, WP 0087 00)
Retaining ring (item 41, WP 0087 00)
Seal assembly (item 4, WP 0087 00)

Material/Parts - Continued

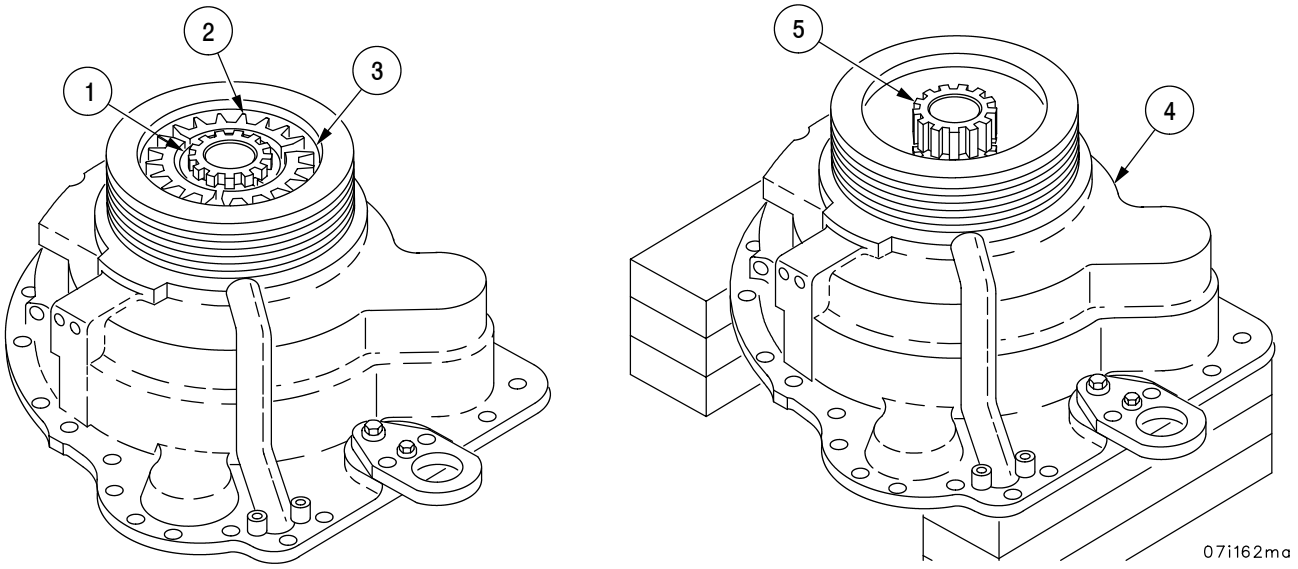
Dry ice
Petrolatum (item 9, WP 0085 00)
Retaining ring (item 25, WP 0087 00)
Retaining ring (item 7, WP 0087 00)
Retaining ring (item 9, WP 0087 00)
Seal (2) (item 20, WP 0087 00)
Self-locking bolt (32) (item 107, WP 0087 00)
Self-locking bolt (32) (item 112, WP 0087 00) (For left steer clutch)
Dowel pin (item 5, WP 0087 00)
Pin (item 21, WP 0087 00)
Seal (item 76, WP 0087 00)
Self-locking bolt (2) (item 95, WP 0087 00)

Equipment Conditions

Steer clutch housing assembly removed from transmission (WP 0038 00)

DISASSEMBLY

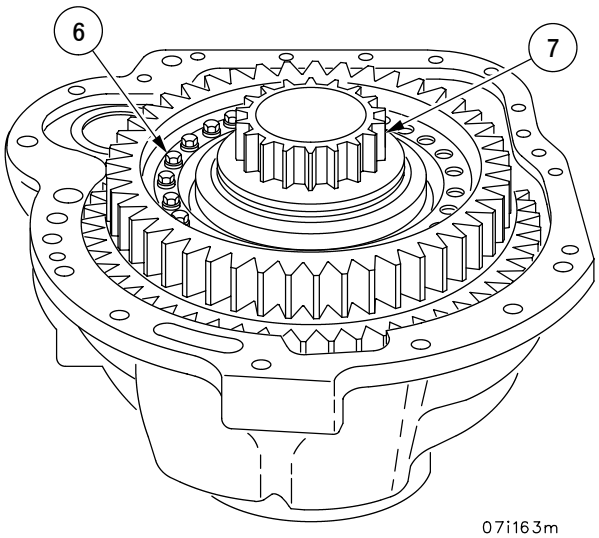
1. Remove snap ring (1) and output coupling (2). Remove hook type seal ring (3) from base of coupling. Discard snap ring and seal ring.
2. Position steer clutch housing assembly (4) on wood blocks. Using a soft hammer or mallet, drive out planetary carrier assembly (5). Approximately one inch downward movement will free the carrier assembly.



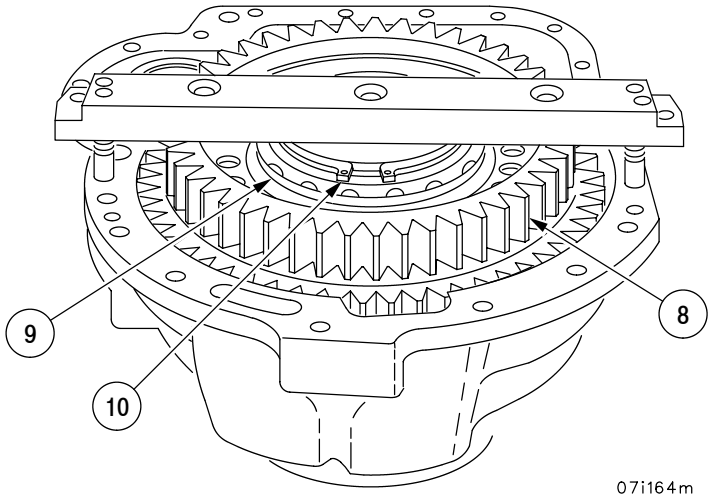
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

3. Remove housing from carrier assembly and position the housing gears upward, on bench. Remove 32 self-locking bolts (6) and output planetary sun gear (7). Discard self-locking bolts.



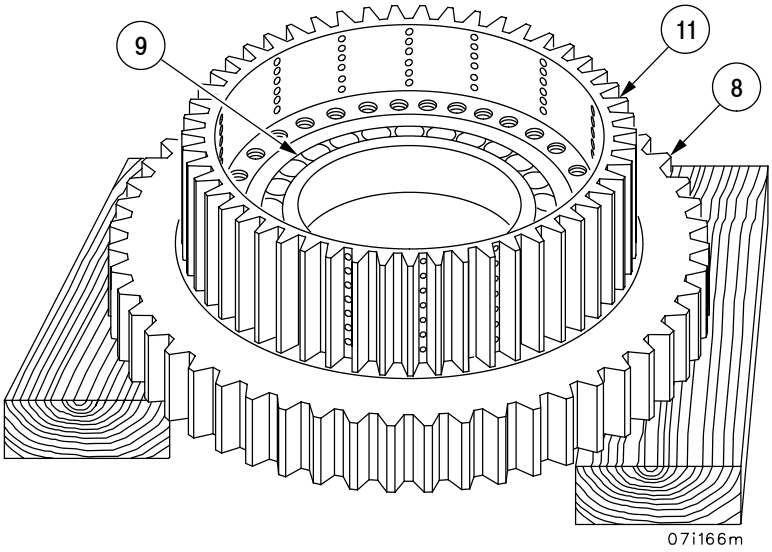
4. Install compressor assembly and tighten the attaching bolts until steer tie shaft drive gear (8) moves downward 1/8 to 3/16 inch. Tap steer tie shaft gear ball bearing (9) downward with a soft hammer or mallet until the snap ring (10) can be removed. Remove and discard snap ring.



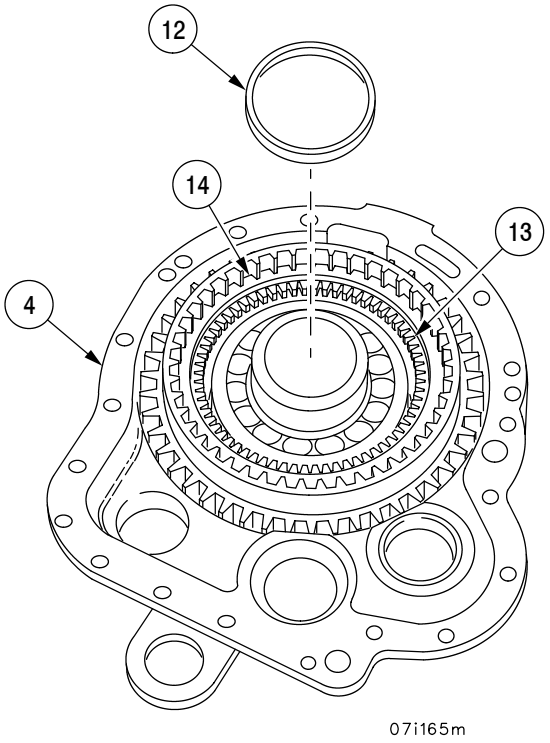
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

5. Remove compressor assembly and lift off steer tie shaft drive gear (8), steer clutch hub (11) and bearing (9). Invert these parts, place on wood blocks. Using soft drift and ball peen hammer, drive out bearing (9) and separate gear (8) and hub (11).



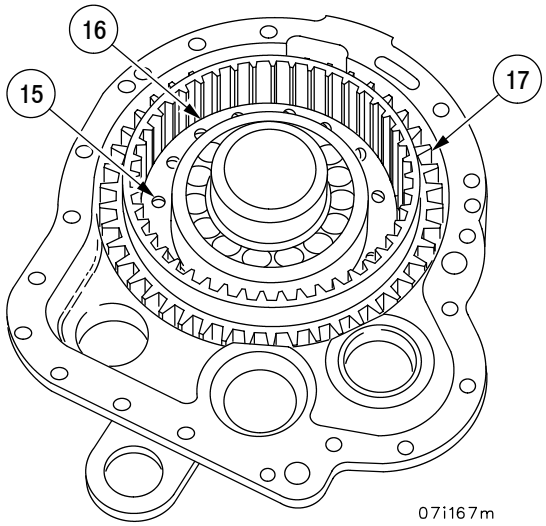
6. Remove spacer (12) from internal hub of steer clutch housing assembly (4). Remove 16 steer clutch plates (13 and 14).



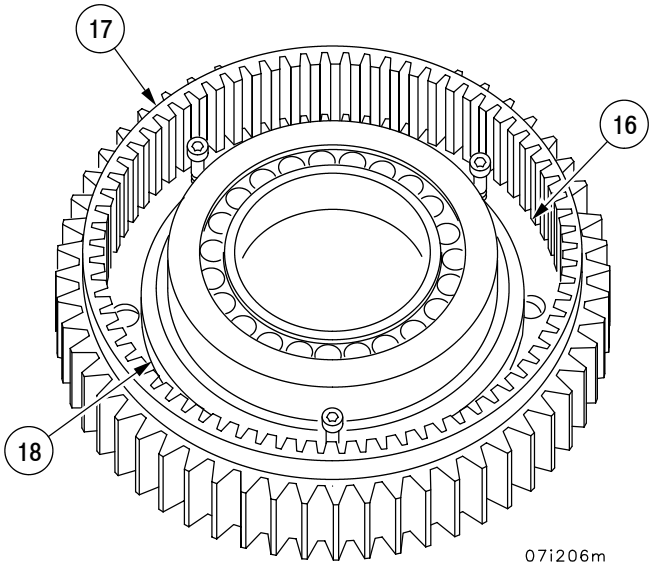
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

7. Remove 12 self-locking screws (15) retaining clutch pressure plate (16). Lift out steer clutch drive gear (17) and plate (16). Discard self-locking screws.



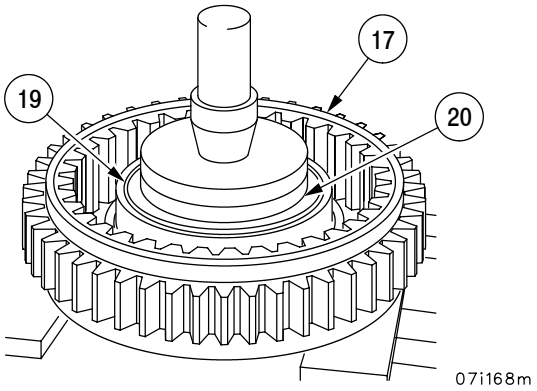
8. Remove clutch pressure plate (16) from steer clutch drive gear (17). Remove oil baffle (18) from drive gear by installing three No. 10-32 screws and using them as lifting jacks. Remove preformed packing from baffle (18). Discard preformed packing.



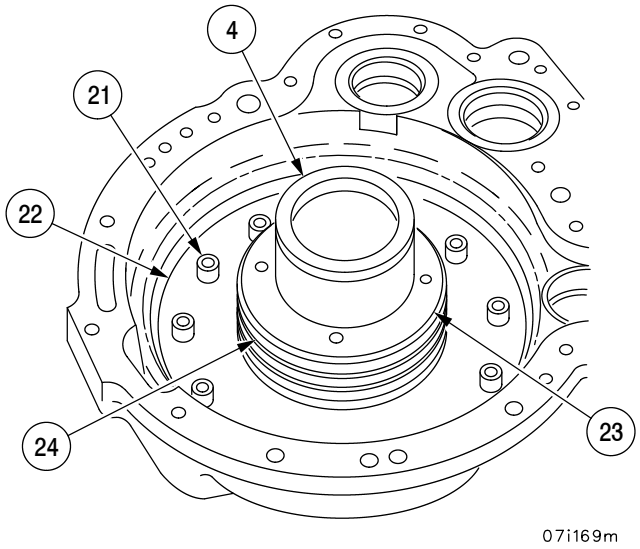
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

9. Turn drive gear (17) over and remove snap ring (19) retaining bearing (20). Position gear in arbor press and remove bearing. Discard snap ring.



10. Remove 12 spacers (21) from steer clutch apply ring (22). Remove flat spacer (23) and four Belleville springs (24) from housing (4) hub.



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

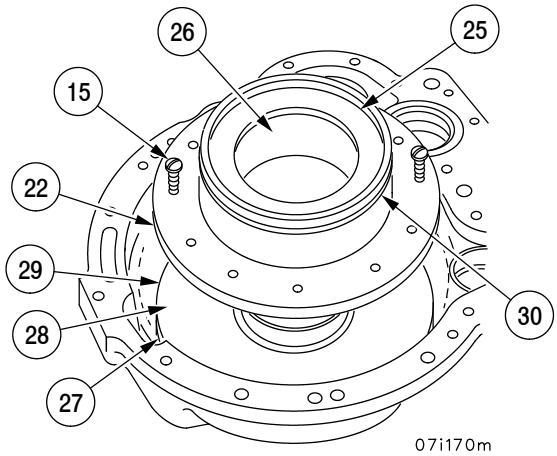
DISASSEMBLY – Continued

11. Using two screws (15) which retained the clutch pressure plate, lift out apply ring assembly (22).

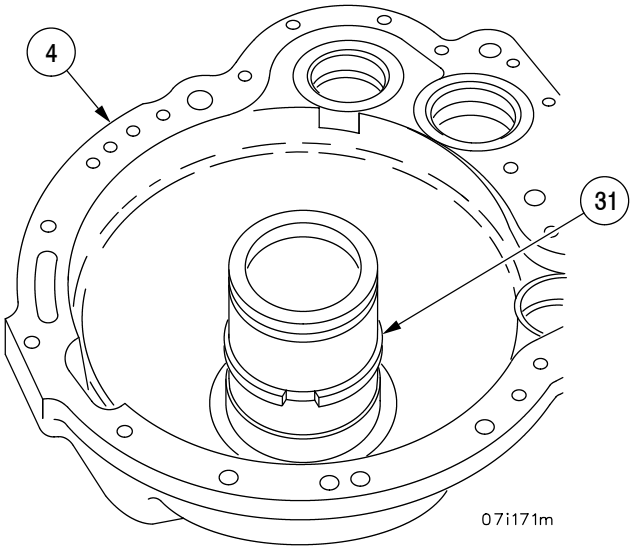
NOTE

Do not remove ball bearing unless replacement is necessary.

12. Remove spacer (25) from apply ring (22) assembly. Remove ball bearing (26). Remove seal ring (27) (hidden) from groove in clutch piston (28). Remove expander (29). Remove preformed packing (30) from groove in apply ring (22). Discard preformed packing and seal ring.



13. Remove hook type seal ring (31) from housing (4) hub. Discard seal ring.



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

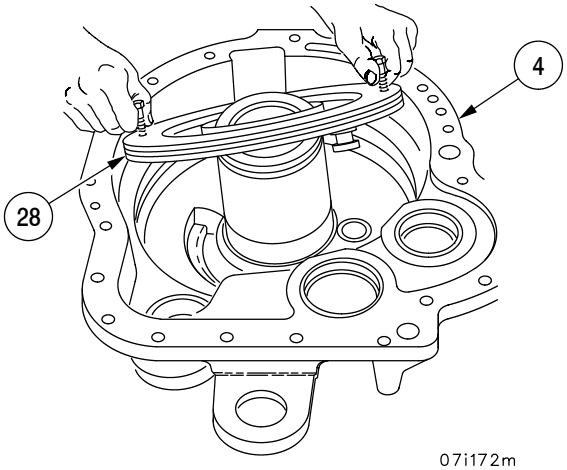
DISASSEMBLY – Continued

14. Using two 3/8–24 bolts as lifters, remove steer clutch piston (28) assembly from housing (4) hub.

NOTE

Do not remove lubrication valve unless replacement is necessary.

15. Remove lubrication valve (32) by drilling end of pin (33) where it is peened into clutch piston. Using an 11/32-inch drill, drill a 3/16-inch deep hole in exact center of the pin. Locate a suitable punch in center of hole and drive out pin. Discard pin.



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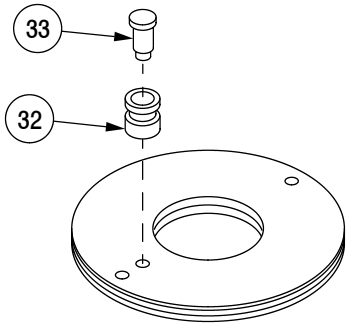

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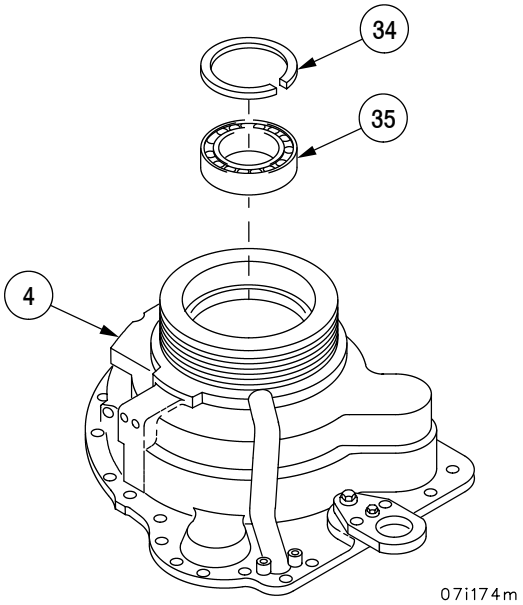
16. Turn over housing (4) and remove snap ring (34) securing ball bearing (35). Turn the housing over again and tap out bearing (35). Discard snap ring.



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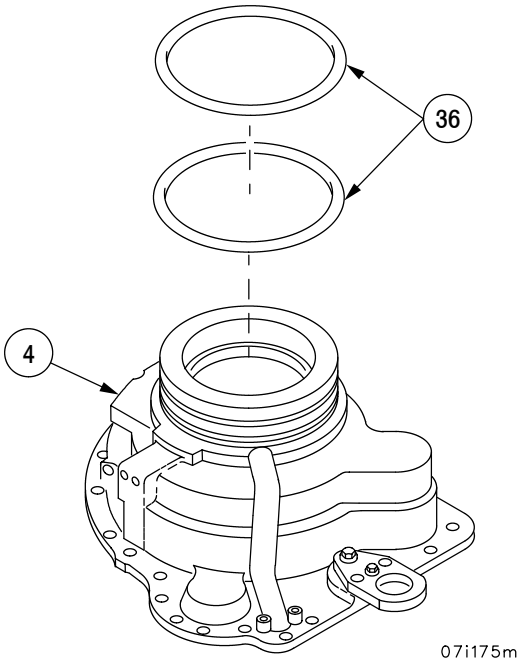
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

17. Remove two preformed packings (36) from housing (4). Discard preformed packings.



NOTE

Do not remove the outer races from the steer tie shaft, tie shaft idler and steer drive shaft bearing unless replacement is necessary. If replacement is necessary, perform Step 18.

Do not remove such minor parts as bolts, lifting bracket, and plugs unless replacement is necessary.

STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

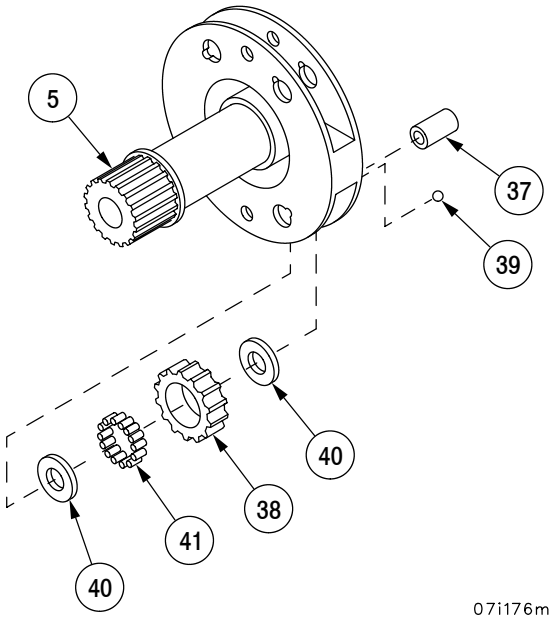
DISASSEMBLY – Continued

18. Hook bearing race out with a heeled tool. Place heel of tool against bottom of recess in housing and pry under edge of race. While right housing contains a tie shaft idler bearing outer race, left housing does not.

NOTE

Do not remove four pinion spindles unless replacement is necessary. Perform Step 19 if replacement is necessary.

19. Position outer planetary carrier assembly (5) shaft upward, in an arbor press. Press out four spindles (37) from pinions (38), catching spindle lock balls (39) as they fall free. Remove pinions (38), two thrust washers (40), and needle bearing rollers (41).



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

DISASSEMBLY – Continued

NOTE

Do not remove dowel pin, tube assembly, and elbow unless replacement is necessary. Perform Step 20 if replacement is necessary.

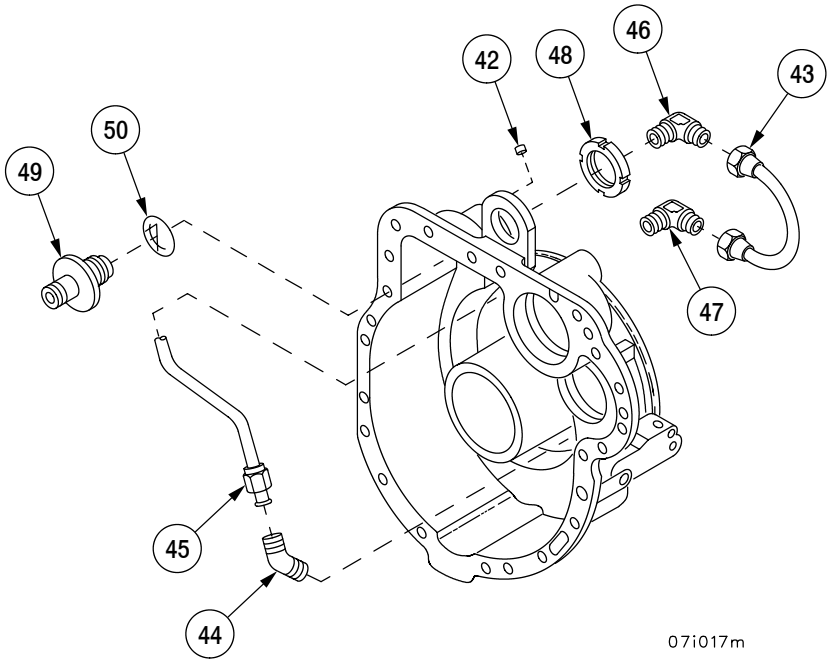
The following steps apply to the left hand steer clutch housing assembly.

20. Remove dowel pin (42), tube assembly (43), and elbow (44). Discard dowel pin.
21. Remove oil tube assembly (45) and elbows (46 and 47).

NOTE

Do not remove nut, oil transfer sleeve, and seal ring unless replacement is necessary. Perform Step 22 if replacement is necessary.

22. Remove nut (48) by bending outer lip out of slot in sleeve (49) where it is staked.
23. Remove seal ring (50) from its groove in sleeve (49). Discard seal ring.



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within dimensions specified.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Output bevel driven gear	OD of outer hub at bearing face	5.5032 to 5.5035 in. Wear limit: 5.5027 in.
	Bearing press fit on gear	0.0022T to 0.0035T
Bearing, inner race	ID of bearing cone	5.5000 to 5.5010 in.
	Bearing press fit on gear	0.0022 to 0.0035 in.
Bearing, outer race	OD of bearing	9.5000 to 9.5010 in.
	Bearing fit in bore	0.0010T to 0.0020L
Output planetary carrier assembly	Diameter at bearing surface	3.3464 to 3.3471 in. Wear limit: 3.3461 in.
Output planetary carrier spindle	OD at center of spindle	1.5127 to 1.5132 in. Wear limit: 1.5117 in.
Thrust washer	Thickness	0.0590 to 0.0620 in. Wear limit: 0.0550 in.
Spindle roller	OD	0.2498 to 0.2500 in. Wear limit: 0.2493 in.
	Slip fit, 22 rollers on spindle	0.0005 to 0.0019 in. Wear limit: 2.0152 in.
Outer planetary pinion	ID	2.0137 to 2.0142 in.
Output planetary sun gear	ID at bearing surface	7.8728 to 7.8742 in.
	Bearing fit	Wear limit: 7.8748 in. 0.0012T to 0.0014L
Ball bearing	OD	7.8728 to 7.8740 in.
	Bearing fit	0.0012T to 0.0014L
Left steer tie shaft gear	ID	7.8728 to 7.8740 in. Wear limit: 7.8748 in.
	Bearing fit	0.0012T to 0.0014L
Internal splined center plate	Plate thickness	0.1580 to 0.1630 in. Wear limit: 0.1380 in.

STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

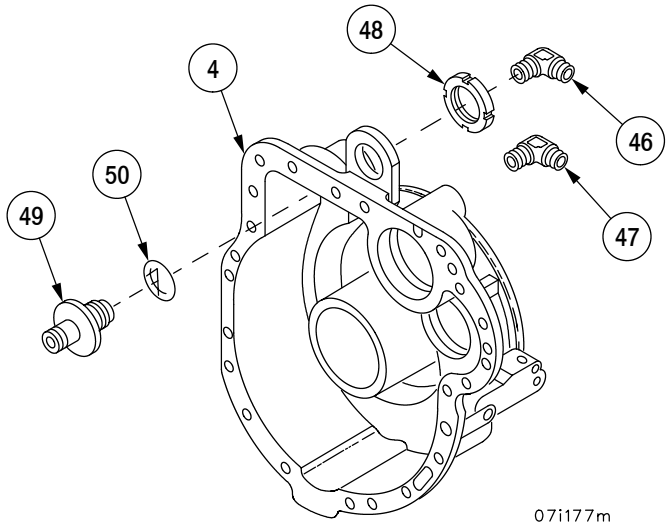
FIT AND WEAR LIMITS – Continued

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
External splined clutch plate	Plate thickness	0.1200 to 0.1250 in.
Steer clutch hub	ID	7.8728 to 7.8742 in. Wear limit: 7.8784 in.
	Bearing fit	0.0012T to 0.0014L
Steer clutch drive gear	ID at bearing surface	7.8728 to 7.8742 in. Wear limit: 7.8748 in.
	Bearing fit	0.0012T to 0.0014L
Ball bearing	ID	5.1171 to 5.1181 in.
	Bearing fit	0.0003T to 0.0017L
Spacer	Thickness	0.1240 to 0.1300 in. Wear limit: 0.1200 in.
Spacer	Thickness	0.1240 to 0.1300 in. Wear limit: 0.1200 in.
Steer clutch apply ring	ID	7.8728 to 7.8742 in. Wear limit: 7.8748 in. 0.0012T to 0.0014L
Ball bearing	ID	5.1171 to 5.1181 in.
	OD	7.8728 to 7.8740 in.
	Bearing fit	0.0012T to 0.0014L
Steer clutch lube valve	OD	1.3735 to 1.3740 in.
	Sleeve fit	0.0018L to 0.0028L
	Combined valve and sleeve	Wear limit: 0.0031 in.
Ball bearing	ID	3.3457 to 3.3465 in.
	OD	5.1173 to 5.1181 in.
	Carrier fit	0.0014T to 0.0001L
	Housing fit	0.0002T to 0.0016L
Oil transfer sleeve	OD	1.300 to 1.301 in.
Left and right steer clutch housing	Large OD of inner hub at bearing surface	5.1164 to 5.1174 in. Wear limit: 5.1159 in.
	Bearing fit on hub	0.0003T to 0.0017L
	Small OD of inner hub at bearing surface	5.1060 to 5.1110 in.
	Bearing	Wear limit: 5.1021 in.
	Bearing fit on hub	0.0061L to 0.0121L
	Steer drive shaft bore OD	3.5428 to 3.5438 in. Wear limit: 3.5422 in.
	Bearing fit to bore	0.0005T to 0.0011L
	ID valve sleeve bore in housing	1.7483 to 1.7493 in.
	Sleeve fit in housing	0.0002T to 0.0022T
	Housing ID at bearing surface	5.1179 to 5.1189 in.
	Bearing fit in housing	0.0002T to 0.0016L

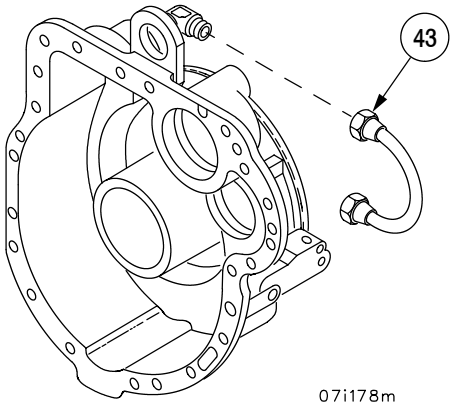
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY

1. Install sleeve (49), threaded end first, through new seal ring (50) and then into bore in housing (4). Install nut (48), flat side first, into sleeve (49). Torque nut to 150 to 200 lb–ft (203.4 to 271.2 N•m). Stake thin outer lip of nut into mill slot of sleeve.
2. Install elbow (46) into threaded end of sleeve (49). Install elbow (47) into nearest tapped hole in housing (4). Tighten both elbows until tube assembly can be fitted properly into elbows. Elbows are positioned toward front of housing at an elevation of approximately 24 degrees above horizontal.



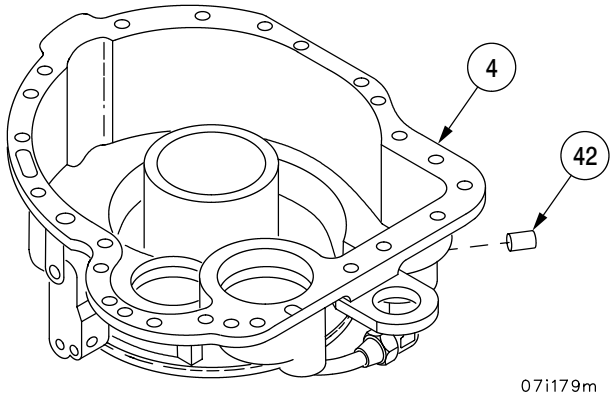
3. Install tube assembly (43). Tighten nuts at ends of tube assembly.



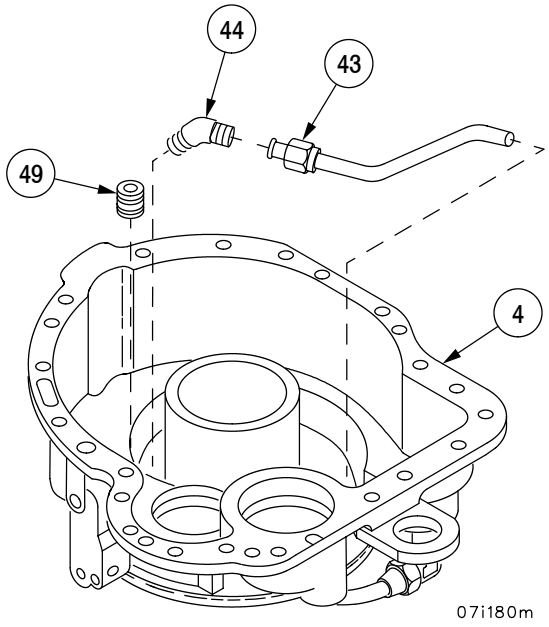
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

4. Install new dowel pin (42). Drive dowel pin into housing (4) until seated firmly. Stake metal of housing over end of pin to retain it.



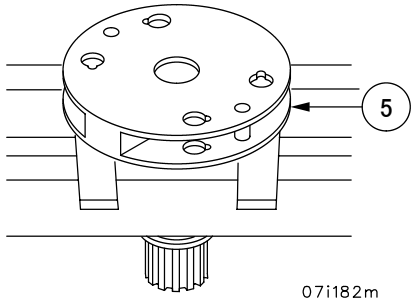
5. Install elbow (44) into threaded hole in housing (4) near sleeve (49). Tighten elbow until tube fitting end is parallel with mounting face of housing.
6. Install tube assembly (43), plain end first, into internal bore of housing (4). This bore aligns with dowel pin. Connect nut end of tube assembly to elbow (44). Tighten nut.



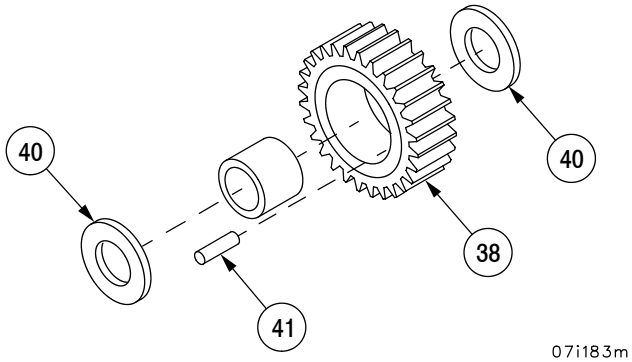
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

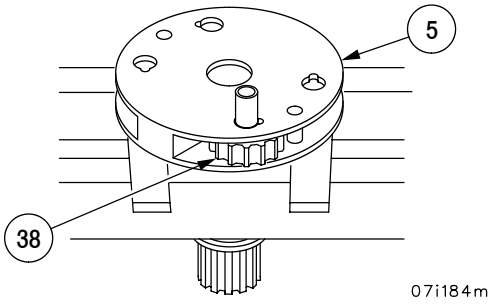
7. Position output planetary carrier assembly (5), shaft downward, in a press.



8. Coat bore of pinion (38) with oil soluble grease. Insert steel tube into pinion (38) bore. Install 22 needle bearing rollers (41) in space between steel tube and pinion (38) bore.
9. Install thrust washer (40) on each side of pinion (38).



10. Withdraw steel tube and install pinion (38) assembly into carrier assembly (5). Align pinion bore with spindle bore of carrier assembly (5) by inserting steel tube.



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

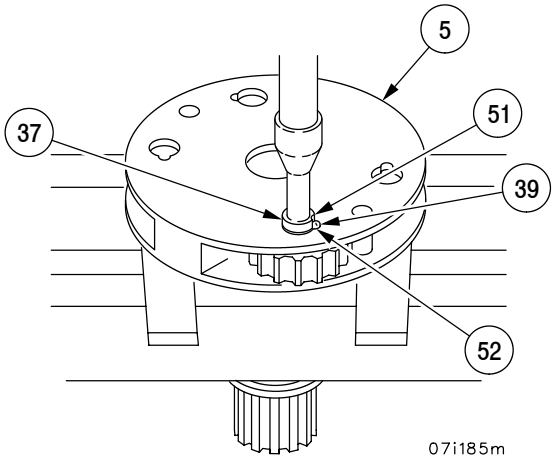
WARNING

Use tongs or gloves to prevent injury when handling chilled parts or dry ice.

NOTE

Chill new spindles in dry ice at least one hour before installation.

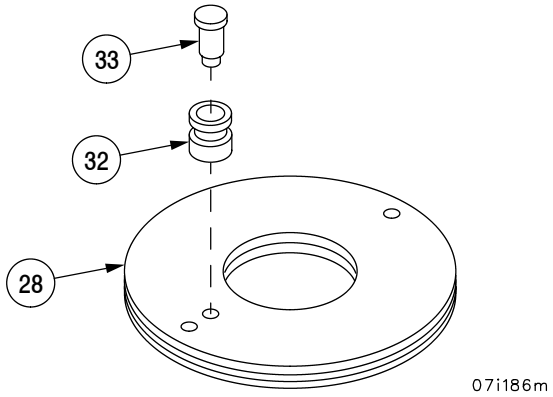
11. Remove steel tube and start a chilled pinion spindle (37), plugged end up, into carrier assembly (5). Align lock ball pocket (51) with lock ball groove (52) in carrier assembly (5).
12. Place lock ball (39) into spindle pocket (51). Press spindle (37) into carrier (5) until flush using press ram and pressing tool.
13. Stake carrier (5) against spindle end by center punching 10–12 points in circle approximately 1/16 inch outside spindle (37) bore. Peening approximately 30 percent of bore circumference is also acceptable.
14. Repeat Steps 1 through 7 for remaining pinion and spindle assemblies.
15. Install any minor parts (plugs, lifting eyes, or bolts) into steer clutch housing.



NOTE

Only right side steer housing is to have steer tie shaft idler bearing race.

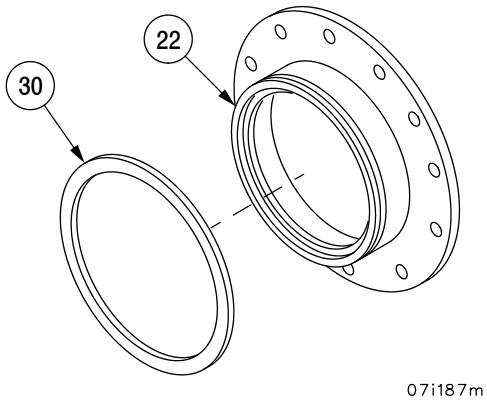
16. Install steer drive shaft tie shaft and tie shaft idler bearing outer race in housing.
17. Install steer clutch lubrication valve (32). Place valve, grooved end outward, against steer–clutch piston (28). Insert new pin (33). Support head of pin and peen small end into piston inner face countersink.



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

18. Install new preformed packing (30) in outer grooves of steer clutch apply ring (22).

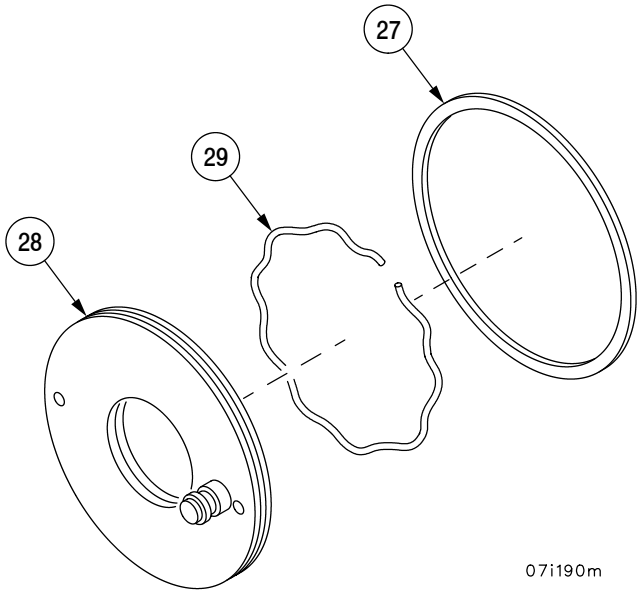


19. Install expander (29) into piston (28) groove. Install new Teflon seal ring (27) carefully on top of expander (29). Place a portion of seal in steer clutch piston ring (28) groove. Work remainder of seal in ring groove.

CAUTION

Use care to prevent seal from popping out of piston ring groove.

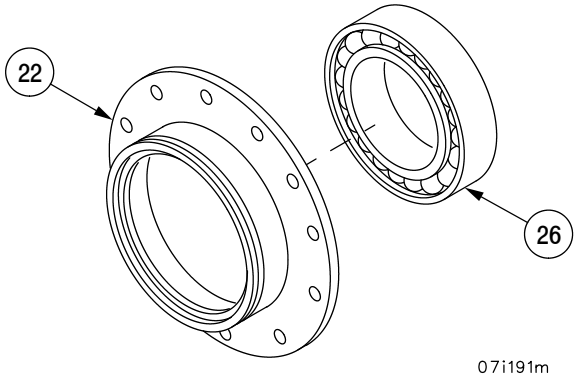
20. Before installing piston (28) and new Teflon seal ring (27) assembly, coat new Teflon seal ring (27) with petrolatum, technical, then work steer clutch piston (28) and seal ring (27) into bore.



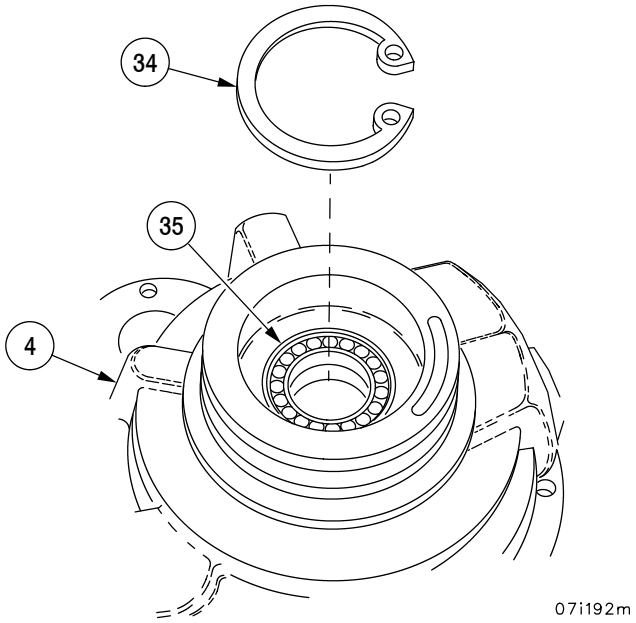
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

21. Install ball bearing (26). Place bearing (26), numbered side out, into apply ring (22) after coating outer race with white lead. Stake ring (22) against bearing (26) by center-punching lip against bearing (26) around entire circumference.



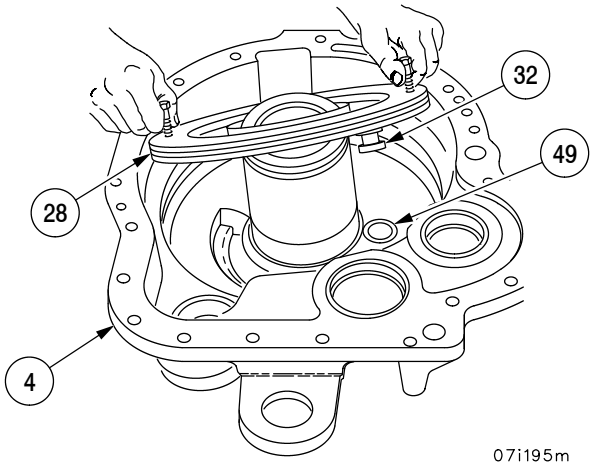
22. Install ball bearing (35) and new snap ring (34) into outer bore of steer clutch housing (4).



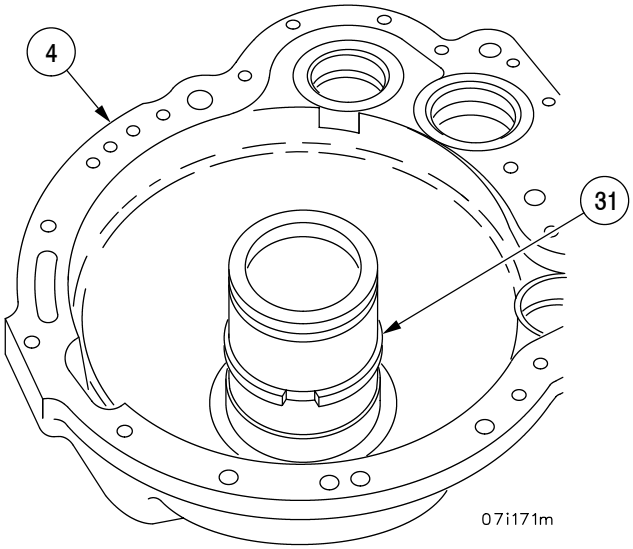
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

23. Invert housing (4) and install steer clutch piston (28) assembly. Make sure steer clutch lubrication valve (32) enters oil transfer sleeve (49) in housing (4).



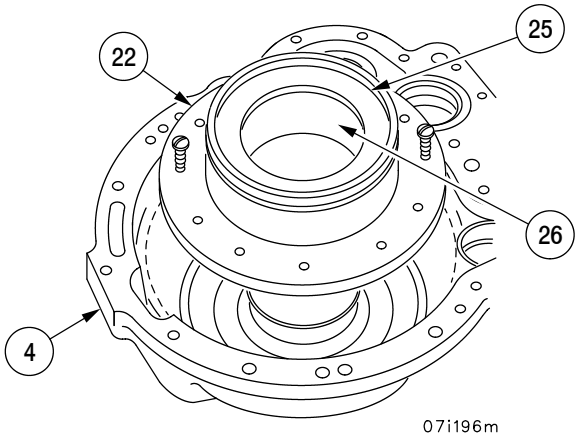
24. Install new hook type seal ring (31) into groove on inner hub of housing (4).



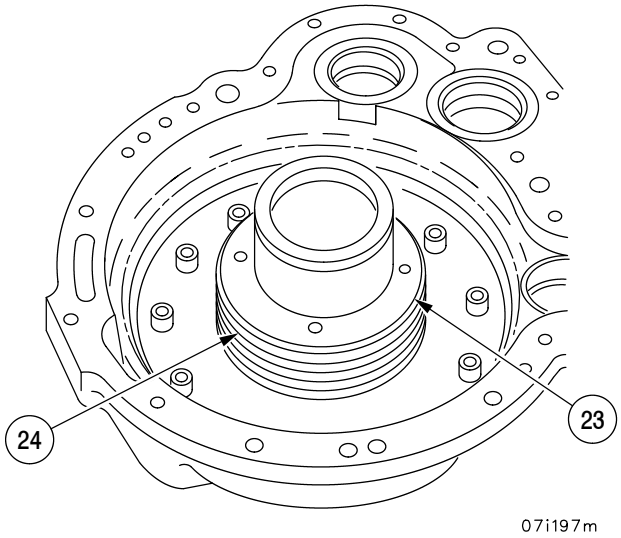
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

25. Using two 5/16–24 flat head screws to grip apply ring (22) assembly, install apply ring assembly (22), seal ring side up, onto inner hub of housing (4). Install spacer (25) onto bearing (26) of apply ring assembly (22).



26. Install four Belleville springs (24), beginning by installing first one convex side down. Install the second spring concave side down; the third one, convex side down; and fourth one, concave side down. Install spacer (23) onto Belleville spring (24).

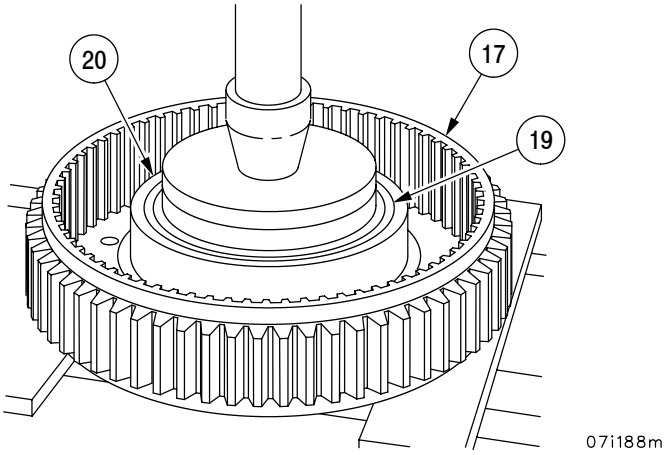


STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

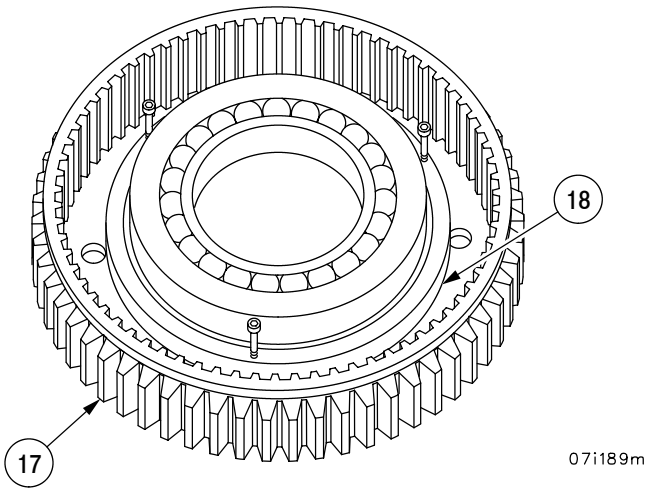
ASSEMBLY – Continued

27. Press steer clutch drive gear ball bearing (20) in steer clutch drive gear (17). Retain bearing (20) with new snap ring (19).

28. Install steer clutch drive gear (17), flat side down into housing.



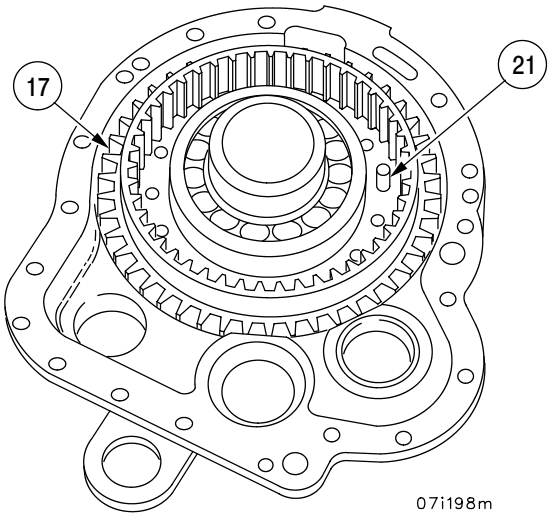
29. Install new preformed packing into inner groove of oil baffle (18). Install baffle (18), tapped hole up, into steer clutch drive gear (17).



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

30. Rotate steer clutch drive gear (17) until 12 holes in gear align with tapped holes in steer clutch piston under it. Install 12 spacers (21) into holes in gear (17).

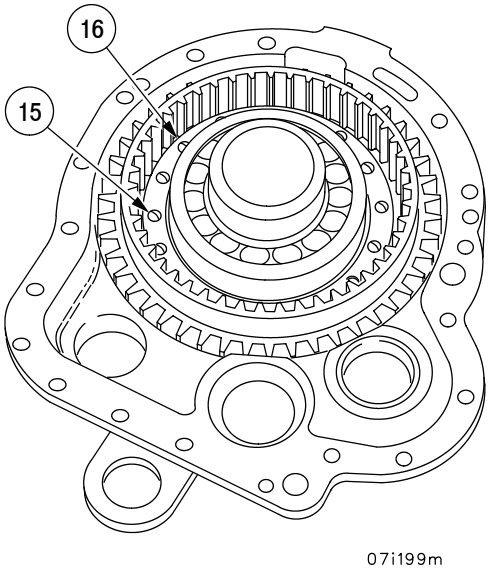


31. Install steer clutch pressure plate (16), grooved side up. Align plate (16) holes with gear holes. Install 12 new self-locking screws (15). Torque screws to 19 to 23 lb-ft (25.8 to 31.2 N•m).

NOTE

Slots in screws heads must not align with grooves in pressure plate.

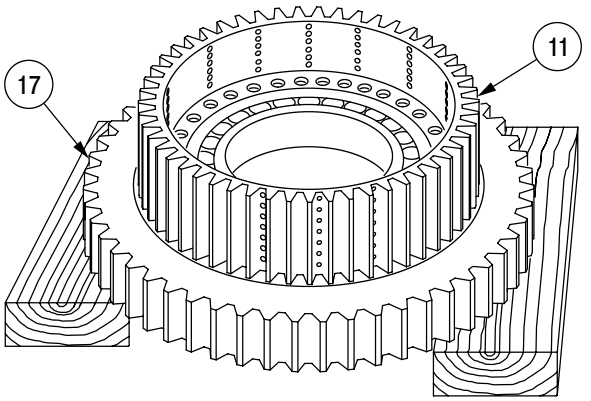
32. Stake each screw (15) head at two points into groove in steer clutch pressure plate (16).



STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

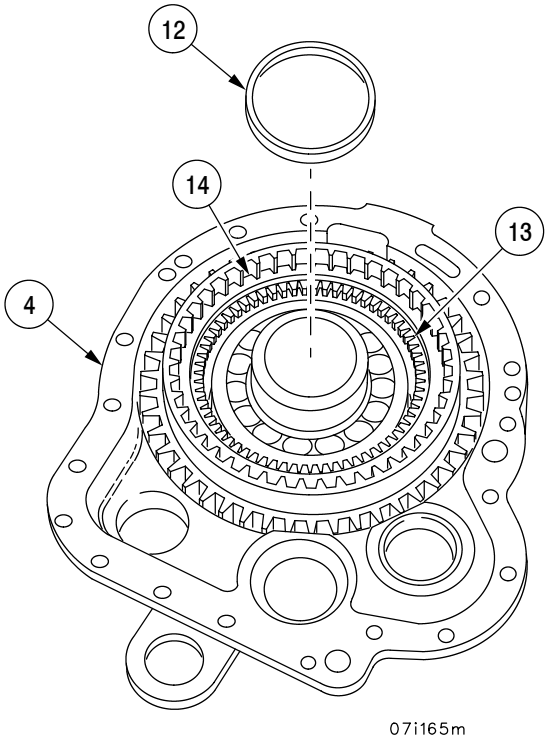
ASSEMBLY – Continued

33. Install steer clutch hub (11), tapped holes up, into steer clutch drive gear (17).



34. Install eight externally splined clutch plates (14) and eight internally splined clutch plates (13). Start with externally splined and alternately install internally splined and externally splined plates.

35. Install spacer (12) onto inner hub of steer clutch housing (4).

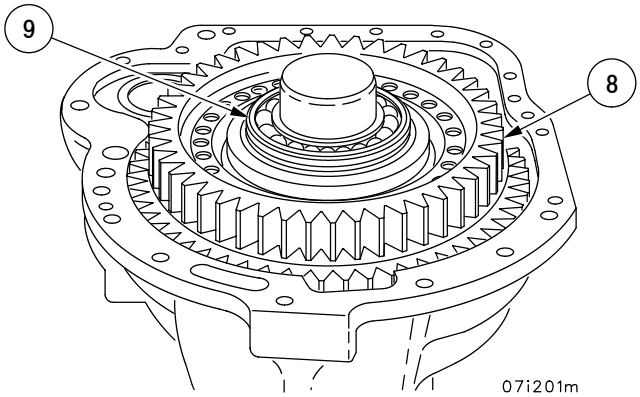


STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

36. Install steer tie shaft drive gear (8), flat side down, onto steer clutch hub and center it. Use two 7/16–20 bolts to align gear holes with those in steer clutch hub.

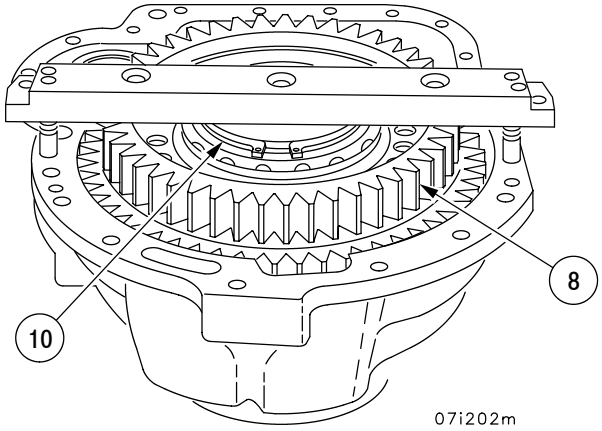
37. Remove 7/16–20 bolts used as guides. Install tie shaft drive gear ball bearing (9), snap ring end up. Tap bearing assembly down until seated against spacer.



NOTE

Snap ring has L–shape cross section. Flat side of ring must be installed up. When compressor assembly is released, bearing is pushed up by Belleville springs and locks snap ring in groove.

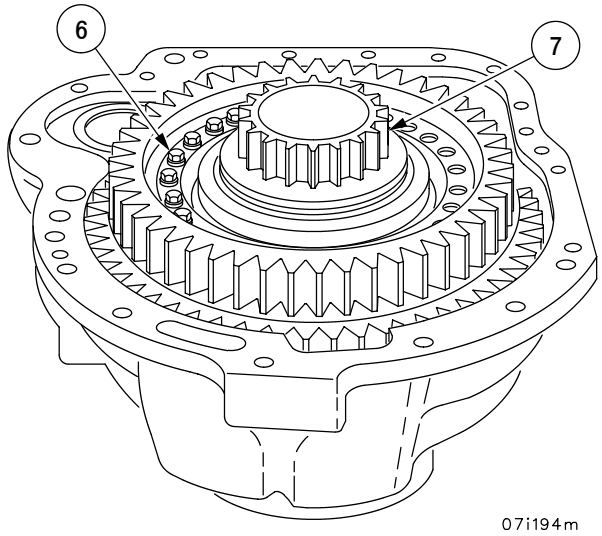
38. Install compressor assembly. Compress steer tie shaft drive gear (8). Install new snap ring (10).



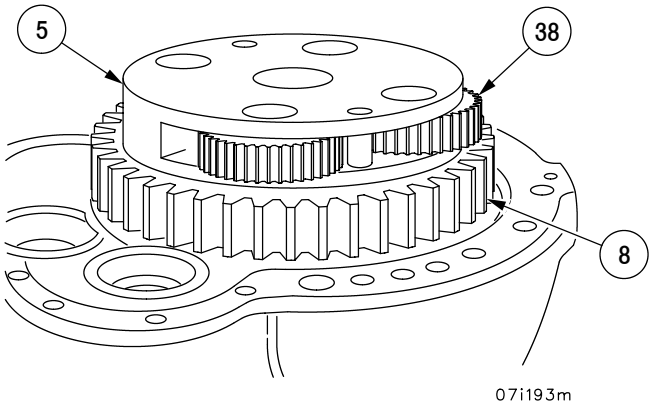
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

39. Remove compressor assembly and install output planetary sun gear (7). Install 32 new self-locking bolts (6). Torque bolts to 50 to 60 lb-ft (67.8 to 81.4 N•m).



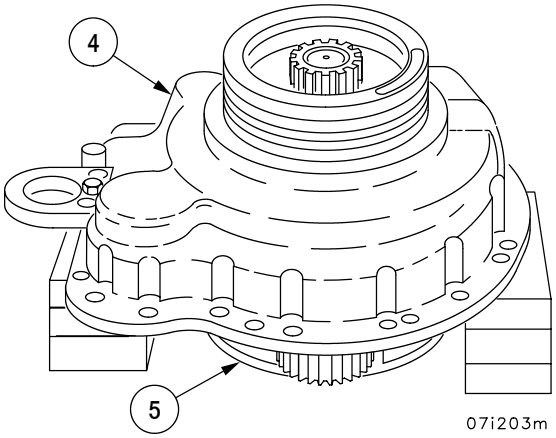
40. Install output planetary carrier assembly (5). Mesh teeth of pinion (38) with those of sun gear. Drive carrier downward until shaft seats in shaft ball bearing. When installed, pinions should be 1/8 inch from tie shaft drive gear (8).



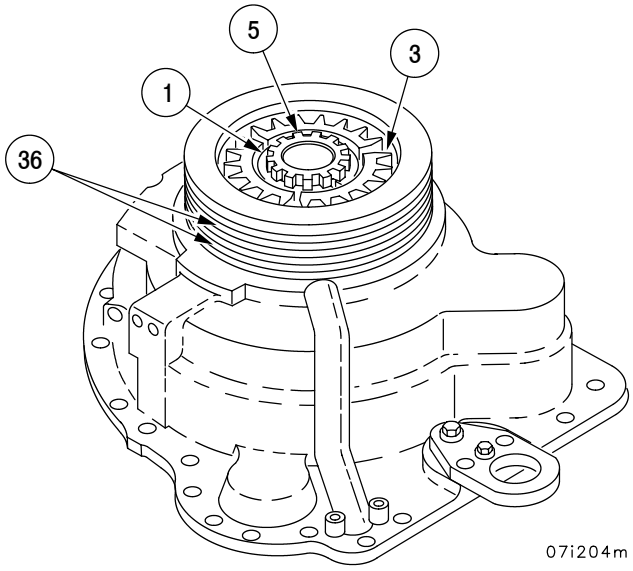
STEER CLUTCH HOUSING ASSEMBLY REPAIR – CONTINUED 0039 00

ASSEMBLY – Continued

41. Turn assembly (4) over and let rest on planetary carrier (5).



42. Install new hook type seal ring (3) into groove on coupling, seal ring end first, onto splined shaft of carrier (5) shaft. Install new snap ring (1), which retains coupling and two new preformed packings (36) into inner grooves on housing hub.



NOTE

FOLLOW-ON MAINTENANCE:
Install steer clutch housing assembly in transmission (WP 0038 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR BRAKE APPLY REACTION PLATE REPLACEMENT

0040 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (2000 lb capacity min)
Fabricated stand (figure 2, WP 0089 00)

Materials/Parts

Self-locking bolt (2) (item 108, WP 0087 00)
Self-locking bolt (27) (item 67, WP 0087 00)

Equipment Conditions

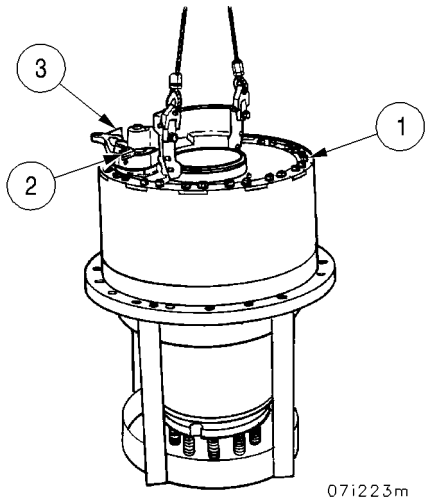
Output reduction gear assembly removed (TM 9-2350-256-20)

REMOVAL

NOTE

Removal procedures for the right and left output reduction gear assemblies are identical. Only the left assembly is illustrated.

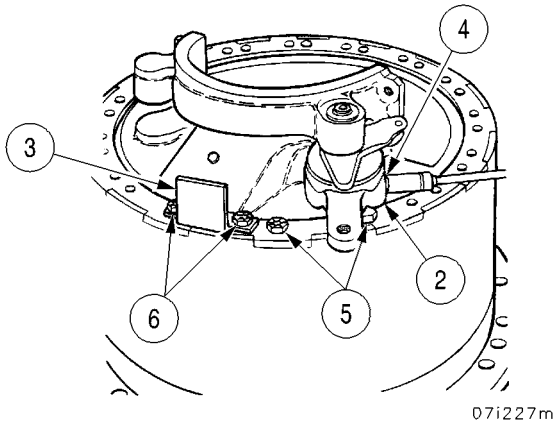
1. Using a suitable lifting device and lifting sling, position output reduction gear assembly in fabricated stand. Do not remove sling. Remove all self-locking bolts (1) except those under lever (2) and those retaining stop (3). Discard self-locking bolts.



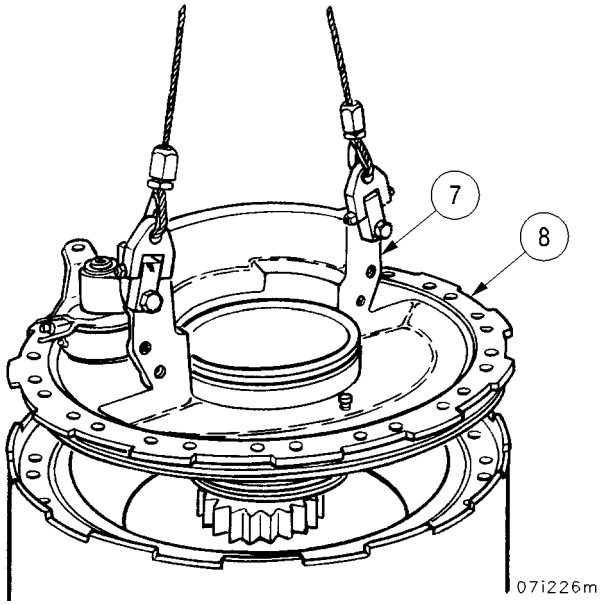
OUTPUT REDUCTION GEAR BRAKE APPLY REACTION PLATE REPLACEMENT – CONTINUED 0040 00

REMOVAL – Continued

2. Apply wrench pressure to depress lock collar (4) and adjusting lever (2) to clear bolts (5). Remove remaining bolts (5), two bolts (6), and stop (3).



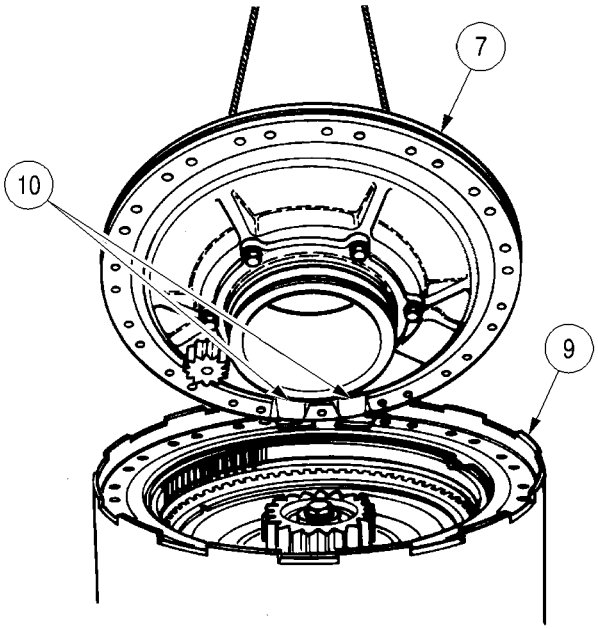
3. Remove brake apply reduction plate assembly (7) and retainer plate (8).



OUTPUT REDUCTION GEAR BRAKE APPLY REACTION PLATE REPLACEMENT – CONTINUED 0040 00

INSTALLATION

1. Install output reduction gear brake apply reaction plate (7) into brake housing (9). Align two ports (10) with notches.



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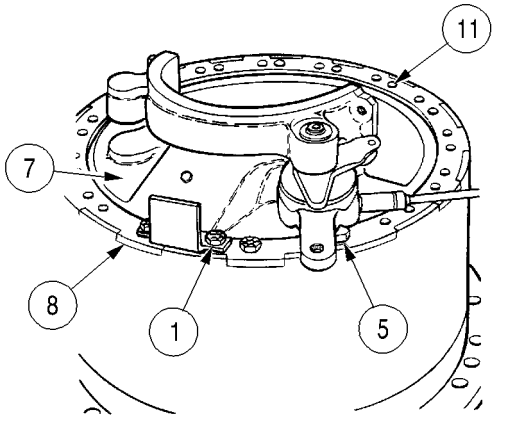
2. Install retainer plate (8), aligning holes with holes in output reduction gear brake apply plate (7). Install 27 new self-locking bolts (1 and 5) into all holes except two (11).



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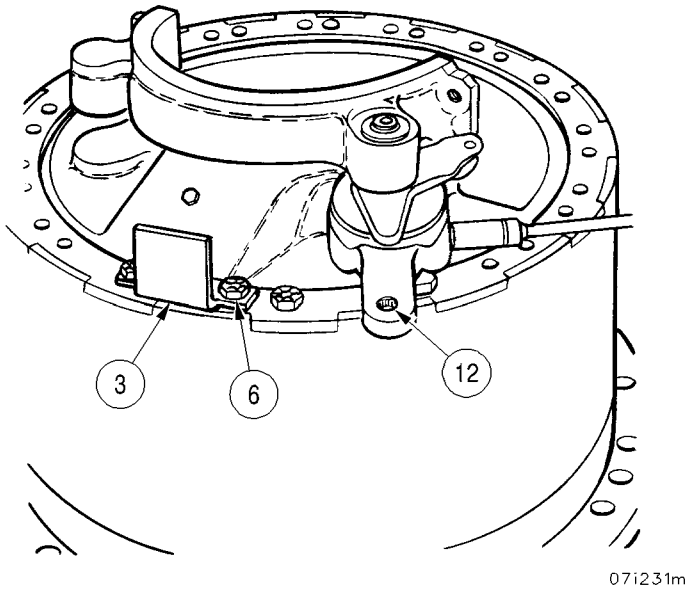
OUTPUT REDUCTION GEAR BRAKE APPLY REACTION PLATE REPLACEMENT – CONTINUED 0040 00

INSTALLATION – Continued

3. Move slack adjuster (12) and install adjuster stop (3) and two new self-locking bolts (6). When bolts (6) are tight, position slack adjuster (12) against stop (3).



NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction gear assembly
(TM 9-2350-256-20)

END OF WORK PACKAGE

BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR 0041 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

White lead (item 13, WP 0085 00)
Seal (2) (item 14, WP 0087 00)
Seal ring (item 22, WP 0087 00)
Retaining ring (item 66, WP 0087 00)
Preformed packing (item 6, WP 0087 00)
Bearing (item 92, WP 0087 00)

Materials/Parts - Continued

Preformed packing (2) (item 55, WP 0087 00)
Lockwasher (6) (item 100, WP 0087 00)
Seal (2) (item 79, WP 0087 00)
Preformed packing (item 34, WP 0087 00)

Equipment Conditions

Output reduction unit removed (TM 9-2350-256-20)

References

TM 9-2350-256-20

DISASSEMBLY

NOTE

These procedures specifically cover the right brake reaction plate assembly, but apply equally to the left assembly except as noted.

BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR – CONTINUED 0041 00

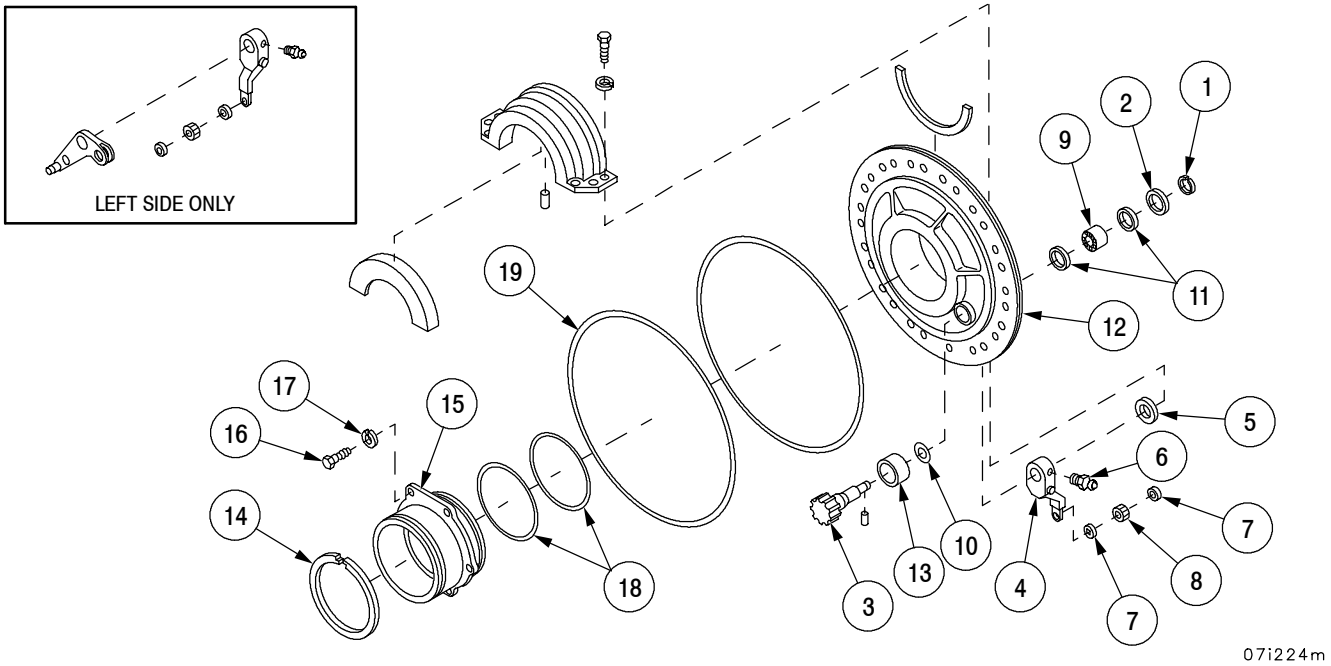
DISASSEMBLY – Continued

1. Remove snap ring (1) and spacer (2) from brake apply shaft (3). Tap brake apply shaft (3) out of assembly. Discard snap ring.

NOTE

On the left assembly, air valve actuating lever is used instead of spacer.

2. Remove brake apply lever (4) and spacer (5).
3. Remove lubrication fitting (6), two seals (7) and needle bearing (8). Two seals (7) may be removed with hook tool or pressed with bearing. Discard seals.
4. Remove bearing (9), preformed packing (10) and two seals (11) from saddle (12). Remove seal and preformed packing with hooked tool. Remove bearing by pressing out. Discard preformed packing, seals and bearing.
5. Remove needle-bearing (13) by inserting drift behind bearing and tap out.
6. Remove hook-type seal ring (14) from saddle sleeve (15). Discard seal ring.
7. Remove six screws (16) and six lockwashers (17). Discard lockwashers.
8. Remove saddle sleeve (15) out of saddle (12). Remove two preformed packings (18) from saddle sleeve (15). Discard preformed packings.
9. Remove preformed packing (19) from outer groove of saddle (12). Discard preformed packing.



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR – CONTINUED 0041 00

FIT AND WEAR LIMITS

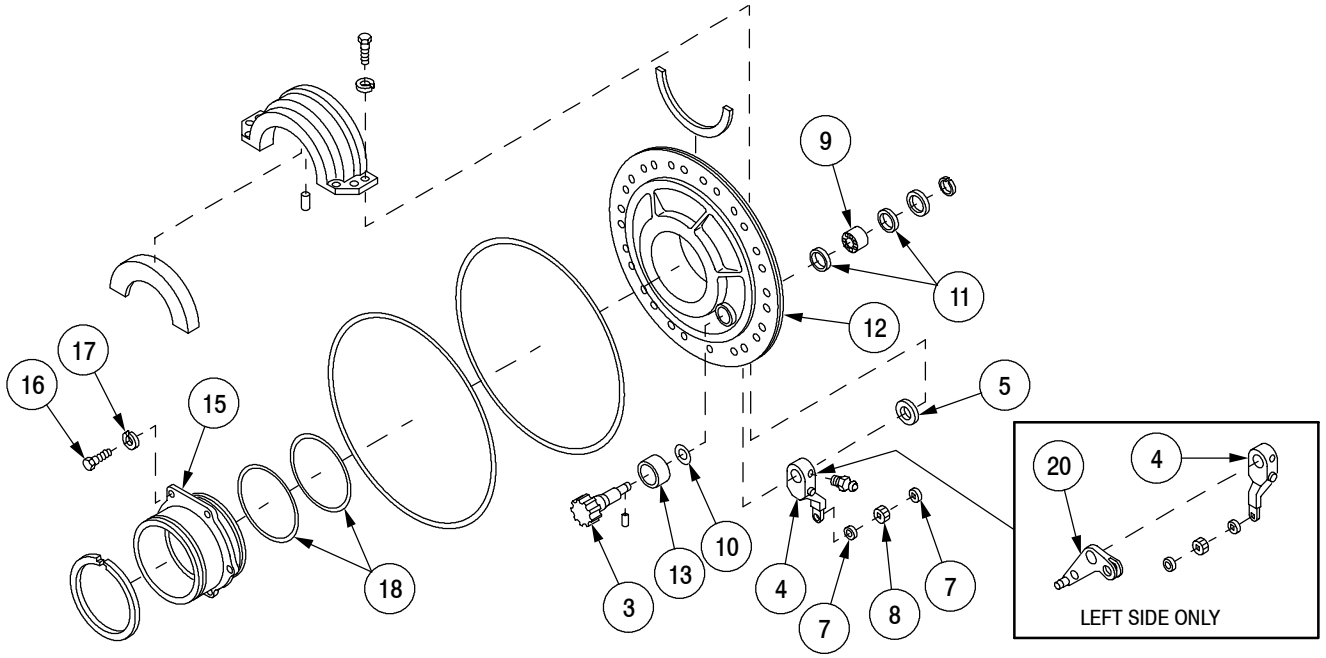
Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Transmission left mounting saddle	Small brake shaft bearing bore ID	1.2495 to 1.2505 in. Wear limit: 1.2510 in.
	Bearing fit in housing	0.0010T to 0.0010L
	Large brake shaft bearing bore ID	2.0623 to 2.0630 in. Wear limit: 2.0635 in.
	Bearing fit in housing	0.0002T to 0.0011L
Needle bearing	Bearing OD	1.2495 to 1.2505 in.
	Bearing fit in housing	0.0002T to 0.0011L
	Bearing ID	To fit 1.4995 to 1.5000 in. diameter shaft
	Bearing fit on gear shaft	To fit 1.4995 to 1.5000 in. diameter shaft
Needle bearing	Bearing OD	
	Bearing fit in housing	2.0619 to 2.0625 in.
	Bearing ID	0.0002T to 0.0011L
	Bearing fit on gear shaft	To fit 1.4995 to 1.5000 in. diameter shaft To fit 1.4995 to 1.5000 in diameter shaft
Brake apply pinion	Bearing surface large OD	
	Bearing fit in gear	1.4995 to 1.5000 in. To fit 1.4995 to 1.5000 in. diameter shaft
	Bearing surface small OD	
	Bearing fit on shaft	0.9995 to 1.0000 in. To fit 1.000 diameter shaft
Internal splined brake plate	Thickness of plate	0.2440 to 0.2480 in. Wear limit: 0.2240 in.
External splined brake plate	Thickness of plate	0.2440 to 0.2470 in.
Brake wear plate	Thickness of plate	0.2440 to 0.2470 in.
Transmission right mounting saddle	Small brake shaft bearing bore ID	1.2495 to 1.2505 in. Wear limit: 1.2510 in.
	Bearing fit on shaft	0.0010T to 0.0010L
	Large brake shaft bearing bore ID	2.0623 to 2.0630 in. Wear limit: 2.0635 in.
	Bearing fit in housing	0.0002T to 0.0011L
Long brake apply roller	Diameter of roller	0.9998 to 1.0000 in. Wear limit: 0.9993 in.
Short brake apply roller	Diameter of roller	0.9998 to 1.0000 in. Wear limit: 0.9993 in.

BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR – CONTINUED 0041 00

ASSEMBLY

1. Install new bearing (9). Coat new bearing (9) with white lead. Press numbered end of bearing (9) only. Locate bearing (9) centrally in bore.
2. Install two new seals (11) so that seal lips face away from needle bearing (9). Press two seals (11) into bore until within approximately 1.16 inch of bearing.
3. Install new preformed packing (10) into second counterbore of brake apply shaft bore.
4. Install needle bearing assembly (13) in first counterbore. Coat needle bearing (13) with white lead and seat against shoulder of bore in saddle (12).
5. Install one new preformed packing (18) against sleeve (15). Install the other new preformed packing (18) into groove.
6. Align bolt holes in sleeve (15) with those in saddle (12). Position sleeve (15) so that straight edges of flange are toward top and bottom of saddle (12).



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BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR – CONTINUED 0041 00

ASSEMBLY – Continued

CAUTION

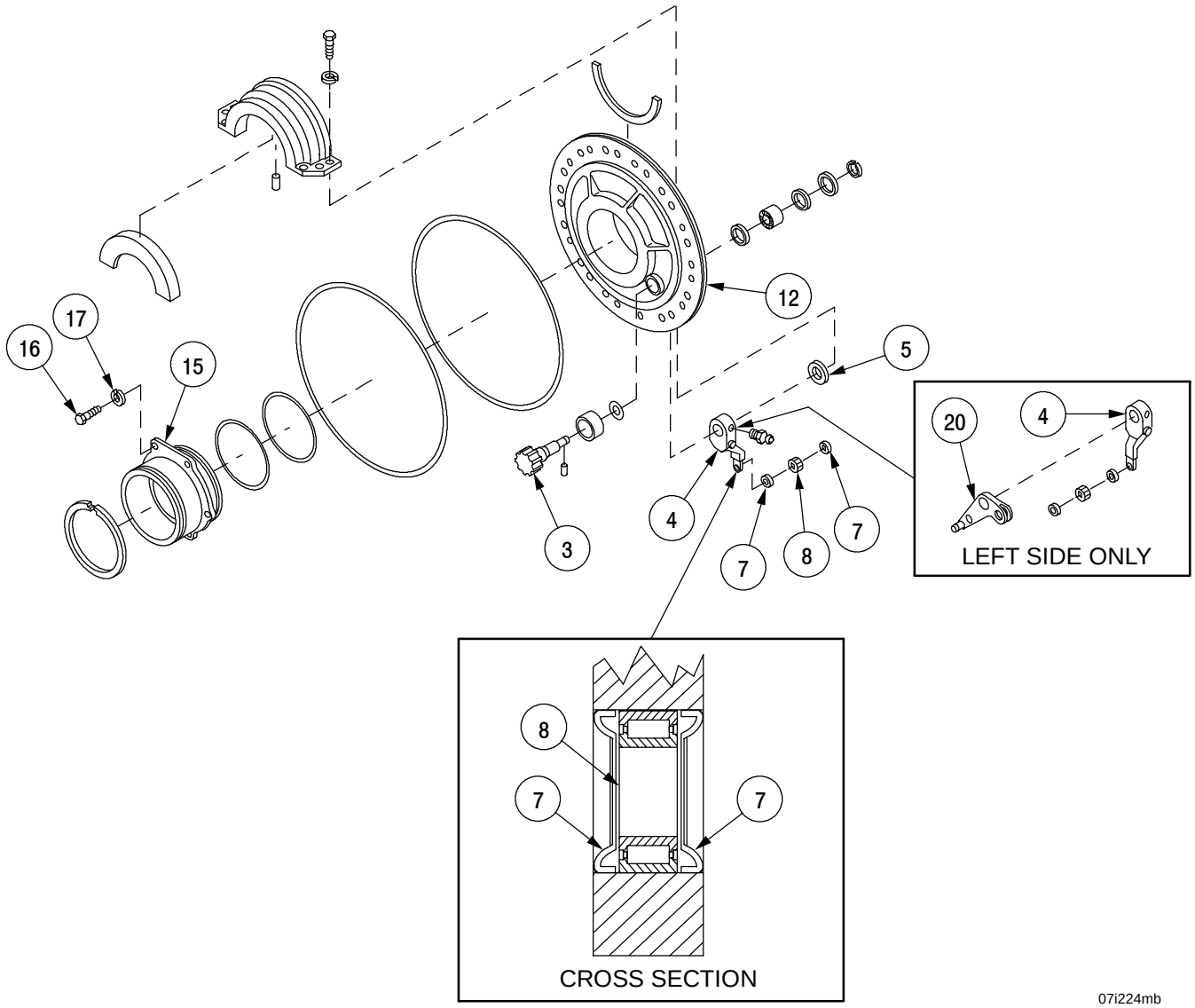
Use care when pressing to prevent damage to seal rings.

7. Press sleeve (15) into saddle (12). Install six new lockwashers (17) and six screws (16) to retain it.
8. Install needle bearing (8) and two new seals (7) in brake apply lever (4). Coat needle-bearing (8) with white lead. Press only on numbered side of needle bearing (8). Locate needle-bearing (8) centrally in bearing bore. Press two new seals (7) in brake apply lever (4) with rubber lips facing toward needle bearing (8), until flush with surface.

NOTE

On the left assembly, install brake apply lever onto assembly before installing lever assembly. Spacer is not used on left assembly.

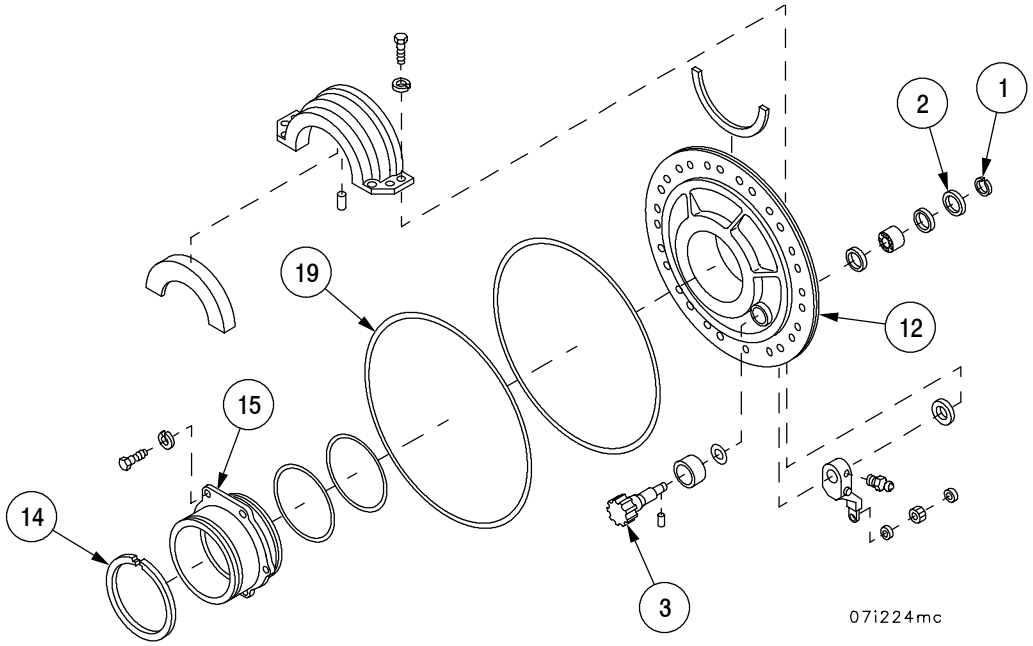
9. Install brake apply lever (20) and spacer (5). Spacer must be between outer bearing and lever assembly. Hold these parts in position and install brake apply lever (3).



BRAKE APPLY REACTION PLATES AND RELATED PARTS REPAIR – CONTINUED 0041 00

ASSEMBLY – Continued

10. Install spacer (2) and new snap ring (1). Spacer has internal notch which must engage dowel pin in brake apply shaft (3).
11. Install new hook-type seal ring (14) into groove on hub of sleeve (15).
12. Install new preformed packing (19) into outer groove of saddle (12).



NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction unit
(TM 9-2350-256-20)

END OF WORK PACKAGE

BRAKE APPLY CAM ASSEMBLIES REPAIR 0042 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Hammer (item 35, WP 0088 00)

Materials/Parts

Grease (item 4, WP 0085 00)

Equipment Conditions

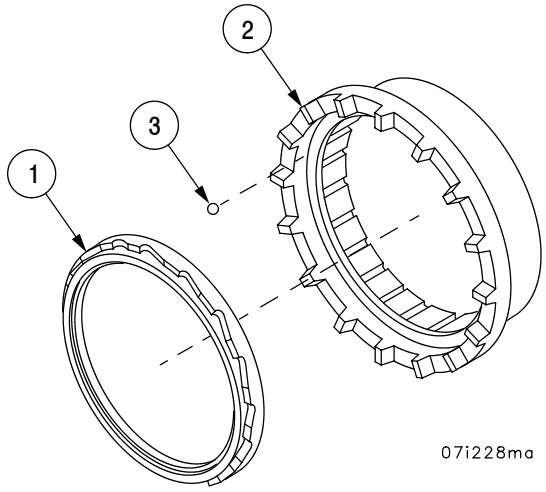
Brake apply reaction plates and related parts removed (WP 0040 00)

DISASSEMBLY

NOTE

Procedures for right and left cam assemblies are identical. Only the right assembly is illustrated. However, procedures apply to both assemblies.

1. Pry up on rotating cam ring (1) until loose from moveable cam ring (2).
2. Lift out rotating cam ring (1). Remove 143 ball bearings (3).



BRAKE APPLY CAM ASSEMBLIES REPAIR – CONTINUED 0042 00

CLEANING

See WP 0018 00for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

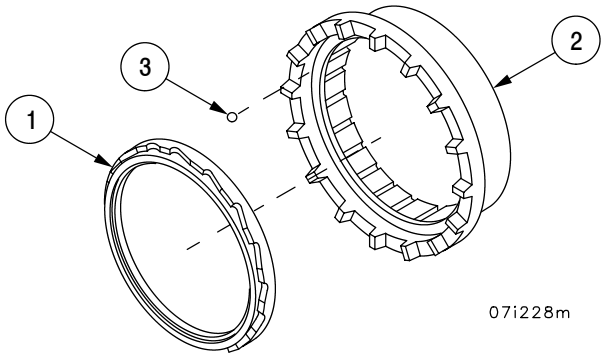
FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Long brake apply roller	Roller OD	0.9998 to 1.0000 in. Wear limit: 0.9993 in.
Short brake apply roller	Roller OD	0.9998 to 1.0000 in. Wear limit: 0.9993 in.

ASSEMBLY

1. Lubricate 143 ball bearings with oil soluble grease and install into groove around inside circumference of moveable cam ring (2).
2. Tilt rotating cam ring (1) slightly and install on row of ball bearings (3). A sharp blow with a mallet on high side of tilted rotating cam ring (1) will engage it with moveable cam ring (2). Hold down on low side when striking high side to prevent its jumping out. When properly installed, rotating cam ring (1) should be free to spin in moveable cam ring (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install brake apply reaction plates and related parts (WP 0040 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT

0043 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (2000 lb capacity min)
Socket wrench, face, spanner (item 17, WP 0088 00)
Adapter (2) (item 42, WP 0088 00)
Puller attachment, mechanical (item 8, WP 0088 00)
Torque wrench (item 26, WP 0088 00)
Fabricated stand (figure 2, WP 0089 00)

Materials/Parts

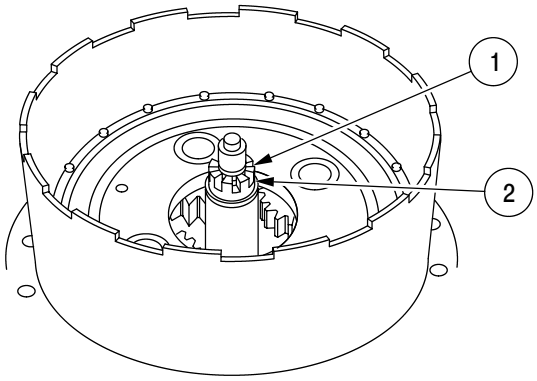
White lead (item 13, WP 0085 00)
Abrasive cloth (item 2, WP 0085 00)
Snap ring (18) (item 45, WP 0087 00)
Preformed packing (item 34, WP 0087 00)

Equipment Conditions

Brake hub assembly removed (WP 0049 00)

REMOVAL

1. Drive out pin (1) securing nut (2).



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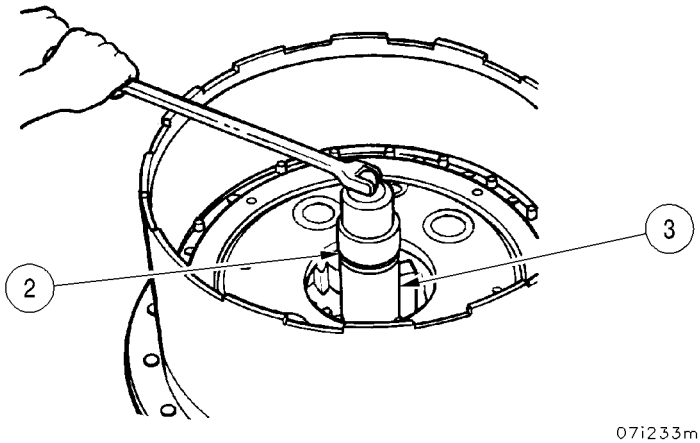
2. Using spanner face wrench socket (item 17, WP 0088 00), loosen but do not remove nut (2). Use soft metal block to prevent output shaft (3) from turning.



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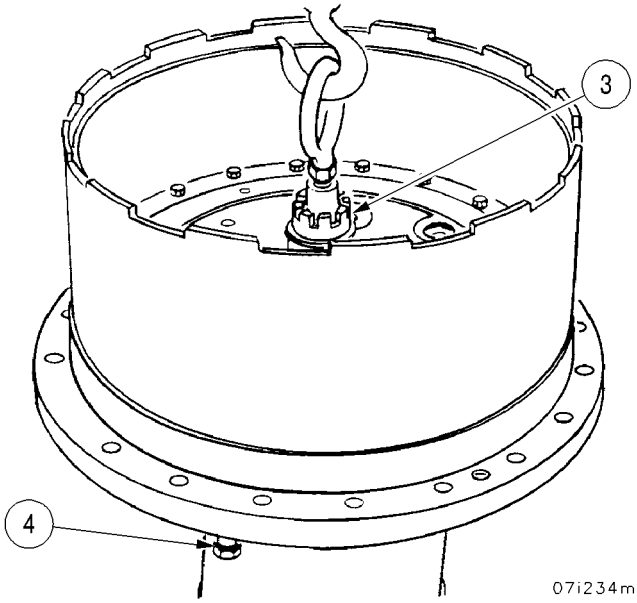
OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT – CONTINUED

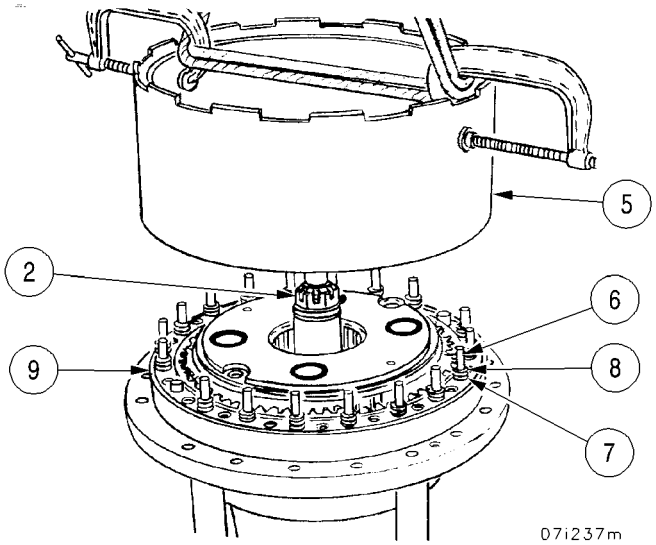
0043 00

REMOVAL – Continued

3. Install a 3/4-16 eye bolt in output shaft (3) and remove assembly from stand. Remove 20 bolts (4).



4. Place assembly in fabricated stand. Remove brake housing assembly (5), 18 pins (6), 18 snap rings (7) and 18 springs (8). Remove nut (2) and seal ring (9). Discard snap rings and seal ring.

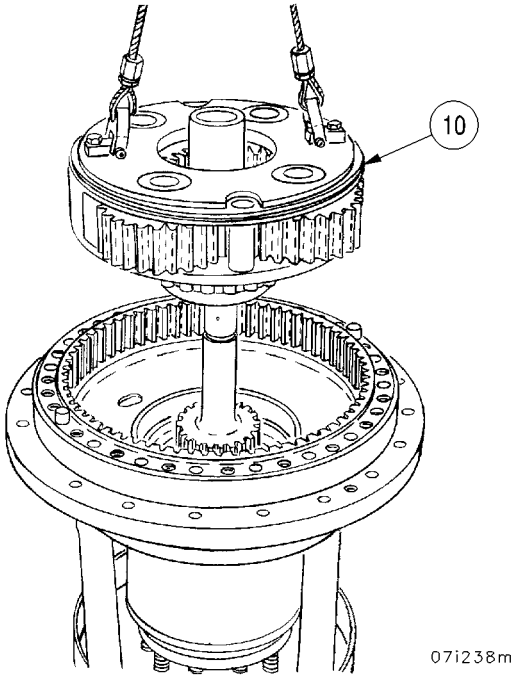


OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT – CONTINUED

0043 00

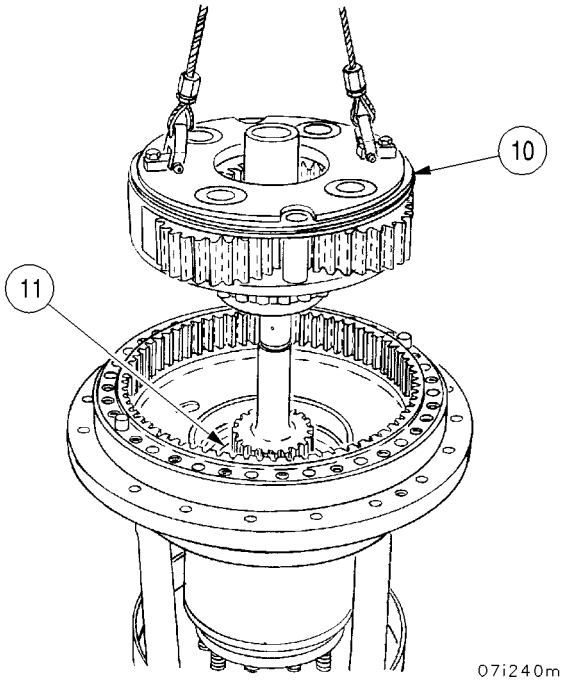
REMOVAL – Continued

5. Install adapters (item 42, WP 0088 00) in output reduction gear carrier assembly (10) lifting holes and, using puller attachment (item 8, WP 0088 00), loosen output reduction gear planetary carrier assembly (10) for removal. Remove output reduction gear planetary carrier assembly (10).



INSTALLATION

1. Place housing assembly in fabricated stand. Install spacer (11), small diameter down. With a suitable lifting device and sling, install output reduction gear planetary carrier assembly (10).

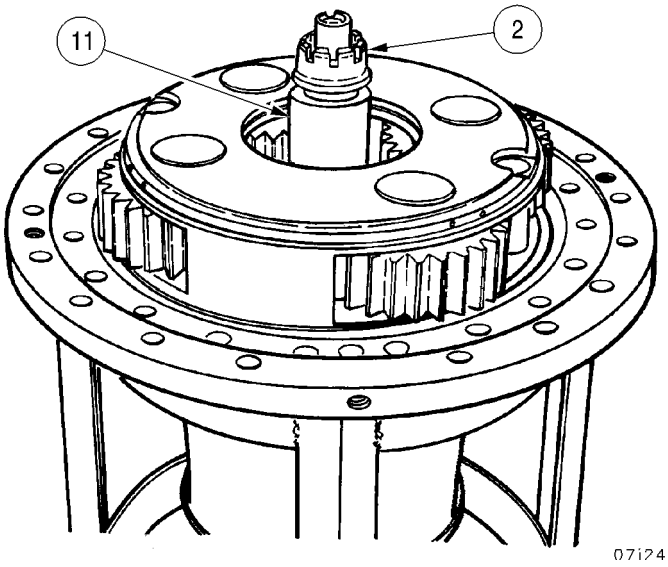


OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT – CONTINUED

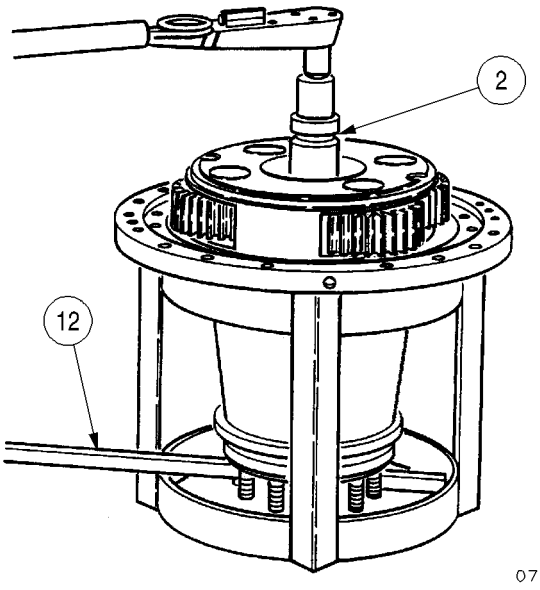
0043 00

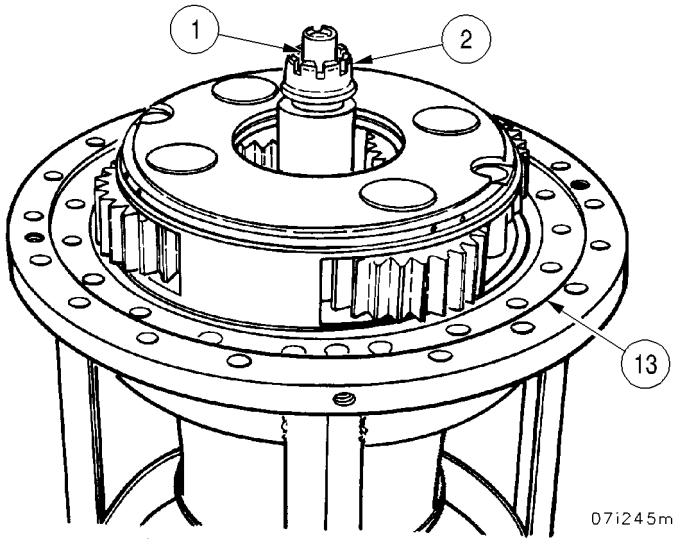
INSTALLATION – Continued

2. Paint shaft threads and top of spacer (11) with white lead. Install nut (2)



3. Place bar (12) between output reduction gear shaft studs. Use torque wrench (item 26, WP 0088 00) and spanner face wrench socket (item 17, WP 0088 00) to tighten nut (2) to 350 lb-ft (474.6 N•m). Continue to tighten nut (2) until nut (2) locking pin (1) can be installed. If 450 lb-ft (610.2 N•m) or more is required, use different nut (2).
4. Install pin (1) and center nut (2). Use a blunt-end drift to drive center of pin (1) down to approximately 1/16 inch. If pin (1) remains loose, drive pin (1) 1/32 inch further. Check to ensure cork seal ring (13) (item 34, WP 0087 00) is in place.



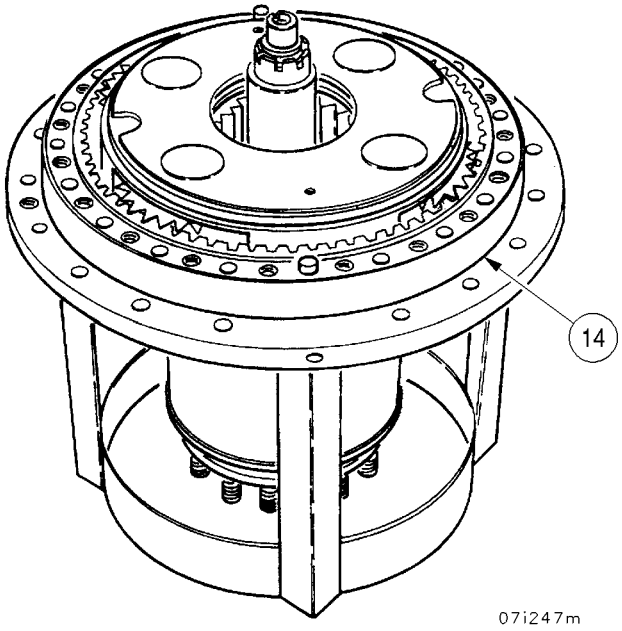


OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT – CONTINUED

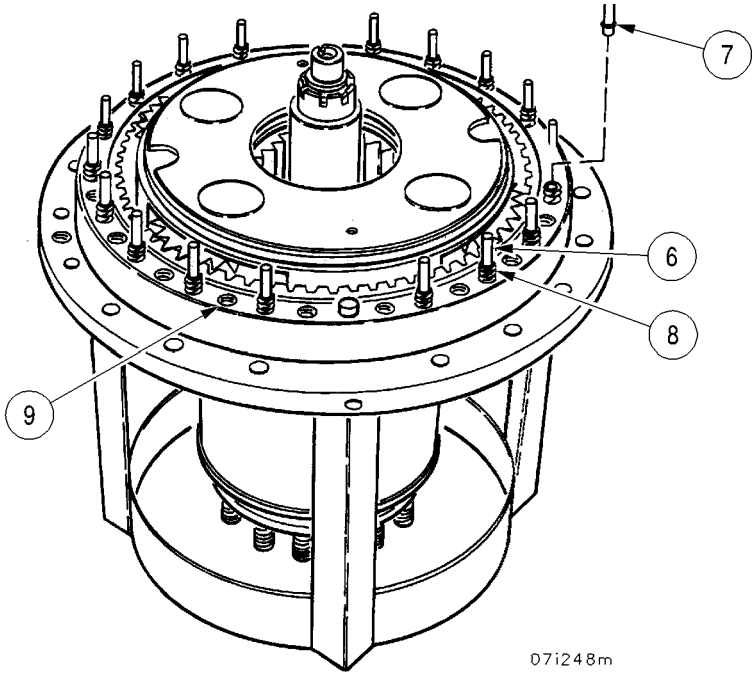
0043 00

INSTALLATION – Continued

5. Install ring gear assembly (14).



6. Install 18 springs (8), 18 pins (6) (long ends facing up) and 18 new snap rings (7). Install new seal ring (9).



OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY AND BRAKE HOUSING ASSEMBLY REPLACEMENT – CONTINUED

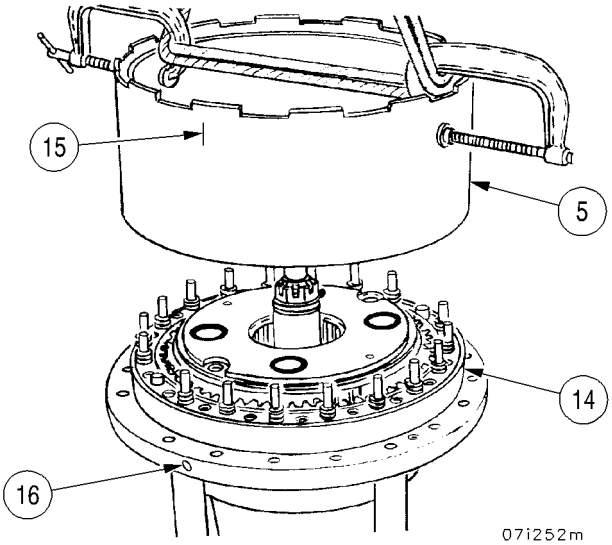
0043 00

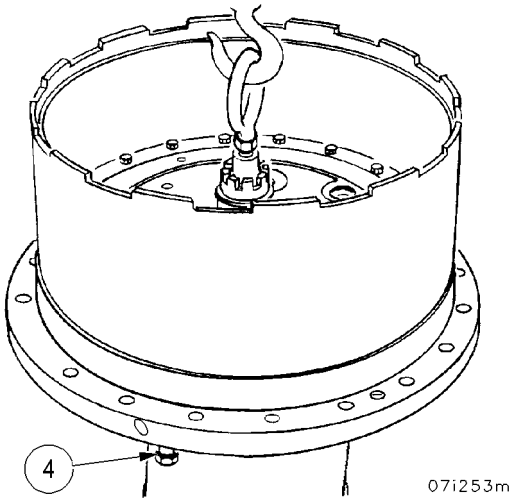
INSTALLATION – Continued

NOTE

There are two scribe marks 180 degrees apart. Either may align with lifting hole.

7. Use improvised sling as shown to install brake housing assembly (5) onto ring gear (14), aligning scribe mark (15) with lifting hole (16).
8. Use lifting sling, 3/4-16 eye-bolt and a suitable lifting device to lift assembly from improvised stand. Lower assembly to floor or table and, with lifting device still attached, install 20 bolts (4).





NOTE

FOLLOW-ON MAINTENANCE:
Install brake hub assembly (WP 0050 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR 0044 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Bearing remover assembly (item 9, WP 0088 00)
Arbor press (item 20, WP 0088 00)
Steel tube (item 14, WP 0088 00)
Replacer assembly (item 11, WP 0088 00)

Materials/Parts

Grease (item 4, WP 0085 00)
Dry ice

Equipment Conditions

Brake apply cam removed (WP 0041 00)

Equipment Conditions

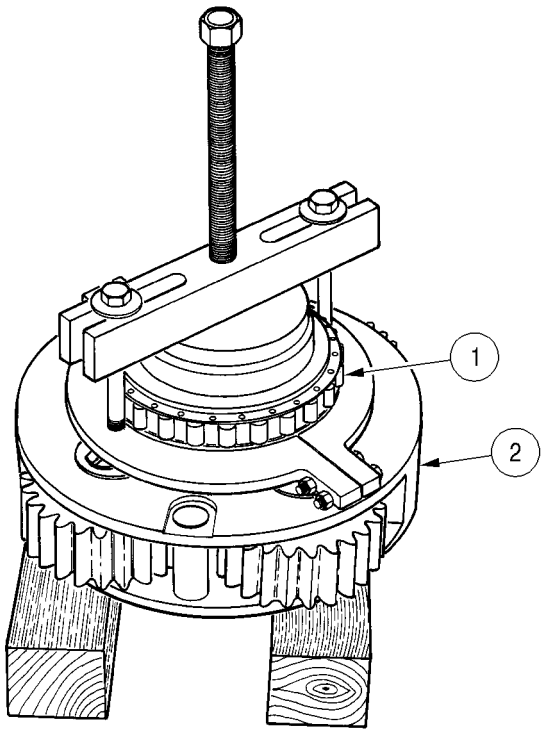
TM 9-2350-292-10

DISASSEMBLY

NOTE

These procedures cover the left and right output reduction gear carrier assemblies.

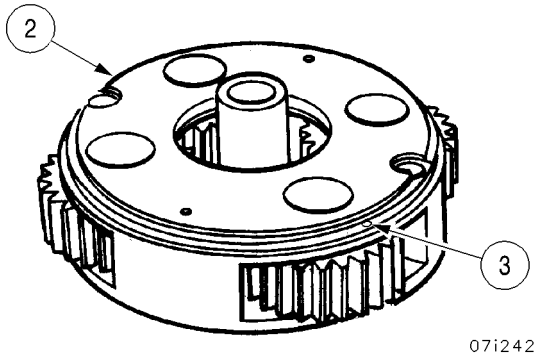
1. Remove roller bearing (1) from output planetary carrier assembly (2).



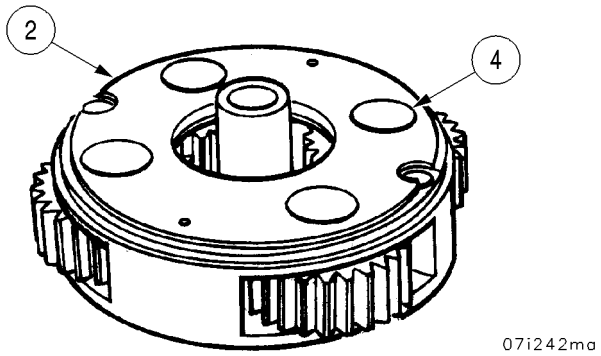
OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

DISASSEMBLY – Continued

2. Drive four spindle lockpins (3) from output reduction gear carrier assembly (2).



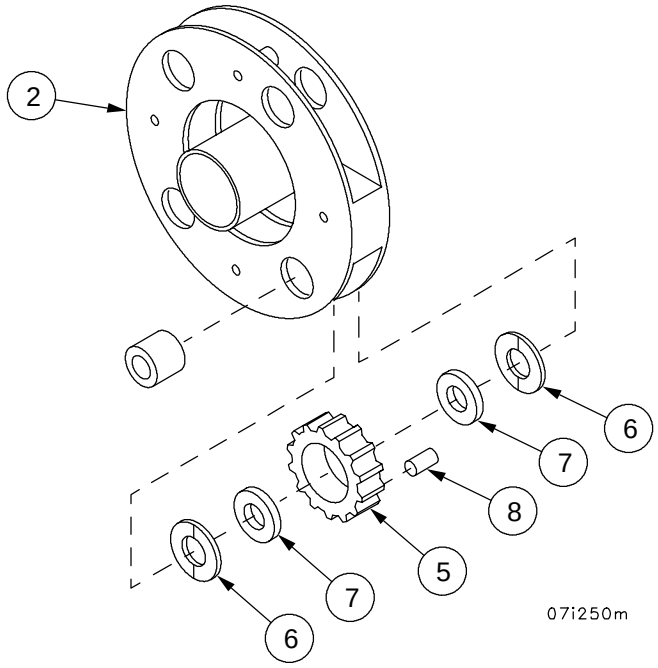
3. Press four spindles (4) from output reduction gear planetary carrier assembly (2).



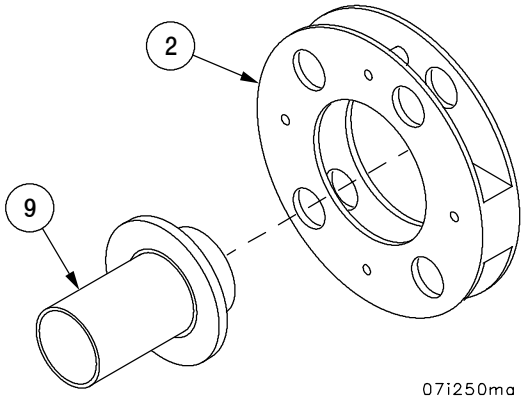
OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

DISASSEMBLY – Continued

4. Remove four output reduction gear planetary carrier assembly pinions (5), 16 thrust washers (6 and 7) and spindle rollers (8) from output reduction gear planetary carrier assembly (2).



5. Remove planetary carrier assembly spacer (9) from output reduction gear planetary carrier assembly (2).



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Ball bearing	Bearing ID Bearing fit in housing Bearing OD Bearing fit in gear	1.3775 to 1.3780 in. 0.0001T to 0.0009L 3.1491 to 3.1496 in. 0.0006T to 0.0005L
Output reduction sun gear	Gear bearing surface OD Bearing fit in gear	3.1490 to 3.1496 in Wear limit: 3.1499 in. 0.0006T to 0.0005L
Output planetary carrier	Carrier hub bearing surface OD Bearing fit on carrier	6.6944 to 6.6957 in. Wear limit: 6.6937 in. 0.0015T to 0.0038L
Planetary carrier spindle	Spindle OD at middle Pinion and roller fit on spindle	2.7433 to 2.7438 in. Wear limit: 2.7423 in. 0.0006L to 0.0020L
Thrust washer	Thickness of washer	0.1220 to 0.1226 in. Wear limit: 0.1170 in.
Thrust washer	Thickness of washer	0.1200 to 0.1250 in. Wear limit: 0.1150 in.
Spindle roller	Roller OD Pinion fit on spindle	0.3748 to 0.3750 in. Wear limit: 0.3743 in. 0.0006L to 0.0020L
Planetary carrier pinion	Pinion ID	3.4944 to 3.4949 in. Wear limit: 3.4959 in.
Roller bearing	Bearing inner race ID Bearing fit on carrier Bearing outer race OD Bearing fit in housing	6.6919 to 6.6929 in. 0.0015T to 0.0038T 10.2348 to 10.2362 in. 0.0010T to 0.0022L
Output shaft housing	Housing large ID at bearing surface Bearing fit in housing Large brake shaft bearing bore ID	10.2352 to 10.2370 in. Wear limit: 10.2380 in. 0.0010T to 0.0022L 9.0551 to 9.9579 in. 0.0000 to 0.0030L
Roller bearing	Bearing ID Bearing fit on shaft Bearing OD Bearing fit in housing	5.1171 to 5.1181 in. 0.0006T to 0.0023T 9.0539 to 9.0551 in. 0.0000 to 0.0030L
Output shaft	Shaft small OD at bearing surface Bearing fit on shaft Shaft large OD at bearing surface Bearing fit on shaft	1.3771 to 1.3776 in. Wear limit: 1.3769 in. 0.0001T to 0.0009L 5.1187 to 5.1194 in. 0.0006T to 0.0023T

OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

ASSEMBLY

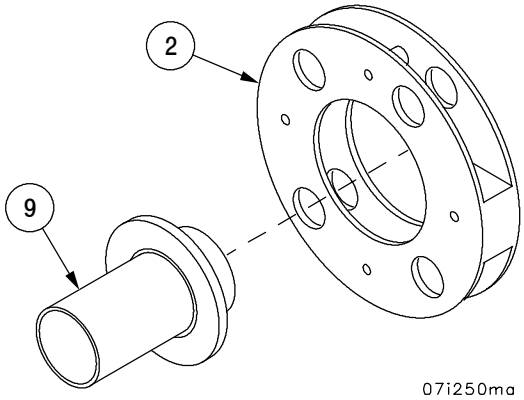
WARNING

Use gloves or tongs when handling dry ice or chilled parts to prevent injury.

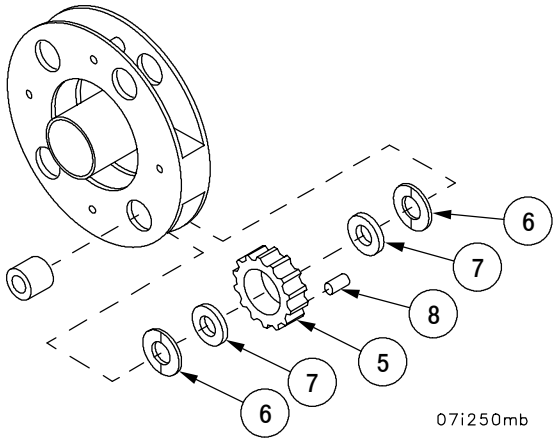
NOTE

Chill new spindles in dry ice for approximately one hour before installation.

1. Install planetary carrier spacer (9), flange end first, into output reduction gear planetary carrier assembly (2).



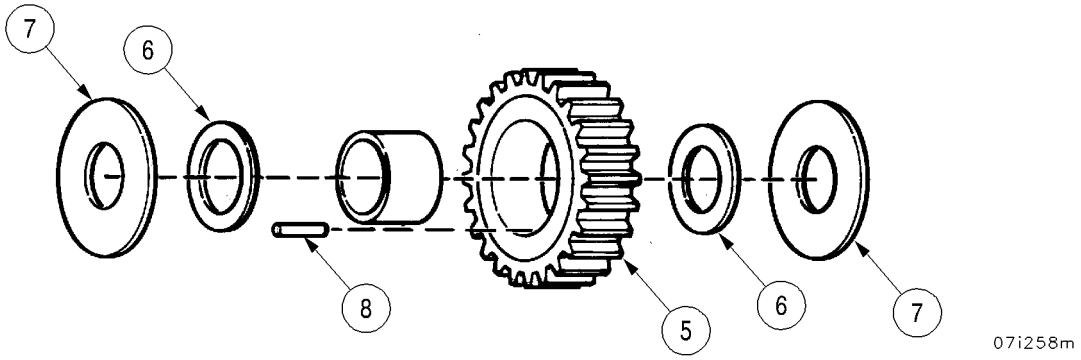
2. Lubricate inside diameter of pinion of planetary carrier pinion (5) with oil-soluble grease. Place thrust washer (6) and thrust washer (7) on one side of planetary carrier pinion (5). Place thrust washer (6) inside planetary carrier pinion (5).



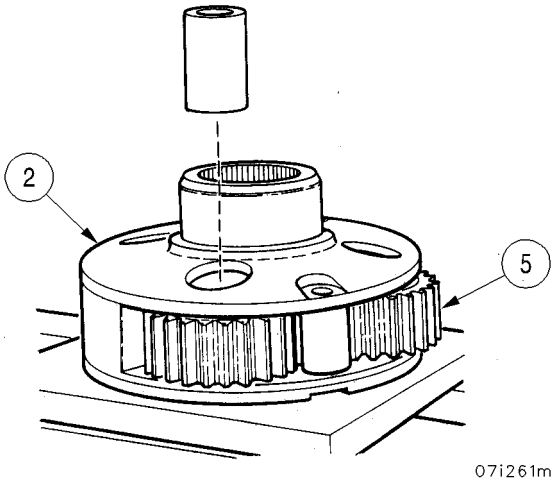
OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

ASSEMBLY – Continued

3. Insert steel tube into planetary carrier pinion (5) and thrust washer (6).
4. Insert 26 spindle rollers (8) into space between steel tube and planetary carrier pinion (5) bore.
5. Place thrust washer (7), then thrust washer (6) over steel tube. Remove steel tube.



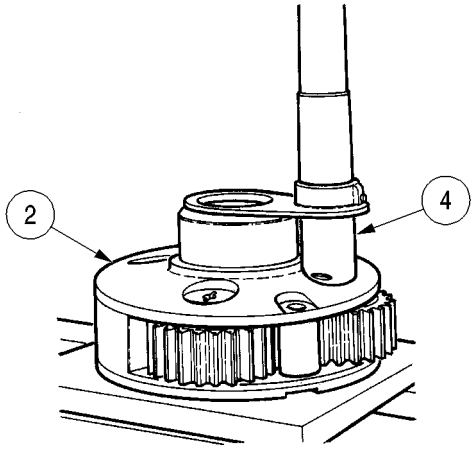
6. Place output reduction gear planetary carrier assembly (2) on press table. Slide planetary carrier pinion (5) and related parts into location in output reduction gear carrier assembly (2) from which removed. Use steel tube to align planetary carrier pinion (5), thrust washers and rollers.



OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

ASSEMBLY – Continued

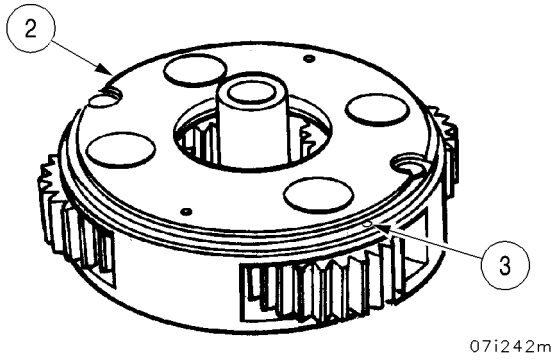
7. Install planetary carrier spindle (4). Press planetary carrier spindle (4) until groove on side is aligned with lockpin hole in output reduction gear carrier assembly (2).



NOTE

Two locating pins engage slotted end of planetary carrier spindle. When spindle is aligned correctly for installation, lockpin groove is directly above lockpin hole in carrier.

8. Install lockpin (3) in hole in output reduction gear planetary carrier assembly (2). Press lockpin (3) 0.700 to 0.800 inch below surface of output reduction gear carrier assembly (2).



OUTPUT REDUCTION GEAR PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0044 00

ASSEMBLY – Continued

NOTE

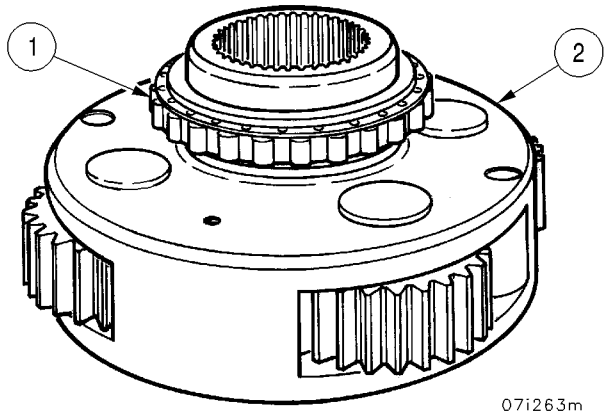
Except where both a new carrier and a new lockpin are used, stake lockpin holes by center punching. This will ensure that lockpin does not work out during operation.

9. Perform Steps 2 through 8 to install three remaining spindles, pinions, six lockwashers and 78 rollers.

WARNING

Use gloves and tongs when handling hot bearings to prevent injury.

10. Heat roller bearing (1) to approximately 300 degrees F. Install roller bearing (1) onto output reduction gear planetary carrier assembly (2). Tap inner race to seat roller bearing (1) firmly against output reduction gear planetary carrier assembly (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install brake apply cam assembly
(WP 0041 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPLACEMENT 0045 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (2000 lb capacity min)
C-clamp (2) (item 32, WP 0088 00)

Materials/Parts

Preformed packing (item 34, WP 0087 00)
White lead (item 13, WP 0085 00)
Lockwire (item 85, WP 0087 00)
Abrasive cloth (item 2, WP 0085 00)

Equipment Conditions

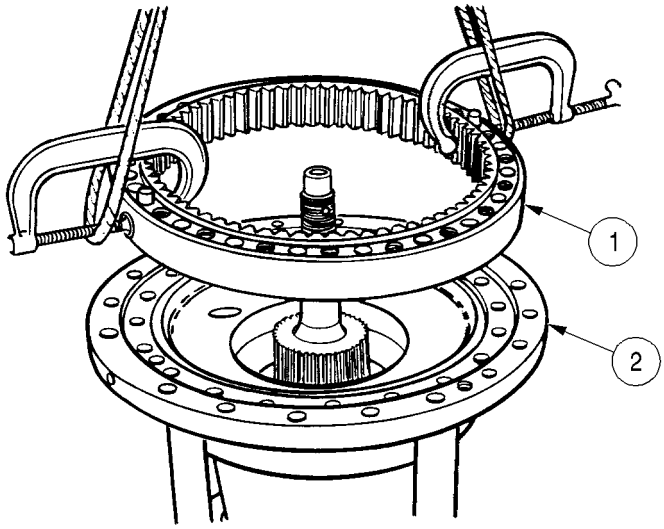
Output reduction planetary carrier assembly removed (WP 0043 00)

REMOVAL

NOTE

It may be necessary to use a screwdriver to pry between the ring gear assembly teeth and housing assembly to loosen ring gear assembly.

1. Remove ring gear assembly (1) from housing assembly (2).



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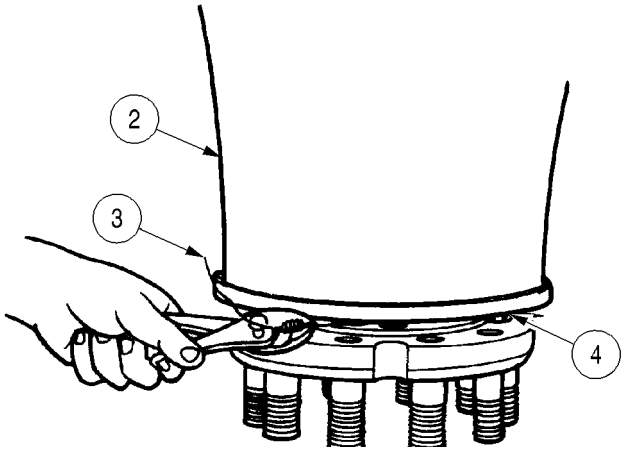
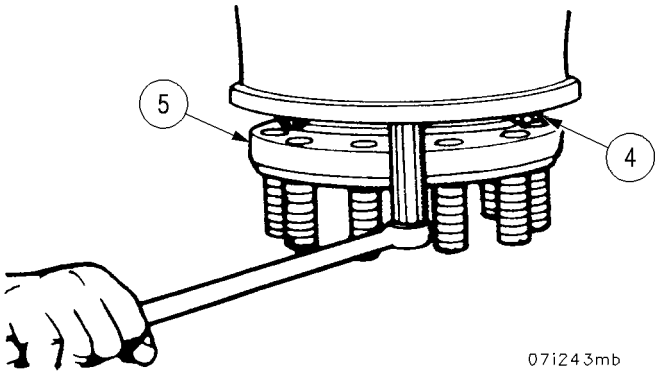
OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPLACEMENT – CONTINUED 0045 00

REMOVAL – Continued

2. Remove housing assembly (2) from fabricated stand. Remove lockwire (3) from eight drilled head bolts (4). Discard lockwire.



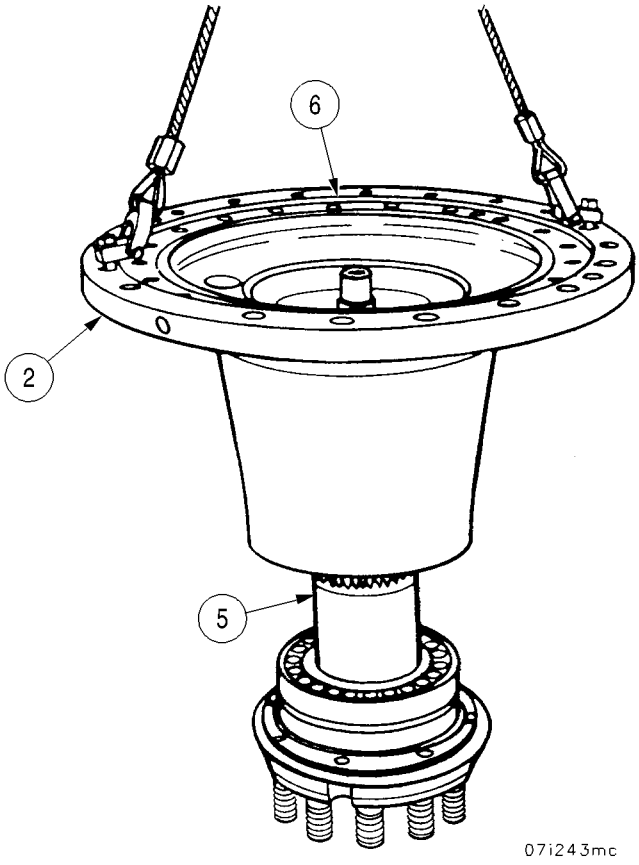
3. With output shaft assembly (5) resting on studs, remove eight drilled head bolts (4).



OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPLACEMENT – CONTINUED 0045 00

REMOVAL – Continued

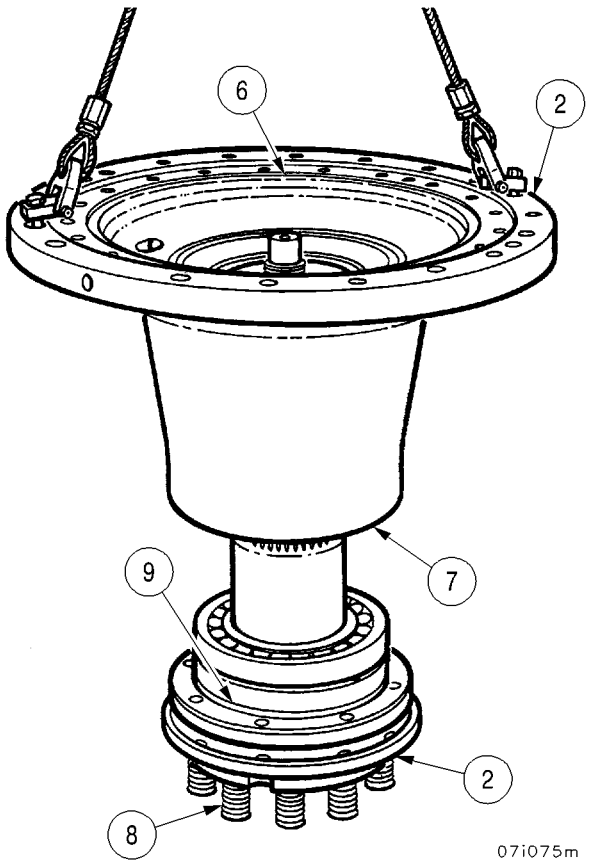
4. Remove housing assembly (2) from output shaft assembly (5). Remove preformed packing (6). Discard preformed packing.

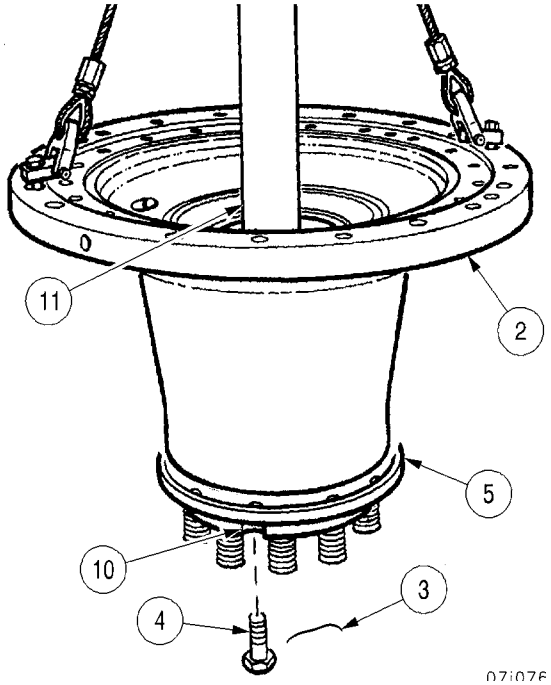


OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPLACEMENT – CONTINUED 0045 00

INSTALLATION

1. Smooth sealing surface (7) prior to installation.
2. Position output shaft assembly (5) on studs (8). Install new preformed packing (6). Coat bearing (9) with white lead. Install housing assembly (2).
3. Install eight drilled head bolts (4) by rotating housing assembly (2) on output shaft assembly (5) and installing successively through cut-out (10). Tighten eight drilled head bolts (4) to 67 to 80 lb-ft (90.9 to 108.5 N•m). Install new locking wire (3) through head of eight drilled head bolts (4). Paint splines (11) with white lead.

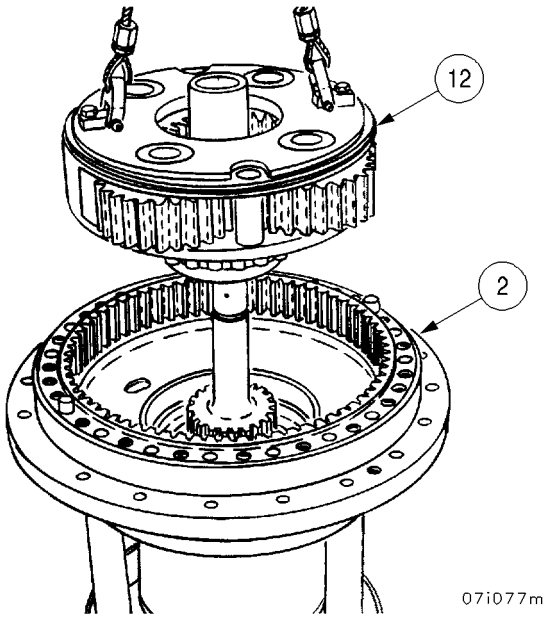


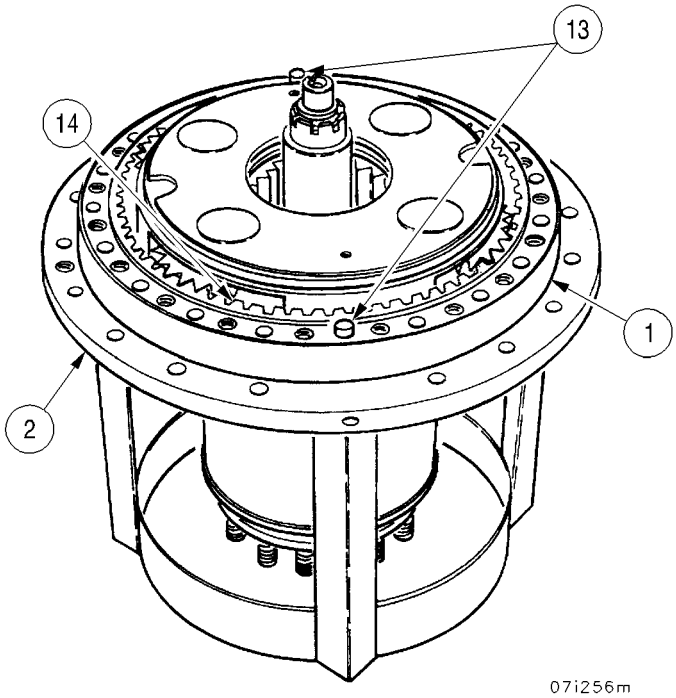


OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPLACEMENT – CONTINUED 0045 00

INSTALLATION – Continued

4. Place housing assembly (2) into fabricated stand. Install planetary carrier assembly (12).
5. Install ring gear assembly (1) aligning two dowel pins (13) with holes in housing assembly (2). Shoulder (14) of ring gear assembly (1) must be up.





NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction planetary carrier assembly (WP 0043 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPAIR 0046 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Hammer (item 35, WP 0088 00)

Materials/Parts

Preformed packing (item 34, WP 0087 00)

Equipment Conditions

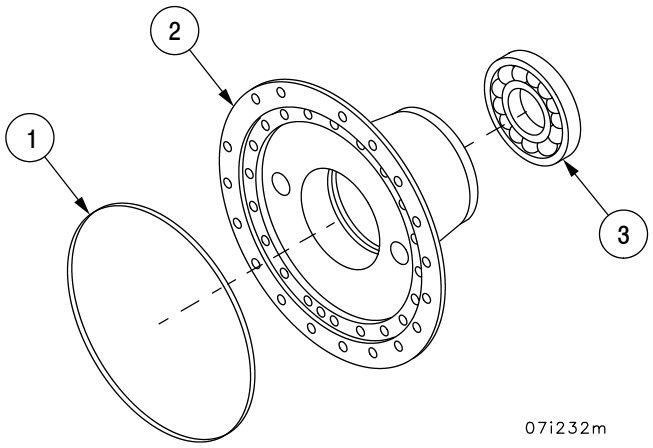
Output reduction gear output shaft and related parts removed (WP 0045 00)

DISASSEMBLY

NOTE

Do not perform Steps 1 and 2 unless replacement of the outer race is necessary.

1. Remove preformed packing (1) from output shaft housing (2). Discard preformed packing.
2. Remove bearing (3) from output shaft housing (2).



OUTPUT REDUCTION GEAR OUTPUT SHAFT HOUSING AND RING GEAR ASSEMBLIES REPAIR -CONTINUED 0046 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

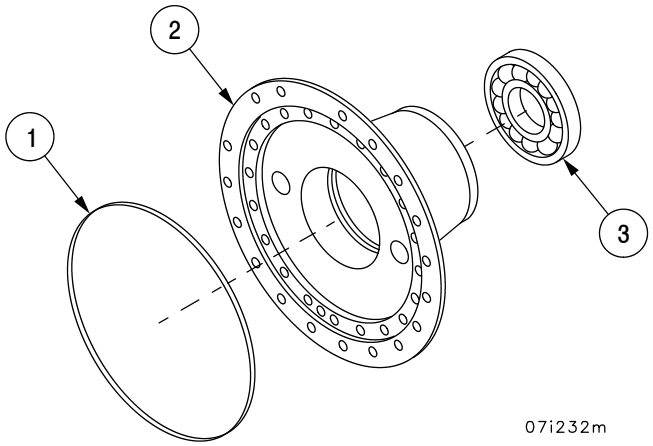
FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Output shaft bearing	Housing large bearing surface ID	10.2352 to 10.2370 in. Wear limit: 10.2380 in.
	Bearing fit in housing	0.0010T to 0.0022L
	Housing small bearing surface ID	9.0551 to 9.0569 in. Wear limit: 9.0579 in.
	Bearing fit in housing	0.0000 to 0.0030L

ASSEMBLY

Install new preformed packing (1) and bearing (3) in output shaft housing (2). Seat race against shoulder in housing bore.



NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction gear shaft and related parts (WP 0045 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR 0047 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)
Oil seal replacer (item 11, WP 0088 00)
Stud remover/setter (item 36, WP 0088 00)

Materials/Parts

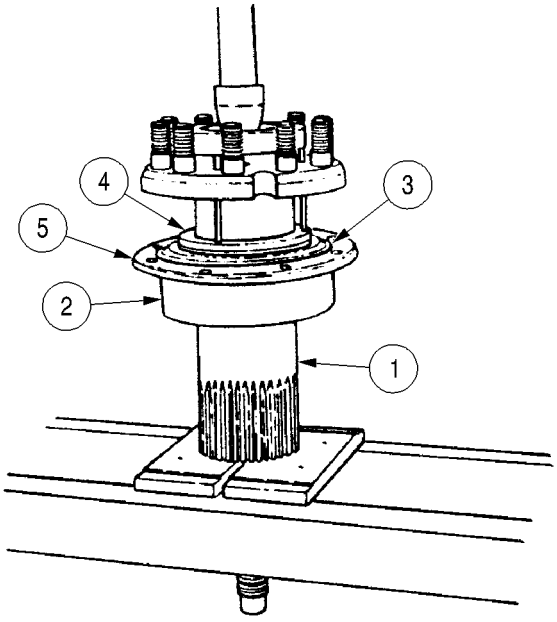
Seal assembly (item 4, WP 0087 00)
Preformed packing (item 71, WP 0087 00)
Preformed packing (item 72, WP 0087 00)
Grease (item 4, WP 0085 00)
Lint free paper (item 8, WP 0085 00)
Lubplate (item 14, WP 0085 00)
Dry-cleaning solvent (item 3, WP 0085 00)
Gasket (item 3, WP 0087 00)
Quick dry solvent (item 10, WP 0085 00)

Equipment Conditions

Output reduction gear output shaft and related parts removed (WP 0045 00)

DISASSEMBLY

1. Insert three equal lengths of 3/8 inch diameter drill rod into three holes in flange of output shaft assembly (1).
2. Place suitable plate on three pieces of drill rod. Press out roller bearing (2), output shaft bearing cap (3), seal assembly (4) and spacer (5) as an assembly from output shaft assembly (1).



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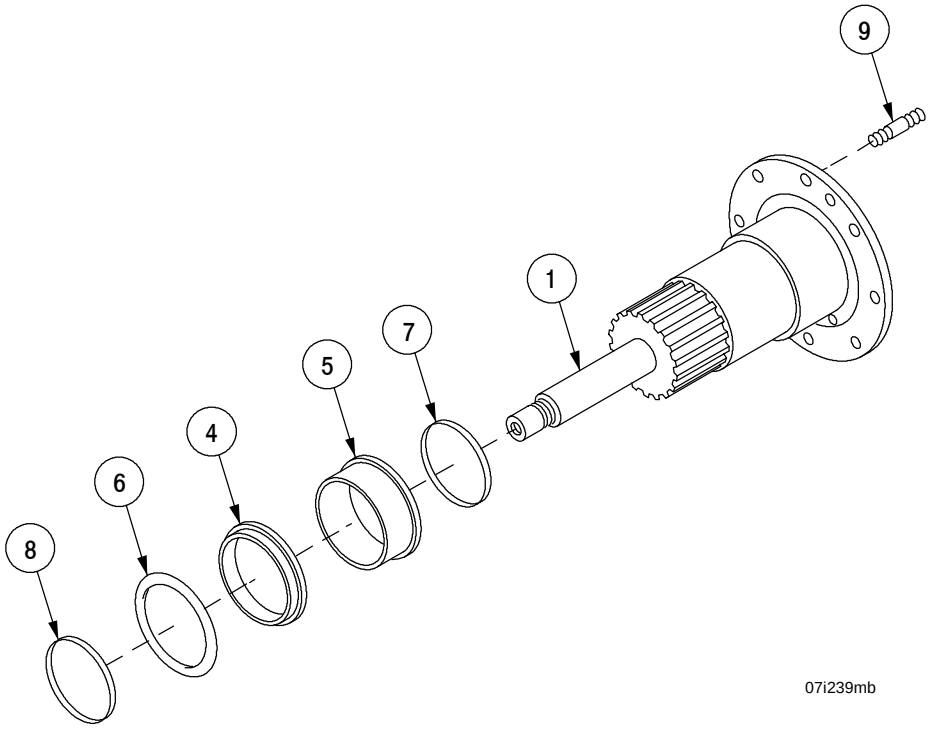
OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

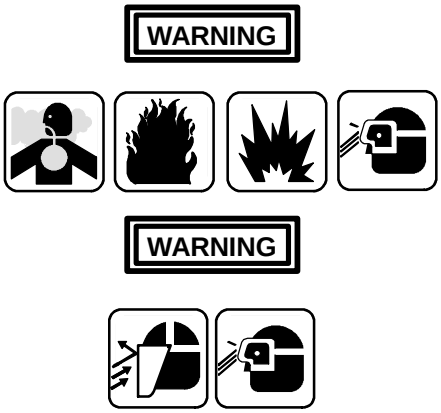
DISASSEMBLY – Continued

3. Remove seal assembly (4) and two preformed packings (6 and 7) from spacer (5). Discard seal assembly and preformed packings.
4. Remove outer ring (8) from output shaft assembly (1) flange.
5. Remove any damaged studs (9) from output shaft assembly (1) flange.

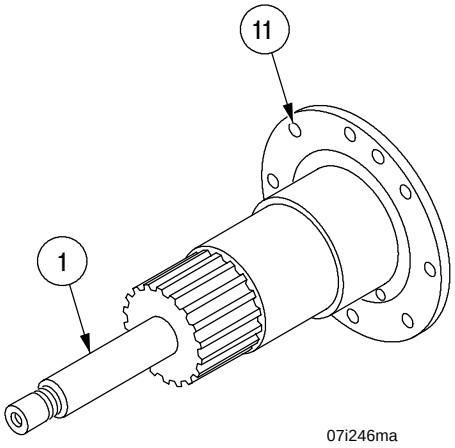


OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

CLEANING



Thoroughly clean output shaft assembly (1), particularly the ten tapped holes (11) by washing in dry-cleaning solvent. Blow dry with compressed air. See WP 0018 00 for additional cleaning procedures.



INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Output shaft	Shaft small bearing surface OD	1.3771 to 1.3776 in. Wear limit: 1.3769 in.
	Bearing fit on shaft	0.0001T to 0.0009L
	Shaft large bearing surface OD	5.1187 to 5.1194 in. Wear limit: 5.1182 in.
Roller bearing	Bearing OD	9.0539 to 9.0551 in.
	Bearing fit on shaft	0.0000 to 0.0030L
	Bearing ID	5.1171 to 5.1181 in.
	Fit of bearing on shaft	0.0006T to 0.0023T

OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY

NOTE

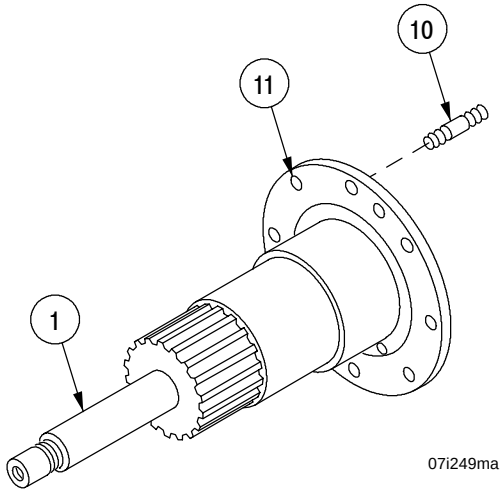
All related items not covered below are installed into output reduction gear assembly as outlined in WP 0045 00**.** No repair of those parts is necessary.

1. Locate output shaft assembly (1) in a stud driving fixture.
2. Carefully examine 10 1–14–tapped holes (11) for presence of burrs, nicks and foreign material. Remove any defects found.
3. Measure and record pitch diameter of 10 1–14 tapped holes (11).
4. Classify each stud (10) part number into groups of A and B according to stud pitch diameter ranges as shown on stud selection chart, WP 0086 00.

NOTE

Pitch diameter data in the stud selection chart has been arranged to give a stud interference fit of approximately 0.0033 to 0.0045 for the four studs listed. This criterion has been created for the tapped hole pitch diameter requirement for stud that exceeds maximum tolerance specified on the shaft drawings. Shafts falling in this category must have normal deviation approval from quality staff office before assembly.

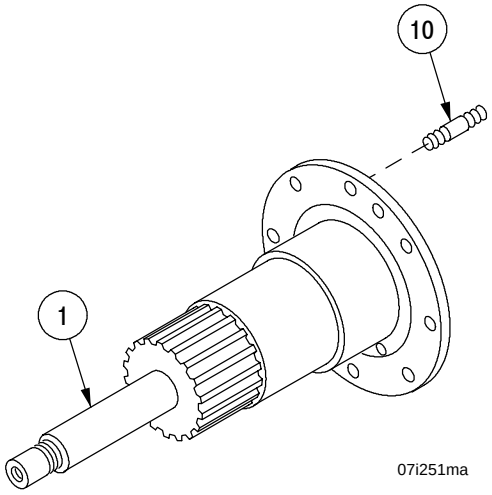
5. Select proper stud (10) part number and pitch diameter range from stud selection chart by matching hole pitch diameter measurement recorded in Step 3 above with tabulated values shown on chart.



OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY – Continued

6. Completely clean selected studs (10) by washing in dry-cleaning solvent. Blow dry with compressed air.
7. Carefully examine threads of studs (10) for presence of burrs, nicks and foreign material. Repair defects found.
8. Apply small amount of lubplate lubricant (item 14, WP 0085 00) to threads of studs (10) and tapped holes in shaft.
9. Insert studs (10) in output shaft assembly (1) flange. Finish driving studs (10) to proper setting heights using stud driving tool set to 320 lb-ft (433.9 N•m).



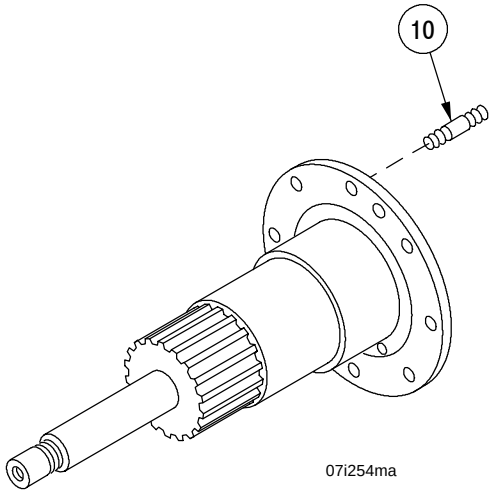
OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY – Continued

10. Check stud driving torque when fully inserted. If torque is less than 75 lb-ft (101.7 N•m) or more than 320 lb-ft (433.9 N•m), stud (10) must be removed by backing out or driving out. Thoroughly clean tapped holes and studs by washing in dry-cleaning solvent. Blow dry with compressed air.

NOTE

Quality control will review condition of both threads and recheck pitch diameters and minor diameter of tapped hole before another stud is driven. When reason of out of limit torque has been established and deficiency corrected, another stud may be driven. In additional to normal inspection of shaft assemblies at final inspection station, procedure must be witnessed by processing inspector on at least one shaft assembly each day and stud driving torques must be rechecked.



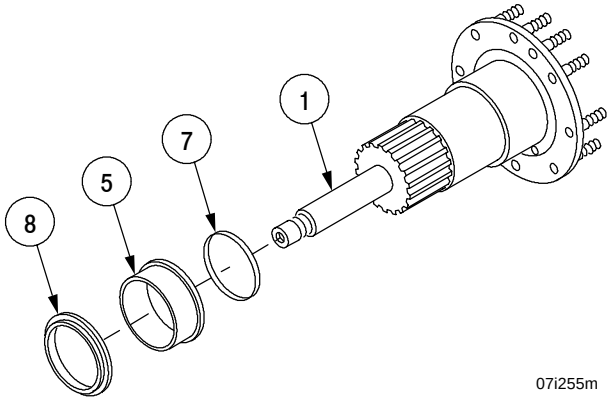
OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY – Continued

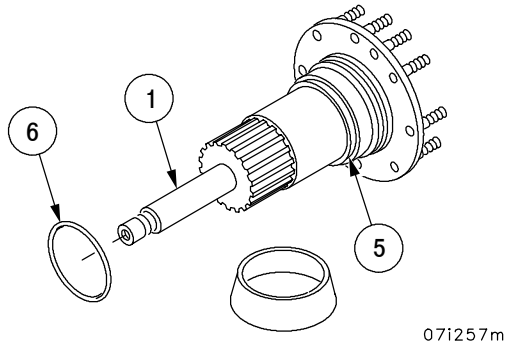
CAUTION

Use extreme care not to touch polished radial sealing face of ring of seal with bare hands or tools. Index hole in ring with pin in flange.

11. Install spacer (5), larger diameter first, onto output shaft assembly (1). Lubricate new preformed packing (7) with oil soluble grease and install into outer groove of spacer (5). Press outer ring (8) sealing face up, over spacer (5) and new preformed packing (7).



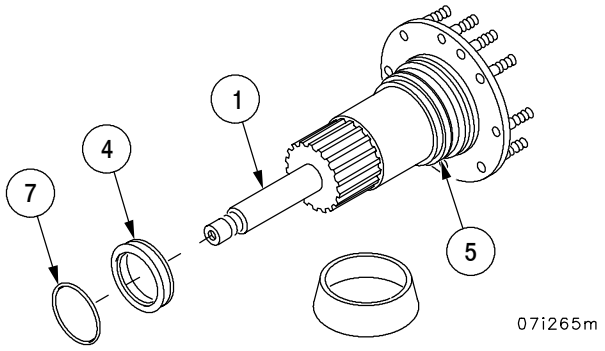
12. Lubricate new small preformed packing (6) with oil soluble grease and roll onto groove of small end of oil seal replacer. Assemble oil seal replacer over output shaft assembly (1) and roll new preformed packing (6) onto bearing journal. Use end of oil seal replacer to push new preformed packing (6) inside diameter groove of spacer (5).



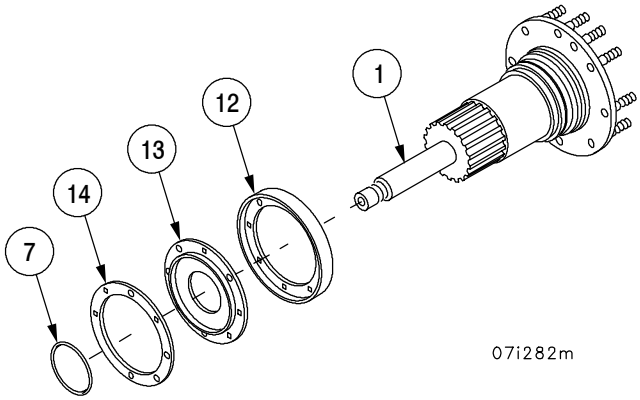
OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY – Continued

13. Reverse oil seal replacer on output shaft assembly (1) with large end against spacer (5). Prepare new seal assembly (4) sealing faces by wiping with lint free paper dipped in quick dry solvent (item 10, WP 0085 00). Dry both faces of seal assembly (4) with lint free paper, using a clean sheet for each face.
14. Pour transmission oil on sealing faces of seal assembly (4). Do not touch sealing faces with hands.
15. Lubricate new preformed packing (7) and outside diameter groove of seal assembly (4) with oil soluble grease. Install spring loaded portion of seal assembly (4) on output shaft assembly (1). Remove oil seal replacer.



16. Place outer seal ring (12) over output shaft assembly (1) and onto output shaft assembly (1) flange face. Assemble cap (14) over new preformed packing (7) on outside diameter of spring loaded portion of seal assembly (13). Align holes in cap (14) with lugs on seal assembly (13).



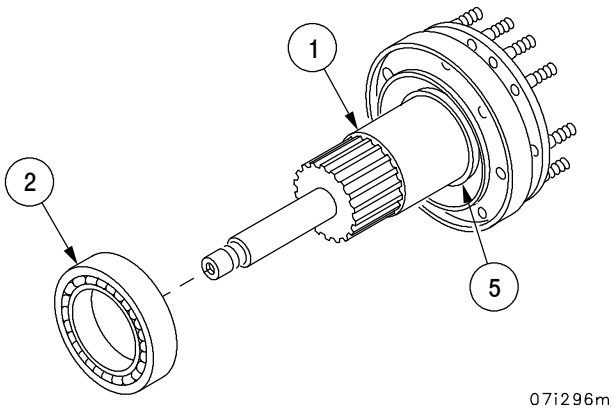
OUTPUT REDUCTION GEAR OUTPUT SHAFT AND RELATED PARTS REPAIR – CONTINUED 0047 00

ASSEMBLY – Continued

WARNING

Use gloves or tongs when handling hot bearings to prevent injury.

17. Heat roller bearing (2) to approximately 300 degrees F. Install roller bearing (2) on output shaft assembly (1). Allow roller bearing (2) to cool to room temperature.
18. Support output shaft assembly (1) on inner race of roller bearing (2) in hydraulic press. Apply ten tons of force against flange to seat roller bearing (2) against spacer (5).



NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction gear output shaft and related parts (WP 0045 00)

END OF WORK PACKAGE

BRAKE HOUSING ASSEMBLY REPAIR 0048 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Drill portable electric (item 30, WP 0088 00)
Drill twist set (item 31, WP 0088 00)
C-clamps (item 32, WP 0088 00)

Materials/Parts

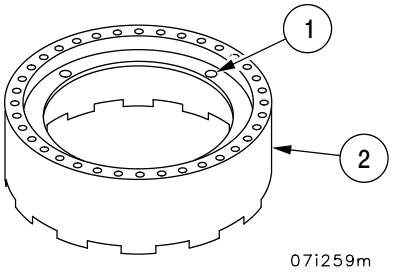
Rivet (4) (item 102, WP 0087 00)

Equipment Conditions

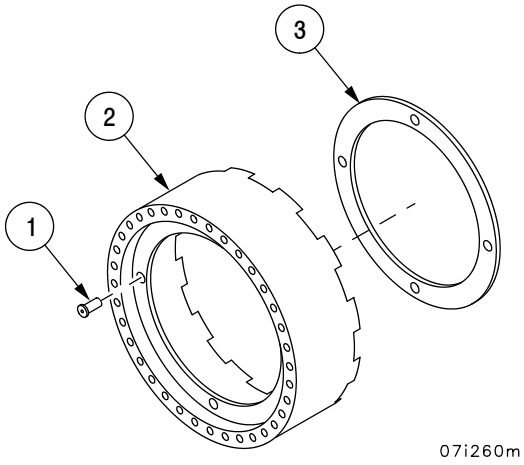
Brake housing assembly removed (WP 0043 00)

DISASSEMBLY

1. Center punch four formed rivet heads (1) on outside of brake housing assembly (2).



2. Drill out four formed rivet (1) heads, approximately ¼ inch deep.
3. Remove four formed rivets (1) heads.
4. Punch four formed rivets (1) out of brake housing assembly (2) and wear plate (3). Remove wear plate (3). Discard rivets.



BRAKE HOUSING ASSEMBLY REPAIR – CONTINUED 0048 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

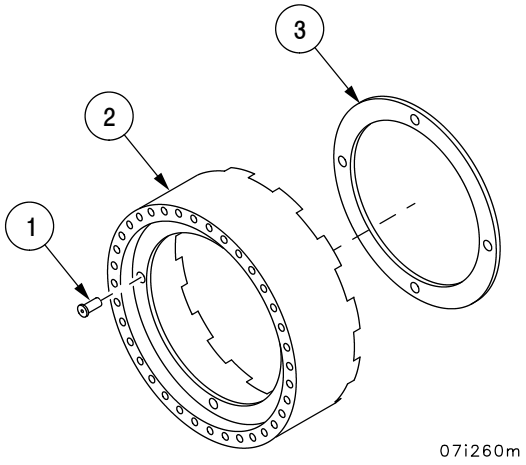
PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Brake wear plate	Thickness of plate	0.2440 to 0.2470 in.

ASSEMBLY

NOTE

Position wear plate so that rivet heads will fit into countersink of holes.

1. Place wear plate (3) against inside surface of brake housing assembly (2) flange. Align four new formed rivets (1) with holes in flange. Use C-clamps to hold wear plate (3) in position.
2. Drive four new formed rivets (1) from wear plate (3) side of brake housing assembly (2) flange.



NOTE

FOLLOW-ON MAINTENANCE:
Install brake housing assembly
(WP 0043 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT 0049 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (2000 lb minimum capacity)
Compressor assembly (item 3, WP 0088 00)
Torque wrench (item 26, WP 0088 00)
Fabricated stand (figure 2, WP 0089 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

Snap ring (item 45, WP 0087 00)
Flat washer (item 84, WP 0087 00)
Retainer packing (item 17, WP 0087 00)

Equipment Conditions

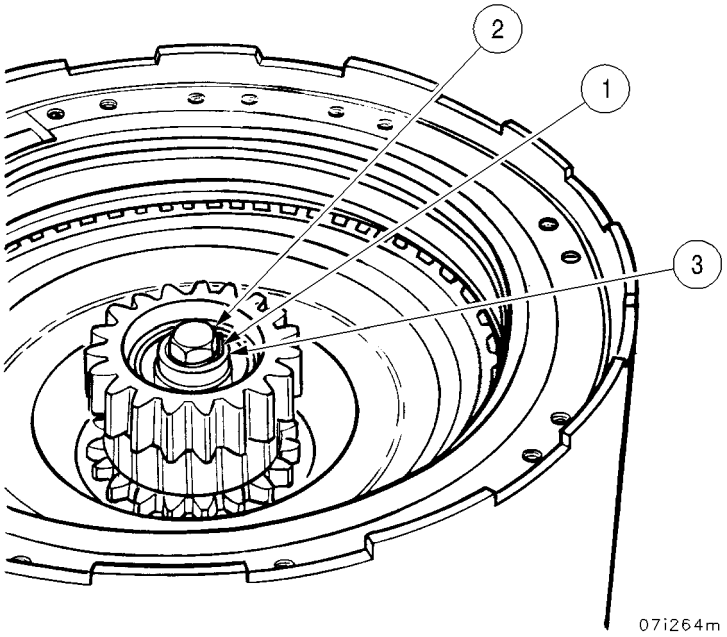
Brake apply reaction plate assembly and retainer plate removed (WP 0040 00)

REMOVAL

NOTE

Disassembly procedures for the right and left output reduction gear assemblies are identical. Only the left assembly is illustrated.

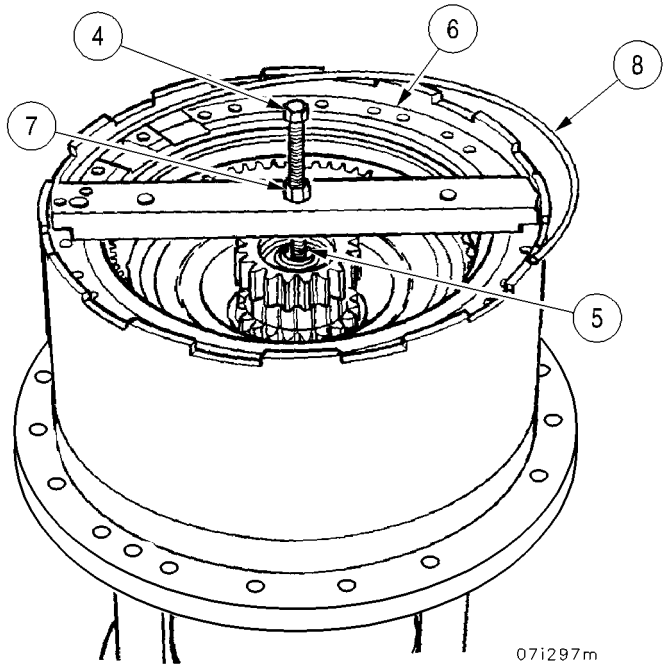
1. Flatten tab on flat washer (1), remove bolt (2), flat washer (1) and retainer packing (3) with steel ball. Discard flat washer and retainer packing.



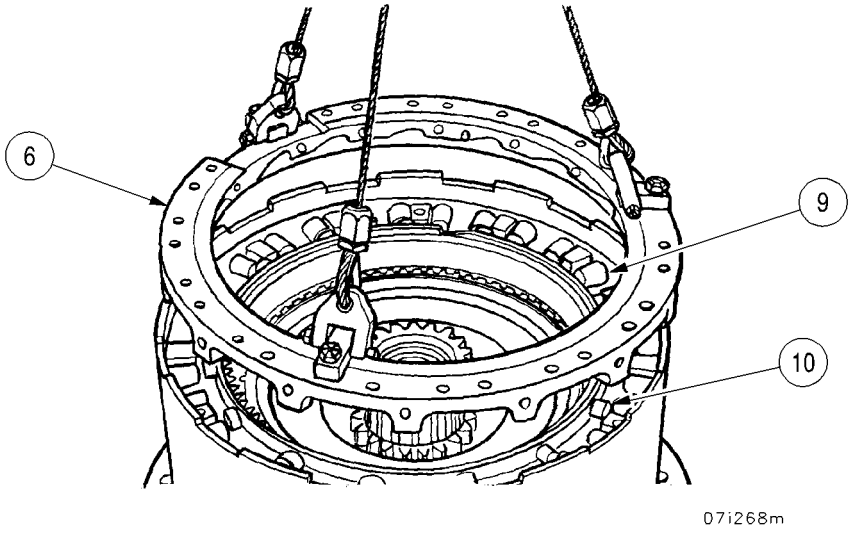
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

REMOVAL – Continued

2. Install compressor assembly. Thread bolt (4) into shaft (5). Depress stationary cam ring assembly (6) by tightening nut (7). Remove snap ring (8). Remove compressor assembly. Discard snap ring.



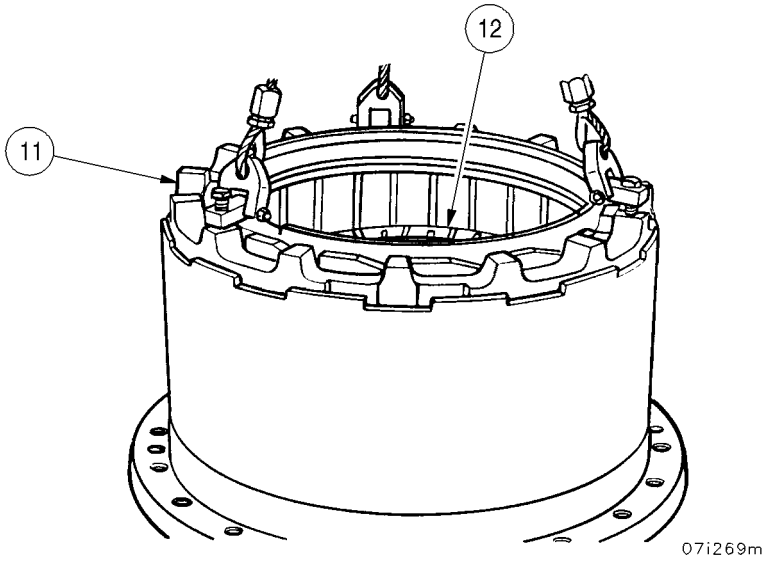
3. Using a lifting sling and suitable lifting device, remove stationary cam ring assembly (6). Remove 30 long rollers (9) and 15 short rollers (10).



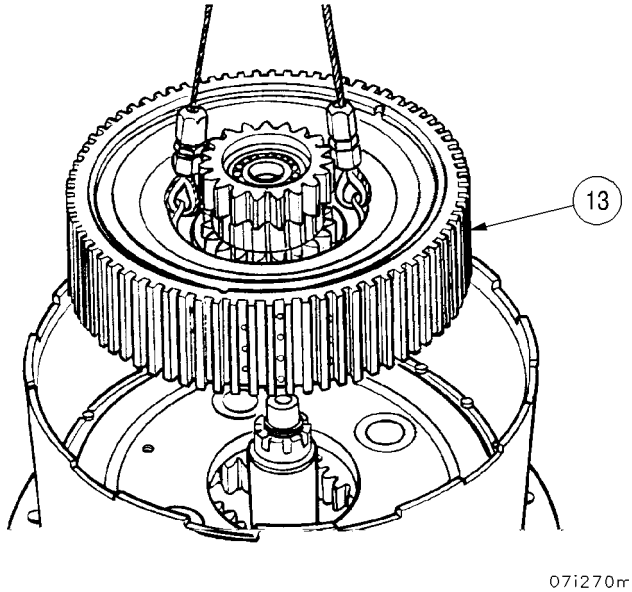
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

REMOVAL – Continued

4. Using a lifting sling and suitable lifting device, remove moveable cam ring assembly (11). Remove 15 brake plates (12).



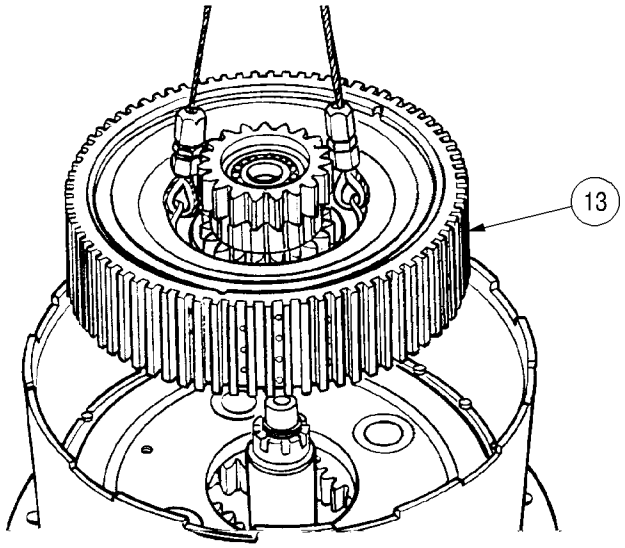
5. Using a hooked sling and suitable lifting device, remove output reduction gear brake hub assembly (13).



OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

INSTALLATION

1. Place assembly in fabricated stand. Use a fabricated hook type sling to install output reduction gear brake hub assembly (13).
2. Beginning with an internal splined plate (12), alternately install eight internally splined plates (12) and seven external splined plates (14). Center all plates carefully. Align external tangs of plates.



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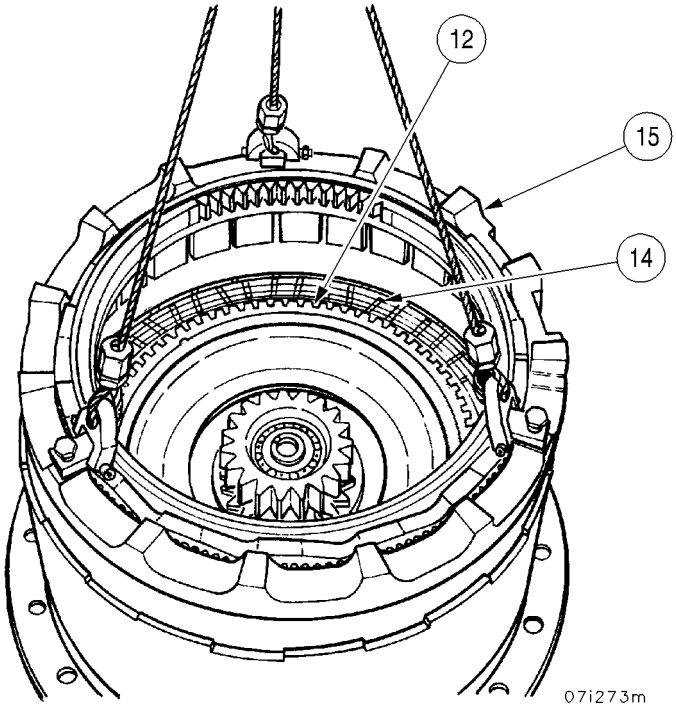
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

INSTALLATION – Continued

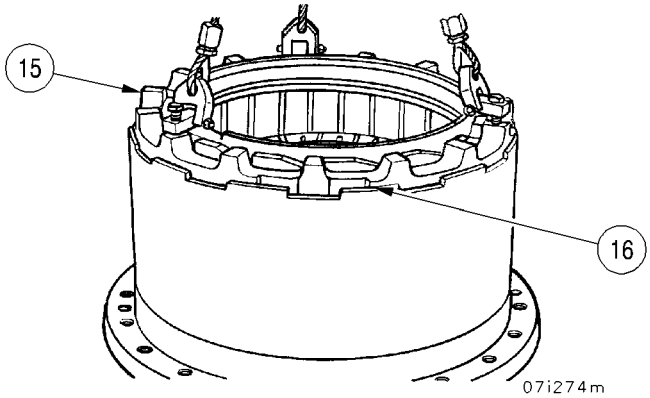
3. Using a lifting sling and suitable lifting device, position assembled movable cam ring and rotating cam ring (15) above externally splined plates (12) and internally splined plates (14).



NOTE

Note relation of slots with scribe marks, which are opposite hole in housing.

4. Carefully lower moveable and rotating cam ring assemblies (15), engaging internal slots (16) with external tangs of brake plates.



OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

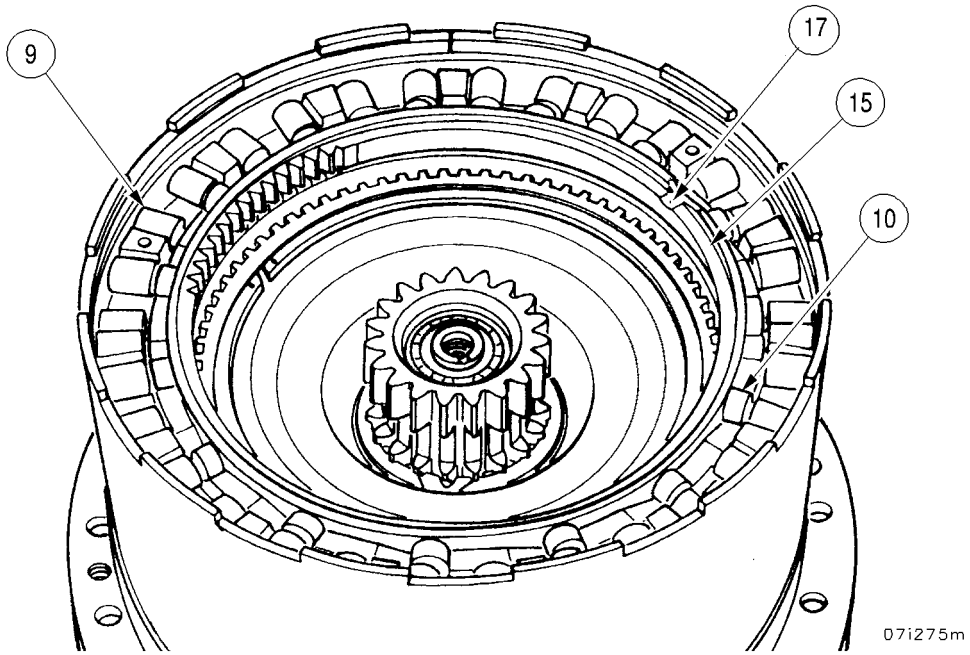
INSTALLATION – Continued

NOTE

Cam ring may be rotated to proper position after it is fully seated.

Illustration is for left output reduction gear assembly. Indexing notch for right assembly would be aligned with fifth roller, counterclockwise scribe mark.

5. Install 30 long rollers (9) and 15 short rollers (10). Moving rotating cam ring (15) until indexing notch (17) is approximately in line with fifth long roller (9), counterclockwise from scribe mark.



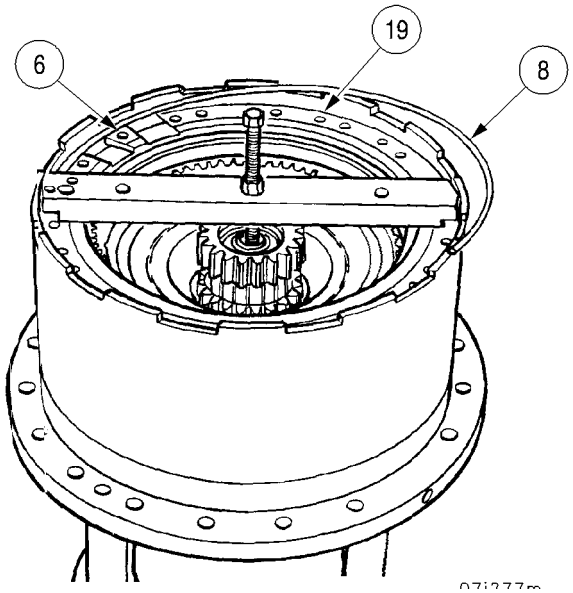
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

INSTALLATION – Continued

NOTE

Note position of notches relative to scribe mark opposite lifting hole.

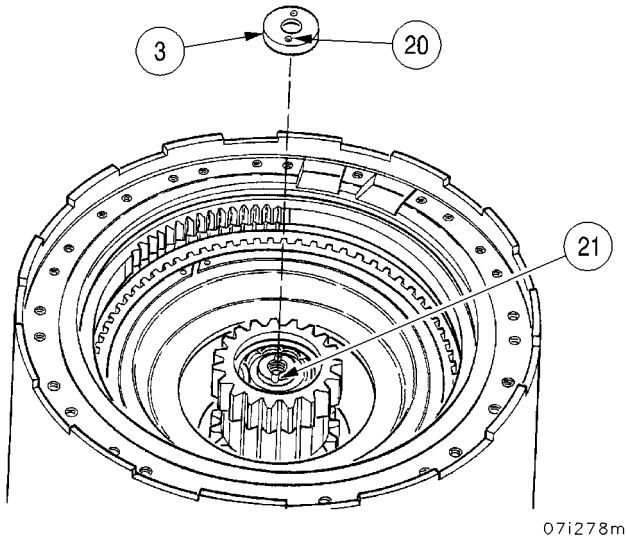
6. Install stationary cam ring assembly (6) indexing pin (18) with indexing notch.
7. Install compressor assembly and compress stationary cam ring assembly (6) until snap ring groove (19) is clear. Install new snap ring (8) in groove. Remove compressor assembly.



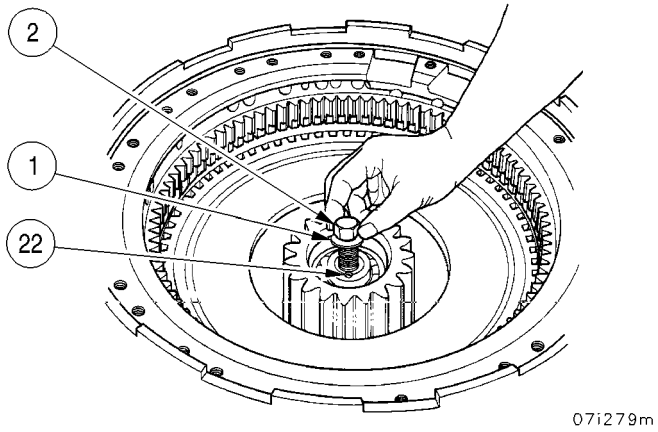
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPLACEMENT – CONTINUED 0049 00

INSTALLATION – Continued

8. Install new retainer packing (3), aligning hole (20) with notch (21).



9. Install ball (22), bolt (2) and new flat washer (1). Tighten bolt (2) to 215 to 250 lb-ft (291.5 to 339 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install brake apply reaction plate assembly and retainer (WP 0040 00)

END OF WORK PACKAGE

OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR 0050 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

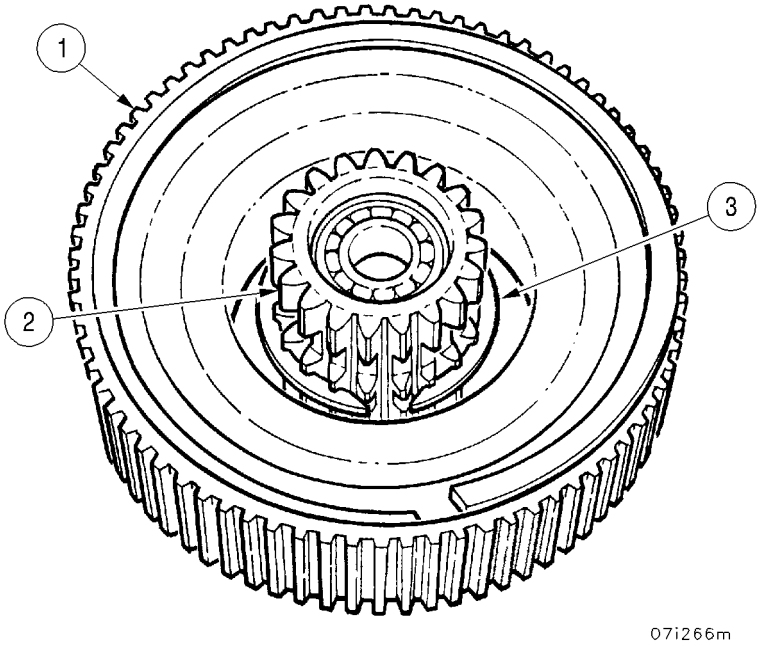
Retaining ring (2) (item 28, WP 0087 00)
Retaining ring (item 26, WP 0087 00)
Retaining ring (item 45, WP 0087 00)

Equipment Conditions

Output reduction gear output shaft and related parts removed (WP 0044 00)

DISASSEMBLY

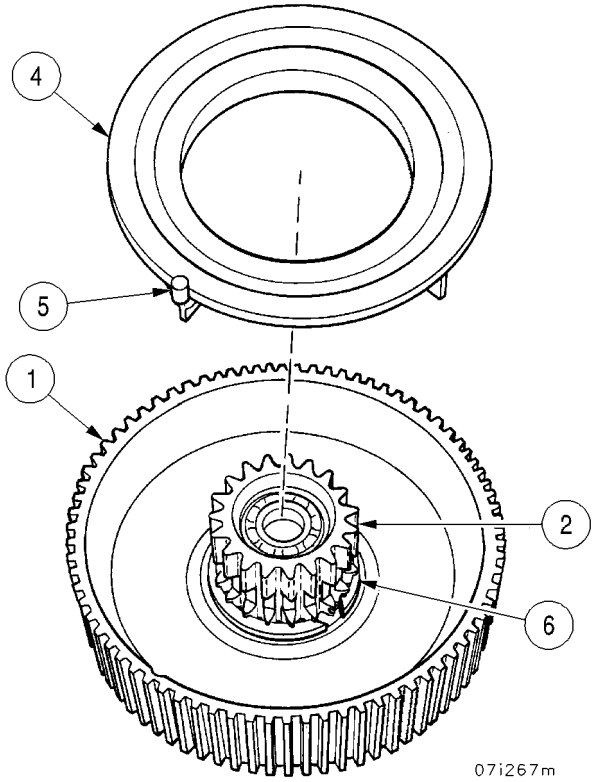
1. Place brake hub assembly (1) on a work table with protruding sun gear (2) down. Remove snap ring (3). Discard snap ring.



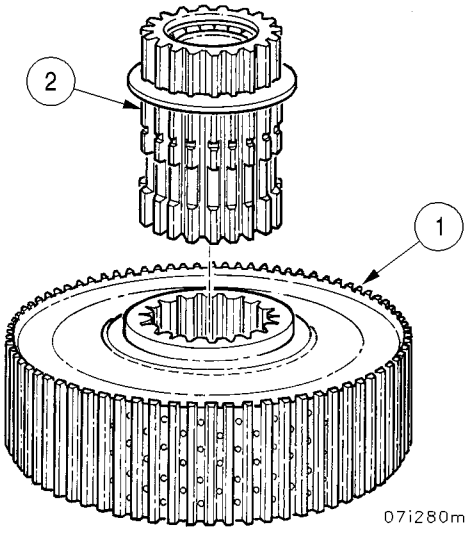
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR – CONTINUED 0050 00

DISASSEMBLY – Continued

2. Lift brake baffle (4) and bearing roller key (5) out of brake hub assembly (1) plate.
3. Remove inner snap ring (6) from sun gear (2). Discard snap ring.



4. Turn brake hub assembly (1) over and lift out sun gear (2).



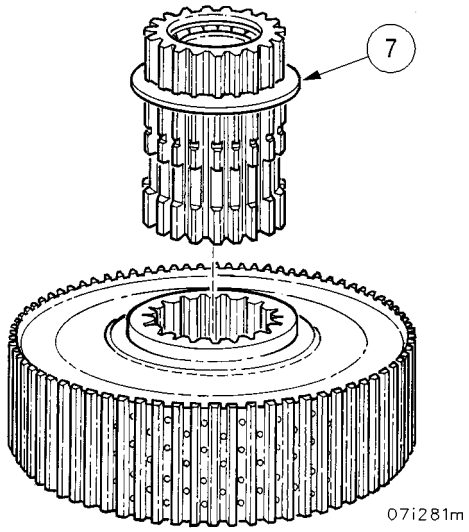
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR – CONTINUED 0050 00

DISASSEMBLY – Continued

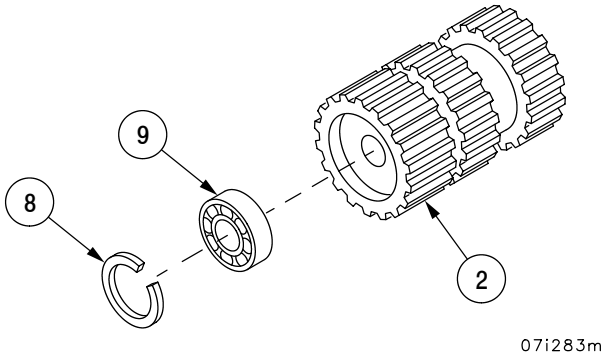
NOTE

Do not remove outer snap ring unless evidence of wear or damage is present. Perform Step 5 if replacement is necessary.

5. Remove outer snap ring (7). Discard snap ring.



6. Remove internal snap ring (8) from sun gear (2). Remove bearing (9). Discard snap ring.



OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR – CONTINUED 0050 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

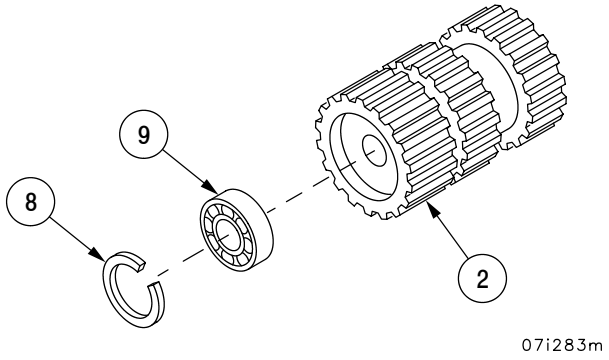
FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Ball bearing	Bearing surface ID Bearing fit on shaft Bearing OD Bearing fit in gear	1.3775 to 1.3780 in. 0.0010T to 0.0009L 3.1491 to 3.1496 in. 0.0006T to 0.0005L
Output reduction sun gear	Gear bearing surface ID Bearing fit in gear	3.1490 to 3.1496 in. Wear limit: 3.1499 in. 0.0006T to 0.0005L

ASSEMBLY

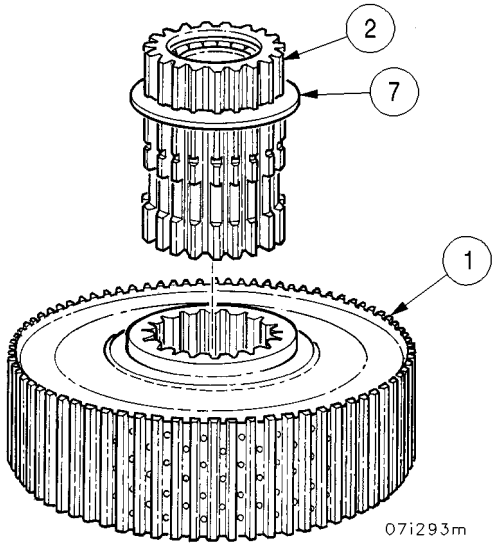
1. Install bearing (9) in sun gear (2). Secure with new snap ring (8).



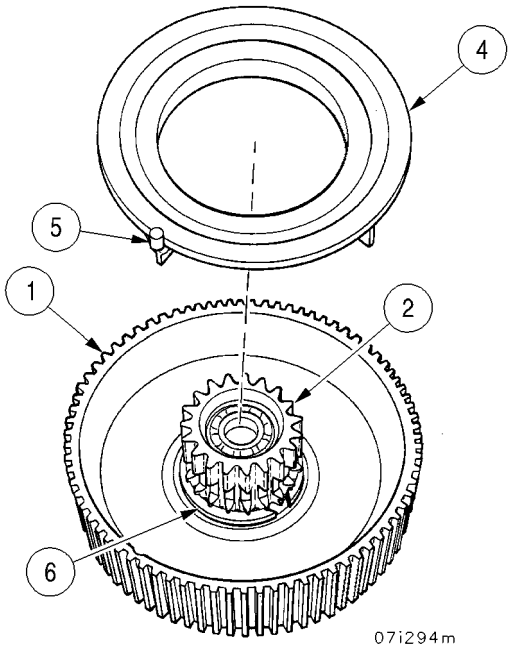
OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR – CONTINUED 0050 00

ASSEMBLY – Continued

2. Install new outer snap ring (7), if removed.
3. Insert sun gear (2), bearing down, into splined hub of brake plate hub (1).



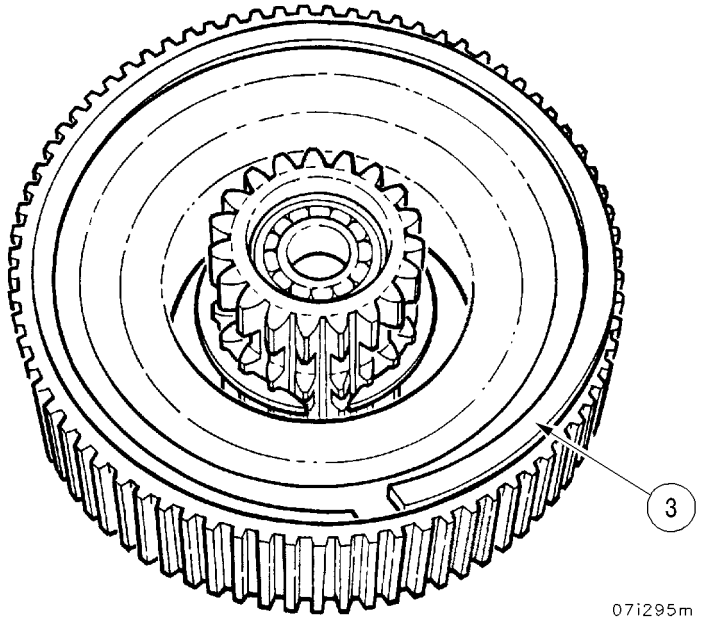
4. Turn brake hub assembly (1) over on work table and install new inner snap ring (6) in inside groove of sun gear (2).
5. Insert brake baffle (4) in brake hub assembly (1). Align roller key (5) with groove in brake hub assembly (1).



OUTPUT REDUCTION GEAR BRAKE HUB ASSEMBLY REPAIR – CONTINUED 0050 00

ASSEMBLY – Continued

6. Install new snap ring (3).



NOTE

FOLLOW-ON MAINTENANCE:
Install output reduction gear shaft and related parts (WP 0045 00)

END OF WORK PACKAGE

RANGE SELECTOR LINKAGE ADJUSTMENT 0051 00

THIS WORK PACKAGE COVERS:

Adjustment

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle parked and blocked (TM 9-2350-256-10)

ADJUSTMENT

1. With range selector linkage disconnected at control valve body assembly, position vehicle range selector control in reverse range position.
2. Position shift position indicator on control valve in reverse range (R) position.
3. Adjust range selector linkage until aligned with lever on control valve body assembly so that connecting clevis pin can be installed freely.
4. Check position of vehicle selector control in all ranges and neutral against position of shift indicator on control valve. All positions should coincide.

END OF WORK PACKAGE

BRAKE LINKAGE, BRAKE AND BRAKE AIR VALVE LINKAGE ADJUSTMENT 0052 00

THIS WORK PACKAGE COVERS:

Adjustment

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle parked and blocked (TM 9-2350-256-10)

BRAKE LINKAGE ADJUSTMENT

1. Disconnect vehicle brake linkage from brake apply lever on output reduction gear assemblies. Adjust brake apply levers by positioning them toward the rear of transmission fully against their stops. Adjustment is made with a socket wrench while pushing wrench against collar surrounding adjusting head to unlock it. Do not rotate adjustment after brake apply lever contacts stop.
2. Position brake control in fully released position. Adjust vehicle linkage until aligned with brake apply levers. Insert connecting pins and lock them.

BRAKE ADJUSTMENT

1. Apply brakes firmly and measure travel of brake apply levers on output reduction gear assemblies. Outer hole in each lever should travel forward no less than 2.92 inches or through an arc of 24 degrees.

CAUTION

Travel must be no less than 24 degrees. Shorter travel will subject brakes to unnecessary wear and cause overheating.

2. If travel is incorrect, release brake and adjust travel by rotating adjustment on brake apply lever. Clockwise rotation will shorten travel, counterclockwise will lengthen it. Adjust travel to as near 24 degrees rotation as possible. After brakes have been in use, readjust them if travel is 34 degrees or more.

BRAKE AIR VALVE LINKAGE ADJUSTMENT

1. After brakes have been adjusted, disconnect brake air valve linkage assembly from left brake apply lever. Loosen three 3/8-24 hexagon nuts, which lock rod ends and brake air valve linkage rod.
2. Apply brakes firmly and, while brakes are applied, adjust length (between clevis pinhole centers) of brake air valve linkage assembly. Length must be ¾ inch greater than the distance between clevis pin holes (center to center) in brake apply lever and brake air valve linkage assembly lever. Release brakes.

NOTE

Plungers are correctly scribed when brakes are applied and a scribe mark is flush with bottom of plunger stop, indicating manufactured and correct brake air valve linkage adjustment.

3. Tighten three 3/8-24 hexagon nuts and reconnect brake air valve linkage assembly to brake apply lever. Apply brakes and check travel of plunger into plunger stop. Travel must be ¾ inch. Readjust as required to obtain required travel.

END OF WORK PACKAGE

CHAPTER 6

GENERAL SUPPORT MAINTENANCE

HIGH RANGE CLUTCH AND RELATED PARTS REPLACEMENT 0053 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Hoist (2000 lb lifting capacity min)
Lifting sling (item 12, WP 0088 00)
C-clamp (2) (item 32, WP 0088 00)

Materials/Parts

Retaining ring (item 8, WP 0087 00)

Equipment Conditions

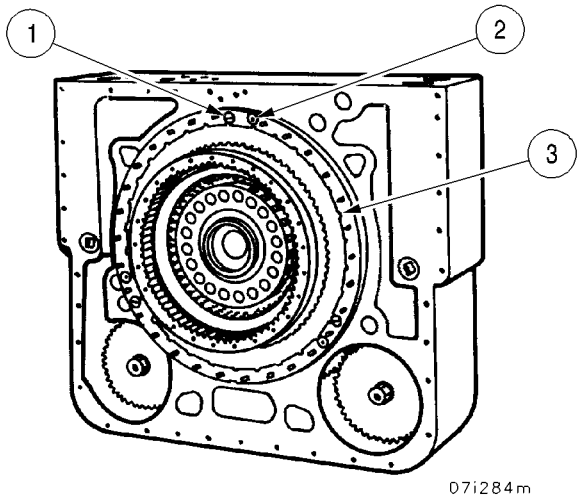
Torque converter removed and placed in upright position on disassembly table (WP 0059 00)

Personnel Required

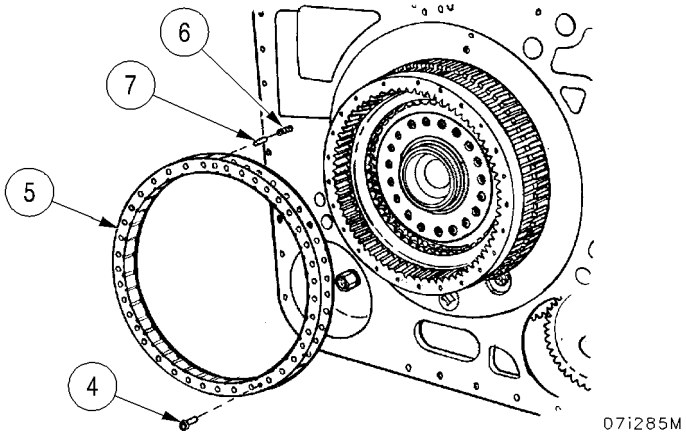
Two

REMOVAL

1. Remove three screws (1), countersunk washers (2) and nine intermediate range clutch plates (3).



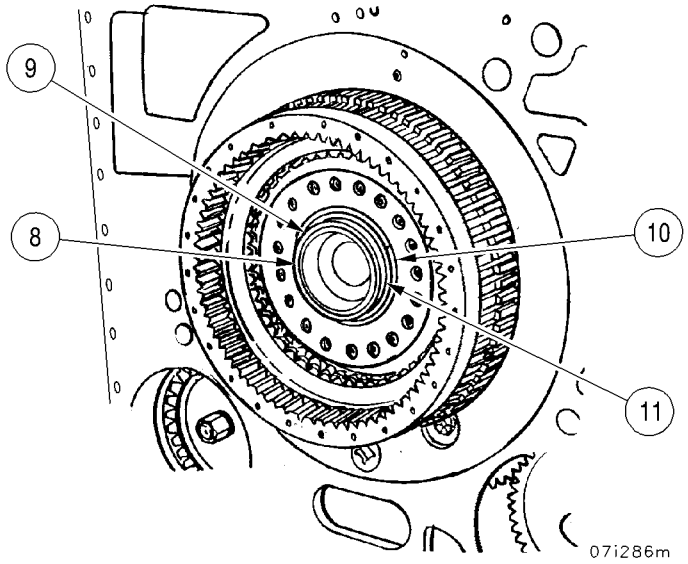
2. Remove three bolts (4) and intermediate range clutch anchor (5). Remove springs (6) and pins (7) from anchor.



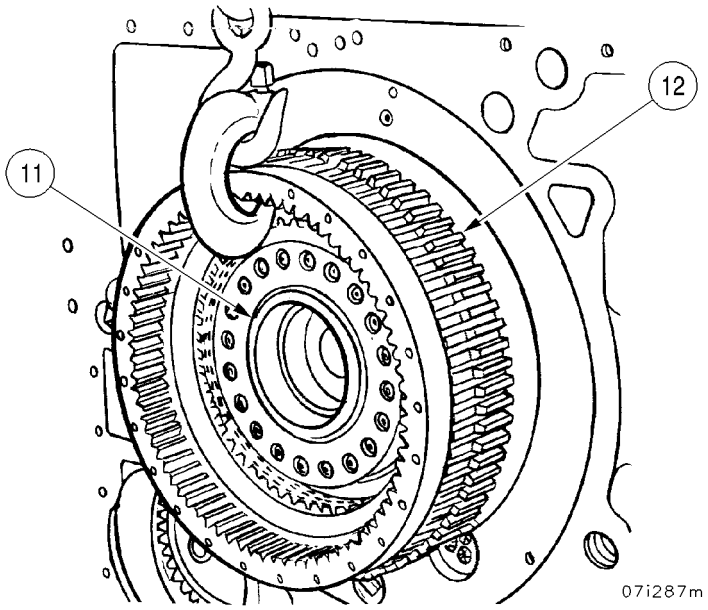
HIGH RANGE CLUTCH AND RELATED PARTS REPLACEMENT – CONTINUED 0053 00

REMOVAL – Continued

3. Remove snap ring (8), steel thrust washer (9) and bronze thrust washer (10) from ground sleeve (11). Discard snap ring.



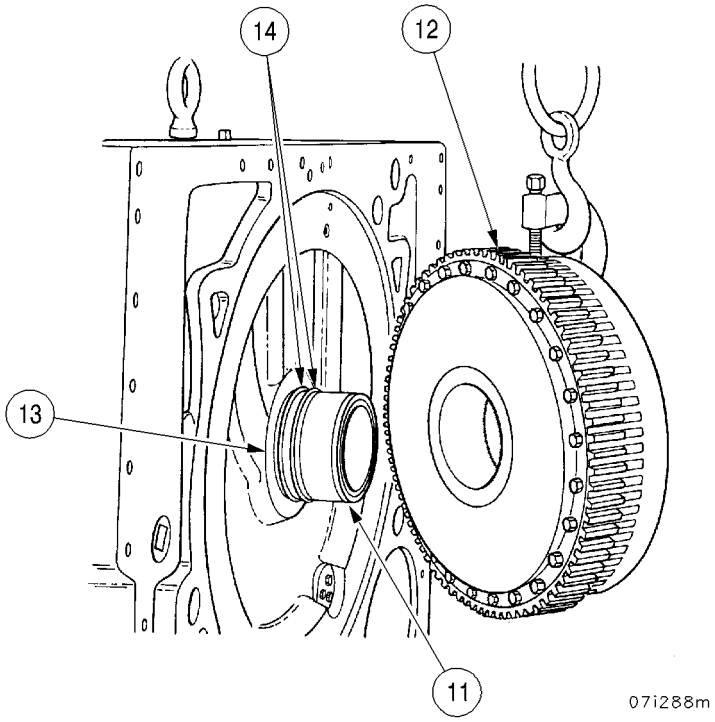
4. Attach C-clamp to high range clutch assembly (12). Support clutch assembly with hoist and remove it from converter ground sleeve (11).



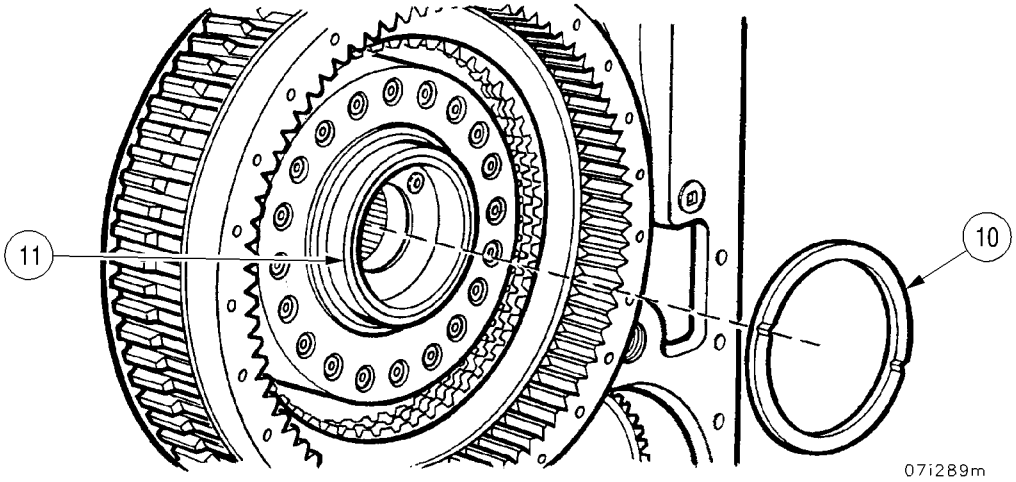
HIGH RANGE CLUTCH AND RELATED PARTS REPLACEMENT – CONTINUED 0053 00

INSTALLATION

1. Assure that thrust washer (13) and two hook type seal rings (14) are correctly positioned. Using C-clamp, hoist assembled high range clutch (12) into position and install it into converter ground sleeve (11).



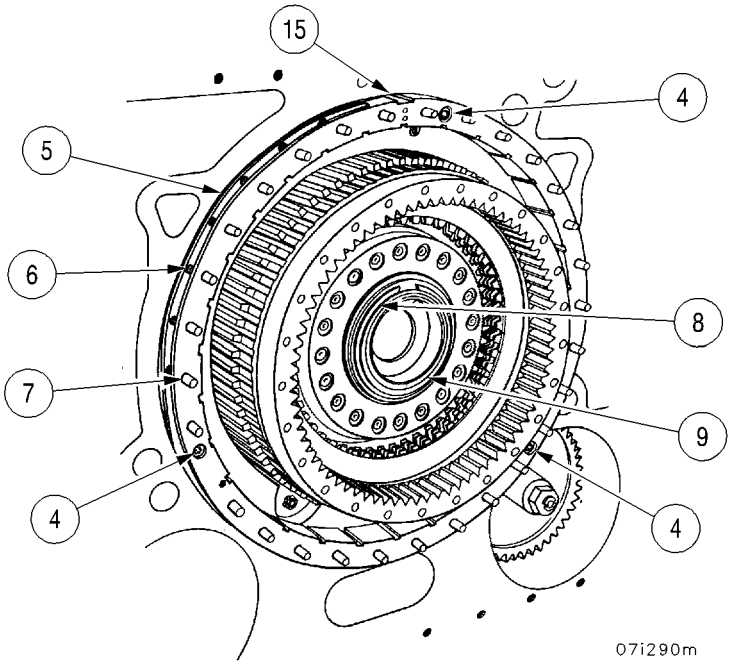
2. Install bronze thrust washer (10) onto converter ground sleeve (11).



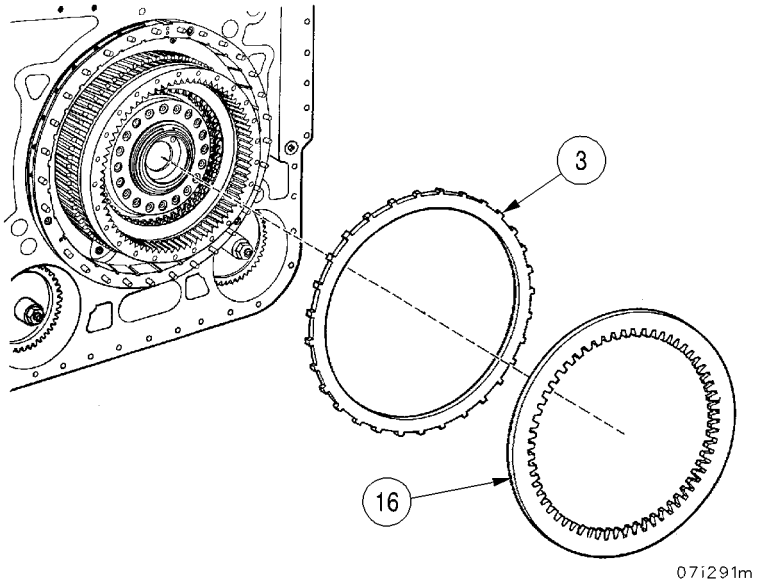
HIGH RANGE CLUTCH AND RELATED PARTS REPLACEMENT – CONTINUED 0053 00

INSTALLATION – Continued

3. Install steel thrust washer (9) and new snap ring (8). Install pin (7) and springs (6) into anchor assembly (5). Install anchor assembly with slot (15) at top and secure it to converter housing with three bolts (4).



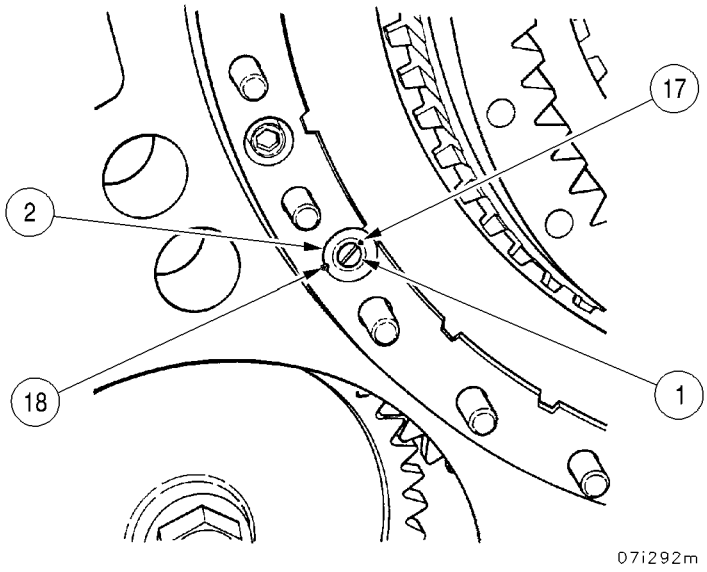
4. Beginning with external splined plain steel plate (3), alternately install five plates (3) and four internal splined plates (16).



HIGH RANGE CLUTCH AND RELATED PARTS REPLACEMENT – CONTINUED 0053 00

INSTALLATION – Continued

5. Install three flat washers (2) and three screws (1). Stake washers (2) as indicated (17 and 18).



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter (WP 0059 00)

END OF WORK PACKAGE

HIGH RANGE CLUTCH AND RELATED PARTS REPAIR 0054 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)
C-clamp (item 32, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

Self-locking bolt (25) (item 81, WP 0087 00)
Retaining ring (item 8, WP 0087 00)
Gasket (item 65, WP 0087 00)
Gasket (item 64, WP 0087 00)

References

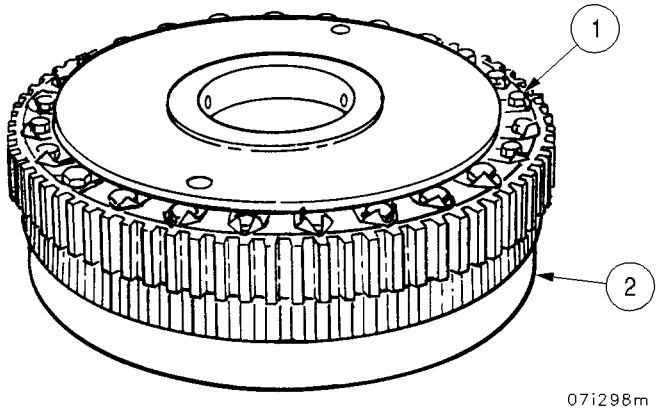
TM 9-2350-292-20

Equipment Conditions

High range clutch removed (WP 0053 00)

DISASSEMBLY

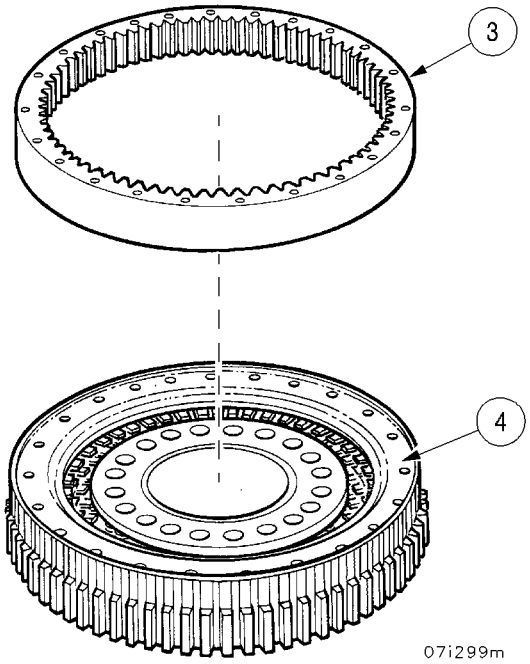
1. Remove 25 self-locking bolts (1) from high range clutch housing (2). Discard self-locking bolts.



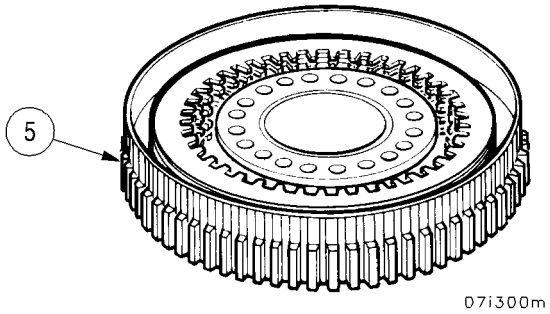
HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

DISASSEMBLY – Continued

2. Turn entire assembly over and remove intermediate range planetary ring gear (3). Remove high range clutch backplate (4).



3. Remove intermediate range clutch hub (5).

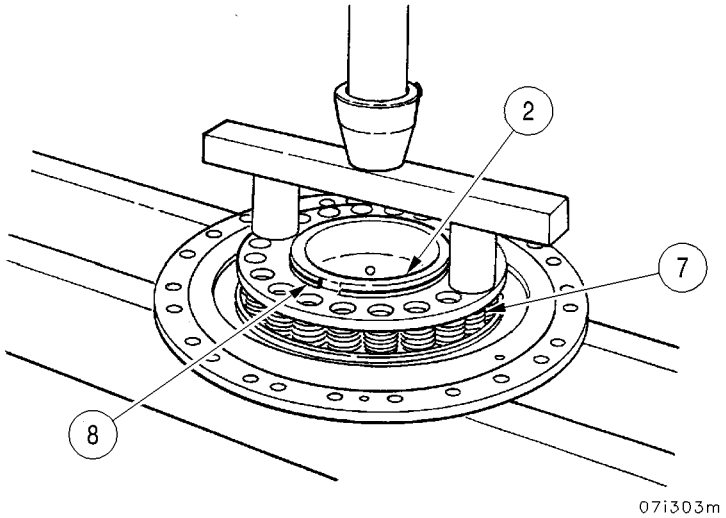


HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

DISASSEMBLY – Continued

4. Remove eight high range clutch plates (6).

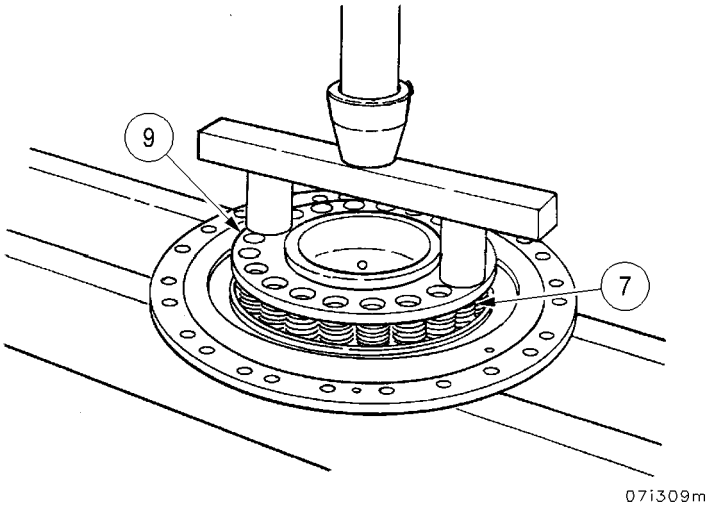
5. Compress high range clutch piston release springs (7) with a press. Remove snap ring (8) from groove in housing (2). Discard snap ring.



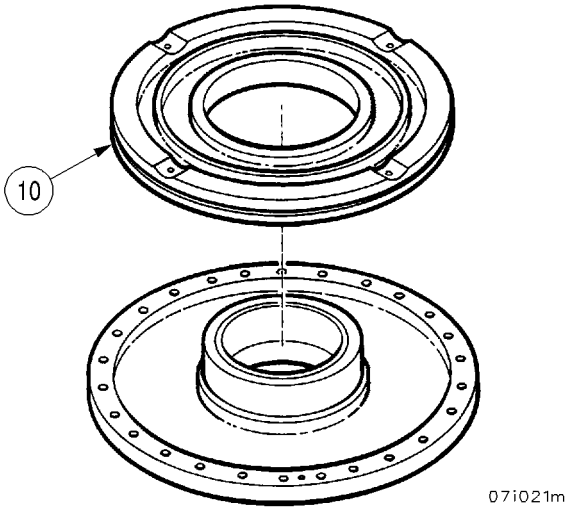
HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

DISASSEMBLY – Continued

6. Remove housing and piston assembly from press and lift off spring retainer (9) and high range piston release springs (7).



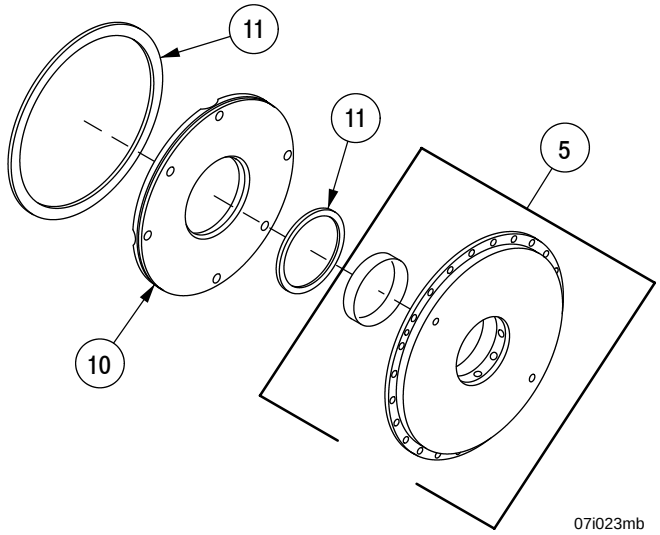
7. Turn housing and piston assembly over. Bump housing hub on a wood surface to dislodge the piston (10). Lift out piston (10).



HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

DISASSEMBLY – Continued

8. Remove two gaskets (11) from grooves in clutch piston (10) and intermediate clutch housing hub assembly (5). Discard gaskets.



CLEANING

Refer to WP 0018 00 for cleaning procedure.

INSPECTION

Refer to WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within specified dimension.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Thrust washer	Thickness of washer	0.0920 to 0.0950 in. Wear limit: 0.0850 in.
High range clutch housing	Larger ID of housing Bushing fit in housing bore	4.5470 to 4.5480 in. 0.0060 to 0.0090 in. press fit
Bushing type bearing	Bushing OD Bushing fit in housing bore Bushing ID Bushing fit on sleeve	Press fit into 4.5470 to 4.5480 in. bore 0.0060 to 0.0090 in. press fit 4.4365 to 4.3475 in. 0.0030L to 0.0050L
High range clutch piston release spring	Free length Length under load	1.948 in. 1.218 at 42 to 52 lb.
Externally splined plate	Thickness of plate	0.1200 to 0.1250 in. Wear limit: 0.1200 in.
Internally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in.
Externally splined plate	Thickness of plate	0.1580 to 0.1630 in.

HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

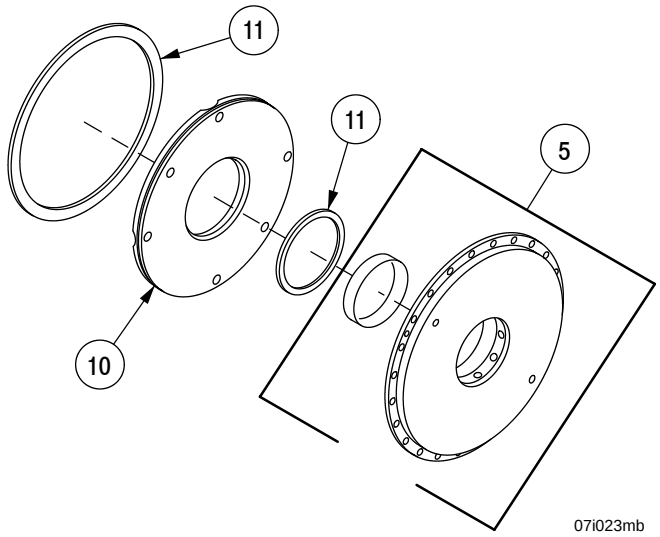
FIT AND WEAR LIMITS – Continued

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Internally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in
Intermediate range clutch release spring	Free length	1.936 in. 1.07 at 27 to 33 lb.
Thrust washer	Thickness of washer	0.0930 to 0.0950 in. Wear limit: 0.0850 in.
Thrust washer	Thickness of washer	0.0620 to 0.0640 in. Wear limit: 0.0550 in.
Thrust washer	Thickness of washer	0.0590 to 0.0620 in. Wear limit: 0.0550 in.
Intermediate planetary pinion	Pinion ID	2.0142 to 2.0147 in. Wear limit: 2.0157 in.
Spindle roller	Roller OD	0.2498 to 0.2500 in. Wear limit: 0.2493 in.
Planetary pinion spindle	Spindle OD	1.5127 to 1.5132 in. Wear limit: 1.5117 in.
Turbine shaft	Shaft bearing mounting surface OD Bearing fit on shaft	2.1660 to 2.1666 in. Wear limit: 2.1657 in. 0.0006T to 0.0018L
Bearing outer race	OD ID	3.9364 to 3.9370 in. 3.4651 to 3.4657 in.
Bearing inner race	Bearing ID Roller assembly OD Roller assembly fit in outer race	2.1648 to 2.1654 in. 3.4627 to 3.4631 in. 0.0020T to 0.0001L
Intermediate range sun gear	Gear hub bearing surface OD Bearing fit on gear	2.7558 to 2.7564 in. Wear limit: 2.7555 in. 0.0011T to 0.0001L
Bearing retainer	Retainer ID Bearing fit in carrier and retainer	4.4211 to 4.9221 in. Wear limit: 4.9224 in. 0.0002T to 0.0001L
Ball bearing	Bearing OD Bearing fit in carrier and retainer Bearing ID Bearing fit on gear	4.9203 to 4.9213 in. 0.0002T to 0.0018L 2.7553 to 2.7759 in. 0.0011T to 0.0001L

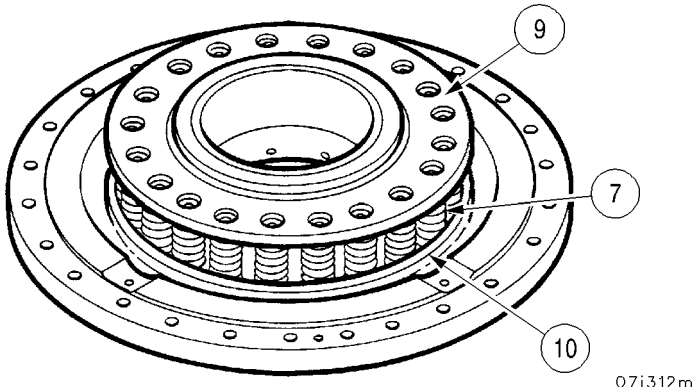
HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

ASSEMBLY

1. Install two new gaskets (11) into grooves of high range clutch piston (10) and intermediate range clutch housing hub assembly (5).
2. Install piston (10), flat side first, into hub (5).



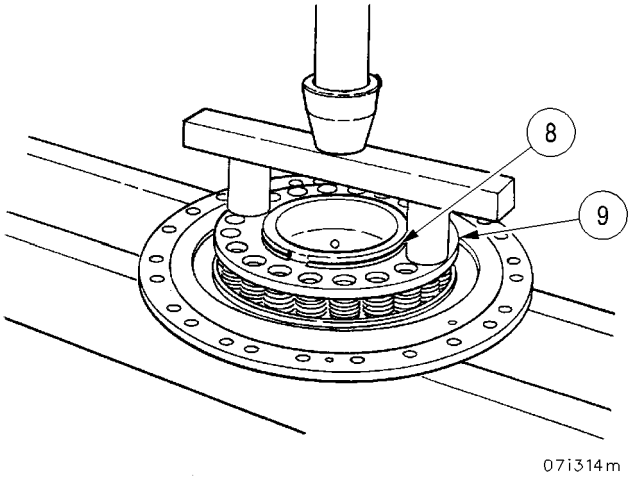
3. Space 20 high range clutch piston release springs (7) evenly around recess in piston (10) and install spring retainer (9).



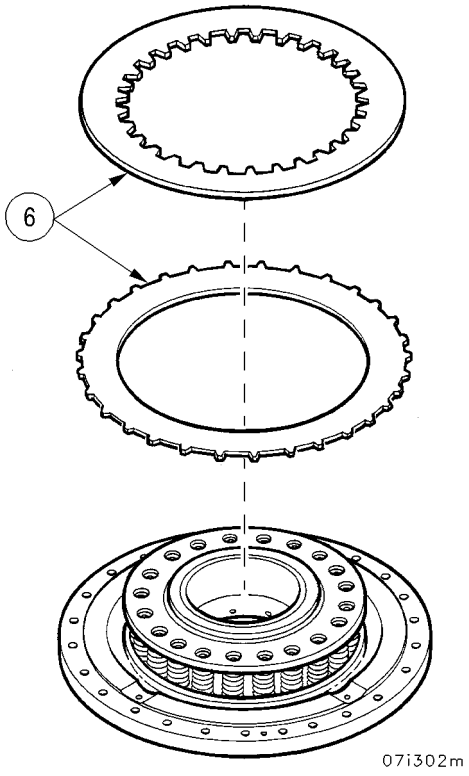
HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

ASSEMBLY – Continued

4. Compress spring retainer (9) with press. Install new snap ring (8) into groove in housing hub.



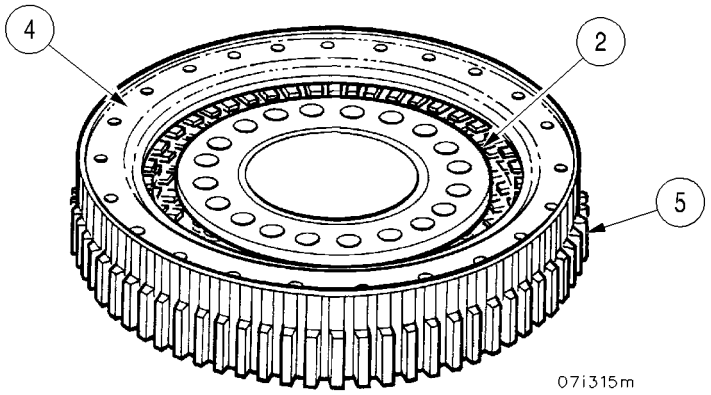
5. Install high range clutch plates (6). Starting with externally splined clutch plate, alternately install four externally splined clutch plates.



HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

ASSEMBLY – Continued

6. Remove assembly from press. Install intermediate range clutch hub (5), outer splines down. Aline hub bolt holes with those in housing (2). Install high range clutch backplate (4) flat side down.

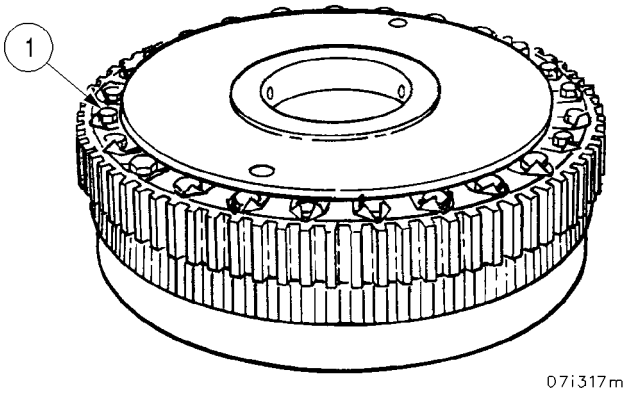


7. Install intermediate range planetary ring gear (3), placing tapped end of bolt holes next to backplate (4).

HIGH RANGE CLUTCH AND RELATED PARTS REPAIR – CONTINUED 0054 00

ASSEMBLY – Continued

8. Turn assembly over and install 25 new self-locking bolts (1). Torque bolts to 41 to 49 lb-ft (55.6 to 66.4 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install high range clutch assembly
(WP 0053 00)

END OF WORK PACKAGE

INPUT SCAVENGE OIL PUMP ASSEMBLY REPLACEMENT 0055 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Puller, mechanical (item 37, WP 0088 00)
Adapter (item 2, WP 0088 00)
Threaded straight pin (item 6, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Torque wrench (item 26, WP 0088 00)

Materials/Parts

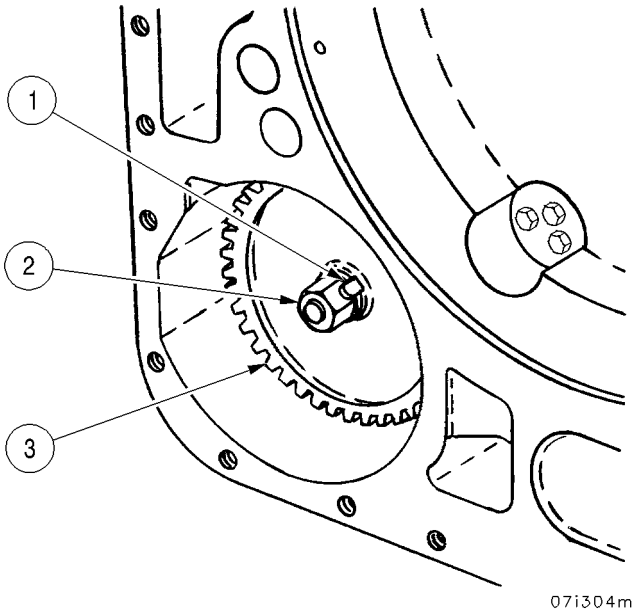
Grease (item 4, WP 0085 00)

Equipment Conditions

Torque converter removed (WP 0059 00)

REMOVAL

1. Straighten tabs on washer (1) or stakes on nut (2), remove nut (2) and gear (3) from scavenge pump assembly.



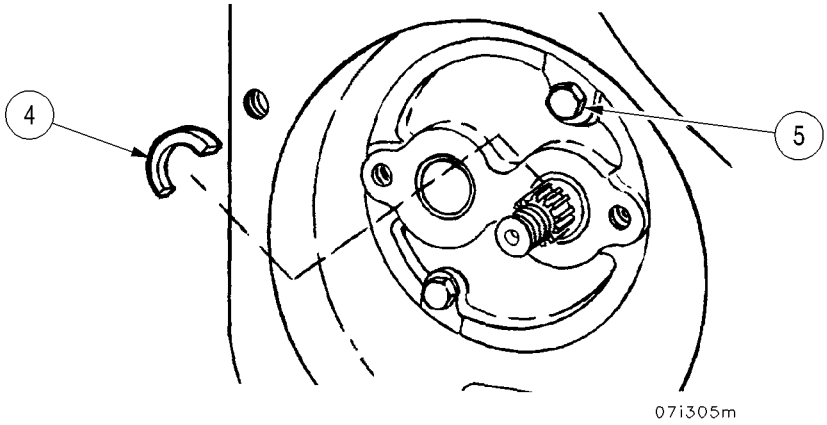
INPUT SCAVENGE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0055 00

REMOVAL – Continued

NOTE

Do not permit seats to drop into converter housing.

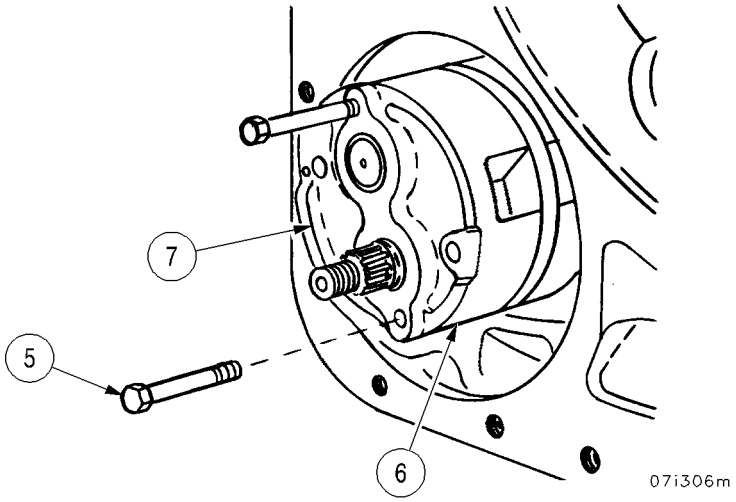
2. Remove two gear seats (4) and two mounting bolts (5).



NOTE

If pump cannot be removed easily, use mechanical puller with adapter.

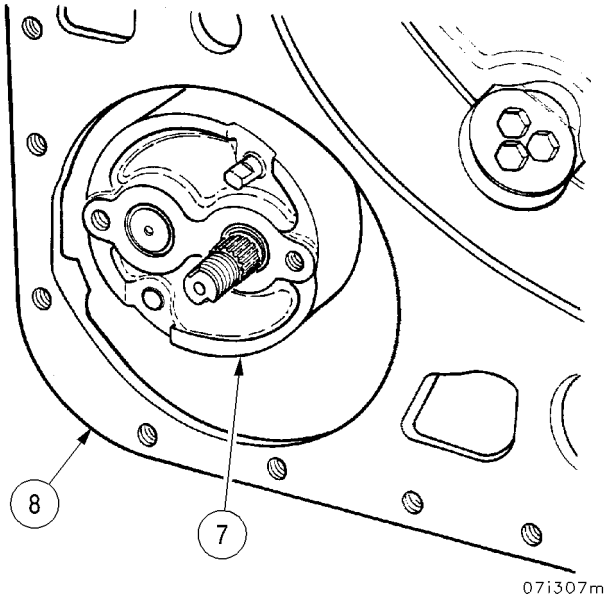
3. Install two mounting bolts (5) as jacking screws into tapped holes in pump body (6) and remove pump assembly (7).



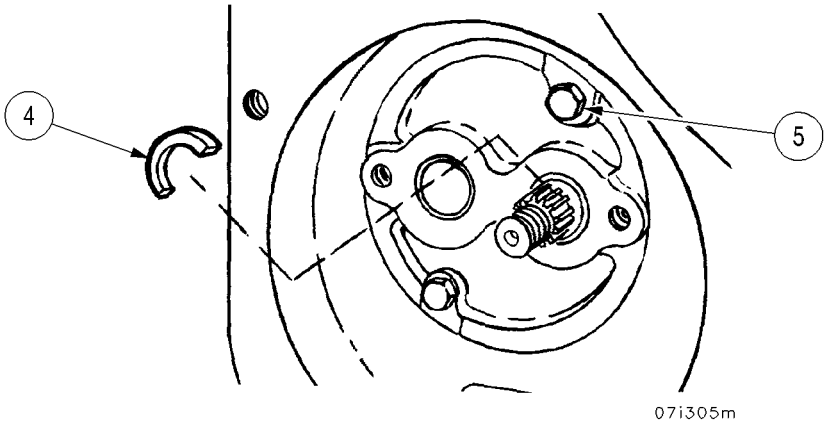
INPUT SCAVENGE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0055 00

INSTALLATION

1. Install pilot in one of pump mounting bolts holes. Install input scavenge pump assembly (7) in converter housing (8). Remove pilot.



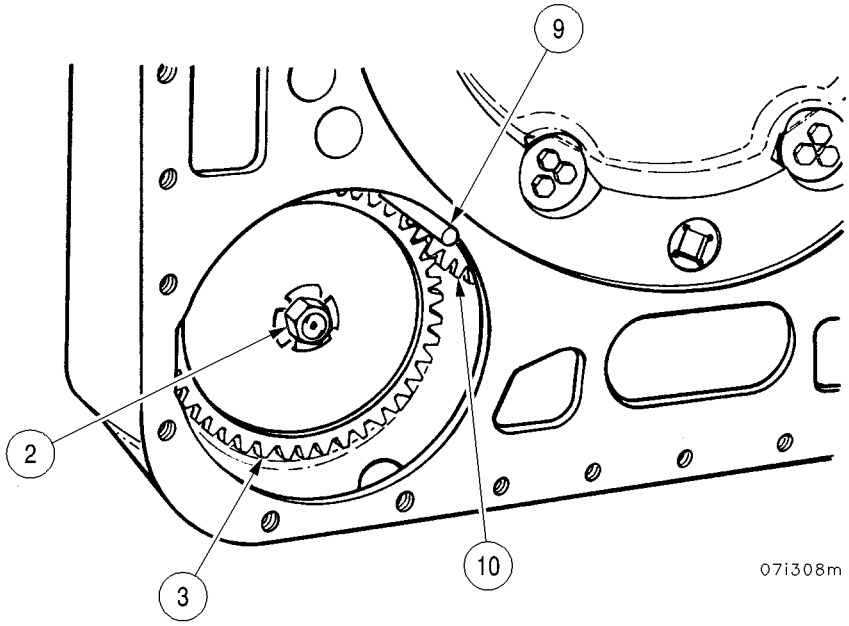
2. Install two mounting bolts (5). Torque bolts to 42 to 50 lb-ft (57 to 67.8 N•m). Install two gear seats (4), retaining them with oil soluble grease.



INPUT SCAVENGE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0055 00

INSTALLATION – Continued

3. Install scavenge pump gear (3) and nut (2) on pump shaft. Place a soft metal drift (9) between pump gear and idler gear (10). Torque nut (2) to 250 lb-ft (339 N•m). Stake lip of nut (2) into two notches in pump drive shaft. Remove drift.



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter (WP 0059 00)

END OF WORK PACKAGE

INPUT SCAVENGE OIL PUMP ASSEMBLY REPAIR 0056 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

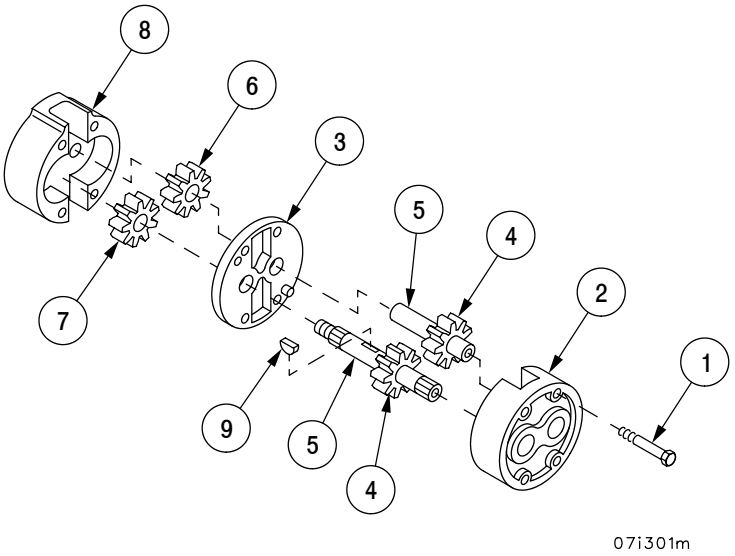
General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Equipment Conditions

Input scavenge oil pump assembly removed (WP 0055 00)

DISASSEMBLY

1. Remove two bolts (1) from pump assembly. Remove cover assembly (2) from divider plate (3).
2. Remove two pump idler gears (4) from gear shafts (5).
3. Remove divider plate (3).
4. Remove drive gear (6) and idler gear (7) from pump body (8). Remove key (9).



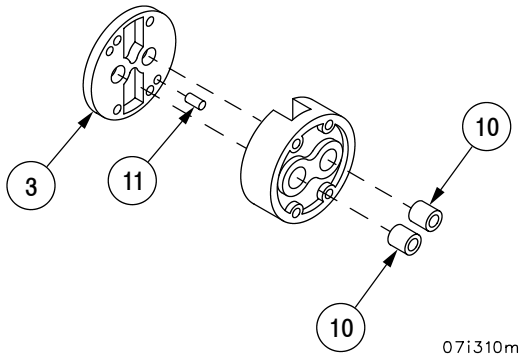
INPUT SCAVENGE OIL PUMP ASSEMBLY REPAIR – CONTINUED 0056 00

DISASSEMBLY – Continued

NOTE

Do not remove dowel pins from divider plate or needle bearings from pump, cover and body unless replacement is required. Step 5 gives procedures for removal.

5. Press or drive needle bearings (10) out. Remove dowel pins (11) from divider plate (3).



CLEANING

See WP 0018 00 for cleaning procedures.

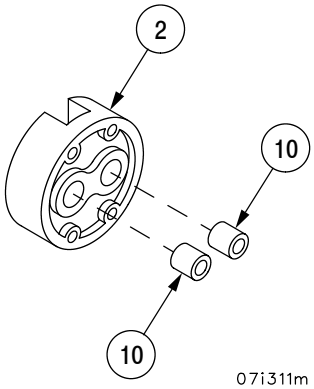
INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Needle bearings	Bearings OD Bearings ID	To press fit 1.2495 to 1.2505 bore To fit 1.000 diameter shaft
Input scavenge pump body	Bore ID in pump body and cover	1.2495 to 1.2505 in. Wear limit: 1.2510 in.
Internal drive gear	Bearing surface OD of gear shaft Bearing fit on gears	0.9990 to 1.0000 in. To fit on 1.0000 diameter shaft
Idler gear	Bearing surface OD of gear shaft Bearing fit on gears	0.9990 to 1.0000 in. To fit on 1.0000 diameter shaft

ASSEMBLY

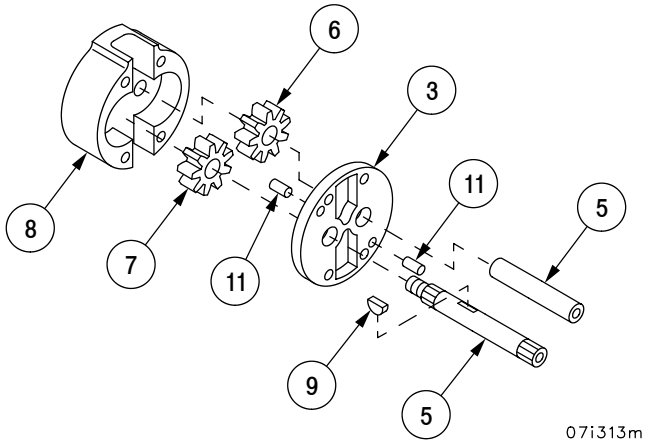
1. Install needle bearings (10) in cover assembly (2).



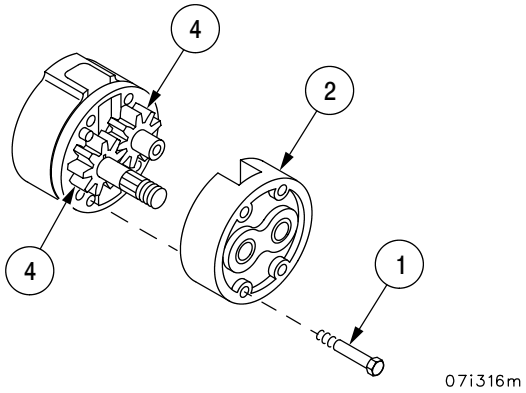
INPUT SCAVENGE OIL PUMP ASSEMBLY REPAIR – CONTINUED 0056 00

ASSEMBLY – Continued

2. Install short ends of main drive gear (6) and main idler gear (7) into gear cavities of pump body (8). Align gears. Shafts must be well seated in needle bearings.
3. Install dowel pins (11) into divider plate (3).
4. Install divider plate (3) over long ends of gear shaft (5). Be sure dowel pins (11) in plate are seated in holes in pump body (8). Insert key (9) into keyway of main drive gear.



5. Install two pump idler gears (4). Engage keyway of one gear with key.
6. Install pump cover assembly (2). Make sure dowel pins of divider plate are seated in holes of cover. Install two bolts (1). Torque bolts to 40 to 50 lb–ft (54.2 to 67.8 N•m).



NOTE

FOLLOW–ON MAINTENANCE:
Install input scavenge oil pump (WP 0055 00)

END OF WORK PACKAGE

INPUT PRESSURE OIL PUMP ASSEMBLY REPLACEMENT 0057 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Adapter, remover (item 2, WP 0088 00)
Puller, mechanical (item 8, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Torque wrench (item 26, WP 0088 00)
Socket wrench set (item 24, WP 0088 00)

Materials/Parts

Grease (item 4, WP 0085 00)
Nut (item 74, WP 0087 00)

Equipment Conditions

Torque converter removed (WP 0061 00)

REMOVAL

NOTE

If the input pressure pump was previously replaced there will not be a washer under the nut. The lip (staked) of the nut portion will have to be removed from the pump shaft and the nut discarded.

1. Flatten tabs (1) on washer (2). Remove nut (3) and gear (4) from input pressure pump (5). Discard washer if present.

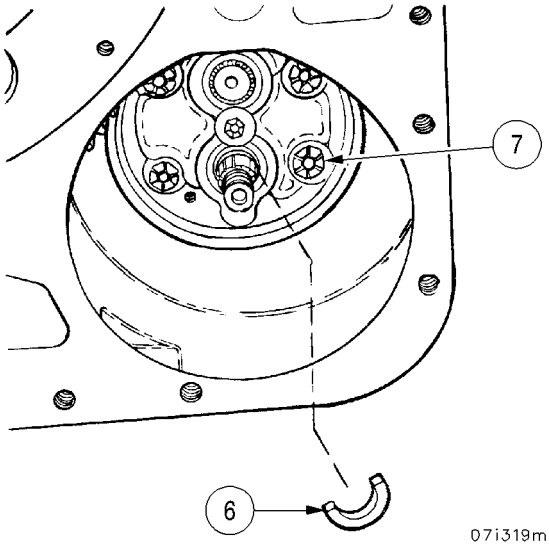
INPUT PRESSURE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0057 00

REMOVAL – Continued

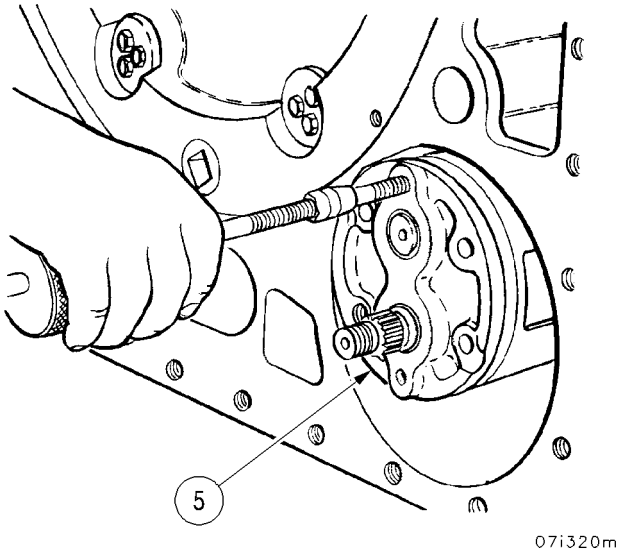
NOTE

Do not permit gear seats to drop into converter housing.

2. Remove two gear seats (6) and four pump mounting bolts (7).



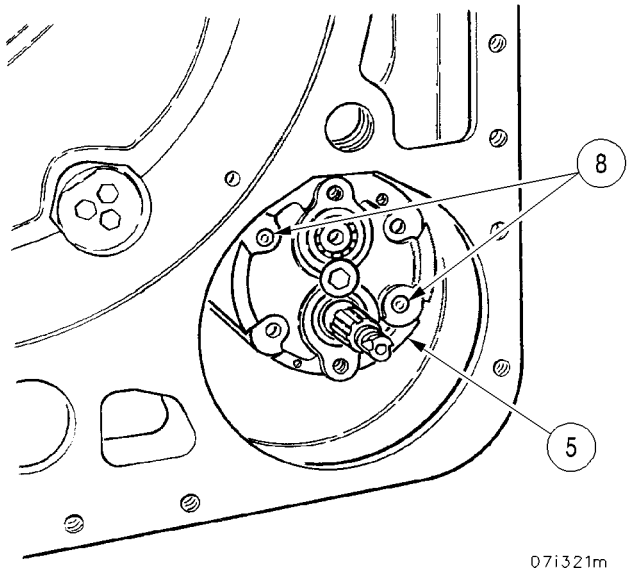
3. Using a mechanical puller and puller adapter, remove input pressure pump assembly (5).



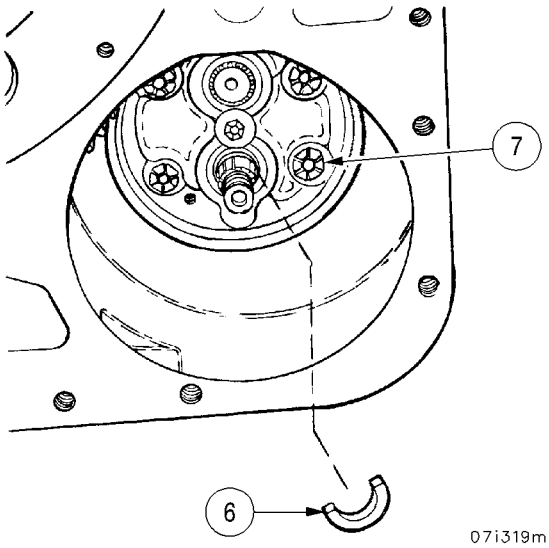
INPUT PRESSURE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0057 00

INSTALLATION

1. Using two headless guide bolts (8) installed in opposite pump mounting bolt holes, install input pressure pump assembly (5).



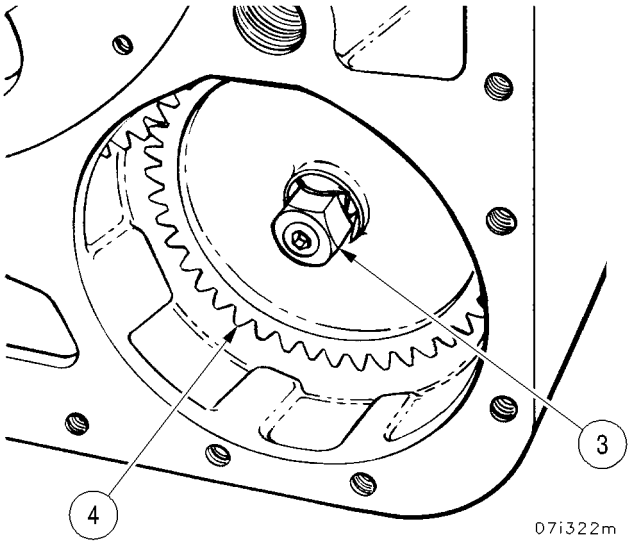
2. Install four pump mounting bolts (7). Torque four pump mounting bolts (7) to 67 to 80 lb-ft (90.9 to 108.5 N•m). Install two gear seats (6). Use oil-soluble grease to retain seats.



INPUT PRESSURE OIL PUMP ASSEMBLY REPLACEMENT – CONTINUED 0057 00

INSTALLATION – Continued

3. Install gear (4) and new nut (3). Torque nut (3) to 250 lb-ft (339 N•m). Stake lip of nut (3) into two notches in pump drive shaft.



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter (WP 0061 00)

END OF WORK PACKAGE

INPUT PRESSURE OIL PUMP ASSEMBLY REPAIR 0058 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Hammer, hand (item 35, WP 0088 00)

Equipment Conditions

Input pressure oil pump assembly removed (WP 0057 00)

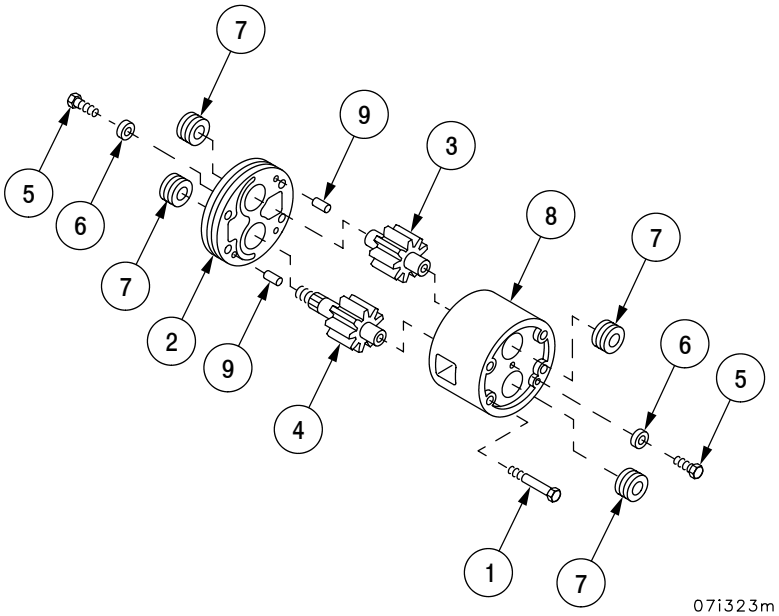
DISASSEMBLY

1. Remove two bolts (1) from pump assembly.
2. Lift off cover assembly (2). Remove pump idler gear (3) and pump internal gear (4).

NOTE

Do not remove dowel pins or needle bearings unless replacement is necessary.

3. Remove two bolts (5) and two flat washers (6). Tap needle bearings (7) out of cover assembly (2) and body (8). Remove dowel pins (9).



INPUT PRESSURE OIL PUMP ASSEMBLY REPAIR - CONTINUED 0058 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

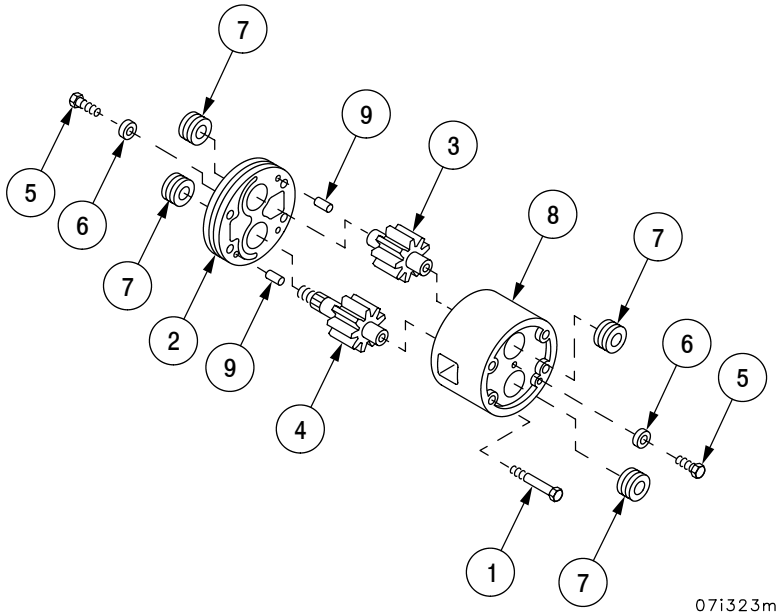
Check the following parts to the dimensions listed. Replace if not within specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Needle bearings	Bearings OD	1.4995 to 1.5000 in.
	Bearings fit in pump body	0.0017 to 0.0002T
Input pressure pump body	Body bearing surface ID	1.4983 to 1.4993 in. Wear limit: 1.4998 in.
	Bearing fit in pump body	0.0017T to 0.0002T
Internally driven gear	Bearing surface OD of gear shaft	0.9990 to 1.000 in. Wear limit: 0.9985 in.
	Bearing fit on gears	0.0010L to 0.0020L
Internally driven gear	Bearing surface OD	0.9990 to 1.000 in. Wear limit: 0.9985 in.
	Bearing fit on gears	0.0010L to 0.0020L
Input pressure pump cover	Cover bearing cover surface ID	1.4983 to 1.4993 in. Wear limit: 1.4998 in.
	Bearing fit in cover	0.0017T to 0.0002T

INPUT PRESSURE OIL PUMP ASSEMBLY REPAIR - CONTINUED 0058 00

ASSEMBLY

1. Tap two needle bearings (7) into pump body (8) and two needle bearings (7) into cover assembly (2). Install dowel pins (9) into cover assembly (2).
2. Lock needle bearings (7) in place with two flat washers (6) and two bolts (5).
3. Install pump internal gear (4) short end first and idler gear (3) in body assembly (8).
4. Place pump cover assembly (2) on body assembly (8). Align dowel pins (9) in cover assembly (2) with holes in body assembly (8).
5. Install two bolts (1) and torque bolts to 46 to 52 lb-ft (62.4 to 70.5 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install input pressure pump (WP 0057 00)

END OF WORK PACKAGE

TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPLACEMENT 0059 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Pin (item 7, WP 0088 00)
Hoist (5000 lb lifting capacity min)

Materials/Parts

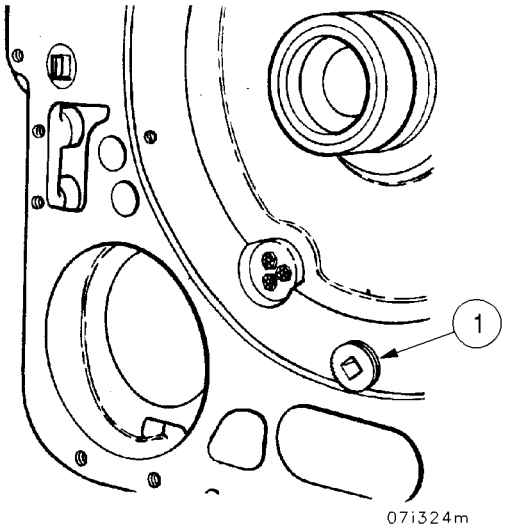
Lumber (item 6, WP 0085 00)

Equipment Conditions

Torque converter input pressure pump removed (WP 0057 00)

REMOVAL

1. Remove pipe plug (1) for access to converter assembly bolts.



TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPLACEMENT - CONTINUED 0059 00

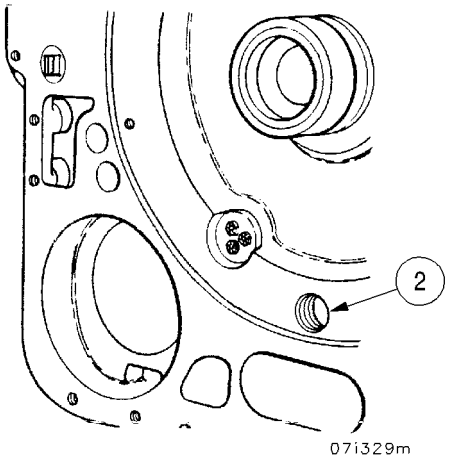
REMOVAL – Continued

NOTE

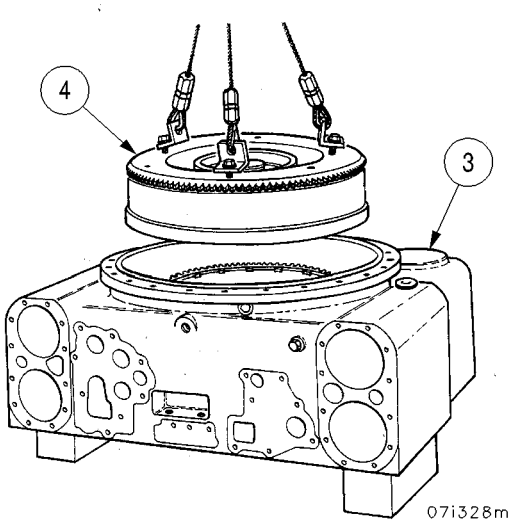
Loosen, but do not remove two of the 40 bolts securing the lockup clutch to the housing. Two bolts must be left until converter is properly positioned.

Converter pump must be rotated to gain access to lockup clutch bolts.

2. Remove 38 bolts of the 40 bolts securing converter lockup clutch to housing through access hole (2).



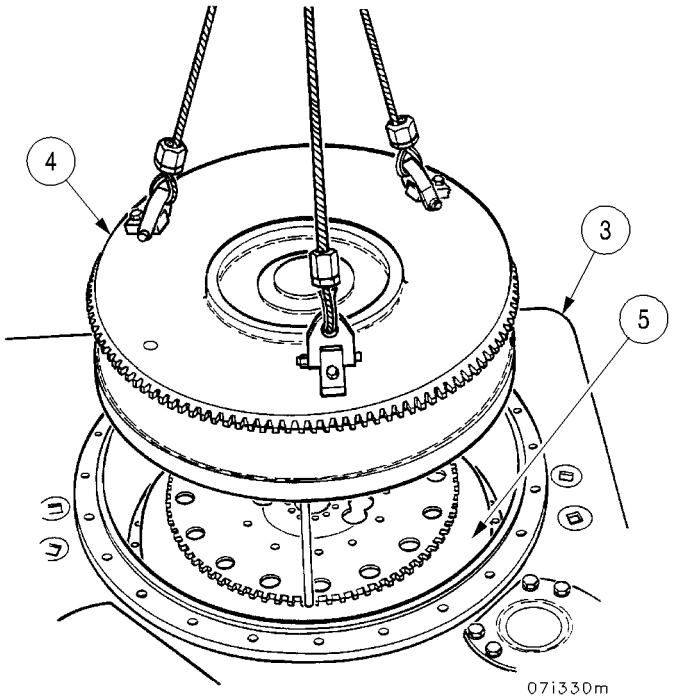
3. Place housing (3) on wooden blocks and remove two remaining lockup clutch-to-housing bolts. Attach sling and remove lockup clutch assembly (4) from housing (3).



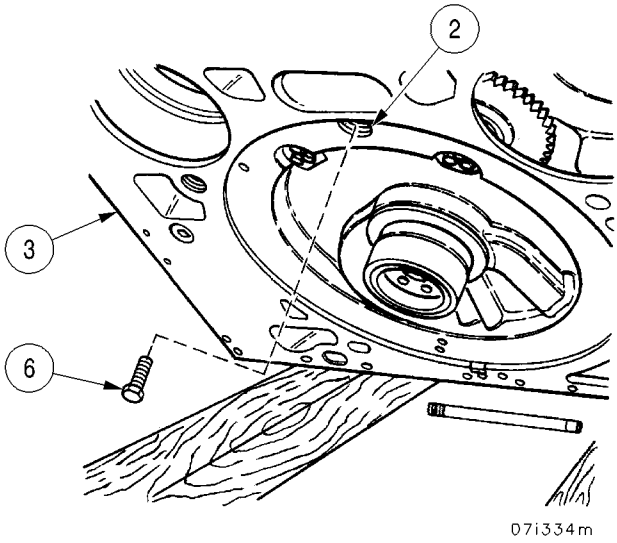
TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPLACEMENT - CONTINUED 0059 00

INSTALLATION

1. Install pin into lockup clutch assembly (4). Position lockup clutch assembly (4) so that pin aligns with hole in converter pump (5) and with access hole at rear of housing (3). Lower lockup clutch assembly (4) onto converter pump (5).



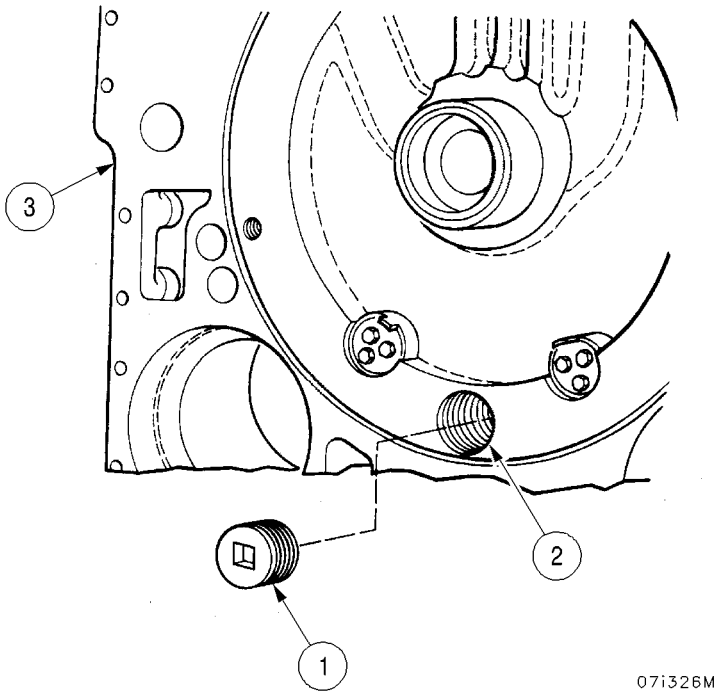
2. Hoist housing (3) partially upward and remove pin from access hole (2). Install two bolts (6) into opposite holes in housing (3) (rotate converter pump a half turn after first bolt is installed).



TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPLACEMENT - CONTINUED 0059 00

INSTALLATION – Continued

3. Position housing (3) upward and install remaining 38 bolts through access hole (2). Tighten bolts to 41 to 49 lb-ft (55.6 to 66.4 N•m). Install access plug (1).



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter input pressure pump (WP 0057 00)

END OF WORK PACKAGE

TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPAIR 0060 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Compressor assembly (item 3, WP 0088 00)

Equipment Conditions

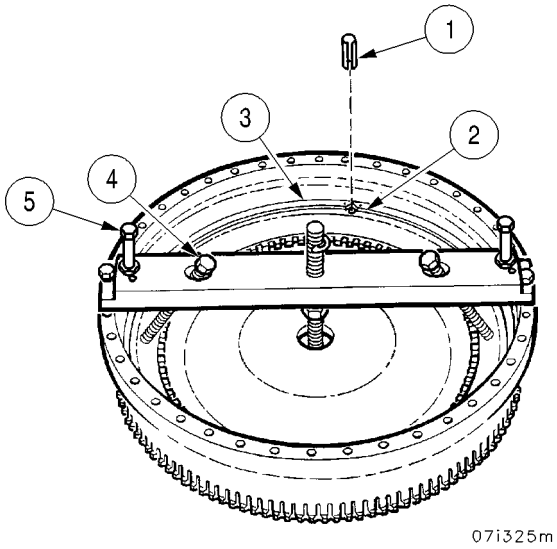
Torque converter lockup clutch removed (WP 0059 00)

Materials/Parts

Retaining ring (item 73, WP 0087 00)
Spring pin (item 93, WP 0087 00)
Gasket (item 69, WP 0087 00)

DISASSEMBLY

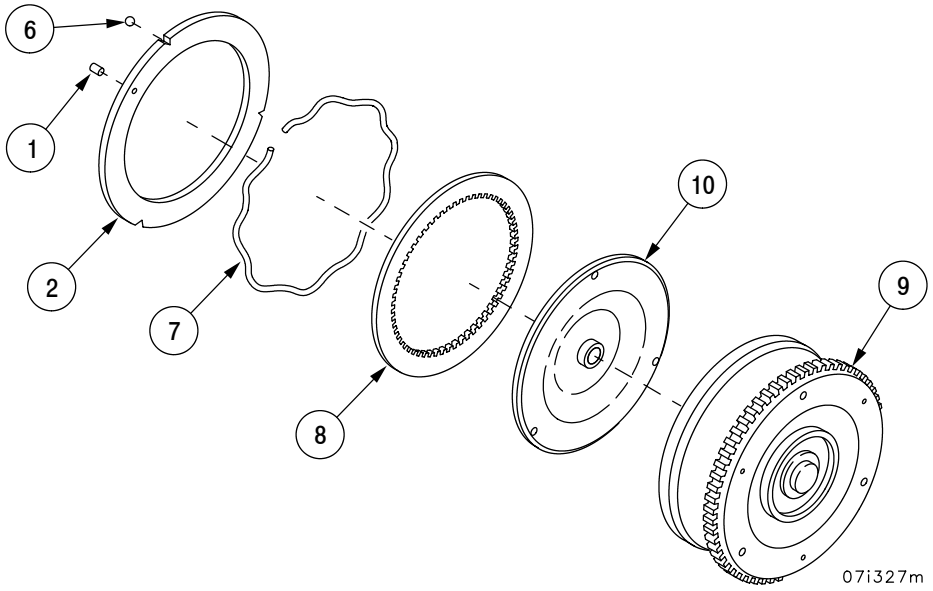
1. Drive spring pin (1) into backplate (2) until flush with rear of backplate (2). Install compressor assembly and depress backplate until pressure on snap ring (3) is relieved. Remove snap ring (3). Discard snap ring.
2. Release compression on backplate (2). Remove two compressor assembly bolts (4). Install 3/8–16 puller bolts (with nuts) (5) through compressor bar into backplate (2). Remove backplate (2) by tightening nuts, alternating from side to side.



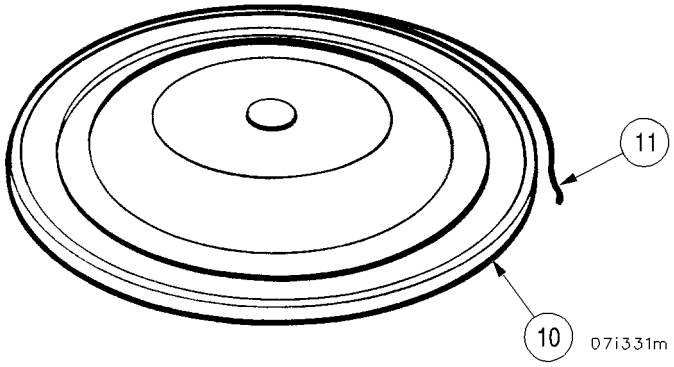
TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPAIR – CONTINUED 0060 00

DISASSEMBLY – Continued

3. Remove three locating balls (6), piston release spring (7) and clutch plate (8). Position housing assembly (9), open end down on disassembly table. Bump one side, then the other against table to dislodge lockup clutch piston (10). Remove piston (10).
4. After removing lockup clutch plate (8), drive spring pin (1) out of backplate (2). Discard spring pin.



5. Remove one-piece gasket (11) from outer groove of lockup clutch piston (10). Discard preformed packing.



TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPAIR – CONTINUED 0060 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

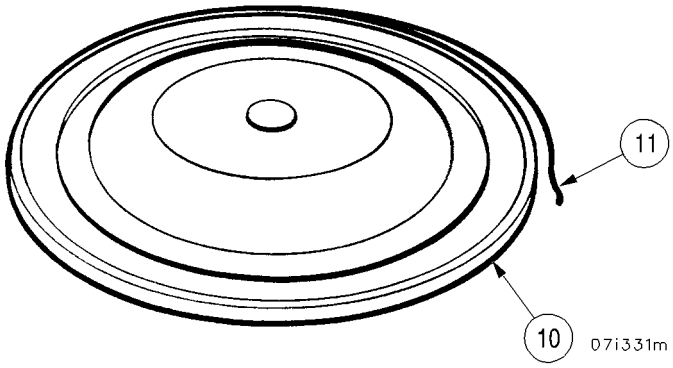
Check the following parts to the dimensions listed. Replace if not within specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Clutch backplate	Thickness of plate	0.8050 to 0.8250 in.
Lockup clutch plate	Thickness of plate	0.3650 to 0.3750 in. Wear limit: 0.3450 in.

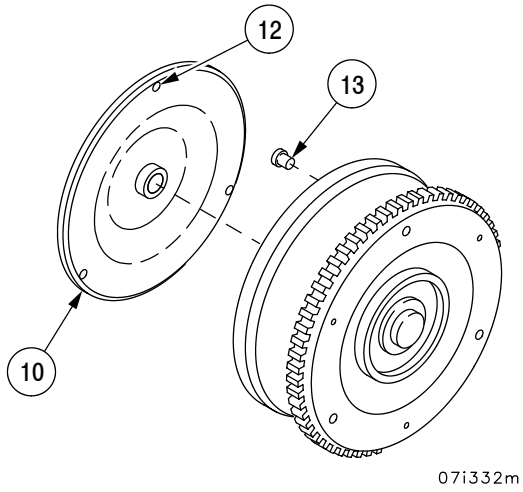
TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPAIR – CONTINUED 0060 00

ASSEMBLY

1. Install new one-piece preformed packing (11) in outer groove of lockup clutch piston (10).



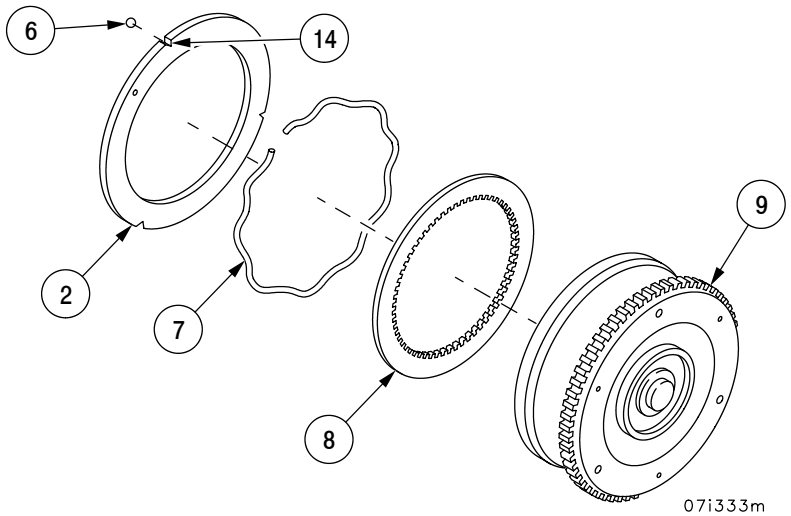
2. Install lockup clutch piston (10), concave side first, engaging drive holes (12) with lockup piston drive pin (13).



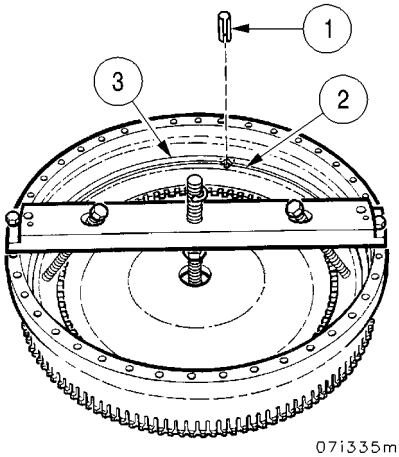
TORQUE CONVERTER LOCKUP CLUTCH ASSEMBLY AND RELATED PARTS REPAIR – CONTINUED 0060 00

ASSEMBLY – Continued

3. Install piston release spring (7) and clutch plate (8) into housing (9).
4. Install three locating balls (6), retaining them with oil soluble grease. Install clutch backplate (2) flat side down, aligning three half-round slots (14) to engage three locating balls (6).



5. Install compressor assembly and compress backplate (2) until clear of snap ring groove. Install new snap ring (3), aligning its gap with pin hole in backplate (2). Install new spring pin (1). Drive pin (1) in until pin (1) is flush with upper surface of snap ring (3).



NOTE

FOLLOW-ON MAINTENANCE:
Install lockup clutch assembly (WP 0059 00)

END OF WORK PACKAGE

TORQUE CONVERTER HOUSING ASSEMBLY REPLACEMENT 0061 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Hoist (7000 lb lifting capacity min)

Materials/Parts

Lockwasher (36) (item 28, WP 0087 00)
Lumber (item 6, WP 0085 00)
Non-hardening gasket sealant (item 7, WP 0085 00)

References

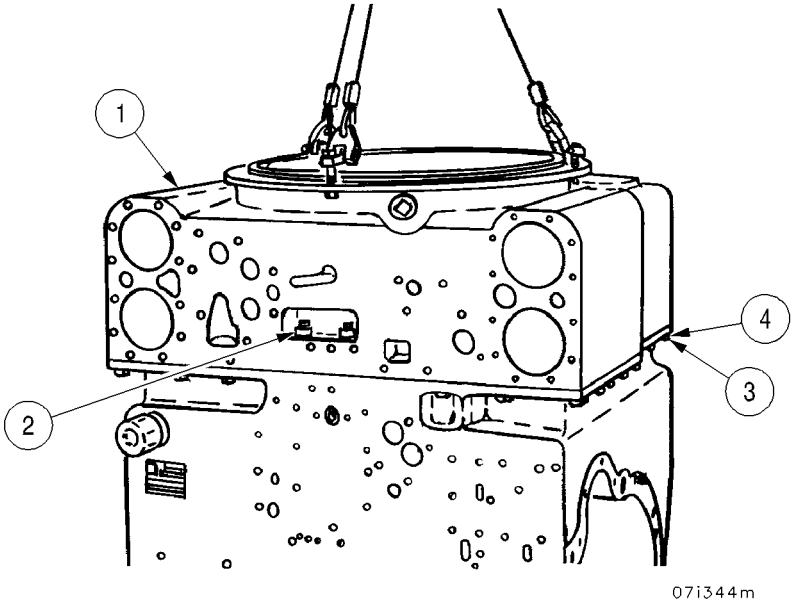
TM 9-2350-292-34

Equipment Conditions

Transmission assembly removed (TM 9-2350-292-34)

REMOVAL

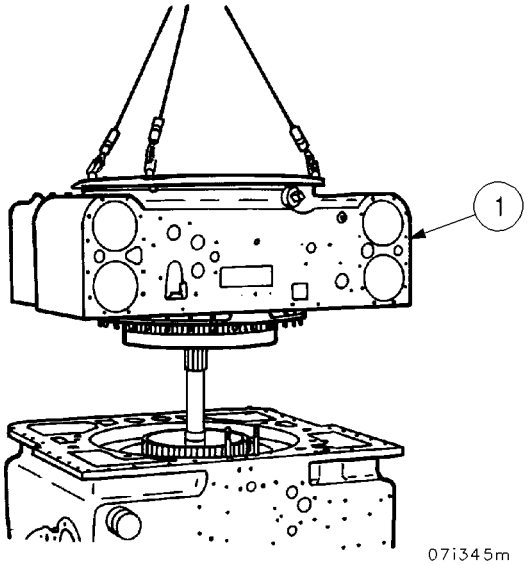
1. Position transmission so that torque converter housing (1) is up. Remove two nuts (2), 34 bolts (3) and 36 lockwashers (4). Discard lockwashers.



TORQUE CONVERTER HOUSING ASSEMBLY REPLACEMENT – CONTINUED 0061 00

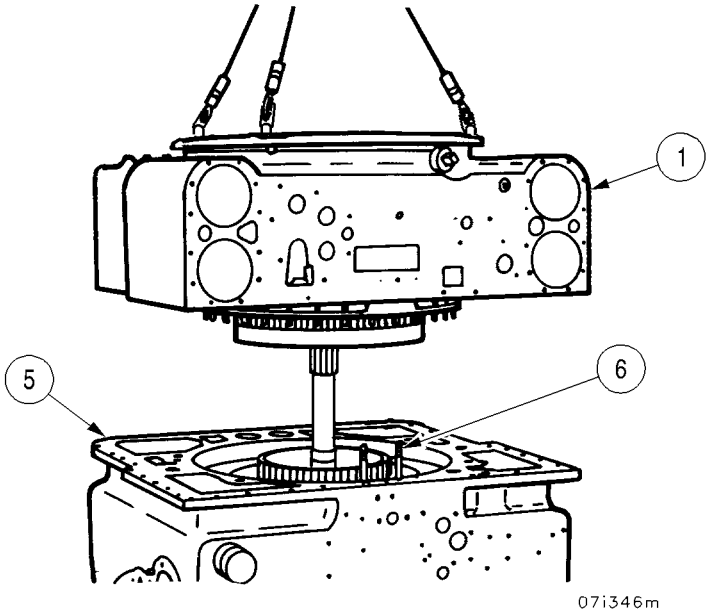
REMOVAL – Continued

2. Remove torque converter housing assembly (1). Place torque converter housing (1) on wooden blocks.



INSTALLATION

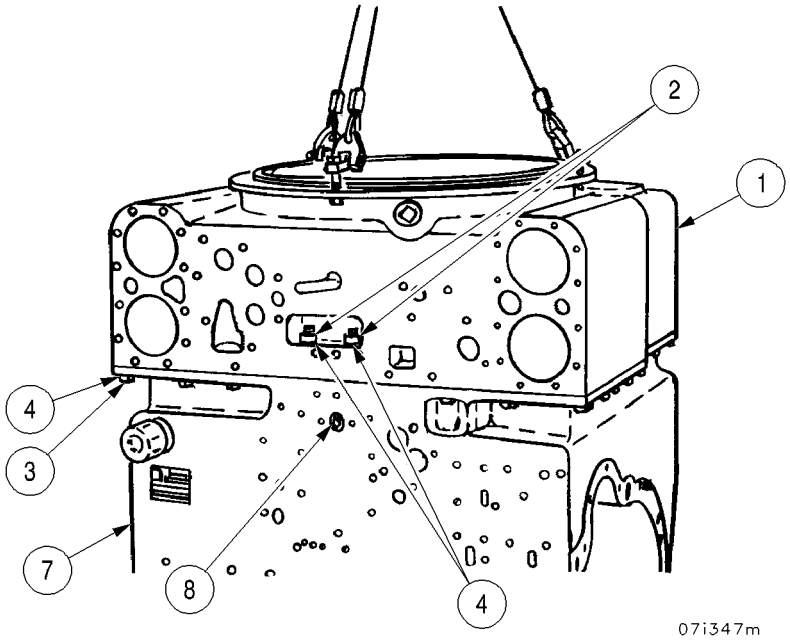
1. Apply a coating of non-hardening sealant to mounting face (5) of transmission housing. Install two headless 1/2-13 bolts (6). Install torque converter housing assembly (1) onto transmission.



TORQUE CONVERTER HOUSING ASSEMBLY REPLACEMENT – CONTINUED 0061 00

INSTALLATION – Continued

2. When converter housing assembly (1) is seated evenly on transmission housing (7), install 34 bolts (3) and 34 new lockwashers (4). Install two nuts (2) and two new lockwashers (4). Tighten anchor bolts (8).



NOTE

FOLLOW-ON MAINTENANCE:
Install transmission (TM 9-2350-292-34)

END OF WORK PACKAGE

TORQUE CONVERTER HOUSING ASSEMBLY REPAIR 0062 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Hammer (item 35, WP 0088 00)

Materials/Parts

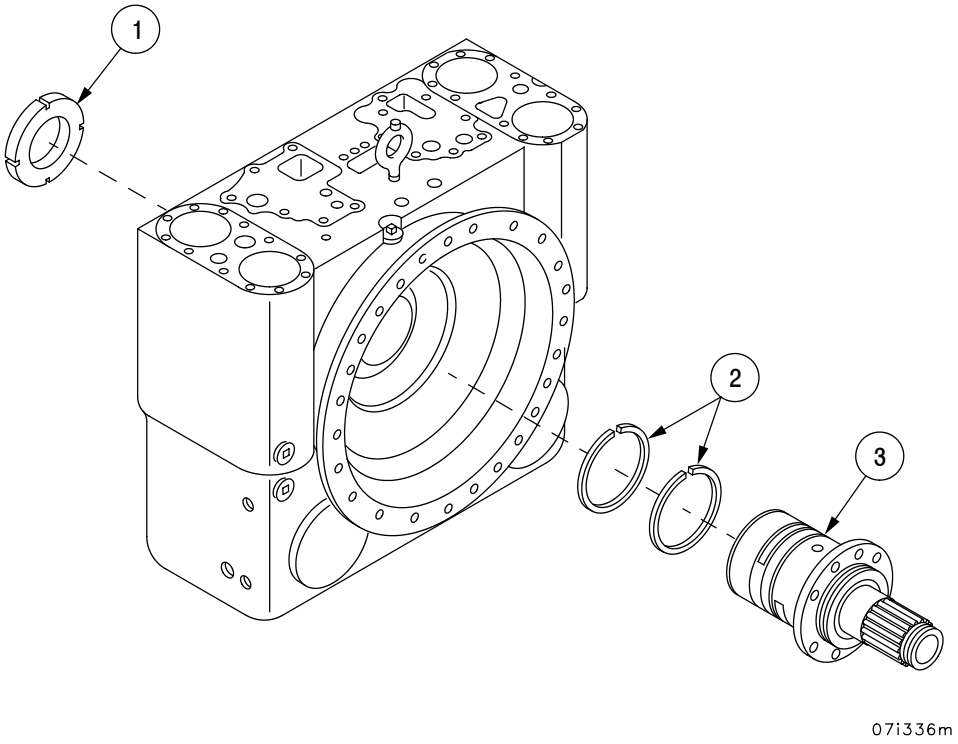
Gasket (item 52, WP 0087 00)
Seal ring (2) (item 31, WP 0087 00)
Self-locking bolt (6) (item 111, WP 0087 00)

Equipment Conditions

Torque converter turbine assembly, stator assembly and pump removed (WP 0057 00)

DISASSEMBLY

1. Remove thrust washer (1) and two hook-type seal rings (2) at rear of ground sleeve (3). Discard seal rings.



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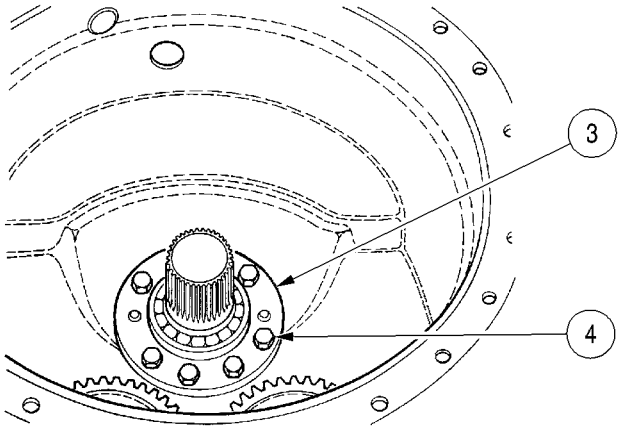
TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

DISASSEMBLY – Continued

2. Remove eight bolts (4) retaining converter ground sleeve (3). Position converter housing (5) to rest on bottom.



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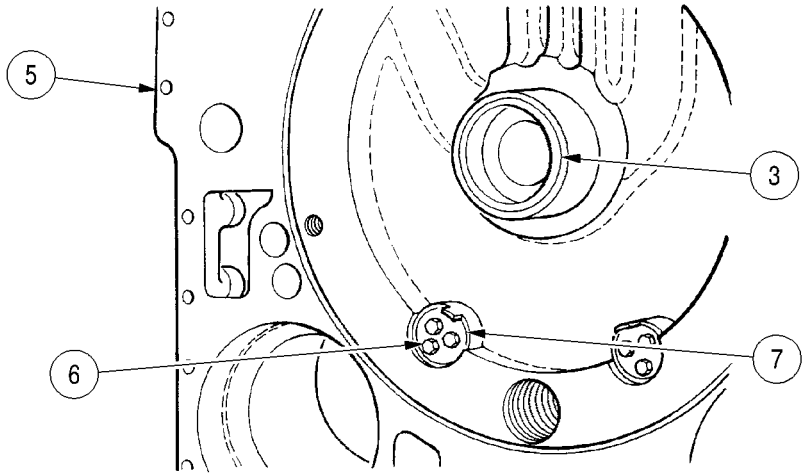
3. Drive converter ground sleeve (3) forward, out of converter housing (5). Use a soft hammer or mallet.
4. Remove three self-locking bolts (6) and lockplate (7) from each of two idler gear spindles. Discard self-locking bolts.



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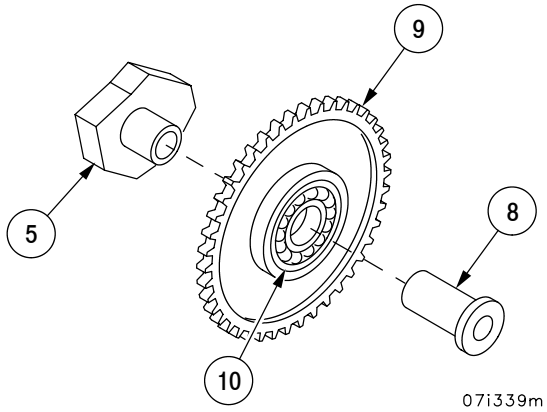
TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

DISASSEMBLY – Continued

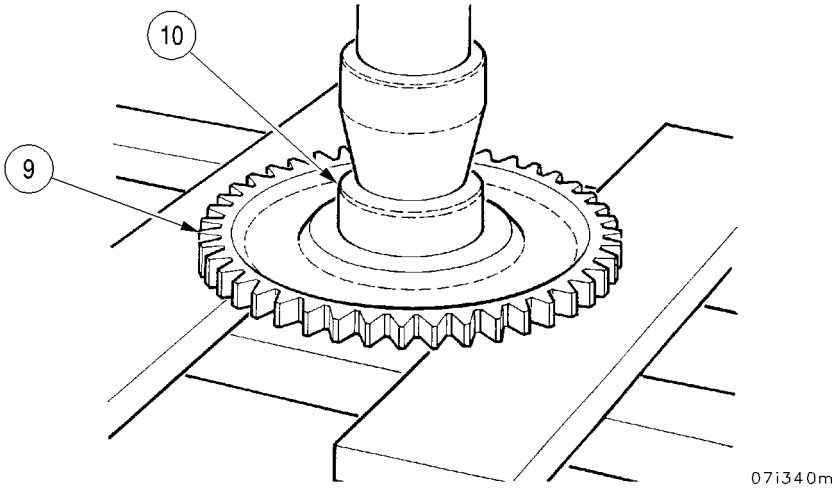
5. Use a soft metal drift to drive two spindles (8), gear (9) and ball bearing assembly (10) out of converter housing (5).
6. Press or drive two spindles (8) from gear (9) and ball bearing assembly (10).



NOTE

Do not remove ball bearing assemblies unless parts replacement is necessary. If removal is necessary, perform Step 7.

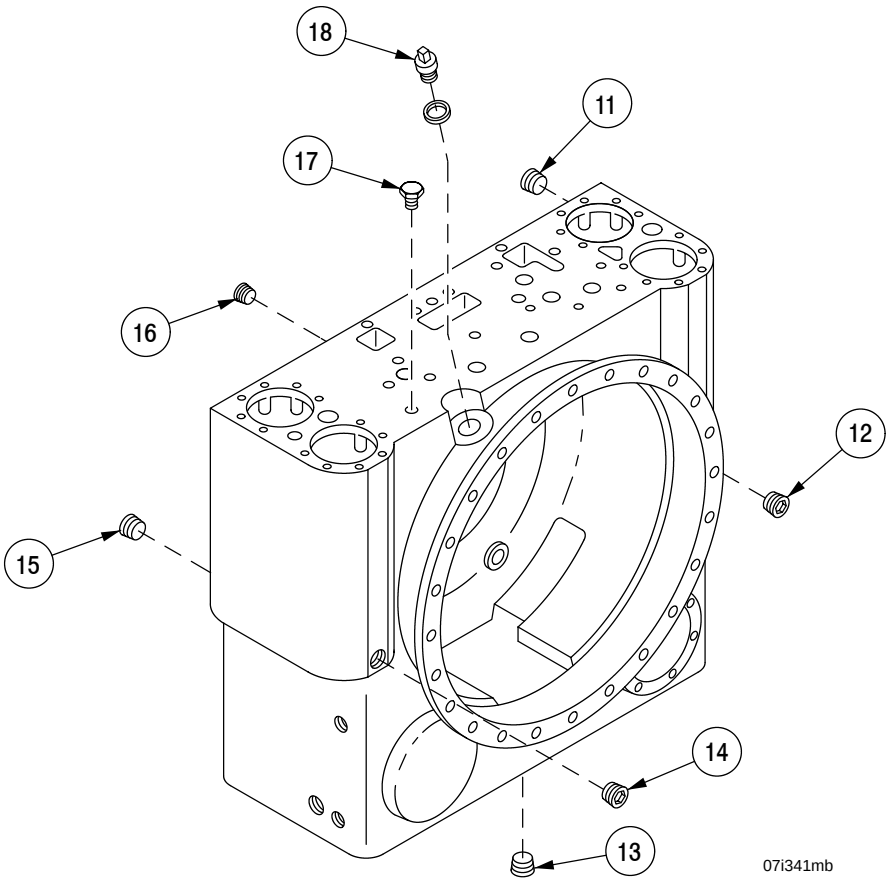
7. Support rear side of gears (9) and press bearing assemblies (10) out.



TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

DISASSEMBLY – Continued

8. Remove plugs (11 through 18) only if evidence of leaks exists.



TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

CLEANING

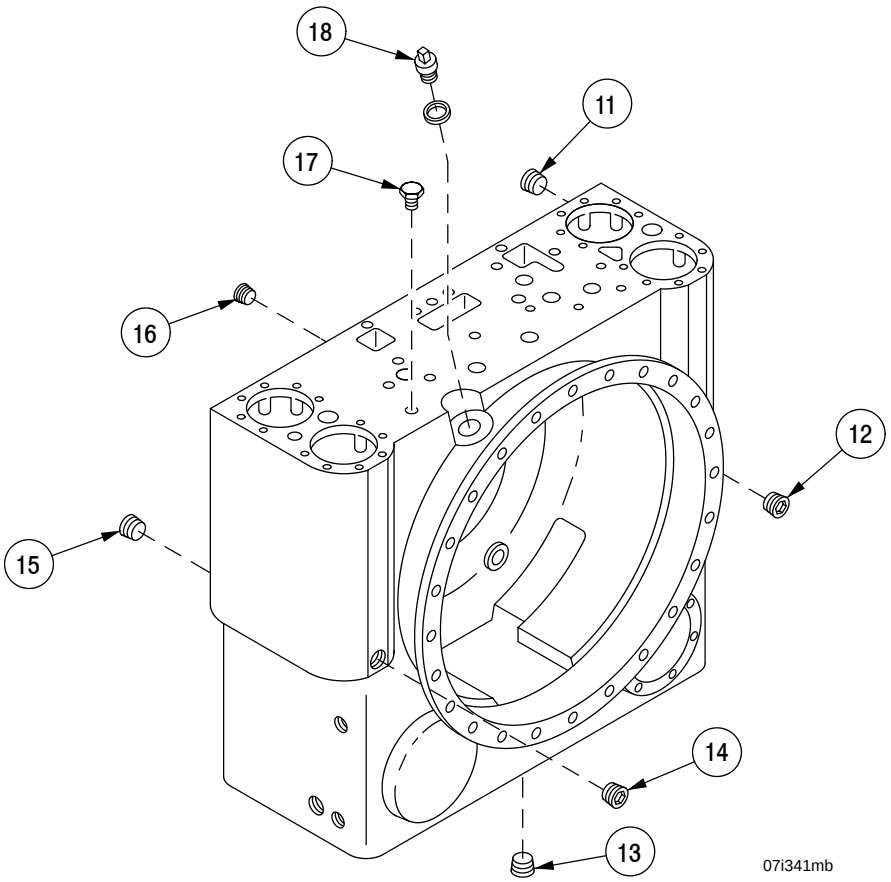
See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

ASSEMBLY

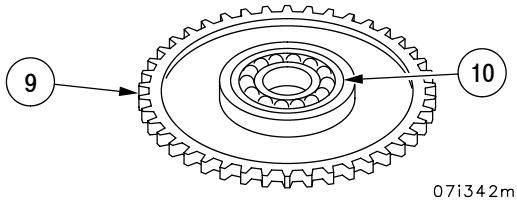
1. Install plugs (11 through 18), if removed.



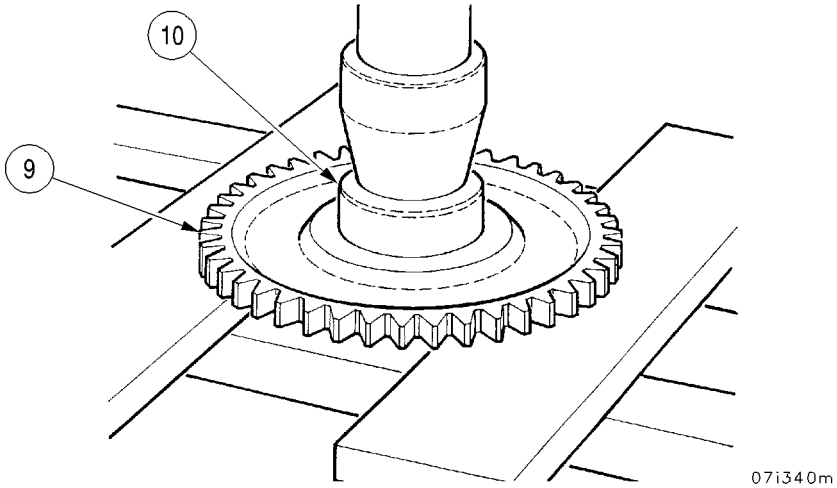
TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

ASSEMBLY – Continued

2. Install ball bearing (10) in gears (9), if removed. Support gears (9), front side down.



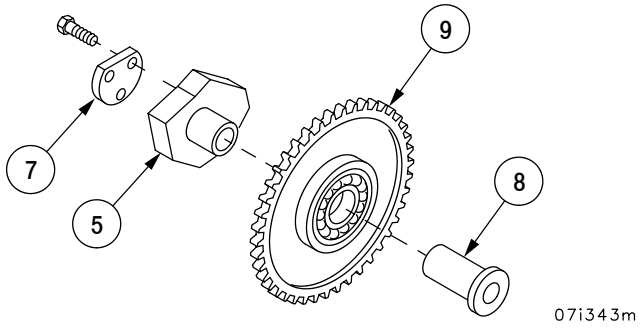
3. Stake edges of gear hubs over bearings (10) at four points on each gear. Place a 1/4–inch steel ball on the hub close to bore of gear (9). Strike with hammer. Bearing (10) must rotate freely after striking.



NOTE

Assure that bent tabs on lockplates align with milled flats on lockplate mounting bosses.

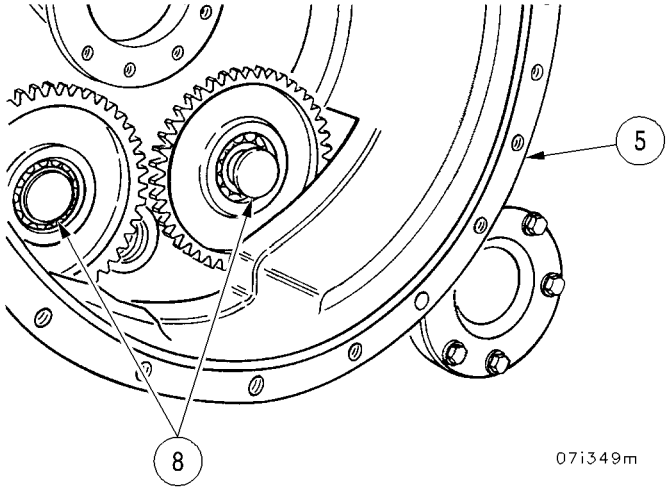
4. Start two spindles (8) into front side of gears (9). Position gears (9) and spindles (8) in converter housing (5). Align tapped holes in spindles (8) with holes in lockplates (7).



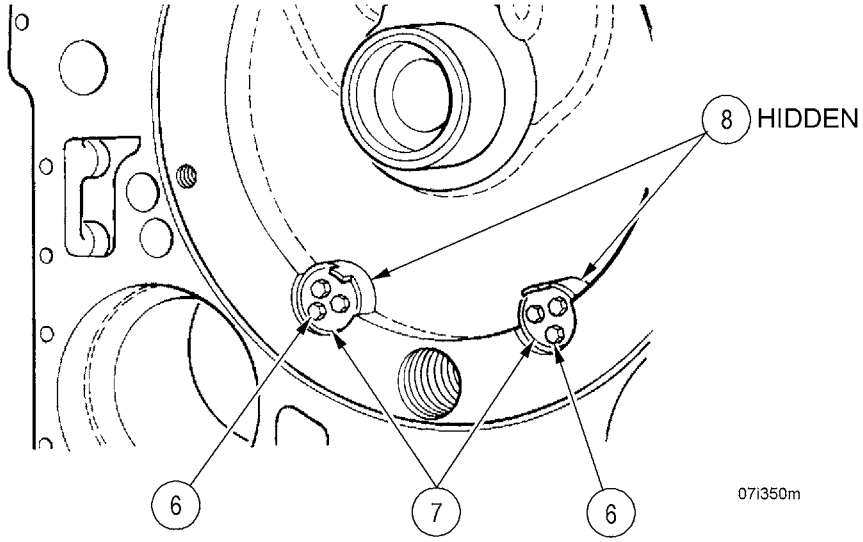
TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

ASSEMBLY – Continued

5. Drive two spindles (8) into converter housing (5) until firmly seated. Use soft metal drift.



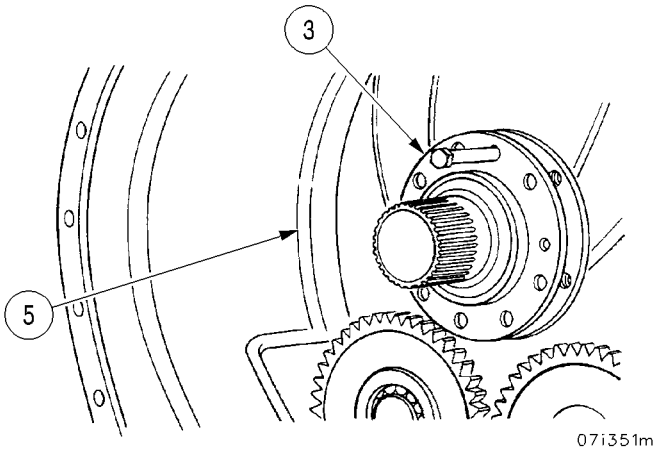
6. Install two lockplates (7) and secure with three new self-locking bolts (6) in each spindle (8).



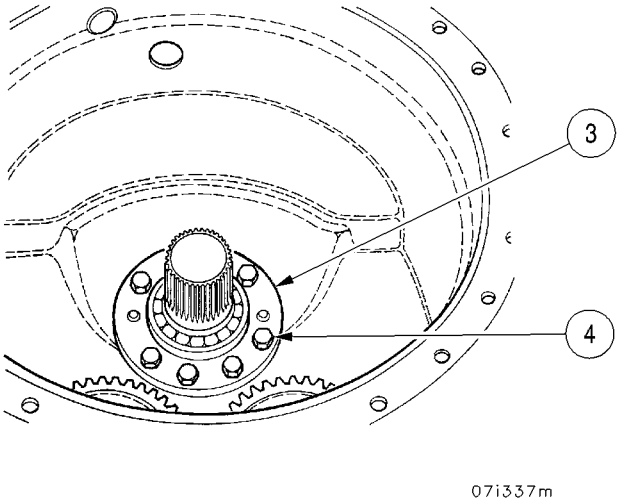
TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

ASSEMBLY – Continued

7. Position ground sleeve (3) in converter housing (5). Use ½-13 bolt to align bolt holes in ground sleeve (3) and converter housing (5). Drive ground sleeve (3) into converter housing (5) with a soft mallet or hammer.



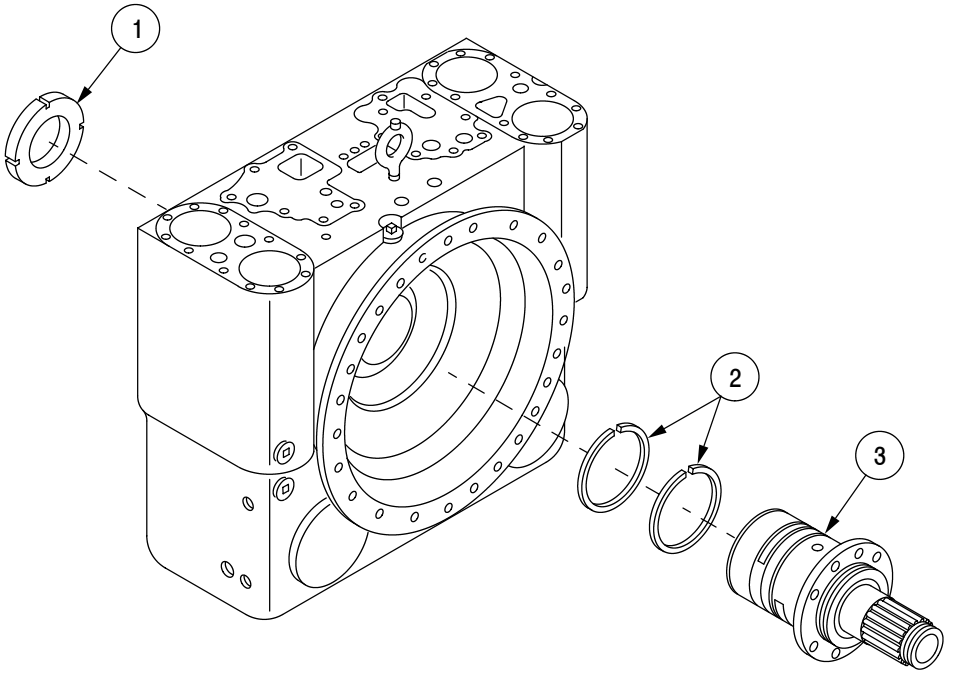
8. Install eight bolts (4) to hold ground sleeve (3).



TORQUE CONVERTER HOUSING ASSEMBLY REPAIR – CONTINUED 0062 00

ASSEMBLY – Continued

9. Install two new hook-type seals (2) and thrust washer (1) in rear of ground sleeve (3).



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NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter turbine assembly, stator assembly and pump (WP 0057 00)

END OF WORK PACKAGE

TORQUE CONVERTER PUMP ASSEMBLY REPLACEMENT 0063 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

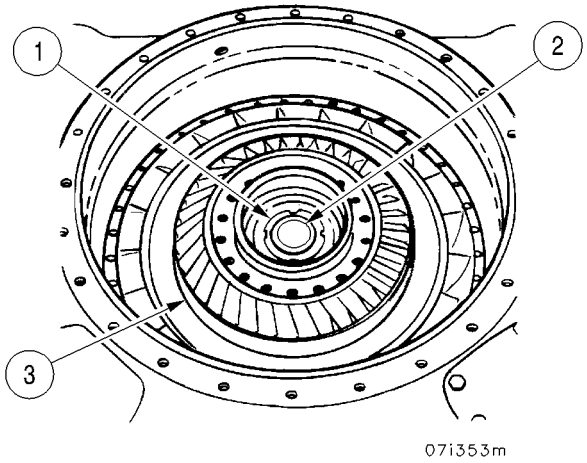
General mechanic's tool kit (item 1, WP 0088 00)
Wrench assembly (item 16, WP 0088 00)
Torque wrench (item 26, WP 0088 00)
Socket wrench set, 3/4-in. dr (item 24, WP 0088 00)

Equipment Conditions

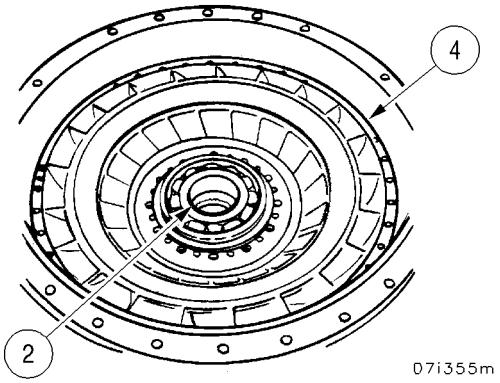
Torque converter shaft turbine assembly removed (WP 0067 00)

REMOVAL

1. Bend thin outer lip of nut (1) out of slots in ground sleeve (2). Remove nut (1) from ground sleeve (2). Lift stator assembly (3) off of ground sleeve (2).



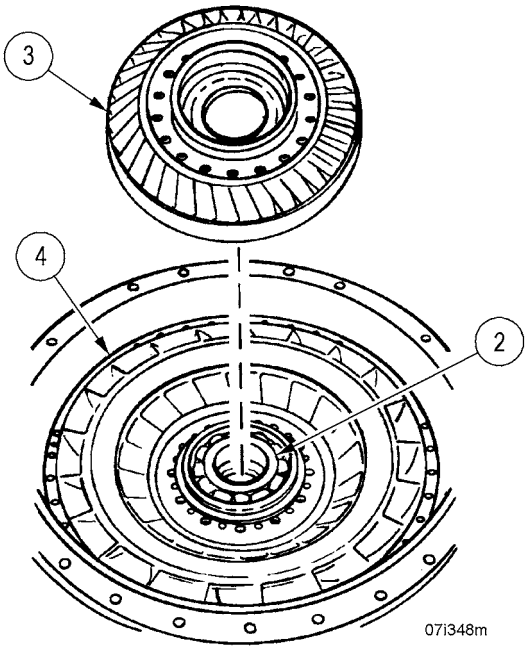
2. Remove torque converter pump assembly (4) from ground sleeve (2).

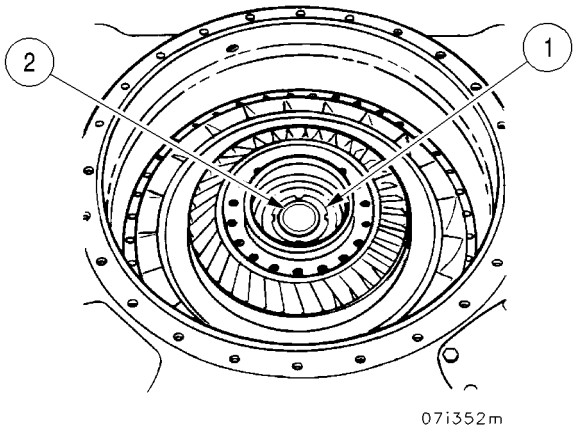


TORQUE CONVERTER PUMP ASSEMBLY REPLACEMENT – CONTINUED 0063 00

INSTALLATION

1. Install torque converter pump assembly (4) and stator assembly (3) on ground sleeve (2).
2. Install nut (1), flat side first, onto ground sleeve (2). Torque nut (1) to 300 lb-ft (406.8 N•m). Stake thin outer lip of nut (1) into two opposite grooves in ground sleeve (2).





NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter turbine shaft assembly (WP 0067 00)

END OF WORK PACKAGE

TORQUE CONVERTER AND RELATED PARTS REPAIR 0064 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Hammer (item 35, WP 0088 00)
Fixture (item 4, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)

Materials/Parts

Grease (item 4, WP 0085 00)
Retaining ring (item 73, WP 0087 00)

Material/Parts - continued

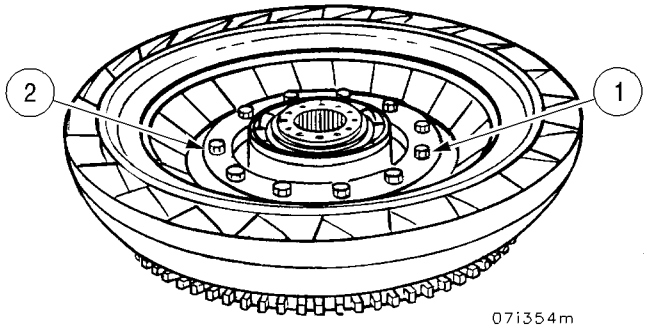
Retaining ring (item 18, WP 0087 00)
Retaining ring (item 15, WP 0087 00)
Screw (18) (item 58, WP 0087 00)
Self-locking bolt (11) (item 80, WP 0087 00)
Self-locking bolt (12) (item 103, WP 0087 00)

Equipment Conditions

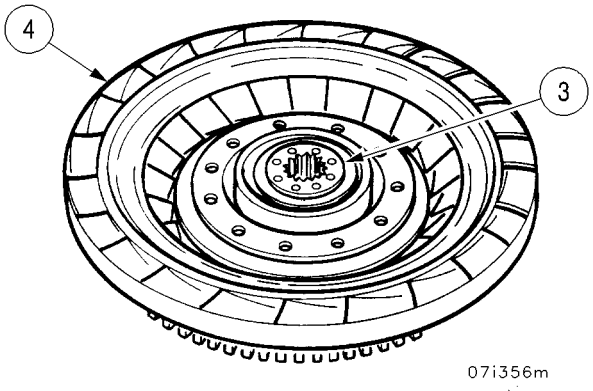
Torque converter housing assembly removed (WP 0061 00)

DISASSEMBLY

1. Remove 11 self-locking bolts (1) retaining turbine hub retainer (2). Discard self-locking bolts.



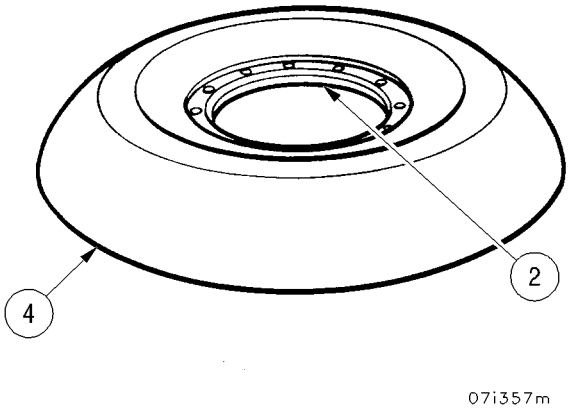
2. Using a soft-faced mallet, tap turbine hub (3) to dislodge it from turbine (4).



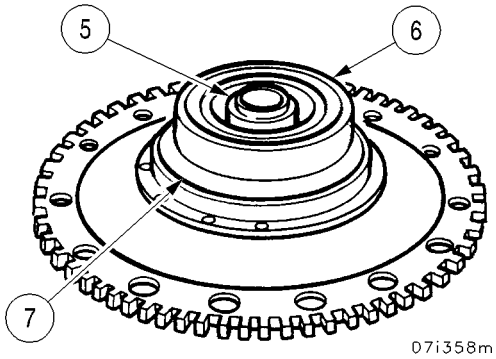
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

DISASSEMBLY – Continued

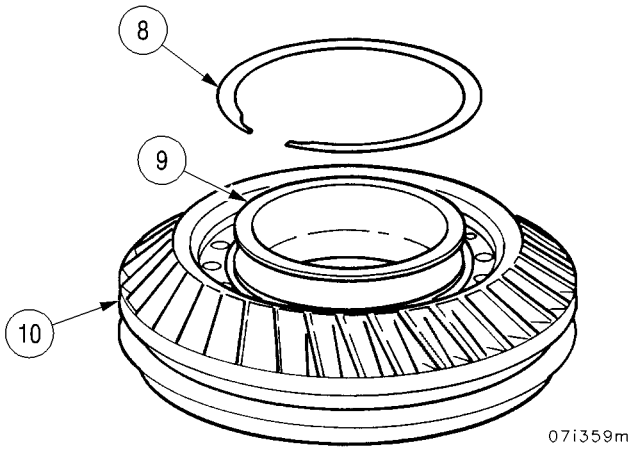
3. Drive turbine retainer (2) out of turbine (4) with soft metal drift.



4. Remove snap ring (5) and remove bearing (6). Remove internal snap ring (7). Discard snap rings.



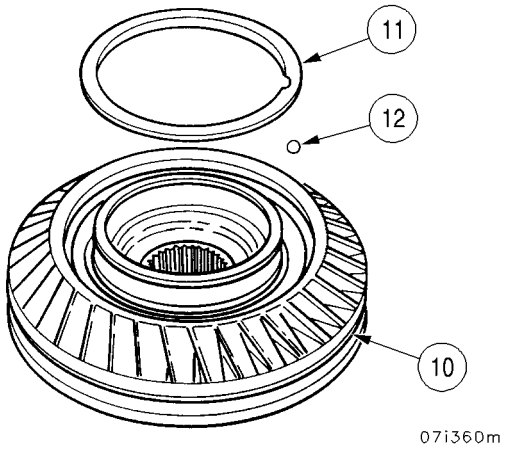
5. Remove notch-type, external snap ring (8) from cam roller race (9) on first stator assembly (10). Discard snap ring.



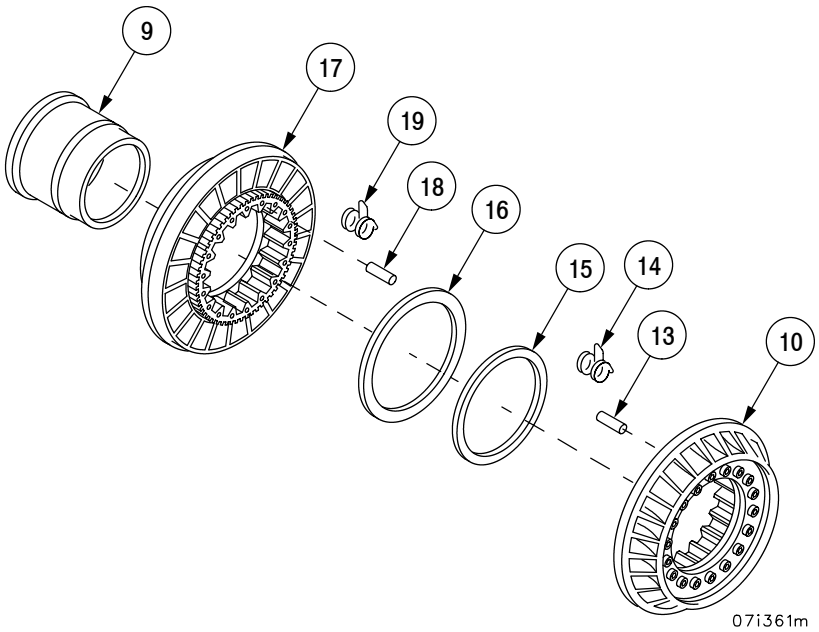
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

DISASSEMBLY – Continued

6. Remove stator thrust washer retainer (11) and lockball (12) from first stator assembly (10).



7. Lift first stator assembly (10) off cam roller race (9). Remove 18 rollers (13) and 18 springs (14).
8. Remove inner and outer thrust washers (15 and 16).
9. Remove second stator assembly (17) from cam race roller (9). Remove 18 rollers (18) and 18 springs (19).



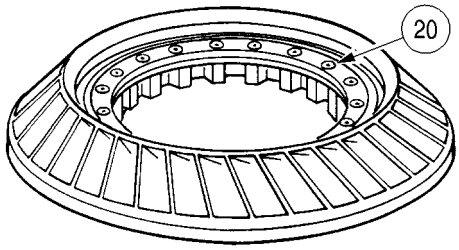
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

DISASSEMBLY – Continued

NOTE

Do not disassemble first or second stator assemblies further unless replacement of parts is necessary. If replacement is necessary, perform Steps 10 and 11. These procedures apply to both assemblies.

10. Remove 18 screws (20) from each stator assembly. Discard screws.



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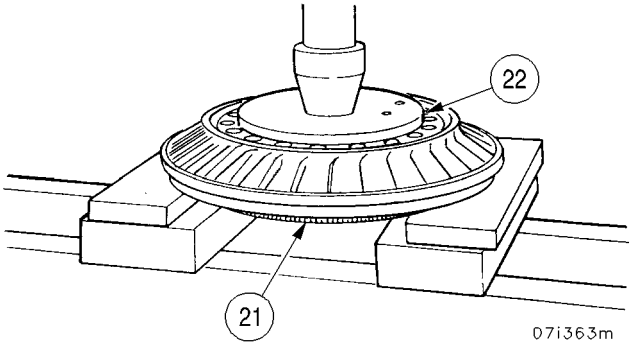
11. Press stator cam (21) and thrust washer (22) out toward flat side of stator. Use a round press tool which will clear bore of stator, but will seat on thrust washer.



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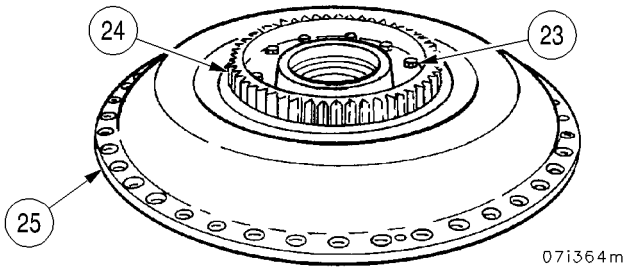
12. Remove 12 self-locking bolts (23) which retain accessory drive gear (24). Remove gear (24) from converter pump (25). Discard self-locking bolts.



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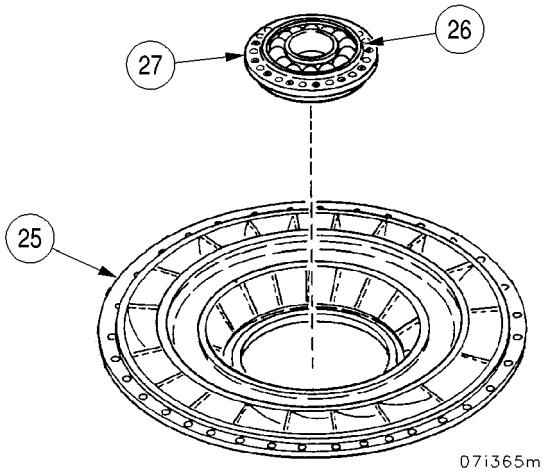
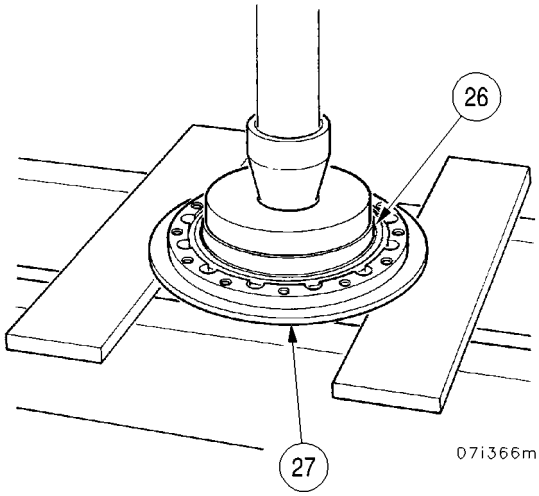
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

DISASSEMBLY – Continued

13. Tap pump bearing (26) and bearing support (27) out of converter pump (25).



14. Press pump bearing (26) out of bearing support (27).



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

FIT AND WEAR LIMITS

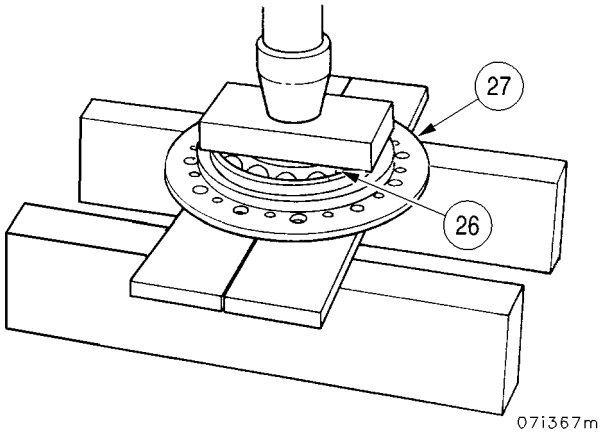
Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Ball bearing	Bearing ID Bearing fit on clutch drive hub Bearing OD Bearing fit in roller race	3.1490 to 3.1496 in. 0.0011T to 0.0001 in. 5.5110 to 5.5118 in. 0.0002T to 0.0016L
Stator thrust washer retainer	Thickness of retainer	0.2640 to 0.2670 in. Wear limit: 0.2620 in.
First stator thrust washer	Thickness of first stator thrust washer	0.0600 to 0.0620 in. Wear limit: 0.0590 in.
Stator cam roller	Roller OD	0.4998 to 0.5000 in. Wear limit: 0.4996 in.
First and second stator thrust washer (inner)	Thickness of inner washer	0.0500 to 0.0520 in. Wear limit: 0.0490 in.
First and second stator thrust washer (outer)	Thickness of outer washer	0.0600 to 0.0620 in. Wear limit: 0.0590 in.
Second stator thrust washer	Thickness of second stator washer	0.0600 to 0.0620 in. Wear limit: 0.0590 in.
Cam roller race	Roller race OD Front roller race ID	6.3740 to 6.3750 in. Wear limit: 6.3740 in. 5.5116 to 5.5126 in. Wear limit: 5.5131 in.
Pump bearing support	Support ID Bearing support fit	5.9055 to 5.9069 in. Wear limit: 5.9075 in. 0.0000T to 0.0022L
Ball bearing	Bearing OD Bearing fit in support Bearing ID Bearing fit in sleeve	5.9047 to 5.9055 in. 0.0000T to 0.0022L 2.7553 to 2.7559 in. 0.0001T to 0.0011L

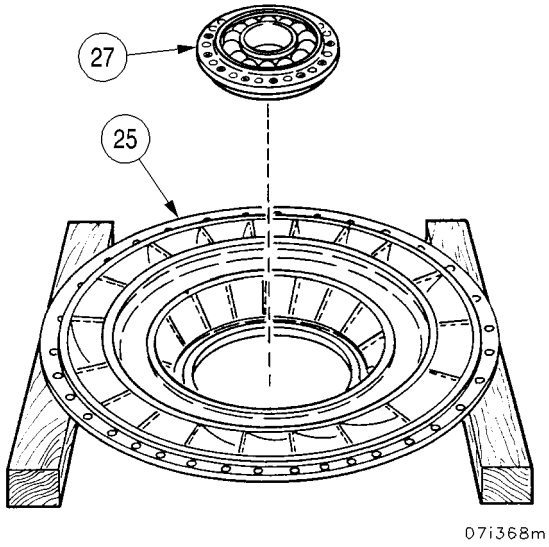
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY

1. Position pump bearing support, with large diameter shoulder up, on a press bed, with clearance for bearing OD shoulder to protrude. Position bearing (26) with OD step down, on support (27). Press bearing (26) into support (27) until OD step face rests on support bore shoulder.



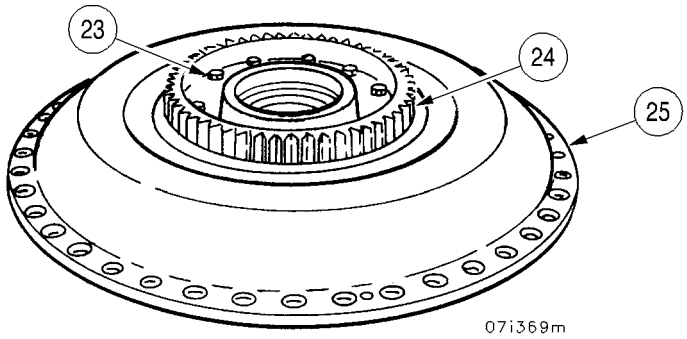
2. Position converter pump (25), vane side up, on a bench. Tap bearing support (27), large diameter shoulder down, into bore of pump (25). Use a soft mallet.



TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

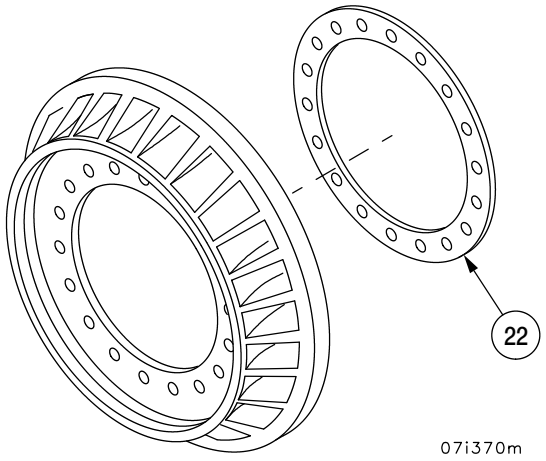
3. Turn pump (25) over. Install accessory drive gear (24). Boltholes in rear must align with holes in bearing support. Install 12 bolts (23). Torque 12 bolts (23) to 23 to 31 lb-ft (31.2 to 42 N•m).



NOTE

Stator cams are identical for both stator assemblies and are index-marked on both sides. Thrust washers are different; first stator washer is steel, while second stator washer is bronze and has three oil grooves on one side. The first stator has 37 vanes, while second stator has 27 vanes. Cavity into which stator cam fits is shallow in first stator and deeper in second stator. Procedures apply to both first and second stator assemblies.

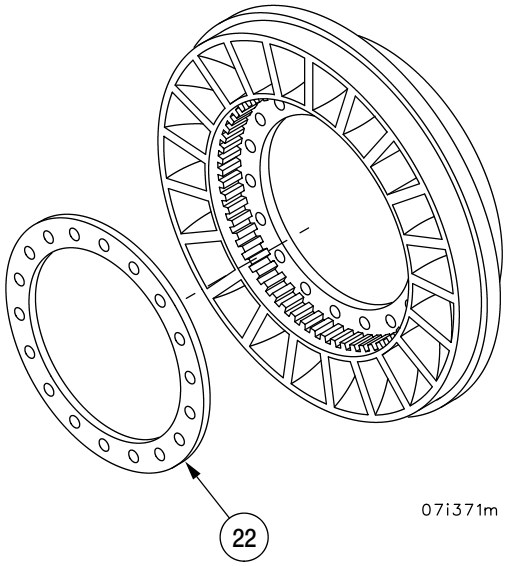
4. Install stator thrust washer (22) into stator. Align holes in thrust washer (22) with holes in stator.



TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

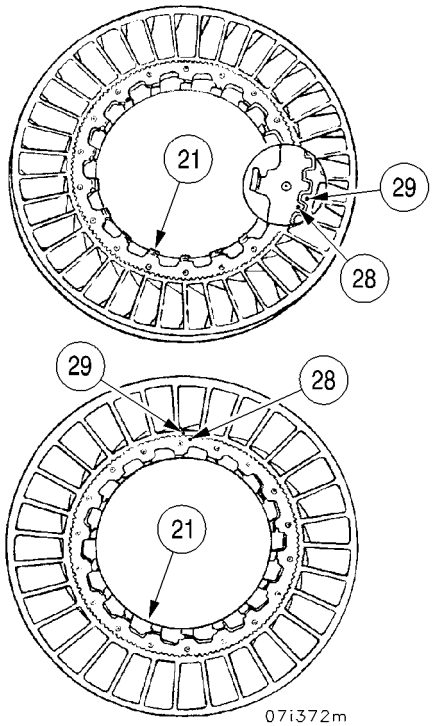
5. Install stator thrust washer (22), grooved side first, into stator. Align holes with those in stator.



NOTE

In the first-stator can, shallow end of the cam roller pockets is toward counterclockwise direction. In the second-stator cam, shallow end of cam roller pockets is toward clockwise direction (when viewed from flat side).

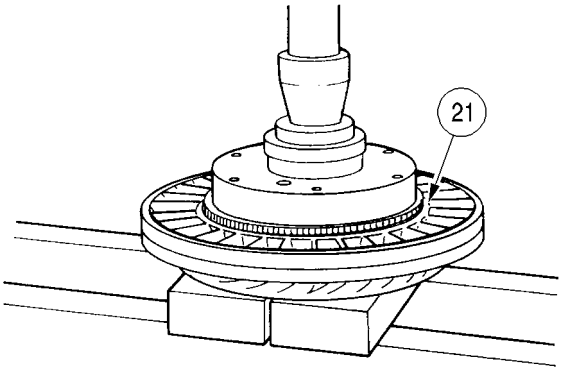
6. Install stator cam (21) into stator. Two index marks (28) on stator cams (21) fall between the single marks (29) on stators.



TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

7. Install stator cam (21) into stator until firmly seated against stator thrust washer.



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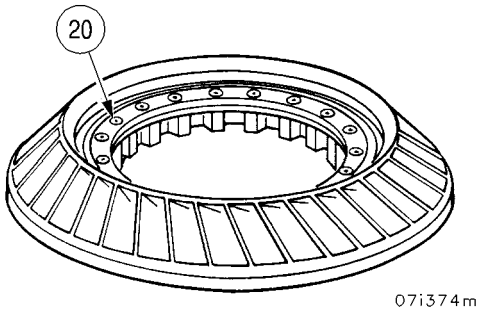
8. Install 18 new screws (20) into stator assembly. Torque 18 screws (20) to 10 to 13 lb-ft (13.6 to 17.6 N•m).



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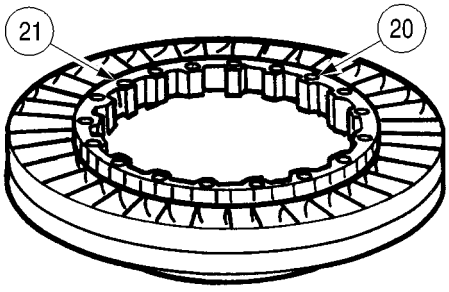
9. Flare hollow end of 18 screws (20) until they substantially fill counterbore in stator cam (21). Use either a ¼-inch steel ball and flat punch or a conical-point punch with an 80-degree included angle.



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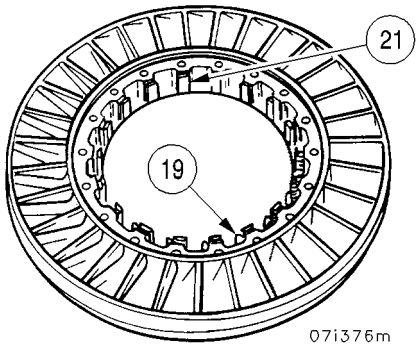
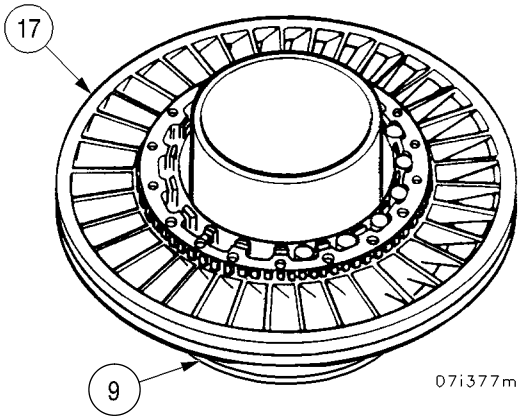
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

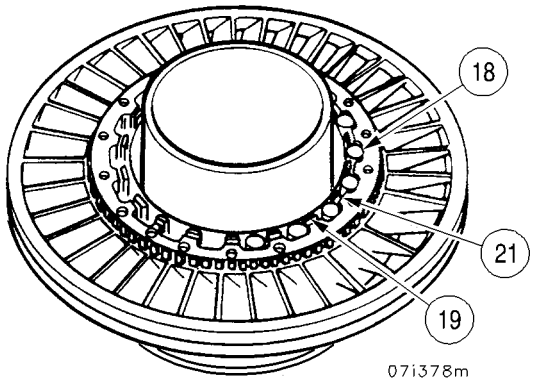
10. Install 18 springs (19) onto stator roller cam (21) of stator assembly.



11. Install second stator assembly (17), flat side up, onto cam roller race (9).



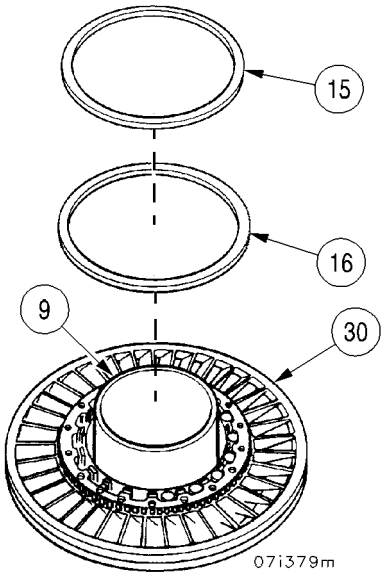
12. Hold 18 springs (19), loops outward toward deep end of roller pockets. Install 18 cam rollers (18) into second stator cam (21). Springs (19) should push rollers (18) toward shallow end of roller pockets.



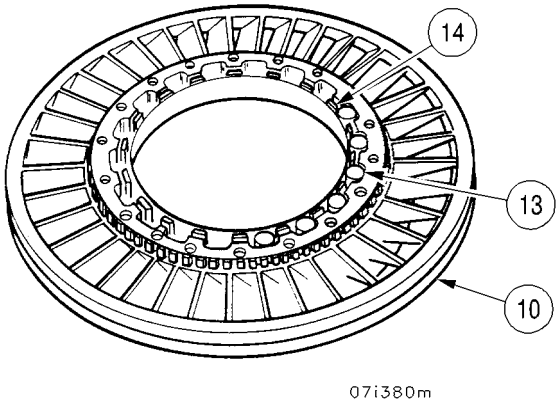
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

13. Install outer and inner thrust washers (15 and 16) on cam roller race (9). Thrust washers (15 and 16) should seat against second stator cam upper face (30).



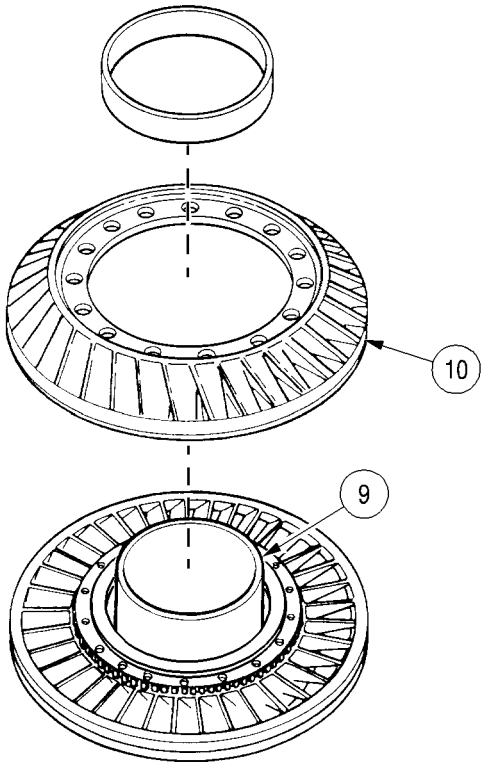
14. Install fixture into first stator assembly (10). Be careful not to disturb any of cam roller springs (14).
15. Hold loops of springs (14) out toward deep end of cam roller pockets. Install 18 rollers (13). Springs (14) should push rollers (13) to shallow end of roller pockets.



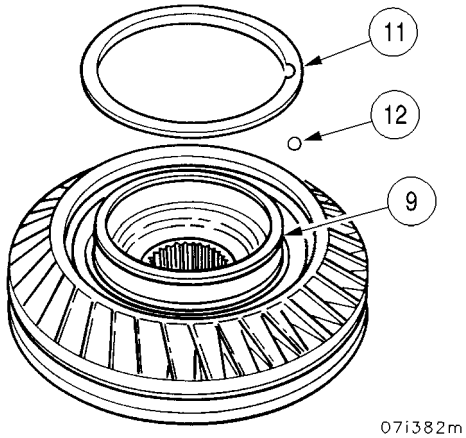
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

16. Turn first stator assembly (10) over carefully. Install assembly, flat side down, onto cam roller race (9). As the assembly slides onto race, fixture will be pushed out and can be removed.



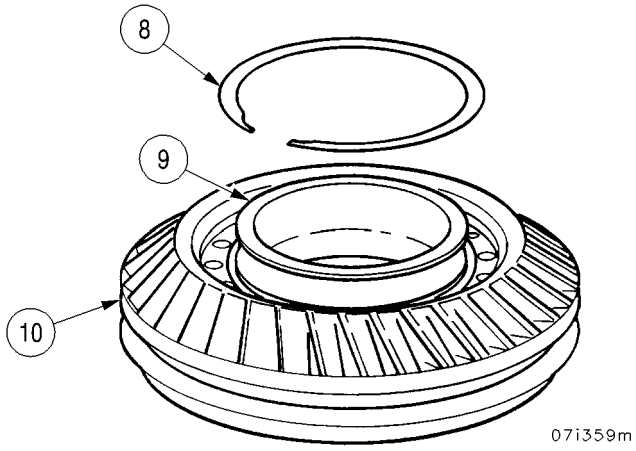
17. Install 3/16-inch lockball (12) into pocket on cam roller race (9). Retain lockball (12) with grease. Install thrust washer retainer (11). Align half-round notch on inner diameter with lockball (12). Side with 16 radial grooves fits down against first stator thrust washer.



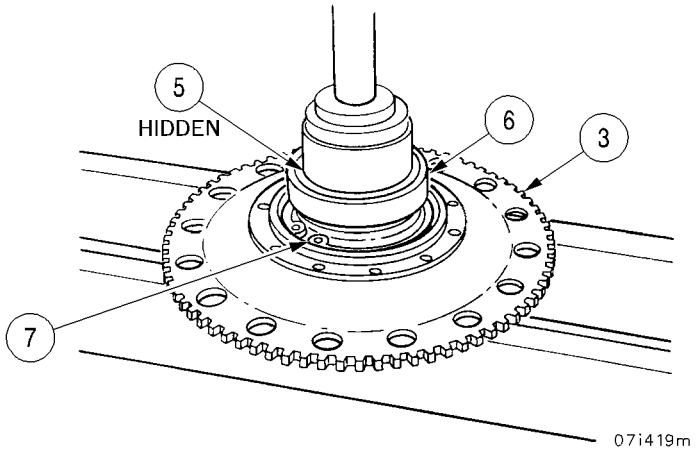
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

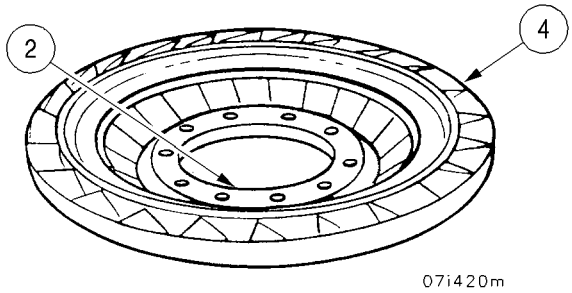
18. Wrap new external snap ring (8) into groove in cam roller race (9) on first stator assembly (10).



19. Position turbine hub (3) concave side down on press bed. Position new internal snap ring (7). Install turbine bearing (6) using a sleeve, between press arm and bearing inner race, seat bearing (6) against shoulder of turbine hub (3). Install new snap ring (5).



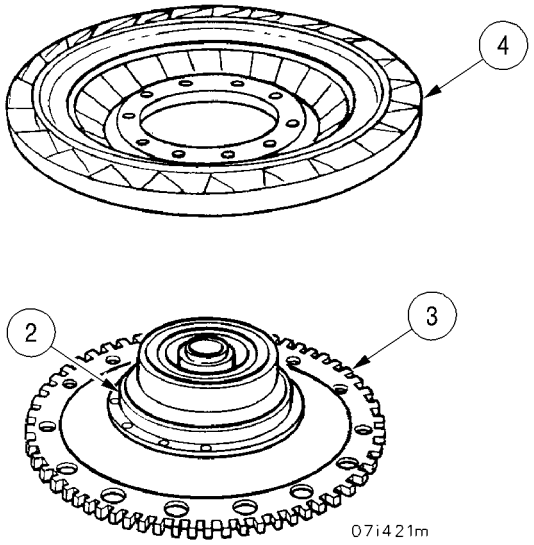
20. Install turbine hub retainer (2), shoulder side first, into turbine (4).



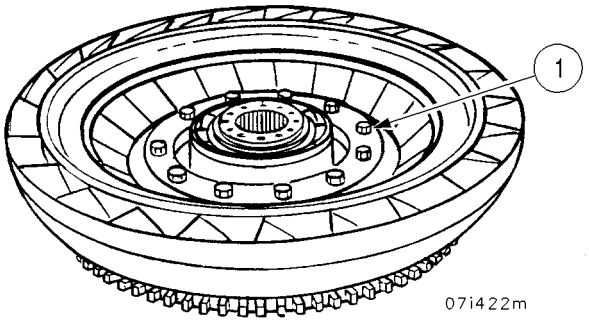
TORQUE CONVERTER AND RELATED PARTS REPAIR – CONTINUED 0064 00

ASSEMBLY – Continued

21. Position turbine hub (3) bearing up. Install turbine (4) vane side up. Align holes in turbine retainer (2) with holes in turbine hub (3).



22. Install 11 new self-locking bolts (1). Torque 11 self-locking bolts (1) alternately and evenly to 23 to 29 lb-ft (31.2 to 39.3 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter housing assembly
(WP 0061 00)

END OF WORK PACKAGE

INTERMEDIATE RANGE PLANETARY CARRIER ASSEMBLY REPLACEMENT 0065 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

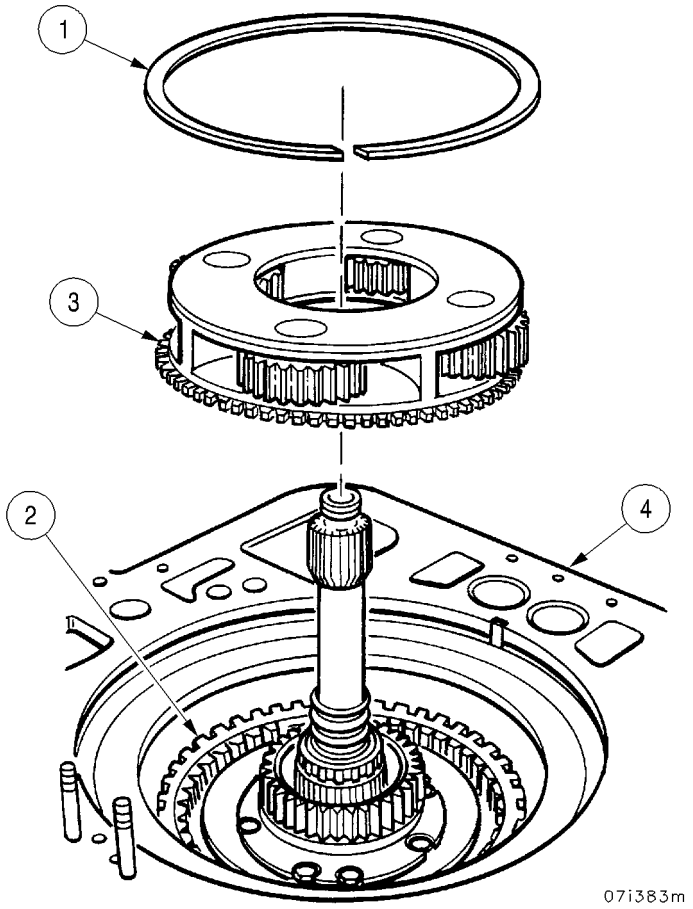
Snap ring (item 42, WP 0087 00)

Equipment Conditions

Torque converter high range clutch hub assembly removed (WP 0053 00)

REMOVAL

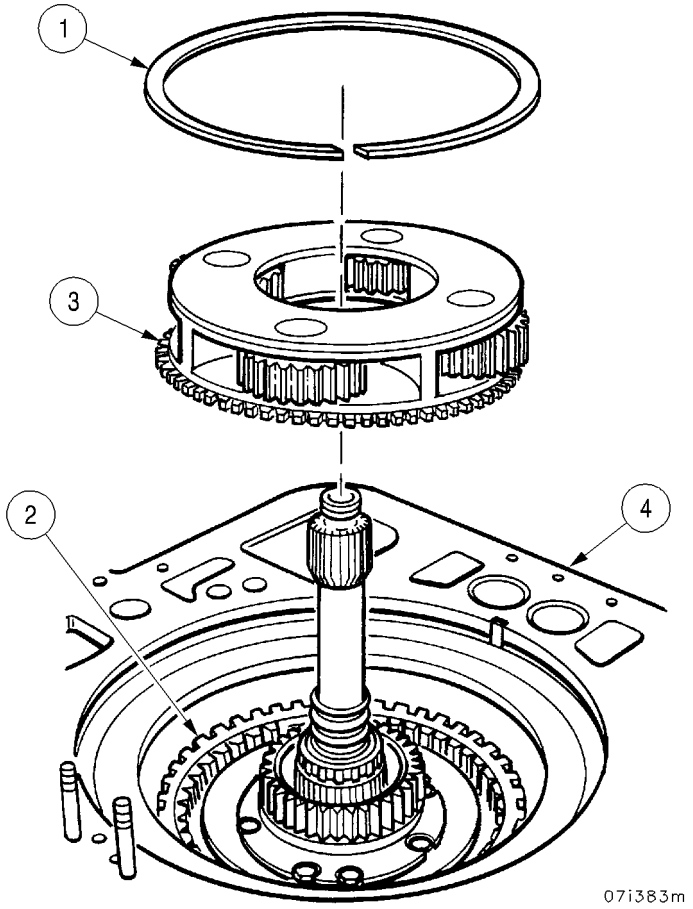
Remove snap ring (1) from groove in low range ring gear (2). Remove intermediate range planetary carrier assembly (3) from transmission housing assembly (4). Discard snap ring.



INTERMEDIATE RANGE PLANETARY CARRIER ASSEMBLY REPLACEMENT – CONTINUED 0065 00

INSTALLATION

1. Install intermediate range planetary carrier assembly (3) into transmission housing (4).
2. Install new snap ring (1) in groove in low range ring gear (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter high range clutch assembly (WP 0053 00)

END OF WORK PACKAGE

INTERMEDIATE RANGE PLANETARY CARRIER ASSEMBLY REPAIR 0066 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)

Materials/Parts

Technical petrolatum (item 9, WP 0085 00)

Equipment Conditions

Intermediate range planetary carrier assembly removed (WP 0065 00)

References

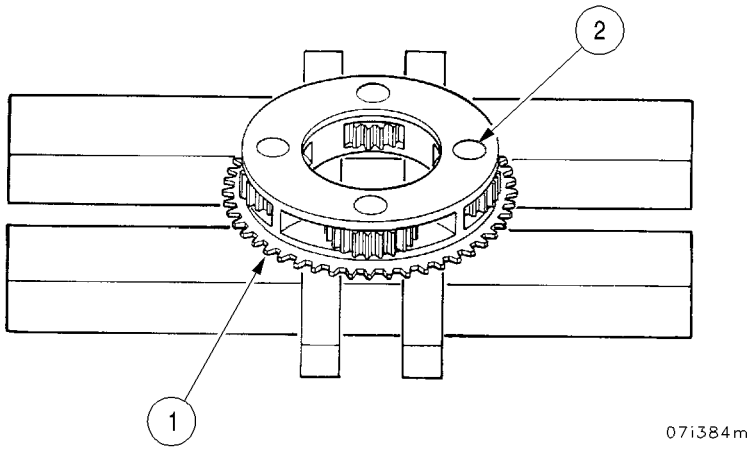
TM 9-2350-292-10

NOTE

Do not disassemble intermediate carrier assembly unless replacement is necessary.

DISASSEMBLY

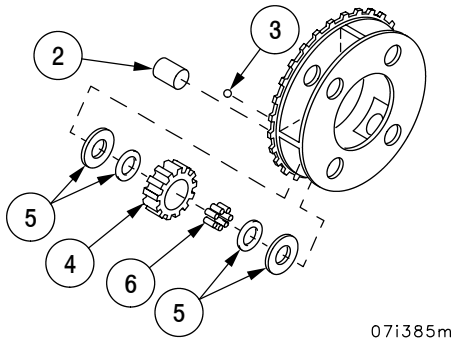
1. Place intermediate carrier assembly (1), splined flange down, in a press. Position support to allow clearance for removing four spindles (2).



NOTE

Be careful not to lose lock balls when pressing out spindles.

2. Press out four spindles (2) and lock ball (3). Remove pinion (4), thrust washers (5), and roller bearings (6).



INTERMEDIATE RANGE PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0066 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Thrust washer	Thickness of washer	0.0590 to 0.0620 in. Wear limit: 0.0550 in.
Intermediate range planetary pinion	Pinion ID	2.0142 to 2.0147 in. Wear limit: 2.0157 in.
	Fit of pinion and roller on spindle	0.0010T to 0.0024L
Spindle roller	Roller OD	0.2498 to 0.2500 in. Wear limit: 0.2493 in.
Planetary pinion spindle	Spindle OD at middle	1.5127 to 1.5132 in. Wear limit: 1.5117 in.

ASSEMBLY

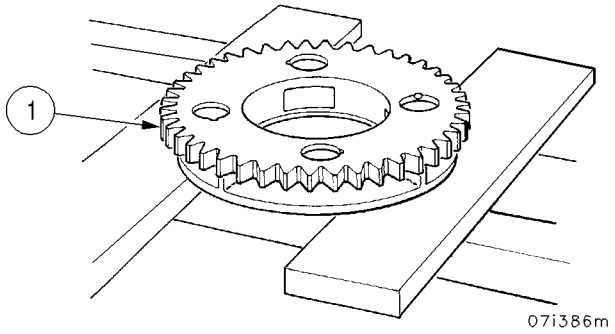
WARNING

Use tongs or gloves when handling chilled parts or dry ice to avoid injury.

NOTE

New spindles should be chilled in dry ice for at least one hour before installation.

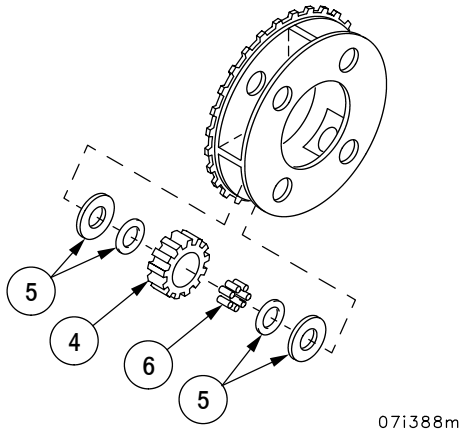
1. Position intermediate planetary carrier assembly (1), splined flange up, in press.



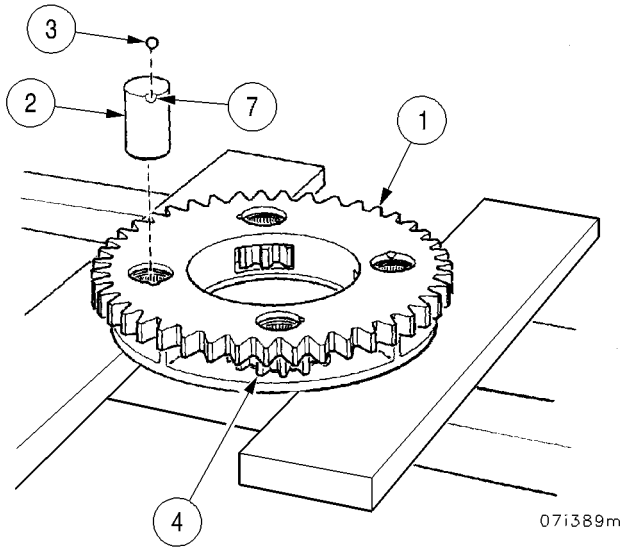
2. Coat bore of pinion (4) with oil soluble grease. Install 22 roller bearings (6) in bore of pinion (4), embedding roller bearings (6) in grease.

INTERMEDIATE RANGE PLANETARY CARRIER ASSEMBLY REPAIR – CONTINUED 0066 00

3. Install thrust washers (5) at each end of pinion (4). Retain thrust washers (5) with oil soluble grease.



4. Install assembled pinion (4) into intermediate range carrier assembly (1). Align parts carefully with spindle bore in carrier.
5. Position spindle (2), solid end up, so that lock ball pocket (7) is aligned directly over lock ball pocket in intermediate range carrier assembly (1). Press spindle (2) into intermediate range carrier assembly (1) until its lock ball pocket is near intermediate range carrier assembly lock ball pocket.
6. Insert lock ball (3) into spindle pocket (7). Press spindle (2) into intermediate range carrier assembly (1) until upper end is flush with carrier.
7. Repeat Steps 2 through 6 to assemble three remaining pinions, 66 rollers and 12 thrust washers.
8. Remove intermediate range carrier assembly (1) from press and stake carrier around solid end of spindles (2). Center punch ten or 12 points approximately 1/16 inch from spindles (2), or use a blunt tool to peen about 30 percent of the circumference of carrier bore against end of spindles (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install intermediate range planetary carrier assembly (WP 0065 00)

END OF WORK PACKAGE

TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPLACEMENT 0067 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)

Materials/Parts

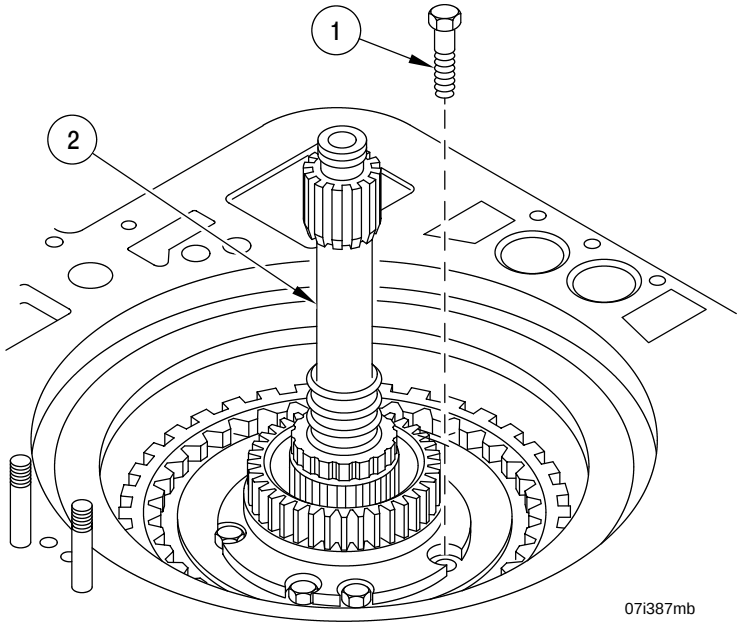
Self-locking bolt (8) (item 82, WP 0087 00)

Equipment Conditions

Intermediate range planetary carrier assembly removed (WP 0065 00)

REMOVAL

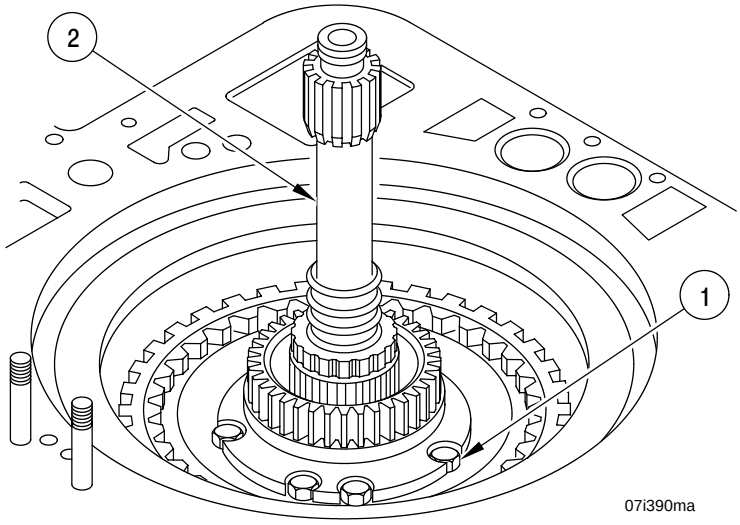
1. Remove eight self-locking bolts (1) from torque converter turbine shaft assembly (2). Discard self-locking bolts.
2. Remove torque converter turbine shaft assembly (2) and parts attached as a unit.



TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPLACEMENT – CONTINUED 0067 00

INSTALLATION

1. Use a 3/4–16 eyebolt to install converter turbine shaft assembly (2). Proceed carefully, rotating converter turbine shaft assembly (2) while lowering.
2. Install eight bolts (1) into converter turbine shaft assembly (2).



NOTE

FOLLOW–ON MAINTENANCE:
Install intermediate range planetary carrier assembly (WP 0065 00)

END OF WORK PACKAGE

TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR 0068 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)
Arbor press (item 20, WP 0088 00)

Materials/Parts

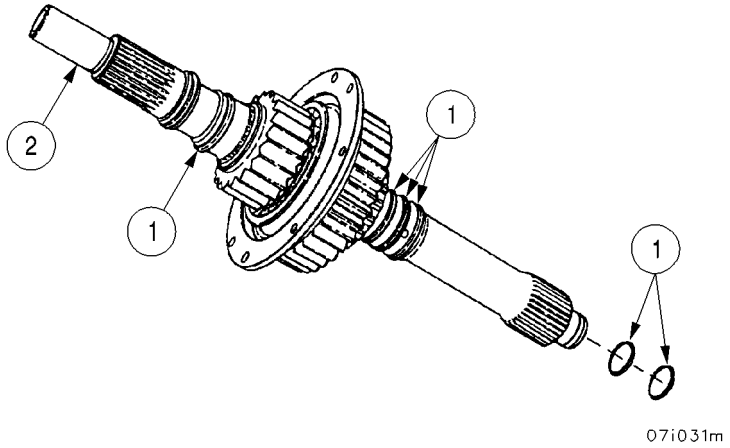
Seal ring (6) (item 30, WP 0087 00)
Retaining ring (2) (item 42, WP 0087 00)

Equipment Conditions

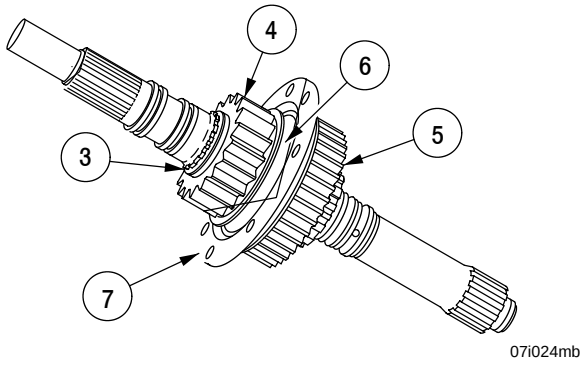
Torque converter turbine shaft assembly removed (WP 0067 00)

DISASSEMBLY

1. Remove torque converter turbine shaft assembly (2) and parts attached as a unit. Remove six hook type seal rings (1) from grooves in torque converter turbine shaft (2). Discard seal rings.



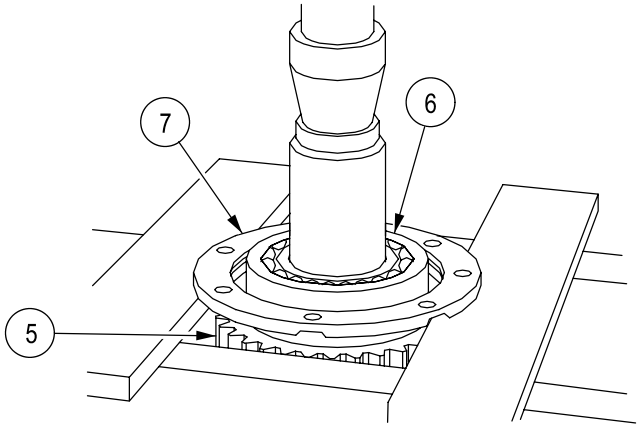
2. Remove snap ring (3) and low range sun gear (4). Discard snap ring.
3. Remove intermediate range sun gear (5), ball bearing (6) and bearing retainer (7) as a unit.



TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

DISASSEMBLY – Continued

4. Support bearing retainer (7) and press intermidiate range sun gear (5) out of ball bearing (6) and retainer (7). Remove ball bearing (6) from retainer (7).



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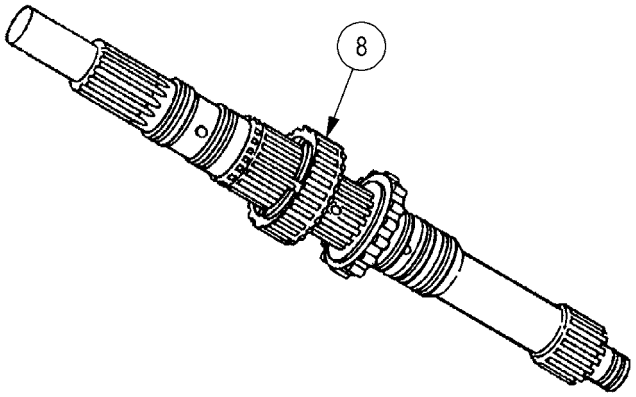
5. Remove high range clutch hub support (8).



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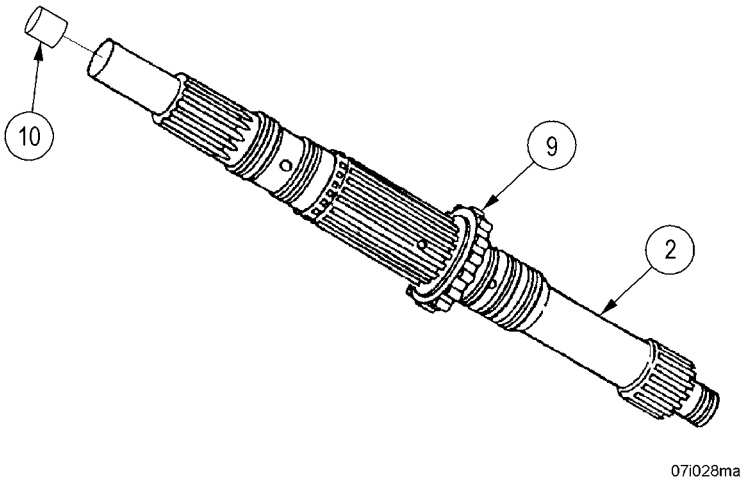
TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

DISASSEMBLY – Continued

NOTE

Do not remove snap ring unless replacement is necessary.

6. Support inner race of roller bearing (9). Press torque conveyer turbine shaft (2) out of roller bearing race (9).
7. Remove pin (10) from torque converter turbine shaft (2).



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Ball bearing	Bearing OD Bearing fit in carrier and retainer Bearing ID Bearing fit on gear	4.9203 to 4.9213 in. 0.0002T to 0.0018L 2.7553 to 2.7559 in. 0.0011T to 0.0001L
Bearing retainer	Retainer ID	4.9211 to 4.9221 in. Wear limit: 4.9224 in.
Bearing inner race	Bearing ID Roller assembly OD Roller assembly fit in outer race	2.1648 to 2.1654 in. 3.4627 to 3.4631 in. 0.0020L to 0.0030L
Intermediate range planetary sun gear	Gear hub bearing surface ID Bearing fit on gear	2.7558 to 2.7564 in. Wear limit: 2.7555 in. 0.0011T to 0.0001L
Bearing inner race	Bearing ID Bearing fit on shaft Roller assembly OD Bearing outer race ID Bearing outer race OD Bearing fit on sleeve	2.1648 to 2.1654 in. 0.0006T to 0.0018T 2.4627 to 3.4631 in. 3.4651 to 3.4657 in. 3.9364 to 3.9370 in. 0.0018T to 0.0000L
Turbine shaft	Diameter of bearing mounting surface on shaft Bearing fit on shaft	2.1660 to 2.1666 in. Wear limit: 2.1657 in. 0.0006T to 0.0018T

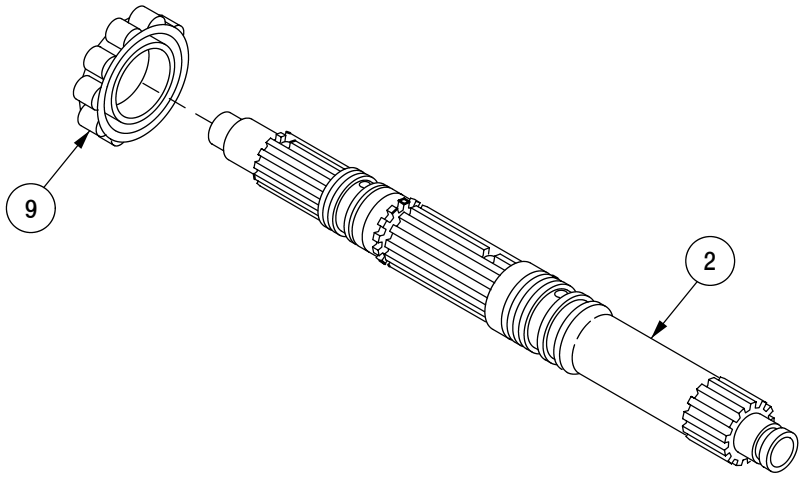
TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

ASSEMBLY

NOTE

Install new snap ring if removed for maintenance purposes.

1. Support roller (9) inner race, numbered side down, in press. Insert torque converter turbine shaft (2) rear (ungloved) end down, into bearing race (9). Press torque converter turbine shaft (2) into roller bearing race (9) until seated against snap ring.



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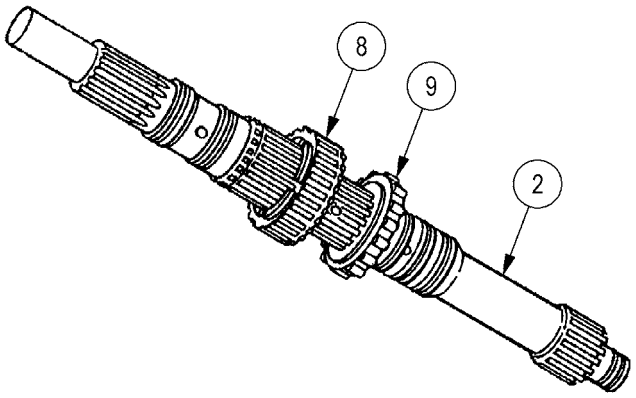
2. Remove torque converter turbine shaft (2) from press. Install high range clutch hub support (8) with external snap ring groove toward roller bearing race (9).

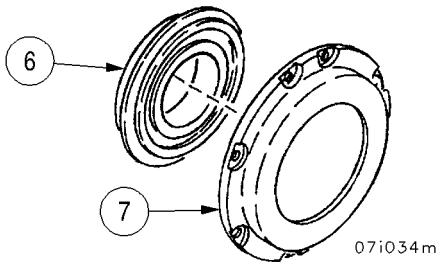


07i026mc

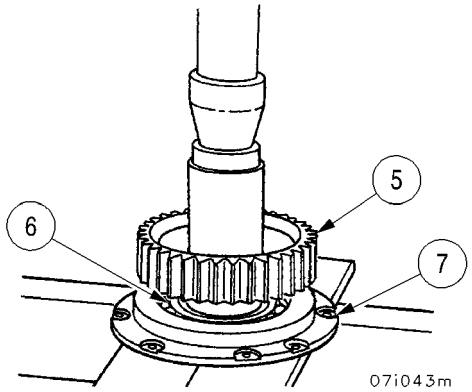
TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

ASSEMBLY – Continued

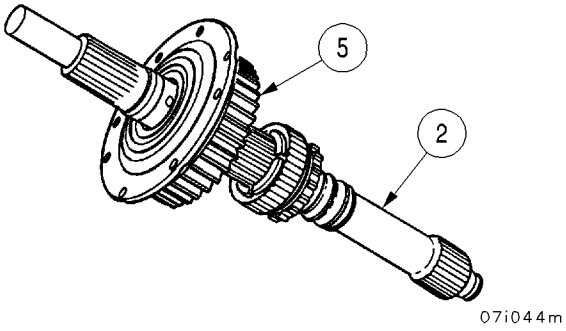
3. Position ball bearing (6), snap ring side down into retainer (7).



4. Turn ball bearing (6) and retainer (7) over. Place ball bearing (6) and retainer (7) on flat press support in press. Press intermediate range sun gear (5) onto ball bearing (6).



5. Install intermediate range sun gear (5) onto torque converter turbine shaft (2).



TORQUE CONVERTER TURBINE SHAFT ASSEMBLY REPAIR – CONTINUED 0068 00

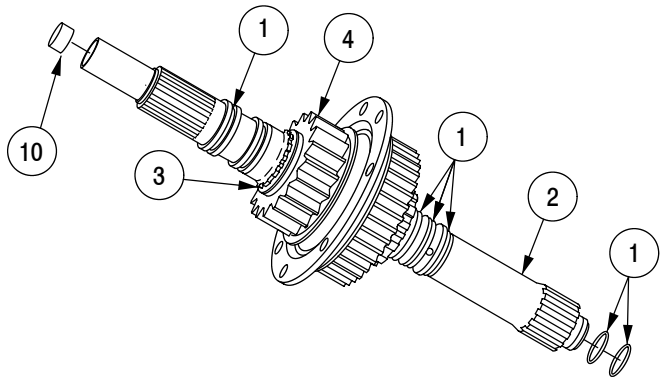
ASSEMBLY – Continued

6. Install low range sun gear (4), short hub end first, onto torque converter turbine shaft (2). Install new snap ring (3).

NOTE

The three seal rings near center of torque converter turbine shaft are slightly larger in diameter than the two toward the rear (ungrooved) end of shaft.

7. Install six new hook type seal rings (1) into grooves on torque converter turbine shaft assembly (2).
8. Press pin (10) into torque converter turbine shaft assembly (2) to a depth of 0.26 inches.



07i045ma

NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter turbine shaft assembly (WP 0067 00)

END OF WORK PACKAGE

REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT 0069 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

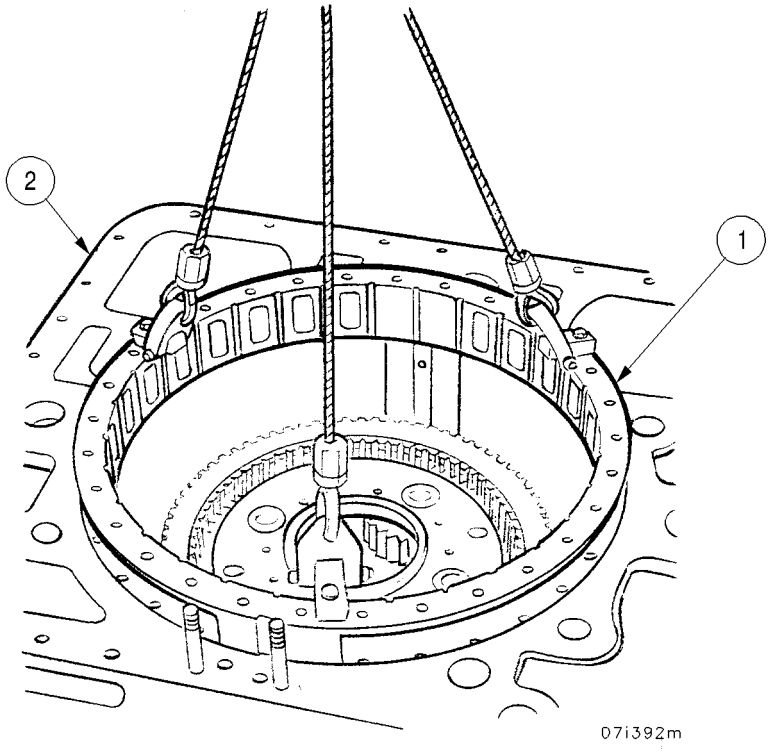
General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (3000 lb capacity min)

Equipment Conditions

Low range clutch anchor and clutch plates removed (WP 0071 00)

REMOVAL

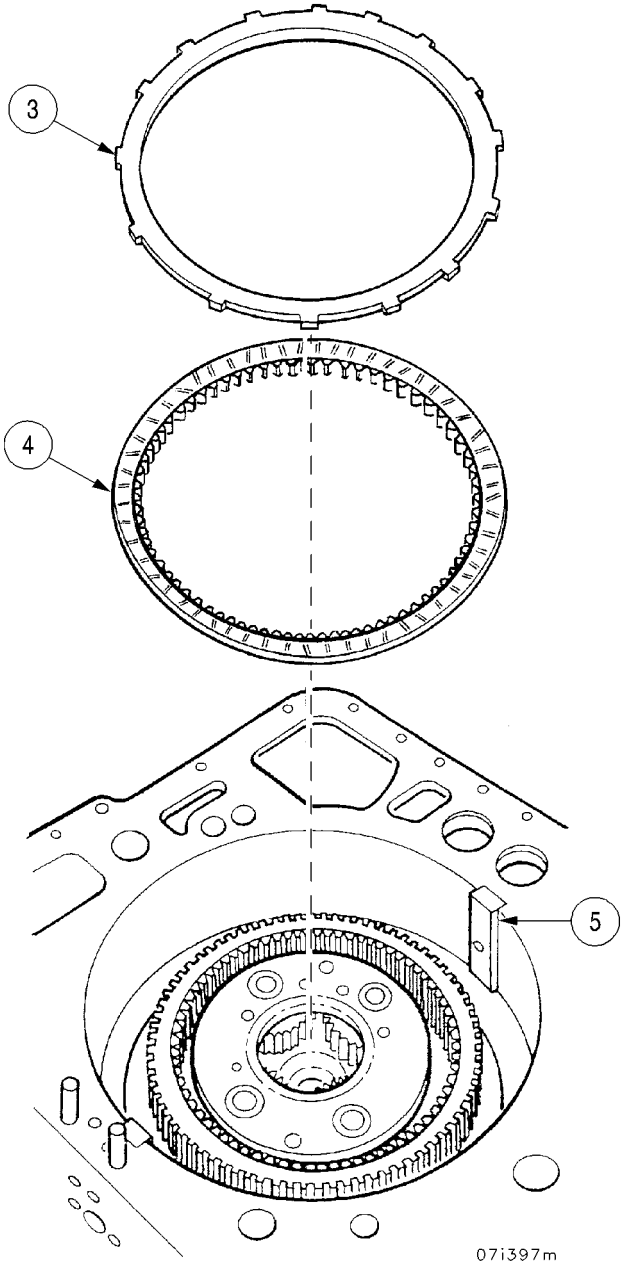
1. Attach lifting sling to reverse clutch anchor (1) and suitable lifting device.
2. Remove reverse clutch anchor (1) from transmission housing (2).



REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT – CONTINUED 0069 00

REMOVAL – Continued

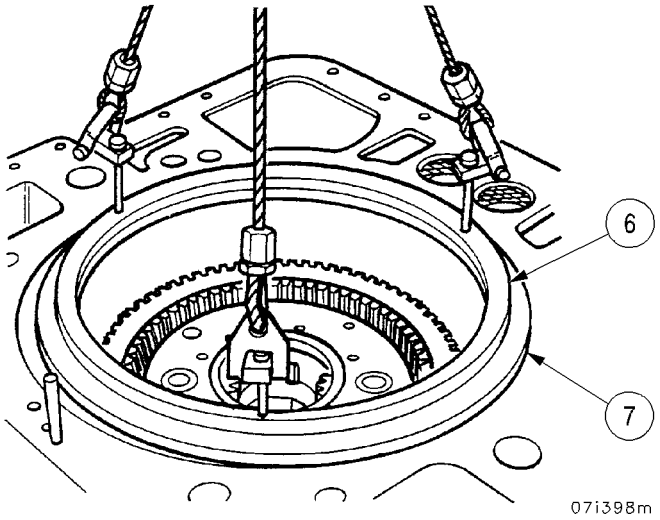
3. Remove eight externally splined clutch plates (3), seven internally splined clutch plates (4), and two anchor keys (5).



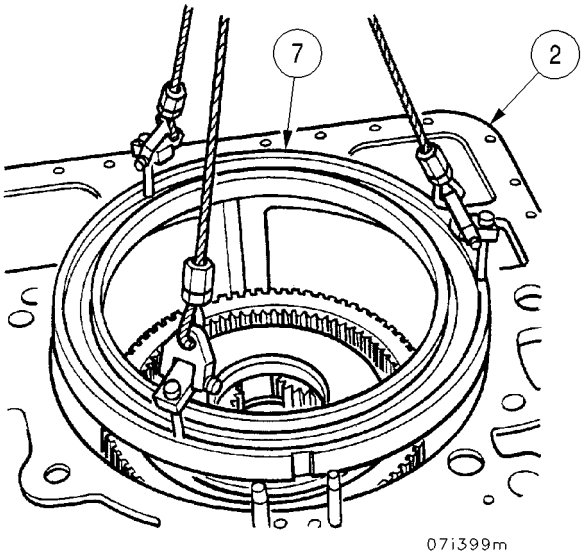
REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT – CONTINUED 0069 00

REMOVAL – Continued

4. Attach lifting sling and a suitable lifting device to reverse range piston (6).
5. Remove reverse range piston (6) from reverse range piston housing (7).



6. Attach lifting sling to reverse range clutch piston housing (7) and a suitable lifting device.
7. Remove reverse clutch piston housing (7) from transmission housing (2).



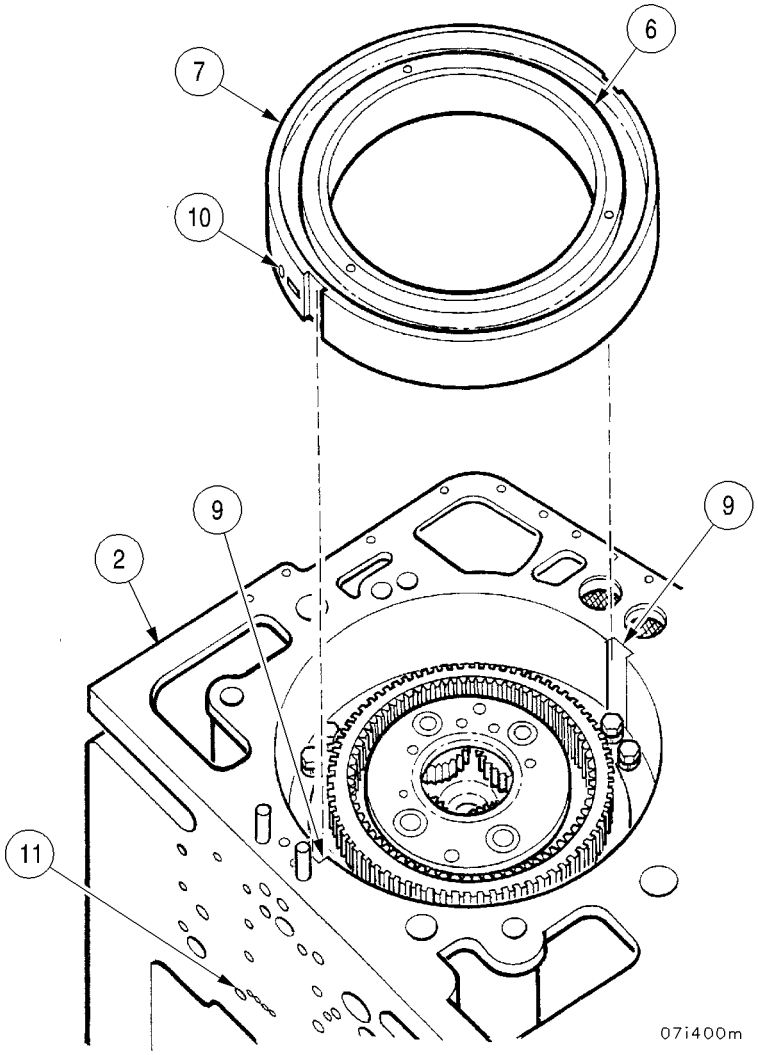
REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT – CONTINUED 0069 00

INSTALLATION

NOTE

Three threaded holes must face up when installing reverse range clutch piston.

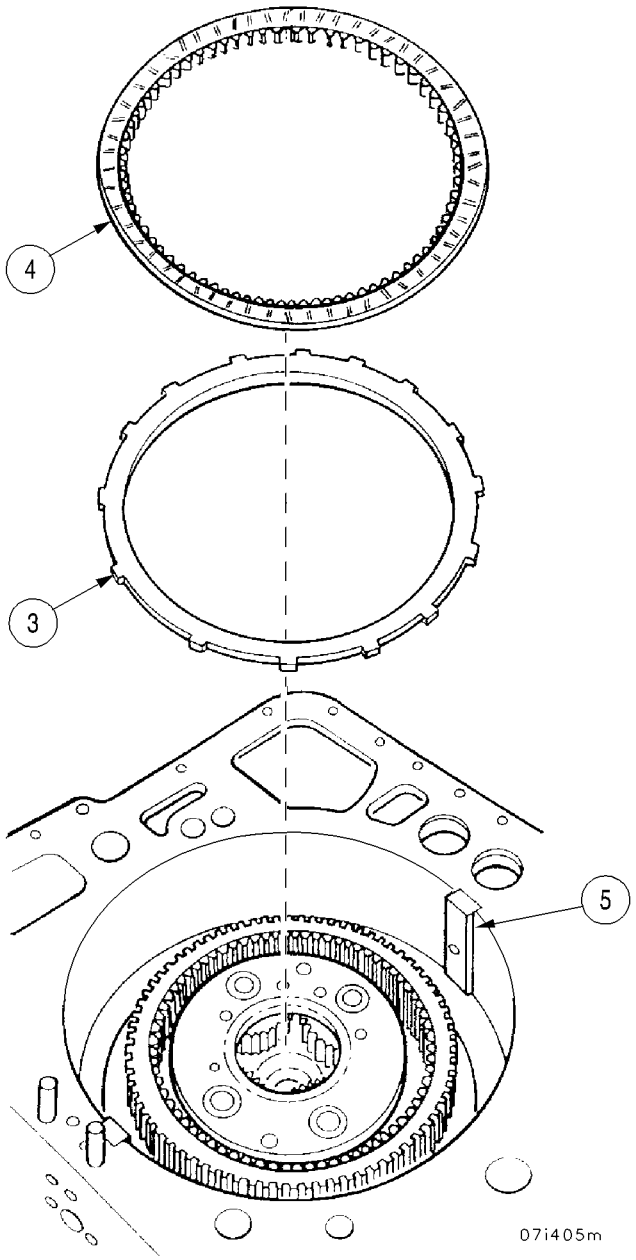
1. Install reverse range clutch piston (6) and reverse range clutch piston housing (7) as an assembly into transmission housing (2). Slots in reverse range clutch piston housing (7) must align with anchor key slots (9) and hole (10) must align with hole (11).



REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT – CONTINUED 0069 00

INSTALLATION – Continued

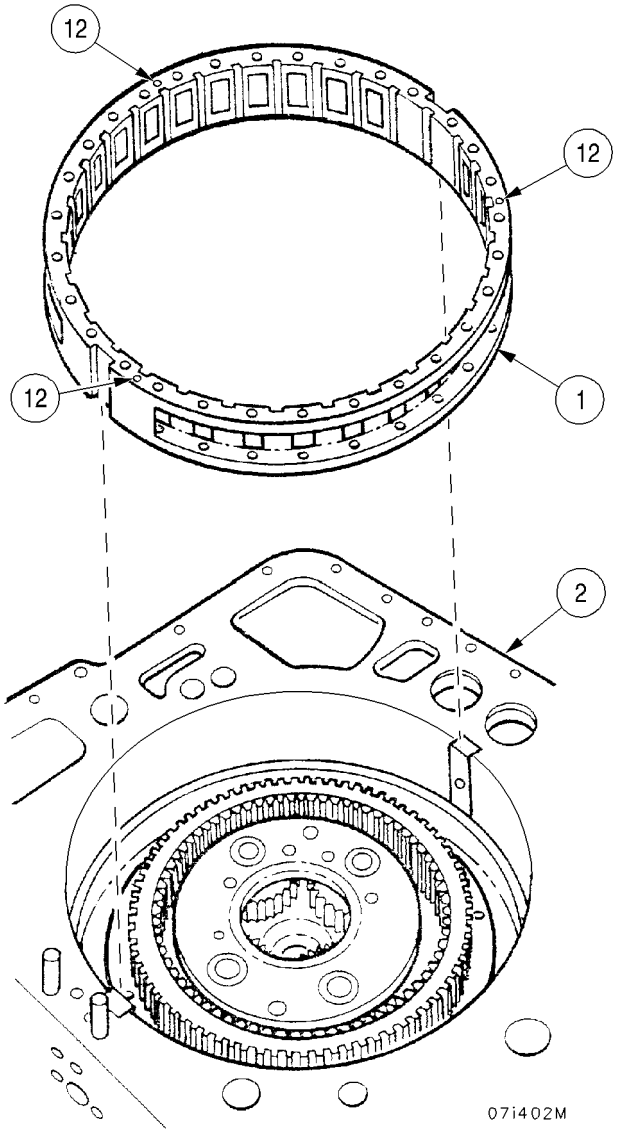
2. Install seven internally splined clutch plates (4), eight externally splined clutch plates (3) and two anchor keys (5).



REVERSE CLUTCH ANCHOR, HOUSING, AND PISTON REPLACEMENT – CONTINUED 0069 00

INSTALLATION – Continued

3. Install reverse range clutch anchor (1) into transmission housing (2) with holes (12) facing up.



NOTE

FOLLOW-ON MAINTENANCE:
Install low range clutch anchor and related parts (WP 0071 00)

END OF WORK PACKAGE

RANGE CLUTCH PISTONS AND PISTON HOUSINGS REPAIR 0070 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)
Arbor press (item 20, WP 0088 00)

Materials/Parts

Grease (item 4, WP 0085 00)
Preformed packing (2) (item 70, WP 0087 00)
Preformed packing (2) (item 68, WP 0087 00)
Preformed packing (item 65, WP 0087 00)
Preformed packing (item 64, WP 0087 00)

Equipment Conditions

Low and intermediate range clutch housing removed (WP 0071 00)
Reverse range clutch housing removed (WP 0069 00)

References

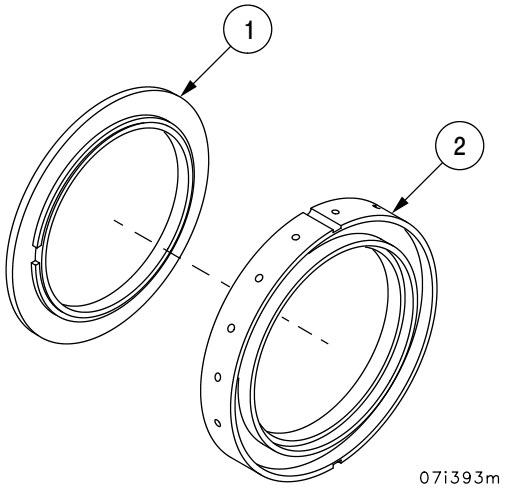
TM 9-2350-292-10

NOTE

The low, intermediate and reverse clutch pistons are identical, pay attention to location during removal to aid in installation.

DISASSEMBLY

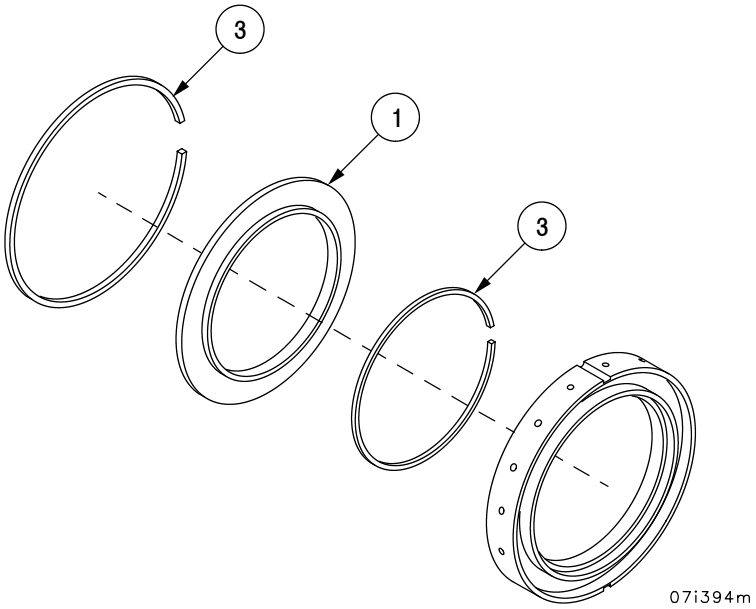
1. Remove intermediate, low and reverse range pistons (1) from piston housings (2) by bumping piston housings (2) piston side down on a wooden surface or on assembly table.



RANGE CLUTCH PISTONS AND PISTON HOUSINGS REPAIR – CONTINUED 0070 00

DISASSEMBLY – Continued

2. Remove six preformed packings (3) from grooves in piston (1). Discard preformed packings.



CLEANING

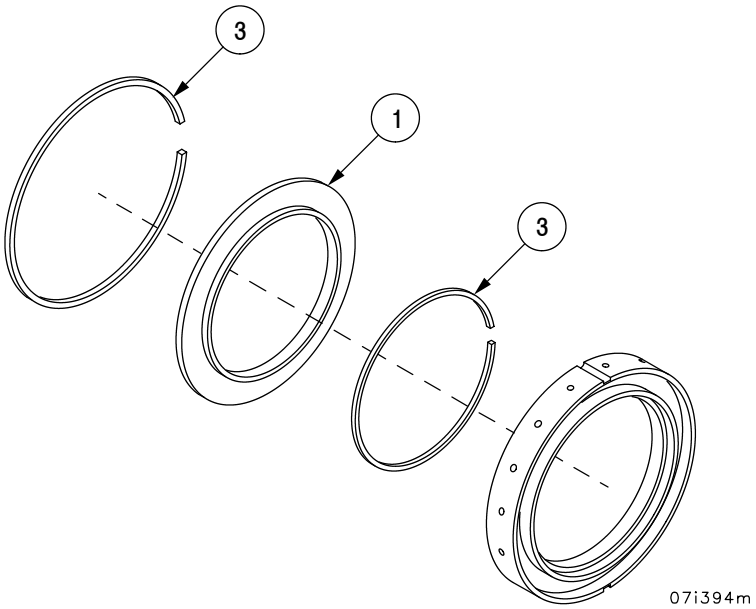
See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

ASSEMBLY

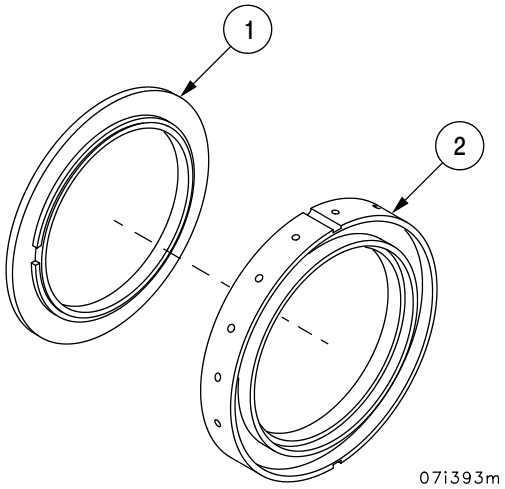
1. Lubricate six new preformed packings (3) and install into grooves in piston (1).



RANGE CLUTCH PISTONS AND PISTON HOUSINGS REPAIR – CONTINUED 0070 00

ASSEMBLY - Continued

2. Install three pistons (1), flat side first, into piston housings (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install low and intermediate range clutch housing (WP 0071 00)
Install reverse range clutch housing (WP 0069 00)

END OF WORK PACKAGE

LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPLACEMENT 0071 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

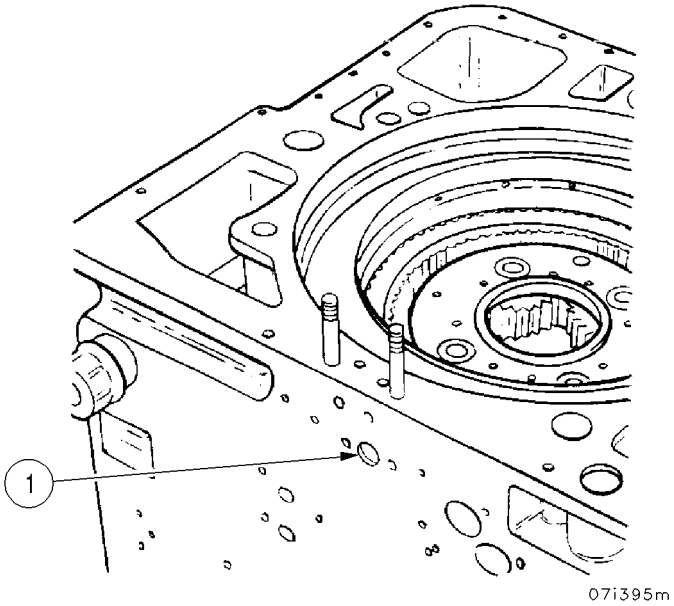
General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)

Equipment Conditions

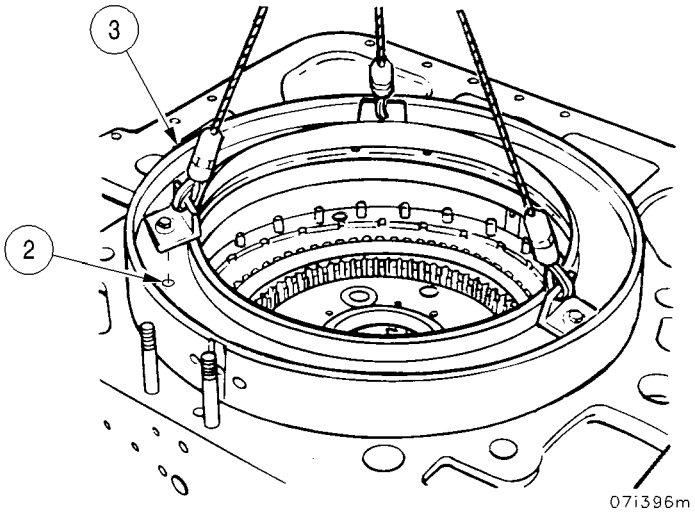
Intermediate range clutch housing removed (WP 0069 00)

REMOVAL

1. Remove anchor bolt (1) located at control valve body mounting surface of transmission housing.



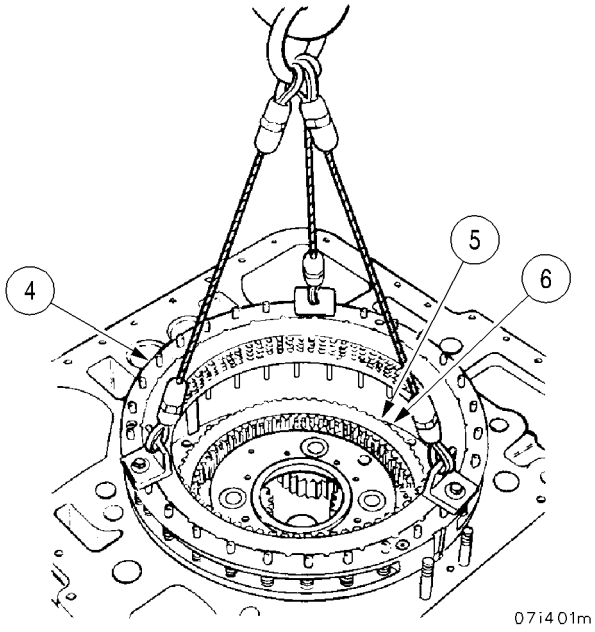
2. Attach sling at lifting holes (2) and a suitable lifting device. Remove piston housing (3).



LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPLACEMENT – CONTINUED 0071 00

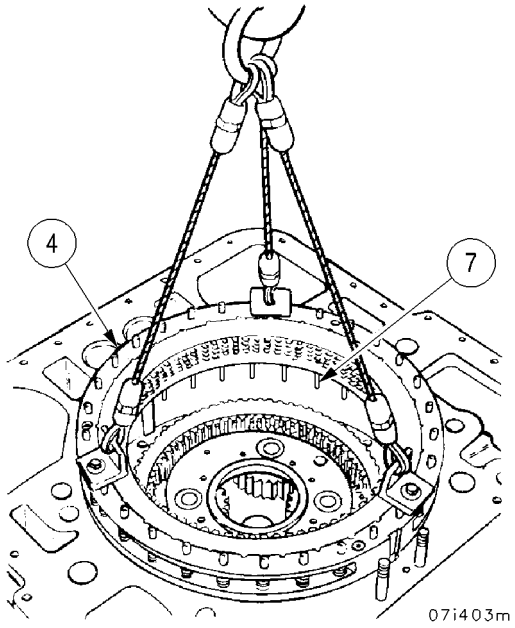
REMOVAL – Continued

3. Attach sling to low range clutch anchor (4). Remove low range clutch anchor (4) and attached parts, and 11 clutch plates (5 and 6) from transmission as a unit. Remove six externally splined steel plates (5) and five internally splined plates (6) from low range clutch anchor (4).



INSTALLATION

1. Attach sling to low range clutch anchor (4) and a suitable lifting device. Install low range clutch anchor (4) in transmission with long ends of pins (7) entering in holes in reverse clutch anchor.



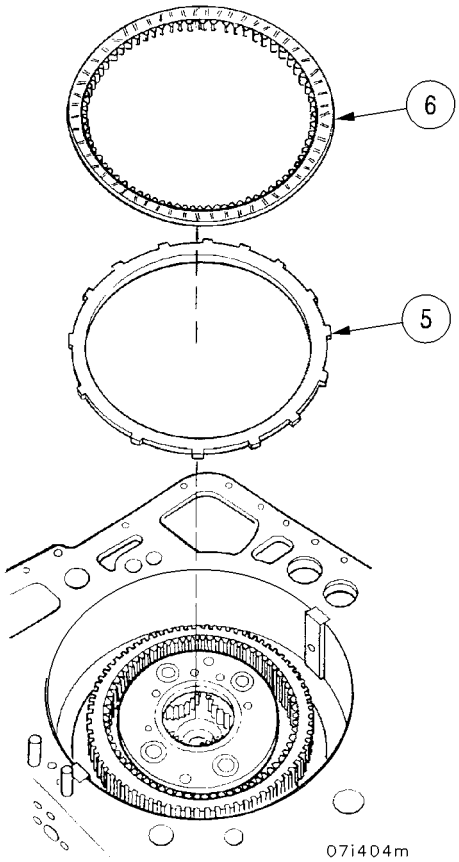
LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPLACEMENT – CONTINUED 0071 00

INSTALLATION – Continued

NOTE

Piston housing and bolt will be installed when intermediate clutch housing is installed.

2. Beginning with externally splined steel plates (5), alternately install six externally splined steel plates (5) and five internally splined plates (6).



NOTE

FOLLOW-ON MAINTENANCE:
Install intermediate range clutch housing
(WP 0069 00)

END OF WORK PACKAGE

LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPAIR 0072 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
C-clamp (2) (item 32, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

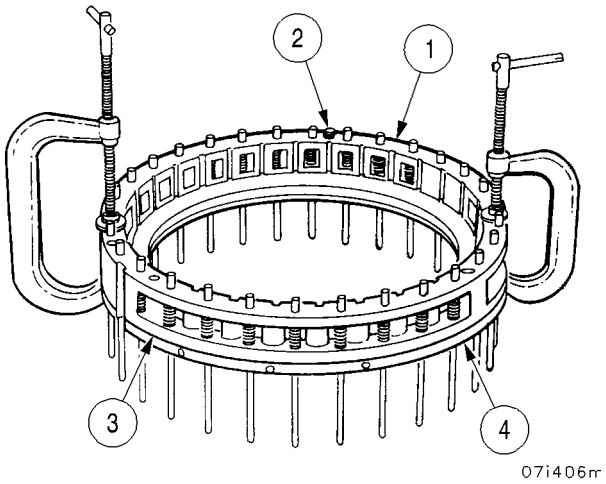
Lumber (item 6, WP 0085 00)
Retaining ring (60) (item 25, WP 0087 00)

Equipment Conditions

Low range clutch housing removed (WP 0071 00)

DISASSEMBLY

1. Clamp the low range clutch anchor assembly (1). Remove three screws (2) from low range clutch anchor (3) and low and reverse range clutch backplate (4).
2. Loosen both clamps at the same time and remove clamps.

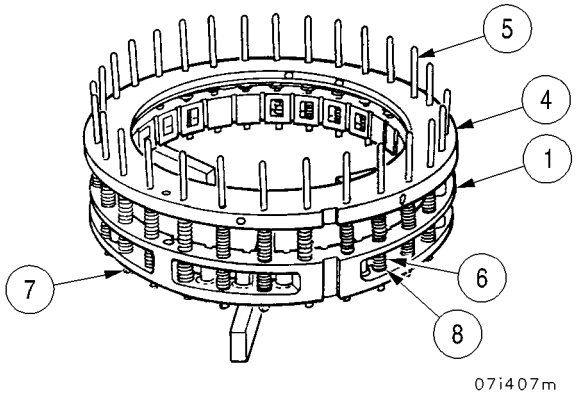


3. Turn the low range clutch anchor assembly (1) over and lift off low and reverse range clutch backplate (4).

NOTE

Do not remove 60 snap rings from pins unless replacement is necessary.

4. Remove 30 long clutch release pins (5), 30 springs (6) and 30 short pins (7). Remove 60 snap rings (8). Discard snap rings.



LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPAIR – CONTINUED 0072 00

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

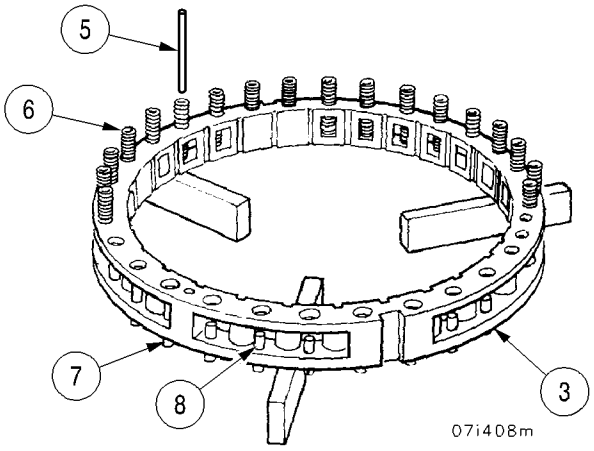
FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

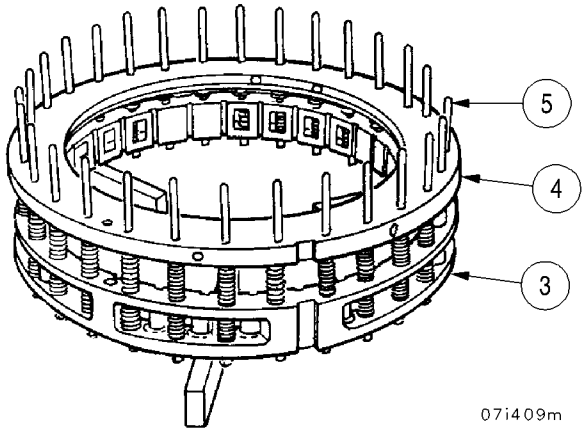
PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Low and reverse range clutch piston release spring	Length of spring Length under load	3.035 in. 1.58 in. at 28.8 to 35.2 lb

ASSEMBLY

1. Position the low range clutch anchor (3), bolt hole counterbores down, on wooden blocks. Install 30 short clutch piston release pins (7), 30 new snap rings (8) and 30 springs (6).
2. Install 30 long clutch release pins (5) with 30 snap rings (8) into springs (6). End of springs next to snap rings (8) must be down.



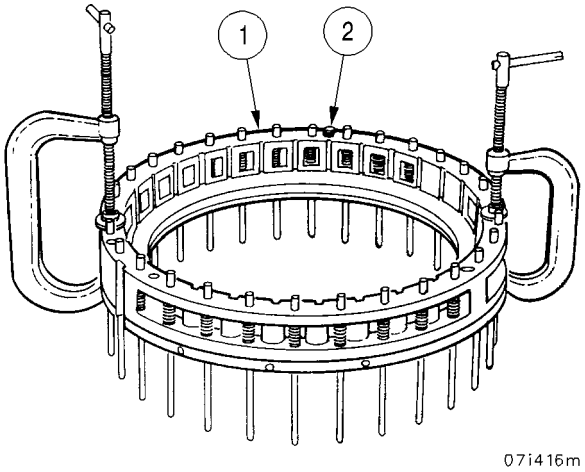
3. Align external slots in low and reverse range clutch backplate (4) with slots in low range clutch anchor (3) and install backplate (4) onto long clutch release pins (5).



LOW RANGE CLUTCH ANCHOR AND RELATED PARTS REPAIR – CONTINUED 0072 00

ASSEMBLY – Continued

4. Turn low range clutch anchor assembly (1) over and clamp together. Install three screws (2). Torque three screws to 36 to 43 lb-ft (48.8 to 58.3 N•m).



NOTE

FOLLOW-ON MAINTENANCE:
Install low range clutch housings
(WP 0071 00)

END OF WORK PACKAGE

LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPLACEMENT 0073 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Suitable lifting device (2000 lb capacity min)
Lifting sling (item 13, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

Lockwasher (2) (item 99, WP 0087 00)
Lockwasher (12) (item 100, WP 0087 00)
Grease (item 4, WP 0085 00)
Self-locking bolt (12) (item 94, WP 0087 00)

Materials/Parts - continued

Preformed packing (item 54, WP 0087 00)
Sealing compound (item 1, WP 0085 00)
Sealing compound (item 12, WP 0085 00)
Dry-cleaning solvent (item 3, WP 0085 00)

Equipment Conditions

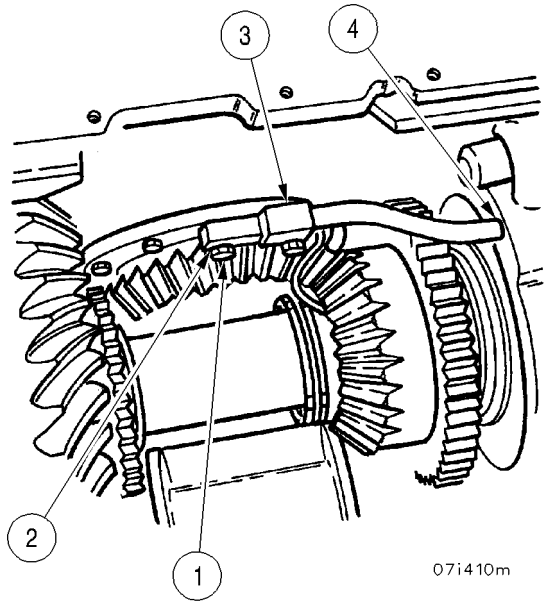
Reverse range clutch piston housing removed (WP 0069 00)

Personnel Required

Two

REMOVAL

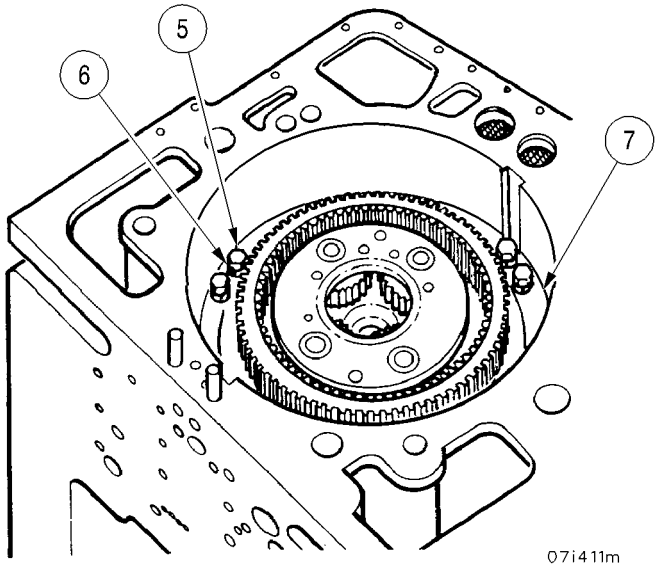
1. Working through the transmission inspection hole, remove two bolts (1) and two lockwashers (2). Discard lockwashers.
2. Remove lubrication manifold (3) and preformed packing (4). Discard preformed packing.



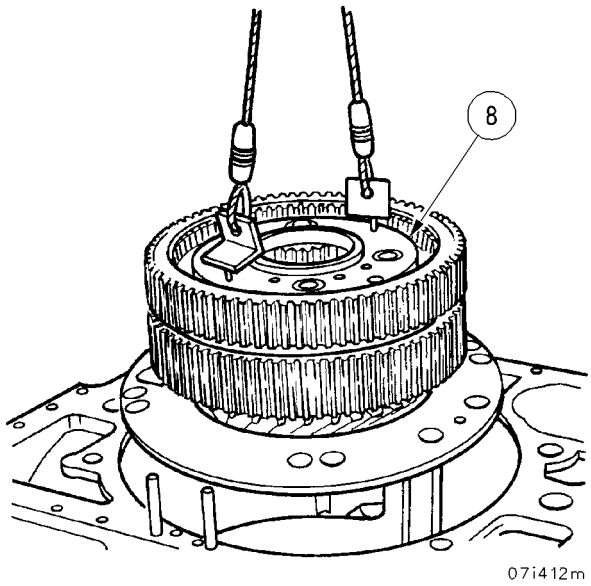
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPLACEMENT – CONTINUED 0073 00

REMOVAL – Continued

3. Remove 12 self-locking bolts (5) and 12 lockwashers (6) retaining transmission main bearing support (7). Discard lockwashers and self-locking bolts.



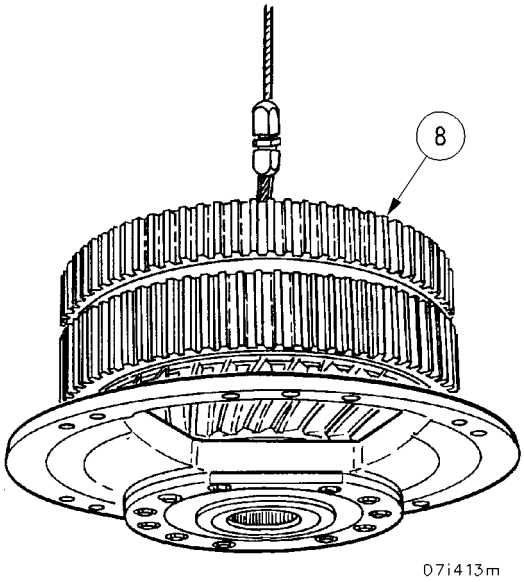
4. Attach two legs of sling to low and reserve range planetary assemblies (8). Using a hoist, remove low and reverse range planetaries (8) as an assembly.



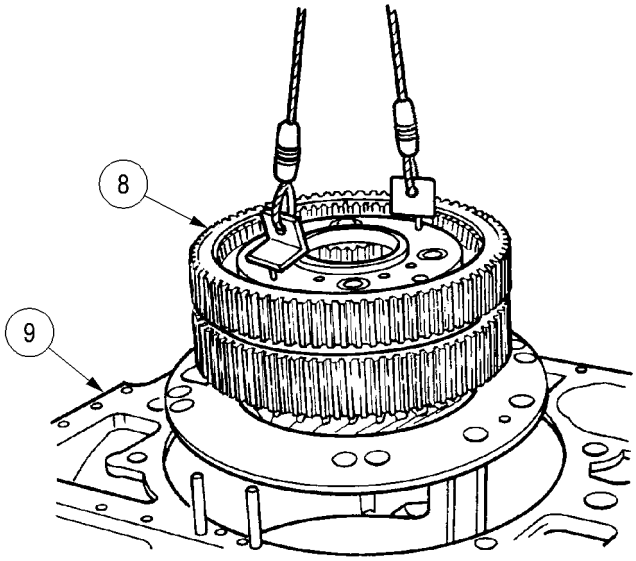
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPLACEMENT – CONTINUED 0073 00

INSTALLATION

1. Using suitable lifting device and lifting sling, suspend low and reverse range planetary assemblies (8).



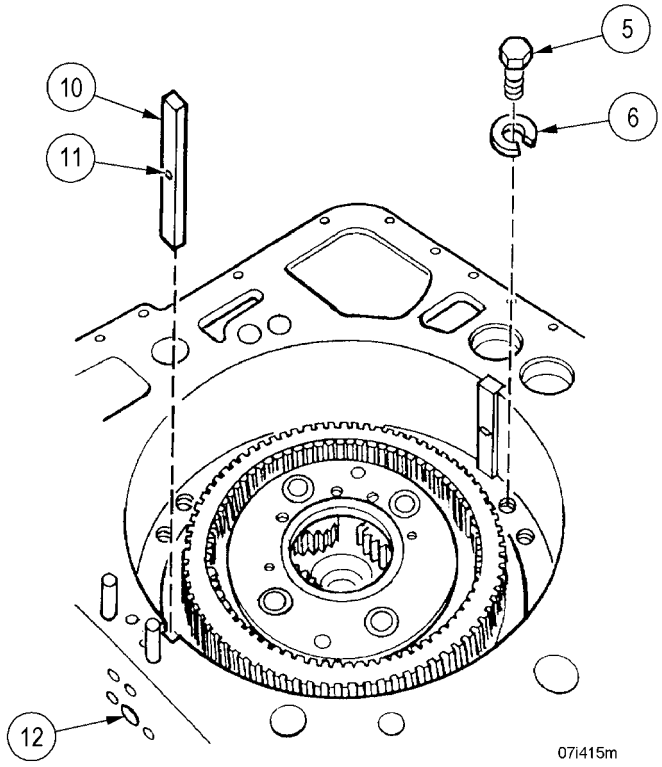
2. Carefully lower low and reverse range planetary assemblies (8) into transmission housing (9), aligning boltholes with guide bolts. Remove guide bolts.



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPLACEMENT – CONTINUED 0073 00

INSTALLATION – Continued

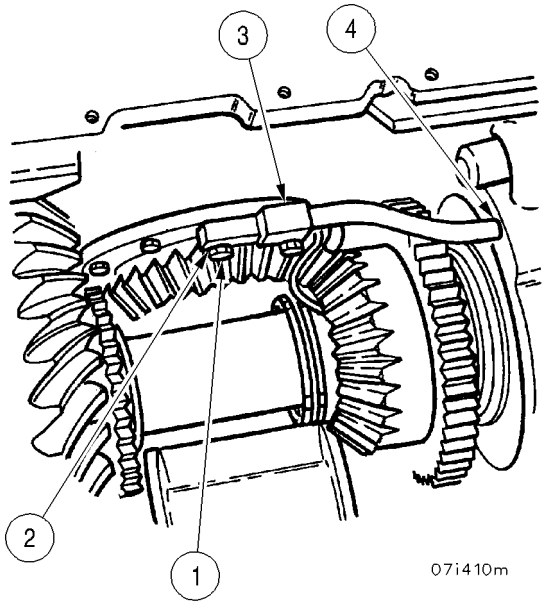
3. Clean 12 bolts (5) corresponding bolt holes with dry-cleaning solvent. Air dry.
4. Apply sealing compound (item 22, WP 0085 00) to threads of 12 new self-locking bolts (5). Install 12 new self-locking bolts (5) and 12 new lockwashers (6). Torque 12 self-locking bolts (5) in a criss-cross manner to 10 lb-ft (13.6 N•m). Apply torque again in a criss-cross manner to 12 self-locking bolts (5) to 42 lb-ft (57 N•m). Apply torque a final time in a criss-cross manner to 12 self-locking bolts (5) to 90 lb-ft (122 N•m). Install two anchor keys (10) and align holes (11) and (12).



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPLACEMENT – CONTINUED 0073 00

INSTALLATION – Continued

5. Working through transmission inspection hole, install lubrication manifold (3) and new preformed packing (4) with two screws (1) and two new lockwashers (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install reverse range clutch piston housing (WP 0069 00)

END OF WORK PACKAGE

LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR 0074 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Mechanical puller attachment (item 8, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)
Spanner wrench (item 18, WP 0088 00)
Arbor press (item 20, WP 0088 00)
Steel tube (item 15, WP 0088 00)
Steel tube (item 14, WP 0088 00)
Torque wrench (item 26, WP 0088 00)

Materials/Parts

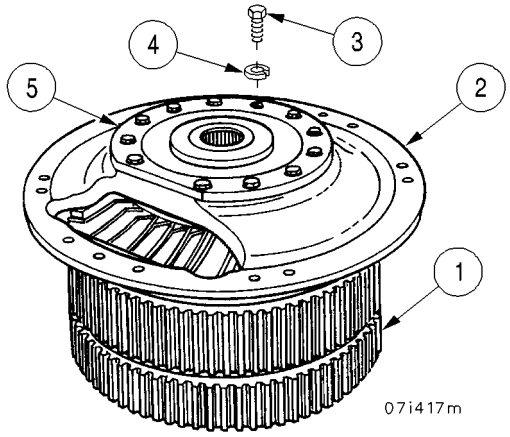
Lumber (item 6, WP 0085 00)
Retaining ring (item 44, WP 0087 00)
Locknut (item 19, WP 0087 00)
Retaining ring (item 27, WP 0087 00)
Lockwasher (10) (item 99, WP 0087 00)
Dry ice

Equipment Conditions

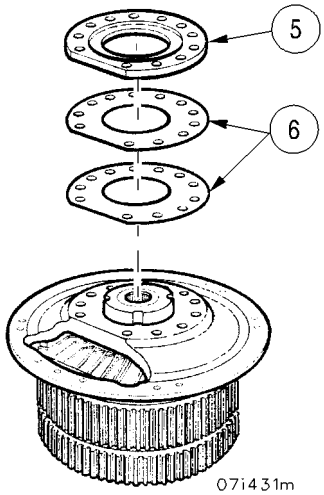
Low and reverse range planetary carriers removed (WP 0073 00)

DISASSEMBLY

1. Position gear assembly (1), main bearing support (2) up. Remove ten bolts (3) and ten lockwashers (4) from main bearing retainer (5). Discard lockwashers.



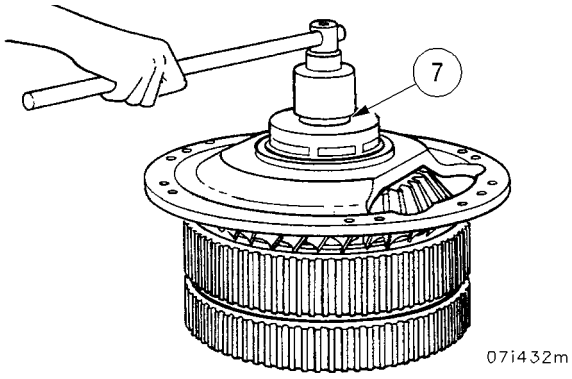
2. Remove main bearing retainer (5) and shims (6) together and mark shims (6) for identification of position.



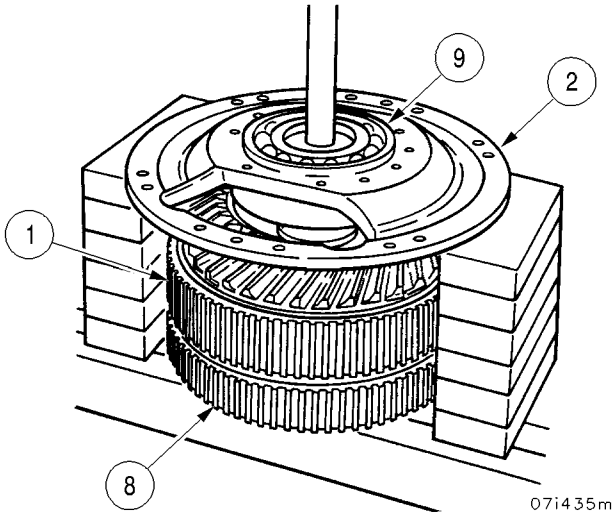
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

3. Straighten main bearing locknut (7) where staked to four slots. Remove locknut (7). Discard locknut.



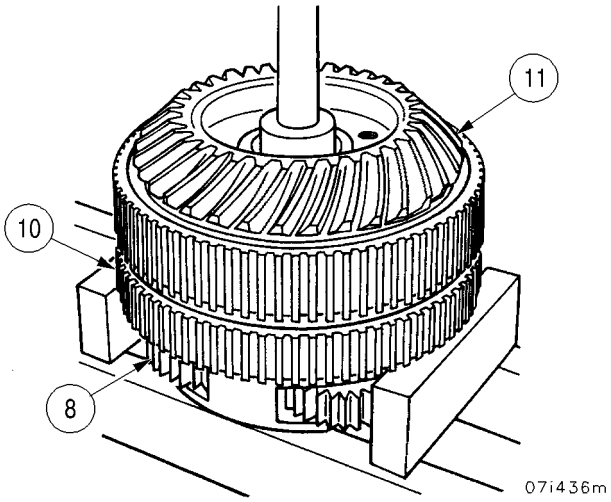
4. Position low and reverse range planetary assembly (1) in press. Support transmission main bearing support (2). Press low range planetary carrier assembly (8) out of main bearing (9). Remove main bearing support (2) and main bearing (9).



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

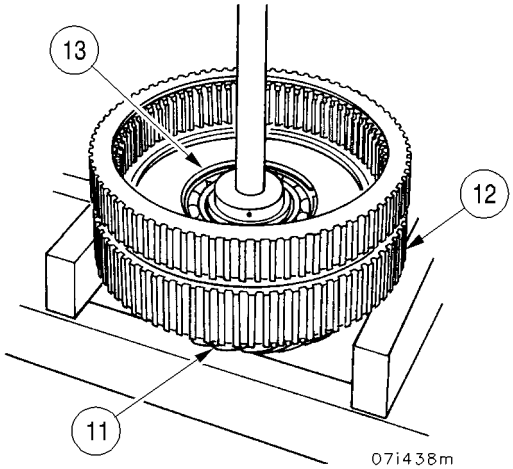
5. Position low range planetary carrier assembly (8) to support low range ring gear (10). Press low range planetary carrier assembly (8) until free of reverse range planetary carrier assembly (11). Lift off reverse range carrier assembly (11) and remove low range planetary carrier assembly (8) from press.



NOTE

Blocks must be placed so that large bronze thrust washer next to bevel gear will not interfere when reverse range carrier assembly is being pressed out.

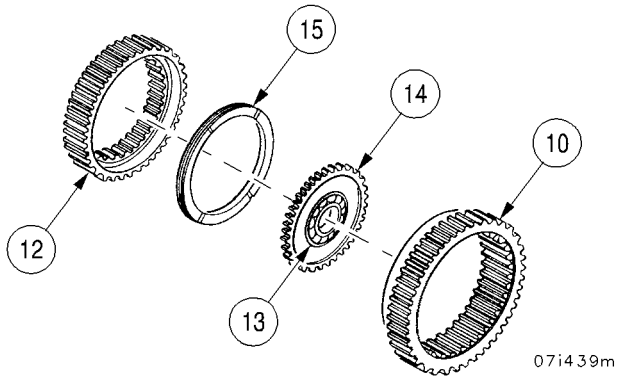
6. Position reverse range carrier planetary assembly (11), bevel gear down, in press, and block to support reverse range ring gear (12). Press reverse range carrier planetary assembly (11) out of ball bearing (13).



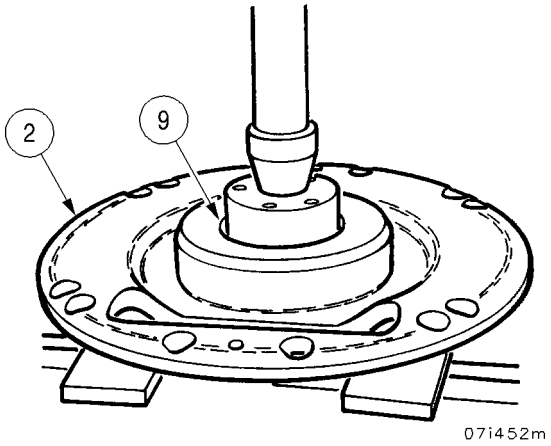
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

7. Remove reverse range ring gear (12), thrust washer (15), reverse range sun gear (14) with bearing (13) and low range ring gear (10).



8. Position main bearing support (2), front side down on block in press. Press main bearing (9) out.



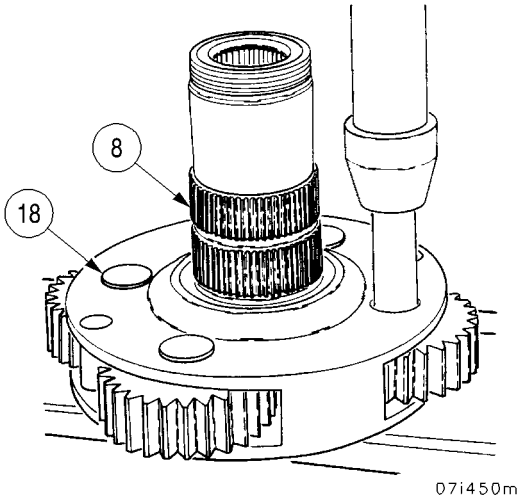
NOTE

Do not remove spindles unless replacement is necessary. Perform Step 9 if replacement is necessary.

LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

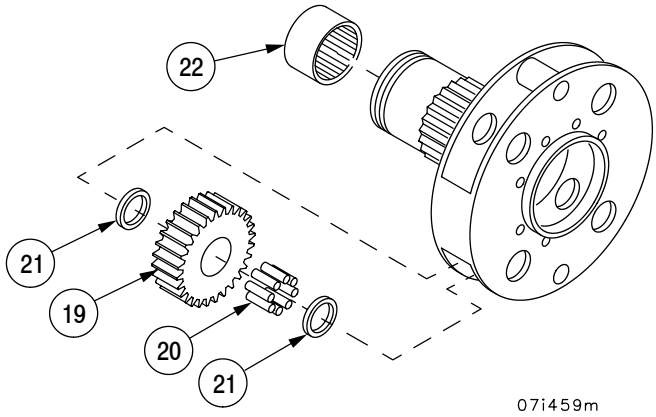
9. Position low range planetary carrier assembly (8), splined hub up, in a press. Press out four pinion spindles (18) with four lock balls.



NOTE

Do not remove needle bearing assembly from hub bore unless replacement is necessary. Removal usually damages this bearing.

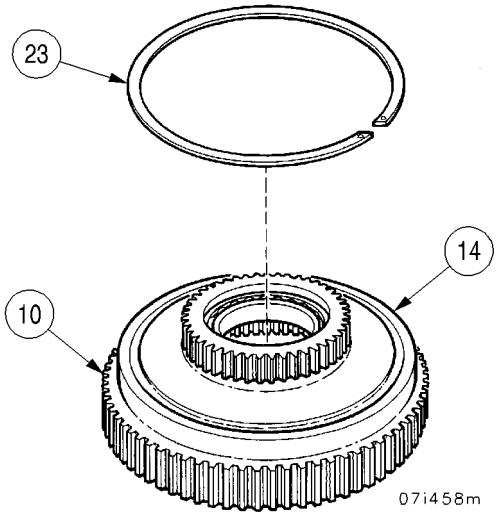
10. Remove four pinions' (19) spindle rollers (20) and two thrust washers (21). Remove needle bearing (22) if necessary. Discard needle bearing if removed.



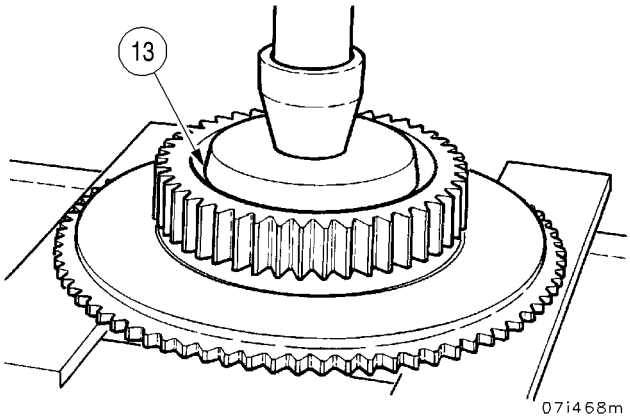
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

11. Remove large internal snap ring (23) retaining reverse range sun gear (14) in low range ring gear (10). Remove reverse range sun gear (14). Discard snap ring.



12. Remove ball bearing (13).



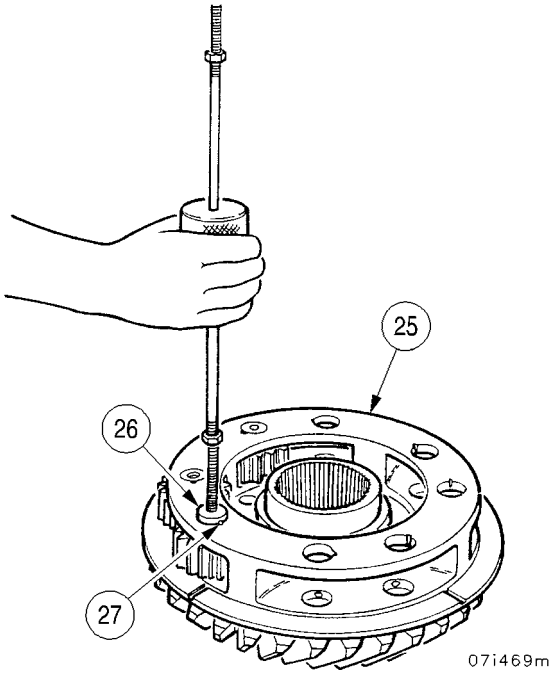
NOTE

Do not remove spindles unless replacement is necessary. Perform Steps 14, 15, and 16 only if replacement is necessary.

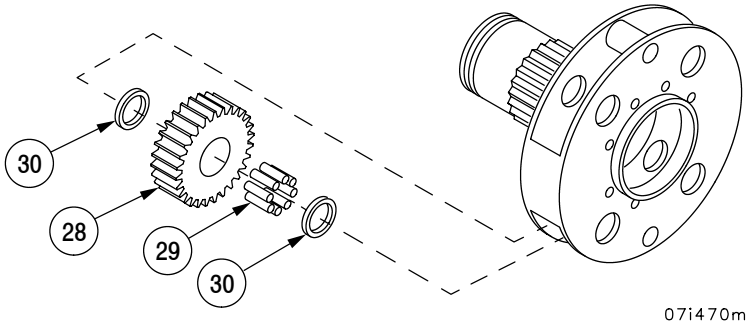
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

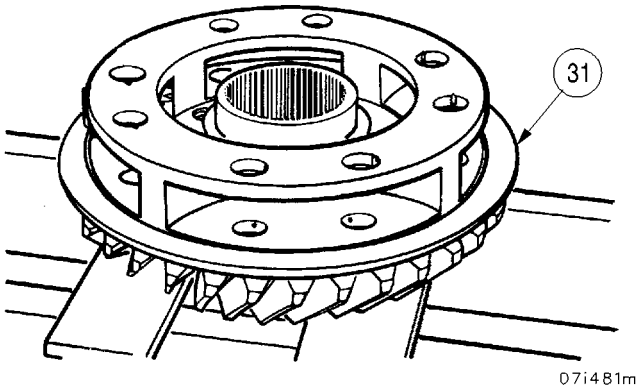
13. Remove eight pinion spindles (26) from reverse range planetary carrier (25) using mechanical puller attachment.
14. Remove eight lock balls (27) as pinion spindles (26) move out of carrier.



15. Remove eight pinions (28), 248 spindle rollers (29) and 16 thrust washers (30).



16. Remove bronze thrust washers (31).



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

DISASSEMBLY – Continued

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Internally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in.
Externally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in.
Ball bearing	Bearing ID Bearing fit on carrier Bearing OD Bearing fit on gear	4.3299 to 4.3307 in. 0.0014T to 0.0001L 6.6919 to 6.6929 in. 0.0002T to 0.0020L
Internally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in.
Externally splined clutch plate	Thickness of plate	0.1580 to 0.1630 in. Wear limit: 0.1380 in.
Low and reverse range clutch piston release spring	Free length of spring Length under load	3.035 in. 1.58 at 28.8 to 35.2 lb
Low range planetary carrier assembly	Carrier ID of splined end Bearing fit in carrier Carrier OD at bearing surface Bearing fit on carrier Carrier ID at gear end Bearing fit in carrier and retainer	2.9990 to 2.9997 in. Wear limit: 3.0000 in. 0.0010T to 0.0003L 3.5432 to 3.5439 in. Wear limit: 3.5428 in. 0.0014T to 0.0001L 4.9211 to 4.9221 in. Wear limit: 4.9924 in. 0.0002T to 0.0018L
Low range planetary	Spindle OD at middle	1.5127 to 1.5132 in. Wear limit: 1.5117 in.
Pinion thrust washer	Thickness of washer	0.0590 to 0.0620 in. Wear limit: 0.0550 in.
Spindle roller	Roller OD	0.2498 to 0.2500 in. Wear limit: 0.2493 in.
Low range planetary pinion	Pinion ID	2.0137 to 2.0142 in. Wear limit: 2.0152 in.

LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

FIT AND WEAR LIMITS – Continued

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Needle bearing	Bearing OD Bearing fit in carrier	2.9994 to 3.0000 in. 0.0010T to 0.0003L
Output bevel drive gear and reverse planetary carrier	Bearing OD at bearing surface Bearing fit on carrier	4.3306 to 4.3313 in. Wear limit: 4.3302 in. 0.0014T to 0.0001L
Thrust washer	Thickness of washer	0.2400 to 0.2500 in. Wear limit: 0.0550 in.
Reverse range planetary carrier spindle	Spindle middle OD	1.1209 to 1.1212 in. Wear limit: 1.1199 in.
Thrust washer	Thickness of washer	0.0590 to 0.0620 in. Wear limit: 0.0550 in.
Spindle roller	Roller OD	1.1248 to 1.1250 in. Wear limit: 1.1243 in.
Reverse range planetary carrier	Pinion ID Pinion and roller fit on spindle	1.3717 to 1.3722 in. Wear limit: 1.3732 in. 0.0005L to 0.0017L

LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY

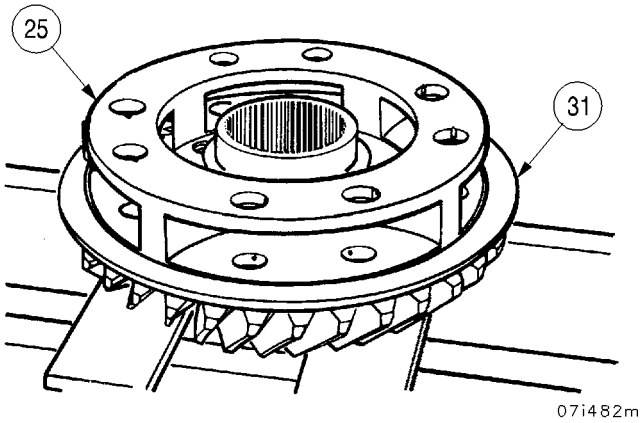
WARNING

Use tongs or gloves when handling chilled parts or dry ice to prevent injury.

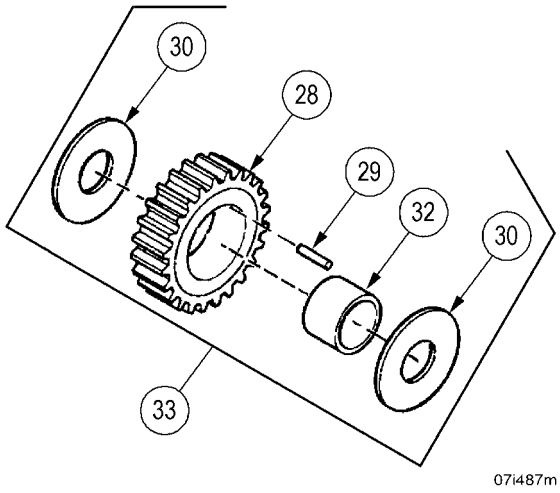
NOTE

New spindles should be chilled in dry ice for at least one hour before installation.

1. Position reverse range planetary carrier (25), bevel gear down, in press. Install large bronze washer (31).



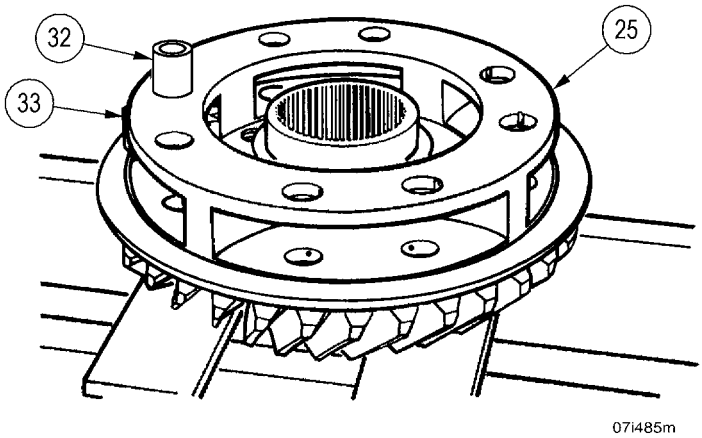
2. Coat bore of pinion (28) with oil soluble grease. Insert steel tube (32) (item 15, WP 0088 00) into pinion (28) bore. Install 31 spindle rollers (29) into space between steel tube (32) and pinion (28) bore.
3. Install thrust washer (30) on each side of pinion (28). Retain two thrust washers (30) with oil soluble grease to make pinion assembly (33).



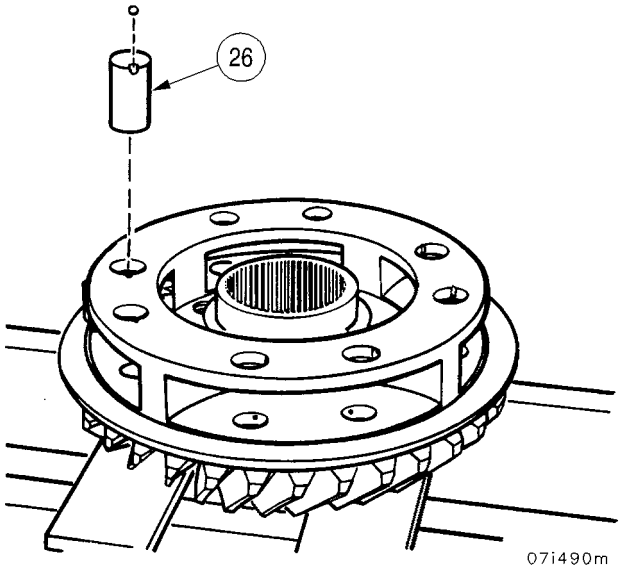
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY - Continued

4. Remove steel tube (32) and install pinion assembly (33) into reverse range planetary carrier (25). Align pinion assembly (33) by inserting steel tube (32) through carrier pinion assembly.



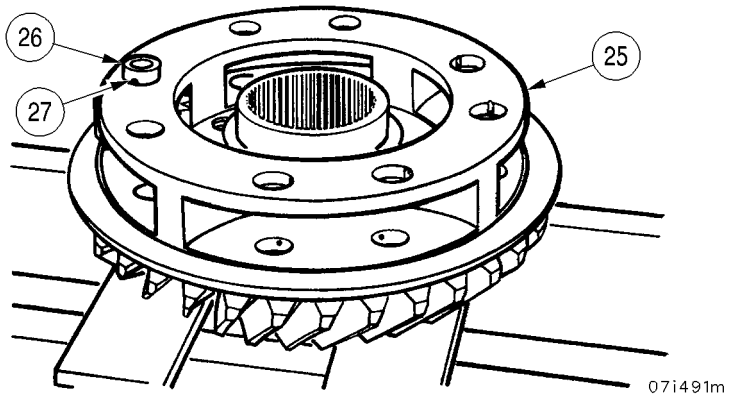
5. Remove steel tube. Position spindle (26) so that lock ball pocket is near upper end of spindle (26) and directly above lock ball pocket.



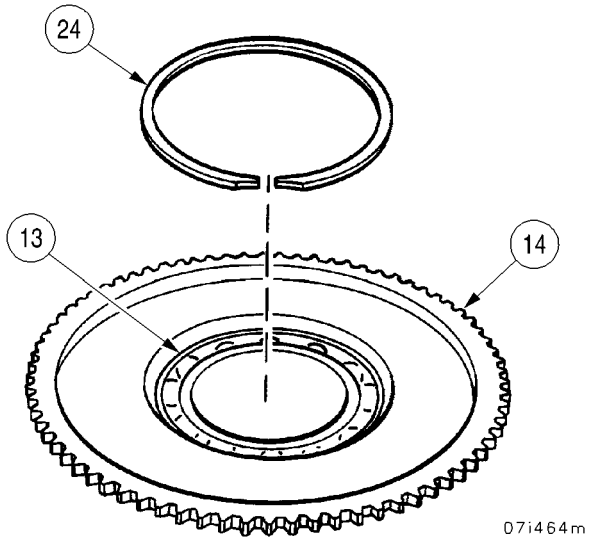
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

6. Press spindle (26) into bore in reverse range planetary carrier (25), installing lock ball (27) when spindle pocket in the spindle is near carrier. Press spindle (26) flush with carrier (25).
7. Repeat Steps 2 through 6, above, for installation of seven spindle and pinion assemblies.
8. Stake reverse range planetary carrier (25) against spindle (26) ends at eight to ten points approximately 1/16 inch outside spindle bore circumference, or peen approximately 30 percent of spindle bore circumference against end of spindles.



9. Install ball bearing (13) into bore of reverse range sun gear (14). Install new internal snap ring (24).



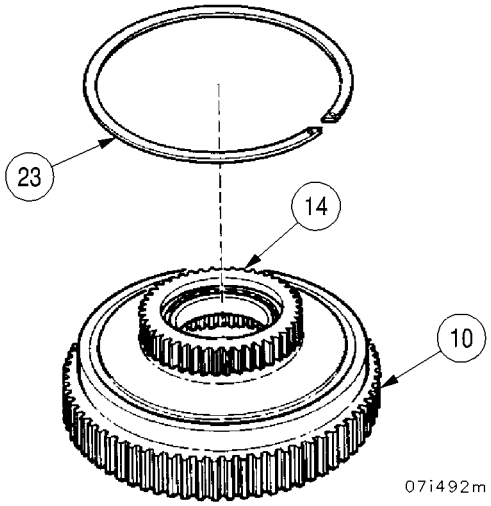
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

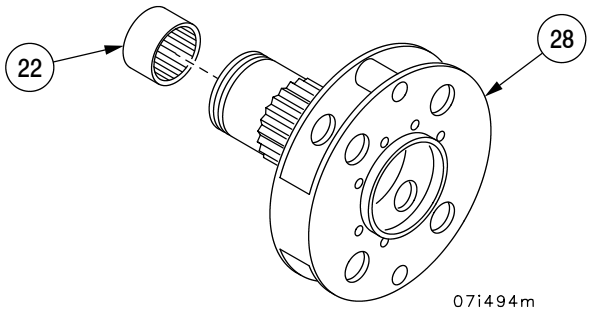
NOTE

Note that sun gear is installed at side of ring gear, which has no external splines.

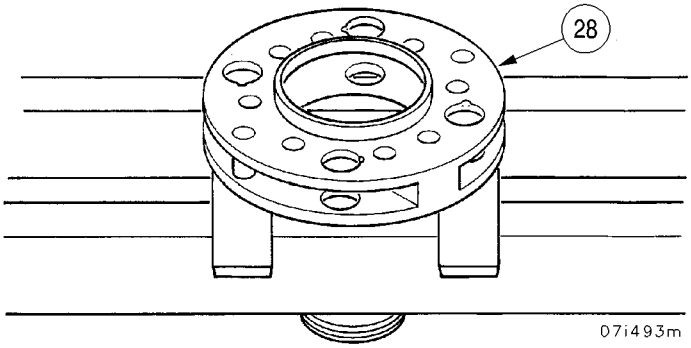
10. Install reverse range sun gear (14) into low range ring gear (10). Install new large internal snap ring (23).



11. If roller bearing assembly (22) has been removed from low range planetary carrier (28), install new bearing. Press only on numbered end of bearing and seat against shoulder on carrier (28).



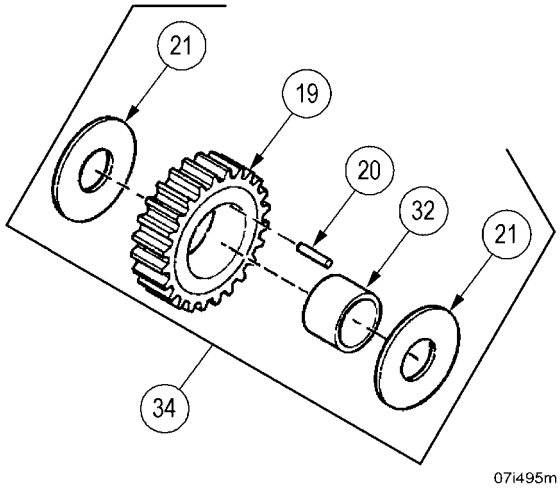
12. Position low range carrier (28) hub down, in press.



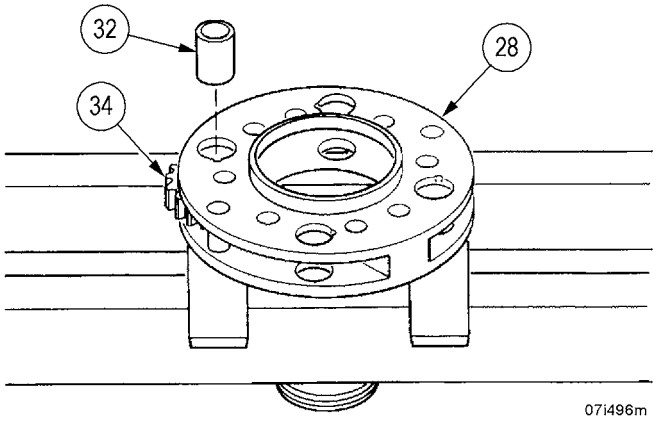
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

13. Coat bore of low range pinions (19) with oil soluble grease. Insert steel tube (32) into bore. Install 22 spindle rollers (20).
14. Install two thrust washers (21) on each side of pinion (19). Retain two thrust washers (21) with oil soluble grease to make pinion assembly (34).



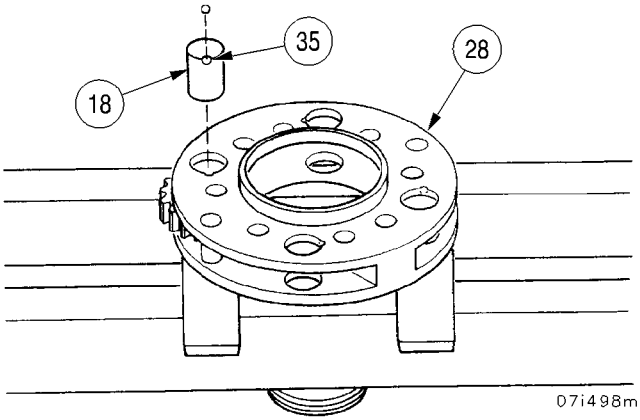
15. Remove steel tube (32). Install pinion assembly (34) into carrier (28). Align pinion by inserting steel tube (32) into carrier and pinion bore.



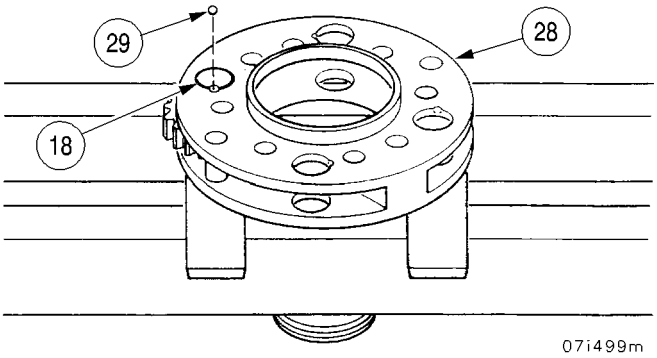
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

16. Position spindle (18), plugged end up, in spindle bore of carrier (28). Align lock ball pocket (35) in spindle with lock ball pocket in carrier (28).



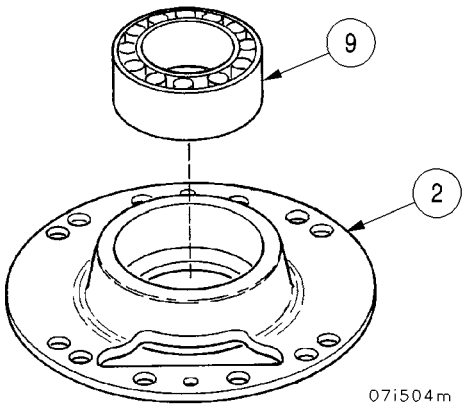
17. Press spindle (18) into carrier (28), installing lock ball (29) when spindle lock ball pocket nears carrier. Press spindle into carrier until flush with surface.



NOTE

The low range planetary carrier does not require staking. They are held together with a retainer.

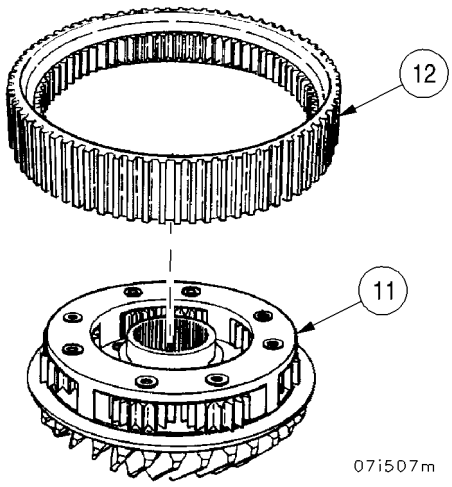
18. Repeat Steps 13 through 17, above, to assemble and install remaining pinions.
19. Position main bearing support (2), open end of bearing bore up, in press. Coat outer surface of main bearing (9) with white lead. Press main bearing (9) into bearing support (2) bore. Set main bearing (9) against shoulder in bearing support (2) bore.



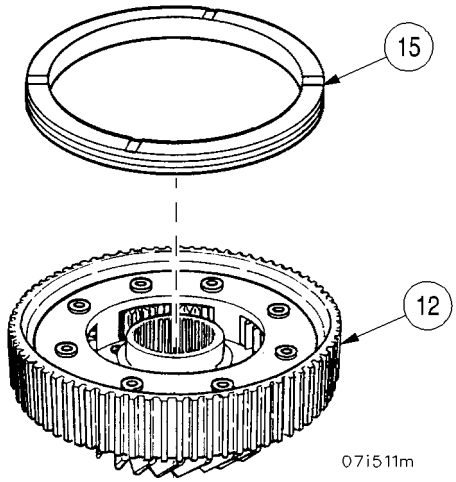
LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

20. Position reverse range planetary carrier assembly (11), bevel gear down. Install reverse ring gear (12), shallow counterbore down, onto reverse range carrier assembly (11).



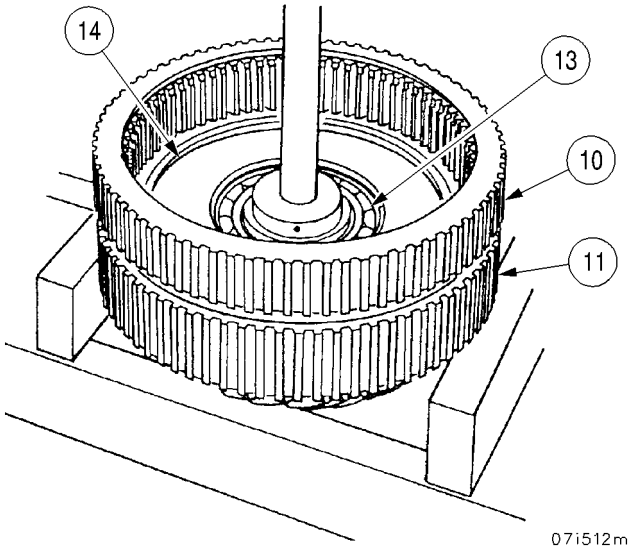
21. Install large bronze thrush washer (15) into deep counterbore of reverse range ring gear (12).



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

22. Install assembled low range ring gear (10) and reverse range sun gear (14), sun gear down. Press ball bearing (13) onto hub of reverse range planetary carrier assembly (11).

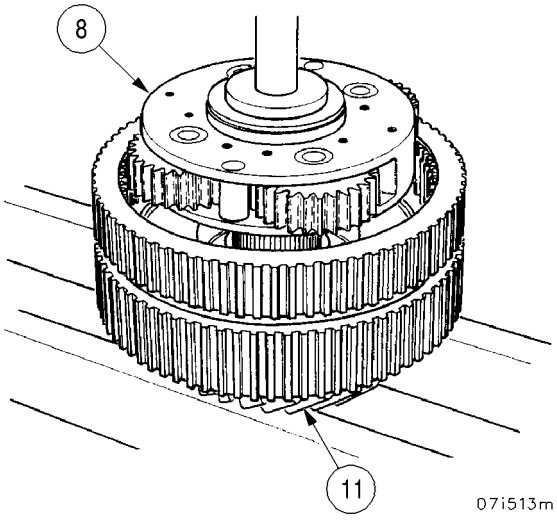


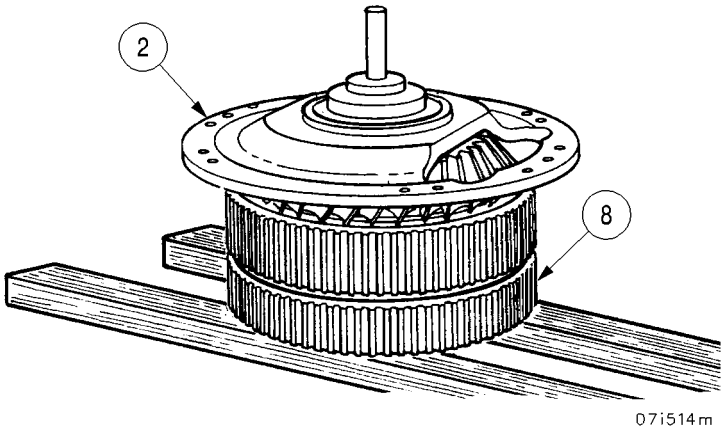
NOTE

Splines must fit between splines in reverse range planetary carrier, and low range pinions must mesh with low range ring gear.

23. Position low range planetary carrier assembly (8), splined hub down, and press into reverse range planetary carrier assembly (11).

24. Turn assembly over and support low range planetary carrier assembly (8). Record gear mounting dimension (MD) etched on web of bevel gear. Press assembled main bearing and support (2) onto hub of reverse range carrier assembly (11).

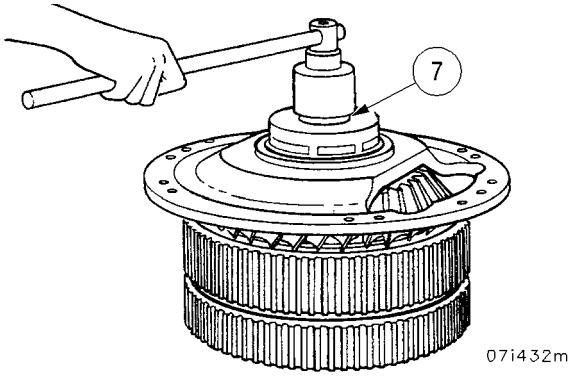




LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

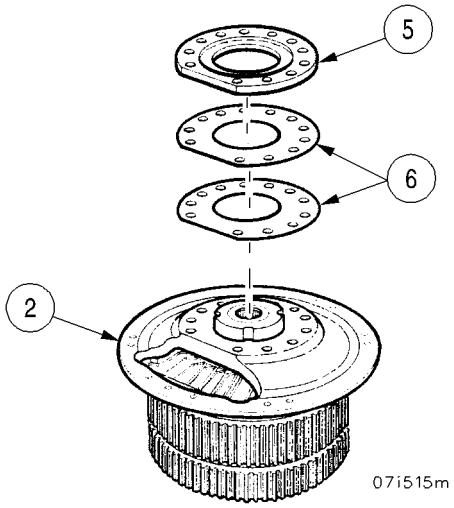
25. Install new main bearing locknut (7). Tighten main bearing locknut (7) to 350 lb-ft. Stake lip of main bearing locknut (7) into four slots in carrier hub.



NOTE

Refer to WP 0022 00 for shimming. Instructions in WP 0022 00 will determine if original shims are to be reused or if different shim pack is required.

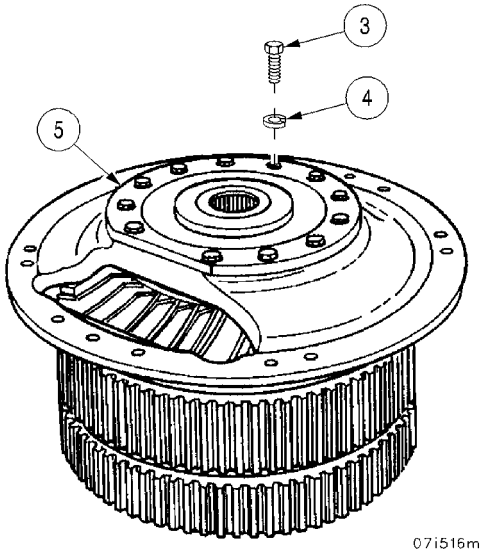
26. Install shims (6) and main bearing retainer (5), flat side down, onto main bearing support (2).



LOW AND REVERSE RANGE PLANETARIES AND RELATED PARTS REPAIR – CONTINUED 0074 00

ASSEMBLY – Continued

27. Install ten bolts (3) and ten new lockwashers (4). Two bolt holes on both sides of lubrication passage in main bearing retainer (5) are not to have bolts at this time.



NOTE

FOLLOW-ON MAINTENANCE:
Install low reverse range planetary carrier assemblies (WP 0073 00)

END OF WORK PACKAGE

OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT

0075 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)

Materials/Parts

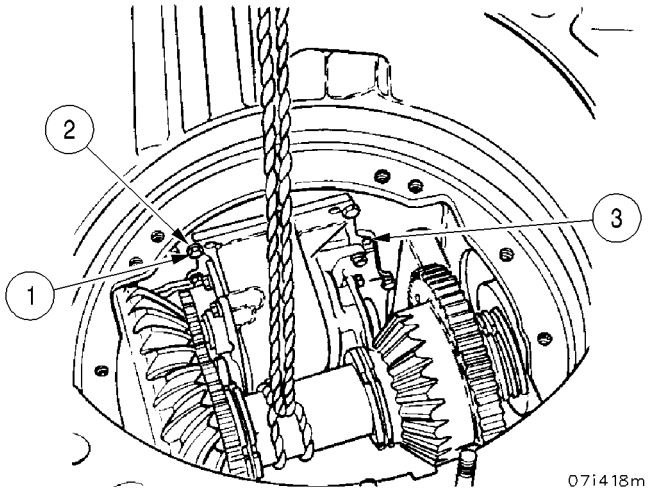
Gasket (item 75, WP 0087 00)
Lockwasher (8) (item 99, WP 0087 00)
Non-hardening gasket sealant (item 7, WP 0085 00)
Rope (item 11, WP 0085 00)

Equipment Conditions

Low range planetary carrier assembly removed (WP 0073 00)
Shims, steer bevel gear and thrust washer removed (WP 0018 00)

REMOVAL

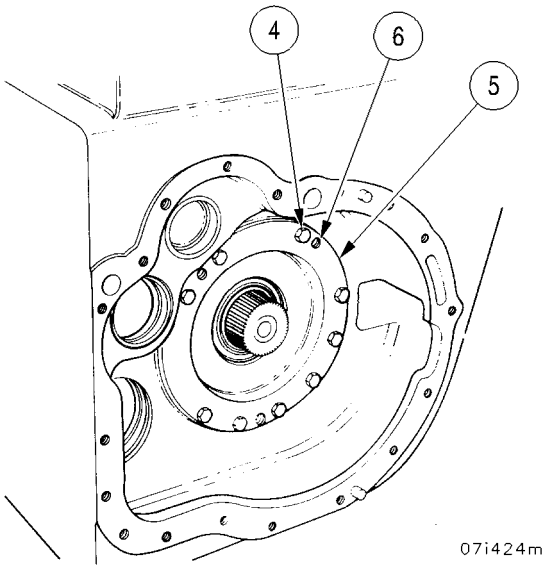
1. Remove eight output pressure and brake coolant pump mounting bolts (1) and eight lockwashers (2). Install two mounting bolts (1) in threaded holes (3) for use as jacking bolts to loosen output pressure and brake coolant pump. Attach rope sling to support weight of output drive shaft assembly. Discard lockwashers.



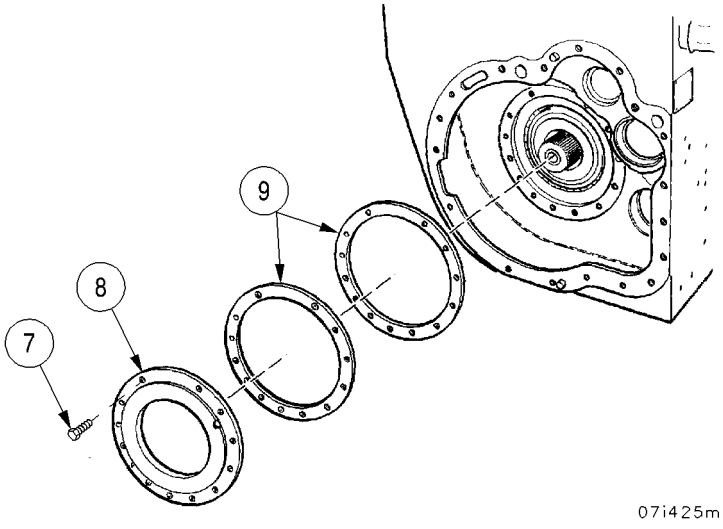
OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT – CONTINUED 0075 00

REMOVAL – Continued

2. Remove 12 bolts (4) from right bearing retainer (5). Install three bolts (4) in tapped holes (6). Using three bolts (4) as jacking screws, remove retainer (5) and right bearing outer race as a unit.



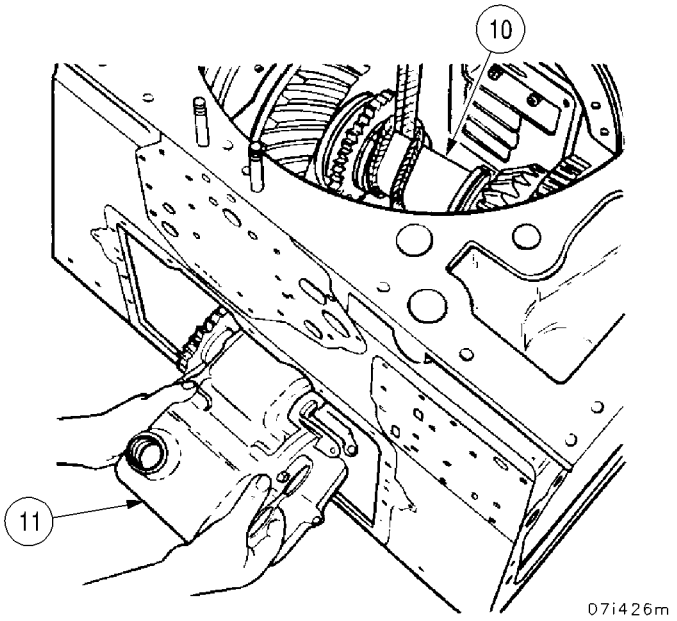
3. Remove 12 bolts (7) from left bearing retainer (8). Remove retainer (8) and shims (9). Measure each shim with micrometer caliper and record total shim pack thickness. Tie shims (9) together until assembly.



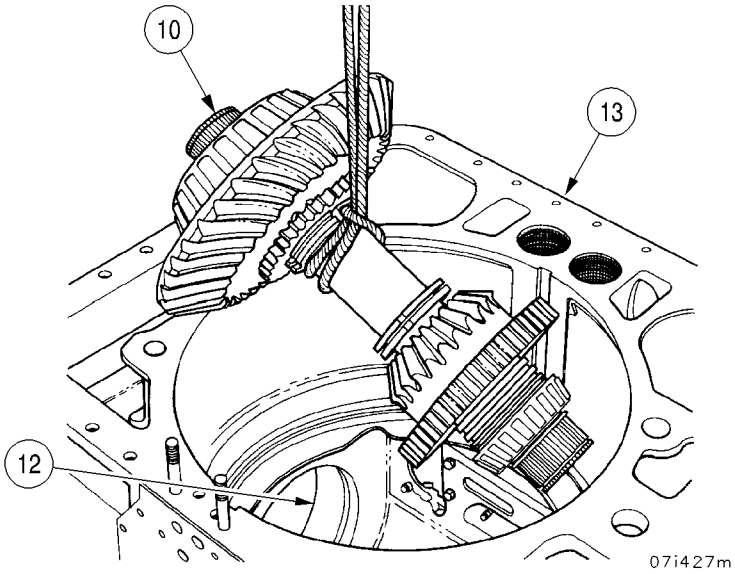
OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT – CONTINUED 0075 00

REMOVAL – Continued

4. Lift output drive shaft assembly (10) to clear output pressure and brake coolant pump assembly (11). Remove output pressure and brake coolant pump assembly (11) with gasket through inspection port. Discard gasket.



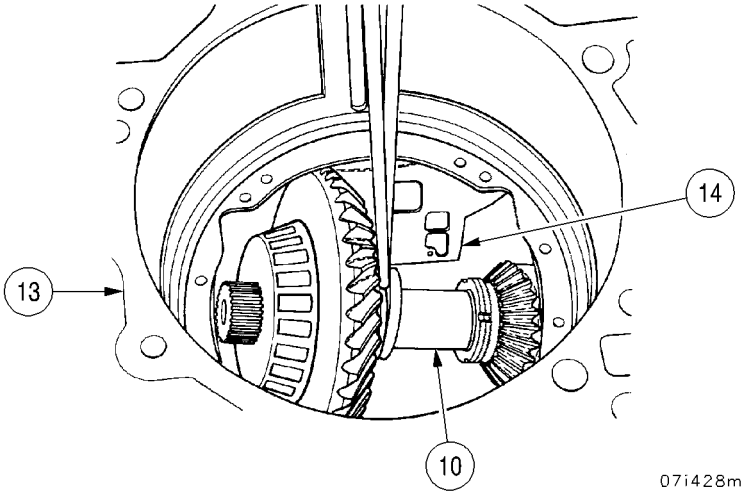
5. Remove output drive shaft assembly (10). Remove left bearing outer race (12) from transmission housing (13).



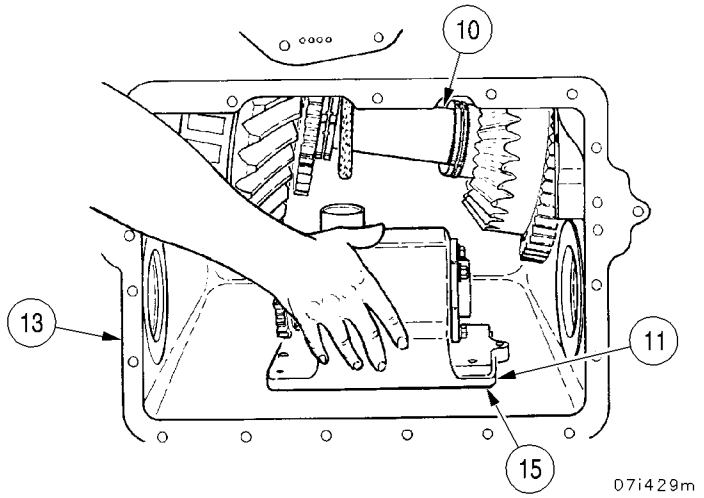
OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT – CONTINUED 0075 00

INSTALLATION

1. Position transmission housing (13) on rear side. Install output drive shaft assembly (10), leaving it suspended on rope sling. Apply a coat of non-hardening gasket sealant to output pressure and brake coolant pump mounting surface (14).



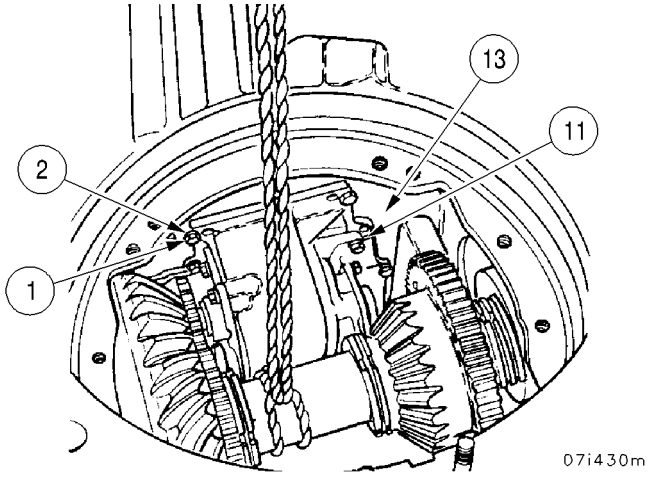
2. Apply a coat of non-hardening gasket sealant to base of output pressure and brake coolant pump assembly (11). Install new gasket (15) onto output pressure and brake coolant pump assembly (11) base. Work through transmission housing (13) inspection port to install output pressure and brake coolant pump assembly (11). Push output pressure and brake coolant pump assembly (11) under output drive shaft assembly (10) and lift into position on mounting pad.



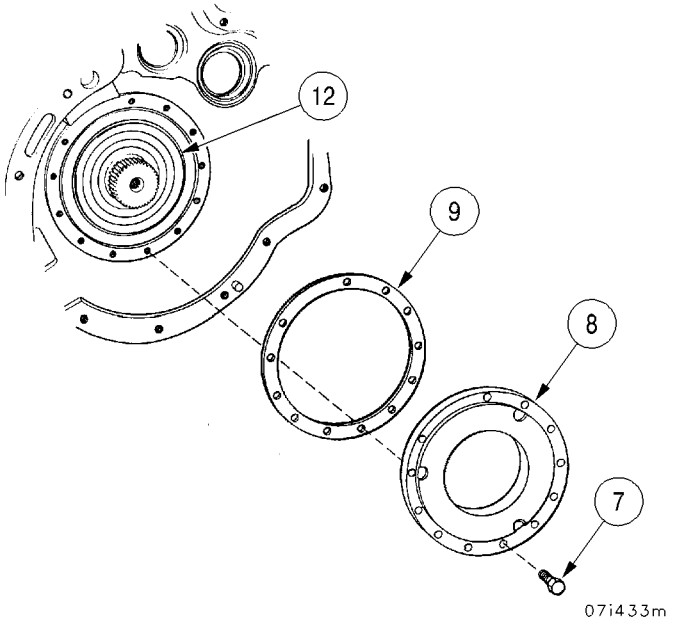
OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT – CONTINUED 0075 00

INSTALLATION – Continued

3. Secure output pressure brake coolant pump assembly (11) to transmission housing (13) with eight bolts (1) and eight new lockwashers (2).



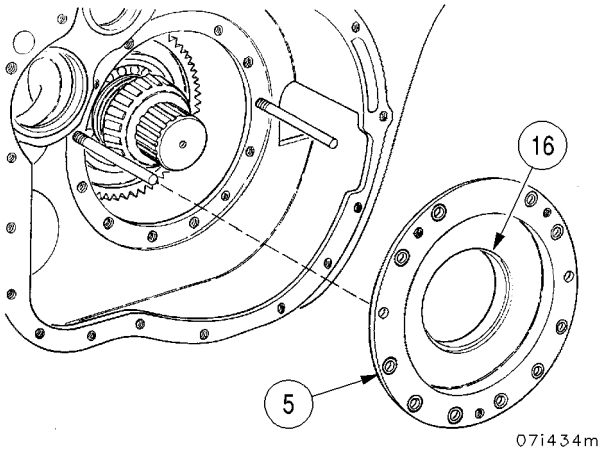
4. Install left bearing outer race (12), shims (9) and bearing retainer (8). Install 12 bolts (7) and tighten evenly.



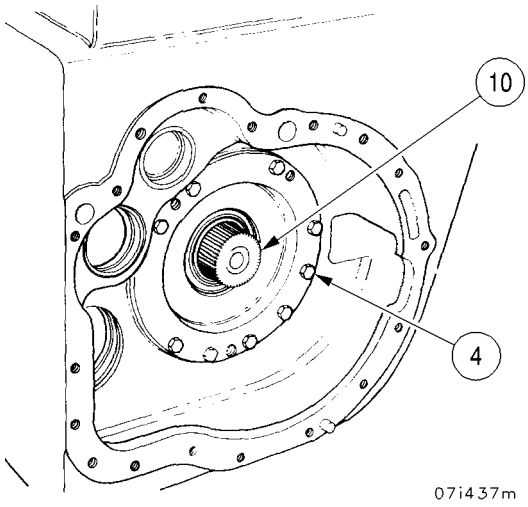
OUTPUT PRESSURE AND BRAKE COOLANT PUMP AND OUTPUT DRIVESHAFT REPLACEMENT – CONTINUED 0075 00

INSTALLATION – Continued

5. Use 1/2-inch guide bolts to install right bearing retainer (5) with right bearing outer race (16).



6. Install 12 bolts (4). Tighten 12 bolts (4) evenly while checking to ensure drive shaft (10) remains free. Remove rope sling.



NOTE

FOLLOW-ON MAINTENANCE:
Install low range planetary carrier assembly (WP 0073 00)
Install shims, steer bevel gear and thrust washer (WP 0018 00)

END OF WORK PACKAGE

OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR 0076 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)

Materials/Parts

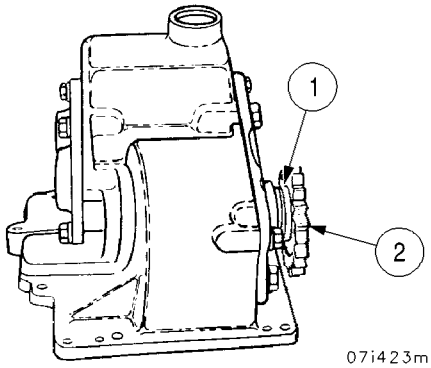
Lockwasher (10) (item 99, WP 0087 00)

Equipment Conditions

Output pressure and brake coolant pump assembly removed (WP 0075 00)

DISASSEMBLY

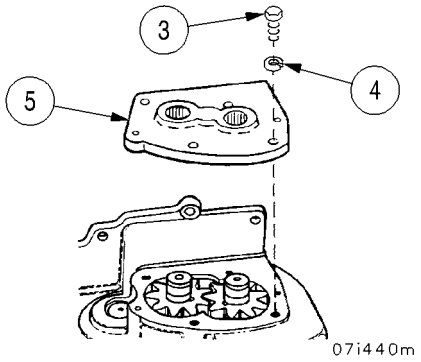
1. Drive out retaining pin (1) from external drive gear (2). Remove external drive gear (2).



NOTE

Do not remove needle bearings or dowel pins unless replacement is necessary.

2. Remove four cap screws (3), four lockwashers (4) and output pump cover assembly (5). Discard lockwashers.



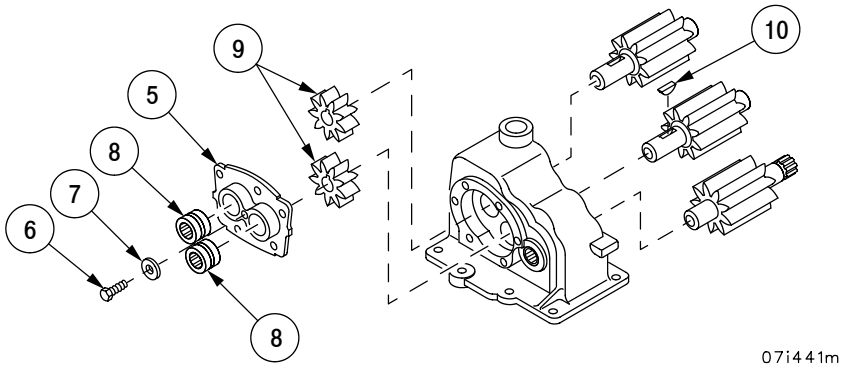
OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

DISASSEMBLY – Continued

NOTE

Do not remove bearings unless loose, damaged, or worn.

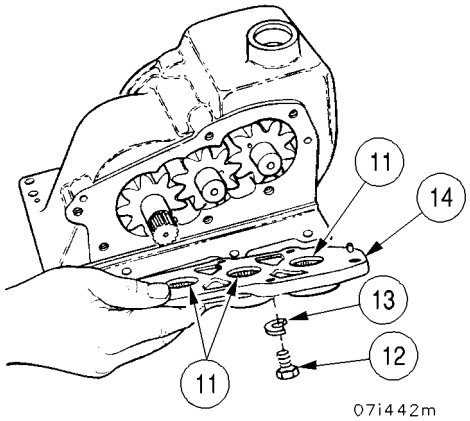
3. Remove bolt (6), flat washer (7) and press out two needle bearings (8) from output pressure pump cover assembly (5).
4. Lift out two pressure pump gears (9) and remove key (10).



NOTE

Do not remove needle bearings unless replacement is necessary. If replacement is necessary, bearings can be pressed out.

5. Remove three needle bearings (11), if necessary. Remove six cap screws (12), six lockwashers (13), and brake coolant pump cover assembly (14). Discard lockwashers.



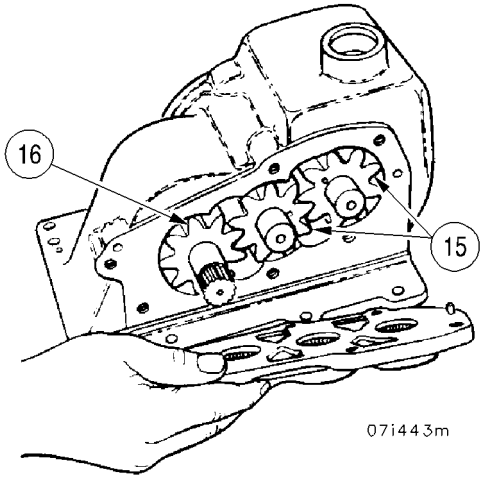
OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

DISASSEMBLY – Continued

NOTE

Do not remove needle bearings unless replacement is necessary. If replacement is necessary, press needle bearings out.

6. Remove two idler gears (15). Remove internal drive gear (16).



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

FIT AND WEAR LIMITS

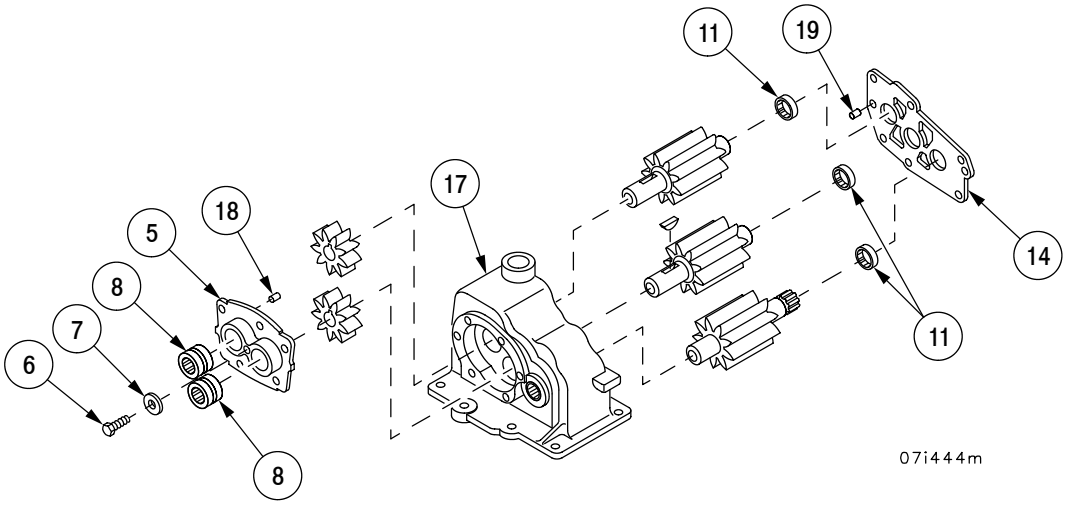
Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Brake coolant pump cover	Bearing ID	1.2495 to 1.2505 in. Wear limit: 1.2510 in.
	Bearing fit in cover	To press fit 1.2495 to 1.2505 cover bores
Needle bearings	Bearing ID	To fit 1.0000 diameter shaft (installed)
	Bearing fit on shaft gears	To fit 1.0000 diameter shaft (installed)
	Bearing OD	To press fit 1.2495 to 1.2505 housing bore
	Bearing fit in housing	To press fit 1.2495 to 1.2505 housing bore
Oil pump internal drive gear	Bearing surface OD of gear	0.9990 to 1.0000 in. Wear limit: 0.9985 in.
	Bearing fit on gear shaft	To fit 1.0000 diameter shaft (installed)
Oil pump internal drive gear	Bearing surface OD of gear	0.9990 to 1.0000 in. Wear limit: 0.9985 in.
	Bearing fit on gear shaft	To fit 1.0000 diameter shaft (installed)
	Bearing surface OD of gear (long end)	0.9989 to 0.9994 in. Wear limit: 0.9984 in.
	Bearing fit on gears	0.0002L to 0.0011L
Oil pump body	Bearing bore ID	1.2495 to 1.2505 in. Wear limit: 1.2510 in.
Needle bearing	Bearing ID	To fit 1.0000 diameter shaft (installed)
	Bearing fit on gear shaft	To fit 1.0000 diameter shaft (installed)
Output pressure pump cover	Bearing surface ID	1.4990 to 1.4995 in. Wear limit: 1.5000 in.
	Bearing fit in cover assembly	0.0005T to 0.0020T
Needle bearing	Bearing OD	1.5000 to 1.5010 in.
	Bearing fit in cover	0.0005T to 0.0020T
	Bearing ID	0.9996 to 1.0000 in.
	Bearing fit on gears	0.0002L to 0.0011L

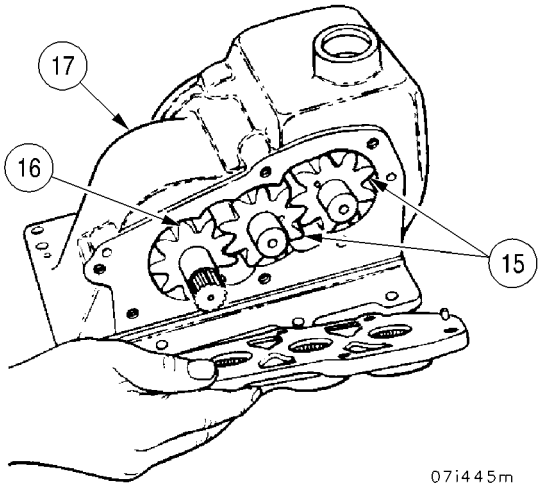
OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

ASSEMBLY

1. Install replacement needle bearings (8 and 11) into body (17) or cover (5) and (14), if removed, by placing driver against numbered ends of bearing races. Drive bearings 0.090 inch below inside machined surfaces in pump body and brake coolant pump cover (14). Bearing must be seated against shoulder in output pressure oil pump cover (5). Install bolt (6) and flat washer (7) in output pressure pump cover. Dowel pins (18 and 19) must protrude ¼ inch when installed in covers.



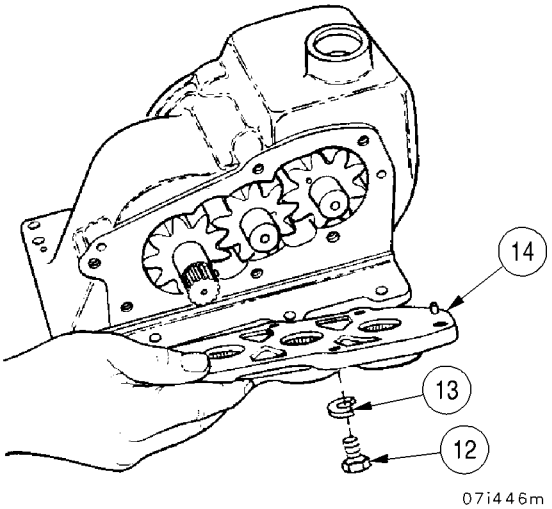
2. Install internal drive gear (16), short end first, into pump body (17). Install two idler gears (15), long ends first, in pump body (17).



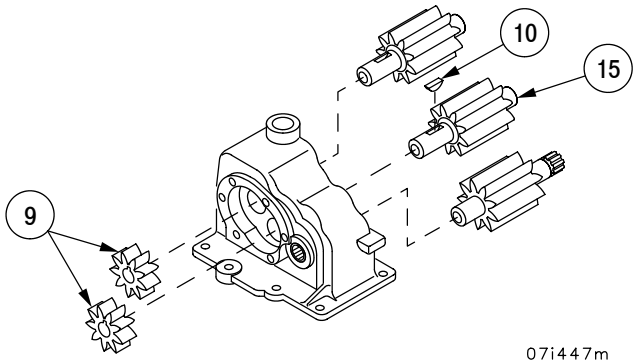
OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

ASSEMBLY – Continued

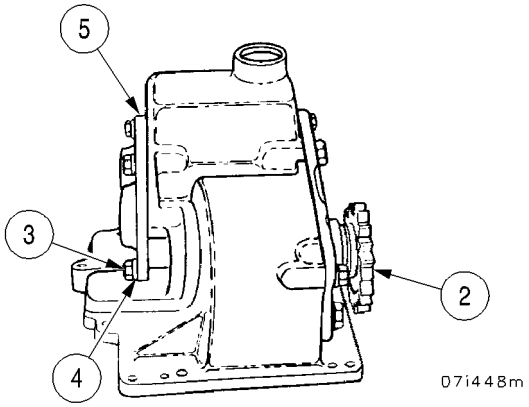
3. Install brake coolant pump cover assembly (14) with six cap screws (12) and six new lockwashers (13).



4. Install key (10) into slot on shaft of center idler gear (15). Install two output pressure pump gears (9).



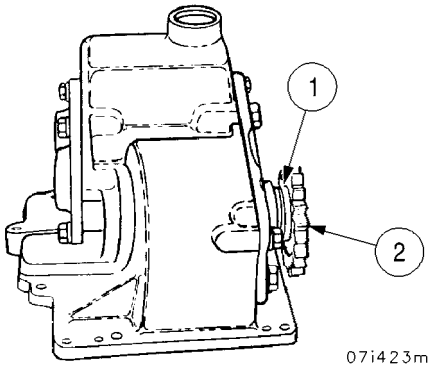
5. Install output pressure pump cover (5) with four cap screws (3) and four new lockwashers (4).
6. Install external drive gear (2) onto splined shaft of internal gear.



OUTPUT PRESSURE AND BRAKE COOLANT PUMP ASSEMBLY REPAIR – CONTINUED 0076 00

ASSEMBLY – Continued

7. Drive retaining pin (1) into hub of external drive gear (2). Secure pin (1) by bending both ends into slots provided in gear hub.



NOTE

FOLLOW-ON MAINTENANCE:
Install output pressure and brake coolant pump assembly (WP 0075 00)

END OF WORK PACKAGE

OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR 0077 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Arbor press (item 20, WP 0088 00)
Retaining ring pliers (item 21, WP 0088 00)
Torque wrench (item 26, WP 0088 00)
Torque multiplier (item 27, WP 0088 00)

Materials/Parts

Lumber (item 6, WP 0085 00)
Retaining ring (3) (item 29, WP 0087 00)
Retaining ring (2) (item 11, WP 0087 00)

Materials/Parts – Continued

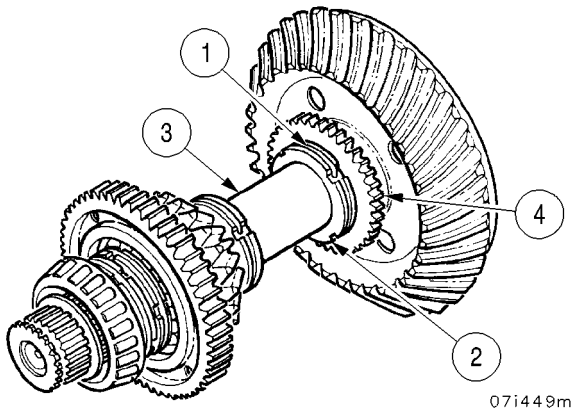
Retaining ring (item 48, WP 0087 00)
White lead (item 13, WP 0085 00)

Equipment Conditions

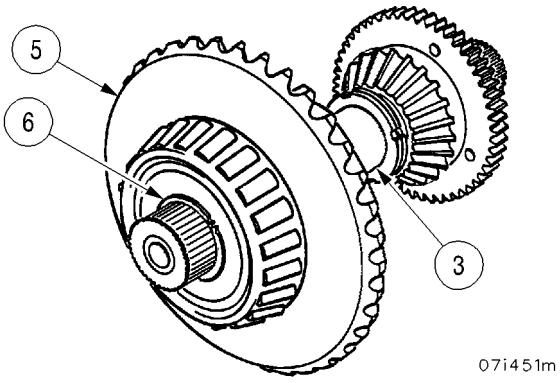
Output drive shaft removed (WP 0075 00)

DISASSEMBLY

1. Remove four spanner nut lock rings (1) from four spanner nuts (2) on drive shaft (3). Discard lock rings.
2. Loosen (approximately four turns) spanner nut (2) which is against output pump drive gear (4).



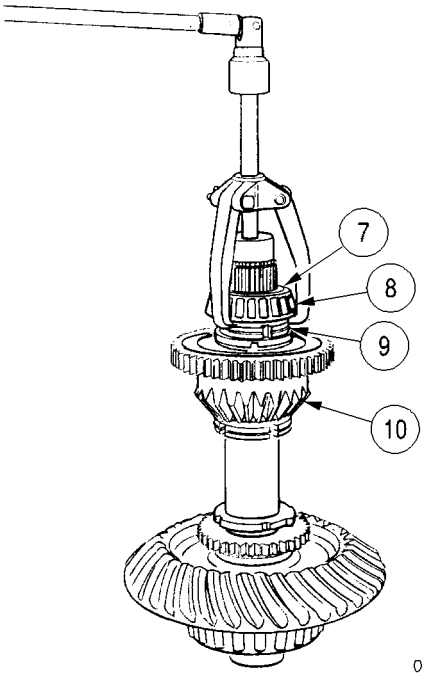
3. Drive output bevel-driven gear (5) toward center of drive shaft (3) and remove snap ring (6) retaining gear. Discard snap ring.



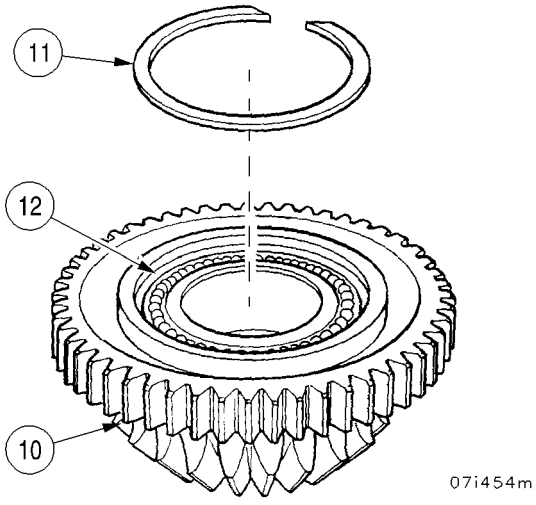
OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

DISASSEMBLY – Continued

4. Remove snap ring (7), smaller roller bearing (8), two spanner nuts (9) and steer bevel-driven gear (10). Discard snap ring.



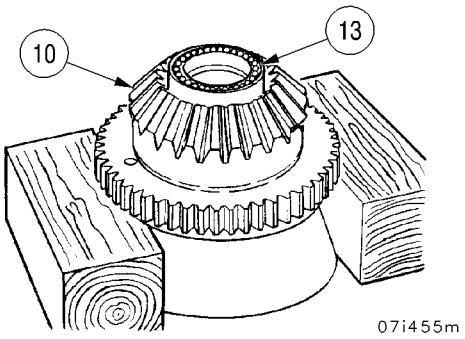
5. Remove snap ring (11) and double-row ball bearing (12) from steer bevel-driven gear (10). Discard snap ring.



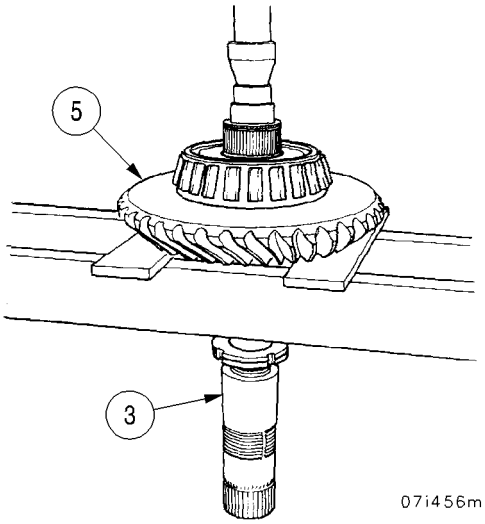
OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

DISASSEMBLY – Continued

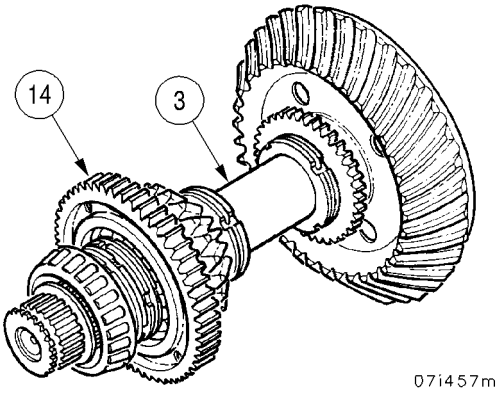
6. Support steer bevel-driven gear (10) on wood blocks. Drive inner bearing (13) and 94 needle bearing rollers out of steer bevel-driven gear (10).



7. Position drive shaft (3) and output bevel-driven gear (5) in press and remove drive shaft (3) from output bevel driven gear (5).



8. Remove brake coolant pump drive gear (14) from drive shaft (3).



OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

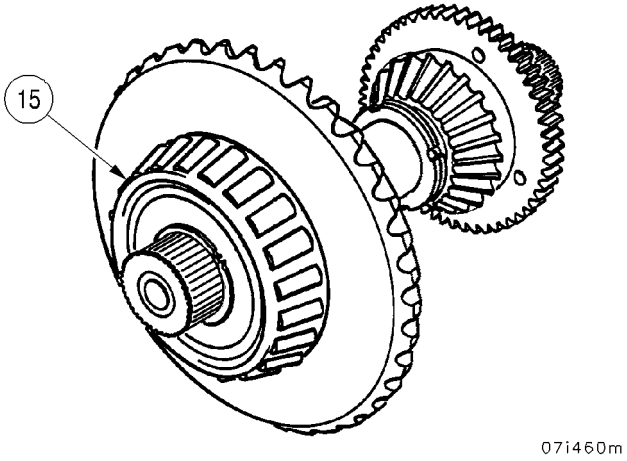
DISASSEMBLY – Continued

NOTE

Do not remove roller bearing from bevel-driven gear unless replacement is necessary. Perform Step 9 if replacement is necessary.

Do not remove spanner nuts from drive shaft unless replacement is necessary.

9. Support flat side of gear and drive bearing (15) off. Insert drift through holes in gear web and drive against race.



CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Output drive shaft	Bearing surface diameter on shaft	3.1490 to 3.1496 in. Wear limit: 3.1487 in.
	Bearing race fit on shaft	0.0006T to 0.0006L
	Bearing surface OD on shaft	3.0010 to 3.0015 in. Wear limit: 3.0007 in.
	Bearing fit on shaft	0.0015T to 0.0000L
Steer bevel-driven gear	Larger ID of gear	5.5109 to 5.5119 in. Wear limit: 5.5125 in.
	Bearing fit in gear	0.0009T to 0.0009L
	Smaller ID of gear	3.9092 to 3.9102 in. Wear limit: 3.9113 in.
	Bearing race and roller fit in gear	0.0015L to 0.0034L
Double-row ball bearing	Bearing OD	5.5110 to 5.5118 in.
	Bearing fit in gear	0.0009T to 0.0009L
	Bearing ID	3.1490 to 3.1496 in.
	Bearing fit on shaft	0.0006T to 0.0006L
Roller bearing	Bearing cone ID	3.0000 to 3.0010 in.
	Bearing fit in shaft	0.0015T to 0.0000L
	Bearing race OD	5.5115 to 5.5125 in.
	Bearing fit in retainer	0.0010T to 0.0030T
Steer bevel-driven gear bearing race	Bearing race OD	3.6572 to 3.6577 in. Wear limit: 3.6562 in.
	Bearing race ID	3.1490 to 3.1496 in.
	Bearing fit on shaft	0.0006T to 0.0006L
Steer bevel-driven gear needle bearing	Roller OD	0.1248 to 0.1250 in. Wear limit: 0.1243 in.
Right bearing retainer	Bearing surface ID of retainer	5.5095 to 5.5105 in. Wear limit: 5.5110 in.
Roller bearing assembly	Bearing race OD	3.1491 to 3.1496 in.
	Bearing race fit in housing bores	0.0005T to 0.0010L
	Bearing race ID	2.6751 to 2.6756 in.
	Fit of inner race in outer race	0.0017L to 0.0026L
	Bearing ID	1.3775 to 1.3780 in.
	Bearing fit on gear	0.0003T to 0.0013T
	OD of roller of inner race	2.6730 to 2.6734 in.
	Fit of inner race in outer race	0.0017L to 0.0026L

OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

FIT AND WEAR LIMITS - Continued

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Steer tie shaft idler gear	Gear bearing surfaces OD	1.3783 to 1.3788 in. Wear limit: 1.3781 in.
Steer bevel drive gear	Bearing surface OD of gear hub	2.2488 to 2.2494 in. Wear limit: 2.2483 in.
Steer bevel drive gear thrust washer	Thickness of washer	0.1260 to 0.1300 in. Wear limit: 0.1210 in.
Steer cross shaft	Bearing surface OD	1.5740 to 1.5746 in. Wear limit: 1.5737 in.
	Bearing fit on shaft	0.0003T to 0.0008L
	Bearing surface OD	1.9660 to 1.9675 in. Wear limit: 1.9665 in.
	Bearing surface OD	2.1643 to 2.1649 in.
	Bearing fit on shaft	0.0001T to 0.0011L
	Bearing surface OD	1.9950 to 1.9955 in. Wear limit: 1.9935 in.
	Bearing fit on shaft	0.0015L to 0.0030L
Roller bearing	Bearing ID	1.5743 to 1.5748 in.
	Bearing fit on shaft	0.0003T to 0.0008L
	Bearing OD	3.5427 to 3.5433 in.
	Fit of bearing races in housing bores	0.0005T to 0.0011L
Steer tie shaft	Shaft bearing surface OD	1.9681 to 1.9687 in. Wear limit: 1.9678 in.
	Bearing fit on shaft	0.0007T to 0.0004L
	Shaft bearing surface OD	2.1650 to 2.1655 in. Wear limit: 2.1647 in.
	Bearing fit on shaft	0.0007T to 0.0004L
Roller bearing	Bearing outer race ID	3.4653 to 3.4659 in.
	Fit of inner race in outer race	0.0022L to 0.0032L
	Bearing outer race OD	3.9364 to 3.9370 in.
	Fit of bearing in bores	0.0005T to 0.0011L
	Bearing ID	2.1648 to 2.1654 in.
	Bearing fit on shaft	0.0007T to 0.0004L
	Bearing inner race OD	3.4627 to 3.4631 in.
	Inner race fit in outer race	0.0022L to 0.0032L

OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

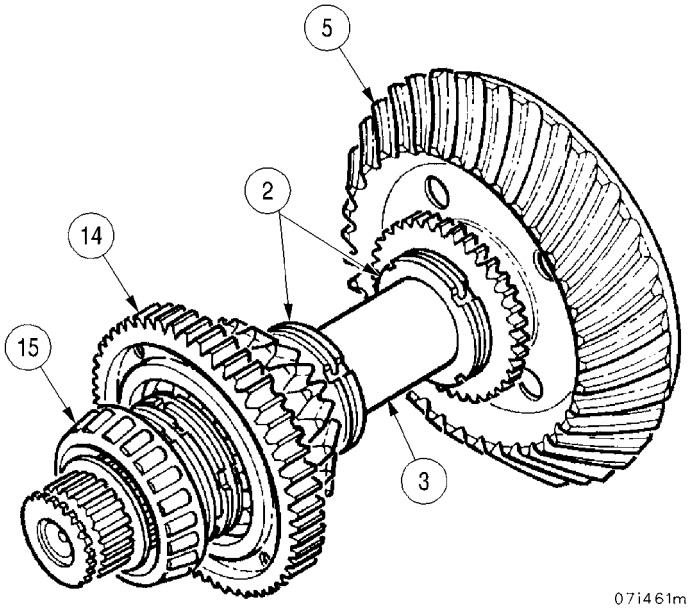
FIT AND WEAR LIMITS - Continued

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Roller bearing	Bearing inner race ID	1.9680 to 1.9685 in.
	Bearing fit on shaft	0.0007T to 0.0004L
	Bearing inner race ID	3 .4627 to 3.4631 in.
	Inner race fit in outer race	0.0022L to 0.0032L
	Bearing outer race ID	3.4653 to 3.4659 in.
	Inner race fit in outer race	0.0022L to 0.0032L
	Bearing outer race OD	3.5427 to 3.5433 in.
	Bearing fit in housing bores	0.0005T to 0.0011L
Fly wheel drive gear	Gear bearing surface ID	2.5623 to 2.5630 in. Wear limit: 2.5640 in.
Fly wheel	Bearing surface ID	3.9369 to 3.9377 in. Wear limit: 3.9381 in.
Ball bearing	Bearing ID	2.1648 to 2.1654 in.
	Bearing fit on shaft	0.0001T to 0.0011L
	Bearing OD	3.9364 to 3.9370 in.
	Bearing fit in fly wheel bore	0.0001T to 0.0013L
Transmission housing	Steer tie shaft bearing bore	3.9365 to 3.9375 in. Wear limit: 3.9379 in.
	Bearing fit in housing bore	0.0005T to 0.0011L
	Steer drive shaft bearing bore in housing	4.3306 to 4.3314 in. Wear limit: 4.3318 in.
	Bearing fit in housing bore	0.0001T to 0.0013L
	Tie shaft idler gear bearing bore in housing	3.1491 to 3.1501 in. Wear limit: 3.1504 in.
	Bearing fit in housing bore	0.0005T to 0.0010L
	Output drive shaft left bearing bore in housing	9.5000 to 9.5020 in.
	Bearing fit in housing bore	0.0010T to 0.0020L
Ball bearing	Bearing ID	1.9680 to 1.9685 in.
	Bearing OD	4.3301 to 4.3307 in.
Roller bearing	Bearing OD	3.5427 to 3.5433 in.
	Bearing race fit in housing bore	0.0005T to 0.0011L
	Bearing ID	1.5743 to 1.5748 in.
	Bearing fit on shaft	0.0003T to 0.0008L
Roller bearing	Bearing outer race ID	3.1577 to 3.1583 in.
	Fit of inner race in outer race	0.0020L to 0.0030L
	Bearing outer race OD	3.5427 to 3.5433 in.
	Bearing fit in housing bores	0.0005L to 0.0011L
	Bearing inner race ID	1.9680 to 1.9685 in.
	Bearing fit on shaft	0.0007T to 0.0004L
	Bearing inner race OD	3.4627 to 3.4631 in.
	Fit of inner race in outer race	0.0020L to 0.0030L
	Bearing ID	2.1648 to 2.1654 in.
	Bearing outer race OD	3.9364 to 3.9370 in.
	Bearing fit in housing	0.0005T to 0.0011L

OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

ASSEMBLY

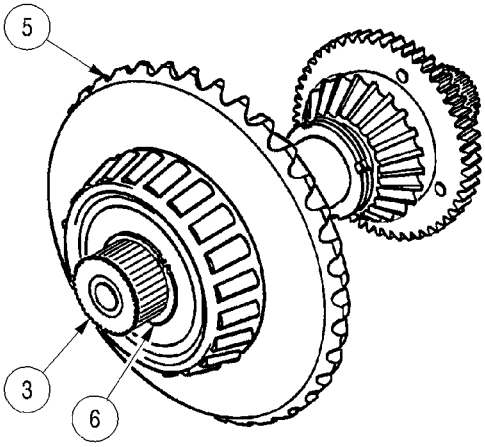
1. Install spanner nuts (2) over smaller diameter end of shaft. Thread first nut, chamfered side first, completely over first threads on shaft, down far enough to thread second nut, chamfered side out, fully on to first threads.
2. Install coolant pump drive gears (14), recessed end first, over long-splined end of shaft (3). Position gear against spanner nut (2).
3. Install large roller bearing (15), if removed. Coat gear (5) with white lead. Press bearing, large diameter first, onto hub.

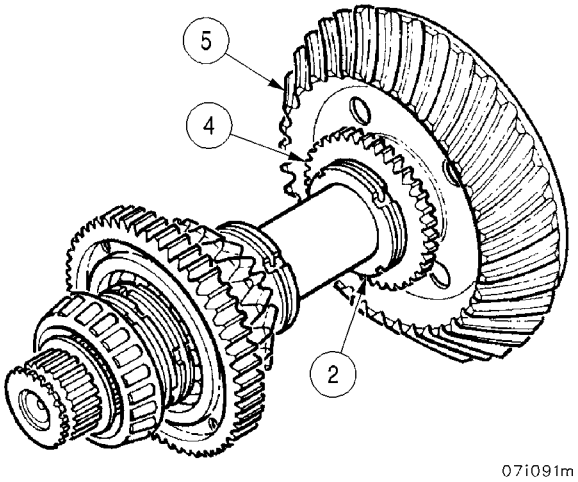


WARNING

Use tongs or gloves to prevent injury when handling heated parts.

4. Install bevel-driven gear (5), tooth side first, onto long-splined end of shaft (3). Press shaft (3) into gear (5) until snap ring can be installed. Install new snap ring (6).
5. Tighten spanner nut (2) against oil pump gear (4) until output bevel-driven gear (5) is tight against snap ring (6) and hole in spanner nut (2) aligns with slot in shaft.

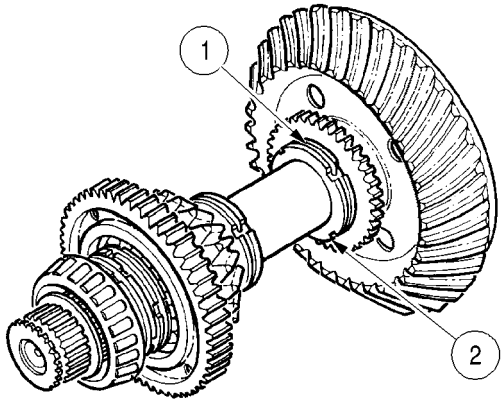




OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

ASSEMBLY - Continued

6. Install four lock rings (1), wrapping each counterclockwise into groove in four spanner nuts (2) (viewed from short-splined end of shaft). Stake spanner nut (2) over lock ring (1) at several points around nut circumference.



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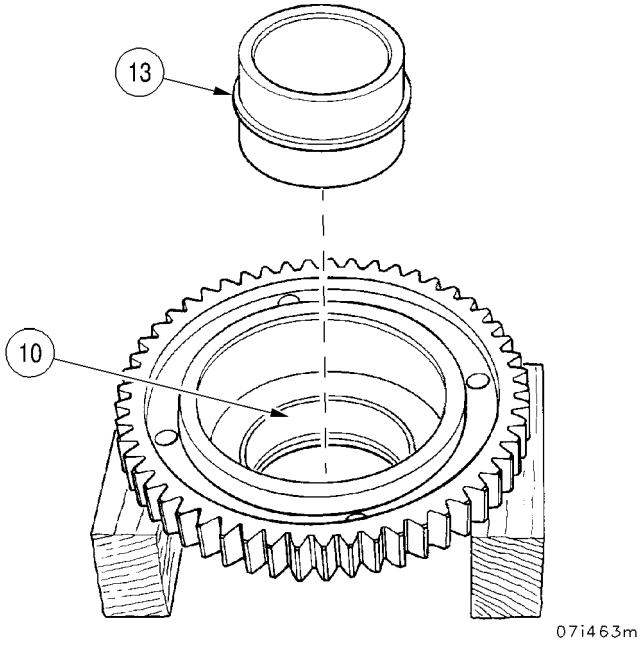
7. Install inner bearing ring (13) with bearing into steer bevel gear (10).



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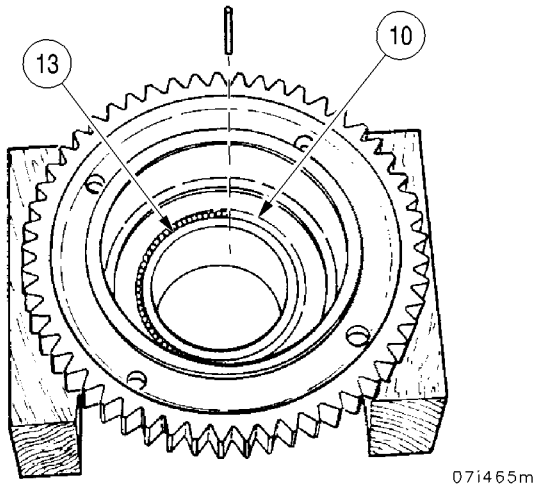
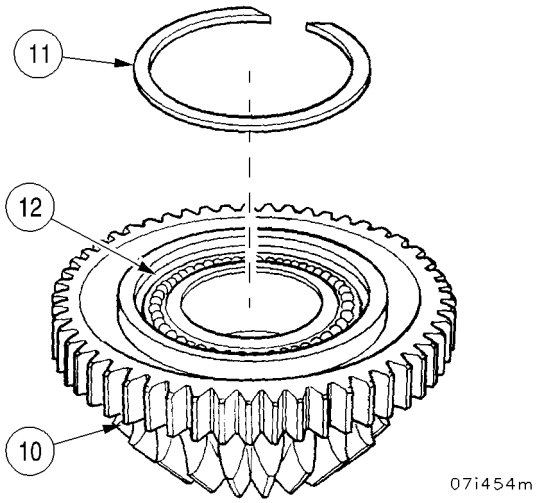
OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

ASSEMBLY – Continued

8. Install 94 needle bearing rollers between inner bearing ring (13) and gear (10).



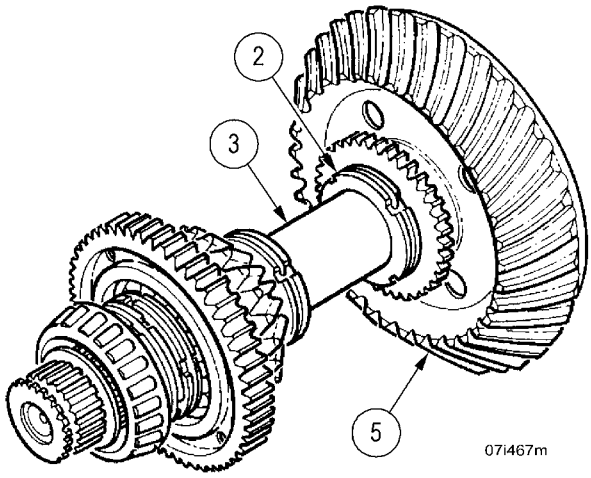
9. Coat double-row ball bearing (12) with white lead. Install double-row ball bearing (12), numbered side up, into gear (10). Install new snap ring (11).



OUTPUT DRIVE SHAFT AND RELATED PARTS REPAIR – CONTINUED 0077 00

ASSEMBLY – Continued

10. Coat shaft (3) with white lead. Install gear assembly, seating gear assembly (5) against spanner nut (2).



NOTE

FOLLOW-ON MAINTENANCE:
Install output drive shaft and related parts
(WP 0075 00)

END OF WORK PACKAGE

TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT 0078 00

THIS WORK PACKAGE COVERS:

Removal, Installation

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Lifting sling (item 13, WP 0088 00)
Suitable lifting device (2000 lb capacity min)
Mechanical puller (item 8, WP 0088 00)
Eyebolt (item 25, WP 0088 00)
Retaining ring pliers set (item 21, WP 0088 00)

Materials/Parts

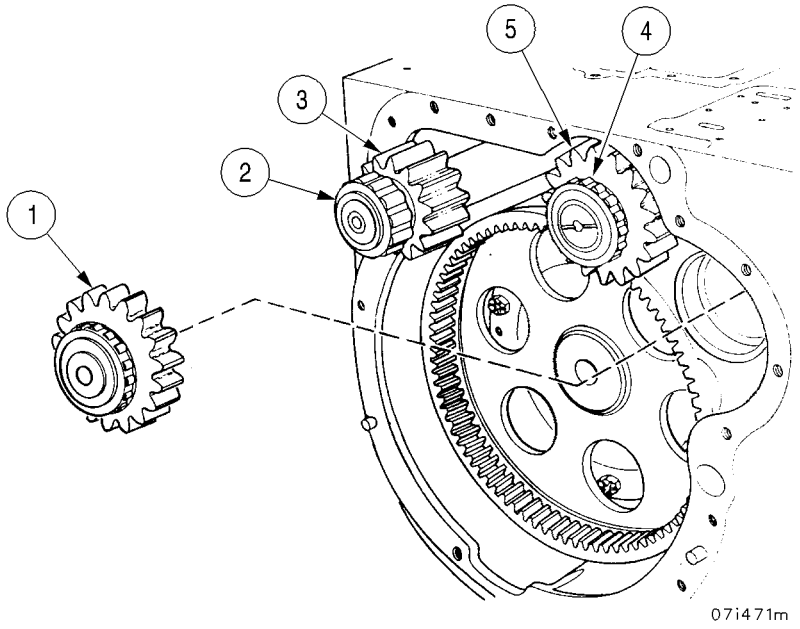
Lockwasher (2) (item 99, WP 0087 00)
Snap ring (2) (item 50, WP 0087 00)
Snap ring (2) (item 89, WP 0087 00)
Snap ring (item 51, WP 0087 00)
Snap ring (3) (item 43, WP 0087 00)
Preformed packing (item 59, WP 0087 00)

Equipment Conditions

Left and right steer clutch assemblies removed (WP 0038 000)

REMOVAL

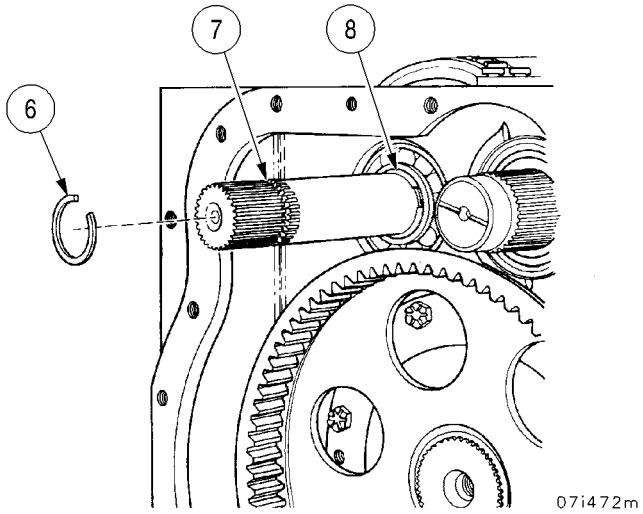
1. Remove idler gear assembly (1), bearing (2), pinion (3), bearing (4) and pinion (5). Remove bearings from idler gear assembly (1).



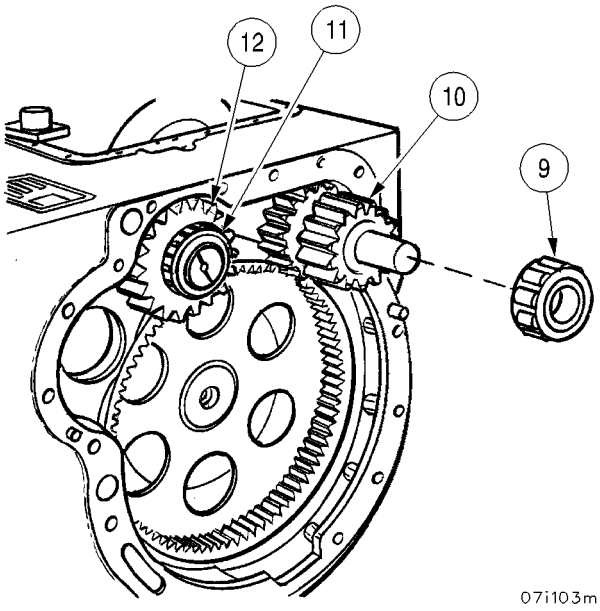
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

2. Remove snap ring (6) from groove (7). Remove snap ring (8). Discard snap rings.



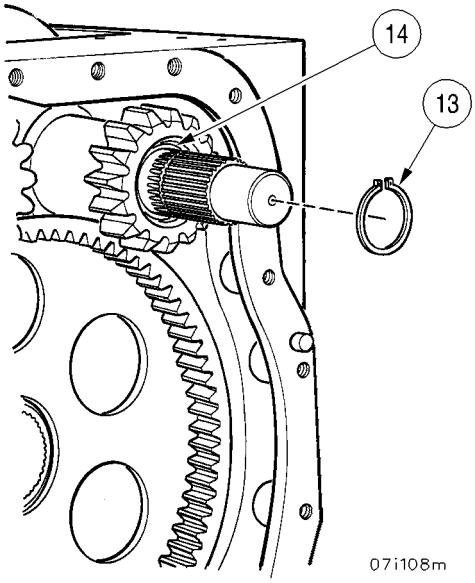
3. Remove bearing (9), pinion (10), bearing (11) and pinion (12).



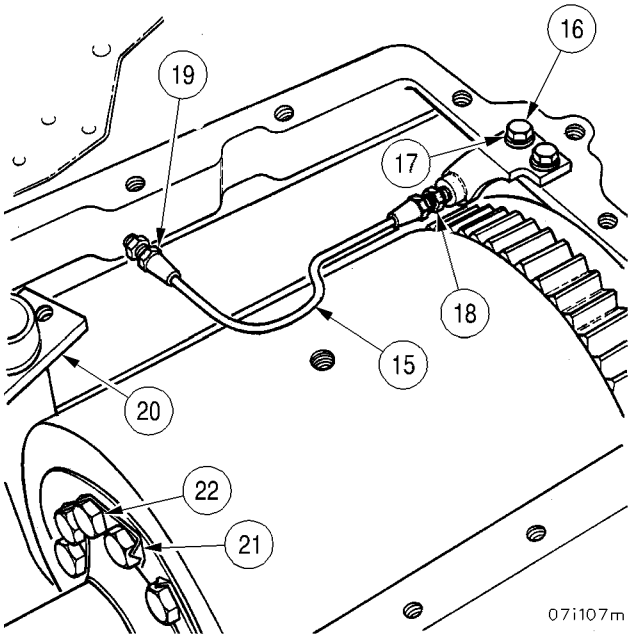
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

4. Remove external snap ring (13) and internal snap ring (14). Discard snap rings.



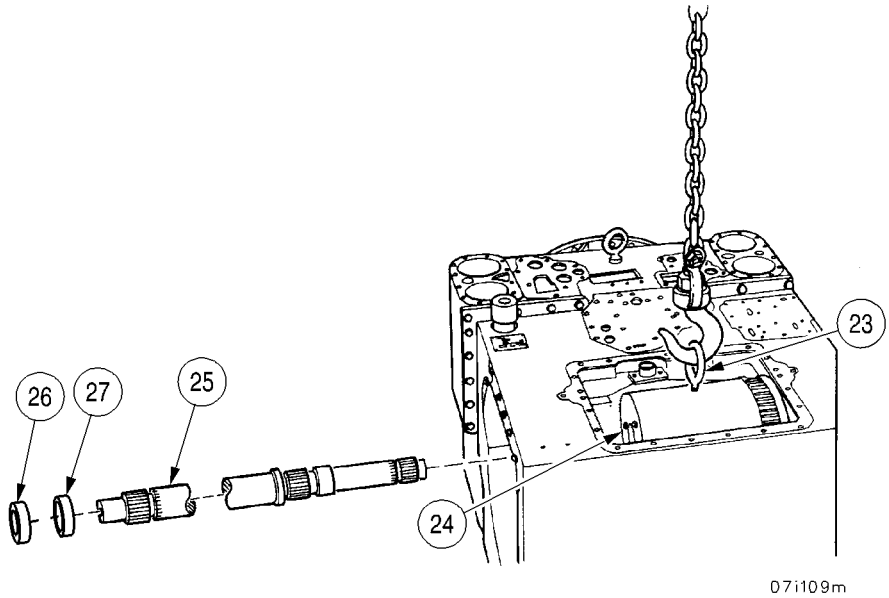
5. Remove governor oil line (15), two bolts (16), two lockwashers (17), pilot tube assembly (18) and fitting (19). Remove air tube assembly (20). Flatten lock strips (21) and remove 12 bolts (22). Discard lockwashers.



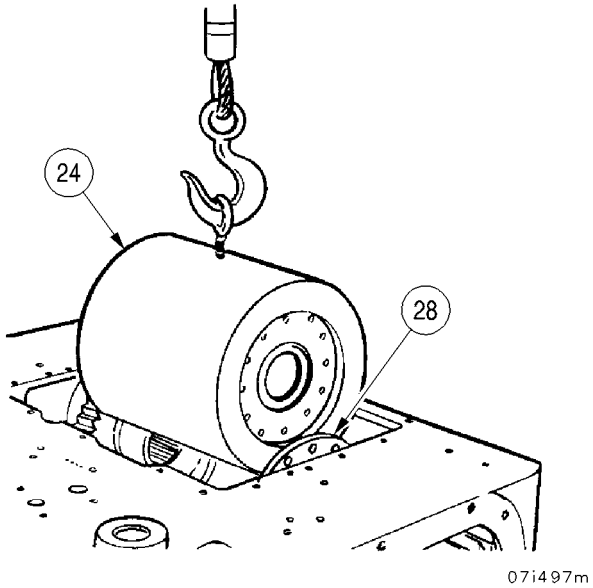
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

6. Install eyebolt (23). Attach lifting device to support flywheel (24). Remove steer-cross shaft (25), bearing (26) and bearing spacer (27).



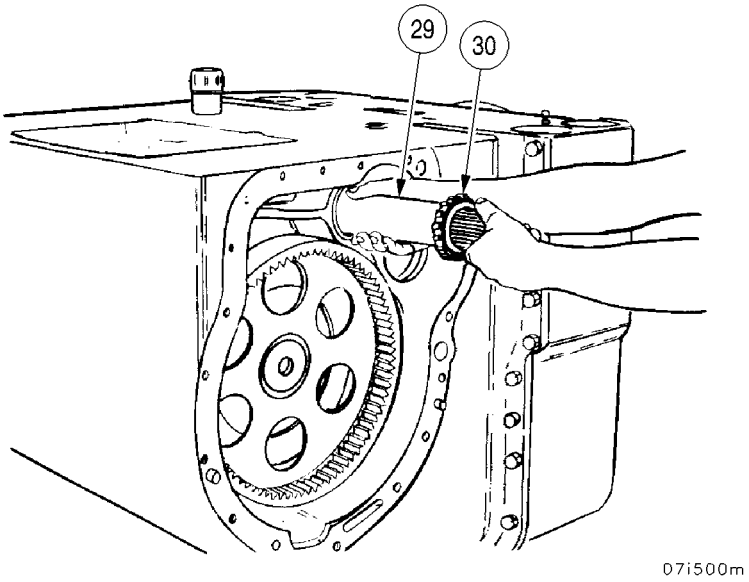
7. Remove flywheel (24) after freeing flywheel drive gear (28) from recess in flywheel (24).



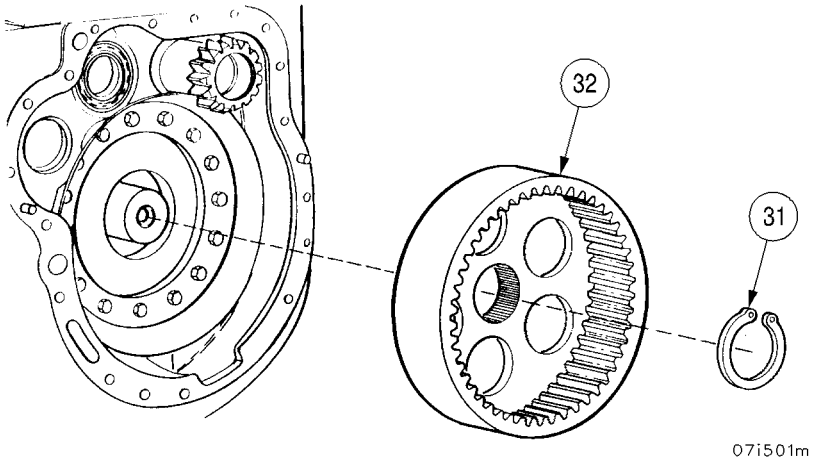
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

8. Install mechanical puller on right side of transmission to push steer tie shaft (29) to left until free of the right end bearing (30). Remove steer tie shaft (29). Remove right end bearing (30) from steer tie shaft.



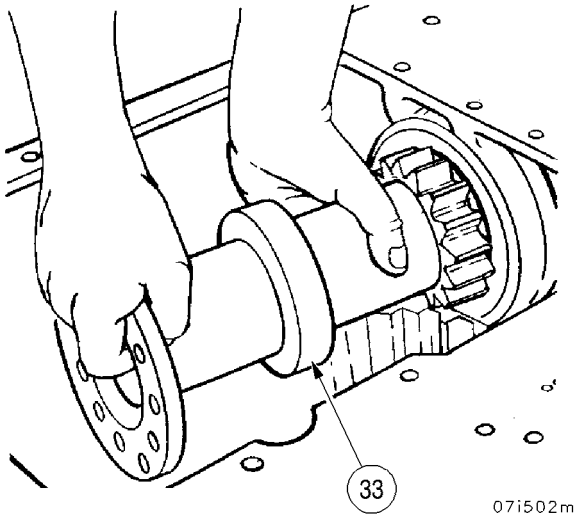
9. Remove snap ring (31) and ring gear (32). Discard snap ring.



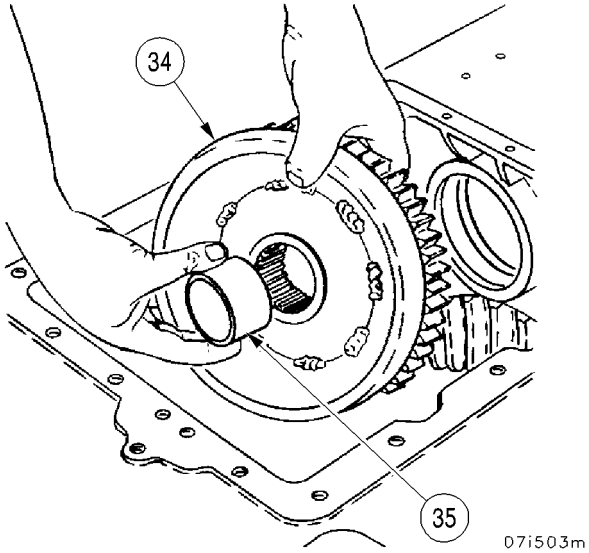
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

10. Remove flywheel gear (33).



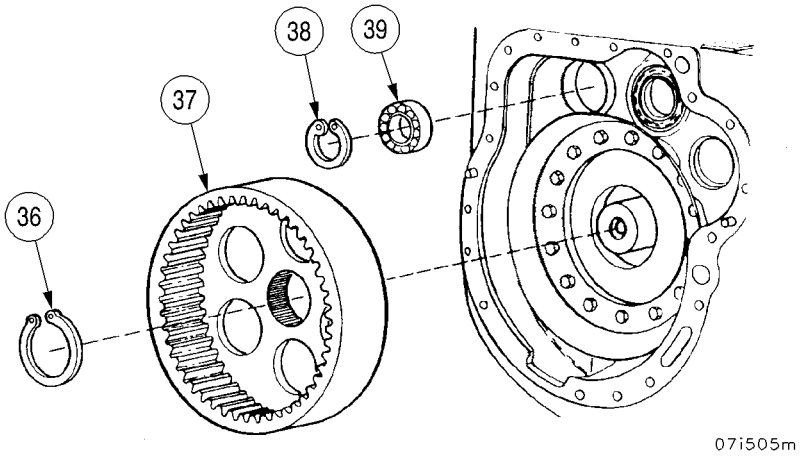
11. Remove steershaft gear assembly (34) and spacer (35).



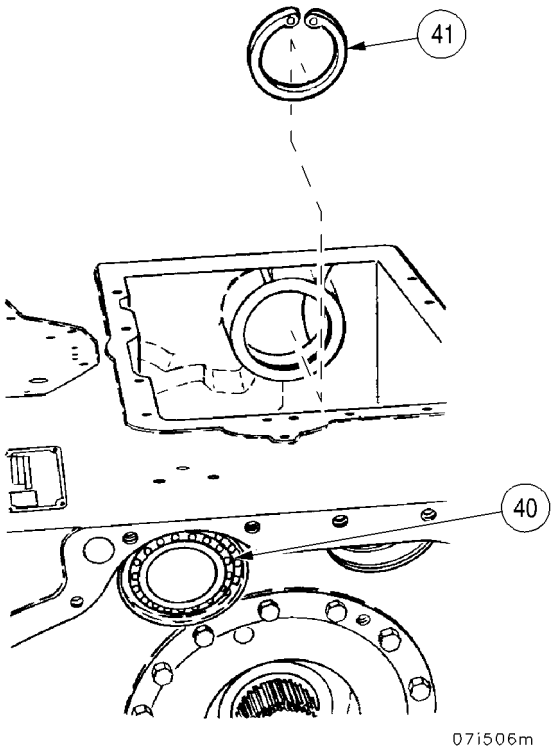
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

REMOVAL – Continued

12. Remove snap ring (36), ring gear (37), internal snap ring (38) and ball bearing (39). Discard snap rings.



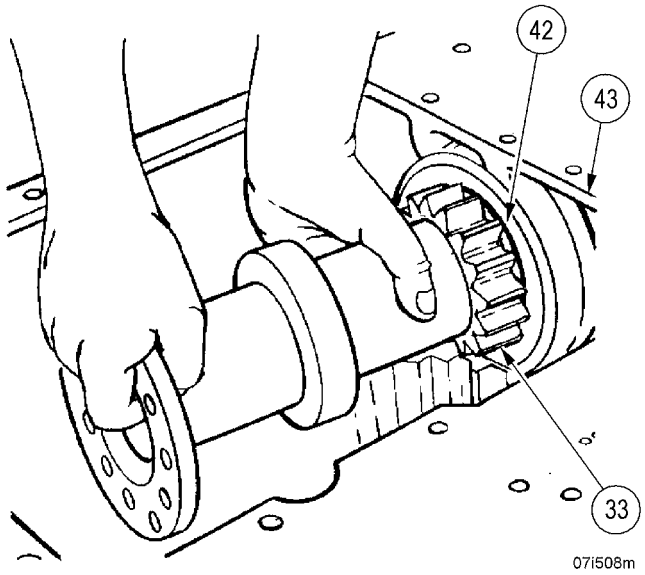
13. Remove tie shaft left bearing (40) and internal snap ring (41). Discard snap ring.



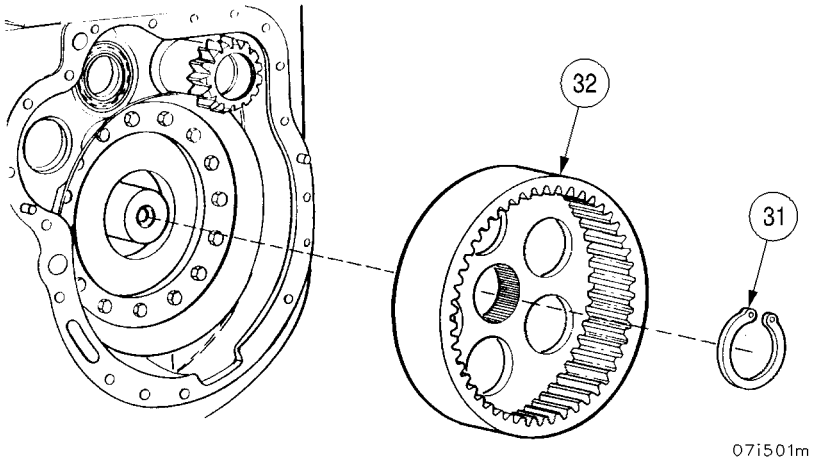
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

INSTALLATION

1. Install flywheel drive gear (33) through bore (42) in transmission housing (43).



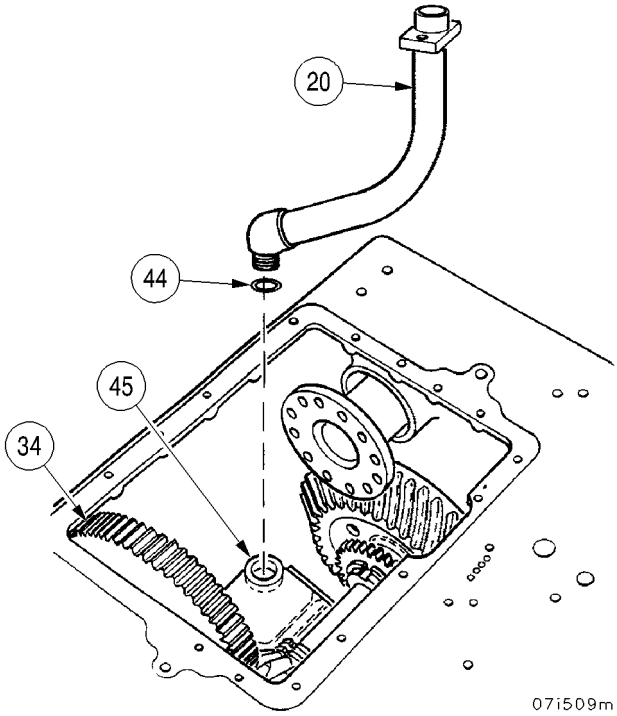
2. Install ring gear (32) and new snap ring (31).



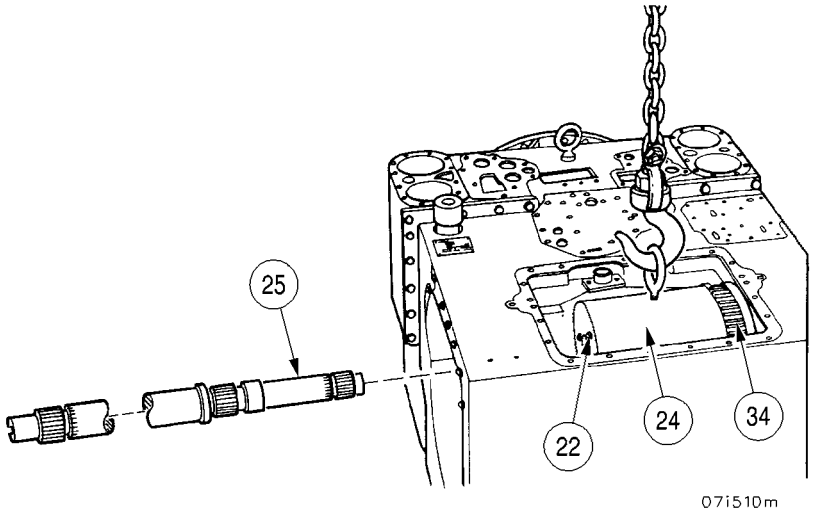
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

INSTALLATION – Continued

3. Install steer-cross shaft drive gear assembly (34). Install new preformed packing (44) onto air tube assembly (20). Install air tube assembly (20) into pump port (45).



4. Install flywheel (24), temporarily starting two bolts (22) to align steer-cross shaft gear assembly (34) with flywheel (24). While flywheel (24) is suspended from hoist, install steer-cross shaft (25).



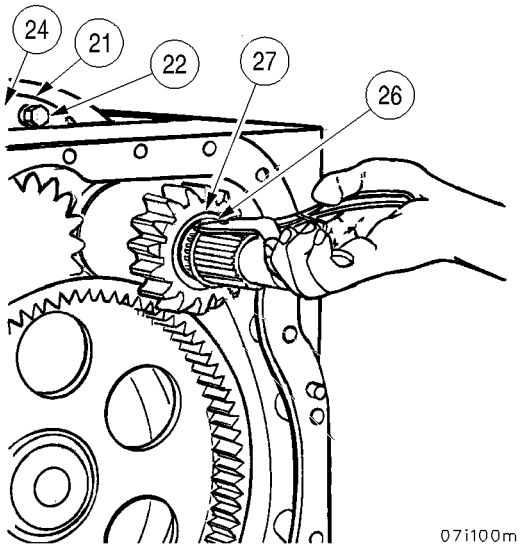
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

INSTALLATION – Continued

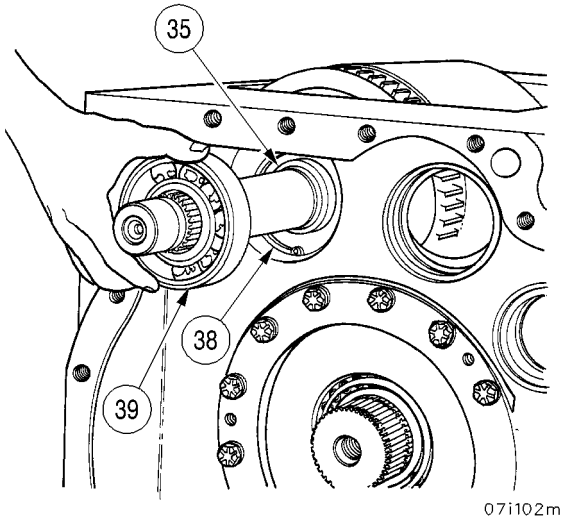
NOTE

Bearing used in right side of flywheel must have bronze separator.

5. Remove two bolts (22) temporarily installed in Installation Step 4. Install six lock strips (21) and 12 bolts (22). Tighten 12 bolts (22) to 96 to 115 lb-ft (130.2 to 155.9 N•m). Bend corners of each lock strip (21) against heads of 12 bolts (22). Install bearing spacer (27) and bearing assembly (26), tapping bearing assembly (26) lightly into bore of flywheel (24).



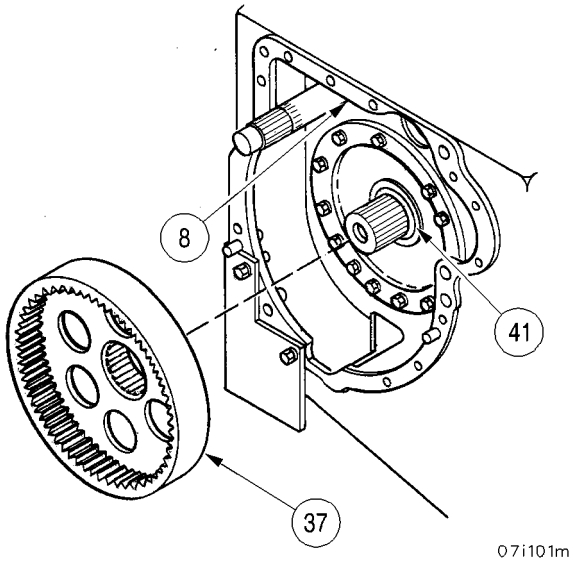
6. Install spacer (35). Install new internal snap ring (38) into inner groove and install bearing (39) against new snap ring (38).



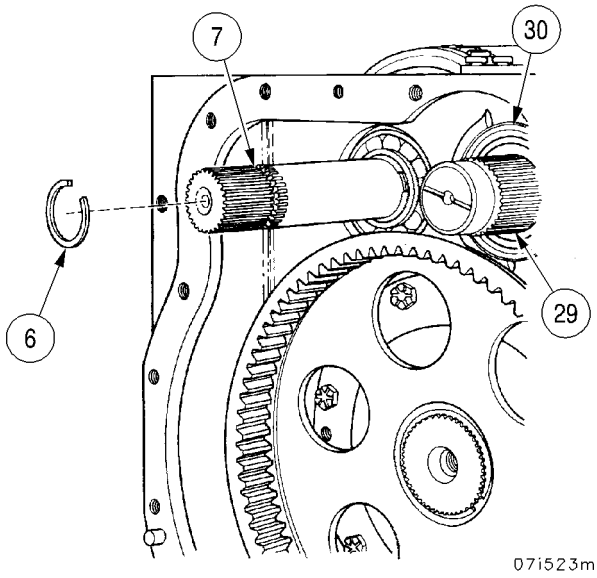
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

INSTALLATION – Continued

7. Install new snap ring (8), new snap ring (41), and ring gear (37) at right side of transmission.



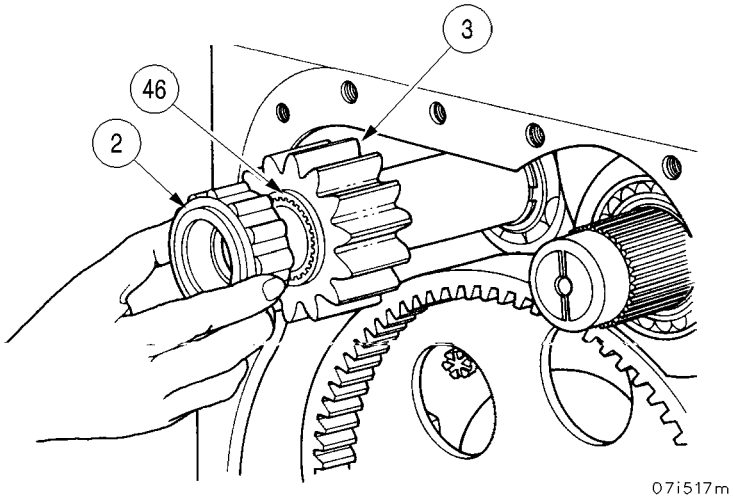
8. Install steer tie shaft (29) and bearing (30). Install new snap ring (6) into groove (7).



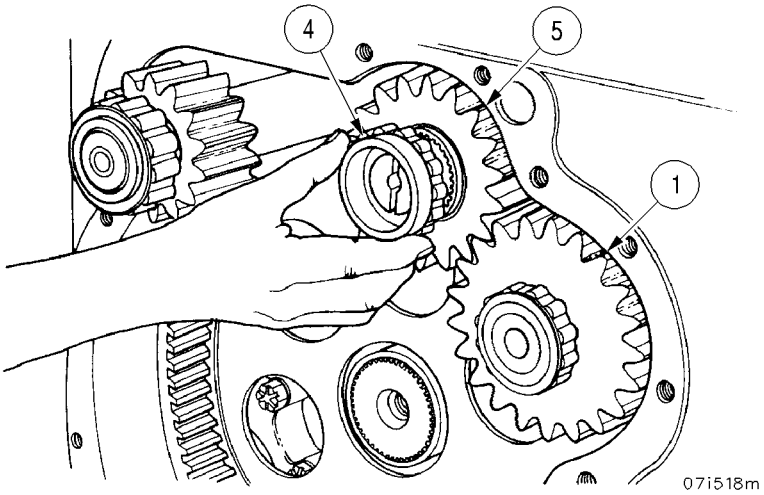
TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

INSTALLATION – Continued

9. Install right steering tie shaft pinion gear (3) with shoulder (46) facing out. Install bearing (2).

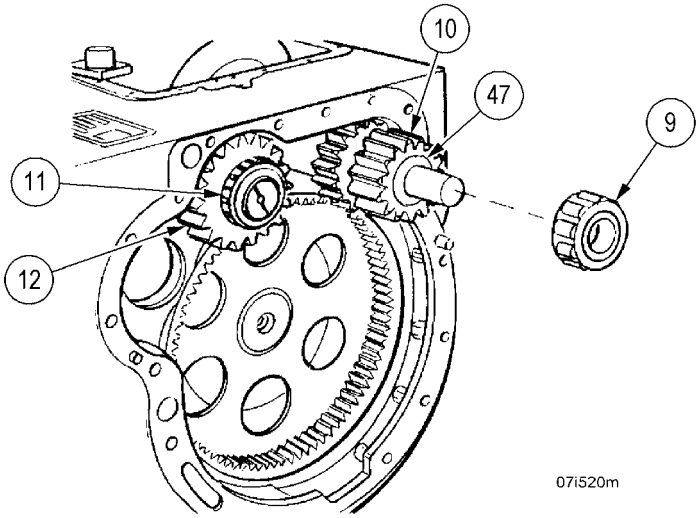


10. Install right steering drive pinion (5), idler gear assembly (1) and bearing (4).



TRANSMISSION HOUSING ASSEMBLY AND STEERING COMPONENTS REPLACEMENT – CONTINUED 0078 00

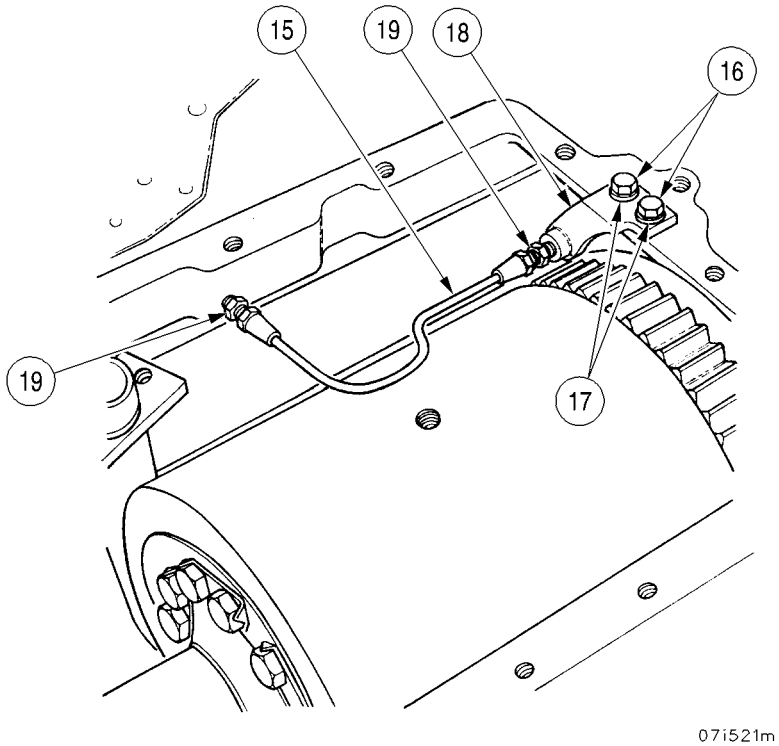
11. Install left steering drive pinion (12) and bearing (11).
12. Install left steering tie shaft pinion (10) with shoulder (47) facing out. Install bearing (9).



NOTE

It is important that pilot be as near as possible to inside circumference of governor ring without interfering with rotation. This ensures maximum governor pressure.

13. Install two tube fittings (19), pilot tube assembly (18) with two bolts (16) and two new lockwashers (17). Install governor oil line (15).



NOTE

FOLLOW-ON MAINTENANCE:
Install left and right steer clutch assemblies (WP 0038 00)

END OF WORK PACKAGE

TRANSMISSION HOUSING ASSEMBLY REPAIR 0079 00

THIS WORK PACKAGE COVERS:

Disassembly, Cleaning, Inspection, Fit and Wear Limits, Assembly

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Materials/Parts

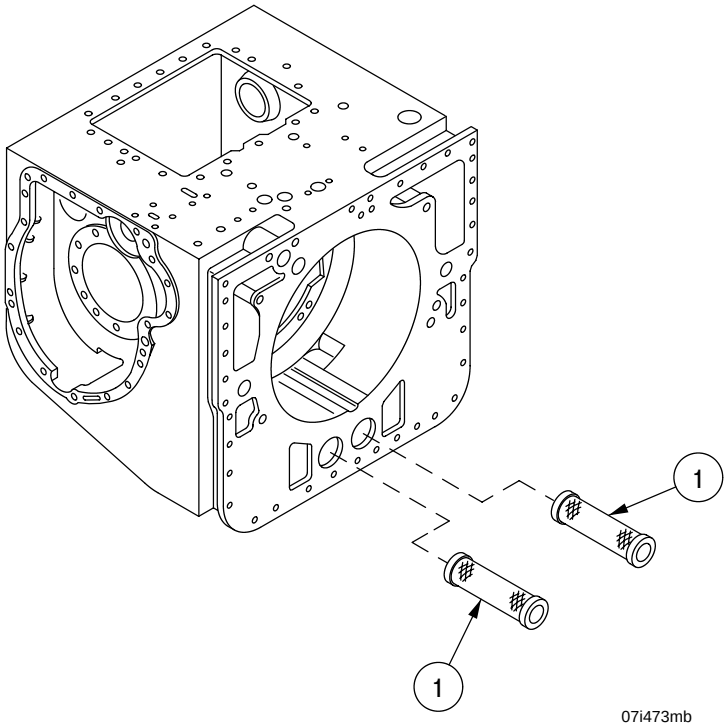
White lead (item 13, WP 0085 00)
Preformed packings (2) (item 86, WP 0087 00)
Preformed packing (item 10, WP 0087 00)
Lockwasher (item 99, WP 0087 00)
Strainer element (item 16, WP 0087 00)

Equipment Conditions

Torque converter assembly removed (WP 0059 00)
Left and right steer clutch housing assemblies removed (WP 0038 00)

DISASSEMBLY

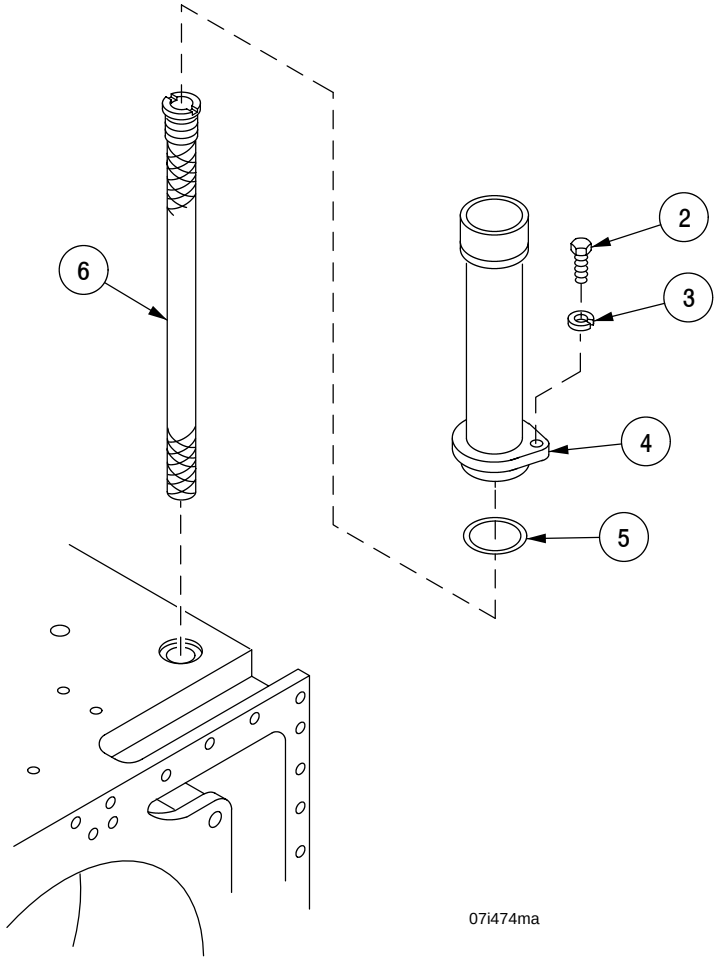
1. Remove two oil strainer screen assemblies (1) from opening at lower front of housing.



TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

DISASSEMBLY – Continued

2. Remove bolt (2), lockwasher (3), oil filler tube (4) and o-ring (5). Unscrew and remove oil filler screen (6). Discard lockwasher and o-ring.



TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

DISASSEMBLY – Continued

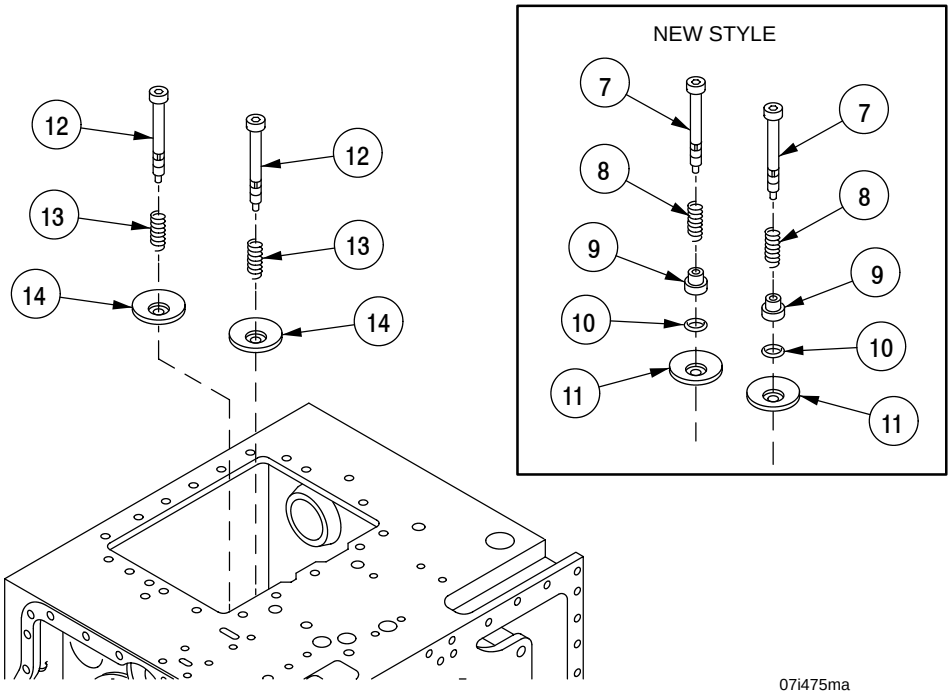
NOTE

Do not remove coolant valve unless replacement is necessary.

There are two styles of brake coolant valve assemblies. The new style includes a seal retainer and preformed packing. Disassembly procedures for the new style assemblies are given in Step 3. Disassembly procedures for the old style are given in Step 4.

Do not discard new style check valve.

3. Remove pressed in pilots (7) using a suitable puller. Remove springs (8), seal retainers (9), preformed packings (10) and check valves (11) from transmission housing. Discard preformed packings.
4. Remove pressed in pilots (12) using a suitable puller. Remove springs (13) and check valves (17). Discard check valves.



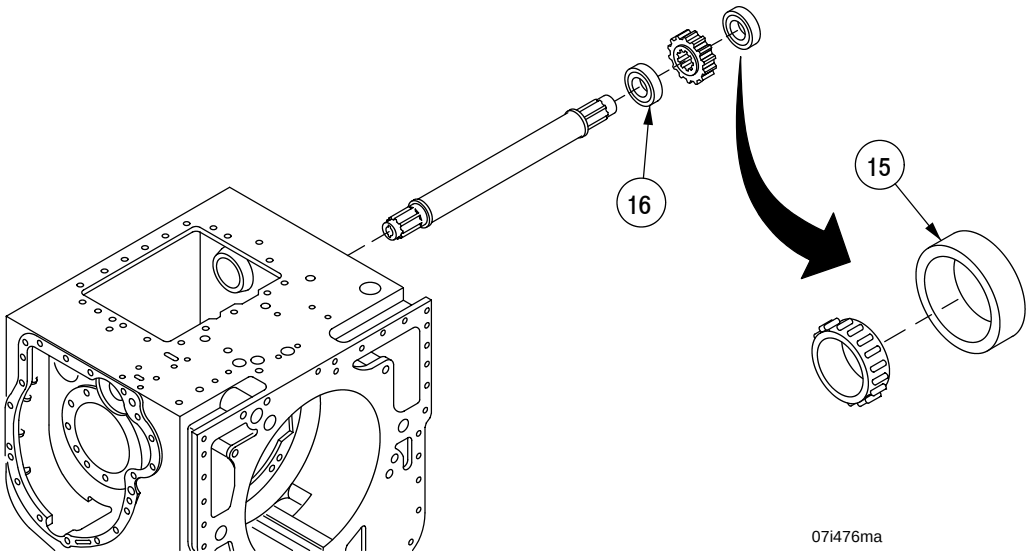
TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

DISASSEMBLY – Continued

NOTE

Do not remove steer tie shaft bearing outer races or idler gear bearing outer race unless replacement is necessary. Perform Step 5 if replacement of either is necessary.

5. Remove tie shaft bearing outer races (15), using a soft metal drift to drive toward outside of housing. Idler gear bearing outer race (16) is removed by prying out, using a heeled tool.



NOTE

Remaining minor components (studs, dowel pins, and plugs) need not be removed unless replacement is necessary.

CLEANING

See WP 0018 00 for cleaning procedures.

INSPECTION

See WP 0018 00 for general inspection and repair recommendations.

TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

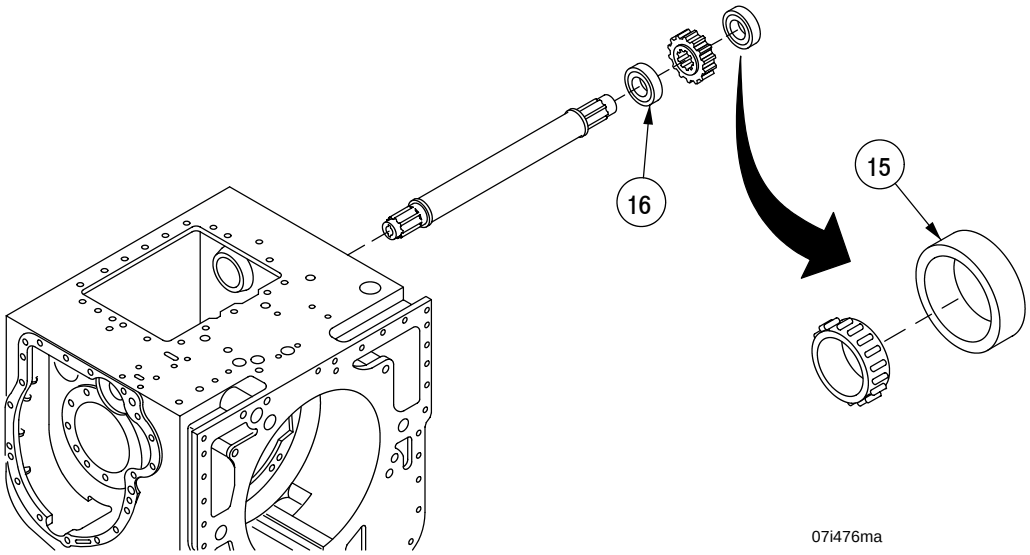
FIT AND WEAR LIMITS

Check the following parts to the dimensions listed. Replace if not within the specified dimensions.

PART NAME	CHECK POINTS	ACCEPTABLE LIMITS
Transmission housing	Steer tie shaft bearing bore (left and right side of housing)	3.9365 to 3.9375 in. Wear limit: 3.9379 in.
	Bearing fit in housing bores	0.0005T to 0.0011L
	Steer drive shaft bearing bore in housing	4.3306 to 4.3314 in. Wear limit: 4.3318 in.
	Bearing fit in housing bore	0.0001T to 0.0013L
	Tie shaft idler gear bearing bores in housing	3.1491 to 3.1501 in. Wear limit: 3.1504 in.
	Bearing race fit in housing bores	0.0005T to 0.0010L
	Output drive shaft left bearing bore in housing	9.5000 to 9.5020 in. Wear limit: 9.5030 in.
	Bearing fit in housing bore	0.0010T to 0.0020L
Brake coolant valve helical compression spring	Free length of spring	2.514 in.
	Length under load	2.59 to 3.65 in. at 4.46 lb.

ASSEMBLY

1. Install tie shaft and idler bearing outer races (15 and 16), if removed. Coat races with white lead. Drive races evenly, small end first, into bores in housing.
2. Install minor parts (studs, dowels and plugs).



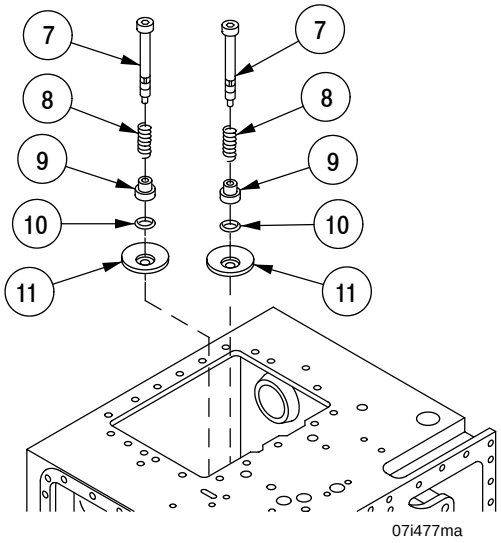
TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

ASSEMBLY – Continued

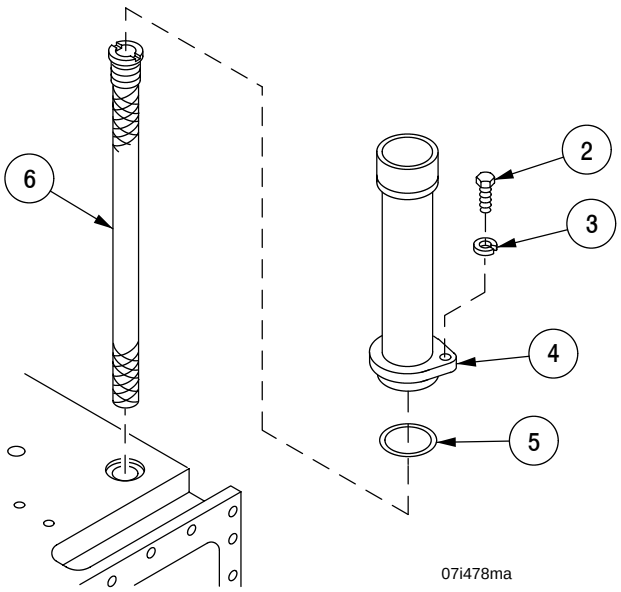
NOTE

Install new style brake coolant valve assemblies.

3. Assemble springs (8), seal retainers (9), new preformed packings (10) and check valves (11) on pilots (7). Install the complete assembly into main housing. Tap pilots (7) into the housing surface until flush to 0.030 inch below the pump mounting surfaces.



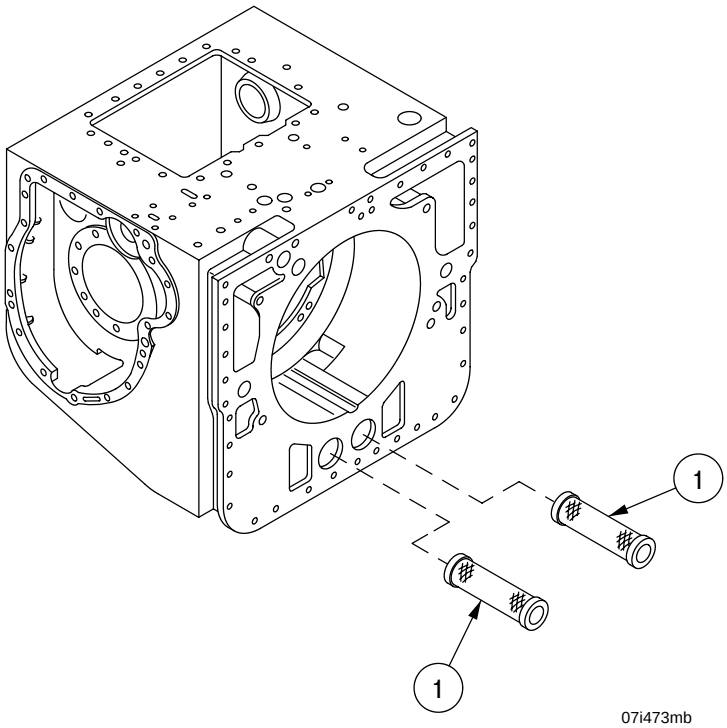
4. Install oil filter screen assembly (6). Install oil filter tube (4) and new o-ring (5). Fasten with bolt (2) and new lockwasher (3).



TRANSMISSION HOUSING ASSEMBLY REPAIR – CONTINUED 0079 00

ASSEMBLY – Continued

5. Install two oil strainer screen assemblies (1) in circular openings at lower front transmission housing. Make sure that the inner ends of the screen assemblies enter inner sockets and that screws are pushed into housing until flush with front surface. Inspect after installation to be sure screens are not buckled.



NOTE

FOLLOW-ON MAINTENANCE:
Install torque converter assembly (WP 0059 00)
Install left and right steer clutch housing assemblies (WP 0038 00)

END OF WORK PACKAGE

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED ON TEST STAND) 0080 00

THIS WORK PACKAGE COVERS:

Oil Pressure Readings, Functional Test

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Gage, pressure indicating 0-60 psi (2) (item 38, WP 0088 00)
Gage, pressure indicating 0-200 psi (2) (item 40, WP 0088 00)
Gage, pressure indicating 0-300 psi (2) (item 28, WP 0088 00)
Gage, pressure indicating 0-400 psi (2) (item 41, WP 0088 00)
Gage, pressure indicating 0-160 psi (2) (item 39, WP 0088 00)
Torque wrench (item 22, WP 0088 00)
Shift selector linkage and manual control
For shifting through all ranges
Steer control linkage and manual control
For operating steer control valve
External oil cooler
Parts kit (item 5, WP 0088 00)

Tools and Special Tools – Continued

Control for varying the transmission input speed (engine throttle or variable electric motor control)
Motor or engine of approximately 100 hp
Properly equipped test stand with a means for driving a transmission motor or engine of approximately 100 hp

Equipment Conditions

Vehicle parked and blocked (TM 9-2350-256-10)

References

TM 9-2350-256-10

OIL PRESSURE READINGS

NOTE

Data sample test log sheet is illustrated in this work package.

Use the oil pressures listed in the data test log sheets as normal values when testing the transmissions.

All necessary oil pressure tests can be made concurrent with functional test outlined in functional test and test data log.

During test conducted on a test stand, parts kit (item 5, WP 0088 00) must be installed to prevent loss of air pressure, which maintains proper oil levels.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED ON TEST STAND) – CONTINUED 0080 00

OIL PRESSURE READINGS – Continued

1. Check transmission oil level (LO 9-2350-256-12). Add or drain oil as required to establish correct oil level.
2. With shift selector control in neutral position, start engine and allow transmission to run until it reaches normal operating temperature (approximately 200 degrees F).

CAUTION

Do not exceed 1020 rpm during reverse range operation.

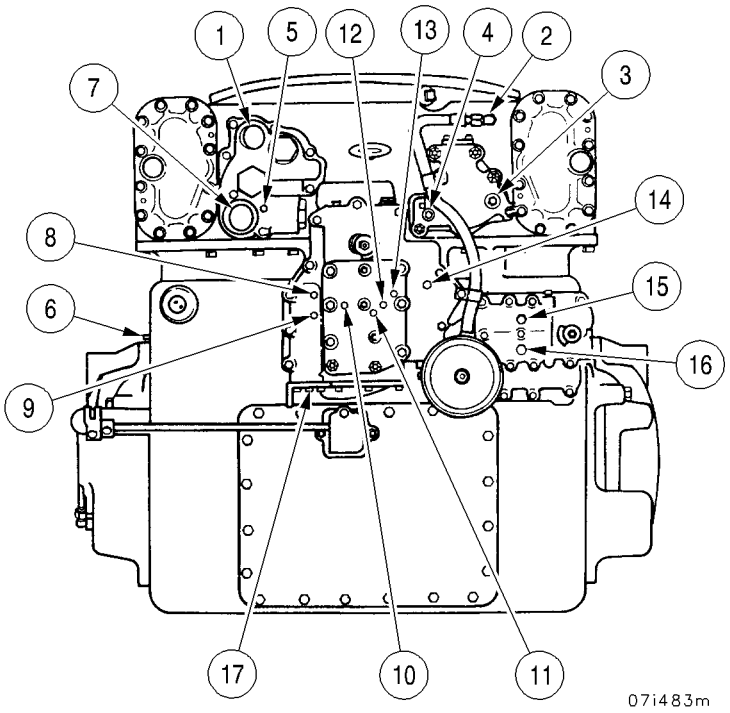
3. During warm-up, input speed should be approximately 980 to 1020 rpm. Shift through all ranges several times to ensure that hydraulic system is completely charged. Reduce input speed while making shifts from forward to reverse range or from reverse to forward range.
4. While operating transmission during warm-up period, inspect transmission thoroughly for evidence of oil leakage at all split lines and around all plugs and bolts. If leakage is present, check plugs and bolts for tightness. If leakage continues, replace gaskets where required. Leakage of oil, in many cases, can cause faulty operation of transmission.
5. Illustration in this work package shows oil pressure checkpoints, breather, manifold vacuum connections and oil cooler connections. Pressure gages used during tests should be connected as follows:
   a. Gage 0.0 to 60 psi – Check points 6 and 8.
   b. Gage 0.0 to 160 psi – Check point 4.
   c. Gage 0.0 to 200 psi – Check points 3, 5, 15, and 16.
   d. Gage 0.0 to 400 psi – Check points 9, 10, 11, 12, 13, and 14.

NOTE

Gage 0.0 to 200 psi may be installed at checkpoints 10 or 12. Gage 0.0 to 300 psi may be installed at checkpoints 3, 4, 5, 6, 8, 10, 12, 15, and 16.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED ON TEST STAND) – CONTINUED 0080 00

OIL PRESSURE READINGS – Continued



1 – Oil line connection (from cooler)
2 – Breather connection
3 – Steer supply pressure
4 – Converter in pressure
5 – Converter out pressure
6 – Lubrication pressure
7 – Oil line connection (to cooler)
8 – Governor pressure
9 – Lockup clutch apply pressure
10 – High range clutch apply pressure
11 – Reverse range clutch apply pressure
12 – Intermediate range clutch apply pressure
13 – Low range clutch apply pressure
14 – Main pressure
15 – Right steer clutch apply pressure
16 – Left steer clutch apply pressure
17 – Throttle-operated lockup relay valve module

Figure 1. Oil pressure check points.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED ON TEST STAND) – CONTINUED 0080 00

FUNCTIONAL TEST

1. Test data logs (Figure 2) are guides for making proper tests as well providing spaces to record actual test results. In addition, above each test entry space, the normal pressures are included for comparison with test results.
2. In all tests, transmission oil must be at normal operating temperature (approximately 200 degrees F). Connect the gages as indicated for each test in test data logs. Position range selector control and steer control as indicated in test data log.
3. Reduce speed of transmission input to engine idle speed before engaging desired range. Slowly increase speed to desired input speed. Record readings for each test.
4. Do not attempt to install gages while transmission is operating. Reinstall plugs immediately upon removing gages.
5. When conducting test for steer clutch pressure, move steer control from center to full steer while observing pressure rise. Pressure should rise to maximum as control is moved fully to steer position.
6. In test for lockup engagement, increase speed slowly until lockup apply pressure shows on gage. The gage connected at location 9 (Figure 1) should read no pressure until lockup engages. At moment pressure shows on gage at location 9, record the input speed.
7. In test for lockup release, first increase input speed to above where lockup occurs. Slowly reduce speed until applied pressure at location 9 (Figure 1) drops quickly. At this moment, record input speed.
8. When tests are completed, remove gages and install plugs, check transmission for leakage, repair as needed. Remove transmission parts kit.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED ON TEST STAND) – CONTINUED 0080 00

FUNCTIONAL TEST – Continued

MODEL XT-1410-4 SERIAL NO._____PAGE NO._____

	Neutral	Low Range	Intermediate Range	High Range	Reverse Range	Right Steer	Left Steer
Connect gage Figure 1	5, 8, 14	5, 8, 13, 14	5, 8, 12, 14	5, 8, 10, 14	5, 8, 11, 14	5, 8, 14, 15	5, 8, 14, 16
Range selector position	N	1	2	3	R	N	N
Input rpm	1000	1000	1000	1000	1000	1000	1000
Normal main pressure	120 min	300 min	120 min	120 min	300 min	120 min	120 min
Actual main pressure							
Normal lubrication pressure	12 min	12 min	12 min	12 min	12 min	3 min	3 min
Actual lubrication pressure							
Normal right-steer pressure	0	0	0	0	0	108 min psi (full steer)	0
Actual right-steer pressure							
Normal left-steer pressure	0	0	0	0	0	0	108 min psi (full steer)
Actual left-steer pressure							
Steer indicator position	Center	Center	Center	Center	Center	R*	L*

Torque Converter Lockup Operation		Lockup engages Input rpm	Lockup releases Input rpm
Model XT-1410-4**	Normal	1700-2000	1380-1535
	Actual		

* Right-steer position indicator turned toward front of transmission; Left-steer position indicator turned toward rear of transmission.
** Based on lockup linkage disconnected and plunger depressed .50 from free position.

Figure 2. Test Data Log

END OF WORK PACKAGE

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED IN VEHICLE) 0081 00

THIS WORK PACKAGE COVERS:

Oil Pressure Readings, Functional Test

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)
Gage, pressure indicating 0-60 psi (2) (item 38, WP 0088 00)
Gage, pressure indicating 0-200 psi (2) (item 40, WP 0088 00)
Gage, pressure indicating 0-400 psi (2) (item 41, WP 0088 00)
Gage, pressure indicating 0-160 psi (2) (item 39, WP 0088 00)
Torque wrench (item 22, WP 0088 00)

Materials/Parts

Lockwasher (6) (item 100, WP 0087 00)

Equipment Conditions

Vehicle parked and blocked (TM 9-2350-256-10)

OIL PRESSURE READINGS

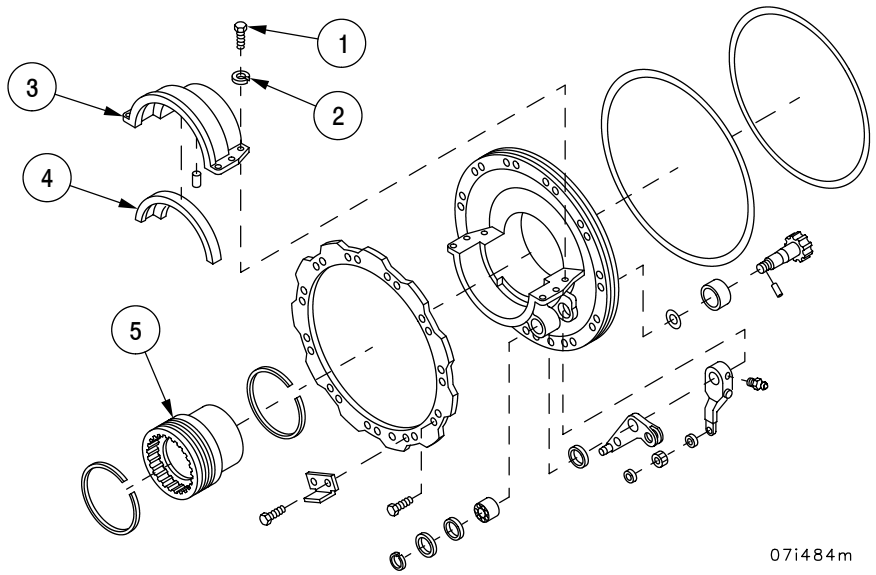
NOTE

Data sample test log sheet is illustrated in this work package.

Use the oil pressures listed in the data test log sheets as normal values when testing the transmissions.

All necessary oil pressure tests can be made concurrent with functional test outlined in functional test and test data log.

1. Remove six screws (1) and six lockwashers (2). Discard lockwashers.
2. Remove saddle cap assembly (3) and retainer (4).
3. Disengage coupling (5) by sliding toward output reduction gear assembly.
4. Reinstall cap assembly (3) with six screws (1) and six new lockwashers (2). Torque screws (1) to 67 to 80 lb-ft (90.9 to 108.5 N•m). Do not install retainer (4).



OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED IN VEHICLE) – CONTINUED 0081 00

OIL PRESSURE READINGS – Continued

5. Check transmission oil level (LO 9-2350-256-12). Add or drain oil as required to establish correct oil level.
6. With shift selector control in neutral position, start engine and allow transmission to run until normal operating temperature (approximately 200 degrees F) is reached.

CAUTION

Do not exceed 1020 rpm during reverse range operation.

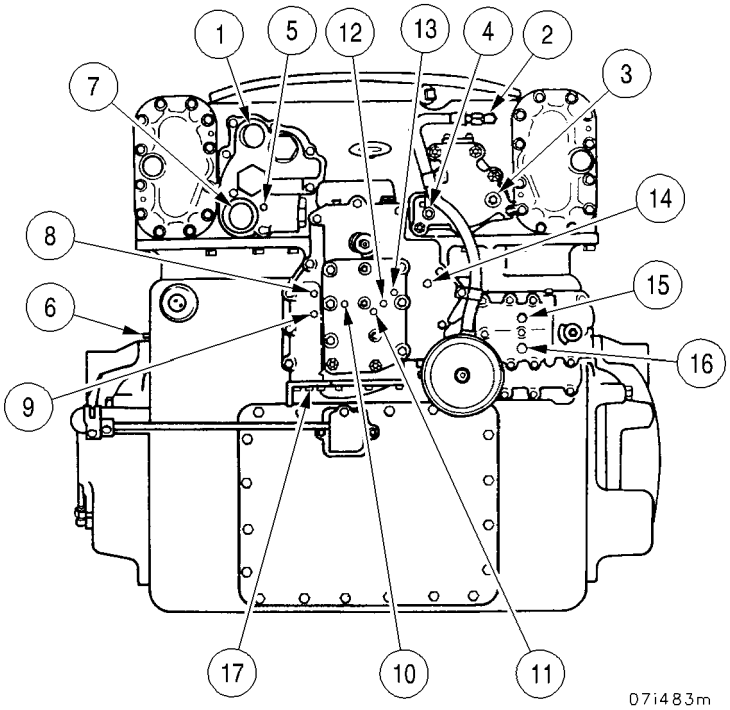
7. During warm-up, input speed should be approximately 980 to 1020 rpm. Shift through all ranges several times to ensure that hydraulic system is completely charged. Reduce input speed while making shifts from forward to reverse range or from reverse to forward range.
8. While operating transmission during warm-up period, inspect transmission thoroughly for evidence of oil leakage at all split lines and around all plugs and bolts. If leakage is present, check plugs and bolts for tightness. If leakage continues, replace gaskets where required. Leakage of oil, in many cases, can cause faulty operation of transmission.
9. Illustration in this work package shows oil pressure checkpoints, breather, manifold vacuum connections and oil cooler connections. Pressure gages used during tests should be connected as follows:
   a. Gage 0.0 to 60 psi – Check points 6 and 8.
   b. Gage 0.0 to 120 psi – Check point 4.
   c. Gage 0.0 to 200 psi – Check points 3, 5, 15, and 16.
   d. Gage 0.0 to 400 psi – Check points 9, 10, 11, 12, 13, and 14.

NOTE

Gage 0.0 to 200 psi may be installed at checkpoints 10 or 12. Gage 0.0 to 300 psi may be installed at checkpoints 3, 4, 5, 6, 8, 10, 12, 15, and 16.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED IN VEHICLE) – CONTINUED 0081 00

OIL PRESSURE READINGS – Continued



1 – Oil line connection (from cooler)
2 – Breather connection
3 – Steer supply pressure
4 – Converter-in pressure
5 – Converter-out pressure
6 – Lubrication pressure
7 – Oil line connection (to cooler)
8 – Governor pressure
9 – Lockup clutch apply pressure
10 – High range clutch apply pressure
11 – Reverse range clutch apply pressure
12 – Intermediate range clutch apply pressure
13 – Low range clutch apply pressure
14 – Main pressure
15 – Right steer clutch apply pressure
16 – Left steer clutch apply pressure
17 – Throttle-operated lockup relay valve module

Figure 1. Oil pressure check points.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED IN VEHICLE) – CONTINUED 0081 00

FUNCTIONAL TEST

1. Test data logs (Figure 2) are guides for making proper tests, as well as providing spaces to record actual test results. In addition, above each test entry space, the normal pressures are included for comparison with test results.
2. In all tests, transmission oil must be at normal operating temperature (approximately 200 degrees F). Connect the gages as indicated for each test in test data logs. Position range selector control and steer control as indicated in test data log.
3. Reduce speed of transmission input to engine idle speed before engaging desired range. Slowly increase speed to desired input speed. Record readings for each test.
4. Do not attempt to install gages while transmission is operating. Reinstall plugs immediately upon removing gages.
5. When making test for steer clutch pressure, move steer control from center to full steer while observing pressure rise. Pressure should rise to maximum as control is moved fully to steer position.
6. In test for lockup engagement, increase speed slowly until lockup apply pressure shows on gage. The gage connected at location 9 (Figure 1) should read no pressure until lockup engages. At moment pressure shows on gage at location 9, record the input speed.
7. In test for lockup release, first increase input speed to above where lockup occurs. Slowly reduce speed until applied pressure at location 9 (Figure 1) drops quickly. At this moment, record input speed.
8. When tests are completed, remove gages and install plugs, install retainer (4) removed in Step 2 of Oil Pressure Readings. Check transmission for leakage, repair as needed.

OIL PRESSURE READINGS AND FUNCTIONAL TEST (TRANSMISSION INSTALLED IN VEHICLE) – CONTINUED 0081 00

FUNCTIONAL TEST – Continued

MODEL XT-1410-4 SERIAL NO._____PAGE NO._____

	Neutral	Low Range	Intermediate Range	High Range	Reverse Range	Right Steer	Left Steer
Figure 1 Connect gage	5, 8, 14	5, 8, 13, 14	5, 8, 12, 14	5, 8, 10, 14	5, 8, 11, 14	5, 8, 14, 15	5, 8, 14, 16
Range selector position	N	1	2	3	R	N	N
Input rpm	1000	1000	1000	1000	1000	1000	1000
Normal main pressure	120 min	300 min	120 min	120 min	300 min	120 min	120 min
Actual main pressure							
Normal lubrication pressure	12 min	12 min	12 min	12 min	12 min	3 min	3 min
Actual lubrication pressure							
Normal right-steer pressure	0	0	0	0	0	108 min psi (full steer)	0
Actual right-steer pressure							
Normal left-steer pressure	0	0	0	0	0	0	108 min psi (full steer)
Actual left-steer pressure							
Steer indicator position	Center	Center	Center	Center	Center	R*	L*

Torque Converter Lockup Operation	Lockup engages Input rpm	Lockup releases Input rpm
Model XT-1410-4** Normal	1700-2000	1380-1535
Actual		

* Right-steer position indicator turned toward front of transmission; Left-steer position indicator turned toward rear of transmission.
** Based on lockup linkage disconnected and plunger depressed .50 from free position.

Figure 2. Test Data Log

END OF WORK PACKAGE

STEER CONTROL LINKAGE AND STEER OIL PRESSURE ADJUSTMENT 0082 00

THIS WORK PACKAGE COVERS:

Adjustment

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

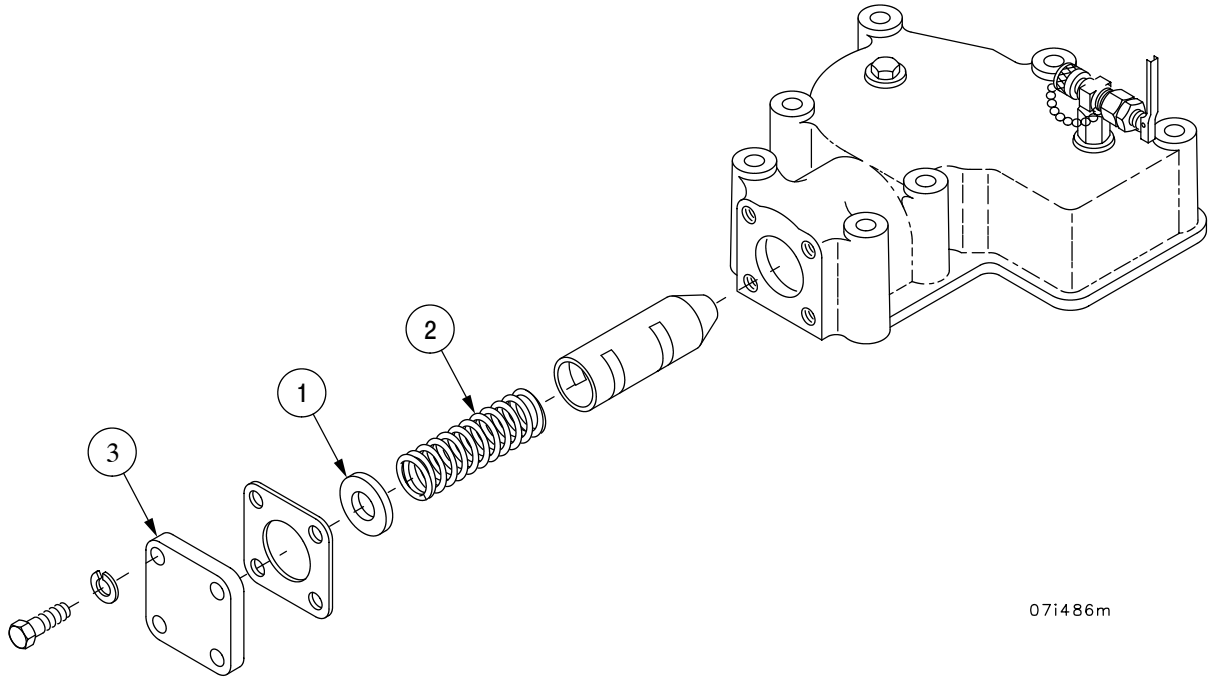
Vehicle parked and blocked (TM 9-2350-256-10)

STEER CONTROL LINKAGE ADJUSTMENT

1. With vehicle steer control in no steer position (centered); adjust steer control linkage so that steer position indicator on steer control valve is centered. Steer position indicator is centered when it points directly to right side of transmission.
2. Check left hand right steer position of vehicle steer control against positions of steer indicator. When vehicle steer control is fully left, steer control indicator must be 30-1/2 degrees (from centered position) toward rear of transmission. When vehicle steer control is fully right, steer position indicator must be 30-1/2 degrees (from centered position) toward front of transmission.
3. If steer position indicator or vehicle steer control cannot be positioned properly, inspect linkage for binding, wear and damage (TM 9-2350-256-20).

STEER OIL PRESSURE ADJUSTMENT

1. Steer oil pressure can be increase by installing spacers (1) between spring (2) and cover (3).
2. Each spacer will increase steer supply pressure approximately 5-1/2 psi. No more than three spacers should be installed. If pressure cannot be increased to proper level by installing three spacers, check spring for load. If spring is not within specified load limits, replace with new spring. Refer to WP 0031 00 for disassembly and assembly procedures.



END OF WORK PACKAGE

TORQUE CONVERTER LOCKUP SPEED AND MAIN OIL PRESSURE ADJUSTMENT 0083 00

THIS WORK PACKAGE COVERS:

Adjustment

INITIAL SETUP:

Tools and Special Tools

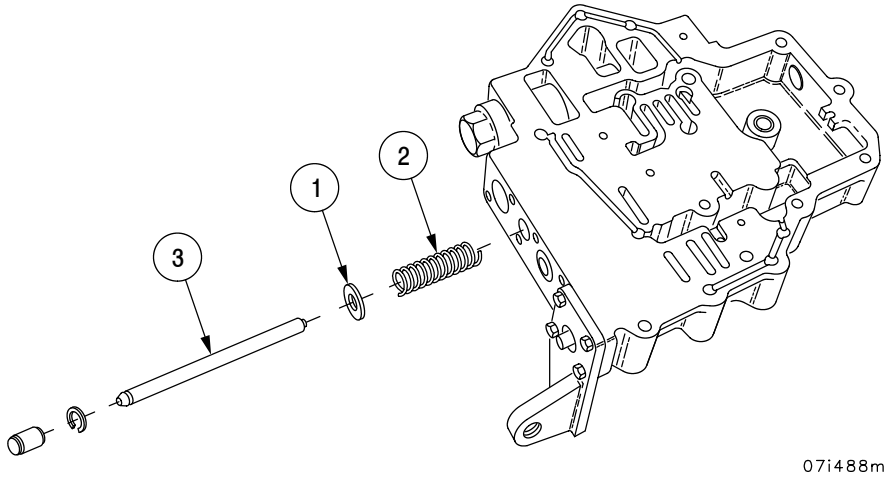
General mechanic's tool kit (item 1, WP 0088 00)

Equipment Conditions

Vehicle parked and blocked (TM 9-2350-256-10)

TORQUE CONVERTER LOCKUP SPEED ADJUSTMENT

1. Transmission center section output shaft speed at lockup may be raised approximately 50 rpm by addition of each spacer washer (1) between spring (2) and plunger (3). Removal of each spacer washer will decrease speed at lockup by the same amount.
2. For disassembly and assembly procedures refer to WP 0029 00.



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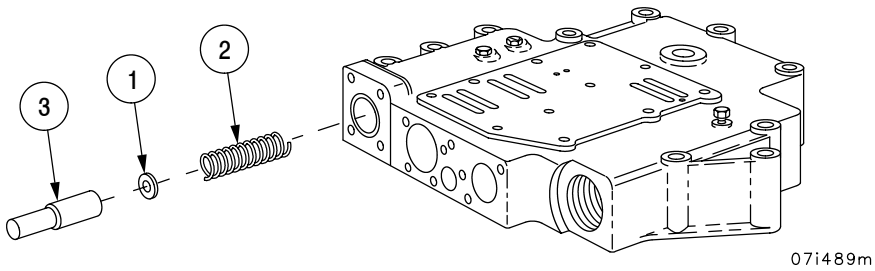
MAIN OIL PRESSURE ADJUSTMENT

1. Main oil pressure can be raised by installing spacers (1) between spring (2) and plug (3).
2. Each spacer will raise main pressure approximately 20 psi. No more than two spacers should be added. If proper main oil pressure cannot be obtained by installing two spacers, check spring for load. If spring is not within specified load limits, replace with new spring.
3. Refer to WP 0029 00 for disassembly and assembly procedures.



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END OF WORK PACKAGE

CHAPTER 7

SUPPORTING INFORMATION

REFERENCES 0084 00

SCOPE

The following publications are applicable at Direct Support and General Support Maintenance levels to material covered in this technical manual. Appropriate indexes should be consulted frequently for latest applicable changes, revisions and additions.

FIELD MANUALS

FM 4-25.11	First Aid for Soldiers
FM 5-250	Explosives and Demolitions (Reprinted W/Basic Incl C1)

FORMS AND RECORDS

DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2407	Maintenance Request
DA Form 285	US Army Accident Investigation Report
PAM 750-8	The Army Maintenance Management System (TAMMS) Users Manual
SF Form 368	Product Quality Deficiency Report
SF Form 364	Report of Discrepancy (ROD)

REGULATIONS

AR 385-40	Accident Reporting and Records
AR 702-7	Reporting of Product Quality Deficiencies Across Component Lines

SUPPLY BULLETINS

SB 740-98-1	Storage Serviceability Standard: Tracked Vehicles, Wheeled Vehicles and Components Parts

SUPPLY CATALOGS

CTA 8-100	Army Medical Department Expendable/Durable Items
CTA 50-970	Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
SC 4910-95-A31	Sets, Kits, and Outfits for Shop Equipment, Automotive Maintenance and Repair for Field Maintenance, Basic, Less Power (NSN 4910-00-754-0705)
SC 4910-95-A62	Sets, Kits, Outfits, and Tools for Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power (NSN 4910-00-754-0706) and Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1 Map Only (NSN 4910-00-919-0078)
SC 4910-95-CL-A72	Sets, Kits, Outfits, and Components List for Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2, Less Power (NSN 4910-00-754-0650) (LIN W32730) and Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2 Map Only (NSN 4910-00-919-0082) (24X Microfiche)
SC 4910-95-B20	Sets, Kits, Outfits, and Components List for Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Less Power (NSN 4910-00-754-0714) (LIN T30414) and Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Map Only (NSN 4910-00-919-0083)

REFERENCES - CONTINUED 0084 00

SUPPLY CATALOGS - continued

SC 5180-90-CL-N05	Sets, Kits, Outfits, Components List, General Mechanic's: (Formerly Tool Kit, Master Mechanic's) (NSN 5180-00-699-5273) (LIN W45060) (24X Microfiche)
SC 5180-90-CL-N26	Tool Kit, General Mechanic's Automotive (NSN 5180-00-177-7033) (LIN W33004)

TECHNICAL BULLETINS

TB 43-0001-39	Equipment Improvement Report and Maintenance Digest

TECHNICAL MANUALS

LO 9-2350-256-12	Recovery Vehicle, Medium, Full-Tracked: M88A1 (NSN 2350-01-122-6826)
TM 740-90-1	Administrative Storage of Equipment
TM 743-200	Storage and Materials Handling
TM 750-244-6	Procedures for Destruction of Tank-automotive Equipment to Prevent Enemy Use (U.S. Army Tank-automotive Command)
TM 9-214	Inspection, Care, and Maintenance of Anti-Friction Bearings
TM 9-2350-256-10	Operator's Manual for Recovery Vehicle, Full-Tracked: Medium, M88A1
TM 9-2350-256-20	Organizational Maintenance for Recovery Vehicle, Full Tracked, Medium: M88A1
TM 9-2520-215-34P	Direct Support and General Support Maintenance Repair Parts and Special Tools Lists (including Depot Maintenance Repair Parts and Special Tools) for Cross Drive Assembly (11649999) (Allison Division-GMC Model XT-1410-4)
TM 9-2350-292-10	Operator's Manual for Recovery Vehicle, Heavy, Full-Tracked: M88A2 (NSN 2350-01-390-4683) (EIC: ACQ)
TM 9-2350-292-20	Unit Maintenance Manual for Recovery Vehicle, Heavy, Full-Tracked: M88A2 (NSN 2350-01-390-4683) (EIC: ACQ)
TM 9-2350-292-24P	Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Recovery Vehicle, Heavy, Full-Tracked: M88A2 (NSN 2350-01-390-4683) (EIC: ACQ)
TM 9-2350-292-34	Direct Support and General Support Maintance Manual for Recovery Vehicle, Heavy, Full-Tracked: M88A2 (NSN 2350-01-390-4683) (EIC: ACQ)

END OF WORK PACKAGE

EXPENDABLE AND DURABLE ITEMS LIST 0085 00

INTRODUCTION

Scope

This work package lists expendable and durable items you will need to maintain the XT-1410-4 transmission. This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

Explanation of Columns in the Expendable/Durable Items List

Column (1) - Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., "Use grease (item 4, WP 0085 00).").

Column (2) - National Stock Number. The number assigned to the item that you can use to requisition it.

Column (3) - Item Name, Description, Commercial and Government Entity Code (CAGEC), Part Number. This column provides the other information you need to identify the item.

Column (4) - Unit of Measure. This code shows the physical unit of measure or count of an item, such as gallon, dozen, gross, etc.

EXPENDABLE AND DURABLE ITEMS

Table 1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER	(3) ITEM NAME, DESCRIPTION, CAGEC, PART NUMBER	(4) U/M
1	8030-01-104-5392	Compound, sealing 242-21	BT
2	5350-00-161-9066	Cloth, abrasive, P-C-451	PG
3		Dry-cleaning solvent (81348) P-D-680TY3	
	6850-01-331-3350	55 GL Drum	GL
	6850-01-331-3349	5 GL Can	GL
4	9150-00-190-0904	Grease, automotive and artillery (98308) MIL-G-10924	LB
5		Lubricating oil, Cat 10 8T9568	
	9150-01-424-7696	1 QT Can	QT
	9150-01-424-7692	5 GL Can	CN
	9150-01-424-7698	55 GL Drum	DR
6	5510-00-267-2134	Lumber, hardwood (81348) 4x4x10	BF
7	8040-00-251-2312	Non-hardening gasket sealant	QT
8	6640-00-285-4699	Paper, lens (81348) NNN-P-40	HD
9	9150-00-250-0926	Petrolatum, technical, VV-P-236	PT
10		Quick-dry solvent, MIL-I-25135	GL
11	4020-01-204-7039	Rope, fibrous (19207)	FT
12		Sealing compound (Loctite 262)	BT
13	8010-00-239-6786	White lead	LB
14	9150-00-140-4434	Lubplate, 1-pound can, 087-056 (92739)	LB

END OF WORK PACKAGE

TORQUE LIMITS AND STUD SELECTION 0086 00

GENERAL

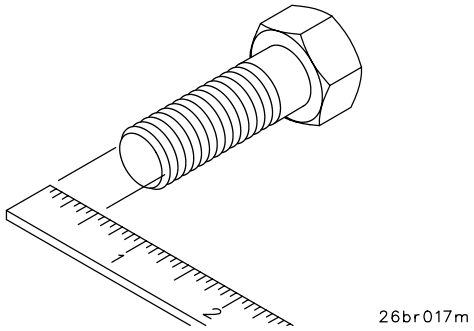
This section provides general torque limits for screws, stud selection and oversize stud selection for use on the transmission. Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits given in this work package shall be used when specific torque limits are not indicated in the maintenance procedure.

These general torque limits shall not be applied to screws that retain rubber components. The rubber components may be damaged before the correct torque limit is reached. If a special torque limit is not given in the maintenance instructions for rubber components, tighten the screw or nut until it touches the metal then tighten it one more turn.

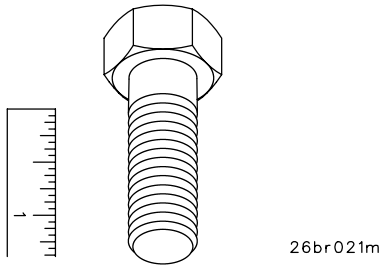
TORQUE LIMITS

Table 1 lists dry torque limits. Dry torque limits are used on screws that do not have lubricants applied to the threads. Table 2 lists wet torque limits. Wet torque limits are used on screws that have high-pressure lubricants applied to the threads.

HOW TO USE TORQUE TABLE



a. Measure the diameter of the screw you are installing.



b. Count the number of threads per inch or use a pitch gauge.

c. Under the heading SIZE, look down the left hand column until you find the diameter of the screw you are installing (there will usually be two lines beginning with the same size).

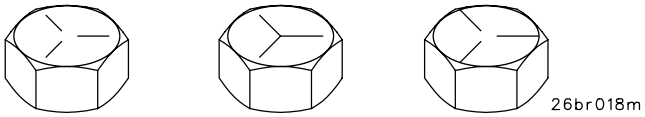
d. In the second column under SIZE, find the number of threads per inch that matches the number of threads you counted in Step b.

TORQUE LIMITS AND STUD SELECTION – CONTINUED 0086 00

HOW TO USE TORQUE TABLE – Continued

CAPSCREW HEAD MARKINGS

Manufacturer's marks may vary. These are all SAE Grade 5 (3 line)

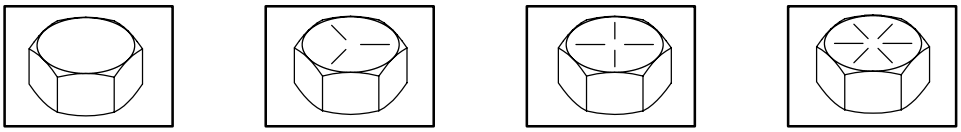


e. To find the grade screw you are installing, match the markings on the head to the correct picture of CAPSCREW HEAD MARKINGS on the torque table.

f. Look down the column under the picture you found in Step e, until you find the torque limit in lb–ft or N•m for the diameter and threads per inch of the screw you are installing.

Table 1. Torque Limits for Dry Fasteners

SAE CAPSCREW HEAD MARKINGS



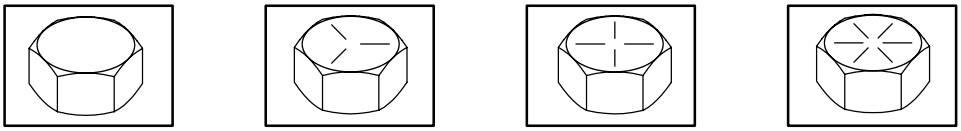
SIZE			TORQUE							
			SAE GRADE No. 1 or 2		SAE GRADE No. 5		SAE GRADE No. 6 or 7		SAE GRADE No. 8	
DIA. INS.	THREADS PER INCH	MMs	POUND-FEET	N·m	POUND-FEET	N·m	POUND-FEET	N·m	POUND-FEET	N·m
1/4	20	6.35	5	6.78	8.0	10.85	10.0	13.56	12.0	16.27
1/4	28	6.35	6	8.14	10.0	13.56	—	—	14.0	18.98
5/16	18	7.94	11	14.92	17.0	23.05	19.0	25.76	24.0	32.52
5/16	24	7.94	13	17.63	19.0	25.76	—	—	27.0	36.61
3/8	16	9.53	18	24.41	31.0	42.04	34.0	46.10	44.0	59.66
3/8	24	9.53	20	27.12	35.0	47.46	—	—	49.0	66.44
7/16	14	11.11	28	37.97	49.0	66.44	55.0	74.58	70.0	94.92
7/16	20	—	30	40.68	55.0	74.58	—	—	78.0	105.77
1/2	13	12.70	39	52.88	75.0	101.70	85.0	115.26	105.0	142.38
1/2	20	—	41	55.60	85.0	115.26	—	—	120.0	162.78
9/16	12	14.29	51	69.16	110.0	149.16	120.0	162.72	155.0	210.18
9/16	18	—	55	74.58	120.0	162.72	—	—	170.0	230.52
5/8	11	15.88	63	85.43	150.0	203.40	167.0	226.45	210.0	284.76
5/8	18	—	95	128.82	170.0	230.52	—	—	240.0	325.44
3/4	10	19.05	105	142.38	270.0	366.12	280.0	379.68	375.0	508.50
3/4	16	—	115	155.94	295.0	400.02	—	—	420.0	596.52
7/8	9	22.23	160	216.96	395.0	535.62	440.0	596.64	605.0	820.38
7/8	14	—	175	237.30	435.0	589.86	—	—	675.0	915.30
1	8	25.40	235	318.66	590.0	800.04	660.0	894.96	910.0	1233.96
1	14	—	250	339.00	660.0	894.96	—	—	990.0	1342.44
1-1/8	—	25.58	—	—	800.0	1064.8	—	—	1280.0	1735.7
					880.0	1193.3			1440.0	1952.8
1-1/4	—	31.75	—	—	—	—	—	—	1820.0	2467.9
							—	—	2000.0	2712.0
1-3/8	—	34.93	—	—	1460.0	1979.8	—	—	2380.0	3227.3
					1680.0	2278.1			2720.0	3688.3
1-1/2	—	38.10	—	—	1940.0	2630.6	—	—	3160.0	4285.0
					2200.0	2983.2			3560.0	4827.4

TORQUE LIMITS AND STUD SELECTION – CONTINUED 0086 00

HOW TO USE TORQUE TABLE – Continued

Table 2. Torque Limits for Wet Fasteners

SAE CAPSCREW HEAD MARKINGS



26br019m

SIZE			TORQUE							
			SAE GRADE No. 1 or 2		SAE GRADE No. 5		SAE GRADE No. 6 or 7		SAE GRADE No. 8	
DIA. INS.	THREADS PER INCH	MMs	POUND-FEET	N·m	POUND-FEET	N·m	POUND-FEET	N·m	POUND-FEET	N·m
1/4	20	6.35	4.9	6.10	7.2	9.76	9.0	12.20	10.8	14.64
1/4	28	6.35	5.4	7.33	9.0	12.20	—	—	12.6	17.08
5/16	18	7.94	9.9	13.34	15.3	22.54	17.1	23.18	21.6	29.27
5/16	24	7.94	11.7	15.87	17.1	23.18	—	—	24.3	32.95
3/8	16	9.53	16.2	21.97	27.9	37.84	30.6	41.49	39.6	53.69
3/8	24	9.53	18.0	24.41	31.5	42.71	—	—	44.1	59.80
7/16	14	11.11	25.2	34.17	44.1	59.80	49.5	67.12	63.0	85.42
7/16	20	—	27.0	36.61	49.5	67.12	—	—	70.2	95.19
1/2	13	12.70	35.1	47.59	67.5	91.53	76.5	103.73	94.5	128.14
1/2	20	—	36.9	50.04	76.5	103.73	—	—	108.0	146.50
9/16	12	14.29	45.9	62.24	99.0	134.24	108.0	146.45	139.5	189.16
9/16	18	—	49.5	67.12	108.0	146.45	—	—	153.0	207.47
5/8	11	15.88	56.7	76.89	135.0	183.06	150.3	203.80	189.0	256.28
5/8	18	—	85.5	115.94	153.0	207.47	—	—	216.0	296.90
3/4	10	19.05	94.5	128.14	243.0	329.51	252.0	341.71	337.5	457.65
3/4	16	—	103.5	140.35	265.5	360.2	—	—	378.0	536.87
7/8	9	22.23	144.0	195.26	355.5	482.06	396.0	536.98	544.5	738.34
7/8	14	—	157.5	213.57	391.5	530.87	—	—	607.5	823.77
1	8	25.40	211.5	286.79	531.0	720.04	594.0	805.46	819.0	1110.56
1	14	—	225.0	305.10	594.0	805.46	—	—	891.0	1208.20
1-1/8	—	25.58	—	—	720.0	976.32	—	—	1152.0	1562.13
					792.0	1073.97			1296.0	1757.52
1-1/4	—	31.75	—	—	—	—	—	—	—	2221.11
										2440.80
1-3/8	—	34.93	—	—	1314.0	1781.82	—	—	2142.0	2904.57
					1512.0	2050.29			2448.0	3319.47
1-1/2	—	38.10	—	—	1746.0	2367.54	—	—	2844.0	3856.5
					1980.0	2684.88			3204.0	4344.66

TORQUE LIMITS AND STUD SELECTION – CONTINUED 0086 00

TIGHTENING METAL FASTENERS

When torquing a fastener, select a torque wrench whose range (Table 3) fits the required torque value. A torque wrench is most accurate from 25% to 75% of its stated range. A torque wrench with a stated range of 0 to 100 will be the most accurate from 25 to 75 pound-feet. The accuracy of readings will decrease as you approach 0 pound-feet or 100 pound-feet. The following ranges (Table 3) are based on this principle.

Table 3. Torque Ranges

STATED RANGE	MOST EFFECTIVE RANGE
0-2000 lb-in	4-13 lb-ft
0-600 lb-ft	50-450 lb-ft
0-170 lb-ft	44-131 lb-ft
15-75 lb-ft	30-60 lb-ft

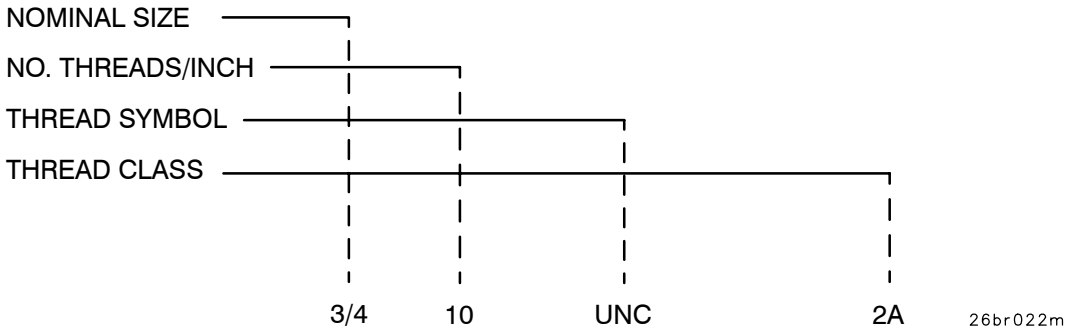
FASTENER SIZE AND THREAD PATTERN

Threaded fasteners are categorized according to diameter of the fastener shank. Thread styles are divided into broad groups, the two most common being coarse (Unified Coarse-UNC) and fine (Unified Fine-UNF). These groups are defined by the number of threads per inch on the bolt shanks. In addition, threads are categorized by thread class (Table 4), which is a measure of degree of fit between the threads of the bolt or screw (external threads) and the threads of the attaching nut or tapped hole (internal threads). The most common thread class for bolts and screws is Class 2.

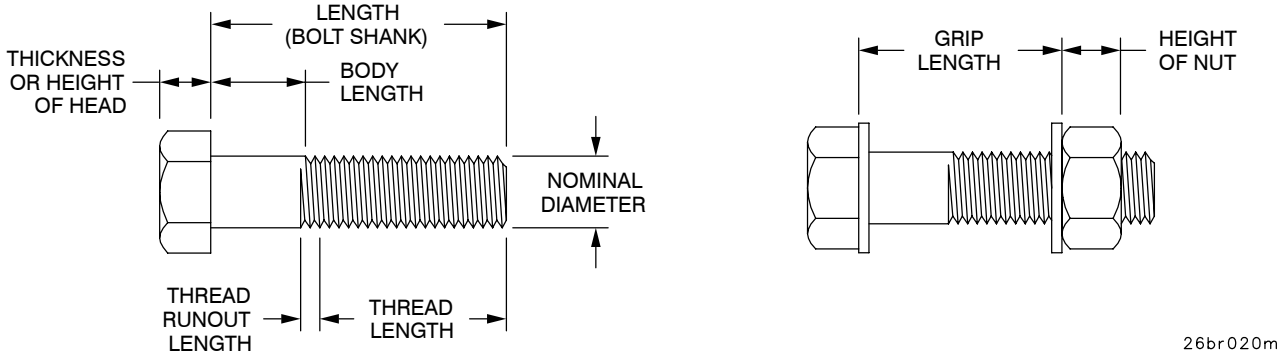
Table 4. Thread Classes and Description

EXTERNAL	INTERNAL	FIT
1A	1B	LOOSE FIT
2A	2B	MEDIUM FIT
3A	3B	CLOSE FIT

Thread patterns are designed as follows:



Note: Unless followed with –LH (e.g. ¾-1OUNC-2A-LH), threads are right hand.



TORQUE LIMITS AND STUD SELECTION – CONTINUED 0086 00

FASTENER GRADE

In addition to being classified by thread type, threaded fasteners are also classified by material. The most familiar fastener classification system is the SAE grading system (Table 5).

Table 5. SAE Screw and Bolt Markings

SCREWS	BOLTS
SAE GRADE 2 NO MARKING	SAE GRADE 6 4 RADIAL DASHES 90° APART
SAE GRADE 3 2 RADIAL DASHES 180° APART	SAE GRADE 7 5 RADIAL DASHES 72° APART
SAE GRADE 5 3 RADIAL DASHES 120° APART	SAE GRADE 8 6 RADIAL DASHES 60° APART

Markings On Hex Locknuts

GRADE A–No Marks
GRADE B–3 Marks
GRADE C–6 Marks

GRADE A–No Mark
GRADE B–Letter B
GRADE C–Letter C

GRADE A–No Notches
GRADE B–One Mark
GRADE B–Two Marks

Table 6. Stud Selection

PART NUMBER	PITCH DIAMETER RANGE	HOLE PITCH DIAMETER	STUD	RESULTANT INTERFERENCE FIT
8355863	A	0.9536–09541	0.9574–0.9580	0.0034–0.0044
	B	0.9542–0.9547	0.9581–0.9586	0.0034–0.0044
8351875	A	0.9548–0.9553	0.9587–0.9593	0.0035–0.0045
	B	0.9554–0.9559	0.9594–09599	0.0035–0.0045
8351876	A	0.9560–0.9565	0.9600–09605	0.0034–0.0045
	B	0.9566–0.9572 (OVERSIZE)	0.9606–09611	0.0034–0.0045
8351877	A	0.9573–0.9578	0.9612–09617	0.0034–0.0044
8355863	B	0.9579–0.9584	0.9618–09623	0.0034–0.0044

TORQUE LIMITS AND STUD SELECTION – CONTINUED 0086 00

Table 6. Oversize Stud Selection

DAMAGE	TAP TO CLEAN UP THREAD	OVERSIZE STUD TO BE USED
LITTLE OR NO DAMAGE	GH-4 GH-6	8351875 8351876
MODERATE DAMAGE	GH-10 GH-12	8351876 8351877
SEVERE DAMAGE	GH-22 GH-24 GH-26	8351877

END OF WORK PACKAGE

MANDATORY REPLACEMENT PARTS LIST 0087 00

INTRODUCTION

Scope

This work package includes a list of all mandatory replacement parts referenced in the task initial setups and procedures. These are items that must be replaced during maintenance regardless of whether they have failed. This includes items based on usage intervals, such as miles, time, rounds fired, etc.

MANDATORY REPLACEMENT PARTS LIST

Table 1. Mandatory Replacement Parts List

(1) ITEM NO.	(2) PART NUMBER/ CAGEC	(3) NSN	(4) DESCRIPTION
1	02802 (14153)	5330-01-349-6109	Gasket
2	03106 (14153)	5330-01-435-4551	Gasket
3	12290966 (19207)	5330-01-096-9333	Gasket
4	12304107 (19207)	2520-01-119-7730	Seal Assembly
5	141234 (21450)	5315-00-014-1234	Pin, Straight, Headless
6	154026 (62983)	5331-00-467-3347	O-ring
7	6760709 (24617)	5325-00-598-0918	Ring, Retaining
8	6766312 (24617)	5325-00-695-9071	Ring, Retaining
9	6767580 (24617)	5325-00-282-7016	Ring, Retaining
10	6770820 (73342)	5331-00-821-4490	O-ring
11	7374262 (19207)	5325-00-737-4262	Ring, Retaining
12	7374390 (19207)	5331-00-467-3347	O-ring
13	7378751 (19207)	5331-00-737-8751	O-ring
14	7400356 (19207)	5330-00-740-0356	Seal
15	7708104 (19207)	5325-00-770-8104	Ring, Retaining
16	7708459 (19207)	4730-00-287-1938	Strainer, Element
17	7708564 (19207)	5330-00-562-0057	Retainer, Packing
18	7708570 (19207)	5325-01-056-0833	Ring, Retaining
19	7708736 (19207)	5310-00-333-7374	Nut, Round, Plain
20	7708760 (19207)	5330-00-692-5272	Seal Ring, Metal
21	7708763 (19207)	5315-00-299-2556	Pin, Shoulder, Headed
22	7708784 (19207)	5330-00-692-5275	Seal Ring
23	7708793 (19207)	5331-00-291-1989	O-ring
24	7708800 (19207)	5331-00-291-1990	O-ring
25	7708813 (19207)	5325-00-598-0942	Ring, Retaining
26	7708814 (19207)	5325-00-205-6664	Ring, Retaining
27	7708816 (19207)	5325-00-205-6662	Ring, Retaining
28	7708817 (19207)	5325-00-282-7015	Ring, Retaining
29	7708877 (19207)	5325-00-282-7390	Ring, Retaining
30	7708895 (19207)	5330-00-692-5279	Seal, Ring Metal
31	7708896 (19207)	5330-00-692-5280	Seal Ring, Metal
32	7708987 NON-ASBESTOS (19207)	5330-01-419-7783	Gasket

MANDATORY REPLACEMENT PARTS LIST - CONTINUED 0087 00

Table 1. Mandatory Replacement Parts List - Continued

(1) ITEM NO.	(2) PART NUMBER/ CAGEC	(3) NSN	(4) DESCRIPTION
33	7708988 (19207)	5330-00-562-0114	Gasket
34	7708991 (19207)	5330-00-692-5285	Packing, Preformed
35	7709035 (19207)	5330-01-495-4883	Gasket
36	7709037 (19207)	5330-00-040-0871	Gasket
37	7709081 (19207)	5330-00-040-0879	Gasket
38	7709087 (19207)	5330-00-040-0882	Gasket
39	7709138 (19207)	5330-00-040-0892	Gasket
40	7709139 (19207)	5330-00-040-0893	Gasket
41	7709185 (19207)	5325-00-282-7017	Ring, Retaining
42	7709192 (19207)	5325-00-282-7391	Ring, Retaining
43	7709193 (19207)	5325-00-282-7392	Ring, Retaining
44	7709195 (19207)	5325-00-205-6660	Ring, Retaining
45	7709201 (19207)	5325-00-282-7393	Ring, Retaining
46	7709228 (19207)	5330-00-040-0910	Gasket
47	7709259 (19207)	5331-00-202-2418	O-ring
48	7709323 (19207)	5325-00-205-4727	Ring, Retaining
49	7709507 (19207)	5330-00-318-4139	Gasket
50	7709511 (19207)	5325-00-205-6657	Ring, Retaining
51	7709516 (19207)	5325-00-598-0943	Ring, Retaining
52	7709609 (19207)	5330-00-318-4140	Gasket
53	7709702 (19207)	5330-00-692-9252	Gasket
54	7711116 (19207)	5331-00-822-3823	O-ring
55	7711172 (19207)	5331-00-678-7028	Packing, Preformed
56	7767532 (19207)	5325-00-776-7532	Retaining Ring
57	7767568 (19207)	5330-00-776-7568	Gasket
58	7767655 (19207)	5305-00-776-7655	Screw, Cap, Socket Head
59	7767695 (19207)	5331-01-010-9693	O-ring
60	7767836 (19207)	5365-00-776-7836	Spacer, Ring
61	7768001 (19207)	5331-00-131-7062	O-ring
62	7994950 (19207)	5330-00-799-4950	Gasket
63	7994963 (19207)	5330-00-799-4963	Gasket
64	8348586 (19207)	5330-00-678-7264	Gasket
65	8348963 (19207)	5330-00-678-7265	Gasket
66	8349231 (19207)	5325-01-046-6810	Ring, Retaining
67	8350628 (18876)	5306-00-940-9060	Bolt, Self-locking
68	8351000 (19207)	5330-00-678-7266	Gasket
69	8351001 (19207)	5330-00-678-7268	Gasket

MANDATORY REPLACEMENT PARTS LIST - CONTINUED 0087 00

Table 1. Mandatory Replacement Parts List - Continued

(1) ITEM NO.	(2) PART NUMBER/ CAGEC	(3) NSN	(4) DESCRIPTION
70	8351003 (19207)	5330-00-678-7270	Gasket
71	8351031 (19207)	5331-00-647-0899	O-ring
72	8351032 (19207)	5331-00-647-0905	O-ring
73	8351140 (19207)	5325-00-893-1863	Ring, Retaining
74	8351288 (19207)	5310-00-837-2591	Nut, Sleeve
75	8351408 (19207)	5330-00-893-1866	Gasket
76	8352146 (19207)	5330-00-857-9658	Seal, Nonmetallic, Round
77	8355855 (19207)	5330-00-994-5791	Seal, Plain, Encased
78	8356910 (19207)	2940-00-933-4433	Filter Element, Fluid
79	8437201-2 (19204)	5330-00-853-7569	Seal, Plain Encased
80	8712322 (19207)	5306-00-977-1199	Bolt, Self-locking
81	9409120 (19207)	5306-00-825-0627	Bolt, Self-locking
82	9409125 (19207)	5306-00-940-9125	Bolt, Self-locking
83	AN122765 (88044)	5315-00-616-5760	Pin, Straight, Headless
84	AN960-1216L (88044)	5310-00-167-0842	Washer, Flat
85	ASTMA641 (81346)	9505-00-248-9850	Wire, Nonelectrical
86	M83248/1-011 (81349)	5331-00-166-0975	O-ring
87	MS16625-1100 (96906)	5325-00-807-2636	Retaining Ring
88	MS16625-2162 (96906)	5325-00-282-2437	Ring, Retaining
89	MS16625-3433 (96906)	5325-01-283-4763	Ring, Retaining
90	MS16633-1037 (96906)	5325-00-256-2465	Ring, Retaining
91	MS16633-1043 (96906)	5325-00-801-3006	Retaining Ring
92	MS17131-30 (96906)	3110-00-157-0535	Bearing, Needle
93	MS171710 (96906)	5315-00-816-6522	Spring, Pin
94	MS18154-113 (96906)	5305-00-915-8087	Bolt, Self-locking
95	MS21042L4 (96906)	5310-00-807-1475	Nut, Self-locking
96	MS29513-223 (96906)	5330-00-599-2537	O-ring
97	MS35338-44 (80205)	5310-00-582-5965	Washer, Lock
98	MS35338-45 (96906)	5310-00-407-9566	Washer, Lock
99	MS35338-46 (96906)	5310-00-637-9541	Washer, Lock
100	MS35338-48 (80205)	5310-00-584-5272	Washer, Lock
101	MS35338-8 (96906)	5310-00-261-7340	Washer, Lock
102	MS35744-38 (96906)	5320-00-010-4170	Rivet, Solid
103	MS35763-1033 (96906)	5306-00-842-8223	Bolt, Self-locking
104	MS35764-1291 (96906)	5306-01-056-5440	Bolt, Self-locking
105	MS35764-1302 (96906)	5306-01-032-3488	Bolt, Self-locking
106	MS35764-1312 (96906)	5306-01-061-5828	Bolt, Self-locking

MANDATORY REPLACEMENT PARTS LIST - CONTINUED 0087 00

Table 1. Mandatory Replacement Parts List - Continued

(1) ITEM NO.	(2) PART NUMBER/ CAGEC	(3) NSN	(4) DESCRIPTION
107	MS35764-1434 (96906)	5306-00-071-4473	Bolt, Self-locking
108	MS35764-1436 (96906)	5306-01-020-9565	Bolt, Self-locking
109	MS35764-218 (96906)	5306-01-011-4995	Bolt, Self-locking
110	MS35764-241 (96906)	5306-01-011-3069	Bolt, Self-locking
111	MS35764-617 (96906)	5306-01-080-4961	Bolt, Self-locking
112	MS35764-651 (96906)	5306-01-156-7664	Bolt, Self-locking

END OF WORK PACKAGE

TOOL IDENTIFICATION LIST 0088 00

INTRODUCTION

Scope

This work package lists all common tools and supplements and special tools/fixtures needed to maintain the XT-1410-4.

Explanation of Columns in the Tool Identification List

Column (1) - Item No. This number is assigned to the entry in the list and is referenced in the initial setup to identify the item (e.g., "C-Clamp (item 32, WP 0088 00)").

Column (2) - Item Name. This column lists the item by noun nomenclature and other descriptive features (e.g., "Gauge, belt tension").

Column (3) - National Stock Number. The number assigned to the item; you can use this to requisition it.

Column (4) - Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) that controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

Column (5) - Reference. This column identifies the authorizing supply catalog or RPSTL for items listed in this work package.

TOOL IDENTIFICATION LIST

Table 1. Tool Identification List

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
1	Tool Kit, General Mechanic's: Automotive (GMTK)	5180-00-177-7033	SC 5180-90-CL-N26	SC 5180-90-CL-N26
2	Adapter, Remover	5120-00-708-2774	7082774	TM 9-2520-215-34P
3	Compressor Assembly	5120-00-330-4274	8708939	TM 9-2520-215-34P
4	Fixture	4910-00-098-6732	8390000	TM 9-2520-215-34P
5	Parts Kit	4910-00-330-8642	8708831	TM 9-2520-215-34P
6	Pilot (pin, straight headed)	4910-00-098-6733	8390002	TM 9-2520-215-34P
7	Pin, Straight, Threaded	5313-00-333-6081	8708909	TM 9-2520-215-34P
8	Puller Attachment, Mechanical	5120-00-473-7352	7082201	TM 9-2520-215-34P
9	Remover Assembly, Bearing	5120-00-776-1861	8351087	TM 9-2520-215-34P
10	Replacer Assembly	5120-00-776-1862	8351083	TM 9-2520-215-34P
11	Replacer, Oil Seal	5120-00-977-5581	8355822	TM 9-2520-215-34P
12	Sling, Lifting	4910-00-473-7556	7081593	TM 9-2520-215-34P
13	Sling, Lifting	4910-00-708-3778	7083778	TM 9-2520-215-34P
14	Tube, Steel	5120-00-098-6736	8390006	TM 9-2520-215-34P
15	Tube, Steel	5120-00-098-6737	8390007	TM 9-2520-215-34P
16	Wrench Assembly	5120-00-977-5582	8355710	TM 9-2520-215-34P
17	Socket, Wrench, Face, Spanner	5120-00-348-7505	8389992	TM 9-2520-215-34P
18	Wrench, Spanner	5120-00-596-4472	8708178	TM 9-2520-215-34P
19	Wrench, Splined	5120-00-348-7506	8389995	TM 9-2520-215-34P
20	Press, Arbor Hand	3444-00-449-7295	26A49 (79805)	SC 4910-95-A31
21	Pliers Set, Retaining Ring	5120-00-789-0492	4440R	SC 4910-95-A31
22	Wrench, Torque, 0-175 lb-ft 1\2 in dr	5100-00-640-6364	A-A-2411	SC 4910-95-A31

TOOL IDENTIFICATION LIST - CONTINUED 0088 00

Table 1. Tool Identification List – Continued

(1) ITEM NO.	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
23	Wrench, Torque, 3/8 in dr 0 to 120 in-lbs	5120-00-585-7706	A-A-1274	SC 4910-95-B20
24	Wrench Set, Socket, 3/4 in dr	5120-00-204-1999	GGG-W-641	SC 4910-95-A31
25	Bolt, Eye	5306-01-297-2749	8764542	CTA 50-970
26	Wrench, Torque, 0-600 lb-ft 3/4 in dr	5120-00-221-7983	SW130-301	SC 4910-95-A31
27	Multiplier, Torque Wrench	5120-00-169-2986	PD 1201	SC 4910-95-A31
28	Gage, Pressure, Dial 0-300 psi	6220-00-795-0330	7950330	TM 9-2520-215-34P
29	Vise, Machinist's	5120-00-223-1945	GGG-V-410	SC 4910-95-A62
30	Drill, Electric, Portable	5130-00-293-1849	W-D-661	SC 4910-95-A31
31	Drill Set, Twist	5133-00-293-0983	800434	SC 4910-95-A31
32	C-Clamp	5120-00-203-6431	GGG-C-406TY1CLB	SC 4910-95-CL-A72
33	Cap, Vise, Jaws	5120-00-221-1506		SC 4910-95-A31
34	Gloves, Welder's	8415-00-268-7859	A-A 50022 (58536)	SC 4910-95-A31
35	Hammer, Hand	5120-01-065-2211	57-534	SC 4910-95-A31
36	Stud Remover/Setter	5120-00-288-6570		SC 5180-90-CL-N05
37	Puller, Kit, Mechanical (Gear/Bearing)	5180-00-423-1596		SC 4910-95-A31
38	Gage, Pressure, Dial Indicating 0-60 psi	6685-00-258-8406	GGG76 (81348)	
39	Gage, Pressure, Dial Indicating 0-160 psi	6685-00-227-0193	GGG75C (81348)	
40	Gage, Pressure, Dial Indicating 0-200 psi	6685-00-846-9720	GGG76 (81348)	
41	Gage, Pressure, Dial Indicating 0-400 psi	6685-00-526-6414	GGG76 (81348)	
42	Adapter, Remover	5720-00-534-7830	5347830 (19207)	TM 9-2350-214-34P

END OF WORK PACKAGE

ILLUSTRATED LIST OF MANUFACTURED ITEMS 0089 00

SCOPE

This work package includes complete instructions for making items authorized to be manufactured or fabricated at Direct Support and General Support maintenance level. A part number index is provided for cross-referencing the item to be manufactured to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are listed in a tabular list on the illustration.

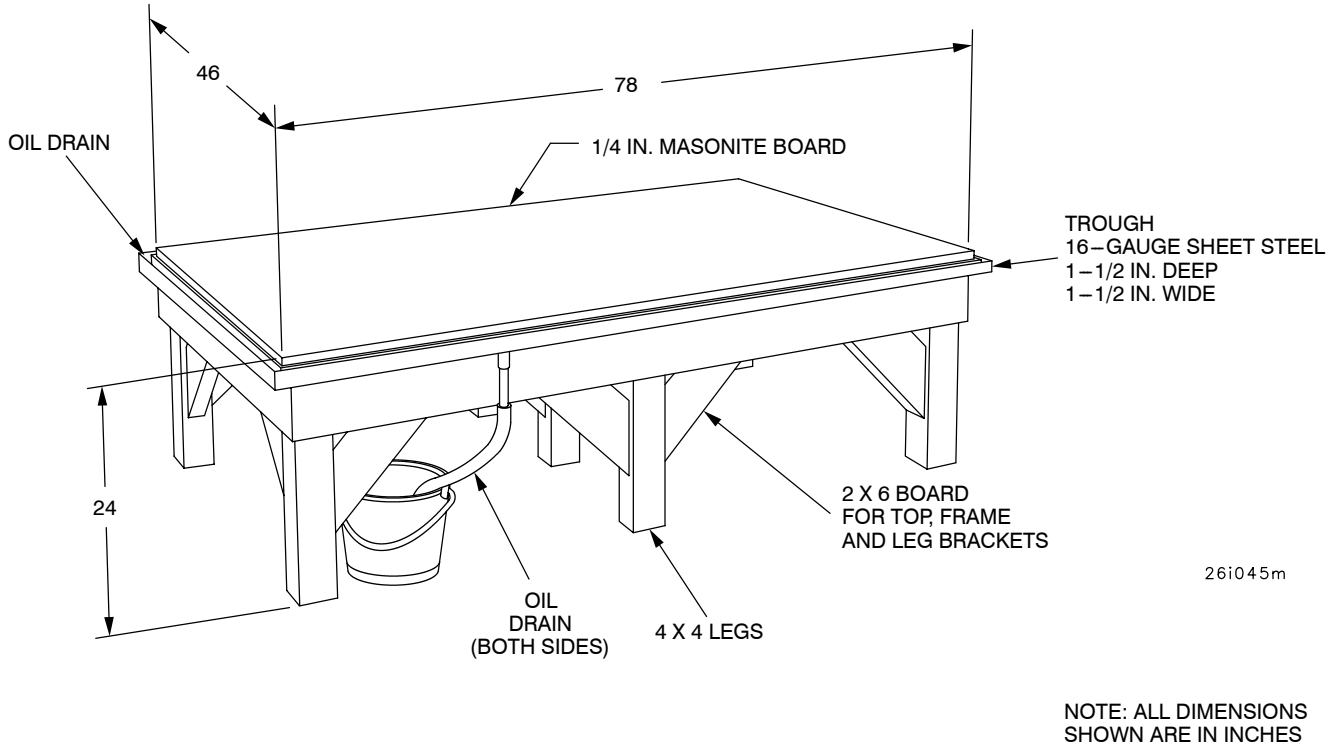
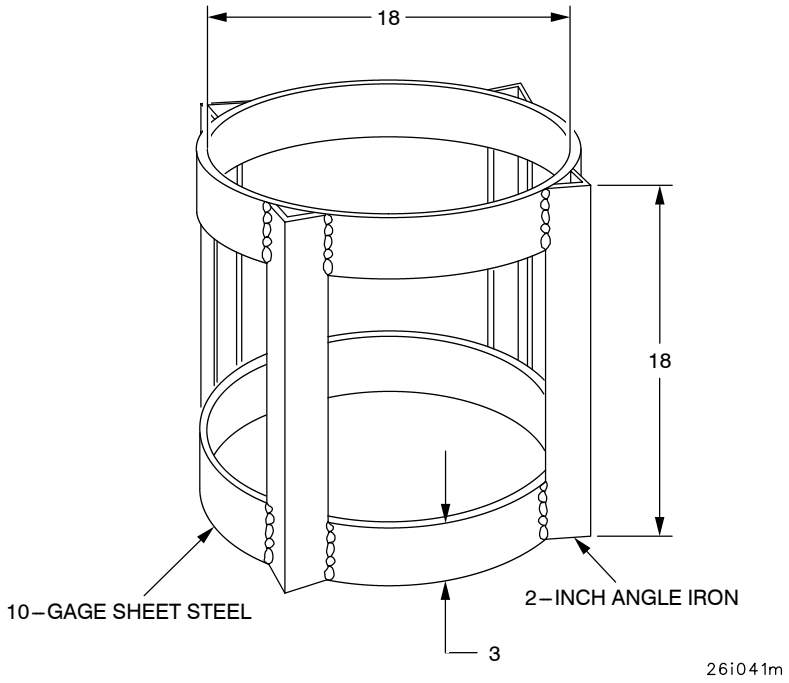


Figure 1. Transmission Assembly and Disassembly Table

ILLUSTRATED LIST OF MANUFACTURED ITEMS – CONTINUED 0089 00

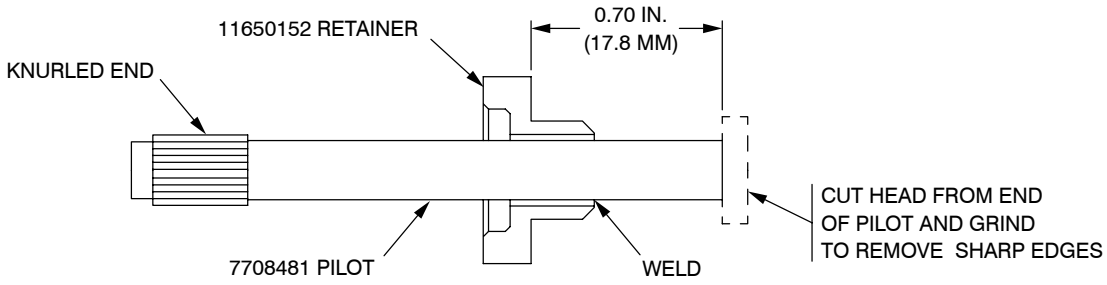


STAND

ITEM NO	ITEM NAME	QUANTITY	SIZE (inches)	MATERIAL
1	Plate	2	3.00 X 18.0 10 gauge	Steel
2	Angle iron	4	2.00 X 18.0 Lg	Steel

Figure 2. Stand

MATERIALS: MAKE FROM 7708481 PILOT AND
11650152 SEAL RETAINER



FABRICATED CHECKING PIN

26i042m

ITEM NO	ITEM NAME	QUANTITY	PART NUMBER	MATERIAL
1	Retainer Seal	1	11650152	Steel
2	Pilot	1	7708481	Steel

Figure 3. Fabricated Checking Pin

NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES

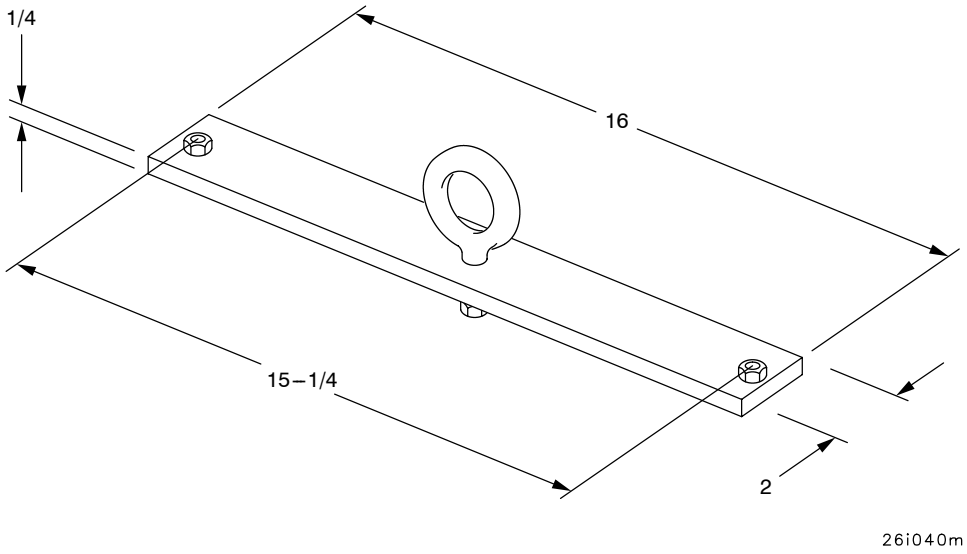


Figure 4. Lifting Tool

END OF WORK PACKAGE

GLOSSARY

Terms	Definitions
Bearing race	part of bearing that balls, rollers, or needles roll on
Buckled	bent or kinked
Chamfer	a beveled edge
Clockwise	in the direction in which the hands of a clock travel
Counterbore	a partial enlargement of an existing hole
Counterclockwise	in a direction opposite to which the hands of a clock travel
Countersunk	a funnel-shaped enlargement of a hole
Criterion	information on which a decision is made
Dry ice	frozen carbon dioxide
External	outside
Extract	to remove or pull out
Governor	a device attached to a machine to limit speed
Helical	spiral
Intermediate	the step between high and low
Internal	inside
Jackscrew	a screw-operated device for lifting
Mallet	a hammer with a large head for striking without marring
Pitot tube	a tube with a short right-angle bend that is placed in a moving fluid to measure flow speed
Planetary	being arranged, like planets, in a circle
psi	pounds per square inch
Receptacle	a receiver or container
Reservoir	a place where fluids are kept in store
Spanner wrench	a wrench for removing or installing bolts
Spline	a thin strip of metal used to connect mechanical parts
Stator	fixed part of a torque converter

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INDEX - Continued

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By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army
0531202

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TM 9–2520–215–34	31 August 2005	CROSS–DRIVE TRANSMISSION – DS/GS (MODEL XT–1410–4)

ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
0102 00–3						Removal step 2 WP reference should be (WP 0039 00).

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

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PUBLICATION NUMBER	DATE	TITLE
TM 9–2520–215–34	31 August 2005	CROSS–DRIVE TRANSMISSION – DS/GS (MODEL XT–1410–4)

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remarks or recommendations or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

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PUBLICATION/FORM NUMBER	DATE	TITLE
TM 9–2520–215–34	31 December 2005	CROSS–DRIVE TRANSMISSION – DS/GS (MODEL XT–1410–4)

ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

*Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

DA FORM 2028 , FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. USAPPC V1.00

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ITEM	PAGE	PARA	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

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TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

CONVERSION TABLE

inch	decimal	mm
1/64	0.015625	0.3969
1/32	0.031250	0.7938
3/64	0.046875	1.1906
1/16	0.062500	1.5875
5/64	0.078125	1.9844
3/32	0.093750	2.3812
7/64	0.109375	2.7781
1/8	0.125000	3.1750
9/64	0.140625	3.5719
5/32	0.156250	3.9688
11/64	0.171875	4.3656
3/16	0.187500	4.7625
13/64	0.203125	5.1594
7/32	0.218750	5.5562
15/64	0.234375	5.9531
1/4	0.250000	6.3500
17/64	0.265625	6.7469
9/32	0.281250	7.1438
19/64	0.296875	7.5406
5/16	0.312500	7.9375
21/64	0.328125	8.3344
11/32	0.343750	8.7312

inch	decimal	mm
23/64	0.359375	9.1281
3/8	0.375000	9.5250
25/64	0.390625	9.9219
13/32	0.406250	10.3188
27/64	0.421875	10.7156
7/16	0.437500	11.1125
29/64	0.453125	11.5094
15/32	0.468750	11.9062
31/64	0.484375	12.3031
1/2	0.500000	12.7000
33/64	0.515625	13.0969
17/32	0.531250	13.4938
35/64	0.546875	13.8906
9/16	0.562500	14.2875
37/64	0.578125	14.6844
19/32	0.593750	15.0812
39/64	0.609375	15.4781
5/8	0.625000	15.8750
41/64	0.640625	16.2719
21/32	0.656250	16.6688
43/64	0.671875	17.0656
11/16	0.687500	17.4625

inch	decimal	mm
45/64	0.703125	17.8594
23/32	0.718750	18.2562
47/64	0.734375	18.6531
3/4	0.750000	19.050
49/64	0.765625	19.4469
25/32	0.781250	19.8437
51/64	0.796875	20.2406
13/16	0.812500	20.6375
53/64	0.828125	21.0344
27/32	0.843750	21.4312
55/64	0.859375	21.8281
7/8	0.875000	22.2250
57/64	0.890625	22.6219
29/32	0.906250	23.0188
59/64	0.921875	23.4156
15/16	0.937500	23.8125
61/64	0.953125	24.2094
31/32	0.96750	24.6062
63/64	0.984375	25.0031
1	1.000000	25.4000

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

TEMPERATURE

5/9 (°F − 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
(9/5 x °C) + 32 = °F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Millimeters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound–Feet	Newton–Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton–Meters	Pound–Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621