KENR6019-08 (en-us)
August 2018

Disassembly and Assembly

16M Motor Grader
Power Train

B9H 1-UP (Machine)
R9H 1-99999 (Machine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards, including human factors that can affect safety. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you verify that you are authorized to perform this work, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

A non-exhaustive list of operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the worksite. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that you are authorized to perform this work, and that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Cat dealers have the most current information available.

⚠ WARNING

When replacement parts are required for this product Caterpillar recommends using Cat replacement parts.

Failure to follow this warning may lead to premature failures, product damage, personal injury or death.

In the United States, the maintenance, replacement, or repair of the emission control devices and systems may be performed by any repair establishment or individual of the owner's choosing.

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⚠ WARNING

Accidental machine starting can cause injury or death to personnel working on the machine.

To avoid accidental machine starting, turn the battery disconnect switch to the OFF position and remove the key. If the machine is not equipped with a battery disconnect switch, disconnect the battery cables from the battery and tape the battery clamps.

Place a do not operate tag at the battery disconnect switch location to inform personnel that the machine is being worked on.

Disassembly and Assembly Section

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Duo-Cone Conventional Seals - Install

SMCS Code: 7561-012-SA; 7561-016; 7561-012

Assembly and Installation of Conventional Duo-Cone Seals

This instruction provides the procedure for assembling and installing conventional Duo-Cone Seals.

When the Duo-Cone Seals are installed and assembled, you must use the correct procedures. The Duo-Cone Seal may fail from one or more mistakes that are made during assembly or during installation of the seal components.

Reference: Special Instruction, SEHS8484, “Tool and Specification Chart for Conventional Duo-Cone Seals”

Required Tools

Use the tools in Table 1 in order to correctly measure the spacing of the Duo-Cone Seals after the seals are installed.

Table 1

Required Tools			
Item	**Part Number**	**Description**	**Qty**
10	6V-3075	Dial Indicator	1
11	6V-6167	Contact Point	1
12	3P-1565	Collet Assembly	1
13	165-8958	Dial Indicator Base	1

Correct Assembly of Conventional Duo-Cone Seals

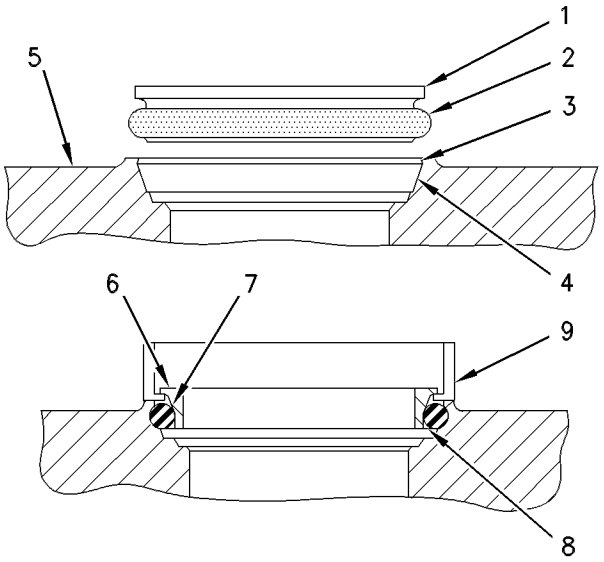

Illustration 1 g00446486

(1) Seal ring
(2) Rubber toric ring
(3) Housing retaining lip
(4) Housing ramp
(5) Seal ring housing
(6) Seal ring face
(7) Seal ring ramp
(8) Seal ring retaining lip
(9) Installation tool

Assembly and Installation Procedure

⚠ WARNING

Avoid prolonged skin contact with isopropyl alcohol. Avoid breathing the vapors in enclosed areas without adequate ventilation and do not smoke.

Isopropyl alcohol is flammable. Do not use near open flame, welding operations, or around heated surfaces exceeding 482°C (900°F).

1. Remove any film, dust or other foreign matter from the following components:

- Rubber toric ring (2)
- Housing ramp (4)
- Seal ring ramp (7)
- Housing retaining lip (3)
- Seal ring retaining lip (8)
- Seal ring housing (5)

Note: Seal rings have very sharp edges. Protective gloves should be worn in order to prevent injury.

Use isopropyl alcohol or other approved cleaning agents. Use a clean lint free cloth for wiping. All components should be completely dry before proceeding.

Note: Never permit oil to contact rubber toric ring (2), housing ramp (4) or seal ring ramp (7) before both seal rings (1) are assembled in the final position.

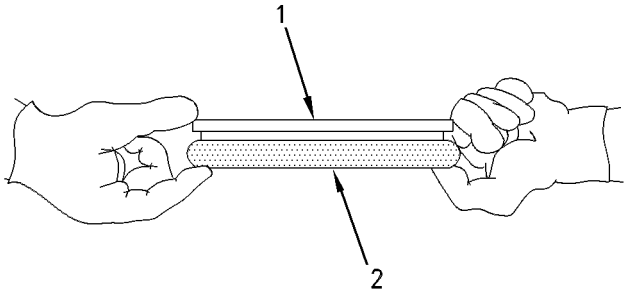

Illustration 2 g00534617

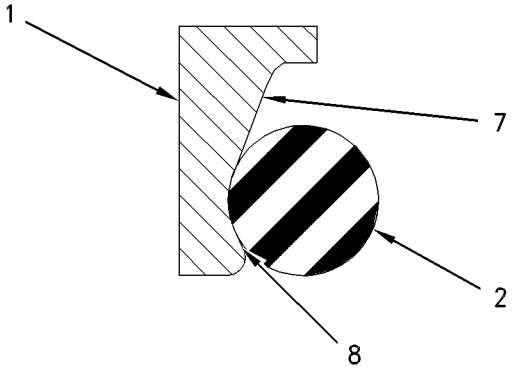

Illustration 3 g00446488

2. Put rubber toric ring (2) on seal ring (1). Make sure that the rubber toric ring is positioned at the bottom of seal ring ramp (7). The rubber toric ring must rest against retaining lip (8). The rubber toric ring must be straight in the seal ring. The rubber toric ring must not be twisted.

Note: Be careful when you are working on the rubber toric ring. Nicks, cuts or scratches may cause leaks.

3. Refer to Special Instruction, SEHS8484, “Tool and Specification Chart for Conventional Duo-Cone Seals” in order to select the proper installation tool.

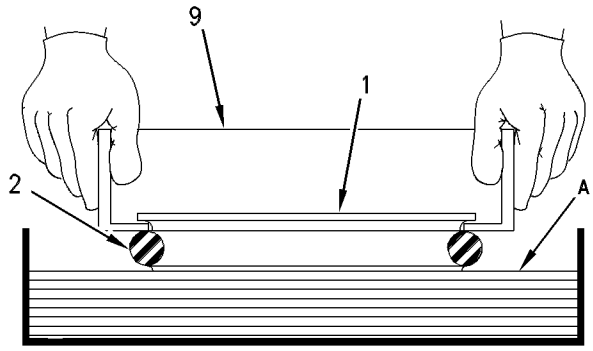

Illustration 4 g00534621

Use towels or a mat (A) that is made of foam in order to aid in the installation of toric ring (2).

4. Use Tooling (9) to install rubber toric ring (2) on seal ring (1). Lightly dampen the lower half of rubber toric ring (2) with an appropriate lubricant. Refer to the “Acceptable Lubricants for Assembly” in this publication for additional information. Use the following procedure in order to dampen the rubber toric ring:

- Wipe the seal with a lint free cloth.
- Place towels or a mat that is made of foam at the bottom of a container. Soak the towels or the mat with the lubricant. Dip the rubber toric seal in the container.

Note: Periodically inspect the installation tool for damage. If necessary, replace the installation tool .

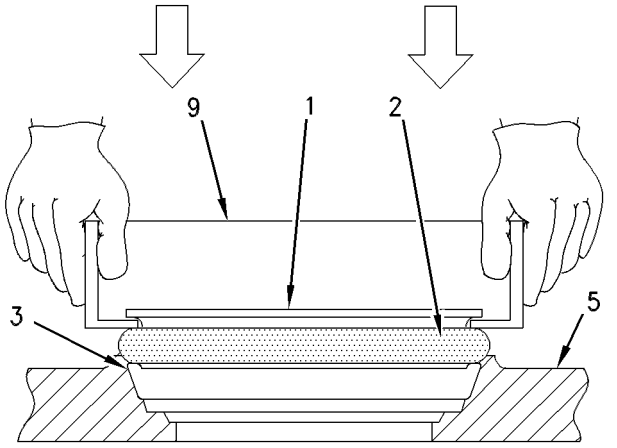

Illustration 5 g00534622

5. Make sure that the lower half of rubber toric ring (2) is still wet. Use Tooling (9) in order to position seal ring (1) and rubber toric ring (2) squarely against seal ring housing (5). Make sure that you use sudden pressure and even pressure when you press a toric ring that has a small diameter. Press rubber toric ring (2) under housing retaining lip (3) that is part of seal ring housing (5). Use the following procedure in order to install a rubber toric ring that has a large diameter:

- Push the rubber toric ring over the seal ring retaining lip on one side.
- Tap the installation tool with a rubber mallet on the opposite side of the rubber toric ring. Tap until the rubber toric ring is past the seal ring retaining lip of the housing.

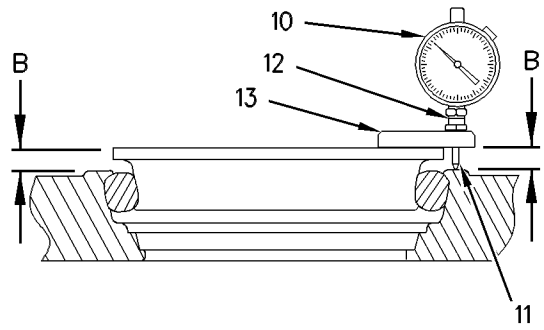

Illustration 6 g00534720

(B) Assembled height
(10) Dial indicator
(11) Contact point
(12) Collet assembly
(13) Dial indicator base (plastic)

6. Check assembled height (B) at four locations that are 90 degrees from each other. Use a calibrated 6V-3075 Dial Indicator and the related tools in Table 1 in order to measure the assembled height. The difference in height must not exceed 1.0 mm (0.04 inch). Refer to Illustration 6 .

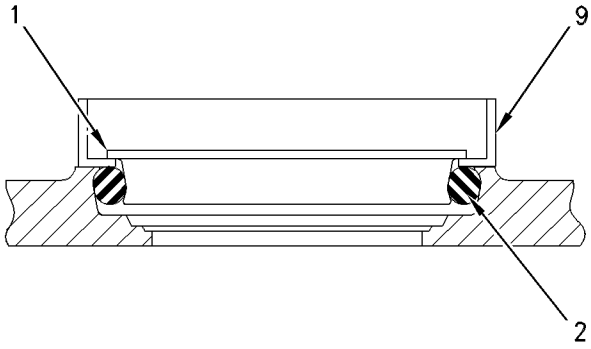

Illustration 7 g00446492

7. Do not adjust the seal ring (1) by pushing on the seal ring or by pulling on the seal ring. Use Tooling (9) in order to push down on the seal.

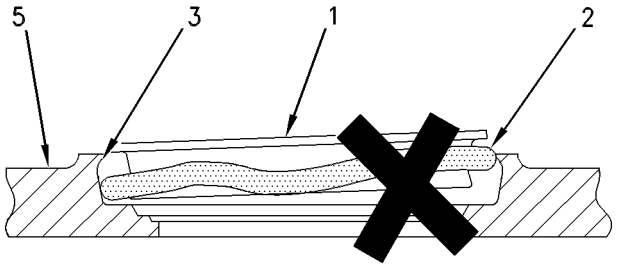

Illustration 8 g00446493

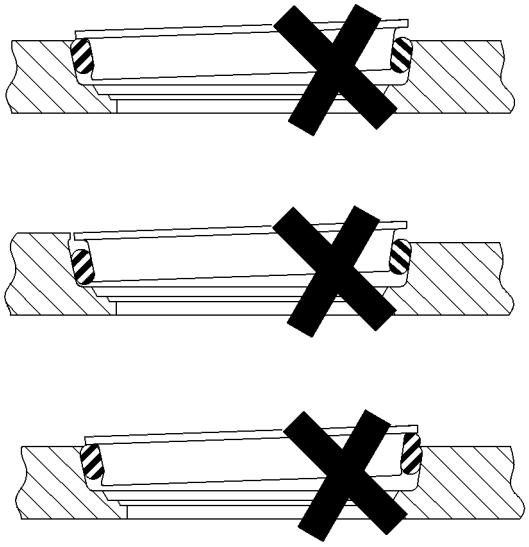

Illustration 9 g00446494

Examples of incorrect assembly

8. Rubber toric ring (2) may twist during installation if the seal is not completely wet or if there are burrs or fins on housing retaining lip (3) that is part of seal ring housing (5). Misalignments, twists and bulges of the rubber toric ring will cause Duo-Cone Seal failures. If correct installation is not obvious, remove the toric ring from the housing and repeat the installation procedure.

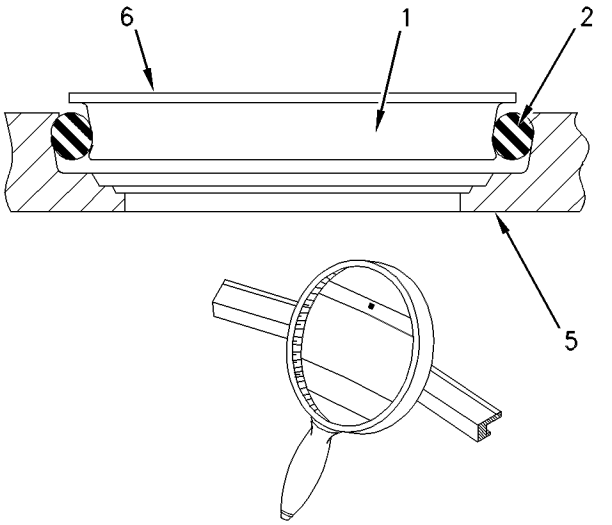

Illustration 10 g00446495

9. Wipe seal ring face (6) that is part of seal rings (1) by using a lint free cloth. No particles of any kind are permissible on the sealing surfaces. A small piece of paper from a paper towel can force apart the seal ring face, which will cause a leak.

Note: Rubber toric ring (2) must never slip on the ramps of seal ring (1) or the ramps of seal ring housing (5). In order to prevent slippage, allow adequate time for evaporation of the lubricant before proceeding with the procedure. Once the rubber toric ring is correctly positioned, the rubber toric ring must roll only on the ramps.

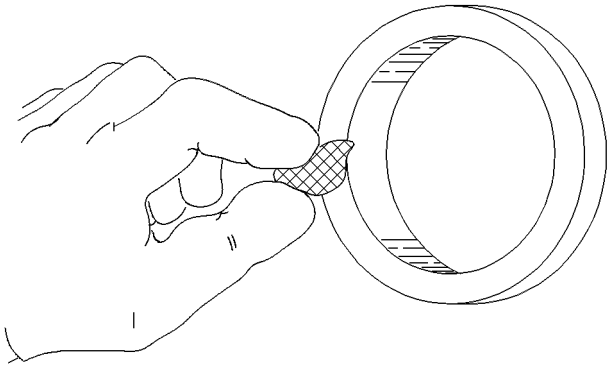

Illustration 11 g00534623

10. Apply a thin film of clean oil on the entire seal ring face of one or both seals. Use a lint free cloth or brush in order to distribute the oil evenly. Be careful not to get any oil on the rubber toric rings. Lubricate the seal faces by using the same oil that was used during assembly. Dye may have been used in the oil that was used during assembly. Use the same kind of oil without dye in order to lubricate the seal faces.

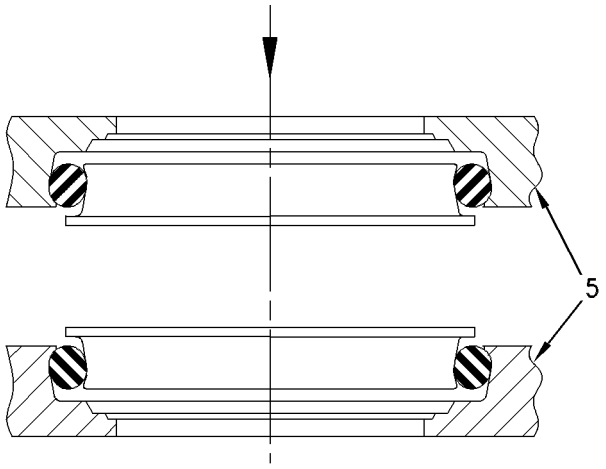

Illustration 12 g00446497

11. Make sure that both seal ring housings (5) are in correct alignment and that the seal ring housings are concentric. Move the parts slowly and move the parts carefully toward each other.

Note: Do not force the seal ring and the seal ring housing together in a sudden manner. The seal component could be scratched or the seal component could be broken if the components are slammed together.

12. Tighten the bolts after the components are in the correct position.

Acceptable Lubricants for Assembly

⚠ WARNING

Avoid prolonged skin contact with isopropyl alcohol. Avoid breathing the vapors in enclosed areas without adequate ventilation and do not smoke.

Isopropyl alcohol is flammable. Do not use near open flame, welding operations, or around heated surfaces exceeding 482°C (900°F).

Note: Do not use any liquid that leaves an oil film. Do not use any liquid that does not evaporate quickly. All of the guidelines for safety and all of the guidelines for disposal must be followed when you use a flammable liquid. The following liquids are acceptable lubricants for assembly:

- Quaker Solvo Clean 68-0
- Houghto-Grind 60 CT
- Isopropyl alcohol

Some seal kits come with silicone toric rings. Silicone toric rings can be chilled for easier installation. This will allow the toric ring to contract for easier installation.

Seals should be placed in a freezer for 5 minutes. Temperature in the freezer should be between −40°C (−40°F) to −18°C (0°F). Chilling should be done prior to installation. Contraction will be sufficient to allow installation. The seals should be allowed to warm to room temperature prior to further assembly.

Result of Incorrect Assembly

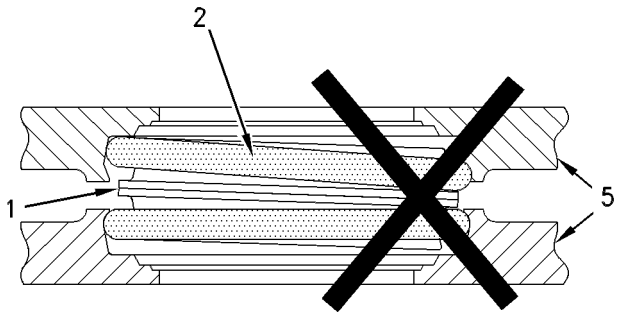

Illustration 13 g00446498

The slipping of the rubber toric ring on the housing ramp or on the seal ring ramp may result in uneven pressure on the seal face. Uneven pressure on the seal face causes galling, scoring, and leakage.

If the rubber toric ring slips at one location but not all the way around the seal ring, the toric ring will twist.

The twisted toric ring could be cocked. Seals that are cocked will cause uneven pressure on the seal face. Seals that are cocked may also cause possible galling, scoring, and leakage.

The twisted toric ring could oscillate when the ring is rotated. Seals that oscillate may allow dirt into the seal joint. This is caused by the pumping action that is created by the toric ring that is oscillating.

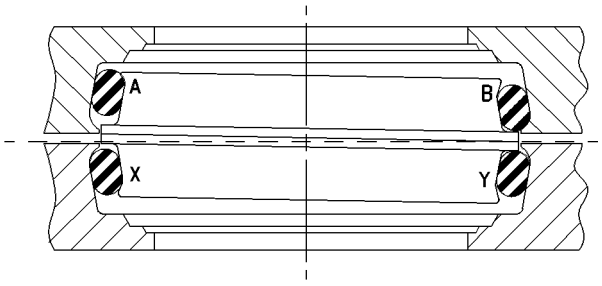

Illustration 14 g00446499

Illustration 14 shows a toric ring that is assembled incorrectly. The upper housing is stationary. The lower housing is rotating.

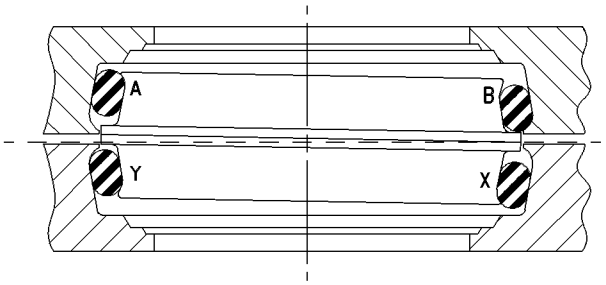

Illustration 15 g00446500

Illustration 15 shows the same seal after the lower housing has rotated 180 degrees. In this position, there will be high pressure at point (B) and at point (X). These points of high pressure may result in galling of the toric rings. There will be low pressure at point (A) and at point (Y) which will result in possible leakage.

i07249549

Wheel and Tire (Rear) - Remove and Install

SMCS Code: 4200-010

Removal Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	425-0952	Chock	2
B	439-3940	Bracket As	2
C	504-9790	Lift Gp (60Hz)(1)	2
	OR		
	504-9792	Lift Gp (50Hz)(2)	2

(1) High-Voltage (480V) Low-Voltage (240V)
(2) High-Voltage (400V) Low-Voltage (200V)

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Connect the steering frame lock. Refer to Operation and Maintenance Manual, “Steering Frame Lock”.

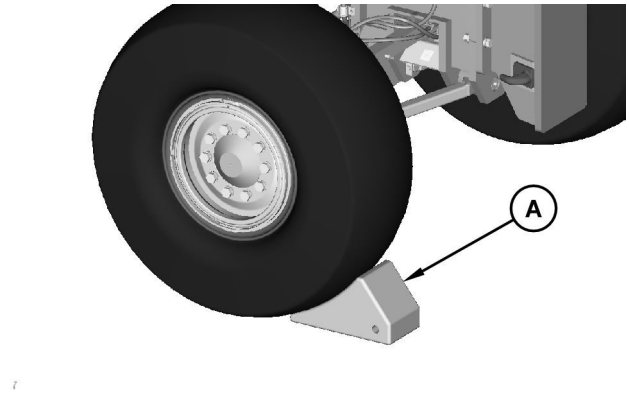

Illustration 16 g01389301

2. Use Tooling (A) to chock the front wheels.

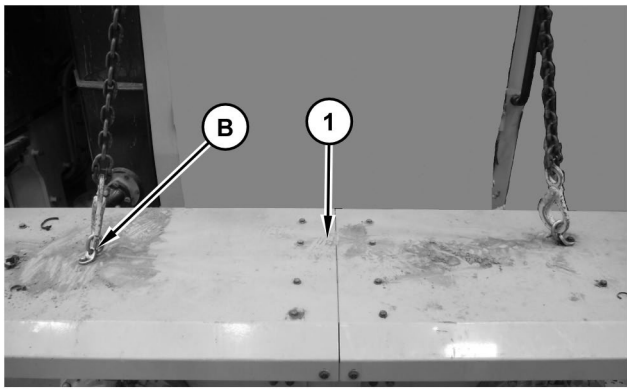

Illustration 17 g03890706

3. Attach Tooling (B) and a suitable lifter device to fender assembly (1). The weight of fender assembly (1) is approximately 188 kg (415 lb).

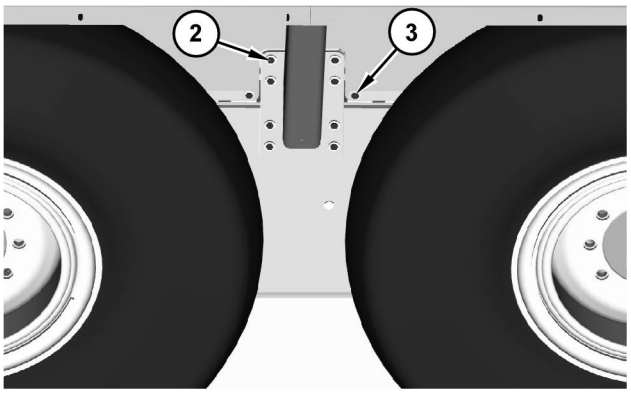

Illustration 18 g03890712

4. Remove bolts (2). Remove bolts (3).

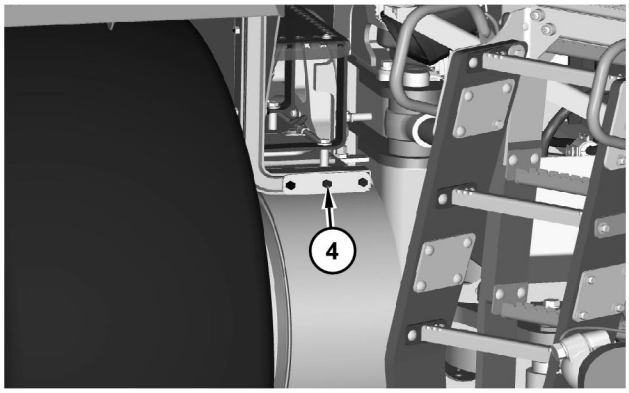

Illustration 19 g03890723

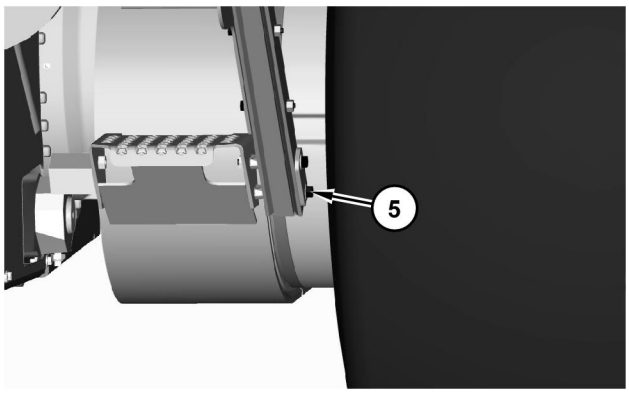

Illustration 20 g03890726

5. Remove bolts (4).

6. Remove bolts (5). Remove fender assembly (1).

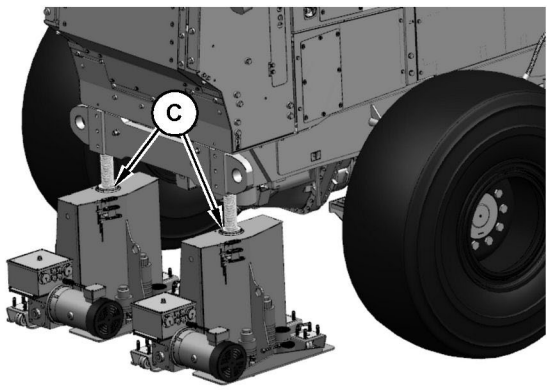

Illustration 21 g06266187
Typical Example

7. Position Tooling (C) as shown in Illustration 21 to raise the rear of the machine until the rear wheels are off the ground. Refer to Tool Operating Manual, NEHS1303, “Lift Group (Stand - 25 Ton)” for more information on Tooling (C).

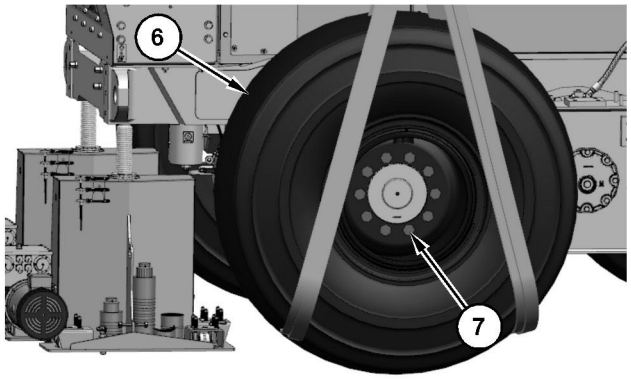

Illustration 22 g06266190
Typical Example

8. Attach a suitable lifting device onto rear wheel and tire (6). Remove bolts (7). Remove rear wheel and tire (6) from the spindle hub. The weight of rear wheel and tire (6) is approximately 340 kg (750 lb). Repeat this step for the remaining wheels.

Installation Procedure

1. Install rear wheel and tire (6) in the reverse order of removal.

2. Tighten bolts (7) to a torque of 1800 ± 200 N·m (1328 ± 148 lb ft).

i07246468

Drive Chain - Remove

SMCS Code: 3261-011

Removal Procedure

Table 3

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	425-0952	Chock	2
B	504-9792	Lift Gp	2
C	5P-7311	Chain Puller	1

Start By:

a. Remove the drive shaft.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

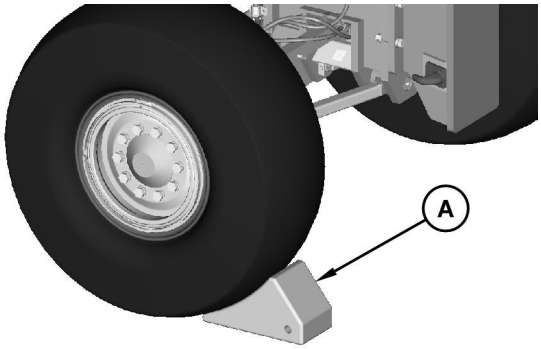

Illustration 23 g01389301

1. Use Tooling (A) to chock the front wheels.

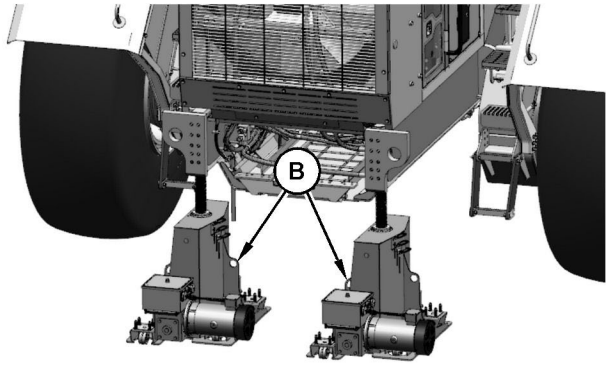

Illustration 24 g06275129
Typical example

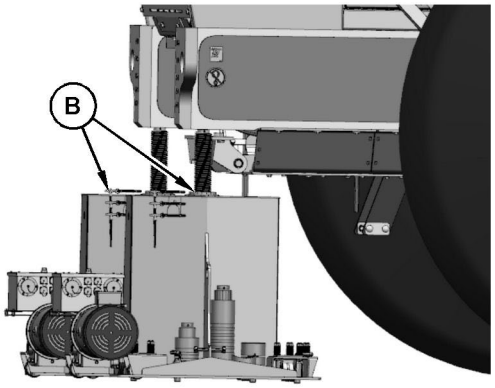

Illustration 25 g06275133

Typical example

2. Position Tooling (B) as shown in Illustration 24 . Raise the rear of the machine until the rear wheels are off the ground. Refer to Tool Operating Manual, NEHS1303 for more information on Tooling (B).

3. Drain the oil from the tandem housing into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Tandem Drive Oil - Change”.

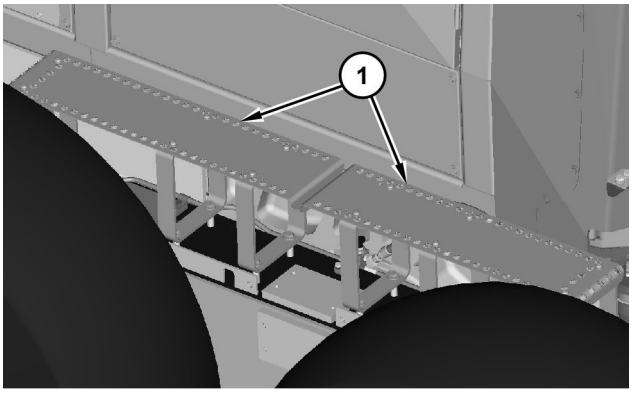

Illustration 26 g01389308

4. Remove walkways (1).

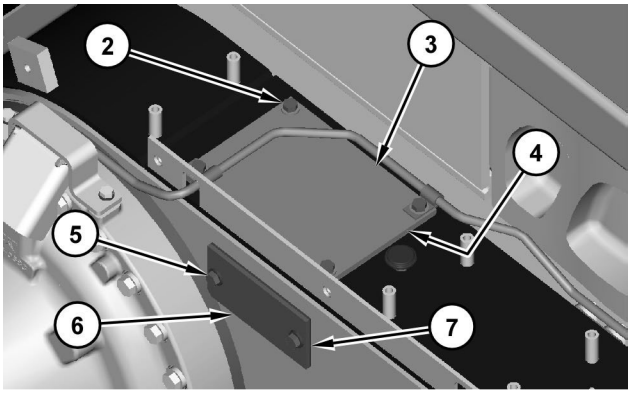

Illustration 27 g01389312

5. Remove bolts (2) to remove cover (3) and gasket (4). Discard gasket (4). Remove bolts (5) to remove cover (6) and gasket (7). Discard gasket (7).

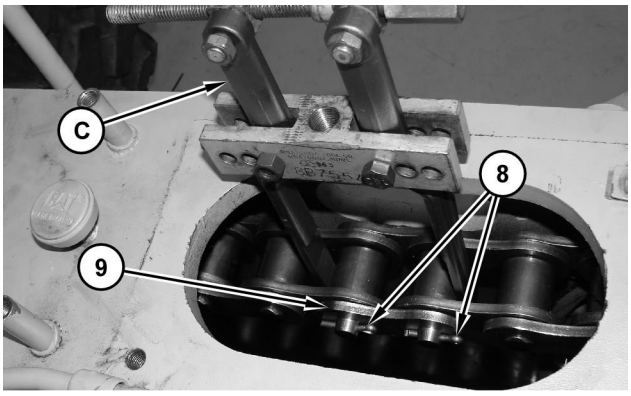

Illustration 28 g01389655

6. Install Tooling (C). Remove cotter pins (8). Disconnect master link (9).

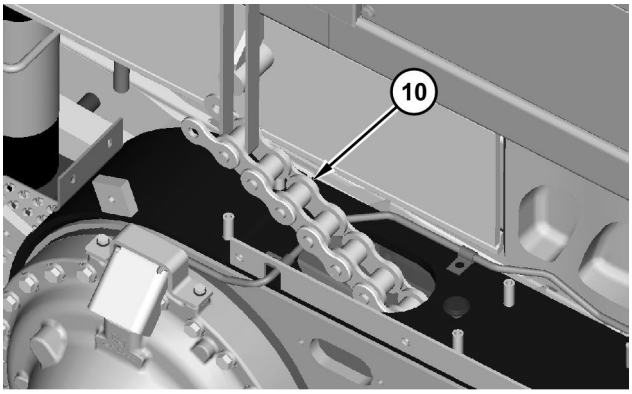

Illustration 29 g01389657

7. Use a suitable lifting device to remove drive chain (10). The weight of drive chain (10) is approximately 40 kg (90 lb).

8. Repeat Step 7 for the remaining drive chains.

i07246476

Drive Chain - Install

SMCS Code: 3261-012

Installation Procedure

Table 4

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	425-0952	Chock	2
B	504-9792	Lift Gp	2
C	5P-7311	Chain Puller	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

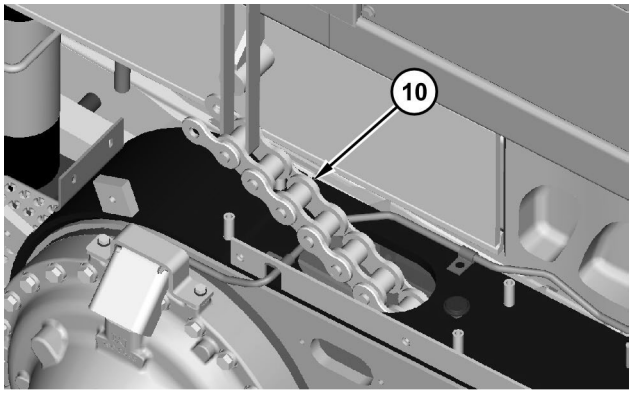

Illustration 30 g01389657

1. Use a suitable lifting device to install drive chain (10). The weight of drive chain (10) is approximately 40 kg (90 lb).

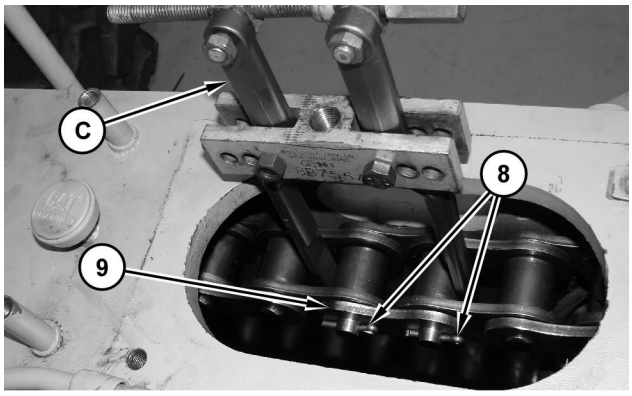

Illustration 31 g01389655

2. Use Tooling (C) to connect master link (9). Install cotter pins (8).

Note: The links should not be in adjacent tooth spaces on the sprocket when the links pass on the center sprocket, or interference may result.

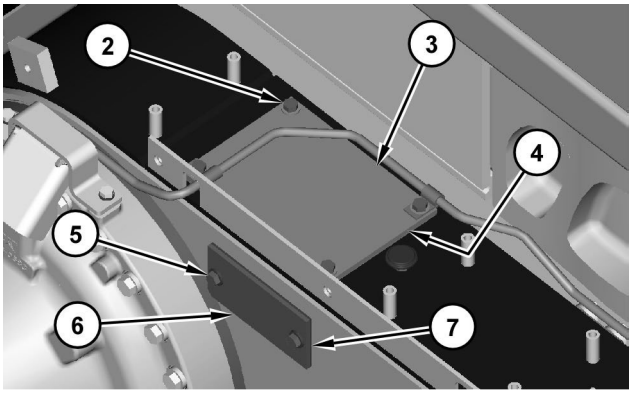

Illustration 32 g01389312

3. Install a new gasket (7), cover (6), and bolts (5). Tighten bolts (5) to a torque of 27 ± 7 N·m (20 ± 5 lb ft). Install a new gasket (4), cover (3), and bolts (2). Tighten bolts (2) to a torque of 27 ± 7 N·m (20 ± 5 lb ft).

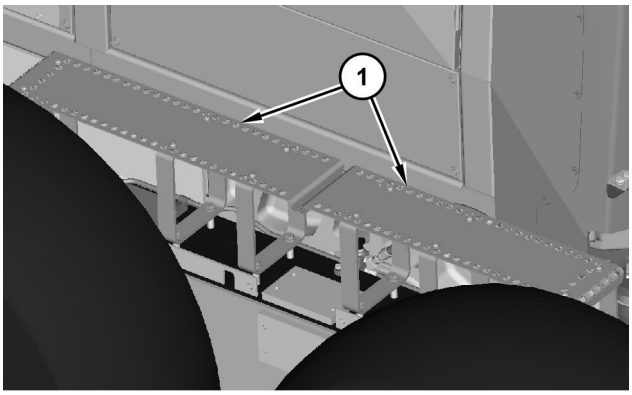

Illustration 33 g01389308

4. Install walkways (1).

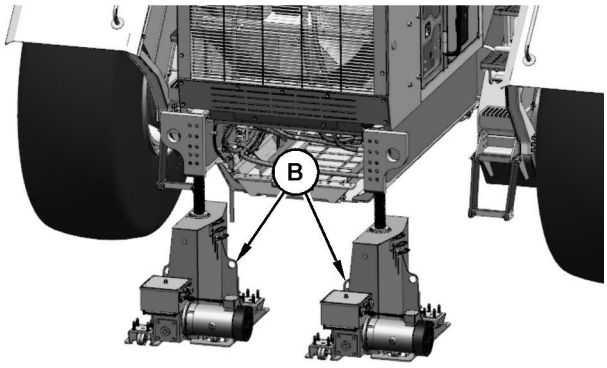

Illustration 34 g06275129
Typical example

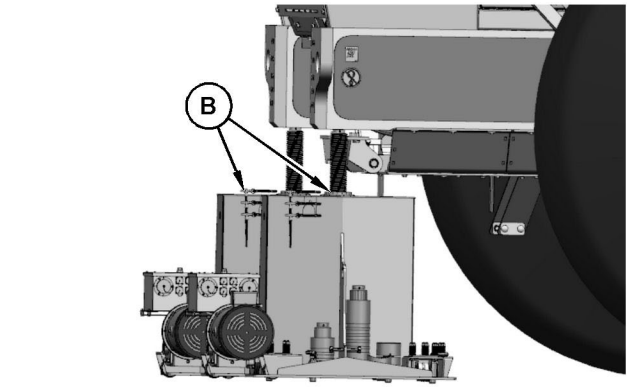

Illustration 35 g06275133
Typical example

5. Use Tooling (B) to lower the rear of the machine. Remove Tooling (B). Refer to Tool Operating Manual, NEHS1303 for more information on Tooling (B).

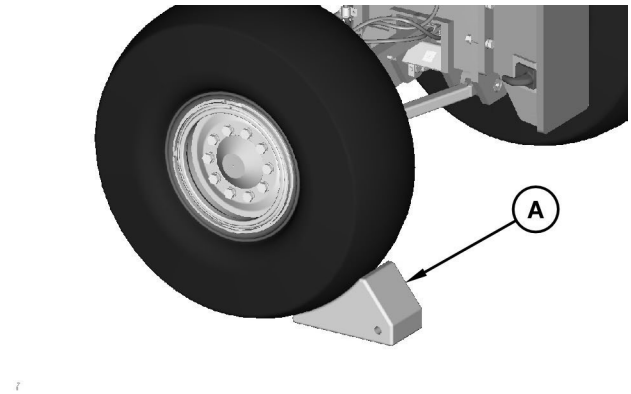

Illustration 36 g01389301

6. Remove Tooling (A) from the front wheels.

7. Fill the tandem housing with oil. Refer to Operation and Maintenance Manual, “Tandem Drive Oil - Change”.

End By:

a. Install the drive shaft.

i05965838

Service Brake (Wheel Spindle) - Remove

SMCS Code: 4002-011

Removal Procedure

Table 5

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7574	Link Bracket	2
B	138-7576	Link Bracket	1

Start By:

a. Remove the rear wheels and tires. Refer to Disassembly and Assembly, “Wheel and Tire (Rear) - Remove and Install”.

b. Remove the drive chain. Refer to Disassembly and Assembly, “Drive Chain - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

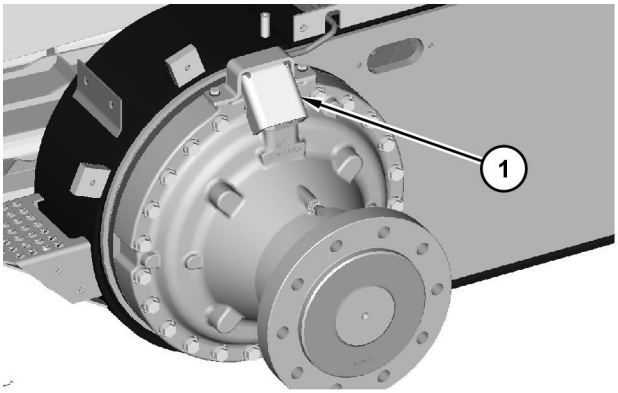

Illustration 37 g01389664

1. Release the hydraulic system pressure. Refer to Operation and Maintenance Manual, “System Pressure - Release”.

2. Remove guard (1).

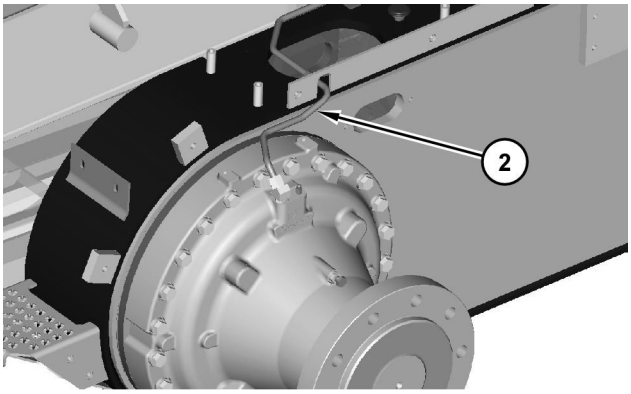

Illustration 38 g01389668

3. Remove tube assembly (2).

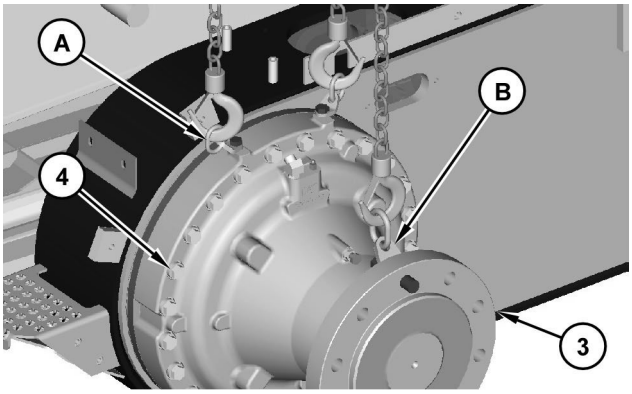

Illustration 39 g03740666

4. Attach Tooling (A), Tooling (B), and a suitable lifting device onto wheel spindle (3). The weight of wheel spindle (3) is approximately 322 kg (710 lb).

5. Remove bolts (4) in order to remove wheel spindle (3).

6. Repeat this procedure for the remaining wheel spindles.

i06745949

Service Brake (Wheel Spindle) - Disassemble

SMCS Code: 4002-015

Disassembly Procedure

Table 6

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7574	Link Bracket	2
B	1P-2420	Transmission Repair Stand	1
C	140-7742	Sleeve	2
D	154-6181	Forcing Bolt	2
E	8B-7551	Bearing Puller Gp	1

Start By:

a. Remove the service brake and the wheel spindle. Refer to Disassembly and Assembly, "Service Brake (Wheel Spindle) - Remove".

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace the O-ring seals that are worn or damaged.

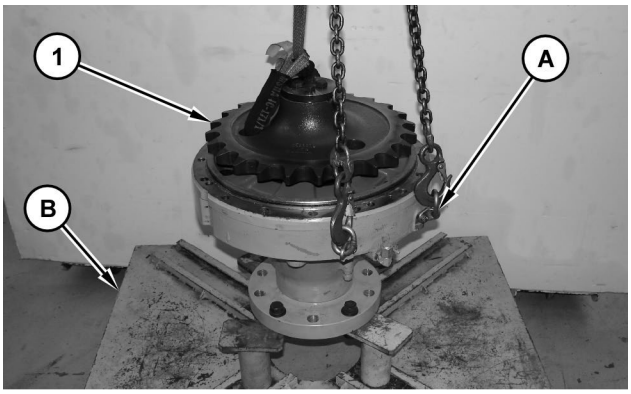

Illustration 40 g01349310

1. Use Tooling (A), Tooling (C), and a suitable lifting device to position service brake (1) onto Tooling (B). The weight of service brake (1) is approximately 272 kg (600 lb).

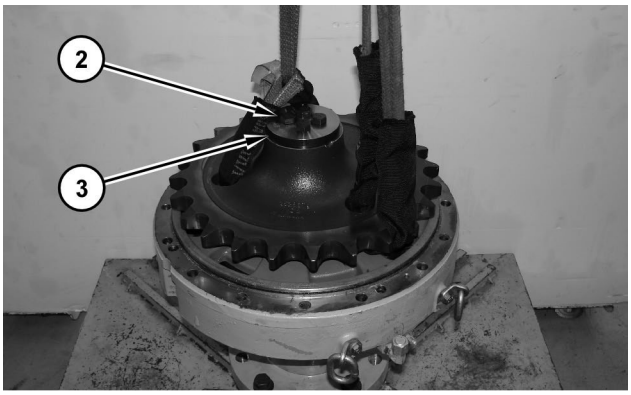

Illustration 41 g01349321

2. Remove bolts (2). Remove retainer (3).

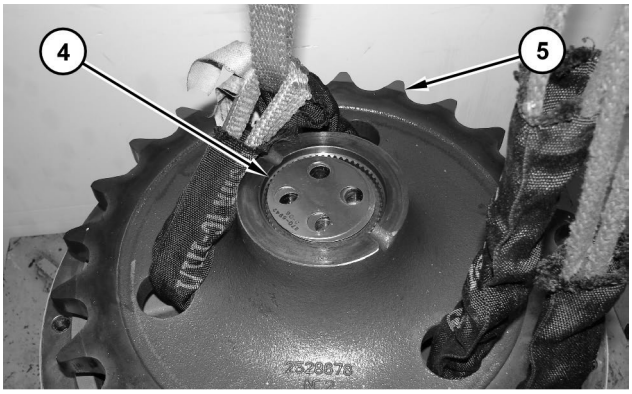

Illustration 42 g01349338

3. Remove shims (4). Use Tooling (C) and a suitable lifting device to remove sprocket (5). The weight of sprocket (5) is approximately 36 kg (80 lb).

Note: Note the quantity and the order of shims (4).

Illustration 43 g01349398

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

4. Remove bolts (6).

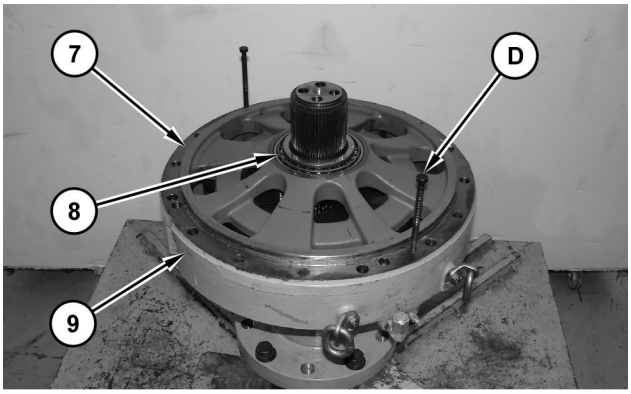

Illustration 44 g01349339

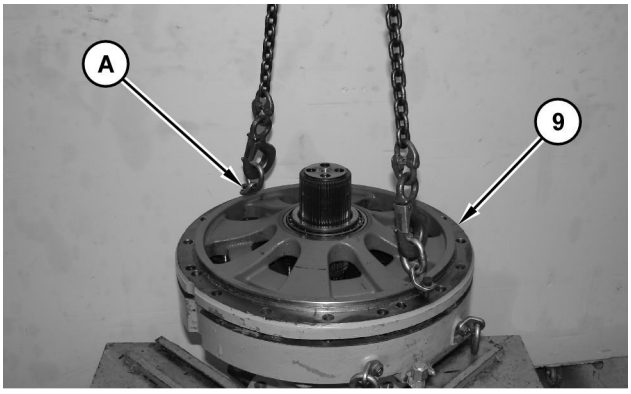

Illustration 45 g01349519

5. Remove O-ring seal (7). Use Tooling (D) to remove bearing cone (8). Use Tooling (A) and a suitable lifting device to remove cover (9). The weight of cover (9) is approximately 41 kg (90 lb).

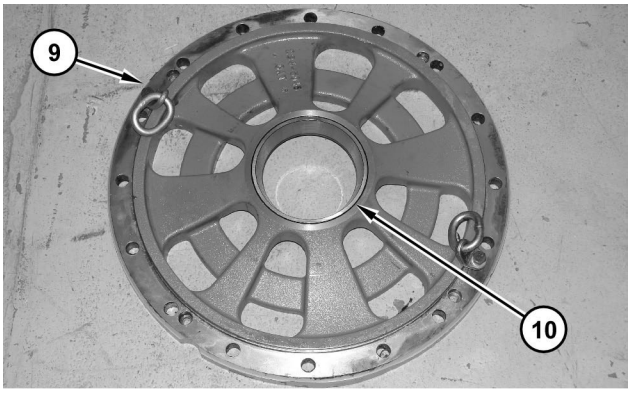

Illustration 46 g01349344

6. Remove bearing cup (10) from cover (9).

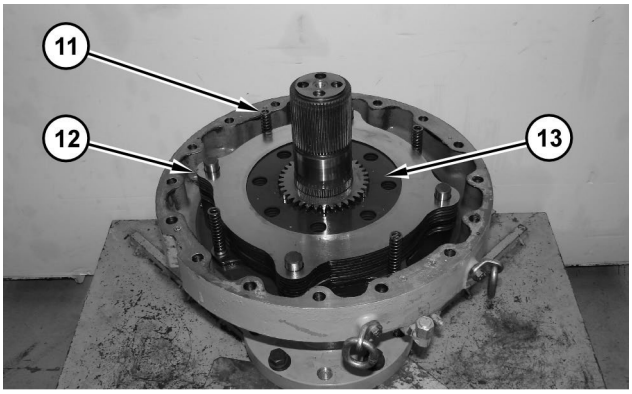

Illustration 47 g01349348

7. Remove springs (11). Remove plates (12) and discs (13).

Note: Note the quantity and the order of plates (12) and discs (13).

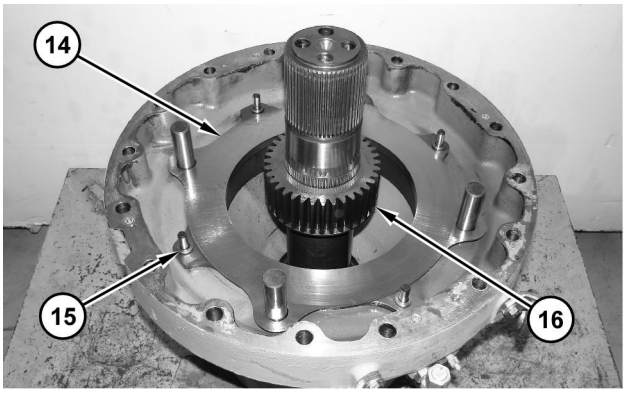

Illustration 48 g01349354

8. Remove piston (14). Remove spacers (15). Remove hub (16).

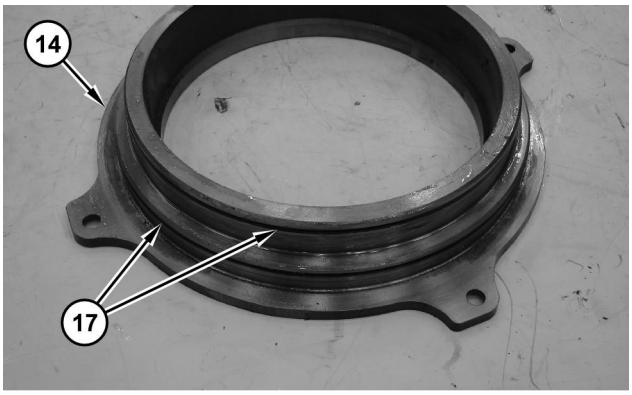

Illustration 49 g01349359

9. Remove seals (17) from piston (14).

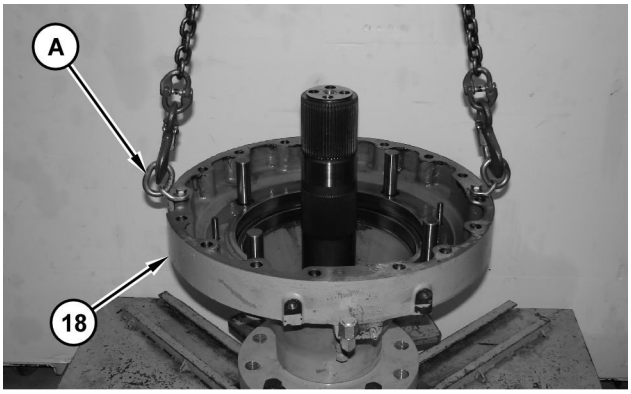

Illustration 50 g01349430

10. Use Tooling (A) to remove housing (18). The weight of housing (18) is approximately 75 kg (165 lb). Position housing (18) onto suitable blocking.

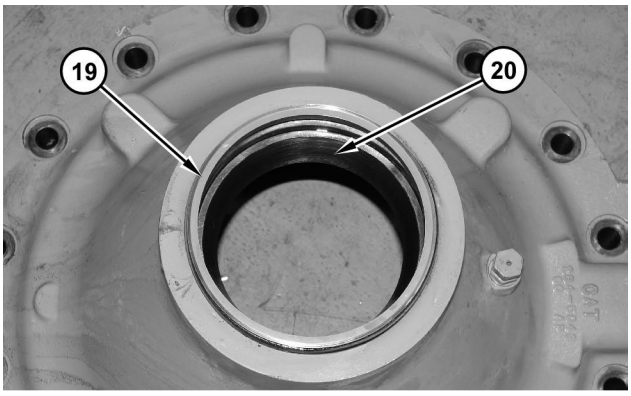

Illustration 51 g01349436

11. Remove the first half of Duo-Cone seal (19). Refer to Disassembly and Assembly, “Duo-Cone Conventional Seals - Remove”. Remove bearing cup (20).

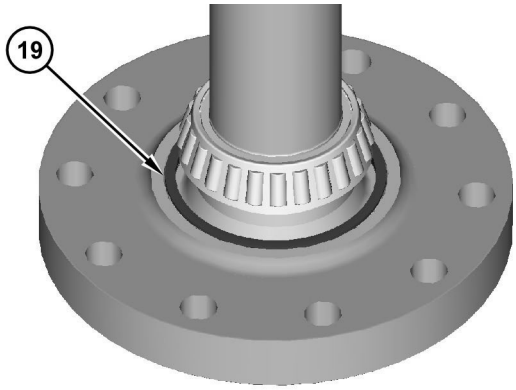

Illustration 52 g01349462

12. Remove the second half of Duo-Cone seal (19). Refer to Disassembly and Assembly, “Duo-Cone Conventional Seals - Remove”.

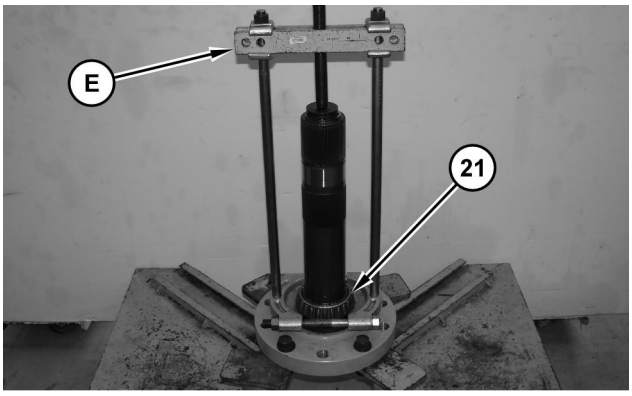

Illustration 53 g01349453

13. Use Tooling (E) to remove bearing cone (21).

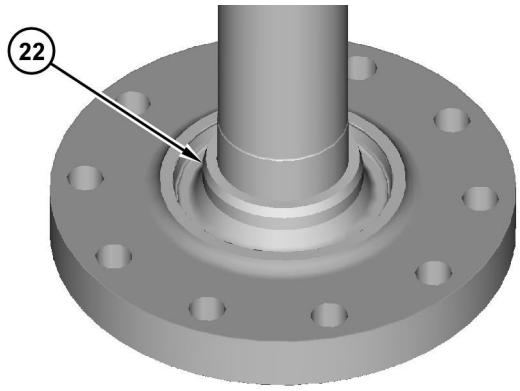

Illustration 54 g01378162

14. Remove spacer (22).

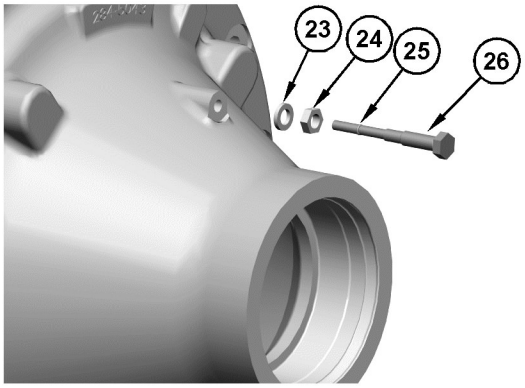

Illustration 55 g06101788

15. Remove compensator (26), O-ring (25), nut (24), and shims (23).

i06891653

Service Brake (Wheel Spindle) - Assemble

SMCS Code: 4002-016

Assembly Procedure

Table 7

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7574	Link Bracket	2
B	1P-2420	Transmission Repair Stand	1
C	140-7742	Sleeve	2
F	169-0503	Installation Kit	1
	1U-8698(1)	Duo-Cone Seal Installer As	1
	1U-6441(2)	Duo-Cone Seal Installer As	1
G	1U-8846	Gasket Sealant	1
H	9S-3263	Loctite 243	1
J	8T-4132	Nut	6
	-	M16 - 2.00 × 180mm Bolt	3
K	6V-7030	Micrometer Depth Gauge Gp	1
L	6V-2055	Grease	1

(1) For a Duo-cone Seal with a diameter of 160.09 ± 0.58 mm (6.303 ± 0.023 inch)
(2) For a Duo-cone Seal with a diameter of 191.26 ± 0.25 mm (7.529 ± 0.009 inch)

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

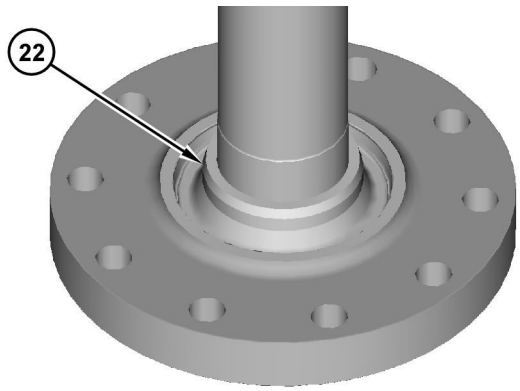

Illustration 56 g01378162

1. Install spacer (22).

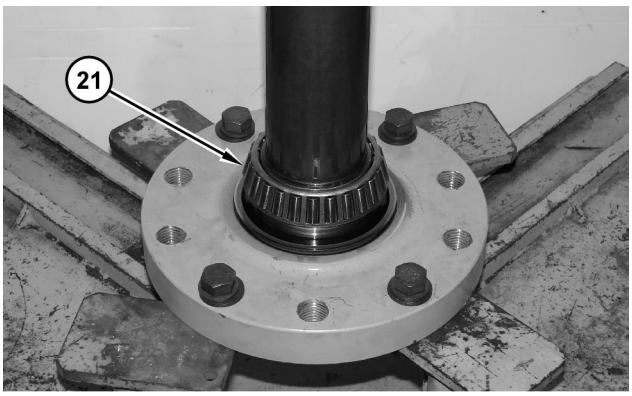

Illustration 57 g01349477

2. Raise the temperature of bearing cone (21). Install bearing cone (21). Ensure that bearing cone (21) is seated correctly against the spacer.

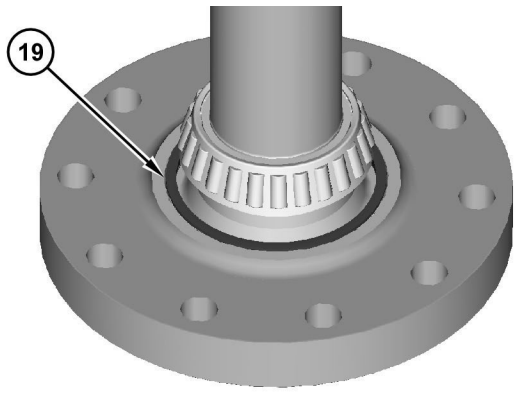

Illustration 58 g01349462

3. Use Tooling (F) to install the second half of Duo-Cone seal (19). Refer to Disassembly and Assembly, “Duo-Cone Conventional Seals - Install”.

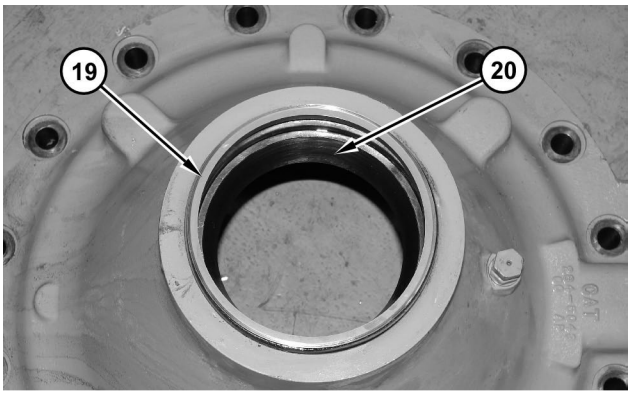

Illustration 59 g01349436

4. Lower the temperature of bearing cup (20). Install bearing cup (20). Ensure that bearing cup (20) is seated correctly. Use Tooling (F) to install the first half of Duo-Cone seal (19). Refer to Disassembly and Assembly, “Duo-Cone Conventional Seals - Install”.

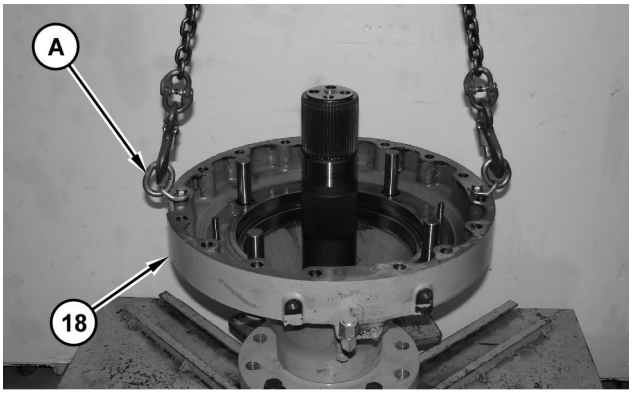

Illustration 60 g01349430

5. Use Tooling (A) and a suitable lifting device to install housing (18). Apply Tooling (L) onto the bores of housing (18). The weight of housing (18) is approximately 75 kg (165 lb).

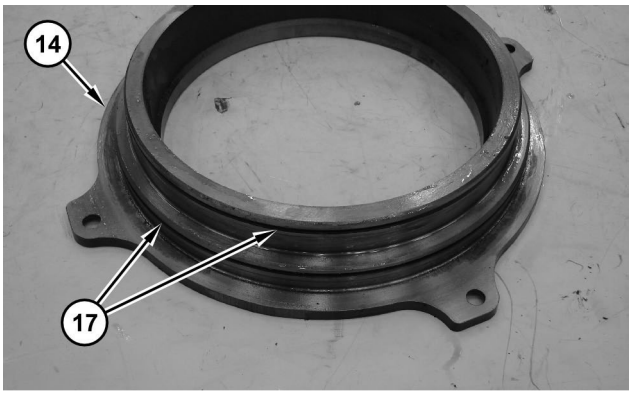

Illustration 61 g01349359

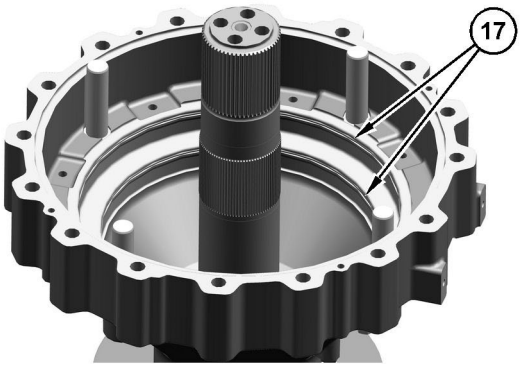

Illustration 62 g06277637

6. Install seals (17).

Note: Some machines require the seals to be installed on the piston, while others require the seals to be installed in the housing.

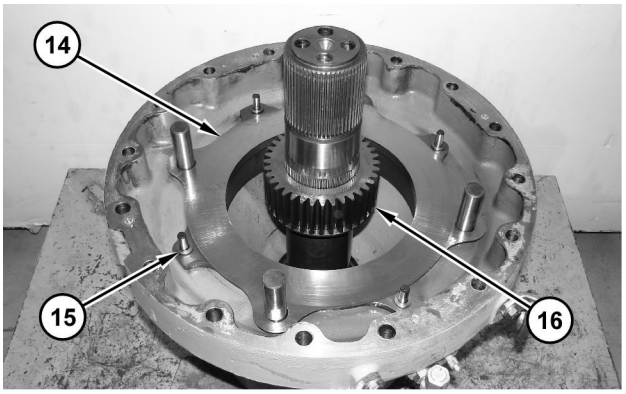

Illustration 63 g01349354

7. Install hub (16), piston (14), and spacers (15).

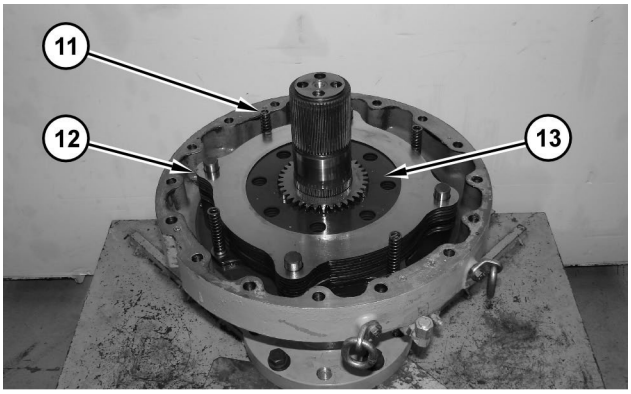

Illustration 64 g01349348

8. Install discs (13) and plates (12). Install springs (11).

Note: Ensure that the vent holes that are in discs (13) are aligned.

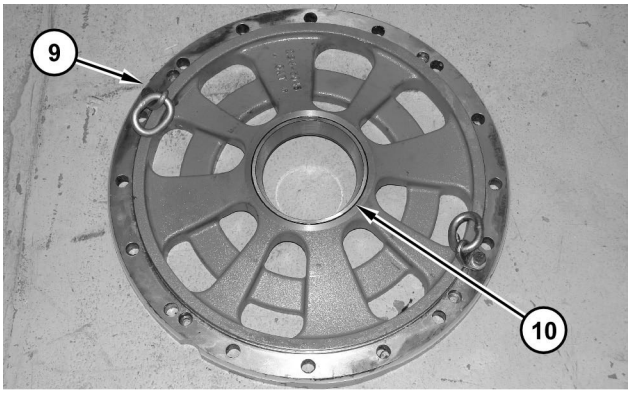

Illustration 65 g01349344

9. Lower the temperature of bearing cup (10). Install bearing cup (10) into cover (9).

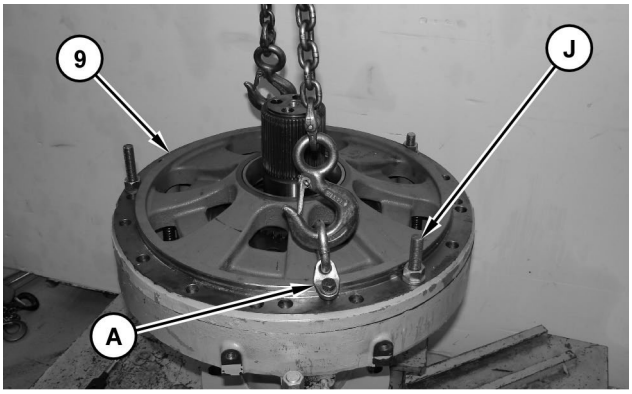

Illustration 66 g01349575

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

10. Apply Tooling (G) onto the mating surface of the housing. Use Tooling (A), and a suitable lifting device to install cover (9). The weight of cover (9) is approximately 41 kg (90 lb).

11. Use Tooling (J) to compress the springs.

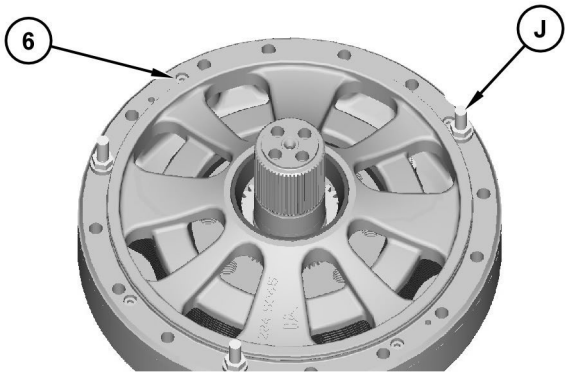

Illustration 67 g01349585

12. Install bolts (6). Remove Tooling (J).

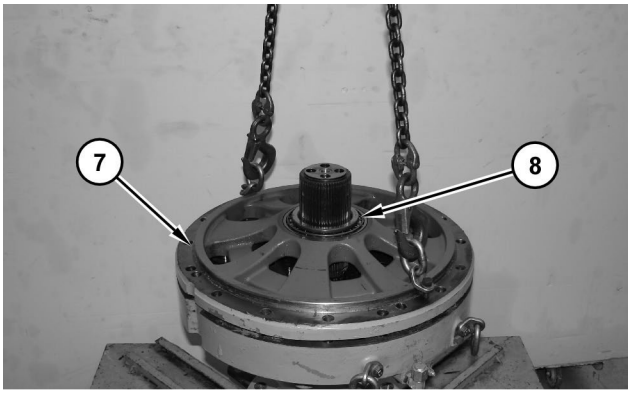

Illustration 68 g01349540

13. Install bearing cone (8). Install O-ring seal (7).

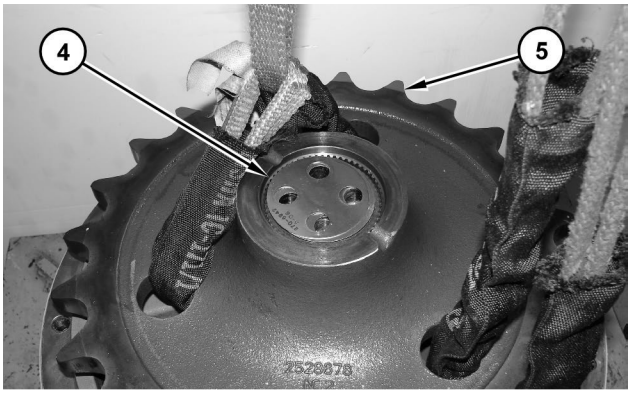

Illustration 69 g01349338

14. Use Tooling (C) and a suitable lifting device to install sprocket (5). The weight of sprocket (5) is approximately 36 kg (80 lb).

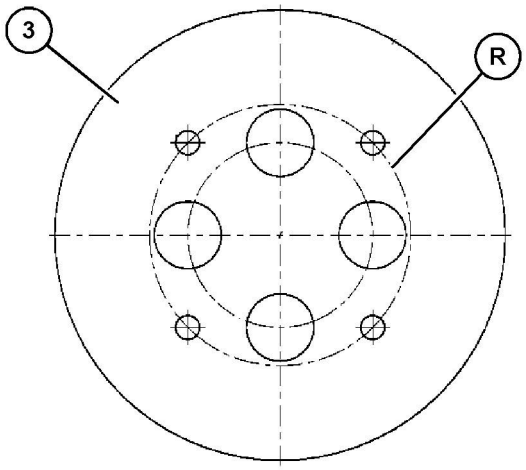

Illustration 70 g06297757

Shown is the pattern to update retainer (3) if necessary. The diameter for circle (R) is 70 mm (2.77 inch).

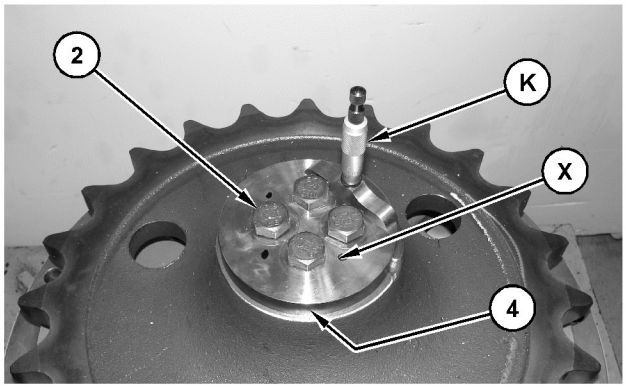

Illustration 71 g06195003

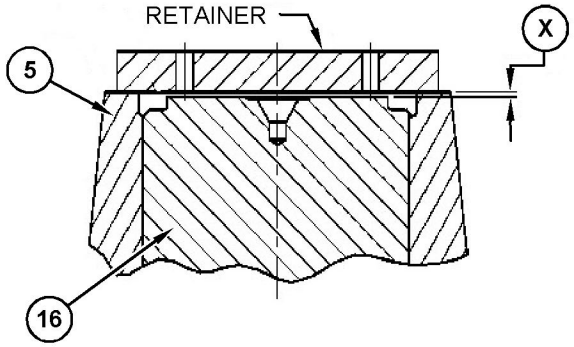

Illustration 72 g06023870

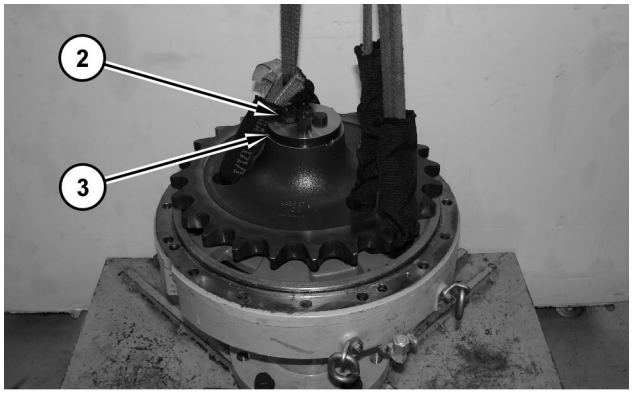

Illustration 73 g01349321

15. Position retainer (3) with no shims (4) installed. Install bolts (2) finger tight against the retainer (3). Tighten bolts (2) to a torque of 90 N·m (66 lb ft). Repeat until bolts (2) no longer turn. Rotate the housing three full rotations once the bolt torque has equalized at a torque of 90 N·m (66 lb ft). Bolts (2) will have to be tightened several times followed by three full rotations to ensure correct torque.

16. Loosen bolts (2) and finger tighten against retainer (3).

17. With bolts (2) finger tight only, rotate the housing three full rotations.

18. Tighten the bolts to 30 N·m (22 lb ft). Repeat until bolts no longer turn. Rotate the housing three full rotations once the bolt torque has equalized at a torque of 30 N·m (22 lb ft). Bolts (2) will have to be tightened several times followed by three full rotations to ensure correct torque.

19. Remove two of bolts (2) and measure Dimension (X) using tooling (K). Subtract 0.03 mm (0.001 inch) from the average of Dimension (X). This result is the desired thickness of shim pack (4).

20. Build shim pack (4) to the dimension calculated in Step 19. Use the most number of thick shims possible for the given total thickness. Position the thin shims between the thick shims.

21. Install retainer (3). Apply Tooling (H) to bolts (2). Install bolts (2) and tighten to a torque of 270 ± 40 N·m (199 ± 30 lb ft).

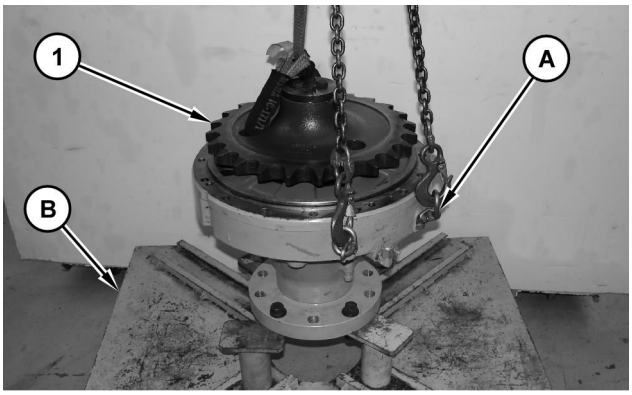

Illustration 74 g01349310

22. Use Tooling (A), Tooling (C), and a suitable lifting device to remove service brake (1) from Tooling (B). The weight of service brake (1) is approximately 272 kg (600 lb).

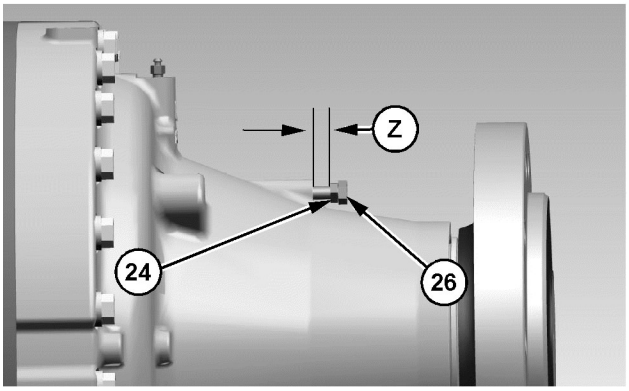

Illustration 75 g06195026

23. Install nut (24) onto compensator (26) snug nut (24) against compensator (26) shoulder. Apply air pressure to the brake piston. Tighten compensator (26) by hand until the compensator contacts the piston. Measure the distance between nut (24) and housing face (27), record this distance as Dimension (z).

24. Subtract 6 mm (0.236 inch) from Dimension (Z) and round down to the nearest 0.5 mm (0.02 inch) To achieve the required number of shims.

25. Remove compensator (26) and nut (24) from housing.

26. Release air pressure from the brake piston.

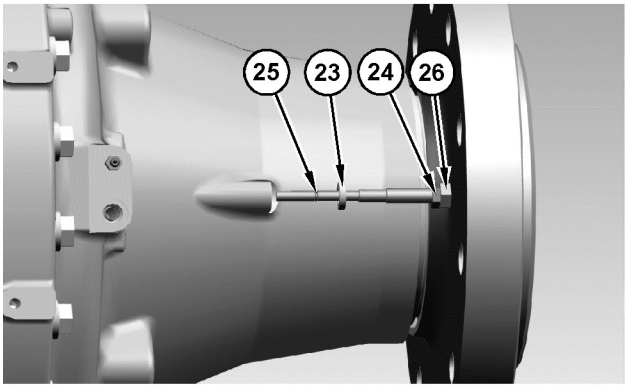

Illustration 76 g06195040

27. Install the required number of shims (23) to compensator (26), up against nut (24).

28. Install O-ring (25) onto compensator (26).

29. Install compensator (26) by hand until the compensator contacts the piston. Loosen compensator (26) 1/2 of a turn.

30. Hold compensator (26) and tighten nut (24) to a torque of 50 ± 10 N·m (37 ± 7 lb ft).

End By:

a. Install the service brake and the wheel spindle. Refer to Disassembly and Assembly, "Service Brake (Wheel Spindle) - Install".

i05965251

Service Brake (Wheel Spindle) - Install

SMCS Code: 4002-012

Installation Procedure

Table 8

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7574	Link Bracket	2
B	138-7576	Link Bracket	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

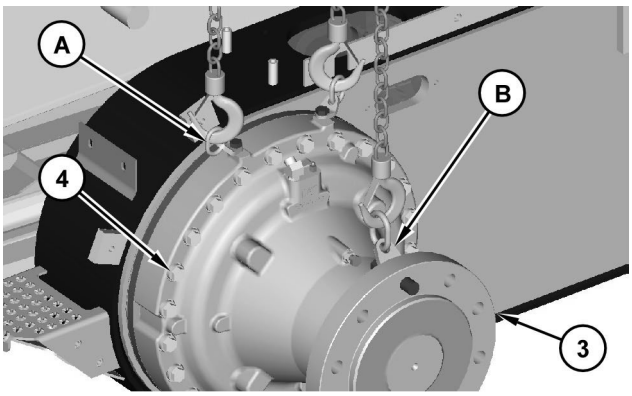

Illustration 77 g03740666

1. Use Tooling (A), Tooling (B), and a suitable lifting device in order to install wheel spindle (3). The weight of wheel spindle (3) is approximately 322 kg (710 lb).

2. Install bolts (4). Tighten bolts (4) to a torque of 270 ± 40 N·m (199 ± 30 lb ft).

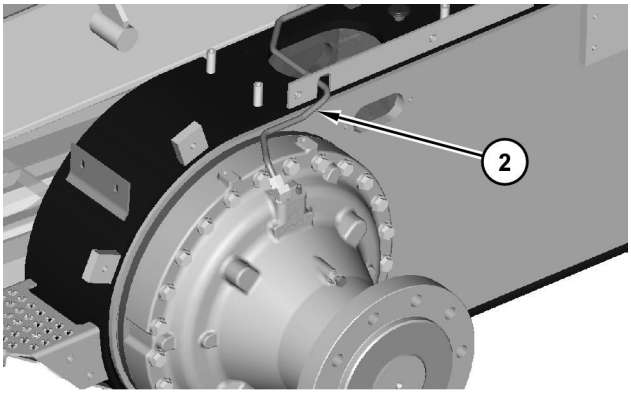

Illustration 78 g01389668

3. Install tube assembly (2).

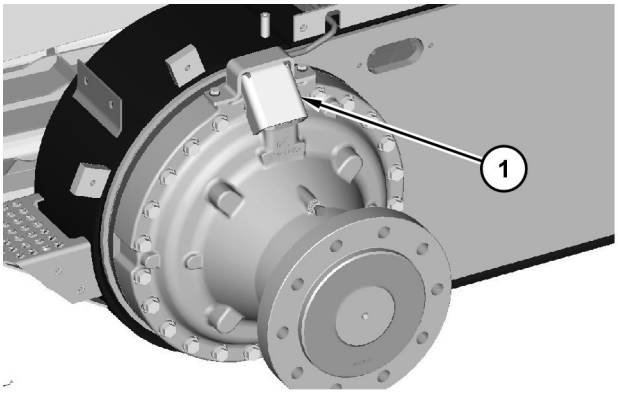

Illustration 79 g01389664

4. Install guard (1).

End By:

a. Install the drive chain. Refer to Disassembly and Assembly, "Drive Chain - Install".

b. Install the rear wheels and tires. Refer to Disassembly and Assembly, "Wheel and Tire (Rear) - Remove and Install".

i05305516

Housing (Tandem) - Remove and Install

SMCS Code: 4064-010

Removal Procedure

Table 9

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	140-7742	Sleeve	2

Start By:

a. Remove the rear wheels. Refer to Disassembly and Assembly, “Wheel and Tire (Rear) - Remove and Install”.

b. Remove the service brakes. Refer to Disassembly and Assembly, “Service Brake (Wheel Spindle) - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace the O-ring seals that are worn or damaged.

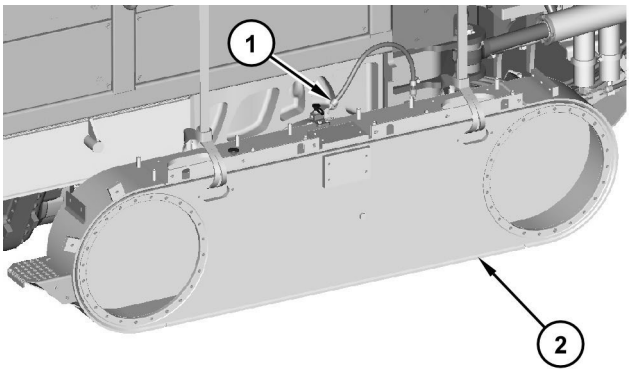

Illustration 80 g01389705

1. Disconnect hose assembly (1). Attach Tooling (A) and two suitable lifting devices onto tandem housing assembly (2). The weight of tandem housing assembly (2) is approximately 621 kg (1370 lb).

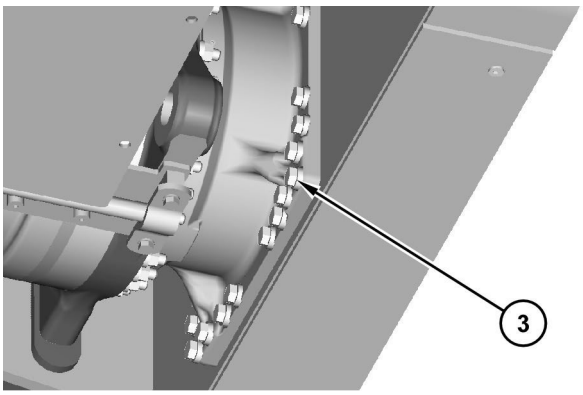

Illustration 81 g01389728

2. Remove bolts (3).

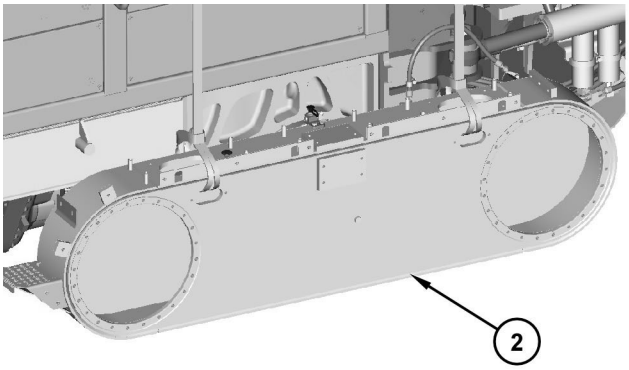

Illustration 82 g01389730

3. Remove tandem housing assembly (2). The weight of tandem housing assembly (2) is approximately 621 kg (1370 lb).

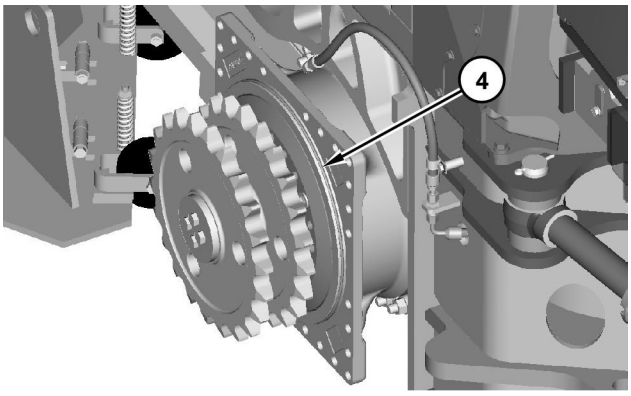

Illustration 83 g01389733

4. Remove O-ring seal (4).

Installation Procedure

Table 10

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	140-7742	Sleeve	2
B	-	Loctite 271	-

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

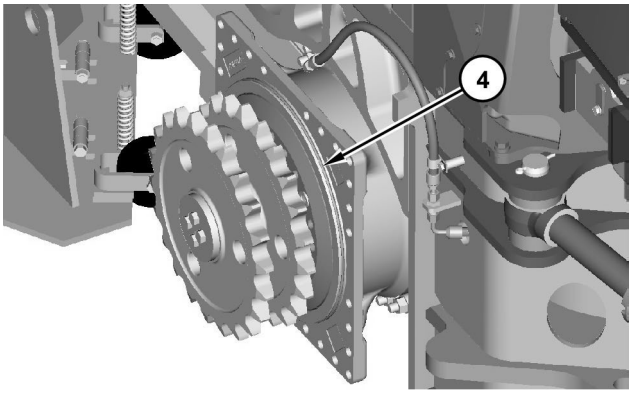

Illustration 84 g01389733

1. Install O-ring seal (4).

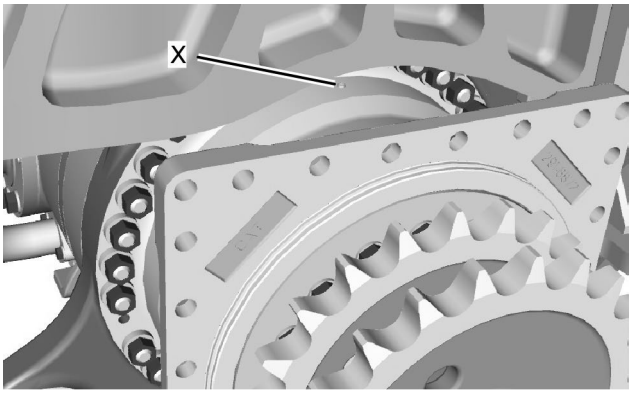

Illustration 85 g02361117

2. Ensure that the lubrication port (X) is orientated vertically on both side of the machine.

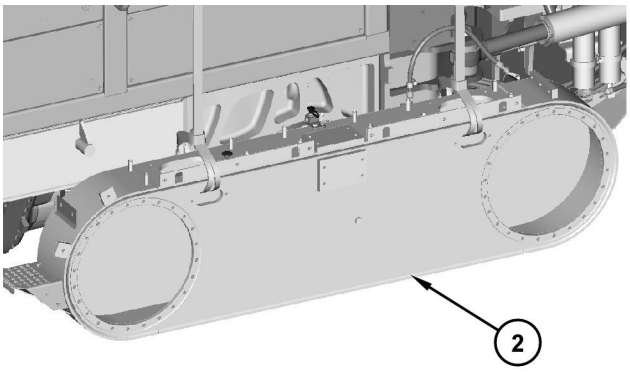

Illustration 86 g01389730

3. Use Tooling (A) and two suitable lifting devices in order to install tandem housing assembly (2). The weight of tandem housing assembly (2) is approximately 621 kg (1370 lb).

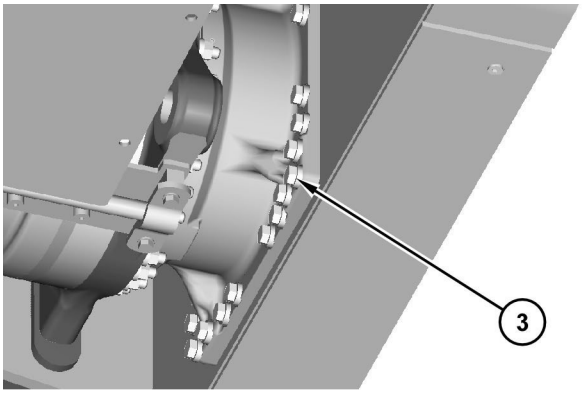

Illustration 87 g01389728

Note: Do not use the four bolts that are on the corners of the final drive to pull the tandem housing against the final drive.

4. Apply Tooling (B) to bolts (3). Install bolts (3). Tighten bolts (3) to a torque of 530 ± 70 N·m (391 ± 52 lb ft).

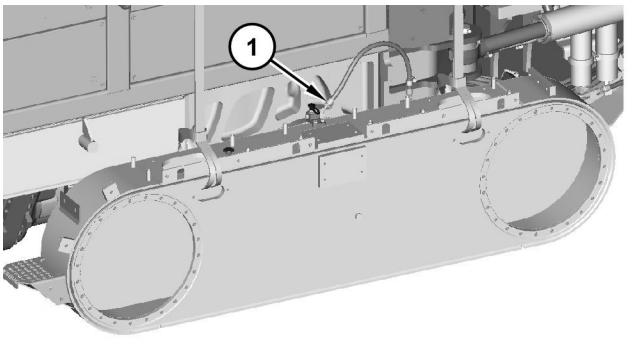

Illustration 88 g01389739

5. Connect hose assembly (1).

End By:

a. Install the service brakes. Refer to Disassembly and Assembly, “Service Brake (Wheel Spindle) - Install”.

b. Install the rear wheels. Refer to Disassembly and Assembly, “Wheel and Tire (Rear) - Remove and Install”.

i02790413

Rear Axle, Differential and Final Drive - Remove

SMCS Code: 3258-011; 3278-011; 3282-011-RE; 4050-011; 4068-011

Removal Procedure

Table 11

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7576	Link Bracket	4
B	1U-9200	Lever Puller Hoist	1
C	1U-7505	Hydraulic Jack	1
D	138-7575	Link Bracket	4
E	6V-6146	Load Leveling Beam	1
F	1U-9744	Floor Jack	1

Start By:

a. Remove the drive chains. Refer to Disassembly and Assembly, “Drive Chain - Remove”.

b. Remove the rear wheels and tires. Refer to Disassembly and Assembly, “Wheel and Tire (Rear) - Remove and Install”.

c. Remove the tandem housing. Refer to Disassembly and Assembly, “Housing (Tandem) - Remove and Install”.

d. Remove the bottom guard. Refer to Disassembly and Assembly, “Bottom Guard - Remove and Install”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

1. Connect the steering frame lock. Refer to Operation and Maintenance Manual, “Steering Frame Lock”.

2. Release the system pressure. Refer to Operation and Maintenance Manual, “System Pressure - Release”.

3. Drain the rear axle oil into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

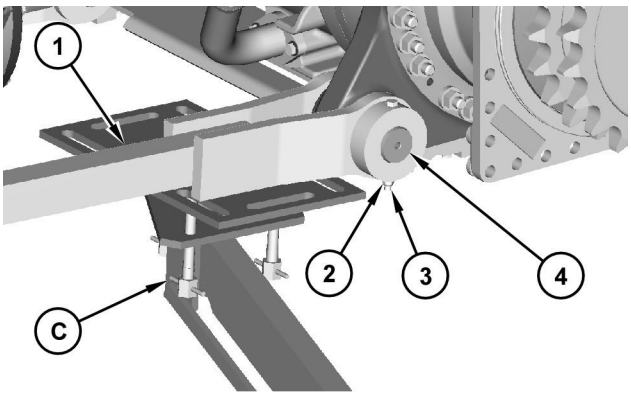

Illustration 89 g01389812

4. Position Tooling (C) under link (1). The weight of link (1) is approximately 75 kg (165 lb). Remove nut (2) and bolt (3). Remove pin (4) and lower link (1) to the ground. Repeat this step for the remaining link.

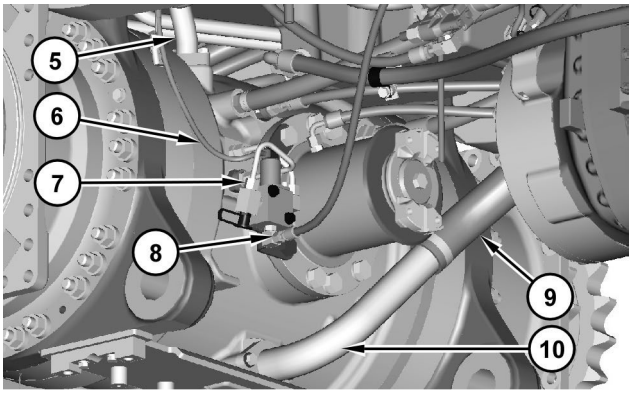

Illustration 90 g01389813

5. Remove tube assembly (5). Disconnect harness assembly (6). Remove tube assembly (7). Disconnect hose assembly (8). Remove hose (9). Remove tube assembly (10).

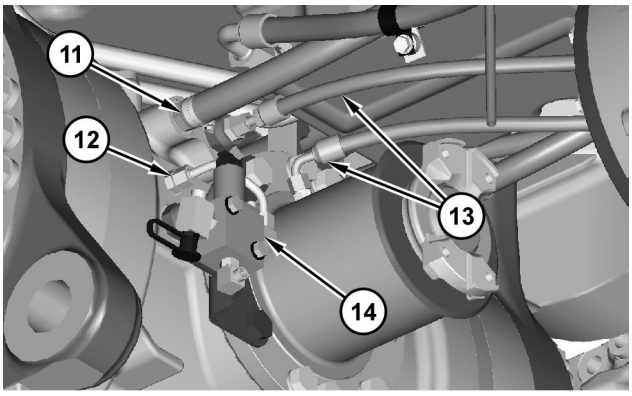

Illustration 91 g01389821

6. Disconnect hose (11). Remove tube assembly (12). Disconnect hose assemblies (13). Remove lock valve (14).

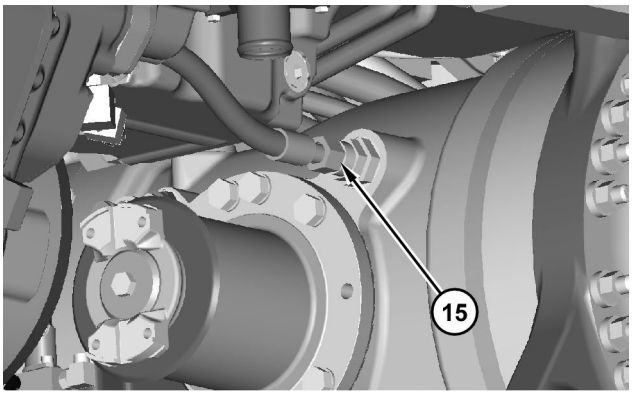

Illustration 92 g01389822

7. Disconnect hose assembly (15).

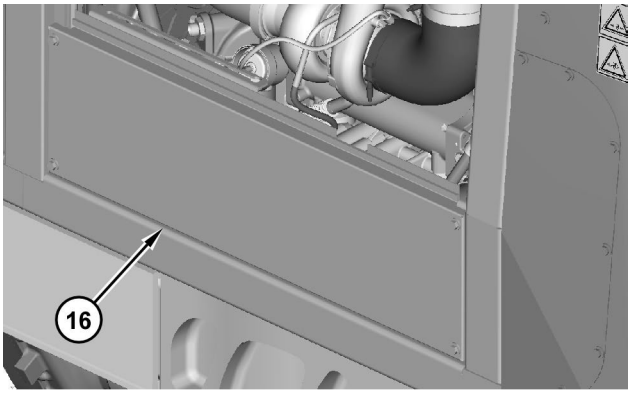

Illustration 93 g01389823

8. Remove panel (16). Repeat this step for the opposite side of the engine enclosure.

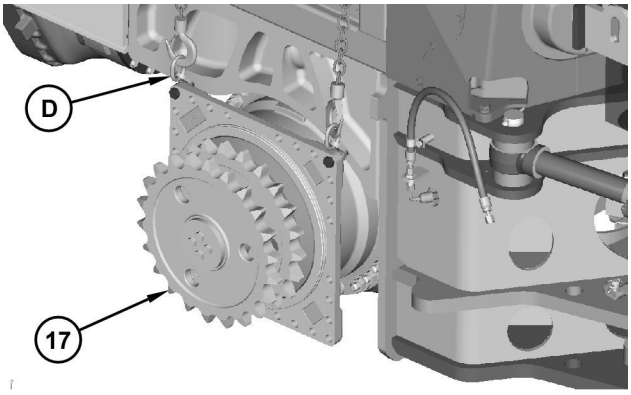

Illustration 94 g01389824

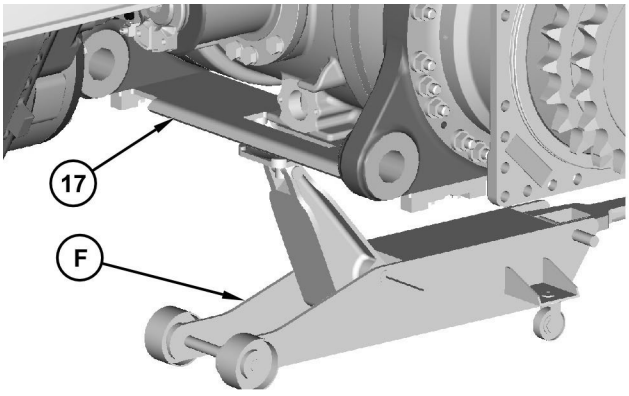

Illustration 95 g01389825

9. Attach Tooling (D), Tooling (E), and two suitable lifting devices onto rear axle, differential, and final drive (17). The weight of rear axle, differential, and final drive (17) is approximately 1828 kg (4030 lb). Repeat this step for the opposite side of rear axle, differential, and final drive (17).

10. Position Tooling (F) under rear axle, differential, and final drive (17) in order to support the differential housing.

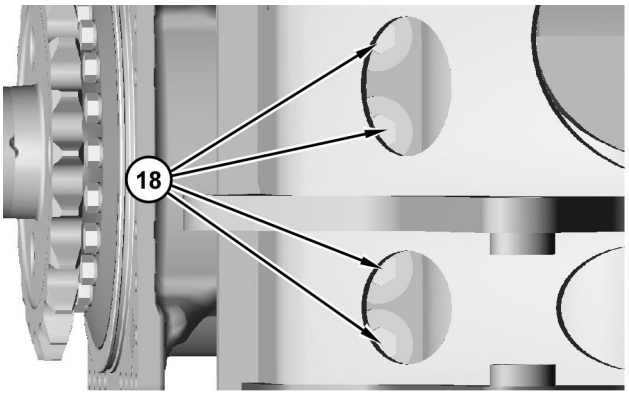

Illustration 96 g01389828

11. Remove bolts (18). Repeat this step for the opposite side of the machine.

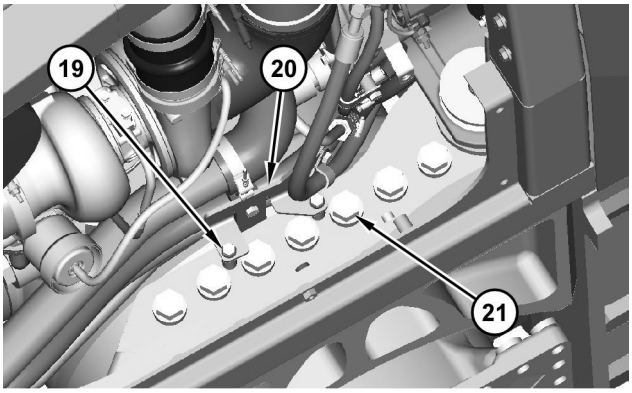

Illustration 97 g01389829

12. Remove bolts (19). Position bracket assembly (20) out of the way. Remove bolts (21). Repeat this step for the opposite side of the machine.

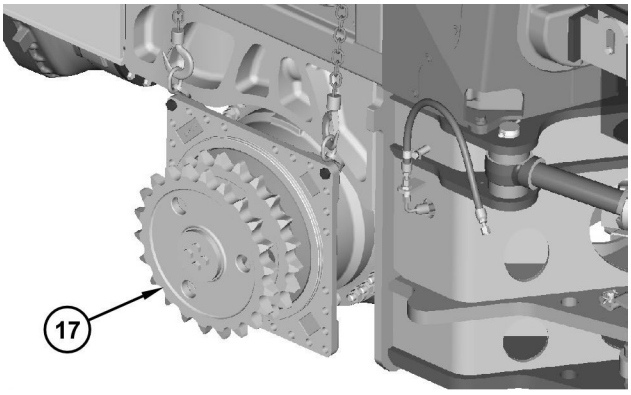

Illustration 98 g01389835

13. Remove rear axle, differential, and final drive (17).

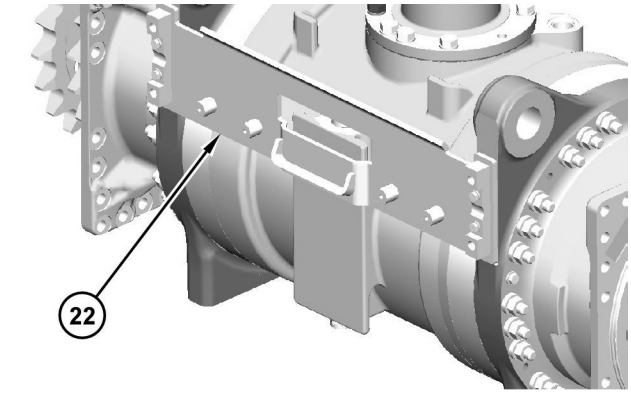

Illustration 99 g01389836

14. Remove bracket assembly (22).

i06791672

Rear Axle, Differential and Final Drive - Disassemble

SMCS Code: 3258-015; 3278-015; 3282-015-RE; 4050-015; 4068-015

Disassembly Procedure

Table 12

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7575	Link Bracket	4
B	140-7742	Sleeve	2
C	1U-9200	Lever Puller Hoist	1

(continued)

(Table 12, contd)

D	154-6182	Forcing Bolt	3
	154-6360	Forcing Bolt(1)	3
		Reaction Plate 1/4 in. Steel	3
E	1D-4601	Bolt	2
	4K-0367	Full Nut	2
	150-1782	Crossblock	1
	5F-7351	Nut	1
	5F-7366	Forcing Screw	1
	1P-0520	Driver Gp	1
	3H-0465	Push-Puller Plate	2
F	138-7574	Link Bracket	2
G	8B-7551	Bearing Puller Gp	1
	1P-5546	Crossarm	1
	3H-0465	Push-Puller Plate	2
	5F-7366	Forcing Screw	1
H	1U-6692	Socket Wrench As	1
J	154-6183	Forcing Bolt	3
K	1U-6405	Three Jaw Puller	1

(1) 154-6360 Forcing Bolt is used for the latest ring gear.

Start By:

a. Remove the rear axle, differential, and final drive. Refer to Disassembly and Assembly, “Rear Axle, Differential, and Final Drive - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace the O-ring seals that are worn or damaged.

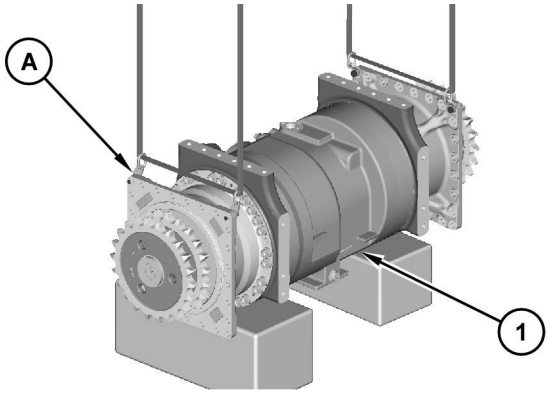

Illustration 100 g01351806

1. Use Tooling (A) and two suitable lifting devices to position rear axle, differential, and final drive (1) onto suitable blocking. The weight of rear axle, differential, and final drive (1) is approximately 1588 kg (3500 lb).

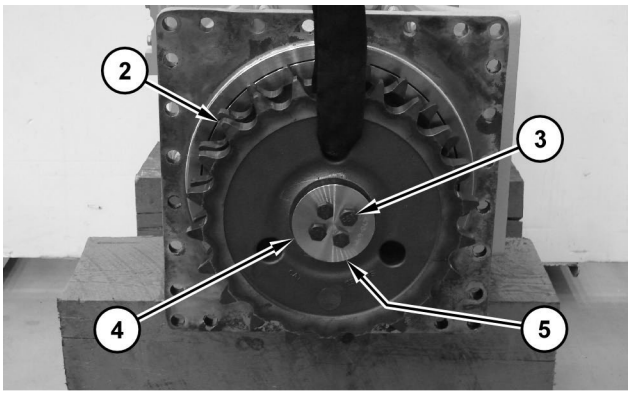

Illustration 101 g01351767

2. Attach Tooling (B) and a suitable lifting device onto sprocket (2). The weight of sprocket (2) is approximately 23 kg (51 lb).

3. Remove bolts (3), retainer (4), shims (5), and sprocket (2).

Note: Note the quantity and the order of shims (5).

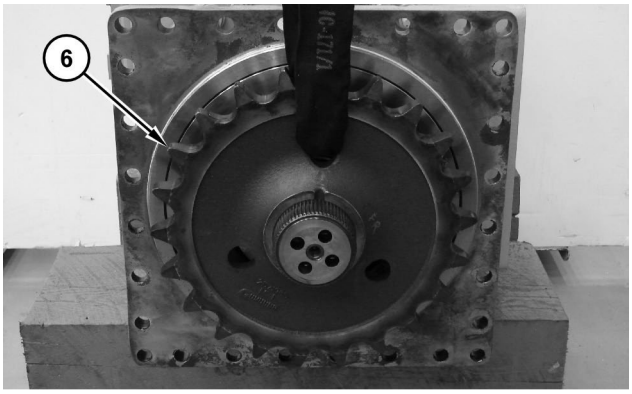

Illustration 102 g01351809

4. Attach Tooling (B) and a suitable lifting device onto sprocket (6). The weight of sprocket (6) is approximately 23 kg (51 lb).

5. Remove sprocket (6).

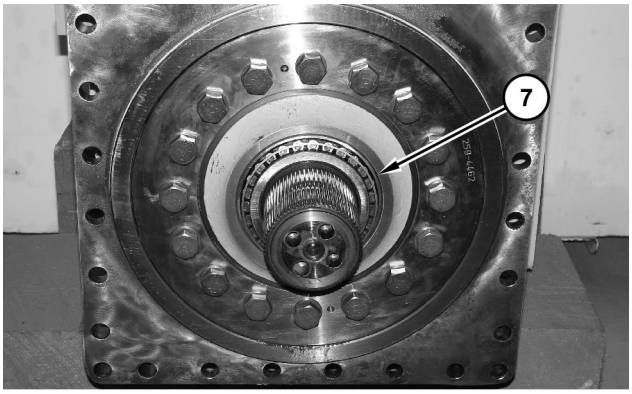

Illustration 103 g01351900

6. Remove bearing cone (7).

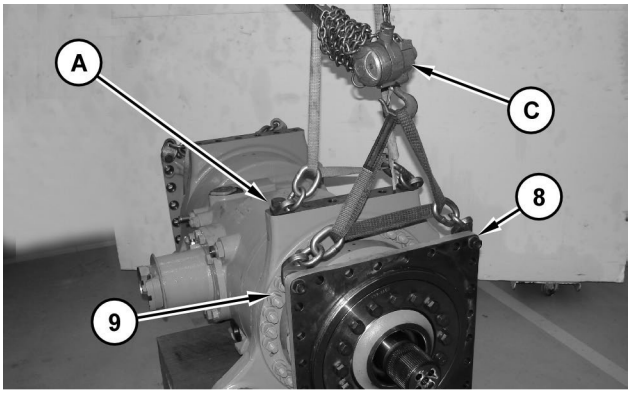

Illustration 104 g01351906

7. Attach Tooling (A), Tooling (C), and two suitable lifting devices onto final drive housing (8). The weight of final drive housing (8) is approximately 254 kg (560 lb). Remove nuts (9).

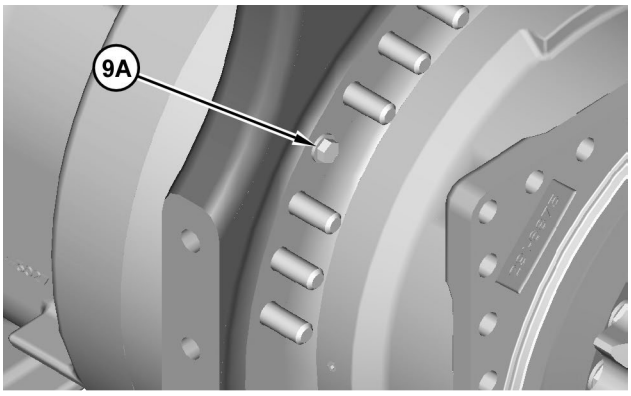

Illustration 105 g01425110

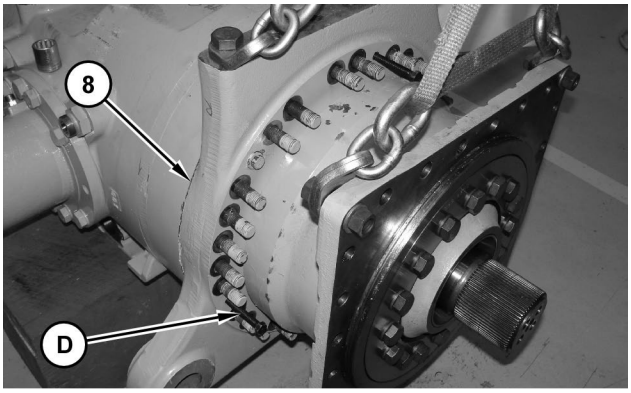

Illustration 106 g01352011

Note: Ensure that the drive shaft and carrier assembly stay in place as final drive housing is removed. Failure to do so may result in the drive shaft and carrier assembly falling out as the final drive housing is removed.

8. Remove bolts (9A). Use Tooling (D) to remove final drive housing (8).

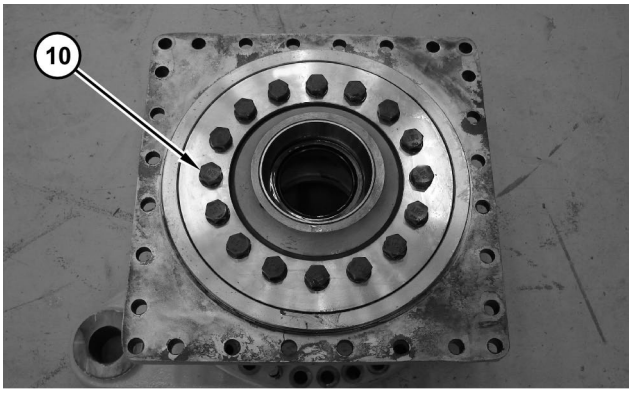

Illustration 107 g02727681

9. Remove bolts (10).

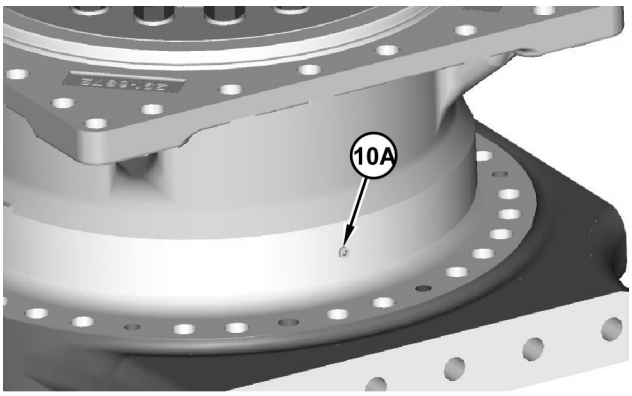

Illustration 108 g02380996

10. Remove plug (10A).

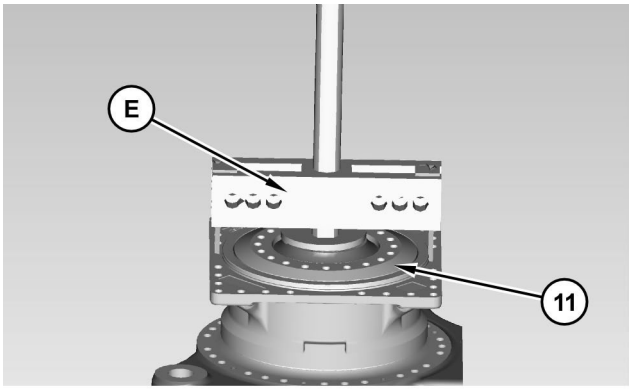

Illustration 109 g02714387

11. Use Tooling (E) to remove retainer (11).

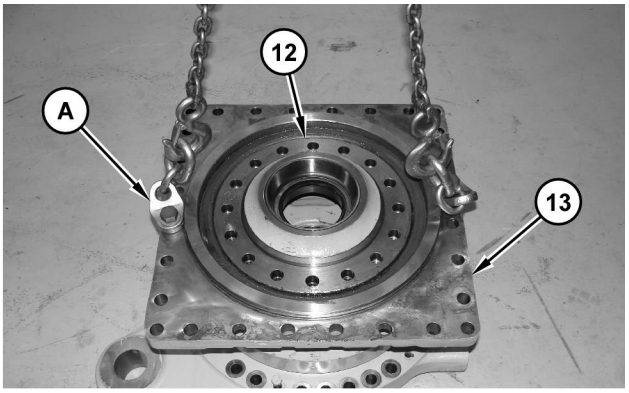

Illustration 110 g01352280

12. Remove shims (12). Use Tooling (A) and a suitable lifting device to remove housing (13). The weight of housing (13) is approximately 90 kg (198 lb).

Note: Note the quantity and the order of shims (12).

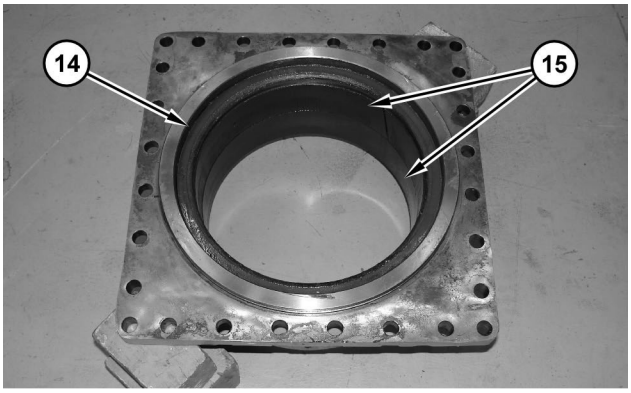

Illustration 111 g01352292

13. Remove thrust washer (14). Remove wear sleeves (15).

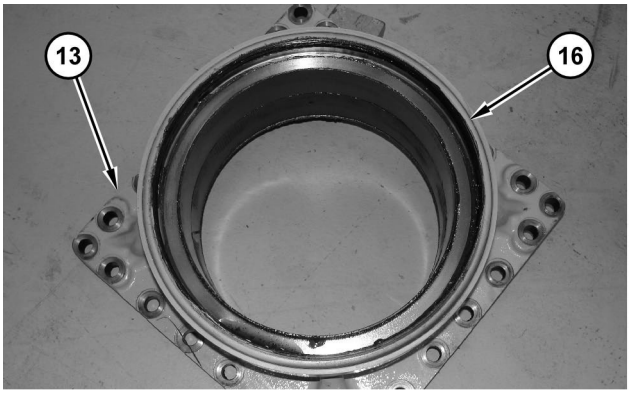

Illustration 112 g01352299

14. Turn over housing (13). Remove lip seal (16).

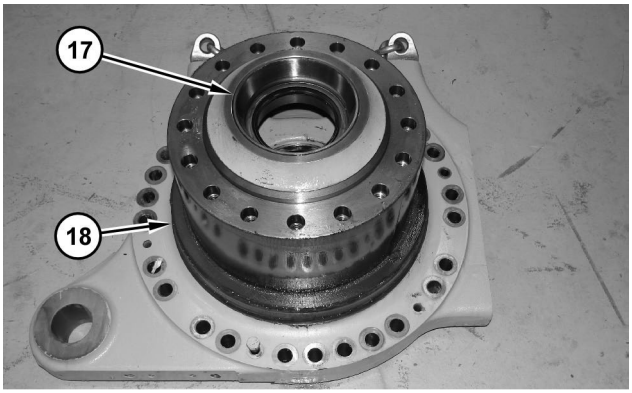

Illustration 113 g01352309

15. Remove bearing cup (17). Remove thrust washer (18).

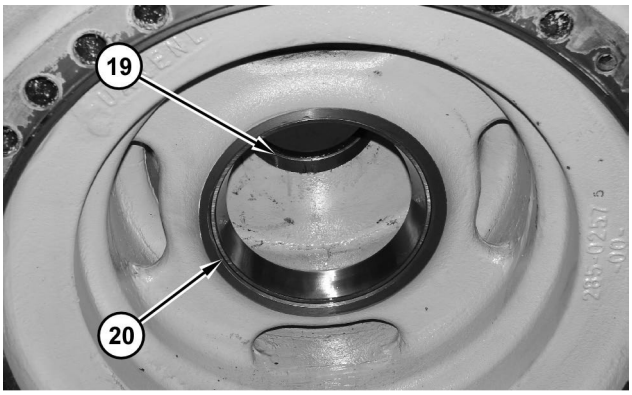

Illustration 114 g01352320

16. Remove lip seal (19). Remove bearing cup (20).

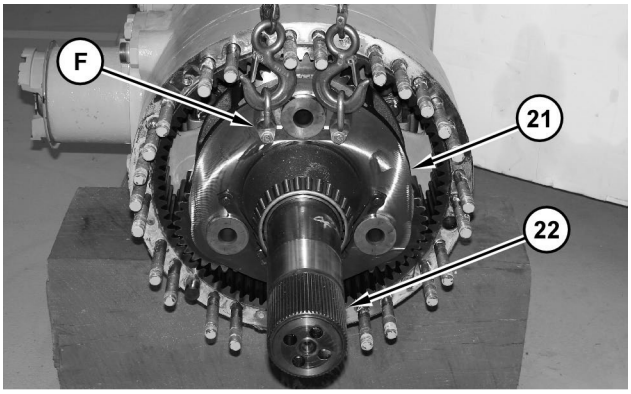

Illustration 115 g01352324

17. Use Tooling (F) to remove carrier assembly (21) and drive shaft (22). The weight of carrier assembly (21) and drive shaft (22) is approximately 125 kg (275 lb).

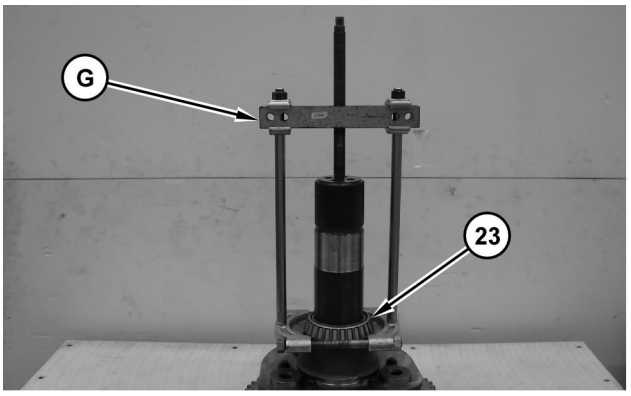

Illustration 116 g01352329

18. Use Tooling (G) to remove bearing cone (23).

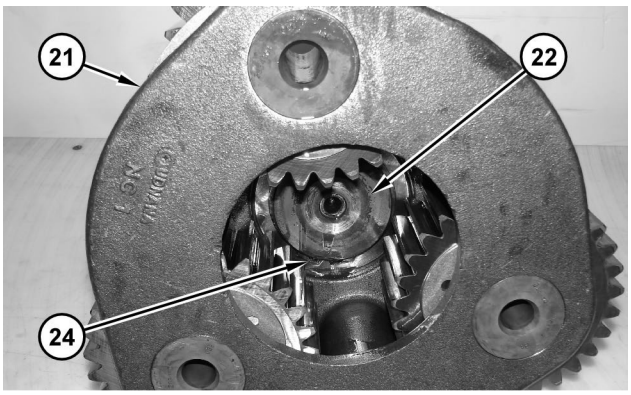

Illustration 117 g01352339

19. Remove retaining ring (24) to remove axle shaft (22) from carrier assembly (21).

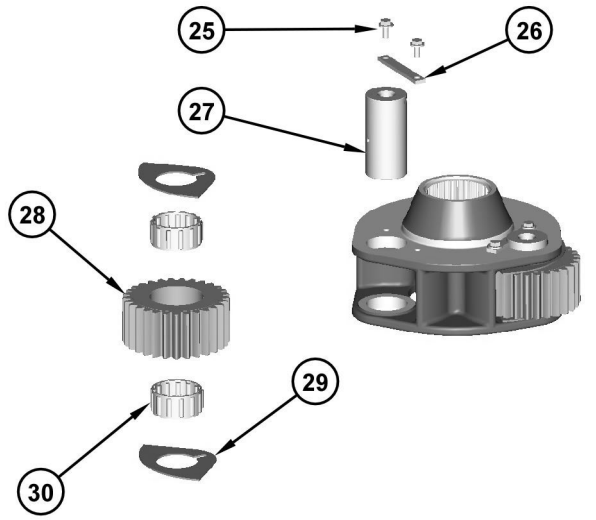

Illustration 118 g01352406

20. Remove bolts (25) and retainer (26). Remove pin (27). Remove gear (28). Remove thrust washers (29) and bearings (30). Repeat this step for the remaining planetary gears.

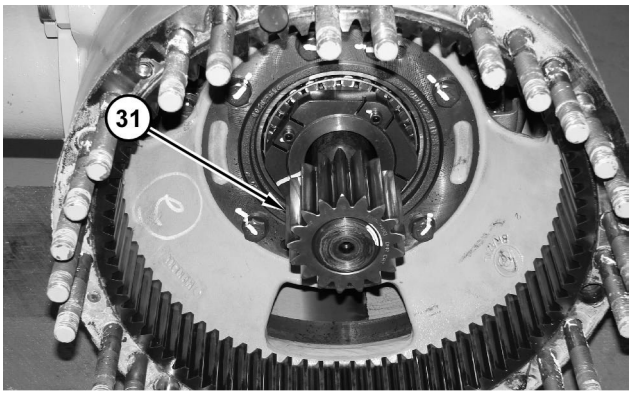

Illustration 119 g01352384

21. Remove axle shaft assembly (31).

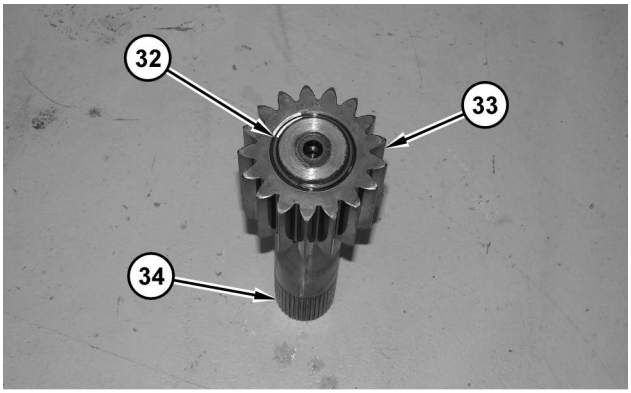

Illustration 120 g01352402

22. Remove retaining ring (32) to remove gear (33) from axle shaft (34).

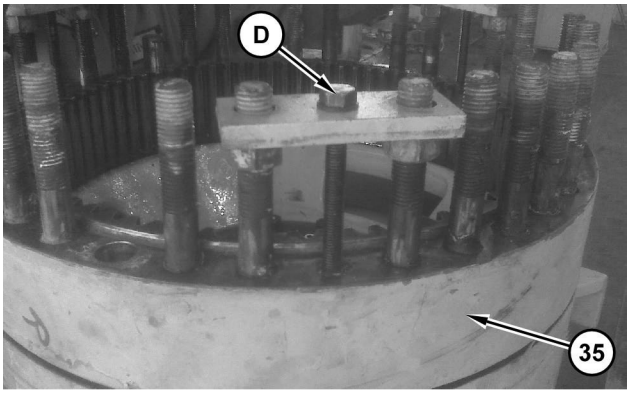

Illustration 121 g02280615

23. Use Tooling (D) to separate ring gear (35) from the intermediate housing.

Note: If threads on Tooling (D) bottom out before ring gear (35) is removed, use washers as needed to remove ring gear (35).

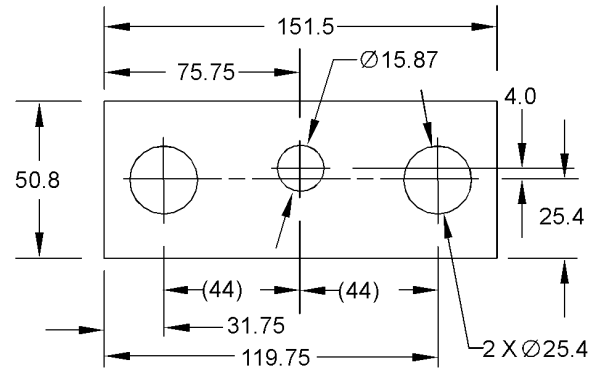

Illustration 122 g06116696

Note: Dimension for reaction plate for 14M.

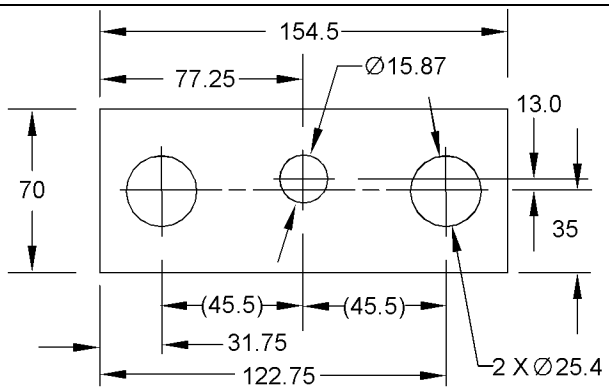

Illustration 123 g06116701

Note: Dimension for reaction plate for 16M.

a. Fabricate the reaction plate of Tooling (D) from 1/4 in. bar stock.

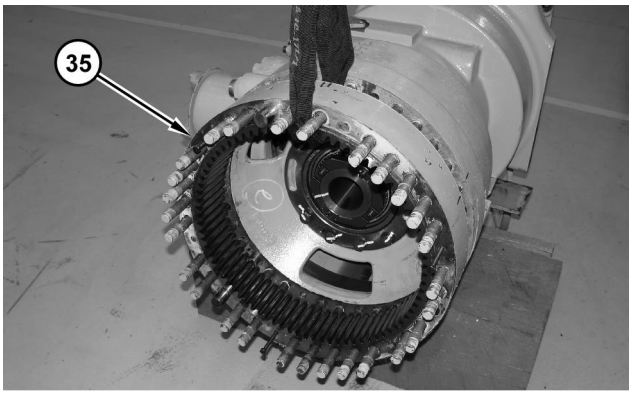

Illustration 124 g01352445

24. Use Tooling (B) and a suitable lifting device to remove ring gear (35). The weight of ring gear (35) is approximately 45 kg (100 lb).

25. Repeat Step 2 through Step 24 for the opposite side.

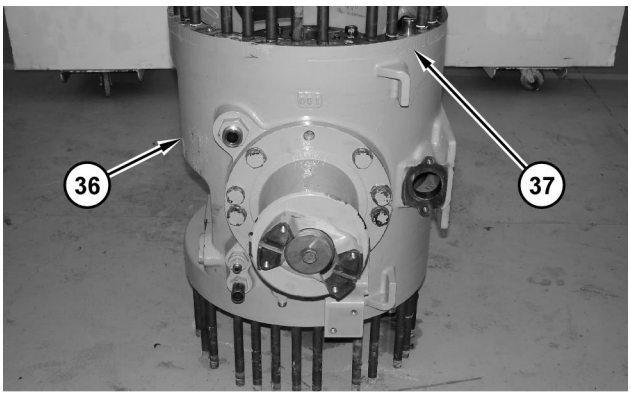

Illustration 125 g01353587

26. Position differential housing (36) with intermediate housing (37) upward.

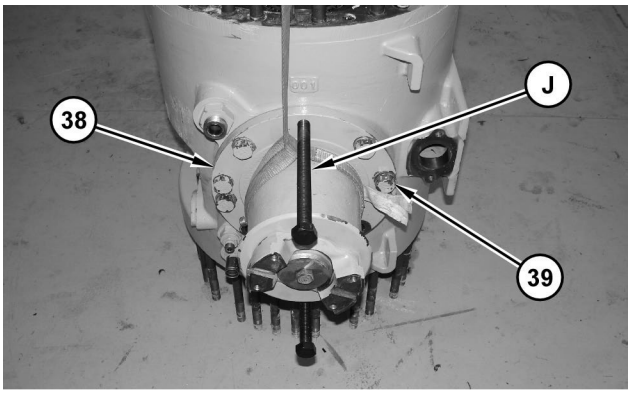

Illustration 126 g01352999

27. Attach a suitable lifting device onto pinion (38). Use Tooling (J) to separate pinion (38) from the center housing. Remove bolts (39) to remove pinion (38). The weight of pinion (38) is approximately 68 kg (150 lb).

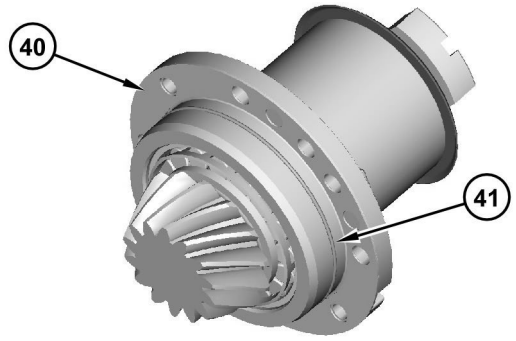

Illustration 127 g01353021

28. Remove shims (40). Remove O-ring seal (41).

Note: Note the order and the quantity of shims (40).

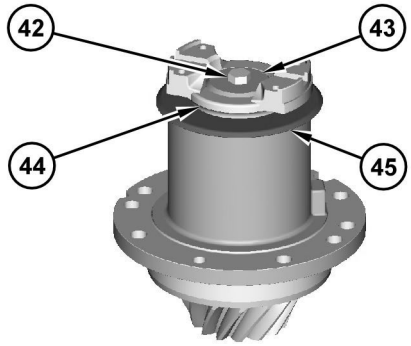

Illustration 128 g01353002

29. Remove bolt (42). Remove retainer (43). Remove yoke (44). Remove guard (45).

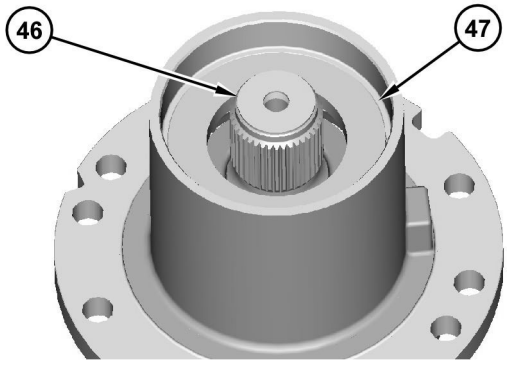

Illustration 129 g01353512

30. Remove shims (46). Remove lip seal (47).

Note: Note the order and the quantity of shims (46).

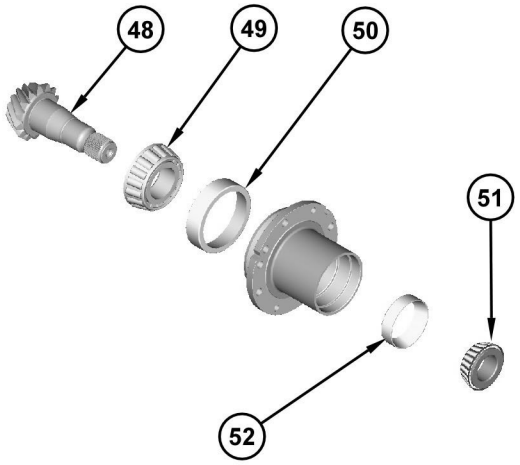

Illustration 130 g01353570

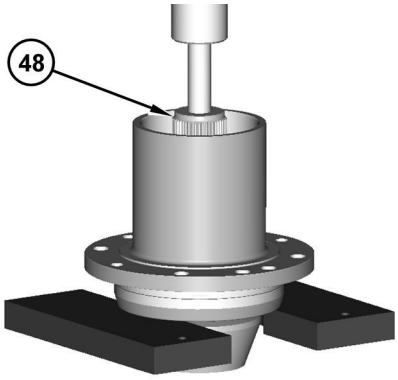

Illustration 131 g02790268

31. Use a suitable press to remove pinion (48). Remove bearing cone (49). Remove bearing cup (50). Remove bearing cone (51). Remove bearing cup (52).

Note: Damage to the housing can occur. Do not use the flange to support the housing when removing the pinion.

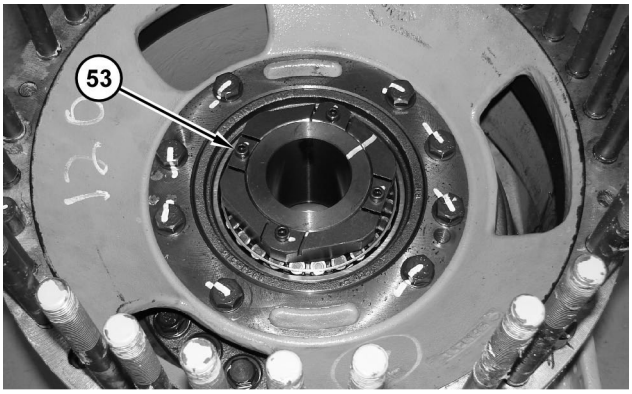

Illustration 132 g01352447

32. Remove bolts (53).

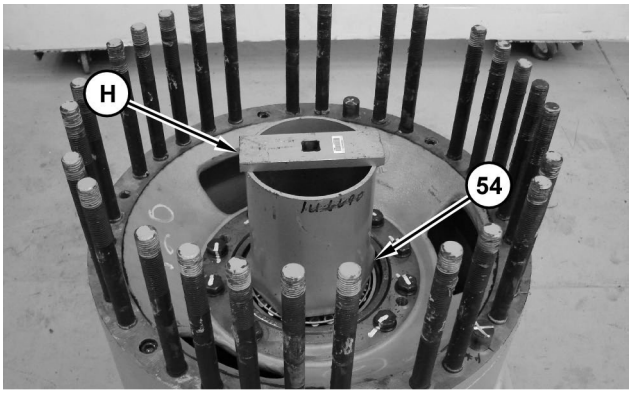

Illustration 133 g01352847

33. Use Tooling (H) to remove nut assembly (54).

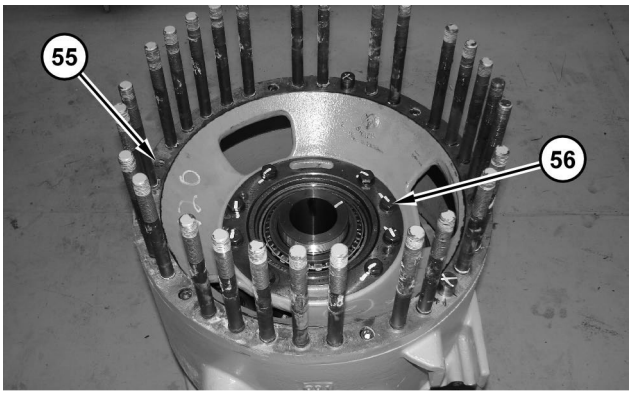

Illustration 134 g01352870

34. Remove bolts (55). Remove bolts (56).

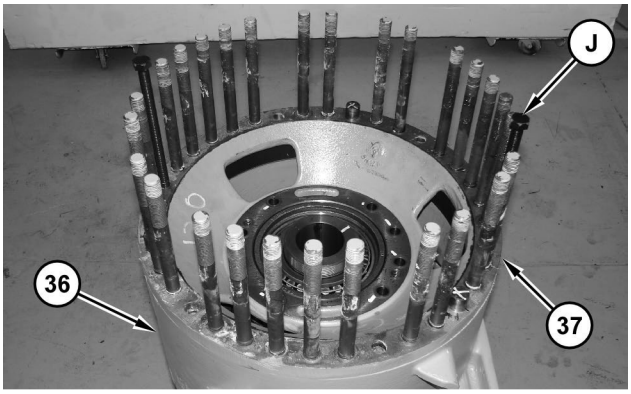

Illustration 135 g01352873

35. Use Tooling (J) to separate intermediate housing (37) from differential housing (36).

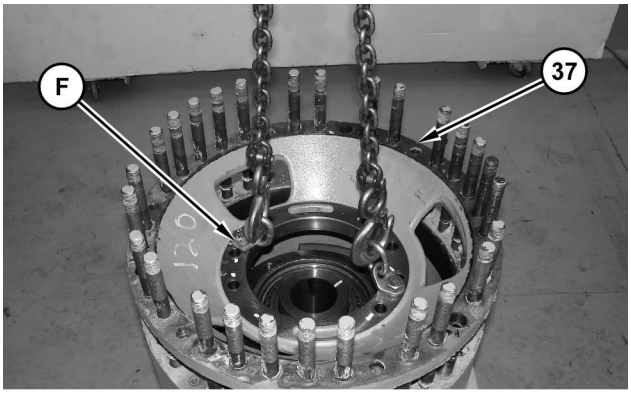

Illustration 136 g01352886

36. Use Tooling (F) to remove intermediate housing (37). The weight of intermediate housing (37) is approximately 54 kg (120 lb).

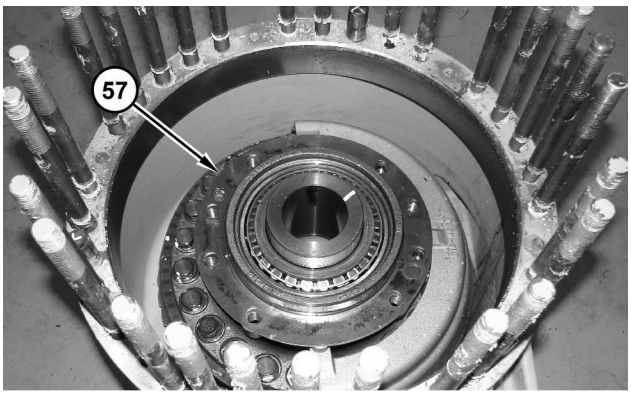

Illustration 137 g01352893

37. Remove shims (57).

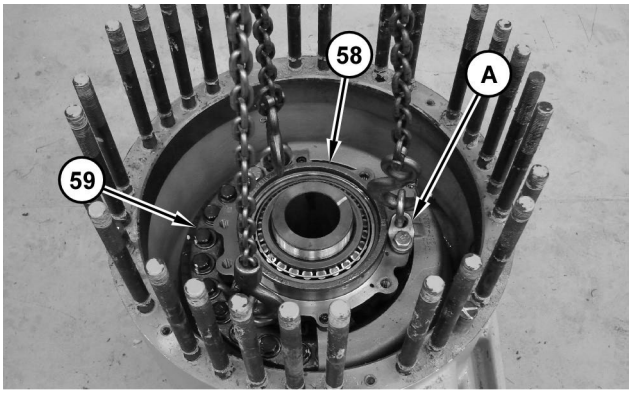

Illustration 138 g01352898

38. Use Tooling (A) to remove bearing assembly (58) and differential (59). The weight of bearing assembly (58) and differential (59) is approximately 159 kg (350 lb).

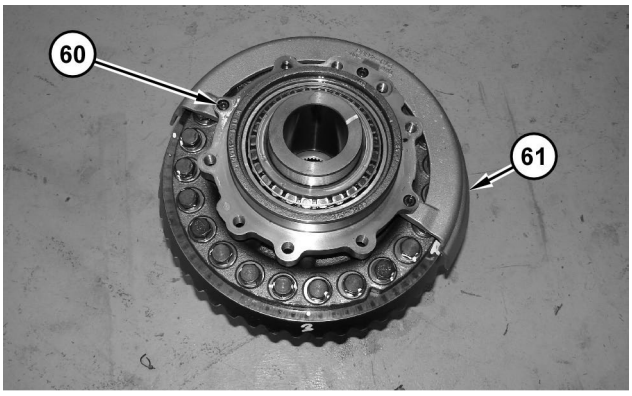

Illustration 139 g01352982

39. Remove bolts (60). Remove shroud (61).

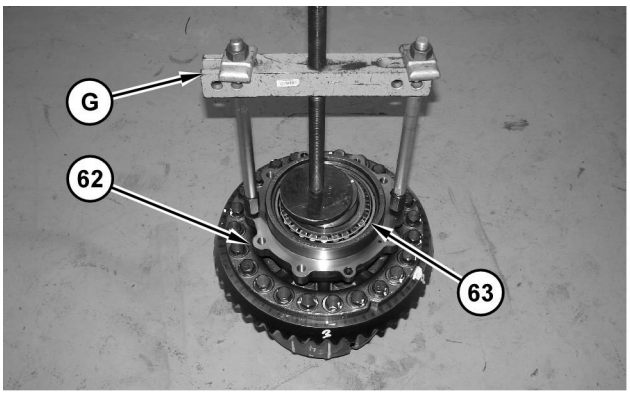

Illustration 140 g02760082

40. Use Tooling (G) to remove bearing assembly (62). Remove bearing cone (63).

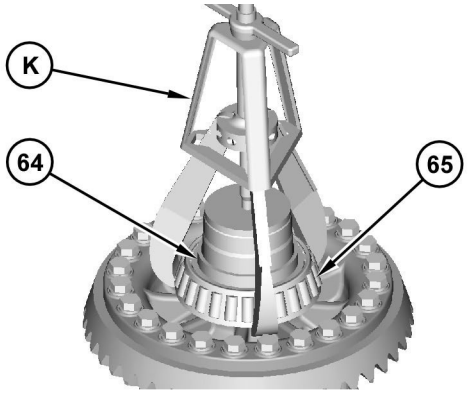

Illustration 141 g02760116

41. Use Tooling (K) to remove spacer (64) and bearing cone (65).

Note: This step is a destructive procedure.

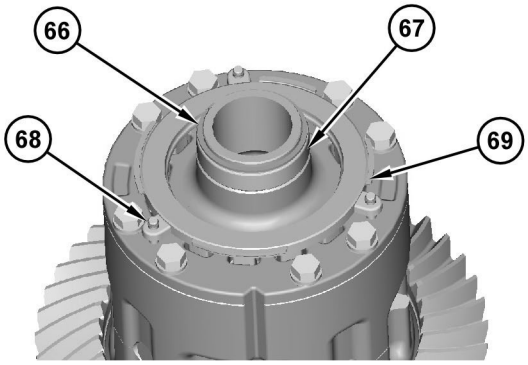

Illustration 142 g02760138

42. Remove retaining ring (66). Remove bearing race (67). Remove O-ring seals (68). Remove thrust ring (69).

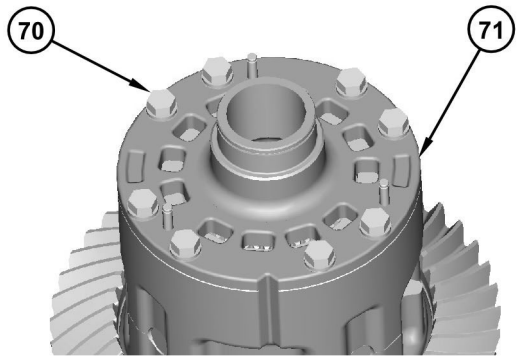

Illustration 143 g02760140

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

43. Remove bolts (70). Remove case (71).

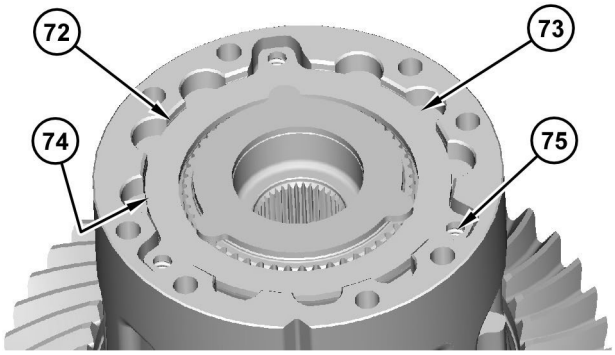

Illustration 144 g02760156

44. Remove thrust washer (72). Remove plates (73) and discs (74). Remove springs (75).

Note: Note the quantity and the order of plates (73) and discs (74).

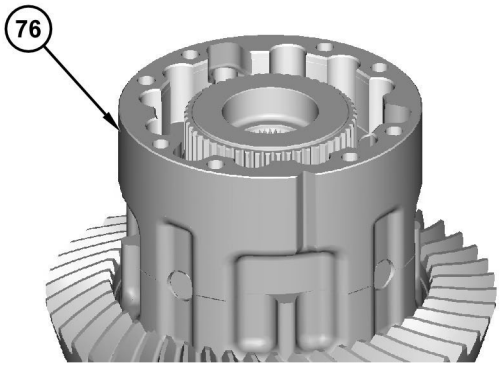

Illustration 145 g02760160

45. Use two people to remove housing (76). The weight of housing (76) is approximately 23 kg (50 lb).

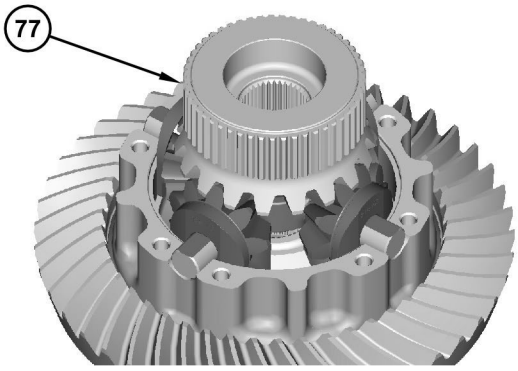

Illustration 146 g02760163

46. Use two people to remove differential gear (77). The weight of differential gear (77) is approximately 14 kg (30 lb).

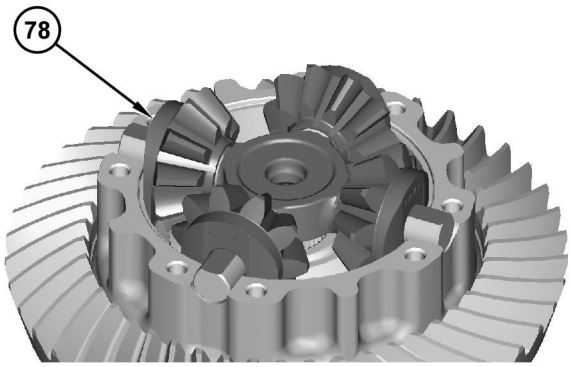

Illustration 147 g02760177

47. Use two people to remove spider assembly (78). The weight of spider assembly (78) is approximately 14 kg (30 lb).

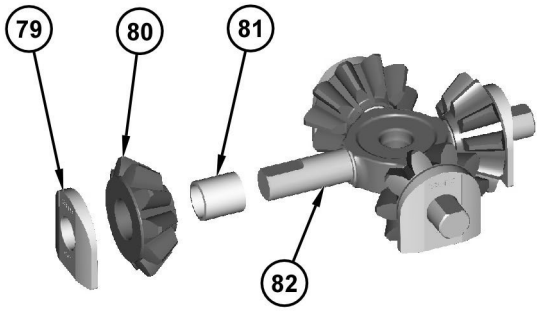

Illustration 148 g02760216

48. Remove thrust washer (79), pinion gear (80), and bearing sleeve (81) from spider (82). Repeat this step for the remaining pinion gears (80).

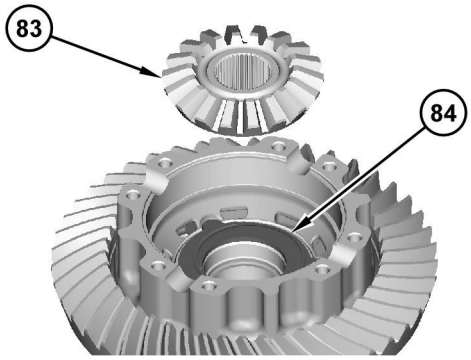

Illustration 149 g02760225

49. Remove differential gear (83). Remove thrust washer (84).

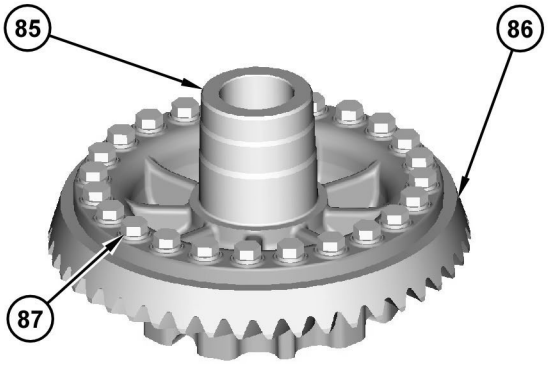

Illustration 150 g02761702

50. Turn over housing (85) and bevel gear (86). Remove bolts (87). Use two people to remove housing (85) from bevel gear (86). The weight of housing (85) is approximately 35 kg (77 lb). The weight of bevel gear (86) is approximately 24 kg (53 lb).

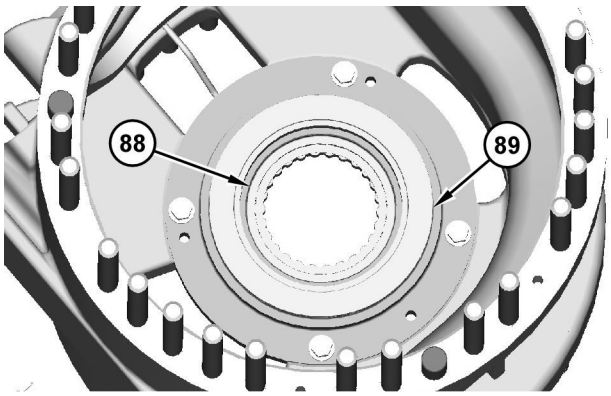

Illustration 151 g02761705

51. Remove bearing assembly (88). Remove piston (89).

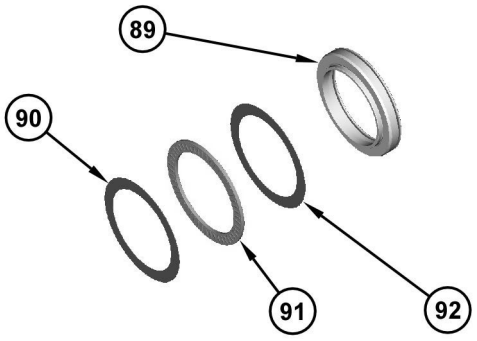

Illustration 152 g02761706

52. Remove thrust race (90), thrust bearing (91), and thrust race (92) from piston (89).

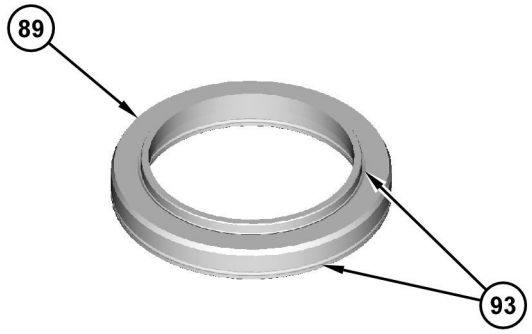

Illustration 153 g02761707

53. Remove seals (93) from piston (89).

i06565314

Rear Axle, Differential and Final Drive - Assemble

SMCS Code: 3258-016; 3278-016; 3282-016-RE; 4050-016; 4068-016

Assembly Procedure

Table 13

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7575	Link Bracket	4
B	140-7742	Sleeve	2
C	1U-9200	Lever Puller Hoist	1

(continued)

(Table 13, contd)

F	138-7574	Link Bracket	2
H	1U-6692	Socket Wrench As	1
J	154-6183	Forcing Bolt	2
L	4C-4030	Thread Lock Compound	1
M	1U-8846	Gasket Sealant	1
N	6V-2012	Depth Micrometer	1
P	8T-5096	Dial Indicator Gp	1
	301-3405	Backlash Gauge	1
R	8T-4140	Bolt	4
S	5P-0960	Cat Advance 3 Moly Grease or Dow Corning Molykote BR - 2 Plus	-

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals, gaskets, and lip seals. Replace O-ring seals, gaskets, and lip seals that are worn or damaged.

Note: Lubricate O-ring seals and lip seals with the lubricant that is being sealed.

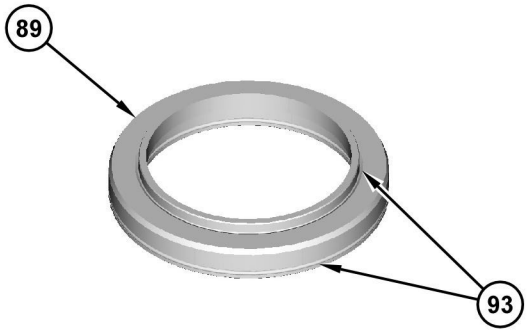

Illustration 154 g02761707

1. Install seals (93) onto piston (89).

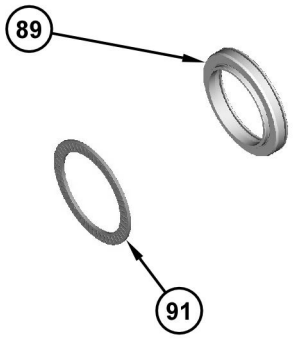

Illustration 155 g02843317

2. Install thrust bearing (91), onto piston (89).

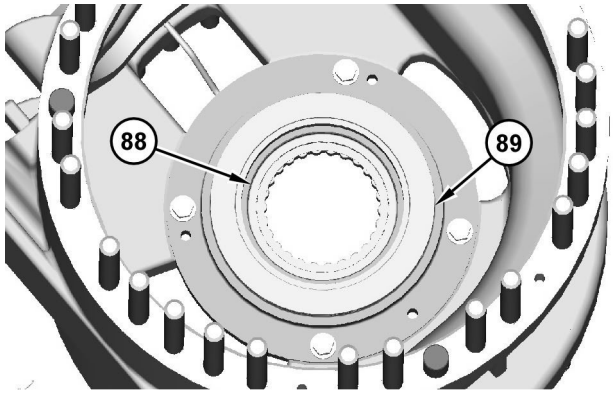

Illustration 156 g02761705

3. Install piston (89). Lower the temperature of bearing assembly (88). Install bearing assembly (88).

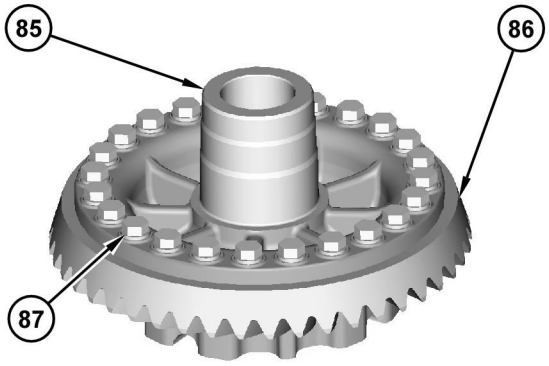

Illustration 157 g02761702

4. Use two people to install housing (85) onto bevel gear (86). The weight of housing (85) is approximately 35 kg (77 lb). The weight of bevel gear (86) is approximately 24 kg (53 lb). Install bolts (87).

14M Tighten bolts (87) to a torque of 300 ± 40 N·m (221 ± 30 lb ft).16M Tighten bolts (87) to a torque of 570 ± 80 N·m (420 ± 59 lb ft).

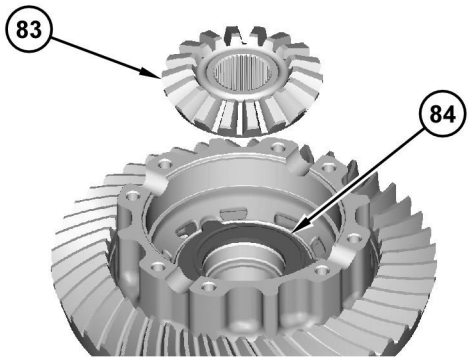

Illustration 158 g02760225

5. Install thrust washer (84). Install differential gear (83).

Note: Install thrust washer (84) with the groove side against the gear.

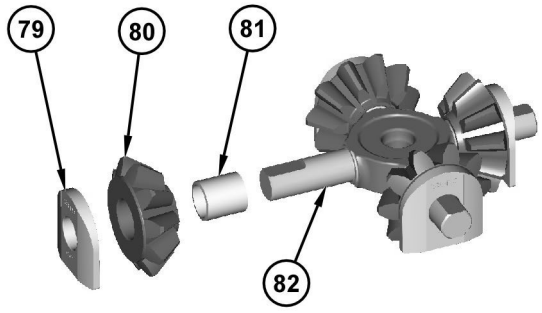

Illustration 159 g02760216

6. Install bearing sleeve (81), pinion gear (80), and thrust washer (79) onto spider (82). Repeat this step for the remaining pinion gears (80).

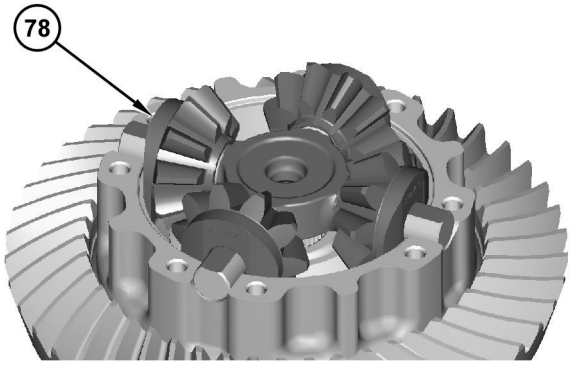

Illustration 160 g02760177

7. Use two people to install spider assembly (78). The weight of spider assembly (78) is approximately 14 kg (30 lb).

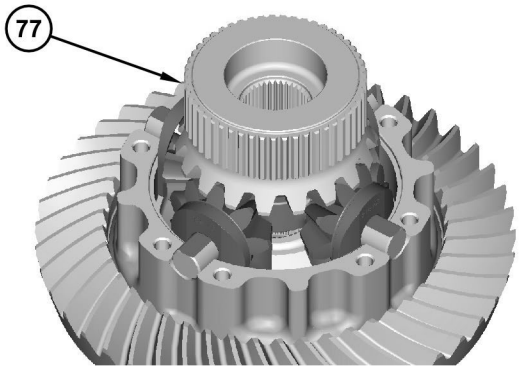

Illustration 161 g02760163

8. Use two people to install differential gear (77). The weight of differential gear (77) is approximately 14 kg (30 lb).

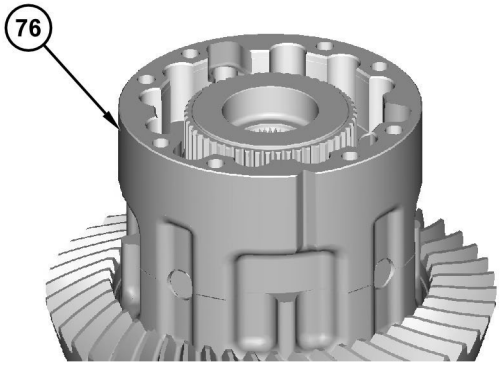

Illustration 162 g02760160

9. Use two people to install housing (76). The weight of housing (76) is approximately 23 kg (50 lb).

Note: Ensure that the notches on the housings are aligned.

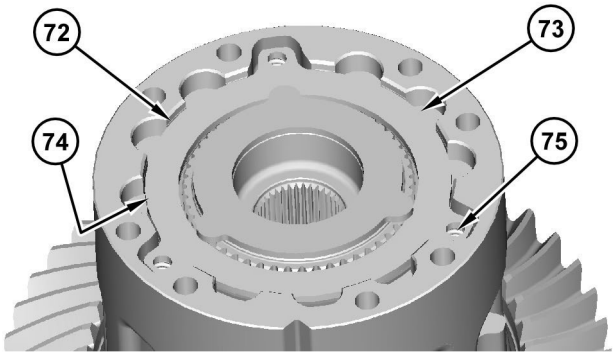

Illustration 163 g02760156

10. Install plates (73) and discs (74). Install thrust washer (72). Install springs (75).

Note: Install thrust washer (72) with the groove side against the gear.

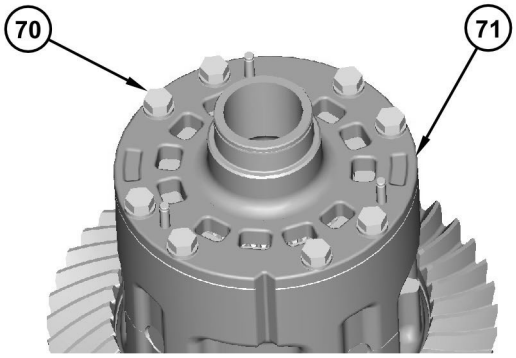

Illustration 164 g02760140

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

11. Install case (71). Install bolts (70).

(14M) Tighten bolts (70) to a torque of 240 ± 40 N·m (177 ± 30 lb ft).

(16M) Tighten bolts (70) to a torque of 530 ± 30 N·m (391 ± 22 lb ft).

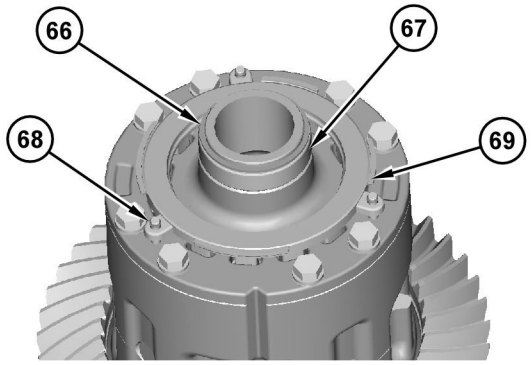

Illustration 165 g02760138

12. Install thrust ring (69). Install O-ring seals (68). Raise the temperature of bearing race (67). Install bearing race (67). Install retaining ring (66).

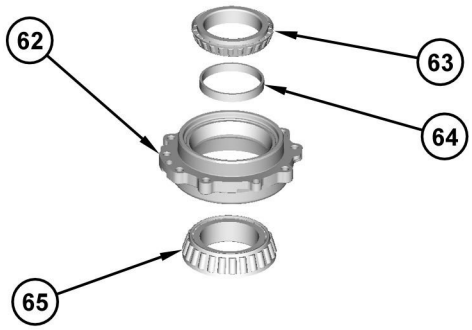

Illustration 166 g02762797

13. Bearing assembly (62) consists of:

- Bearing cone (65)
- Spacer (64)
- Bearing cone (63)

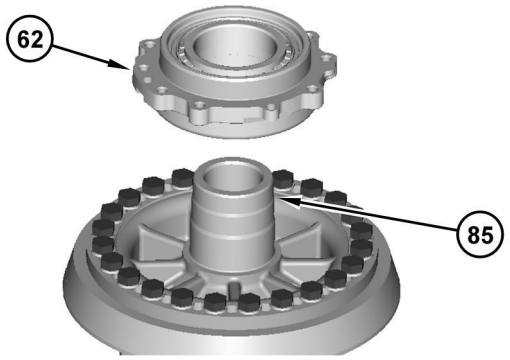

Illustration 167 g02762896

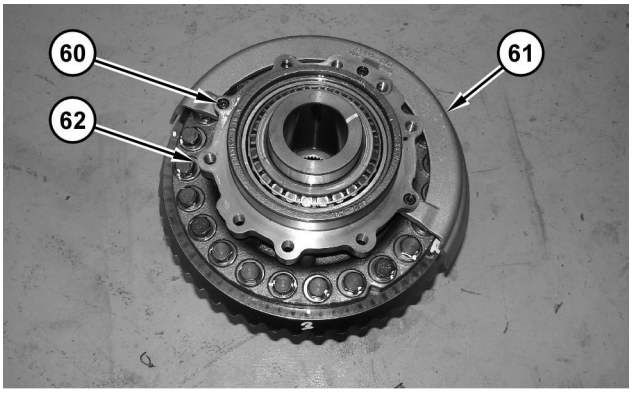

Illustration 168 g02762919

14. Use a suitable press to install new bearing assembly (62) onto housing (85).

15. Install shroud (61). Apply Tooling (L) onto bolts (60). Install bolts (60). Tighten bolts (60) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

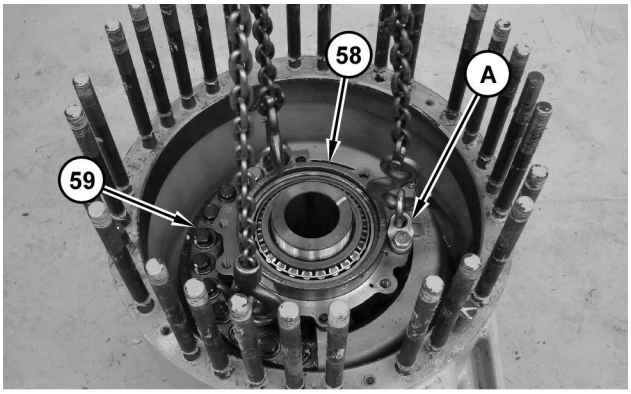

Illustration 169 g01352898

16. Use Tooling (A) and a suitable lifting device to install bearing assembly (58) and differential (59). The weight of bearing assembly (58) and differential (59) is approximately 159 kg (350 lb).

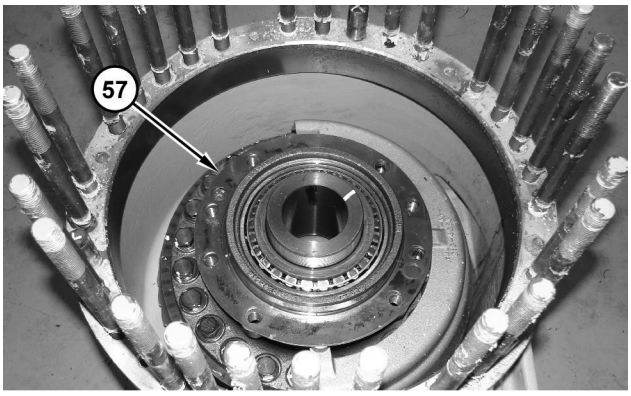

Illustration 170 g01352893

17. Install a number of shims (57) that is equal to 2.29 mm (0.09 inch).

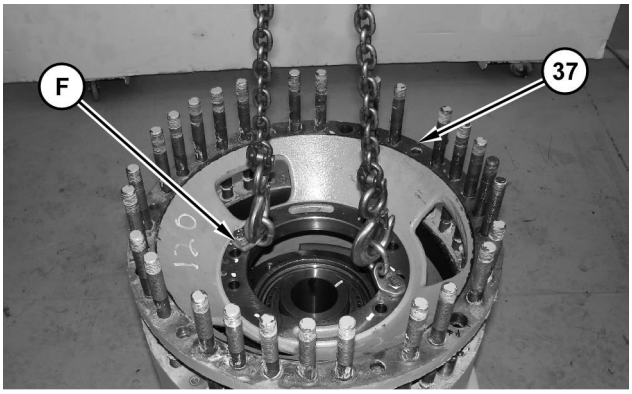

Illustration 171 g01352886

18. Use Tooling (F) and a suitable lifting device to install intermediate housing (37). The weight of intermediate housing (37) is approximately 54 kg (120 lb).

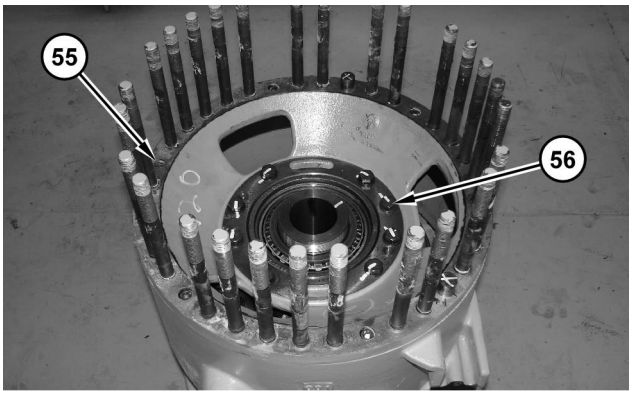

Illustration 172 g01352870

19. Install bolts (56). Tighten bolts (56) to a torque of 300 ± 40 N·m (221 ± 30 lb ft). Install bolts (55). Tighten bolts (55) to a torque of 105 ± 20 N·m (77 ± 15 lb ft).

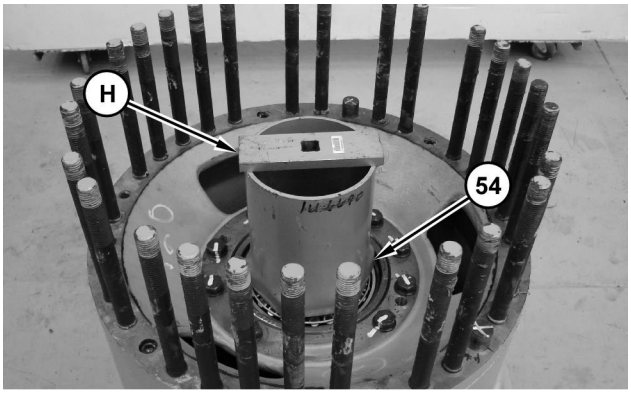

Illustration 173 g01352847

20. Use Tooling (H) to Install nut assembly (54). Tighten nut assembly (54) to a torque of 300 ± 40 N·m (221 ± 30 lb ft).

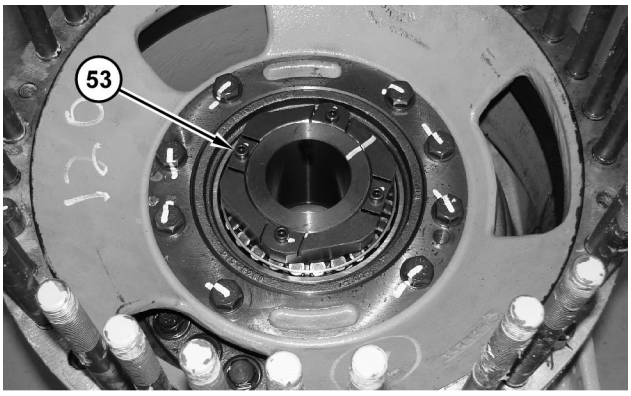

Illustration 174 g01352447

21. Install bolts (53). Tighten bolts (53) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

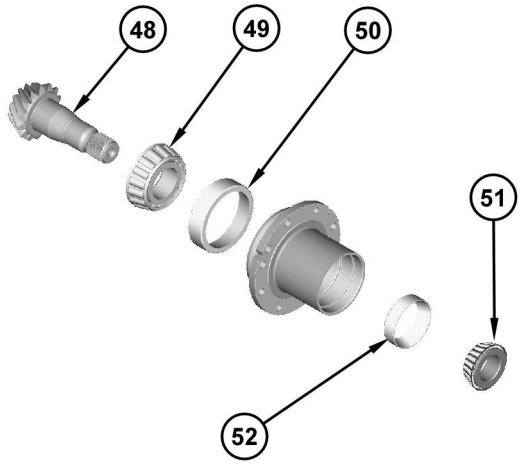

Illustration 175 g01353570

22. Lower the temperature of bearing cup (52). Install bearing cup (52). Lower the temperature of bearing cup (50). Install bearing cup (50). Raise the temperature of bearing cone (49). Install bearing cone (49) onto pinion gear (48). Install pinion (48). Raise the temperature of bearing cone (51). Install bearing cone (51).

Note: Lubricate the splines of the pinion shaft prior to assembly.

Note: Lubricate bearing cone (49) prior to assembly.

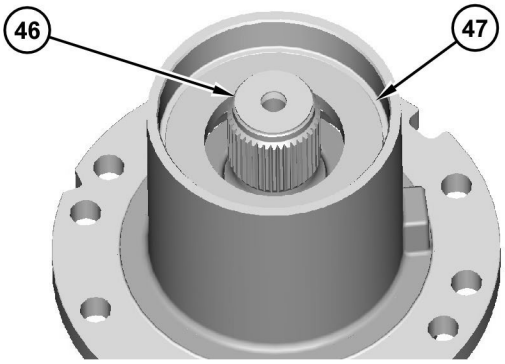

Illustration 176 g01353512

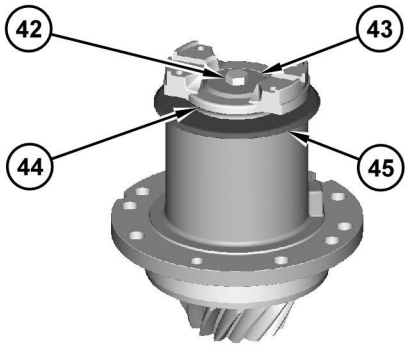

Illustration 177 g01353002

23. Install guard (45). Install yoke (44). Install shims (46). Install retainer (43). Install bolt (42). Tighten bolt (42) to a torque of 300 N·m (221 lb ft).

24. Ensure that the bearings are seated correctly.

25. Measure the rolling torque. Add or remove shims to obtain a rolling torque measurement of 1.2 ± 0.5 N·m (10.5 ± 4.5 lb in).

Note: Loosen the bearing after the rolling torque is measured and shims are added or removed.

26. Remove bolt (42). Remove retainer (43). Remove shims (46). Remove yoke (44). Remove guard (45).

27. Install lip seal (47). Install guard (45). Install yoke (44). Install shims (46). Install retainer (43). Install a new bolt (42). Tighten new bolt (42) to a torque of 300 ± 40 N·m (221 ± 30 lb ft).

Note: Lubricate the seal and the shaft prior to installation.

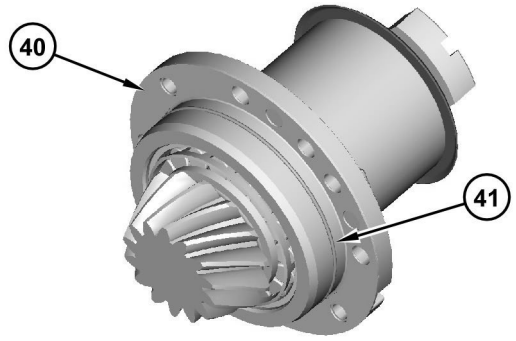

Illustration 178 g01353021

28. Install a number of shims (40) that is equal to 1.78 mm (0.07 inch). Do not install O-ring seal (41) at this time.

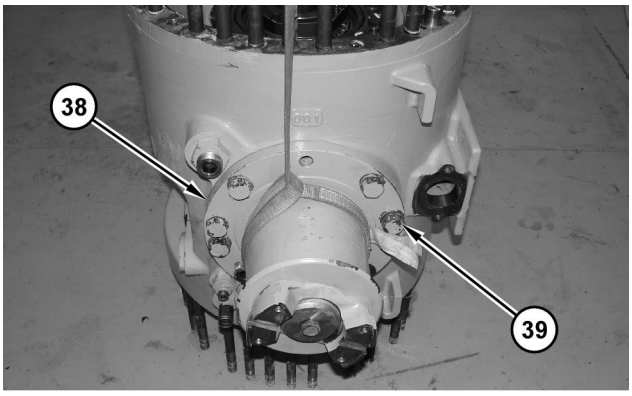

Illustration 179 g01355005

29. Use a suitable lifting device to install pinion (38). The weight of pinion (38) is approximately 68 kg (150 lb). Install bolts (39). Tighten bolts (39) to a torque of 530 ± 70 N·m (391 ± 52 lb ft).

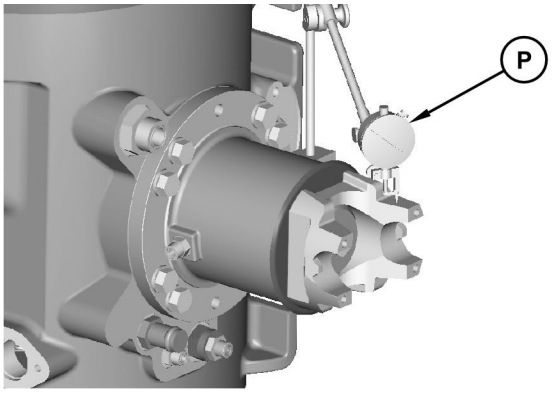

Illustration 180 g01567993

30. Use Tooling (P) to measure the backlash between the pinion gear and the bevel gear. Prevent the bevel gear from moving while you are checking the backlash. Measure the backlash at three locations that are separated by 120 degrees.

(14M) The backlash must be
0.36 + 0.00 - 0.12 mm
(0.014 + 0.000 - 0.005 inch).

(16M) The backlash must be 0.39 ± 0.13 mm (0.015 ± 0.005 inch).

31. If the backlash measurement does not meet the specification, repeat steps 17 through 21. Add shims (57) or remove shims (57) to adjust the backlash.

32. After the backlash adjustment has been made, the tooth contact between the pinion shaft and bevel gear must be checked. Use the following procedure:

a. Apply a small amount of Prussian blue, red lead, or paint on three or four adjacent teeth on the bevel gear.

b. Rotate the pinion shaft for five to eight revolutions in one direction. Then rotate the pinion shaft for five to eight revolutions in the opposite direction.

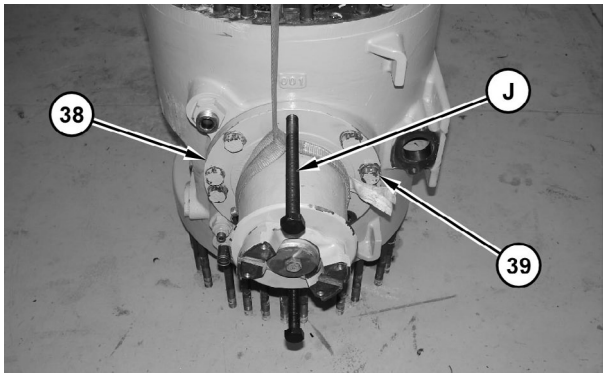

Illustration 181 g01425182

c. Attach a suitable lifting device onto pinion (38). Use Tooling (J) to separate pinion (38) from the center housing. Remove bolts (39) to remove pinion (38). Observe the contact pattern on the bevel gear. The weight of pinion (38) is approximately 68 kg (150 lb).

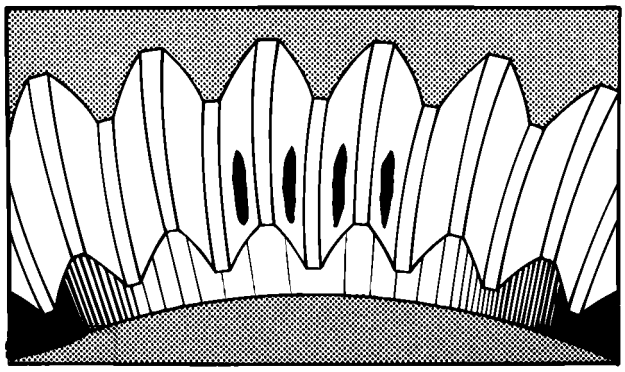

Illustration 182 g00315875

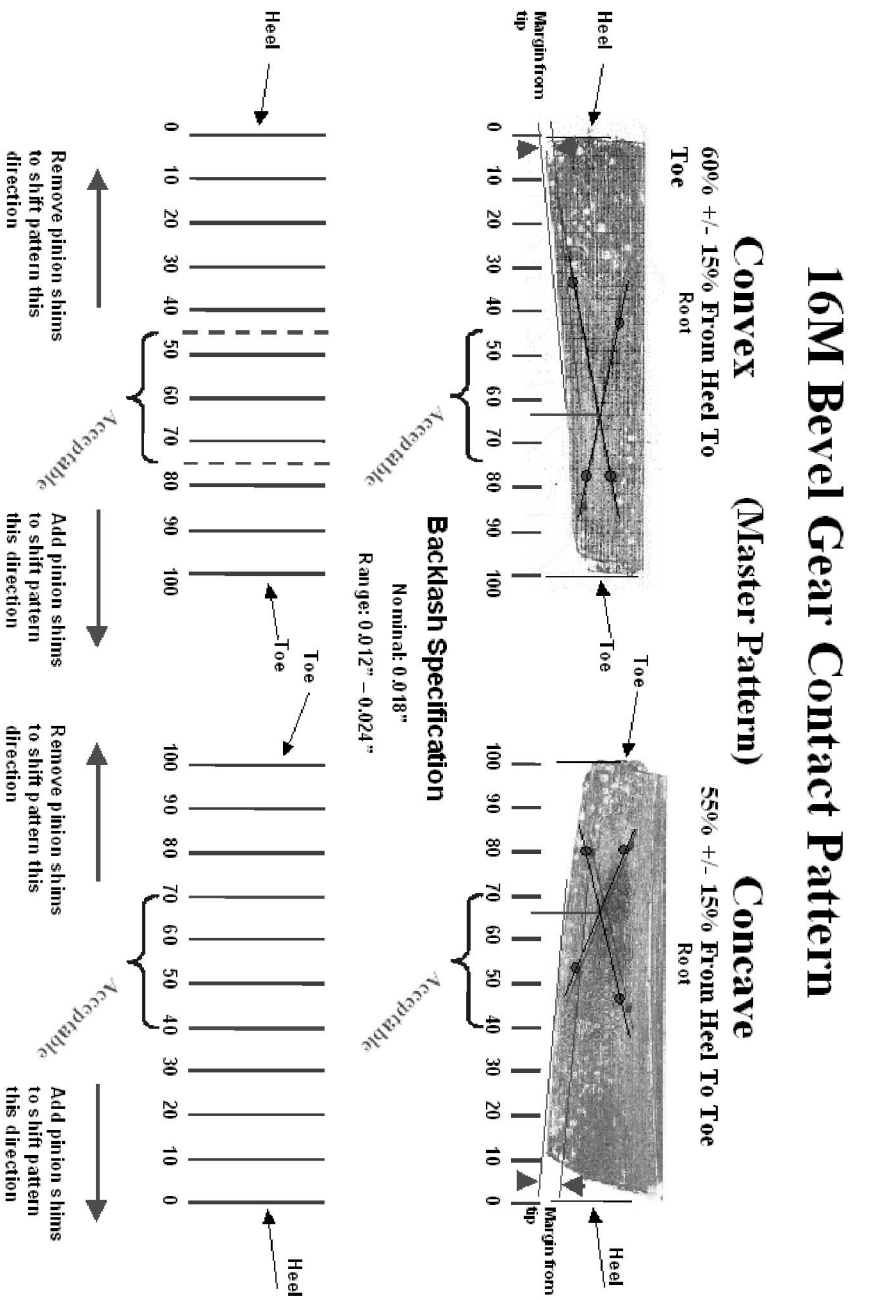

Illustration 183 g02066276

Illustration 184 g02066313

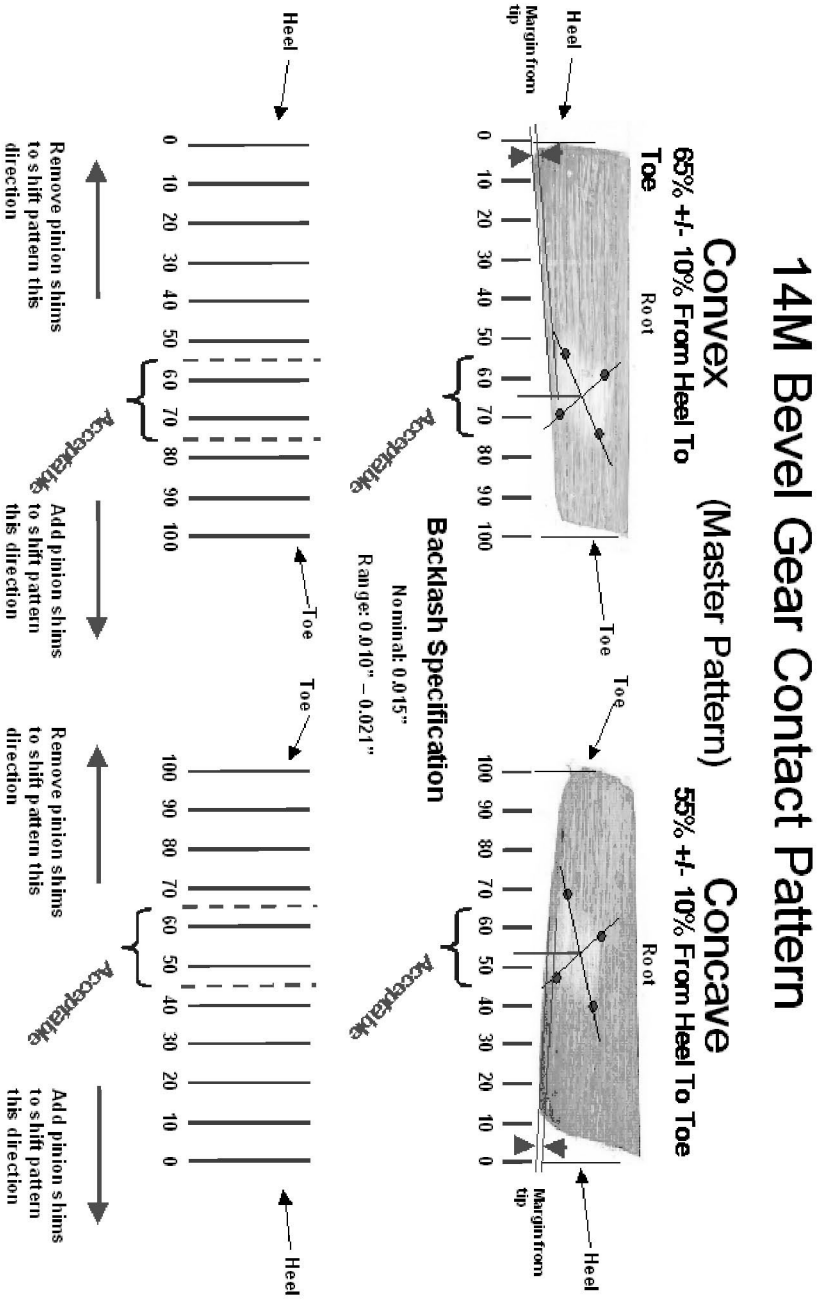

Illustration 185 g02066435

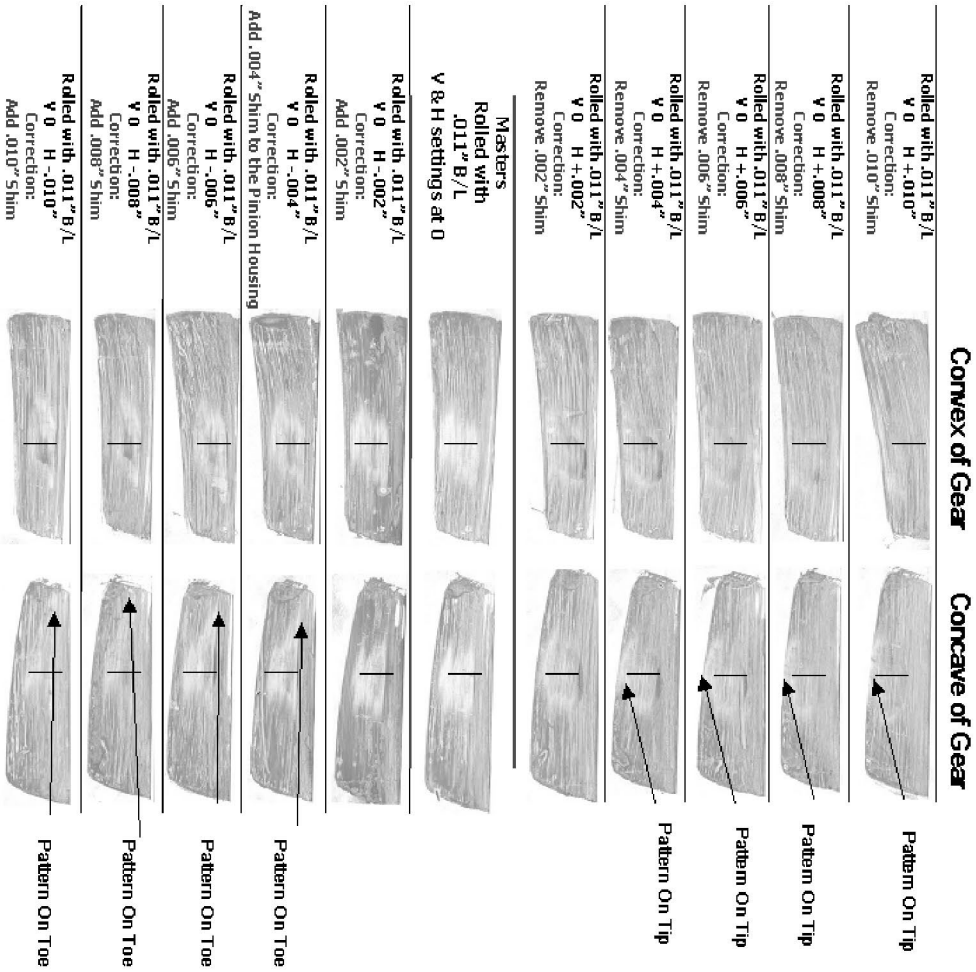

Illustration 186 g02066436

33. The middle of the contact pattern must be within the acceptable range.

34. If the contact pattern does not fall into the acceptable range, either add shims or remove shims. Recheck the contact pattern of the bevel gear. Repeat this step until the desired contact pattern is achieved.

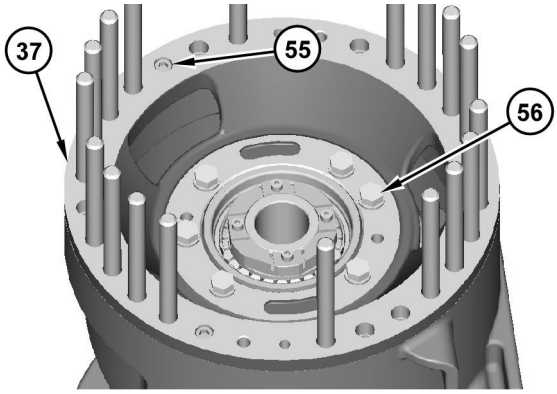

Illustration 187 g01567774

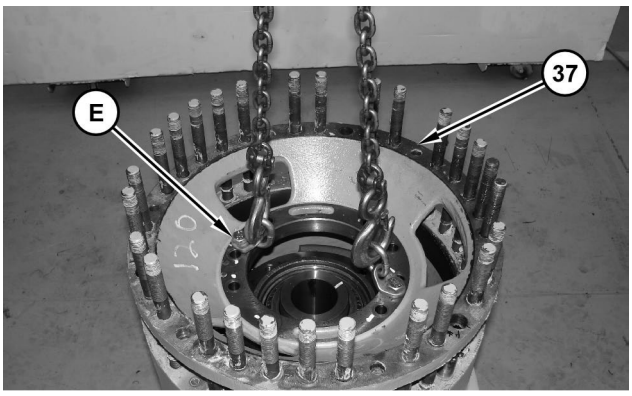

Illustration 188 g01420124

35. Once the backlash and the contact pattern of the bevel gear are correct, Remove bolts (56) and bolts (55). Use Tooling (F) to remove intermediate housing (37). The weight of intermediate housing (37) is approximately 45 kg (100 lb).

36. Apply Tooling (M) onto the mating surface of the center housing. Install intermediate housing (37). Install new bolts (56). Tighten new bolts (56) to a torque of 300 ± 40 N·m (221 ± 30 lb ft). Install new bolts (55). Tighten new bolts (55) to a torque of 105 ± 20 N·m (77 ± 15 lb ft).

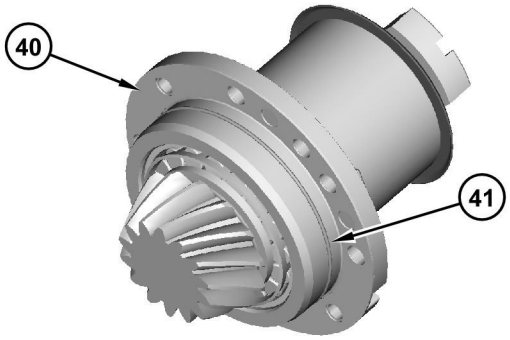

Illustration 189 g01353021

37. Install O-ring seal (41). Retain shims (40).

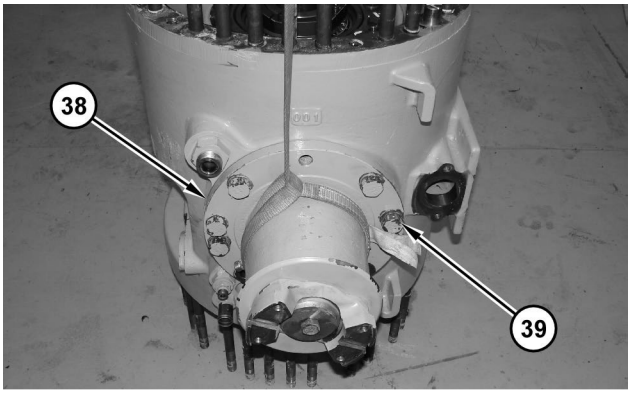

Illustration 190 g01355005

38. Use a suitable lifting device to install pinion (38). The weight of pinion (38) is approximately 68 kg (150 lb). Install new bolts (39). Tighten bolts (39) to a torque of 530 ± 70 N·m (391 ± 52 lb ft).

Note: Lubricate the O-ring seal, the shaft, and the bore with the lubricant that is being sealed prior to assembly.

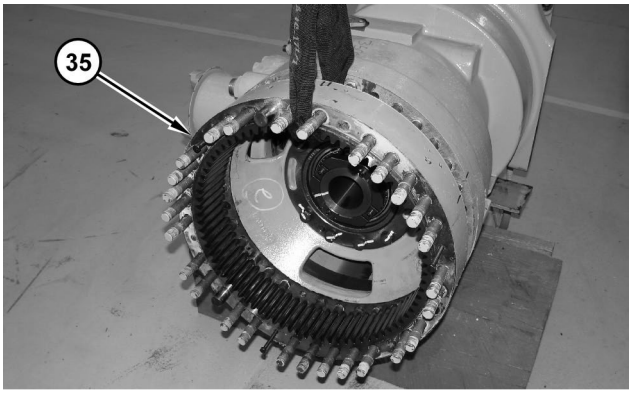

Illustration 191 g01352445

39. Position the differential housing horizontally onto suitable blocking. Apply Tooling (M) onto the mating surface of the differential housing. Use Tooling (B) and a suitable lifting device to install ring gear (35). The weight of ring gear (35) is approximately 45 kg (100 lb).

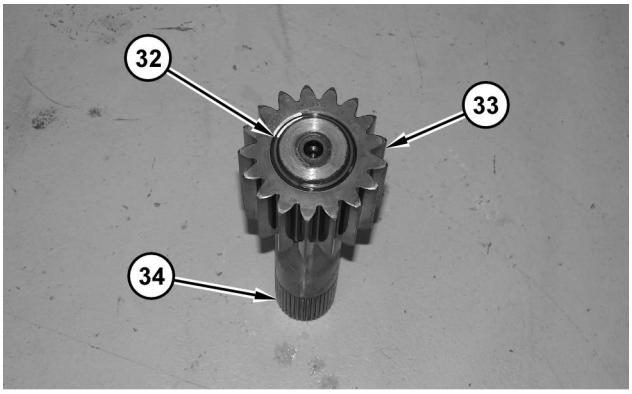

Illustration 192 g01352402

40. Install gear (33) onto axle shaft (34). Install retaining ring (32).

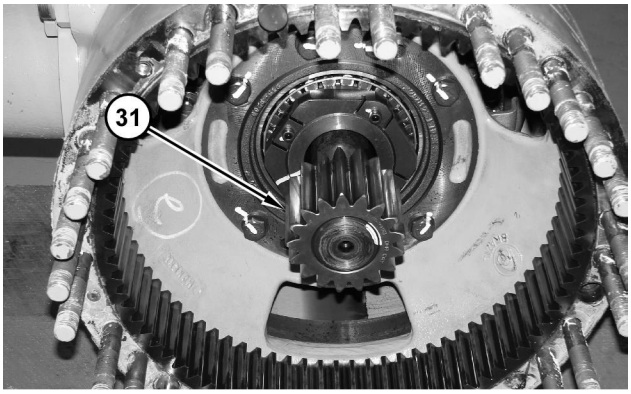

Illustration 193 g01352384

41. Install axle shaft assembly (31).

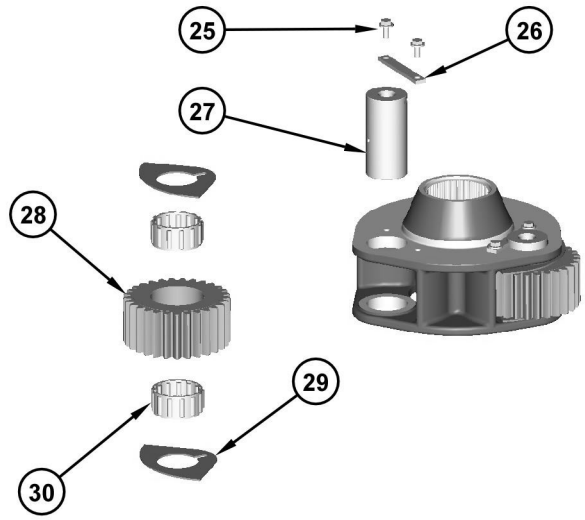

Illustration 194 g01352406

42. Install bearings (30) into gear (28). Install gear (28). Install thrust washers (29). Install pin (27). Install retainer (26) and bolts (25). Repeat this step for the remaining planetary gears.

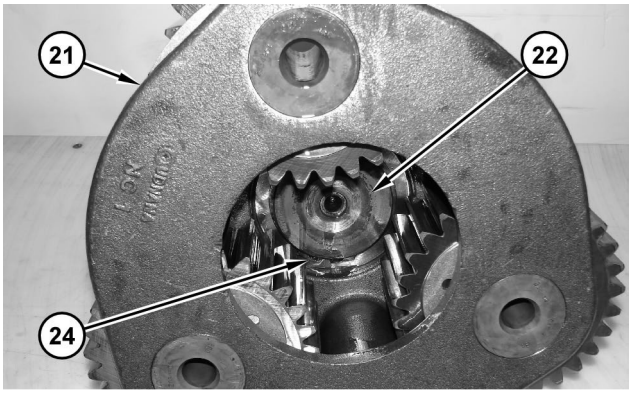

Illustration 195 g01352339

43. Install axle shaft (22) onto carrier assembly (21). Install retaining ring (24).

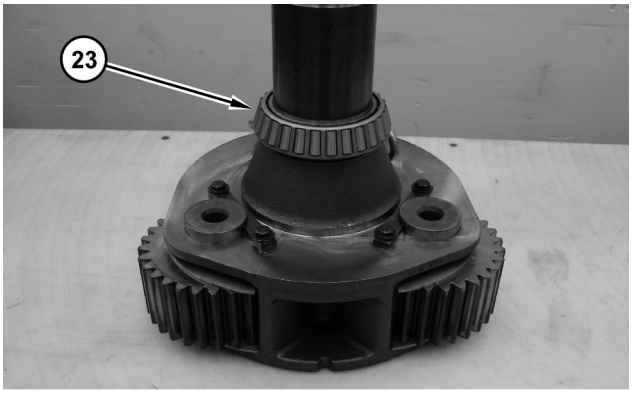

Illustration 196 g01355691

44. Raise the temperature of bearing cone (23). Install bearing cone (23).

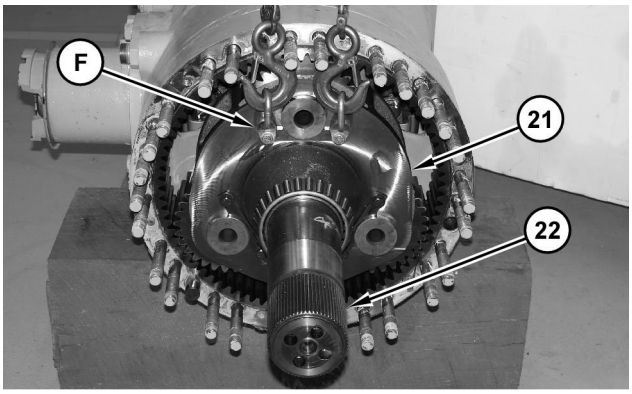

Illustration 197 g01352324

45. Use Tooling (F) to install carrier assembly (21) and drive shaft (22). The weight of carrier assembly (21) and drive shaft (22) is approximately 125 kg (275 lb).

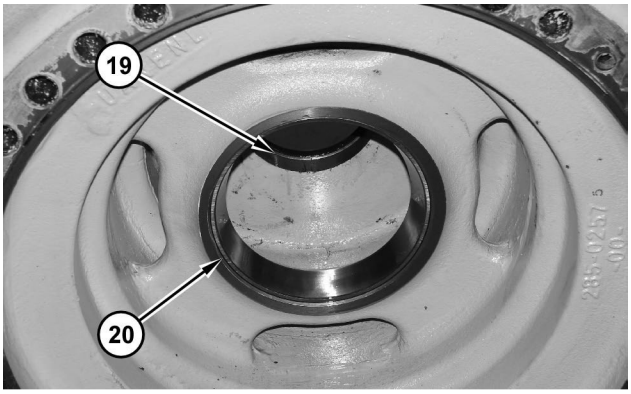

Illustration 198 g01352320

46. Lower the temperature of bearing cup (20). Install bearing cup (20). Install lip seal (19) with the spring side of seal facing out towards the tandem.

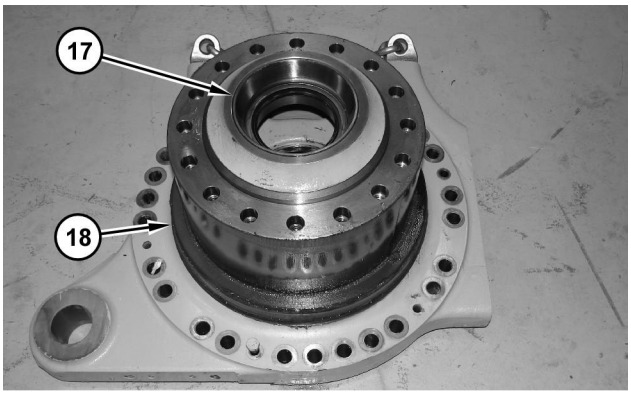

Illustration 199 g02359721

47. Apply Tooling (S) onto thrust washer (18). Install thrust washer (18). Lower the temperature of bearing cup (17). Install bearing cup (17).

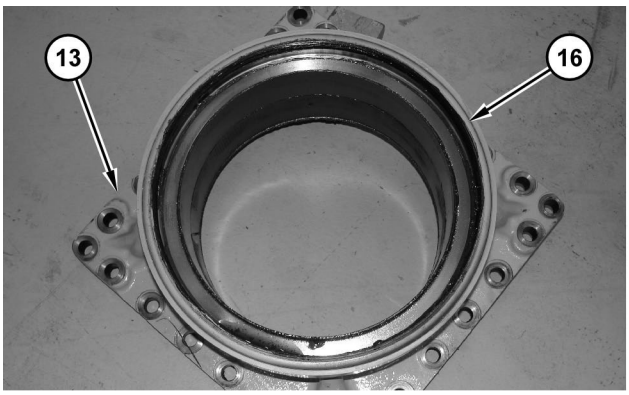

Illustration 200 g01352299

48. Install lip seal (16) into housing (13).

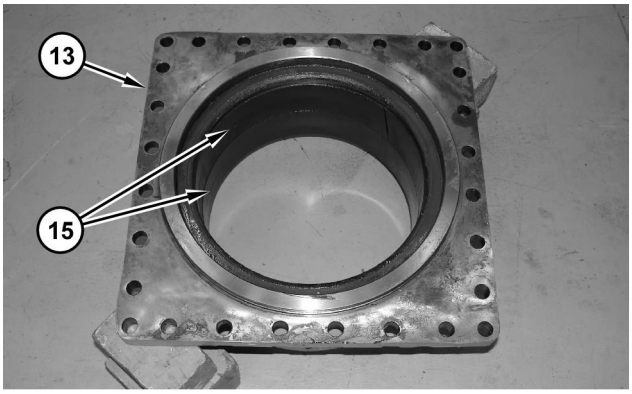

Illustration 201 g03357308

49. Turn over housing (13). Apply Tooling (S) onto both sides of wear sleeves (15). Install wear sleeves (15). The diagonal cuts that are in wear sleeves (15) are separated by 90°.

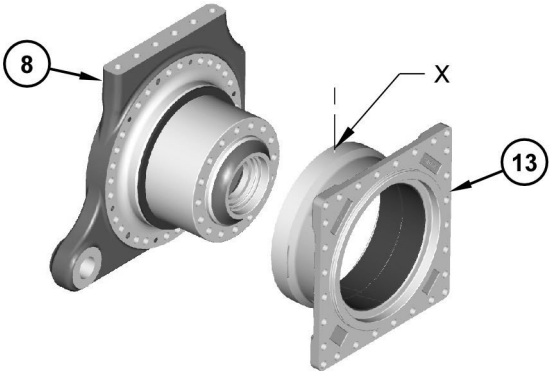

Illustration 202 g02359756

50. Ensure that the lubrication port (X) that is on housing (13) will be oriented to the vertical position when final drive housing (8) is installed onto the differential.

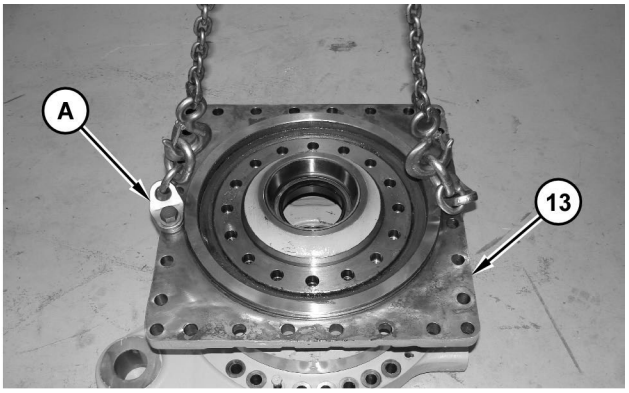

Illustration 203 g02033793

51. Use Tooling (A) and a suitable lifting device to install housing (13). The weight of housing (13) is approximately 90 kg (198 lb). Use a suitable soft hammer to drive the wear sleeves into housing (13) until the sleeves are flush with the top of the bore surface.

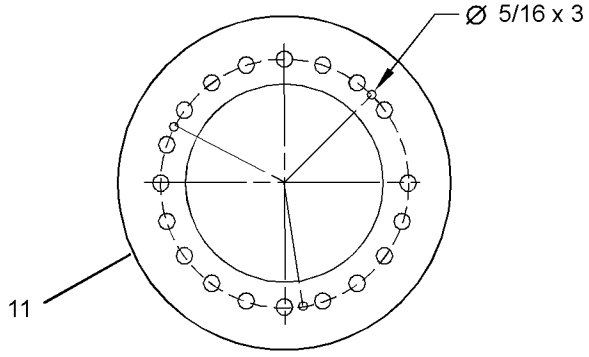

Illustration 204 g02359725

52. Drill three equally spaced 8 mm (5/16 inch) holes in retainer (11). The holes must be centered on the existing bolt hole pattern and perpendicular to each surface.

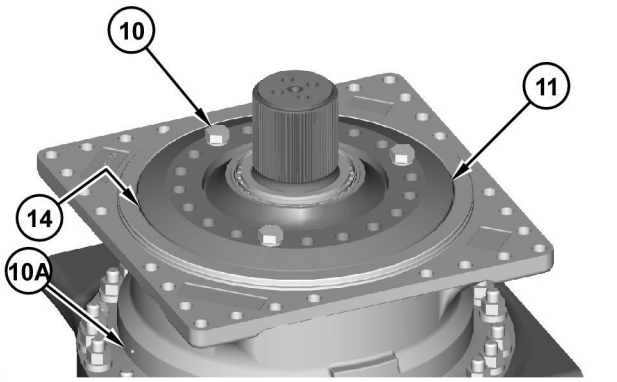

Illustration 205 g03357376

Note: Do not install the shims or the thrust washer at this time.

53. Remove plug (10A). Install retainer (11). Install three of bolts (10). Tighten bolts (10) to a torque of 10 N·m (89 lb in). Use Tooling (N) to measure the gap between the top surface of retainer (11) and the final drive housing at three 8 mm (5/16 inch) hole locations. Average the three measurements and record the result as Dimension (A).

54. Remove retainer (11). Install a clean and dry thrust washer(14) (not shown).

Note: Do not install the shims at this time.

55. Install retainer (11) and three bolts (10). Tighten bolts (10) to a torque of 50 N·m (37 lb ft). Check the bolts to verify that the proper torque is achieved. Loosen bolts (10). Tighten bolts (10) to a torque of 10 N·m (89 lb in). Check the bolts to verify a torque of 10 N·m (89 lb in) is achieved.

56. Use Tooling (N) to measure the gap between the top surface of retainer (11) and the final drive housing at three 8 mm (5/16 inch) hole locations. Average the three measurements and record the result as Dimension (B).

57. Subtract Dimension (A) from Dimension (B). Record the result as Dimension (C)

58. Add 0.00 mm to -0.05 mm (0.0 inch to -0.002 inch) of thickness to Dimension (C) to obtain the required shim thickness for shims (12).

Note: These instructions are written to achieve the tightest joint within the specifications. Assemble shim pack (12) using a micrometer to measure thickness. Record the measured thickness of the shim pack installed.

59. Remove bolts (10), retainer (11), and thrust washer (14) (not shown). Apply Tooling (S) to the front and back of thrust washer (14).

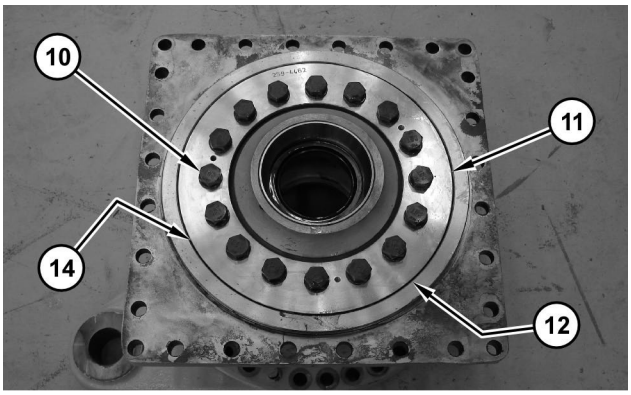

Illustration 206 g03357382

60. Install shims (12), thrust washer (14), retainer (11). Install three bolts (10) evenly spaced. Tighten three bolts (10) to a torque of 10 N·m (89 lb in).

61. Using a 1.4 m (4.5 ft) bar, verify that housing (13) can be rotated in relation to housing (8). If the housing does not move add 0.05 mm (0.002 inch) to shims (12).

62. Repeat Steps 60 through 61 until housing (13) will rotate in relation to housing (8).

63. Tighten the same three evenly spaced bolts (10) to a torque of 50 N·m (37 lb ft). Repeat Step 61.

64. Tighten the same three evenly spaced bolts (10) to a torque of 203 N·m (150 lb ft). Repeat Step 61.

65. Tighten the same three evenly spaced bolts (10) to a torque of 530 N·m (391 lb ft). Repeat Step 61.

66. Install remaining bolts (10) and tighten to a torque of 530 N·m (391 lb ft).

67. Record the final thickness of shims (12).

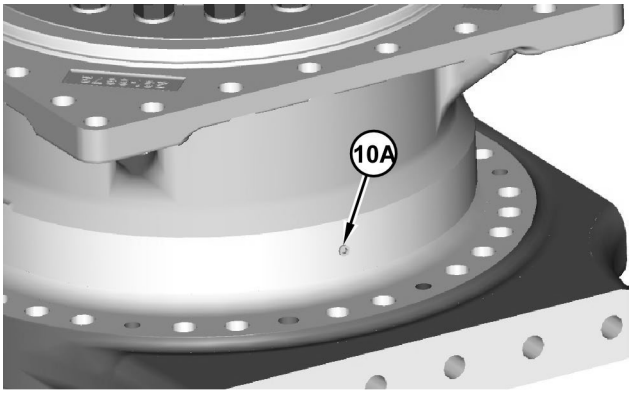

Illustration 207 g02380996

68. Install plug (10A).

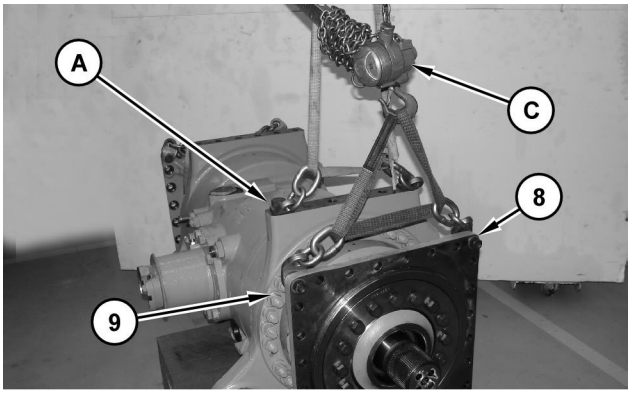

Illustration 208 g01351906

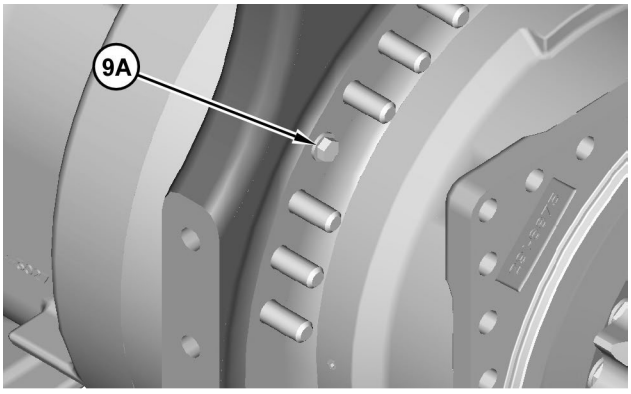

Illustration 209 g01425110

69. Apply Tooling (M) onto the mating surface of final drive housing (8). Use Tooling (A), Tooling (C), and two suitable lifting devices to install final drive housing (8). The weight of final drive housing (8) is approximately 254 kg (560 lb). Install bolts (9A). Tighten bolts (9A) to a torque of 105 ± 20 N·m (77 ± 15 lb ft). Install nuts (9). Tighten nuts (9) to a torque of 530 ± 70 N·m (391 ± 52 lb ft).

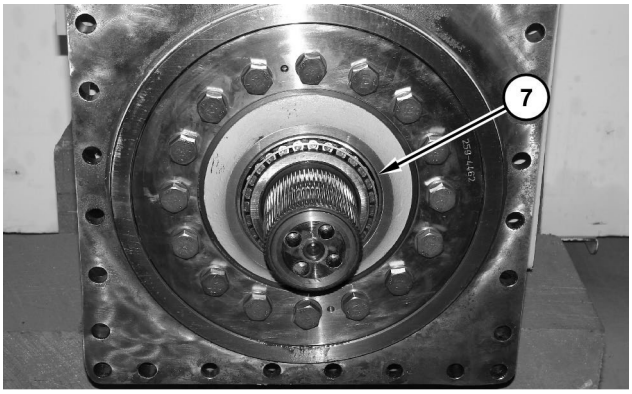

Illustration 210 g01351900

70. Install bearing cone (7).

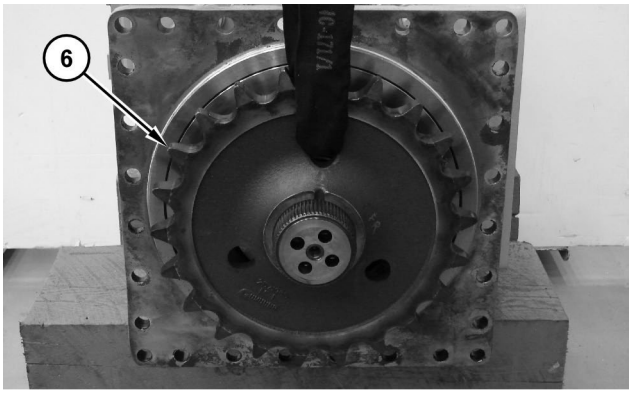

Illustration 211 g01351809

71. Use Tooling (B) and a suitable lifting device to install sprocket (6). The weight of sprocket (6) is approximately 23 kg (51 lb).

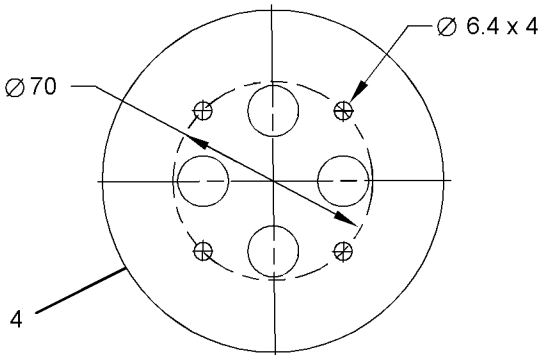

Illustration 212 g02359700

72. Drill four equally spaced 6.4 mm (0.252 inch) holes in retainer (4) on a 70 mm (2.755 inch) diameter.

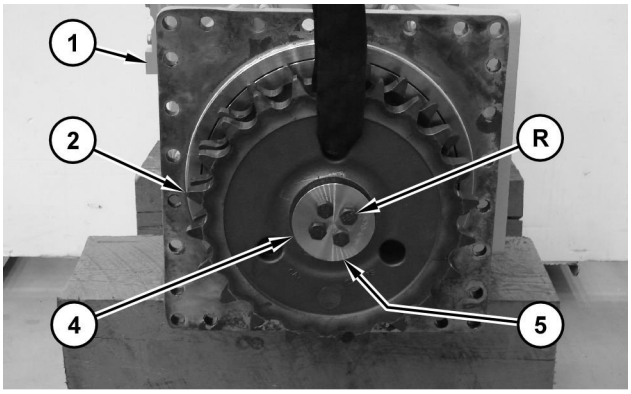

Illustration 213 g01622789

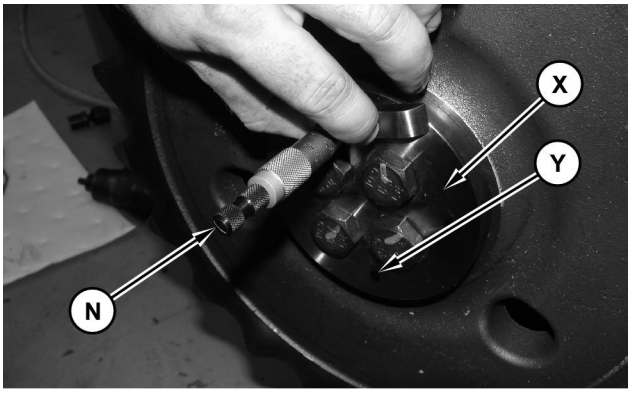

Illustration 214 g01615505

73. Use Tooling (B) and a suitable lifting device to install sprocket (2) onto rear axle, differential, and final drive (1). The weight of sprocket (2) is approximately 23 kg (51 lb).

Note: The sprockets must be offset.

74. Install Retainer(4) and Tooling (R). Tighten Tooling (R) to a torque of 48 ± 3 N·m (35 ± 2 lb ft) while you are turning the sprocket. Ensure that the torque has equalized. Turn the sprocket three times. Insert Tooling (N) into Holes (Y) to measure the distance from the face of the spindle shaft to Surface (X) in four places. Record the average distance. Remove Tooling (R) and Retainer(4). Measure the thickness of Retainer(4).

(14M) Install a number of shims (5) that is equal to the average distance minus 0.150 mm (0.0059 inch) and the thickness of Retainer(4).

(16M) Install a number of shims (5) that is equal to the average distance minus 0.080 mm (0.0031 inch) and the thickness of Retainer(4).

75. The shim pack thickness can have a tolerance of + 0.0000 - 0.050 mm (+ 0.0000 - 0.0020 inch).

Note: Install the thin shims between the thick shims prior to installation.

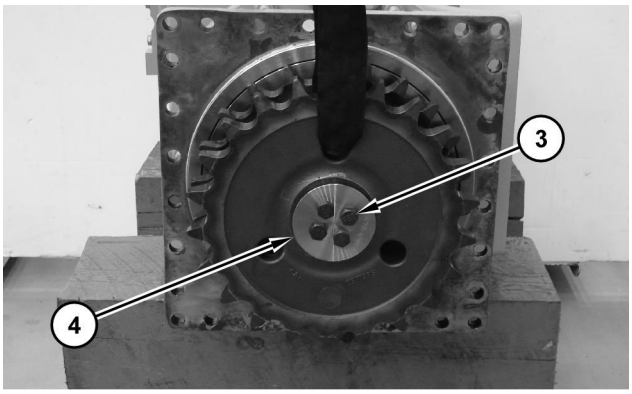

Illustration 215 g01381700

76. Install retainer (4) and bolts (3). Tighten bolts (3) to a torque of 270 ± 40 N·m (199 ± 30 lb ft).

77. Repeat Step 39 through Step 76 for the opposite side.

i03553463

Rear Axle, Differential and Final Drive - Install

SMCS Code: 3258-012; 3278-012; 3282-012-RE; 4050-012; 4068-012

Installation Procedure

Table 14

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7576	Link Bracket	4
B	1U-9200	Lever Puller Hoist	1
C	1U-7505	Hydraulic Jack	1
D	138-7575	Link Bracket	4
E	6V-6146	Load Leveling Beam	1
F	1U-9744	Floor Jack	1
G	155-0695	Thread Lock Compound	1

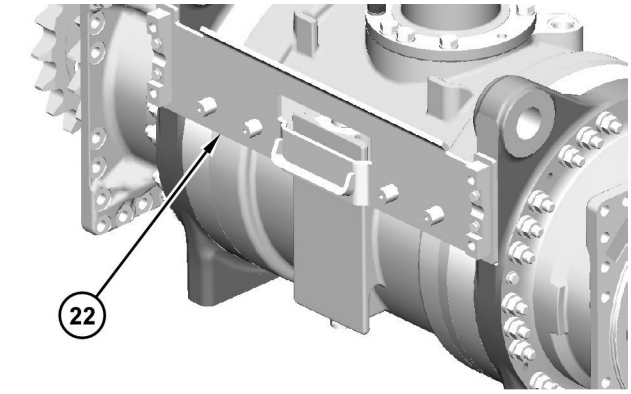

Illustration 216 g01389836

1. Install bracket assembly (22).

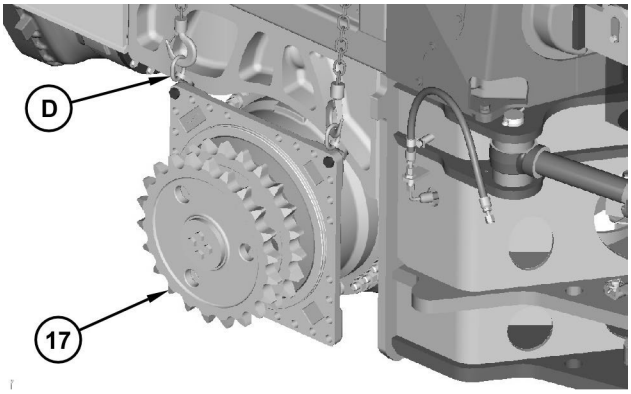

Illustration 217 g01389824

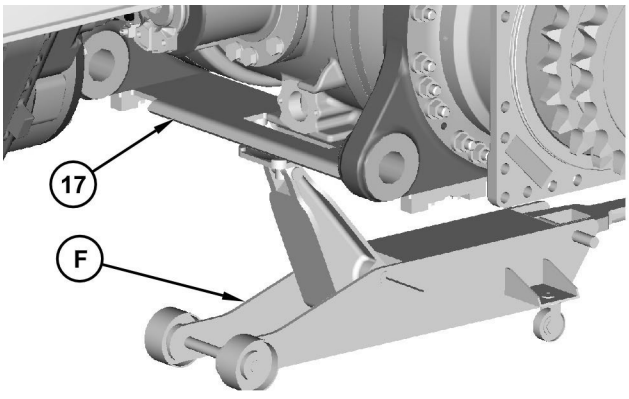

Illustration 218 g01389825

2. Use Tooling (D), Tooling (E), Tooling (F) and two suitable lifting devices in order to position rear axle, differential, and final drive (17). The weight of rear axle, differential, and final drive (17) is approximately 1828 kg (4030 lb).

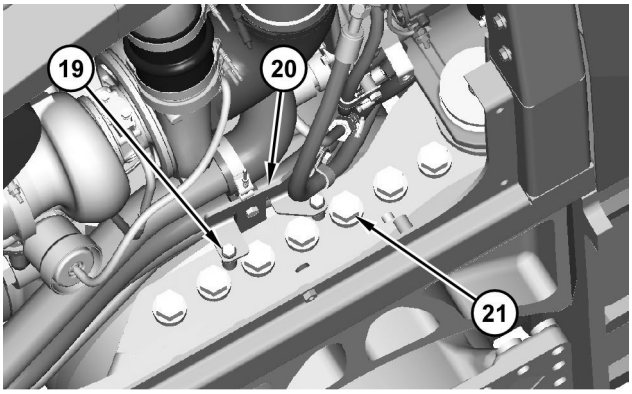

Illustration 219 g01389829

3. Apply Tooling (G) onto bolts (19). Position bracket assembly (20) and install bolts (19). Repeat this step for the opposite side of the machine.

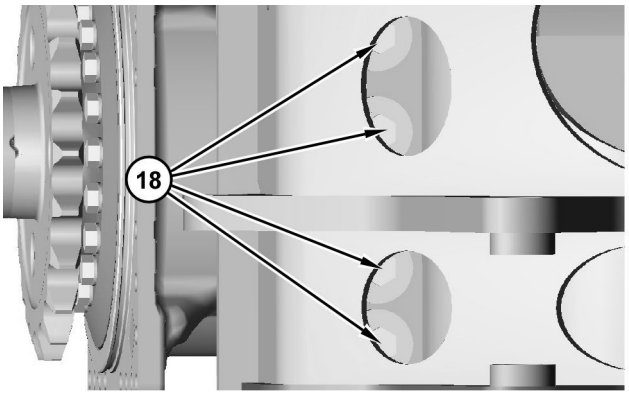

Illustration 220 g01389828

4. Apply Tooling (G) onto bolts (18). Install bolts (18). Repeat this step for the opposite side of the machine.

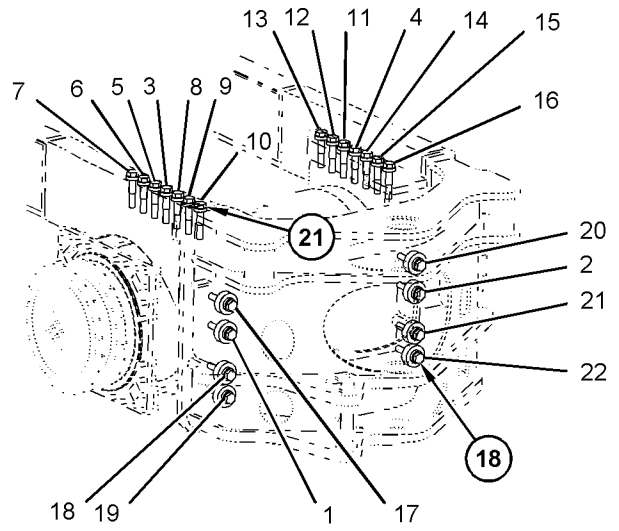

Illustration 221 g01389840

5. Tighten bolts (21) and bolts (18) to a torque of 200 N·m (148 lb ft) in the sequence that is shown. Tighten bolts (21) and bolts (18) again to a torque of 900 ± 100 N·m (664 ± 74 lb ft).

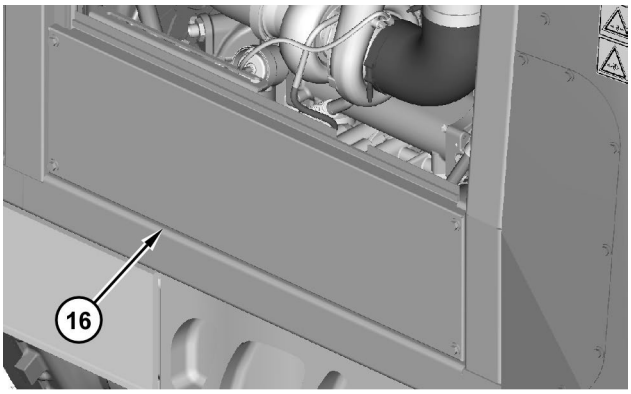

Illustration 222 g01389823

6. Install panel (16). Repeat this step for the opposite side of the engine enclosure.

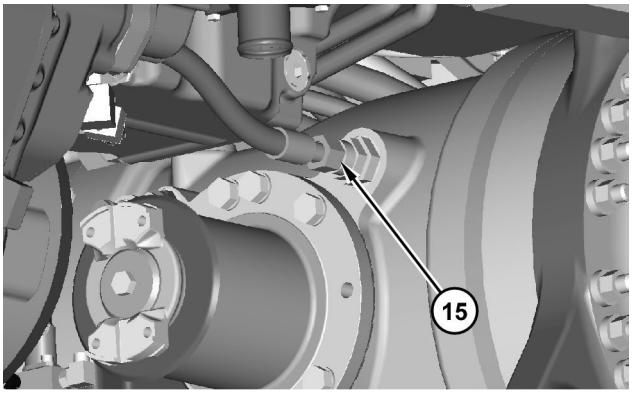

Illustration 223 g01389822

7. Connect hose assembly (15).

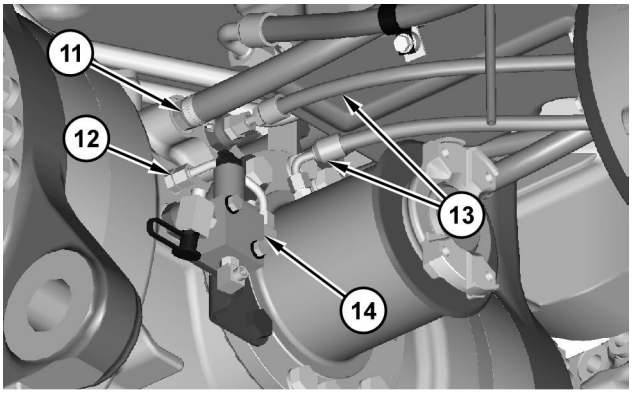

Illustration 224 g01389821

8. Install lock valve (14). Connect hose assemblies (13). Install tube assembly (12). Connect hose (11).

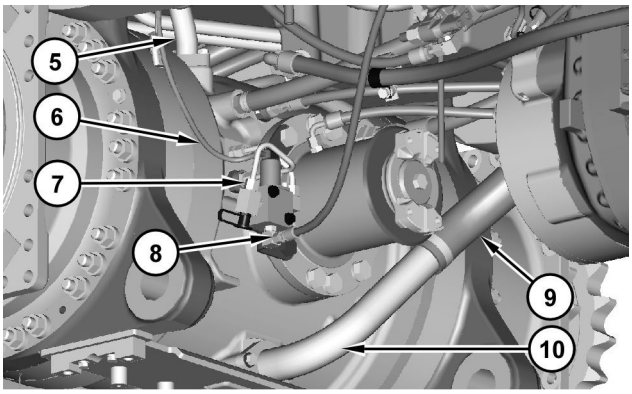

Illustration 225 g01389813

9. Install tube assembly (10). Install hose (9). Connect hose assembly (8). Install tube assembly (7). Connect harness assembly (6). Install tube assembly (5).

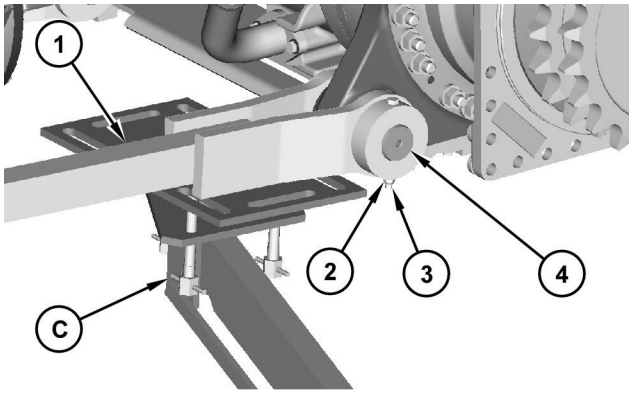

Illustration 226 g01389812

10. Use Tooling (C) in order to raise link (1). The weight of link (1) is approximately 75 kg (165 lb). Install pin (4). Install bolt (3) and nut (2). Repeat this step for the remaining link.

11. Repeat Step 1 through Step 10 for the opposite side of the machine.

12. Fill the rear axle. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

13. Separate the steering frame lock. Refer to Operation and Maintenance Manual, “Steering Frame Lock”.

End By:

a. Install the bottom guard. Refer to Disassembly and Assembly, “Bottom Guard - Remove and Install”.

b. Install the tandem housing. Refer to Disassembly and Assembly, “Housing (Tandem) - Remove and Install”.

c. Install the rear wheels and tires. Refer to Disassembly and Assembly, “Wheel and Tire (Rear) - Remove and Install”.

d. Install the drive chains. Refer to Disassembly and Assembly, “Drive Chain - Install”.

i02783058

Transmission Oil Filter Base - Remove

SMCS Code: 3068-011

Removal Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

Note: Put identification marks on all lines, on all hoses, on all wires, and on all tubes for installation purposes. Plug all lines, hoses, and tubes. This helps to prevent fluid loss and this helps to keep contaminants from entering the system.

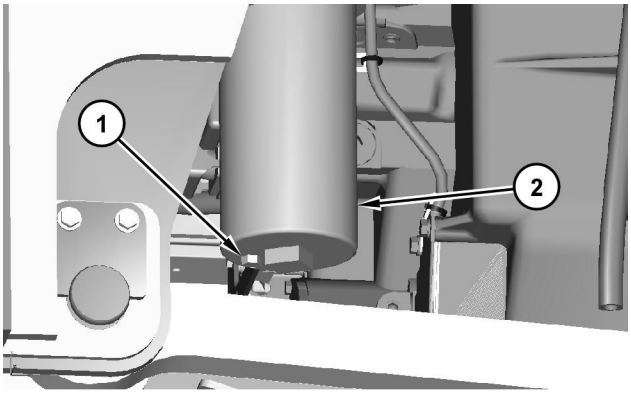

Illustration 227 g01389905

1. Remove plug (1) and drain filter (2) into a suitable container for storage or disposal.

2. Remove filter housing (2).

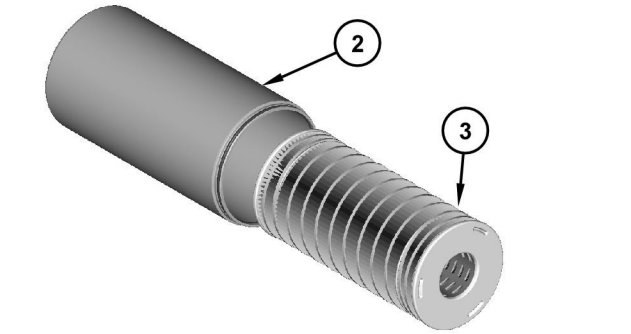

Illustration 228 g01389908

3. Remove filter element (3) from filter housing (2).

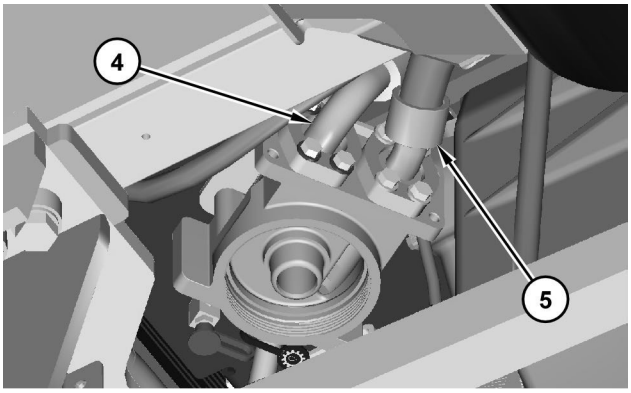

Illustration 229 g01389911

4. Disconnect hose assembly (4). Disconnect hose assembly (5).

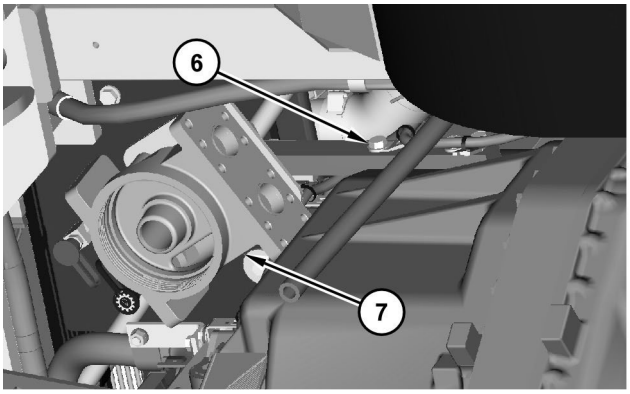

Illustration 230 g01389915

5. Remove bolts (6) in order to remove transmission oil filter base (7).

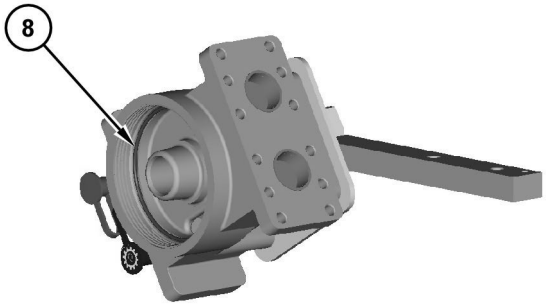

Illustration 231 g01389916

6. Remove O-ring seal (8).

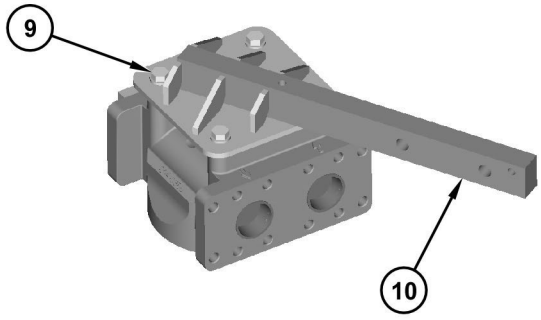

Illustration 232 g01389920

7. Remove bolts (9). Remove mounting bracket (10).

i02674631

Transmission Oil Filter Base - Disassemble

SMCS Code: 3068-015

Disassembly Procedure

Start By:

a. Remove the transmission oil filter base. Refer to Disassembly and Assembly, “Transmission Oil Filter Base - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace O-ring seals that are worn or damaged.

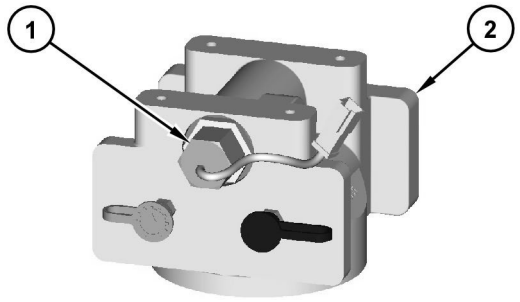

Illustration 233 g01343745

1. Remove switch assembly (1) from transmission oil filter base (2).

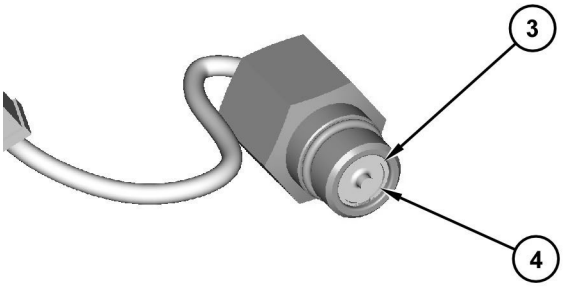

Illustration 234 g01343852

⚠ WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

2. Remove retaining ring (3). Remove plunger assembly (4).

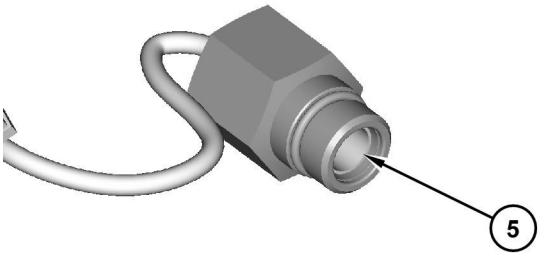

Illustration 235 g01343765

3. Remove spring (5).

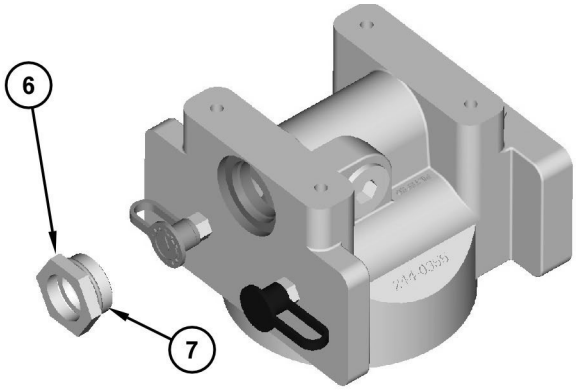

Illustration 236 g01343857

⚠ WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

4. Remove adapter (6). Remove O-ring seal (7).

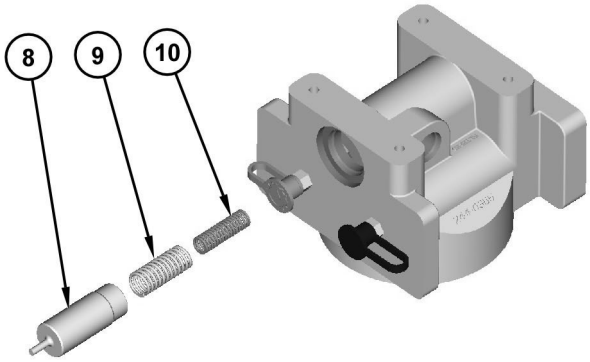

Illustration 237 g01343861

5. Remove spool (8). Remove spring (9). Remove spring (10).

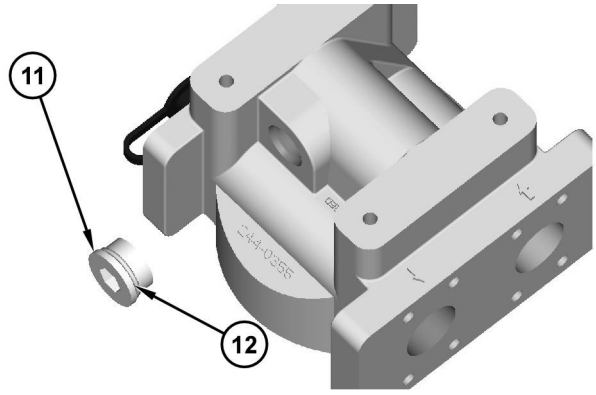

Illustration 238 g01343868

6. Remove plug (11). Remove O-ring seal (12).

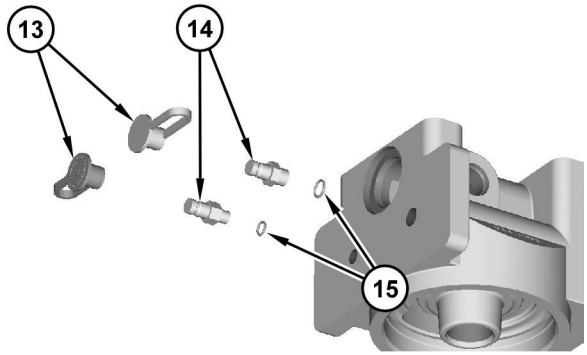

Illustration 239 g01343873

7. Remove dust caps (13). Remove test ports (14). Remove O-ring seals (15).

i02674632

Transmission Oil Filter Base - Assemble

SMCS Code: 3068-016

Assembly Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

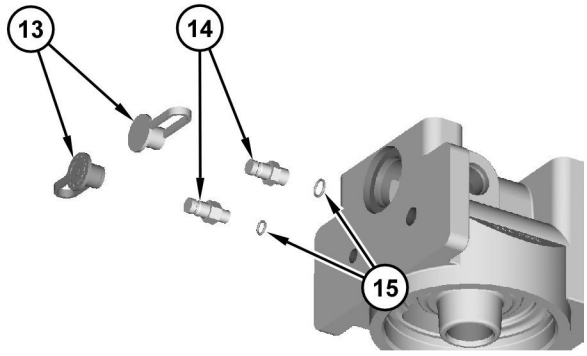

Illustration 240 g01343873

1. Install O-ring seals (15). Install test ports (14). Install dust caps (13).

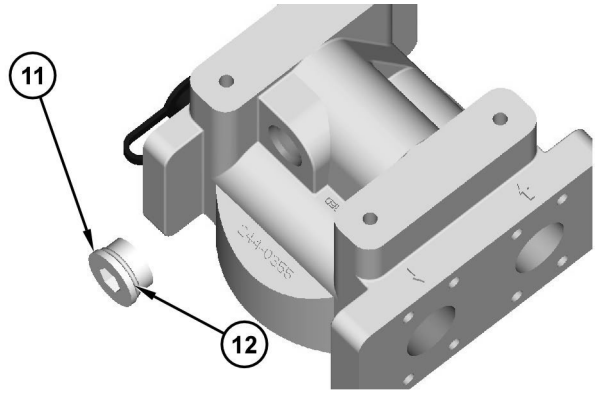

Illustration 241 g01343868

2. Install O-ring seal (12). Install plug (11).

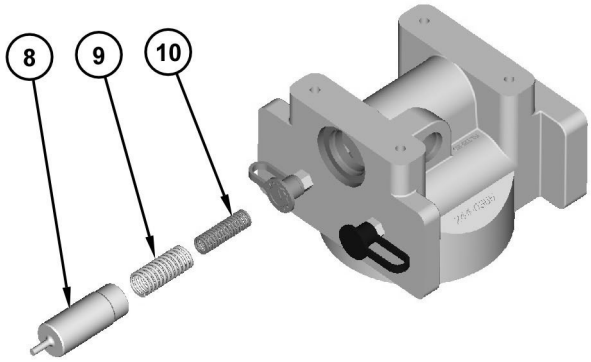

Illustration 242 g01343861

3. Install spring (10). Install spring (9). Install spool (8).

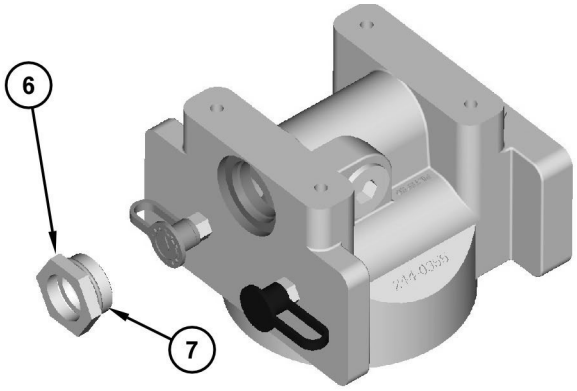

Illustration 243 g01343857

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

4. Install O-ring seal (7). Install adapter (6).

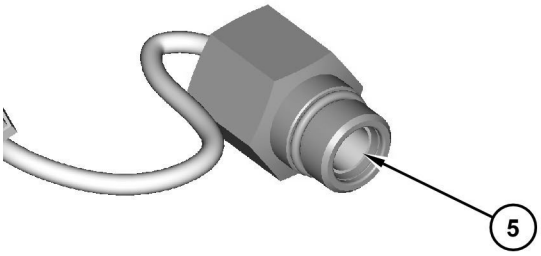

Illustration 244 g01343765

5. Install spring (5).

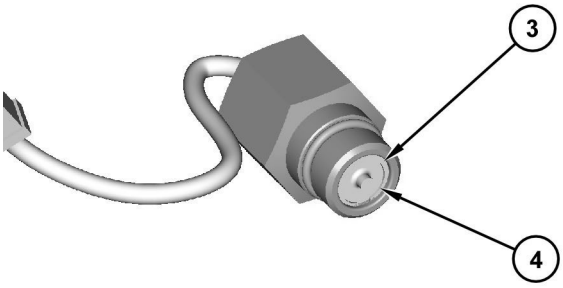

Illustration 245 g01343852

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

6. Install plunger assembly (4). Install retaining ring (3).

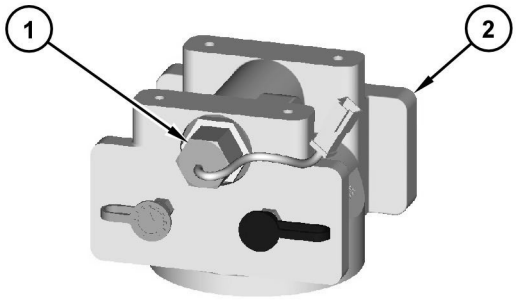

Illustration 246 g01343745

7. Install switch assembly (1) into transmission oil filter base (2). Tighten switch assembly (1) to a torque of 80 ± 10 N·m (59 ± 7 lb ft).

End By:

a. Install the transmission oil filter base. Refer to Disassembly and Assembly, "Transmission Oil Filter Base - Install".

i02783059

Transmission Oil Filter Base - Install

SMCS Code: 3068-012

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

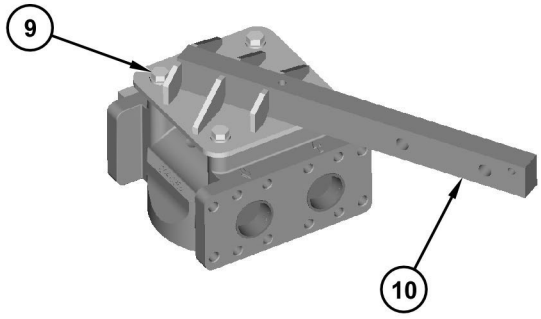

Illustration 247 g01389920

1. Position mounting bracket (10) and install bolts (9).

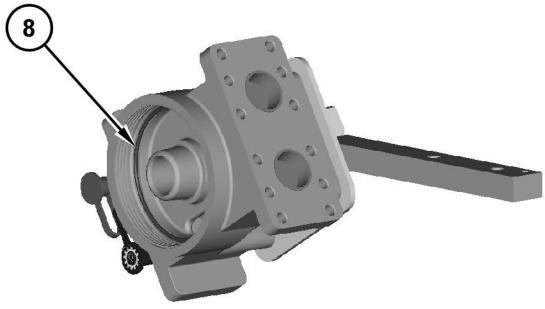

Illustration 248 g01389916

2. Install O-ring seal (8).

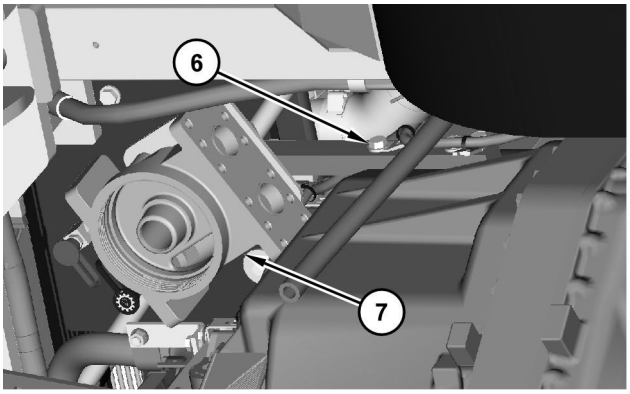

Illustration 249 g01389915

3. Install transmission oil filter base (7). Install bolts (6).

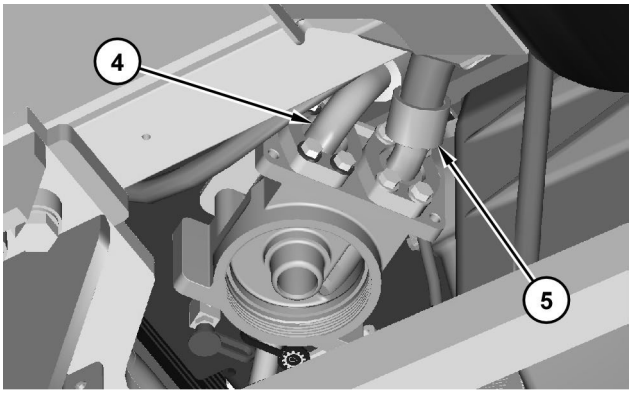

Illustration 250 g01389911

4. Connect hose assembly (5). Connect hose assembly (4).

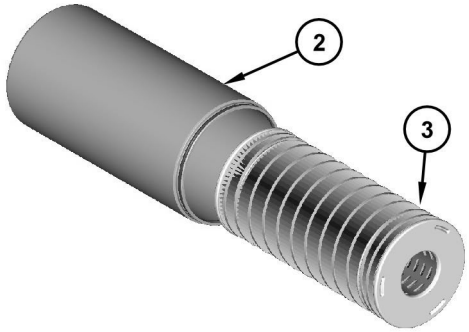

Illustration 251 g01389908

5. Install filter element (3) into filter housing (2).

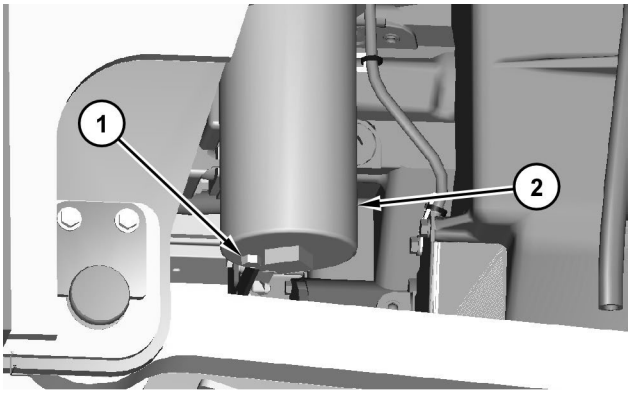

Illustration 252 g01389905

6. Install filter housing (2). Install plug (1).

7. Check the oil level in the transmission. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil Level - Check”.

i02654074

Gear Pump (Transmission Charging and Scavenge) - Remove

SMCS Code: 3066-011; 3115-011

Removal Procedure

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

Note: Put identification marks on all lines, on all hoses, on all wires, and on all tubes for installation purposes. Plug all lines, hoses, and tubes. This helps to prevent fluid loss and this helps to keep contaminants from entering the system.

1. Drain the transmission into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

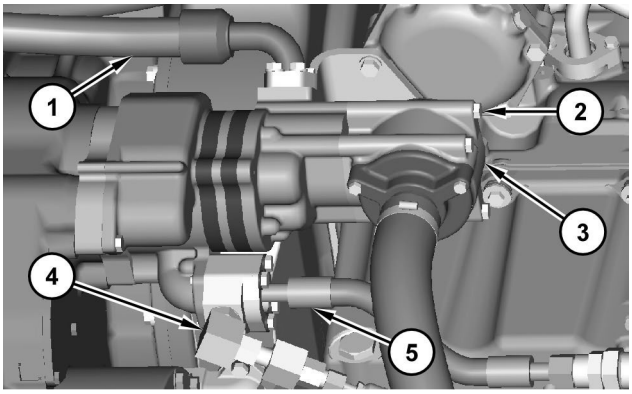

Illustration 253 g01332840

2. Disconnect hose assembly (1).

3. Remove bolts (2) and position magnetic screen assembly (3) out of the way.

4. Disconnect fitting (4).

5. Disconnect hose assembly (5).

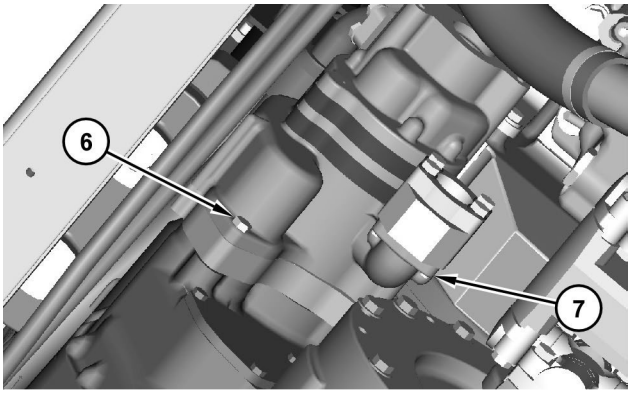

Illustration 254 g01332852

6. Remove bolts (6). Use two people in order to remove gear pump (7). The weight of gear pump (7) is approximately 34 kg (75 lb).

i02650460

Gear Pump (Transmission Charging and Scavenge) - Disassemble

SMCS Code: 3066-015; 3115-015

Disassembly Procedure

Start By:

a. Remove the gear pump. Refer to Disassembly and Assembly, “Gear Pump (Transmission Charging and Scavenge) - Remove”.

Illustration 255 g01330897

1. Remove bolts (1).

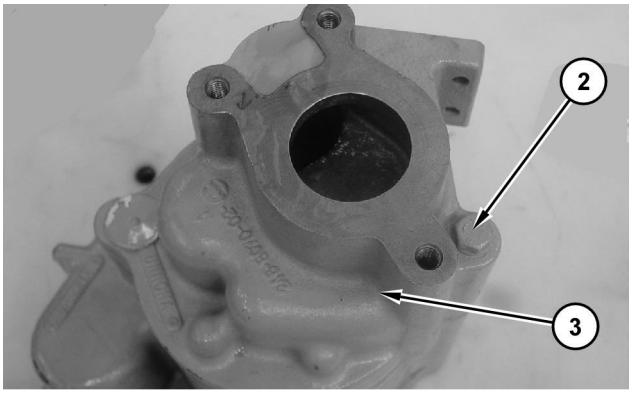

Illustration 256 g01330898

2. Remove bolt (2) and cover (3).

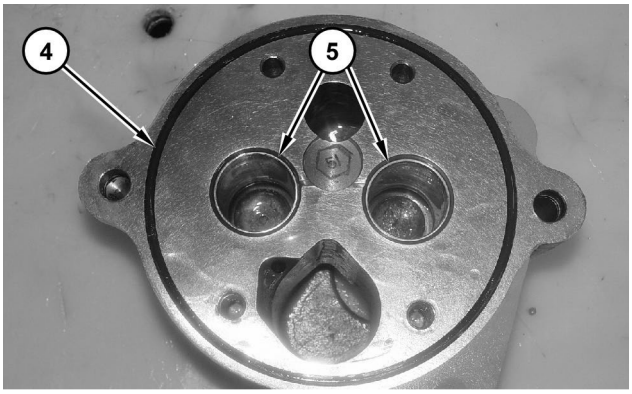

Illustration 257 g01330900

3. Remove O-ring seal (4) and bearings (5).

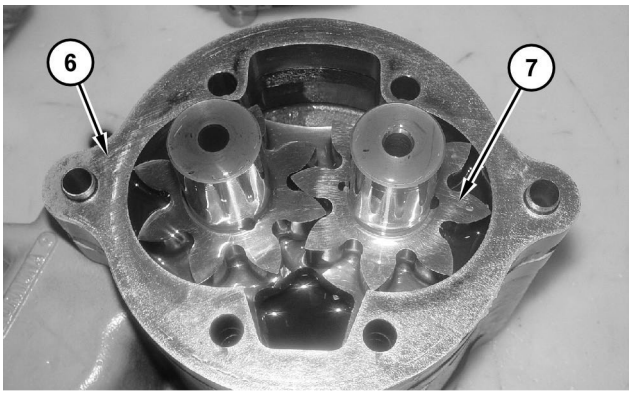

Illustration 258 g01330901

4. Remove housing (6) and gears (7).

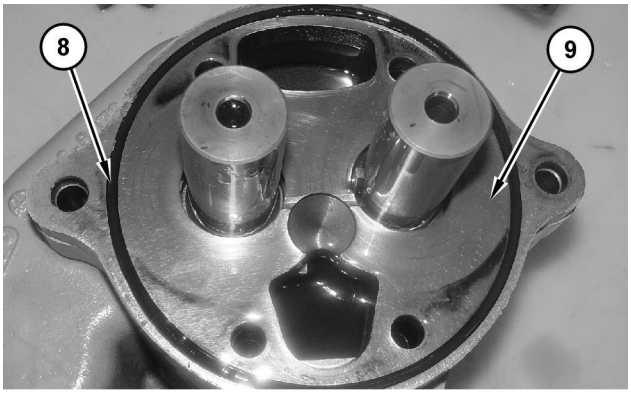

Illustration 259 g01330902

5. Remove O-ring seal (8) and housing (9).

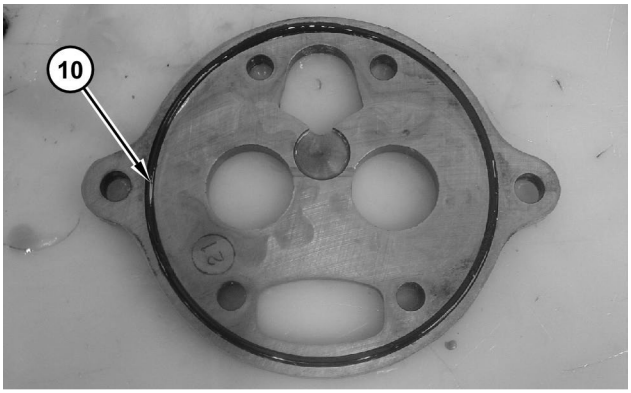

Illustration 260 g01330904

6. Remove O-ring seal (10).

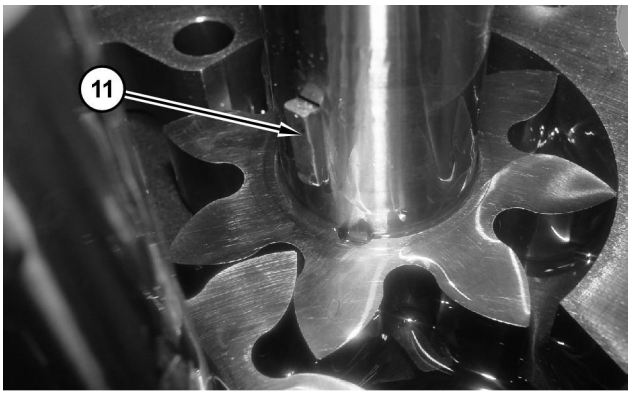

Illustration 261 g01330906

7. Remove key (11).

Illustration 262 g01330907

8. Remove gear (12), gear (13), and housing (14).

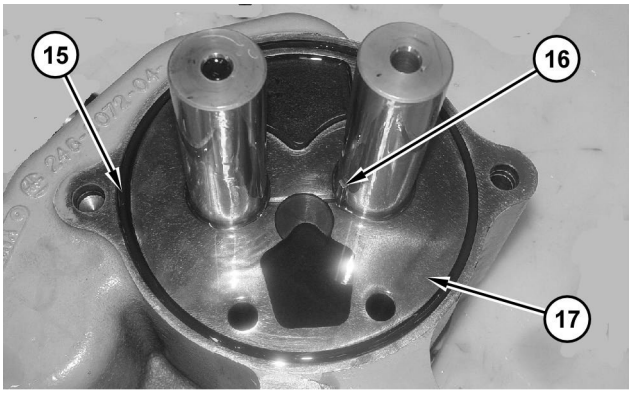

Illustration 263 g01330908

9. Remove key (16), O-ring seal (15), and housing (17).

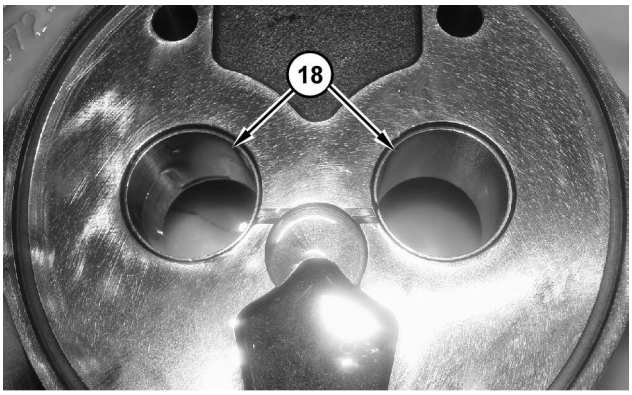

Illustration 264 g01330910

10. Remove bearings (18).

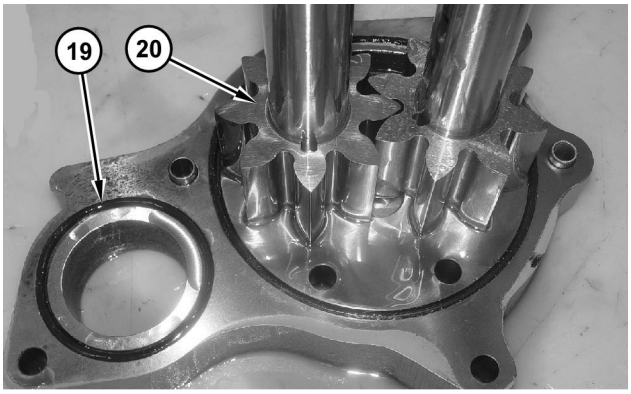

Illustration 265 g01330911

11. Remove O-ring seals (19) and shafts (20).

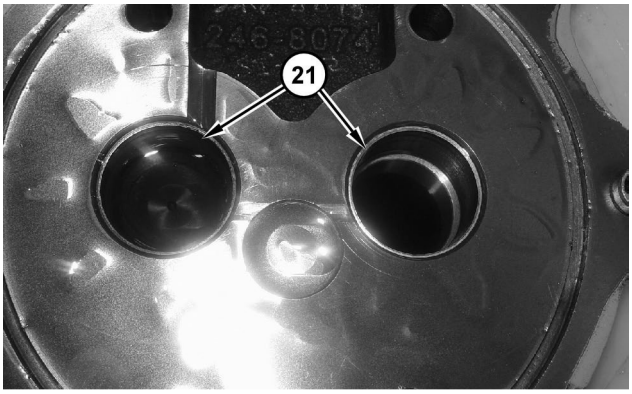

Illustration 266 g01330913

12. Remove bearings (22).

i02650461

Gear Pump (Transmission Charging and Scavenge) - Assemble

SMCS Code: 3066-016; 3115-016

Assembly Procedure

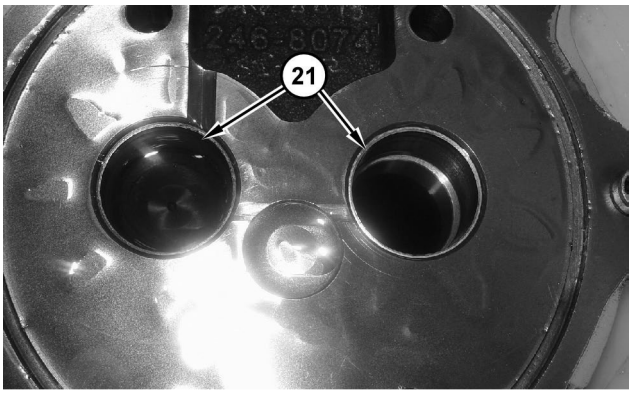

Illustration 267 g01330913

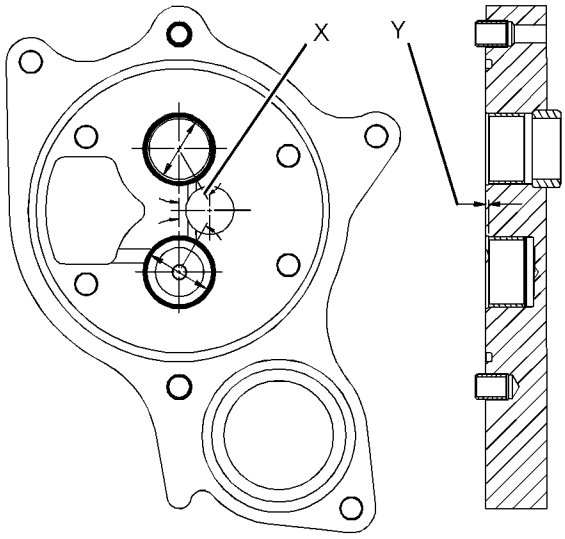

Illustration 268 g01332135

(X) 30 degrees
(Y) 1.50 ± 0.25 mm (0.059 ± 0.010 inch)

1. Install bearings (22).

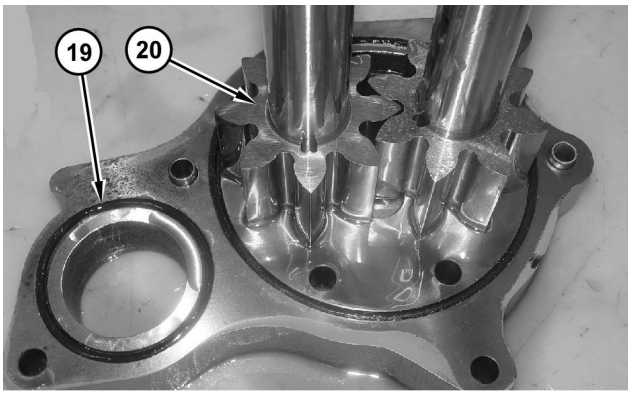

Illustration 269 g01330911

2. Install shafts (20) and O-ring seals (19).

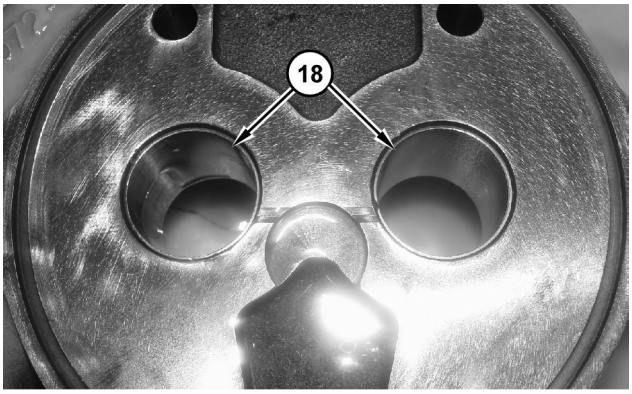

Illustration 270 g01330910

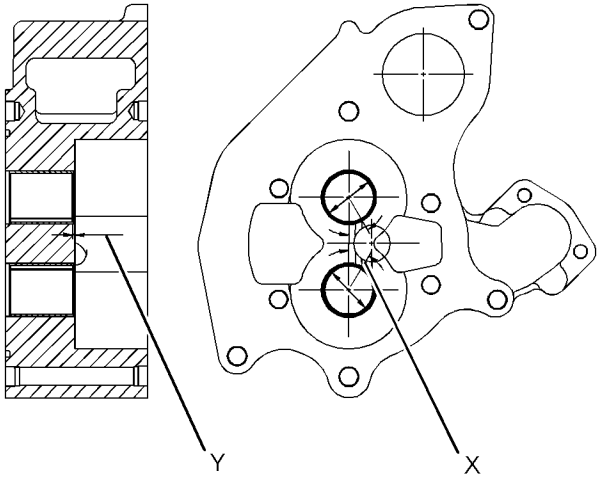

Illustration 271 g01332136

(X) 30 degrees
(Y) 1.50 ± 0.25 mm (0.059 ± 0.010 inch)

3. Install bearings (18).

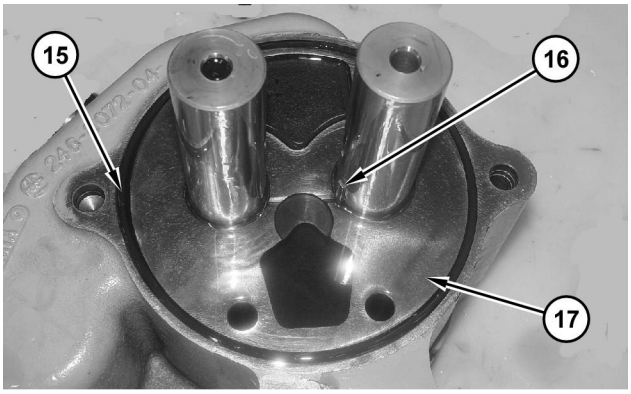

Illustration 272 g01330908

4. Install housing (17), O-ring seal (15), and key (16).

Illustration 273 g01330907

5. Install housing (14), gear (13), and gear (12).

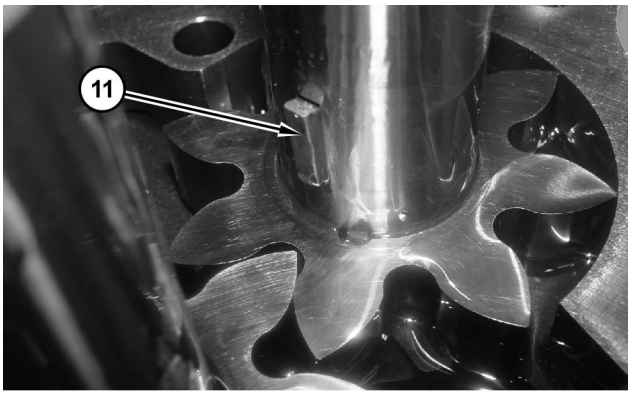

Illustration 274 g01330906

6. Install key (11).

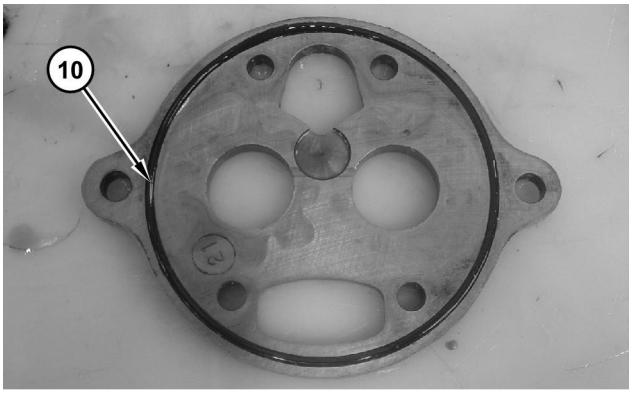

Illustration 275 g01330904

7. Install O-ring seal (10).

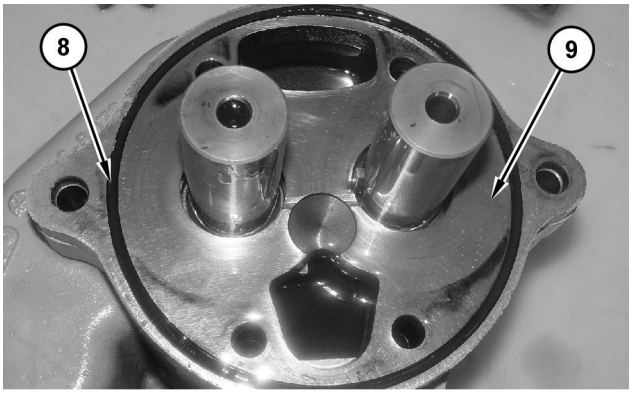

Illustration 276 g01330902

8. Install housing (9) and O-ring seal (8).

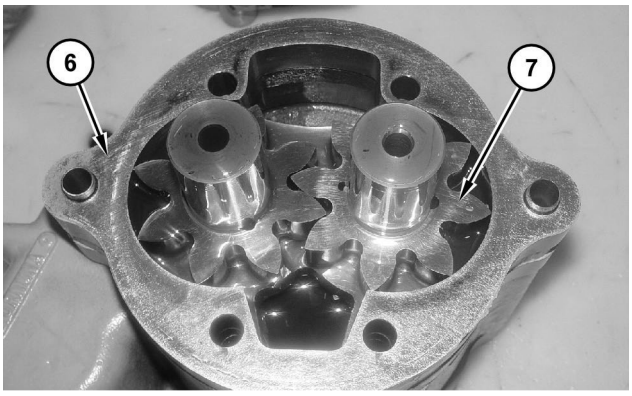

Illustration 277 g01330901

9. Install gears (7) and housing (6).

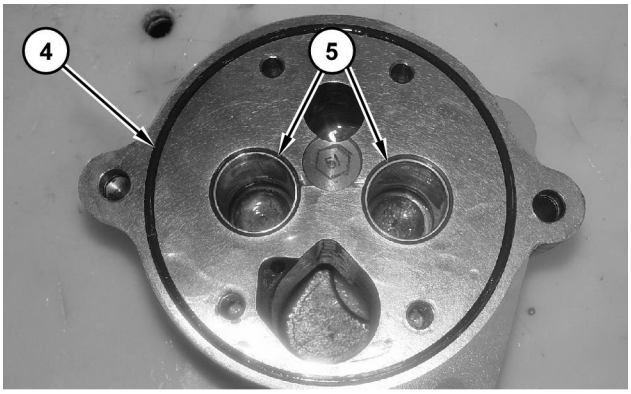

Illustration 278 g01330900

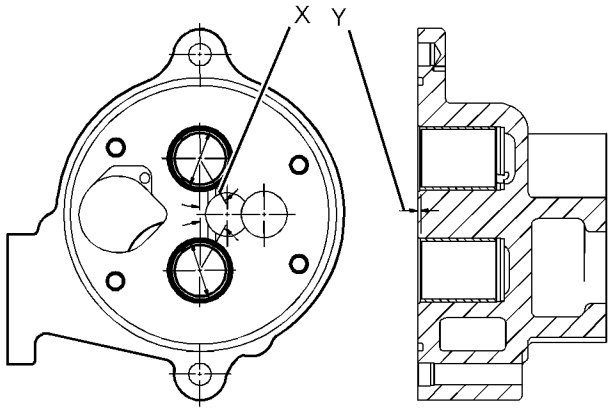

Illustration 279 g01332137

(X) 30 degrees
(Y) 1.50 ± 0.25 mm (0.059 ± 0.010 inch)

10. Install bearings (5) and O-ring seal (4).

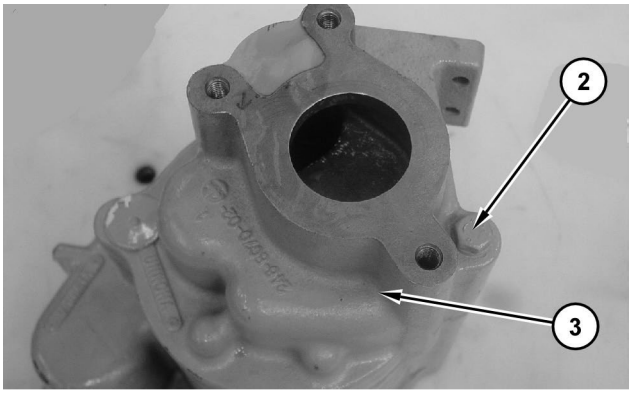

Illustration 280 g01330898

11. Install cover (3) and bolt (2).

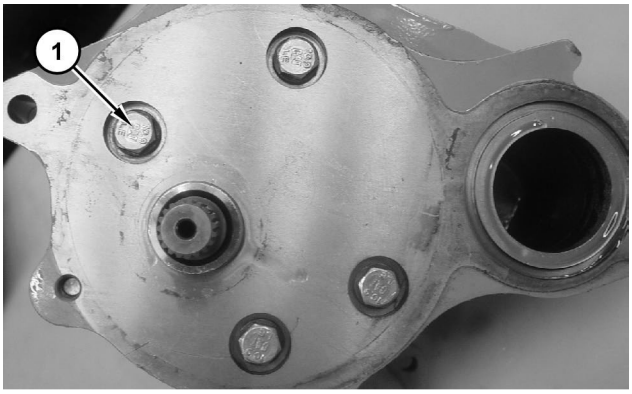

Illustration 281 g01330897

12. Install bolts (1).

End By:

a. Install the gear pump. Refer to Disassembly and Assembly, “Gear Pump (Transmission Charging and Scavenge) - Install”.

i02654076

Gear Pump (Transmission Charging and Scavenge) - Install

SMCS Code: 3066-012; 3115-012

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

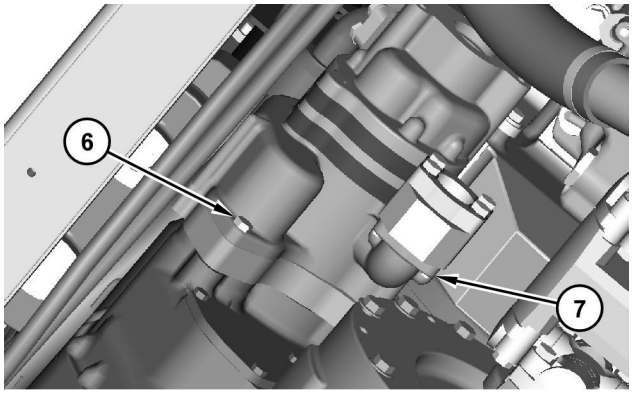

Illustration 282 g01332852

1. Use two people in order to install gear pump (7). The weight of gear pump (7) is approximately 34 kg (75 lb). Install bolts (6).

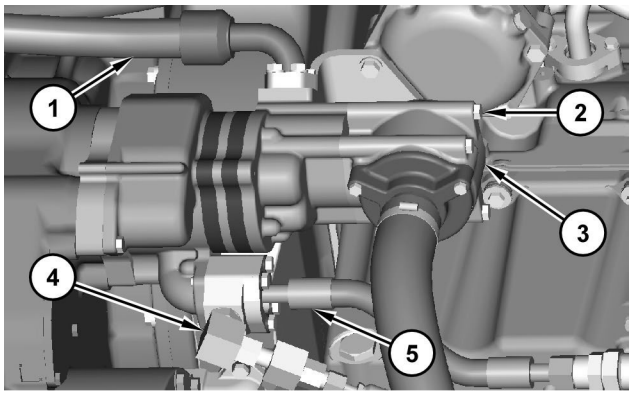

Illustration 283 g01332840

2. Connect hose assembly (5).

3. Connect fitting (4).

4. Position magnetic screen assembly (3) and install bolts (2).

5. Connect hose assembly (1).

6. Fill the transmission with transmission oil. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

i02783129

Transmission Oil Cooler - Remove

SMCS Code: 1375-011; 1375-011-KO

Removal Procedure

Table 15

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7575	Link Bracket	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

Note: Put identification marks on all lines, on all hoses, on all wires, and on all tubes for installation purposes. Plug all lines, hoses, and tubes. This helps to prevent fluid loss and this helps to keep contaminants from entering the system.

Note: Inspect the O-ring seals. Replace O-ring seals that are worn or damaged.

1. Drain the hydraulic oil into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Hydraulic System Oil - Change”.

2. Drain the engine coolant into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Cooling System Coolant (ELC) - Change”.

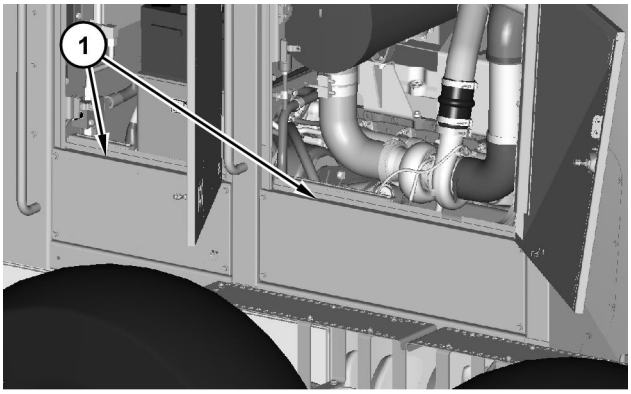

Illustration 284 g01390102

3. Remove panels (1).

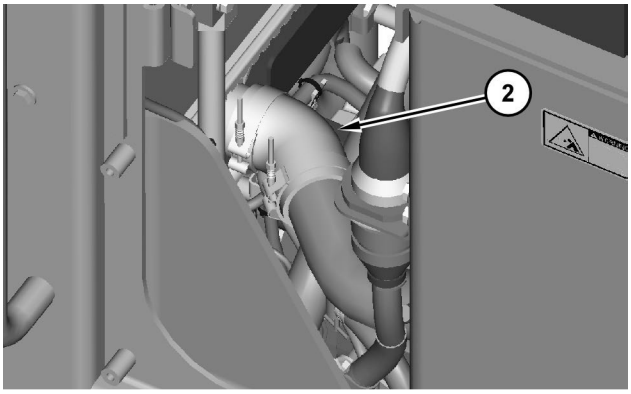

Illustration 285 g01390103

4. Disconnect hose (2).

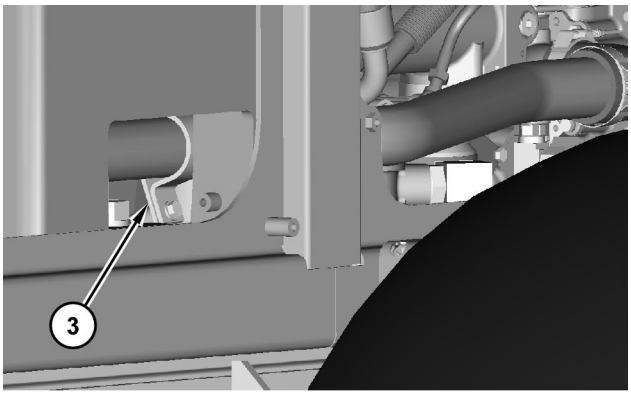

Illustration 286 g01390106

5. Remove clamps (3).

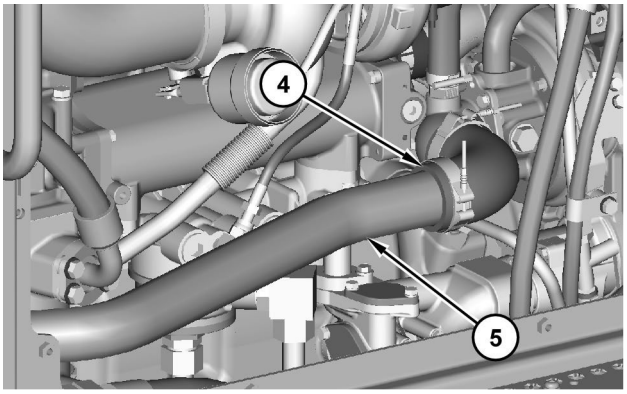

Illustration 287 g01390107

6. Disconnect elbow (4). Remove tube (5).

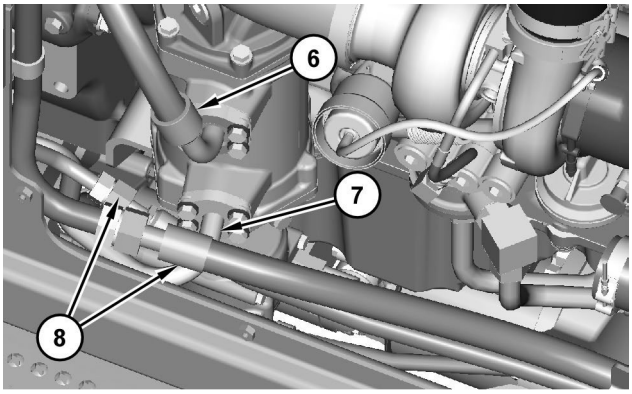

Illustration 288 g01390112

7. Disconnect hose assembly (6). Disconnect tube assembly (7). Disconnect hose assemblies (8).

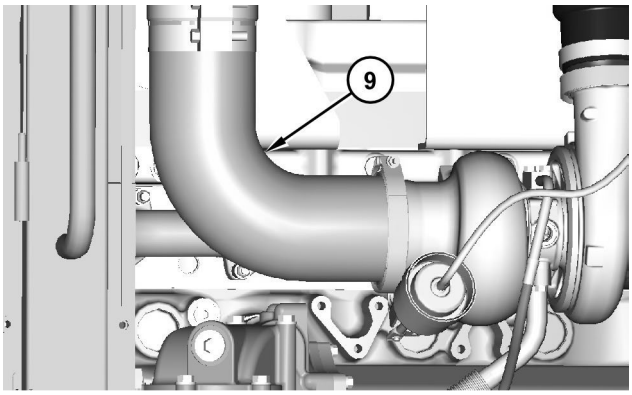

Illustration 289 g01390120

8. Remove elbow (9).

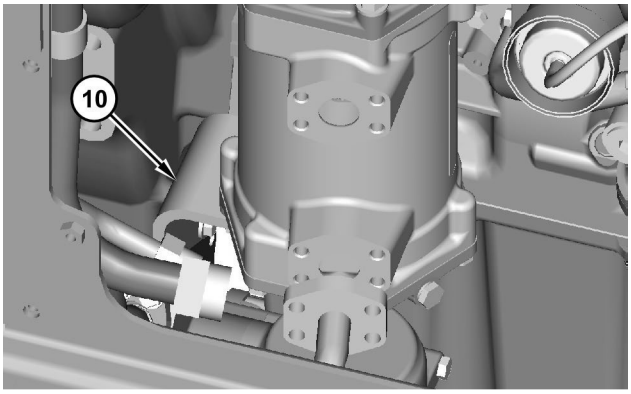

Illustration 290 g01390185

9. Remove bracket (10).

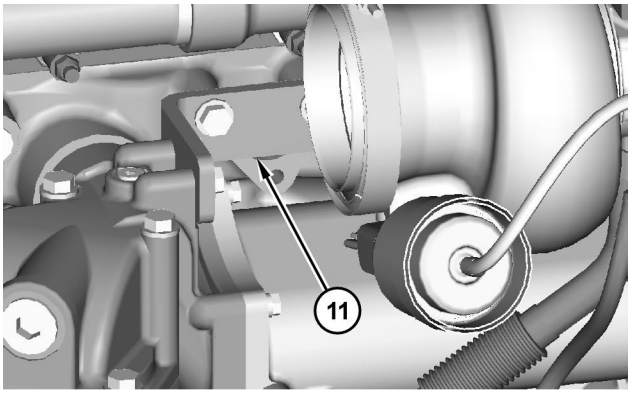

Illustration 291 g01390188

10. Remove bracket (11).

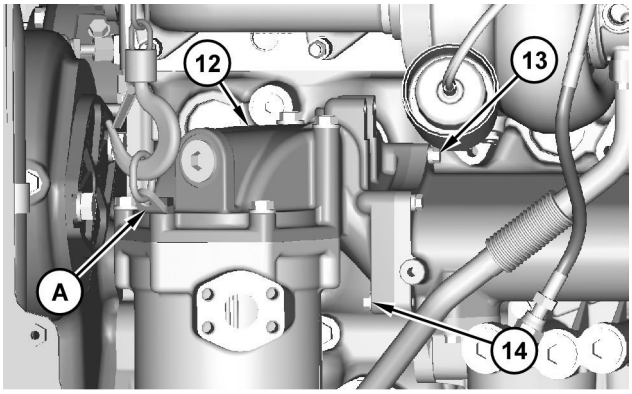

Illustration 292 g01390197

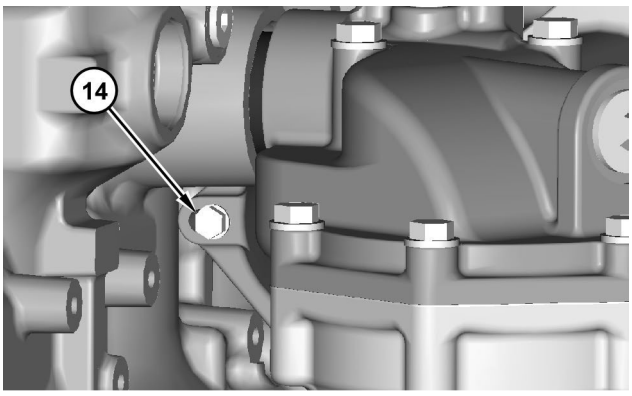

Illustration 293 g01390200

11. Attach Tooling (A) and a suitable lifting device onto transmission oil cooler (12). The weight of transmission oil cooler (12) is approximately 30 kg (66 lb). Remove bolts (13) and bolts (14). Remove transmission oil cooler (12).

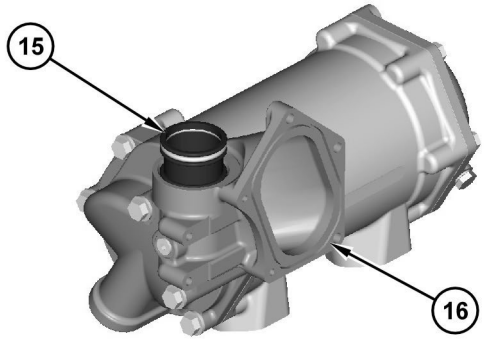

Illustration 294 g01390202

12. Remove coupling (15). Remove O-ring seal (16).

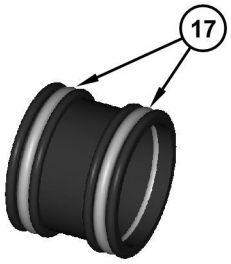

Illustration 295 g01390204

13. Remove O-ring seals (17).

i02783131

Transmission Oil Cooler - Install

SMCS Code: 1375-012; 1375-012-KO

Installation Procedure

Table 16

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7575	Link Bracket	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

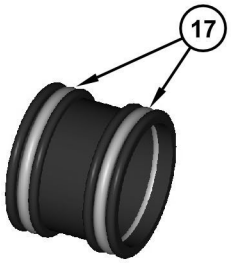

Illustration 296 g01390204

1. Install O-ring seals (17).

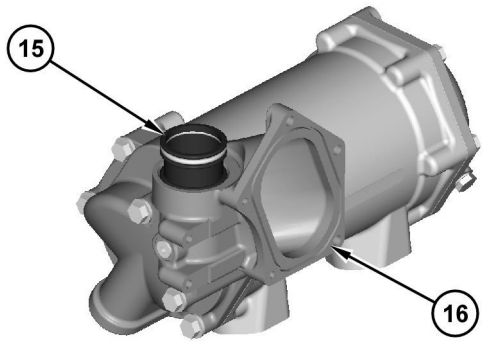

Illustration 297 g01390202

2. Install O-ring seal (16). Install coupling (15).

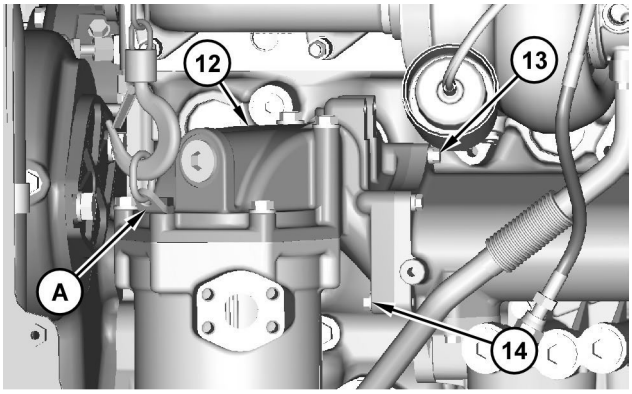

Illustration 298 g01390197

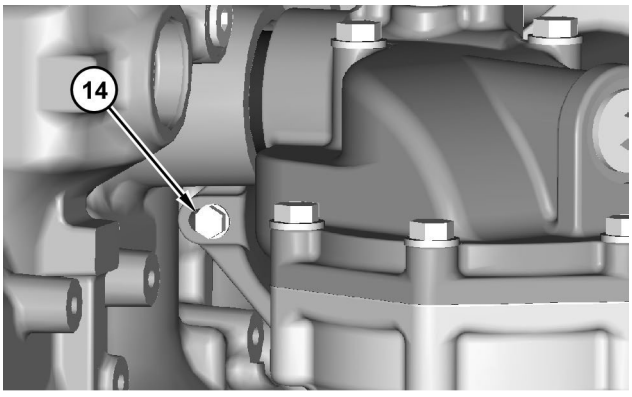

Illustration 299 g01390200

3. Use Tooling (A) and a suitable lifting device in order to install transmission oil cooler (12). The weight of transmission oil cooler (12) is approximately 30 kg (66 lb). Install bolts (14) and bolts (13).

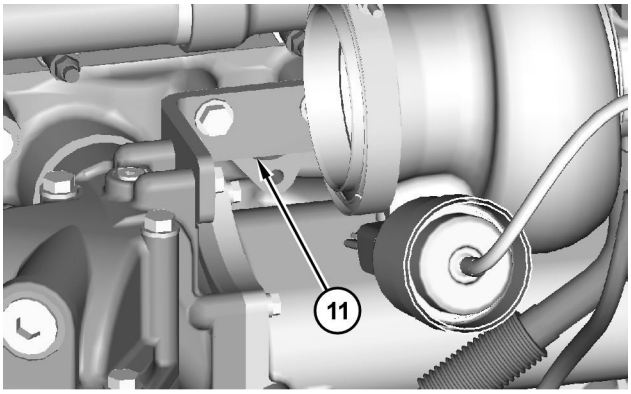

Illustration 300 g01390188

4. Install bracket (11).

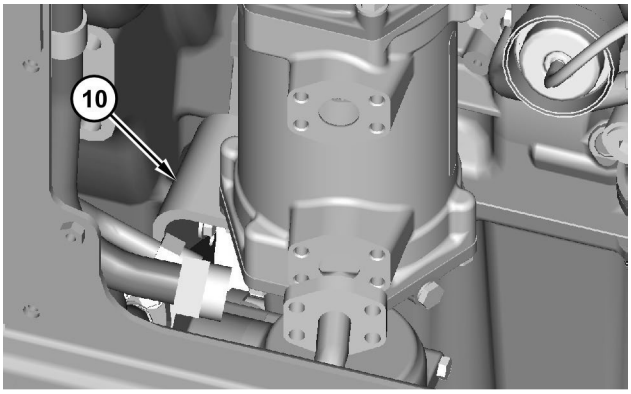

Illustration 301 g01390185

5. Install bracket (10).

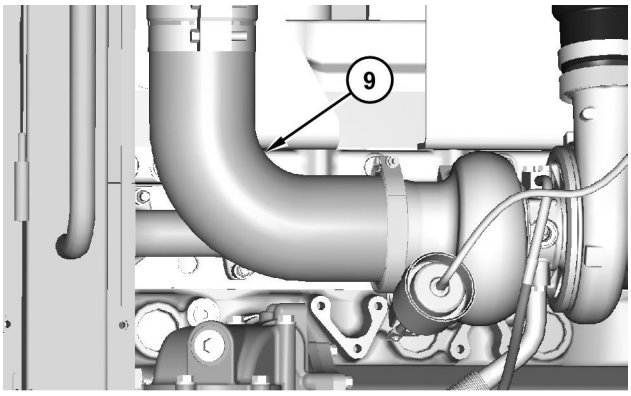

Illustration 302 g01390120

6. Install elbow (9).

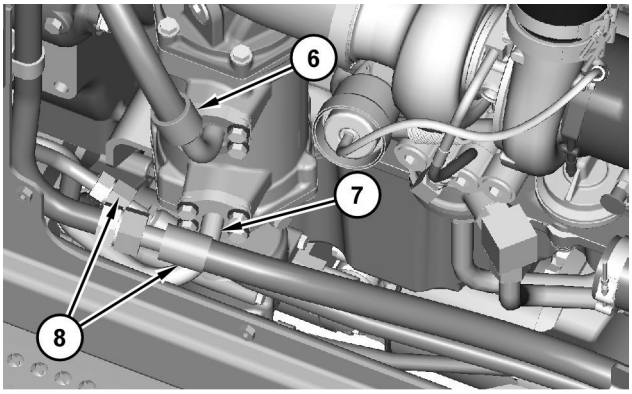

Illustration 303 g01390112

7. Connect hose assemblies (8). Connect tube assembly (7). Connect hose assembly (6).

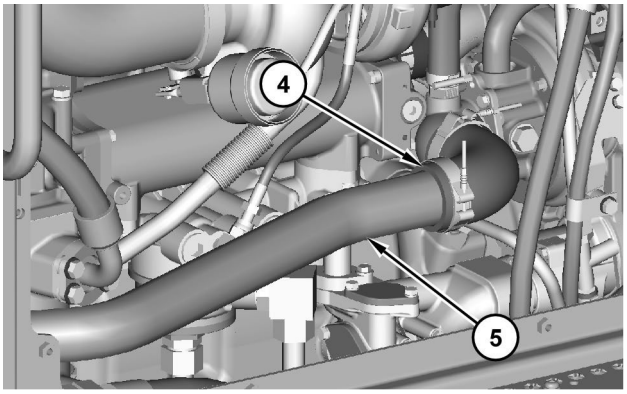

Illustration 304 g01390107

8. Install tube (5). Connect elbow (4).

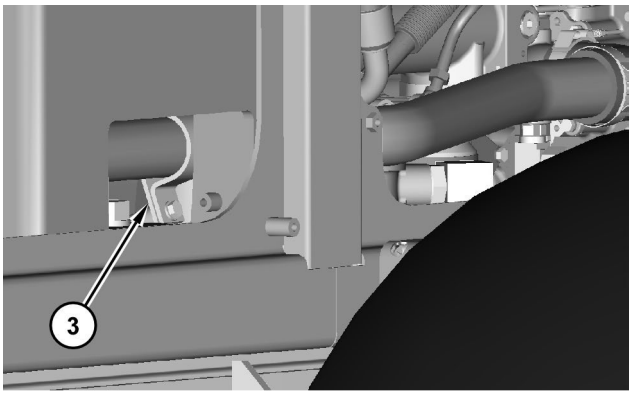

Illustration 305 g01390106

9. Install clamps (3).

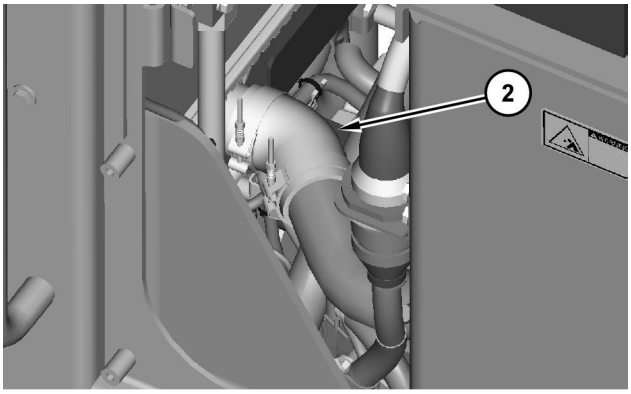

Illustration 306 g01390103

10. Connect hose (2).

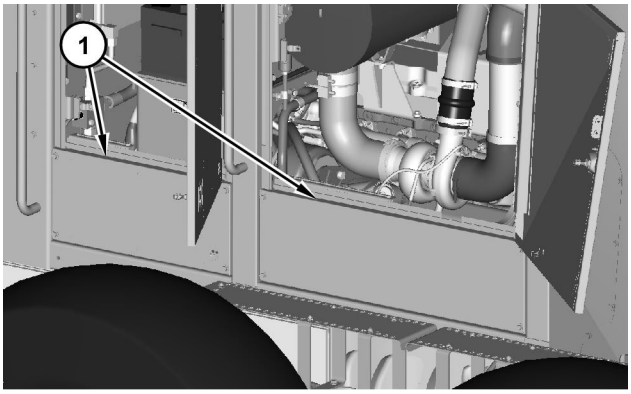

Illustration 307 g01390102

11. Install panels (1).

12. Fill the engine coolant. Refer to Operation and Maintenance Manual, “Cooling System Coolant (ELC) - Change”.

13. Fill the hydraulic oil. Refer to Operation and Maintenance Manual, “Hydraulic System Oil - Change”.

i02676743

Modulating Valve (Transmission Clutch) - Remove

SMCS Code: 3139-011-T3

Removal Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

Note: Put identification marks on all lines, on all hoses, on all wires, and on all tubes for installation purposes. Plug all lines, hoses, and tubes. This helps to prevent fluid loss and this helps to keep contaminants from entering the system.

1. Drain the transmission oil into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

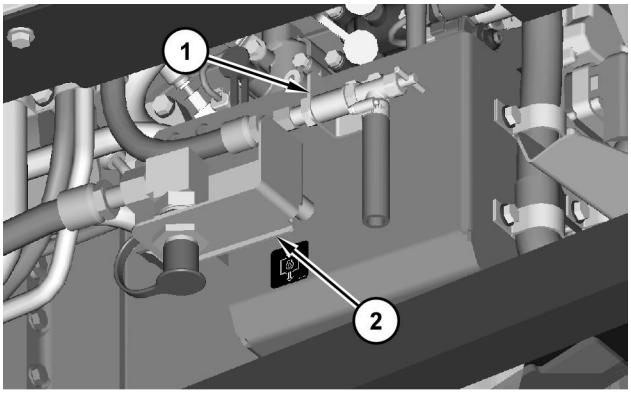

Illustration 308 g01345047

2. Disconnect bracket (1) and bracket (2).

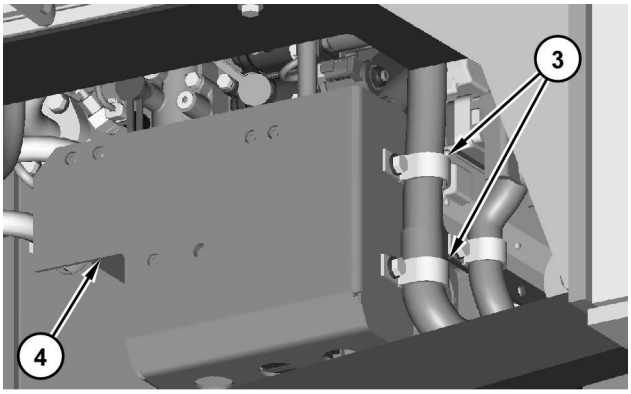

Illustration 309 g01345053

3. Remove clips (3). Remove guard (4).

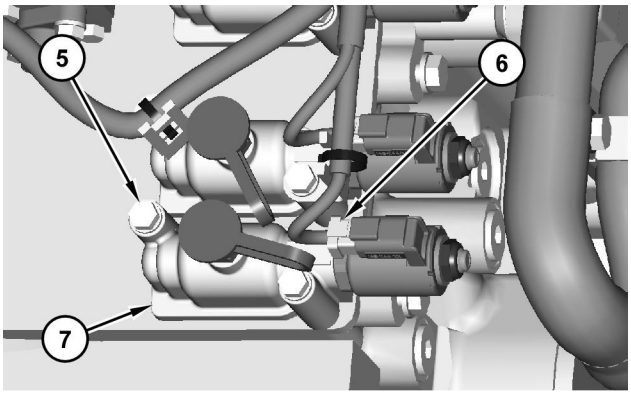

Illustration 310 g01345062

4. Remove bolts (5). Disconnect harness assembly (6). Remove modulating valve (7).

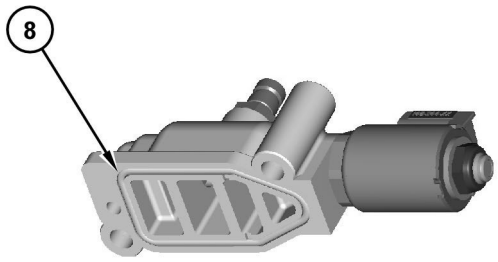

Illustration 311 g01345068

5. Remove O-ring seal (8).

6. Repeat Step 4 through Step 5 for the remaining modulating valves.

i02676751

Modulating Valve (Transmission Clutch) - Disassemble

SMCS Code: 3139-015-T3

Disassembly Procedure

Start By:

a. Remove the modulating valve. Refer to Disassembly and Assembly, "Modulating Valve - Remove".

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace O-ring seals that are worn or damaged.

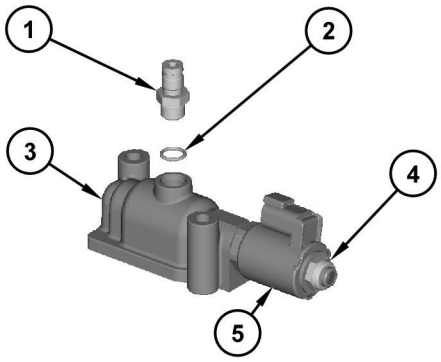

Illustration 312 g01345108

1. Remove test port (1) and O-ring seal (2) from modulating valve (3). Remove nut (4). Remove coil assembly (5).

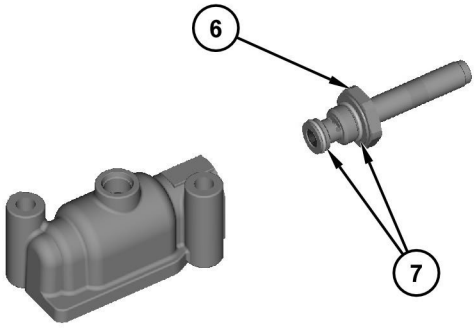

Illustration 313 g01345128

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

2. Remove cartridge assembly (6). Remove O-ring seals (7).

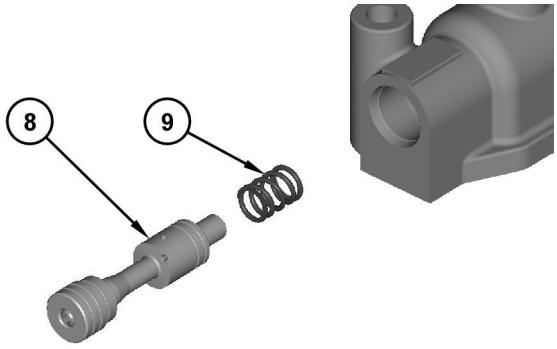

Illustration 314 g01345146

3. Remove spool (8). Remove spring (9).

i05489992

Modulating Valve (Transmission Clutch) - Assemble

SMCS Code: 3139-016-T3

Assembly Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

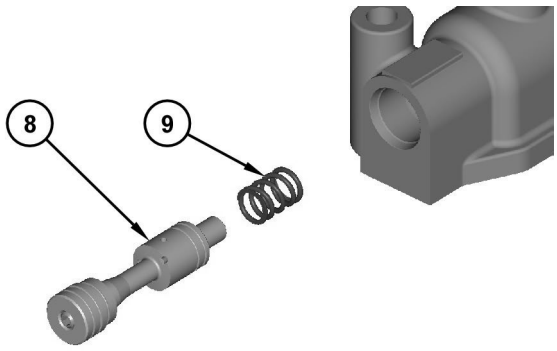

Illustration 315 g01345146

1. Install spring (9). Install spool (8).

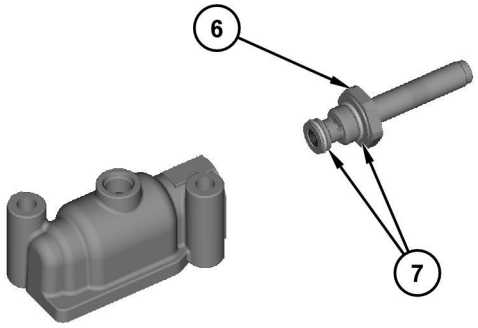

Illustration 316 g01345128

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

2. Install O-ring seals (7). Install cartridge assembly (6). Tighten cartridge assembly (6) to a torque of 50 ± 5 N·m (37 ± 4 lb ft).

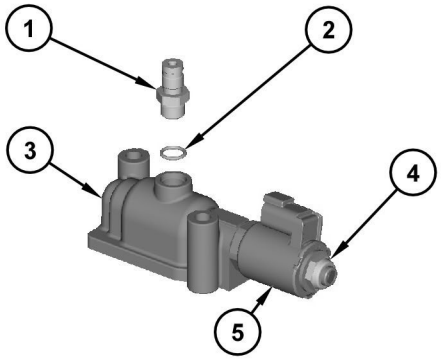

Illustration 317 g01345108

3. Install coil assembly (5). Install nut (4). Tighten nut (4) to a torque of 13 ± 1.5 N·m (10 ± 1 lb ft). Install O-ring seal (2) and test port (1) into modulating valve (3). Tighten test port (1) to a torque of 14 ± 4 N·m (124 ± 35 lb in).

End By:

a. Install the modulating valve.

i02676744

Modulating Valve (Transmission Clutch) - Install

SMCS Code: 3139-012-T3

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

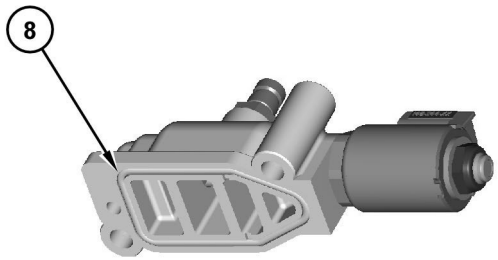

Illustration 318 g01345068

1. Install O-ring seal (8).

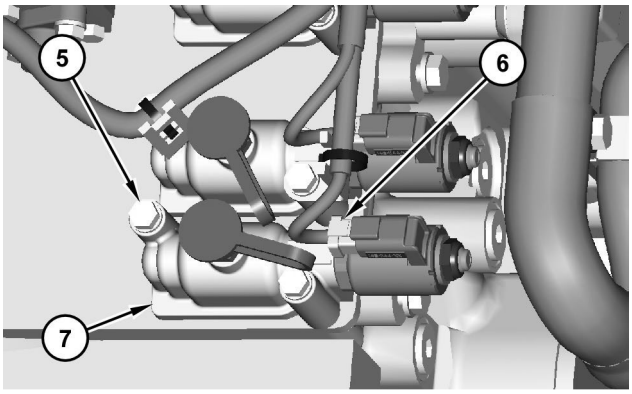

Illustration 319 g01345062

2. Install modulating valve (7). Connect harness assembly (6). Install bolts (5). Tighten bolts (5) to a torque of 30 ± 4 N·m (22 ± 3 lb ft).

3. Repeat Step 1 through Step 2 for the remaining modulating valves.

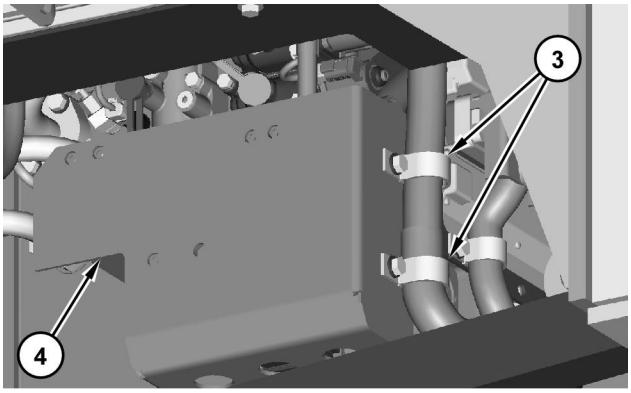

Illustration 320 g01345053

4. Install guard (4). Install clips (3).

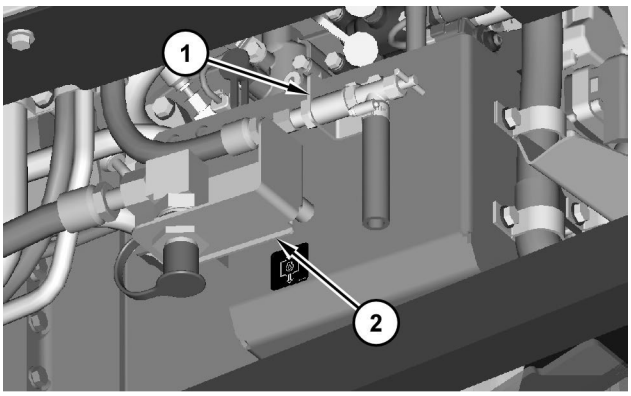

Illustration 321 g01345047

5. Connect bracket (2) and bracket (1).

6. Fill the transmission oil. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

i02741457

Transmission - Remove

SMCS Code: 3002-011; 3030-011; 3159-011

Removal Procedure

Table 17

Required Tools			
Tool	Part Number	Part Description	Qty
A	311-5882	Support	2
B	138-7574	Link Bracket	2

Start By:

a. Remove the bottom guard. Refer to Disassembly and Assembly, "Bottom Guard - Remove and Install".

b. Remove the radiator guard and support, the aftercooler, and the radiator. Refer to Disassembly and Assembly, "Radiator Guard and Support, Aftercooler, and Radiator - Remove".

c. Remove the drive shaft. Refer to Disassembly and Assembly, "Drive Shaft - Remove and Install".

d. Remove the piston pump (hydraulic and steering). Refer to Disassembly and Assembly, "Piston Pump (Hydraulic and Steering) - Remove".

e. Remove the gear pump (transmission charging and scavenge). Refer to Disassembly and Assembly, "Gear Pump (Transmission and Scavenge) - Remove".

f. Remove the piston pump (hydraulic fan). Refer to Disassembly and Assembly, "Piston Pump (Hydraulic Fan) - Remove".

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

⚠ WARNING

Personal injury or death can result from improper lifting or blocking.

When a hoist or jack is used to lift any part or component, stand clear of the area. Be sure the hoist or jack has the correct capacity to lift a component. Install blocks or stands before performance of any work under a heavy component.

Approximate weights of the components are shown. Clean all surfaces where parts are to be installed.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

1. Put identification marks on all hoses, all lines, all tubes, and all wires for installation purposes. Plug all hoses, all lines, and all tubes. This helps to prevent fluid loss and will help keep contaminants from entering the system.

Note: CAUTION! Failing to mark and reinstall in the correct location can cause catastrophic damage.

2. Drain the transmission into a suitable container for storage or disposal.

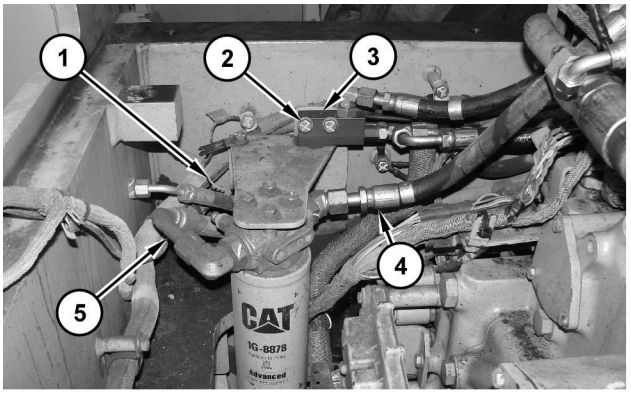

Illustration 322 g01374043

3. Disconnect harness assembly (1). Remove bolts (2). Position manifold (3) out of the way.
Disconnect hose assembly (4) and hose assembly (5).

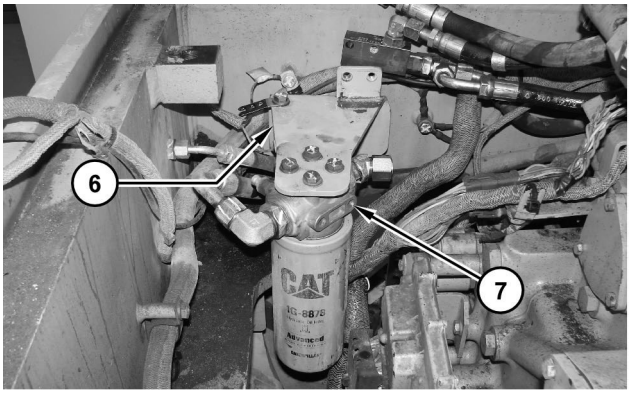

Illustration 323 g01374144

4. Remove bolts (6) and position hydraulic oil filter (7) out of the way.

Illustration 324 g01374194

5. Remove transmission oil filter (8).

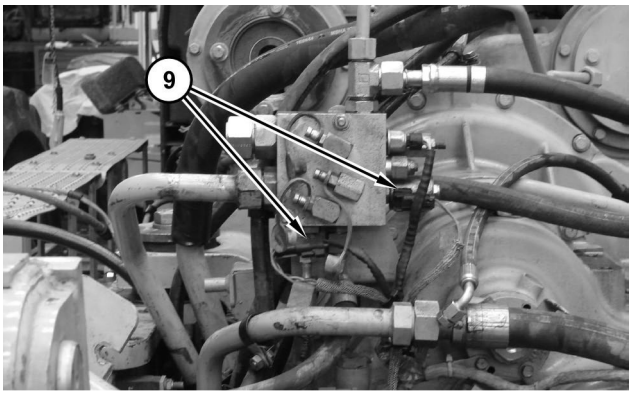

Illustration 325 g01374204

6. Disconnect harness assemblies (9) and remove the connecting hardware.

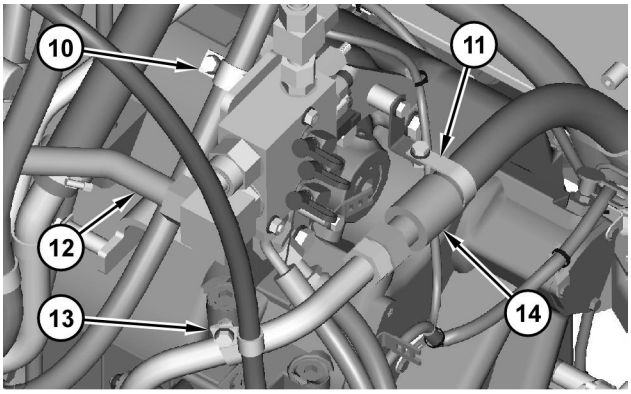

Illustration 326 g01374300

7. Remove clip (10). Remove clip (11). Disconnect tube assembly (12). Remove clips (13). Disconnect hose assembly (14).

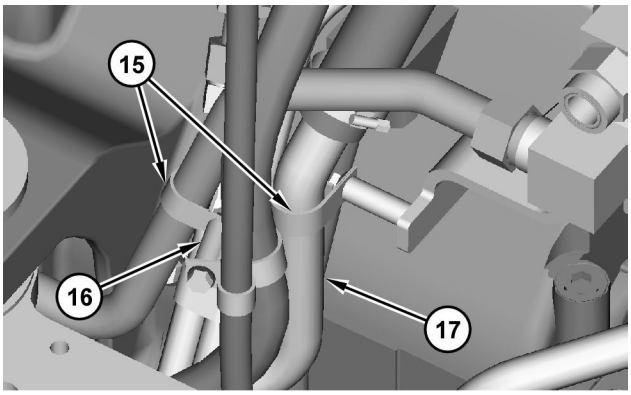

Illustration 327 g01374336

8. Remove clips (15) and spacer (16). Remove tube assembly (17).

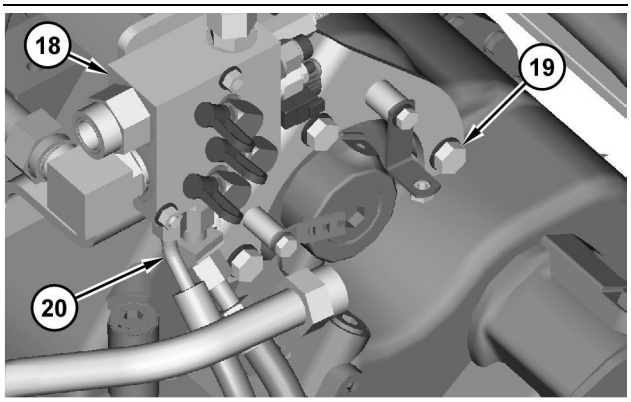

Illustration 328 g01374423

9. Disconnect hose assembly (20). Remove bolts (19) and position control valve (18) out of the way.

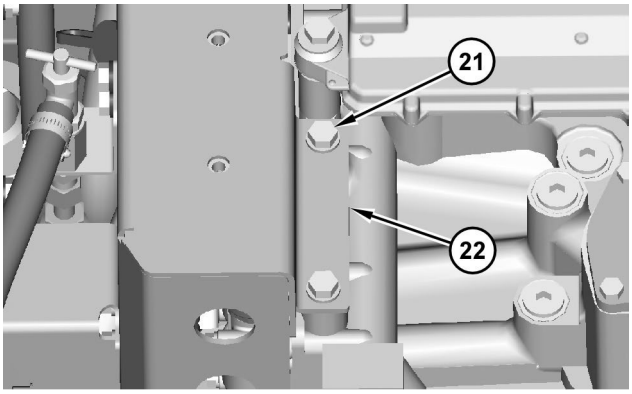

Illustration 329 g01374435

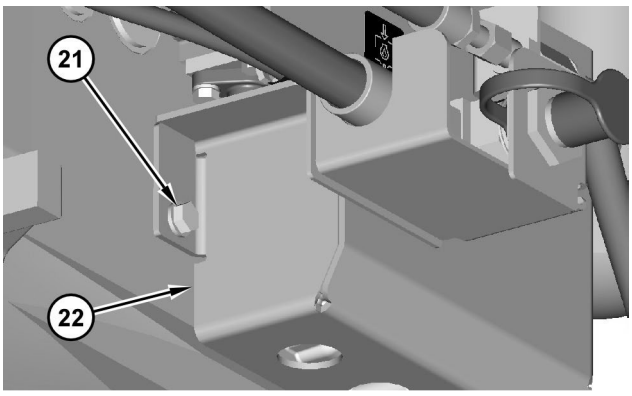

Illustration 330 g01374655

10. Remove bolts (21). Position cover (22) out of the way.

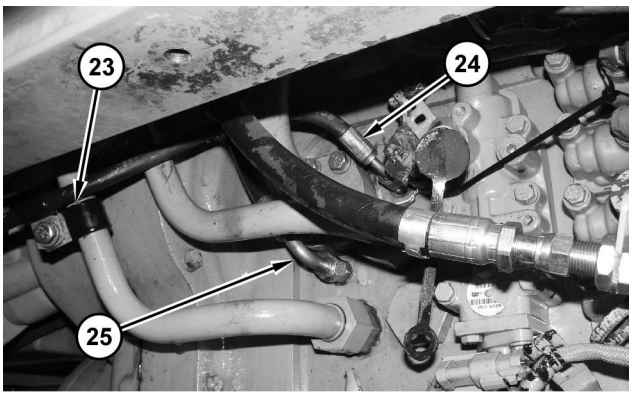

Illustration 331 g01374668

11. Remove clips (23). Disconnect hose assembly (24) and hose assembly (25).

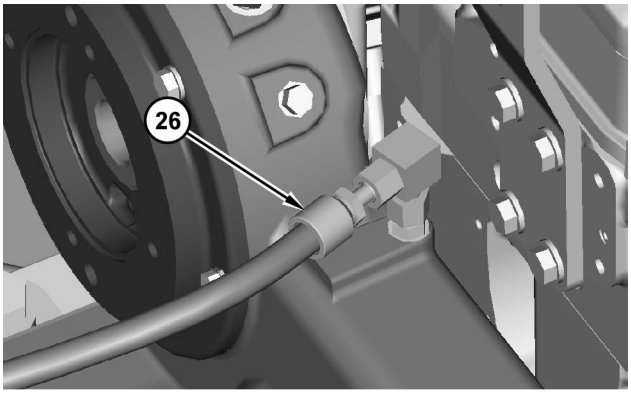

Illustration 332 g01374660

12. Disconnect hose assembly (26).

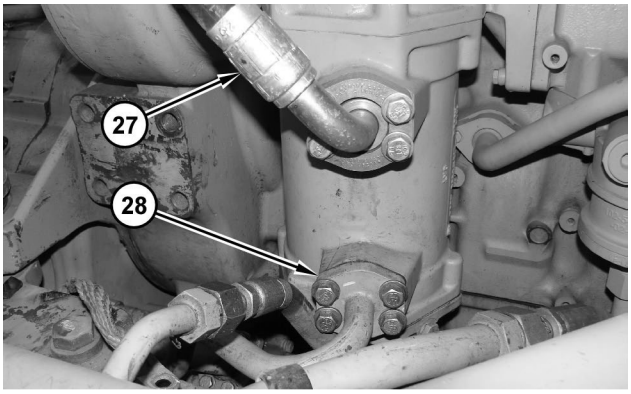

Illustration 333 g01374683

13. Disconnect hose assembly (27). Remove tube assembly (28).

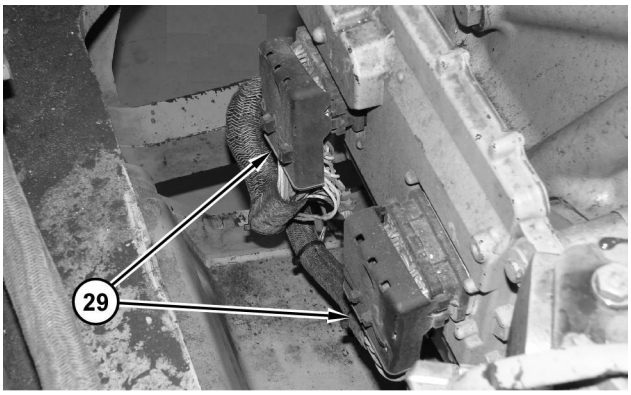

Illustration 334 g01374695

14. Disconnect harness assemblies (29).

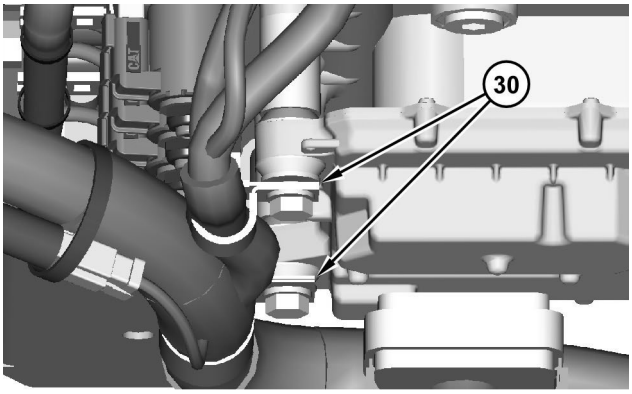

Illustration 335 g01374772

15. Remove clips (30).

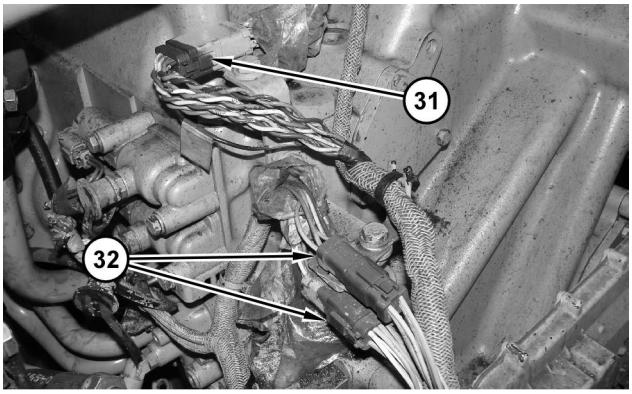

Illustration 336 g01374792

16. Disconnect harness assembly (31) and remove the connecting hardware. Disconnect harness assemblies (32) and remove the connecting hardware.

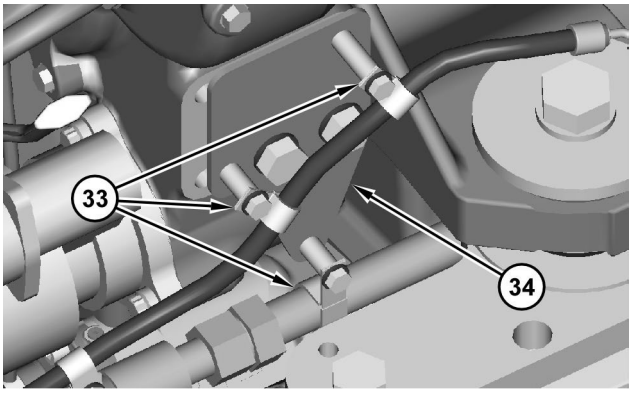

Illustration 337 g01374948

17. Remove clips (33). Remove bracket (34).

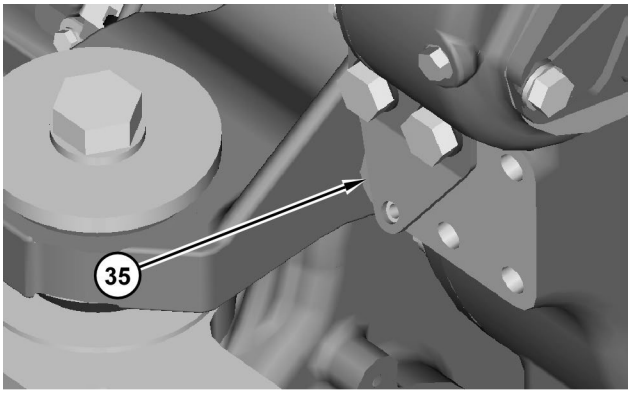

Illustration 338 g01374975

18. Remove bracket (35).

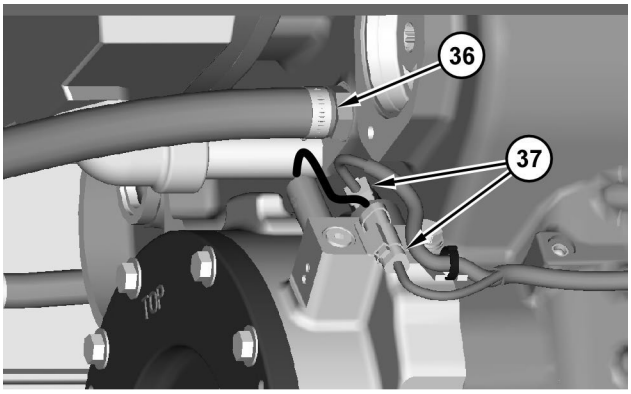

Illustration 339 g01375127

19. Disconnect hose (36). Disconnect harness assembly (37) and remove the connecting hardware.

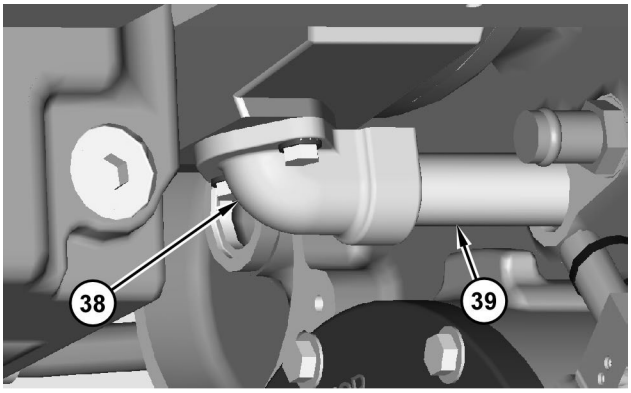

Illustration 340 g01375213

20. Remove elbow (38). Remove tube (39).

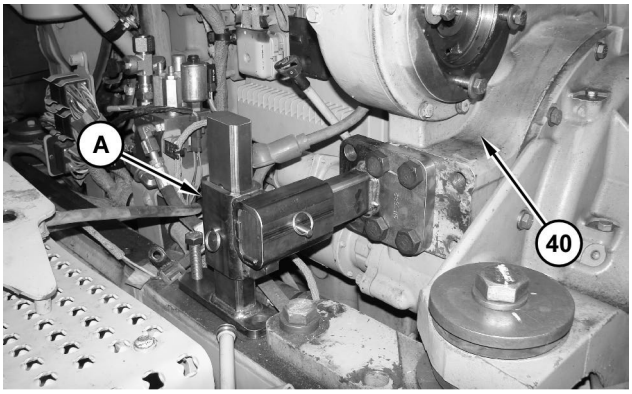

Illustration 341 g01375219

21. Install Tooling (A) in order to support engine (40). The weight of engine (40) is approximately 1497 kg (3300 lb).

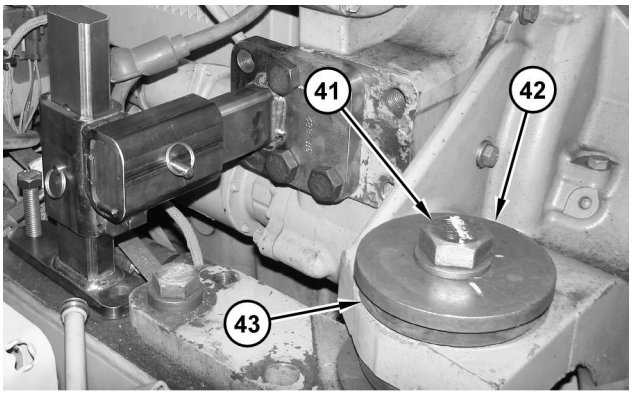

Illustration 342 g01380932

22. Remove bolt (41), washer (42), and mount assembly (43). Repeat this step for the opposite side.

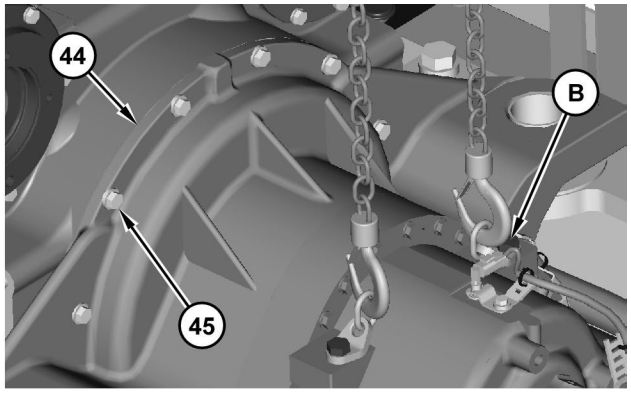

Illustration 343 g01380959

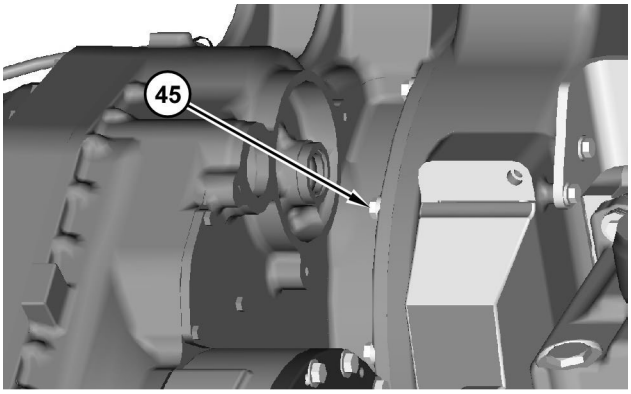

Illustration 344 g01380961

23. Attach Tooling (B) and a suitable lifting device onto transmission (44). The weight of transmission (44) is approximately 1043 kg (2300 lb). Remove bolts (45).

24. Remove transmission (44).

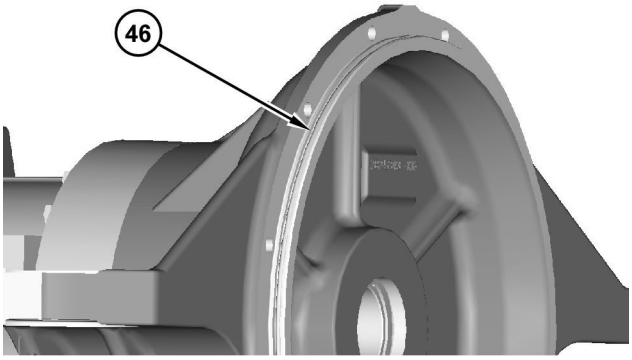

Illustration 345 g01380965

25. Remove O-ring seal (46).

i07050685

Transmission - Disassemble

SMCS Code: 3030-015; 3159-015; 3176-015

Disassembly Procedure

Table 18

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	138-7575	Link Bracket	4
B	1U-9202	Lever Puller Hoist	1
C	1P-2420	Transmission Repair Stand	1
D	4C-8156	Lifting Fixture	1
E	FT-2769	Table	1
F	1U-6410	Three Jaw Puller	1
G	9U-7480	Compressing Tube	1
	5P-7970	Nut	1
	8T-4224	Hard Washer	1
	-	Bolt M8 - 1.25 by 460 mm	1
H	1U-6415	Three Jaw Puller	1
J	9U-7480	Compressing Tube	1
	8T-4133	Nut	1
	8T-4121	Washer	1
	-	Bolt M10 - 1.5 by 460mm	1
K	189-0408	Shackle As	1

(continued)

(Table 18, contd)

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
L	3E-3882	Eyebolt	1
M	9U-7480	Compressing Tube	1
	6V-8149	Nut	1
	5P-8245	Hard Washer	1
	-	Bolt M12- 1.75 by 460 mm	1

Start By:

a. Remove the transmission. Refer to Disassembly and Assembly, “Transmission - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

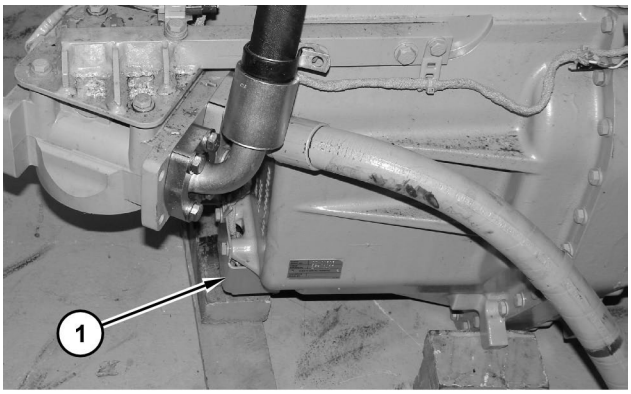

Illustration 346 g01390304

1. Position transmission (1) onto suitable cribbing. The weight of transmission (1) is approximately 1043 kg (2300 lb).

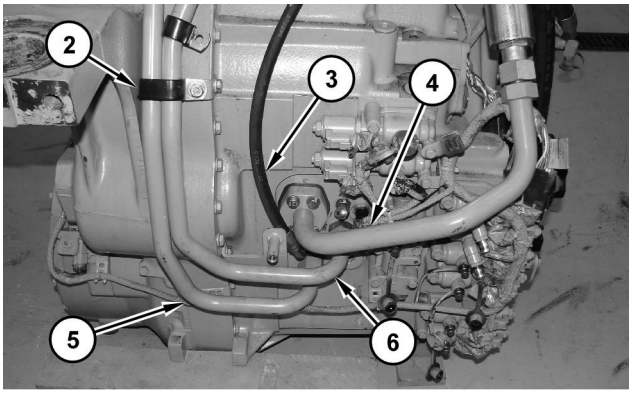

Illustration 347 g01390307

2. Remove clip (2). Remove hose assembly (3). Remove tube assembly (4). Remove tube assembly (5). Remove tube assembly (6).

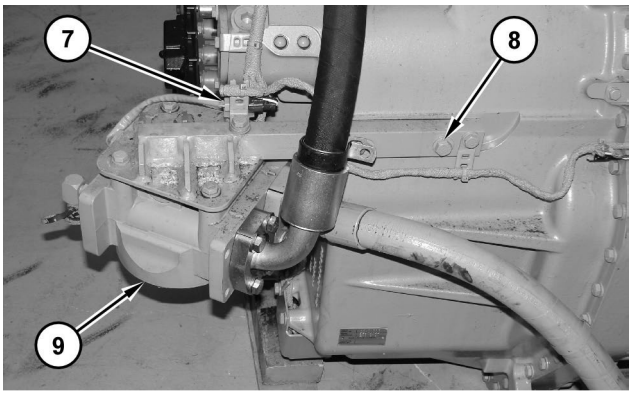

Illustration 348 g01390308

3. Disconnect harness assembly (7). Remove bolts (8) to remove filter base (9).

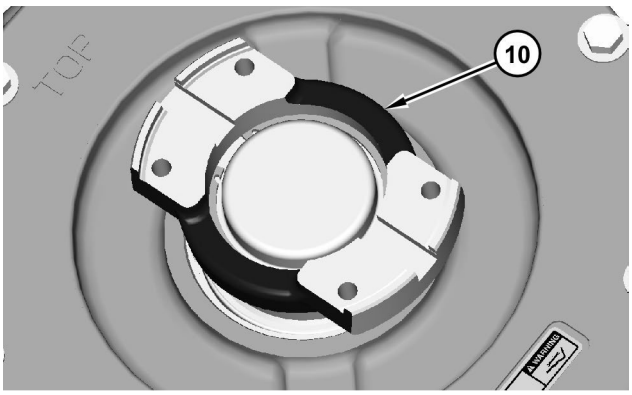

Illustration 349 g01390309

4. Remove yoke assembly (10).

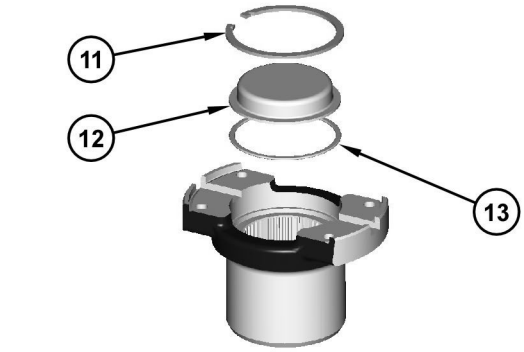

Illustration 350 g01390315

5. Remove retaining ring (11).

6. Remove cup (12). Remove O-ring seal (13).

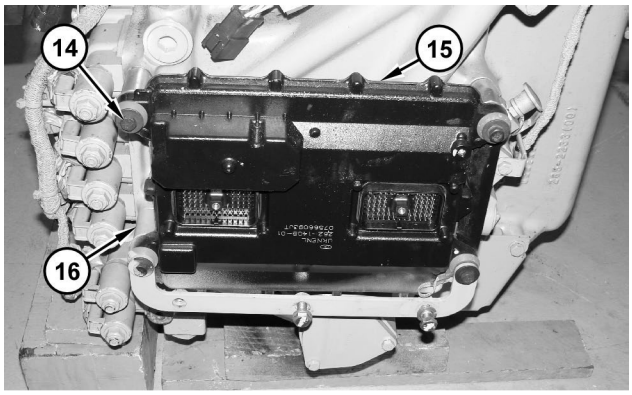

Illustration 351 g01390318

7. Remove bolts (14) to remove control module (15) and spacers (16).

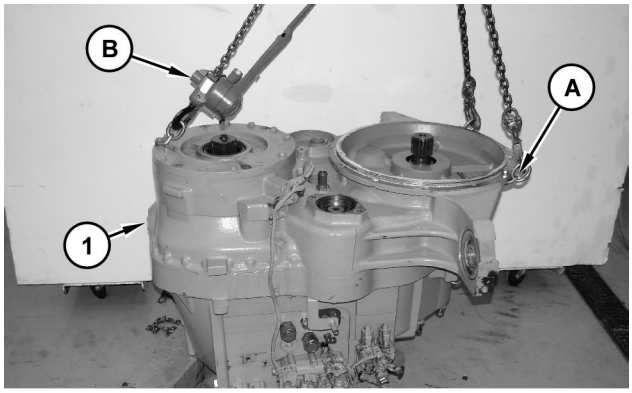

Illustration 352 g01390322

8. Use Tooling (A), Tooling (B), and a suitable lifting device to position transmission (1) with the output shaft upward.

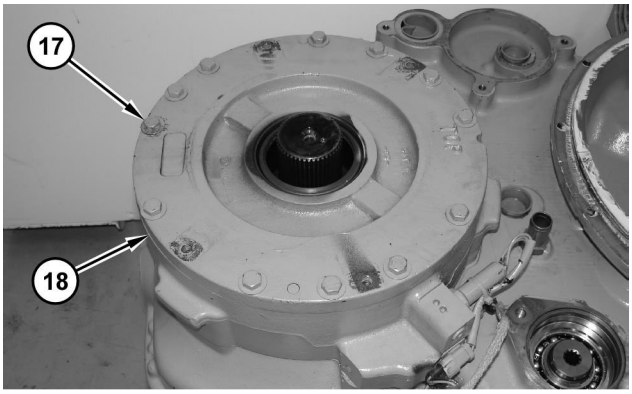

Illustration 353 g01390323

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

9. Remove bolts (17) evenly to remove spring plate (18).

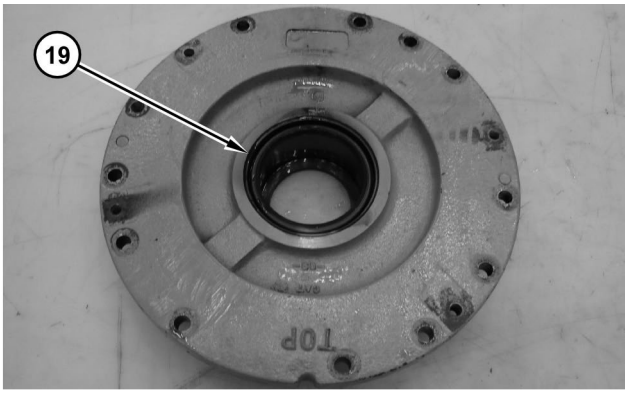

Illustration 354 g01390327

10. Remove lip seal (19).

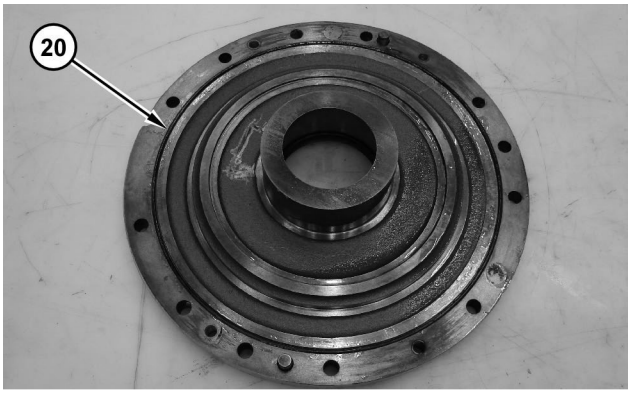

Illustration 355 g01390329

11. Remove O-ring seal (20).

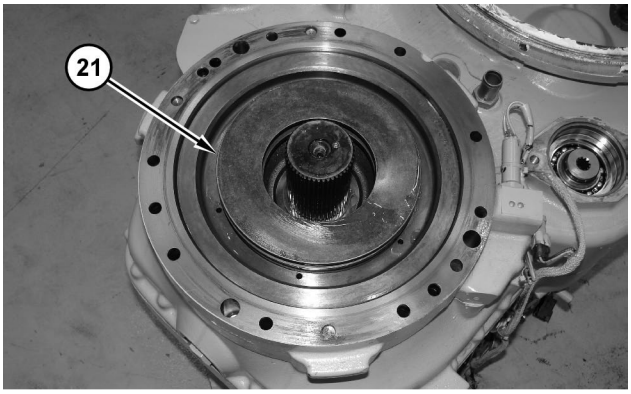

Illustration 356 g01390331

12. Remove spring discs (21).

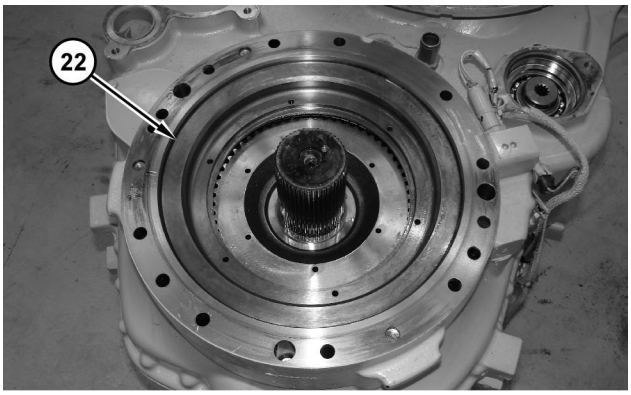

Illustration 357 g01390334

13. Remove piston (22).

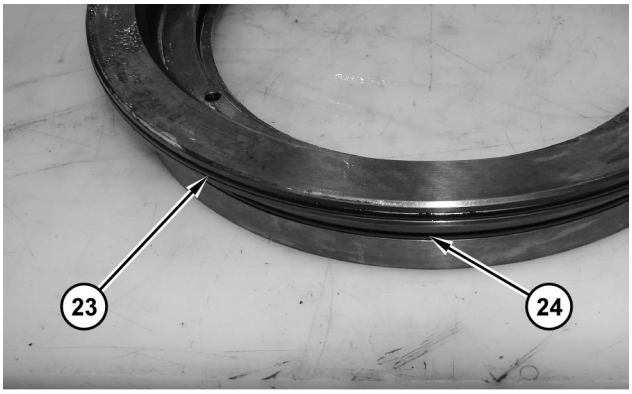

Illustration 358 g01390338

14. Remove piston seal (23). Remove piston seal (24).

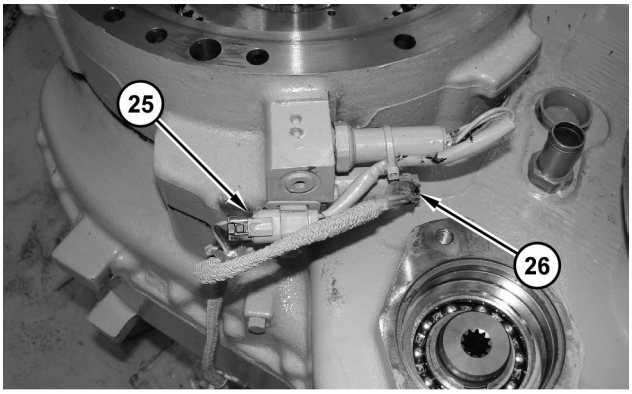

Illustration 359 g01390339

15. Disconnect harness assembly (25) and harness assembly (26).

Illustration 360 g01390342

16. Remove bolts (27). Use two people to remove housing (28). The weight of housing (28) is approximately 27 kg (60 lb).

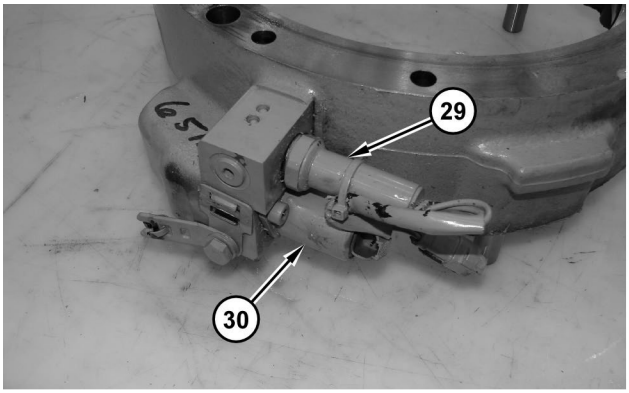

Illustration 361 g01390343

17. Remove pressure sensor (29) and the O-ring seal. Remove solenoid (30).

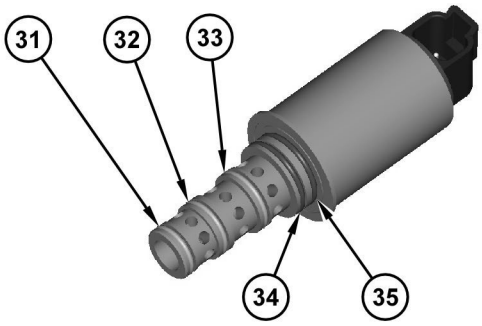

Illustration 362 g01390345

18. Remove O-ring seal (31), O-ring seal (32), O-ring seal (33), O-ring seal (34), and O-ring seal (35).

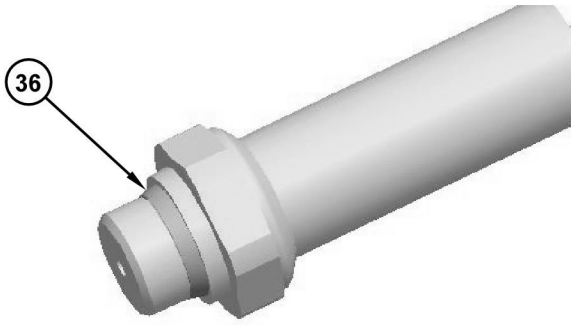

Illustration 363 g01390349

19. Remove seal (36).

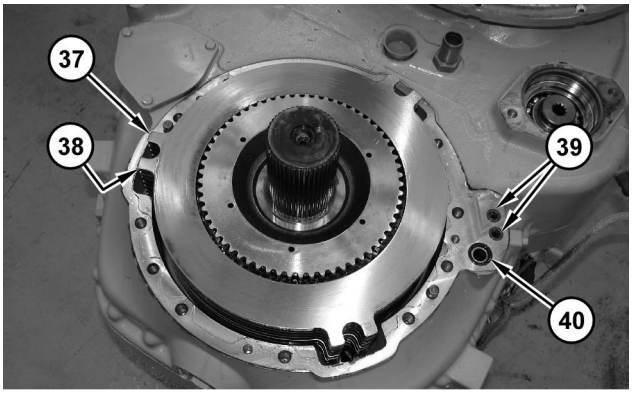

Illustration 364 g01390351

20. Remove discs (37) and plates (38).

Note: Note the quantity and the order of discs (37) and plates (38) for installation purposes.

21. Remove O-ring seals (39) and O-ring seal (40).

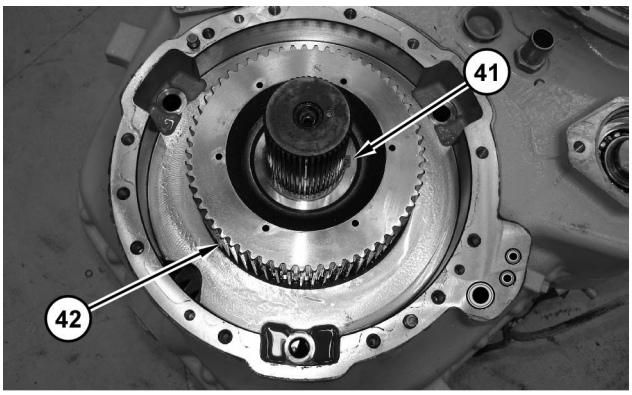

Illustration 365 g01390352

22. Remove retaining ring (41). Remove hub (42).

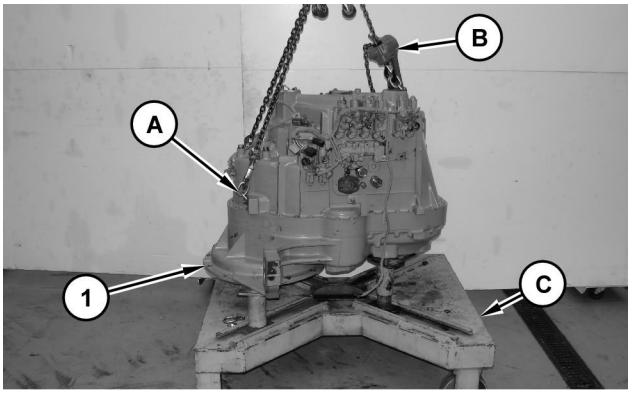

Illustration 366 g01390353

23. Use Tooling (A), Tooling (B), and a suitable lifting device to position transmission (1) onto Tooling (C) with the output shaft downward. The weight of transmission (1) is approximately 1043 kg (2300 lb).

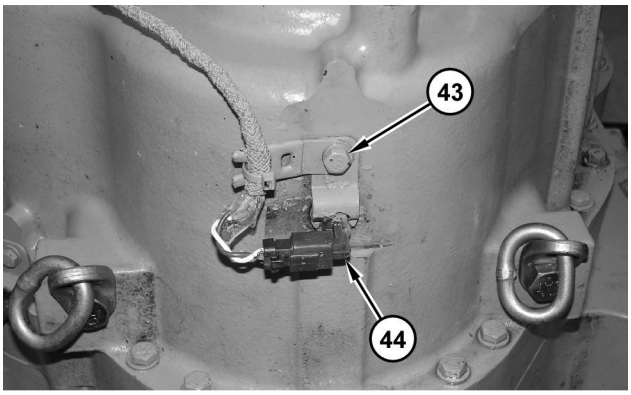

Illustration 367 g01390355

24. Remove bolt (43) to remove speed sensor (44).

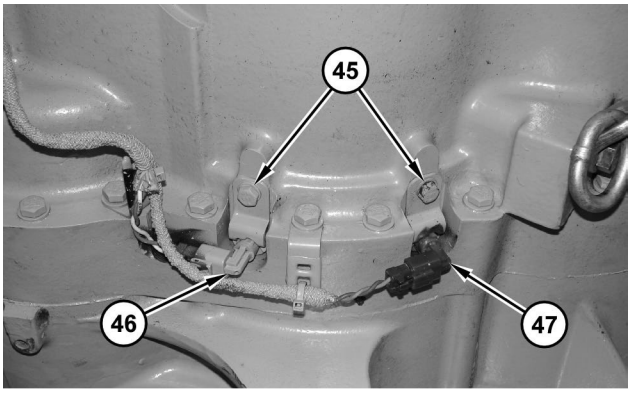

Illustration 368 g01390356

25. Remove bolts (45) to remove speed sensor (46) and speed sensor (47).

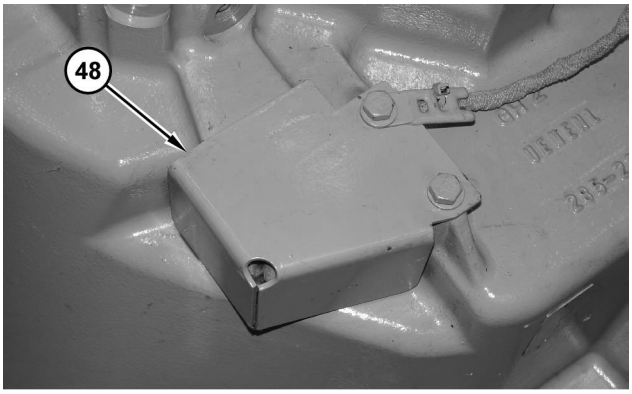

Illustration 369 g01390359

26. Remove cover (48).

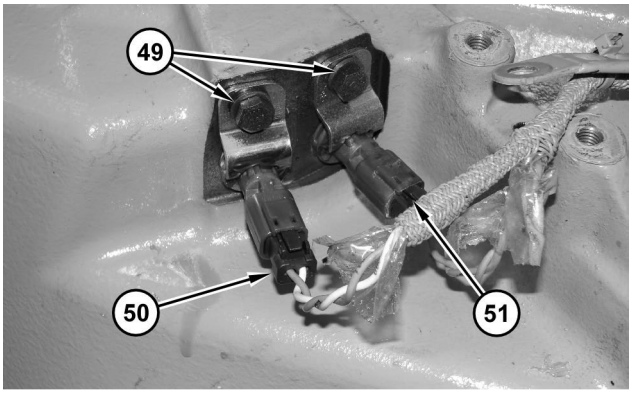

Illustration 370 g01390360

27. Remove bolts (49) to remove speed sensor (50) and speed sensor (51).

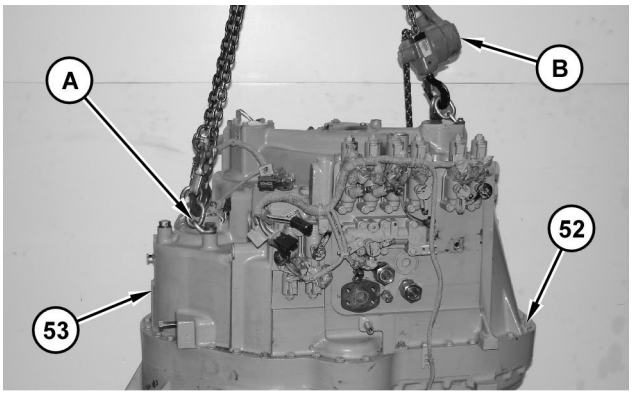

Illustration 371 g01390362

28. Remove bolts (52).

29. Use Tooling (A), Tooling (B), and a suitable lifting device to remove housing (53). The weight of housing (53) is approximately 261 kg (575 lb).

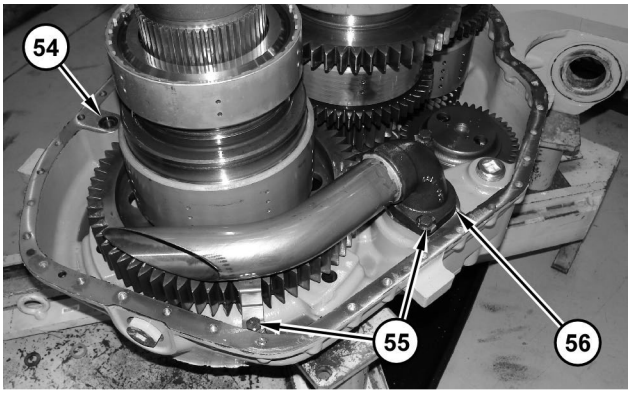

Illustration 372 g01390365

30. Remove O-ring seal (54). Remove bolts (55). Remove tube assembly (56).

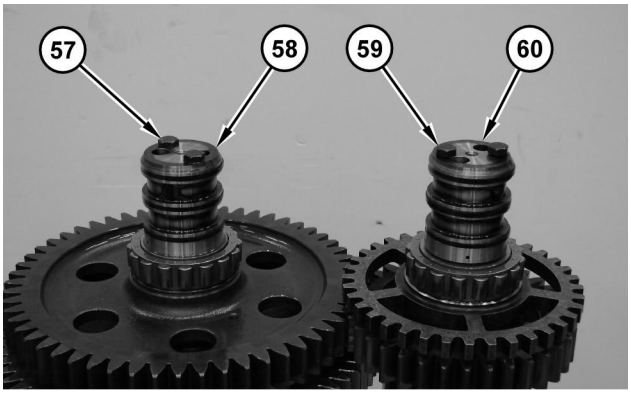

Illustration 373 g01390366

31. Remove bolts (57) to remove seal carrier (58). Remove bolts (59) to remove seal carrier (60).

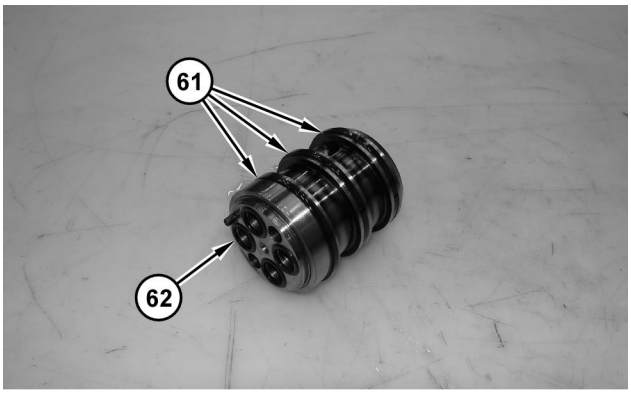

Illustration 374 g01390367

32. Remove seal rings (61). Remove O-ring seals (62). Repeat this step for the remaining seal carrier.

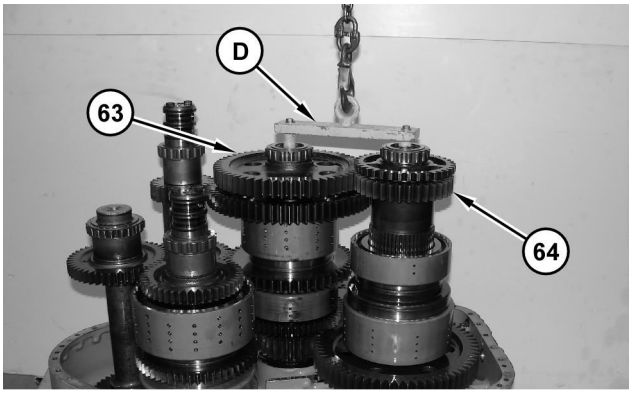

Illustration 375 g01390368

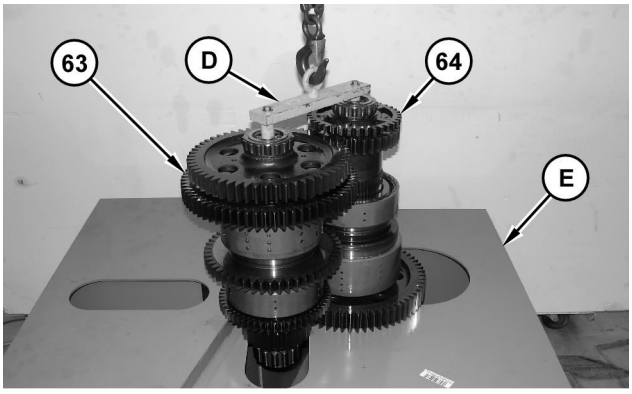

Illustration 376 g01390372

33. Use Tooling (D) and a suitable lifting device to remove clutch assembly (63) and clutch assembly (64). The weight of clutch assembly (63) and clutch assembly (64) is approximately 204 kg (450 lb).

34. Position clutch assembly (63) and clutch assembly (64) onto Tooling (E). If necessary, support clutch assembly (63) with suitable blocking.

35. Remove Tooling (D) to separate clutch assembly (63) from clutch assembly (64).

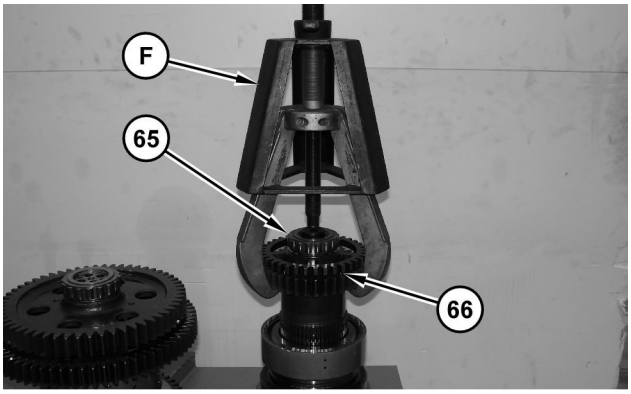

Illustration 377 g01390376

36. Use Tooling (F) to remove bearing (65) and rotor (66).

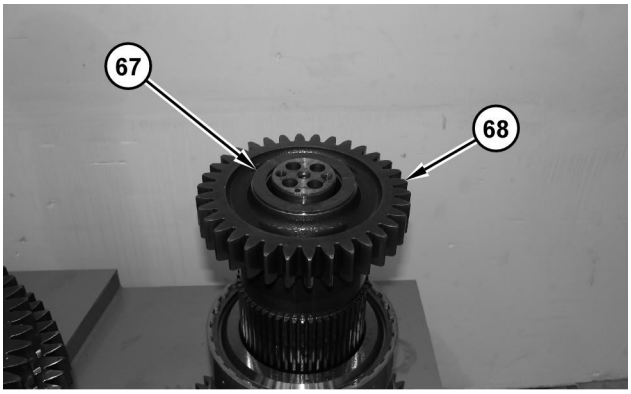

Illustration 378 g01390377

37. Remove thrust washer (67). Remove gear (68).

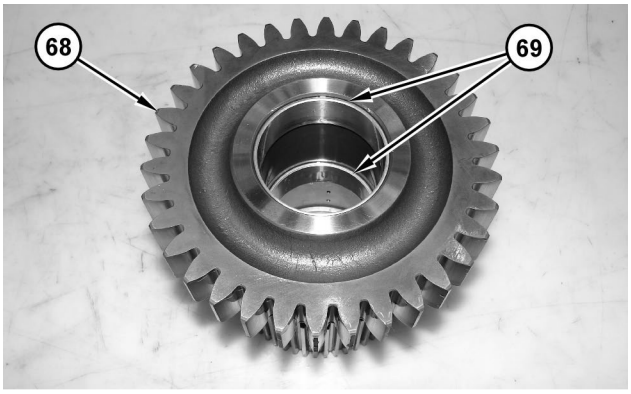

Illustration 379 g01390381

38. Remove bearing sleeves (69) from gear (68).

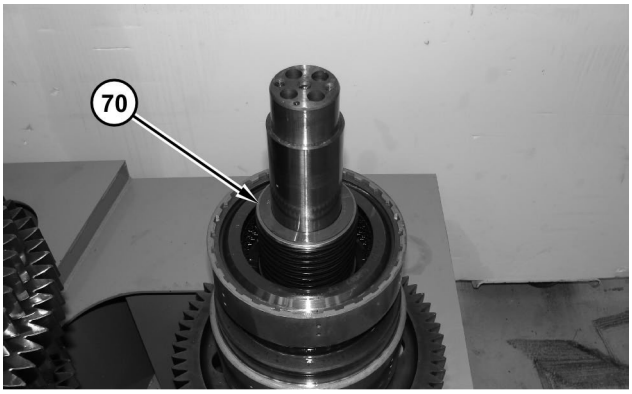

Illustration 380 g01390383

39. Remove thrust washer (70).

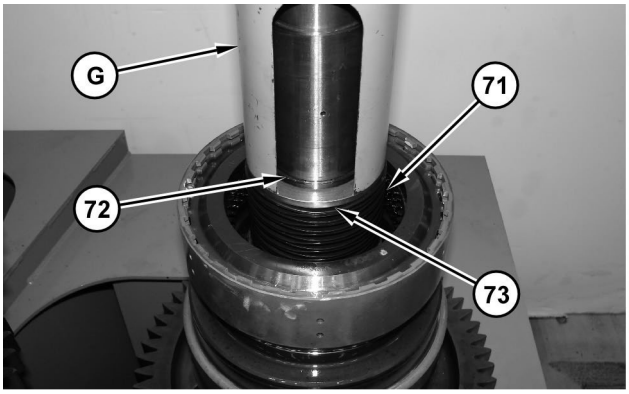

Illustration 381 g01390389

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

40. Use Tooling (G) to compress spring (71). Remove retaining ring (72). Remove Tooling (G). Remove retainer (73). Remove spring (71).

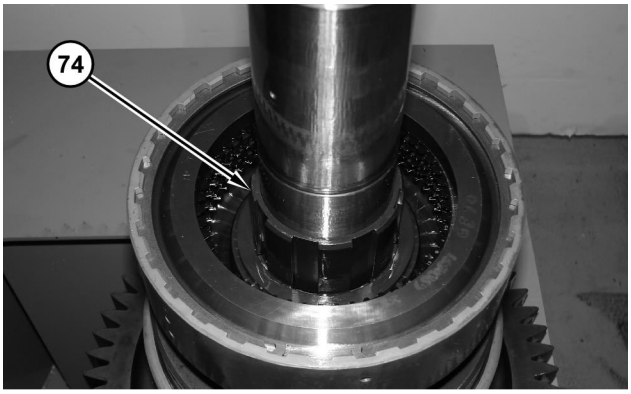

Illustration 382 g01390392

41. Remove slider (74).

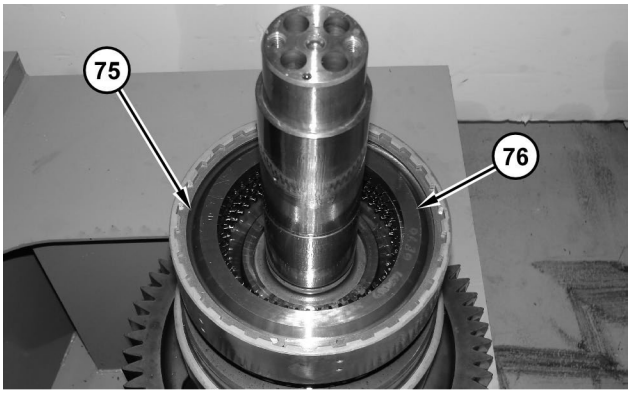

Illustration 383 g01390395

42. Remove retaining ring (75) to remove end plate (76).

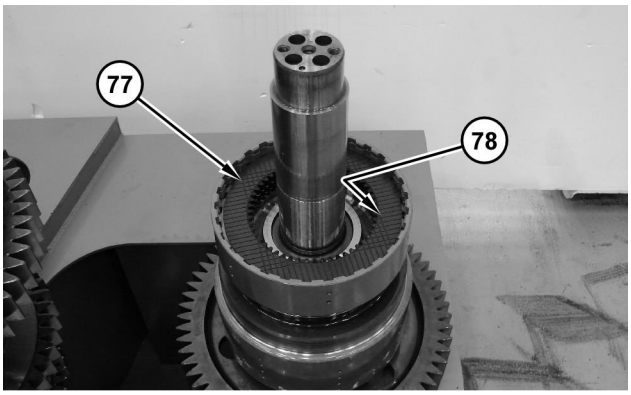

Illustration 384 g01390400

43. Remove discs (77) and plates (78).

Note: Note the quantity and the order of discs (77) and plates (78) for installation purposes.

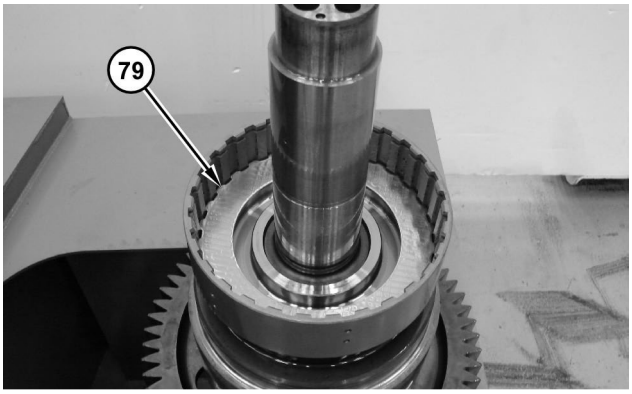

Illustration 385 g01390403

44. Remove piston (79).

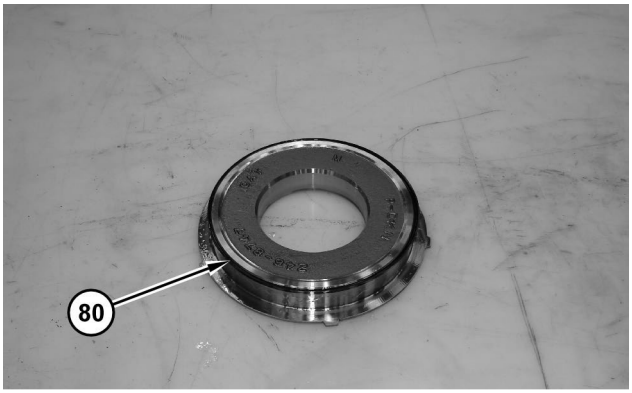

Illustration 386 g01390405

45. Remove seal ring (80).

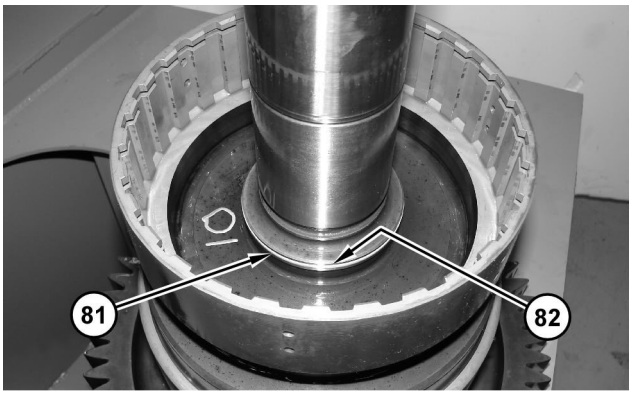

Illustration 387 g01390409

46. Remove seal ring (81) and O-ring seal (82).

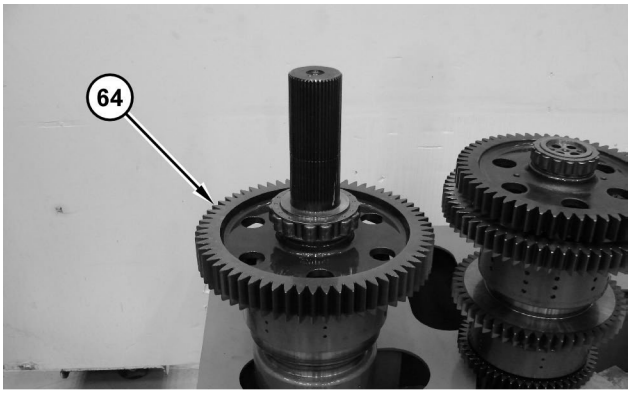

Illustration 388 g01390412

47. Use a suitable lifting device to turn over clutch assembly (64). The weight of clutch assembly (64) is approximately 104 kg (230 lb).

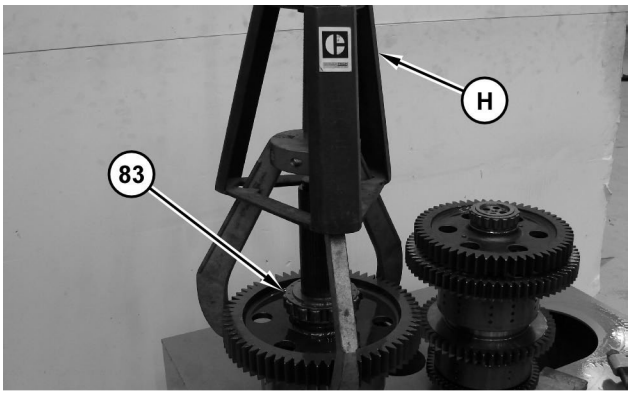

Illustration 389 g01390413

48. Use Tooling (H) to remove bearing (83).

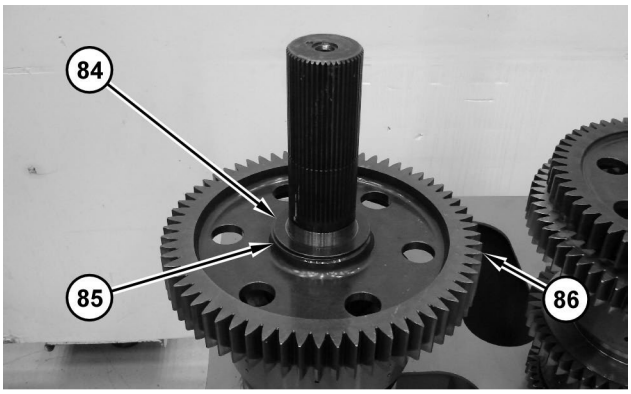

Illustration 390 g01390414

49. Remove spacer (84) and thrust washer (85).

50. Remove gear (86).

Illustration 391 g01390419

51. Remove bearing sleeves (87) from gear (86).

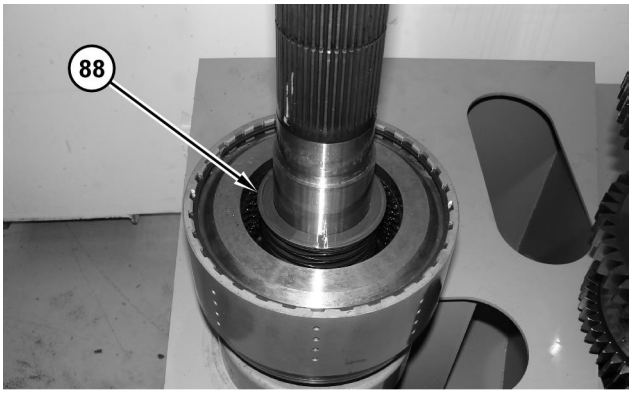

Illustration 392 g01390420

52. Remove thrust washer (88).

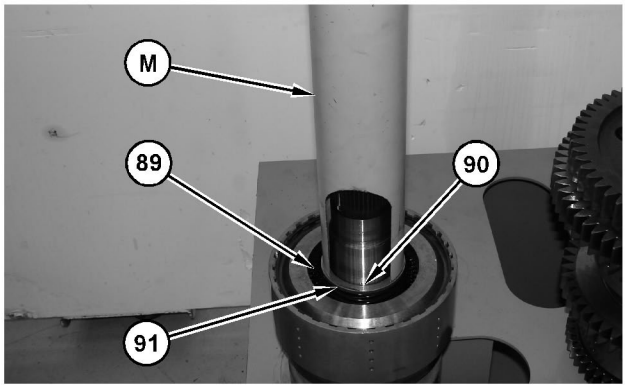

Illustration 393 g06210691

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

53. Use Tooling (M) to compress spring (89). Remove retaining ring (90). Remove Tooling (M). Remove retainer (91). Remove spring (89).

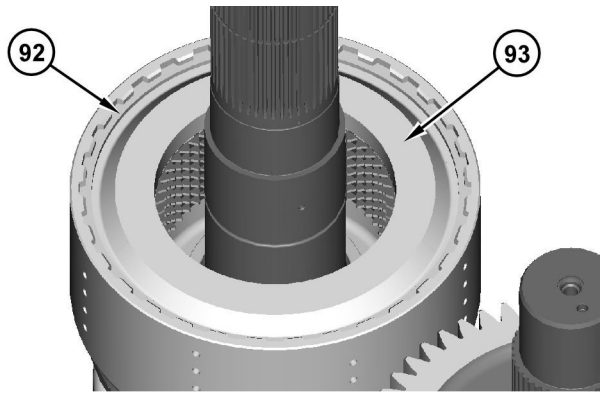

Illustration 394 g01390425

54. Remove retaining ring (92) to remove end plate (93).

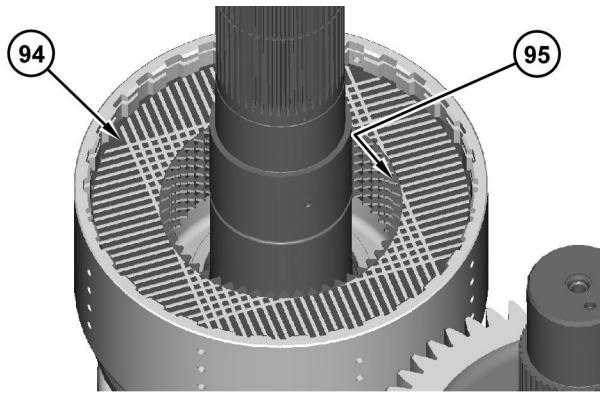

Illustration 395 g01390426

55. Remove discs (94) and plates (95).

Note: Note the quantity and the order of discs (94) and plates (95) for installation purposes.

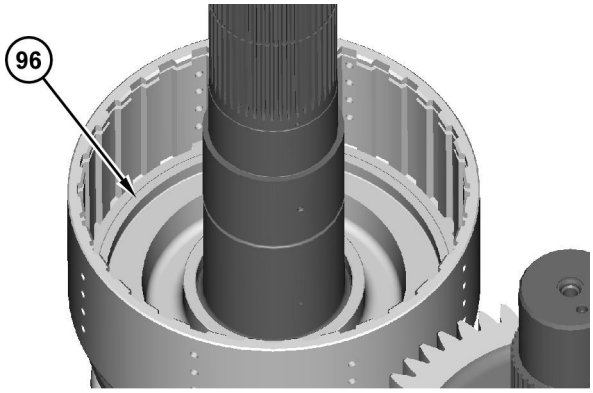

Illustration 396 g01390428

56. Remove piston (96).

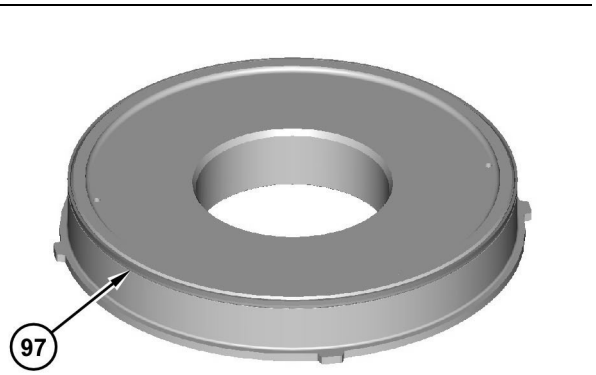

Illustration 397 g01390430

57. Remove seal ring (97).

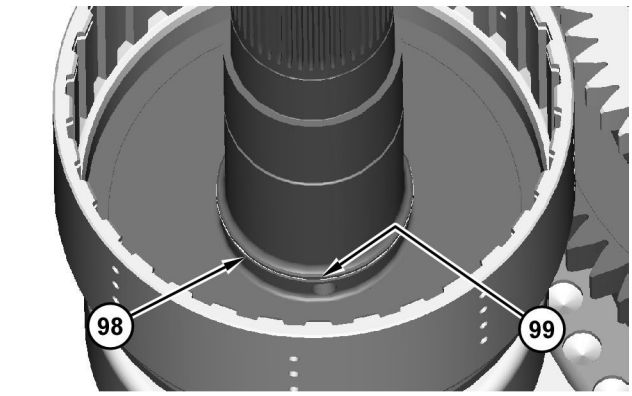

Illustration 398 g01390540

58. Remove seal ring (98) and O-ring seal (99).

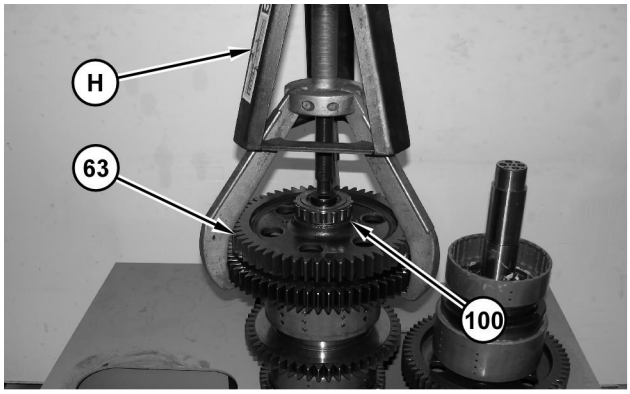

Illustration 399 g01390545

59. Use Tooling (H) to remove bearing (100) from clutch assembly (63).

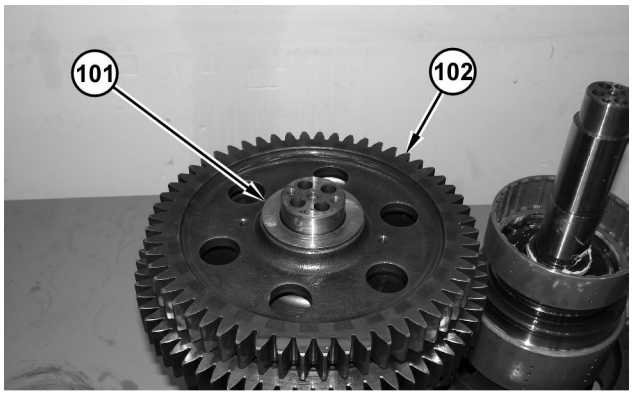

Illustration 400 g01390547

60. Remove thrust washer (101). Remove gear (102).

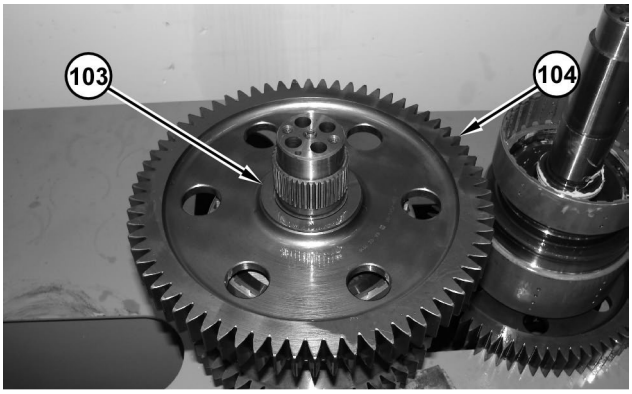

Illustration 401 g01390549

61. Remove thrust washer (103). Remove gear (104).

Illustration 402 g01390554

62. Remove bearing sleeve (105) from gear (104).

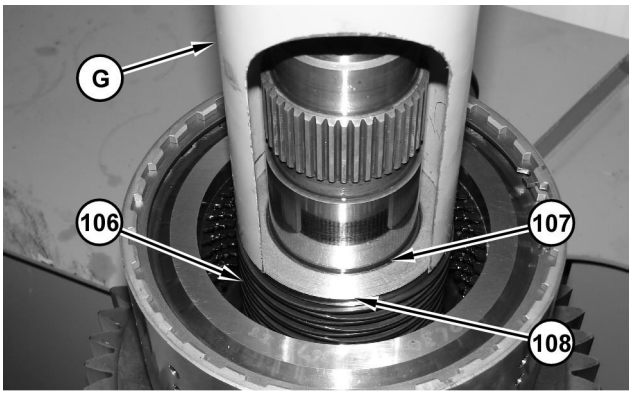

Illustration 403 g01390555

63. Use Tooling (G) to compress spring (106). Remove retaining ring (107). Remove Tooling (G). Remove retainer (108). Remove spring (106).

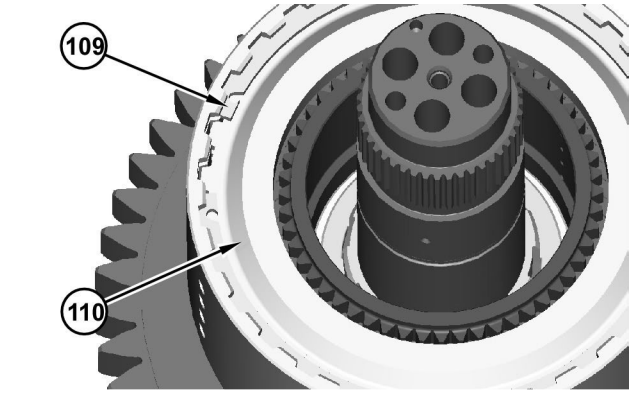

Illustration 404 g01390562

64. Remove retaining ring (109) to remove end plate (110).

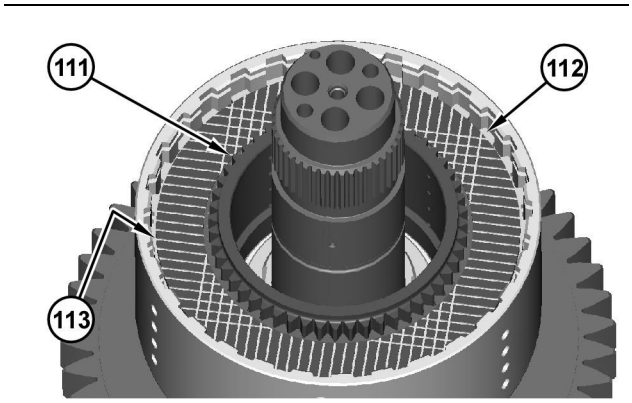

Illustration 405 g01390565

65. Remove hub (111).

66. Remove discs (112) and plates (113).

Note: Note the quantity and the order of discs (112) and plates (113) for installation purposes.

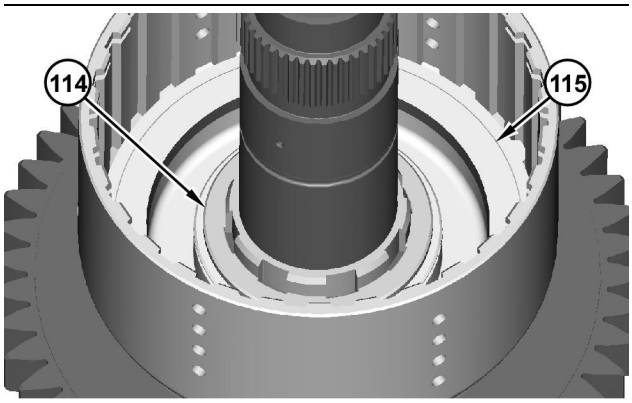

Illustration 406 g01390572

67. Remove slider (114). Remove piston (115).

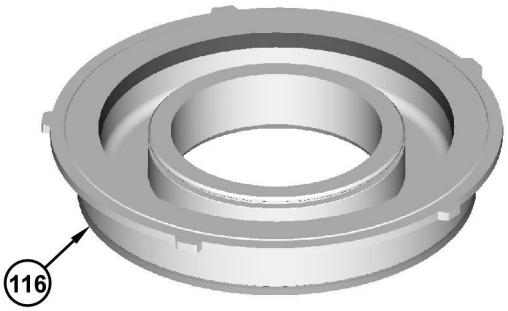

Illustration 407 g02518836

68. Remove seal ring (116).

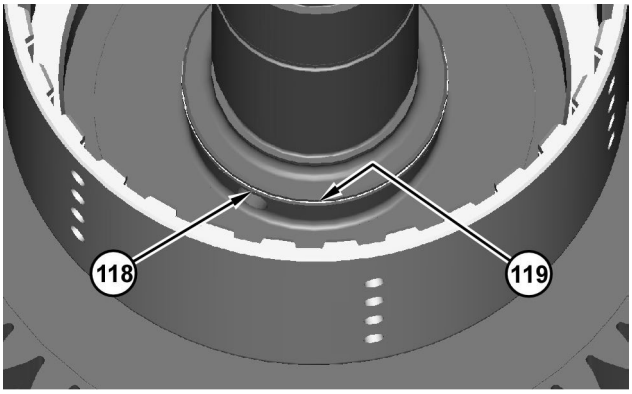

Illustration 408 g01390578

69. Remove seal ring (118) and O-ring seal (119).

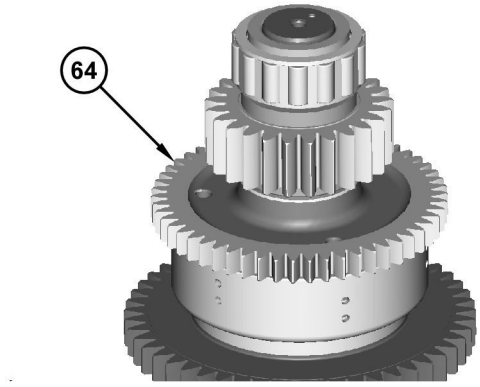

Illustration 409 g01390580

70. Use a suitable lifting device to turn over clutch assembly (64). The weight of clutch assembly (64) is approximately 113 kg (250 lb).

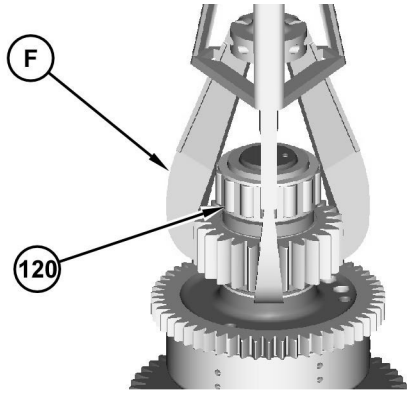

Illustration 410 g01390581

71. Use Tooling (F) to remove bearing (120).

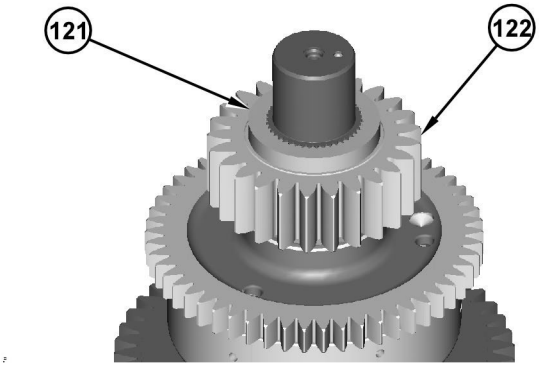

Illustration 411 g01390582

72. Remove spacer (121). Remove gear (122).

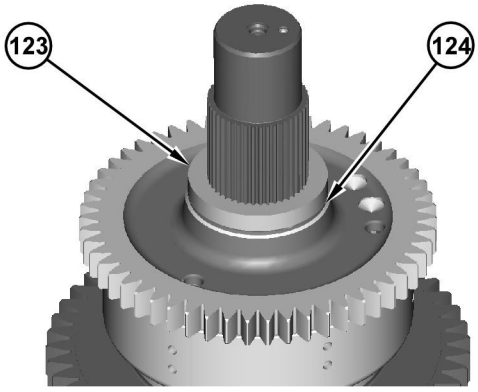

Illustration 412 g01390583

73. Remove spacer (123). Remove thrust washer (124).

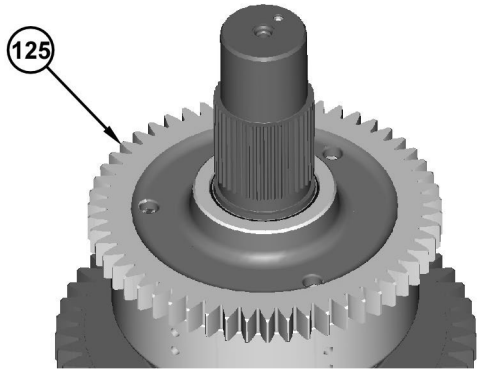

Illustration 413 g01390584

74. Remove gear (125).

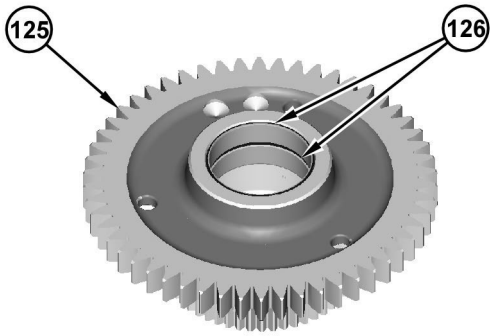

Illustration 414 g01390586

75. Remove bearing sleeves (126) from gear (125).

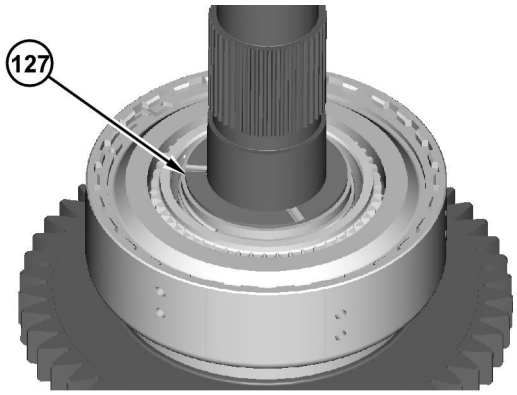

Illustration 415 g01390588

76. Remove thrust washer (127).

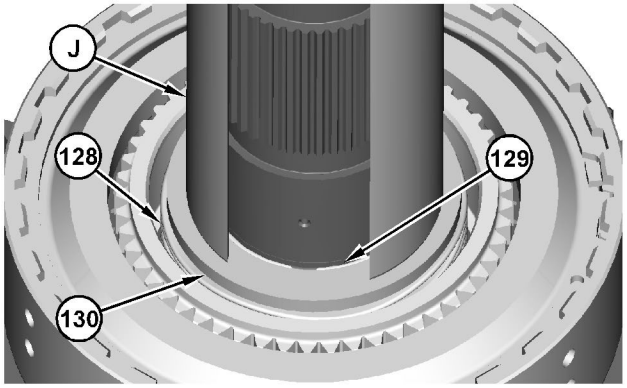

Illustration 416 g06210695

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

77. Use Tooling (G) to compress spring (128). Remove retaining ring (129). Remove Tooling (G). Remove retainer (130). Remove spring (128).

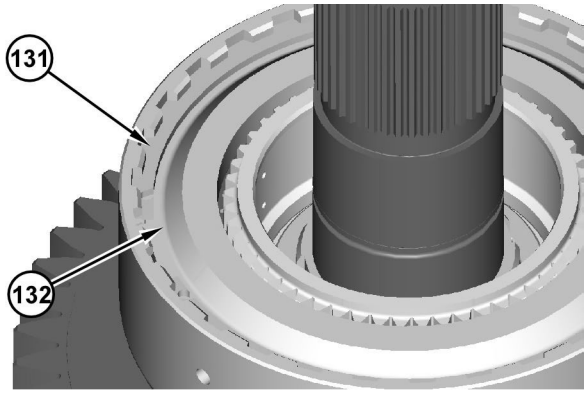

Illustration 417 g01390592

78. Remove retaining ring (131) to remove end plate (132).

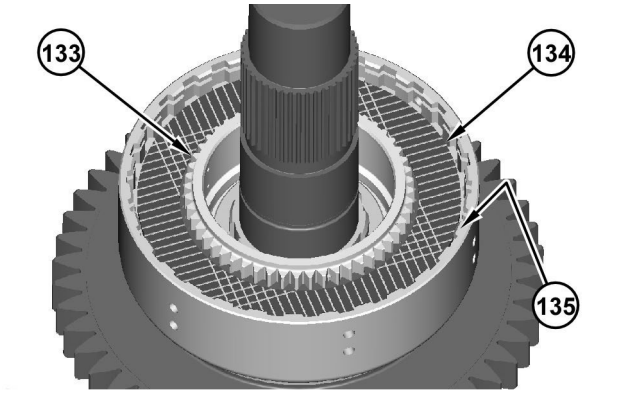

Illustration 418 g01390593

79. Remove hub (133).

80. Remove discs (134) and plates (135).

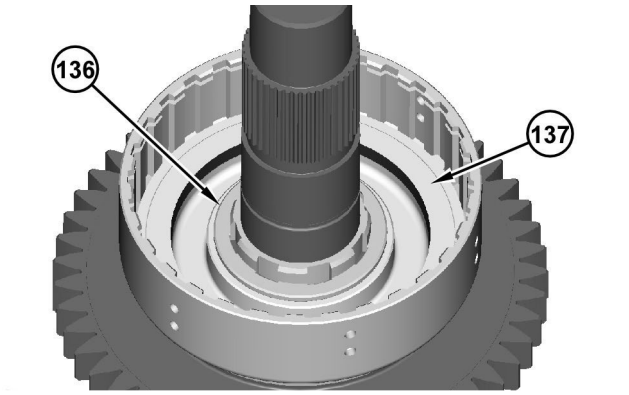

Illustration 419 g01390595

81. Remove slider (136). Remove piston (137).

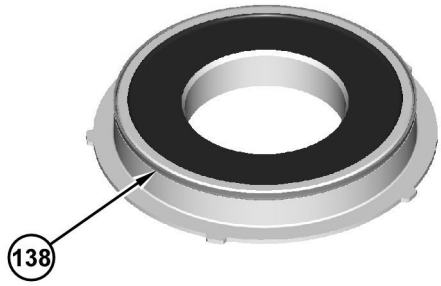

Illustration 420 g01390596

82. Remove seal ring (138).

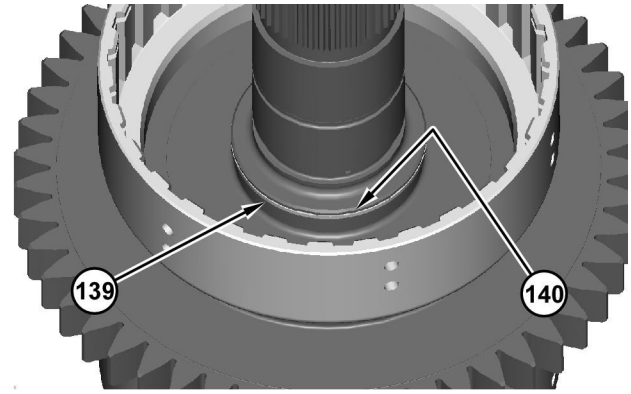

Illustration 421 g01390597

83. Remove seal ring (139) and O-ring seal (140).

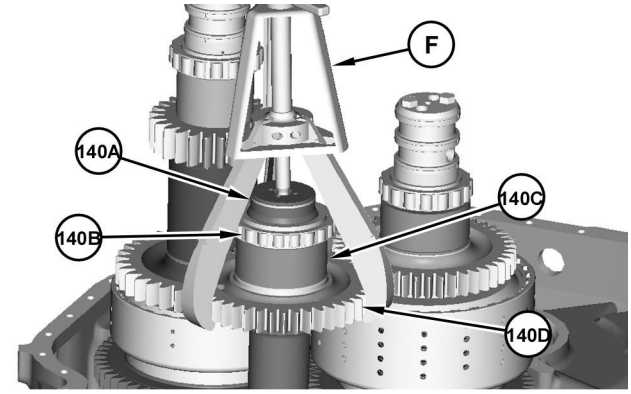

Illustration 422 g02521756

84. Remove seal ring (140A). Use Tooling (F) to remove bearing (140B) and spacer (140C). Remove gear (140D).

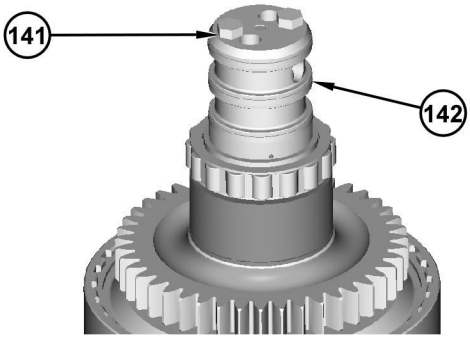

Illustration 423 g01390601

85. Remove bolts (141). Remove seal carrier (142).

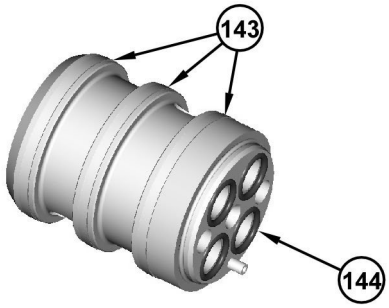

Illustration 424 g01390603

86. Remove seal rings (143). Remove O-ring seals (144).

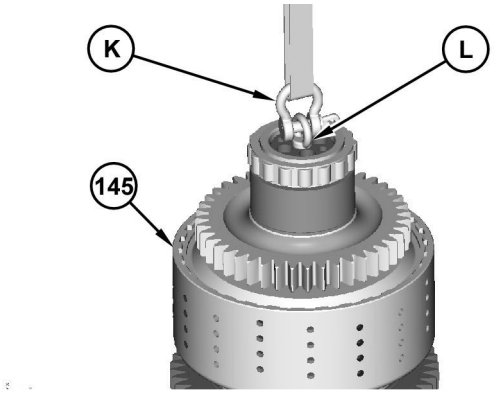

Illustration 425 g01390604

87. Use Tooling (K), Tooling (L), and a suitable lifting device to remove clutch assembly (145). The weight of clutch assembly (145) is approximately 86 kg (190 lb).

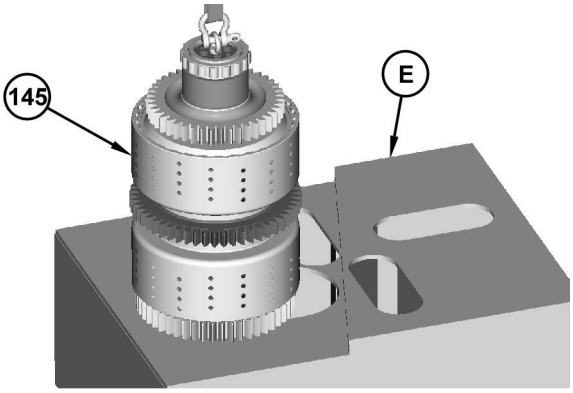

Illustration 426 g01390606

88. Position clutch assembly (145) onto Tooling (E).

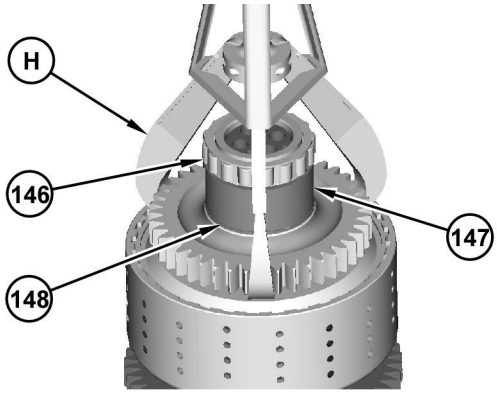

Illustration 427 g01390608

89. Use Tooling (H) to remove bearing (146).

90. Remove spacer (147). Remove thrust washer (148).

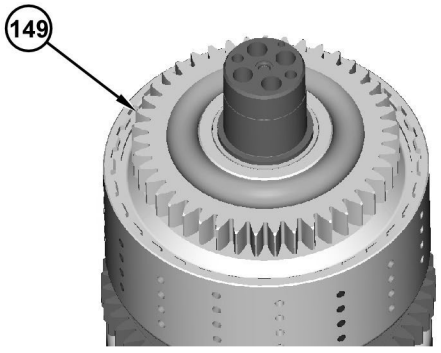

Illustration 428 g01390612

91. Remove gear (149).

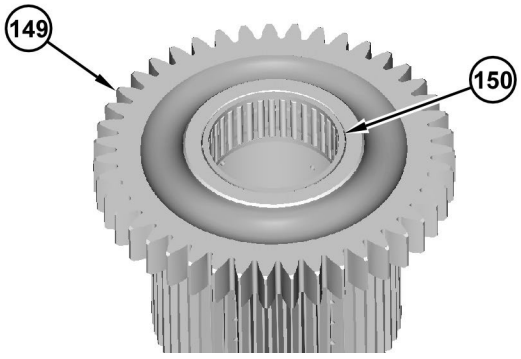

Illustration 429 g01390614

92. Use a suitable press to remove bearing (150) from gear (149).

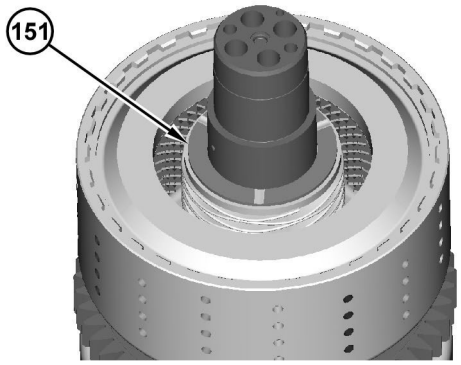

Illustration 430 g01390620

93. Remove thrust washer (151).

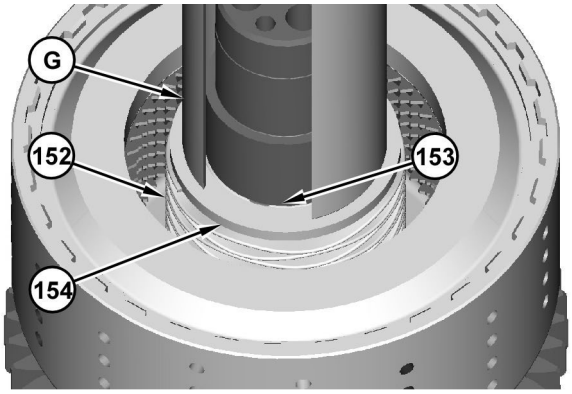

Illustration 431 g01390617

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

94. Use Tooling (G) to compress spring (152). Remove retaining ring (153). Remove Tooling (G). Remove retainer (154). Remove spring (152).

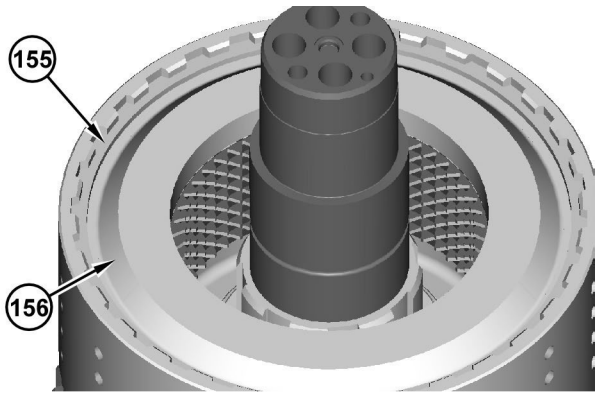

Illustration 432 g01390622

95. Remove retaining ring (155) to remove end plate (156).

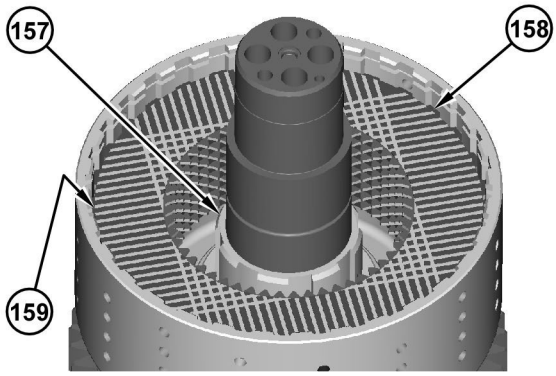

Illustration 433 g01390625

96. Remove slider (157).

97. Remove discs (158) and plates (159).

Note: Note the quantity and the order of discs (158) and plates (159) for installation purposes.

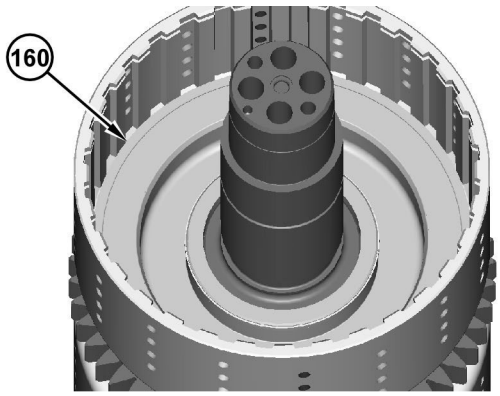

Illustration 434 g01390627

98. Remove piston (160).

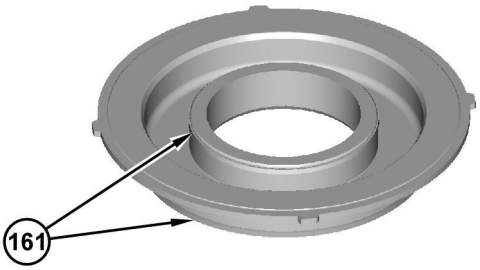

Illustration 435 g01390629

99. Remove seal rings (161).

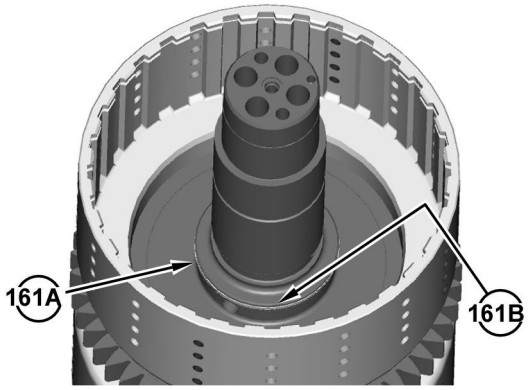

Illustration 436 g02407538

100. Remove seal ring (161A) and O-ring seal (161B).

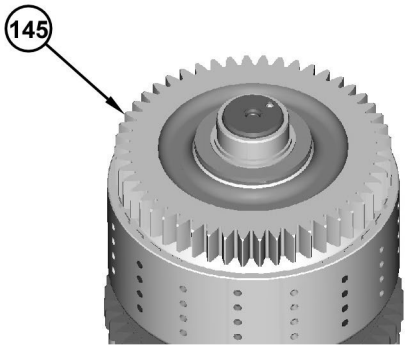

Illustration 437 g01390632

101. Use a suitable lifting device to turn over clutch assembly (145). The weight of clutch assembly (145) is approximately 86 kg (190 lb).

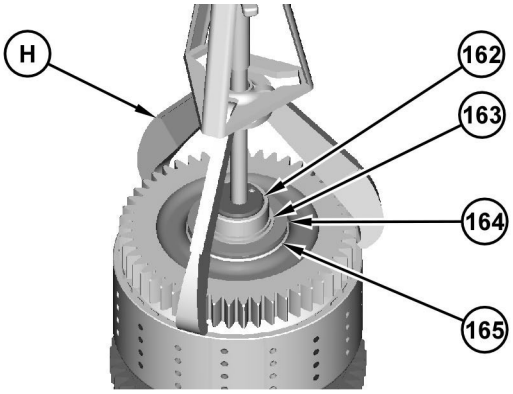

Illustration 438 g01390633

102. Use Tooling (H) to remove race (162). Remove thrust race (163). Remove thrust washer (164) and thrust washer (165).

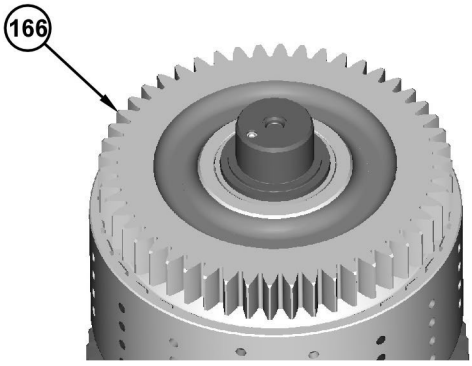

Illustration 439 g01390634

103. Remove gear (166).

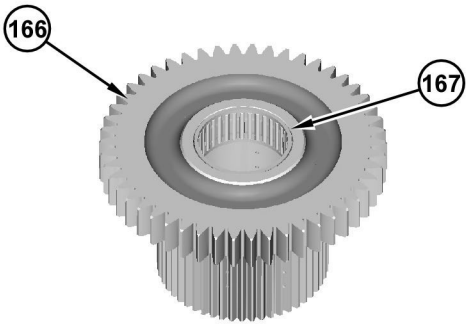

Illustration 440 g01390639

104. Use a suitable press to remove bearing (167) from gear (166).

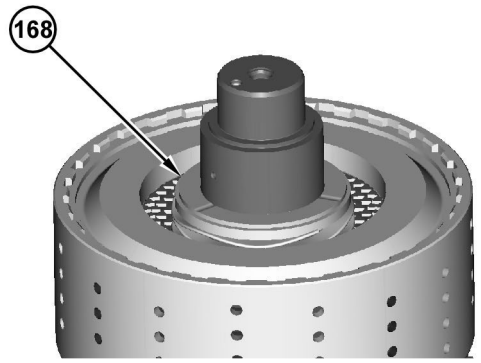

Illustration 441 g01390641

105. Remove thrust washer (168).

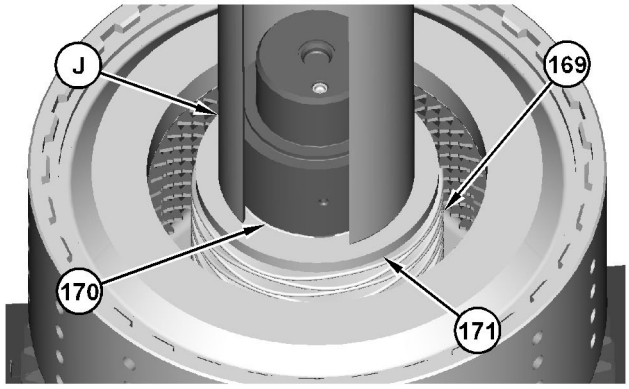

Illustration 442 g06210699

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

106. Use Tooling (J) to compress spring (169). Remove retaining ring (170). Remove Tooling (J). Remove retainer (171). Remove spring (169).

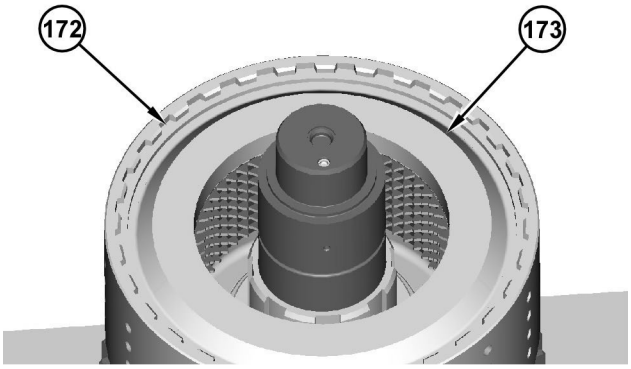

Illustration 443 g01390646

107. Remove retaining ring (172) to remove end plate (173).

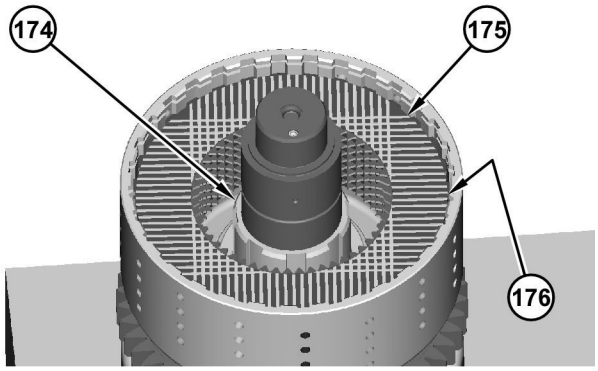

Illustration 444 g01390647

108. Remove slider (174).

109. Remove discs (175) and plates (176).

Note: Note the quantity and the order of discs (175) and plates (176) for installation purposes.

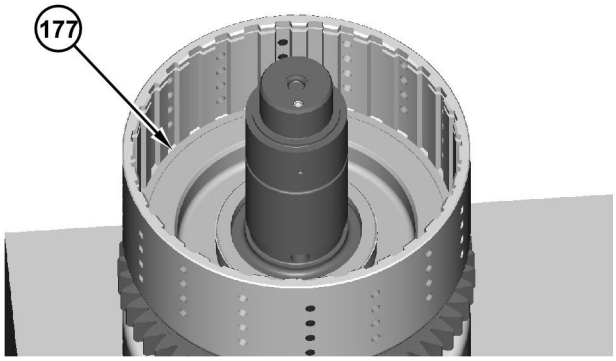

Illustration 445 g01390651

110. Remove piston (177).

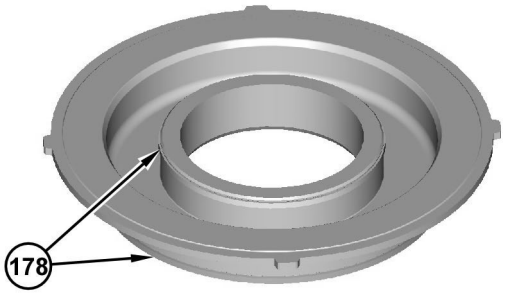

Illustration 446 g01390652

111. Remove seal rings (178).

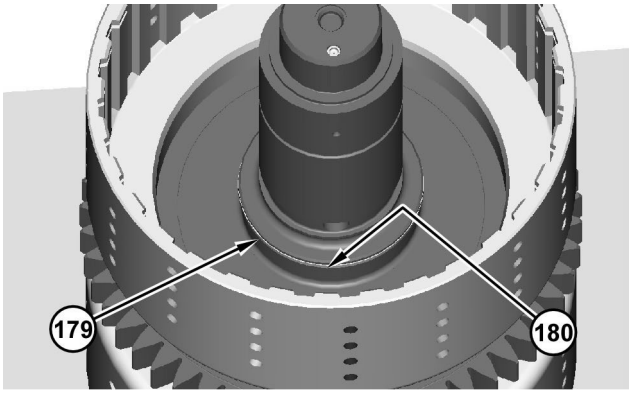

Illustration 447 g01391047

112. Remove seal ring (179) and O-ring seal (180).

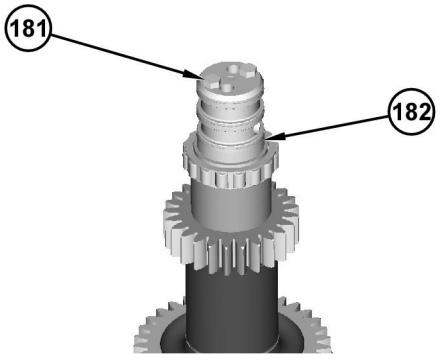

Illustration 448 g01390655

113. Remove bolts (181) to remove seal carrier (182).

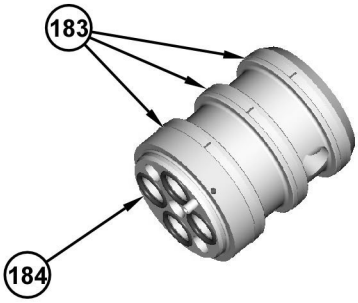

Illustration 449 g01390657

114. Remove seal rings (183). Remove O-ring seals (184).

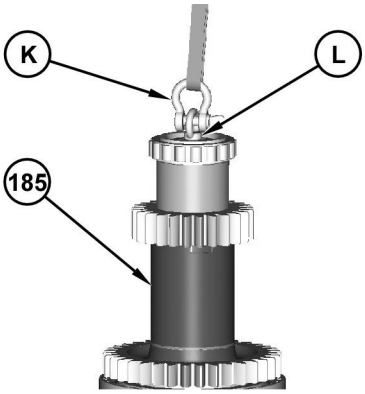

Illustration 450 g01390658

115. Use Tooling (K), Tooling (L), and a suitable lifting device to remove clutch assembly (185). The weight of clutch assembly (185) is approximately 68 kg (150 lb).

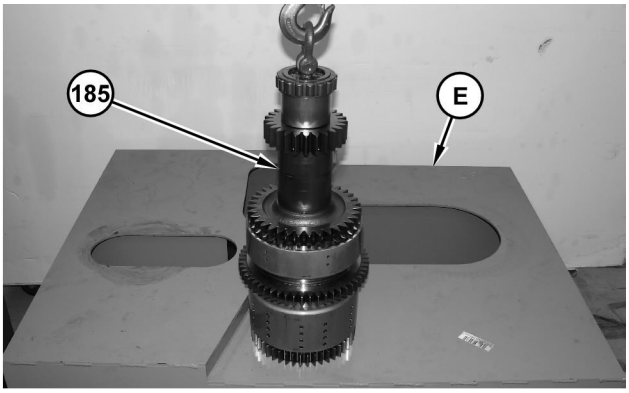

Illustration 451 g01390662

116. Position clutch assembly (185) onto Tooling (E).

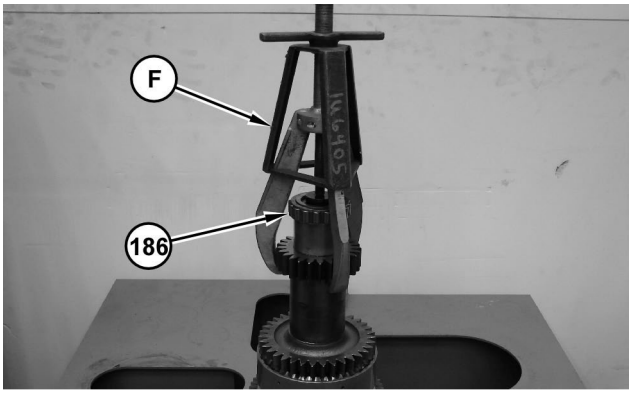

Illustration 452 g01390666

117. Use Tooling (F) to remove bearing (186).

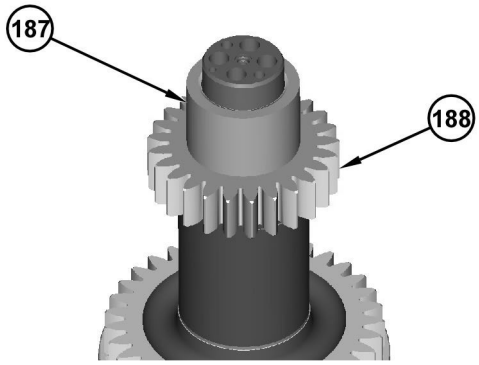

Illustration 453 g01390668

118. Remove spacer (187). Remove gear (188).

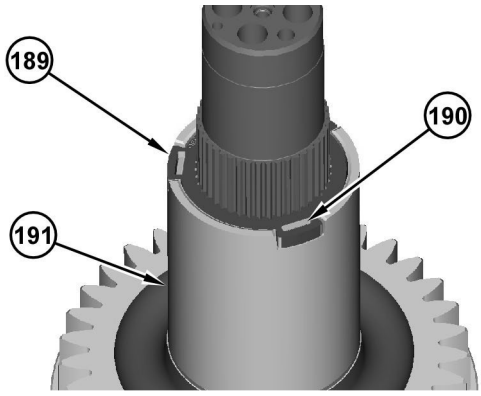

Illustration 454 g01390671

119. Remove spacer (189). Remove slugs (190). Remove spacer (191).

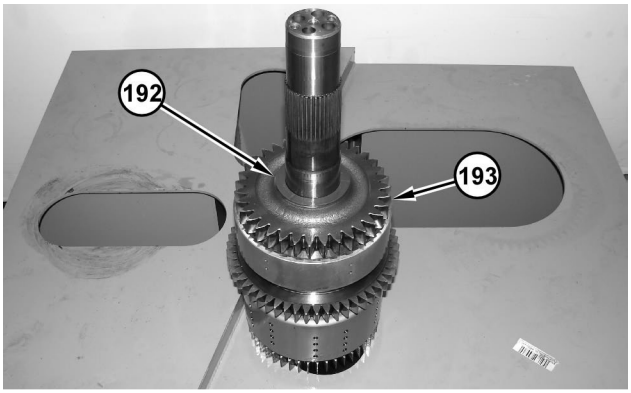

Illustration 455 g01390672

120. Remove thrust washer (192). Remove gear (193).

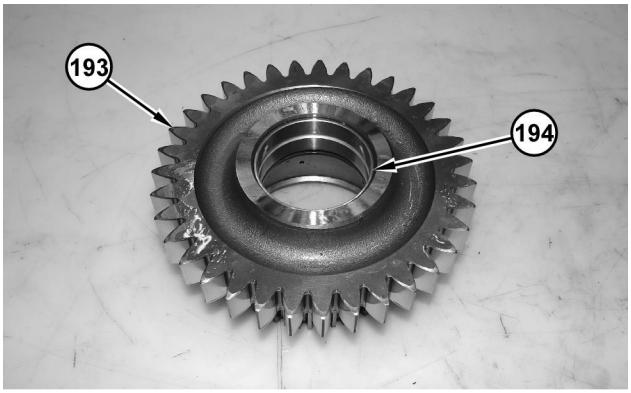

Illustration 456 g01390676

121. Remove bearing sleeves (194) from gear (193).

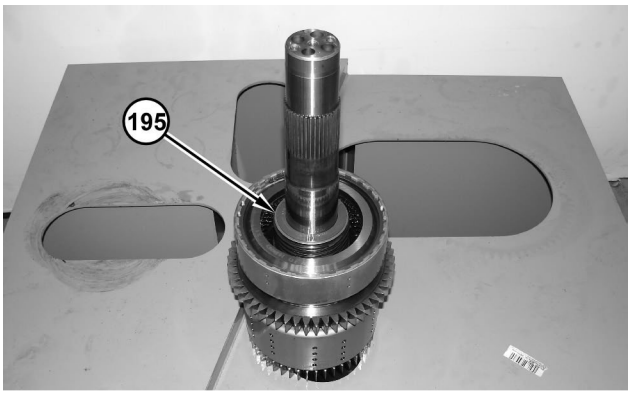

Illustration 457 g01390680

122. Remove thrust washer (195).

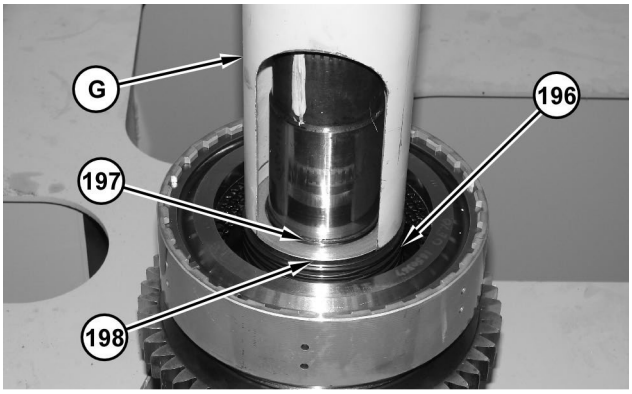

Illustration 458 g01390682

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

123. Use Tooling (G) to compress spring (196). Remove retaining ring (197). Remove Tooling (G). Remove retainer (198). Remove spring (196).

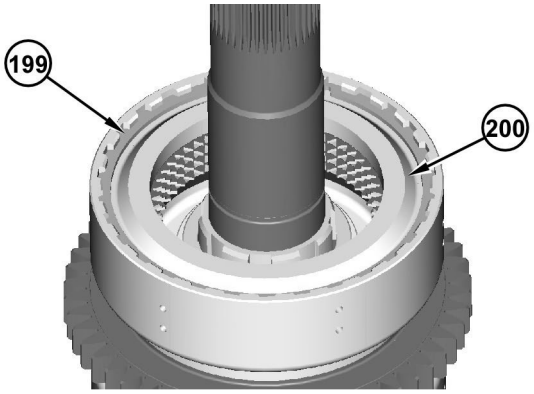

Illustration 459 g01390949

124. Remove retaining ring (199) to remove end plate (200).

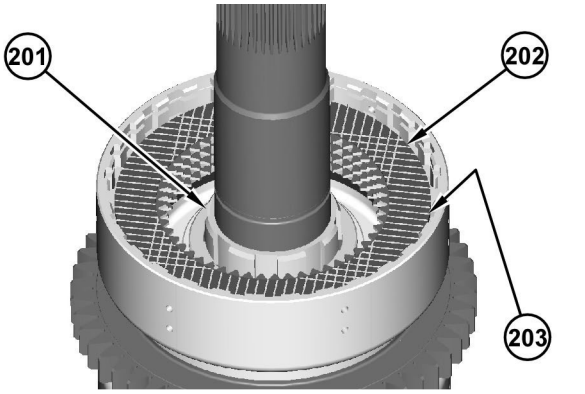

Illustration 460 g01390685

125. Remove slider (201).

126. Remove discs (202) and plates (203).

Note: Note the quantity and the order of discs (202) and plates (203) for installation purposes.

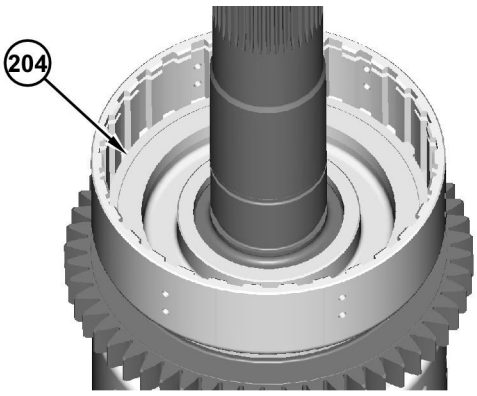

Illustration 461 g01390686

127. Remove piston (204).

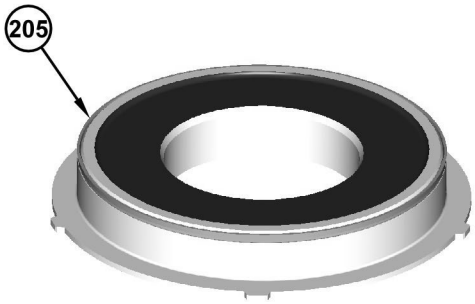

Illustration 462 g01390688

128. Remove seal ring (205).

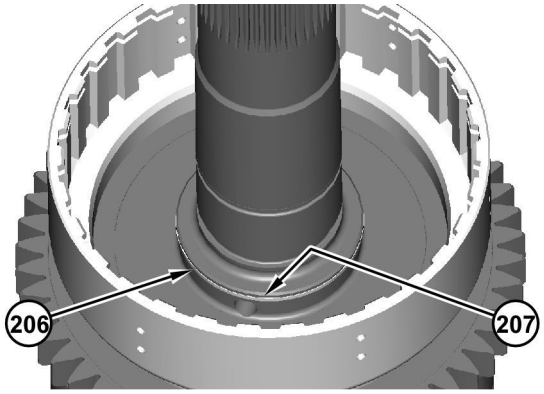

Illustration 463 g01390689

129. Remove seal ring (206) and O-ring seal (207).

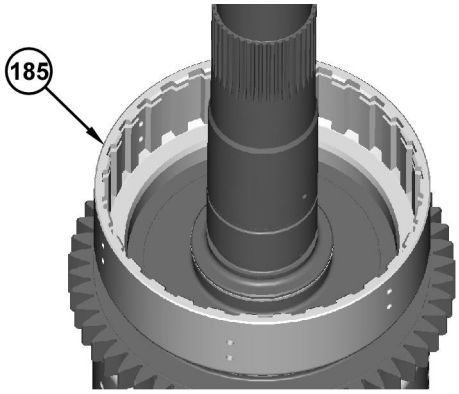

Illustration 464 g01390946

130. Use a suitable lifting device to turn over clutch assembly (185). The weight of clutch assembly (185) is approximately 68 kg (150 lb).

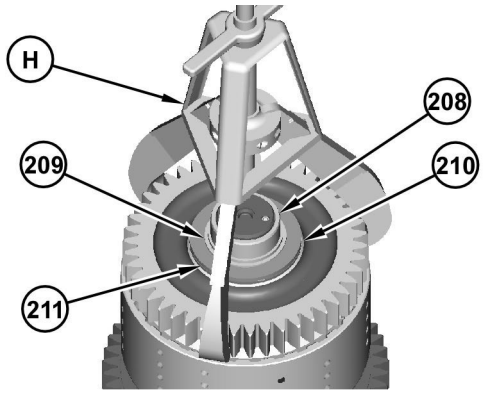

Illustration 465 g01390863

131. Use Tooling (H) to remove race (208). Remove thrust race (209). Remove thrust washer (210). Remove thrust washer (211).

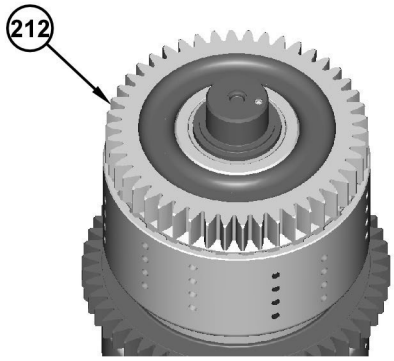

Illustration 466 g01390871

132. Remove gear (212).

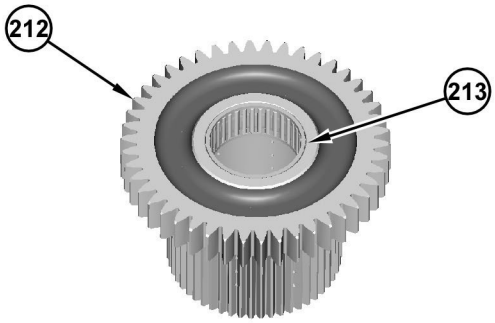

Illustration 467 g01390872

133. Use a suitable press to remove bearing (213) from gear (212).

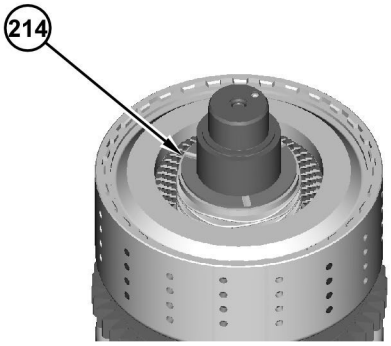

Illustration 468 g01390877

134. Remove thrust washer (214).

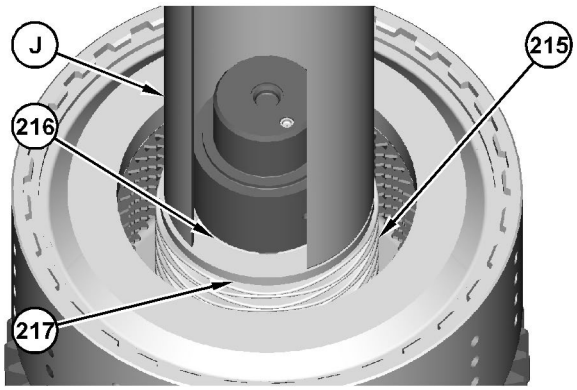

Illustration 469 g06210706

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

135. Use Tooling (J) to compress spring (215). Remove retaining ring (216). Remove Tooling (J). Remove retainer (217). Remove spring (215).

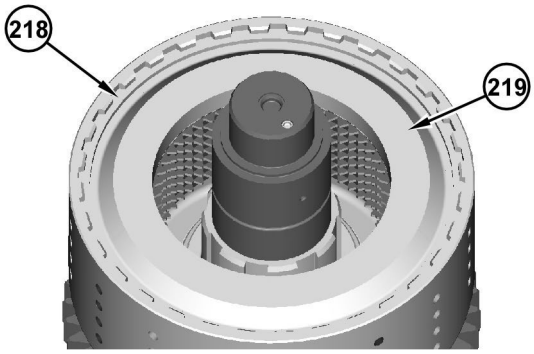

Illustration 470 g01390880

136. Remove retaining ring (218) to remove end plate (219).

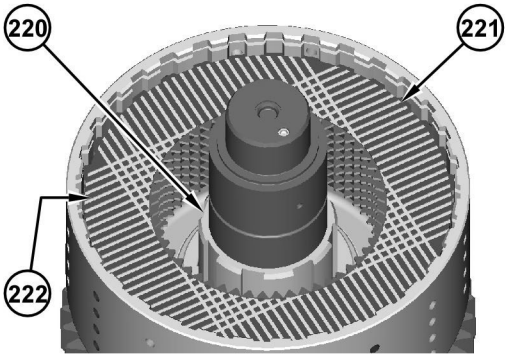

Illustration 471 g01390883

137. Remove slider (220).

138. Remove discs (221) and plates (222).

Note: Note the quantity and the order of discs (221) and plates (222) for installation purposes.

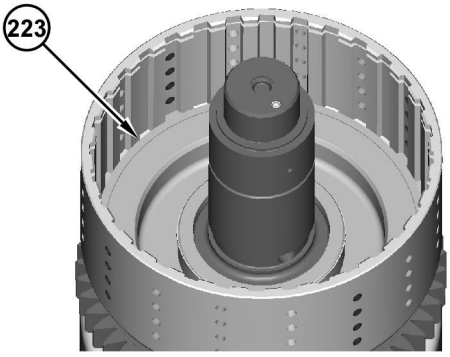

Illustration 472 g01390885

139. Remove piston (223).

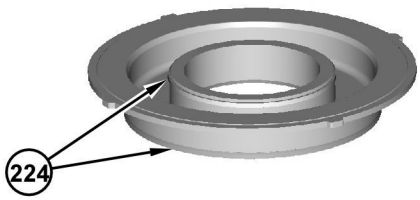

Illustration 473 g01390887

140. Remove seal rings (224).

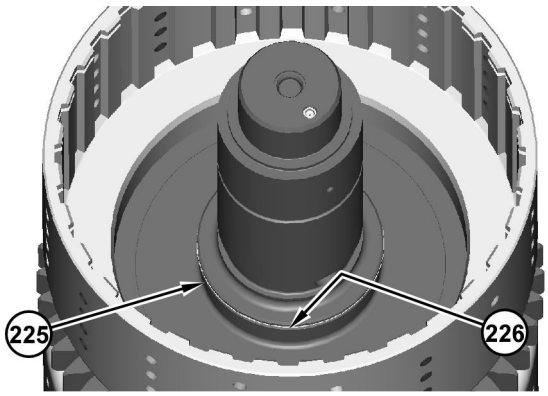

Illustration 474 g01390889

141. Remove seal ring (225) and O-ring seal (226).

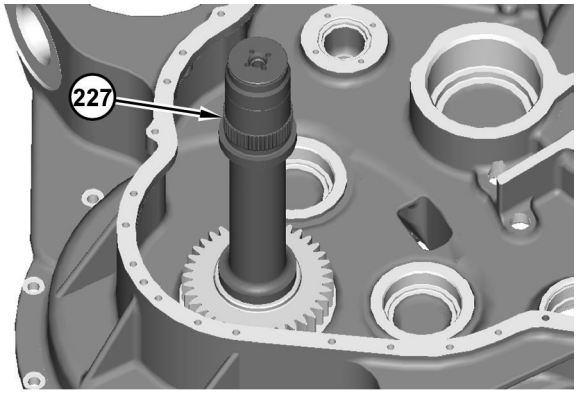

Illustration 475 g02517216

Input Shaft

142. Use a suitable lifting device to remove shaft assembly (227). The weight of shaft assembly (227) is approximately 36 kg (80 lb).

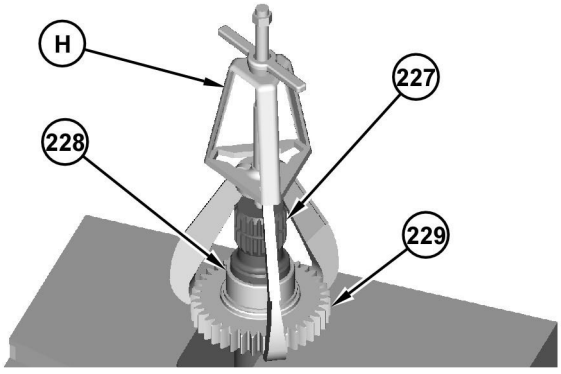

Illustration 476 g02517356

143. Use a suitable lifting device to position shaft assembly (227) onto Tooling (E).

144. Use suitable blocking to support shaft assembly (227). Use Tooling (H) to remove race (228).

145. Remove gear (229).

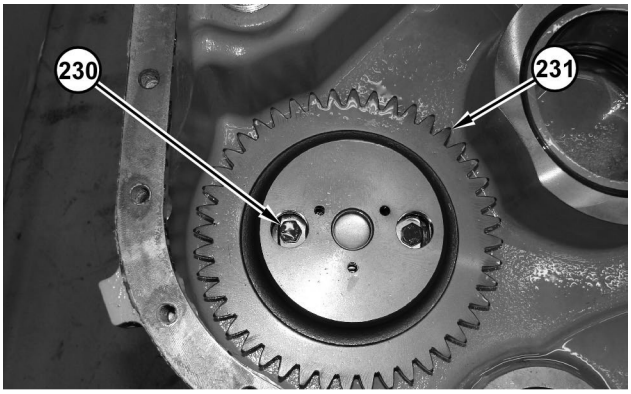

Illustration 477 g02517358

146. Remove bolts (230). Use bolts (230) to remove gear (231).

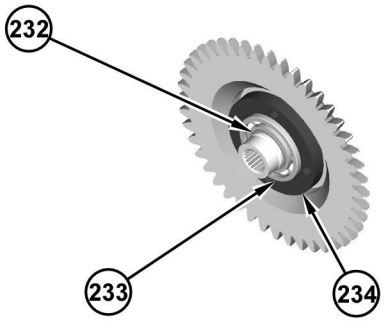

Illustration 478 g02517359

147. Remove retaining ring (232). Remove bearing (233). Remove retainer (234).

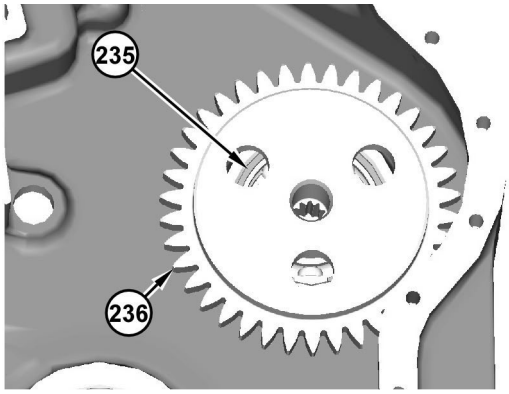

Illustration 479 g02517360

148. Remove retaining ring (235).

149. Remove gear (236).

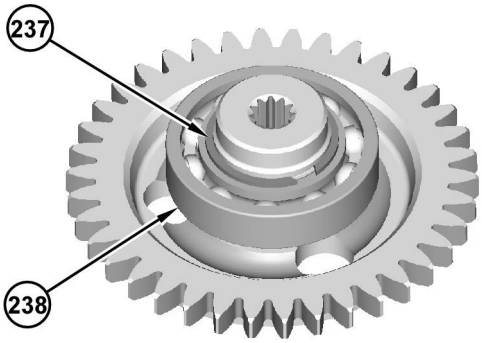

Illustration 480 g02517362

150. Remove retaining ring (237). Remove bearing (238).

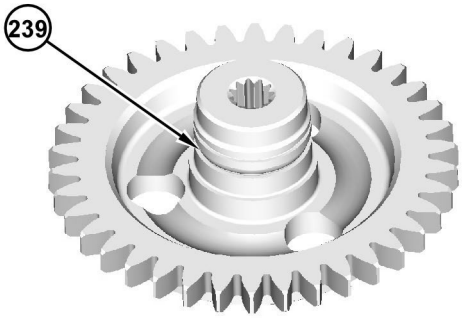

Illustration 481 g02517376

151. Remove O-ring seal (239).

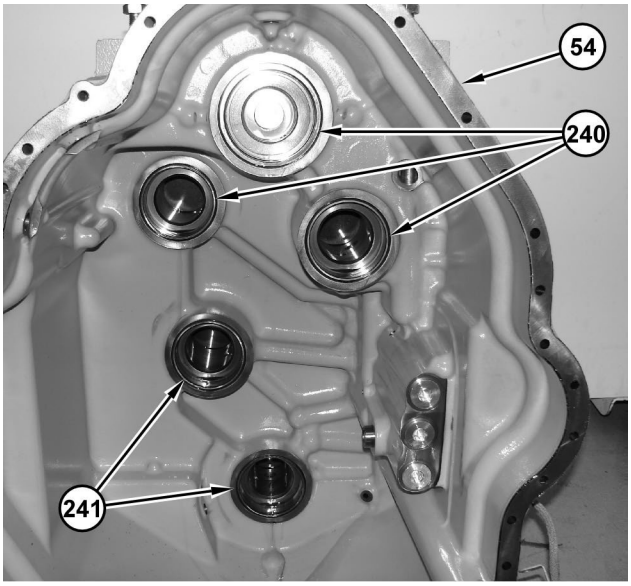

Illustration 482 g02517378

152. Remove races (240) and races (241) from housing (54).

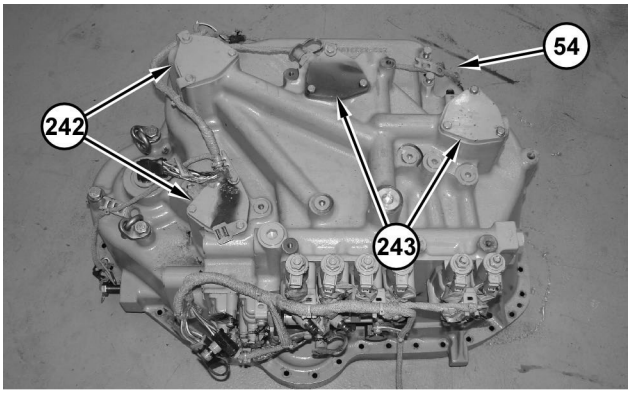

Illustration 483 g02517380

153. Remove covers (242) and covers (243) from housing (54).

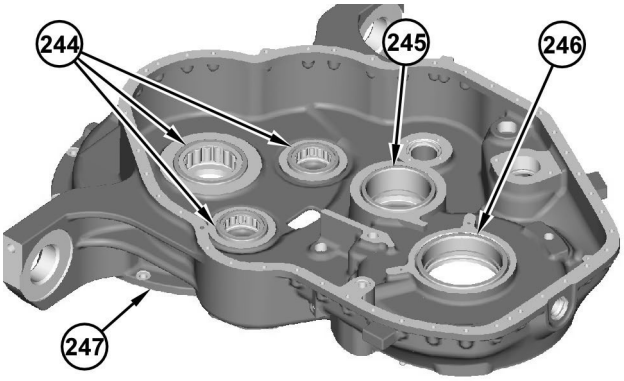

Illustration 484 g02517381

154. Remove bearings (244), race (245), and race (246) from housing (247).

i07050715

Transmission - Assemble

SMCS Code: 3002-016; 3030-016; 3159-016

Assembly Procedure

Table 19

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	439-3940	Link Brackets	4
B	386-6033	Lever Puller Hoist	1
C	1P-2420	Transmission Repair Stand	1
D	4C-8156	Lifting Fixture	1
E	FT-2769	Table	1
G	9U-7480	Compressing Tube	1
	5P-7970	Nut	1
	8T-4224	Hard Washer	1
	-	Bolt M13 - 1.25 by 460 mm	1
J	9U-7480	Compressing Tube	1
	8T-4133	Nut	1
	8T-4121	Washer	1
	-	Bolt M10 - 1.5 by 460mm	1
K	189-0408	Shackle As	1
L	3E-3882	Eyebolt	1

(continued)

(Table 19, contd)

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
N	271-2911	Alignment Tool	1
	271-2922	Alignment Tool	1
M	9U-7480	Compressing Tube	1
	6V-8149	Nut	1
	5P-8245	Hard Washer	1
	-	Bolt M12- 1.75 by 460 mm	1
P	426-2786	Seal Installer	1
R	8C-8422	Sealant	-

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Lubricate all seal rings and O-ring seals prior to assembly.

Note: Inspect the O-ring seals. Replace O-ring seals that are worn or damaged.

Note: Remove old anaerobic sealant from the bottom of the blind tapped holes in housing (251) before assembling.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

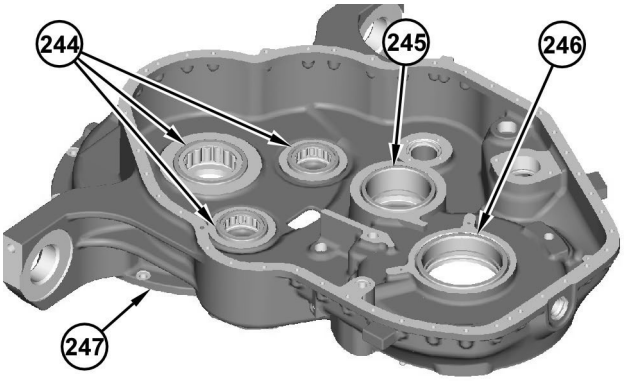

Illustration 485 g02517381

1. Lower the temperature of race (246) and race (245). Install race (246) and race (245) into housing (247). Lower the temperature of bearings (244). Install bearings (244) into housing (247).

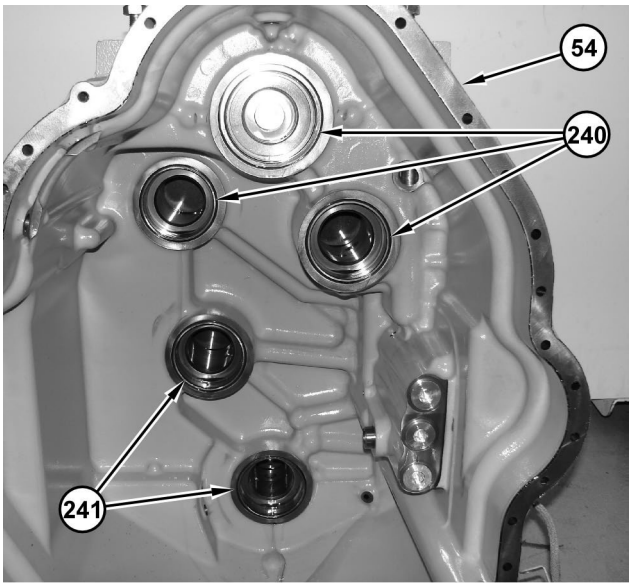

Illustration 486 g02517378

2. Lower the temperature of races (241) and races (240) . Install races (241) and races (240) into housing (54).

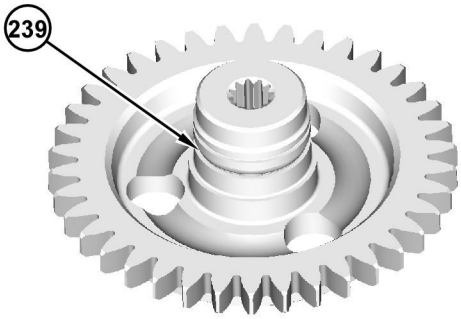

Illustration 487 g02517376

3. Install O-ring seal (239).

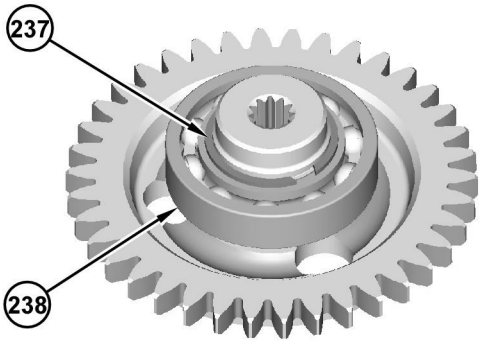

Illustration 488 g02517362

4. Raise the temperature of bearing (238). Install bearing (238). Install retaining ring (237).

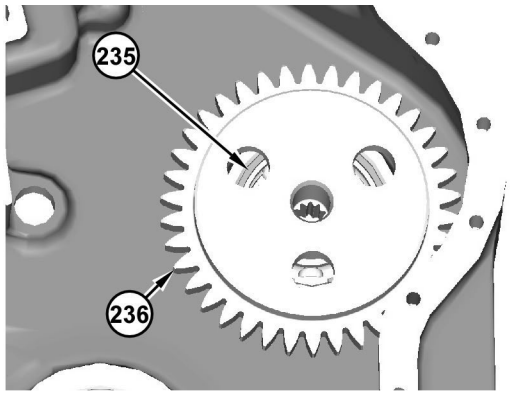

Illustration 489 g02517360

5. Install gear (236).

6. Install retaining ring (235).

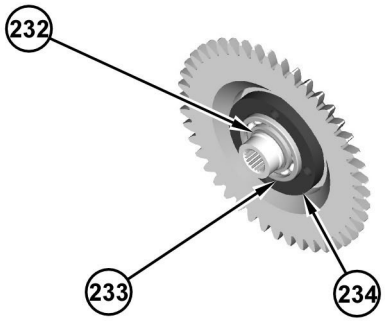

Illustration 490 g02517359

7. Install retainer (234). Install bearing (233). Install retaining ring (232).

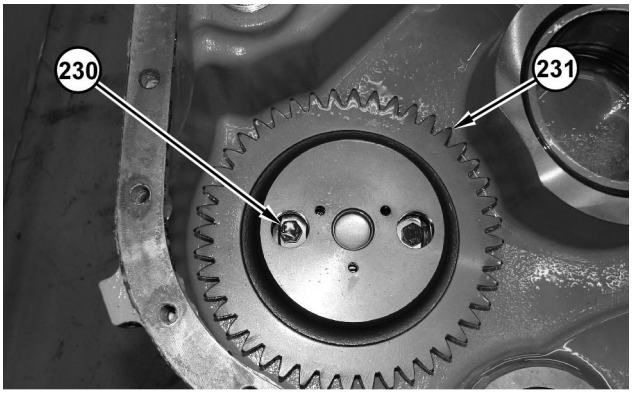

Illustration 491 g02517358

8. Install gear (231). Install bolts (230). Tighten bolts (230) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

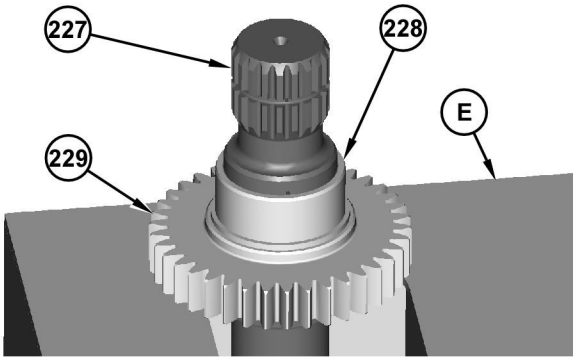

Illustration 492 g02517437

9. Use a suitable lifting device to position shaft assembly (227) onto Tooling (E). The weight of shaft assembly (227) is approximately 20 kg (44 lb). Use suitable blocking to support shaft assembly (227). Install gear (229). Raise the temperature of race (228). Install race (228).

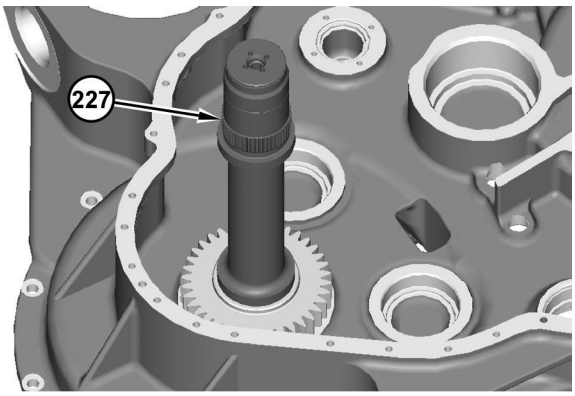

Illustration 493 g02517216

10. Use a suitable lifting device to remove shaft assembly (227). The weight of shaft assembly (227) is approximately 20 kg (44 lb).

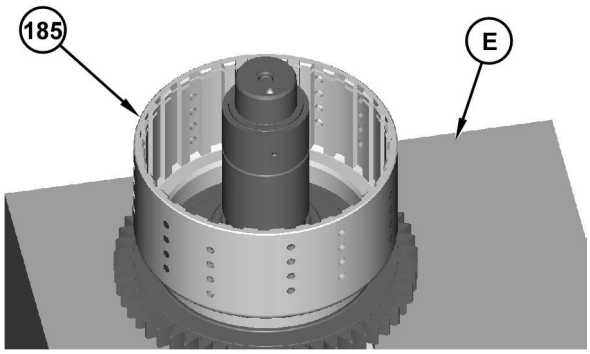

Illustration 494 g01391080

11. Use a suitable lifting device to position clutch assembly (185) onto Tooling (E). The weight of clutch assembly (185) is approximately 35 kg (77 lb).

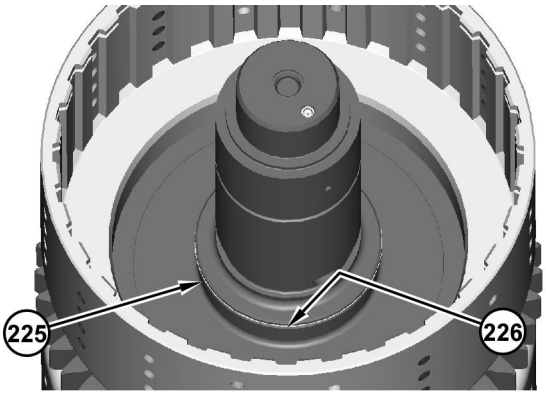

Illustration 495 g01390889

12. Install O-ring seal (226) and seal ring (225).

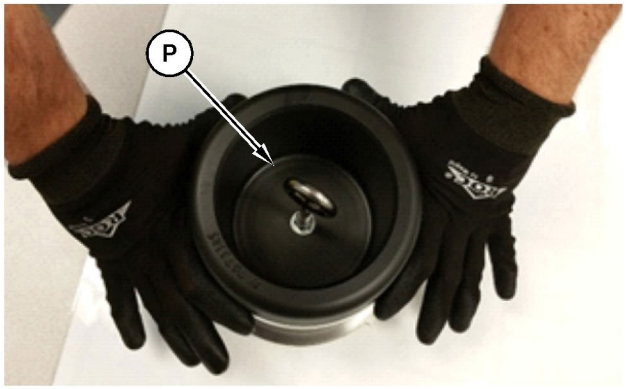

Illustration 496 g06082035

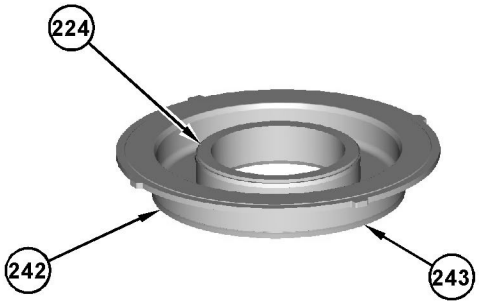

Illustration 497 g06085755

13. Install piston seal ring (224). Lubricate piston and seal groove with the oil being sealed. Use Tooling (P) to install the O-ring (242) and seal ring (243) as shown.

Note: Do not overstretch the seals.

Note: Assure that the seal rings are properly seated in the groove of the piston.

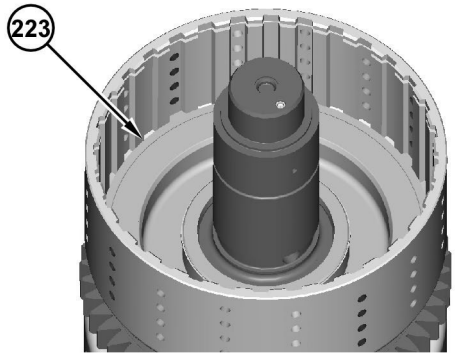

Illustration 498 g01390885

14. Install piston (223).

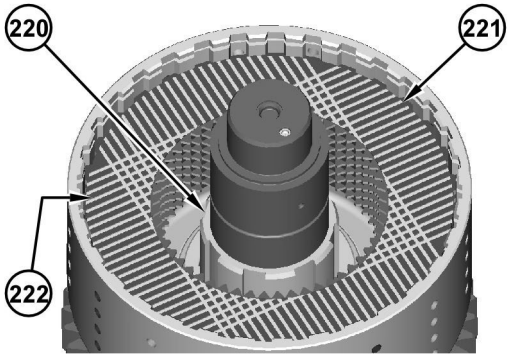

Illustration 499 g01390883

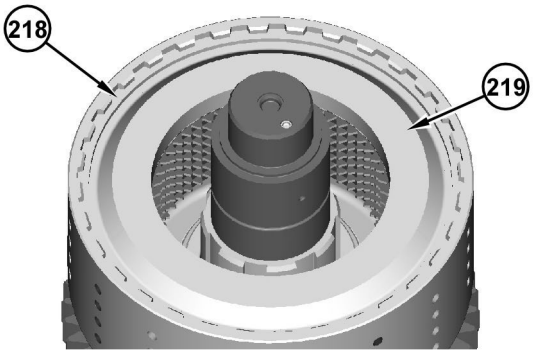

Illustration 500 g01390880

15. Install plates (222) and discs (221).

16. Install slider (220).

17. Use Tooling (K) to align plates (222) and discs (221). Install end plate (219). Install retaining ring (218). Remove Tooling (K).

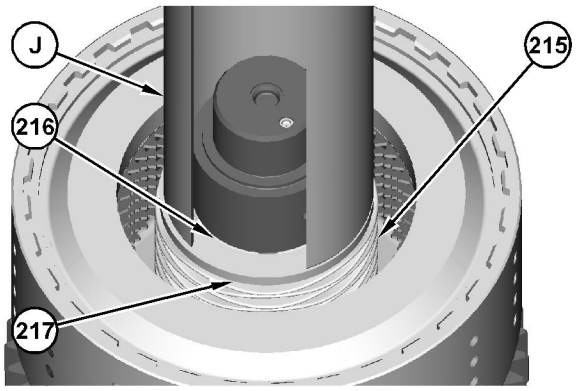

Illustration 501 g06210706

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

18. Install spring (215). Install retainer (217). Use Tooling (J) to compress spring (215). Install retaining ring (216). Remove Tooling (J).

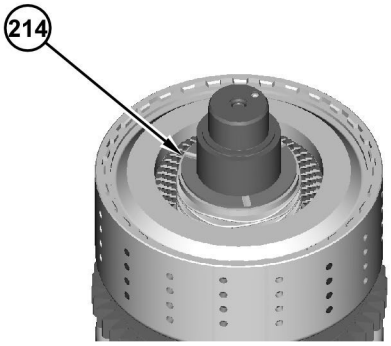

Illustration 502 g01390877

19. Install thrust washer (214).

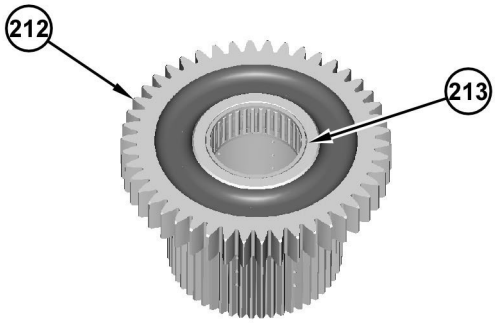

Illustration 503 g01390872

20. Lower the temperature of bearing (213). Install bearing (213) into gear (212).

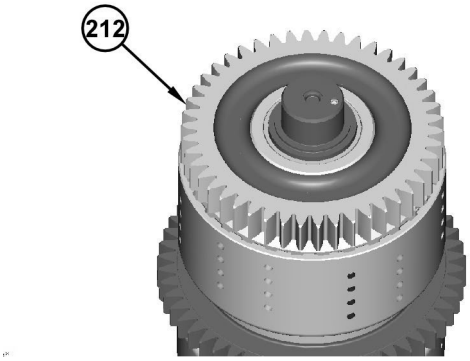

Illustration 504 g01390871

21. Install gear (212).

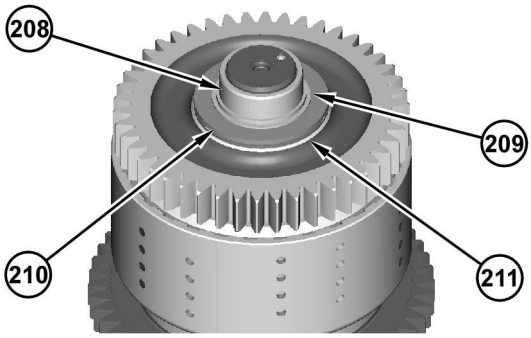

Illustration 505 g01391086

22. Install thrust washer (211). Install thrust washer (210). Install thrust race (209). Lower the temperature of race (208). Install race (208).

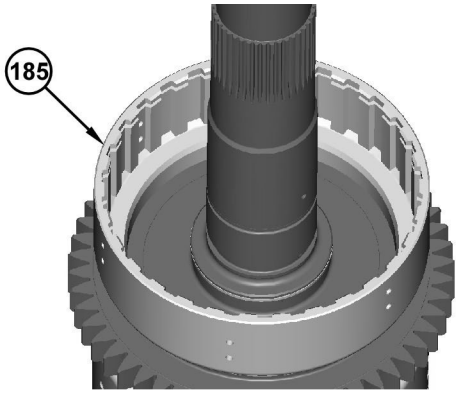

Illustration 506 g01390946

23. Use a suitable lifting device to turn over clutch assembly (185). The weight of clutch assembly (185) is approximately 68 kg (150 lb).

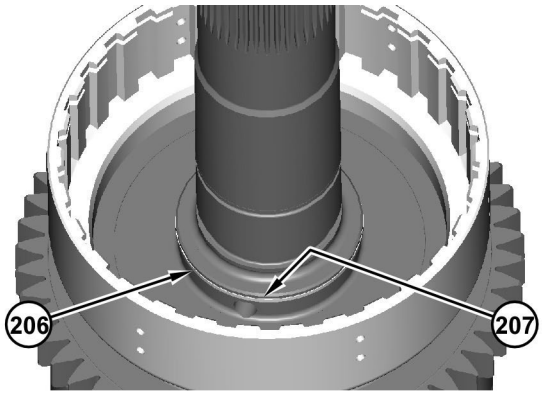

Illustration 507 g01390689

24. Install O-ring seal (207) and seal ring (206).

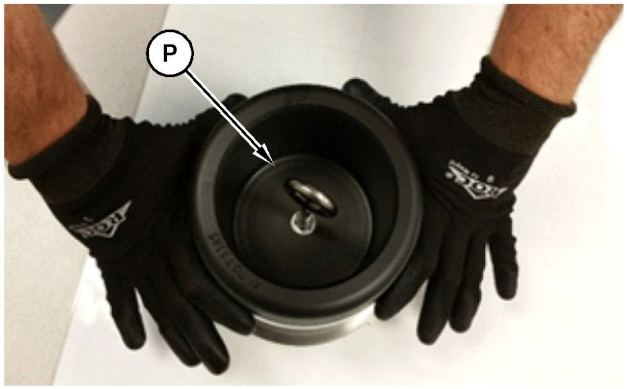

Illustration 508 g06082035

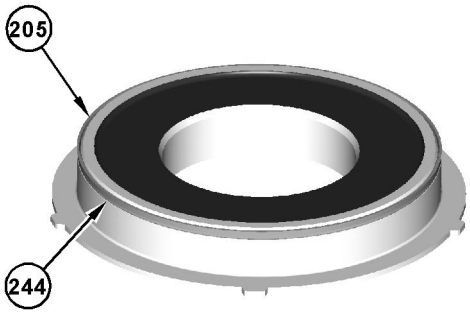

Illustration 509 g06085763

25. Lubricate the piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring seal (244) and seal ring (205) as shown.

Note: Do not overstretch the seals.

Note: Assure that the seal ring is properly seated in the groove of the piston.

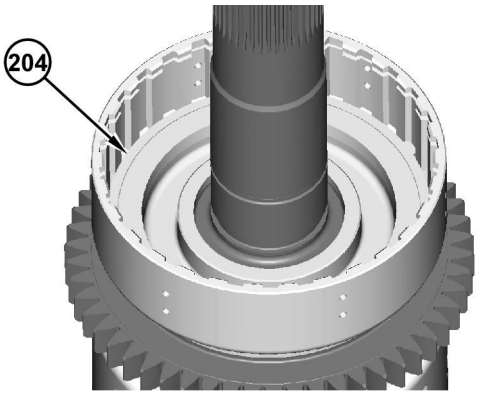

Illustration 510 g01390686

26. Install piston (204).

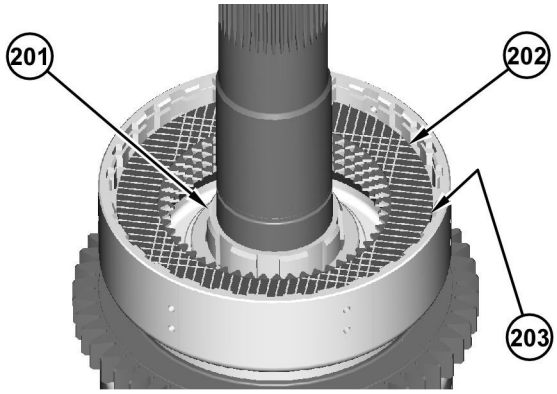

Illustration 511 g01390685

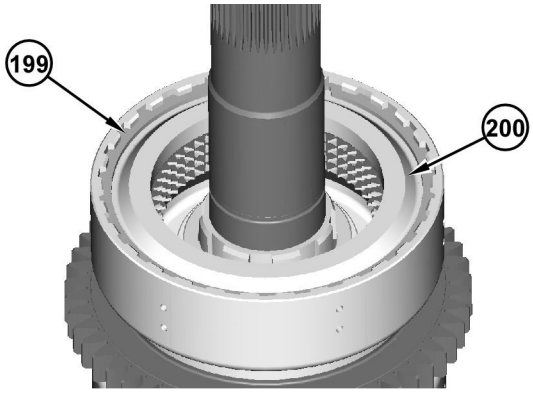

Illustration 512 g01390949

27. Install plates (203) and discs (202).

28. Install slider (201).

29. Use Tooling (K) to align plates (203) and discs (202). Install end plate (200). Install retaining ring (219). Remove Tooling (K).

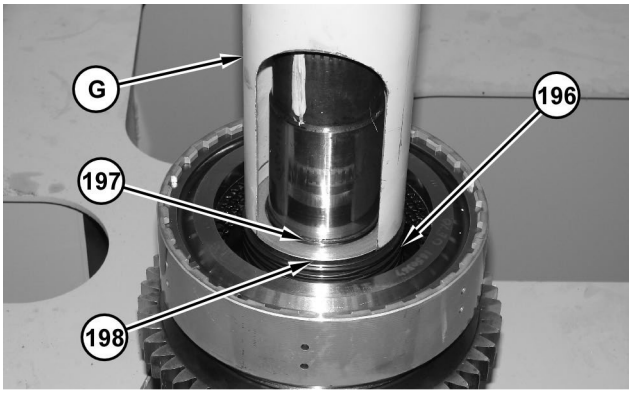

Illustration 513 g01390682

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

30. Install spring (196). Install retainer (198). Use Tooling (G) to compress spring (196). Install retaining ring (197). Remove Tooling (G).

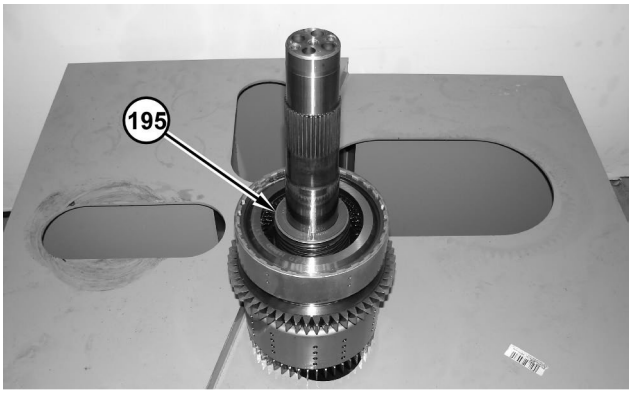

Illustration 514 g01390680

31. Install thrust washer (195).

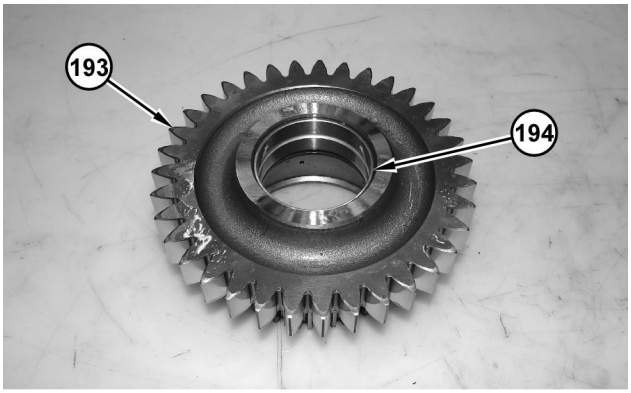

Illustration 515 g01390676

32. Lower the temperature of bearing sleeves (194). Install bearing sleeves (194) into gear (193).

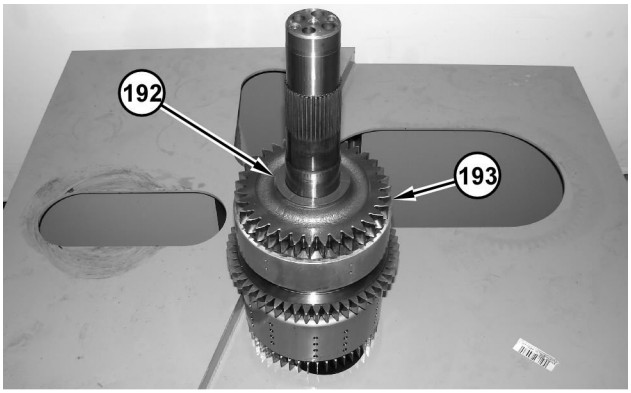

Illustration 516 g01390672

33. Install gear (193). Install thrust washer (192).

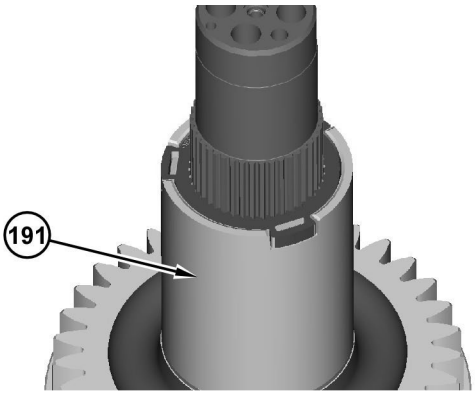

Illustration 517 g03780804

34. Install spacer (191).

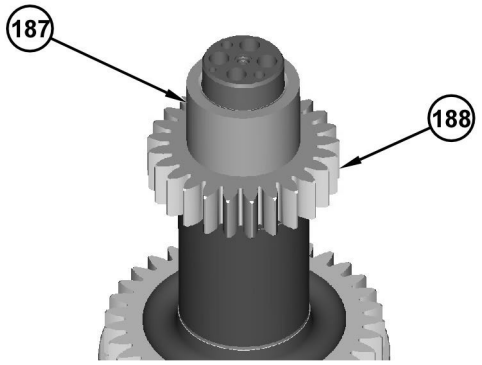

Illustration 518 g01390668

35. Install gear (188). Install spacer (187).

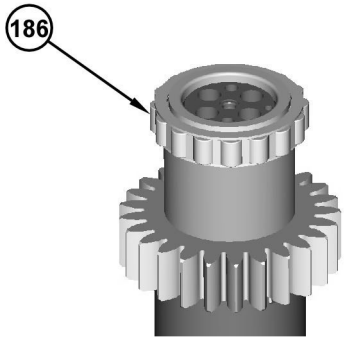

Illustration 519 g01391096

36. Raise the temperature of bearing (186). Install bearing (186).

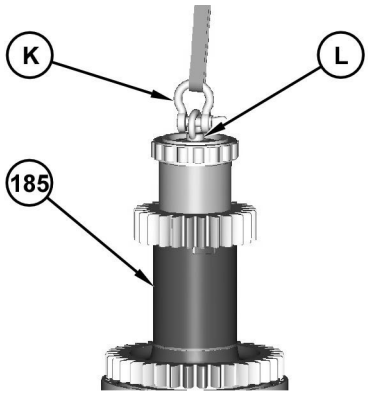

Illustration 520 g01390658

37. Use Tooling (K), Tooling (L), and a suitable lifting device to install clutch assembly (185). The weight of clutch assembly (185) is approximately 68 kg (150 lb).

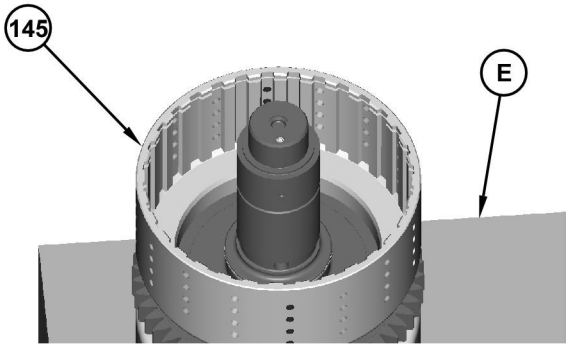

Illustration 521 g01391099

38. Use a suitable lifting device to position clutch assembly (145) onto Tooling (E). The weight of clutch assembly (145) is approximately 34 kg (75 lb).

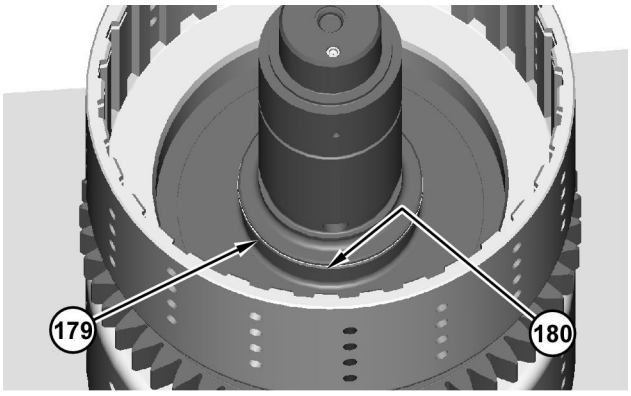

Illustration 522 g01391047

39. Install O-ring seal (180) and seal ring (179).

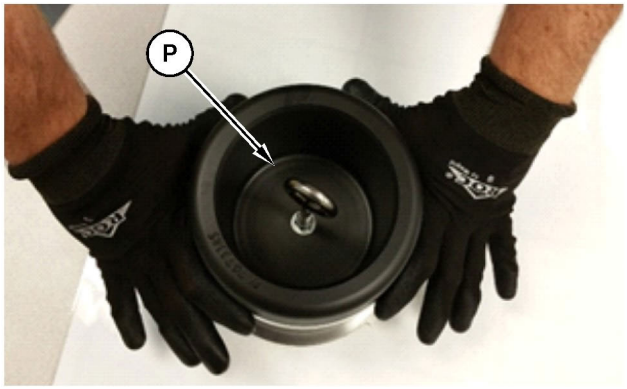

Illustration 523 g06082035

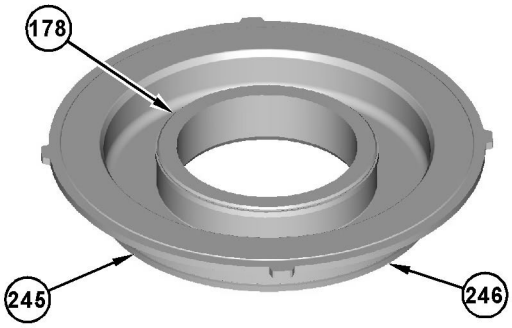

Illustration 524 g06085771

40. Install piston seal ring (178). Lubricate the piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring (245) and seal ring (246) as shown.

Note: Do not overstretch the seals.

Note: Assure that the seal rings are properly seated in the groove of the piston.

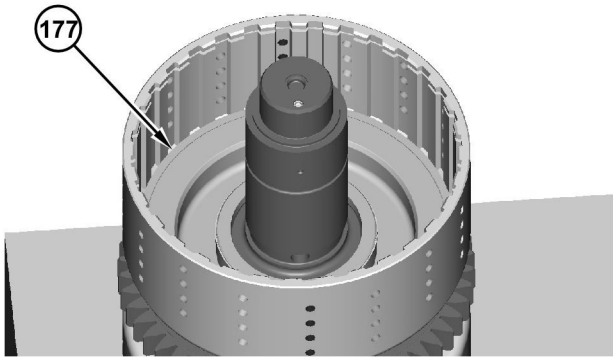

Illustration 525 g01390651

41. Install piston (177).

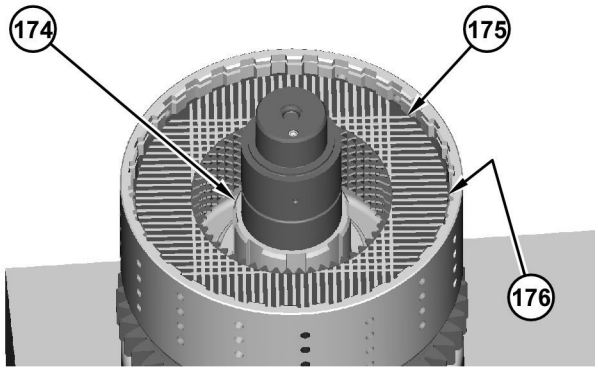

Illustration 526 g01390647

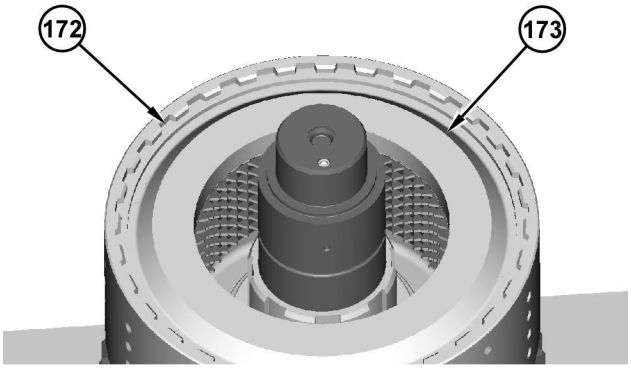

Illustration 527 g01390646

42. Install plates (176) and discs (175).

43. Install slider (174).

44. Use Tooling (N) to align plates (176) and discs (175). Install end plate (173). Install retaining ring (172).

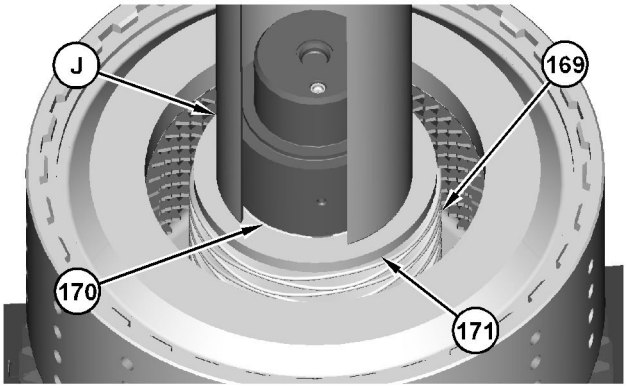

Illustration 528 g06210699

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

45. Install spring (169). Install retainer (171). Use Tooling (G) to compress spring (169). Install retaining ring (170). Remove Tooling (G).

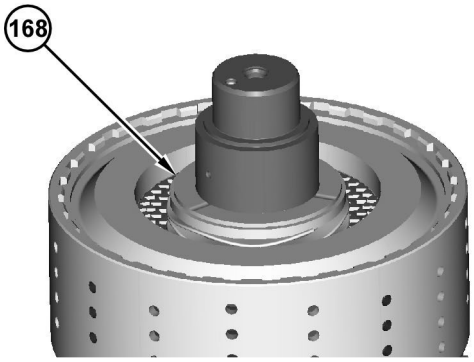

Illustration 529 g01390641

46. Install thrust washer (168).

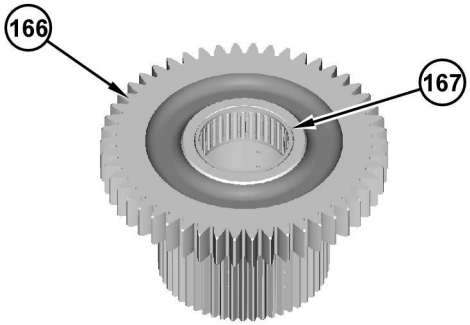

Illustration 530 g01390639

47. Lower the temperature of bearing (167). Install bearing (167) into gear (166).

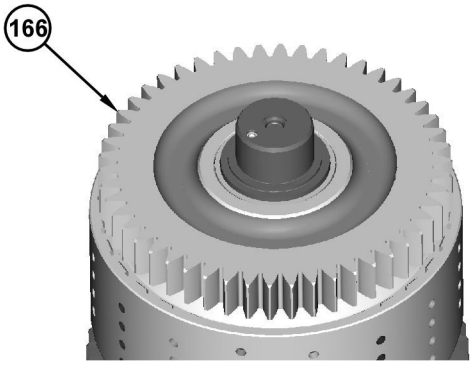

Illustration 531 g01390634

48. Install gear (166).

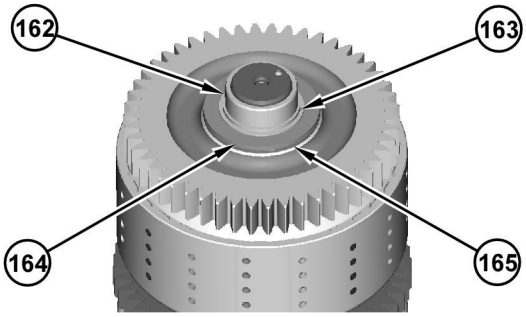

Illustration 532 g01391104

49. Install thrust washer (165). Install thrust washer (164). Install thrust race (163). Raise the temperature of race (162). Install race (162).

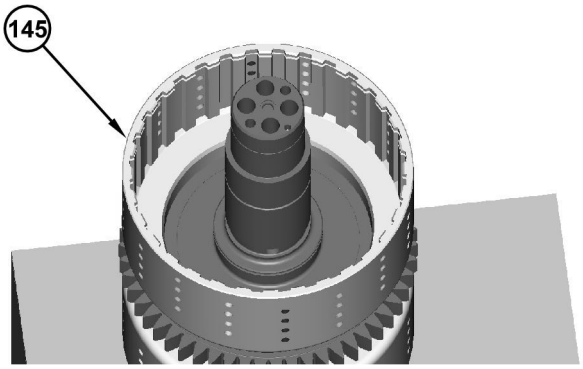

Illustration 533 g01391110

50. Use a suitable lifting device to turn over clutch assembly (145). The weight of clutch assembly (145) is approximately 86 kg (190 lb).

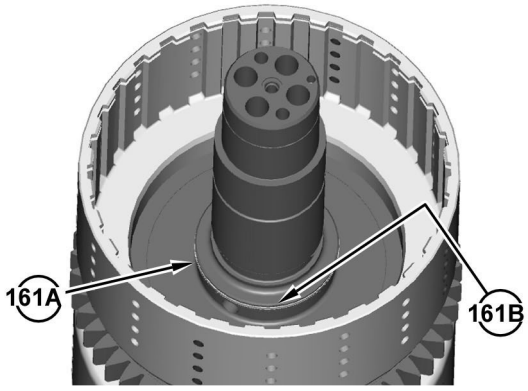

Illustration 534 g02407538

51. Install O-ring seal (161B) and seal ring (161A).

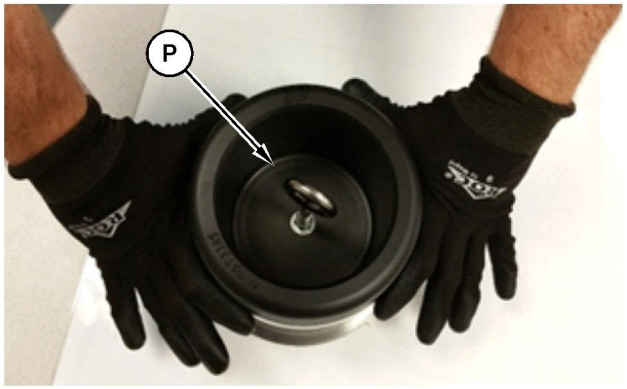

Illustration 535 g06082035

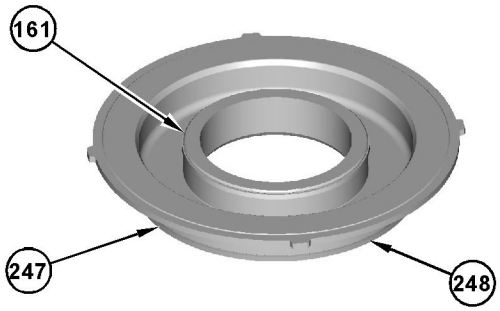

Illustration 536 g06085780

52. Install piston seal rings (161). Lubricate piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring (247) and ring seal (248) as shown.

Note: Do not overstretch the seals.

Note: Assure that the ring seals are properly seated in the groove of the piston.

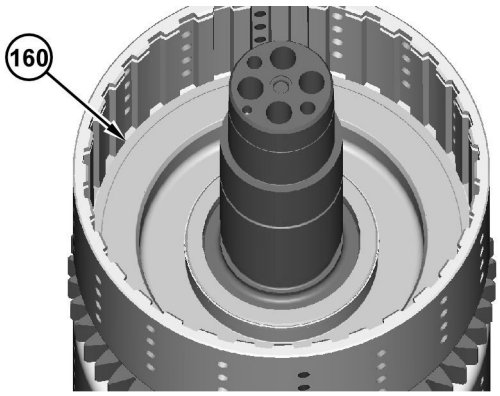

Illustration 537 g01390627

53. Install piston (160).

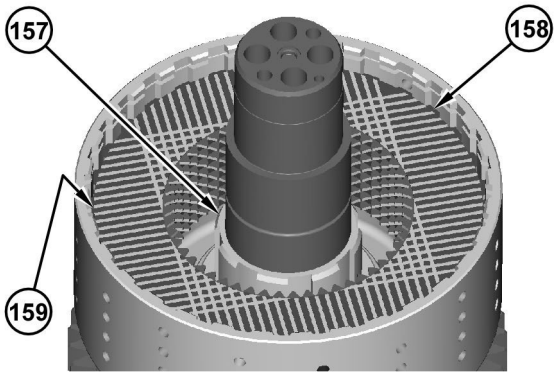

Illustration 538 g01390625

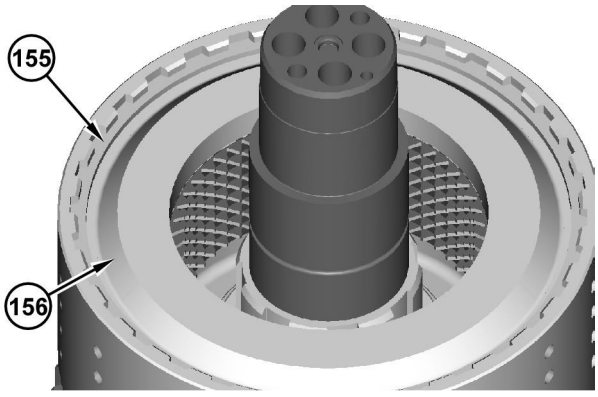

Illustration 539 g01390622

54. Install plates (159) and discs (158).

55. Install slider (157).

56. Use Tooling (N) to align plates (159) and discs (158). Install end plate (156). Install retaining ring (155).

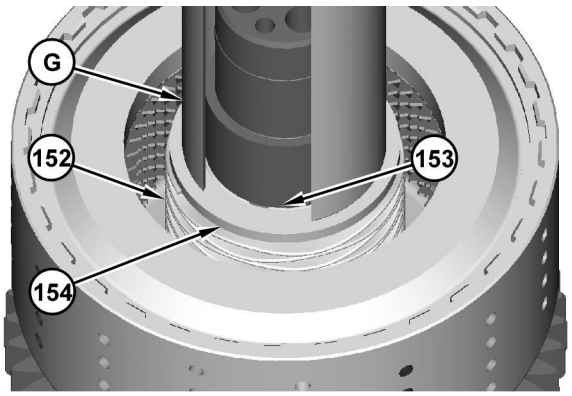

Illustration 540 g01390617

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

57. Install spring (152). Install retainer (154). Use Tooling (G) to compress spring (152). Install retaining ring (153). Remove Tooling (G).

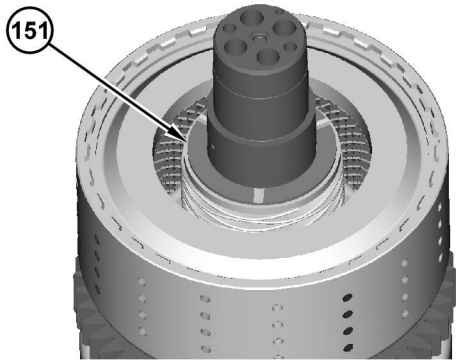

Illustration 541 g01390620

58. Install thrust washer (151).

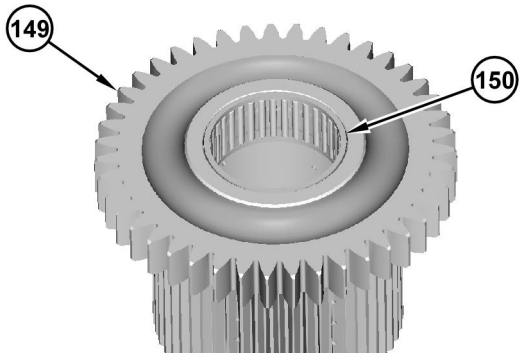

Illustration 542 g01390614

59. Lower the temperature of bearing (150). Install bearing (150) into gear (149).

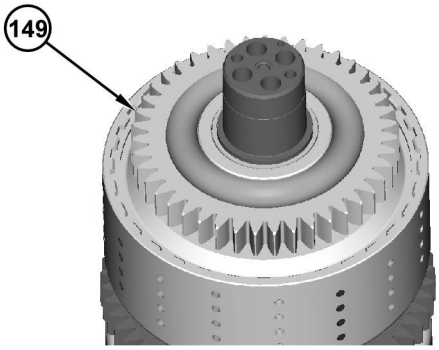

Illustration 543 g01390612

60. Install gear (149).

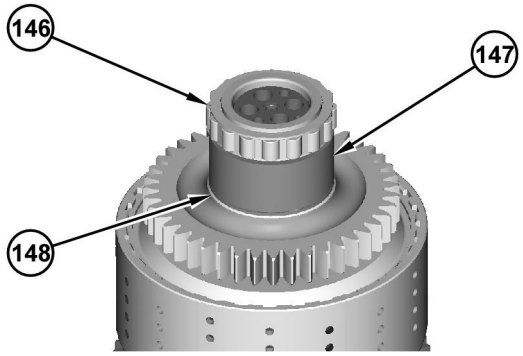

Illustration 544 g01391116

61. Install thrust washer (148). Install spacer (147). Raise the temperature of bearing (146). Install bearing (146).

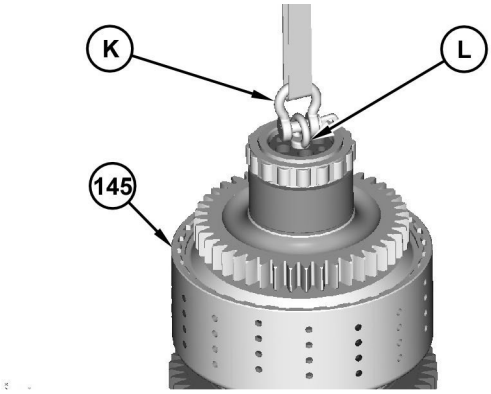

Illustration 545 g01390604

62. Use Tooling (K), Tooling (L), and a suitable lifting device to install clutch assembly (145). The weight of clutch assembly (145) is approximately 86 kg (190 lb).

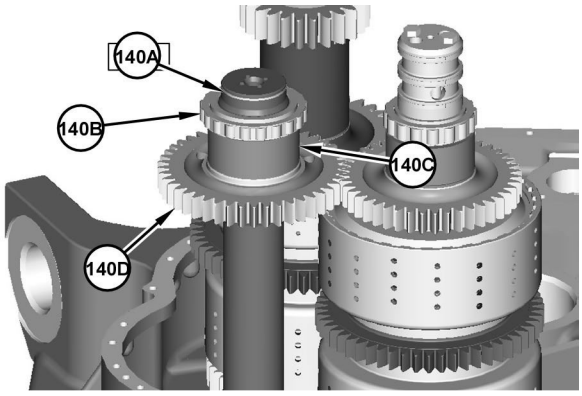

Illustration 546 g02521778

63. Install gear (140D) and spacer (140C). Raise the temperature of bearing (140B). Install bearing (140B). Install seal ring (140A).

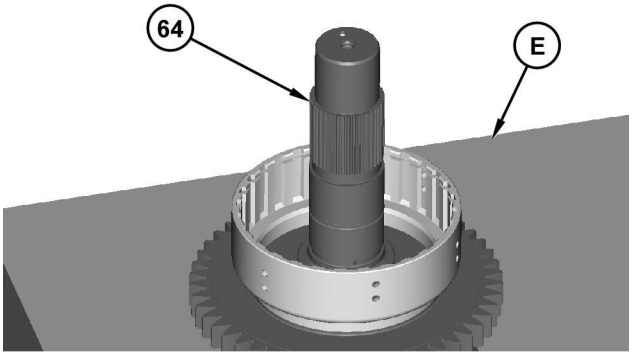

Illustration 547 g01391124

64. Use a suitable lifting device to position clutch assembly (64) onto Tooling (E). The weight of clutch assembly (64) is approximately 34 kg (75 lb).

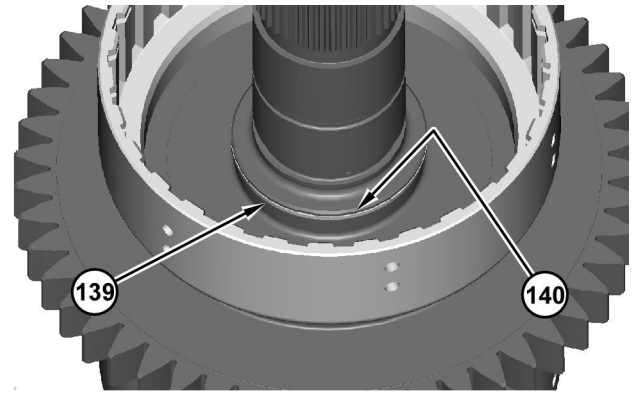

Illustration 548 g01390597

65. Install O-ring seal (140) and seal ring (139).

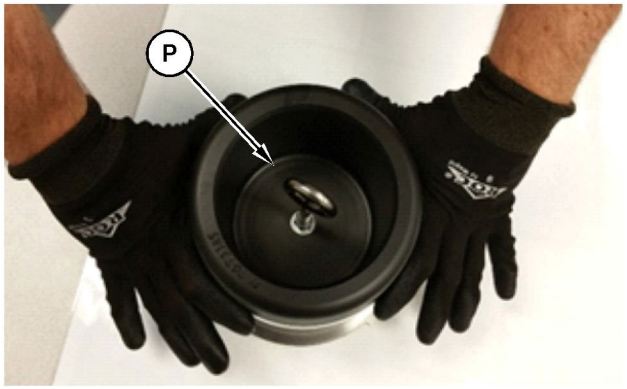

Illustration 549 g06082035

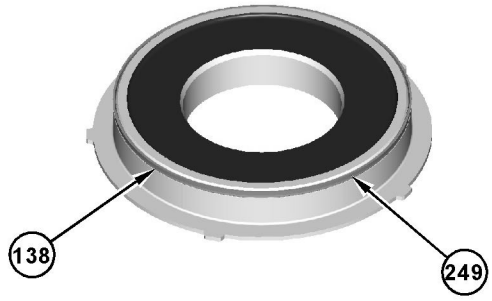

Illustration 550 g06085796

66. Lubricate the piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring seal (138) and seal ring (249) as shown.

Note: Do not overstretch seals.

Note: Assure that the seal ring is properly seated in the groove of the piston.

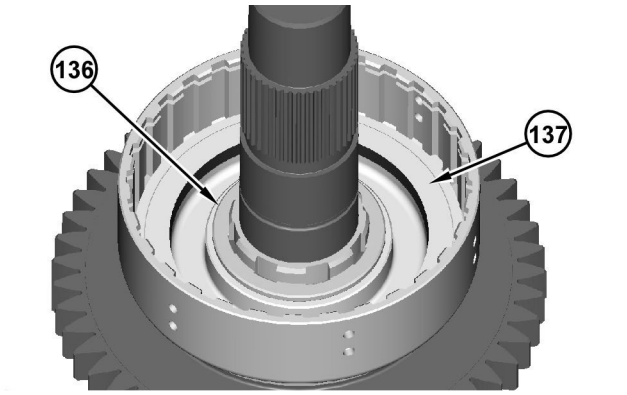

Illustration 551 g01390595

67. Install piston (137). Install slider (136).

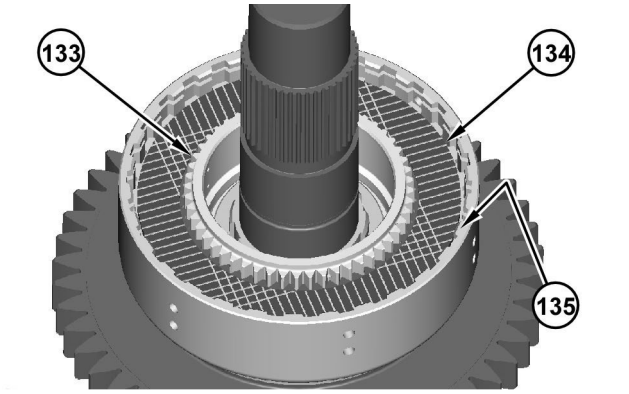

Illustration 552 g01390593

68. Install plates (135) and discs (134).

69. Install hub (133).

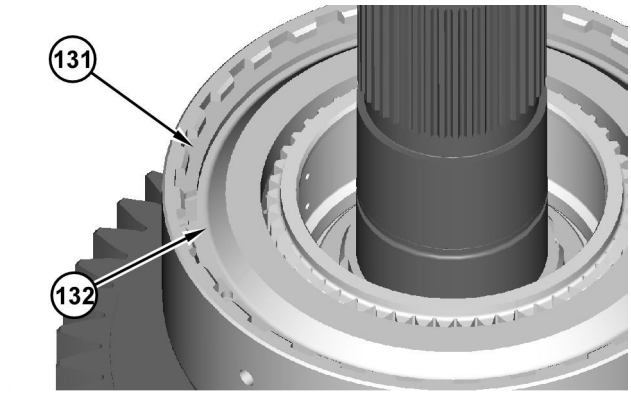

Illustration 553 g01390592

70. Install end plate (132). Install retaining ring (131).

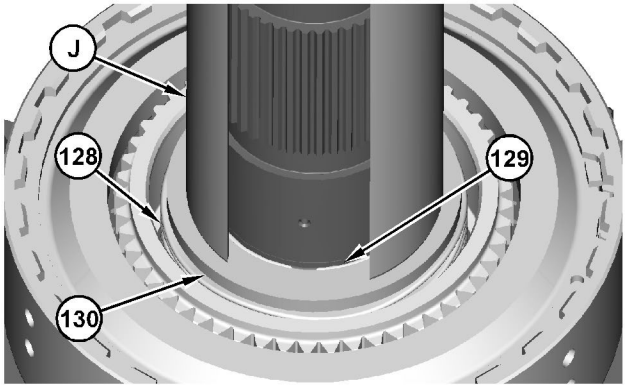

Illustration 554 g06210695

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

71. Install spring (128). Install retainer (130). Use Tooling (J) to compress spring (128). Install retaining ring (129). Remove Tooling (J).

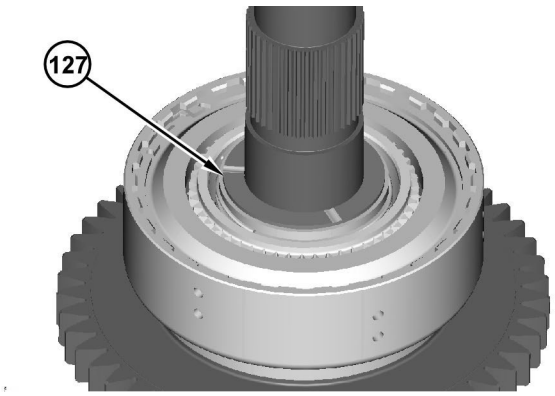

Illustration 555 g01390588

72. Install thrust washer (127).

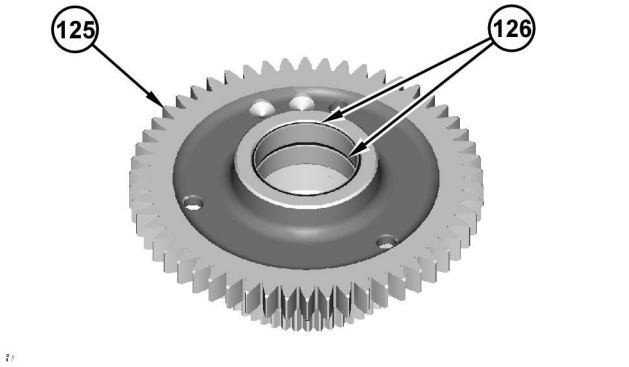

Illustration 556 g01390586

73. Lower the temperature of bearing sleeves (126). Install bearing sleeves (126) into gear (125).

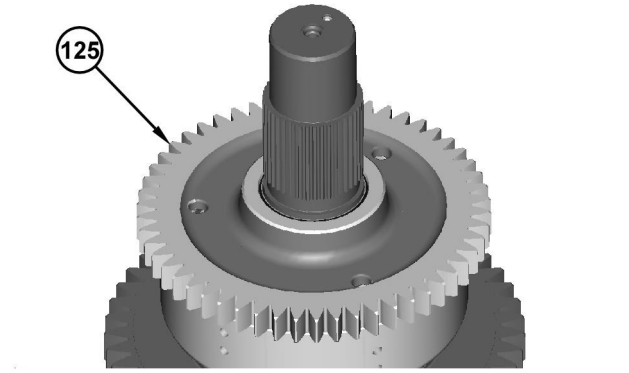

Illustration 557 g01390584

74. Install gear (125).

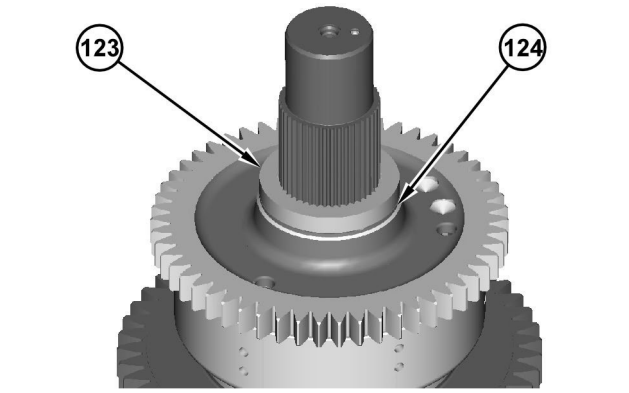

Illustration 558 g01390583

75. Install thrust washer (124). Install spacer (123).

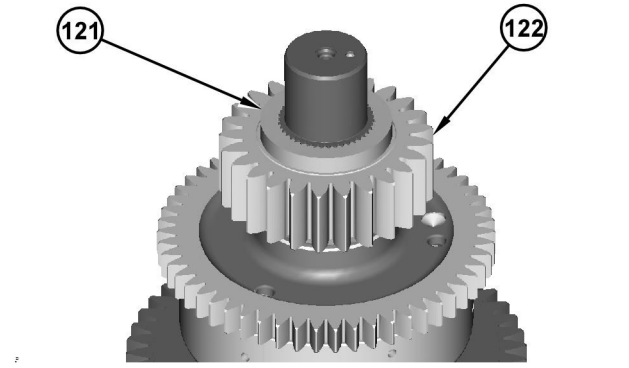

Illustration 559 g01390582

76. Install gear (122). Install spacer (121).

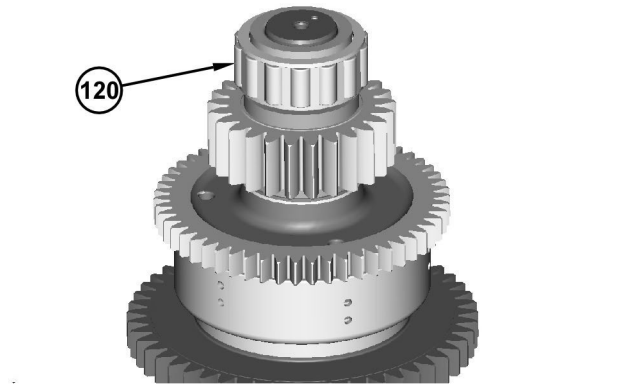

Illustration 560 g01391134

77. Raise the temperature of bearing (120). Install bearing (120).

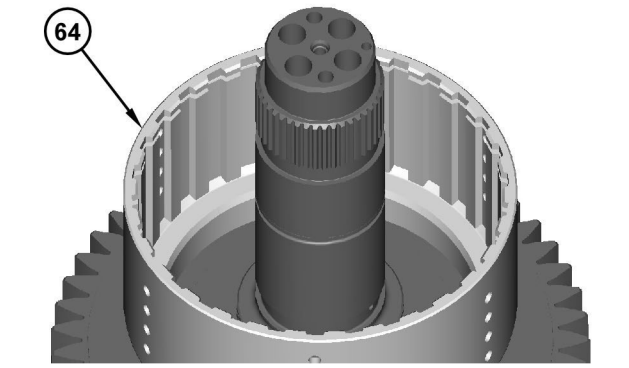

Illustration 561 g01391136

78. Use a suitable lifting device to turn over clutch assembly (64). The weight of clutch assembly (64) is approximately 113 kg (250 lb).

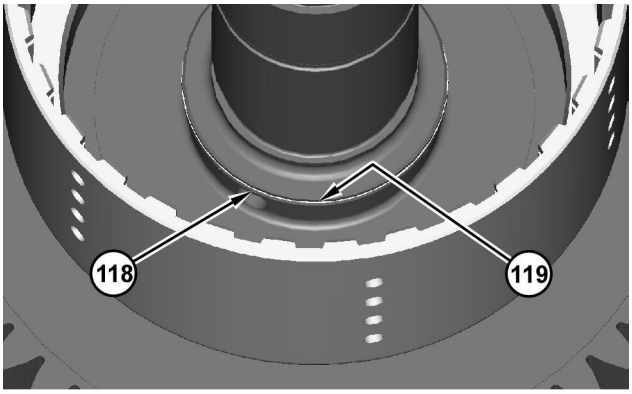

Illustration 562 g01390578

79. Install O-ring seal (119) and seal ring (118).

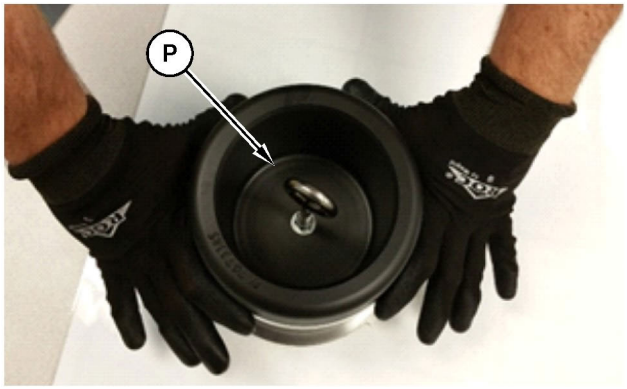

Illustration 563 g06082035

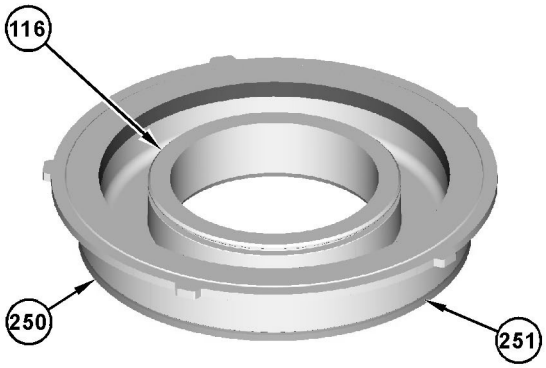

Illustration 564 g06085814

80. Install piston seal ring (116). Lubricate the piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring seal (250) and seal ring (251) as shown.

Note: Do not overstretch seals.

Note: Assure that the seal ring is properly seated in the groove of the piston.

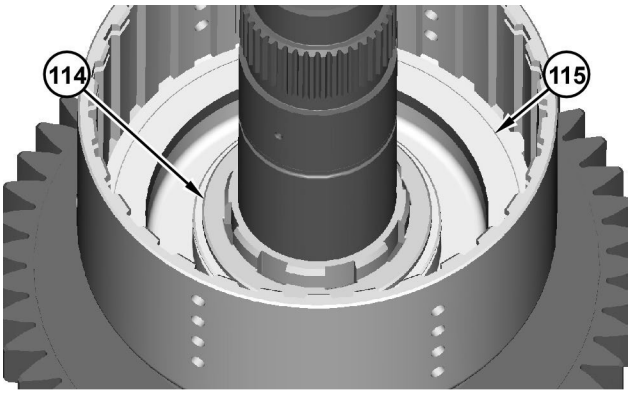

Illustration 565 g01390572

81. Install piston (115). Install slider (114).

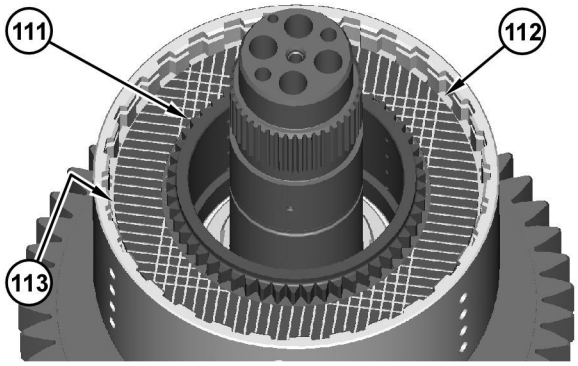

Illustration 566 g01390565

82. Install plates (113) and discs (112).

83. Install hub (111).

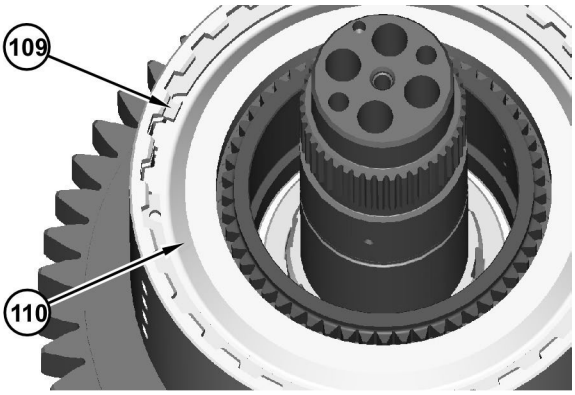

Illustration 567 g01390562

84. Install end plate (110). Install retaining ring (109).

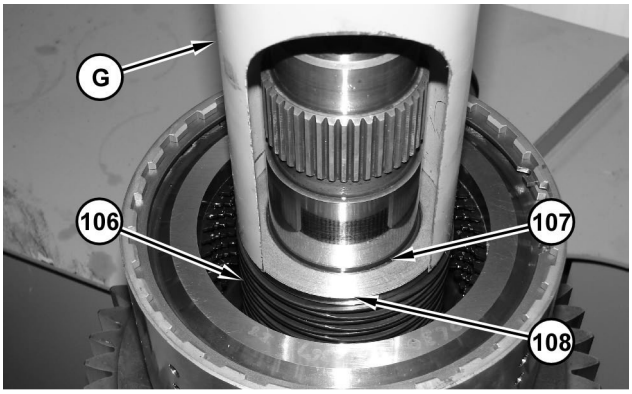

Illustration 568 g01390555

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

85. Install spring (106). Install retainer (108). Use Tooling (G) to compress spring (106). Install retaining ring (107). Remove Tooling (G).

Illustration 569 g01390554

86. Lower the temperature of bearing sleeve (105). Install bearing sleeve (105) into gear (104).

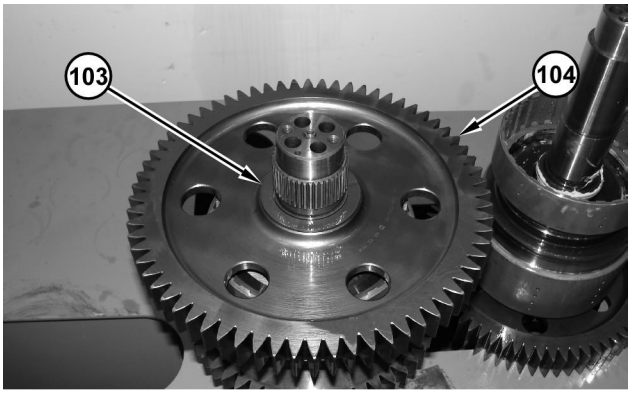

Illustration 570 g01390549

87. Install gear (104). Install thrust washer (103).

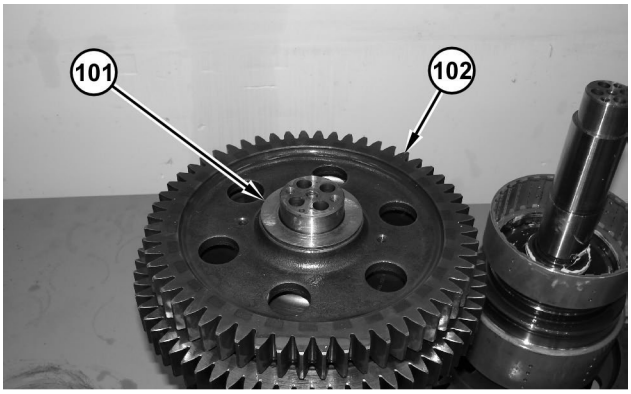

Illustration 571 g01390547

88. Install gear (102). Install thrust washer (101).

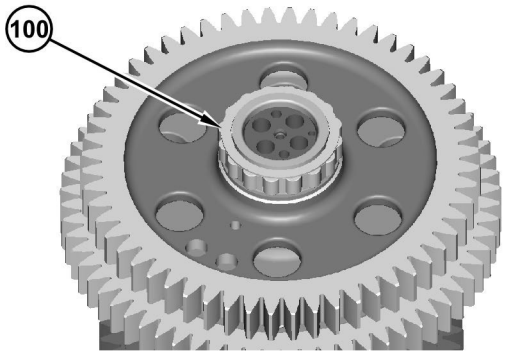

Illustration 572 g01391152

89. Raise the temperature of bearing (100). Install bearing (100).

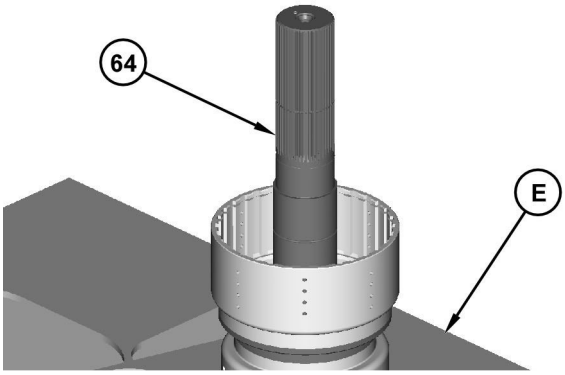

Illustration 573 g01391164

90. Use a suitable lifting device to position clutch assembly (64) onto Tooling (E). The weight of clutch assembly (64) is approximately 38 kg (84 lb).

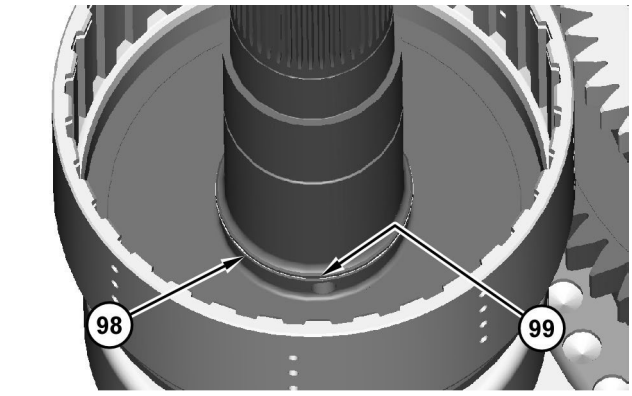

Illustration 574 g01390540

91. Install O-ring seal (99) and seal ring (98).

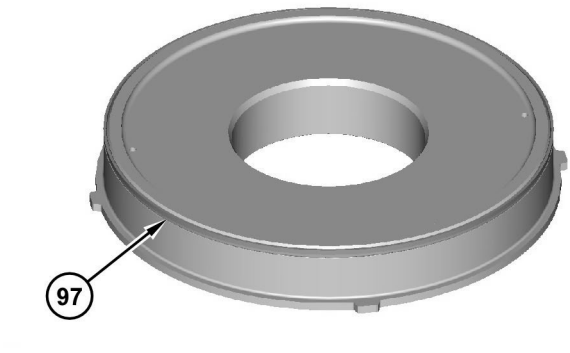

Illustration 575 g01390430

92. Lubricate the piston and seal groove with the oil being sealed. Install seal ring (97).

Note: Do not over stretch seal ring.

Note: Assure that the seal ring is properly seated in the groove of the piston.

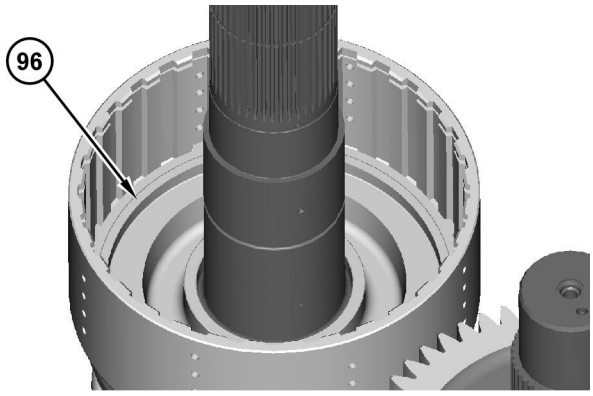

Illustration 576 g01390428

93. Install piston (96).

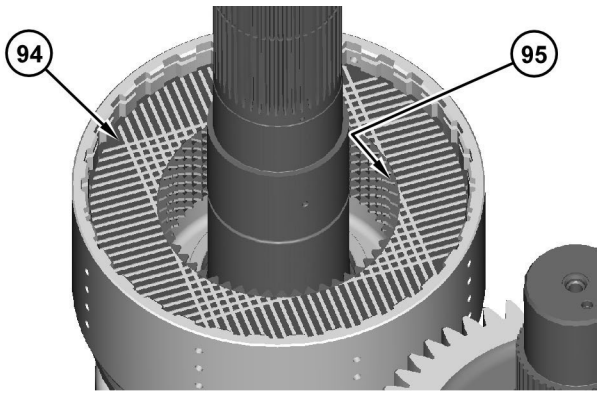

Illustration 577 g01390426

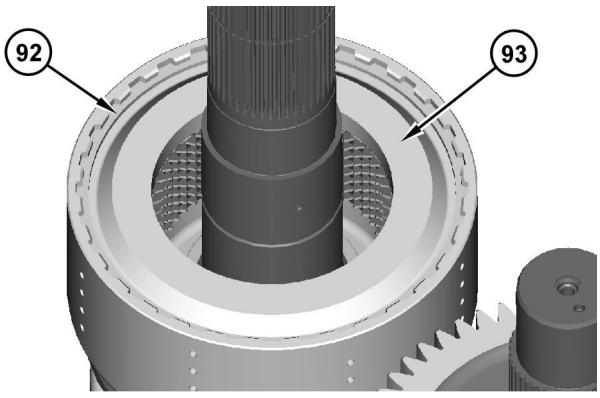

Illustration 578 g01390425

94. Install plates (95) and discs (94).

95. Use Tooling (N) to align plates (95) and discs (94). Install end plate (93). Install retaining ring (92).

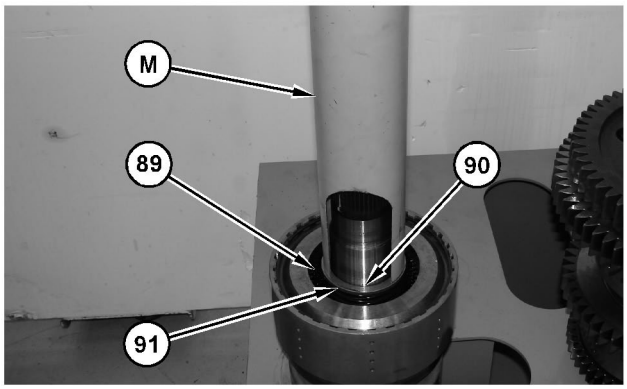

Illustration 579 g06210691

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

96. Install spring (89). Install retainer (91). Use Tooling (M) to compress spring (89). Install retaining ring (90). Remove Tooling (M).

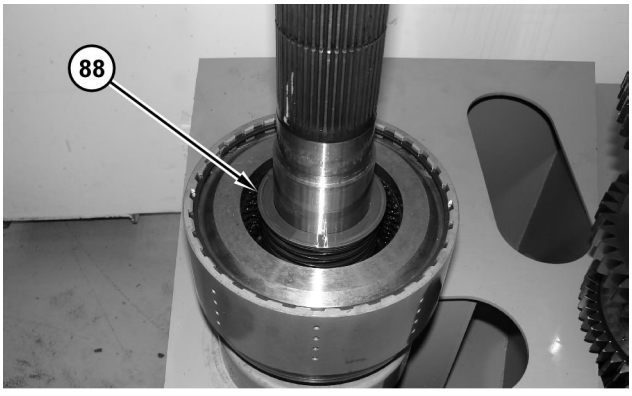

Illustration 580 g01390420

97. Install thrust washer (88).

Illustration 581 g01390419

98. Install gear (86). Lower the temperature of bearing sleeves (87). Install bearing sleeves (87).

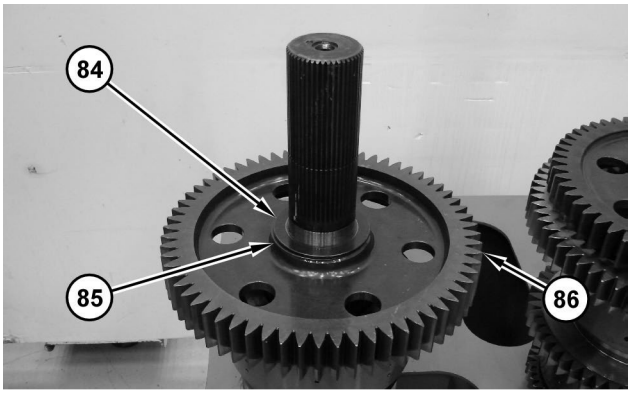

Illustration 582 g01390414

99. Install gear (86).

100. Install thrust washer (85). Install spacer (84).

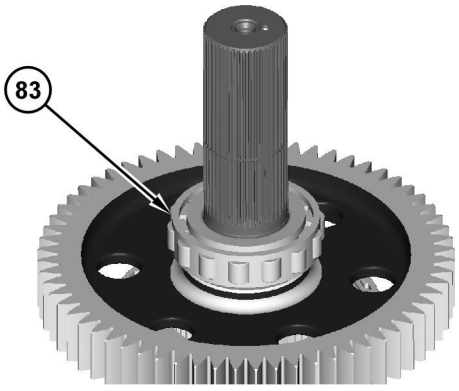

Illustration 583 g01391166

101. Raise the temperature of bearing (83). Install bearing (83).

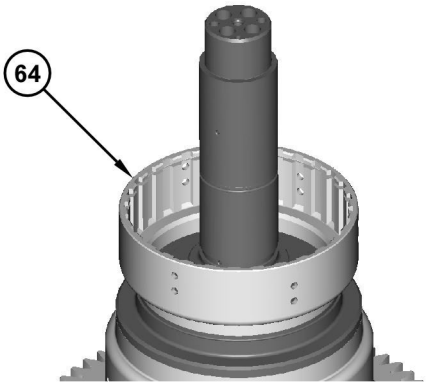

Illustration 584 g01391168

102. Use a suitable lifting device to turn over clutch assembly (64). The weight of clutch assembly (64) is approximately 104 kg (230 lb).

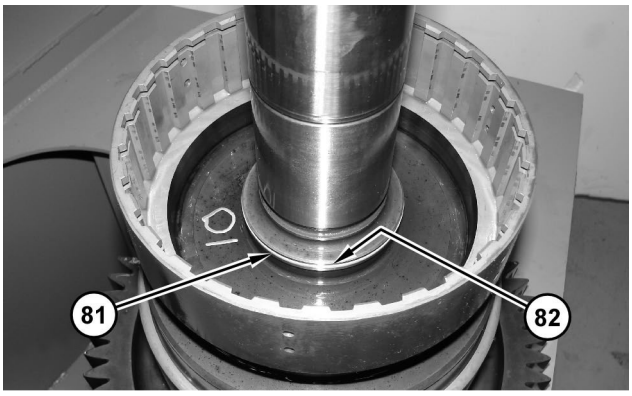

Illustration 585 g01390409

103. Install O-ring seal (82) and seal ring (81).

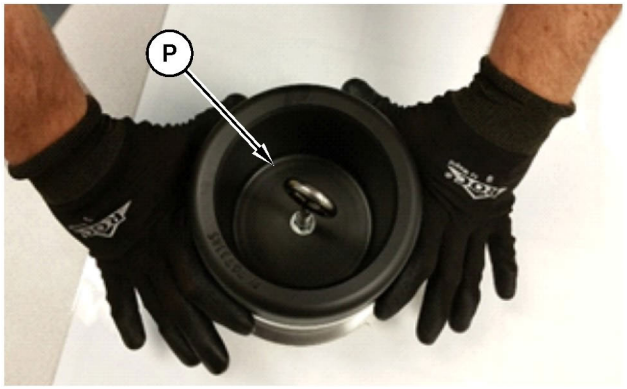

Illustration 586 g06082035

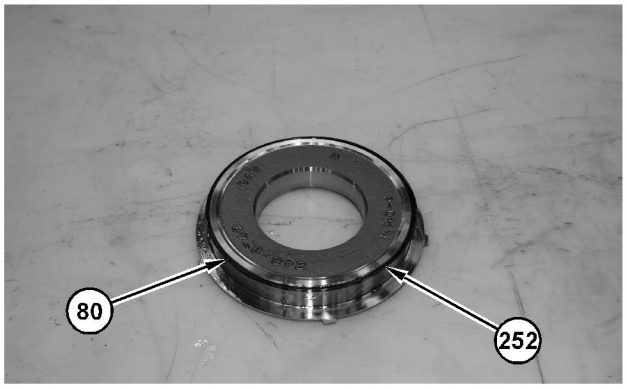

Illustration 587 g06085833

104. Lubricate the piston and seal groove with the oil being sealed. Use Tooling (P) to install O-ring seal (80) and seal ring (252) as shown.

Note: Do not overstretch seals.

Note: Assure that the seal ring is properly seated in the groove of the piston.

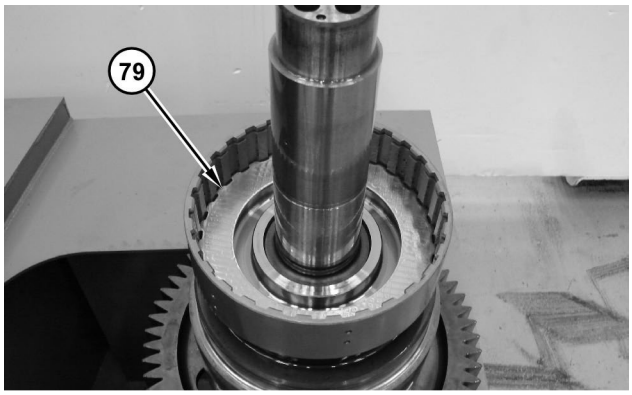

Illustration 588 g01390403

105. Install piston (79).

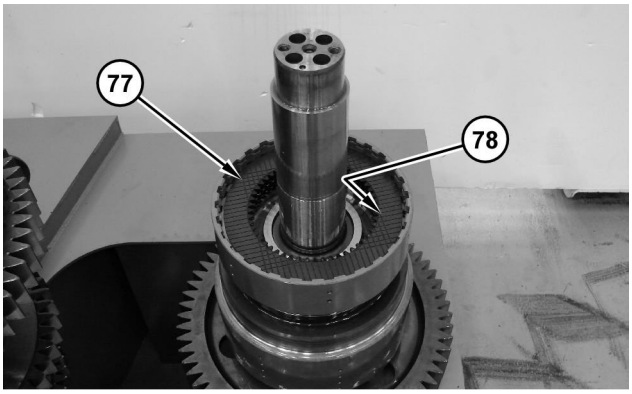

Illustration 589 g01390400

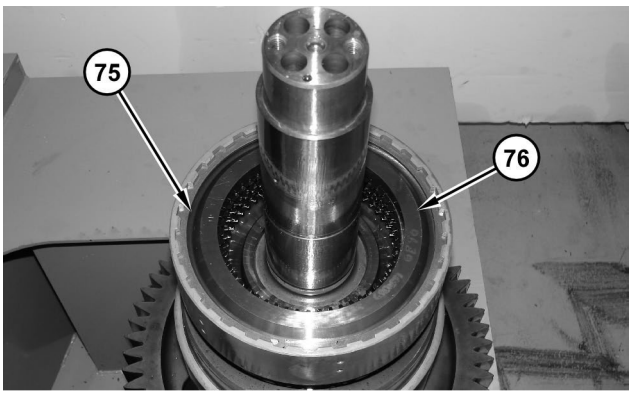

Illustration 590 g01390395

106. Install plates (78) and discs (77).

107. Use Tooling (N) to align plates (78) and discs (77). Install end plate (76). Install retaining ring (75).

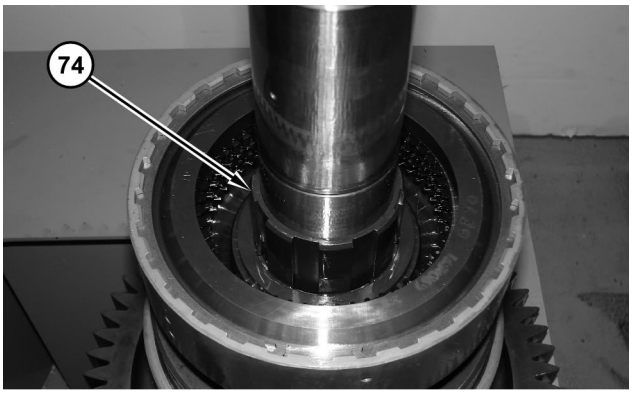

Illustration 591 g01390392

108. Install slider (74).

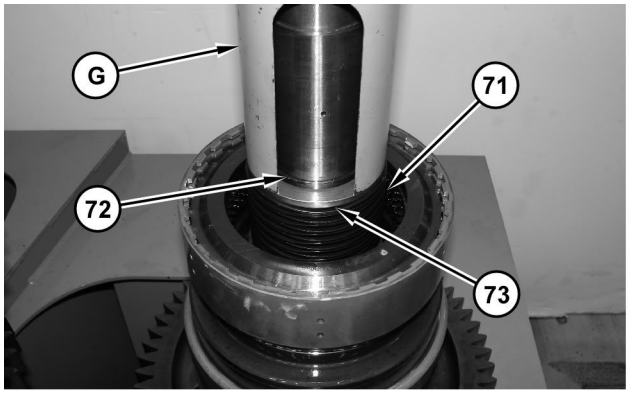

Illustration 592 g01390389

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

109. Install spring (71). Install retainer (73). Use Tooling (G) to compress spring (71). Install retaining ring (72). Remove Tooling (G).

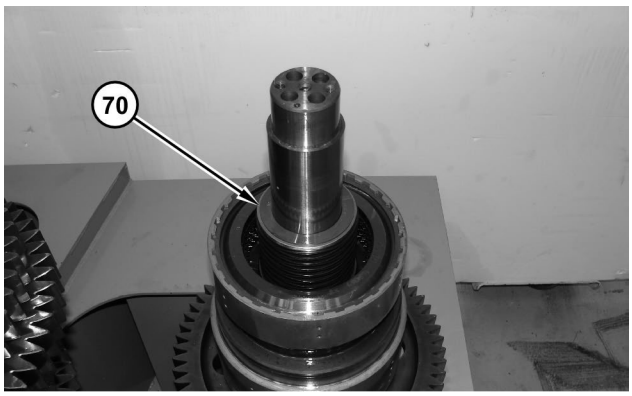

Illustration 593 g01390383

110. Install thrust washer (70).

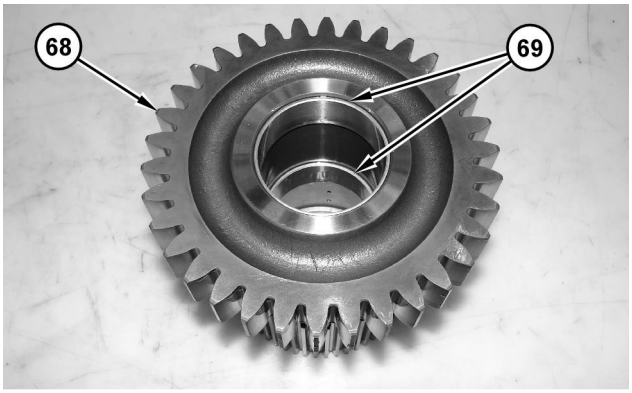

Illustration 594 g01390381

111. Lower the temperature of bearing sleeves (69). Install bearing sleeves (69) into gear (68).

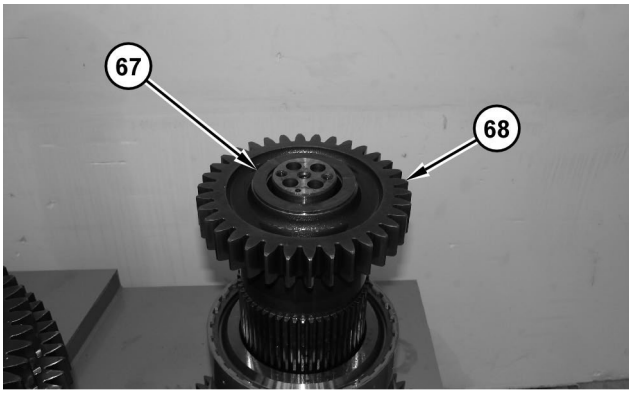

Illustration 595 g01390377

112. Install gear (68). Install thrust washer (67).

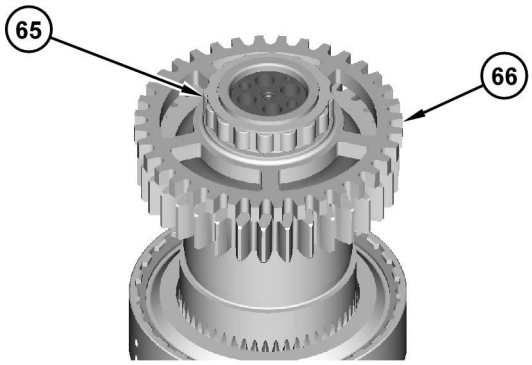

Illustration 596 g01391176

113. Install rotor (66). Raise the temperature of bearing (65). Install bearing (65).

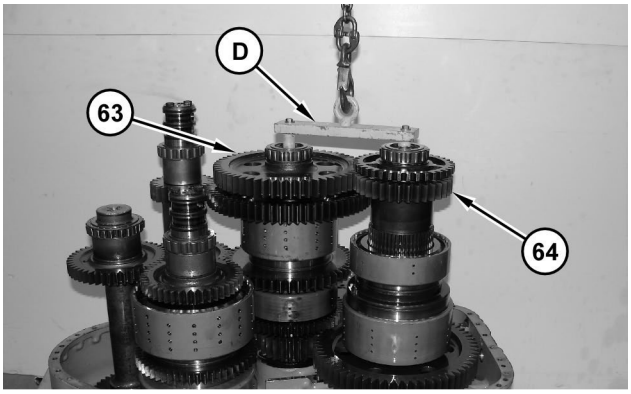

Illustration 597 g01390368

114. Use Tooling (D) and a suitable lifting device to install clutch assembly (64) and clutch assembly (63). The weight of clutch assembly (64) and clutch assembly (63) is approximately 204 kg (450 lb).

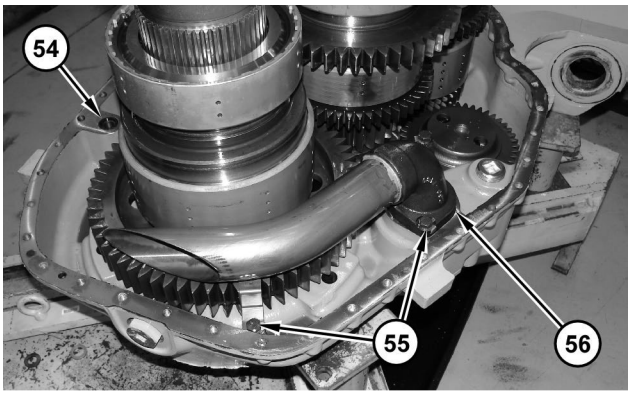

Illustration 598 g01390365

115. Install tube assembly (56). Install bolts (55). Tighten bolts (55) to a torque of 55 ± 10 N·m (41 ± 7 lb ft). Install O-ring seal (54).

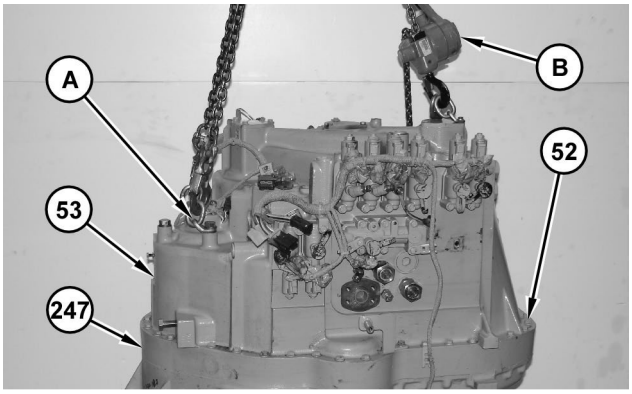

Illustration 599 g02517501

116. Apply Tooling (R) onto the mating surface of housing (247). Use Tooling (A), Tooling (B), and a suitable lifting device to install housing (53). The weight of housing (53) is approximately 261 kg (575 lb).

117. Install bolts (52). Tighten bolts (52) to a torque of 55 ± 10 N·m (41 ± 7 lb ft).

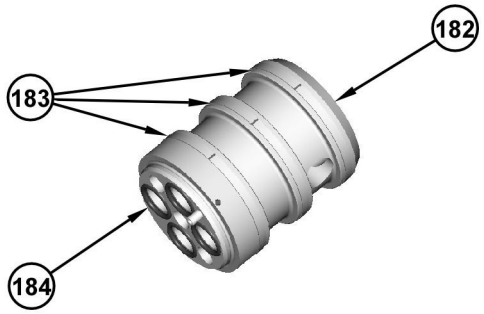

Illustration 600 g01391196

118. Install seal rings (183) and install O-ring seals (184) onto seal carrier (182).

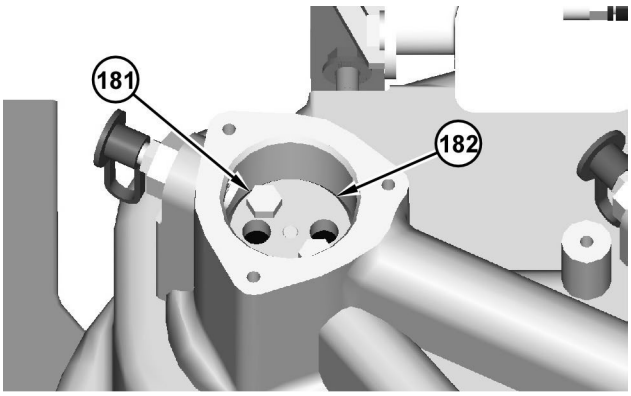

Illustration 601 g01391201

119. Install seal carrier (182). Install bolts (181).

Note: Ensure that the spring pin that is in the seal carrier is aligned with the hole that is in the end of the shaft assembly.

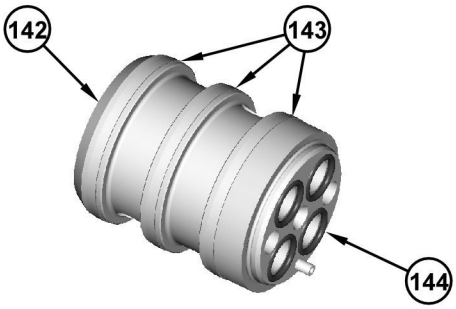

Illustration 602 g01391205

120. Install O-ring seals (144) and install seal rings (143) onto seal carrier (142).

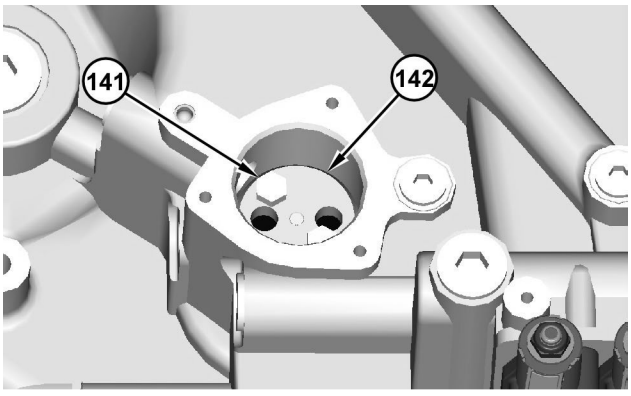

Illustration 603 g01391212

121. Install seal carrier (142). Install bolts (141).

Note: Ensure that the spring pin that is in the seal carrier is aligned with the hole that is in the end of the shaft assembly.

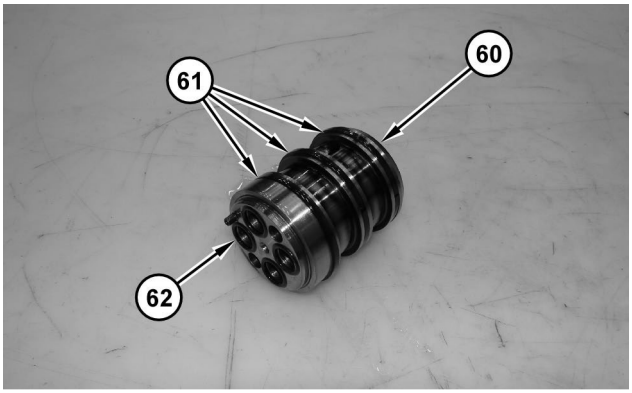

Illustration 604 g01391216

122. Install seal rings (61) and install O-ring seals (62) onto seal carrier (60). Repeat this step for seal carrier (58).

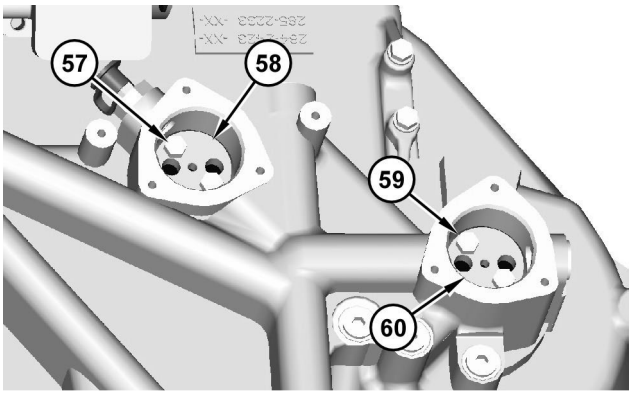

Illustration 605 g01391217

123. Install seal carrier (58) and install bolts (57). Install seal carrier (60) and install bolts (59).

Note: Ensure that the spring pin that is in the seal carrier is aligned with the hole that is in the end of the shaft assembly.

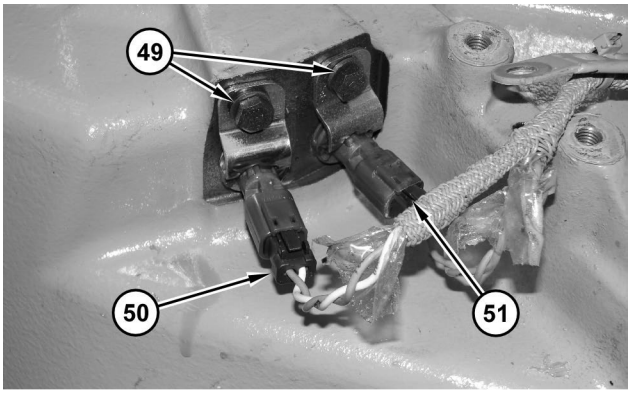

Illustration 606 g01390360

124. Install speed sensor (50) and speed sensor (51). Install bolts (49).

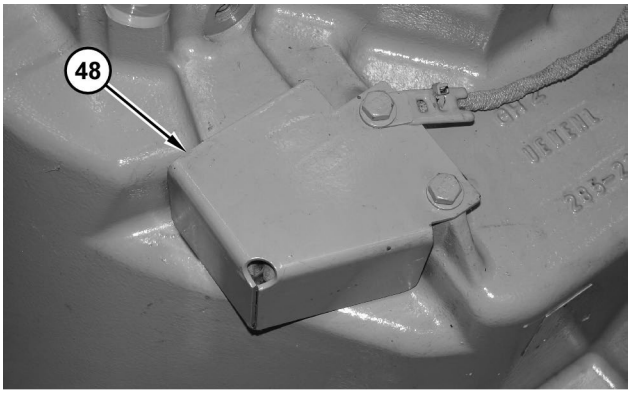

Illustration 607 g01390359

125. Install cover (48).

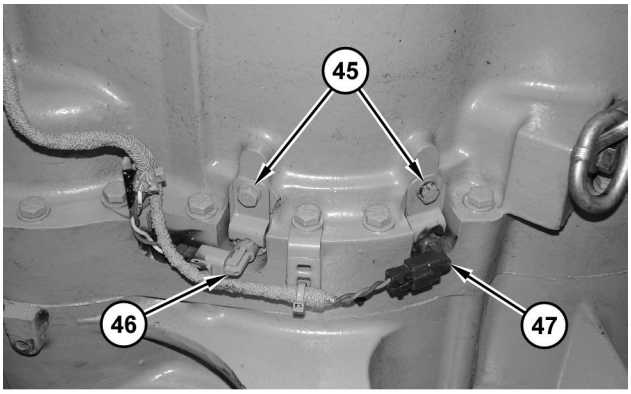

Illustration 608 g01390356

126. Install speed sensor (47) and speed sensor (46). Install bolts (45).

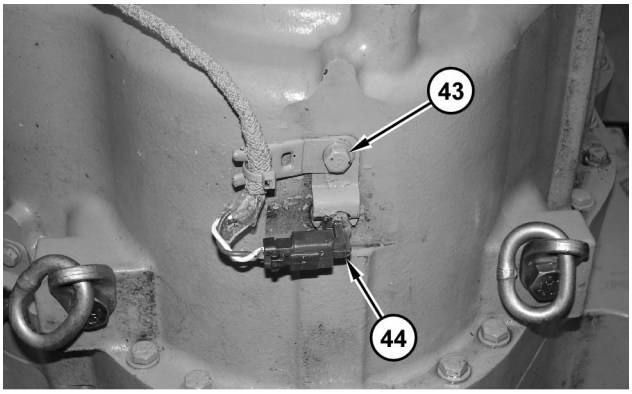

Illustration 609 g01390355

127. Install speed sensor (44). Install bolt (43).

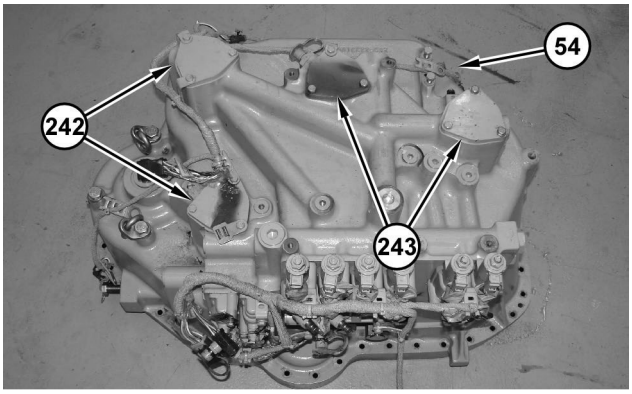

Illustration 610 g02517380

128. Install covers (243) and covers (242) onto housing (54).

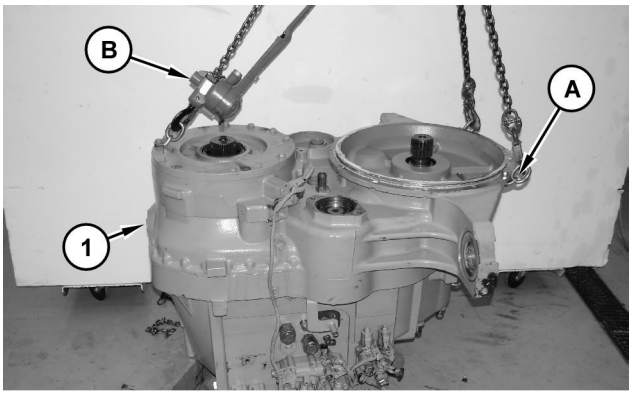

Illustration 611 g01390322

129. Use Tooling (A), Tooling (B), and a suitable lifting device to position transmission (1) with the output shaft upward. The weight of transmission (1) is approximately 1043 kg (2300 lb).

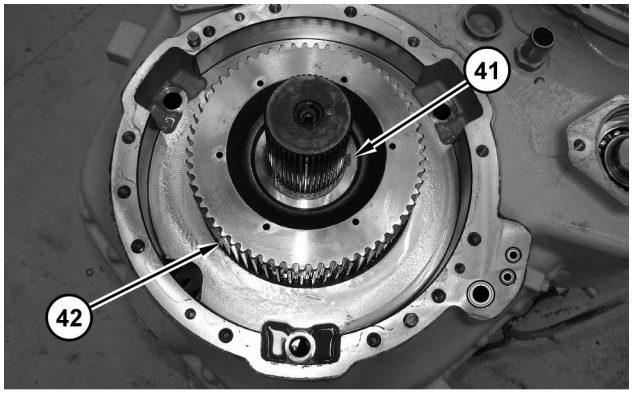

Illustration 612 g01390352

130. Install hub (42). Install retaining ring (41).

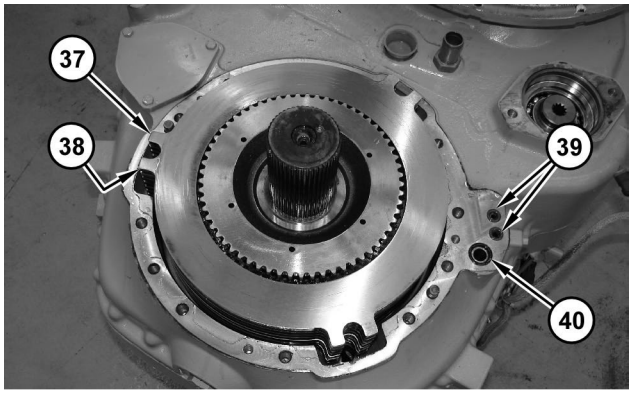

Illustration 613 g01390351

131. Install O-ring seals (40) and O-ring seal (39).

132. Install discs (37) and plates (38).

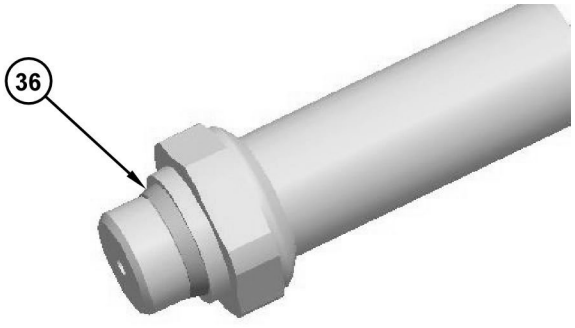

Illustration 614 g01390349

133. Install seal (36).

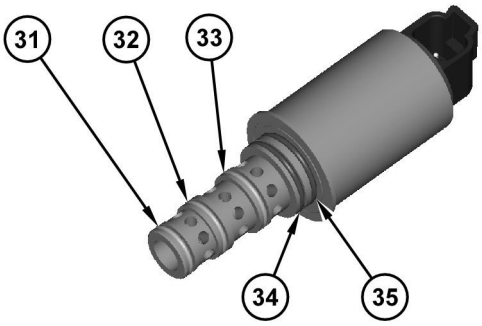

Illustration 615 g01390345

134. Install O-ring seal (35), O-ring seal (34), O-ring seal (33), O-ring seal (32), and O-ring seal (31).

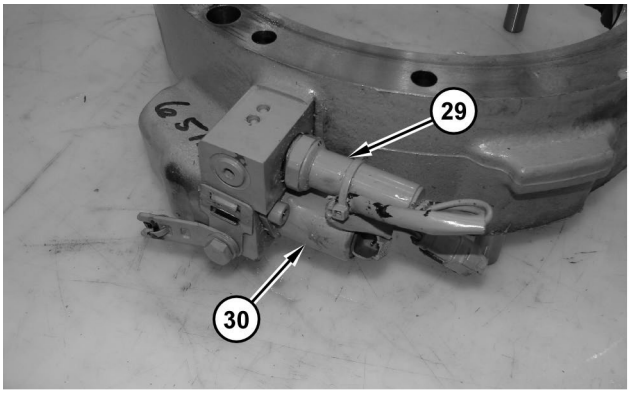

Illustration 616 g01390343

135. Install solenoid (30). Install pressure sensor (29) and the O-ring seal.

Illustration 617 g01390342

136. Use two people to install housing (28). The weight of housing (28) is approximately 27 kg (60 lb). Install bolts (27). Tighten bolts (27) to a torque of 55 ± 10 N·m (41 ± 7 lb ft).

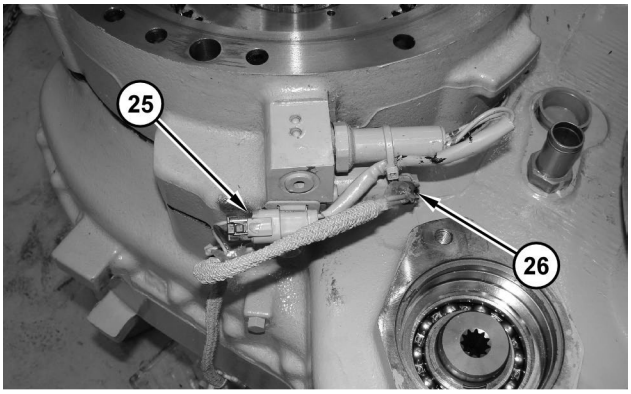

Illustration 618 g01390339

137. Connect harness assembly (26) and harness assembly (25).

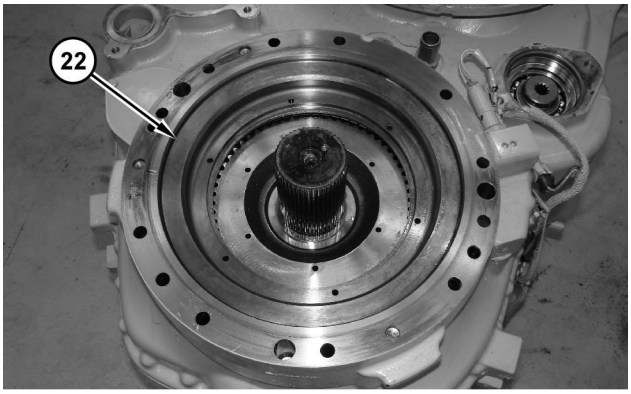

Illustration 619 g01390334

138. Install piston (22).

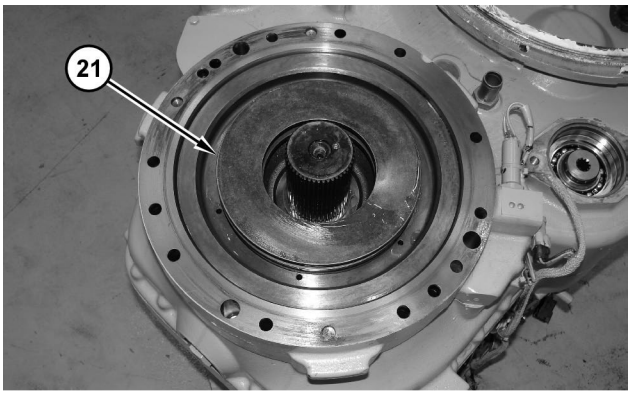

Illustration 620 g01390331

139. Install spring discs (21).

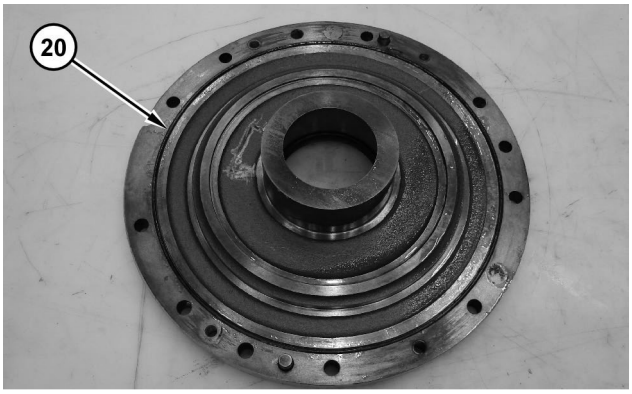

Illustration 621 g01390329

140. Install O-ring seal (20).

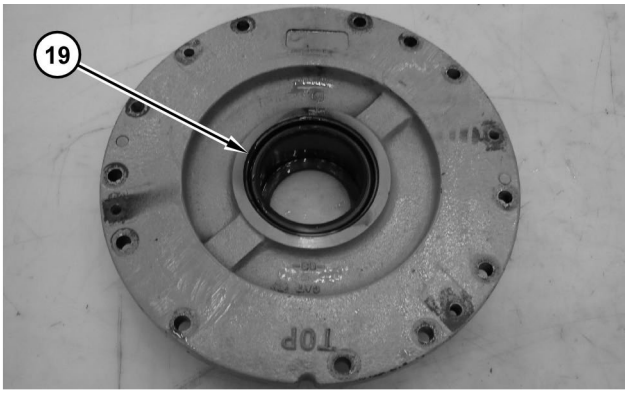

Illustration 622 g01390327

141. Install lip seal (19).

Illustration 623 g01390323

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

142. Install spring plate (18). Install bolts (17). Tighten bolts (17) to a torque of 100 ± 20 N·m (74 ± 15 lb ft).

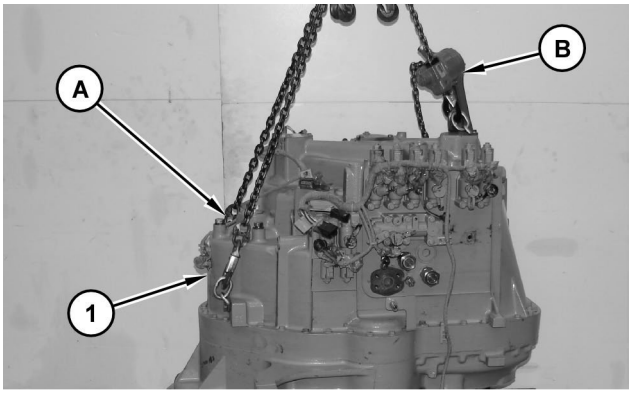

Illustration 624 g01391235

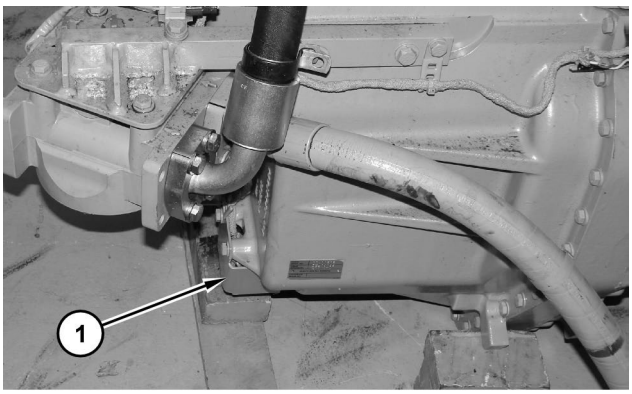

Illustration 625 g01390304

143. Use Tooling (A), Tooling (B), and a suitable lifting device to remove transmission (1) from Tooling (C). The weight of transmission (1) is approximately 1043 kg (2300 lb). Position transmission (1) onto suitable cribbing.

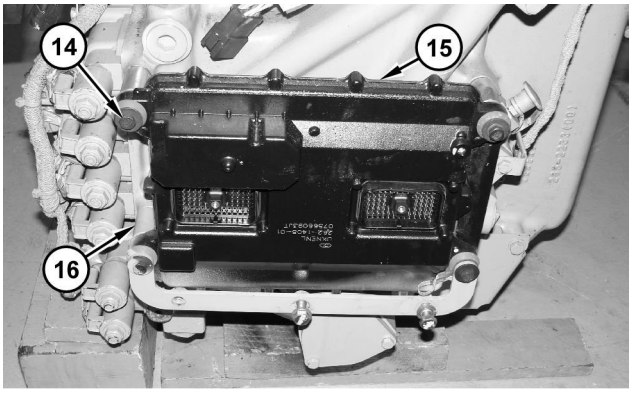

Illustration 626 g01390318

144. Install spacers (16) and control module (15). Install bolts (14).

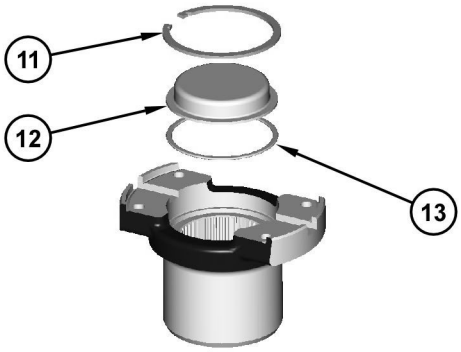

Illustration 627 g01390315

145. Install O-ring seal (13). Install cup (12). Install retaining ring (11).

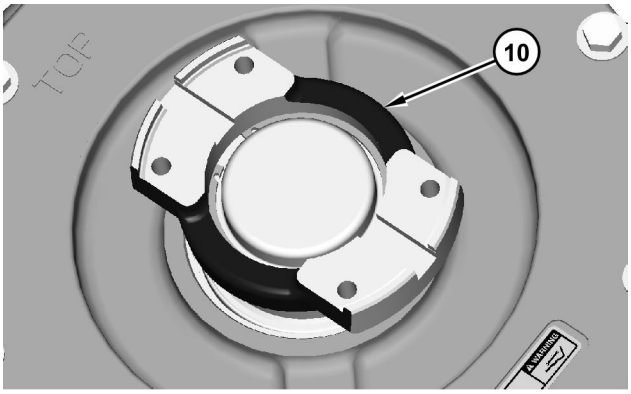

Illustration 628 g01390309

146. Install yoke assembly (10).

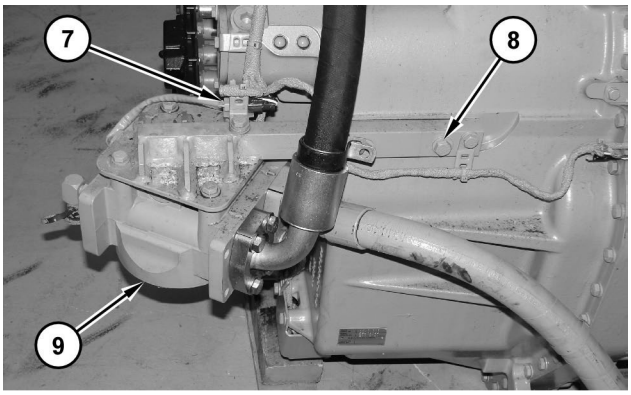

Illustration 629 g01390308

147. Position filter base (9) and install bolts (8). Connect harness assembly (7).

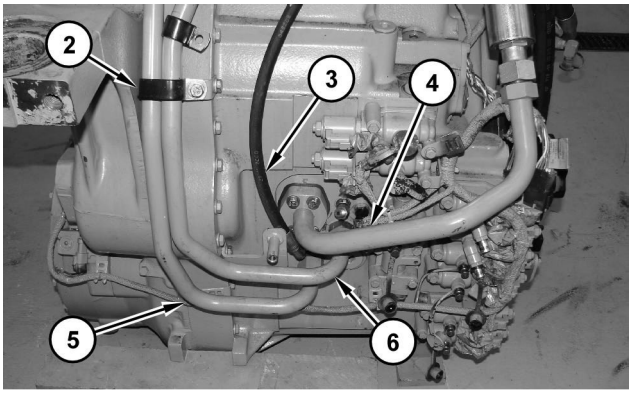

Illustration 630 g01390307

148. Install tube assembly (6). Install tube assembly (5). Install tube assembly (4). Install hose assembly (3). Install clip (2).

End By:

a. Install the transmission. Refer to Disassembly and Assembly, “Transmission - Install”.

i02741458

Transmission - Install

SMCS Code: 3030-012; 3159-012; 3176-012

Installation Procedure

Table 20

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	311-5882	Support	2
B	138-7574	Link Bracket	2

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Inspect the O-ring seals. Replace the O-ring seals that are worn or damaged.

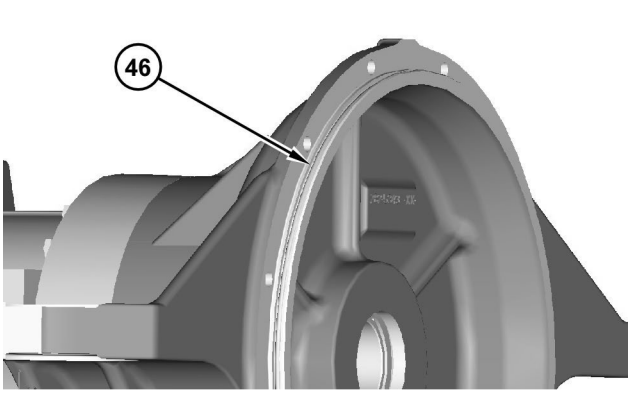

Illustration 631 g01380965

2. Install O-ring seal (46).

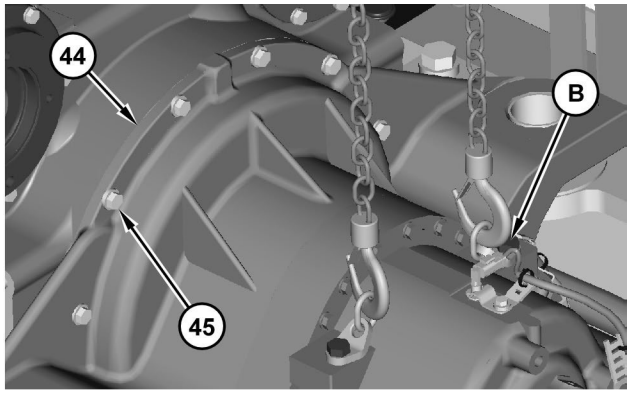

Illustration 632 g01380959

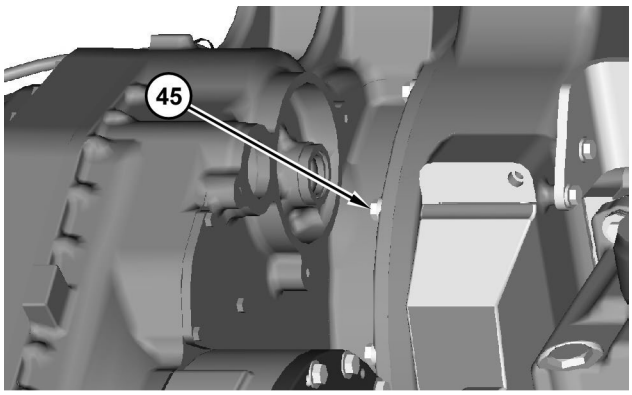

Illustration 633 g01380961

3. Use Tooling (B) and a suitable lifting device in order to install transmission (44). The weight of transmission (44) is approximately 1043 kg (2300 lb).

4. Install bolts (45).

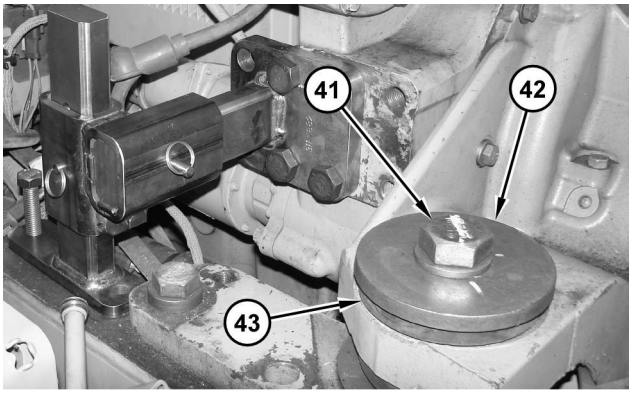

Illustration 634 g01380932

5. Install mount assembly (43), washer (42), and bolt (41). Repeat this step for the opposite side.

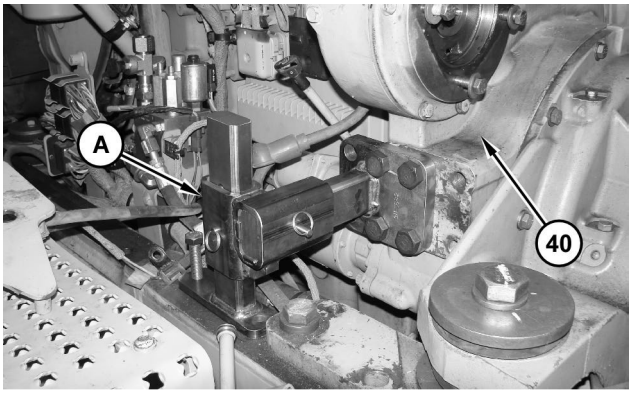

Illustration 635 g01375219

6. Remove Tooling (A) from engine (40). The weight of engine (40) is approximately 1497 kg (3300 lb).

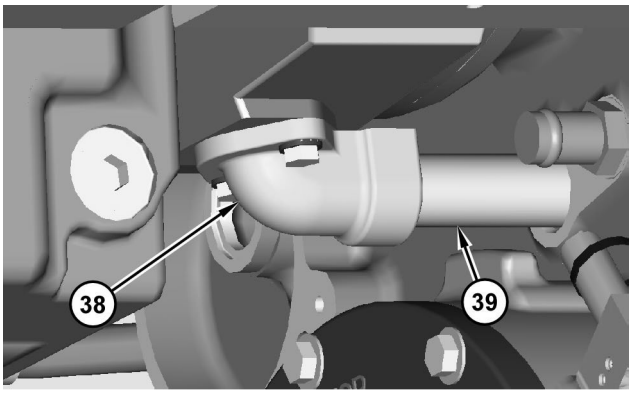

Illustration 636 g01375213

7. Install tube (39). Install elbow (38).

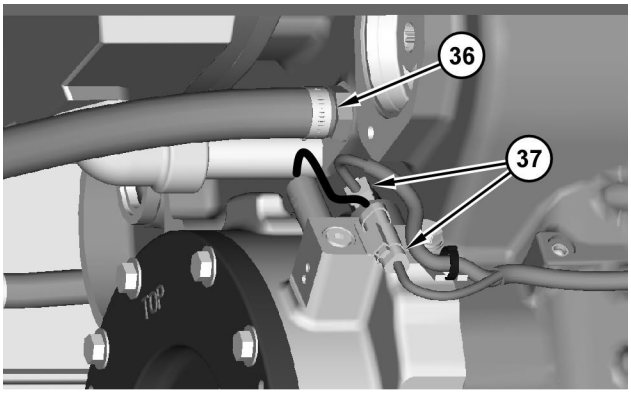

Illustration 637 g01375127

8. Connect harness assembly (37) and the connecting hardware. Connect hose (36).

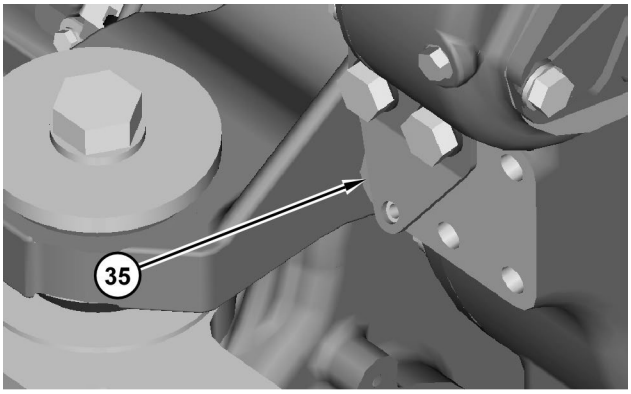

Illustration 638 g01374975

9. Install bracket (35).

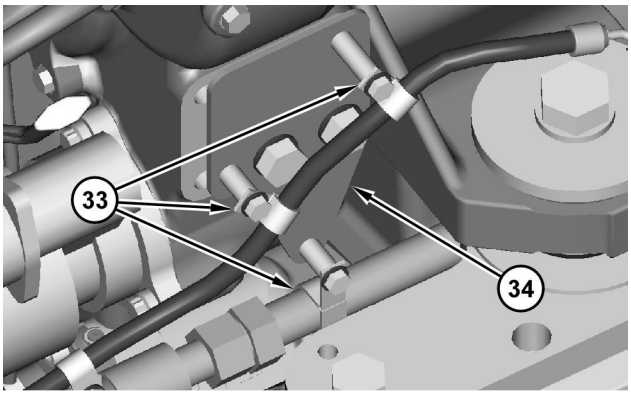

Illustration 639 g01374948

10. Install bracket (34). Install clips (33).

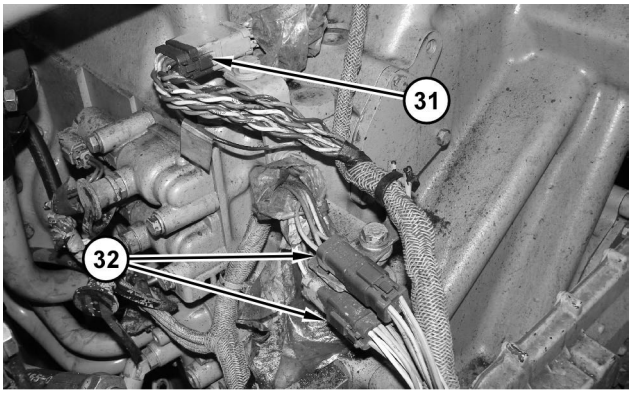

Illustration 640 g01374792

11. Connect harness assemblies (32) and the connecting hardware. Connect harness assembly (31) and the connecting hardware.

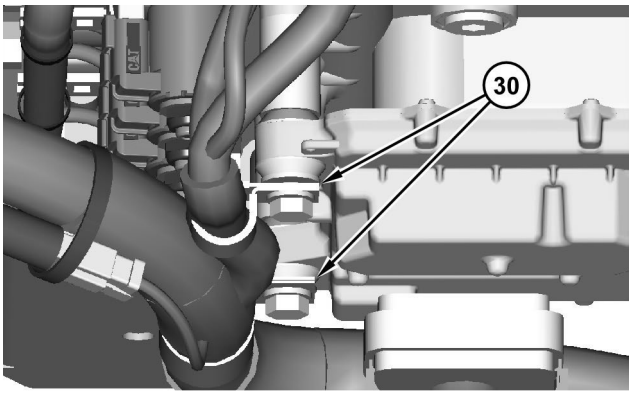

Illustration 641 g01374772

12. Install clips (30).

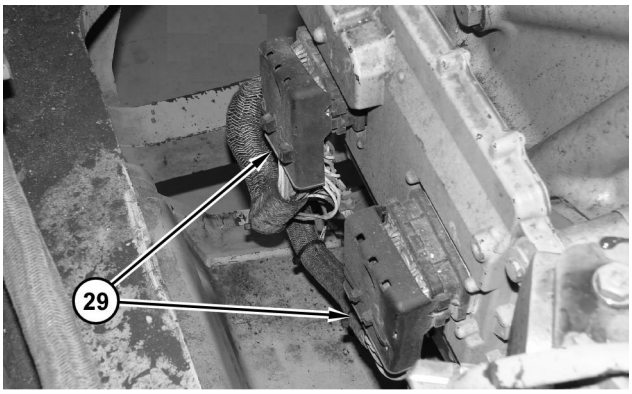

Illustration 642 g01374695

13. Connect harness assemblies (29).

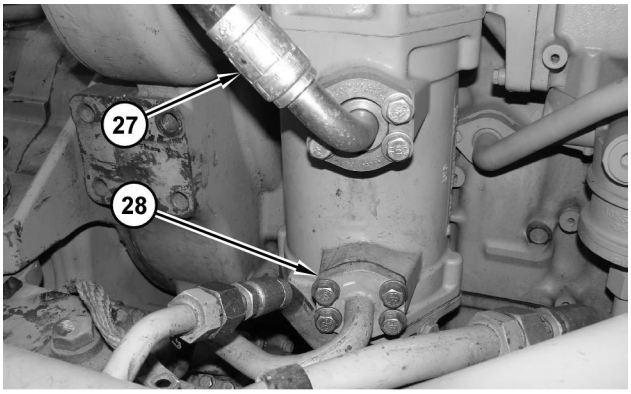

Illustration 643 g01374683

14. Install tube assembly (28). Connect hose assembly (27).

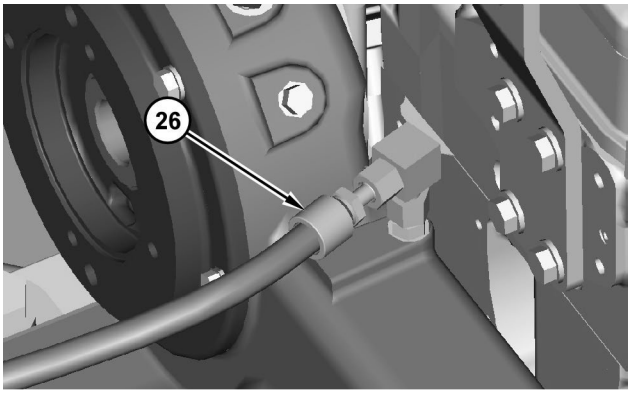

Illustration 644 g01374660

15. Connect hose assembly (26).

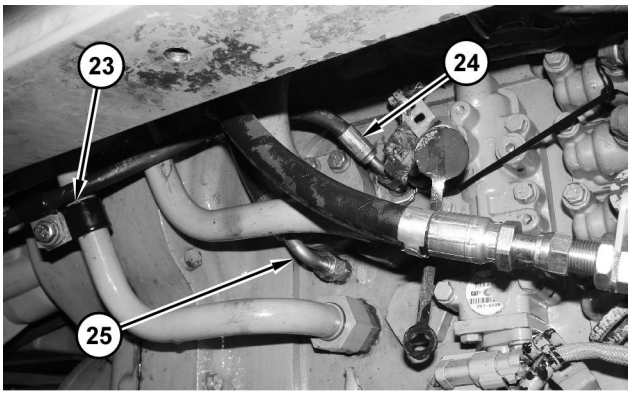

Illustration 645 g01374668

16. Connect hose assembly (Flywheel Housing Lube Circuit)(25) and hose assembly (Supply Oil to Differential Lock Valve)(24). Install clips (23).

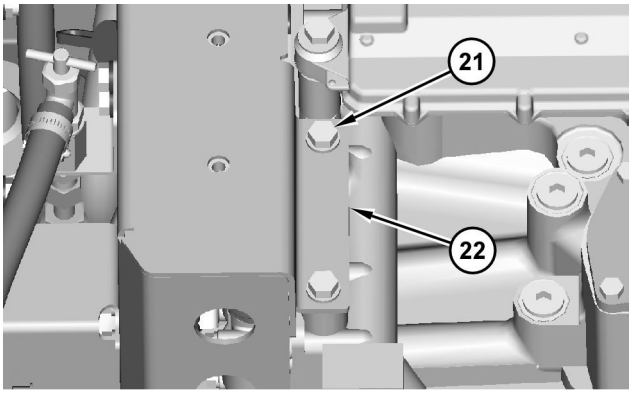

Illustration 646 g01374435

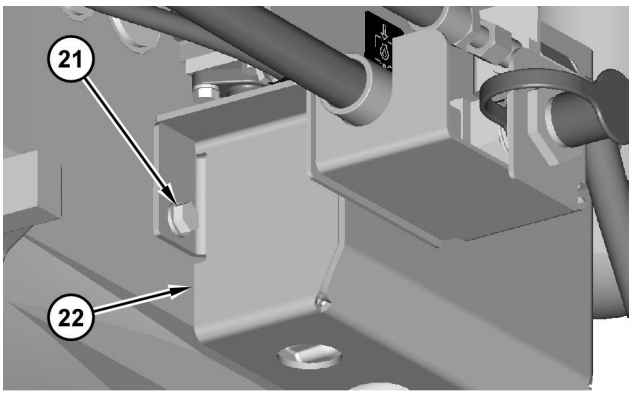

Illustration 647 g01374655

17. Position cover (22) and install bolts (21).

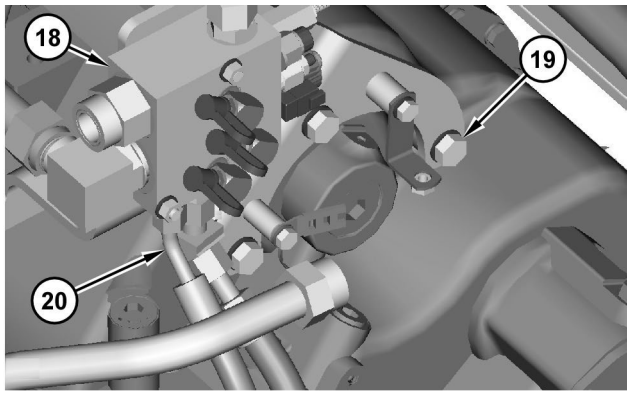

Illustration 648 g01374423

18. Position control valve (18) and install bolts (19). Connect hose assembly (20).

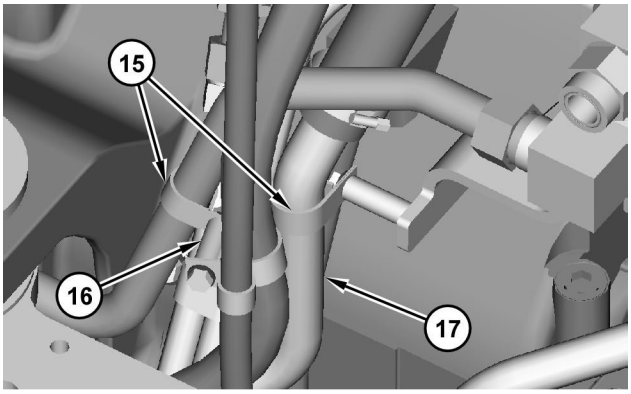

Illustration 649 g01374336

19. Install tube assembly (17). Install spacer (16) and clips (15).

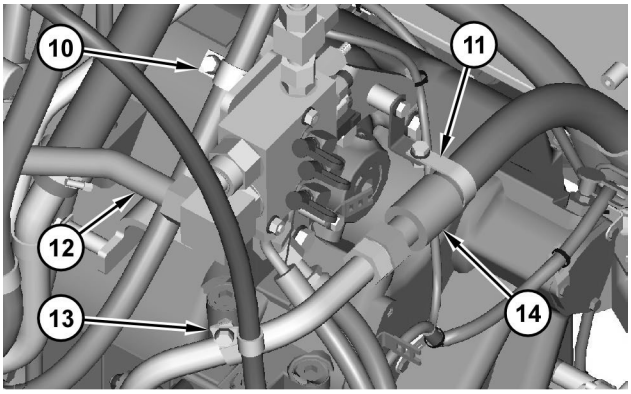

Illustration 650 g01374300

20. Connect hose assembly (14). Install clips (13). Connect tube assembly (12). Install clip (11). Install clip (10).

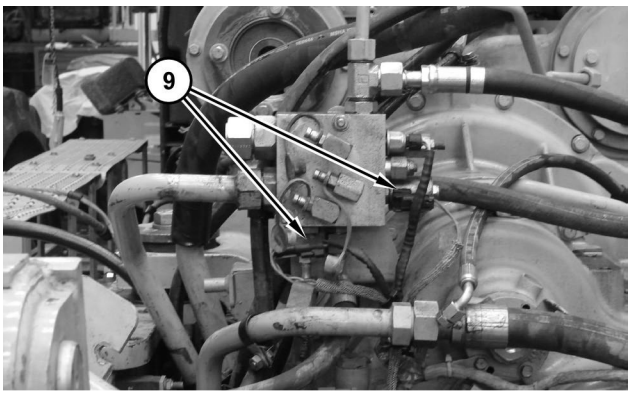

Illustration 651 g01374204

21. Connect harness assemblies (9) and the connecting hardware.

Illustration 652 g01374194

22. Install transmission oil filter (8).

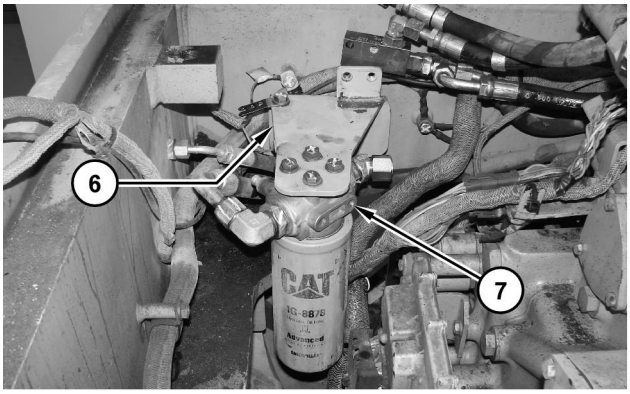

Illustration 653 g01374144

23. Position hydraulic oil filter (7) and install bolts (6).

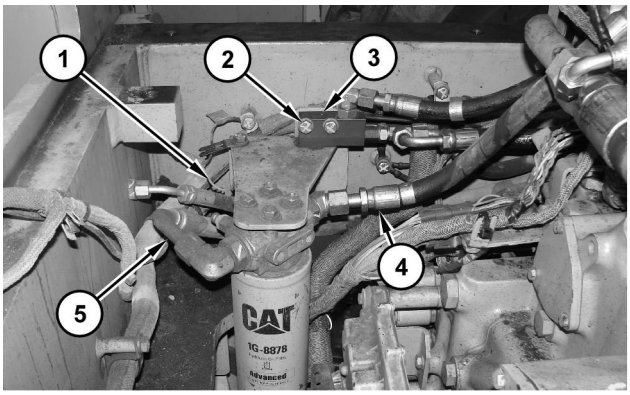

Illustration 654 g01374043

24. Connect hose assembly (5) and hose assembly (4). Position manifold (3) and install bolts (2). Connect harness assembly (1).

End By:

a. Install the piston pump (hydraulic fan). Refer to Disassembly and Assembly, “Piston Pump (Hydraulic Fan) - Install”.

b. Install the gear pump (transmission charging and scavenge). Refer to Disassembly and Assembly, “Gear Pump (Transmission and Scavenge) - Install”.

c. Install the piston pump (hydraulic and steering). Refer to Disassembly and Assembly, “Piston Pump (Hydraulic and Steering) - Install”.

d. Install the drive shaft. Refer to Disassembly and Assembly, “Drive Shaft - Remove and Install”.

e. Install the radiator guard and support, the aftercooler, and the radiator. Refer to Disassembly and Assembly, “Radiator Guard and Support, Aftercooler, and Radiator - Install”.

f. Install the bottom guard. Refer to Disassembly and Assembly, “Bottom Guard - Remove and Install”.

i03699623

Parking Brake - Remove

SMCS Code: 3275-011; 4267-011

Removal Procedure

Table 21

Required Tools			
Tool	**Part Number**	**Description**	**Qty**
A	2P-8312	Retaining Ring Pliers	1

Start By:

a. Remove the drive shaft. Refer to Disassembly and Assembly, “Drive Shaft - Remove and Install”.

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Drain the transmission into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

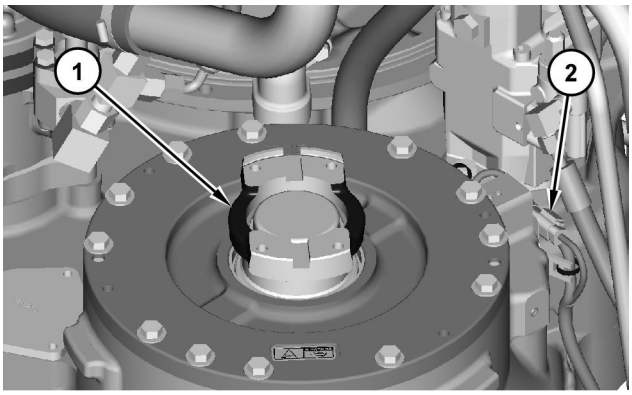

Illustration 655 g01363168

2. Remove yoke (1). Disconnect harness assemblies (2).

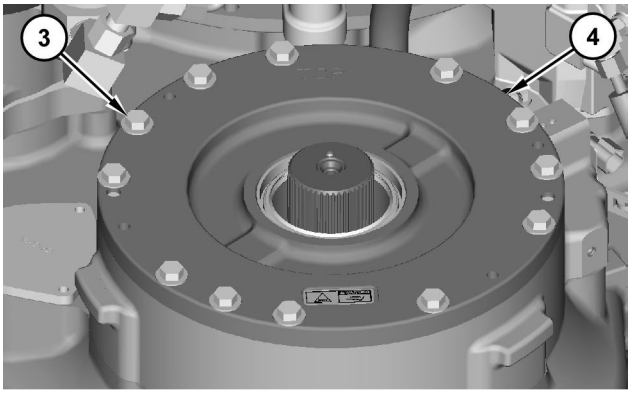

Illustration 656 g01363175

⚠ WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

3. Loosen bolts (3) evenly. Remove bolts (3). Remove spring plate (4).

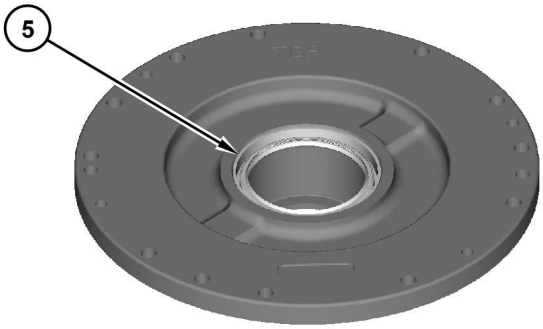

Illustration 657 g01363281

4. Remove lip seal (5).

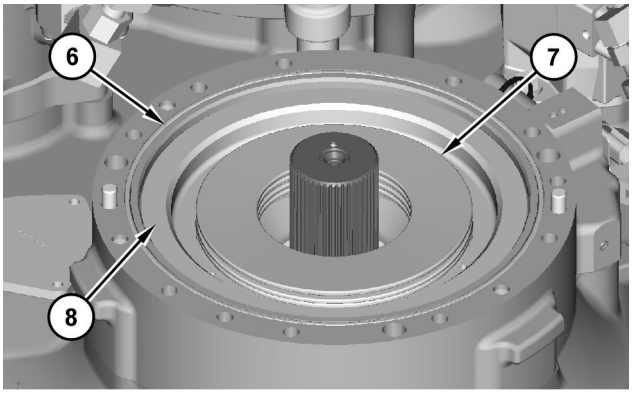

Illustration 658 g01363286

5. Remove O-ring seal (6). Remove spring discs (7). Remove piston (8).

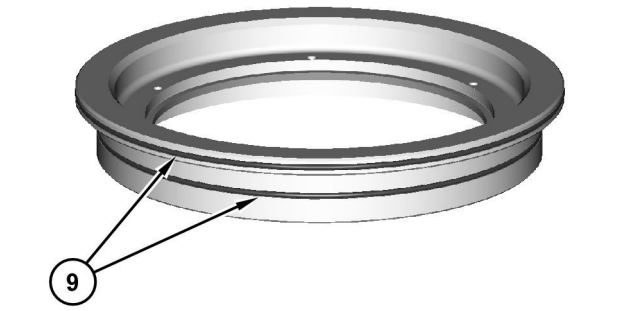

Illustration 659 g01363292

6. Remove seals (9).

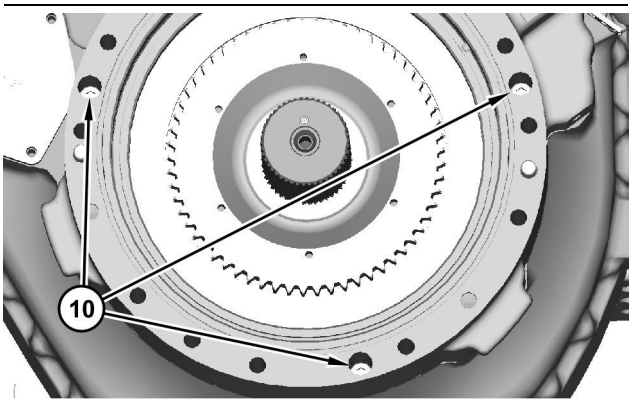

Illustration 660 g01363295

7. Remove bolts (10).

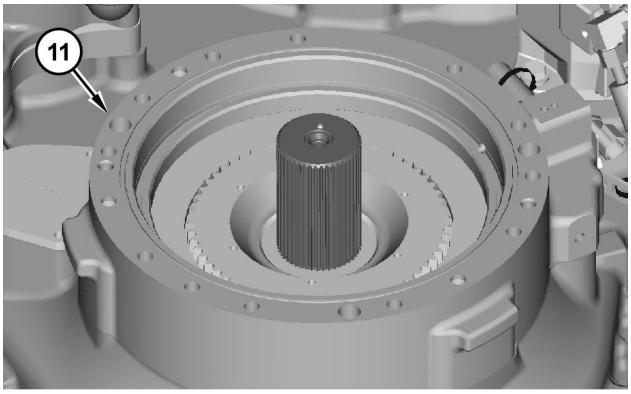

Illustration 661 g01363308

8. Use two people in order to remove housing (11).

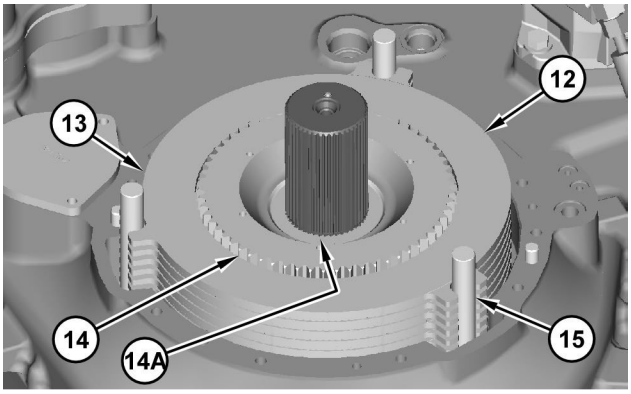

Illustration 662 g01612233

9. Remove discs (12) and plates (13). Remove dowels (15).

Note: Note the quantity and the order of discs (12) and plates (13).

10. Use Tooling (A) in order to remove retaining ring (14A) (not shown).

11. Remove hub (14).

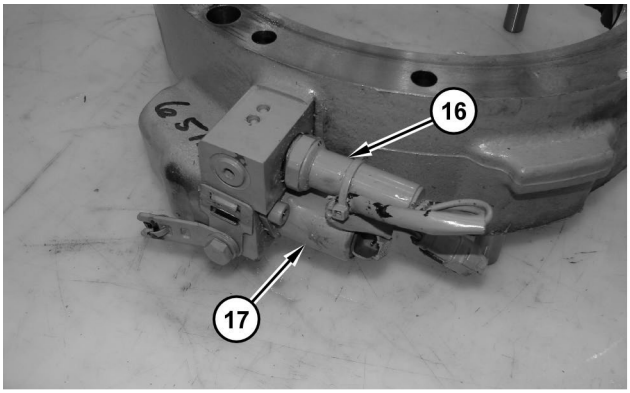

Illustration 663 g01363332

12. Remove pressure sensor (16).

13. Remove the allen head bolt and the retaining bracket from solenoid (17).

14. Use a flat head screwdriver to carefully remove solenoid (17). Lift solenoid (17) straight out of the bore.

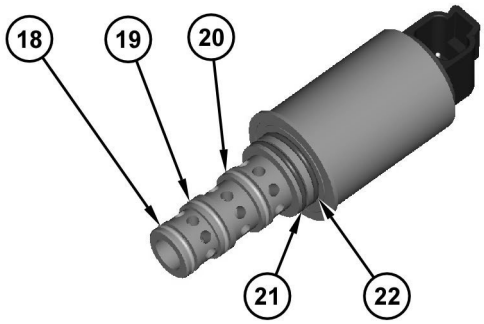

Illustration 664 g01363336

15. Remove O-ring seal (18), O-ring seal (19), O-ring seal (20), O-ring seal (21), and O-ring seal (22).

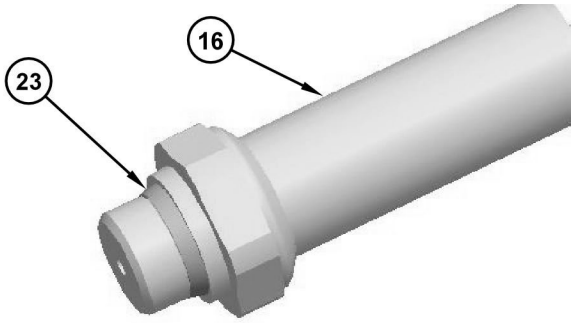

Illustration 665 g01990357

16. Remove seal (23) from pressure sensor (16).

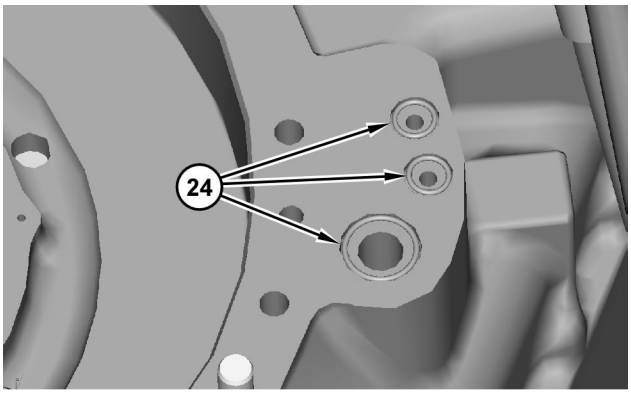

Illustration 666 g01363355

17. Remove O-ring seals (24).

i05745634

Parking Brake - Install

SMCS Code: 3275-012; 4267-012

Installation Procedure

Table 22

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	2P-8312	Retaining Ring Pliers	1
B	8C-8422	Sealant	-

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

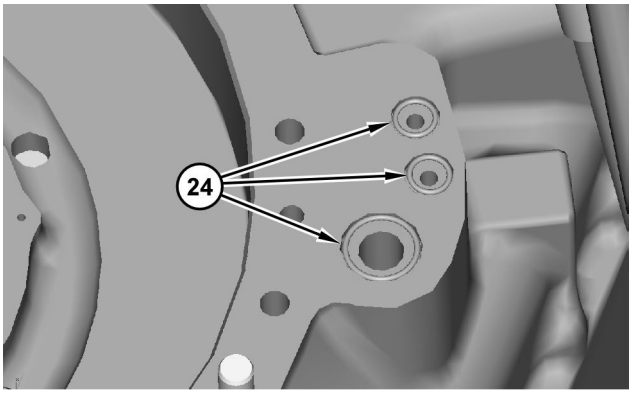

Illustration 667 g01363355

1. Install O-ring seals (24).

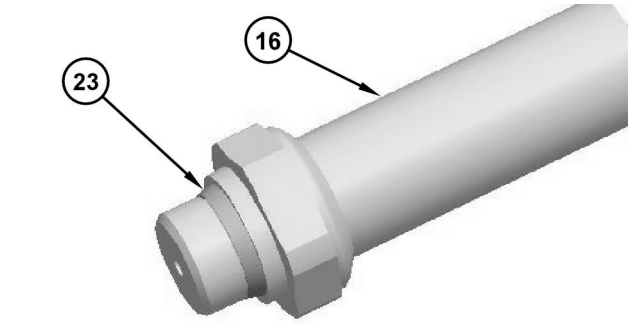

Illustration 668 g01990357

2. Install seal (23) onto pressure sensor (16).

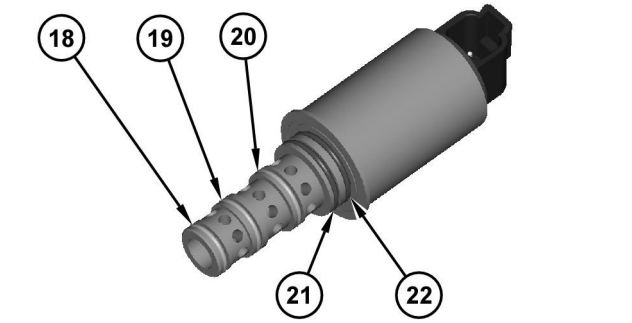

Illustration 669 g01363336

3. Ensure that all of the O-ring seals are not cut or otherwise damaged. Install O-ring seal (22), O-ring seal (21), O-ring seal (20), O-ring seal (19), and O-ring seal (18).

4. Lubricate the O-ring seals with the lubricant that is being sealed.

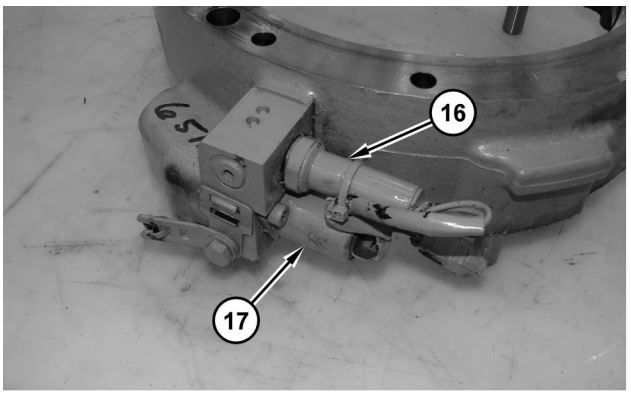

Illustration 670 g01363332

5. Verify that the brake manifold is clean and free of debris.

6. Hold solenoid (17) straight and install solenoid (17) into the bore. Gentle pressure will be needed to seat solenoid (17) in the bore.

7. Install the retaining bracket and the allen head bolt. Slowly tighten the allen head bolt until solenoid (17) is fully seated. Tighten the allen head bolt to a torque of 12 ± 3 N·m (106 ± 275 lb in).

8. Install pressure sensor (16). Tighten pressure sensor (16) to a torque of 60 ± 6 N·m (44 ± 4 lb ft).

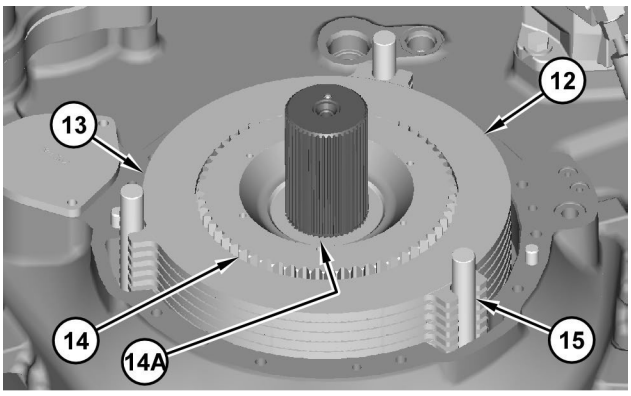

Illustration 671 g01612233

9. Install dowels (15). Install discs (12) and plates (13). Install hub (14).

10. Use Tooling (A) in order to install retaining ring (14A) (not shown).

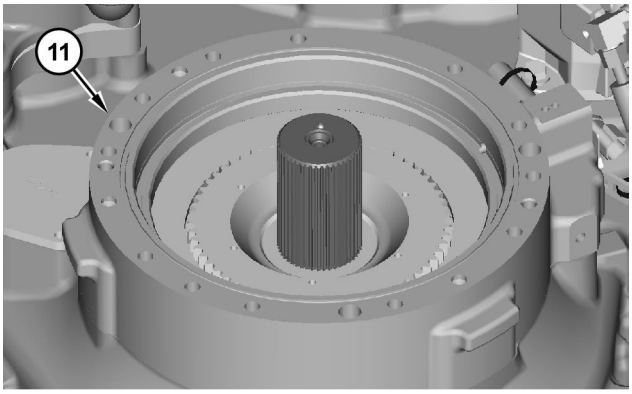

Illustration 672 g01363308

11. Apply Tooling (B) onto the mating surfaces. Use two people in order to Install housing (11).

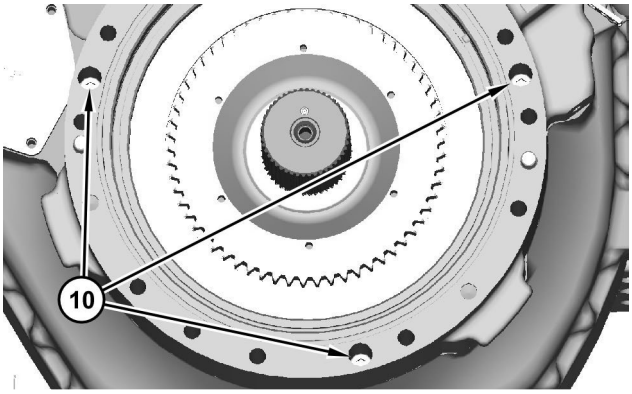

Illustration 673 g01363295

12. Install bolts (10). Tighten bolts (10) to a torque of 55 ± 10 N·m (41 ± 7 lb ft).

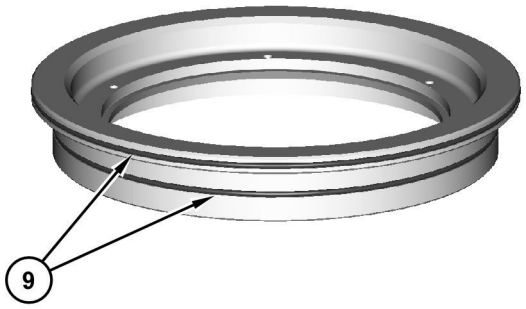

Illustration 674 g01363292

13. Install seals (9).

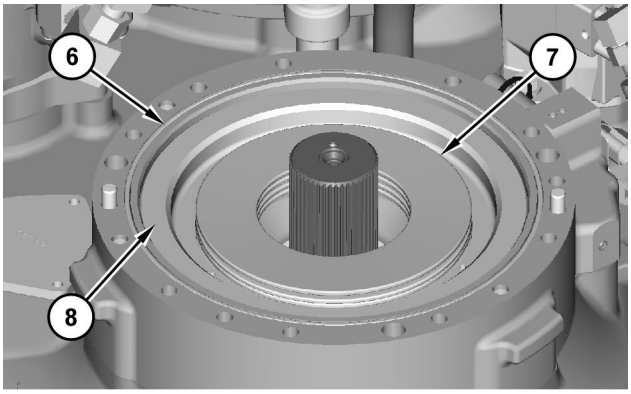

Illustration 675 g01363286

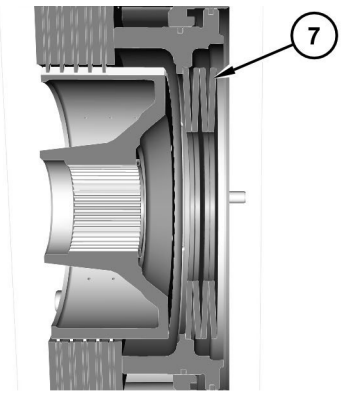

Illustration 676 g03648878

14. Install piston (8). Install spring discs (7) in orientation shown. Install O-ring seal (6).

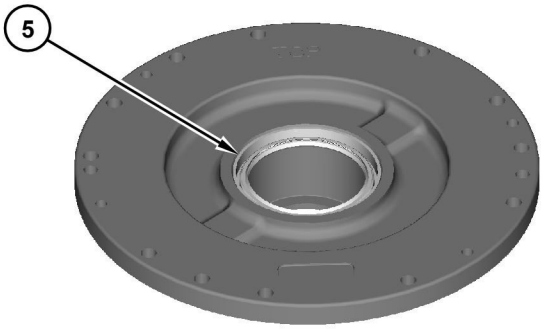

Illustration 677 g01363281

15. Install lip seal (5).

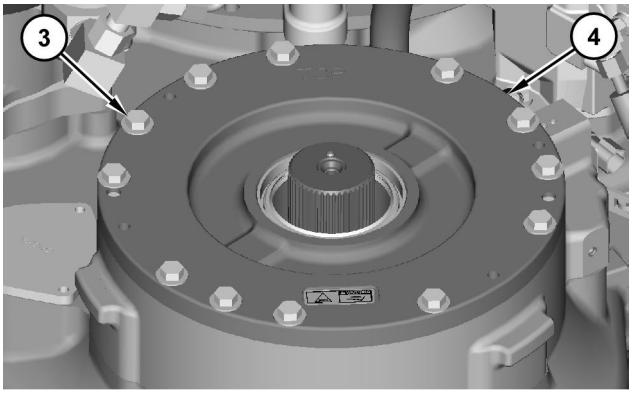

Illustration 678 g01363175

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

16. Install spring plate (4). Install bolts (3). Tighten bolts (3) to a torque of 100 ± 20 N·m (74 ± 15 lb ft).

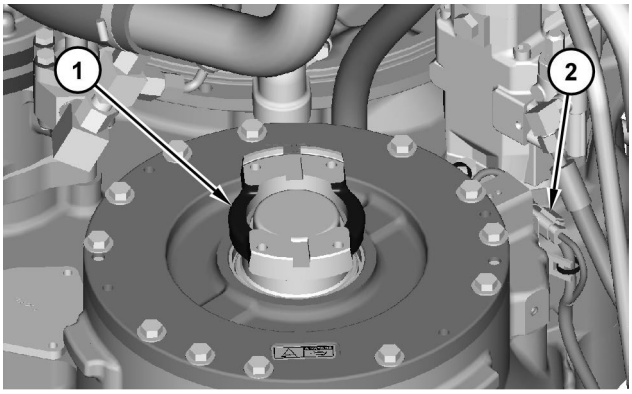

Illustration 679 g01363168

17. Connect harness assemblies (2). Install yoke (1).

18. Fill the transmission. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

End By:

a. Install the drive shaft. Refer to Disassembly and Assembly, “Drive Shaft - Remove and Install”.

i07188042

Drive Shaft - Remove and Install

SMCS Code: 3253-010

Removal Procedure

Table 23

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	1U-7505	Hydraulic Jack	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

1. Park the machine. Refer to Operation and Maintenance Manual, “Parking”.

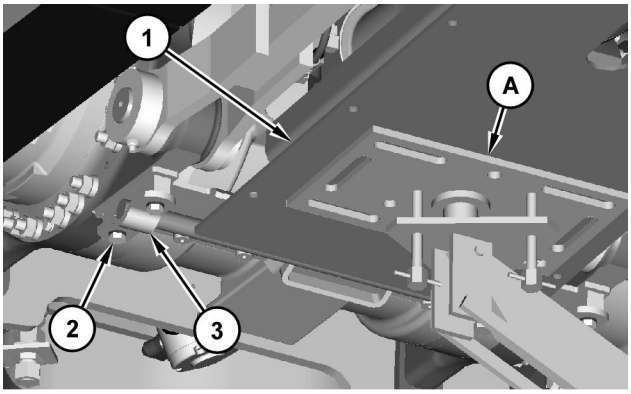

Illustration 680 g01384262

2. Position Tooling (A) under bottom guard (1).

3. Remove bolts (2) and cap (3). Repeat this step for the opposite side.

4. Use Tooling (A) to lower bottom guard (1).

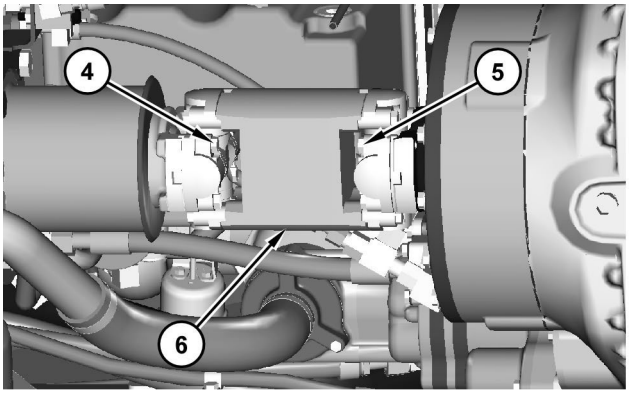

Illustration 681 g01384243

5. Remove bolts (4) and bolts (5). Use two people to remove drive shaft (6). The weight of drive shaft (6) is approximately 34 kg (75 lb).

Installation Procedure

Table 24

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	1U-7505	Hydraulic Jack	1

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

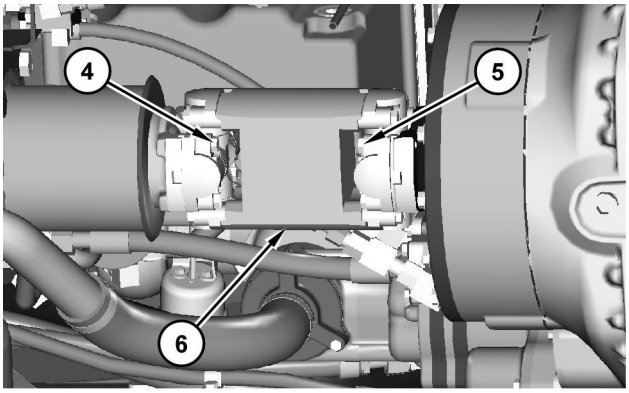

Illustration 682 g01384243

1. Use two people to install drive shaft (6). The weight of drive shaft (6) is approximately 34 kg (75 lb).

2. Install bolts (5). Tighten bolts (5) to a torque of 120 ± 20 N·m (89 ± 15 lb ft) in an alternating X pattern.

3. Install bolts (4). Tighten bolts (4) to a torque of 120 ± 20 N·m (89 ± 15 lb ft) in an alternating X pattern.

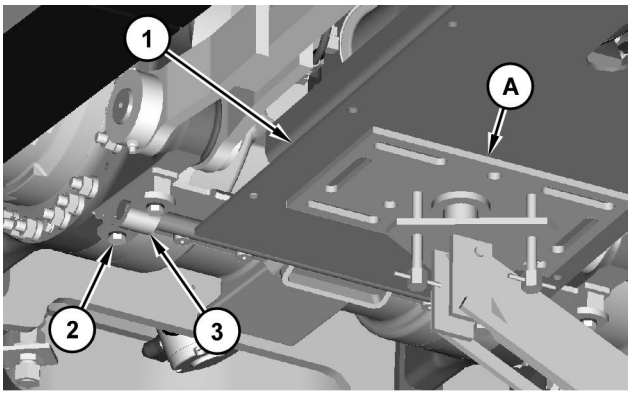

Illustration 683 g01384262

4. Use Tooling (A) to raise bottom guard (1).

5. Install cap (3) and bolts (2). Repeat this step for the opposite side.

i02676249

Relief Valve - Remove

SMCS Code: 5117-011

Removal Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the work tools have been lowered to the ground, and the oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

Note: Put identification marks on all lines, on all hoses, on all wires, and on all tubes for installation purposes. Plug all lines, hoses, and tubes. This helps to prevent fluid loss and this helps to keep contaminants from entering the system.

1. Drain the transmission oil into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

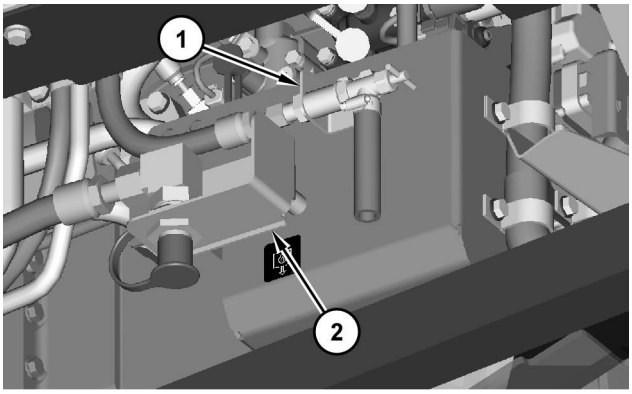

Illustration 684 g01344736

2. Disconnect bracket (1) and bracket (2).

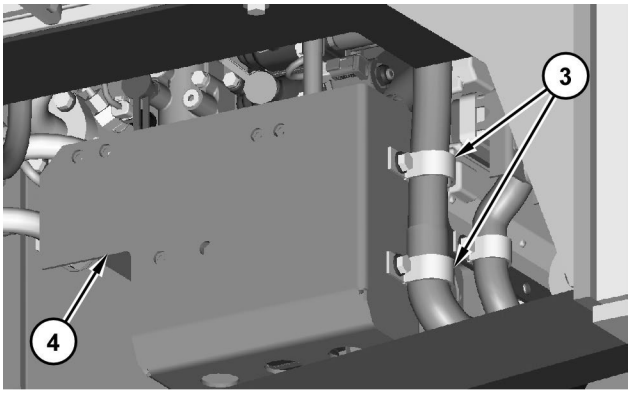

Illustration 685 g01344756

3. Remove clips (3). Remove guard (4).

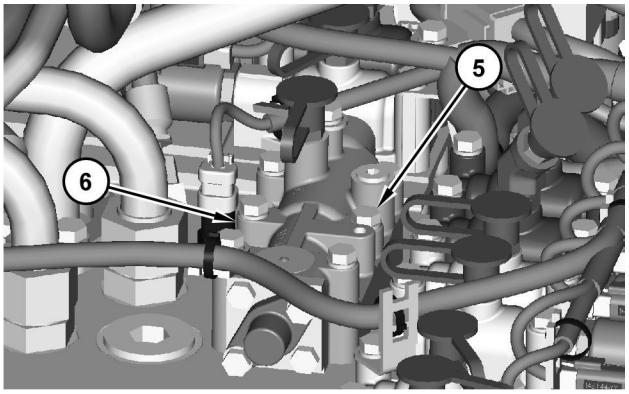

Illustration 686 g01344757

4. Remove bolts (5). Remove relief valve (6).

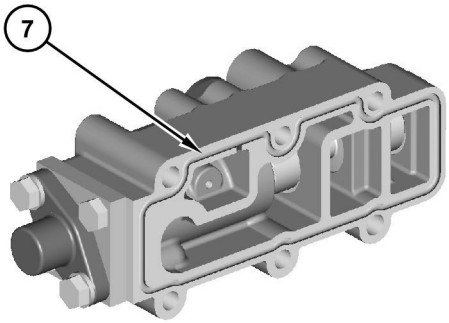

Illustration 687 g01344762

5. Remove O-ring seal (7).

i02676397

Relief Valve - Disassemble

SMCS Code: 5117-015

Disassembly Procedure

Start By:

a. Remove the relief valve. Refer to Disassembly and Assembly, “Relief Valve - Remove”.

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Inspect the O-ring seals. Replace the O-ring seals that are worn or damaged.

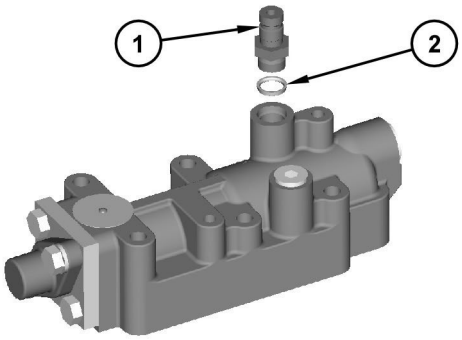

Illustration 688 g01344856

1. Remove test port (1). Remove O-ring seal (2).

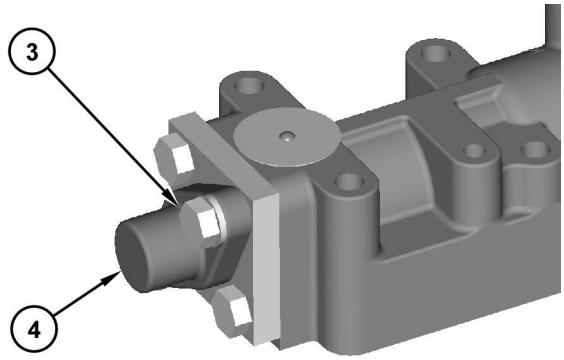

Illustration 689 g01344871

2. Remove bolts (3). Remove cover (4).

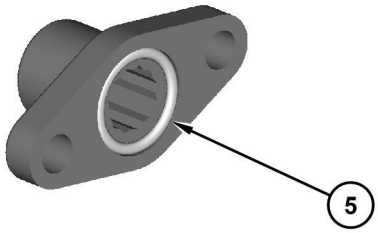

Illustration 690 g01344888

3. Remove O-ring seal (5).

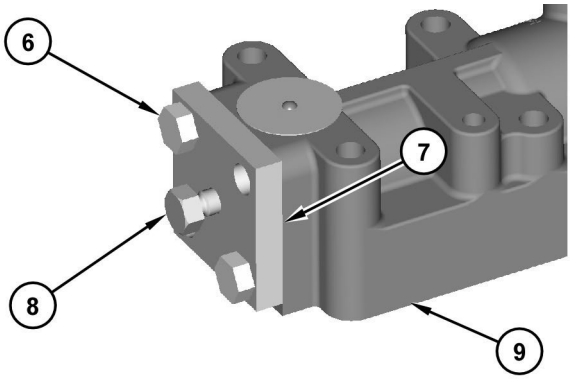

Illustration 691 g01344891

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

4. Remove bolts (6). Remove cover (7) and screw (8) from body (9).

Note: Measure the adjustment of screw (8) for assembly purposes.

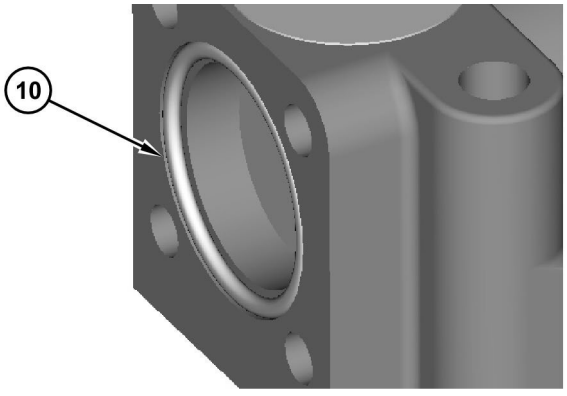

Illustration 692 g01344896

5. Remove O-ring seal (10).

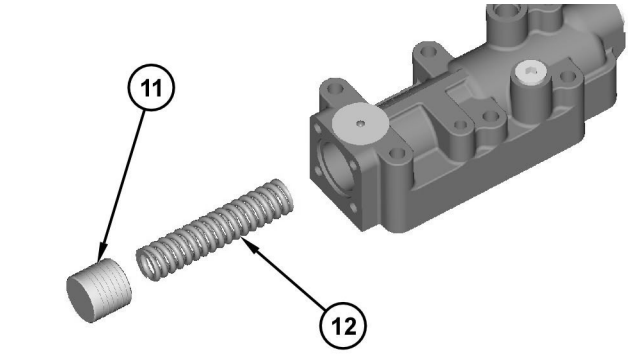

Illustration 693 g01344900

6. Remove piston (11). Remove spring (12).

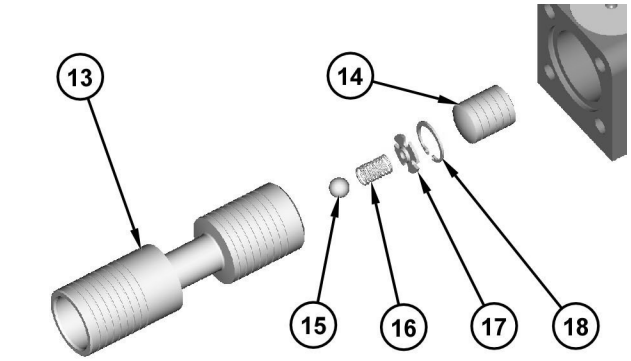

Illustration 694 g01344901

WARNING

Personal injury can result from being struck by parts propelled by a released spring force.

Make sure to wear all necessary protective equipment.

Follow the recommended procedure and use all recommended tooling to release the spring force.

7. Remove spool (13). Remove slug (14).

8. Remove retaining ring (18). Remove retainer (17). Remove spring (16). Remove ball (15).

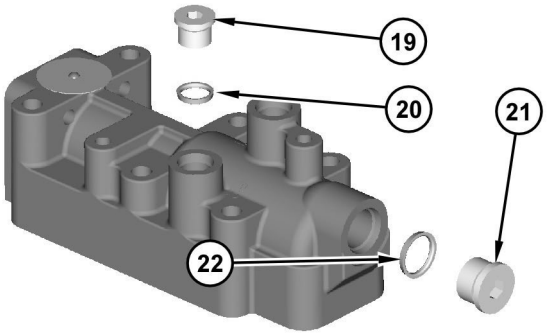

Illustration 695 g01344905

9. Remove plug (19). Remove O-ring seal (20). Remove plug (21). Remove O-ring seal (22).

i02676398

Relief Valve - Assemble

SMCS Code: 5117-016

Assembly Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

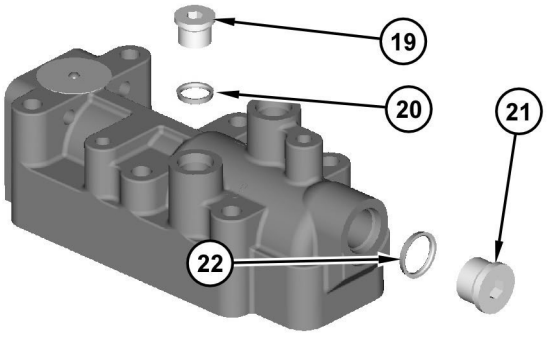

Illustration 696 g01344905

1. Install O-ring seal (22). Install plug (21). Tighten plug (21) to a torque 35 ± 3.5 N·m (26 ± 3 lb ft). Install O-ring seal (20). Install plug (19). Tighten plug (19) to a torque 17 ± 1.5 N·m (13 ± 1 lb ft).

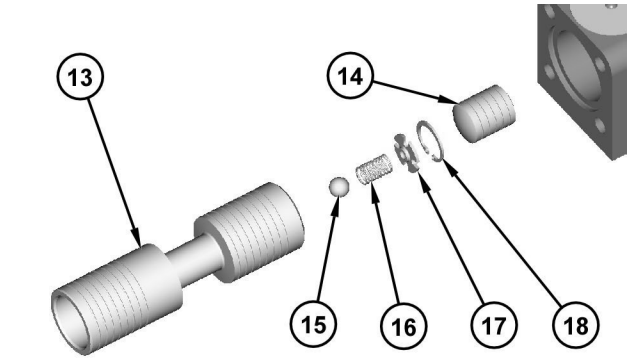

Illustration 697 g01344901

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

2. Install ball (15). Install spring (16). Install retainer (17). Install retaining ring (18).

3. Install slug (14). Install spool (13).

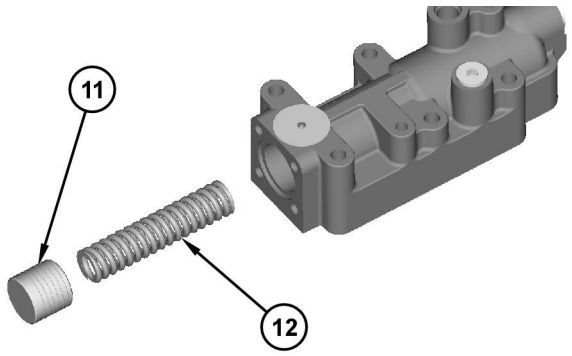

Illustration 698 g01344900

4. Install spring (12). Install piston (11).

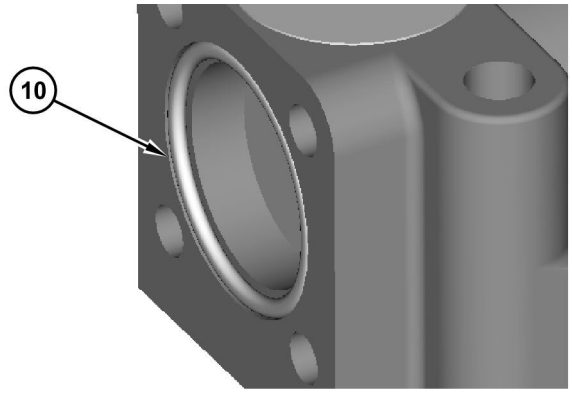

Illustration 699 g01344896

5. Install O-ring seal (10).

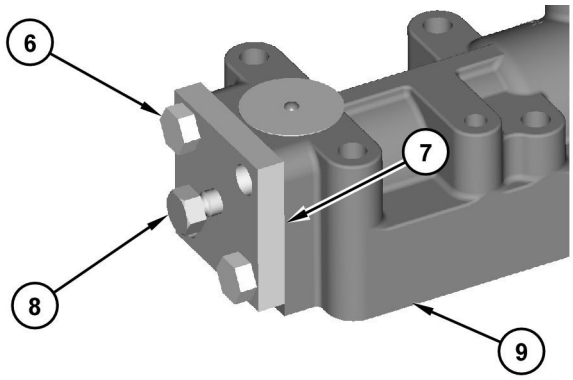

Illustration 700 g01344891

WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

6. Install screw (9) and cover (8) onto body (9). Install bolts (6). Tighten bolts (6) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

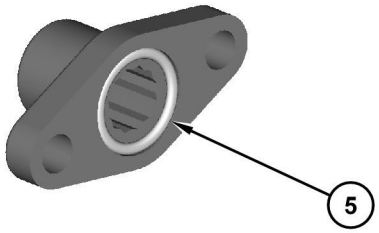

Illustration 701 g01344888

7. Install O-ring seal (5).

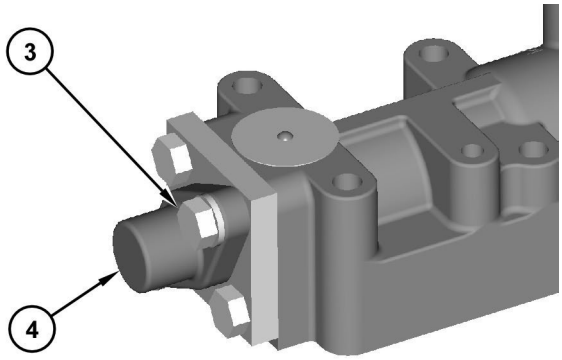

Illustration 702 g01344871

8. Install cover (4). Install bolts (3). Tighten bolts (3) to a torque of 28 ± 7 N·m (21 ± 5 lb ft).

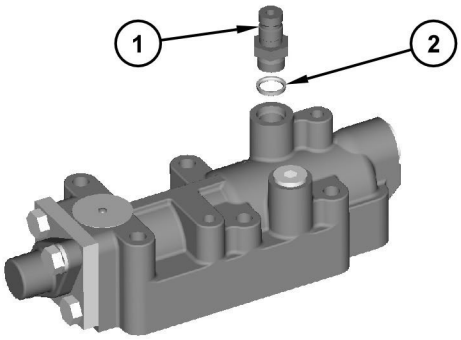

Illustration 703 g01344856

9. Install O-ring seal (2). Install test port (1). Tighten test port (1) to a torque 17 ± 1.5 N·m (13 ± 1 lb ft).

End By:

a. Install the relief valve. Refer to Disassembly and Assembly, “Relief Valve - Install”.

i02676252

Relief Valve - Install

SMCS Code: 5117-012

Installation Procedure

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

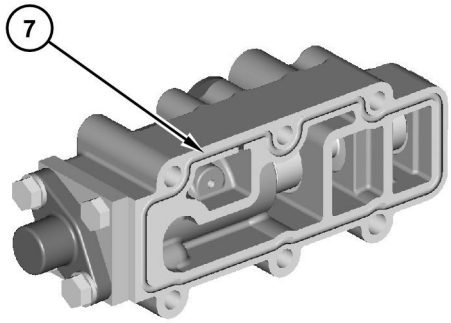

Illustration 704 g01344762

1. Install O-ring seal (7).

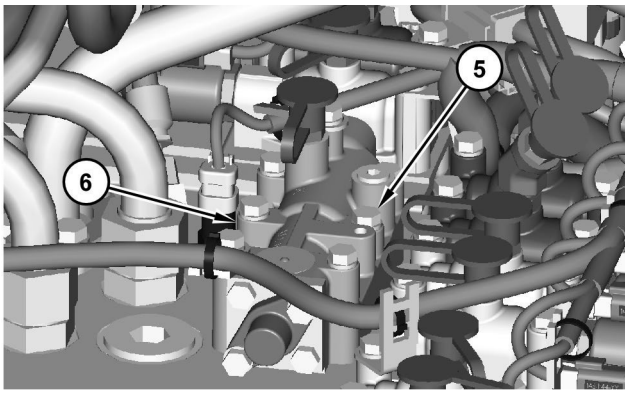

Illustration 705 g01344757

2. Install relief valve (6). Install bolts (5). Tighten bolts (5) to a torque of 30 ± 4 N·m (22 ± 3 lb ft).

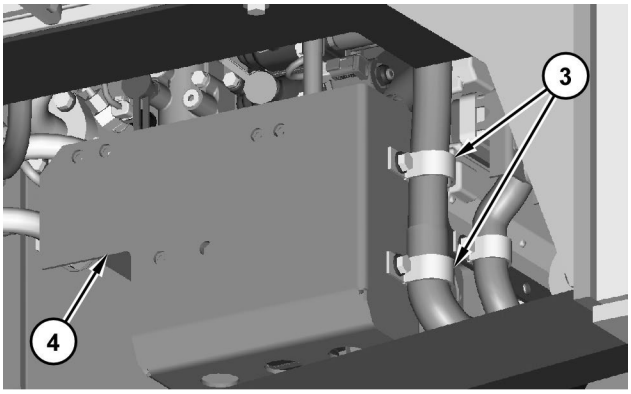

Illustration 706 g01344756

3. Install guard (4). Install clips (3).

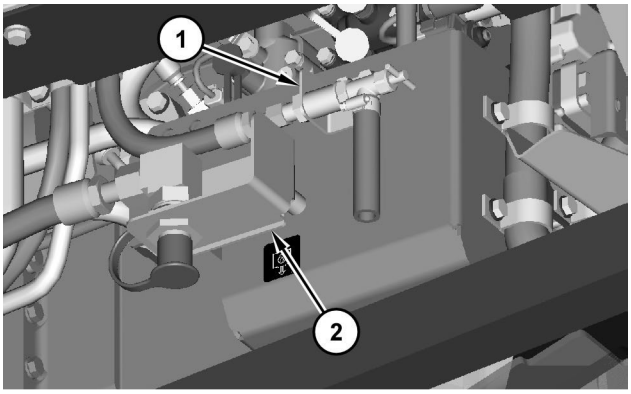

Illustration 707 g01344736

4. Connect bracket (2) and bracket (1).

5. Fill the transmission. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil - Change”.

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