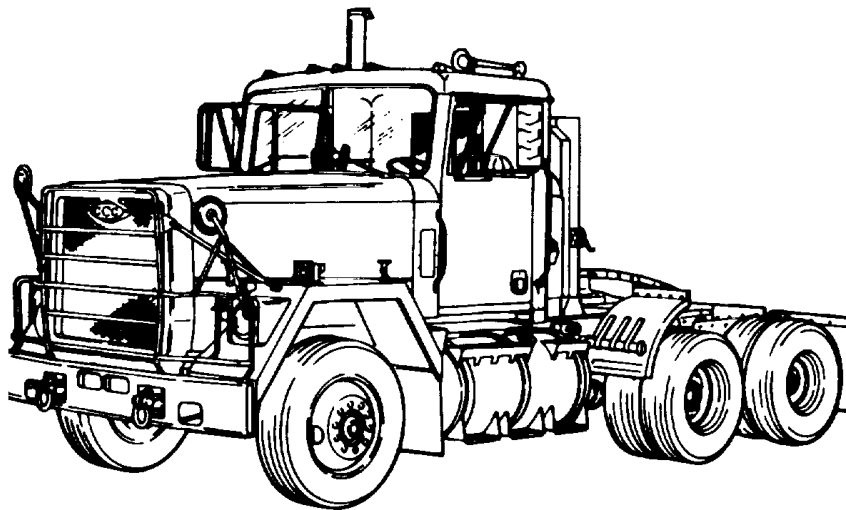


**TECHNICAL MANUAL
DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE**

**TRUCK TRACTOR, LINE HAUL,
50,000 GVWR, 6 x 4, M915A1**

(NSN 2320-01-125-2640)



**HEADQUARTERS,
DEPARTMENT OF THE ARMY**

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DECEMBER 1983

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WARNING**CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU**

Carbon monoxide is without color or smell, but can kill you. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no air movement. Precautions must be followed to ensure crew safety when the personnel heater, main or auxiliary engine of any vehicle is operated for any purpose.

1. **DO NOT** operate personnel heater or engine of vehicle in a closed place unless the place has a lot of moving air.
2. **DO NOT** idle engine for long periods without ventilator blower operating.
3. **DO NOT** drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
4. **BE ALERT** at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, **IMMEDIATELY VENTILATE** personnel compartments. If symptoms persist, remove affected crew to fresh air; keep warm; **DO NOT PERMIT PHYSICAL EXERCISE**: if necessary, give artificial respiration.
5. **BE AWARE**: the field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION

WARNING

When power is supplied to the No-SPIN differential both wheels spin even when one wheel is on ground. To avoid injury raise and support both sides of tandem axles when checking differential action or wheel rotation with power. Failure to follow this precaution may result in serious injury to you and other personnel.

WARNING

Particles blown by compressed air are hazardous. Always direct air stream away from the user and other persons in the area. User must wear a safety eyeshield when using compressed air in cleaning.

WARNING

Improper cleaning methods and use of unauthorized cleaning solvents will injure personnel and damage equipment. See TM 9-247 for correct information.

WARNING

Fuel tank, even when dry and empty, contains traces of diesel fuel that can catch fire during repair. To avoid serious injury to you and other personnel, render fuel tank safe before repairing.

WARNING

Hydrochloric acid (muriatic acid) can burn you. It can give off harmful vapors if it is used on metals containing phosphorus. To avoid serious injury, wear protective rubber gloves, apron, and goggles and always use in a well ventilated area.

WARNING

Snaprings are spring steel and may pop off when being removed. Wear a face shield when removing snaprings to prevent personal injury.

WARNING

When using a hydraulic press for removal or installation of bearings, wear a face shield to prevent possible injury to personnel.

WARNING

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

WARNING

To avoid injury, do not work in engine compartment with engine running.

WARNING

Direct all personnel to stand clear during hoisting operations. A heavy or swinging load can cause severe injury.

WARNING

Use extreme care when handling broken glass. Broken, chipped, or cracked glass can cause serious injury. When removing broken glass, wear protective face shield and gloves.

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DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL

TRUCK TRACTOR, LINE HAUL,
50,000 GVWR, 6 X 4, M915A1

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to Commander, U.S. Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be furnished to you.

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HOW TO USE THIS MANUAL

As a maintenance technician, you are responsible for maintaining the equipment covered in this manual. The best way to do this is with the aid of your maintenance manual. Below is a sample problem.

PROBLEM: Organizational maintenance mechanic reports that the rear tandem axle lockout will not engage.

1. Turn to the cover of your manual.

On the right-hand side you will find a listing for "SERVICE AND TROUBLESHOOTING INSTRUCTIONS". Along with the listing is a page number and a black marker. Follow either the page number reference or the black marker to the first page in the service and troubleshooting section.

2. What is the quickest way to find the solution to the problem? Turn to paragraph 2-6.

This is the "TROUBLESHOOTING SYMPTOM INDEX". Follow the numerical listing "REAR TANDEM AXLES" until you see item 18 "Lockout will not engage". Now go to the page listed directly to the right of the malfunction.

3. What caused the problem? Turn to page 2-9, paragraph 2-7, Troubleshooting.

Here you will find the most likely causes of the problem. After following each step in the order listed and finding the problem, let's say, "The differential lockout is defective", go to the referenced paragraph (para 3-71).

4. How do you fix the problem? Turn to paragraph 3-71.

This is the maintenance procedure for the differential lockout.

It is arranged step-by-step so everything you need to know to maintain the differential lockout is covered. Now you are ready to correct the problem.

Your maintenance manual is easy to use. Also, you eliminate mistakes because you always are made aware of the warnings and cautions you need to know for personnel and equipment safety.

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CHAPTER 1

INTRODUCTION

1-1. OVERVIEW.

This chapter familiarizes the technician with standard forms, record data, and the equipment to be maintained at the Direct Support and General Support Maintenance levels. This information is covered in the following sections:

Section I General Information

Section II Equipment Description and Data

Section I. GENERAL INFORMATION

1-2. SCOPE.

- a. Type of Manual: Direct Support and General Support Army Maintenance.
- b. Model Number and Equipment Name: M915A1, truck tractor, line haul, 50,000 GVWR, 6 x 4.

1-3. MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Procedures for destruction of Army equipment to prevent enemy use can be found in TM 750-244-6.

1-5. PREPARATION FOR STORAGE OR SHIPMENT

Information concerning storage or shipment of equipment can be found in TM 740-90-1. Additional information concerning storage of Cummins NTC-400engine can be found in TM 9-2815-225-34&P.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your M915A1 Truck Tractor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF368 (Quality Deficiency Report). Mail it to Commander, U.S. Army Tank-Automotive Command, ATTN: DRSTA-M, Warren, Michigan 48090. We'll send you a reply.

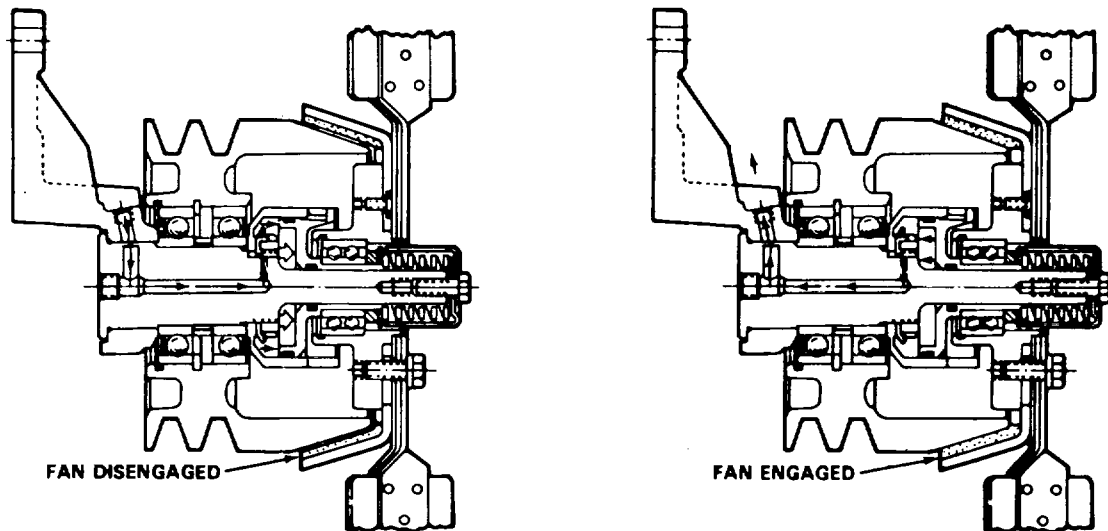
Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. General. Specific capabilities, characteristics, and features of components for which maintenance is authorized at Direct and General Support maintenance level are described in b through o below. Additional descriptions and data covering the M915A1 vehicle are given in TM 9-2320-283-10 and TM 9-2320-283-20.

b. Engine. Description of characteristics, capabilities, and features of the Cummins NIC-400 diesel engine can be found in TM 9-2815-225-34&P.

c. Fan Clutch. The fan clutch is controlled by a temperature sensitive air valve installed in the engine block. The control valve directly senses coolant temperature. Provided coolant temperature remains below the setting of the valve, air passes through it to disengage the fan clutch. When coolant temperature rises to the valve setting, it closes and exhausts air pressure from the fan clutch which engages the fan.



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EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

d. Alternator-Rectifier. The alternator-rectifier consists of three basic subassemblies. These subassemblies are described in 1 through 3 below:

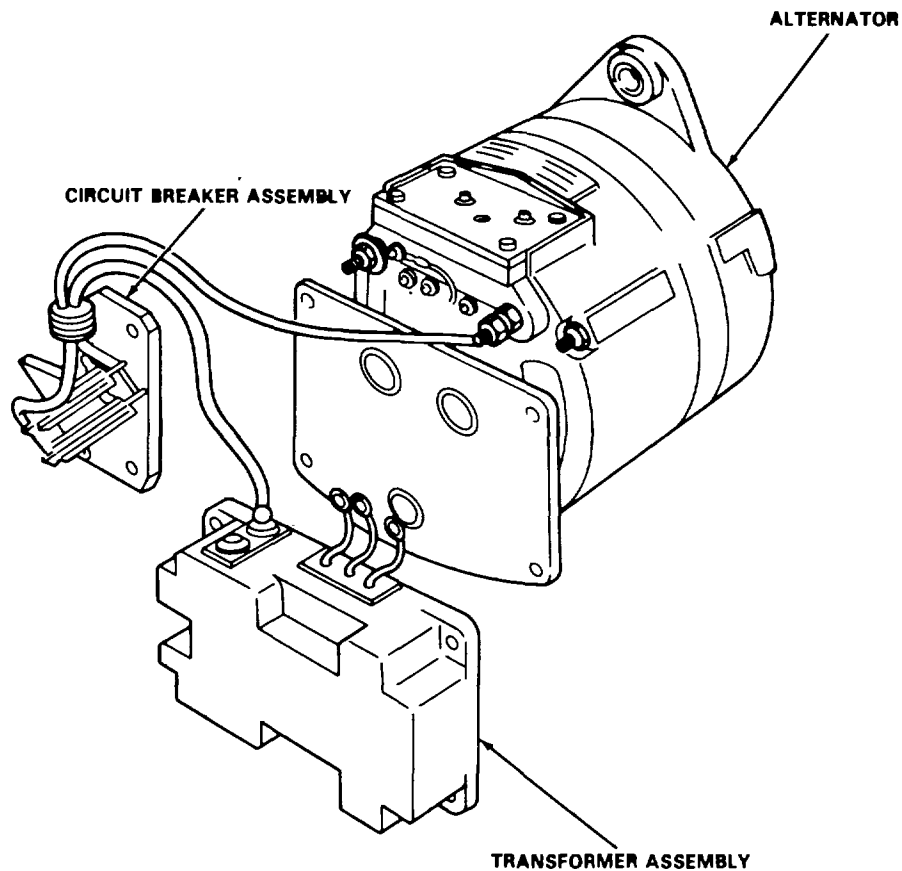
1. Alternator. The alternator is a self-load limiting device featuring a fully adjustable, built-in solid-state voltage regulator. The rated output of the alternator is 85 amperes at 14 volts dc nominal and has a maximum speed of 8,000 rpm. Six silicon diodes mounted in heat sinks convert alternating current into direct current. A capacitor connected between the heat sinks assists in suppressing transient voltage spikes which could possibly injure the diodes. The brushes and voltage regulator are located in a waterproof housing and may be removed for replacement or inspection without dismantling the entire alternator. The regulator is also equipped with transient voltage protection and will withstand instantaneous opening of the charging circuit under full load conditions.

2. Transformer Assembly. The transformer assembly consists of a 3-phase transformer to obtain electrical isolation from the alternator, and a 3-phase, full wave rectifier to provide dc output. It is energized from the ac terminals of the alternator to which it is connected by 3 leads. The transformer assembly replaces the conventional series parallel switch and is used to provide a source of power for charging the cranking batteries on 12-volt vehicles equipped with 24-volt cranking motors. The system batteries are charged by the transformer-rectifier unit.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).d. Alternator-Rectifier (Continued).

3. Circuit Breaker Assembly. The circuit breaker assembly is an automatically resetting protective device which limits the current flow from the transformer assembly. In the event cranking batteries become fully discharged or shorted out, the current flow from the transformer assembly could become so high that it would cause a failure to the transformer assembly. The circuit breaker assembly limits the current flow to about 25 amperes under all battery conditions.



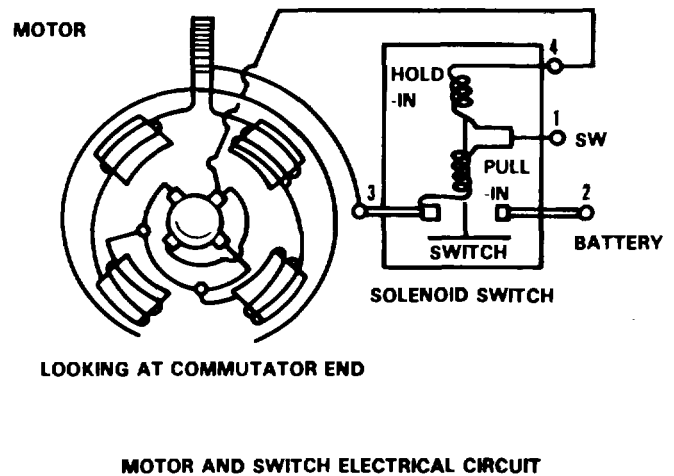
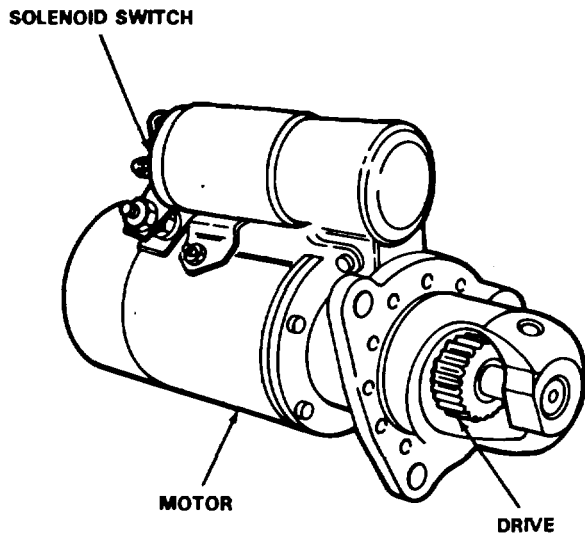
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EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

e. Starter Motor and Solenoid. The starter motor is a 24-volt, water-resistant motor with an electric shift engagement, overrunning clutch drive. The water-resistant solenoid switch is mounted on the motor field ring. The solenoid switch actuates the clutch drive through a hinged yoke and linkage assembly.

When the START button is pressed, two circuits in the solenoid switch are energized: the pull-in coil and the hold-in coil. The solenoid switch moves the drive assembly into mesh with the engine flex disk and ring gear (flywheel) and, in the proper sequence, closes the cranking contacts in the switch. When the cranking contacts close, the pull-in coil is then in parallel with the contacts and no current flows in this circuit. The hold-in coil holds the cranking switch closed and also holds the pinion in the cranking position. When the engine starts, the overrunning clutch in the drive allows the pinion to run free until the START button is released. At this time the solenoid switch is deenergized and the drive returns to an at-rest position by the return spring in the solenoid switch.



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EQUIPMENT DESCRIPTION AND DATA.**1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).**

f. Transmission. The transmission is fully automatic with five forward speeds and one reverse speed. Ratios are established by four planetary gear sets. The planetaries are controlled by six hydraulically-applied clutches. All gearing is in constant mesh. Major components are described in 1 through 10 below:

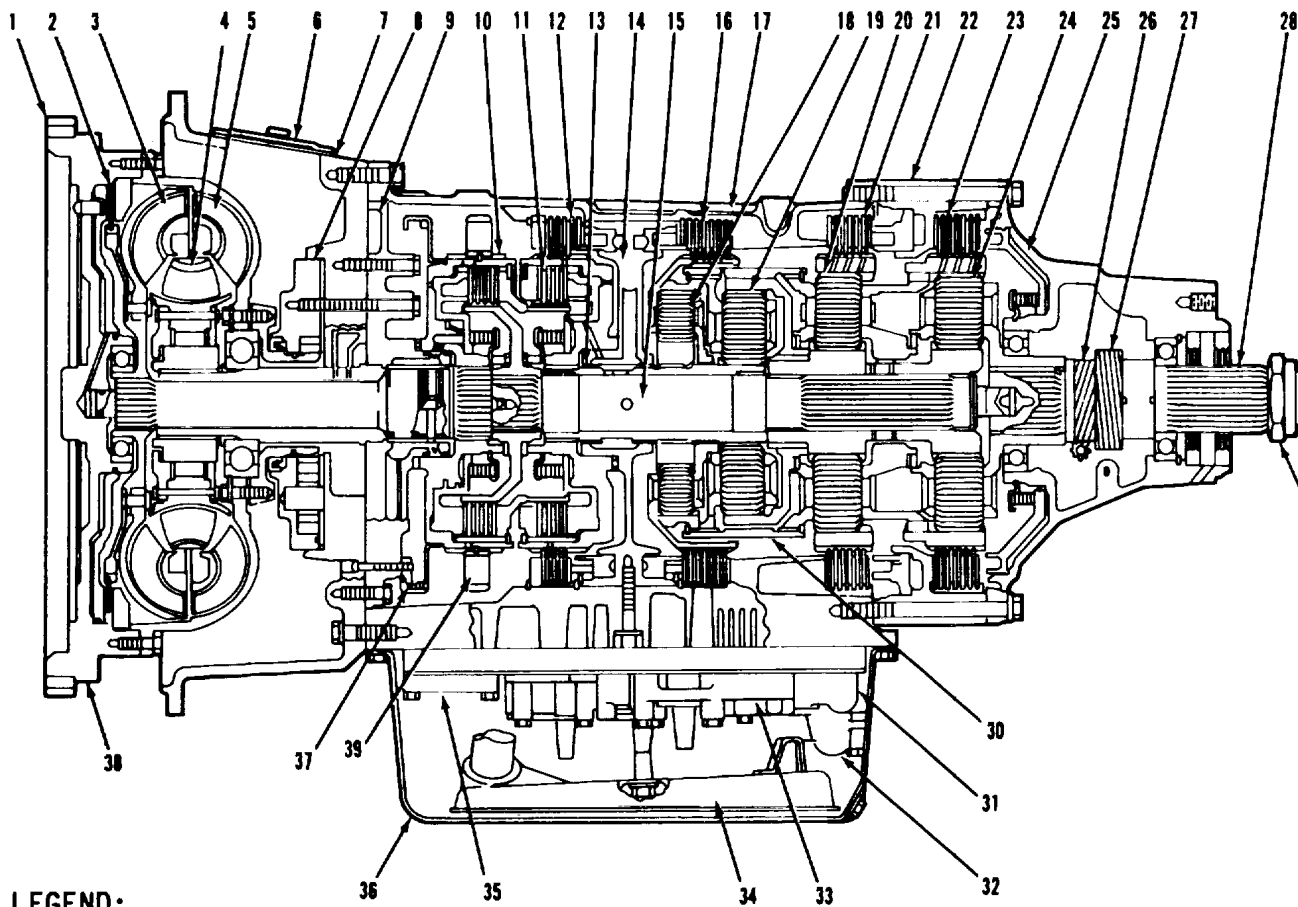
1. Torque Converter. A three element torque converter transmits power from the engine to the transmission gearing. The torque converter serves as both a fluid coupling and a torque multiplier. The three elements, pump, stator, and turbine are vaned cast aluminum. The pump assembly is the input element and is driven by the engine through the flex disk and ring gear (flywheel). The stator is the torque multiplying element. The turbine is the output element.

The torque converter assembly is continually filled with oil, which flows through the converter to cool and lubricate it. When the converter is driven by the engine, the pump vanes throw oil against the turbine vanes. The impact of the oil against the turbine vanes tends to rotate the turbine.

The turbine transmits torque to the transmission gearing. At engine idle speed, the impact of oil against the turbine vanes is not great. At high engine speed, the impact is much greater than at idle, and high torque is produced by the turbine.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).1. Torque Converter (Continued).

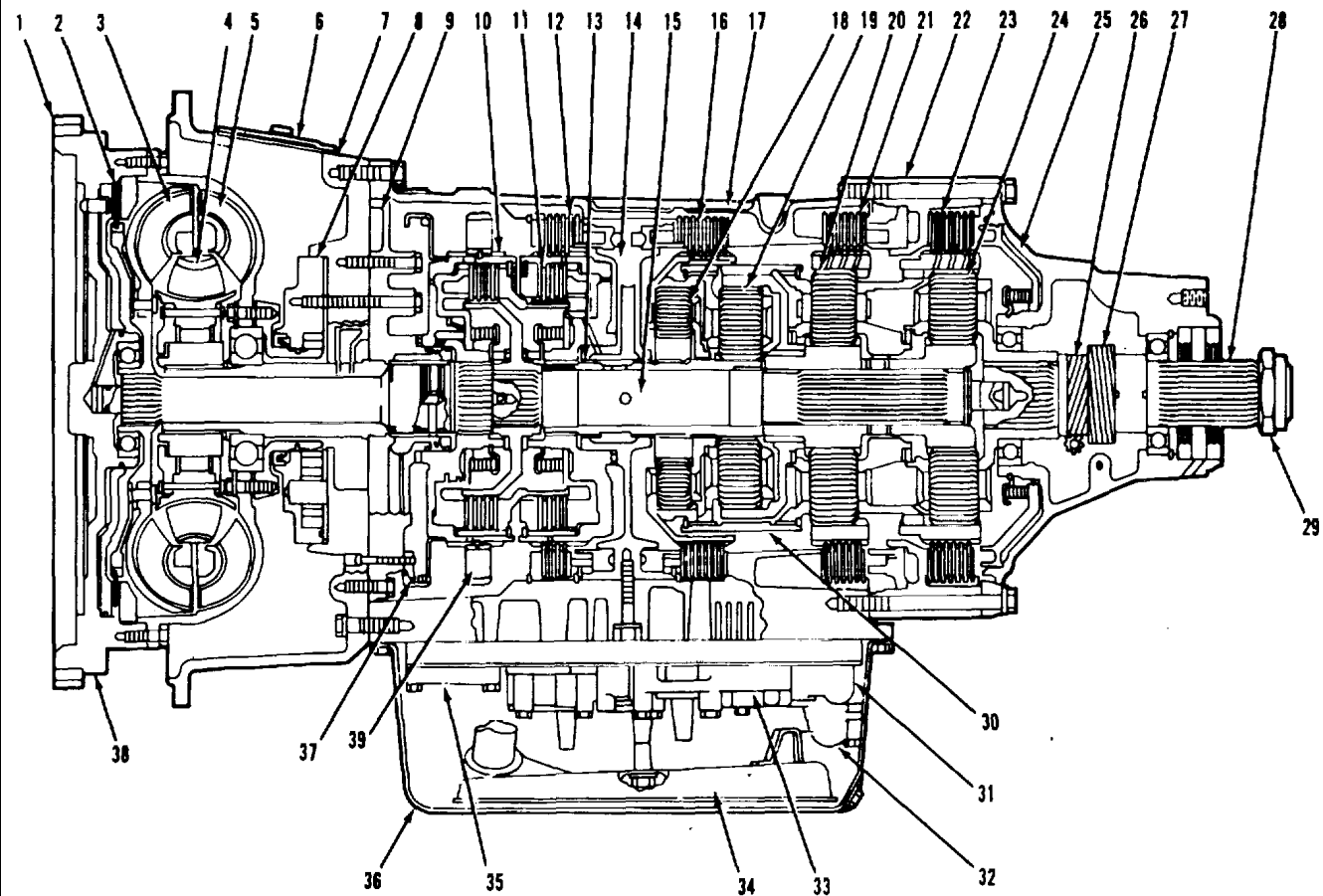
Oil thrown into the turbine flows to the stator vanes. The stator vanes change the direction of oil flow and directs the oil to pump in a direction that assists the rotation of the pump. It is the redirection of the oil in a manner to assist the pump that enables the torque converter to multiply input torque. Greatest torque multiplication occurs when the turbine is stalled and the pump is rotating at its highest speed. Torque multiplication decreases as the turbine rotates and gains speed. When turbine speed approaches the speed of the pump, oil flowing to the stator begins striking the backs of the stator vanes. This rotates the stator in the same direction as the turbine and pump. At this point, torque multiplication stops and the converter becomes, in effect, a fluid coupling.

2. Lockup Clutch. The lockup clutch consists of a piston, a clutch, and a backplate. These are located inside the flex disk and ring gear (flywheel). The piston and backplate rotate with the converter pump. The clutch plate is located between the piston and backplate and is splined to the converter turbine.

When sufficient rotational speed is achieved, hydraulic pressure compresses the lockup clutch plate between the piston and backplate, locking all three together. Thus, the converter pump and turbine are locked together, and provide a direct drive from the engine. As rotational speed decreases, the lockup clutch is released.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
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| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).

3. Forward Clutch and Input Shaft. The forward clutch has multiple functions. When engaged with low clutch, it produces first gear. When engaged with first, second, third, or fourth clutches, it produces second, third, fourth, or fifth gears, in that sequence.

The forward clutch has a clutch housing with input shaft attached, ten clutch plates, a piston, a forward clutch hub and a fourth-clutch driving hub.

Five of the clutch plates are internally splined, while the remaining five are externally toothed. The internally splined plates are splined to the forward clutch hub. The externally toothed plates are anchored against rotation by the internal grooves of the forward clutch housing.

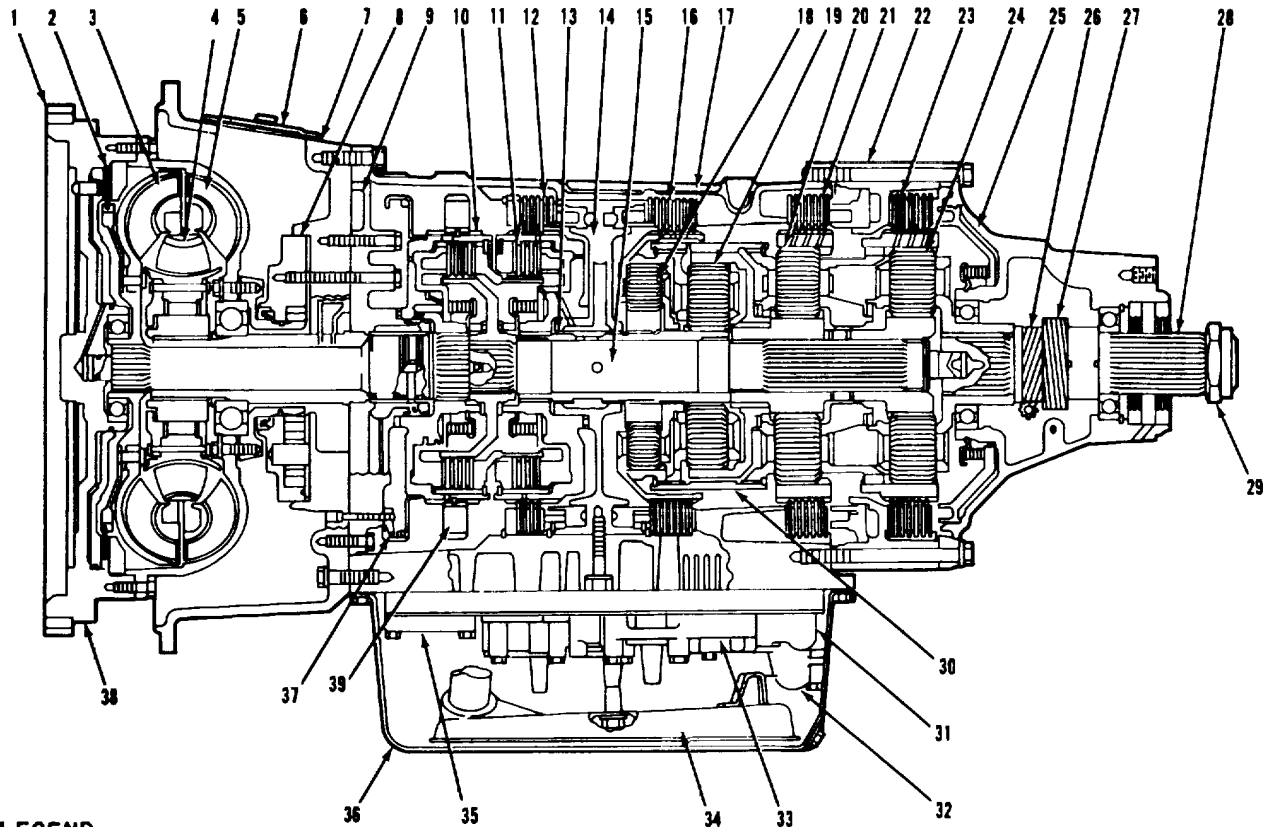
Clutch housing and shaft assembly rotate when the converter turbine rotates. Fourth-clutch drive hub also rotates causing the internally splined plates of the fourth-clutch pack to rotate.

When hydraulic pressure is directed to the piston, clutch plates are compressed together. This locks forward-clutch hub to the forward clutch housing. Since hub is splined to the transmission main shaft, the shaft will rotate with the hub, at input speed.

The simultaneous application of two clutches is necessary to produce one forward or one reverse gear. The forward clutch is applied only in forward gears. When the converter turbine rotates, and the forward clutch is applied, it drives the output shaft.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |
| 18. FRONT PLANETARY ASSEMBLY | 38. FLYWHEEL |
| 19. CENTER PLANETARY ASSEMBLY | 39. PTO DRIVE GEAR |
| 20. REAR PLANETARY ASSEMBLY | |

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).

4. **Fourth Clutch.** The fourth clutch has a dual function. Engaged with the forward clutch, it produces fifth gear. Engaged with the first clutch, it produces reverse gear.

The fourth clutch contains ten clutch plates, a clutch piston housing, and a piston. Five plates are internally splined and five are externally toothed.

Internally splined clutch plates, driven by the fourth-clutch driving hub, rotate any time the input shaft and the forward-clutch housing assembly rotates.

When hydraulic pressure is directed to the piston, the piston compresses the clutch plates together. This locks the internally splined plates to the externally toothed plates and, in turn, to the clutch housing.

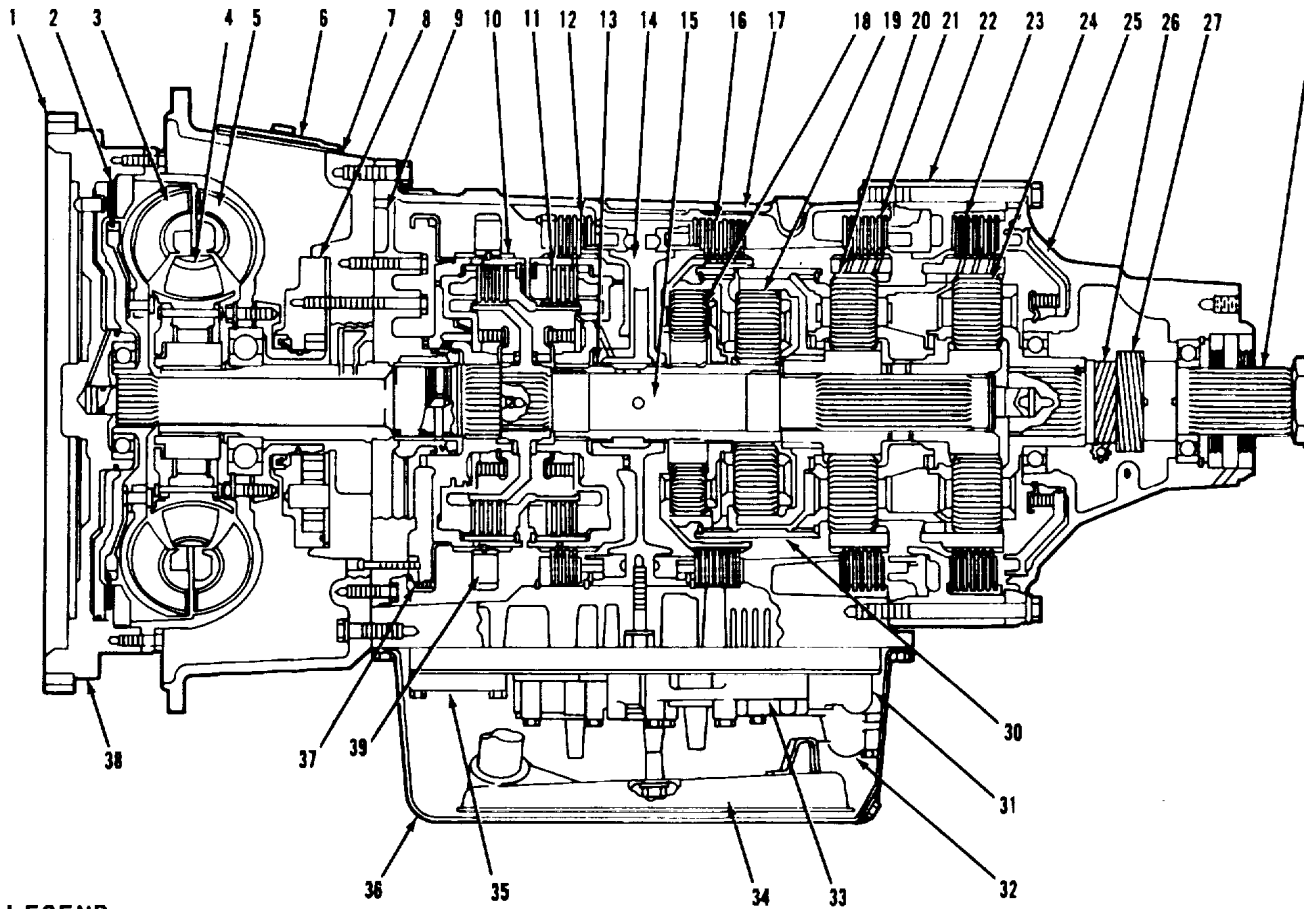
Since the center sun gear and shaft assembly is splined to the clutch housing, it will also rotate at input speed.

5. **Second Clutch, Third Clutch, and Center Support.** The second and third clutches perform only one function. When engaged with forward clutch, the second clutch produces third gear, while the third clutch produces fourth gear.

The second and third clutches are composed of two identical pistons, twenty-one clutch plates (13 in second clutch; 8 in third clutch) and a center support. Two pistons are separated by a wall in the center support housing assembly.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).5. Second Clutch, Third Clutch, and Center Support (Continued).

Eight clutch plates are required for the third clutch (four internally splined and four externally toothed plates). The internally splined plates are splined to the outside diameter of the fourth clutch housing and are free to rotate. The externally toothed plates are anchored against rotation to the transmission housing.

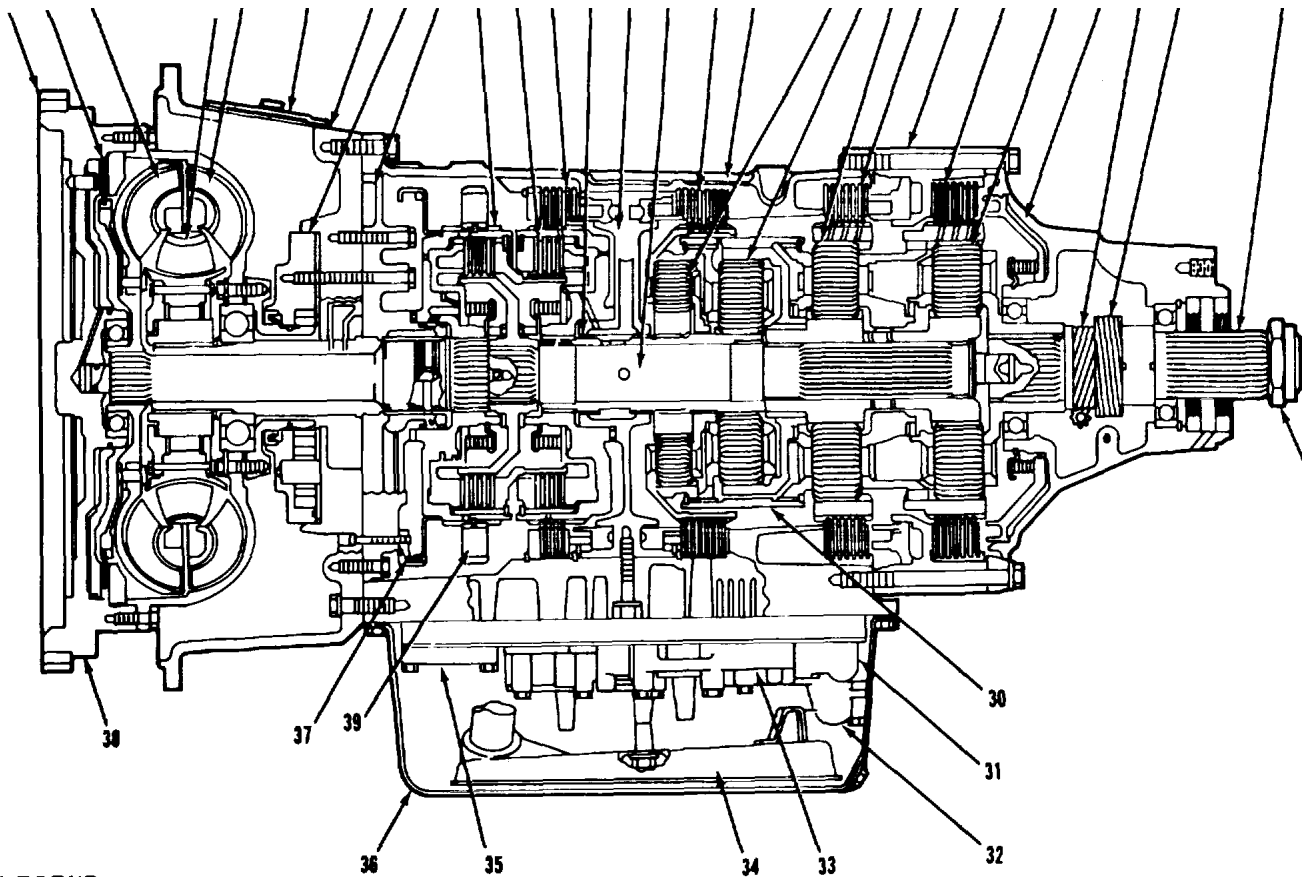
Thirteen clutch plates are required for the second clutch. Six internally splined plates are splined to the outside diameter of the front carrier assembly and are free to rotate. The seven externally toothed clutch plates are anchored to the transmission housing and cannot rotate.

When hydraulic pressure is directed through the oil passages in the center support to the back side of third clutch piston, the clutch plates are compressed together. This locks the fourth clutch housing to the transmission housing, which prevents the fourth clutch housing and attached components from rotating. With the application of the forward clutch in conjunction with third clutch, a reaction within the planetary gearing will produce a forward rotation to the output shaft.

When hydraulic pressure is directed through the oil passages in the center support to the front side of second clutch piston, the clutch plates are compressed together. This locks the front planetary carrier to the transmission housing, which prevents the carrier from rotating. With the application of the forward clutch in conjunction with the second clutch, a reaction within the planetary gearing will produce a forward rotation to the output shaft.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |
| 18. FRONT PLANETARY ASSEMBLY | 38. FLYWHEEL |
| 19. CENTER PLANETARY ASSEMBLY | 39. DTO DRIVE GEAR |

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).

6. First Clutch. The first clutch has a single function. Engaged with the forward clutch, it produces second gear.

The first clutch contains thirteen clutch plates and a piston. Six are internally splined clutch plates and seven are externally toothed clutch plates. The externally toothed plates are held stationary by the transmission housing, while the internally splined plates are free to rotate. When the first clutch is released, internally splined plates are free to rotate. Since the rear planetary ring gear is splined to the internal plates, it will also rotate freely.

When hydraulic pressure is directed to the piston, the piston compresses the clutch plates together. This locks the rotating internal plates to the stationary external plates preventing the ring gear from rotating.

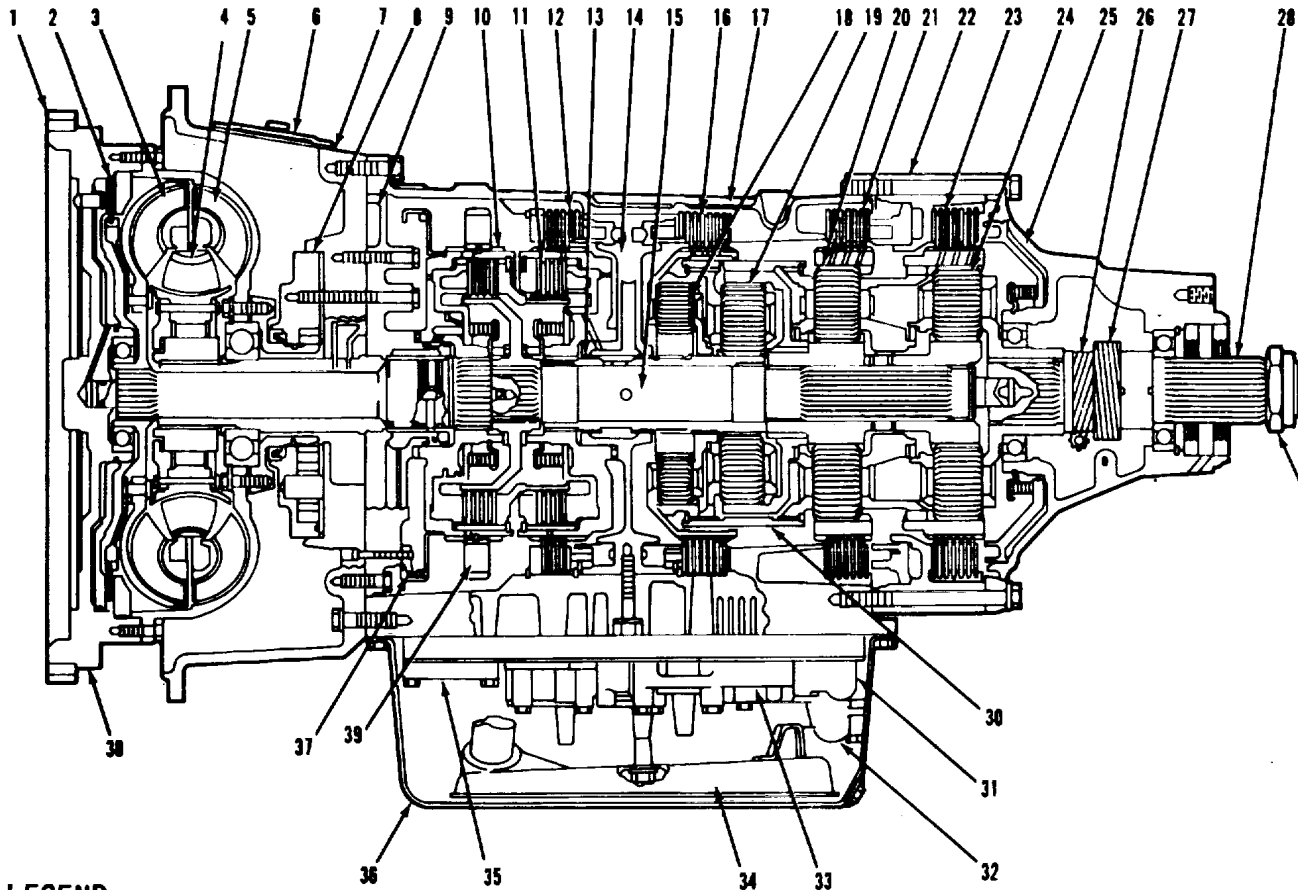
With the application of the forward clutch in conjunction with the first clutch, a reaction within the planetary gearing will produce a forward rotation at the output shaft.

7. Low-Reverse Clutch. The low-reverse clutch has a dual function. When engaged with the forward clutch, it produces first gear. When engaged with the fourth clutch, it produces reverse gear.

The low-reverse clutch contains thirteen clutch plates and a piston. Six are internally splined clutch plates and seven are externally toothed clutch plates. The externally toothed plates are held stationary by the adapter housing, while the internally splined plates are free to rotate.

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |
| 18. FRONT PLANETARY ASSEMBLY | 38. FLANGE |
| | 39. OIL PUMP |

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).7. Low-Reverse Clutch (Continued).

When the low-reverse clutch is released, internally splined clutch plates are free to rotate. Since low planetary ring gear is splined to the internal plates, it will also rotate freely.

When hydraulic pressure is directed to the piston, the piston compresses the clutch plates together. This locks rotating internally splined plates to stationary externally toothed plates, preventing ring gear from rotating.

With the application of the forward or fourth clutch in conjunction with the low-reverse clutch, a reaction within the planetary gearing will produce either forward or reverse rotation, respectively, at the output shaft.

8. Planetary Gearing. The planetary gearing is composed of a gear unit and main shaft assembly and the planetary carrier assembly with its sun gear and ring gear.

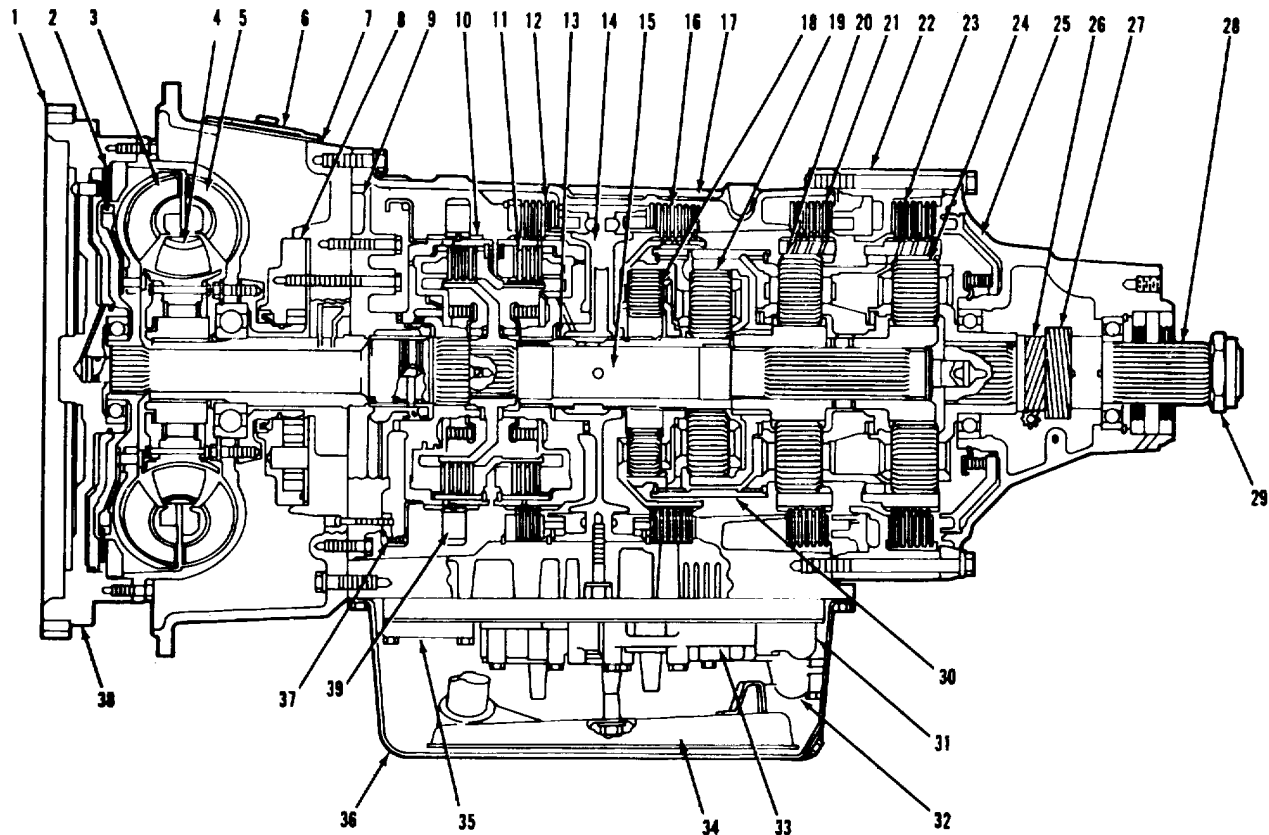
The gear unit and main shaft assembly contains three planetaries called front, center, and rear, so designated because of their location in relation to each other in the gear unit.

Each of the three planetaries has a sun gear and a ring gear which are connected by the main transmission shaft and a connecting drum.

The low planetary gear set is located behind the gear unit and main shaft assembly. It contains a sun gear, a carrier assembly, and a ring gear. The sun gear is splined to the main shaft and the rear carrier is splined to the low ring gear, thereby connecting the four planetary systems.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |
| 18. FRONT PLANETARY ASSEMBLY | 38. FLYWHEEL |
| 19. CENTER PLANETARY ASSEMBLY | 39. PTO DRIVE GEAR |
| 20. REAR PLANETARY ASSEMBLY | |

DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).f. Transmission (Continued).8. Planetary Gearing (Continued).

This connection of the planetary input, reaction, and output elements and connections with the forward and fourth clutches produces five forward speeds and one reverse speed.

The front planetary assembly, used in conjunction with the center planetary assembly, produces third gear when the forward and second clutches are applied.

The center planetary is active in third, fourth, fifth, and reverse gears.

The rear planetary assembly is inactive in second, third, fourth, and fifth gears. In second gear, with the application of forward and first clutches, it transmits torque, at a reduction, through the low carrier to the output shaft. In third, fourth, and fifth gears, its only function is the transmitting of torque through the planetary carrier assembly to the output shaft.

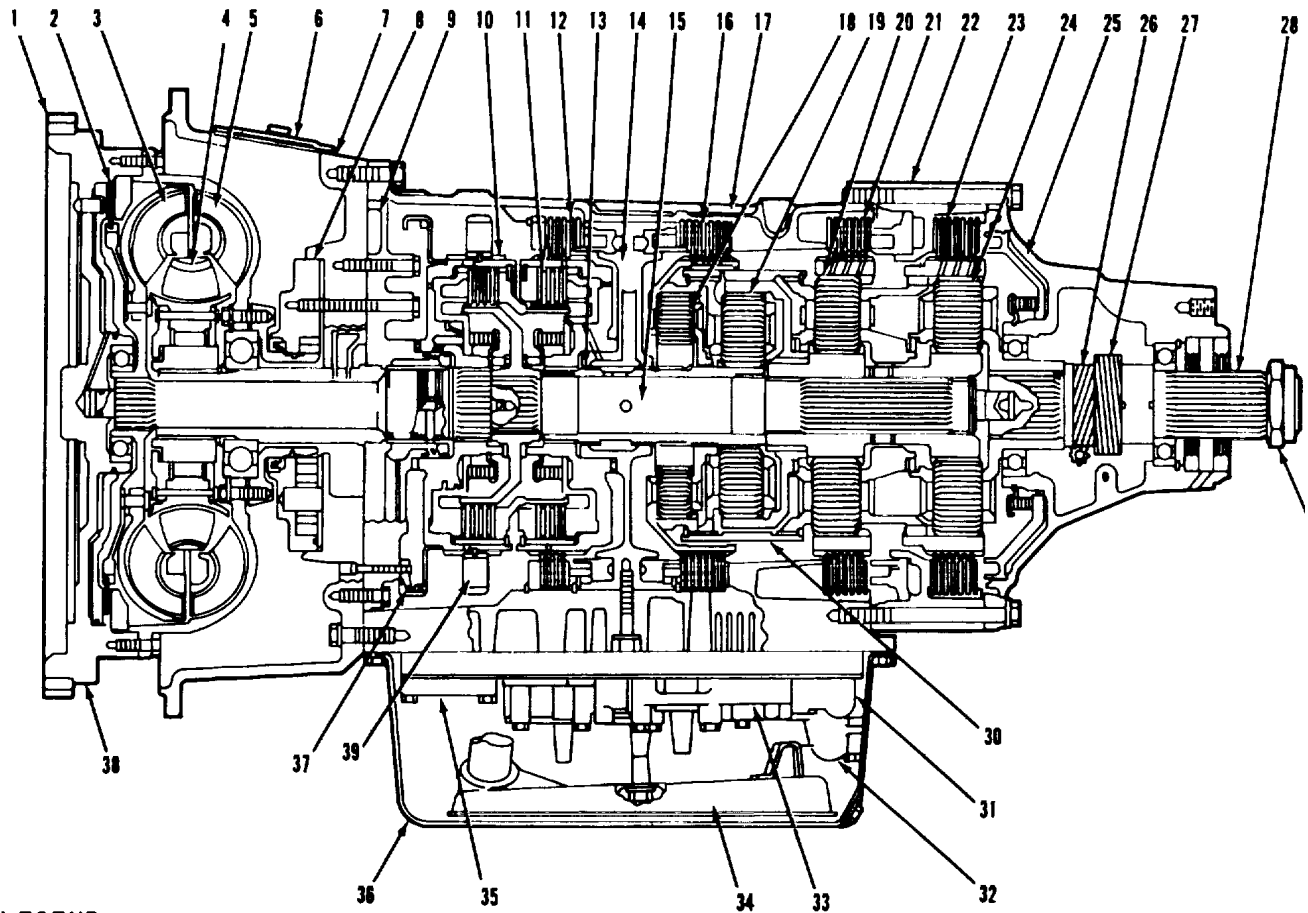
The planetary carrier assembly is active in all gears. With the application of the forward clutch with any one of the other clutches (low-reverse, first, second, third, fourth) torque is transmitted, via the main shaft and planetary components, through the carrier to the output shaft. In reverse gear, torque is transmitted through the fourth clutch housing, sun gear shaft assembly, center assembly, and main shaft assembly to the low sun gear and carrier.

NOTE

In fifth gear, because both the forward and fourth clutches are engaged, all four planetary rotate as a unit. This gives direct drive through the transmission.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. DITOT TUBE |

EQUIPMENT DESCRIPTION AND DATA.**1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).**

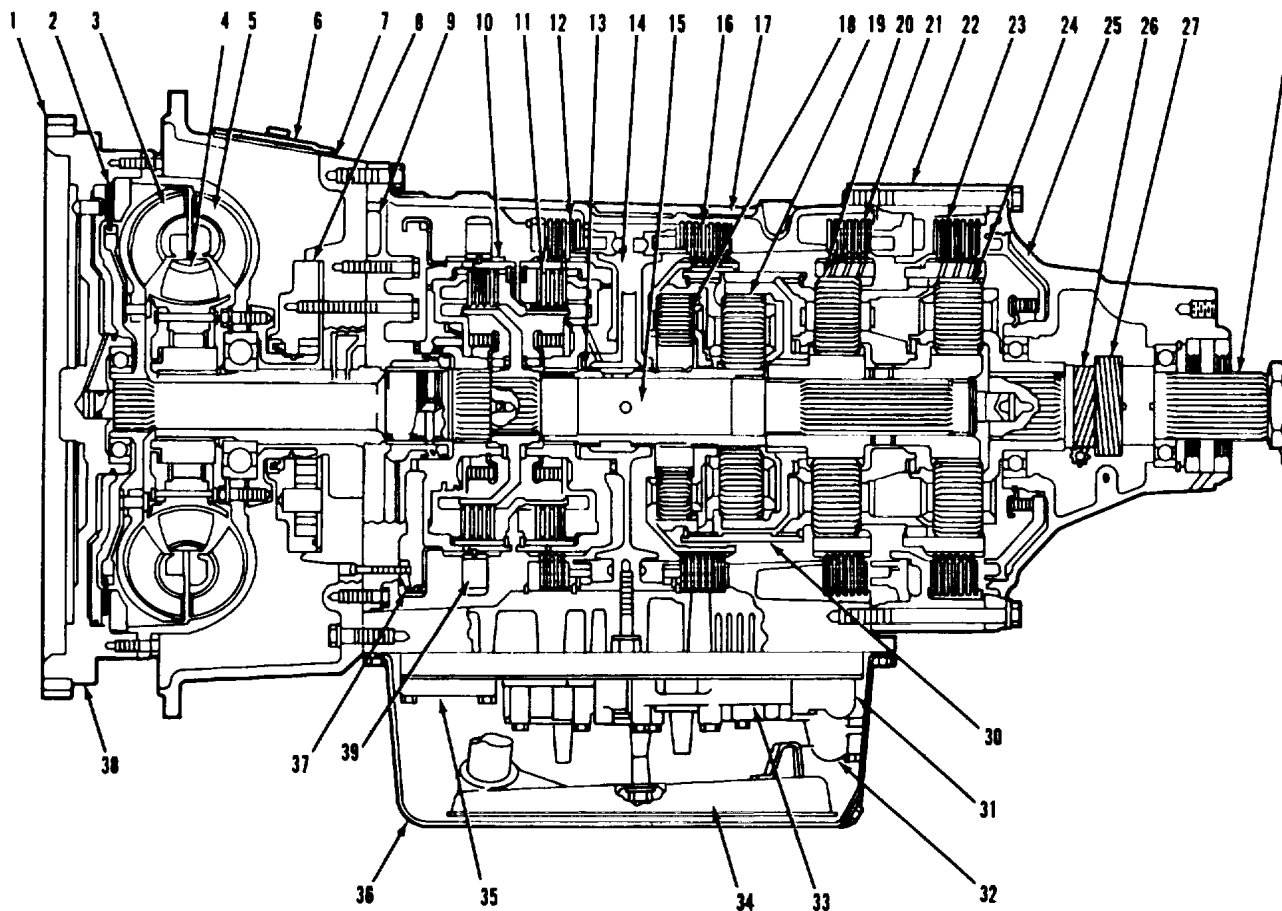
9. Governor. The governor assembly is a centrifugal (flywheel) governor driven by a gear on the output shaft.

Rotation of the governor causes the governor valve to travel within its bore. When the valve moves leftward, governor pressure rises; when the valve moves rightward, governor pressure falls. Thus, governor pressure is proportional to transmission output speed. Governor pressure, in combination with modulator pressure, provides the automatic shifting in the transmission.

10. Valve Body. The valve body assembly includes the various valves, springs, and other components which control the selection of ranges, as well as the automatic shifting of gears. The valve body assembly is bolted to the bottom of the transmission case, which is channeled to direct the flow of oil between the valve body, clutches, and other components.

EQUIPMENT DESCRIPTION AND DATA.

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LEGEND:

- | | |
|---------------------------------------|------------------------------------|
| 1. STARTER RING GEAR | 21. FIRST CLUTCH |
| 2. LOCKUP CLUTCH | 22. ADAPTER HOUSING ASSEMBLY |
| 3. TORQUE CONVERTER TURBINE | 23. LOW-REVERSE CLUTCH |
| 4. TORQUE CONVERTER STATOR | 24. LOW PLANETARY CARRIER ASSEMBLY |
| 5. TORQUE CONVERTER PUMP | 25. REAR COVER ASSEMBLY |
| 6. ACCESSORY COVER | 26. GOVERNOR DRIVE GEAR |
| 7. TORQUE CONVERTER HOUSING | 27. SPEEDOMETER DRIVE GEAR |
| 8. TRANSMISSION INPUT PUMP | 28. OUTPUT SHAFT |
| 9. FORWARD SUPPORT AND VALVE ASSEMBLY | 29. OUTPUT FLANGE RETAINING NUT |
| 10. FORWARD CLUTCH ASSEMBLY | 30. GEAR UNIT CONNECTING DRUM |
| 11. FOURTH CLUTCH ASSEMBLY | 31. LOW SHIFT VALVE ASSEMBLY |
| 12. THIRD CLUTCH | 32. LOW TRIMMER VALVE ASSEMBLY |
| 13. SUN GEAR AND SHAFT ASSEMBLY | 33. VALVE BODY ASSEMBLY |
| 14. CENTER SUPPORT HOUSING ASSEMBLY | 34. OIL FILTER |
| 15. MAIN SHAFT ASSEMBLY | 35. COVER PLATE |
| 16. SECOND CLUTCH | 36. OIL PAN |
| 17. TRANSMISSION HOUSING | 37. PITOT TUBE |

EQUIPMENT DESCRIPTION AND DATA.**1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).**

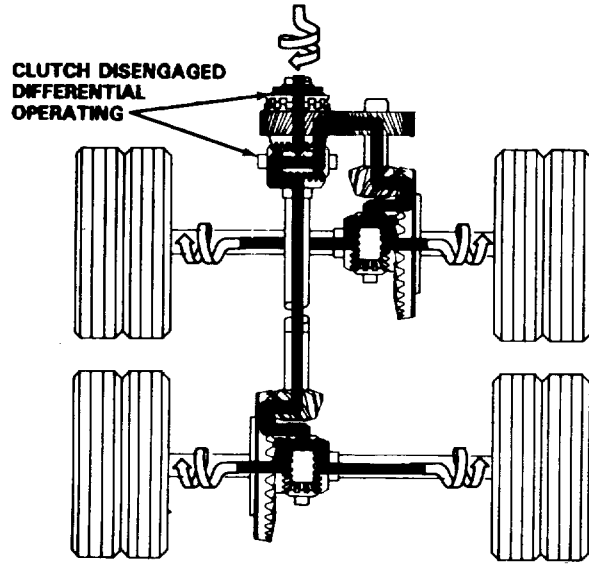
g. Rear Tandem Axles. The rear tandem axles consist of a forward-rear axle assembly and a rear-rear axle assembly. The forward-rear axle assembly is equipped with a No-Spin differential carrier and an air actuated power divider. The rear-rear axle assembly is equipped with differential side and pinion gears. The gears in each differential carrier are spiral bevel in design, with each drive pinion positioned at the center line of the ring gears. The differential and drive pinion are each mounted on tapered roller bearings.

The power divider, mounted on the forward-rear axle carrier, is actuated by a cab mounted air switch. This enables the driver to "lock-in" or "lockout" the interaxle differential. With the power divider in the lock in position, torque is distributed to both axles without differential action. The forward-rear axle ring and pinion gear are then driven by the helical-side gear. The rear axle gearing is driven from the output shaft side gear and interaxle drive line.

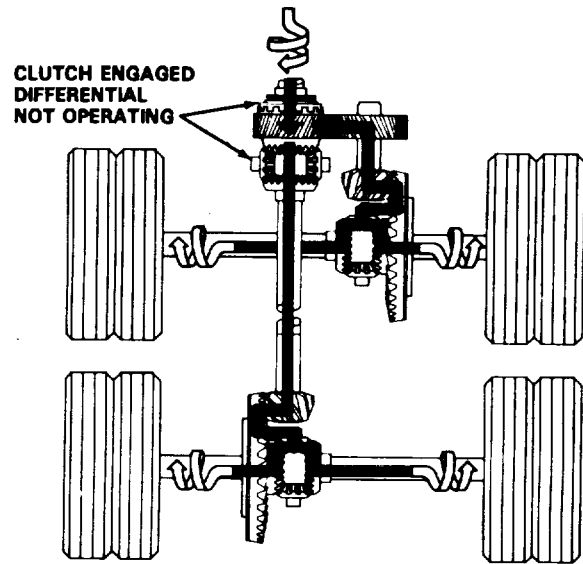
The No-SPIN® differential locks the forward-rear axle wheels, turning them at the same speed. If one wheel loses traction or leaves the ground, the opposite wheel, which still has traction, continues to drive the vehicle. There can be no one-wheel spinout on the forward-rear axle. When turning a corner, the No-SPIN* differential Automatically allows for the necessary difference in wheel speed with the power divider in the unlocked position. This difference in wheel speed will cause a normal "clicking" sound at the No-SPIN® differential.

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).



LOCKOUT DISENGAGED

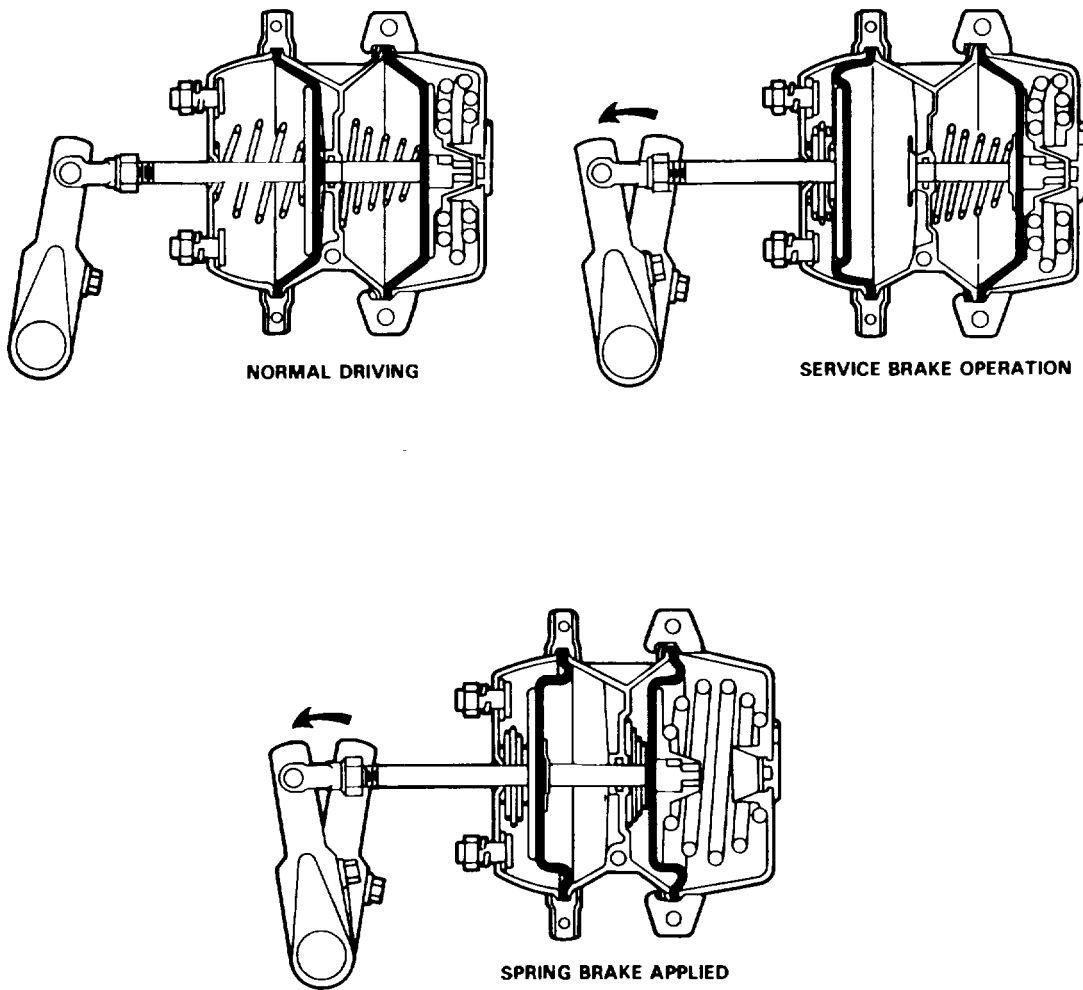


LOCKOUT ENGAGED

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

h. Forward-Rear Axle Brake Chamber. The forward-rear axle brake chamber is both spring and air operated. During normal driving, air pressure cages the I spring. When service brakes are applied, air pressure applies brakes and cages the spring. When air pressure is released, either by the parking brake valve, or accidental loss of air pressure, spring pressure applies brakes.

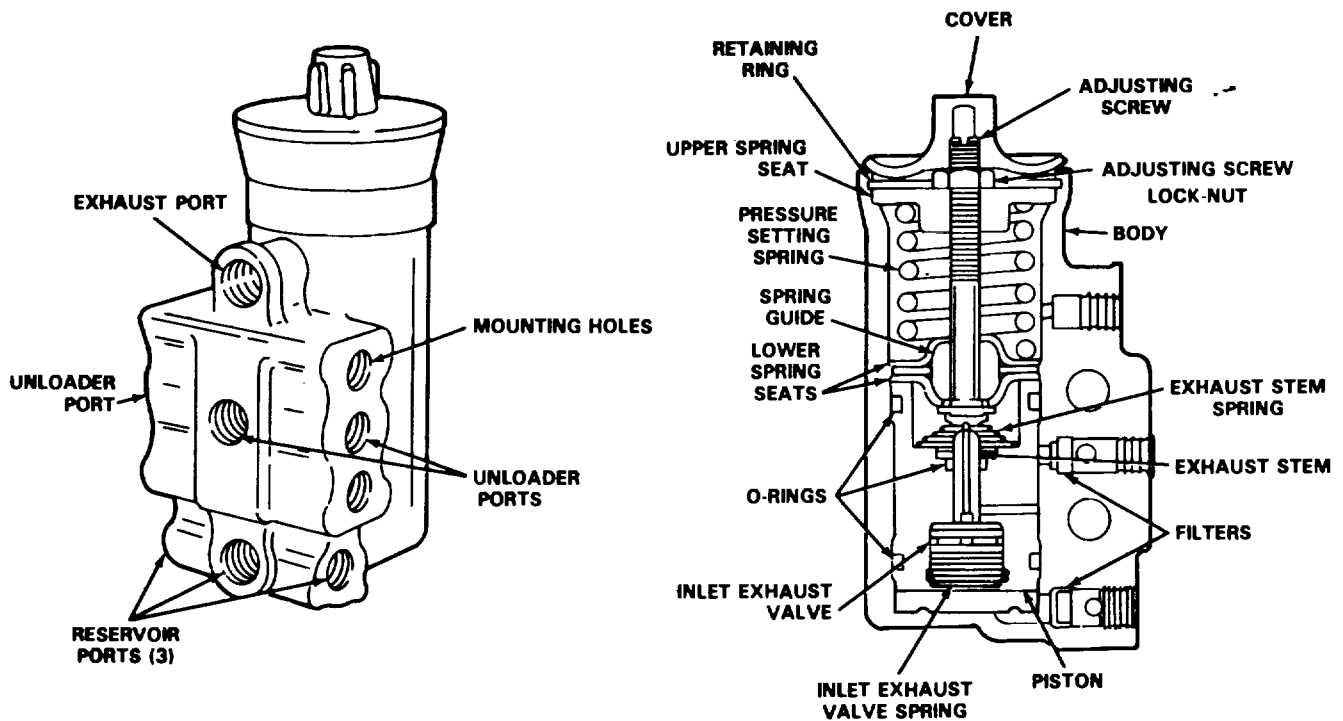


EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

i. Air Compressor Governor. The air compressor governor operates with the air compressor unloading mechanism (refer to TM 9-2815-225-34&P) to control air pressure to a maximum (cutout) and minimum (cut-in) pressure. The pressures are adjustable. However, the difference between maximum and minimum pressures will always be about 25 psi.

Air pressure enters through one of the reservoir ports. As pressure reaches maximum, the governor piston is pushed up and pressure is released out one of the un-loader ports. When minimum pressure is reached, the governor piston goes down and pressure in the un loader lines is released out the exhaust port.

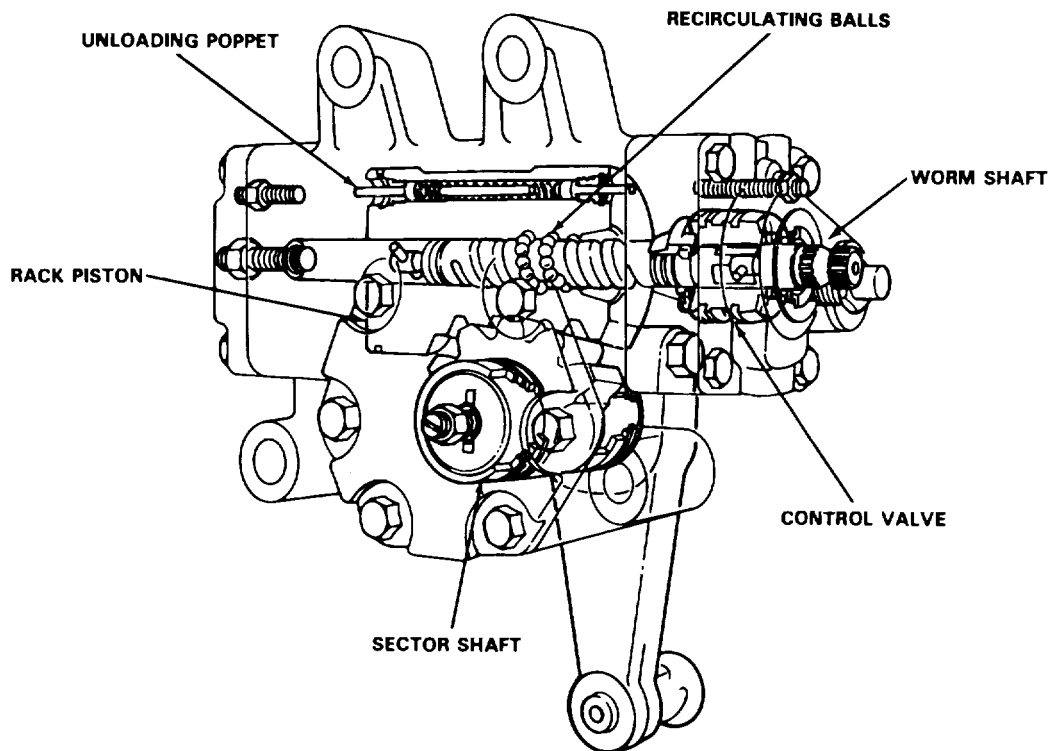


EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

j. Steering Gear. The steering gear is an integral steering unit incorporating a hydraulic control valve, a hydraulic power cylinder, and a manual steering mechanism.

When the worm shaft is turned by the steering column, recirculating balls mechanically move the rack piston to turn the sector shaft. Also, when the worm shaft is turned, the control valve is turned. Turning the control valve directs hydraulic pressure to assist the movement of the rack piston. When the rack piston reaches the end of its travel at full steer, an unloading poppet relieves pressure to protect against excessive pressure build-up.

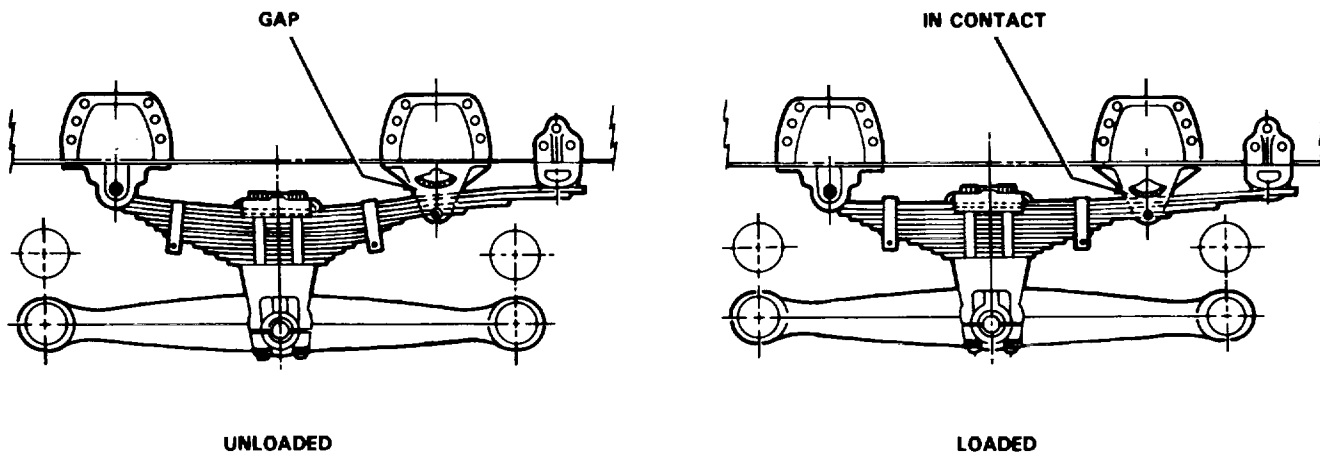


EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

k. Steering Pump and Reservoir. The steering pump is a roller vane type pump with an integral reservoir and fluid filter. The pump is rated at 1.65 cubic inches per revolution. The pump has an internal flow control and relief valve protection system operating at 2,000 psi with flow rates up to 5 gallons per minute at 3,000 rpm shaft speed.

l. Rear Tandem Axle Springs. The rear tandem axle springs are a two-stage, leaf type. When the vehicle has no load, there is a gap between the top leaf and the rear spring hanger so the weight of the vehicle is only on the top leaves. When the vehicle is loaded, contact is made with rear spring hanger so all leaves are used to carry the weight of vehicle.



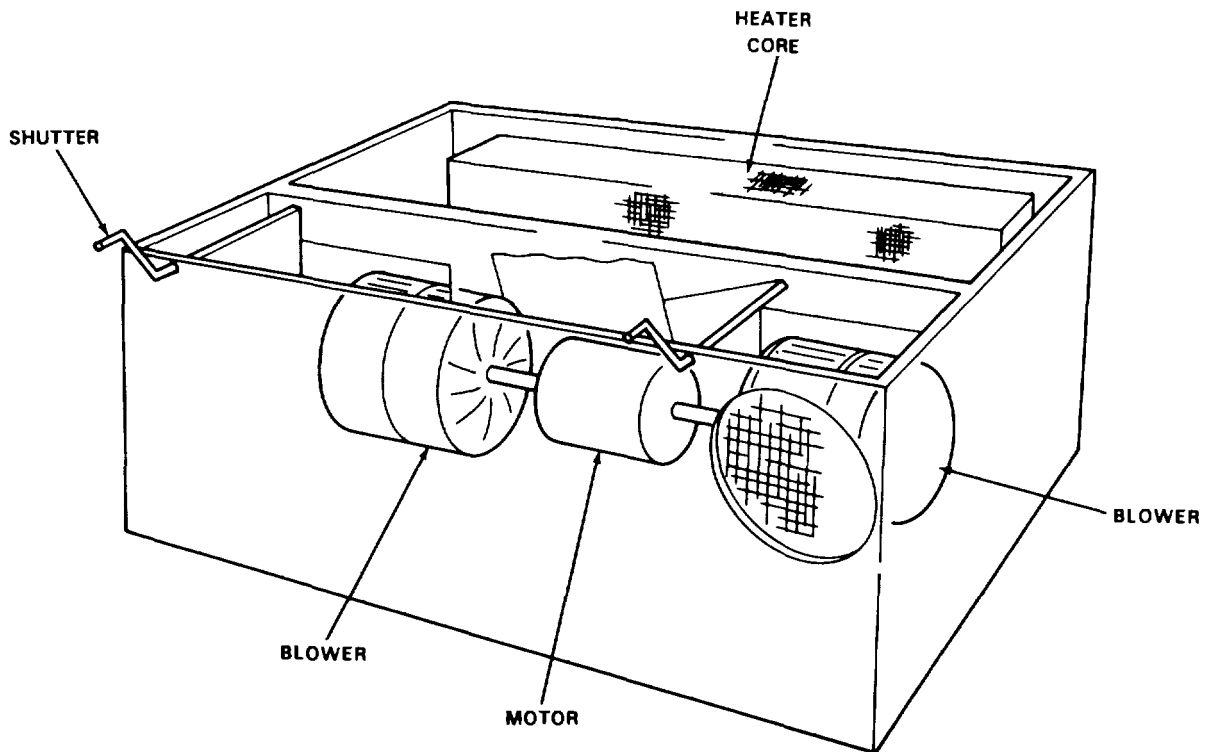
m. Equalizer Beams. The equalizer beams distribute load equally between the forward-rear and rear-rear axles. This allows the vehicle to go over bumps and uneven roads and still have equal weight on each axle. There are compressed sleeve bushings in the center and at each end of the beams.

n. Front Axle Springs. The front axle springs are leaf type. They are attached to fixed pivot points in the front and to shackles in the rear.

EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (Continued).

- o. Personnel Heater. The personnel heater is a hot water type unit, which consists of the following major items.
1. Heater Core. Receives hot coolant from engine block. It dissipates the heat from the coolant in a manner similar to the engine radiator.
 2. Blowers. Draw cold outside air through the heater core, where the air picks up the heat and directs the hot air into the cab.
 3. Motor. Drives both blowers.
 4. Shutter. Allows the driver to direct the hot air to the floor of the cab or to the windshield (for defroster operation).
 5. Controls. Allow the driver to place heater assembly in operation and regulate temperature of air from heater. (See TM 9-2320-283-10 for description and illustration).



EQUIPMENT DESCRIPTION AND DATA

1-8. EQUIPMENT DATA

Table 1-1 contains equipment data for components and subassemblies which have maintenance authorized at Direct and General Support level. For equipment data on the engine refer to TM 9-2815-225-34&P. For additional equipment data concerning the M915A1 refer to TM 9-2320-283-20 and TM 9-2320-283-10.

Table 1-1. EQUIPMENT DATA

FAN CLUTCH

Manufacturer..... Bendix
 Model FD-1
 Net Weight..... 40 lbs

ALTERNATOR-RECTIFIER

Manufacturer Leece-Neville
 Model 2500 JB
 Net Weight..... 23 lbs
 Maximum Amperage 360006 Engine Rpm 85 amp
 Voltage 14 volts nominal

STARTER

Manufacturer Leece-Neville
 Model 7400 MA
 Voltage 24 volts

TRANSMISSION

Manufacturer Detroit Diesel Allison
 Model HT 754 CRD
 Net Weight..... 940 lbs
 Rating
 Input Torque 1300 lb-ft maximum
 Input Speed 2100 rpm maximum
 Input Horsepower..... 425 maximum
 Rotation (view from input)
 Input Clockwise
 Output (in forward ranges)..... Clockwise

EQUIPMENT DESCRIPTION AND DATA

1-8. EQUIPMENT DATA (Continued)

Table 1-1. EQUIPMENT DATA (Continued).

TRANSMISSION (Continued).

Torque Converter	
Type	Single stage, polyphase 3 element
Model	TC 498
Torque Multiplication Ratio (at stall)	2.35:1
Gear Type	Planetary straight-cut spur, constant mesh
Clutches	Oil cooled, hydraulically actuated, spring released, self-compensating for wear
Oil Pressure	
Main Pressure @ 600 rpm fwd or rvs	90 psi
Main Pressure @ 1200 rpm fwd (stall)	140-175 psi
Main Pressure @ 1500-2000 rpm in all forward ranges	140-175 psi
Lubrication Pressure	Within 10 psi of main pressure
Oil Type	OE/HDO-10
Mechanical Gear Ratios	
First	3.69:1
Second	2.00:1
Third	1.58:1
Fourth	1.25:1
Fifth	1.00:1
Reverse	9.65:1

REAR TANDEM AXLES

Manufacturer	Eaton
Model	
Forward Rear	DS 401 P
Rear Rear	RS 401
Ratio	4.33:1
Load Rating	40,000 lbs

FORWARD REAR AXLE BRAKE CHAMBER

Manufacturer	Anchorlok
Model	2024
Net Weight	15.2 lbs

EQUIPMENT DESCRIPTION AND DATA

1-8. EQUIPMENT DATA (Continued).

Table 1-1. EQUIPMENT DATA (Continued).

AIR COMPRESSOR GOVERNOR

Manufacturer..... Bendix
 Model D-2
 Maximum Pressure Setting (Cutout)..... 125 psi
 Minimum Pressure Setting (Cut-n) 100 psi

STEERING GEAR

Manufacturer..... TRW Ross Gear Division
 Model HFB 64
 Maximum Operating Pressure..... 2000 psi
 Maximum Flow Rate 6 GPM
 Load Rating..... 12,000 lbs

STEERING PUMP AND RESERVIOR

Manufacturer..... Eaton
 Model B165
 Flow
 600 rpm 3.25 GPM minimum
 3000 rpm 5.00 GPM maximum
 Pressure (No Flow)
 600 rpm 1850 psi minimum
 3000 rpm 2000 psi maximum

CHAPTER 2 SERVICE AND TROUBLESHOOTING INSTRUCTIONS

2-1. OVERVIEW.

a. This chapter provides information on common tools, special tools, and troubleshooting instructions.

b. This information is divided into the following sections:

Section I Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment.

Section II Troubleshooting.

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

2-2. COMMON TOOLS AND EQUIPMENT.

Refer to Modified Table of Organization and Equipment (MTOE) for authorized common tools and equipment applicable to your unit.

2-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

a. Special tools and support equipment are listed and illustrated in TM 92320-283-34P.

b. Calibrate all measuring and test equipment used to determine equipment conformance in accordance with MIL-STD-120, MIL-C-45662, and MIL-L-45607.

2-4. REPAIR PARTS.

Repair parts are listed and illustrated in TM 9-2320-283-34P.

Section II. TROUBLESHOOTING**2-5. GENERAL**

a. This section provides procedures to troubleshoot vehicle systems, assemblies, and components for which repairs are authorized at Direct Support and General Support maintenance level. These procedures supplement the following troubleshooting procedures for the M915A1 vehicles.

- (1) Operator/crew level (TM 9-2320-283-10).
- (2) Organizational level (TM 9-2320-283-20).
- (3) Engine Direct Support and General Support level (TM 9-2815-225-34&P).

b. The troubleshooting procedures in this section cannot give all the answers or correct all vehicle malfunctions encountered. However, these procedures are an organized step by step study of a problem that directs test and inspections toward the source of a problem and successful correction.

CAUTION

Operation of a deedlined vehicle with out preliminary inspection will cause further damage to a disabled component and possible injury to personnel.

- c. Always check the easiest and most obvious things first. This simple rule saves time and trouble.
- d. Double check before disassembly. The source of most problems can be traced to more then one part in a system.
- e. Check all tags, service request forms, and vehicle log book for repair history. This may help lead to source of problems.
- f. Before correcting a problem, diagnose the cause of the problem. Do not allow the same failure to occur again

TROUBLESHOOTING

2-6. TROUBLESHOOTING SYMPTOM INDEX.

MALFUNCTION NO	MALFUNCTION	TROUBLESHOOTING PROCEDURE PAGE
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TRANSMISSION

1.	Transmission shifts at too high a speed	2-4
2.	Transmission shifts at too low a speed	2-4
3.	Oil leaking into converter housing	2-4
4.	Transmission overheating.	2-4
5.	No response to shift lever movement	2-5
6.	Rough shifting	2-5
7.	Dirty oil.	2-5
8.	Oil leaking at output shaft	2-6
9.	Transmission slips in all forward gears	2-6
10.	Transmission slips in first and reverse only	2-6
11.	Transmission slips in fifth and reverse only	2-6
12.	Transmission slips in fourth only	2-7
13.	Transmission slips in third only	2-7
14.	Transmission slips in second only	2-7
15.	Vehicle moves in neutral	2-7

REAR TANDEM AXLES

16.	Excessive play (backlash)	2-8
17.	Excessive noise	2-9
18.	Lockout will not engage	2-9
19.	Lubricant leaking	2-10

BRAKE SYSTEM

20.	Air pressure too high	2-10
21.	Air pressure too low	2-10

STEERING SYSTEM

22.	Excessive play at steering wheel	2-11
23.	Steering gear leaking oil	2-11
24.	Hard to steer in one or both directions	2-11
25.	No recovery.	2-11

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

TRANSMISSION

1. TRANSMISSION SHIFTS AT TOO HIGH A SPEED.

Step 1. Check for a stuck or damaged governor.

Clean or replace governor (para 3-29).

Step 2. Check shift speed adjustment.

a. Adjust shift speed (para 3-56).

b. If malfunction is not corrected, replace valve body (para 3-30 and para 3-54).

2. TRANSMISSION SHIFTS AT TOO LOW A SPEED.

See malfunction 1, steps 1 and 2.

3. OIL LEAKING INTO CONVERTER HOUSING.

Step 1. Check for worn torque converter pump hub or leaking seal.

Repair torque converter pump (para 3-38).

Step 2. Check for worn or leaking rear engine seal.

Repair rear engine seal (TM 9-2815-225-34&P).

4. TRANSMISSION OVERHEATING.

Step 1. Check for low lubrication oil pressure (para 3-57).

a. Replace external oil filter (TM 9-2320-283-20).

b. Clean or replace oil lines and fittings (TM 9-2320-283-20).

c. Clean or replace oil cooler (TM 9-2320-283-20).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

4. TRANSMISSION OVERHEATING (Continued).

Step 2. Check for low main oil pressure (para 3-57).

- a. Replace internal oil filter (TM 9-2320-283-20).
- b. Replace valve body (para 3-30 and para 3-54).
- c. Replace or repair torque converter pump (para 3-31, para 3-38, and para 3-53).

5. NO RESPONSE TO SHIFT LEVER MOVEMENT.

Step 1. Check for damaged or loose range selector part at valve body.

Clean or repair transmission housing (para 3-47).

Step 2. Check for low main oil pressure (para 3-57).

- a. Replace internal oil filter (TM 9-2320-282-20).
- b. Replace valve body (para 3-30 and para 3-54).
- c. Replace or repair torque converter pump (para 3-31, para 3-38, and para 3-53).

6. ROUGH SHIFTING.

Check shift speed adjustment.

- a. Adjust shift speed (para 3-56).
- b. If malfunction is not corrected, replace valve body (para 3-30 and para 3-54).

7. DIRTY OIL.

Check for damaged clutches.

Overhaul transmission (para 3-27 thru para 3-56).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

8. OIL LEAKING AT OUTPUT SHAFT.

Check rear oil seal and rear cover for damage or wear.

Repair rear cover (para 3-46).

9. TRANSMISSION SLIPS IN ALL FORWARD GEARS.

Step 1. Check for low main oil pressure (para 3-57).

a. Replace internal oil filter (TM 9-2320-283-20).

b. Replace valve body (para 3-30 and para 3-54).

c. Replace or repair torque converter pump (para 3-31, para 3-38, and para 3-53).

Step 2. Check forward clutch for damage or wear.

Replace or repair forward clutch (para 3-32, para 3-40, and para 3-51).

Step 3. Check front support for damage or wear.

Replace or repair front support (para 3-39).

10. TRANSMISSION SLIPS IN FIRST AND REVERSE ONLY.

Check low-reverse clutch for damage or wear.

Replace low-reverse clutch (para 3-33 and para 3-50).

11. TRANSMISSION SLIPS IN FIFTH AND REVERSE ONLY.

Check fourth clutch for damage or wear.

Replace or repair fourth clutch (para 3-32, para 3-41, and para 3-51).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

12. TRANSMISSION SLIPS IN FOURTH ONLY.

Check third clutch for damage or wear.

Replace third clutch (para 3-32 and para 3-51).

13. TRANSMISSION SLIPS IN THIRD ONLY.

Check second clutch for damage or wear.

Replace second clutch (para 3-35 and para 3-49).

14. TRANSMISSION SLIPS IN SECOND ONLY.

Check first clutch for damage or wear.

Replace first clutch (para 3-34 and para 3-49).

15. VEHICLE MOVES IN NEUTRAL.

Step 1. Check forward clutch for damage or wear.

Replace or repair forward clutch (para 3-32, para 3-40, and para 3-51).

Step 2. Check fourth clutch for damage or wear.

Replace or repair fourth clutch (para 3-32, para 3-41, and para 3-51).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

REAR TANDEM AXLES

WARNING

When power is supplied to the No-SPIN differential both wheels spin even when one wheel is on ground. To avoid injury raise and support both sides of tandem axles when checking differential action or wheel rotation with power. Failure to follow this precaution may result in serious injury to you and other personnel.

NOTE

The No-SPIN® differential emits a normal metallic sound when torque is transferred from both wheels to one wheel when cornering. This sound does not indicate a malfunction.

16. EXCESSIVE PLAY (BACKLASH).

Step 1. Check differential bearing adjustment.

- a. Remove axle carrier (para 3-69 for forward-rear and para 3-75 for rear-rear).
- b. Adjust bearing (para 3-70 for forward-rear and para 3-76 for rear-rear).

Step 2. Check ring and pinion gears for wear or damage.

Replace or repair axle carrier (para 3-69 and para 3-70 for forward-rear, para 3-75 and para 3-76 for rear-rear).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

17. EXCESSIVE NOISE.

Step 1. Check pinion bearings for wear or damage.

Replace or repair axle carrier (para 3-69 and para 3-70 for forward-rear, para 3-75 and para 3-76 for rear-rear).

Step 2. Check side carrier bearings for wear or damage.

Replace or repair axle carrier (para 3-69 and para 3-70 for forward-rear, para 3-75 and para 3-76 for rear-rear).

Step 3. Check ring and pinion gears for wear or damage.

Replace or repair axle carrier (para 3-69 and para 3-70 for forward-rear, para 3-75 and para 3-76 for rear-rear).

Step 4. Check spider and side gears for wear or damage (rear-rear axle).

Replace or repair axle carrier (para 3-75 and para 3-76 for rear-rear).

Step 5. Check differential carrier cover bearings and gears for wear or damage.

Replace or repair differential carrier cover (para 3-67 and para 3-68).

18. LOCKOUT WILL NOT ENGAGE.

Step 1. Check differential lockout for air leaks or damage.

Replace or repair differential lockout (para 3-71).

Step 2. Check differential carrier cover for stuck or damaged shift fork or clutch.

Replace or repair differential carrier cover (para 3-67 and para 3-68).

TROUBLESHOOTING

2-7. TROUBLESHOOTING PROCEDURES (Continued).

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

19. LUBRICANT LEAKING.

Step 1. Check oil seals at yoke and flanges for wear or damage.

Replace oil seal (para 3-65 and para 3-66 for forward-rear, para 3-74 for rear-rear).

Step 2. Check carrier bolts for looseness and check sealant for leakage.

Remove carrier and apply new sealant (para 3-69 for forward-rear, para 3-75 for rear-rear, para 3-67 for differential carrier cover).

Step 3. Check pump housing seal for damage

Replace pump housing seal (para 3-67).

Step 4. Check or cracked or damaged axle housing.

Replace or repair axle housing (para 3-63 and para 3-64 for forward-rear, para 3-72 and para 3-73 for rear-rear).

BRAKE SYSTEM

20. AIR PRESSURE TOO HIGH.

Step 1. Check air compressor governor adjustment.

Adjust air compressor governor (para 3-83).

Step 2. Check air compressor governor for stuck or damaged internal parts.

Replace or repair air compressor governor (para 3-84 and para 3-85).

Step 3. Refer to air compressor troubleshooting (TM 9-2815-225-34&P)

TROUBLESHOOTING

2.7. TROUBLESHOOTING PROCEDURES (Continued)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

21. AIR PRESSURE TOO LOW.

See malfunction 20, step 1 thru 3.

STEERING SYSTEM

22. EXCESSIVE PLAY AT STEERING WHEEL.

Step 1. Check steering gear adjustment.

Adjust steering gear (para 3-92).

Step 2. Check steering gear for wear or damage.

Replace or repair steering gear (para 3-93).

23. STEERING GEAR LEAKING OIL.

Check steering gear seals for wear or damage.

Replace steering gear (para 3-93).

24. HARD TO STEER IN ONE OR BOTH DIRECTIONS.

Check for internal leakage (para 3-91).

Replace steering gear (para 3-93).

25. NO RECOVERY.

Step 1. Check steering gear adjustment.

Adjust steering gear (para 3-92).

Step 2. Check steering gear for wear or damage.

Replace or repair steering gear (para 3-93).

CHAPTER 3

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

3-1. OVERVIEW.

- a. This chapter provides information on cleaning, inspection, testing, adjustment, replacement, and repair of components.
- b. This information is divided into the following sections:

Section I	General Maintenance Instructions
Section II	Engine
Section III	Fuel System
Section IV	Cooling System
Section V	Electrical System
Section VI	Transmission
Section VII	Front Axle
Section VIII	Rear Tandem Axles
Section IX	Brake System
Section X	Wheels
Section XI	Steering System
Section XII	Frame and Towing Attachments
Section XIII	Springs, Shock Absorbers, and Torque Rods
Section XIV	Cab and Body
Section XV	Accessory Items

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Section I. GENERAL MAINTENANCE INSTRUCTIONS

3-2. GENERAL.

a. This section provides general instructions for cleaning, inspection, repair, and assembly of vehicle component parts.

b. Publications which provide additional information on general shop practice techniques, preservation, welding, sheet metal work, etc. are listed in appendix A of this manual. To find a particular general service instruction, use the maintenance task summary below.

3-3. TASK SUMMARY.

TASK PARA	PROCEDURES	PAGE NO.
3-4	Cleaning <ul style="list-style-type: none"> a. General Instructions b. The Importance of Cleaning c. External Engine Cleaning d. Disassembled Parts Cleaning e. Castings f. Oil Passages g. Oil Seals, Cables, and Flexible Hoses h. Ball-Roller Bearings 	3-4.
3-5	Inspection <ul style="list-style-type: none"> a. General Instructions b. Castings c. Ball-Roller Bearings d. Studs, Bolts, and Capscrews e. Gears f. Bushings and Bushing Type Bearings g. Oil Seals 	3-5.
3-6	Repair <ul style="list-style-type: none"> a. General Instructions b. Castings c. Ball-Roller Bearings d. Studs e. Gears f. Bushings and Bushing Type Bearings g. Oil Seals 	3-6.
3-7	Assembly	3-7.

3-4. CLEANING.

a. General Instruction. Cleaning procedures will be the same for the majority of parts and components which make up the vehicle subassemblies. General cleaning procedures are detailed in "b" through "h" below.

b. The Importance of Cleaning. Great care and effort are required in all cleaning operations. The presence of dirt and foreign material is a constant threat to satisfactory vehicle operation and maintenance. The following will apply to all cleaning operations:

- (1) Clean all parts before inspection, after repair, and before assembly.
- (2) Hands must be kept free of any accumulation of grease which can collect dust and grit.
- (3) After cleaning, all parts must be covered or wrapped in plastic or paper to protect them from dust and/or dirt.

WARNING

Particles blown by compressed air are hazardous. Always direct air stream away from the user and other persons in the area. User must wear a safety eyeshield when using compressed air in cleaning.

c. External Engine Cleaning. All electrical equipment and other parts that could be damaged by steam cleaning or moisture must be removed, and all openings covered before cleaning. Dry with compressed air.

d. Disassembled Parts Cleaning. Place all disassembled parts in suitable wire baskets for cleaning.

- (1) Dry and cover all cleaned parts.
- (2) Place on or in "racks" and hold for inspection or repair.
- (3) All parts subject to rusting must be lightly oiled and wrapped.
- (4) Keep all related parts and components together. Do not mix parts.

3-4. CLEANING (Continued).**WARNING**

Improper cleaning methods and use of unauthorized cleaning solvents will injure personnel and damage equipment. See TM 9-247 for correct information.

e. Castings.

- (1) Clean inner and outer surfaces of castings and all areas subject to grease and oil with cleaning solvents. Refer to TM 9-247.
- (2) Use a stiff brush to remove sludge and gum deposits.

WARNING

Particles blown by compressed air are hazardous. Always direct air stream away from the user and other persons in the area. User must wear safety eyeshield when using compressed air in cleaning.

- (3) Use compressed air to blow out all tapped holes and to dry castings after cleaning.

f. Oil Passages. Particular attention must be given to all oil passages in castings and machined parts. All oil passages must be clean and free of any obstructions.

- (1) Clean passages with wire probes to break up any sludge or gum deposits.
- (2) Wash passages by flushing with solvents. See TM 9-247.
- (3) Dry passages with compressed air.

CAUTION

Do not allow drycleaning solvents to come in contact with seals, cables, or flexible hoses. These cleaners cause leather, rubber, and synthetic materials to dry out, rot, and lose pliability making them unserviceable.

3-4. CLEANING (Continued).

- g. Oil Seals, Electrical Cables, and Flexible Hoses. Clean with soap and water.
- h. Ball-Roller Bearings.
 - (1) Bearings require special cleaning. After removing surface oil and gum deposits, place bearing in hot oil, 140°F, to loosen congealed oil and grease. Wipe bearings dry, do not use compressed air. After cleaning, coat bearings with oil, wrap in paper, and hold for inspection.
 - (2) See TM 9-214 for information on and care of bearings.

3-5. INSPECTION.

a. General Instructions. The procedures for inspections will be the same for many of the parts and components which make up the vehicle subassemblies. The general procedures are detailed in "b" through "g" below. Some dimensional standards for parts have been fixed at extremely close tolerances, so use specification tables. Also use specified inspection equipment for inspection where cracks and other damage cannot be spotted visually. Exercise extreme care in all phases of inspection.

b. Castings.

- (1) Inspect all castings for cracks using a magnifying glass and strong light.
- (2) See MIL-I-6866 inspection, penetrant methods, and MIL-I-6868, inspection process, magnetic particles.
- (3) Particularly check areas around studs, pipe plugs, threaded inserts, and sharp corners. Replace all cracked castings.
- (4) Inspect machined surfaces for nicks, burrs, or raised metal. Mark damaged areas for repair or replacement.
- (5) Inspect all pipe plugs, pipe plug openings, capscrews, and capscrew openings for damaged or stripped threads.
- (6) Check all gasket mating surfaces for warpage with a straightedge or surface plate. Inspect mating flanges for discolorations which may indicate persistent oil leakage.
- (7) Check all castings for conformance to applicable repair standards.

3-5. INSPECTION (Continued).

- c. Ball-Roller Bearings. See TM 9-214 for inspection of bearings. Check all bearings for conformance to applicable repair standards.
- d. Studs, Bolts, and Capscrews. Replace if bent, loose, stretched, or if threads are damaged.
- e. Gears.
 - (1) Inspect all gears for cracks, using a magnifying glass and strong light. No cracks are allowed.
 - (2) Inspect gear teeth for wear, sharp fins, burrs, and galled or pitted surfaces.
 - (3) Check keyway slots for wear and/or damage.
- f. Bushings and Bushing Type Bearings.
 - (1) Check all bushings and bushing type bearings for secure fit, evidence of heating, wear, burrs, nicks, and out-of-round conditions.
 - (2) Check for dirt in lubrication holes or grooves. Holes and grooves must be clean and free from damage.
- g. Oil Seals. Oil seals are mandatory replacement items.

3-6. REPAIR.

- a. General Instructions. Repair of most parts and components is limited to procedures outlined in applicable maintenance instructions and the following general procedures detailed in "b" through "h" below.

CAUTION

Repaired items must be thoroughly cleaned to remove metal chips and abrasives to prevent them from entering working parts of vehicle.

- b. Castings.
 - (1) All cracked castings will be replaced.

3-6. REPAIR (Continued).

- (2) Only minor repairs to machined surfaces, flanges, and gasket mating surfaces are permitted. Remove minor nicks, burrs, and/or scratches with:
 - (a) Fine mill file.
 - (b) Crocus cloth dipped in cleaning solvent.
 - (c) Lapping across a surface plate.
- (3) Remachining of machined surfaces to repair damage, warpage, or uneven surfaces is not permitted.
- (4) Repair damaged threaded holes with a thread tap or repair oversize holes with threaded inserts.
 - c. Ball-Roller Bearings. See TM 9-214.
 - d. Studs. Repair minor thread damage with a thread chaser. Replace all bent, stretched, stripped, or damaged studs as outlined below:
 - (1) Remove with a stud remover. Back studs out slowly to avoid heat build-up and seizure which can cause studs to break off.
 - (2) If a stud is broken off too short to use a stud remover, use extractor to remove, or use "welding method".

CAUTION

See TM 9-237 welding instructions to avoid damage to castings if welding method is used.

- (3) A broken stud can be removed by welding bar stock or a nut to stud and removing with wrench.

NOTE

Standard studs may have a coarse thread on one end and a fine thread on the other end. The coarse thread end is installed in the aluminum casting. Studs having coarse threads on both ends are used in some applications. The shorter threaded end goes into the casting. See TM 9-2320-283-34P for correct part numbers.

3-6. REPAIR (Continued).

- (4) All replacement studs have special coating and must have a small amount of antiseize compound (MIL-A-13881) applied on threads before stud is installed. Install replacement studs slowly to prevent heat build-up and snapping off.

e. Gears.

- (1) Remove gears using suitable pullers.
- (2) Use the same methods described in paragraph 3-6 "b" (2), for castings to remove minor nicks, burrs, or scratches on gear teeth.

f. Bushings and Bushing Type Bearings. When bushings and bushing type bearings seize to a shaft and spin in the bore the associated parts must also be replaced.

g. Oil Seals.

- (1) Remove oil seals by pressing or prying out, being careful not to damage casting or adapter bore.
- (2) Always install new seal in bore using proper seal. replacing tool.

3-7. ASSEMBLY.

a. General. Extreme care must be exercised in all component assembly operations to ensure satisfactory vehicle performance. Precautionary rules for assembly are outlined below. Step-by-step procedures for assembly of various components are covered in the paragraph relating to the specific component.

b. Precautionary Rules.

- (1) Cleanliness is essential in all component assembly operations. Dirt and dust, even in minute quantities, are abrasive. Parts must be cleaned as specified and kept clean. Wrap or cover parts and components when assembly procedures are not immediately completed.
- (2) Coat all bearings and contact surfaces with operating oil (axle oil for axle parts, transmission oil for transmission parts, etc.) to ensure lubrication of parts during initial operation after repair.
- (3) Use new gaskets and preformed packings during assembly of all components.

Section II. ENGINE

3-8. GENERAL.

This section provides procedures authorized at direct and general support maintenance levels to replace engine components.. To find a specific procedure contained in this section, see the task summary below:

3-9. TASK SUMMARY.

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

CONDITION DESCRIPTION

(Refer to specific paragraph for this information).

TEST EQUIPMENT

None.

SPECIAL TOOLS

2 1/2 - Ton overhead lift hoist
with adjustable chain hoist.
Engine lifting fixture
15434 (ST-125).

MATERIALS/PARTS (P/N)

Cable tie
5975-00-570-9598.
Cotter pin
85757 (10087-2).
Cotter pin
24617 (9427317).

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Vehicle on level ground away from blowing dirt and dust.

ENGINE.

3-9. TASK SUMMARY (Continued).

INITIAL SETUP (Continued).

REFERENCES (TM)

TM 9-2320-283-10.
 LO 9-2320-283-12.
 TM 9-2320-283-20.
 TM 9-2320-283-34P
 TM 9-2815-225-34&P.

TROUBLESHOOTING REFERENCES

None .

GENERAL SAFETY INSTRUCTIONS

Vehicle parked on level ground. Front and rear wheels blocked. Parking brake set.

Do not use hands to free engine. Use a tanker bar or a pry bar to avoid injury.

Make sure all hoses, lines and linkage are fastened clear of engine to avoid damage and personnel injury.

Direct all personnel to stand clear during hoisting operations. A heavy or swinging load can cause serious personnel injury.

To keep vehicle from moving, set park brake and block rear wheels.

LIST OF TASKS

TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)
1	Engine Replacement	3-10	
	a. Preliminary Disconnection	3-10a	
	b. Removal	3-10b	
	c. Installation	3-10c	
2	Engine Mounts Replacement	3-11	
	a. Removal of Front Engine Mounts	3-11a	
	b. Removal of Rear Engine Mounts	3-11b	
	c. Cleaning	3-11c	
	d. Inspection	3-11d	
	e. Installation of Front Engine Mounts	3-11e	
	f. Installation of Rear Engine Mounts	3-11f	

ENGINE.

3-10. ENGINE REPLACEMENT.

THIS TASK COVERS

- a. Preliminary Disconnections.
- b. Removal.
- c. Installation.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

TEST EQUIPMENT

None.

SPECIAL TOOLS

2 1/2 - Ton overhead lift
with adjustable chain hoist

Engine lifting fixture
15434 (ST-125).

MATERIALS/PARTS (P/N)

Cable tie
5975-00-570-9598.
Cotter pin
85757 (10087-2).
Cotter pin
24617 (9427317).

EQUIPMENT CONDITION

PARAGRAPH

CONDITION DESCRIPTION

TM 9-2320-283-20.

Battery ground cables
disconnected.

TM 9-2320-283-10.

Air reservoirs drained.

TM 9-2320-283-20.

Hood removed.

TM 9-2320-283-20.

Brush guard and spotter
mirrors removed.

TM 9-2320-283-20.

Bumper and towing eyes
removed.

TM 9-2320-283-20.

Left and right front
fenders removed.

TM 9-2320-283-20.

Grille shell removed.

TM 9-2320-283-20.

Air cleaner and
brackets removed.

TM 9-2320-283-20.

Turbocharger exhaust
tube and disconnected
removed.

TM 9-2320-283-20.

Radiator and radiator
support rods removed.

TM 9-2320-283-20.

Water pump bypass hose
removed.

LO 9-2320-283-12.

Engine oil drained.

TM 9-2320-283-20.

All cooling system
hoses removed.

TM 9-2320-283-20.

Horn wire disconnected.

TM 9-2320-283-20.

Power steering pump
hoses disconnected.

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).****INITIAL SETUP (Continued)**PERSONNEL REQUIRED

Two (MOS-63W).

REFERENCES (TM)

TM 9-2320-283-10.

LO 9-2320-283-12.

TM 9-2320-283-20.

TM 9-2320-283-34P.

TM 9-2815-225-34&P.

TROUBLESHOOTING REFERENCES

None.

SPECIAL ENVIRONMENTAL CONDITIONS

None.

GENERAL SAFETY INSTRUCTIONS

Vehicle parked on level ground.

Front and rear wheels blocked.

Parking brake set.

Do not use hands to free engine.

Use a tanker bar or a pry bar to avoid injury.

Make sure all hoses, lines and linkages are fastened clear of engine to avoid damage and personnel injury.

Direct all personnel to stand clear during hoisting operations. A heavy or swinging load can cause serious personnel injury.

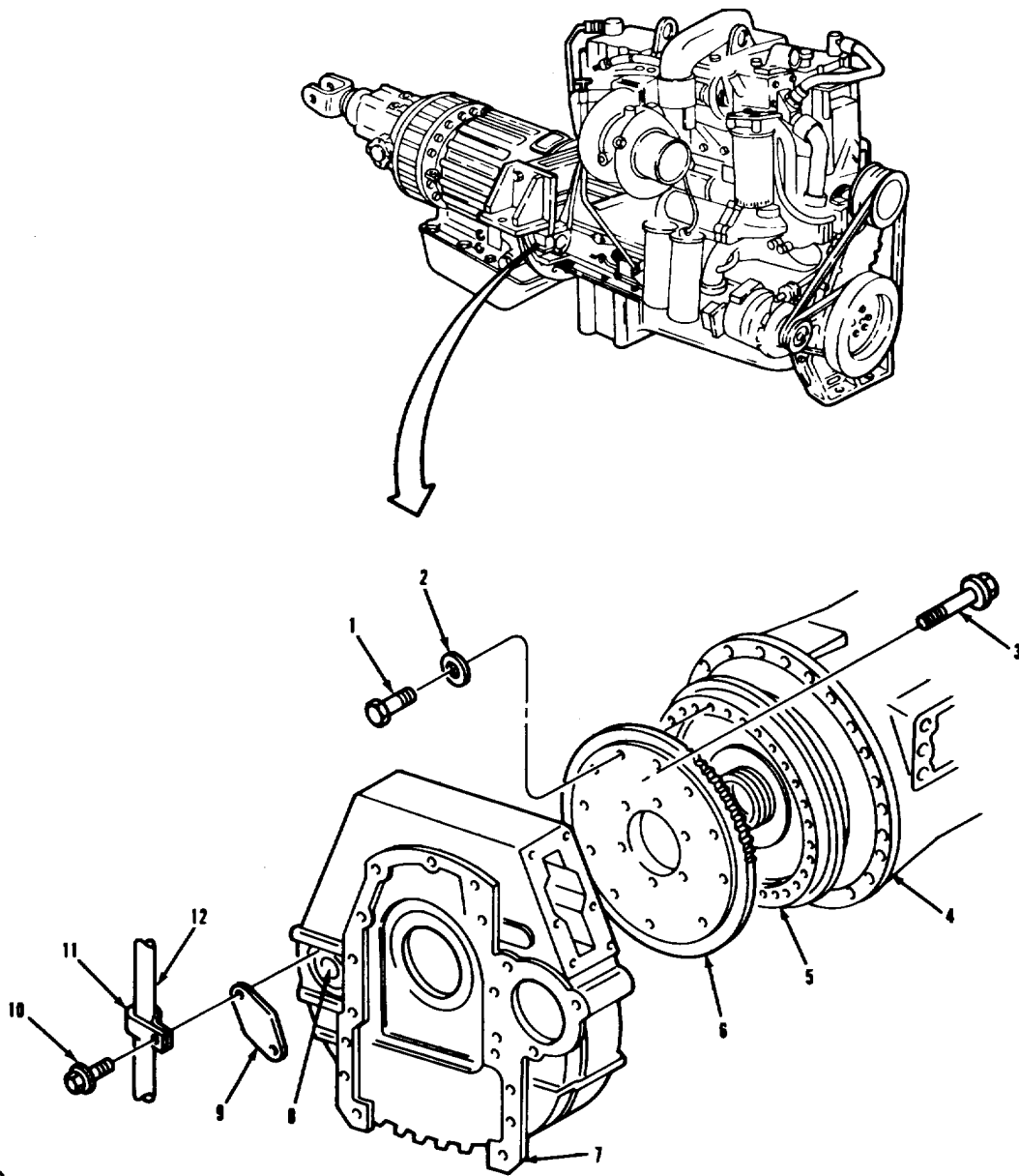
ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS.	<p>WARNING</p> <ul style="list-style-type: none"> • Make sure all hoses, wires, lines and linkages are fastened clear of engine and transmission to avoid hangups or snagging during removal which will cause equipment damage or personnel injury. • Do not attempt to remove engine with transmission attached. Transmission must be separated from engine before engine is removed. <p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • If the engine is removed in the field an additional assistant will be needed to operate the wrecker crane. Shop removal of engine requires a mechanic and one assistant if overhead hoist is available. 	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

- | | |
|---|------------------------------|
| 1. HEXAGON CAPSCREW (12) | 7. FLYWHEEL HOUSING |
| 2. WASHER (12) | 8. FLYWHEEL INDEX HOLE |
| 3. HEXAGON CAPSCREW WITH CAPTIVE
WASHER (12) | 9. FLYWHEEL INDEX HOLE COVER |
| 4. TRANSMISSION | 10. SCREW (2) |
| 5. FLYWHEEL | 11. TUBE CLAMP |
| 6. DISK AND RING GEAR | 12. BREATHER TUBE EXTENSION |

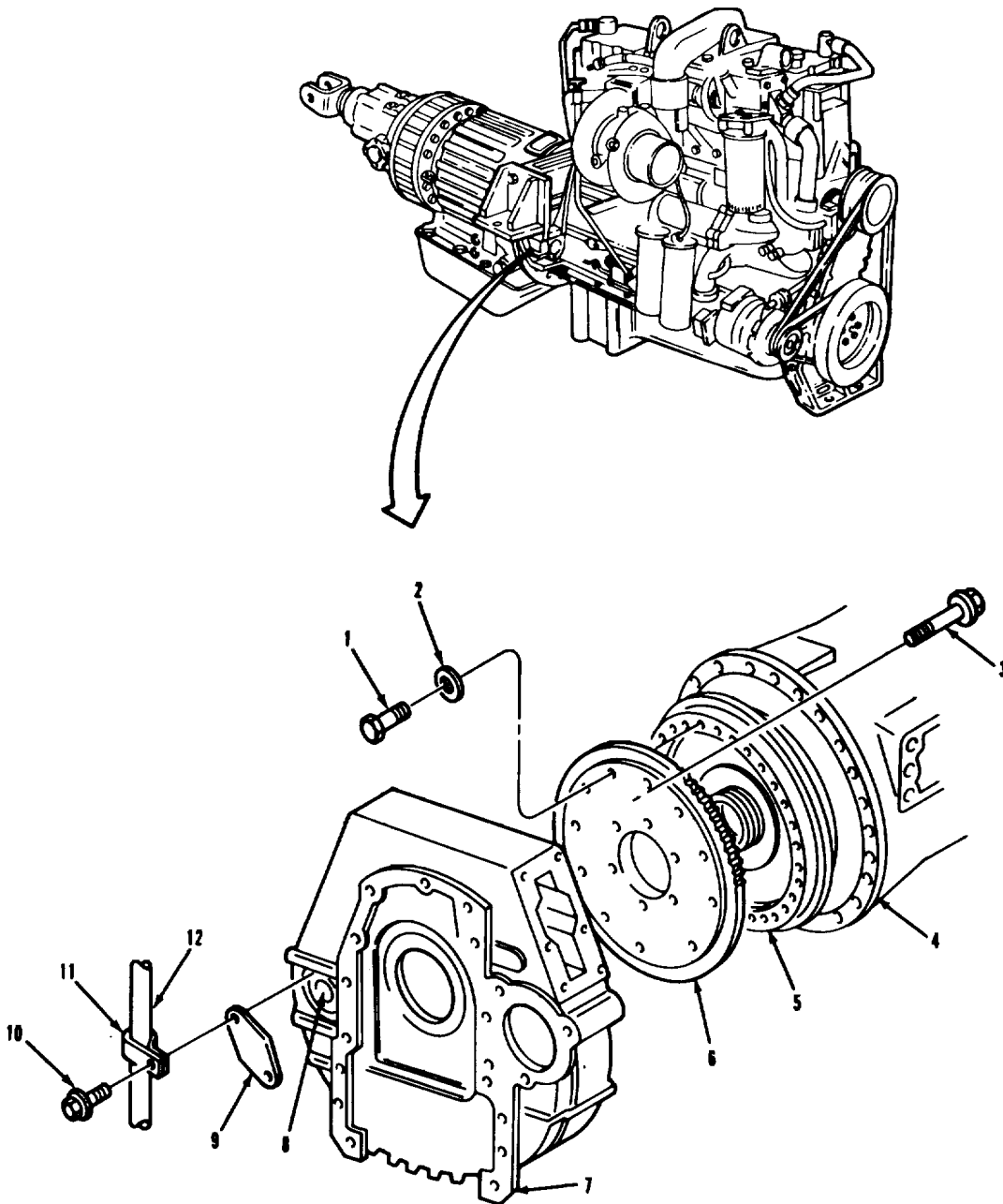
TA 238057

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).****LOCATION/ITEM****ACTION****REMARKS****A. PRELIMINARY DISCONNECTIONS (Continued).**

- | | | |
|---|---|--|
| 1. Transmission (4). | Position suitable transmission jack under item (4) and secure it to item (4). | |
| 2. Cover (9) and two screws (10). | Loosen two items (10). | |
| 3. Upper screw (10), clamp (11) and tube (12). | Remove upper item (10) only and move items (11) and (12) out of way. | Do not remove item (11) from item (12). Do not remove lower item (10). |
| 4. Cover (9) and hole (8). | Swivel item (9) down to get into (8). | |
| 5. Twelve capscrews (1), washers (2), gear (6), and flywheel (5). | Rotate engine using accessory drive pulley nut. | Do not remove twelve items (3) at this time. |

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

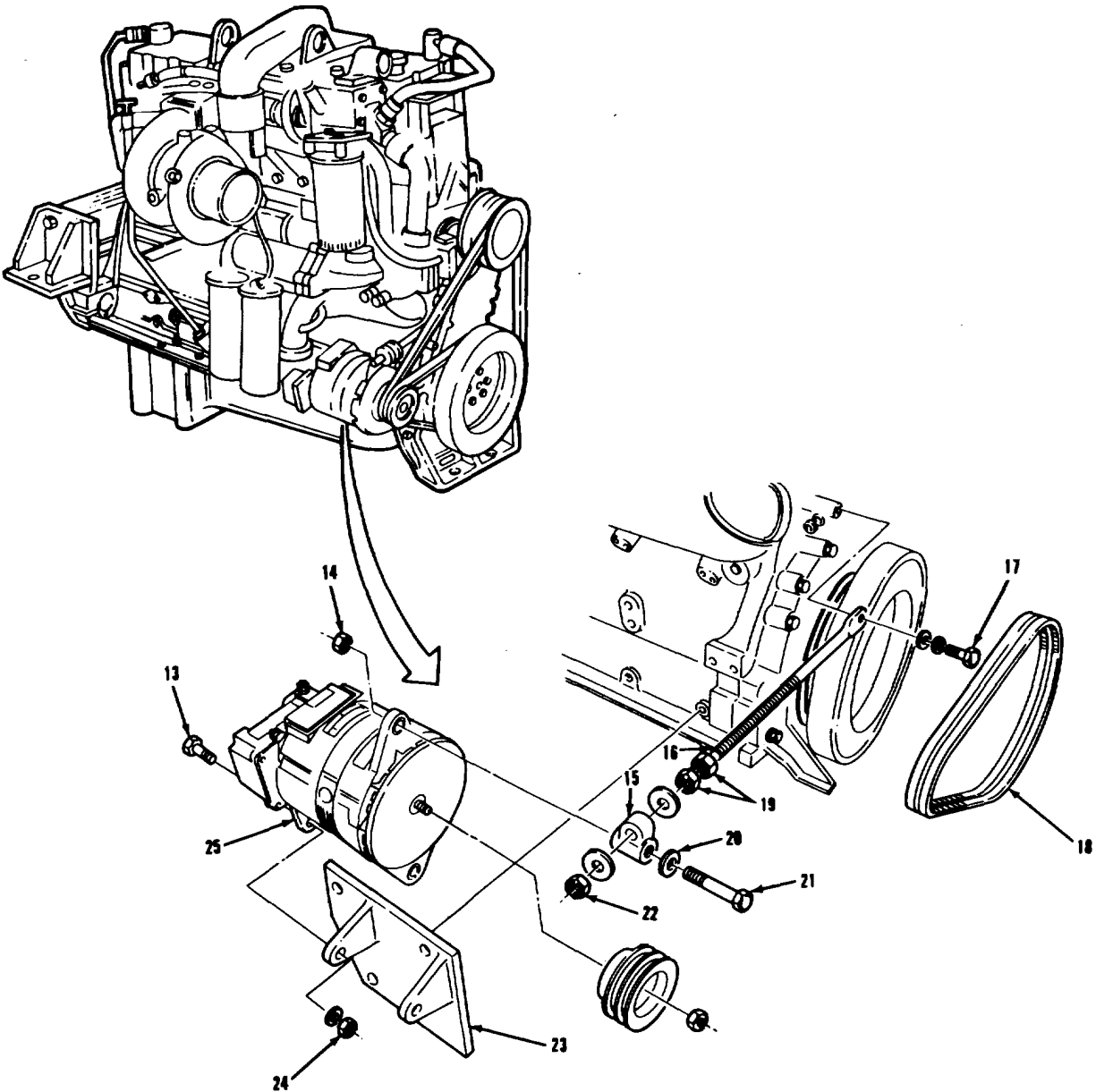
- | | |
|--|------------------------------|
| 1. HEXAGON CAPSCREW (12) | 7. FLYWHEEL HOUSING |
| 2. WASHER (12) | 8. FLYWHEEL INDEX HOLE |
| 3. HEXAGON CAPSCREW WITH CAPTIVE WASHER (12) | 9. FLYWHEEL INDEX HOLE COVER |
| 4. TRANSMISSION | 10. SCREW (2) |
| 5. FLYWHEEL | 11. TUBE CLAMP |
| | 12. BREATHER TUBE EXTENSION |

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS (Continued).		
6. Alternator assembly (25), two screws (13), and nuts (24).	Loosen two items (13) and two items (24).	Allows item (25) to be pivoted on item (23).
7. Rod (16) and screw (17).	Loosen item (17).	
8. Two nuts (19) and nut (22).	Loosen items (19) and (22).	Hold item (19) closest to item (15) while turning other item (19).
9. Block (15), screw (21), washer (20), and nut (14).	Remove items (21), (20), and (14). Disengage item (15) from item (25).	
10. Alternator assembly (25).	Swing item (25) in toward engine as far as it will go. Tighten items (13) and (24) to prevent item (25) from falling down.	Provides clearance between alternator assembly (25) and vehicle frame when removing engine.
11. Two belts (18).	Remove two items (18).	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

- | | |
|--------------------------------|--|
| 13. HEX HEAD SCREW (2) | 20. WASHER |
| 14. NUT | 21. HEX HEAD SCREW |
| 15. ALTERNATOR ADJUSTING BLOCK | 22. JAM NUT |
| 16. ALTERNATOR ADJUSTING ROD | 23. ALTERNATOR MOUNTING BRACKET ASSEMBLY |
| 17. HEX HEAD SCREW | 24. NUT (2) |
| 18. BELT (2) | 25. ALTERNATOR ASSEMBLY |
| 19. JAM NUT (2) | |

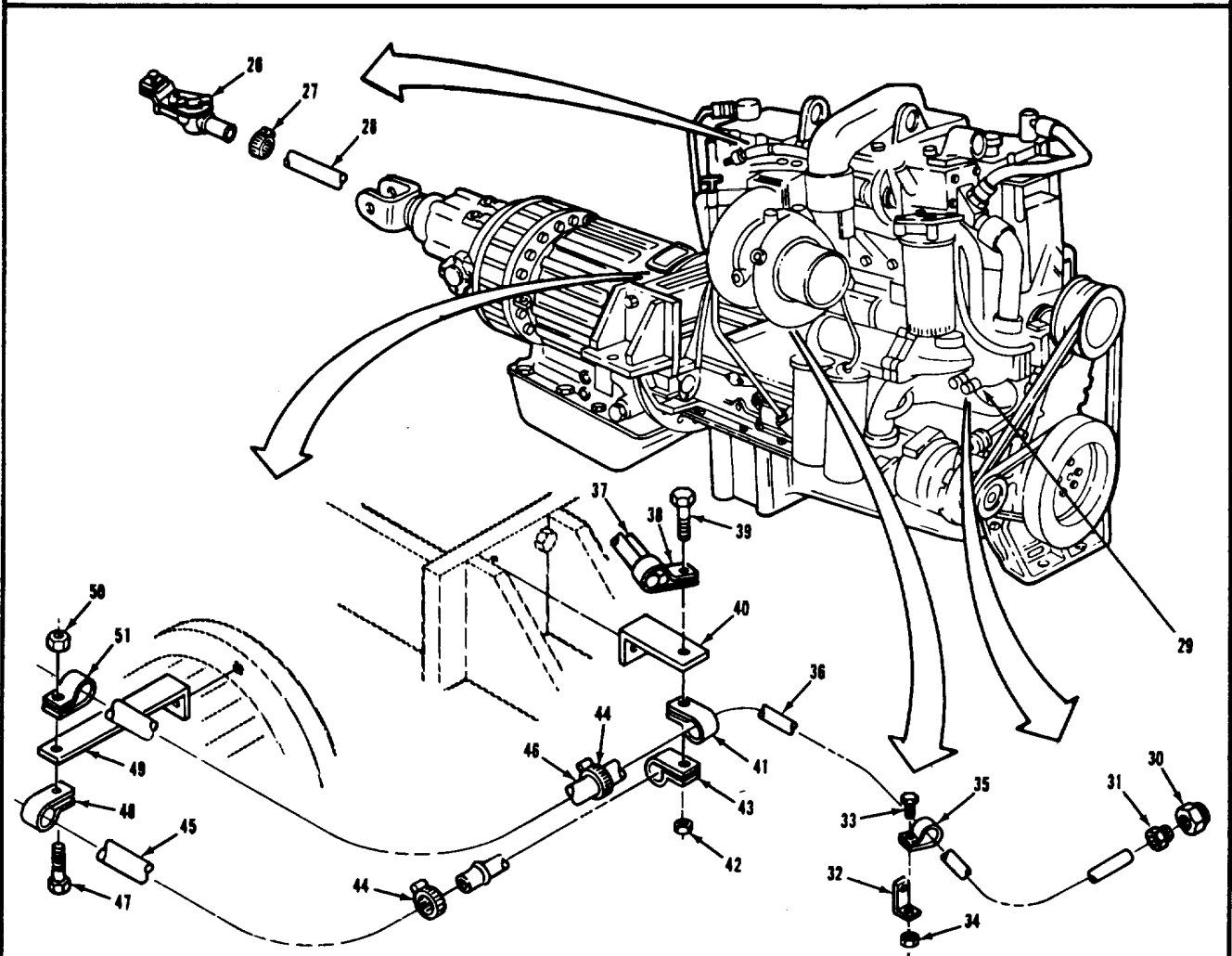
TA 238050

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS (Continued).		
12. Valve (26) and clamp (27).	Loosen item (27) then remove item (28) from item (26).	Retain item (27) for reassembly.
13. Bracket (32) and clamp (35).	Loosen and remove items (33) and (34).	Leave item (35) around item (36).
14. Connection (29), connector (30), and nut (31).	Loosen and remove item (31) from item (30).	Use tubing wrench on item (31).
15. Support (40), clamp (41), clamp (43), and clamp (38).	Loosen and remove item (39), item (42) and item (38).	
16. Cable/harness (37) and clamp (44).	Position item (37) to allow access to item (44).	
17. Heater return tube assembly (36), clamp (44), and hose (46).	Loosen item (44). item (36) from item (46).	Remove
18. Heater return tube assembly (36).	Remove.	
19. Bracket (49), clamp (48), and clamp (51).	Loosen and remove item (50) and item (47).	Position item (45) and item (46) so that they do not interfere with engine removal.

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

- | | |
|---|--------------------------------|
| 26. CHECK VALVE | 38. CUSHIONED CLAMP |
| 27. HOSE CLAMP | 39. SCREW |
| 28. HEATER HOSE | 40. HOSE SUPPORT |
| 29. WATER PUMP TO RADIATOR CONNECTION | 41. CLOSED DIPPED CLAMP |
| 30. CONNECTOR | 42. NUT |
| 31. INVERTED FLARE NUT | 43. CLOSED DIPPED CLAMP |
| 32. COOLANT RETURN HOSE BRACKET | 44. HOSE CLAMP (2) |
| 33. SCREW | 45. HEATER HOSE TO FUEL HEATER |
| 34. NUT | 46. FUEL HEATER TO ENGINE HOSE |
| 35. CLOSED DIPPED CLAMP | 47. SCREW |
| 36. HEATER RETURN TUBE ASSEMBLY | 48. CLOSED DIPPED CLAMP |
| 37. STARTER BATTERY CABLE/STE/ICE HARNESS | 49. COOLANT HOSE BRACKET |
| | 50. NUT |
| | 51. CLOSED DIPPED CLAMP |

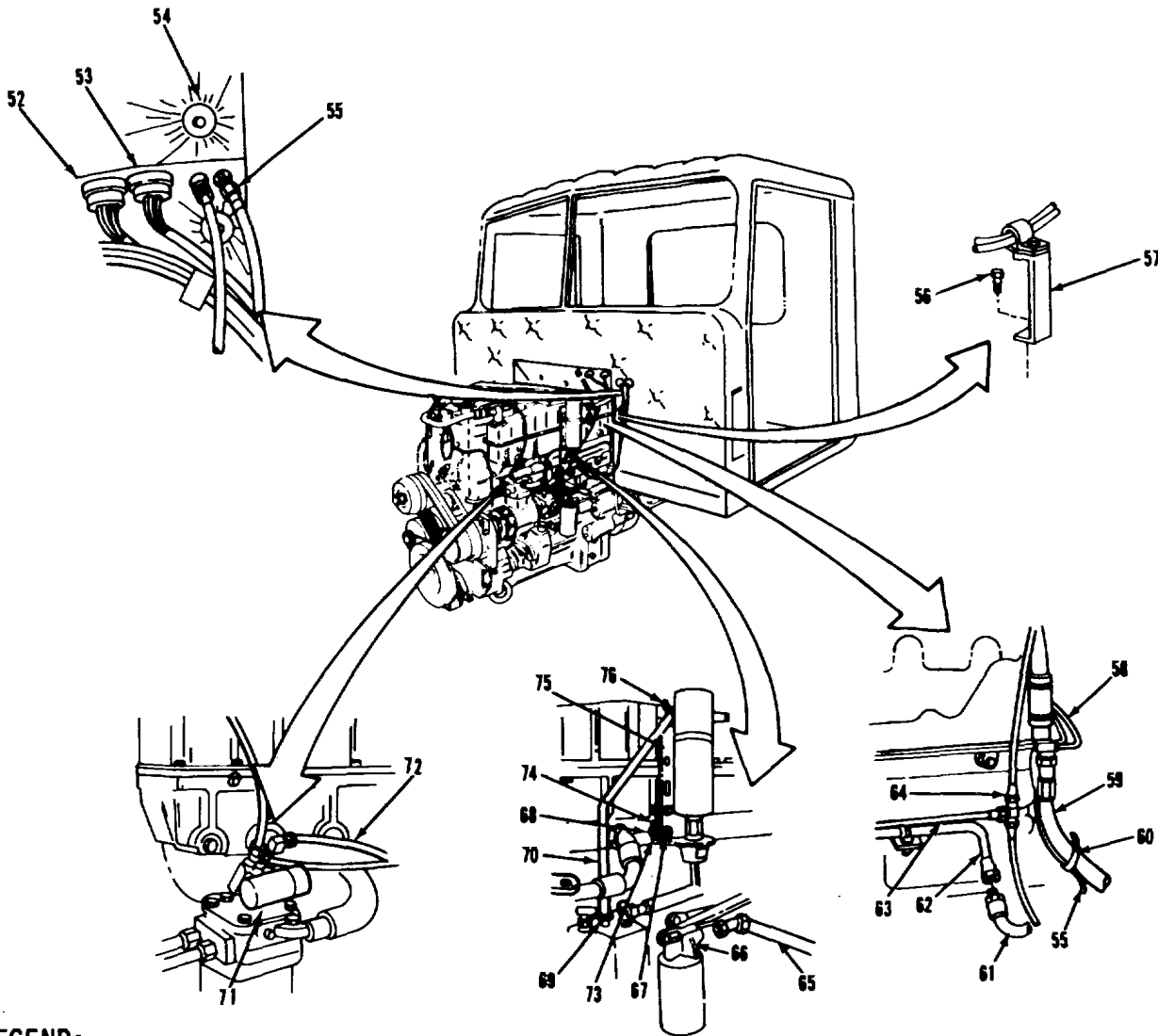
TA 238060

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS (Continued).		
20. Connector (52), connector (53), and firewall (54).	Disconnect items (52) and (53) at item (54).	Tag to aid in reassembly.
21. Line (59) and tee (58).	Disconnect item (59) from item (58).	
22. Line (62) and hose (61).	Disconnect item (61) from item (62).	
23. Line (63) and T-adapter (64).	Disconnect item (63) from item (64).	Black colored line.
24. Line (65) and fuel filter and damper assembly (66).	Disconnect item (65) from item (66).	
25. Tachometer shaft assembly (70), tachometer (69), and tie (76).	Disconnect item (70) from item (69). Cut and remove item (76).	
26. Line (72) and air compressor assembly (71).	Disconnect item (72) from item (71).	Green colored line. Use tubing wrench.
27. Bracket (75), clamp (73), and clamp (74).	Loosen and remove items (67) and (68). Remove item (73). Replace items (67) and (68).	
28. Speedometer shaft assembly (55), line (59), and tie (60).	Cut and remove item (60).	
29. Bracket (57) and screw (56).	Remove item (56). Move item (57) out of position.	Reinstall item (56).

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

- | | |
|--------------------------------|-------------------------------------|
| 52. CONNECTOR | 65. FUEL SUPPLY LINE |
| 53. CONNECTOR | 66. FUEL FILTER AND DAMPER ASSEMBLY |
| 54. FIREWALL | 67. SCREW |
| 55. SPEEDOMETER SHAFT ASSEMBLY | 68. NUT |
| 56. CAPTIVE WASHER SCREW | 69. PULSE TACHOMETER |
| 57. BRACKET | 70. TACHOMETER SHAFT ASSEMBLY |
| 58. FUEL RAIL MALE BRANCH TEE | 71. AIR COMPRESSOR ASSEMBLY |
| 59. FUEL RETURN LINE | 72. COMPRESSOR LINE |
| 60. CABLE TIE | 73. LOOP CLAMP |
| 61. COMPRESSOR HOSE | 74. LOOP CLAMP |
| 62. COMPRESSOR LINE | 75. ETHER QUICK START KIT BRACKET |
| 63. COMPRESSOR LINE | 76. CABLE TIE |
| 64. TACHOMETER | |

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

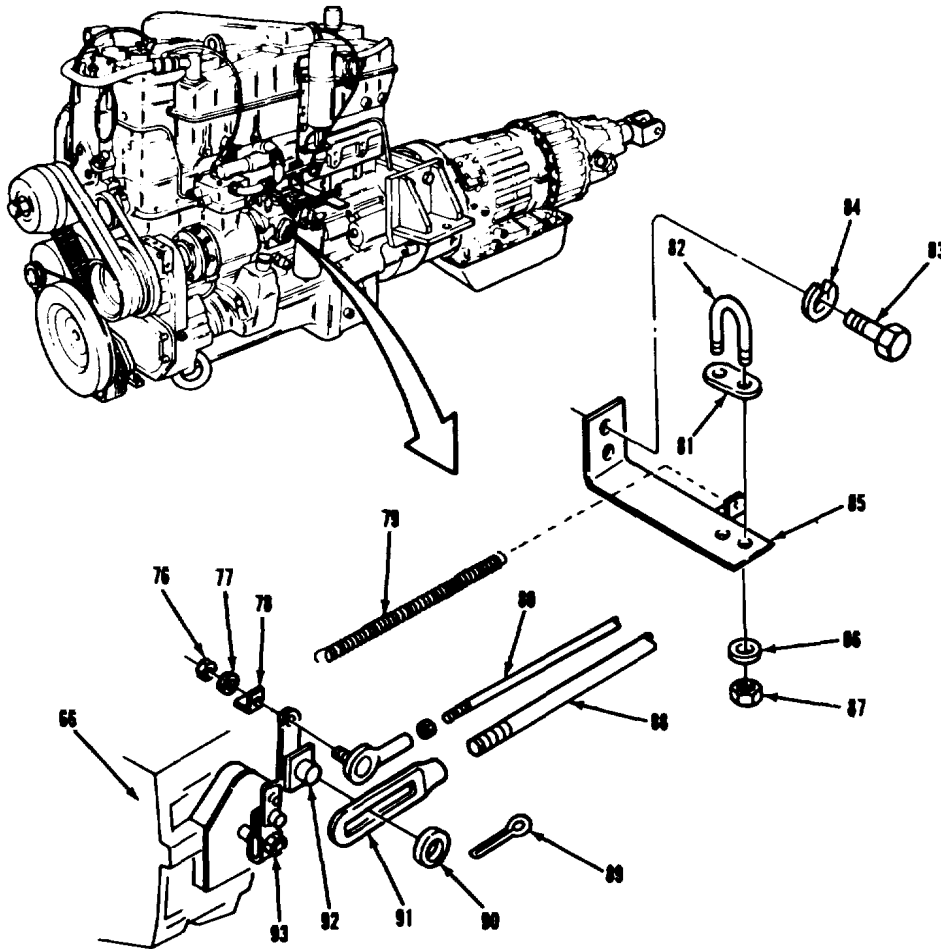
LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

A. PRELIMINARY DISCONNECTIONS (Continued).

- | | | |
|--|---|--|
| 30. Spring (79), clip (78), and bracket (85). | Disconnect item (79) from item (78) and item (85). | |
| 31. Accelerator link assembly (80), pump (66), and fuel control lever assembly (93). | Loosen and remove item (76). Remove items (77) and (78). Pull item (80) from mounting hole in item (93). | |
| 32. Transmission modulator control assembly (88) and U-bolt (82). | Remove two items (87) and two items (86). Lift item (82) and item (81) from items (85) and (88) and (88). | |
| 33. Link (91) and link pin and locknut (92). | Remove item (89) from end of item (92). Remove item (90). Disconnect item (91) from item (92). | |
| 34. Two screws (83), lockwashers (84), and bracket (85). | Remove items (83) and (84) together with item (85). | |

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

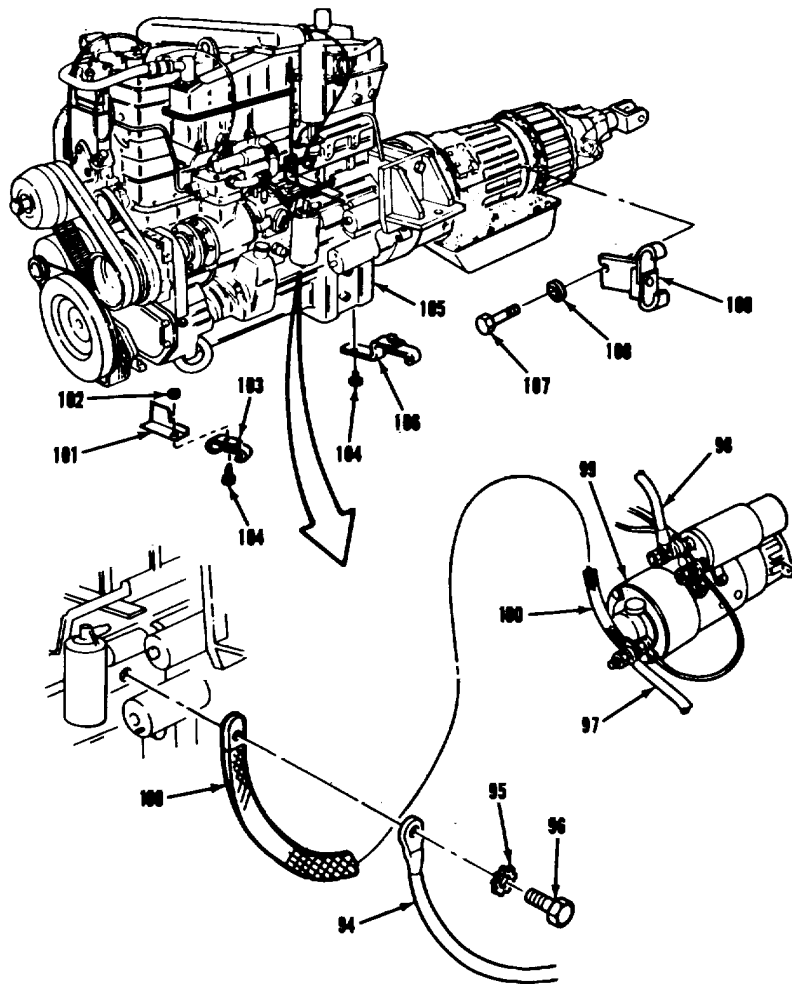
- | | |
|-------------------------------|---|
| 66. FUEL PUMP | 85. BRACKET |
| 76. NUT | 86. WASHER (2) |
| 77. WASHER | 87. NUT (2) |
| 78. SPRING CLIP | 88. TRANSMISSION MODULATOR CONTROL ASSEMBLY |
| 79. ACCELERATOR RETURN SPRING | 89. COTTER PIN |
| 80. ACCELERATOR LINK ASSEMBLY | 90. WASHER |
| 81. SHIM | 91. SLIP LINK |
| 82. U-BOLT | 92. LINK PIN AND LOCKNUT |
| 83. SCREW | 93. FUEL CONTROL LEVER ASSEMBLY |

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS (Continued).		
35. Motor (99), cable (97), cable (98), and strap (100).	Disconnect only items (97), (98), and (99).	Tag to aid in reattachment.
36. Bolt (96) and lockwasher (95).	Remove from items (94) and (100)	Item (100) will be loose.
37. Bolt (104) and nut (102).	a. Remove from item (103). b. Remove item (103) from item (101).	
38. Bolt (104).	a. Remove from item (106). b. Remove item (106) from item (105).	Install item (104) back into item (105).
39. Two bolts (107) and washers (108).	a. Remove from item (109). b. Remove item (109) from transmission.	Install items (107) and (108) back into transmission.

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).



LEGEND:

- | | |
|-------------------------------------|--------------------------|
| 94. ENGINE TO FRAME GROUND | 102. HEXAGON HEAD NUT |
| 95. LOCKWASHER | 103. HOSE CLAMP |
| 96. HEX BOLT | 104. HEXAGON BOLT (2) |
| 97. NEGATIVE BATTERY CABLE | 105. OIL PAN |
| 98. POSITIVE BATTERY CABLE | 106. COOLER HOSE BRACKET |
| 99. STARTER MOTOR | 107. HEXAGON BOLT (2) |
| 100. ENGINE TO STARTER GROUND STRAP | 108. WASHER (2) |
| 101. COOLER HOSE BRACKET | 109. COOLER HOSE BRACKET |

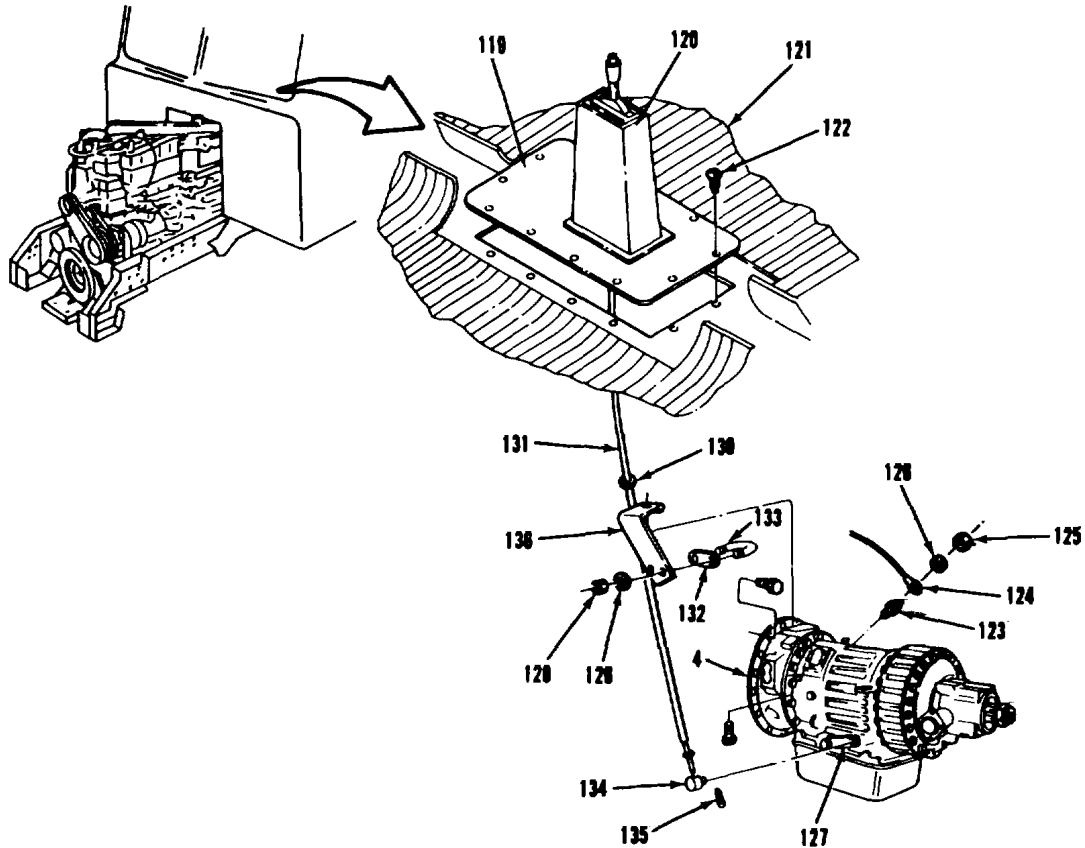
TA 238063

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. PRELIMINARY DISCONNECTIONS (Continued).		
40. Transmission shift control cable assembly (131), trunnion (134), and pin (135).	Remove item (135) from item (134). Disconnect item (134) from item (127).	Discard item (135).
41. Two locknuts (128), lockwashers (129), and U-bolt (133)	Remove two items (128) and (129) from item (133). Remove item (133) from item (136).	Retain item (132) for reassembly.
42. Mat (121), floor pan access cover assembly (119), and control/-bracket assembly (120).	Lift item (121) to expose item (119).	
43. Ten screws (122).	Remove ten items (122). Lift and remove items (120) and (119) as a unit.	Allows access to items (123) and (124). Set items (119), (120) and (122) aside for reassembly.
44. Transmission (4).	Remove item (125) and (126). Remove item (124) from item (123).	Do not remove item (123)

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- | | |
|---|--|
| 4. TRANSMISSION | 126. WASHER |
| 119. FLOORBOARD ACCESS COVER ASSEMBLY | 127. LEVER |
| 120. TRANSMISSION SHIFTER CONTROL ASSEMBLY AND TRANSMISSION CONTROL MOUNTING BRACKET ASSEMBLY | 128. HEX HEAD LOCKNUT (2) |
| 121. FLOOR MAT | 129. LOCKWASHER (2) |
| 122. SCREW (10) | 130. GROMMET |
| 123. TRANSMISSION TEMPERATURE SENDING UNIT | 131. TRANSMISSION SHIFT CONTROL CABLE ASSEMBLY |
| 124. ENGINE HARNESS ASSEMBLY | 132. SHIM |
| | 133. U-BOLT |
| | 134. TRUNNION |

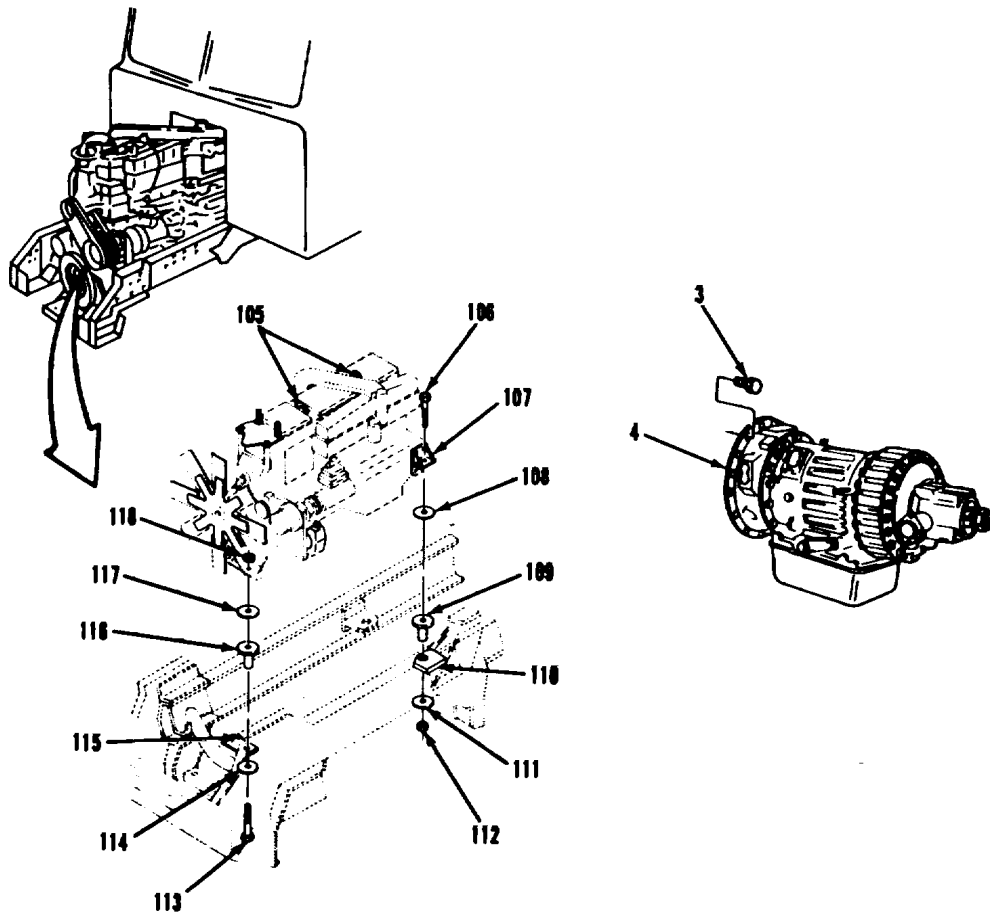
ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. PRELIMINARY DISCONNECTIONS (Continued).</u>		
45. Twelve capscrews (3) and transmission (4)	Remove.	Use floorboard access location to remove two items (3). Rest of items (3) come off from under vehicle.
46. Two brackets (105).	Attach sling to support engine.	Raise hoist until all slack is removed from chain.
47. Two nuts (118) and front crossmember assembly (115).	Loosen and remove two items (118). Remove two items (113) and (114) from two items (116) and (117).	
48. Two nuts (112) and brackets (107).	Loosen two items (112) and remove. Remove two items (111). Remove two items (106) from two items (108), (109), and (110).	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 3. HEXAGON CAPSCREW WITH CAPTIVE WASHER (12)
- 4. TRANSMISSION
- 105. ENGINE LIFTING BRACKET (2)
- 106. HEXAGON HEAD CAPSCREW (2)
- 107. REAR ENGINE MOUNT BRACKET (2)

- 111. FLAT WASHER (2)
- 112. HEXAGON NUT (2)
- 113. HEXAGON HEAD CAPSCREW (2)
- 114. FLAT WASHER (2)
- 115. FRONT CROSSMEMBER ASSEMBLY
- 116. FRONT CROSSMEMBER MOUNTING BRACKET (2)

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM

ACTION

REMARKS

B. REMOVAL.

WARNING

- Direct all personnel not participating in engine removal to stand clear during hoisting operation. A heavy or swinging load can cause serious personnel injury and damage to equipment.
- Do not use hands to free engine of hangup or snags. Use tanker or prybars to avoid serious personnel injury.

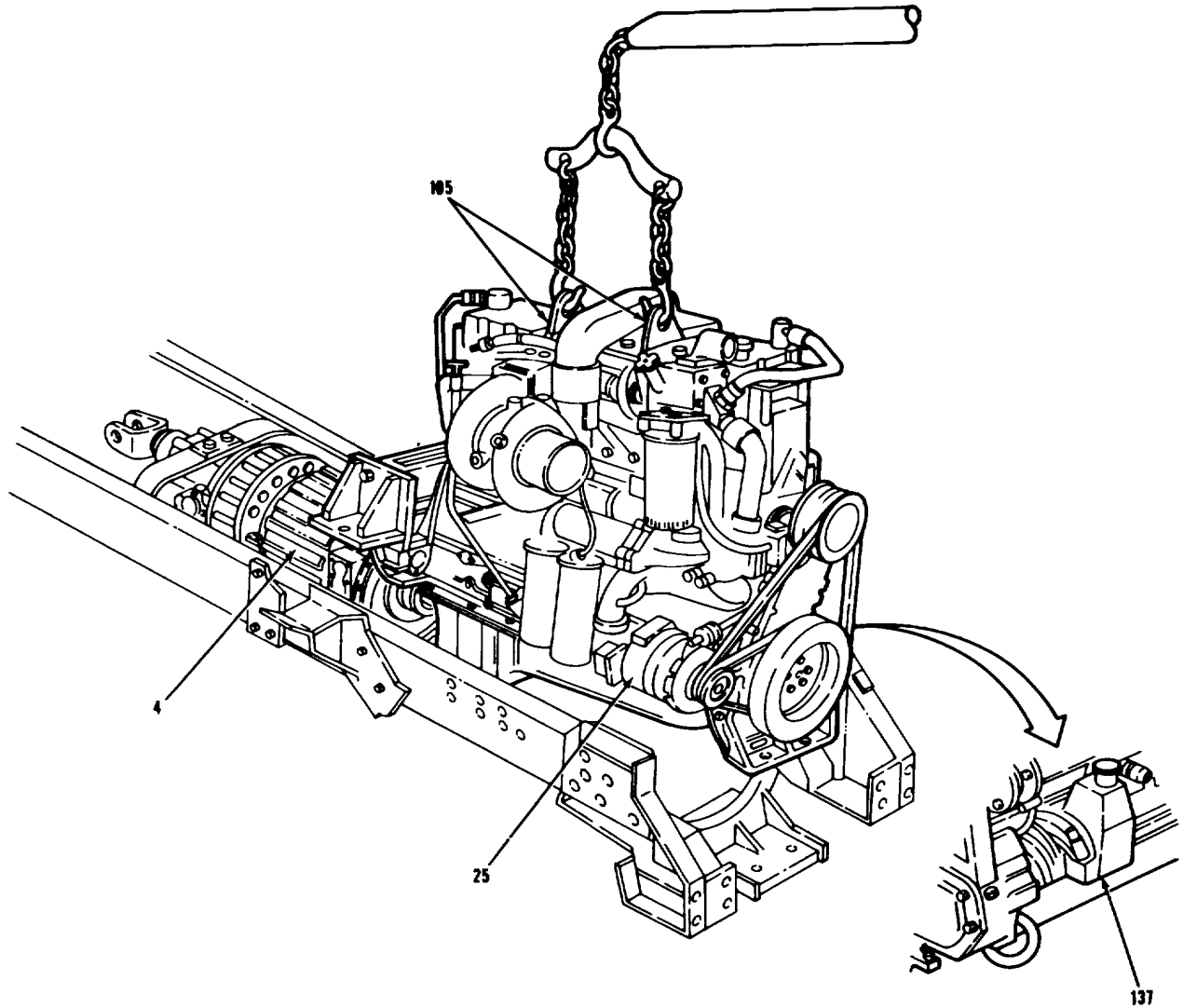
CAUTION

Always remove the engine slowly and watch for the following: Engine binding or hard to move means that something may still be connected to engine that must be removed; make sure that wiring, lines, cables, and rods are not in the path of removal.

49 Two brackets (105).	Raise engine, watch clearance between items (25) and (137) and vehicle frame. Move engine clear of vehicle.	Use two MOS-63W personnel to guide engine out.
50 Engine oil and fuel	Drain from engine	Refer to LO 9-2320-283-12.
51 Engine harness	Remove from engine	Refer to LO 9-2320-283-20.
52 Engine	Mount on suitable shipping stand.	Disconnect hoist.
53 Transmission (4)	Cover opening on transmission.	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 4. TRANSMISSION
- 25. ALTERNATOR ASSEMBLY
- 105. ENGINE LIFTING BRACKET (2)
- 137. POWER STEERING PUMP

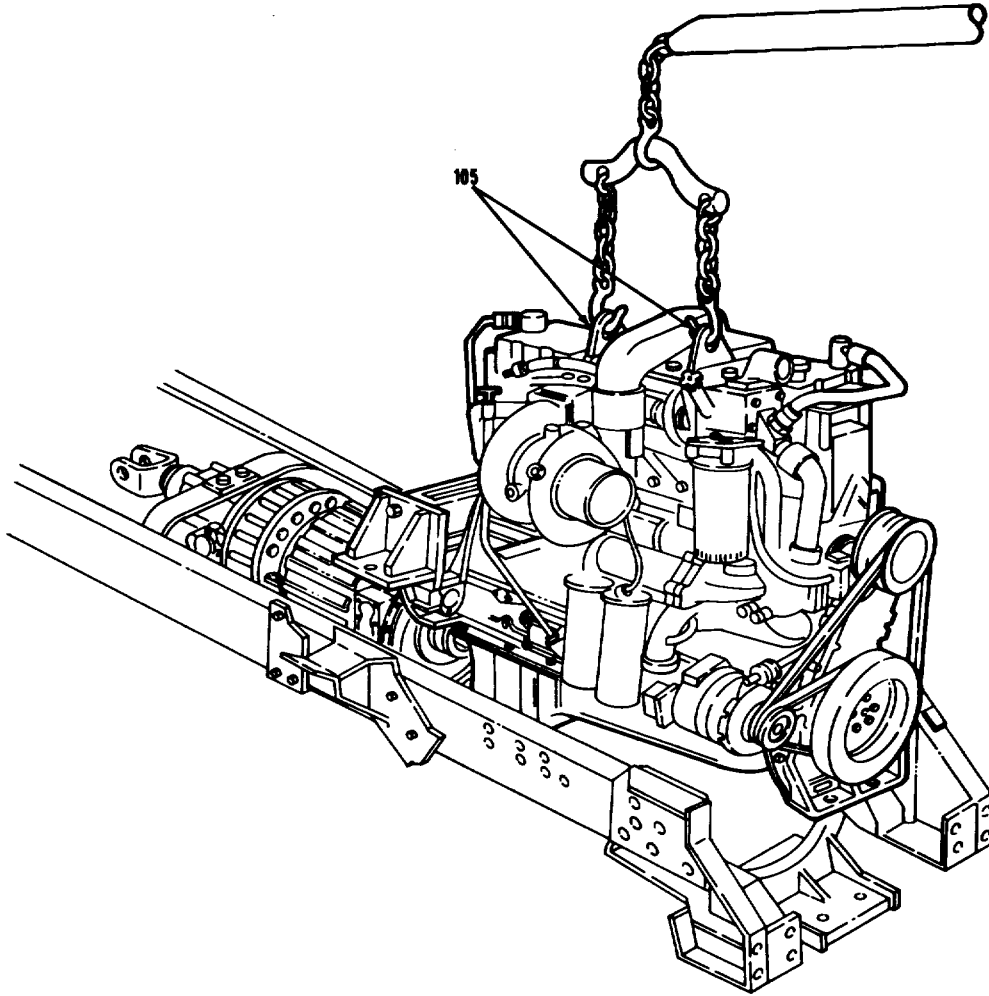
ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION.</u>		
54. Two brackets (105).	Attach sling to support engine. Remove from shipping stand.	Remove cover from transmission opening.
55. Engine harness.	Install on engine	Refer to TM 9-2320-283-20.
WARNING		
<ul style="list-style-type: none"> • Direct all personnel not participating in engine removal to stand clear during lowering operation. A heavy or swinging load can cause serious personnel injury and damage to equipment. • Do not use hands to free engine of hangups or snags. Use tanker or pry bars to guide engine into frame. Failure to heed warning can result in serious personnel injury. 		
CAUTION		
<p>Always install engine slowly. Lower into chassis carefully and closely observe all engine components to prevent engine damage.</p>		

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

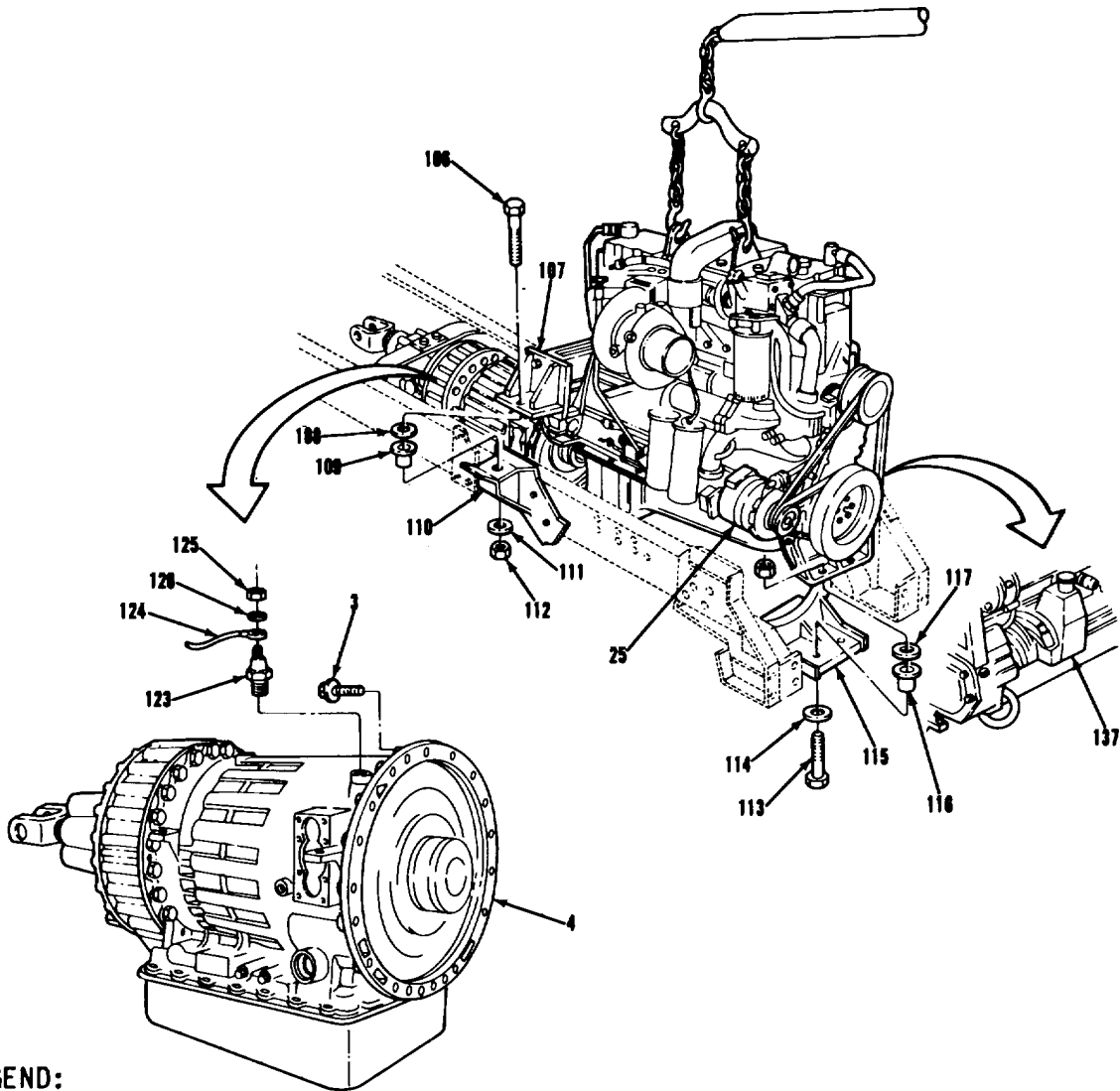
105. ENGINE LIFTING BRACKET (2)

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
C. INSTALLATION (Continued).		
56. Two washers (117) and washers (108).	Position items (108) and (117) on top of two items (109) and two items (116).	
57. Engine hoist.	Move engine into engine compartment and lower onto item (115) and two items (110).	Use two MOS-63W personnel to guide engine. Watch clearance between items (25) and (137) and vehicle frame.
58. Two capscrews (106).	Install items (106) through two items (107), (108), (109), and (110).	Long drift pin may be needed to line up mounting holes.
59. Two washers (111) and nuts (112).	Install two items (111) and (112) on two items (106).	Tighten two items (112) finger tight.
60. Two capscrews (113) and washers (114).	Install items (113) and (114) through two items (115), (116), and (117).	Long drift pin may be needed to line up mounting holes.
61. Two nuts (118).	Install two items (118) on two items (113).	Tighten two items (118) finger tight.
62. Nut (125) and washer (126).	a. Position item (124) on item (123). b. Secure with item (125) and (126).	Reach through floorboard access hole.
63. Two capscrews (3) and transmission (4).	Using suitable drift, aline mounting holes in items (4) and flywheel housing. Install two items (3).	Reach through floorboard access hole. Use transmission jack and/or hoist to aline position of mounting holes.

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

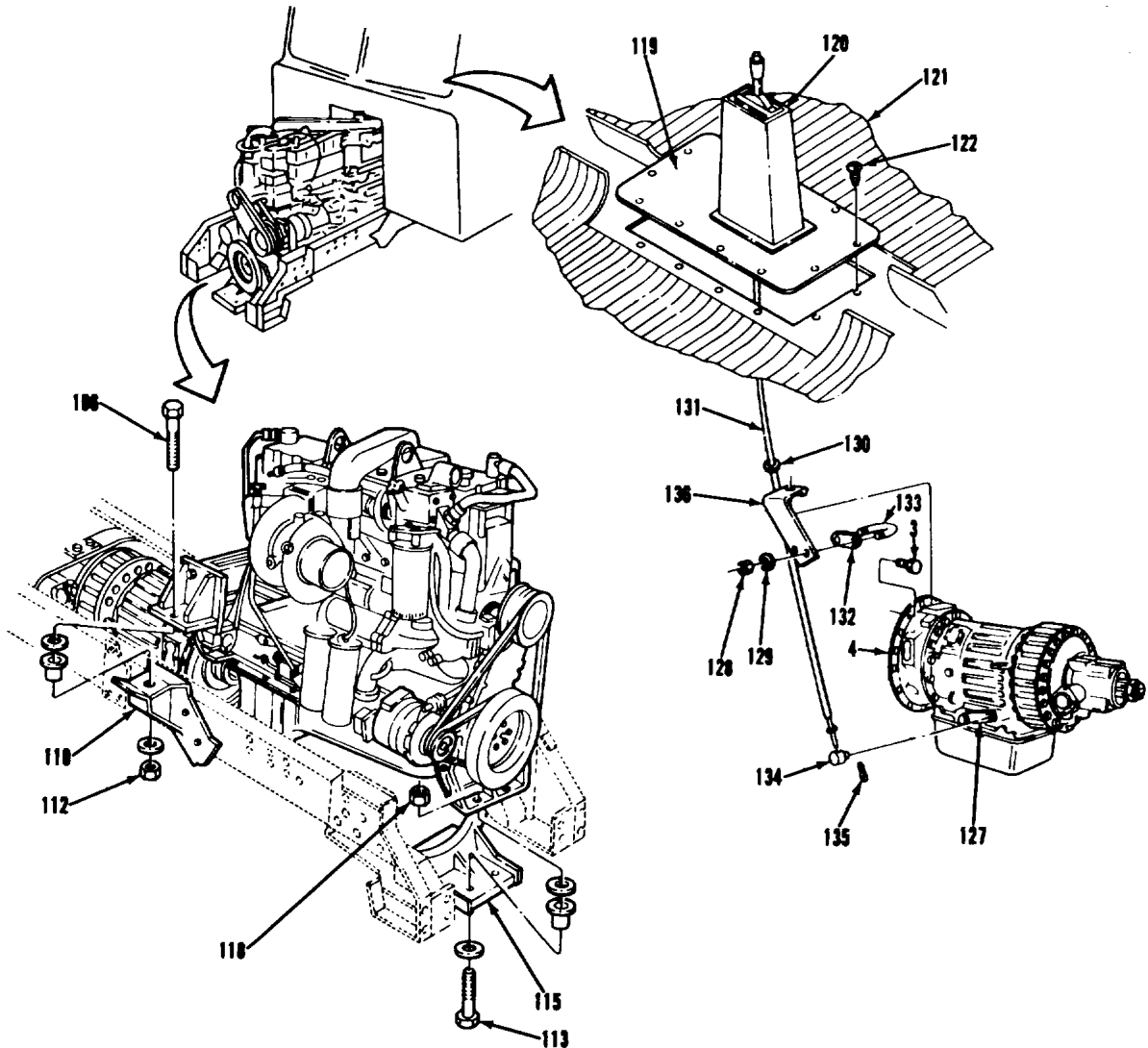
- | | |
|--|--|
| <ul style="list-style-type: none"> 3. HEXAGON CAPSCREW WITH CAPTIVE WASHER (12) 4. TRANSMISSION 106. HEXAGON HEAD CAPSCREW (2) 107. REAR ENGINE MOUNT BRACKET (2) 108. FLAT WASHER (2) 109. REAR VIBRATION INSULATOR (2) 110. REAR ENGINE FRAME MOUNT BRACKET (2) 111. FLAT WASHER (2) 112. HEXAGON NUT (2) 113. HEXAGON HEAD CAPSCREW (2) 114. FLAT WASHER (2) | <ul style="list-style-type: none"> 115. FRONT CROSSMEMBER ASSEMBLY 116. FRONT VIBRATION INSULATOR (2) 117. FLAT WASHER (2) 118. HEXAGON NUT (2) 123. TRANSMISSION TEMPERATURE SENDING UNIT 124. ENGINE HARNESS ASSEMBLY TRANSMISSION TEMPERATURE SENDER LEAD TERMINAL 125. NUT 126. WASHER |
|--|--|

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION (Continued).</u>		
64. Transmission (4) and ten capscrews (3).	Install ten items (3).	Torque twelve items (3) to 60 lb-ft.
65. Front crossmember assembly (115) and two nuts (118).	Torque items (118) to 270-295 lb-ft.	If necessary, hold two items (113) to prevent turning.
66. Two brackets (110) and nuts (112).	Torque items (112) to 270-295 lb-ft.	If necessary, hold two items (106) to prevent turning.
67. Control/bracket assembly (120) and floorboard access cover assembly (119).	Place item (120) and (119) into position. Secure with ten items (122).	Reposition item (121).
68. Trunnion (134) and lever (127).	Install item (134) into item (127). Secure with new item (135).	
69. U-bolt (133), shim (132), and bracket (136).	Secure item (131) with item (133), two items (129) and two items (128).	Be sure item (130) is correctly positioned in item (133). Position item (132) between items (131) and (136).

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 3. HEXAGON CAPSCREW WITH CAPTIVE WASHER (12)
- 4. TRANSMISSION
- 106. HEXAGON HEAD CAPSCREW (2)
- 110. REAR ENGINE FRAME MOUNT BRACKET (2)
- 112. HEXAGON NUT (2)
- 113. HEXAGON HEAD CAPSCREW (2)
- 115. FRONT CROSSMEMBER ASSEMBLY
- 118. HEXAGON NUT (2)
- 119. FLOORBOARD ACCESS COVER ASSEMBLY

- 121. FLOOR MAT
- 122. SCREW (10)
- 127. LEVER
- 128. HEX HEAD LOCKNUT (2)
- 129. LOCKWASHER (2)
- 130. GROMMET
- 131. TRANSMISSION SHIFT CONTROL CABLE ASSEMBLY
- 132. SHIM
- 133. U-BOLT

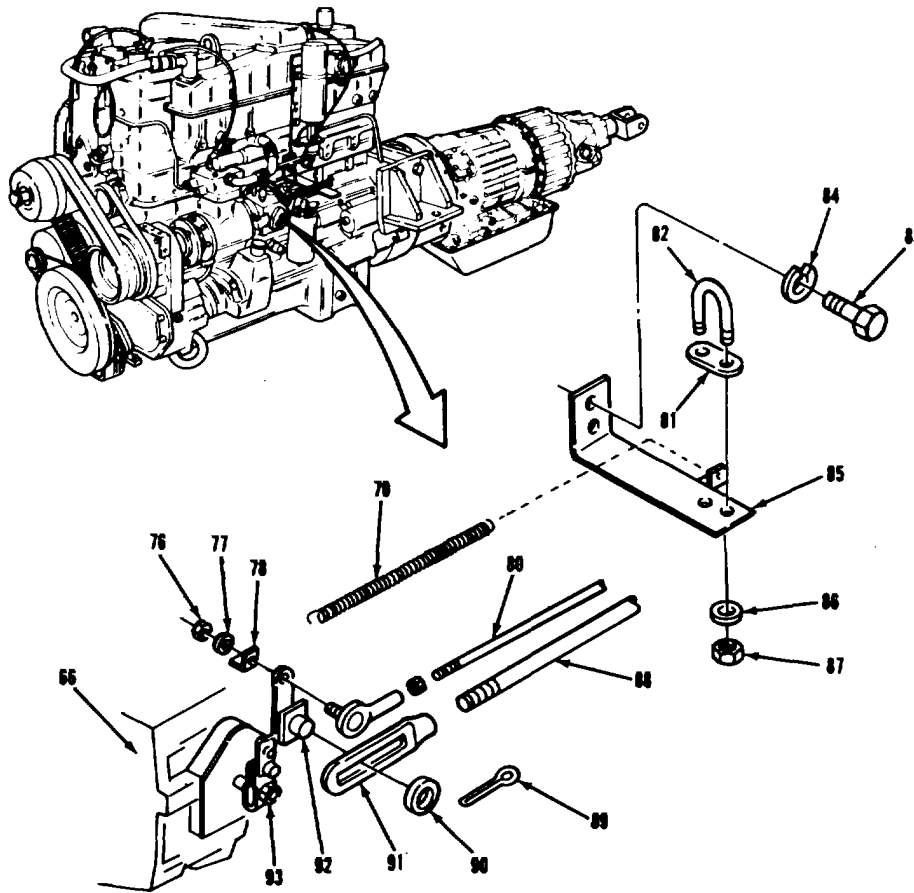
ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. INSTALLATION (Continued).		
70. Two bolts (107) and washers (108)	a. Line up holes in item (109) with holes in transmission. b. Secure with two items (107) and (108).	
71. Bolt (104)	a. Line up hole in item (106) with hole in item (105). b. Secure with item (102).	
72. Bolt (104)	a. Line up hole in item (103) with hole in item (101). b. Secure with item (104).	
73. Motor (99), cable (97), cable (98), and strap (100).	Install items (97), (98), and (100) on item (99).	
74. Two screws (83), lockwashers (84), and bracket (85)	a. Line up hole in item (85) with holes in engine block. b. Secure with two items (83) and (84).	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

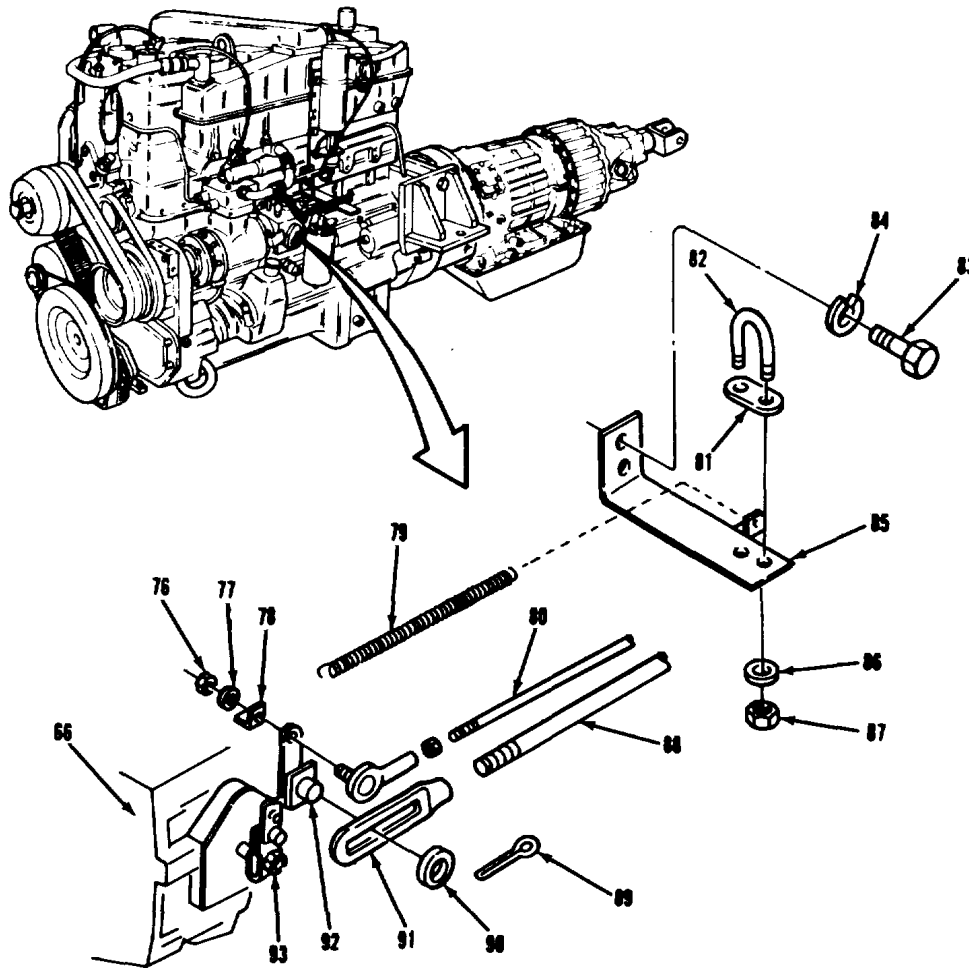
- | | |
|-------------------------------------|--------------------------|
| 83. SCREW | 102. HEXAGON HEAD NUT |
| 84. LOCKWASHER | 103. HOSE CLAMP |
| 85. MODULATOR BRACKET ASSEMBLY | 104. HEXAGON BOLT (2) |
| 97. NEGATIVE BATTERY CABLE | 105. OIL PAN |
| 98. POSITIVE BATTERY CABLE | 106. COOLER HOSE BRACKET |
| 99. STARTER MOTOR | 107. HEXAGON BOLT (2) |
| 100. ENGINE TO STARTER GROUND STRAP | 108. WASHER (2) |
| 101. COOLER HOSE BRACKET | 109. COOLER HOSE BRACKET |

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION (Continued).</u>		
75 Transmission modulator control assembly (88) and link (91)	a. Position item (91) on item (92). b. Secure with item (89) and (90).	
76 U-bolt (82) and shim (81).	a. Position item (81) between items (88) and (85) Line up holes in item (81) with holes in item (85). b. Position item (82) through holes in item (85). c. Secure with two items (86) and two items (87).	
77 Accelerator link assembly (80) and clip (78).	a. Position item (80) through hole in item (93). b. Position item (78) on item (80). c. Secure with item (76) and (77).	
78 Spring (79)	Install item (79) between item (78) and tab on item (85).	Ensure that no binding exists in lever action of item (93).

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 76. NUT
- 77. WASHER
- 78. SPRING CLIP
- 79. ACCELERATOR RETURN SPRING
- 80. ACCELERATOR LINK ASSEMBLY
- 81. SHIM

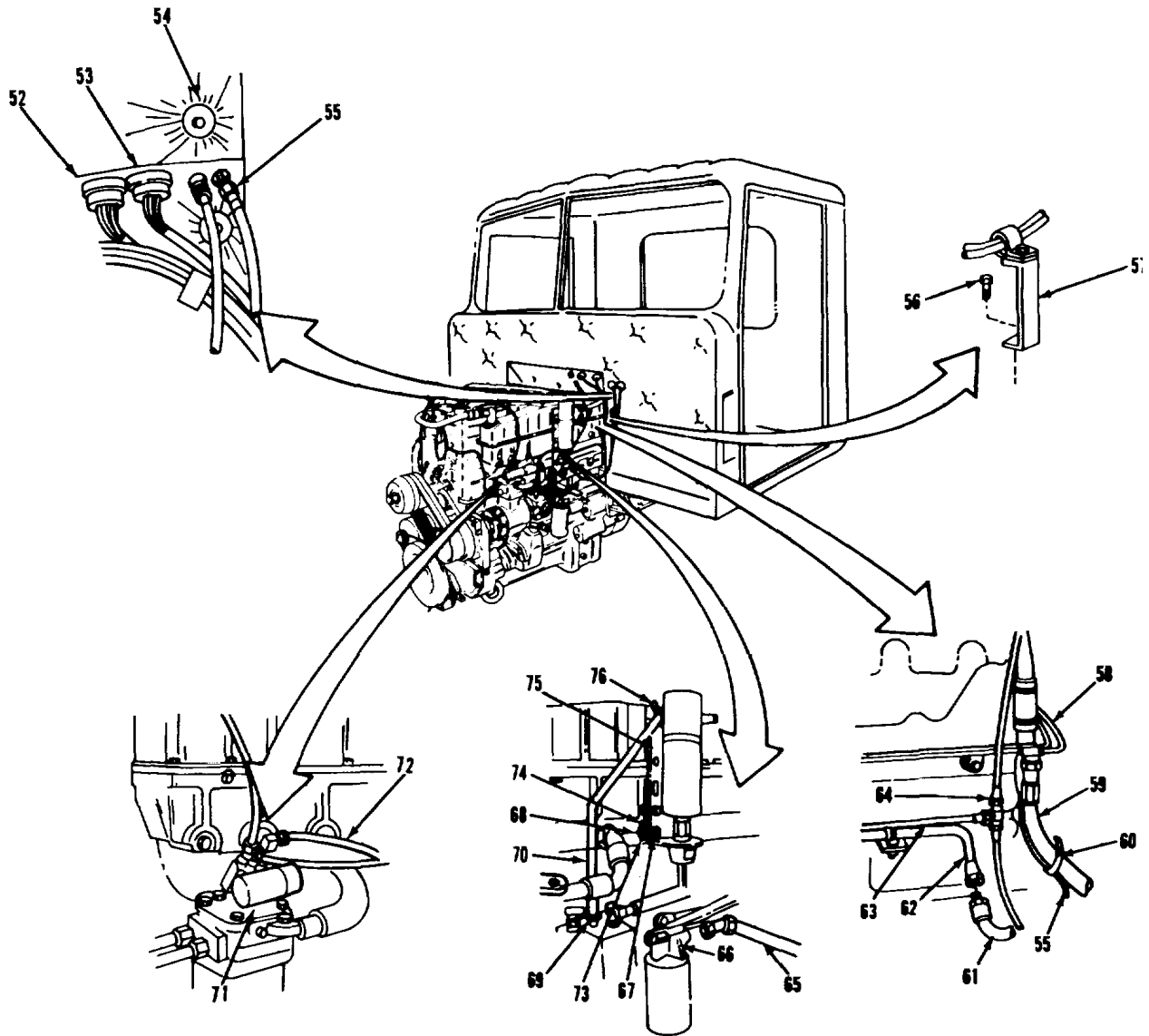
- 82. TRANSMISSION MODULATOR CONTROL ASSEMBLY
- 83. NUT (2)
- 84. WASHER
- 85. SPRING CLIP
- 86. WASHER
- 87. NUT (2)
- 88. TRANSMISSION MODULATOR CONTROL ASSEMBLY
- 89. COTTER PIN
- 90. WASHER
- 91. SLIP LINK

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION (Continued).</u>		
79. Bracket (57) and screw (56).	a. Remove item (56). Move item (57) into position. b. Secure with item (56).	Hold item (70).
80. Speedometer shaft assembly (55), line (59), and tie (60).	Secure item (55) to item (59) with new item (60).	Do not overtighten item (60).
81. Line (72) and line (63).	Position behind item (75). Secure item (73) and item (74) to item (75) with items (67) and (68).	Make sure both items (73) and (74) are fastened together.
82. Line (62) and hose (61).	Connect item (62) to item (61).	Use tubing wrench.
83. Tachometer (69) and tachometer shaft assembly (70).	Connect item (70) to item (69).	
84. Line (65), fuel filter and damper assembly (66).	Connect item (65) to item (66).	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 55. SPEEDOMETER SHAFT ASSEMBLY
- 56. CAPTIVE WASHER SCREW
- 57. BRACKET
- 59. FUEL RETURN LINE
- 60. CABLE TIE

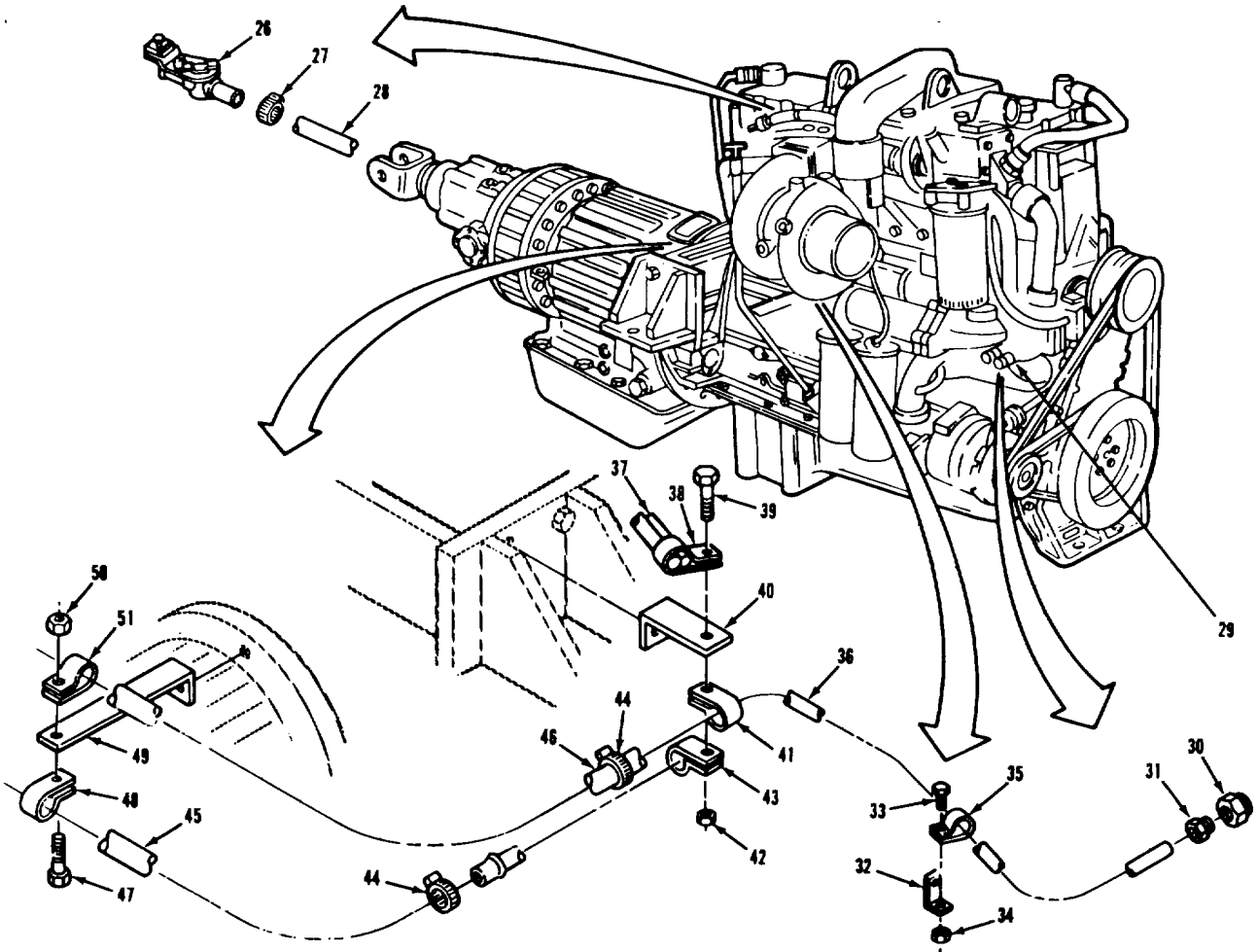
- 66. FUEL FILTER AND DAMPER ASSEMBLY
- 67. SCREW
- 68. NUT
- 69. PULSE TACHOMETER
- 70. TACHOMETER SHAFT ASSEMBLY

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).****LOCATION/ITEM****ACTION****REMARKS****C. INSTALLATION (Continued).**

85. Line (63) and T-adapter (64).	Connect item (63) to item (64).	Use tubing wrench.
86. Line (59) and tee (58).	Connect item (59) to item (58).	Use tubing wrench.
87. Connector (52) and connector (53).	Connect items (52) and (53) at (54).	Remove tags. Observe that item (52) has sixteen leads.
88. Tachometer shaft assembly (70) and bracket (75).	Secure item (70) to top of item (75) with new item (76).	Do not overtighten item (76).
89. Line (72) and air compressor assembly (71).	Connect item (72) to item (71).	Green colored line. Use tubing wrench.

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

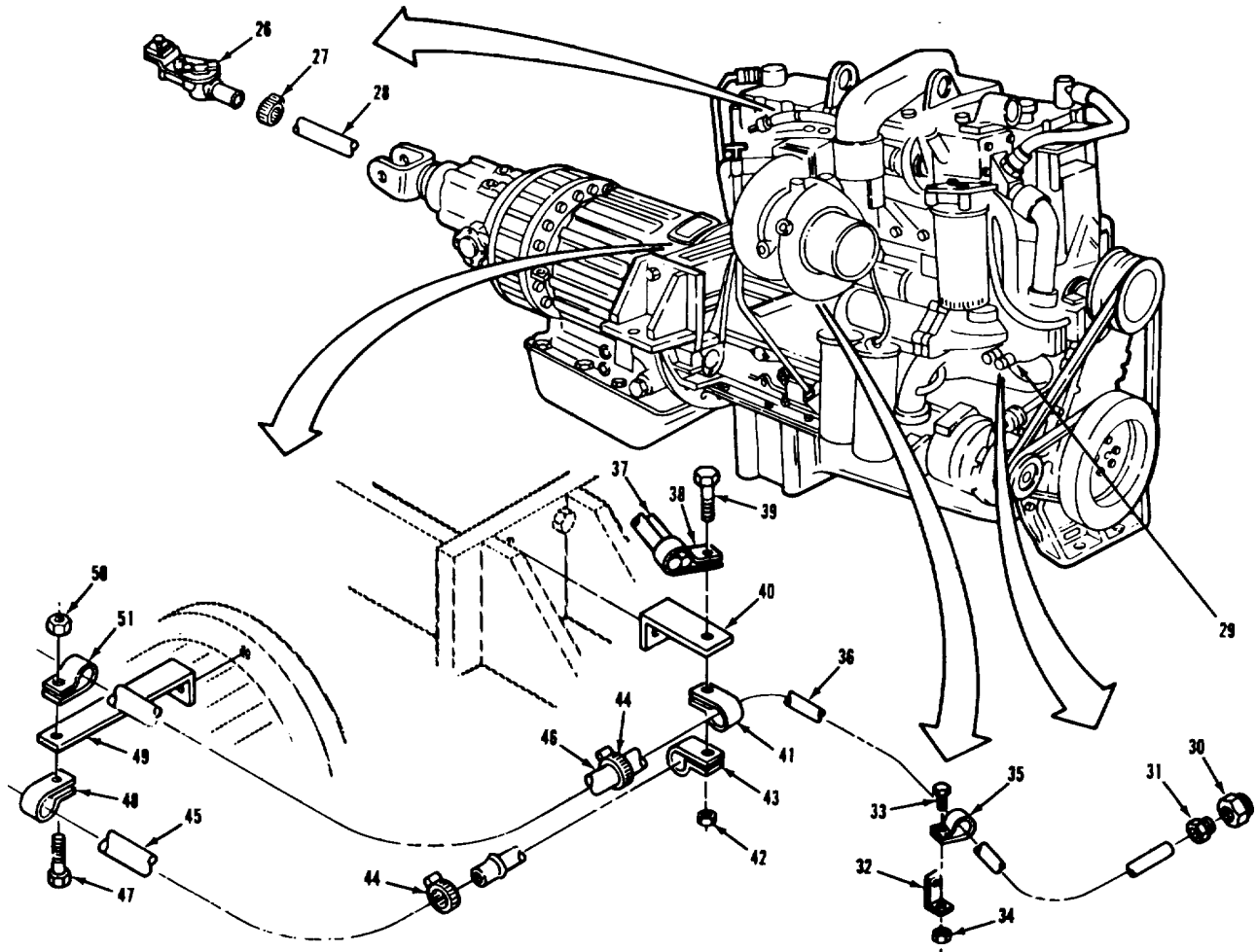
- | | |
|---|--------------------------------|
| 26. CHECK VALVE | 39. SCREW |
| 27. HOSE CLAMP | 40. HOSE SUPPORT |
| 28. HEATER HOSE | 41. CLOSED DIPPED CLAMP |
| 30. CONNECTOR | 42. NUT |
| 31. INVERTED FLARE NUT | 43. CLOSED DIPPED CLAMP |
| 32. COOLANT RETURN HOSE BRACKET | 44. HOSE CLAMP (2) |
| 33. SCREW | 45. HEATER HOSE TO FUEL HEATER |
| 34. NUT | 46. FUEL HEATER TO ENGINE HOSE |
| 35. CLOSED DIPPED CLAMP | 47. SCREW |
| 36. HEATER RETURN TUBE ASSEMBLY | 48. CLOSED DIPPED CLAMP |
| 37. STARTER BATTERY CABLE/STE/ICE HARNESS | 49. COOLANT HOSE BRACKET |
| 38. CUSHIONED CLAMP | 50. NUT |
| | 51. CLOSED DIPPED CLAMP |

ENGINE.**3-10. ENGINE REPLACEMENT (Continued).**

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION (Continued).</u>		
90 Cable/harness (37).	Thread between vehicle frame and vehicle body into area of item (40).	Make sure that enough slack exists on end of item (37) to reach batteries.
91 Heater return tube assembly (36).	Move into position on side of engine and hold. Connect item (31) to item (30).	Do not tighten item (31) at this time.
92 Clamp (35) and bracket (32)	Move item (35) into position under item (32) (35) with items (33) and (34).	Tighten items (33) and Secure item (34) finger tight.
93 Heater return tube assembly (36) and hose (46).	Connect item (36) to item (46) Secure with item (44).	
94 Hose (45), heater return tube assembly (36), and cable/harness (37)	Move items (37), (36) and (45) into position items (38), (41) and (43) to item (40) with items (39) and (42)	Items (37) and (38) Secure pass over top of item (40) Items (36), (43) and (45), (41) are fastened to bottom of item (40).
95 Clamp (51), clamp (48), and bracket (49)	Fasten items (45) and (46) to item (49) using items (51), (48), (47), and (50).	
96 Valve (26) and hose (28)	Attach item (26) to item (28). Secure with item (27).	
97 Heater return tube assembly (36) and nut (31).	Secure item (31) to item (36).	Use tubing wrench.
98 Nut (34)	Tighten item (34).	

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- | | |
|---|--------------------------------|
| 26. CHECK VALVE | 39. SCREW |
| 27. HOSE CLAMP | 40. HOSE SUPPORT |
| 28. HEATER HOSE | 41. CLOSED DIPPED CLAMP |
| 30. CONNECTOR | 42. NUT |
| 31. INVERTED FLARE NUT | 43. CLOSED DIPPED CLAMP |
| 32. COOLANT RETURN HOSE BRACKET | 44. HOSE CLAMP (2) |
| 33. SCREW | 45. HEATER HOSE TO FUEL HEATER |
| 34. NUT | 46. FUEL HEATER TO ENGINE HOSE |
| 35. CLOSED DIPPED CLAMP | 47. SCREW |
| 36. HEATER RETURN TUBE ASSEMBLY | 48. CLOSED DIPPED CLAMP |
| 37. STARTER BATTERY CABLE/STE/ICE HARNESS | 49. COOLANT HOSE BRACKET |
| 38. CUSHIONED CLAMP | 50. NUT |
| | 51. CLOSED DIPPED CLAMP |

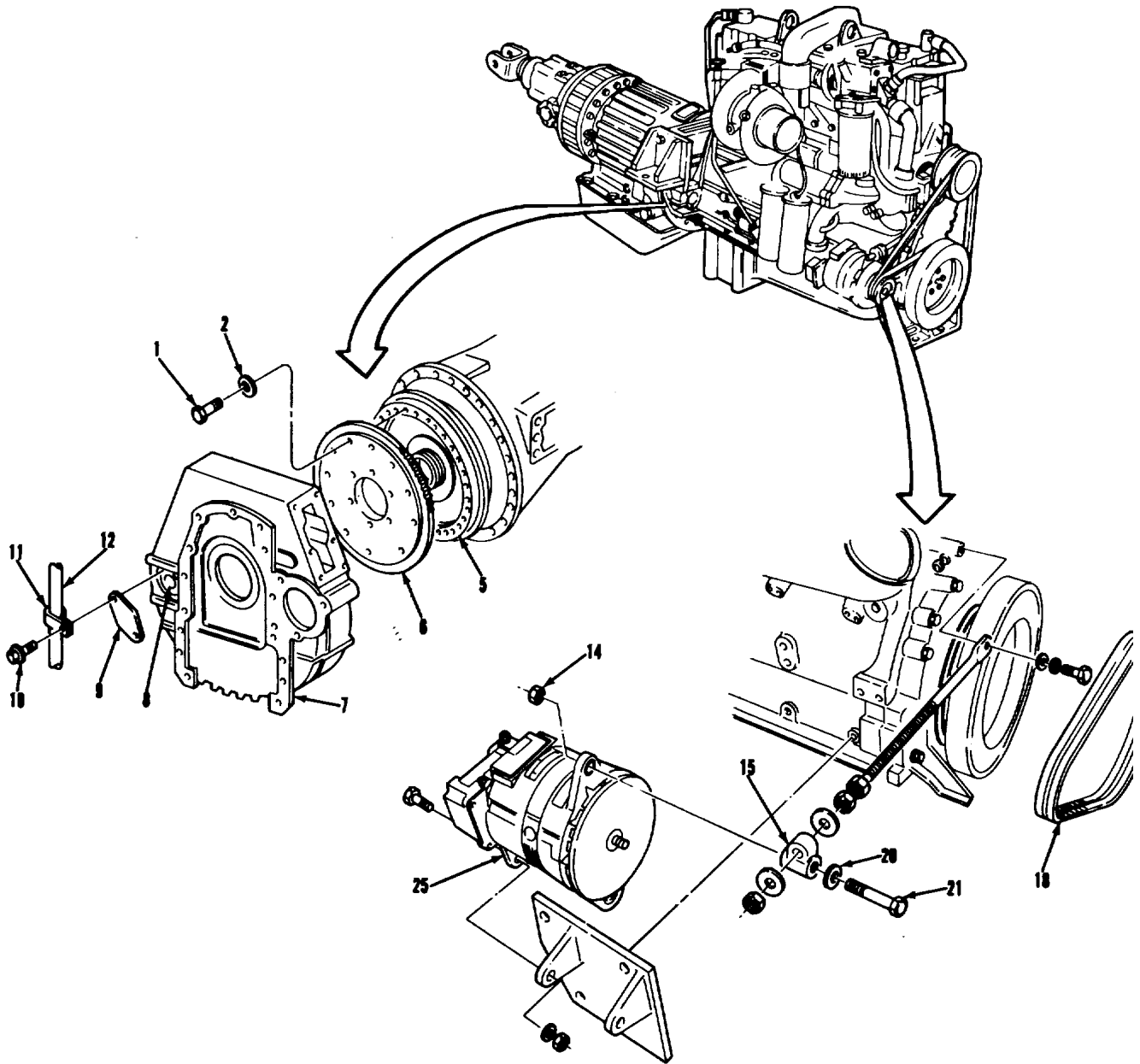
ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSTALLATION (Continued).</u>		
99. Two belts (18).	Install two items (18).	Refer to TM 9-2320-283-20 for alternator drive belt replacement and adjustment.
100. Alternator assembly (25) and block (15).	Attach item (15) to item (25) using items (20), (21), and (14).	
101. Housing (7) and hole (8).	Attach item (6) to item (5) using twelve items (1) and twelve items (2). Alternately torque twelve items (1) to 42 to 48 lb-ft.	Bar engine over using suitable tanker bar inserted into item (8).
102. Cover (9), upper screw (10), clamp (11), and extension (12).	Position item (9) and item (11) in line with upper screw hole in items (9) and (7). Secure with item (10). Tighten upper and lower item (10).	
NOTE		
<p>Follow-on maintenance action required: Install horn wire (TM 9-2320-283-20). Install radiator and support rods (TM 9-2320-283-20). Install grille shell (TM 9-2320-283-20). Install fan (TM 9-2320-283-20). Install upper radiator fan shroud(TM 9-2320-283-20). Install radiator support brackets(TM 9-2320-283-20).</p>		

ENGINE.

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 1. HEXAGON CAPSCREW (12)
- 2. WASHER (12)
- 5. FLYWHEEL
- 6. DISK AND RING GEAR
- 7. FLYWHEEL HOUSING

- 11. TUBE CLAMP
- 12. BREATHER TUBE EXTENSION
- 14. NUT
- 15. ALTERNATOR ADJUSTING BLOCK
- 18. BELT (2)

ENGINE.

3-10. ENGINE REPLACEMENT (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. INSTALLATION (Continued).

NOTE

**Follow-on maintenance action required
(Continued):**

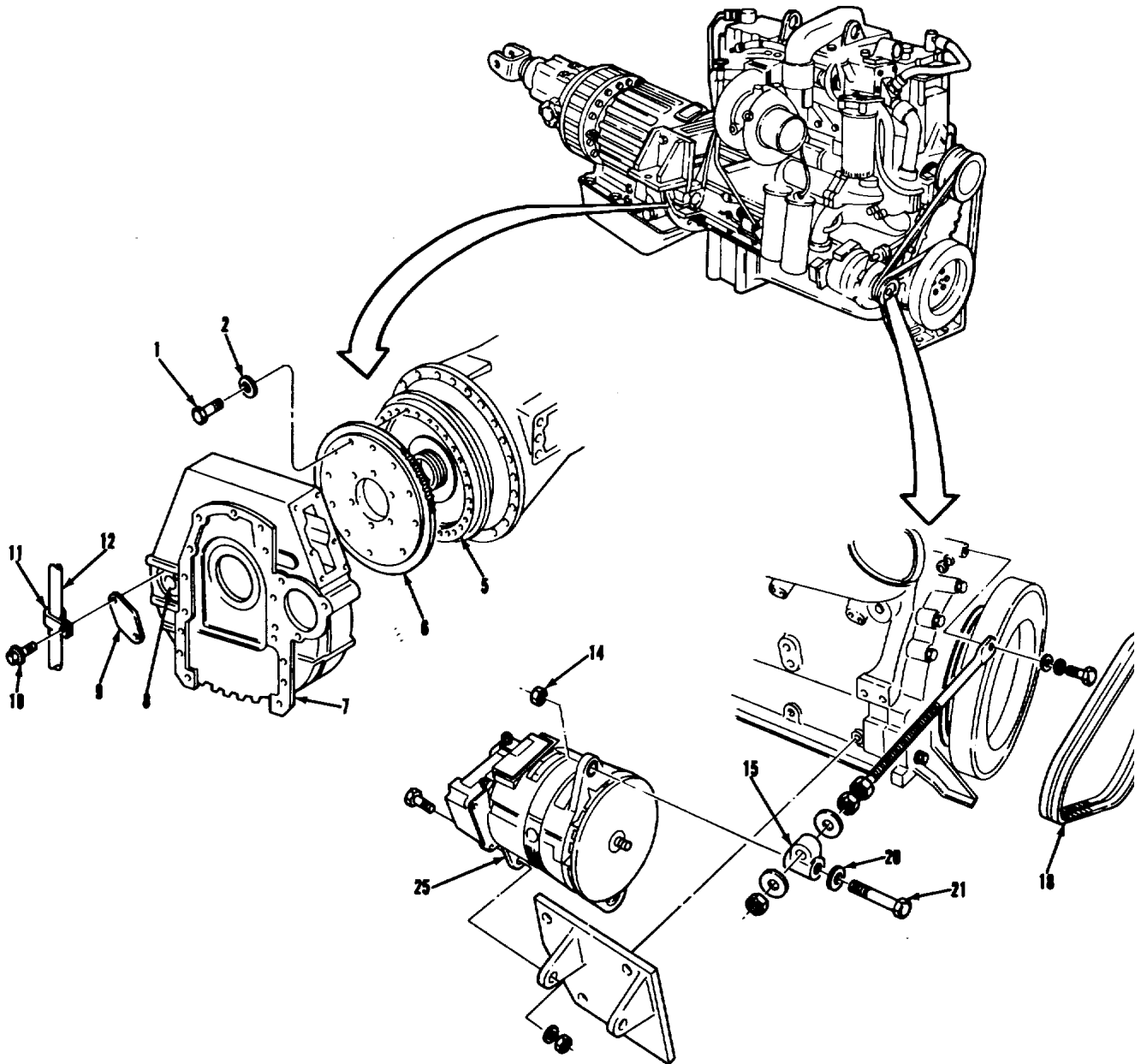
- Install air cleaner (TM 9-2320-283-20).
- Install turbocharger exhaust tube (TM 9-2320-283-20).
- Install cooling system hoses (TM 9-2320-283-20).
- Install power steering pump hydraulic lines (TM 9-2320-283-20).
- Install transmission oil cooler lines (TM 9-2320-283-20).
- Fill steering system to proper oil level (LO 9-2320-283-12).
- Fill cooling system to proper coolant level (TM 9-2320-283-20).
- Fill engine crankcase to proper oil level (LO 9-2320-283-12).
- Install hood (TM 9-2320-283-20).
- Install fenders (TM 9-2320-283-20).
- Install bumper and towing eyes (TM 9-2320-283-20).
- Install brush guard and spotter mirrors (TM 9-2320-283-20).
- Close air reservoir draincocks (TM 9-2320-283-20).
- Reconnect battery cables (TM 9-2320-283-20).

CAUTION

- Always perform break-in procedure for a new or repaired engine to prevent premature bearing and ring failure.
- Do engine testing (refer to TM 9-2815-225-34&P).

ENGINE

3-10. ENGINE REPLACEMENT (Continued)



LEGEND:

- 1. HEXAGON CAPSCREW (12)
- 2. WASHER (12)
- 5. FLYWHEEL
- 6. DISK AND RING GEAR
- 7. FLYWHEEL HOUSING

- 11. TUBE CLAMP
- 12. BREATHER TUBE EXTENSION
- 14. NUT
- 15. ALTERNATOR ADJUSTING BLOCK
- 18. BELT (2)

ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT.

THIS TASK COVERS

- | | |
|------------------------------------|---|
| a. Removal of Front Engine Mounts. | d. Inspection. |
| b. Removal of Rear Engine Mounts. | e. Installation of Front Engine Mounts. |
| c. Cleaning. | f. Installation of Rear Engine Mounts. |

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

TM 9-2320-283-20.

CONDITION DESCRIPTION

Front engine mounts require removal of upper fan shroud.

TEST EQUIPMENT

None.

SPECIAL TOOLS

None.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Vehicle on level ground away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-20.

GENERAL SAFETY INSTRUCTIONS

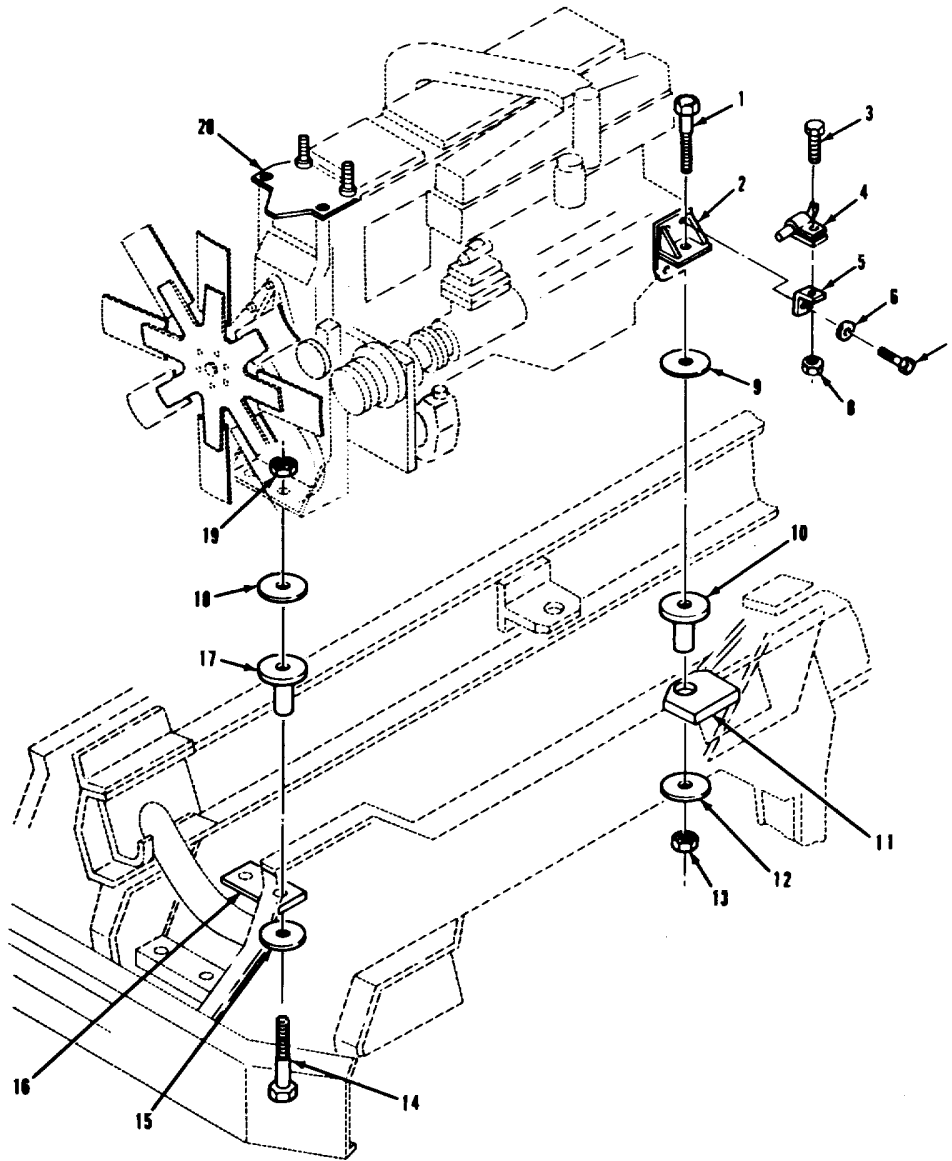
To keep vehicle from moving set park brake and block rear wheels.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT (Continued).



LEGEND:

- | | |
|----------------------------------|---|
| 1. HEXAGON HEAD CAPSCREW (2) | 11. REAR ENGINE MOUNT BRACKET (FRAME) (2) |
| 2. REAR ENGINE MOUNT BRACKET (2) | 12. FLAT WASHER (2) |
| 3. HEXAGON HEAD SCREW (2) | 13. PIPE THREAD HEXAGON NUT (2) |
| 4. LOOP CLAMP (3) | 14. HEXAGON HEAD CAPSCREW (2) |
| 5. TUBE SUPPORT BRACKET (2) | 15. FLAT WASHER (2) |
| 6. FLAT WASHER (8) | 16. FRONT CROSSMEMBER ASSEMBLY |
| 7. HEXAGON HEAD CAPSCREW (8) | 17. FRONT VIBRATION INSULATOR (2) |
| 8. PLAIN HEXAGON NUT (2) | 18. FLAT WASHER (2) |
| 9. FLAT WASHER (2) | 19. PIPE THREAD HEXAGON NUT (2) |
| 10. REAR VIBRATION INSULATOR (2) | 20. ENGINE |

ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT.

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

A. REMOVAL OF FRONT ENGINE MOUNTS.

- 1 Two capscrews (14), Remove. washers (15), and nuts (19).

CAUTION

Body of oil pan can be damaged easily. Do not place lifting device under oil pan.

- | | | |
|---|--|-----------------|
| 2 Engine (20) | Using suitable lifting device, raise about five inches at front. | Block securely. |
| 3 Two washers (18) and insulators (17). | Remove from item (16). | |

B. REMOVAL OF REAR ENGINE MOUNTS.

NOTE

Removal is the same for both sides of the engine. The left side is shown.

- | | | |
|---|--------|--|
| 4 Capscrew (1), nut 13), and washer (12). | Remove | |
|---|--------|--|

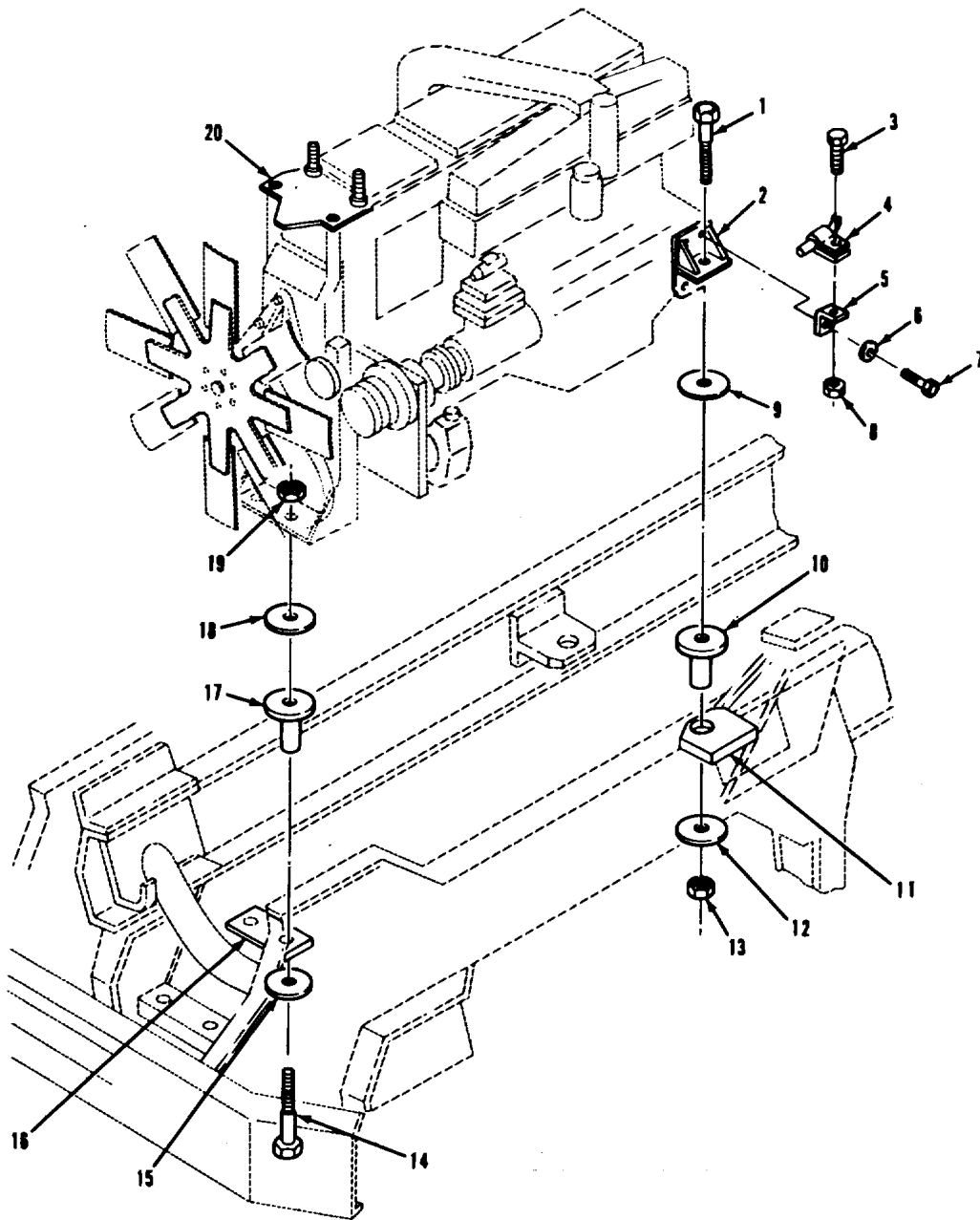
CAUTION

Body of oil pan can be damaged easily. Do not place lifting device under oil pan.

- | | | |
|---------------|---|-----------------|
| 5 Engine (20) | Using suitable lifting device, raise about five inches at rear. | Block securely. |
|---------------|---|-----------------|

ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT (Continued).

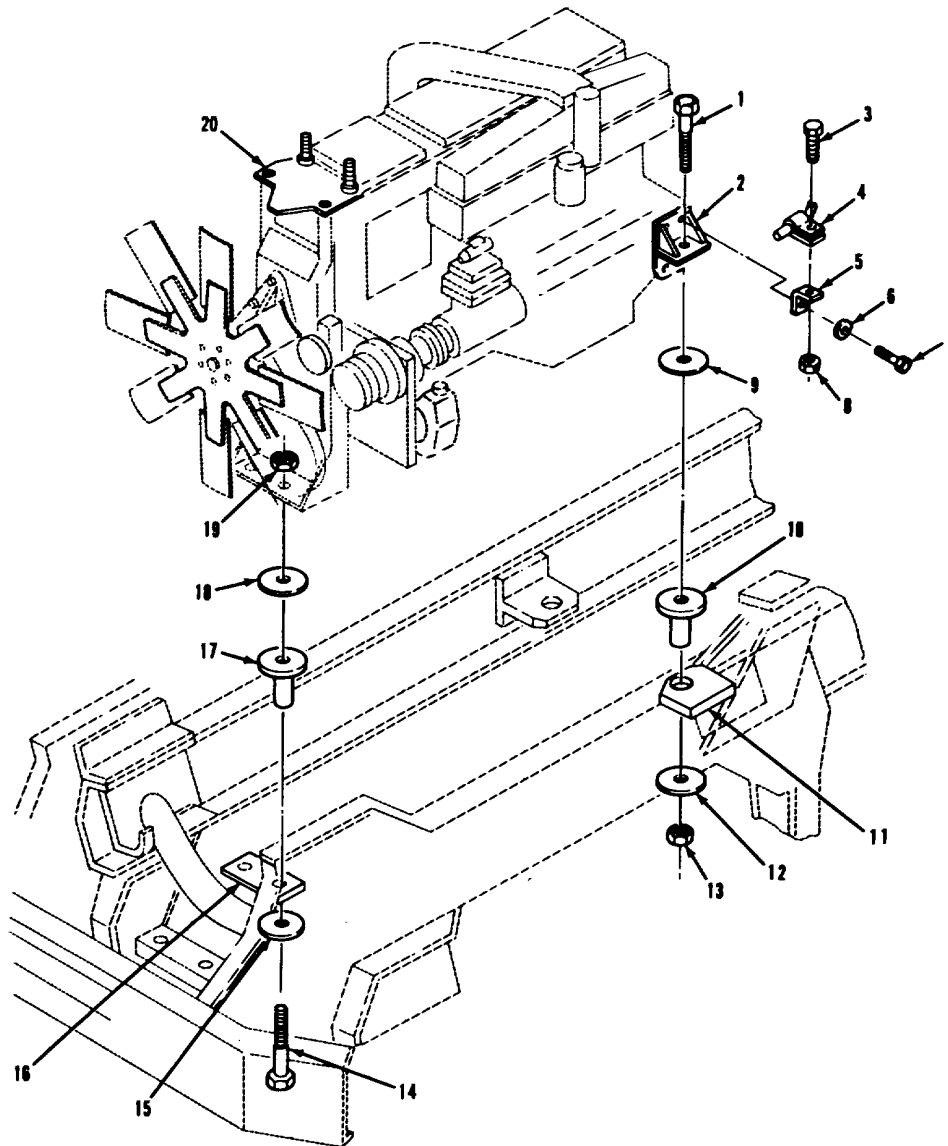


LEGEND:

- | | |
|----------------------------------|---------------------------------------|
| 1. HEXAGON HEAD CAPSCREW (2) | 11. REAR ENGINE MOUNT BRACKET (FRAME) |
| 2. REAR ENGINE MOUNT BRACKET (2) | 12. FLAT WASHER (2) |
| 3. HEXAGON HEAD SCREW (2) | 13. PIPE THREAD HEXAGON NUT (2) |
| 4. LOOP CLAMP (3) | 14. HEXAGON HEAD CAPSCREW (2) |
| 5. TUBE SUPPORT BRACKET (2) | 15. FLAT WASHER (2) |
| 6. FLAT WASHER (8) | 16. FRONT CROSSMEMBER ASSEMBLY |
| 7. HEXAGON HEAD CAPSCREW (2) | 17. FRONT VIBRATION INSULATOR (2) |

ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT (Continued).



LEGEND:

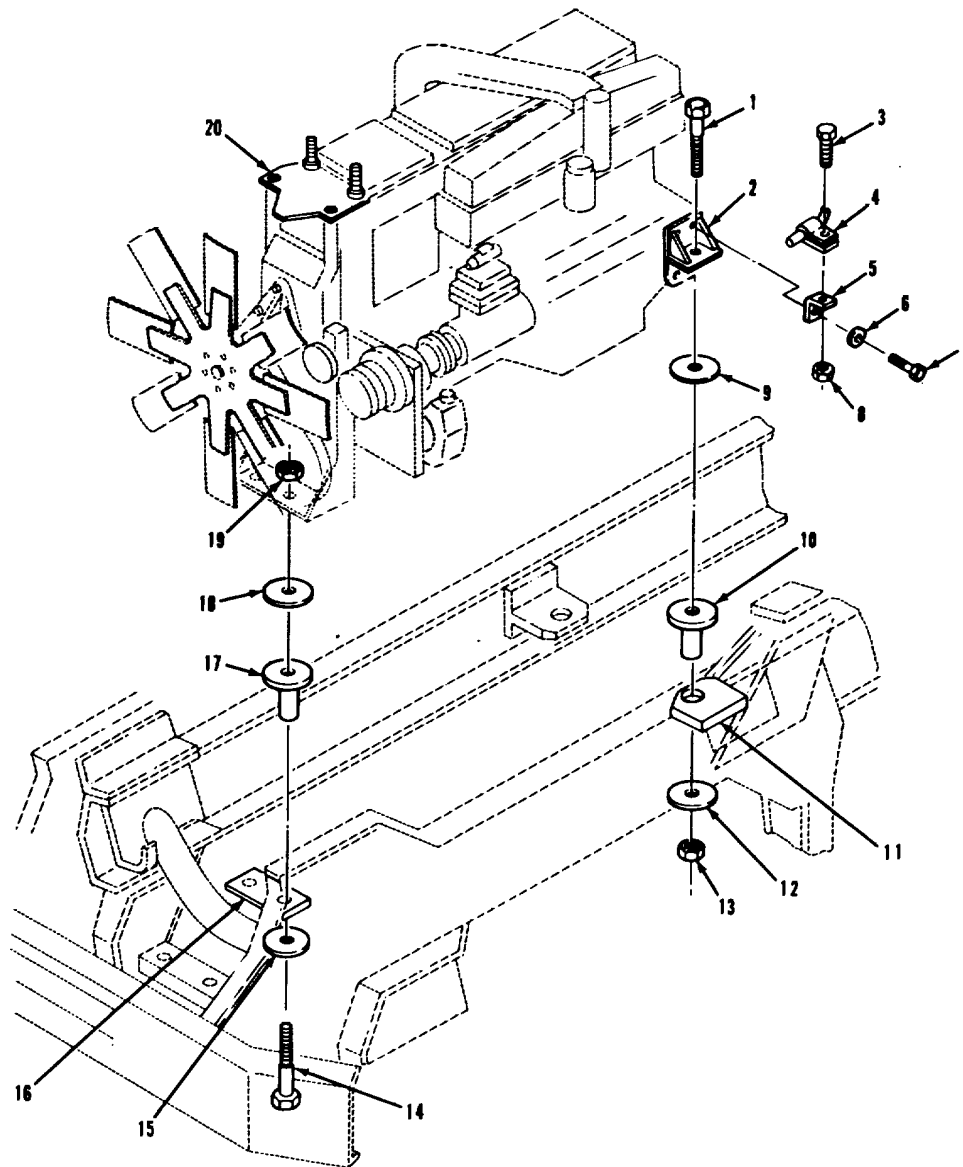
- | | |
|----------------------------------|---|
| 1. HEXAGON HEAD CAPSCREW (2) | 11. REAR ENGINE MOUNT BRACKET (FRAME) (2) |
| 2. REAR ENGINE MOUNT BRACKET (2) | 12. FLAT WASHER (2) |
| 3. HEXAGON HEAD SCREW (2) | 13. PIPE THREAD HEXAGON NUT (2) |
| 4. LOOP CLAMP (3) | 14. HEXAGON HEAD CAPSCREW (2) |
| 5. TUBE SUPPORT BRACKET (2) | 15. FLAT WASHER (2) |
| 6. FLAT WASHER (8) | 16. FRONT CROSSMEMBER ASSEMBLY |
| 7. HEXAGON HEAD CAPSCREW (8) | 17. FRONT VIBRATION INSULATOR (2) |
| 8. PLAIN HEXAGON NUT (2) | 18. FLAT WASHER (2) |
| 9. FLAT WASHER (2) | 19. PIPE THREAD HEXAGON NUT (2) |
| 10. REAR VIBRATION INSULATOR (2) | 20. ENGINE |

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ENGINE.

3-11. ENGINE MOUNTS REPLACEMENT (Continued).		
LOCATION/ITEM	ACTION	REMARKS
F. <u>INSTALLATION OF REAR ENGINE MOUNTS.</u>		
NOTE		
Installation is the same for both sides of engine. The left side is shown.		
13. Brackets (2) and (5).	a. Position on mounting surface of item (20). b. Secure with four items (6) and (7).	Ensure mounting holes are alined. Torque to 370-420 lb-ft.
14. Clamp (4).	a. Place in position on item (5). b. Secure in place with items (3) and (8).	
15. Insulator (10) and washer (9).	Install on item (11).	Item (20) will have to be raised and blocked about five inches.
16. Capscrew (1), washer (12), and nut (13).	a. Unblock and lower item (20) and remove lifting device. b. Install items (1), (12), and (13).	Ensure mounting hole is alined. Torque to 270-295 lb-ft.

3-11. ENGINE MOUNTS REPLACEMENT (Continued).



LEGEND:

- | | |
|----------------------------------|---|
| 1. HEXAGON HEAD CAPSCREW (2) | 11. REAR ENGINE MOUNT BRACKET (FRAME) (2) |
| 2. REAR ENGINE MOUNT BRACKET (2) | 12. FLAT WASHER (2) |
| 3. HEXAGON HEAD SCREW (2) | 13. PIPE THREAD HEXAGON NUT (2) |
| 4. LOOP CLAMP (3) | 14. HEXAGON HEAD CAPSCREW (2) |
| 5. TUBE SUPPORT BRACKET (2) | 15. FLAT WASHER (2) |
| 6. FLAT WASHER (8) | 16. FRONT CROSSMEMBER ASSEMBLY |
| 7. HEXAGON HEAD CAPSCREW (8) | 17. FRONT VIBRATION INSULATOR (2) |
| 8. PLAIN HEXAGON NUT (2) | 18. FLAT WASHER (2) |
| 9. FLAT WASHER (2) | 19. PIPE THREAD HEXAGON NUT (2) |
| 10. REAR VIBRATION INSULATOR (2) | 20. ENGINE |

TA 238080

Section III. FUEL SYSTEM

3-12. GENERAL.

This section provides procedures authorized at Direct and General Support maintenance levels to repair fuel system components. To find a specific procedure contained in this section, see the task summary below:

3-13. TASK SUMMARY.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u> All.	<u>EQUIPMENT CONDITION PARAGRAPH</u> TM 9-2320-283-20.	<u>CONDITION DESCRIPTION</u> Fuel tank removed.
--	---	--

TEST EQUIPMENT
None.

SPECIAL TOOLS
None.

MATERIALS/PARTS (P/N)
None.

PERSONNEL REQUIRED
One (MOS-44B).

SPECIAL ENVIRONMENTAL CONDITIONS
None.

REFERENCES (TM)
TM 9-2320-283-20.
TM 9-237.
FM 43-2.
TB ORD 1047.

GENERAL SAFETY INSTRUCTIONS
None.

TROUBLESHOOTING REFERENCES
None.

LIST OF TASKS

TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)
Fuel Tank Repair	3-14	
a. Cleaning.	3-14a	
b. Inspection.	3-14b	
c. Testing.	3-14c	
d. Repair.	3-14d	

FUEL SYSTEM.

3-14. FUEL TANK REPAIR.

THIS TASK COVERS

- a. Cleaning.
- b. Inspection.
- c. Testing.
- d. Repair.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION
PARAGRAPH

TM 9-2320-283-20.

CONDITION DESCRIPTION

Fuel tank removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

None.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

One (MOS-44B).

SPECIAL ENVIRONMENTAL CONDITIONS

None.

REFERENCES (TM)

TM 9-2320-283-20.
 TM 9-237.
 FM 43-2.
 TB ORD 1047.

GENERAL SAFETY INSTRUCTIONS

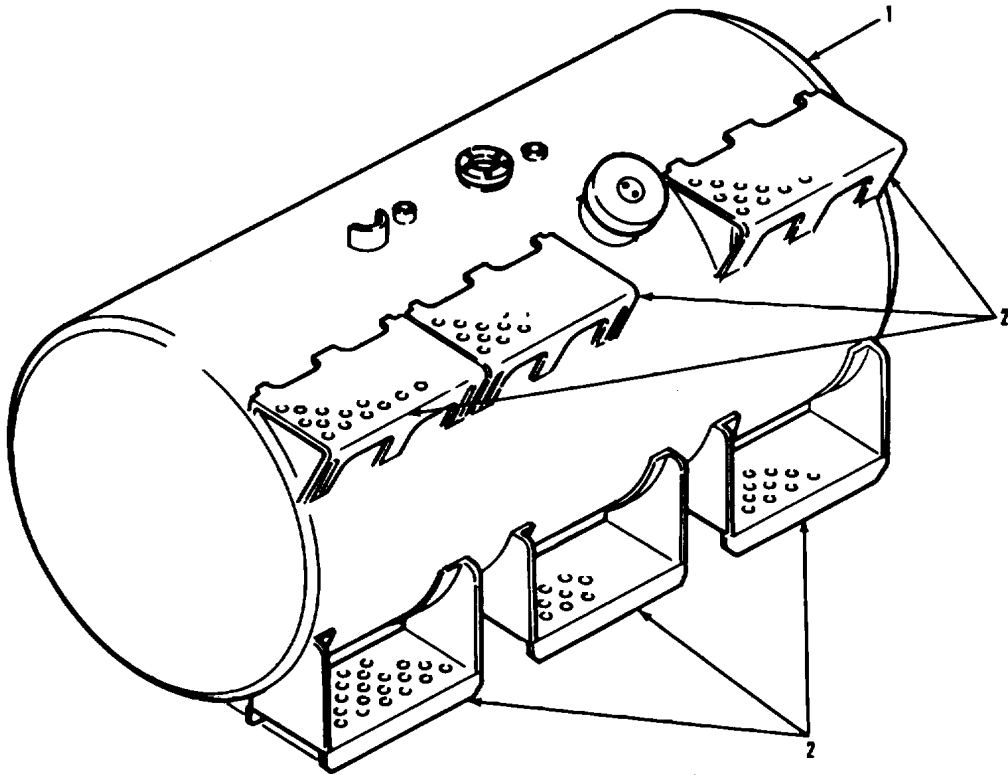
None.

TROUBLESHOOTING REFERENCES

None.

FUEL SYSTEM.

3-14. FUEL TANK REPAIR (Continued).



LEGEND:
1. FUEL TANK
2. STEP (6)

TA238081

FUEL SYSTEM.

3-14. FUEL TANK REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

A. CLEANING

WARNING

Fuel tank, even when empty, contains traces of diesel fuel that can catch fire during repair. To avoid serious injury to you and other personnel, render fuel tank safe for repair as prescribed below.

- | | | |
|--------------|--|--|
| 1. Tank (1). | a. Clean outside | Refer to paragraph 3-4. |
| | b. Flush and clean all traces of diesel fuel from inside of Metal or Plastic Gasoline and Diesel Fuel Tanks) | Refer to TB ORD 1047 (Elimination of Combustibles from Interiors |
| | c. Dry thoroughly. | |

B. INSPECTION

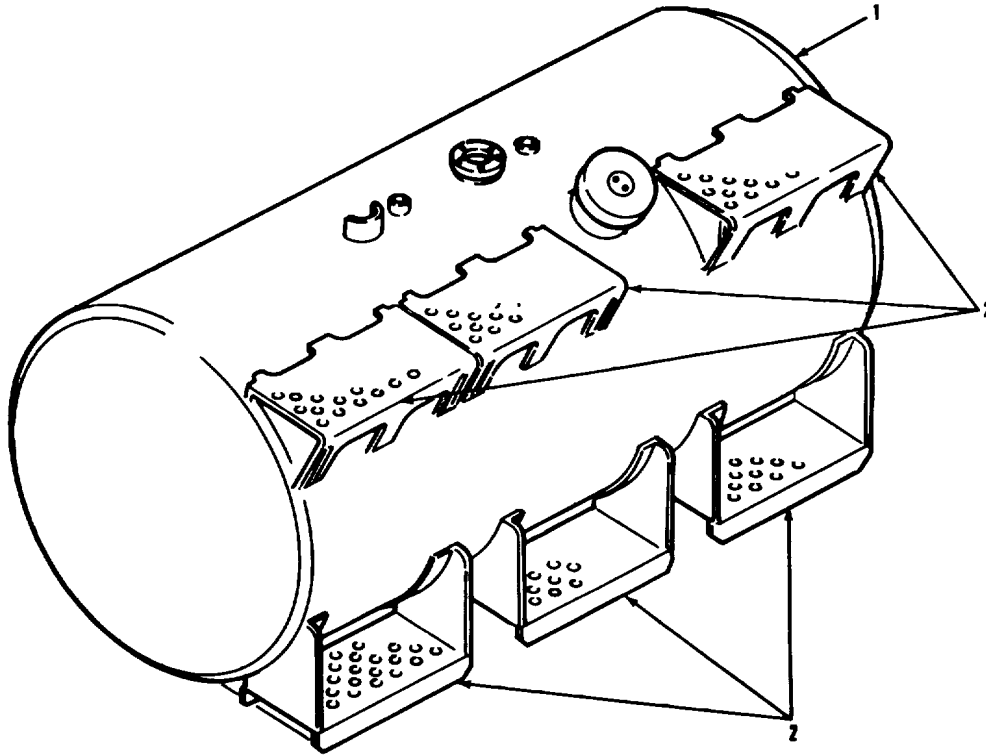
- | | | |
|---------------------------|---------|--|
| 2. Tank (1) and steps (2) | Inspect | Refer to paragraph 3-5. Circle defected areas. |
|---------------------------|---------|--|

C. TESTING

- | | | |
|-------------|-----------------------------------|-------------------------|
| 3. Tank (1) | a. Pressurize to 10 psi openings. | Be sure to plug all |
| | b. Use soapy solution. | |
| | c. Check for leaks are found. | Circle area where holes |
| | d. Release air pressure. | |

FUEL SYSTEM.

3-14. FUEL TANK REPAIR (Continued).



LEGEND:

- 1. FUEL TANK
- 2. STEP (6)

TA 238082

FUEL SYSTEM.

3-14. FUEL TANK REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

B. REPAIR

NOTE

- **Repairs are limited to sheet metal straightening and welding.**
- **To help you with repairs, observe the following material composition.**

- a. Tank and Baffles - Aluminum 5052-H32 or H34 (0. Inch thick).
- b. Steps - Aluminum, 5052-H32 or H34 (0. inch thick).

4. Tank (1) and step (2)

- a. Repair circled areas.
- b. Wire brush all welded areas and remove any weld spatter.
- c. Pressurize to 10 psi.
- d. Use soapy solution.
- e. Check for leaks
- f. Release air pressure.
- g. Vacuum inside item (1).

Refer to FM 43-2 (Metal Body Repair and Related Operations) and TM 9-247 (Welding Theory and Application).

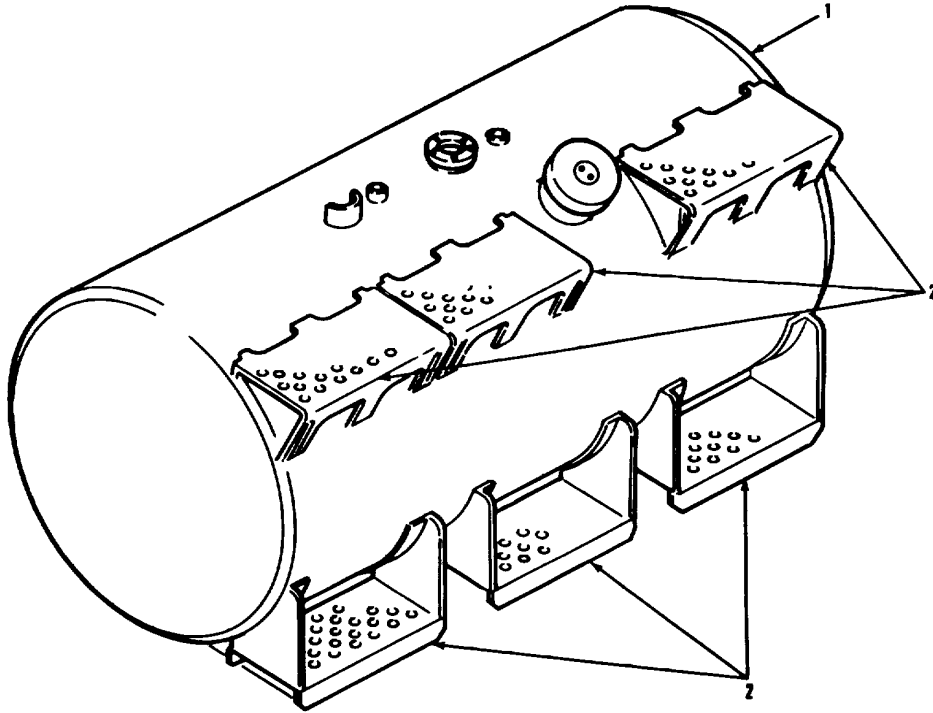
If leaks are found, circle area, release air pressure, and repeat step 4. If OK, go to go to step f.

NOTE

**Follow-on maintenance action required:
Install fuel tank (TM 9-2320-283-20).**

FUEL SYSTEM.

3-14. FUEL TANK REPAIR (Continued).



LEGEND:
1. FUEL TANK
2. STEP (6)

TA238083

Section IV. COOLING SYSTEM

3-15. GENERAL

This section provides procedures authorized at direct and general support maintenance levels to repair cooling system components. To find a specific procedure contained in this section, see the task summary below:

3-16. TASK SUMMARY.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All

EQUIPMENT CONDITION

PARAGRAPH

(Refer to specific paragraph for this information).

CONDITION DESCRIPTION

TEST EQUIPMENT

See TM 750-254.

SPECIAL TOOLS

See TM 750-254.

Spanner wrench

(06853) 294514

MATERIALS/PARTS (P/N)

Sealant, silicone rubber

silastic (12-oz. tube)

Item 27, Appendix B

Loctite, RC 601

Item 12, Appendix B

Lubricant, BW 655M

Item 14, Appendix B

Tape, thread sealing

Item 35, Appendix B.

Gasket (4)

(39215) 842920.

Lockwasher (104)

(39215) 10245.

Pressure Plate and

Lining Repair Kit

(06853) 288907.

PERSONNEL REQUIRED

One (MOS-44B)

dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-20

TM 9-2320-283-34P.

TM 750-254.

GENERAL SAFETY INSTRUCTIONS

None.

TROUBLESHOOTING REFERENCES

None.

COOLING SYSTEM.

3-16. TASK SUMMARY (Continued).

LIST OF TASKS

TASK NO	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)
1	Radiator Repair	3-17	
	a. Cleaning	3-17a	
	b. Testing	3-17b	
	c. Repair	3-17c	
	d. Disassembly	3-17d	
	e. Assembly	3-17e	
2	Fan Clutch Repair	3-18	
	a. Disassembly	3-18a	
	b. Cleaning	3-18b	
	c. Inspection	3-18c	
	d. Repair	3-18d	
	e. Assembly	3-18e	
	f. Testing	3-18f	

COOLING SYSTEM.

3-17. RADIATOR REPAIR.

THIS TASK COVERS

- a. Cleaning.
- b. Testing.
- c. Repair.
- d. Disassembly.
- e. Assembly.

INITIAL SETUP

EQUIPMENT CONDITION

APPLICABLE CONFIGURATIONS

All

PARAGRAPH

TM 9-2320-283-20

CONDITION DESCRIPTION

Remove radiator.

TEST EQUIPMENT

See TM 750-254.

SPECIAL TOOLS

See TM 750-254

MATERIALS/PARTS (P/N)

Sealant, silicone rubber

silastic (12-oz. tube)

Item 27, Appendix B.

Gasket (4)

(39215) 842920.

Lockwasher (104)

(39215) 10245.

PERSONNEL REQUIRED

One (MOS-44B)

SPECIAL ENVIRONMENTAL CONDITIONS

None.

REFERENCES (TM)

TM 9-2320-283-20

TM 9-2320-283-34P.

TM 750-254.

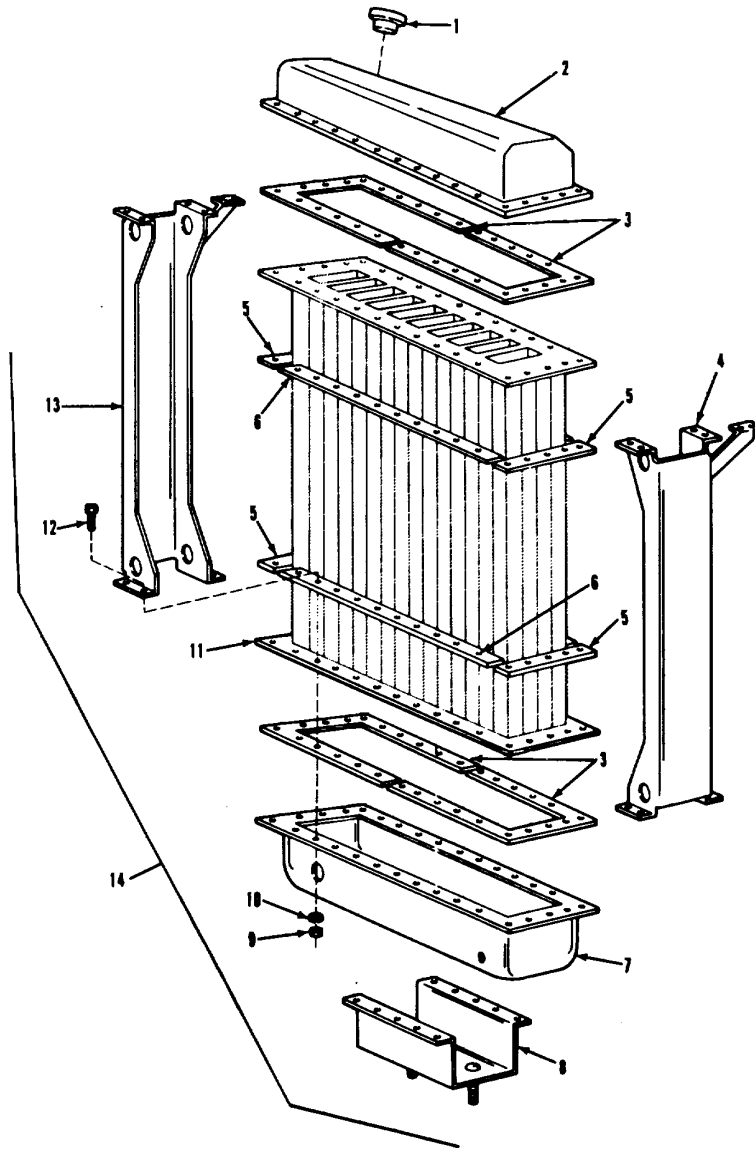
GENERAL SAFETY INSTRUCTIONS

None.

TROUBLESHOOTING REFERENCES

None.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

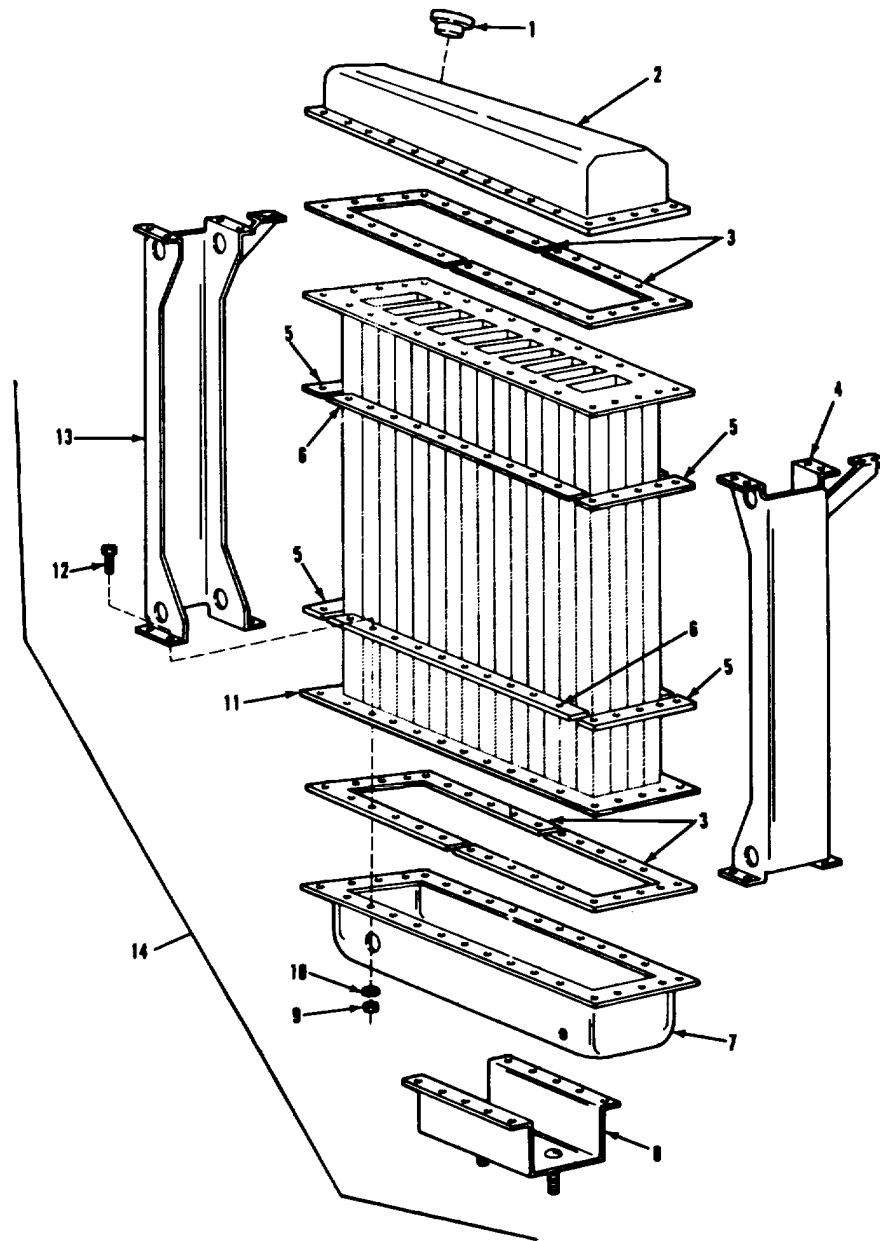
TA 238084

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>CLEANING</u>		
1. Radiator assembly (14)	a. Clean and flush Tactical Vehicles). b. Dry thoroughly.	Refer to TM 750-254 (Cooling Systems:
B. <u>TESTING.</u>		
NOTE		
<ul style="list-style-type: none"> • The following specifications should be noted when testing radiator: <ul style="list-style-type: none"> a. Designed for 10 psi cooling system. b. Pressure valve in radiator cap opens between 9 and 11 psi. c. Vacuum valve in radiator cap opens between 0 and 8 psi below atmospheric pressure. • -Radiator cap is tested after repair and installation of radiator has been made. Replace defective cap at that time. 		
2. Radiator assembly (14) and cap (1)	Test	Refer to TM 750-254 (Cooling Systems: Tactical Vehicles). Repair known defects as prescribed on next page.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

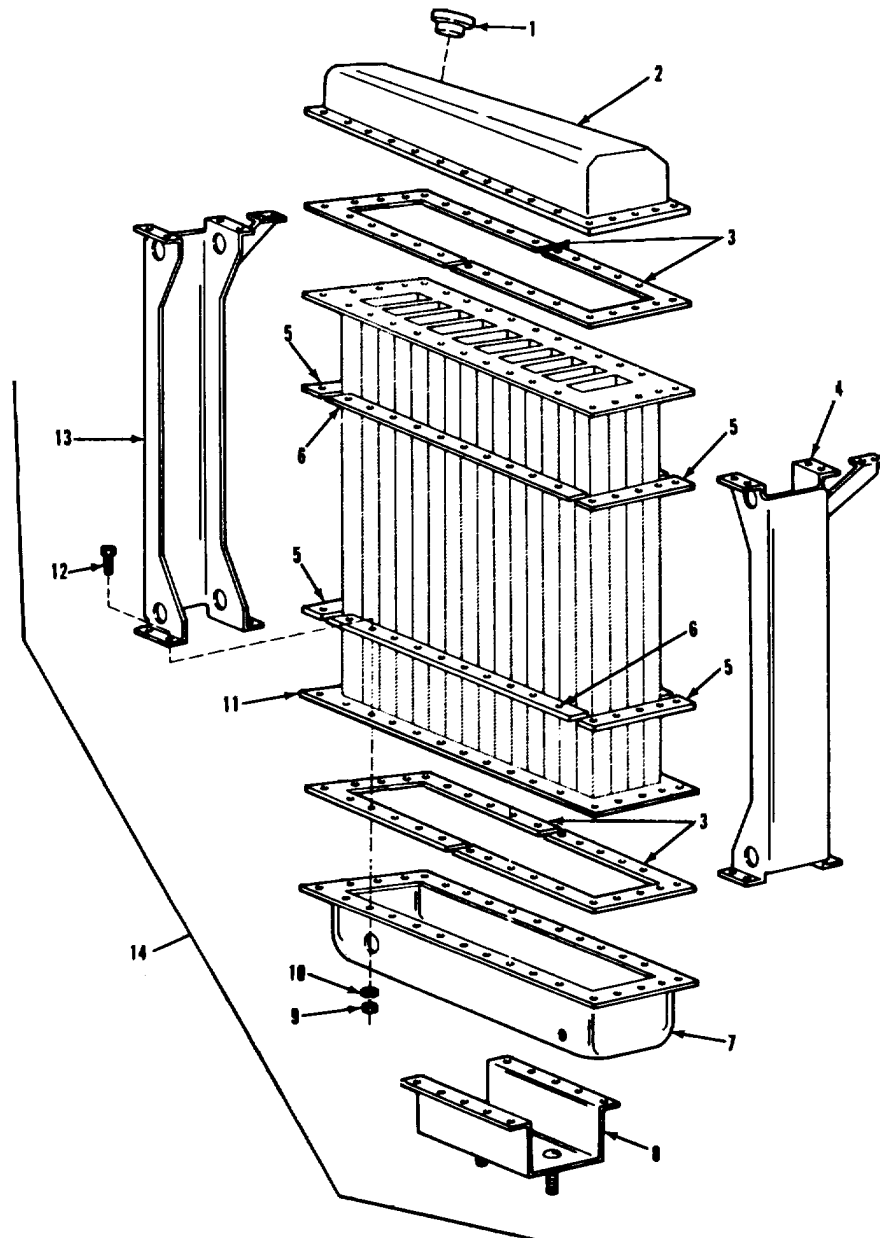
- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

TA 238085

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).		
LOCATION/ITEM	ACTION	REMARKS
<p>C. REPAIR.</p> <p style="text-align: center;">NOTE</p> <p>Repair consists of soldering core, rodding core tubes, and replacement of defective parts.</p>		
3. Core (11)	Repair and paint	Refer to TM 750-254 (Cooling Systems: Tactical Vehicle). If repair consists of rodding, disassemble as prescribed in TM 750-254, and refer to disassembly and assembly instructions below.
4. All other parts of radiator assembly (14)	Repair by replacement	Refer to disassembly and assembly instructions for replacement.
<p>D. DISASSEMBLY.</p> <p style="text-align: center;">CAUTION</p> <p>Avoid scratching and bending seal surfaces on top and bottom tank when removing. Scratches and bends will cause radiator to leak.</p> <p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • Mark all parts that are disassembled so that they can be properly assembled later. Transfer marks from replaced parts to new parts. • Only disassemble radiator as far as necessary to perform repair. 		

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

TA 232028

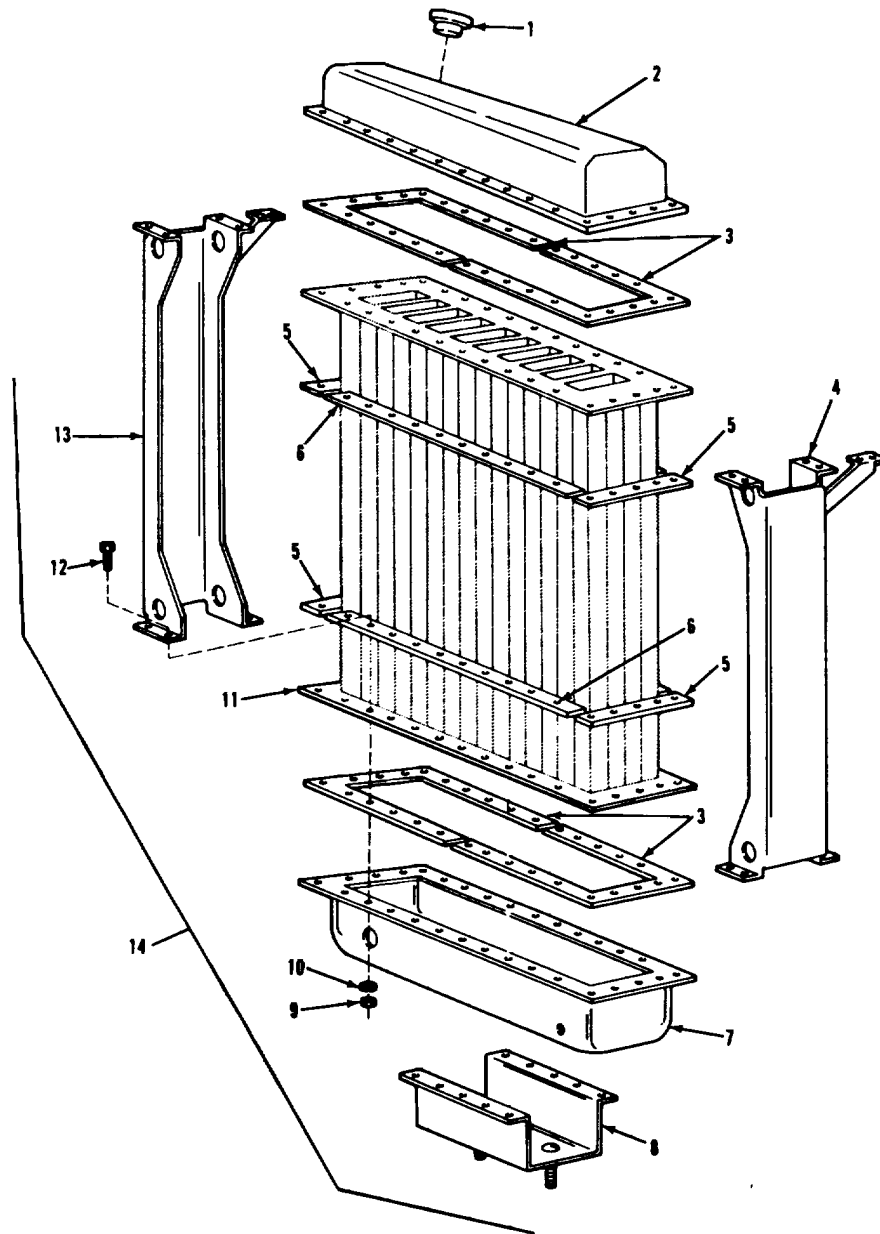
COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
D. <u>DISASSEMBLY (Continued).</u>		
5. Thirty-two nuts (9), lockwashers (10), and twenty-four capscrews (12)	a. Remove from items (4) and (13). b. Remove items (4) and (13)	Discard items (10). from item (11).
6. Thirty-eight nuts (9), lockwashers (10), twenty-five capscrews (12), strip (5), and strip (6).	Remove from item (2)	Discard items (10).
7. Top tank assembly (2).	Remove from item (11).	
8. Thirty-four nuts (9), lockwashers (10), capscrews (12), saddle (8), strip (5), and strip (6).	Remove from item (7)	Discard items (10).
9. Bottom tank assembly (7).	Remove from item (11).	
10. Saddle assembly (8).	Remove from item (7).	
11. Two gaskets (3)	Remove from item (2)	Discard two items (3).
NOTE		
If radiator cap is not removed; do step 12, otherwise go to step 13.		
12. Cap (1)	Remove from item (2).	
13. Two gaskets (3)	Remove from item (7)	Discard two items (3).

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

TA 238067

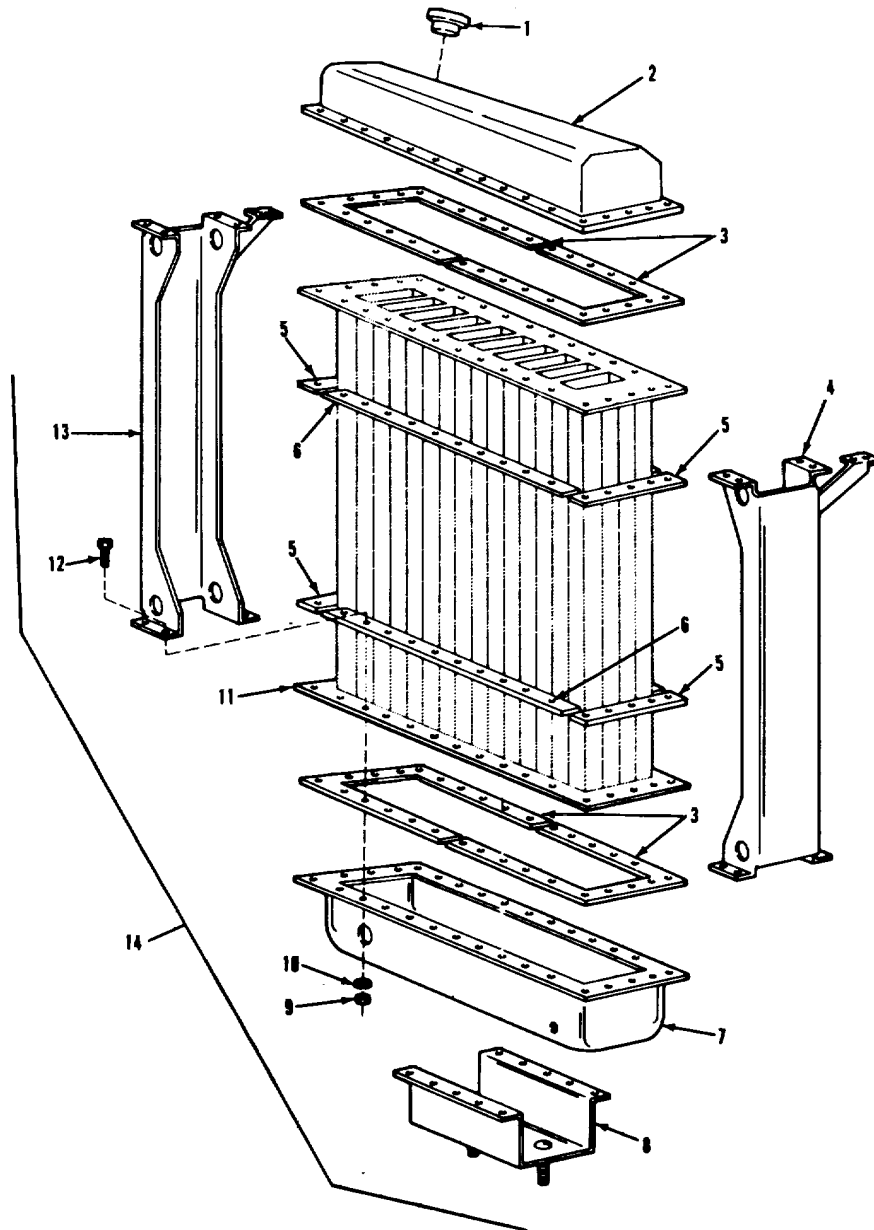
COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
D. <u>DISASSEMBLY</u> (Continued).		
WARNING		
Hydrochloric acid (muriatic acid) can burn you. It can give off harmful vapors if it is used on metals containing phosphorus. To avoid serious injury, wear protective rubber gloves, apron, and goggles and always use in well ventilated area.		
14. Top tank assembly (2) and bottom tank assembly (7)	Clean sealing surfaces with hydrochloric acid until bright and clean.	
E. <u>ASSEMBLY.</u>		
CAUTION		
Avoid scratching and bending seal surfaces on top and bottom tank when installing. Scratches and bends will cause radiator to leak.		
15. Bottom tank assembly (7)	Apply thin coat of silicone sealant over sealing surface.	
16. Two new gaskets (3)	Line up holes in item (3) with holes in item (7)	Press item (3) into place on item (7).
17. Saddle assembly (8)	a. Line up scribe mark on item (8) with mark on item (7) b. Push in place.	Be sure holes in item (8) line up with holes in item (7).

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

TA 23808i

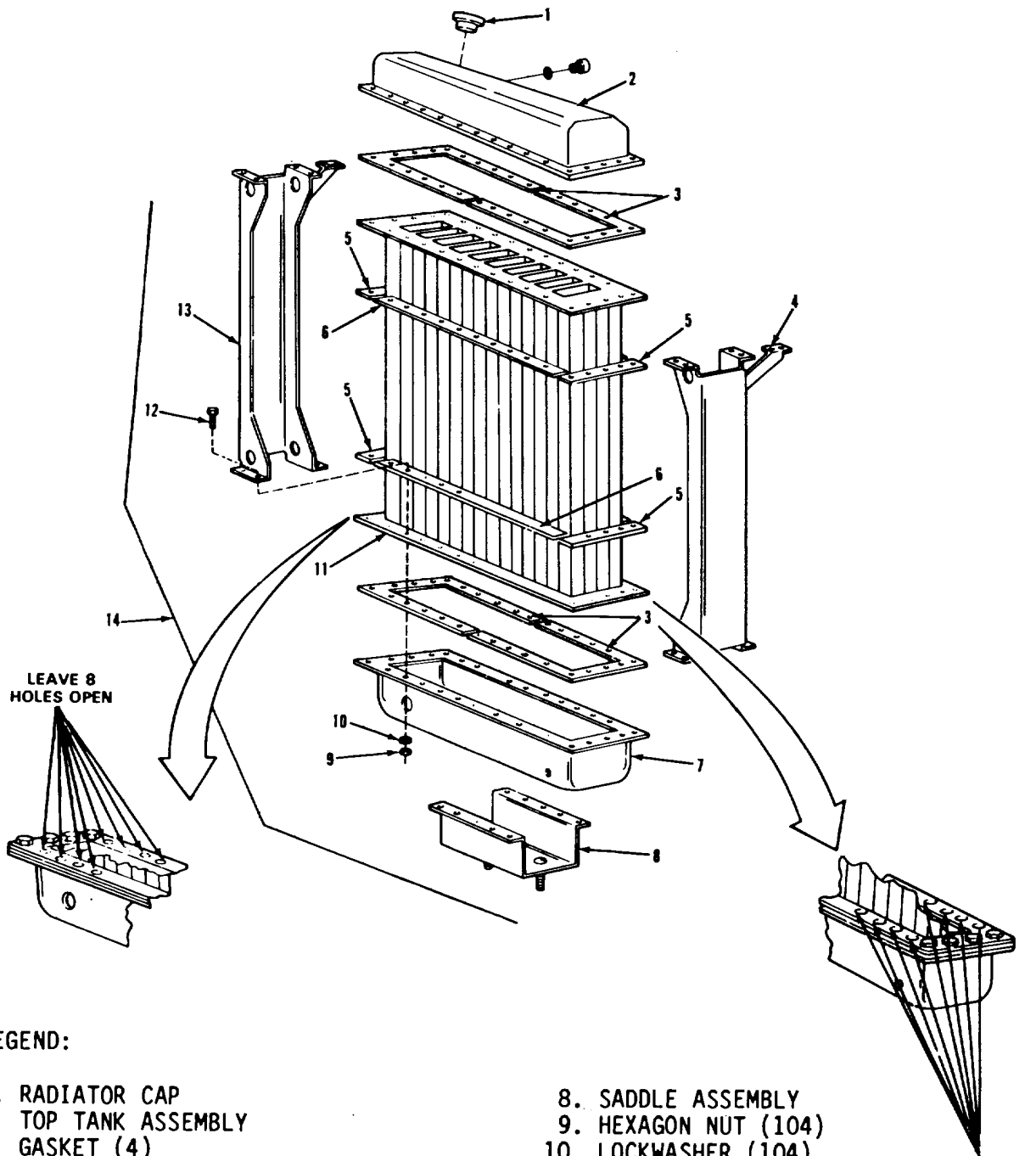
COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
18. Strips (5) and (6)	a. Line up holes in items (5) and (6) with holes in item (11). b. Set in place on item (11) be loose.	Items (5) and (6) will
19. Bottom tank assembly (7) with gasket (3) and attached saddle assembly (8)	a. Line up scribe mark on item (7) with mark on item (11) b. Secure finger tight with thirty-four items (9), new items (10), and items (12) (See illustration). c. Alternately tighten thirty-four items (9) surface from warping.	Be sure holes in items (7) and (8) line up with holes in item (11). Keep eight holes open at each end of item (7) and (11) for mounting items (4) and (13). Tighten alternately to prevent item (7) sealing
20. Top tank assembly (2)	Apply thin coat of silicone sealant over sealing surface.	
21. Two new gaskets (3)	a. Line up holes in item (3) with holes in item (2). b. Push in position.	
22. Strips (5) and (6)	a. Line up holes in items (5) and (6) with holes in item (11). b. Set in place. Items (5) and (6) will be loose.	

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- 1. RADIATOR CAP
- 2. TOP TANK ASSEMBLY
- 3. GASKET (4)
- 4. RIGHT-HAND CHANNEL ASSEMBLY
- 5. CLAMPING STRIP (4)
- 6. CLAMPING STRIP (4)
- 7. BOTTOM TANK ASSEMBLY

- 8. SADDLE ASSEMBLY
- 9. HEXAGON NUT (104)
- 10. LOCKWASHER (104)
- 11. RADIATOR CORE
- 12. CAPSCREW (83)
- 13. LEFT-HAND CHANNEL ASSEMBLY
- 14. RADIATOR ASSEMBLY

TA 238089

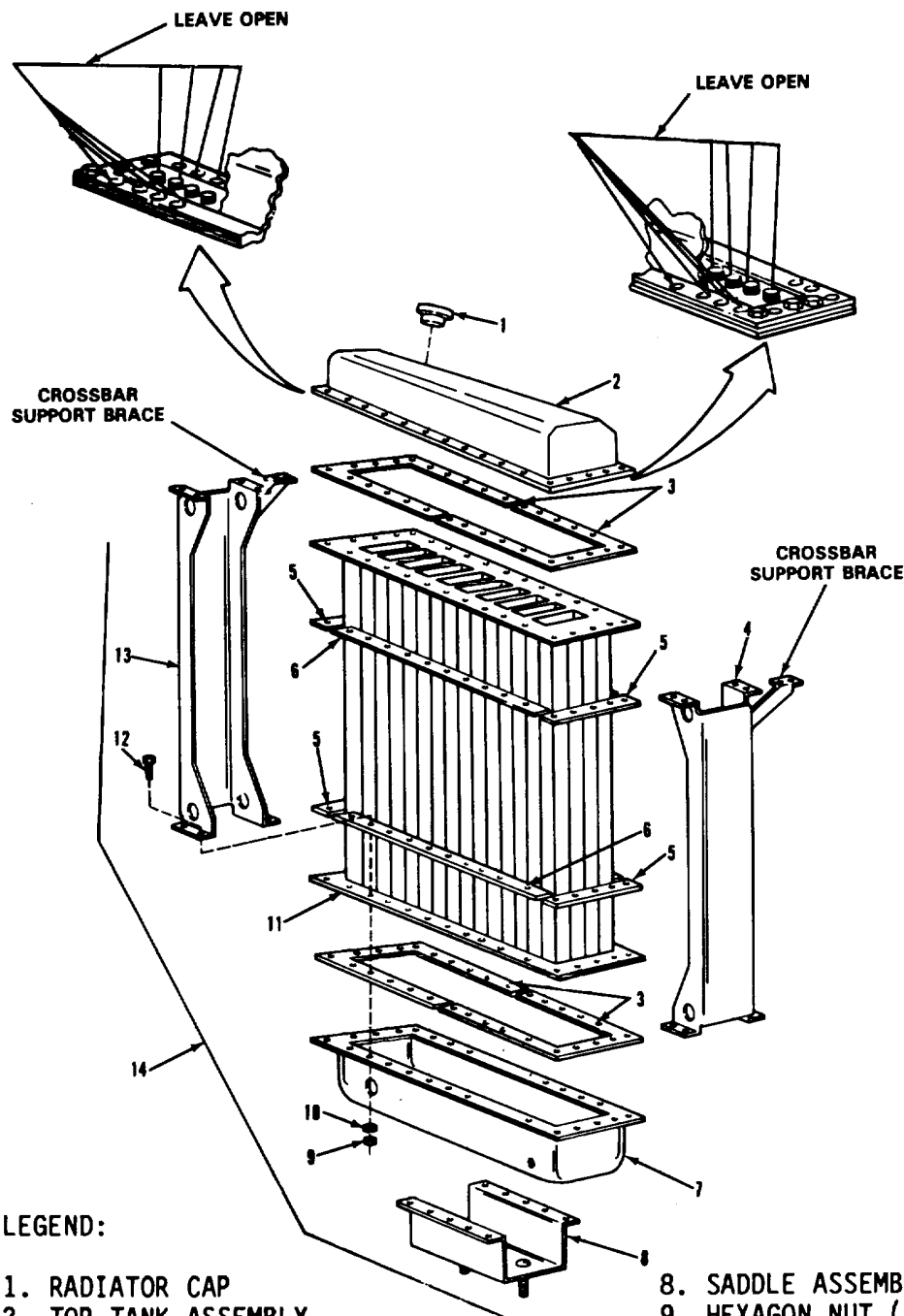
COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
23. Top tank assembly (2)	a. Line up scribe marks on item (2) with mark on item (11) b. Secure finger tight with thirty-eight items (9), new items (10), and twenty-five items (12) c. Alternately tighten thirty-eight items (9) and twenty-five items (12)	Be sure that inlet port on item (2) faces same direction as outlet port on item (7). Keep four studs and four holes at each end of item (2) open. (See illustration). Tighten alternately to prevent item (2) sealing surface from warping.
24. Right-hand channel assembly (4) and left-hand channel assembly (13)	a. Line up scribe marks on item (4) and (13) with marks on item (11) as inlet and outlet ports. (See illustration). b. Secure with thirty-two items (9), new items (10), and twenty-four items (12)	Be sure crossbar support braces on item (4) and (13) face same direction Tighten items (9) and (12) alternately to prevent (2) and (7) sealing surfaces from warping.
25. Cap (1)	Install on item (2).	
NOTE		
Follow-on maintenance action required:		
Install radiator (TM 9-2320-283-20). Test radiator cap (TM 750-254).		

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------|--------------------------------|
| 1. RADIATOR CAP | 8. SADDLE ASSEMBLY |
| 2. TOP TANK ASSEMBLY | 9. HEXAGON NUT (104) |
| 3. GASKET (4) | 10. LOCKWASHER (104) |
| 4. RIGHT-HAND CHANNEL ASSEMBLY | 11. RADIATOR CORE |
| 5. CLAMPING STRIP (4) | 12. CAPSCREW (83) |
| 6. CLAMPING STRIP (4) | 13. LEFT-HAND CHANNEL ASSEMBLY |
| 7. BOTTOM TANK ASSEMBLY | 14. RADIATOR ASSEMBLY |

TA 239090

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR.

THIS TASK COVERS

- | | |
|----------------|--------------|
| a. Disassembly | d. Repair. |
| b. Cleaning | e. Assembly. |
| c. Inspection | f. Testing. |

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All

EQUIPMENT CONDITION PARAGRAPH

TM 9-2320-283-20

CONDITION DESCRIPTION

Fan clutch removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Spanner wrench
(06853) 294514.

MATERIALS/PARTS (P/N)

Loctite RC601®
Item 12, Appendix B
Lubricant BW 655M
Item 14, Appendix B.
Tape, thread sealing
Item 35, Appendix B.

Pressure Plate and
Lining Repair Kit
288907 (06853).

PERSONNEL REQUIRED

One (MOS-63W)
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

IM 9-2320-283-20
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

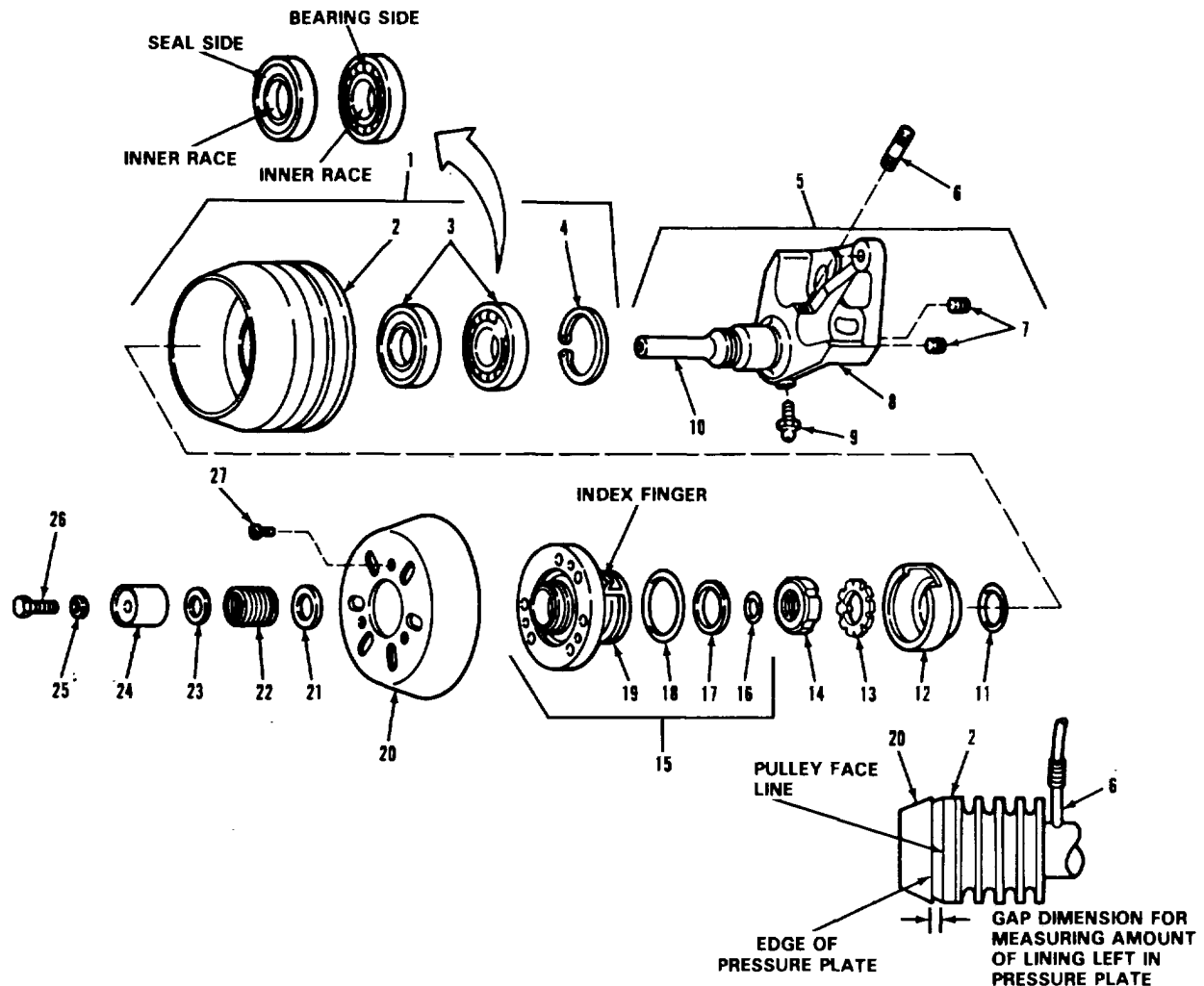
None.

TROUBLESHOOTING REFERENCES

None.

COOLING SYSTEM.

3-17. RADIATOR REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

TA 238091

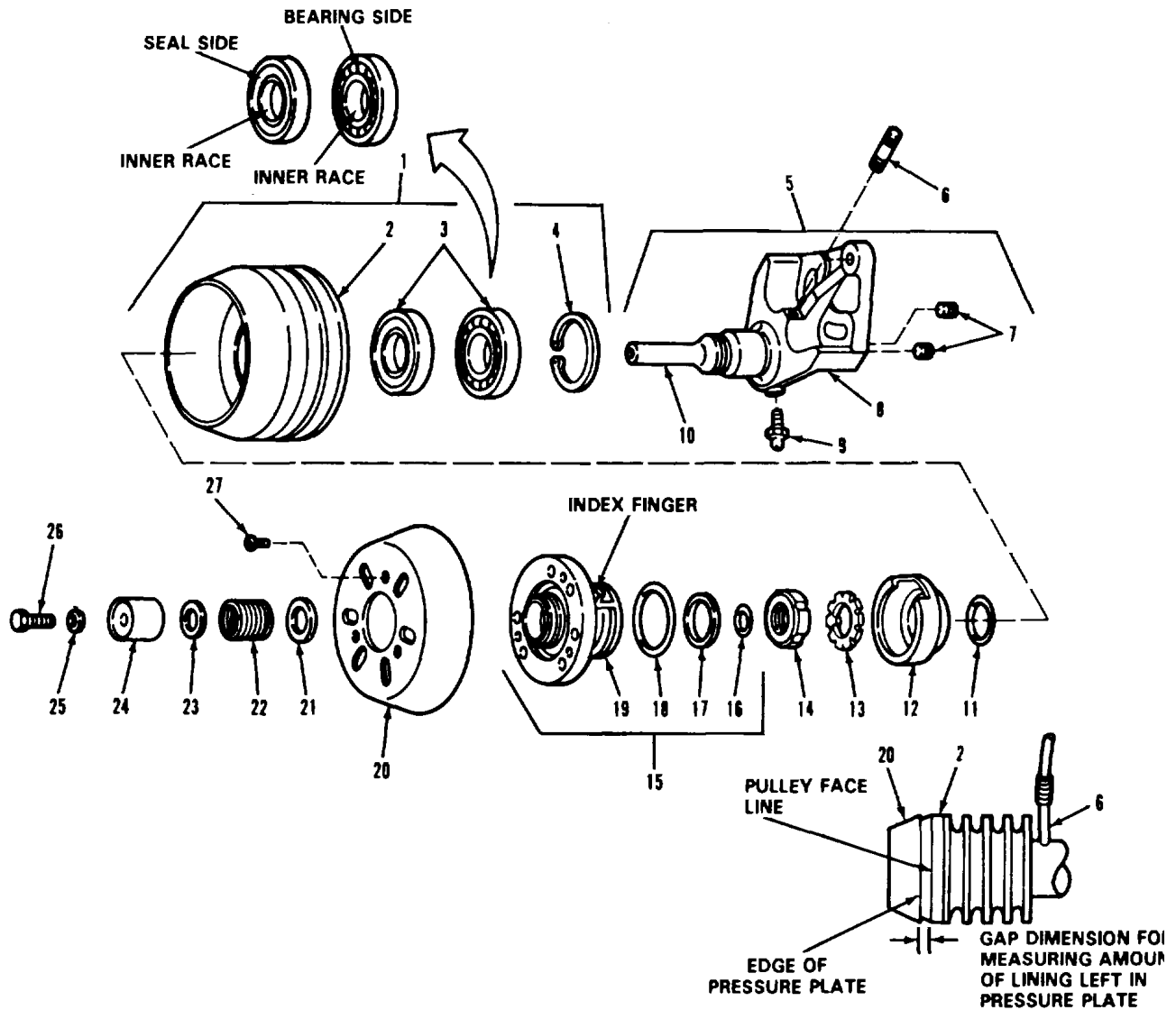
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY.</u>		
WARNING		
Capscrew (26) is under spring tension. Use care when removing capscrew (26) to avoid injury to you or other personnel.		
1. Capscrew (26), washers (25), (23), and (21), retainer (24), and spring (22).	Remove from items (10) and (15).	Discard item (26).
2. Plate (20) and pulley and bearing retainer assembly (15).	Pull off of items (1) and (10)	NJ
3. Three screws (27) and plate (20).	Remove from item (15)	Discard item (27).
4. O-rings (16) and (18), and ring (17).	Remove from item (15).	
5. Lockwasher (13)	Using 1/8-inch flat head punch, press lock tab down to release item (14)	During installation some lock tabs are bent up into grooves of item (14).
6. Locknut (14)	Using spanner wrench, remove from item (10).	
7. Lockwasher (13), housing (12), and O-ring (11).	Remove.	

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |

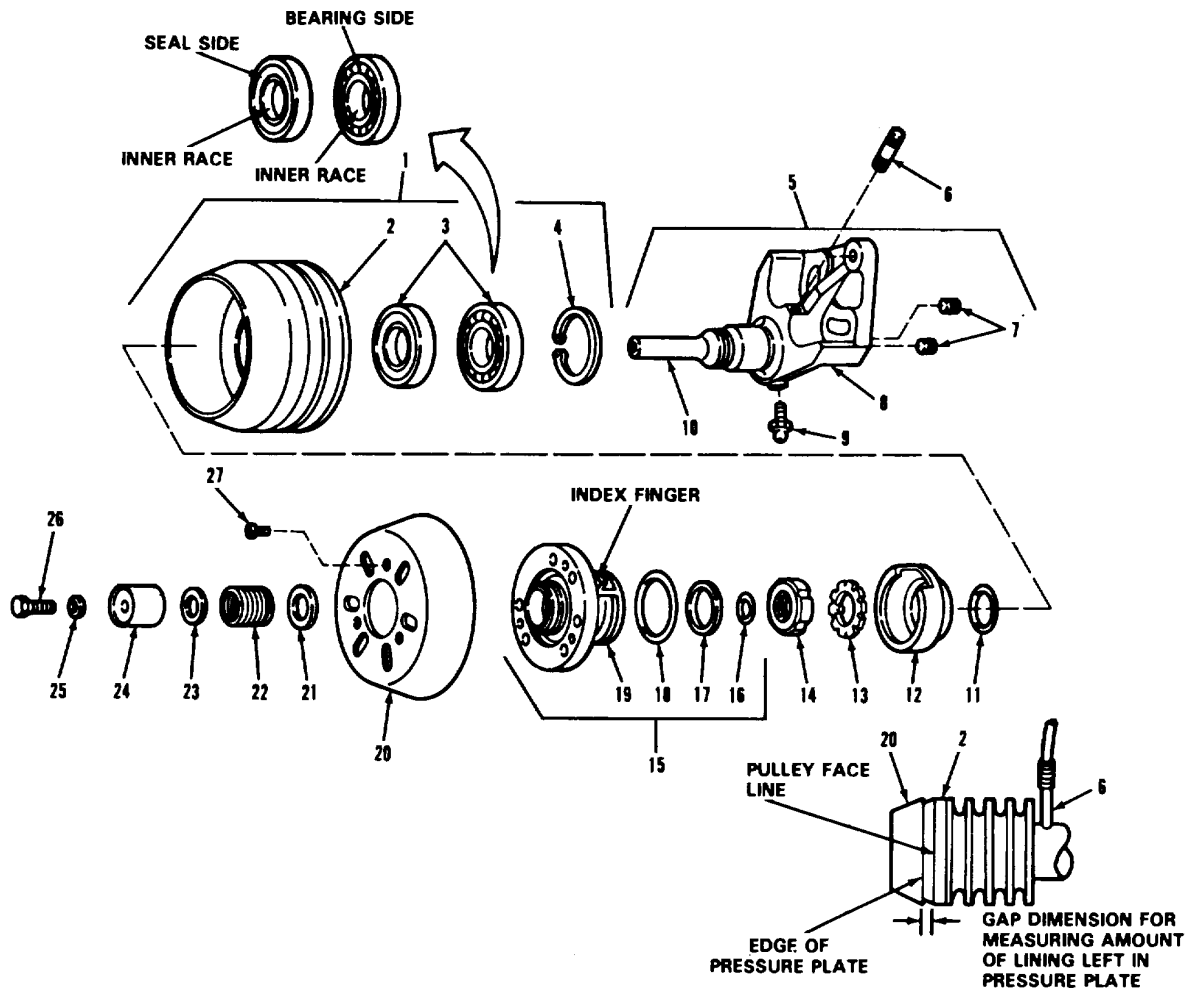
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY</u> (Continued).		
<p>NOTE Support back side of pulley (2) so that shaft and bracket assembly (5) can be pressed down and removed from pulley assembly (1). Since bearings (3) are originally installed with Loctite® between shaft (10) and bearings (3), a hydraulic force as high as 2 1/2-tons may be required to move the pulley assembly. If shaft is to be reused, a capscrew (26) should be screwed in end of shaft to protect it from damage.</p>		
8. Shaft and bracket assembly (5).	Remove from item (1).	
9. Ring (4)	Remove from item (2)	Use snapping pliers.
10. Two bearings (3)	Remove from item (2).	
11. Two plugs (7), nipple (6) and fitting (95).	Remove from item (5).	
B. <u>CLEANING</u>		
12. All parts	Clean	Refer to paragraph 3-4.
C. <u>INSPECTION.</u>		
13. All parts	Inspect	Refer to paragraph 3-5.
14. O-ring (11)	Inspect overall condition	Discard if worn, cracked, or falling apart.
15. Lockwasher (13)	Inspect tabs	Discard if it looks like tabs are broken or cannot be bent back in place for locking item (14).

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

TA 238093

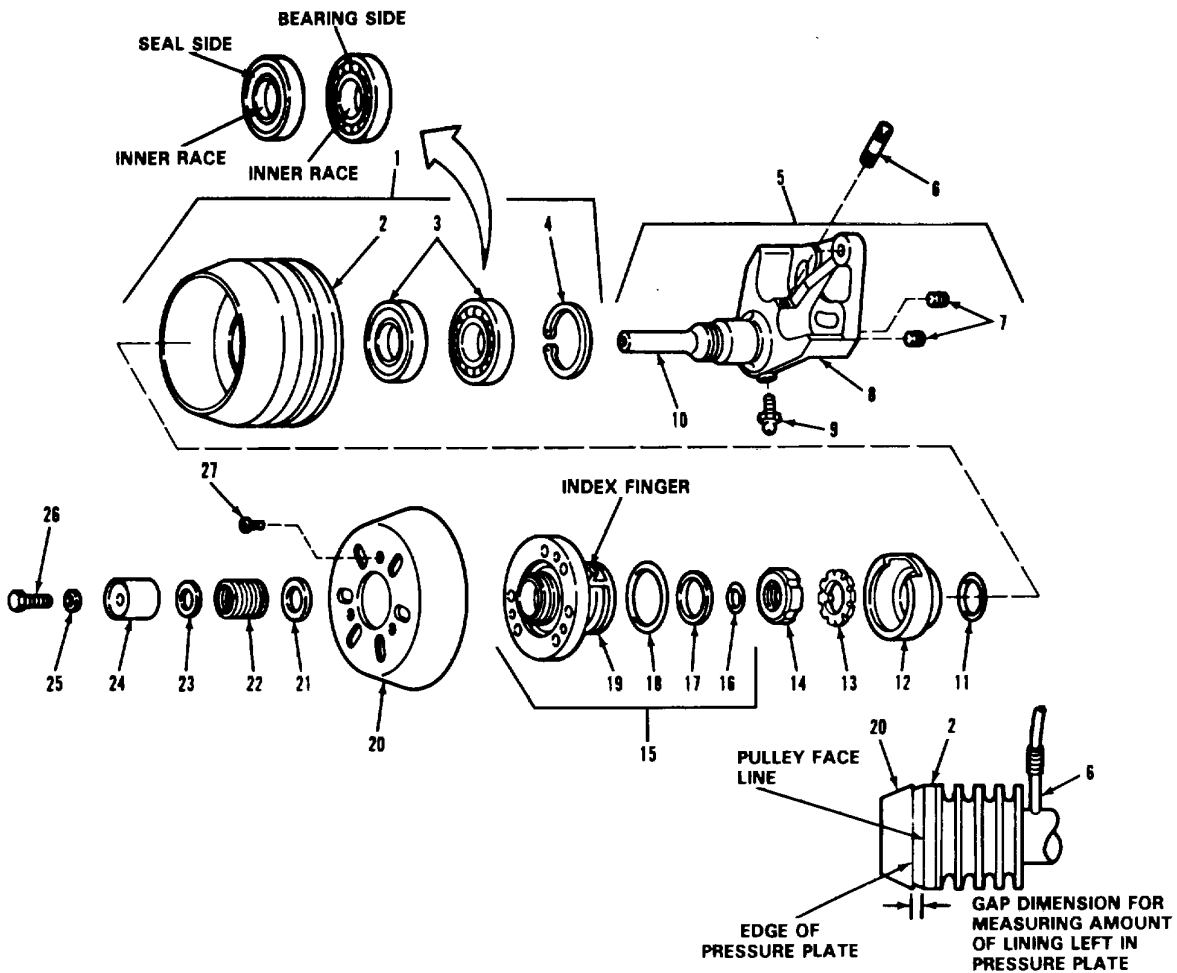
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. <u>INSPECTION (Continued).</u>		
16 Plate (20)	a Set item (2) so that small or tapered end is facing up. b Place item (20) on item (2). c Measure gap dimension between pulley face line and edge of pressure plate	Discard item (20) if gap is less than 0.375 inches.
D. REPAIR		
<p>NOTE</p> <p>To repair the fan clutch assembly (28), replace all parts found to be defective during inspection.</p>		
E. <u>ASSEMBLY</u>		
17 Fitting (9) and two plugs (7).	Install into item (8).	
18 Nipple (6)	a Apply thread sealing tape to threads. b Install into item (8).	
19 Two bearings (3) and ring (4)	a Insert the first item (3) into item (2) The seal side should go in first. b Insert the second item (3) into item (2) side should go in first. c Install item (4) into item (2).	Seal side should face inside. Bearing side should -x,- The bearing face inside. Use snapping pliers.

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

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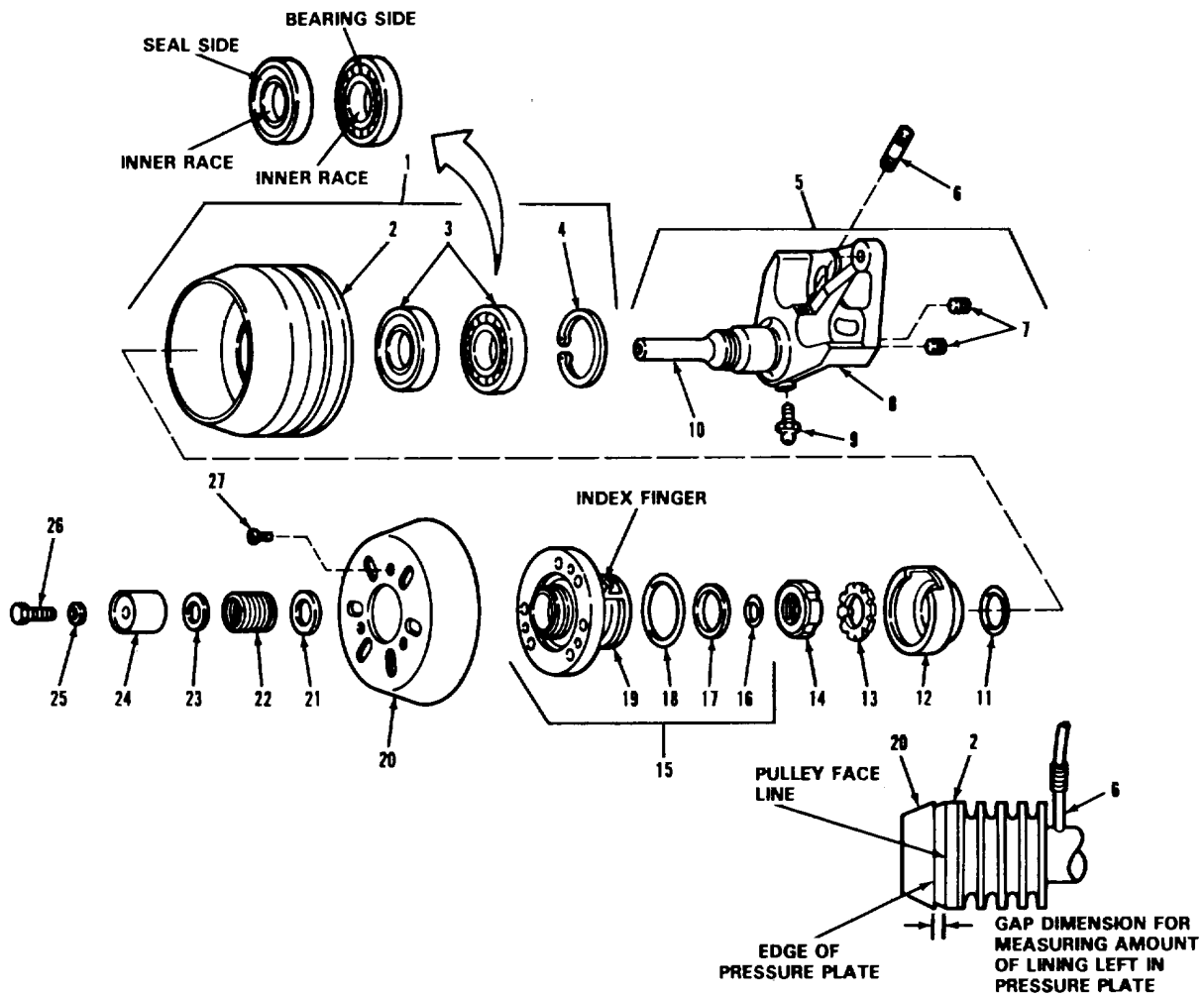
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
<p>NOTE Steps 20 thru 22 should all be performed within fifteen minutes to prevent Loctite® from setting up. *For the next step, support shaft and bracket assembly (5) with shaft (10) pointing up.</p>		
<p>20. Pulley assembly (1)</p>	<p>a. Apply a thin coat of Loctite RC601® around the bottom portion of item (10).</p> <p>b. Apply a thin coat Loctite RC601® to inner race of two items (3).</p> <p>c. Slide onto item (10) as far as it will go.</p>	<p>The bottom portion of item (10) is the mounting location for item (1).</p>
<p>21. O-ring (11), housing (12), lockwasher (13), and nut (14).</p>	<p>Install on item (10) to secure item (1).</p>	<p>Use spanner wrench to torque item (14) to 100-150 lb-ft..</p>
<p>CAUTION</p> <p>Care must be taken to ensure that finish of piston housing (12) is not damaged. Damage to finish could cause air leaks.</p>		
<p>22. Lockwasher (13).</p>	<p>Bend up one of its tabs into one of the spanner grooves of item (14).</p>	
<p>NOTE</p> <p>Allow Loctite RC601 ® to dry for approximately twenty-four hours before you continue with the steps below.</p>		

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

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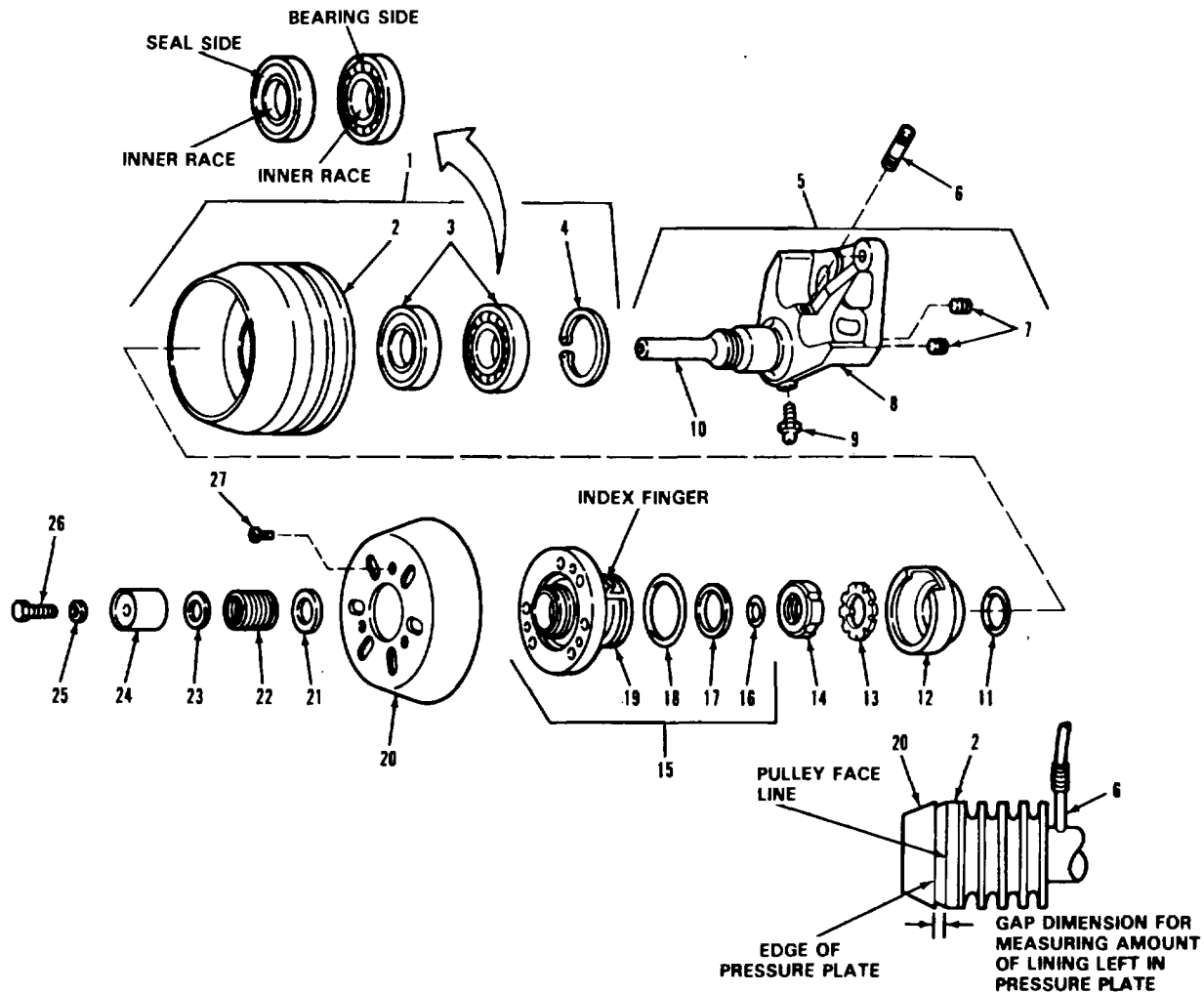
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
23. Shaft (10), housing (12), O-rings (16) and (18), and ring (17).	Apply thin coating of BW655M.	Items (16), (17), and (18) should be new.
24. O-rings (16) and (18), and ring (17).	Install on item (15).	
<p>NOTE</p> <p>Examine back surface of pulley and bearing retainer assembly (15) to locate index finger. The index finger is an extended piece of metal. During assembly, the index finger slides into a slot or opening on side of piston housing (12).</p>		
25. Pulley and bearing retainer assembly (15).	<p>a. Position over item (10).</p> <p>b. Aline index finger of item (15) with slot in the side of item (12).</p> <p>c. Press onto item (10) until you feel index finger slide into slot.</p>	Item (15) should be pressed onto item (10) as far as it will go.
26. Plate (20).	Place on item (2).	
27. Washers (21), (23), and (25), spring (22), retainer (24), and new capscrew (26).	<p>a. Fasten to item (10).</p> <p>b. Torque item (26) to 300 lb-in.</p>	Item (26) should be new. Use a press to compress item (22) before installing item (26).
28. Nipple (6).	Connect and apply air pressure at 80-120 psi.	

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

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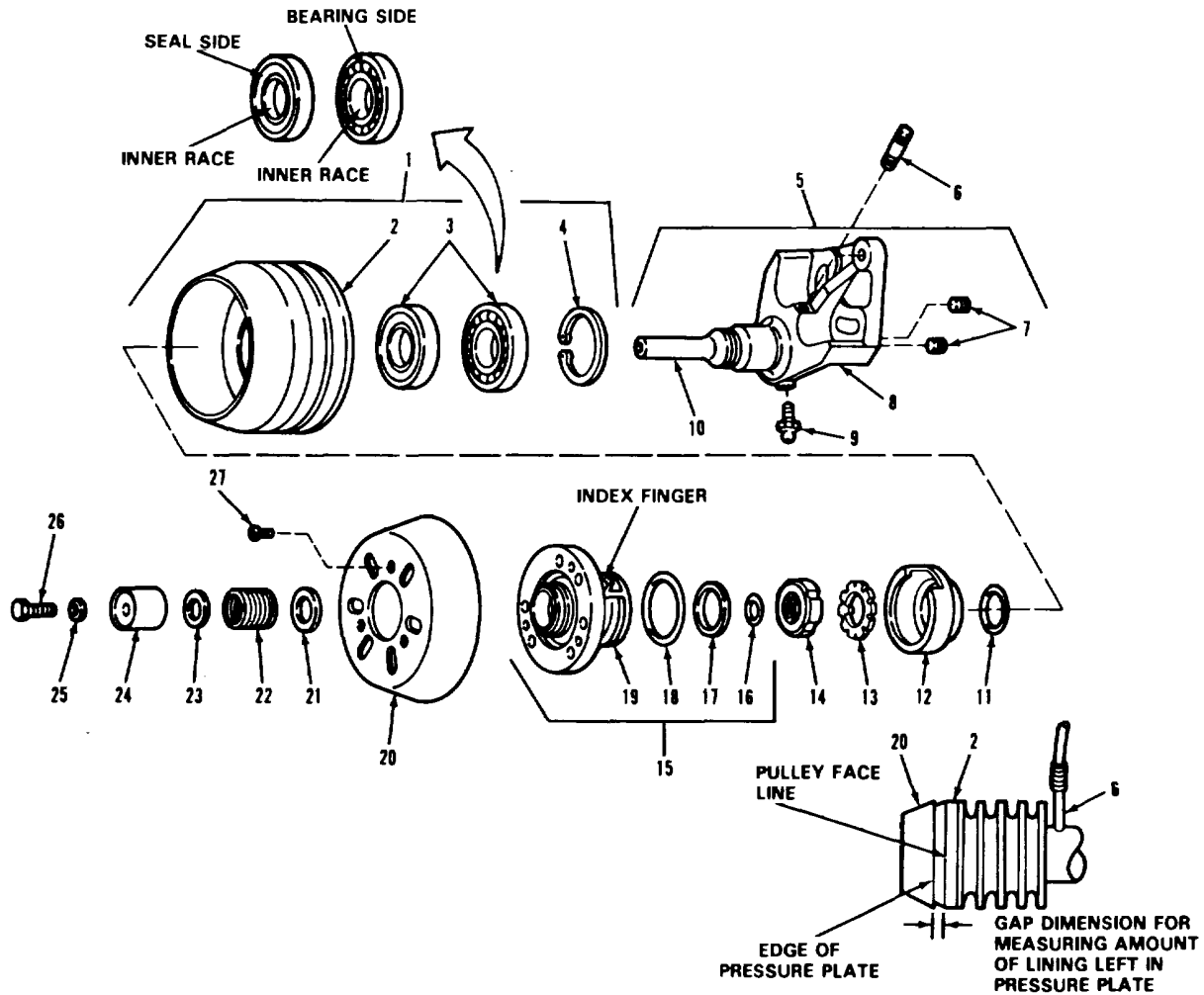
COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
NOTE		
Application of air pressure should push pulley and bearing assembly (15) against pressure plate (20). This enables you to aline and install three truss head screws (27).		
29. Plate (20) and three screws (27).	a. Fasten to item (15). b. Torque three items (27) to 40 lb-in. c. Disconnect air pressure.	Three items (27) should be new.
F. TESTING.		
30. Plate (20) and pulley (2).	Measure gap dimension between pulley face line and edge of pressure plate as follows.	
	a. With no air pressure applied to item (6).	Gap should be 0.375 0.415 inches.
	b. With 120 psi air pressure applied.	Gap should be a minimum of 0.576 inches.
31. Plate (20).	With item (1) held firmly, rotate item (20).	
	a. With no air pressure applied it should be very difficult to turn.	Torque to rotate should not exceed 10 lb-in.
	b. With 70-120 psi air pressure applied to item (6), it should rotate easily.	Must rotate freely, separate from pulley.
NOTE		
Follow-on maintenance action required: Install fan clutch TM 9-2320-283-20.		

COOLING SYSTEM.

3-18. FAN CLUTCH REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. PULLEY ASSEMBLY | 15. PULLEY AND BEARING RETAINER ASSEMBLY |
| 2. PULLEY | 16. O-RING |
| 3. PULLEY BEARING (2) | 17. BACKUP RING |
| 4. RETAINING RING | 18. O-RING |
| 5. SHAFT AND BRACKET ASSEMBLY | 19. RETAINER |
| 6. NIPPLE | 20. PRESSURE PLATE WITH LINING |
| 7. PIPE PLUG (2) | 21. SPECIAL WASHER |
| 8. BRACKET | 22. SPRING |
| 9. LUBRICATION FITTING | 23. SPECIAL WASHER |
| 10. SHAFT | 24. SPRING RETAINER |
| 11. O-RING | 25. WASHER |
| 12. PISTON HOUSING | 26. CAPSCREW |
| 13. LOCKWASHER | 27. TRUSS HEAD SCREW (3) |
| 14. LOCKNUT | 28. FAN CLUTCH ASSEMBLY |

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Section V. ELECTRICAL SYSTEM.

3-19. GENERAL.

This section provides procedures authorized at direct and general support maintenance levels to repair electrical system components. To find a specific procedure contained in this section, see the task summary below:

3-20. TASK SUMMARY.

INITIAL SETUP

APPLICABLE CONFIGURATIONS
All.

EQUIPMENT CONDITION
PARAGRAPH
(Refer to specific paragraph for this information).

CONDITION DESCRIPTION

TEST EQUIPMENT

Armature test set
6625-825-5810.
Dial indicator
5210-277-8440.

SPECIAL TOOLS

V-block set
3460-725-5810.

MATERIALS/PARTS (P/N)

Grease, automotive and artillery
Item 7, Appendix B.
Varnish
Item 40, Appendix B.
Oil, OE/HDO-30.
Item 17, Appendix B.
Loctite No. 22140
Item 13, Appendix B.
Regulator gasket
2520-01-033-4319.
Gasket
5330-01-078-2825.

O-ring
5330-01-088-6867.
Gasket
5330-01-088-6867.
Boot
2530-01-088-4432.
O-ring
5330-640-6913.
Starter kit
5310-01-079-8096.

PERSONNEL REQUIRED

One (MOS-63G).
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-20.
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

None.

TROUBLESHOOTING REFERENCES

None.

ELECTRICAL SYSTEM.

3-20. TASK SUMMARY (Continued).

LIST OF TASKS

TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO (PARA)
1	Alternator and Rectifier Repair a. Disassembly. b. Inspection. c. Testing. d. Repair. e. Assembly. f. Bench Testing.	3-21 3-21a 3-21b 3-21c 3-21d 3-21e 3-21f	
2	Starter Motor and Solenoid Repair a. Disassembly. b. Cleaning. c. Electrical Checks. d. Inspection. e. Assembly. f. Calibration.	3-22 3-22a 3-22b 3-22c 3-22d 3-22e 3-22f	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR.

THIS TASK COVERS

- | | |
|-----------------|-------------------|
| a. Disassembly. | d. Repair. |
| b. Inspection. | e. Assembly. |
| c. Testing. | f. Bench testing. |

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

TM 9-2320-283-20.

CONDITION DESCRIPTION

Alternator removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

None.

MATERIALS/PARTS (P/N)

Gasket, regulator
2520-01-033-04319.

Gasket
5330-01-078-2825.

Grease, automotive and
artillery, GAA
Item 7, Appendix B.

PERSONNEL REQUIRED

One (MOS-63G).
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

IM 9-2320-263-20.
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

None.

TROUBLESHOOTING REFERENCES

None.

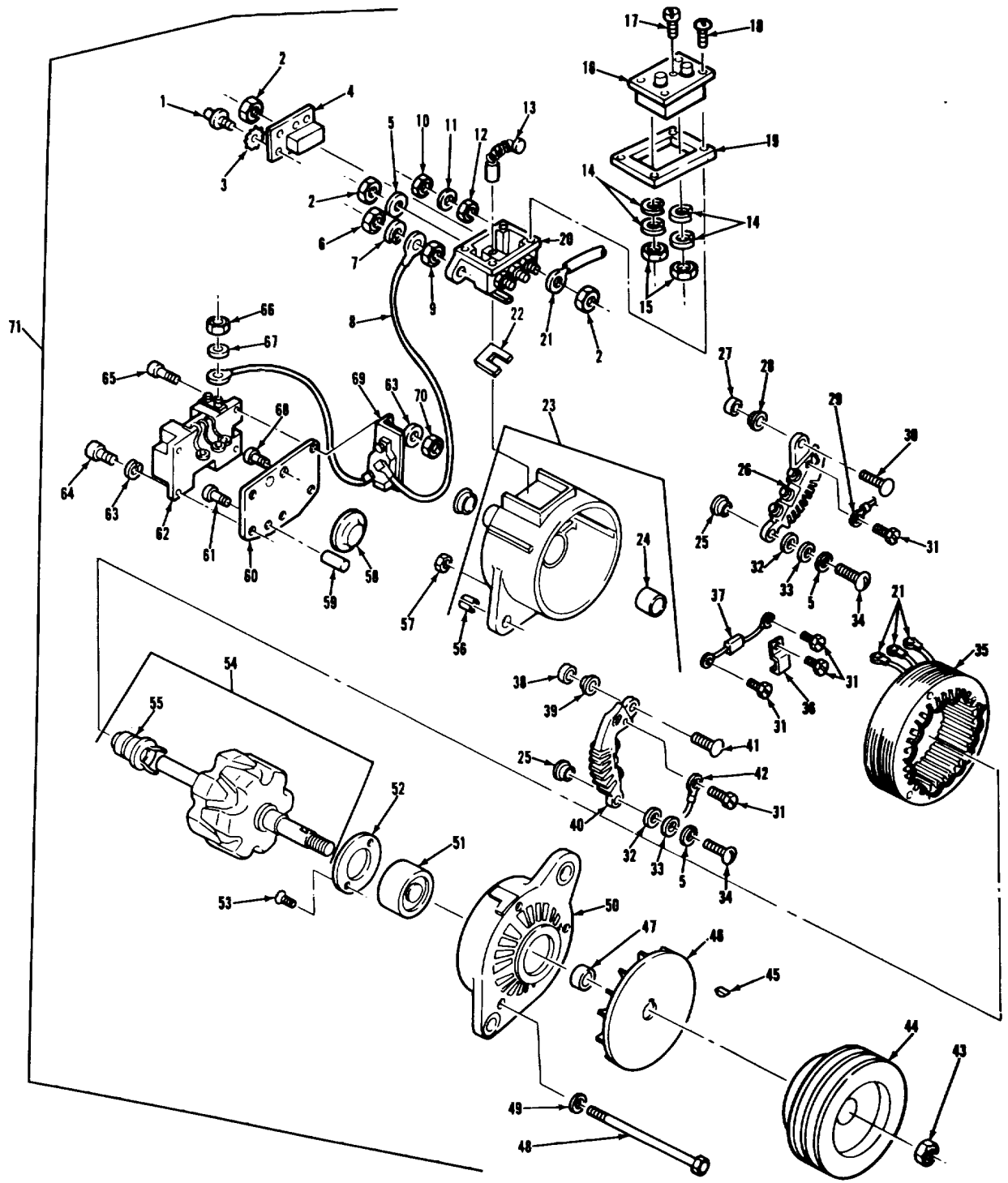
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<p>NOTE</p>		
<p>The complete alternator art and legend are shown on the next two pages. Detail views of the alternator are used within the procedure. Use the complete art to help clarify the detail views when needed.</p>		

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



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ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LEGEND:

- | | |
|-----------------------------------|-----------------------------------|
| 1. TERMINAL SCREW | 37. CAPACITOR ASSEMBLY |
| 2. HEX HEAD NUT (7) | 38. INSULATION BUSHING |
| 3. LOCKWASHER | 39. INSULATION BUSHING |
| 4. DIODE TRIO | 40. RECTIFIER ASSEMBLY (POSITIVE) |
| 5. LOCKWASHER (3) | 41. TERMINAL SCREW (POSITIVE) |
| 6. HEX HEAD NUT | 42. LEAD ASSEMBLY (POSITIVE) |
| 7. LOCKWASHER | 43. HEX FLANGE HEAD NUT |
| 8. WIRE LEAD | 44. ALTERNATOR PULLEY |
| 9. HEX HEAD NUT | 45. KEY |
| 10. HEX HEAD NUT | 46. FAN ASSEMBLY |
| 11. PLAIN WASHER | 47. FAN SPACER |
| 12. HEX HEAD NUT | 48. HEX HEAD SCREW (3) |
| 13. BRUSH (2) | 49. BELLEVILLE WASHER (3) |
| 14. LOCKWASHER (7) | 50. DRIVE END HOUSING |
| 15. HEX HEAD NUT (2) | 51. BALL BEARING |
| 16. REGULATOR ASSEMBLY | 52. BEARING RETAINER |
| 17. PLUG | 53. FLATE HEAD SCREW (4) |
| 18. PLAIN HEAD SCREW (4) | 54. ROTOR AND SLIPRING ASSEMBLY |
| 19. REGULATOR GASKET | 55. SLIPRING |
| 20. BRUSH AND REGULATOR HOLDER | 56. SLIDABLE BUSHING |
| 21. TERMINAL WIRE (3) | 57. ELASTIC STOP NUT (3) |
| 22. GASKET | 58. DUST CAP |
| 23. SLIPRING HOUSING ASSEMBLY | 59. SPACER (2) |
| 24. SLIPRING BEARING | 60. TRANSFORMER PLATE |
| 25. INSULATION BUSHING (2) | 61. SOCKET HEAD SCREW (2) |
| 26. RECTIFIER ASSEMBLY (NEGATIVE) | 62. TRANSFORMER ASSEMBLY |
| 27. INSULATION BUSHING | 63. LOCKWASHER (4) |
| 28. INSULATION BUSHING | 64. SOCKET HEAD SCREW (2) |
| 29. ASSEMBLY LEAD (NEGATIVE) | 65. SOCKET HEAD SCREW (2) |
| 30. TERMINAL SCREW (NEGATIVE) | 66. HEX HEAD NUT (2) |
| 31. HEX HEAD TAPPING SCREW (5) | 67. LOCKWASHER (2) |
| 32. INSULATION WASHER (2) | 68. SOCKET HEAD SCREW |
| 33. GUARD WASHER (2) | 69. CIRCUIT BREAKER ASSEMBLY |
| 34. ROUND HEAD SCREW (2) | 70. HEX HEAD NUT (2) |
| 35. STATOR ASSEMBLY | 71. ALTERNATOR ASSEMBLY |
| 36. CLAMP | |

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY.</u>		
1. Slipring housing assembly (23).	Remove items (6), (7), and (8).	
2. Trio (4).	Remove three items (2) and three wires attached to item (62).	Note wire locations for assembly.
3. Circuit breaker assembly (69).	Remove two items (70) and two items (63).	
4. Plate (60).	a. Remove two items (65) and item (69).	
	b. Remove two items (64) and two items (63).	
	c. Remove item (62) and item (69) as an assembly.	Set aside.
	d. Remove two items (68).	Note location for assembly.
	e. Remove two items (61) and two items (59). Set item (60) aside.	
5. Slipring housing assembly (23).	Remove item (4).	

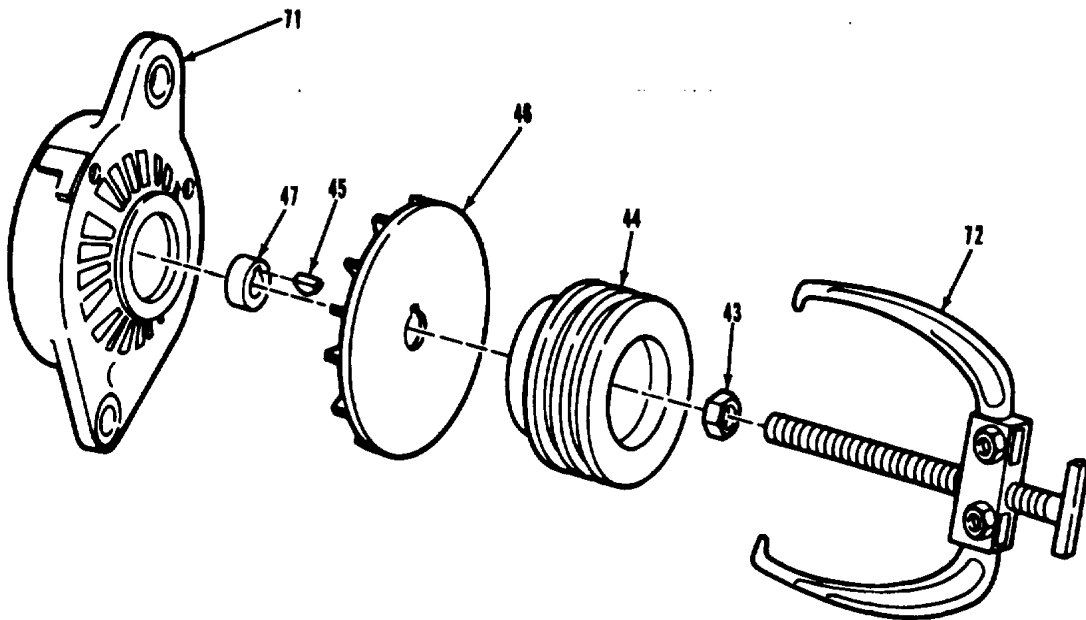
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY (Continued).</u>		
6. Rotor and slipring assembly (54).	a. Remove item (43) while holding item (44). b. Remove items (44) and (46). c. Remove items (45) and (47).	Use item (72), if needed.

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 43. HEX FLANGE HEAD NUT
- 44. ALTERNATOR PULLEY

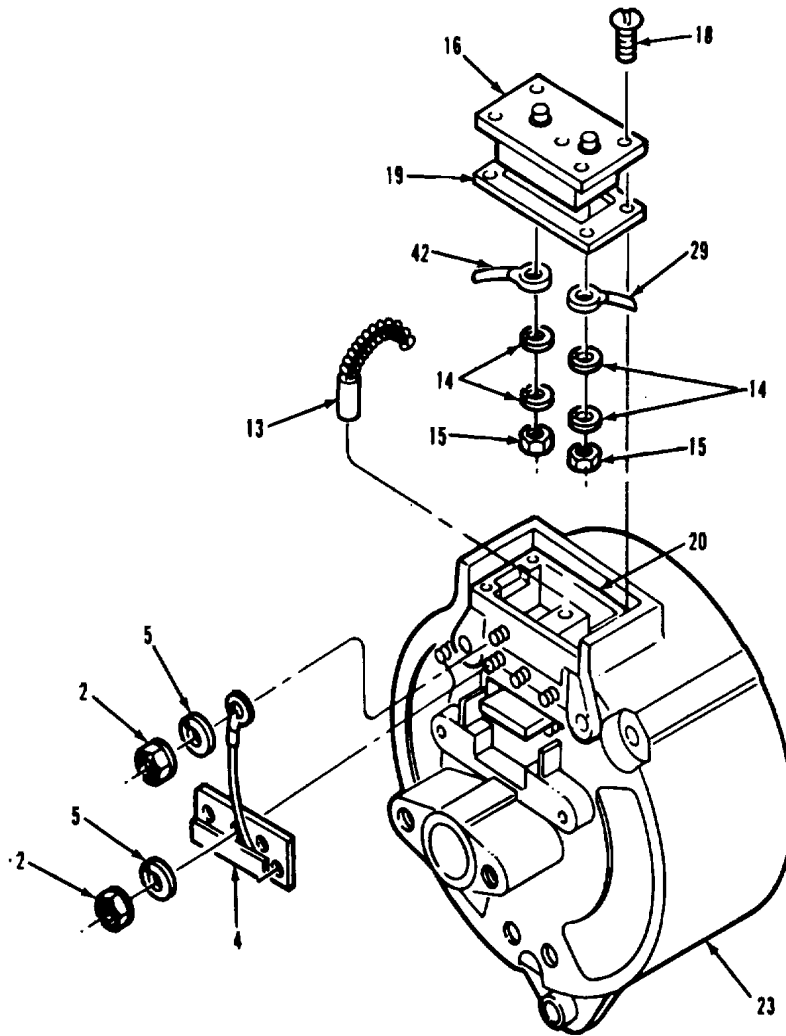
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY (Continued).</u>		
7. Slipring housing assembly (23).	a. Remove four items (18).	
	b. Carefully lift item (16) free of item (20).	Use a screwdriver to pry up along sides.
	c. While holding item (16), remove items (15), (14), and (42).	Note wire location for assembly.
	d. Remove items (15), (14), and (29).	Note wire location for assembly.
	e. Remove item (19).	
	f. Carefully remove two items (13) from item (20).	
	g. Remove items (2) and (15), remove item (4).	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 2. HEX HEAD NUT (7)
- 4. DIODE TRIO
- 5. LOCKWASHER (2)

- 18. PLAIN HEAD SCREW (4)
- 19. REGULATOR GASKET
- 20. BRUSH AND REGULATOR HOLDER

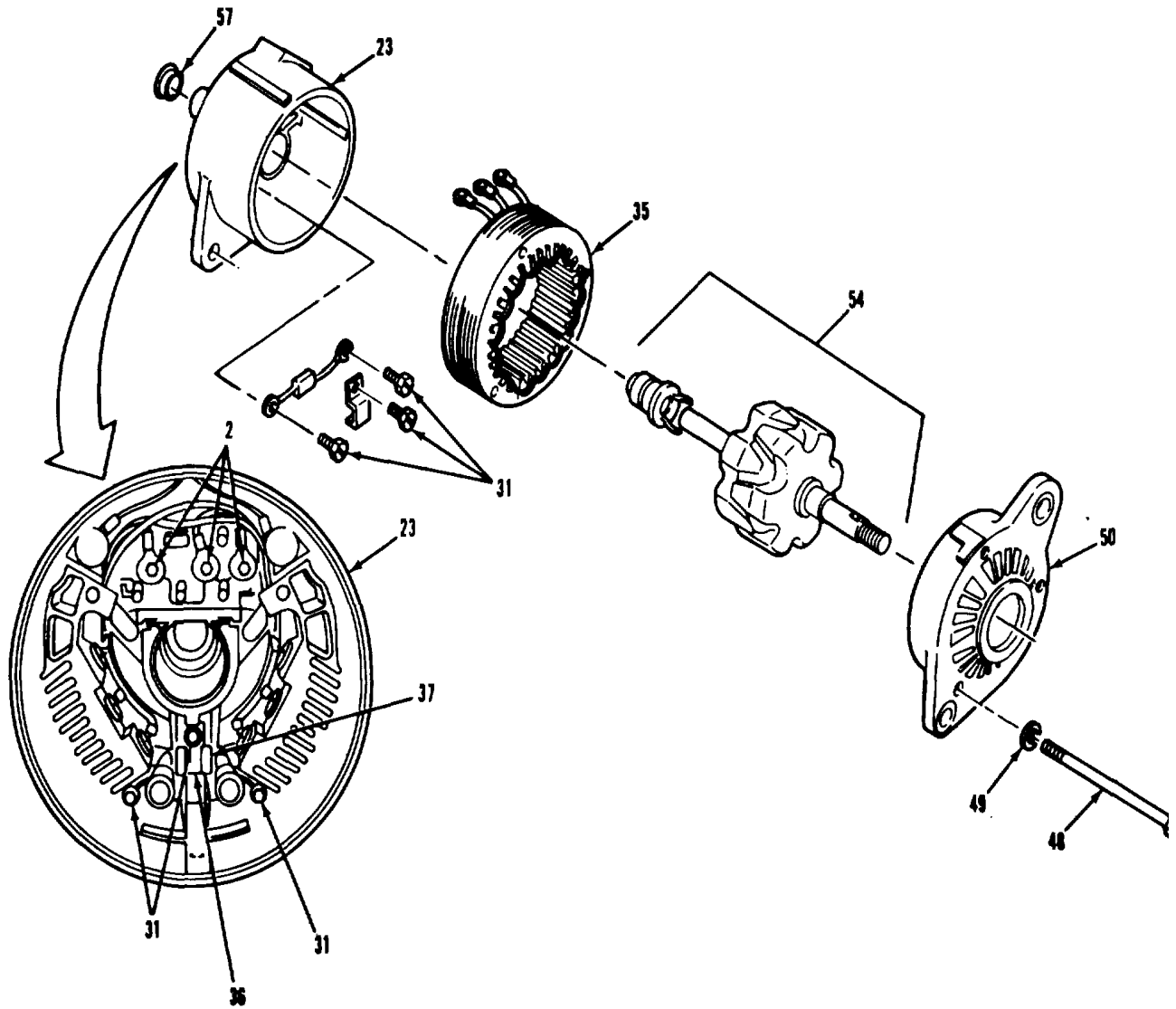
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY (Continued).</u>		
8. Housing (50) and slipring housing assembly (23).	a. Remove three items (57) and three items (48), retain three items (49) with items (48).	Scribe an alinement mark on items (50) and (23) before separating.
<p>CAUTION Be sure that the drive end housing separates from the stator assembly and that the stator assembly remains in the slipring housing assembly to avoid damage to the stator leads.</p>		
	b. Remove item (50) and item (54) as one assembly.	If item (50) binds on item (35), loosen by tapping gently on mounting ears with rubber mallet.
	c. Remove three items (2) from the inside of item (23).	
	d. Remove item (35) and set aside.	Note wire locations for assembly.
	e. Remove three items (31) and items (36) and (37). Set aside.	Note wire locations for assembly.

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

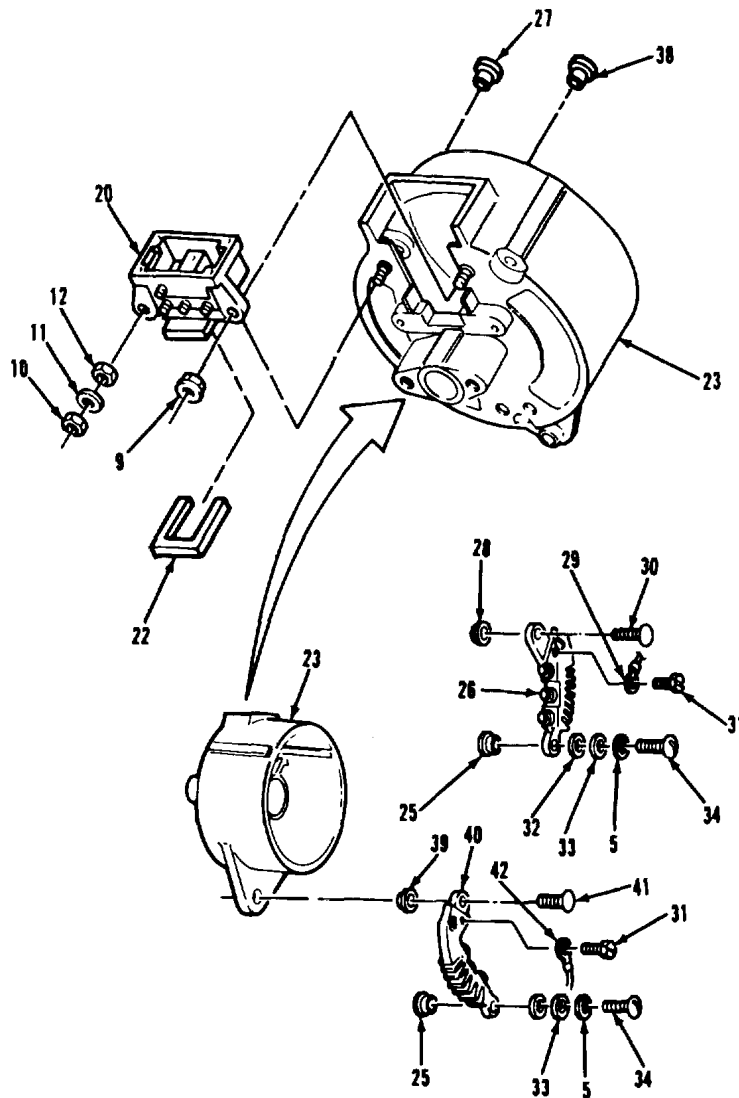
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>DISASSEMBLY (Continued).</u>		
9. Slipring housing assembly (23).	a. Remove items (9), (10), (11), and (12).	Note locations of nuts.
<p>NOTE During disassembly note position of gasket for purpose of easier assembly.</p>		
	b. Remove items (20), (22), (38), and (27).	Note locations of items (38) and (27).
	c. Remove items (31) and (42).	Note wire location for assembly.
10. Rectifier assembly	a. Remove item (41). (positive) (40).	
	b. Remove items (34), (5), (33), and (32).	
11. Slipring housing assembly (23).	Remove items (40), (25), and (39).	
12. Rectifier assembly	a. Remove item (30). (negative) (26).	
	b. Remove items (31) and (29).	Note wire location for assembly.
	c. Remove items (34), (5), (33), and (32).	
13. Slipring housing assembly (23).	a. Remove items (26), (25), and (28).	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



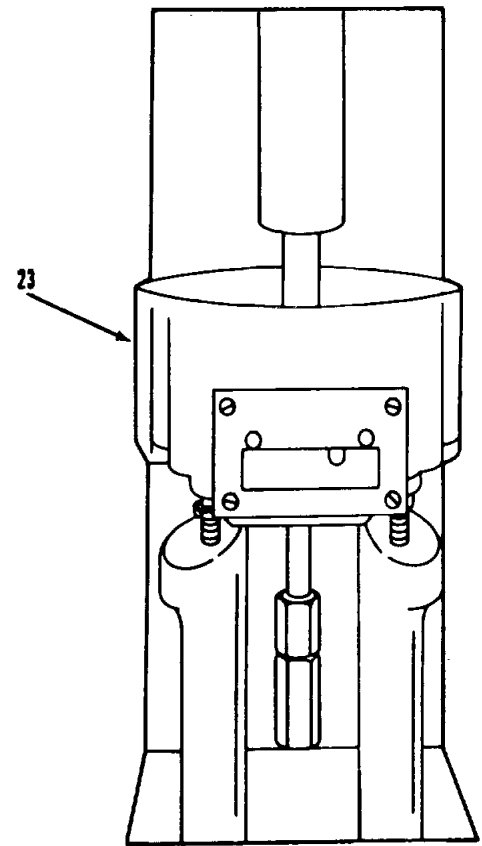
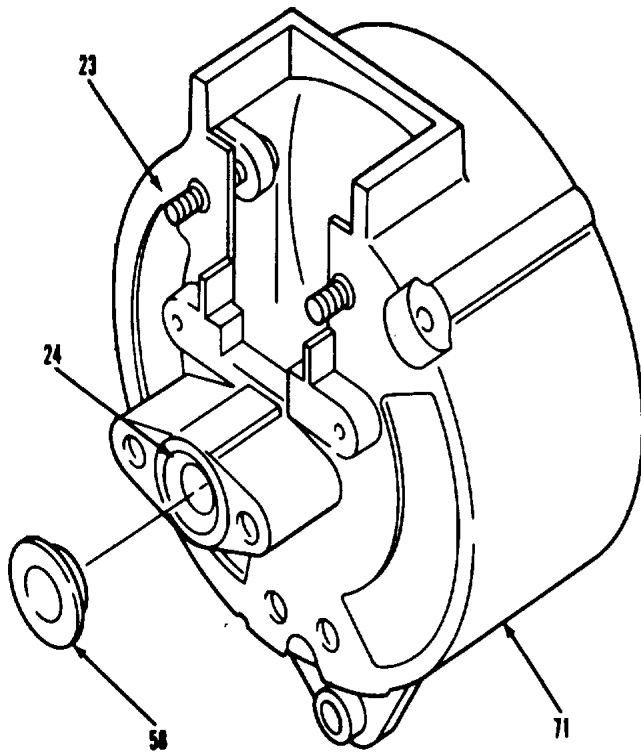
LEGEND:

- 5. LOCKWASHER (3)
- 9. HEX HEAD NUT
- 10. HEX HEAD NUT
- 11. PLAIN WASHER
- 12. HEX HEAD NUT
- 20. BRUSH AND REGULATOR HOLDER
- 22. GASKET
- 23. SLIPRING HOUSING ASSEMBLY
- 25. INSULATION BUSHING (2)

- 29. ASSEMBLY LEAD (NEGATIVE)
- 30. TERMINAL SCREW (NEGATIVE)
- 31. HEX HEAD TAPPING SCREW (2)
- 32. INSULATION WASHER (2)
- 33. GUARD WASHER (2)
- 34. ROUND HEAD SCREW (2)
- 38. INSULATION BUSHING
- 39. INSULATION BUSHING
- 40. RECTIFIER ASSEMBLY (POSITIVE)

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



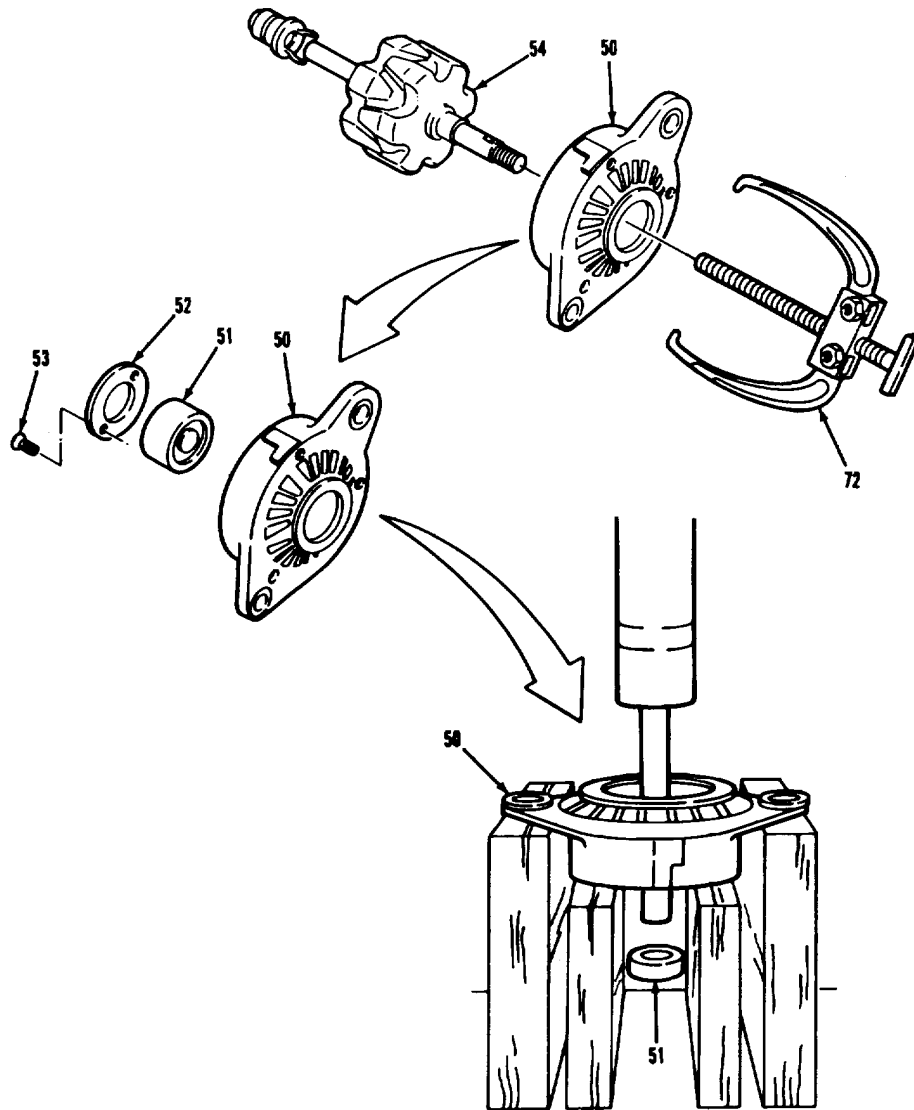
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
14. Rotor and slipring assembly (54).	Using item (72), remove item (50).	Be careful not to damage item (50).
15. Housing (50). and item (52).	a. Remove four items (53)	
	b. Face mounting ears up on press.	Support the bottom of item (50).
	c. Carefully press out item (51).	Be careful not to damage item (50).

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 50. DRIVE END HOUSING
- 51. BALL BEARING
- 52. BEARING RETAINER
- 53. PLATE HEAD SCREW (4)
- 54. ROTOR AND SLIPRING ASSEMBLY
- 72. SUITABLE PULLER

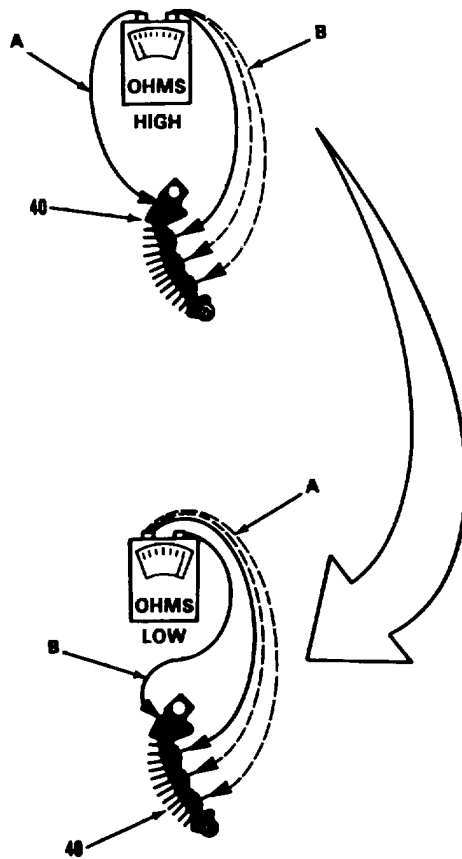
TA 238105

ELECTRICAL SYSTEM.**3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
B. <u>INSPECTION.</u>		
16. Alternator assembly (71).	Inspect all parts for wear, cracks, breakage, or burnt, charred, or overheated components.	Replace any damaged parts.
C. <u>TESTING.</u>		
17. Positive rectifier assembly (40) on item (40).	<p>a. Connect positive lead (A) of ohmmeter to heat sink</p> <p>b. Touch negative lead (B) of ohmmeter to each of the three terminals on item (40), one at a time.</p> <p>c. A high resistance should be indicated at all three terminals, if not, item (40) is shorted and must be replaced.</p> <p>d. Reverse ohmmeter test leads so negative lead (B) is connected to heat sink on item (40).</p> <p>e. Touch positive lead (A) to all three terminals of item (40), one at a time.</p> <p>f. A low resistance should be indicated at all three terminals; if not, item (40) is open and must be replaced.</p>	<p>Set ohmmeter at R X 10,000.</p> <p>Set ohmmeter at R X 10,000.</p>

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 40. POSITIVE RECTIFIER ASSEMBLY
- A. POSITIVE OHMMETER TEST LEAD
- B. NEGATIVE OHMMETER TEST LEAD

TA 238106

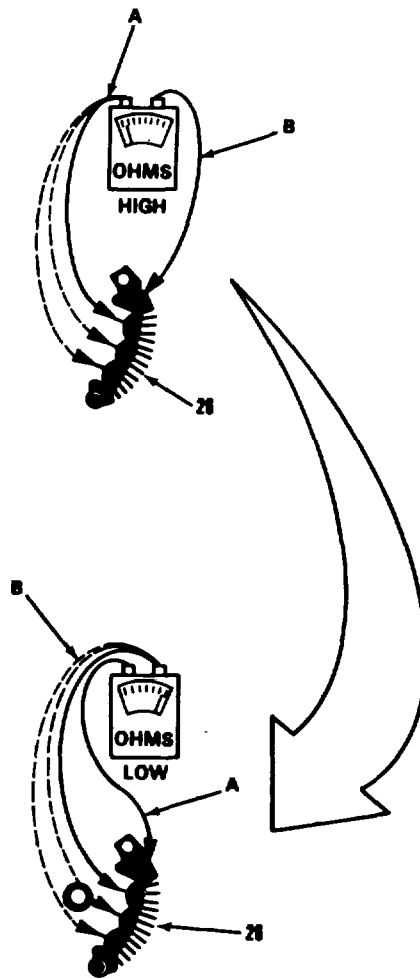
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. TESTING (Continued)		
18. Negative rectifier assembly (26) on item (26).	a. Connect negative lead (B) of ohmmeter to heat sink	Set ohmmeter at R X 10,000.
	b. Touch positive lead (A) of ohmmeter to each of three terminals on item (26), one at a time.	
	c. A high resistance should be indicated at all three terminals. If not, item (26) is shorted and must be replaced.	
	d. Reverse ohmmeter test leads so positive lead (A) is connected to heat sink on item (26).	Set ohmmeter at R X 10,000.
	e. Touch negative lead (B) to all three terminals on item (26) one at a time.	
	f. A low resistance should be indicated at all three terminals (26) is open and must be replaced.	If not, item

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 26. NEGATIVE RECTIFIER ASSEMBLY
- A. POSITIVE OHMMETER TEST LEAD
- B. NEGATIVE OHMMETER TEST LEAD

TA 238107

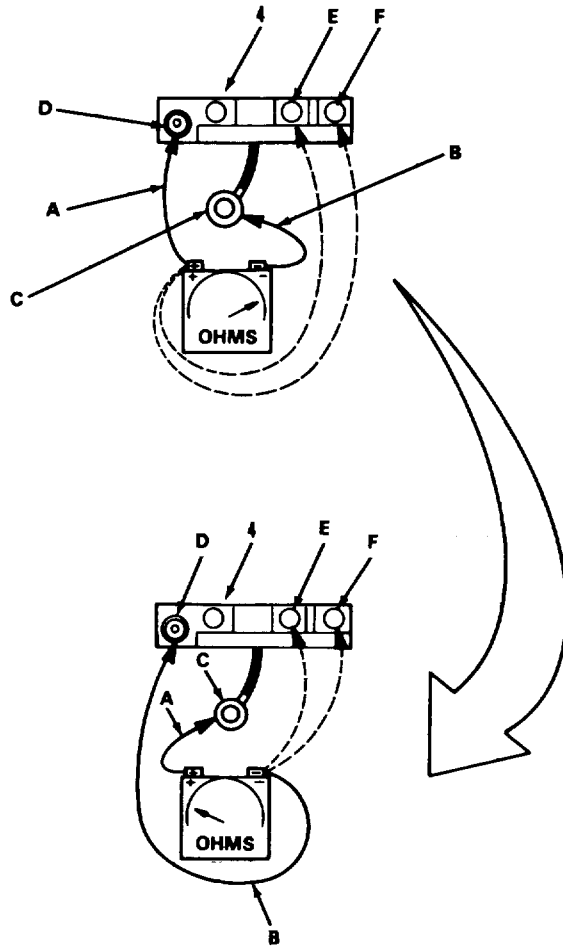
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. <u>TESTING (Continued).</u>		
19.1 Trio (4) (B) of ohmmeter to output lead (C) on item (4).	<ul style="list-style-type: none"> a. Connect negative test lead b. Touch positive lead (A) to all three terminals (D), (E), and (F) on item (4), one at a time, a low resistance should be indicated, if not, replace item (4). c. Reverse ohmmeter test leads so positive lead (A) is connected to output lead (C) on item (4). d. Touch negative test lead (B) to all three terminals (D), (E), and (F) on item (4), one at a time, a high resistance should be indicated, if not, replace item (4). 	
	3-124	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 4. DIODE TRIO
- A. POSITIVE OHMMETER TEST LEAD
- B. NEGATIVE OHMMETER TEST LEAD
- C. DIODE OUTPUT LEAD
- D. TERMINAL PAD
- E. TERMINAL PAD
- F. TERMINAL PAD

TA 238108

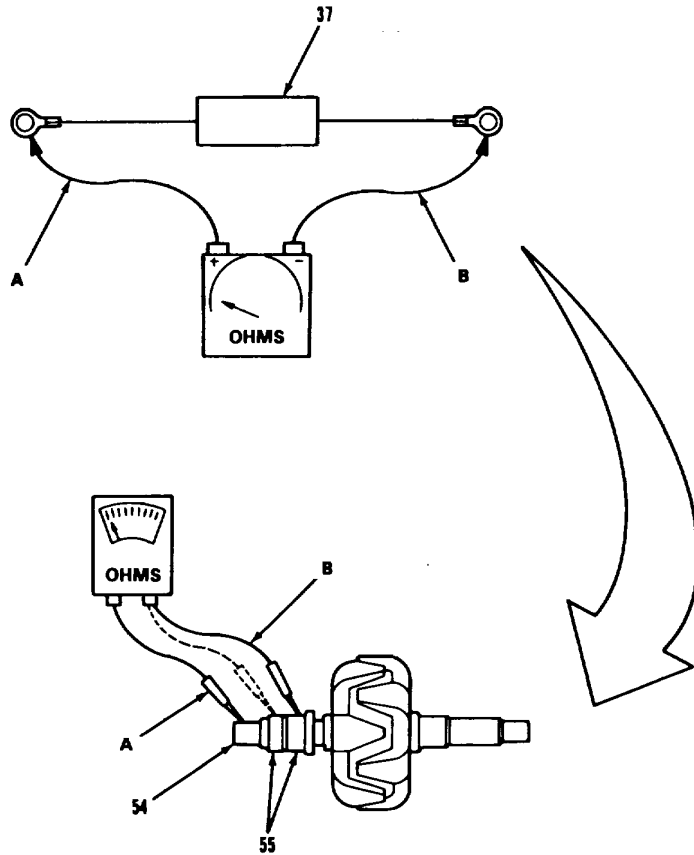
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. TESTING (Continued).		
20. Capacitor assembly (37). terminals on item (37), if a low resistance is indicated, item (37) is shorted and must be replaced.	Connect test leads (A) and (B) of ohmmeter across	
21. Regulator assembly (16).	<p>NOTE</p> <p>Regulator circuitry contains devices connected in such a manner that parallel circuits exist, making it impossible to electrically test each individual component, as several will be in the circuit at the same time. For this reason, point-to-point resistance checks with an ohmmeter may be inconclusive or misleading. The regulator can be most accurately tested by installing it in an alternator known to be serviceable.</p>	
22. Rotor and slip-ring assembly (54).	a. Connect one ohmmeter test lead to item (54) shaft and other test lead to two items (55). An infinity reading should be obtained.	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 37. CAPACITOR ASSEMBLY
- 54. ROTOR AND SLIPRING ASSEMBLY
- 55. SLIPRING (2)
- A. POSITIVE OHMMETER LEAD
- B. NEGATIVE OHMMETER LEAD

TA 238109

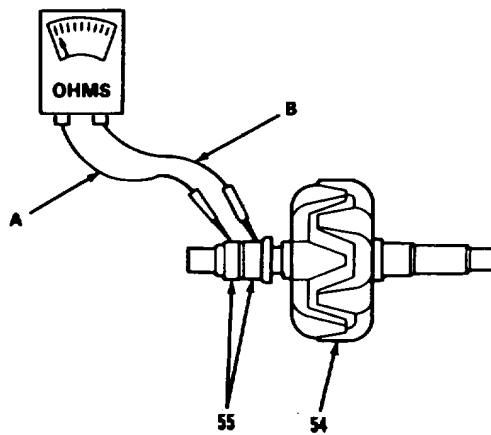
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. TESTING (Continued).		
22. Rotor and slipring assembly (54) (continued).	<p>b. If a resistance is measured then replace item (54).</p> <p>c. Connect one ohmmeter test lead to each item (55).</p> <p>d. Ohmmeter reading should be within 2.3-2.7 ohms. If not, check solder joints for defects. Repair defects. Recheck resistance measurement. If 2.3-2.7 ohms is not obtained, then replace items (54).</p>	Set ohmmeter to lowest setting.

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 54. ROTOR AND SLIPRING ASSEMBLY
- 55. SLIPRING (2)
- A. POSITIVE OHMMETER LEAD
- B. NEGATIVE OHMMETER LEAD

TA 238110

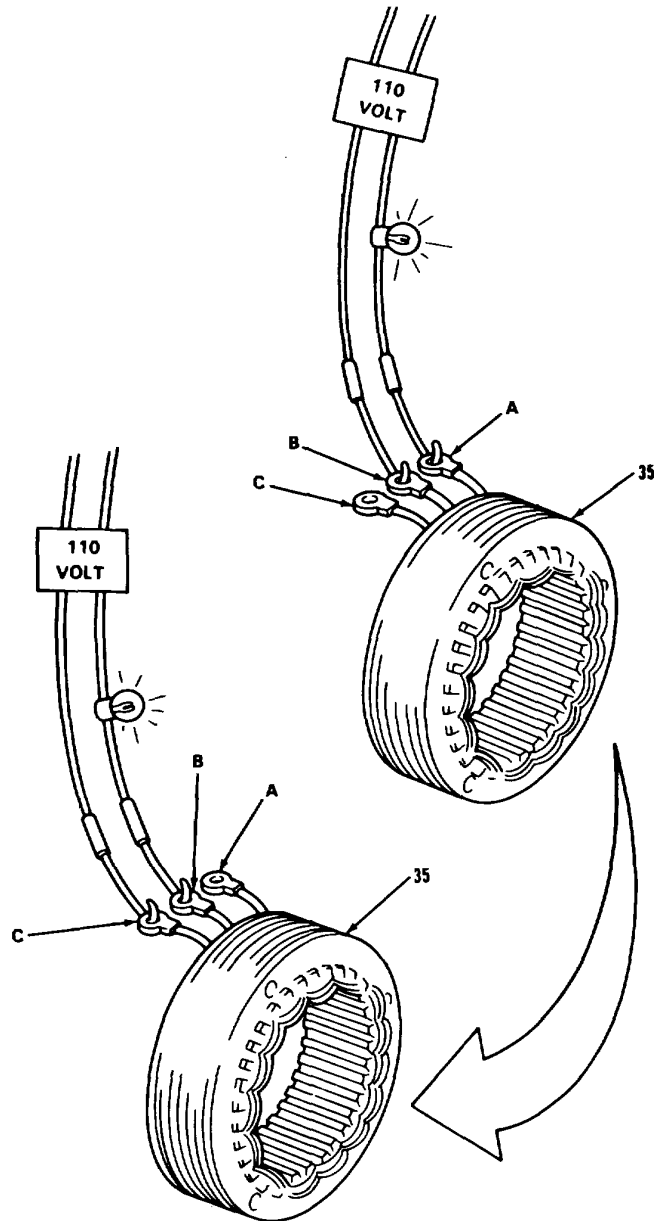
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<p>C. <u>TESTING (Continued).</u></p>		
<p>NOTE</p>		
<p>Remove stator assembly from alternator before performing stator test or parts damage may result.</p>		
<p>23. Stator assembly (35).</p>	<p>WARNING</p>	
<p>In the following test, high voltage is used. Do not touch any uninsulated wires, or serious personal injury could result.</p>		
	<p>a. Using a 115 vac test light, check for continuity by touching test leads to stator leads (A) and (B), test lamp should light; if not, replace item (35).</p>	<p>Replace any item (35) that has been over-heated or has charred insulation, no matter how they test.</p>
	<p>b. Touch test leads to item (35) leads (B) and (C), test lamp should light, if not, replace item (35).</p>	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 35. STATOR ASSEMBLY
- A. STATOR LEAD
- B. STATOR LEAD
- C. STATOR LEAD

TA 238111

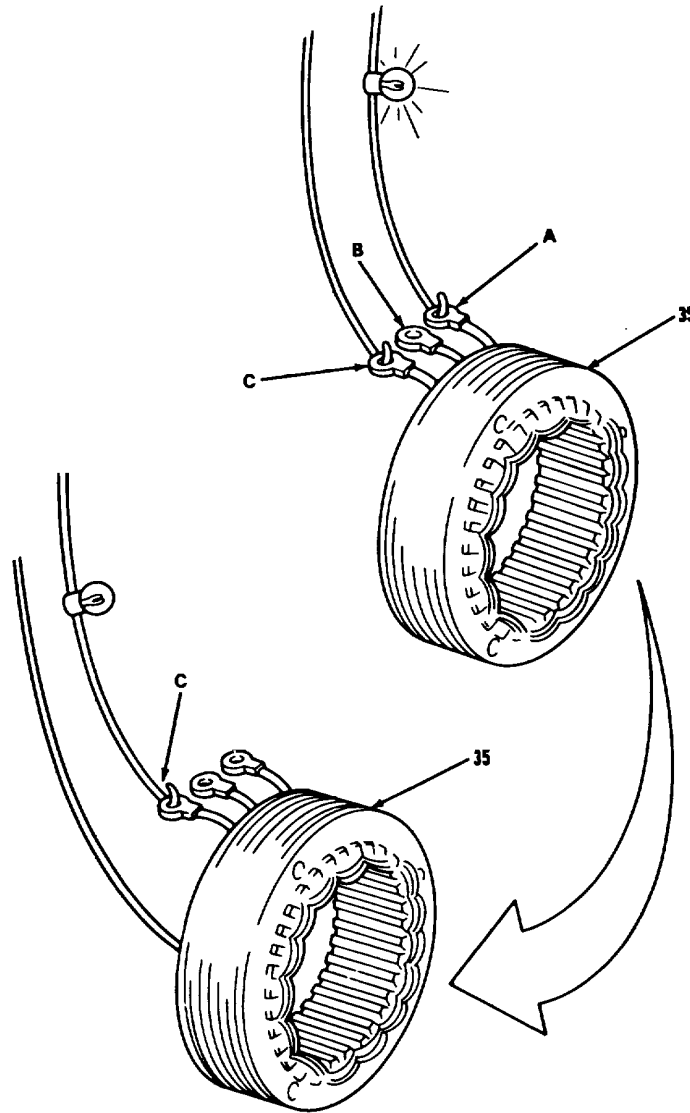
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. TESTING (Continued).		
23. Stator assembly (35) (continued).	<p>c. Touch test leads to item (35) leads (A) and (C). Test lamp should light. If not, replace item (35).</p> <p>d. Check for a grounded item (35), by touching one test lead to item (35) lead (C), and ground other test lead to frame of item (35). Test lamp will not light. If it does, replace item (35).</p>	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 35. STATOR ASSEMBLY
- A. STATOR LEAD
- B. STATOR LEAD
- C. STATOR LEAD

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ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. TESTING (Continued).

24. Transformer assembly (62) windings. Touch one test lead to terminal (A) and other lead to terminal (B). Ohmmeter should read zero. If not, replace item (62).

a. Using ohmmeter, check for continuity in item (62)

b. Touch one ohmmeter test lead to item (62) terminal (A) and other lead to terminal (C). Ohmmeter should read infinity. If not, replace item (62).

c. Touch one ohmmeter test lead to item (62) terminal (B) and other test lead to terminal (C). Ohmmeter should read infinity. If not, replace item (62).

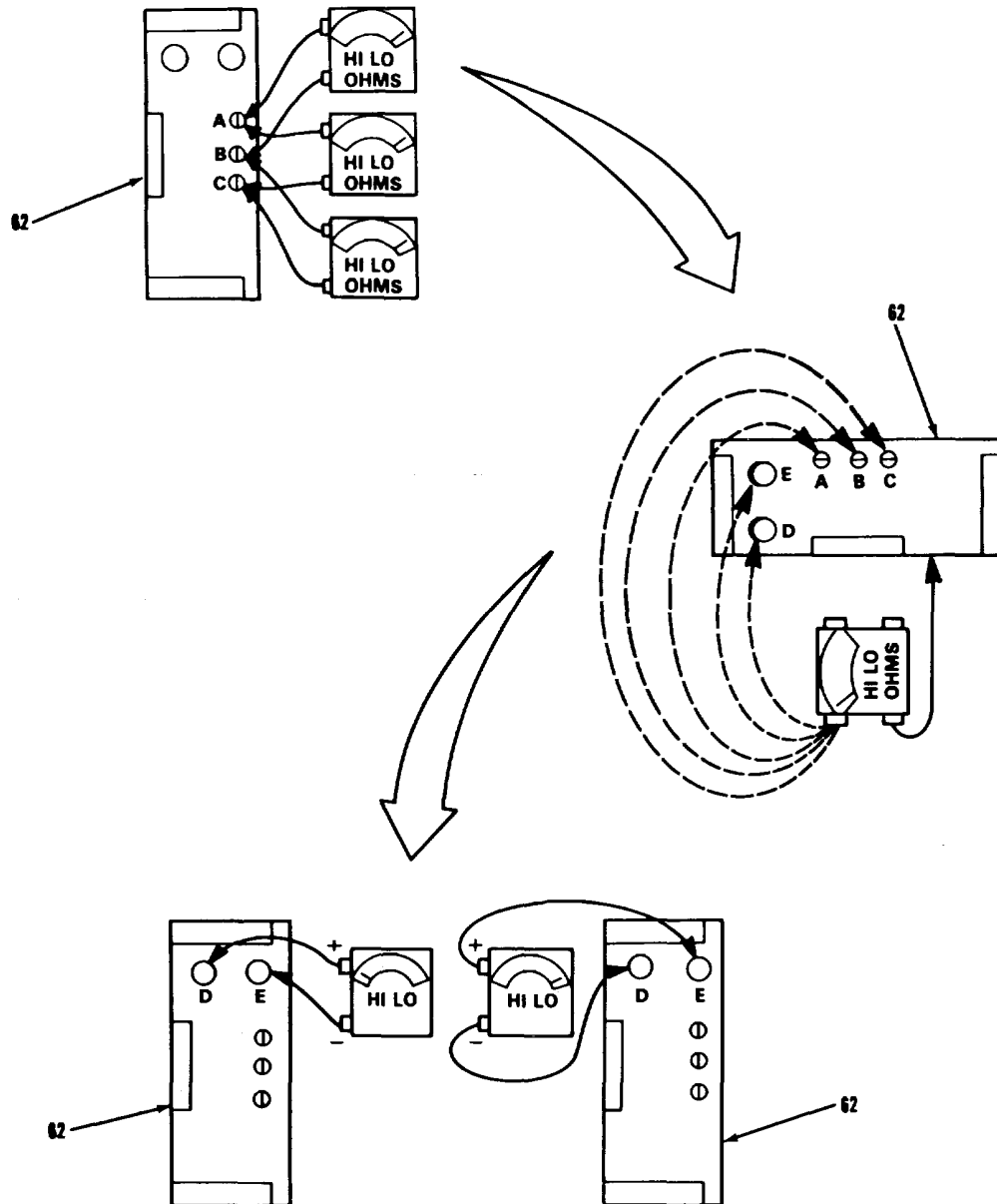
d. Using ohmmeter, check for grounds between all five terminals and item (62) housing. Ohmmeter should read infinity at all five terminals, (A), (B), (C), (D), and (E). If not, replace item (62).

e. Connect ohmmeter positive test lead to positive terminal (D) of item (62) and negative test lead to negative terminal (E). Infinity reading should be indicated. If not, replace item (62).

f. Reverse ohmmeter test leads. A low resistance reading should be indicated. If not, replace item (62).

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 62. TRANSFORMER ASSEMBLY
- A. TERMINAL
- B. TERMINAL
- C. TERMINAL
- D. POSITIVE TERMINAL
- E. NEGATIVE TERMINAL

TA 238113

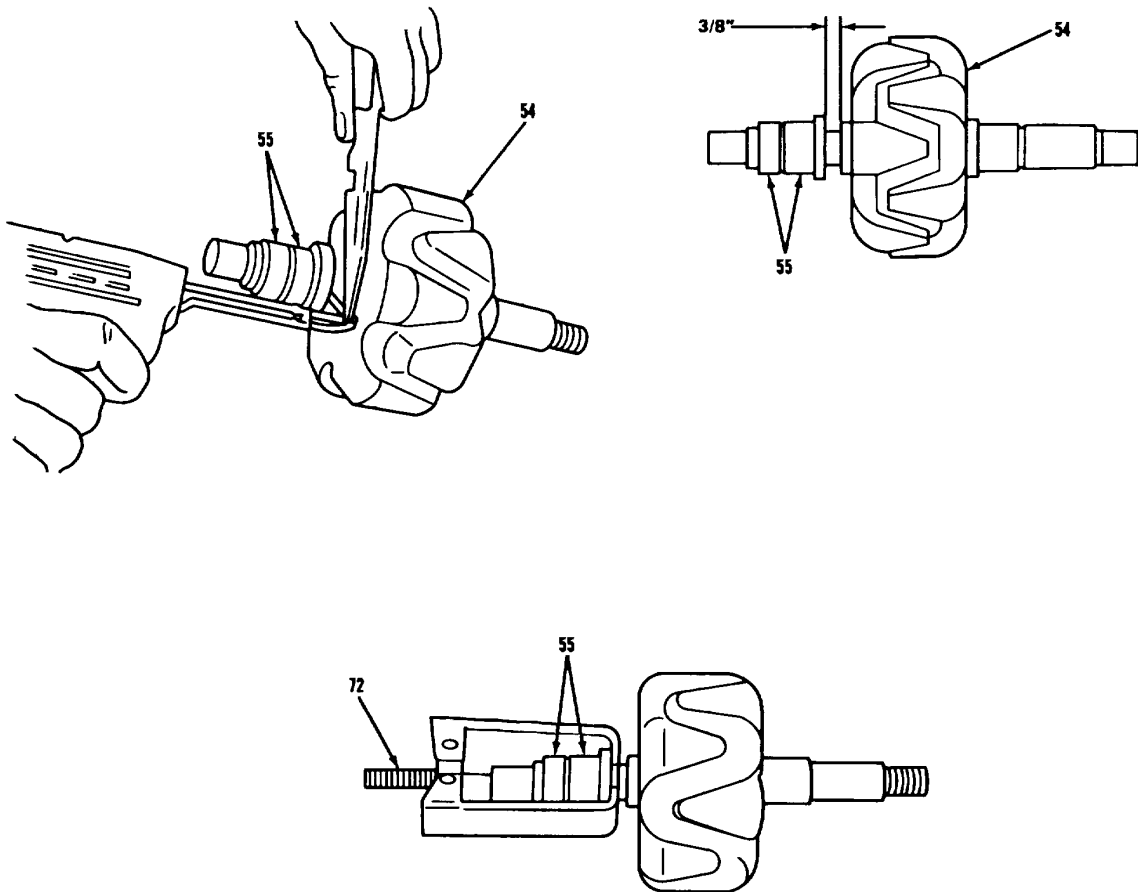
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
D. REPAIR.		
25. Slipring (55).	<ul style="list-style-type: none"> a. Unsolder item (55) leads from item (54) eyelets. b. Remove item (55) from item (54) using item (72). c. Wipe shaft of item (54) clean, and apply small amount of Loctite ® to shaft where item (55) was removed. d. Press new item (55) onto item (54) shaft. Aline item (55) leads with item (54) eyelets. e. Resolder item (55) leads. 	<p>Do not lose eyelets.</p> <p>Press item (55) to 3/8 inch from item (54).</p>

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 54. ROTOR ASSEMBLY
- 55. SLIPRING (2)
- 72. SUITABLE PULLER

TA 238114

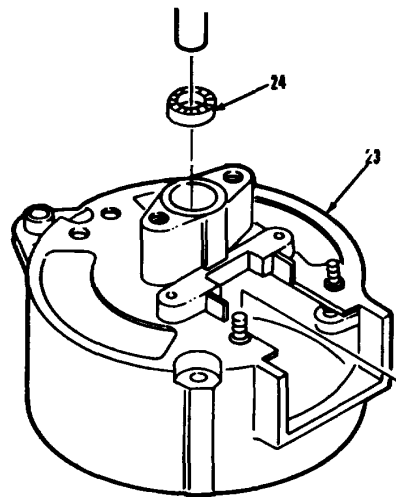
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<p>E. ASSEMBLY.</p>	<p>26. Slipping housing assembly (23).</p>	<p>Bearing is properly installed when the manufacturer's part number is facing upward.</p>
	<p style="text-align: center;">NOTE If slipping bearing was not removed, go to step Ild.</p>	
	<p>a. Place item (23) on press with rear of housing facing up.</p>	
	<p>b. Place item (24) with seal facing downward on housing. Carefully press bearing into housing until bearing is seated on lip inside housing bore.</p>	
	<p>c. After bearing is installed, apply a small amount of grease to rollers.</p>	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 23. SLIPRING HOUSING ASSEMBLY
- 24. SLIPRING BEARING

TA 238115

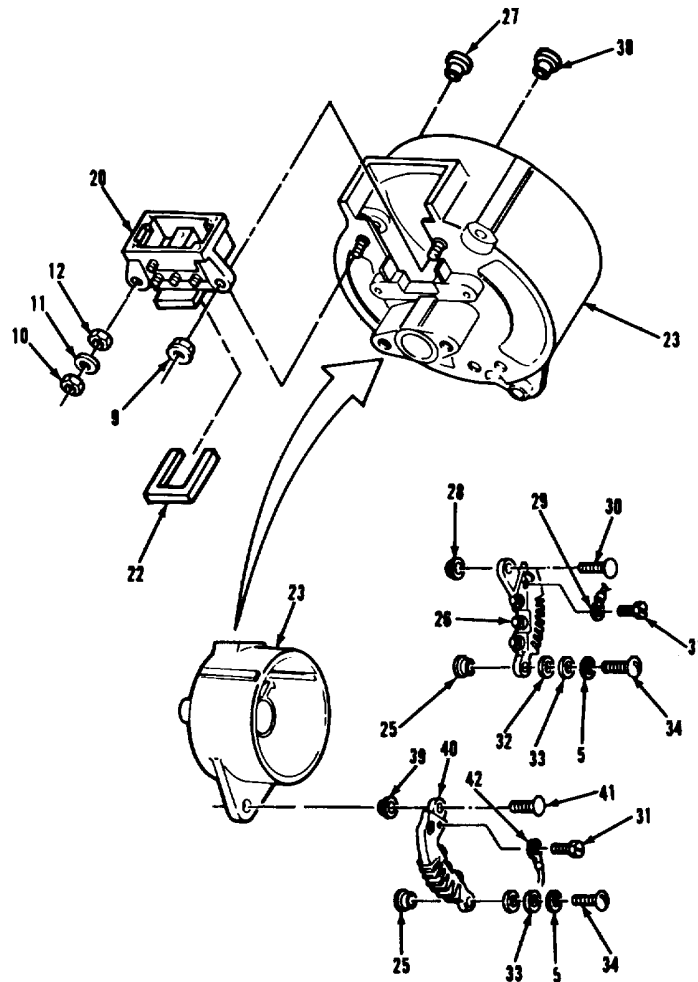
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
26. Slipring housing assembly (23) (continued).	d. Place item (23) on table so that inside is facing up.	
<p>NOTE Replacement rectifier assemblies may be different in thickness or shape but will fit and operate the same as original.</p>		
	e. Install items (27) and (38).	
	f. Install items (39) and (25).	
	g. Place item (40) onto bushings, and align holes.	Be sure item (40) is the positive rectifier.
27. Rectifier assembly (positive) (40). this order, item (32), (33), (5), (34).	a. Install the following items into item (40) in	Finger tighten item (34).
	b. Install item (41) through item (40) and (39).	
	c. Install item (31) and (42) into item (40). Tighten item (31).	Be sure item (42) is a red wire.
28. Slipring housing assembly (23).	Install item (28) and item (25) into housing.	
29. Rectifier assembly (negative) (26).	a. Place item (26) onto bushings and align holes.	Be sure item (26) is a negative rectifier.
	b. Install the following items into item (26) in this order, item (32), (33), (5), (34).	Finger tighten item (34).
	c. Install item (30) through item (26) and (28).	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- | | |
|-----------------------------------|-----------------------------------|
| 5. LOCKWASHER | 33. GUARD WASHER (2) |
| 23. SLIPRING HOUSING ASSEMBLY | 34. ROUND HEAD SCREW (2) |
| 25. INSULATION BUSHING (2) | 38. INSULATION BUSHING |
| 26. RECTIFIER ASSEMBLY (NEGATIVE) | 39. INSULATION BUSHING |
| 27. INSULATION BUSHING | 40. RECTIFIER ASSEMBLY (POSITIVE) |
| 28. INSULATION BUSHING | 41. TERMINAL SCREW (POSITIVE) |
| 31. HEX HEAD TAPPING SCREW (2) | 42. LEAD ASSEMBLY (POSITIVE) |
| 32. INSULATION WASHER (2) | |

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ELECTRICAL SYSTEM.**3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
29. Rectifier assembly (negative) (26) (continued).	d. Install item (31) and (29) on to item (26). Tighten item (31).	Be sure item (29) is a black wire.
30. Slipring housing assembly (23). end housing.	a. Route items (42) and (29) through cutaway section of	Ensure items (42) and (29) are not pinched.
	b. Install item (22) and item (20).	Make sure items (42) and (29) are not pinched.
31. Holder (20).	a. Install item (9), (10), (11), and (12).	Tighten items (9), (10), (12), and both items (34).
	b. Position three wires of item (26) and three wires of item (40) on three studs of item (20).	

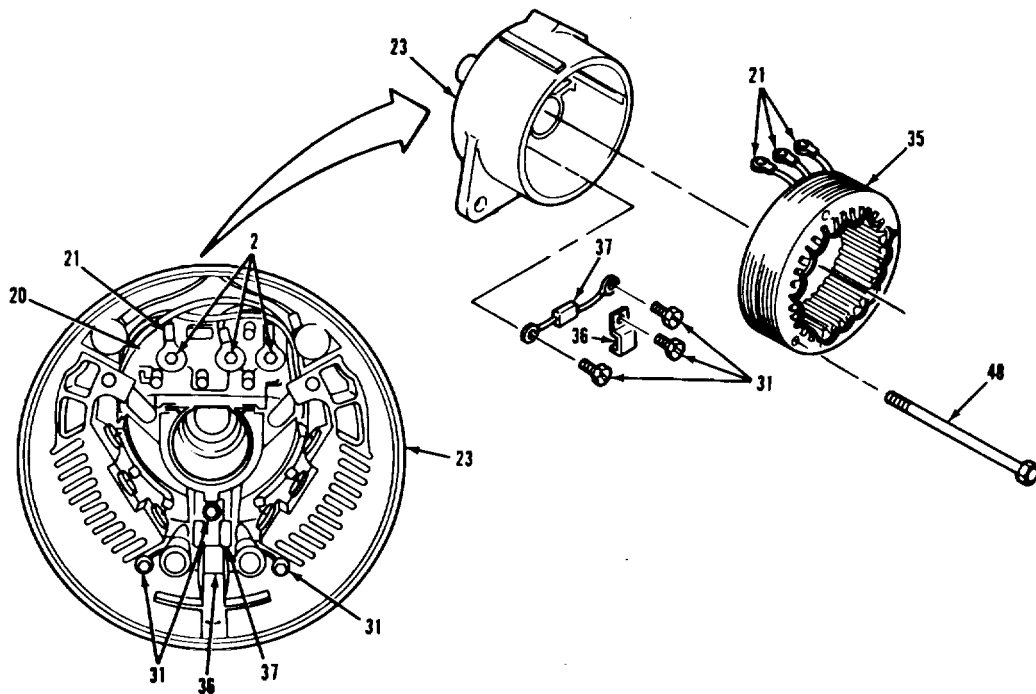
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
32. Slipring housing assembly (23).	a. Install items (37) and (36).	
	b. Install one item (31) into items (36) and (37). Install the remaining items (31).	Tighten all items (31).
	c. Install item (35) onto item (23).	
	d. Temporarily install three items (48) through housing, to help align item (35) with housing.	
	e. Connect three items (21) to three terminals on the back of item (20). Install three items (2).	Tighten all items (2).

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 2. HEX HEAD NUT (3)
- 20. BRUSH AND REGULATOR HOLDER
- 21. TERMINAL WIRE (3)
- 23. SLIPRING HOUSING ASSEMBLY
- 31. HEX HEAD TAPPING SCREW (3)

- 35. STATOR ASSEMBLY
- 36. CLAMP
- 37. CAPACITOR ASSEMBLY
- 48. HEX HEAD SCREW (3)

TA 238118

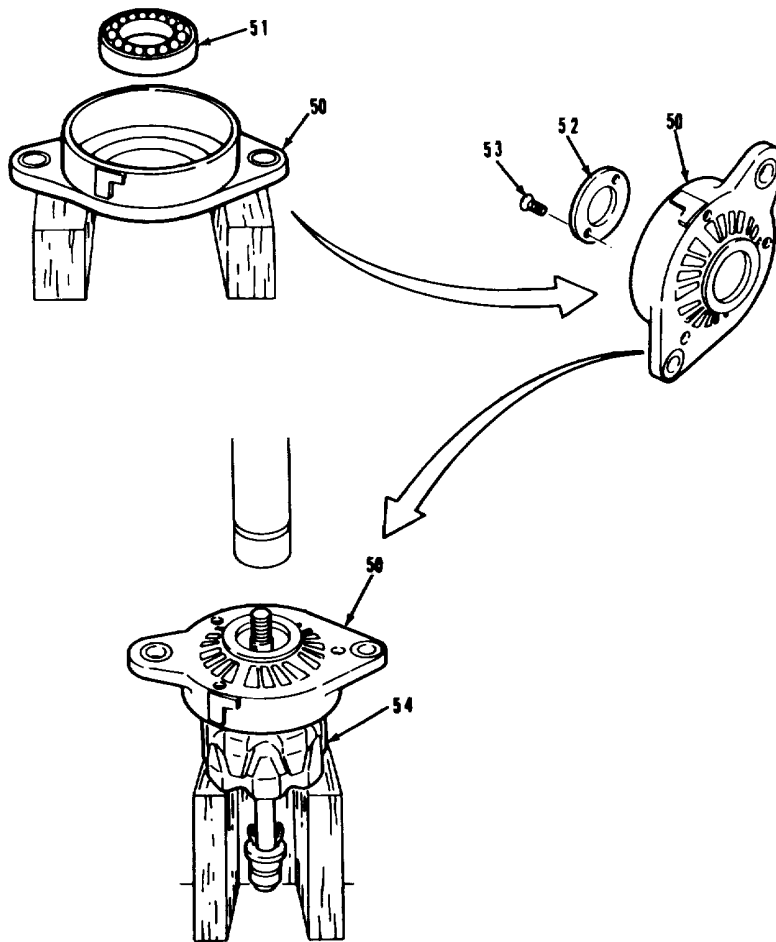
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
33. Housing (50).		
CAUTION		
When installing bearing, press on outer race only to avoid transmitting damaging force through ball bearings.		
a. Place item (50) with mounting ears facing up on press.	Support the bottom of item (50).	
b. Carefully press item (51) into the bore.	Make sure bearing is fully seated.	
c. Install item (52) and four items (53).		
d. Place item (54) on press and support.		
CAUTION		
In the following step, use a sleeve around the shaft to press on inner race to avoid damaging bearing.		
e. Carefully press item (50) onto item (54). (54).	Make sure item (50) is fully seated on item (54).	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 50. DRIVE END HOUSING
- 51. BALL BEARING
- 52. BEARING RETAINER
- 53. PLATE HEAD SCREW (4)
- 54. ROTOR AND SLIPRING ASSEMBLY

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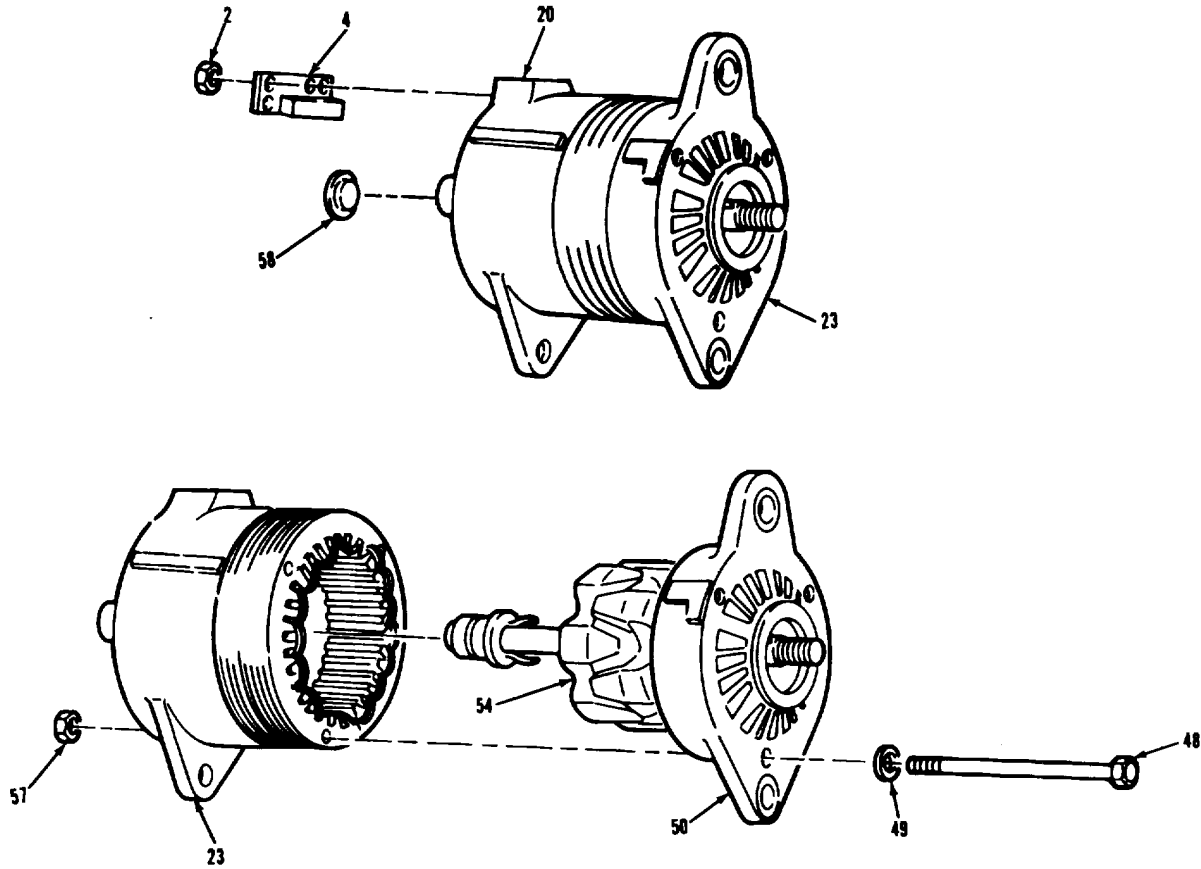
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
34. Slipring housing assembly (23).	<ul style="list-style-type: none"> a. Remove three items (48). b. Install items (54) and (50). c. Install three items (48), three items (49), and three items (57). d. Place a small amount of grease into the rear of item (23) and install item (58) by tapping into place. 	<p>Make sure mounting ears are lined up.</p> <p>Torque items (57) to 50-60 lb-in..</p>
35. Holder (20).	<ul style="list-style-type: none"> a. Install item (4) and three items (2). Finger tighten only. 	

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 2. HEX HEAD NUT (3)
- 4. DIODE TRIO
- 20. BRUSH AND REGULATOR HOLDER
- 23. SLIPRING HOUSING ASSEMBLY
- 48. HEX HEAD SCREW (3)

- 49. BELLEVILLE WASHER (3)
- 50. DRIVE END HOUSING
- 54. ROTOR AND SLIPRING ASSEMBLY
- 57. ELASTIC STOP NUT (3)
- 58. DUST CAP

TA 238120

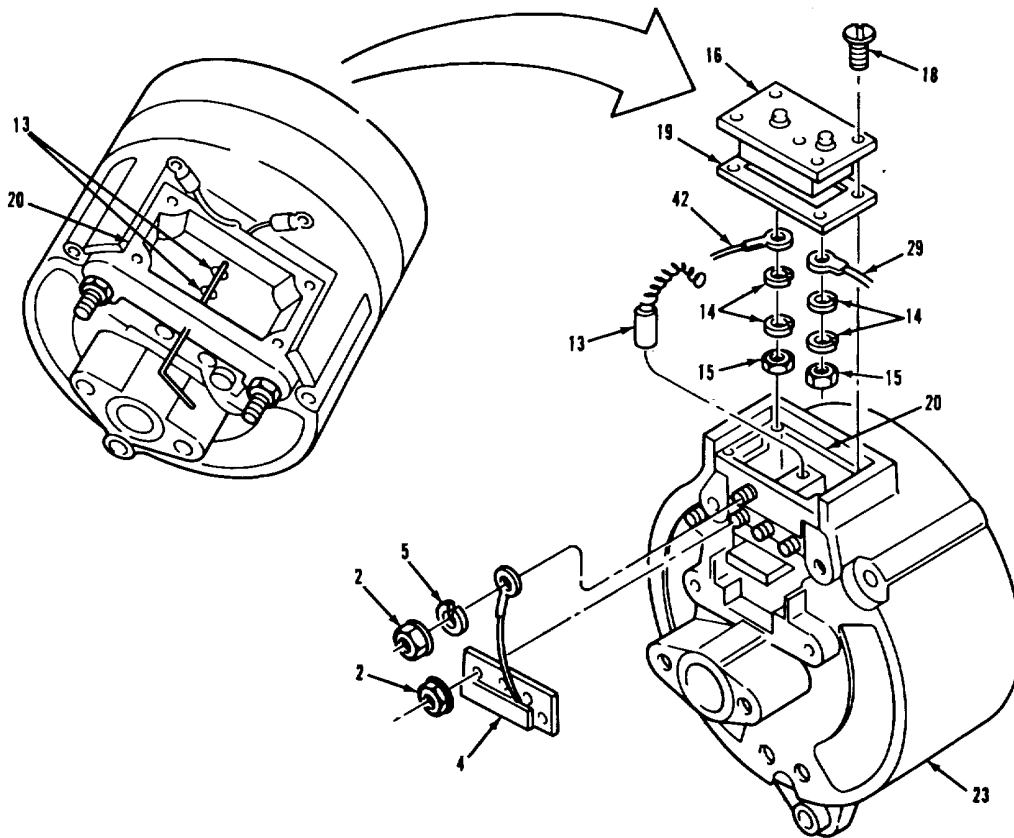
ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
35. Holder (20) (continued)	<p>b. Insert item (13) into outer hole in item (20) and compress item (13). While holding item (13), insert suitable pin through hole in rear of housing so that spring is held in compressed position.</p> <p>c. Install the remaining item (13) in the same manner, by pushing pin farther into housing.</p>	A suitable pin can be made from a paper clip.
36. Regulator assembly (16)	<p>a. Install item (19) onto</p> <p>b. While holding item (16) in one hand, attach item (42) to item (16) and install items (14) and (15).</p> <p>c. Attach item (29) to item (16) and install items (14) and (15).</p>	<p>item (16) and align holes.</p> <p>Tighten item (15).</p> <p>Tighten item (15).</p>
37. Holder (20).	<p>a. Attach blue regulator lead to stud on item (20) by slipping under head of nut. Tighten nut.</p> <p>b. Install item (16) onto item (20) and install four items (18). Do not tighten screws.</p> <p>c. Remove pin from rear of item (20), and tighten four items (18).</p> <p>d. Attach black diode lead to item (20) and tighten item (2).</p>	Be sure that the red and black leads are properly routed through their slots in the regulator housing.

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 2. HEX HEAD NUT (4)
- 4. DIODE TRIO
- 5. LOCKWASHER
- 13. BRUSH (2)
- 14. LOCKWASHER (4)
- 15. HEX HEAD NUT (2)
- 16. REGULATOR ASSEMBLY

- 18. PLAIN HEAD SCREW (4)
- 19. REGULATOR GASKET
- 20. BRUSH AND REGULATOR HOLDER
- 23. SLIPRING HOUSING ASSEMBLY
- 29. ASSEMBLY LEAD (NEGATIVE)
- 42. ASSEMBLY LEAD (POSITIVE)

TA 238121

ELECTRICAL SYSTEM.**3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).****LOCATION/ITEM****ACTION****REMARKS****E. ASSEMBLY (Continued).**

38. Rotor and slipring
assembly (54).

CAUTION

Do not force or pound pulley on shaft.

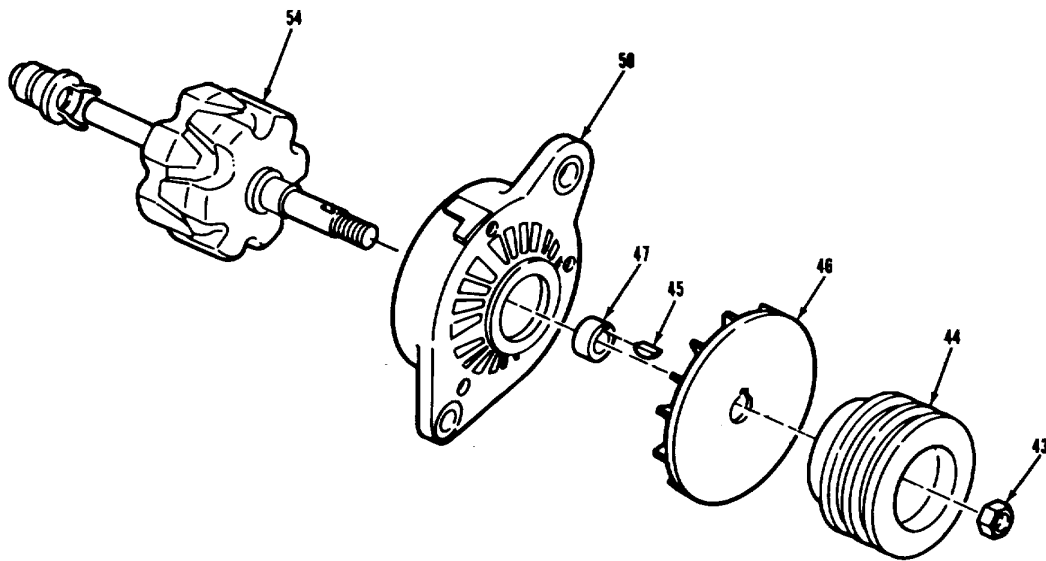
- a. Install item (47) onto shaft of item (54). Insert item (45) into shaft and install items (46) and (44).
- b. While holding item (44), torque item (43) to 70-80 lb-ft.

NOTE

Due to the design of the alternator, a small amount of shaft end play will be present in new or rebuilt units. End play between 0.004 and 0.012 inches is normal.

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 43. HEX FLANGE NUT
- 44. ALTERNATOR PULLEY
- 45. KEY
- 46. FAN ASSEMBLY
- 47. FAN SPACER
- 50. DRIVE END HOUSING
- 54. ROTOR AND SLIPRING ASSEMBLY

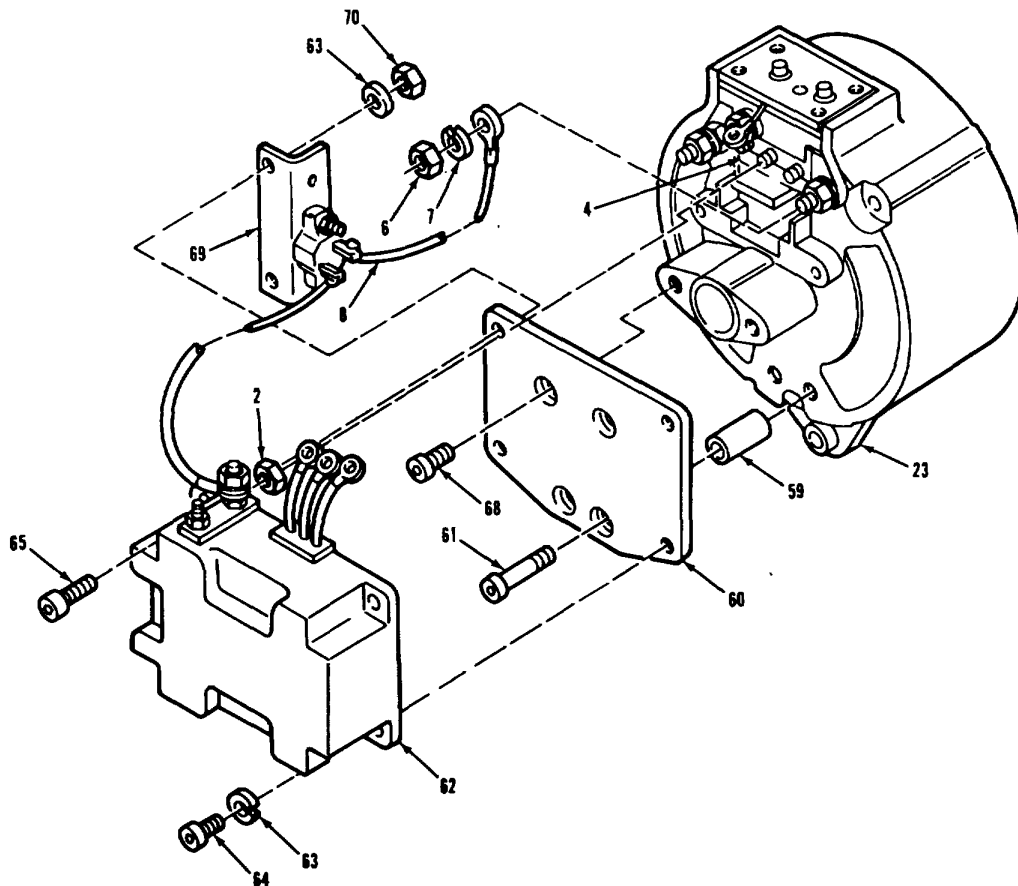
TA 238122

ELECTRICAL SYSTEM.**3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY (Continued).		
39. Slipring housing assembly (23).	Install two items (61) through item (60) and two items (59) into item (23). Install two items (68) into item (23).	Tighten items (61) and (68).
40. Plate (60).	<p>a. While holding item (62) in one hand, align holes with item (60) and install items (63) and (64).</p> <p>b. Place item (69) onto items (65) and install items (63) and (70).</p>	Tighten items (64) and (70).
41. Trio (4).	<p>a. Remove three items (2).</p> <p>b. Attach the three wire leads of item (62) and install three items (2).</p>	Tighten three nuts item (2).
42. Slipring housing assembly (23).	Attach item (8) to the positive terminal and install items (7) and (6).	Tighten items (7) and (6).

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|------------------------------|
| 2. HEX HEAD NUT (3) | 61. SOCKET HEAD SCREW (2) |
| 4. DIODE TRIO | 62. TRANSFORMER ASSEMBLY |
| 6. HEX HEAD NUT | 63. LOCKWASHER (4) |
| 7. LOCKWASHER | 64. SOCKET HEAD SCREW (2) |
| 8. WIRE LEAD | 65. SOCKET HEAD SCREW (2) |
| 23. SLIPRING HOUSING ASSEMBLY | 68. SOCKET HEAD SCREW (2) |
| 59. SPACER (2) | 69. CIRCUIT BREAKER ASSEMBLY |
| 60. TRANSFORMER PLATE | 70. HEX HEAD NUT |

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ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

F. BENCH TESTING.

43. Alternator assembly (71).

- a. Connect positive and negative output leads to test stand.
- b. Connect jumper wire (A) to diode trio terminal (B) and quickly touch positive output terminal (C) with other end of jumper wire (A) to restore the remaining magnetism.
- c. On test stand, run item (71) to 580-620 rpm.
- d. Adjust voltage output to 14 vdc at location (E) of item (71).
- e. Vary load on item (71) between 1 and 85 amps, and check that the output matches the load.
- f. Now adjust output to 28 vdc, at location (E) of item (71).
- g. Vary load on item (71) between 1 and 15 amps, and check that the output matches the load.
- h. If output does not match load repeat steps 43c through g.

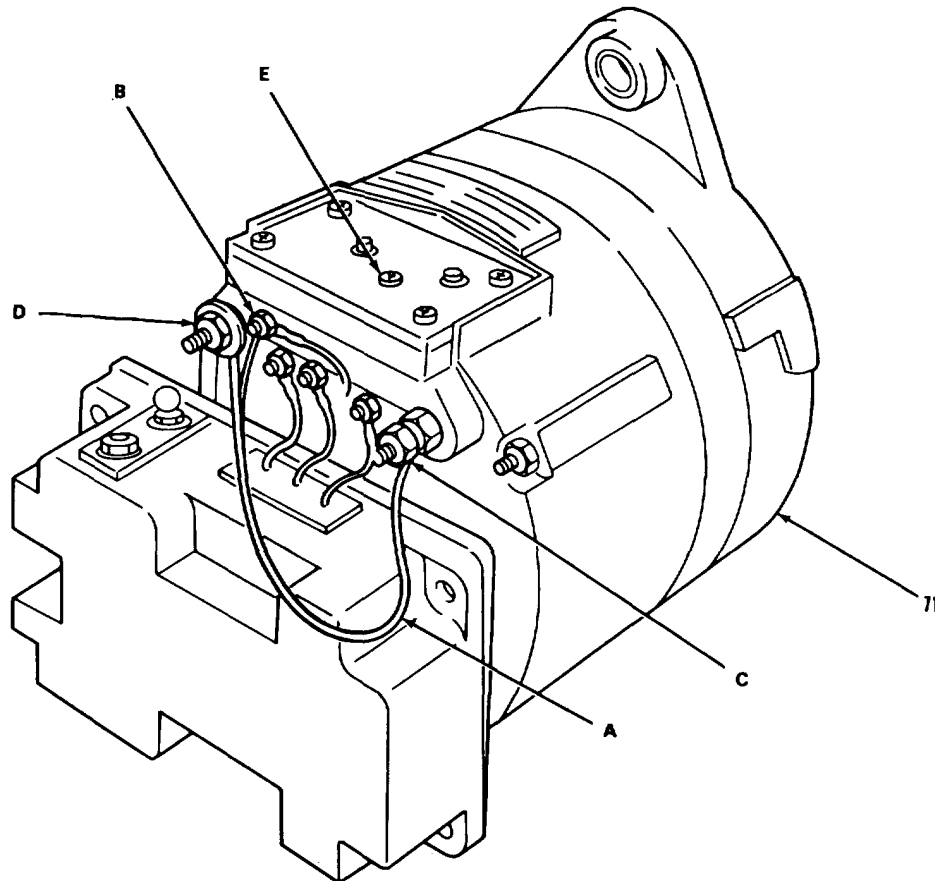
NOTE

Follow-on maintenance action required:

Install alternator (TM 9-2320-283-20).

ELECTRICAL SYSTEM.

3-21. ALTERNATOR AND RECTIFIER REPAIR (Continued).



LEGEND:

- 71. ALTERNATOR ASSEMBLY
- A. JUMPER WIRE
- B. DIODE TRIO TERMINAL
- C. POSITIVE OUTPUT TERMINAL
- D. NEGATIVE OUTPUT TERMINAL
- E. VOLTAGE ADJUSTMENT LOCATION

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ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR.

THIS TASK COVERS

- | | |
|-----------------------|-----------------|
| a. Disassembly. | d. Inspection. |
| b. Cleaning. | e. Assembly. |
| c. Electrical Checks. | f. Calibration. |

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	TM 9-2320-283-20.	Starter removed.

TEST EQUIPMENT

Armature test set
6625-825-5810.
Dial indicator
5210-277-8440.

SPECIAL TOOLS

V-block set
3460-725-5810.

MATERIALS/PARTS (P/N)

Varnish	Gasket
Item 40, Appendix B.	5330-01-088-6867.
Oil, OE/HDO-30.	Boot
Item 17, Appendix B.	2530-01-088-4432.
Loctite No. 22140	O-ring
Item 13, Appendix B.	5330-640-6913.
O-ring (2)	Starter kit
5330-01-088-6867.	q5310-01-079-8096.

PERSONNEL REQUIRED

One (MOS-63G).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-20.
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

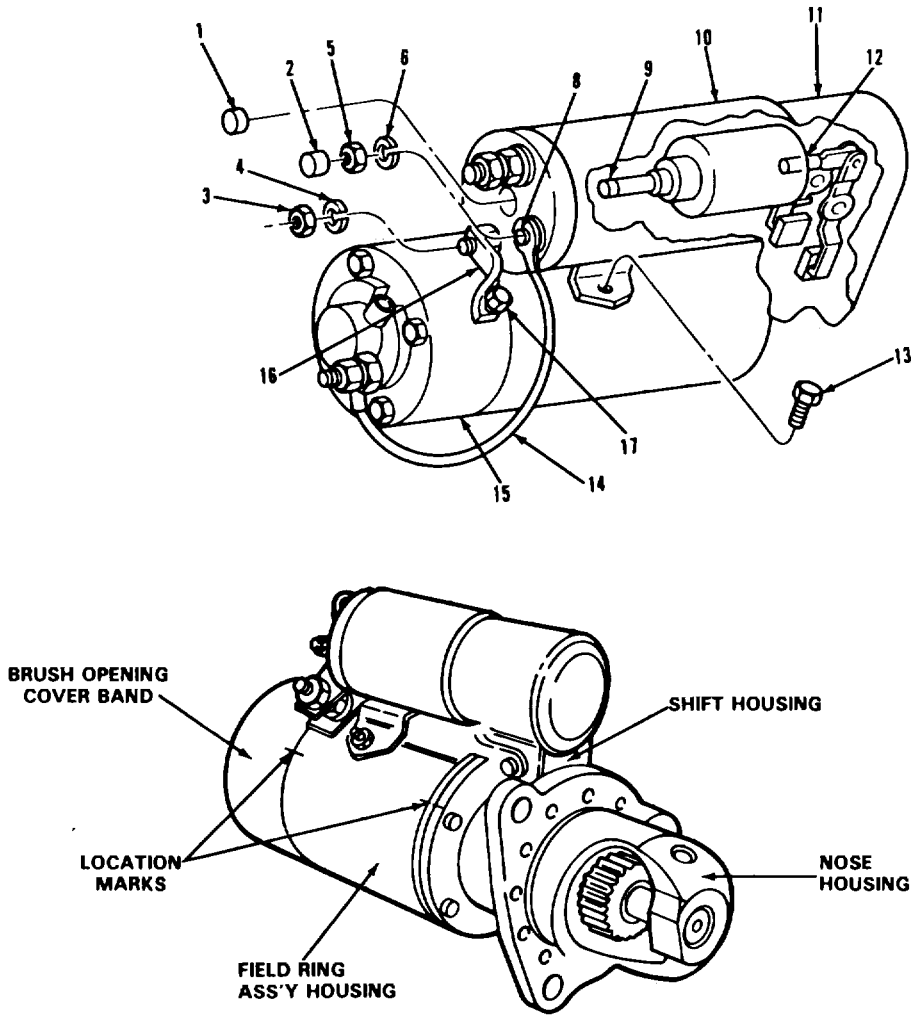
None.

TROUBLESHOOTING REFERENCES

None.

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | |
|-------------------|--------------------------|
| 1. PLUG | 10. SWITCH ASSEMBLY |
| 2. CAP (2) | 11. HOUSING ASSEMBLY |
| 3. HEXAGON NUT | 12. LINK SCREW |
| 4. LOCKWASHER | 13. HEXAGON CAPSCREW (2) |
| 5. HEXAGON NUT | 14. JUMPER WIRE |
| 6. LOCKWASHER | 15. FIELD RING |
| 7. TERMINAL NO. 3 | 16. BUS BAR |
| 8. TERMINAL NO. 4 | 17. HEXAGON PLAIN NUT |
| 9. TIMING SHAFT | |

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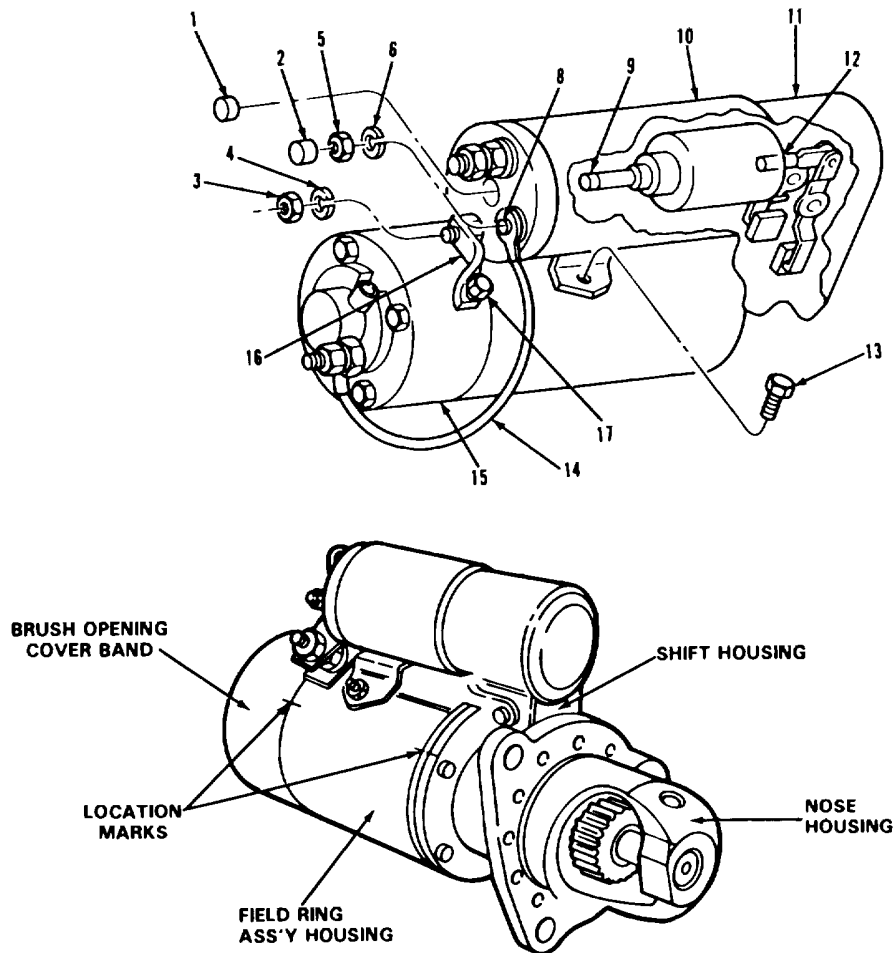
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. DISASSEMBLY.		
1. Cap (2), nut (5), washer (6), and wire (14).	Remove from item (8).	
2. Nut (3), washer (4), bar (16), and nut (17).	Remove from items (10) and (15).	
3. Plug (1).	Remove from item (10).	
4. Two capscrews (13).	Remove from item (10).	
NOTE		
Switch assembly is held to housing assembly by timing shaft and link screw. The timing shaft and link screw are joined with standard screw type threads. Unscrew timing shaft using either 1/4" nut driver or 1/4" deep socket.		
5. Shaft (9).	Remove from item (12).	
6. Switch assembly (10).	Unscrew item (9) and remove item (10) from item (11).	
NOTE		
To aid in reassembly, scribe location marks on each side of all assemblies that might be separated (see illustration).		

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | |
|-------------------|--------------------------|
| 1. PLUG | 10. SWITCH ASSEMBLY |
| 2. CAP (2) | 11. HOUSING ASSEMBLY |
| 3. HEXAGON NUT | 12. LINK SCREW |
| 4. LOCKWASHER | 13. HEXAGON CAPSCREW (2) |
| 5. HEXAGON NUT | 14. JUMPER WIRE |
| 6. LOCKWASHER | 15. FIELD RING |
| 7. TERMINAL NO. 3 | 16. BUS BAR |
| 8. TERMINAL NO. 4 | 17. HEXAGON PLAIN NUT |
| 9. TIMING SHAFT | |

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ELECTRICAL SYSTEM.**3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

A. DISASSEMBLY (Continued).

7. Two screws (18), two nuts (19), and cover (20).	Remove from item (15).	
--	------------------------	--

NOTE**Access brushes (21) through openings in housing (15).**

8. Eight screws (22), four plates (23), and eight brushes (21).	Remove from four items (24).	
---	------------------------------	--

NOTE**Before disassembly, scribe a mark along housings to aid during reassembly.**

9. Six screws (37).	Remove from item (36).	
---------------------	------------------------	--

10. Housing (36).	Remove from item (47).	
-------------------	------------------------	--

11. Plug (40), wick (39), and six plugs (41).	Remove from item (36).	
---	------------------------	--

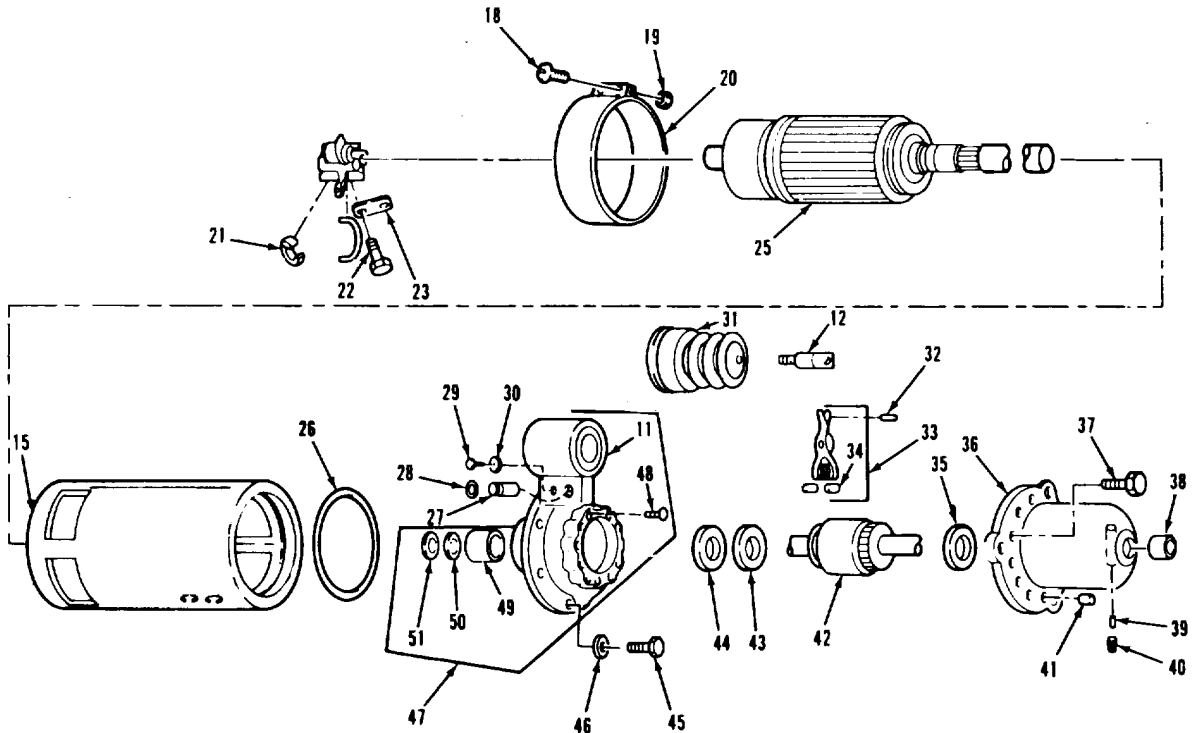
NOTE**Do not remove sleeve bushing unless damaged. Refer to D. INSPECTION, to determine if damaged.**

12. Bushing (38).	Remove from item (36).	Use hammer and chisel to break loose.
-------------------	------------------------	---------------------------------------

13. Washer (35).	Remove from item (42).	
------------------	------------------------	--

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST BOOT | 50. THRUST WASHER |
| 32. HEADLESS STRAIGHT PIN | 51. SEAL |
| 33. ARM ASSEMBLY | |

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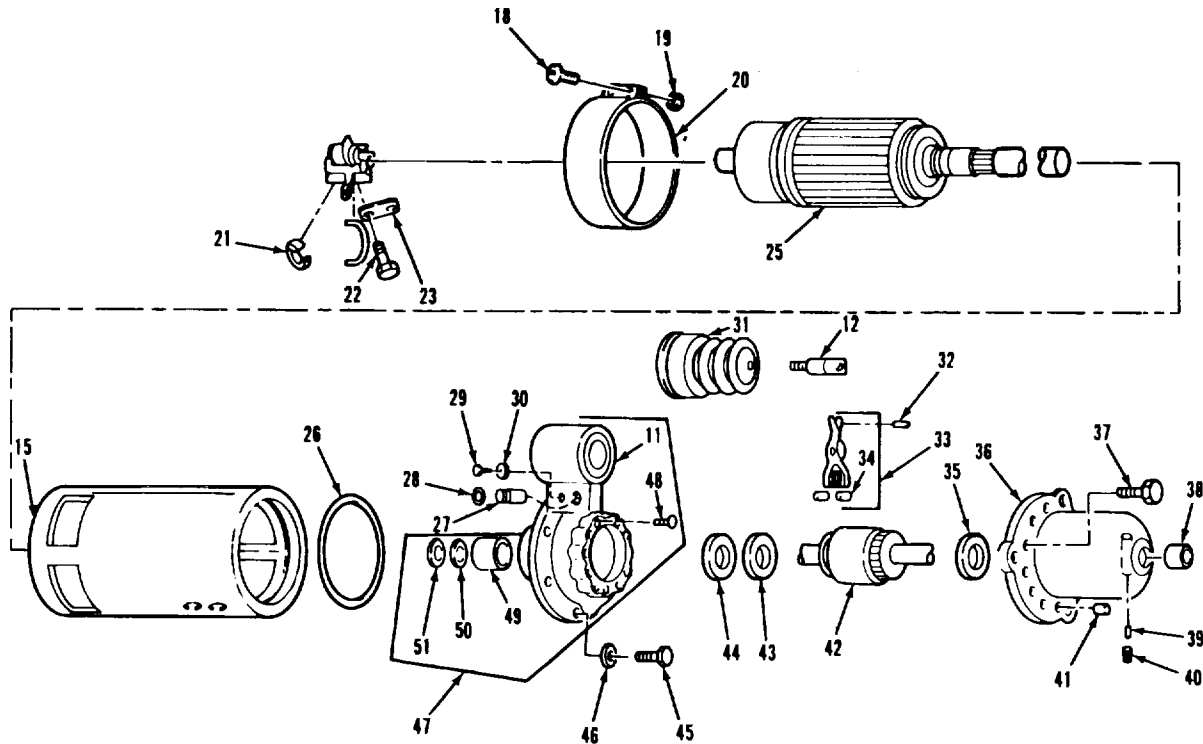
ELECTRICAL SYSTEM.**3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).****LOCATION/ITEM****ACTION****REMARKS****A. DISASSEMBLY (Continued).****NOTE**

Before disassembly scribe a mark along housing and field ring to aid during assembly.

- | | | |
|--|----------------------------------|--|
| 14. Five capscrews (45) and lock-washers (46). | Remove from item (11). | |
| 15. Drive assembly (42), washer (43), seal (44), housing assembly (47), and O-ring (26). | Remove from items (15) and (42). | Remove items (42), (43), (44), and (47) as an assembly. |
| 16. Drive assembly (42), washer (43), and seal (44). | Remove from item (47). | Item (44) should be discarded. |
| 17. Washer (50) and seal (51). | Remove from item (25). | Items (50) and (51) should be discarded. |
| 18. Boot (31), screw (29), and washer (30). | Remove from item (11). | Items (29) and (30) are used to retain items (27) and (28). |
| 19. Two cams (34). | Remove from item (33). | |
| 20. Shaft (28), O-ring (27), arm assembly (33), screw (12), and pin (32). | Remove from item (11). | Remove items (33), (12), and (32) as an assembly. Item (27) should be discarded. |
| 21. Screw (12) and pin (32). | Remove from item (33). | |

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST BOOT | 50. THRUST WASHER |
| 32. HEADLESS STRAIGHT PIN | 51. SEAL |
| 33. ARM ASSEMBLY | |

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ELECTRICAL SYSTEM.**3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).****LOCATION/ITEM****ACTION****REMARKS****A. DISASSEMBLY (Continued).****NOTE**

Do not remove bushing unless damaged because it will break during removal. Refer to D. INSPECTION, to determine if damaged.

22. Bushing (49).

Remove from item (11).

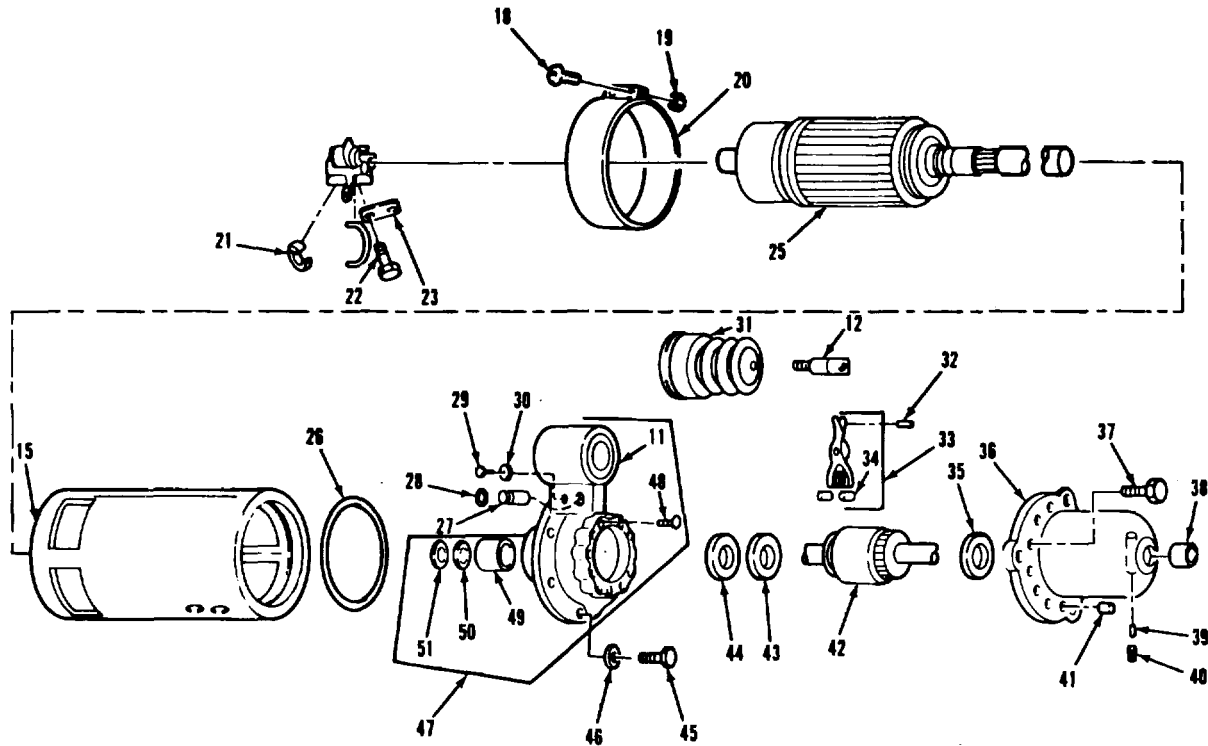
Item (49) should be discarded.

23. Setscrew (48).

Remove from item (11).

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST BOOT | 50. THRUST WASHER |
| 32. HEADLESS STRAIGHT PIN | 51. SEAL |
| 33. ARM ASSEMBLY | |

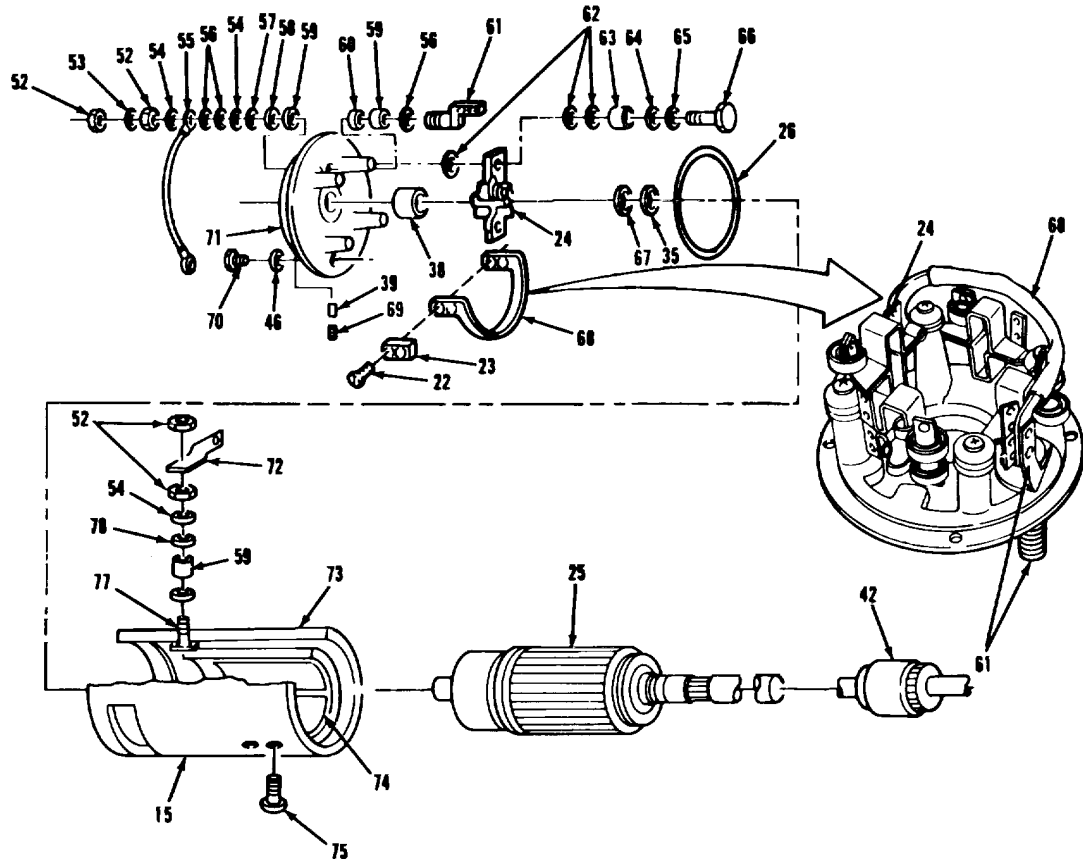
TA 238129

ELECTRICAL SYSTEM.**3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
A. DISASSEMBLY (Continued).		
24. Armature assembly (25) and washers (35) and (67).	Remove from item (15).	
25. Washers (35) and (67).	Remove from item (25).	
26. Four screws (70) and washer (46).	Remove from item (71).	Location markers scribed on items (71) and (15).
27. Housing (71) with attached hardware and O-ring (26).	Remove from item (15).	Item (26) should be discarded.
28. Jumper (68).	Remove from between item (61) and two items (24).	
29. Twelve washers (62) and four screws (66), lock-washers (65 and (64), bushings (63), and holders (24).	Remove from item (71).	
30. Two nuts (52), lockwasher (53), washers (54), (57), and (58), and bushing (59).	Remove from item (71).	
CAUTION		
If you use a hammer to remove jumper and screw, install nut on the end being hammered to protect threads.		
31. Jumper and screw assembly (61), washer (56), bushing (59), and gasket (60).	Remove from item (71).	Item (60) should be discarded.
32. Plug (69) and wick (39).	Remove from item (71).	

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- | | | |
|--|-----------------------------------|------------------------------|
| 15. FIELD RING | 54. PLAIN WASHER (3) | 67. PLAIN WASHER |
| 22. SELF-TAPPING SCREW (8) | 55. BUS BAR ASSEMBLY | 68. BRUSH HOLDER JUMPER |
| 23. LOCK PLATE (4) | 56. BELLEVILLE WASHER (3) | 69. PIPE PLUG |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 57. INSULATOR WASHER | 70. SCREW (4) |
| 25. ARMATURE ASSEMBLY | 58. INSULATOR WASHER | 71. COMMUTATOR END HOUSING |
| 26. O-RING (2) | 59. INSULATOR BUSHING (3) | 72. JUMPER |
| 35. PLAIN WASHER (2) | 60. GASKET | 73. POLE PIECE (4) |
| 38. SLEEVE BUSHING (2) | 61. JUMPER AND SCREW ASSEMBLY | 74. COIL AND JUMPER ASSEMBLY |
| 39. WICK (2) | 62. PLAIN WASHER (INSULATOR) (12) | 75. SCREW (8) |
| 42. DRIVE ASSEMBLY | 63. INSULATOR BUSHING (4) | 76. TERMINAL STUD |
| 46. LOCKWASHER (9) | 64. GUARD WASHER (4) | 77. INSULATOR |
| 52. PLAIN HEXAGON NUT (4) | 65. LOCKWASHER (4) | 78. INSULATOR |
| 53. LOCKWASHER | 66. THREADED TAPPING SCREW (4) | |

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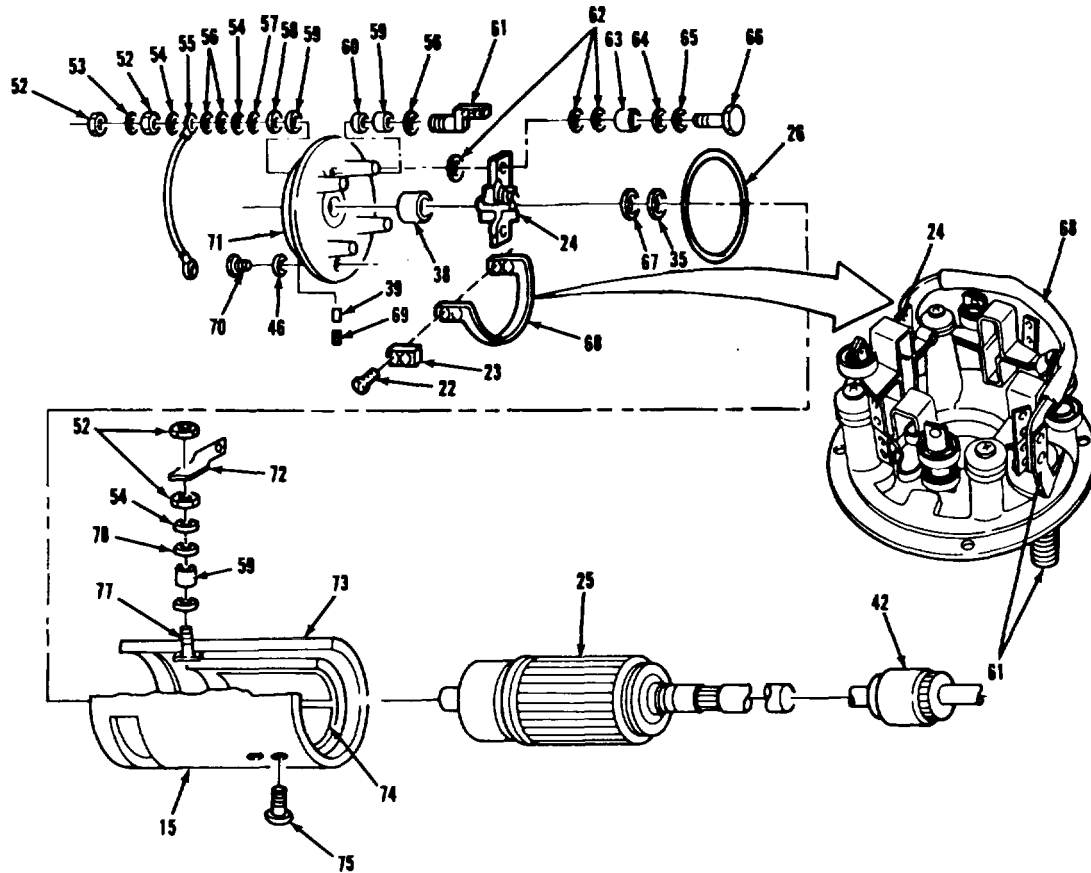
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. ASSEMBLY (Continued).		
NOTE		
Do not remove sleeve bushing unless damaged. Refer to D. INSPECTION, to determine if damaged.		
33. Bushing (38).	Remove from item (71).	Use hammer and chisel to break loose.
CAUTION		
Terminal stud is retained in a plastic end base. To keep from breaking base, heat stud to 300F before removing attaching parts.		
34. Two nuts (52), jumper (72), washer (54), insulator (78), and bushing (59).	Remove from item (76).	
34. Stud (76) and insulator (77).	Remove from item (15).	
NOTE		
Before removing coil and jumper assembly and four pole pieces, perform electrical checks per step 44.		
35. Eight screws (75) and four pieces (73).	Remove from item (15).	
36. Coil and jumper assembly (74). 3-170	Remove from item (15).	
3-170		

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- 15. FIELD RING
- 22. SELF-TAPPING SCREW (8)
- 23. LOCK PLATE (4)
- 24. BRUSH HOLDER AND SPRING ASSEMBLY (4)
- 25. ARMATURE ASSEMBLY
- 26. O-RING (2)
- 35. PLAIN WASHER (2)
- 38. SLEEVE BUSHING (2)
- 39. WICK (2)
- 42. DRIVE ASSEMBLY
- 46. LOCKWASHER (9)
- 52. PLAIN HEXAGON NUT (4)
- 53. LOCKWASHER

- 54. PLAIN WASHER (3)
- 55. BUS BAR ASSEMBLY
- 56. BELLEVILLE WASHER (3)
- 57. INSULATOR WASHER
- 58. INSULATOR WASHER
- 59. INSULATOR BUSHING (3)
- 60. GASKET
- 61. JUMPER AND SCREW ASSEMBLY
- 62. PLAIN WASHER (INSULATOR) (12)
- 63. INSULATOR BUSHING (4)
- 64. GUARD WASHER (4)
- 65. LOCKWASHER (4)
- 66. THREADED TAPPING SCREW (4)

- 67. PLAIN WASHER
- 68. BRUSH HOLDER JUMPER
- 69. PIPE PLUG
- 70. SCREW (4)
- 71. COMMUTATOR END HOUSING
- 72. JUMPER
- 73. POLE PIECE (4)
- 74. COIL AND JUMPER ASSEMBLY
- 75. SCREW (8)
- 76. TERMINAL STUD
- 77. INSULATOR
- 78. INSULATOR

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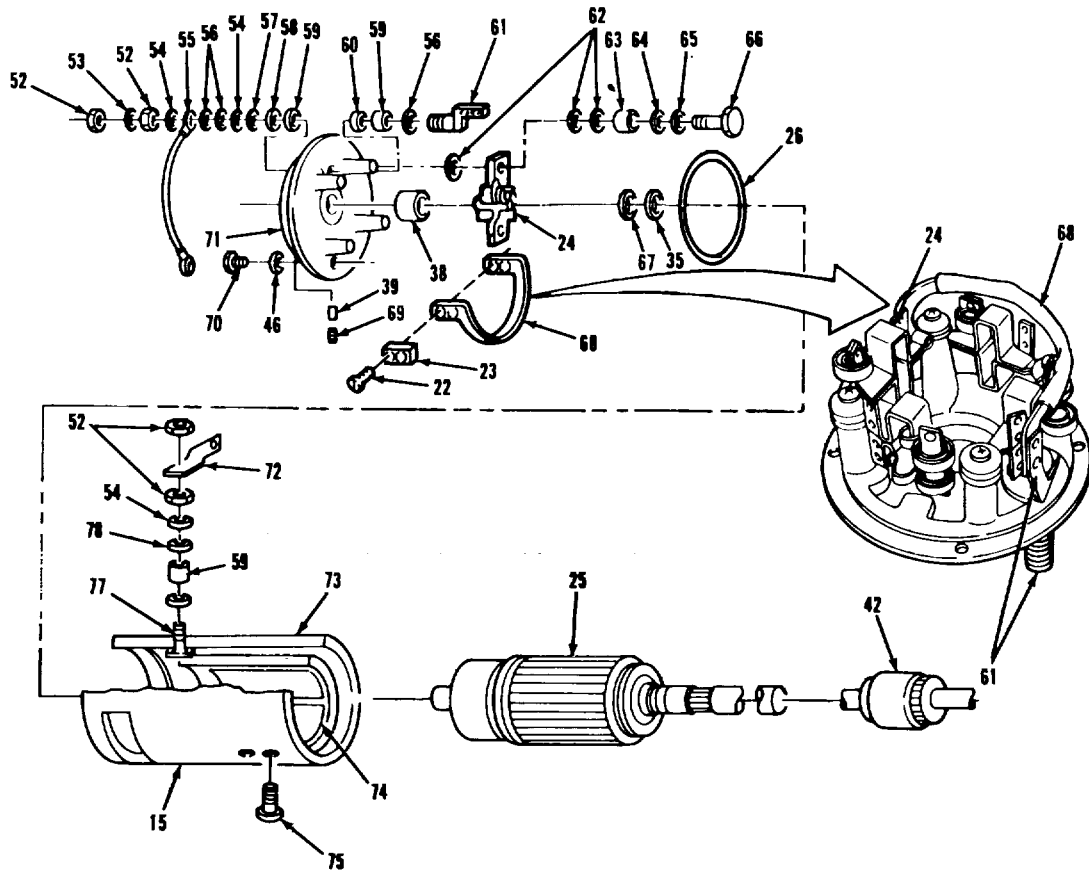
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
B. CLEANING.		
<p style="text-align: center;">CAUTION</p> <p>Do not put the drive assembly in cleaning solvent. The drive assembly contains special lubricants which could be damaged.</p>		
38. All parts.	Clean.	Refer to paragraph 3-4.

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- 15. FIELD RING
- 22. SELF-TAPPING SCREW (8)
- 23. LOCK PLATE (4)
- 24. BRUSH HOLDER AND SPRING ASSEMBLY (4)
- 25. ARMATURE ASSEMBLY
- 26. O-RING (2)
- 35. PLAIN WASHER (2)
- 38. SLEEVE BUSHING (2)
- 39. WICK (2)
- 42. DRIVE ASSEMBLY
- 46. LOCKWASHER (9)
- 52. PLAIN HEXAGON NUT (4)
- 53. LOCKWASHER

- 54. PLAIN WASHER (3)
- 55. BUS BAR ASSEMBLY
- 56. BELLEVILLE WASHER (3)
- 57. INSULATOR WASHER
- 58. INSULATOR WASHER
- 59. INSULATOR BUSHING (3)
- 60. GASKET
- 61. JUMPER AND SCREW ASSEMBLY
- 62. PLAIN WASHER (INSULATOR) (12)
- 63. INSULATOR BUSHING (4)
- 64. GUARD WASHER (4)
- 65. LOCKWASHER (4)
- 66. THREADED TAPPING SCREW (4)

- 67. PLAIN WASHER
- 68. BRUSH HOLDER JUMPER
- 69. PIPE PLUG
- 70. SCREW (4)
- 71. COMMUTATOR END HOUSING
- 72. JUMPER
- 73. POLE PIECE (4)
- 74. COIL AND JUMPER ASSEMBLY
- 75. SCREW (8)
- 76. TERMINAL STUD
- 77. INSULATOR
- 78. INSULATOR

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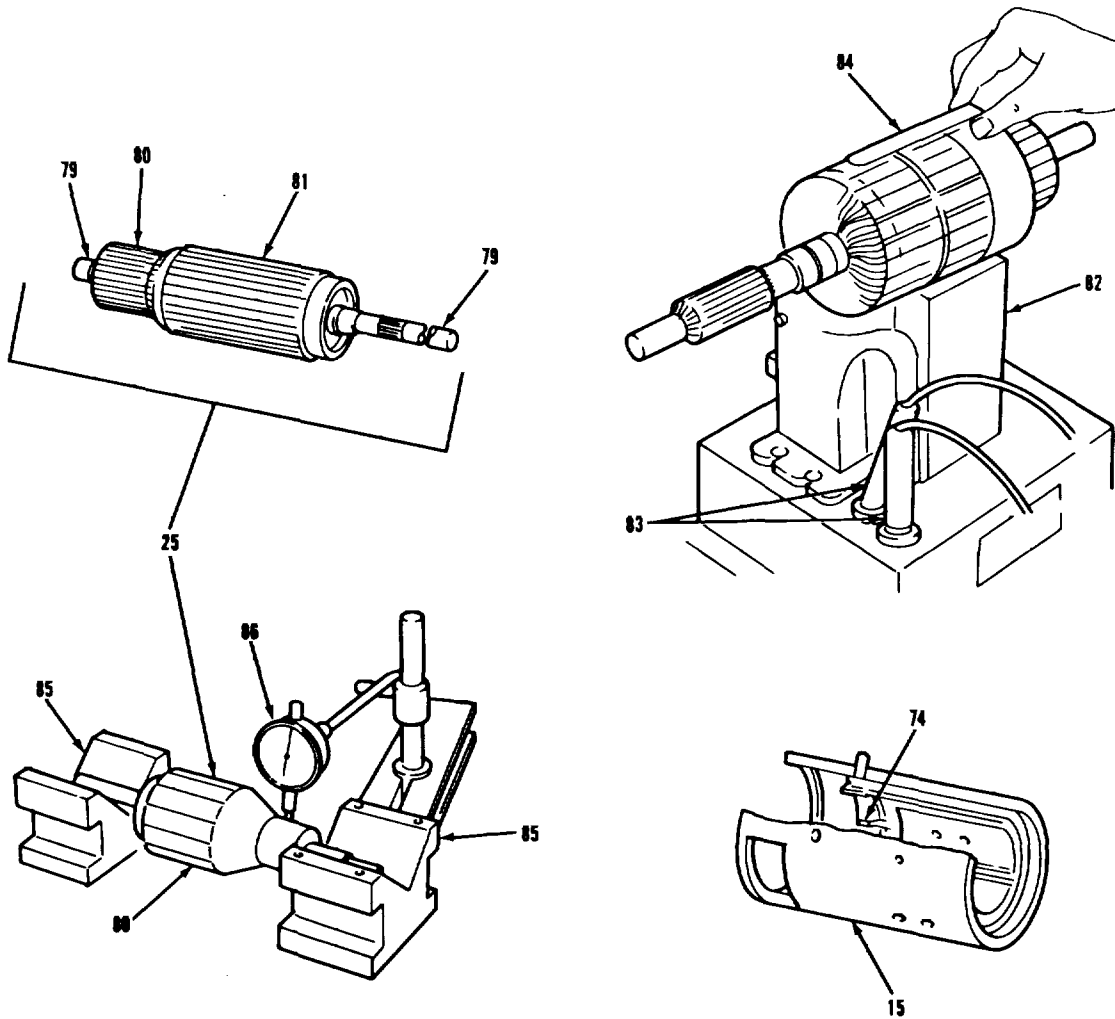
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ELECTRICAL CHECKS.		
NOTE		
<p>The following tests are done with an armature test set. The test set uses two electrical leads called probes to apply electrical current through the object being tested. When current flows between points where probes are applied, the test lamp on the test set lights up (or turns on).</p>		
39. Set (82).	<p>a. Install item (25) as shown.</p> <p>b. Position ON/OFF switch to ON.</p> <p>c. Touch tips of item (83) together.</p>	Test lamp should light.
NOTE		
<p>When the word test is used in steps 40 thru 42 hold tip of one probe in first position indicated. Then, one at a time, touch all other positions as instructed. Armature is defective if results indicated by remarks column are not met.</p>		
40. One bar (80) and twenty-six bars (80).	Test each bar.	Test lamp should light for each of the other items (80) touched.
41. Twenty-seven bars (80) and twenty-seven sections (81).	Test each bar.	Test lamp should not light.

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- 15. FIELD RING
- 25. ARMATURE ASSEMBLY
- 74. COIL AND JUMPER ASSEMBLY
- 79. SHAFT
- 80. COMMUTATOR BAR (27)
- 81. CORE SECTION (27)
- 82. ARMATURE TEST SET WITH ARMATURE INSTALLED
- 83. TEST PROBE (2)
- 84. HACKSAW BLADE OR THIN STEEL BAR
- 85. V-BLOCK (2)
- 86. DIAL INDICATOR

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ELECTRICAL SYSTEM.**3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).****LOCATION/ITEM****ACTION****REMARKS****C. ELECTRICAL CHECKS (Continued).**

- | | | |
|--|--|--|
| 42. Shaft (79),
twenty-seven bars
(80), and twenty-
seven sections
(81). | Test each bar. | Test lamp should not
light. |
| 43. Armature assembly
(25), twenty-seven
sections (81),
and blade (85). | Rotate while holding item
(84) approximately 1/16 inch
over item (81). | A short circuit exists
if item (84) begins to
vibrate and pull toward
item (81). If this
happens, item (25) is
defective. |
| 44. Coil and jumper
assembly (74) and
ring (15).
(74) and (15). | Using armature test set or
multimeter, test for
continuity between items | There should be no
current flow between
them. If there is,
item (74) is defective. |

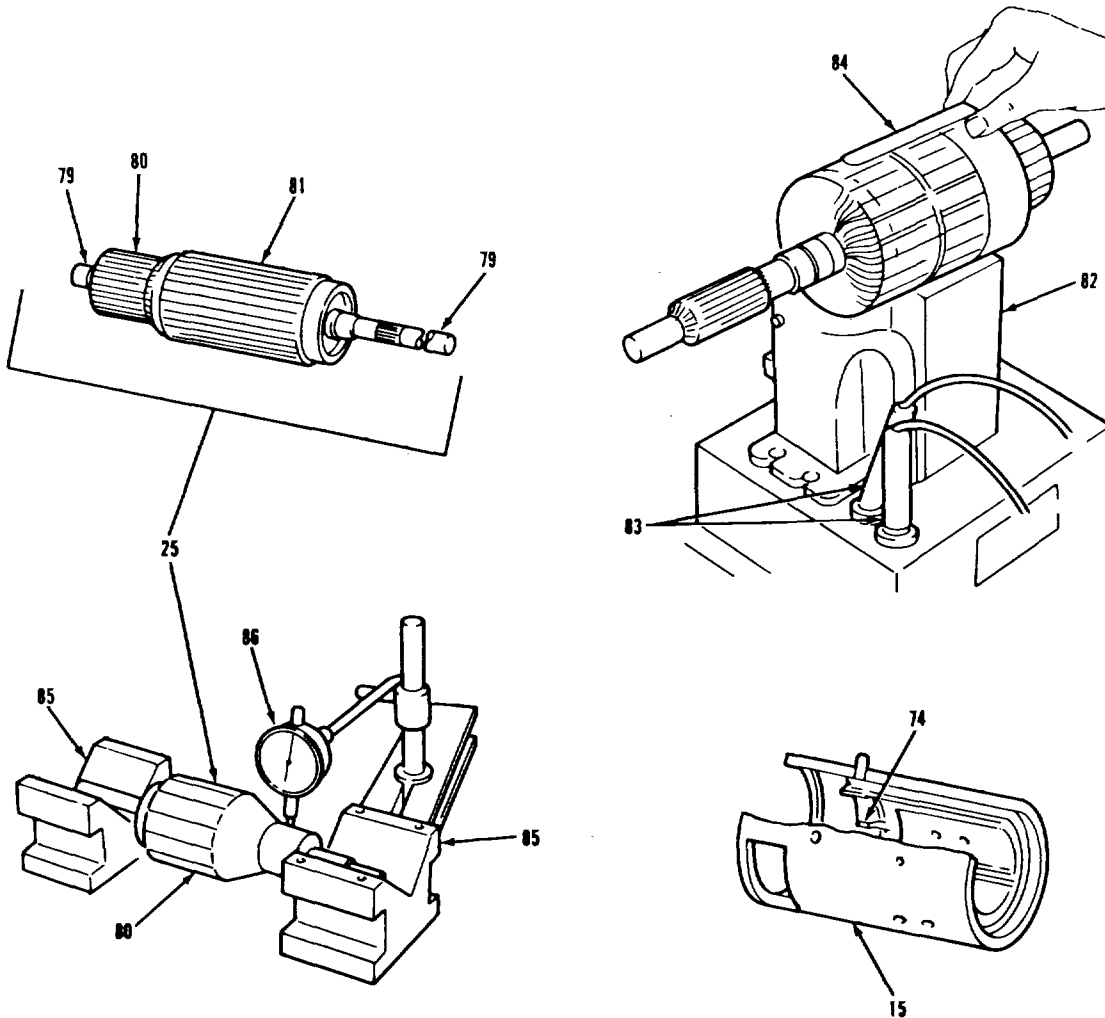
D. INSPECTION.

- | | | |
|---|--|---|
| 45. All parts. | Inspect. | Refer to paragraph 3-5. |
| 46. Armature assembly
(25), two V-blocks illustration.
(85), and
indicator (86). | a. Set up as shown in

b. While slowly rotating item
(25), check run out of
twenty-seven items (80). | Total indicator run out
should not exceed 0.003
inch. |

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).



LEGEND:

- 15. FIELD RING
- 25. ARMATURE ASSEMBLY
- 74. COIL AND JUMPER ASSEMBLY
- 79. SHAFT
- 80. COMMUTATOR BAR (27)
- 81. CORE SECTION (27)
- 82. ARMATURE TEST SET WITH ARMATURE INSTALLED
- 83. TEST PROBE (2)
- 84. HACKSAW BLADE OR THIN STEEL BAR
- 85. V-BLOCK (2)
- 86. DIAL INDICATOR

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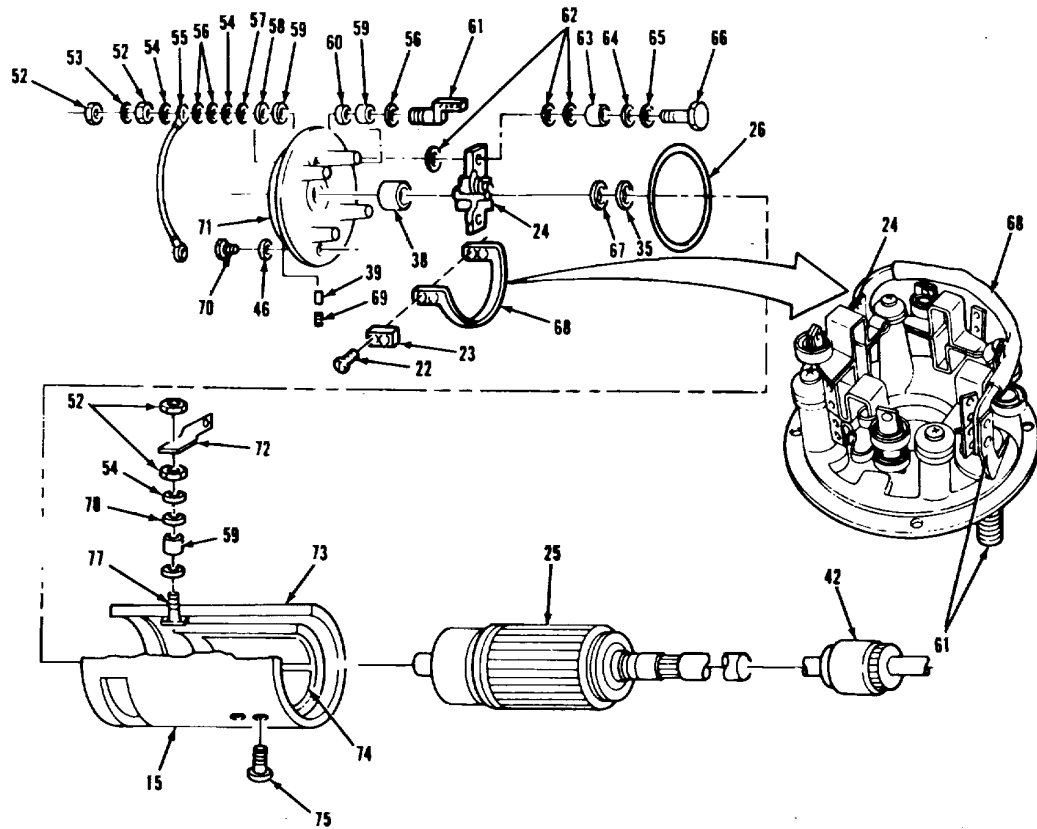
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
E. ASSEMBLY.		
NOTE		
<p>Coil and jumper assembly should be heated to approximately 300°F before placing in position in field ring. Application of heat makes coil and jumper flexible so that is can be drawn tightly against field ring.</p>		
<p>47. Coil and jumper assembly (74) and four pieces (73).</p>	<p>a. Immediately after heating, place in position inside item (15).</p> <p>b. Secure with eight items (75). Tighten until there is no space between items (15) and (74).</p> <p>c. Apply one coat of varnish to item (74).</p>	<p>Ensure mounting hole for item (76) is alined.</p> <p>Torque to 40-70 lb-in..</p> <p>Do not get any varnish on four items (73).</p>
<p>48. Bushing (59).</p>	<p>Install into item (15).</p>	
<p>49. Stud (76) and insulator (78).</p>	<p>a. Assemble together.</p> <p>b. From the inside of item (15), insert into mounting hole.</p>	
<p>c. Secure in place with item (54) and one item (52). 50. Jumper (72) and nut (52).</p>	<p>Fasten to item (76), but do not tighten.</p>	

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | | |
|--|-----------------------------------|------------------------------|
| 15. FIELD RING | 54. PLAIN WASHER (3) | 67. PLAIN WASHER |
| 22. SELF-TAPPING SCREW (8) | 55. BUS BAR ASSEMBLY | 68. BRUSH HOLDER JUMPER |
| 23. LOCK PLATE (4) | 56. BELLEVILLE WASHER (3) | 69. PIPE PLUG |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 57. INSULATOR WASHER | 70. SCREW (4) |
| 25. ARMATURE ASSEMBLY | 58. INSULATOR WASHER | 71. COMMUTATOR END HOUSING |
| 26. O-RING (2) | 59. INSULATOR BUSHING (3) | 72. JUMPER |
| 35. PLAIN WASHER (2) | 60. GASKET | 73. POLE PIECE (4) |
| 38. SLEEVE BUSHING (2) | 61. JUMPER AND SCREW ASSEMBLY | 74. COIL AND JUMPER ASSEMBLY |
| 39. WICK (2) | 62. PLAIN WASHER (INSULATOR) (12) | 75. SCREW (8) |
| 42. DRIVE ASSEMBLY | 63. INSULATOR BUSHING (4) | 76. TERMINAL STUD |
| 46. LOCKWASHER (9) | 64. GUARD WASHER (4) | 77. INSULATOR |
| 52. PLAIN HEXAGON NUT (4) | 65. LOCKWASHER (4) | 78. INSULATOR |
| 53. LOCKWASHER | 66. THREADED TAPPING SCREW (4) | |

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ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****E. ASSEMBLY (Continued).**

51. Bushing (38).

Press into item (71) until flush with housing.

NOTE

After installing new bushing sleeve, slide it over shaft of armature assembly. If it is hard to slide on and off, ream it out until it slides on and off easily. Be careful not to make it too loose as it acts as a bearing for the shaft to rotate on.

52. Wick (39) and plug (69).

a. Install item (39) into mounting hole.

b. Add three to five drops of oil into mounting hole of item (69).

Use OE/HDO-30.

c. Install item (69).

53. Gasket (60), bushing (59), washer (56), and jumper and screw assembly (61).

a. Assemble together.

Item (60) should be new.

b. Press into item (71). (61) should be facing the outside of item (71).

Jumper contact of item

54. Bushing (59), washers (58), (57), and (54), two washers (56), bar (55), washer (54), and nut (52).

Install on item (61).

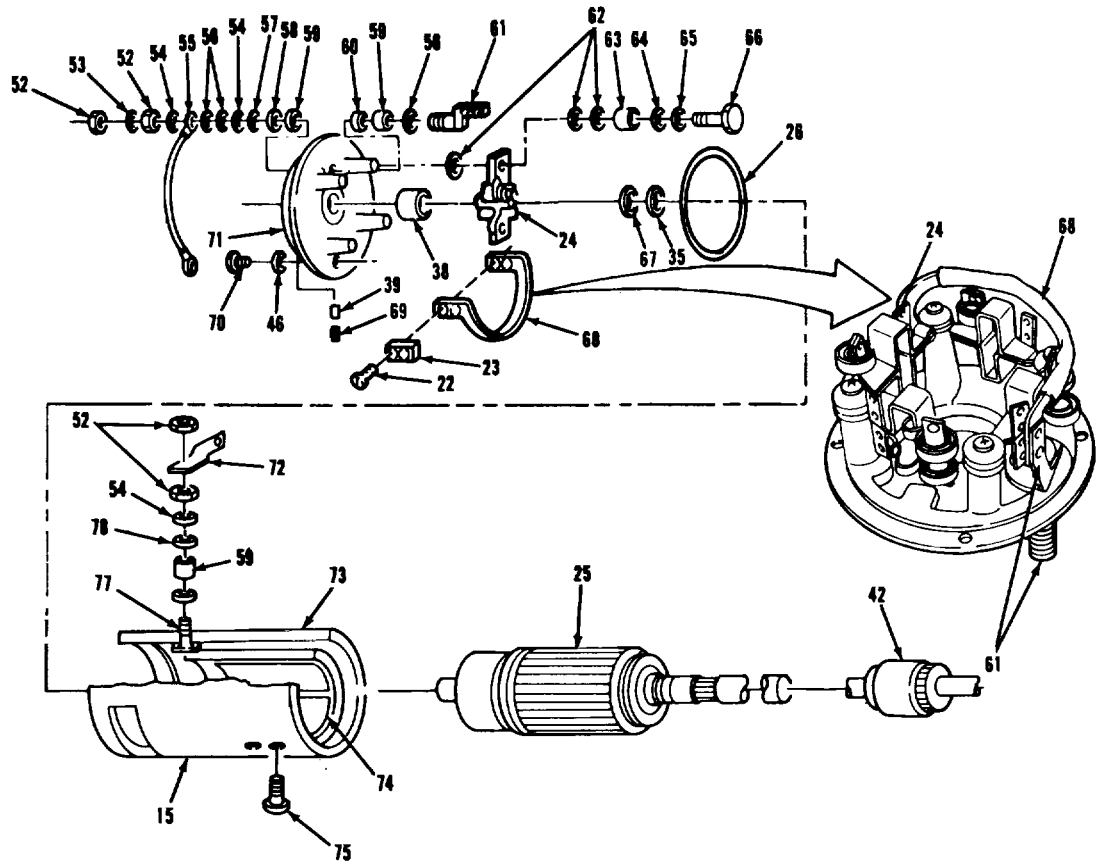
Torque item (52) to 40-70 lb-in..

55. Lockwasher (53) and nut (52).

Install on item (61), but do not tighten.

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | | |
|--|-----------------------------------|------------------------------|
| 15. FIELD RING | 54. PLAIN WASHER (3) | 67. PLAIN WASHER |
| 22. SELF-TAPPING SCREW (8) | 55. BUS BAR ASSEMBLY | 68. BRUSH HOLDER JUMPER |
| 23. LOCK PLATE (4) | 56. BELLEVILLE WASHER (3) | 69. PIPE PLUG |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 57. INSULATOR WASHER | 70. SCREW (4) |
| 25. ARMATURE ASSEMBLY | 58. INSULATOR WASHER | 71. COMMUTATOR END HOUSING |
| 26. O-RING (2) | 59. INSULATOR BUSHING (3) | 72. JUMPER |
| 35. PLAIN WASHER (2) | 60. GASKET | 73. POLE PIECE (4) |
| 38. SLEEVE BUSHING (2) | 61. JUMPER AND SCREW ASSEMBLY | 74. COIL AND JUMPER ASSEMBLY |
| 39. WICK (2) | 62. PLAIN WASHER (INSULATOR) (12) | 75. SCREW (8) |
| 42. DRIVE ASSEMBLY | 63. INSULATOR BUSHING (4) | 76. TERMINAL STUD |
| 46. LOCKWASHER (9) | 64. GUARD WASHER (4) | 77. INSULATOR |
| 52. PLAIN HEXAGON NUT (4) | 65. LOCKWASHER (4) | 78. INSULATOR |
| 53. LOCKWASHER | 66. THREADED TAPPING SCREW (4) | |

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ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

E. ASSEMBLY (Continued).

NOTE

Plain washer is an insulator and made of fiber material. There should be one of these washers installed both above and below each mounting arm of each brush holder and spring assembly.

56. Four bushings (63), twelve washers (62), four holders (24), four washer (64), four lockwashers (65), and four screws (66).	Install on item (71).
--	-----------------------

NOTE

One contact of brush holder jumper attaches between the jumper and screw assembly and a brush holder and spring assembly. The second contact mounts to the brush holder and spring assembly on the opposite side.

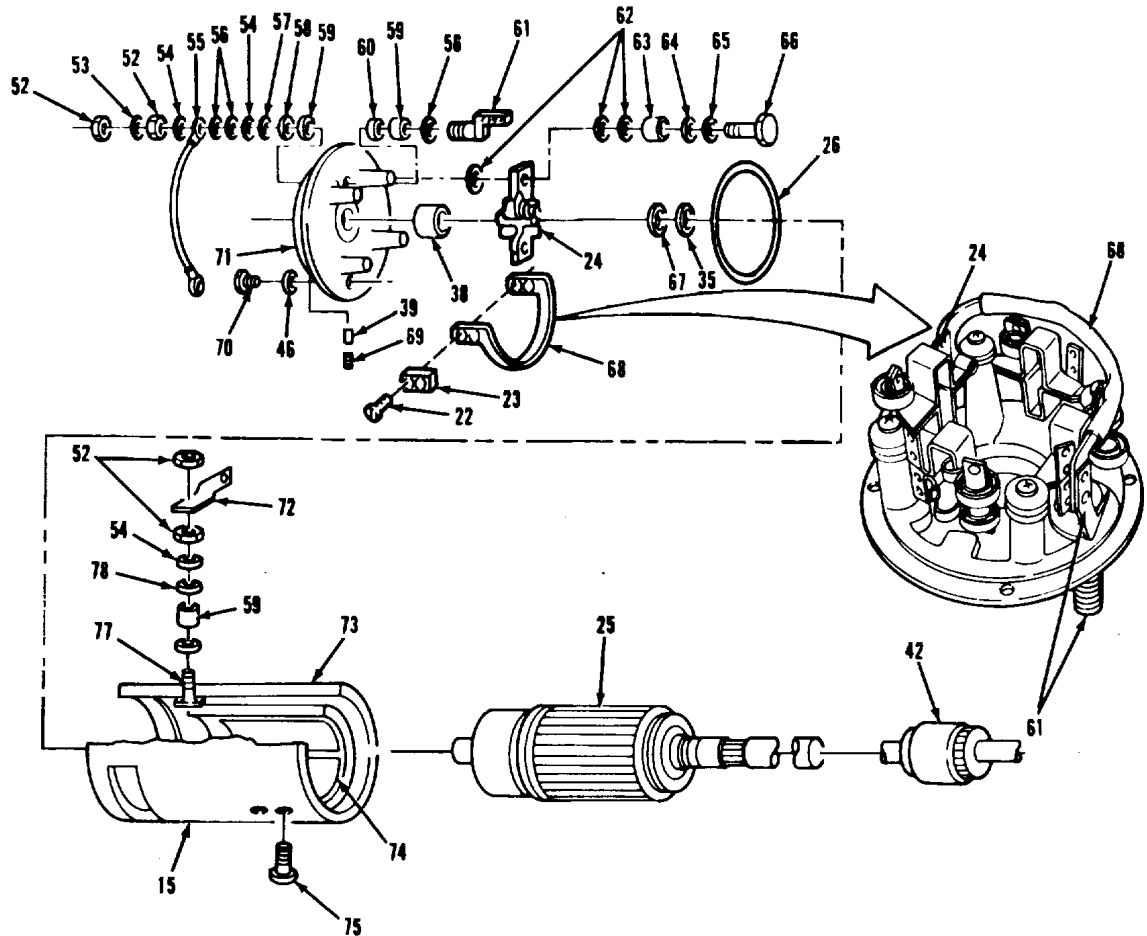
57. Jumper (68).	a. Position between item (61) and two items (24).
	b. Secure in place with two items (23) and four items (22).

NOTE

Aline communtator end housing with field ring using location markers. The location markers were scribed or marked on the housing prior to disassembly.

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | | |
|--|-----------------------------------|------------------------------|
| 15. FIELD RING | 54. PLAIN WASHER (3) | 67. PLAIN WASHER |
| 22. SELF-TAPPING SCREW (8) | 55. BUS BAR ASSEMBLY | 68. BRUSH HOLDER JUMP |
| 23. LOCK PLATE (4) | 56. BELLEVILLE WASHER (3) | 69. PIPE PLUG |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 57. INSULATOR WASHER | 70. SCREW (4) |
| 25. ARMATURE ASSEMBLY | 58. INSULATOR WASHER | 71. COMMUTATOR END HOUSING |
| 26. O-RING (2) | 59. INSULATOR BUSHING (3) | 72. JUMPER |
| 35. PLAIN WASHER (2) | 60. GASKET | 73. POLE PIECE (4) |
| 38. SLEEVE BUSHING (2) | 61. JUMPER AND SCREW ASSEMBLY | 74. COIL AND JUMPER ASSEMBLY |
| 39. WICK (2) | 62. PLAIN WASHER (INSULATOR) (12) | 75. SCREW (8) |
| 42. DRIVE ASSEMBLY | 63. INSULATOR BUSHING (4) | 76. TERMINAL STUD |
| 46. LOCKWASHER (9) | 64. GUARD WASHER (4) | 77. INSULATOR |

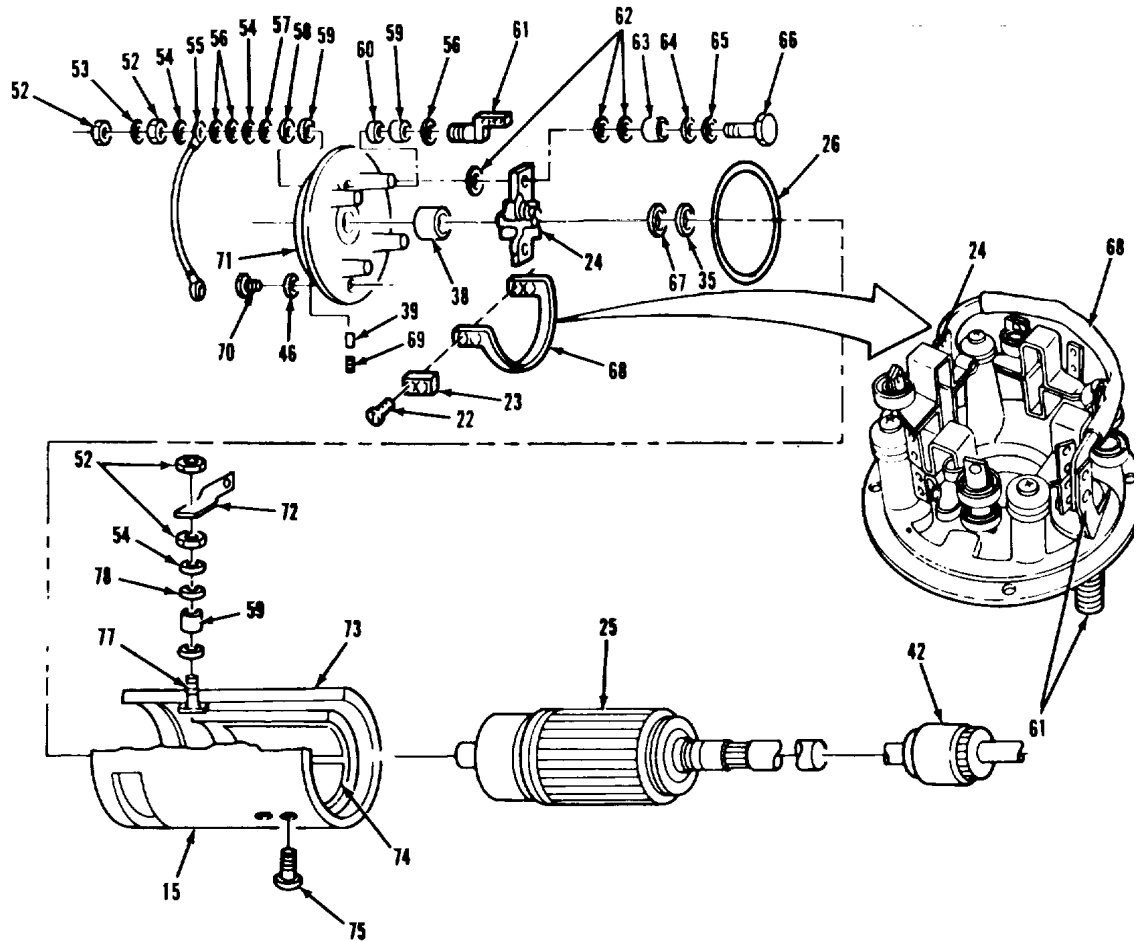
ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>E. ASSEMBLY (Continued).</u>		
58. Housing (71) with attaching hardware, O-ring (26), and ring (15).	a. Assemble together. b. Secure with four items (46) and four items (70).	Item (26) should be new. Torque to 40-50 lb-in..
59. Washers (35) and (67).	Install on item (25).	
60. Armature (25). as it will go.	Install into item (15) as far	

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | | |
|--|-----------------------------------|------------------------------|
| 15. FIELD RING | 54. PLAIN WASHER (3) | 67. PLAIN WASHER |
| 22. SELF-TAPPING SCREW (8) | 55. BUS BAR ASSEMBLY | 68. BRUSH HOLDER JUMP |
| 23. LOCK PLATE (4) | 56. BELLEVILLE WASHER (3) | 69. PIPE PLUG |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 57. INSULATOR WASHER | 70. SCREW (4) |
| 25. ARMATURE ASSEMBLY | 58. INSULATOR WASHER | 71. COMMUTATOR END HOUSING |
| 26. O-RING (2) | 59. INSULATOR BUSHING (3) | 72. JUMPER |
| 35. PLAIN WASHER (2) | 60. GASKET | 73. POLE PIECE (4) |
| 38. SLEEVE BUSHING (2) | 61. JUMPER AND SCREW ASSEMBLY | 74. COIL AND JUMPER ASSEMBLY |
| 39. WICK (2) | 62. PLAIN WASHER (INSULATOR) (12) | 75. SCREW (8) |
| 42. DRIVE ASSEMBLY | 63. INSULATOR BUSHING (4) | 76. TERMINAL STUD |
| 46. LOCKWASHER (9) | 64. GUARD WASHER (4) | 77. INSULATOR |

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****E. ASSEMBLY (Continued).**

- | | | |
|-------------------|---|--------------------------|
| 1. Setscrew (48). | a. Place in position on item (11).

b. Screw in until you feel it on the inside of item (11). | Item (48) should be new. |
| 62. Bushing (49). | Press into item (11) until flush with housing. | |

NOTE

After installing new bushing, slide it over shaft of armature assembly. If it is hard to slide on and off, ream it out until it slides on and off easily. Be careful not to make it too loose as it acts as a bearing for the shaft to rotate on.

- | | | |
|--|--|---|
| 63. Screw (12) and arm (33). | a. Assemble together.

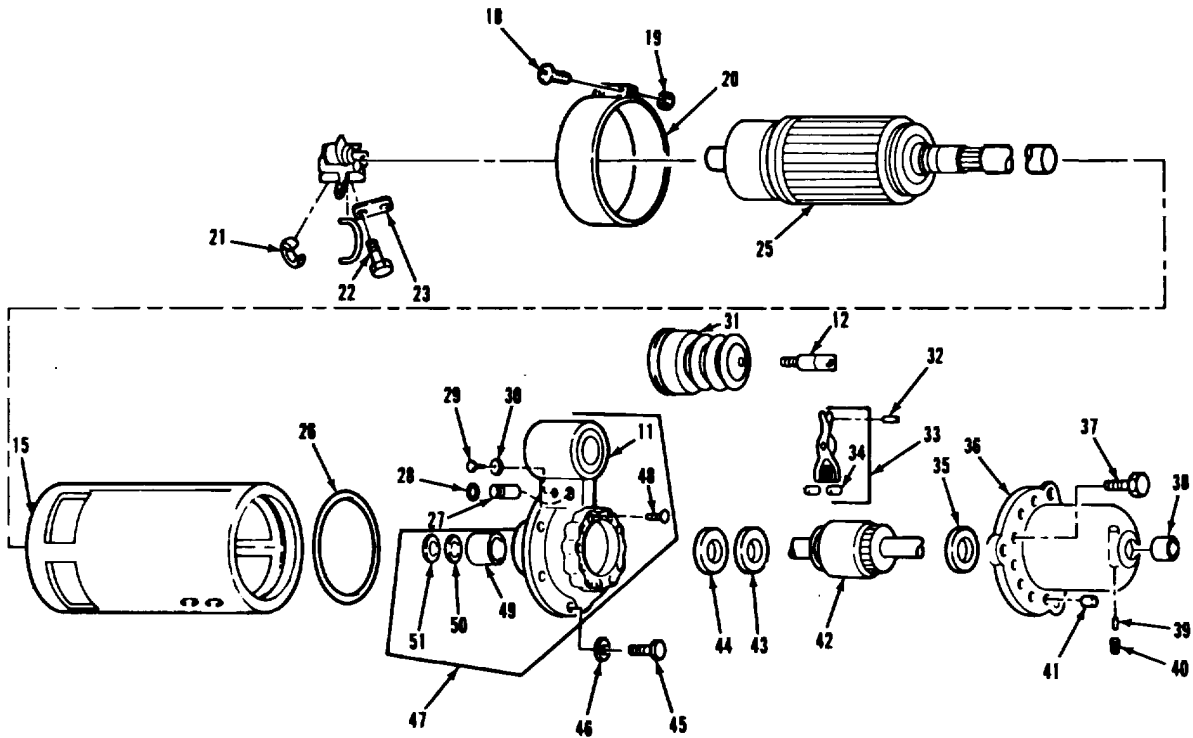
b. Secure with item (32). | |
| 64. O-ring (27). | Install on item (28). | Item (27) should be new. |
| 65. Arm (33), with screw (12) and pin (32) attached. | a. Position inside housing of item (11).

b. Secure with items (28), (29), and (30). | Two items (34) are not installed yet.

Item (27) should be attached to item (28). |
| 66. Boot (31). | Install into housing of item (11) and feed threads of item (12) through hole in center. | |

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST BOOT | 50. THRUST WASHER |
| 32. HEADLESS STRAIGHT PIN | 51. SEAL |
| 33. ARM ASSEMBLY | |

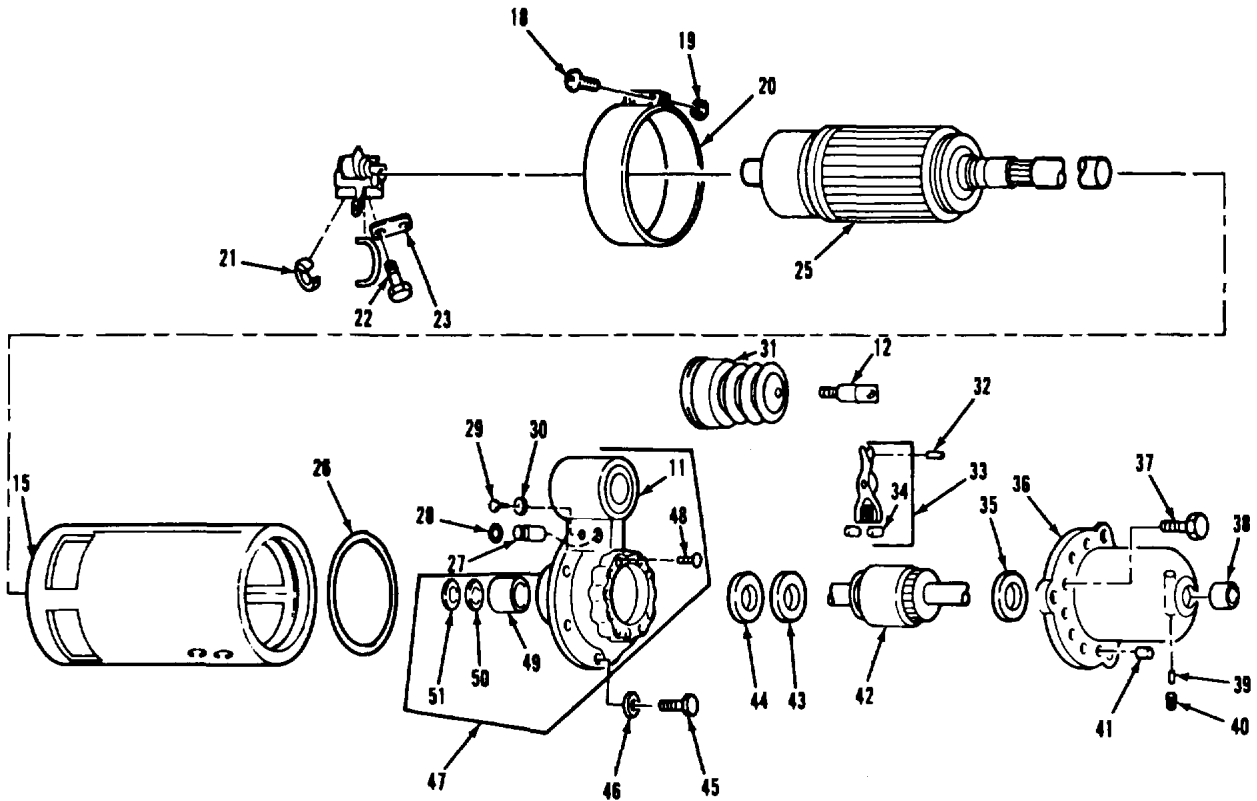
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3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>E. ASSEMBLY (Continued).</u>		
67. Washer (43) and seal (44).	Install on item (42).	Item (44) should be new.
68. Seal (51) and washer (50).	Install in item (11).	
69. Two cams (34).	Install on item (33).	
70. Drive assembly (42).	Install into housing of item (11).	
NOTE		
Aline housing assembly with field ring using location markers. The location markers were scribed or marked on their housings prior to disassembly.		
71. Housing assembly (47) with attaching parts and O-ring (26).	a. Slide over item (25) and position on item (15).	Item (26) should be new.
	b. Secure with five items (45) and (46).	Torque to 40-50 lb-in..
72. Washer (35).	Install on item (25).	

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****E. ASSEMBLY (Continued).**

73. Bushing (38).
with housing end.

Press into item (36) flush

NOTE

After installing new bushing, slide it over shaft of armature assembly. If it is hard to slide on and off, ream it out until it slides on and off easily. Be careful not to make it too loose as it acts as a bearing for the shaft to rotate on.

74. Wick (39) and
six plugs (40).

a. Install item (39) into
mounting hole of item
(40).

b. Add three to five drops
of oil into mounting hole
of item (40).

Use OE/HDO-30.

c. Install item (40).

NOTE

Aline nose housing with housing assembly using location markers. The location markers were scribed or marked on their housings prior to disassembly.

75. Housing (36) and
housing assembly
(47).

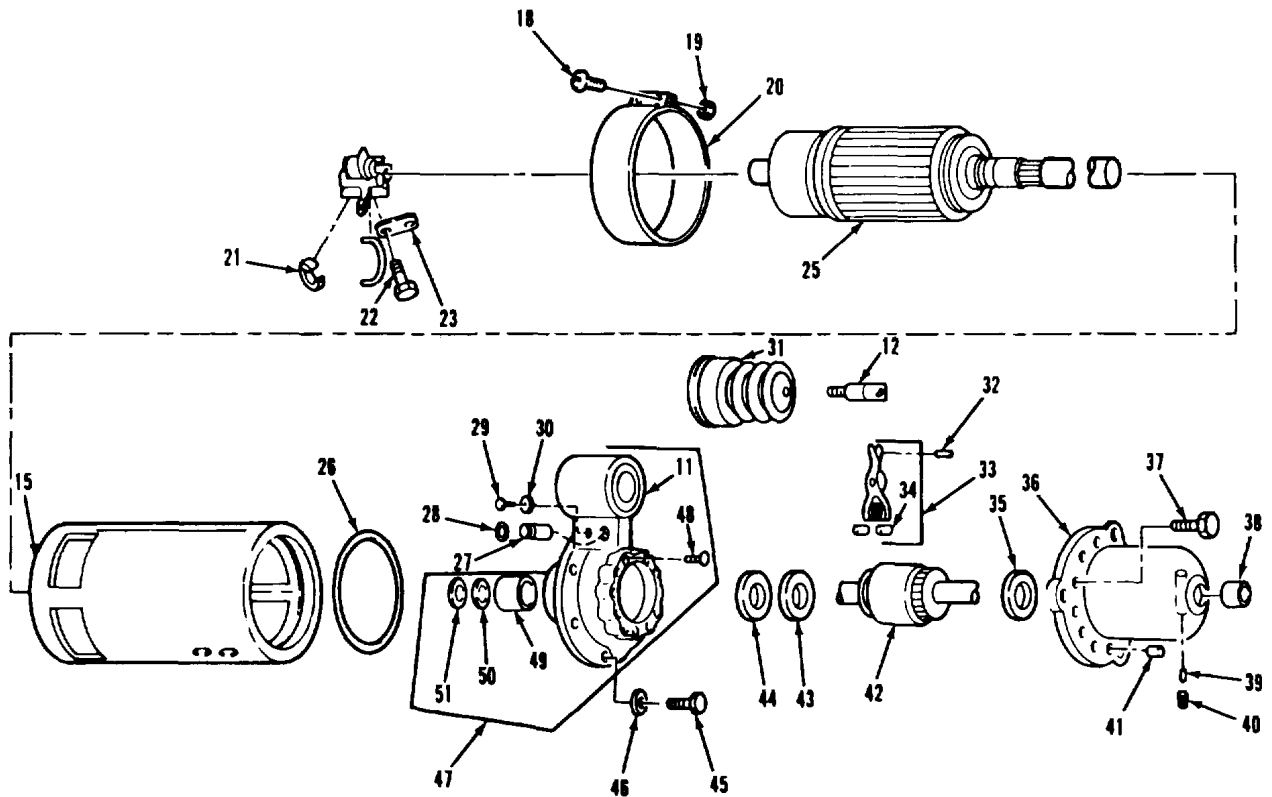
a. Slide item (36) onto item
(25) and aline with item
(47).

b. Secure with six items
(37).

Torque to 40-50 lb-in..

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST ROOT | 50. THROTTLE WASHER |

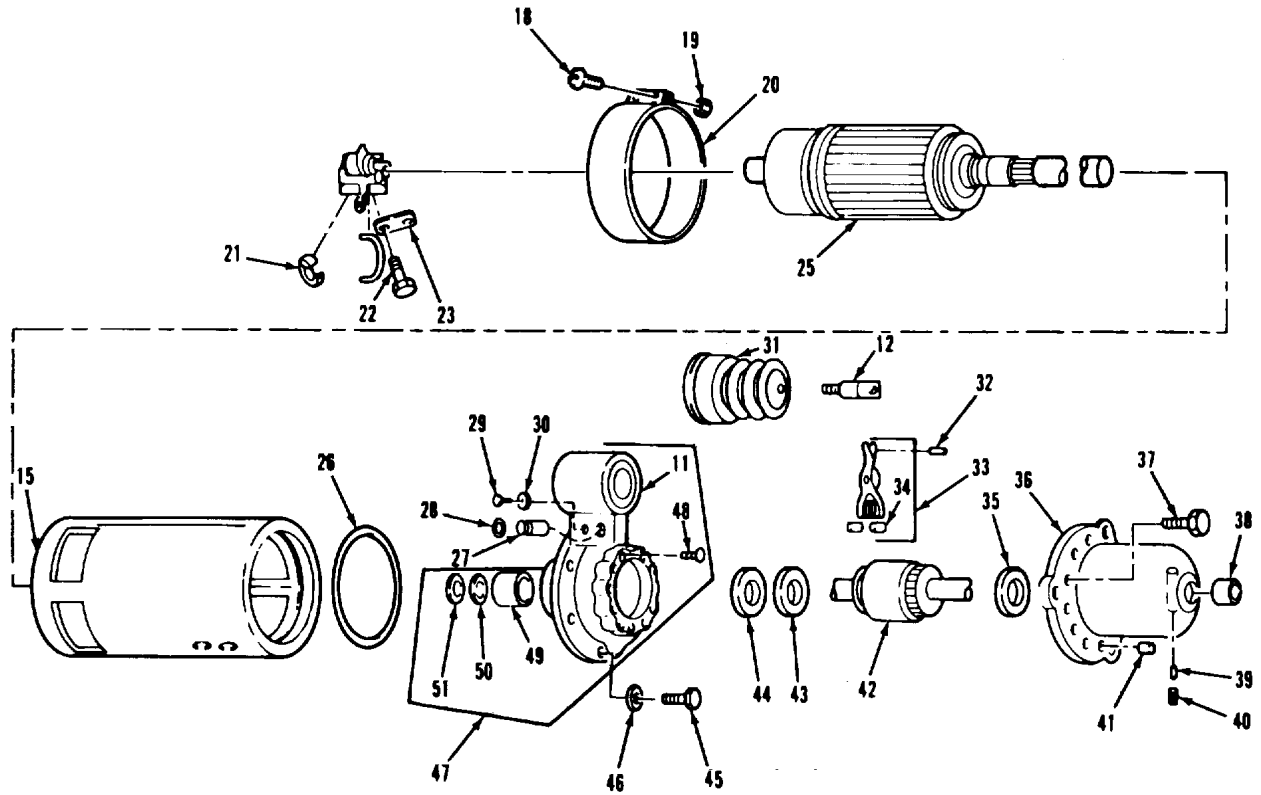
3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****E. ASSEMBLY (Continued).****NOTE**

There are four locations where electrical brushes are to be installed. Each location will contain two electrical brushes, one lock plate and two self-tapping screws. Two of these locations already have two selftapping screws and a lock plate installed. Only remove one plate with two screws at a time while installing electrical brushes. If both plates and four screws are removed, parts installed during an earlier step may fall apart.

- | | |
|--|---|
| 76. Eight brushes (21), four plates (23), and eight screws (22). | <ul style="list-style-type: none"> a. Install on four items (24). b. Slide eight items (21) into spring retainers of four items (24). |
| 77. Cover (20), two screws (18) and nuts (19). | Install on item (15). |

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

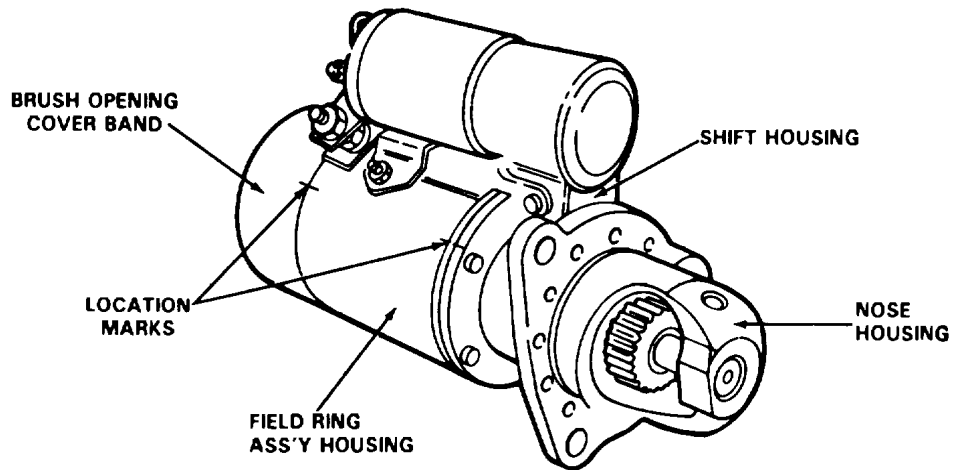
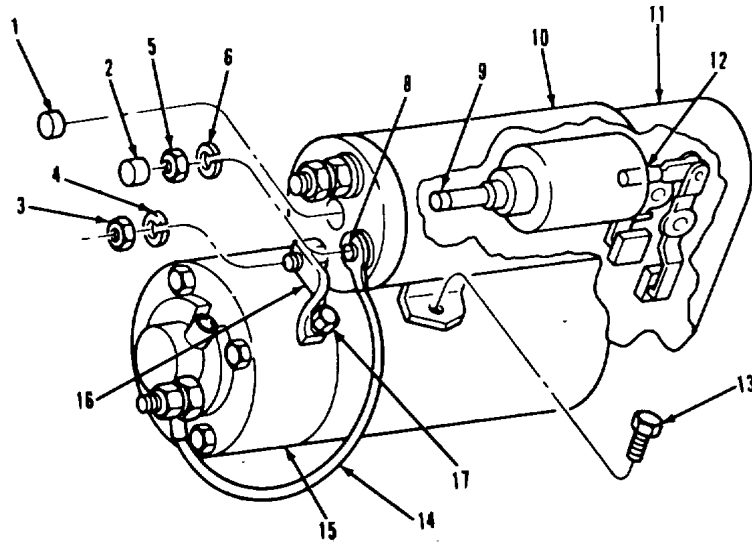
- | | |
|--|-------------------------|
| 11. HOUSING ASSEMBLY | 34. CAM (2) |
| 12. LINK SCREW | 35. PLAIN WASHER (2) |
| 15. FIELD RING | 36. NOSE HOUSING |
| 18. ROUND HEAD SCREW (2) | 37. SCREW (6) |
| 19. SQUARE NUT (2) | 38. SLEEVE BUSHING (2) |
| 20. ACCESS COVER | 39. WICK (2) |
| 21. ELECTRICAL BRUSH (8) | 40. PIPE PLUG |
| 22. SELF-TAPPING SCREW (8) | 41. SEALING PLUG (6) |
| 23. LOCK PLATE (4) | 42. DRIVE ASSEMBLY |
| 24. BRUSH HOLDER AND SPRING ASSEMBLY (4) | 43. BRAKE WASHER |
| 25. ARMATURE ASSEMBLY | 44. PLAIN SEAL |
| 26. O-RING (2) | 45. SOCKET CAPSCREW (5) |
| 27. O-RING | 46. LOCKWASHER (9) |
| 28. SHIFT LEVER SHAFT | 47. HOUSING ASSEMBLY |
| 29. SOCKET HEAD SCREW | 48. SETSCREW |
| 30. PLAIN WASHER | 49. BUSHING |
| 31. DUST AND MOIST BOOT | 50. THRUST WASHER |

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>E. ASSEMBLY (Continued).</u>		
NOTE		
Switch assembly attaches to housing assembly by the timing shaft and link screw. The timing shaft and link screw are joined with standard screw type threads. To install, simply screw on using a 1/4" nut driver or 1/4" deep drive socket.		
78. Switch assembly (10) and shaft (9).	a. Apply two drops of Loctite 2214® on threads of item (12). b. Screw item (10) onto item (11) by turning item (9) approximately ten turns. c. Secure to item (15) with two items (13).	
79. Plug (1).	Install on item (10).	
80. Bus bar (16), washer (4), nut (3) and nut (17).	Install on items (7) and (15).	
81. Wire (14), lock-washer (6), nut (5), and cap (2).	Install on item (8). tape end of item (8).	If item (2) is missing

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | |
|-------------------|--------------------------|
| 1. PLUG | 10. SWITCH ASSEMBLY |
| 2. CAP (2) | 11. HOUSING ASSEMBLY |
| 3. HEXAGON NUT | 12. LINK SCREW |
| 4. LOCKWASHER | 13. HEXAGON CAPSCREW (2) |
| 5. HEXAGON NUT | 14. JUMPER WIRE |
| 6. LOCKWASHER | 15. FIELD RING |
| 7. TERMINAL NO. 3 | 16. BUS BAR |

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>E. CALIBRATION.</u>		
82. Plug (1).	Remove from item (10).	
83. Four cables (89), battery (91), and switch (90).	Connect as shown.	Items (7), (8), (10), (14), (16), (61), and (76) are already installed.

NOTE

Make gage bar by cutting a piece of 3/16" square bar stock to a length approximately 6" long.

84. Switch (90).	Set to ON.	
85. Driver (92), shaft (9), drive (42), washer (35), and housing (36).	a. Insert items (92) and (93) as shown. b. Adjust spacing so that clearance at points indicated is approximately 3/16 inch. c. Remove items (92) and (93).	Adjustment is made by turning item (9) with item (92).
86. Plug (1).	Install into item (10).	

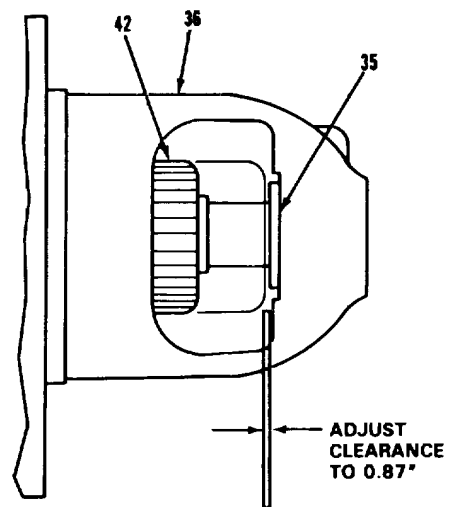
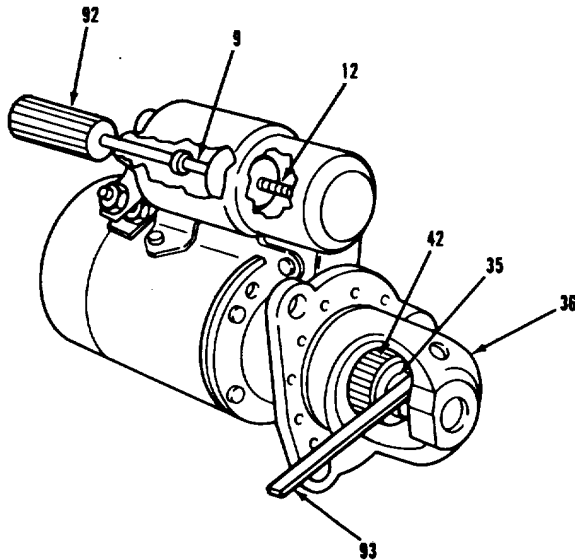
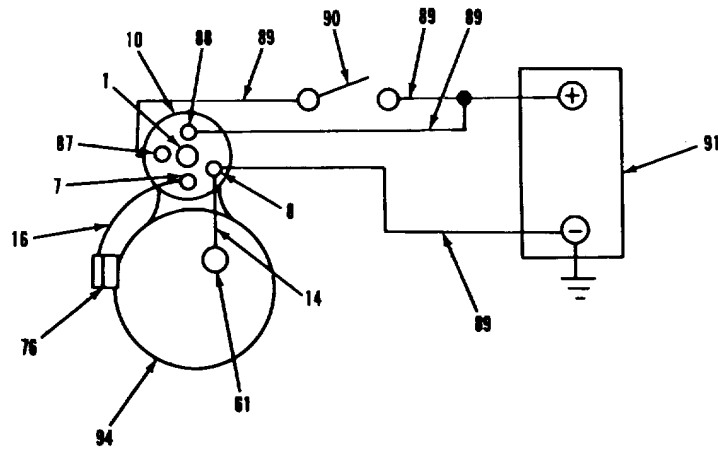
NOTE

Follow-on maintenance action required:

Install starter (TM 9-2320-283-20).

ELECTRICAL SYSTEM.

3-22. STARTER MOTOR AND SOLENOID REPAIR (Continued)



LEGEND:

- | | |
|----------------------------|-------------------------------|
| 1. PLUG | 61. JUMPER AND SCREW ASSEMBLY |
| 7. TERMINAL NO. 3 | 76. TERMINAL STUD |
| 8. TERMINAL NO. 4 | 87. TERMINAL NO. 1 |
| 9. TIMING SHAFT | 88. TERMINAL NO. 2 |
| 10. SWITCH ASSEMBLY | 89. ONE GAGE CABLE (4) |
| 12. LINK SCREW | 90. SWITCH |
| 14. SPECIAL CABLE ASSEMBLY | 91. TWENTY-FOUR VOLT BATTERY |
| 16. BUS BAR | 92. NUT DRIVER (1/4" DRIVE) |
| 35. PLAIN WASHER | 93. GAGE BAR (3/16" SQUARE) |
| 36. NOSE HOUSING | 94. STARTER MOTOR |
| 42. DRIVE ASSEMBLY | |

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Section VI. TRANSMISSION

3-23. GENERAL.

This section provides procedures authorized at direct and general support maintenance levels to replace, repair, test, and adjust the HT 754 CRD automatic transmission. To find a specific procedure contained in this section, see the task summary below:

3-24. TASK SUMMARY.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	(Refer to specific paragraph for this information).	

TEST EQUIPMENT

Pressure gage set (1)
4910-00-572-8612.

SPECIAL TOOLS

Guide pins	Stator cam spring and
(33287) J-24315-2.	roller retainer ring
Holding fixture	(33287) J-24218-2.
(33287) J-24310.	Lockup valve and main
Lifting tool	pressure regulator
(33287) J-24365.	Spring compressor
Guide pin (2)	(33287) J-24219.
(33287) J-3387-2.	Front support hub needle
Remover and installer	bearing installer
converter pump snapping	(33287) J-24197.
(33287) J-26598.	Guide pin
Forward clutch lifting tool	(33287) J-24315-1.
(33287) J-33709-1.	Dust shield (front seal
Fourth clutch lifting tool	installer)
(33287) J-24209.	(33287) J-24198.
Center support compressor bar tool	Driver handle
(33287) J-24208-3.	(33287) J-24202-4.
Center support lifting bracket	Bearing driver
(33287) J-24195.	(33287) J-28646.
Main shaft lifting bracket	Washer
(33287) J-24196.	(33287) J-33080-13.

TRANSMISSION.**3-24. TASK SUMMARY (Continued).**INITIAL SETUP (Continued).SPECIAL TOOLS

Collar (33287) J-33080-5.	Planetary rebuilding set (33287) J-25587-01.
Collet (33287) J-33080-4.	Lockring installer (33287) J-24453.
Bridge (33287) J-33080-1.	Seal and dust shield remover (33287) J-24171.
Retriever (33287) J-33080-2.	Output shaft seal installer (33287) J-24202.
Height gage (33287) J-33080-7.	Output shaft bushing installer (33287) J-24203.
Clutch spring compressor (33287) J-24204-3.	Speedometer bushing remover and installer (33287) J-24204.
Lower removal tool (33287) J-26899-2.	Orifice plug installer (33287) J-24369.
Collector ring installer (33287) J-24002-2.	Governor support pin installer (33287) J-28684.
Staking tool (33287) J-24002-1.	Slide hammer (33287) J-6125-1.
Forward clutch seal protector (33287) J-2421601.	Clutch piston seal protector (33287) J-24210.
Clutch pack clearance gage (33287) J-24192.	Shift lever seal installer (33287) J-26282.
Center fixture tool (33287) J-26899-1.	Clutch pack clearance gage (33287) J-24192.
Clutch plate alinement tool (33287) J-24221.	Center support lifting bracket (33287) J-24195.
Bar and stud assembly tool (33287) J-24204-2.	Center support compressor bar tool set (33287) SE-2553.
Bushing remover tool (33287) J-28525-2.	Snapping selection gage (33287) J-24208-13.
Lockring installer (33287) J-24453.	Converter housing alinement pin (33287) J-1126-1.
Bushing installer - (33287) J-28525-1.	Pilot tube (33287) J-6889-1.
Sun gear bushing staking tool (33287) J-26997.	Guide pin (33287) J-24315-3.
Main shaft orifice plug installer (33287) J-24217.	Valve adjusting ring tool (1) (33287) J-24314.
Drive handle (33287) J-8092.	
Front planetary bushing sleeve installer (33287) J-24207.	

TRANSMISSION.

3-24. TASK SUMMARY (Continued).

INITIAL SETUP (Continued)

MATERIALS/PARTS (P/N)

Oil, lubricating: OE/HDO-30.
Item 17, Appendix B.
Grease, oil soluble
Item 9, Appendix B.
Sealer, nonhardening
Item 28, Appendix B.
Loctite, RC601®
Item 12, Appendix B.
Fluid, automatic transmission
Item 6, Appendix B.

Crocus cloth
Item 1, Appendix B.
Grease, high temperature
Item 8, Appendix B.
Parts tags
Item 32, Appendix B.
Mineral spirits,
Item 15, Appendix B.
Transmission overhaul kit
(73342) 6885217.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

LO 9-2320-283-12.
TM 9-2320-283-10.
TM 9-2320-283-20.
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

Front and rear wheels blocked.
Parking brake on.

Personnel must be clear from underside of vehicle with engine running.

TROUBLESHOOTING REFERENCES

Paragraph 2-11.

TASK OF TASKS

TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)
1	Wear Limits and Replacement Standards	3-25	
2	Transmission Mounts Replacement	3-26	
	a. Removal.	3-26a	
	b. Cleaning.	3-26b	
	c. Inspection.	3-26c	
	d. Installation.	3-26d	

TRANSMISSION.

3-24. TASK SUMMARY (Continued).

TASK OF TASKS				
TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)	
3	Transmission Replacement a. Removal. b. Installation.	3-27 3-27a 3-27b	2-7	
4	Installation and Removal of Transmission on Holding Fixture a. Cleaning. b. Installation. c. Removal.	3-28 3-28a 3-28b 3-28c	2-7	
5	Governor, Flywheel, Turbine, and Stator Removal	3-29	2-7	
6	Oil Pan and Valve Body Removal	3-30	2-7	
7	Torque Converter Pump and Converter Housing Removal	3-31	2-7	
8	Forward, Fourth, and Third Clutch Removal	3-32	2-7	
9	Rear Cover and Low-Reverse Clutch Removal	3-33	2-7	
10	Adapter Housing, First-Reverse Clutch, and Center Support Removal	3-34	2-7	
11	Gear Unit and Second Clutch Removal	3-35	2-7	
12	Flywheel and Turbine Repair a. Disassembly. b. Cleaning. c. Inspection. d. Assembly.	3-36 3-36a 3-36b 3-36c 3-36d	2-7	
13	Stator Repair a. Disassembly. b. Cleaning. c. Inspection. d. Assembly.	3-37 3-37a 3-37b 3-37c 3-37d	2-7	

TRANSMISSION.

3-24. TASK SUMMARY (Continued).

TASK OF TASKS				
TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)	
14	Torque Converter Pump Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-38 3-38a 3-38b 3-38c	2-7	
15	Converter Housing and Front Support Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-39 3-39a 3-39b 3-39c	2-7	
16	Forward Clutch and Input Shaft Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-40 3-40a 3-40b 3-40c	2-7	
17	Forth Clutch Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-41 3-41a 3-41b 3-41c	2-7	
18	Center Support Repair a. Disassembly. b. Cleaning. c. Inspection. d. Assembly.	3-42 3-42a 3-42b 3-42c 3-42d	2-7	
19	Gear Unit and Mainshaft Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-43 3-43a 3-43b 3-43c	2-7	
20	Planetary Carrier Bushing Repair a. Cleaning. b. Inspection. c. Repair.	3-44 3-44a 3-44b 3-44c	2-7	
21	Adapter Housing Repair a. Disassembly. b. Cleaning. c. Inspection. d. Assembly.	3-45 3-45a 3-45b 3-45c 3-45d	2-7	

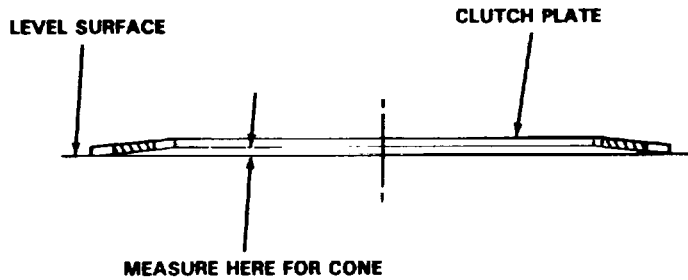
TRANSMISSION.

3-24. TASK SUMMARY (Continued).

TASK OF TASKS				
TASK NO.	TASK	TASK REF	TROUBLESHOOTING REF NO. (PARA)	
22	Rear Cover Repair a. Disassembly. b. Cleaning. c. Inspection. d. Assembly.	3-46 3-46a 3-46b 3-46c 3-46d	2-7	
23	Transmission Housing Repair a. Disassembly. b. Cleaning and Inspection. c. Assembly.	3-47 3-47a 3-47b 3-47c	2-7	
24	Establishing Clutch Clearance a. Cleaning. b. Inspection. c. Assembly.	3-48 3-48a 3-48b 3-48c	2-7	
25	First and Reverse Clutches, Gear Unit, Second Clutch, and Center Support Installation	3-49	2-7	
26	Adapter Housing, Low-Reverse Clutch, Rear Cover, and Governor Installation	3-50	2-7	
27	Fourth, Third, and Forward Clutch Installation	3-51	2-7	
28	Torque Converter Housing Installation	3-52	2-7	
29	Torque Converter Pump and Stator Installation	3-53	2-7	
30	Valve Body and Oil Pan Installation	3-54	2-7	
31	Flywheel and Turbine Installation	3-55	2-7	
32	Shift Speed Adjustment a. Testing. b. Adjustment.	3-56 3-56a 3-56b	2-7	
33	Transmission Oil Pressure Test a. Lubrication Oil Pressure Testing. b. Main Oil Pressure Testing.	3-57 3-57a 3-57b	2-7	

3-25. TRANSMISSION WEAR LIMITS AND REPLACEMENT STANDARDS.

- a. All parts which do not meet the minimum wear standard specified in Table 3-1 will be replaced with new material.
- b. All used parts considered for reuse must comply with minimum wear standards specified in Table 3-1. Parts must be closely inspected to ensure there is no damage in areas not listed in Table 3-1, which would make them unfit for further use.
- c. To measure cone in clutch plates, put clutch plate on a smooth level surface and measure from inside diameter of clutch plate and level surface. See illustration below:



**METHOD OF MEASURING CLUTCH
PLATE CONE**

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Table 3-1. WEAR LIMITS.

Part Name	Measurement	Minimum (Inches)	Maximum (Inches)
FLYWHEEL AND TURBINE			
Lockup clutch piston	Face wear		0.010
Lockup clutch plate internally splined	Thickness	0.019	
	Depth of oil grooves	0.008	
Backing plate	Face wear	0.010	
STATOR			
Thrust bearing race	Thickness	0.029	
Stator free wheel roller race	Outside diameter	3.998	
CONVERTER HOUSING			
Pump cover, driven gear, and oil pump body	End clearance		0.006
Pump cover, driven gear, and oil pump body	End clearance		0.006
FORWARD CLUTCH			
Externally toothed forward clutch plate	Thickness	0.0993	
	Cone		0.010
Internally splined forward clutch plate	Thickness	0.090	
	Depth of oil grooves	0.008	
Fourth clutch driving hub face	Thickness of friction	0.390	
FOURTH CLUTCH			
Backing plate	Thickness	0.380	
Internally splined clutch plate	Thickness	0.090	
Externally toothed clutch plate	Thickness Cone	0.0993	0.010

Table 3-1. Wear Limits (Continued).

Part Name	Measurement	Minimum (Inches)	Maximum (Inches)
THIRD CLUTCH			
Third clutch backing plate	Thickness	0.490	
Internally splined clutch plate	Thickness	0.1347	
Externally toothed third clutch plate	Thickness (P/N 6834488)	0.0993	
	Thickness (P/N 6834720)	0.1161	
	Cone		0.013
SECOND SUPPORT			
Internally splined clutch plate	Thickness	0.1347	
Externally toothed third clutch plate	Thickness (P/N 6834488)	0.0993	
	Thickness (P/N 6834720)	0.1161	
	Cone		0.013
CENTER SUPPORT			
Bushing, sun gear, and shaft assembly	Clearance		0.0065
GEAR UNIT AND MAINSHAFT			
Bronze thrust washer	Thickness	0.091	
Thrust washer (all)	Thickness	0.091	
Sleeve bushing and main shaft assembly	Clearance		0.0064
Front planetary carrier assembly, sun gear, and shaft assembly	Clearance		0.0072
Sun gear, shaft assembly, and center support bushing	Clearance		0.0065

Table 3-1. Wear Limits (Continued).

Part Name	Measurement	Minimum (Inches)	Maximum (Inches)
TRANSMISSION HOUSING			
Transmission housing	Depth of grooves for externally toothed clutch plates	0.090	
FIRST AND REVERSE CLUTCH			
Externally toothed clutch plate	Thickness (P/N 6834680)	0.0993	
	Thickness (P/N 6834766) Cone	0.1161	0.013
Internally splined clutch plate	Thickness	0.1347	
	Depth of oil grooves	0.008	
LOW-REVERSE CLUTCH			
Low and reverse clutch plate internally toothed	Thickness	0.1347	
	Depth of oil grooves	0.008	
Low and reverse clutch plate externally toothed	Thickness (P/N 6834680)	0.0993	
	Thickness (P/N 6834766)	0.1161	
	Cone		0.013
ADAPTER HOUSING			
Adapter housing externally toothed clutch plates	Depth of grooves for	0.090	
REAR COVER			
Rear cover and governor	Clearance		0.004
Bushing and mainshaft assembly	Clearance		0.004

TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT

THIS TASK COVERS

- a. Removal.
- b. Cleaning.
- c. Inspection.
- d. Installation.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u> All.	<u>EQUIPMENT CONDITION PARAGRAPH</u> None.	<u>CONDITION DESCRIPTION</u> None.
--	---	---------------------------------------

TEST EQUIPMENT
None.

SPECIAL TOOLS
None.

MATERIALS/PARTS (P/N)
None.

PERSONNEL REQUIRED
two (MOS-63W .

SPECIAL ENVIRONMENTAL CONDITIONS
None.

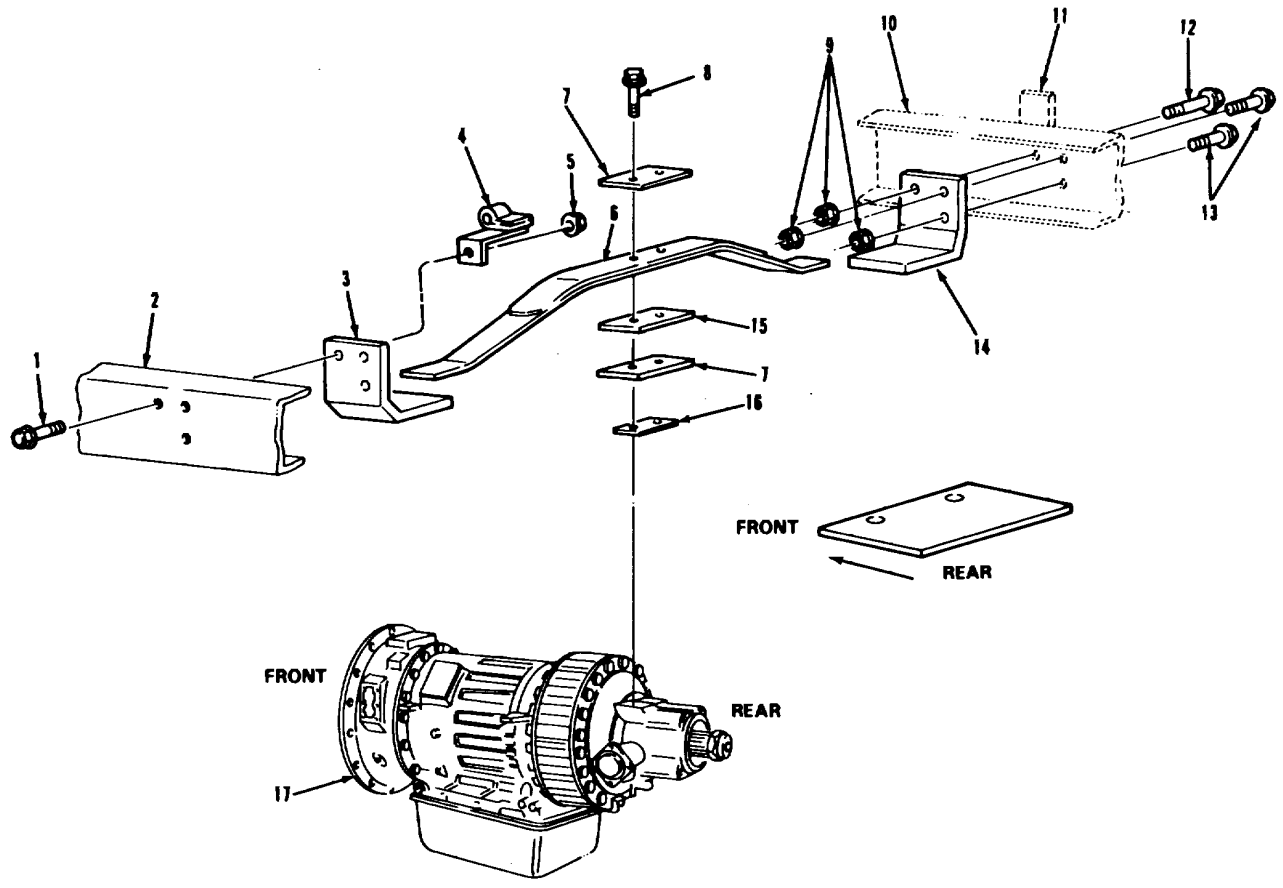
REFERENCES (TM)
None.

GENERAL SAFETY INSTRUCTIONS
None.

TROUBLESHOOTING REFERENCES
Paragraph 2-7.

TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).



LEGEND:

- | | |
|---|---|
| 1. FLANGE HEAD SCREW (3) | 9. FLANGE HEAD NUT (3) |
| 2. LEFT-HAND MAIN RAIL | 10. RIGHT-HAND MAIN RAIL |
| 3. LEFT-HAND TRANSMISSION MOUNT BRACKET | 11. BATTERY BOX MOUNTING BRACKET |
| 4. TUBE SUPPORT BRACKET | 12. FLANGE HEAD SCREW |
| 5. FLANGE HEAD NUT (3) | 13. FLANGE HEAD SCREW (2) |
| 6. TRANSMISSION MOUNT SPRING | 14. RIGHT-HAND TRANSMISSION MOUNT BRACKET |
| 7. TRANSMISSION MOUNT CLAMP (2) | 15. TRANSMISSION MOUNT INSULATOR |
| 8. FLANGE HEAD SCREW (2) | 16. SPACER PLATE |
| | 17. TRANSMISSION |

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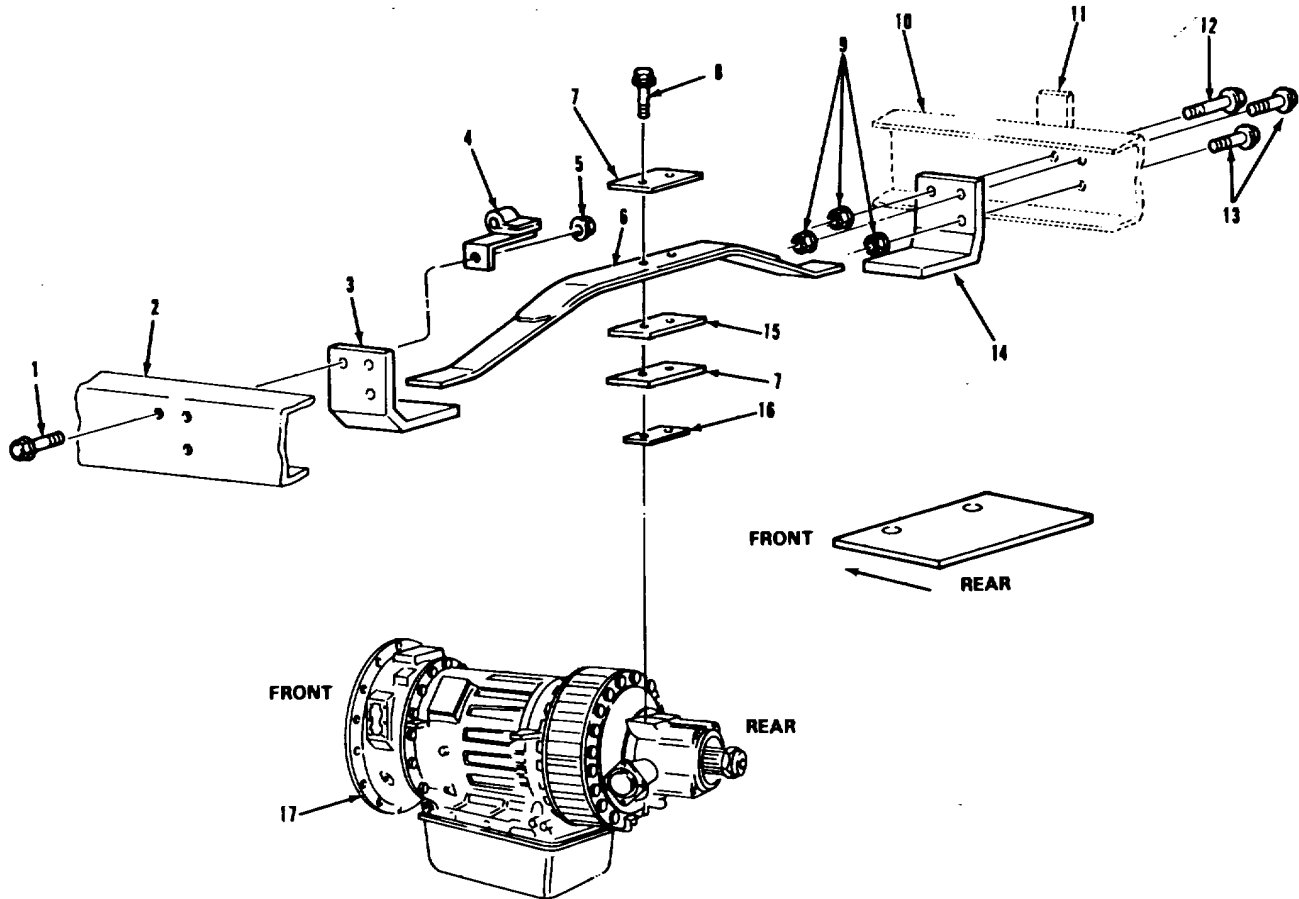
TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>REMOVAL.</u>		
<u>WARNING</u>		
<p>Apply downward pressure to relieve spring tension when disconnecting transmission mount spring. A sudden release of pressure could cause injury to personnel.</p>		
<u>NOTE</u>		
Two persons may be needed for step 1 below.		
1. Two screws (8).	<p>a. Remove while applying downward pressure against item (7). removing two items (8). b. Slowly release downward pressure.</p>	<p>Apply pressure using suitable bar or tool for leverage while-j</p>
2. Two clamps (7), spring (6), insulator (15), and plate (16).	Remove from item (17).	
3. Brackets (3) and (4), three screws (1) and three nuts (s).	Remove from item (2).	
4. Bracket (14), screw (12), two screws (13), and three nuts (9).	Remove from items (10) and (11).	

TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).



LEGEND:

- | | |
|---|---|
| 1. FLANGE HEAD SCREW (3) | 9. FLANGE HEAD NUT (3) |
| 2. LEFT-HAND MAIN RAIL | 10. RIGHT-HAND MAIN RAIL |
| 3. LEFT-HAND TRANSMISSION MOUNT BRACKET | 11. BATTERY BOX MOUNTING BRACKET |
| 4. TUBE SUPPORT BRACKET | 12. FLANGE HEAD SCREW |
| 5. FLANGE HEAD NUT (3) | 13. FLANGE HEAD SCREW (2) |
| 6. TRANSMISSION MOUNT SPRING | 14. RIGHT-HAND TRANSMISSION MOUNT BRACKET |
| 7. TRANSMISSION MOUNT CLAMP (2) | 15. TRANSMISSION MOUNT INSULATOR |
| 8. FLANGE HEAD SCREW (2) | 16. SPACER PLATE |
| | 17. TRANSMISSION |

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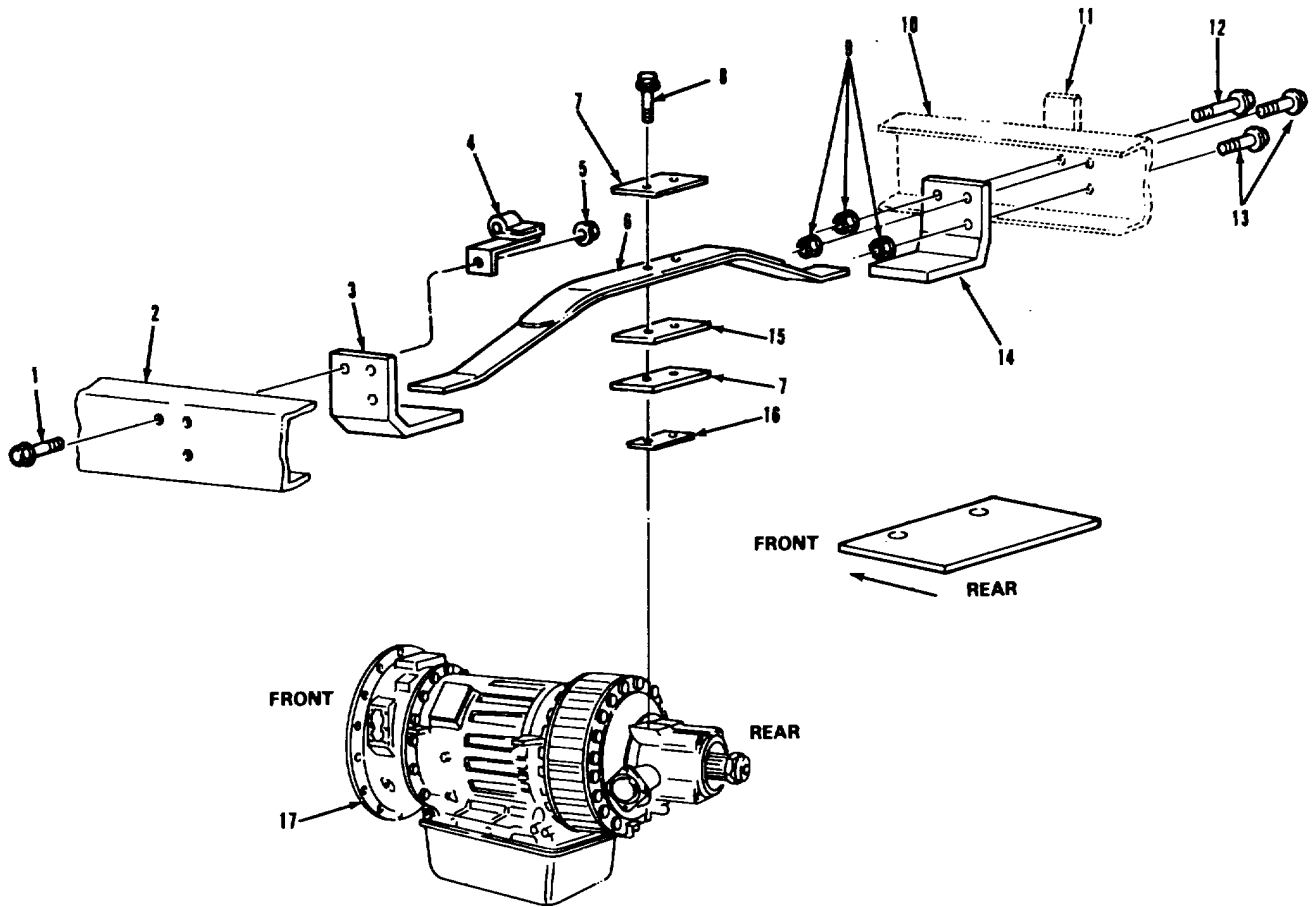
TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
B. <u>CLEANING.</u>		
5. All parts.	Clean.	Refer to paragraph 3-4.
C. <u>INSPECTION.</u>		
6. All parts.	Inspect.	Refer to paragraph 3-5.
D. <u>INSTALLATION.</u>		
7. Bracket (14).	<ul style="list-style-type: none"> a. Place in position on item (10). b. Fasten to items (10) and (11) with item (12), two items (13), and three items (9). 	Ensure that mounting holes of items (14), (10), and (11) are aligned.
8. Brackets (3) and	<ul style="list-style-type: none"> a. Place in position on (4).item (2).Ensure that mounting holes are aligned. b. Secure with three items (1) and (5). 	
NOTE		
Two persons may be needed for step 9.		
3-212		

TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).



LEGEND:

- | | |
|---|---|
| 1. FLANGE HEAD SCREW (3) | 9. FLANGE HEAD NUT (3) |
| 2. LEFT-HAND MAIN RAIL | 10. RIGHT-HAND MAIN RAIL |
| 3. LEFT-HAND TRANSMISSION MOUNT BRACKET | 11. BATTERY BOX MOUNTING BRACKET |
| 4. TUBE SUPPORT BRACKET | 12. FLANGE HEAD SCREW |
| 5. FLANGE HEAD NUT (3) | 13. FLANGE HEAD SCREW (2) |
| 6. TRANSMISSION MOUNT SPRING | 14. RIGHT-HAND TRANSMISSION MOUNT BRACKET |
| 7. TRANSMISSION MOUNT CLAMP (2) | 15. TRANSMISSION MOUNT INSULATOR |
| 8. FLANGE HEAD SCREW (2) | 16. SPACER PLATE |
| | 17. TRANSMISSION |

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TRANSMISSION.

3-26. TRANSMISSION MOUNTS REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
D. <u>INSTALLATION</u> (Continued).		
9. Two screws (8) and clamps (7), spring (6), insulator (15), and plate (16).	<ul style="list-style-type: none"> a. Assemble together and place in position on items (3), (14), and (17). b. Apply downward pressure and fasten to item (17) with two items (8), but do not tighten. c. Remove tape if used. d. Tighten two items (8). 	<p>Tape can be used to temporarily bind them together.</p> <p>C-clamps may be used on items (3) and (14) to block item (6) from slipping forward.</p> <p>Torque to 65-75 lb.-ft.</p>
NOTE		
Follow-on maintenance action required:		
None.		

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT.

THIS TASK COVERS

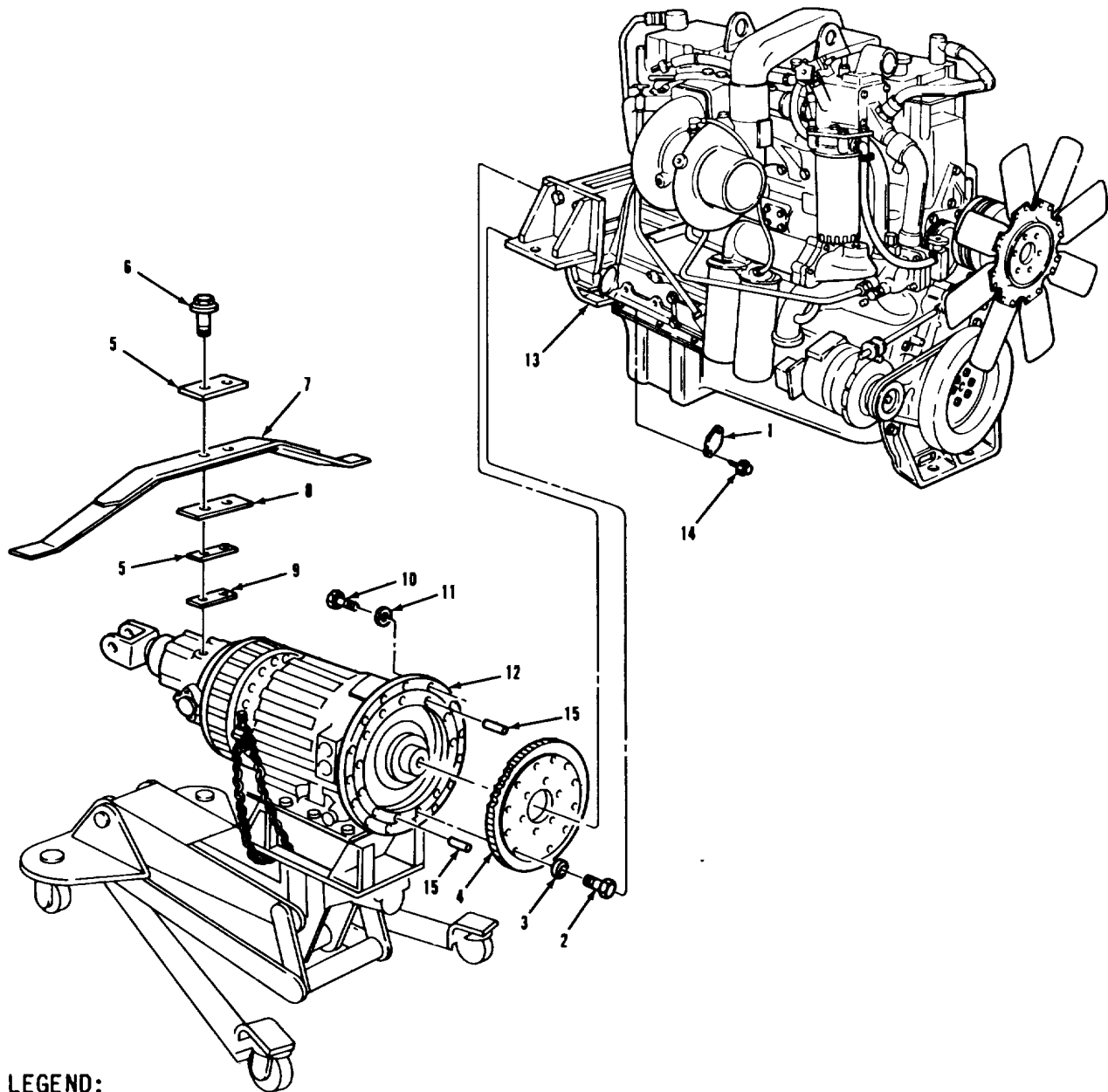
- a. Removal.
- b. Installation.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	LO 9-2326-283-12.	Transmission fluid drained.
<u>TEST EQUIPMENT</u> None.	TM 9-2320-283-20. TM 9-2320-283-20.	Fill tube removed. Modulator, shift control, and speedometer cables removed.
<u>SPECIAL TOOLS</u> Guide pins (33287) J-24315-2.	TM 9-2320-283-20.	Oil filter and coolant lines and line support brackets removed.
<u>MATERIALS/PARTS (P/N)</u> Oil, lubricating: OE/HDO-10 Item 16, Appendix C.	TM 9-2320-283-20.	Shift control cover plate removed.
	TM 9-2320-283-20.	Propeller shaft disconnected.
	TM 9-2320-283-20.	Batteries disconnected.
	TM 9-2320-283-20.	Exhaust pipe, flex tube, extension tube and bracket removed.
	TM 9-2320-283-20.	Passenger side step plate and brackets removed.
<u>PERSONNEL REQUIRED</u> Two (MOS-63W).	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u> None.	
<u>REFERENCES (TM)</u> LO 9-2320-283-12. TM 9-2320-283-20. TM 9-2320-283-34P.	<u>GENERAL SAFETY INSTRUCTIONS</u> Front and rear wheels blocked. Parking brake on.	
<u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-11.		

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- | | |
|---------------------------------|----------------------------|
| 1. FLYWHEEL INDEX HOLE COVER | 9. SPACER PLATE |
| 2. HEXAGON CAPSCREW (12) | 10. HEX HEAD SCREW (12) |
| 3. PLAIN WASHER (12) | 11. FLAT WASHER (12) |
| 4. DISK AND RING GEAR | 12. TRANSMISSION |
| 5. TRANSMISSION MOUNT CLAMP (2) | 13. FLYWHEEL HOUSING |
| 6. FLANGE HEAD SCREW (2) | 14. SELF-TAPPING SCREW (2) |
| 7. TRANSMISSION MOUNT SPRING | 15. GUIDE PIN (2) |
| 8. TRANSMISSION INSULATOR MOUNT | |

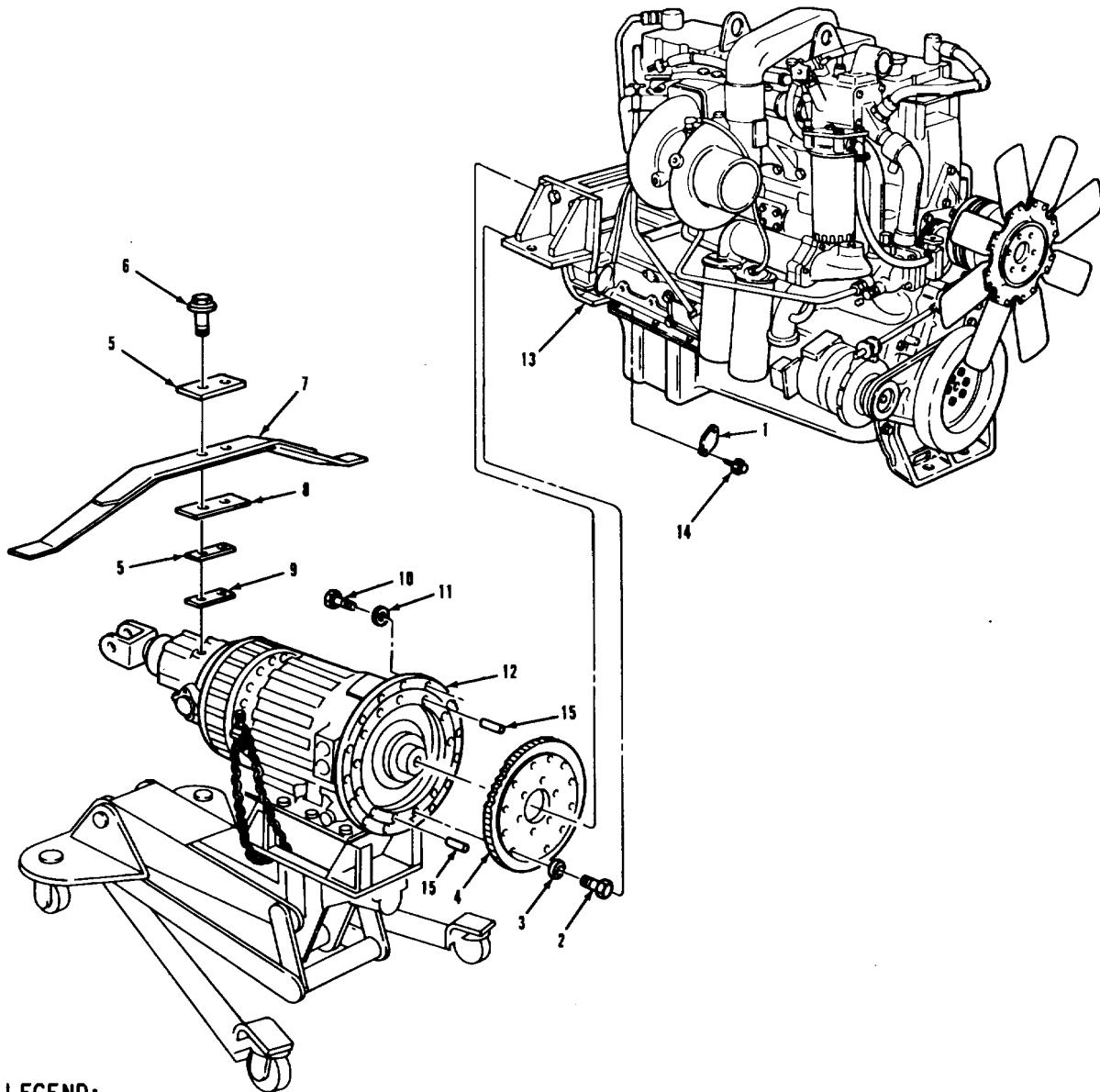
TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>REMOVAL.</u>		
1. Two screws (14) and cover (1).	Remove from item (13).	This gains access to item (4).
NOTE		
Rotate disk and ring gear with a standard tip screwdriver to gain access to each of the twelve hexagon capscrews and washers.		
2. Twelve capscrews (2) and washers (3).	Remove from item (4).	
<u>WARNING</u>		
<ul style="list-style-type: none"> • Position a suitable transmission jack under transmission oil pan so it corresponds with the center of gravity of the transmission. The center of gravity of the transmission is 14.50 inches measured from front of transmission to the rear. If transmission is not positioned with center of gravity, serious injury to personnel and equipment could result. 		
<ul style="list-style-type: none"> • When removing two bolts from transmission mount spring, apply downward pressure to relieve spring tension. A sudden release of pressure could cause injury to personnel. 		
3. Transmission jack.	Position under item (12) as illustrated.	

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- | | |
|---------------------------------|----------------------------|
| 1. FLYWHEEL INDEX HOLE COVER | 9. SPACER PLATE |
| 2. HEXAGON CAPSCREW (12) | 10. HEX HEAD SCREW (12) |
| 3. PLAIN WASHER (12) | 11. FLAT WASHER (12) |
| 4. DISK AND RING GEAR | 12. TRANSMISSION |
| 5. TRANSMISSION MOUNT CLAMP (2) | 13. FLYWHEEL HOUSING |
| 6. FLANGE HEAD SCREW (2) | 14. SELF-TAPPING SCREW (2) |
| 7. TRANSMISSION MOUNT SPRING | 15. GUIDE PIN (2) |
| 8. TRANSMISSION INSULATOR MOUNT | |

TA 238151

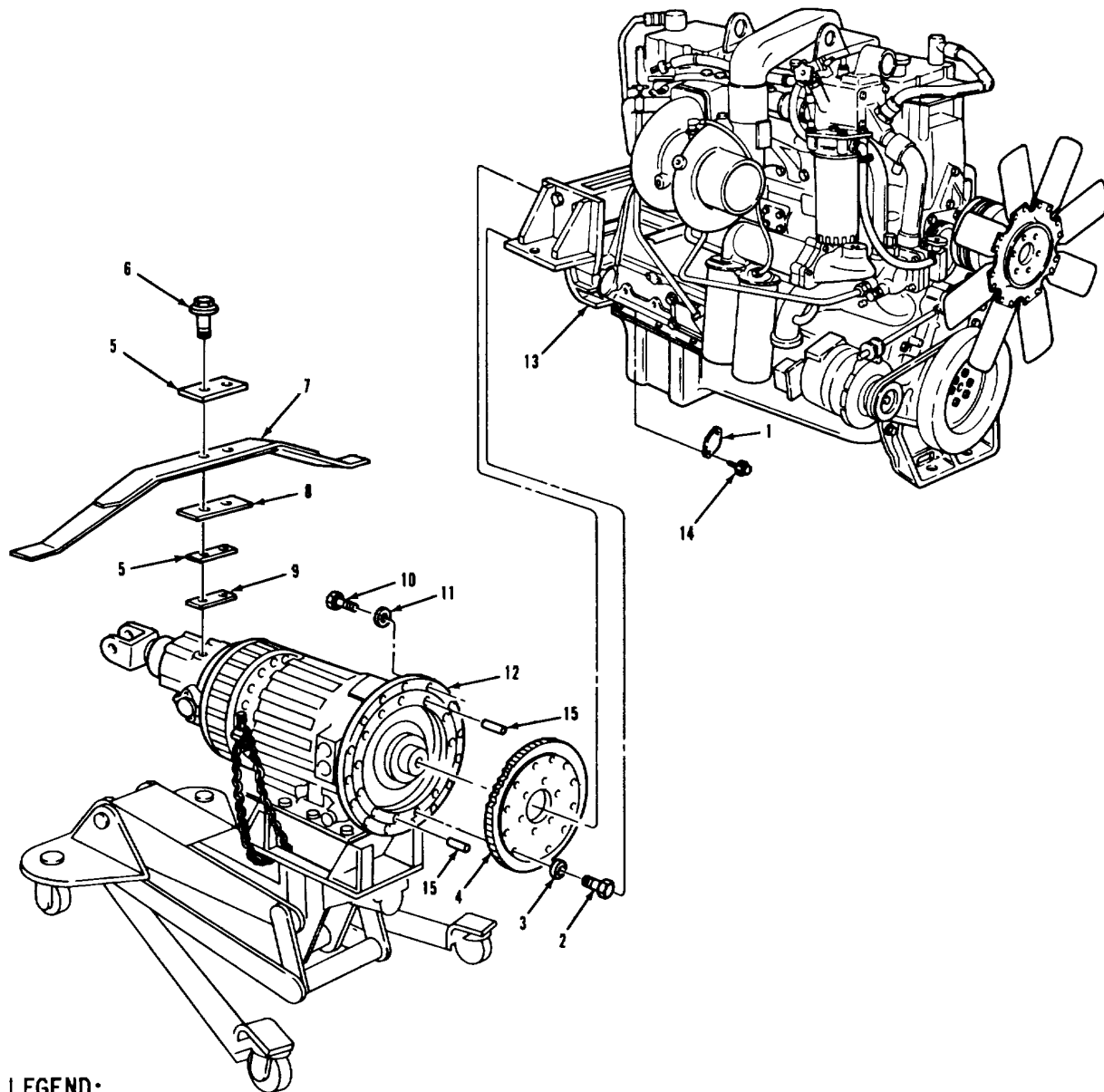
TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. REMOVAL (Continued).		
4. Two screws (6).	Remove from item (5).	
5. Two clamps (5), mount (8), plate (9), and spring (7).	Remove from the top of item (12).	
6. Ten screws (10) and washers (11).	Remove from item (12).	Two items (10) and (11) were removed when oil filter and coolant line support bracket was removed as a condition description.
7. Transmission (12).	Pull away from engine and lower transmission jack after it has cleared engine.	
<u>WARNING</u>		
After raising rear-rear tandem tires 16 inches above ground, position jack stands under rear-rear axle housing for support to protect personnel in the event of a crane failure.		
8. Two lifting hooks at rear of frame. so rear-rear tandem tires are	Attach a suitable overhead crane and raise rear of frame rear axle housing. 16 inches above ground.	Support with suitable jack stands under rear-
9. Transmission (12) and transmission jack.	Remove from under frame.	

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- | | |
|---------------------------------|----------------------------|
| 1. FLYWHEEL INDEX HOLE COVER | 9. SPACER PLATE |
| 2. HEXAGON CAPSCREW (12) | 10. HEX HEAD SCREW (12) |
| 3. PLAIN WASHER (12) | 11. FLAT WASHER (12) |
| 4. DISK AND RING GEAR | 12. TRANSMISSION |
| 5. TRANSMISSION MOUNT CLAMP (2) | 13. FLYWHEEL HOUSING |
| 6. FLANGE HEAD SCREW (2) | 14. SELF-TAPPING SCREW (2) |
| 7. TRANSMISSION MOUNT SPRING | 15. GUIDE PIN (2) |
| 8. TRANSMISSION INSULATOR MOUNT | |

TA 238152

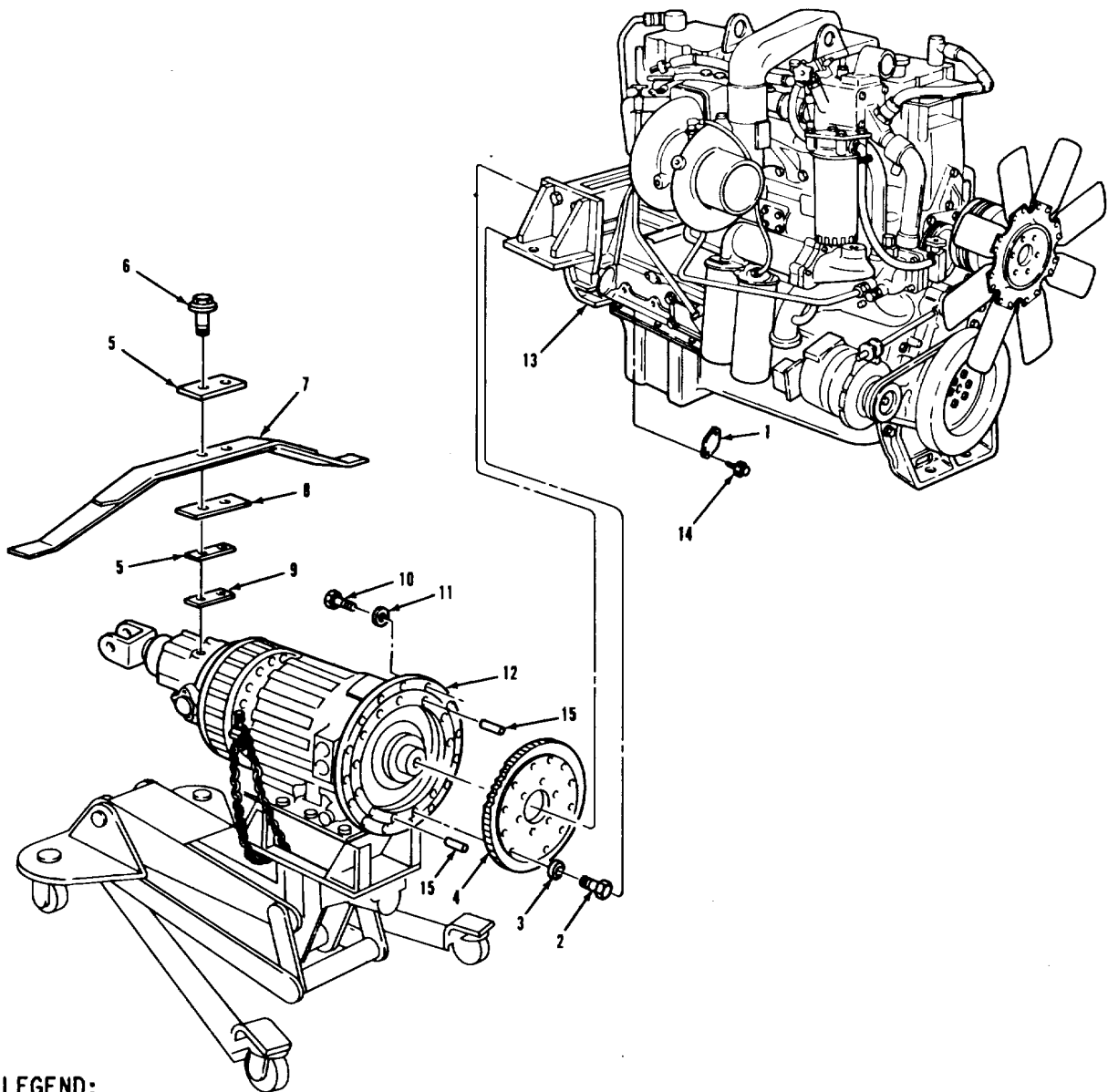
TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).

LOCATION/ITEM	ACTION	REMARKS
B. <u>INSTALLATION.</u>		
10. Two pins (15).	Install into item (13) at opposite locations.	
<u>WARNING</u>		
<p>Position a suitable transmission jack under transmission oil pan so it corresponds with the center of gravity of the transmission. The center of gravity of the transmission is 14.50 inches measured from front of transmission to the rear. If transmission is not positioned with center of gravity, serious injury to personnel and equipment could result.</p>		
11. Transmission (12).	Position on suitable transmission jack.	
<u>WARNING</u>		
<p>After raising rear-rear tandem tires 16 inches above ground, position jack stands under rear-rear axle housing for support to protect personnel in the event of a crane failure.</p>		
12. Two lifting hooks at rear of frame	Attach a suitable overhead crane and raise rear of frame so rear-rear tandem tires are 16" above ground.	Support with suitable jack stands under rear-rear axle housing.
13. Transmission (12) and transmission jack.	Roll into position under vehicle.	Position transmission (12) and transmission jack so both are located close to the rear of the engine. Make certain make vehicle is lowered the two items (15) will not interfere with transmission (12).

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- | | |
|---------------------------------|----------------------------|
| 1. FLYWHEEL INDEX HOLE COVER | 9. SPACER PLATE |
| 2. HEXAGON CAPSCREW (12) | 10. HEX HEAD SCREW (12) |
| 3. PLAIN WASHER (12) | 11. FLAT WASHER (12) |
| 4. DISK AND RING GEAR | 12. TRANSMISSION |
| 5. TRANSMISSION MOUNT CLAMP (2) | 13. FLYWHEEL HOUSING |
| 6. FLANGE HEAD SCREW (2) | 14. SELF-TAPPING SCREW (2) |
| 7. TRANSMISSION MOUNT SPRING | 15. GUIDE PIN (2) |
| 8. TRANSMISSION INSULATOR MOUNT | |

TA 238153

TRANSMISSION.**3-27. TRANSMISSION REPLACEMENT (Continued).****LOCATION/ITEM****ACTION****REMARKS****B. INSTALLATION (Continued).**

- | | | |
|--|--|---|
| 14. Jack stands. | Remove from rear of vehicle and lower vehicle slowly. | |
| 15. Transmission (12) and transmission jack. | Slowly raise and move jack inward so guide pins (15) are aligned with mounting holes of item (12). | |
| 16. Eight screws (10) and washers (11). | Install finger tight in item (12) at proper locations. | There will be two holes without screws. These are used for coolant line and filter mounting bracket and will be installed during follow-on maintenance. |

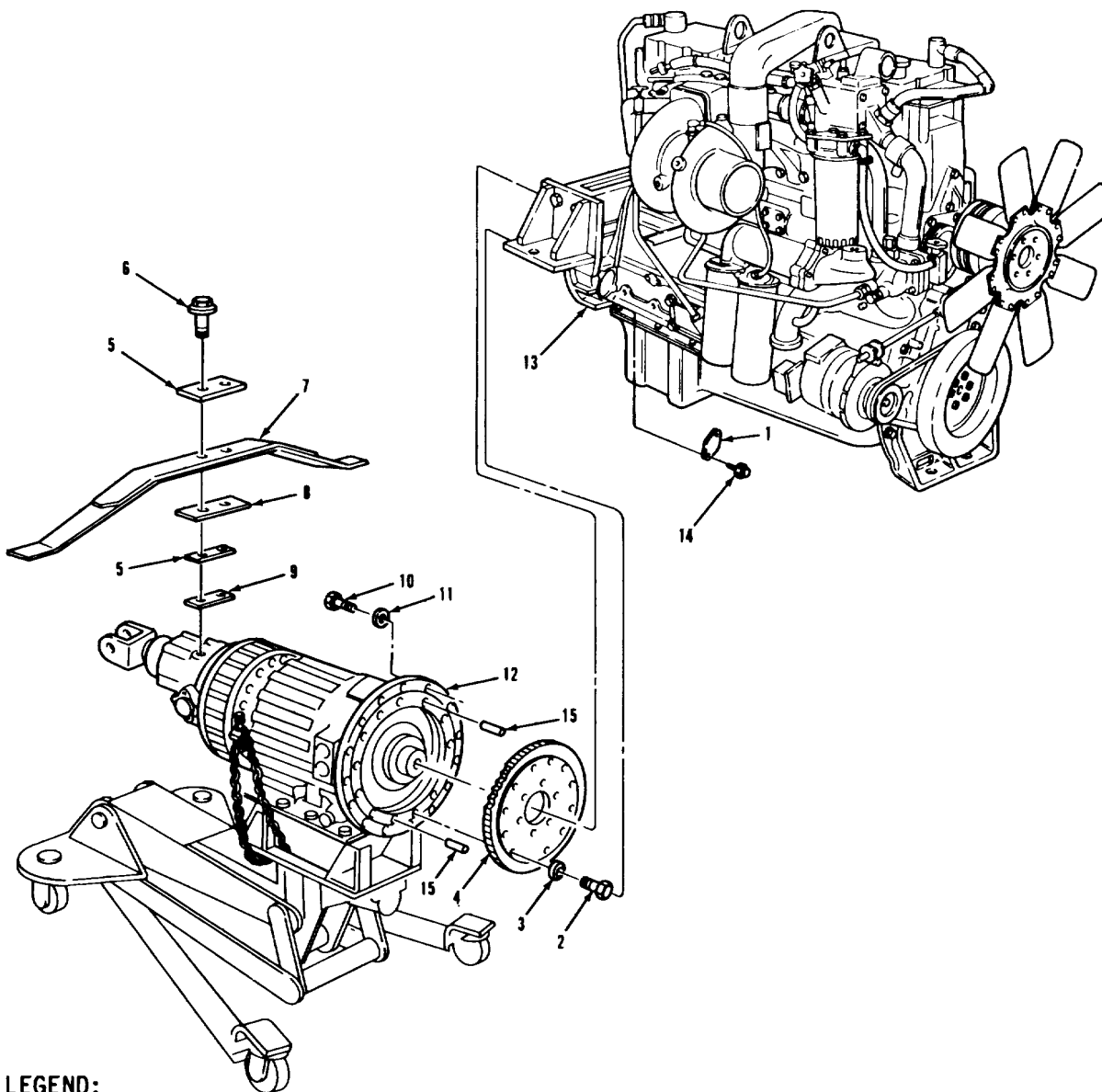
NOTE

It may be necessary to exert pressure on the transmission mount spring so the two screws can be installed.

- | | | |
|---|--|--|
| 17. Two pins (15). | Remove and install two remaining items (10) and (11) finger tight. | |
| 18. Two clamps (5), mount (8), plate (9), and spring (7). | Position in correct order on item (12). | |
| 19. Two screws (6). | Install in two holes of items (5), (7), (8), (9) and (12) and tighten. | |

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- | | |
|---------------------------------|----------------------------|
| 1. FLYWHEEL INDEX HOLE COVER | 9. SPACER PLATE |
| 2. HEXAGON CAPSCREW (12) | 10. HEX HEAD SCREW (12) |
| 3. PLAIN WASHER (12) | 11. FLAT WASHER (12) |
| 4. DISK AND RING GEAR | 12. TRANSMISSION |
| 5. TRANSMISSION MOUNT CLAMP (2) | 13. FLYWHEEL HOUSING |
| 6. FLANGE HEAD SCREW (2) | 14. SELF-TAPPING SCREW (2) |
| 7. TRANSMISSION MOUNT SPRING | 15. GUIDE PIN (2) |
| 8. TRANSMISSION INSULATOR MOUNT | |

TA 238164

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).**LOCATION/ITEM****ACTION****REMARKS****B. INSTALLATION (Continued).**

20. Twelve capscrews (2) and washers (3).

Install in item (4) and torque between 42 and 48 lb.-ft.

Use a screwdriver to rotate item (4) to gain access for items (2). Do not torque items (2) until all are installed.

21. Ten screws (10).

Torque to 60 lb.-ft.

22. Two screws (14) and cover (1).

Install in item (13).

NOTE**Follow-on maintenance action required:**

Install step plate (TM 9-2320-283-20).

Install exhaust pipe, flex tube, and extension tube (TM 9-2320-283-20).

Install external breather (TM 9-2320-283-20).

Install propeller shaft (TM 9-2320-283-20).

Install shift control cover plate (TM 9-2320-283-20).

Install transmission oil filter and coolant line (TM 9-2320-283-20).

Install modulator, shift control, and speedometer cable (TM 9-2320-283-20).

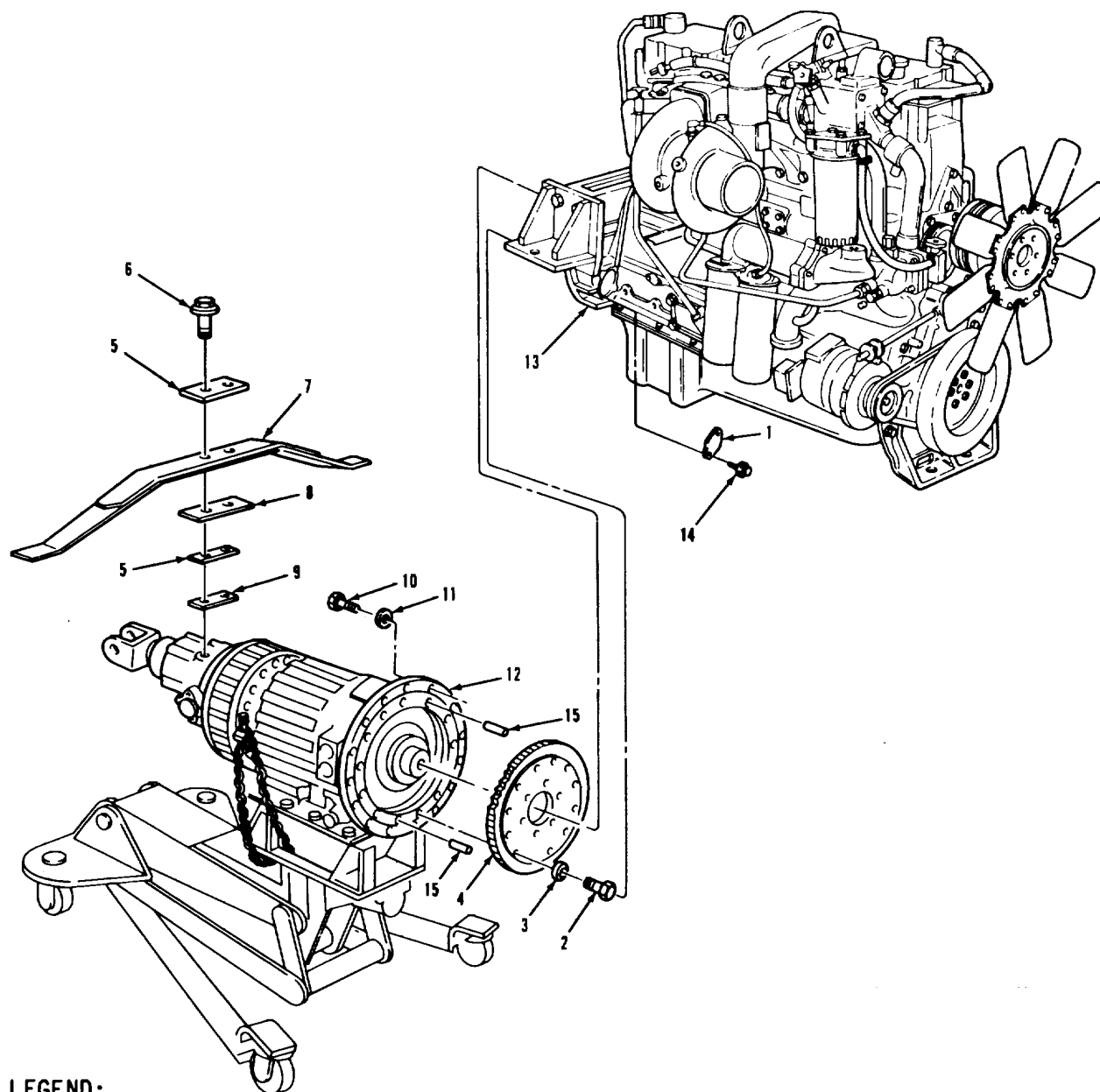
Install fill tube (TM 9-2320-283-20).

Fill transmission with oil (LO 9-2320-283-12).

Connect batteries (TM 9-2320-283-20).

TRANSMISSION.

3-27. TRANSMISSION REPLACEMENT (Continued).



LEGEND:

- 1. FLYWHEEL INDEX HOLE COVER
- 2. HEXAGON CAPSCREW (12)
- 3. PLAIN WASHER (12)
- 4. DISK AND RING GEAR
- 5. TRANSMISSION MOUNT CLAMP (2)
- 6. FLANGE HEAD SCREW (2)
- 7. TRANSMISSION MOUNT SPRING
- 8. TRANSMISSION INSULATOR MOUNT

- 9. SPACER PLATE
- 10. HEX HEAD SCREW (12)
- 11. FLAT WASHER (12)
- 12. TRANSMISSION
- 13. FLYWHEEL HOUSING
- 14. SELF-TAPPING SCREW (2)
- 15. GUIDE PIN (2)

TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE.

THIS TASK COVERS

- a. Cleaning.
- b. Installation.
- c. Removal.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION
PARAGRAPH

3-27.

CONDITION DESCRIPTION

Transmission removed from vehicle.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Holding fixture
(33287) J24310.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

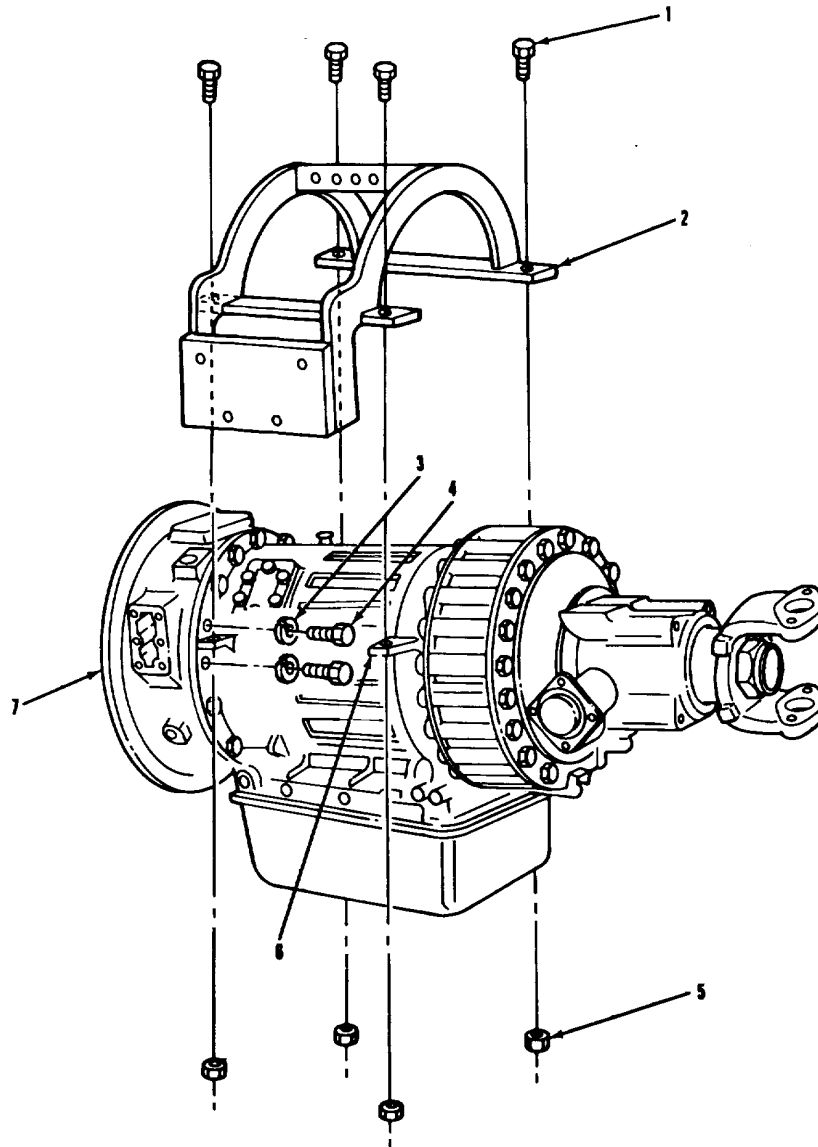
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE (Continued).



LEGEND:

- 1. HEX HEAD SCREW (4)
- 2. HOLDING FIXTURE
- 3. LOCKWASHER (4)
- 4. HEX HEAD SCREW (4)
- 5. NUTS (4)
- 6. MOUNTING TAB (4)
- 7. TRANSMISSION ASSEMBLY

TA 238156

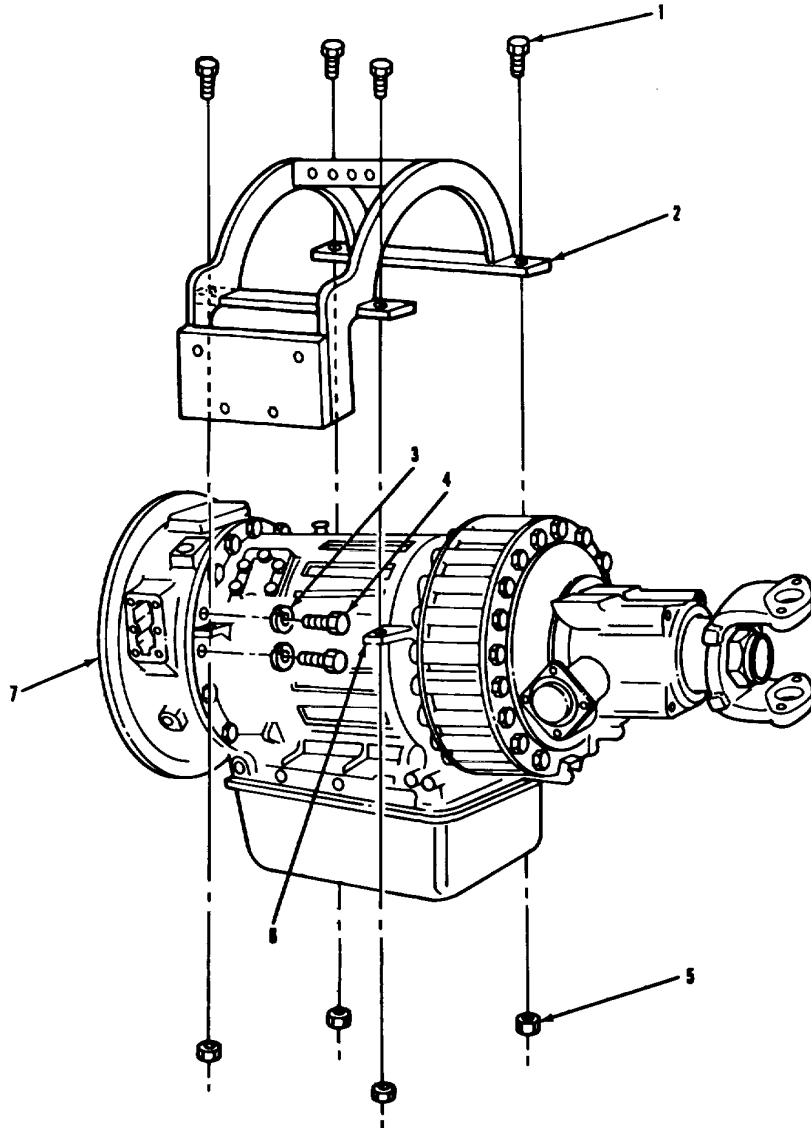
TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. <u>CLEANING.</u>		
<u>CAUTION</u>		
<p>During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.</p>		
<u>NOTE</u>		
<p>Steam cleaning should be followed immediately by disassembly to avoid rust of internal parts due to condensation.</p>		
1. Transmission assembly (7).	Clean.	Refer to paragraph 3-4.
B. <u>INSTALLATION.</u>		
2. Holding fixture (2).	a. Remove four items (4) and four items (3).	
	b. Place item (2) onto transmission case.	Use tool number J-24310.
	c. Line up tool with four items (6).	
	d. Install four items (1), into item (2) and item (7).	Use 1/2"-13 x 2-1/2" screws.
	e. Install and tighten four items (5).	Use 1/2"-13 nuts.
	f. Mount item (2) to suitable support.	

TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE (Continued).



LEGEND:

- 1. HEX HEAD SCREW (4)
- 2. HOLDING FIXTURE
- 3. LOCKWASHER (4)
- 4. HEX HEAD SCREW (4)
- 5. NUTS (4)
- 6. MOUNTING TAB (4)
- 7. TRANSMISSION ASSEMBLY

TA 238157

TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE (Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

C. REMOVAL.

- | | | |
|-------------------------|--|--|
| 3. Holding fixture (2). | a. Remove four items (5). | |
| | b. Remove four items (1) from item (2) and item (7). | |
| | c. Remove item (2) from item (7). | |
| | d. Install four items (4) and four items (3). | |
| | e. Torque item (4) to 67-80 lb.-ft. | |

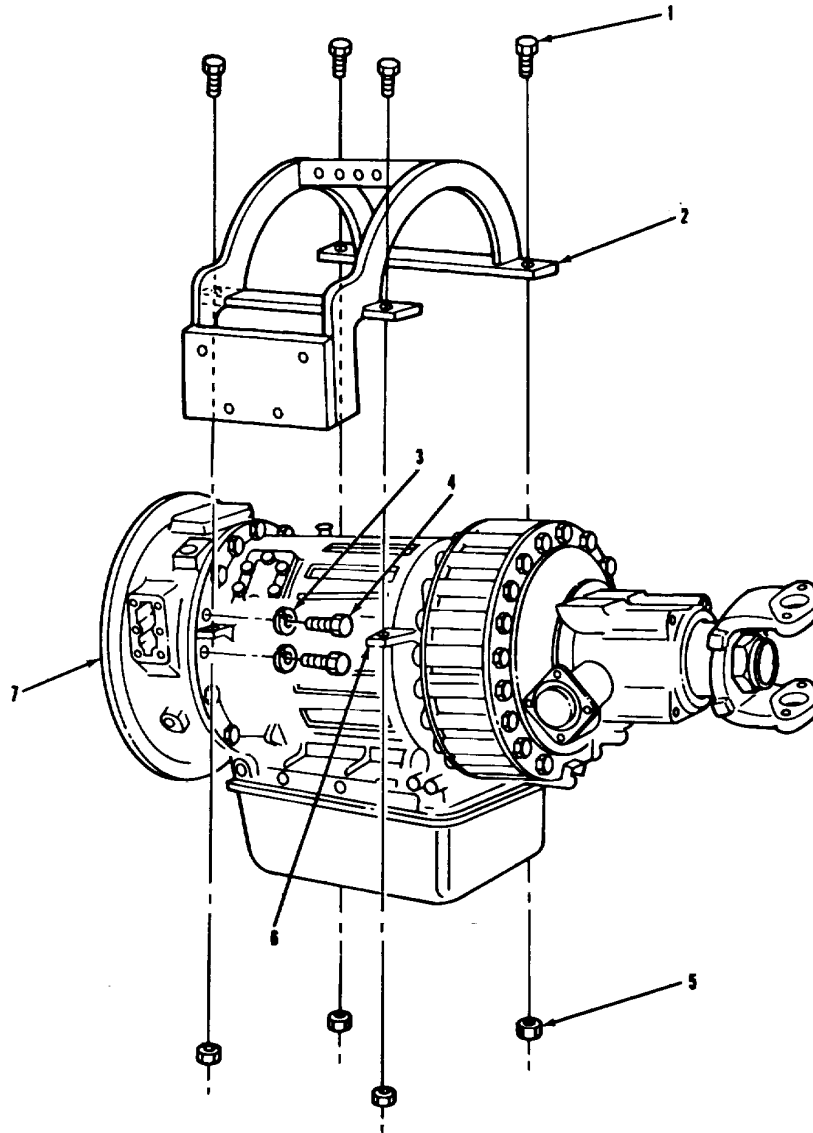
NOTE

Follow-on maintenance action required:

Install transmission (para 3-27).

TRANSMISSION.

3-28. INSTALLATION AND REMOVAL OF TRANSMISSION ON HOLDING FIXTURE (Continued).



LEGEND:

- 1. HEX HEAD SCREW (4)
- 2. HOLDING FIXTURE
- 3. LOCKWASHER (4)
- 4. HEX HEAD SCREW (4)
- 5. NUTS (4)
- 6. MOUNTING TAB (4)
- 7. TRANSMISSION ASSEMBLY

TA 238158

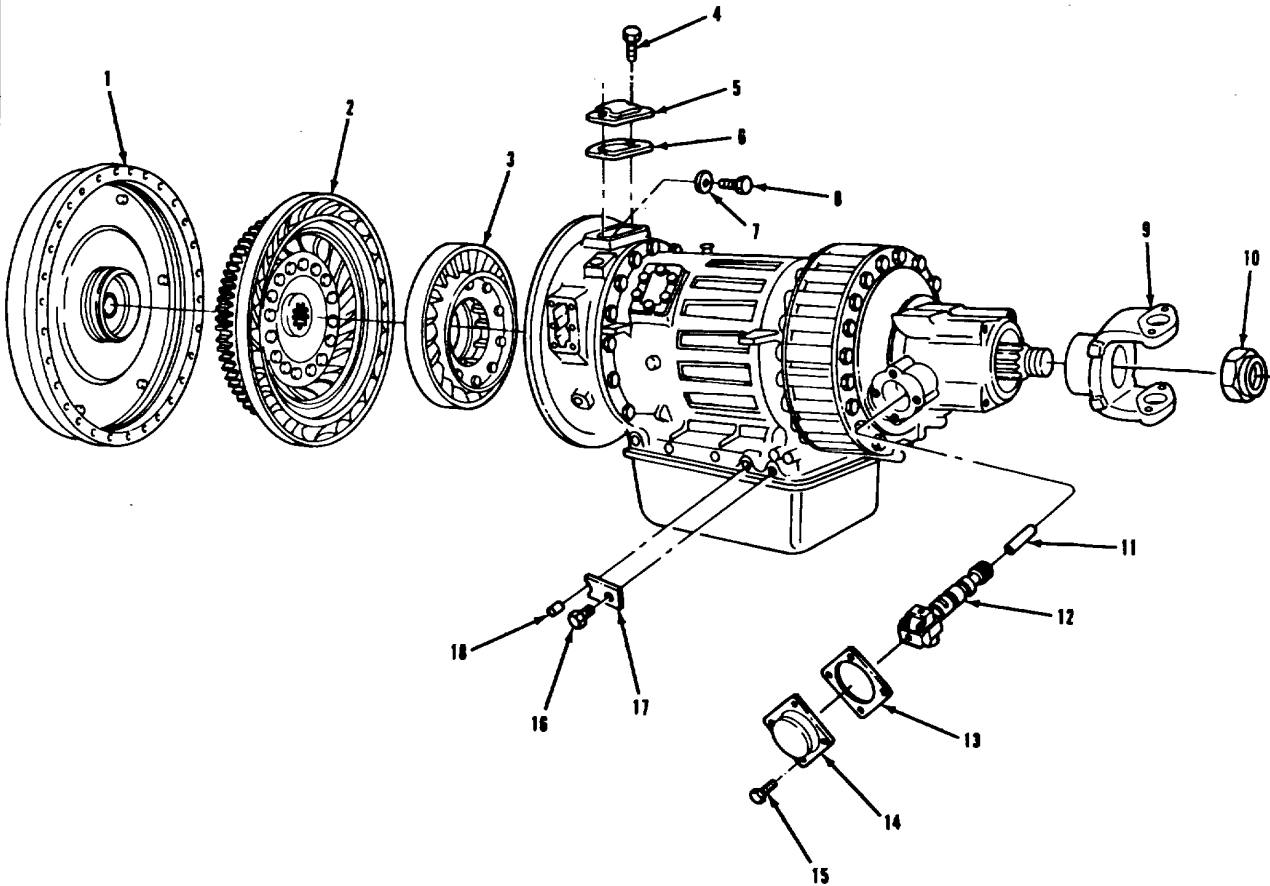
TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL.

LOCATION/ITEM	ACTION	REMARKS
<p><u>THIS TASK COVERS</u> Removal.</p>		
<p>INITIAL SETUP</p>		
<p><u>APPLICABLE CONFIGURATIONS</u> All.</p>	<p><u>EQUIPMENT CONDITION PARAGRAPH</u> 3-27.</p>	<p><u>CONDITION DESCRIPTION</u> Transmission removed from vehicle.</p>
<p><u>TEST EQUIPMENT</u> None.</p>		
<p><u>SPECIAL TOOLS</u> Lifting tool (33287) J-24365.</p>		
<p><u>MATERIALS/PARTS (P/N)</u> Transmission overhaul kit (73342) 6885217.</p>		
<p><u>PERSONNEL REQUIRED</u> Two (MOS-63W). dust and dirt.</p>	<p><u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing</p>	
<p><u>REFERENCES (TM)</u> TM 9-2320-283-34P.</p>	<p><u>GENERAL SAFETY INSTRUCTIONS</u> None.</p>	
<p><u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.</p>		

TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL (Continued).



LEGEND:

- | | |
|--------------------------------------|---------------------------|
| 1. FLYWHEEL ASSEMBLY | 10. SELF-LOCKING NUT |
| 2. TORQUE CONVERTER TURBINE ASSEMBLY | 11. GOVERNOR SUPPORT PIN |
| 3. TORQUE CONVERTER STATOR ASSEMBLY | 12. GOVERNOR |
| 4. HEX HEAD SCREW (2) | 13. GOVERNOR COVER GASKET |
| 5. CONVERTER ACCESS COVER | 14. GOVERNOR COVER |
| 6. ACCESS COVER GASKET | 15. HEX HEAD SCREW (4) |
| 7. WASHER (30) | 16. HEX HEAD SCREW |
| 8. HEX HEAD SCREW (30) | 17. MODULATOR RETAINER |
| 9. OUTPUT SHAFT FLANGE (YOKE) | 18. VALVE SPACER |

TA 238159

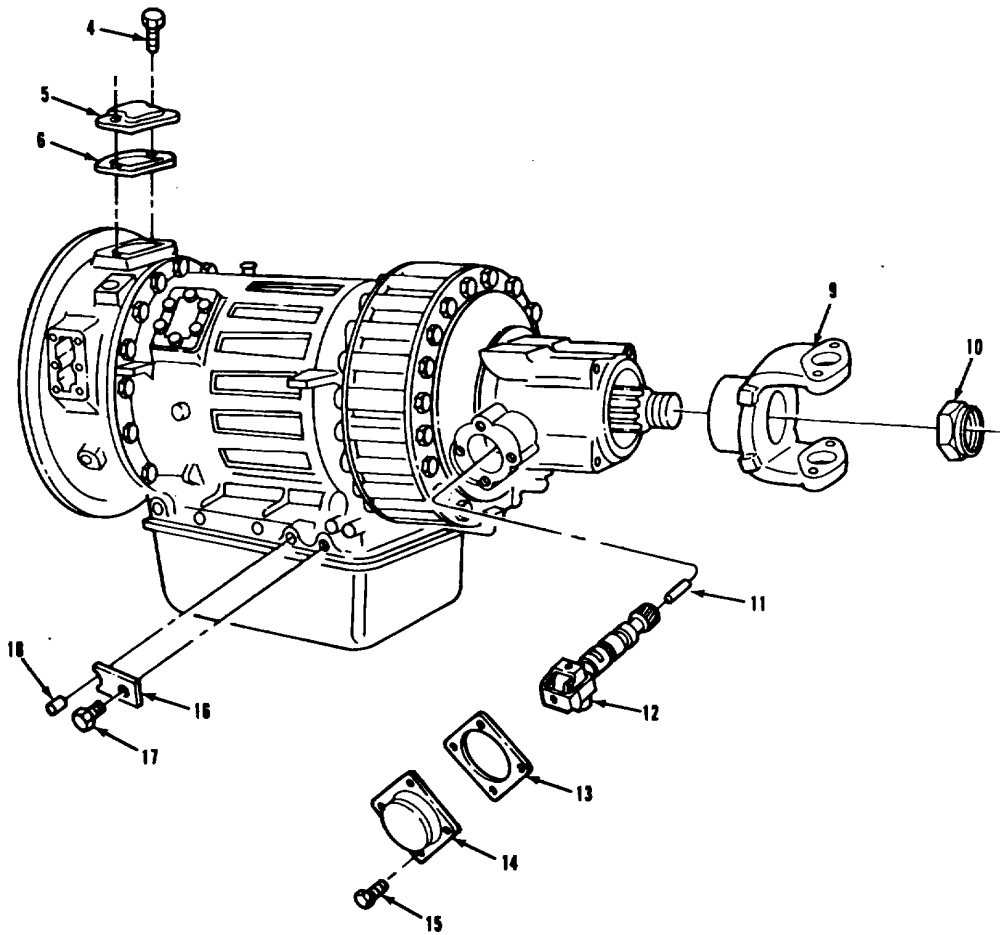
TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL , TURBINE, AND STATOR REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>REMOVAL.</u>		
<u>CAUTION</u>		
<p>During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.</p>		
<u>NOTE</u>		
<p>Exterior of transmission should be thoroughly cleaned before beginning disassembly. Steam cleaning should be followed immediately by disassembly to avoid rust of internal parts due to condensation.</p>		
1. Flange (9).	a. Clean and inspect output shaft threads.	
	b. Remove item (10).	After initial breakaway, nut must require (300 lb.-in.) torque to turn, if less than (300 lb.-in.), discard nut.
	c. Remove item (9).	
2. Cover (5).	Remove two items (4).	Discard item (6).
3. Governor (12).	a. Remove items (13), (14), and four items (15).	Discard item (13).
	b. Remove items (11) and (12).	Rotate item (12) clockwise to remove.
4. Retainer (16).	a. Remove items (17) and (16).	
	b. Remove item (18).	Use needle nose pliers.

TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL (Continued).



LEGEND:

- | | |
|-------------------------------|---------------------------|
| 4. HEX HEAD SCREW | 13. GOVERNOR COVER GASKET |
| 5. CONVERTER ACCESS COVER | 14. GOVERNOR COVER |
| 6. ACCESS COVER GASKET | 15. HEX HEAD SCREW (4) |
| 9. OUTPUT SHAFT FLANGE (YOKE) | 16. MODULATOR RETAINER |
| 10. SELF-LOCKING NUT | 17. HEX HEAD SCREW |
| 11. GOVERNOR SUPPORT PIN | 18. VALVE SPACER |
| 12. GOVERNOR | |

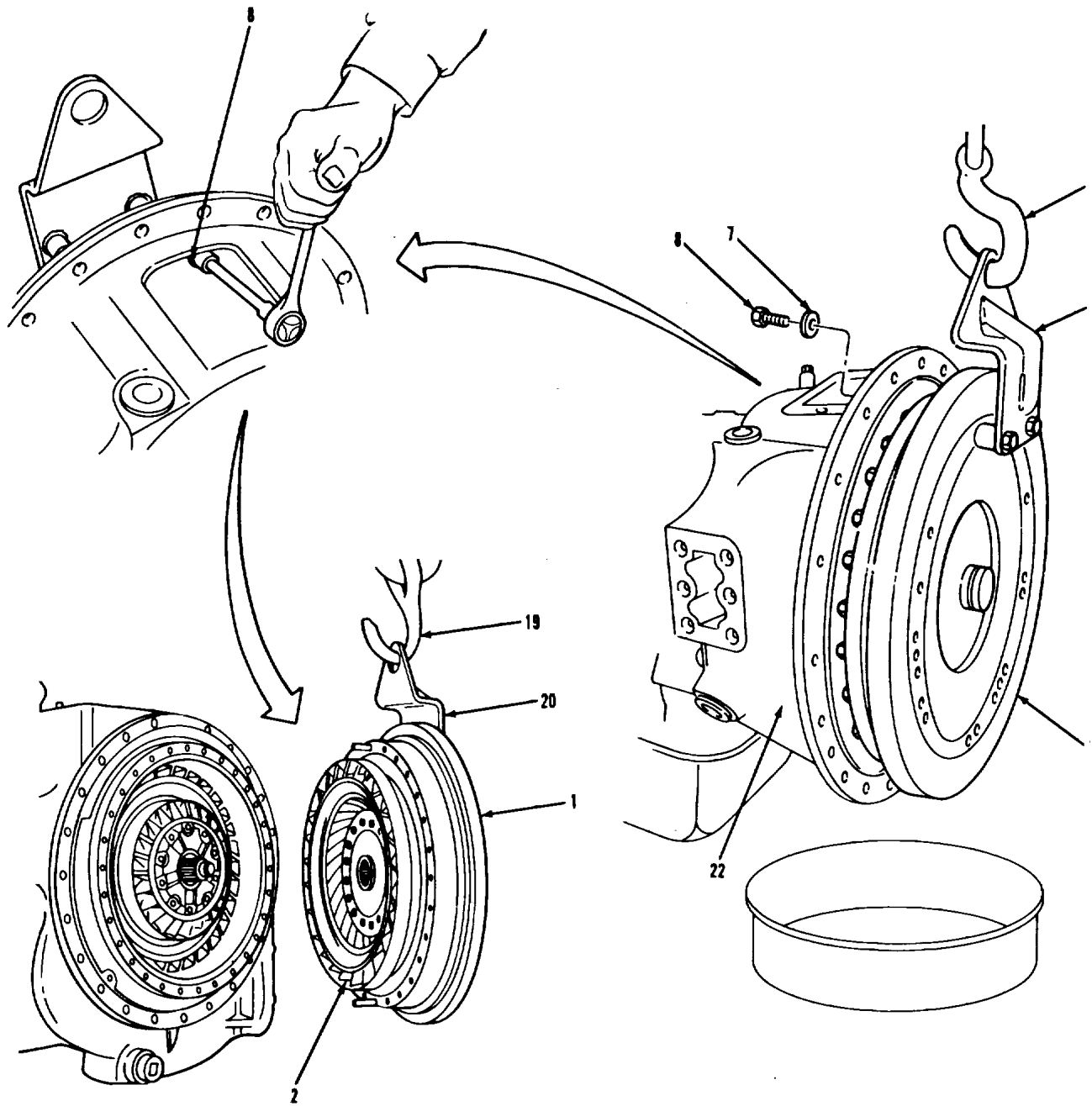
TA 238161

TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL , TURBINE, AND STATOR REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>REMOVAL</u> (Continued).		
5. Flywheel assembly (1) and torque converter turbine assembly (2).	<ul style="list-style-type: none"> a. Position item (22) horizontally and place a container under flywheel to catch excess oil. b. Remove twenty-nine of thirty items (7) and (8), that hold item (1). c. Install item (19) on item (1). d. Attach item (20) to item (19). e. Lift item (20) enough to support item (1) while removing last items (7) and (8). 	<p>Leave one item (7) and (8) in place until after item (19) is installed.</p> <p>Use tool number J-24365.</p>
<u>WARNING</u>		
While removing flywheel assembly from transmission, torque converter turbine assembly may drop. Use care to prevent personal injury or parts damage.		
	<ul style="list-style-type: none"> f. Remove items (1) and (2) together. g. Remove item (19). 	
3-238		

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL (Continued)



LEGEND:

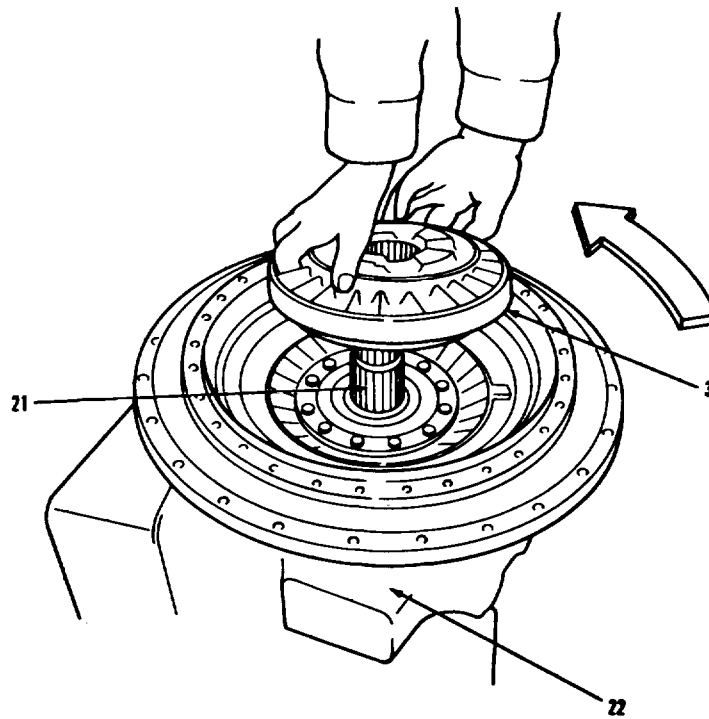
- 1. FLYWHEEL ASSEMBLY
- 2. TORQUE CONVERTER TURBINE ASSEMBLY
- 7. WASHER (30)
- 8. HEX HEAD SCREW (30)
- 19. LIFTING TOOL

TRANSMISSION.

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
6. Torque converter stator assembly (3).	a. Place item (22) in a vertical position.	
<u>CAUTION</u>		
Stator may come apart when removed. Use care to prevent loss of parts.		
	b. Grasp firmly and rotate item (3) counterclockwise.	
	c. Carefully lift out item (3) from item (21)	See paragraph 3-37 for item (3) repair instructions.
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

3-29. GOVERNOR, FLYWHEEL, TURBINE, AND STATOR REMOVAL (Continued).



LEGEND:

- 3. TORQUE CONVERTER STATOR ASSEMBLY
- 21. INPUT SHAFT
- 22. TRANSMISSION ASSEMBLY

TA 238163

TRANSMISSION.

3-30. OIL PAN AND VALVE BODY REMOVAL.

THIS TASK COVERS

Removal.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All	3-29	Governor, flywheel, turbine, and stator removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Guide pin (2)
(33287) J-3387-2.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

Two (MOS-63Wi)

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dust and dirt.

REFERENCES (TM)

TM 9-2320-283-34P

GENERAL SAFETY INSTRUCTIONS

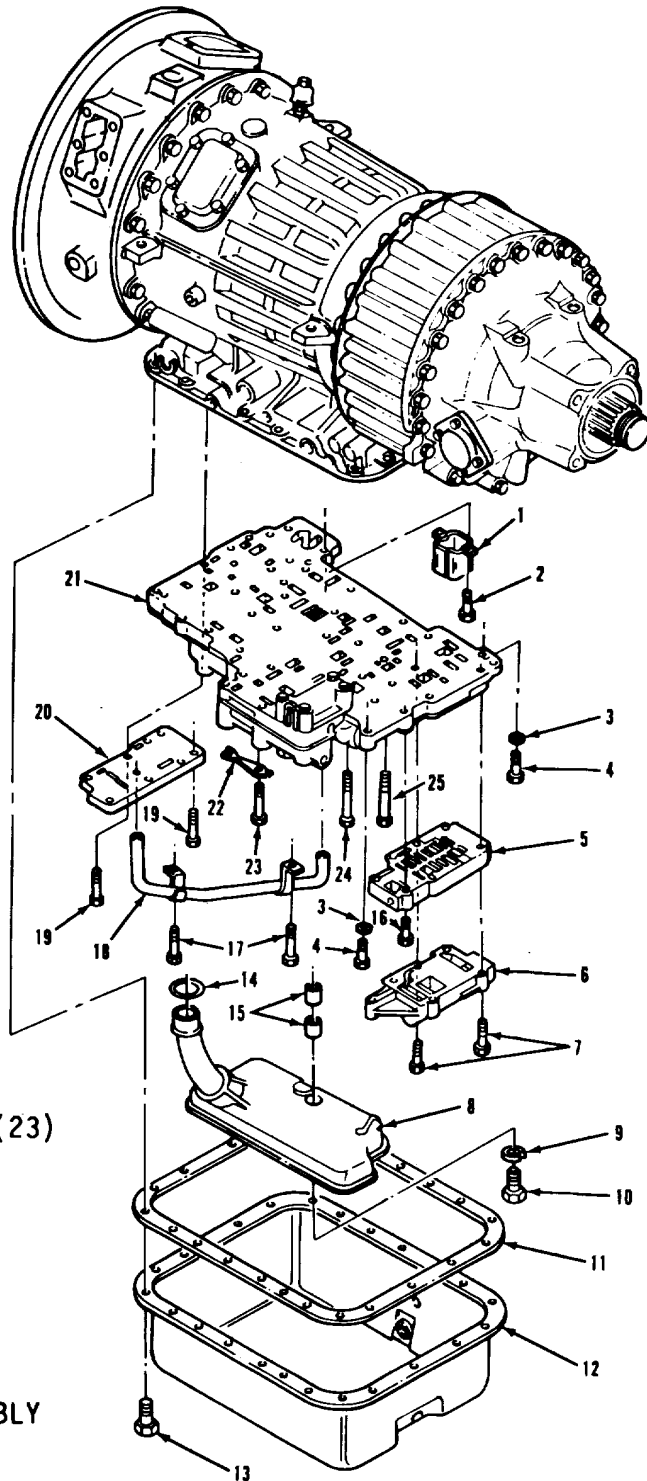
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).



LEGEND:

1. OIL BAFFLE
2. HEX HEAD SCREW (2)
3. PLAIN WASHER (2)
4. HEX HEAD SCREW (2)
5. LOW SHIFT VALVE BODY
6. LOW TRIMMER VALVE BODY
7. HEX HEAD SCREW (6)
8. OIL FILTER
9. PLAIN WASHER
10. HEX HEAD SCREW
11. OIL PAN GASKET
12. OIL PAN ASSEMBLY
13. SPECIAL HEX WASHER HEAD SCREW (23)
14. SEAL RING
15. OIL FILTER SPACER
16. HEX HEAD SCREW
17. HEX HEAD SCREW (2)
18. SIGNAL TUBE
19. HEX HEAD SCREW (8)
20. COVER PLATE
21. CONTROL VALVE
22. DETENT ROLLER AND SPRING ASSEMBLY
23. HEX HEAD SCREW
24. HEX HEAD SCREW (13)
25. HEX HEAD SCREW (3)

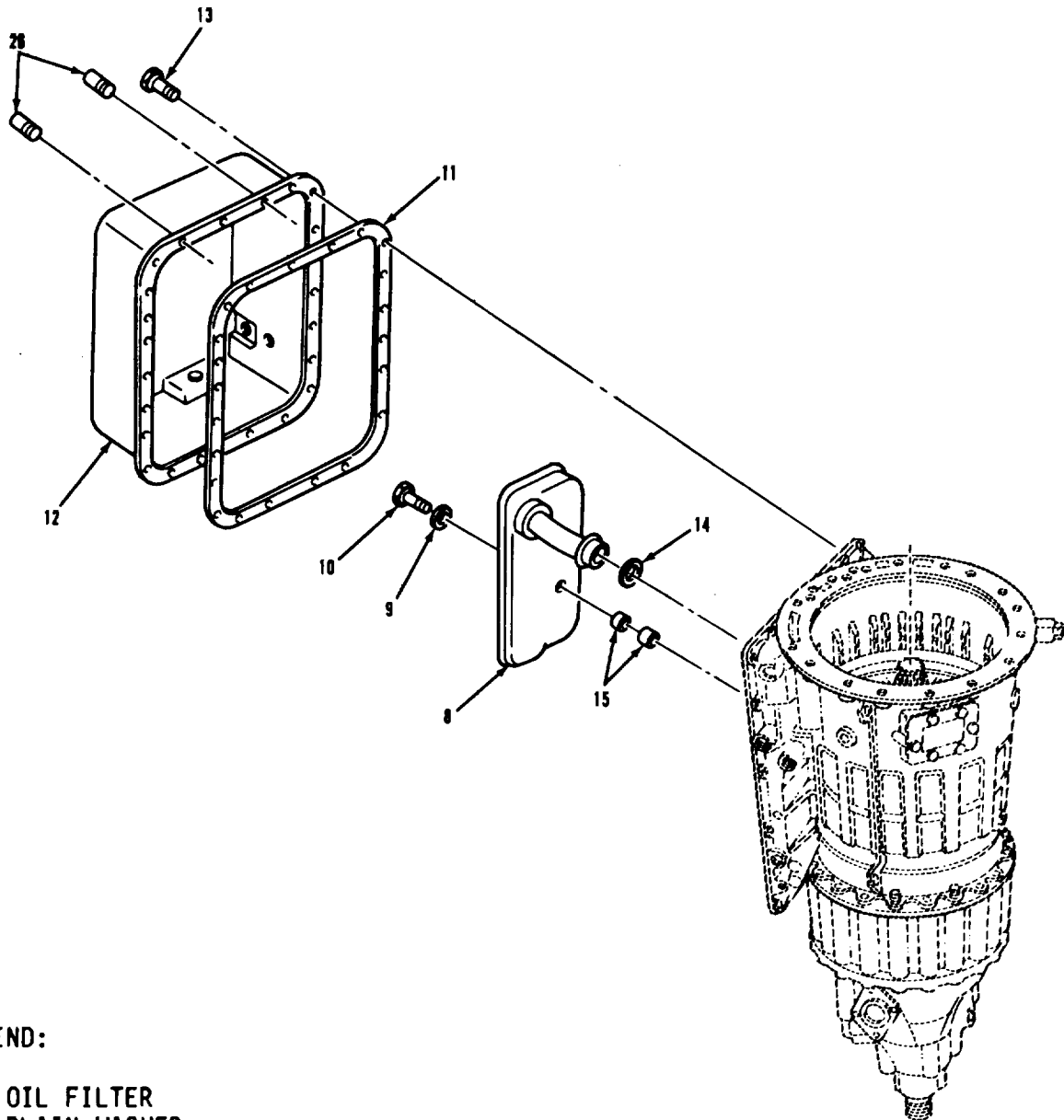
TA 238164

TRANSMISSION.

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL.		
CAUTION		
During disassembly all parts must be handled with care to avoid nicking, scratching or denting Close fitting parts can bind if damaged or scratched.		
1. Oil pan assembly (12)	<ul style="list-style-type: none"> a. Remove two of twenty-three item (12). b. Install two items (26) into those two holes. c. Remove remaining twenty-one items (13). d. Remove items (12) and (11). e. Remove two items (26). 	<p>See view for location. items (13) from top of</p> <p>Use pins number J-3387 -2. Will support item (12) in next steps.</p> <p>Discard gasket.</p>
2. Filter (8)	<ul style="list-style-type: none"> a. Remove items (10) and (9). b. Remove items (8) and (14). 	<p>Two items (15) will drop when item (10) is removed.</p> <p>Discard item (14).</p>

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).



LEGEND:

- 8. OIL FILTER
- 9. PLAIN WASHER
- 10. HEX HEAD SCREW
- 11. OIL PAN GASKET
- 12. OIL PAN ASSEMBLY
- 13. SPECIAL HEX WASHER HEAD SCREW (23)
- 14. SEAL RING
- 15. OIL FILTER SPACER
- 26. GUIDE PIN (2)

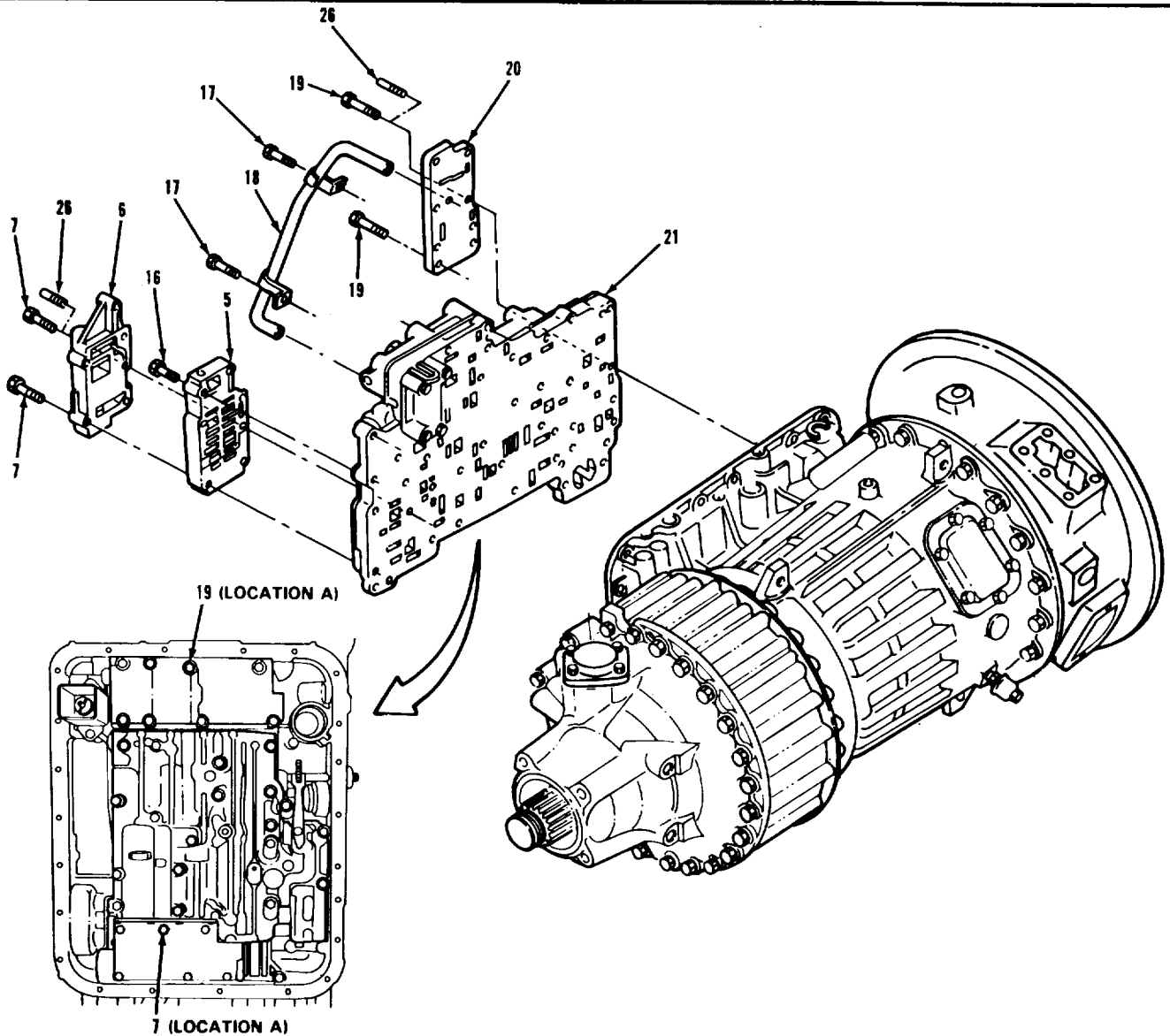
TA 238165

TRANSMISSION.**3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).**

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
3. Plate (20) and control valve (21)	Remove two items (17) and item (18)	Items (17) are three inches long. Retain for use during assembly.
4. Plate (20) and low trimmer valve body (6)	a. Remove items (7) and (19). b. Install two items (26) in place of items (7) and (19) c. Remove five remaining items (7). d. Remove item (6).	At location A shown. Use guide pins number J-24315-3. Will locate valves during disassembly at location A.
5. Body (5)	a. Remove items (16) and (5). b. Remove item (26) from location A of item (7).	
6. Plate (20)	a. Remove seven items (19) from item (20). b. Remove item (20). c. Remove item (26) from location A of item (19).	

TRANSMISSION.

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).



LEGEND:

- 5. LOW SHIFT VALVE BODY
- 6. LOW TRIMMER VALVE BODY
- 7. HEX HEAD SCREW (6)
- 16. HEX HEAD SCREW
- 17. HEX HEAD SCREW (2)
- 18. SIGNAL TUBE
- 19. HEX HEAD SCREW (8)
- 20. COVER PLATE
- 21. CONTROL VALVE
- 26. GUIDE PIN (2)

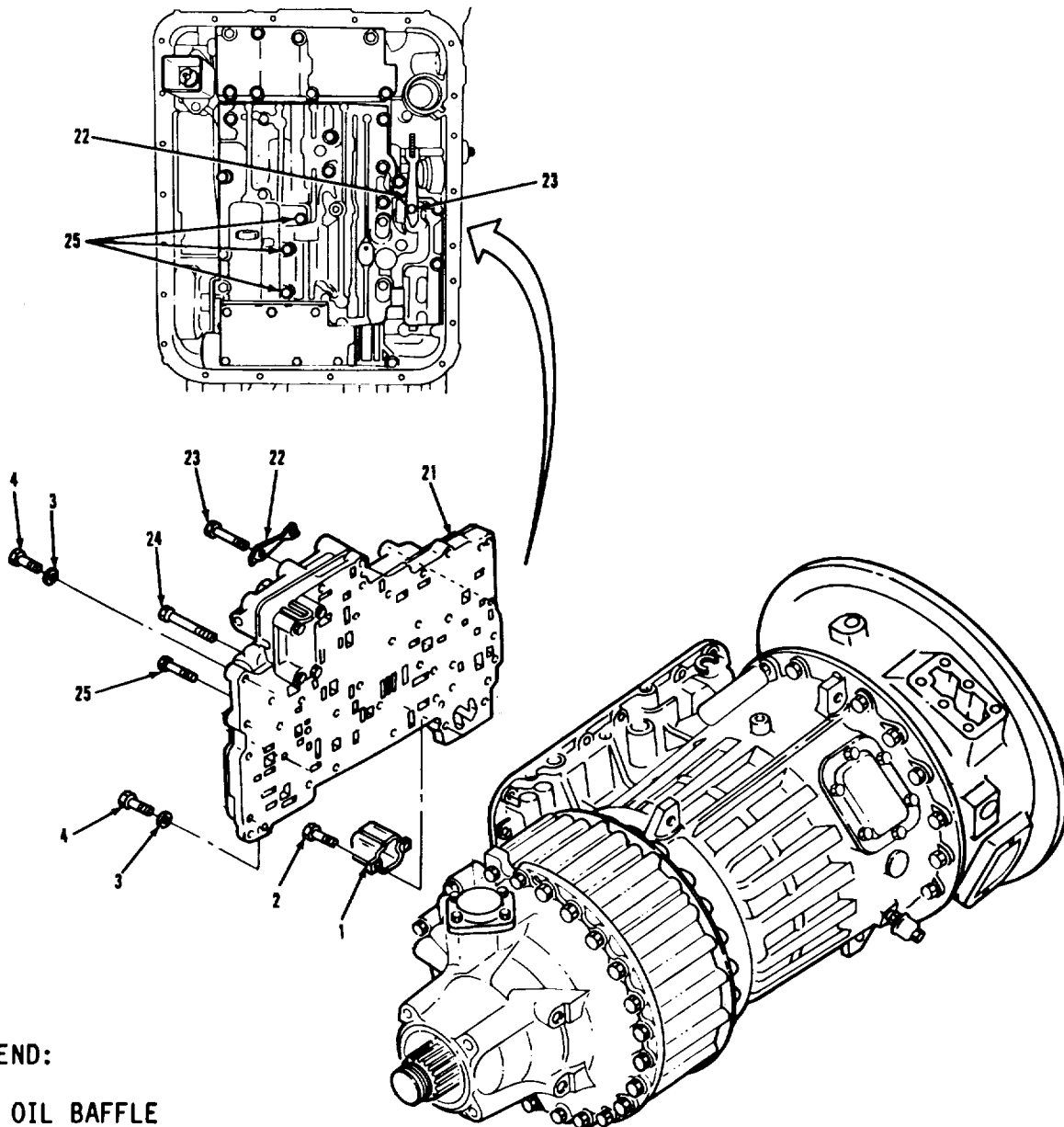
TA 238100

TRANSMISSION.

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
7. Control valve (21).	<ul style="list-style-type: none"> a. Remove thirteen items (24) and three items (25). b. Remove items (23) and (22). c. Remove two items (2) and item (1). d. Remove two items (4) and two items (3). e. Remove item (21). 	<p>Items (24) are three inches long and items (25) are three and one-half inches long.</p> <p>Discard washers.</p>
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		
3-248		

3-30. OIL PAN AND VALVE BODY REMOVAL (Continued).



LEGEND:

1. OIL BAFFLE
2. HEX HEAD SCREW (2)
3. PLAIN WASHER (2)
4. HEX HEAD SCREW (2)
21. CONTROL VALVE
22. DETENT ROLLER AND SPRING ASSEMBLY
23. HEX HEAD SCREW
24. HEX HEAD SCREW (13)
25. HEX HEAD SCREW (3)

TA 238167

TRANSMISSION.

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL

THIS TASK COVERS

Removal.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All	3-30	Oil pan and valve bodies removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Remover and installer converter pump snapping (33287) J-26598.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul. (73342) 6885217.

PERSONNEL REQUIRED

Two (MOS-63W)

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dust and dirt.

REFERENCES (TM)

TM9-2320-283-34P

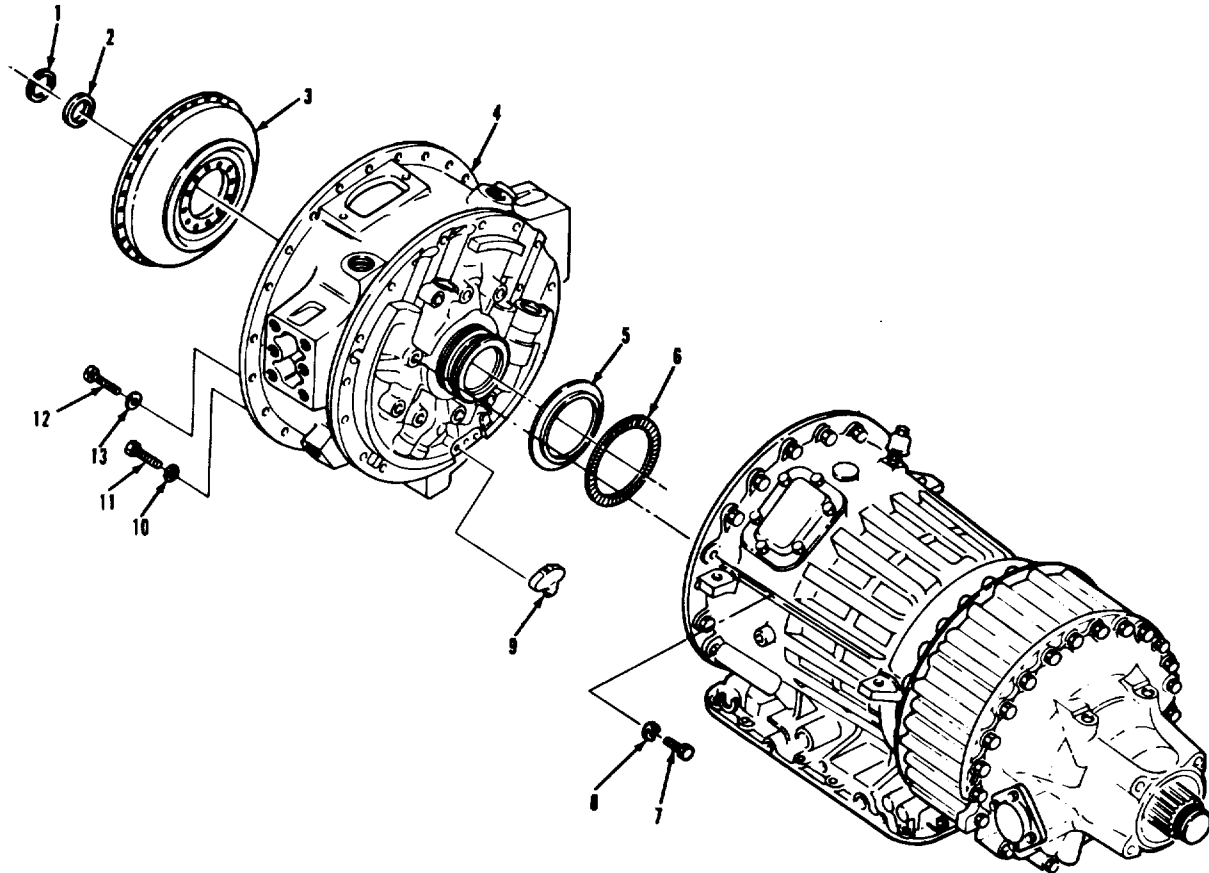
GENERAL SAFETY INSTRUCTIONS

None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL (Continued).



LEGEND:

- 1. EXTERNAL SNAPRING
- 2. CONVERTER PUMP SPACER
- 3. TORQUE CONVERTER PUMP ASSEMBLY
- 4. CONVERTER HOUSING
- 5. THRUST BEARING RACE
- 6. ROLLER BEARING ASSEMBLY
- 7. HEX HEAD SCREW (9)
- 8. LOCKWASHER (9)
- 9. FRONT PITOT
- 10. LOCKWASHER (7)
- 11. HEX HEAD SCREW (7)
- 12. FILLISTER MACHINE SCREW (2)
- 13. FLAT WASHER (2)

TA 238168

TRANSMISSION.

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL (Continued).

LOCATION/ITEM

ACTION

REMARKS

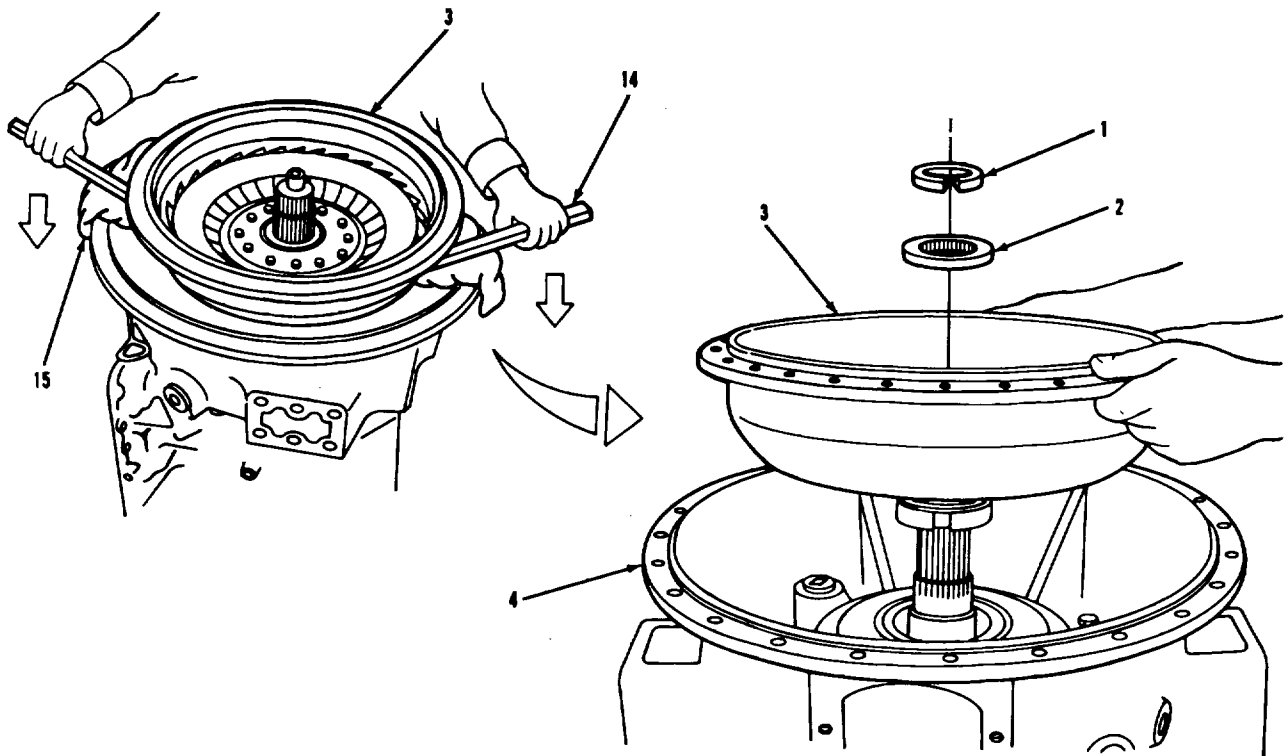
REMOVAL

CAUTION

During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.

- | | | |
|--|--|---|
| 1. Torque converter pump assembly (3). | a. Remove item (1). | Use tool number J-26598. |
| | b. Remove item (2). | |
| | c. Place items (14) between item (3) and item (4). | Wrap items (14) with items (15) to prevent damage to parts. |
| | d. Press down on both items (14) at same time. | |
| | e. Lift item (3) out of item (4). | See paragraph 3-38 for item (3) repair instructions. |

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL (Continued).



LEGEND:

1. EXTERNAL SNAPRING
2. CONVERTER PUMP SPACER
3. TORQUE CONVERTER PUMP ASSEMBLY
4. CONVERTER HOUSING
14. PRY BARS (2)
15. SHOP TOWELS (2)

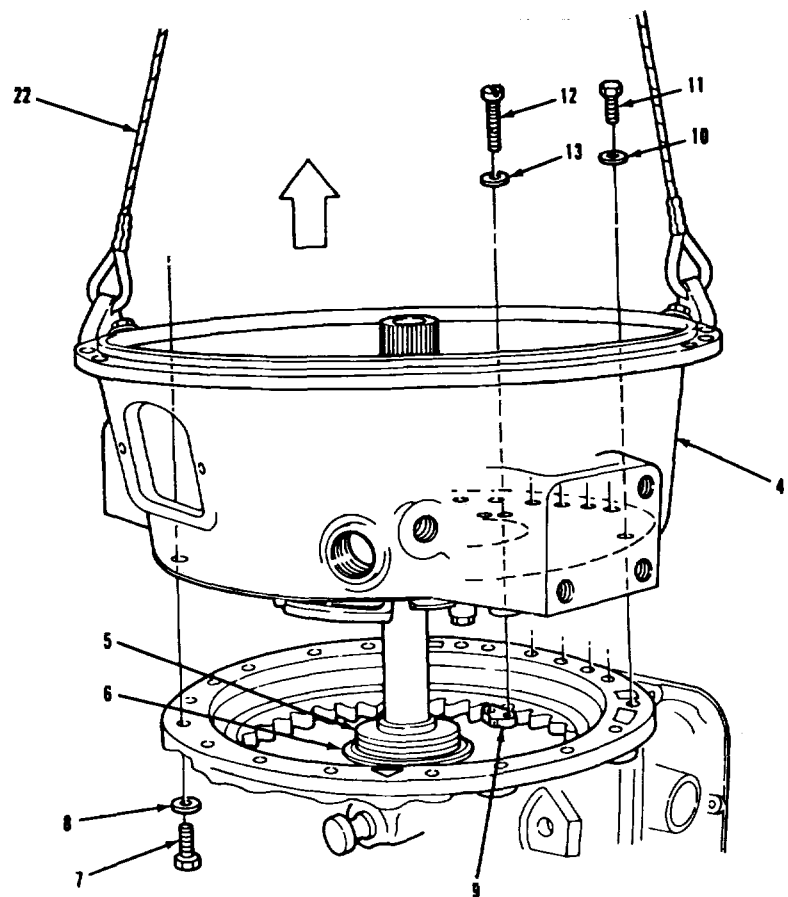
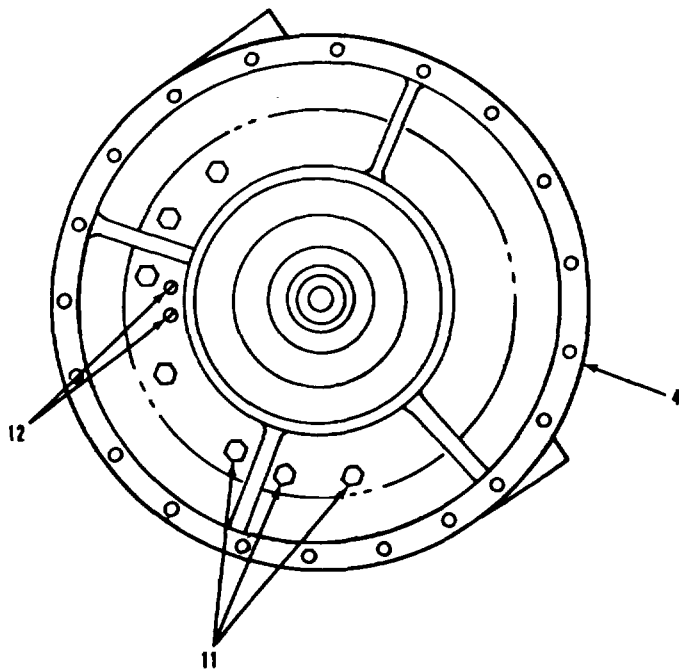
TA 238169

TRANSMISSION.

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL (Continued)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
2. Housing (4)	<ul style="list-style-type: none"> a. Remove two items (12) and two items (13) from inside item (4). b. Remove seven items (11) and items (10) from inside item (4). c. Remove nine items (7) and items (8) from outside item (4). d. Attach item (16) to item (4). 	Use to secure item (9).
NOTE		
During removal of converter housing, bearing race and roller bearing should stay in housing.		
	e. Remove item (4).	
	f. Remove loose item (9) from top of transmission	See paragraph 3-39 for item (9) repair instructions.
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		
3-254		

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL (Continued).



LEGEND:

- 4. CONVERTER HOUSING
- 5. THRUST BEARING RACE
- 6. ROLLER BEARING ASSEMBLY
- 7. HEX HEAD SCREW (9)
- 8. LOCKWASHER (9)
- 9. FRONT PITOT
- 10. LOCKWASHER (7)
- 11. HEX HEAD SCREW (7)
- 12. FILLISTER MACHINE SCREW (2)
- 13. FLAT WASHER (2)
- 22. LIFTING SLING

TA 238170

TRANSMISSION.

3-31. TORQUE CONVERTER PUMP AND CONVERTER HOUSING REMOVAL

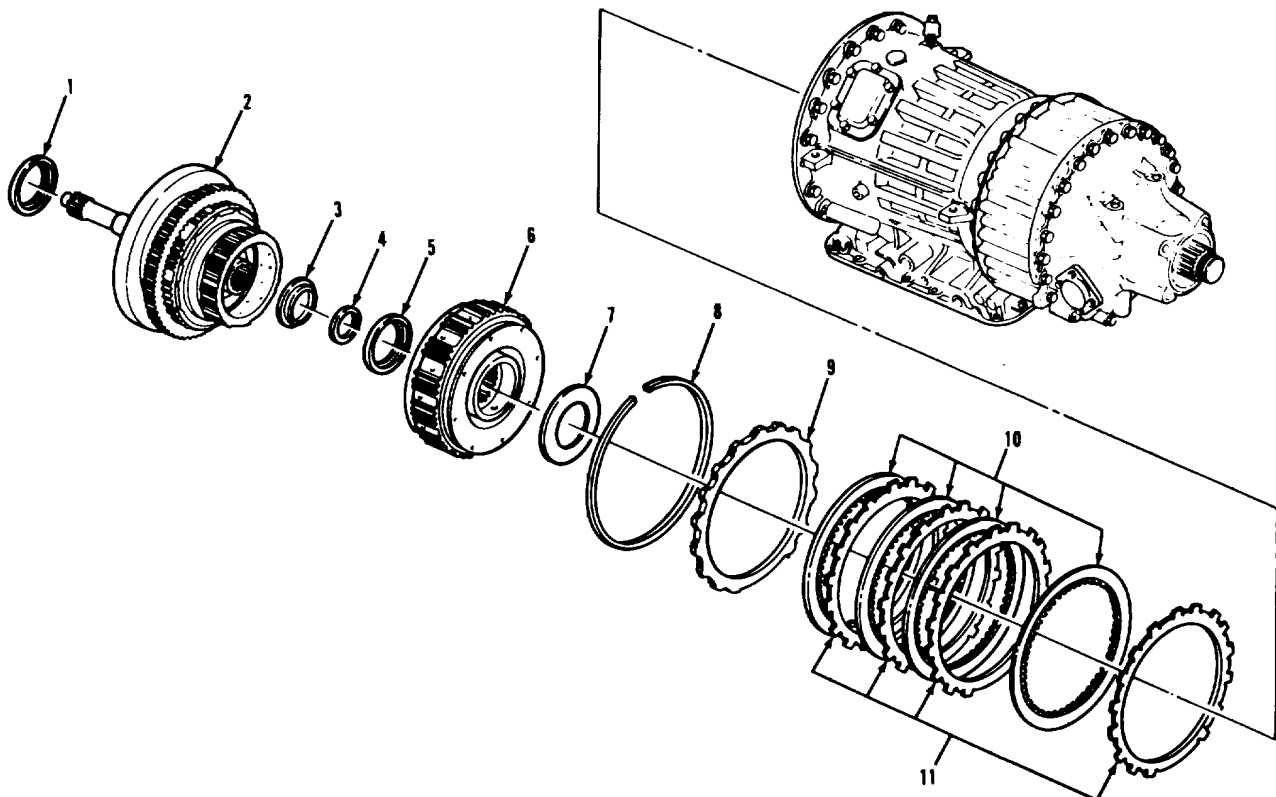
THIS TASK COVERS

Removal.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All	3-31	Torque converter pump and converter housing removed.
<u>TEST EQUIPMENT</u>		
None.		
<u>SPECIAL TOOLS</u>		
Forward clutch lifting tool (33287) J-33079-1. Fourth clutch lifting tool (33287) J-24209.		
<u>MATERIALS/PARTS (P/N)</u>		
None.		
<u>PERSONNEL REQUIRED</u>	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u>	
Two (MOS-63W)	Work area clean and away from blowing dust and dirt.	
<u>REFERENCES (TM)</u>	<u>GENERAL SAFETY INSTRUCTIONS</u>	
TM 9-2320-283-34P	None.	
<u>TROUBLESHOOTING REFERENCES</u>		
Paragraph 2-7.		

3-32. FORWARD, FOURTH, AND THIRD CLUTCH REMOVAL (Continued).



LEGEND:

1. THRUST BEARING RACE
2. FORWARD CLUTCH ASSEMBLY
3. THRUST BEARING RACE
4. ROLLER BEARING ASSEMBLY
5. THRUST BEARING RACE
6. FOURTH CLUTCH ASSEMBLY
7. THRUST BEARING RACE
8. INTERNAL SNAPPING
9. THIRD CLUTCH BACKING PLATE
10. INTERNALLY SPLINED THIRD CLUTCH PLATE (4)
11. EXTERNALLY TOOTHED THIRD CLUTCH PLATE (4)

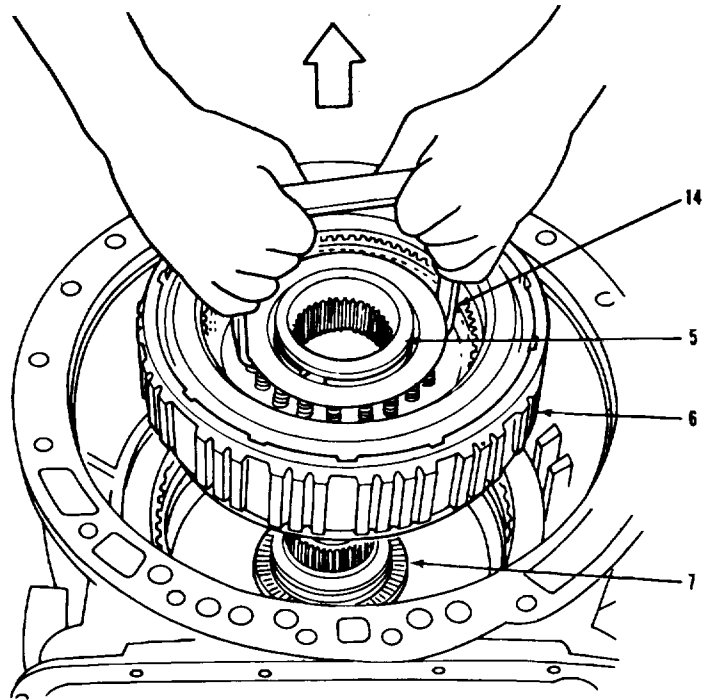
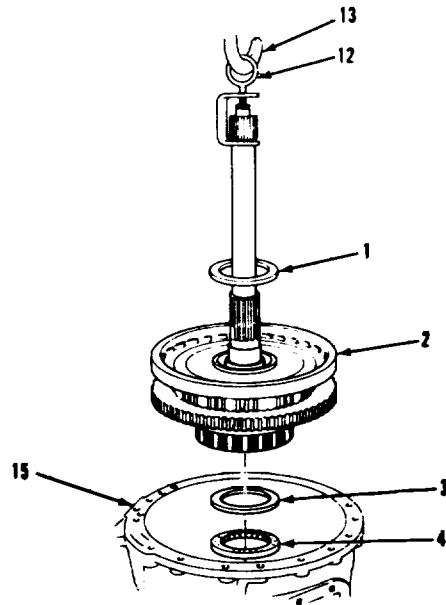
TA 238171

TRANSMISSION.

3-32. FORWARD, FOURTH, AND THIRD CLUTCH REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
CAUTION		
During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.		
NOTE		
Do not lose bearing race from top of forward clutch assembly.		
1. Forward clutch assembly (2)	a. Install item (12) onto shaft b. Lift out item (2) using item (13)	Use tool number J-33079-1. See paragraph 3-40 for repair instructions.
CAUTION		
Set forward clutch assembly upright on table to prevent damage.		
2. Fourth clutch assembly (6)	c. Remove items (3) and (4) from item (2) on (15) a. Place hooked legs of item (14) under edges of spring retainer on item (6). b. Remove item (6) by lifting straight up c. Remove item (7).	Items (3) and (4) may be found on either items (2) or (15). Use tool number J-24209. See paragraph 3-41 for repair instructions.
NOTE		
A bearing race must be kept on the top and on the bottom of the fourth clutch.		

3-32. FORWARD, FOURTH, AND THIRD CLUTCH REMOVAL (Continued).

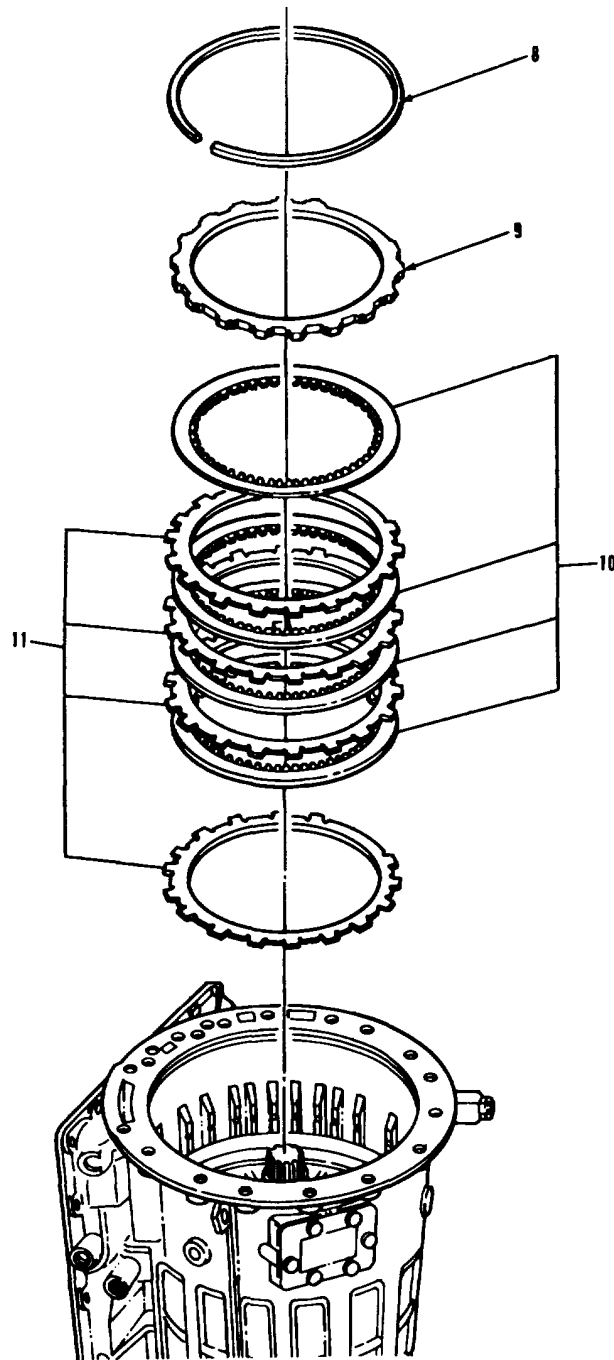


LEGEND:

- 1. THRUST BEARING RACE
- 2. FORWARD CLUTCH ASSEMBLY
- 3. THRUST BEARING RACE
- 4. ROLLER BEARING ASSEMBLY
- 5. THRUST BEARING RACE
- 6. FOURTH CLUTCH ASSEMBLY
- 7. THRUST BEARING RACE
- 12. FORWARD CLUTCH LIFTING TOOL
- 13. SUITABLE HOIST
- 14. FOURTH CLUTCH LIFTING TOOL
- 15. TRANSMISSION

TA 238173

3-32. FORWARD, FOURTH, AND THIRD CLUTCH REMOVAL (Continued).



LEGEND:

- 8. INTERNAL SNAPRING
- 9. THIRD CLUTCH BACKING PLATE
- 10. INTERNALLY SPLINED THIRD CLUTCH PLATE (4)
- 11. EXTERNALLY TOOTHED THIRD CLUTCH PLATE (4)

TA 238174

TRANSMISSION.

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL

THIS TASK COVERS
Removal.

INITIAL SETUP

APPLICABLE CONFIGURATIONS
All

EQUIPMENT CONDITION
PARAGRAPH
3-32

CONDITION DESCRIPTION
Forward, fourth, and
third clutch removed.

TEST EQUIPMENT
None.

SPECIAL TOOLS
None.

MATERIALS/PARTS (P/N)
None.

PERSONNEL REQUIRED
Two (MOS-63W)

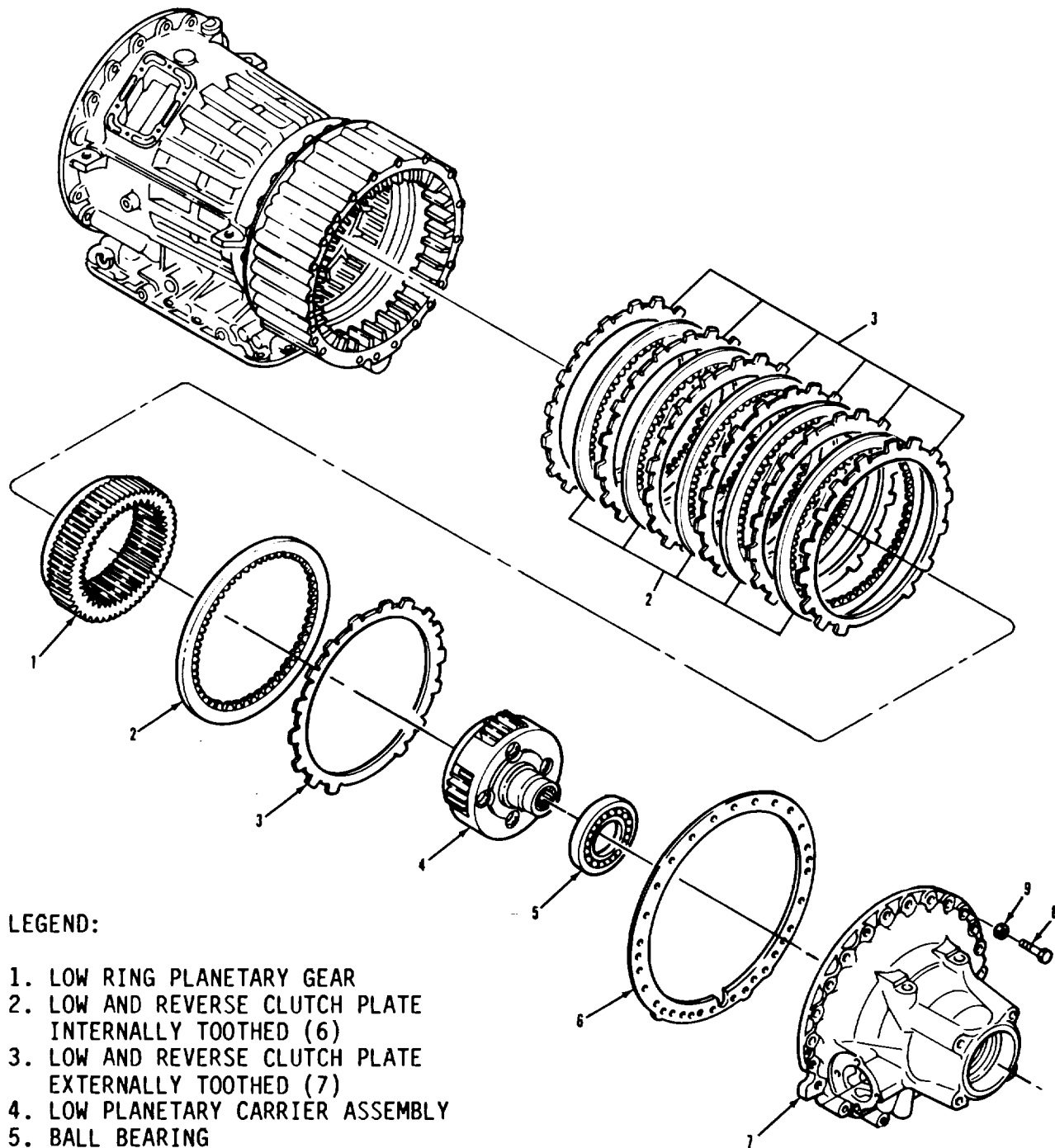
SPECIAL ENVIRONMENTAL CONDITIONS
Work area clean and away from blowing
dust and dirt.

REFERENCES (TM)
None

GENERAL SAFETY INSTRUCTIONS
None.

TROUBLESHOOTING REFERENCES
Paragraph 2-7.

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL (Continued).



LEGEND:

1. LOW RING PLANETARY GEAR
2. LOW AND REVERSE CLUTCH PLATE INTERNALLY TOOTHED (6)
3. LOW AND REVERSE CLUTCH PLATE EXTERNALLY TOOTHED (7)
4. LOW PLANETARY CARRIER ASSEMBLY
5. BALL BEARING
6. GASKET
7. REAR COVER ASSEMBLY
8. HEX HEAD SCREW (24)
9. LOCKWASHER (24)

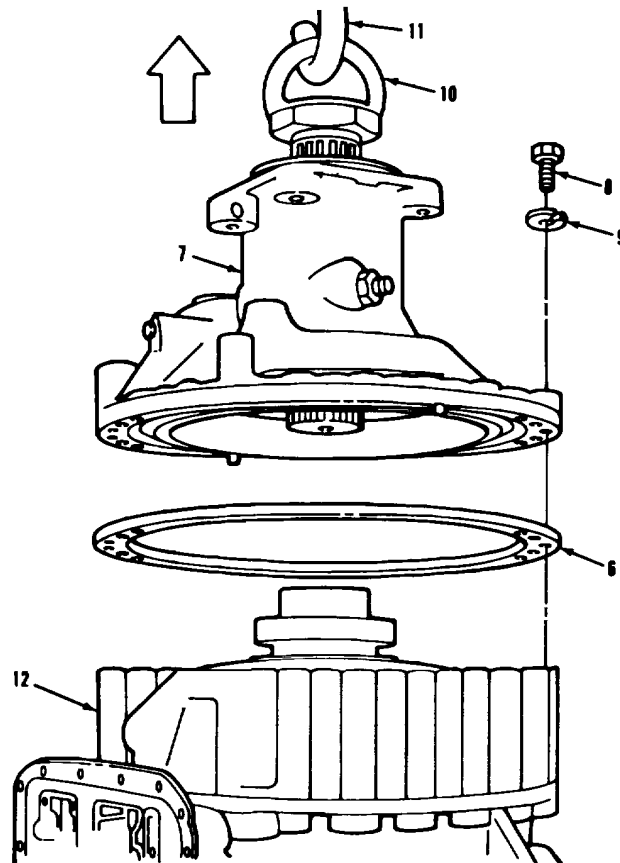
TA 238175

TRANSMISSION.

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
CAUTION		
<p>During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.</p>		
NOTE		
Keep drain pan under transmission. Fluid will drip when transmission is turned over.		
1. Rear cover assembly	<ul style="list-style-type: none"> a. Rotate item (2) so that (7) rear faces up. b. Remove twenty-four items (8) and (9) from item (7). c. Attach item (11) to item (7) output shaft 	<p>Bracket must be made from extra nut, fitting output shaft, and suitable metal stock.</p>
CAUTION		
<p>Low ring planetary gear may stick in rear cover assembly upon removal. Support it to prevent it from dropping.</p>		
	<ul style="list-style-type: none"> d. Using item (12), remove item (7). e. Remove item (6). 	

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL (Continued).



LEGEND:

- 6. GASKET
- 7. REAR COVER ASSEMBLY
- 8. HEX HEAD SCREW (24)
- 9. LOCKWASHER (24)
- 10. SUITABLE LIFTING BRACKET
- 11. HOIST
- 12. TRANSMISSION

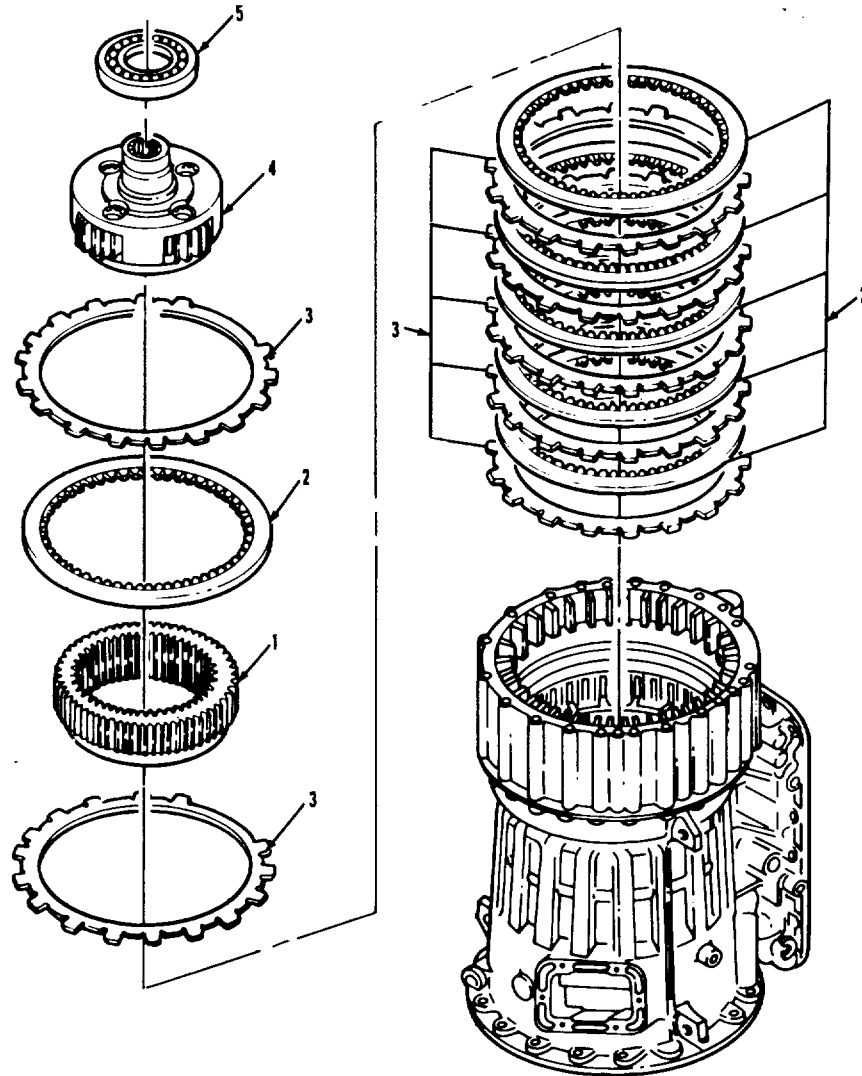
TA 238176

TRANSMISSION.

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
REMOVAL (Continued).		
CAUTION		
Do not lift or carry the low planetary carrier assembly by its bearing during disassembly, the bearing may not stick to it and cause injury.		
2. Low planetary carrier assembly (4).	Remove. repair instructions.	See paragraph 3-44 for
3. Gear (1).	a. Remove one item (2) and one item (3).	
	b. Remove gear item (1).	
NOTE		
Tie all clutch plates together and label "low and reverse clutch pack". Identification is required at assembly.		
4. "Low and reverse clutch pack".	Remove remaining items (2) and (3).	
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		
3-266		

3-33. REAR COVER AND LOW REVERSE CLUTCH REMOVAL (Continued).



LEGEND:

1. LOW RING PLANETARY GEAR
2. LOW AND REVERSE CLUTCH PLATE INTERNALLY TOOTHED (6)
3. LOW AND REVERSE CLUTCH PLATE EXTERNALLY TOOTHED (7)
4. LOW PLANETARY CARRIER ASSEMBLY
5. BALL BEARING

TA 238177

TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL

THIS TASK COVERS
Removal.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All	3-33	Rear cover and low-reverse clutch removed.

TEST EQUIPMENT
None.

SPECIAL TOOLS
Center support compressor bar tool (33287) J-24208-3.
Center support lifting bracket (33287) J-24195.

MATERIALS/PARTS (P/N)
None.

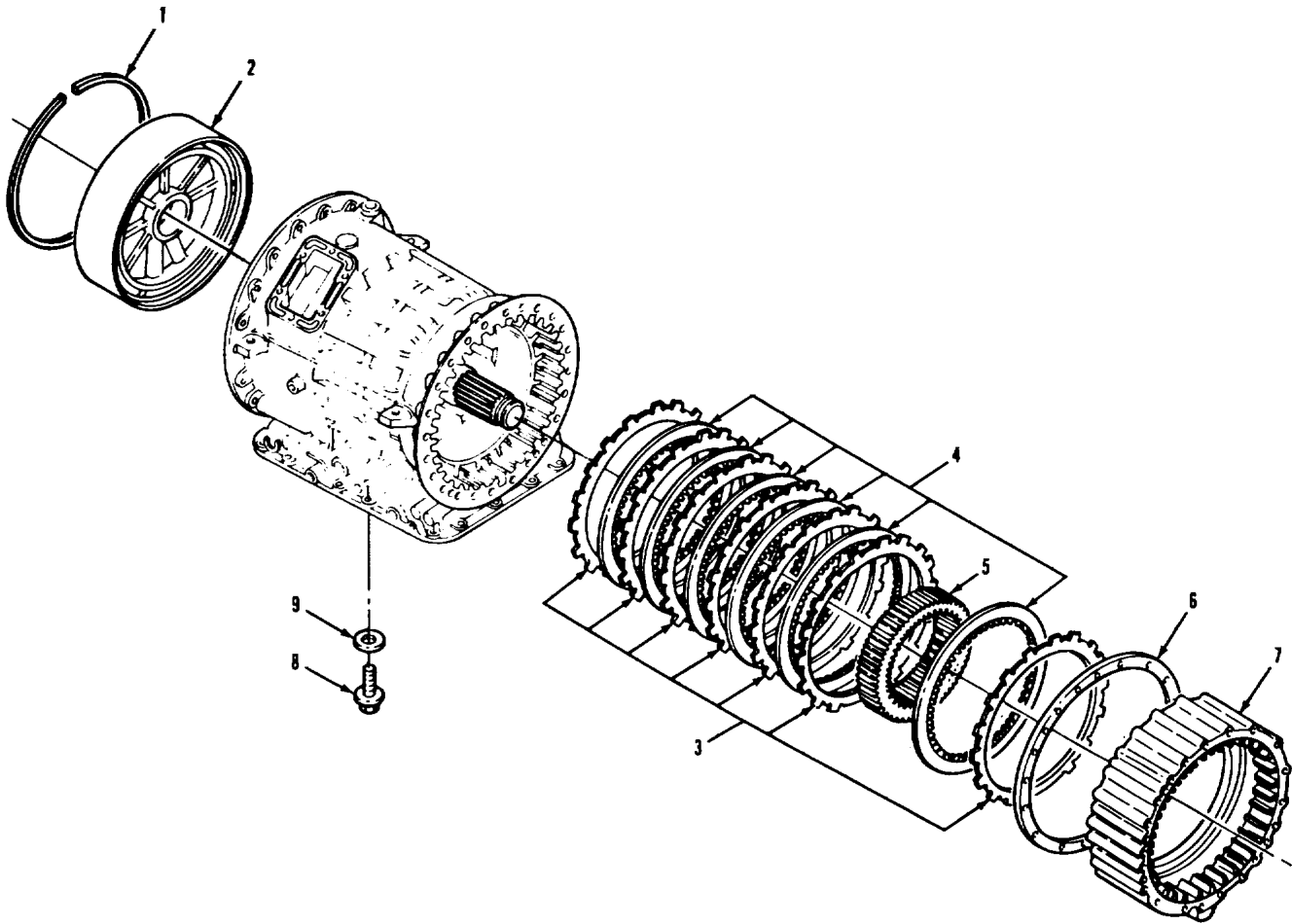
<u>PERSONNEL REQUIRED</u> Two (MOS-63W)	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing dust and dirt.
--	---

<u>REFERENCES (TM)</u> TM 9-2320-283-34P	<u>GENERAL SAFETY INSTRUCTIONS</u> None.
---	---

TROUBLESHOOTING REFERENCES
Paragraph 2-7.

TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL (Continued).



LEGEND:

1. INTERNAL SNAPRING
2. CENTER SUPPORT HOUSING ASSEMBLY
3. FIRST AND REVERSE CLUTCH PLATE, EXTERNALLY TOOTHED (7)
4. FIRST AND REVERSE CLUTCH PLATE (6)
5. REAR PLANETARY RING GEAR
6. ADAPTER HOUSING GASKET
7. ADAPTER HOUSING
8. HEX HEAD SCREW, CENTER SUPPORT
9. PLAIN WASHER, CENTER SUPPORT

TA 238178

TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL (Continued).

LOCATION/ITEM

ACTION

REMARKS

REMOVAL.

CAUTION

During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.

- | | | |
|-----------------|---------------------------|---|
| 1. Housing (7). | Remove items (6) and (7). | Discard item (6). See paragraph 3-45 for repair instructions. |
|-----------------|---------------------------|---|

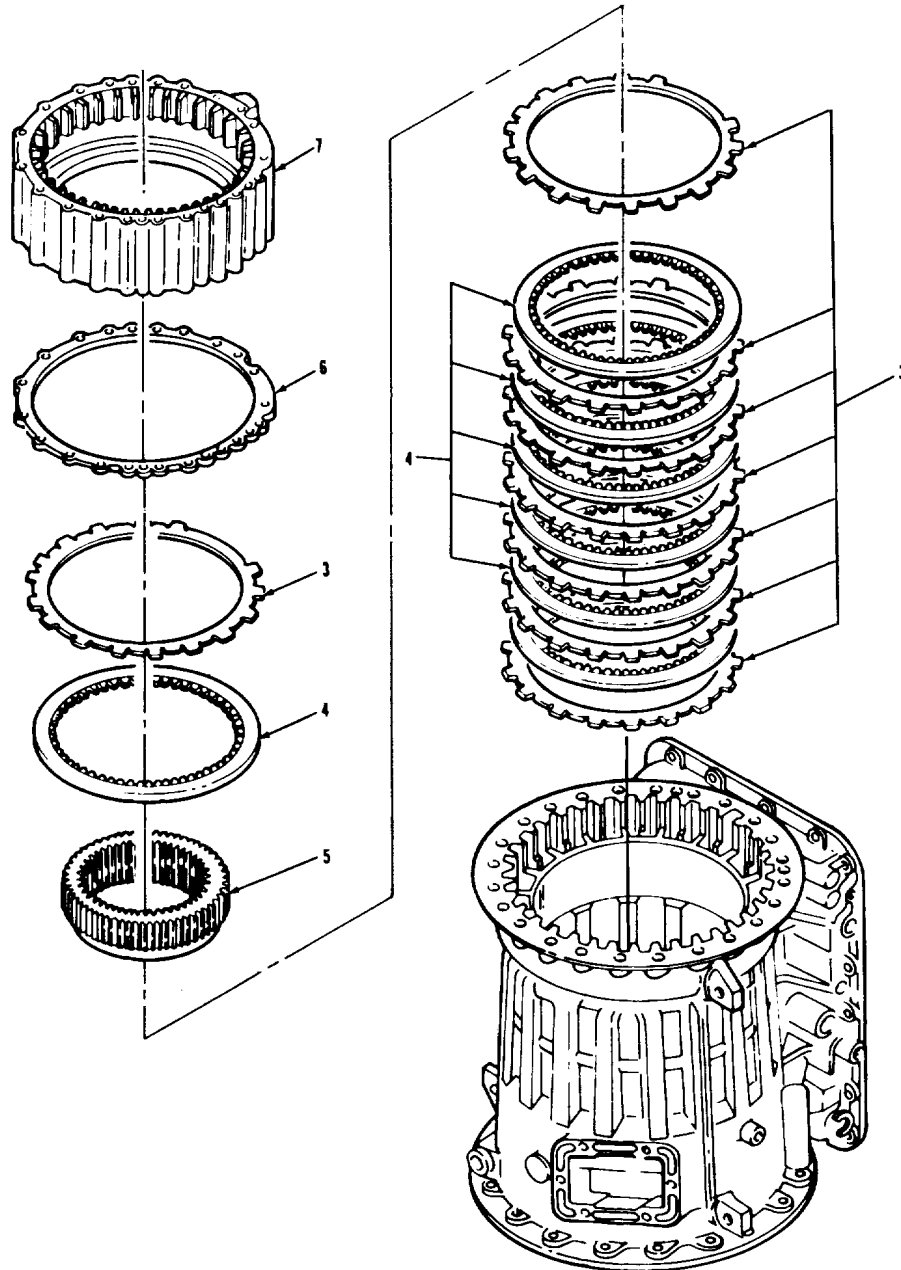
NOTE

Tie all clutch plates items (3) and (4) together and label "first and reverse clutch pack". Identification will be required at assembly.

- | | | |
|-------------------------------------|--|---|
| 2. "First and reverse clutch pack". | <ul style="list-style-type: none"> a. Remove two items (3) and one item (4). b. Remove item (5). c. Remove remaining items (3) and (4). | Aline inner splines with gear unit splines. |
|-------------------------------------|--|---|

TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL (Continued).



LEGEND:

- 3. FIRST AND REVERSE CLUTCH PLATE, EXTERNALLY TOOTHED (7)
- 4. FIRST AND REVERSE CLUTCH PLATE (6)
- 5. REAR PLANETARY RING GEAR
- 6. ADAPTER HOUSING GASKET
- 7. ADAPTER HOUSING

TA 238179

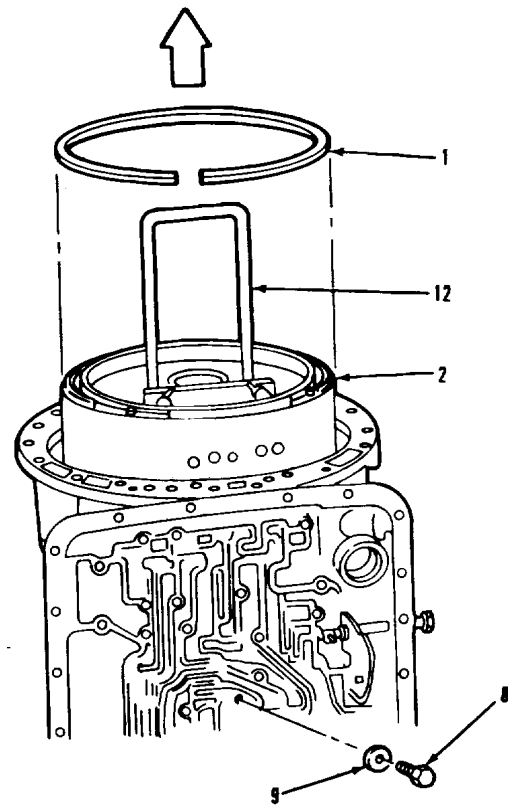
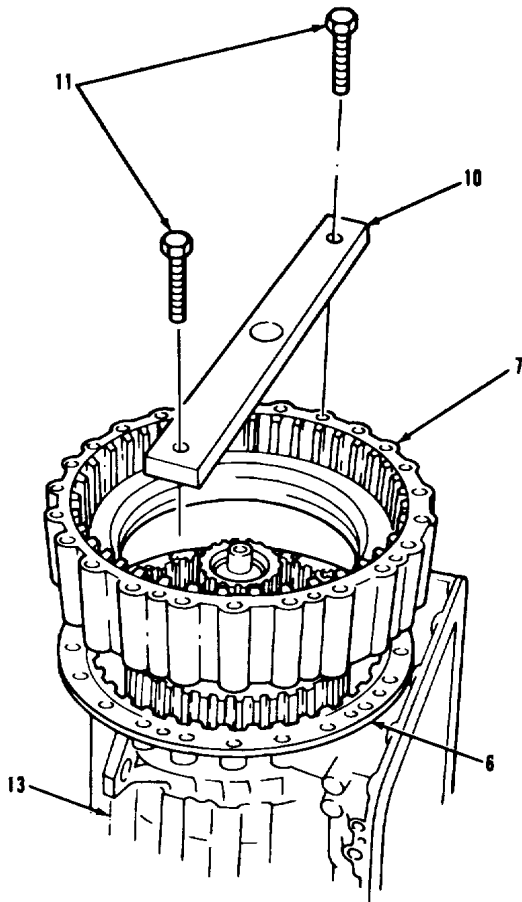
TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>REMOVAL (Continued)</u>		
3 Center support housing assembly (2).	a Install item (7) onto item (6).	
	b Install item (10)	Use tool number J-24208-3.
	c Install two items (11) to hold items (10) and (7) to item (13).	Short screws from rear cover will work.
	d Turn item (13) so that item (10) is at bottom.	
	e Remove items (8) and (9).	
	f Remove item (1).	
	g Install item (12) into groove of center support hub.	Use tool number J-24195.
CAUTION		
A cold transmission case may have to be warmed to remove center support. DO NOT USE A TORCH; case damage will result. Use a heat lamp or heat gun.		
	h Lift item (2) out of case	If item (2) starts to move then binds, back down then lift again. See paragraph 3-42 for item (2) repair instructions. Remove tool from item (2).
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		

TRANSMISSION.

3-34. ADAPTER HOUSING, FIRST-REVERSE CLUTCH, AND CENTER SUPPORT REMOVAL (Continued).



LEGEND:

- 1. INTERNAL SNAPRING
- 2. CENTER SUPPORT HOUSING ASSEMBLY
- 6. ADAPTER HOUSING GASKET
- 7. ADAPTER HOUSING
- 8. HEX HEAD SCREW, CENTER SUPPORT
- 9. PLAIN WASHER, CENTER SUPPORT
- 10. COMPRESSOR TOOL
- 11. SUITABLE HEX HEAD SCREW (2)
- 12. CENTER SUPPORT LIFTING TOOL
- 13. TRANSMISSION

TA 238180

TRANSMISSION.

3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL.

THIS TASK COVERS

Removal.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	3-34.	Adapter housing, first-reverse clutch, and center support removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Main shaft lifting bracket (33287) J-24196.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dust and dirt.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

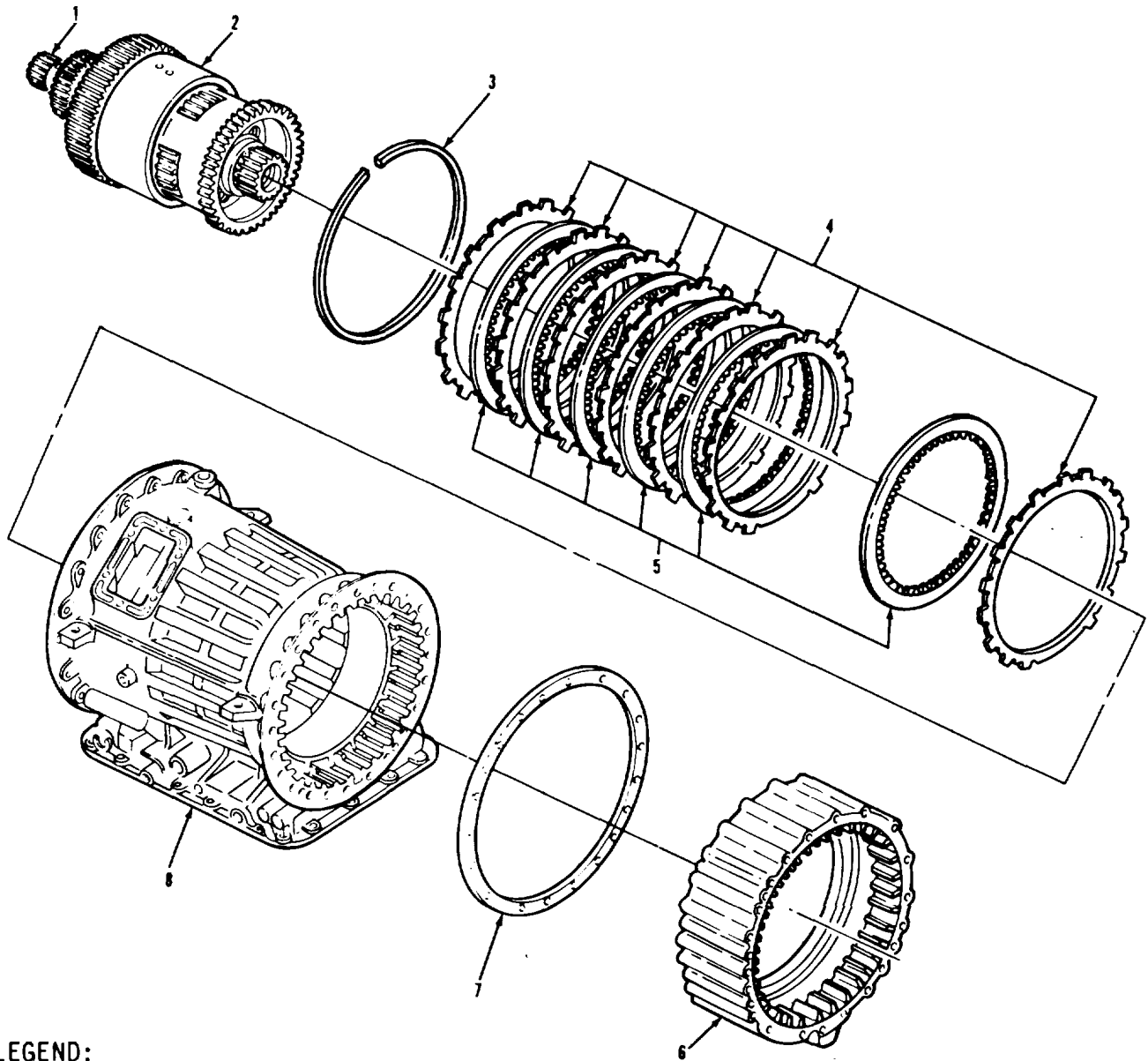
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL (Continued).



LEGEND:

1. MAIN SHAFT ASSEMBLY
2. GEAR UNIT
3. INTERNAL SNAPRING
4. EXTERNALLY TOOTHED CLUTCH PLATE (7)
5. INTERNALLY SPLINED CLUTCH PLATE (6)
6. ADAPTER HOUSING
7. ADAPTER HOUSING GASKET
8. TRANSMISSION HOUSING

TA 238181

TRANSMISSION.

3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL (Continued).

LOCATION/ITEM

ACTION

REMARKS

REMOVAL.

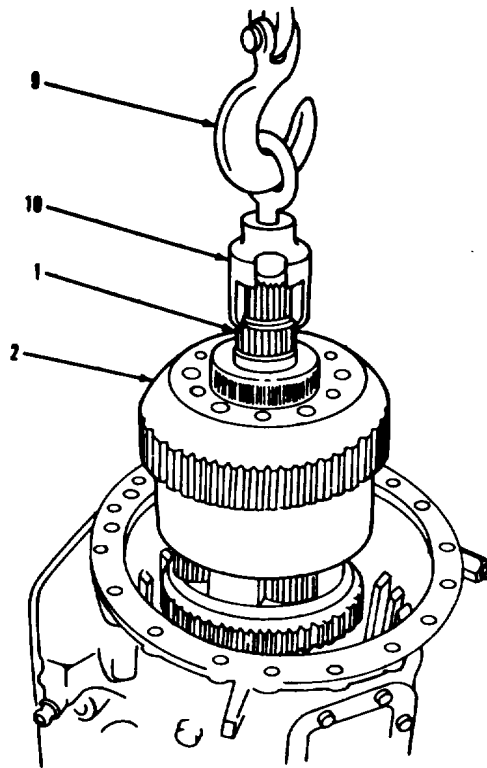
CAUTION

During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.

- | | | | | |
|---|----------|---|----------------------------------|---|
| 1 | Unit (2) | a | Install item (10) onto item (1). | Use tool number J-24196. |
| | | b | Remove item (2) with item (9) | See paragraph 3-43 for repair instructions. |

TRANSMISSION.

3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL (Continued).



LEGEND:

- 1. MAIN SHAFT ASSEMBLY
- 2. GEAR UNIT
- 9. SUITABLE HOIST
- 10. LIFTING BRACKET

TA 238182

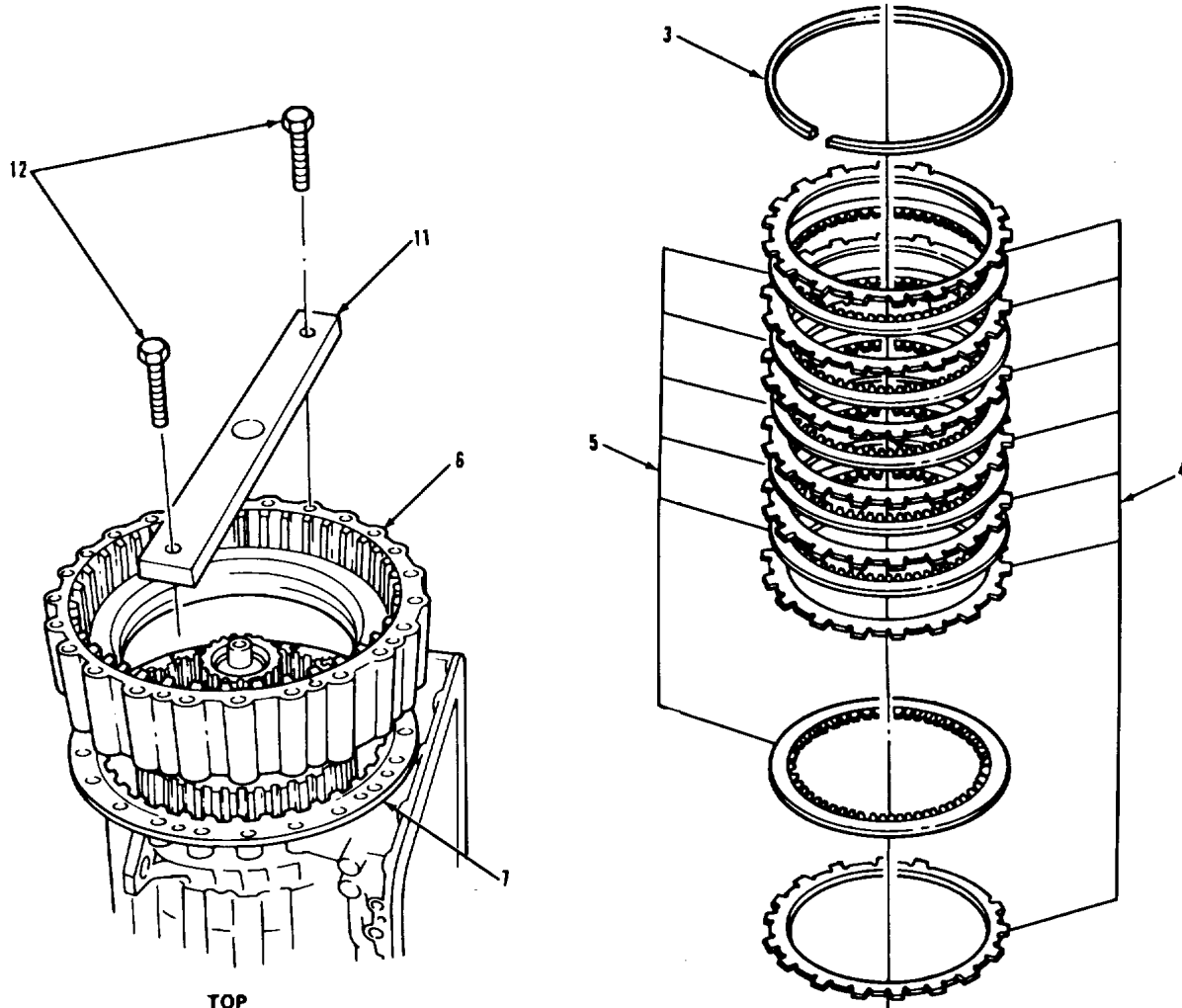
TRANSMISSION.

3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>REMOVAL (Continued).</u>		
NOTE		
Tie all clutch plates items (4) and (5) together and label "second clutch pack". Identification is required at assembly.		
2 "Second clutch pack".	<ul style="list-style-type: none"> a Remove item (3). b Remove seven items (4) and six items (5). 	
3 Bar (11)	<ul style="list-style-type: none"> a Turn item (13) so rear faces up. b Remove two items (12), and items (11), (6), and (7). 	
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		

TRANSMISSION.

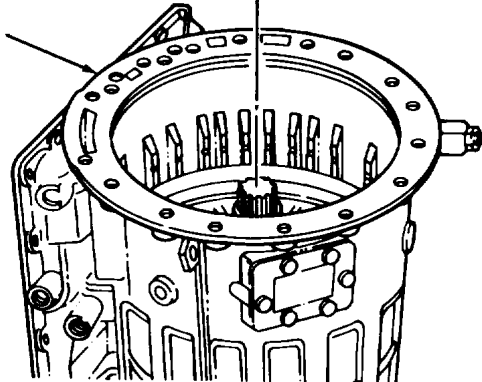
3-35. GEAR UNIT AND SECOND CLUTCH REMOVAL.



TOP

LEGEND:

- 3. INTERNAL SNAPPING
- 4. EXTERNALLY TOOTHED CLUTCH PLATE (7)
- 5. INTERNALLY SPLINED CLUTCH PLATE (6)
- 6. ADAPTER HOUSING
- 7. ADAPTER HOUSING GASKET
- 11. COMPRESSOR BAR
- 12. HEX HEAD SCREWS (2)
- 13. TRANSMISSION



TA 238183

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR.

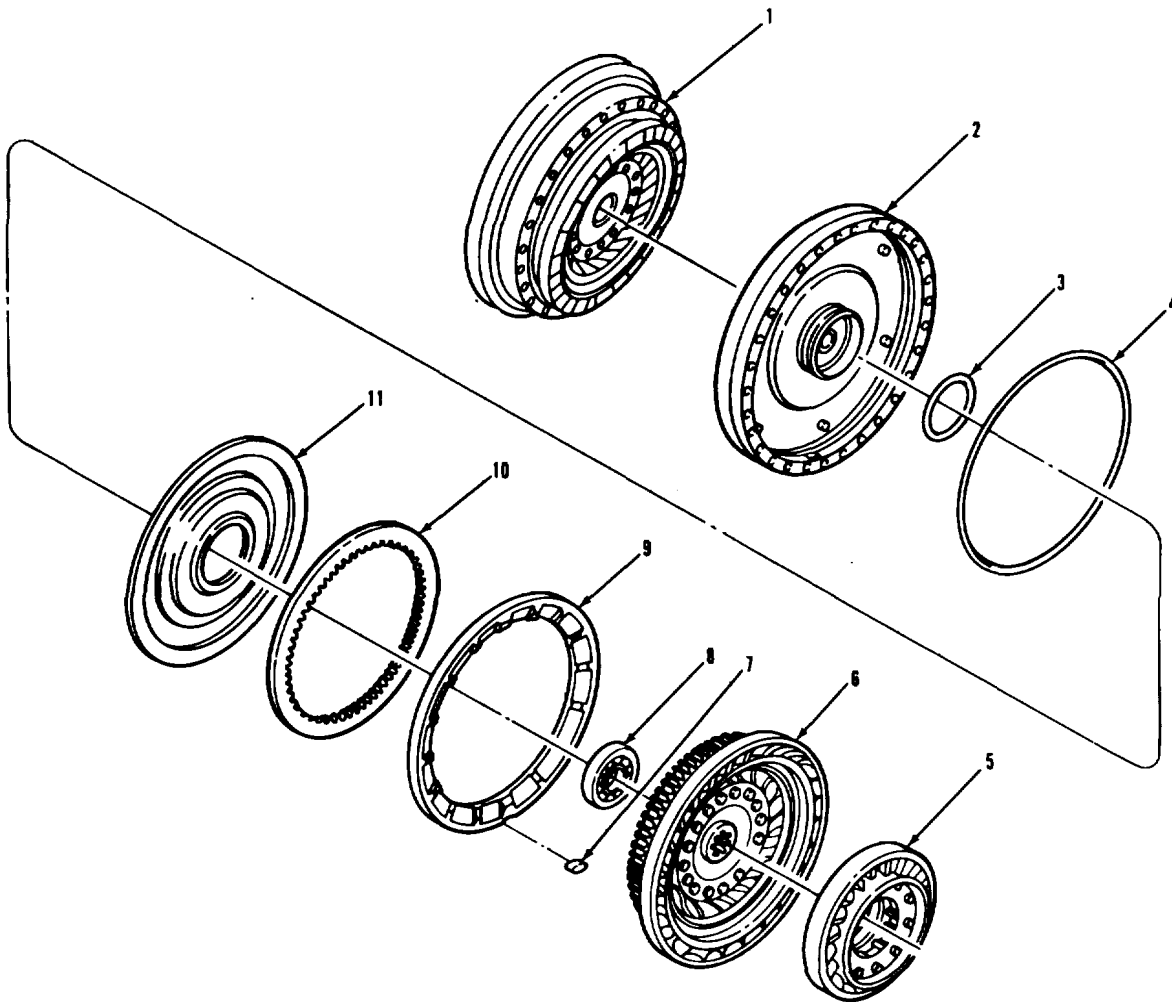
THIS TASK COVERS

- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Assembly.

INITIAL SETUP

<p><u>APPLICABLE CONFIGURATIONS</u> All.</p> <p><u>TEST EQUIPMENT</u> None.</p> <p><u>SPECIAL TOOLS</u> None.</p> <p><u>MATERIALS/PARTS (P/N)</u> Oil, OE/HDO-10 Item 16, Appendix B. Grease, oil solution Item 9, Appendix B.</p> <p><u>PERSONNEL REQUIRED</u> Two (MOS-63WJ. dust and dirt.</p> <p><u>REFERENCES (TM)</u> None.</p> <p><u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.</p>	<p><u>EQUIPMENT CONDITION PARAGRAPH</u> 3-29.</p> <p><u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Area clean and away from blowing</p> <p><u>GENERAL SAFETY INSTRUCTIONS</u> None.</p>	<p><u>CONDITION DESCRIPTION</u> Subassembly removed from transmission.</p>
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3-36. FLYWHEEL AND TURBINE REPAIR (Continued).



LEGEND:

1. RING GEAR
2. FLYWHEEL ASSEMBLY
3. SEALRING
4. SEALRING
5. STATOR ASSEMBLY
6. TURBINE ASSEMBLY
7. BACKING PLATE LOCK KEY
8. SINGLE ROW BALL BEARING
9. BACKING PLATE
10. LOCKUP CLUTCH PLATE INTERNALLY SPLINED
11. LOCKUP CLUTCH PISTON

TA 238184

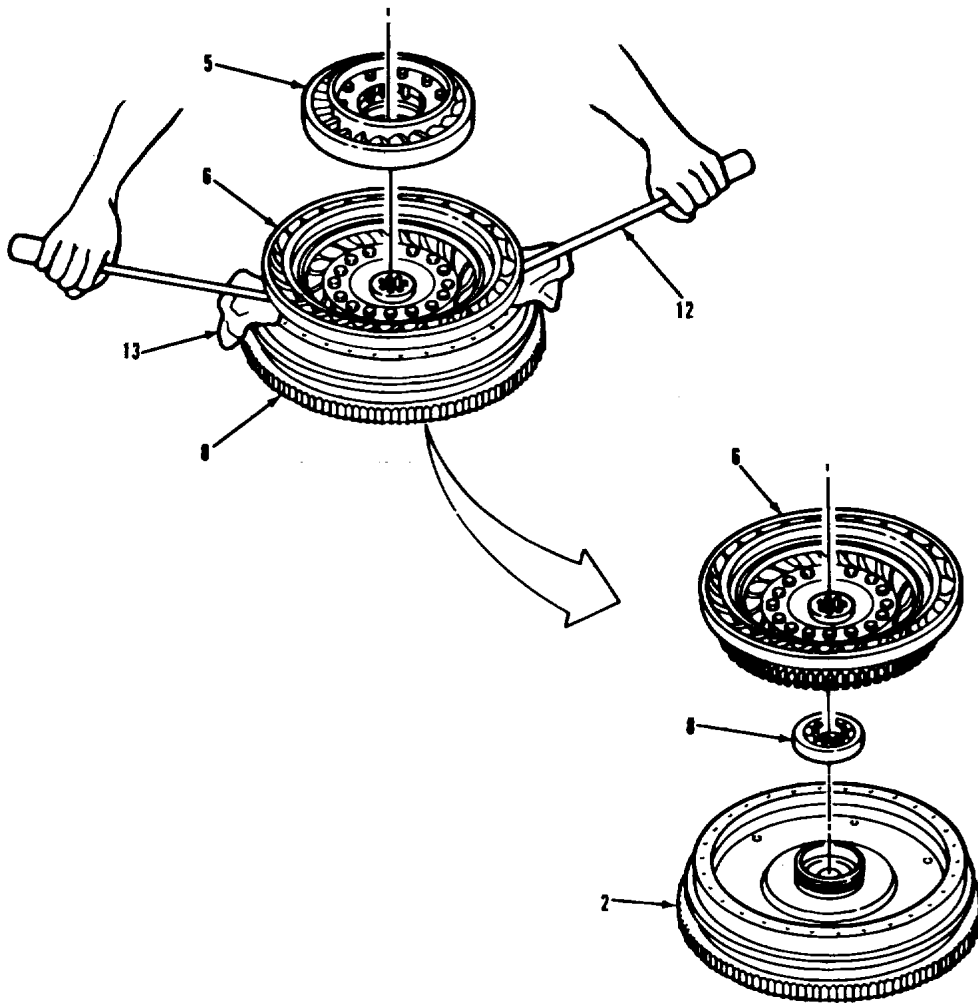
TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. DISASSEMBLY.	CAUTION	
	During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.	
1 Turbine assembly (6)	<ul style="list-style-type: none"> a Remove item (5) from item (6). b Place item (2) and item (6) front down on bench. c Insert two items (12) under item (6) d Press equally on items (12). e Remove item (6). 	Use items (13) on tool ends to prevent parts damage.
	NOTE	
	Remove ball bearing from turbine assembly only if replacement is necessary; otherwise, go to step 2.	
	<ul style="list-style-type: none"> f Remove item (8) from item (6) if necessary. 	Use universal puller.

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).



LEGEND:

- 2. FLYWHEEL ASSEMBLY
- 5. STATOR ASSEMBLY
- 6. TURBINE ASSEMBLY
- 8. SINGLE ROW BALL BEARING
- 12. PRYBAR (2)
- 13. SHOP TOWEL (2)

TA 238185

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

A. DISASSEMBLY (Continued).

NOTE

May need to use compressed air to remove piston. Apply to hole on piston and block holes on center of flywheel.

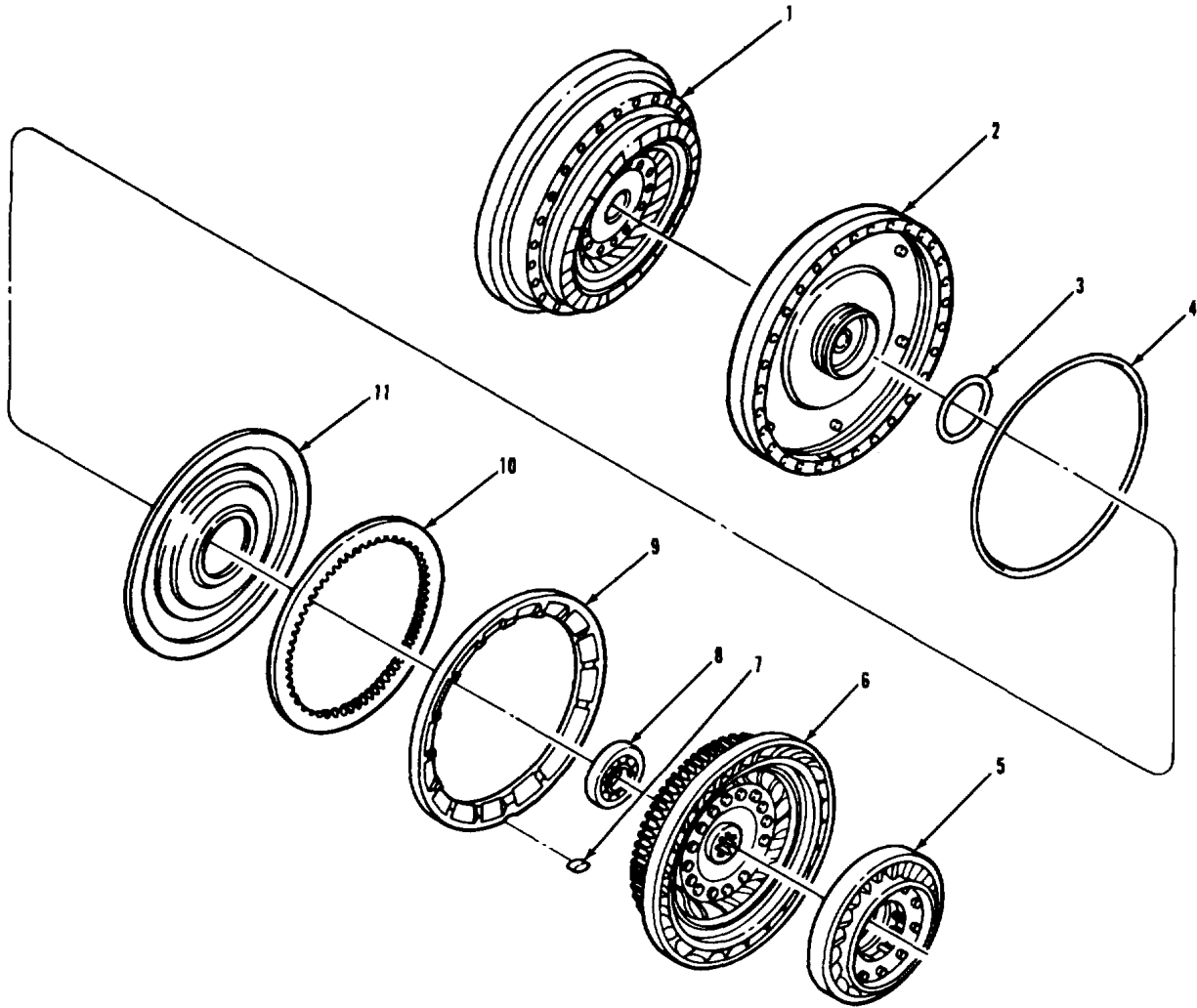
2 Lockup clutch parts

- a Remove items (9), (7), (10), and (11).
- b Remove item (4) from outside groove of item (11).
- c Remove item (3) from inner hub of item (2).

Tap item (7) to remove.

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).



LEGEND:

- 1. RING GEAR
- 2. FLYWHEEL ASSEMBLY
- 3. SEALRING
- 4. SEALRING
- 5. STATOR ASSEMBLY
- 6. TURBINE ASSEMBLY
- 7. BACKING PLATE LOCK KEY
- 8. SINGLE ROW BALL BEARING
- 9. BACKING PLATE
- 10. LOCKUP CLUTCH PLATE INTERNALLY SPLINED
- 11. LOCKUP CLUTCH PISTON

TA 238186

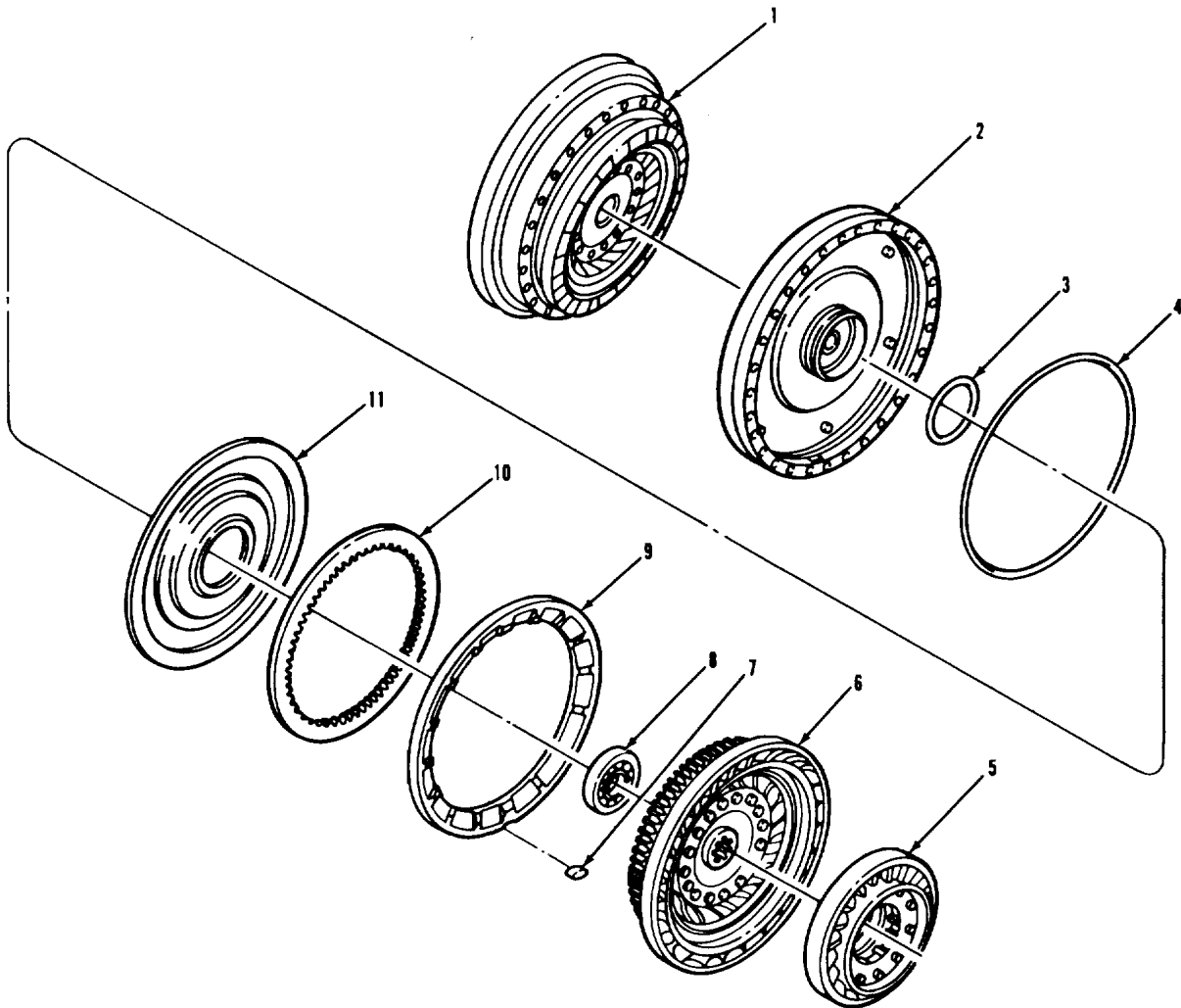
TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B</u> <u>CLEANING</u>		
3 All parts	Clean	See paragraph 3-4 for cleaning instructions.
<u>C</u> <u>INSPECTION</u>		
4 Turbine assembly (6)	<ul style="list-style-type: none"> a Inspect for cracks, twisted or loose parts, teeth, damaged threads, or damaged ball bearings. b Replace assembly if it shows any defects. 	See paragraph 3-5 for more inspection instructions.
5 Flywheel assembly (2)	<ul style="list-style-type: none"> a Inspect sealing surfaces for nicks or wear b Inspect for damaged threads cracks, or deformation. c Replace assembly if any defects are found. 	See paragraph 3-5 for more inspection instructions.
6 Backing plate (9)	Inspect for wear and depth of oil grooves	Minimum wear limit for item (10) is 0.090 inch and minimum depth of oil grooves is 0.008 inch. Discard if worn beyond limits.
7 Remaining parts	Inspect for nicks, damaged threads, damaged teeth, cracks or damage to clutch surface.	See paragraph 3-5 for more inspection instructions.

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).



LEGEND:

- 1. RING GEAR
- 2. FLYWHEEL ASSEMBLY
- 3. SEALRING
- 4. SEALRING
- 5. STATOR ASSEMBLY
- 6. TURBINE ASSEMBLY
- 7. BACKING PLATE LOCK KEY
- 8. SINGLE ROW BALL BEARING
- 9. BACKING PLATE
- 10. LOCKUP CLUTCH PLATE INTERNALLY SPLINED
- 11. LOCKUP CLUTCH PISTON

TA 238187

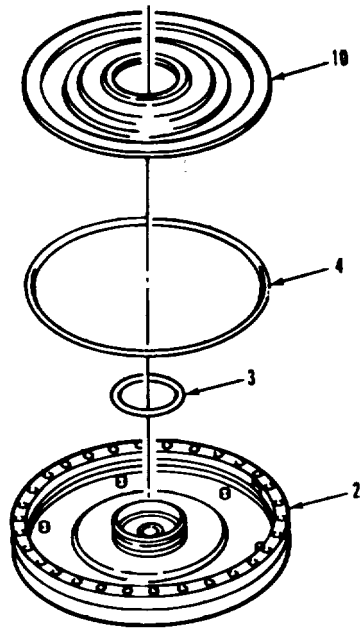
TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
D. ASSEMBLY. 8. Flywheel assembly (2).	a. Place item (2) cavity side up. b. Install new item (3) onto hub of item (2). c. Install new item (4) onto item (11). d. With a pencil, mark item (11) and item (2) next to a dowel pin or hole. e. Install item (11) into item (2) by alining pencil mark.	Lubricate with OE/HDO-10. Lubricate with OE/HDO-10. Will help aline item (11) properly. Be sure dowel pins are engaged and piston is fully seated.

TRANSMISSION.

3-36. FLYWHEEL AND URBINE REPAIR (Continued)



LEGEND:

- 2. FLYWHEEL ASSEMBLY
- 3. SEALRING
- 4. SEALRING
- 11. LOCKUP CLUTCH PISTON

TA238188

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).

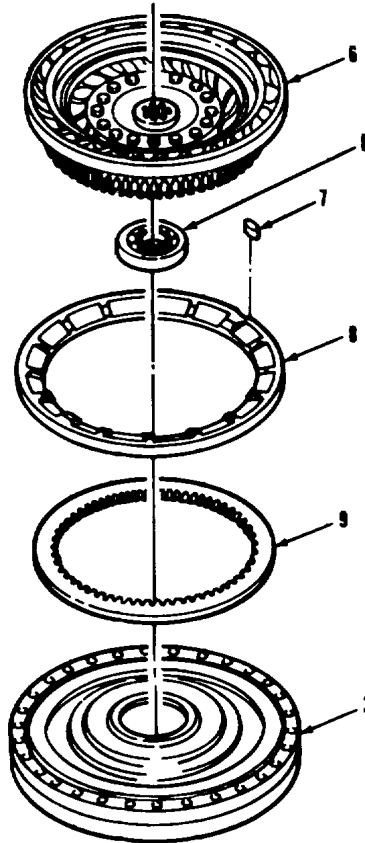
LOCATION/ITEM	ACTION	REMARKS
D. ASSEMBLY (Continued). I		
8 Flywheel assembly (2) (continued)	f Install item (7) into groove of item (9)	Use oil soluble grease to retain it.
	g Install item (10).	
	h Install item (9) flat side first.	Aline with item (7).
	i Press item (8) onto item (6), if it was removed in step 1e.	Press on inner race with suitable tool.
	j Center item (10) in item (2).	
	k Install item (6), engaging splines with item (10)	Be sure item (6) is fully seated.
	1 Install item (5) in item (6).	
	m Store assembly in a clean dry area until transmis- sion is ready for assem- bly.	

NOTE

Follow-on maintenance action required: Proceed with transmission maintenance.

TRANSMISSION.

3-36. FLYWHEEL AND TURBINE REPAIR (Continued).



LEGEND:

- 2. FLYWHEEL ASSEMBLY
- 5. STATOR ASSEMBLY
- 6. TURBINE ASSEMBLY
- 7. BACKING PLATE LOCK KEY
- 8. SINGLE ROW BALL BEARING
- 9. BACKING PLATE
- 10. LOCKUP CLUTCH PLATE INTERNALLY SPLINED

TA 238189

TRANSMISSION.

3-37. STATOR REPAIR.

THIS TASK COVERS

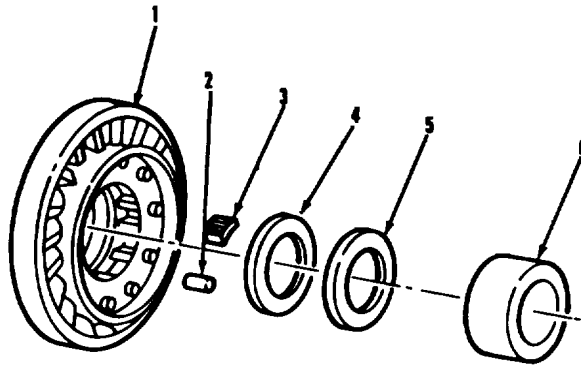
- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Assembly.

INITIAL SETUP

<p><u>APPLICABLE CONFIGURATIONS</u> All.</p> <p><u>TEST EQUIPMENT</u> None.</p> <p><u>SPECIAL TOOLS</u> Stator cam spring and roller retainer ring (33287) J-24218-2.</p> <p><u>MATERIALS/PARTS (P/N)</u> Grease, oil soluble Item 9, Appendix B.</p> <p><u>PERSONNEL REQUIRED</u> Two (MOS-63W). dirt and dust.</p> <p><u>REFERENCES (TM)</u> TM 9-2320-283-34P.</p> <p><u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.</p>	<p><u>EQUIPMENT CONDITION PARAGRAPH</u> 3-29.</p> <p><u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing</p> <p><u>GENERAL SAFETY INSTRUCTIONS</u> None.</p>	<p><u>CONDITION DESCRIPTION</u> Subassembly removed from transmission.</p>
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TRANSMISSION.

3-37. STATOR REPAIR (Continued).



LEGEND:

1. TORQUE CONVERTER STATOR ASSEMBLY
2. STATOR FREEWHEEL ROLLER (10)
3. STATOR FREEWHEEL ROLLER SPRING (10)
4. THRUST BEARING RACE
5. ROLLER BEARING ASSEMBLY
6. STATOR FREEWHEEL ROLLER RACE

TA 238190

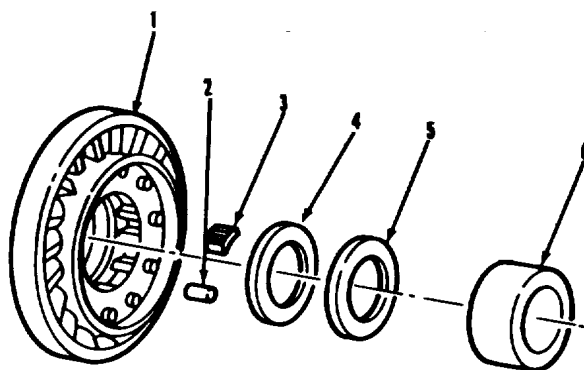
TRANSMISSION.

3-37. STATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
<p style="text-align: center;">CAUTION During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.</p>		
1. Torque converter stator assembly (1).	a. Turn item (6) clockwise. b. Remove items (4), (5), and (6), ten items (2), and ten items (3).	
<u>B. CLEANING.</u>		
2. All parts.	Clean.	Refer to paragraph 3-4.

TRANSMISSION.

3-37. STATOR REPAIR (Continued).



LEGEND:

1. TORQUE CONVERTER STATOR ASSEMBLY
2. STATOR FREEWHEEL ROLLER (10)
3. STATOR FREEWHEEL ROLLER SPRING (10)
4. THRUST BEARING RACE
5. ROLLER BEARING ASSEMBLY
6. STATOR FREEWHEEL ROLLER RACE

TA 238191

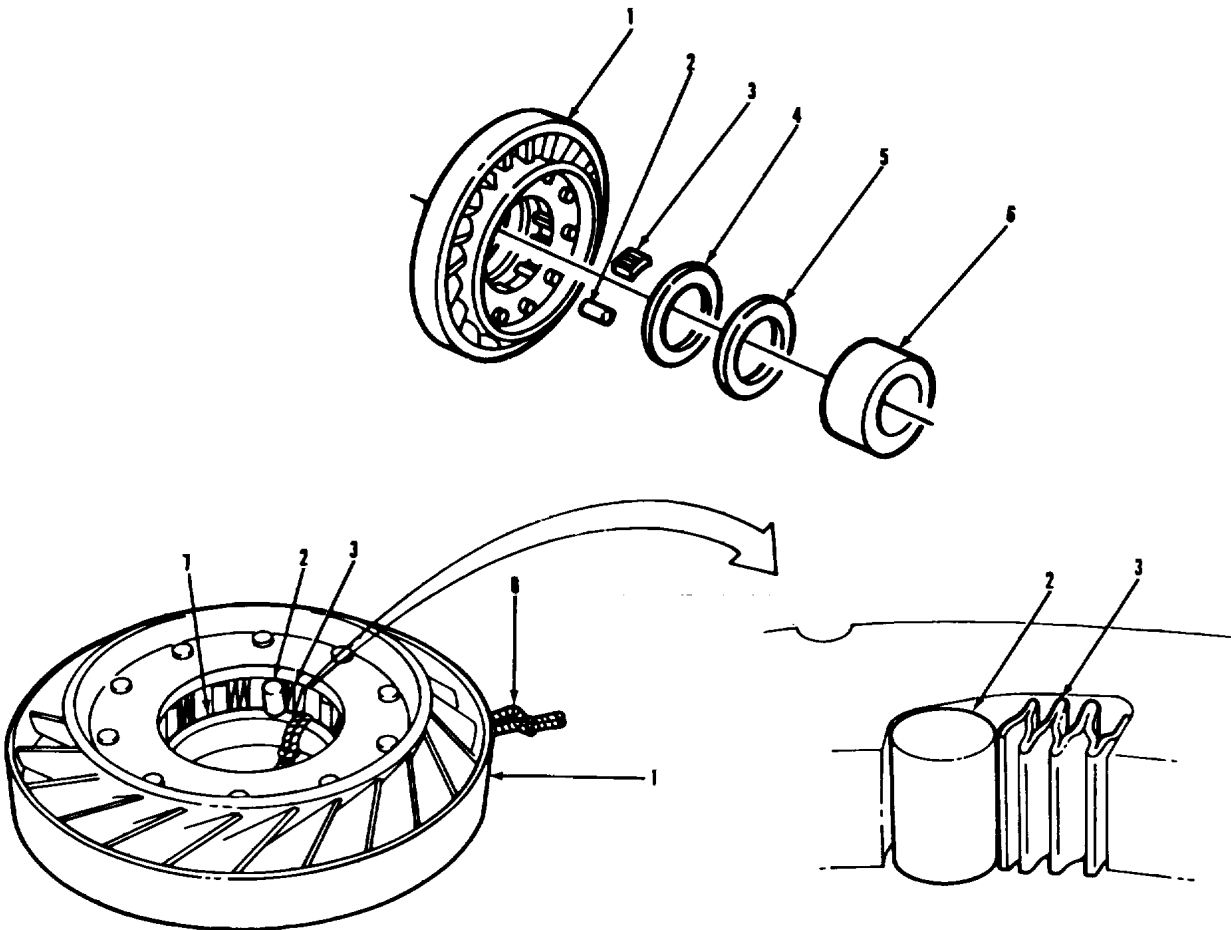
TRANSMISSION.

3-37. STATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSPECTION.</u>		
3 Torque converter stator assembly (1).	<ul style="list-style-type: none"> a Inspect for cracks and burrs. b Replace item (1) if it fails inspection. 	Refer to paragraph 3-5.
4 Items (2) thru (6)	<ul style="list-style-type: none"> a Inspect for wear or weakness. b Replace parts if they fail inspection. 	Refer to paragraph 3-5.
<u>D ASSEMBLY</u>		
5 Torque converter stator assembly (1).	<ul style="list-style-type: none"> a Place item (1) rear side up. b Install item (4). c Coat items (2) and (3) with oil soluble grease. d Install item (7) on top of item (4) in item (1) e Install ten items (3) into item (1) pockets. f Install ten items (2) into item (1) pockets. g Install item (5) onto item (6). h Start item (6) into item (1), stop when near item (7). i Remove item (7) by pulling item (8). 	Use holding collar tool number J-242180-2.
		Twist clockwise to install.

TRANSMISSION.

3-37. STATOR REPAIR (Continued).



LEGEND:

1. TORQUE CONVERTER STATOR ASSEMBLY
2. STATOR FREEWHEEL ROLLER (10)
3. STATOR FREEWHEEL ROLLER SPRING (10)
4. THRUST BEARING RACE
5. ROLLER BEARING ASSEMBLY
6. STATOR FREEWHEEL ROLLER RACE
7. HOLDING COLLAR TOOL
8. HOLDING COLLAR TOOL CORD

TA 238192

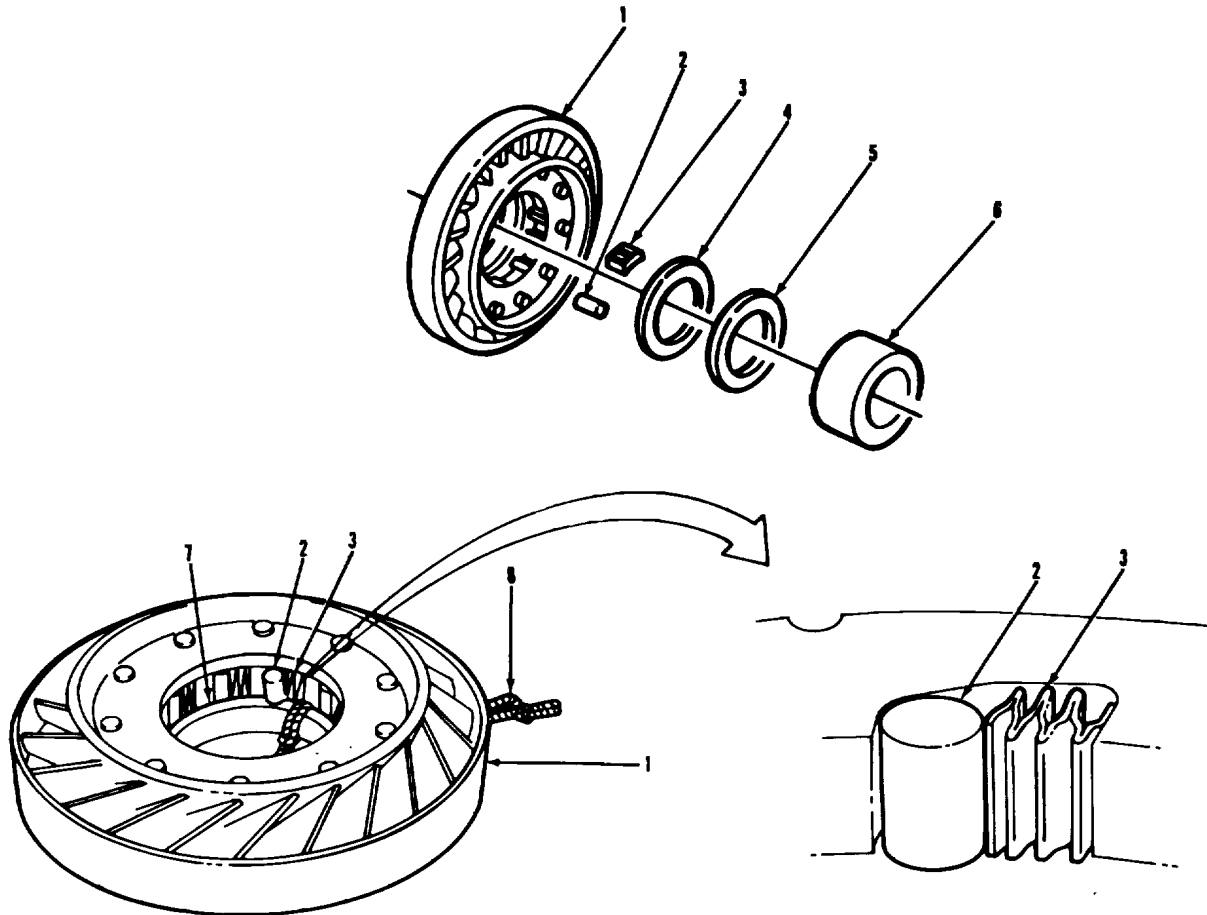
TRANSMISSION.

3-37. STATOR REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
5 Torque converter stator assembly (1) (continued).	j Twist item (6) clockwise and push in.	Item (4) must seat.
	k Rotate item (6) counter-clockwise to lock in place.	
	l Wrap item (1) in a plastic bag or shop towels.	
	m Store in a clean dry place.	Keep item (6) up.
<p>NOTE Follow-on maintenance action required: Proceed with transmission maintenance.</p>		

TRANSMISSION.

3-37. STATOR REPAIR (Continued).



LEGEND:

1. TORQUE CONVERTER STATOR ASSEMBLY
2. STATOR FREEWHEEL ROLLER (10)
3. STATOR FREEWHEEL ROLLER SPRING (10)
4. THRUST BEARING RACE
5. ROLLER BEARING ASSEMBLY
6. STATOR FREEWHEEL ROLLER RACE
7. HOLDING COLLAR TOOL
8. HOLDING COLLAR TOOL CORD

TA 238193

TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning and Inspection.
- c. Assembly.

INITIAL SETUP

EQUIPMENT CONDITION

APPLICABLE CONFIGURATIONS

All. 3-31.

PARAGRAPH

Subassembly removed from transmission.

CONDITION DESCRIPTION

TEST EQUIPMENT

None.

SPECIAL TOOLS

None.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul (73342) 6885217.

PERSONNEL REQUIRED

Two (MOS-63W).
dust and dirt.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

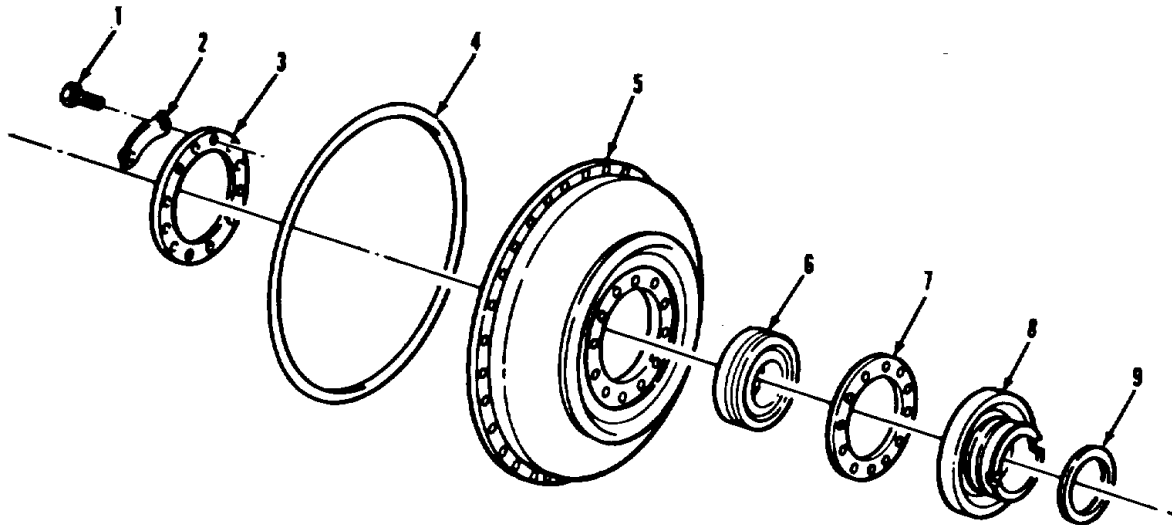
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).



LEGEND:

- 1. HEX HEAD SCREW (12)
- 2. LOCKING STRIP (6)
- 3. BEARING RETAINER
- 4. SEAL RING
- 5. TORQUE CONVERTER PUMP ASSEMBLY
- 6. SINGLE ROW BALL BEARING
- 7. PUMP HUB GASKET
- 8. CONVERTER PUMP HUB
- 9. HOOK TYPE SEAL RING

TA 238194

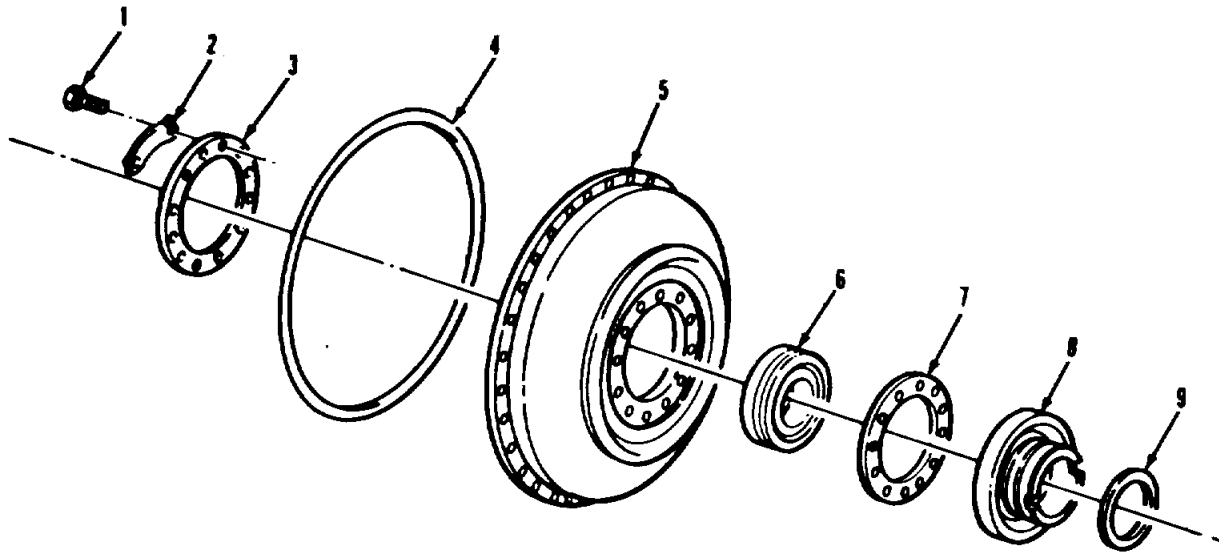
TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
<u>CAUTION</u>		
During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.		
1. Torque converter pump assembly (5).	a. Flatten corners of six items (2). b. Remove twelve items (1). c. Remove six items (2). d. Remove item (3).	
<u>NOTE</u>		
Sealing ring from the charging oil pump may have transferred behind item (9). See item (33) para 339 for proper location.		
	e. Remove items (8), item (7), and items (9).	Tap item (8) to remove.
	f. Remove items (4) from item (5).	
	g. Remove item (6).	Item (6) is a three piece bearing.

TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).



LEGEND:

- 1. HEX HEAD SCREW (12)
- 2. LOCKING STRIP (6)
- 3. BEARING RETAINER
- 4. SEAL RING
- 5. TORQUE CONVERTER PUMP ASSEMBLY
- 6. SINGLE ROW BALL BEARING
- 7. PUMP HUB GASKET
- 8. CONVERTER PUMP HUB
- 9. HOOK TYPE SEAL RING

TA 238195

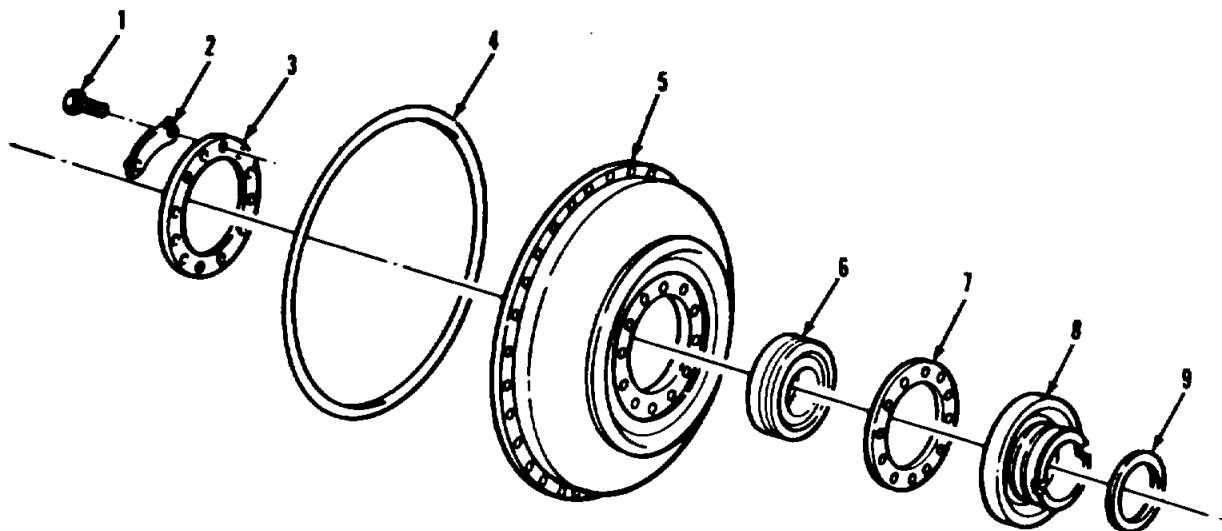
TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING AND INSPECTION.</u>		
2. All parts.	a. Clean and inspect. b. Replace any parts failing inspection.	Refer to paragraph 3-4.
<u>C. ASSEMBLY.</u>		
3. Torque converter pump assembly (5).	a. Install item (6) into item (8). b. Install new item (7) into item (8). c. Install suitable guide pin into item (8). d. Install new item (4) around item (5). e. Install item (5) onto item (8). f. Remove guide pin. g. Install item (9) onto item (8).	When replacing a three piece bearing, all three parts must be clean and must have the same serial number.

TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).



LEGEND:

1. HEX HEAD SCREW (12)
2. LOCKING STRIP (6)
3. BEARING RETAINER
4. SEAL RING
5. TORQUE CONVERTER PUMP ASSEMBLY
6. SINGLE ROW BALL BEARING
7. PUMP HUB GASKET
8. CONVERTER PUMP HUB
9. HOOK TYPE SEAL RING

TA 238196

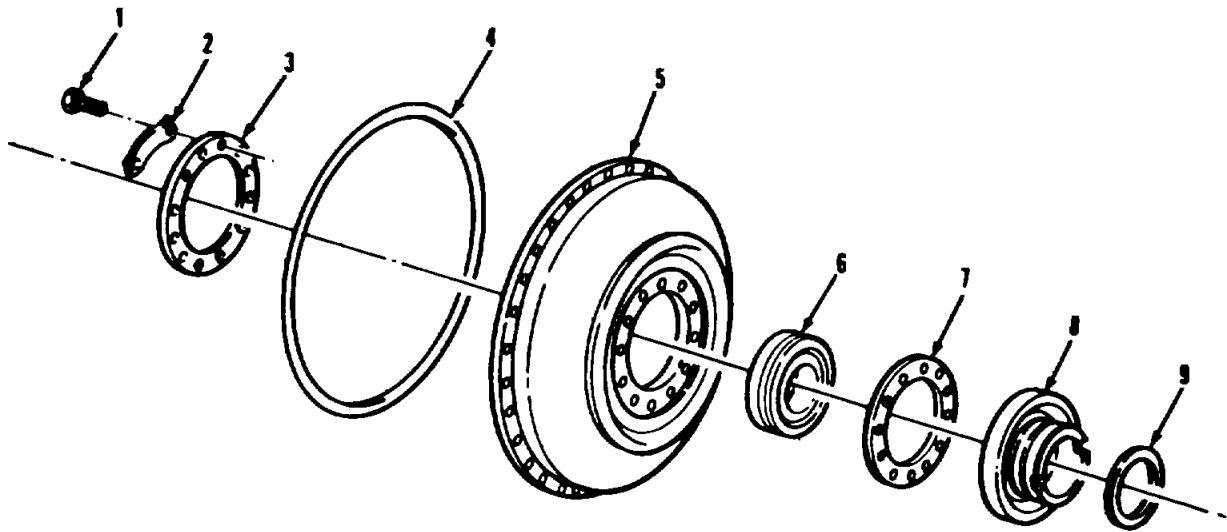
TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
3. Torque converter pump assembly (5) (continued).	<ul style="list-style-type: none"> <li data-bbox="618 443 911 533">h. Install item (3) and twelve items (1) with six new items (2). <li data-bbox="618 564 964 627">i. Bend a corner of item (2) against each item (1). <li data-bbox="618 659 976 747">j. Store assembly in a clean dry place until transmission assembly. 	Hold item (5) in suitable fixture and torque item (1) to 33-40 lb-ft.
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		

TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).



LEGEND:

- 1. HEX HEAD SCREW (12)
- 2. LOCKING STRIP (6)
- 3. BEARING RETAINER
- 4. SEAL RING
- 5. TORQUE CONVERTER PUMP ASSEMBLY
- 6. SINGLE ROW BALL BEARING
- 7. PUMP HUB GASKET
- 8. CONVERTER PUMP HUB
- 9. HOOK TYPE SEAL RING

TA 238197

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning and Inspection.
- c. Assembly.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION</u> <u>PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	3-32.	Subassembly removed from transmission.

TEST EQUIPMENT
None.

<u>SPECIAL TOOLS</u>	
Lockup valve and main pressure regulator	Dust shield (front seal installer)
Spring compressor (33287) J-24219.	(33287) J-24198.
Front support hub needle bearing installer (33287) J-24197.	Driver handle (33287) J-24202-4.
Guide pin (33287) J-24315-1.	Bearing driver (33287) J-28646.

<u>MATERIALS/PARTS (P/N)</u>	
Grease, oil soluble Item 9, Appendix B.	Sealer, nonhardening Item 28, Appendix B.
Oil, OE/HDO-10. Item 16, Appendix B.	Kit, transmission overhaul (77342) 6885217.

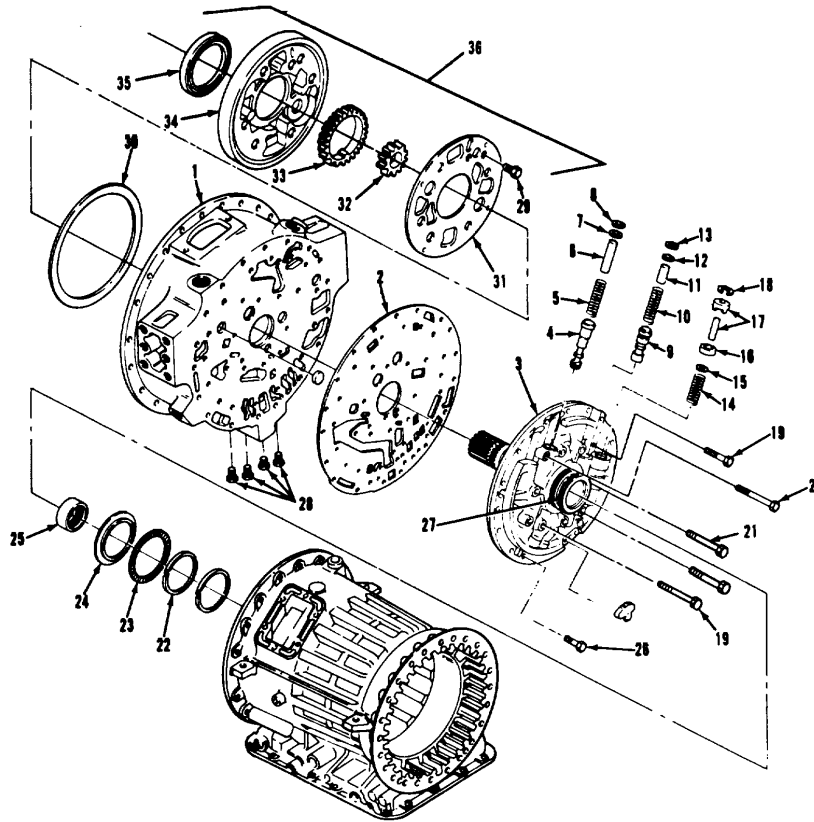
<u>PERSONNEL REQUIRED</u>	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u>
Two (MOS-63W). dirt and dust.	Work area clean and away from blowing dirt and dust.

<u>REFERENCES (TM)</u>	<u>GENERAL SAFETY INSTRUCTIONS</u>
TM 9-2320-283-34P.	None.

TROUBLESHOOTING REFERENCES
Paragraph 2-7.

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- | | |
|----------------------------------|--------------------------------|
| 1. CONVERTER HOUSING | 19. HEX HEAD SCREW (3) |
| 2. CONVERTER HOUSING GASKET | 20. HEX HEAD SCREW |
| 3. FRONT SUPPORT | 21. HEX HEAD SCREW (6) |
| 4. MAIN PRESSURE REGULATOR VALVE | 22. SEAL RING (2) |
| 5. MAIN REGULATOR VALVE SPRING | 23. ROLLER BEARING ASSEMBLY |
| 6. VALVE STOP | 24. THRUST BEARING RACE |
| 7. RETAINER WASHER | 25. ROLLER BEARING ASSEMBLY |
| 8. SNAPRING | 26. HEX HEAD SCREW (15) |
| 9. LOCKUP SHIFT VALVE | 27. FRONT SUPPORT HUB |
| 10. VALVE SPRING | 28. PIPE PLUG (4) |
| 11. VALVE STOP | 29. FLAT HEAD MACHINE SCREW |
| 12. RETAINER WASHER | 30. SEAL RING |
| 13. SNAPRING | 31. PUMP COVER |
| 14. VALVE SPRING | 32. DRIVEN GEAR |
| 15. CONVERTER BYPASS VALVE | 33. DRIVE GEAR |
| 16. VALVE SEAT | 34. OIL PUMP BODY |
| 17. VALVE SUPPORT ASSEMBLY | 35. OIL SEAL |
| 18. SNAPRING | 36. CHARGING OIL PUMP ASSEMBLY |

TA 238198

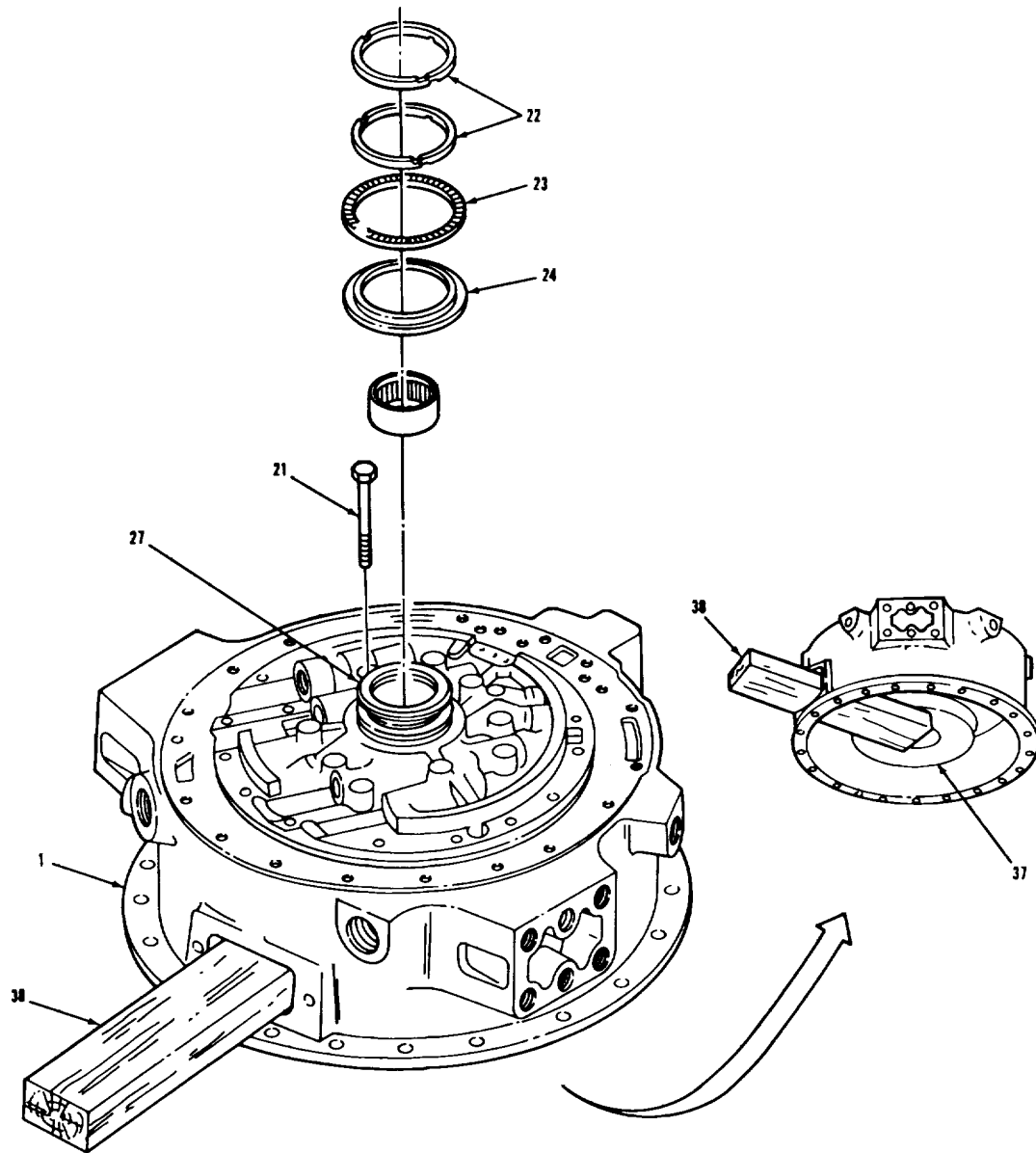
TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
<u>CAUTION</u>		
During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
1. Converter housing (1). on bench.	<ul style="list-style-type: none"> a. Place item (1) front down b. Remove items (22), (23), and (24) from item (27). c. Place item (38) through access opening, approximately fourteen inches. d. Remove only four of six items (21). e. Loosen remaining two items (21). f. Tap the two loose items (21), with a mallet while pressing on item (38) and free item (37). g. Remove two items (21). h. Remove items (38) and (37). 	

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 1. CONVERTER HOUSING
- 21. HEXHEAD SCREW (6)
- 22. SEAL RING (2)
- 23. ROLLER BEARING ASSEMBLY
- 24. THRUST BEARING RACE LEGEND:
- 27. HUB
- 37. CHARGING OIL PUMP ASSEMBLY
- 38. WOODEN BLOCK

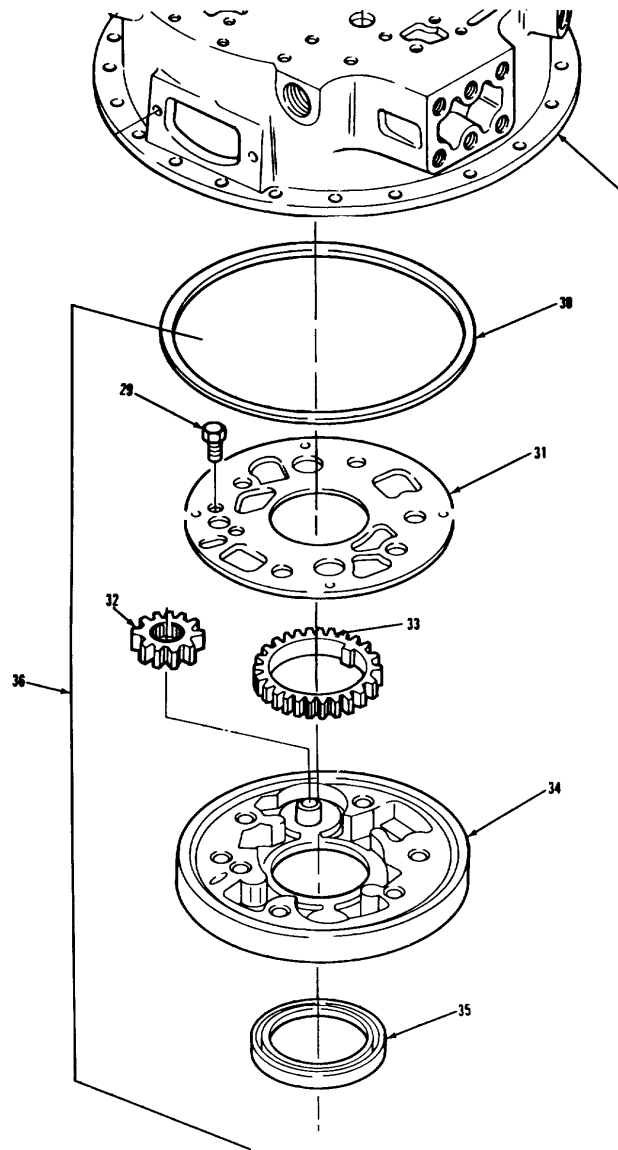
TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
2. Charging oil pump assembly (36).	a. Remove item (29).	
	b. Remove items (30) and (31).	Discard item (30).
NOTE		
Before removing drive or driven gears note the correct orientation of each. Always reinstall in the same direction they were removed.		
	c. Remove items (32) and (33).	
	d. Remove item (35) from item (34).	

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 1. CONVERTER HOUSING
- 29. FLATHEAD MACHINE SCREW
- 30. SEAL RING
- 31. PUMP COVER
- 32. DRIVEN GEAR
- 33. DRIVE GEAR
- 34. OIL PUMP BODY
- 35. OIL SEAL
- 36. CHARGING OIL PUMP ASSEMBLY

TA 238200

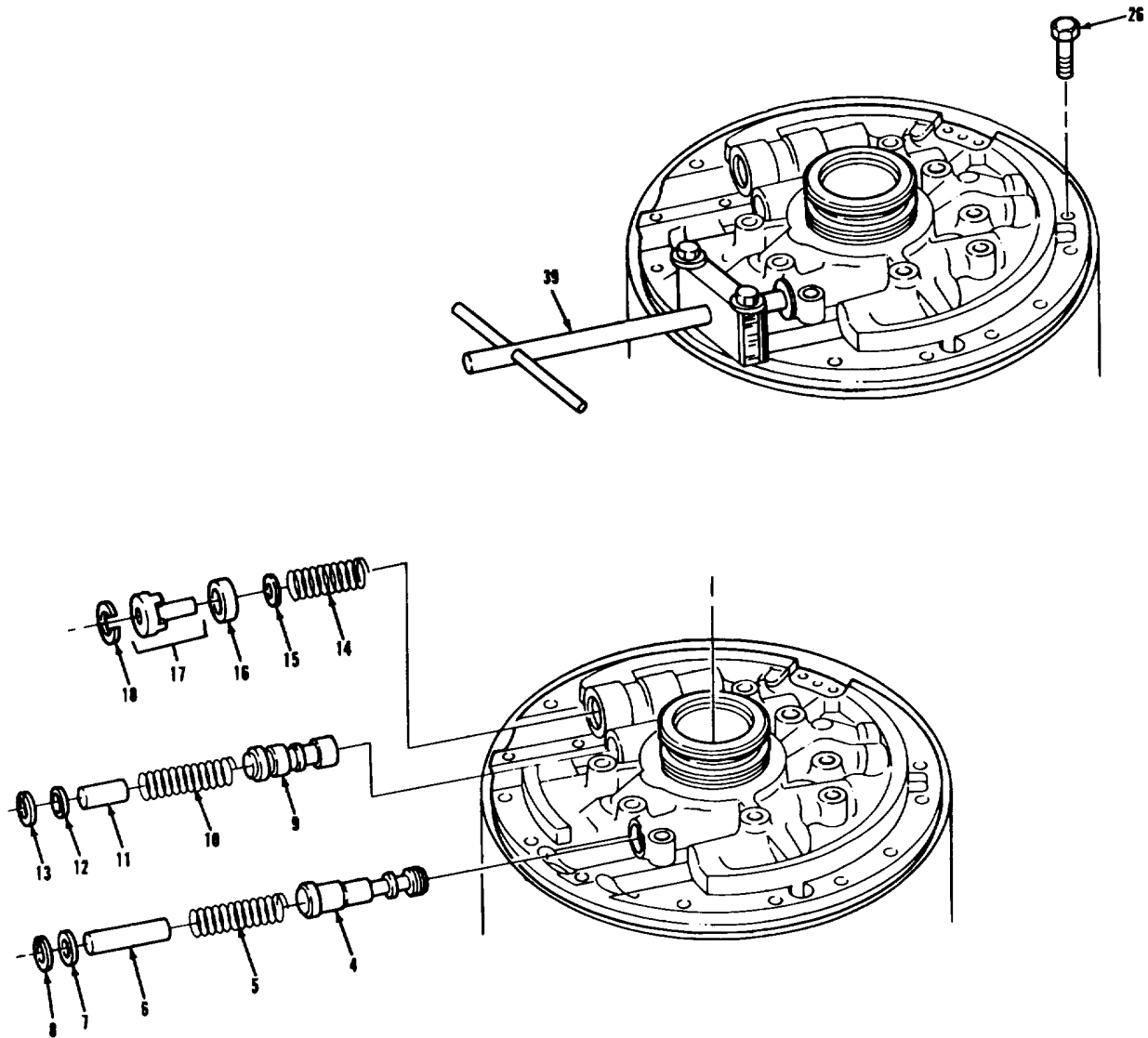
TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
3. Valve (4).	a. Remove two items (26) in front of item (4).	
	b. Install item (39).	Use tool number J-24219.
	c. Compress item (7) and remove item (8).	
	d. Carefully remove item (37).	
	e. Remove items (7), (6), (5), and (4).	
4. Valve (9).	a. Remove two items (26) in front of item (9).	
	b. Install item (39).	Use tool number J-24219.
	c. Compress item (12) and remove item (13).	
	d. Carefully remove item (39) and items (12), (11), (10), and (9).	
5. Valve (15).	a. Push in item (17) and remove item (18).	Item (37) not used.
	b. Remove items (17), (16), (15), and (14).	

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- | | |
|----------------------------------|----------------------------|
| 4. MAIN PRESSURE REGULATOR VALVE | 13. SNAPRING |
| 5. MAIN REGULATOR VALVE SPRING | 14. VALVE SPRING |
| 6. VALVE STOP | 15. CONVERTER BYPASS VALVE |
| 7. RETAINER WASHER | 16. VALVE SEAT |
| 8. SNAPRING | 17. VALVE SUPPORT ASSEMBLY |
| 9. LOCKUP SHIFT VALVE | 18. SNAPRING |
| 10. VALVE SPRING | 26. HEX HEAD SCREW (4) |
| 11. VALVE STOP | 39. SPRING COMPRESSOR |
| 12. RETAINER WASHER | |

TA 23801

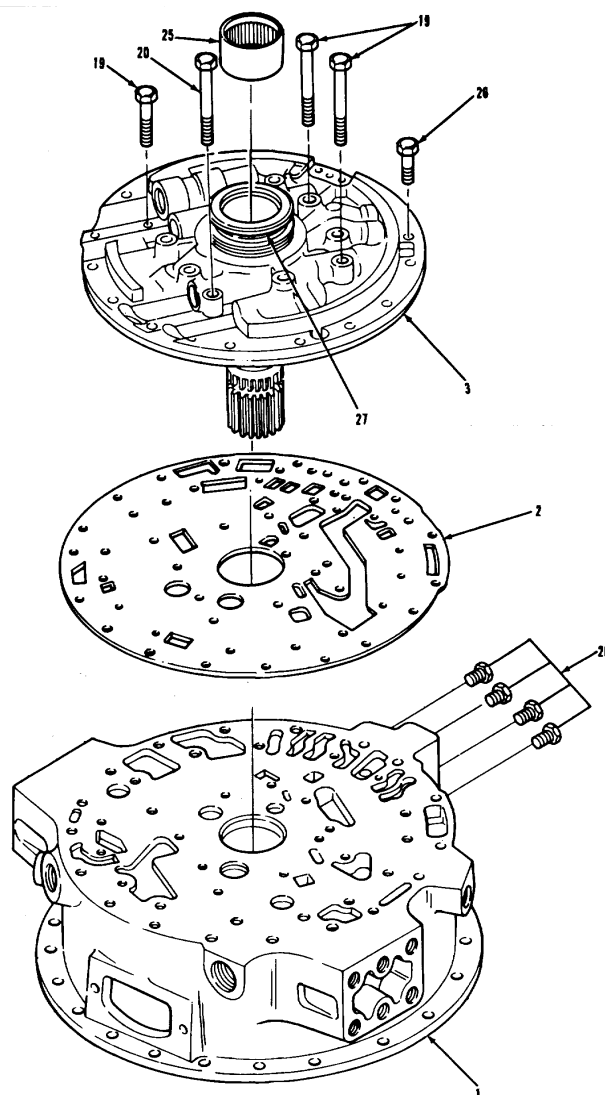
TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
6. Support (3).	a. Remove three items (19), item (20), and eleven items (26).	Total of fifteen.
NOTE		
Mark front support and converter housing to help position it on reassembly.		
	b. Remove items (3) and (2) from item (1).	
NOTE		
Do steps c and d only when new parts are needed.		
	c. Remove item (25) from item (27).	
	d. Remove four items (28).	

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 1. CONVERTER HOUSING
- 2. CONVERTER HOUSING GASKET
- 3. FRONT SUPPORT
- 19. HEX HEAD SCREW (3)
- 20. HEX HEAD SCREW
- 25. ROLLER BEARING ASSEMBLY
- 26. HEX HEAD SCREW (11)
- 27. FRONT SUPPORT HUB
- 28. PIPE PLUG (4)

TA 238202

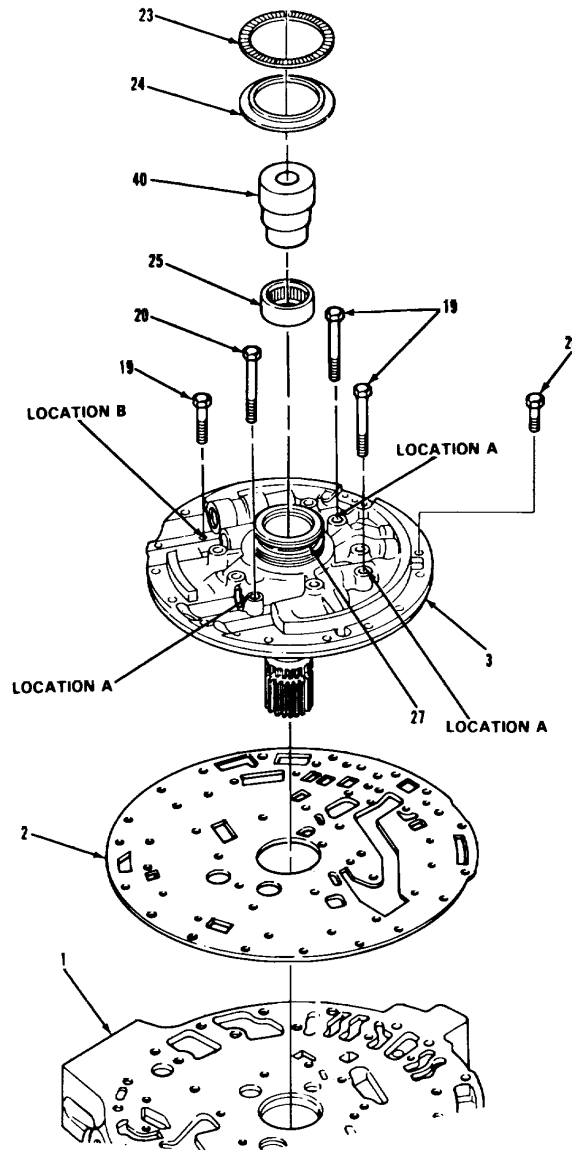
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3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING AND INSPECTION.</u>		
7. Support (3).	<ul style="list-style-type: none"> a. Clean. b. Inspect item (27) carefully for any damage or wear. c. Replace defective parts. 	Refer to paragraph 3-4.
8. All other parts.	<ul style="list-style-type: none"> a. Clean and inspect. b. Replace any parts failing inspection. 	Refer to paragraph 3-5.
<u>C. ASSEMBLY.</u>		
NOTE		
Do steps a and b only if roller bearing was removed from the front support.		
9. Support (3).	<ul style="list-style-type: none"> a. Set new item (25) into item (27) with part number showing. b. Using item (40), press item (25) into item (27). c. Place item (1) on bench face down. d. Place new item (2) onto item (1). e. Set item (3) onto item (2). f. Install three items (19) into item (3) at location A. g. Install item (20) into item (3) at location B. 	<ul style="list-style-type: none"> Use tool number J-24197. Seat item (25) fully. Align all holes. Align all holes. Use 2-1/2 inch long screw. Use 1-1/2 inch long screw.

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 1. CONVERTER HOUSING
- 2. CONVERTER HOUSING GASKET
- 3. FRONT SUPPORT
- 19. HEX HEAD SCREW (3)
- 20. HEX HEAD SCREW
- 23. ROLLER BEARING ASSEMBLY
- 24. THRUST BEARING RACE
- 25. ROLLER BEARING ASSEMBLY
- 26. HEX HEAD SCREW (11)
- 27. FRONT SUPPORT HUB
- 40. BEARING INSTALLER

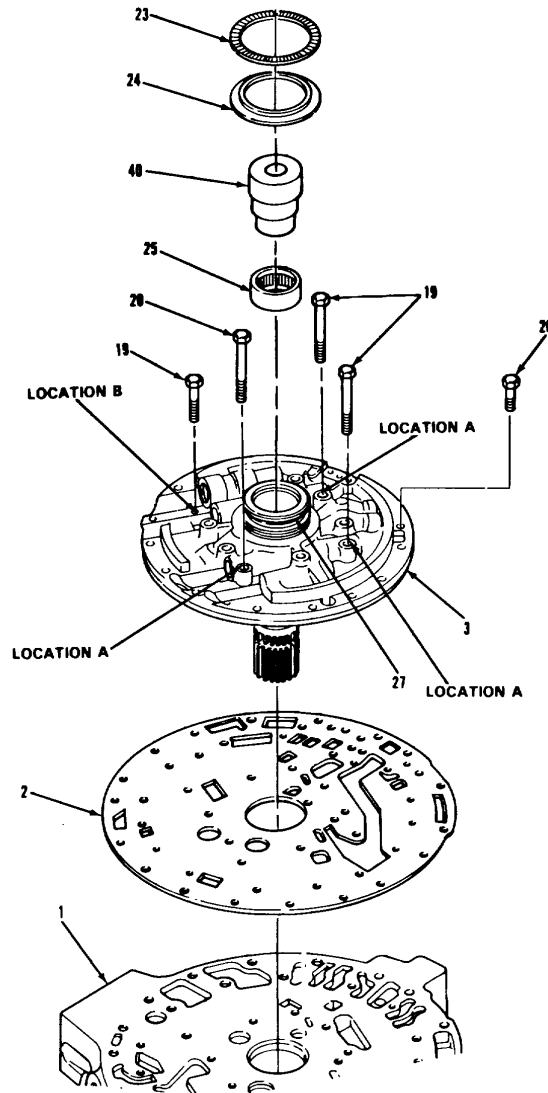
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3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
NOTE		
Leave four screws near pressure valves out so compressor tool can be used.		
9. Support (3) (continued).	h. Install eleven items (26) into item (3). i. Install item (24), flat side down, onto item (27). j. Install item (23) onto item (24).	Use 1-1/2 inch long screws. Coat with oil soluble grease to hold in place. Coat with oil soluble grease to hold in place.

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 1. CONVERTER HOUSING
- 2. CONVERTER HOUSING GASKET
- 3. FRONT SUPPORT
- 19. HEX HEAD SCREW (3)
- 20. HEX HEAD SCREW
- 23. ROLLER BEARING ASSEMBLY
- 24. THRUST BEARING RACE
- 25. ROLLER BEARING ASSEMBLY
- 26. HEX HEAD SCREW (11)
- 27. FRONT SUPPORT HUB

TA 238204

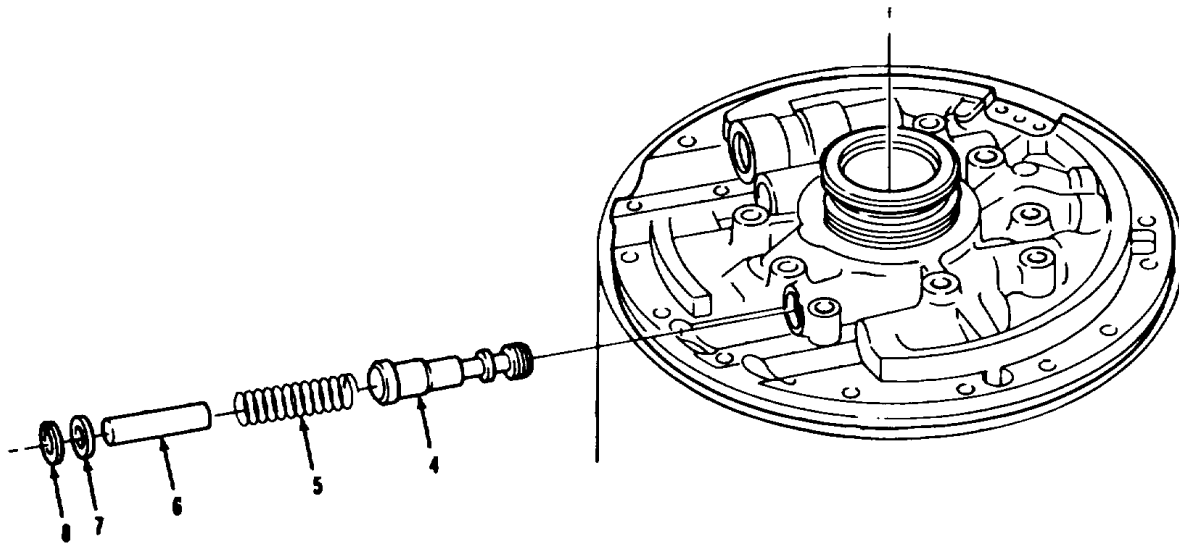
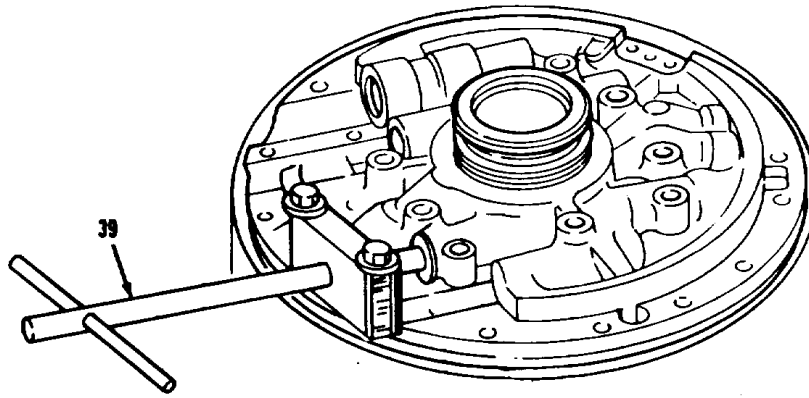
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3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
NOTE		
Valves must be free in their bores.		
10. Valve (4).	<ul style="list-style-type: none"> a. Install item (4) into its bore. b. Install item (5) and item (6). 	Small end first.
CAUTION		
Compressor tool must be centered to prevent binding the retainer washer.		
	<ul style="list-style-type: none"> c. Install item (39). d. Put items (7) and (8) onto item (37) and compress into bore. e. Install item (8). f. Remove item (39). 	Use tool number J-24219.

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 4. MAIN PRESSURE REGULATOR VALVE
- 5. MAIN REGULATOR VALVE SPRING
- 6. VALVE STOP
- 7. RETAINER WASHER
- 8. SNAPRING
- 39. SPRING COMPRESSOR

TA 238205

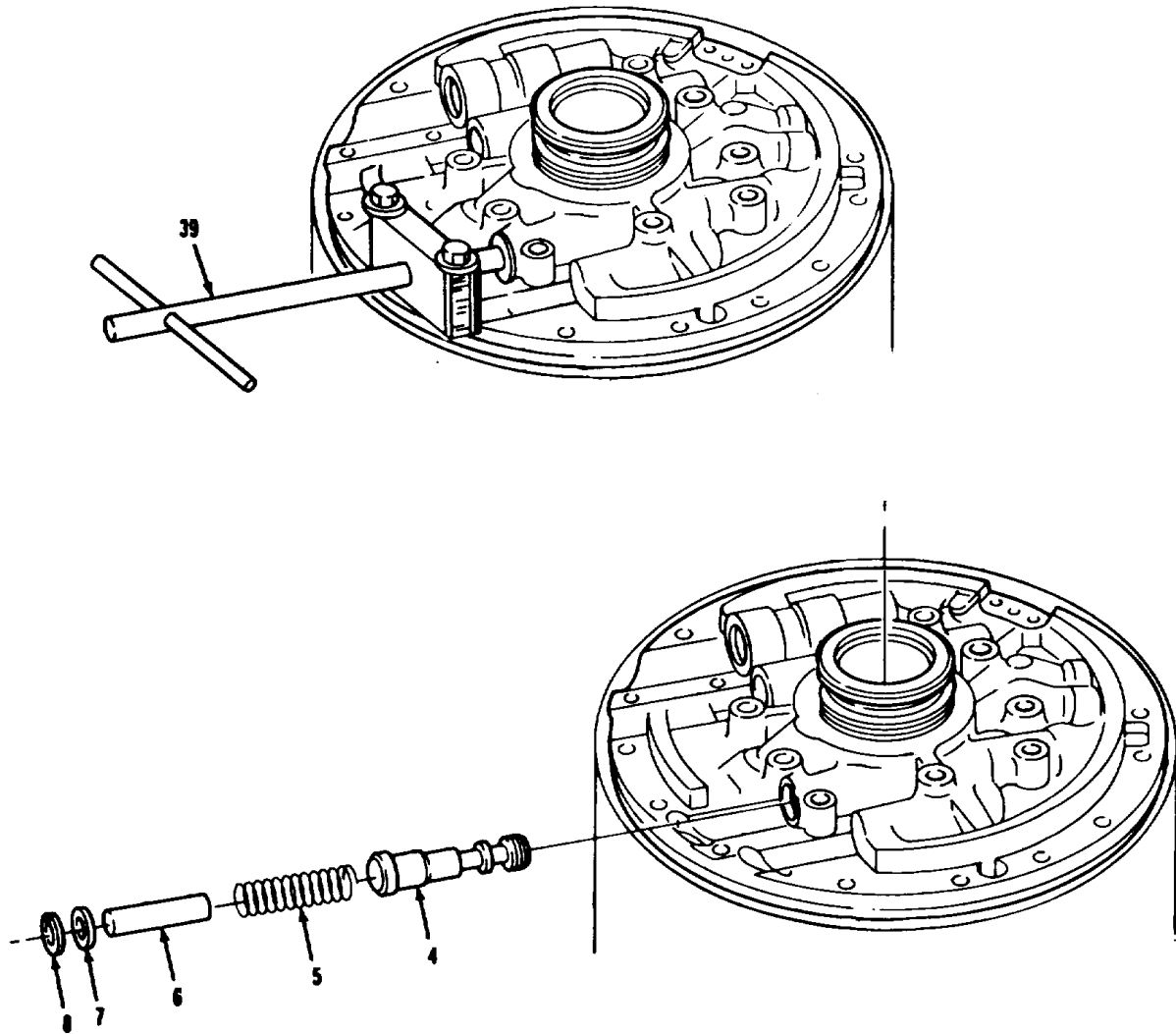
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3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
NOTE		
Valves must be free in their bores.		
11. Valve (9).	<ul style="list-style-type: none"> a. Install item (9) into its bore. b. Install items (10) and (11). 	Small end first.
CAUTION		
Compressor tool must be centered to prevent binding the retainer washer.		
	<ul style="list-style-type: none"> c. Install item (39). d. Put items (12) and (13) onto item (39) and compress into bore. e. Install item (13). f. Remove item (39). 	

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 9. LOCKUP SHIFT VALVE
- 10. VALVE SPRING
- 11. VALVE STOP
- 12. RETAINER WASHER
- 13. SNAPRING
- 39. SPRING COMPRESSOR

TA 238206

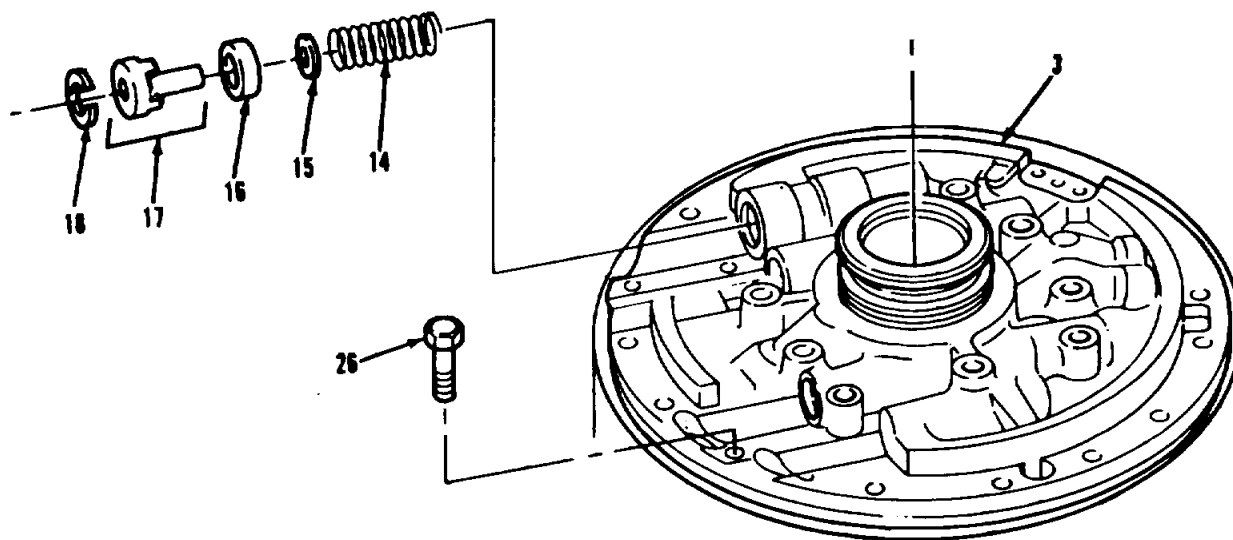
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3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
NOTE		
Valves must be free in their bores.		
12. Valve (15).	<ul style="list-style-type: none"> a. Install item (14) into its bore. b. Install item (15) and item (16). c. Install item (17). d. Push in item (17) and install item (18). e. Install four items (26) into item (3). f. Torque items (26) that have been installed on item (3). 	<p>Compressor tool not needed.</p> <p>Use 1-1/2 inch long screws.</p> <p>Torque to 36-43 lb-ft.</p>

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



LEGEND:

- 3. FRONT SUPPORT
- 14. VALVE SPRING
- 15. CONVERTER BYPASS VALVE
- 16. VALVE SEAT
- 17. VALVE SUPPORT ASSEMBLY
- 18. SNAPRING
- 26. HEX HEAD SCREW (4)

TA 238207

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS**C. ASSEMBLY (Continued).

13. Charging oil pump assembly (37).

- a. Coat oil seal bore in item (34) with sealant.

NOTE

Lip of oil seal must face down when installing.

- b. Install new item (35) using installation tools.

Use seal installer number J-24198 and handle number J-24202-4. Seat fully.

NOTE

Install drive and gears in same direction as removed.

- c. Install items (32) and (33) onto item (34).

- d. Install item (29) through (31) and into item (34).

Torque item (29) to 9-11 lb-ft.

- e. Using a feeler gage, check end clearance of item (32) through opening (41).

Replace item (37) if clearance exceeds .006 inch.

- f. Using a feeler gage, check end clearance of item (33) through opening (42).

Replace item (37) if clearance exceeds .006 inch.

- g. Install item (30) onto item (31).

- h. Install two items (43) into holes of item (34).

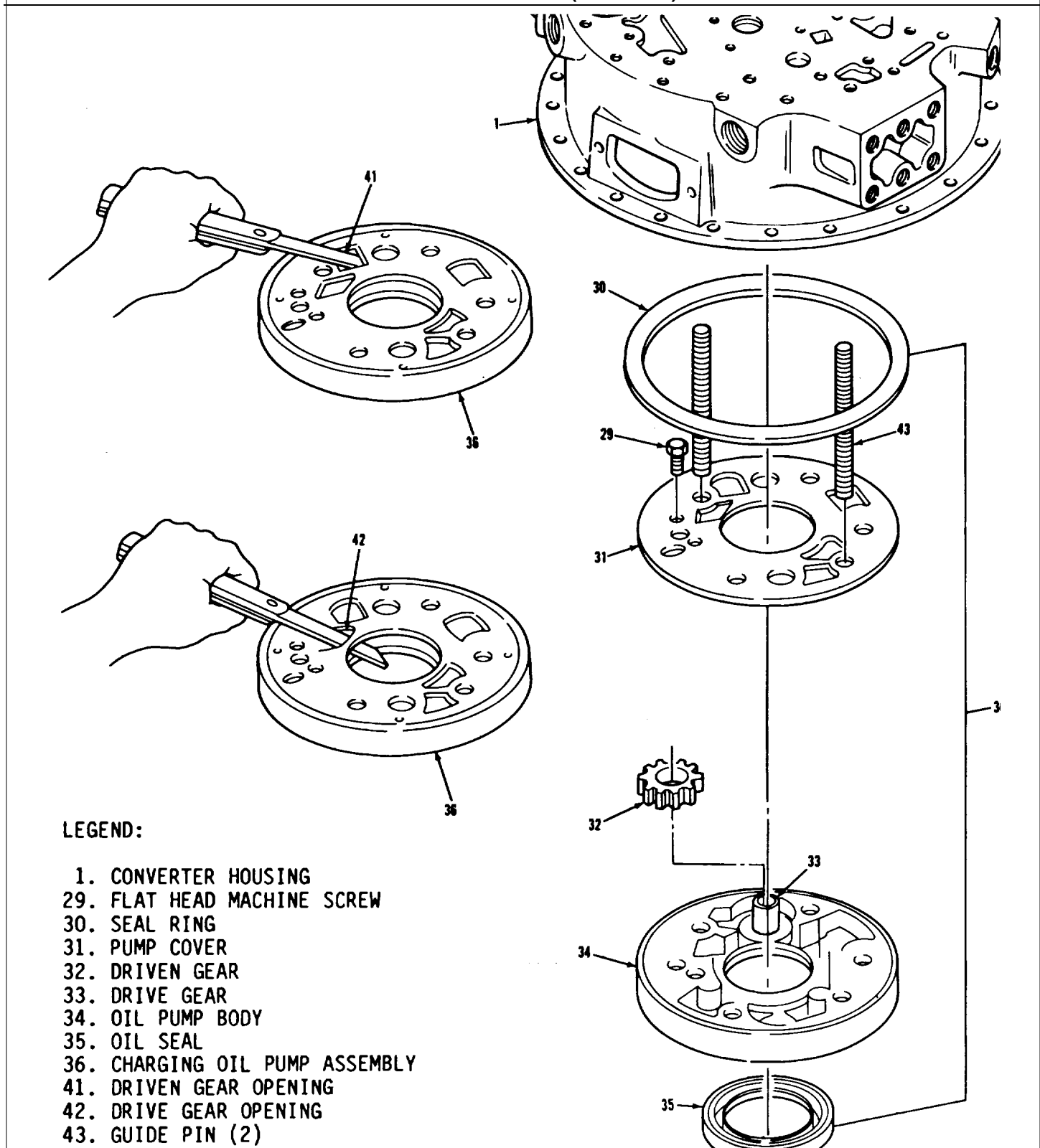
Use tools number J-24315-1.

CAUTION

Square hole in pump cover must align with square hole in converter housing. Parts damage will result if not aligned correctly.

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



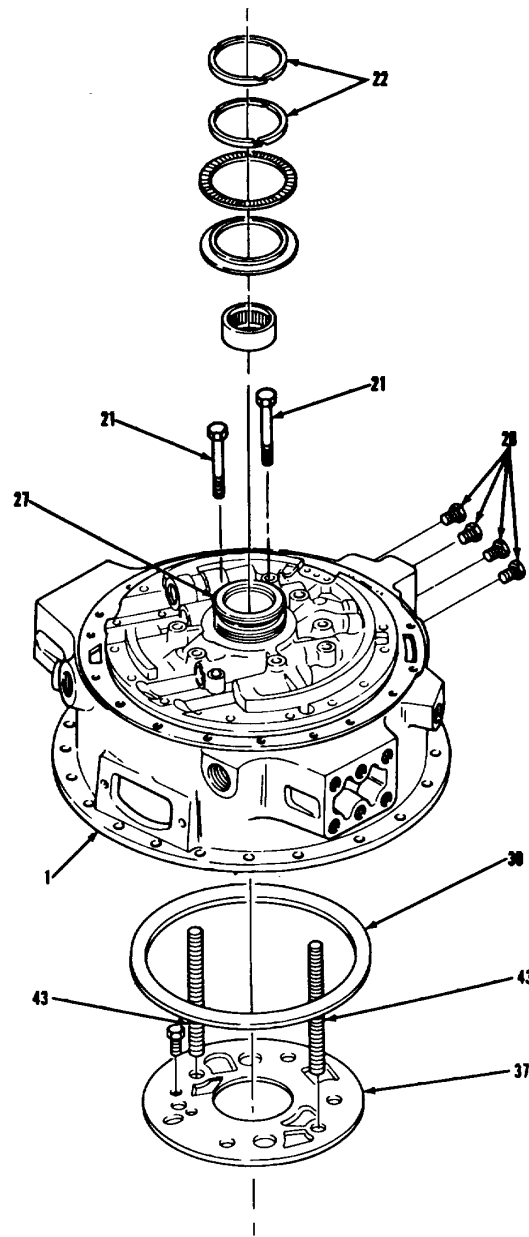
TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
13. Charging oil pump assembly (37) (continued).	i. Lubricate item (30) and oil pump cavity in item (1).	Use OE/HDO-10.
	j. Install item (37) into item (1).	Use two items (43) to align holes.
	k. Hold item (37) in place and install four items (21) into item (1).	
	l. Remove two items (43).	
	m. Install two more items (21) into item (1).	Torque all six items (21) to 36-43 lb-ft.
	n. Lubricate and install items (22) onto item (27).	Use OE/HDO-10.
NOTE		
Do step p only if plugs were removed from converter housing in step g thru j.		
	o. Coat threads with sealer and install four items (28) into item (1).	
	p. Store complete item (1) in a clean dry place until final assembly.	
NOTE		
Follow-on maintenance action required: Proceed with transmission maintenance.		

TRANSMISSION.

3-39. CONVERTER HOUSING AND FRONT SUPPORT REPAIR (Continued).



TRANSMISSION.

3-40. FORWARD CLUICH AND INPUT SHAFI REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning and Inspection.
- c. Assembly.

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION PARAGRAPH

3-32.

CONDITION DESCRIPTION

Subassembly removed from transmission.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Clutch spring compressor
(33287) J-24204-3.
Lower removal tool
(33287) J-26899-2.
Collector ring installer
(33287) J-24002-2.
Staking tool
(33287) J-24002-1.

Forward clutch seal protector
(33287) J-2421601.
Clutch pack clearance gage
(33287) J-24192
Center fixture tool
(33287) J-26899-1.
Clutch plate alinement tool
(33287) J-24221.

MATERIALS/PARTS (P/N)

kit, transmission overhaul
(77342) 6885217.
Grease, oil soluble
Item 9, Appendix B.

Oil, OE/HDO-10
Item 16, Appendix B.
Loctite, RC6010
Item 12, Appendix B.

PERSONNEL REQUIRED

Two (MOS-63WJ.
dust and dirt.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

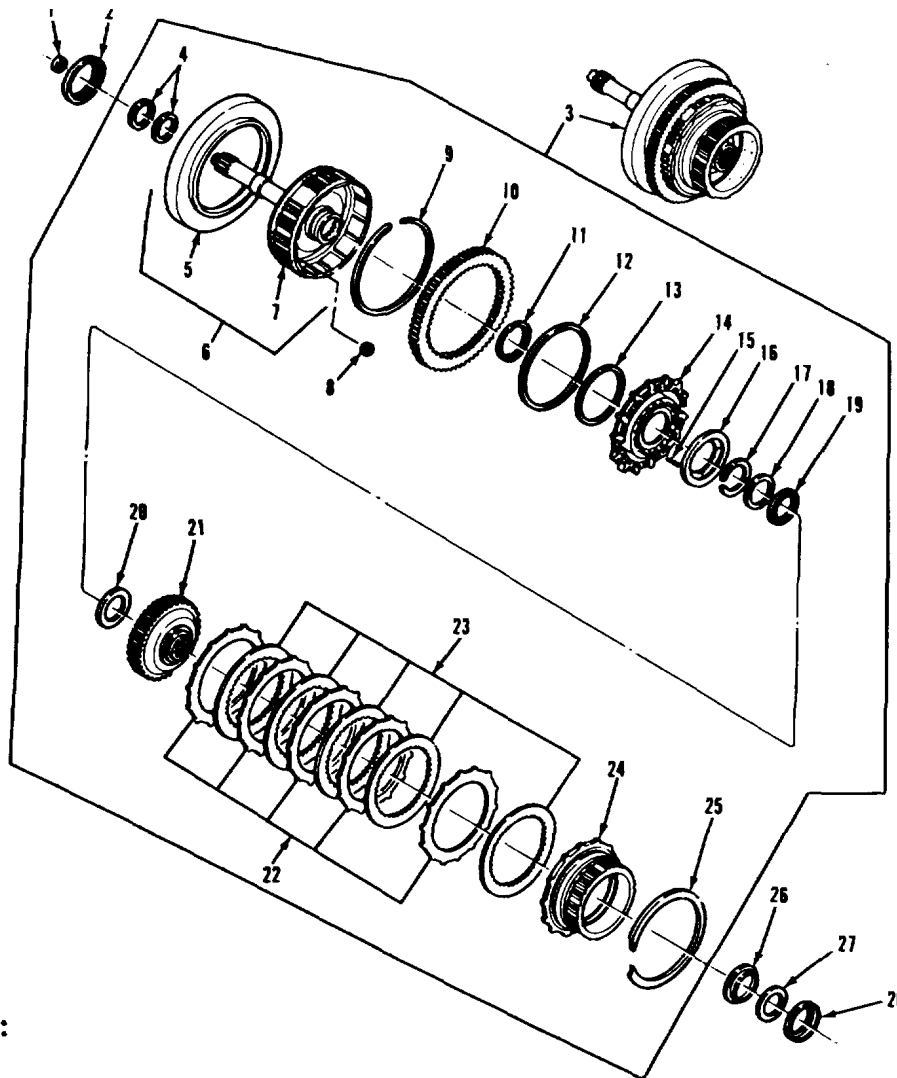
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-40. FORWARD CLUICH AND INPUT SHAFI REPAIR.



LEGEND:

- | | |
|---|---|
| 1. SEAL RING | 16. SPRING RETAINER |
| 2. BEARING THRUST RACE | 17. EXTERNAL SNAPRING |
| 3. FORWARD CLUTCH ASSEMBLY | 18. BEARING THRUST RACE |
| 4. HOOK TYPE SEAL RING (2) | 19. ROLLER BEARING ASSEMBLY |
| 5. PILOT COLLECTOR RING | 20. BEARING THRUST RACE |
| 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY | 21. FORWARD CLUTCH HUB |
| 7. FORWARD CLUTCH HOUSING | 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5) |
| 8. BALL | 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5) |
| 9. INTERNAL SNAPRING | 24. FOURTH CLUTCH DRIVING HUB |
| 10. PTO GEAR | 25. SNAPRING |
| 11. PISTON INNER SEAL RING | 26. BEARING THRUST RACE |
| 12. PISTON OUTER SEAL RING | 27. ROLLER BEARING ASSEMBLY |
| 13. CLUTCH HOUSING SEAL RING | 28. BEARING THRUST RACE |
| 14. FORWARD CLUTCH PISTON | |
| 15. FORWARD CLUTCH RELEASE SPRING (20) | |

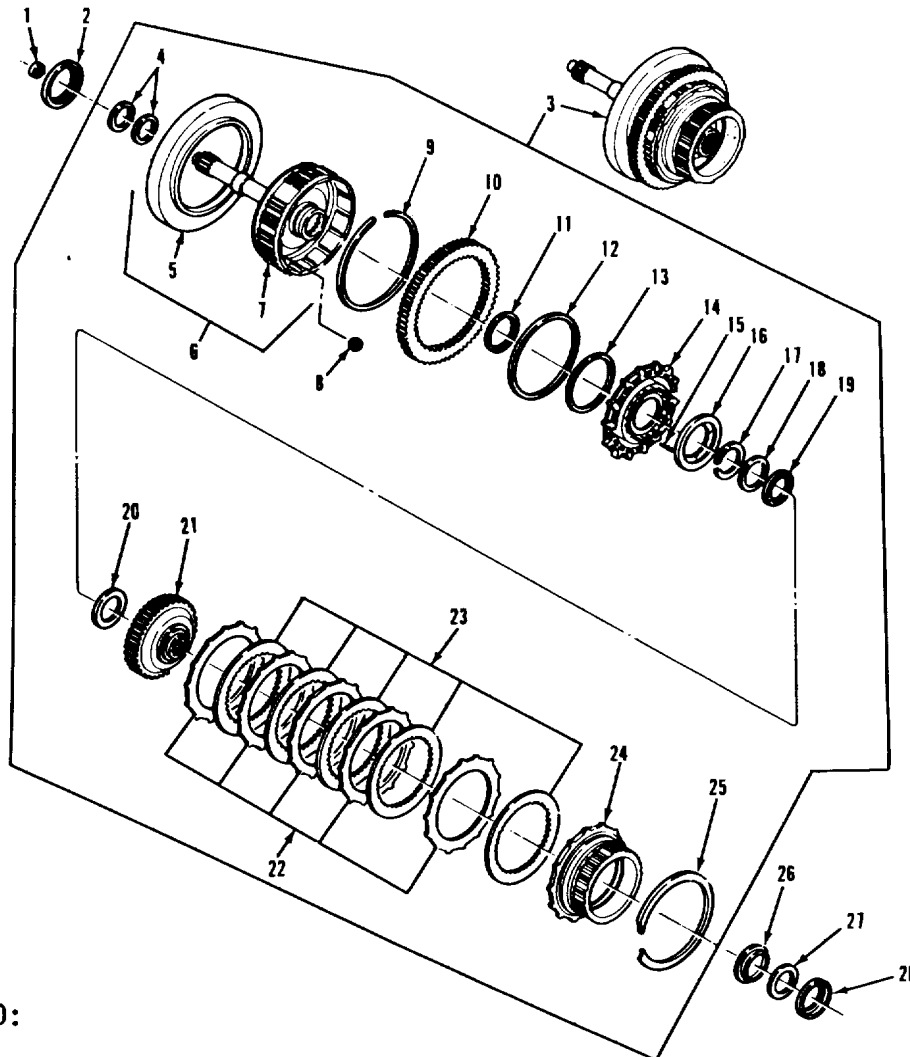
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
CAUTION		
During disassembly all parts must be handled with care to avoid nicking, scratching or denting. Close fitting parts can bind if damaged or scratched.		
1. Forward clutch assembly (3)	<ul style="list-style-type: none"> a. Remove item (1) from item (6). b. Remove item (2) from item (6). c. Remove two items (4) from item (6). d. Position item (3) input shaft down. e. Remove item (27), and item (26) from item (21). f. Remove item (25) from item (7). g. Remove item (24) from item (7). h. Remove item (21) from item (7). i. Remove five items (22) and five items (23) from item (7). j. Remove item (20) and item (19) from item (21) or item (7). k. Remove item (18) from item (7) or (19). 	

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- | | |
|---|---|
| 1. SEAL RING | 16. SPRING RETAINER |
| 2. BEARING THRUST RACE | 17. EXTERNAL SNAPRING |
| 3. FORWARD CLUTCH ASSEMBLY | 18. BEARING THRUST RACE |
| 4. HOOK TYPE SEAL RING (2) | 19. ROLLER BEARING ASSEMBLY |
| 5. PILOT COLLECTOR RING | 20. BEARING THRUST RACE |
| 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY | 21. FORWARD CLUTCH HUB |
| 7. FORWARD CLUTCH HOUSING | 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5) |
| 8. BALL | 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5) |
| 9. INTERNAL SNAPRING | 24. FOURTH CLUTCH DRIVING HUB |
| 10. PTO GEAR | 25. SNAPRING |
| 11. PISTON INNER SEAL RING | 26. BEARING THRUST RACE |
| 12. PISTON OUTER SEAL RING | 27. ROLLER BEARING ASSEMBLY |
| 13. CLUTCH HOUSING SEAL RING | 28. BEARING THRUST RACE |
| 14. FORWARD CLUTCH PISTON | |
| 15. FORWARD CLUTCH RELEASE SPRING (20) | |

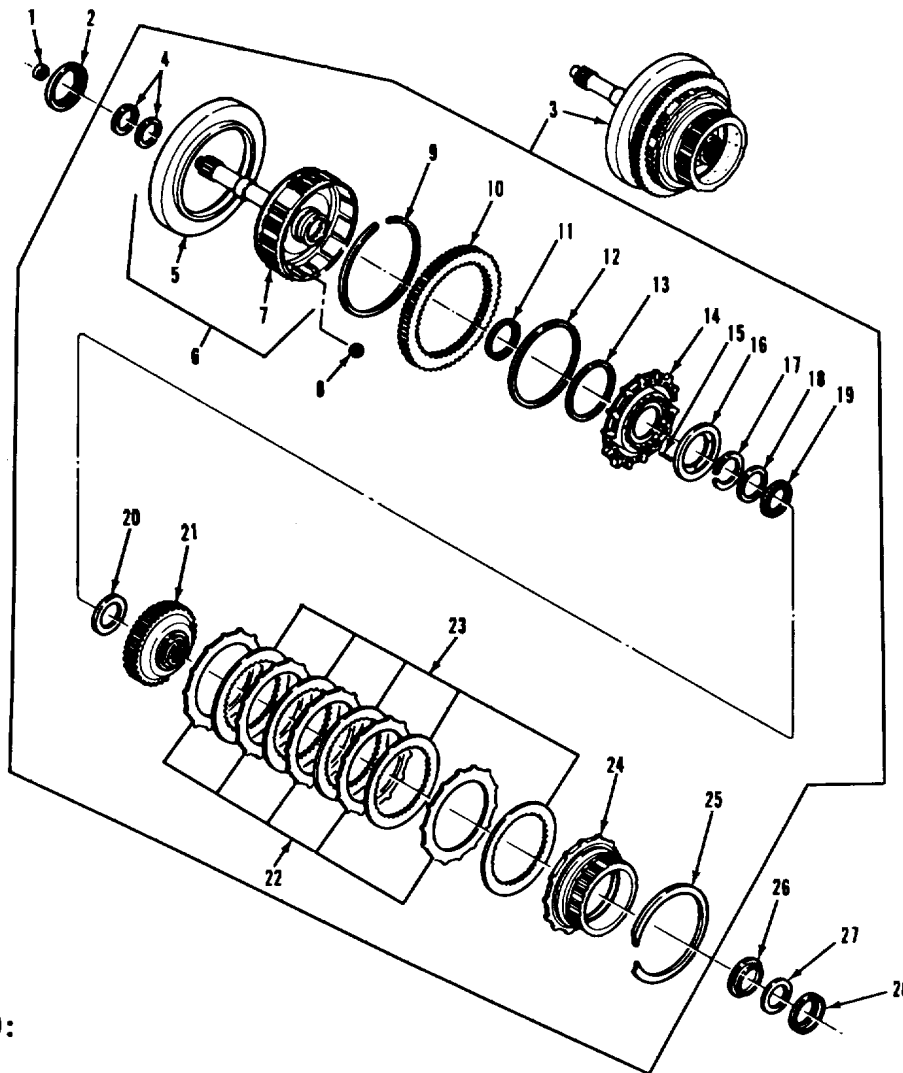
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
1. Forward clutch assembly (3) (continued).	<p>CAUTION Support collector ring on wood to prevent damage.</p>	
	l. Place item (3) in a press with spring compressor tool on item (16).	Use tool number J-24204-3.
	m. Compress tool with a press.	
	n. Remove item (17).	
	o. Carefully release pressure from item (16) and remove it.	
	p. Remove twenty items (15).	
	q. Remove items (14), (13), (12), and item (11). C.	Item (14) is indicated with a letter A, B, or

TRANSMISSION.

3-40: FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- | | |
|---|---|
| 1. SEAL RING | 16. SPRING RETAINER |
| 2. BEARING THRUST RACE | 17. EXTERNAL SNAPPING RING |
| 3. FORWARD CLUTCH ASSEMBLY | 18. BEARING THRUST RACE |
| 4. HOOK TYPE SEAL RING (2) | 19. ROLLER BEARING ASSEMBLY |
| 5. PILOT COLLECTOR RING | 20. BEARING THRUST RACE |
| 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY | 21. FORWARD CLUTCH HUB |
| 7. FORWARD CLUTCH HOUSING | 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5) |
| 8. BALL | 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5) |
| 9. INTERNAL SNAPPING RING | 24. FOURTH CLUTCH DRIVING HUB |
| 10. PTO GEAR | 25. SNAPPING RING |
| 11. PISTON INNER SEAL RING | 26. BEARING THRUST RACE |
| 12. PISTON OUTER SEAL RING | 27. ROLLER BEARING ASSEMBLY |
| 13. CLUTCH HOUSING SEAL RING | 28. BEARING THRUST RACE |
| 14. FORWARD CLUTCH PISTON | |
| 15. FORWARD CLUTCH RELEASE SPRING (20) | |

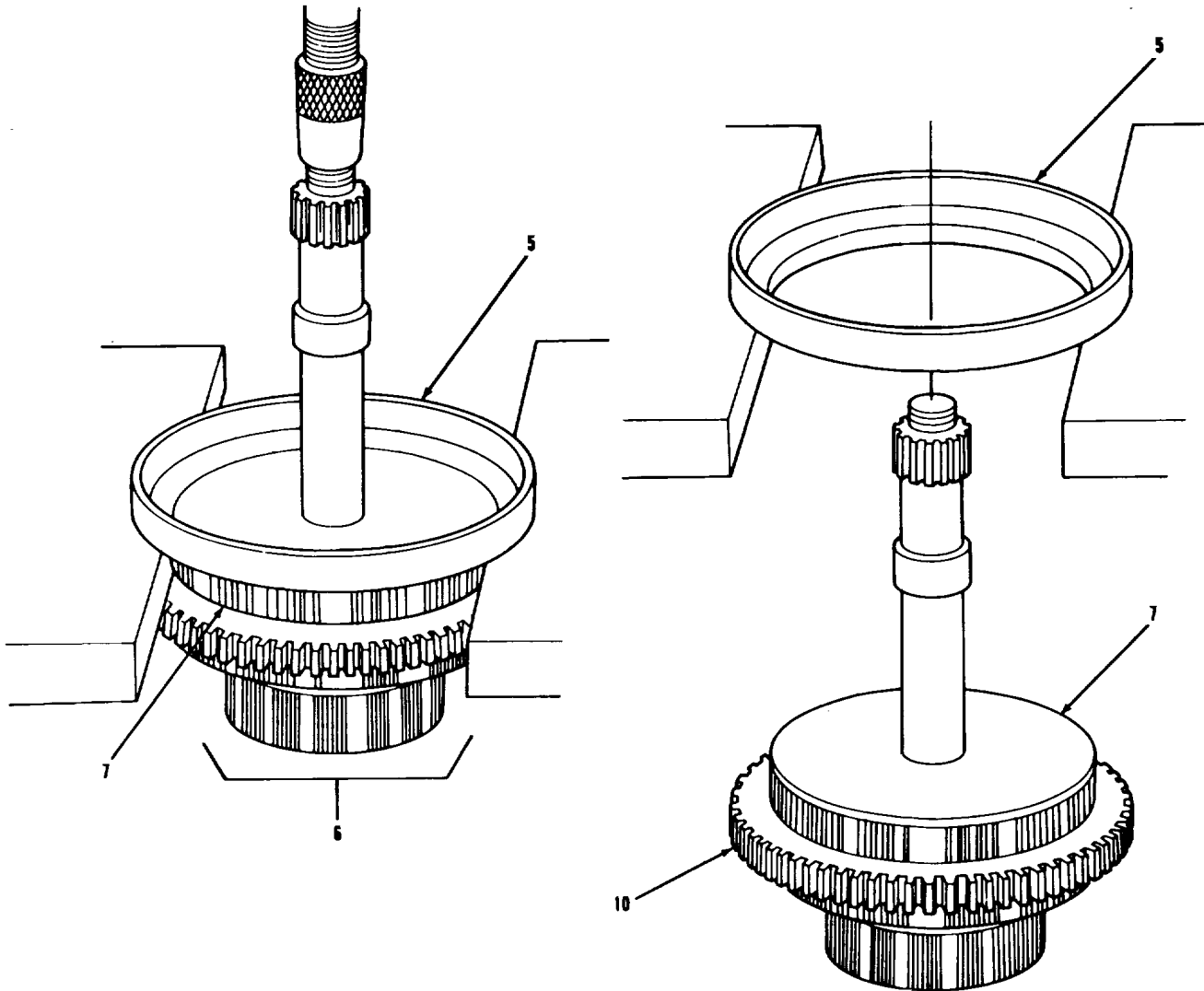
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
NOTE		
Do not remove collector ring unless damaged or if PTO gear must be replaced (see step 3).		
2. Ring (5)	a. Position item (6) in a suitable press, with input shaft up.	Support item (5) in a suitable fixture.
CAUTION		
Be sure entire assembly is supported from below to prevent injury or parts damage.		
	b. Carefully press item (7) out of item (5).	

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- 5. PILOT COLLECTOR RING
- 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY
- 7. FORWARD CLUTCH HOUSING
- 10. PTO GEAR

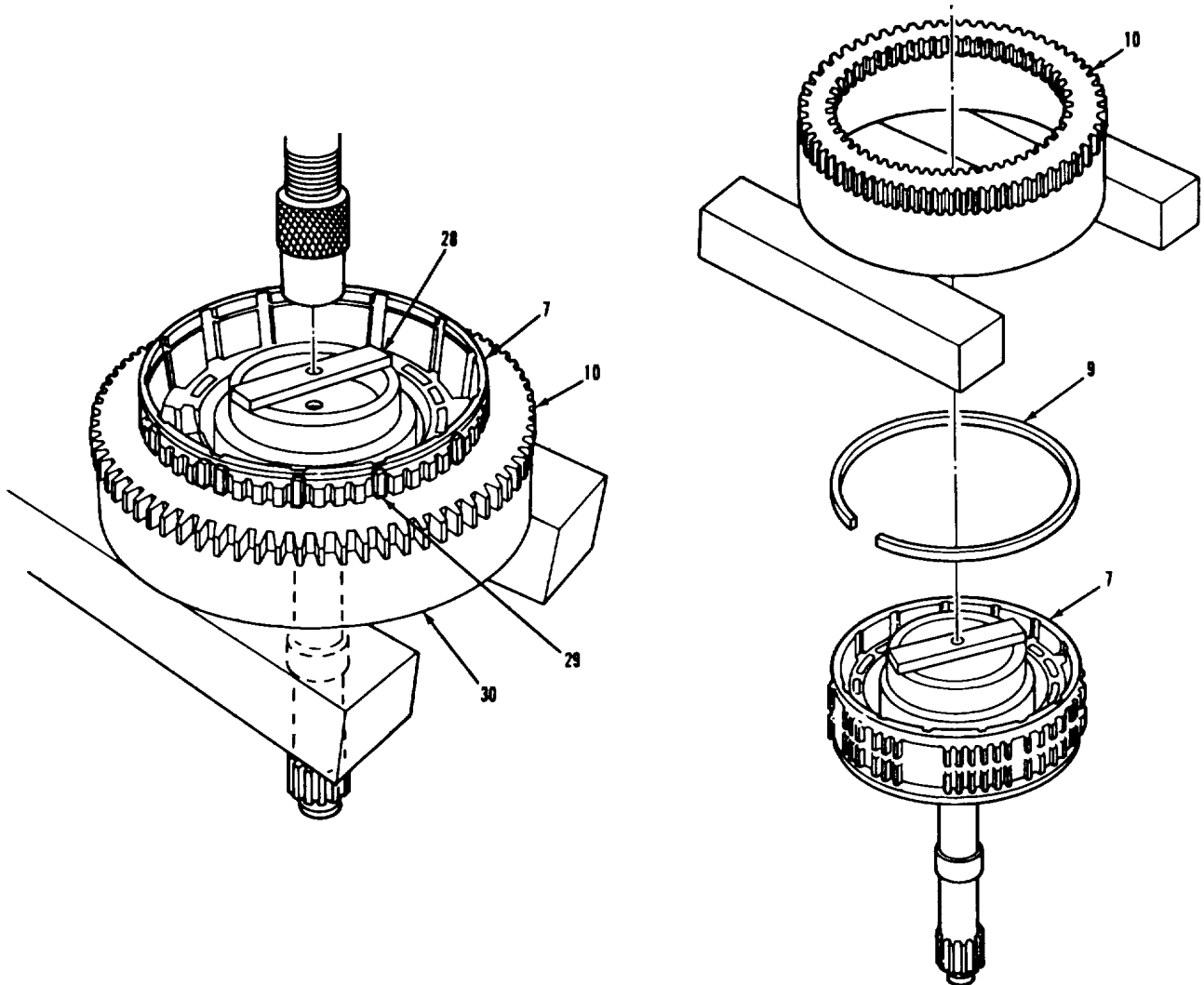
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3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
3. Gear (10).		
NOTE		
<ul style="list-style-type: none"> • Remove PTO gear only when damaged. If not go to step 4. • The snapping must be compressed before removal of the PTO gear. 		
	a. Make ten items (29) from shim stock.	Size 3/32" x 13/64" x 3".
	b. Locate end gap of item (9).	
	c. Locate opening in item (7) where spline is missing.	Next to end gap of item (9).
	d. Place item (29) at opening between item (10) and item (9).	Compress item (9) into item (7) with ten items (29) equally spaced around item (7).

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

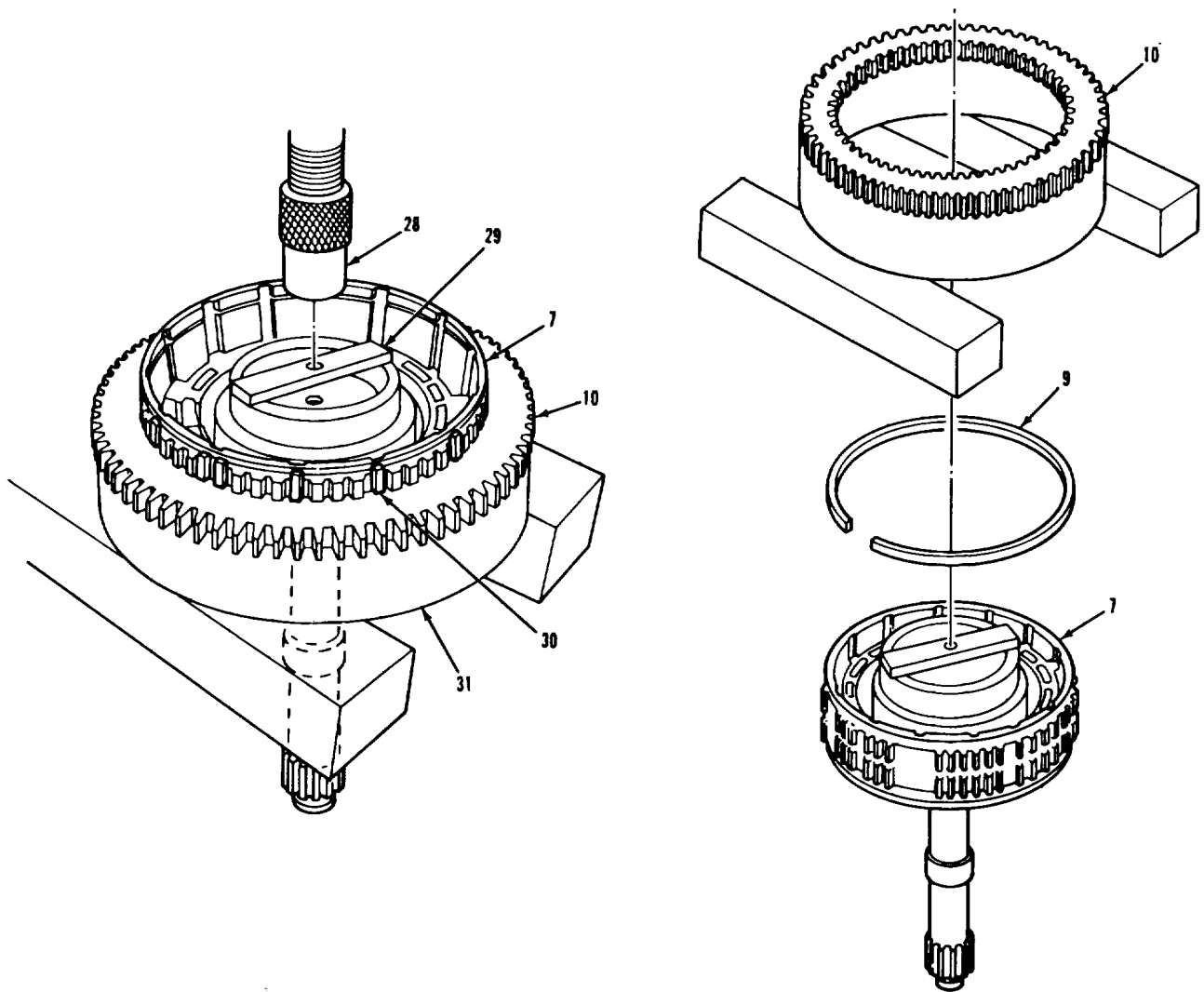
- 7. FORWARD CLUTCH HOUSING
- 9. INTERNAL SNAPPING
- 10. PTO GEAR
- 28. UPPER REMOVAL TOOL
- 29. STEEL SHIMS (10)
- 30. LOWER REMOVAL TOOL

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****A. DISASSEMBLY (Continued).**3. Gear (10)
(continued)e. Repeat step d ten times
around item (7).f. Place item (30) flat side
down on a pressUse tool number
J-26899-2.g. Place item (7) and item
(10) through item (30)
input shaft down.Center item (10) on tool
(31).h. Center item (28) on hub
on item (7)Use tool number
J-26899-1.**NOTE****Be sure snapping is compressed into forward clutch housing.**i. Carefully press on item
(28) and remove item (10)
from item (7).**CAUTION****Do not press directly on hub of clutch housing, parts damage will result.**j. Remove item (9) from item
(7).

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- 7. FORWARD CLUTCH HOUSING
- 9. INTERNAL SNAPPING
- 10. PTO GEAR
- 28. UPPER REMOVAL TOOL
- 29. STEEL SHIMS (10)
- 30. LOWER REMOVAL TOOL

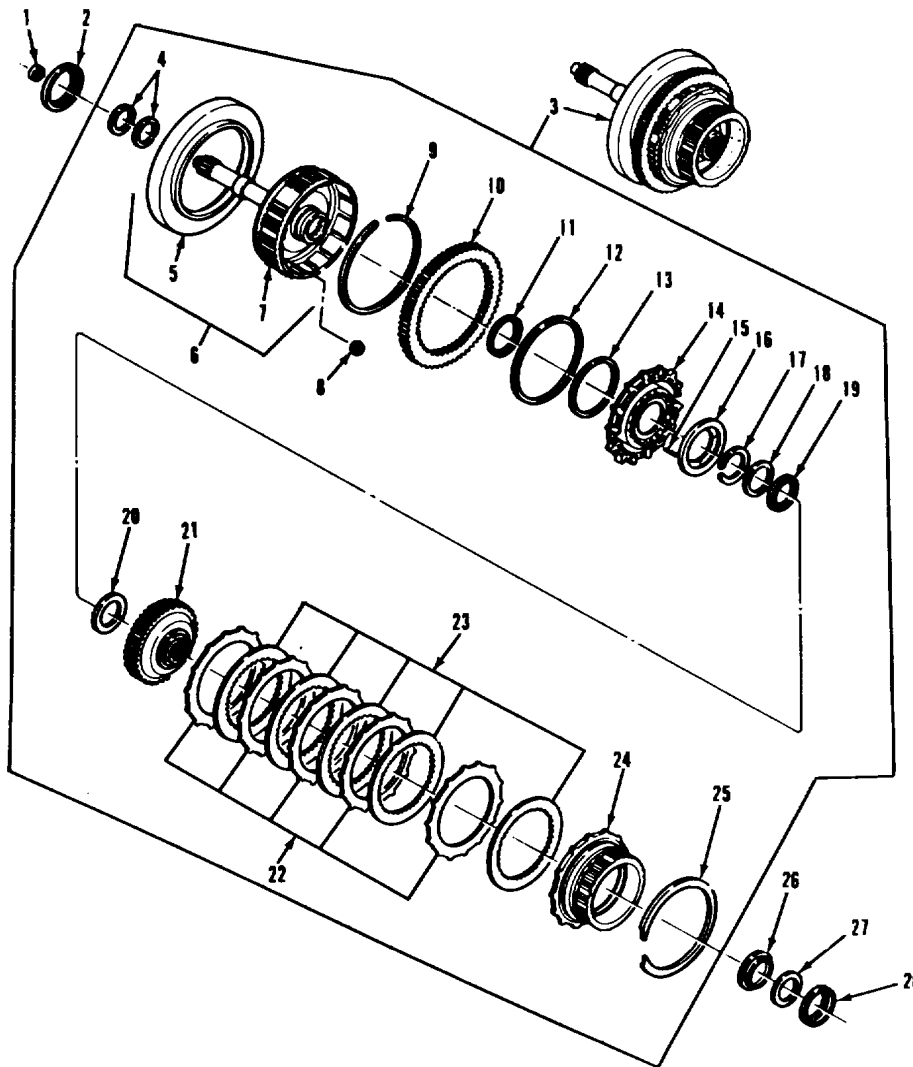
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING AND INSPECTION.</u>		
4. Five plates (22) and five plates (23)	a. Inspect items (22) and (23) for burrs, embedded faces, loose facings, excessive wear scoring, chocks, distortion, and damaged splines or teeth.	Refer to paragraph 3-25 for wear limit data. metal particles, pitted
	b. Inspect for cone of items (22) and (23), by measuring the distance between inside diameter and a level surface.	Refer to paragraph 3-25 for wear limit data. Discard plates items (22) and (23) having excessive cone.
	c. Remove burrs from item (23), using a soft honing stone	Replace plates items (22) and (23), which 'J' have other defects.
5. Four balls (8)	Inspect for free movement in item (7)	Must turn freely but remain staked in place.
6. All other parts	a. Clean and inspect b. Replace any parts failing inspection.	See paragraphs 3-4 and 3-5 for more instructions.

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- | | |
|---|---|
| 1. SEAL RING | 15. FORWARD CLUTCH RELEASE SPRING (20) |
| 2. BEARING THRUST RACE | 16. SPRING RETAINER |
| 3. FORWARD CLUTCH ASSEMBLY | 17. EXTERNAL SNAPRING |
| 4. HOOK TYPE SEAL RING (2) | 18. BEARING THRUST RACE |
| 5. PILOT COLLECTOR RING | 19. ROLLER BEARING ASSEMBLY |
| 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY | 20. BEARING THRUST RACE |
| 7. FORWARD CLUTCH HOUSING | 21. FORWARD CLUTCH HUB |
| 8. BALL | 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5) |
| 9. INTERNAL SNAPRING | 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5) |
| 10. PTO GEAR | 24. FOURTH CLUTCH DRIVING HUB |
| 11. PISTON INNER SEAL RING | 25. SNAPRING |
| 12. PISTON OUTER SEAL RING | 26. BEARING THRUST RACE |
| 13. CLUTCH HOUSING SEAL RING | 27. ROLLER BEARING ASSEMBLY |
| 14. FORWARD CLUTCH PISTON | |

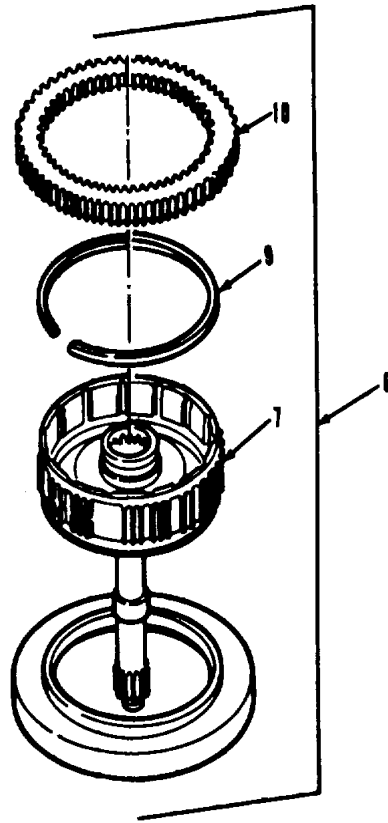
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<p><u>C. ASSEMBLY.</u></p>		
<p>7. Forward clutch housing and input shaft assembly (6).</p>	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps a thru c only if the PTO gear was re moved. If not go to step d.</p> <p style="text-align: center;">a. Place item (7) input shaft down.</p> <p style="text-align: center;">b. Seat item (9) onto item (7).</p> <p style="text-align: center;">c. Install item (10) onto item (7) bevel end first.</p>	
	<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> • Be sure the snapping is expanded and free in the PTO gear. • Do steps 6d thru 6g only if the collector ring was removed. If not, go to step h. 	
	<p style="text-align: center;">d. Place item (7) input shaft up.</p>	

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



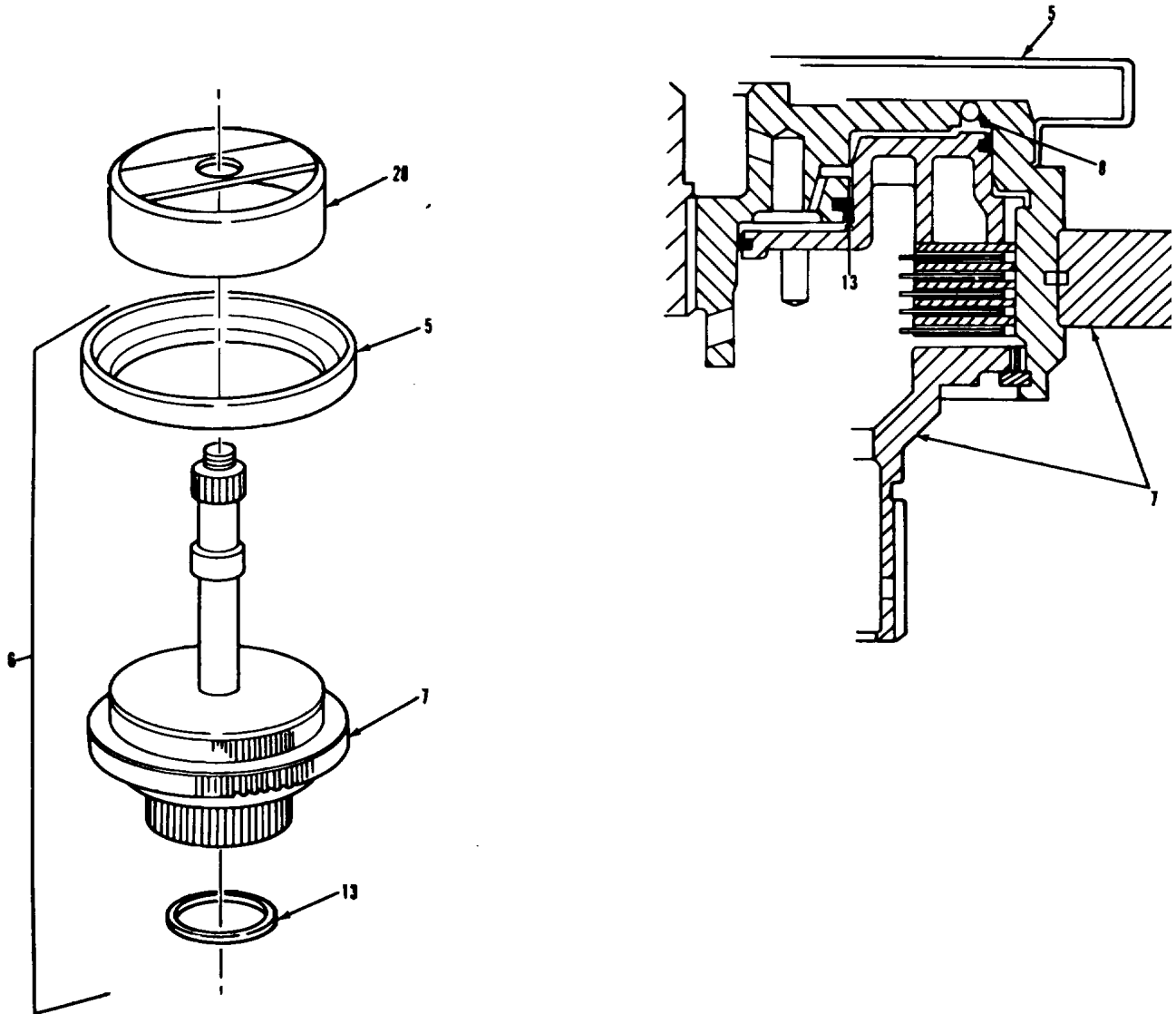
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
7. Forward clutch housing and input shaft assembly (6) (continued)	e. Coat inner surface of item (5) with locking sealant.	Use Loctite RC601®.
	f. Using installer tool, install item (5) onto item (7).	Use tool number J-24002-2.
<p>NOTE Tap evenly around installer to seat the pilot collector ring.</p>		
	g. Using staking tool, bend edge of item (5) into first groove in item (7).	Use tool number J-24200-1.
<p>NOTE Be sure lip of the seal ring faces upward when installing.</p>		
	h. Lubricate item (13) and install into item (7).	Use OE/HDO-10.

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- 5. PILOT COLLECTOR RING
- 6. FORWARD CLUTCH HOUSING AND INPUT SHAFT ASSEMBLY
- 7. FORWARD CLUTCH HOUSING AND PTO GEAR
- 8. BALL (4)
- 13. CLUTCH HOUSING SEAL RING

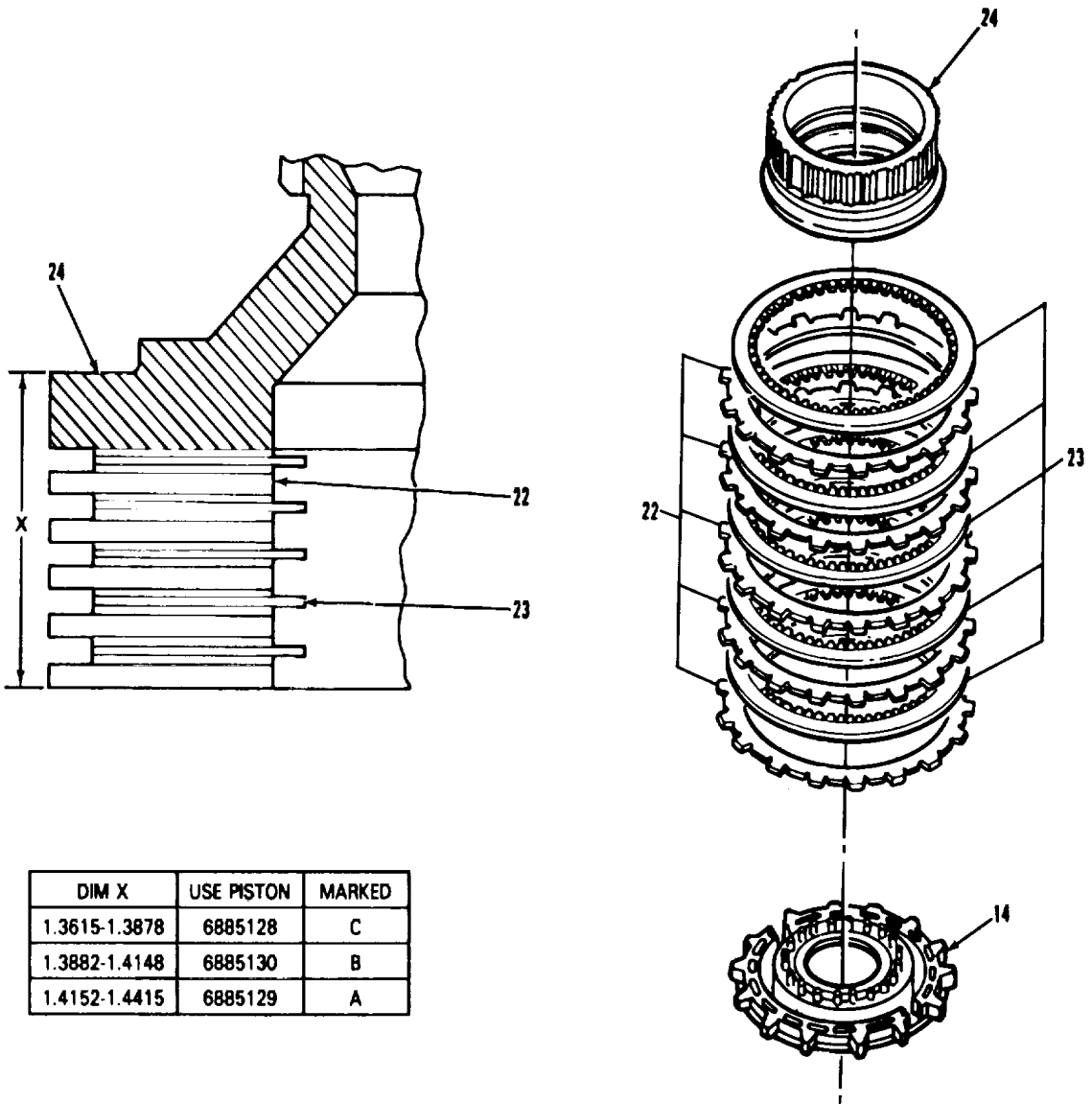
TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
8. Piston (14).		
NOTE		
<p>The clutch piston is coded by size. Use same code letter if replaced. If the clutch housing is replaced, the clutch piston must be selected by the following steps a thru e. If not, go to step 8.</p>		
a. Alternately stack items (22) and (23) together on the press table.	All plates must be new for proper measurement.	
b. Set item (24) on top.	Aline stack.	
c. Evenly apply load to item (24) with a press.	Apply a 980-1020 lb load.	
d. Measure stack at x and compare to chart.	See illustration.	
e. Select proper piston item (14).		

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



DIM X	USE PISTON	MARKED
1.3615-1.3878	6885128	C
1.3882-1.4148	6885130	B
1.4152-1.4415	6885129	A

1 FCEND.

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
9. Forward clutch assembly (3) ing.	a. Place item (14) on bench with spring mounts showing.	
	b. Lubricate and install item (11) and item (12).	Use OE/HDO-10.
<p>NOTE Be sure both lips face down.</p>		
	c. Install item (31) over hub of item (7)	Use tool number J-24216-01.
<p>NOTE Seat piston below protector tool '3</p>		
	d. Install item (14) into item (7).	Spring mounts showing.
<p>NOTE Use care to prevent lips of seals folding back during assembly If installation is difficult, remove piston and check seals and cover bore before attempting assembly again.</p>		
	e. Remove item (31).	
	f. Alternately install plates, items (22) and (23), into item (7) one at a time.	Start with one item (22).
	g. Install item (24) flat side down, and item (25).	
	h. Hold item (24) against item (25).	

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
LEGEND:		
3. FORWARD CLUTCH ASSEMBLY		
7. FORWARD CLUTCH HOUSING		
11. PISTON INNER SEAL RING		
12. PISTON OUTER SEAL RING		
14. FORWARD CLUTCH PISTON		
22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5)		
23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5)		

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY (Continued).**

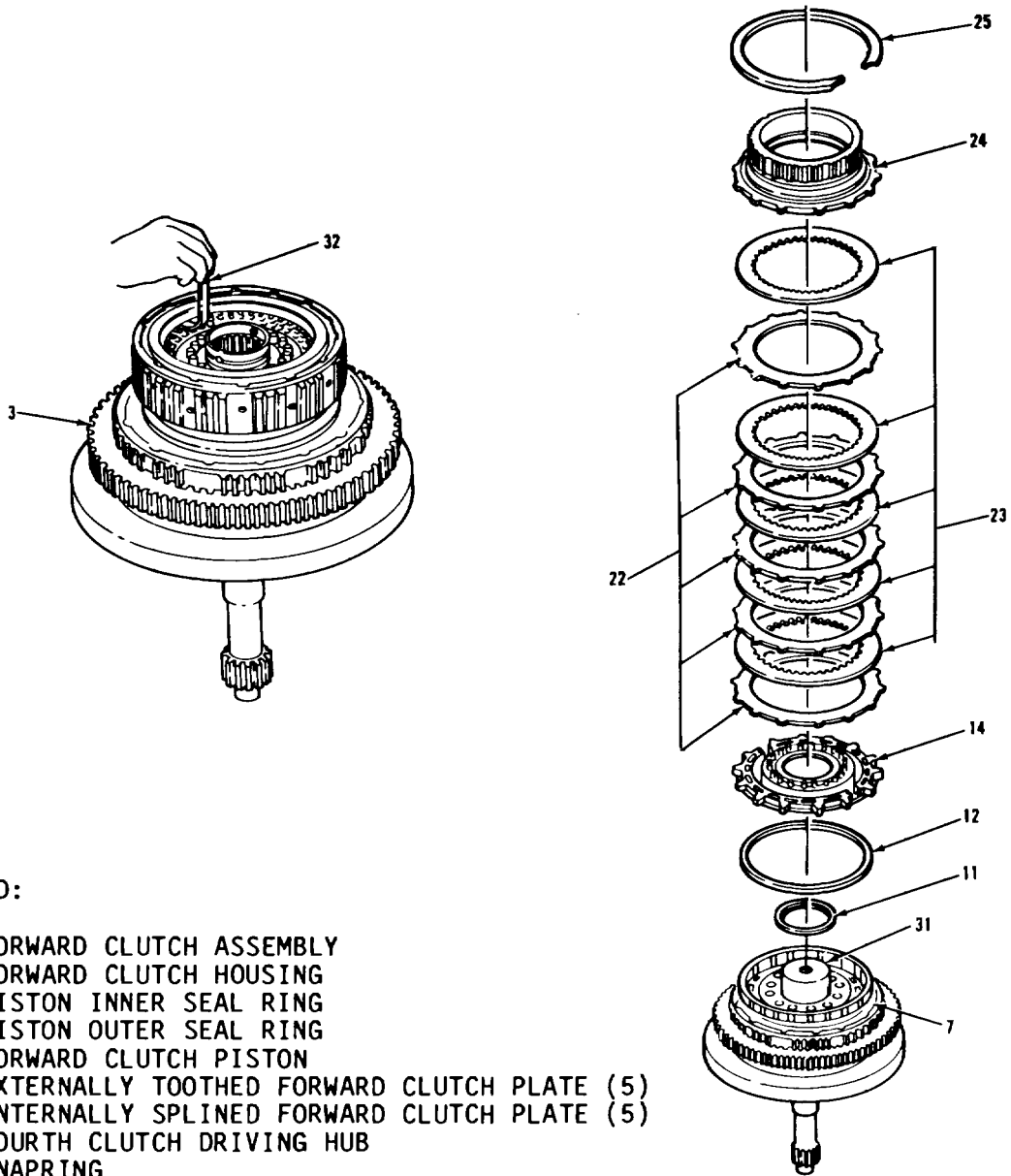
9. Forward clutch
assembly (3)
(continued)

i. Install item (32) between
top of item (23) and item
(24).

Use tool number J-24192.

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- 3. FORWARD CLUTCH ASSEMBLY
- 7. FORWARD CLUTCH HOUSING
- 11. PISTON INNER SEAL RING
- 12. PISTON OUTER SEAL RING
- 14. FORWARD CLUTCH PISTON
- 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5)
- 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5)
- 24. FOURTH CLUTCH DRIVING HUB
- 25. SNAPRING
- 31. PROTECTOR TOOL
- 32. GAGE TOOL

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. ASSEMBLY (Continued).

9. Forward clutch assembly (3) (continued).

NOTE

If clearance is good, thin step of gage will slide in, but thick part will not. If so, go to step m, if not, continue with step j.

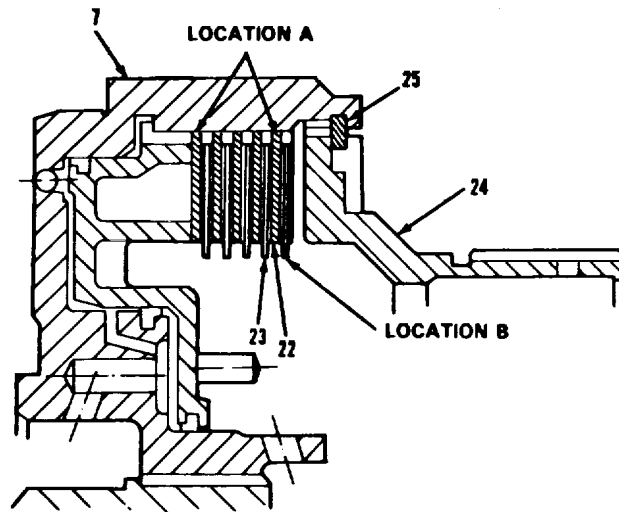
j. Remove item (25) and item (24).

k. Replace item (22) at locations A and item (23) at locations B.

l. Go back to step g.

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- 7. FORWARD CLUTCH HOUSING
- 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5)
- 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5)
- 24. FOURTH CLUTCH DRIVING HUB
- 25. SHIM

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
9. Forward clutch assembly (3) (continued).	m. Remove item (25) and item (24).	
	n. Remove items (22) and (23).	Total of ten.
	o. Soak items (23) in oil for at least two minutes.	Use OE/HDO-10.
	p. Alternately install items (22) and (23) one at a time.	Start with one item (22).
	q. Set item (7) in a press	Input shaft down.
	r. Install items (15) onto item (14).	Total of twenty.
	s. Install item (16)	Outer lip down.
<p>NOTE Snapping must be set in place before spring compressor tool is used.</p>		
	t. Compress item (16) using tool	Use tool number J-24204-3.
	u. Install item (17).	
	v. Remove item (7) from press.	
	w. Coat item (18) with grease and install on hub of item (7).	

TRANSMISSION.

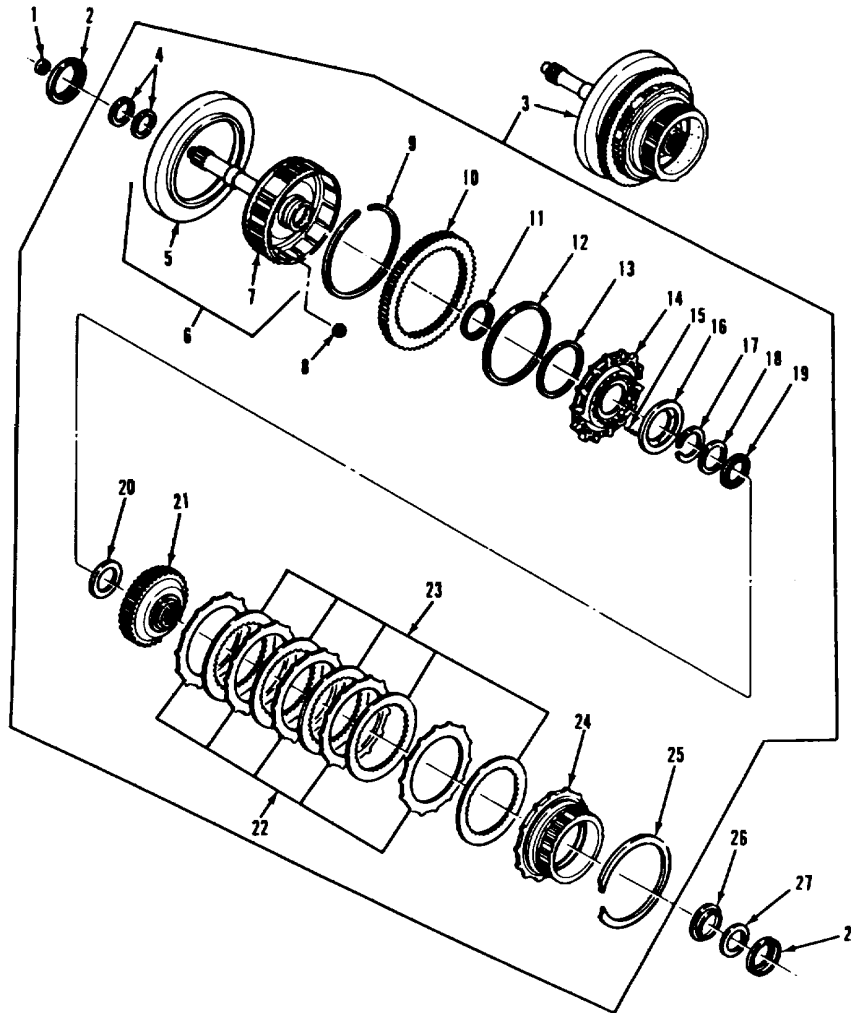
3.40 FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
9. Forward clutch assembly (3) (continued).	x. Coat item (20) with grease and install into item (21).	
	y. Coat item (19) with grease and install onto item (20).	
	z. Aline items (22) and (23) with tool.	Use tool number J-24221.
	aa. Install item (21) into item (7).	Open side first.
	bb. Install item (24).	
	cc. Install item (25).	
	dd. Lubricate and install items (4) onto input shaft of item (7).	Use OE/HDO-10.
	ee. Install item (1) and item (2) onto input shaft of item (7).	Cupped side of item (2) first.
	ff. Coat item (26) and (27) with grease and install onto bottom of item (21).	
	gg. clean, dry place until final assembly.	Store item (3) in a

NOTE**Follow-on maintenance action required:****Proceed with transmission maintenance.**

TRANSMISSION.

3-40. FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).



LEGEND:

- | | |
|---|---|
| 1. SEAL RING | 15. FORWARD CLUTCH RELEASE SPRING (20) |
| 2. BEARING THRUST RACE | 16. SPRING RETAINER |
| 3. FORWARD CLUTCH ASSEMBLY | 17. EXTERNAL SNAPRING |
| 4. HOOK TYPE SEAL RING (2) | 18. BEARING THRUST RACE |
| 5. PILOT COLLECTOR RING | 19. ROLLER BEARING ASSEMBLY |
| 6. FORWARD HOUSING AND INPUT SHAFT ASSEMBLY | 20. BEARING THRUST RACE |
| 7. FORWARD CLUTCH HOUSING | 21. FORWARD CLUTCH HUB |
| 8. BALL | 22. EXTERNALLY TOOTHED FORWARD CLUTCH PLATE (5) |
| 9. INTERNAL SNAPRING | 23. INTERNALLY SPLINED FORWARD CLUTCH PLATE (5) |
| 10. PTO GEAR | 24. FOURTH CLUTCH DRIVING HUB |
| 11. PISTON INNER SEAL RING | 25. SNAPRING |
| 12. PISTON OUTER SEAL RING | 26. BEARING THRUST RACE |
| 13. CLUTCH HOUSING SEAL RING | 27. ROLLER BEARING ASSEMBLY |
| 14. FORWARD CLUTCH PISTON | |

TRANSMISSION.

3.41 FORWARD CLUTCH REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

This task covers:

- a. Disassembly
- c. Cleaning and Inspection
- b. Assembly

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

**EQUIPMENT CONDITION
PARAGRAPH**

3-32.

CONDITION DESCRIPTION

Subassembly removed from transmission.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Bar and stud assembly tool
(33287) J-24204-2.
Clutch spring compressor
(33287) J-24204-3.
Clutch pack clearance gage
(33287) J-24192.
Forward clutch seal protector
(33287) J-24216-01.

MATERIALS/PARTS (P/N)

Kit, Transmission overhaul
(73342) 6885217.

PERSONNEL REQUIRED

Two (MOS-63W5).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

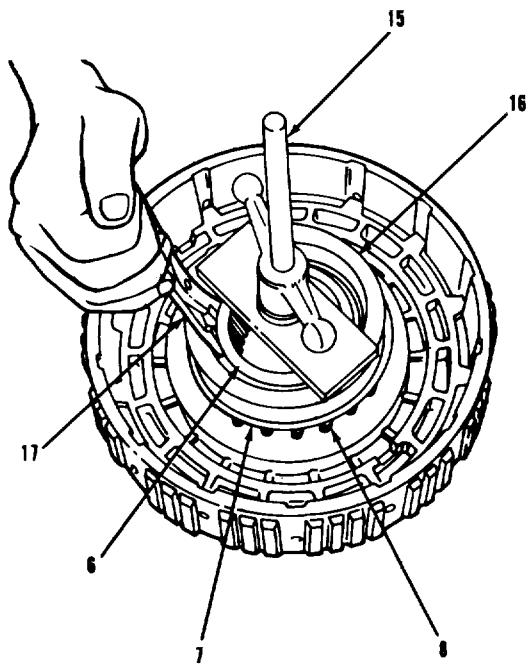
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

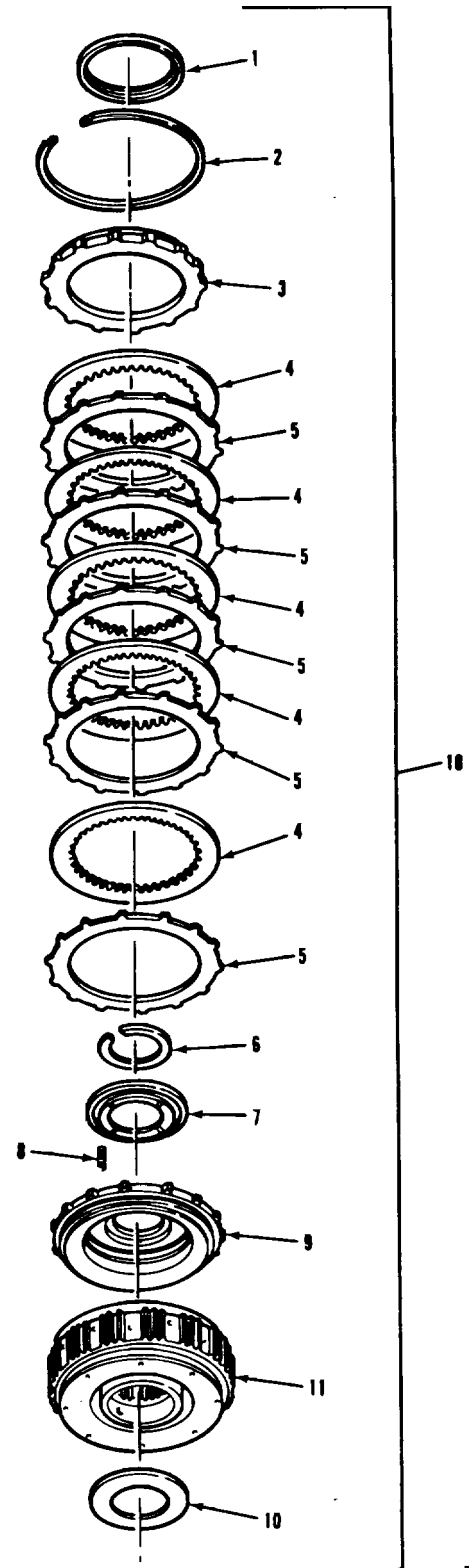
TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 1. BEARING RACE (FRONT)
- 2. SNAPRING
- 3. BACKING PLATE
- 4. CLUTCH PLATE (INTERNALLY SPLINED) (5)
- 5. CLUTCH PLATE (EXTERNALLY TOOTHED) (5)
- 6. SNAPRING
- 7. SPRING RETAINER
- 8. RELEASE SPRING (20)
- 9. CLUTCH PISTON
- 10. BEARING RACE (REAR)
- 11. CLUTCH HOUSING
- 15. TOOL
- 16. TOOL
- 17. SNAPRING PLIERS
- 18. FOURTH CLUTCH ASSEMBLY



TRANSMISSION.

3.40 FORWARD CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
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CAUTION

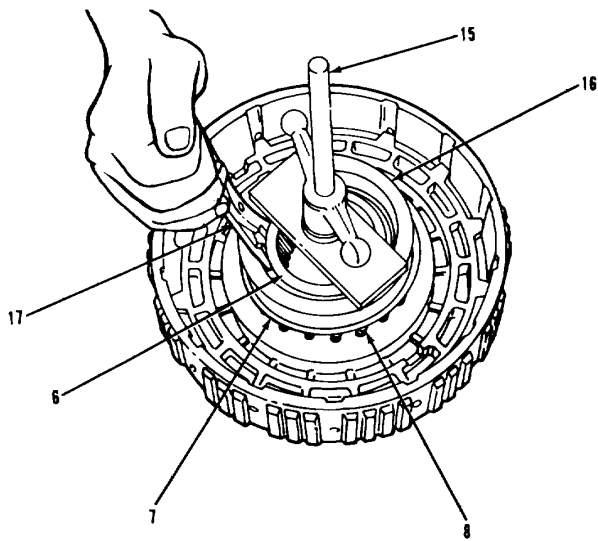
During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.

A. DISASSEMBLY.

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Fourth clutch assembly (18). | <ol style="list-style-type: none"> a. Remove item (1) and item (10) from item (11). b. Place item (11), cavity up, on table. c. Remove item (2) with item (17). d. Remove item (3). e. Remove five items (4) and five items (5). f. Using items (15) and (16), Use tool numbers compress down on item (7), J-24204-2 and J-24204-3. until it clears item (6). Remove item (6) with item (17). g. Slowly release pressure from item (7). h. Remove items (15) and (16). i. Remove item (7). Remove twenty items (8). |
|---|--|

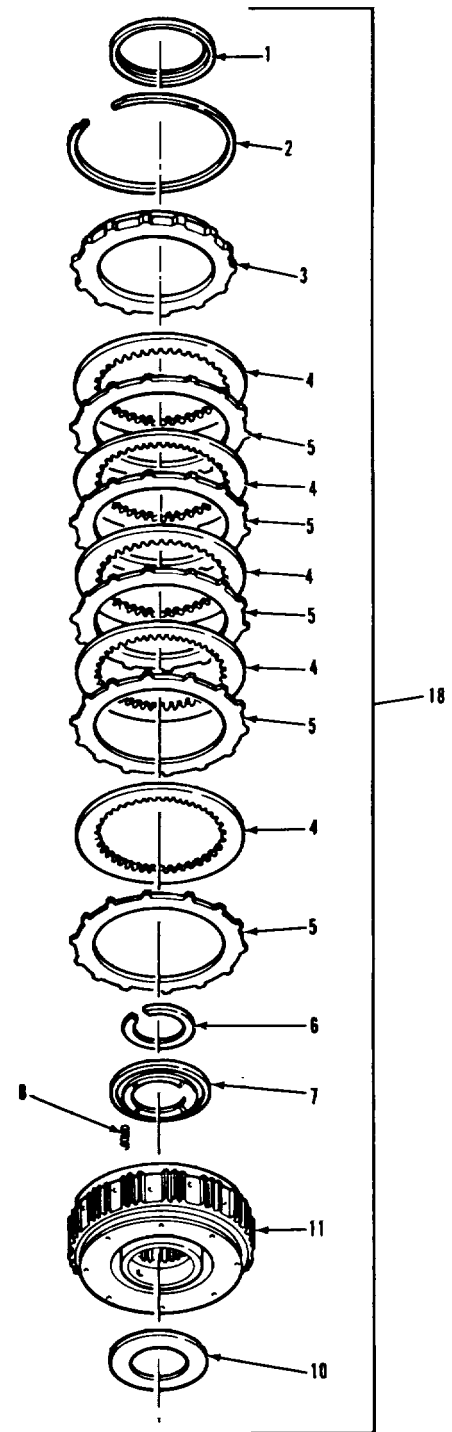
TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 1. BEARING RACE (FRONT)
- 2. SNAPRING
- 3. BACKING PLATE
- 4. CLUTCH PLATE (INTERNALLY SPLINED) (5)
- 5. CLUTCH PLATE (EXTERNALLY TOOTHED) (5)
- 6. SNAPRING
- 7. SPRING RETAINER
- 8. RELEASE SPRING (20)
- 10. BEARING RACE (REAR)
- 11. CLUTCH HOUSING
- 15. TOOL
- 16. TOOL
- 17. SNAPRING PLIERS
- 18. FOURTH CLUTCH ASSEMBLY



TA 238226

TRANSMISSION.

3.40 FORWARD CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

A. DISASSEMBLY (Continued).

1. Fourth clutch assembly (18) (continued).

WARNING

Compressed air used for repair purposes will not exceed 30 psi. Use only with personal protective equipment (goggles/shield, gloves, etc.).

- j. Remove item (9) from item (11).

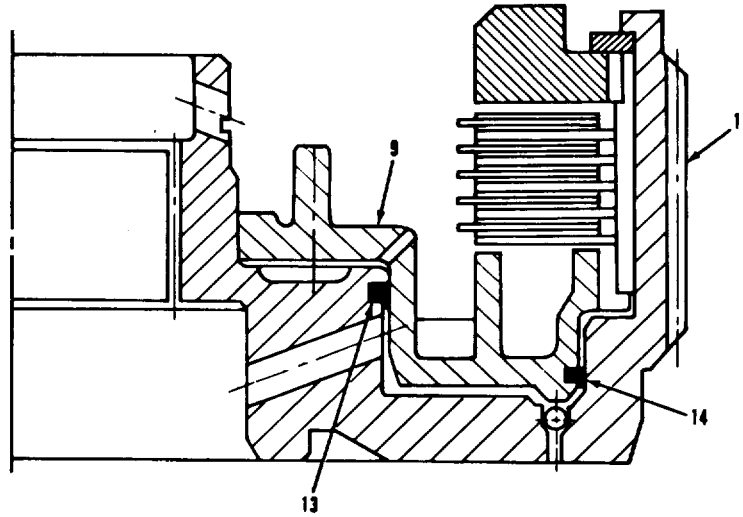
Apply compressed air to holes inside rear of hub of item (11) to remove item (9).

- k. Remove item (13) from item (11).

- l. Remove item,(14) from item (9).

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 9. CLUTCH PISTON
- 11. CLUTCH HOUSING
- 13. SEAL RING (INTERNAL)
- 14. SEAL RING (EXTERNAL)

TA 23827

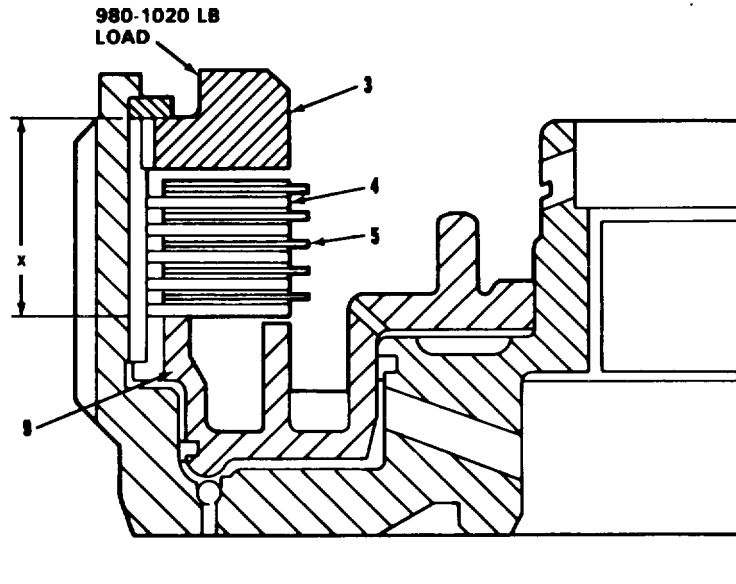
TRANSMISSION.

3.40 FORWARD CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING AND INSPECTION.</u>		
2. All parts.	a. Clean and inspect all parts for wear or damage. b. Inspect eight balls in housing to be sure they are securely staked and are free to move.	Refer to paragraph 3-25. for detailed instructions.
<u>C. ASSEMBLY.</u>		
NOTE		
<p>If clutch piston is replaced use new piston with same stamped code letter (M, S, or T). If the clutch housing is replaced, a new clutch piston must be selected by following steps a thru e. If not, go to step f.</p>		
3. Fourth clutch assembly (18).	a. Alternately stack new tems (4) and (5) in suitable press. b. Install item (3). c. Using press, apply specified load, and measure dimension x. d. From paragraph 3-25 (wear limits and replacement standards), select proper item (9). e. Use measured parts and selected piston (9) in fourth clutch final assembly.	Item (5) first. 980-1020 lb load.

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



	DIM X	USE PISTON	MARKED
AFTER S/N 16900	1.3615-1.3878	6885131	T
AFTER S/N 16900	1.3882-1.4148	6885132	S
AFTER S/N 16900	1.4152-1.4415	6885133	M

LEGEND:

- 3. BACKING PLATE
- 4. CLUTCH PLATE (INTERNALLY SPLINED) (5)
- 5. CLUTCH PLATE (EXTERNALLY TOOTHED) (5)
- 9. CLUTCH PISTON

TA 23828

TRANSMISSION.

3.40 FORWARD CLUTCH REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY (Continued).**

3. Fourth clutch assembly (18) (continued).

f. Place item (11) on table, cavity side up.

g. Grease and install new item (13) into item (11).

Use oil soluble grease. Refer to appendix B.

h. Make sure lip of item (13) faces bottom of cavity.

i. Place item (9) on table, spring side up.

j. Grease and install item (14) lip side down into outside groove of item (9).

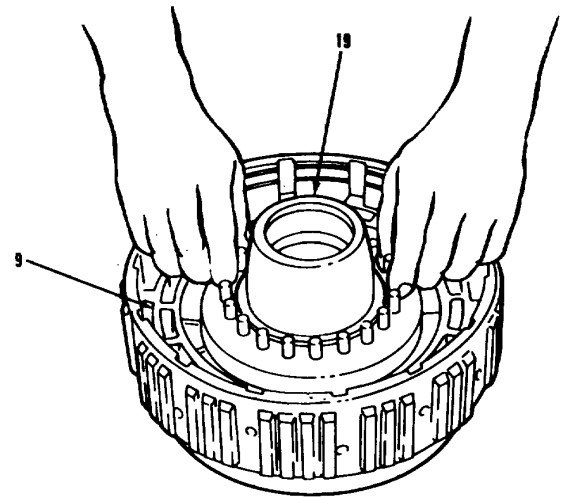
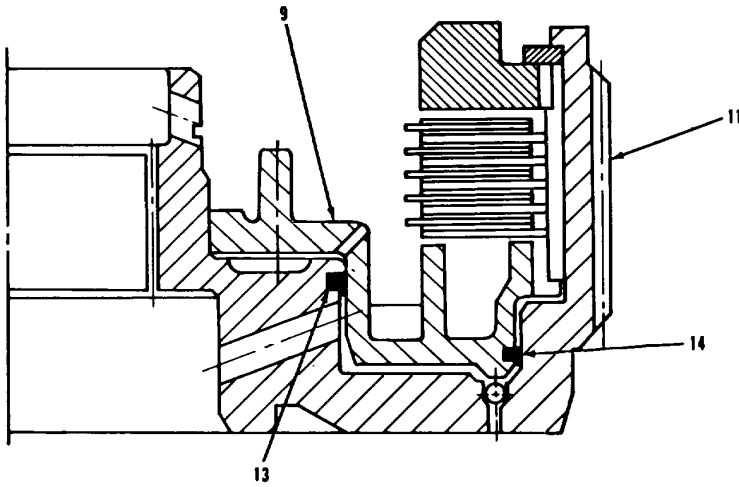
Use oil soluble grease. Refer to appendix B.

k. Install item (9) into item (11). (19) to center and guide item (9).

Use tool number J-24216- Using item 01.

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 9. CLUTCH PISTON
- 11. CLUTCH HOUSING
- 13. SEAL RING (INTERNAL)
- 14. SEAL RING (EXTERNAL)
- 19. SEAL PROTECTOR

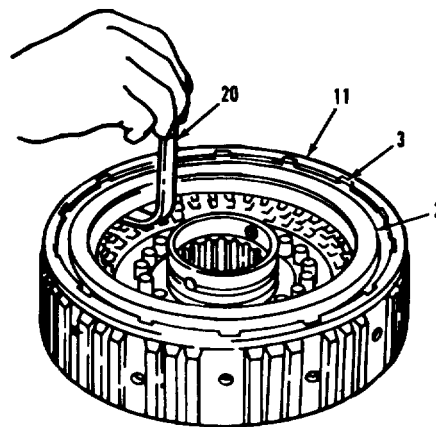
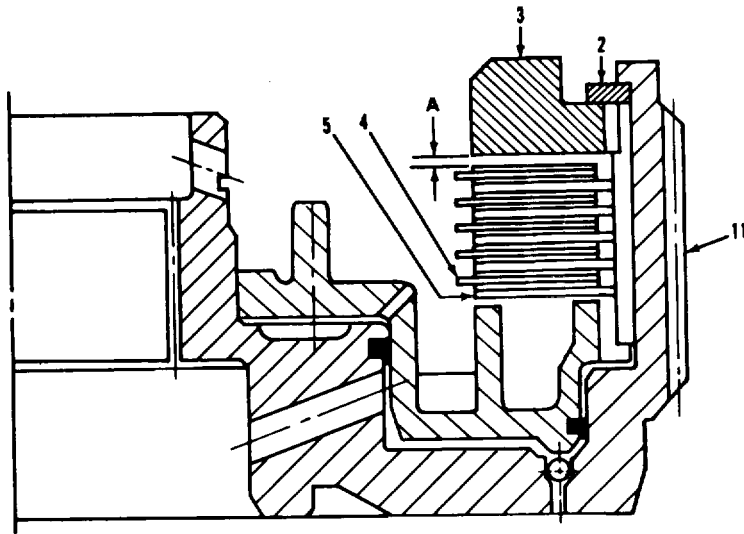
TRANSMISSION.

3.40 FORWARD CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
3. Fourth clutch assembly (18) (continued).	<ul style="list-style-type: none"> <li data-bbox="618 506 943 653">l. Start with one item (5). Alternately install five items (5) and five items (4) into item (11), one at a time. <li data-bbox="618 688 829 720">m. Install item (3). <li data-bbox="618 751 829 783">n. Install item (2). <li data-bbox="618 814 878 867">o. Hold item (3) firmly against item (2). <li data-bbox="618 905 943 1020">p. Insert item (20) between items (3) and (4) and check for clearance at location (A) in diagram. 	<p data-bbox="1094 905 1403 1083">Use tool number J-24192. When there is proper clearance, thinner step of gage will fit between item (3) and item (4), thicker step will not.</p>

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 2. SNAPRING
- 3. BACKING PLATE
- 4. CLUTCH PLATE (INTERNALLY SPLINED) (5)
- 5. CLUTCH PLATE (EXTERNALLY TOOTHED) (5)
- 11. CLUTCH HOUSING
- 20. CLUTCH PACK CLEARANCE GAGE
- A. RUNNING CLEARANCE 0.080-0.120 INCH

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

C. ASSEMBLY (Continued).

NOTE

If clutch clearance is not within wear limits, repeat steps 1 thru p with new clutch plates.

3. Fourth clutch assembly (18) (continued).	q. When proper clutch clearance is attained, remove items (2), (3), (4) and (5).	Total of five items (4) and five items (5).
---	--	---

NOTE

Soak all internally splined plates in OE/HDO-10 lubricating oil for two minutes.

- r. Starting with item (5), alternately install five items (5) and five items (4) into item (11).
- s. Install items (3) and (2) into item (11).

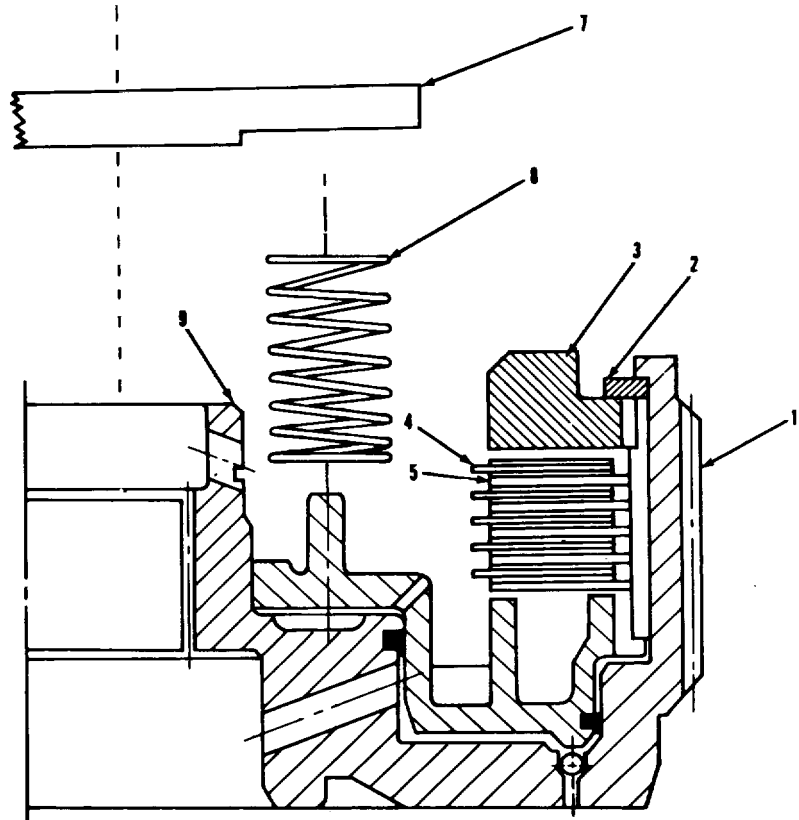
NOTE

Fourth clutch must be set on spring compressor tool number J-24204-2 before springs are installed.

- t. Install twenty items (8) onto item (9).
- u. Install item (7) on top of items (8).

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 2. SNAPRING
- 3. BACKING PLATE
- 4. CLUTCH PLATE (INTERNALLY SPLINED) (5)
- 5. CLUTCH PLATE (EXTERNALLY TOOTHED) (5)
- 7. SPRING RETAINER
- 8. RELEASE SPRING (20)
- 9. CLUTCH PISTON
- 11. CLUTCH HOUSING

TA 238231

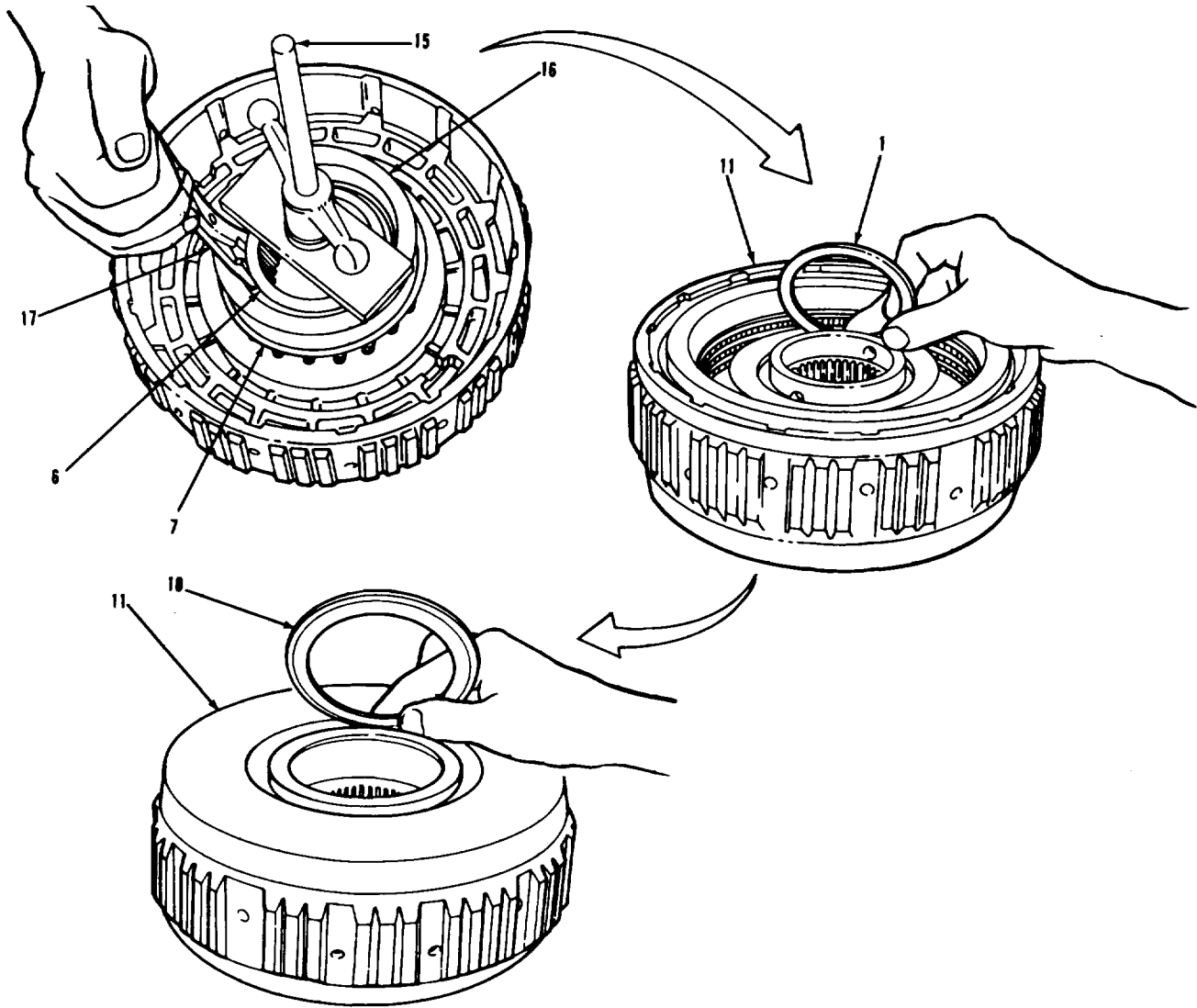
TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
3. Fourth clutch assembly (18) (continued).	v. Compress item (7) using items (15) and (16) until ring groove on item (11) is clear. w. Install item (6) using item (17). x. Remove items (15) and (16). y. Grease item (1) and install on front of item (11). z. Grease item (10) and install on rear of item (11).	Use tool numbers J-24204-2 and J-24204-3. Refer to appendix B. Use oil soluble grease.
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

TRANSMISSION.

3-41. FOURTH CLUTCH REPAIR (Continued).



LEGEND:

- 1. BEARING RACE (FRONT)
- 6. SNAPRING
- 7. SPRING RETAINER
- 10. BEARING RACE (REAR)
- 11. CLUTCH HOUSING
- 15. BAR AND STUD ASSEMBLY TOOL
- 16. CLUTCH SPRING COMPRESSOR
- 17. SNAPRING PLIERS

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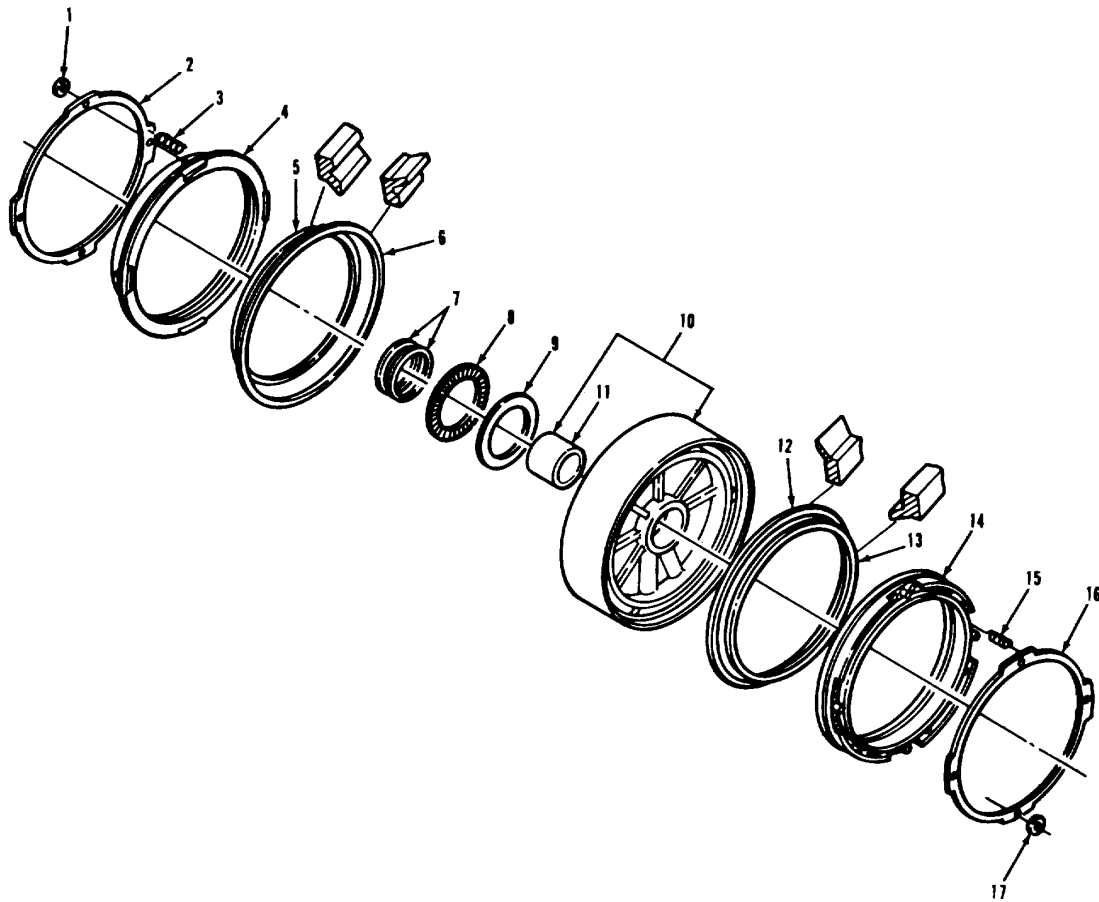
TRANSMISSION.

3.42 CENTER SUPPORT REPAIR.

LOCATION/ITEM	ACTION	REMARKS
<p>This task covers:</p> <ul style="list-style-type: none"> a. Disassembly b. Cleaning c. Inspection d. Assembly 		
<p>INITIAL SETUP:</p>		
<p><u>APPLICABLE CONFIGURATIONS</u> All.</p>	<p><u>EQUIPMENT CONDITION PARAGRAPH</u> 3-34.</p>	<p><u>CONDITION DESCRIPTION</u> Subassembly removed from transmission.</p>
<p><u>TEST EQUIPMENT</u> None.</p>		
<p><u>SPECIAL TOOLS</u> Bushing remover tool (33287) J-28525-2. Lockring installer (33287) J-24453. Bushing installer (33287) J-28525-1.</p>		
<p><u>MATERIALS/PARTS (P/N)</u> Fluid, automatic transmission Item 6, Appendix B. Grease, oil-soluble Item 9, Appendix B. Kit, transmission overhaul (73342) 6885217.</p>		
<p><u>PERSONNEL REQUIRED</u> Two (MOS-63W).</p>	<p><u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing dirt and dust.</p>	
<p><u>REFERENCES (TM)</u> TM 9-2320-283-34P.</p>	<p><u>GENERAL SAFETY INSTRUCTIONS</u> None.</p>	
<p><u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.</p>		

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

1. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)
2. SPRING RETAINER RING
3. THIRD CLUTCH PISTON RELEASE SPRING (20)
4. THIRD CLUTCH PISTON
5. SEAL RING INTERNAL LIP TYPE
6. SEAL RING EXTERNAL LIP TYPE
7. SEAL RING (2)
8. ROLLER BEARING ASSEMBLY
9. THRUST BEARING RACE
10. CENTER SUPPORT HOUSING ASSEMBLY
11. CENTER HOUSING BUSHING
12. SEAL RING EXTERNAL LIP TYPE
13. SEAL RING INTERNAL LIP TYPE
14. SECOND CLUTCH PISTON
15. SECOND CLUTCH PISTON RELEASE SPRING (20)
16. SPRING RETAINER RING
17. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)

TA 238233

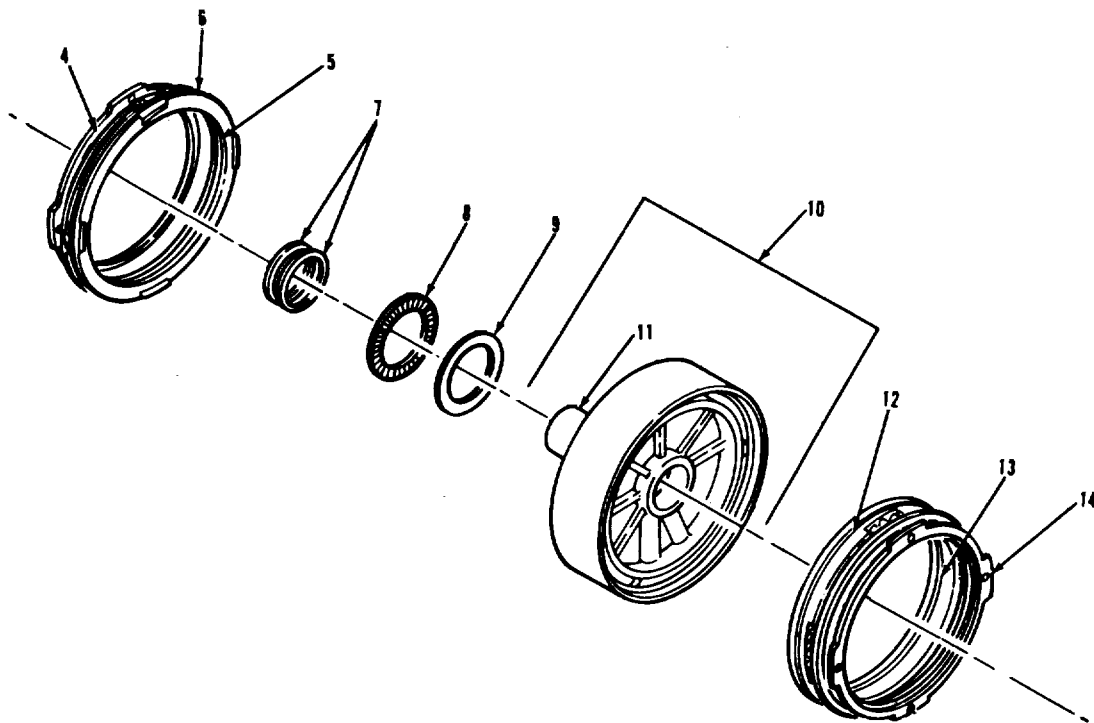
TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
CAUTION		
During repair all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
1. Center support housing assembly (10).	<ul style="list-style-type: none"> a. Place item (10) with item (11) facing up. b. Remove item (4) from item (10) as an assembly. c. Remove items (5) and (6) from item (4). d. Remove two items (7) from item (10). e. Remove items (8) and (9). f. Turn item (10) over. 	Lift up on two sides.
	<ul style="list-style-type: none"> g. Remove item (14) from item (10) as an assembly. h. Remove items (12) and (13) from item (14). 	Lift up on two sides.

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 4. THIRD CLUTCH PISTON
- 5. SEAL RING INTERNAL LIP TYPE
- 6. SEAL RING EXTERNAL LIP TYPE
- 7. SEAL RING (2)
- 8. ROLLER BEARING ASSEMBLY
- 9. THRUST BEARING RACE
- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 11. CENTER HOUSING BUSHING
- 12. SEAL RING EXTERNAL LIP TYPE
- 13. SEAL RING INTERNAL LIP TYPE
- 14. SECOND CLUTCH PISTON

TA 238234

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

A. DISASSEMBLY (Continued).

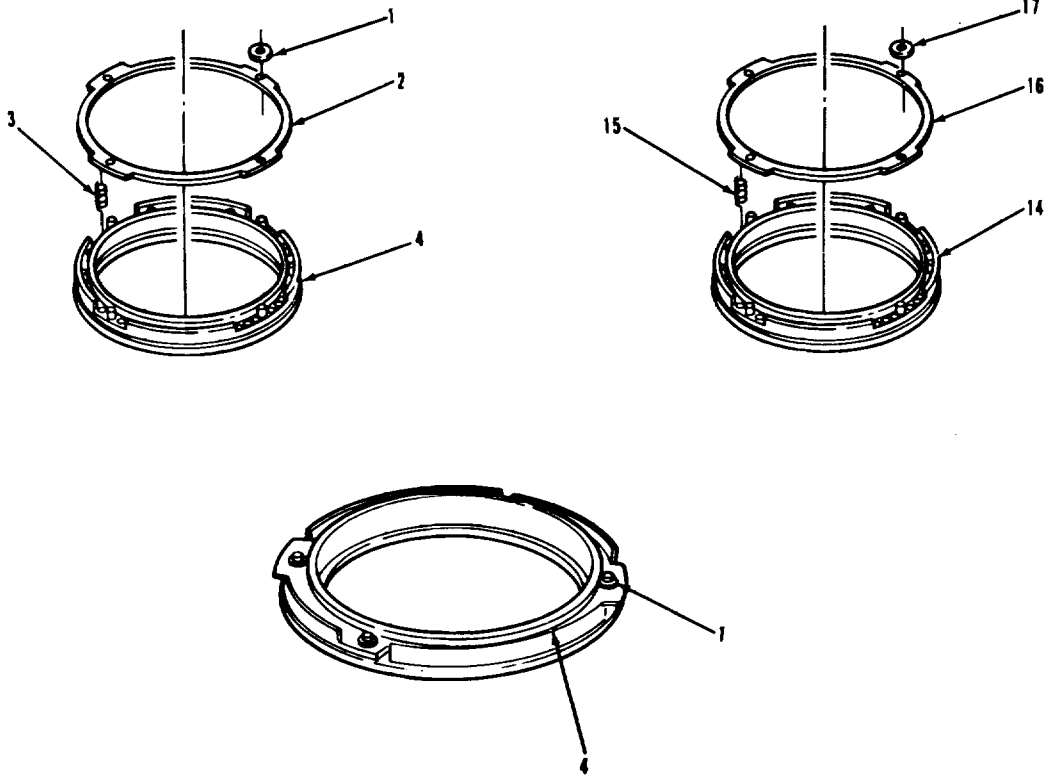
NOTE

- **If pistons do not have to be repaired go to step 4.**
- **Cut spring retaining rings with side cutters so that retaining studs will not be damaged.**

2. Piston (4).	a. Cut four items (1) while depressing item (2). b. Remove item (2) from item (4) and twenty items (3).	Do not lose springs.
3. Piston (14).	a. Cut four items (17) while depressing item (16). b. Remove item (16) from item (14) and twenty items (15).	Do not lose springs.

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 1. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)
- 2. SPRING RETAINER RING
- 3. THIRD CLUTCH PISTON RELEASE SPRING (20)
- 4. THIRD CLUTCH PISTON
- 14. SECOND CLUTCH PISTON
- 15. SECOND CLUTCH PISTON RELEASE SPRING (20)
- 16. SPRING RETAINER RING
- 17. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)

TA 23835

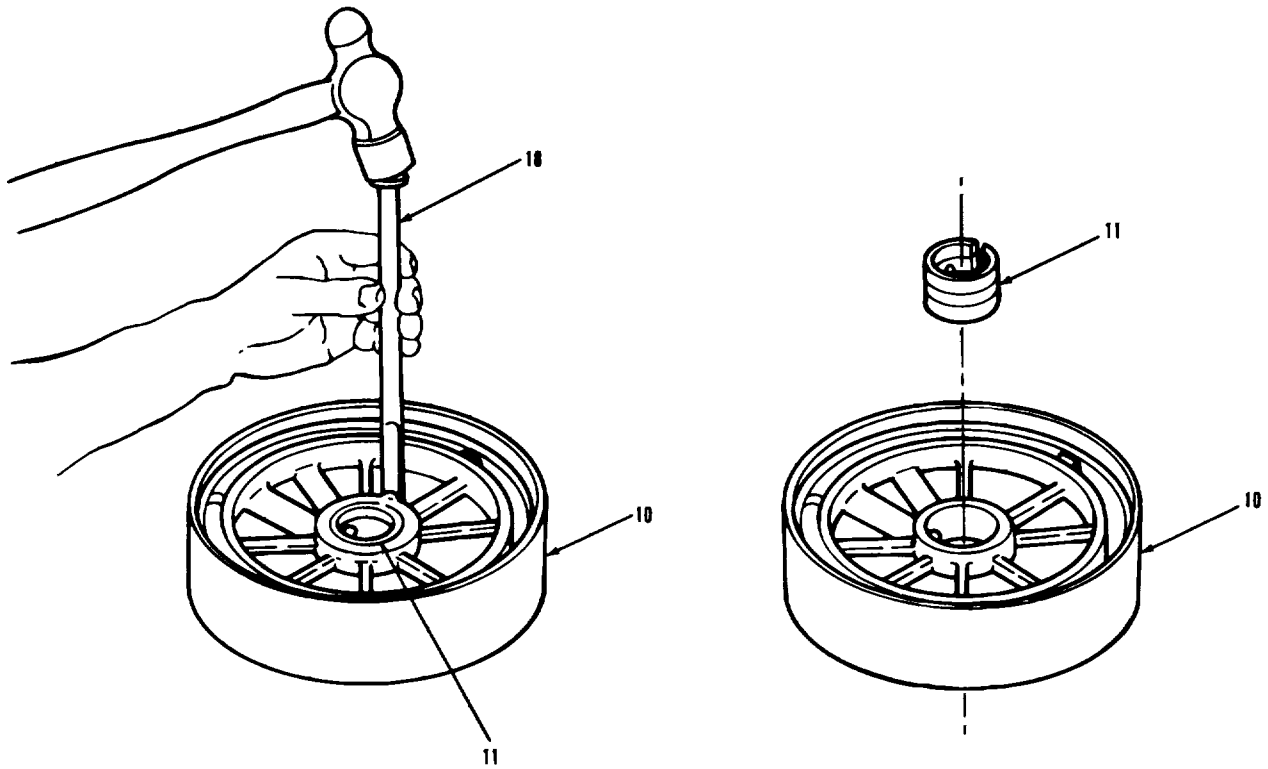
TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
NOTE		
If center housing bushing does not have to be replaced, go to step 5.		
4. Center support housing assembly (10).	a. Turn item (10) over. b. Collapse item (11) along seam. c. Remove item (11) from item (10).	Using item (18), use great care not to damage center support bore.

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 11. CENTER HOUSING BUSHING
- 18. HALF-ROUND CHISEL

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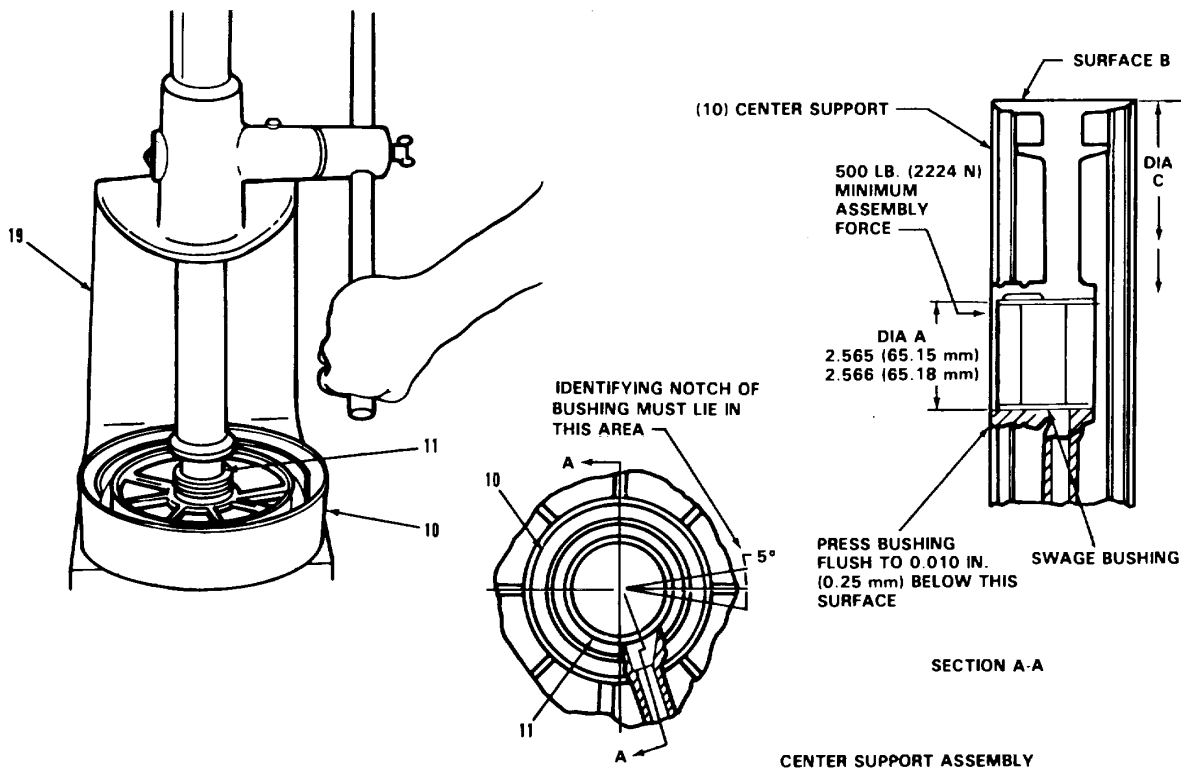
TRANSMISSION.

3.40 CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING.</u>		
5. All parts.	Clean.	Refer to paragraph 3-4.
<u>C. INSPECTION.</u>		
6. All parts.	Inspect.	Refer to paragraph 3-5.
NOTE		
Inspect center support cavities for any obstruction or foreign material.		
<u>D. ASSEMBLY.</u>		
NOTE		
If center housing bushing was not replaced, go to step 8.		
7. Bushing (11).	<ul style="list-style-type: none"> a. Place item (10) on press with bushing bore facing up. b. Place new pre-bored item (11) in item (10), carefully aline oil hole in item (11) with item (10). c. Using item (19), carefully press item (11) into item (10). 	Use tool number J-28525-2. Be sure oil holes are alined.
NOTE		
Press center housing bushing flush to 0.010 inch below center support bore.		
	<ul style="list-style-type: none"> d. Swage bushing using swaging tool. 	Use tool number J-28525-1. Swaging secures the bushing within the center support.

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 11. CENTER HOUSING BUSHING
- 19. PRESS

TA 238237

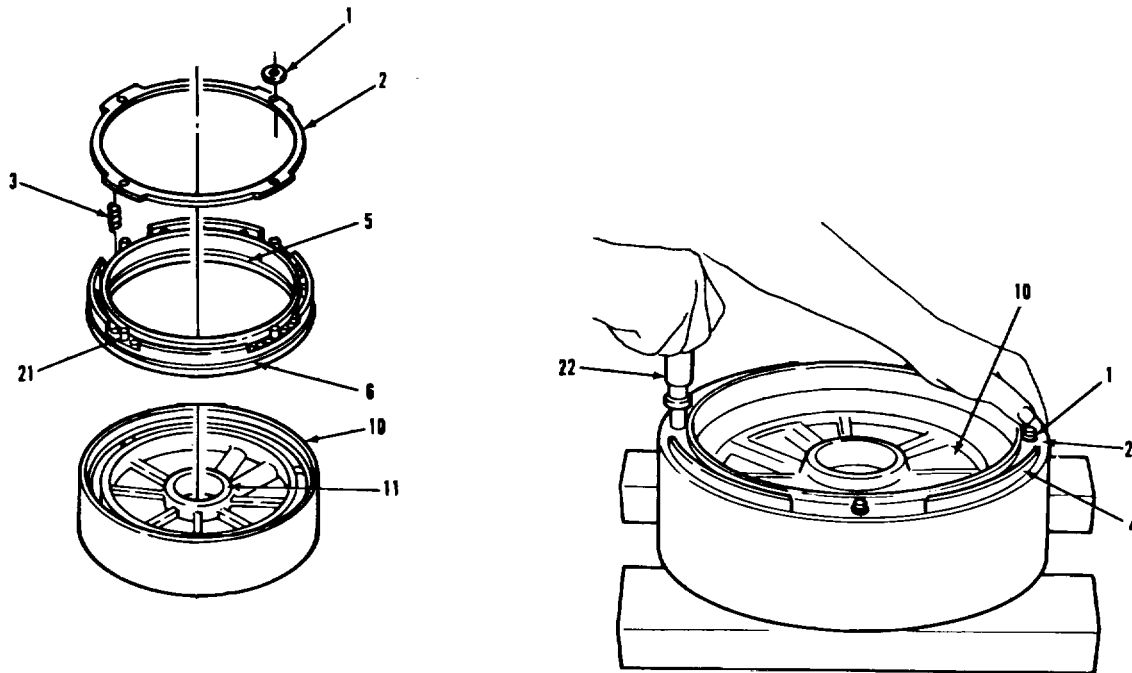
TRANSMISSION.

3.40 FORWARD CLUTCH AND INPUT SHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
NOTE		
If third clutch piston was not disassembled, go to step 8g for piston.		
8. Piston (4).	<ul style="list-style-type: none"> a. Place item (10) with item (11) facing up. b. Temporarily place item (4) into item (10) with item (21) facing up. c. Install twenty items (3) into pockets of item (4). d. Place item (2) onto item (4) and align holes in item (2) with item (21). e. Compress item (2) onto item (4) and install four items (1) using item (22). 	Use tool number J-24453.
NOTE		
If the pistons are not forced to the bottom of their cavities during installation of self-locking retainer ring (1), proper clutch clearance cannot be established.		
	<ul style="list-style-type: none"> f. Remove item (4) from item (10). g. Grease items (5) and (6). h. Install item (5) into internal groove and install item (6) in outside groove of item (4). 	<p>Use oil soluble grease.</p> <p>The lips of all seal rings must be toward the piston cavities of the center support.</p>
3-388		

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 1. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)
- 2. SPRING RETAINER RING
- 3. THIRD CLUTCH PISTON RELEASE SPRING (20)
- 4. THIRD CLUTCH PISTON
- 5. SEAL RING INTERNAL LIP TYPE
- 6. SEAL RING EXTERNAL LIP TYPE
- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 11. CENTER HOUSING BUSHING
- 21. STUD (4)
- 22. LOCKRING INSTALLER

TA 238238

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

D. ASSEMBLY (Continued).

NOTE

If pistons were not disassembled, go to step 9f.

9. Piston (14).

a. Temporarily place item (14) into item (10) with retaining items (23) facing up

b. Install twenty items (15) into pockets of item (14).

c. Place item (16) onto item (14) and align holes in item (16) with item (23).

Use tool number J-24453.

NOTE

If the piston are not forced to the bottom of their cavities during installation of self-locking retainer ring, proper clutch clearance cannot be established.

e. Remove item (14) from item (10).

f. Grease items (12) and (13).

Use oil soluble grease.

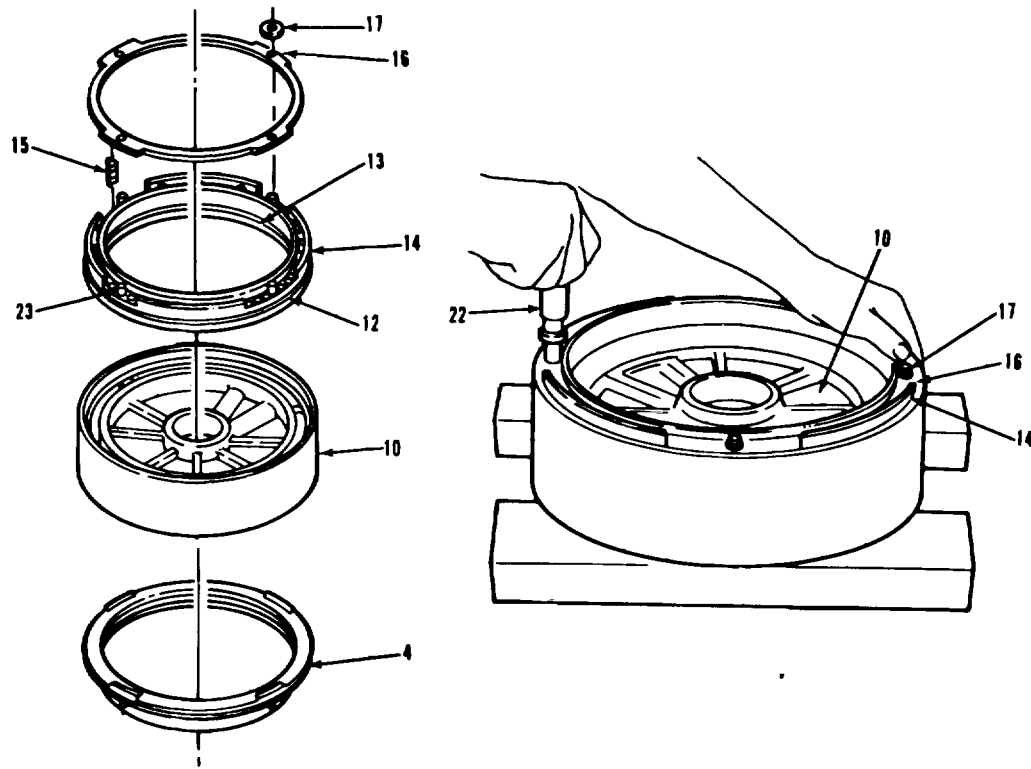
NOTE

The lips of all seal rings must be toward the piston cavities of the center support.

g. Install item (13) into internal groove of item (14).

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 4. THIRD CLUTCH PISTON
- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 12. SEAL RING EXTERNAL LIP TYPE
- 13. SEAL RING INTERNAL LIP TYPE
- 14. SECOND CLUTCH PISTON
- 15. SECOND CLUTCH PISTON RELEASE SPRING (20)
- 16. SPRING RETAINER RING
- 17. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)
- 22. LOCK RING INSTALLER
- 23. STUD (4)

TA 23823

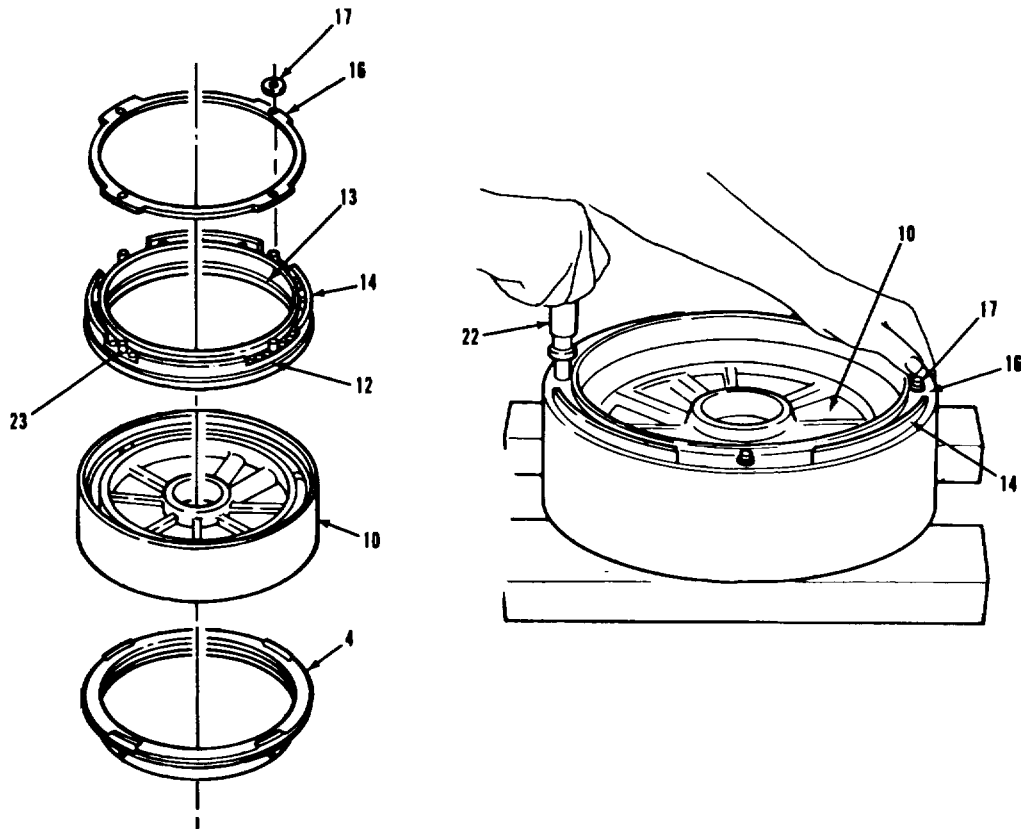
TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. ASSEMBLY (Continued).</u>		
9. Piston (14) (continued).	h. Install item (12) in groove on outside of item (14). i. Turn item (10) over. j. Apply a generous amount of OE/HDO-10 lubricating oil into item (10). k. Install item (14) into cavity of item (10). face the bottom of piston cavity.	Be sure the lips of the inner and out seal rings
NOTE		
Leave item (4) out of item (10) until final assembly of transmission.		

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 4. THIRD CLUTCH PISTON
- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 12. SEAL RING EXTERNAL LIP TYPE
- 13. SEAL RING INTERNAL LIP TYPE
- 14. SECOND CLUTCH PISTON
- 16. SPRING RETAINER RING
- 17. T-TYPE SELF-LOCKING EXTERNAL RETAINING RING (4)
- 22. LOCK RING INSTALLER
- 23. STUD (4)

TA 238240

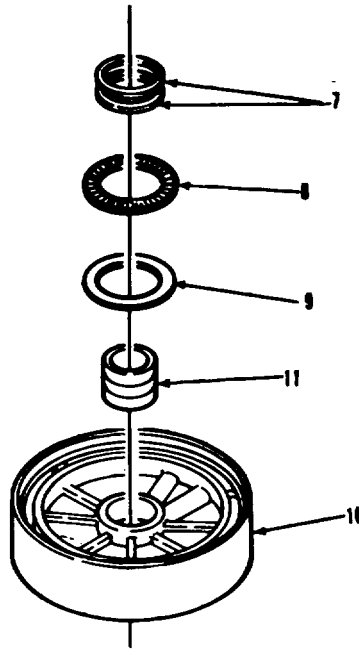
TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
10. Roller bearing assembly (8) and race (9).	a. Turn item (10) over. b. Grease items (8) and (9). c. Install item (9) flat side down onto item (10). (11). Do not force. d. Install item (8) onto item (9).	When installing item (9) keep it square with item
11. Two rings (7).	a. Grease two items (7). b. Carefully install two items (7) onto grooves of item (11). c. Store complete assembly in a clean dry place until final assembly.	
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

TRANSMISSION.

3-42. CENTER SUPPORT REPAIR (Continued).



LEGEND:

- 7. SEAL RING (2)
- 8. ROLLER BEARING ASSEMBLY
- 9. THRUST BEARING RACE
- 10. CENTER SUPPORT HOUSING ASSEMBLY
- 11. CENTER HOUSING BUSHING

TA 238241

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning and Inspection.
- c. Assembly.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

3-35.

CONDITION DESCRIPTION

Subassembly removed from transmission.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Sun gear bushing swaging tool (33287) J-26997-A.
Main shaft orifice plug installer (33287) J-24ZI7.
Sun gear bushing reamer set (33287) 0;28489.

MATERIALS/PARTS (P/N)

Grease, oil soluble
Item 9, Appendix B.
Loctite RC601®
Item 12, Appendix B.

PERSONNEL REQUIRED

Two (MOS-63W*.
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

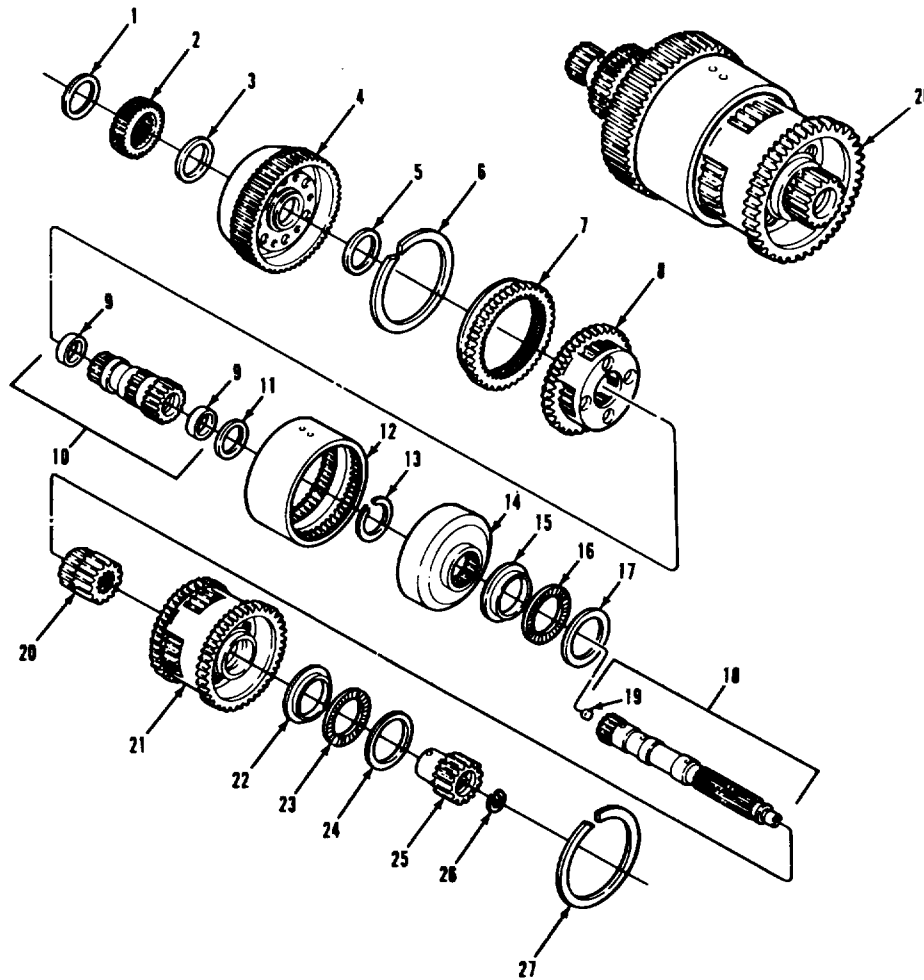
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------------|--------------------------------------|
| 1. BRONZE THRUST WASHER | 15. BEARING THRUST RACE |
| 2. FRONT SUN GEAR | 16. BEARING ASSEMBLY |
| 3. THRUST WASHER | 17. THRUST BEARING RACE |
| 4. FRONT PLANETARY CARRIER ASSEMBLY | 18. MAINSHAFT ASSEMBLY |
| 5. THRUST WASHER | 19. LUBE ORIFICE PLUG |
| 6. INTERNAL SNAPRING | 20. REAR PLANETARY SUN GEAR |
| 7. FRONT PLANETARY RING GEAR | 21. REAR PLANETARY CARRIER ASSEMBLY |
| 8. CENTER PLANETARY CARRIER ASSEMBLY | 22. BEARING THRUST RACE |
| 9. SLEEVE BUSHING (2) | 23. BEARING ASSEMBLY |
| 10. SUN GEAR AND SHAFT ASSEMBLY | 24. THRUST BEARING RACE |
| 11. THRUST WASHER | 25. LOW PLANETARY SUN GEAR |
| 12. PLANETARY CONNECTING DRUM | 26. EXTERNAL SNAPRING |
| 13. EXTERNAL SNAPRING | 27. INTERNAL SNAPRING |
| 14. CENTER PLANETARY RING GEAR | 28. GEAR UNIT AND MAINSHAFT ASSEMBLY |

TA 23842

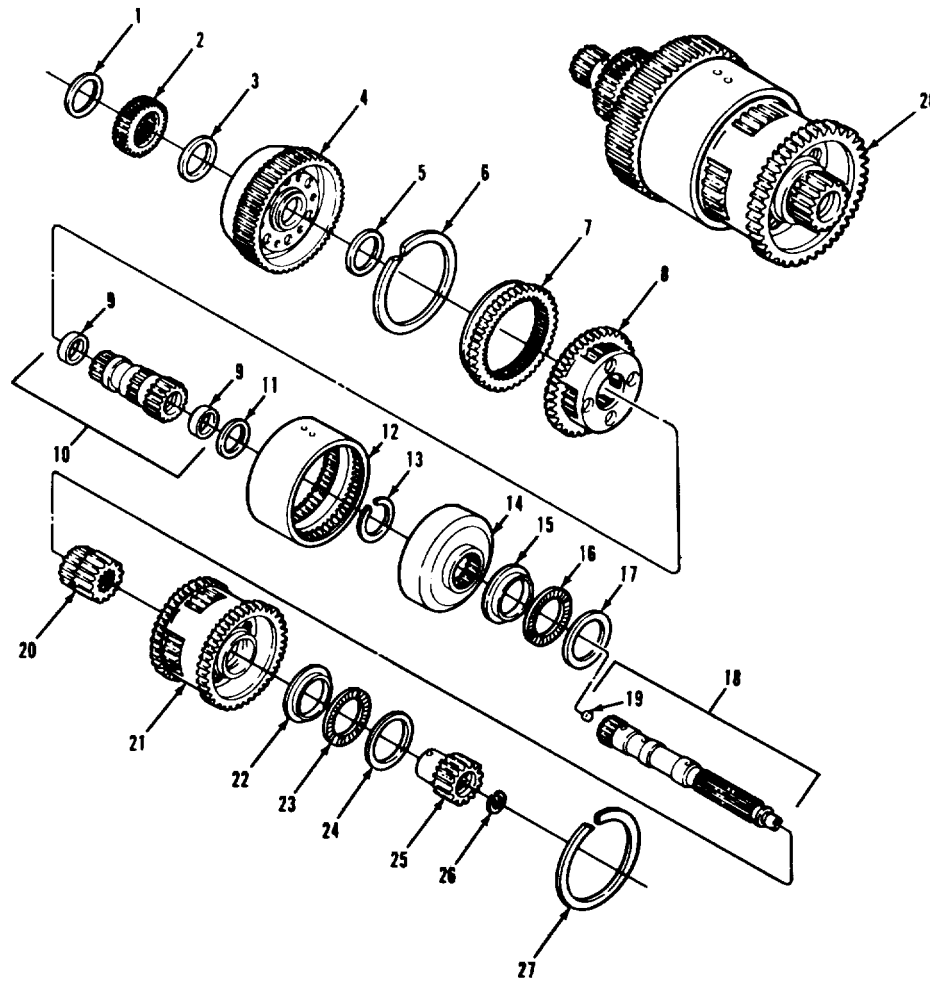
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
CAUTION		
<p>During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.</p>		
<p>1. Gear unit and mainshaft assembly (28).</p>	<p>a. Remove items (1), (2), and (3). b. Remove item (4).</p>	
NOTE		
<p>Transmission oil may cause the thrust washer to stick to the front planetary carrier assembly or the center planetary carrier assembly. Check both components when disassembling.</p>		
	<p>c. Remove items (10) and (11).</p>	
NOTE		
<p>Do step d only if bushings in sun gear and shaft are worn or damaged.</p>		
	<p>d. Using a chisel remove trio items (9) from item (10). e. Remove item (6) and item (7) from inside item (1;). f. Lift out items (8), (5), and (11). g. Remove items (24), (23), and (22).</p>	

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------------|--------------------------------------|
| 1. BRONZE THRUST WASHER | 15. BEARING THRUST RACE |
| 2. FRONT SUN GEAR | 16. BEARING ASSEMBLY |
| 3. THRUST WASHER | 17. THRUST BEARING RACE |
| 4. FRONT PLANETARY CARRIER ASSEMBLY | 18. MAINSHAFT ASSEMBLY |
| 5. THRUST WASHER | 19. LUBE ORIFICE PLUG |
| 6. INTERNAL SNAPRING | 20. REAR PLANETARY SUN GEAR |
| 7. FRONT PLANETARY RING GEAR | 21. REAR PLANETARY CARRIER ASSEMBLY |
| 8. CENTER PLANETARY CARRIER ASSEMBLY | 22. BEARING THRUST RACE |
| 9. SLEEVE BUSHING (2) | 23. BEARING ASSEMBLY |
| 10. SUN GEAR AND SHAFT ASSEMBLY | 24. THRUST BEARING RACE |
| 11. THRUST WASHER | 25. LOW PLANETARY SUN GEAR |
| 12. PLANETARY CONNECTING DRUM | 26. EXTERNAL SNAPRING |
| 13. EXTERNAL SNAPRING | 27. INTERNAL SNAPRING |
| 14. CENTER PLANETARY RING GEAR | 28. GEAR UNIT AND MAINSHAFT ASSEMBLY |

TA 238243

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

A. DISASSEMBLY (Continued).

- | | | |
|---|--|--|
| 1. Gear unit and mainshaft assembly (28) (continued). | h. Remove items (26) and (25). | |
| | i. Remove item (18). | |
| | j. Remove item (19) from item (18), if damaged. | |
| | k. Remove items (13), (14), and (20) as an assembly. | |

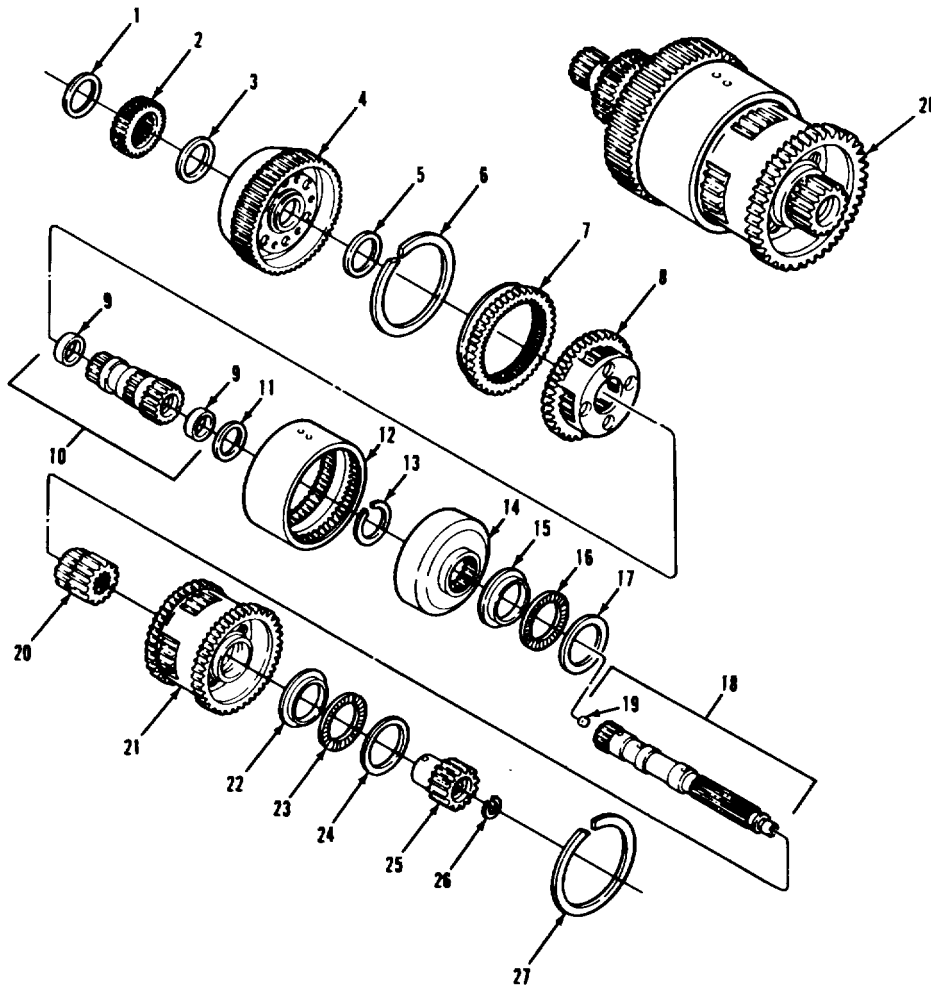
WARNING

Snapping may spring out and cause personal injury. Wear a face shield to prevent personal injury.

- | | | |
|--|--|--|
| | l. Remove item (13) from-item (20). | |
| | m. Lift item (14) off of item (20). | |
| | n. Remove items (15), (16), and (17) from item (14) or (21). | |
| | o. Remove item (27). | |
| | p. Remove item (21) from item (12). | |

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------------|--------------------------------------|
| 1. BRONZE THRUST WASHER | 15. BEARING THRUST RACE |
| 2. FRONT SUN GEAR | 16. BEARING ASSEMBLY |
| 3. THRUST WASHER | 17. THRUST BEARING RACE |
| 4. FRONT PLANETARY CARRIER ASSEMBLY | 18. MAINSHAFT ASSEMBLY |
| 5. THRUST WASHER | 19. LUBE ORIFICE PLUG |
| 6. INTERNAL SNAPRING | 20. REAR PLANETARY SUN GEAR |
| 7. FRONT PLANETARY RING GEAR | 21. REAR PLANETARY CARRIER ASSEMBLY |
| 8. CENTER PLANETARY CARRIER ASSEMBLY | 22. BEARING THRUST RACE |
| 9. SLEEVE BUSHING (2) | 23. BEARING ASSEMBLY |
| 10. SUN GEAR AND SHAFT ASSEMBLY | 24. THRUST BEARING RACE |
| 11. THRUST WASHER | 25. LOW PLANETARY SUN GEAR |
| 12. PLANETARY CONNECTING DRUM | 26. EXTERNAL SNAPRING |
| 13. EXTERNAL SNAPRING | 27. INTERNAL SNAPRING |
| 14. CENTER PLANETARY RING GEAR | 28. GEAR UNIT AND MAINSHAFT ASSEMBLY |

TA 238244

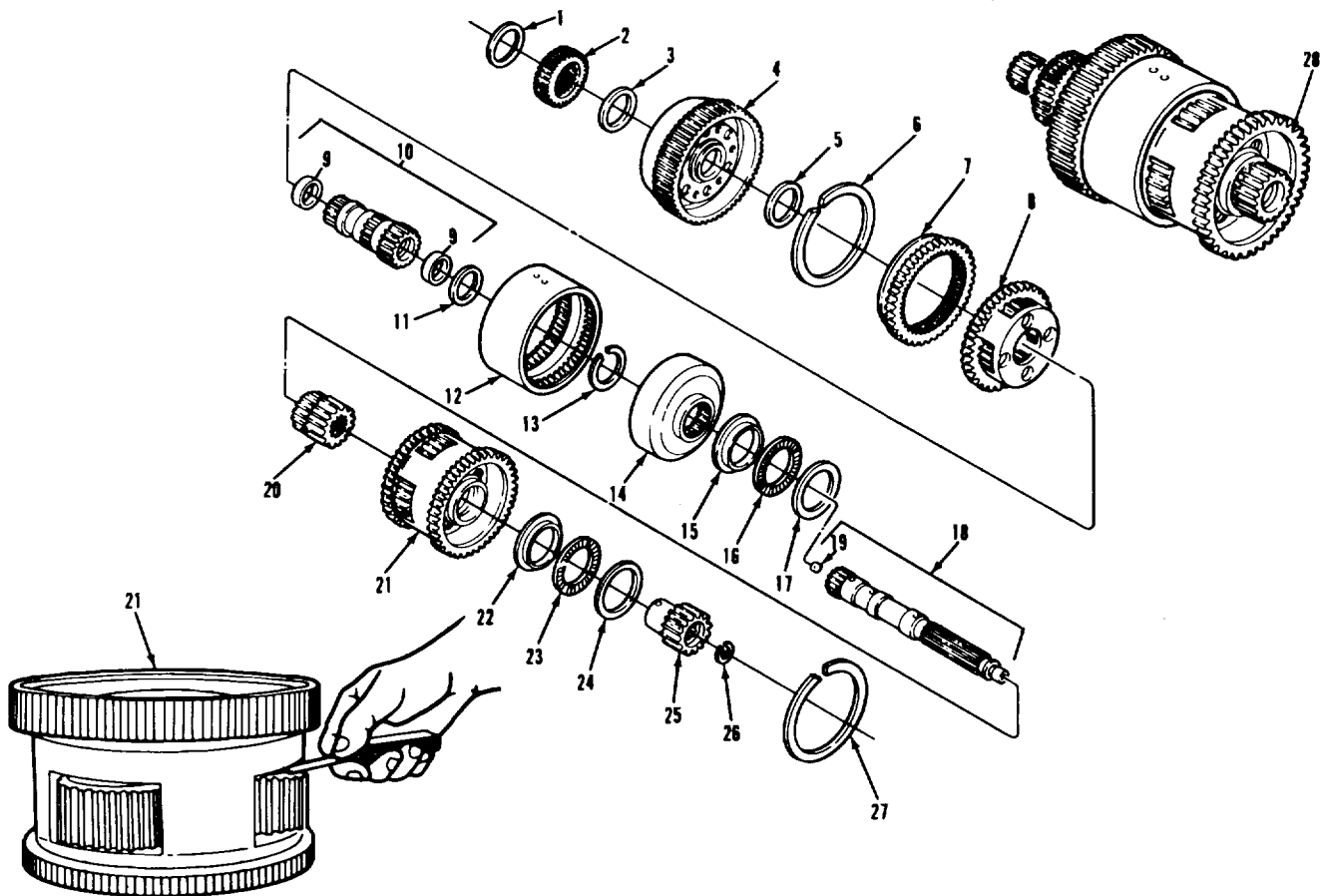
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>B. CLEANING AND INSPECTION.</u>		
2. All parts.	Clean.	Refer to paragraph 3-4.
NOTE		
Repeat steps a and b for each planetary carrier.		
3. Planetary carriers (4), (8), and (21).	a. Inspect the carrier for any sign of overheating, metal damage, or wear. b. Hold the bronze washer flat against pinion and insert a feeler gage between the washer and the carrier housing.	Repeat for each pinion. End play must be between 0.008-0.031 inch.

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- | | |
|--------------------------------------|--------------------------------------|
| 1. BRONZE THRUST WASHER | 15. BEARING THRUST RACE |
| 2. FRONT SUN GEAR | 16. BEARING ASSEMBLY |
| 3. THRUST WASHER | 17. THRUST BEARING RACE |
| 4. FRONT PLANETARY CARRIER ASSEMBLY | 18. MAINSHAFT ASSEMBLY |
| 5. THRUST WASHER | 19. LUBE ORIFICE PLUG |
| 6. INTERNAL SNAPRING | 20. REAR PLANETARY SUN GEAR |
| 7. FRONT PLANETARY RING GEAR | 21. REAR PLANETARY CARRIER ASSEMBLY |
| 8. CENTER PLANETARY CARRIER ASSEMBLY | 22. BEARING THRUST RACE |
| 9. SLEEVE BUSHING (2) | 23. BEARING ASSEMBLY |
| 10. SUN GEAR AND SHAFT ASSEMBLY | 24. THRUST BEARING RACE |
| 11. THRUST WASHER | 25. LOW PLANETARY SUN GEAR |
| 12. PLANETARY CONNECTING DRUM | 26. EXTERNAL SNAPRING |
| 13. EXTERNAL SNAPRING | 27. INTERNAL SNAPRING |
| 14. CENTER PLANETARY RING GEAR | 28. GEAR UNIT AND MAINSHAFT ASSEMBLY |

TA 238245

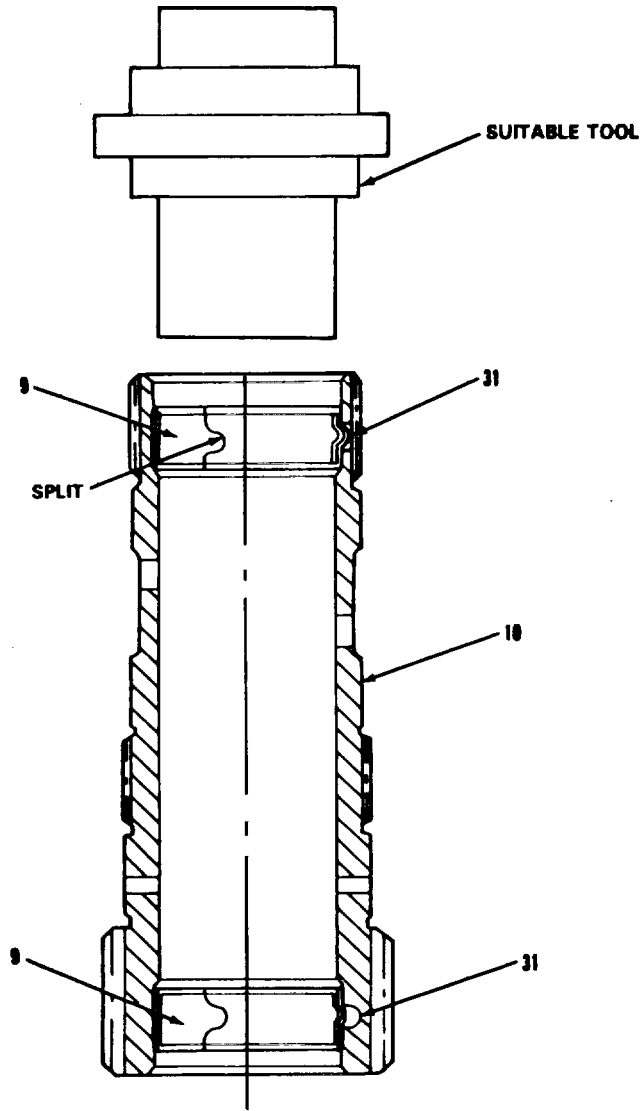
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY.</u>		
NOTE		
If sleeve bushings were removed from sun gear and shaft assembly proceed to step 4. If not, go to step 5.		
4. Sun gear and shaft assembly (10).	a. Coat bore in splined end of item (10) with locking sealant.	
NOTE		
Split in bushing must be more than 1/8 turn away from swaging hole in shaft.		
	b. Position new item (9) into item (10).	
NOTE		
<ul style="list-style-type: none"> • Use a minimum of 500 pounds force on suitable installation tool to assure proper seating of bushing. 		
<ul style="list-style-type: none"> • Use long part of installer when working on splined end of shaft. 		
	c. Using suitable installation tool, press item (9) into item (10).	Use tool No. J-24201. Seat 0.360 inch below end surface of item (10).

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 9. SLEEVE BUSHING
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 31. SWAGING HOLE

TA 238246

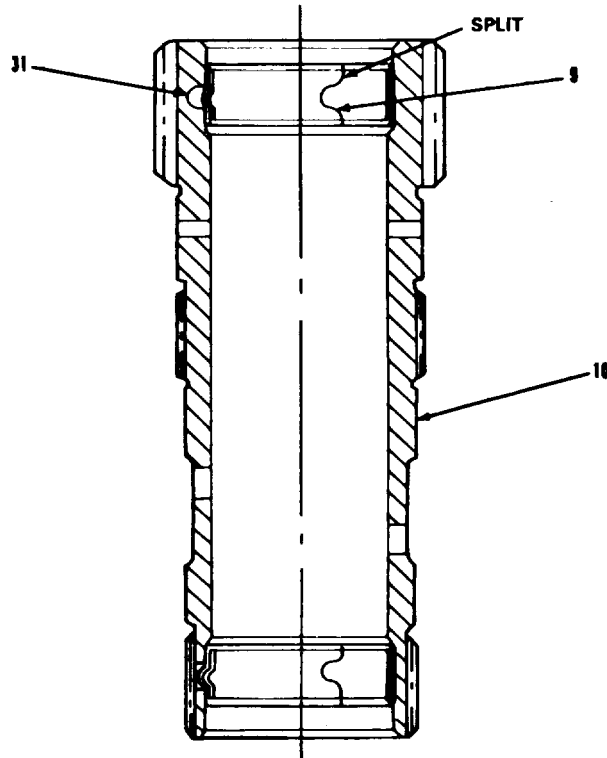
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
4. Sun gear and shaft assembly (10) (continued).	d. Coat bore in gear end of item (10) with locking sealant.	
NOTE		
Split in bushing must be more than 1/8 turn away from swaging hole in shaft.		
	e. Position other new item (9) into item (10).	
NOTE		
Use a minimum of 500 pounds force on suitable installation tool to assure proper seating of bushing.		
	f. Using suitable installation tool, press item (9) into item (10). (10).	Use tool No. J-24201. Seat 0.260 inch below end surface of item

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 9. SLEEVE BUSHING
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 31. SWAGING HOLE

TA 238247

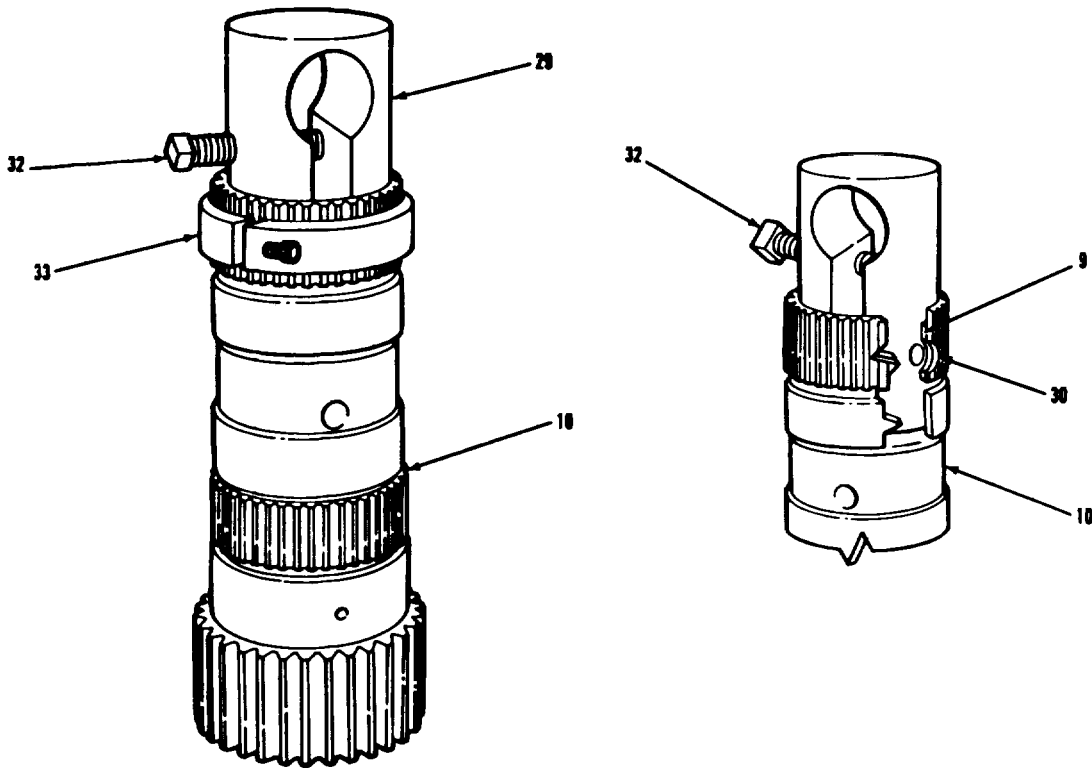
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
4. Sun gear and shaft assembly (10) (continued).		
CAUTION		
If support collar is not used, over-expansion of swaging tool may cause damage to sun gear shaft.		
	g. Position item (33) on small end of item (10) flush with end of shaft.	Use tool No. J-26997-2.
	h. Locate slot of item (33) approximately 180° from item (31) and tighten locking screw.	
	i. Insert item (29) into item (9).	Use tool number J-26997. Tool will rest on end of item (9).
	j. Aline item (32) with item (31).	
	k. Turn item (32) clockwise until item (29) expands and stops against item (9).	
	l. Back out item (32) remove item (29).	
	m. Loosen locking screw and remove item (33).	
NOTE		
Repeat steps h through l for opposite end. Collar is not required.		

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 9. SLEEVE BUSHING (2)
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 29. SWAGING TOOL
- 31. SWAGING HOLE
- 32. ADJUSTING SCREW
- 33. SUPPORT COLLAR

TA 238248

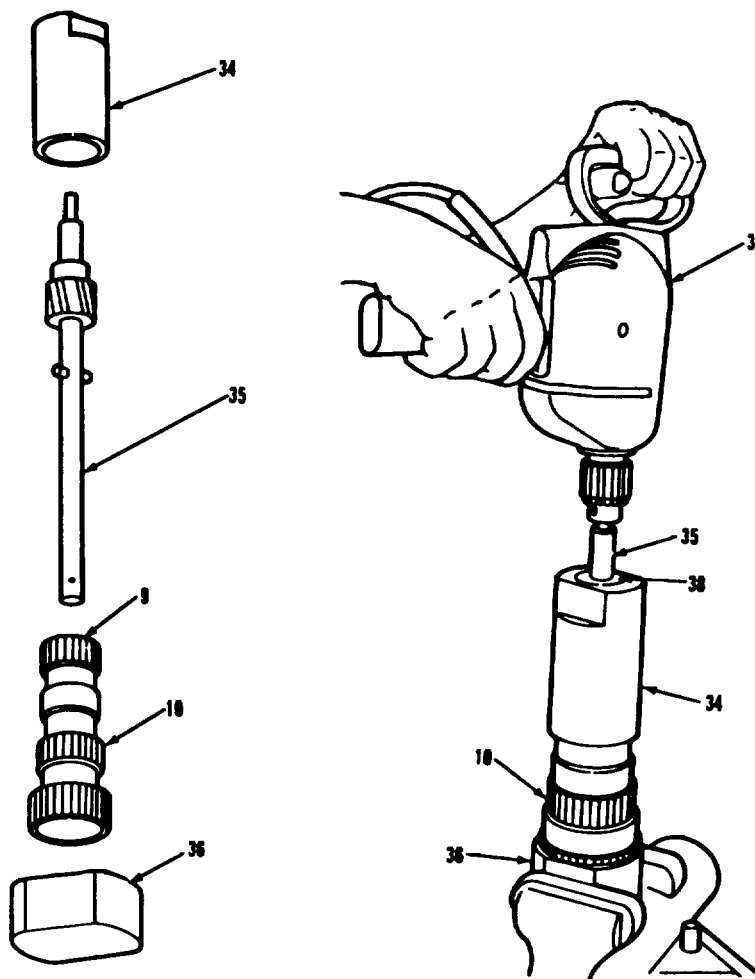
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
4. Sun gear and shaft assembly (10) (continued).	n. Clamp item (36) in a vise and place item (10) into item (36).	Use tool No. J-28489-3.
	o. Put items (35) and (34) in position inside item (10).	Use tool No. J-28489-2 and J-28489-1.
	p. Attach item (37) to item (35).	
CAUTION		
Keep reamer and shaft assembly at full drill speed when pulling it back through the sleeve bushing. If reamer is not rotating during retrieval it could damage the sleeve bushing.		
	q. Machine item (9) while adding cutting lubricant through item (38).	
	r. Remove items (35) and (34) from item (10).	
	s. Remove item (10) from item (36) and remove item (36) from vise.	
	t. Remove items (34) and (35) from item (37). Separate items (34) and (35).	
3-410		

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 9. SLEEVE BUSHING (2)
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 34. PILOT TOOL
- 35. REAMER AND SHAFT ASSEMBLY
- 36. HOLDING FIXTURE
- 37. 1/2-INCH ELECTRIC DRILL (75 TO 150 RPM)
- 38. CUTTING LUBRICANT HOLE

TA 238249

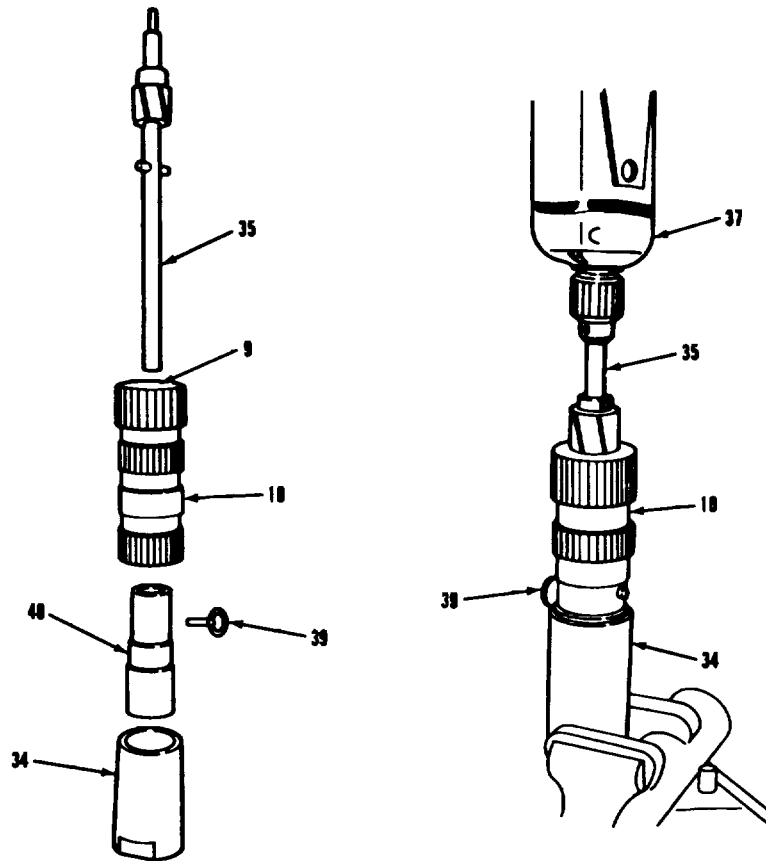
TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>C. ASSEMBLY (Continued).</u>		
4. Sun gear and shaft assembly (10) (continued).	u. Clamp item (34) in a vise.	Use tool No. J-28489-1.
	v. Insert item (40) into the newly machined bushing end of item (10) and fasten them together with item (39).	Use tool No. J-28489-4 and J-28489-6.
	w. Insert assembled items (10), (39), and (40) into item (34).	
	x. Attach item (37) to item (35).	
CAUTION		
Keep reamer and shaft assembly at full drill speed when pulling it back through the sleeve bushing. If reamer is not rotating during retrieval, it could damage the sleeve bushing.		
	y. Machine item (9) while adding cutting lubricant.	
	z. Check ID of two items (9) for runout.	Runout should not exceed .002 in. total indicator reading. Surface finish should be 30 microinch.
	aa. Thoroughly clean item (10) of chips and debris.	

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 9. SLEEVE BUSHING (2)
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 24. PILOT TOOL
- 35. REAMER AND SHAFT ASSEMBLY
- 37. 1/2-INCH ELECTRIC DRILL (75 TO 150 RPM)
- 39. LOCKING PIN
- 40. BUSHING PILOT TOOL

TA 238250

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. ASSEMBLY (Continued).

NOTE

If plug was removed from mainshaft, start here. If not, go to step 6.

5. Plug (19).

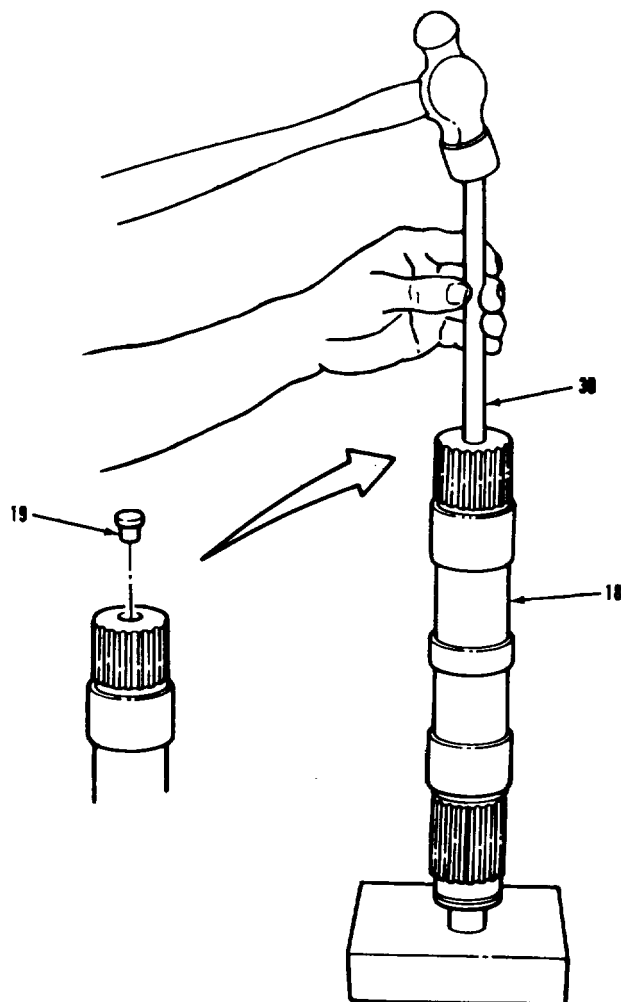
a. Position into end of item (18).

b. Press into place using item (30).

Use tool No. J-24369. Press past bottom of beveled edge.

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 18. SUN GEAR AND SHAFT ASSEMBLY
- 19. LUBE ORIFICE PLUG
- 30. PLUG INSTALLER

TA 238251

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY (Continued).**

6. Gear unit and
mainshaft assembly

a. Position item (12) with
long inside splines down.
(28).

b. Install item (21), pinions
down, into item (12).

c. Install item (27).

d. Coat item (15) with grease
and install it flat side
first onto item (14).

e. Coat items (16) and (17)
with grease and install
them onto item (15).

Install item (16)
first.

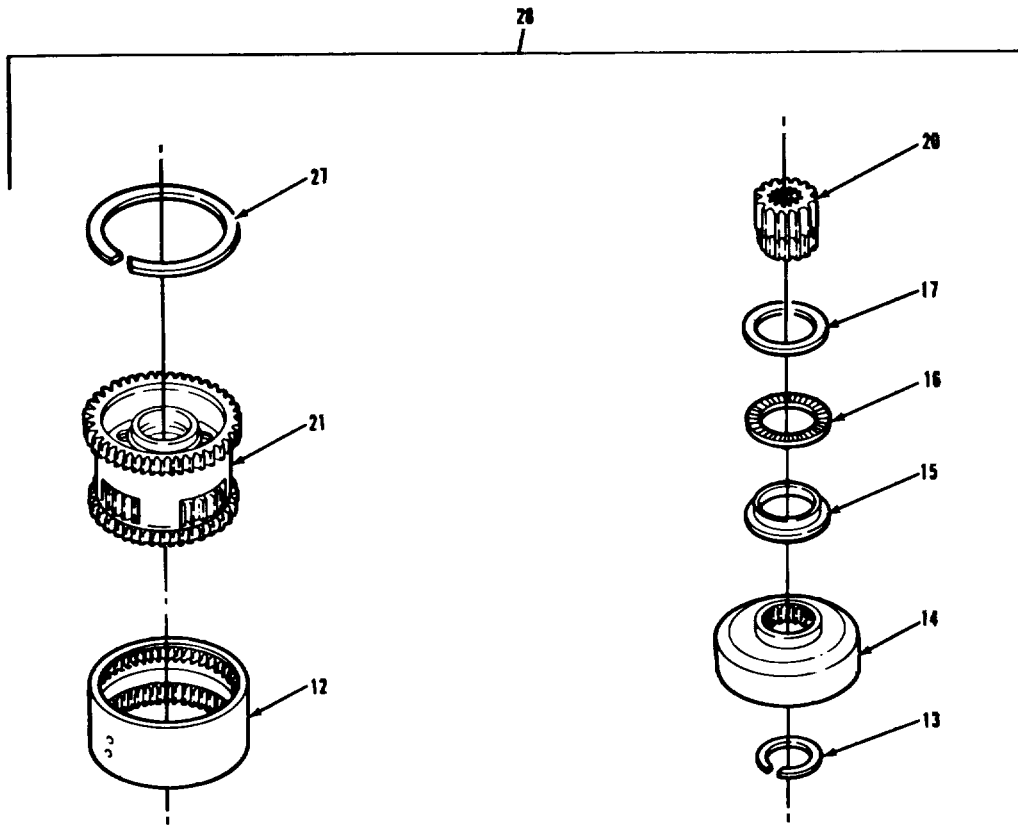
f. Install item (20) into
rear of item (14).

Item (20) has two sets
of splines.

g. Install item (13) onto
front of item (20).

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 12. PLANETARY CONNECTING DRUM
- 13. EXTERNAL SNAPRING
- 14. CENTER PLANETARY RING GEAR
- 15. BEARING THRUST RACE
- 16. BEARING ASSEMBLY
- 17. THRUST BEARING RACE
- 20. REAR PLANETARY SUN GEAR
- 21. REAR PLANETARY CARRIER ASSEMBLY
- 27. INTERNAL SNAPRING
- 28. GEAR UNIT AND MAINSHAFT ASSEMBLY

TA 238252

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).**LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY (Continued).**

6. Gear unit and mainshaft assembly (28) (continued).

h. Install item (14) with attached parts into item (12).

Put small end first.

i. Install item (18) through items (14) and (12).

Seat item (17) against item (21).

j. Coat item (22) with grease and install flat side first onto rear item (21).

k. Coat items (23) and (24) with grease and install onto item (22).

Install item (23) first.

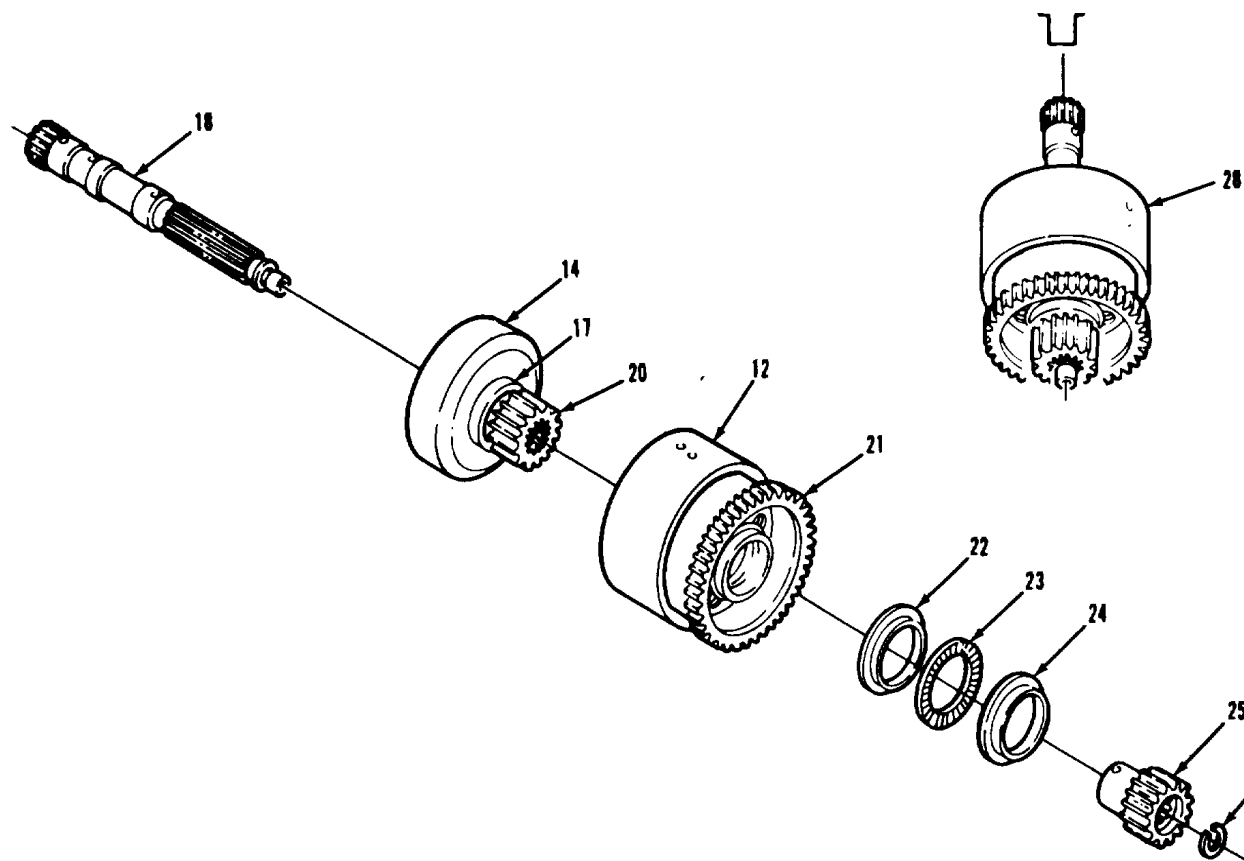
l. Install item (25), smooth end first, onto rear of item (18).

m. Install item (26) to retain item (25).

n. Position assembly (28) with front up and supported.

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



EGEND:

- 2. PLANETARY CONNECTING DRUM
- 4. CENTER PLANETARY RING GEAR
- 7. THRUST BEARING RACE
- 8. MAINSHAFT ASSEMBLY
- 0. REAR PLANETARY SUN GEAR
- 1. REAR PLANETARY CARRIER ASSEMBLY
- 2. BEARING THRUST RACE
- 3. BEARING ASSEMBLY

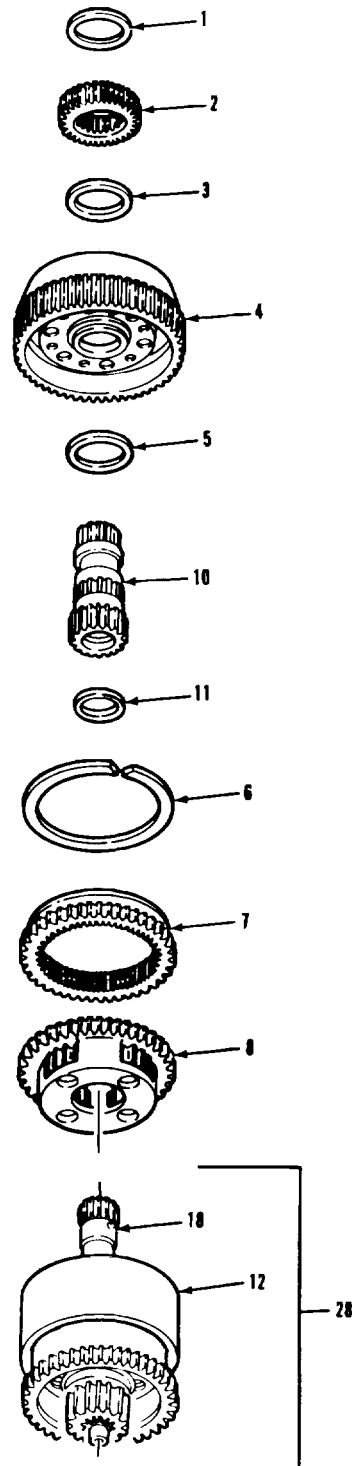
TRANSMISSION.**3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).****LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY (Continued).**

6 Gear unit and mainshaft assembly (28) (continued).	o. Install item (8) into item (12).	Large gear up.
	p. Install item (7) into item (12).	Outer splines first.
	q. Install item (6).	
	r. Install item (11) onto item (18).	
	s. Install item (10) onto item (18).	Gear end first.
	t. Coat item (5) with grease and install it on the rear of item (4).	Item (5) is plastic.
	u. Install item (4)	Seat on item (8).
	v. Install items (3), (2), and (1) into item (4).	
	w. Store assembly in a clean, dry place until ready to assemble transmission.	

NOTE**Follow-on maintenance action required:****Proceed with transmission maintenance.**

TRANSMISSION.

3-43. GEAR UNIT AND MAINSHAFT REPAIR (Continued).



LEGEND:

- 1. BRONZE THRUST WASHER
- 2. FRONT SUN GEAR
- 3. THRUST WASHER
- 4. FRONT PLANETARY CARRIER ASSEMBLY
- 5. THRUST WASHER
- 6. INTERNAL SNAPRING
- 7. FRONT PLANETARY RING GEAR
- 8. CENTER PLANETARY CARRIER ASSEMBLY
- 10. SUN GEAR AND SHAFT ASSEMBLY
- 11. THRUST WASHER
- 12. PLANETARY CONNECTING DRUM
- 18. MAINSHAFT ASSEMBLY
- 28. GEAR UNIT AND MAINSHAFT ASSEMBLY

TA 23825

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Assembly.

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

**EQUIPMENT CONDITION
PARAGRAPH**

3-34.

CONDITION DESCRIPTION

Subassembly removed from transmission.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Lockring installer
(33287) J-24453.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul
(73342) 6885217.
Oil, lubricating: OE/HDO-10
Item 16, Appendix B.

PERSONNEL REQUIRED

Two (MOS-63W5).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

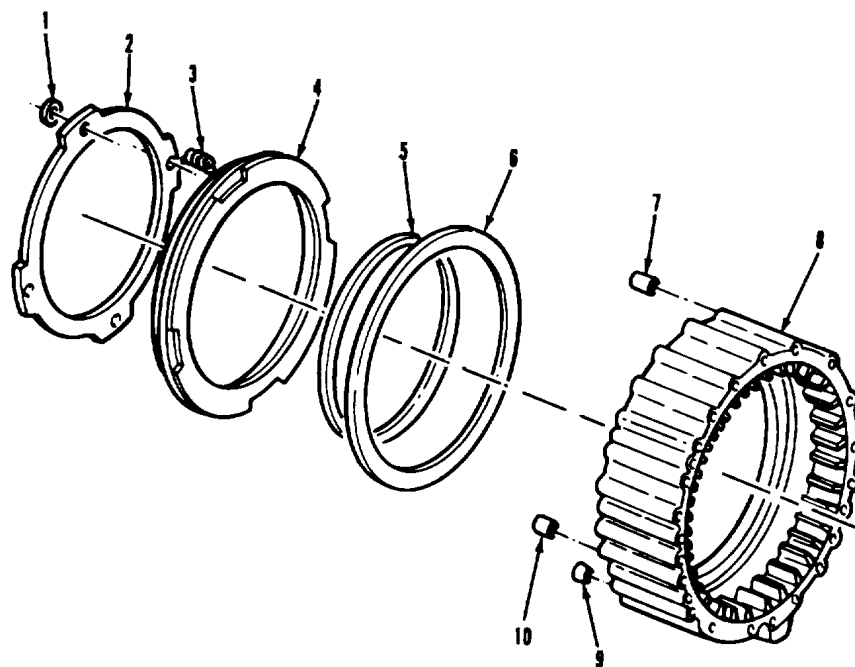
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



LEGEND:

- 1. SELF-LOCKING RETAINING RING
- 2. SPRING RETAINER RING
- 3. PISTON RETURN SPRING (28)
- 4. FIRST CLUTCH PISTON
- 5. INTERNAL SEAL RING
- 6. EXTERNAL SEAL RING
- 7. COUPLING RING
- 8. ADAPTER HOUSING
- 9. O-RING
- 10. O-RING

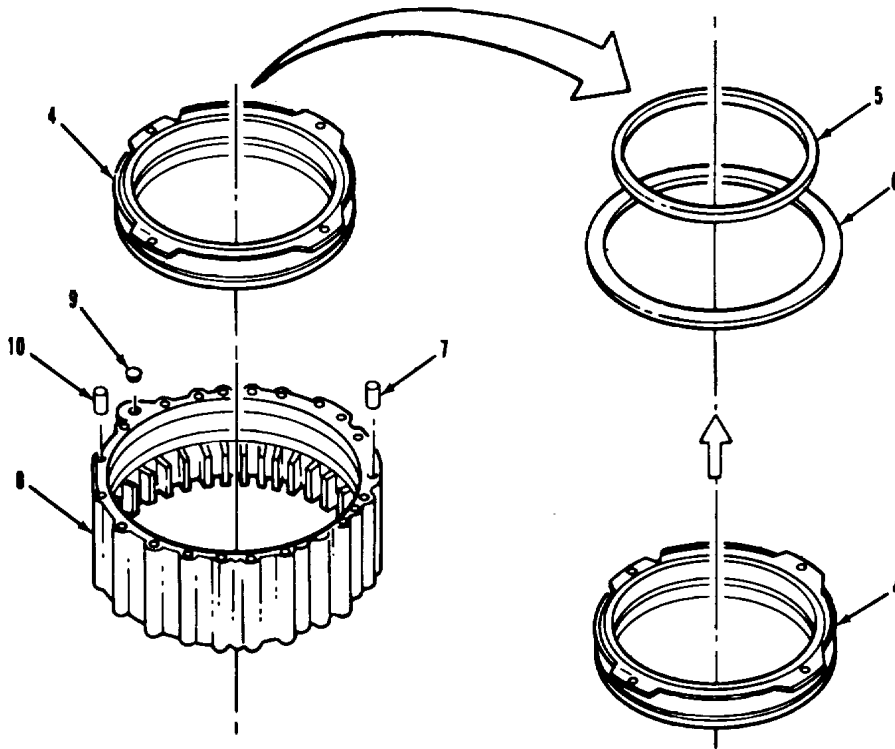
TRANSMISSION.

3-44. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
<p><u>CAUTION</u> During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.</p>		
1 Housing (8)	<p>a. Place item (8) with item (4) facing up.</p> <p>b. Remove item (4) from item (8) as an assembly.</p> <p>c. Remove item (5) and item (6) from item (4).</p> <p>d. Remove two items (7) and item (10) from item (8).</p> <p>e. Remove item (9) from item (8).</p>	<p>If damaged.</p> <p>If damaged.</p>

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



LEGEND:

- 4. FIRST CLUTCH PISTON
- 5. INTERNAL SEAL RING
- 6. EXTERNAL SEAL RING

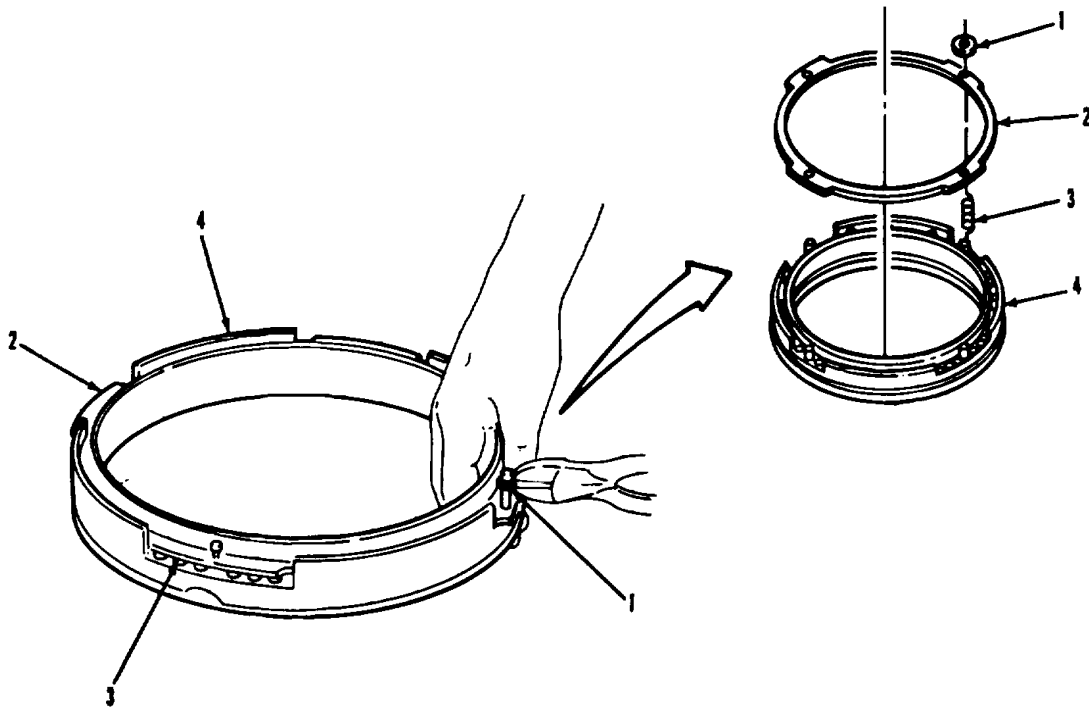
TRANSMISSION.

3-44. GEAR UNIT AND MAINSHAFT REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
<p>NOTE If pistons do not have to be repaired, go to step 2.</p>		
1 Housing (8) (continued)	f. Cut four items (1) while depressing item (2).	
	g. Remove item (2) and twenty-eight items (3) from item (4).	Do not lose springs.
<u>B. CLEANING.</u>		
2 All parts	Clean	Refer to paragraph 3-4.
<u>C. INSPECTION.</u>		
3 All parts	a. Inspect mounting faces for nicks, burrs, and scratches.	Refer to paragraph 3-5.
	b. Replace any parts failing inspection.	

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



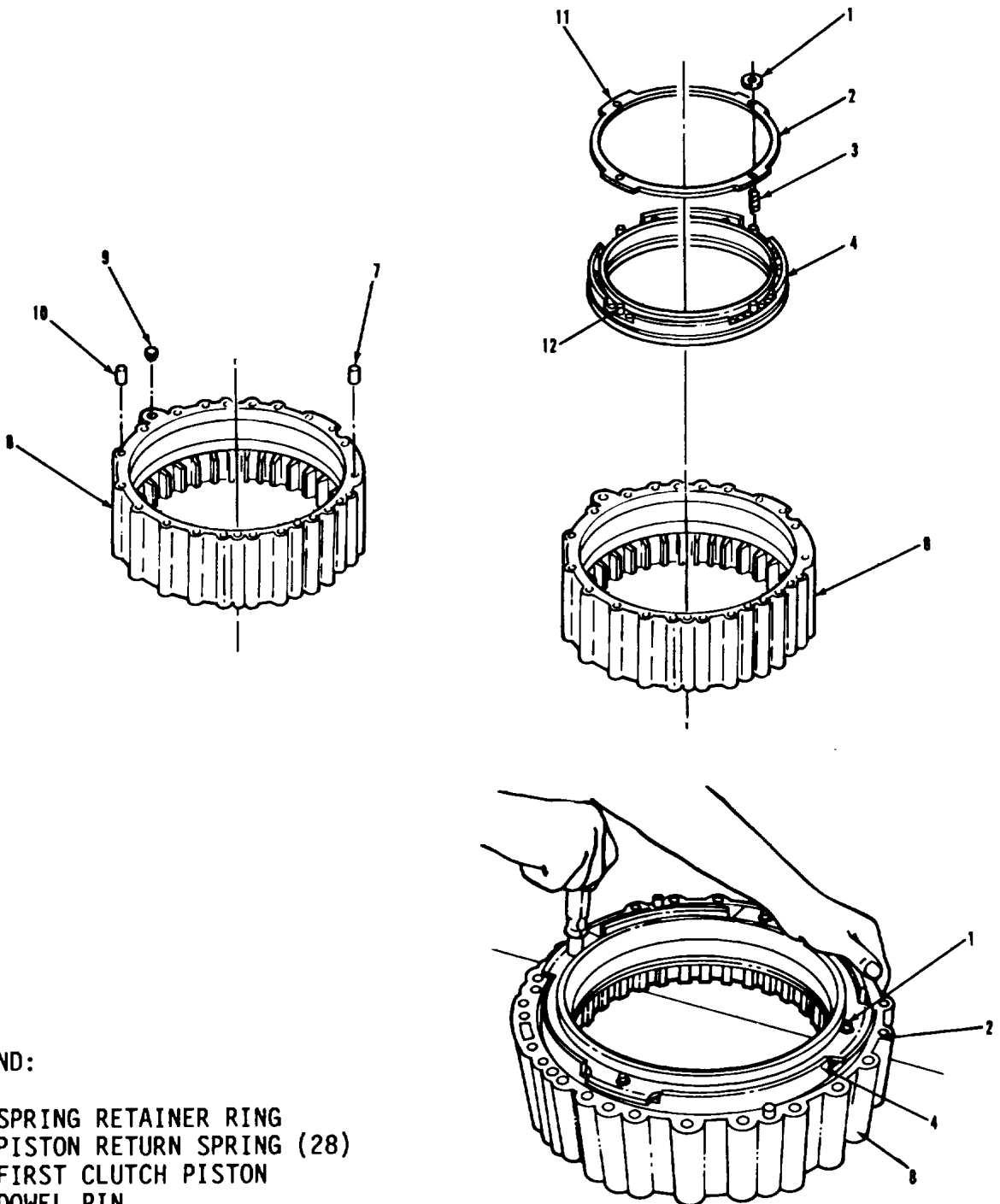
TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY.</u>		
<p>NOTE If dowel pins and orifice plug were not removed, go to step 4.</p>		
4. Housing (8).	a. Install items (7) and (10) into item (8).	Items (7) and (10) must project 0.360 to 0.400 from face of item (8).
	b. Install item (9).	Item (9) must be flush with or 0.060 inch below face of item (8).
<p>NOTE If piston was not disassembled, go to step 4i.</p>		
	c. Place item (4) into item (8) with spring pockets facing up.	Be sure piston is fully seated in bottom of housing cavity.
	d. Install twenty-eight items (3) into pockets of item (4).	
	e. Install item (2) onto item (4) so that tangs of item (2) are facing upward.	
	f. Line up holes in item (2) with studs on item (4).	

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



LEGEND:

- 2. SPRING RETAINER RING
- 3. PISTON RETURN SPRING (28)
- 4. FIRST CLUTCH PISTON
- 7. DOWEL PIN
- 8. ADAPTER HOUSING
- 9. ORIFICE PLUG

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).

LOCATION/ITEM

ACTION

REMARKS

D. ASSEMBLY (Continued).

4. Housing (8) (continued)

g. Using tool, install four items (1).

With tool number J-24453, press each ring into place until adjacent retaining tang is fully seated in housing bore.

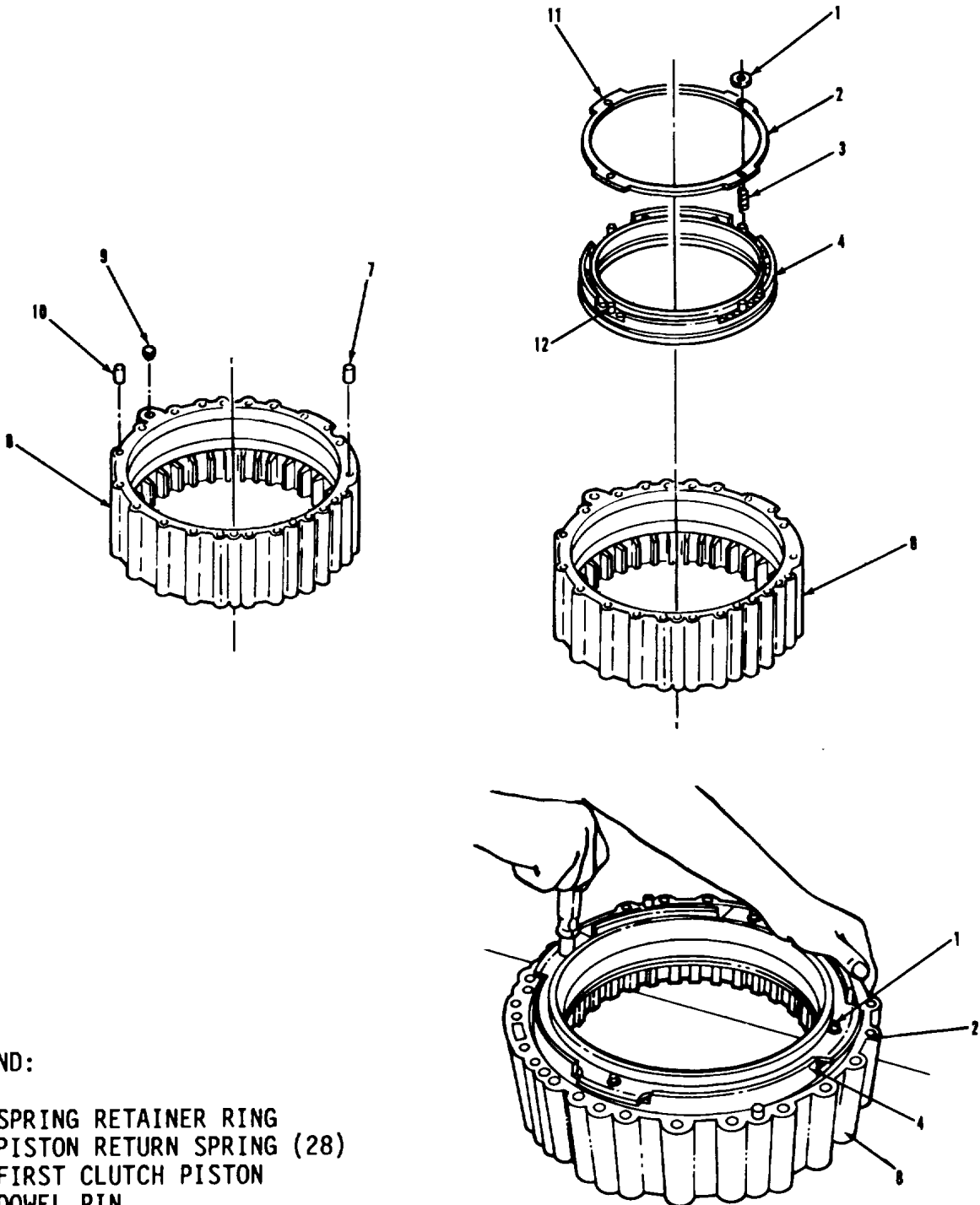
CAUTION

Failure to install the retainer rings properly can result in transmission damage.

h. Remove item (4) from item (8).

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



LEGEND:

- 2. SPRING RETAINER RING
- 3. PISTON RETURN SPRING (28)
- 4. FIRST CLUTCH PISTON
- 7. DOWEL PIN
- 8. ADAPTER HOUSING
- 9. ORIFICE PLUG

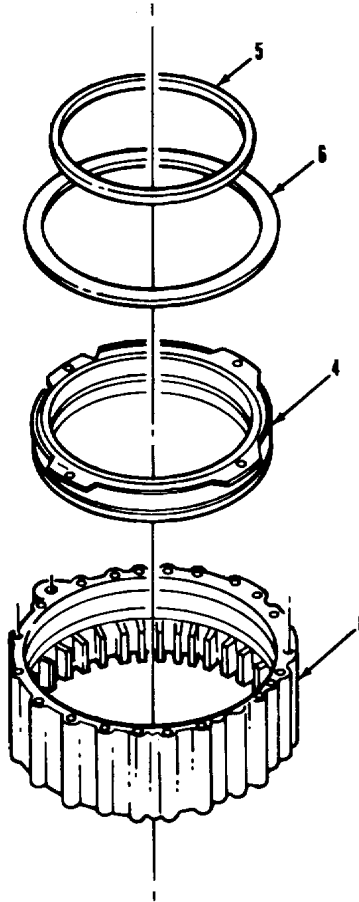
TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
4 Housing (8) (continued)	i. Lubricate item (5) and item (6)	Use OE/HDO-1O lubricating oil.
	j. Install item (5) into groove inside item (4)	Lip of seal must face away from spring side of piston.
	k. Install item (6) into outside groove of item (4).	Lip of seal must face away from spring side of piston.
	l. Place item (8) with piston cavity facing upward.	
	m. Apply a generous amount of OE/HDO-1O lubricating oil into piston cavity of item (8).	
	n. Install item (4) into cavity of item (8)	Retaining ring of piston must face away from adapter housing.
<p style="text-align: center;">NOTE</p> <p>Use care to prevent lips of seals folding back during assembly. If installation is difficult, remove piston and check seal and cavity bore before attempting assembly again.</p>		
	o. Store assembly in a clean dry place.	
<p style="text-align: center;">NOTE</p> <p>Follow-on maintenance action required:</p> <p>Proceed with transmission maintenance.</p>		

TRANSMISSION.

3-44. ADAPTER HOUSING REPAIR (Continued).



LEGEND:

4. FIRST CLUTCH PISTON

TRANSMISSION.

3-45. REAR COVER REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Assembly.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	3-33.	Subassembly removed from transmission.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Seal and dust shield remover (33287) J-24171.	Orifice plug installer (33287) J-24369.
Output shaft seal installer (33287) J-24202-4 and J-24202-1A.	Governor support pin installer (33287) J-28684.
Output shaft bushing installer (33287) J-24203.	Slide hammer (33287) J-6125-1.
Speedometer bushing remover and installer (33287) J-24204.	Clutch piston seal protector (33287) J-24210.

MATERIALS/PARTS (P/N)

Oil, lubricating: OE/HDO-10
Item 16, Appendix B.
Sealer, nonhardening
Item 28, Appendix B.
Grease, high temperature
Item 8, Appendix B.
Kit, transmission overhaul
(73346) 6885217.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

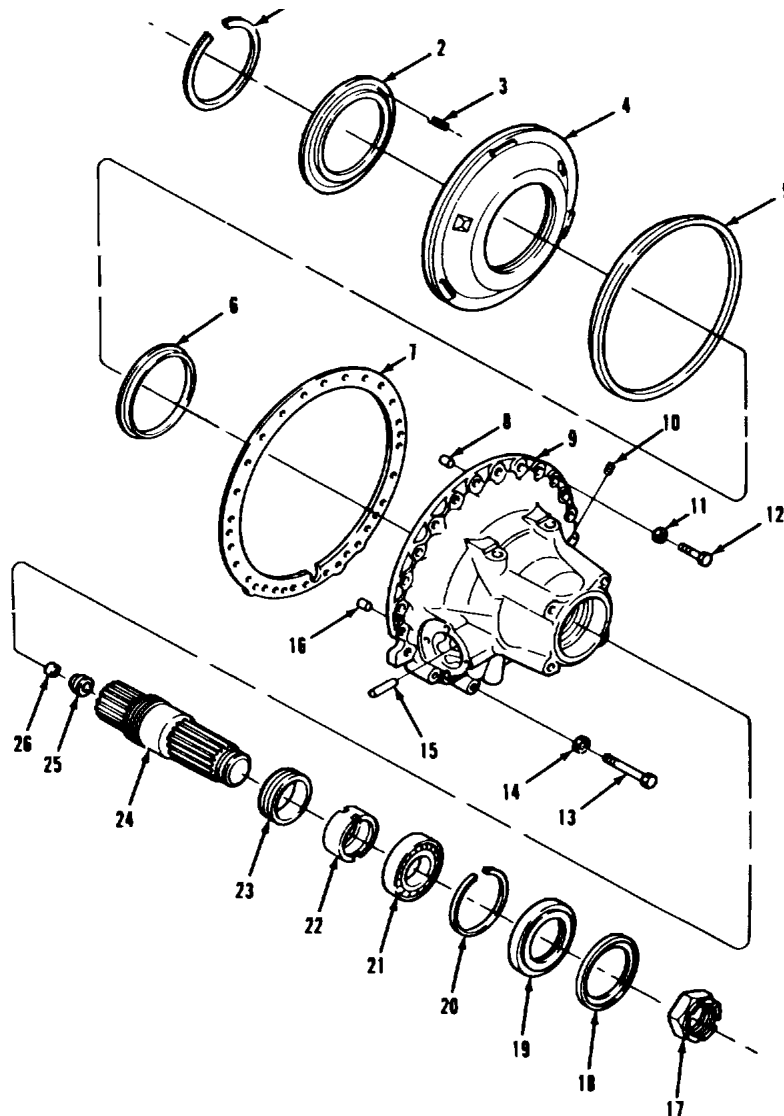
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- | | |
|-------------------------------|----------------------------|
| 1. SNAPRING (INTERNAL) | 14. LOCKWASHER (3) |
| 2. SPRING RETAINER | 15. GOVERNOR SUPPORT PIN |
| 3. RELEASE SPRING (30) | 16. DOWEL PIN |
| 4. PISTON (FIRST AND REVERSE) | 17. SELF-LOCKING NUT |
| 5. SEAL RING | 18. DUST SHIELD |
| 6. SEAL RING (INTERNAL) | 19. OIL SEAL |
| 7. GASKET | 20. SNAPRING |
| 8. DOWEL PIN | 21. BALL BEARING |
| 9. REAR COVER | 22. SPACER |
| 10. GEAR BUSHING | 23. SPEEDOMETER DRIVE GEAR |
| 11. LOCKWASHER (21) | 24. OUTPUT SHAFT |
| 12. HEX HEAD SCREW (21) | 25. BUSHING |
| 13. HEX HEAD SCREW (3) | 26. ORIFICE PLUG |

TA

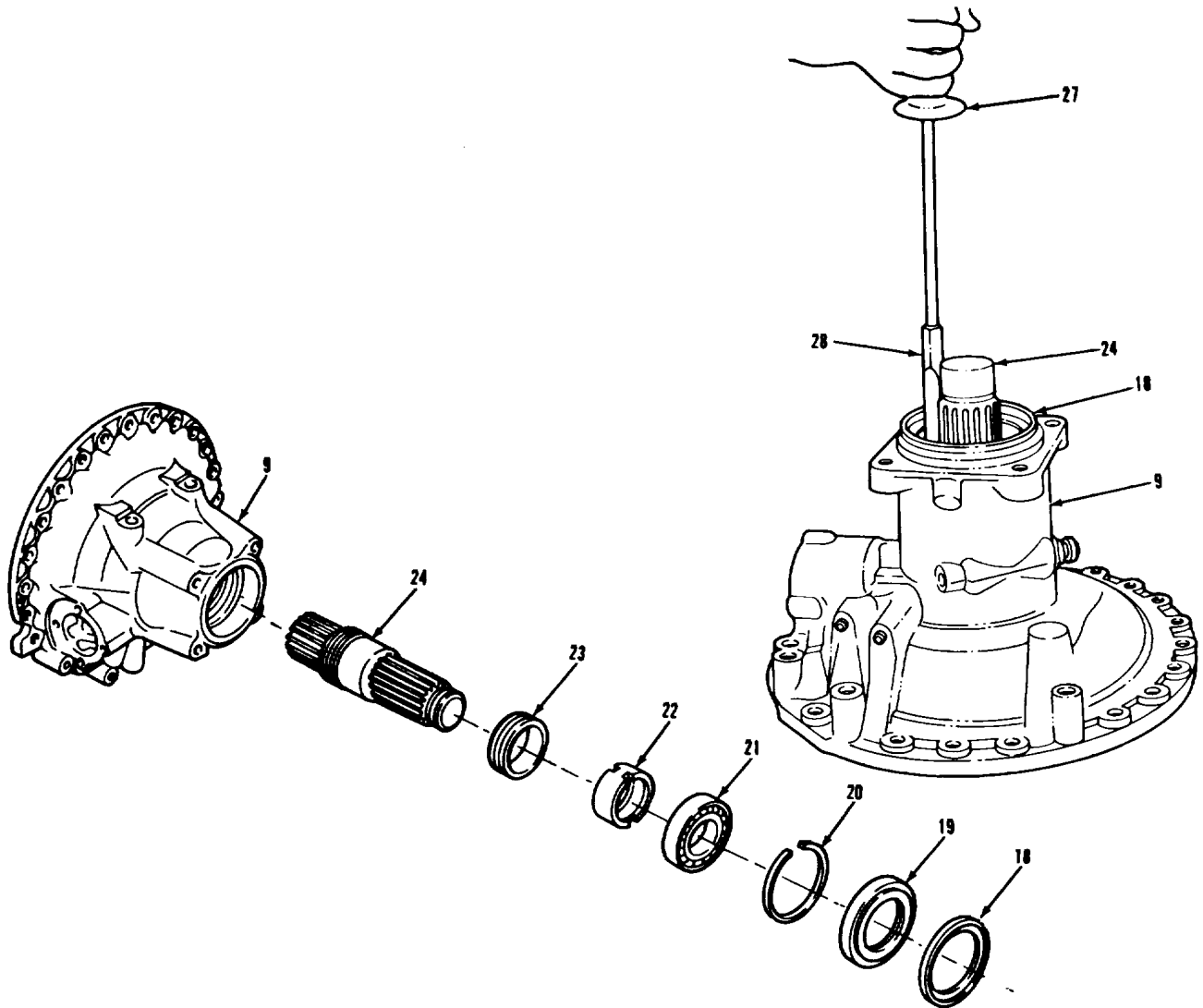
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY.</u>		
1. Cover (9).		
<u>CAUTION</u>		
During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
a. Remove item (18) and item (19) from item (9)	Use tool numbers J-24171-1, J-24171-2 and J-24171-3.	
b. Remove item (20) from item (9)		
c. Remove item (24) from item (9).		
d. From item (24), press off item (21), item (22) and item (23), using suitable press.		

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 9. REAR COVER
- 18. DUST SHIELD
- 19. OIL SEAL
- 20. SNAPRING
- 21. BALL BEARING
- 22. SPACER
- 23. SPEEDOMETER DRIVE GEAR
- 24. OUTPUT SHAFT
- 27. SLIDE HAMMER
- 28. DUST SHIELD & COUPLER REMOVER

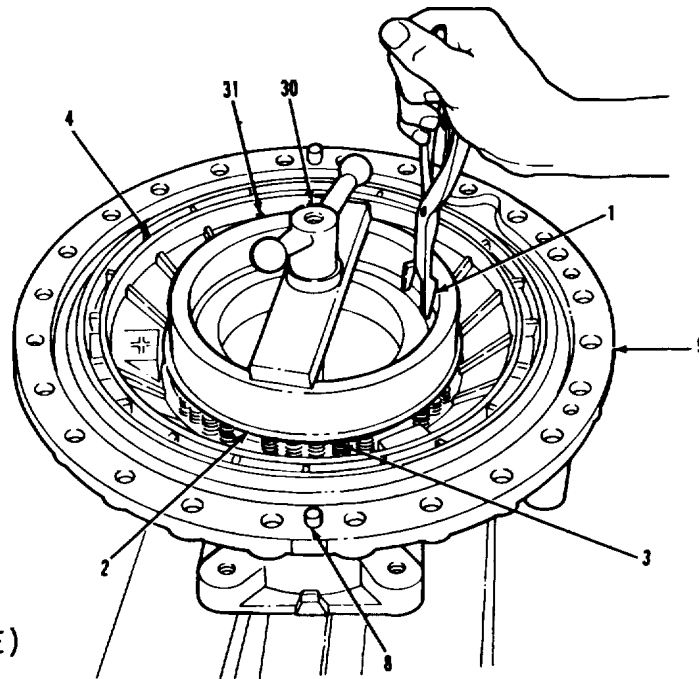
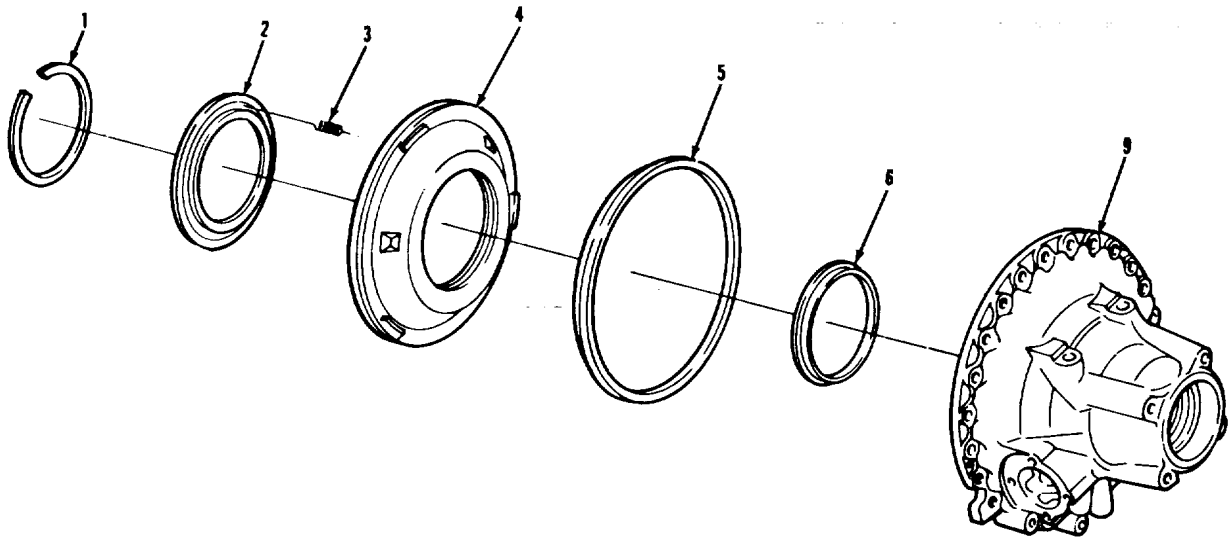
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
1 Cover (9) (continued)	<p>e. Using items (30) and (31), compress item (2) and item (3) enough to clear item (1).</p> <p>f. Remove items (30) and (31) from item (9).</p> <p>g. Remove item (1), item (2), and thirty items (3) from item (9).</p> <p>h. Remove item (4) from item (9).</p> <p>i. Remove items (5) and (6) from item (4).</p>	Use tool numbers J-24204-1 and J-24204-2.

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 1. SNAPRING (INTERNAL)
- 2. SPRING RETAINER
- 3. RELEASE SPRING (30)
- 4. PISTON (FIRST AND REVERSE)
- 5. SEAL RING
- 6. SEAL RING (INTERNAL)
- 8. DOWEL PIN (7/16 X 3/4)
- 9. REAR COVER
- 30. BAR AND STUD ASSEMBLY
- 31. SPRING COMPRESSOR

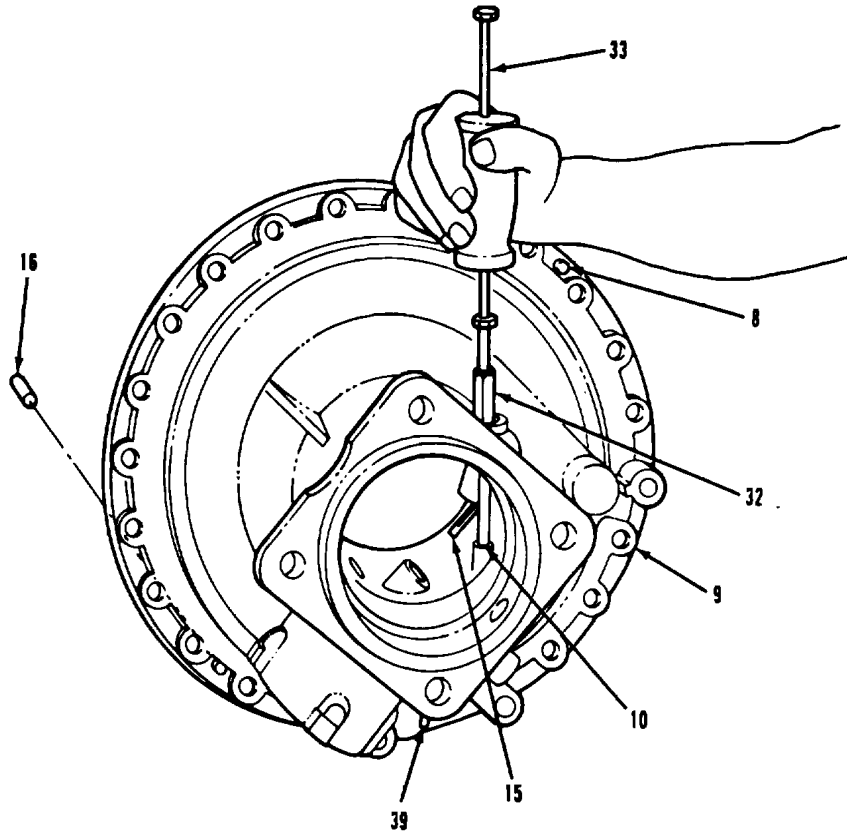
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. DISASSEMBLY (Continued).</u>		
1 Cover (9) (continued)	j. Remove access item (39) and item (10), only if damaged.	
	k. Thread item (32) into item (10) Attach item (33) to item (32) and remove item (10) from item (9).	Use tool numbers J-24205-2 and J-6125-1.
	l. Remove items (8), (15), and (16) only if damaged.	
<u>B. CLEANING.</u>		
2 All parts	Wash in mineral spirits	See paragraph 3-4 for detailed instructions.

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

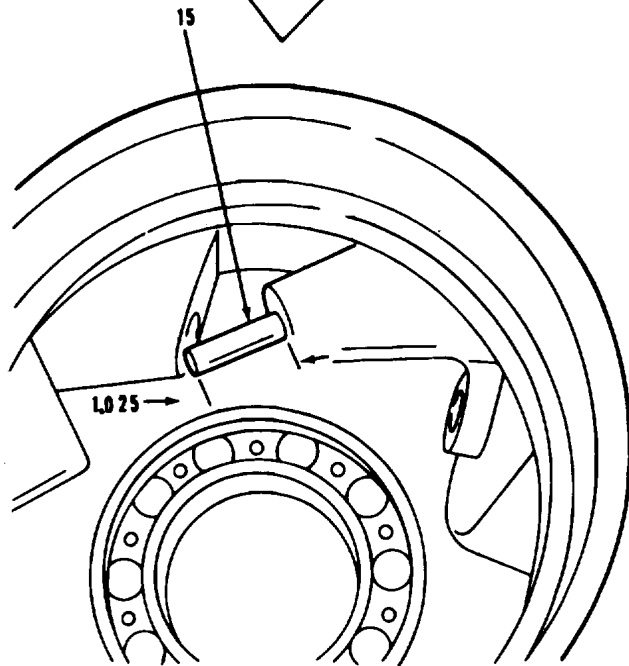
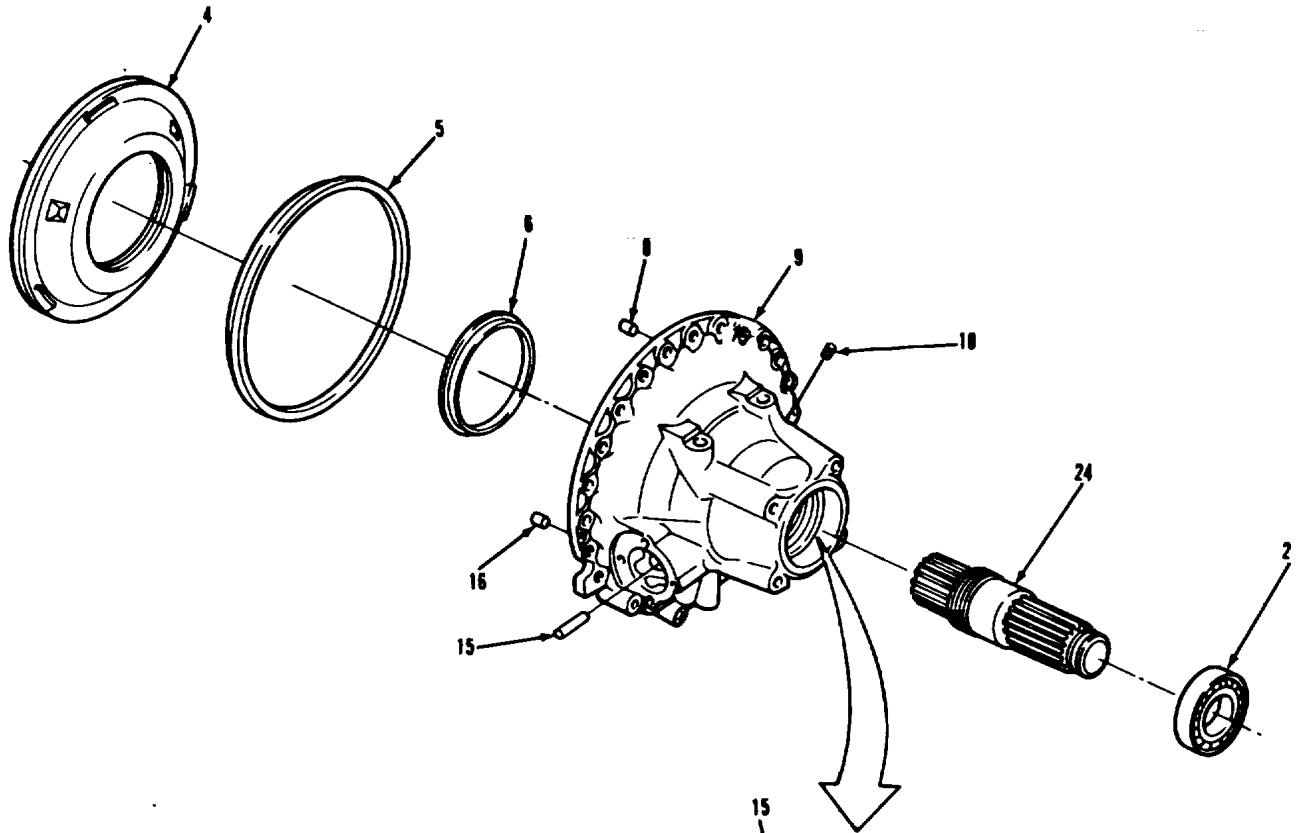
- 8. DOWEL PIN
- 9. REAR COVER
- 10. GEAR BUSHING
- 15. GOVERNOR SUPPORT PIN

TRANSMISSION.**3-45. REAR COVER REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
<u>C. INSPECTION.</u>		
3. Cover (9)	Inspect for wear, cracks, nicks, dents on mounting faces.	See paragraph 3-5 for detailed instructions.
4. Shaft (24)	Inspect for stripped, twisted or chipped splines	See paragraph 3-5 for detailed instructions.
5. Piston (4)	Inspect for wear	See paragraph 3-25 for detailed instructions.
6. Bearing (21)	Inspect for roughness of rotation	See paragraph 3-5 for detailed instructions.
7. All other parts	Inspect for wear or damage	See paragraph 3-25 for detailed instructions.
D. ASSEMBLY		
8. Cover (9)	a. Replace items (8) and (16) in mounting face of item (9) if removed	Items (8) and (16) project 0.360 to 0.400 inch above mounting face of item (9).
	b. Install item (15) if removed. Use installing tool to accurately locate in governor bore.	Use tool number J-28684.
	c. If tool is not available, install item (15) to dimension shown in diagram.	Pin protrudes 1.025 inches inside of rear cover (9).
	d. Install item (10)	Use tool number J-24205-1.
	e. Coat items (5) and (6) with OE/HDO-10 lubricating oil and install in grooves of item (4).	Lips of items (5) and (6) must face piston cavity in rear cover.

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 4. PISTON
- 5. SEAL RING
- 6. SEAL RING (INTERNAL)
- 8. DOWEL PIN
- 9. REAR COVER
- 10. GEAR BUSHING
- 15. GOVERNOR SUPPORT PIN
- 16. DOWEL PIN
- 21. RAIL BEARING

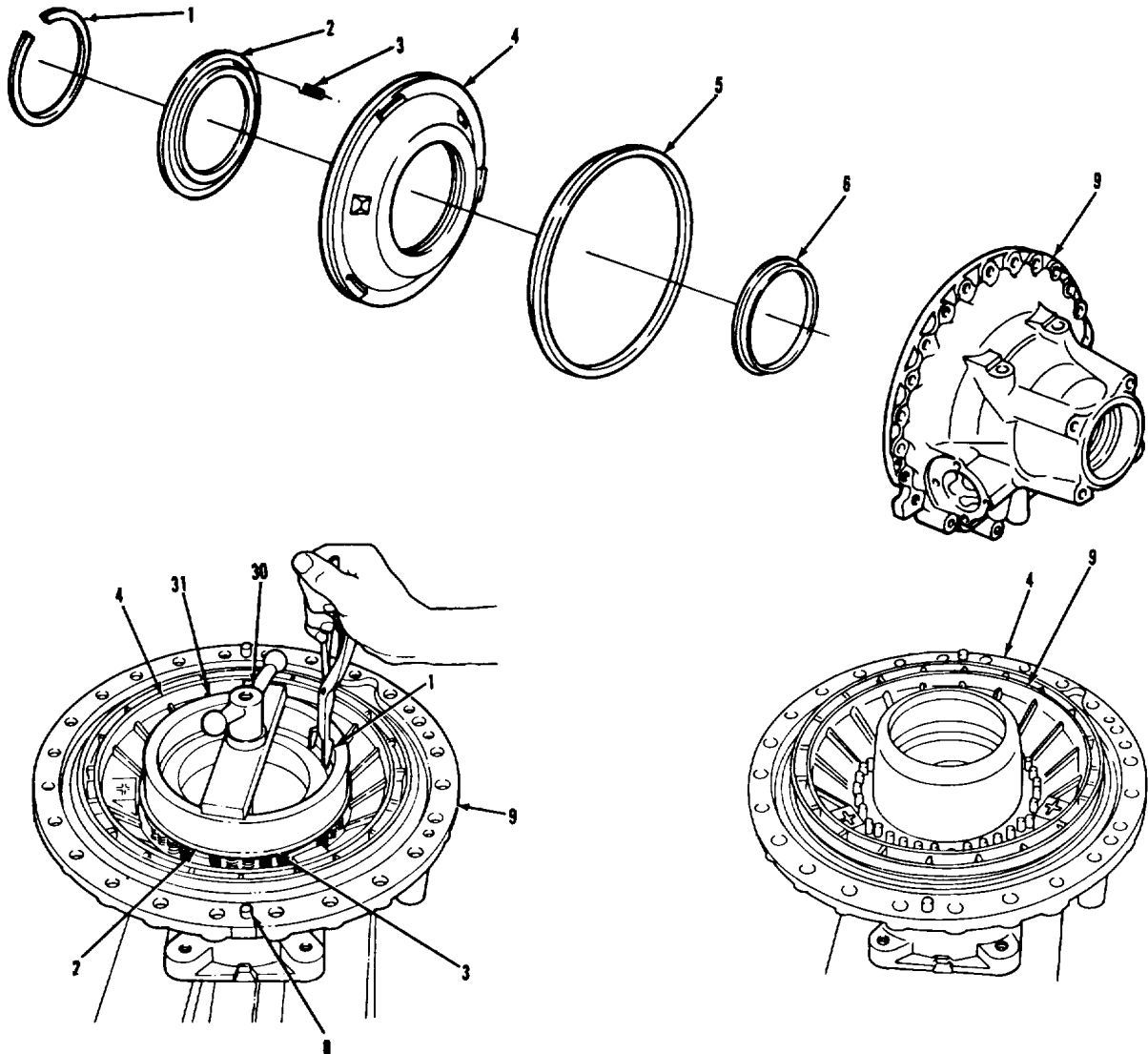
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
8. Cover (9) (continued).		
NOTE		
Use care to prevent lips of seals folding back during assembly. If installation is difficult, remove piston and check seals and cover bore before attempting assembly again.		
f. Install item (4) into item (9) with spring mounts up.	Use tool No. J-24210 to center and guide item (4) into item (9).	
g. Remove tool, and install thirty items (3) onto item (4).		
h. Install item (2), cupped side toward item (3).		
NOTE		
Place snapping in before compressor tool.		
i Use items (30) and (31) to compress item (2) and install item (1).	Use tool numbers J-24204-2 and J-24204-1.	
j. Remove items (30) and (31).		

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 1. SNAPRING (INTERNAL)
- 2. SPRING RETAINER
- 3. RELEASE SPRING (30)
- 4. PISTON (FIRST AND REVERSE)
- 5. SEAL RING
- 6. SEAL RING (INTERNAL)
- 8. DOWEL PIN
- 9. REAR COVER
- 30. RAB AND STDN ASSEMBLY

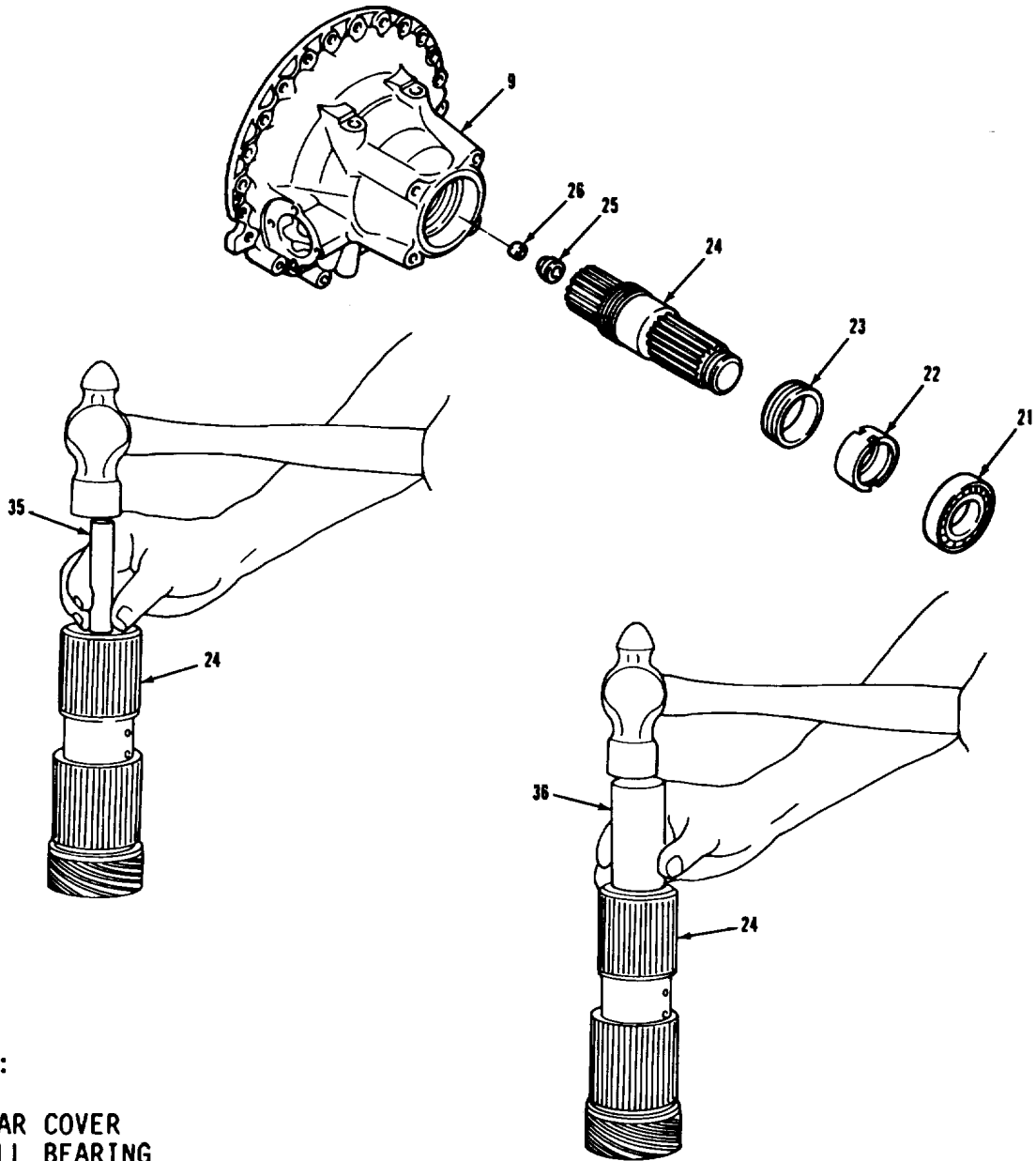
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
8 Cover (9) (continued)	k. If removed, install item (26) into item (24), using item (35).	Use tool number J-24369.
	l. If removed, install item (25) into item (24) using item (36)	Use tool number J-24203. Locate item (25) 0.145 to 0.165 inch from front of shaft item (24).
	m Using suitable press, press items (23), (22), and (21) onto item (24).	

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 9. REAR COVER
- 21. BALL BEARING
- 22. SPACER
- 23. SPEEDOMETER DRIVE GEAR
- 24. OUTPUT SHAFT
- 25. BUSHING
- 26. ORIFICE PLUG
- 35. ORIFICE PLUG INSTALLER
- 36. BUSHING INSTALLER

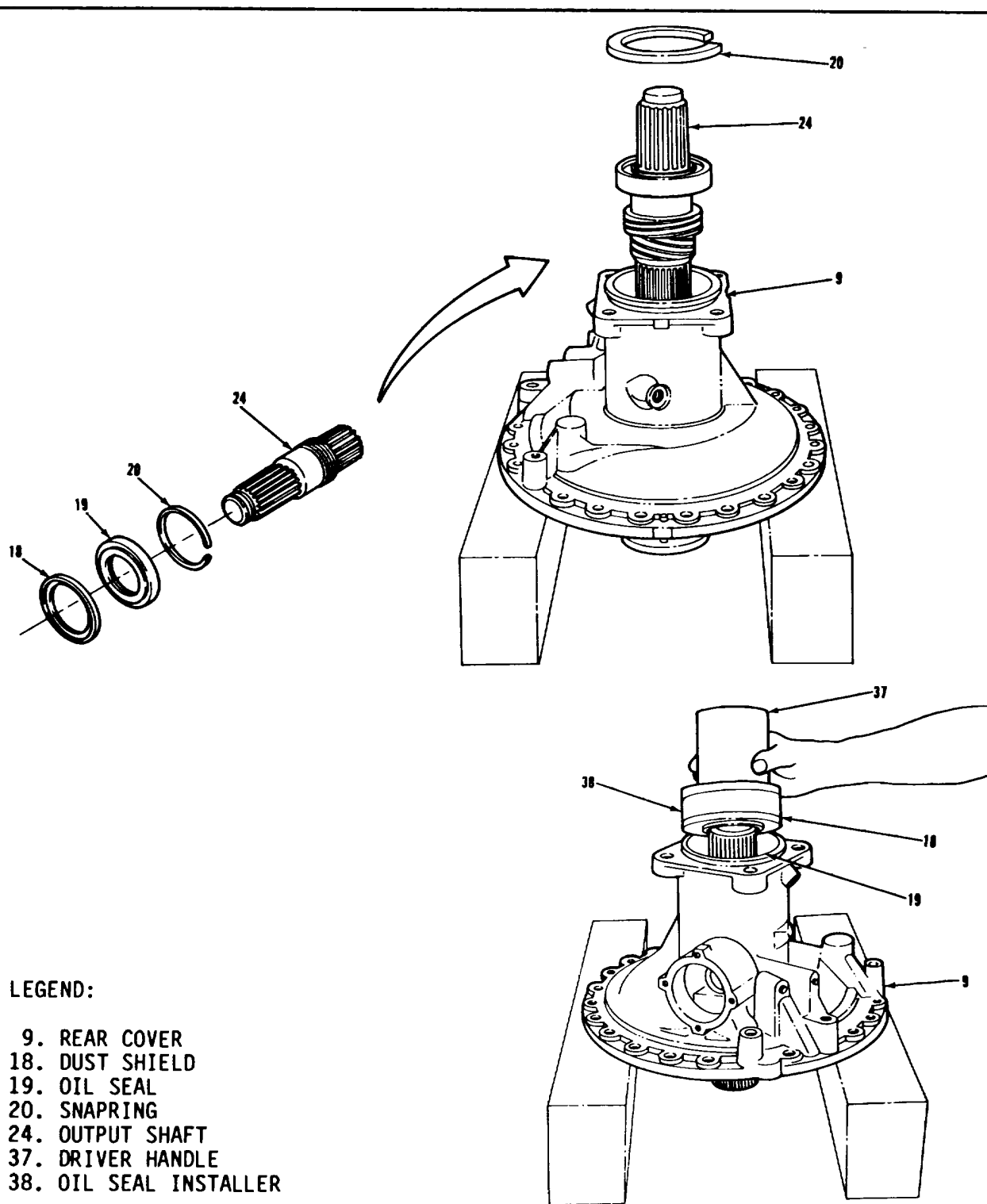
TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>D. ASSEMBLY (Continued).</u>		
8 Cover (9) (continued)	n. Install item (24) into item (9).	Threaded end up.
	o. Install item (20) making sure it is fully expanded into groove of item (9).	
	p. Install item (19), lip side first, using items (37) and (38)	Coat inside of item (19) with high temperature grease Use special tools numbers J-24202-4 and J-24202-1A.
	q. Install item (18)	Coat outside edge of item (18) with non-hardening sealer before installation. Seat flush with housing.
	r. Store assembly in a clean dry place until final transmission assembly.	
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

TRANSMISSION.

3-45. REAR COVER REPAIR (Continued).



LEGEND:

- 9. REAR COVER
- 18. DUST SHIELD
- 19. OIL SEAL
- 20. SNAPRING
- 24. OUTPUT SHAFT
- 37. DRIVER HANDLE
- 38. OIL SEAL INSTALLER

TA 238268

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR.

THIS TASK COVERS

- a. Disassembly.
- b. Cleaning and Inspection.
- c. Assembly.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

3-26 thru 3-35.

CONDITION DESCRIPTION

All subassemblies removed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Shift lever seal installer
(33287) J-26282.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul
(713342) 6885217.
Sealer, nonhardening
Item 28, Appendix B.
Oil, lubricating: OE/HDO-10
Item 16, Appendix B.

PERSONNEL REQUIRED

Two (MOS-63WJ).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

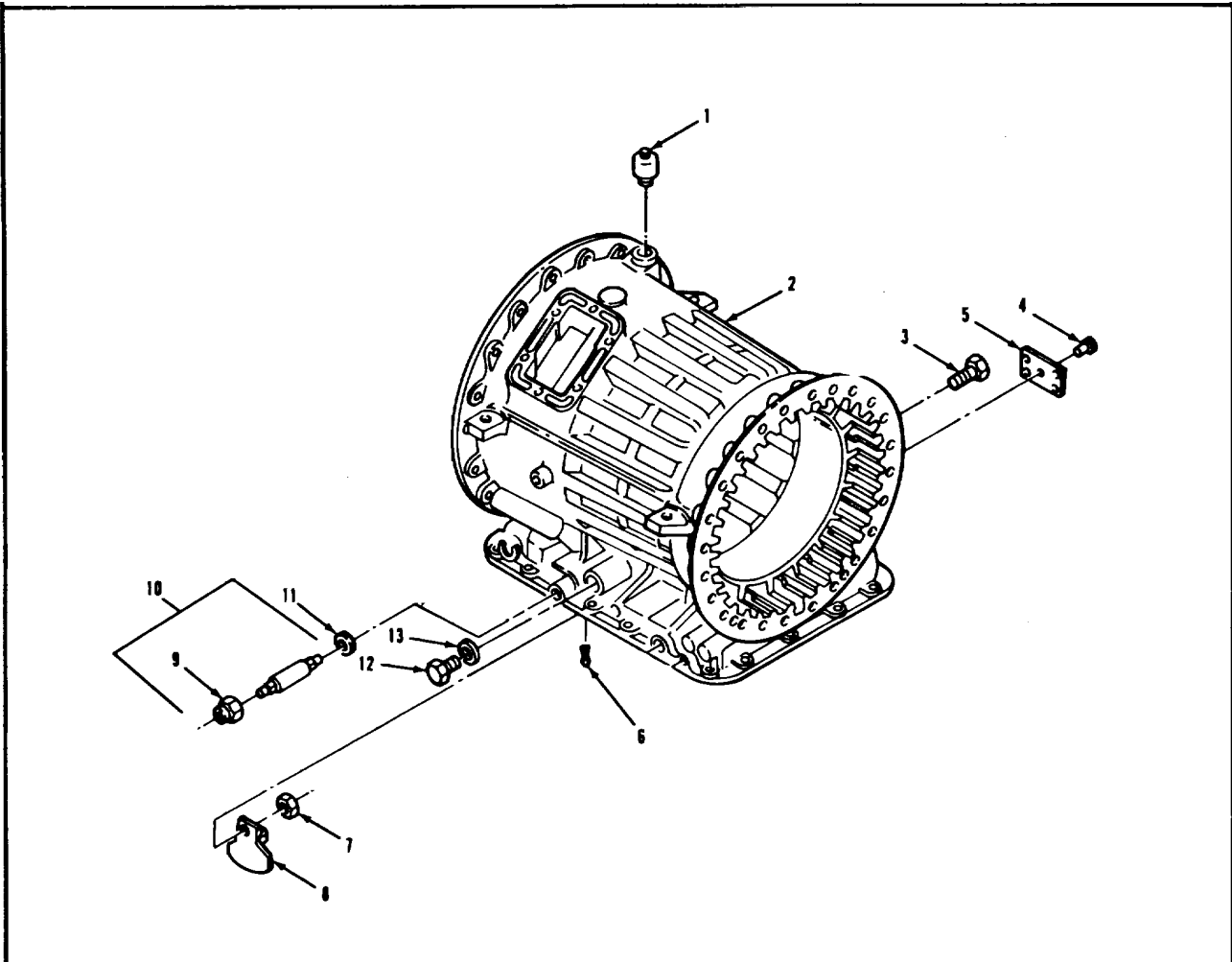
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).



LEGEND:

- 1. TRANSMISSION BREATHER
- 2. TRANSMISSION HOUSING
- 3. PIPE PLUG
- 4. DRIVE SCREW
- 5. NAMEPLATE
- 6. SELECTOR SHAFT PIN
- 7. LOCKNUT
- 8. INSIDE DETENT LEVER ASSEMBLY
- 9. SELECTOR SHAFT NUT
- 10. SELECTOR SHAFT AND NUT
- 11. SHAFT SEAL ASSEMBLY
- 12. PLUG
- 13. WASHER

TA 238269

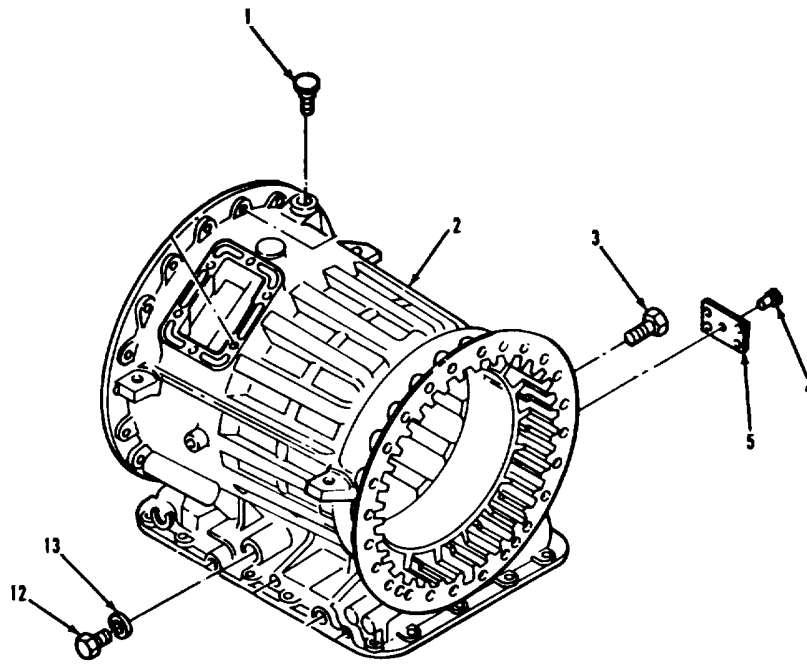
TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. DISASSEMBLY.		
CAUTION		
During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
1. Housing (2).	<ul style="list-style-type: none"> a. Inspect item (1) for damage and replace if necessary. b. Inspect item (12), item (13), and item (3) for damage and replace if necessary. c. Inspect item (5) and replace if damaged using item (4). 	
NOTE		
If nameplate is replaced, it is important that the identical information be stamped on new nameplate. All replacement parts ordered refer to the information on this nameplate.		

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).



LEGEND:

- 1. TRANSMISSION BREATHER
- 2. TRANSMISSION HOUSING
- 3. PIPE PLUG
- 4. DRIVE SCREW
- 5. NAMEPLATE
- 12. PLUG
- 13. WASHER

TA 238270

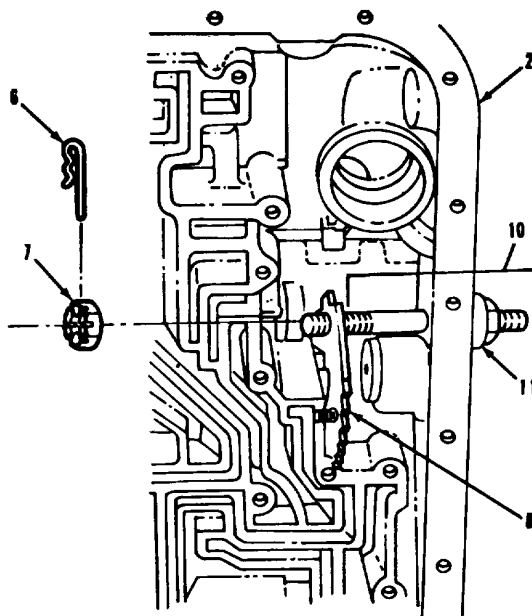
TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. DISASSEMBLY (Continued).		
1. Housing (2) (continued).	d. Remove item (6) from item (10).	
	e. Remove item (7) from item (10).	
CAUTION		
If the shaft is burred or rough, smooth it with crocus cloth or a honing stone before removal from housing to avoid scratching the housing bore.		
	f. Hold item (8) in one hand and remove item (10) by carefully pulling through housing.	Lightly tap item (8) if necessary.
	g. Remove item (8) from item (2).	
	h. Remove item (11) from item (2).	

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).



LEGEND:

- 2. TRANSMISSION HOUSING
- 6. SELECTOR SHAFT PIN
- 7. LOCKNUT
- 8. INSIDE DETENT LEVER ASSEMBLY
- 10. SELECTOR SHAFT AND NUT
- 11. SHAFT SEAL ASSEMBLY

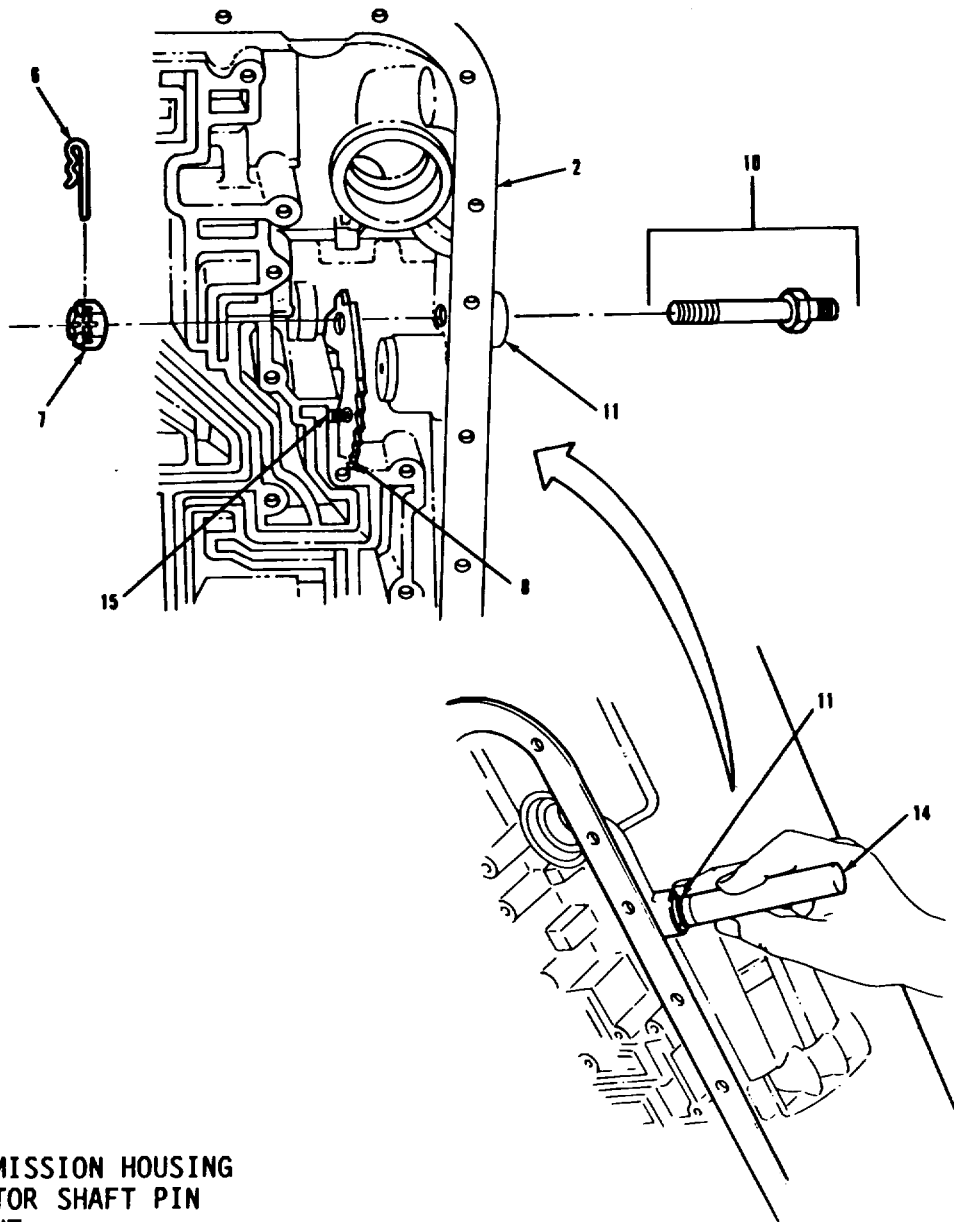
TA 238271

TRANSMISSION.**3-46. TRANSMISSION HOUSING REPAIR (Continued).**

LOCATION/ITEM	ACTION	REMARKS
B. CLEANING AND INSPECTION.		
1. Housing (2) (continued).	i. Clean all oil passages and inspect for dirt and cracks.	
	j. Inspect internal grooves for cracks or wear damage.	Clutch plate tang groove depth must not exceed 0.090 inch wear.
	k. Clean and inspect all other parts removed.	
C. ASSEMBLY		
	l. Coat the inside of item (11) with seal lubricant and the outside with non-hardening sealant.	
	m. Using item (14), install item (11) lip first into bore of item (2).	Use tool number J-26282. Seal must clear chamfer in housing bore.
	n. Position item (8) into housing so that item (15) is facing inside of housing.	
	o. Slide item (10) through item (11) and into slot of item (8).	
	p. Install items (7) and (6).	Torque item (7) to 15 to 20 lb-ft.

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).



LEGEND:

- 2. TRANSMISSION HOUSING
- 6. SELECTOR SHAFT PIN
- 7. LOCKNUT
- 8. INSIDE DETENT LEVER ASSEMBLY
- 10. SELECTOR SHAFT AND NUT
- 11. SHAFT SEAL ASSEMBLY
- 14. SHIFT LEVER SEAL INSTALLER
- 15. SELECTOR VALVE PIN

TA 238272

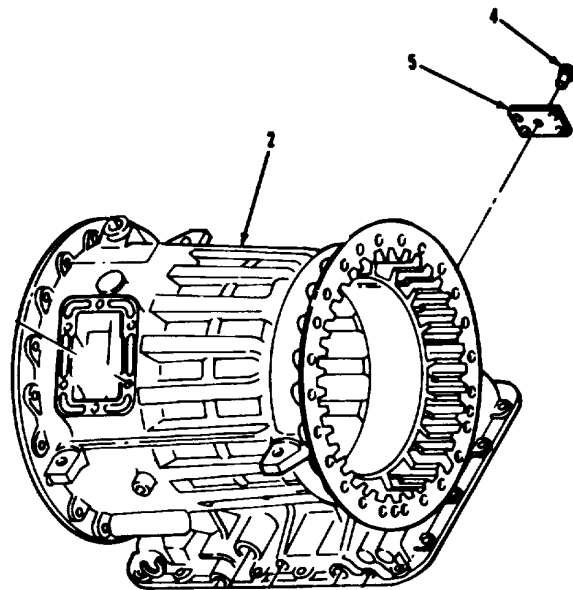
TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
1. Housing (2) (continued).	f. Store item (2) in a clean, dry place until transmission is to be assembled.	
<p>NOTE Follow-on maintenance action required: Proceed with transmission maintenance.</p>		

TRANSMISSION.

3-46. TRANSMISSION HOUSING REPAIR (Continued).



LEGEND:

- 2. TRANSMISSION HOUSING
- 4. DRIVE SCREW
- 5. NAMEPLATE

TA 238273

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE.

THIS TASK COVERS

- a. Cleaning.
- b. Inspection.
- c. Assembly.

INITIAL SETUP

APPLICABLE CONFIGURATIONS
All.

**EQUIPMENT CONDITION
PARAGRAPH**
3-32 thru 3-35.

CONDITION DESCRIPTION
Clutches removed from
transmission.

TEST EQUIPMENT
None.

SPECIAL TOOLS
Clutch pack clearance gage
(33287) J-24194.
Center support lifting - bracket
(33287) J-24195.
Center support compressor
bar tool set
(33287) SE-2553.
Snapping selection gage
(33287) J-24208-13.

MATERIALS/PARTS (P/N)
Parts tags,
Item 32, Appendix B.
Mineral spirits,
Item 15, Appendix B.

PERSONNEL REQUIRED
Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS
Work area clean and away from blowing dirt and dust.

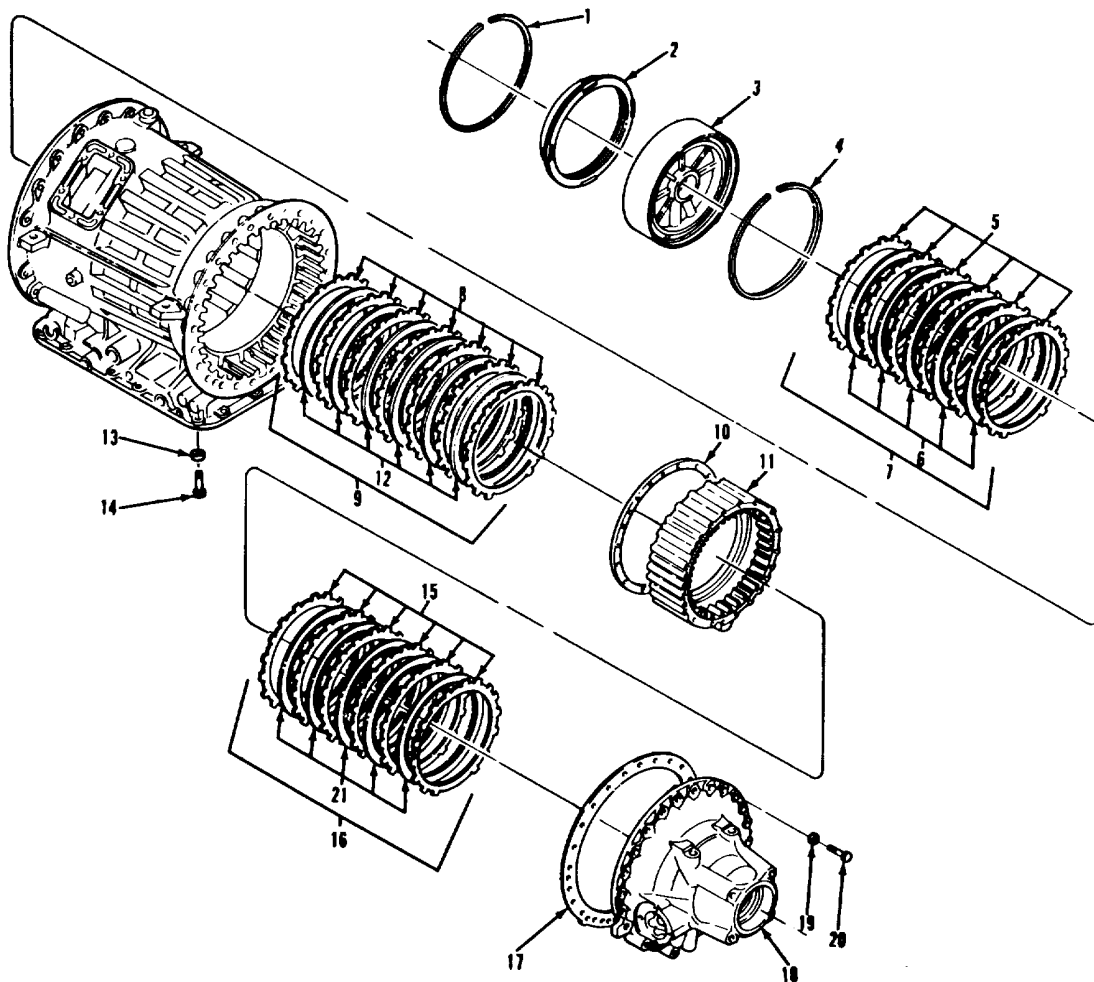
REFERENCES (TM)
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS
None.

TROUBLESHOOTING REFERENCES
Paragraph 2-7.

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- | | |
|--|---|
| 1. INTERNAL SNAPRING, COLOR-CODED | 12. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6) |
| 2. THIRD CLUTCH PISTON | 13. PLAIN WASHER |
| 3. CENTER SUPPORT HOUSING ASSEMBLY | 14. HEX HEAD SCREW |
| 4. INTERNAL SNAPRING | 15. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7) |
| 5. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7) | 16. LOW AND REVERSE CLUTCH PACK (6) |
| 6. INTERNALLY SPLINED SECOND CLUTCH PLATE (6) | 17. GASKET |
| 7. SECOND CLUTCH PACK | 18. REAR COVER ASSEMBLY |
| 8. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7) | 19. LOCKWASHER (6) |
| 9. FIRST AND REVERSE CLUTCH PACK (7) | 20. HEX HEAD SCREW (6) |
| 10. ADAPTER HOUSING GASKET | 21. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6) |
| 11. ADAPTER HOUSING | |

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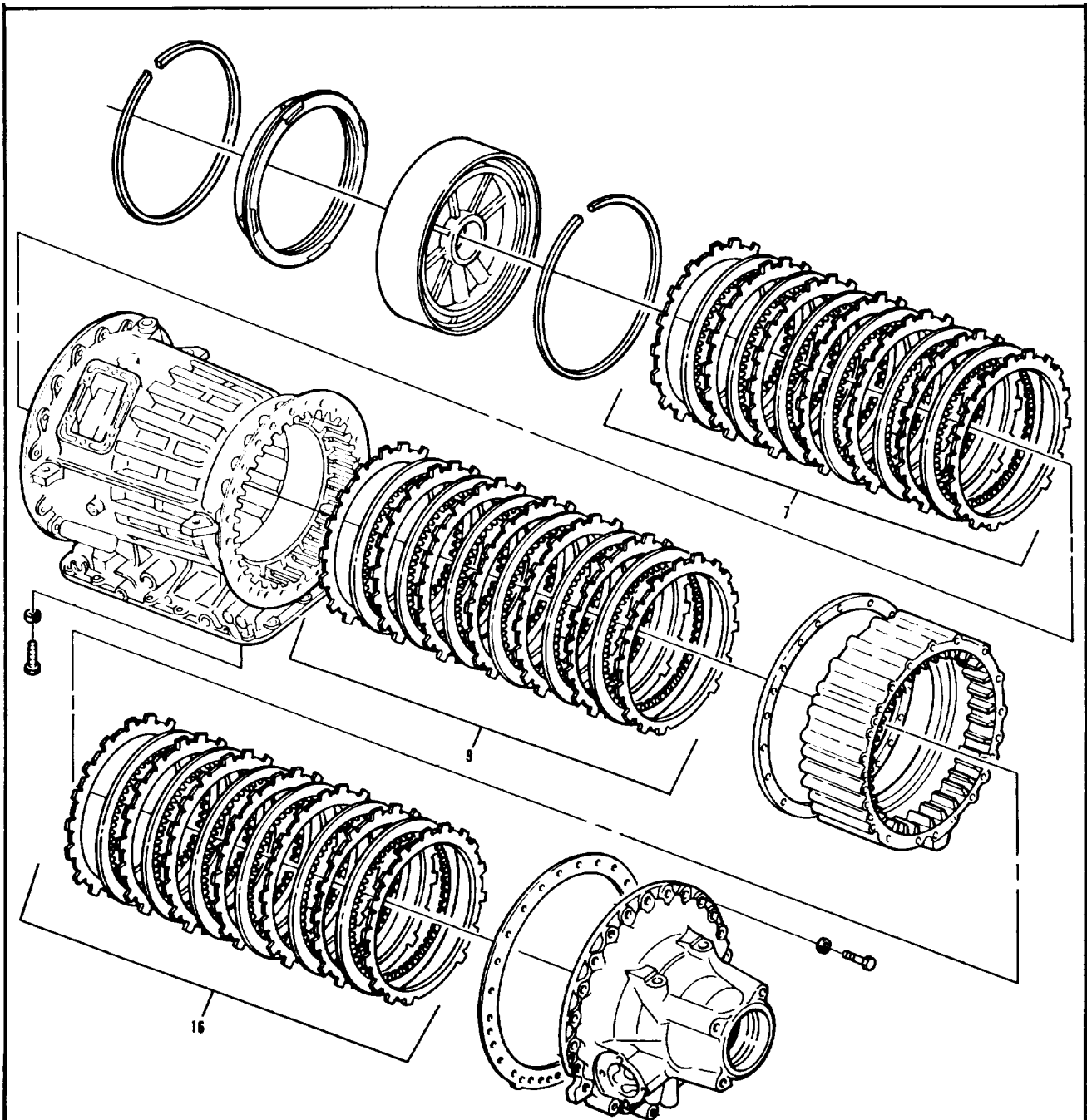
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
A. CLEANING.		
1. All clutch packs (7), (9) and (16).		
CAUTION		
During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
NOTE		
Each clutch pack must stay tied together until assembly to prevent mixing of plates.		
	a. Soak each clutch pack in clean mineral spirits.	Use mineral spirits only.
	b. Remove dirt with a clean nylon brush.	
WARNING		
Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).		
	c. Blow all clutch plates dry.	
B. INSPECTION.		
	d. Inspect and measure all items (7), (9), and (16).	Refer to paragraph 3-25.

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 7. SECOND CLUTCH PACK
- 9. FIRST AND REVERSE CLUTCH PACK (7)
- 16. LOW AND REVERSE CLUTCH PACK (6)

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TRANSMISSION.**3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).****LOCATION/ITEM****ACTION****REMARKS****C. ASSEMBLY.**

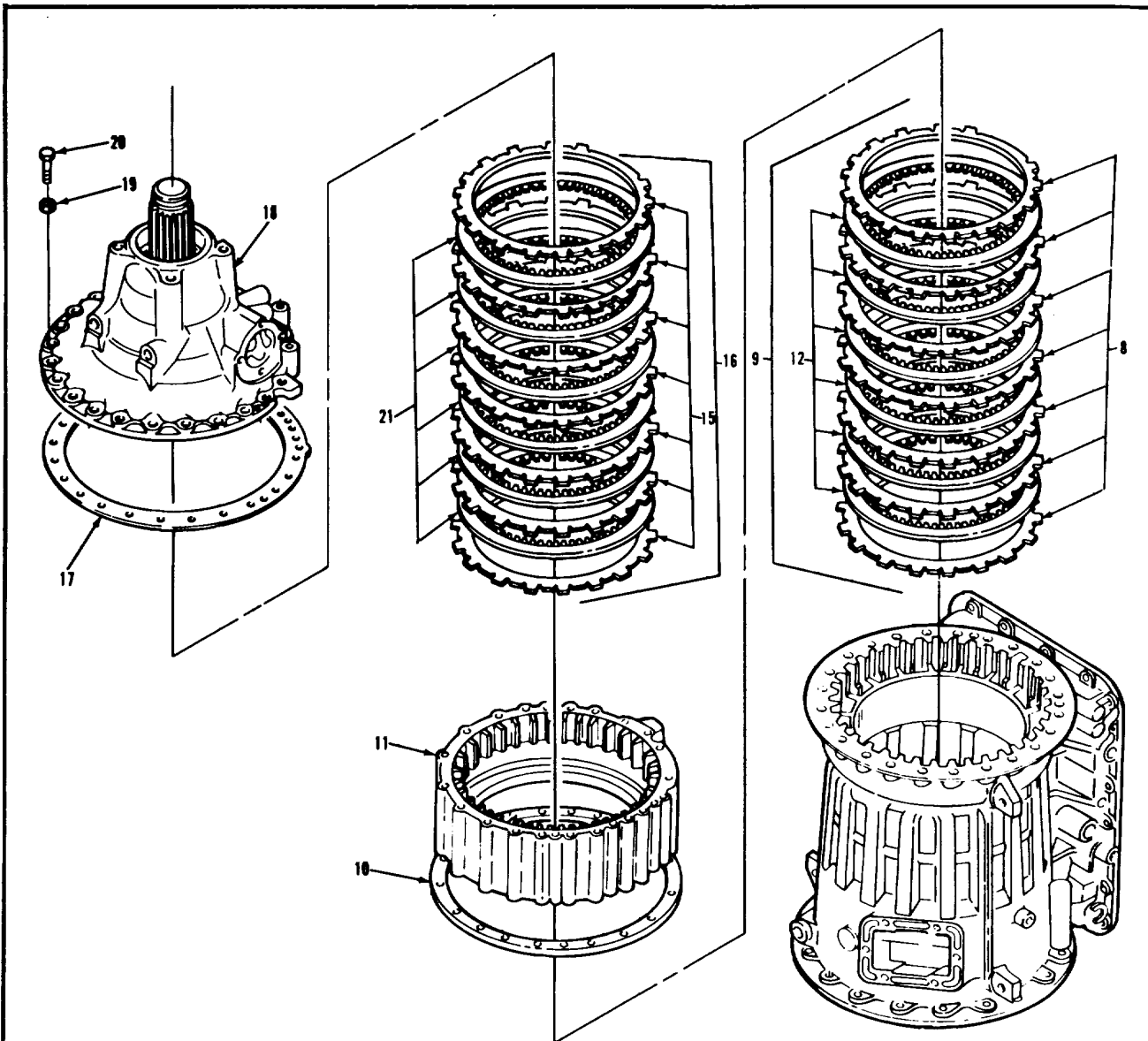
2. Clutch packs (9) and (16).

NOTE

- **The following steps are performed to determine clutch clearances only. After assembling clutch packs into the housing and getting proper clearances, the packs will be removed and labeled for later assembly.**
- **All clutch plates must be clean and dry to get proper clearances.**
 - a. Place transmission vertically with rear up.
 - b. Alternately install seven items (8) and six items (12). Start with item (8).
 - c. Install items (10) and (11).
 - d. Alternately install seven items (15) and six items (21). Start with item (15).
 - e. Install items (17) and (18).
 - f. Install six items (19) and (20), evenly spaced around item (18). Torque to 30 lb-ft.

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 8. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7)
- 9. FIRST AND REVERSE CLUTCH PACK (7)
- 10. ADAPTER HOUSING GASKET
- 11. ADAPTER HOUSING
- 12. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6)
- 15. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7)

- 16. LOW AND REVERSE CLUTCH PACK (6)
- 17. GASKET
- 18. REAR COVER ASSEMBLY
- 19. LOCKWASHER (6)
- 20. HEX HEAD SCREW (6)
- 21. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6)

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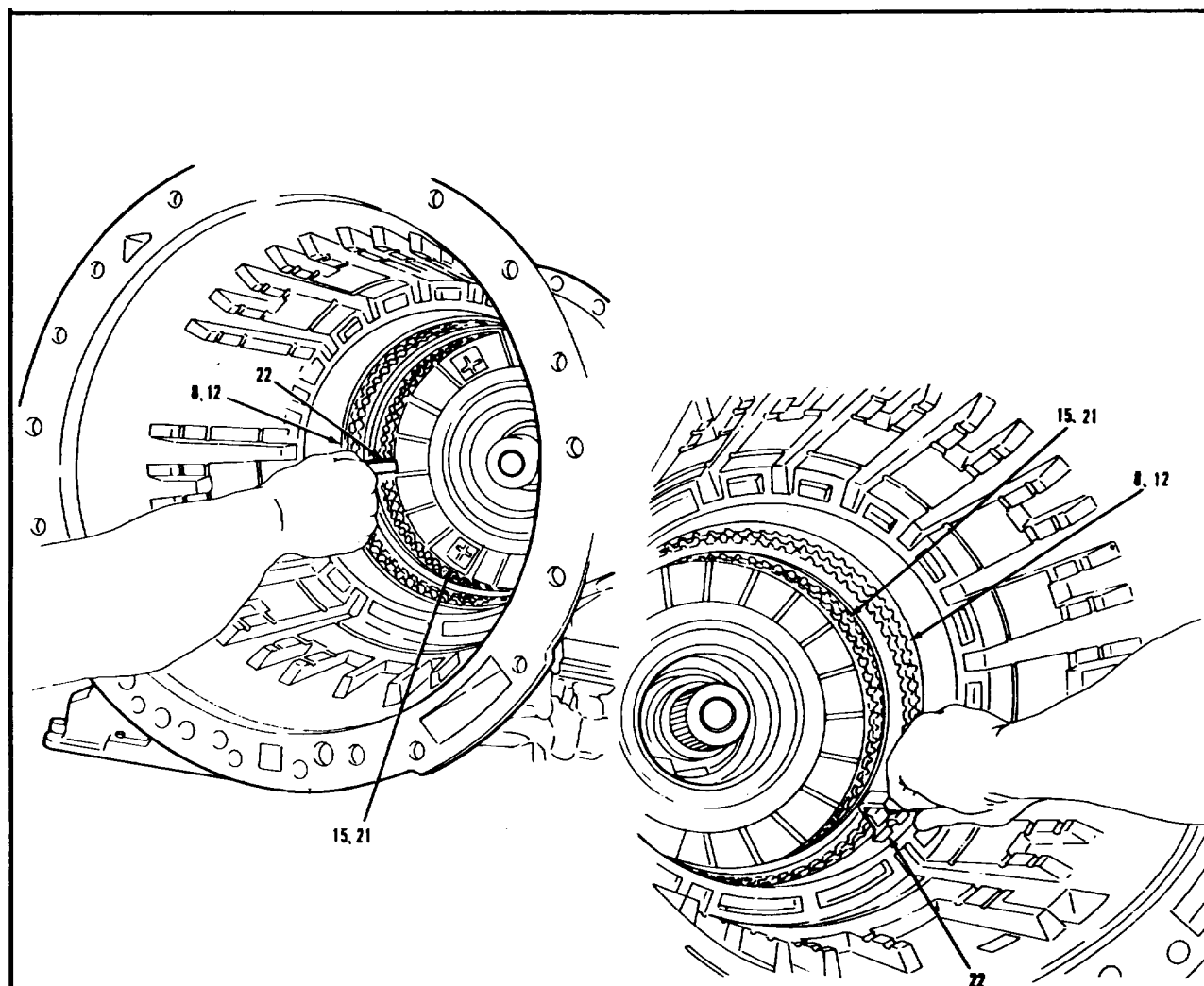
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
3. Clutch packs (9) and (16) (continued).	g. Turn front of transmission up.	
	h. Install item (22) between lower adapter housing edge and upper item (15).	Use tool number J-24194.
<p>NOTE Clearance is good when thin step of gage will slide in, but thick part will not.</p>		
	i. Install item (22) between top item (8) and transmission case.	Use tool number J-24194.
<p>NOTE If both clearances are good (thin step of gage will slide in, but thick part will not), go to step 3. If not, continue with step j.</p>		

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 8. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7)
- 12. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6)
- 15. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7)
- 21. INTERNAL SPLINED LOW AND REVERSE CLUTCH PLATE (6)
- 22. CLUTCH PACK CLEARANCE GAGE

TA 238277

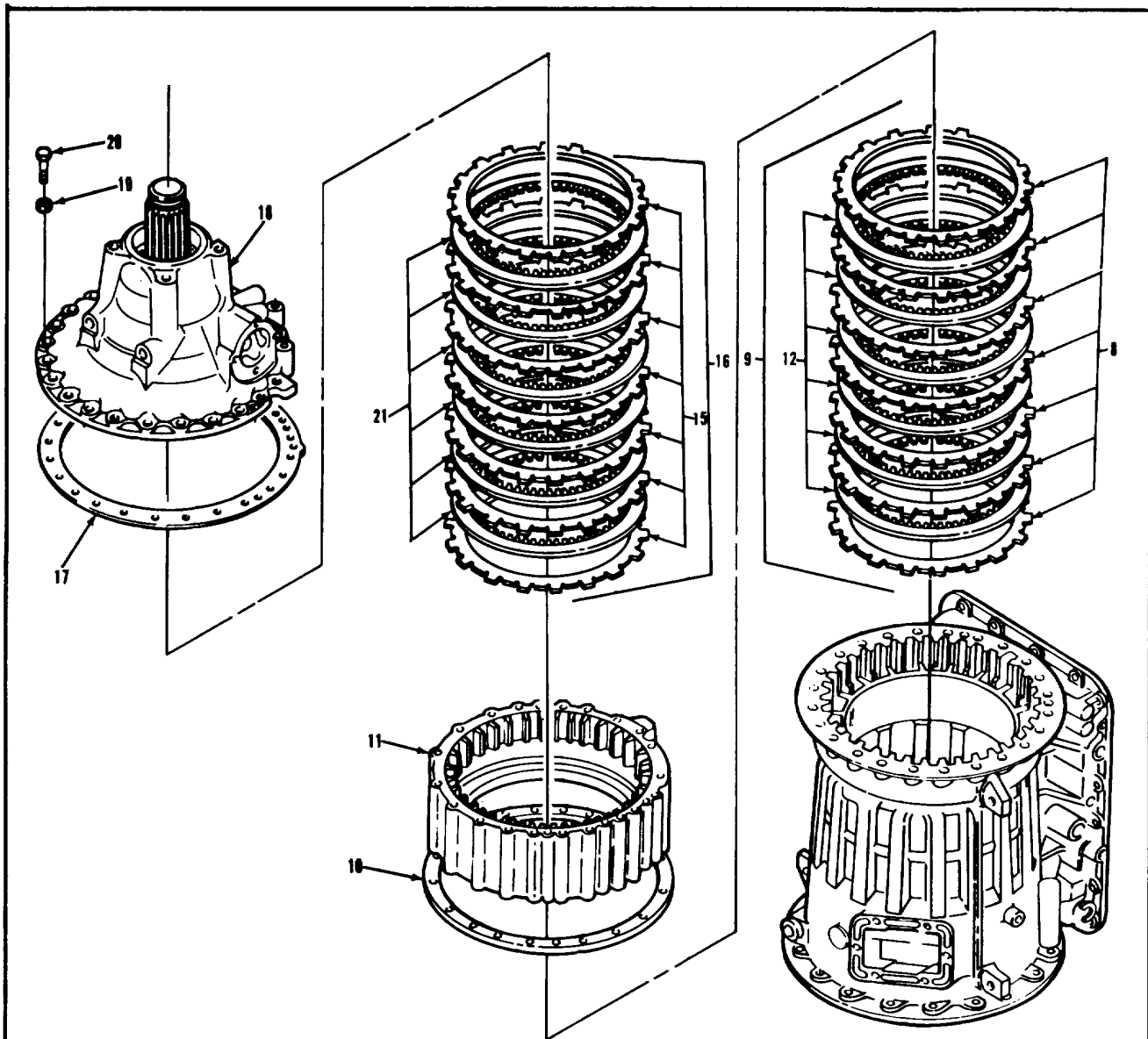
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
2. Clutch packs (9) and (16) (continued).	J. Place transmission case rear side up.	
	k. Remove six items (20) and six items (19).	
	l. Remove items (18) and (17).	
	m. Remove items (11) and (10).	Item (15) and (21) will stay in item (11).
	n. Replace items (12) showing the most wear.	
	o. Install items (10) and (11).	
	p. Replace items (21) showing the most wear.	
	q. Repeat steps 2e thru 2i.	

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- | | |
|---|---|
| 8. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7) | 16. LOW AND REVERSE CLUTCH PACK (6) |
| 9. FIRST AND REVERSE CLUTCH PACK (7) | 17. GASKET |
| 10. ADAPTER HOUSING GASKET | 18. REAR COVER ASSEMBLY |
| 11. ADAPTER HOUSING | 19. LOCKWASHER (6) |
| 12. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6) | 20. HEX HEAD SCREW (6) |
| 15. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7) | 21. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6) |

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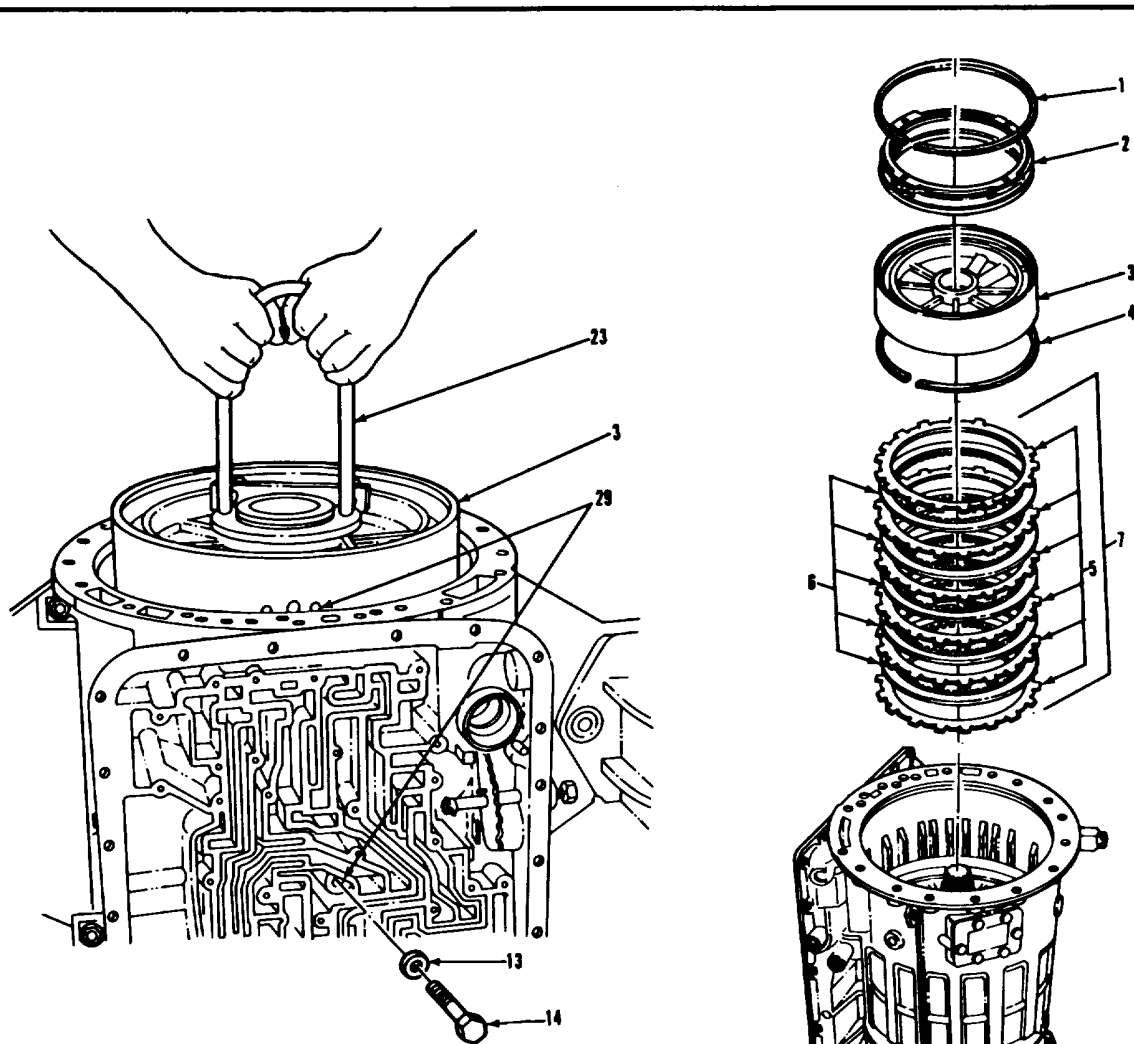
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
3. Second clutch pack (7).	a. Install seven items (5) and six items (6) on lowest edge. b. Install item (4).	Start with item (5).
<p>NOTE Snapping end gap must face away from valve body mounting surface for proper operation.</p>		
	c. Place item (3) on table with hub up. d. Remove item (2) if it is still in item (3). e. Place item (23) onto hub of item (3). f. Install item (3) into case. g. Install items (13) and (14) finger tight. h. Remove item (23) from hub of item (3).	Use tool number J-24195 Align threaded hole in item (3) with item (29).
<p>3-470</p>		

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 1. INTERNAL SNAPRING, COLOR-CODED
- 2. THIRD CLUTCH PISTON
- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 4. INTERNAL SNAPRING
- 5. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7)
- 6. INTERNALLY SPLINED SECOND CLUTCH PLATE (6)
- 7. SECOND CLUTCH PACK
- 13. PLAIN WASHER
- 14. HEX HEAD SCREW
- 23. CENTER SUPPORT LIFTING BRACKET
- 29. SCREW HOLE

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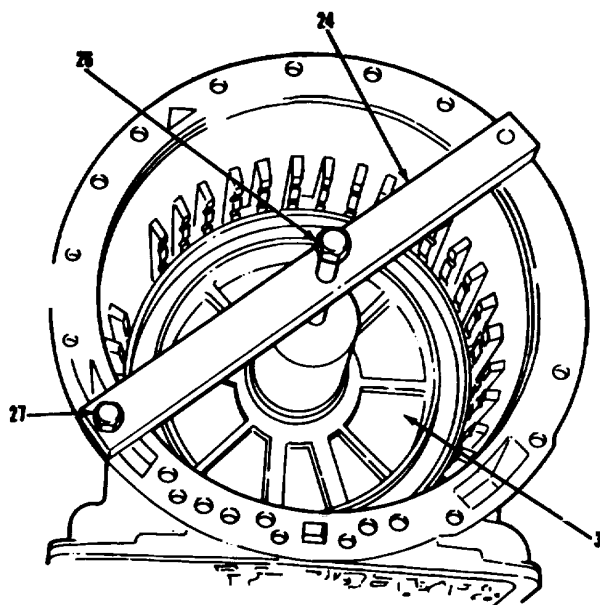
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
4. Center support housing assembly (3)	a. Set item (25) on hub of item (3).	Use tool number J-24208-2.
	b. Place item (24) across case.	Use tool number J-24208-3.
	d. Install two items (27) to hold item (24).	
	e. Tighten item (26) to compress center support.	Torque to 5 lb-ft.

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

**LEGEND:**

- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 24. COMPRESSOR BAR
- 25. SLEEVE TOOL
- 26. CENTER SCREW PART OF TOOL SET
- 27. HEX HEAD SCREW (2) PART OF TOOL SET

TA 238280

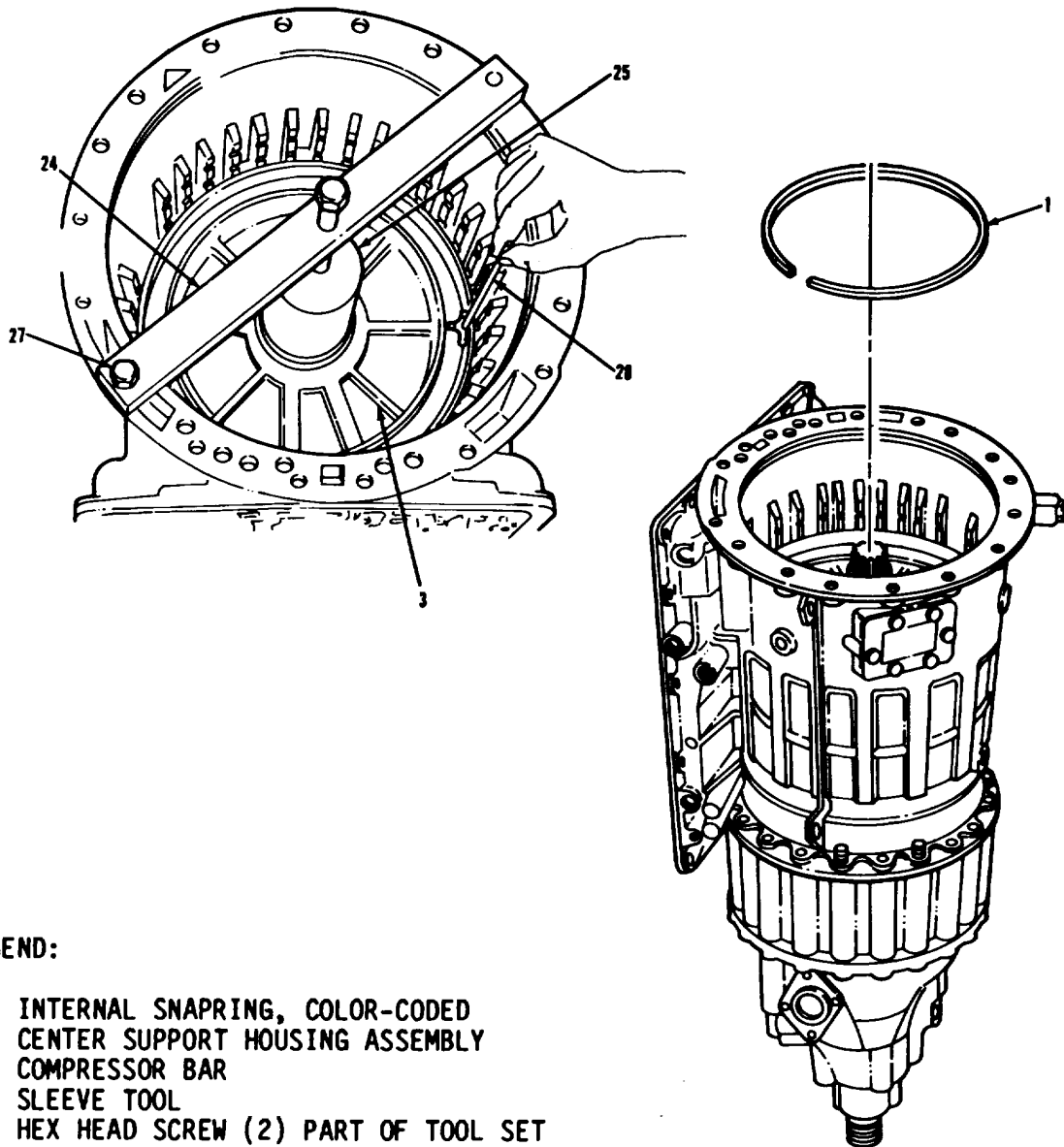
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
4. Center support housing assembly (3) (continued).	e. Install item (28) into item (1) groove above item (3). f. Choose lug of item (28) that fits the tightest in the groove and match color of lug to chart.	Use tool number J-24208-13.
<p>NOTE Snapping end gap must face away from valve body mounting surface for proper operation.</p>		
	g. Install item (1), selected above, into its groove.	
	h. Remove two items (27), item (24), and item (25).	

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 1. INTERNAL SNAPPING, COLOR-CODED
- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 24. COMPRESSOR BAR
- 25. SLEEVE TOOL
- 27. HEX HEAD SCREW (2) PART OF TOOL SET
- 28. GAGE TOOL

THICKNESS

- BLUE - 0.148-0.150 in.
- YELLOW - 0.152-0.154 in.
- WHITE - 0.155-0.157 in.
- RED - 0.158-0.160 in.

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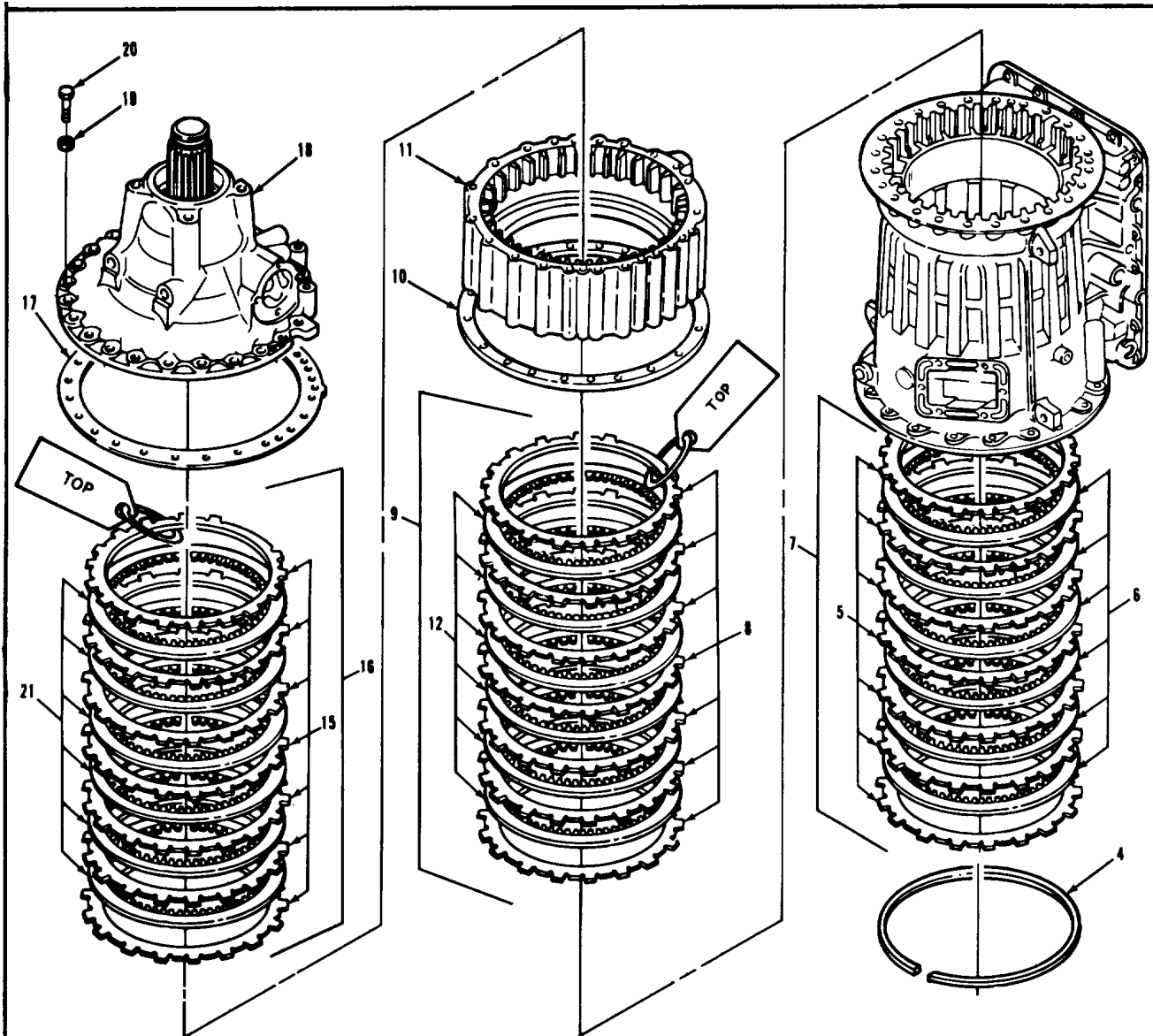
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
5. Rear cover assembly (18)	a. Place transmission with rear cover up. b. Remove six items (20) and six items (19). c. Remove items (17) and (18).	
6. Low and reverse clutch pack (16).		
<p>NOTE Clutch plates must be kept in same order as removed for correct clearance. Remove items (15) and (21). Label top plate "Top".</p>		
<p>NOTE Tie all plates together in order and label them "Low and Reverse Clutch Pack".</p>		
7. Housing (10).	Remove items (11) and (10).	
8. First and reverse clutch pack (9).	Remove items (8) and (12). Label top plate "Top".	
<p>NOTE Tie all plates together in order and label them "First and Reverse Clutch Pack".</p>		
<p>3-476</p>		

TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- | | |
|--|--|
| <ul style="list-style-type: none"> 8. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7) 9. FIRST AND REVERSE CLUTCH PACK (7) 10. ADAPTER HOUSING GASKET 11. ADAPTER HOUSING 12. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6) | <ul style="list-style-type: none"> 15. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7) 16. LOW AND REVERSE CLUTCH PACK (6) 17. GASKET 18. REAR COVER ASSEMBLY 19. LOCKWASHER (6) 20. HEX HEAD SCREW (6) 21. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6) |
|--|--|

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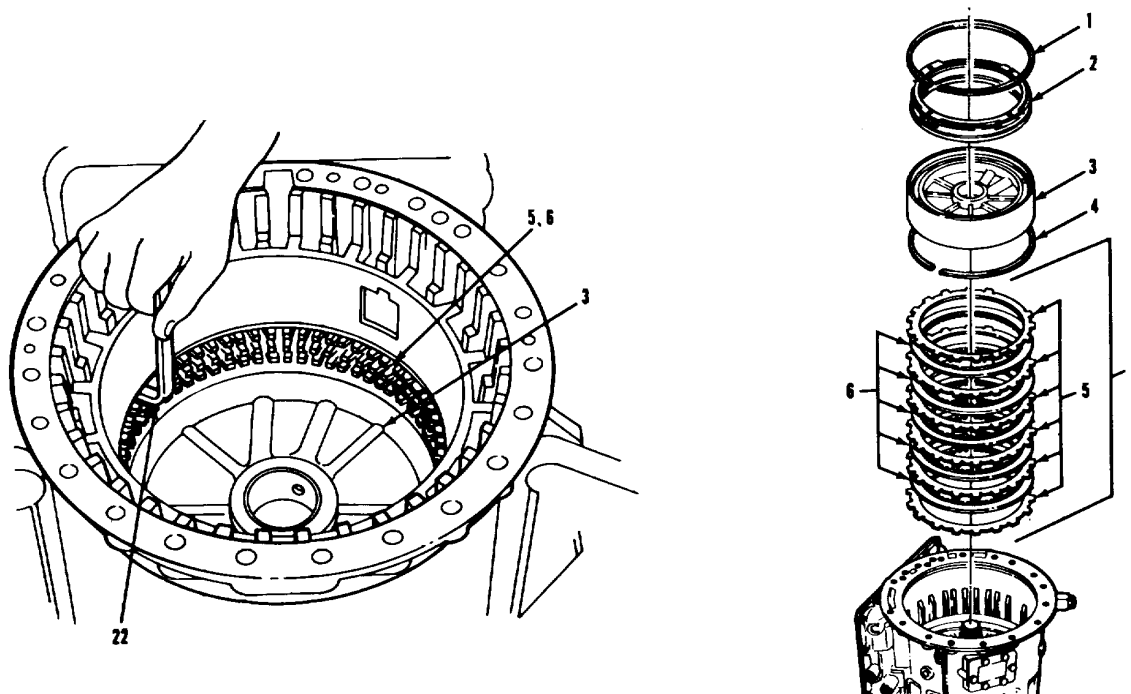
TRANSMISSION.

3-47. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM	ACTION	REMARKS
C. ASSEMBLY (Continued).		
9. Second clutch pack (7)	a. Turn transmission so that front faces up. b. Install item (22) between top item (5) and case.	Use tool number J-24194.
<p>NOTE Clearance is good when thin step or gage will slide in but thick part will not. If good go to step n. If not, continue with step c.</p>		
	c. Remove items (1), (13) and (14). d. Using item (23), remove item (3). e. Remove item (4). f. Replace item (6) showing the most wear. g. Install item (4).	Use tool number J-24195.

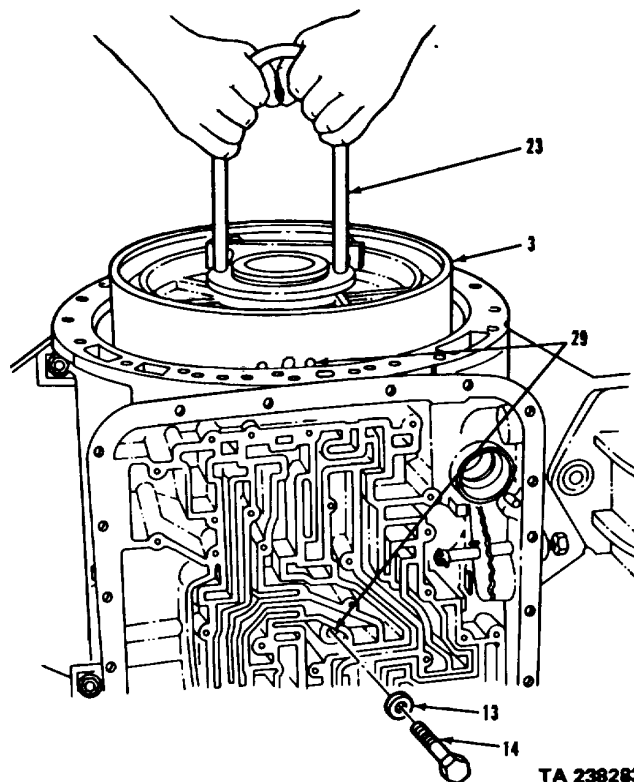
TRANSMISSION.

3-48. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- 1. INTERNAL SNAPRING, COLOR-CODED
- 2. THIRD CLUTCH PISTON
- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 4. INTERNAL SNAPRING
- 5. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7)
- 6. INTERNALLY SPLINED SECOND CLUTCH PLATE (6)
- 7. SECOND CLUTCH PACK
- 13. PLAIN WASHER
- 14. HEX HEAD SCREW
- 22. GAGE TOOL
- 23. HOLDER TOOL
- 29. SCREW HOLE



TA 238283

TRANSMISSION.

3-48. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. ASSEMBLY (Continued).

9. Second clutch pack
(7) (continued).

NOTE

Snapping end gap must face away from valve body mounting surface for proper operation.

h. Using item (23) install item (3) into case.

Use tool number J-24195. Aline items (29) in item (3) with hole in valve body.

i. Install items (13) and (14) finger tight.

j. Remove item (23) from hub of item (3).

k. Install item (1).

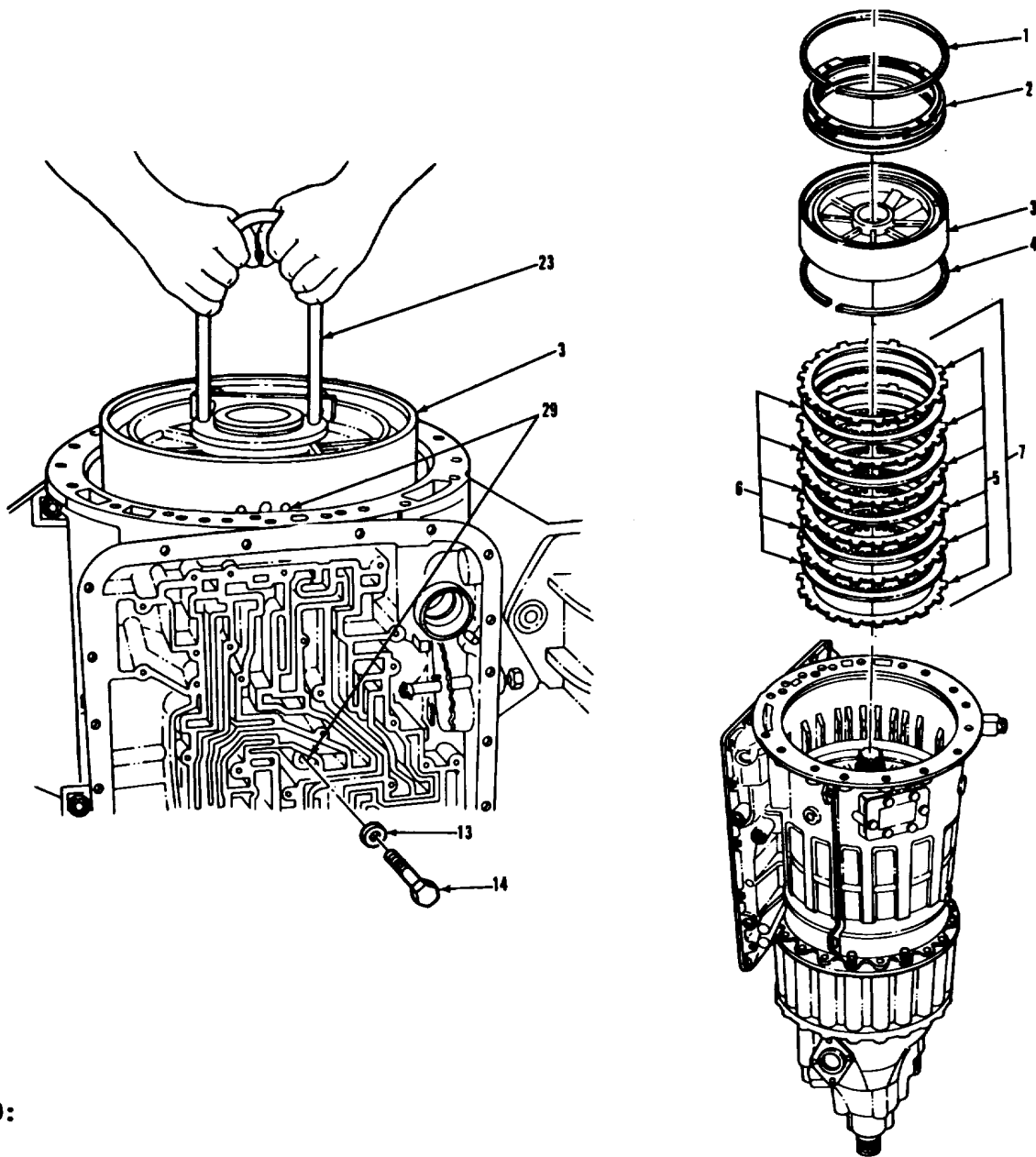
l. Turn transmission so that rear faces up.

m. Repeat step b.

n. Turn transmission so that front faces up.

TRANSMISSION.

3-48. ESTABLISHING CLUTCH CLEARANCE (Continued).



LEGEND:

- | | |
|---|-----------------------|
| 1. INTERNAL SNAPRING, COLOR-CODED | 7. SECOND CLUTCH PACK |
| 2. THIRD CLUTCH PISTON | 13. PLAIN WASHER |
| 3. CENTER SUPPORT HOUSING ASSEMBLY | 14. HEX HEAD SCREW |
| 4. INTERNAL SNAPRING | 23. HOLDER TOOL |
| 5. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7) | 29. SCREW HOLE (2) |
| 6. INTERNALLY SPLINED SECOND CLUTCH PLATE (6) | |

TA 238284

TRANSMISSION.

3-48. ESTABLISHING CLUTCH CLEARANCE (Continued).

LOCATION/ITEM

ACTION

REMARKS

C. ASSEMBLY (Continued).

4. Second clutch pack (7) (continued).

o. Remove items (1), (14), and (13).

p. Using item (23), remove item (3).

Use tool number J-24195.

q. Remove item (4).

NOTE

Clutch plates must be kept in order when removed, to maintain correct clearance.

r. Remove items (5) and (6).

Label top plate "Top".

NOTE

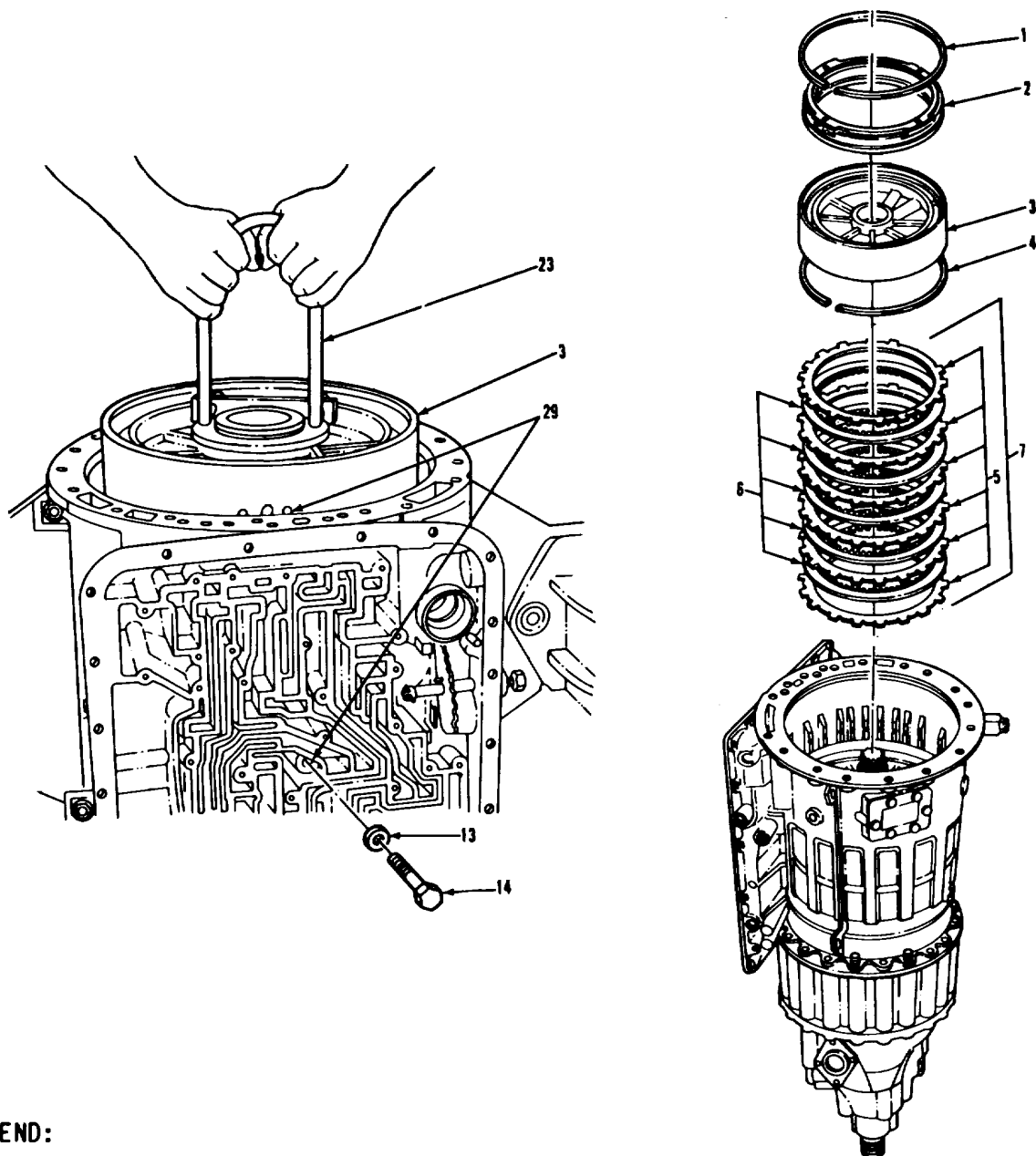
- Tie all plates together in order and label them "Second Clutch Pack".

- Follow-on maintenance action required:

Proceed with transmission maintenance.

TRANSMISSION.

3-48. ESTABLISHING CLUTCH CLEARANCE (Cont inued).



LEGEND:

- 1. INTERNAL SNAPRING, COLOR-CODED
- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 4. INTERNAL SNAPRING
- 5. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7)
- 6. INTERNALLY SPLINED SECOND CLUTCH PLATE (6)

- 7. SECOND CLUTCH PACK
- 13. PLAIN WASHER
- 14. HEX HEAD SCREW
- 23. HOLDER TOOL
- 29. SCREW HOLE

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TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

THIS TASK COVERS

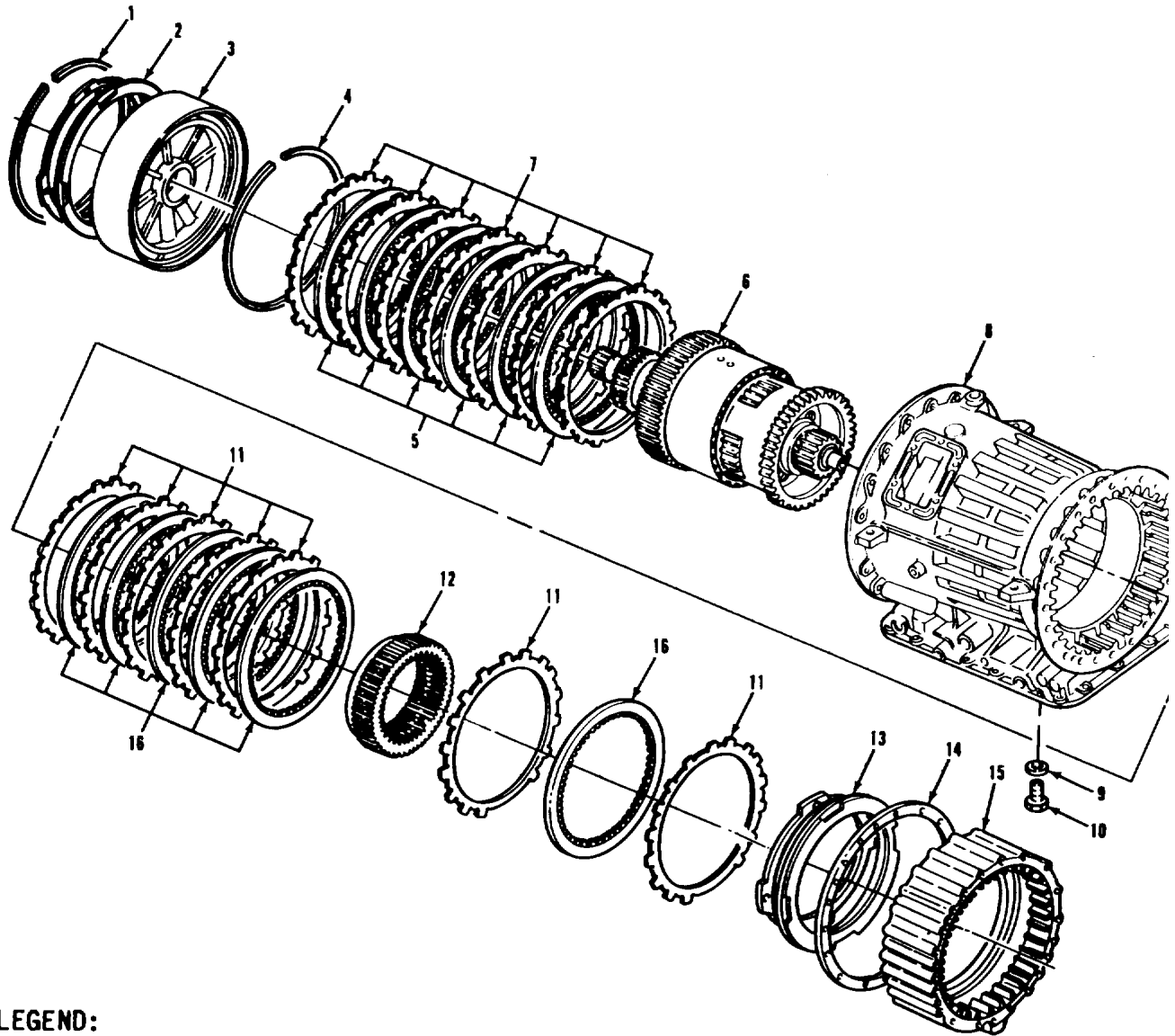
Assembly.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All.	3-48.	Clutch clearances established.
<u>TEST EQUIPMENT</u>		
None.		
<u>SPECIAL TOOLS</u>		
Center support compressor bar set (33287) SE-2553. Mainshaft lifting bracket (33287) J-24196. Center support lifting bracket (33287) J-24195. Center support compressor set (33287) J-24208-C.		
<u>MATERIALS/PARTS (P/N)</u>		
Oil, lubricating: OE/HDO-10 Item 16, Appendix B.		
<u>PERSONNEL REQUIRED</u>	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u>	
Two (MOS-63W). dirt and dust.	Work area clean and away from blowing	
<u>REFERENCES (TM)</u>	<u>GENERAL SAFETY INSTRUCTIONS</u>	
TM 9-2320-283-34P.	None.	
<u>TROUBLESHOOTING REFERENCES</u>		
Paragraph 2-7.		

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.



LEGEND:

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. INTERNAL SNAPRING 2. THIRD CLUTCH PISTON 3. CENTER SUPPORT HOUSING ASSEMBLY 4. INTERNAL SNAPRING 5. INTERNALLY SPLINED SECOND CLUTCH PLATE (6) 6. GEAR UNIT AND MAINSHAFT ASSEMBLY 7. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7) 8. TRANSMISSION HOUSING | <ul style="list-style-type: none"> 9. PLAIN WASHER, CENTER SUPPORT 10. HEX HEAD SCREW 11. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7) 12. REAR PLANETARY RING GEAR 13. FIRST CLUTCH PISTON 14. ADAPTER HOUSING GASKET 15. ADAPTER HOUSING 16. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6) |
|--|---|

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

ASSEMBLY.

1. First/reverse clutch pack (11) and (16).

CAUTION

During disassembly all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.

- a. Place item (12) with short external splines facing down on table.

NOTE

Soak clutch pack in OE/HDO 10 lubricating oil for 2 minutes before installing.

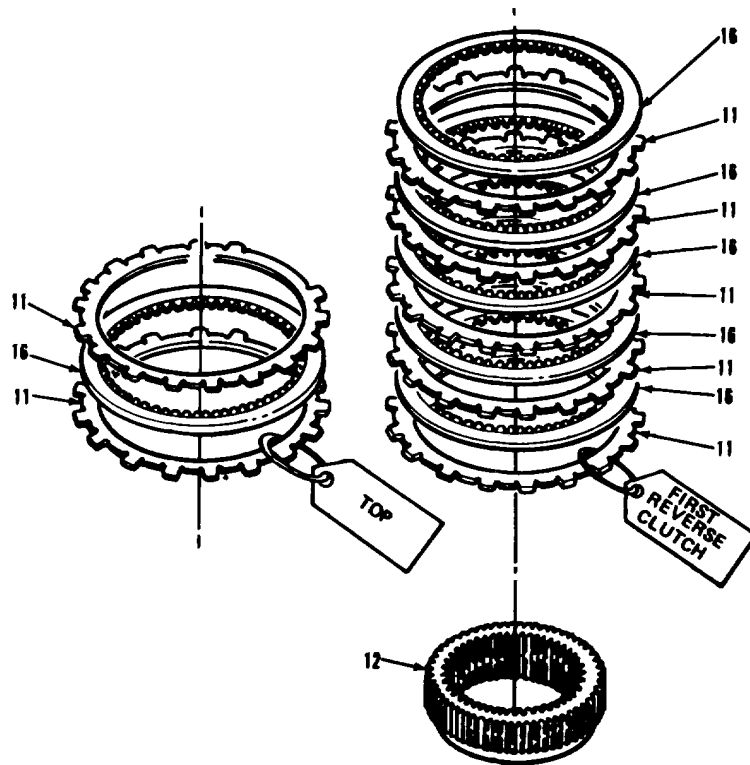
- b. Place first and reverse clutch pack with plate labeled "Top" facing up on table.
- c. Flip the first three plates over from the " " clutch pack and lay aside.
- d. Starting with item (16) alternately install five items (16) and five items (11) onto item (12).

Place on table so that "Top" is facing downward.

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).



LEGEND:

- 11. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7)
- 12. REAR PLANETARY RING GEAR
- 16. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6)

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TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

ASSEMBLY (Continued).

1. First/reverse clutch pack (11) and (16) (continued).	e. Line up teeth of all items (11) with each other.	
	f. Place item (8) with rear facing up.	
	g. Carefully turn item (12), (11), and (16) over and install into rear of transmission housing.	Do not let plates drop.

NOTE

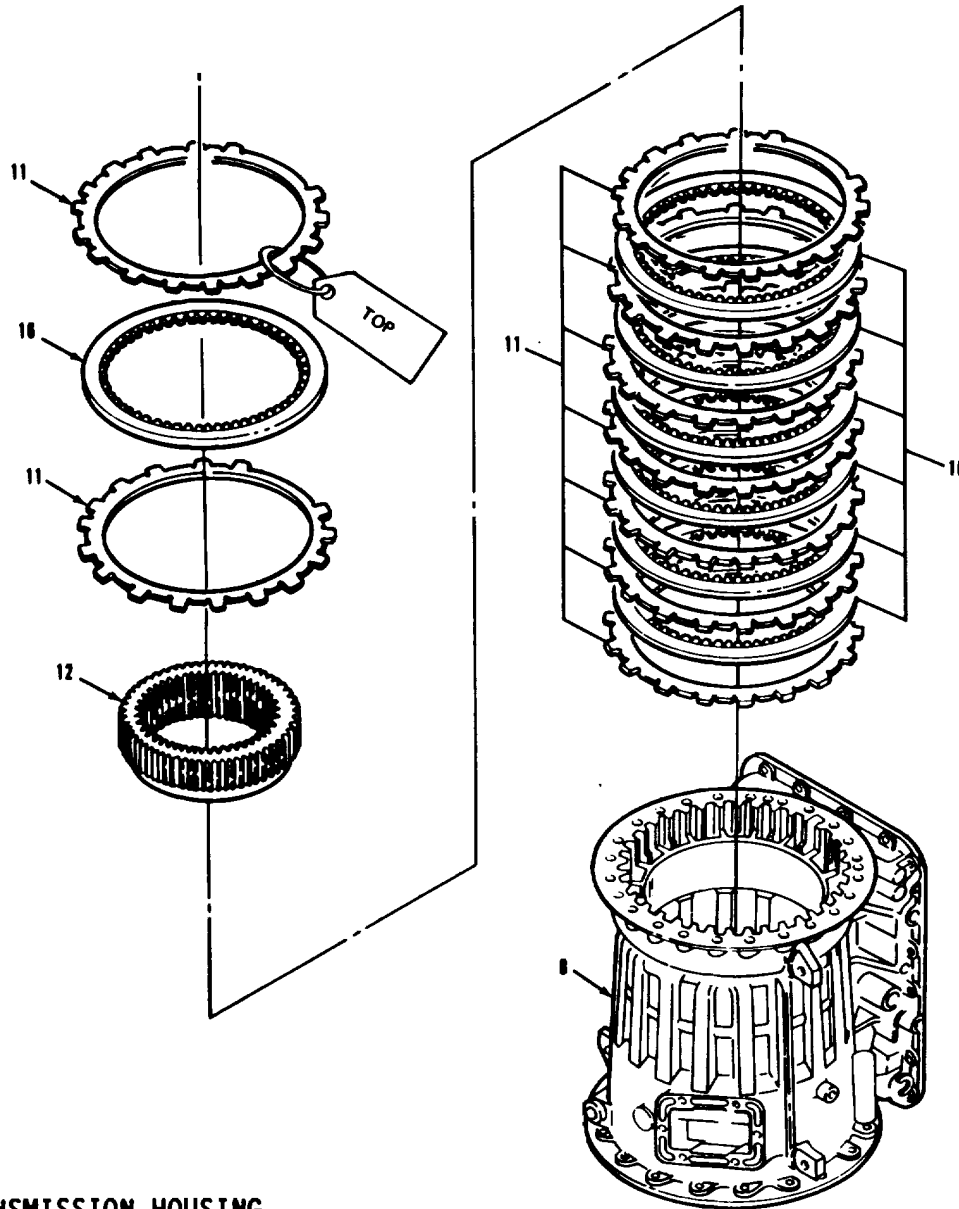
Short external spline of ring gear must be facing upward.

- h. Install remaining items (11) and (16) alternately onto item (12) with last plate being one marked "Top".

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).



LEGEND:

- 8. TRANSMISSION HOUSING
- 11. EXTERNALLY TOOTHED FIRST AND REVERSE CLUTCH PLATE (7)
- 12. REAR PLANETARY RING GEAR
- 16. INTERNALLY SPLINED FIRST AND REVERSE CLUTCH PLATE (6)

TA 238288

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

ASSEMBLY (Continued).

2. Housing (15).	a. Place item (15) onto item (8) with piston front facing down. b. Install item (17) onto item (15). Secure with two suitable screws.	Use tool number J-24208-3. Screws from rear cover will work.
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NOTE

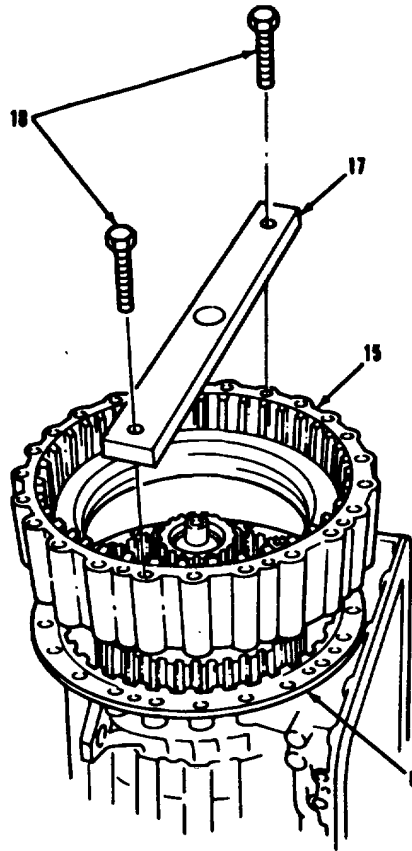
Center screw must be removed from compressor bar to prevent parts damage.

- c. Position transmission with the front upward.

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).



LEGEND:

- 8. TRANSMISSION HOUSING
- 15. ADAPTER HOUSING
- 17. CENTER SUPPORT COMPRESSOR SET
- 18. HEX HEAD SCREW (2)

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TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

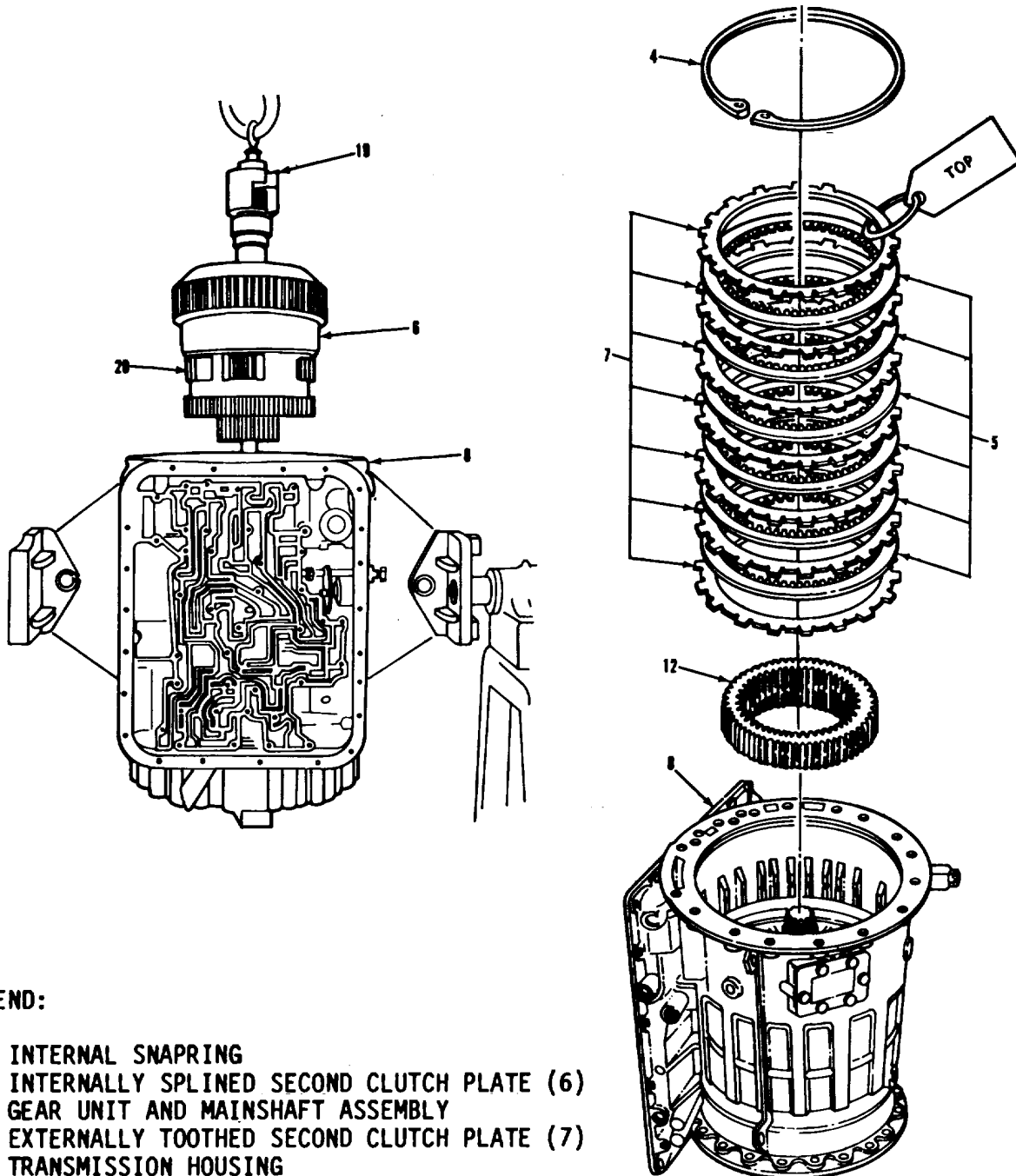
(Continued).

LOCATION/ITEM	ACTION	REMARKS
ASSEMBLY (Continued).		
3. Gear unit and main-shaft assembly (6). (6).	a. Attach item (19) to item	Use tool number J-24196.
NOTE		
Be sure a bearing and two races do not drop from gear unit when lifting.		
	b. Carefully lift item (6) with hoist and position over item (8).	
	c. Coat item (6) with OE/HDO-10 lubricating oil.	
	d. Carefully lower item (6) into item (8). Aline item (20) of item (6) to mesh with item (12)	Item (6) must seat on compressor bar.
	e. Remove item (19).	
4. Second clutch pack (5) and (7).		
NOTE		
Soak clutch pack in OE/HDO 10 lubricating oil for 2 minutes before installing.		
	a. Starting with item (7) alternately install seven items (7) and six items (5) into item (8).	Item (7) previously labeled "Top" must be last plate installed.
	b. Install item (4).	
NOTE		
Snapping end gap must face away from valve body mounting surface for proper operation.		

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).



LEGEND:

- 4. INTERNAL SNAPPING
- 5. INTERNALLY SPLINED SECOND CLUTCH PLATE (6)
- 6. GEAR UNIT AND MAINSHAFT ASSEMBLY
- 7. EXTERNALLY TOOTHED SECOND CLUTCH PLATE (7)
- 8. TRANSMISSION HOUSING
- 12. REAR PLANETARY RING GEAR
- 19. MAINSHAFT LIFTING BRACKET
- 20. PINION

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TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).

LOCATION/ITEM	ACTION	REMARKS
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ASSEMBLY (Continued).

5. Center support housing assembly (3).	a. Apply a generous amount of OE/HDO 10 lubricating oil into piston cavity of item (3).	
	b. Install item (2) into cavity of item (3).	Retaining ring of item (2) must face away from item (3).

NOTE

Piston seal lips must face towards piston cavity.

c. Install item (21) onto hub of item (3).	Use tool number J-24195.
d. Install item (3) into item (8), being careful to align hole in item (3) with hole in item (8).	
e. Install item (9) and (10) through hole in item (8) and finger tight to item (3).	
f. Remove item (21) from hub.	

NOTE

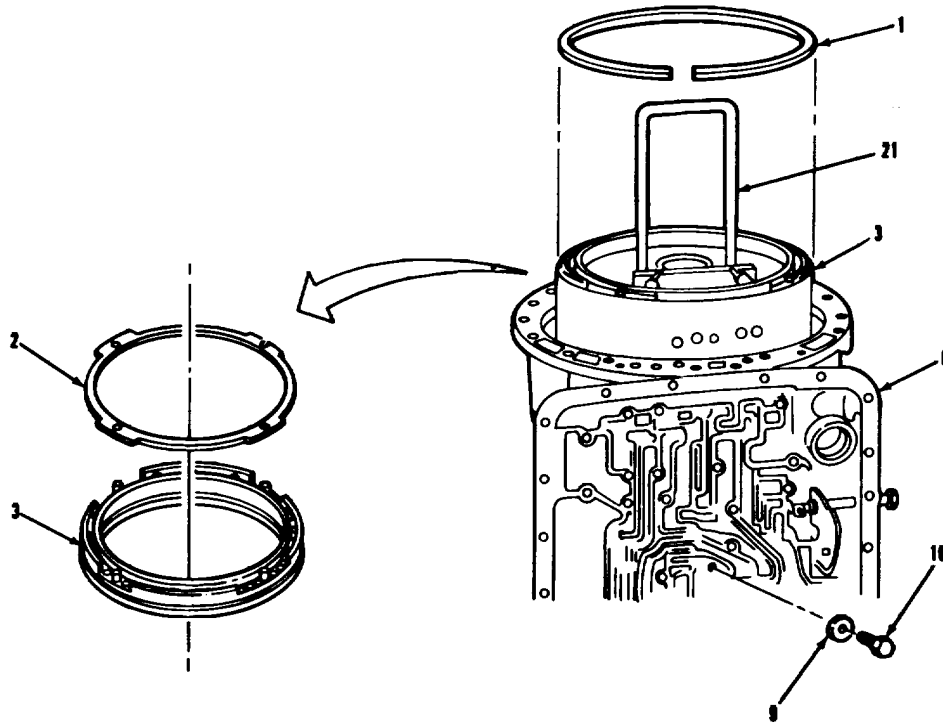
Snapping end gap must face away from valve body mounting surface for proper operation.

g. Install selected item (1).	Refer to paragraph 3-25 for item (1) selection instruction.
-------------------------------	---

TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).



LEGEND:

- 1. INTERNAL SNAPPING, COLOR-CODED
- 2. THIRD CLUTCH PISTON
- 3. CENTER SUPPORT HOUSING ASSEMBLY
- 8. TRANSMISSION HOUSING
- 9. PLAIN WASHER CENTER SUPPORT
- 10. HEX HEAD SCREW
- 21. CENTER SUPPORT LIFTING BRACKET

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TRANSMISSION.

3-48. FIRST AND REVERSE CLUTCH, GEAR UNIT, SECOND CLUTCH, AND CENTER SUPPORT INSTALLATION.

(Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

ASSEMBLY (Continued).

- | | | |
|------------------------------------|--|--|
| 5. Center support housing assembly | h. Position item (8) with rear upward.
(3) (continued).

i. Remove two items (18) and item (17) from item (15).

j. Remove item (15). | |
|------------------------------------|--|--|

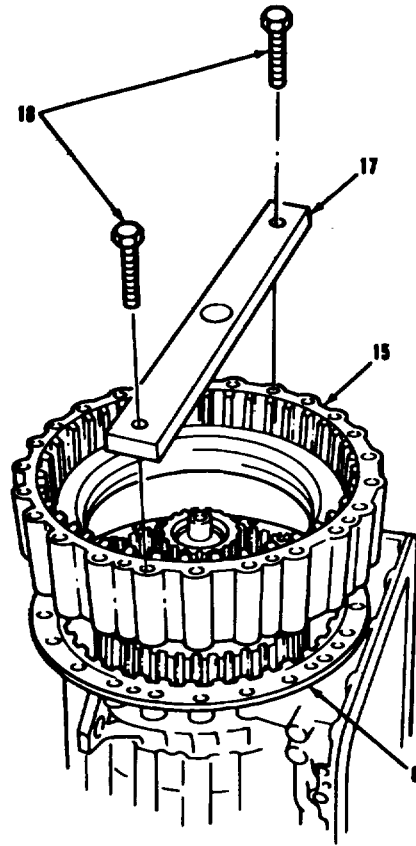
NOTE

Follow-on maintenance action required:

Proceed with transmission maintenance.

TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).



LEGEND:

- 8. TRANSMISSION HOUSING
- 15. ADAPTER HOUSING
- 17. CENTER SUPPORT COMPRESSOR SET
- 18. HEX HEAD SCREW (2)

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TRANSMISSION.

**3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).**

THIS TASK COVERS

Assembly.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION
PARAGRAPH

3-49.

CONDITION DESCRIPTION

First, reverse clutch,
gear unit, second
clutch, and center
support installed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

None.

MATERIALS/PARTS (P/N)

Oil, lubricating: OE/HDO-10
Item 16, Appendix B.
Grease, oil soluble
Item 9, Appendix B.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing
dirt and dust.

REFEENCES (TM)

None.

GENERAL SAFETY INSTRUCTIONS

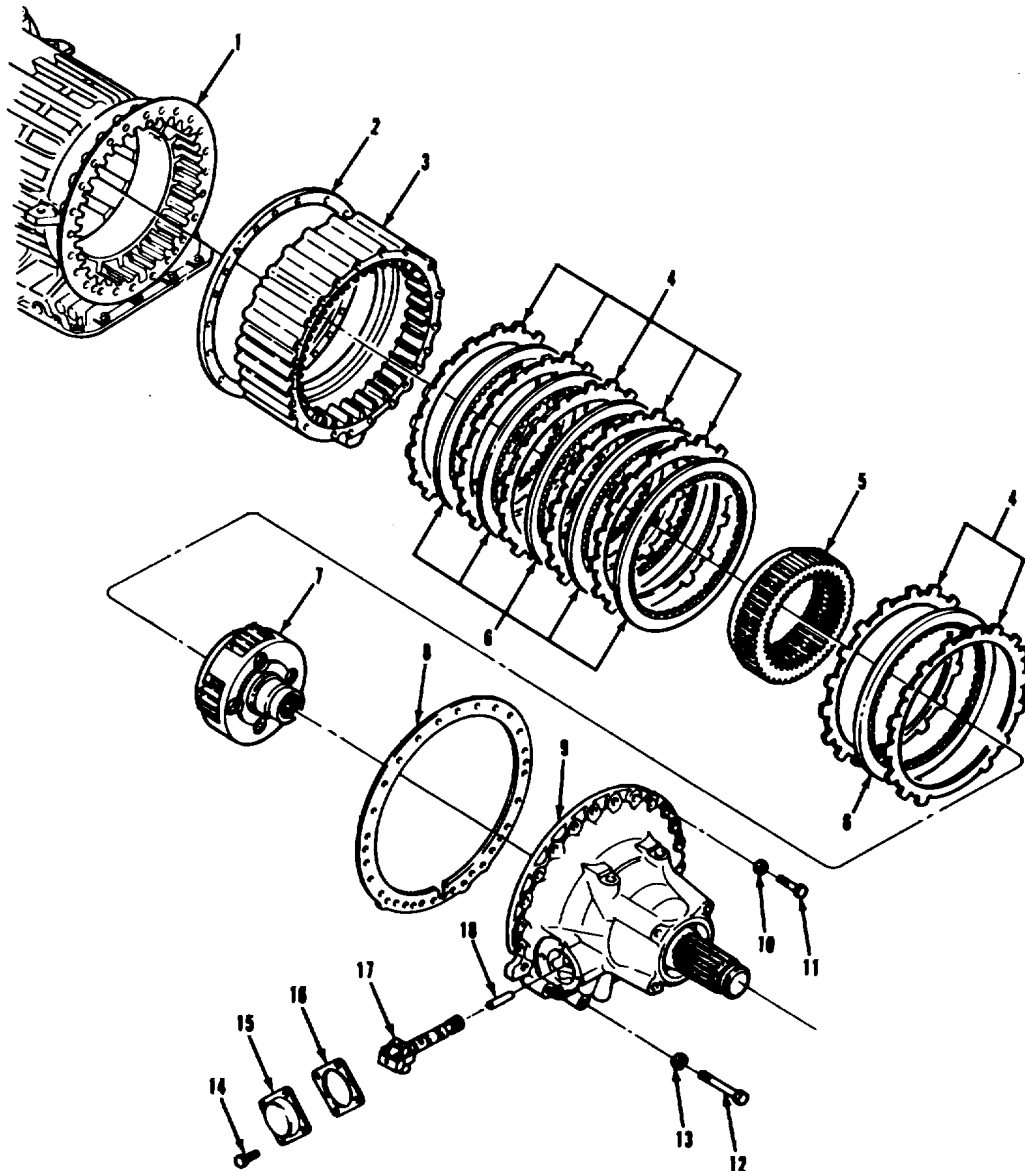
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION



LEGEND:

- | | |
|--|---------------------------|
| 1. TRANSMISSION HOUSING | 9. REAR COVER ASSEMBLY |
| 2. ADAPTER HOUSING GASKET | 10. LOCKWASHER (21) |
| 3. ADAPTER HOUSING | 11. HEX HEAD SCREW (21) |
| 4. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7) | 12. HEX HEAD SCREW (3) |
| 5. LOW PLANETARY RING GEAR | 13. LOCKWASHER (3) |
| 6. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6) | 14. HEX HEAD SCREW (4) |
| 7. LOW PLANETARY CARRIER ASSEMBLY | 15. GOVERNOR COVER |
| 8. REAR COVER GASKET | 16. GOVERNOR COVER GASKET |
| | 17. GOVERNOR |
| | 18. GOVERNOR SUPPORT PIN |

TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).

LOCATION/ITEM

ACTION

REMARKS

ASSEMBLY.

1. Housing (3) and low-reverse clutch pack (4) and (6).

a. Place item (5) on table with short splines down.

NOTE

Soak clutch pack in OE/HDO-10 lubricating oil for 2 minutes before installing.

b. Place items (4) and (6) on table with plate labeled "top" facing up.

c. Flip first three plates over clutch pack. Lay aside.

Plate labeled "top" should be facing down on table.

d. Starting with item (6), alternately install five items (4) and five items (6) into item (5).

e. Aline external teeth.

f. Place item (3) with piston retaining ring facing up onto assembled item (5), (4), and (6).

g. Install item (2) onto item (3) and aline holes.

Retain gasket with oil soluble grease.

NOTE

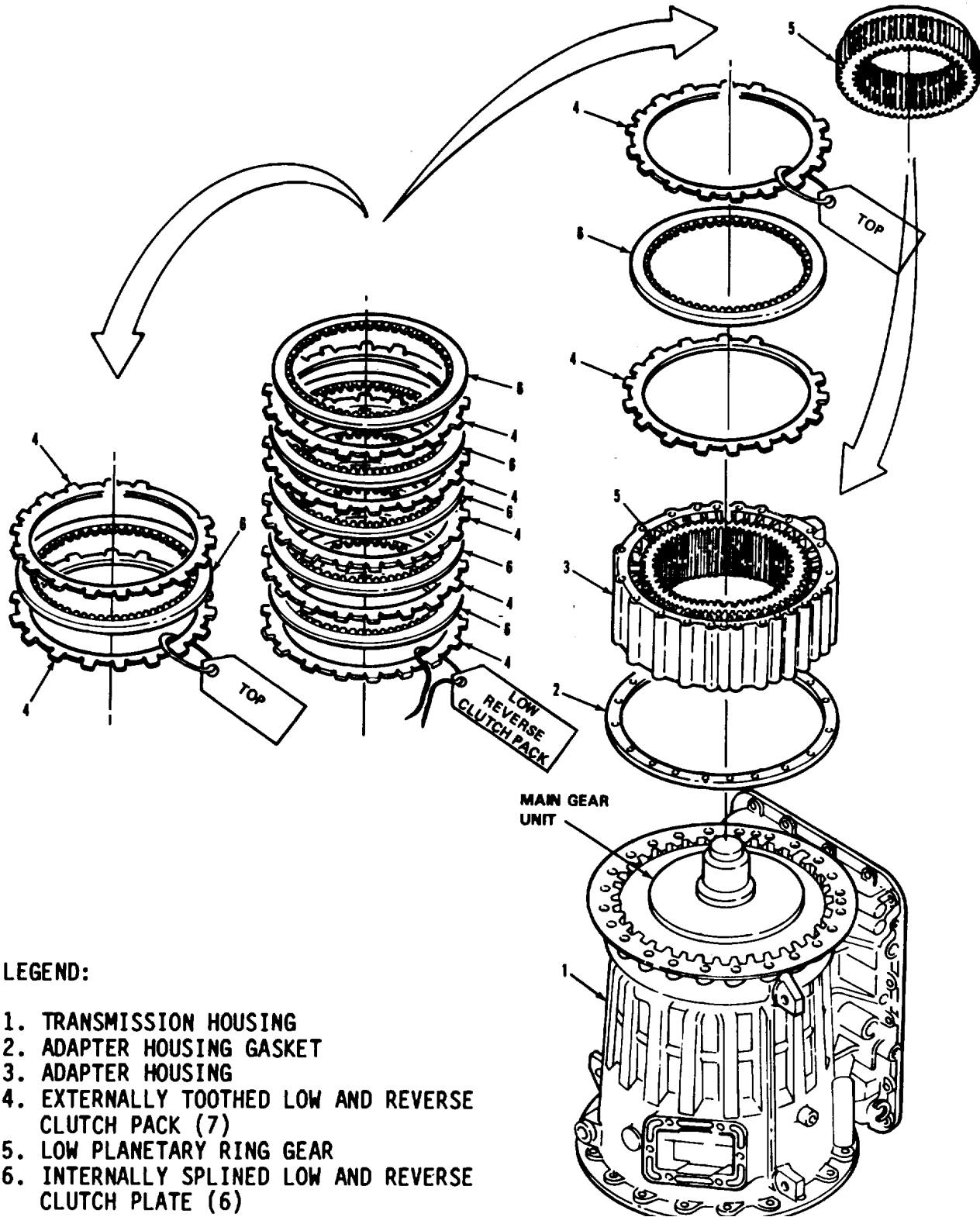
It will be necessary to have a helper during the next five steps.

h. Grasp the assembled item (3) and turn it over.

Do not let plates drop.

TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION
(Continued).



LEGEND:

- 1. TRANSMISSION HOUSING
- 2. ADAPTER HOUSING GASKET
- 3. ADAPTER HOUSING
- 4. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PACK (7)
- 5. LOW PLANETARY RING GEAR
- 6. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6)

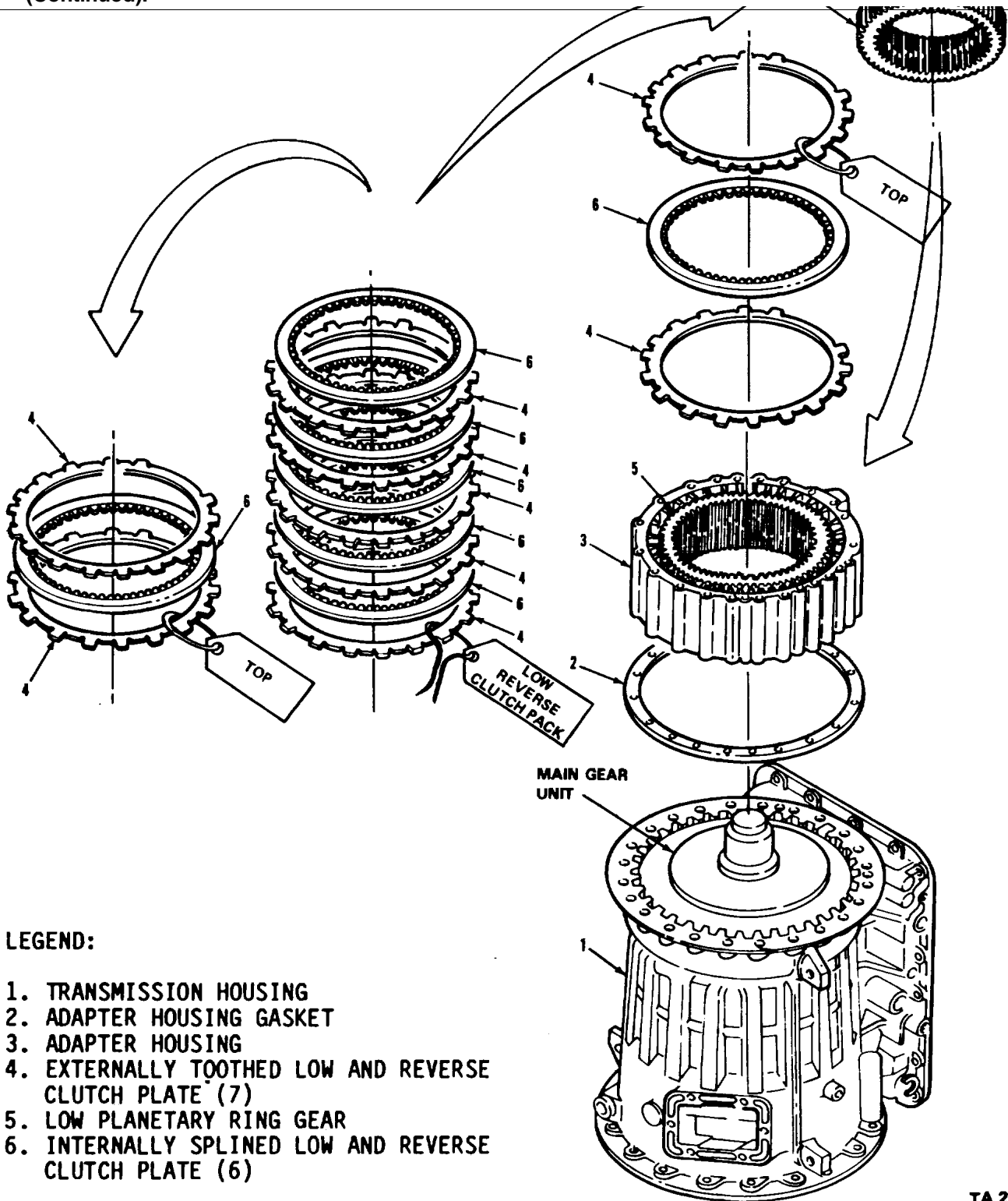
TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).

LOCATION/ITEM	ACTION	REMARKS
ASSEMBLY (Continued).		
1. Housing (3) and low-reverse clutch pack (4) and (6) (continued).	i. Position assembled item (3) above item (1) and carefully align dowel pins in item (3) with proper holes in item (1).	
	j. Lower item (3) until the internal teeth of item (5) begin to mesh with main gear unit.	
	k. While holding item (3), have helper tap item (5) onto main gear unit until fully seated.	Use soft mallet.
	l. When meshing is completed, seat item (3) fully to transmission.	
	m. Starting with item (4), alternately install remaining three items (4) and (6).	Remove label marked "top" from last plate.

TRANSMISSION.

3-49. ADAPTER HOUSNG, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION
(Continued).



TA 236

TRANSMISSION.

3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).

LOCATION/ITEM

ACTION

REMARKS

ASSEMBLY (Continued).

CAUTION

Do not lift lower planetary carrier by ball bearing. Carrier may drop and be damaged.

2. Rear cover assembly (9).

- a. Install item (7) with bearing facing up into item (5). Carefully align the four items (7) with spline in item (5).
- b. Install item (8) onto item (9) and align holes.
- c. Attach item (19) to rear shaft of item (9).
- d. Using item (20), position item (9) over item (3).
- e. Slowly guide item (9) down onto item (3) keeping dowel pins in line with item (3).
- f. Install twenty-one items (10) and twenty-one items (11) into item (9).
- g. Install three items (13) and (12) into item (9).
- h. Install item (17) into item (9) by turning it counterclockwise.
- e. Install item (16) onto item (15).
- j. Install item (15) onto item (9) and retain it with four items (14).

Retain gasket with oil soluble grease.

Be sure rear collar is fully seated to item (3).

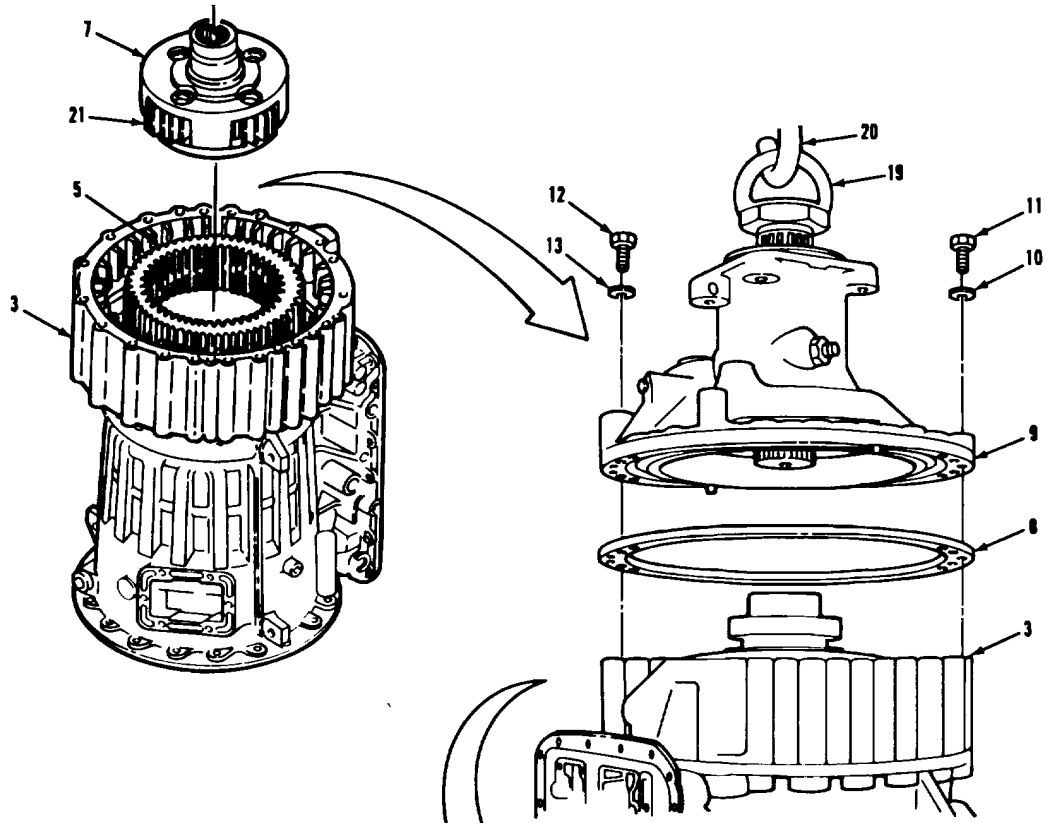
Torque all screws to 67-80 lb-ft.

Torque all screws to 67-80 lb-ft.

Torque all screws to 10-13 lb-ft.

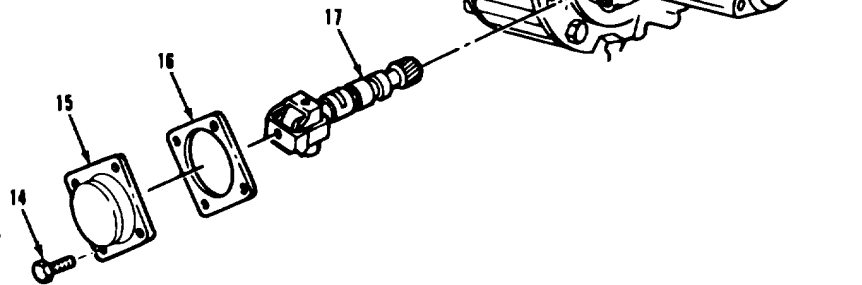
TRANSMISSION.

3-49. ADAPTER HOUSNG, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION
(Continued).



LEGEND:

- 3. ADAPTER HOUSING
- 5. LOW PLANETARY RING GEAR
- 7. LOW PLANETARY CARRIER ASSEMBLY
- 8. REAR COVER GASKET
- 9. REAR COVER ASSEMBLY
- 10. LOCKWASHER (21)
- 11. HEX HEAD SCREW (21)
- 12. HEX HEAD SCREW (3)
- 13. LOCKWASHER (3)
- 14. HEX HEAD SCREW (4)
- 15. GOVERNOR COVER
- 16. GOVERNOR COVER GASKET
- 17. GOVERNOR
- 19. SUITABLE LIFTING TOOL
- 20. HOIST
- 21. PINION GEAR (4)



TA 238296

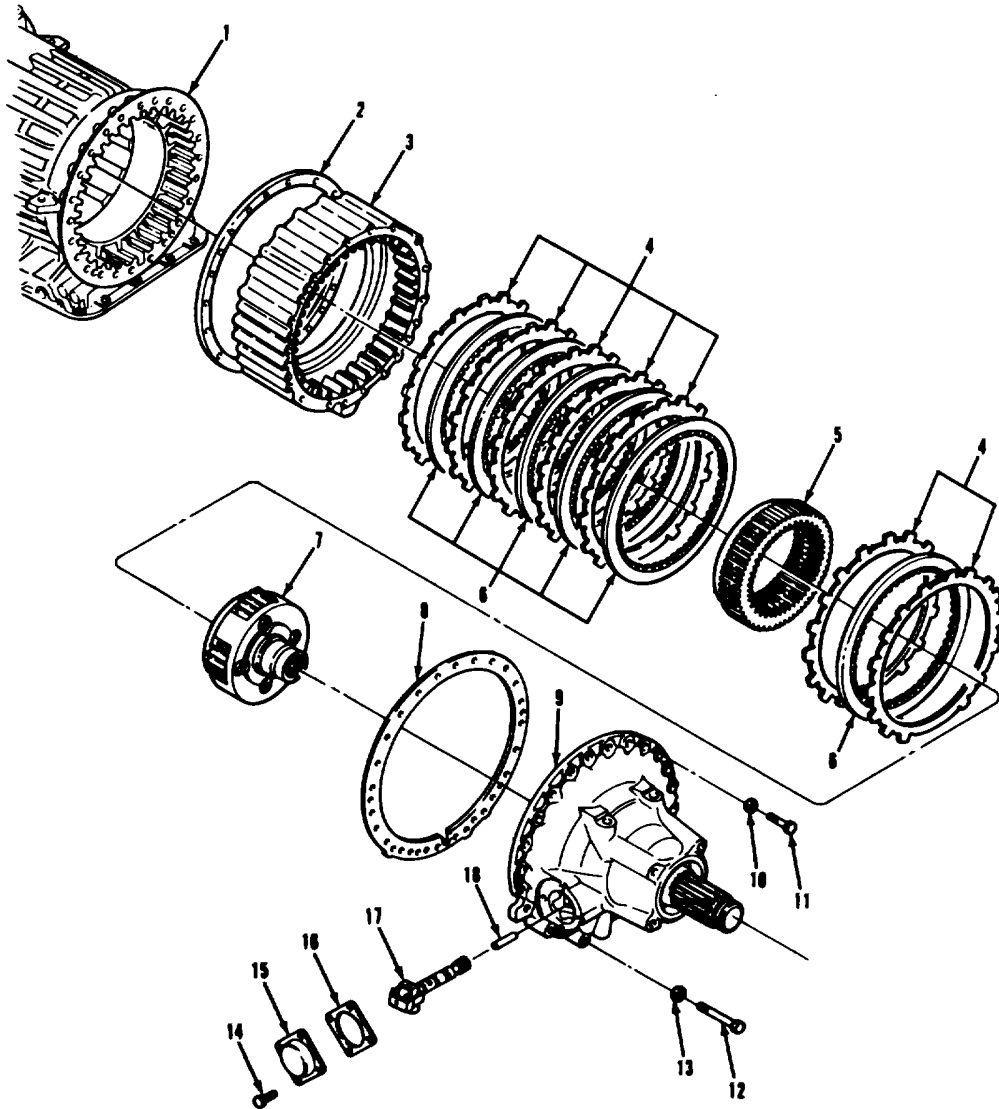
TRANSMISSION.

**3-49. ADAPTER HOUSING, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION.
(Continued).**

LOCATION/ITEM	ACTION	REMARKS
ASSEMBLY (Continued).		
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

TRANSMISSION.

3-49. ADAPTER HOUSNG, LOW-REVERSE CLUTCH, REAR COVER, AND GOVERNOR INSTALLATION
(Continued).



LEGEND:

- | | |
|--|---------------------------|
| 1. TRANSMISSION HOUSING | 9. REAR COVER ASSEMBLY |
| 2. ADAPTER HOUSING GASKET | 10. LOCKWASHER (21) |
| 3. ADAPTER HOUSING | 11. HEX HEAD SCREW (21) |
| 4. EXTERNALLY TOOTHED LOW AND REVERSE CLUTCH PLATE (7) | 12. HEX HEAD SCREW (3) |
| 5. LOW PLANETARY RING GEAR | 13. LOCKWASHER (3) |
| 6. INTERNALLY SPLINED LOW AND REVERSE CLUTCH PLATE (6) | 14. HEX HEAD SCREW (4) |
| 7. LOW PLANETARY CARRIER ASSEMBLY | 15. GOVERNOR COVER |
| 8. REAR COVER GASKET | 16. GOVERNOR COVER GASKET |
| | 17. GOVERNOR |

TA 238297

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION.

THIS TASK COVERS

Installation

INITIAL SETUP:

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION
PARAGRAPH

3-50.

CONDITION DESCRIPTION

Adapter housing, low-reverse clutch, rear cover, and gasket installed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Front clutch lifting fixture
(33287) J-24209.
Clutch rack clearance gage
(33287) J-24193.
Fourth clutch alinement fixture
(33287) J-24221.

MATERIALS/PARTS (P/N)

Oil, lubricating: OE/HDO-10
Item 16, Appendix B.
Grease, oil soluble
Item 9, Appendix B.
Kit, transmission overhaul
(73346) 6885217.

PERSONNEL REQUIRED

two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)-

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

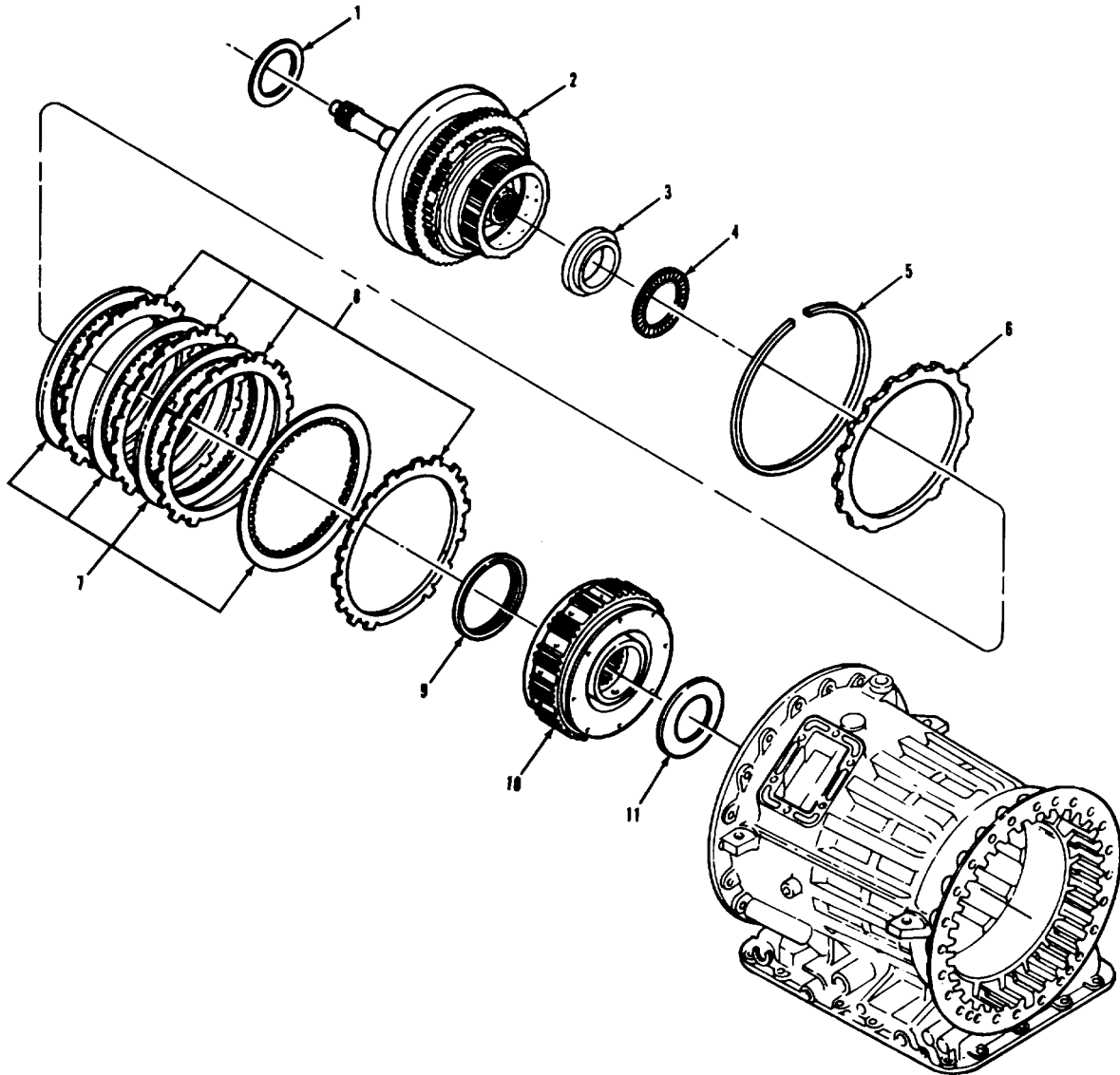
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).



LEGEND:

- | | |
|-------------------------------|--|
| 1. THRUST BEARING RACE | 7. INTERNALLY SPLINED THIRD CLUTCH PLATE (4) |
| 2. FORWARD CLUTCH ASSEMBLY | 8. EXTERNALLY TOOTHED THIRD CLUTCH PLATE (4) |
| 3. THRUST BEARING RACE | 9. THRUST BEARING RACE |
| 4. THRUST BEARING | 10. FOURTH CLUTCH ASSEMBLY |
| 5. SNAPRING (INTERNAL) | 11. THRUST BEARING RACE |
| 6. THIRD CLUTCH BACKING PLATE | |

TA 238298

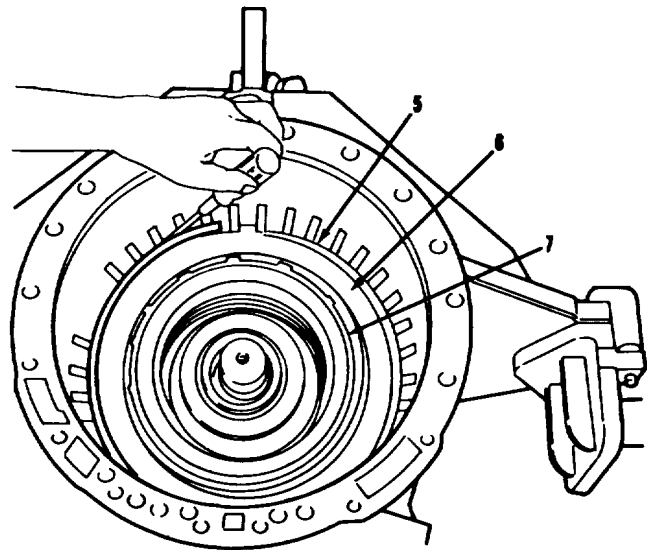
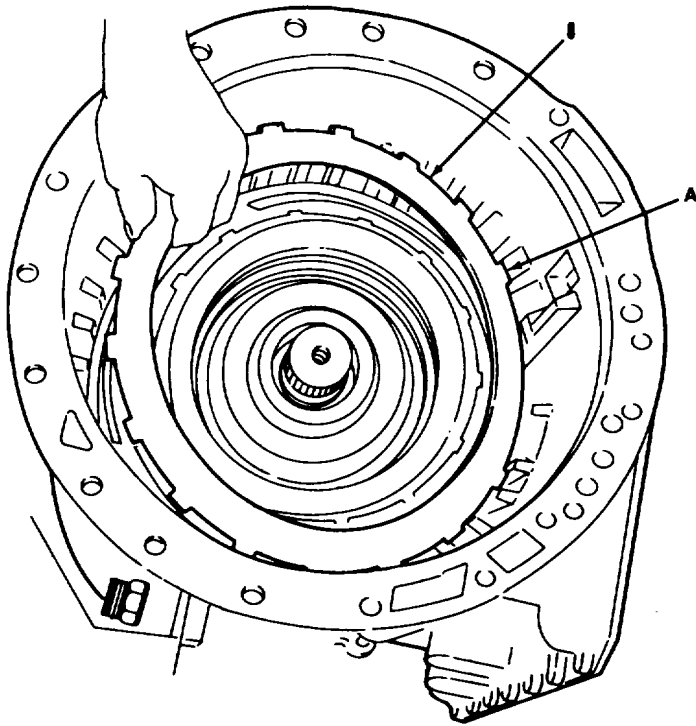
TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION.</u>		
1. Third clutch plates (7) and (8).	NOTE	
	<p>When installing externally toothed clutch plates, they must have a definite toothtoslot relation. Teeth must be installed into the shorter, narrower slots in transmission housing location A.</p>	
	<p>a. Alternately install four items (8) and four items (7) into transmission.</p>	<p>Start with item (8) first.</p>
	<p>b. Install item (6) into transmission.</p>	
	<p>c. Install item (5) into transmission. sion housing.</p>	<p>Be sure gap of item (5) is at top of transmis-</p>

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).



LEGEND:

- 5. SNAPPING (INTERNAL)
- 6. THIRD CLUTCH BACKING PLATE
- 7. INTERNALLY SPLINED THIRD CLUTCH PLATE (4)
- 8. EXTERNALLY TOOTHED THIRD CLUTCH PLATE (4)
- A. TOOTH AND SLOT LOCATION

TA 238299

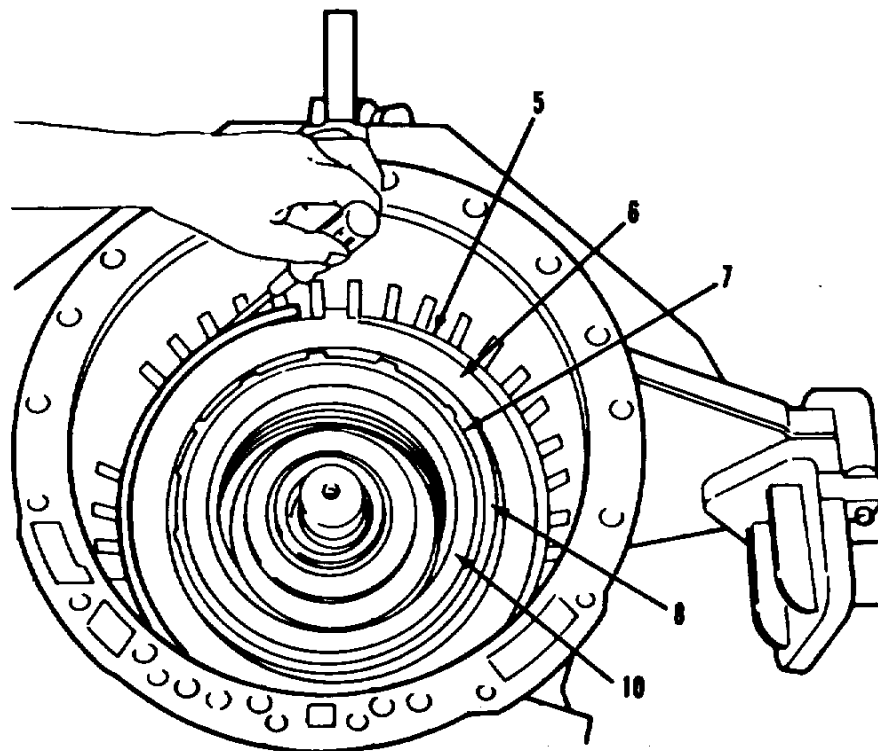
TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION (Continued).		
1. Third clutch plate (7) and (8) (continued). inch.	d. Check clutch clearance between item (5) and item (6).	Use tool No. J-24193. Clearance should be 0.060 to 0.120 of an
	e. If clearance is not satisfactory, remove item (10) and replace items (7) and (8) to obtain proper clearance.	Refer to para 3-47 for detailed clearance information.
	f. If clearance is satisfactory, remove items (5), (6), (7), and (8) from transmission.	
	g. Soak each item (7) in OE/HDO-10 lubricating oil for two minutes, then repeat installation steps 2a thru 2c only.	

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).



LEGEND:

- 5. SNAPRING (INTERNAL)
- 6. THIRD CLUTCH BACKING PLATE
- 7. INTERNALLY SPLINED THIRD CLUTCH PLATE (4)
- 8. EXTERNALLY TOOTHED THIRD CLUTCH PLATE (4)
- A. FOURTH CLUTCH ASSEMBLY

TA 238300

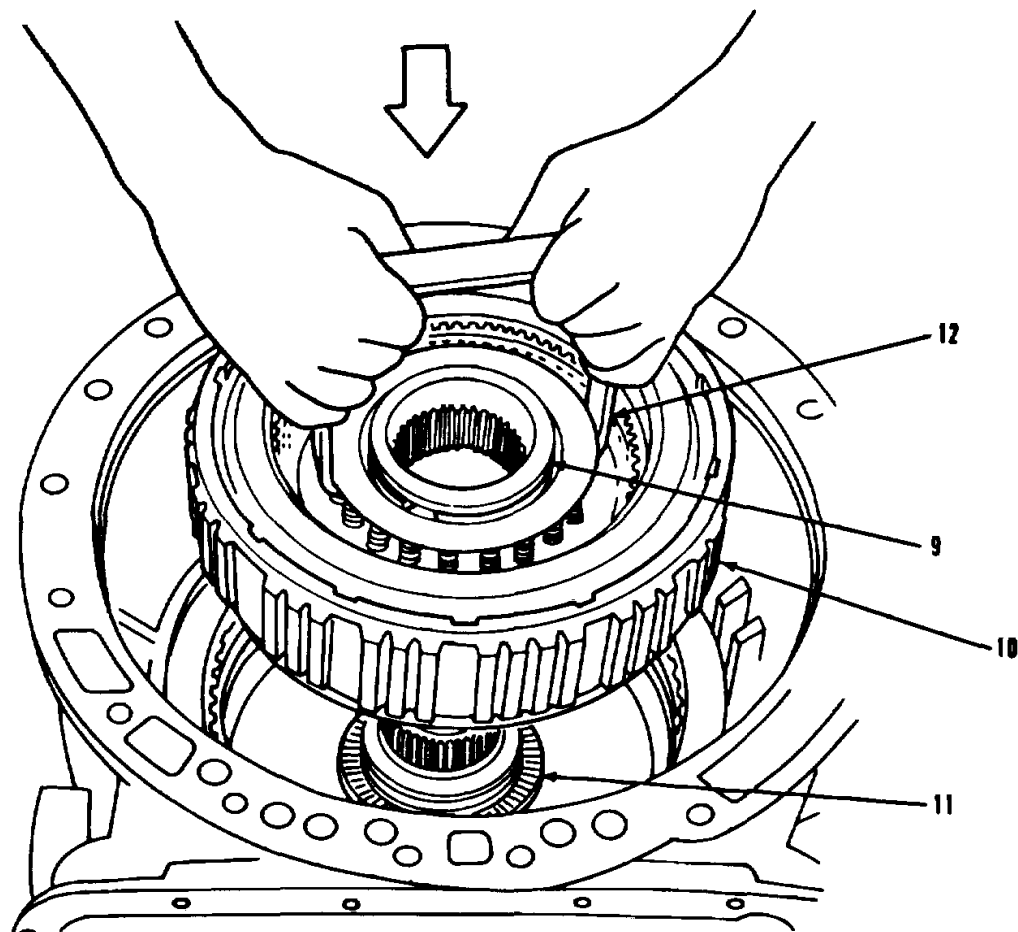
TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
NOTE		
Before installation of the fourth clutch assembly, be sure front and rear bearing assemblies are in place.		
2. Fourth clutch assembly (10).	a. Carefully align third clutch internal teeth. b. Using item (12), carefully lower item (10) into transmission.	Use tool number J-24209.
NOTE		
<ul style="list-style-type: none"> • Make sure splines on the fourth clutch assembly are engaged with splines on sun gear shaft. • Be sure fourth clutch is fully seated with inner splines and even with splines on the mainshaft. 		

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).



LEGEND:

- 9. THRUST BEARING RACE
- 10. FOURTH CLUTCH ASSEMBLY
- 11. THRUST BEARING
- 12. FRONT CLUTCH LIFTING FIXTURE

TA 238301

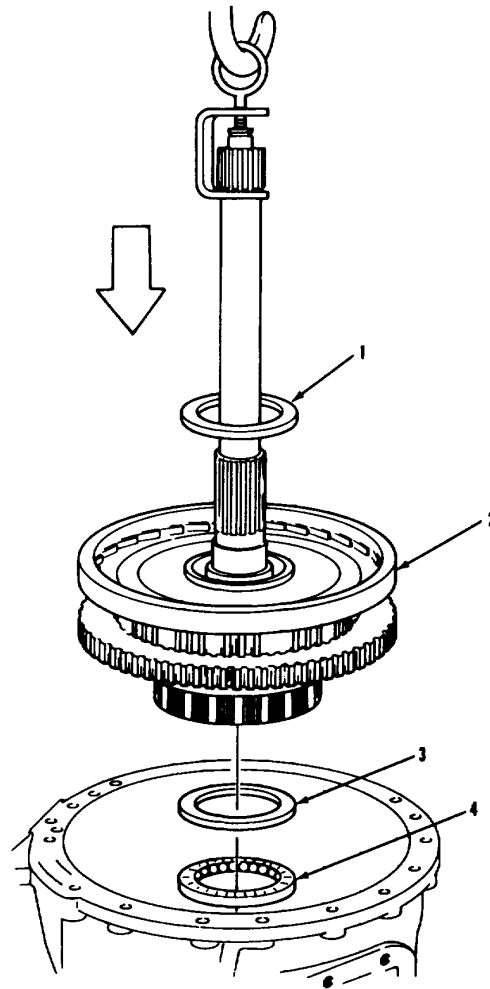
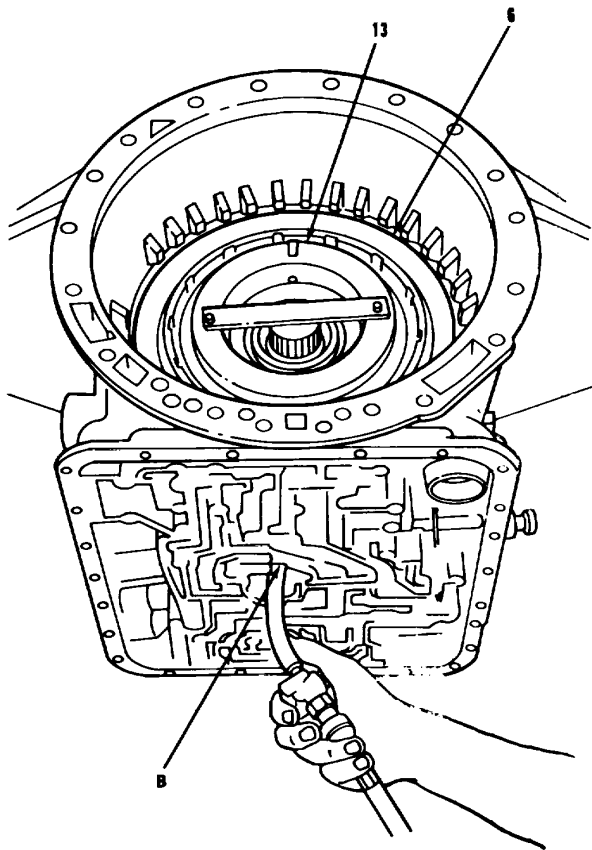
TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
3. Forward clutch assembly (2).	<p style="text-align: center;">WARNING</p> <p style="text-align: center;">Compressed air used for repair purposes will not exceed 30 psi. Use only with personal protective equipment (goggles/shield, gloves etc.)</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Make sure thrust bearing race assembly and thrust bearing at rear of forward clutch assembly are installed.</p>	
	a. Install item (13) and apply air pressure to fourth clutch piston at location (B). pressure is applied.	Use tool number J-24221. If all plates do not engage item (13), it will rise slightly when
	b. Hold air pressure at location (B) and remove item (13).	
	c. Install items (2), (3), and (4).	
	d. Release air pressure when item (2) is fully seated. released if it is not fully seated.	Item (2) will drop slightly when air is
	e. Make sure item (1) is installed on item (2).	Use oil soluble grease.
	f. Remove lifting tool from input shaft.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on maintenance action required:</p> <p style="text-align: center;">Proceed with transmission maintenance.</p>		

TRANSMISSION.

3-50. FOURTH, THIRD, AND FORWARD CLUTCH INSTALLATION (Continued).



END:

THRUST BEARING RACE
 FORWARD CLUTCH ASSEMBLY
 THRUST BEARING RACE

LEGEND:

- 1. THRUST BEARING RACE
- 2. FORWARD CLUTCH ASSEMBLY
- 3. THRUST BEARING RACE
- 4. THRUST BEARING
- 6. THIRD CLUTCH BACKING PLATE
- 13. FOURTH CLUTCH ALIGNMENT FIXTURE
- B. FOURTH CLUTCH PISTON OIL PASSAGE

TA 238302

TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continued).

THIS TASK COVERS

Installation.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION
PARAGRAPH

3-39.

CONDITION DESCRIPTION

Converter housing
repaired.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Converter housing alignment pin
(33287) J-1126-1.
Pilot tube
(33287) J-6889-1.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul
(73342) 6885217.

PERSONNEL REQUIRED

two (MOS-63W).
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

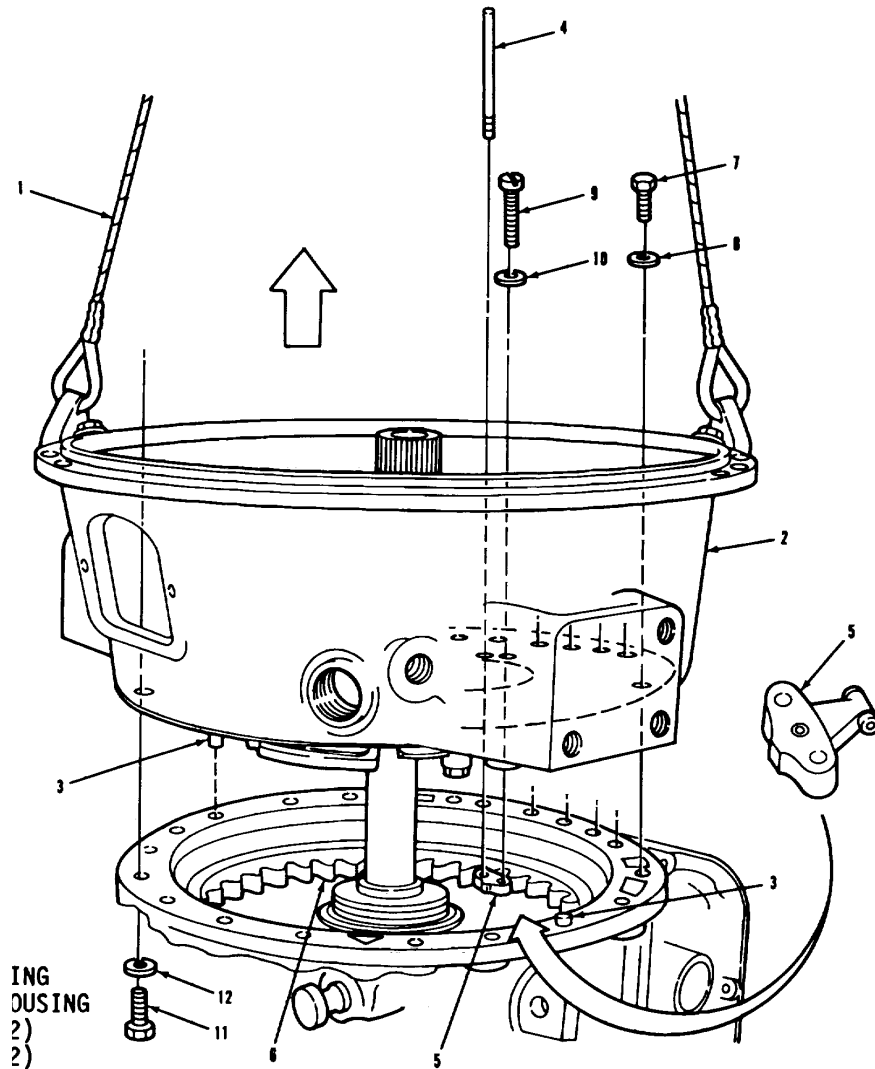
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continued).



LEGEND:

- 1. SUITABLE SLING
- 2. CONVERTER HOUSING
- 3. GUIDE PIN (2)
- 4. GUIDE PIN (2)
- 5. FRONT PITOT
- 6. OIL COLLECTOR RING
- 7. HEX SCREW (7)
- 8. LOCKWASHER (7)
- 9. MACHINE SCREW (2)
- 10. FLATWASHER (2)
- 11. HEX SCREW (11)
- 12. LOCKWASHER (11)

TA 238303

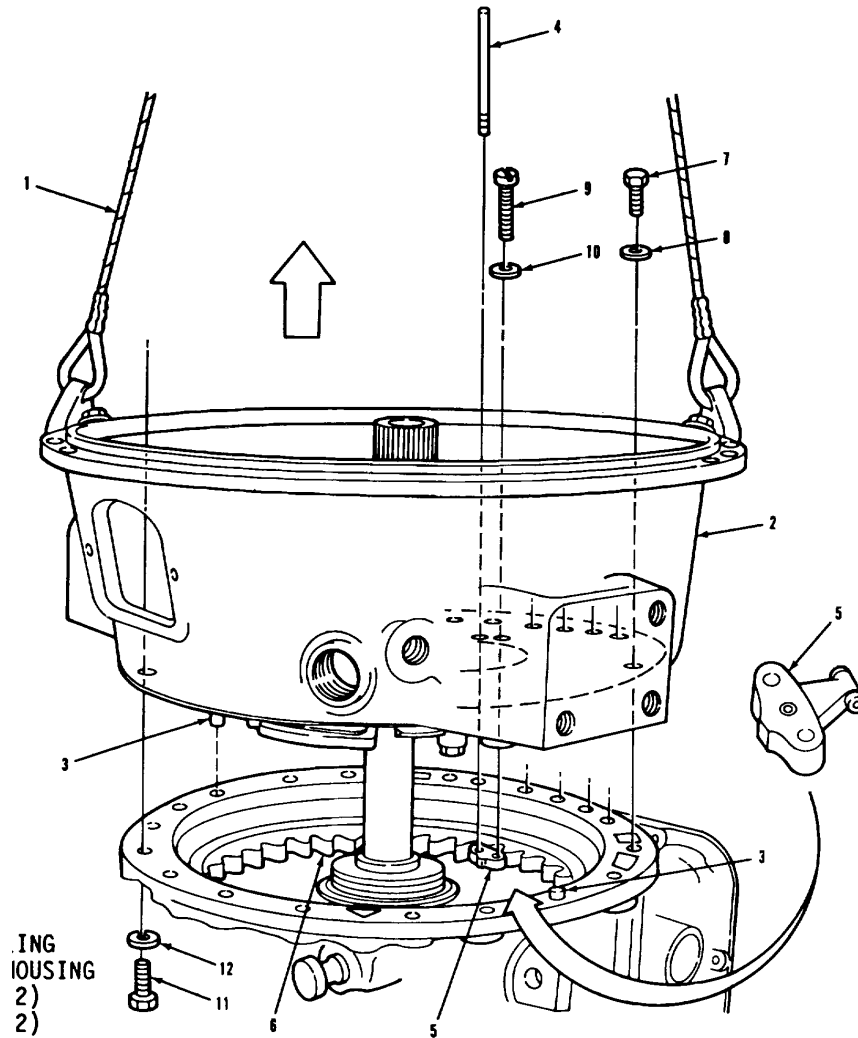
TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION.</u>		
CAUTION		
During installation all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
NOTE		
Be sure bearing race, thrust bearing, and two seal rings have been installed at rear of converter housing.		
1. Housing (2).	a. Attach item (1) to item (2) and raise above transmission.	
NOTE		
Two bolt cover in converter housing must be at the top of the transmission.		
	b. Install two items (3), (one into item (2) and one into transmission).	Use tool No. J-1126-1.
	c. Install two items (4) into top of item (5) and guide two items (4) when item (2) is being lowered on item (3). ward toward item (6).	Use tool No. J-6889-1. Exit port of item (5) must face upward toward item (2). Entrance port of item (5) faces out-
CAUTION		
Lower housing slowly onto transmission to avoid damage to front pitot and oil collector ring.		

TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continued).



LEGEND:

- 1. SUITABLE SLING
- 2. CONVERTER HOUSING
- 3. GUIDE PIN (2)
- 4. GUIDE PIN (2)
- 5. FRONT PITOT
- 6. OIL COLLECTOR RING
- 7. HEX SCREW (7)
- 8. LOCKWASHER (7)
- 9. MACHINE SCREW (2)
- 10. FLATWASHER (2)
- 11. HEX SCREW (11)
- 12. LOCKWASHER (11)

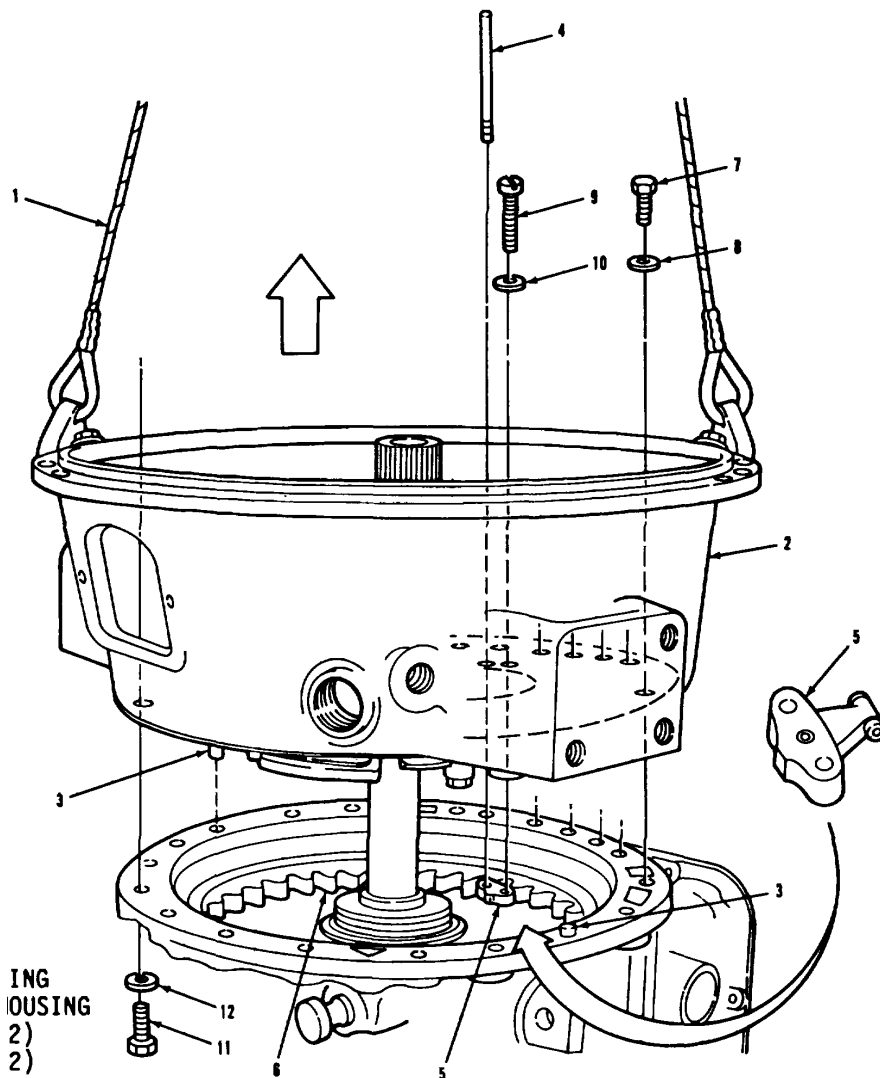
TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
1. Housing (2) (continued) and (8) into inside of item (2).	e. Remove one item (3) and install seven items (7)	
	f. Remove one item (4) from front item (5).	
	g. Install one item (9) and item (10) in place of item (4).	
	h. Remove other item (4) and replace with items (9) and 30-46 lb-in (10).	Torque items (9) to
NOTE		
Four converter housing hex screws and washers cannot be installed until holding fixture is removed.		
	i. Remove remaining item (3) and install seven items (11) and (12) through transmission into item (2).	Torque all items (7) and (11) to 67-80 lb-ft.

TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continue d).



LEGEND:

- 1. SUITABLE SLING
- 2. CONVERTER HOUSING
- 3. GUIDE PIN (2)
- 4. GUIDE PIN (2)
- 5. PITOT
- 6. OIL COLLECTOR RING
- 7. HEX SCREW (7)
- 8. LOCKWASHER (7)
- 9. MACHINE SCREW (2)
- 10. FLATWASHER (2)
- 11. HEX SCREW (11)
- 12. LOCKWASHER (11)

TRANSMISSION.

3-51. TORQUE CONVERTER HOUSING INSTALLATION (Continued).

THIS TASK COVERS

Installation.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

3-37 and 3-38.

CONDITION DESCRIPTION

Converter pump and stator repaired.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Remover and installer converter pump snapping (33287) J-26598.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul (73342) 6885217.

PERSONNEL REQUIRED

Two (MOS-63WJ).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

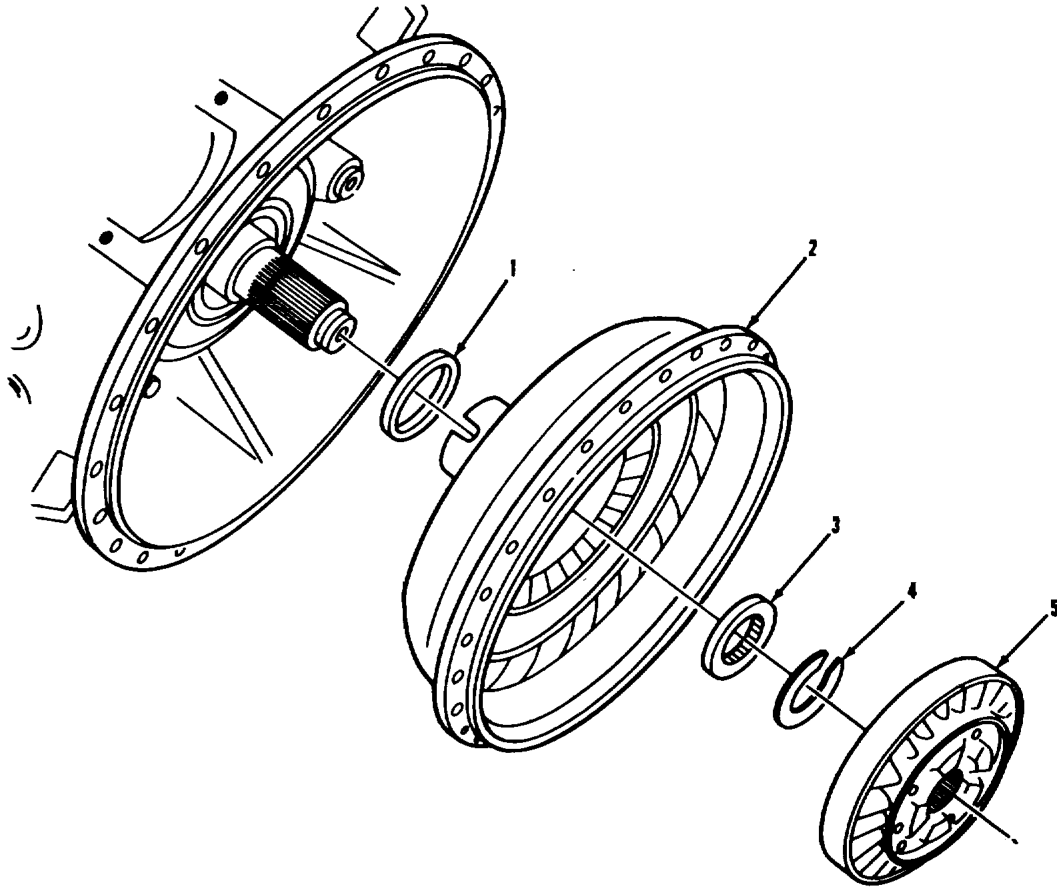
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-52. TORQUE CONVERTER PUMP AND STATOR INSTALLATION (Continued).



LEGEND:

- 1. SEAL RING
- 2. TORQUE CONVERTER PUMP ASSEMBLY
- 3. CONVERTER PUMP SPACER
- 4. SNAPRING
- 5. STATOR

TA 238306

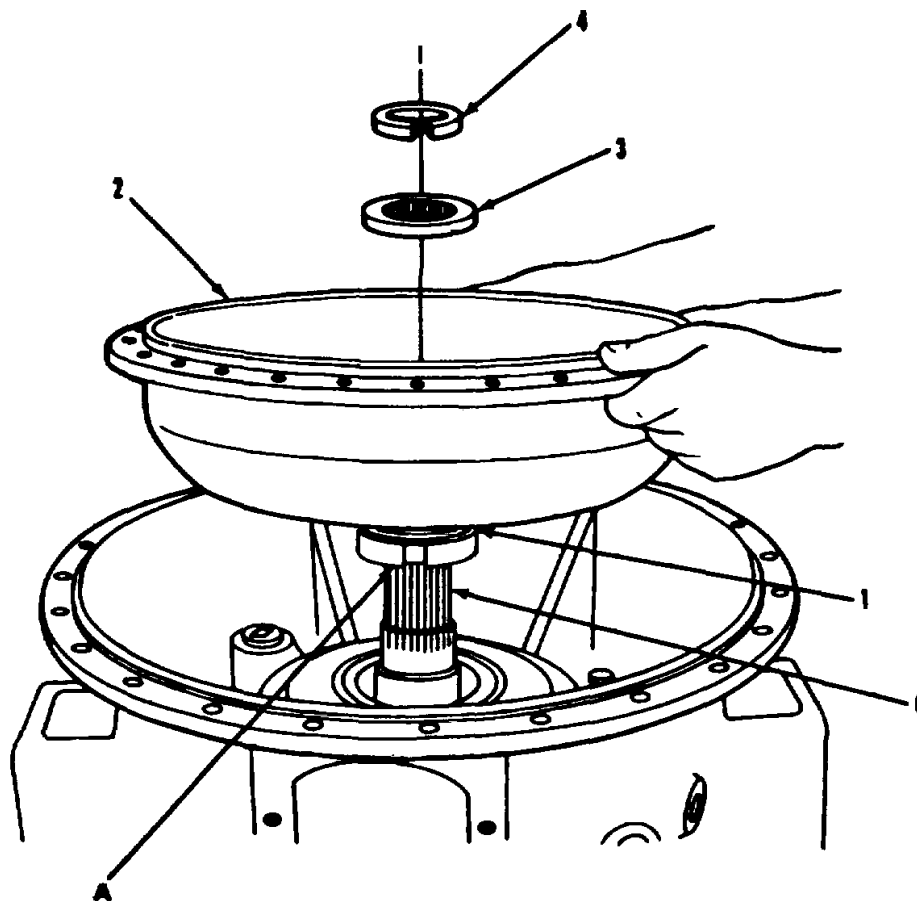
TRANSMISSION.

3-52. TORQUE CONVERTER PUMP AND STATOR INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION.</u>		
CAUTION		
During repair all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.		
1. Torque converter pump assembly (2). (2).	a. Be sure item (1) is installed on hub of item	Lubricate item (1).
NOTE		
Align slots (location A) in pump hub with tangs in drive gear as pump is being installed.		
	b. Install item (2) onto item (6).	
NOTE		
Since pump bearing is a press fit on the ground sleeve, it may be necessary to heat the hub and bearing area of pump assembly to 300°F with heated oil before installation.		
	c. Install item (3) onto item (6).	
	d. Install item (4).	Use tool number 26598A.

TRANSMISSION.

3-52. TORQUE CONVERTER PUMP AND STATOR INSTALLATION (Continued).



LEGEND:

- 1. SEAL RING
- 2. TORQUE CONVERTER PUMP ASSEMBLY
- 3. CONVERTER PUMP SPACER
- 4. SNAPRING
- 6. CONVERTER SLEEVE
- A. SLOT

TA 238307

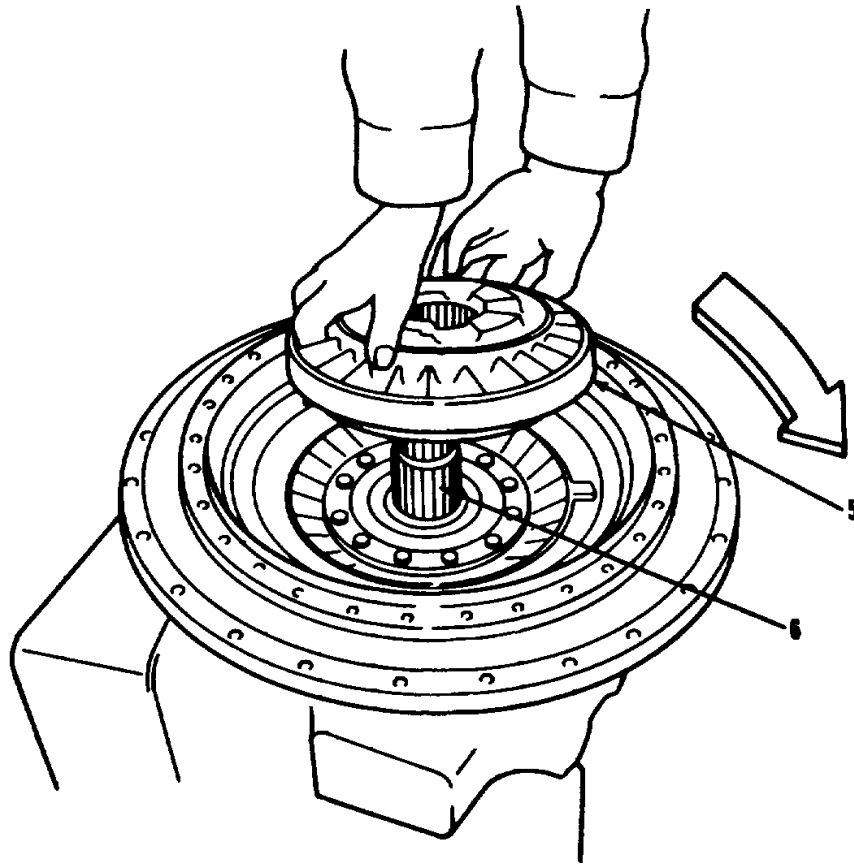
TRANSMISSION.

3-38. TORQUE CONVERTER PUMP REPAIR (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
CAUTION		
Use care to keep freewheel roller race from dropping out of stator and damaging parts.		
2. Stator assembly (5). item (6).	a. Install item (5) onto roller race down. b. Rotate item (5) clockwise to check for freedom of rotation.	Install with free wheel Item (5) should lock if counterclockwise rotation is attempted.
NOTE		
Follow-on maintenance action required:		
Proceed with transmission maintenance.		

TRANSMISSION.

3-52. TORQUE CONVERTER PUMP AND STATOR INSTALLATION (Continued).



LEGEND:

- 5. STATOR ASSEMBLY
- 6. CONVERTER SLEEVE

TA 238307

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION.

THIS TASK COVERS

Installation

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

PARAGRAPH

3-53.

EQUIPMENT CONDITION
CONDITION DESCRIPTION

Torque converter pump
and stator installed.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Guide pin (2)
(33287) J-24315-3.

MATERIALS/PARTS (P/N)

Kit, transmission overhaul
(73346) 6885217.

PERSONNEL REQUIRED

Two (MOS-63WJ.
dirt and dust.

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing

REFERENCES (TM)

TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

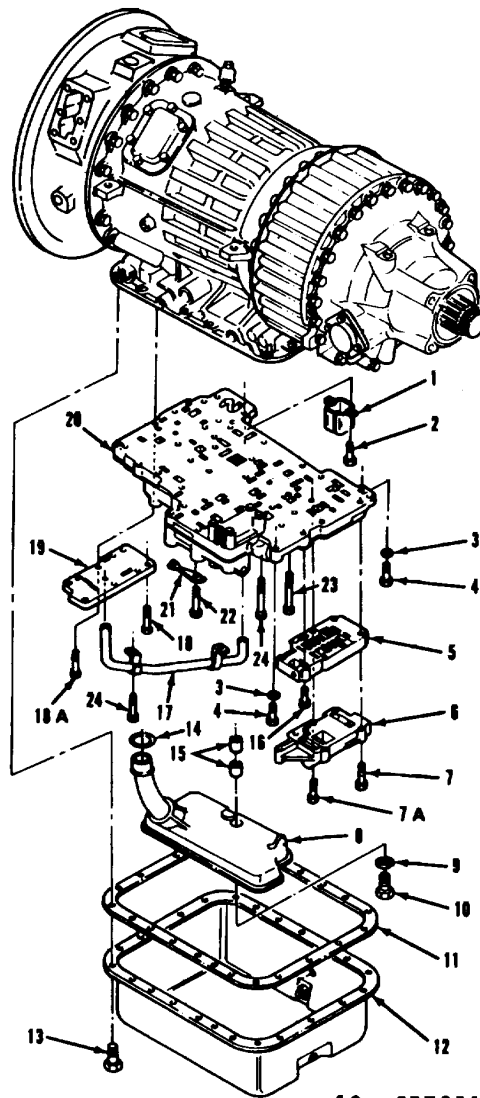
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).



LEGEND:

- | | |
|---------------------------|--|
| 1. OIL BAFFLE | 13. SPECIAL HEX WASHER HEAD SCREW (23) |
| 2. HEX HEAD SCREW (2) | 14. SEAL RING |
| 3. PLAIN WASHER (2) | 15. OIL FILTER SPACER |
| 4. HEX HEAD SCREW (2) | 16. HEX HEAD SCREW |
| 5. LOW SHIFT VALVE BODY | 17. SIGNAL TUBE |
| 6. LOW TRIMMER VALVE BODY | 18. HEX HEAD SCREW (8) |
| 7. HEX HEAD SCREW (6) | 19. COVER PLATE |
| 8. OIL FILTER | 20. CONTROL VALVE |
| 9. PLAIN WASHER | 21. DETENT ROLLER AND SPRING ASSEMBLY |
| 10. HEX HEAD SCREW | 22. HEX HEAD SCREW |
| 11. OIL PAN GASKET | 23. HEX HEAD SCREW (3) |
| 12. OIL PAN ASSEMBLY | 24. HEX HEAD SCREW (18) |

TA 238309

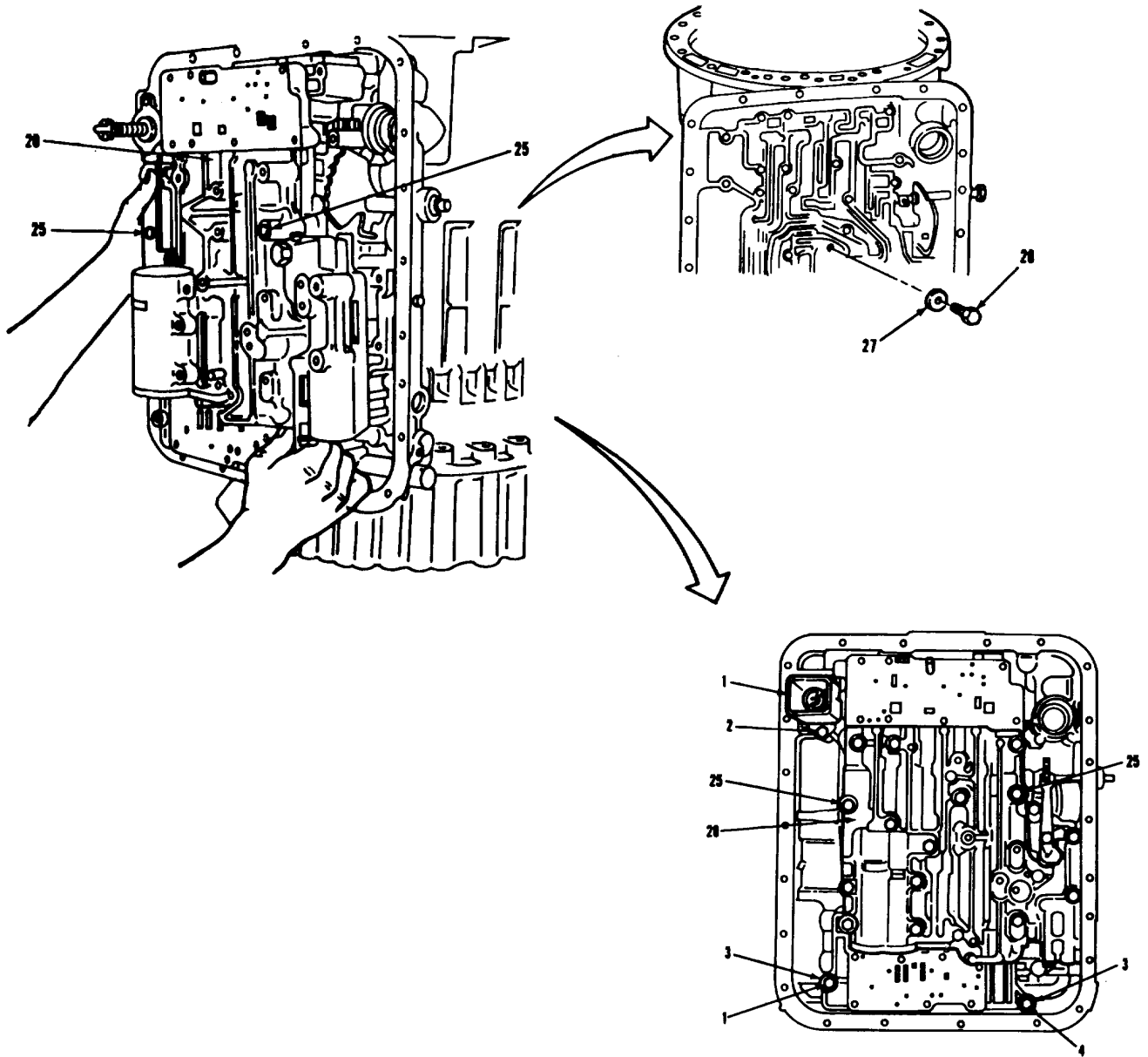
TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION.</u>		
1. Valve (20).		
<u>CAUTION</u>		
<p>During installation all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.</p>		
	a. Install item (26) and item (27) and torque item (26) to 39-46 lb-ft.	
	b. Position transmission horizontally with valve body mounting surface up.	Do not let stator drop.
	c. Install two items (25) at location shown in transmission housing.	Use tool No. J-24315-3.
<u>NOTE</u>		
<p>The groove in selector valve must engage on pin selector lever.</p>		
	d. Install item (20) into transmission housing using two items (25) for support.	
	e. Install item (1) and retain with two items (2).	Use one and one-half inch long screws.
	f. Install two items (3) and (4).	Use one and one-half inch long screws.

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).



LEGEND:

- 1. OIL BAFFLE
- 2. HEX HEAD SCREW (2)
- 3. PLAIN WASHER (2)
- 4. HEX HEAD SCREW (2)
- 20. CONTROL VALVE
- 25. GUIDE PIN (2)
- 26. HEX HEAD SCREW
- 27. PLAIN WASHER

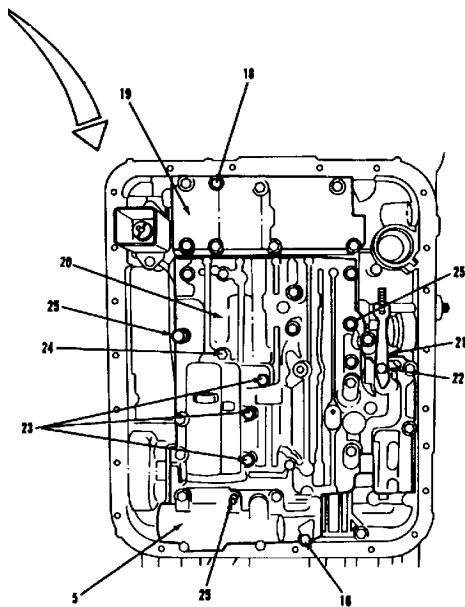
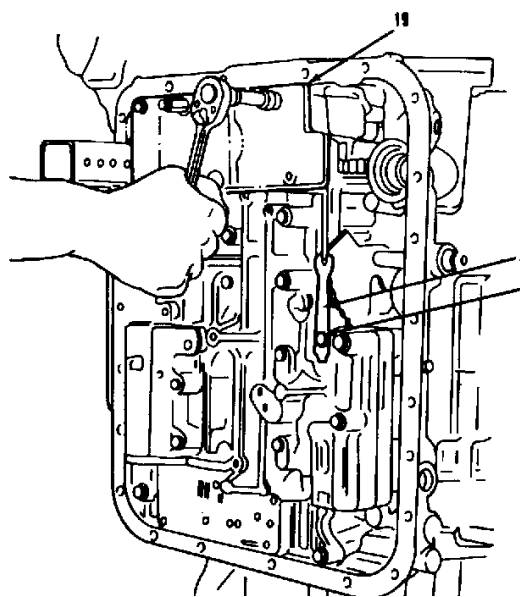
TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
1. Valve (20) (continued). housing. (25).	g. Install eleven items (24) through item (20) and into Remove two items	Use three inch long screws.
	h. Install two items (24) into item (20) where items (25) were removed.	Use three inch long screw.
	i. Install three items (23). inch long screws.	Use three and one half
	J. Install item (21) and retain with item (22).	Use two and one half inch long screw.
	k. Install item (19), and retain with eight items (18), and tighten to 9-11 lb-ft.	Use two inch long screws.
	l. Install item (5) using item (25) as a support and retain with one item (16).	Use two and three quarter inch long screw.

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).



LEGEND:

- 5. LOW SHIFT VALVE BODY
- 16. HEX HEAD SCREW
- 18. HEX HEAD SCREW (8)
- 19. COVER PLATE
- 20. CONTROL VALVE
- 21. DETENT ROLLER AND SPRING ASSEMBLY
- 22. HEX HEAD SCREW
- 23. HEX HEAD SCREW (3)
- 24. HEX HEAD SCREW (15)
- 25. GUIDE PIN (2)

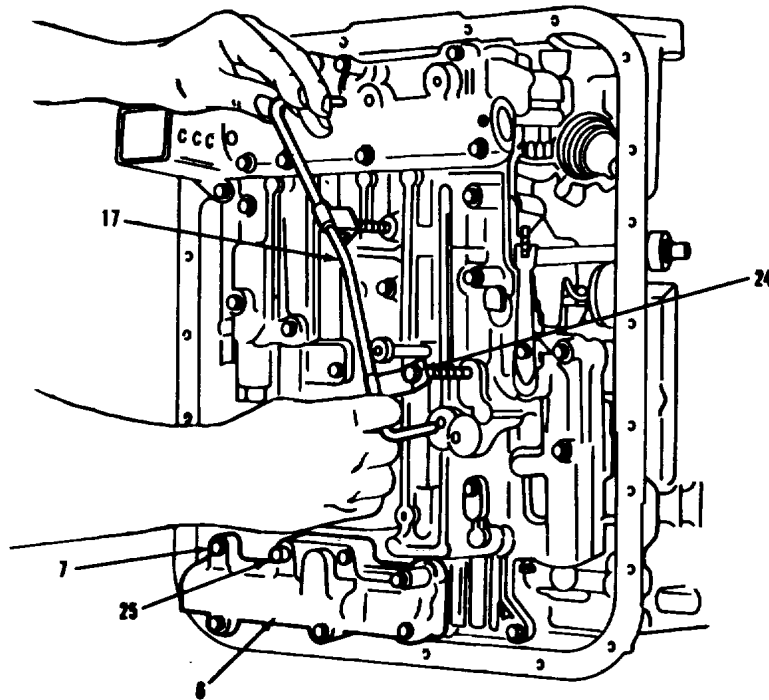
TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
1. Valve (20) (continued). (7).	m. Install item (6) and retain with five items	Use four inch long screws.
	n. Remove item (25) and install remaining items (7).	Use tool number J-24203.
	o. Torque all items (7) of item (6) to 9-11 lb-ft.	
	p. Install item (17) and secure with two items (24).	Use three inch long screws.

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).



LEGEND:

- 6. LOW TRIMMER VALVE BODY
- 7. HEX HEAD SCREW (6)
- 17. SIGNAL TUBE
- 24. HEX HEAD SCREW (15)
- 25. GUIDE PIN

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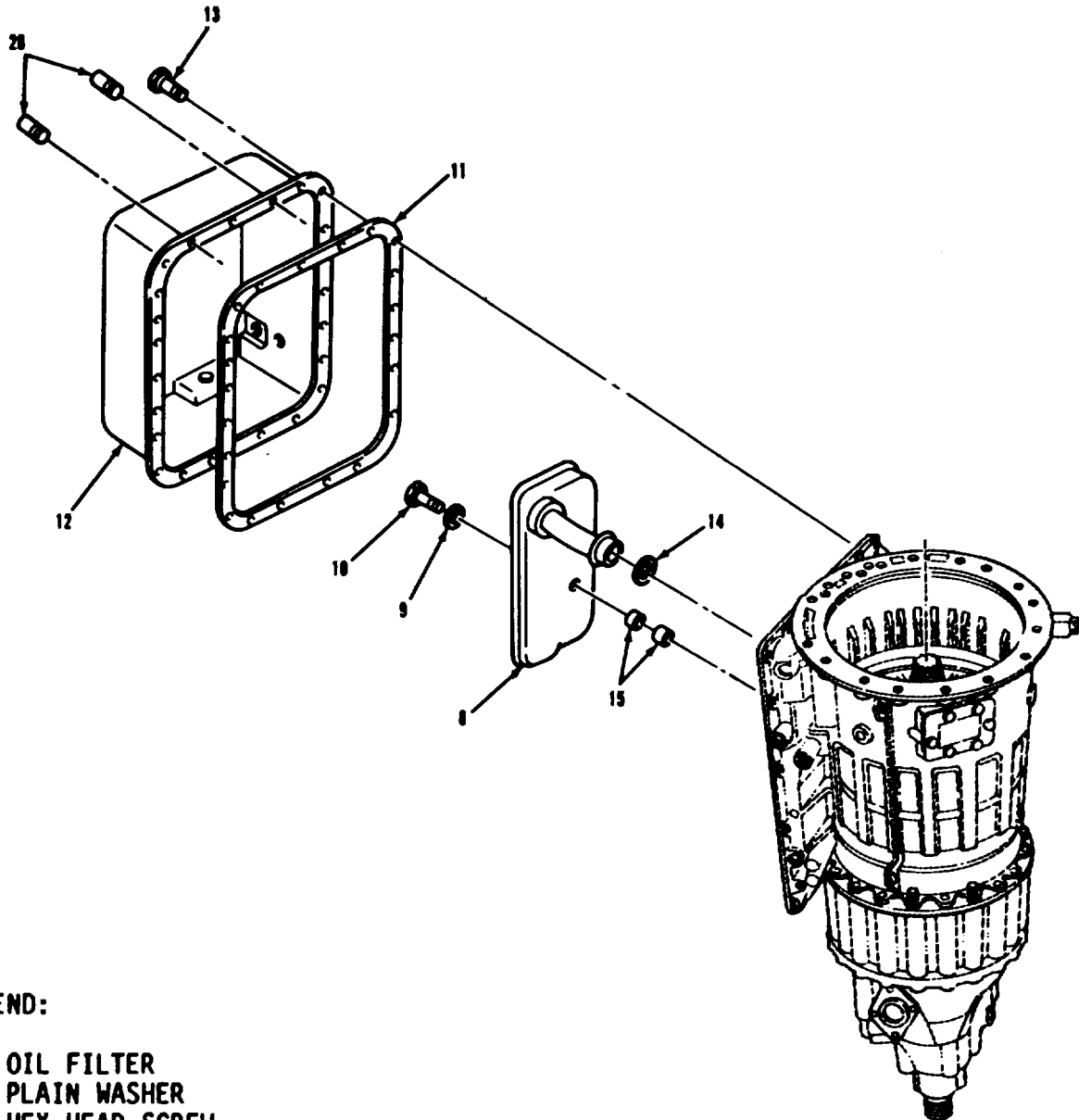
TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
2. Filter (8) and oil pan assembly (12).	a. Install item (14). soluble grease.	Lubricate with oil
	b. Install item (8) snugly into housing.	Do not twist filter during installation.
	c. Retain item (8) with item (10), item (9), and two items (15).	
	d. Torque item (10) to 10-13 lb-ft.	
	e. Install two items (28) into top of transmission housing.	Use tool number J-3387-2.
	f. Install new item (11) over items (28), aligning all holes.	
	g. Install item (12) and retain with twenty-three items (13).	Remove guide pins.
	h. Torque items (13) evenly to 10-13 lb-ft.	

TRANSMISSION.

3-53. VALVE BODY AND OIL PAN INSTALLATION (Continued).



LEGEND:

- 8. OIL FILTER
- 9. PLAIN WASHER
- 10. HEX HEAD SCREW
- 11. OIL PAN GASKET
- 12. OIL PAN ASSEMBLY
- 13. SPECIAL HEX WASHER HEAD SCREW (23)
- 14. SEAL RING
- 15. OIL FILTER SPACER (2)
- 28. GUIDE PIN TOOL (2)

TA 238313

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION.

THIS TASK COVERS

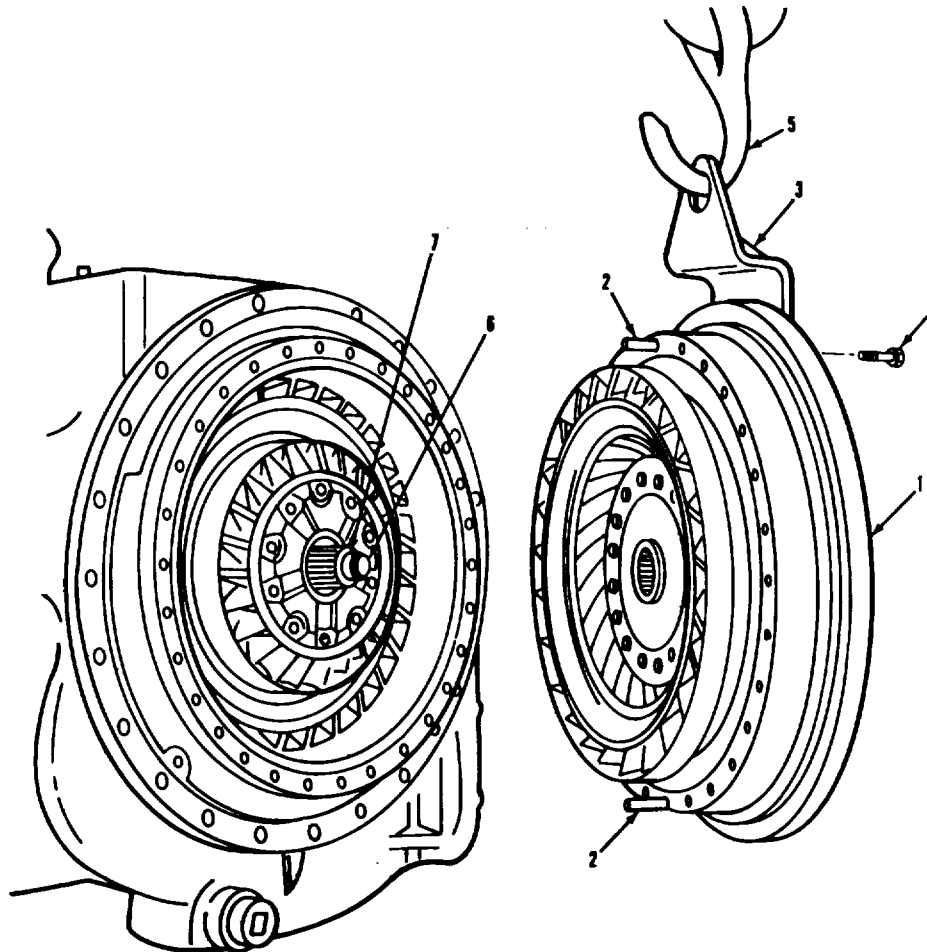
Installation.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION DESCRIPTION</u>
All. installed.	3-54.	Valve body and oil pan
<u>TEST EQUIPMENT</u> None.		
<u>SPECIAL TOOLS</u> Guide pin (33287) J-24315-2. Lifting tool (33287) J-24365.		
<u>MATERIALS/PARTS (P/N)</u> Kit, transmission overhaul (73342) 6885217.		
<u>PERSONNEL REQUIRED</u> Two (MOS-63W).	<u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing dirt and dust.	
<u>REFERENCES (TM)</u> TM 9-2320-283-34P.	<u>GENERAL SAFETY INSTRUCTIONS</u> None.	
<u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.		

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).



LEGEND:

- 1. FLYWHEEL ASSEMBLY
- 2. GUIDE PIN (2)
- 3. LIFTING BRACKET
- 4. HEX HEAD SCREW
- 5. SUITABLE HOIST
- 6. SEAL RING
- 7. INPUT SHAFT

TA 238314

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).

LOCATION/ITEM

ACTION

REMARKS

INSTALLATION.

CAUTION

During installation all parts must be handled with care to avoid nicking, scratching, or denting. Close fitting parts can bind if damaged or scratched.

1. Flywheel assembly (1) and shaft (7).

a. Position transmission horizontally with two bolt cover up.

b. Place item (1) down on table and install two items (2) into item (1) mounting holes.

Use tool number J-24315-2. Select two mounting holes directly across from each other.

c. Lift item (1) to a vertical position and attach item (3) opposite one item (2) with two items (4).

Use tool number J-24365.

CAUTION

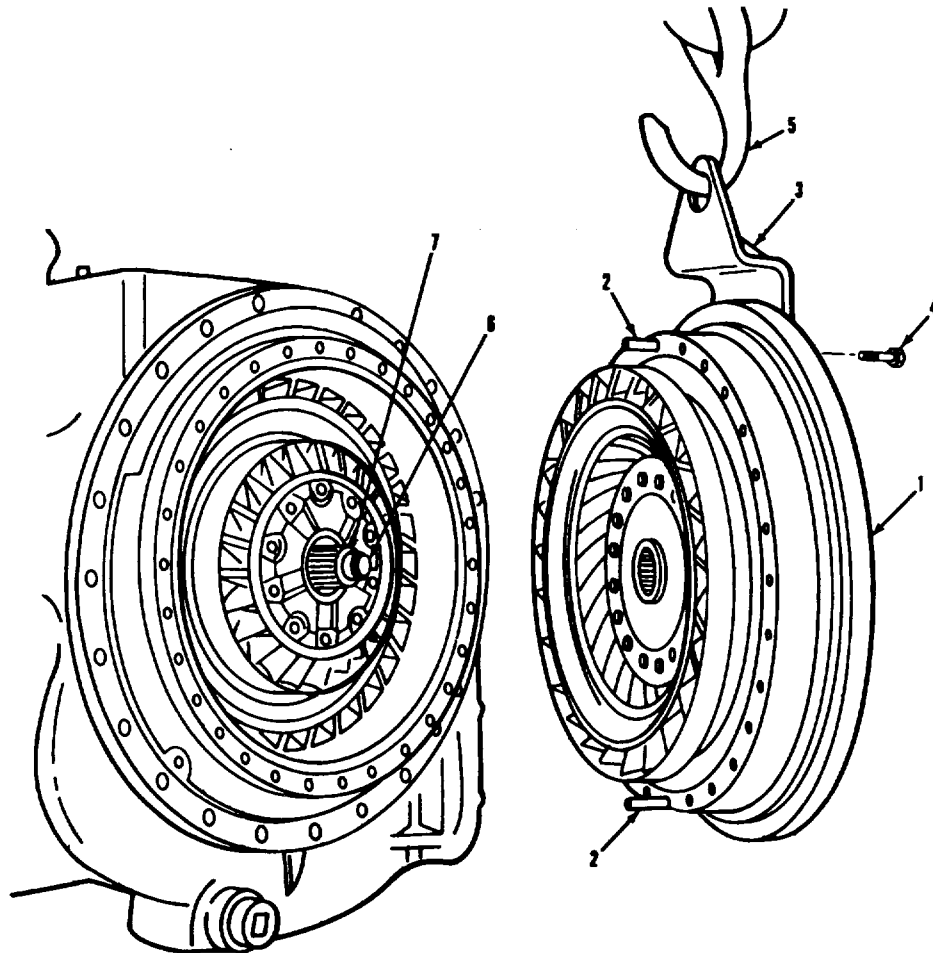
Use care to prevent turbine from dropping off flywheel assembly.

d. Attach item (5) to item (3).

e. Be sure item (6) is in place at end of item (7).

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).



LEGEND:

- 1. FLYWHEEL ASSEMBLY
- 2. GUIDE PIN (2)
- 3. LIFTING BRACKET
- 4. SUITABLE HOIST
- 6. SEAL RING
- 7. INPUT SHAFT

TA 238318

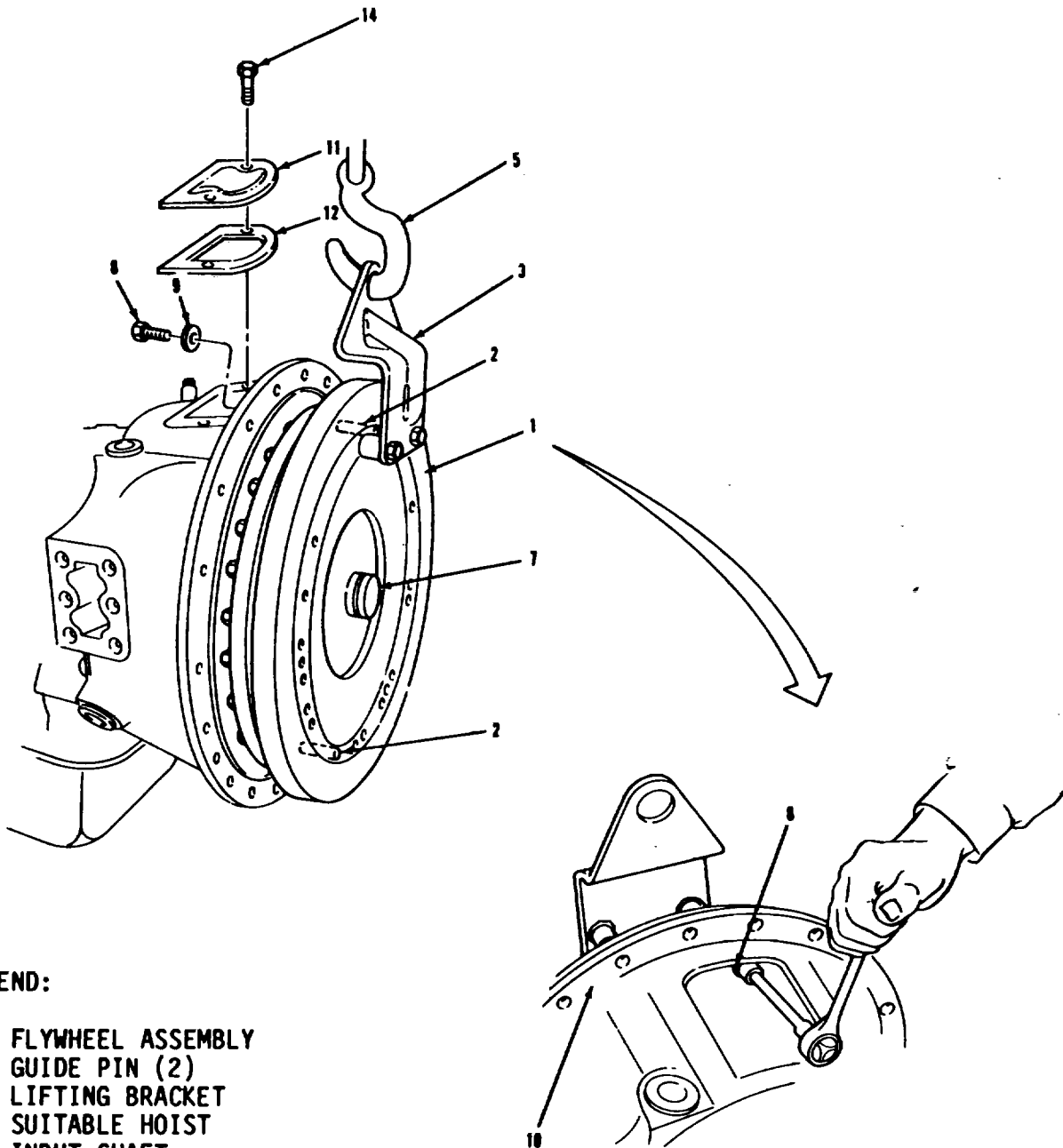
TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION (Continued).</u>		
1. Flywheel assembly and shaft (7) mission. (continued).	f. Aline item (1) with trans-	
	g. Push item (1) straight onto transmission, alining item (2) with mounting holes.	
	h. Install one item (8) and item (9) through item (10) into item (1).	Tighten finger tight.
	i. Release item (5) and remove item (3).	
	j. Install remaining twenty-nine items (8) and items (9) and remove two items (2).	
	k. Torque item (8) to 41-49 lb-ft.	
	l. Install items (11), (12), and two items (14).	

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).



LEGEND:

- 1. FLYWHEEL ASSEMBLY
- 2. GUIDE PIN (2)
- 3. LIFTING BRACKET
- 5. SUITABLE HOIST
- 7. INPUT SHAFT
- 8. HEX HEAD SCREW (30)
- 9. WASHER (30)
- 10. CONVERTER HOUSING
- 11. CONVERTER ACCESS COVER
- 12. CONVERTER ACCESS COVER GASKET
- 14. HEX HEAD SCREW (2)

TA 238318

TRANSMISSION.

3-55. MODULATOR RETAINER AND VALVE SPACER INSTALLATION.

THIS TASK COVERS

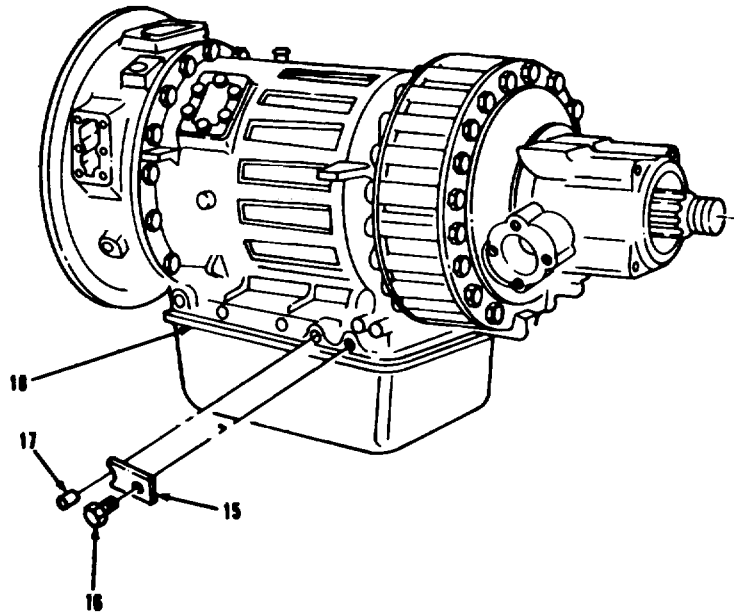
Installation.

INITIAL SETUP

<p><u>APPLICABLE CONFIGURATIONS</u> All.</p>	<p><u>EQUIPMENT CONDITION PARAGRAPH</u> 3-54.</p>	<p><u>CONDITION DESCRIPTION</u> Flywheel and turbine installed.</p>
<p><u>TEST EQUIPMENT</u> None.</p>		
<p><u>SPECIAL TOOLS</u> None.</p>		
<p><u>MATERIALS/PARTS (P/N)</u> None.</p>		
<p><u>PERSONNEL REQUIRED</u> One (MOS-63W).</p>	<p><u>SPECIAL ENVIRONMENTAL CONDITIONS</u> Work area clean and away from blowing dirt and dust.</p>	
<p><u>REFERENCES (TM)</u> TM 9-2320-283-34P.</p>	<p><u>GENERAL SAFETY INSTRUCTIONS</u> None.</p>	
<p><u>TROUBLESHOOTING REFERENCES</u> Paragraph 2-7.</p>		

TRANSMISSION.

3-55. MODULATOR RETAINER AND VALVE SPACER INSTALLATION (Continued).



LEGEND:

- 15. MODULATOR RETAINER
- 16. HEX HEAD SCREW
- 17. VALVE SPACER
- 18. TRANSMISSION

TA 238317

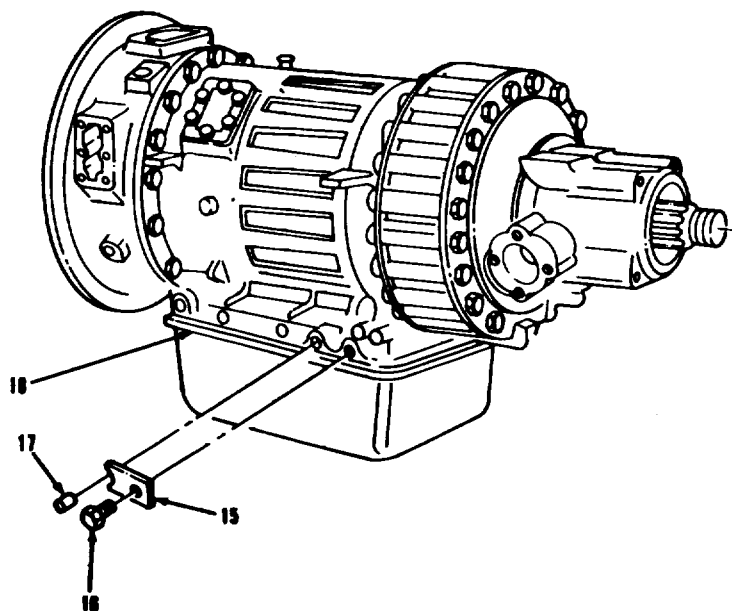
TRANSMISSION.

3-55. MODULATOR RETAINER AND VALVE SPACER INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>INSTALLATION.</u>		
1. Spacer (17).	Install in hole of item (18) using needle nose pliers.	
2. Retainer (5).	Position above hole on item (18) and secure with item (16).	
NOTE		
Follow-on maintenance action required:		
Remove transmission from holding fixture (para 3-28).		

TRANSMISSION.

3-55. MODULATOR RETAINER AND VALVE SPACER INSTALLATION (Continued).



LEGEND:

- 15. MODULATOR RETAINER
- 16. HEX HEAD SCREW
- 17. VALVE SPACER
- 18. TRANSMISSION

TA 230318

TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT.

THIS TASK COVERS

- a. Testing.
- b. Adjustment.

INITIAL SETUP

APPLICABLE CONFIGURATIONS

All.

EQUIPMENT CONDITION

PARAGRAPH

None.

CONDITION DESCRIPTION

None.

TEST EQUIPMENT

None.

SPECIAL TOOLS

Valve adjusting ring tool (1)
(33287) J-24314.

MATERIALS/PARTS (P/N)

None.

PERSONNEL REQUIRED

Two (MOS-63W).

SPECIAL ENVIRONMENTAL CONDITIONS

Work area clean and away from blowing dirt and dust.

REFERENCES (TM)

TM 9-2320-283-10.
TM 9-2320-283-20.
TM 9-2320-283-34P.

GENERAL SAFETY INSTRUCTIONS

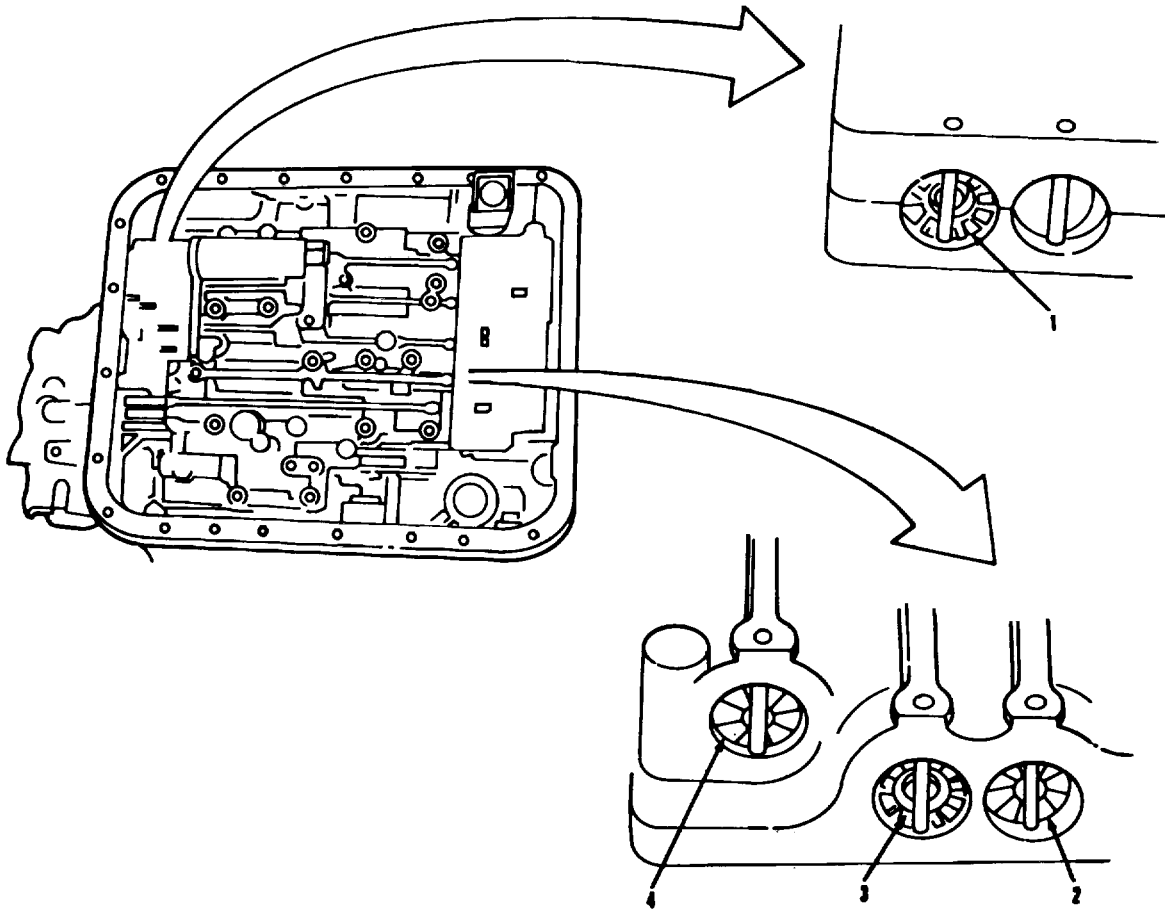
None.

TROUBLESHOOTING REFERENCES

Paragraph 2-7.

TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT (Continued).



LEGEND:

- 1. FIRST TO SECOND ADJUSTING RING
- 2. FOURTH TO FIFTH ADJUSTING RING
- 3. THIRD TO FOURTH ADJUSTING RING
- 4. SECOND TO THIRD ADJUSTING RING

TA 238319

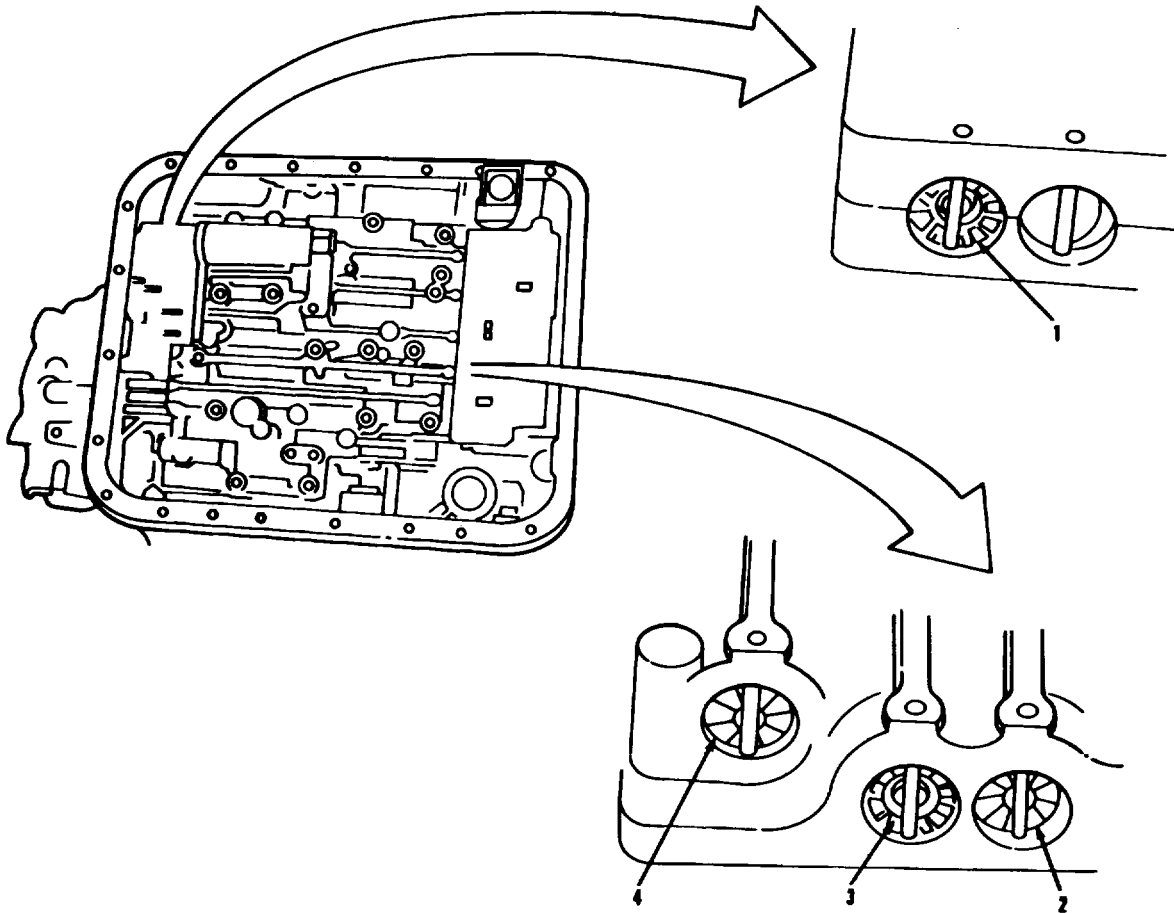
TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT(Continued).

LOCATION/ITEM	ACTION	REMARKS
<u>A. TESTING.</u>		
NOTE		
<ul style="list-style-type: none"> • This is a road test. Refer to TM 9-2320-283-10 for operation of vehicle. • Before doing this test check shift connect control cable and modulator control adjustments. Refer to TM 92320-283-20). • An accurate tachometer is required for this test. To check tachometer refer to TM 9-2320-283-20. 		
1. Vehicle.	a. Bring transmission oil temperature to normal operating range. b. Put gear selector in 1-5. c. From full stop, press accelerator pedal fully to floor. Continued until transmission shifts into fifth gear.	Normal range is between 120° and 220° F. Assistant notes engine RPM when each shift occurs. Each shift should occur at 2100 rpm. If all shifts occur at 2100 rpm go to follow-on maintenance.
<u>B. ADJUSTMENT.</u>		
2. Transmission oil pan.	Remove.	Refer to TM 9-2320-283-20.
3. Internal oil filter.	Remove.	Refer to TM 9-2320-283-20.
3-552		

TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT (Continued).



LEGEND:

- 1. FIRST TO SECOND ADJUSTING RING
- 2. FOURTH TO FIFTH ADJUSTING RING
- 3. THIRD TO FOURTH ADJUSTING RING
- 4. SECOND TO THIRD ADJUSTING RING

TA 238320

TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT (Continued).

LOCATION/ITEM

ACTION

REMARKS

B. ADJUSTMENT (Continued).

NOTE

- **If engine RPM's are too high turn adjusting ring counterclockwise. If engine RPM's are too low turn adjusting ring clockwise.**
- **Only make adjustments for shifts that do not occur at 2100 rpm.**

4. Ring (1).	Push in and turn with valve adjusting ring tool.	Use tool No. J-24314. Each notch will change shift point 10 rpm.
5. Ring (4).	Push in and turn with valve adjusting ring tool.	Each notch will change 3l, shift point 10 rpm.
6. Ring (3).	Push in and turn with valve adjusting ring tool.	Each notch will change shift point 25 rpm.
7. Ring (2).	Push in and turn with valve adjusting ring tool.	Each notch will change shift point 35 rpm.
8. Internal oil filter.	Install.	Refer to TM 9-2320-283-20.
9. Transmission oil pan.	Install.	Refer to TM 9-2320-283-20.
10. Vehicle.	Repeat step 1.	

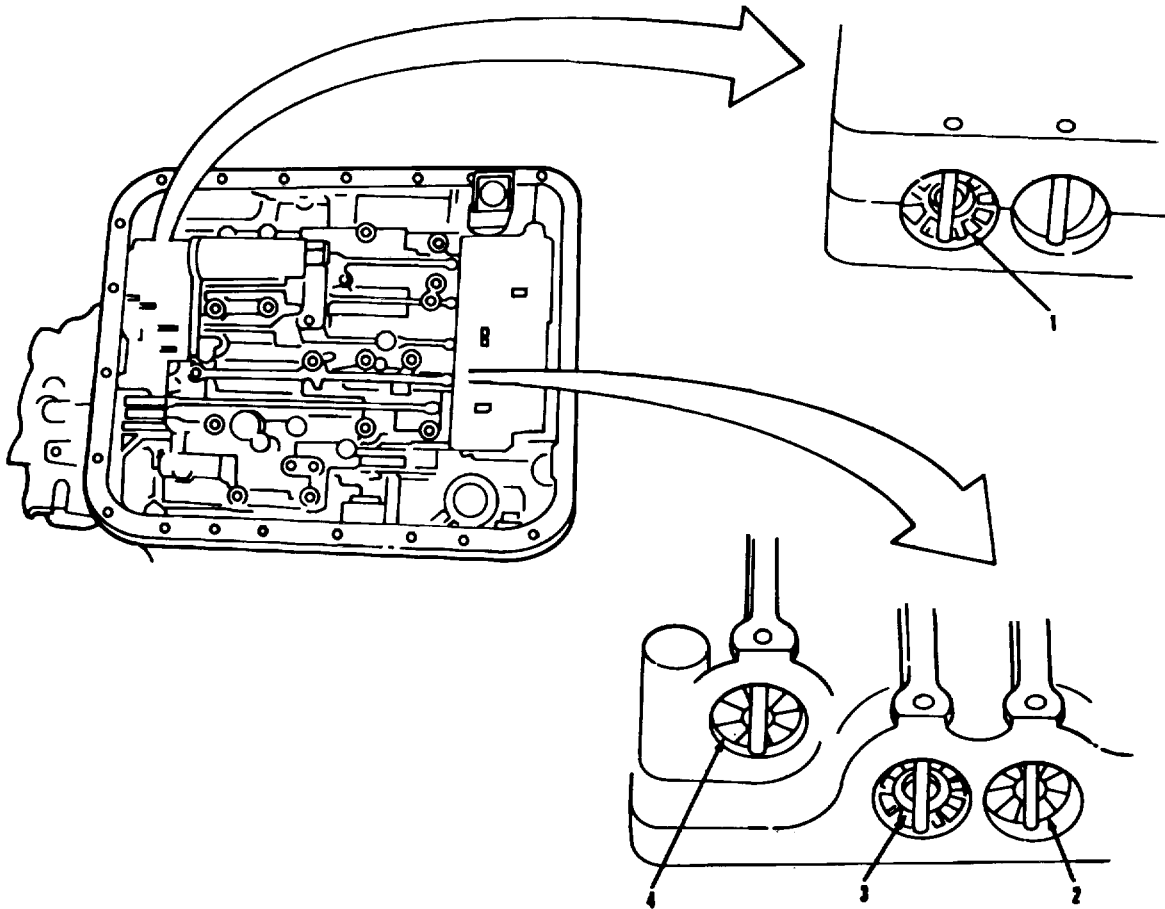
NOTE

Follow-on maintenance action required:

None.

TRANSMISSION.

3-56. SHIFT SPEED ADJUSTMENT (Continued).



LEGEND:

- 1. FIRST TO SECOND ADJUSTING RING
- 2. FOURTH TO FIFTH ADJUSTING RING
- 3. THIRD TO FOURTH ADJUSTING RING
- 4. SECOND TO THIRD ADJUSTING RING

TA 238319

TRANSMISSION.

3-57. TRANSMISSION OIL PRESSURE TEST.

THIS TASK COVERS

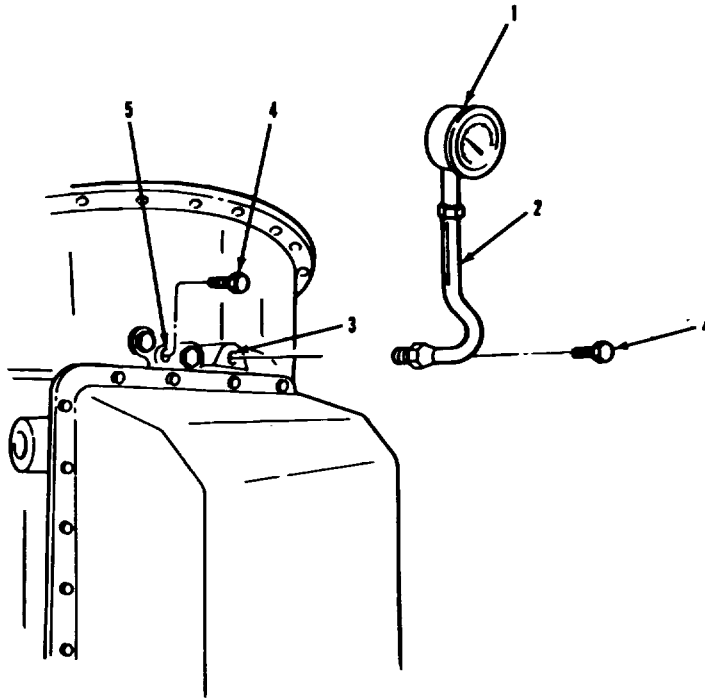
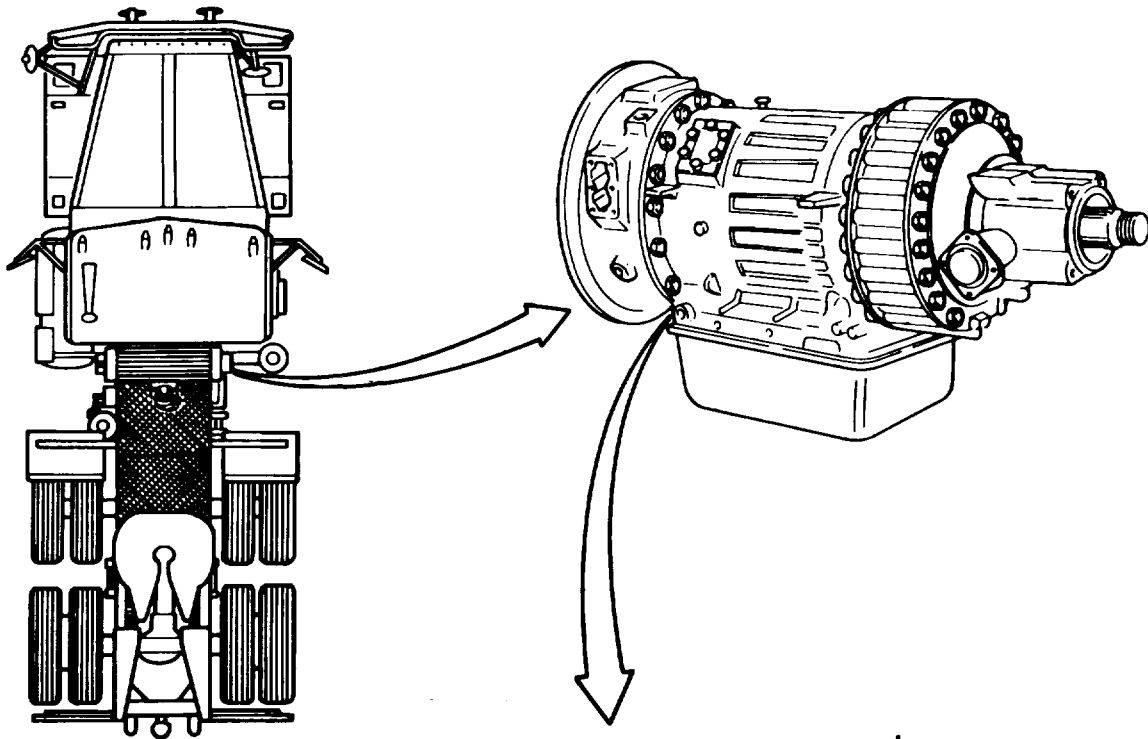
- a. Lubrication oil pressure testing.
- b. Main oil pressure testing.

INITIAL SETUP

<u>APPLICABLE CONFIGURATIONS</u>	<u>EQUIPMENT CONDITION PARAGRAPH</u>	<u>CONDITION</u>	<u>DESCRIPTION</u>
All. T	TM 9-2320-283-10. TM 9-2320-283-10.	Set parking brake. Chock wheels.	
<u>TEST EQUIPMENT</u>			
Pressure gage set (1) 4910-00-572-8612.			
<u>SPECIAL TOOLS</u>			
None.			
<u>MATERIALS/PARTS (P/N)</u>			
None.			
<u>PERSONNEL REQUIRED</u>		<u>SPECIAL ENVIRONMENTAL CONDITIONS</u>	
Two (MOS-63W).		Work area clean and away from blowing dirt and dust.	
<u>REFERENCES (TM)</u>		<u>GENERAL SAFETY INSTRUCTIONS</u>	
TM 9-2320-283-10. TM 9-2320-283-34P.		Personnel must be clear from underside of vehicle with engine running.	
<u>TROUBLESHOOTING REFERENCES</u>			
Paragraph 2-7.			

TRANSMISSION.

3-57. TRANSMISSION OIL PRESSURE TEST (Continued).



LEGEND:

- 1. PRESSURE GAGE
- 2. HOSE
- 3. MAIN PRESSURE PORT
- 4. PIPE PLUG (2)
- 5. LUBRICATION PRESSURE PORT

TA 238322

TRANSMISSION.**3-57. TRANSMISSION OIL PRESSURE TEST (Continued).****LOCATION/ITEM****ACTION****REMARKS****A. LUBRICATION OIL PRESSURE TESTING.**

- | | | |
|---------------------------|-----------------------|--------------------------------------|
| 1. Plug (4). | Remove from item (5). | |
| 2. Gage (1) and hose (2). | Connect to item (5). | Use 1/8 pipe thread hose connection. |

WARNING

Make sure all personnel are clear from underside and front of vehicle before starting engine. Transmission slipping into gear could cause severe injury or death.

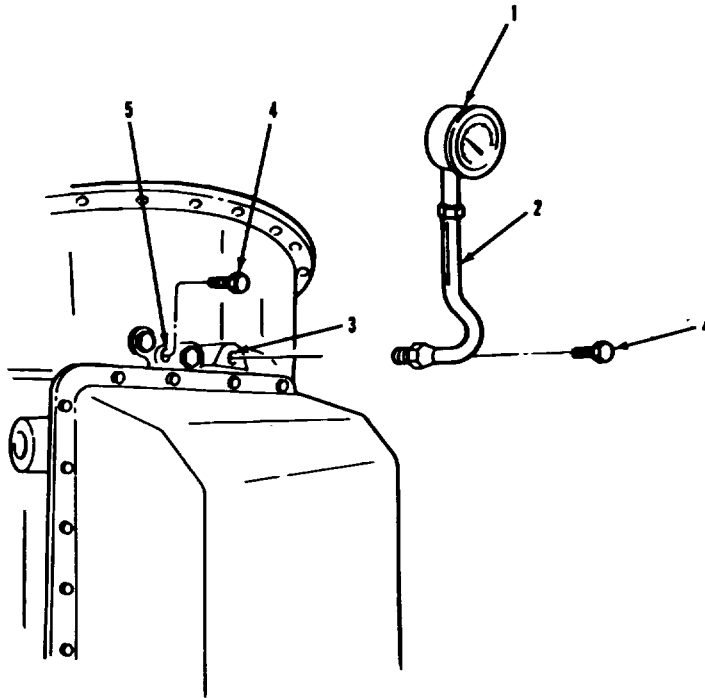
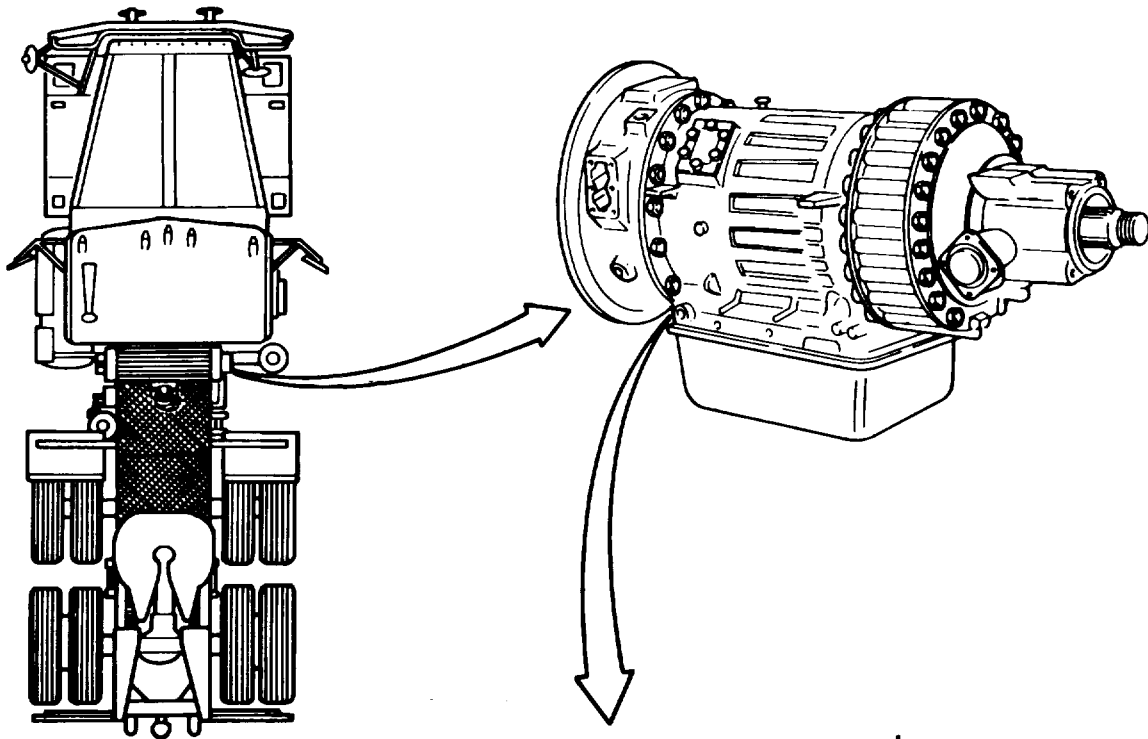
- | | | |
|--------------------------|--|--|
| 3. Engine. | a. Start and check connections for leaks. | Refer to TM 9-2320-283-10. |
| | b. Bring transmission oil to normal operating temperature. | Normal range is between 120° and 220° F. |
| | c. Operate engine at 1900 rpm. | Transmission in neutral. |
| 4. Gage (1). | Check pressure. | Pressure should be 30-50 psi. |
| 5. Engine. | Stop. | |
| 6. Gage (1) and hose (2) | Disconnect from item (5). | |
| 7. Plug (4). | Install in item (5). | Torque to 4-5 lb-ft. |

B. MAIN OIL PRESSURE TEST.

- | | | |
|---------------------------|-----------------------|--------------------------------------|
| 8. Plug (4). | Remove from item (3). | |
| 9. Gage (1) and hose (2). | Connect to item (3). | Use 1/8 pipe thread hose connection. |

TRANSMISSION.

3-57. TRANSMISSION OIL PRESSURE TEST (Continued).



LEGEND:

- 1. PRESSURE GAGE
- 2. HOSE
- 3. MAIN PRESSURE PORT
- 4. PIPE PLUG (2)
- 5. LUBRICATION PRESSURE PORT

TA 238322

TRANSMISSION.

3-57. TRANSMISSION OIL PRESSURE TEST (Continued).

LOCATION/ITEM

ACTION

REMARKS

B. MAIN OIL PRESSURE TEST (Continued).

WARNING

Make sure all personnel are clear from underside and front of vehicle before starting engine. Transmission slipping into gear could cause severe injury or death.

10. Engine.

a. Start and check connections for leaks.

Refer to TM 9-2320-283-10.

b. Bring transmission oil to normal operating temperature.

Normal range is between 120° and 220° F.

11. Vehicle.

Apply service brakes.

To prevent vehicle movement, refer to TM 92320-272-10.

CAUTION

Do not maintain stalled condition for longer than 30-second intervals. Transmission oil will overheat and cause transmission damage.

12. Engine.

a. Place transmission shift lever in 1-5.

b. Operate at 1200 rpm.

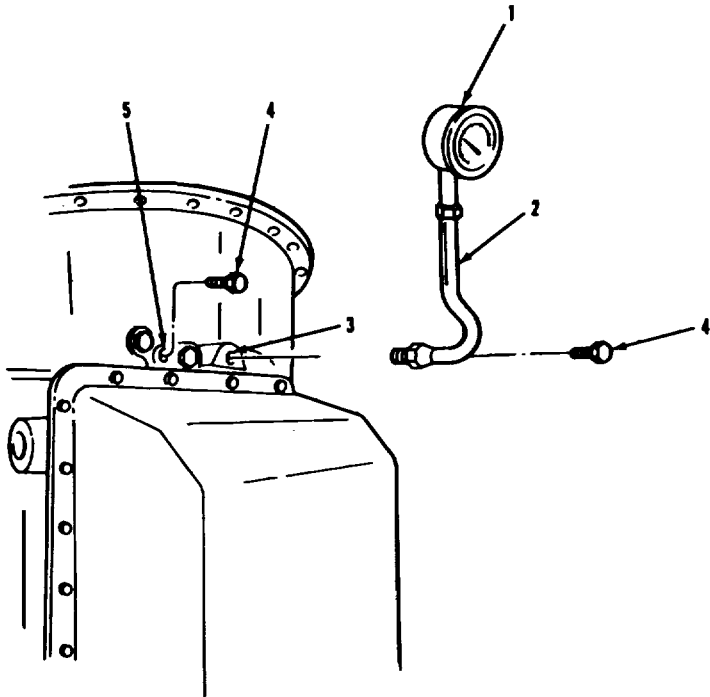
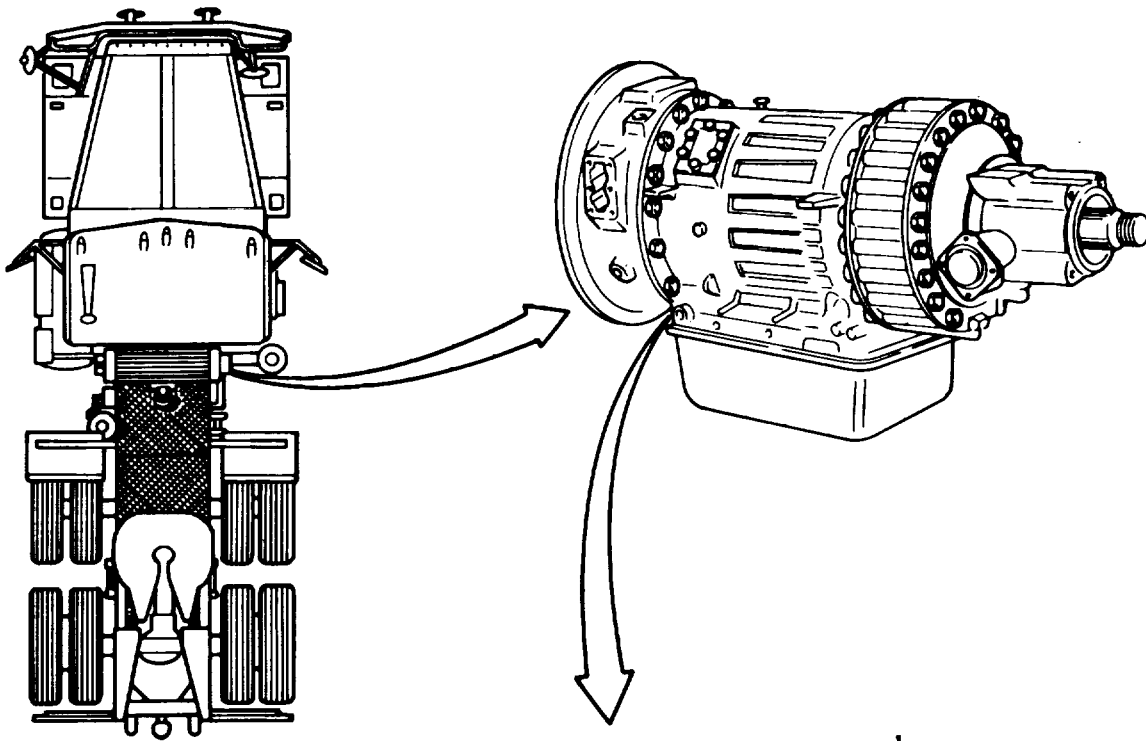
13. Gage (1).

Check pressure.

Pressure should be 140-175 psi.

TRANSMISSION.

3-57. TRANSMISSION OIL PRESSURE TEST (Continued).



LEGEND:

- 1. PRESSURE GAGE
- 2. HOSE
- 3. MAIN PRESSURE PORT
- 4. PIPE PLUG (2)
- 5. LUBRICATION PRESSURE PORT

TA 238324

TRANSMISSION.

3-54. FLYWHEEL AND TURBINE INSTALLATION (Continued).

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

B. TRANSMISSION OIL PRESSURE TEST (Continued).

- | | | |
|----------------------------|---|----------------------|
| 14. Engine. | Stop and place transmission shift lever in neutral (N). | |
| 15. Gage (1) and hose (2). | Disconnect from item (3). | |
| 16. Plug (4). | Install in item (3). | Torque to 4-5 lb-ft. |

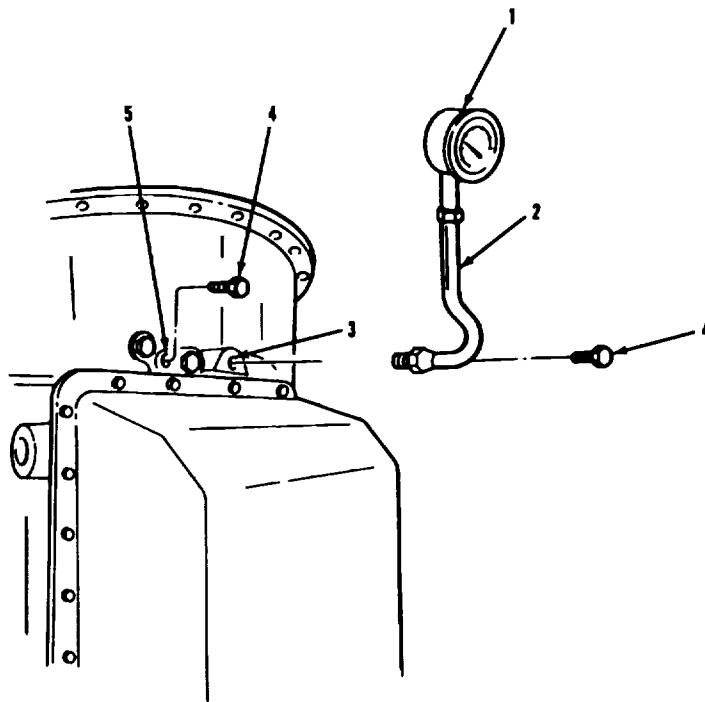
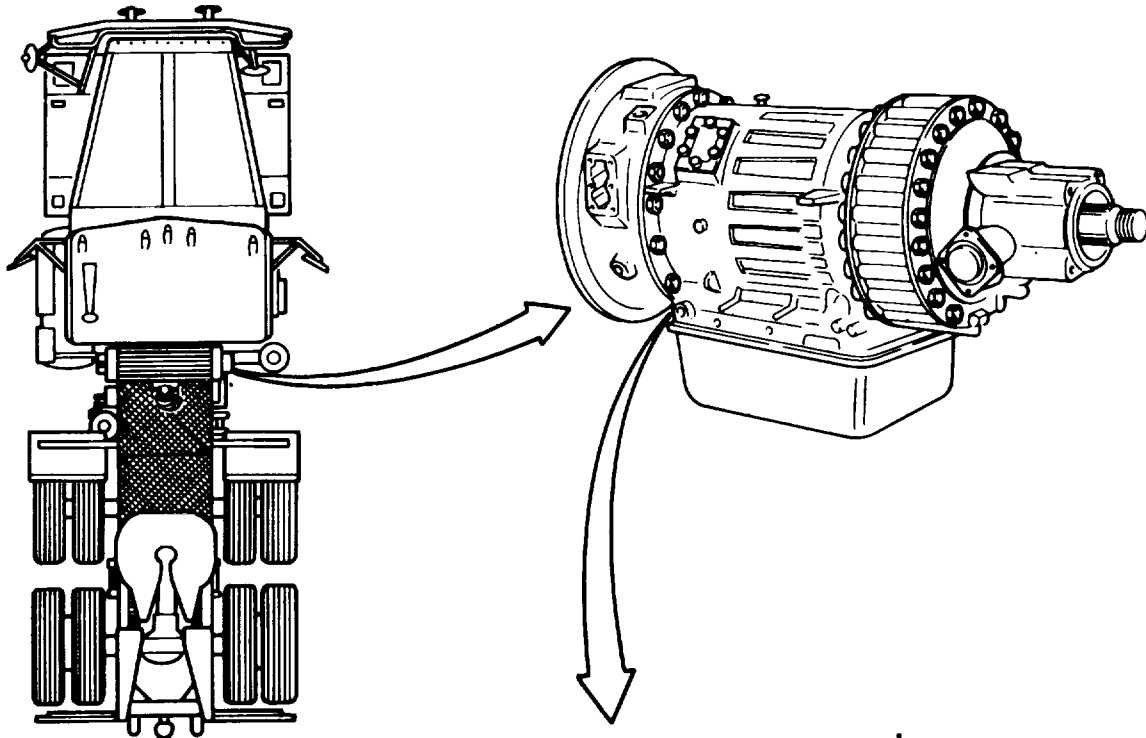
NOTE

Follow-on maintenance action required:

None.

TRANSMISSION.

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LEGEND:

- 1. PRESSURE GAGE
- 2. HOSE
- 3. MAIN PRESSURE PORT
- 4. PIPE PLUG (2)
- 5. LUBRICATION PRESSURE PORT

TA 238325

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By Order of the Secretary of the Army:

E.C. MEYERS
General, United States Army
Chief of Staff

Official:

JOHN A. WICKHAM, JR.
Brigadier General, United States Army
The Adjutant General

Official:

To be distributed in accordance with DA Form 12-38, Direct and General Support Maintenance requirements for Truck, Tractor, Line Haul, 6x4, M915A1.

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 Lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

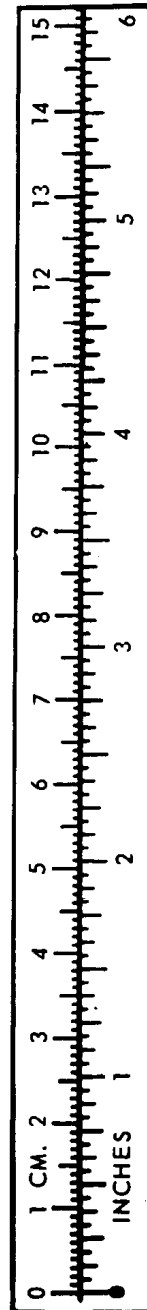
1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 (^{\circ}\text{C} + 32) = \text{F}^{\circ}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches.....	Centimeters.....	2.540
Feet.....	Meters.....	0.305
Yards.....	Meters.....	0.914
Miles.....	Kilometers.....	1.609
Square Inches.....	Square Centimeters.....	6.451
Square Feet.....	Square Meters.....	0.093
Square Yards.....	Square Meters.....	0.836
Square Miles.....	Square Kilometers.....	2.590
Acres.....	Square Hectometers.....	0.405
Cubic Feet.....	Cubic Meters.....	0.028
Cubic Yards.....	Cubic Meters.....	0.765
Fluid Ounces.....	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 Square Inch.....	Kilopascals.....	6.895
Miles per Gallon.....	Kilometers per Liter.....	0.425
Miles per Hour.....	Kilometers per Hour.....	1.609
TO CHANGE	TO	MULTIPLY BY
Centimeters.....	Inches.....	0.394
Meters.....	Feet.....	3.280
Meters.....	Yards.....	1.094
Kilometers.....	Miles.....	0.621
Square Centimeters.....	Square Inches.....	0.155
Square Meters.....	Square Feet.....	10.764
Square Meters.....	Square Yards.....	1.196
Square Kilometers.....	Square Miles.....	0.386
Square Hectometers.....	Acres.....	2.471
Cubic Meters.....	Cubic Feet.....	35.315
Cubic Meters.....	Cubic Yards.....	1.308
Milliliters.....	Fluid Ounces.....	0.034
Liters.....	Pints.....	2.113
Liters.....	Quarts.....	1.057
Liters.....	Gallons.....	0.264
Grams.....	Ounces.....	0.035
Kilograms.....	Pounds.....	2.205
Metric Tons.....	Short Tons.....	1.102
Newton-Meters.....	Pound-Feet.....	0.738
Kilopascals.....	Pounds per Square Inch.....	0.145
Kilometers per Liter.....	Miles per Gallon.....	2.354
Kilometers per Hour.....	Miles per Hour.....	0.621



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