CHAPTER 1. WHEELS

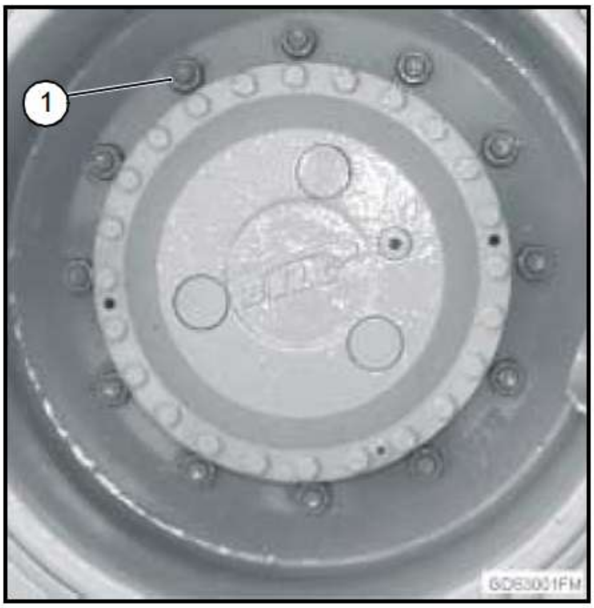
REMOVAL AND INSTALLATION OF WHEELS

Removal

⚠ CAUTION

Always chock at least one other wheel when raising a wheel off the ground.

Park the machine on firm level ground. Chock wheels.



Loosen flange nuts (1) one full turn.

⚠ CAUTION

Components are heavy. Use lifting devices.

Truck - Specification

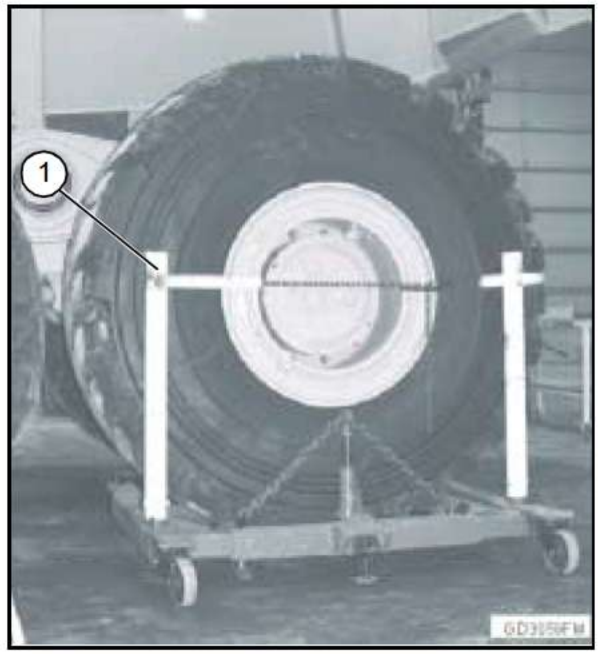
B25D Articulated Dump Truck - Weight ---- 17 700kg ----------------------------------(39,000 lb.)

B30D Articulated Dump Truck - Weight ----18 200 kg ----------------------------------(41,000 lb.)

Wheel - Specification

Tyre and Rim - Weight approximate --------- 520kg. ---------------------------------- (1144 lb.)

Raise wheel. Support axle housing with an 18 to 20 ton floor stand.



Attach wheel lift (1) to wheel. Secure tyre with safety chain.

Remove flange nuts and washers. Remove wheel.

Clean threads of wheel bolts and flange nuts.

Clean mating surfaces of flange nuts, washers, rim, and hub.

⚠ WARNING

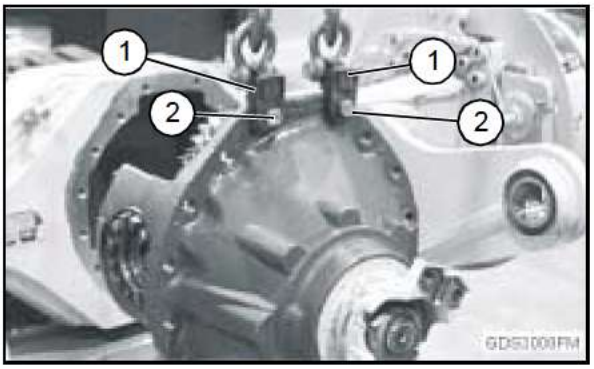
Re-check torque on flange nuts after five hours. Tighten as necessary. Re-check torque every 50 hours thereafter.

Install Wheel

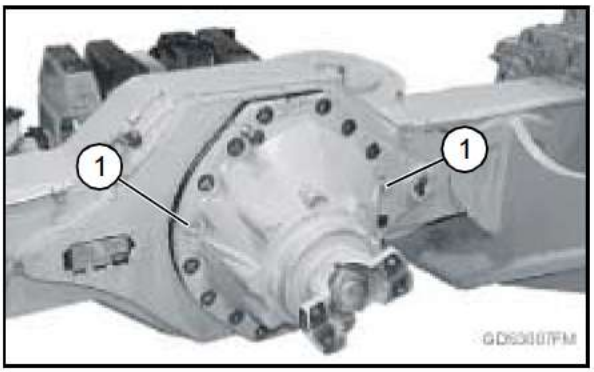
Install washers and flange nuts.

Tighten flange nuts to specification in a crisscross pattern.

Wheel Nut Torque ------------- 650 Nm (480 lb-ft)



Attach JT01748 Lifting Brackets (1) with bolts and nuts (2) to differential and support with hoist.



Remove cap screws (1).

Remove differential from housing.

Clean and inspect axle housing for wear or damage.

Repair or replace differential.

Apply cure primer and flexible form-in-place gasket to differential housing.

Install differential in housing.

Install cap screws as guide. Remove lifting brackets.

Apply cure primer and thread lock and sealer (medium strength) to differential cap screws. Install and tighten cap screws.

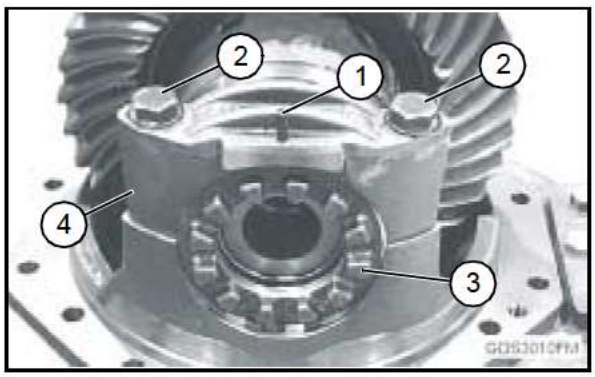
Install axle shafts. **(See Remove and Install Axle Shaft CHAPTER 2, SECTION 5).**

Fill axle housing. **(See Change Axle Oil in Operator's Manual, CHAPTER 15, SECTION 2).**

Fill planetaries. **(See Change Final Drive Oil in Operator's Manual, CHAPTER 15, SECTION 2).**

Disassemble Differential

Attach D01006AA Bench Mount Fixture (1) to housing and lock in bench mount.



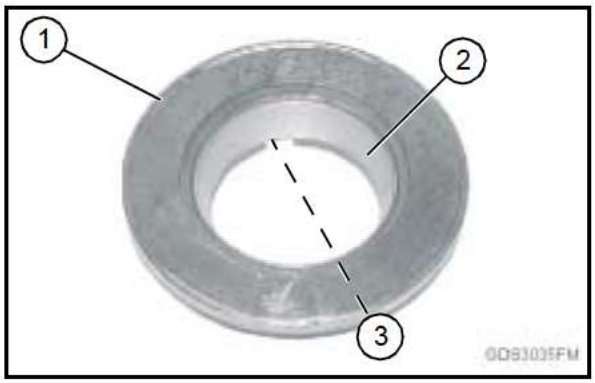
Mark locations of bearing caps (4).

Loosen cap screws (2), remove lock pin (1), and loosen adjuster nuts (3) with JDG1278 Axle Spanner Nut Wrench.

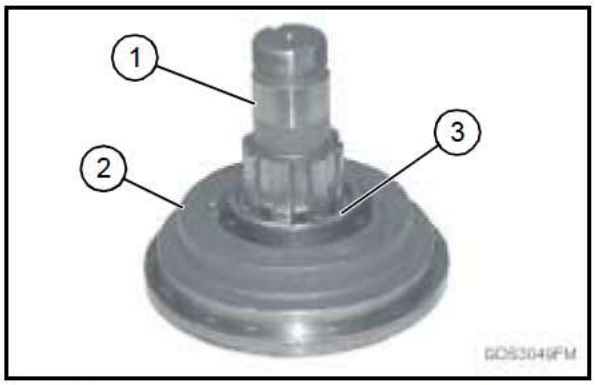
Remove bolts and washers, adjuster nuts, and bearing caps.

Remove carrier with lifting strap.

Install bearing cone (1) on pinion shaft.



Install pre-determined shim (3) and bearing cup (2) into bearing retainer (1).



Install bearing retainer (2) on pinion shaft (1).

Install shim (3) with collar up.

Heat spur gear (2) to 110°C (230°F).

Install spur gear on pinion shaft (3) with chamfer (1) facing down toward shim. Ensure that spur gear is fully seated on shim.

Heat adapter case bore and install pinion shaft as an assembly.

Insert DFT1199 Bushing Pusher in threaded holes in taper plug. Turn pushers clockwise evenly until walking beam comes off.

Replace parts as necessary.

Install bearings and taper plug on walking beam.

Install walking beam on machine. Install washers and cap screws.

Attach lifting devices to middle and rear axles. Raise axles to walking beam.

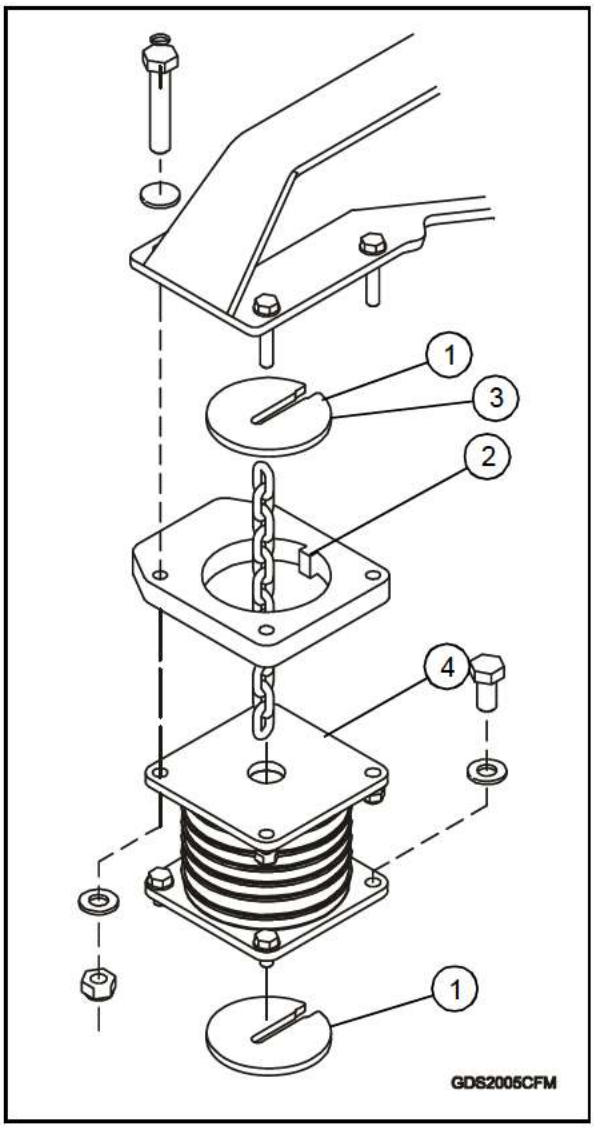
Connect walking beam to rubber mounts.

Install wheels. **(See "Install Wheel" on page 1).**

Remove and Install Rubber Mount

Support axle with lifting device and remove wheel. **(See "Removal" on page 1).**

Support walking beam with shop stand.



1. Retainer (2 used).
2. Spacer.
3. Chain.
4. Rubber Mount.

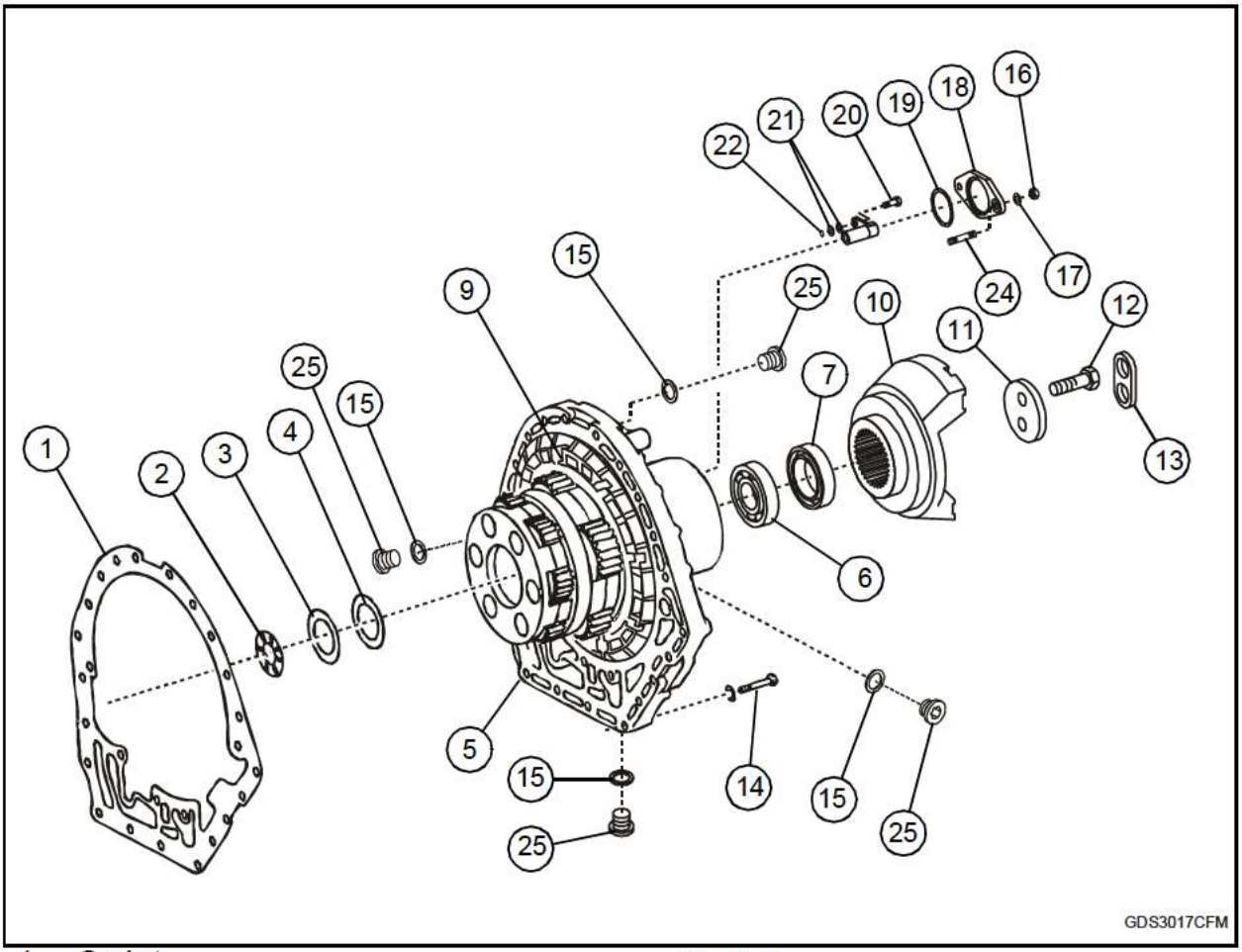
Disconnect rubber mount (4) from walking beam and axle. Lower axle with lifting device. Remove rubber mount.

Inspect parts and replace as necessary.

Install rubber mount on axle. Raise axle with lifting device. Install rubber mount on walking beam.

Install wheel. **(See "Install Wheel" on page 1).**

Remove Output Planetary and Clutch Element



1. Gasket.
2. Needle Bearing.
3. Shim.
4. Shim.
5. Output Cover.
6. Bearing.
7. Seal.
8. Output Planetary Carrier.
9. Piston.
10. Output Flange.
11. Retainer Plate.
12. Bolt.
13. Lock Plate.
14. Bolt.
15. O-Ring.
16. Nut.
17. Washer.
18. Output Sensor Cover.
19. O-Ring.
20. Bolt.
21. Shim (s).
22. O-Ring.
23. Output Speed Sensor.
24. Stud.
25. Plug

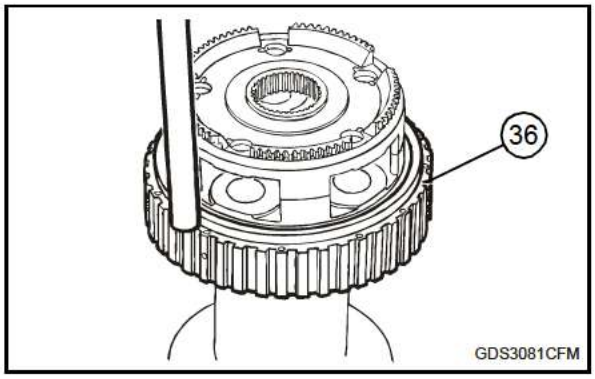
Remove output flange (10) with puller.

Remove cover (18) and disconnect wire connectors at output speed sensor.

Remove output speed sensor (23).

⚠ CAUTION

If torque converter is remove, lifting device 281710 Lifting Device must be installed to turbine shaft to prevent it from falling out after output planetary is removed.



Use plastic drift to remove ring gear (36).

Planetary one is disassembled similar to plane tary two.

Inspect , clean, lubricate and assemble parts (16 - 23) and (23 - 36).

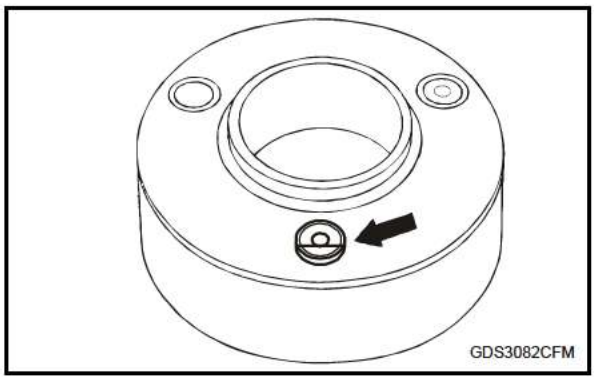
8. Install plates (21, 32 and 33) with steel side to carrier.

Assemble planetary pinions with new pinion shafts (17 and 27).

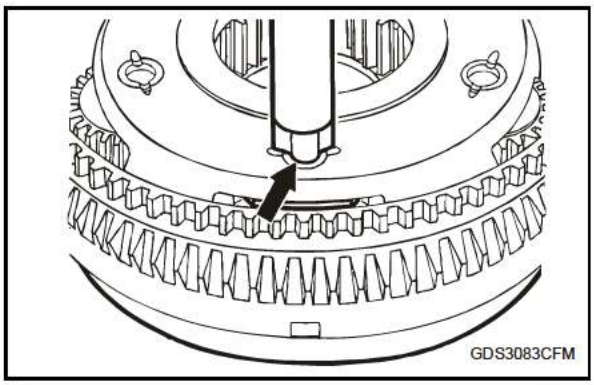
Measure end play of all pinions at pinion outer edge between carrier and thrust plate.

Disassemble and Assemble Planetary One and Two Specification

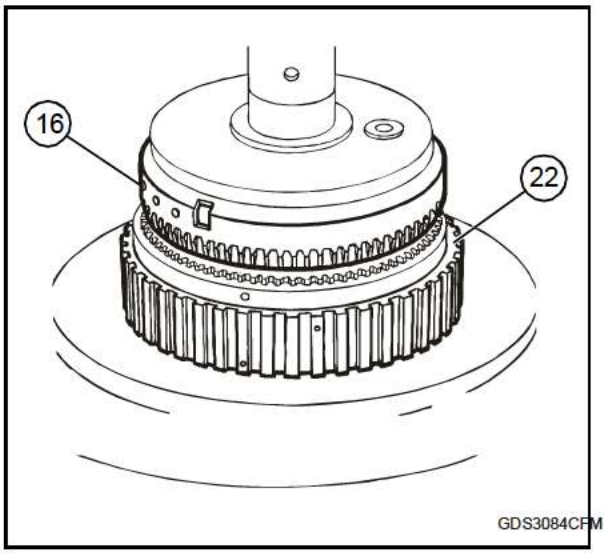
Planetary Pinion End Play- 0.5 - 1.2 mm (0.02 - 0.047 in.)



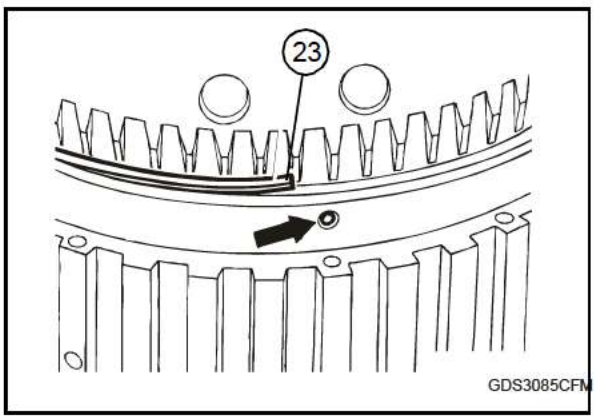
Support pinion shafts with JDG1624 Planetary Gear Pin Support at arrow and secure planetary one pinion shafts with 281714 Punch.



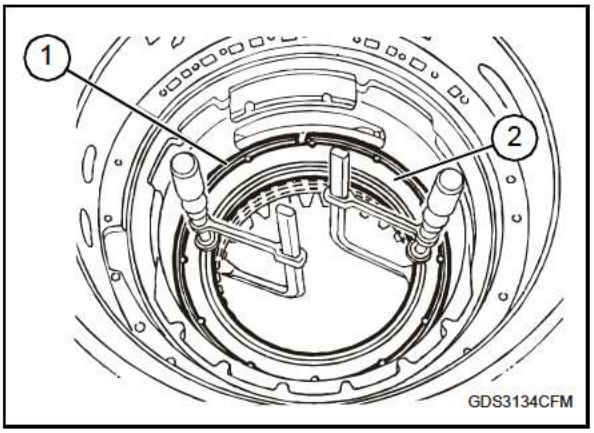
Secure planetary two pinion shafts with 281715 Punch.



Align ring gear (22) with carrier (16). Using press push ring gear into carrier and install snap ring (23 See next figure) with end gap at opening in ring gear.

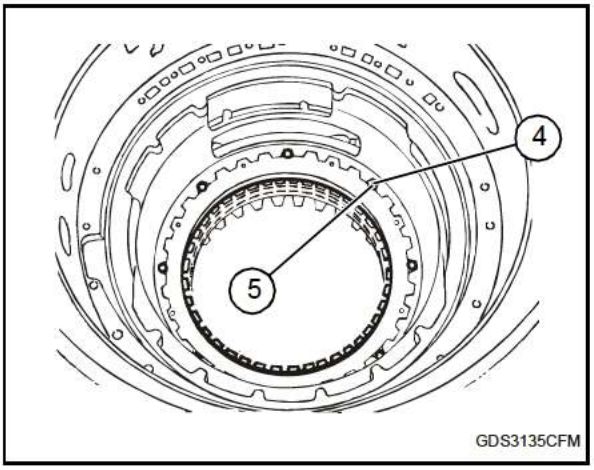


Snap ring must be engage in groove completely.



Use screw clamps to compress clutch D springs as shown to remove snap ring (1).

Release screw clamps evenly and remove end plate (2).

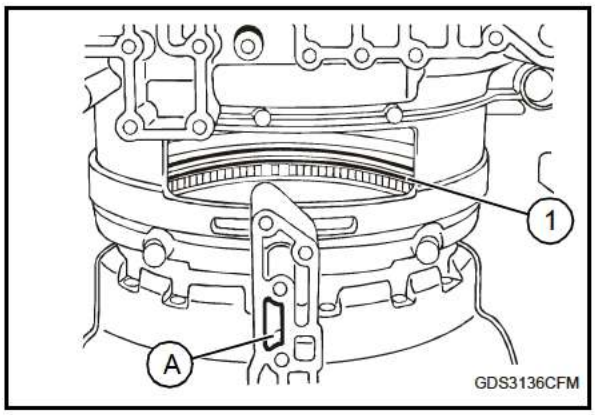


Remove springs (5) and pins (4).

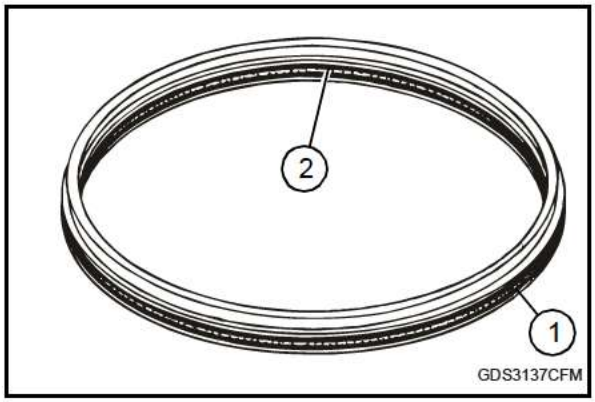
Remove plates, mark and identify order and position.

⚠ CAUTION

Wear eye and face protection before using compressed air. Cover transmission oil ports with a cloth for protection from transmission oil when using compressed air.



Remove clutch D piston (1) with low air pressure applied to port (A).

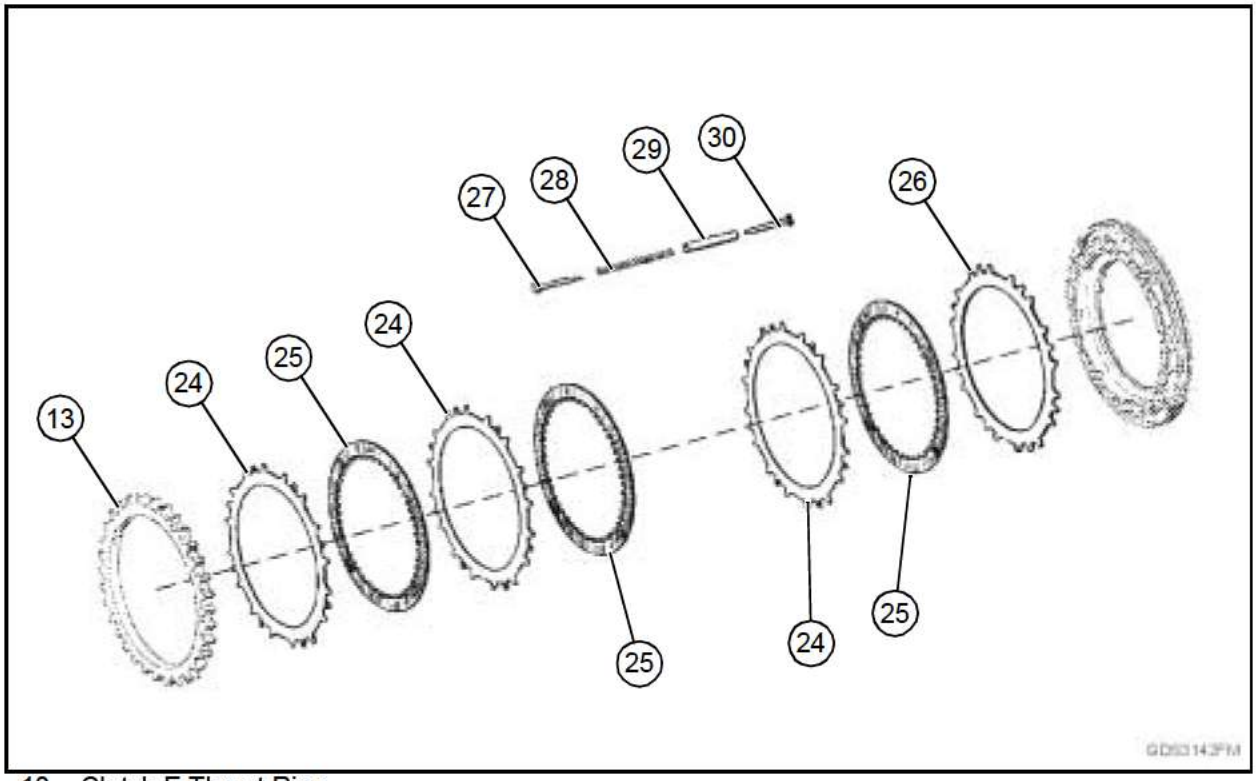


Replace seals (1 and 2). Seal lip must be positioned toward pressure side of piston.

NOTE:Piston must move freely and rest at bottom of bore.

Apply a thin layer of petroleum jelly and install clutch piston D (1).

NOTE:Spring plate inner edge must be positioned on spring plate holder.



13. Clutch E Thrust Ring.
24. Outer Plate (6 used).
25. Inner Plate (7 used).
26. End Plate.
27. Pin (8 used).
28. Spring (8 used).
29. Guide Tube (8 used).
30. Pin (8 used).

End plate must measure 3 mm (0.118 in.) .

Install first outer plate with notches located at spring pins.

Install remaining plates in alternating order with inner plate last.

NOTE:End plate (26) teeth are larger than outer plates.

Measure thickness of end plate (26) and install. End plate has larger teeth and must measure 3 mm (0.118 in.) thick.

Place gasket into position on transmission housing.

Remove bolts for front engine mounts (1).

⚠ CAUTION

Do not mix engine mounting, transmission or transfer case shims.

NOTE:Note location of washers between rubber mounts and frame.

Remove transmission mounts (1). Note location of washers between rubber mounts and frame.

Remove engine. Use shop stands or wooden blocks to support the engine and transmission.

Using JDG1500-16 turning tool rotate engine until flex plate cap screws (1) appear in access hole.

Rotate engine and remove cap screws.

⚠ CAUTION

Approximate weight of transmission is 544 kg (1200 lb)

Attach JDG1501-6 main case holding fixture tool to transmission. Attach a suitable hoist to tool.

Remove bolts (1) and remove transmission from engine. Remove bolts holding flexplate adapter to flywheel.

Repair or replace as necessary.

Install flexplate adapter to flywheel. Tighten cap screws to specification.

Remove and Install Engine Specification

Flexplate Adapter-to-Flywheel Cap Screws Torque	110 Nm (81 lb-ft)

Before installing the transmission, align one of the cap screw holes in the flex plate discs and one of the tapped holes in torque converter adapter with hole in flywheel housing.

Install transmission to flywheel housing.

Apply rigid form in place gasket to threads of transmission-to-flywheel housing cap screws.

Tighten to specification.

Permissible Lateral Runout

Measure	Size
Fitted bearing journals	0.015 mm (0.0006 in.)

Radial Run out Measured At Middle Main Bearing Journal (Mounted On Outer Main Bearing Journals)

Measure	Size
	0.11 mm (0.004 in.)

Fillet Radii

Measure	Size
Main and conrod bearing journals	2.5 - 3.0 mm (0.1 - 0.118 in.)

Hardness

Measure	Size
Main and conrod bearing journals	52 HRc

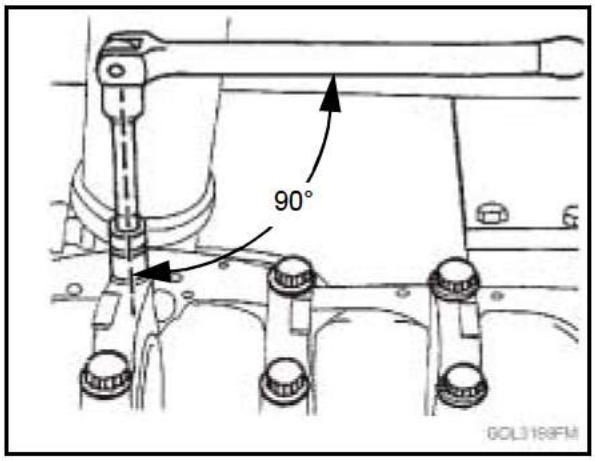
Crown

Measure	Size
Main and conrod bearing journals	0.0 - 0.004 mm (0.0 - 0.0002 in.)

Measure Main Bearings In Engine Block

With crankshaft removed from engine, install main bearing caps with bearing (if previously removed).

Ensure bearings are installed correctly and dry. **(See "Install Crankshaft" on page 173).**



Tighten main bearing cap screws to specification. **(See below).**

Tighten main bearing cap screws to their final torque by placing ratchet handle centerline to crankshaft, then turn clockwise an additional 90°, as shown.

Handle should then be perpendicular to crankshaft centerline.

Crankshaft Specification

Main Bearing Cap To Crankcase Screw Torque - - - - -
1st stage - 30 Nm (22 lb-ft)

Main Bearing Cap To Crankcase Screw Torque - - - - -
2nd Stage- 80 Nm (59 lb-ft)

Main Bearing Cap To Crankcase Screw Torque - - - - -
3rd Stage - 155 Nm (59 lb-ft)

Main Bearing Cap To Crankcase Screw Torque - - - - -
4th Stage - 90°

NOTE: If engine has previously had a major overhaul and undersized bearings were used, ID and OD dimensions may not be the same as those recorded. However, oil clearance must be as specified in this procedure. See Crankshaft Grinding Specifications in this procedure for under size bearing and crankshaft journal specifications.

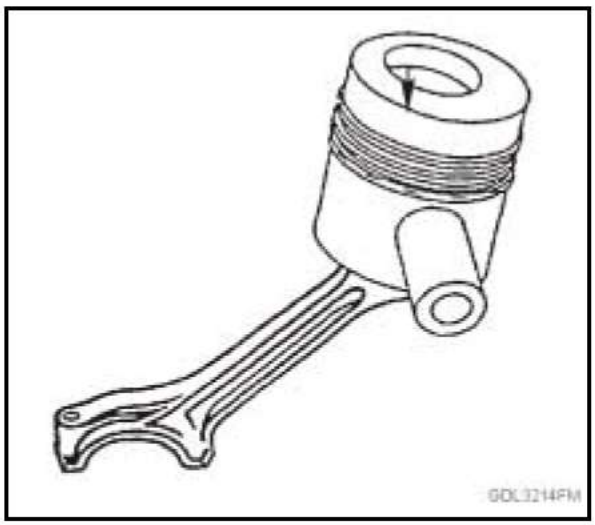
Pistons marked “AB” to be used in cylinders “A” or ”B” and pistons marked “CD” in cylinders “B” or “C”

Assemble Piston and Connecting Rod

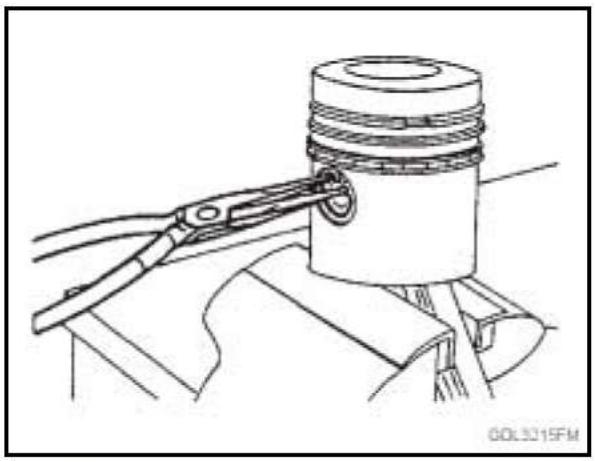
⚠ CAUTION

1. Pistons must be installed on same connecting rods from which they were removed.
2. New piston pin snap rings must be used.

Apply clean engine oil to piston pins.

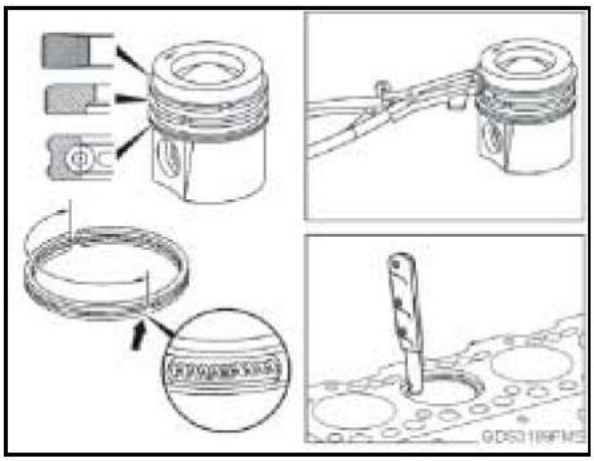


Install pistons on connecting rods. Arrow or triangle should point to the flywheel.



Install piston pins using new retaining rings.

NOTE: If old rings were not removed, ensure rings are clean before reinstalling piston, especially center piston ring.



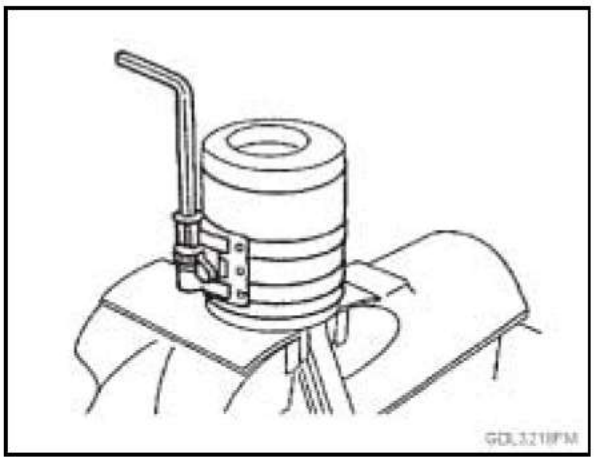
Install new rings into cylinder and check ring end gap using a feeler gauge. **(See “Remove And Install Piston Rings” on page 189).**

Apply clean engine oil to rings and install piston rings on piston using JDG1500-31 Piston Ring Pliers.

Install piston rings in proper grooves as called out in figure. Stagger ring gaps 120°.

Install Piston-conrod assemblies

Check that ring gaps are ofset by 120°.



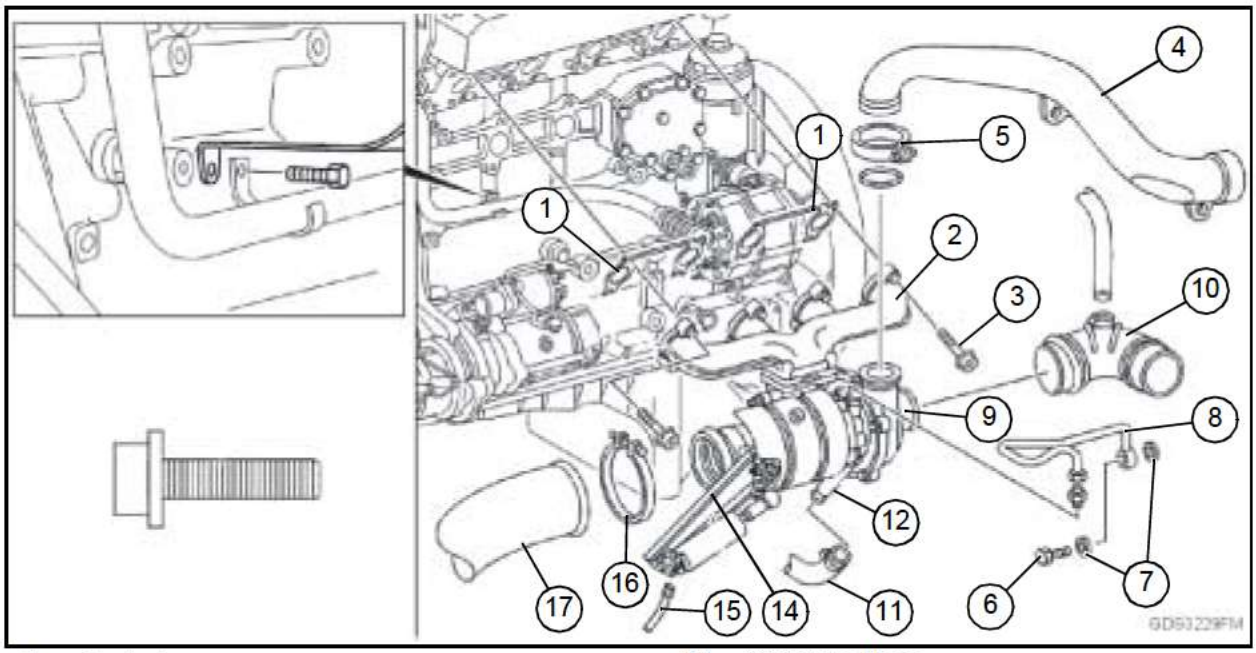
Fit tensioning strap onto piston.

Apply clean engine oil to piston, ID of liner and piston ring compressor. Install ring compressor on piston tight enough to where ring compressor can just be shifted on piston.

CHAPTER 4. ENGINE

SECTION 7. EXHAUST SYSTEM

REMOVE AND INSTALL EXHAUST MANIFOLD



1. Gasket.
2. Exhaust Manifold.
3. Exhaust Manifold Bolt.
4. Boost Air Pipe.
5. Clamp.
6. Banjo Bolt.
7. Seal.
8. Oil Delivery Line.
9. Turbocharger.
10. Air Intake Hose.
11. Oil Return Flow Hose.
12. Heat Shield.
13. Bolt.
14. Engine Brake Flap Connection.
15. Compressed Air Line.
16. Clamp.
17. Exhaust Pipe.

⚠ CAUTION

Prevent possible injury from hot exhaust pipes. Exhaust pipes can be hot enough to cause burns. Wait for exhaust pipes to cool before working on the machine.

Remove boost air pipe (4).

Detach exhaust pipe (17) at engine brake flap connection (14).

Detach compressed air line (15).

Detach heat shield (12) at turbocharger.

Detach oil return flow hose (11).

Detach oil delivery line (8) at oil filter and turbocharger. Collect engine oil that flows out.

Detach air intake hose (10) at turbocharger.

Loosen exhaust manifold bolts (3) and exhaust manifold (2).

Remove gaskets (1).

Inspect manifold bolts. If out of specification; replace.

Remove and Install Thermostats and Housing

(See "THERMOSTATS AND HOUSING" on page 237).

Loosen belt and remove from pulley

Remove bolts and disconnect adapter pipe from water pump (1).

Remove pulley.

Remove bolts (3) and remove water pump.

Repair or replace as required.

Install water pump using a new gasket (2) and bolts (3).

Tighten to specification.

Remove and Install Water Pump Specification

Water Pump bolts To CrankcaseTorque
---------- 25 Nm (221 lb-in.)

Install pulley.

Tighten bolts to specification.

Remove and Install Water Pump Specification

Water Pump Pulley bolts Torque
---------- 25 Nm (221 lb-in.)

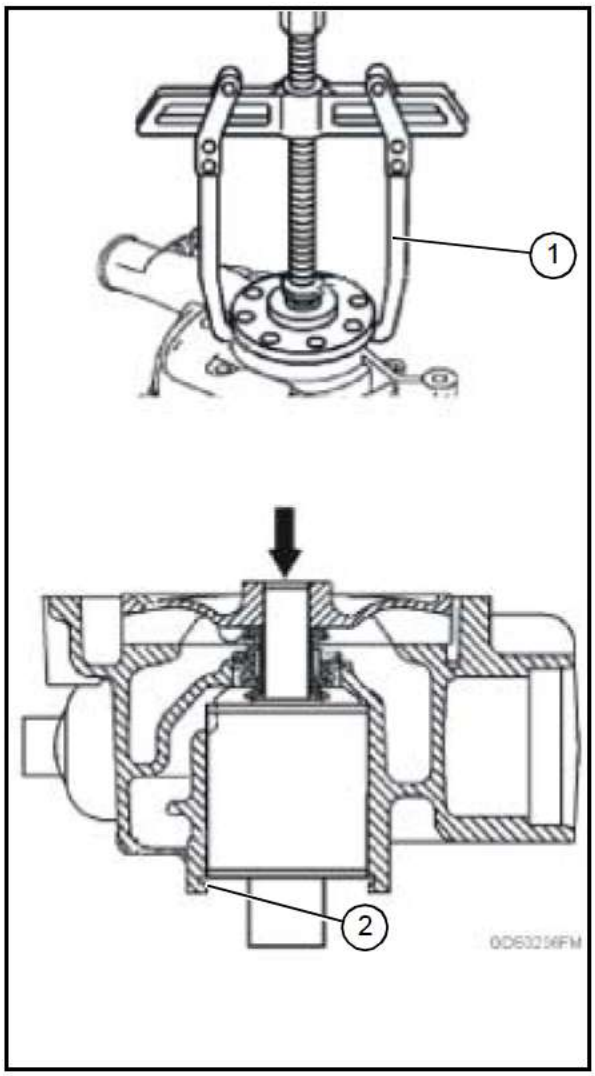
Install belt.

Install thermostat housing. **(See "Remove And Install Thermostats And Housing" on page 237)**

Disassemble and Assemble

Remove water pump from engine. **(See "WATER PUMP" on page 233).**

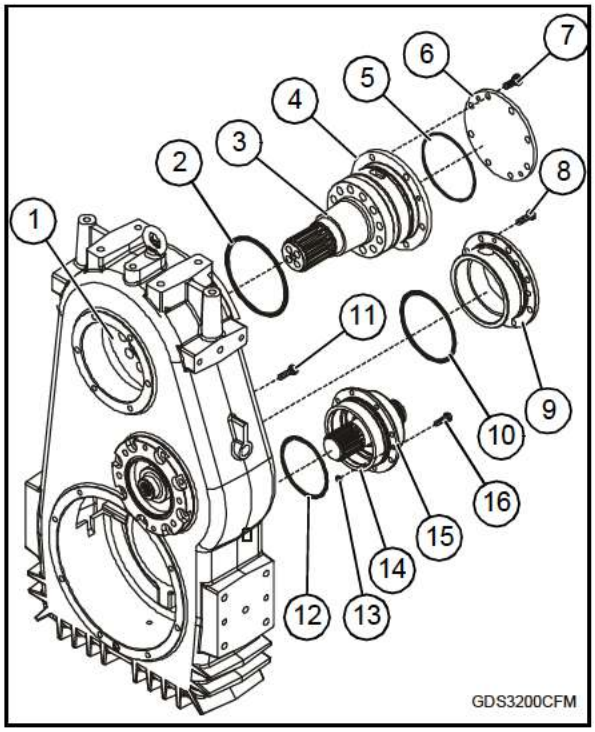
Remove thermostats and housing. **(See "Remove And Install Thermostats And Housing" on page 237).**



Remove water pump pulley hub (1) with a gear puller.

Remove snap ring (2) from front bore of water pump housing with snap ring pliers.

Use a suitable drift to press bearing out of the impeller and coolant pump housing.



Remove input shaft cover (6).

Loosen input shaft rear bearing housing (4), using jack screws.

Tap input shaft (3) with soft-faced hammer to remove shaft from input gear (1). Remove input shaft assembly.

Remove idler shaft rear bearing housing (9), using jack screws.

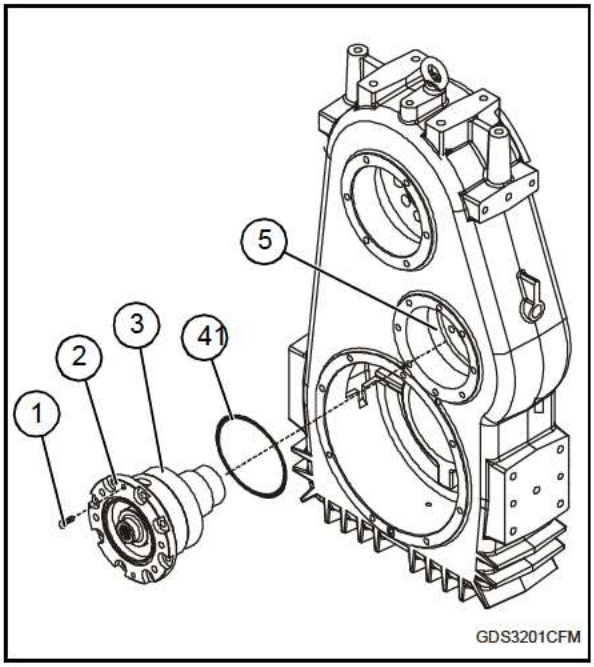
Remove cap screws (11) securing idler gear to shaft.

Remove rear output shaft assembly (12 - 15), using jack screws.

⚠ CAUTION

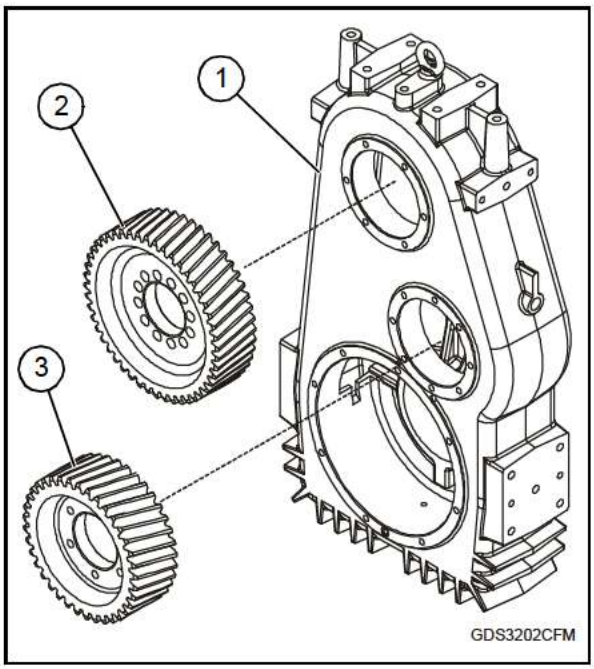
DO NOT rotate transfer case right-side up. Input and idler gears can fall from case.

Rotate transfer case 180°. Ensure that top of case rotates downward, so gears do not fall from case.

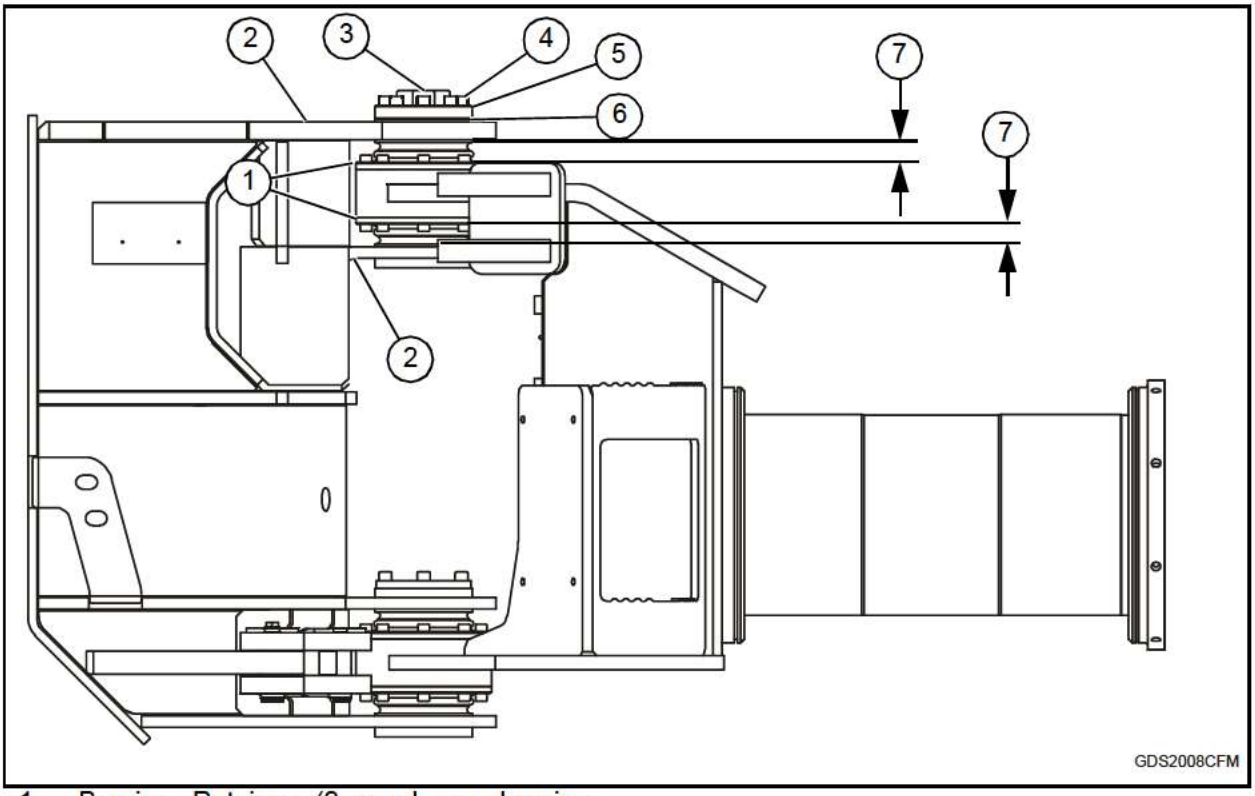


Loosen idler shaft front bearing housing (2), using jack screws.

Tap idler shaft (3) with soft-faced hammer to remove from idler gear (4). Remove idler shaft assembly (2 - 4).



Remove idler gear (3) and input gear (2) from transfer case (1).



1. Bearing Retainer (2 used per bearing assembly). 3.Socket Head Cap Screw (4 5. Upper Articulation Pin 7.Frame Plate-to-Bearing
used) Retaining Plate Retainer Gap
2. Engine Frame Plate (2 used 4.Socket Head Cap Screw (8 6.Shim (as required)
per bearing assembly) used)

Adjust Articulation Joint Bearings

Tighten cap screws (3 and 4) until snug.

Measure gaps (7) between engine frame plates (2) and bearing retainers (1) of upper articulation joint. Gaps should be equal.

Add or remove shims (6) as necessary under pin retaining plate (5) to adjust gaps.

Repeat steps 1 - 3 as necessary until gaps are equal.

Remove cap screws (3 and 4) and apply medium-strength thread lock and sealer to threads. Install retainer plate. Install cap screws (3 and 4) and tighten to specification.

Articulation Frame Specification

Retaining Plate-to-Engine Frame Plate Cap Screw Torque - 145 Nm (107 ft-lb)

Retaining Plate-to-Upper Articulation Pin Cap Screw Torque - 690 Nm (509 ft-lb)

Oscillation Joint

Replace Bushings

Separate Front and Rear Frames. **(See "SEPARATE FRONT AND REAR FRAMES" on page 305.)**

NOTE:Replace one bushing at a time.

- Using a rotary grinder, cut slots through bushing. Drive bushing out with a brass drift.
- Clean grease and grinding residue from bushing seat and interior of tube.