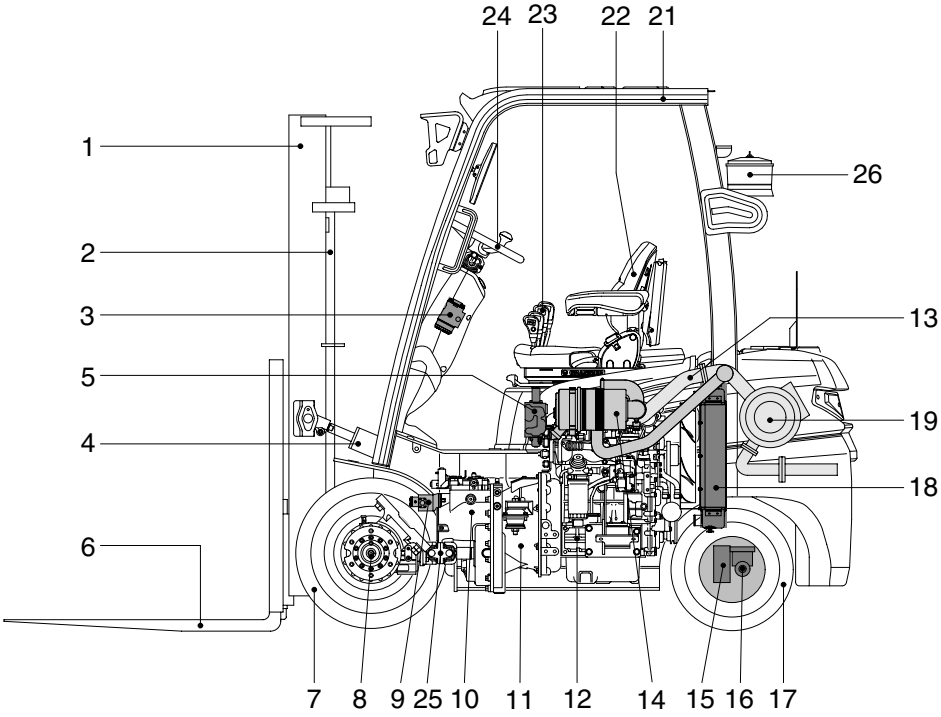
SECTION 2 REMOVAL & INSTALLATION OF UNIT

GROUP 1 STRUCTURE



15D9OM21

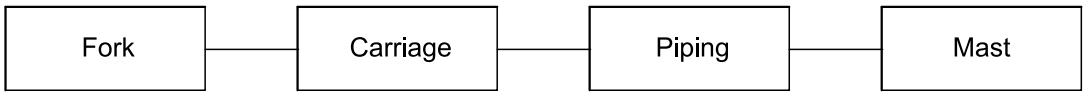
1	Mast	10	Transmission	19	Muffler
2	Lift cylinder	11	Torque converter	21	Overhead guard
3	Steering unit	12	Engine	22	Seat
4	Tilt cylinder	13	Exhaust pipe	23	Control lever
5	Control valve	14	Air cleaner	24	Steering wheel
6	Fork	15	Steering axle	25	Drive shaft
7	Front wheel	16	Steering cylinder	26	Pre-cleaner (opt)
8	Drive axle	17	Rear wheel		
9	Hydraulic pump	18	Radiator		

GROUP 2 REMOVAL AND INSTALLATION OF UNIT

Remove and install following units as explained in the flow chart.

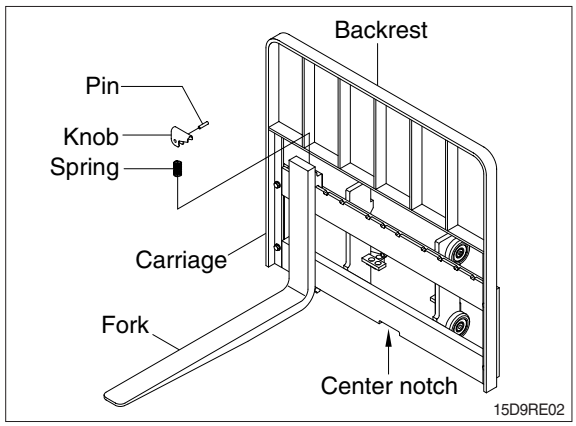
1. MAST

1) REMOVAL



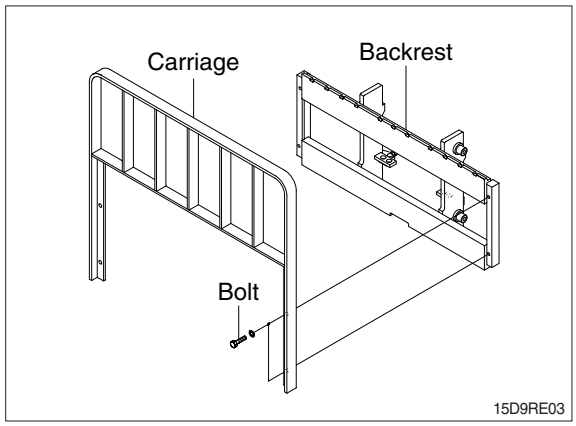
(1) Forks

① Lower the fork carriage until the forks are approximately 25 mm (1 in) from the floor.
② Turn knob up and slide one fork at a time toward the center of the carriage where a notch has been cut in the bottom plate for easy removal.
③ Remove only one fork at a time.
※ On larger forks it may be necessary to use a block of wood.



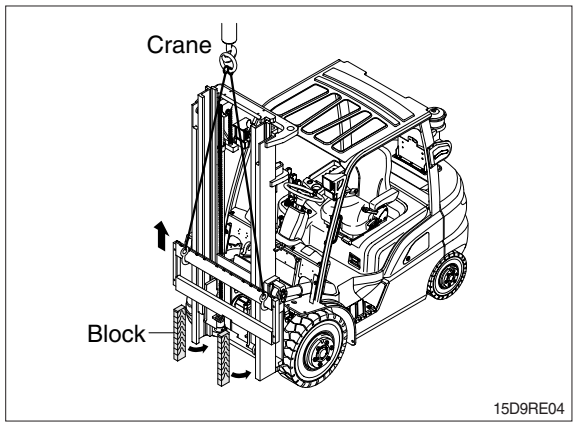
(2) Backrest (If necessary)

① Remove bolts securing backrest to fork carriage. Lift backrest straight up and remove it from carriage.

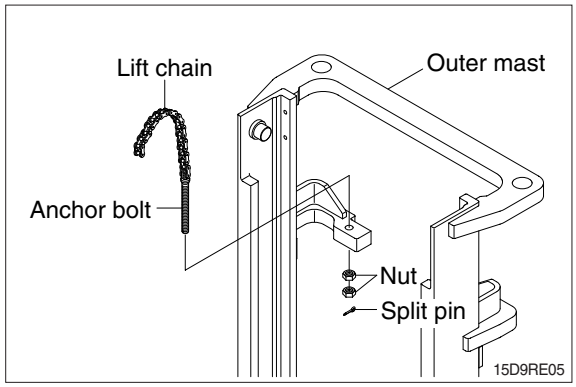


(3) Carriage

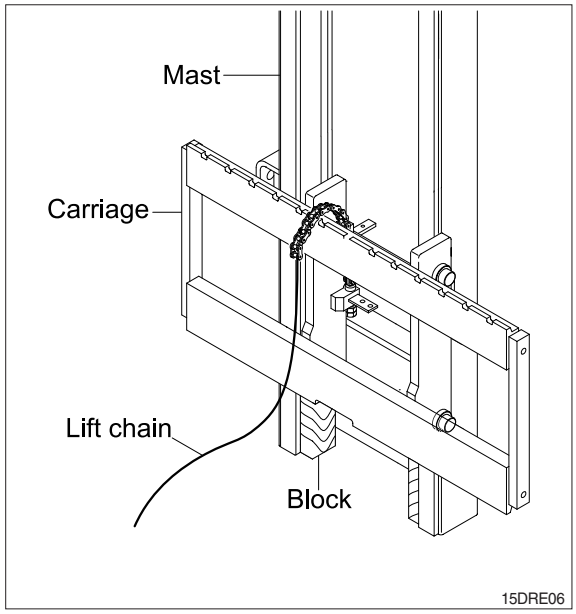
① With the mast vertical, raise the carriage high enough to place blocks under the load forks. This is done to create slack in the load chains when the carriage is lowered. Lower the carriage all the way down to the floor. Make sure the carriage is level, this will prevent any binding when the mast is raised.



② While supporting lift chains, remove the nuts and split pin from the chain anchor bolts of stationary upright.



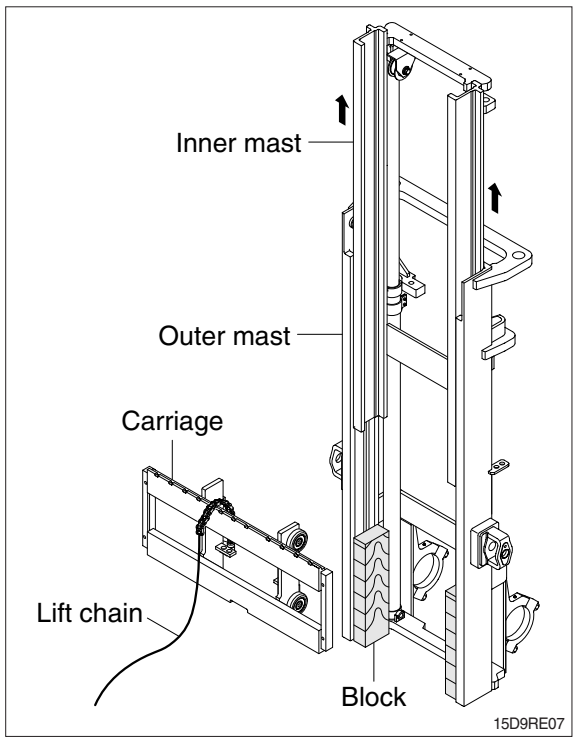
③ Pull the chains out of the sheaves and drape them over the front of the carriage.



④ Slowly raise inner mast upright until mast clears top of fork carriage. Move carriage to work area and lower the mast.

⚠ **Make sure that carriage remains on floor and does not bind while mast is being raised.**

※ Inspect all parts for wear or damage. Replace all worn or damaged parts.



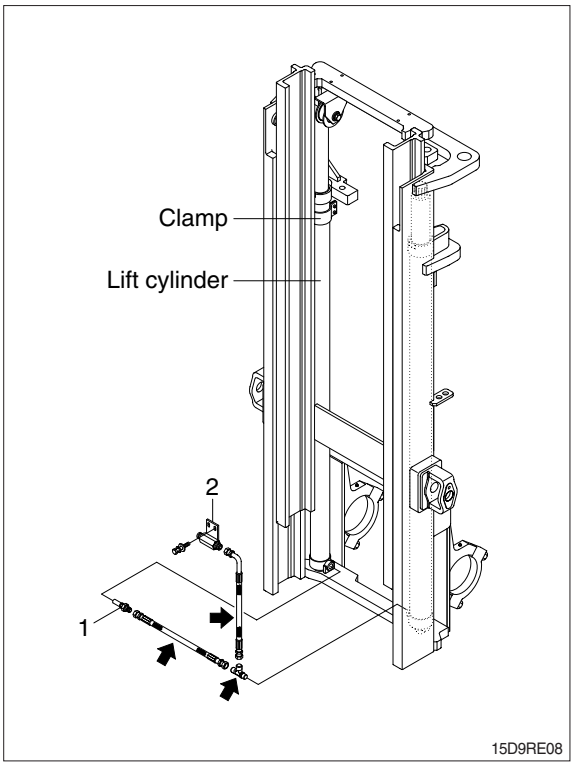
(4) Piping

① Remove the hoses and clamps attached to the cylinder.

② Remove hose assembly, velocity fuse valve(1) and tee from the lift cylinder.

※ Put blind plugs in the piping immediately after removing hoses.
This prevents the hydraulic oil from flowing out and also prevents dust and dirt from getting in.

③ Disconnect hose assembly from the connector(2).



(5) Lift cylinder

① Loosen the nuts and remove stud bolts securing the lift cylinders to inner mast.

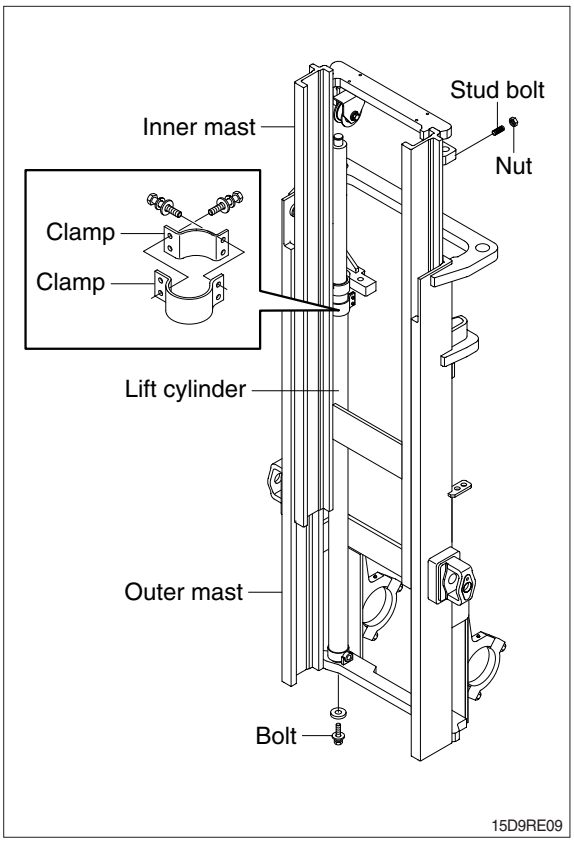
② Bind the lift cylinder with overhead hoist rope and pull up so that the rope has no slack or binding.

⚠ Make sure that the lift cylinder be tightened firmly for safety.

③ Loosen and remove hexagon bolts and clamps securing cylinder to outer mast.

④ Using an overhead hoist, slowly raise the inner mast high enough to clear lift cylinder.

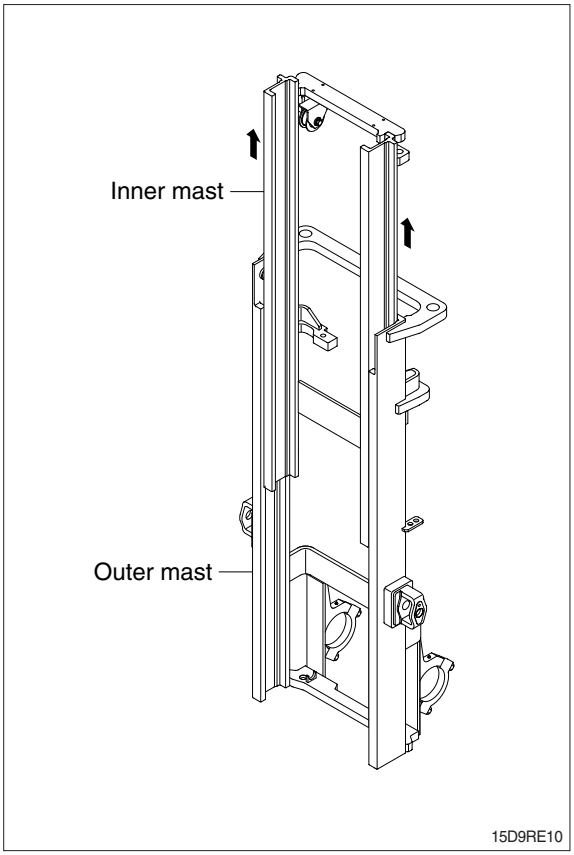
⑤ Using an overhead hoist, draw out lift cylinder carefully and put down on the work floor.



(6) Inner mast

① Using an overhead hoist raise the inner mast straight and carefully draw out of outer mast section.

⚠ Be careful the mast not to swing or fall.



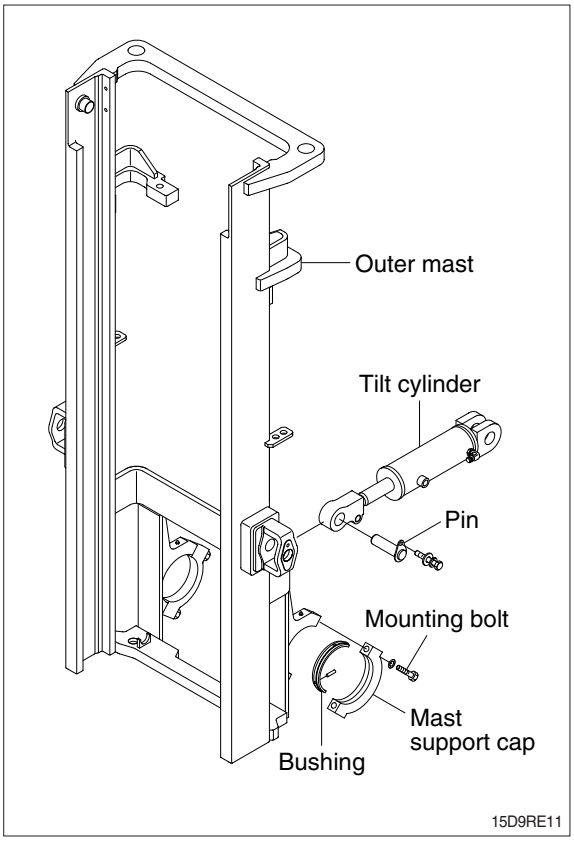
(7) Tilt cylinder pin

(8) Mast support cap

① Attach a crane to the stay at the top of the outer mast, and raise enough to sustain jacked up machine.

※ This operation is carried out from under the machine, so use a pit, or if there is no pit, jack up the machine and loosen with on impact wrench.

② Remove the mounting bolts from the cap then slowly raise the outer mast.



2) INSTALLATION

After assembling mast components totally without piping connections, install mast assembly to the equipment.

※ Installation procedure for each of mast component is the reverse of the removal procedure.

(1) Mast support cap

① Check the mast support cap and spring pin for wear.

② Jack up the machine so that the front is raised and then using an overhead hoist assemble outer mast to drive axle unit.

③ Tighten mounting bolts to mast support cap. Apply loctite #277.

· Tightening torque : 19.9~26.9 kgf·m (144~195 lbf·ft)

(2) Tilt cylinder pin

Hold the mast with a crane, operate the tilt control lever and align the holes, then knock the pin.

(3) Lift cylinder installation and adjustment

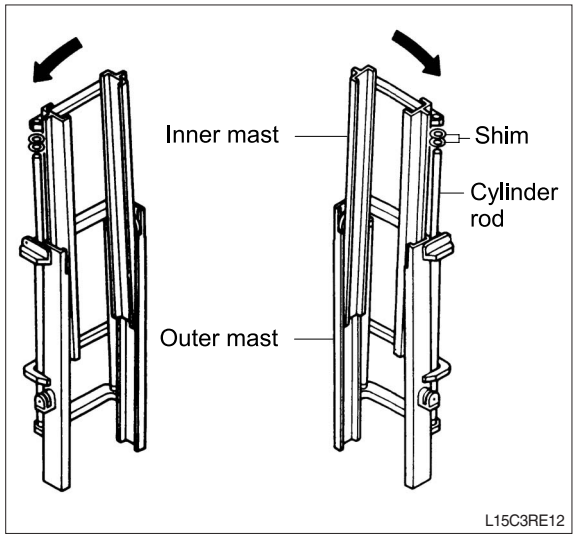
① Assemble the lift cylinder inside the outer mast, then tighten the stopper bolt. If the cylinder assembly has been replaced, adjust as follows so that the left and right cylinders are synchronized at the maximum lifting height.

② Assemble the cylinder rod to the inner mast, and check the left-to-right play of the mast at the maximum lifting height.

※ If play is to LEFT, install adjustment shim to LEFT cylinder.

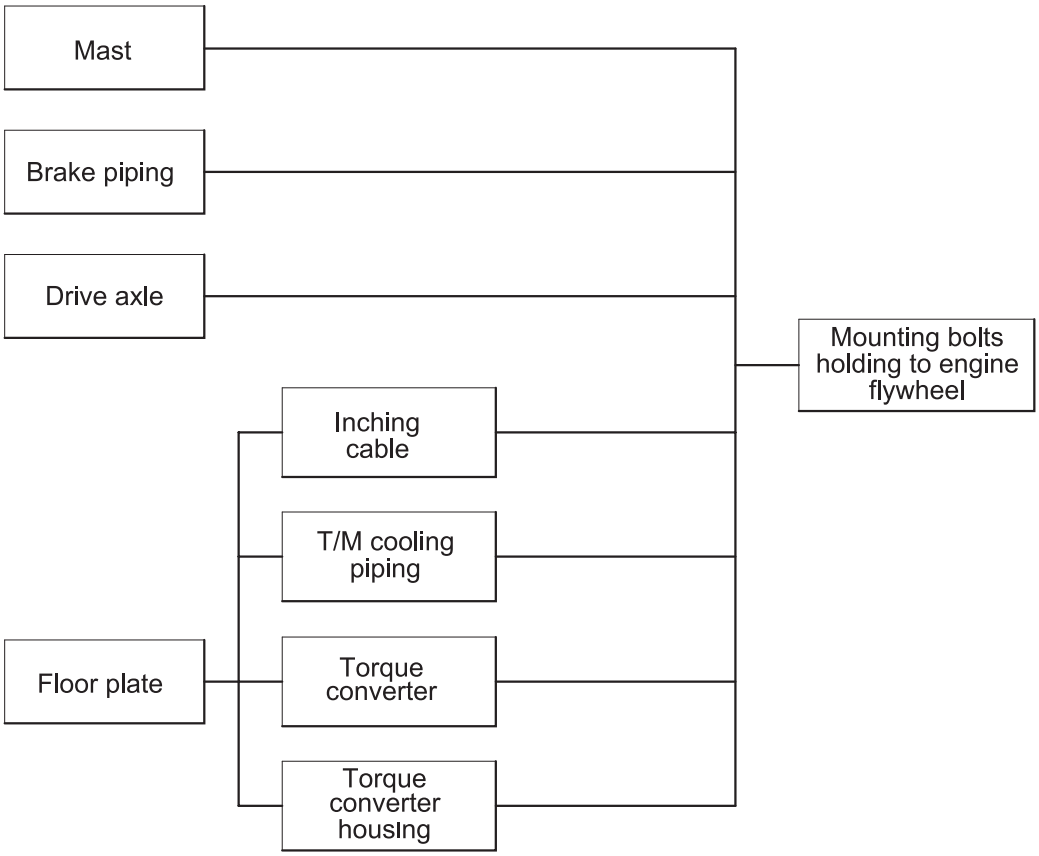
※ If play is to RIGHT, install adjustment shim to RIGHT cylinder.

· Shim thickness : 1.0 mm (0.04 in)



2. POWER TRAIN ASSEMBLY

1) REMOVAL



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(1) Mast

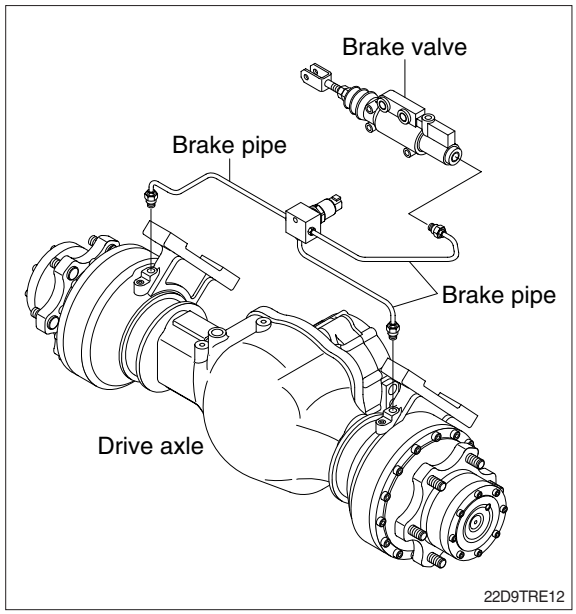
Refer to section on mast (Page 2-2)

(2) Brake piping

Disconnect the brake piping from the brake housing of drive axle.

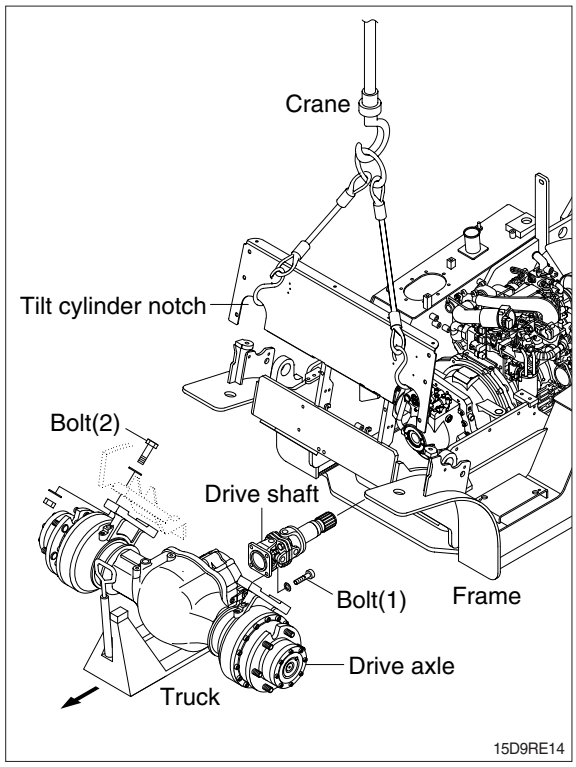
⚠ When disconnecting the brake piping and refilling the oil for the brake housing of the drive axle take to extreme care not to spill it on the work site.

It can cause to happen unexpected accidents such as personal injury due to slippage on the oil or fire.
If the oil is spilt on the work site, wipe it off immediately.



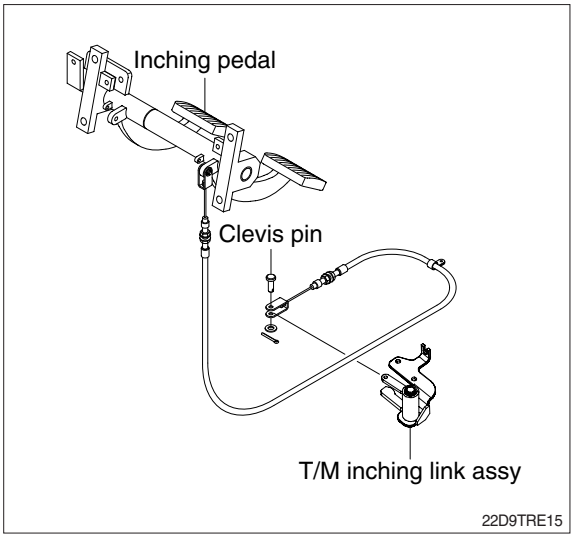
(3) Drive axle

① Attach a crane to the tilt cylinder notches on the dashboard and raise the machine.
② Loosen hexagonal bolts (1) connection drive axle to the transmission.
③ Put the block under the drive axle and support under the drive axle with a truck.
④ Remove drive axle mount bolts (2) from the frame and then slowly pull out the truck with drive axle to the front.
⑤ Remove drive shaft assy from transmission.



(4) Inching linkage

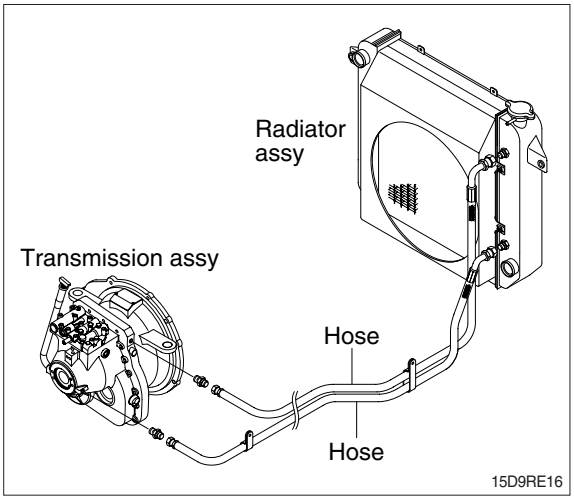
Remove the clevis pin from the transmission control valve.



(5) Transmission cooling piping

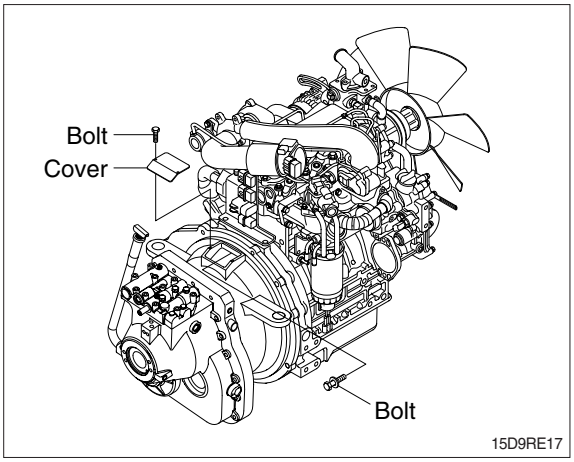
① Disconnect cooling hose from the transmission.

※ Make sure that the coolant be drained from the hose.



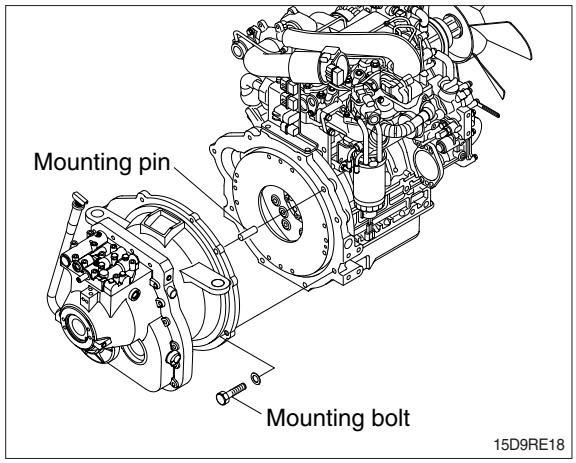
(6) Torque converter

① Remove the cover on top face of the torque converter housing then remove the 8 mounting bolts installed on the engine flywheel. To rotate the flywheel, remove 1 mounting bolt, then insert a turning tool in the mounting hole. One man must turn the engine fan by hand while the other turns the flywheel.

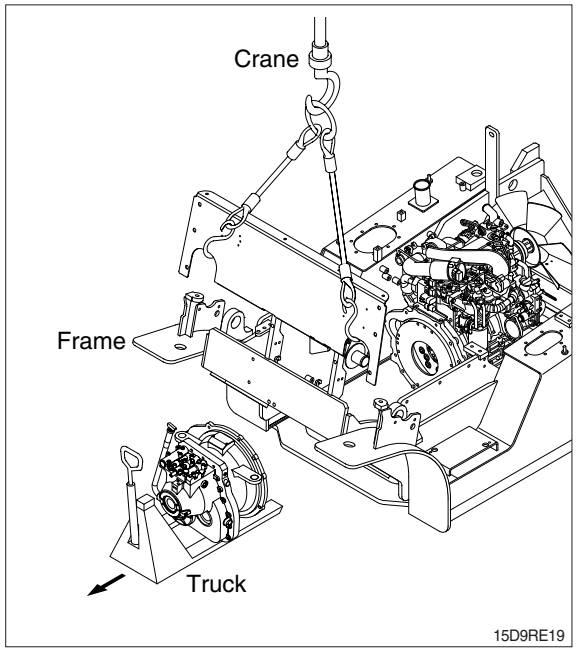


(7) Mounting bolts holding to flywheel housing

① Remove transmission assembly from the engine flywheel housing by loosening the 8 mounting bolts.



② Using a moving truck slowly pull out transmission assembly to the front.

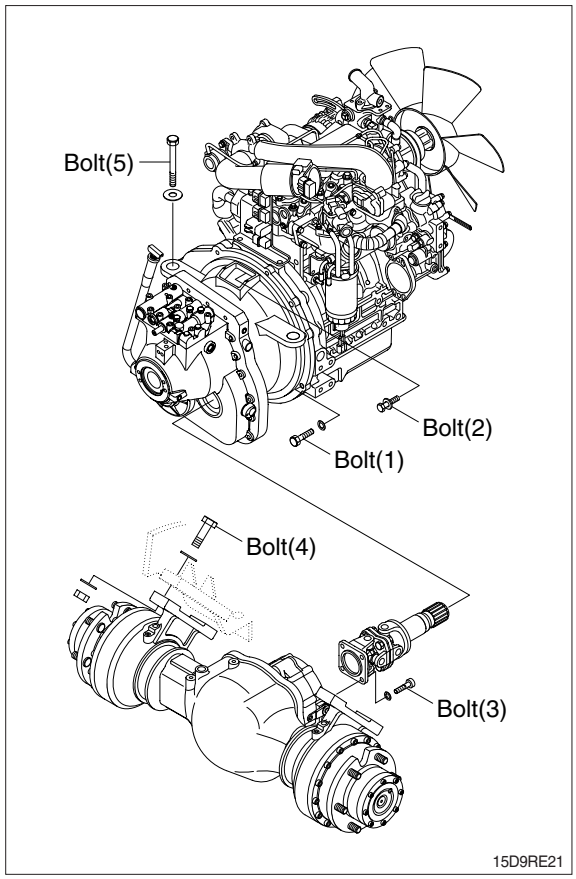


2) INSTALLATION

(1) Installation is the reverse order to removal, but be careful of the following points.

(2) Tightening torque

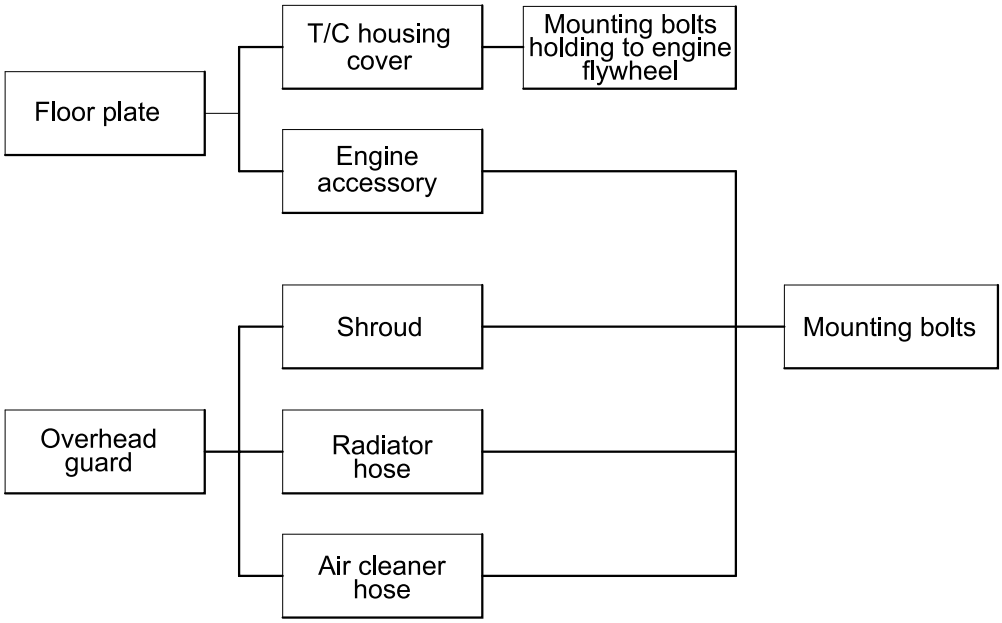
- Bolt (1) : 5.5~8.3 kgf·m (39.8~60 lbf·ft)
- Bolt (2) : 2.7~4.1 kgf·m (19.5~29.7 lbf·ft)
- Bolt (3) : 5.5~8.3 kgf·m (39.8~60 lbf·ft)
- Bolt (4) : 62~68 kgf·m (448~492 lbf·ft)
- Bolt (5) : 7.5 kgf·m (54.2 lbf·ft)



3. ENGINE

Remove the torque converter, transmission and front axle inside the frame, then remove the engine assembly.

1) REMOVAL



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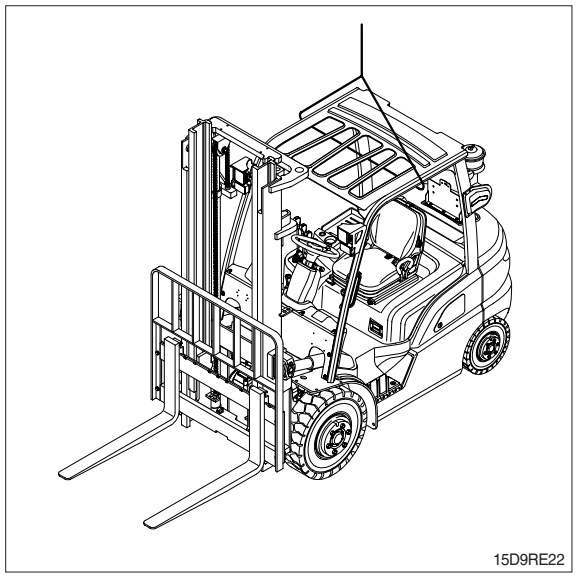
(1) Overhead guard

Remove the wiring for rear combination lamp, working lamp, head lamp and flasher lamp on the stay of the overhead guard and then raise it together remove the bonnet.



15D9RE22

(2) Remove the torque converter housing cover, mounting bolts installed to flywheel housing.
For details, see page 2-10.

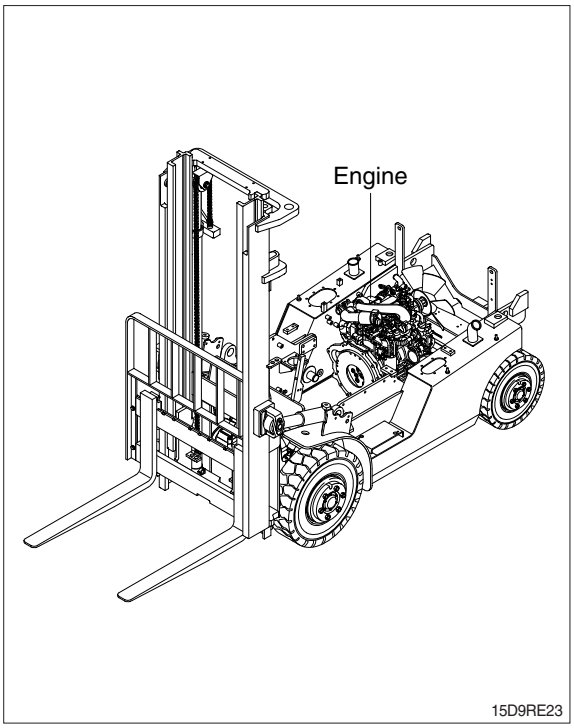
(3) Engine accessory

Remove all wiring harnesses, cables and hoses around the engine, dashboard and frame.

① Wiring harness to alternator and starter.
② Wiring harness for oil pressure and engine water temperature gauges.
③ Hoses to fuel tank and air cleaner.
④ Exhaust pipe.

(4) Radiator hose

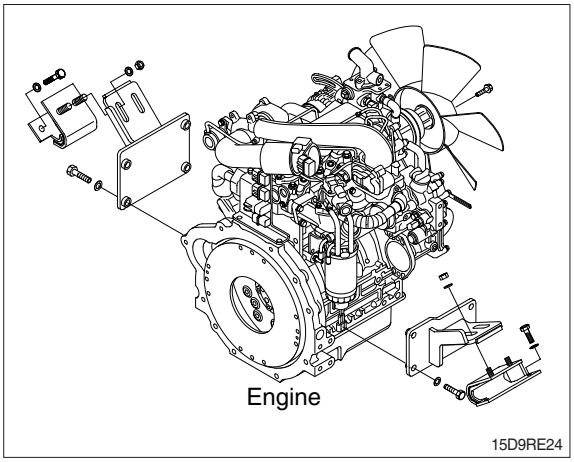
Open the drain valve of the radiator and drain the cooling water, then remove the radiator hose.



(5) Mounting bolt

Attach a crane to the engine hook and raise, then remove mounting bolts. Raise the engine slightly, slide towards the radiator, then lift up.

※ When sliding the engine, be careful of the collision engine and radiator.



2) INSTALLATION

Installation is the reverse order of removal, but be careful of the following points.

(1) Tighten the engine mounting bolts and nuts.

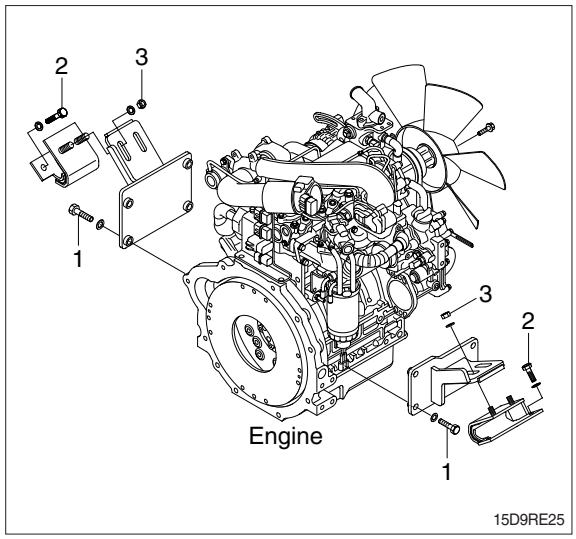
(2) Tighten the engine mounting bracket bolts.

※ Do not remove the bolts unless necessary. Loctite is coated over the threads of bolt. So, once the bolts were removed, coat them with loctite (#243) when installing.

※ Before installing the bolts, loctite in the holes should be removed by a tap.

(3) Tightening torque of mounting bolt installing to torque converter housing.

- Bolt (1) : 9.9~14.7kgf·m (72~106 lbf·ft)
  (2) : 9.8~15.8kgf·m (71~114 lbf·ft)
- Nut (3) : 7.8~11.6 kgf·m (56~84 lbf·ft)



(4) Radiator hoses

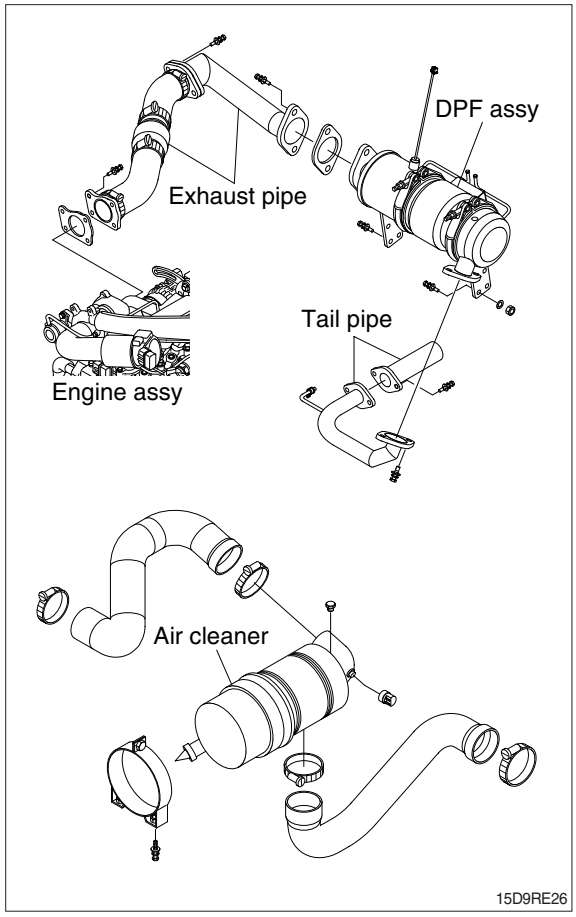
- Distance to insert hose : 35 mm (1.4 in)

(5) Air cleaner hose

① Insert the air cleaner hose securely and fit a clamp.

② **Distance to insert hose**

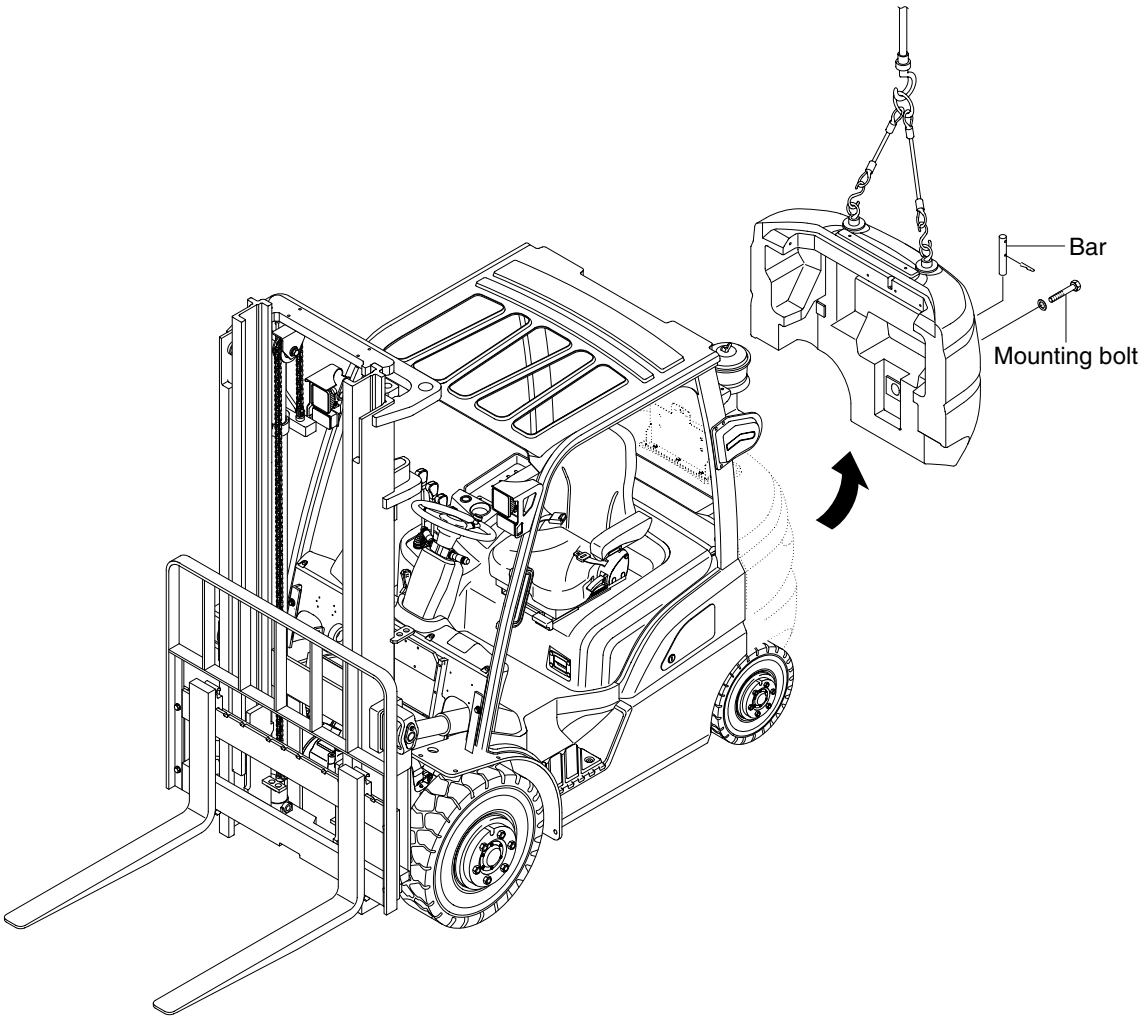
- Air cleaner hose : 35 mm (1.4 in)
- Engine end : 25 mm (1 in)



4. STEERING AXLE

1) REMOVAL

Counterweight → Rear wheel → Hose → Mounting bolt



15D9RE27

(1) Counterweight

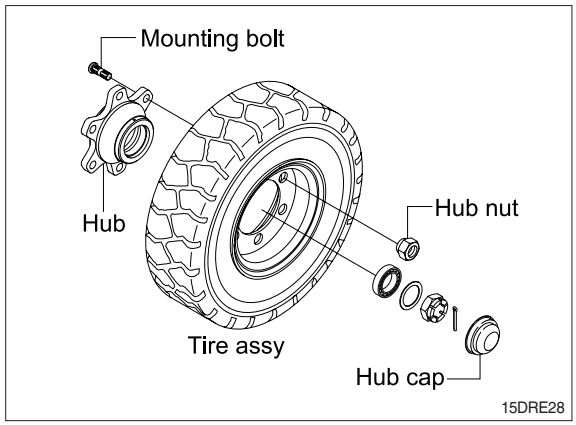
Hold the counterweight with hoist bars, and raise it with a crane.

Remove the mounting bolts, raise slightly and move it slowly to rear side.

- Weight of counterweight (standard)
  15D-9 : 735 kg (1620 lb)
  18D-9 : 900 kg (1980 lb)
  20D-9 : 1035 kg (2280 lb)
- Tightening torque :
  55~65 kgf·m (398~470 lbf·ft)

(2) Rear wheel

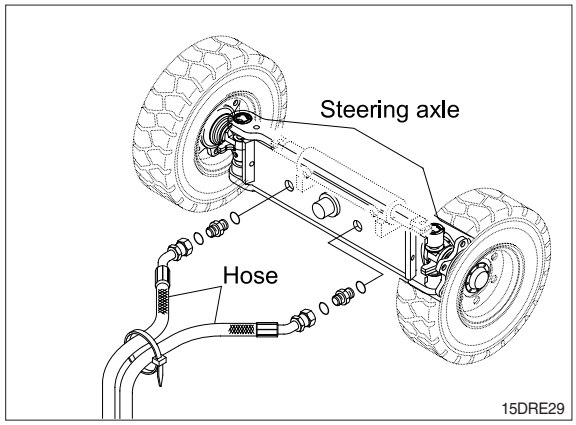
Remove mounting bolt and hub nut with socket wrench and then carefully take out the tire assembly.



(3) Hose

Drain hydraulic oil in the hoses and cylinders before removing them.

Remove the fitting and then disconnect the hoses.



(4) Mounting bolt

Put a block under the steering axle, block on a truck, and raise the frame with a crane. Remove the mounting bolts installing to the frame, and pull out to the rear.

There are shims between the block and steering axle to prevent play.

· Tightening torque :
49.5~66.5 kgf·m (358~481 lbf·ft)