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135ZV-2 SHOP MANUAL Disassembly & Reassembly Service Standard

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October 2008

SHOP MANUAL

WHEEL LOADER

135ZV-2

Disassembly & Reassembly Service Standard

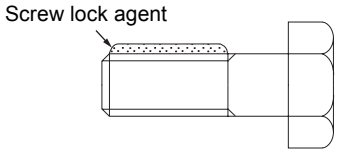
Powered by CUMMINS QST30-C ENGINE

Serial No. 13C1-9301~

Screw lock agent application procedure

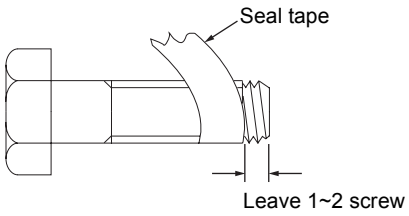
Through-hole

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



65ZV00002

How to wind a seal tape



65ZV00004

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

Hydraulic Tank

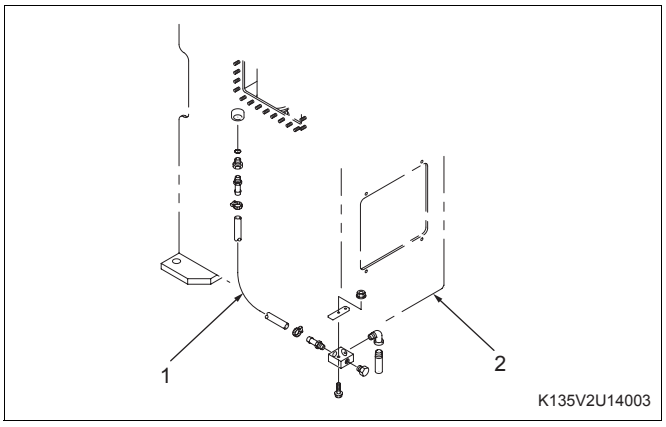
Hydraulic tank removing and installing

Hydraulic tank removing

⚠ WARNING

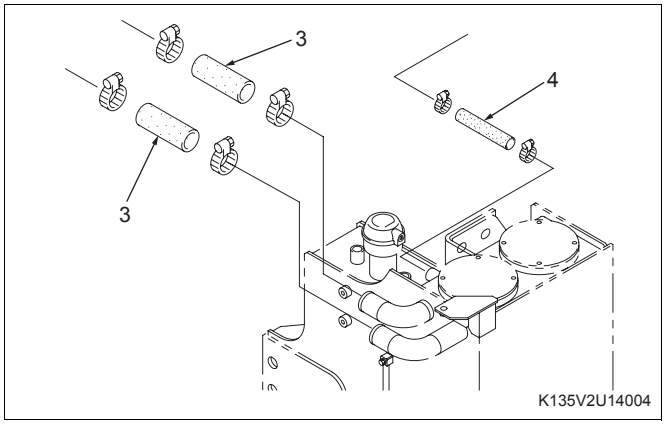
Unexpected movement of the machine could cause an accident resulting in injury or death. Be sure to observe the following items before starting hydraulic tank removal:
- Position the machine on level ground, and apply the parking brake.
- Lower the attachment onto the ground, and block the tires with chocks, etc. to prevent them from moving.
- Remove the engine key, and hang a "DO NOT START ENGINE!" tag on the operation board.

Before starting work:
- Drain hydraulic oil from the hydraulic tank. (Hydraulic tank capacity: 320 L (85 gal))
- Remove the left side deck.
- Clean the area around the tank.
- Put matching marks on the hoses connected to the hydraulic main tank.
- When removing the sub tank, remove the engine room by referring to "Engine Room".



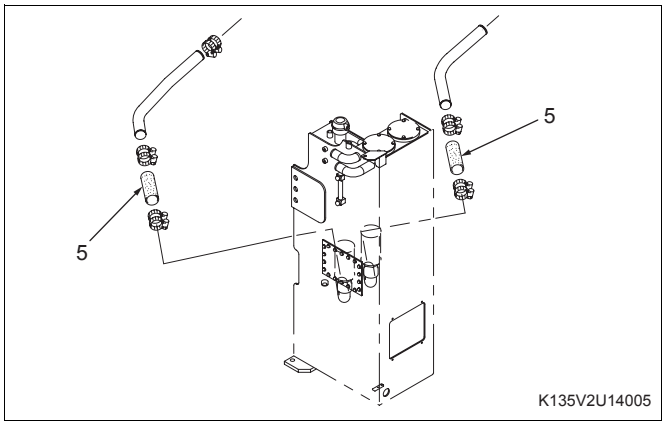
1. Remove drain hose (1) from hydraulic main tank (2).

Note
Cover the disconnected hose with vinyl to protect it from dust and dirt.



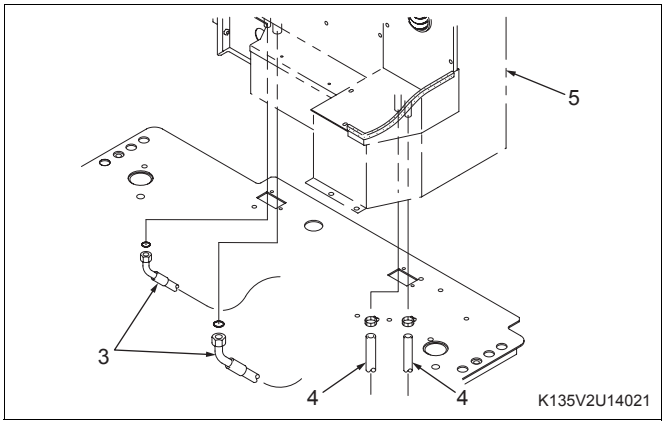
2. Remove hose bands and remove return hoses (3)(4) from the hydraulic main tank.

Note
Cover or plug the disconnected hoses to protect them from dust, and dirt.



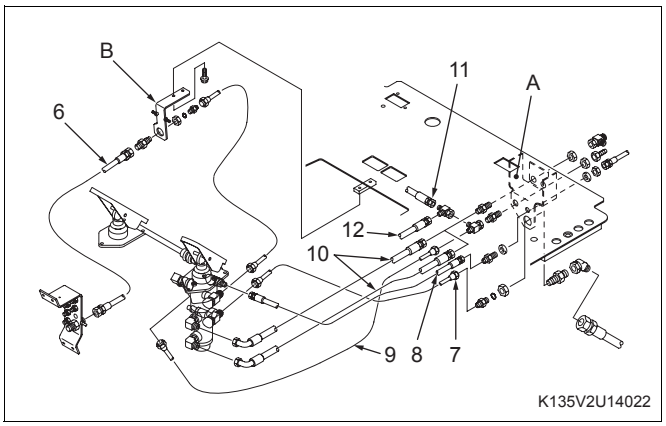
3. Remove hose bands and remove suction hose (5) from the hydraulic main tank.

Note
Cover the disconnected hoses with vinyl to protect them from dust and dirt.



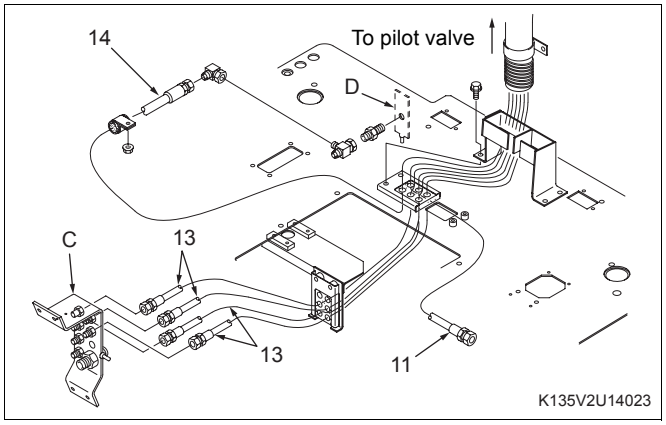
3. Disconnect hoses (3)(4) from air conditioner unit (5).

Note
Cover the disconnected hoses and pipes with vinyl to protect them from dust and dirt.



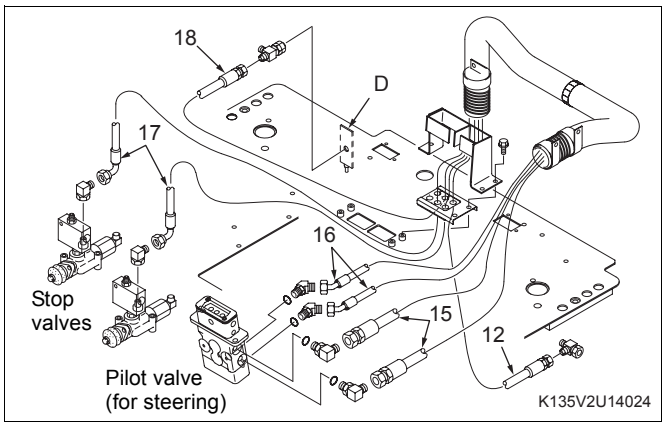
4. Remove brake line pipes and hoses (6)~(10) from the brake valve at plate A or B of the floor board.
   Disconnect hoses (11)(12) from the pilot valves also at plate A.

Note
Cover the disconnected pipes and hoses with vinyl to protect them from dust and dirt.



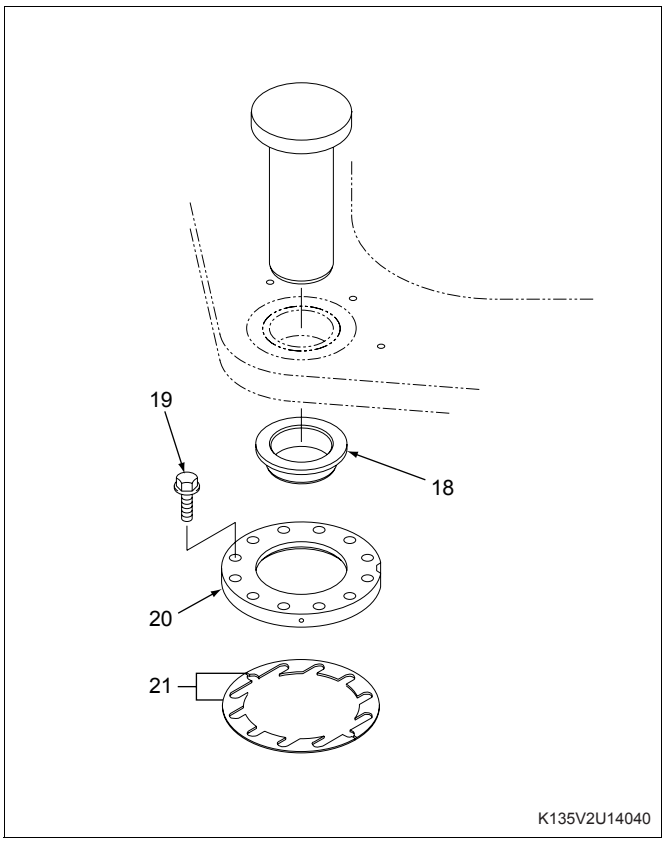
5. Remove hydraulic line hose (13) at plate C located on the front chassis.
   Remove hydraulic line hose (14) at plate D.

Note
Cover the disconnected hoses with vinyl to protect them from dust and dirt.



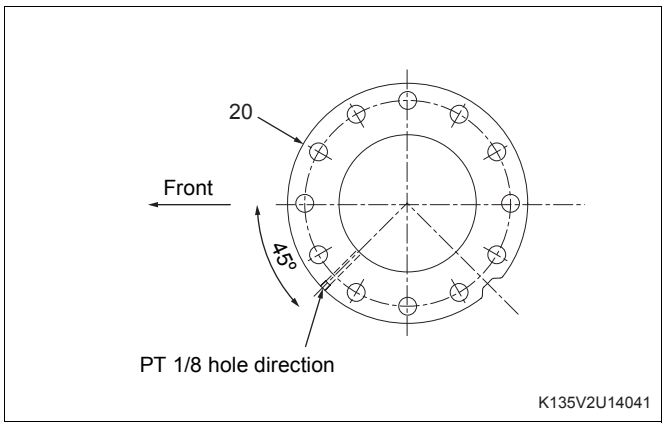
6. Remove hydraulic line hoses (15)(16) at the pilot valve (for steering).
   Remove hydraulic line hose (17) at the stop valves.
   Remove hydraulic line hose (18) at plate D.

Note
Cover the disconnected hoses with vinyl to protect them from dust and dirt.



13. Remove ring (18) and remove bolts (19) from bearing cover (20).

: Bolt (19): 721 N-m (73.5 kgf-m) (532 lb-ft)

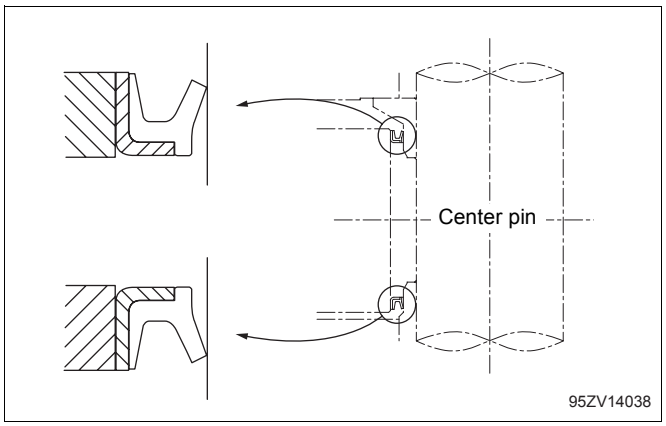


Note
When reinstalling bearing cover (20), be careful with the installation direction.

14. Remove shim (14).

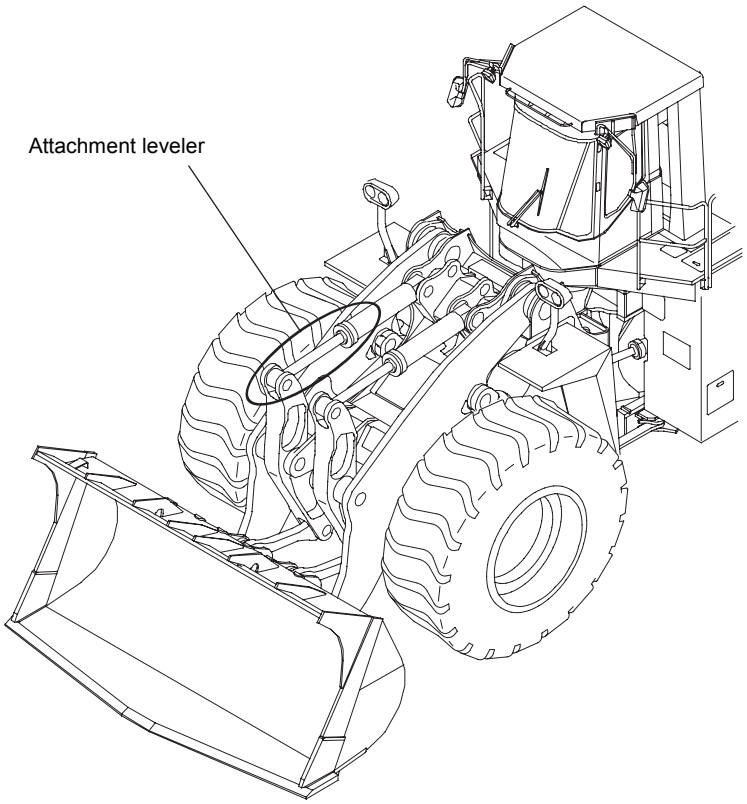
Note
If the taper roller bearing is replaced, be sure to adjust the clearance using shims.
Thickness of shim (mm): 0.1, 0.2, 0.3, 0.5, and 1.0
Refer to Section 15.

15. Replace the dust seals in the upper center pin and the lower center pin with new ones.



Note
Take care of the correct direction of dust seals as shown above.

Attachment Leveler



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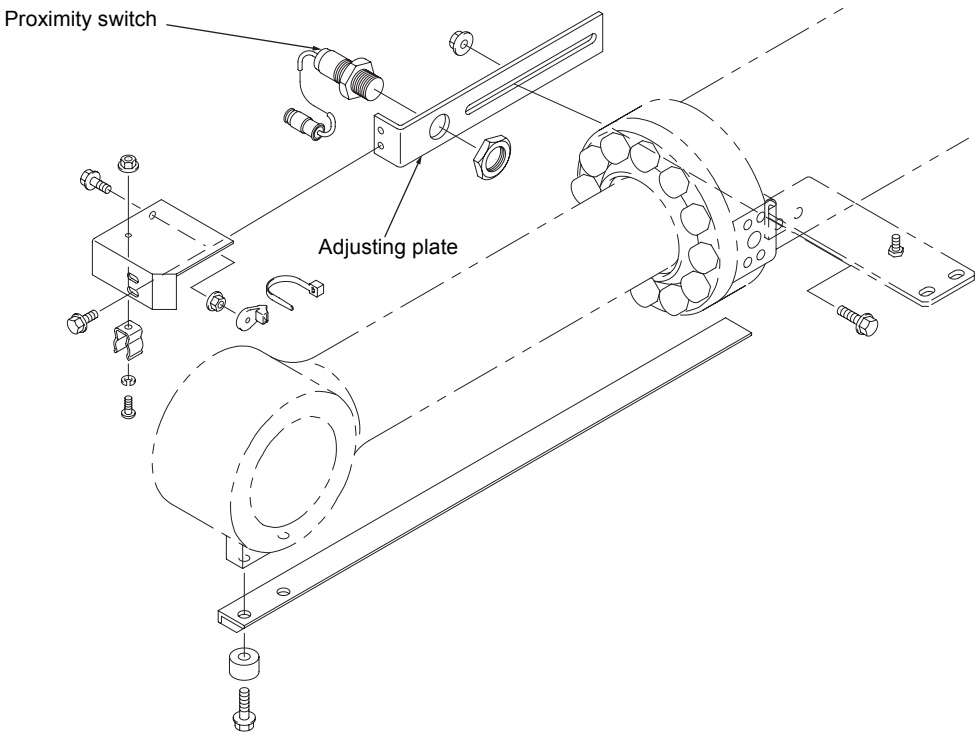

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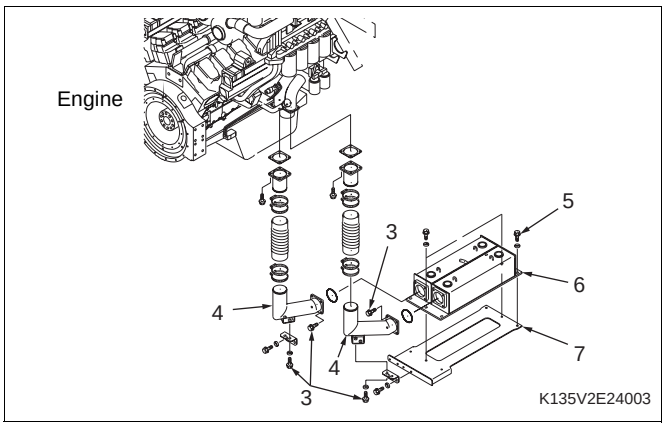
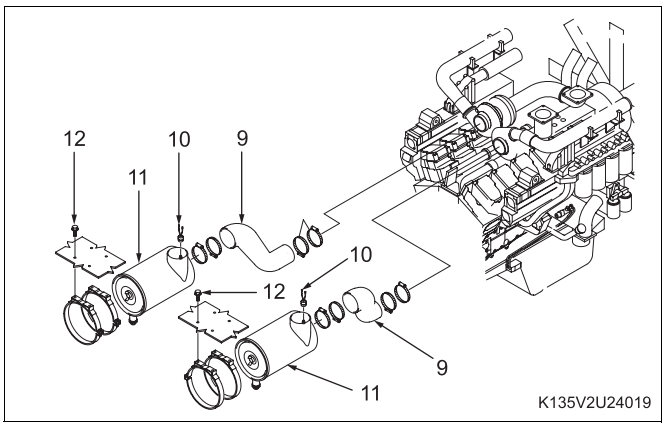


3. Temporarily sling torque converter oil cooler (6). Remove bolt (5), and then, remove torque converter oil cooler (6) with bracket (7).

: Bolt (5): 94 N-m (9.6 kgf-m) (69 lb-ft)
: T/C oil cooler (with bracket): 150 kg (330 lbs)

Torque converter oil cooler installing

To reinstall the torque converter oil cooler, follow the above removal procedure in reverse order.



3. Remove the hose bands and remove rubber hose (9).

Note
Cover the disconnected hoses and pipes with caps, plugs, or vinyl to protect them from dust and dirt.

4. Disconnect pressure sensor (10).

5. While supporting air cleaner case (11) with your hand, remove bolts (12), and then, lower the air cleaner case.
   Take out air cleaner case (11) from the opening.

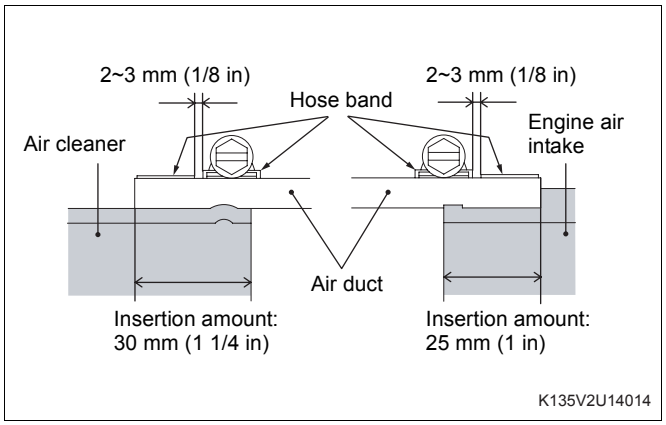
Note
- This work should be done by two or more persons.
- Cover the open pipes with caps, plugs or vinyl.

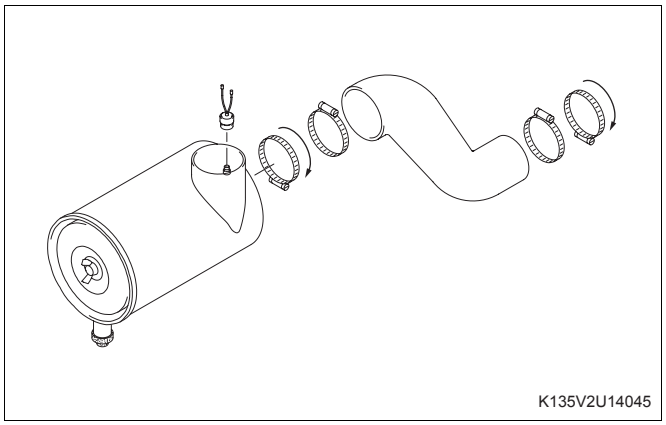
Air cleaner installing

For reinstallation, follow the above procedure in reverse order.

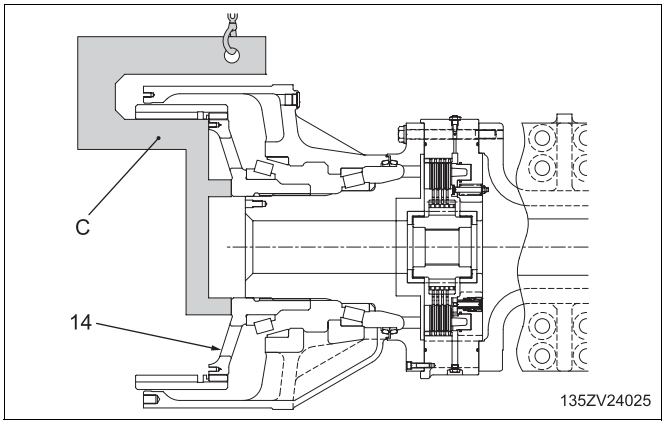
Air cleaner installation cautions

- Be sure the inside of air cleaner case (11) are wiped clean before reinstallation.



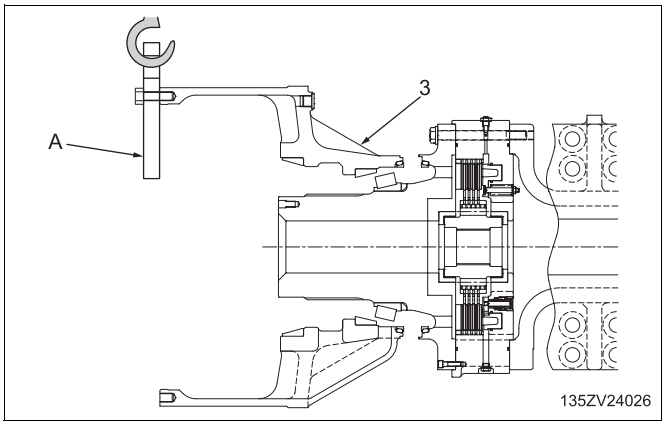


- If the bands of the air duct are not properly positioned or tightened, the duct will draw in dust that will cause an engine problem. Carefully reinstall the air duct (One band is to be fixed on the beading, and the other one should be half-turned. See the figures.)



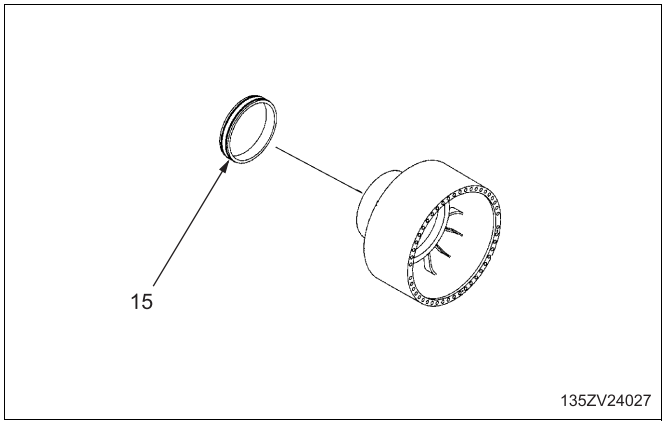
12. Sling internal gear hub assembly (14) using internal gear hub hoisting tool (C), and remove internal gear hub assembly (14).

: Internal gear hub assy: 275 kg (605 lbs)



13. Sling wheel hub (3) using wheel hub hoisting tools (D) and remove the turn buckle.
Then remove wheel hub (3).

: Wheel hub: 440 kg (970 lbs)



14. Remove floating seal (15).

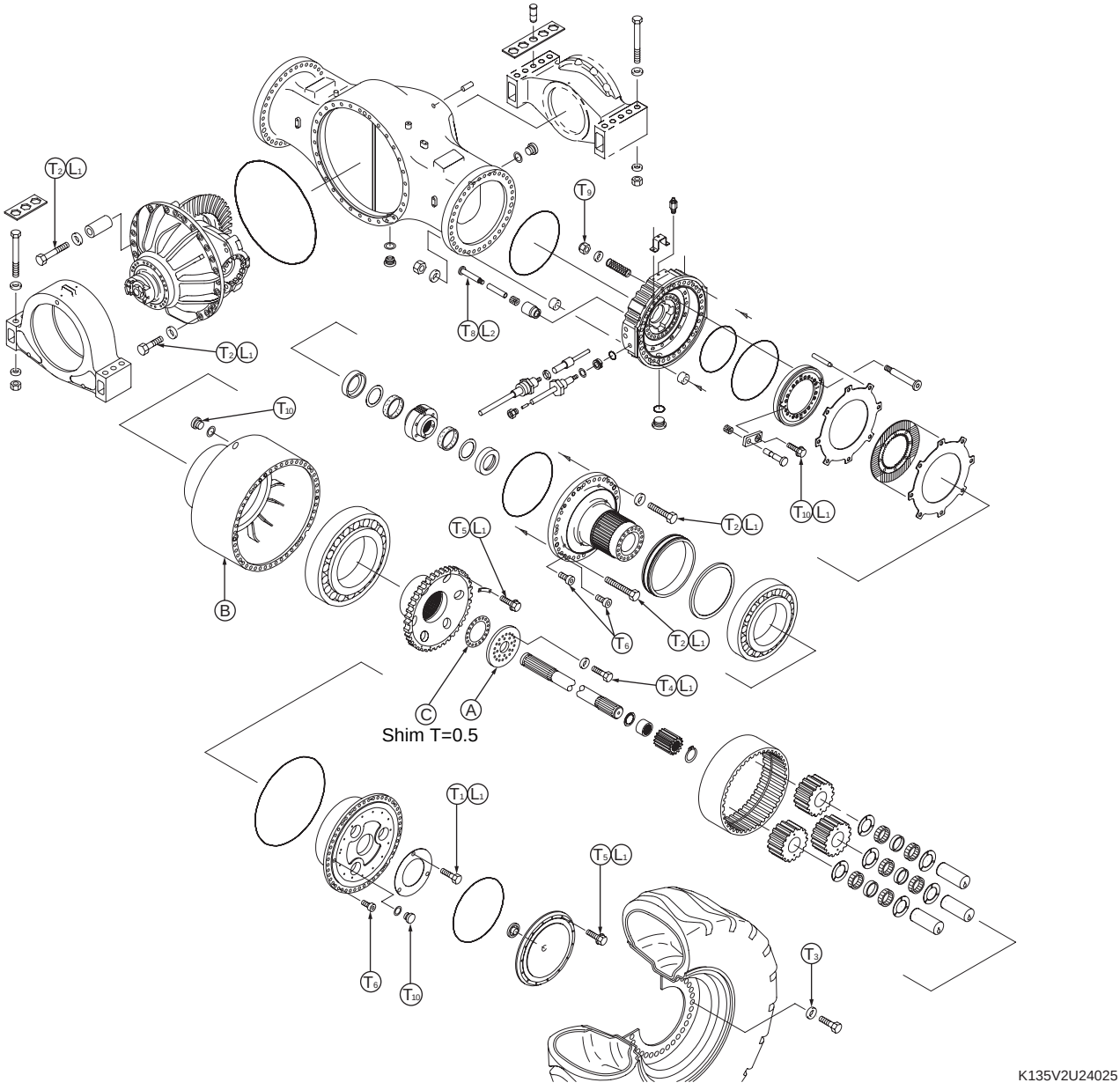
Note
Disassemble the other wheels in the same manner.
Refer to Section 54 for further procedures to disassemble the service brake.

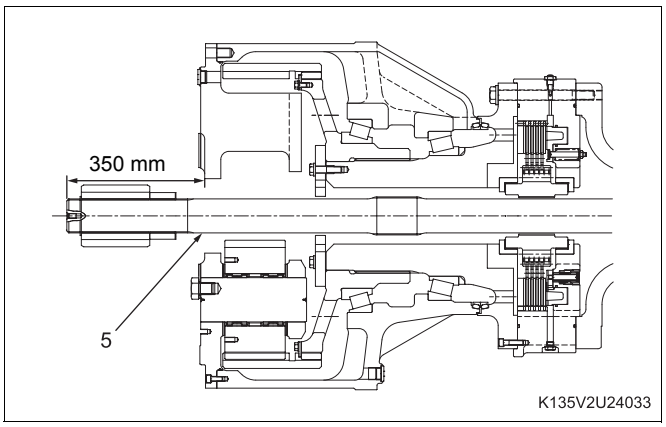
Front axle assembling

To reassemble the front axle, follow the above procedure in reverse order.

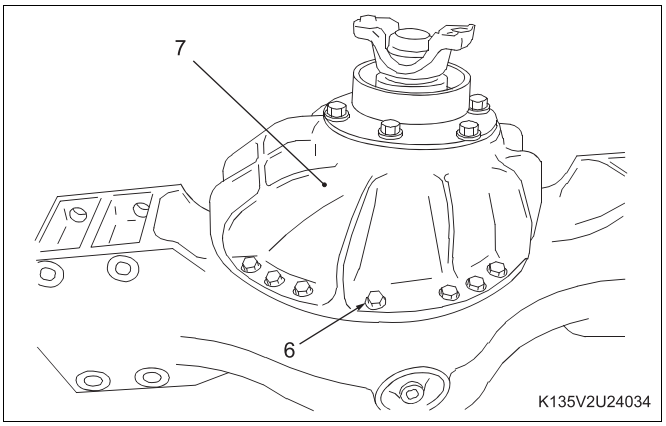
Rear Axle Assembly

Rear axle assembly tightening torque



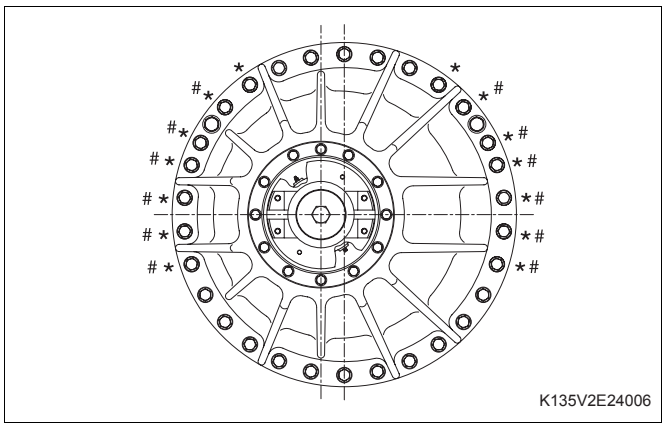


3. Pull out right and left axle shafts (5) by 350 mm (14 in).



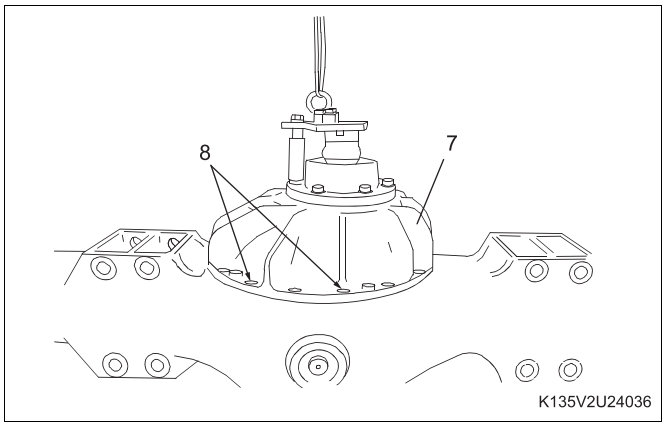
4. Remove bolt (6) from differential (7).

: Bolt (6)
(Front): 608 N-m (62.0 kgf-m) (449 lb-ft)
(Rear): 1,030 N-m (105 kgf-m) (760 lb-ft)
: Screw lock agent (Three Bond 1327)



Note
14 spacers are inserted at bolt (6) in the front differential, and 12 spacers in the rear differential.

Front differential: At positions "∗"
Rear differential: At positions "#"



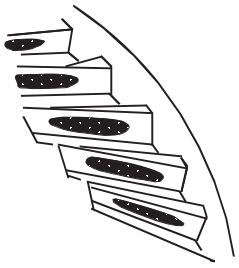
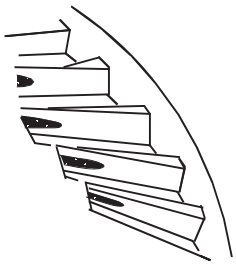
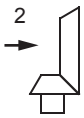
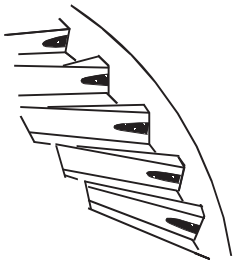
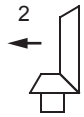
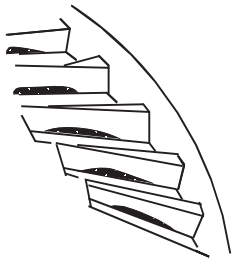
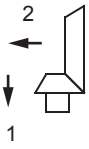
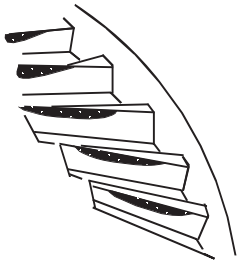
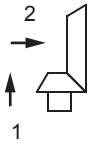
5. Temporarily sling differential (7), and insert bolts into remover tap (Jack Screw) holes (8) to slightly lift the differential.

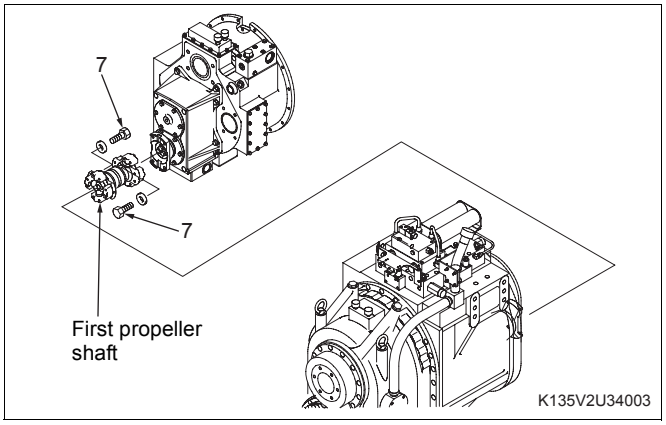
: Differential (front): 1,180 kg (2,600 lbs)
: Differential (rear): 1,270 kg (2,800 lbs)

Note
Be careful to sling the differential so that it is balanced and is lifted straight up.

Adjusting tooth contact

After adjusting the backlash to the standard value, check that manual rotation of the gear is possible.
After that, paint blue or red on the tooth surface of ring gear, and check the tooth contact.
To adjust the tooth contact, adjust the thickness of the shim between the pinion and cage, and turn the adjustment nut.

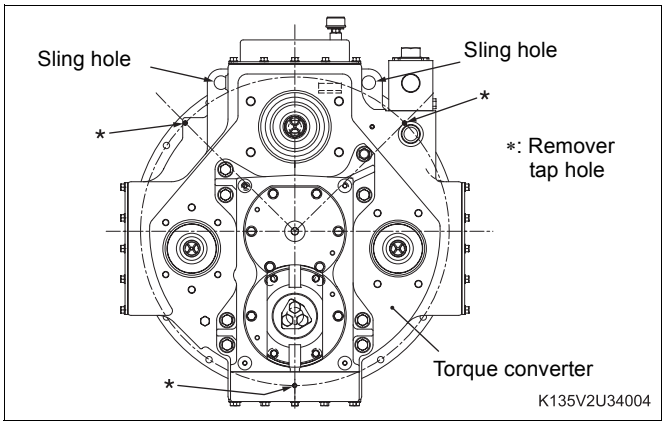
	Tooth contact	Possible cause	Adjusting method	
A			Correct	
B		Ring gear is too close to the drive pinion	Loosen the bearing adjuster on the rear side of ring gear, and tighten the adjuster of tooth side at the same quantity as loosening, so that the ring gear is far apart from the drive pinion. Check again the backlash and tooth contact.	
C		Ring gear is too far from the drive pinion	Do the reverse adjusting as B.	
D		Drive pinion is too close to the ring gear.	Increase the thickness of shim at the part of bearing cage being installed and makes drive pinion apart from the ring gear. Check again the backlash and tooth contact.	
E		Drive pinion is too far from the ring gear.	Decrease the thickness of shim reverse as D, and makes drive pinion approach the ring gear. Check again the backlash and tooth contact.	



3. Remove bolts (7) and remove the first propeller shaft.

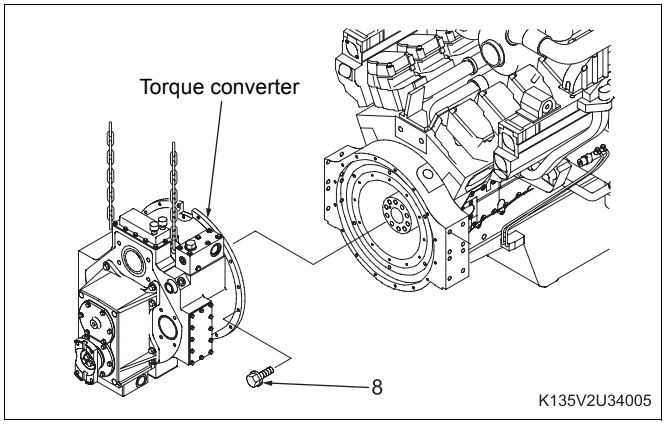
: Bolt (7): 221 N-m (22.5 kgf-m) (163 lb-ft)
: Screw lock agent (Three Bond 1327)
: First propeller shaft: 40 kg (90 lbs)

Note
- If the retainer bolts are too tight due to the screw lock agent, heat the bolt head using slow flame of a gas burner.
- Keep the flame away from the seals of the coupling.
- Do not reuse the bolts, always replace with new ones.



4. Temporarily sling the torque converter.

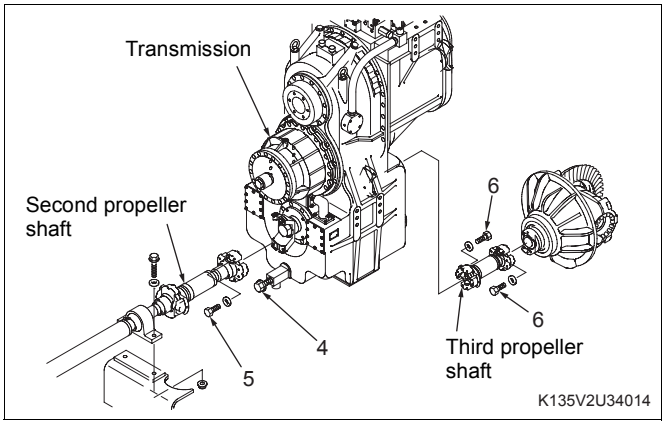
: Torque converter (excluding oil): 540 kg (1,190 lbs)



5. Remove all bolt (8) and insert three bolts (M12 x 1.75) into the remover tap (Jack screw) holes.

6. Remove the torque converter toward the front of the machine using the Jack screws.

: Bolt (8): 94 N-m (9.6 kgf-m) (69 lb-ft)
: With lubricating oil (engine oil or gear oil)



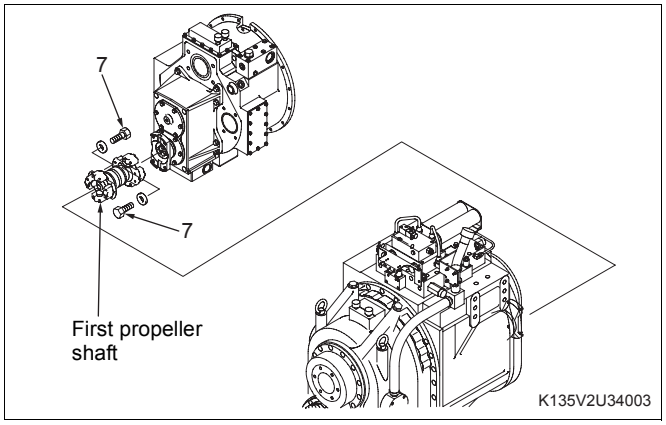
3. Loosen drain plug (4) to drain the transmission oil.

   : Transmission oil: 200 L (53 gal)

4. Remove bolt (5) from the second propeller shaft on the transmission side only.
   Remove retainer bolt (6) of the third propeller shaft on the transmission side only.

   : Bolt (5)(6): 221 N-m (22.5 kgf-m) (163 lb-ft)
   : Screw lock agent (Three Bond 1327)

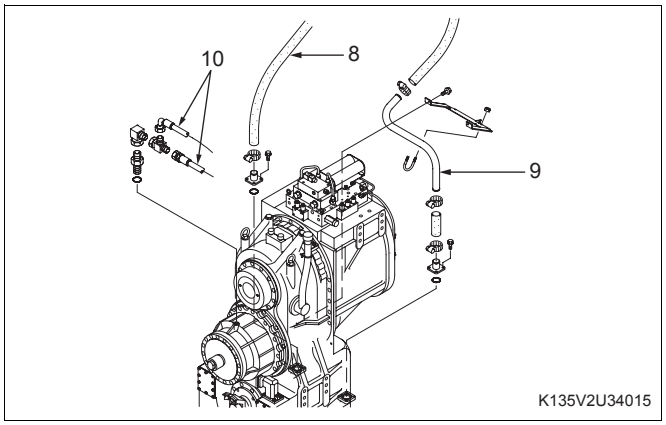
Note
- If the retainer bolts are too tight due to the screw lock agent, heat the bolt head using slow flame of a gas burner.
- Keep the flame away from the seals of the coupling.
- Do not reuse the bolts, always replace with new ones.



5. Remove bolts (7) and remove the first propeller shaft.

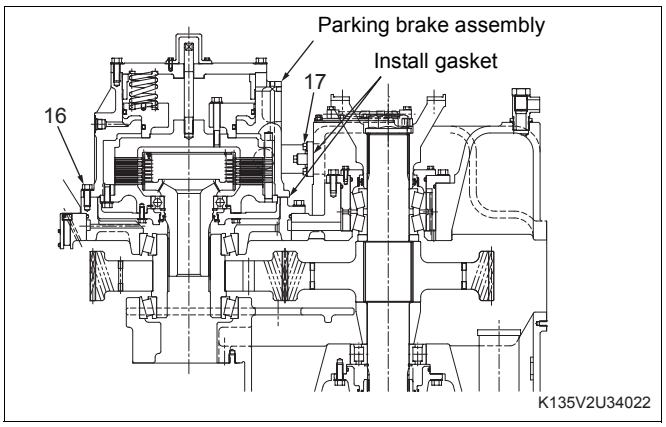
   : Bolt (7): 221 N-m (22.5 kgf-m) (163 lb-ft)
   : Screw lock agent (Three Bond 1327)
   : First propeller shaft: 40 kg (90 lbs)

Note
- If the retainer bolts are too tight due to the screw lock agent, heat the bolt head using slow flame of a gas burner.
- Keep the flame away from the seals of the coupling.
- Do not reuse the bolts, always replace with new ones.



6. Remove suction hose (8), pipe (9) and brake line hose (10) from the transmission.

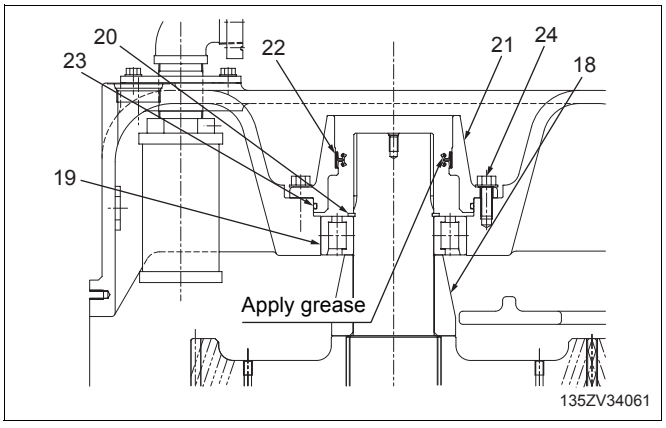
Note
Cover the removed hoses and pipes with vinyl or plastic caps to protect them from dust and dirt.



6. Install parking brake assembly to the transmission housing and tighten bolt (16)(17).

: Bolt (16): 230 N-m (23.5 kgf-m) (170 lb-ft)
: Bolt (17): 93.7 N-m (9.55 kgf-m) (69 lb-ft)
: With lubricating oil (engine oil or gear oil)
: Parking brake assembly: 330 kg (730 lbs)

Note
Make sure to install the gaskets to the contact surface between the parking brake housing and the transmission housing.



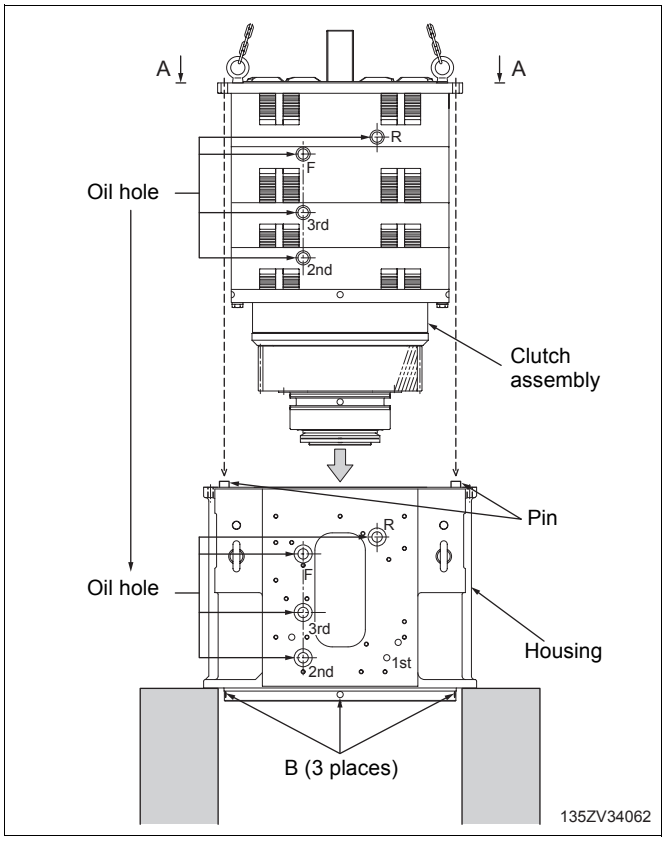
7. Turn over the transmission, and install ring (18), roller bearing (19) and snap ring (20) to the output shaft on the third propeller shaft side.
Install oil seal (22) and O-ring (23) to seal retainer (21), and install seal retainer (21) to the transmission housing. Tighten bolt (24).

: Bolt (24): 230 N-m (23.5 kgf-m) (170 lb-ft)
: With lubricating oil (engine oil or gear oil)

Note
Apply grease to the oil seal (22) before installing them to the housing.

IMPORTANT

Be careful with the installation direction of the oil lip seal (22).



8. Lift the clutch assembly to install it to the housing.

: Clutch assembly: 1,260 kg (2,780 lbs)

IMPORTANT

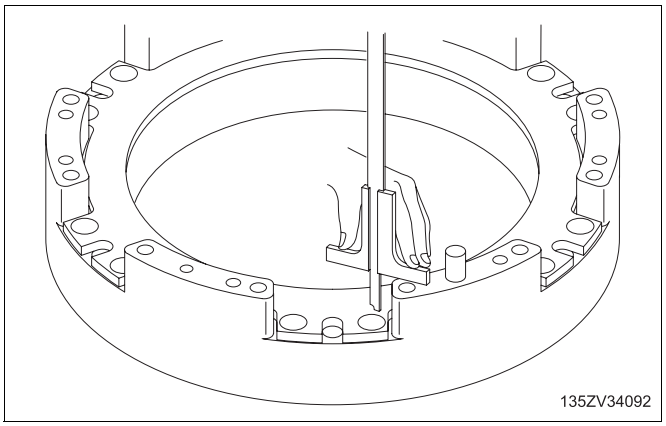
Be sure to align the oil holes of the clutch pack assembly with those of the transmission housing.

Clutch assembly assembling

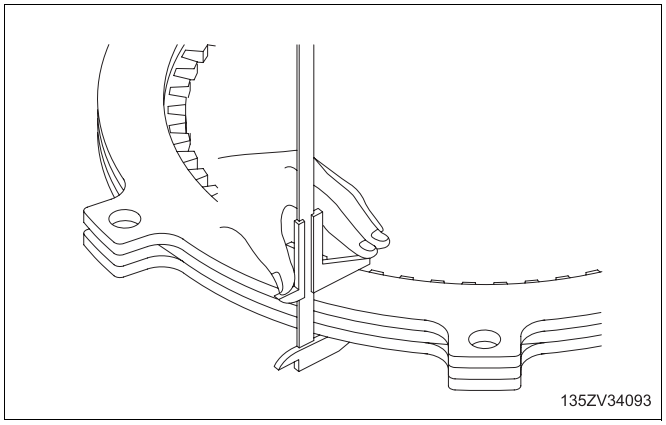
Before starting work:
- Clean and check each part, and replace any part with a new one, if necessary.
  (Refer to Section 35 for the limit.)
- Be sure to apply the transmission oil to each necessary point when reassembling the clutch assembly.
- Replace the packing and the seals with new ones.
- Check each steel plate for flatness. If there is any warpage, replace the plate.

Measurement of piston stroke

Measure the piston stroke of the 2nd, 3rd, low and reverse clutch respectively.



(a) Insert the desired clutch piston into each clutch housing completely, and measure the dimension as shown in the illustration. (This is dimension A.)



(b) Set the necessary number of friction plates and steel plates referring to the following table and measure the total thickness. (This is dimension B.)

	Friction plate	Steel plate
2nd	4 pcs	4 pcs
3rd	5 pcs	5 pcs
Forward	8 pcs	8 pcs
Reverse	8 pcs	8 pcs

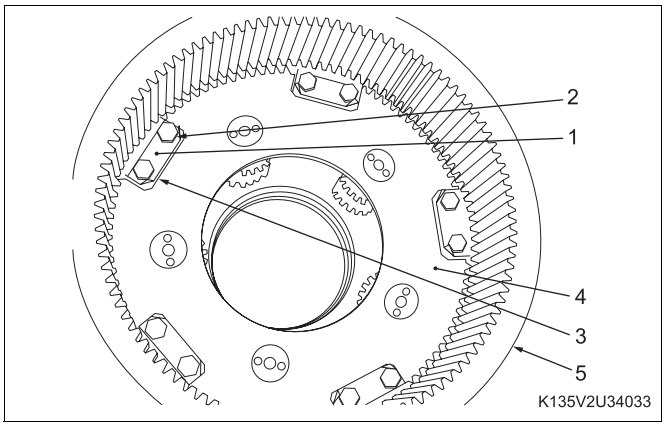
(c) Subtracting dimension B from dimension A equals to the piston stroke.
The piston stroke should be within the range shown in the following table.

	Piston stroke mm (in)
2nd	5.0 ± 0.5 (0.1969 ± 0.0196)
3rd	7.0 ± 0.5 (0.2756 ± 0.0196)
Forward	9.0 ± 0.5 (0.3543 ± 0.0196)
Reverse	9.0 ± 0.5 (0.3543 ± 0.0196)

2nd Clutch Spider

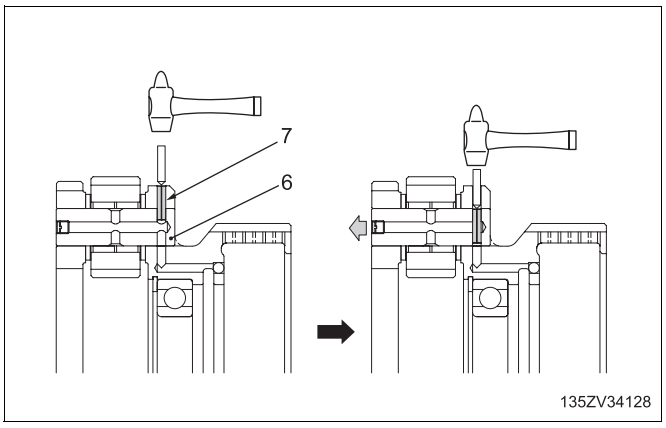
2nd clutch spider disassembling and assembling

2nd clutch spider disassembling



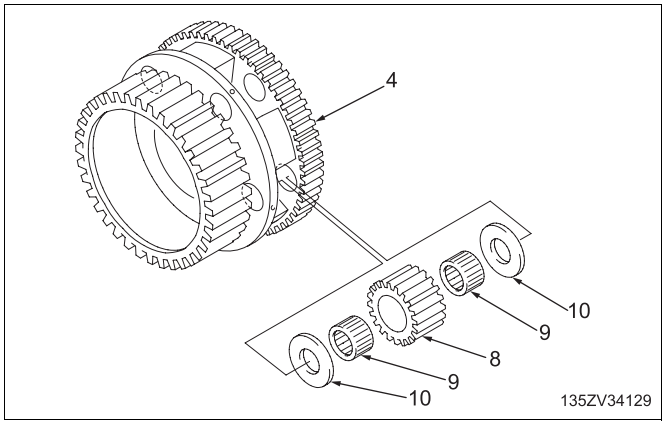
1. Release calked lock plate (1) and remove bolt (2). Remove lock plate (1) and plate (3). Separate spider assembly (4) from internal gear (5).

   : Bolt (2): 132 N-m (13.5 kgf-m) (98 lb-ft)
   : With lubricating oil (engine oil or gear oil)

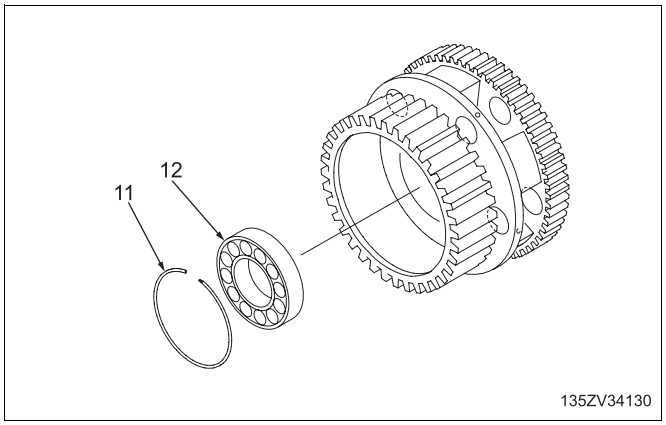


2. Knock in spring pin (7) that locks pin (6) all the way to unlock pin (6). Pull out pin (6).

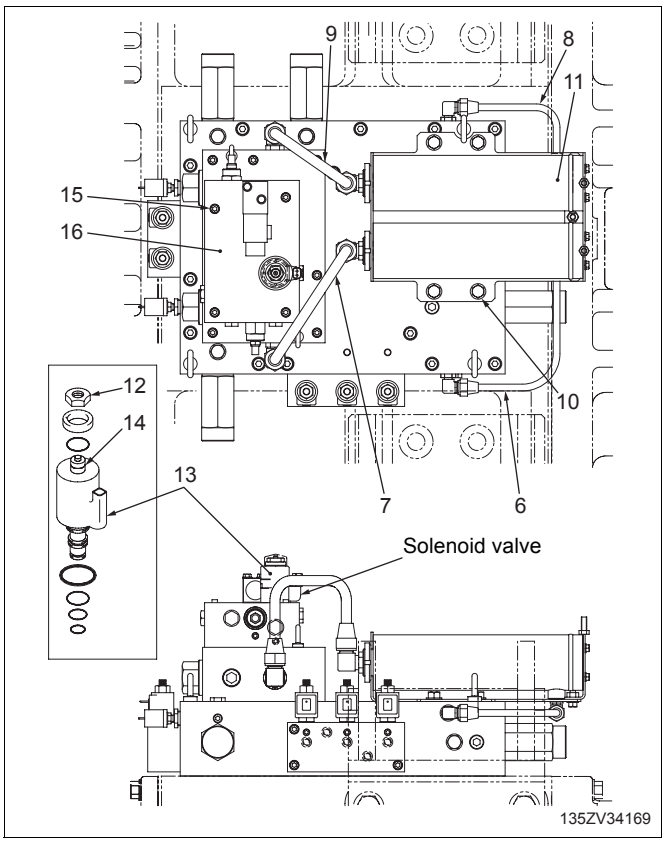
Note
After removing pin (6), take spring pin (7) out of pin(6).



3. Remove planetary gears (8), needle bearings (9) and washer (10).



4. Remove snap ring (11) and remove bearing (12) from spider assembly (4).



3. Remove pipes (6)~(9).

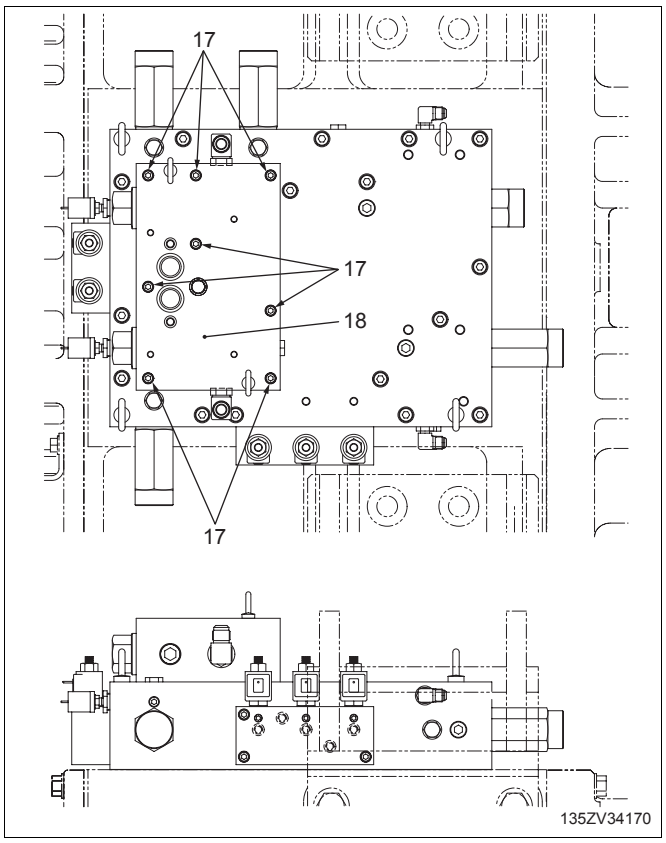
4. Remove four bolts (10) to remove accumulator assembly (11).

5. Remove lock nut (12) from the solenoid valve. After removing coil (13), remove valve (14).

   : Nut (12): 9.8 N-m (1.0 kgf-m) (7.2 lb-ft)
   : Valve (14): 29.4 N-m (3.0 kgf-m) (22 lb-ft)

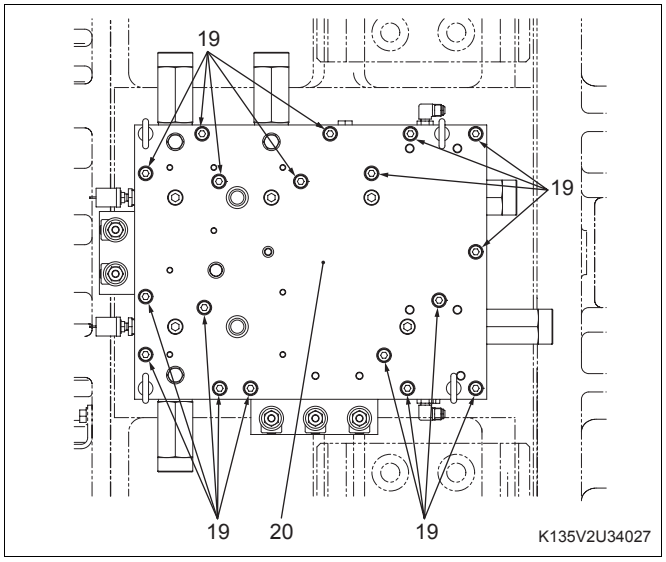
6. Remove four bolts (15) and remove valve assembly (16).

   : Bolt (15): 25.5 N-m (2.60 kgf-m) (19 lb-ft)



7. Remove eight bolts (17) to remove check valve assembly (18).

   : Bolt (17): 25.5 N-m (2.60 kgf-m) (19 lb-ft)



8. Remove eighteen bolts (19) to remove control valve (20).

   : Bolt (19): 86.6 N-m (8.80 kgf-m) (64 lb-ft)

mm (in), N (lbf)

Ref.	Item		Standard value			Allowable limit		Solution
			Free length	Installed length	Installed load	Free length	Installed load	
1	Spring	Clutch return spring (F, R)	105 (4.1)	94.2 (3.7)	369 (37.6)	—	—	Replacement
2		Clutch return spring (3rd)	70 (2.8)	63 (2.5)	298 (30.4)	—	—	Replacement
3		Clutch return spring (2nd)	60 (2.4)	52.6 (2.1)	330 (33.7)	—	—	Replacement
4		Clutch return spring (1st)	55 (2.2)	49 (2.0)	291 (29.7)	—	—	Replacement
5		Parking brake spring	130 (5.1)	103 (4.1)	5,084 (518.4)	—	—	Replacement
	Item		Judgement criteria					Solution
			Standard value		Allowable limit			
6	Oil seal	Shaft diameter of output yoke and input yoke	109.91~110 (4.3272~4.3307)		109.8 (4.3228)		Replace oil seal when disassem-bling	Replacement
7		Shaft diameter of front yoke and rear yoke	129.9~130 (5.1142~5.1181)		129.8 (5.1102)			Replacement
8		Parking brake shaft diameter	124.9~125 (4.9173~4.9213)		124.8 (4.9134)			Replacement

Hydraulic Pump

Hydraulic pump removing and installing

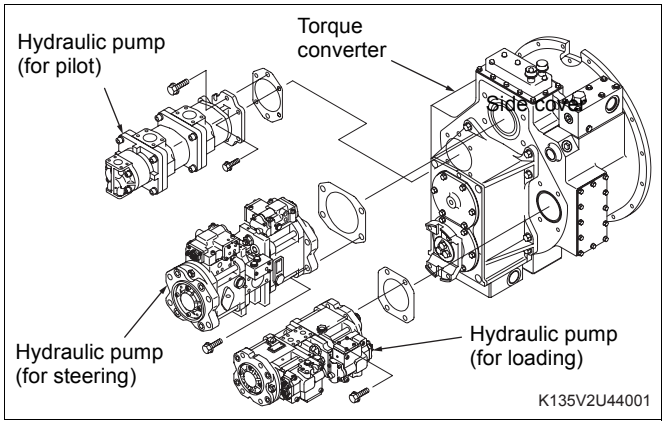
Hydraulic pump removing

⚠ WARNING

Unexpected movement of the machine could cause serious injury or death. To prevent such an accident, observe the following items:
- Park the machine on level and solid ground.
- Apply the parking brake.
- Block the tires with chocks to prevent the wheels from moving.
- Lower the attachment onto the ground, and relieve the residual pressure from the loading line and the hydraulic tank to prevent the oil from spouting out.
- Before starting work, be sure to remove the engine key, and hang a "DO NOT START!" tag on the operation board or the operator's seat.
- Use a stepladder or work platform to reach the higher parts of the machine.
- Give proper instructions to the service technicians.

IMPORTANT

Starting the machine just after installing the hydraulic pump could make the hydraulic pump be seized.
- Before installing, pour new oil from the outlet and inlet ports into the pump to form an oil film inside the pump.
- When installing, clean the outer surface of the pump.
- Keep hoses and ports capped during installation to keep dirt out.
- After installing, supply hydraulic oil into the hydraulic tank, and remove the plugs of the pump suction pipe to vent air in the hydraulic pipe. If no oil comes out from the plug, pour hydraulic oil until the oil overflows from the plug.
- Operate the engine at low-idling speed for 5 minutes or more. Do not operate any hydraulic functions during this period.



Before starting work:
- Drain the hydraulic oil from the hydraulic sub tank.

  : Hydraulic oil: Approx. 300 (79.3 gal)

- Relieve the residual pressure from the hydraulic circuit. Refer to the following procedures.

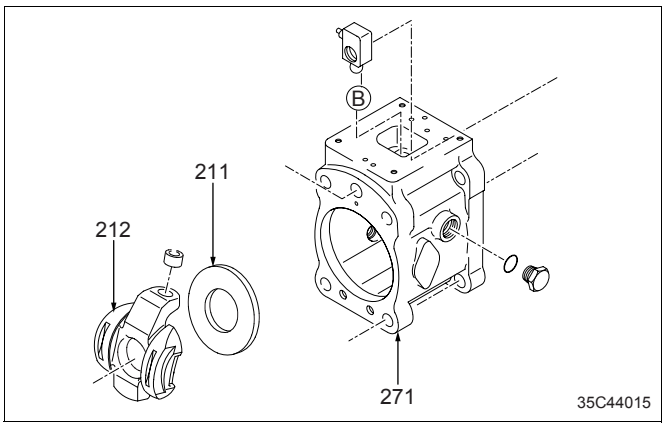
Hydraulic line residual pressure removal procedure

For loading line

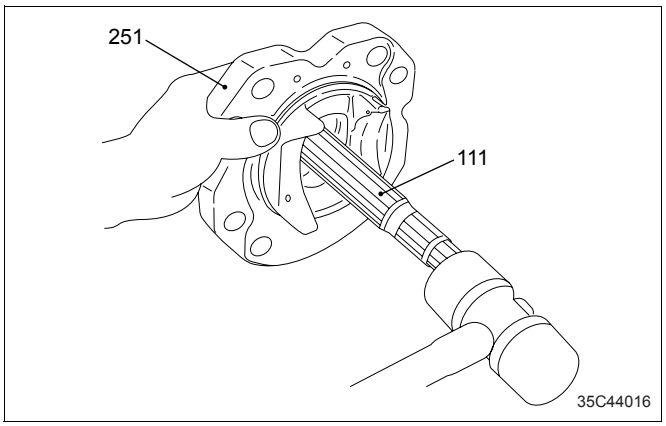
1. Raise the boom. When the boom is approximately 30~50 cm (1~2 ft) above the ground, stop the engine.
2. Tilt the attachment all the way down, and lower the boom onto the ground.
3. Move the attachment and boom lever back and forth to fully relieve the pressure.
4. Push the cap of the hydraulic tank to relieve the internal pressure from the hydraulic tank.

For steering line (U.S.A. specification)

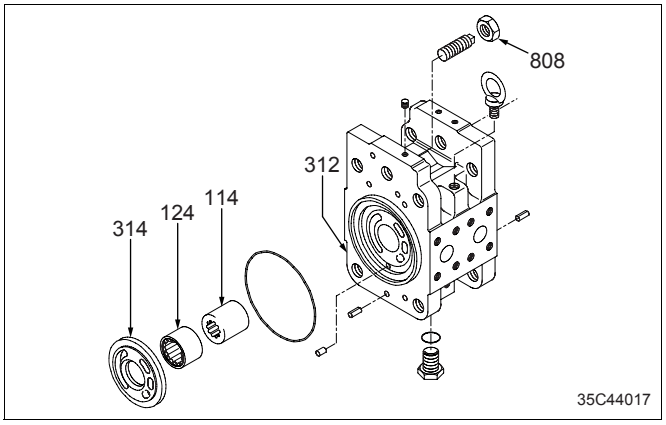
1. Install the hose for measuring pressure to the fitting at the steering cylinder rod side, and then relieve the residual pressure.
   To prevent the machine from moving, be sure to apply the articulation stopper before starting work.
2. Push the cap of the hydraulic tank to relieve the internal pressure from the hydraulic tank.



7. Remove plate (212) and shoe plate (211) from pump casing (271).

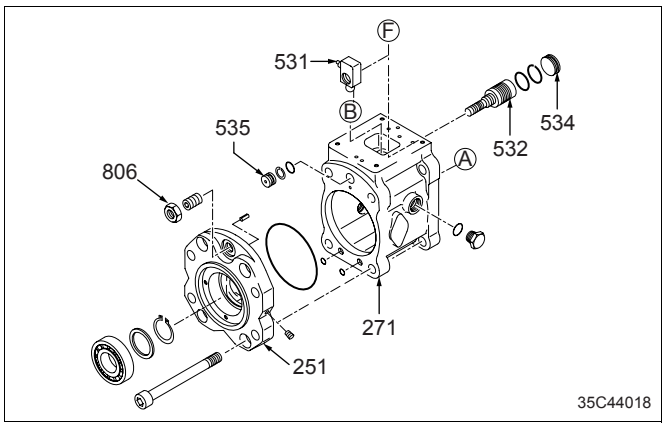


8. Tap the shaft-end of drive shaft (111), and pull out drive shaft (111) from plate (251).



9. Remove valve plate (314) from valve block (312).

10. Disassemble the rear pump following the same procedure.



11. If necessary, remove stopper (L) (534), stopper (S) (535), servo piston (532) and pin (531) from pump casing (271).
    Also, remove needle bearing (124) and spline (114) from valve block (312).

Note
- When removing pin (531), take care not to scratch the head of it.
- The connecting section of pin (531) and servo piston (532) have liquid adhesive applied to them.
  Take care not to scratch the servo piston while removing.
- Do not remove the needle bearing unless disassembly is absolutely necessary for replacement.

IMPORTANT

Do not loosen hexagon nuts (806, 808) of valve block (312) and plate (251).
Loosening or misadjusting them causes oil flow amount change and it decreases performance of the pump.

Hydraulic steering pump assembling

To reassemble the steering pump, follow the above disassembling procedure in reverse order.

Pilot Valve (for Loading)

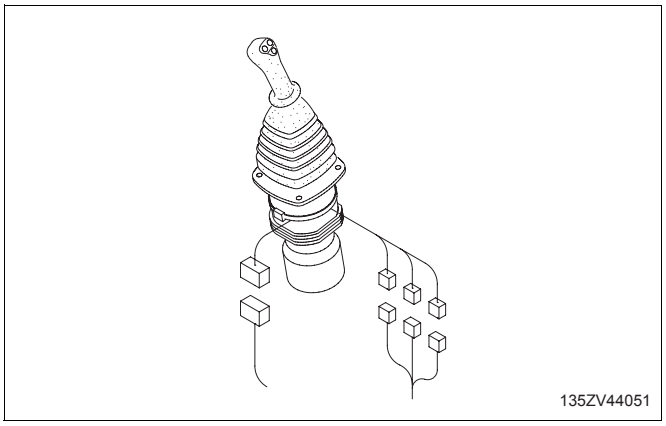
Pilot valve (for loading) removing and installing

Pilot valve (for loading) removing

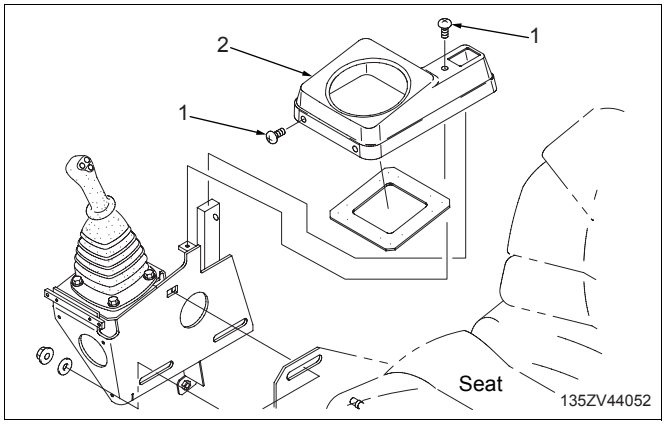
⚠ WARNING

Unexpected movement of the machine could cause serious injury or death. To prevent such an accident, observe the following items:
- Park the machine on level ground, and then block the tires with chocks to prevent the wheels from moving. In addition, apply the parking brake.
- Lower the attachment onto the ground, and then, relieve the internal pressure from the line.
- Relieve the internal pressure from the hydraulic tank.

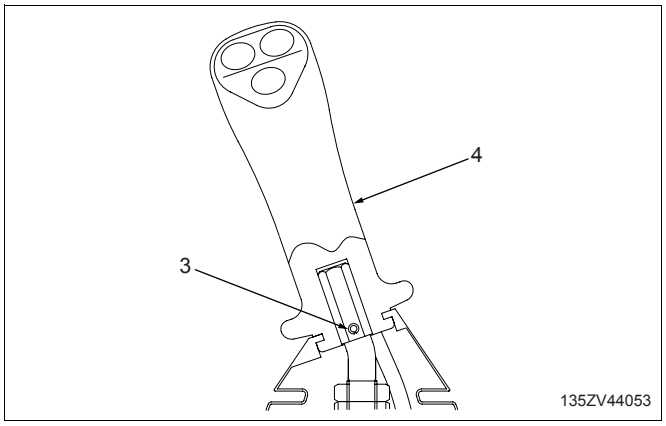
Before starting work:
- Stop the engine and lower the attachment to the ground. After that move the lever back and forth, left and right and relieve inner pressure from pilot line.



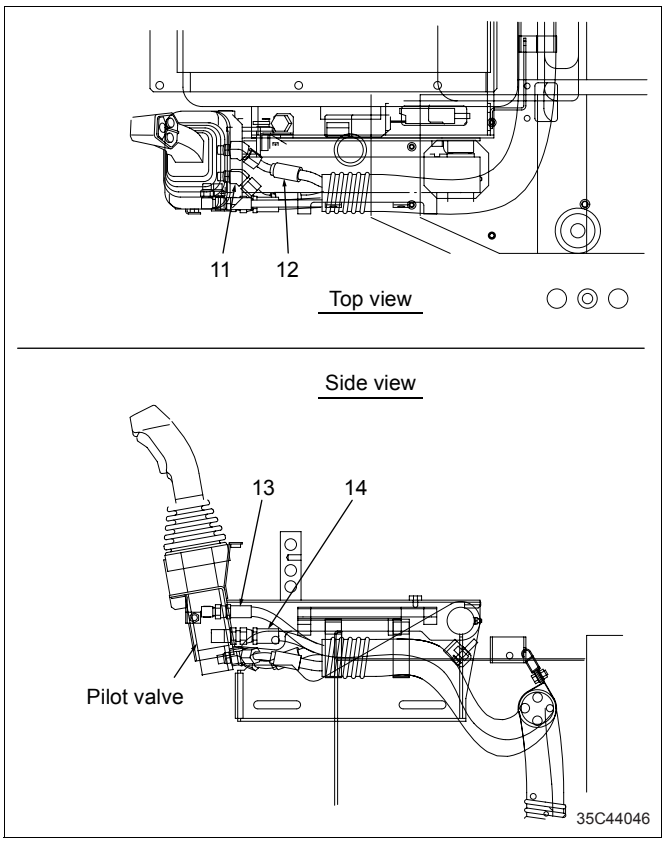
1. Remove connector from the control lever.



2. Remove screw (1) and cover (2) from the control lever.

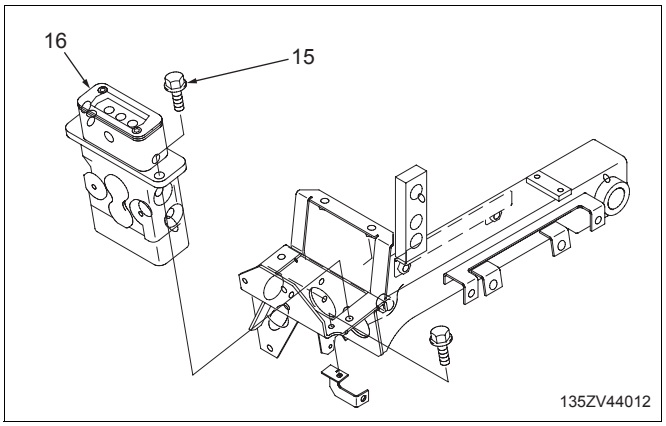


3. Remove spring pin (3) and knob (4) from the control lever.



4. Protect the cab interior from spilt oil.
   Disconnect "L" (Left) port hose (11), "R" (Right) port hose (12), "T" (Tank) port hose (13) and "P" (Pressure) port hose (14).

Note
- Before disconnecting these hoses, be sure to put matchmarks on them.
- Cover the disconnected hoses with vinyl, plugs or caps to protect them from dust and dirt.



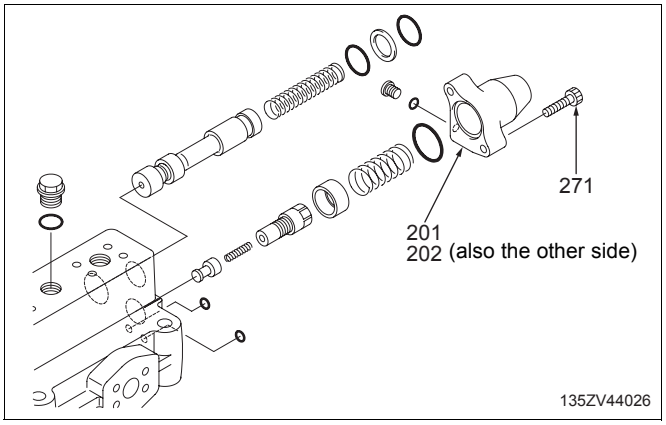
5. Remove bolt (15) and then remove pilot valve (16).

Pilot valve (for steering) installing

To reinstall the pilot valve for steering, follow the removal procedure in reverse order.

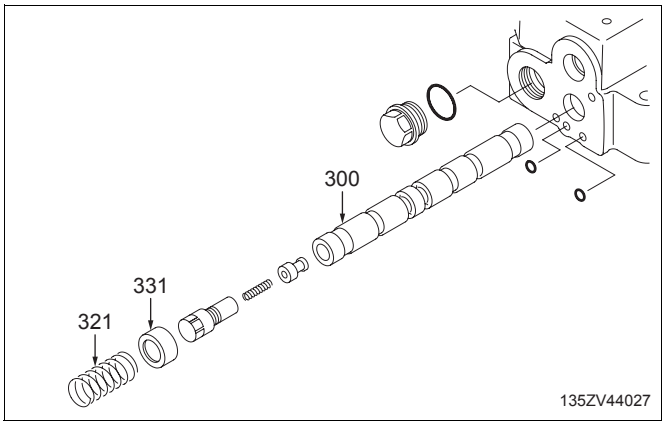
Pilot valve (for steering) installation cautions

Be sure to wipe off any spilt oil inside the cab.



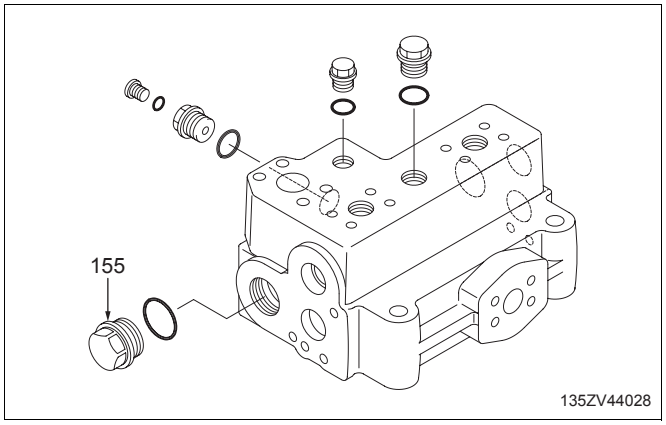
4. Remove bolt (271) and remove covers (201)(202).

: Bolt (271): 62 N-m (6.3 kgf-m) (46 lb-ft)
: Allen wrench width across flats
: 8 mm (0.315 in)



5. Remove spring (321) and spring seat (331), and then pull out spool (300).

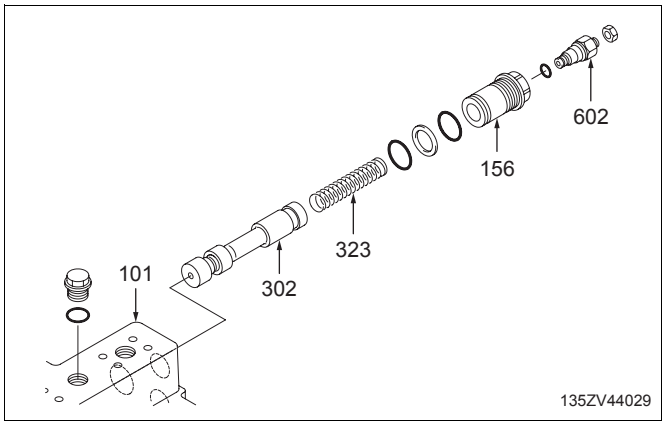
Note
- Carefully pull out the spool so that the casing and the spool are not scratched.
- Put match marks on the spool and casing to assure the direction of the spool during reassembly.



6. Slowly loosen plug (155). Do not remove it here.

: Plug (155): 98 N-m (10 kgf-m) (72 lb-ft)
: Width across flat: 41 mm (1.61 in)

Note
Carefully loosen plug (155). It may spring out by the spring force.



7. Remove relief valve (602).

: Valve (602): 79 N-m (8 kgf-m) (58 lb-ft)
: Width across flat: 19 mm (0.75 in)

8. Remove plug (156) and pull out spring (323) and spool (302) from casing (101).

: Plug (155): 98 N-m (10 kgf-m) (72 lb-ft)

Note
- Carefully remove plug (156). It may spring out by the spring force.
- Carefully pull out spool (302) so that casing (101) and spool (302) do not scratch each other.

9. Remove plug (155) loosened in the above step 6).

Stop Valve

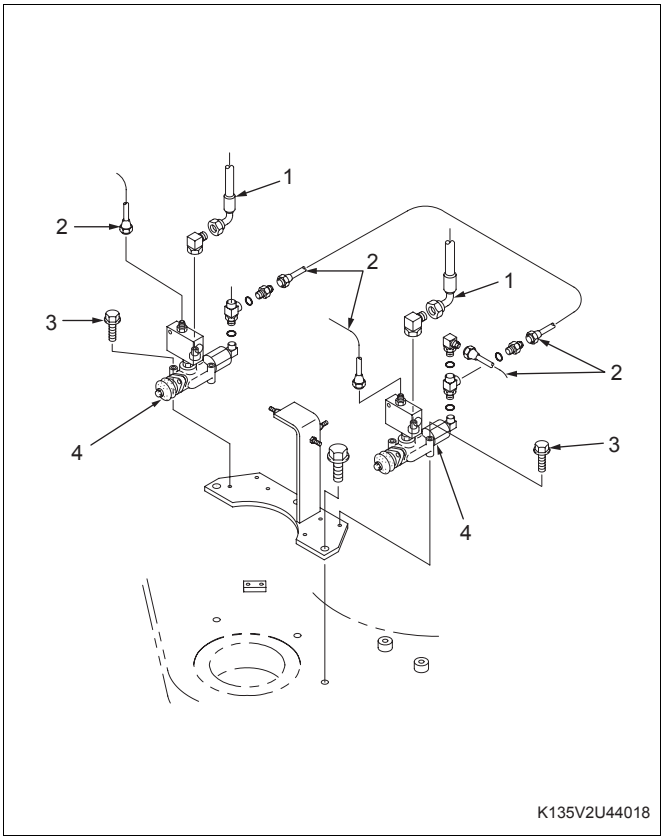
Stop valve removing and installing

Stop valve removing

⚠ WARNING

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

- Park the machine on level ground, and apply the parking brake. In addition, block the tires with chocks to prevent the 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 operation board.
- Use a stepladder or the like to reach the higher position of the machine.



1. Disconnect hose (1) and oil pipe (2).

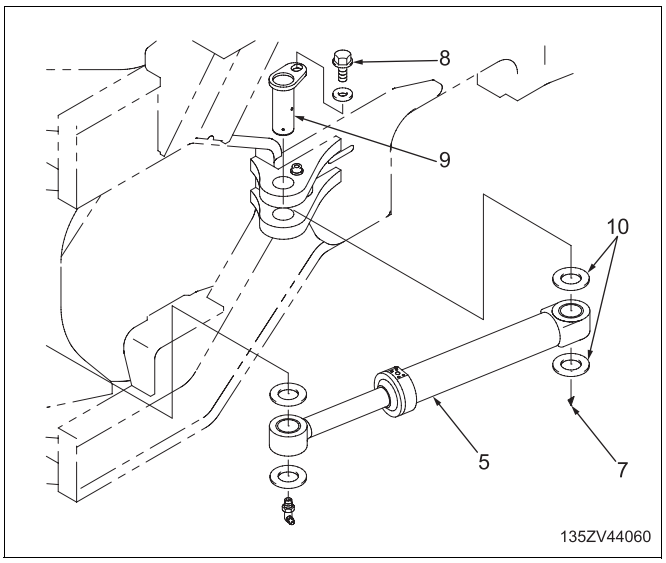
Note
Cover the disconnected hoses and pipes with plastic, plugs or caps to protect them from dust and dirt.

2. Remove bolt (3), and then, remove stop valve (4).

: Bolt (3): 28 N-m (2.85 kgf-m) (21 lb-ft)

Stop valve installing

For reinstallation, follow the above procedure in reverse order.



4. Remove grease pipe (7) and bolt (8) to remove pin (9).
   Sling steering cylinder (5) and remove it.

Note
There are shims (10) in the pin section at the bottom side. Carefully store the removed shims, and correctly reinsert the shims when reinstalling the cylinder.

Steering cylinder installing

To reinstall the steering cylinder, follow the above removal procedure in reverse order.

Steering cylinder installation cautions

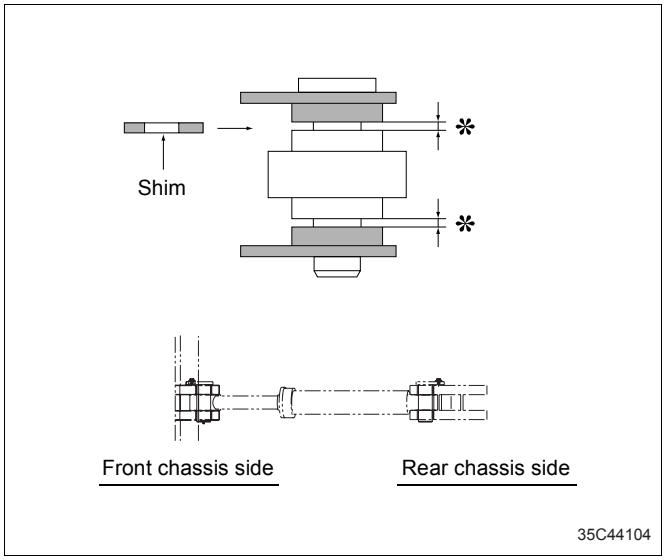
⚠ WARNING

Articulation area is a crush zone. Moving the machine with a person in this area can cause injury or death. When moving the K-Lever while engine is running, do not enter the articulation area of the machine.
If a person is in the articulation area, do not start the engine.

Pin installation

Be sure the pins accept grease after installation.

Shim adjustment

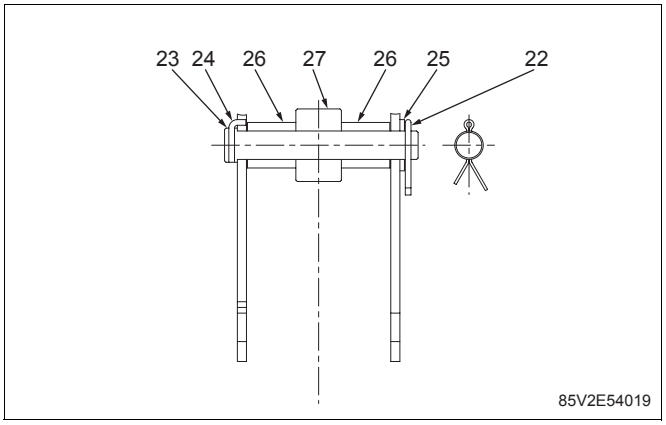


IMPORTANT

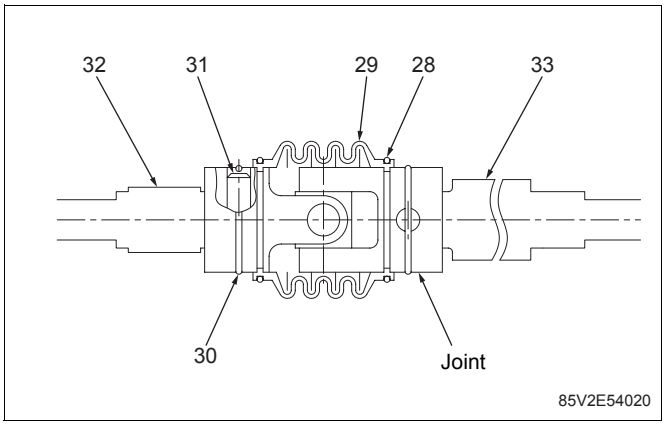
Insert shims so that the clearance between the chassis and the cylinder is 1.2 mm (0.047 in) or less. Place the same number of shims under the cylinder as on top of the cylinder. Refer to "Linkage Pin Standard Clearance Values" page 15-3.

Adjust the clearance on the rear chassis side first, and then, adjust the clearance on the front chassis side while checking that the cylinder is not inclined.

MEMO

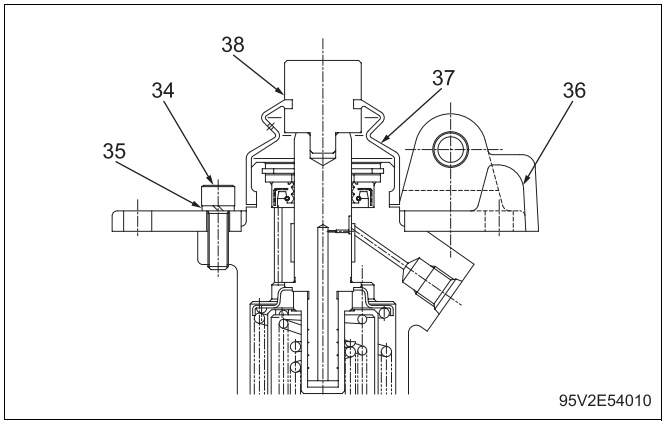


7. Pull out pin (22), pedal pin (23), L-shape pin (24) and washer (25), and then, remove collar (26) and roller (27).



8. Remove ring (28) and pull out boot (29).

9. Remove ring (30) for the joint, and remove pin (31) by using a pressing machine or equivalent to separate shaft assembly (32)(33).



10. Loosen bolt (34) and remove spring washer (35) and mounting plate (36).

    : Bolt (34): 25.5 N-m (2.6 kgf-m) (18.8 lb-ft)

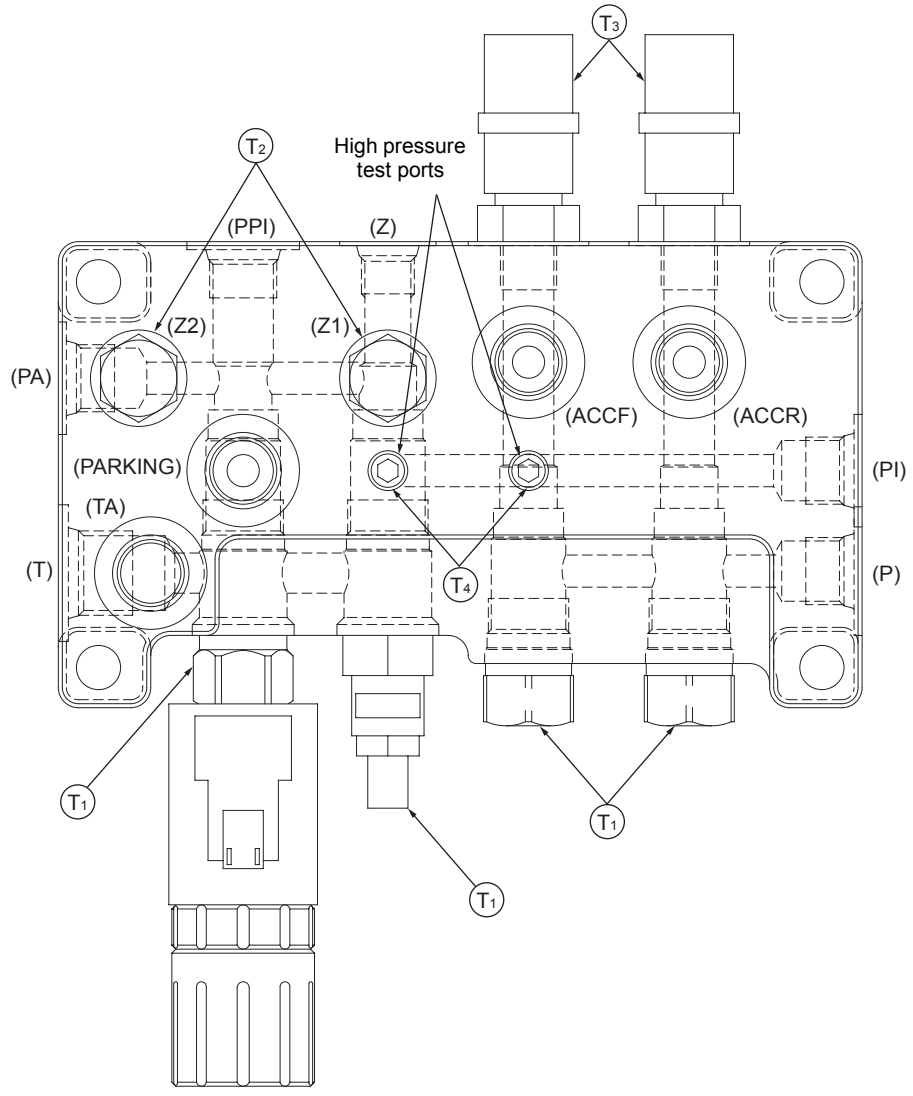
11. Remove dust cover (37) and seat (38).

Valve assembly disassembling and assembling

IMPORTANT
Before disassembly or reassembly, read and understand the aforementioned "Hydraulic Parts Disassembly and Assembly Cautions" page 44-3.

⚠ CAUTION
The accumulator pressure [11.8 MPa (1,706 psi)] is applied to the high pressure test ports, that may cause serious injury when escaping from the plugs. Completely depress brake pedal 80~100 times to relieve all pressure before removing plugs.

Valve assembly cross section and tightening torque



K135V2U54009

:
T_1: 50 N-m (5.1 kgf-m) (37 lb-ft)
T_2: 38 N-m (3.9 kgf-m) (28 lb-ft)
T_3: 23.5 N-m (2.4 kgf-m) (17 lb-ft)
T_4: 11 N-m (1.1 kgf-m) (8 lb-ft)

:
L_1: Screw lock agent application (Loctite® 262)

[Charging pressure: 2.9 MPa (30 kgf/cm^2) (427 psi) at 20ºC (68ºF)]

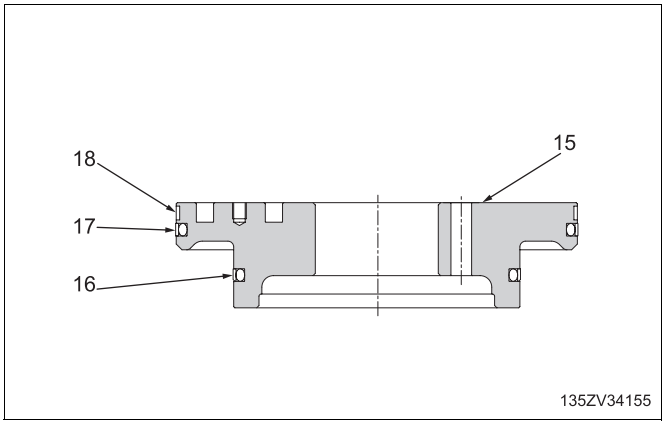
Note
Gas pressure is variable with temperature.
Use the following formula for the correct nitrogen charging pressure.
If the pressure on the gauge is too high, slowly turn the handle (1-2) counterclockwise.

P_X = 30 (kgf/cm^2) x {273 + t (ºC)} / {273 + 20 (ºC)}
P_X: Charging gas pressure
t: Ambient temperature
30: Standard gas pressure

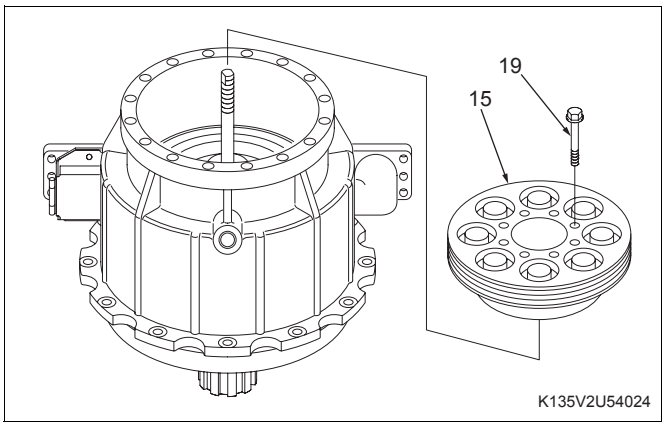
8. Turn handle (1-1) counterclockwise to return the piston of the gas valve. Then turn handle (1-2) counterclockwise to bleed the gas from the charging assembly and the hose.

9. After removing pressure gauge (2), remove the charging assembly from the accumulator.

Note
- Apply soapy water to the gas valve on the accumulator to check for gas leakage.
- Recheck the gas pressure once within a week after the charging.
- Check the gas pressure at every 2,000 operation hours.
- A little gas is lost each time of the checking, so add the gas to compensate for the loss.

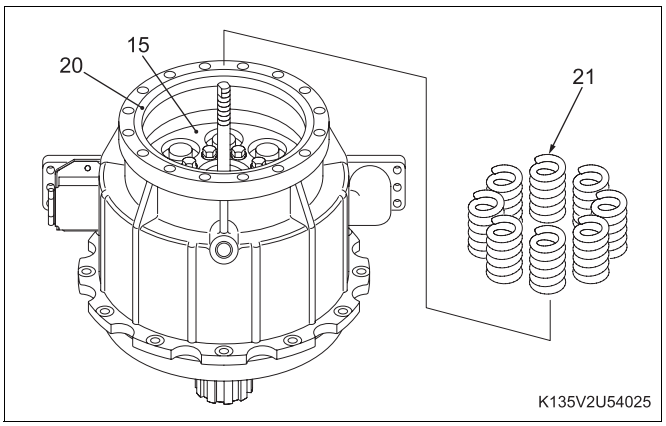


10. Assemble seal assemblies (16)(17) and wear ring (18) into piston (15).



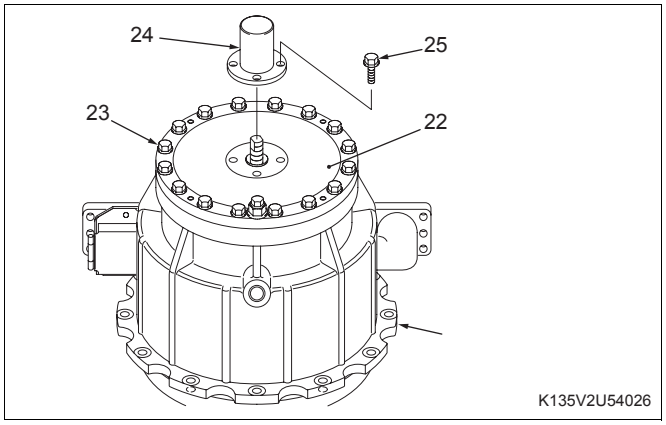
11. Assemble piston (15) into the parking brake housing, and tighten bolt (19).

: Bolt (19): 230 N-m (23.5 kgf-m) (170 lb-ft)
: With lubricating oil (Engine oil or gear oil)



12. Install ring (20) into the parking brake housing.

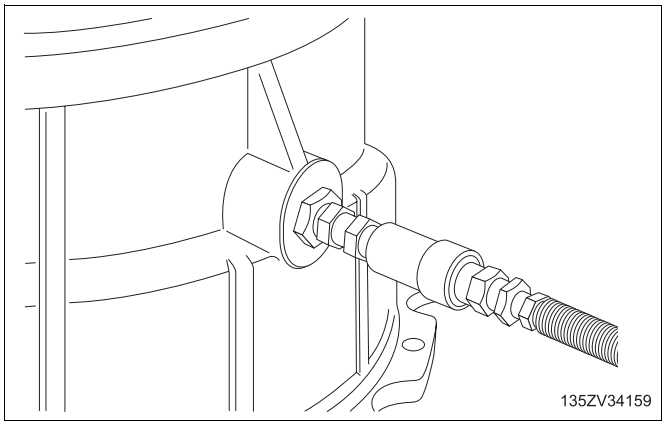
13. Install eight springs (21) to piston (15).



14. Install cover (22) to the parking brake housing and tighten bolt (23).

: Bolt (23): 230 N-m (23.5 kgf-m) (170 lb-ft)
: With lubricating oil (Engine oil or gear oil)

Note
Screw two prepared longer bolts completely into the holes that are diagonal from cover (22) installation bolt holes. Tighten fourteen bolts (23) to the rest of installation bolt holes. Remove two longer bolts tightened first, and then tighten two residual bolts (23).



15. Gradually apply air pressure to the oil port, and check that the shaft stroke mount is constant and the shaft operates properly.
Also check the air leakage.

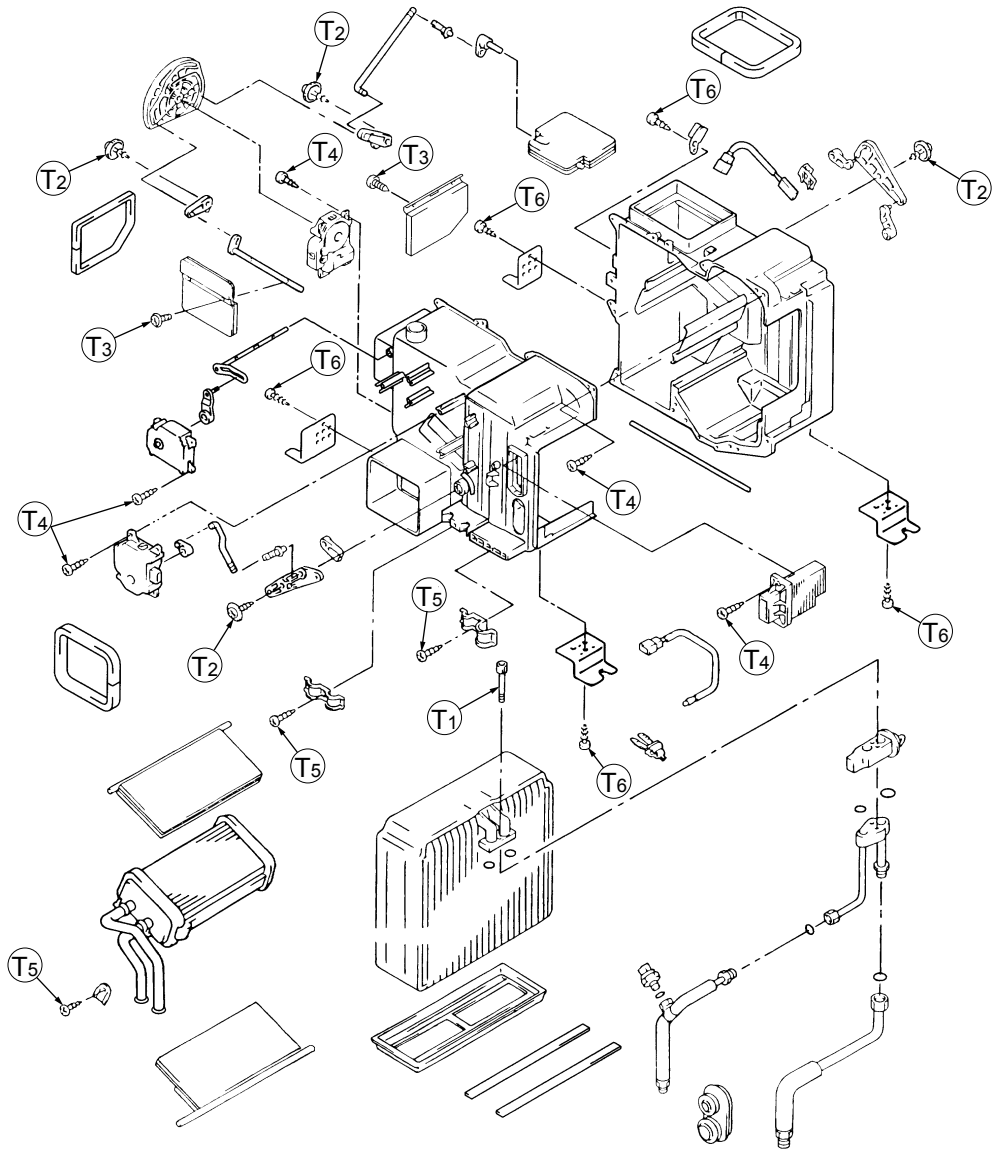
16. Install cover (24) and tighten bolt (25).

: Bolt (25): 27.9 N-m (2.85 kgf-m) (21 lb-ft)

Air conditioner disassembling and assembling

Air conditioner tightening torque

[Cooling unit]



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: Bolt tightening torque
T_1: 5.4 N-m (0.55 kgf-m) (4 lb-ft)
T_2: 1.9 N-m (0.19 kgf-m) (1.4 lb-ft)
T_3: 1.0 N-m (0.1 kgf-m) (0.7 lb-ft)
T_4: 0.8 N-m (0.08 kgf-m) (0.6 lb-ft)
T_5: 1.9 N-m (0.19 kgf-m) (1.4 lb-ft)
T_6: 2.5 N-m (0.25 kgf-m) (1.8 lb-ft)

Air Conditioner

Air conditioner periodical inspection/servicing

Inspection/maintenance item		Criteria	Solution
Refrigerant	Charge quantity	Air bubbles should not be seen through sight glass.	Inspection/adjustment
Condenser	Blockage in fins	Blockage should not be detected.	Clean
Compressor	Operating status	Magnetic clutch should operate. Abnormal sounds should not be detected.	Inspection/ adjustment/ replacement
Belt tension pulley	Operating status	Abnormal sounds and backlash should not be detected.	Inspection/ replacement
V belt	Damage and tension	Damages should not be detected.	Replacement
Blower motor and fan	Operating status	Abnormal sounds or vibration should not be detected.	Inspection/ replacement
Control mechanism	Operating status	Each part should operate in accordance with switch operations.	Inspection/ replacement
Air filter for inside/outside air	Clogging	Air quantity should not be so small as to hinder air conditioning.	Cleaning/replacement
Each mounting area and piping	Looseness, gas leak and damages	Looseness, gas leak and damages should not be detected.	Tightening/charge

Air conditioner tightening torque

Tightening torque for hose and pipes

Connection type	Connection area	Pipe size or bolt size	Tightening torque N-m (kgf-m) (lb-ft)
Nut type	Condenser-expansion valve	ø8 piping	15 (1.50) (11)
	Compressor-condenser	D1/2 piping	25 (2.50) (18)
	Evaporator-compressor	D5/8 piping	34 (3.50) (25)
Block joint	Receiver	M6 bolt in receiver (4T)	7 (0.70) (5.1)
	Evaporator-compressor	Any M6 bolt (6T) other than above	12 (1.20) (8.7)

Tightening torque for screws and bolts in special control regions

Special control area	Bolt size	Tightening torque N-m (kgf-m) (lb-ft)
Head bolt of magnetic clutch	M6	18 (1.8) (13)
Mounting bolt for servo motor for inside/ outside air selection (Tapping screw)		0.8 (0.08) (0.6)
Fixing nut of blower motor and condenser fan	M6	5.4 (0.55) (4.0)
Fixing bolt of blower motor and condenser motor	M5	4 (0.4) (2.9)