



65ZV



93207-00240

January 2004

SHOP MANUAL

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Disassembly & Reassembly
Service Standard

WHEEL LOADER

65ZV

Disassembly & Reassembly Service Standard

93207-00240

Powered by CUMMINS 6BTAA5.9 ENGINE

Serial No. 65C4-9001~

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Liquid Gasket and Screw Lock Agent

To reassemble the disassembled parts, be sure to use the specified liquid gasket or screw lock agent or the equivalent according to the following lists:

	Code	Manufacturer	Product name
Liquid Gasket	AA01	Loctite®	Plastic Gasket 568
	AA02	Loctite®	Hydraulic sealant
	AA03	Three Bond	Three Bond 1215
Screw Lock Agent	AB01	Loctite®	Loctite® 262
	AB02	Three Bond	Three Bond 1327
	AB03	Three Bond	Three Bond 1374

Cautions regarding parts removal

If a screw or shaft to be removed has been locked by one of the above agents, remove the screw or shaft using a general tool, such as a wrench or puller.

If it is difficult to remove the screw or shaft, heat the bolt to soften the agent (200 to 250°C) using a soldering iron or gas torch.

Caution: If there is a seal near the screw or shaft to be removed, carefully use the heating method for removal, to avoid damage to the seal.

If heat has been used to remove the bolt a new bolt should be used during reassembly.

Cautions regarding reassembly

To reassembly a screw:

Completely remove the hardened lock agent from the screw and the threaded hole before reassembling the screw.

Note: A piece of hardened lock agent may be peeled off and remain in the component. The remaining piece may cause malfunction during fastener installation.

To bond a plane or to fit a shaft:

Remove the hardened lock agent using a wire brush or the like, and polish the surface using sand paper. Use of a loctite primer like Locquic ® Primer T cleans threads and speeds curing time.

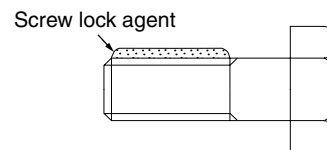
Antiseize Agent

Code	Manufacturer	Product name
AC01	Loctite®	Loctite® 767 (Paste or spray)

Screw lock agent application procedure

Through-hole

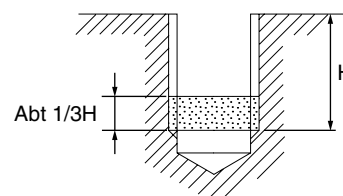
Apply screw lock agent one or two lines on the male threads.



65ZV00002

Blind hole

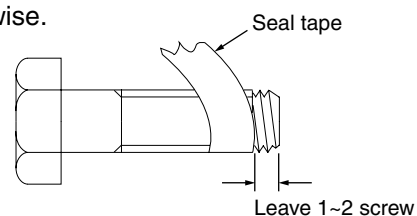
Apply screw lock agent all-round on the female threads at 1/3 of the female thread length from the bottom.



65ZV00003

How to wind a seal tape

To avoid a piece of seal tape left in the circuit, leave 1 or 2 screw from the end of the thread and start winding it clockwise.



65ZV00004

Engine Room

Removing and reinstalling engine room

1. Removing engine room

⚠ WARNING

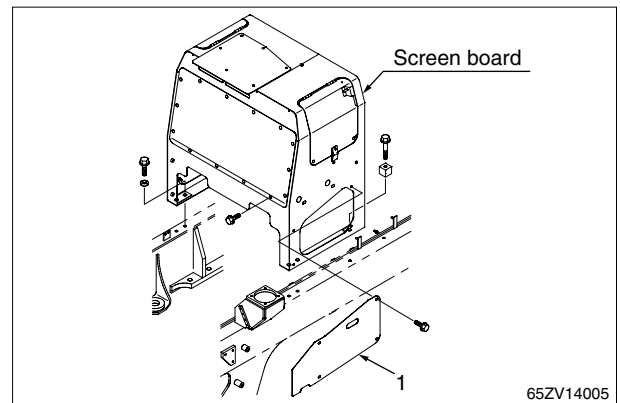
Unexpected movement of machine could cause an accident resulting in injury or death. Be sure to observe the following items before starting engine room removal:

- Position machine on level ground, and apply the parking brake.
- Lower bucket to ground, and block tires with chocks, etc. to prevent them from moving.
- Remove engine key, and hang a "DO NOT START ENGINE !" tag on steering wheel.

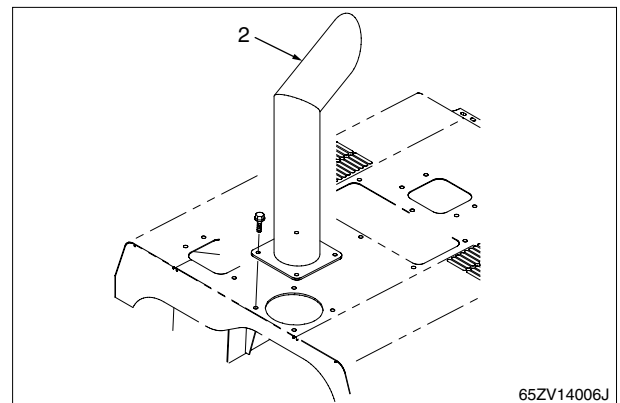
Before starting work:

- Recover/recycle refrigerant on machine with optional air conditioner, if required.
- Remove the right and left decks together with the handrail.

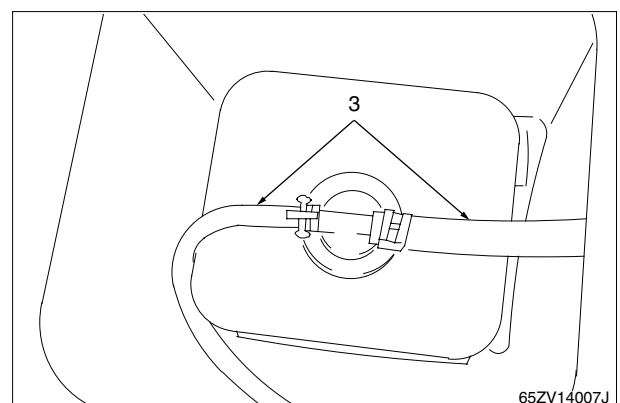
1) Remove covers (1) from both the right and left sides.



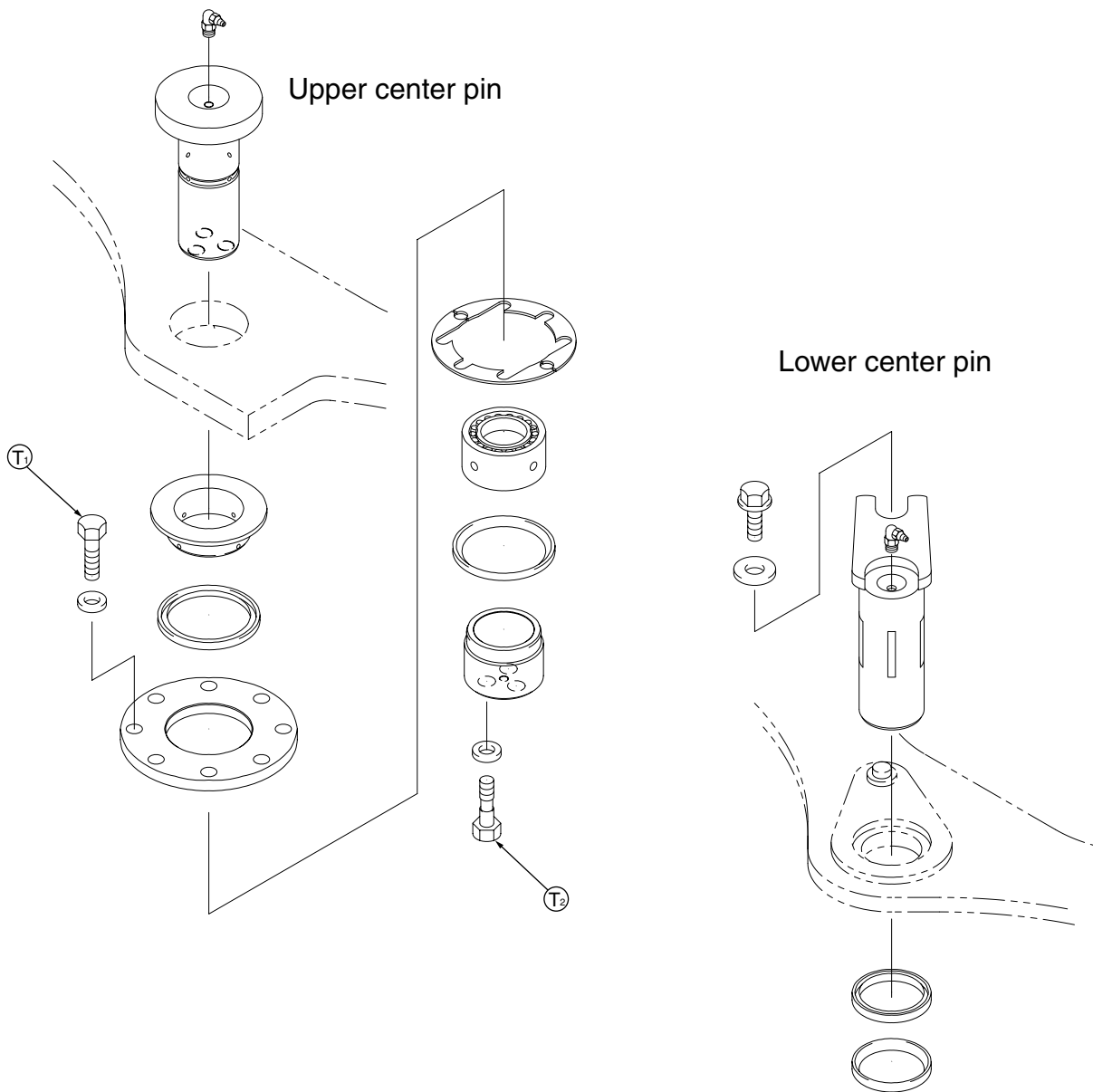
2) Remove exhaust pipe (2).




3) Disconnect sub tank hose (3) for the radiator.



Center Pin



-  T₁: 206 N-m (21 kgf-m) (152 lb-ft)
 T₂: 422 N-m (43.0 kgf-m) (311 lb-ft)
 (with lubricating oil (Engine oil or gear oil))

65ZV14010

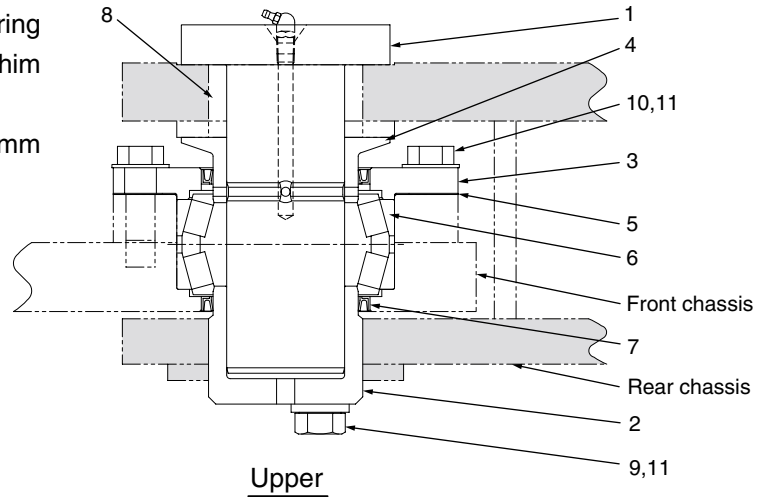
Shim adjustment: Adjust the clearance to 0.1 ± 0.05 mm
 (0.0039 ± 0.0020 in.) using the
 appropriate shim.
 After that, tighten the T₁ bolt.

Center Pin

Shim adjustment

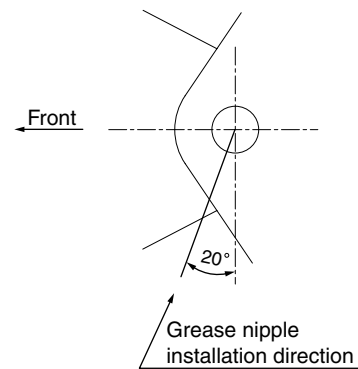
The clearance between the front chassis and bearing cover (#3) is 0.75 ± 0.5 mm (0.03 ± 0.02 in) before shim adjustment.

Add shims (#5) so that the clearance is 0.1 ± 0.05 mm (0.004 ± 0.002 in).




Installing bearing cover

Install the bearing cover so that the grease nipple mounting hole is positioned at the specified angle as shown in the right figure.

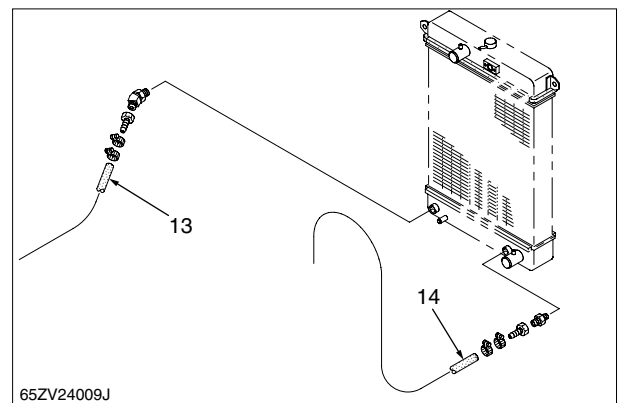


65ZV15001

9) Lift the radiator about 10 cm (4 in.) and then disconnect transmission cooler hoses (13)(14).

 : Engine oil (or ATF): 1 ℓ (0.26 Gal.)

Note: Cover disconnected hoses with caps to protect hoses from dust and dirt.



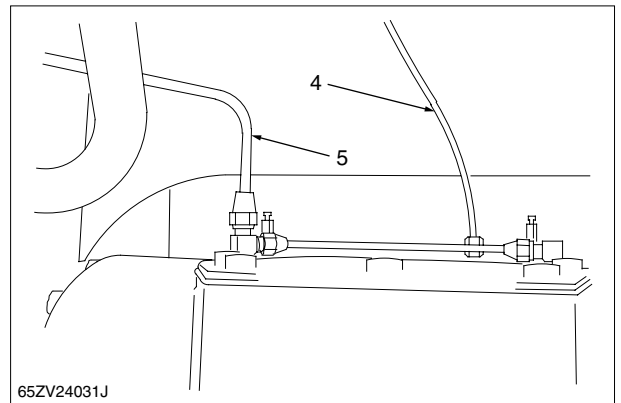
10) Remove radiator (11) from the rear chassis.

2. Reinstalling radiator


For reinstallation, follow the above procedure in the reversed direction.

3) Disconnect air bleeder tube (4) and brake pipes (5).


Note: Install plastic caps to protect from dirt entering fittings or pipes.



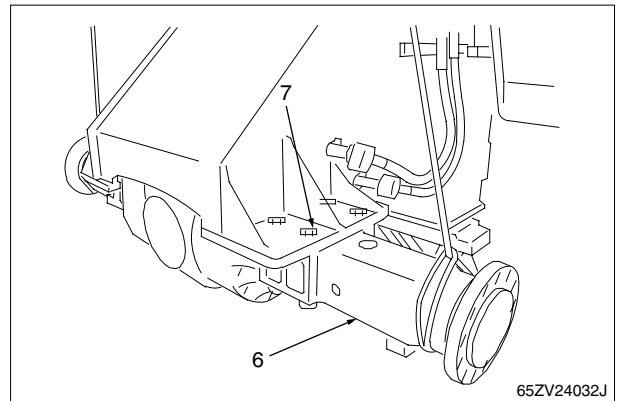
4) Attach sling to axle assembly (6), and then remove eight retainer bolts (7).

 : Axle assembly: 525 kg(1,157 lbs)

Torque for assembly:

 : Retainer bolt: 721 N-m(73.5 kgf-m)(532 lb-ft)

Note: During reassembly be sure both mating surfaces are clean and free of paint.

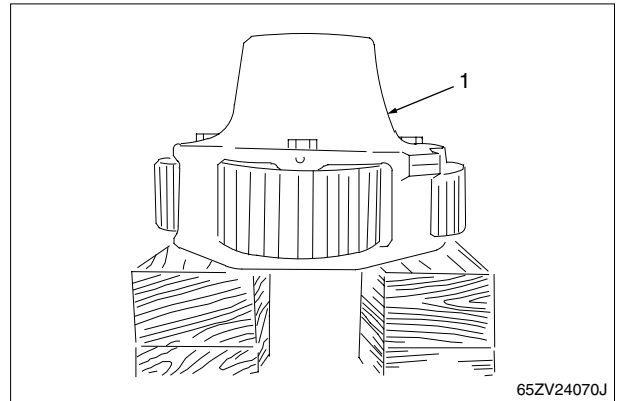


5) Place axle assembly (6) on a carrier or rolling floor jack with special adapter to smoothly pull out the assembly.

Disassembling and reassembling spider assembly

1. Disassembling spider assembly

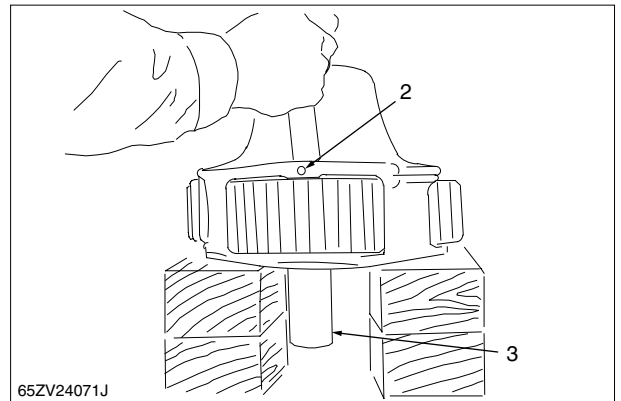
1) Put the spider assembly (1) on wooden blocks.



2) Push spring pin (2) into planetary pin (3) using a bar.

Spring pin hole dia. $\varnothing 6^{+0.12}_0$

3) Strike planetary pin (3) out from axle shaft side to differential side.



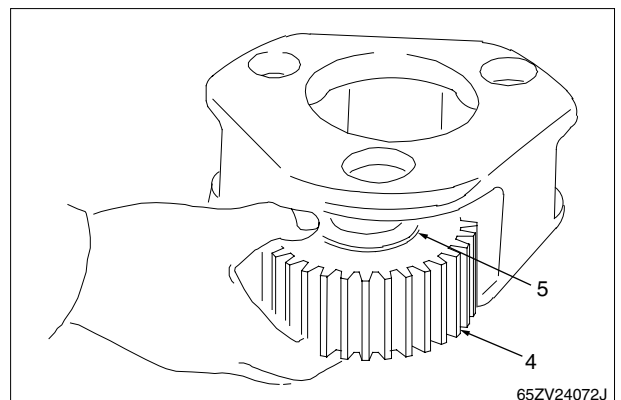
⚠ WARNING

Hitting the parts quenched such as bearing, shaft, pin and tooth by a steel-hammer could cause a breakage resulting in injury or death.

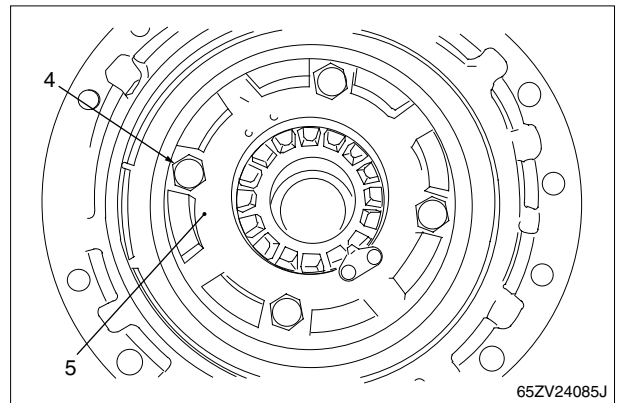
- Keep persons away from working area.
- Use a support plate in case a steel hammer is used.
- Use a copper-hammer or a plastic hammer.
- Always wear protection goggles.

4) Remove spring pin from planetary pin (3).

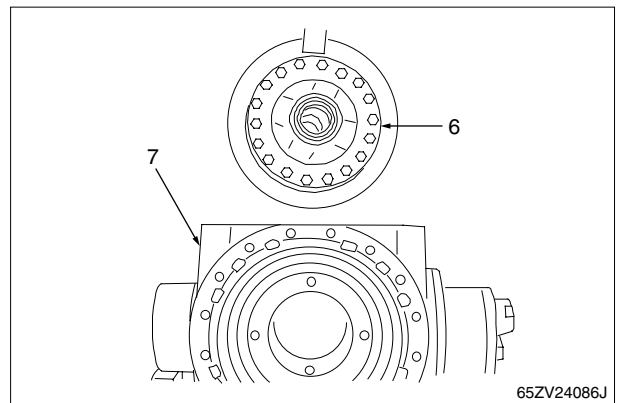
5) Remove planetary gear (4) and thrust washer (5).



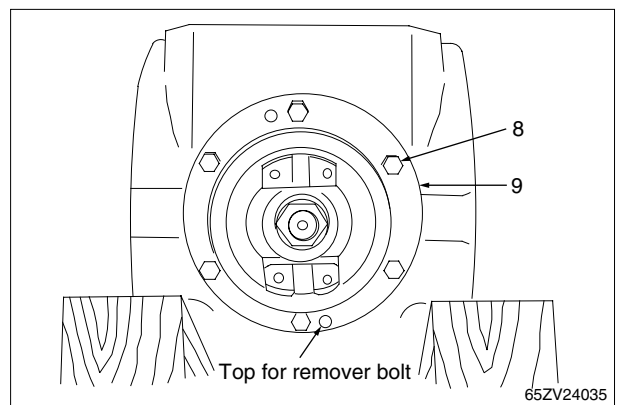
4) Remove bolts (4) and bearing carrier (5) (both right and left sides).



5) Remove differential cage (6) from differential carrier (7). Refer to "Disassembling and reassembling differential cage".



6) Remove bolts (8) and then remove pinion assembly (9) from differential carrier. Refer to "Disassembling and reassembling pinion assembly".

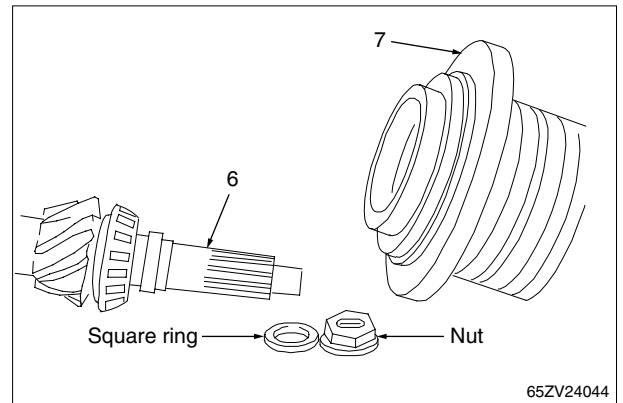


- 4) Remove pinion gear (6) and pinion cage (7) together.
Tap pinion gear (6) out of pinion cage (7) with a plastic hammer.

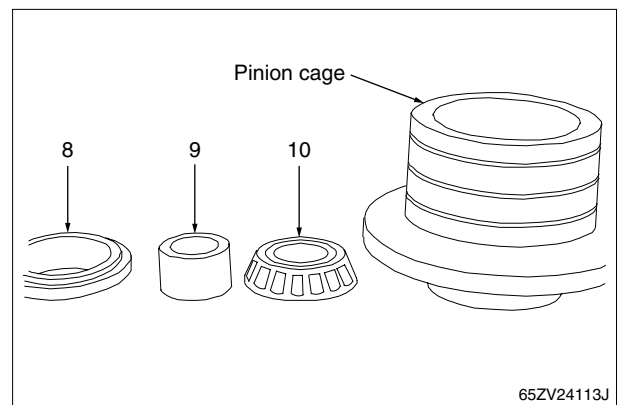
⚠ WARNING

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- Use a copper-hammer or a plastic hammer.
- Always wear protection goggles.

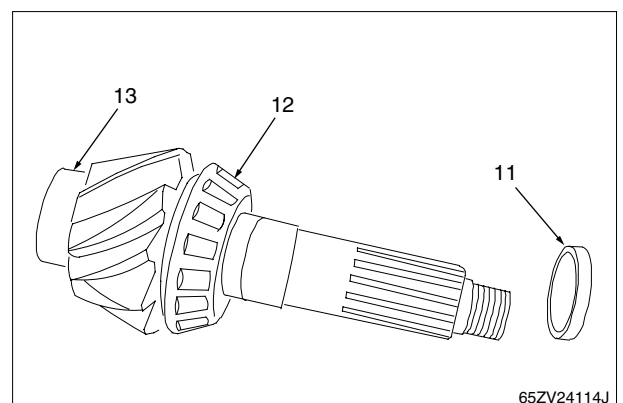


- 5) Remove oil seal (8), spacer (9) and taper roller bearing (10) from pinion cage (7).



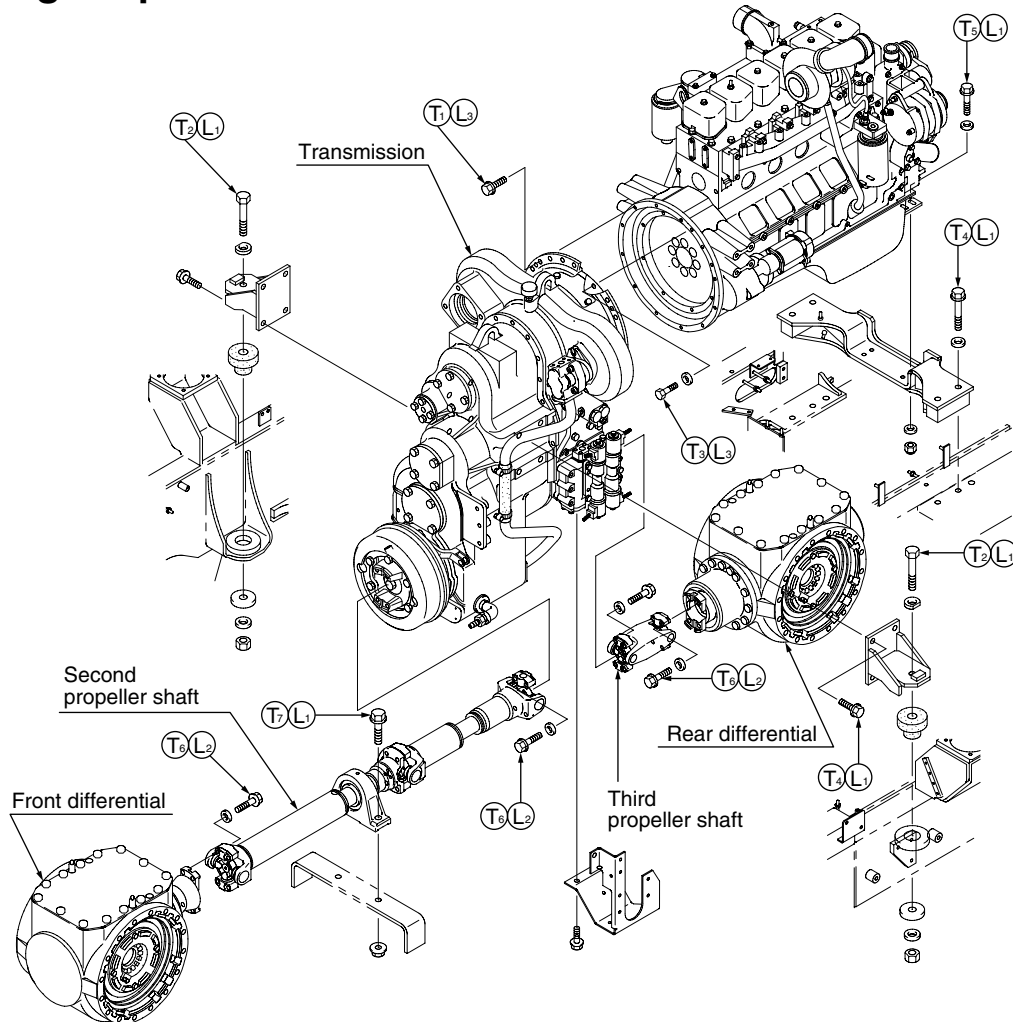
- 6) Remove spacer (11). Remove taper roller bearing (12) and roller bearing (13) from the pinion, using the bearing puller.

Note: Do not remove them unless they should be replaced.



Torque Converter and Transmission Assembly

Tightening torque



65ZV24001

 : Bolt tightening torque

T₁: 53 N-m(5.4 kgf-m)(39 lb-ft)

T₂: 417 N-m(42.5 kgf-m)(307 lb-ft)

T₃: 44 N-m(4.5 kgf-m)(33 lb-ft)

T₄: 216 N-m(22.0 kgf-m)(159 lb-ft)

T₅: 90 N-m(9.15 kgf-m)(66 lb-ft)

T₆: 80 N-m(8.15 kgf-m)(59 lb-ft)

T₇: 230 N-m(23.5 kgf-m)(170 lb-ft)

Always replace drive shaft bolts with new bolts - Never reuse.



L₁: Screw lock agent (Loctite® 262) application

L₂: Screw lock agent (Three Bond 1327) application

L₃: With lubrication oil (Engine oil or gear oil)

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Disassembling and reassembling transmission assembly


1. Disassembling transmission assembly

Before starting work:

- Clean the transmission assembly.


1) Remove the bolt for pump suction pipe (1).

Tightening torque for assembly:

 : Bolt: 53 N-m(5.4 kgf-m)(39 lb-ft)

2) Remove pipe (2) and then remove the strainer.

Tightening torque for assembly:

 : Bolt: 69 N-m(7.00 kgf-m)(51 lb-ft)


3) Remove the pilot boss, drive cover and the turbine.

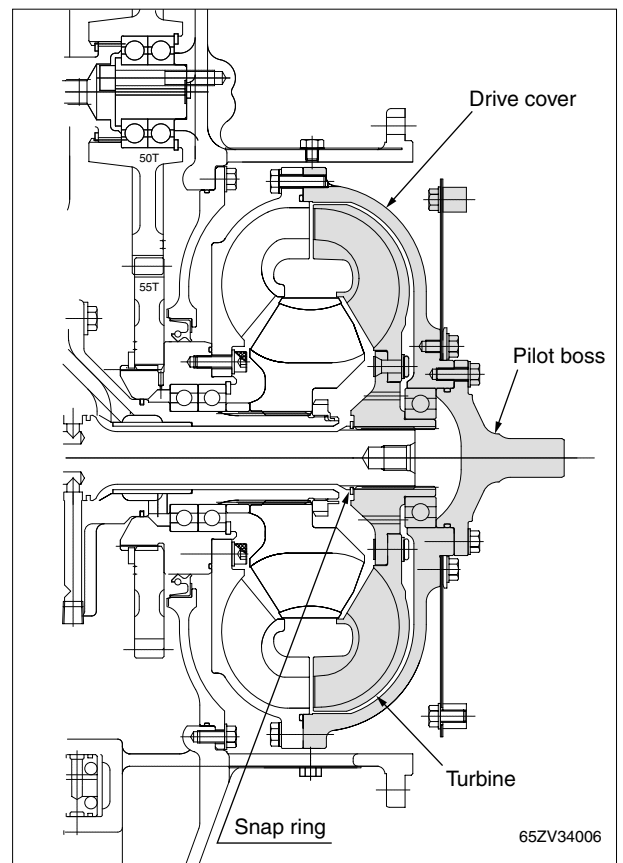
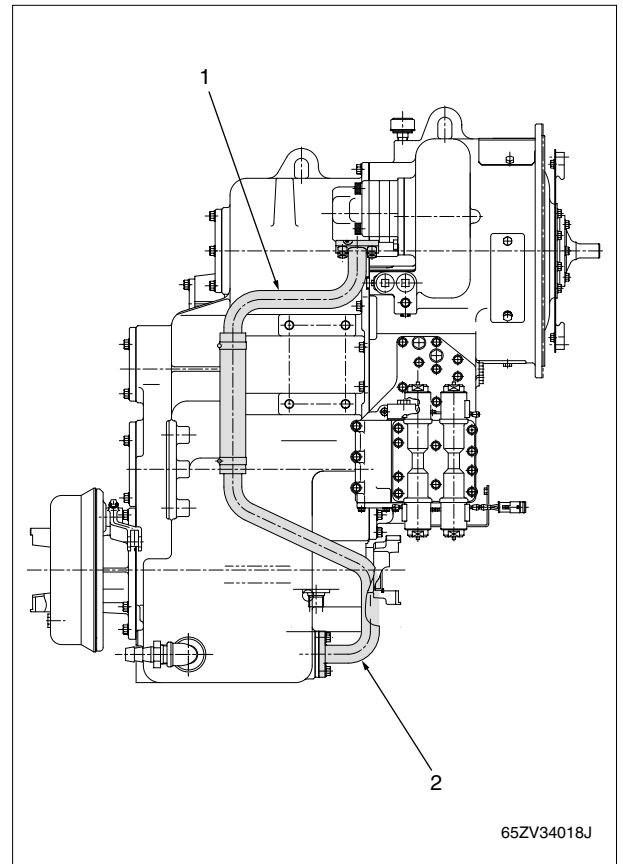
4) Remove the snap ring from the turbine shaft.

5) Remove the retainer bolt connecting the torque converter housing and the transmission housing.

Use a jacking bolt (M10x1.5) to separate the torque converter housing and the transmission housing.

Tightening torque for assembly:

 : Housing connection bolt: 69 N-m(7.00 kgf-m)
(51 lb-ft)



Control Valve Assembly

Removing and reinstalling control valve

1. Removing control valve

⚠ WARNING

Unexpected movement of machine could cause an accident, resulting in injury or death. To prevent such an accident, observe the following items:

- Park machine on level ground, and then lower bucket to the ground.
- Apply the parking brake, and block tires with chocks to prevent wheels from moving.
- Remove the starter key, and hang a "DO NOT START!" tag on the steering wheel.

1) Remove the electric wiring coupler for each solenoid valve.


Note: Put matchmark on each coupler to avoid mis-connection when reassembling.

2) Remove the main clutch pressure measuring hose.

Note: Cover the disconnected hoses with plastic cap to protect the hoses from dust and dirt.

3) Remove bolt (1)(2)(3) and the control valve.

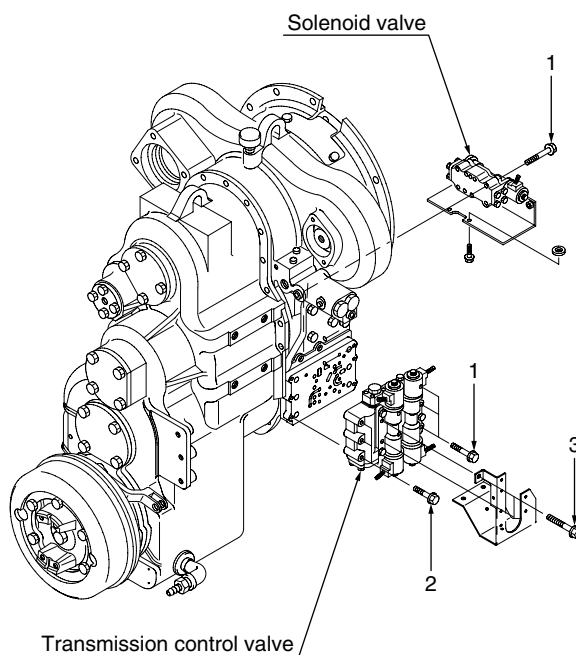
Tightening torque for assembly:

 : Control valve retainer bolt: 34 N-m(3.5 kgf-m)
(25 lb-ft)

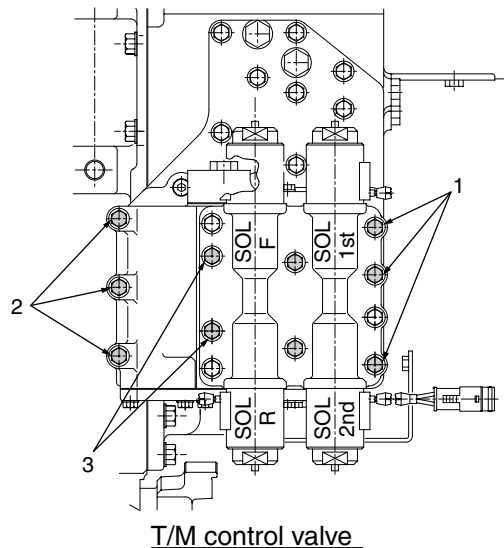
Note: Cover the disconnected parts with vinyl to protect them from dust, water and dirt.

⚠ CAUTION

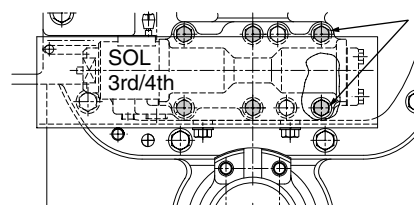
When removing/reinstalling the control valve, be sure to protect the attaching face both on the transmission case and the control valve from dust and dirt.



70ZV34013



T/M control valve



3rd/4th solenoid valve

70ZV34014

Hydraulic Pump Assembly

Removing and reinstalling hydraulic pump assembly

1. Removing hydraulic pump assembly

⚠ DANGER

Entering the articulation area while engine is running may cause serious injury or death. So, when entering the area, stop the engine and place "DO NOT START " or "DO NOT OPERATE" tag on steering wheel.

⚠ CAUTION

Removing hoses and plugs without bleeding residual pressure could cause injury or burns from hot oil under pressure. Before removing hoses and plugs, relieve residual pressure. Relieve internal pressure from hydraulic tank to prevent oil from spraying.

Before starting work:


- a) Remove the cab and the floor board by referring to Section 14.
- b) Clean the area around the hydraulic pump.

1) Disconnect outlet hose (2) and suction pipe (3) from hydraulic pump (1).


Note: Cover the hoses with plastic, plugs or caps to protect from dust and dirt.

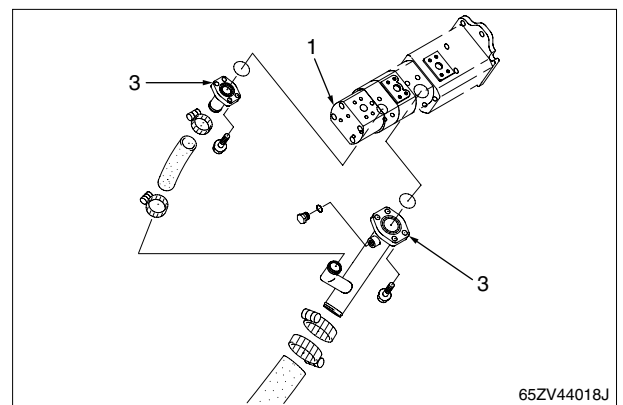
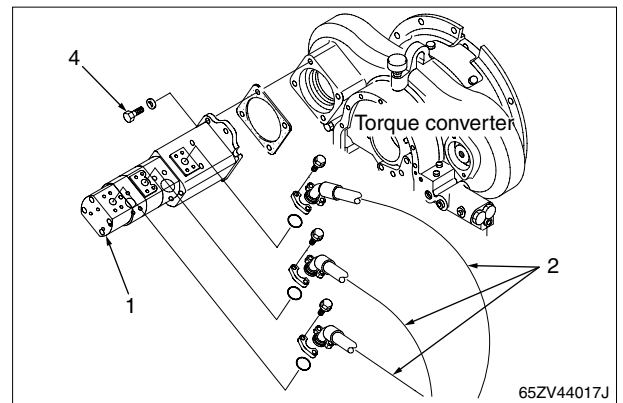
2) Remove hydraulic pump retainer bolts (4).

Torque for assembly:

 : Bolt: 142 N-m (14.5 kgf-m) (105 lb-ft)

3) Attach sling to hydraulic pump (1) and remove hydraulic pump (1).

 : Hydraulic pump: 25 kg (55 lbs)



Removing and reinstalling steering cylinder

1. Removing steering cylinder

⚠ WARNING

Unexpected movement of machine could cause serious injury or death. To prevent such an accident, observe the following items:

- Park machine on level ground, and apply the parking brake. In addition, block tires with chocks to prevent wheels from moving.
- Place boom and bucket on ground.
- Stop the engine, and turn the steering wheel clockwise and counterclockwise to relieve the pressure from the line.
- Press cap down ward to vent, then open the cap of the hydraulic tank to relieve the internal pressure from the tank.
- Place a "DO NOT START!" tag on the steering wheel or the operator's seat .


Before starting work:

- Clean the area around the cylinder to be removed.

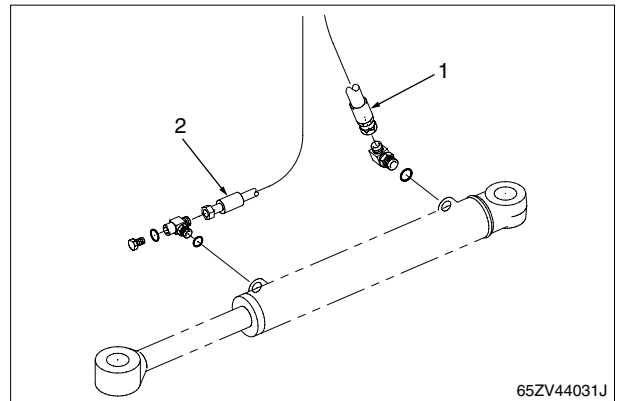
1) Disconnect hoses (1) (2).

Note: Cover the disconnected hoses with vinyl, cap, or plugs to protect them from dust, water, and dirt.

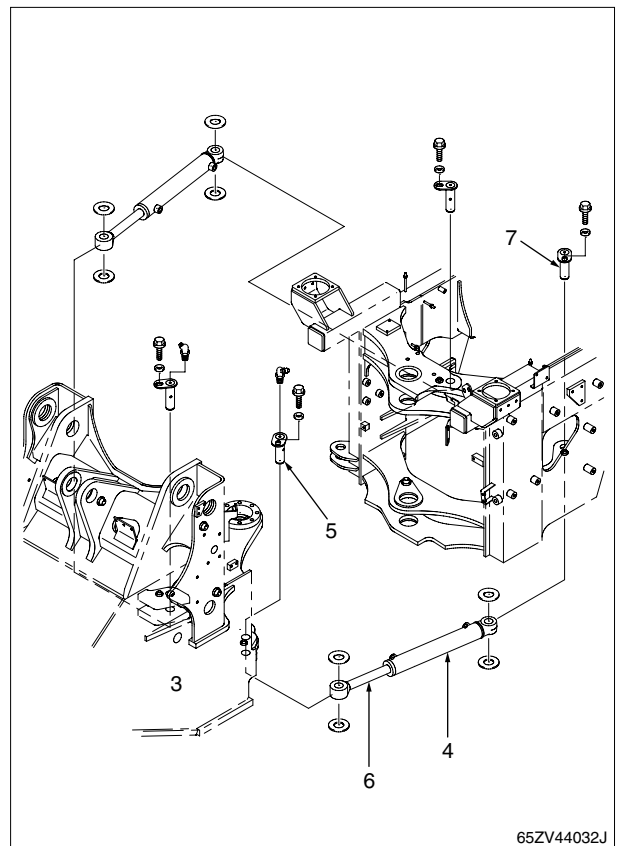
2) There is pin (5) between front chassis (3) and steering cylinder (4). Remove pin (5), and then push rod (6) into the cylinder to shorten the length of the cylinder.

 : Oil will be drained from the oil port of the cylinder. Place a container at the oil port to catch the drained oil.

3) Disconnect the grease pipe and then remove pin (7).




65ZV44031J

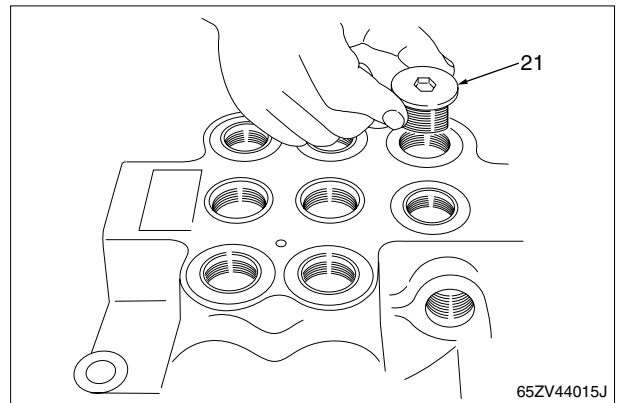


65ZV44032J

- 9) Remove plug assembly (21) and remove the O-ring.
Hexagon hole width across flat: 12 mm (15/32 in.)

Torque for assembly


: #21: 225 N-m (26.0 kgf-m) (188 lb-ft)



- 10) Set the spool assembly in a vise and then loosen bolt (22) to remove.

Hexagon hole width across flat: 10 mm (25/64 in.)

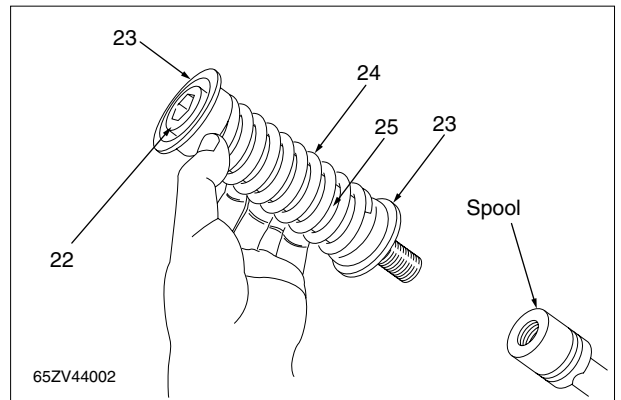
Torque for assembly

: #22: 18 N-m (1.8 kgf-m) (13 lb-ft)

: Screw lock agent AB01 application

- 11) Remove spring seat (23), spring (24), stopper (25) from each spool (there are two spools).

Note: Cover the spool to protect it from being scratched.



3.Reassembling multiple control valve

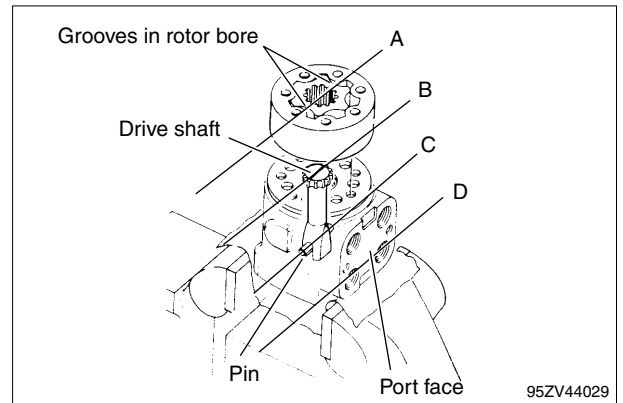
To reassemble the multiple control valve, follow the above disassembling procedure in the reversed direction.

4.Cautions regarding reassembling


- Clean and check all the parts. If a part is defective, replace or repair it.
- Replace all the O-rings with new ones.
- Apply a thin coat of hydraulic oil or grease to each part before reassembly.
- Apply the specified torque to tighten each main part.

12) Holding the rotor assembly with the O-ring side facing the plate, install the assembly so that the grooves in the star-shaped bore mesh with the drive shaft.

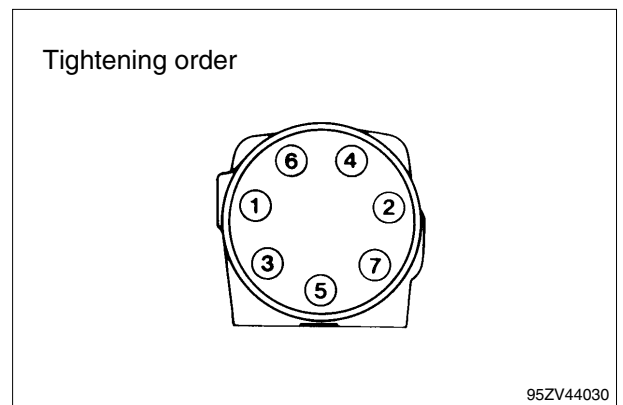
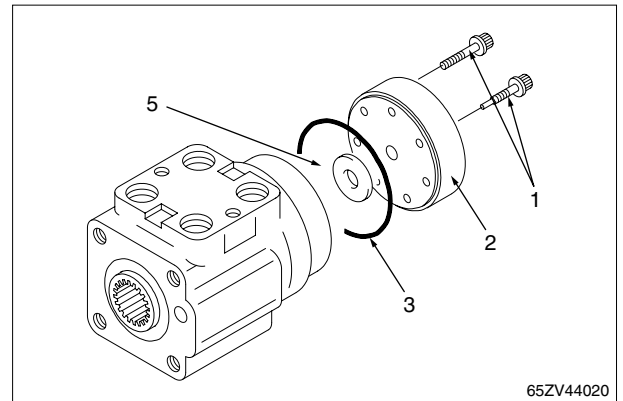
- Note:** ①Align the bolt holes in the rotor assembly with those in the housing without disengaging the drive shaft from the rotor assembly's star-shaped bore.
 ②Confirm that lines A, B, C and D are all parallel.



13) Install spacer (5), O-ring (3) and end cap (2).

-  : Provisional tightening torque:
 15 N-m (1.5 kgf-m) (11 lb-ft)
 Tightening torque: 23 N-m (2.3 kgf-m) (17 lb-ft)

Note: Provisionally tighten bolt (1), then tighten them securely in the order shown at the right.



Fan Motor

Removing and reinstalling fan motor

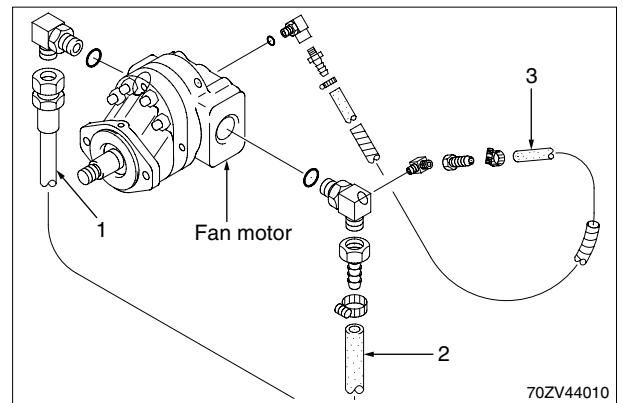
1. Removing fan motor

⚠ WARNING

Unexpected movement of machine, bucket, or boom during service work could cause serious injury or death. To prevent such an accident, observe the following items:

- Park machine on level ground, and apply parking brake. In addition, block tires with chocks to prevent wheels from moving.
- Relieve the internal pressure from the hydraulic tank to prevent the oil from spouting out.
- Remove the engine key, and hang a "DO NOT START ENGINE !" tag on the steering wheel.


1) Remove hoses (1) (2) (3) from the fan motor.




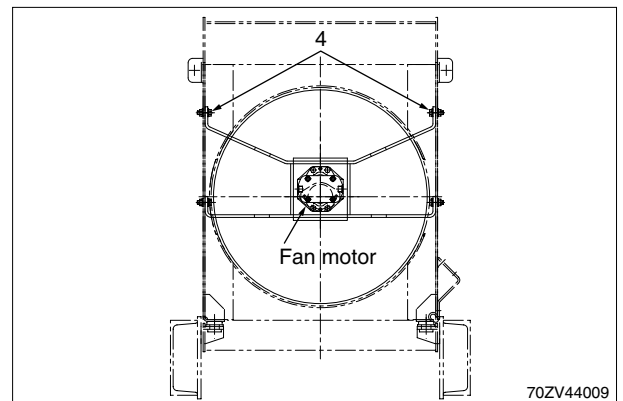
2) Attach sling to the fan bracket.

Remove bolt (4) and then remove bracket with the fan motor and the fan.

Torque for assembly:


 : Bolt: 93.7 N-m (9.55 kgf-m) (69 lb-ft)

 : Bracket(with fan motor and fan):
35 kg (77lbs)




3) Remove flange nut (5) and then remove the fan.

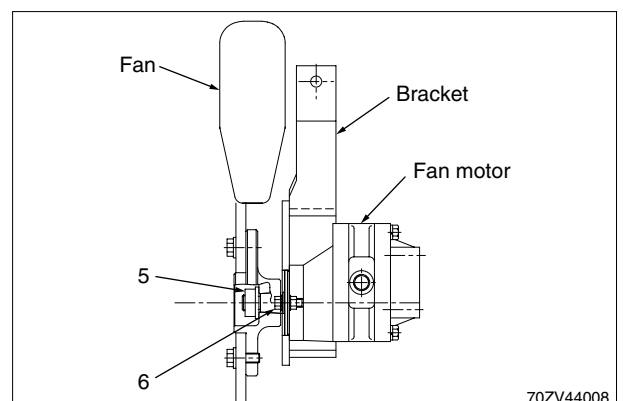
Torque for assembly:

 : Flange nut: 355 N-m (36 kgf-m) (260 lb-ft)

4) Remove bolt (6), and then remove the fan motor from the bracket.

Torque for assembly:

 : Bolt (6): 53 N-m (5.4 kgf-m) (39 lb-ft)



2.Reinstalling fan motor


For reinstallation, follow the above procedure in the reversed direction.

2. Disassembling unloader valve

1) Remove plug (1), then pull out spool (2) and spring (3).

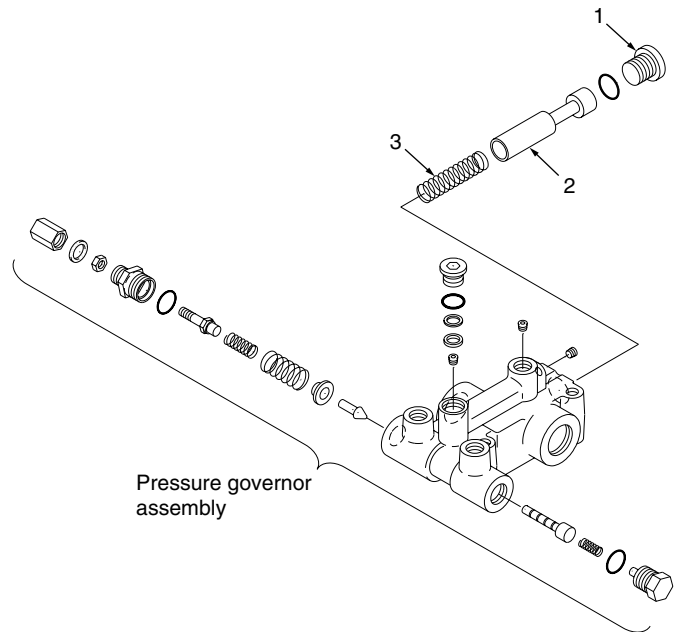
Note: Carefully remove plug (1). It may spring out by the spring force.

Torque for assembly:

 : 137 N-m (14 kgf-m) (101 lb-ft)

Note: Do not disassemble the pressure governor assembly and the pressure switch assembly unless it is necessary.

Because, readjustment of accumulator pressure and resetting of shims are required.



95ZV54001

3. Reassembling unloader valve

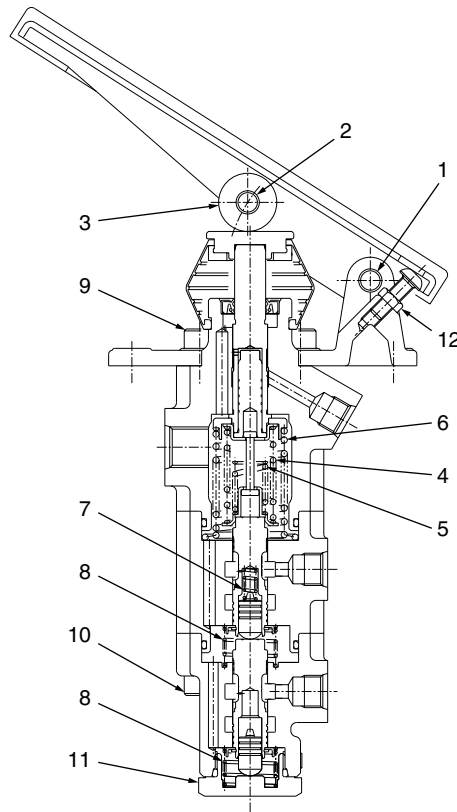
To reassemble the unloader valve, follow the above disassembly procedure in the reversed direction.

Service Brake

Disassembling and reassembling service brake

Refer to "Disassembling and Reassembling Front Axle" in Power group.

Brake Valve



97ZV55001

Unit : mm (in.)

No.	Item	Judgment standard				Solution	
		Standard dimension	Tolerance				
			Shaft	Hole	Standard clearance		Allowable clearance
1	Clearance between pedal installation hole and bracket hole	∅ 10 (0.3937)	-0.025~-0.075 (-0.0010~-0.0030)	+0.1 (0.0039) 0	0.175~0.025 (0.0069~0.0010)	0.25 (0.010)	Replacement
2	Clearance between roller and pin	∅ 10 (0.3937)	-0.025~-0.075 (-0.0010~-0.0030)	+0.1 (0.0039) 0	0.175~0.025 (0.0069~0.0010)	0.25 (0.010)	
3	Outer diameter of roller	∅ 30 (1.1811)	0 -0.5 (-0.0197)				

No.	Item	Judgment standard				Solution	
		Standard dimension			Tolerance limit		
		Free length mm (in)	Installation length mm (in)	Installation load N (kgf) (lb)	Free length mm (in)		Installation load N (kgf) (lb)
4	Control spring	54.4 (2.1417)	49.7 (1.9567)	39 (4.0) (29)	53.0 (2.0866)		Replacement
5	Control spring	27.2 (1.0709)	27.2 (1.0709)	0	56.2 (2.2126)		
6	Return spring	69.0 (2.7165)	58.0 (2.2835)	103 (10.5) (23.1)	62.1 (2.4449)		
7	Balance spring	17.0 (0.6693)	15.0 (0.5906)	70 (7.1) (15.7)	16.2 (0.6378)		
8	Spool return spring	31.5 (1.2402)	19.5 (0.7677)	17 (1.7) (3.7)	28.0 (1.1024)		
9	Bracket installation bolt tightening torque	73.5 N-m (7.5 kgf-m) (54 lb-ft)				Tightening	
10	Cylinder installation bolt tightening torque	73.5 N-m (7.5 kgf-m) (54 lb-ft)					
11	Plug tightening torque	176.4 N-m (18 kgf-m) (130 lb-ft)					
12	Stopper bolt lock nut tightening torque	9.8 N-m (1.0 kgf-m) (7.2 lb-ft)					

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