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## Summary of Safety Precautions for Lifting

### **DANGER!!!**

Unsafe use of the wheel loader while making rated lifts could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property. Do not let anyone operate the machine unless they've been properly trained and understand the information in the Operation and Maintenance Manual.

To make safe lifts, the following items must be evaluated by the operator and the work-site crew.

- Condition of ground support
- Wheel loader configuration and attachments
- Load weight
- Safe rigging of the load
- Proper handling of the suspended load

Taglines on opposite sides of the load can be very helpful in keeping a suspended load secure, if they are anchored safely to control points on the ground.

### **WARNING!!!**

1. **NEVER** wrap a tagline around your hands or body.
2. **NEVER** rely on taglines or use the wheel loader in lifting mode when wind gusts are in excess of 48.3 km/h (30 mi/h). Be prepared for any type of wind gust when working with loads that have a large surface area.

## Unauthorized Modifications

### **IMPORTANT**

If you need more information or have any questions or concerns about safe operating procedures or working the wheel loader correctly in a particular application or in the specific conditions of your individual operating environment, please consult your local Daewoo representative.

Any modification made without authorization or written approval from Daewoo can create a safety hazard, for which the machine owner must be held responsible.

For safety's sake, replace all OEM parts with the correct authorized or genuine Daewoo part. For example, not taking the time to replace fasteners, bolts or nuts with the correct replacement parts could lead to a condition in which the safety of critical assemblies is dangerously compromised.

### **Attachment Precautions**

Options kits are available through your dealer. Contact Daewoo for information on available one-way (single-acting) and two-way (double-acting) piping/valving/ auxiliary control kits. Because Daewoo cannot anticipate, identify or test all of the attachments that owners may wish to install on their machines, please contact Daewoo for authorization and approval of attachments, and their compatibility with options kits.

### **Avoid High-voltage Cables**

Serious injury or death can result from contact or proximity to high-voltage electric lines. *The bucket does not have to make physical contact with power lines for current to be transmitted.*

Use a spotter and hand signals to stay away from power lines not clearly visible to the operator.

Depending upon the voltage in the line and atmospheric conditions, strong current shocks can occur with the boom or bucket as far away as 4 m – 6 m (13' 0" – 20' 0") from the power line. Very high voltage and rainy weather could further decrease that safety margin.

### **Always Use Adequate Equipment Supports and Blocking**

Do not allow weight or equipment loads to remain suspended. Lower everything to the ground before leaving the operator's seat. Do not use hollow, cracked or unsteady, wobbling weight supports. Do not work under any equipment supported solely by a lift jack.

### **Do Not Work on Hot Engines or Hot Cooling or Hydraulic Systems**

Wait for the engine to cool off after normal operation. Park the wheel loader on a firm, level surface and lower all equipment before shutting down and switching off controls. When engine lube oil, gearbox lubricant or other fluids require change, wait for fluid temperatures to decrease to a moderate level before removing drain plugs.

#### **NOTE**

*Oil will drain more quickly and completely if it is warm. Do not drain fluids at temperatures exceeding 95°C (203°F), however do not allow full cool-down.*

### **Cool-down is Required Prior to Radiator or Reservoir Checks**

Stop the engine and allow heat to dissipate before performing service on the engine radiator or hydraulic fluid reservoir. Both assemblies have air vent levers at or near the filler cap for venting built-up air pressure. Release the levers before trying to take off filler caps and **LOOSEN CAPS SLOWLY**, prior to removal.

### **Pressurized Hydraulic Oil Fluid Leaks Can Be Dangerous**

Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but pressurized oil has enough force to pierce the skin and cause serious injury.

Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers.

**Obtain immediate medical attention if pressurized oil pierces the skin.**



**Failure to obtain prompt medical assistance could result in gangrene or other serious damage to tissue.**

### **Use Correct Replacement Fasteners Tightened to Proper Torque**

Refer to the General Maintenance section of the Shop Manual for information on tightening torques and recommended assembly compounds and always use the correct part.

Poor or incorrect fastener connections can dangerously weaken assemblies.

### **Dispose of All Petroleum-based Oils and Fluids Properly**

Physical contact with used motor oil may pose a health risk. Wipe oil from your hands promptly and wash off any remaining residue.

Used motor oil is an environmental contaminant and may only be disposed of at approved collection facilities. Never drain any petroleum-based product on the ground or dispose of old oil in municipal waste collection containers, or in metropolitan sewer systems or rural landfills.

Check state and local regulations for other requirements.

### **Check Tire Pressure and Condition**

Maintain tire pressure but do not over inflate. Inspect tires and wheels daily. When inflating tires, follow procedures in the Maintenance section, which include using an extension to allow you to avoid standing in front of or over a tire. Do not change a tire unless you have both experience and proper equipment.

1. Remote Fittings for Bucket Cylinder Heads
2. Remote Fittings for Lift Cylinder Heads
3. Remote Fitting for Drive Shaft Center Bearing

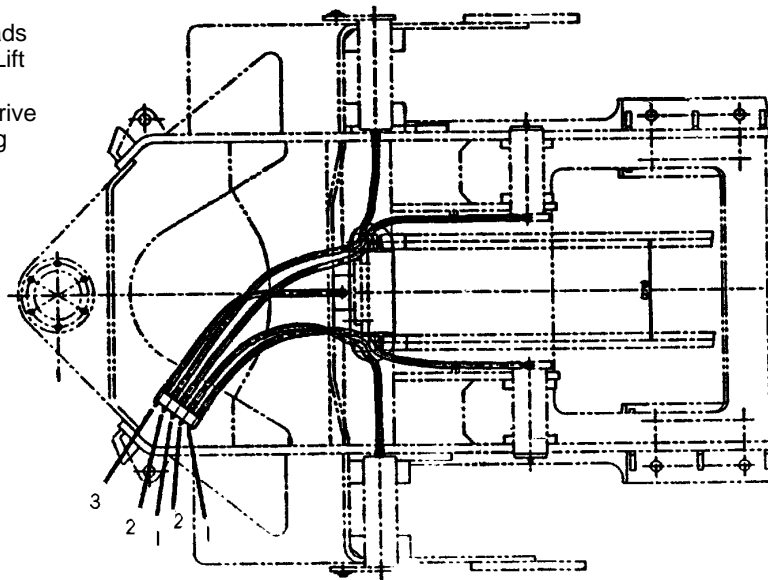


FIGURE 3-4

2861



FIGURE 3-5

2037

1. Lift Cylinder Head End
2. Loader Arm Cylinder Foot End



FIGURE 3-6

2041

- C. Lift cylinder heads. See Figure 3-6. Greased from two remote grease points (2, Figure 3-4).

Loader arm cylinder foot end, 1 place on each side of the machine. See Figure 3-6.

- D. Arm-lever connecting pins, 1 place on each side of machine. See Figure 3-7.

Lift cylinder rods, 1 place on each side of machine. See Figure 3-7.



FIGURE 3-7

2040

## Tires and Wheels

Proper tire pressure is an important factor in determining tire performance and tire life. A tire that is under-inflated does not properly support the machine, and will wear out quickly. Over-inflated tires have poor traction and puncture easily.

Use a pressure gauge to measure tire pressure. Always measure tire pressure before the machine

has been working, when the tires are cold. Use Table 4-2 to determine the correct pressure for front or rear tires when driving the machine, or when working the machine.

Check the tires for damage and embedded objects. Check the valve stems for damage.

### Wheel Nut Torque

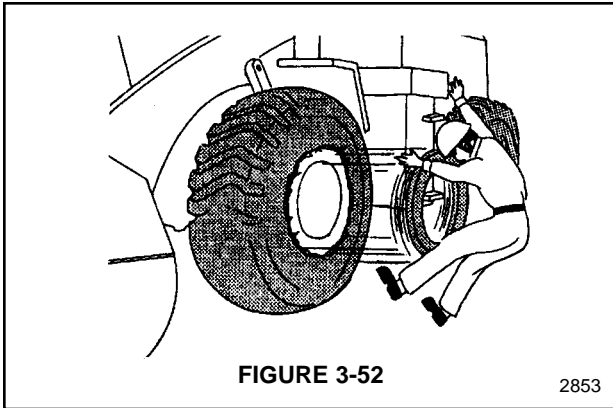
Tighten the wheel nuts to 60 kg m (434 ft lb).

Table 4-2

Tire Dimension	Working Pressure		Driving Pressure	
	Front Tire	Rear Tire	Front Tire	Rear Tire
23.5-25-16PR(L-3) (Standard)	3.75 kg/cm <sup>2</sup> (53 psi)	3.0 kg/cm <sup>2</sup> (43 psi)	2.25 kg/cm <sup>2</sup> (32 psi)	2.25 kg/cm <sup>2</sup> (32 psi)
20.5-25-16PR(L-2) (Option)	4.25 kg/cm <sup>2</sup> (60 psi)	3.5 kg/cm <sup>2</sup> (50 psi)	2.5 kg/cm <sup>2</sup> (36 psi)	2.5 kg/cm <sup>2</sup> (36 psi)

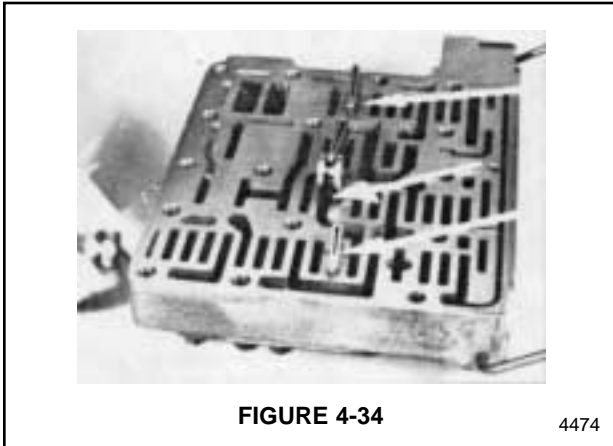
## WARNING!!!

If a wheel and tire must be removed from the machine and replaced, or if a tire must be replaced on the wheel, allow this task to be performed only by experienced service personnel. A tire rim could be propelled off the wheel and cause serious bodily injury or death. See Figure 3-52.

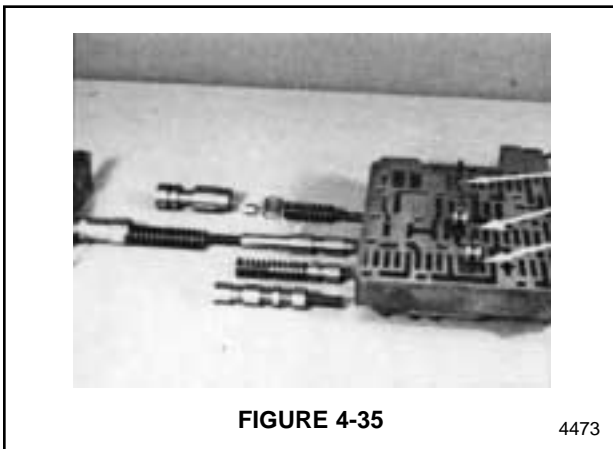


## Assembly

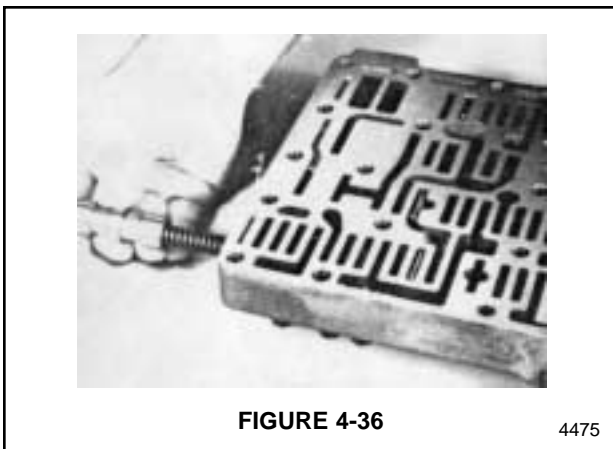
1. Install the detents and stop plates in the valve body. See Figure 4-34.



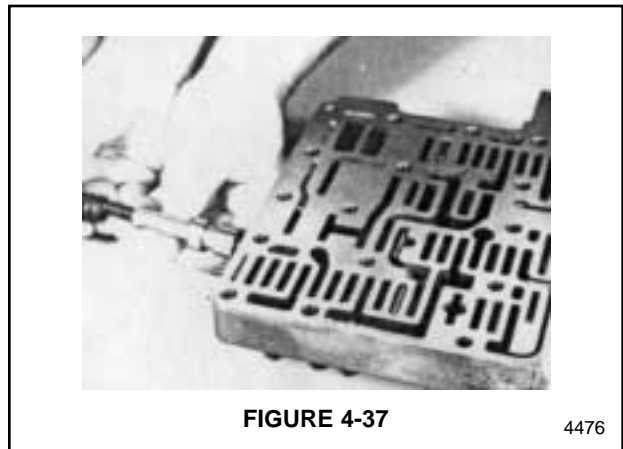
2. Valve spools and springs are assembled into their bores as shown in Figure 4-35.



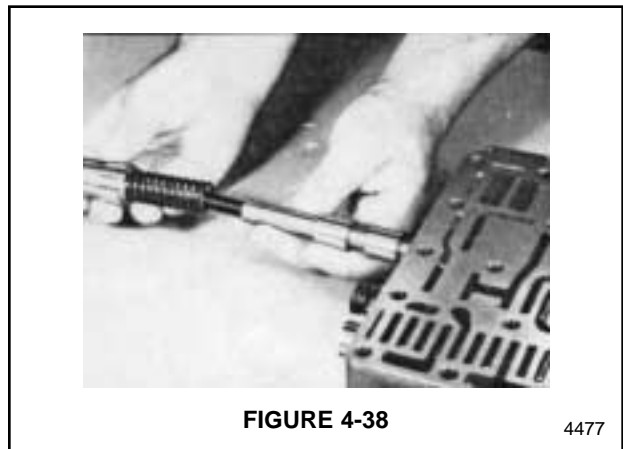
3. Install the spring and spool as shown in Figure 4-36.



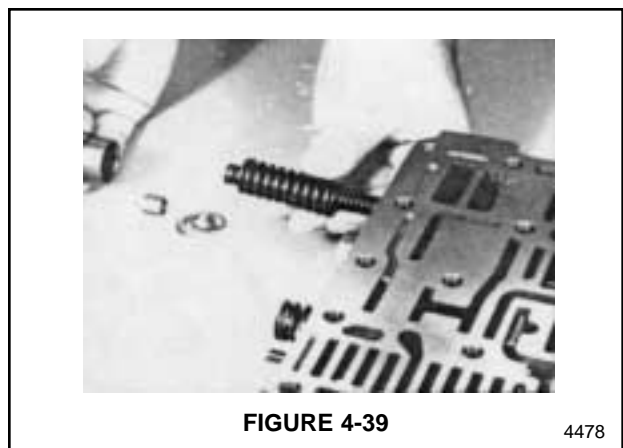
4. Insert the reset spool and spring. See Figure 4-37.



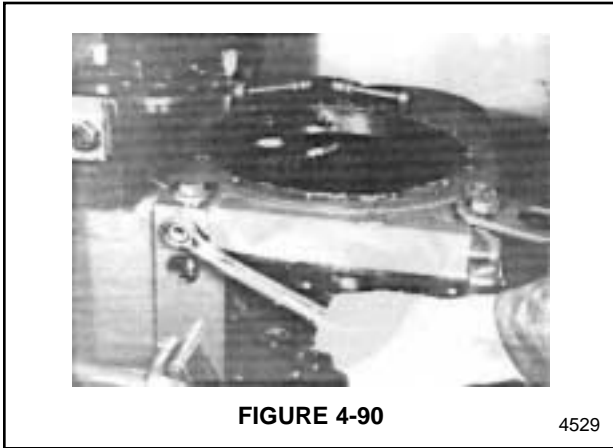
5. Install the spool and springs for the pressure control spool. See Figure 4-38.



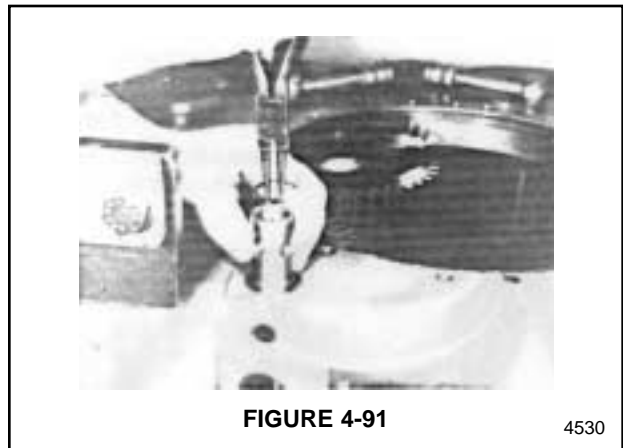
6. Install the spool, springs, and piston in the last bore. See Figure 4-39.



25. Unthread and then remove the socket for the temperature sensor. See Figure 4-90.



26. Unthread and remove the plug from the converter oil control valve. See Figure 4-91. Remove the spring clip and then remove the parts for the control valve.



27. Position the transmission so that the input side is laying down on the work surface. This will position the Power Takeoff (PTO) assembly facing upward. An exploded view drawing that contains internal transmission components is shown in Figure 4-92.

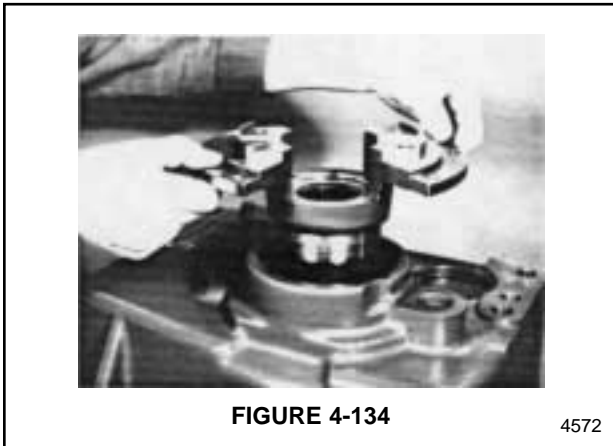
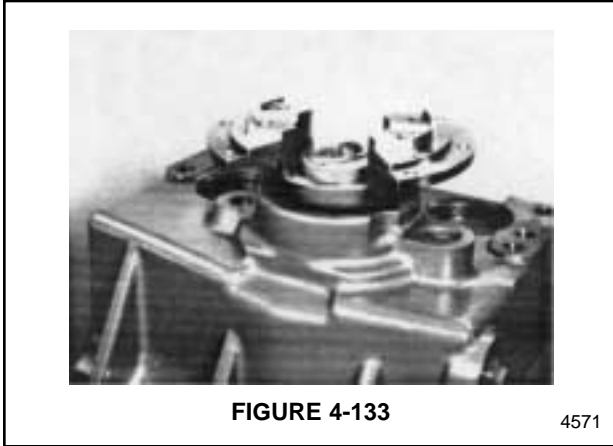


## Final Drive Disassembly

### NOTE

*For units without a parking brake, perform Steps 1 and 2.*

1. Remove the bolts from the lock plate. See Figure 4-133. Remove the lock plate.

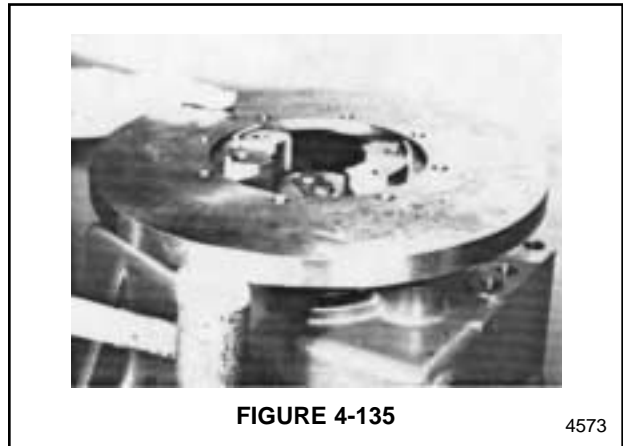


2. Remove the drive flange. See Figure 4-134.

### NOTE

*For units equipped with a parking brake disc, perform Steps 3 and 4.*

3. Remove the bolts from the brake disc. See Figure 4-135. Use a large plastic hammer to lightly tap the brake disc. Remove the brake

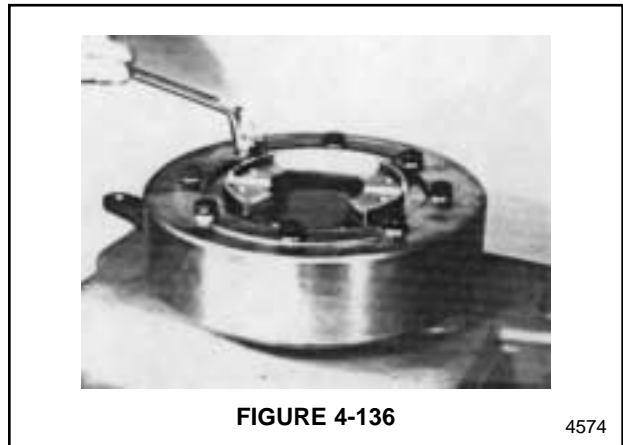


disc.

4. Remove the bolts from the lock plate. Remove the lock plate. Remove the drive flange.

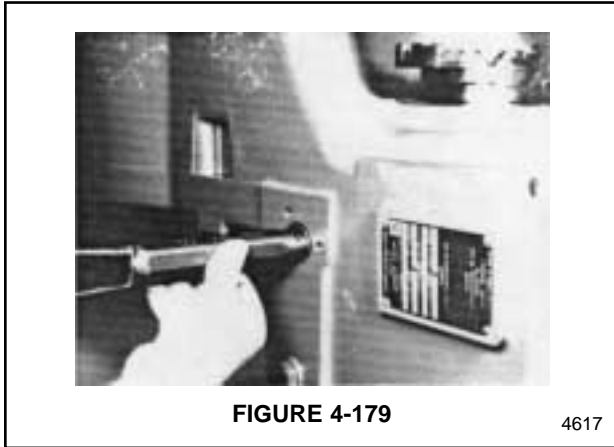
### NOTE

*For units equipped with a brake drum, perform Steps 5, 6, 7, and 8.*

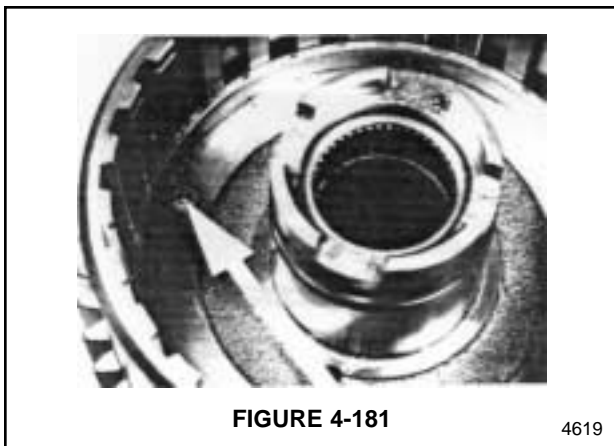
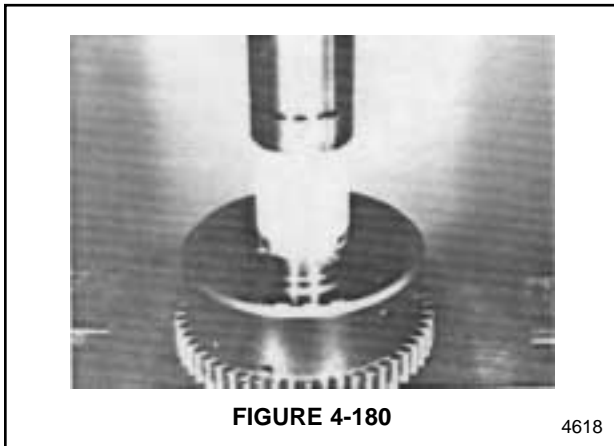


5. Remove the bolts from the brake drum. See Figure 4-136.

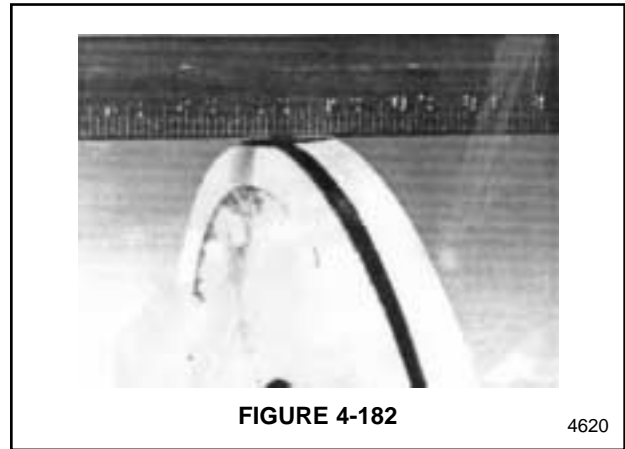
21. Slide the output flange onto the splined output shaft. See Figure 4-174.



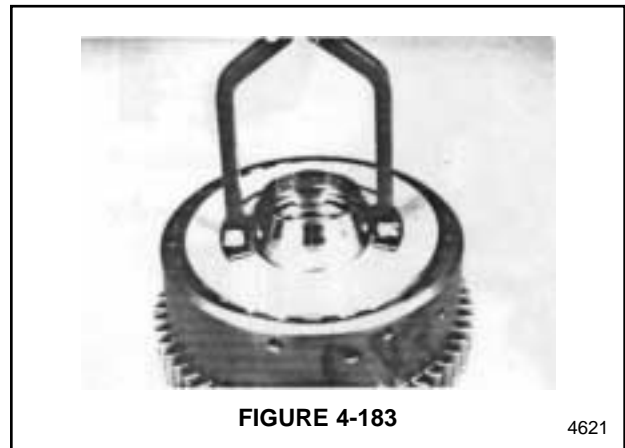
22. Apply a non hardening sealant to the retaining disc. Install the disc over the output flange. See Figure 4-175. Install the bolts through the disc and tighten them to 49 Nm (36 ft lb).
23. Install the bolt lock plate. See Figure 4-176.



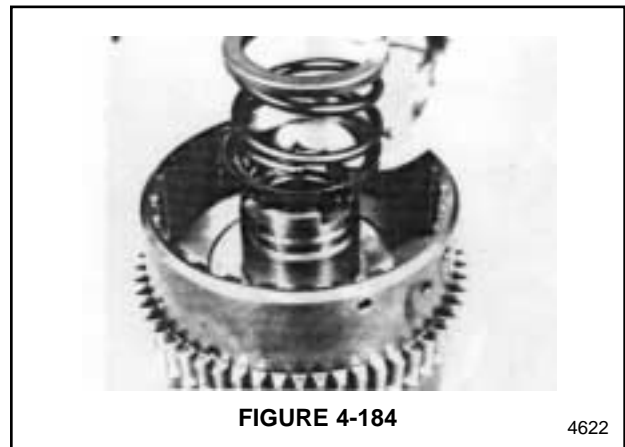
24. Install the oil seal in the speedometer tube.



Heat the speedometer gear and install it on the end of the drive shaft. See Figure 4-177. Assemble the drive shaft and tube.



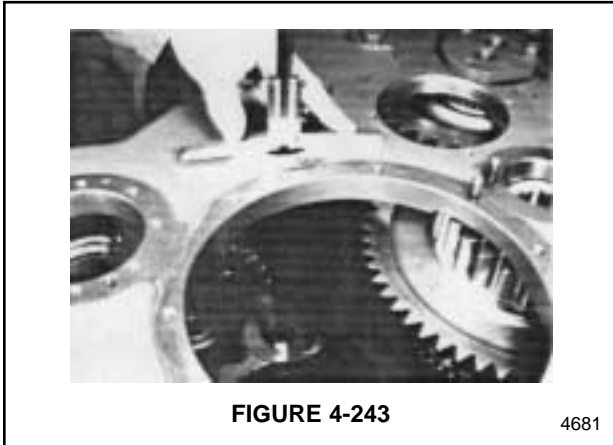
25. Place the speedometer gasket on the side of the transmission. Insert the speedometer tube into the transmission and install the bolts to



hold it in place. See Figure 4-178. Tighten the

## Shim Selection

1. Place the split tab washer and the grooved disc over the bore in the bottom of the transmission. See Figure 4-243. Lay the gasket in place over the bore on the top of the transmission. Use a depth micrometer to measure from the gasket on the top of the bore, to the surface of the grooved disc in the bottom of the bore. In this example, this distance is



252.0 mm (9.921"). This is measurement A.

2. Measure the distance from the first shoulder on the shaft to the shaft flange. See

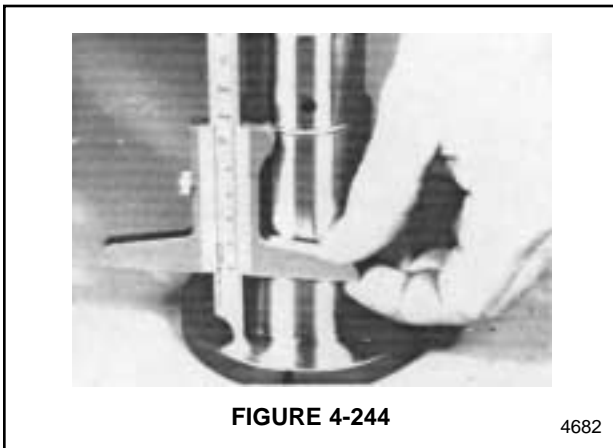
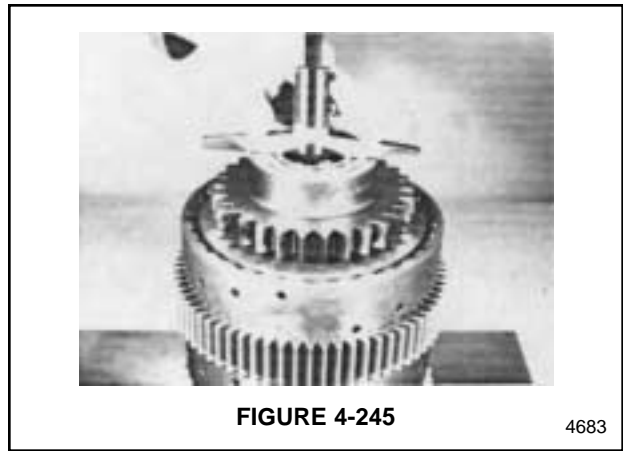


Figure 4-244. In this example, this distance is 27.0 mm (1.0629"). This is measurement B.

3. Set the clutch carrier on a flat metal plate. See Figure 4-245. Measure the distance from the bottom of the clutch carrier to the top edge of the clutch carrier bore. In this example, this distance is 224.7 mm (8.846"). This is measurement C.



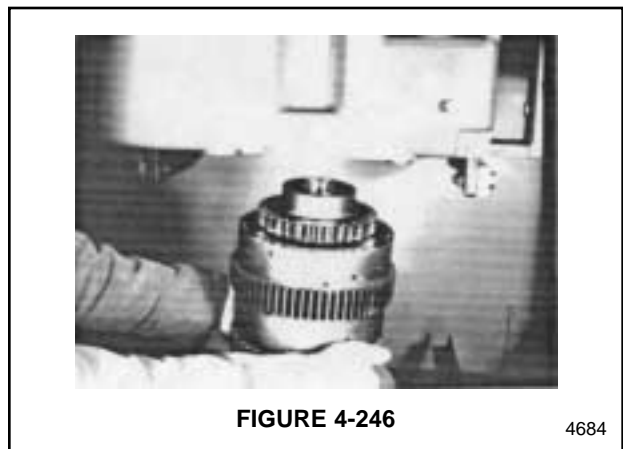
The allowable amount of end play is between 0.10 and 0.30 mm (.0039 and .0118"). To calculate the end play, perform the following calculations.

$$\begin{array}{r}
 252.00 \text{ mm (9.9210")} \text{ measurement A} \\
 -27.00 \text{ mm (1.0629")} \text{ measurement B} \\
 \hline
 225.00 \text{ mm (8.8581")} \\
 -224.60 \text{ mm (8.8425")} \text{ measurement C} \\
 \hline
 .40 \text{ mm ( .0156")} \text{ end play}
 \end{array}$$

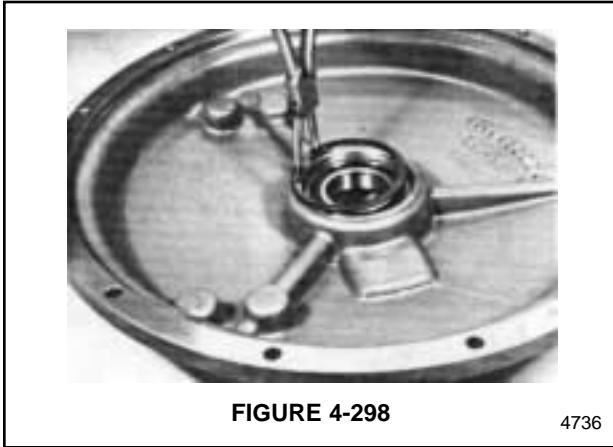
To bring the shaft within the allowable amount of end play, choose a .20 mm (.0078") shim.

$$\begin{array}{r}
 .40 \text{ mm (.0156")} \text{ end play} \\
 -.20 \text{ mm (.0078")} \text{ shim} \\
 \hline
 .20 \text{ mm (.0078")} \text{ end play}
 \end{array}$$

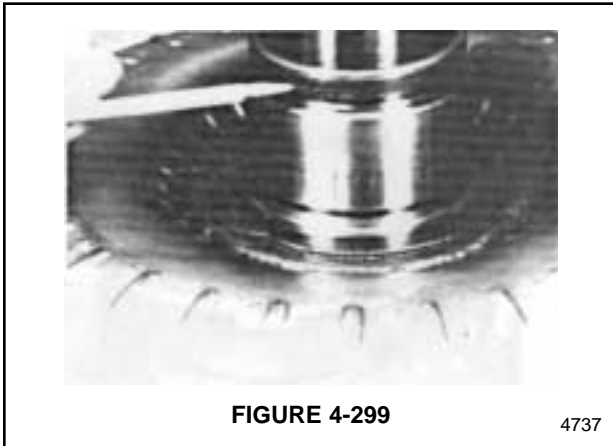
4. Install the clutch pack into the transmission. See Figure 4-246. Do not install the shaft at this time.



17. Install the bolts that hold the pump to the oil supply flange. See Figure 4-290. Tighten the bolts to 25 Nm (18.4 ft lb).
18. Use a plastic hammer to lightly tap the pump drive shaft a few times to release tension. See Figure 4-291.

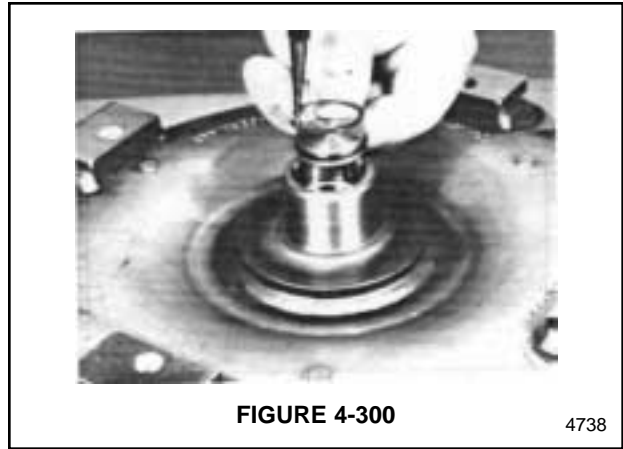


19. Apply Loctite to the flange around the pressure intake pathway. A seal ring in good con-

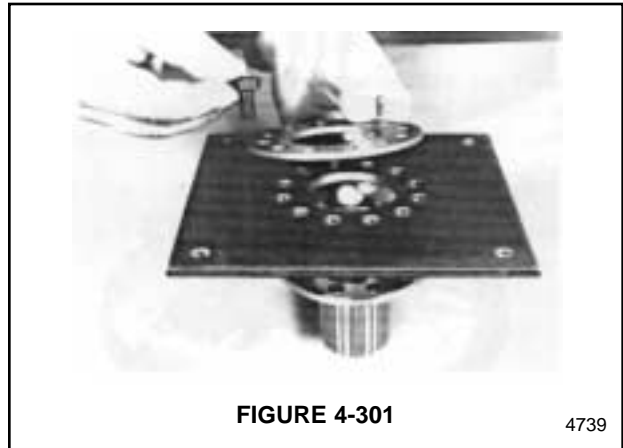


dition is necessary for the pressure intake pathway. Install 2 assembly studs into the transmission to guide the installation of the oil supply flange and pump assembly.

20. Heat the housing bore that the oil supply flange will be installed into. See Figure 4-292.
21. Install the gasket on the bore of the oil supply flange. Set the oil supply flange and pump assembly into the bore in the transmission. See Figure 4-293.

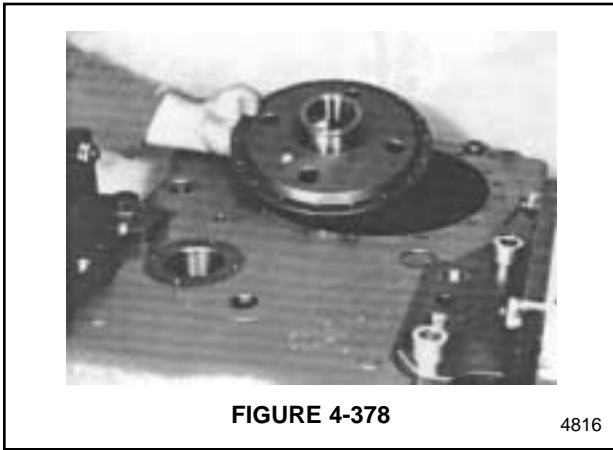


22. Install the 2 roll pins. See Figure 4-294. Install 3 socket head screws to temporarily hold the oil supply flange.

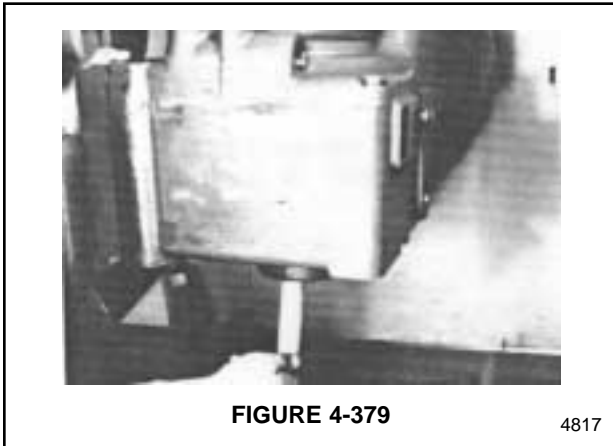


23. Set the adapter case into place on top of the oil supply flange. See Figure 4-295. Install the bolts into the adapter case and tighten to 69 Nm (51 ft lb).

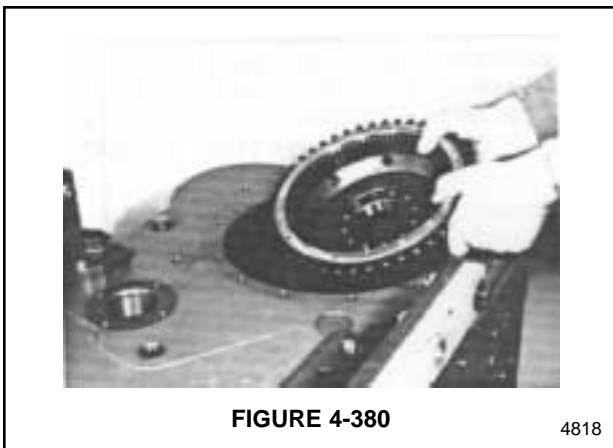
19. Remove the cover plate. See Figure 4-378.



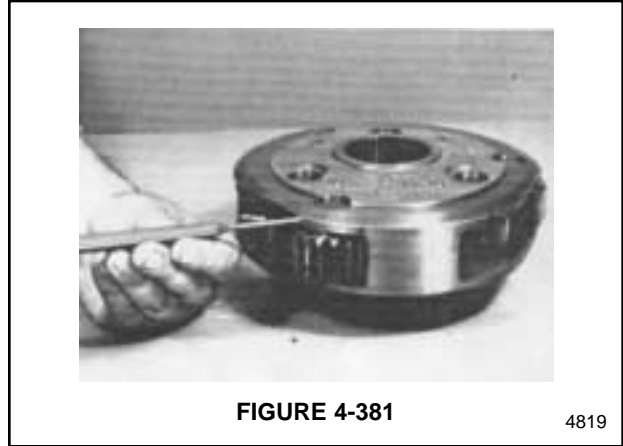
20. Tap the planetary carrier with a pin to loosen it. See Figure 4-379. Remove the planetary carrier from the transmission.



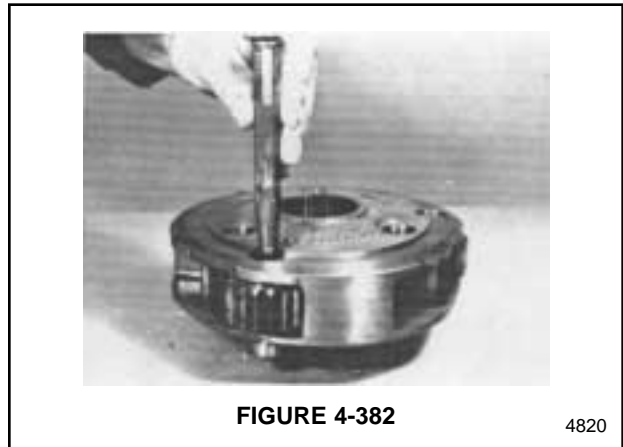
21. Remove the output gear from the transmission. See Figure 4-380.



22. Use a pin punch to drive the planetary gear roll pin into the planetary gear shaft. See Figure 4-381.



23. Drive the planetary gear shaft out of the carrier. See Figure 4-382. Remove all the planetary gears from the planetary carrier.



18. Set the cover ring over the plate pack. See Figure 4-451. Install the bolts into the cover ring and plate pack. Tighten bolts to 35 Nm (26 ft lb).



**FIGURE 4-451**

4889

20. Remove the snap ring. See Figure 4-453. Install beneath the snap ring, a shim washer with the thickness measured in the previous step (1.40 mm). Install the snap ring.



**FIGURE 4-453**

4891

**NOTE**

*The following steps describe taking measurements to calculate a shim thickness. The measurements shown in these steps are an example only. Be sure to take your own measurements to derive the correct shim thickness for your torque converter.*

19. Use compressed air to move the piston. Then measure the gap between the snap ring and cup spring. See Figure 4-452. In this example, this gap measured 1.40 mm (.055").



**FIGURE 4-452**

4890

21. Install the hub in the turbine wheel. See Figure 4-454. Install the bolts and tighten to 25 Nm (18 ft lb).



**FIGURE 4-454**

4892

22. Heat the ball bearing and install it on the hub shaft. See Figure 4-455. Install the snap ring.



**FIGURE 4-455**

4893

# Steering System Troubleshooting

Problem	Cause	Solution
Steering wheel does not operate smoothly	<ol style="list-style-type: none"> <li>1. Broken or damaged oil pump</li> <li>2. Stuck or damaged relief valve</li> <li>3. Stuck, damaged, or worn out steering valve</li> <li>4. Restricted hose or pipe. Leaking or restricted hose, pipe, or connection</li> <li>5. Mechanical defect in steering gear</li> </ol>	<p>Replace pump</p> <p>Repair or replace</p> <p>Clean, repair, or replace</p> <p>Clean, repair, or replace</p> <p>Repair, replace</p>
Steering wheel has a heavy feel	<ol style="list-style-type: none"> <li>1. Oil level low in reservoir</li> <li>2. Low oil pressure due to broken or damaged oil pump</li> <li>3. Steering valve stuck</li> <li>4. Low oil level in steering gearbox</li> <li>5. Damaged bolt and nut in steering gearbox</li> </ol>	<p>Add oil</p> <p>Replace pump</p> <p>Clean, repair, replace</p> <p>Inspect oil level, fill to proper level</p> <p>Replace damaged parts</p>
Difficult to drive in a straight line	<ol style="list-style-type: none"> <li>1. Defective spool in steering valve</li> <li>2. Stuck or damaged steering valve or damaged or defective spring</li> <li>3. Improper fit of track link</li> </ol>	<p>Tighten lock nut</p> <p>Repair, replace</p> <p>Repair, replace</p>
Noise during steering	<ol style="list-style-type: none"> <li>1. Low oil level in reservoir</li> <li>2. Restricted inlet pipe or filter</li> </ol>	<p>Add oil</p> <p>Clean, replace</p>
Steering system leaking oil	<ol style="list-style-type: none"> <li>1. Worn or damaged O-ring and oil seal of pipe and steering valve</li> </ol>	<p>Replace worn or damage parts</p>