

***NMWR 9-2520-582**

NATIONAL MAINTENANCE WORK REQUIREMENT

INCLUDING

REPAIR PARTS AND SPECIAL TOOLS LIST

CONTAINING

NATIONAL OVERHAUL STANDARDS

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

(NSN 2520-01-489-0849) P/N 57K4407

(NSN 2520-01-489-0850) P/N 57K6204

(NSN 2520-01-625-7876) P/N 57K6233

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U.S. ARMY TACOM LIFE CYCLE MANAGEMENT COMMAND

WARREN, MICHIGAN 48397-5000

4 APRIL 2014

WARNING SUMMARY

- This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to comply may result in serious injury or death to personnel. Refer to FM 4-25.11 for first aid instructions.
- Cleaning compound solvent MIL-PRF-680 is flammable and must not be used near an open flame. A fire extinguisher must be kept nearby when cleaning solvent is used. Use only in well-ventilated areas. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Cleaning compound solvent MIL-PRF-680 is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. Always use protective goggles or face shield and avoid repeated and prolonged skin contact by wearing rubber or solvent resistant gloves. If contact with eyes occurs, flush eyes with water and seek medical attention. Wash hands and skin immediately after exposure with soap and water and use a lanolin-based skin cream to prevent skin drying. Remove contaminated clothing as soon as possible. Store, handle, and dispose of contaminated cloths and clothing according to local procedures and plans.
- Ensure cleaning solvent container is sealed when not in use. Store, handle, and dispose of unused and spent solvents in accordance with local procedures and plans. Failure to comply may result in damage to environment and health of personnel. Seek medical attention in the event of an injury.
- Appropriate eye protection must be worn when cleaning with a wire brush, sandblast, grit blast, or other effective methods. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Paints, cleaning solvents, and primers may cause burns, skin irritation, and emit harmful vapors. Inhalation may cause irritation to upper respiratory passages. Keep paints, cleaning solvents, and primers away from fire or heat sources and use only in well-ventilated areas. Keep paints, cleaning solvents, and primers closed when not in use. Always wear protective equipment such as goggles, face mask, gloves, and a proper respirator. If paints, cleaning solvents, and primers contact skin, wash immediately with soap and water. Failure to comply may cause injury to personnel. Seek medical attention in the event of an injury.
- Prolonged contact with lubricating oil may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well ventilated to keep fumes to a minimum. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Use caution when handling heavy parts. Provide adequate support and use assistance during procedure. Transmission weight is 252 lbs (114 kg). Ensure lifting device is in good operating condition and of suitable load capacity. Failure to comply may result in death or injury to personnel. Seek medical attention in the event of an injury.
- All personnel must stand clear during lifting operations. A swinging or shifting load may result in death or injury to personnel. Seek medical attention in the event of an injury.
- Torque converter must be supported by retaining straps at all times to prevent torque converter from falling out. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- When steam-cleaning, wear protective clothing. Failure to comply may result in serious injury to personnel. Seek medical attention in the event of an injury.
- Compressed air used for cleaning purposes must not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.). Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.
- Air pressure must not exceed 70 psi (483 kPa) when air-checking direct/forward clutch piston operation. Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.

WARNING SUMMARY - CONTINUED

- Use compressed air only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.). Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Air pressure must not exceed 15 psi (103 kPa) when air checking intermediate clutch piston operation. Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

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TOTAL NUMBER OF WORK PACKAGES IS 49,
CONSISTING OF THE FOLLOWING:**

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Blank	0	WP 0025 (2 pgs)	0
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MANAGEMENT COMMAND
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any errors, or if you would like to recommend any improvements to the procedures in this publication, please let us know. The preferred method is to submit your DA Form 2028 (Recommended Changes to Publications and blank forms) through the Internet, on the TACOM Unique Logistics Support Applications (TULSA) Web site. The Internet address is <https://tulsa.tacom.army.mil>. Access to all applications requires CAC authentication, and you must complete the Access Request form the first time you use it. The DA Form 2028 is located under the TULSA Applications on the left-hand navigation bar. Fill out the form and click on SUBMIT. Using this form on the TULSA Web site will enable us to respond more quickly to your comments and better manage the DA Form 2028 program. You may also mail, email, or fax your comments or DA Form 2028 directly to the Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCL-IM/TECH PUBS, MS 727, 6501 E. 11 Mile Road, Warren, MI 48397-5000. The e-mail address is tacomlcmc.daform2028@us.army.mil. The fax number is DSN 786-1856 or commercial (586) 282-1856. A reply will be furnished to you.

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CHAPTER 1

GENERAL INFORMATION AND EQUIPMENT

DESCRIPTION AND DATA

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

**SUSTAINMENT MAINTENANCE
GENERAL INFORMATION**

SCOPE

This NMWR is for use by maintenance technicians at certified repair sites. The instructions in this NMWR apply to model-year 2000 and newer 4L80-E/4L85-E transmissions (HMMWV FOV). If information conflicts, the data contained in this NMWR shall take precedence. The condition of the transmission after rebuild shall be that utility and performance are returned to a near-zero-time/near-zero-miles or like-new condition.

Tolerances and wear limits established by this NMWR are the minimum acceptable standards. Parts, components, assemblies, or subassemblies not meeting these requirements will be disposed of in accordance with the appropriate directive.

Test requirements stated or referenced in this NMWR are the minimum acceptable standards. Components that are worn or defective beyond the repair limits established by this NMWR shall be disposed of in accordance with current directives.

Before performing any rebuild activity, the maintenance technician shall become familiar with all procedures in this NMWR.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your 4L80-E/4L85-E transmission needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance.

All non-Aviation/Missile EIRs and PQDRs must be submitted through the Product Data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: <https://www.pdrep.csd.disa.mil/>.

If you do not have Internet access, you may submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion prevention and control of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. The term "corrosion" means the deterioration of a material or its properties due to a reaction of that material with its chemical environment. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade (also considered to be corrosion based on the above definition of corrosion). Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically ultraviolet) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking. The U.S. Army has defined the following nine (9) forms of corrosion used to evaluate the deterioration of metals. These shall be used when evaluating and documenting corrosion.

UNIFORM (or general attack): Affects a large area of exposed metal surface, like rust on steel or tarnish on silver. It gradually reduces the thickness of the metal until it fails.

CREVICE: Occurs in crevices created by rubber seals, gaskets, bolt heads, lap joints, dirt or other surface deposits. It will develop anywhere moisture or other corrosive agents are trapped and unable to drain or evaporate.

SELECTIVE LEACHING: One element, usually the anodic element of an alloy, corrodes away, leaving the cathodic element. This can create holes in metal.

INTERGRANULAR: Metal deterioration caused by corrosion on the bonds between or across the grain boundaries of the metal. The metal will appear to be peeling off in sheets, flaking, or being pushed apart by

CORROSION PREVENTION AND CONTROL (CPC) - CONTINUED

layers. A particular type of intergranular corrosion is exfoliation.

PITTING: This can result from conditions similar to those for crevice corrosion. Pits can develop on various materials due to their composition. Rifle boxes are big victims of pitting.

EROSION: Results when a moving fluid (liquid or gas) flows across a metal surface, particularly when solid particles are present in the fluid. Corrosion actually occurs on the surface of the metal, but the moving fluid washes away the corrosion and exposes a new metal surface, which also corrodes.

FRETTING: Occurs as a result of small, repetitive movements (e.g., vibration) between two surfaces in contact with each other. It's usually identified by a black powder corrosion product or pits on the surface.

GALVANIC: Occurs when two different types of metal come in contact with each other, like steel bolts on aluminum, for example. This is a common problem on aircraft because of their mix of metals.

STRESS: Term used to describe corrosion cracking and corrosion fatigue. Where an item is not ready/available due to one of these forms of corrosion, it shall be recorded as a corrosion failure in the inspection record and the appropriate code (170) for corrosion shall be used when requesting/performing maintenance.

SF Form 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

ARMY PETROLEUM, OIL, AND LUBRICANTS (POL)

Proper disposal of hazardous waste material is vital to protecting the environment and providing a safe work environment. Materials such as batteries, oils, and antifreeze must be disposed of in a safe and efficient manner.

DO NOT overfill any fluid reservoir. If fluid flows out of reservoir, stop IMMEDIATELY to avoid spillage. Immediately clean up spilled fluid before proceeding with any task.

Refer to local procedures and plans for preventing and responding to fluid spills or leaks. Comply with local regulations when disposing of clean up material and fluids.

The following references are provided to ensure that proper disposal methods are followed:

- Waste Disposal Instructions (MEIS/MIDI CD ROM)
- National Environmental Policy Act of 1969 (NEPA)
- Clean Air Act (CAA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Emergency Planning and Community Right to Know Act (EPCRA)
- Toxic Substances Control Act (TSCA)
- Occupational Safety and Health Act (OSHA)

The disposal of Army Petroleum, Oil, and Lubricants (POL) products is affected by some of the above regulations. State regulations also may apply to POL. If you are unsure of which legislation affects you, contact state and local agencies for regulations regarding proper disposal of Army POL.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Procedures for destruction of army materiel to prevent enemy use can be found in TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use.

PREPARATION FOR STORAGE OR SHIPMENT

To prepare the 4L80-E/4L85-E transmission (HMMWV FOV) for storage, refer to WP 0023. Additional information is found in TM 746-10, General Packaging Instructions for Field Use, Marking, Packing, and Shipment of Supplies and Equipment.

Perform packing, packaging, preservation, and marking requirements in accordance with Special Packaging Instructions (SPI).

PREPARATION FOR STORAGE OR SHIPMENT - CONTINUED

The applicable SPI can be found at <https://www.ilsc.army.mil/tdps/index.asp> by searching for 4L80-E/4L85-E transmission (HMMWV FOV) NSN or NIIN.

A NSN or part number must be entered at the query screen. An image reviewer will be needed to view images. The viewer can be downloaded from the website by going to Help and following the directions.

LIST OF ABBREVIATIONS/ACRONYMS

Abbreviations and acronyms appearing in this manual are defined in the work package from where they first appear, after which only the abbreviation or acronym is used. The following is a quick-reference list of all abbreviations and acronyms and their corresponding word or compound term used in this manual.

CAGEC–Commercial And Government Entity Code	QA–Quality Assurance
CPC–Corrosion Prevention and Control	QTY–Quantity
ECP–Engineering Change Proposal	RPSTL–Repair Parts and Special Tools List
EIR–Equipment Improvement Recommendations	SMR–Source, Maintenance, and Recoverability
FIR–Final Inspection Report	SOR–Source Of Repair
FOV–Family Of Vehicles	SPI–Special Packaging Instructions
HMMWV–High Mobility Multi–Purpose Wheeled Vehicle	SRA–Specialized Repair Activity
GTP–General Transmission Products	TACOM–Tank-automotive and Armaments Command
IUID–Item Unique Identification	TAMMS–The Army Maintenance Management System
MAC–Maintenance Allocation Chart	TAMMS-A–The Army Maintenance Management System-Aviation
MEL–Maintenance Expenditure Limit	TCC–Torque Converter Clutch
NIIN–National Item Identification Number	TM–Technical Manual
NMWR–National Maintenance Work Requirement	TMDE–Test, Measurement, and Diagnostic Equipment
NSN–National Stock Number	UOC–Usable On Code
P/N–Part Number	WP–Work Package
PQDR–Product Quality Deficiency Report	

QUALITY OF MATERIAL

Material used for replacement, repair, or modification must meet the requirements of this NMWR. If quality of material requirements are not stated in this NMWR, the material must meet the requirements of the drawings, standards, specifications, or approved engineering change proposals applicable to the 4L80-E/4L85-E transmission.

ENGINEERING CHANGE PROPOSALS (ECPs)

Engineering Change Proposals (ECPs) are submitted in accordance with AR 70-1, Army Acquisition Policy, directly to Commander, U.S. Army TACOM Life Cycle Management Command, ATTN: AMSTA-LCC-HHM, Mail Stop 420, 6501 E. 11 Mile Road, Warren, Michigan 48397-5000. A reply will be furnished to you.

DEVIATIONS AND EXCEPTIONS

Requests for deviations or exceptions to this NMWR will be processed in accordance with ISO 9000 Series standards or equivalent.

MOBILIZATION REQUIREMENTS

All rebuild/repair procedures contained within this NMWR are required to return the 4L80-E/4L85-E transmission (HMMWV FOV) to a serviceable condition.

COST CONSIDERATIONS

This work requirement shall be the basis for establishing the extent of rebuild while taking into consideration cost factors. A determination shall be made on all subassemblies/assemblies to replace worn or damaged components which are available in supply, if acquisition cost is less than the cost to repair and restore to the NMWR standard. The cost to repair/restore any individual item with an established Maintenance Expenditure Limit (MEL) to the NMWR standard shall not exceed the MEL, unless a waiver has been approved in accordance with AMC-R 750-51. This requirement does not apply to items exempted from MEL in accordance with AMC-R 750-51.

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The 4L80-E/4L85-E transmission (Figure 1) is hydraulically actuated and oil cooled. The transmission has four forward and one reverse driving ranges and automatically upshifts or downshifts within each forward driving range. Built-in inhibitors prevent downshifting into D1 unless vehicle speed is within an acceptable range.

The 4L80-E/4L85-E transmission has a three-element torque converter that transmits power from the engine to the transmission gearing. The torque converter serves as both a fluid coupling and a torque multiplier and includes a lockup clutch in the assembly.

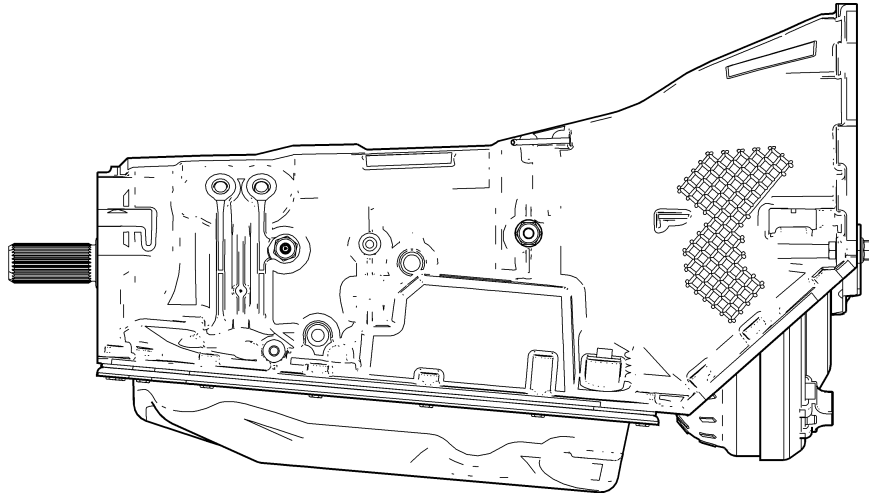


Figure 1. Transmission.

DIFFERENCES BETWEEN MODELS

The 4L85-E is a heavier-duty version of the 4L80-E. The 4L85-E has a brazed torque converter, induction-hardened turbine shaft, high-torque overdrive roller clutch, and five-pinion rear planetaries.

A model-year 2000 and newer 4L80-E transmission can be converted to a 4L85-E by replacing certain parts and identifying markings.

An appropriately marked data plate should be affixed to the transmission which indicates the new model number 4L85-E.

Using all the replacement parts in the table below converts the 4L80-E transmission to a 4L85-E transmission.

Table 1. 4L85-E Parts.

WORK PACKAGE AND ITEM NO.	NATIONAL STOCK NUMBER (NSN)	CAGEC	PART NUMBER	DESCRIPTION	QTY
WP 0013-6 WP 0035, Item 6		34623	5717743	* Housing Part, Transmission, Mechanical	1
WP 0013-6 WP 0035, Item 8	2520-01-461-0085	7X677	8661629	* Retainer and Spring	1
WP 0013-6 WP 0035, Item 9	5325-01-408-7971	7X677	8661568	* Ring, Retaining	1
WP 0013-11 WP 0035, Item 12	3110-01-411-5784	7X677	07471001	* Retainer, Roller, Bearing	1
WP 0013-9 WP 0035, Item 3	2835-01-478-4268	7X677	24222184	** Shaft, Turbine, Nonaircraft	1
WP 0013-11 WP 0035, Item 11		34623	5717752	* Carrier, Gear Assembly	1
WP 0017-9 WP 0034, Item 14		34623	5717742	Carrier, Planetary Gears	1
WP 0017-10 WP 0034, Item 8		34623	5717741	Carrier, Clutch Assembly, Reaction	1
WP 0020-27 WP 0031, Item 1	2520-01-624-2240	34623	5717740	Torque Converter	1

* Model-year 2000 and early 2001 transmissions already have the high-torque roller clutch and related parts. Replacement is only necessary when converting transmissions equipped with a high-speed roller clutch.

** GTP 4L80-E transmissions already have the upgraded turbine shaft. Replacement is only necessary when converting GM Hydra-matic 4L80-E. Determine manufacturer from sticker on transmission if it is legible. If sticker is not legible, use any trademarks or part numbers which are cast into the housing to determine manufacturer.

EQUIPMENT DATA

The following tables provide equipment data for easy referencing.

Table 2. Equipment Configuration Data.

Manufacturer	GTP
Model	4L80-E/4L85-E
Type	Automatic
Speeds	Four forward, one reverse
Rated Capacity (4L80-E)	14,000 lbs (6,350 kg)
Rated Capacity (4L85-E)	16,000 lbs (7,257 kg)
Weight	252 lb (114 kg)
Fluid type	Dexron® VI
Oil Capacity:	
After rebuild	15.5 qt (14.8L)
Drain and refill	7.7 qt (7.3 L)

Table 3. Gear Range Information.

RANGE	CLUTCH(ES)	RATIO
Park	First	0
Neutral	First	0
First speed	Forward and first	2.48:1
Second speed	Forward and second	1.48:1
Third speed	Forward and third	1.00:1
Fourth speed	Forward and fourth	0.75:1
Reverse	First and fourth	2.08:1

EQUIPMENT DATA PLATE

The equipment data plate is located on the right rear side of the 4L80-E/4L85-E transmission housings. The data plate shows the transmission serial number, part number, and model number. If the data plate has been damaged or is illegible, it must be replaced. Transfer pertinent data from the damaged data plate to a new data plate.

REBUILD DATA PLATE

After a 4L80-E/4L85-E transmission has been rebuilt, tested, and documented to be serviceable, a rebuild data plate is attached on flat surface above or below vent line hole. The rebuild data plate must show, at a minimum, rebuild facility and date of repair.

END OF WORK PACKAGE

CHAPTER 2

NMWR TROUBLESHOOTING PROCEDURES

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

**SUSTAINMENT MAINTENANCE
PRESHOP ANALYSIS**

INITIAL SETUP:

References
WP 0005

SCOPE

The purpose of the Component Checklist is to identify the component and the condition as received. This information comes from shipping labels, attached tags, and visual inspection.

PRESHOP ANALYSIS INSTRUCTIONS

1. Remove transmission from container. Refer to WP 0005.
2. Make a copy of the Component Checklist (Figure 2) and fill in the information as requested.
3. Fill in the required information at top of the Component Checklist.
 - a. Records check: Review accompanying shipping and maintenance tags and documents. These tags and documents may supply information helpful to the maintenance technician. Record any significant information, such as trouble codes, transmission will not shift gears, housing cracked, or burnt fluid. Verify that the model year of the transmission is within the scope this NMWR.

NOTE

If there is any damage to the container, component, or any parts are missing from the component, refer to the work directive/contract for instructions.

- b. Container check: Visually check container for evidence of damaged or missing parts. Note any damaged or missing parts.
- c. Component check: Visually check component for evidence of damaged or missing parts. Note any damaged or missing parts.

Upon completion of the Component Checklist, remove all tags and documents from component. Develop a record file for the component. Include the tags and documents, completed Component Checklist, Test Report, and Final Inspection Report (FIR) in the record file. The Test Report will be completed during final testing of the rebuilt component. The FIR will be completed when preparing component for storage.

Table 2. Preshop Analysis Checksheet.

INSPECTION POINT	CONDITION	ACTION	REMARKS	DATE CHECKED	CHECKED BY
(1) Transmission Case	Inspect for obvious damage and overall condition.	External Visual Inspection			
(2) Speed Sensors	Inspect for obvious damage and overall condition.	External Visual Inspection			
(3) Output Shaft	Inspect for obvious damage and overall condition.	External Visual Inspection			
(4) Harness Connector	Inspect for obvious damage and overall condition.	External Visual Inspection			
(5) Oil Pan	Inspect for obvious damage and overall condition.	External Visual Inspection			

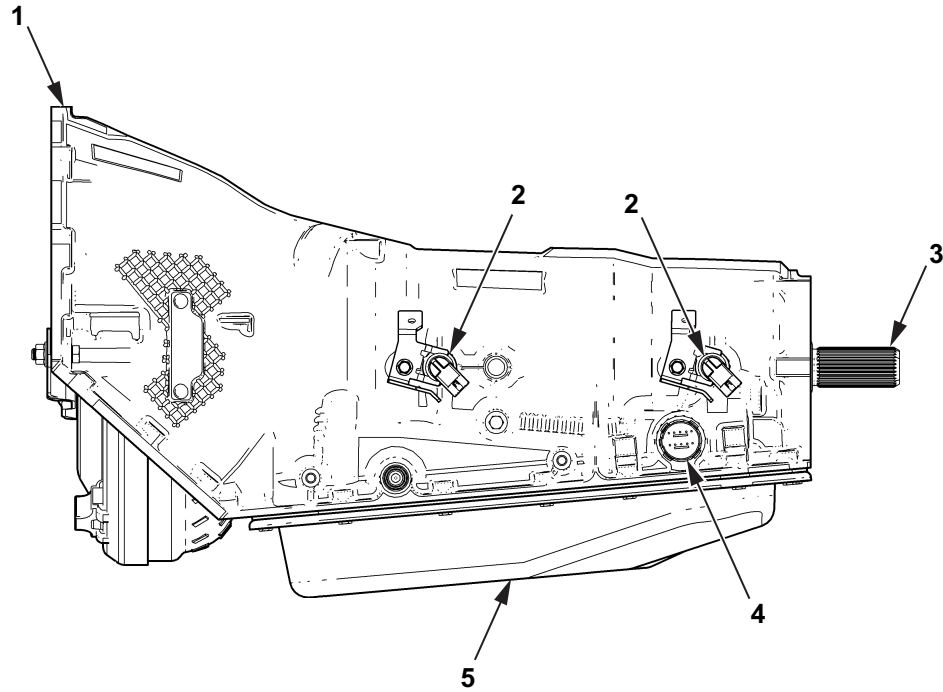


Figure 1. Transmission Assembly Preshop Analysis.

COMPONENT CHECKLIST

Name/nomenclature of the equipment/item _____

Serial number _____

Date received _____

Received from (identify unit) _____

Component name _____

NSN _____

Part number _____

Quantity required _____

Quantity received _____

Visual damage found _____

*Figure 2. Component Checklist.***END OF WORK PACKAGE**

CHAPTER 3

MAINTENANCE INSTRUCTIONS

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

**SUSTAINMENT MAINTENANCE
GENERAL MAINTENANCE INSTRUCTIONS**

INITIAL SETUP:**Materials/Parts**

Cleaning compound (WP 0047, Item 2)
Cloth, cleaning (WP 0047, Item 4)
Dexron® VI (WP 0047, Item 5)

References

TB 43-0213
NASM33537
TM 9-214
WP 0028
WP 0048

SCOPE

This Work Package (WP) contains general maintenance information pertaining to disassembly, cleaning, inspection, repair, and assembly of model-year 2000 and newer 4L80-E/4L85-E transmissions (HMMWV FOV). Detailed information will be found in specific WPs.

Maximum overhaul of parts to like-new condition is mandatory. Parts, components, assemblies, or subassemblies found to be worn or defective beyond limits established by this NMWR will be disposed of in accordance with appropriate directives and, in the case of commercial contracts, as specified in the contract. When new or rebuilt parts, components, assemblies, or subassemblies are unavailable, items will be reviewed on a case-by-case basis. Tolerances and wear limits set forth herein are the minimum acceptable standards.

PRECAUTIONS

All material-handling equipment shall be adequate to ensure safe working conditions for personnel and efficient processing of items.

Follow all WARNINGS, CAUTIONS, and NOTES included in specific WPs to ensure personnel safety and prevent damage to equipment.

SPECIAL PROCESSES

Special processes and equipment required for overhaul operations, as specified in this NMWR, are defined or referenced at the point of their application. When a special process is required, the overhaul activity (when requested) shall provide evidence of compliance with controlling specifications.

END OF TASK**TOOLS AND EQUIPMENT**

Tools and equipment required to overhaul this component are found in WP 0048, Tool Identification List. Torque specifications are given within the text, as applicable. U.S. standard measurements are listed first followed by metric equivalents in parentheses. For example: Tighten oil pump to transmission screws to 18 lb-ft (24 N·m). Standard capscrew markings and torque specifications are found in WP 0028, Torque Limits. Tolerances, torque values, and adjustments are provided in each WP where necessary.

END OF TASK**DISASSEMBLY****CAUTION**

Use caution when handling parts during disassembly. Nicks, scratches, or other damage caused by careless handling may result in premature failure of equipment.

Each appropriate WP will contain specific instructions for disassembly of components. Matched or mated items such as gear sets must be fastened together or otherwise identified as parts being processed together. If one matched or mated part fails inspection, both parts must be replaced as a set.

END OF TASK

CLEANING**WARNING**

- Cleaning compound solvent MIL-PRF-680 is flammable and must not be used near an open flame. A fire extinguisher must be kept nearby when cleaning solvent is used. Use only in well-ventilated areas. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Cleaning compound solvent MIL-PRF-680 is an environmentally compliant and low toxic material. However, it may be irritating to the eyes and skin. Always use protective goggles or face shield and avoid repeated and prolonged skin contact by wearing rubber or solvent resistant gloves. If contact with eyes occurs, flush eyes with water and seek medical attention. Wash hands and skin immediately after exposure with soap and water and use a lanolin-based skin cream to prevent skin drying. Remove contaminated clothing as soon as possible. Store, handle, and dispose of contaminated cloths and clothing according to local procedures and plans.
- Ensure cleaning solvent container is sealed when not in use. Store, handle, and dispose of unused and spent solvents in accordance with local procedures and plans. Failure to comply may result in damage to environment and health of personnel. Seek medical attention in the event of an injury.
- Appropriate eye protection must be worn when cleaning with a wire brush, sandblast, grit blast, or other effective methods. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.
- Paints, cleaning solvents, and primers may cause burns, skin irritation, and emit harmful vapors. Inhalation may cause irritation to upper respiratory passages. Keep paints, cleaning solvents, and primers away from fire or heat sources and use only in well-ventilated areas. Keep paints, cleaning solvents, and primers closed when not in use. Always wear protective equipment such as goggles, face mask, gloves, and a proper respirator. If paints, cleaning solvents, and primers contact skin, wash immediately with soap and water. Failure to comply may cause injury to personnel. Seek medical attention in the event of an injury.
- Prolonged contact with lubricating oil may cause a skin rash. Skin and clothing that come in contact with lubricating oil should be thoroughly washed. Saturated clothing should be removed immediately. Areas in which lubricating oil is used should be well ventilated to keep fumes to a minimum. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.

CAUTION

- Block all ports and mask machined surfaces of aluminum castings before using the following cleaning procedures. Failure to comply may result in damage to equipment.
- Do not separate or intermix matched, married, or mated parts during cleaning operations. Failure to comply may result in damage to equipment.

For authorized cleaning materials, refer to TB 43-0213, Corrosion Prevention and Control (CPC) for Tactical Vehicles.

CLEANING - CONTINUED**Table 1. Cleaning Guidelines.**

NO.#	ITEM	CLEANING
1	Oil passages	Remove all obstructions with compressed air or by working a soft wire back and forth through oil passage and flushing it with cleaning solvent.
2	Castings	Clean inner and outer surfaces of castings and all areas subject to grease and oil with cleaning solvent.
3	Nonmetallic parts & hoses	Soap and water.

END OF TASK

INSPECTION—ACCEPTANCE AND REJECTION CRITERIA

All components subjected to magnetic particle inspection shall be demagnetized prior to assembly. All components subjected to dye penetrant inspection shall be cleaned after inspection. Coat part with preservative oil as required. Throughout this NMWR, measurements are used to confirm serviceability of items after a visual inspection. Measurements are performed as required by quality assurance, in-process inspection, rebuild procedures, test report, and Final Inspection Report (FIR). Used components and refinished parts, recovered as products of disassembly, will be examined 100 percent to determine serviceability. Refer to the rebuild WPs, work directive, or contract for more detail. Parts showing evidence of overheating shall not be repaired by any process. Discard these parts.

NOTE

Some parts may not look exactly like the illustrations.
 Manufacturing methods may change part appearance, but parts are functionally the same.

Table 2. General Inspection Guidelines.

INSPECT	ACTION
Oil passages	Remove all obstructions with compressed air or by working a soft wire or wire brush back and forth through oil passage.
Threads (internal)	Inspect threads for minor irregularities. For damaged thread repair, refer to Table 3, Repairable Defects.
Machined surfaces	Check for damage that could cause oil leakage or malfunction of the part. Refer to Table 3, Repairable Defects.
Gear and spline teeth	Check for nicks, burrs, or scoring. If any such conditions are found, refer to Table 3, Repairable Defects.
Rotating or lockup inner parts	Check for cracked rotating or lockup inner parts. If cracked, these parts must be replaced and no repair attempted.
Capscrews and plugs	Inspect capscrews and plugs for damage. Replace capscrews and plugs that are damaged and cannot be repaired. Inspect heads for rounding, cracks or fractures. Replace capscrews or plugs with damaged heads. Inspect capscrews and plugs for minor irregularities. For damaged thread repair, refer to Table 3, Repairable Defects. If major thread damage is found, replace fastener.

END OF TASK

REPAIR OR REPLACEMENT

Parts that are beyond wear limit tolerances, broken, cracked, or otherwise damaged may be considered for repair by special processes by requesting approval from TACOM Equipment Specialists. In requesting approval, the rebuild activity will furnish:

1. Written repair procedure
2. Specifications covering the procedure
3. Reference drawing
4. Samples (when requested) of parts repaired by the applicable process

END OF TASK**UNREPAIRABLE DEFECTS**

Do not repair any of the following:

1. Casting cracks at through-bores, threaded holes, or high-stress areas
2. Cracked, chipped, ridged, or pitted spline or gear teeth
3. Cracked or split keyways
4. Cracked or chipped retaining ring grooves
5. Oil channels with cracked walls or chipped edges
6. Pitted or grooved gear teeth and splines, unless otherwise indicated in this NMWR
7. Parts showing evidence of overheating
8. Cracked rotating or lockup inner parts

END OF TASK

REPAIRABLE DEFECTS

Table 3. Repairable Defects.

REPAIRABLE PART/AREA	REPAIR PROCESS
Machined surfaces	Small burrs and scratches may be removed with a fine-mill file or fine-grit emery cloth. Discard components that have burrs or scratches too large to repair.
Damaged internal threads	Repair threads in tapped holes having minor irregularities by re-tapping with correct size previously used hole tap. Drill out tapped holes having badly damaged threads and install a threaded insert. Follow kit manufacturer's and NASM33537 instructions. When drilling, the land width (space between holes, or between edge of hole and edge of material) must measure no less than three-fourths of the hole diameter. Discard any component with damaged internal threads that are not repairable.
Housing, castings, and shaped, machined surfaces	Unless otherwise indicated, use fine-grit emery cloth, crocus cloth, or soft stone to repair minor nicks, burrs, and scoring. Minor surface irregularities on non-contact surfaces do not need repair. Discard components not repairable.
Gears, splines, and shafts	Use crocus cloth, fine-mill file, or soft stone to remove minor nicks, burrs, and scoring. Welding, grinding, machining, plating, etc. of gear or splined teeth to correct defects is not authorized. Discard components not repairable.
Surface rust and corrosion	Remove surface rust and corrosion from all internal parts and surfaces. Mechanical and/or chemical methods may be used. Use fine-grit emery cloth, crocus cloth, or soft stone to remove minor surface rust and corrosion. Do not assemble components having rusted or corroded parts. Corrosion or rust may flake off and cause damage to component while circulating in oil during operation. Discard components not repairable.

END OF TASK

ASSEMBLY**CAUTION**

Seals may be contaminated with dirt, debris, or moisture when the seal packets are opened. Do not open seal packets until seals are ready to be installed. Failure to comply may result in equipment damage.

Cleanliness is essential in all component assembly operations. Dust and dirt, even in minute quantities, are abrasive. Parts must be kept clean. See individual WPs for specific assembly instructions. Replace any part that does not pass visual inspection or that is outside specified wear limits. Coat all bearings, bushings, gears, shafts, seals, friction parts, and other contact surfaces with operating oil (Dexron® VI) to ensure lubrication of parts during initial operation after rebuild. For additional information on bearing lubrication and installation, refer to TM 9-214.

Seal handling:

1. Do not open seal packaging until ready to install seal. Seals may become contaminated with dust or dirt, and some types of seals may absorb moisture which may affect installation and result in damage or shorten life of seal.
2. Ensure lip-type seals are installed so spring-loaded lip faces toward lubricant.
3. Tighten all capscrews, screws, bolts, nuts, and fittings to torque values as specified in maintenance WPs and in torque specifications in WP 0028.
4. For parts identification, refer to the applicable WP.

END OF TASK**END OF WORK PACKAGE**

**SUSTAINMENT MAINTENANCE
REMOVING TRANSMISSION FROM SHIPPING CONTAINER**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Chains

Lifting device

References

ASTM-D 6880

REMOVAL FROM CONTAINER**WARNING**

- Use caution when handling heavy parts. Provide adequate support and use assistance during procedure. Transmission weighs 252 lbs (114 kg). Ensure lifting device is in good operating condition and of suitable load capacity. Failure to comply may result in death or injury to personnel. Seek medical attention in the event of an injury.
- All personnel must stand clear during lifting operations. A swinging or shifting load may result in death or injury to personnel. Seek medical attention in the event of an injury.

NOTE

- Container is reusable, do not destroy. If container requires repair, refer to ASTM-D 6880, CL.2, STYLE 4 for container requirement information.
- Container inside dimensions are 37 x 27 x 26 in.

1. Remove screws (as required) from upper container.
2. Remove upper container from lower container.
3. Remove bolts (as required) securing transmission to lower container.
4. Using chains and lifting device, remove transmission from container.

END OF TASK**END OF WORK PACKAGE**

**SUSTAINMENT MAINTENANCE
MOUNTING TRANSMISSION ON HOLDING FIXTURE**

INITIAL SETUP:**Tools and Special Tools**

- Adapter, holding tool (WP 0048, Item 3)
 - Base, transmission holding fixture (WP 0048, Item 4)
 - Fixture, transmission holding (WP 0048, Item 11)
 - General mechanic's tool kit: automotive (WP 0048, Item 13)
-

MOUNTING TRANSMISSION ON HOLDING FIXTURE**WARNING**

Torque converter must be supported by retaining straps at all times to prevent torque converter from falling out. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.

1. Remove two nuts (Figure 1, Item 6) and capscrews (Figure 1, Item 1) from retaining strap (Figure 1, Item 4) and transmission (Figure 1, Item 2).
2. Remove capscrew (Figure 1, Item 5) and retaining strap (Figure 1, Item 4) from torque converter (Figure 1, Item 3).
3. Remove torque converter (Figure 1, Item 3) from transmission (Figure 1, Item 2). Discard torque converter (Figure 1, Item 3).

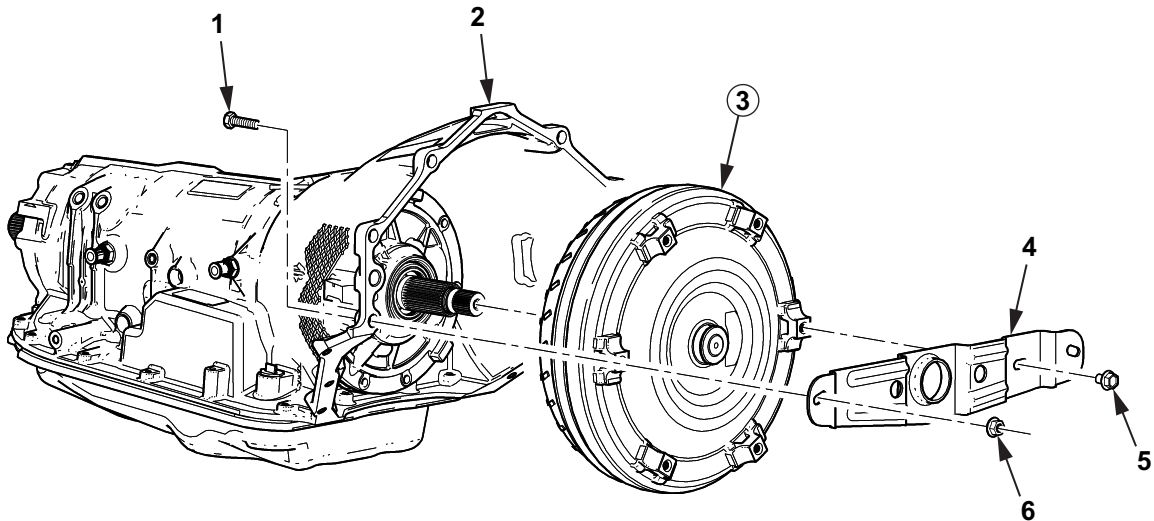


Figure 1. Transmission and Torque Converter Assembly.

MOUNTING TRANSMISSION ON HOLDING FIXTURE - CONTINUED**CAUTION**

Do not overtighten screws. This will cause the center support to bind.

4. Install transmission holding fixture (Figure 2) and holding tool adapter (Figure 2) into locating holes on side of transmission case (Figure 2, Item 1).
5. Install transmission holding fixture (Figure 2) and transmission case (Figure 2, Item 1) into transmission holding fixture base (Figure 2).

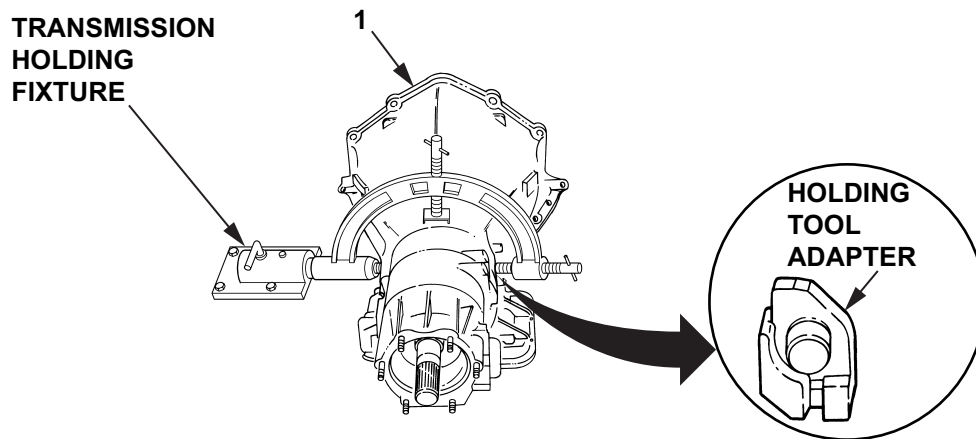


Figure 2. Transmission Mounted In Holding Fixture.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TRANSMISSION DISASSEMBLY INTO SUBASSEMBLIES**

INITIAL SETUP:**Tools and Special Tools**

- Clutch assembly remover/installer
(WP 0048, Item 6)
- Dial indicator (WP 0048, Item 8)
- Direct clutch assembly, remover/installer
(WP 0048, Item 9)
- General mechanic's tool kit: automotive
(WP 0048, Item 13)
- Installer/remover, gear unit (WP 0048, Item 18)
- Remover, seal (WP 0048, Item 21)
- Remover/installer, selector shaft seal
(WP 0048, Item 22)
- Remover/installer, oil pump (WP 0048, Item 23)
- Scriber, machinist's (WP 0048, Item 24)
- Slide hammer, mechanical puller
(WP 0048, Item 26)
- Standard automotive tool set (WP 0048, Item 27)

Materials/Parts

- Cleaning compound (WP 0047, Item 2)
- Cloth, cleaning (WP 0047, Item 4)

References

- WP 0017
- WP 0018

SPEED SENSORS REMOVAL

Remove two bolts (Figure 1, Item 4), speed sensors (Figure 1, Item 3), and O-rings (Figure 1, Item 2) from transmission (Figure 1, Item 1). Discard O-rings (Figure 1, Item 2).

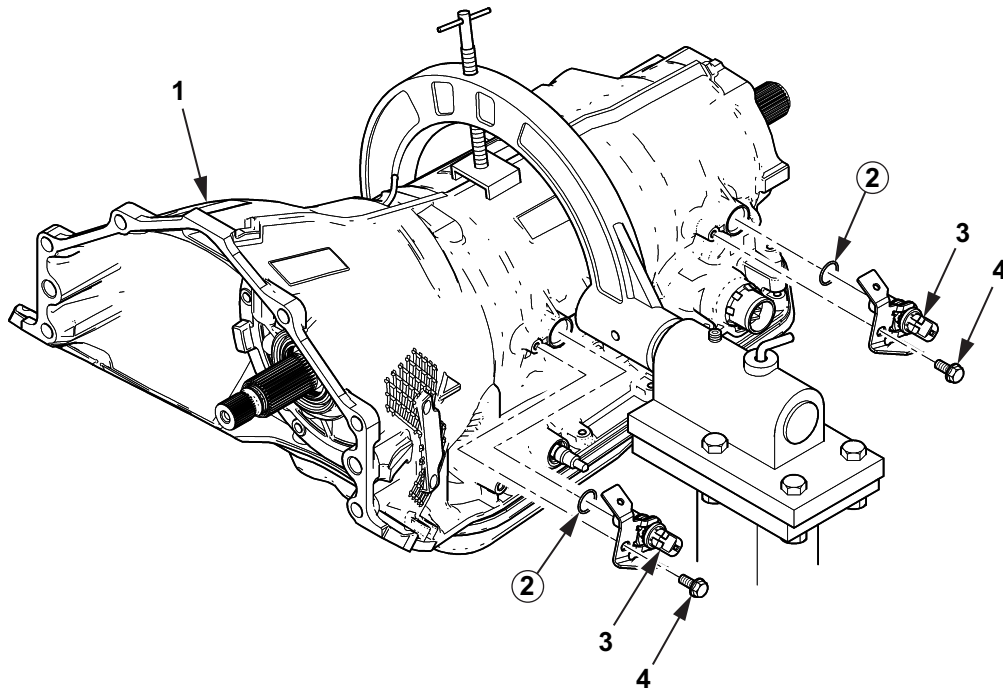


Figure 1. Transmission Speed Sensors.

END OF TASK

OIL PAN AND FILTER ASSEMBLY REMOVAL

1. Rotate transmission (Figure 2, Item 1) to vertical left side position and lock in place to prevent any remaining contaminated fluid from reentering transmission (Figure 2, Item 1).
2. Remove seventeen bolts (Figure 2, Item 6) and oil pan (Figure 2, Item 5) from transmission (Figure 2, Item 1). Discard oil pan (Figure 2, Item 5) if not equipped with drain plug.
3. Remove oil pan gasket (Figure 2, Item 4) and magnet (Figure 2, Item 7) from transmission oil pan (Figure 2, Item 5). Discard oil pan gasket (Figure 2, Item 4).
4. Remove filter (Figure 2, Item 3) and seal (Figure 2, Item 2) from transmission (Figure 2, Item 1). Discard filter (Figure 2, Item 3) and seal (Figure 2, Item 2).

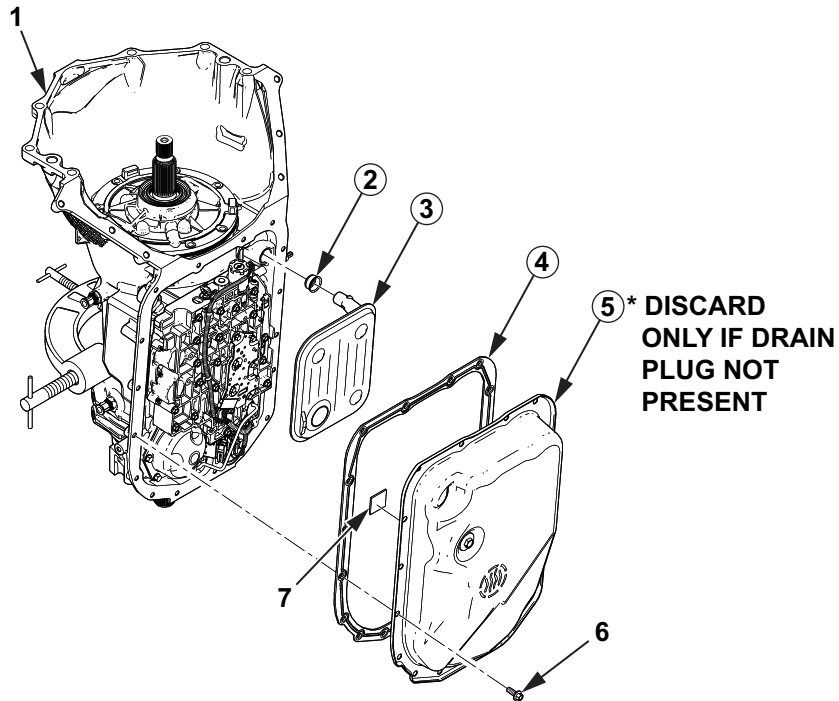


Figure 2. Transmission Oil Pan and Filter.

END OF TASK

CONTROL VALVE ASSEMBLY REMOVAL

1. Position transmission (Figure 3, Item 1) so oil pan surface faces up.
2. Disconnect wiring harness (Figure 3, Item 6) from TCC solenoid (Figure 3, Item 7), pressure control solenoid (Figure 3, Item 8), transmission fluid pressure switch (Figure 3, Item 2), 2-3 shift solenoid (Figure 3, Item 5), and 1-2 shift solenoid (Figure 3, Item 4).
3. Remove connector (Figure 3, Item 3) from transmission (Figure 3, Item 1).

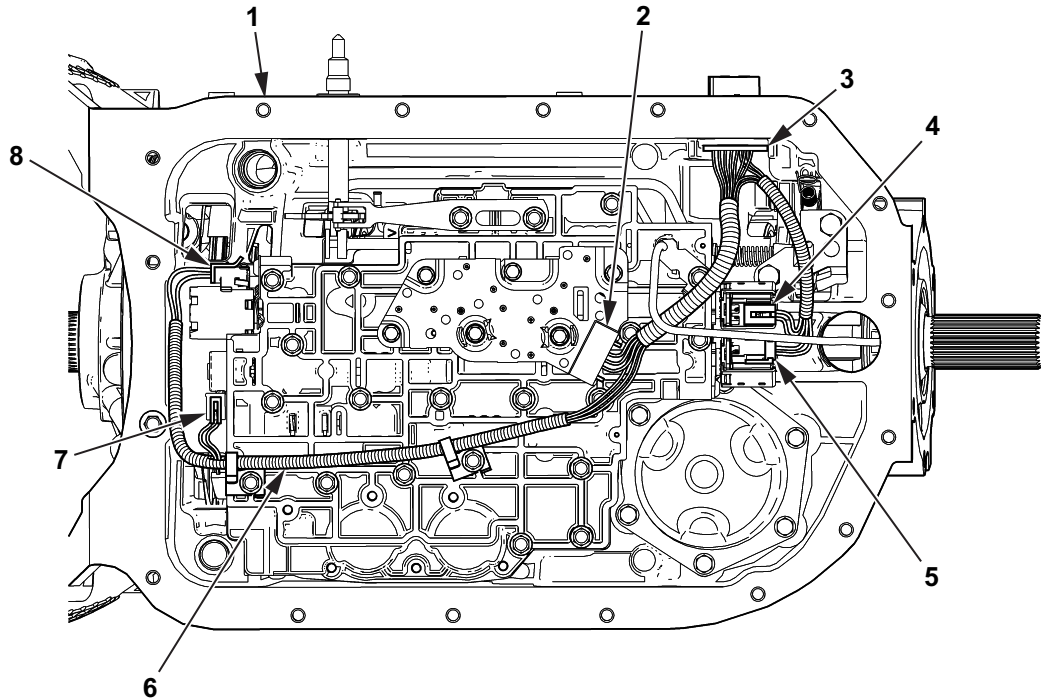


Figure 3. Transmission Solenoid Wiring Harness.

CONTROL VALVE ASSEMBLY REMOVAL - CONTINUED

NOTE

- Bolts are different lengths. Record location of each bolt for installation.
 - Some transmissions may have a two or three bolt and clip configurations.
4. Remove two or three bolts (Figure 4, Item 1), clips (Figure 4, Item 2), and harness (Figure 4, Item 9) from control valve assembly (Figure 4, Item 6) and transmission (Figure 4, Item 8).
 5. Remove seal (Figure 4, Item 7) from harness (Figure 4, Item 9). Discard seal (Figure 4, Item 7).
 6. Remove bolt (Figure 4, Item 3), clip (Figure 4, Item 4), and tube (Figure 4, Item 5) from control valve assembly (Figure 4, Item 6) and transmission (Figure 4, Item 8).

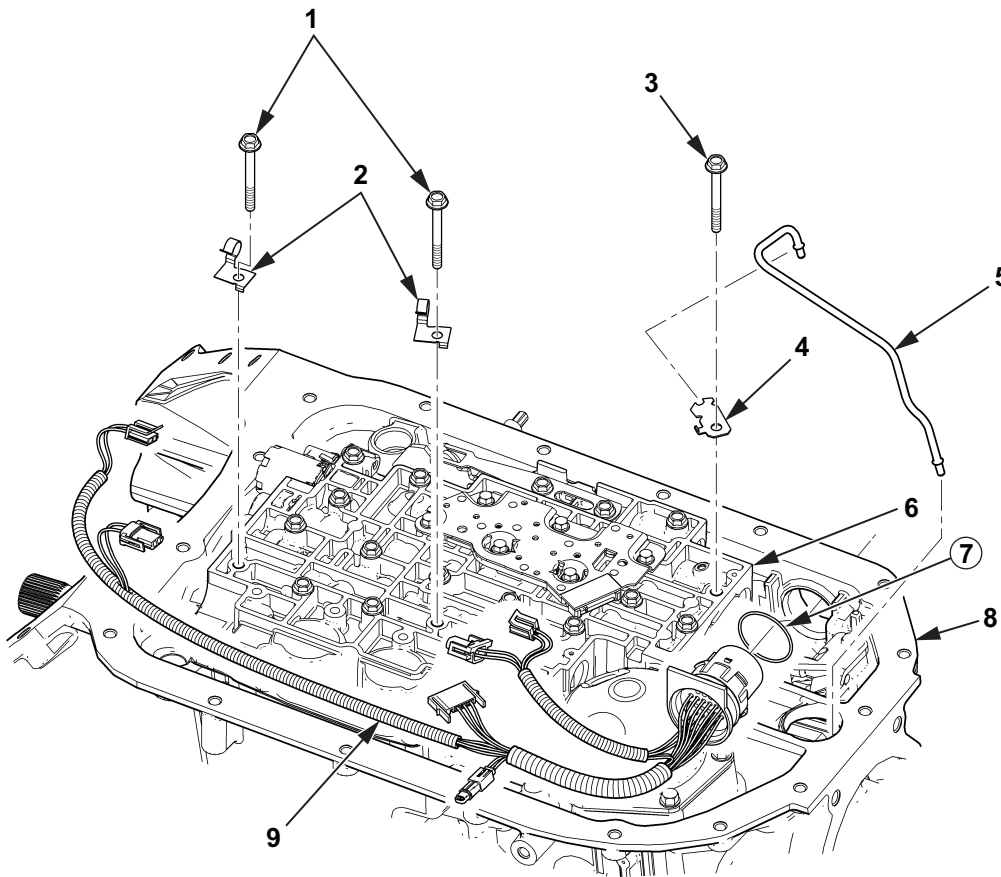


Figure 4. Wiring Harness Removal.

CONTROL VALVE ASSEMBLY REMOVAL - CONTINUED

7. Remove six bolts (Figure 5, Item 1) and transmission fluid pressure switch (Figure 5, Item 2) from control valve assembly (Figure 5, Item 5) and transmission (Figure 5, Item 6).
8. Remove two bolts (Figure 5, Item 3) and spring tension clip (Figure 5, Item 4) from control valve assembly (Figure 5, Item 5) and transmission (Figure 5, Item 6).

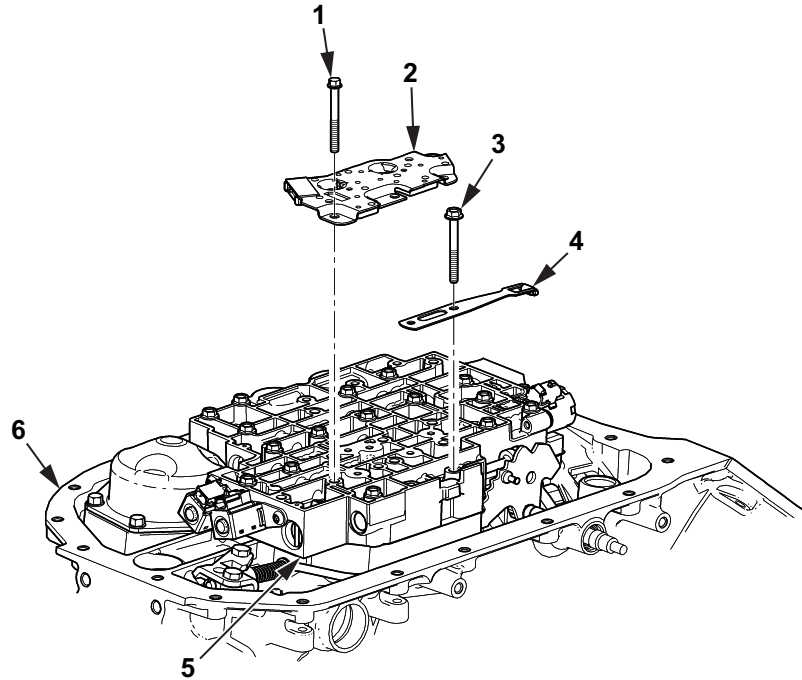


Figure 5. Transmission Pressure Switch and Spring and Roller Assembly.

CONTROL VALVE ASSEMBLY REMOVAL - CONTINUED

9. Remove fifteen or sixteen bolts (Figure 6, Item 2) and control valve body assembly (Figure 6, Item 1) from transmission (Figure 6, Item 4).
10. Remove screen (Figure 6, Item 3) from transmission (Figure 6, Item 4). Discard screen (Figure 6, Item 3).

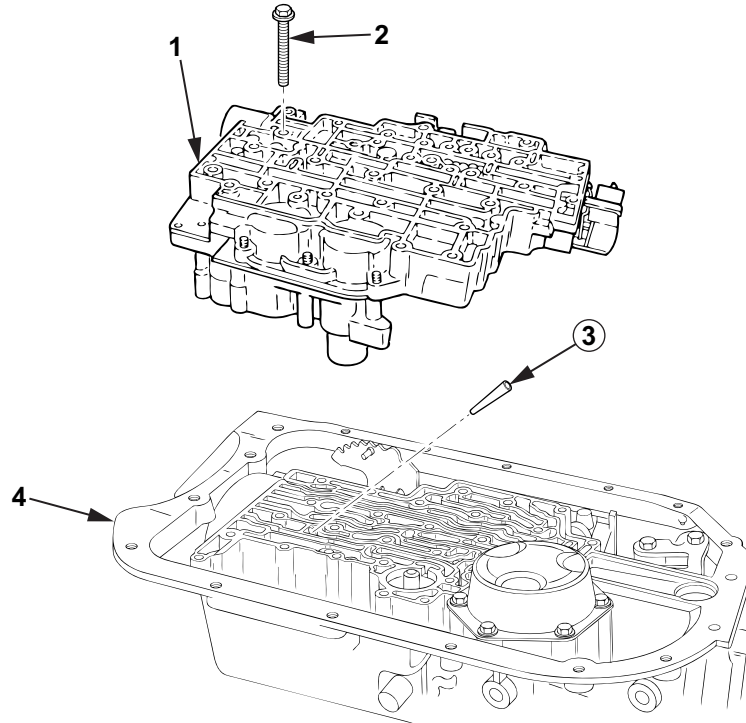


Figure 6. Screen Filter Location.

CONTROL VALVE ASSEMBLY REMOVAL - CONTINUED**CAUTION**

Do not use magnets or any magnetized tools to remove checkballs. Some checkballs are metal and, if magnetized, will pick up debris from oil and cause malfunction of transmission. Failure to comply may result in damage to equipment.

NOTE

Record locations of checkballs for assembly. The ninth checkball pocket should not contain a checkball.

11. Remove eight checkballs (Figure 7, Item 2) from transmission (Figure 7, Item 1).

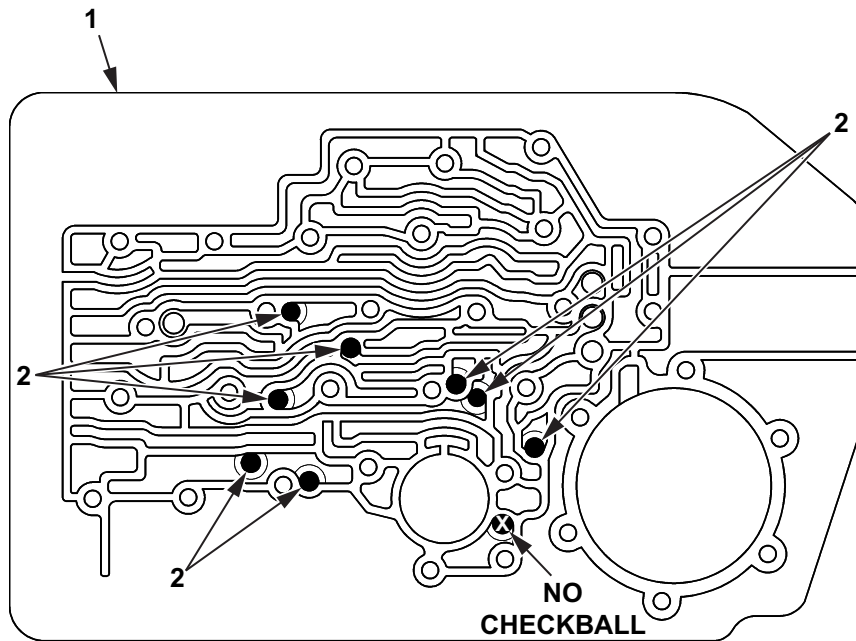


Figure 7. Checkball Locations.

END OF TASK

FRONT SERVO REMOVAL

Remove servo piston assembly (Figure 8, Item 1) and piston spring (Figure 8, Item 2) from transmission case (Figure 8, Item 3).

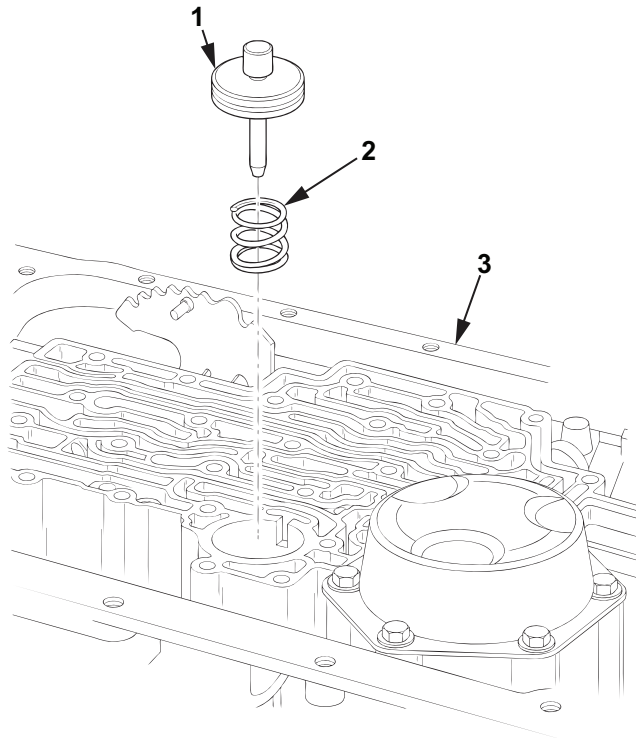


Figure 8. Front Servo Piston.

END OF TASK

REAR SERVO REMOVAL

1. Remove six bolts (Figure 9, Item 1), cover (Figure 9, Item 2), and rear servo cover gasket (Figure 9, Item 3) from transmission case (Figure 9, Item 6). Discard rear servo cover gasket (Figure 9, Item 3).
2. Remove servo piston assembly (Figure 9, Item 4) and piston spring (Figure 9, Item 5) from transmission case (Figure 9, Item 6).

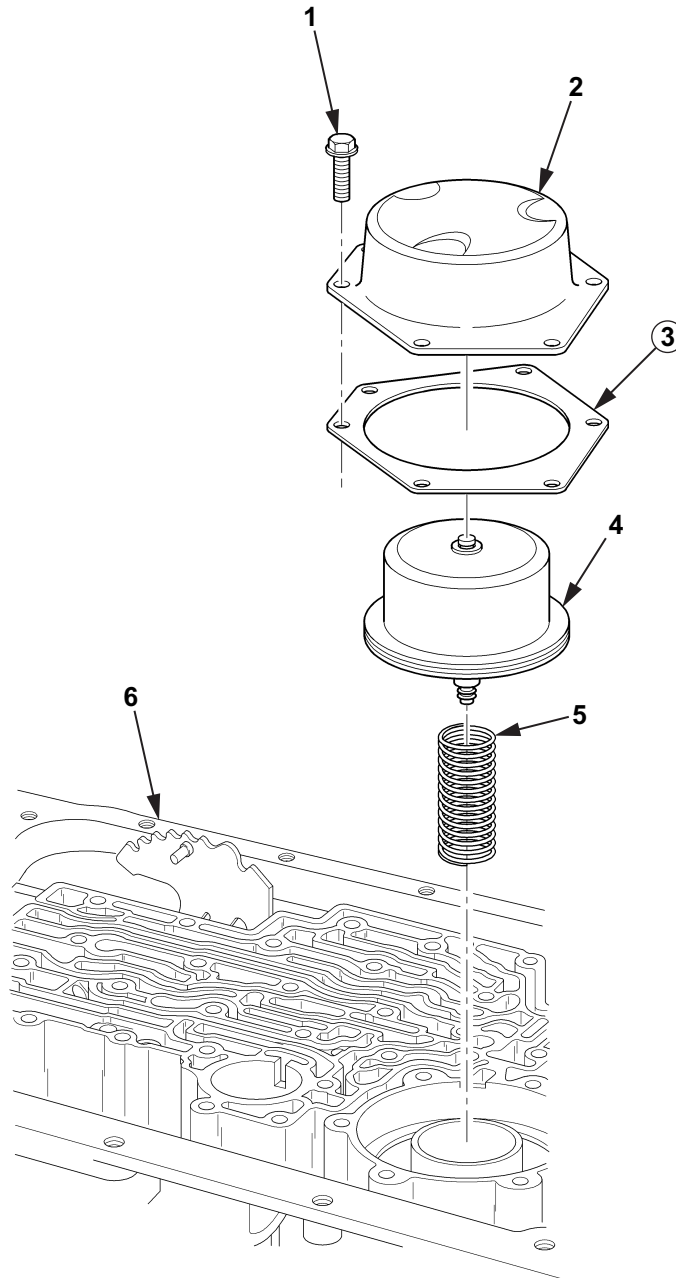


Figure 9. Rear Servo Piston.

END OF TASK

PARKING PAWL AND ACTUATOR ASSEMBLY REMOVAL**CAUTION**

Do not apply excessive force, prying, or hammering to any parking mechanism part. Doing so may cause parking system failure.

1. Rotate output shaft (Figure 10, Item 1) by hand and shift detent lever (Figure 10, Item 3) into park.
2. Visually inspect operation of parking pawl (Figure 10, Item 2).

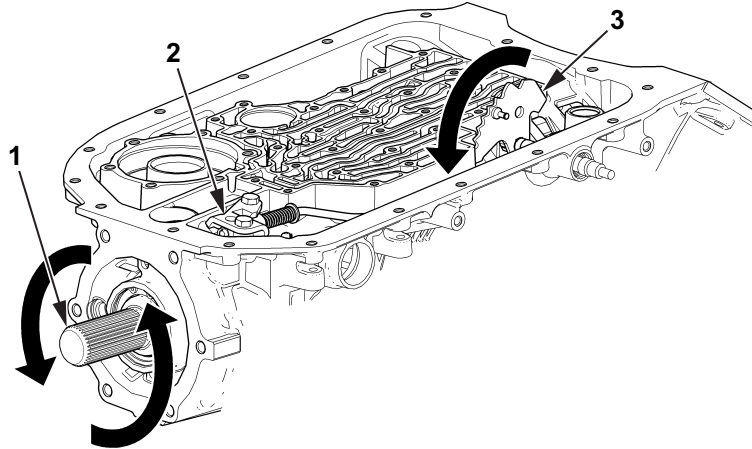


Figure 10. Parking System Operational Check.

NOTE

Parking pawl should lock output shaft so that it cannot be turned. If no issues are present, proceed to Step 12.

3. Remove shaft retaining pin (Figure 11, Item 5) from manual shaft (Figure 11, Item 6).
4. Loosen nut (Figure 11, Item 3), slide manual shaft (Figure 11, Item 6) from detent lever (Figure 11, Item 4), and remove nut (Figure 11, Item 3) and detent lever (Figure 11, Item 4) from transmission case (Figure 11, Item 9).
5. Turn detent lever (Figure 11, Item 4) to free it from connecting link (Figure 11, Item 2).
6. Remove two bolts (Figure 11, Item 1) and bracket (Figure 11, Item 14) from transmission case (Figure 11, Item 9).
7. Remove connecting link (Figure 11, Item 2) from parking pawl (Figure 11, Item 12).
8. Disconnect and remove return spring (Figure 11, Item 13) from parking pawl (Figure 11, Item 12) and round end on stud (Figure 11, Item 15) in transmission case (Figure 11, Item 9).
9. Remove pipe plug (Figure 11, Item 10) from transmission case (Figure 11, Item 9). Discard pipe plug (Figure 11, Item 10).
10. Remove retainer (Figure 11, Item 8), pin (Figure 11, Item 11), and parking pawl (Figure 11, Item 12) from transmission case (Figure 11, Item 9).
11. Remove manual shaft (Figure 11, Item 6) from transmission case (Figure 11, Item 9).
12. Using selector shaft seal remover/installer, remove manual shaft seal (Figure 11, Item 7) from transmission case (Figure 11, Item 9). Discard manual shaft seal (Figure 11, Item 7).

PARKING PAWL AND ACTUATOR ASSEMBLY REMOVAL - CONTINUED

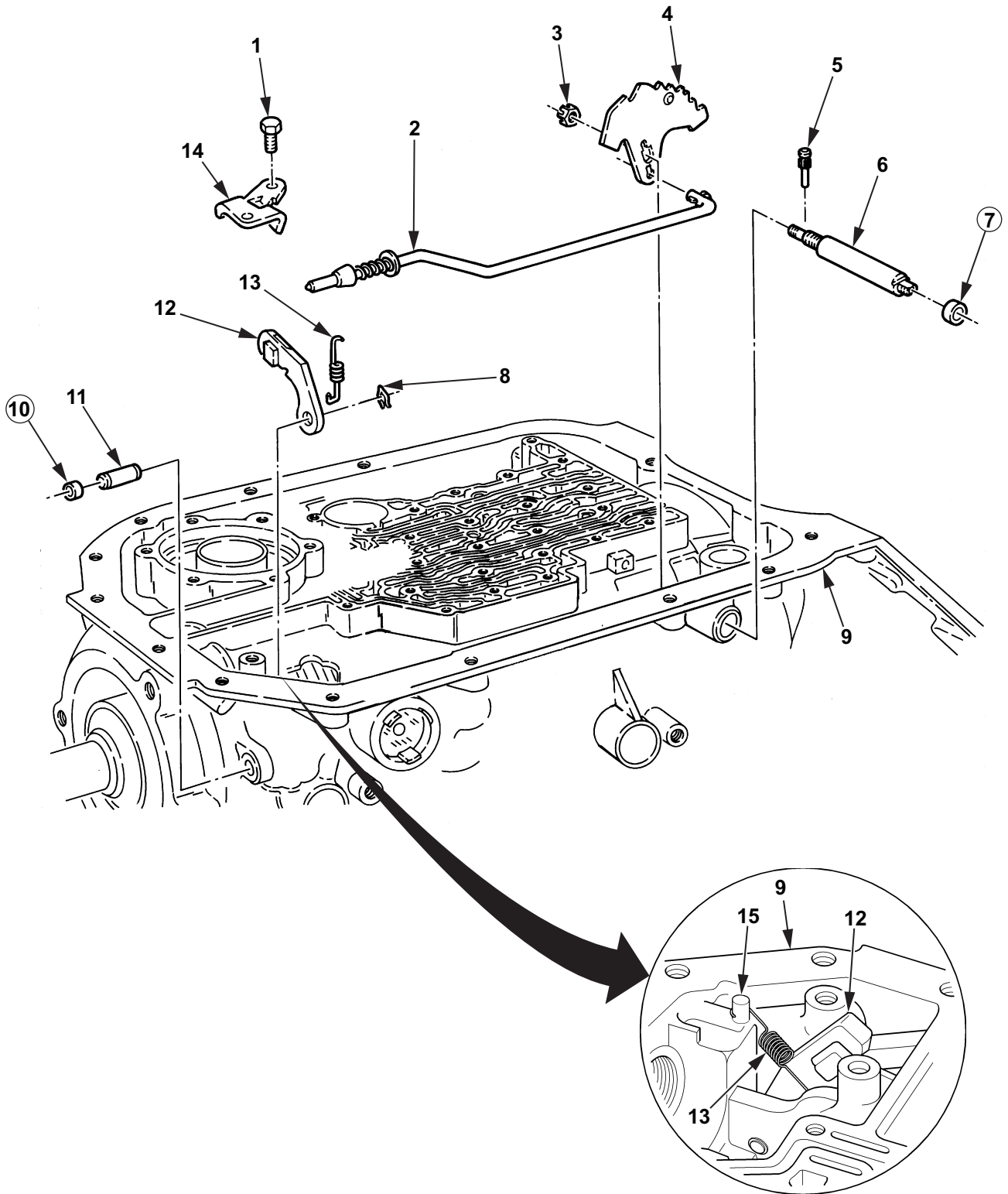


Figure 11. Parking Pawl and Actuator Assembly Removal.

END OF TASK

FRONT END PLAY CHECK (MEASURED)**CAUTION**

If end play procedures are not closely adhered to, incorrect shim thickness will be selected, which may result in severe damage to internal transmission components.

1. Rotate transmission case (Figure 12, Item 2) with turbine shaft (Figure 12, Item 1) vertical.

NOTE

Dial indicator may be mounted to oil pump or to bell housing as shown.

2. Set dial indicator (Figure 12) to read turbine shaft (Figure 12, Item 1) vertical movement.
3. Press down turbine shaft (Figure 12, Item 1) and pry up output carrier with pry tool (Figure 12) to remove rear end play.
4. Lift turbine shaft (Figure 12, Item 1) with light force to remove slack between retaining ring on turbine shaft (Figure 12, Item 1) and overdrive carrier (not shown).
5. Index dial indicator (Figure 12) to read "zero".
6. Pull up turbine shaft (Figure 12, Item 1) and hold up overdrive carrier (not shown). Use enough force (at least 20 lb (9.1 kg)) to lift front parts. Read amount of movement on dial indicator (Figure 12).
7. Record turbine shaft movement value for use in reassembly. Proper end play is 0.004–0.022 in (0.102–0.559 mm). Remove dial indicator (Figure 12) and pry tool (Figure 12) from transmission case (Figure 12, Item 2).

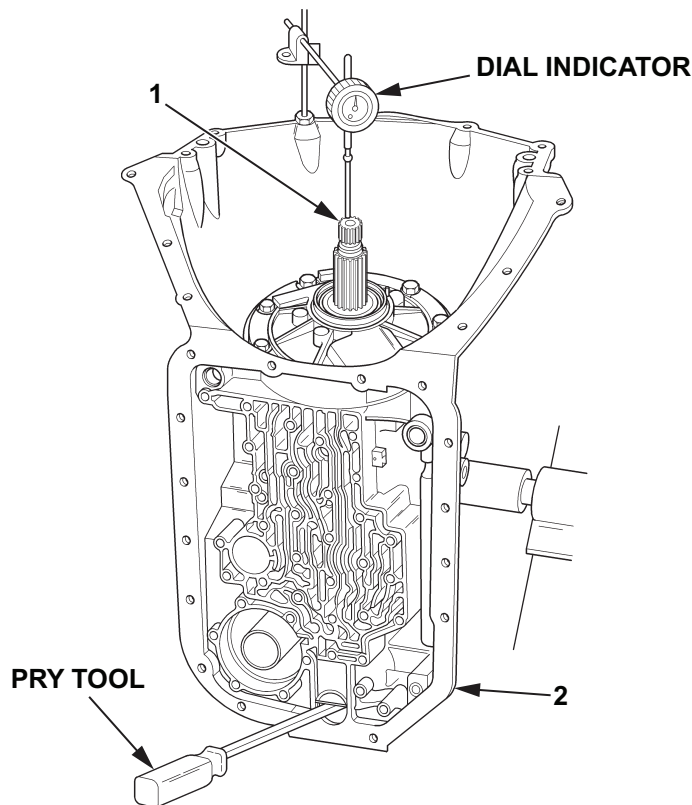


Figure 12. Front End Play.

END OF TASK

REAR UNIT END PLAY CHECK (MEASURED)

1. Rotate transmission case (Figure 13, Item 1) with output shaft (Figure 13, Item 2) horizontal.
2. Set dial indicator (Figure 13) to read end movement of output shaft (Figure 13, Item 2).
3. Push output shaft (Figure 13, Item 2) into transmission case (Figure 13, Item 1) and “zero” dial indicator (Figure 13).
4. Pull output shaft (Figure 13, Item 2) out of transmission case (Figure 13, Item 1) and read amount of movement on dial indicator (Figure 13).
5. Record output shaft value for use in reassembly. Proper end play is 0.005–0.025 in. (0.127–0.635 mm).
6. Remove dial indicator (Figure 13).

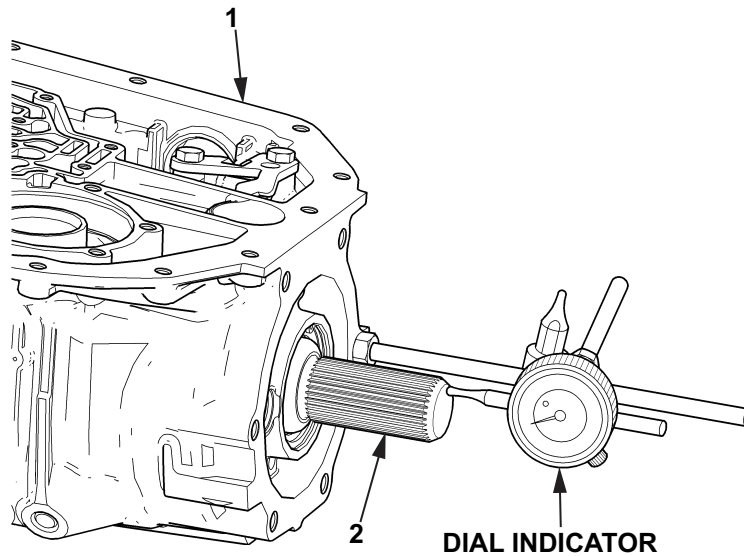


Figure 13. Rear End Play.

END OF TASK

PUMP ASSEMBLY REMOVAL

1. Rotate transmission (Figure 14, Item 1) to bell housing-up vertical position and lock in place.
2. Remove seal (Figure 14, Item 2) from turbine shaft (Figure 14, Item 4). Discard seal (Figure 14, Item 2).
3. Using seal remover and slide hammer, remove seal (Figure 14, Item 3) from oil pump (Figure 14, Item 5). Discard seal (Figure 14, Item 3).

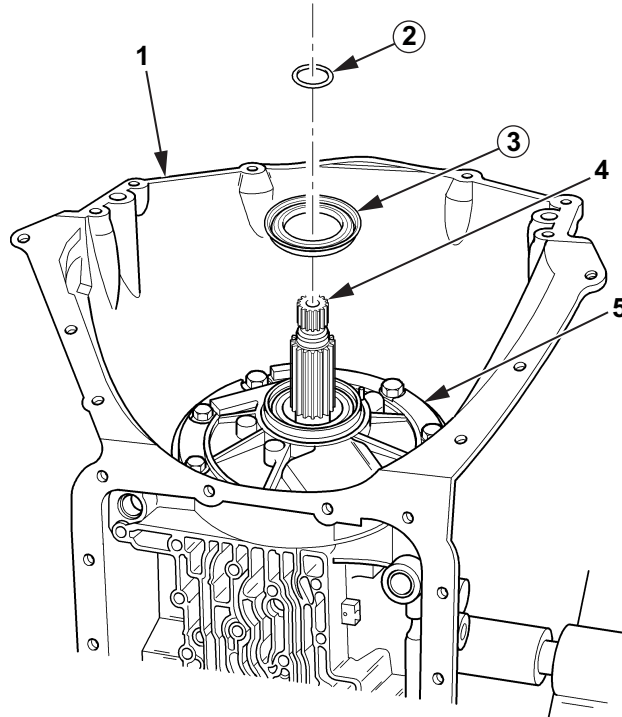


Figure 14. Turbine Shaft Seal Removal.

4. Install oil pump remover/installer (Figure 15) on stator shaft (Figure 15, Item 1).

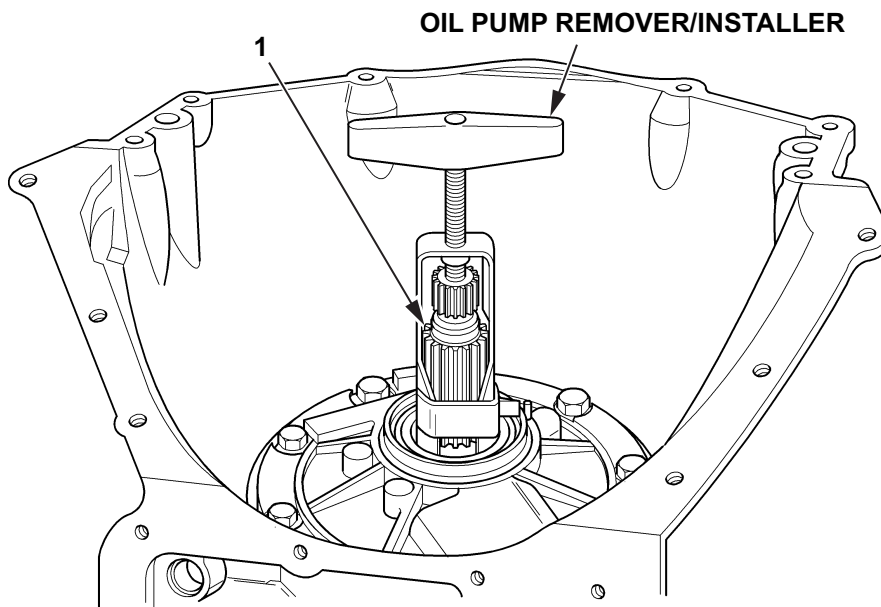


Figure 15. Oil Pump Remover/Installer Installation.

PUMP ASSEMBLY REMOVAL - CONTINUED

5. Remove seven bolts (Figure 16, Item 1) and O-rings (Figure 16, Item 7) from pump (Figure 16, Item 2). Discard bolts (Figure 16, Item 1) and O-rings (Figure 16, Item 7).
6. Using oil pump remover/installer (Figure 16), remove pump (Figure 16, Item 2) and oil pump gasket (Figure 16, Item 3) from transmission case (Figure 16, Item 5). Discard oil pump gasket (Figure 16, Item 3).
7. Remove thrust washer (Figure 16, Item 4) from pump (Figure 16, Item 2) or overdrive carrier (Figure 16, Item 6).

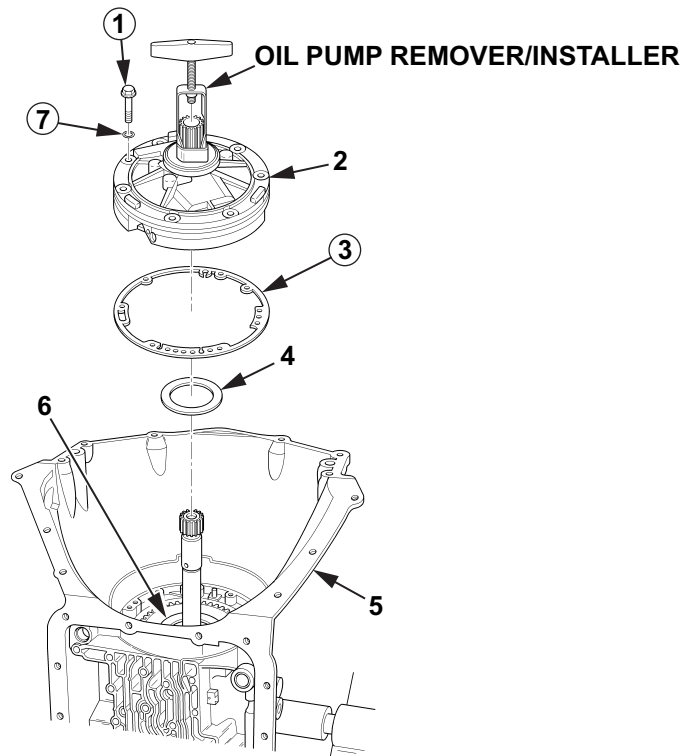


Figure 16. Oil Pump Removal.

END OF TASK

TURBINE SHAFT AND OVERDRIVE CARRIER ASSEMBLY REMOVAL

1. Lift turbine shaft (Figure 17, Item 1) and remove overdrive carrier assembly (Figure 17, Item 2) from transmission case (Figure 17, Item 5).
2. Remove flat bearing assembly (Figure 17, Item 3) from overdrive carrier assembly (Figure 17, Item 2) or top of forward clutch assembly (Figure 17, Item 4).

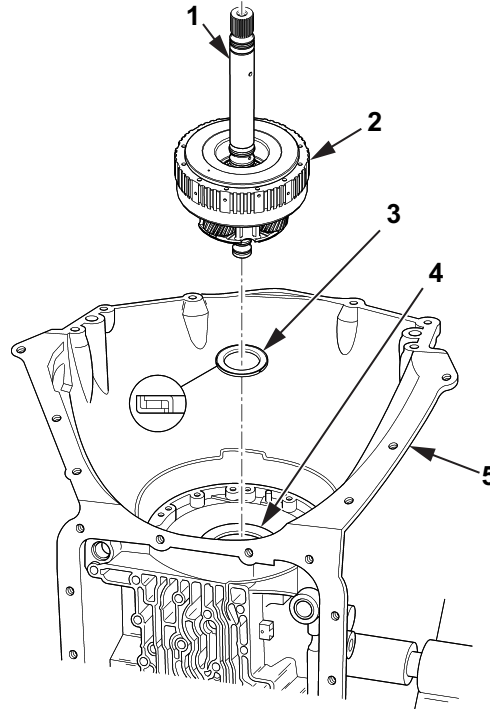


Figure 17. Turbine Shaft Removal.

3. Remove bolt (Figure 18, Item 3) from fourth clutch housing (Figure 18, Item 1). Discard bolt (Figure 18, Item 3).
4. Remove fourth clutch housing (Figure 18, Item 1) from transmission case (Figure 18, Item 2).

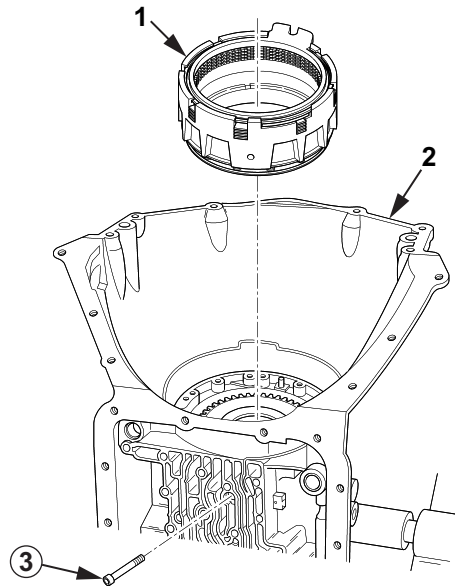


Figure 18. Fourth Clutch Housing Removal.

END OF TASK

FORWARD CLUTCH ASSEMBLY REMOVAL

Using clutch assembly remover/installer (Figure 19), remove forward clutch assembly (Figure 19, Item 1) from transmission case (Figure 19, Item 2).

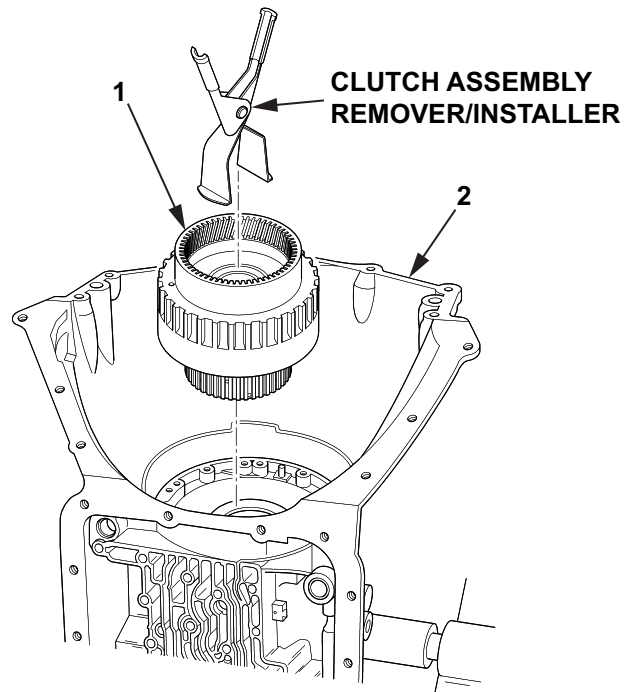


Figure 19. Forward Clutch Assembly Removal.

END OF TASK

DIRECT CLUTCH AND FRONT BAND ASSEMBLY REMOVAL

1. Using direct clutch assembly remover/installer (Figure 20), remove direct clutch housing (Figure 20, Item 2) from transmission case (Figure 20, Item 1).
2. Remove front band (Figure 20, Item 3) from transmission case (Figure 20, Item 1). Discard front band (Figure 20, Item 3).

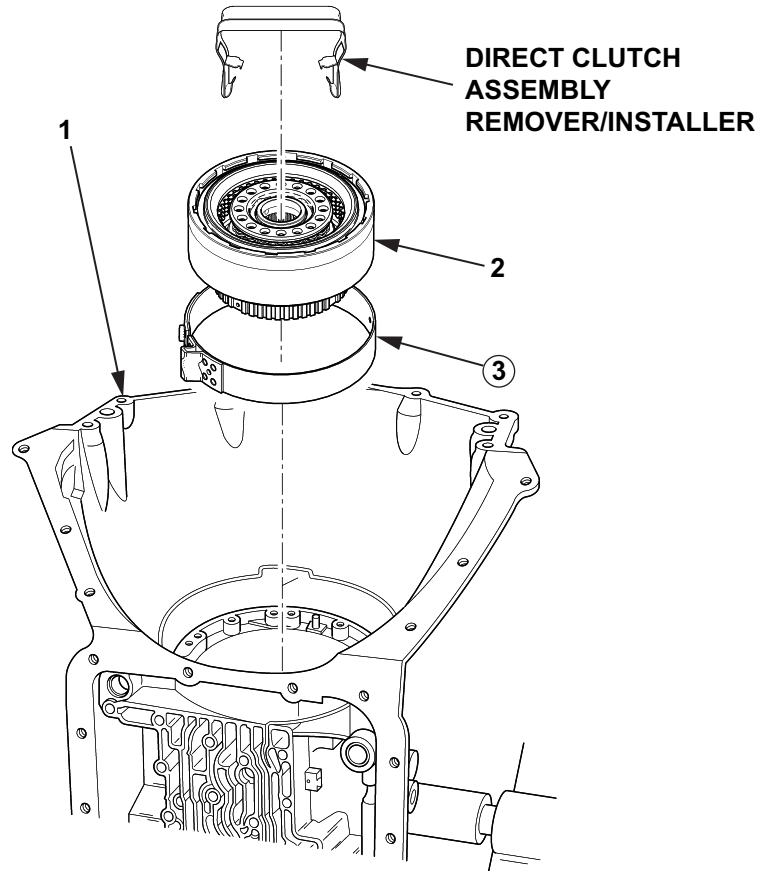


Figure 20. Direct Clutch and Front Band Assembly Removal.

END OF TASK

INTERMEDIATE CLUTCH ASSEMBLY REMOVAL**NOTE**

If dished plate was present during disassembly, discard and replace with waved plate during assembly.

Remove retaining ring (Figure 21, Item 1), thick drive plate ring (Figure 21, Item 2), four clutch disk assemblies (Figure 21, Item 6), thin drive plate rings (Figure 21, Item 3), and waved plate (Figure 21, Item 5) from transmission case (Figure 21, Item 4). Discard clutch disk assemblies (Figure 21, Item 6).

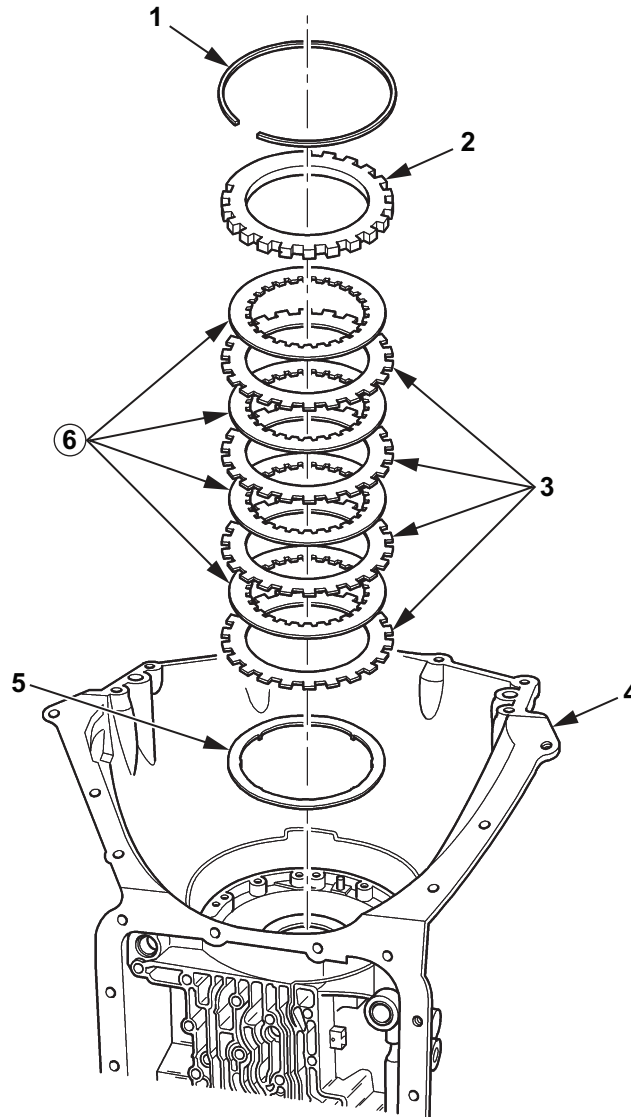


Figure 21. Intermediate Clutch Assembly Removal.

END OF TASK

GEAR UNIT ASSEMBLY AND REAR BAND REMOVAL

1. Remove oil cooler adapters (Figure 22, Items 3 and 4) from transmission case (Figure 22, Item 1).
2. Remove O-rings (Figure 22, Items 2) from oil cooler adapters (Figure 22, Items 3 and 4). Discard O-rings (Figure 22, Items 2).

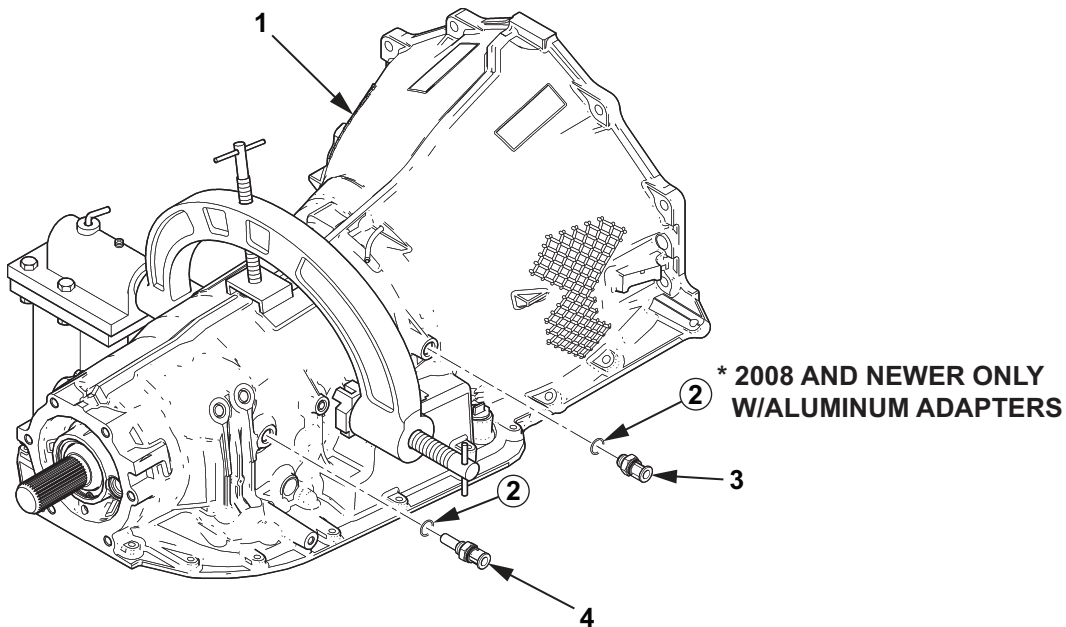


Figure 22. Oil Cooler Adapters Removal.

CAUTION

If center support bolt is gold in color, center support must be replaced. If center support bolt is black in color, center support must have bolt hole reamed to accept new bolt. Bolt hole is reamed after disassembly in WP 0018.

3. Remove center support bolt (Figure 23, Item 1) from transmission case (Figure 23, Item 2).
4. Note color of center support bolt (Figure 23, Item 1). Discard center support bolt (Figure 23, Item 1).

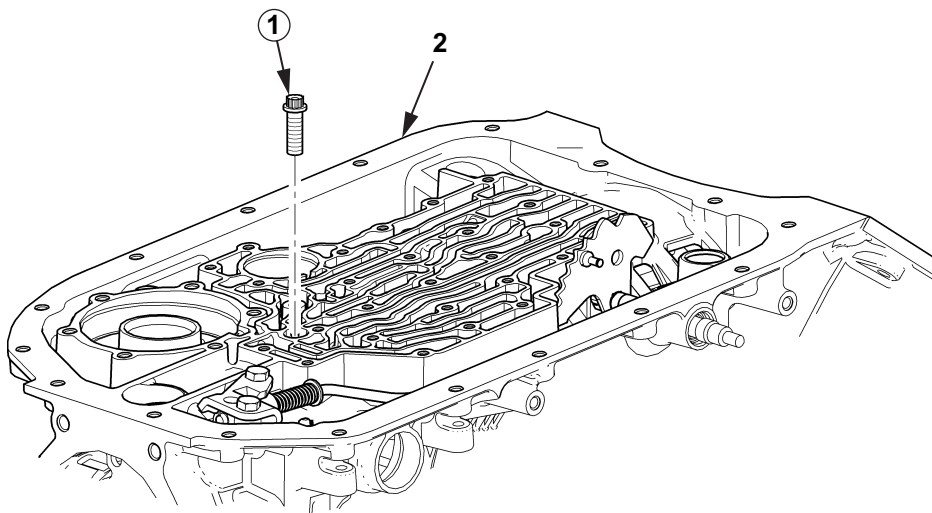


Figure 23. Center Support Bolt Removal.

GEAR UNIT ASSEMBLY AND REAR BAND REMOVAL - CONTINUED

5. Remove retaining ring (Figure 24, Item 1) from transmission case (Figure 24, Item 6).
6. Attach gear unit remover/installer (Figure 24) and slide hammer (Figure 24) to main shaft (Figure 24, Item 2).
7. Lift gear unit (Figure 24, Item 3) out of transmission case (Figure 24, Item 6).
8. Remove thrust washers (Figure 24, Items 4 and 5) from gear unit (Figure 24, Item 3) or transmission case (Figure 24, Item 6).

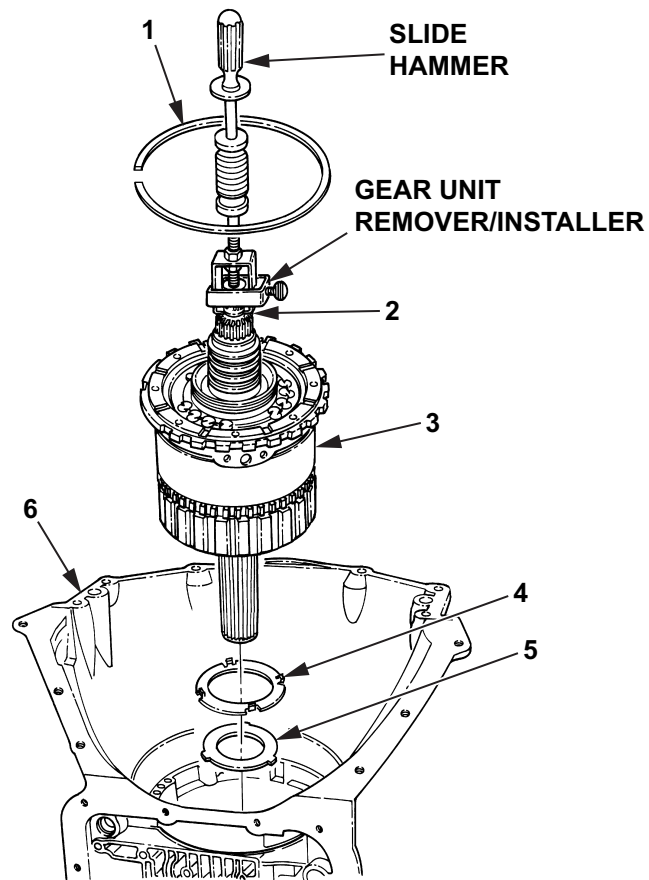


Figure 24. Rear Drum Removal.

GEAR UNIT ASSEMBLY AND REAR BAND REMOVAL - CONTINUED

9. Remove spacer (Figure 25, Item 1) and rear band (Figure 25, Item 2) from transmission case (Figure 25, Item 3). Discard rear band (Figure 25, Item 2).

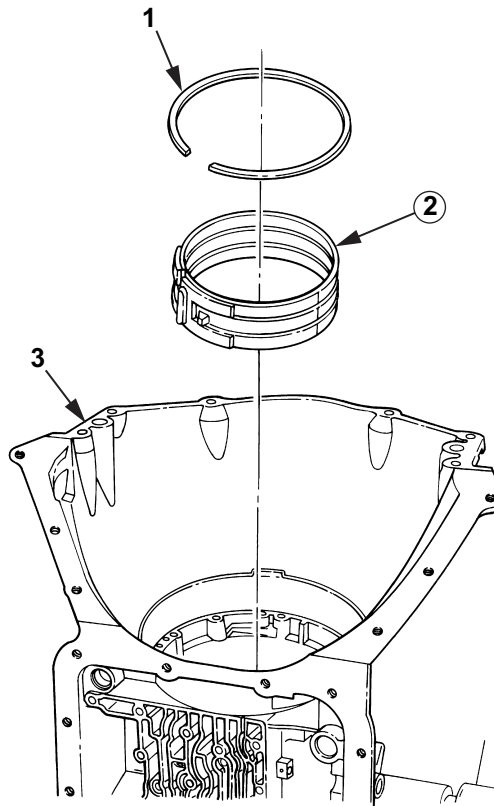


Figure 25. Rear Band Removal.

END OF TASK

CENTER SUPPORT ASSEMBLY REMOVAL**NOTE**

Thrust washer is a bronze bushing. A smaller roller bearing and races are disassembled from gear unit in WP 0017.

1. Remove center support (Figure 26, Item 1) and thrust washer (Figure 26, Item 2) from gear unit (Figure 26, Item 3).
2. If center support bolt was gold in color, discard center support (Figure 26, Item 1).

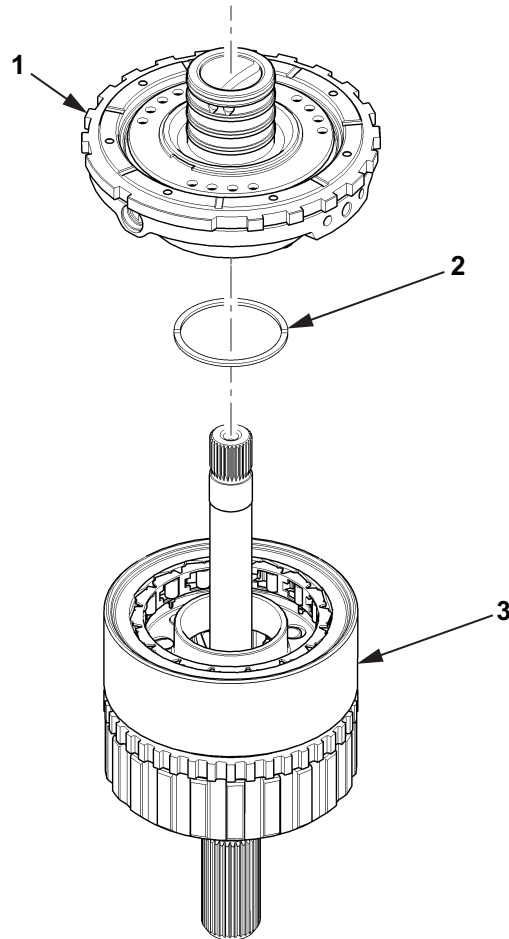


Figure 26. Center Support Assembly.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
ACCUMULATOR HOUSING AND CONTROL VALVE**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)
Scriber, machinist's (WP 0048, Item 24)

References

WP 0004
WP 0021

Materials/Parts

Petrolatum (WP 0047, Item 8)
Tags (WP 0047, Item 11)
Parts kit, mechanical (WP 0049, Item 10)

ACCUMULATOR HOUSING DISASSEMBLY**CAUTION**

Use 900 grit micro-fine lapping compound to clean valve. Do not use a honing stone, fine sandpaper, or crocus cloth. Failure to comply may result in damage to equipment.

NOTE

Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. Remove six bolts (Figure 1, Item 1) from accumulator housing (Figure 1, Item 2).

NOTE

Tag/identify springs. Springs must be returned to same location they are removed from during assembly.

2. Remove accumulator housing (Figure 1, Item 2), gasket (Figure 1, Item 4), and springs (Figure 1, Items 3 and 9) from control valve assembly (Figure 1, Item 8). Discard gasket (Figure 1, Item 4).
3. Remove gasket (Figure 1, Item 5), spacer plate (Figure 1, Item 6), and gasket (Figure 1, Item 7) from control valve assembly (Figure 1, Item 8). Discard gaskets (Figure 1, Items 5 and 7).

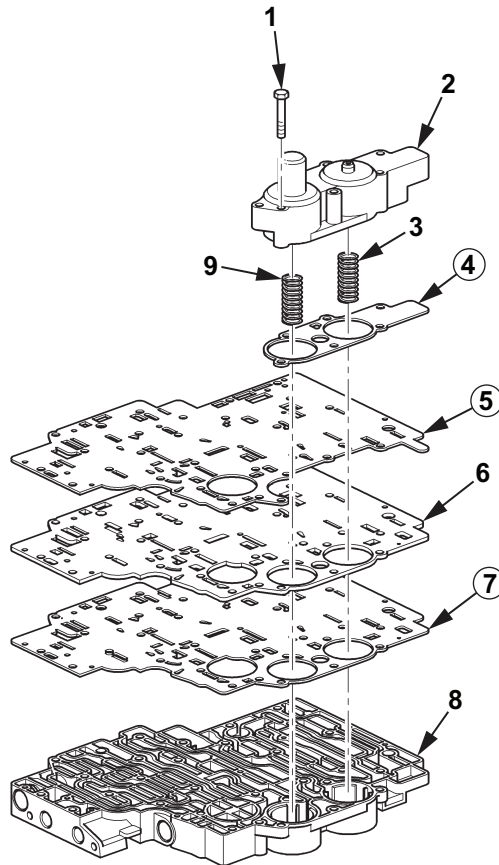


Figure 1. Accumulator Housing.

ACCUMULATOR HOUSING DISASSEMBLY - CONTINUED

4. Remove third clutch piston (Figure 2, Item 4) from accumulator housing (Figure 2, Item 2).
5. Remove seals (Figure 2, Items 3 and 5) from third clutch piston (Figure 2, Item 4). Discard seals (Figure 2, Items 3 and 5).
6. Remove upper retaining ring (Figure 2, Item 1) from pin (Figure 2, Item 8).
7. Remove fourth clutch piston assembly (Figure 2, Item 7) and pin (Figure 2, Item 8) from accumulator housing (Figure 2, Item 2).
8. Remove lower retaining ring (Figure 2, Item 9) (if equipped) and fourth clutch piston assembly (Figure 2, Item 7) from pin (Figure 2, Item 8).
9. Remove seal (Figure 2, Item 6) from fourth clutch piston (Figure 2, Item 7). Discard seal (Figure 2, Item 6).

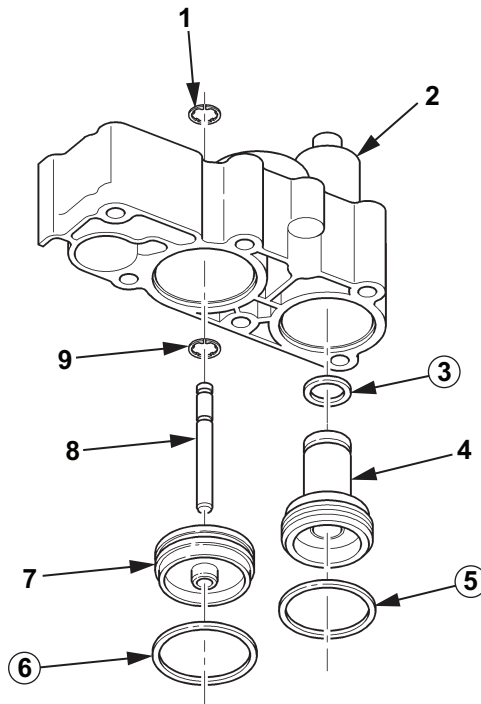


Figure 2. Accumulator Housing Disassembly.

END OF TASK

CONTROL VALVE DISASSEMBLY**NOTE**

When using a Control Valve Dynamometer (Dyno) perform Steps 1, 2, and 9 only. If not using a Dynamometer (Dyno) perform Steps 1 through 15.

1. Remove manual valve (Figure 3, Item 32) from control valve assembly (Figure 3, Item 2).
2. Remove screen filter (Figure 3, Item 1) from control valve assembly (Figure 3, Item 2). Discard screen filter (Figure 3, Item 1).
3. Remove spring pin (Figure 3, Item 9), plug (Figure 3, Item 8), ball (Figure 3, Item 7), bushing (Figure 3, Item 6), O-ring (Figure 3, Item 5), 3-4 shift valve (Figure 3, Item 4), and spring (Figure 3, Item 3) from control valve assembly (Figure 3, Item 2). Discard O-ring (Figure 3, Item 5).
4. Remove bolt (Figure 3, Item 10), 2-3 shift solenoid (Figure 3, Item 11), spring pin (Figure 3, Item 13), 2-3 shift valve (Figure 3, Item 14), and spring (Figure 3, Item 15) from control valve assembly (Figure 3, Item 2).
5. Remove O-ring (Figure 3, Item 12) from 2-3 shift solenoid (Figure 3, Item 11). Discard O-ring (Figure 3, Item 12).
6. Remove bolt (Figure 3, Item 21) and 1-2 shift solenoid (Figure 3, Item 20) from control valve assembly (Figure 3, Item 2).
7. Remove O-ring (Figure 3, Item 19) from 1-2 shift solenoid (Figure 3, Item 20). Discard O-ring (Figure 3, Item 19).
8. Remove spring pin (Figure 3, Item 18), 1-2 shift valve (Figure 3, Item 17), and spring (Figure 3, Item 16) from control valve assembly (Figure 3, Item 2).
9. Remove spring pin (Figure 3, Item 22), plug (Figure 3, Item 23), and filter (Figure 3, Item 24) from control valve assembly (Figure 3, Item 2). Discard filter (Figure 3, Item 24).
10. Remove sleeve (Figure 3, Item 25), plug (Figure 3, Item 26), and ball (Figure 3, Item 27) from control valve assembly (Figure 3, Item 2).
11. Remove bolt (Figure 3, Item 34), clip (Figure 3, Item 33), and pressure control solenoid (Figure 3, Item 35) from control valve assembly (Figure 3, Item 2).
12. Remove clip (Figure 3, Item 41), Torque Converter Clutch (TCC) solenoid (Figure 3, Item 42), spring pin (Figure 3, Item 38), TCC regulator apply valve (Figure 3, Item 37), and spring (Figure 3, Item 36) from control valve assembly (Figure 3, Item 2).
13. Remove O-rings (Figure 3, Items 39 and 40) from TCC solenoid (Figure 3, Item 42). Discard O-rings (Figure 3, Items 39 and 40).
14. Remove clip (Figure 3, Item 43), spring (Figure 3, Item 44), and feed-limit valve (Figure 3, Item 45) from control valve assembly (Figure 3, Item 2).
15. Remove spring pin (Figure 3, Item 28), plug (Figure 3, Item 29), spring (Figure 3, Item 30), and accumulator valve (Figure 3, Item 31) from control valve assembly (Figure 3, Item 2).

CONTROL VALVE DISASSEMBLY - CONTINUED

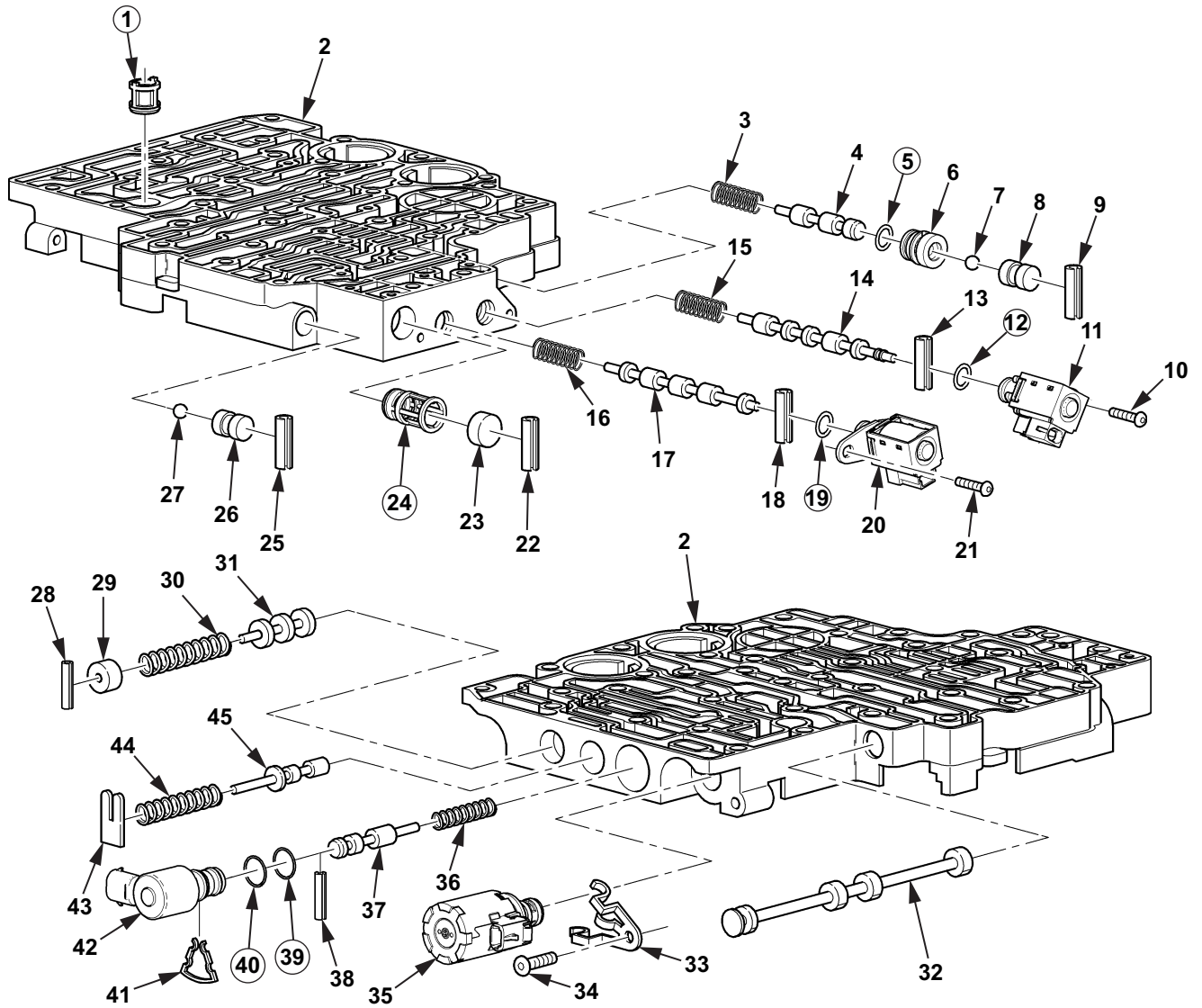


Figure 3. Control Valve Disassembly.

END OF TASK

CONTROL VALVE CLEANING AND INSPECTION

1. For general parts cleaning information, refer to CLEANING, WP 0004.
2. For general parts inspection information, refer to INSPECTION, WP 0004.
3. Inspect valves (Figure 4, Items 3, 11, 14, 26, 27, 32, and 38) and bushing (Figure 4, Item 4) for scoring, nicks, and scratches. Replace control valve assembly (Figure 4, Item 1) if damaged.
4. Inspect solenoids (Figure 4, Items 9, 16, 30, and 35). Replace if damaged.
5. Inspect springs (Figure 4, Items 2, 12, 13, 25, 31, and 37) for damaged or distorted coils. Replace springs (Figure 4, Items 2, 12, 13, 25, 31, and 37) if damaged.
6. Inspect control valve assembly (Figure 4, Item 1) for cracks, interconnected passages, and damaged machined surfaces. Replace control valve assembly (Figure 4, Item 1) if damaged.
7. Inspect manual valve (Figure 4, Item 27) for centricity by rolling it on a gauge block. Replace if damaged.
8. Inspect balls (Figure 4, Items 5 and 22) for damage. Replace if damaged.
9. Inspect spring pins (Figure 4, Items 7, 10, 15, 18, 20, 23, and 33). Replace if damaged.
10. Inspect screws for damaged threads (Figure 4, Items 8, 17, and 29). Replace if damaged.
11. Inspect plugs (Figure 4, Items 6, 19, 21, and 24) for cracks or damage. Replace if damaged.
12. Inspect clips (Figure 4, Items 28, 34 and 36) for bent and cracks. Replace if bent or cracked.

CONTROL VALVE CLEANING AND INSPECTION - CONTINUED

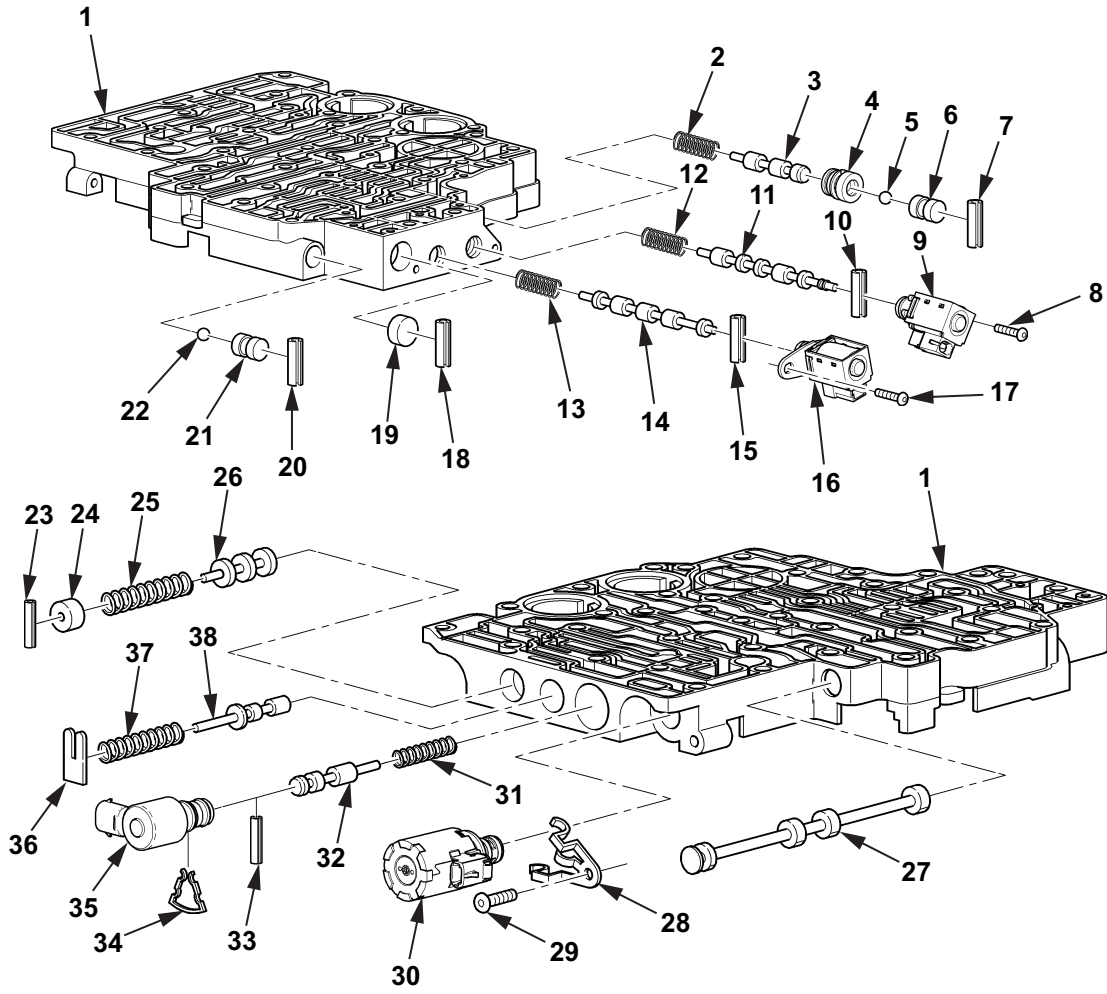


Figure 4. Control Valve Cleaning and Inspection.

END OF TASK

CONTROL VALVE ASSEMBLY**NOTE**

When using a Control Valve Dynamometer (Dyno) perform Steps 7, 8, 15, 16, and 17 only. When not using a Dynamometer (Dyno) perform Steps 1 through 17.

1. Install accumulator valve (Figure 5, Item 33), spring (Figure 5, Item 32), and plug (Figure 5, Item 31) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 30).
2. Install feed-limit valve (Figure 5, Item 47) and spring (Figure 5, Item 46) in control valve assembly (Figure 5, Item 3) with clip (Figure 5, Item 45).
3. Install O-rings (Figure 5, Items 41 and 42) on TCC solenoid (Figure 5, Item 44).
4. Install spring (Figure 5, Item 38) and TCC valve (Figure 5, Item 39) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 40). Install TCC solenoid (Figure 5, Item 44) in control valve assembly (Figure 5, Item 3) with clip (Figure 5, Item 43).
5. Install clip (Figure 5, Item 35) and pressure control solenoid (Figure 5, Item 37) in control valve assembly (Figure 5, Item 3) with bolt (Figure 5, Item 36). Tighten bolt (Figure 5, Item 36) 4–8 lb-ft (5.4–10.8 N·m).

NOTE

Ball must rotate freely when assembled.

6. Install ball (Figure 5, Item 29) and plug (Figure 5, Item 28) in control valve assembly (Figure 5, Item 3) with sleeve (Figure 5, Item 27).
7. Install O-ring (Figure 5, Item 26) on filter (Figure 5, Item 25) if not installed.
8. Install filter (Figure 5, Item 25) and plug (Figure 5, Item 24) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 23).
9. Install spring (Figure 5, Item 17) and 1-2 shift valve (Figure 5, Item 18) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 19).
10. Install O-ring (Figure 5, Item 20) on 1-2 shift solenoid (Figure 5, Item 21).
11. Install 1-2 shift solenoid (Figure 5, Item 21) to control valve assembly (Figure 5, Item 3) with bolt (Figure 5, Item 22). Tighten bolt (Figure 5, Item 22) 4–8 lb-ft (5.4–10.8 N·m).
12. Install O-ring (Figure 5, Item 13) on 2-3 shift solenoid (Figure 5, Item 12).
13. Install spring (Figure 5, Item 16) and 2-3 shift valve (Figure 5, Item 15) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 14). Install 2-3 shift solenoid (Figure 5, Item 12) in control valve assembly (Figure 5, Item 3) with bolt (Figure 5, Item 11). Tighten bolt (Figure 5, Item 11) 4–8 lb-ft (5.4–10.8 N·m).
14. Install spring (Figure 5, Item 4), 3-4 shift valve (Figure 5, Item 5), O-ring (Figure 5, Item 6), bushing (Figure 5, Item 7), ball (Figure 5, Item 8), and plug (Figure 5, Item 9) in control valve assembly (Figure 5, Item 3) with spring pin (Figure 5, Item 10).
15. Install manual valve (Figure 5, Item 34) in control valve assembly (Figure 5, Item 3).
16. Install O-ring (Figure 5, Item 2) on screen filter (Figure 5, Item 1) if not installed.
17. Install screen filter (Figure 5, Item 1) in control valve assembly (Figure 5, Item 3).

CONTROL VALVE ASSEMBLY - CONTINUED

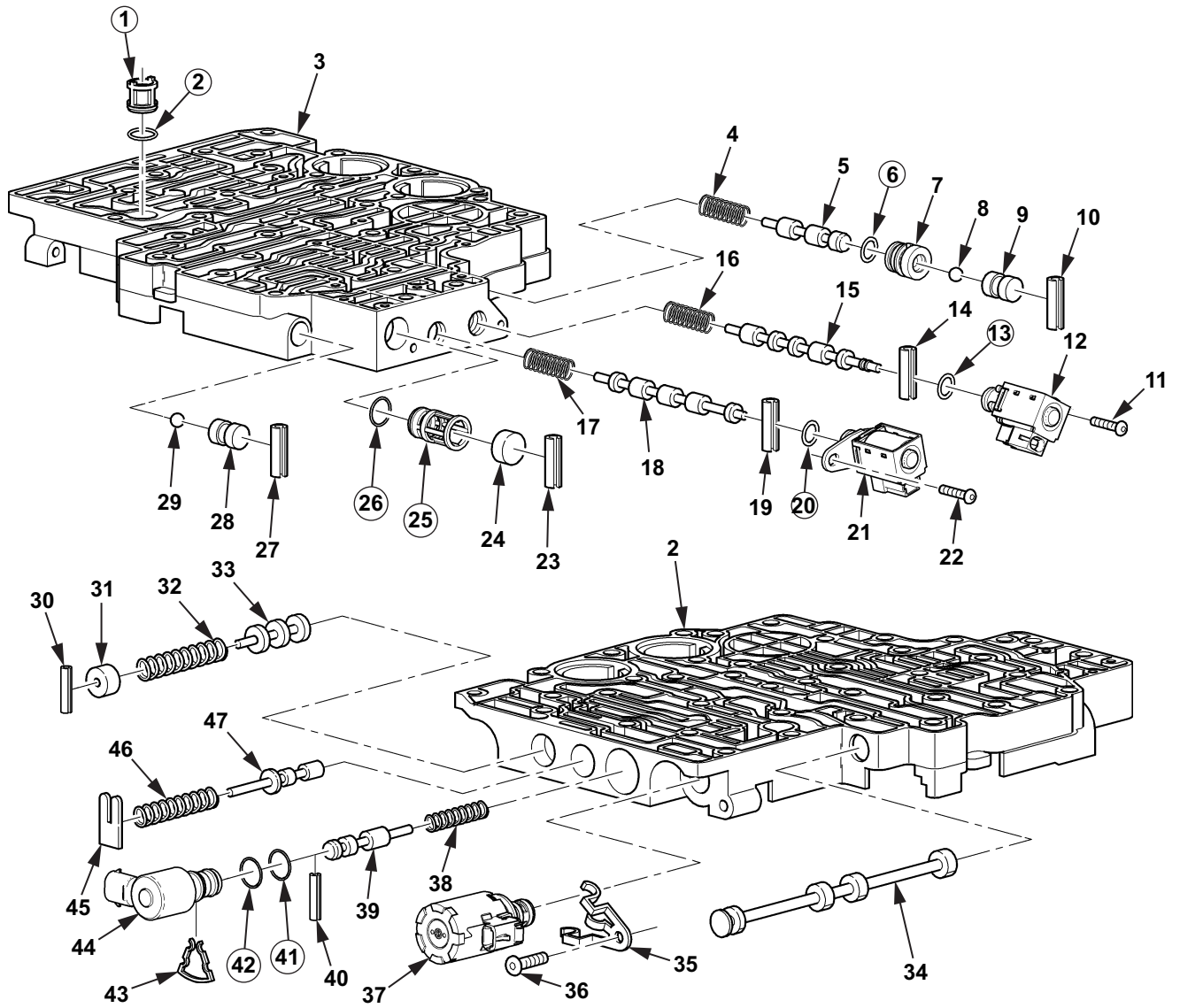


Figure 5. Control Valve Assembly.

END OF TASK

ACCUMULATOR HOUSING CLEANING AND INSPECTION

1. For general parts cleaning information, refer to CLEANING, WP 0004.
2. For general parts inspection information, refer to INSPECTION, WP 0004.
3. Inspect accumulator housing (Figure 6, Item 1) for cracks, breaks, and scoring on bores and sealing surfaces. Remove minor scoring. Replace if damaged.
4. Inspect springs (Figure 6, Items 4 and 6) for breaks or distortion. Replace if damaged.
5. Inspect third clutch piston (Figure 6, Item 3) and fourth clutch piston (Figure 6, Item 7) for cracks, breaks, and chipped or damaged seal grooves. Replace if damaged.
6. Inspect pin (Figure 6, Item 8) for cracks, dents, bent, and damaged grooves. Replace if damaged.
7. Inspect spacer plate (Figure 6, Item 5) for cracks, dents, wear, or distortion. Replace if damaged.
8. Inspect retaining ring(s) (Figure 6, Items 2) for damage or distortion. Replace if damaged.

ACCUMULATOR HOUSING CLEANING AND INSPECTION - CONTINUED

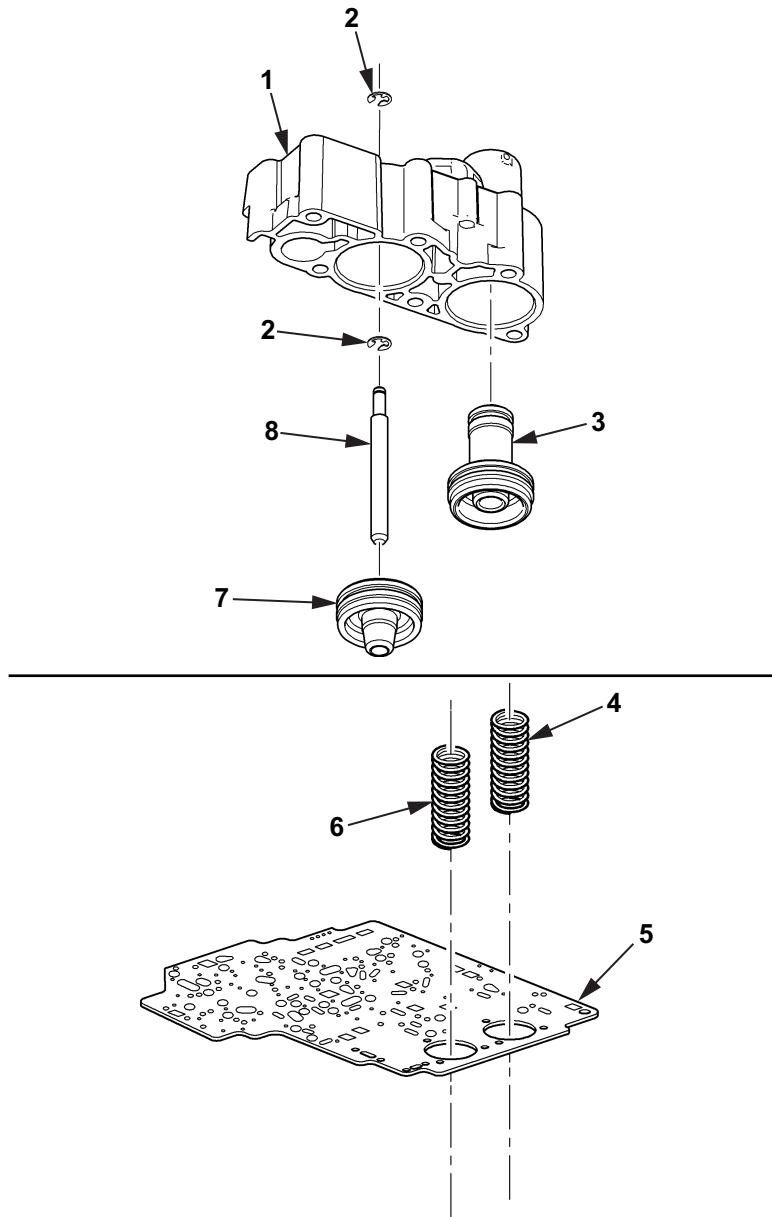


Figure 6. Accumulator Housing Cleaning and Inspection.

END OF TASK

ACCUMULATOR HOUSING ASSEMBLY**NOTE**

Use rounded seals from the rebuild kit.

1. Coat seals (Figure 7, Items 3 and 5) with petrolatum and install on third clutch piston (Figure 7, Item 4).
2. Install third clutch piston (Figure 7, Item 4) in accumulator housing (Figure 7, Item 2).
3. Coat seal (Figure 7, Item 6) with petrolatum and install on fourth clutch piston (Figure 7, Item 7).
4. Install fourth clutch piston (Figure 7, Item 7) and pin (Figure 7, Item 8) in accumulator housing (Figure 7, Item 2) and secure with one or two retaining rings (Figure 7, Items 1 and 9).
5. Install springs (Figure 7, Items 11 and 17) on control valve assembly (Figure 7, Item 16).
6. Install gasket (Figure 7, Item 15), spacer plate (Figure 7, Item 14), and gasket (Figure 7, Item 13) on control valve assembly (Figure 7, Item 16).
7. Install gasket (Figure 7, Item 12) and accumulator housing (Figure 7, Item 2) on control valve assembly (Figure 7, Item 16) with six bolts (Figure 7, Item 10). Tighten bolts (Figure 7, Item 10) in sequence as shown in Figure 7 to 97 lb-in (11 N·m).

NOTE

If not using a Control Dynamometer skip Step 8 and proceed to Pressure Control Solenoid Test (Cold).

8. Install control valve assembly (Figure 7, Item 16) on to control valve dynamometer and follow the dynamometer instruction for testing. Repair as necessary and retest.

ACCUMULATOR HOUSING ASSEMBLY - CONTINUED

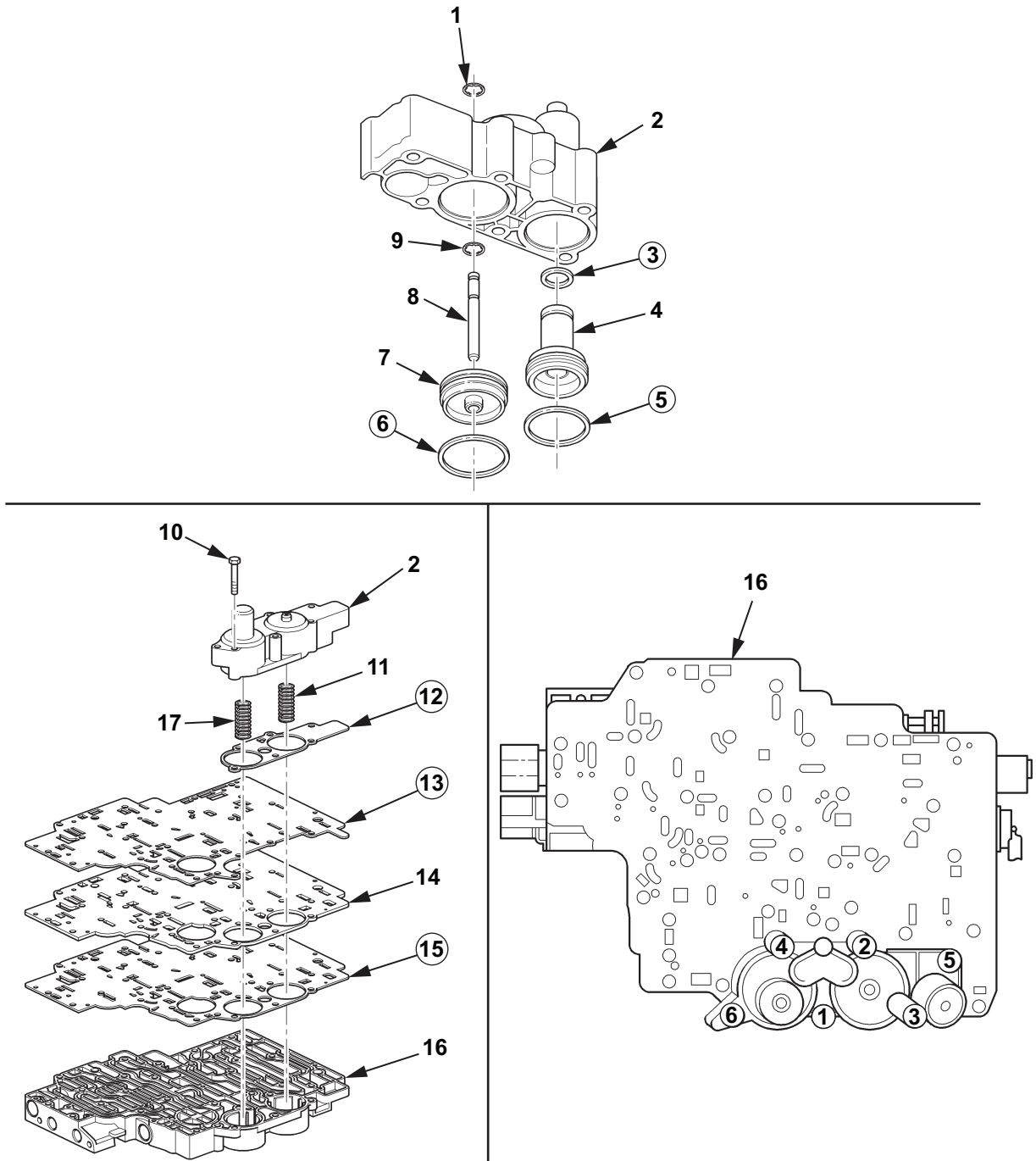


Figure 7. Accumulator Housing Tightening Sequence.

END OF TASK

PRESSURE CONTROL SOLENOID TEST (COLD)

NOTE

- Solenoids are checked for proper resistance values when transmission is cold and again when transmission is warm. Perform the following test to check solenoid resistance values while transmission is cold and is on work bench. Record results on Table 3. Pressure Control Solenoid Test (Cold), Item 1, WP 0021.
- Wire colors can fade after prolonged exposure to transmission fluid. Light blue can appear purple and yellow can appear tan.

1. Connect transmission wiring harness to solenoids.
2. Connect resistance meter to transmission wiring harness plug.
3. Using resistance meter, check resistance of 1-2 shift solenoid. Record results. Refer to Table 1 for solenoid resistance.
4. Using resistance meter, check resistance of 2-3 shift solenoid. Record results. Refer to Table 1 for solenoid resistance.
5. Using resistance meter, check resistance of pressure control solenoid. Record results. Refer to Table 1 for solenoid resistance.
6. Using resistance meter, check resistance of torque converter clutch solenoid. Record results. Refer to Table 1 for solenoid resistance.

Table 1. Solenoid Resistance Chart.

COMPONENT	WIRE COLOR	J1 CONNECTOR	RESISTANCE	CKT ²
1-2 Shift Solenoid	Red	E ¹	20–40 OHMS	1149A
	Lt. Green	A		1222
2-3 Shift Solenoid	Red	E ¹	20–40 OHMS	1149B
	Yellow	B		1223
Pressure Control Solenoid	Purple	C	3.5–7 OHMS	1228
	Lt. Blue	D		1229
Torque Converter Clutch Solenoid	Red	E ¹	10–20 OHMS	1149C
	Black	S		1350

¹ Spliced internally to pin E.

² Internal harness number

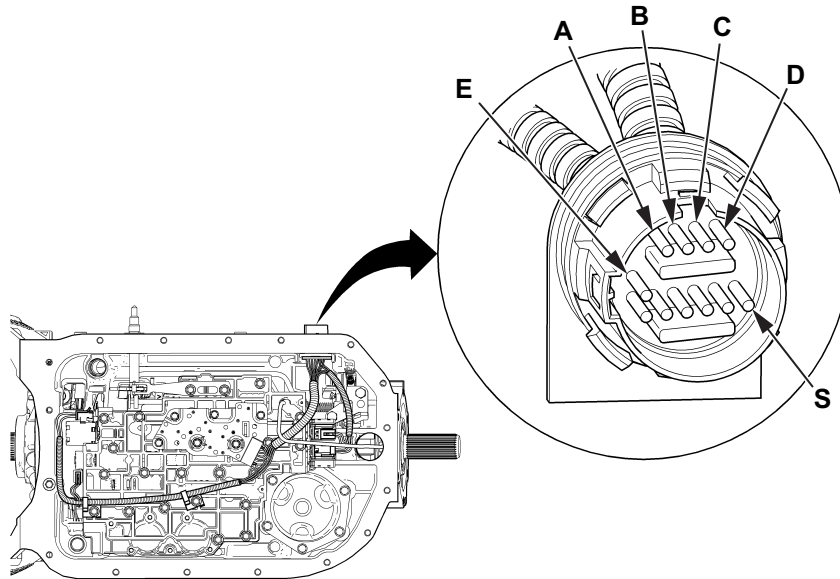


Figure 8. Connector End View.

7. Disconnect transmission wiring harness from solenoids.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TRANSMISSION CASE REPAIR**

INITIAL SETUP:**Tools and Special Tools**

- Fixture, transmission holding (WP 0048, Item 11)
- General mechanic's tool kit: automotive (WP 0048, Item 13)
- Insertor and remover, seal (WP 0048, Item 15)
- Standard automotive tool set (WP 0048, Item 27)

Materials/Parts

- Cloth, abrasive (WP 0047, Item 3)
- Parts kit, mechanical (WP 0049, Item 10)

References

- WP 0004
-

DISASSEMBLY

1. Rotate transmission case (Figure 1, Item 1) to tail-up position and lock in place.
2. Remove retaining ring (Figure 1, Item 2) and seal (Figure 1, Item 3) from transmission (Figure 1, Item 1). Discard seal (Figure 1, Item 3).

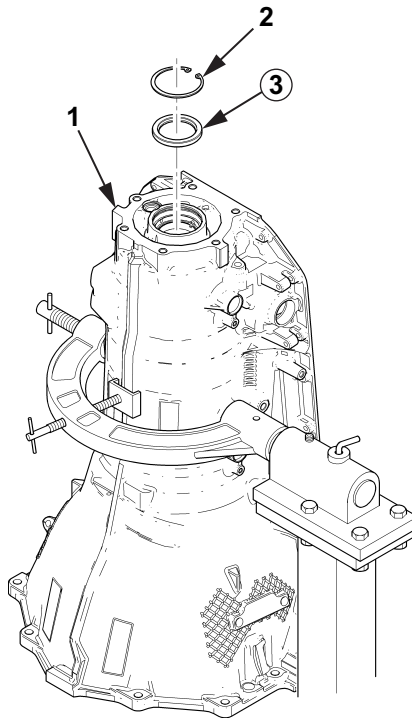


Figure 1. Retaining Ring and Seal Removal.

END OF TASK

CLEANING**NOTE**

Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. For general parts cleaning information, refer to CLEANING, WP 0004.
2. For general parts inspection information, refer to INSPECTION, WP 0004.

END OF TASK

INSPECTION

1. Remove transmission case (Figure 2, Item 1) from transmission holding fixture (Figure 2).

WARNING

When steam-cleaning, wear protective clothing. Failure to comply may result in serious injury to personnel. Seek medical attention in the event of an injury.

2. Thoroughly steam-clean transmission case (Figure 2, Item 1).

WARNING

Compressed air used for cleaning purposes must not exceed 30 psi (207 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.). Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.

3. Use compressed air to blow all dirt and cleaning solution from transmission case (Figure 2, Item 1).

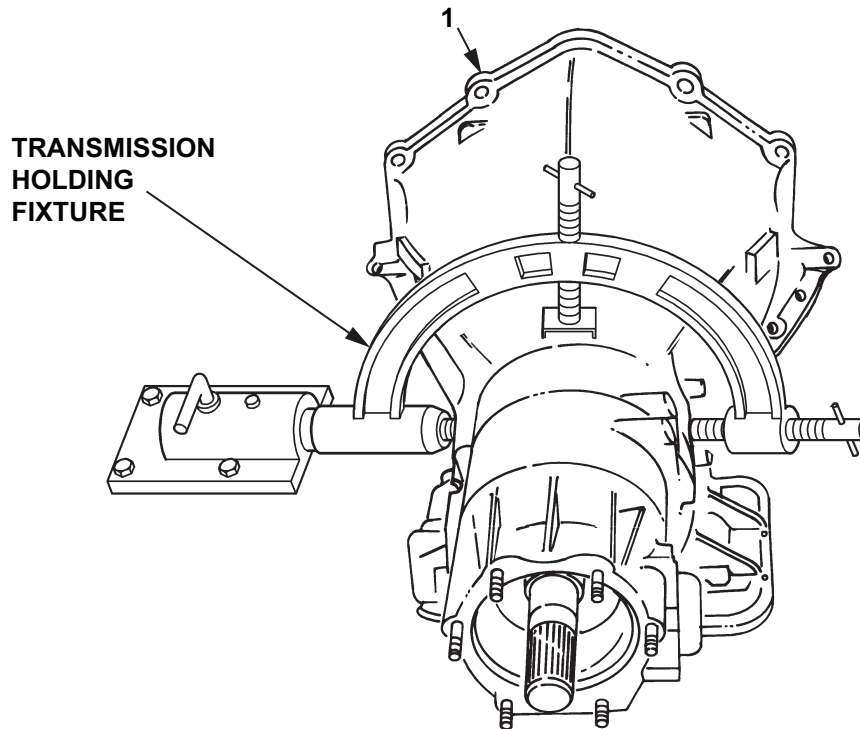


Figure 2. Transmission Mounted in Holding Fixture.

INSPECTION - CONTINUED

4. Inspect anchor pins (Figure 3, Item 2) for looseness and damage. Replace transmission case (Figure 3, Item 1) if anchor pins are damaged or loose.
5. Inspect internal splines, lugs, and retaining ring grooves in transmission case (Figure 3, Item 1) for cracks, breaks, and burrs. Repair minor burrs. Replace damaged transmission case (Figure 3, Item 1).
6. Inspect bolt holes (Figure 3, Item 3) for damage. Replace transmission case (Figure 3, Item 1) if holes (Figure 3, Item 3) are damaged.

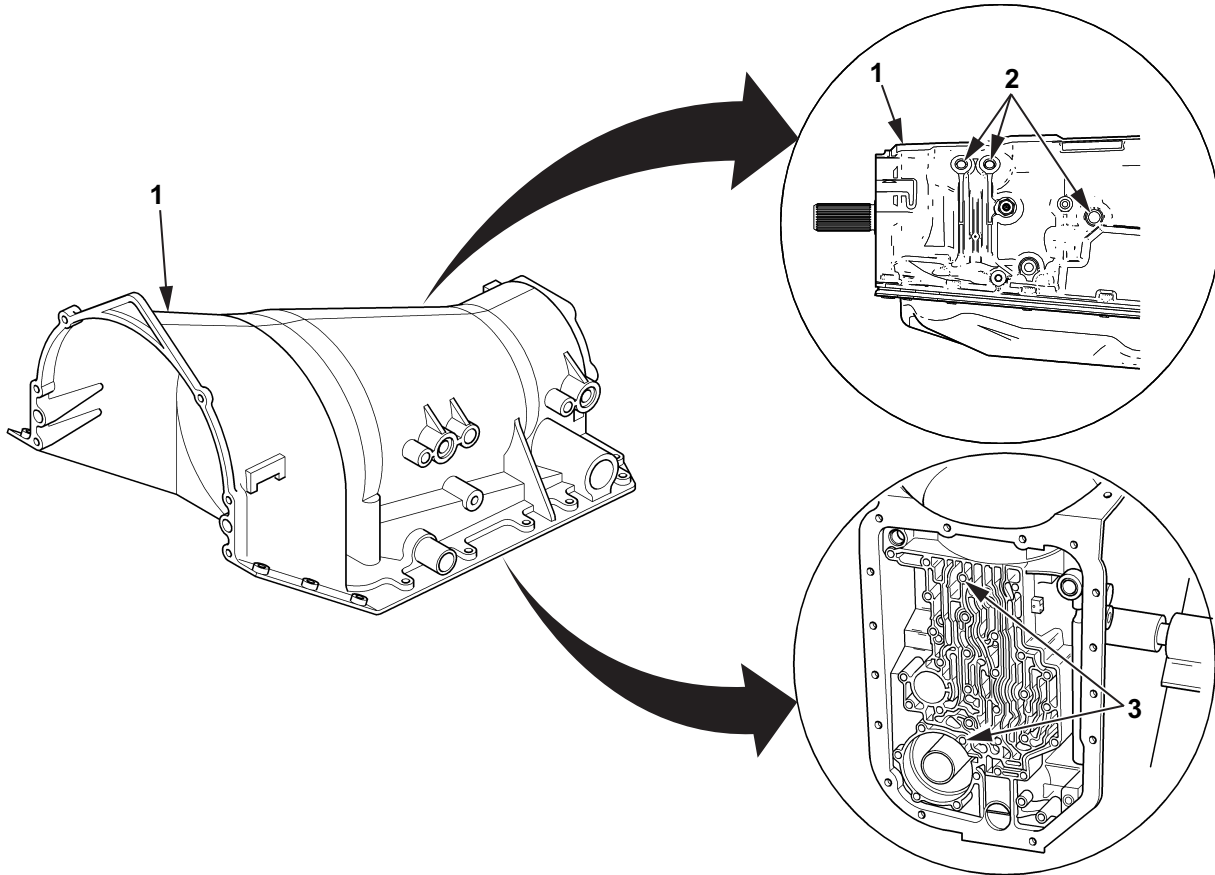


Figure 3. Transmission Case Inspection.

END OF TASK

PARKING PAWL AND ACTUATOR ASSEMBLY INSPECTION**NOTE**

The parking pawl and actuator assembly is inspected without removing from transmission case.

1. Inspect parking pawl (Figure 4, Item 6) for cracks and burrs. Remove any minor burrs. Replace if cracked.
2. Inspect parking pawl pin (Figure 4, Item 7) for cracks, burrs, and damaged flats. Remove minor burrs. Replaced if damaged.
3. Inspect detent lever (Figure 4, Item 1) and manual shaft (Figure 4, Item 3) for cracks, burrs, and damaged threads. Replace if damaged.
4. Inspect connecting link (Figure 4, Item 4) for cracks, burrs, free movement, and damaged spring. Replace if damaged.
5. Inspect return spring (Figure 4, Item 5) for breaks and distortion. Replace if damaged.
6. Inspect retaining pin (Figure 4, Item 2) for tightness. Replace if damaged.

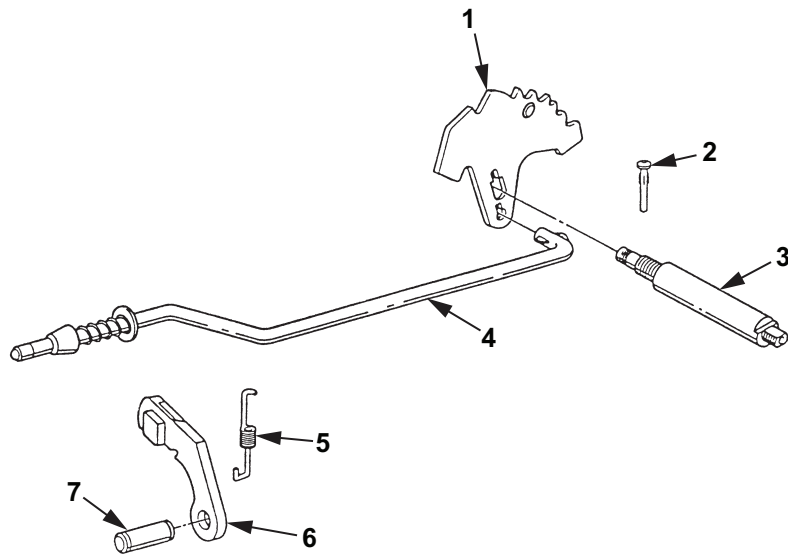


Figure 4. Parking Pawl and Actuator Assembly Inspection.

END OF TASK

ASSEMBLY

Using seal inserter and remover, install seal (Figure 5, Item 3) and retaining ring (Figure 5, Item 2) in transmission (Figure 5, Item 1)

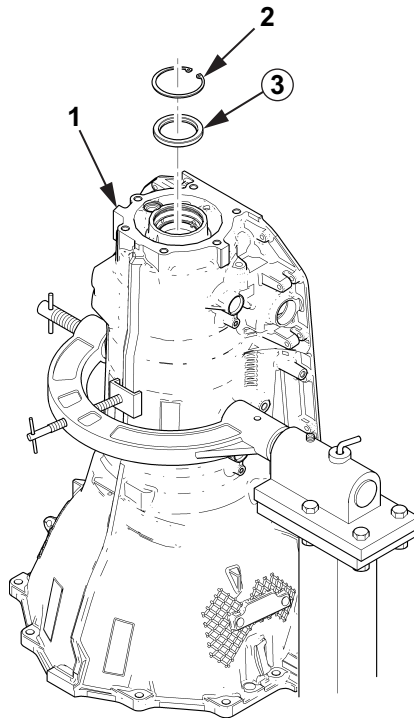


Figure 5. Seal and Retaining Ring Installation.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
FRONT SERVO REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)
Scriber, machinist's (WP 0048, Item 24)

Materials/Parts

Dexron® VI (WP 0047, Item 5)
Parts kit, mechanical (WP 0049, Item 10)

References

WP 0004

DISASSEMBLY**NOTE**

Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. Remove slotted washer (Figure 1, Item 4) and piston (Figure 1, Item 3) from pin (Figure 1, Item 1).
2. Remove seal (Figure 1, Item 2) from piston (Figure 1, Item 3). Discard seal (Figure 1, Item 2).

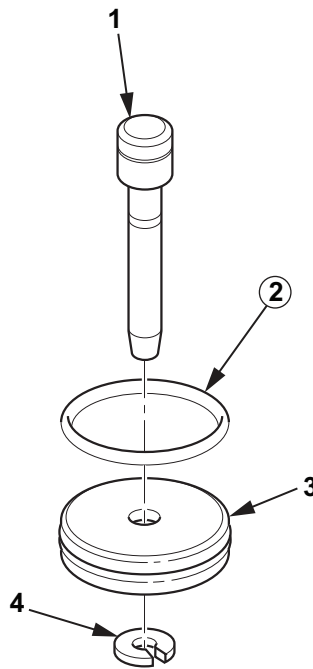


Figure 1. Front Servo Disassembly.

END OF TASK

CLEANING

For general parts cleaning information, refer to CLEANING, WP 0004.

END OF TASK**INSPECTION**

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect piston (Figure 2, Item 4) for cracks and broken seal groove. Replace piston (Figure 2, Item 4) if cracked or broken.
3. Inspect pin (Figure 2, Item 1) for cracks, bends, and damaged retaining ring groove. Replace pin (Figure 2, Item 1) if cracked, bent, or damaged retaining ring groove.
4. Inspect spring (Figure 2, Item 2) for breaks and distortion. Replace spring (Figure 2, Item 2) if cracked or distorted.
5. Inspect slotted washer (Figure 2, Item 3) for damage. Replace piston retainer (Figure 2, Item 3) if damaged.

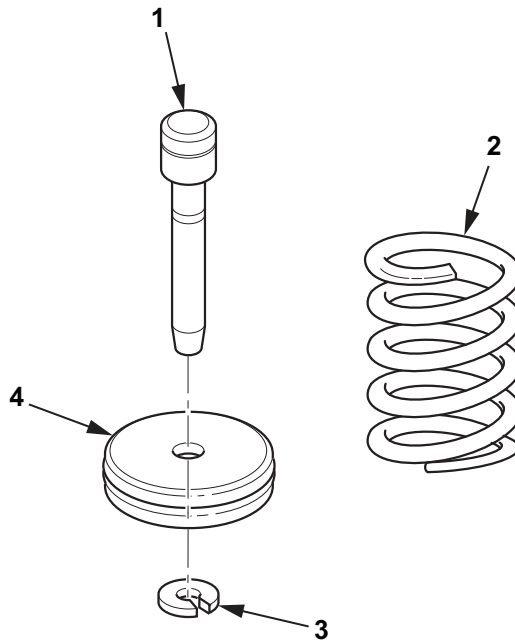


Figure 2. Front Servo/Spring Inspection.

END OF TASK

ASSEMBLY

1. Coat seal (Figure 3, Item 2) with Dexron® VI and install seal (Figure 3, Item 2) on piston (Figure 3, Item 3).
2. Install piston (Figure 3, Item 3) on pin (Figure 3, Item 1) and secure with slotted washer (Figure 3, Item 4).

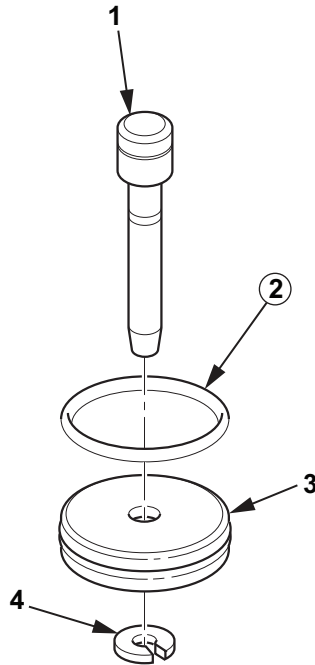


Figure 3. Front Servo Assembly.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
REAR SERVO REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Materials/Parts

Dexron® VI (WP 0047, Item 5)
Parts kit, mechanical (WP 0049, Item 10)

References

WP 0004

DISASSEMBLY**NOTE**

Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. Remove retaining ring (Figure 1, Item 1) from pin (Figure 1, Item 9) in servo piston (Figure 1, Item 11).
2. Remove spring (Figure 1, Item 2), accumulator piston (Figure 1, Item 4), spacer (Figure 1, Item 6), servo spring (Figure 1, Item 7), and spring seat (Figure 1, Item 8) from pin (Figure 1, Item 9).
3. Remove outer seal (Figure 1, Item 10), inner seal (Figure 1, Item 3), and piston seal (Figure 1, Item 5) from piston (Figure 1, Item 4). Discard seals (Figure 1, Items 10, 3, and 5).

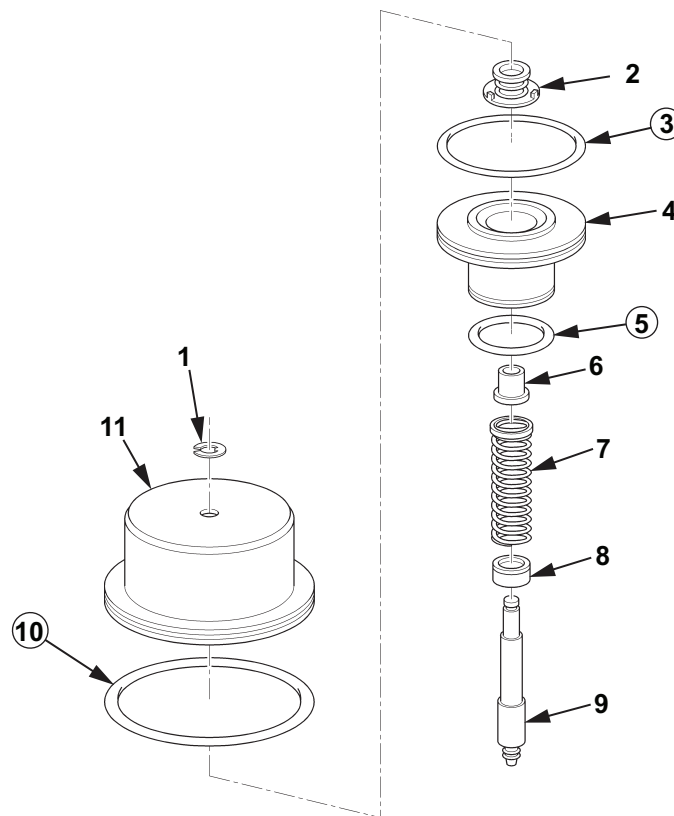


Figure 1. Rear Servo Disassembly.

END OF TASK

CLEANING

For general parts cleaning information, refer to CLEANING, WP 0004.

END OF TASK**INSPECTION**

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect servo spring (Figure 2, Item 5) and spring (Figure 2, Item 2) for breaks and distortion. Replace servo spring (Figure 2, Item 5) or spring (Figure 2, Item 2) if broken or distorted.
3. Inspect pin (Figure 2, Item 7) for cracks, burrs, bends, and chipped or damaged retainer groove. Replace pin (Figure 2, Item 7) if damaged.
4. Inspect servo piston (Figure 2, Item 8) for damage. Replace servo piston (Figure 2, Item 8) if damaged.
5. Inspect accumulator piston (Figure 2, Item 3) for damage. Replace accumulator piston (Figure 2, Item 3) if damaged.
6. Inspect spring seat (Figure 2, Item 6) for damage. Replace spring seat (Figure 2, Item 6) if damaged.
7. Inspect spacer (Figure 2, Item 4) for damage. Replace spacer (Figure 2, Item 4) if damaged.
8. Inspect retaining ring (Figure 2, Item 1) for damage. Replace retaining ring (Figure 2, Item 1) if damaged.

INSPECTION - CONTINUED

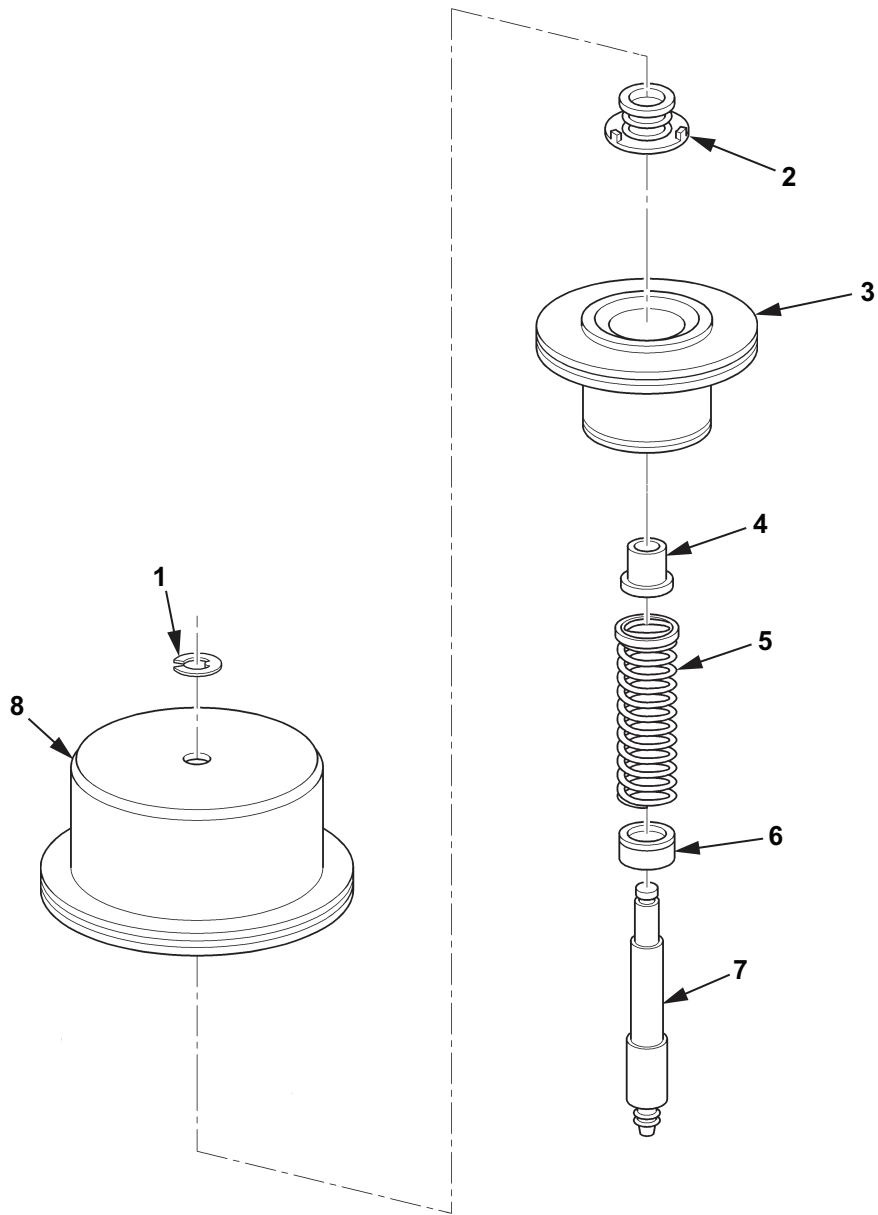


Figure 2. Rear Servo Inspection.

END OF TASK

ASSEMBLY

NOTE

When replacing any seal, coat seal with clean Dexron® VI transmission fluid.

1. Install outer seal (Figure 3, Item 10), inner seal (Figure 3, Item 3) and piston seal (Figure 3, Item 5) on accumulator piston (Figure 3, Item 4).
2. Install spring seat (Figure 3, Item 8), servo spring (Figure 3, Item 7), spacer (Figure 3, Item 6), and accumulator piston (Figure 3, Item 4) on pin (Figure 3, Item 9) and secure with retaining ring (Figure 3, Item 1).
3. Install spring (Figure 3, Item 2) and accumulator piston (Figure 3, Item 4) in servo piston (Figure 3, Item 11).

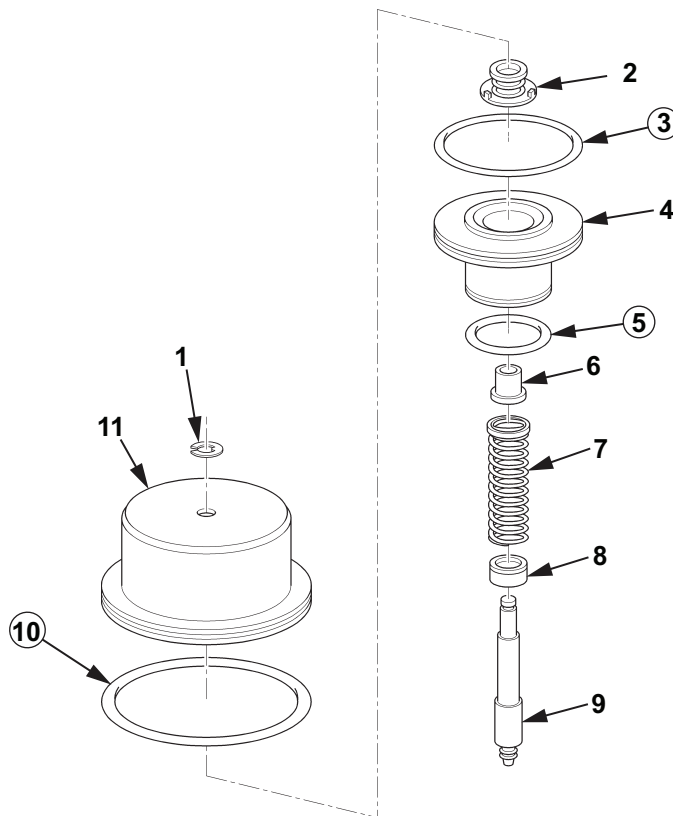


Figure 3. Rear Servo Assembly.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
OIL PUMP REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)
Hose clamp (WP 0048, Item 14)
Installer, oil pump seal (WP 0048, Item 16)
Scriber, machinist's (WP 0048, Item 24)
Straightedge (WP 0048, Item 28)

Materials/Parts

Dexron® VI (WP 0047, Item 5)
Petrolatum (WP 0047, Item 8)
Parts kit, mechanical (WP 0049, Item 10)

References

WP 0004

DISASSEMBLY

1. Remove oil pump seal (Figure 1, Item 2) from pump body (Figure 1, Item 1). Discard oil pump seal (Figure 1, Item 2).
2. Remove five bolts (Figure 1, Item 6) from pump cover (Figure 1, Item 5) and pump body (Figure 1, Item 1). Separate pump body (Figure 1, Item 1) and pump cover (Figure 1, Item 5).
3. Remove driven gear (Figure 1, Item 3) and drive gear (Figure 1, Item 4) from pump body (Figure 1, Item 1).

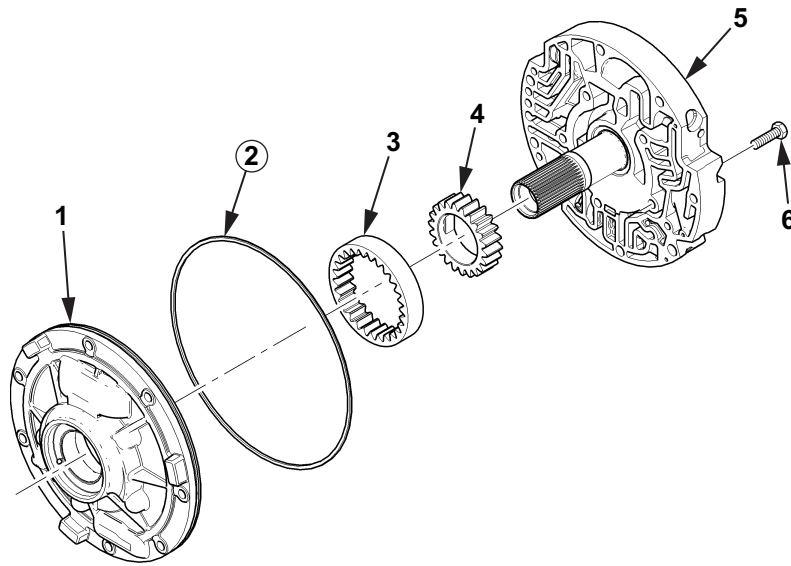


Figure 1. Oil Pump Disassembly.

DISASSEMBLY - CONTINUED

4. Remove vent shield (Figure 2, Item 3) from pump cover (Figure 2, Item 2).
5. Remove two O-rings (Figure 2, Item 1) from pump cover (Figure 2, Item 2). Discard O-rings (Figure 2, Item 1).

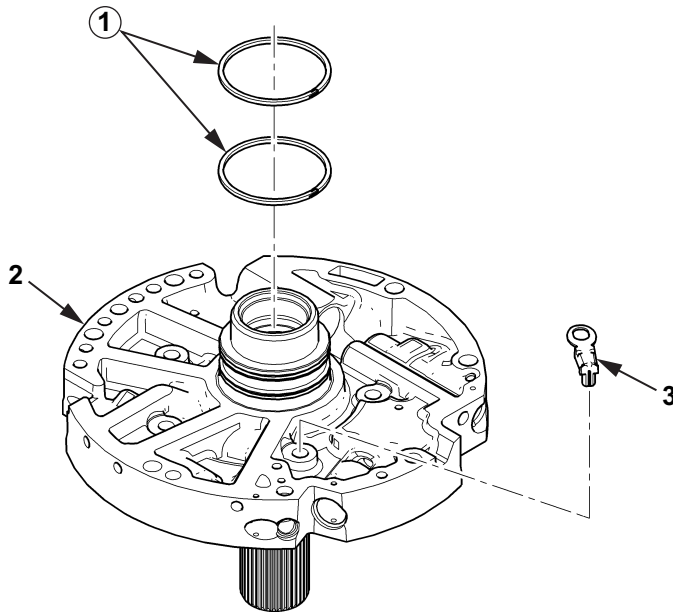


Figure 2. Oil Pump O-Rings Removal.

END OF TASK

CLEANING

For general parts cleaning information, refer to **CLEANING**, WP 0004.

END OF TASK

INSPECTION

NOTE

Ensure dot on drive gear faces up.

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Install drive gear (Figure 3, Item 3) and driven gear (Figure 3, Item 2) in pump body (Figure 3, Item 1) with chamfered edges facing down.

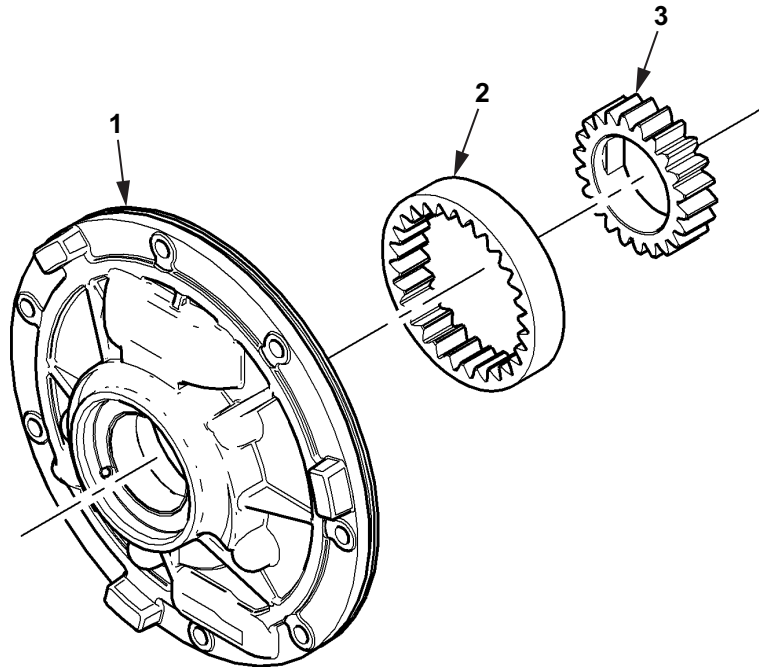


Figure 3. Oil Pump Gears.

3. Using straightedge and feeler gauge, measure clearance of gears (Figure 4, Items 2 and 3) to pump body (Figure 4, Item 1). Clearance should be 0.0007–0.0028 in. (0.017–0.071 mm). If clearance does not meet specifications, replace pump.

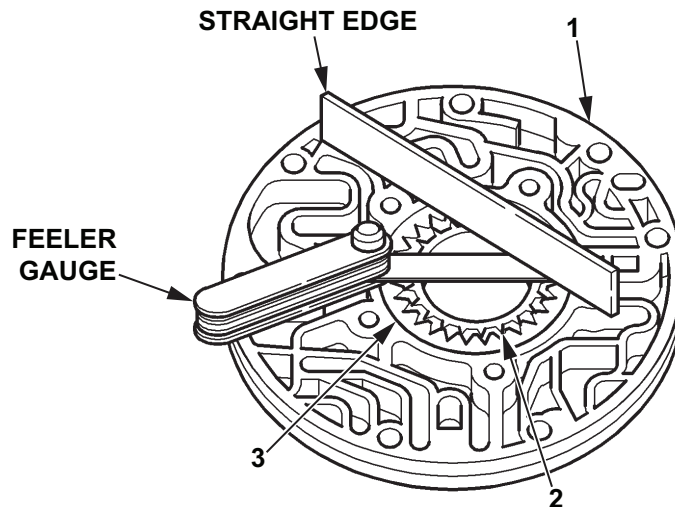


Figure 4. Oil Pump Measurement.

INSPECTION - CONTINUED

4. Inspect pump cover (Figure 5, Item 3) for cracks, breaks, burrs, and chipped seal or retaining ring grooves. Remove minor burrs. If damaged, replace pump cover (Figure 5, Item 3).
5. Inspect stator shaft (Figure 5, Item 6) splines. Replace pump cover (Figure 5, Item 3) if damaged.
6. Inspect pump cover (Figure 5, Item 3) for scored, discolored, or worn bushings. If damaged, replace pump cover (Figure 5, Item 3).
7. Inspect pump cover (Figure 5, Item 3) for chipped or broken oil seal ring grooves on hub. If damaged, replace pump cover (Figure 5, Item 3).
8. Inspect pump cover (Figure 5, Item 3) for blocked oil passages and ports, and cross-channel leakage paths. Clear oil passages. If damaged, replace pump cover (Figure 5, Item 3).
9. Inspect pump cover (Figure 5, Item 3) for blocked breather hole. Unblock hole if plugged.
10. Inspect pressure regulator valve (Figure 5, Item 4), converter limit valve (Figure 5, Item 2), converter clutch valve (Figure 5, Item 5), and converter enable valves (Figure 5, Item 1) for breaks, burrs, and chips, and ensure free movement (dry) in pump cover (Figure 5, Item 3). Replace any damaged items.
11. Inspect spring pins (Figure 5, Item 7) for breaks, burrs, or chips. If damaged, replace spring pin.

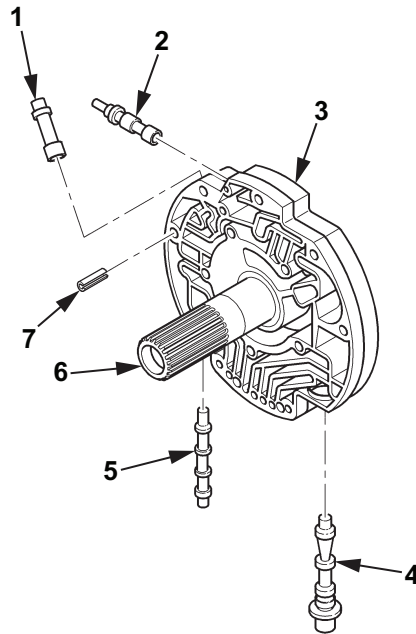


Figure 5. Oil Pump Valve Inspection.

END OF TASK

ASSEMBLY

ASSEMBLY - CONTINUED

1. Using oil pump seal installer (Figure 6), install oil pump seal (Figure 6, Item 2) on pump body (Figure 6, Item 1).

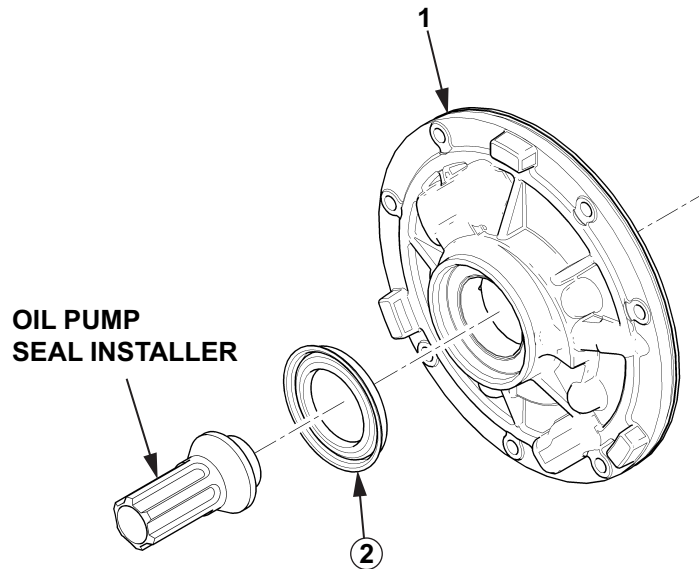


Figure 6. Oil Pump Seal Installation.

NOTE

Ensure dot on drive gear faces up.

2. Install drive gear (Figure 7, Item 2) and driven gear (Figure 7, Item 1) with marked surfaces facing up in pump body (Figure 7, Item 3).

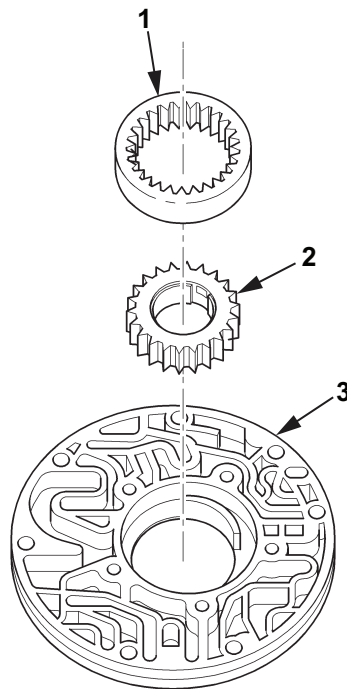


Figure 7. Oil Pump Gear Installation.

ASSEMBLY - CONTINUED

3. Install pump cover (Figure 8, Item 2) and vent shield (Figure 8, Item 4) on pump body (Figure 8, Item 1) with five bolts (Figure 8, Item 3). Align pump cover (Figure 8, Item 2) with pump body (Figure 8, Item 1) using hose clamp. Tighten bolts (Figure 8, Item 3) to 18 lb-ft (24 N·m).

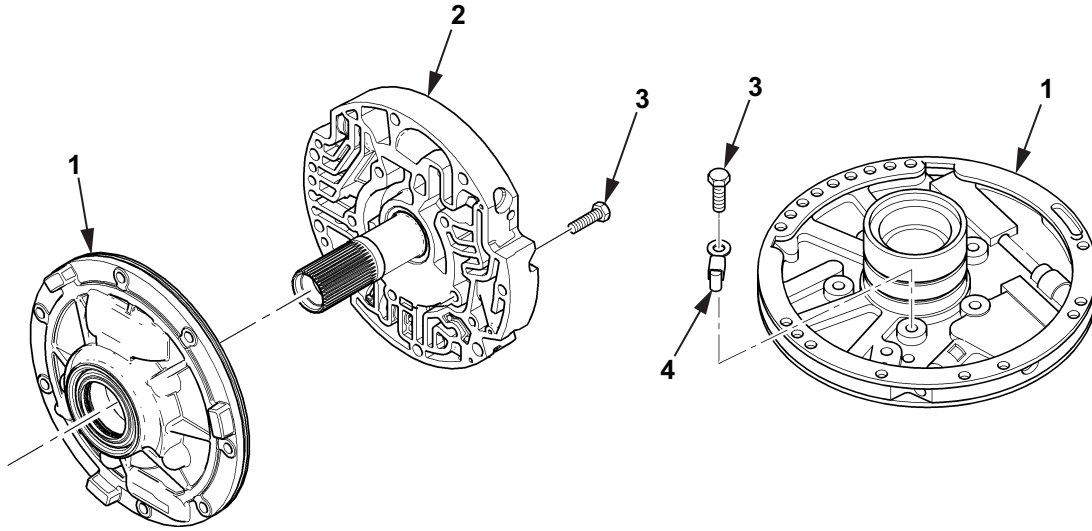


Figure 8. Oil Pump Assembly.

ASSEMBLY - CONTINUED

4. Coat seal (Figure 9, Item 7) with petrolatum and install on oil pump (Figure 9, Item 4).
5. Coat selective thrust washer (Figure 9, Item 3) with petrolatum and install on oil pump (Figure 9, Item 4).
6. Install O-ring (Figure 9, Item 2) in pump cover groove (Figure 9, Item 6).
7. Install O-ring (Figure 9, Item 1) in pump cover groove (Figure 9, Item 5).

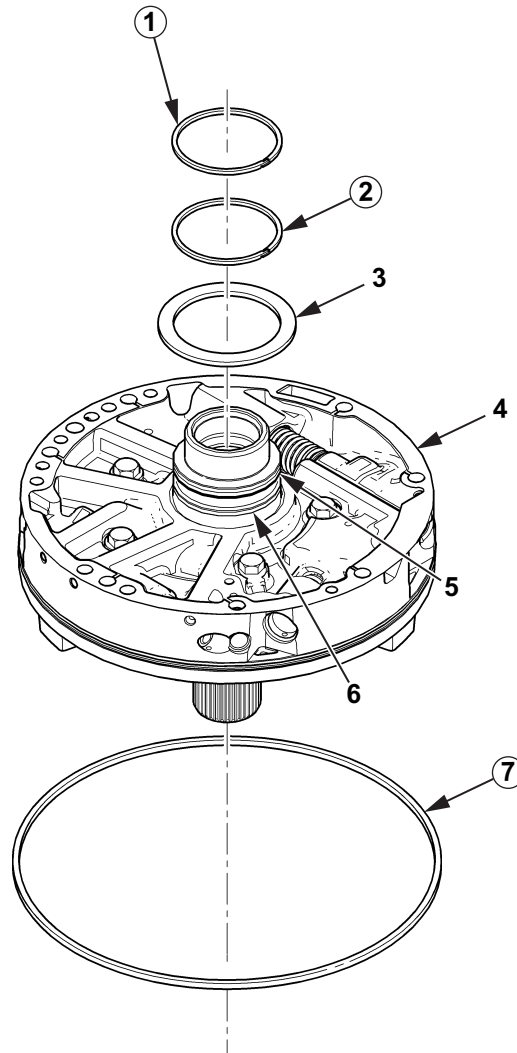


Figure 9. Oil Pump O-Rings Installation.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TURBINE SHAFT AND OVERRUN CLUTCH REPAIR**

INITIAL SETUP:**Tools and Special Tools**

- Adapter, clutch spring compressor
(WP 0048, Item 1)
- Compressor, clutch spring (WP 0048, Item 7)
- General mechanic's tool kit: automotive
(WP 0048, Item 13)
- Installer, turbine shaft seal (WP 0048, Item 17)
- Standard automotive tool set (WP 0048, Item 27)

Materials/Parts

- Dexron® VI (WP 0047, Item 5)
- Parts kit, mechanical (WP 0049, Item 10)

References

- WP 0002
- WP 0015
- WP 0020
- WP 0035

OVERDRIVE UNIT DISASSEMBLY**NOTE**

- If converting 4L80-E to 4L85-E refer to WP 0002 to determine if turbine shaft can be reused.
- Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. Remove retaining ring (Figure 1, Item 1) and turbine shaft (Figure 1, Item 5) from overdrive carrier assembly (Figure 1, Item 2).
2. Remove four seals (Figure 1, Items 4 and 6) from turbine shaft (Figure 1, Item 5). Discard seals (Figure 1, Items 4 and 6).
3. Separate overdrive carrier assembly (Figure 1, Item 2) from overrun clutch housing assembly (Figure 1, Item 3).

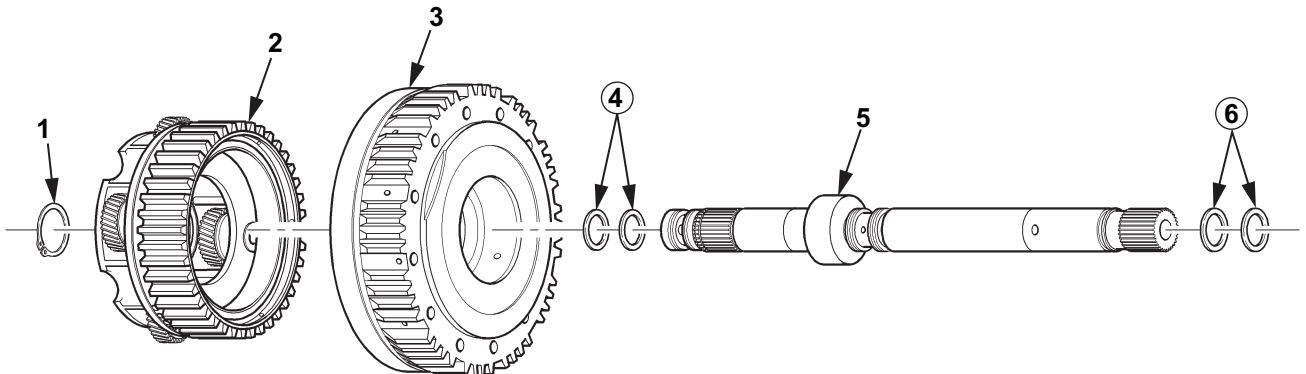


Figure 1. Turbine Shaft Assembly Disassembly.

END OF TASK

OVERRUN CLUTCH DISASSEMBLY

1. Remove retaining ring (Figure 2, Item 1), backing plate (Figure 2, Item 2), three clutch plates (Figure 2, Item 9), roller clutch (Figure 2, Item 4), and clutch discs (Figure 2, Item 3) from clutch housing (Figure 2, Item 8). Discard clutch discs (Figure 2, Item 3).
2. Using clutch spring compressor (Figure 2) and adapter (Figure 2), compress spring and retainer assembly (Figure 2, Item 6) and remove retaining ring (Figure 2, Item 5).
3. Remove clutch spring compressor (Figure 2), adapter (Figure 2), spring and retainer assembly (Figure 2, Item 6), and piston (Figure 2, Item 7) from clutch housing (Figure 2, Item 8). Discard piston (Figure 2, Item 7).

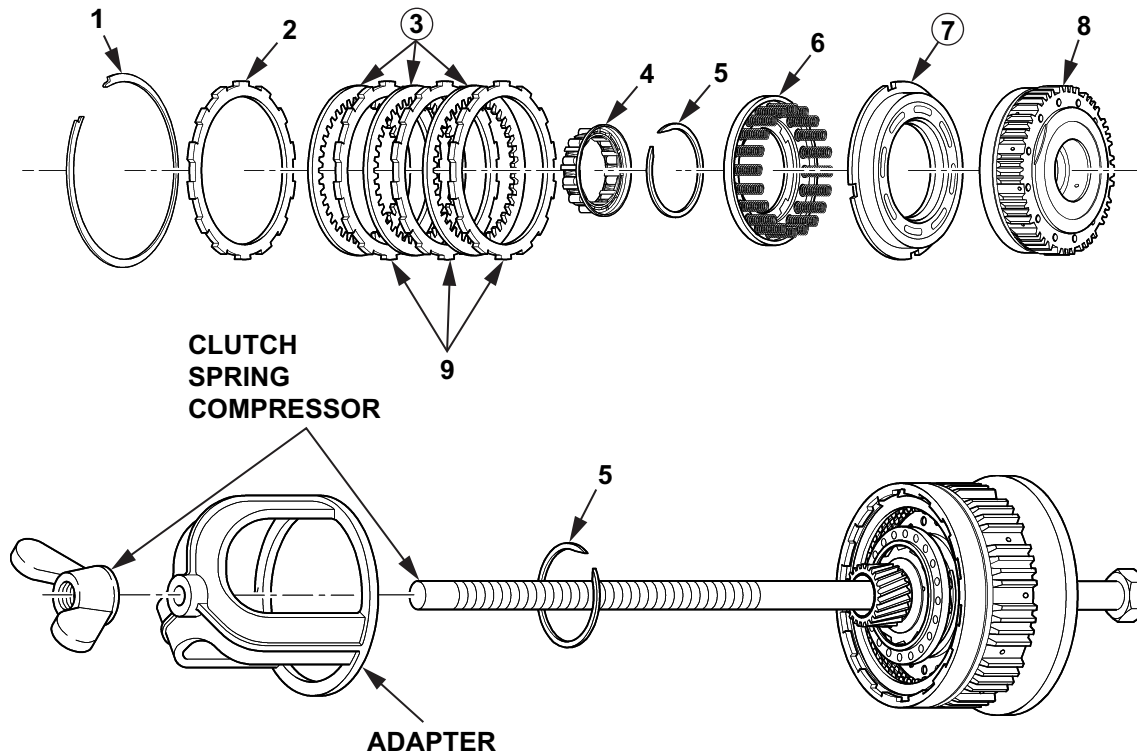


Figure 2. Overrun Clutch Disassembly.

END OF TASK

OVERDRIVE UNIT CLEANING AND INSPECTION

1. Inspect turbine shaft (Figure 3, Item 1) check ball (Figure 3, Item 2) for damage. Replace turbine shaft (Figure 3, Item 1) or check ball (Figure 3, Item 2) if damaged.

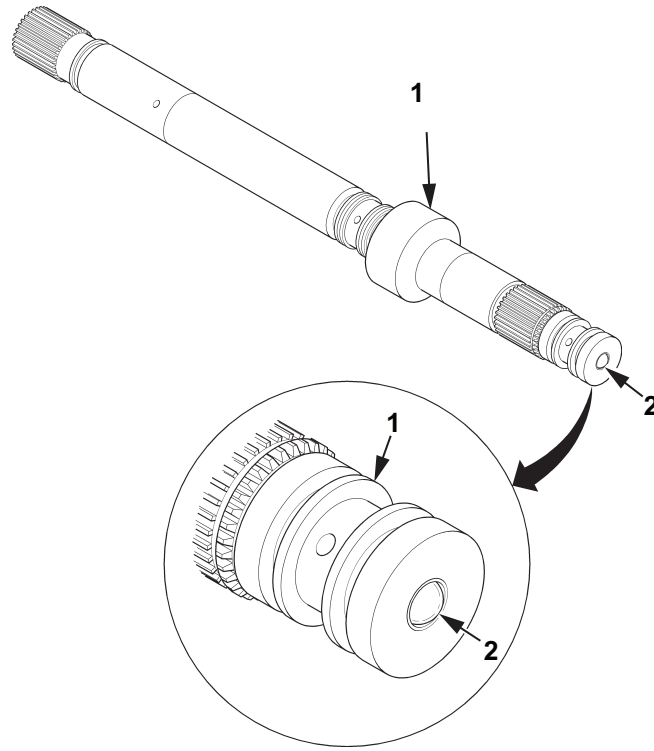


Figure 3. Turbine Shaft Checkball Inspection.

OVERDRIVE UNIT CLEANING AND INSPECTION - CONTINUED

2. Inspect backing plate (Figure 4, Item 2), clutch plates (Figure 4, Items 3), turbine shaft (Figure 4, Item 7), and carrier assembly (Figure 4, Item 9) for cracks, warpage, and scoring. Remove minor scoring. Replace backing plate (Figure 4, Item 2), clutch plates (Figure 4, Items 3), turbine shaft (Figure 4, Item 7), and carrier assembly (Figure 4, Item 9) if damaged.
3. Inspect roller clutch (Figure 4, Item 8) for broken cage, springs, and scored or pitted rollers. Discard roller clutch (Figure 4, Item 8) if broken, scored, or pitted.
4. Inspect retaining rings (Figure 4, Items 1 and 4), spring and retainer assembly (Figure 4, Item 5), and housing (Figure 4, Item 6) for cracks or damage. Replace retaining rings (Figure 4, Items 1 and 4), spring and retainer assembly (Figure 4, Item 5), and housing (Figure 4, Item 6) if damaged.

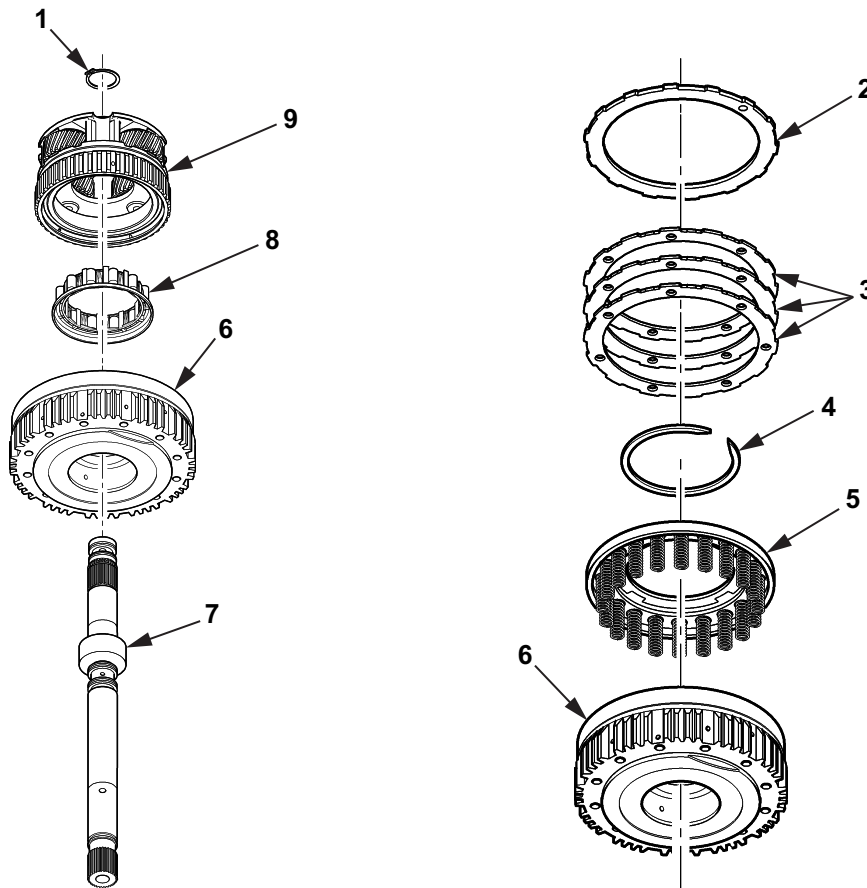


Figure 4. Turbine Shaft/Overrun Clutch Inspection.

OVERDRIVE UNIT CLEANING AND INSPECTION - CONTINUED

NOTE

4L80-E transmissions can use either high-torque or high-speed roller clutch parts. All five parts must be of the same type. Parts are not interchangeable between types except as a set. 4L85-E transmissions must use only high-torque roller-clutch parts.

5. Ensure carrier assembly (Figure 5), retaining ring (Figure 5), spring and retainer assembly (Figure 5), roller clutch (Figure 5), and housing (Figure 5), are of the same type.

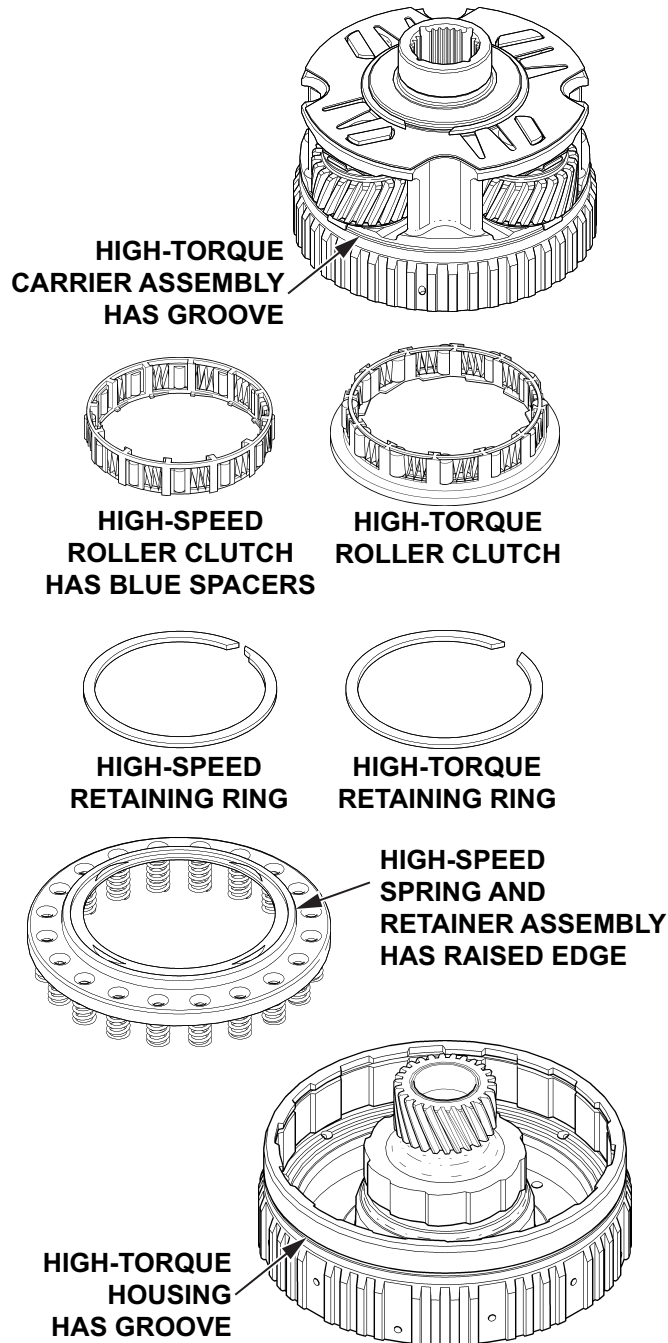


Figure 5. High-Speed and High-Torque Parts Identification.

END OF TASK

OVERRUN CLUTCH ASSEMBLY

CAUTION

All transmission parts must be soaked in clean Dexron® VI transmission fluid for 15 minutes before assembly. Foreign material may cause transmission damage.

NOTE

4L85-E and early 2001 and older 4L80-E transmissions use a different overdrive clutch housing (Figure 6, Item 7), spring and retainer assembly (Figure 6, Item 5), and retaining ring (Figure 6, Item 4) than late 2001 and newer 4L80-E. Refer to RPSTL WP 0035, Items 6, 8, and 9 for 4L85-E conversion.

1. Install piston (Figure 6, Item 6) on clutch housing (Figure 6, Item 7) and rotate piston (Figure 6, Item 6) while seating in housing (Figure 6, Item 7).
2. Using clutch spring compressor and adapter (Figure 6), install spring and retainer assembly (Figure 6, Item 5) on housing (Figure 6, Item 7) and secure with retaining ring (Figure 6, Item 4).
3. Starting with clutch plate (Figure 6, Item 8), install three clutch plates (Figure 6, Item 8) alternately with three clutch discs (Figure 6, Item 3) in housing (Figure 6, Item 7).
4. Install backing plate (Figure 6, Item 2) over clutch plate assembly (Figure 6, Items 3 and 8) and secure with retaining ring (Figure 6, Item 1).

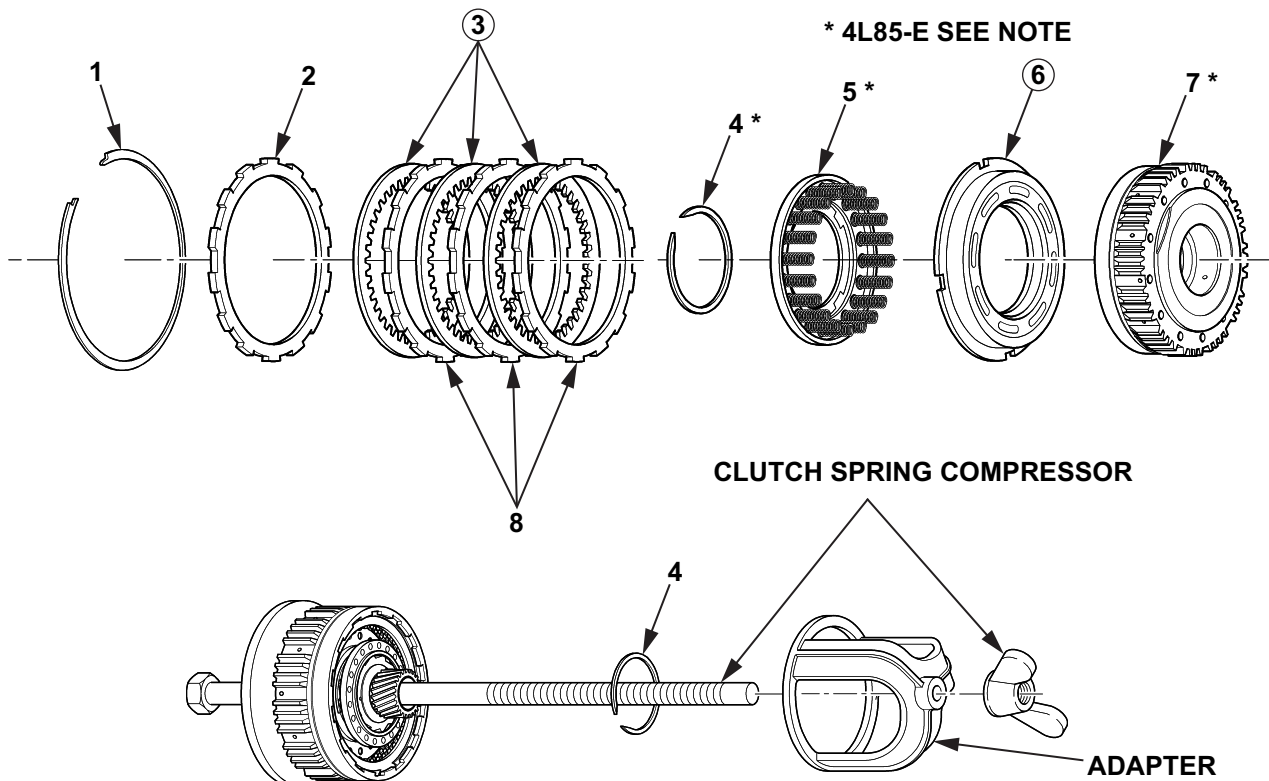


Figure 6. Overrun Clutch Assembly.

OVERRUN CLUTCH ASSEMBLY - CONTINUED

- Using feeler gauge (Figure 7), measure gap between retaining ring (Figure 7, Item 1) and backing plate (Figure 7, Item 2). Gap should be 0.033–0.094 in. (0.838–2.388 mm). If not, disassemble and inspect clutch stack up.

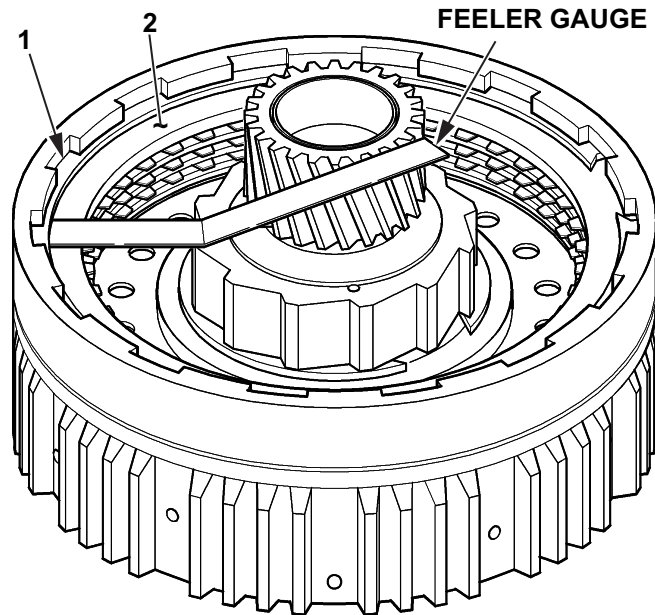


Figure 7. Overrun Clutch Clearance Check.

END OF TASK

OVERDRIVE UNIT ASSEMBLY**CAUTION**

Lubricate seals with clean Dexron® VI transmission fluid before assembly. Failure to comply may result in seal damage.

NOTE

- 4L85-E and GTP 4L80-E transmissions use a different turbine shaft (Figure 8, Item 3) than GM Hydra-matic 4L80-E. 4L85-E and early 2001 and older transmissions use a different roller clutch (Figure 10, Item 1) and overdrive carrier assembly (Figure 11, Item 1) than late 2001 and newer 4L80-E. Refer to RPSTL WP 0035, Items 3, 11, and 12 for 4L85-E conversion.
 - Turbine shaft is needed for air checking in WP 0015 and will be installed in WP 0020.
1. Adjust seal installer (Figure 8) so end is at inner seal groove (Figure 8, Item 1).
 2. Place seal installer (Figure 8) on turbine shaft (Figure 8, Item 3).
 3. Place lubricated seal (Figure 8, Item 4) on seal installer (Figure 8).
 4. Using seal pusher (Figure 8), push inner seal (Figure 8, Item 4) down seal installer (Figure 8) to inner seal groove (Figure 8, Item 1).
 5. Remove seal pusher (Figure 8) and seal installer (Figure 8).
 6. Slide seal sizer (Figure 8) down turbine shaft (Figure 8, Item 3) and over seal ring.
 7. Remove seal sizer (Figure 8).
 8. Repeat steps 2 through 5 for outer seal (Figure 8, Item 5) and install outer seal (Figure 8, Item 5) in outer seal groove (Figure 8, Item 2).
 9. Slide seal sizer (Figure 8) down turbine shaft and over seals (Figure 8, Items 4 and 5) and leave in place for 5 minutes. Remove seal sizer (Figure 8).

OVERDRIVE UNIT ASSEMBLY - CONTINUED

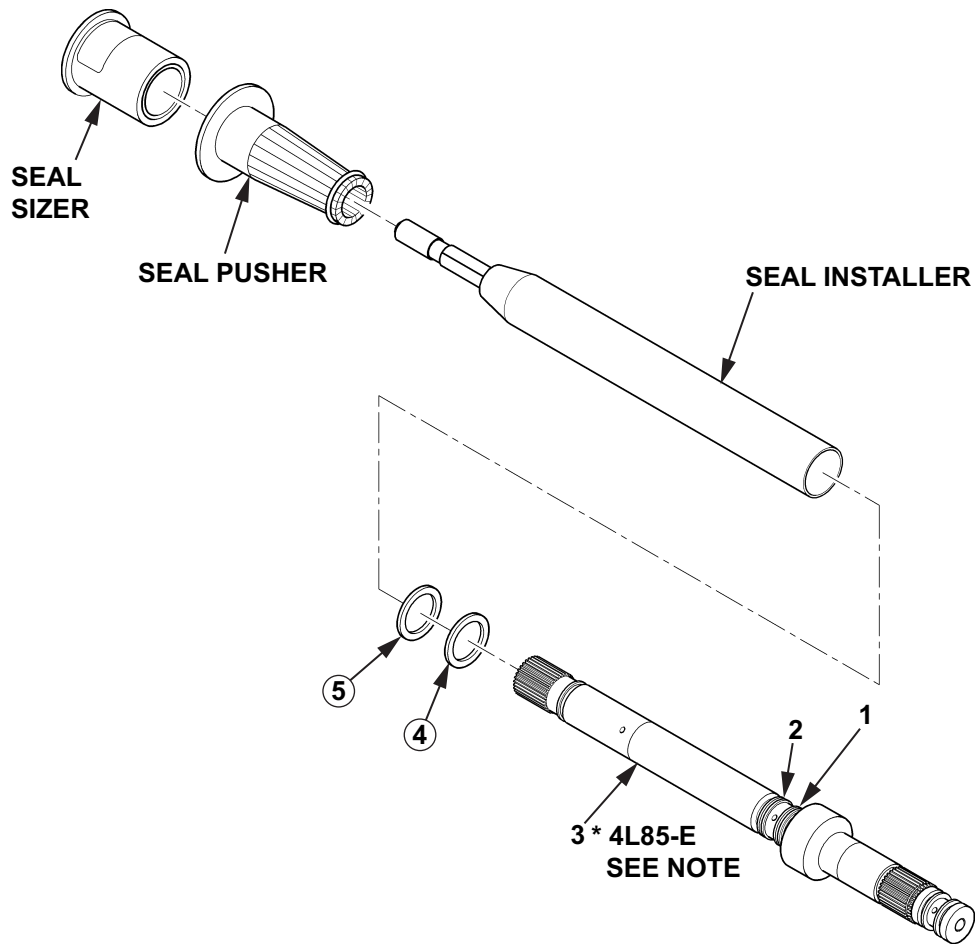


Figure 8. Turbine Shaft Seal Installation.

OVERDRIVE UNIT ASSEMBLY - CONTINUED

10. Adjust seal installer (Figure 9) so end is at seal groove (Figure 9, Item 5).
11. Place seal installer (Figure 9) on turbine shaft (Figure 9, Item 1).
12. Place lubricated seal (Figure 9, Item 2) on seal installer (Figure 9).
13. Using seal pusher (Figure 9), push inner seal (Figure 9, Item 2) down seal installer (Figure 9) to inner seal groove (Figure 9, Item 5).
14. Remove seal pusher (Figure 9) and seal installer (Figure 9).
15. Slide seal sizer (Figure 9) down turbine shaft (Figure 9, Item 1) and over seal (Figure 9, Item 3).
16. Remove seal sizer (Figure 9) and seal installer (Figure 9).
17. Adjust seal installer (Figure 9) so end is at seal groove (Figure 9, Item 4).
18. Place lubricated seal (Figure 9, Item 3) on seal installer (Figure 9).
19. Using seal pusher (Figure 9), push seal (Figure 9, Item 3) down seal installer (Figure 9) to outer seal groove (Figure 9, Item 4).
20. Remove seal pusher (Figure 9) and seal installer (Figure 9).
21. Slide seal sizer (Figure 9) down turbine shaft (Figure 9, Item 1) and over seals (Figure 9, Items 2 and 3) and leave in place for 5 minutes. Remove seal sizer (Figure 9).

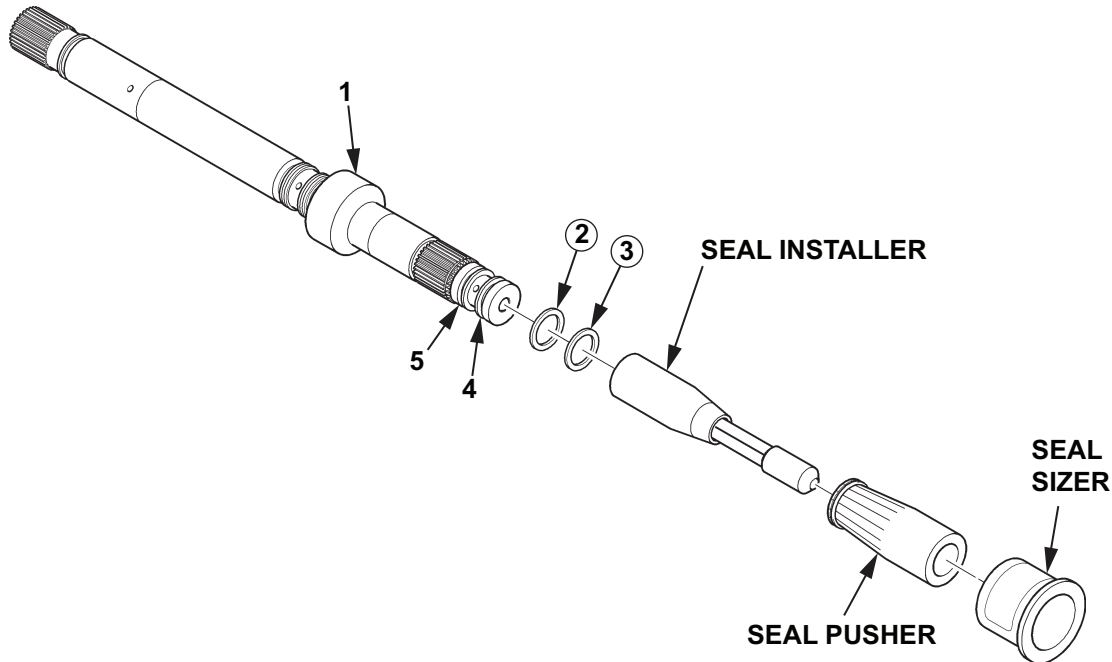


Figure 9. Turbine Shaft Seal Installation.

OVERDRIVE UNIT ASSEMBLY - CONTINUED

NOTE

- Ensure carrier assembly only spins counterclockwise.
- 4L85-E and GTP 4L80-E transmissions use a different turbine shaft (Figure 8, Item 3) than GM Hydra-matic 4L80-E. 4L85-E and early 2001 and older transmissions use a different roller clutch (Figure 10, Item 1) and overdrive carrier assembly (Figure 11, Item 1) than late 2001 and newer 4L80-E. Refer to RPSTL WP 0035, Items 3, 11, and 12 for 4L85-E conversion.

22. Install roller clutch (Figure 10, Item 1) in housing (Figure 10, Item 2).

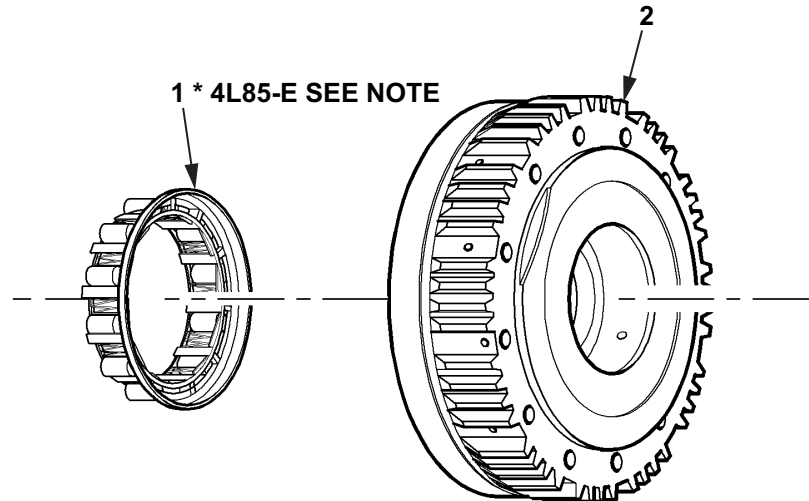


Figure 10. Roller Clutch Installation.

23. Place carrier assembly (Figure 11, Item 1) in housing (Figure 11, Item 2). Rotate carrier assembly (Figure 11, Item 1) during assembly to align clutch plate assembly teeth.

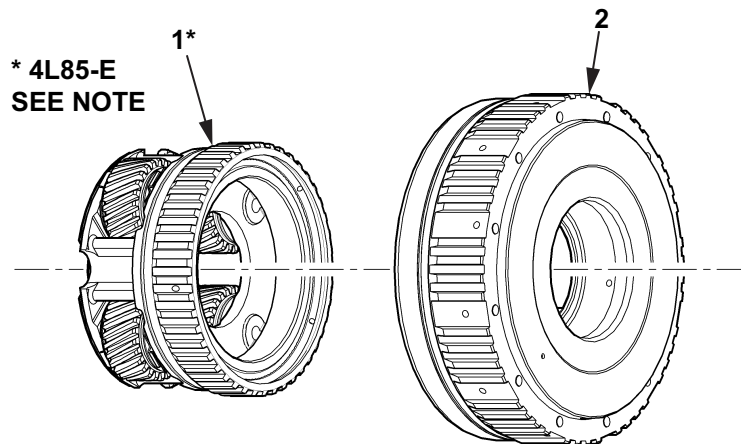


Figure 11. Overdrive Unit Assembly.

END OF TASK

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE FOURTH CLUTCH REPAIR

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Tool kit, transmission fourth clutch
(WP 0048, Item 30)

Materials/Parts

Dexron® VI (WP 0047, Item 5)

Parts kit, mechanical (WP 0049, Item 10)

References

WP 0004

DISASSEMBLY

1. Remove retaining ring (Figure 1, Item 1), backing plate (Figure 1, Item 10), four clutch plates (Figure 1, Item 8), and clutch discs (Figure 1, Item 9) from clutch housing (Figure 1, Item 4). Discard clutch discs (Figure 1, Item 9).
2. Remove retaining ring (Figure 1, Item 7) and clutch spring guide (Figure 1, Item 6) from clutch housing (Figure 1, Item 4).
3. Remove piston (Figure 1, Item 3) from clutch housing (Figure 1, Item 4).
4. Remove O-ring (Figure 1, Item 2) from piston (Figure 1, Item 3) and O-ring (Figure 1, Item 5) from clutch housing (Figure 1, Item 4). Discard O-rings (Figure 1, Items 2 and 5).

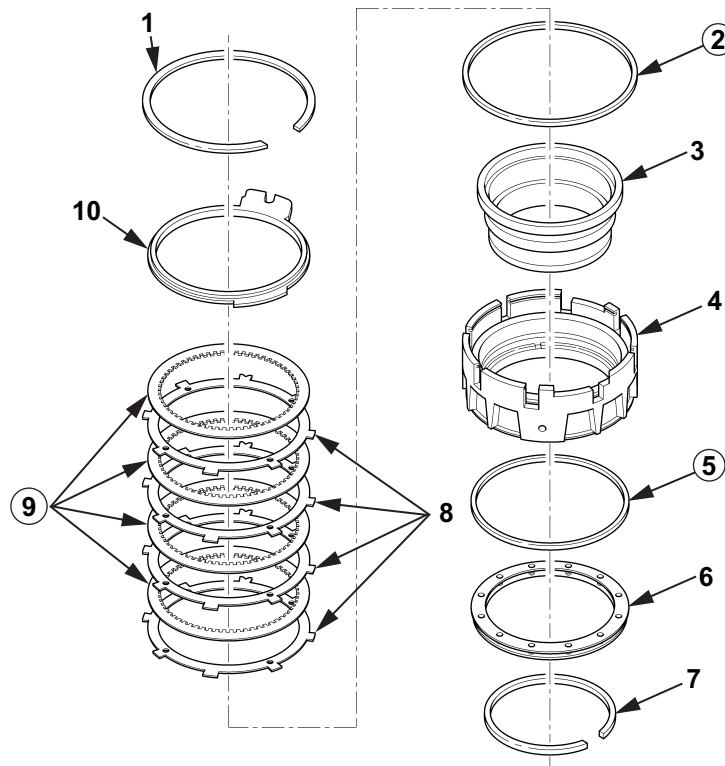


Figure 1. Fourth Clutch Disassembly.

END OF TASK

CLEANING AND INSPECTION**Cleaning**

For general parts cleaning information, refer to CLEANING, WP 0004.

Inspection

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect piston (Figure 2, Item 2), clutch plates (Figure 2, Item 5), backing plate (Figure 2, Item 1), and clutch housing (Figure 2, Item 3) for cracks, breaks, and damaged seal ring grooves. Replace any part that is cracked, broken, or damaged.
3. Inspect plug (Figure 2, Item 4). If missing, replace clutch housing (Figure 2, Item 3).

INSPECTION - CONTINUED

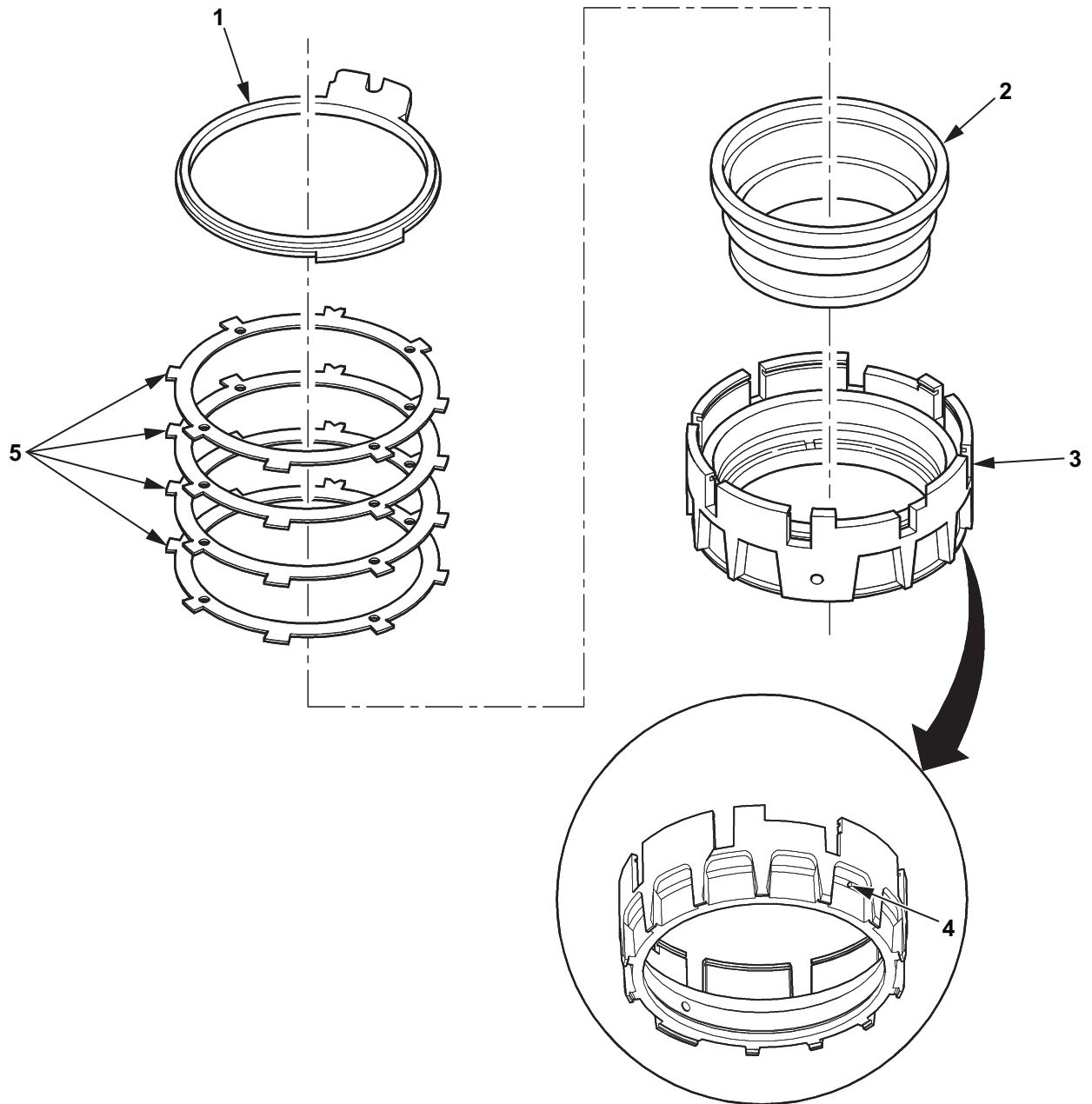


Figure 2. Fourth Clutch Cleaning and Inspection.

END OF TASK

ASSEMBLY**CAUTION**

All transmission parts must be lubricated with clean Dexron® VI transmission fluid before assembly. Foreign material may cause transmission damage.

1. Install O-ring (Figure 3, Item 2) on piston (Figure 3, Item 3) with lip facing toward clutch spring guide (Figure 3, Item 6) side.
2. Install O-ring (Figure 3, Item 5) on clutch housing (Figure 3, Item 4) with lip facing away from clutch spring guide (Figure 3, Item 6) side.
3. Place inner seal installer/remover (Figure 3) on clutch housing (Figure 3, Item 4).
4. Place outer seal installer/remover (Figure 3) on piston (Figure 3, Item 3).
5. Position piston (Figure 3, Item 3) on base (Figure 3) with retaining ring groove of piston (Figure 3, Item 3) facing up.
6. Place clutch housing (Figure 3, Item 4) over piston (Figure 3, Item 3) while holding inner seal remover installer/remover (Figure 3) in position.
7. With both hands firmly gripping outside of clutch housing (Figure 3, Item 4), push down on clutch housing (Figure 3, Item 4) until inner piston (Figure 3, Item 3) protrudes through center.
8. Place clutch spring guide (Figure 3, Item 6) and retaining ring (Figure 3, Item 7) over piston (Figure 3, Item 3), keeping clutch housing (Figure 3, Item 4) on base (Figure 3).
9. Compress clutch spring guide (Figure 3, Item 6) and install retaining ring (Figure 3, Item 7) on clutch housing (Figure 3, Item 4).

NOTE

Clutch plate index notch is opposite fourth clutch assembly bolt hole in clutch housing. Start with clutch plate and alternate between clutch plates and clutch discs.

10. Turn clutch housing (Figure 3, Item 4) over and install four clutch plates (Figure 3, Item 8), clutch discs (Figure 3, Item 9), and backing plate (Figure 3, Item 10) on clutch housing (Figure 3, Item 4).

CAUTION

Backing plate must have flat side down. Failure to comply may cause damage to equipment.

11. Secure backing plate (Figure 3, Item 10), clutch plates (Figure 3, Item 8), and clutch disc assemblies (Figure 3, Item 9) to clutch housing (Figure 3, Item 4) with retaining ring (Figure 3, Item 1).

ASSEMBLY - CONTINUED

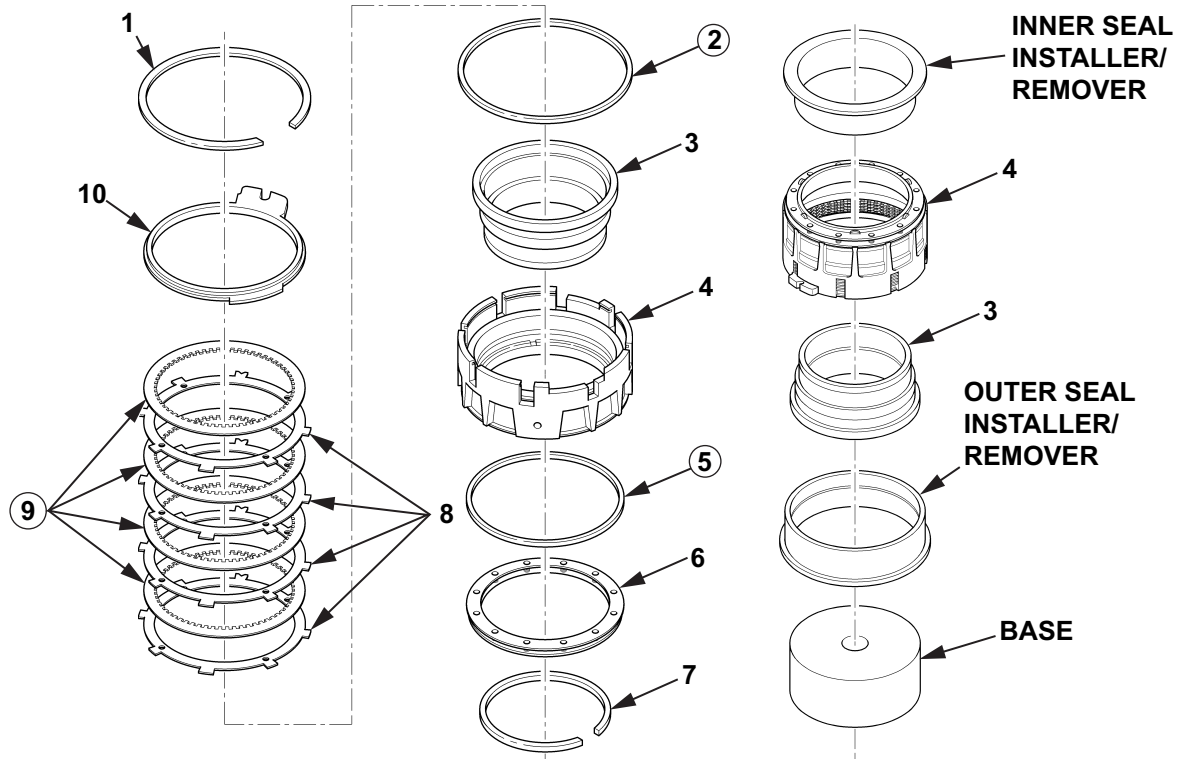


Figure 3. Fourth Clutch Assembly.

END OF TASK

END PLAY MEASUREMENT

1. Place fourth clutch assembly (Figure 4, Item 3) on bench with clutch spring guide (Figure 4, Item 4) facing down.
2. Using feeler gauge (Figure 4), press lightly on backing plate (Figure 4, Item 2) and measure gap between retaining ring (Figure 4, Item 1) and backing plate (Figure 4, Item 2). Measurement should be 0.040–0.100 in. (1.016–2.540 mm). If not, check for correct clutch plate pack or replace worn clutch plate pack.

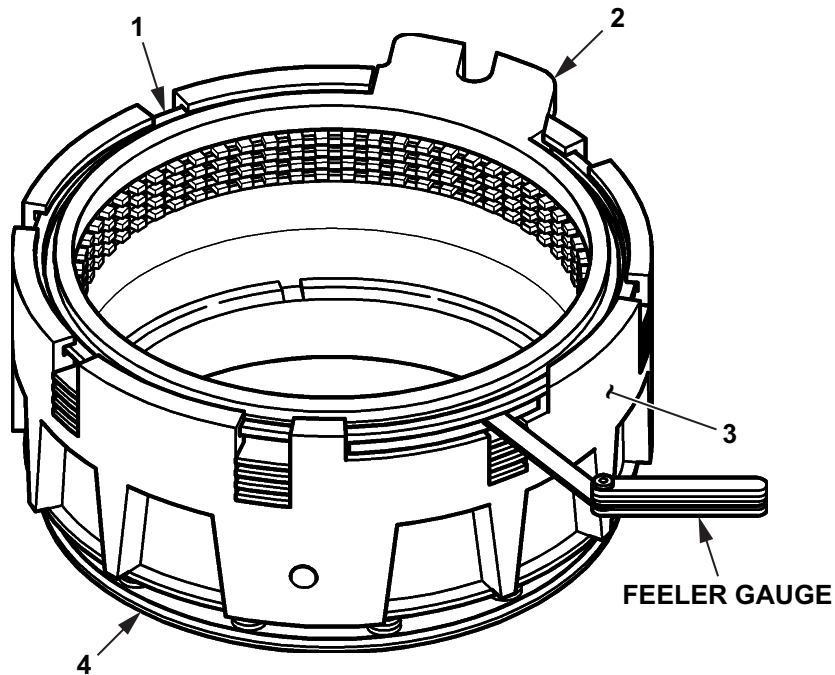


Figure 4. Fourth Clutch Measurement.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
FORWARD CLUTCH REPAIR**

INITIAL SETUP:**Tools and Special Tools**

- Clutch spring adapter (WP 0048, Item 2)
- Compressor, clutch spring (WP 0048, Item 7)
- Dial indicator (WP 0048, Item 8)
- General mechanic's tool kit: automotive (WP 0048, Item 13)
- Seal protectors, forward clutch piston kit (WP 0048, Item 25)
- Standard automotive tool set (WP 0048, Item 27)

Materials/Parts

- Dexron® VI (WP 0047, Item 5)
- Petrolatum (WP 0047, Item 8)
- Parts kit, mechanical (WP 0049, Item 10)

References

- WP 0004
-

DISASSEMBLY

1. Remove retaining ring (Figure 1, Item 1) and clutch driving hub (Figure 1, Item 2) from forward clutch housing (Figure 1, Item 8).
2. Remove forward clutch gear (Figure 1, Item 4), thrust washer (Figure 1, Item 3), and bearing washer (Figure 1, Item 5) from clutch driving hub (Figure 1, Item 2).
3. Remove five clutch plates (Figure 1, Items 9), clutch discs (Figure 1, Items 6), and waved clutch plate (Figure 1, Item 7) from forward clutch housing (Figure 1, Item 8). Discard clutch discs (Figure 1, Item 6).

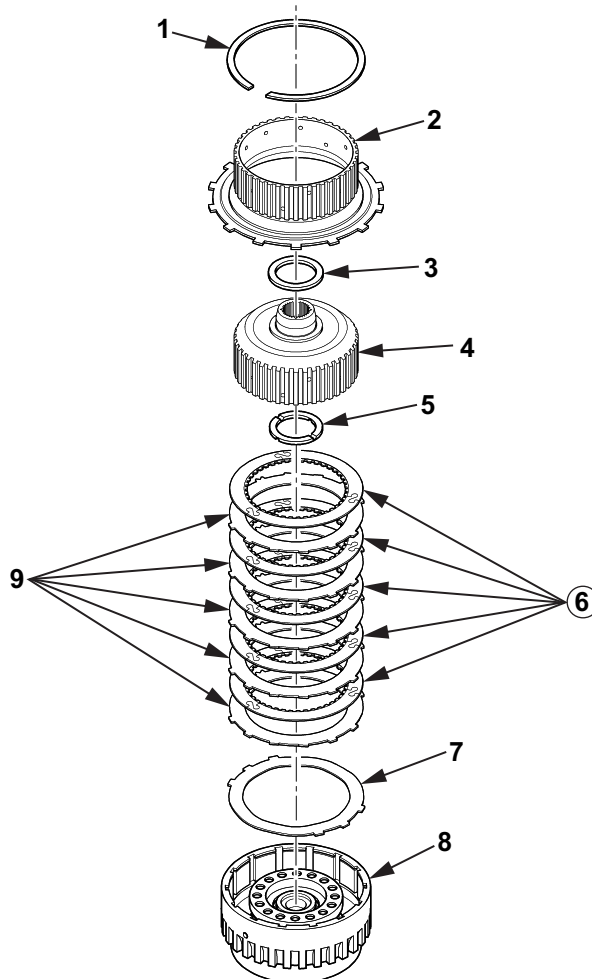


Figure 1. Forward Clutch Disassembly.

DISASSEMBLY - CONTINUED

4. Using clutch spring compressor (Figure 2) and adapter (Figure 2), compress spring and retainer assembly (Figure 2, Item 1) and remove retaining ring (Figure 2, Item 5) from forward clutch housing (Figure 2, Item 4).
5. Remove spring and retainer assembly (Figure 2, Item 1) from forward clutch housing (Figure 2, Item 4).
6. Remove piston (Figure 2, Item 2) and center sleeve seal (Figure 2, Item 3) from forward clutch housing (Figure 2, Item 4). Discard piston (Figure 2, Item 2) and center sleeve seal (Figure 2, Item 3).

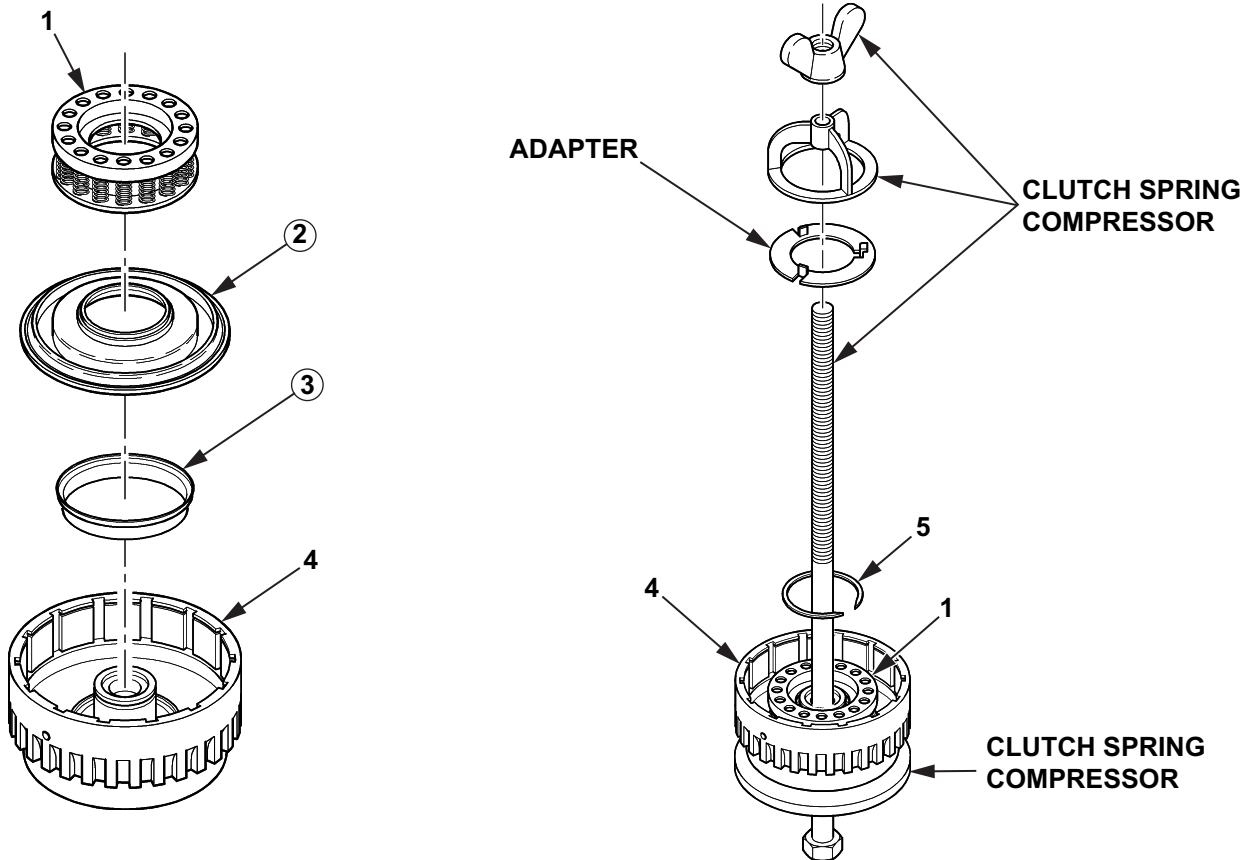


Figure 2. Forward Clutch Piston Disassembly.

END OF TASK

CLEANING AND INSPECTION**Cleaning**

For general parts cleaning information, refer to CLEANING, WP 0004.

Inspection

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect waved clutch plate (Figure 3, Item 4) and two retaining rings (Figure 3, Items 3 and 5) for distortion or damage. Replace if distorted or damaged.
3. Inspect forward clutch gear (Figure 3, Item 7) and direct clutch hub (Figure 3, Item 6) for damage. Replace either if damaged.
4. Inspect five clutch plates (Figure 3, Items 8) for distortion or damage. Replace if distorted or damaged.
5. Inspect spring and retainer assembly (Figure 3, Item 2) for collapsed coils or distortion. Replace if distorted or damaged.
6. Inspect clutch housing (Figure 3, Item 9) for damage. Replace if damaged.
7. Inspect for free movement of checkball (Figure 3, Item 1) and for open oil passages in clutch housing (Figure 3, Item 9). Replace forward clutch assembly (Figure 3, item 9) if checkball (Figure 3, Item 1) is not free or if oil passages are blocked.

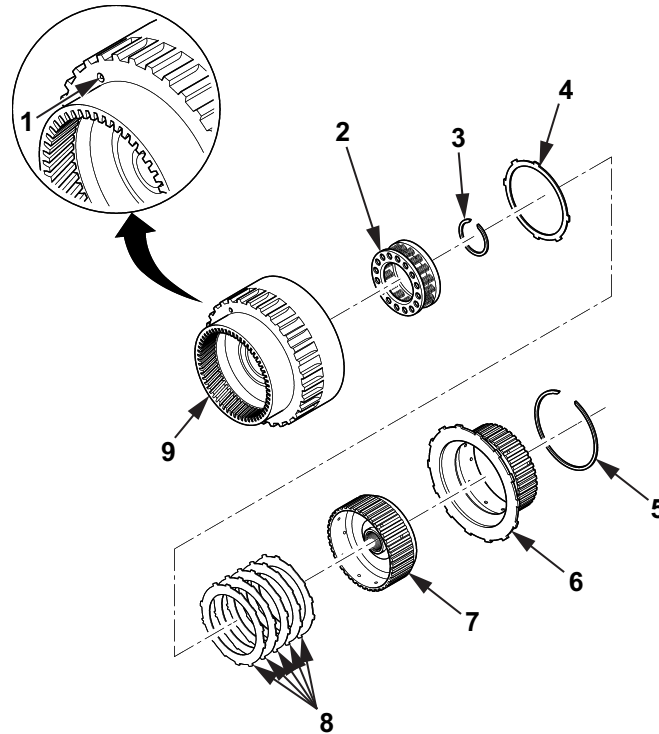


Figure 3. Forward Clutch.

END OF TASK

ASSEMBLY

1. Install center sleeve seal (Figure 4, Item 1) on forward clutch housing (Figure 4, Item 2).

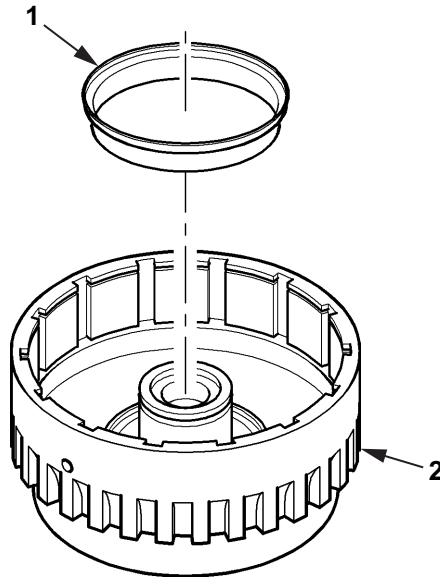


Figure 4. Center Sleeve Seal Installation.

2. Place seal installers (Figure 5) over forward clutch housing (Figure 5, Item 2).

NOTE

Forward and direct pistons are similar in appearance and may be stamped with identifying markings, but pistons are not interchangeable.

3. Install piston (Figure 5, Item 1) on forward clutch housing (Figure 5, Item 2). Twist piston slightly to ensure piston (Figure 5, Item 1) seats on forward clutch housing (Figure 5, Item 2).

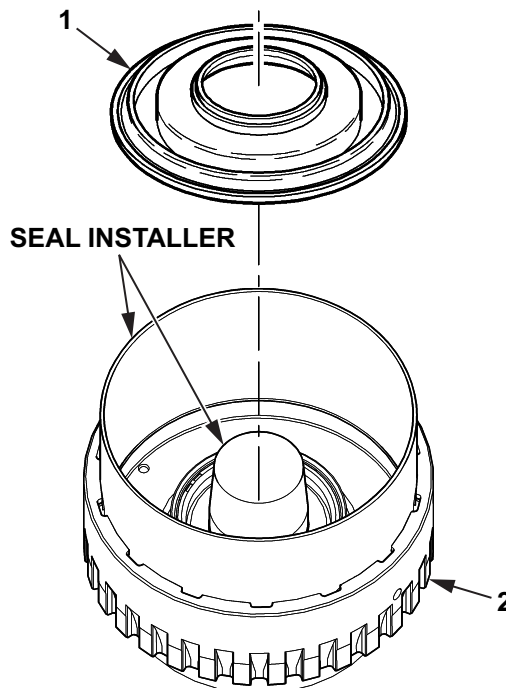


Figure 5. Seal Installers.

ASSEMBLY - CONTINUED

4. Using clutch spring compressor (Figure 6) and adapter (Figure 6), install spring and retainer assembly (Figure 6, Item 1) on forward clutch housing (Figure 6, Item 3) and secure with retaining ring (Figure 6, Item 2).

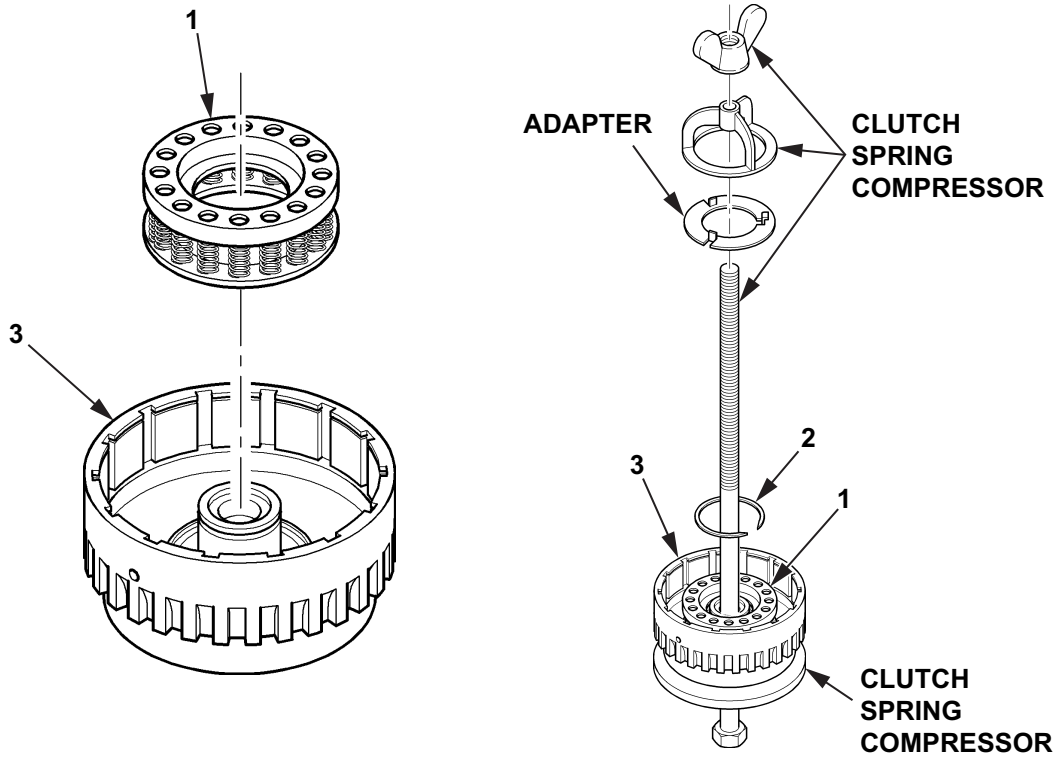


Figure 6. Spring Compressor.

ASSEMBLY - CONTINUED

5. Install waved clutch plate (Figure 7, Item 4) on forward clutch housing (Figure 7, Item 5).
6. Starting with a clutch plate (Figure 7, Item 6), install five clutch plates (Figure 7, Items 6) and clutch discs (Figure 7, Items 3) on clutch housing (Figure 7, Item 5).
7. Install clutch driving hub (Figure 7, Item 2) in forward clutch housing (Figure 7, Item 5) with retaining ring (Figure 7, Item 1).

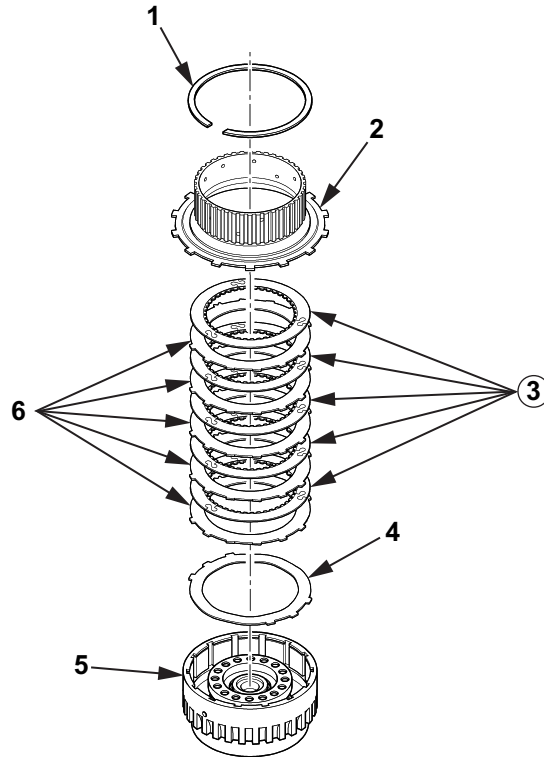


Figure 7. Forward Clutch Assembly.

ASSEMBLY - CONTINUED

8. Install forward clutch housing (Figure 8, Item 2) onto turbine shaft (Figure 8, Item 4).
9. Set up dial indicator (Figure 8) to measure piston (Figure 8, Item 1) movement with direct clutch driving hub (Figure 8, Item 5).

WARNING

Air pressure must not exceed 70 psi (483 kPa) when air-checking direct/forward clutch piston operation. Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.

10. Apply 70 psi (483 kPa) of air pressure to hole (Figure 8, Item 3) on turbine shaft (Figure 8, Item 4). Piston (Figure 8, Item 1) should move 0.050–0.186 in. (1.27–4.72 mm).

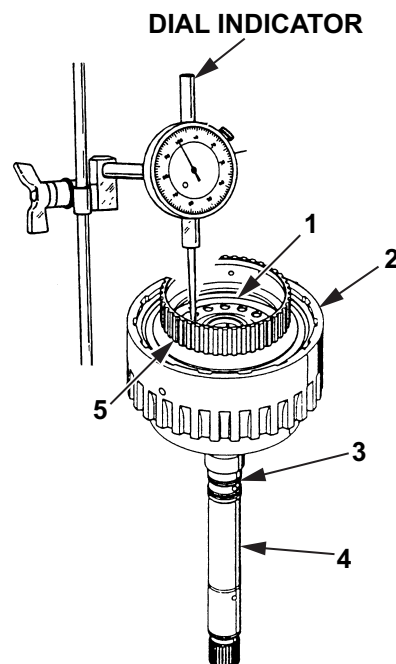


Figure 8. Forward Clutch Measurement.

ASSEMBLY - CONTINUED

11. Remove turbine shaft (Figure 9, Item 1), retaining ring (Figure 9, Item 3), and clutch driving hub (Figure 9, Item 4) from forward clutch housing (Figure 9, Item 2).
12. Install thrust washer (Figure 9, Item 5) in forward clutch gear (Figure 9, Item 6), and install bearing washer (Figure 9, Item 7) on outside of forward clutch gear (Figure 9, Item 6). Retain washers (Figure 9, Items 5 and 7) with petrolatum.
13. Install forward clutch gear (Figure 9, Item 6) on forward clutch housing (Figure 9, Item 2).
14. Install clutch driving hub (Figure 9, Item 4) on forward clutch housing (Figure 9, Item 2) with retaining ring (Figure 9, Item 3).
15. Re-install forward clutch housing (Figure 9, Item 2) onto turbine shaft (Figure 9, Item 1).

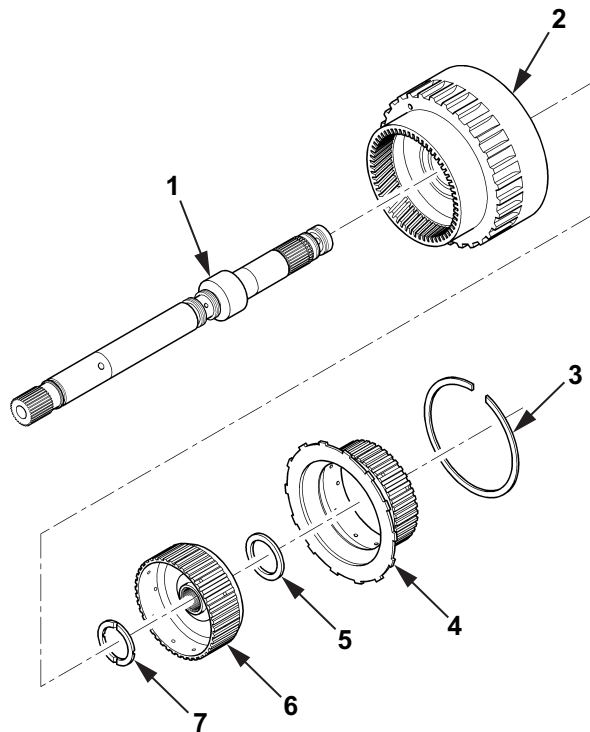


Figure 9. Forward Clutch.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
DIRECT CLUTCH REPAIR**

INITIAL SETUP:**Tools and Special Tools**

- Clutch spring adapter (WP 0048, Item 2)
- Compressor, clutch spring (WP 0048, Item 7)
- General mechanic's tool kit: automotive (WP 0048, Item 13)
- Seal protectors, forward clutch piston kit (WP 0048, Item 25)

Materials/Parts

- Dexron® VI (WP 0047, Item 5)
- Clip, retaining (WP 0049, Item 6)
- Parts kit, mechanical (WP 0049, Item 10)

References

- WP 0004
-

DISASSEMBLY**NOTE**

Inspect outer race to ensure it turns only clockwise and locks on housing when turned counterclockwise. If so, proceed to Step 3.

1. Remove retaining clip (Figure 1, Item 1), clutch retainer (Figure 1, Item 2), and outer race (Figure 1, Item 3) from direct clutch housing (Figure 1, Item 5). Discard retaining clip (Figure 1, Item 1).
2. Remove sprag assembly (Figure 1, Items 4) from direct clutch housing (Figure 1, Item 5).

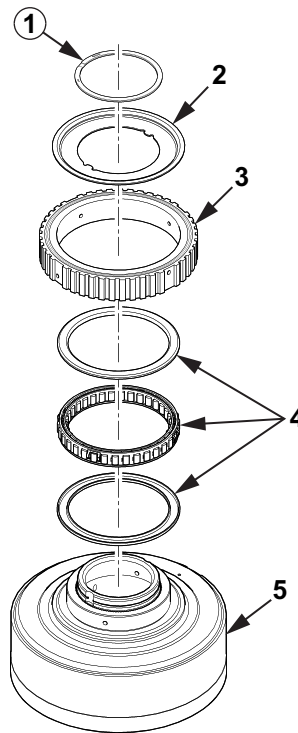


Figure 1. Direct Clutch Sprag Disassembly.

DISASSEMBLY - CONTINUED

3. Remove retaining ring (Figure 2, Item 1), backing plate (Figure 2, Item 2), five clutch discs (Figure 2, Item 3), clutch plates (Figure 2, Item 6), and waved plate (Figure 2, Item 4) from direct clutch housing (Figure 2, Item 5). Discard clutch discs (Figure 2, Item 3).

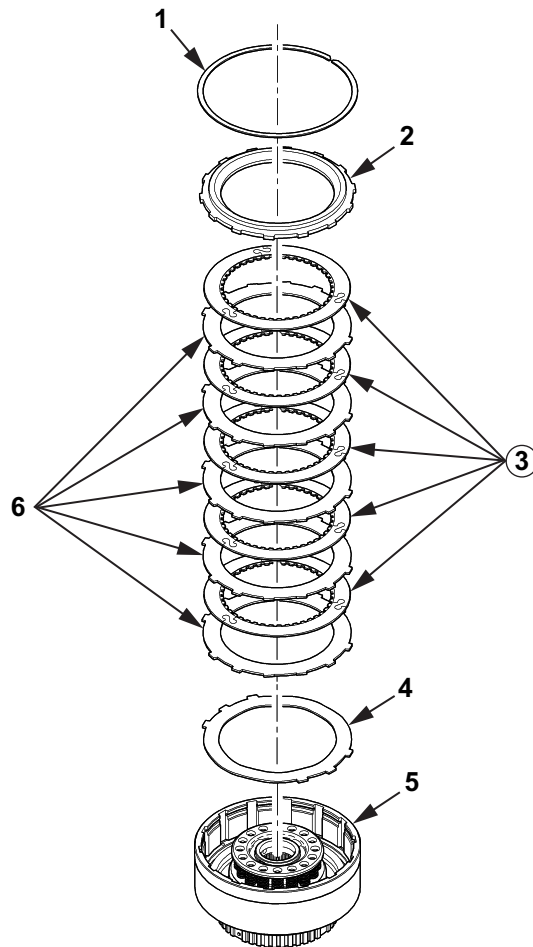


Figure 2. Direct Clutch Disassembly.

DISASSEMBLY - CONTINUED

4. Using clutch spring compressor (Figure 3) and clutch spring adapter (Figure 3), remove retaining ring (Figure 3, Item 5), spring and retainer assembly (Figure 3, Item 1), and piston (Figure 3, Item 2) from clutch housing (Figure 3, Item 4). Discard piston (Figure 3, Item 2).
5. Remove direct clutch seal (Figure 3, Item 3) from clutch housing (Figure 3, Item 4). Discard seal (Figure 3, Items 3).

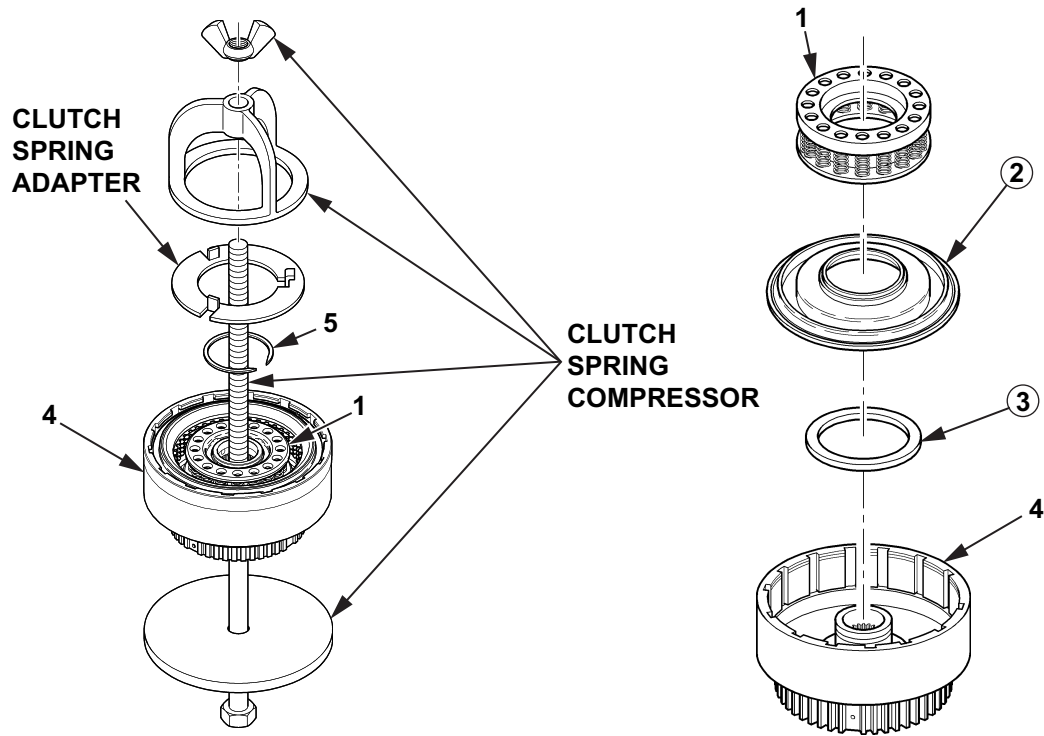


Figure 3. Direct Clutch Piston Disassembly.

END OF TASK

CLEANING AND INSPECTION**Cleaning**

For general parts cleaning information, refer to CLEANING, WP 0004.

Inspection

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect backing plate (Figure 4, Item 2), clutch plates (Figure 4, Items 3), and waved plate (Figure 4, Item 4) for signs of burning, scoring, or cracking. Replace any plate if burnt, scored, or cracked.
3. Inspect retaining rings (Figure 4, Items 1, and 5) and retaining clip (Figure 4, Item 8) (if not removed) for distortion or damage. Replace any distorted or damaged parts.
4. Inspect spring and retainer assembly (Figure 4, Item 6) for collapsed coils or distortion. Replace all if any are collapsed or distorted.
5. Inspect direct clutch housing (Figure 4, Item 7) for damage. Replace if damaged.
6. Check for free movement of checkball (Figure 4, Item 9) and ensure all oil passages in clutch housing (Figure 4, Item 7) are open. Replace direct clutch housing (Figure 4, Item 7) if checkball (Figure 4, Item 9) is not free or oil passages are blocked.

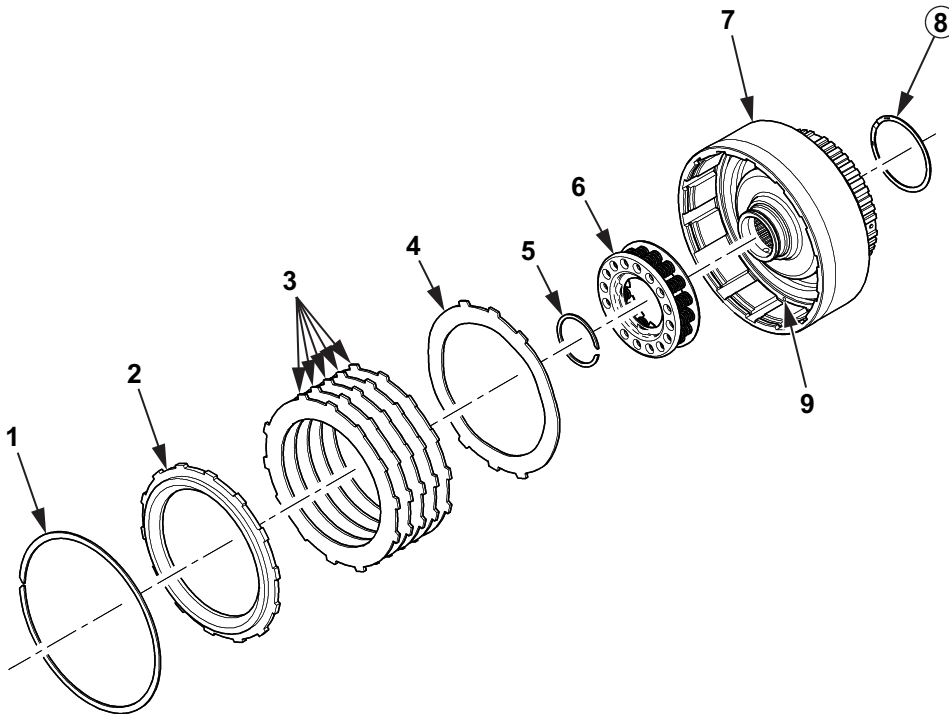


Figure 4. Direct Clutch Inspection.

END OF TASK

ASSEMBLY

CAUTION

All transmission parts must be soaked with clean Dexron® VI transmission fluid for 15 minutes before assembly. Foreign material may cause transmission damage.

1. Position piston (Figure 5, Item 1) facing up, and install direct clutch seal (Figure 5, Item 5) with lip side up in clutch housing (Figure 5, Item 2).
2. Position seal installer (Figure 5) on direct clutch housing (Figure 5, Item 2).
3. Install piston (Figure 5, Item 1) on direct clutch housing (Figure 5, Item 2) using twisting motion until seated.
4. Using clutch spring compressor (Figure 5), and clutch spring adapter (Figure 5), install spring and retainer assembly (Figure 5, Item 3) on piston (Figure 5, Item 1) with retaining ring (Figure 5, Item 6).

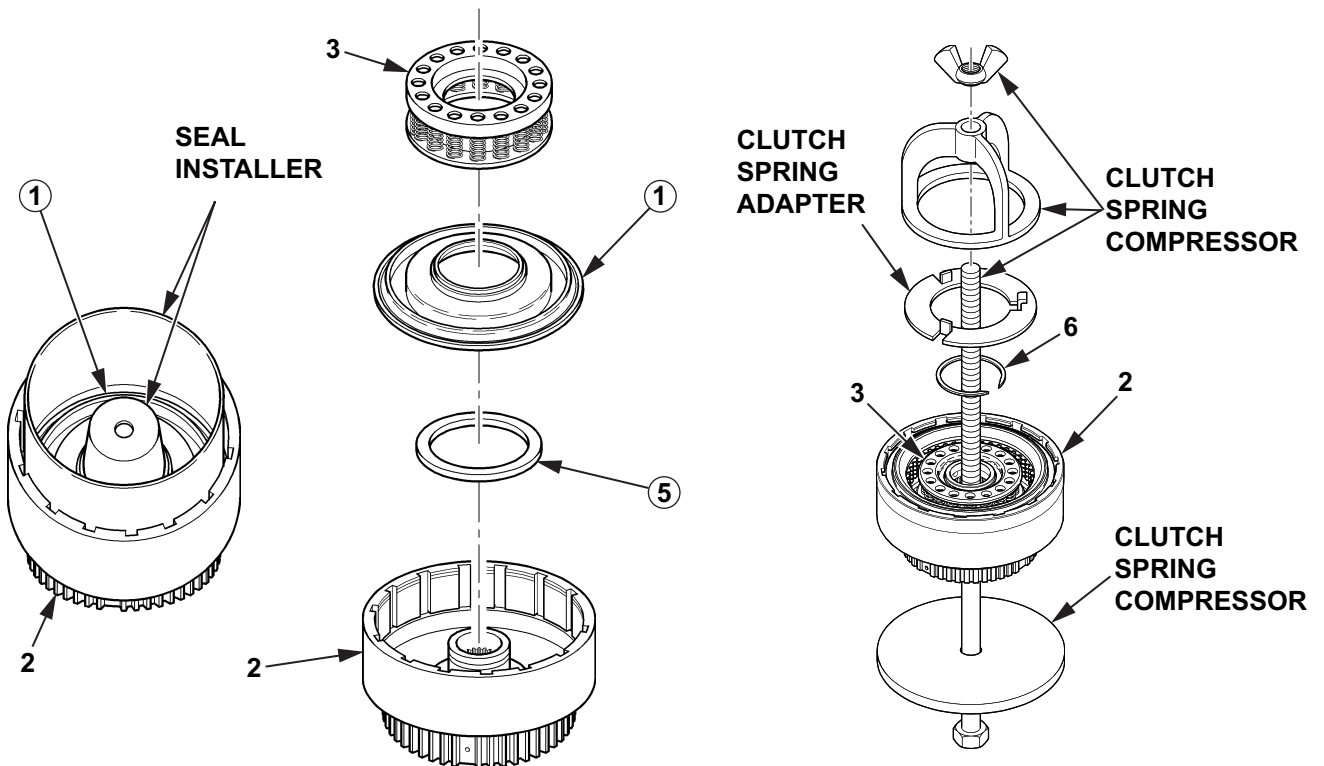


Figure 5. Direct Clutch Piston Assembly.

ASSEMBLY - CONTINUED

NOTE

Proceed to Step 8 if sprag was not disassembled.

5. Install sprag assembly (Figure 6, Item 4) over rear hub of direct clutch housing (Figure 6, Item 5).
6. Install outer race (Figure 6, Item 3), grooved side up, and clutch retainer (Figure 6, Item 2) over sprag assembly (Figure 6, Items 4) with retaining clip (Figure 6, Item 1).
7. Check outer race (Figure 6, Item 3) to ensure it turns only clockwise and locks on housing (Figure 6, Item 5) when turned counterclockwise.

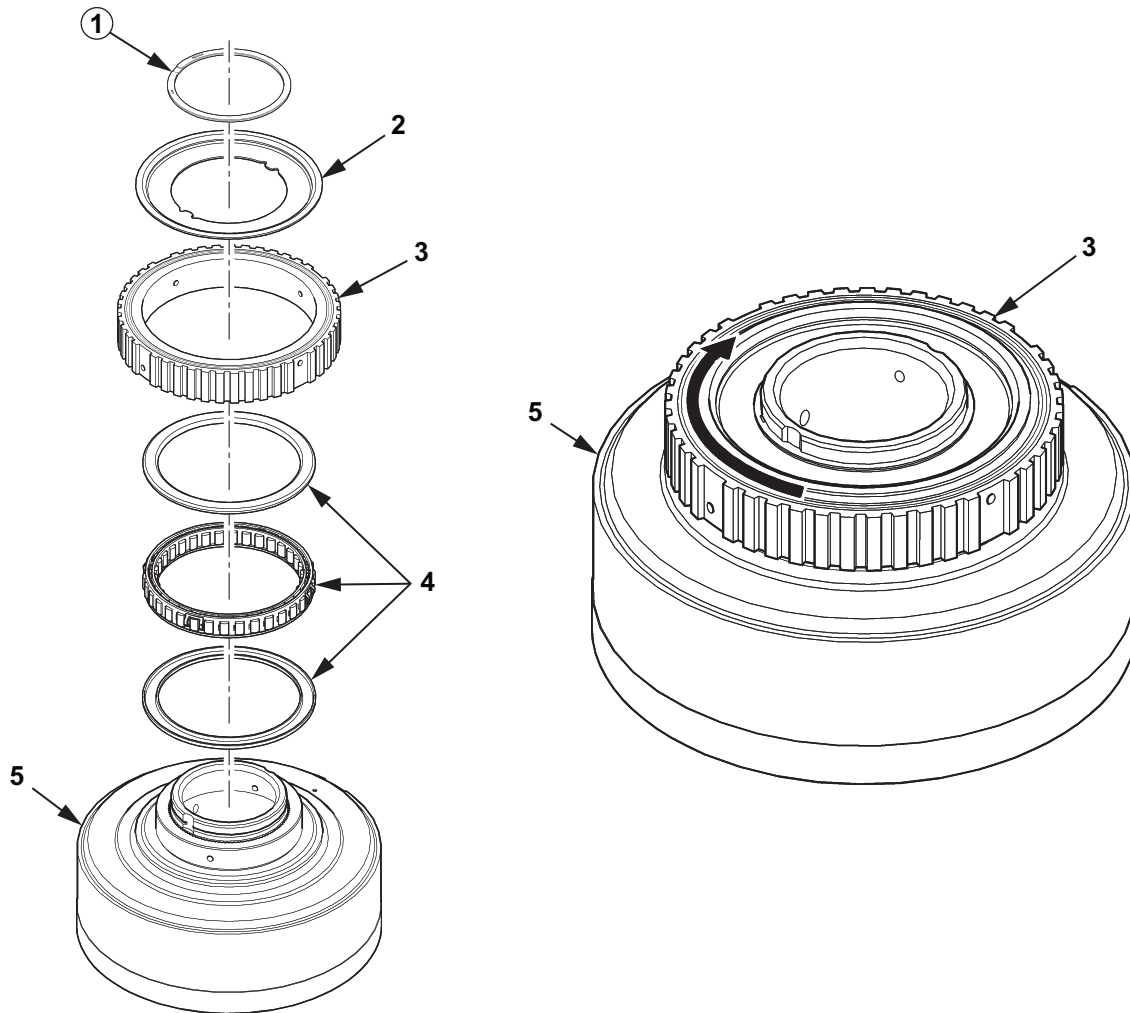


Figure 6. Direct Clutch Sprag Installation.

ASSEMBLY - CONTINUED

NOTE

If dished plate was present during disassembly, discard and replace with waved plate during assembly.

8. Install waved plate (Figure 7, Item 4) on direct clutch housing (Figure 7, Item 5).
9. Alternate plates, starting with a clutch plate (Figure 7, Item 6), and install five clutch plates (Figure 7, Item 6) and clutch discs (Figure 7, Item 3) on direct clutch housing (Figure 7, Item 5).
10. Install backing plate (Figure 7, Item 2) on direct clutch housing (Figure 7, Item 5) with retaining ring (Figure 7, Item 1).

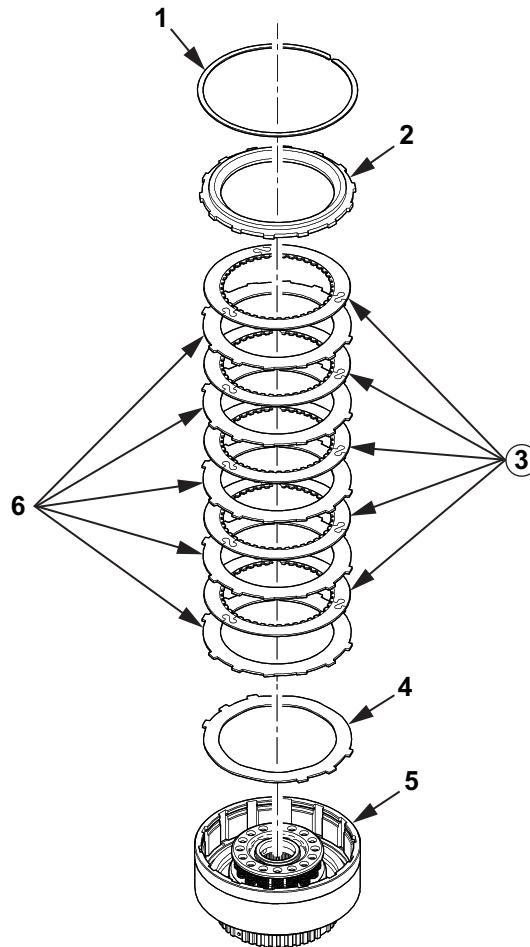


Figure 7. Direct Clutch Assembly.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
GEAR UNIT AND OUTPUT SHAFT REPAIR**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)

References

WP 0004
WP 0034

Materials/Parts

Dexron® VI (WP 0047, Item 5)
Petrolatum (WP 0047, Item 8)

DISASSEMBLY

1. Remove sun gear shaft (Figure 1, Item 6) from sun gear (Figure 1, Item 7) and main shaft (Figure 1, Item 8).
2. Remove reaction drum (Figure 1, Item 2) and washer (Figure 1, Item 9) from output carrier assembly (Figure 1, Item 10).

NOTE

Keep all bearing and races together as sets.

3. Remove roller bearing (Figure 1, Item 4), two races (Figure 1, Items 3 and 5), and sun gear (Figure 1, Item 7) from output carrier assembly (Figure 1, Item 10).
4. Remove roller clutch (Figure 1, Item 1) from reaction drum (Figure 1, Item 2).

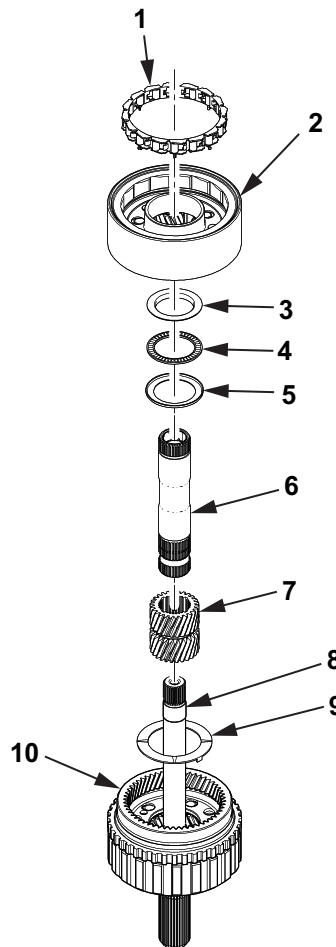


Figure 1. Gear Unit.

DISASSEMBLY - CONTINUED

5. Remove thrust washer (Figure 2, Item 1), retaining ring (Figure 2, Item 2), output shaft (Figure 2, Item 3), bearing race (Figure 2, Item 4), roller bearing (Figure 2, Item 5), and bearing race (Figure 2, Item 6) from internal gear (Figure 2, Item 7).
6. Remove internal gear (Figure 2, Item 7), main shaft (Figure 2, Item 8), bearing race (Figure 2, Item 10), roller bearing (Figure 2, Item 11), bearing race (Figure 2, Item 12), and washer (Figure 2, Item 9) from output carrier assembly (Figure 2, Item 13).

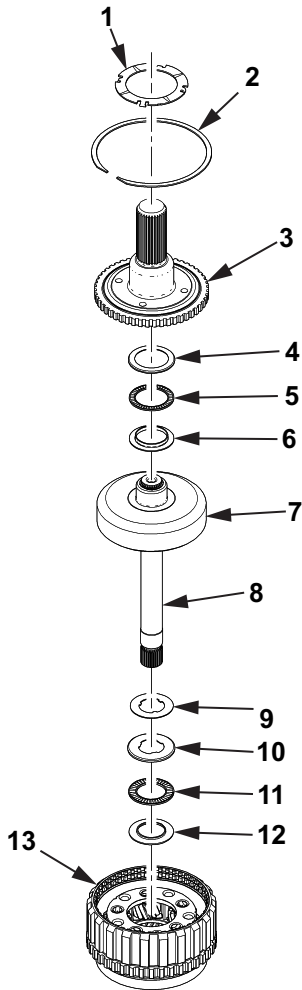


Figure 2. Internal Gear.

DISASSEMBLY - CONTINUED

7. Remove retaining ring (Figure 3, Item 1) and internal gear (Figure 3, Item 2) from main shaft (Figure 3, Item 3).

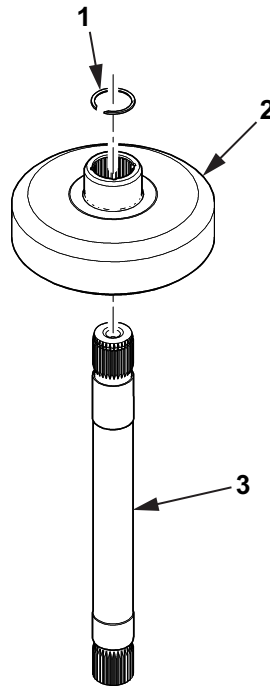


Figure 3. Main Shaft.

END OF TASK

CLEANING AND INSPECTION**Cleaning**

For general parts cleaning information, refer to CLEANING, WP 0004.

Inspection

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect output carrier (Figure 4, Item 1) for damage. Replace if damaged.
3. Inspect output carrier pinion gears (Figure 4, Item 2) for damage, rough bearings, or excessive end play. Using feeler gauge (Figure 4), measure pinion gear end play. End play should not exceed 0.024 in. (0.61 mm). If any of these conditions exist, replace output carrier (Figure 4, Item 1).

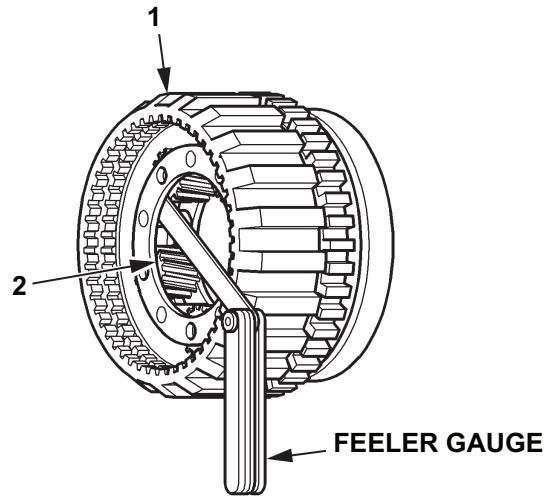


Figure 4. Output Carrier.

4. Inspect sun gear (Figure 5, Item 1) for damage. Replace if damaged.

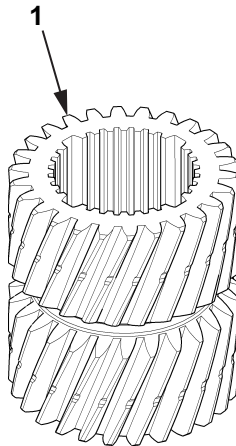


Figure 5. Sun Gear.

INSPECTION - CONTINUED

5. Inspect band surface (Figure 6, Item 2) on reaction drum (Figure 6, Item 1) for burning, scoring, or galling. Replace if burnt, scored, or pitted.
6. Inspect reaction carrier bushing (Figure 6, Item 4). Replace reaction drum (Figure 6, Item 1) if reaction carrier bushing (Figure 6, Item 4) is damaged.
7. Inspect reaction carrier pinion gear (Figure 6, Item 3) for damage, rough bearings, or excessive end play. Using feeler gauge, measure pinion gear end play. End play should not exceed 0.024 in. (0.61 mm). If any of these conditions exist, replace reaction drum (Figure 6, Item 1).

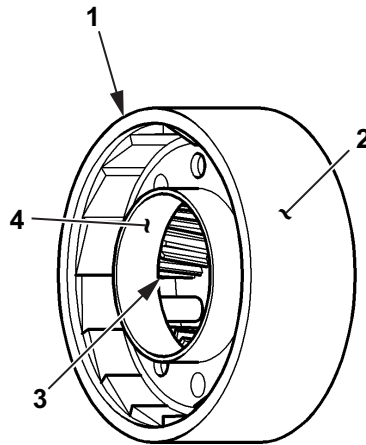


Figure 6. Reaction Drum.

8. Inspect roller clutch (Figure 7, Item 3) for damaged rollers (Figure 8, Item 1), springs (Figure 7, Item 2), or cage (Figure 7, Item 4). Replace roller clutch (Figure 7, Item 3) if any parts are damaged.

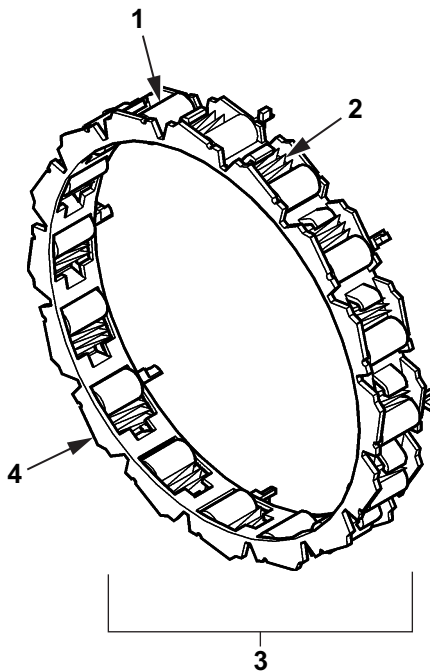


Figure 7. Roller Clutch.

INSPECTION - CONTINUED

9. Inspect retaining ring (Figure 8, Item 1), case thrust washer (Figure 8, Item 2), and reaction carrier thrust washer (Figure 8, Item 3) for distortion or damage. Replace any parts distorted or damaged.

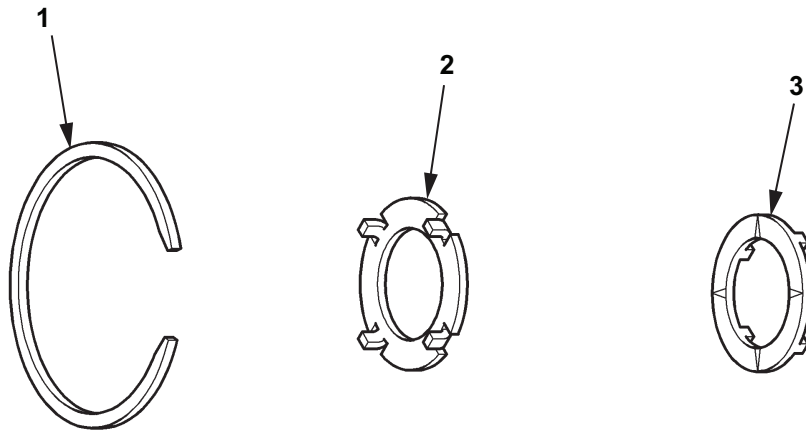


Figure 8. Retaining Ring and Washers.

10. Inspect sun gear shaft (Figure 9, Item 1) for damage. Replace if damaged.

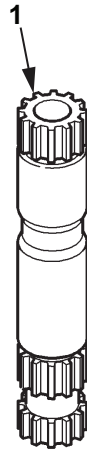


Figure 9. Sun Gear Shaft.

INSPECTION - CONTINUED

11. Inspect output shaft (Figure 10, Item 1) for damage. Replace if damaged.

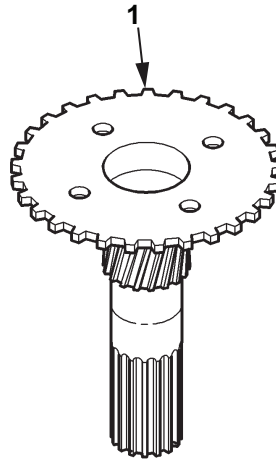


Figure 10. Output Shaft.

12. Inspect bearings and races (Figure 11, Item 1) for damage, rough bearings, burnt, or scored. Replace any if damaged.

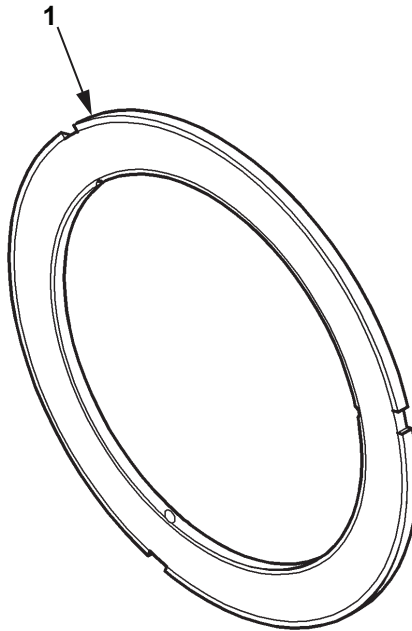


Figure 11. Bearing Inspection.

END OF TASK

ASSEMBLY**CAUTION**

All transmission parts must be lubricated with Dexron® VI transmission fluid before assembly.

NOTE

4L85-E transmissions use a different output planetary gear carrier (Figure 13, Item 13) and reaction clutch carrier (Figure 14, Item 2) than 4L80-E. Refer to RPSTL WP 0034 Items 8 and 14 for 4L85-E conversion.

1. Install main shaft (Figure 12, Item 3) into rear internal gear (Figure 12, Item 2) with retaining ring (Figure 12, Item 1).

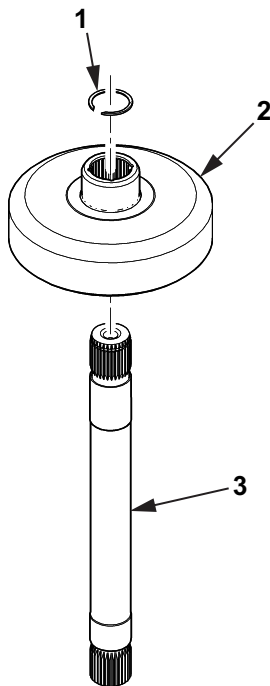


Figure 12. Output Shaft Assembly.

ASSEMBLY - CONTINUED

2. Install roller bearing (Figure 13, Item 5) and two bearing races (Figure 13, Items 4 and 6) on rear journal of rear internal gear (Figure 13, Item 7). Retain bearing (Figure 13, Item 5) and bearing races (Figure 13, Items 4 and 6) with petrolatum.
3. Install output carrier assembly (Figure 13, Item 13), washer (Figure 13, Item 9), roller bearing (Figure 13, Item 11), two bearing races (Figure 13, Items 10 and 12), and output shaft (Figure 13, Item 3) on internal gear (Figure 13, Item 7). Secure with retaining ring (Figure 13, Item 2).

NOTE

- Metal thrust washer is installed on output shaft. Plastic thrust washer is installed in output carrier.
 - 4L85-E transmissions use a different output planetary gear carrier (Figure 13, Item 13) and reaction clutch carrier (Figure 14, Item 2) than 4L80-E. Refer to RPSTL WP 0034 Items 8 and 14 for 4L85-E conversion.
4. Install thrust washer (Figure 13, Item 1) on output shaft (Figure 13, Item 3) and retain with petrolatum. Seat tabs in pockets of output shaft (Figure 13, Item 3).
 5. Turn partially assembled gear unit over so main shaft (Figure 13, Item 8) faces up.

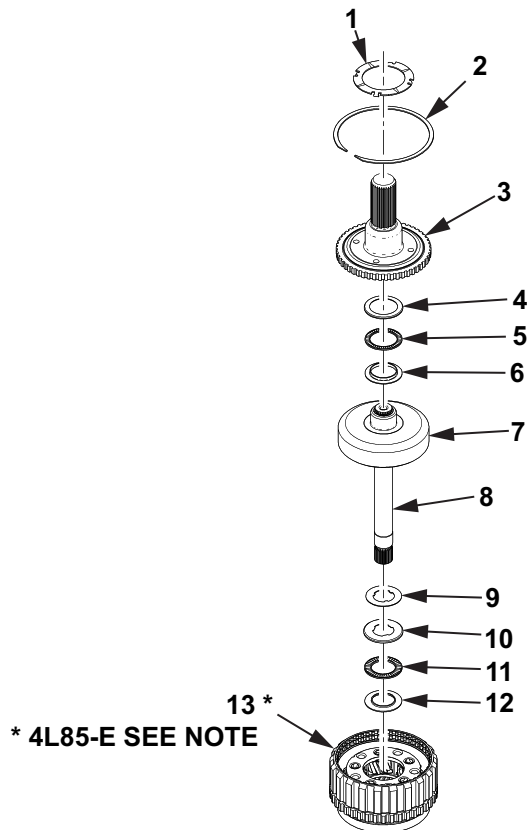


Figure 13. Output Drum Assembly.

ASSEMBLY - CONTINUED

6. Install plastic thrust washer (Figure 14, Item 9) and reaction drum (Figure 14, Item 2) on output carrier assembly (Figure 14, Item 10). Mesh gears.
7. Install sun gear (Figure 14, Item 7), chamfered edge first, into reaction drum (Figure 14, Item 2) and output carrier assembly (Figure 14, Item 10).
8. Install long, splined end of sun gear shaft (Figure 14, Item 6) in sun gear (Figure 14, Item 7) and main shaft (Figure 14, Item 8).
9. Install roller bearing (Figure 14, Item 4) and two races (Figure 14, Items 3 and 5) with longer lip race on reaction drum (Figure 14, Item 2). Retain roller bearing (Figure 14, Item 4) and races (Figures 13, Items 3 and 5) with petrolatum.
10. Install roller clutch (Figure 14, Item 1) in reaction drum (Figure 14, Item 2).

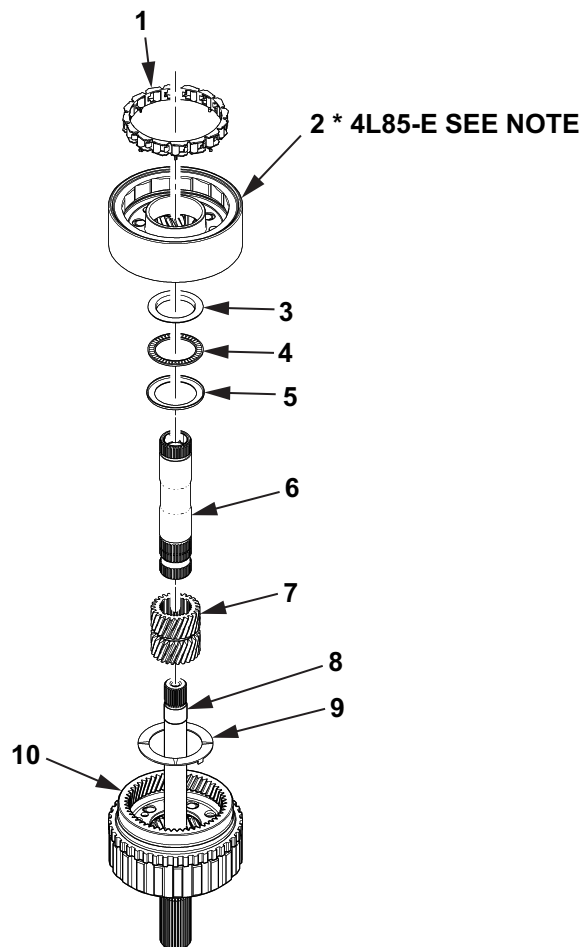


Figure 14. Gear Unit Assembly.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
CENTER SUPPORT REPAIR**

INITIAL SETUP:**Tools and Special Tools**

Adapter clutch spring compressor
(WP 0048, Item 1)
Compressor, clutch spring (WP 0048, Item 7)
General mechanic's tool kit: automotive
(WP 0048, Item 13)
Protector, inner seal, clutch (WP 0048, Item 19)
Reamer, hand (WP 0048, Item 20)
Standard automotive tool set (WP 0048, Item 27)

Materials/Parts

Dexron® VI (WP 0047, Item 5)
Petrolatum (WP 0047, Item 8)
Parts kit, mechanical (WP 0049, Item 10)

References

WP 0004

DISASSEMBLY**NOTE**

Work area should be well ventilated, clean, and free from blowing dirt and dust.

1. Remove four center support packing retainers (Figure 1, Item 1) from center support (Figure 1, Item 2). Discard center support packing retainers (Figure 1, Item 1).
2. Remove oil cooler pipe fitting seal (Figure 1, Item 3) from center support (Figure 1, Item 2). Discard oil cooler pipe fitting seal (Figure 1, Item 3).

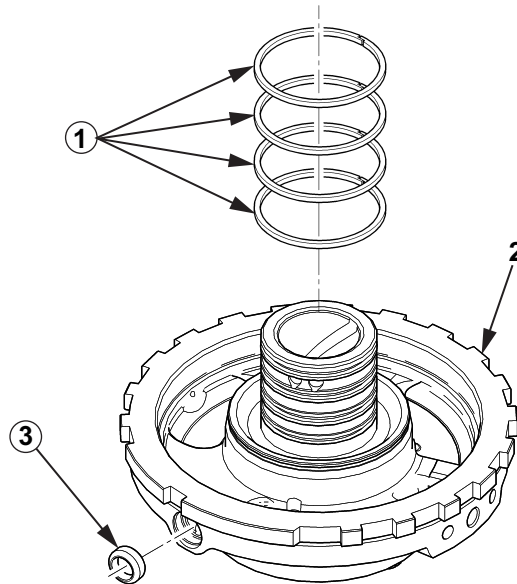


Figure 1. Center Support Packing Retainers.

DISASSEMBLY - CONTINUED

3. Using adapter (Figure 2) and clutch spring compressor (Figure 2), compress spring and retainer assembly (Figure 2, Item 6).
4. Using lock ring pliers (Figure 2), remove retaining ring (Figure 2 Item 1) from center support (Figure 1, Item 5).
5. Remove spring and retainer assembly (Figure 2, Item 6) and clutch piston (Figure 2, Item 2) from center support (Figure 2, Item 5).
6. Remove preformed packings (Figure 2 Items 3 and 4) from clutch piston (Figure 2, Item 2). Discard preformed packings (Figure 2, Items 3 and 4).

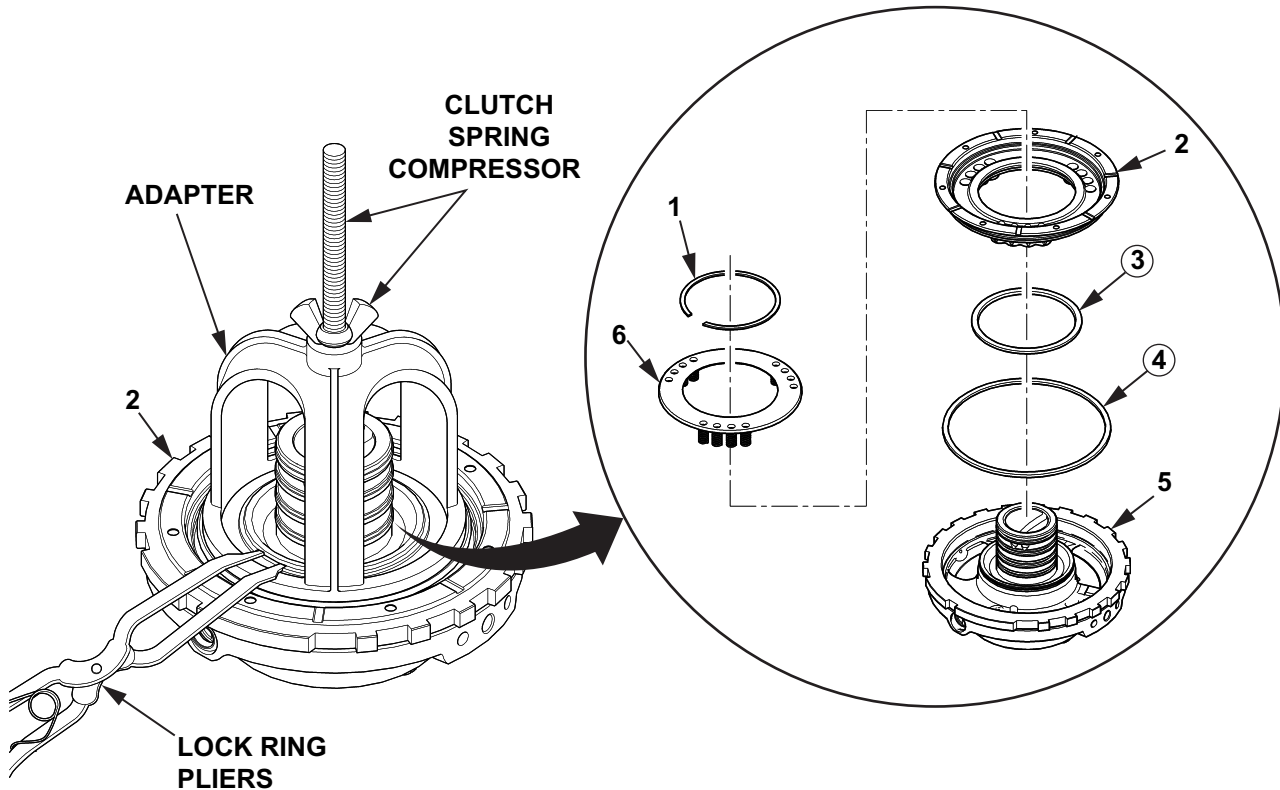


Figure 2. Center Support Disassembly.

END OF TASK

CLEANING AND INSPECTION**Cleaning**

For general parts cleaning information, refer to CLEANING, WP 0004.

Inspection

1. For general parts inspection information, refer to INSPECTION, WP 0004.
2. Inspect roller clutch inner race (Figure 3, Item 2) for damage. Replace center support (Figure 3, Item 1) if damaged.
3. Inspect oil ring grooves (Figure 3, Item 3) in center support (Figure 3, Item 1) for roughness or damage. Replace center support (Figure 3, Item 1) if damaged.
4. Inspect center support (Figure 3, Item 1) for damage. Replace if damaged.

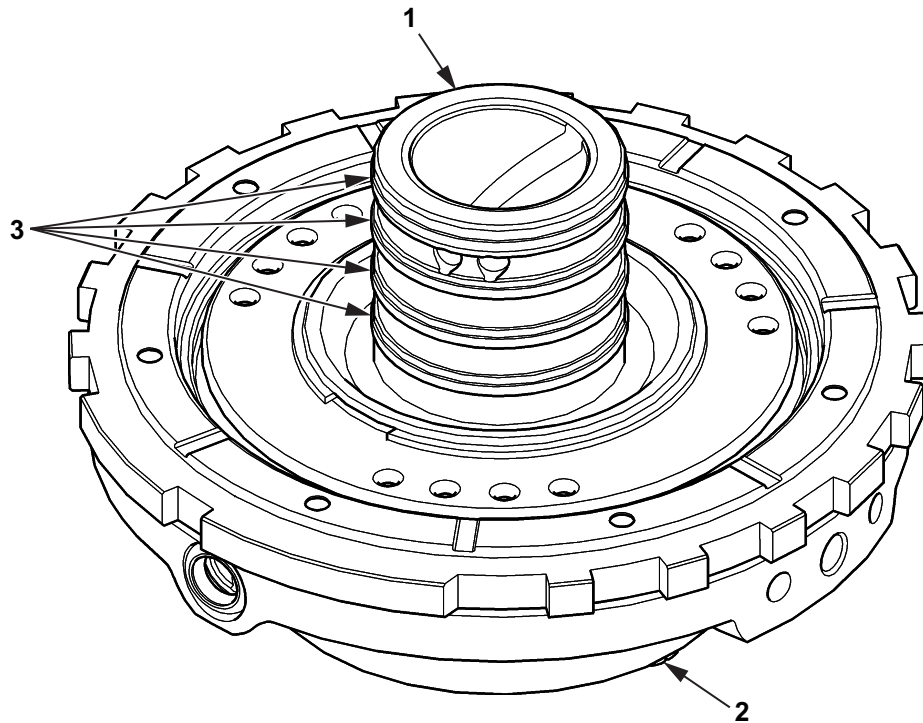


Figure 3. Center Support Inspection.

INSPECTION - CONTINUED

5. Using gauge pin (Figure 4) inspect center support assembly bolt hole (Figure 4, Item 2).
 - a. If gauge pin (Figure 4) fits into center support assembly bolt hole (Figure 4, Item 2) discard center support (Figure 4, Item 1).
 - b. If gauge pin (Figure 4) does NOT fit into center support assembly bolt hole (Figure 4, Item 2) proceed to Step 6.

NOTE

The center support bolt hole can be reconditioned **ONE TIME ONLY** using a reamer and a new service bolt.

6. Position reamer (Figure 4) in bolt hole (Figure 4, Item 2) and using light pressure, turn clockwise approximately 4 – 6 times or until reamer (Figure 4) bottoms out. Remove reamer (Figure 4) and clean center support (Figure 4, Item 1).
7. Check all oil passages in center support (Figure 4, Item 1) for blockage.

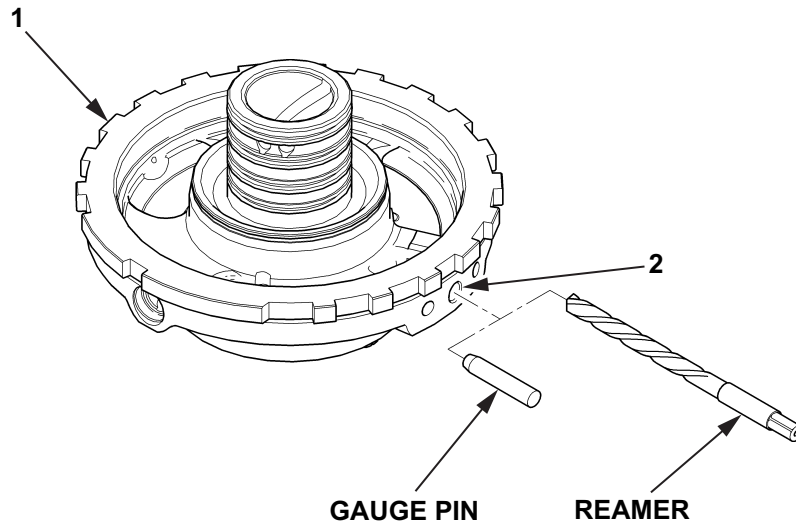


Figure 4. Gauge Pin.

INSPECTION - CONTINUED

8. Inspect spring and retainer assembly (Figure 5, Item 2) for signs of distortion or collapsed springs. Replace spring and retainer assembly (Figure 5, Item 2) if springs are distorted or collapsed.
9. Inspect clutch piston (Figure 5, Item 3), and retaining ring (Figure 5, Item 1) for damage or distortion. Replace clutch piston (Figure 5, Item 3), or retaining ring (Figure 5, Item 1) if damaged or distorted.

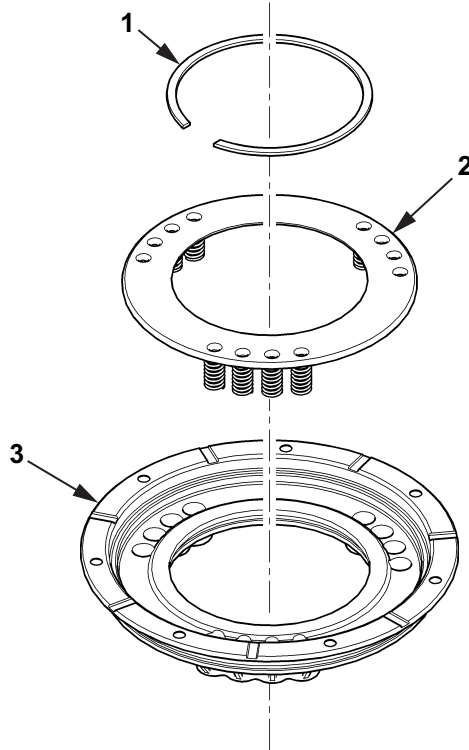


Figure 5. Springs/Clutch.

10. Inspect drive plate rings (Figure 6, Item 1) for signs of burning, scoring, or cracks. Replace any that are burned, scored, or cracked.

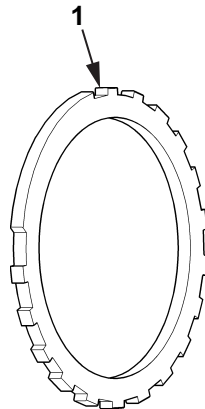


Figure 6. Drive Plate Rings.

INSPECTION - CONTINUED

11. Inspect bushing (Figure 7, Item 3) in center support (Figure 7, Item 1) for damage. If damaged, replace center support (Figure 7, Item 1).
12. Check center support (Figure 7, Item 1) for obstructions in orifice plug (Figure 7, Item 2). Remove obstructions with a piece of wire. Replace center support if orifice plug (Figure 7, Item 2) is missing or obstructions cannot be removed.

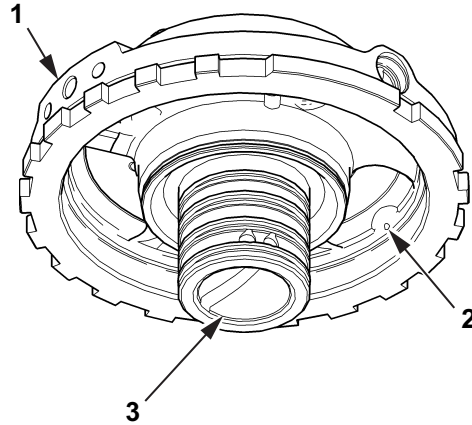


Figure 7. Center Support Bushing Inspection.

END OF TASK

ASSEMBLY**CAUTION**

All transmission parts must be soaked in with clean Dexron® VI transmission fluid for 15 minutes before assembly. Foreign material will cause transmission damage.

NOTE

It may be necessary to use a 0.015 in. (0.381 mm) feeler gauge to start outer and inner piston seals in center support.

1. Install preformed packing (Figure 8, Items 2 and 3) on clutch piston (Figure 8, Item 1).
2. Using seal protector (Figure 8), install clutch piston (Figure 8, Item 1) in center support (Figure 8, Item 4) indexing spring pockets in clutch piston (Figure 8, Item 1) with cored areas in center support (Figure 8, Item 4).

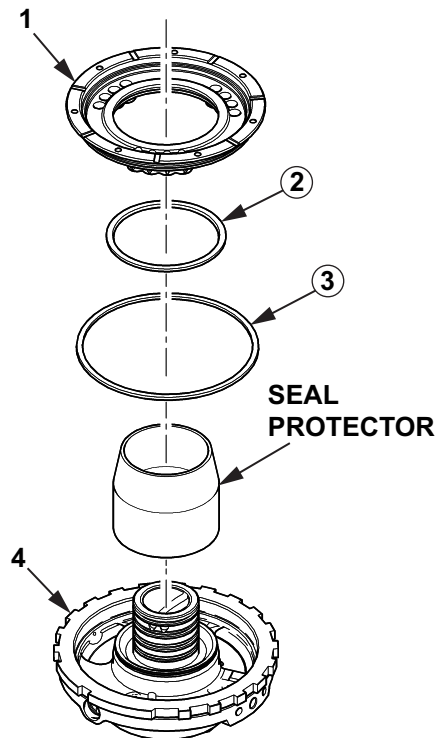


Figure 8. Center Support Piston Installation.

ASSEMBLY - CONTINUED

3. Place release springs (Figure 9, Item 3) and spring retainer (Figure 9, Item 2) on center support (Figure 9, Item 4).
4. Using adapter (Figure 9) and clutch spring compressor (Figure 9), compress springs (Figure 9, Item 3) and retainer (Figure 3, Item 2) on center support (Figure 9, Item 4) and use lock ring pliers (Figure 9) to install retaining ring (Figure 9, Item 1).

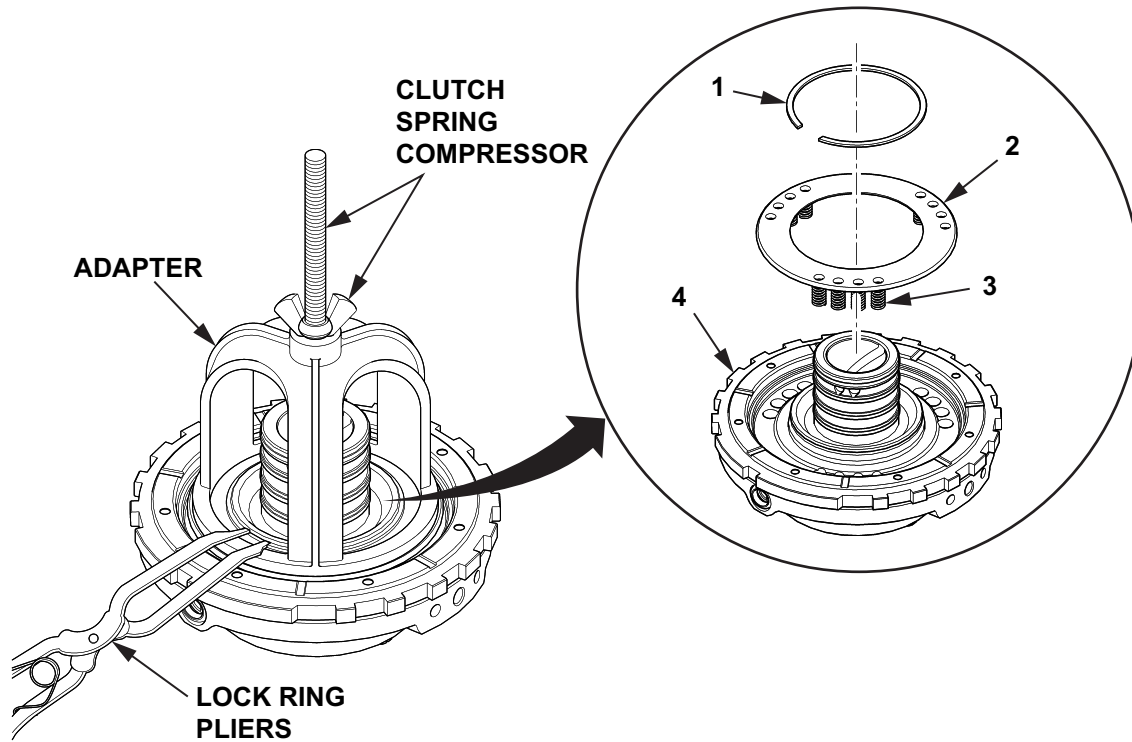


Figure 9. Center Support Spring Assembly.

ASSEMBLY - CONTINUED

WARNING

- Air pressure must not exceed 15 psi (103 kPa) when air checking intermediate clutch piston operation. Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.
- Use compressed air only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.). Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.

NOTE

Clutch piston must move up and down freely when air pressure is applied.

5. Apply compressed air through center support bolt hole (Figure 10, Item 4) to check operation of clutch piston (Figure 10, Item 3).
6. Coat four packing retainers (Figure 10, Item 1) with petrolatum and install on oil delivery sleeve (Figure 10, Item 2).

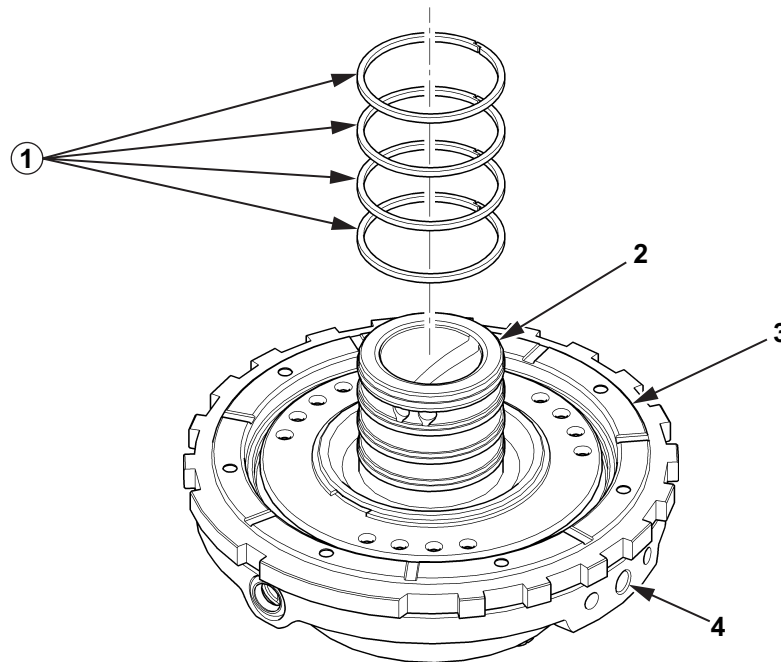


Figure 10. Center Support Packing Retainer Installation.

ASSEMBLY - CONTINUED

7. Install oil cooler pipe fitting seal (Figure 11, Item 2) in center support (Figure 11, Item 1).

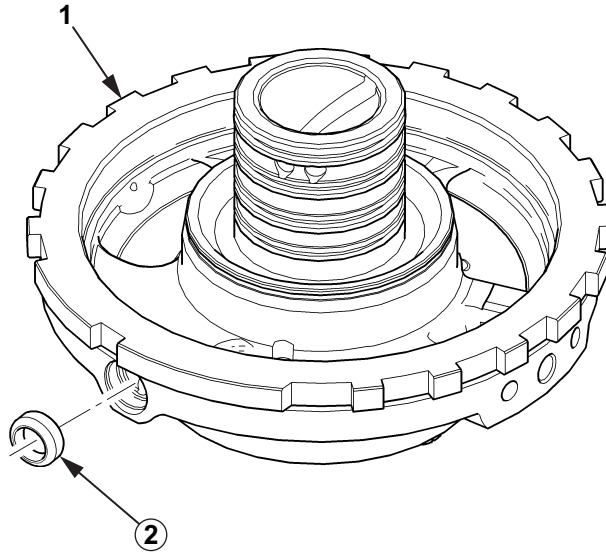


Figure 11. Oil Cooler Pipe Fitting Seal.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
DIRECT CLUTCH PISTON MOVEMENT MEASUREMENT**

INITIAL SETUP:**Tools and Special Tools**

Dial indicator (WP 0048, Item 8)
General mechanic's tool kit: automotive
(WP 0048, Item 13)

Materials/Parts

Dexron® VI (WP 0047, Item 5)

DIRECT CLUTCH PISTON MOVEMENT MEASUREMENT

1. Set direct clutch assembly (Figure 1, Item 1) on center support (Figure 1, Item 2).
2. Set dial indicator (Figure 1) to seat on direct clutch assembly (Figure 1, Item 1).

WARNING

- Air pressure must not exceed 70 psi (483 kPa) when air-checking direct/forward clutch piston operation. Failure to comply may result in injury to personnel and/or damage to equipment. Seek medical attention in the event of an injury.
- Use compressed air only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.) Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.

NOTE

Air in reverse passage will vent out normally.

3. Apply 70 psi (483 kPa) of air pressure to direct clutch fluid passage (Figure 1, Item 4) in center support (Figure 1, Item 2) only. Do not apply air pressure to reverse passage (Figure 1, Item 3); air will vent out normally.

NOTE

Piston should move to compress clutch plates. Travel should be 0.121–0.186 in. (3.07–4.72 mm).

4. If correct measurement is read, remove direct clutch assembly (Figure 1, Item 1) from center support (Figure 1, Item 2).
5. If incorrect measurement is read, check clutch plates (Figure 1, Item 5) for proper installation.

NOTE

Disassemble center support and place aside for transmission assembly.

6. Unload direct clutch assembly (Figure 1, Item 1).

DIRECT CLUTCH PISTON MOVEMENT MEASUREMENT - CONTINUED

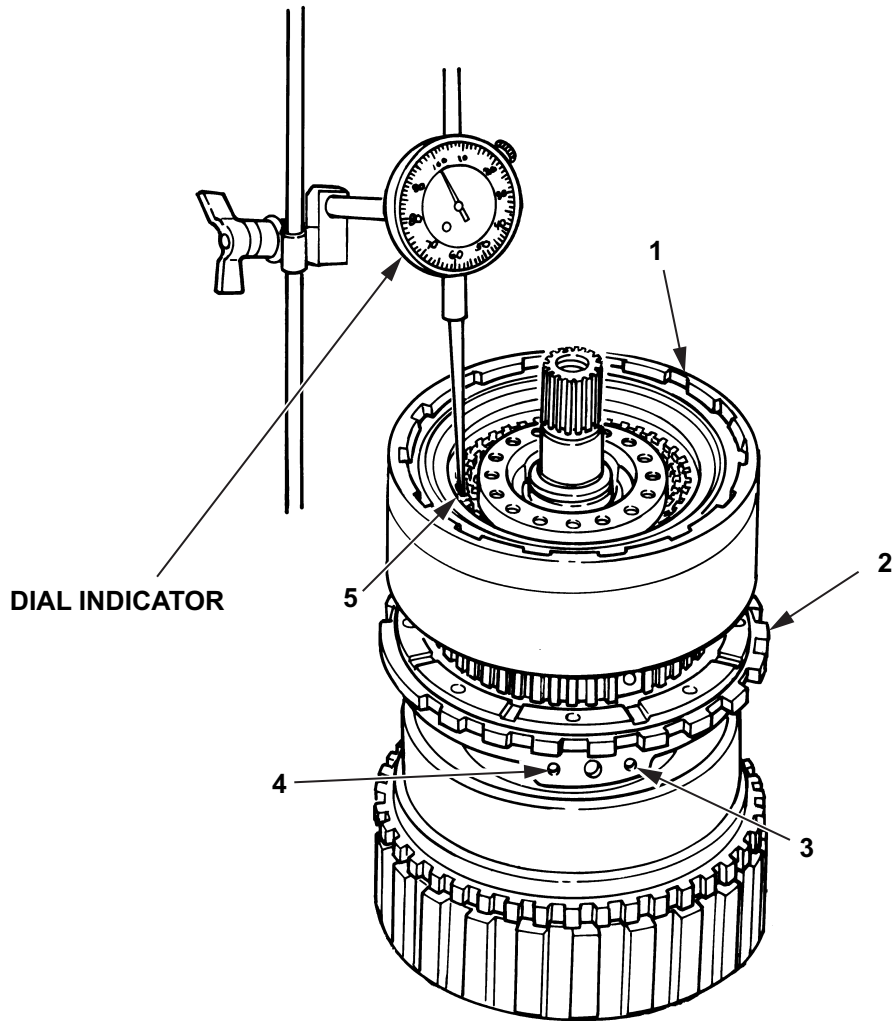


Figure 1. Direct Clutch Measurement.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TRANSMISSION ASSEMBLY**

INITIAL SETUP:**Tools and Special Tools**

Adapter, holding tool (WP 0048, Item 3)
 Base, transmission holding fixture
 (WP 0048, Item 4)
 Clutch alignment tool (WP 0048, Item 5)
 Clutch assembly remover/installer
 (WP 0048, Item 6)
 Dial indicator (WP 0048, Item 8)
 Direct clutch assembly, remover/installer
 (WP 0048, Item 9)
 Fixture, transmission holding (WP 0048, Item 11)
 Gauge pin, trans band apply (WP 0048, Item 12)
 General mechanic's tool kit: automotive
 (WP 0048, Item 13)
 Guide Pins (WP 0027, Item 1)
 Installer/remover, gear unit (WP 0048, Item 18)
 Remover/installer, selector shaft seal
 (WP 0048, Item 22)
 Remover/installer, oil pump (WP 0048, Item 23)
 Slide hammer, mechanical puller
 (WP 0048, Item 26)
 Standard automotive tool set (WP 0048, Item 27)
 Tool, trans band pin (WP 0048, Item 29)

Materials/Parts

Antiseize compound (WP 0047, Item 1)
 Dexron® VI (WP 0047, Item 5)
 Petrolatum (WP 0047, Item 8)
 Sealing compound (WP 0047, Item 10)
 Torque converter (WP 0049, Item 1)
 Bolt, machine (WP 0049, Item 3)
 Gasket, oil pan (WP 0049, Item 4)
 Brake band and lining, rear (WP 0049, Item 5)
 Seal, speedometer, transmission harness
 (WP 0049, Item 7)
 Bolt, machine (WP 0049, Item 8)
 * Parts kit, hydraulic transmission pan
 (WP 0049, Item 9)
 Parts kit, mechanical (WP 0049, Item 10)

References

WP 0006
 WP 0010
 WP 0011
 WP 0014
 WP 0031

NOTE

* Drain plug oil pan kit only required if drain plug not present on transmission.

PARKING LOCK PAWL AND ACTUATOR ASSEMBLY INSTALLATION**CAUTION**

All transmission parts must be soaked in clean Dexron® VI transmission fluid for 15 minutes before assembly. Failure to comply may result in damage to transmission.

NOTE

- During assembly operations, it is important to closely inspect each unit to ensure nothing has been overlooked during inspection and repair.
- Plugs should be checked for tightness, parts kept clean, openings covered, and machined surfaces protected.
- Lubricant should be kept in covered containers after use.

1. Install transmission case (Figure 1, Item 9) into holding fixture (WP 0006).

NOTE

If parking pawl assembly was not removed perform Step 6 only.

2. Install pin (Figure 1, Item 12) and pawl (Figure 1, Item 14) in transmission case (Figure 1, Item 9) and secure with retainer (Figure 1, Item 13).
3. Install pipe plug (Figure 1, Item 11) in transmission case (Figure 1, Item 9).
4. Install return spring (Figure 1, Item 15) with square hook end under pawl (Figure 1, Item 14) and round end on stud (Figure 1, Item 10) in transmission case (Figure 1, Item 9).
5. Position connecting link (Figure 1, Item 3) in detent lever (Figure 1, Item 5) over pawl (Figure 1, Item 14) in transmission case (Figure 1, Item 9).
6. Using selector shaft seal remover/installer, install manual shaft seal (Figure 1, Item 8) in transmission case (Figure 1, Item 9).
7. Coat manual shaft (Figure 1, Item 7) with transmission fluid, and install shaft (Figure 1, Item 7) on transmission case (Figure 1, Item 9) through seal (Figure 1, Item 8) and detent lever (Figure 1, Item 5).
8. Secure manual shaft (Figure 1, Item 7) to detent lever (Figure 1, Item 5) with nut (Figure 1, Item 4).
9. Adjust position of manual shaft (Figure 1, Item 7) in transmission case (Figure 1, Item 9) and secure manual shaft (Figure 1, Item 7) with retaining pin (Figure 1, Item 6). Tighten nut (Figure 1, Item 4) to 18 lb-ft (24 N·m).
10. Install slide bracket (Figure 1, Item 1) over connecting link (Figure 1, Item 3) and transmission case (Figure 1, Item 9) with two bolts (Figure 1, Item 2).

PARKING LOCK PAWL AND ACTUATOR ASSEMBLY INSTALLATION - CONTINUED

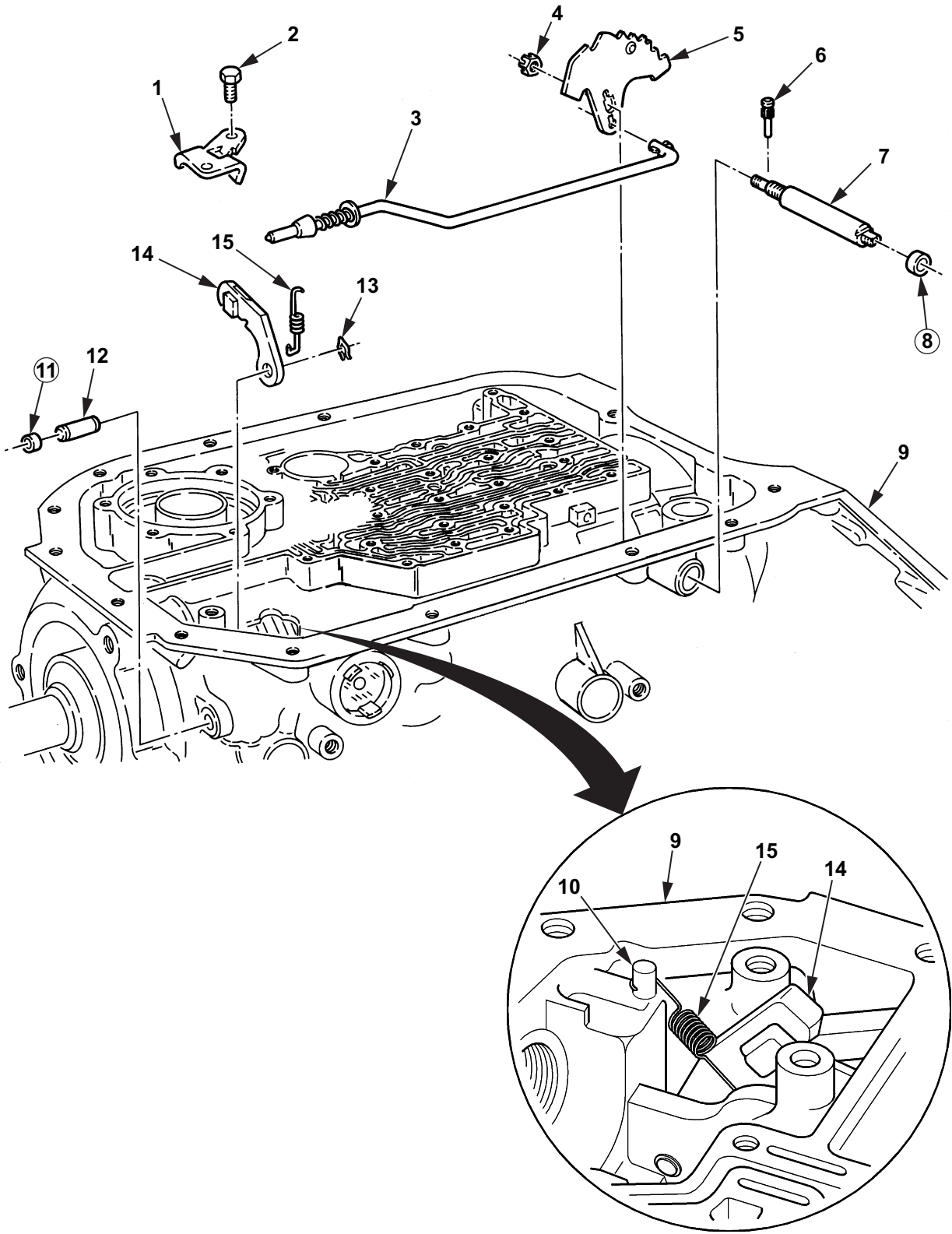


Figure 1. Transmission Parking Lock Pawl.

END OF TASK

CENTER SUPPORT ASSEMBLY INSTALLATION

1. Install thrust washer (Figure 2, Item 2) and center support (Figure 2, Item 1) in gear unit (Figure 2, Item 3).
2. Install gear unit installer/remover (Figure 2) and slide hammer (Figure 2) on center support (Figure 2, Item 1) to hold assembly together.

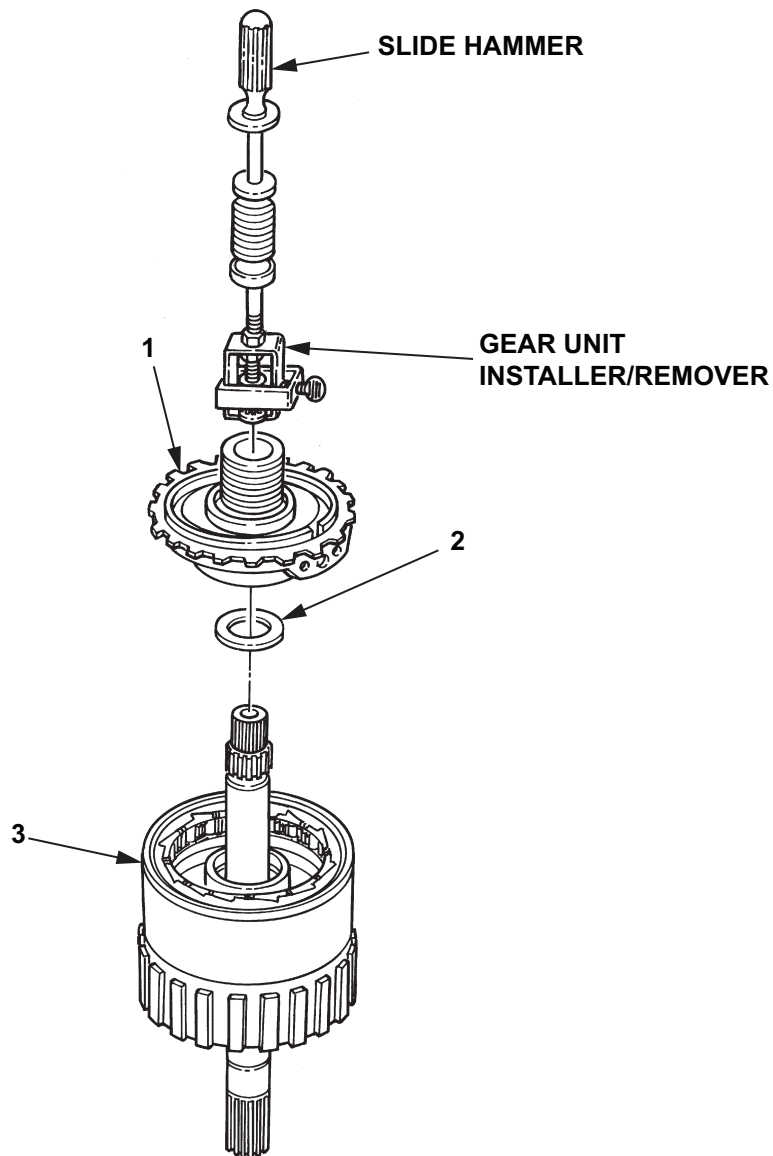


Figure 2. Center Support Assembly.

END OF TASK

GEAR UNIT ASSEMBLY INSTALLATION

1. Install selective thrust washer (Figure 3, Item 2) in transmission case (Figure 3, Item 3) with smooth side of selective thrust washer (Figure 3, Item 2) facing up.
2. Position rear band (Figure 3, Item 1) on transmission case (Figure 3, Item 3) with flat end in notch and tab aligned with servo pin hole.

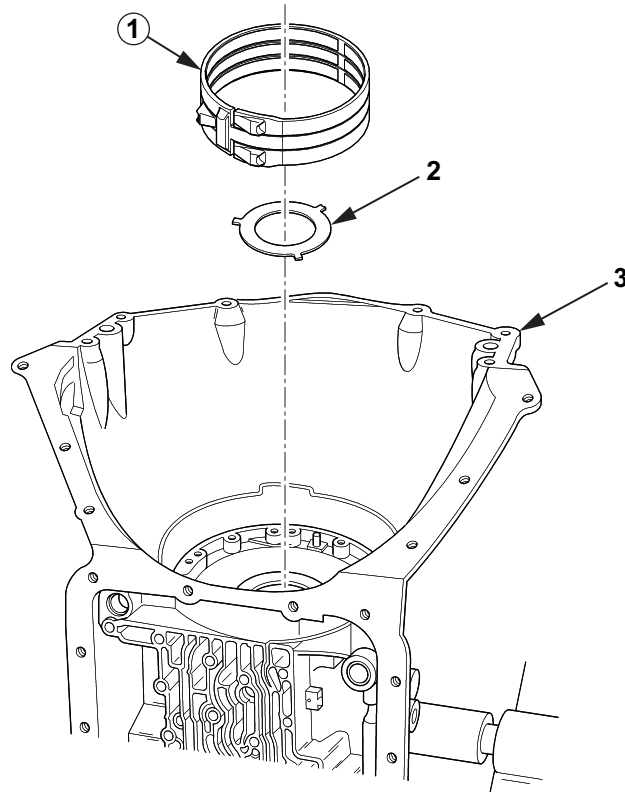


Figure 3. Rear Band Installation.

GEAR UNIT ASSEMBLY INSTALLATION - CONTINUED

NOTE

Do not confuse center support spacer (0.040-in. (1.016-mm)) thick and both sides flat) with center support retaining ring (beveled on one side) or intermediate clutch backing plate retaining ring (0.093-in. (2.362-mm)) thick and both sides flat).

3. Install center support spacer (Figure 4, Item 3) on third retaining ring groove (Figure 4, Item 4) in transmission case (Figure 4, Item 5) and position spacer gap at 9 o'clock position.
4. Coat thrust washer (Figure 4, Item 7) with petrolatum and install over output shaft (Figure 4, Item 6) onto gear unit (Figure 4, Item 8) ensuring four tabs align with holes on gear unit (Figure 4, Item 8).
5. Align bolt hole (Figure 4, Item 2) in center support (Figure 4, Item 9) with bolt hole (Figure 4, Item 2) in transmission case (Figure 4, Item 5).
6. Lower gear unit (Figure 4, Item 8) into transmission case (Figure 4, Item 5). Remove gear unit installer/remover (Figure 4).

NOTE

Beveled side of retaining ring must be in an upward position, and retaining ring gap must be at 9 o'clock position.

7. Install center support retaining ring (Figure 4, Item 1) against center support (Figure 4, Item 9) in second retaining ring groove.

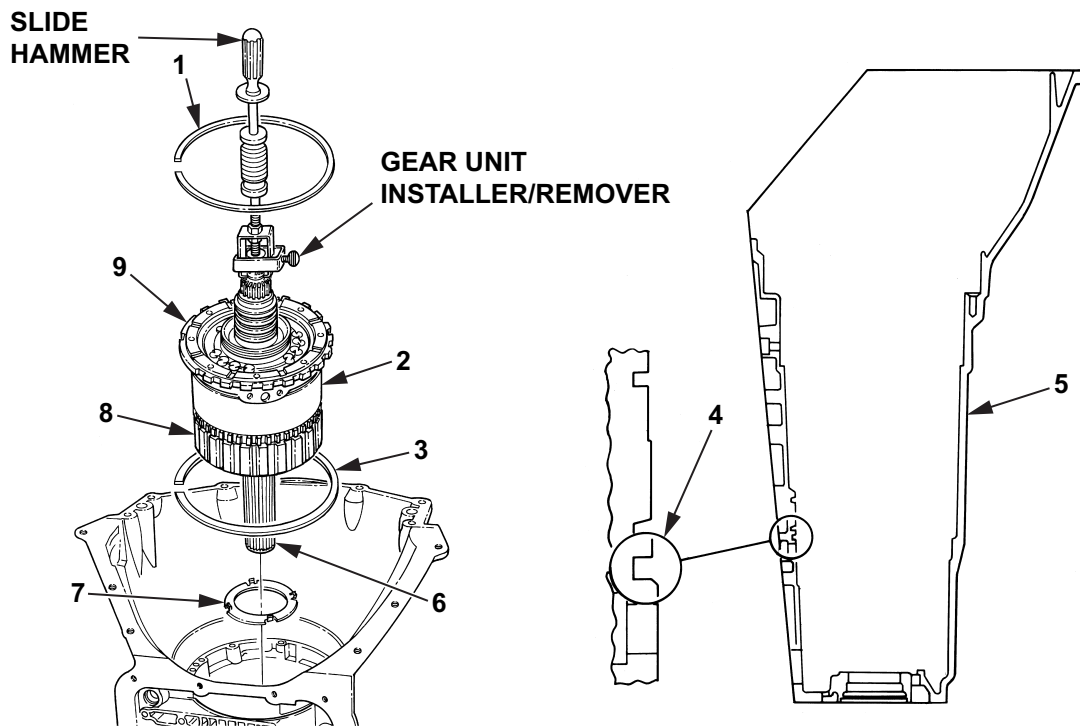


Figure 4. Center Support Installation.

END OF TASK

REAR UNIT END PLAY CHECK

1. Rotate transmission case (Figure 5, Item 1) horizontal, and install dial indicator (Figure 5) on transmission case (Figure 5, Item 1) with probe against end of output shaft (Figure 5, Item 2).
2. Push output shaft (Figure 5, Item 2) into transmission case (Figure 5, Item 1) and set dial indicator to “zero”.
3. Pull output shaft (Figure 5, Item 2) out and read movement from dial indicator. Repeat twice to check value. Movement should be 0.005–0.025 in. (0.127–0.635 mm).

NOTE

The selective washer controlling end play is the steel washer having three lugs and located between the rear thrust washer and the rear face of the transmission case.

4. If end play is not within specifications, remove selective washer, and install a selective washer of proper thickness. Refer to Table 1 for washer selection.

Table 1. Rear Selective Washer Thickness.

THICKNESS	IDENTIFICATION NOTCHES	NUMERAL
0.074–0.078 in. (1.88–1.98 mm)	none	1
0.0852–0.086 in (2.08–2.18 mm)	1 tab side	2
0.090–0.094 in. (2.29–2.39 mm)	2 tabs side	3
0.098–0.102 in. (2.48–2.59 mm)	1 tab outer diameter	4
0.106–0.110 in. (2.69–2.79 mm)	2 tabs outer diameter	5
0.114–0.118 in. (2.89–2.99 mm)	3 tabs outer diameter	6

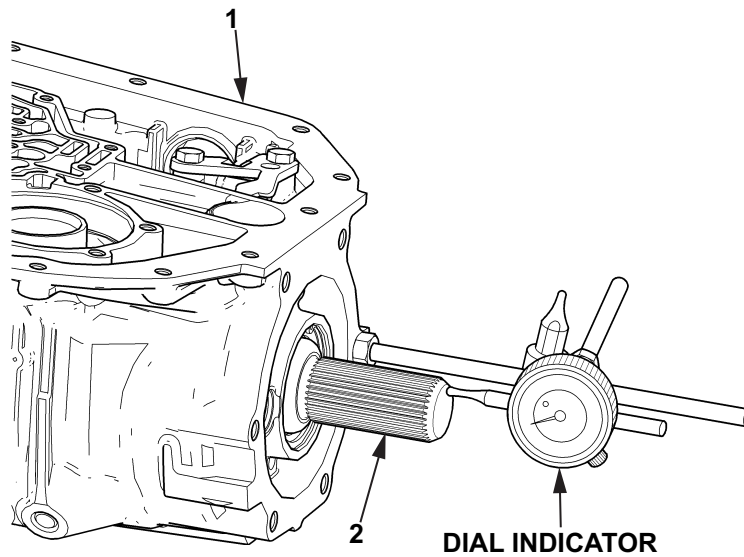


Figure 5. Transmission End Play Check.

REAR UNIT END PLAY CHECK - CONTINUED**CAUTION**

Do not overtighten bolt. Failure to comply may result in transmission malfunction.

5. Install bolt (Figure 6, Item 1) on transmission case (Figure 6, Item 2). Tighten bolt (Figure 6, Item 1) to 32 lb-ft (43 N·m).

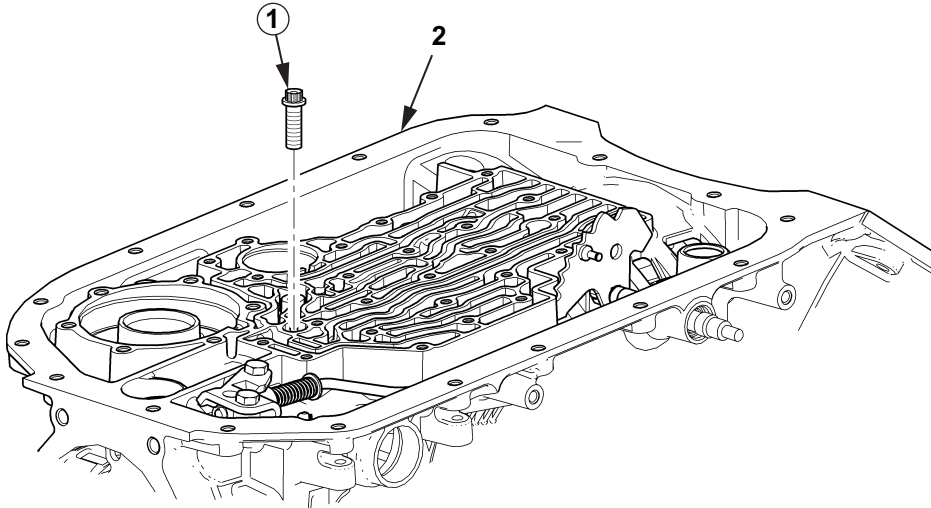


Figure 6. Center Support Bolt Installation.

REAR UNIT END PLAY CHECK - CONTINUED

NOTE

Early 2008 and older transmissions have steel oil cooler adapters. Late 2008 and newer transmissions have aluminum oil cooler adapters. Steel and aluminum oil cooler adapters have different thread sizes and are not interchangeable. Additionally, the front oil cooler hole is machined to accept an O-ring if aluminum adapters are to be used.

6. Inspect front oil cooler hole (Figure 7) to determine oil cooler adapter type.

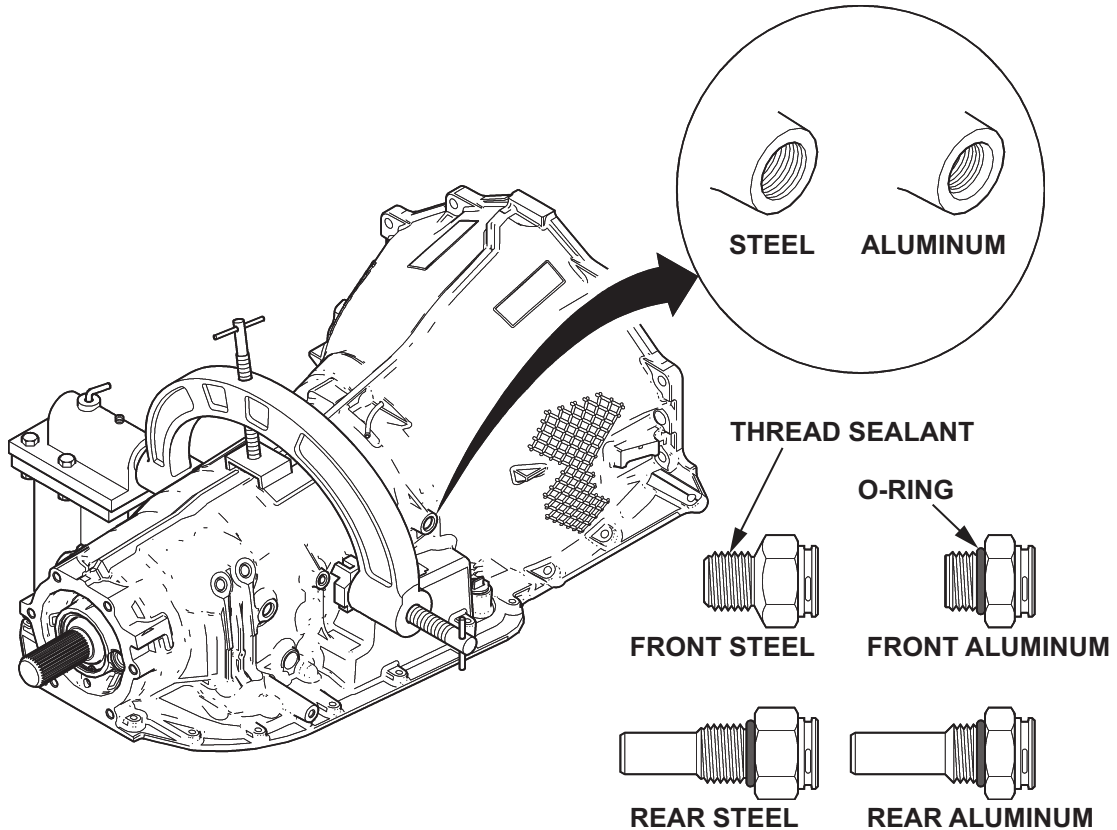


Figure 7. Oil Cooler Adapter Identification.

REAR UNIT END PLAY CHECK - CONTINUED

NOTE

Perform Steps 7 and 8 only if steel adapters are used.

7. Apply thread sealant to front oil cooler adapter (Figure 8, Item 3).
8. Install O-ring (Figure 8, Item 2) on rear oil cooler adapter (Figure 8, Item 4).

NOTE

Perform Step 9 only if aluminum adapters are used.

9. Install O-rings (Figure 8, Items 2) on oil cooler adapters (Figure 8, Items 3 and 4).
10. Install rear oil cooler adapter (Figure 8, Item 4) into transmission case (Figure 8, Item 1). Tighten oil cooler adapter (Figure 8, Item 4) to 26 lb-ft (35 N·m).
11. Install front oil cooler adapter (Figure 8, Item 3) into transmission case (Figure 8, Item 1). Tighten oil cooler adapter (Figure 8, Item 3) to 26 lb-ft (35 N·m).

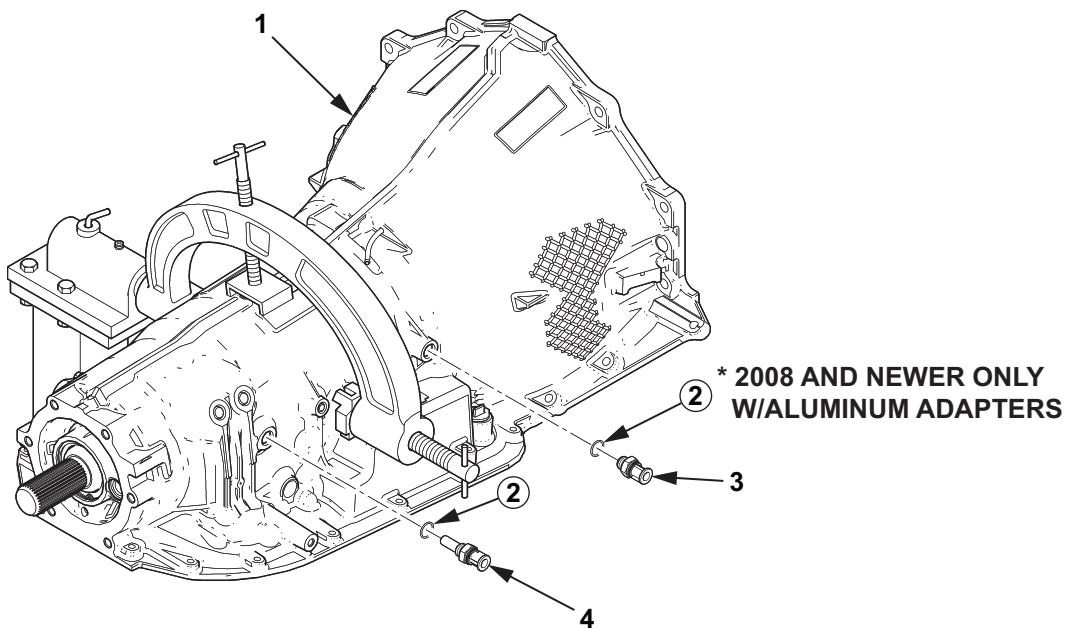


Figure 8. Oil Cooler Adapter Installation.

END OF TASK

INTERMEDIATE CLUTCH ASSEMBLY INSTALLATION

NOTE

Soak all clutch plates in clean Dexron® VI transmission fluid for at least 15 minutes before assembly.

1. Rotate transmission (Figure 9, Item 4) to bell housing-up vertical position and lock in place.
2. Install wave plate (Figure 9, Item 5), four thin drive plate rings (Figure 9, Item 3), clutch plate assemblies (Figure 9, Item 6), and thick drive plate ring (Figure 9, Item 2) on transmission case (Figure 9, Item 4) starting with clutch disc (Figure 9, Item 3), then alternating plate assemblies (Figure 9, Item 6) with clutch disc (Figure 9, Item 3), and ending with thick drive plate ring (Figure 9, Item 2).
3. Secure thick drive plate (Figure 9, Item 2) to transmission case (Figure 9, Item 4) with retaining ring (Figure 9, Item 1). Position retaining ring (Figure 9, Item 1) gap at 9 o'clock position.
4. Measure gap between retaining ring (Figure 9, Item 1) and thick drive plate (Figure 9, Item 2). Gap should be 0.040–0.107 in. (1.02–2.72 mm).

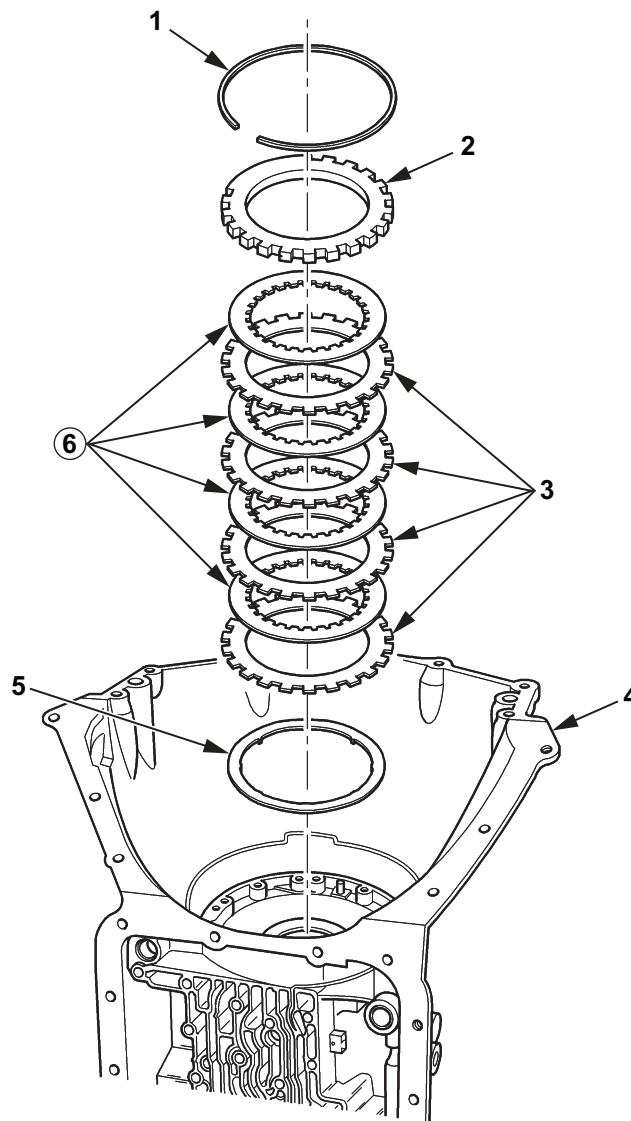


Figure 9. Intermediate Clutch Assembly.

END OF TASK

DIRECT CLUTCH ASSEMBLY INSTALLATION**NOTE**

Use a rocking/twisting method to install assembly.

1. Install front band (Figure 10, Item 2) on transmission case (Figure 10, Item 3). Ensure pin socket on front band (Figure 10, Item 2) is over servo pin hole and tab end can move freely.
2. Using clutch alignment tool (Figure 10), align intermediate clutch plates. Do not remove clutch alignment tool (Figure 10).
3. Apply air to intermediate clutch plates through hole in center support bolt (Figure 10, Item 4). Remove clutch alignment tool (Figure 10) and maintain air pressure.
4. Using direct clutch assembly remover/installer (Figure 10), install direct clutch assembly (Figure 10, Item 1) into transmission case (Figure 10, Item 3) and remove air pressure.

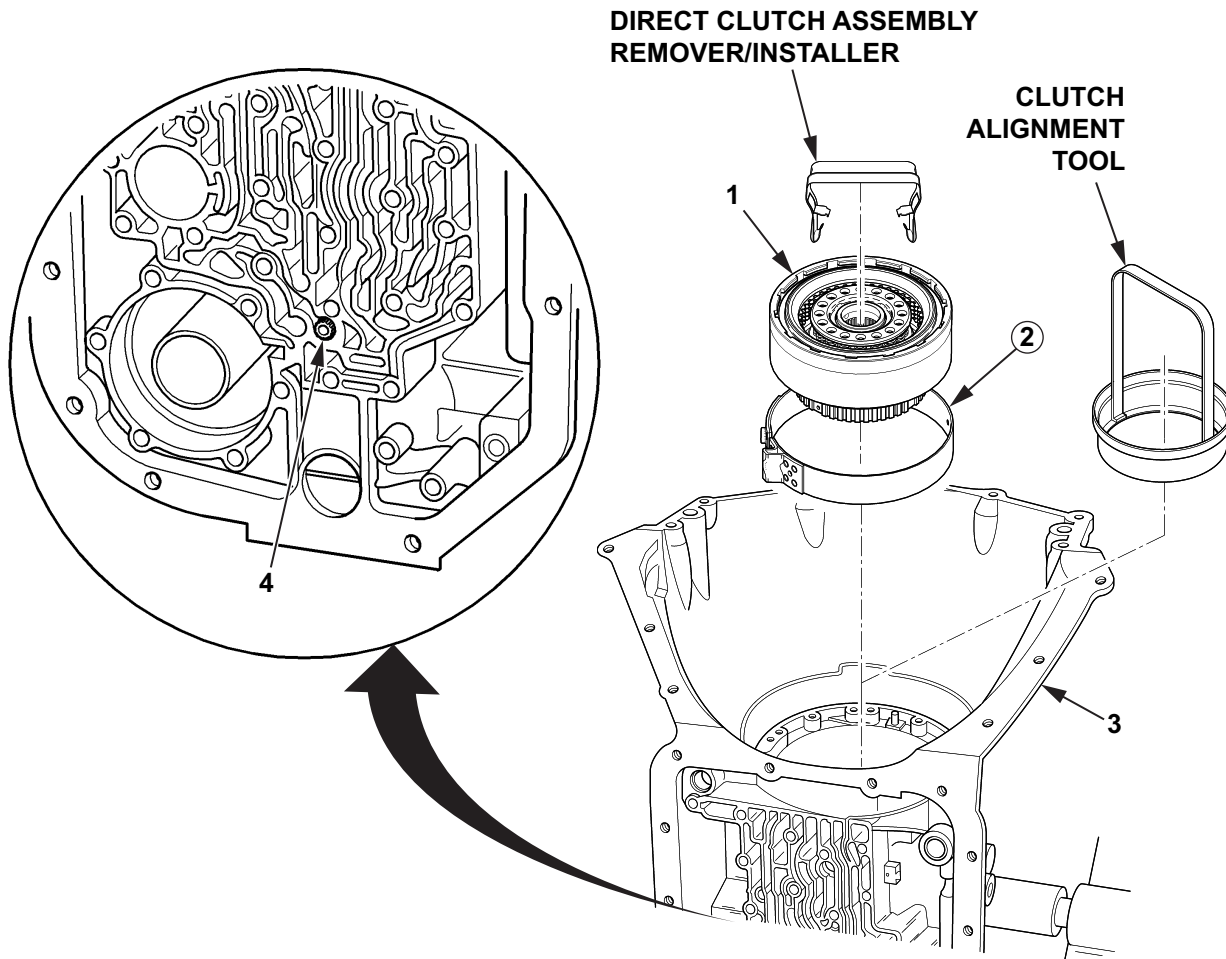


Figure 10. Direct Clutch Assembly.

END OF TASK

FORWARD CLUTCH ASSEMBLY

1. Install forward clutch assembly (Figure 11, Item 2) on direct clutch (not shown).
2. Ensure that forward clutch assembly (Figure 11, Item 2) is fully seated and top of speed sensor ring (Figure 11, Item 4) is 3.85–3.89 in. (98–99 mm) below oil pump gasket surface (Figure 11, Item 3).
3. Install flat bearing assembly (Figure 11, Item 1) on forward clutch assembly (Figure 11, Item 2).

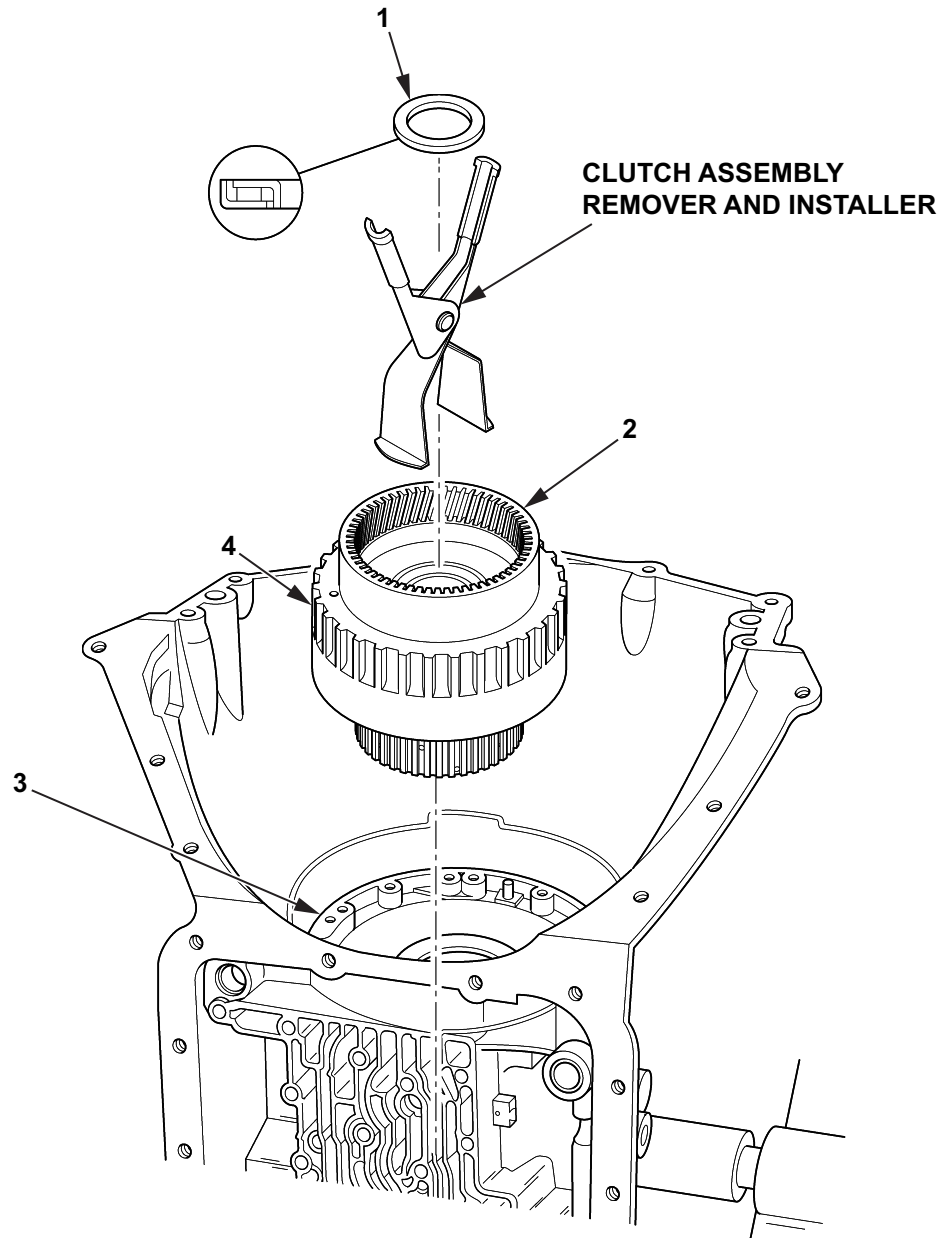


Figure 11. Forward Clutch Installation.

END OF TASK

FOURTH CLUTCH, TURBINE SHAFT, AND OVERDRIVE CARRIER ASSEMBLY

1. Install fourth clutch housing (Figure 12, Item 1) on transmission case (Figure 12, Item 2), aligning bolt hole in housing (Figure 12, Item 1) with bolt hole in transmission case (Figure 12, Item 2).
2. Install bolt (Figure 12, Item 3) on fourth clutch housing (Figure 12, Item 1). Tighten bolt (Figure 12, Item 3) to 13–17 lb-ft (18–23 N·m).

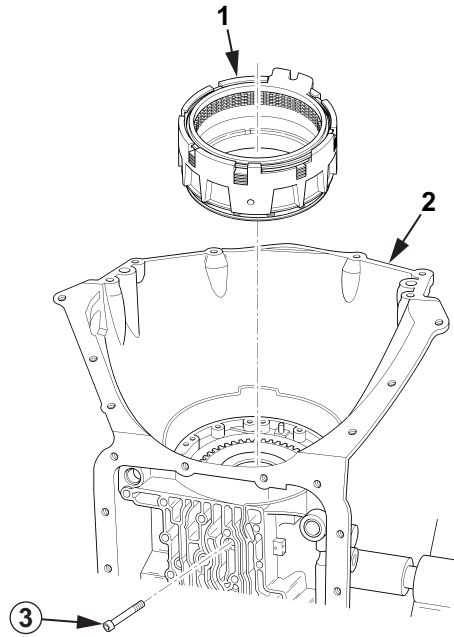


Figure 12. Fourth Clutch Housing.

3. Install turbine shaft (Figure 13, Item 1) through housing and carrier assembly (Figure 13, Item 2) and secure with retaining ring (Figure 13, Item 3).
4. Install turbine shaft (Figure 13, Item 1) and housing and carrier assembly (Figure 13, Item 2) on fourth clutch assembly (Figure 13, Item 4). Mesh pinion gears in teeth of forward clutch assembly (Figure 13, Item 4).

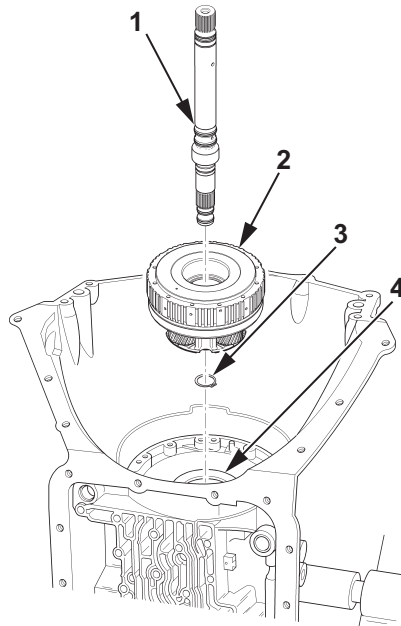


Figure 13. Overrun Clutch Housing Installation.

END OF TASK

PUMP ASSEMBLY INSTALLATION

1. Install two guide pins (Figure 14) at 12 and 5 o'clock positions on transmission case (Figure 14, Item 4).
2. Install oil pump gasket (Figure 14, Item 3) over guide pins (Figure 14), ensuring it matches holes in transmission case (Figure 14, Item 4).
3. Using oil pump remover/installer (Figure 14), align pump assembly (Figure 14, Item 2) over guide pins (Figure 14) in transmission case (Figure 14, Item 4).

CAUTION

If turbine shaft cannot be rotated when pump assembly is being pulled into place, the overrun, fourth, forward, and/or direct clutch housings have not been properly installed. This condition must be corrected before pump assembly is fully installed. Failure to comply may result in damage to transmission.

4. Remove two guide pins (Figure 14) from transmission case (Figure 14, Item 4).
5. Install oil pump (Figure 14, Item 2) in transmission case (Figure 14, Item 4) with seven bolts (Figure 14, Item 1) and O-rings (Figure 14, Item 5). Tighten bolts (Figure 14, Item 1) evenly to 18 lb-ft (24 N·m).

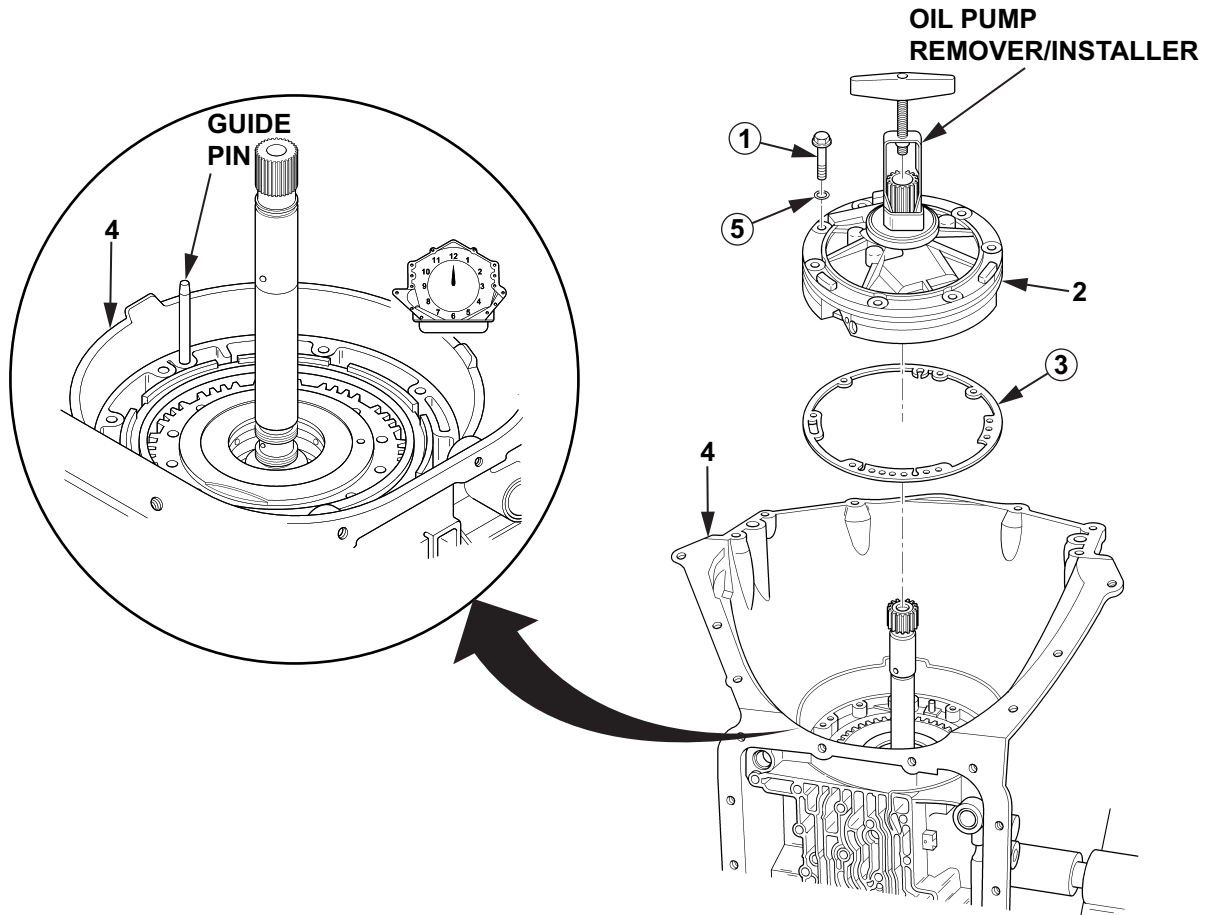


Figure 14. Oil Pump Installation.

END OF TASK

FRONT UNIT END PLAY CHECK

CAUTION

If end play procedures are not closely followed, incorrect shim thickness will be selected, resulting in severe damage to internal transmission components.

1. Install dial indicator (Figure 15) on transmission case (Figure 15, Item 1) to read vertical movement on turbine shaft (Figure 15, Item 3).
2. Press down turbine shaft (Figure 15, Item 3) and using pry bar (Figure 15), pry up on output carrier to eliminate slack between end of turbine shaft (Figure 15, Item 3) and stator shaft (Figure 15, Item 2).
3. Zero dial indicator (Figure 15).
4. Pull turbine shaft (Figure 15, Item 3) up and read dial indicator (Figure 15).

NOTE

- Selective washer controlling end play is located between pump cover and forward clutch housing (WP 0014). If thicker or thinner washer is required to bring end play within specifications, select proper washer from Table 2.
- An oil-soaked washer may discolor.
- It will be necessary to measure washer for actual thickness.

Table 2. Front Selective Washer Thickness.

THICKNESS	COLOR
0.057– 0.061 in. (1.45–1.55 mm)	Blue
0.073–0.077 in. (1.85-1.96 mm)	Red
0.089–0.093 in. (2.26-2.36 mm)	Brown
0.105–0.109 in. (2.67–2.77 mm)	Green
0.121–0.125 in. (3.07–3.18 mm)	Plain

5. Resulting travel or end play should be 0.004–0.022 in. (0.102–0.559 mm). If end play is not within specifications, remove selective washer and install selective washer of proper thickness.

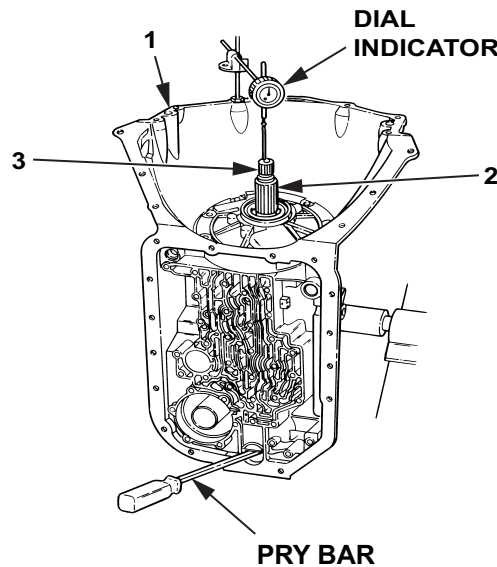


Figure 15. End Play Check.

FRONT UNIT END PLAY CHECK - CONTINUED

6. Install seal (Figure 16, Item 1) on turbine shaft (Figure 16, Item 2).

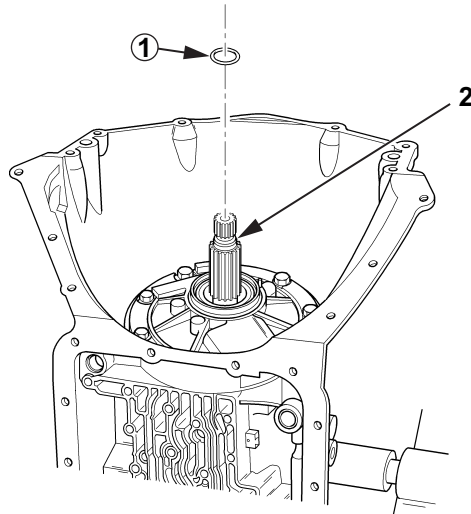


Figure 16. Seal Installation.

END OF TASK

FRONT SERVO INSTALLATION**NOTE**

Ensure spring seats are properly in machined groove transmission case.

Install spring (Figure 17, Item 2) and piston assembly (Figure 17, Item 1) in transmission case (Figure 17, Item 3) ensuring piston assembly (Figure 17, Item 1) is firmly seated on spring (Figure 17, Item 2).

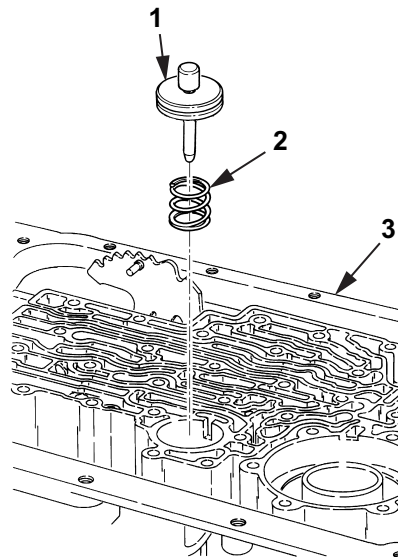


Figure 17. Front Servo Installation.

END OF TASK

BAND APPLY PIN CHECK

1. Place gauge pin (Figure 18) in rear servo bore of transmission case (Figure 18, Item 1) and rotate to side A.
2. Place checking tool (Figure 18) on servo bore with hex nut (Figure 18, Item 3) facing parking pawl side of transmission case (Figure 18, Item 1).
3. Secure checking tool (Figure 18) to transmission case (Figure 18, Item 1) with two servo cover screws (Figure 18, Item 2). Tighten screws (Figure 18, Item 2) 18 lb-ft (24 N·m).
4. Ensure gauge pin (Figure 18) can move freely in checking tool (Figure 18).
5. Apply 25 lb-ft (34 N·m) of torque to hex nut (Figure 18, Item 3).
6. Read end of gauge pin (Figure 18) that is even with checking tool (Figure 18) edge at gauge pin (Figure 18). Record number and letter

NOTE

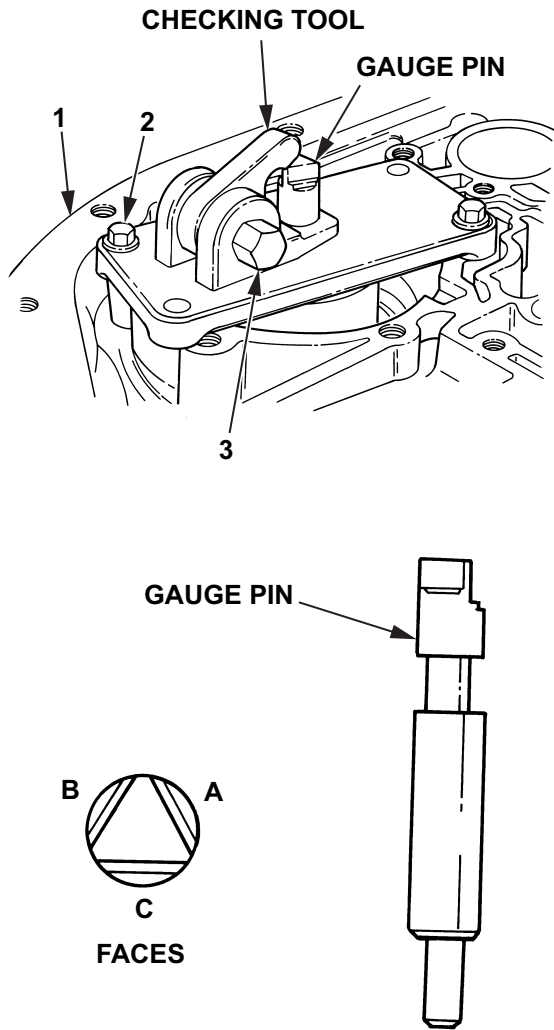
Apply pins are identified by the number of rings around small end of apply pin. If necessary to change apply pin, refer to Front Servo (WP 0010) and Rear Servo (WP 0011).

7. Determine correct apply pin to be used from Table 3.
8. Remove checking tool (Figure 18) and gauge pin (Figure 18) from transmission case (Figure 18, Item 1).

Table 3. Apply Pin Selection.

Side A	If both flats are above gauge surface, use pin length #1. If one flat is above gauge surface, use pin length #2. If both flats are below gauge surface, rotate to side B. (See below).
Side B	If both flats are above gauge surface, use pin length #3. If one flat is above gauge surface, use pin length #4. If both flats are below gauge surface, rotate to side C. (See below).
Side C	If both flats are above gauge surface, use pin length #5. If one flat is above gauge surface, use pin length #6. If both flats are below gauge surface, use pin length #7. (See below).

BAND APPLY PIN CHECK - CONTINUED



	PIN LENGTH	I.D.
7	3.468"-3.474"	
6	3.440"-3.446"	
5	3.412"-3.418"	
4	3.384"-3.390"	
3	3.356"-3.362"	
2	3.328"-3.334"	
1	3.300"-3.306"	

Figure 18. Band Apply Pin.

END OF TASK

REAR SERVO INSTALLATION**NOTE**

Lubricate bore with petrolatum before rear servo installation.

Install spring (Figure 19, Item 5), servo piston (Figure 19, Item 4), rear servo cover gasket (Figure 19, Item 3), and servo cover (Figure 19, Item 2) in bore (Figure 19, Item 6) of transmission case (Figure 19, Item 7) with six bolts (Figure 19, Item 1). Tighten bolts (Figure 19, Item 1) to 18 lb-ft (24 N·m).

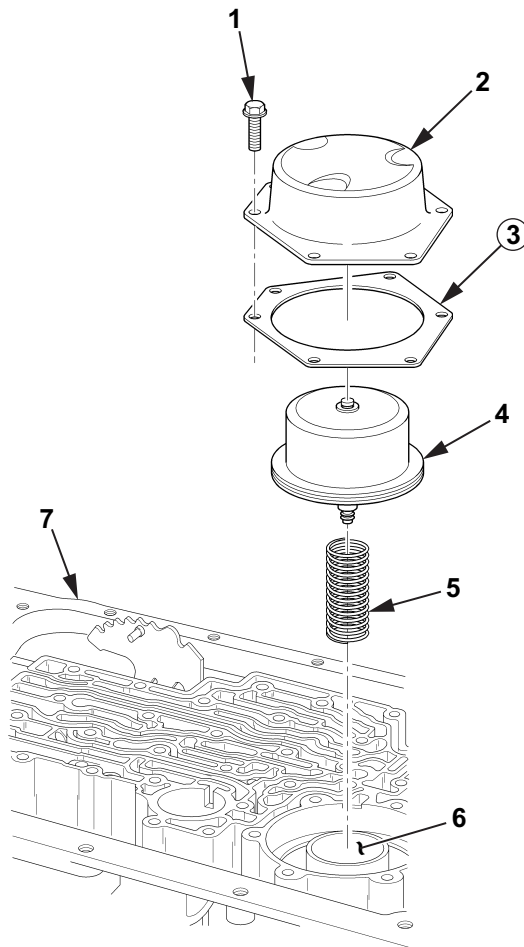


Figure 19. Rear Servo Installation.

END OF TASK

CONTROL VALVE ASSEMBLY INSTALLATION

NOTE

The ninth checkball pocket should not contain a checkball.

1. Install eight checkballs (Figure 20, Items 1) in passages of transmission case (Figure 20, Item 2).

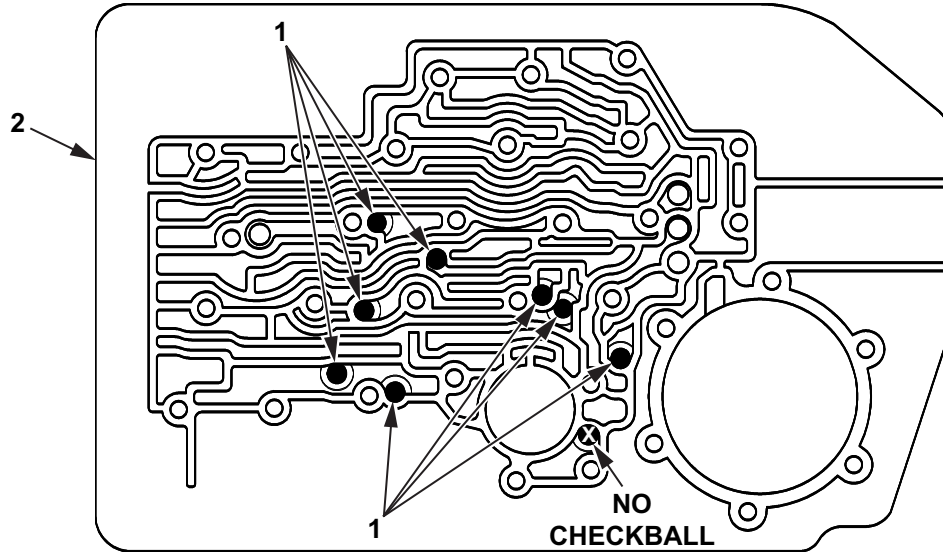


Figure 20. Checkball Location.

2. Install screen (Figure 21, Item 3) in transmission case (Figure 21, Item 4).
3. Position control valve assembly (Figure 21, Item 1) on transmission case (Figure 21, Item 4) and install sixteen bolts (Figure 21, Item 2) or fifteen bolts (Figure 21, Item 2) finger-tight.

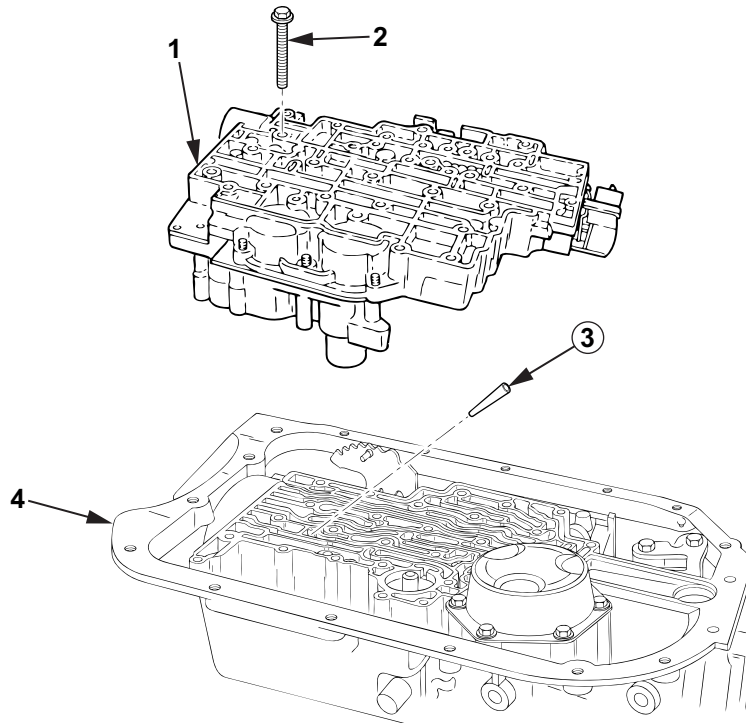


Figure 21. Control Valve Installation.

CONTROL VALVE ASSEMBLY INSTALLATION - CONTINUED

4. Install transmission fluid pressure switch assembly (Figure 22, Item 2) on control valve assembly (Figure 22, Item 5) with six bolts (Figure 22, Item 1) finger-tight.
5. Install spring tension clip (Figure 22, Item 4) on control valve assembly (Figure 22, Item 5) with two bolts (Figure 22, Item 3) finger-tight.

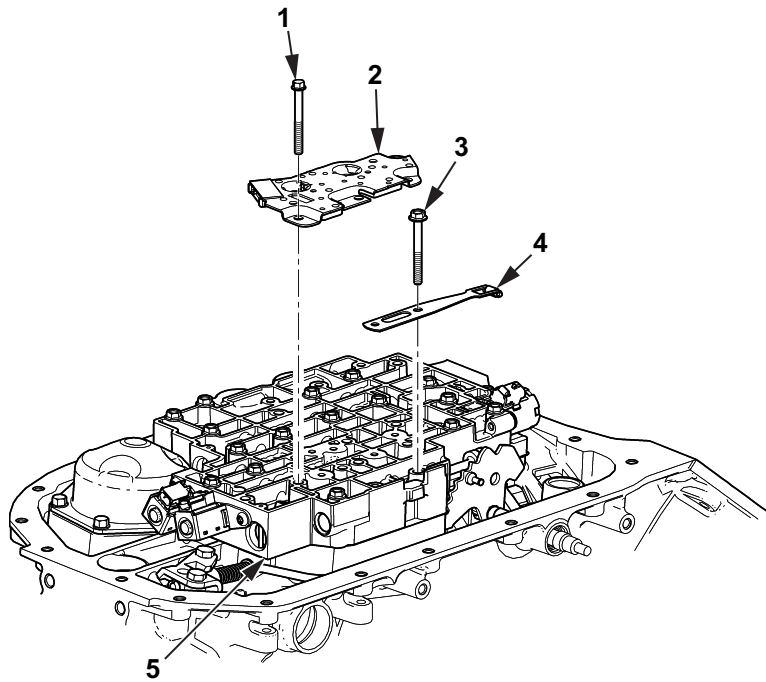


Figure 22. Spring and Roller Installation.

CONTROL VALVE ASSEMBLY INSTALLATION - CONTINUED

6. Install tube (Figure 23, Item 5), clip (Figure 23, Item 4), and bolt (Figure 23, Item 3) in control valve assembly (Figure 23, Item 6).

NOTE

Wiring harness and solenoids must have matching connector types.

7. Install seal (Figure 23, Item 7) on wiring harness (Figure 23, Item 10).
8. Position wiring harness (Figure 23, Item 10) over control valve assembly (Figure 23, Item 6) with electrical connector (Figure 23, Item 9) going through transmission case (Figure 23, Item 8).
9. Install two or three wiring harness clips (Figure 23, Item 2) and wiring harness (Figure 23, Item 10) on control valve assembly (Figure 23, Item 6) with two or three bolts (Figure 23, Item 1).

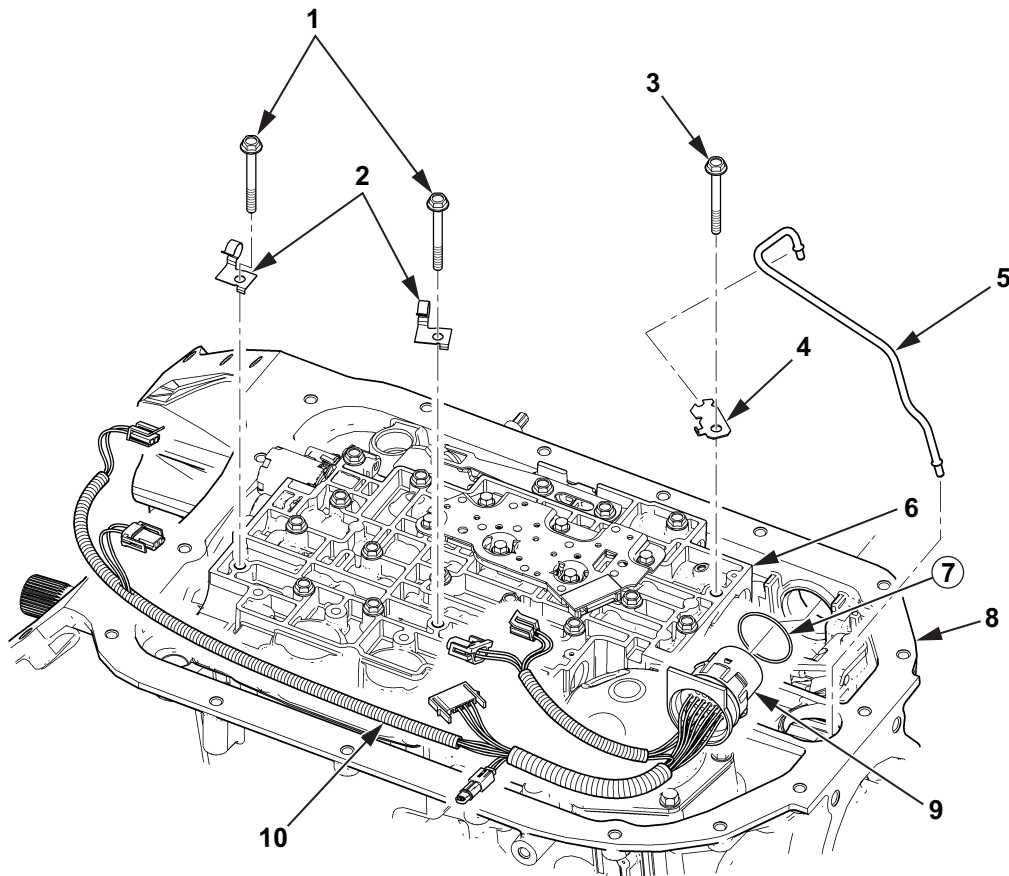


Figure 23. Lube Tube and Wire Harness Installation.

CONTROL VALVE ASSEMBLY INSTALLATION - CONTINUED

10. Connect wiring harness (Figure 24, Item 6) to pressure control solenoid (Figure 24, Item 8), Torque Converter Clutch (TCC) solenoid (Figure 23, Item 7), 2-3 shift solenoids (Figure 24, Item 5), 1-2 shift solenoid(s) (Figure 24, Item 4), and transmission fluid pressure switch assembly (Figure 24, Item 2).
11. Connect wiring harness electrical connector (Figure 24, Item 3) to transmission (Figure 24, Item 1).

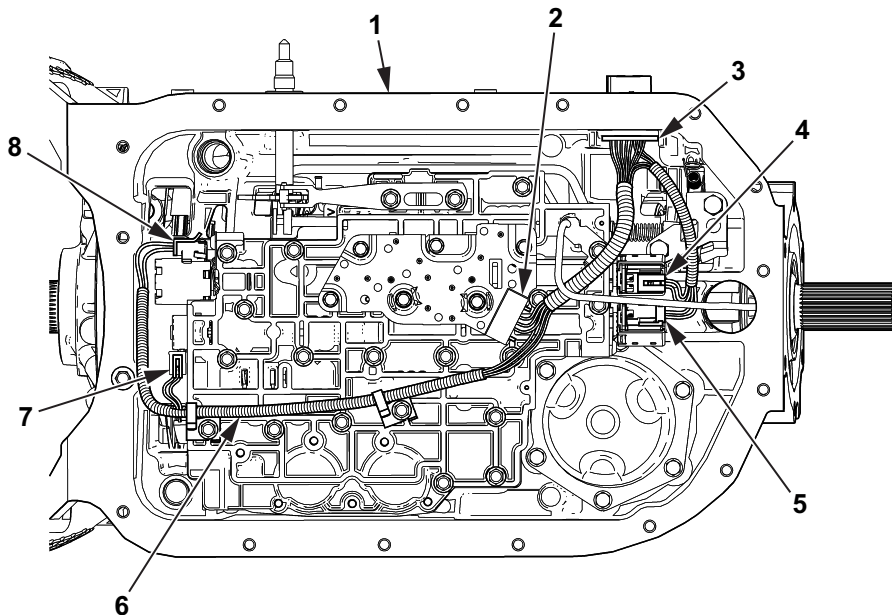


Figure 24. Wire Harness Installation.

12. Tighten bolts installed in steps 3 through 9 to 97 lb-in (11 N·m) in sequence shown, 1 through 27 (Figure 25).

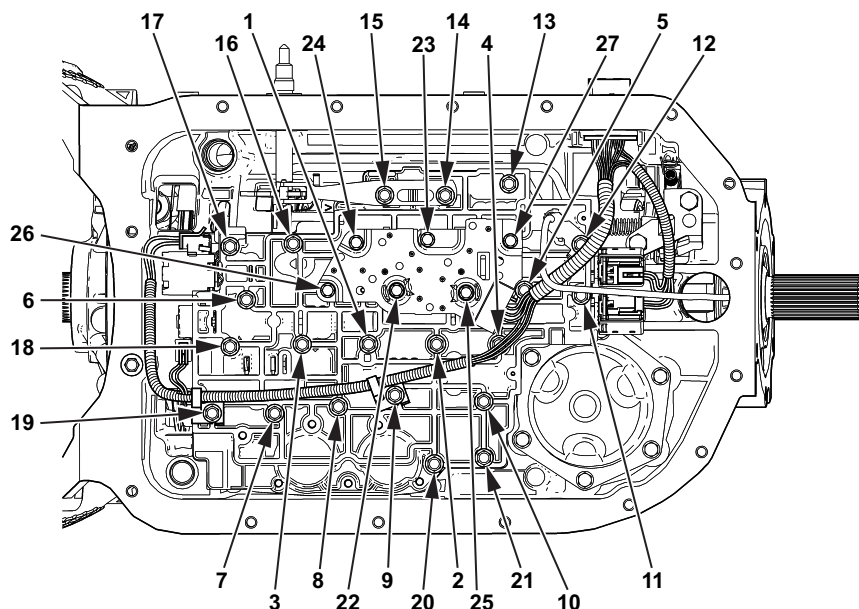


Figure 25. Torque Sequence.

END OF TASK

OIL PAN AND FILTER ASSEMBLY INSTALLATION

1. Install filter (Figure 26, Item 5) and gasket (Figure 26, Item 6) on transmission case (Figure 26, Item 7).
2. Install magnet (Figure 26, Item 8) in oil pan (Figure 26, Item 3).

NOTE

Do not use sealer or adhesive on oil pan gasket, oil pan, or transmission case surface.

3. Install oil pan gasket (Figure 26, Item 4) and oil pan (Figure 26, Item 3) on transmission case (Figure 26, Item 7) with seventeen bolts (Figure 26, Item 1). Tighten bolts (Figure 26, Item 1) to 18 lb-ft (24 N·m).
4. Tighten drain plug (Figure 26, Item 2) to 20 lb-ft (27 N·m).

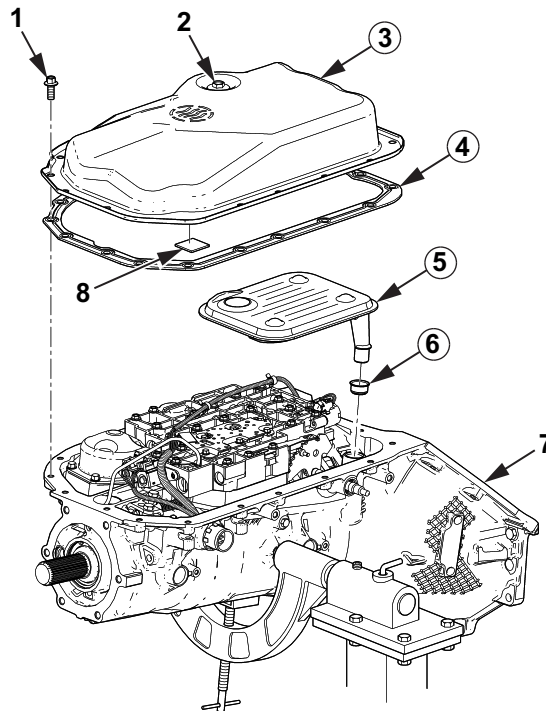


Figure 26. Filter Installation.

END OF TASK

SPEED SENSORS INSTALLATION

Install two O-rings (Figure 27, Item 2) and speed sensors (Figure 27, Item 3) on transmission (Figure 27, Item 1) with two bolts (Figure 27, Item 4).

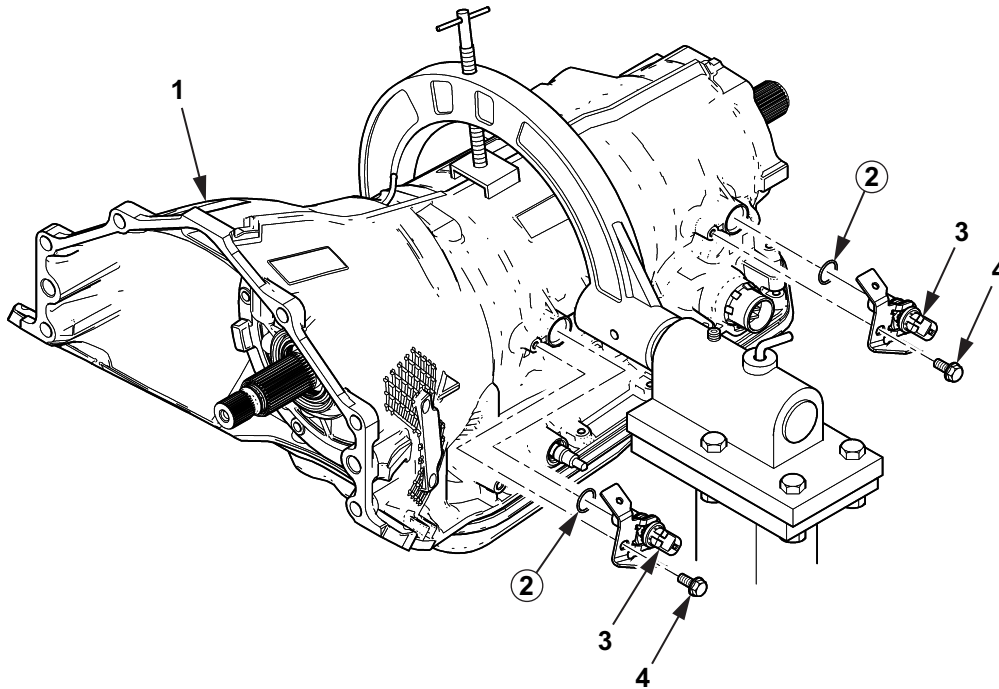


Figure 27. Speed Sensor Installation.

END OF TASK

TORQUE CONVERTER INSTALLATION**WARNING**

Torque converter must be supported by retaining straps at all times to prevent torque converter from falling out. Failure to comply may result in injury to personnel. Seek medical attention in the event of an injury.

NOTE

- 4L85-E transmissions use a different torque converter (Figure 28, Item 3) than 4L80-E. Refer to RPSTL WP 0031 Item 1 for 4L85-E conversion.
- Ensure drive lugs of inner pump rotor are properly engaged with drive slots of torque converter hub.

1. Install torque converter (Figure 28, Item 3) in transmission (Figure 28, Item 2).
2. Apply antiseize compound to three capscrews (Figure 28, Items 1) and install retaining strap (Figure 28, Item 4) on transmission (Figure 28, Item 2) and torque converter (Figure 28, Item 3) with three capscrews (Figure 28, Items 1) and two nuts (Figure 28, Item 5).

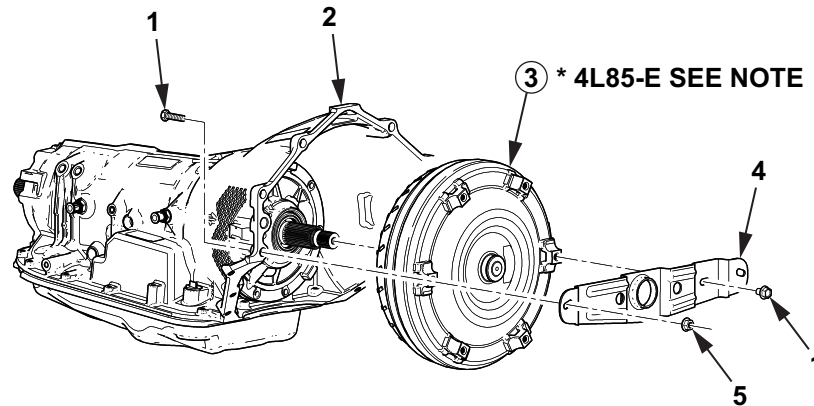


Figure 28. Torque Converter Installation.

END OF TASK

HOLDING FIXTURE REMOVAL

Remove transmission (Figure 29, Item 1) and holding tool adapter (Figure 29) from transmission holding fixture (Figure 29).

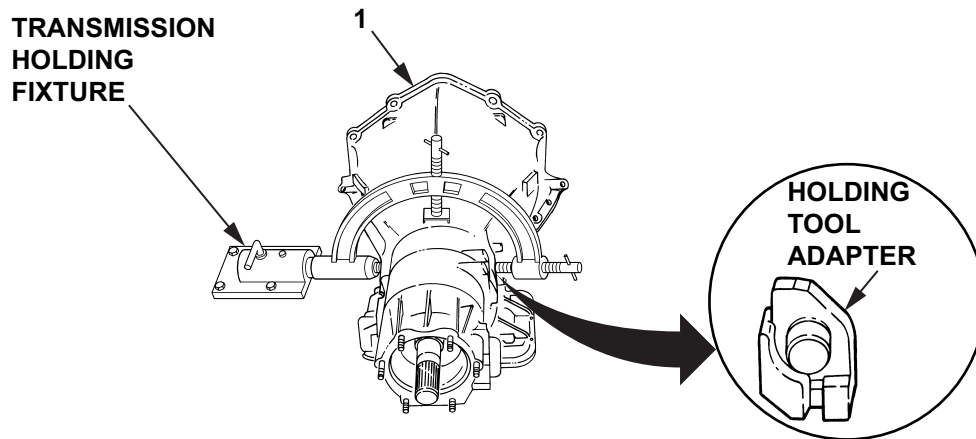


Figure 29. Transmission Holding Fixture.

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TRANSMISSION TESTING AND TEST REPORTS**

INITIAL SETUP:**Tools and Special Tools**

Electronic shifter with dynamometer
(WP 0048, Item 10)

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Materials/Parts

Dexron® VI (WP 0047, Item 5)

Plug, pipe (WP 0049, Item 2)

FREE RUNNING TEST**NOTE**

Transmission test stand must be capable of producing 285 lb-ft (386 N•m) of input torque at 2000 rpms minimum, monitor transmission fluid pressures from 0–350 psi (0–2413 kPa), and contain a 12V DC power supply and device that controls transmission electronic shift functions.

1. Install dipstick tube, dip stick, or equivalent in transmission.
2. Install transmission on test stand per manufacturer's instructions.
3. Fill transmission with 8 qts (7.5 L) of Dexron® VI automatic transmission fluid.
4. Connect electronic shifter to transmission wiring harness plug.
5. Select 4L80-E or 4L85-E transmission test program.
6. Set Electronic Pressure Control (EPC) to 40 percent and Torque Converter Clutch (TCC) control to 100 percent.

CAUTION

Stop test immediately if transmission fluid temperature rises above 245° F (118° C). Failure to comply may result in false test readings or damage to transmission or test equipment.

7. Using test stand and electronic shifter, shift transmission into NEUTRAL and perform free-running, no-load test at 600 rpm for 30 seconds. Check fluid level, fill with fluid as necessary, and inspect transmission for leaks.
8. Using test stand, run transmission at 1500 rpm. Using electronic shifter, shift transmission through all gear ranges.
9. After 30 seconds of run time, stop power from test stand to transmission drive.
10. With transmission in park, check fluid level, fill with fluid as necessary, and inspect transmission for leaks.
11. If leak is present, remove transmission from test stand and repair as necessary.

END OF TASK**STALL TEST****CAUTION**

Stop test immediately if transmission fluid temperature rises above 245° F (118° C). Failure to comply may result in false test readings or damage to transmission or test equipment.

NOTE

Use the Dynamometer temperature gauge to monitor the internal transmission fluid temperature. Incorrect test readings will occur if proper transmission fluid temperature is not maintained at 194°–221° F (90°–105° C).

1. Select menu option to stall test 4L80-E or 4L85-E transmission.
2. Using test stand, run transmission at 900 rpm.

CAUTION

Transmission test time must not exceed 5 minutes. Failure to comply may result in false test readings or damage to transmission or test equipment.

3. Using the electronic control shifter, run transmission in DRIVE with load cell locked until transmission reaches 194°–221° F (90°–105° C). Record results on Table 4. Stall Test, Item 5.

STALL TEST - CONTINUED

4. Check transmission torque on test stand. Minimum torque allowed is 250 lb-ft (339 N•m). Record results on Table 4. Stall Test, Item 6.

END OF TASK**POWER AND LINE PRESSURE TEST****CAUTION**

- Stop test immediately if transmission fluid temperature rises above 245° F (118° C). Failure to comply may result in false test readings or damage to transmission or test equipment.
- Allow transmission speed to drop slowly and transmission to downshift. Failure to comply may result in false test readings or damage to transmission or test equipment.

NOTE

- Transmission fluid temperature must be 194°–221° F (90°–105° C) for testing. Incorrect test readings will occur if proper transmission fluid temperature is not maintained. Gear range must be manually selected using shift lever.
 - Refer to Table 1 for all minimum transmission oil pressures.
1. Using test stand, run transmission at 600 rpm and, using electronic shifter, shift transmission in PARK, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 7.
 2. With transmission running at 600 rpm and using electronic shifter, shift transmission to NEUTRAL, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 8.
 3. With transmission running at 600 rpm and using electronic shifter, shift transmission to DRIVE 1, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 9.
 4. With transmission running at 600 rpm and using electronic shifter, shift transmission to DRIVE 2, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 10.
 5. With transmission running at 600 rpm and using electronic shifter, shift transmission to DRIVE 3, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 11.
 6. With transmission running at 600 rpm and using electronic shifter, shift transmission to OVERDRIVE, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 12.
 7. With transmission running at 600 rpm and using electronic shifter, shift transmission to REVERSE, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 13.
 8. Increase transmission speed to 1500 rpm and using electronic shifter, shift transmission to DRIVE 1, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 14.
 9. With transmission running at 1500 rpm and using electronic shifter, shift transmission to DRIVE 2, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 15.
 10. With transmission running at 1500 rpm and using electronic shifter, shift transmission to DRIVE 3, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 16.
 11. With transmission running at 1500 rpm and using electronic shifter, shift transmission to REVERSE, check transmission oil pressure, and record results on Table 5. Power And Line Pressure Test, Item 17.

POWER AND LINE PRESSURE TEST - CONTINUED

Table 1. Power and Line Pressure Test Specifications.

TRANSMISSION GEAR RANGE	TRANSMISSION SPEED RPM	TRANSMISSION OIL PRESSURE MINIMUM/MAXIMUM PSI (kPa) @ 194°–221° F (90°–105° C)
PARK, NEUTRAL, DRIVE 1, DRIVE 2, DRIVE 3, OVERDRIVE	600	35–171 psi (24.3–1179 kPa)
REVERSE	600	67–324 psi (461.9–2233.9 kPa)
DRIVE 1, DRIVE 2, DRIVE 3, OVERDRIVE	1500	35–171 psi (24.3–1179 kPa)
REVERSE	1500	67–324 psi (461.9–2233.9 kPa)

END OF TASK

PRESSURE CONTROL SOLENOID TEST (WARM)

NOTE

- All solenoids are checked for proper resistance values when transmission is cold and again when transmission is warm. Perform the following test to check solenoid resistance values after transmission has been run. Transmission must be warm and mounted on test bench.
 - Transmission fluid temperature must be 194°–221° F (90°–105° C) for testing. Incorrect test readings will occur if proper transmission fluid temperature is not maintained.
1. Connect electronic shifter to transmission wiring harness plug.
 2. Using electronic shifter, check resistance of 1-2 shift solenoid. Record results on Table 6. Pressure Control Solenoid Test (Warm), Item 18. Refer to Table 2 for solenoid resistance.
 3. Using electronic shifter, check resistance of 2-3 shift solenoid. Record results on Table 6. Pressure Control Solenoid Test (Warm), Item 19. Refer to Table 2 for solenoid resistance.
 4. Using electronic shifter, check resistance of pressure control solenoid. Record results on Table 6. Pressure Control Solenoid Test (Warm), Item 20. Refer to Table 2 for solenoid resistance.
 5. Using electronic shifter, check resistance of TCC solenoid. Record results on Table 6. Pressure Control Solenoid Test (Warm), Item 21. Refer to Table 2 for solenoid resistance.
 6. If any solenoid fails solenoid test, replace solenoid that is defective or inspect and repair wiring harness.

PRESSURE CONTROL SOLENOID TEST (WARM) - CONTINUED

Table 2. Solenoid Resistance Chart (Warm).

COMPONENT	WIRE COLOR	J1 CONNECTOR	RESISTANCE	CKT ²
1-2 Shift Solenoid	RED	E ¹	20–40 Ohms	1149A
	LT. GREEN	A		1222
2-3 Shift Solenoid	RED	E ¹	20–40 Ohms	1149B
	YELLOW	B		1223
Pressure Control Solenoid	PURPLE	C	3.5–7 Ohms	1228
	LT BLUE	D		1229
TCC Solenoid	RED	E ¹	10–20 Ohms	1149C
	BLACK	S		1350
¹ spliced internally to pin E. ² internal harness number.				

END OF TASK

TRANSMISSION TEST REPORTS

1. Inspect transmission for leaks. Record results on Table 7. Final Inspection, Item 22 or Item 23. If leak is present, remove transmission from test stand, repair defective area, and retest transmission.
2. Drain transmission fluid and inspect transmission fluid for metal particles. Record results on Table 7, Final Inspection, Item 24 or Item 25. If metal particles are present in fluid, remove transmission from test stand, repair defective area, and retest transmission.
3. Remove transmission from test stand, install new pipe plug in pressure port, remove paint and do not repaint.

Table 3. Pressure Control Solenoid Test (Cold).

COMPONENT	WIRE COLOR	J1 CONNECTOR	RESISTANCE	CKT ²
1-2 Shift Solenoid	RED	E ¹	20–40 Ohms	1149A
	LT. GREEN	A	ACTUAL RESISTANCE ITEM 1 _____	1222
2-3 Shift Solenoid	RED	E ¹	20–40 Ohms	1149B
	YELLOW	B	ACTUAL RESISTANCE ITEM 2 _____	1223
Pressure Control Solenoid	PURPLE	C	3.5–7 Ohms	1228
	LT BLUE	D	ACTUAL RESISTANCE ITEM 3 _____	1229
TCC Solenoid	RED	E ¹	10–20 Ohms	1149C
	BLACK	S	ACTUAL RESISTANCE ITEM 4 _____	1350
¹ Spliced internally to pin E. ² Internal harness number				

TRANSMISSION TEST REPORTS - CONTINUED

Table 4. Stall Test.

Transmission Temperature Normal	Actual Item 5 _____
Transmission Output Torque Minimum 285 lb-ft (386 N•m)	Actual Item 6 _____

Table 5. Power and Line Pressure Test.

TRANSMISSION GEAR RANGE	TRANSMISSION OIL PRESSURE MINIMUM/MAXIMUM PSI (kPa) @ 600 RPM		TRANSMISSION OIL PRESSURE MINIMUM/MAXIMUM PSI (kPa) @ 1500 RPM	
	PARK	35–171 psi (24.3–1179 kPa)	Actual Item 7 _____	_____
NEUTRAL	35–171 psi (24.3–1179 kPa)	Actual Item 8 _____	_____	
DRIVE 1	35–171 psi (24.3–1179 kPa)	Actual Item 9 _____	35–171 psi (24.3–1179 kPa)	Actual Item 14 _____
DRIVE 2	35–171 psi (24.3–1179 kPa)	Actual Item 10 _____	35–171 psi (24.3–1179 kPa)	Actual Item 15 _____
DRIVE 3	35–171 psi (24.3–1179 kPa)	Actual Item 11 _____	35–171 psi (24.3–1179 kPa)	Actual Item 16 _____
OVERDRIVE	35–171 psi (24.3–1179 kPa)	Actual Item 12 _____	35–171 psi (24.3–1179 kPa)	Actual Item 17 _____
REVERSE	67–324 psi (461.9–2233.9 kPa)	Actual Item 13 _____	67–324 psi (461.9–2233.9 kPa)	Actual Item 18 _____

Table 6. Pressure Control Solenoid Test (Warm).

COMPONENT	WIRE COLOR	J1 CONNECTOR	RESISTANCE	CKT ²
1-2 Shift Solenoid	RED	E ¹	20–40 Ohms	1149A
	LT. GREEN	A	Actual Resistance Item 18 _____	1222
2-3 Shift Solenoid	RED	E ¹	20–40 Ohms	1149B
	YELLOW	B	Actual Resistance Item 19 _____	1223
Pressure Control Solenoid	PURPLE	C	3.5–7 Ohms	1228
	LT BLUE	D	Actual Resistance Item 20 _____	1229
TCC Solenoid	RED	E ¹	10–20 Ohms	1149C
	BLACK	S	Actual Resistance Item 21 _____	1350

¹ Spliced internally to pin E.
² Internal harness number

TRANSMISSION TEST REPORTS - CONTINUED

Table 7. Final Inspection.

TRANSMISSION LEAKS	YES. ITEM 22 _____	NO. ITEM 23 _____
TRANSMISSION FLUID METAL PARTICLES	YES. ITEM 24 _____	NO. ITEM 25 _____

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
PRESERVATION, PACKAGING, AND MARKING**

INITIAL SETUP:**References**

MIL-HDBK-774
MIL-STD-129
SB 725-92-1
TB 9-289
TB 55-8100-200-24
WP 0023

MARKING FOR SHIPMENT AND STORAGE

a. Storage: In addition to any special markings called out on the special packaging instruction (SPI) or in the packaging requirements code, all unit packages, intermediate packs, exterior shipping containers, and, as applicable, unitized loads shall be marked in accordance with MIL-STD-129 including bar coding. The repair facility is responsible for application of special markings as required by MIL-STD-129 regardless of whether specified in the contract/order or not. Special markings include, but are not limited to, Shelf-life markings, structural markings, and transportation special handling markings. The marking of pilferable and sensitive materiel will not identify the nature of the materiel.

b. Shipment: The repair facility shall apply identification and address markings with bar codes in accordance with MIL-STD-129. A Military Shipment Label (MSL) is required for all shipments except contractor to contractor. The MSL will include both linear and 2D bar codes per the standard. Military Shipping Label: Military Shipment Labels may be created using the Computer Automated Transportation Tool Military Shipment Label/Issue Receipt Release Document (CATT MSL/IRRD).

HEAT TREATMENT AND MARKING OF WOOD PACKAGING MATERIALS

Wood Packaging Materials (WPM) (i.e., boxes, crates, skids, pallets, and any wood used as inner packaging made of non-manufactured wood) shall be constructed of lumber that has been heat-treated in accordance with the requirements of International Standard for Phytosanitary Measures (ISPM) –15. The WPM manufacturer shall be affiliated with an inspection agency accredited by the board of review of the American Lumber Standard Committee. The WPM manufacturer shall ensure traceability to the original source of heat treatment. Each piece of WPM shall be marked to show the conformance to the International Plant Protection Convention Standard. Certification markings shall be indelible and permanent. They may be stamped, stenciled, or branded directly onto or into the WPM. Certification marks shall be applied in a visible location on at least two opposite sides of the wood packaging product, but are not required on each individual component piece of a wood packaging product. On dunnage, the marking shall be applied every two feet to opposite surfaces of each piece. If possible, the mark shall be visible when the dunnage is placed in the load to enable inspectors to verify the WPM's compliance without unloading or unstuffing the container. Foreign manufacturers shall have the heat treatment of WPM verified in accordance with their National Plant Protection Organization's compliance program.

ALTERNATIVES

The packaging requirements have been validated and the method of preservation/packing has proven successful in meeting the needs of the military distribution system, including undefined storage and shipment throughout the world. Tailoring of the packaging instructions may only be authorized by the packaging requirements developer. If tailored, prototype package is required to validate the sizes and fit requirements. Minor dimensional and size changes are acceptable provided email notification is provided to the packaging requirements developer. Any design changes or changes in the method of preservation that provide a cost savings without degrading the method of preservation or packing or affecting the serviceability of the item will be considered and responded to within 10 days of submission. The equipment proponent reserves the right to require testing to validate alternate preservation methods, materials, alternates, blocking, bracing, cushioning, and packing.

REUSE OF PACKAGING MATERIALS

The cushioning material and the fiberboard boxes may be reused provided:

- a. There is no visible damage to material.
- b. The foam cushioning has not taken a permanent set.
- c. The fiberboard has no punctures, delaminating, or crushed flutes.

The water vapor proof barrier bag shall never be reused. Always use new barrier material, evacuate air from the barrier bag, and conduct a snap test after two hours on each bag to ensure seal is holding. All components of the wood box/crate must be present, properly secured in position, and not broken. Splits are acceptable provided the boards remain secured and not loose. When reapplying the lid, fasteners shall be placed 1/2 inch away from the previous fastener hole. Strapping shall be applied per MIL-HDBK-774.

CONTAINER REPAIR

Each long life metal reusable container will be inspected and reconditioned in accordance with TB 9-289, TB 55-8100-200-24, or SB 725-92-1 and the applicable container-drawing package. Container drawings are available upon request from the packaging requirements developer. This reconditioning effort includes mandatory replacement of breather valves, humidity indicators, data plates, sealing gaskets, and desiccant, plus all shear mounts with an age factor of five years or older. It also includes a leak test after reconditioning, inspection and replacement of unserviceable wood skids, and touch up or total stripping and refinishing of the container surfaces with CARC paint.

END OF TASK**END OF WORK PACKAGE**

**SUSTAINMENT MAINTENANCE
PREPARATION FOR STORAGE OR SHIPMENT**

INITIAL SETUP:**Tools and Special Tools**

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Materials/Parts

Dexron® VI (WP 0046, Item 5)
Lubricating oil, engine (WP 0047, Item 6)
Lubricating oil, general purpose (WP 0047, Item 7)
Pressure sensitive adhesive (WP 0047, Item 9)

References

ASTM-D 1974
ASTM-D 5118
MIL-STD-129P
MIL-STD-130
MIL-STD-1686
TM 746-10
WP 0002

IDENTIFICATION AND LABELING**NOTE**

All actions to ensure 4L80-E or 4L85-E transmission is properly identified and labeled must be recorded in item 3 of the FIR.

Attach rebuild data plate to transmission. Refer to WP 0002 for further information.

END OF TASK**COVERS**

1. Bag: MIL-DTL-117, TYPE I, CLASS B, size: 3 in. x 3 in. After placing items in bag, close bag by heat sealing.
2. Identification: Identify the bag with segregated pack number "1".
3. Inspection: Inspect segregated pack in accordance with criteria for Method 31.

END OF TASK**E-PROM (4L80-E)**

1. Package at an approved Electrostatic Discharge workstation. Information on approved Electrostatic Discharge work areas can be found in MIL-STD-1686.
2. Cushioning: PPP-C-1797, TYPE II, 1/8 inch thick, size: 3-1/2 in. x 5 in. Wrap cushioning around item.
3. Bag: MIL-DTL-117, TYPE I, CLASS F, STYLE 1, size: 4 x 5 in. Close bag by heat sealing.
4. Container: ASTM-D 5118, TYPE CF, CLASS WR, GRADE W5C, STYLE FOL, size 2-1/2 in. x 1-1/4 in. x 4 in.. Closure shall be in accordance with ASTM-D 1974, METHOD 1d.
5. Identification: Identify in accordance with MIL-STD-129. In addition, bag and container shall include sensitive electronic device markings in accordance with MIL-STD-129P. Identify the container with segregated pack number "2".

END OF TASK**CONSOLIDATE ITEMS**

1. Container: ASTM-D 5118, TYPE CF, CLASS DOM, VARIETY SW, GRADE 275, STYLE RSC, size 17-5/8 in. x 6-1/4 in. x 3-1/8 in.
2. Closure: Shall be in accordance with ASTM-D 1974, METHOD 1d.
3. Inspection: Inspect consolidation pack in accordance with criteria for Method 10.
4. Mark container with note: "THIS BOX CONTAINS SEGREGATED PACKS 1 AND 2." (4L80-E) or "THIS BOX CONTAINS SEGREGATED PACK 1." (4L85-E).

END OF TASK

PREPARE TRANSMISSION**NOTE**

- All actions to ensure 4L80-E or 4L85-E transmission is properly lubricated for storage or shipment must be recorded in item 2 of the FIR.
- All actions to prepare 4L80-E or 4L85-E transmission for storage must be recorded in item 4 of the FIR.

1. Internal preservative: Dexron® VI. Fill transmission assembly to operating level with Dexron® VI. Rotate internal mechanism sufficiently to ensure complete coverage of all internal surfaces. Drain oil from assembly and install drain plug.
2. Exterior preservative: MIL-PRF-21260, GRADE PE10. Apply preservative to all external unpainted ferrous metallic surfaces of transmission assembly and shipping plate.
3. Closure: NAS834. Seal all ports with plugs or caps of appropriate size.
4. Blocking: MIL-STD-1186. Blocking shall be devised to immobilize item.
5. Wrap: MIL-PRF-121, TYPE II, GRADE A, CLASS 2. Secure wrap using tape.
6. Using tape, secure E-PROM to top of wrapped transmission housing at its lowest point (4L80-E).
7. Using tape, secure container to rear side of transmission housing.
8. Cushioning: PPP-C-1797, TYPE I, thickness 1/8 inch. Cushioning shall completely cover transmission.
9. Envelope: MIL-E-6060.
10. Paper: A-A-203, basis weight 50 lb (min). Paper shall be large enough to prevent envelope from coming in direct contact with container base.
11. Container: PPP-B-621, CLASS 2, STYLE 2.
12. Provide packing list with unit pack in accordance with MIL-STD-129 identifying items with kit. On packing list, identify items within each segregated pack together with their segregated pack number.
13. Exterior container shall also include sensitive electronic device markings in accordance with MIL-STD-129.
14. Unit container is shipping container.

END OF TASK

IUID TAG VERIFICATION

NOTE

- Reference the following OSD Web Link:
<http://www.acq.osd.mil/dpap/pdi/uid/index.html> for the latest information on Directives; Guides; and National and International Standards, Policy, and Regulation along with other information and clarification for Item Unique Identification (IUID).
- The IUID tag (Figure 1, Item 2) and serial number should be located on top of the transmission bell housing (Figure 1, Item 1).

1. Conduct an initial inspection and determine that there is a realistic probability that the transmission can be repaired.
2. Verify presence of the IUID tag (Figure 1, Item 2) and serial number.
3. If the IUID tag (Figure 1, Item 2) is present but the transmission data plate with the serial number is not present, stamp the serial number into the transmission bell housing (Figure 1, Item 1) below the IUID tag (Figure 1, Item 2). Refer to IUID tag Installation instructions, which are located in this WP.

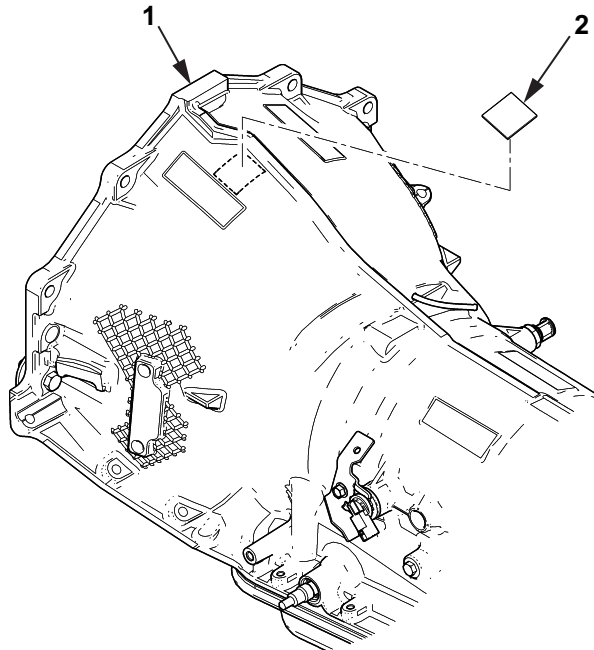


Figure 1. Transmission IUID Tag Label Location.

IUID TAG VERIFICATION - CONTINUED

4. If the serial number is present and readable but the IUID tag (Figure 2, Item 1) is missing or damaged and unreadable, remake the IUID tag (Figure 2, Item 1) and follow the IUID tag installation instructions, which are located in this WP. Check the DoD registry first to see if the serial number was previously registered.
 - a. If Letterkenny is providing IUID tags, use the link: <https://www.bpn.gov/iuid/ControlledLogin.aspx> and query the number.
 - b. If locally creating IUID tags and registered in Business Partner Network (BPN), use the link: <https://www.bpn.gov/iuid/ControlledLogin.aspx> and query the number.
5. If the transmission has an existing IUID tag (Figure 2, Item 1) and determined to be non-repairable (will be scrapped), retire the transmission IUID tag (Figure 2, Item 1) from the DoD Registry.
 - a. If Letterkenny is providing IUID tags, send all information to the IUID web site and retire the IUID tag (Figure 2, Item 1) from the registry.
 - b. If locally creating IUID tags, retire the IUID tag (Figure 2, Item 1) from the registry.
6. If the transmission has neither an IUID tag (Figure 2, Item 1) nor a serial number, obtain an IUID tag (Figure 2, Item 1) and assign a serial number.

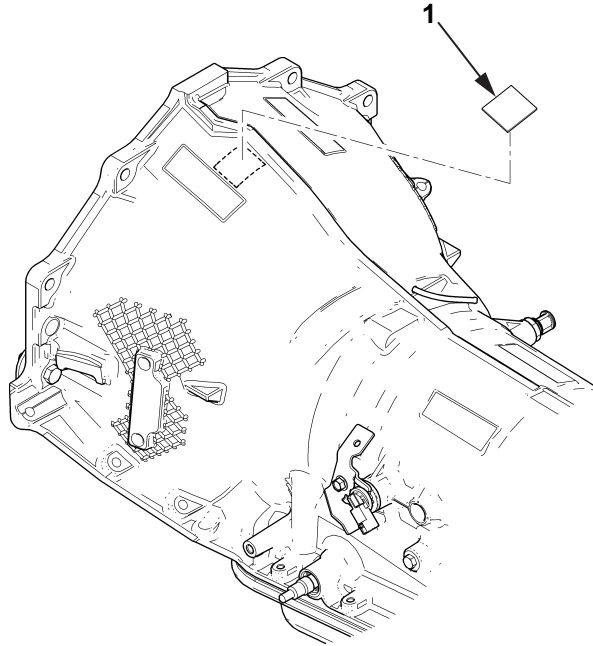


Figure 2. Transmission IUID Tag Label Location.

END OF TASK

ORDERING IUID TAGS**NOTE**

The Source of Repair (SOR) will not close a work order or ship a transmission until the IUID tag (Figure 3, Item 1) has been applied and an IUID tag registration confirmed.

1. Provide Letterkenny the necessary information to create the IUID tag (Figure 3, Item 1) using the IUID works web site http://www.letterkenny.army.mil/UID_works/howto.html.
2. The order number will be automatically generated on the IUID works web site. For accountability purposes, place NMP in front of the order number (i.e., NMP125848).

NOTE

All fields must be in capital letters, no spaces in the part number and serial number fields, and no special characters with the exception of hyphens (-).

3. Download the Microsoft excel order sheet and fill in the following information:
 - a. IUID Tag Design – 1 x 3 inches with construct 2 information. The IUID tag (Figure 3, Item 1) will include this information in the form of human readable text, linear bar code, and 2-D data matrix. All markings will comply with the requirements of the latest version of MIL-STD-130.
 - b. Enterprise ID – This is the SORs maintenance activity DODAAC.
 - c. Enterprise Name – The organization in which the code, DODAAC, identifies.
 - d. Part Number – The part number of the asset being tagged.
 - e. Description – In this field, the SOR will enter the nomenclature of the item being tagged.
 - f. Serial Number – The SOR will establish a serial number using the maintenance activities UIC and unique numbers from the serial number log book to generate a serial number for the transmission inducted into NMP without a serial number.
 - g. Mark Value – Enter the transmission's NSN.
 - h. Mark Contents – Denotes what information is contained in the Mark Value field. This field will be the NSN.
 - i. Medium – "Human Readable" will always be entered here.
 - j. Bagged – "N" for Standard Assets.

NOTE

The pinworks standard tag is 0.020 gauge thickness aluminum unless specified otherwise.

ORDERING IUID TAGS - CONTINUED

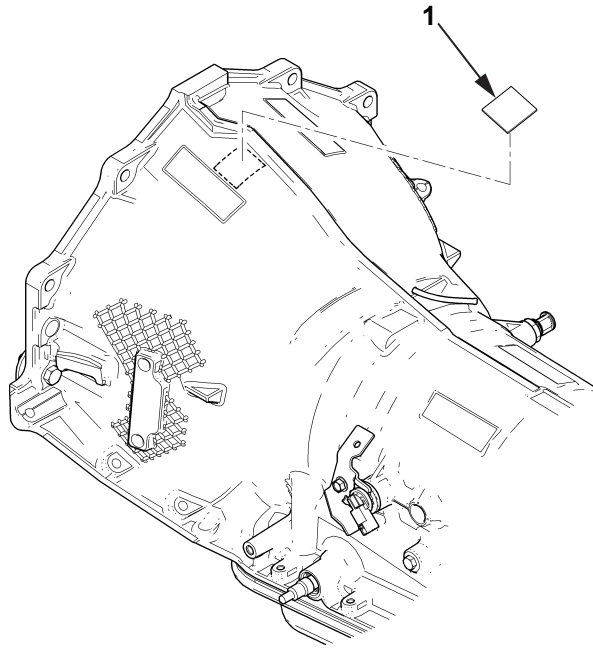


Figure 3. Transmission IUID Tag Label Location.

ORDERING IUID TAGS - CONTINUED

4. SOR will fill out the IUID works supplemental order form with the following information.
 - a. Tag quantity.
 - b. Adhesive (yes, high temperature)
 - c. Shipping information.
 - d. Verification (yes)
 - e. Registration (LEAD)
5. After completing the IUID supplemental order form, the SOR will e-mail both completed forms to uidworkslead@conus.army.mil with the required additional information included in the subject line of the e-mail, SOR POC information (name, date, and order).
6. Letterkenny will create the IUID tag (Figure 4, Item 1) and queue the information to be transmitted to the DoD IUID registry.
7. LEAD will ship the IUID tag (Figure 4, Item 1) via FedEx to the requesting SOR.
8. The SOR will verify the human readable data on the IUID tag (Figure 4, Item 1) and will attach the IUID tag (Figure 4, Item 1) to the transmission using the IUID tag installation instructions, which are located in this WP.
9. Once the IUID tag (Figure 4, Item 1) is applied to the transmission, the SOR will then send a confirmation e-mail to Letterkenny confirming that the IUID tag (Figure 4, Item 1) has been attached. Letterkenny will then finalize the IUID registration process with the IUID registry.
10. IUID tags that are not applied to transmissions that are washed out must be returned to Letterkenny for destruction.

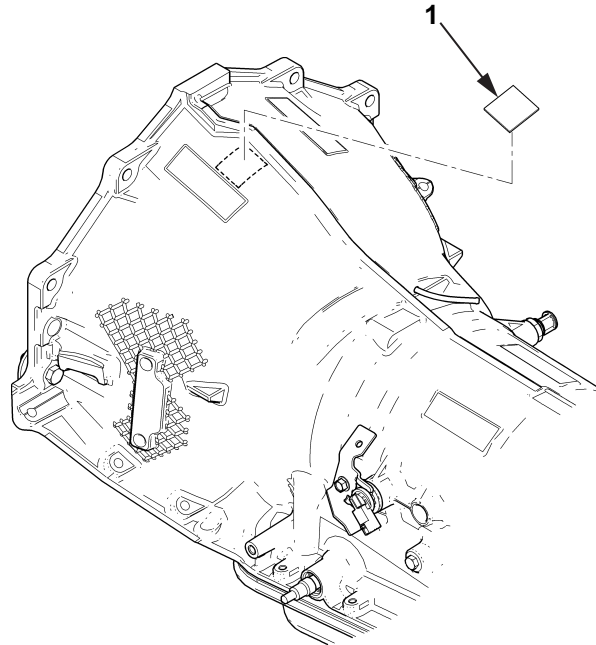


Figure 4. Transmission IUID Tag Label Location.

END OF TASK

LOCALLY CREATED IUID TAGS**NOTE**

- The SOR will not close a work order or ship a transmission until the IUID tag (Figure 5, Item 1) has been applied and the IUID tag registration is confirmed.
 - Use the IUID tag implementation steps if the IUID tags will be created locally.
1. The maintenance activity will create a 1 x 3 inch aluminum IUID tag (Figure 5, Item 1) with construct 2 information to include the transmission's part number, maintenance activity DODAAC, and a unique serial number. If a serial number on the data plate is missing or unreadable, create a serial number using the maintenance activities UIC and unique numbers from the serial number log book. The IUID tag (Figure 5, Item 1) will include all of this information in the form of human readable text, linear bar code, and 2-D data matrix. All IUID tags will meet the legibility and marking requirements of the latest version of MIL-STD-130.
 2. The SOR will affix the IUID tag (Figure 5, Item 1) to the transmission using the IUID tag installation instructions, which are located in this WP.
 3. The SOR will register the IUID tag (Figure 5, Item 1) in the DoD IUID registry.

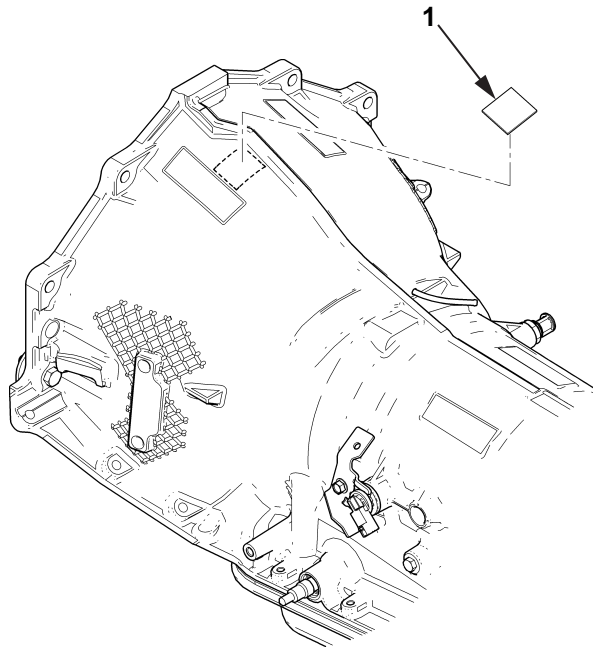


Figure 5. Transmission IUID Tag Label Location.

END OF TASK

IUID TAG INSTALLATION

- Using a clean rag and cleaner/degreaser, clean the top side of the transmission bell housing (Figure 6, Item 1).

NOTE

- Use a high temperature adhesive for mounting the IUID tag (Figure 6, Item 2). The high temperature adhesive should be the best known available for mounting the IUID tags. This will ensure they will adhere to the transmission bell housing (Figure 6, Item 1) through the normal life expectancy.
 - The IUID tags will be fastened in such a way as they will not have any deleterious effect.
 - The transmission shall be tagged in a way that will survive its anticipated life cycle up to the point of rebuild.
- Place the IUID tag (Figure 6, Item 2) on the top side of the transmission bell housing (Figure 6, Item 1). Be sure the IUID tag (Figure 6, Item 2) is right-side-up, and leave enough space below the IUID tag (Figure 6, Item 2) in order to stamp the serial number if the serial number is missing or does not exist.
 - Using $\frac{1}{4}$ inch stamp, stamp the transmission serial number in the space just below the IUID tag (Figure 6, Item 2).

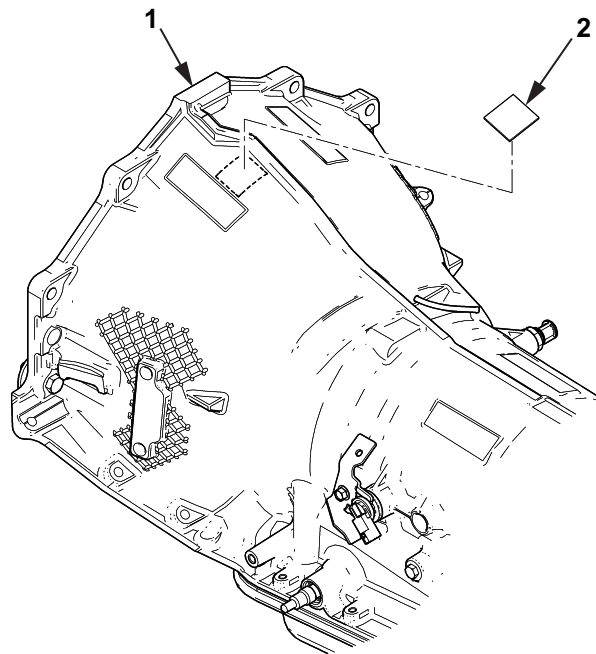


Figure 6. Transmission IUID Tag Label Location.

END OF TASK

IDENTIFICATION AND LABELING OF CRATE

NOTE

All actions taken to ensure container is properly identified and labeled must be recorded in item 5 of the FIR.

Follow Marking for Shipment and Storage, MIL-STD-129P, to prepare 4L80-E or 4L85-E transmission and crate for storage. Additional information can be found in TM 746-10, Marking, Packaging, and Shipment of Supplies and Equipment: General Packaging Instructions for Field Use.

END OF TASK

FINAL INSPECTION REPORT (FIR)

Table 1. Final Inspection Report (FIR).

ITEM NO.	CHARACTERISTIC AND TYPE OF INSPECTION	METHOD OF INSPECTION	INSPECTOR'S INITIALS
1.	PAINTING (Coverage, runs, overspray, etc.) Satisfactory. Unsatisfactory. Describe: _____ _____ _____	Visual	_____
2.	LUBRICATION Tagged incomplete (Refer to lubrication in this WP.) Satisfactory. Unsatisfactory. Describe: _____ _____ _____	Visual	_____
3.	IDENTIFICATION AND LABELING OF TRANSMISSION (Data plates secure, properly marked, decals, etc.) Satisfactory. Unsatisfactory. Describe: _____ _____ _____	Visual	_____
4.	PREPARATION FOR STORAGE (Transmission secure in crate, openings properly plugged, etc.) Satisfactory. Unsatisfactory. Describe: _____ _____ _____	Visual/ manual	_____
5.	IDENTIFICATION AND LABELING OF CRATE (Correct labeling) Unsatisfactory. Describe: _____ _____ _____	Visual	_____

END OF TASK

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
WEAR LIMITS**

SCOPE

The table contained in this work package lists the specifications needed to determine if a transmission part is serviceable. Any part that is not within specified tolerance must be replaced.

Table 1. Wear Limits.

PART	LOCATION/DESCRIPTION	WEAR LIMIT
OIL PUMP ASSEMBLY Drive and drive gear	Clearance to pump body	0.0007–0.0028 in. (0.018–0.071 mm)
OVERRUN CLUTCH Overrun clutch assembly Overdrive carrier	Retaining ring to backing plate End free play	0.033–0.094 in. (0.838–2.388 mm) 0.009–0.024 in. (0.229–0.610 mm)
FOURTH CLUTCH Fourth clutch assembly	Retaining ring to backing plate	0.040–0.100 in. (1.016–2.540 mm)
FORWARD CLUTCH Forward clutch assembly Forward clutch speed sensor ring	Piston movement To oil pump gasket surface	0.121–0.186 in. (3.07–4.72 mm) 3.85–3.8 in. (97.79–98.81 mm)
DIRECT CLUTCH Direct clutch assembly	Piston movement	0.121–0.186 in. (3.07–4.72 mm)
OUTPUT SHAFT	End play	0.005–0.025 in. (0.127–0.635 mm)
INTERMEDIATE CLUTCH Intermediate clutch assembly	Retaining ring to backing plate	0.040–0.107 in. (1.02–2.72 mm)
TURBINE SHAFT	End play	0.004–0.022 in. (0.102–0.559 mm)
GEAR CARRIER	Gear to housing gap	0.020 in. (0.508 mm)

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
QUALITY ASSURANCE REQUIREMENTS**

STATEMENT OF RESPONSIBILITY

The repair activity is responsible for complying with the quality assurance requirements contained in this work package and in accordance with ISO 9000 Series standards or equivalent. The commodity manager reserves the right to perform inspections or make changes that ensure the sustainment work being done meets the quality standards of the NMWR and preserves the inherent reliability of the item.

ACCEPTANCE INSPECTIONS

Items rebuilt in accordance with this NMWR are accepted based on the following criteria:

1. Conformance to quality of material requirements
2. Conformance to all in-process quality assurance inspections
3. Conformance to all final assembly testing requirements
4. Conformance to the preservation, packaging, and marking requirements

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
ILLUSTRATED LIST OF MANUFACTURED ITEMS INTRODUCTION**

SCOPE

This work package includes complete instructions for making items authorized to be manufactured or fabricated at the sustainment level.

HOW TO USE THE INDEX OF MANUFACTURED ITEMS

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the information that covers fabrication criteria.

EXPLANATION OF THE ILLUSTRATIONS OF MANUFACTURED ITEMS

All instructions needed by maintenance personnel to manufacture the item are included on the illustrations. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustrations.

Table 1. Manufactured Items Part Number Table of Contents.

TOOL NO.	PART DESCRIPTION	PAGE NO.
1	Guide Pin	0027-1

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
ILLUSTRATED LIST OF MANUFACTURED ITEMS**

INITIAL SETUP:

Tools and Special Tools

General mechanic's tool kit: automotive
(WP 0048, Item 13)

Materials/Parts

0.312 in. x 2 in. Bolt

GUIDE PIN

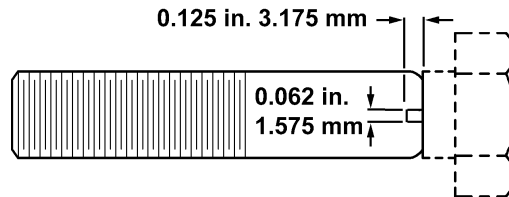


Figure 1. Guide Pin.

Table 1. Materials.

ITEM NO.	ITEM	PART NO.	NSN
1	0.312 in. x 2 in. Bolt	B1821BH031C200N	5306-00-226-4833

Fabricate and finish per diagram above.

1. Fabricate from machine bolt B1821BH031C200N.
2. Cut bolt head off of machine bolt.
3. Round off edge of non-threaded end as shown.
4. Cut a slit approximately 1/16 in. wide and 1/8 in. deep in non-threaded end as shown above.
5. Remove any burrs after cutting.

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TORQUE LIMITS**

GENERAL

This work package provides general torque limits for screws used on the 4L80-E/4L85-E transmission. Special torque limits are indicated in the maintenance procedures for applicable components. The general torque limits in this WP shall be used when specific torque limits are not indicated in the maintenance procedure. These general torque limits cannot be applied to screws that retain rubber components. The rubber components will be damaged before the correct torque limit is reached. If a special torque limit is not given in the maintenance instructions, tighten the screw or nut until it touches the metal bracket, then tighten it one complete revolution.

TORQUE TABLES

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. For metric fasteners, refer to Tables 3 and 4 for torque limit requirements. Table 5 lists torque limits for specific fasteners used on the transmission.

HOW TO USE TORQUE LIMITS

1. Measure the diameter of the screw you are installing (Figure 1).

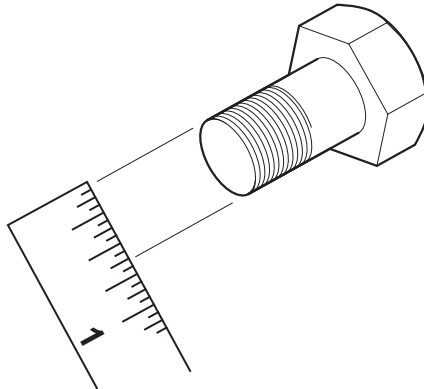


Figure 1. Measuring Screw Diameter.

NOTE

Perform Step 2 for standard screws only. To determine if screw is standard or metric, check capscrew head and refer to the following illustration.

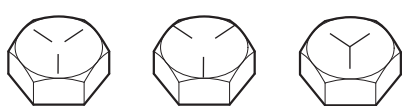
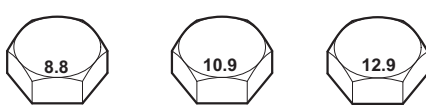
<p>Manufacturer's marks may vary. Screws shown are all SAE Grade 5 (3-line).</p>  <p>STANDARD</p>	<p>Metric screws can be three grades: 8.8, 10.9, and 12.9. Grades and manufacturer's marks appear on screw head.</p>  <p>METRIC</p>
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Figure 2. Capscrew Head Markings.

HOW TO USE TORQUE LIMITS - CONTINUED

- Count the number of threads per inch (Figure 3).

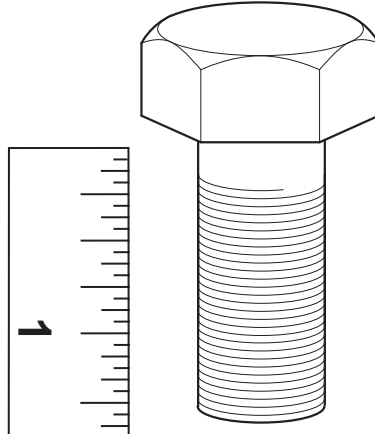


Figure 3. *Measuring Screw.*

- 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.)
- In the second column under **SIZE**, find the number of threads per inch that matches the number of threads you counted in Step 2. (Not required for metric screws.)
- To find the grade screw you are installing, match the markings on the head to the correct picture of Capscrew Head Markings in the illustration preceding the torque tables.
- Look down the column under the picture you found in Step 5, until you find the torque limit (lb-in, lb-ft, or N•m) for the diameter and threads per inch of the screw.

Table 1. Torque Limits for Dry Fasteners.

SIZE			TORQUE							
			SAE GRADE NO. 1 OR 2		SAE GRADE NO. 5		SAE GRADE NO. 6 OR 7		SAE GRADE NO. 8	
DIA. INCHES	THREADS PER INCH	DIA. MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
1/4	20	6.35	5	7	8	11	10	14	10	16
1/4	28	6.35	6	8	10	14	12	16	12	16
5/16	18	7.94	11	15	17	23	21	28	24	33
5/16	24	7.94	12	16	19	26	24	33	27	37
3/8	16	9.53	20	27	30	41	40	54	45	61
3/8	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	80	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	136	120	163
9/16	12	14.29	65	88	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	230
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	240	325
3/4	10	19.05	160	217	260	353	320	434	380	515
3/4	16		180	244	300	407	360	488	420	596
7/8	9	22.23	140	190	400	542	520	705	600	813
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1356
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1735
1-1/8	12		340	461	880	1193	1260	1708	1440	1952
1-1/4	7	31.75	420	569	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2386	2000	2712
1-3/8	6	34.93	560	759	1460	1979	2080	2820	2380	3227
1-3/8	12		640	868	1690	2291	2380	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2630	2780	3769	3160	4284
1-1/2	12		840	1139	2200	2983	3100	4203	3560	4827

CAPSCREW HEAD MARKINGS



Manufacturer's marks may vary. These are all SAE Grade 5 (3-line).

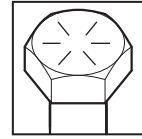
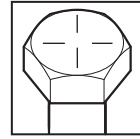
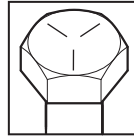
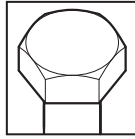


Table 2. Torque Limits for Wet Fasteners.


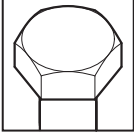
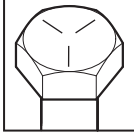
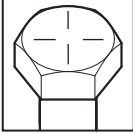
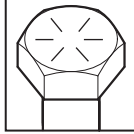
CAPSCREW HEAD MARKINGS											
 <p>Manufacturer's marks may vary. These are all SAE Grade 5 (3-line).</p>											
SIZE			TORQUE								
			SAE GRADE NO. 1 OR 2		SAE GRADE NO. 5		SAE GRADE NO. 6 OR 7		SAE GRADE NO. 8		
DIA. INCHES	THREADS PER INCH	DIA. MILLIMETERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	
1/4	20	6.35	4	5	6	8	8	11	9	12	
1/4	28	6.35	5	7	7	9	9	12	10	14	
5/16	18	7.94	8	11	13	18	16	22	18	24	
5/16	24	7.94	9	12	14	19	18	24	20	27	
3/8	16	9.53	15	20	23	31	30	41	40	54	
3/8	24	9.53	17	23	25	34	30	41	44	60	
7/16	14	11.11	24	33	35	47	45	61	55	75	
7/16	20		25	34	40	54	50	68	60	81	
1/2	13	12.70	35	47	55	75	70	95	80	108	
1/2	20		40	54	65	88	80	108	90	122	
9/16	12	14.29	50	68	80	108	100	136	110	149	
9/16	18		55	75	90	122	110	149	130	176	
5/8	11	15.88	70	95	110	149	140	190	170	239	
5/8	18		80	108	130	176	160	217	180	244	
3/4	10	19.05	120	163	200	271	240	325	280	380	
3/4	16		140	190	220	298	280	380	320	434	
7/8	9	22.23	110	149	300	407	400	542	460	624	
7/8	14		120	163	320	434	440	597	500	678	
1	8	25.40	160	217	440	597	600	813	680	922	
1	12		170	230	480	651	660	895	740	1003	
1-1/8	7	25.58	220	298	600	813	840	1139	960	1302	
1-1/8	12		260	353	660	895	940	1274	1080	1464	
1-1/4	7	31.75	320	434	840	1139	1100	1491	1360	1844	
1-1/4	12		360	488	920	1247	1320	1790	1500	2034	
1-3/8	6	34.93	420	569	1100	1491	1560	2115	1780	2413	
1-3/8	12		460	624	1260	1708	1780	2413	2040	2766	
1-1/2	6	38.10	560	759	1460	1979	2080	2820	2360	3200	
1-1/2	12		620	841	1640	2224	2320	3145	2660	3606	

Table 3. Torque Limits for Dry Metric Fasteners.

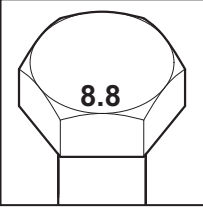
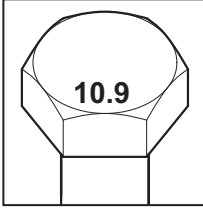
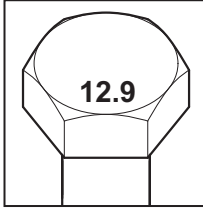
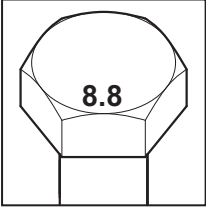
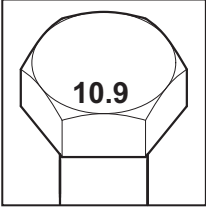
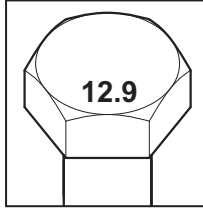
CAPSCREW HEAD MARKINGS							
							
SIZE		TORQUE					
		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
DIA. INCHES	THREADS PER INCH	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
0.157	4	2	3	3	4	4	5
0.197	5	4	5	6	8	7	9
0.237	6	7	9	10	14	11	15
0.276	7	11	15	16	22	20	27
0.315	8	18	24	25	34	29	39
0.394	10	32	43	47	64	58	79
0.473	12	58	79	83	113	100	136
0.552	14	94	127	133	180	159	216
0.630	16	144	195	196	266	235	319
0.709	18	190	258	269	365	323	438
0.788	20	260	353	366	496	440	597
0.867	22	368	499	520	705	678	919
0.946	24	470	637	664	900	794	1077
1.064	27	707	959	996	1350	1235	1674
1.182	30	967	1311	1357	1840	1630	2210

Table 4. Torque Limits for Wet Metric Fasteners.

CAPSCREW HEAD MARKINGS							
							
SIZE		TORQUE					
		METRIC GRADE 8.8		METRIC GRADE 10.9		METRIC GRADE 12.9	
DIA. INCHES	THREADS PER INCH	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS	POUND FEET	NEWTON METERS
0.197	5	3	4	5	7	6	8
0.237	6	6	8	8	11	10	14
0.276	7	10	14	14	19	16	22
0.315	8	14	19	20	27	24	33
0.394	10	28	38	40	54	47	64
0.473	12	49	66	69	94	81	94
0.552	14	78	106	111	150	130	176
0.630	16	121	164	172	233	202	274
0.709	18	167	226	238	323	279	378
0.788	20	235	319	337	457	394	534
0.867	22	321	435	460	624	537	728
0.946	24	407	552	582	789	681	923
1.064	27	597	809	854	1157	998	1353
1.182	30	809	1097	1158	1570	1353	1834

TORQUE WRENCH ADAPTERS

Some tasks require the use of a torque wrench adapter when the nut or screw cannot be reached with a regular socket on the end of the torque wrench. These adapters add to the overall length of the torque wrench and make the dial or scale reading less than actual torque applied to the nut or screw. To prevent over torquing and damage to equipment, calculate correct dial or scale reading using the conversion formula on the following page.

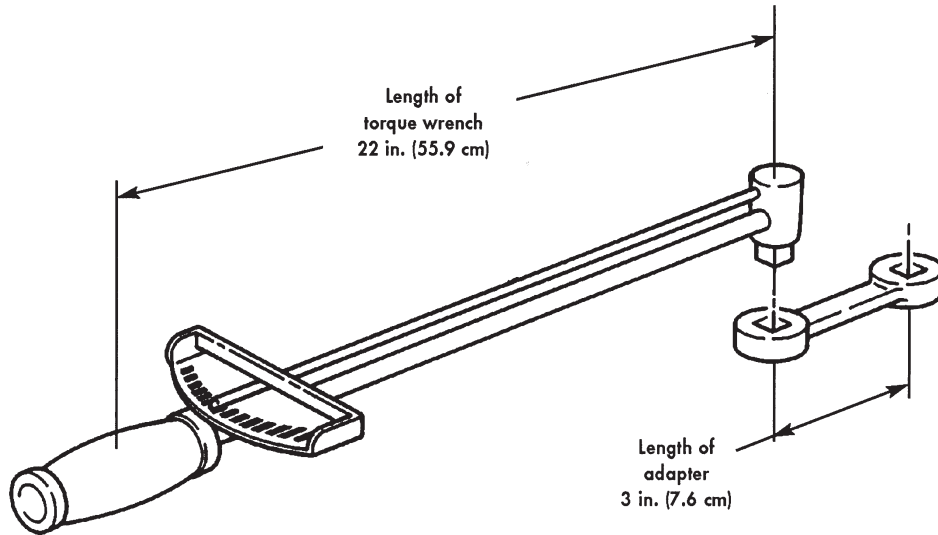
CONVERSION FORMULA

Correct dial or scale readings are determined by the use of the following formula.

$$\text{Correct Reading} = \text{Required torque value} \div \frac{\text{Length of torque wrench} + \text{Length of adapter}}{\text{Length of torque wrench}}$$

NOTE

The length of the torque wrench is measured from the center of the handle to the center of the drive. The length of the adapter is measured from the center of the drive to the center of the wrench.



In this example, the torque wrench measures 22 in. (55.9 cm) and the adapter is 3 in. (7.6 cm). The required torque is 19 lb-ft (25.8 N•m).

$$\begin{aligned} \text{Correct Reading} &= 19 \text{ lb-ft (25.8 N}\cdot\text{m)} \div \frac{22 \text{ in. (55.9 cm)} + 3 \text{ in.}}{22 \text{ in. (55.9 cm)}} \\ \text{Correct Reading} &= 19 \text{ lb-ft (25.8 N}\cdot\text{m)} \div \frac{25 \text{ in. (63.5 cm)}}{22 \text{ in. (55.9 cm)}} \\ \text{Correct Reading} &= 19 \text{ lb-ft (25.8 N}\cdot\text{m)} \div 1.14 \\ \text{Correct Reading} &= 17 \text{ lb-ft (23.0 N}\cdot\text{m)} \end{aligned}$$

Table 5. Torque Specifications For Transmission.

Fastener Location	Torque Specification
Accumulator housing screws	97 lb-in (11 N•m)
Center support bolt	32 lb-ft (43 N•m)
Control valve screws	97 lb-in (11 N•m)
Detent roller and spring screw	8–12 lb-ft (10–16 N•m)
Drain plug	15–20 lb-ft (20–27 N•m)
First clutch tube screw	8–12 lb-ft (10–16 N•m)
Fourth clutch housing bolt	13–17 lb-ft (18–23 N•m)
Manual shaft nut	18 lb-ft (24 N•m)
Oil pan screws	18 lb-ft (24 N•m)
Oil pump to transmission screws	18 lb-ft (24 N•m)
Oil pump cover to oil pump body screws	18 lb-ft (24 N•m)
Pipe plugs	49–59 lb-in (5.5–6.7 N•m)
Servo cover bolts	18 lb-ft (24 N•m)
Solenoid screws	4–8 lb-ft (5.4–10.8 N•m)

END OF TASK**END OF WORK PACKAGE**

CHAPTER 4

PARTS INFORMATION

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

**SUSTAINMENT MAINTENANCE
REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL) INTRODUCTION**

INTRODUCTION

SCOPE

This RPSTL lists and authorizes spares and repair parts; special tools; special Test, Measurement, and Diagnostic Equipment (TMDE); and other special support equipment required for performance of the National Maintenance Work Requirement (NMWR) of the 4L80-E/4L85-E Transmission. It authorizes the requisitioning, issue and disposition of spares, repair parts and special tools as indicated by the Source, Maintenance, and Recoverability (SMR) codes.

GENERAL

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. Repair Parts List Work Packages. Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in the Bulk Items work package which follows the Special Tools Repair Parts work package. Repair parts kits are listed separately in their own functional group and work package. Repair parts for repairable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
2. Special Tools List Work Packages. Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
3. Cross-Reference Indexes Work Packages. There are two cross-reference indexes work packages in this RPSTL: The National Stock Number (NSN) Index work package, and The Part Number (P/N) Index work package. The National Stock Number Index work package refers you to the figure and item number. The Part Number Index work package refers you to the figure and item number.

EXPLANATION OF ENTRIES IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout. This entry may be subdivided into 4 subentries, one for each service.

Table 1. SMR Code Explanation.

<u>Source Code XX</u>	<u>Maintenance Code XX</u>	<u>Recoverability Code X</u>
1st two positions: How to get an item.	3rd position: Who can install, replace, or use the item.	4th position: Who can do complete repair* on the item.
		5th position: Who determines disposition action on unserviceable items.

NOTE

*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

<u>Source Code</u>	<u>Application/Explanation</u>
--------------------	--------------------------------

PA

PB

PC

PD

PE

PF

PG

PH

PR

PZ

KD

KF

KB

MF-Made at field

MH-Made at below depot/sustainment level

ML-Made at SRA

MD-Made at depot

MG-Navy only

NOTE

Items coded PC are subject to deterioration.

Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the third position of the SMR code.

Items with these codes are not to be requested/requisitioned individually. They are part of a kit that is authorized to the maintenance level indicated in the third position of the SMR code. The complete kit must be requisitioned and applied.

Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) entry and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the third position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.

<u>Source Code</u>	<u>Application/Explanation</u>
AF-Assembled by field	
AH-Assembled by below depot sustainment level	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the third position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
AL-Assembled by SRA	
AD-Assembled by depot	
AG- Navy only	
XA	Do not requisition an "XA" coded item. Order the next higher assembly. (Refer to NOTE below.)
XB	If an item is not available from salvage, order it using CAGEC and part number.
XC	Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's part number.
XD	Item is not stocked. Order an XD-coded item through local purchase or normal supply channels using the CAGEC and part number given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

<u>Maintenance Code</u>	<u>Application/Explanation</u>
F -	Field maintenance can remove, replace, and use the item.
H -	Below Depot Sustainment maintenance can remove, replace, and use the item.
L -	Specialized repair activity can remove, replace, and use the item.
G-	Afloat and ashore intermediate maintenance can remove, replace, and use the item (Navy only).
K-	Contractor facility can remove, replace, and use the item.
Z -	Item is not authorized to be removed, replaced, or used at any maintenance level.
D -	Depot can remove, replace, and use the item.

NOTE

*Army may use C in the third position. However, for joint service publications, Army will use O.

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

<u>Maintenance Code</u>	<u>Application/Explanation</u>
F -	Field is the lowest level that can do complete repair of the item.
H -	Below Depot Sustainment is the lowest level that can do complete repair of the item.
L -	Specialized repair activity is the lowest level that can do complete repair of the item.
D -	Depot is the lowest level that can do complete repair of the item.
G-	Both afloat and ashore intermediate levels are capable of complete repair of item. (Navy only)
K-	Complete repair is done at contractor facility.
Z -	Nonreparable. No repair is authorized.
B -	No repair is authorized. No parts or special tools are authorized for maintenance of a "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

<u>Recoverability Code</u>	<u>Application/Explanation</u>
Z -	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
F -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the field level.
H -	Reparable item. When uneconomically repairable, condemn and dispose of the item at the below depot sustainment level.
D -	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L -	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A -	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.
G -	Field Level repairable item. Condemnation and dispose at either afloat or ashore intermediate levels. (Navy only)
K -	Reparable item. Condemnation and disposal to be performed at contractor facility.

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which 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.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name, and when required, a minimum description to identify the item.
2. Part numbers of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.
3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.
4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGES FORMAT AND COLUMNS

1. National Stock Number (NSN) Index Work Package. NSN's in this index are listed in National Item Identification Number (NIIN) sequence.

STOCK NUMBER Column. This column lists the NSN in NIIN sequence. The NIIN consists of the last nine digits of the NSN. When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

For example, if the NSN is 5385-01-574-1476, the NIIN is 01-574-1476.

FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. Part Number (P/N) Index Work Package. Part numbers in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

PART NUMBER Column. Indicates the part number assigned to the item.

FIG. Column. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

SPECIAL INFORMATION

UOC. The UOC appears in the lower left corner of the Description Column heading. Usable on codes are shown as "UOC:" in the Description Column (justified left) on the first line under the applicable item/nomenclature. Uncoded items are applicable to all models. Identification of the UOCs used in the RPSTL are:

<u>Code</u>	<u>Used On</u>
Component Specific	Not Applicable

Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk material are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in NMWR 9-2520-582.

Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN/Part Number (P/N) Index work packages and the bulk material list in the bulk items work package.

HOW TO LOCATE REPAIR PARTS

1. When NSNs or Part Numbers Are Not Known.

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group or the subfunctional group to which the item belongs.

Third. Identify the item on the figure and note the number(s).

Fourth. Look in the repair parts list work packages for the figure and item numbers. The NSN's and part numbers are on the same line as the associated item numbers.

2. When NSN Is Known.

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

3. When Part Number Is Known.

First. If you have the part number and not the NSN, look in the PART NUMBER column of the part number index work package. Identify the figure and item number.

Second. Look up the item on the figure in the applicable repair parts list work package.

END OF WORK PACKAGE

SUSTAINMENT MAINTENANCE
TRANSMISSION SHIFT LEVER

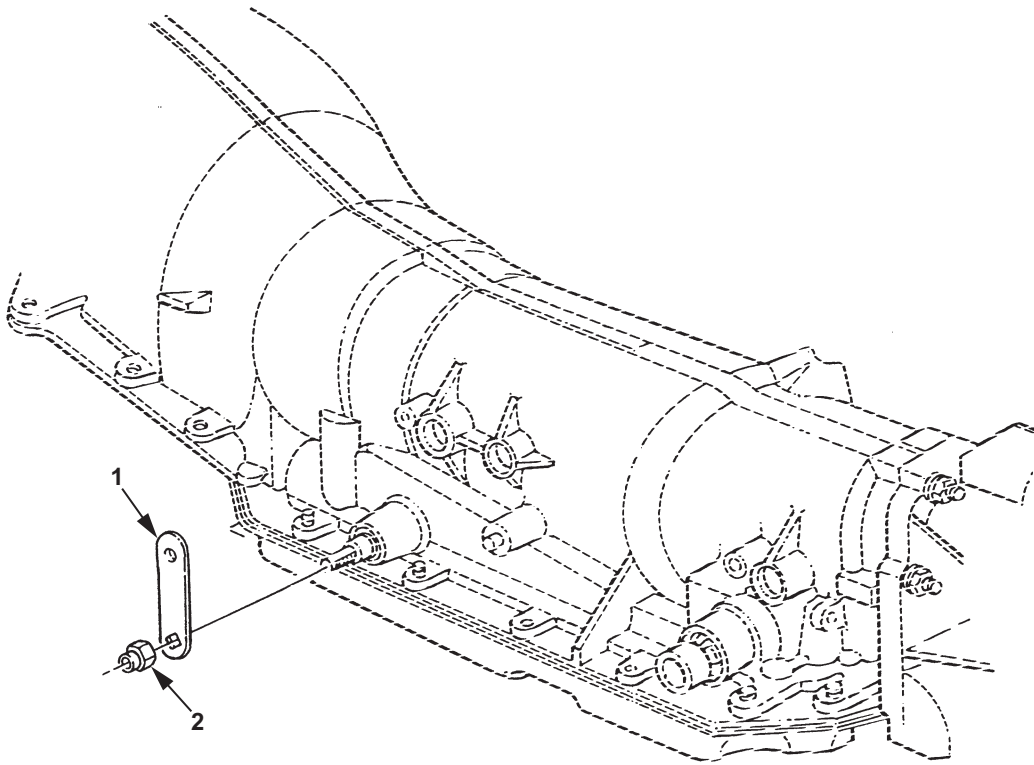


Figure 1. Transmission Shift Lever.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0705 GEAR SHIFT, VACUUM BOOSTER AND CONTROLS	
					FIG. 1 TRANSMISSION SHIFT LEVER	
1	PAFZZ	3040-01-409-2502	19207	12447176	CONNECTING LINK,RIG	1
2	PAFZZ	5310-01-155-2503	7X677	11514603	NUT,PLAIN,HEXAGON M10-1.5	1
					END OF FIGURE	

SUSTAINMENT MAINTENANCE
TORQUE CONVERTER

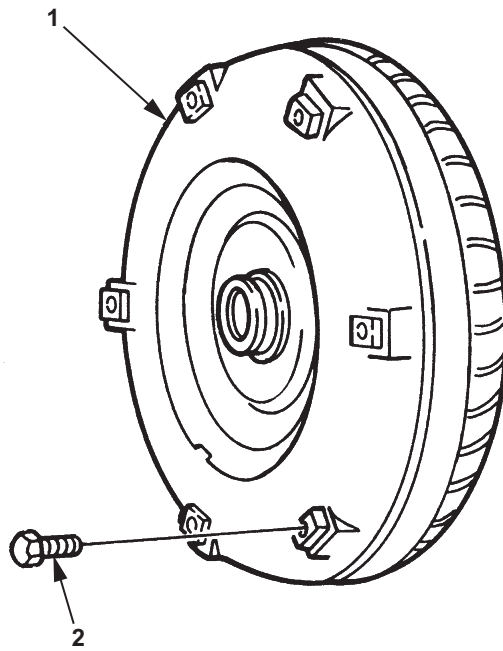


Figure 2. Torque Converter.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0708 TORQUE CONVERTER OR FLUID COUPLING	
					FIG. 2 TORQUE CONVERTER	
1	PAFZZ	2520-01-480-7553	7X677	24217238	TORQUE CONVERTER,VE 4L80-E	1
1	PAFZZ	2520-01-624-2240	34623	5717740	DIFFERENTIAL,DRIVIN 4L85-E,TORQUE CONVERTER	1
2	PAFZZ	5305-01-188-5133	19207	12340514	SCREW,CAP,HEXAGON H M10-1.5X60	6
					END OF FIGURE	

SUSTAINMENT MAINTENANCE
TRANSMISSION ASSEMBLY

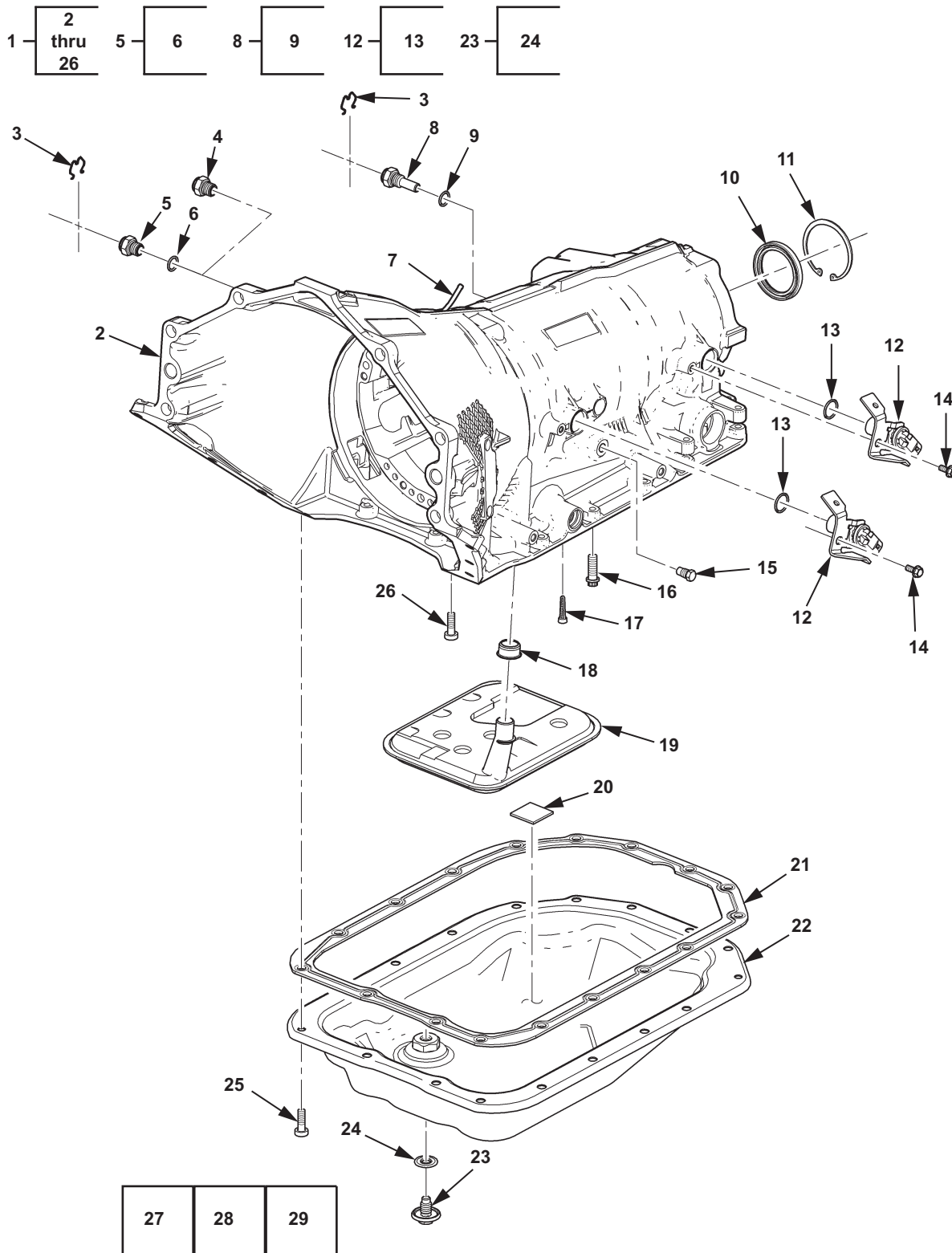


Figure 3. Transmission Assembly.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0710 TRANSMISSION ASSEMBLY (HYDRAULIC), (HYDRAMATIC), (HYDRO-STATIC), (TORQUMATIC), (ALLISON), AND ASSOCIATED PARTS	
					FIG. 3 TRANSMISSION ASSEMBLY	
1	PAFHH	2520-01-489-0850	19207	57K6204	TRANSMISSION, HYDRAU 4L80-E, TURBO	1
1	PAFHH	2520-01-625-7876	19207	57K6233	TRANSMISSION, HYDRAU 4L85-E	1
1	PAFHH	2520-01-489-0849	19207	57K4407	TRANSMISSION, HYDRAU 4L80-E, NON-TURBO	1
2	XAHZZ		34623	24241457	.CASE, TRANSMISSION	1
3	PAFZZ	5340-01-474-4011	7X677	24205103	.CLIP, RETAINING PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	2
4	PAFZZ	4730-01-615-4243	34623	5714961	.ADAPTER STEEL, 2000 THROUGH MID 2008, OUTPUT TO COOLER	1
5	PAFZZ	4730-01-597-3501	7X677	24236579	.ADAPTER, STRAIGHT, PI ALUMINUM, MID 2008 AND ABOVE, OUTPUT TO COOLER	1
6	KFFZZ		34623	24238150	..O-RING PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
7	PAFZZ	4710-01-477-3662	7X677	24200374	.PIPE, PLASTIC	1
8	PAFZZ	4730-01-560-3083	7X677	24233367	.ADAPTER, STRAIGHT PI STEEL, 2000 THROUGH MID 2008, INPUT FROM COOLER	1
8	PAFZZ	4730-01-595-7069	7X677	24236581	.ADAPTER, STRAIGHT PI ALUMINUM, MID 2008 AND ABOVE, INPUT FROM COOLER	1
9	KFFZZ		34623	24238150	..O-RING PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
10	PAFZZ	5330-01-460-8988	7X677	8675517	.SEAL, PLAIN PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
11	PAFZZ	5325-01-460-9908	7X677	5714335	.RING, RETAINING	1
12	PAFZZ	2990-01-399-1023	61928	24203876	.SENSOR, EGR VALVE, EM SPEED, INPUT, OUTPUT	2
13	PAFZZ		34623	5717780	..O-RING SPEED SENSOR PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	2
14	PAFZZ	5306-01-602-0476	7X677	11514308	.BOLT, MACHINE PART OF KIT P/N 5717778	2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
15	PAFZZ		34623	5717769	.PLUG,PIPE LINE PRESSURE TEST HOLE PART OF KIT P/N 5717778	1
16	PAHZZ	5306-01-461-3557	7X677	8661762	.BOLT,MACHINE STANDARD SIZE,BLACK PART OF KIT P/N 6220FL0007 PART OF KIT P/N 24208849	1
16	PAHZZ	5306-01-624-5774	34623	5715154	.BOLT,MACHINE 57/100X1.370,OVERSIZED,GOLD BOLT PART OF KIT P/N 5717778	1
17	PAFZZ	2520-01-461-2374	7X677	8661834	.SCREEN,VALVE,AUTOMA PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
18	PAFZZ	5330-01-397-0374	7X677	8656613	.SEAL,PLAIN ENCASED PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778 PART OF KIT 24210956	1
19	KFFZZ		34623	24212452	.FILTER ELEMENT,FLUI PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778 PART OF KIT 24210956	1
20	PAFZZ		34623	5715715	.MAGNET,CHIP COLLECT	1
21	PAFZZ	5330-01-360-5271	7X677	8677743	.GASKET OIL PAN PART OF KIT P/N 5717778	1
22	PAFZZ	2520-01-481-8344	34623	5717517	.PARTS KIT,OIL PAN PART OF KIT P/N 5714952	1
23	PAFZZ	5365-01-480-6812	34623	5714953	.PLUG,MACHINE THREAD DRAIN PART OF KIT P/N 5714952	1
24	PAFZZ	5330-01-480-2502	7X677	24205123	..GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
25	PAFZZ	5306-01-465-2140	34623	5744077	.BOLT,MACHINE M8-1.25X20	17
26	PAHZZ	5306-01-461-3555	7X677	8686124	.BOLT,MACHINE PART OF KIT P/N 24200789 PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
27	KBHZZ		7Y635	34002EAF	KIT,OVERHAUL YEAR MODEL 1997 AND ABOVE,FIBER PART OF KIT P/N 6220FL0007	1
28	KBHZZ		7Y635	34030EA	KIT,BUSHING YEAR MODEL 1997 AND ABOVE PART OF KIT P/N 6220FL0007	1
29	KBHZZ		7Y635	TS160-019C	KIT,BOX SEAL FWD X-LG PART OF KIT P/N 6220FL0007	1

END OF FIGURE

**SUSTAINMENT MAINTENANCE
PARKING LOCK SYSTEM**

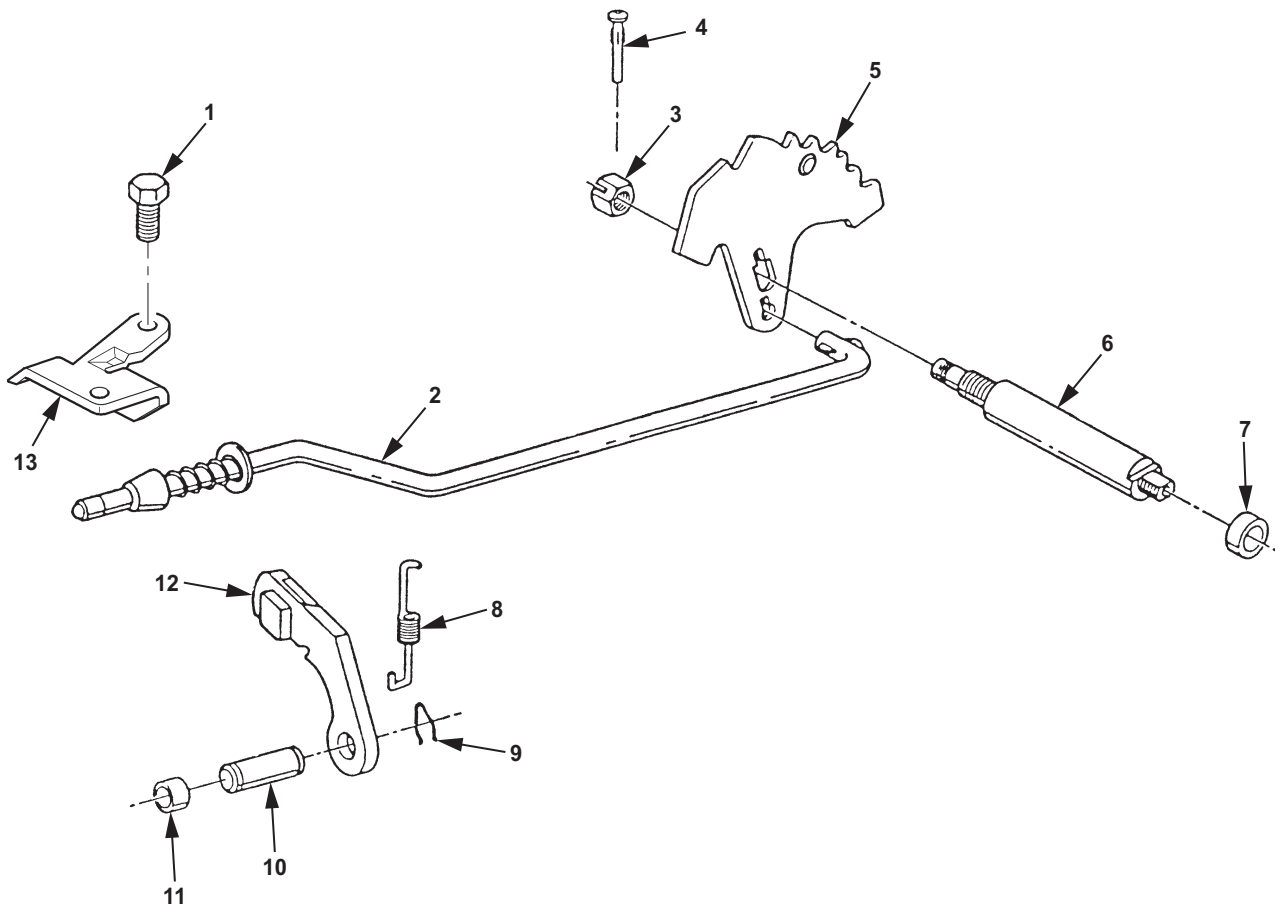


Figure 4. Parking Lock System.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0710 TRANSMISSION ASSEMBLY (HYDRAULIC), (HYDRAMATIC), (HYDRO-STATIC), (TORQUMATIC), (ALLISON), AND ASSOCIATED PARTS	
					FIG. 4 PARKING LOCK SYSTEM	
1	PAFZZ	5306-01-197-1492	24617	11508687	BOLT,MACHINE M8-1.25X20	2
2	PAHZZ	3040-01-447-7995	7X677	24200173	CONNECTING LINK,RIG	1
3	PAHZZ	5310-01-447-0968	7X677	8648178	NUT,PLAIN,HEXAGON	1
4	PAHZZ	5315-01-447-0492	7X677	8678347	PIN,STRAIGHT,HEADLE	1
5	KFHZZ		34623	24201001	LEVER,REMOTE CONTRO PART OF KIT P/N 24204472	1
6	KFHZZ		34623	24200999	SHAFT PART OF KIT P/N 24204472	1
7	PAFZZ	5330-01-251-1607	7X677	8657163	GASKET SEAL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
8	PAFZZ	5360-01-461-4931	7X677	24202611	SPRING,HELICAL,EXTE	1
9	PAFZZ	5340-00-366-0618	72582	148148	CLIP,RETAINING	1
10	PAFZZ	5315-01-460-9907	7X677	8661692	PIN,STRAIGHT,HEADLE	1
11	PAFZZ	4730-01-460-5520	7X677	24200224	PLUG,PIPE PART OF KIT P/N 5717778	1
12	PAFZZ	3040-01-460-9964	7X677	8661693	PAWL	1
13	PAFZZ	2590-01-460-8316	7X677	24200347	BRACKET,VEHICULAR C	1
					END OF FIGURE	

SUSTAINMENT MAINTENANCE
PLANETARY GEAR CARRIER

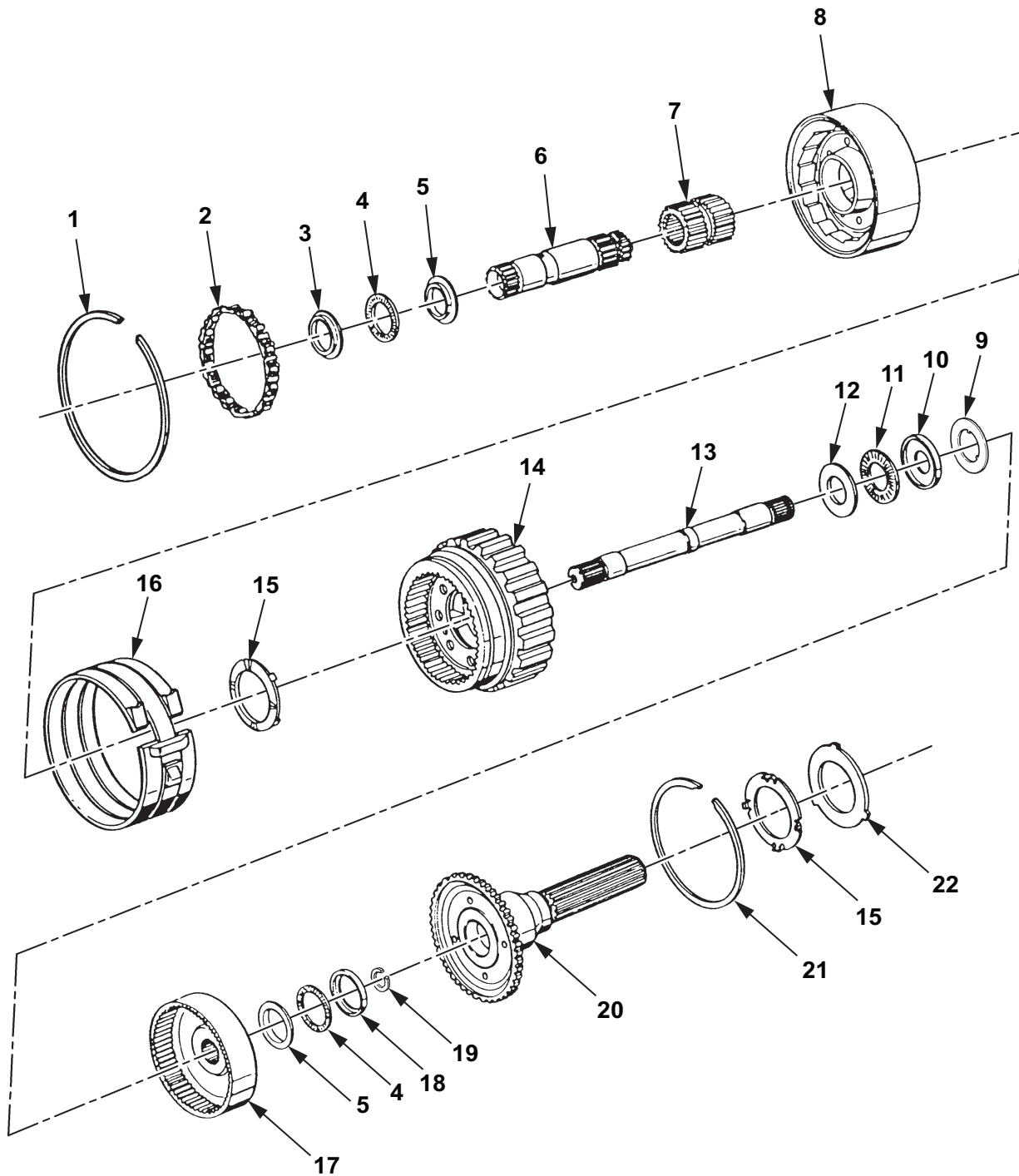


Figure 5. Planetary Gear Carrier.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0710 TRANSMISSION ASSEMBLY (HYDRAULIC), (HYDRAMATIC), (HYDRO-STATIC), (TORQUMATIC), (ALLISON), AND ASSOCIATED PARTS	
					FIG. 5 PLANETARY GEAR CARRIER	
1	PAHZZ	5325-01-154-8562	7X677	8626816	RING,RETAINING SPACER	1
2	PAHZZ	3110-01-480-5240	7X677	7471009	BEARING,ROLLER,NEED CLUTCH PART OF KIT P/N 24205551	1
3	KFHZZ		34623	8623183	RACE,BEARING PART OF KIT P/N 8623920	1
4	PAHZZ	3110-01-169-0734	34623	5740384	BEARING,ROLLER,THRU PART OF KIT P/N 8623920 PART OF KIT P/N 8623922	2
5	PAHZZ	3120-01-167-4172	7X677	8623204	PARTS KIT,BEARING PART OF KIT P/N 8623920 PART OF KIT P/N 8623922	2
6	PAHZZ	3040-01-493-4677	7X677	24207264	SHAFT,STRAIGHT SUN	1
7	PAHZZ	3020-01-480-7302	7X677	24209475	GEAR,HELICAL SUN	1
8	PAHZZ	2520-01-480-7563	7X677	24241433	CARRIER,CLUTCH ASSE 4L80-E,REACTION PART OF KIT P/N 24205551	1
8	PAHZZ		34623	5717741	CARRIER,CLUTCH ASSE 4L85-E,REACTION	1
9	PAHZZ		34623	5717770	WASHER,SLOTTED REAR INTERNAL GEAR	1
10	KFHZZ		34623	5714960	RACE,BEARING PART OF KIT P/N 24208848	1
11	KFHZZ		34623	5470378	BEARING NEEDLE PART OF KIT P/N 24208848	1
12	KFHZZ		34623	5740377	RACE,BEARING PART OF KIT P/N 24208848	1
13	PAHZZ	3040-01-480-7309	7X677	24203400	SHAFT,SHOULDERED MAIN	1
14	PAHZZ	3040-01-480-7536	7X677	8675611	CARRIER,PLANETARY G 4L80-E,OUTPUT	1
14	PAHZZ		34623	5717742	CARRIER,PLANETARY G 4L85-E,OUTPUT	1
15	PAHZZ	3120-01-154-7174	7X677	24241242	BEARING,WASHER,THRU	2
16	PAHZZ	3040-01-480-7593	7X677	24202229	BRAKE BAND AND LINI REAR PART OF KIT P/N 5717778	1
17	PAHZZ	3020-01-480-7630	7X677	24203398	GEAR,INTERNAL	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
18	KFHZZ		34623	5740386	RACE,BEARING PART OF KIT P/N 8623922	1
19	PAHZZ	5325-01-174-8626	7X677	8625221	RING,RETAINING	1
20	PAHZZ	3040-01-480-7591	7X677	24241428	GEARSHAFT,SPUR OUTPUT	1
21	PAHZZ	5325-01-150-4982	7X677	8626173	RING,RETAINING	1
22	PAHZZ	3120-01-154-4369	7X677	8625403	BEARING,WASHER,THRU .090-.094	1
22	PAHZZ	3120-01-154-8516	7X677	8625401	BEARING,WASHER,THRU .074-.078	1
22	PAHZZ	3120-01-159-5773	7X677	8625402	BEARING,WASHER,THRU .082-.086	1
22	PAHZZ	3120-01-154-8517	7X677	8625406	BEARING,WASHER,THRU .114-.118	1
22	PAHZZ	3120-01-161-4033	7X677	8625404	BEARING,WASHER,THRU .098-.102	1
22	PAHZZ	3120-01-162-5787	7X677	8625405	BEARING,WASHER,THRU .106-.110	1

END OF FIGURE

SUSTAINMENT MAINTENANCE
OVERRUN, OVERDRIVE, AND FOURTH CLUTCH ASSEMBLY

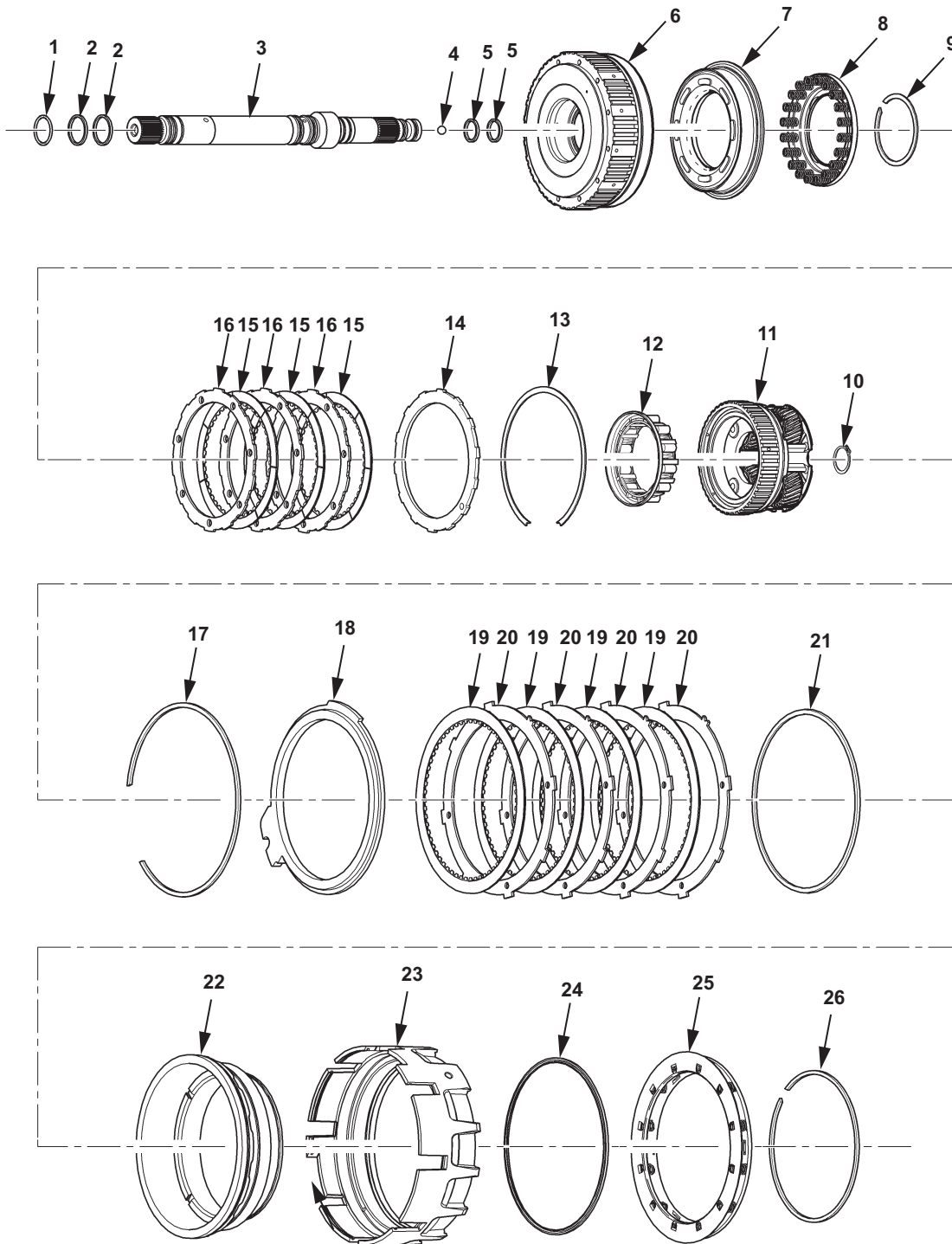


Figure 6. Overrun, Overdrive, and Fourth Clutch Assembly.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0713 INTERMEDIATE CLUTCH	
					FIG. 6 OVERRUN, OVERDRIVE, AND FOURTH CLUTCH ASSEMBLY	
1	PAHZZ	5330-01-414-6607	7X677	8661760	SEAL,PLAIN PART OF KIT P/N 5717778	1
2	PAHZZ	5330-01-468-3604	24617	8661894	SEAL,PLAIN ENCASED PART OF KIT P/N 5717778	2
3	PAHZZ	2835-01-478-4268	7X677	24222184	SHAFT,TURBINE,NONAI	1
4	PAHZZ	3110-01-412-0490	7X677	453571	BALL,BEARING 9/32	2
5	PAHZZ	5330-01-460-8987	7X677	8661893	SEAL,PLAIN PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	2
6	PAHZZ		34623	5717743	HOUSING PART,TRANSM 4L80-E/4L85-E,OVERRUN CLUTCH,HIGH TORQUE	1
6	PAHZZ		34623	5717781	HOUSING ASSY,TRANSM 4L80-E,OVERRUN CLUTCH,HIGH SPEED	1
7	PAHZZ	2520-01-456-5014	7X677	24202092	CARRIER,CLUTCH ASSE PISTON PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
8	PAHZZ	2520-01-461-0085	7X677	8661629	RETAINER AND SPRING 4L80-E/4L85-E,OVERRUN CLUTCH,HIGH TORQUE	1
8	PAHZZ		34623	5717782	RETAINER AND SPRING 4L80-E OVERRUN CLUTCH,HIGH SPEED	1
9	PAHZZ	5325-01-408-7971	7X677	8661568	RING,RETAINING 4L80-E/4L85- E,OVERRUN CLUTCH,HIGH TORQUE BACKING	1
9	PAHZZ		34623	5717581	RING,RETAINING 4L80-E,OVERRUN CLUTCH,HIGH SPEED	1
10	PAHZZ	5325-01-408-7969	7X677	8675523	RING,RETAINING	1
11	PAHZZ		34623	5717752	CARRIER,GEAR ASSEMB 4L80-E/4L85-E,OVERDRIVE CLUTCH,HIGH TORQUE	1
11	PAHZZ		34623	5716610	CARRIER,GEAR ASSEMB 4L80-E OVERDRIVE CLUTCH,HIGH SPEED	1
12	PAHZZ	3110-01-411-5784	7X677	07471001	RETAINER,ROLLER,BEA 4L80-E/4L85-E,OVERDRIVE CLUTCH,HIGH TORQUE	1
12	PAHZZ	2815-01-601-6438	34623	5716582	ROLLER BRAKE ASSEMB 4L80-E OVERDRIVE CLUTCH,HIGH SPEED	1
13	PAHZZ	5325-01-408-7970	7X677	8661572	RING,RETAINING	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
14	PAHZZ	2520-01-461-0078	7X677	8681449	RETAINER,CLUTCH PLA BACKING	1
15	PAHZZ	2520-01-409-1758	7X677	8661571	DISK,CLUTCH OVERRUN PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	3
16	PAHZZ	2520-01-409-1767	7X677	24204287	PLATE,INTERMEDIATE OVERRUN CLUTCH PART OF KIT P/N 6220FL0007	3
17	PAHZZ	5325-01-408-7972	7X677	8677887	RING,RETAINING	1
18	PAHZZ	2520-01-409-1751	7X677	8661582	RETAINER,CLUTCH PLA BACKING	1
19	PAHZZ	2520-01-439-5265	7X677	8682802	DISK,CLUTCH,VEHICUL FOURTH PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	4
20	PAHZZ	2520-01-411-3959	7X677	8661579	PLATE,INTERMEDIATE FOURTH CLUTCH PART OF KIT P/N 6220FL0007	4
21	PAHZZ	5331-01-414-4161	7X677	24202358	O-RING PART OF KIT P/N 5717778	1
22	PAHZZ	3040-01-480-4797	7X677	8661271	PISTON,LINEAR ACTUA	1
23	KFHZZ		34623	8686122	HOUSING,FRICION CL PART OF KIT P/N 24200789	1
24	PAHZZ	5331-01-480-0748	7X677	24202357	O-RING PART OF KIT P/N 5717778	1
25	PAHZZ	2520-01-410-8241	7X677	8661577	CLUTCH SPRING GUIDE	1
26	PAHZZ	5325-01-461-7157	7X677	8661578	RING,RETAINING	1

END OF FIGURE

SUSTAINMENT MAINTENANCE
FORWARD CLUTCH

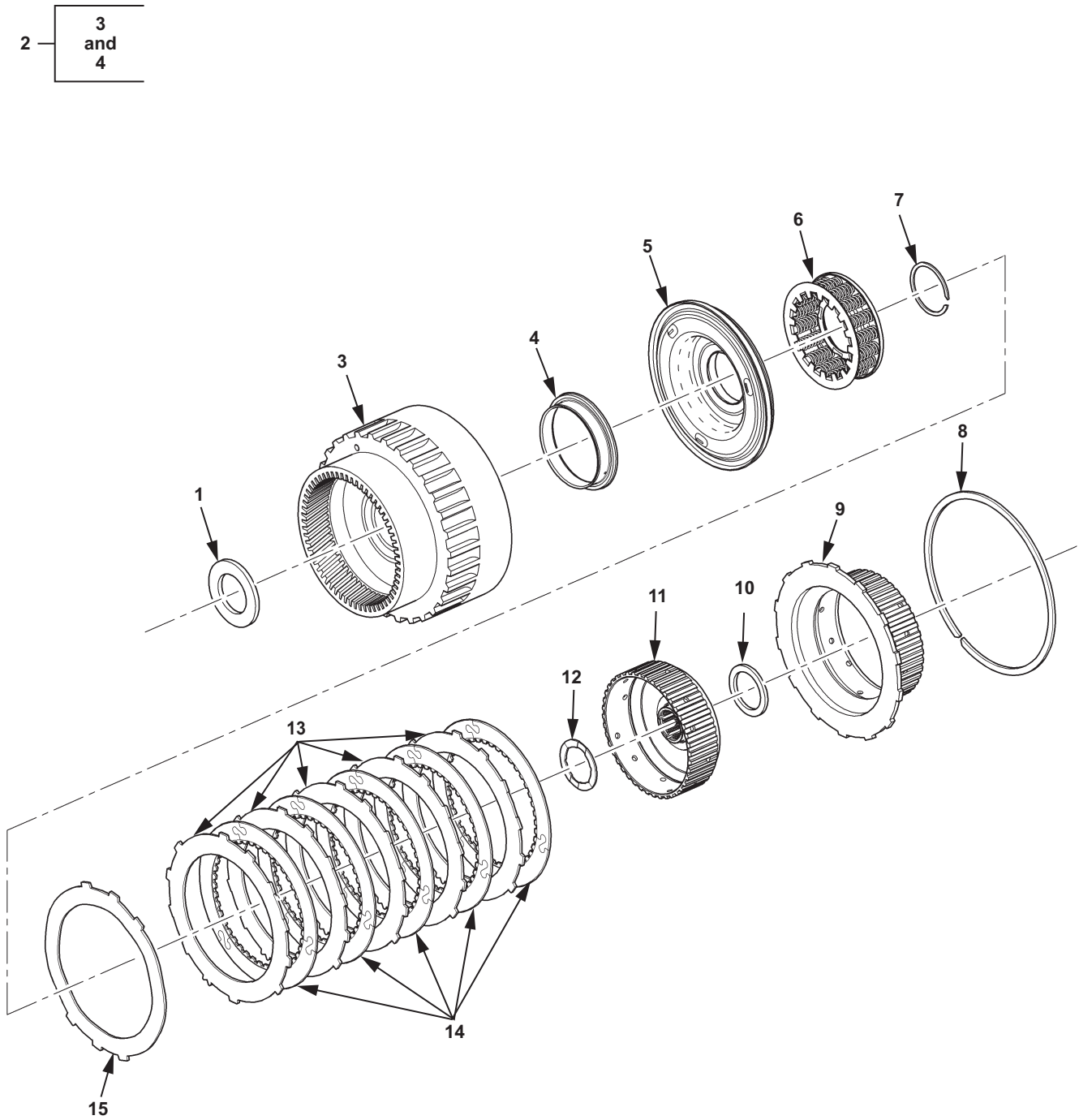


Figure 7. Forward Clutch.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0713 INTERMEDIATE CLUTCH	
					FIG. 7 FORWARD CLUTCH	
1	PAHZZ	3120-01-478-4269	7X677	8628202	BEARING,WASHER,THRU	1
2	PAHZZ	2520-01-410-8078	7X677	24222173	HOUSING PART,TRANSM	1
3	XAHZZ		34623	24203499	.HOUSING,FORWARD CLU	1
4	KFHZZ		34623	24207501	.SEAL,INNER CENTER SLEEVE PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
5	PAHZZ	2520-01-478-6604	7X677	24204957	PISTON,CLUTCH SHAFT PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
6	PAHZZ	2520-01-461-0099	7X677	8661764	SPRING AND RETAINER	1
7	PAHZZ	5325-01-171-3392	7X677	8623105	RING,RETAINING	1
8	PAHZZ	5325-00-007-3052	7X677	8623112	RING,RETAINING 5.97 I.D.,6.430 O.D.,.060 THICK	1
9	PAHZZ	2520-01-478-6607	7X677	8661837	HUB,SYNCHRONIZER,TR CLUTCH DRIVING	1
10	PAHZZ	3120-00-255-5697	7X677	8624781	BEARING,WASHER,THRU	1
11	PAHZZ	3020-01-479-2069	7X677	8677091	GEAR,SPUR DRIVEN HUB	1
12	PAHZZ	3120-01-156-8763	7X677	24241413	BEARING,WASHER,THRU	1
13	PAHZZ	2520-01-150-3931	7X677	8623849	DISK,CLUTCH,VEHICULPLATE PART OF KIT P/N 6220FL0007	5
14	PAHZZ	2520-01-150-3932	7X677	24202646	DISK,CLUTCH,VEHICUL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	5
15	PAHZZ	2520-01-481-8479	7X677	24205560	DISK,CLUTCH,VEHICUL WAVED PLATE	1
					END OF FIGURE	

SUSTAINMENT MAINTENANCE
DIRECT CLUTCH ASSEMBLY

10 — 11 and 12

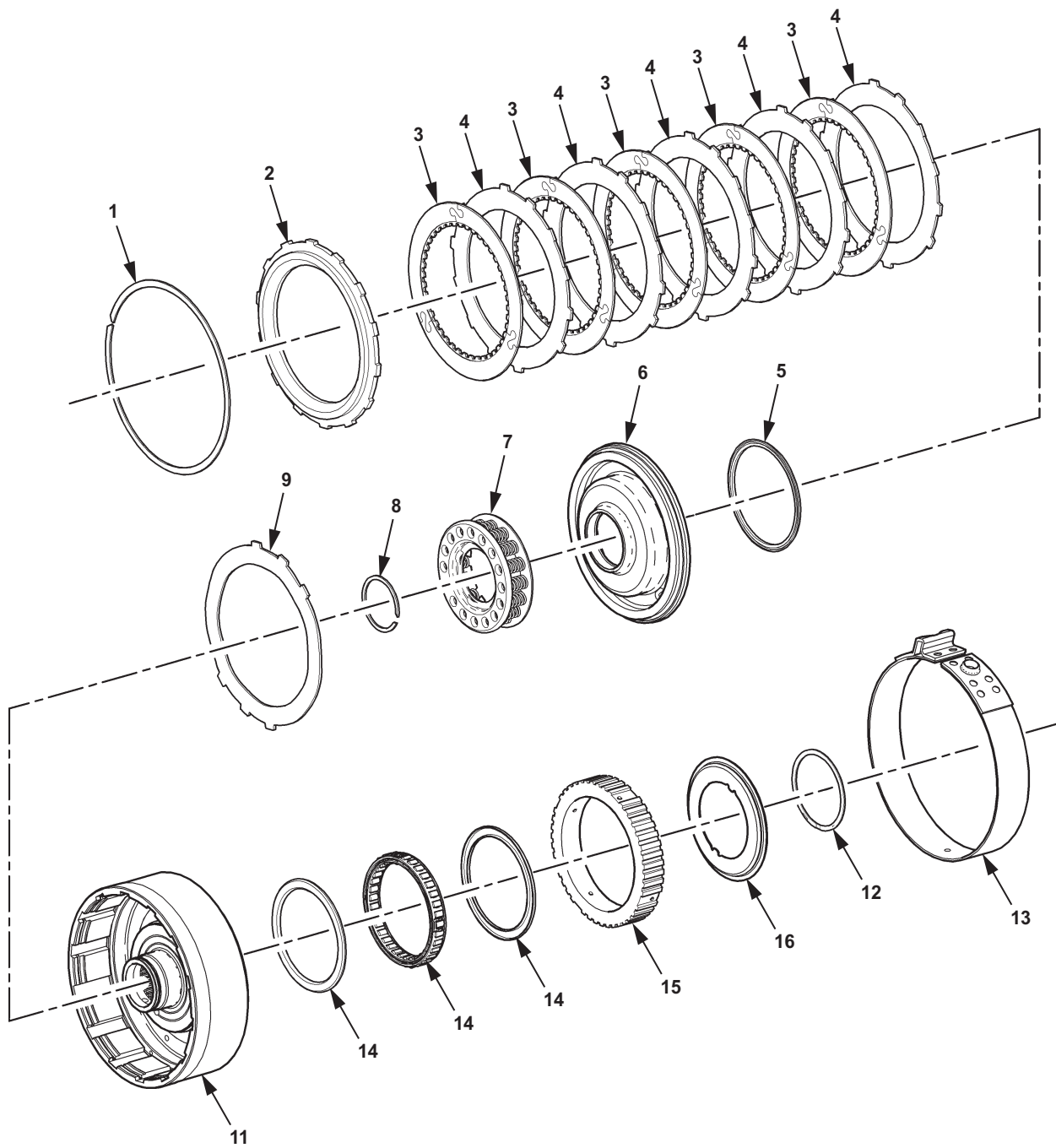


Figure 8. Direct Clutch Assembly.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0713 INTERMEDIATE CLUTCH						
FIG. 8 DIRECT CLUTCH ASSEMBLY						
1	PAHZZ	5325-00-007-3052	7X677	8623112	RING,RETAINING 5.97 I.D.,6.430 O.D.,.060 THICK	1
2	PAHZZ	2520-01-461-0076	7X677	8675557	RETAINER,CLUTCH PLA BACKING	1
3	PAHZZ	2520-01-150-3932	7X677	24202646	DISK,CLUTCH,VEHICUL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	5
4	PAHZZ	2520-00-172-1947	73342	29530330	DISK,CLUTCH PLATE PART OF KIT P/N 6220FL0007	5
5	KFHZZ		34623	24209225	SEAL,CLUTCH CENTER PART OF KIT P/N 5717778	1
6	PAHZZ	2520-01-474-8871	7X677	24204961	BEARING,CLUTCH PISTON PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
7	PAHZZ	2520-01-461-0099	7X677	8661764	SPRING AND RETAINER	1
8	PAHZZ	5325-01-171-3392	7X677	8623105	RING,RETAINING	1
9	PAHZZ	2520-01-481-8479	7X677	24205560	DISK,CLUTCH,VEHICUL WAVED PLATE	1
10	PAHZZ	2520-01-411-2749	7X677	8680924	CLUTCH ASSEMBLY,FRI	1
11	XAHZZ		34623	24209244	.HOUSING,DIRECT CLUT	1
12	PAHZZ	5340-01-476-0352	7X677	8675558	.CLIP,RETAINING PART OF KIT P/N 8680915 PART OF KIT 5717778	1
13	PAHZZ	2520-01-480-7556	7X677	24228967	BAND,CLUTCH FRONT PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
14	PAHZZ	2520-01-461-0092	7X677	8633173	SPRAG ASSEMBLY PART OF KIT P/N 8680915	1
15	KFHZZ		34623	8675520	RACE,OUTER PART OF KIT P/N 8680915	1
16	PAHZZ	2520-01-149-1868	7X677	8627334	DISK,CLUTCH,VEHICUL RETAINER PART OF KIT P/N 8680915	1

END OF FIGURE

**SUSTAINMENT MAINTENANCE
INTERMEDIATE CLUTCH AND CENTER SUPPORT ASSEMBLY**

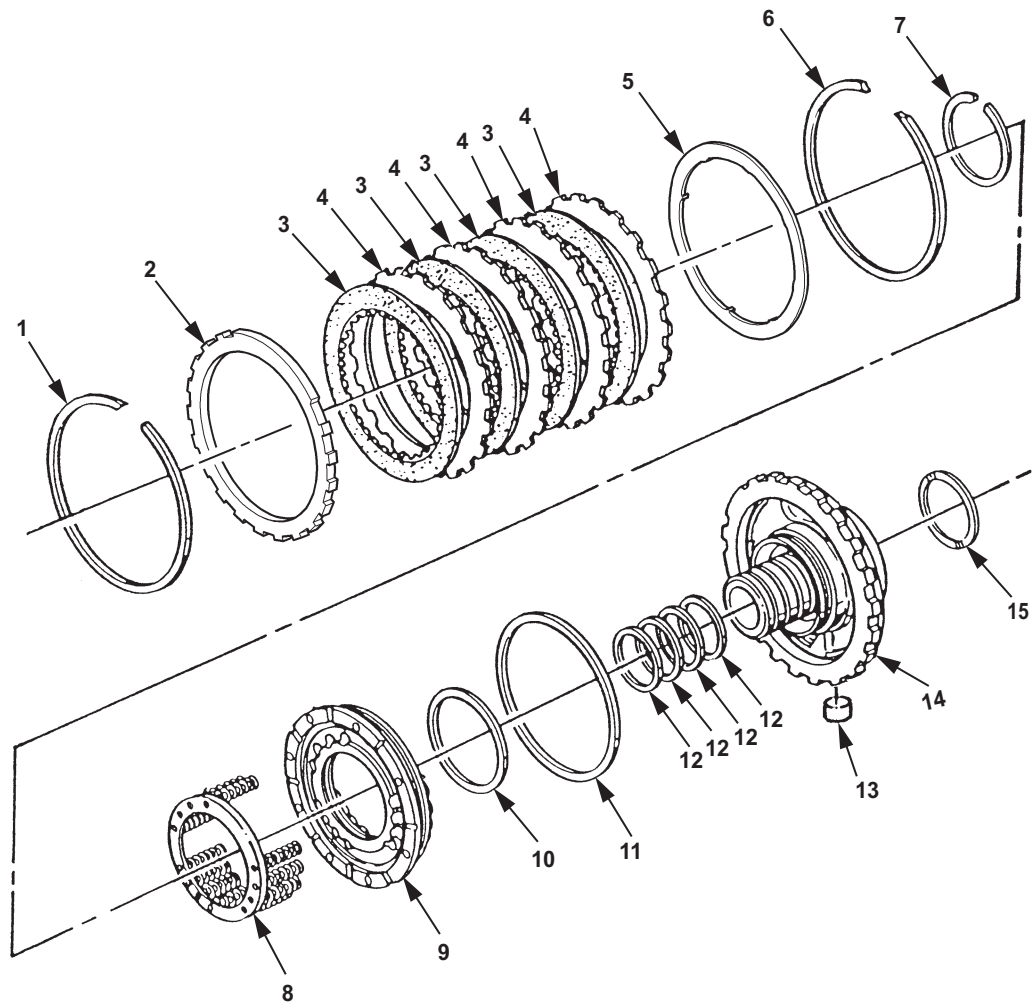


Figure 9. Intermediate Clutch and Center Support Assembly.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
					GROUP 0713 INTERMEDIATE CLUTCH	
					FIG. 9 INTERMEDIATE CLUTCH AND CENTER SUPPORT ASSEMBLY	
1	PAHZZ	5325-01-150-7830	7X677	8623149	RING,RETAINING	1
2	PAHZZ	2520-01-461-0073	7X677	8675519	RING,DRIVE PLATE,TR	1
3	PAHZZ	2520-01-456-7883	7X677	24202966	DISK,CLUTCH,VEHICUL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	4
4	PAHZZ	2520-01-461-0074	7X677	8675522	RING,DRIVE PLATE,TR PART OF KIT P/N 6220FL0007	4
5	PAHZZ	2520-01-456-2736	7X677	24204497	DISK,CLUTCH WAVED PLATE	1
6	PAHZZ	5325-01-160-4693	7X677	8623437	RING,RETAINING	1
7	PAHZZ	5325-01-158-2182	7X677	8623153	RING,RETAINING	1
8	PAHZZ	2520-01-460-4961	7X677	24202976	SPRING AND RETAINER	1
9	PFHZZ	2520-01-474-8868	7X677	24202552	BEARING,CLUTCH PISTON	1
10	PAHZZ	5330-01-478-5994	7X677	24202360	PACKING,PREFORMED PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
11	PAHZZ	5330-01-478-3900	7X677	24202361	PACKING,PREFORMED PART OF KIT P/N 5717778	1
12	PAHZZ	5330-01-480-0750	7X677	24205722	PACKING WITH RETAIN PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	4
13	PAHZZ	5365-01-593-8425	7X677	24203511	PLUG,MACHINE THREAD SEAL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778 PART OF KIT P/N 24208849	1
14	KFHZZ		346237	24207180	SUPPORT PART OF KIT P/N 24208849	1
15	PAHZZ	3120-01-155-4468	7X677	24241414	BEARING,WASHER,THRU	1
					END OF FIGURE	

**SUSTAINMENT MAINTENANCE
CONTROL VALVE AND RELATED PARTS**

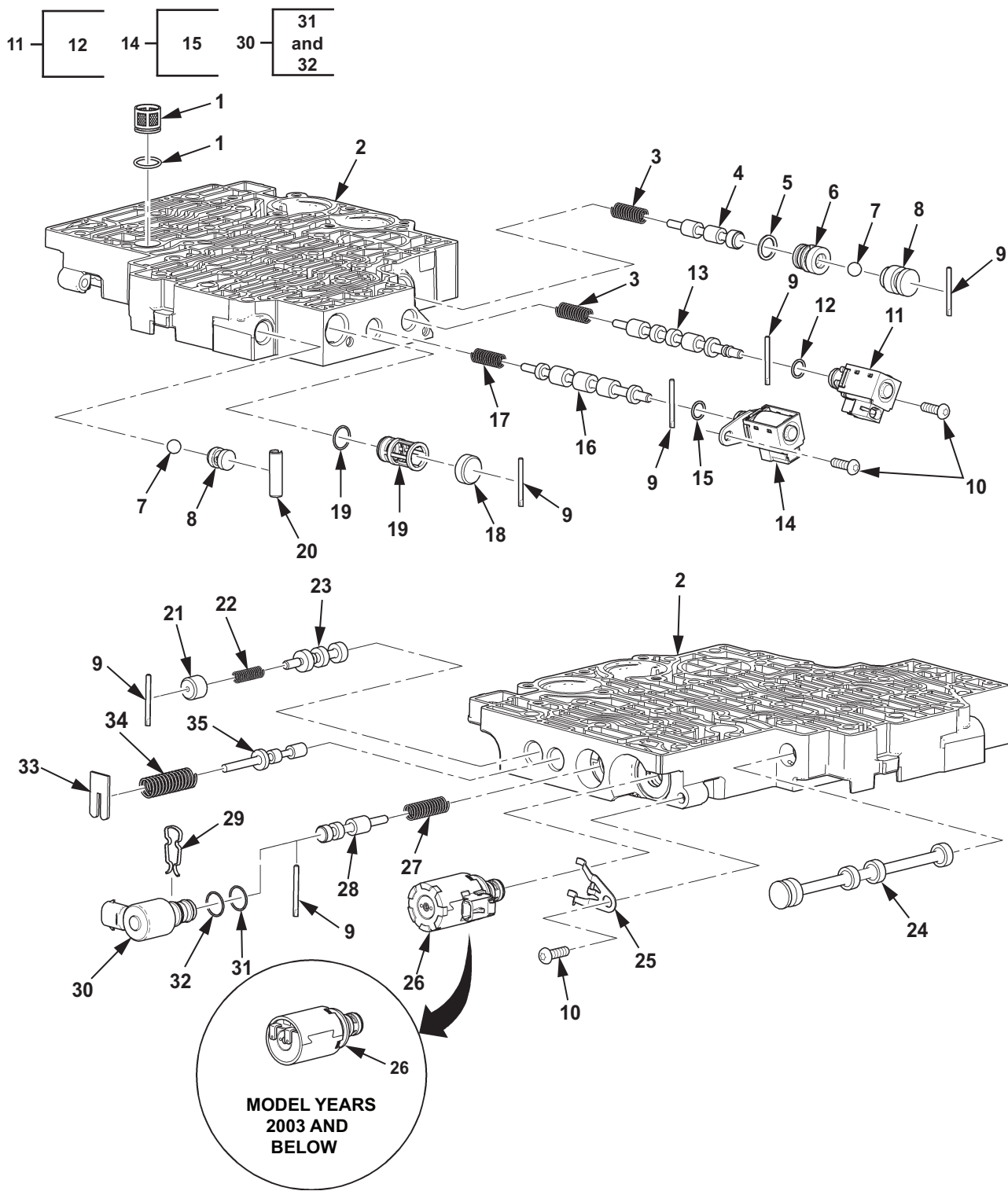


Figure 10. Control Valve and Related Parts.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0714 SERVO UNIT						
FIG. 10 CONTROL VALVE AND RELATED PARTS						
1	KFHZZ		34623	5714355	FILTER ELEMENT,FLUI PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
2	XAHZZ		34623	24204266	BODY,CONTROL VALVE	1
3	PAHZZ	5360-01-460-9069	7X677	8661891	SPRING,HELICAL,COMP	2
4	XAHZZ		34623	24243477	VALVE 3-4 SHIFT	1
5	PAHZZ	5330-01-456-7886	7X677	24201388	PACKING,PREFORMED O-RING PART OF KIT P/N 5717778	1
6	XAHZZ		34623	24201390	BUSHING	1
7	XAHZZ		34623	147500	BALL,0.375 DIA 3/8	2
8	XAHZZ		34623	24201389	PLUG	2
9	XAHZZ		34623	8675535	PIN	6
10	PAFZZ	5306-01-542-3498	7X677	11561724	BOLT,MACHINE M6-1.0X19.6	3
11	PAFZZ	5950-01-480-5377	7X677	24230289	COIL,ELECTRICAL 2-3 SHIFT,SOLENOID	1
12	PCFZZ	5331-00-492-2367	81343	AS568B-013	.O-RING PART OF KIT P/N 5717778	1
13	XAHZZ		34623	8661804	VALVE,SHIFT	1
14	PAFZZ	5950-01-480-5380	7X677	24230288	COIL,ELECTRICAL 1-2 SHIFT,SOLENOID	1
15	PCFZZ	5331-00-492-2367	81343	AS568B-013	.O-RING PART OF KIT P/N 5717778	1
16	XAHZZ		34623	8661805	VALVE	1
17	XAHZZ		34623	8661873	SPRING	1
18	XAHZZ		34623	8661821	PLUG	1
19	PAHZZ	4330-01-411-2786	7X677	24205853	FILTER ELEMENT,FLUI PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
20	XAHZZ		34623	8661867	SLEEVE	1
21	XAHZZ		34623	8661822	PLUG	1
22	XAHZZ		34623	8676074	SPRING	1
23	XAHZZ		34623	24202959	VALVE	1
24	PAHZZ	4820-01-409-1218	7X677	24246474	SLIDE,DIRECTIONAL C MANUAL VALVE	1
25	PAFZZ	5340-01-460-8362	7X677	8684217	CLIP,SPRING TENSION	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
26	PAFZZ	5945-01-568-2679	7X677	24230986	SOLENOID,ELECTRICAL PRESSURE CONTROL,MODEL YEARS 2004 AND ABOVE	1
26	PAFZZ	5945-01-478-7862	34623	5714373	SOLENOID,ELECTRICAL PRESSURE CONTROL,MODEL YEARS 2003 AND BELOW	1
27	XAHZZ		34623	8661871	SPRING	1
28	XAHZZ		34623	8681899	VALVE	1
29	PAFZZ	5340-01-460-8364	7X677	8678523	CLIP,SPRING TENSION	1
30	PAFZZ	5950-01-480-5374	7X677	24210864	COIL,ELECTRICAL TCC SOLENOID	1
31	PCFZZ	5331-00-492-2367	81343	AS568B-013	.O-RING PART OF KIT P/N 5717778	1
32	PCFZZ	5331-01-385-5215	62351	AS568A-014	.O-RING PART OF KIT P/N 5717778	1
33	PAHZZ	5340-01-460-8363	7X677	8684215	CLIP,SPRING TENSION	1
34	XAHZZ		34623	8684214	SPRING	1
35	XAHZZ		34623	8684213	VALVE	1

END OF FIGURE

SUSTAINMENT MAINTENANCE
CONTROL VALVE, ACCUMULATOR, AND RELATED PARTS

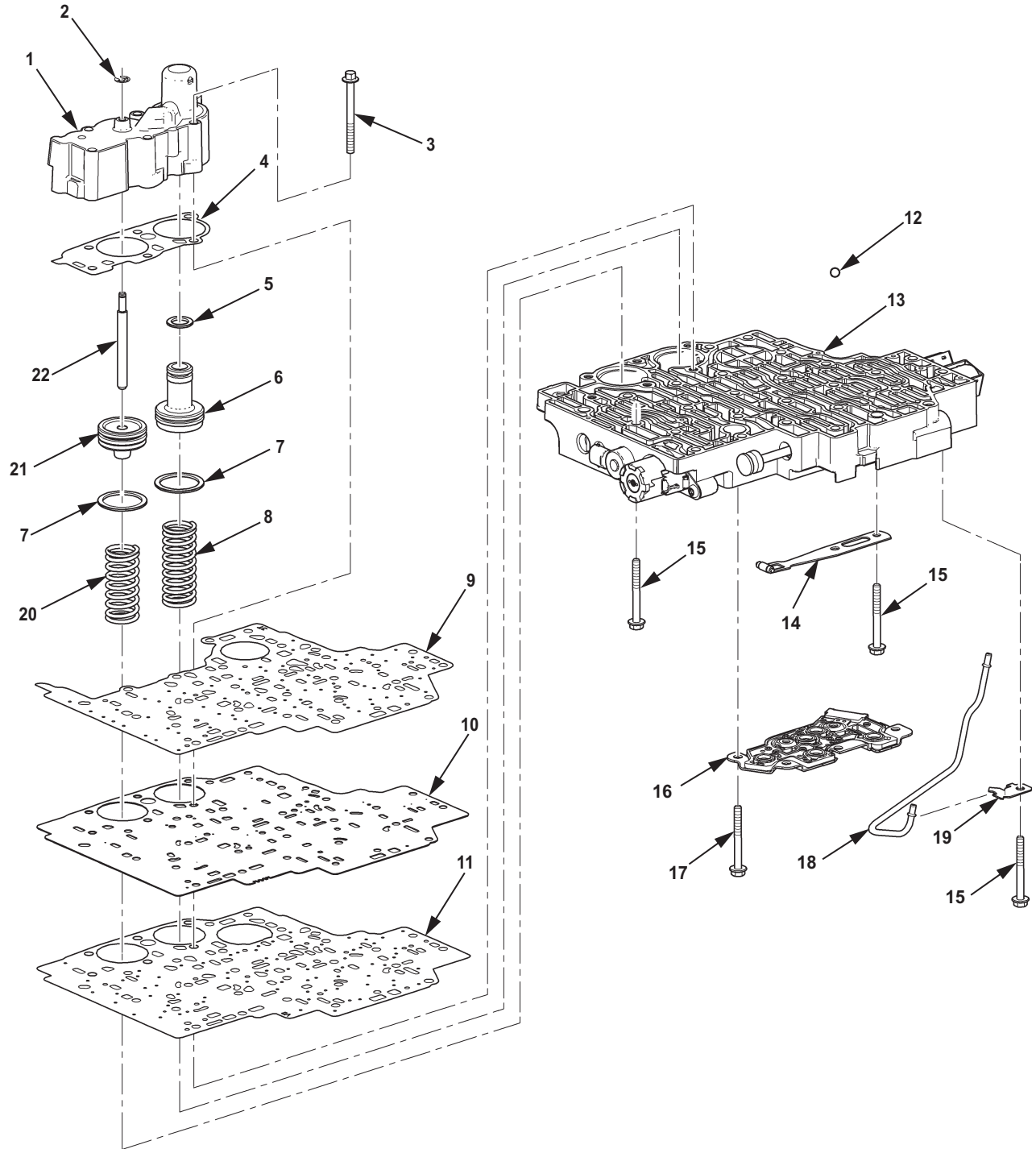
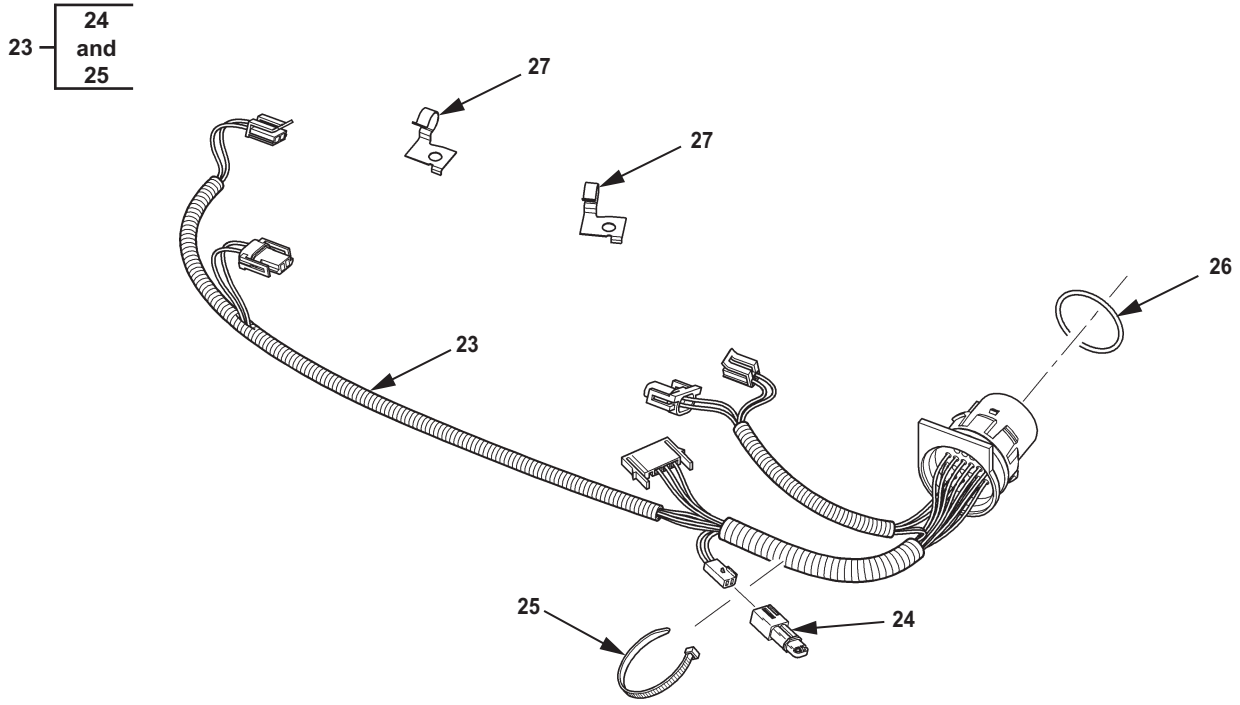
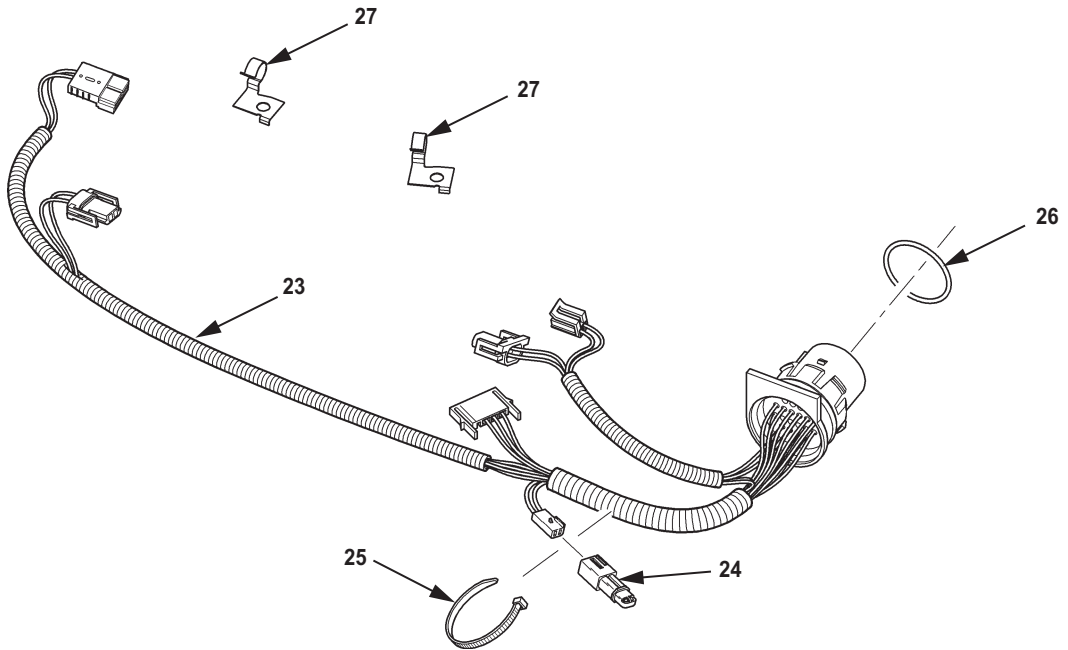


Figure 11. Control Valve, Accumulator, and Related Parts (Sheet 1 of 2).



MODEL YEARS 2004 AND ABOVE



MODEL YEARS 2003 AND BELOW

Figure 11. Control Valve, Accumulator, and Related Parts (Sheet 2 of 2).

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0714 SERVO UNIT						
FIG. 11 CONTROL VALVE, ACCUMULATOR, AND RELATED PARTS						
1	PAHZZ	2520-01-409-2509	7X677	8684220	HOUSING PART, TRANSM	1
2	PFHZZ	5325-01-408-7973	7X677	9413349	RING, RETAINING PART OF KIT P/N 24206749	1
3	PAHZZ	5306-01-469-9903	7X677	8675533	BOLT, MACHINE	6
4	PAHZZ	5330-01-478-6555	7X677	8661829	GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
5	PAHZZ	5330-01-470-6543	7X677	8661639	PACKING, PREFORMED SEAL PART OF KIT P/N 24206749 PART OF KIT P/N 5717778	1
6	PAHZZ	2520-01-444-2711	61928	8683088	PISTON, CLUTCH SHAFT 3RD CLUTCH	1
7	KFHZZ		34623	8661647	RETAINER, SEAL PART OF KIT P/N 24206749 PART OF KIT P/N 5717778	2
8	PAHZZ	5360-01-476-2692	7X677	24200436	SPRING, HELICAL, COMP	1
9	PAHZZ	5330-01-478-5993	7X677	24204253	GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
10	PAHZZ	2520-01-475-9665	7X677	24204270	PLATE, INTERMEDIATE	1
11	PAHZZ	5330-01-473-8584	7X677	24204268	GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
12	PAHZZ	3110-00-900-2560	96906	MS19061-20 007	BALL, BEARING 1/4 CHECKBALL	8
13	PAHZZ		34623	5716608	VALVE ASSEMBLY, TRAN	1
14	PAFZZ	5340-01-474-4002	7X677	8676418	CLIP, SPRING TENSION	1
15	PAFZZ	5306-01-476-3500	7X677	11515262	BOLT, MACHINE M6-1X55	21
16	PAHZZ	5930-01-456-7880	7X677	24222077	SWITCH, PRESSURE	1
17	PAHZZ	5306-01-476-3501	7X677	8676222	BOLT, MACHINE M6X1.00	6
18	PAHZZ	4710-01-477-9032	7X677	24204275	TUBE, BENT, METALLIC	1
19	PAHZZ	5340-01-491-7497	7X677	24204276	CLIP, RETAINING	1
20	PAHZZ	5360-01-469-8077	7X677	8675634	SPRING, HELICAL, COMP	1
21	KFHZZ		34623	24206025	PISTON, ACCUMULATOR 4TH CLUTCH PART OF KIT P/N 24206749	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
22	KFHZZ		34623	24216613	PIN,STRAIGHT,HEADLE PART OF KIT P/N 24206749	1
23	PAFZZ	6150-01-566-0525	7X677	24229664	WIRING HARNESS,BRAN MODEL YEARS 2004 AND ABOVE	1
23	PAFZZ	6150-01-470-2011	7X677	24241218	WIRING HARNESS,BRAN MODEL YEARS 2003 AND BELOW	1
24	PAFZZ	6685-01-477-2349	73342	12129691	.SENSOR,AMBIENT TEMP	1
25	PAFZZ	5975-00-133-8687	96906	MS3367-5-0	.STRAP,TIEDOWN,ELECT	1
26	PAFZZ	5330-01-096-7699	7X677	10054241	SEAL,SPEEDOMETER TRANSMISSION HARNESS PART OF KIT P/N 5717778	1
27	PAFZZ	5340-01-447-5839	7X677	8675539	CLIP,SPRING TENSION	2

END OF FIGURE

**SUSTAINMENT MAINTENANCE
FRONT SERVO, REAR SERVO, AND GOVERNOR ASSEMBLY**

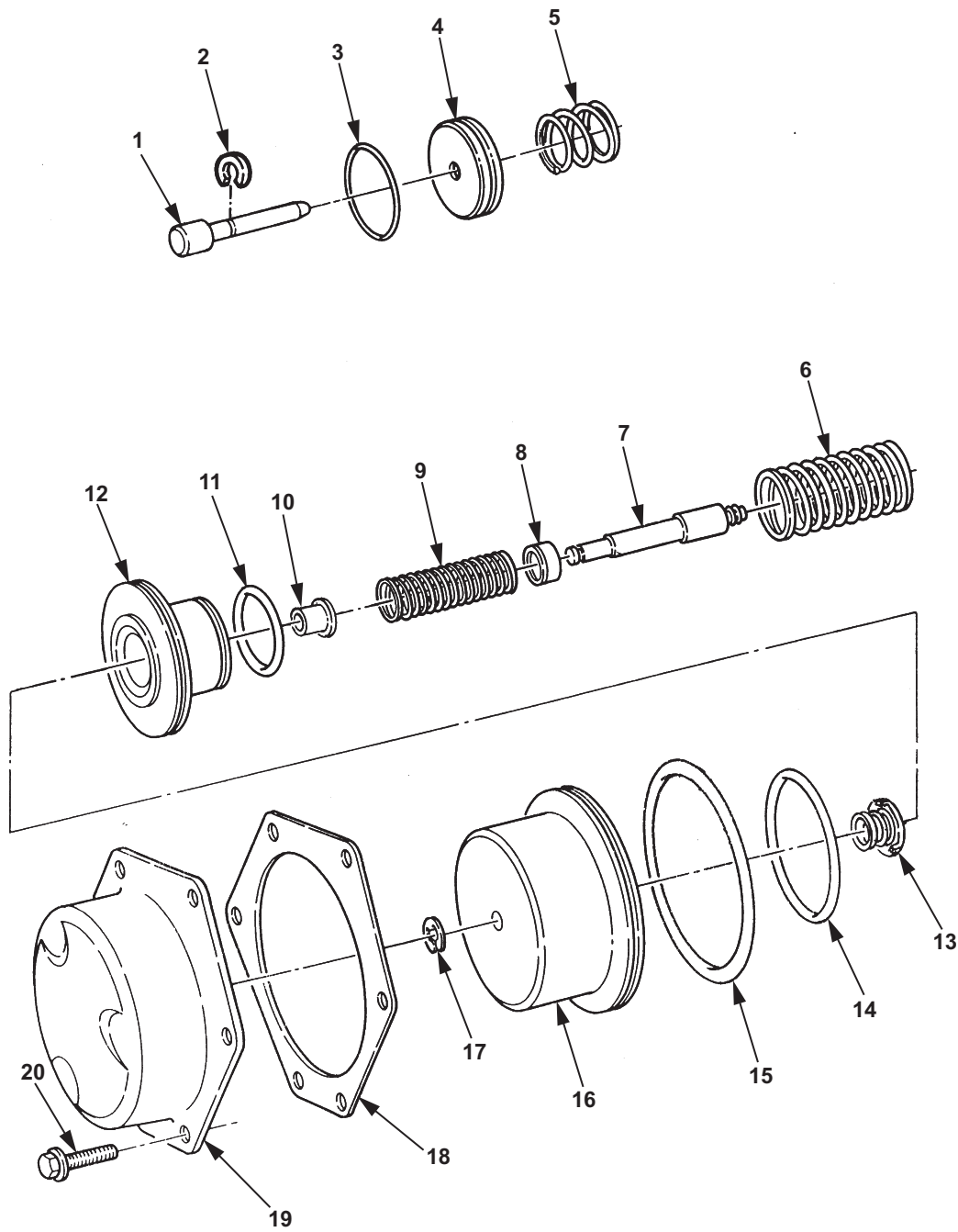


Figure 12. Front Servo, Rear Servo, and Governor Assembly.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0714 SERVO UNIT						
FIG. 12 FRONT SERVO, REAR SERVO, AND GOVERNOR ASSEMBLY						
1	KFHZZ		34623	8685473	PIN 2-1 SERVO BAND PART OF KIT P/N 24200418	1
2	KFHZZ		34623	8685474	WASHER,SLOTTED PART OF KIT P/N 24200418	1
3	PAHZZ	5330-01-163-2614	7X677	8626423	SEAL RING,METAL PART OF KIT P/N 24200418 PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
4	KFHZZ		34623	8685472	PISTON 2-1 SERVO BAND PART OF KIT P/N 24200418	1
5	PAHZZ	5360-01-150-6086	7X677	8623489	SPRING,HELICAL,COMP PART OF KIT P/N 24200418	1
6	PAHZZ	5360-01-478-6550	7X677	8655843	SPRING,FLAT	1
7	PAHZZ	5315-01-456-2743	7X677	24202583	PIN,SHOULDER,HEADLE 3.468-3.474,#7	1
7	PAHZZ	5315-01-456-6254	7X677	24202579	PIN,SHOULDER,HEADLE 3.412-3.418,#5	1
7	PAHZZ	5315-01-456-2737	7X677	24202577	PIN,SHOULDER,HEADLE 3.300-3.306,#1	1
7	PAHZZ	5315-01-456-2739	7X677	24202578	PIN,SHOULDER,HEADLE 3.356-3.362,#3	1
7	PAHZZ	5315-01-456-7882	7X677	24202582	PIN,SHOULDER,HEADLE 3.440-3.446,#6	1
7	PAHZZ	5315-01-456-2738	7X677	24202580	PIN,SHOULDER,HEADLE 3.328-3.334,#2	1
7	PAHZZ	5315-01-456-2740	7X677	24202581	PIN,SHOULDER,HEADLE 3.384-3.390,#4	1
8	PAHZZ	5340-01-154-6559	7X677	8623664	SEAT,HELICAL COMPRE	1
9	PAHZZ	5360-01-150-7829	7X677	8623666	SPRING,HELICAL,COMP	1
10	PAHZZ	5365-01-456-2742	7X677	24202986	SPACER,SLEEVE	1
11	KFHZZ		34623	8678294	RING,OIL SEAL ACCUM PART OF KIT P/N 6220FL0007 PART OF KIT P/N 24205250 PART OF KIT P/N 5717778	1
12	KFHZZ		34623	24202928	PISTON PART OF KIT P/N 24205250	1
13	PAHZZ	5360-01-456-2745	7X677	24202987	SPRING,HELICAL,COMP	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
14	KFHZZ		34623	8661890	RING,OIL SEAL ACCUM PART OF KIT P/N 24205250 PART OF KIT P/N 5717778	1
15	PAHZZ	5330-01-150-6239	7X677	8623430	GASKET SEAL PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
16	PAHZZ	3040-01-456-7881	7X677	24202985	PISTON,LINER ACTUA	1
17	PAHZZ	5325-01-480-7331	7X677	11610075	RING,RETAINING	1
18	PAHZZ	5330-01-478-4797	7X677	8675728	GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
19	PAHZZ	5340-01-456-2741	7X677	24202282	COVER,ACCESS	1
20	PAHZZ	5306-01-491-9414	7X677	8676000	BOLT,MACHINE	6

END OF FIGURE

SUSTAINMENT MAINTENANCE
TRANSMISSION OIL PUMP

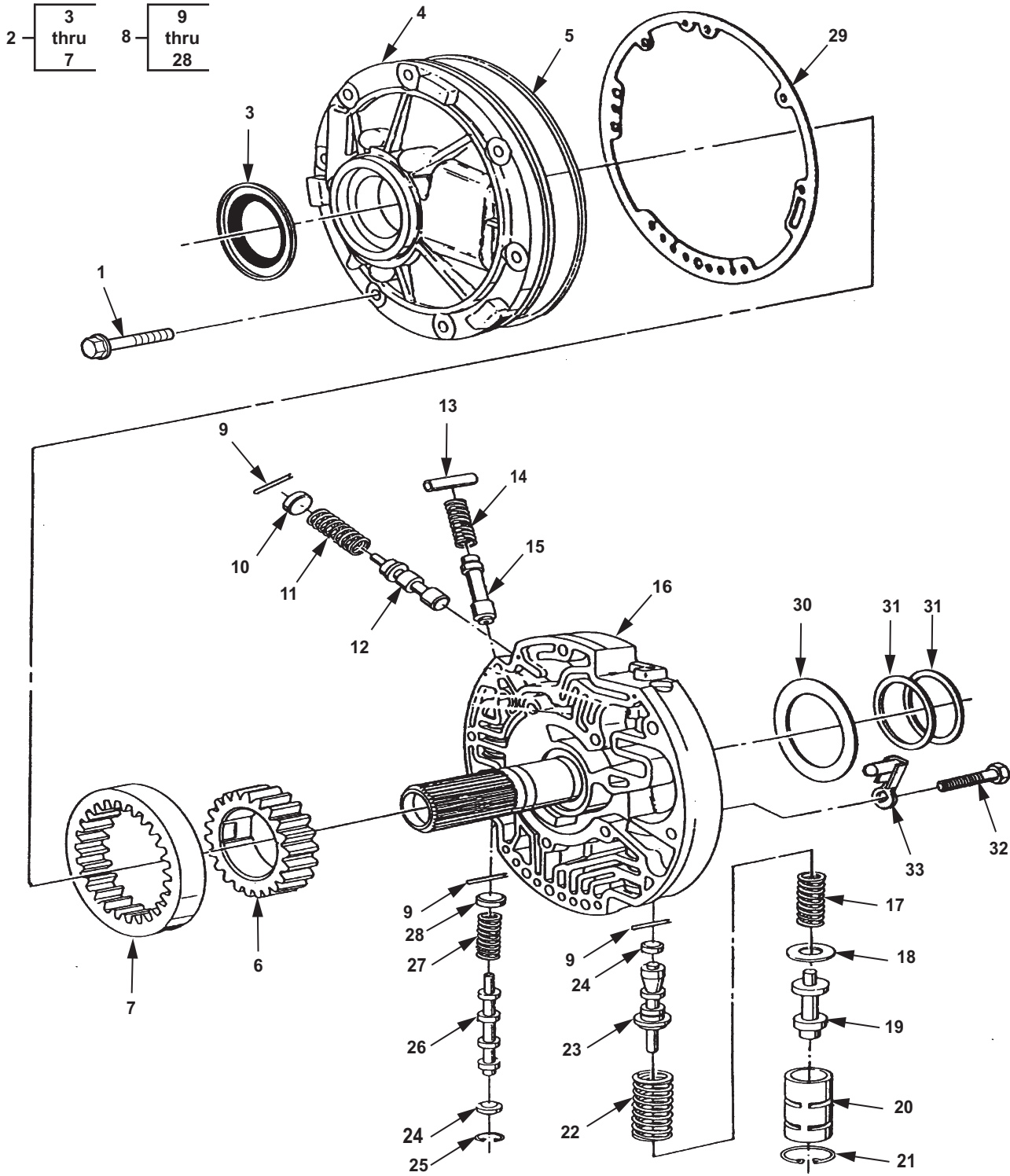


Figure 13. Transmission Oil Pump.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 0721 COOLERS, PUMPS, MOTORS						
FIG. 13 TRANSMISSION OIL PUMP						
1	PAHZZ	5306-01-411-1596	7X677	24206031	BOLT,MACHINE PART OF KIT P/N 5717778	7
2	PAHZZ	4320-01-485-7480	34623	5714975	PUMP,ROTARY	1
3	PAHZZ	5330-01-480-9169	7X677	24209839	.SEAL,PLAIN BLACK PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
4	XAHZZ		34623	24205778	.BODY,OIL PUMP	1
5	PAHZZ	5330-01-324-0906	7X677	24210605	.SEAL,PLAIN ENCASED PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
6	XAHZZ		34623	24205786	.GEAR	1
7	XAHZZ		34623	8661683	.GEAR	1
8	PAHZZ	2520-01-465-8809	7X677	24243751	COVER ASSEMBLY,TRAN	1
9	PAHZZ	5315-01-461-8374	7X677	8661838	.PIN,STRAIGHT,HEADLE	3
10	PAHZZ	5340-01-477-7052	7X677	8682858	.PLUG,EXPANSION	1
11	PAHZZ	5360-01-460-9068	7X677	8678258	.SPRING,HELICAL,COMP	1
12	PAHZZ	4820-01-460-9991	7X677	8678257	.VALVE,LINER,DIRECT	1
13	PAHZZ	5315-01-461-5649	7X677	8661768	.PIN,STRAIGHT,HEADLE	1
14	PFHZZ	5360-01-408-7977	7X677	8661767	.SPRING,HELICAL,COMP	1
15	PAHZZ	4810-01-460-9975	7X677	8661766	.SLIDE,DIRECTIONAL VALVE	1
16	XAHZZ		34623	24204304	.COVER,PUMP	1
17	PAHZZ	5360-01-460-9073	7X677	8680551	.SPRING,HELICAL,COMP	1
18	PAHZZ	3120-01-461-6680	7X677	8680548	.BEARING,WASHER,THRU	1
19	PAHZZ	4820-01-461-0011	7X677	8680549	.VALVE,LINER,DIRECT	1
20	PAHZZ	5340-01-460-8361	7X677	8682856	.SEAT,HELICAL COMPRE	1
21	PAHZZ	5325-01-477-6608	7X677	8679465	.RING,RETAINING	1
22	PAHZZ	5360-01-460-9070	7X677	8661798	.SPRING,HELICAL,COMP	1
23	PAHZZ	4820-01-460-8288	7X677	8680547	.SLIDE,DIRECTIONAL	1
24	PAHZZ	2520-01-461-5133	7X677	8682855	.PLUG,TRANSMISSION	2
25	PAHZZ	2010-00-937-5599	73342	274267	.RING REDUCTION,GEAR	1
26	PAHZZ	4820-01-460-9988	7X677	8681070	.VALVE,LINER,DIRECT	1
27	PAHZZ	5360-01-460-9072	7X677	8681069	.SPRING,HELICAL,COMP	1
28	PAHZZ	2520-01-461-5648	7X677	8682857	.PLUG,TRANSMISSION	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
29	PAHZZ	5330-01-409-1665	7X677	8677782	GASKET PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	1
30	PAHZZ	3120-01-471-7844	7X677	8677572	BEARING,WASHER,THRU .075 THICK,RED	1
30	PAHZZ	3120-01-411-5783	7X677	8677573	BUSHING,SLEEVE .091 THICK	1
30	PAHZZ	3120-01-411-5787	7X677	8677574	BEARING,WASHER,THRU .107 THICK,GREEN	1
30	PAHZZ	3120-01-461-6677	7X677	8677575	BEARING,WASHER,THRU .123 THICK,BLACK	1
30	PAHZZ	3120-01-461-6679	7X677	8677571	BEARING,WASHER,THRU .059 THICK	1
31	PAHZZ	5331-01-477-6762	7X677	24205833	O-RING PART OF KIT P/N 6220FL0007 PART OF KIT P/N 5717778	2
32	PAHZZ	5306-01-150-1190	7X677	11500921	BOLT,MACHINE M10-1.5X40	5
33	PAHZZ	4320-01-456-6258	7X677	24200357	SHIELD,VENT	1

END OF FIGURE

SUSTAINMENT MAINTENANCE
KITS

Figure KITS.

0043-2

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
GROUP 9401 FIGURE KITS						
FIG. KITS						
1	PAHZZ	4820-01-474-8911	7X677	24200418	PARTS KIT,PRESSURE PIN (1) 12 - 1 PISTON (1) 12 - 4 SEAL RING,METAL (1) 12 - 3 SPRING,HELICAL,COMP (1) 12 - 5 WASHER,SLOTTED (1) 12 - 2	1
2	PAHZZ	2520-01-459-5454	7X677	24200789	PARTS KIT,TRANSMISS BOLT,MACHINE (1) 3 - 26 HOUSING,FRICTION CL (1) 6 - 23	1
3	PAHZZ	1005-00-049-9324	7X677	24204472	VERNIER ASSY LEVER,REMOTE CONTRO (1) 4 - 5 SHAFT (1) 4 - 6	1
4	PAHZZ	3040-01-462-1286	7X677	24205250	PISTON,LINEAR ACTUA PISTON (1) 12 - 12 RING,OIL SEAL ACCUM (1) 12 - 14 RING,OIL SEAL ACCUM (1) 12 - 11	1
5	PAHZZ	2520-01-149-7861	7X677	24205551	CARRIER ASSEMBLY,TR BEARING,ROLLER,NEED (1) 5 - 2 CARRIER,CLUTCH ASSE (1) 5 - 8	1
6	PAHZZ	5340-01-408-8525	7X677	24206749	SEAT,HELICAL COMPRE PACKAGING,PREFORMED (1) 11 - 5 PIN,STRAIGHT,HEADLE (1) 11 - 22 PISTON,ACCUMULATOR (1) 11 - 21 RETAINER,SEAL (2) 11 - 7 RING,RETAINING (1) 11 - 2	1
7	PAHZZ	3110-01-478-4266	7X677	24208848	BALL,BEARING BEARING NEEDLE (1) 5 - 11 RACE,BEARING (1) 5 - 12 RACE,BEARING (1) 5 - 10	1
8	PAHZZ	2520-01-481-8460	7X677	24208849	PARTS KIT,CLUTCH DI BOLT,MACHINE (1) 3 - 16 PLUG,MACHINE THREAD (1) 9 - 13 SUPPORT (1) 9 - 14	1
9	PAFZZ	4330-01-496-5720	7X677	24210956	PARTS KIT,FLUID PRE FILTER ELEMENT,FLUI (1) 3 - 19 SEAL,PLAIN ENCASED (1) 3 - 18	1
10	PAFZZ	2520-01-482-4280	34623	5714952	PARTS KIT,HYDRAULIC PARTS KIT,OIL PAN (1) 3 - 22 PLUG,MACHINE THREAD (1) 3 - 23	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
11	PAHZZ	2520-01-624-2208	34623	5717778	PARTS KIT,MECHANICA BAND,CLUTCH (1) 8 - 13 BEARING,CLUTCH (1) 8 - 6 BOLT,MACHINE (1) 3 - 26 BOLT,MACHINE (1) 3 - 16 BOLT,MACHINE (2) 3 - 14 BOLT,MACHINE (7) 13 - 1 BRAKE BAND AND LINI (1) 5 - 16 CARRIER,CLUTCH ASSE (1) 6 - 7 CLIP,RETAINING (1) 8 - 12 CLIP,RETAINING (2) 3 - 3 DISK,CLUTCH (3) 6 - 15 DISK,CLUTCH,VEHICUL (4) 6 - 19 DISK,CLUTCH,VEHICUL (4) 9 - 3 DISK,CLUTCH,VEHICUL (5) 7 - 14 DISK,CLUTCH,VEHICUL (5) 8 - 3 FILTER ELEMENT,FLUI (1) 3 - 19 FILTER ELEMENT,FLUI (1) 10 - 19 FILTER ELEMENT,FLUI (1) 10 - 1 GASKET (1) 4 - 7 GASKET (1) 11 - 9 GASKET (1) 3 - 21 GASKET (1) 11 - 4 GASKET (1) 12 - 15 GASKET (1) 12 - 18 GASKET (1) 13 - 29 GASKET (1) 3 - 24 GASKET (1) 11 - 11 O-RING (1) 3 - 9 O-RING (1) 10 - 32 O-RING (1) 10 - 15 O-RING (1) 6 - 21 O-RING (1) 10 - 31 O-RING (1) 6 - 24 O-RING (1) 3 - 6 O-RING (1) 10 - 12 O-RING (2) 13 - 31 O-RING (2) 3 - 13 PACKING WITH RETAIN (4) 9 - 12 PACKING,PREFORMED (1) 9 - 11 PACKING,PREFORMED (1) 10 - 5 PACKING,PREFORMED (1) 11 - 5 PISTON,CLUTCH SHAFT (1) 7 - 5 PLUG,MACHINE THREAD (1) 9 - 13 PLUG,PIPE (1) 3 - 15 PLUG,PIPE (1) 4 - 11 RETAINER,SEAL (2) 11 - 7 RING,OIL SEAL ACCUM (1) 12 - 14 RING,OIL SEAL ACCUM (1) 12 - 11 SCREEN,VALVE,AUTOMA (1) 3 - 17 SEAL RING,METAL (1) 12 - 3 SEAL,CLUTCH CENTER (1) 8 - 5 SEAL,INNER (1) 7 - 4 SEAL,PLAIN (1) 3 - 10 SEAL,PLAIN (1) 6 - 1 SEAL,PLAIN (1) 13 - 3 SEAL,PLAIN (2) 6 - 5 SEAL,PLAIN ENCASED (1) 13 - 5 SEAL,PLAIN ENCASED (1) 3 - 18 SEAL,PLAIN ENCASED (2) 6 - 2 SEAL,SPEEDOMETER (1) 11 - 26	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
12	PAHZZ	2520-01-600-3071	16236	6220FL0007	REPAIR KIT,MECHANIC BAND,CLUTCH (1) 8 - 13 BEARING,CLUTCH (1) 8 - 6 BOLT,MACHINE (1) 3 - 26 BOLT,MACHINE (1) 3 - 16 CARRIER,CLUTCH ASSE (1) 6 - 7 CLIP,RETAINING (2) 3 - 3 DISK,CLUTCH (3) 6 - 15 DISK,CLUTCH (5) 8 - 4 DISK,CLUTCH,VEHICUL (4) 6 - 19 DISK,CLUTCH,VEHICUL (4) 9 - 3 DISK,CLUTCH,VEHICUL (5) 7 - 13 DISK,CLUTCH,VEHICUL (5) 7 - 14 DISK,CLUTCH,VEHICUL (5) 8 - 3 FILTER ELEMENT,FLUI (1) 3 - 19 FILTER ELEMENT,FLUI (1) 10 - 19 FILTER ELEMENT,FLUI (1) 10 - 1 GASKET (1) 4 - 7 GASKET (1) 11 - 9 GASKET (1) 11 - 4 GASKET (1) 12 - 15 GASKET (1) 12 - 18 GASKET (1) 13 - 29 GASKET (1) 3 - 24 GASKET (1) 11 - 11 KIT,BOX SEAL (1) 3 - 29 KIT,BUSHING (1) 3 - 28 KIT,OVERHAUL (1) 3 - 27 O-RING (1) 3 - 9 O-RING (1) 3 - 6 O-RING (2) 13 - 31 O-RING (2) 3 - 13 PACKING WITH RETAIN (4) 9 - 12 PACKING,PREFORMED (1) 9 - 11 PACKING,PREFORMED (1) 9 - 10 PISTON,CLUTCH SHAFT (1) 7 - 5 PLATE,INTERMEDIATE (3) 6 - 16 PLATE,INTERMEDIATE (4) 6 - 20 PLUG,MACHINE THREAD (1) 9 - 13 RING,DRIVE PLATE,TR (4) 9 - 4 RING,OIL SEAL ACCUM (1) 12 - 11 SCREEN,VALVE,AUTOMA (1) 3 - 17 SEAL RING,METAL (1) 12 - 3 SEAL,INNER (1) 7 - 4 SEAL,PLAIN (1) 3 - 10 SEAL,PLAIN (1) 13 - 3 SEAL,PLAIN (2) 6 - 5 SEAL,PLAIN ENCASED (1) 13 - 5 SEAL,PLAIN ENCASED (1) 3 - 18 SEAL,PLAIN ENCASED (2) 6 - 2	1
13	PAHZZ	3120-01-167-4172	7X677	8623920	PARTS KIT,BEARING R BEARING,ROLLER,THRU (2) 5 - 4 PARTS KIT,BEARING (2) 5 - 5 RACE,BEARING (1) 5 - 3	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO.	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODE (UOC)	QTY
14	PAHZZ	3110-01-169-0734	7X677	8623922	BEARING,ROLLER,THRU BEARING,ROLLER,THRU (2) 5 - 4 PARTS KIT,BEARING (2) 5 - 5 RACE,BEARING (1) 5 - 18	1
15	PAHZZ	2520-01-410-8077	7X677	8680915	PARTS KIT,MECHANICA CLIP,RETAINING (1) 8 - 12 DISK,CLUTCH,VEHICUL (1) 8 - 16 RACE,OUTER (1) 8 - 15 SPRAG ASSEMBLY (1) 8 - 14	1

END OF FIGURE

**SUSTAINMENT MAINTENANCE
NATIONAL STOCK NUMBER INDEX**

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5325-00-007-3052	7	8	3120-01-159-5773	5	22
	8	1	5325-01-160-4693	9	6
1005-00-049-9324	KITS	3	3120-01-161-4033	5	22
5975-00-133-8687	11	25	3120-01-162-5787	5	22
2520-00-172-1947	8	4	5330-01-163-2614	12	3
3120-00-255-5697	7	10	3120-01-167-4172	5	5
5340-00-366-0618	4	9		KITS	13
5331-00-492-2367	10	12	3110-01-169-0734	5	4
	10	15		KITS	14
	10	31	5325-01-171-3392	7	7
3110-00-900-2560	11	12		8	8
2010-00-937-5599	13	25	5325-01-174-8626	5	19
5330-01-096-7699	11	26	5305-01-188-5133	2	2
2520-01-149-1868	8	16	5306-01-197-1492	4	1
2520-01-149-7861	KITS	5	5330-01-251-1607	4	7
5306-01-150-1190	13	32	5330-01-324-0906	13	5
2520-01-150-3931	7	13	5330-01-360-5271	3	21
2520-01-150-3932	7	14	5331-01-385-5215	10	32
	8	3	5330-01-397-0374	3	18
5325-01-150-4982	5	21	2990-01-399-1023	3	12
5360-01-150-6086	12	5	5325-01-408-7969	6	10
5330-01-150-6239	12	15	5325-01-408-7970	6	13
5360-01-150-7829	12	9	5325-01-408-7971	6	9
5325-01-150-7830	9	1	5325-01-408-7972	6	17
3120-01-154-4369	5	22	5325-01-408-7973	11	2
5340-01-154-6559	12	8	5360-01-408-7977	13	14
3120-01-154-7174	5	15	5340-01-408-8525	KITS	6
3120-01-154-8516	5	22	4820-01-409-1218	10	24
3120-01-154-8517	5	22	5330-01-409-1665	13	29
5325-01-154-8562	5	1	2520-01-409-1751	6	18
5310-01-155-2503	1	2	2520-01-409-1758	6	15
3120-01-155-4468	9	15	2520-01-409-1767	6	16
3120-01-156-8763	7	12	3040-01-409-2502	1	1
5325-01-158-2182	9	7	2520-01-409-2509	11	1

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
2520-01-410-8077	KITS	15	2520-01-459-5454	KITS	2
2520-01-410-8078	7	2	2520-01-460-4961	9	8
2520-01-410-8241	6	25	4730-01-460-5520	4	11
5306-01-411-1596	13	1	4820-01-460-8288	13	23
2520-01-411-2749	8	10	2590-01-460-8316	4	13
4330-01-411-2786	10	19	5340-01-460-8361	13	20
2520-01-411-3959	6	20	5340-01-460-8362	10	25
3120-01-411-5783	13	30	5340-01-460-8363	10	33
3110-01-411-5784	6	12	5340-01-460-8364	10	29
3120-01-411-5787	13	30	5330-01-460-8987	6	5
3110-01-412-0490	6	4	5330-01-460-8988	3	10
5331-01-414-4161	6	21	5360-01-460-9068	13	11
5330-01-414-6607	6	1	5360-01-460-9069	10	3
2520-01-439-5265	6	19	5360-01-460-9070	13	22
2520-01-444-2711	11	6	5360-01-460-9072	13	27
5315-01-447-0492	4	4	5360-01-460-9073	13	17
5310-01-447-0968	4	3	5315-01-460-9907	4	10
5340-01-447-5839	11	27	5325-01-460-9908	3	11
3040-01-447-7995	4	2	3040-01-460-9964	4	12
2520-01-456-2736	9	5	4810-01-460-9975	13	15
5315-01-456-2737	12	7	4820-01-460-9988	13	26
5315-01-456-2738	12	7	4820-01-460-9991	13	12
5315-01-456-2739	12	7	4820-01-461-0011	13	19
5315-01-456-2740	12	7	2520-01-461-0074	9	4
5340-01-456-2741	12	19	2520-01-461-0076	8	2
5365-01-456-2742	12	10	2520-01-461-0078	6	14
5315-01-456-2743	12	7	2520-01-461-0085	6	8
5360-01-456-2745	12	13	2520-01-461-0092	8	14
2520-01-456-5014	6	7	2520-01-461-0099	7	6
5315-01-456-6254	12	7		8	7
4320-01-456-6258	13	33	2520-01-461-2374	3	17
5930-01-456-7880	11	16	5306-01-461-3555	3	26
3040-01-456-7881	12	16	5306-01-461-3557	3	16
5315-01-456-7882	12	7	5360-01-461-4931	4	8
2520-01-456-7883	9	3	2520-01-461-5133	13	24
5330-01-456-7886	10	5	2520-01-461-5648	13	28

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5315-01-461-5649	13	13	5330-01-478-4797	12	18
3120-01-461-6677	13	30	5330-01-478-5993	11	9
3120-01-461-6679	13	30	5330-01-478-5994	9	10
3120-01-461-6680	13	18	5360-01-478-6550	12	6
5325-01-461-7157	6	26	5330-01-478-6555	11	4
5315-01-461-8374	13	9	5330-01-478-6569	11	7
3040-01-462-1286	KITS	4	2520-01-478-6604	7	5
5306-01-465-2140	3	25	2520-01-478-6607	7	9
2520-01-465-8809	13	8	5945-01-478-7862	10	26
5330-01-468-3604	6	2	3020-01-479-2069	7	11
5360-01-469-8077	11	20	5331-01-480-0748	6	24
5306-01-469-9903	11	3	5330-01-480-0750	9	12
6150-01-470-2011	11	23	5330-01-480-2502	3	24
5330-01-470-6543	11	5	3040-01-480-4797	6	22
3120-01-471-7844	13	30	3110-01-480-5240	5	2
5330-01-473-8584	11	11	5950-01-480-5374	10	30
5340-01-474-4002	11	14	5950-01-480-5377	10	11
5340-01-474-4011	3	3	5950-01-480-5380	10	14
2520-01-474-8868	9	9	5365-01-480-6812	3	23
2520-01-474-8871	8	6	3020-01-480-7302	5	7
4820-01-474-8911	KITS	1	3040-01-480-7309	5	13
2520-01-475-9665	11	10	5325-01-480-7331	12	17
5340-01-476-0352	8	12	3040-01-480-7536	5	14
5360-01-476-2692	11	8	2520-01-480-7553	2	1
5306-01-476-3500	11	15	2520-01-480-7556	8	13
5306-01-476-3501	11	17	2520-01-480-7563	5	8
6685-01-477-2349	11	24	2520-01-480-7565	9	2
4710-01-477-3662	3	7	3040-01-480-7591	5	20
5325-01-477-6608	13	21	3040-01-480-7593	5	16
5331-01-477-6762	13	31	3020-01-480-7630	5	17
5340-01-477-7052	13	10	5330-01-480-9169	13	3
4710-01-477-9032	11	18	2520-01-481-8344	3	22
5330-01-478-3900	9	11	2520-01-481-8460	KITS	8
3110-01-478-4266	KITS	7	2520-01-481-8479	7	15
2835-01-478-4268	6	3		8	9
3120-01-478-4269	7	1	2520-01-482-4280	KITS	10

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4320-01-485-7480	13	2	4730-01-595-7069	3	8
2520-01-489-0850	3	1	4730-01-597-3501	3	5
5340-01-491-7497	11	19	2520-01-600-3071	KITS	12
5306-01-491-9414	12	20	2815-01-601-6438	6	12
3040-01-493-4677	5	6	5306-01-602-0476	3	14
4330-01-496-5720	KITS	9	4730-01-615-4243	3	4
5306-01-542-3498	10	10	2520-01-624-2208	KITS	11
4730-01-560-3083	3	8	2520-01-624-2240	2	1
6150-01-566-0525	11	23	5306-01-624-5574	3	16
5945-01-568-2679	10	26	2520-01-625-7876	3	1
5365-01-593-8425	9	13			

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
PART NUMBER INDEX**

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
07471001	6	12	24202552	9	9
10054241	11	26	24202577	12	7
11500921	13	32	24202578	12	7
11508687	4	1	24202579	12	7
11514308	3	14	24202580	12	7
11514603	1	2	24202581	12	7
11515262	11	15	24202582	12	7
11561724	10	10	24202583	12	7
11610075	12	17	24202611	4	8
12129691	11	24	24202646	7	14
12340514	2	2		8	3
12447176	1	1	24202928	12	12
147500	10	7	24202959	10	23
148148	4	9	24202966	9	3
24200173	4	2	24202976	9	8
24200224	4	11	24202985	12	16
24200347	4	13	24202986	12	10
24200357	13	33	24202987	12	13
24200374	3	7	24203398	5	17
24200418	KITS	1	24203400	5	13
24200436	11	8	24203499	7	3
24200789	KITS	2	24203511	9	13
24200999	4	6	24203876	3	12
24201001	4	5	24204253	11	9
24201388	10	5	24204266	10	2
24201389	10	8	24204268	11	11
24201390	10	6	24204270	11	10
24202092	6	7	24204275	11	18
24202229	5	16	24204276	11	19
24202282	12	19	24204287	6	16
24202357	6	24	24204304	13	16
24202358	6	21	24204472	KITS	3
24202360	9	10	24204497	9	5
24202361	9	11	24204957	7	5

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
24204961	8	6	24230289	10	11
24205103	3	3	24230986	10	26
24205123	3	24	24233367	3	8
24205250	KITS	4	24236579	3	5
24205551	KITS	5	24236581	3	8
24205560	7	15	24238150	3	6
	8	9		3	9
24205722	9	12	24241218	11	23
24205778	13	4	24241242	5	15
24205786	13	6	24241413	7	12
24205833	13	31	24241414	9	15
24205853	10	19	24241428	5	20
24206025	11	21	24241433	5	8
24206031	13	1	24241457	3	2
24206749	KITS	6	24243751	13	8
24207180	9	14	24246474	10	24
24207264	5	6	274267	13	25
24207501	7	4	29530330	8	4
24208848	KITS	7	34002EAF	3	27
24208849	KITS	8	34030EA	3	28
24209225	8	5	453571	6	4
24209244	8	11	5470378	5	11
24209475	5	7	5714335	3	11
24209839	13	3	5714355	10	1
24210605	13	5	5714373	10	26
24210864	10	30	5714952	KITS	10
24210956	KITS	9	5714953	3	23
24212452	3	19	5714960	5	10
24216613	11	22	5714961	3	4
24217238	2	1	5714975	13	2
24222077	11	16	5715154	3	16
24222173	7	2	5715672	9	2
24222184	6	3	5715715	3	20
24228967	8	13	5716582	6	12
24229664	11	23	5716608	11	13
24230288	10	14	5716610	6	11

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
5717517	3	22	8623922	KITS	14
5717581	6	9	8624781	7	10
5717740	2	1	8625221	5	19
5717741	5	8	8625401	5	22
5717742	5	14	8625402	5	22
5717743	6	6	8625403	5	22
5717752	6	11	8625404	5	22
5717769	3	15	8625405	5	22
5717770	5	9	8625406	5	22
5717778	KITS	11	8626173	5	21
5717780	3	13	8626423	12	3
5717781	6	6	8626816	5	1
5717782	6	8	8627334	8	16
5740377	5	12	8628202	7	1
5740384	5	4	8633173	8	14
5740386	5	18	8648178	4	3
5744077	3	25	8655843	12	6
57K6204	3	1	8656613	3	18
57K6233	3	1	8657163	4	7
6220FL0007	KITS	12	8661271	6	22
7471009	5	2	8661568	6	9
8623105	7	7	8661571	6	15
	8	8	8661572	6	13
8623112	7	8	8661577	6	25
	8	1	8661578	6	26
8623149	9	1	8661579	6	20
8623153	9	7	8661582	6	18
8623183	5	3	8661629	6	8
8623204	5	5	8661639	11	5
8623430	12	15	8661647	11	7
8623437	9	6	8661683	13	7
8623489	12	5	8661692	4	10
8623664	12	8	8661693	4	12
8623666	12	9	8661760	6	1
8623849	7	13	8661762	3	16
8623920	KITS	13	8661764	7	6

PART NUMBER	FIG.	ITEM	PART NUMBER	FIG.	ITEM
8661764	8	7	8676418	11	14
8661766	13	15	8677091	7	11
8661767	13	14	8677571	13	30
8661768	13	13	8677572	13	30
8661798	13	22	8677573	13	30
8661801	10	4	8677574	13	30
8661804	10	13	8677575	13	30
8661805	10	16	8677743	3	21
8661821	10	18	8677782	13	29
8661822	10	21	8677887	6	17
8661829	11	4	8678257	13	12
8661834	3	17	8678258	13	11
8661837	7	9	8678294	12	11
8661838	13	9	8678347	4	4
8661867	10	20	8678523	10	29
8661871	10	27	8679465	13	21
8661873	10	17	8680547	13	23
8661890	12	14	8680548	13	18
8661891	10	3	8680549	13	19
8661893	6	5	8680551	13	17
8661894	6	2	8680915	KITS	15
8675517	3	10	8680924	8	10
8675520	8	15	8681069	13	27
8675522	9	4	8681070	13	26
8675523	6	10	8681449	6	14
8675533	11	3	8681899	10	28
8675535	10	9	8682802	6	19
8675539	11	27	8682855	13	24
8675557	8	2	8682856	13	20
8675558	8	12	8682857	13	28
8675611	5	14	8682858	13	10
8675634	11	20	8683088	11	6
8675728	12	18	8684213	10	35
8676000	12	20	8684214	10	34
8676074	10	22	8684215	10	33
8676222	11	17	8684217	10	25

<u>PART NUMBER</u>	<u>FIG.</u>	<u>ITEM</u>	<u>PART NUMBER</u>	<u>FIG.</u>	<u>ITEM</u>
8684220	11	1	AS568A-014	10	32
8685472	12	4	AS568B-013	10	12
8685473	12	1		10	15
8685474	12	2		10	31
8686122	6	23	MS19061-20007	11	12
8686124	3	26	MS3367-5-0	11	25
9413349	11	2	TS160-019C	3	29

END OF WORK PACKAGE

CHAPTER 5

SUPPORTING INFORMATION

FOR

4L80-E/4L85-E TRANSMISSION

HMMWV FOV

**SUSTAINMENT MAINTENANCE
REFERENCES**

SCOPE

This Work Package (WP) lists all forms, technical manuals, and other publications referenced in this NMWR.

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms
SF 368	Product Quality Deficiency Report

TECHNICAL BULLETINS

TB 9-289	Type I and Type II Reusable Metal Containers Manual
TB 43-0213	Corrosion Prevention and Control (CPC) for Tactical Vehicles
TB 55-8100-200-24	Maintenance of Specialized Reusable Containers for Aircraft Equipment

TECHNICAL MANUALS

TM 9-214	Inspection, Care, and Maintenance of Antifriction Bearings
TM 746-10	General Packaging Instructions for Field Use
TM 750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

OTHER PUBLICATIONS

AMC-R 750-51	Maintenance Expenditure Limits (MEL)
AR 70-1	Army Acquisition Policy
AR 700-138	Army Logistics Readiness and Sustainability
AR 750-1	Army Materiel Maintenance Policy
ASTM-D 1974	Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes
ASTM-D 5118	Standard Practice for Fabrication of Fiberboard Shipping Boxes
ASTM-D 6880	Standard Specification for Wooden Boxes
DA PAM 738-751	Functional Users Manual for The Army Maintenance Management - Aviation (TAMMS-A)
DA PAM 750-8	The Army Maintenance Management System (TAMMS) User's Manual
FM 4-25.11	US Military First Aid Manual
ISO 9000	Series standards
MIL-HDBK-774	Palletized Unit Loads
MIL-STD-129P	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-1686	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment
NASM33537	Standard Assembly Dimensions for Insert, Screw Thread, Helical Coil, Inch Series, Coarse and Fine Thread
SB 725-92-1	Nonexpendable Special Reusable Shipping and Storage Containers

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
EXPENDABLE AND DURABLE ITEMS LIST**

INTRODUCTION**Scope**

This work package lists expendable and durable items that you will need to rebuild the 4L80-E or 4L85-E 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), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use Cloth (WP 0047, Item 4)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (H= Below Depot).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 1. Expendable and Durable Items List.

(1) Item No.	(2) Level	(3) National Stock Number (NSN)	(4) Item Name, Description, Part Number/(CAGEC)	(5) U/I
1	H	8030-00-059-2761	ANTISEIZE COMPOUND: MIL-PRF-907 (81349) ¼ POUND CAN	CN
2	H	6850-01-472-2719	CLEANING COMPOUND MIL-PRF-680 (81349) 55 Gallon Drum	DR
3	H	5350-00-221-0872	CLOTH, ABRASIVE (crocus) 9 inch x 11 inch sheets, ANSI-B74.18 (80204) 50 sheets	PG
4	H	7920-00-044-9281	CLOTH: cleaning, lint-free, general purpose, white A-A-59323 (58536) 10-Pound Box	BX
5	H	9150-01-353-4799 9150-01-114-9968	Dexron® VI transmission fluid (24617) 1-Quart Can 55-Gallon Drum	DR
6	H	9150-00-186-6668	LUBRICATING OIL, engine MIL-PRF-2104 (81349)	CN
7	H	9150-00-231-6689	LUBRICATING OIL, general purpose MIL-PRF-32033 (81349)	QT
8	H	9150-00-250-0926 9150-00-250-0933	PETROLATUM: technical 14PI (81348) 1 ¾-Pound Can 7 ½-Pound Can	CN CN
9	H	7510-00-079-7906	PRESSURE SENSITIVE ADHESIVE 7510-00-079-7906 (83421)	RO
10	H	8030-00-111-2762 8030-00-111-2763	SEALING COMPOUND, thread sealant ASTM D5363 (81346) ASTM D5363 (81346)	BT BX
11	H	8135-00-178-9200	TAGS: identification 1789200 (IS6A9) (pk/500)	BX

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
TOOL IDENTIFICATION LIST**

INTRODUCTION**Scope**

This work package lists special tools and equipment needed to maintain the 4L80-E or 4L85-E transmission.

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., Scriber, machinist's (WP 0048, Item 24)).

Column (2) Item Name. This column lists the item by noun nomenclature and other descriptive features (e.g., Gage, belt tension).

Column (3) National Stock Number (NSN). This is the National Stock Number (NSN) assigned to the item; use it to requisition the item.

Column (4) Part Number/(CAGEC). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity) which 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. The manufacturer's Commercial and Government Entity Code (CAGEC) is also included.

Table 1. Tool Identification List.

(1) Item No.	(2) Item Name	(3) National Stock Number (NSN)	(4) Part Number/ (CAGEC)
1	Adapter, clutch spring compressor *	5120-01-422-1329	J-38734 (33287)
2	Clutch spring adapter *	5120-01-410-8216	J-25018-A (33287)
3	Adapter, holding tool *	5120-01-422-1326	J-38655 (33287)
4	Base, transmission holding fixture	5120-01-144-4484	J-03289-20 (33287)
5	Clutch alignment tool	4910-01-209-0729	J24396 (33287)
6	Clutch assembly remover/installer	5120-01-566-0895	J-38358-A (34623)
7	Compressor, clutch spring *	4910-01-178-0724	J-23327 (25341)
8	Dial indicator	5120-00-277-8840	196A (57163)
9	Direct clutch assembly, remover/installer	5120-01-565-7726	J-38733-A (16734)
10	Electronic shifter with dynamometer	-	-
11	Fixture, transmission holding	5120-01-198-7583	J-8763-B (33287)
12	Gauge pin, trans band apply *	5120-01-423-0032	J-21370-10 (33287)
13	General mechanic's tool kit: automotive	5180-00-177-7033	SC5180-90-CL-N26 (50980)
14	Hose clamp	-	STBC888L
15	Insertor and remover, seal	5120-01-566-0528	J-41505 (34623)
16	Installer, oil pump seal	-	J-38693
17	Installer, turbine shaft seal *	5120-01-408-7051	J-38736 (33287)
18	Installer/remover, gear unit *	5120-01-422-1300	J-38868-A (33287)
19	Protector, inner seal, clutch	4190-01-178-0713	J-21363 (25341)
20	Reamer, hand	5110-01-566-0527	J-39919 (34623)
21	Remover, seal	5120-01-425-0216	J-23129 (25341)
22	Remover/installer, selector shaft seal	-	J-42543
23	Remover/installer, oil pump *	4710-01-539-6693	J-45053 (33287)
24	Scriber, machinist's	5120-00-221-7063	68B 57163

Table 1. Tool Identification List - Continued.

(1) Item No.	(2) Item Name	(3) National Stock Number (NSN)	(4) Part Number/ (CAGEC)
25	Seal protectors, forward clutch piston kit *	5120-01-422-1301	J-38732 (33287)
26	Slide hammer, mechanical puller	5120-01-253-6749	J-6125-B (33287)
27	Standard automotive tool set	4910-01-531-2053	KTC S1753 (00NS2)
28	Straightedge	5210-01-598-7502	GA435 (55719)
29	Tool, trans band pin *	5120-01-422-1313	J-38737 (33287)
30	Tool kit, transmission fourth clutch *	5180-01-422-0138	J-38731-A (33287)
	* Part of Special tool kit, GS supplement	-	57K3218

END OF WORK PACKAGE

**SUSTAINMENT MAINTENANCE
MANDATORY REPLACEMENT PARTS LIST**

INTRODUCTION

Scope

This Work Package (WP) lists mandatory replacement parts for the 4L80-E or 4L85-E transmission. Replacement of these parts is not dependent on any inspection criteria.

Explanation of Columns in the Mandatory Replacement Parts 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 torque converter (WP 0049, Item 1)).

Column (2) Nomenclature. Name or identification of the part.

Column (3) Part Number. This is manufacturer’s part number.

Column (4) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (5) Work Package and Item Number. This is the figure number and item number in which a part can be found.

Table 1. Mandatory Replacement Parts List.

(1) Item No.	(2) NOMENCLATURE	(3) PART NUMBER	(4) NATIONAL STOCK NUMBER (NSN)	(5) WORK PACKAGE AND ITEM NUMBER
1	Torque converter 4L80-E	24217238	2520-01-480-7553	WP 0031, Item 1
	Torque converter 4L85-E	5717740	2520-01-624-2240	WP 0031, Item 1
2	Plug, pipe ¹	AA59616ACABUA	4730-01-166-2244	WP 0032, Item 15
3	Bolt, machine standard size, black ²	8661762	5306-01-461-3557	WP 0032, Item 16
	Bolt, machine oversized, gold ¹	5715154	5306-01-624-5774	WP 0032, Item 16
4	Gasket, oil pan ¹	8677743	5330-01-360-5271	WP 0032, Item 21
5	Brake band and lining, rear ¹	24202229	3040-01-480-7593	WP 0034, Item 16
6	Clip, retaining ¹	8675558	5340-01-476-0352	WP 0037, Item 12
7	Seal, speedometer, transmission harness ¹	10054241	5330-01-096-7699	WP 0040, Item 26
8	Bolt, machine ¹	24206031	5306-01-411-1596	WP 0042, Item 1
9	Parts kit, hydraulic transmission pan ³	5714952	2520-01-482-4280	WP 0043, Item 10
10	Parts kit, mechanical	5717778	2520-01-624-2208	WP 0043, Item 11
	Repair kit, mechanical	6220FL0007	2520-01-600-3071	WP 0043, Item 12

¹ Part of kit P/N 5717778.

² Standard size center support bolt only required if transmission had gold oversized bolt. Part of kit P/N 24208849.

³ Drain plug oil pan kit only required if drain plug not present on transmission.

END OF WORK PACKAGE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <i>Date you filled out this form.</i>
For use of this form, see AR 25-30; the proponent agency is OAASA.							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-IM/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code) <i>Your mailing address</i>	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER <i>TM Number</i>					DATE <i>DD MMMM YYYY</i>	TITLE <i>TM Title</i>	
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
	0007-3					Figure 2, Item 9 should show a lockwasher. Currently shows a flat washer.	
	0018-2					Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be change to (12).	
<h1>SAMPLE</h1>							
TYPED NAME, GRADE OR TITLE <i>Your Name</i>					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>		SIGNATURE <i>Your Signature</i>

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-IM/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i> <i>Your Address</i>	DATE <i>Date you filled out this form</i>
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER <i>TM Number</i>	DATE <i>DD MMMM YYYY</i>	TITLE <i>TM Title</i>
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<h1>SAMPLE</h1>								

PART III – REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE <i>Your Name</i>	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>	SIGNATURE <i>Your Signature</i>
--	--	------------------------------------

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-IM/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER NMWR 9-2520-582				DATE 4 APRIL 2014	TITLE 4L80-E/4L85-E TRANSMISSION		
	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TO <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-IM/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000	FROM <i>(Activity and location) (Include ZIP Code)</i>	DATE
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER NMWR 9-2520-582	DATE 4 APRIL 2014	TITLE 4L80-E/4L85-E TRANSMISSION
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III – REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is OAASA							
TO (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-IM/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						FROM (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER NMWR 9-2520-582				DATE 4 APRIL 2014	TITLE 4L80-E/4L85-E TRANSMISSION		
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER NMWR 9-2520-582	DATE 4 APRIL 2014	TITLE 4L80-E/4L85-E TRANSMISSION
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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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NMWR 9-2520-582

U.S. Army TACOM Life Cycle Management Command
AMSTA-LCL-IM/TECH PUBS
6501 E. 11 Mile Road
Warren, MI 48397-5000

This NMWR 9-2520-582 was prepared under the control of the Commanding General and the Chief of Publications, TACOM, and is published for the information and guidance of all concerned.

FOR THE COMMANDER:

OFFICIAL:
RONALD J. SHUN
COLONEL, GS
Chief of Staff

/s/ Mark D. Colley
MARK D. COLLEY
*Chief, Maintenance Integration
and Publications Group*
T.00729

THE METRIC SYSTEM AND EQUIVALENTS

<p>Linear Measure</p> <p>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</p> <p>Weights</p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces 1 Kilogram = 1000 Grams = 2.2 Pounds 1 Metric Ton = 1000 kilograms = 1 Megagram = 1.1 Short Tons</p> <p>Liquid Measure</p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p>Square Measure</p> <p>1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles</p> <p>Cubic Measure</p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p>Temperature</p> <p>$9/5 C^{\circ} + 32 = F^{\circ}$ $5/9 (F^{\circ} - 32) = C^{\circ}$ 212° Fahrenheit is equivalent to 100° Celsius 90° Fahrenheit is equivalent to 32.2° Celsius 32° Fahrenheit is equivalent to 0° Celsius</p>
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APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	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 Sq 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
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq 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 Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

