CONTENTS

SECTION 1 GENERAL

5. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60.0
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.0	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

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)

① **Mast support cap**

② Check the mast support cap and spring pin for wear.

Jack up the machine so that the front is raised and then using an overhead hoist assemble outer

③ mast to drive axle unit.

Tighten mounting bolts to mast support cap.

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

Tilt cylinder pin

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

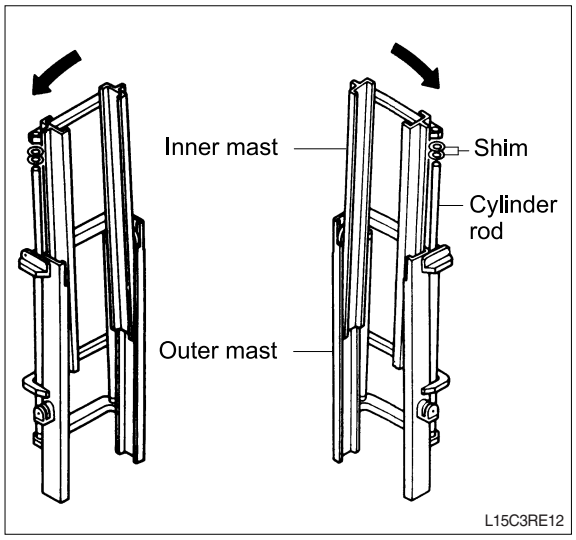
① Assemble the lift cylinder inside the outer mast, then tighten the stopper bolt. If the cylinder assembly has been replaced, adjust as follows so that the left and right cylinders are synchronized at the maximum lifting height.

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.

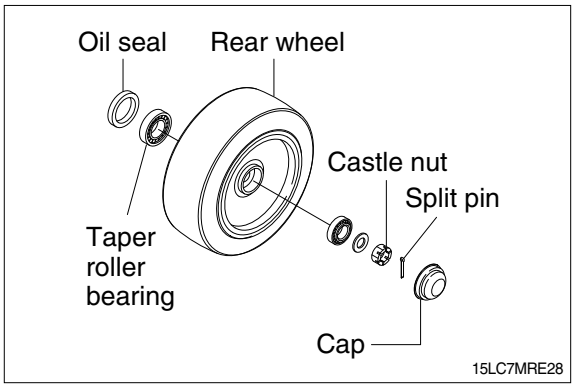
※ If play is to RIGHT, install adjustment shim to RIGHT cylinder.

· Shim thickness : 1.0mm(0.04in)



(2) Rear wheel

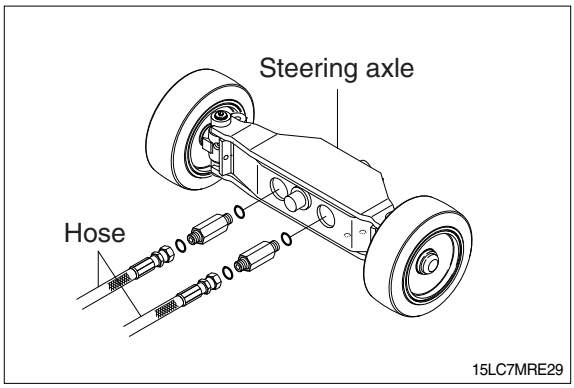
Remove cap, split pin and castle nut and then carefully take out the tire assembly.



(3) Hose

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

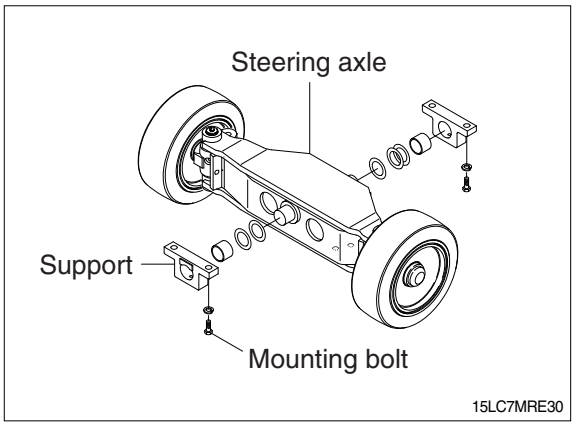
Loosen connector and then disconnect the hoses.



(4) Mounting bolt

Put a block under the steering axle, support 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 support and steering axle to prevent play.



(2) Operation

The transmission case includes the function of a control valve, an oil filter and a parking brake.

The oil filter is charge of filtering sucked oil by an oil pump before transmitting sucked oil to a control valve and a torque converter.

Oil transmitted through an oil filter delivers oil pressure to the piston of the forward and reverse clutch through the solenoid valve.

At this time, the solenoid valve is in charge of the important function of transmitting oil pressure for forward and reverse through an electric signal by the forward and reverse selection lever of the truck.

Oil pressure chosen for forward or reverse by the solenoid valve is transmitted to the forward clutch through the formed oil path between transmission case or the reverse clutch through the pipe of transmission outside.

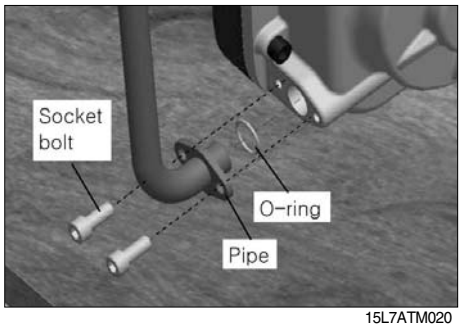
Parking brake works by the band brake installed on parking drum which is linked to the output shaft of the forward clutch.

GROUP 2 TROUBLESHOOTING

1. TRANSMISSION

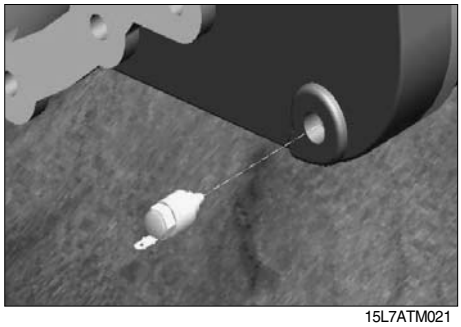
Trouble symptom	Probable cause	Remedy
1. Output does not go up		
1) Torque converter		
- Torque converter oil	· The oil is in short supply.	· Replenish oil.
	· The oil that is not regulated is used.	· Change the oil to regular oil.
	· The air has mixed into oil.	· Tighten each joint coupling and the pipe further.
	· The oil filter is clogging.	· Wash the oil filter or change it.
- Main body of torque converter	· The stator free wheel is broken.	· Change the stall revolution then if the revolution is extremely low, change the free wheel inner race, free wheel cam and roller.
	· The stator free wheel is sticking.	· Check the rise of the temperature of oil at no load. Change the free wheel inner race, free wheel cam and roller when the temperature of oil rises abnormally.
	· The wheel with blades is broken or it is touching other components.	· Check whether the aluminum powder and the like has mixed into torque converter oil. Change the wheel with blades if the aluminum powder and the like has mixed in.
2) Transmission		
- Charging pump	· The pump does not operates normally.	· Change the pump.
- Torque converter oil	· The oil is in short supply.	· Replenish oil.
	· The oil that is not regulated is used.	· Change the oil to regular oil.
	· The air bubble occurs because the torque converter pressure decrease.	· Check and adjust the torque converter pressure.
	· The water has mixed into oil.	· Check the cooler, and change all oil.
- Valve assy	· The clutch oil pressure has decreased, because the spring is setting or break.	· Change the spring.
	· The valve does not move with the valve opens.	· Repair or change the valve.
	· The orifice is clogging.	· Wash the orifice.
- Clutch	· The seal ring of the clutch piston are damaged.	· Change the seal ring.
	· The clutch plate slips because the clutch oil pressure decrease.	· Measure the clutch pressure.
	· The clutch plate is worn out or damaged.	· Change the clutch plate.
	· The clutch piston down not operate normally.	· Repair or change the clutch piston.

(15) Remove the socket bolt, and then remove the pipe.
Next remove the O-ring at the pipe.

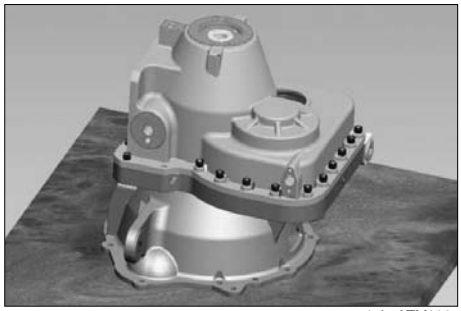


15L7ATM020

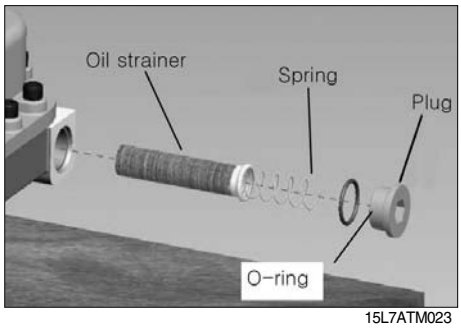
(16) Remove the temperature sensor.


15L7ATM021

(17) Lay the T/M assy without damage to the T/C housing.(engine mounting surface)


15L7ATM022

(18) Remove the plug, and then remove the spring, oil strainer.
Next remove the O-ring at the plug.



15L7ATM023

2. ASSEMBLY OF TRANSMISSION

1) ASSEMBLING OF GEAR ASSEMBLIES

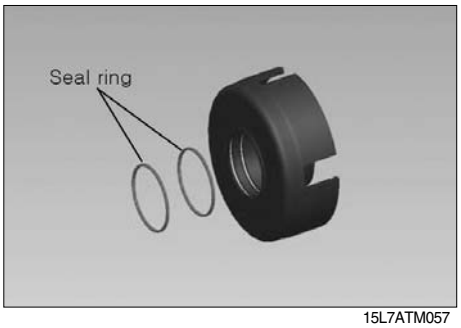
※ Assemble the part with reverse the aforementioned disassemble procedure.

· **Assembling of clutch gear assembly.**

(1) Forward clutch drum sub assembly.

① In drum internal groove tefron seal assembly.

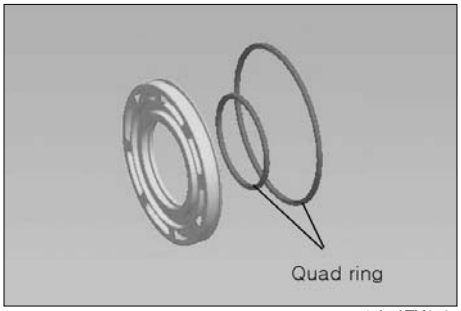
※ Spread grease on seal ring.



15L7ATM057

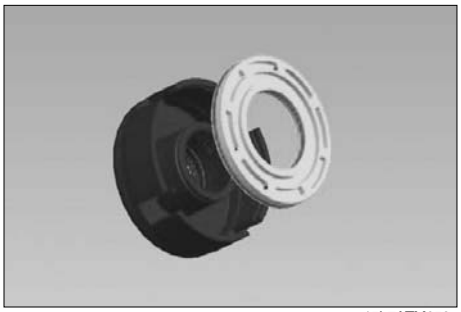
② In piston groove quad ring assembly.

※ Spread grease on seal ring.



15L7ATM058

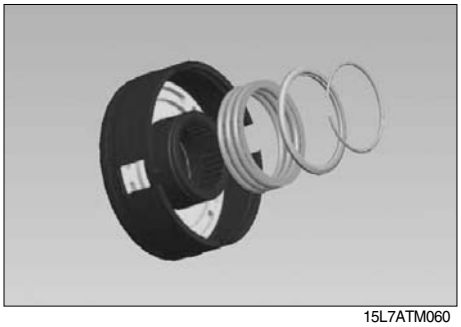
③ Assemble piston at the drum.



15L7ATM059

④ Assemble return spring, plate back and wire ring at the drum sub.

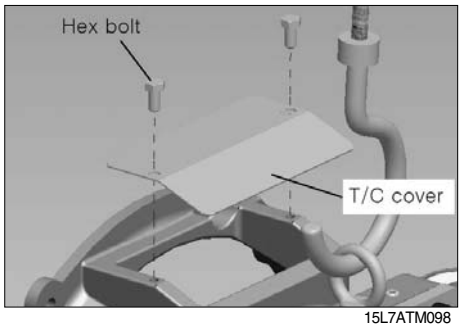
※ When you assemble the wire ring, it might be shot out by impact of spring.
Certainly fixing the spring, will have to assemble.



15L7ATM060

(20) Assemble the T/C cover and hexagon bolts.
- Hexagon bolt (M8 × 1.25p × 16㎜) × 2EA
- Tightening torque : 2.0~3.0 kgf · m(14.5~21.7 lbf · ft)

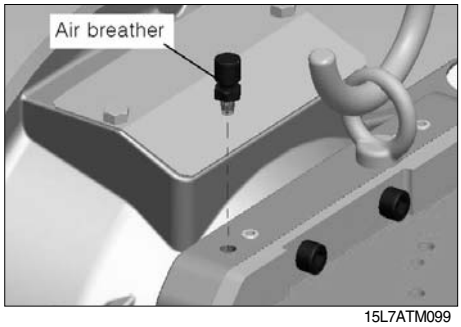
※ Spread loctite #277 on socket bolt.



15L7ATM098

(21) Assemble the air breather.
- Tightening torque : 1.0~1.5 kgf · m(7.0~11 lbf · ft)

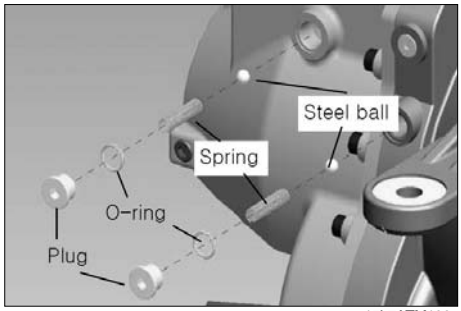
※ Spread loctite #577 on air breather.



15L7ATM099

(22) Assemble the O-ring at the plug, and then insert steel ball, spring.
Next assemble O-ring+plug assy.
- Plug(3/4-16 UNF) × 2EA
  - Tightening torque : 3.5~4.5 kgf · m(25~33 lbf · ft)

※ Spread loctite #577 on plug.
※ Spread grease on O-ring.

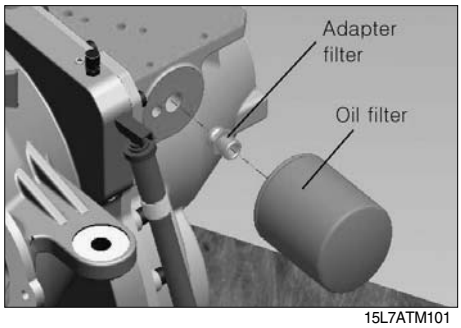


15L7ATM100

(23) Assemble the adapter filter, and then assemble the oil filter.
- Adapter filter
  - Tightening torque : 3.5~4.5 kgf · m(25~32 lbf · ft)

※ Spread loctite #277 on adapter filter.

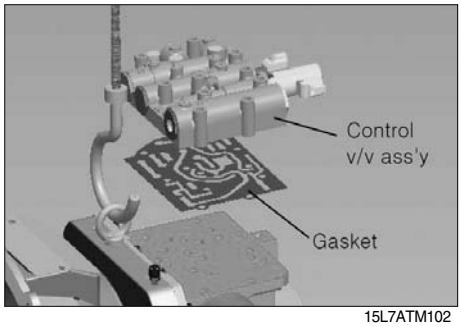
- Oil filter
  - Tightening torque : 0.8~1.2 kgf · m(5.8~8.7 lbf · ft)



15L7ATM101

(24) Install the gasket, and then install the control valve assy.

※ Spread grease on gasket.



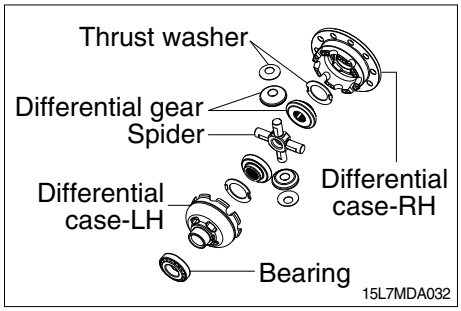
15L7ATM102

2) ASSEMBLY

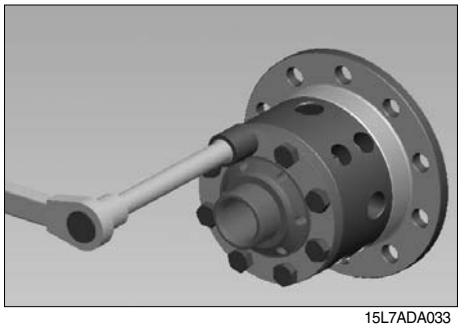
(1) Carrier sub assembly

Differential device assembly

① Prepare parts for assembly of differential.

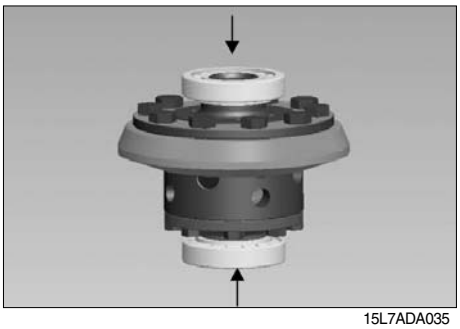


② Fix differential case RH and LH with bolt.
After paste loctite #277 on spiral of bolt.
Confirm torque : 350~380 kgf · cm



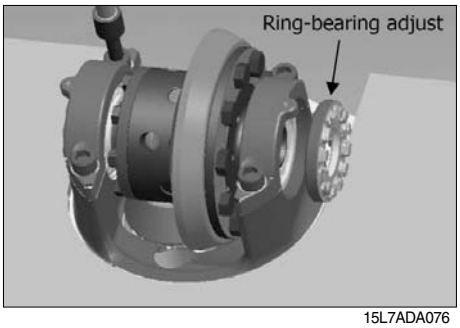
③ Assemble ring gear.
After paste loctite #277 on spiral of bolt.
Confirm torque : 710~760 kgf · cm

④ Assemble bearing.
Heating pressurize bearing cone.



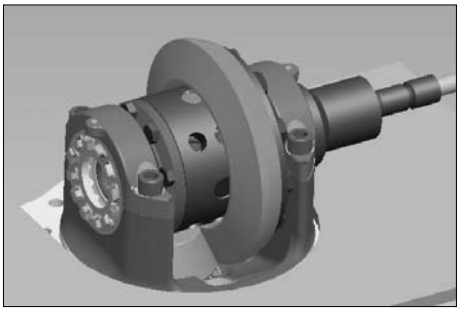
Adjusting the gearset backlash

① Assemble bearing adjust ring.

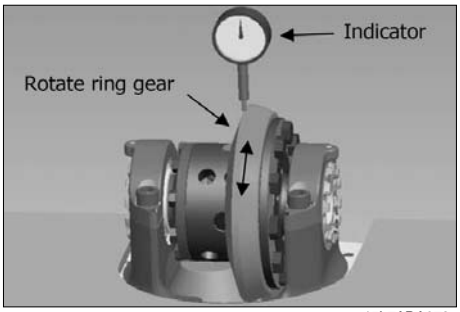


15L7ADA076

② Adjust bearing adjust ring.

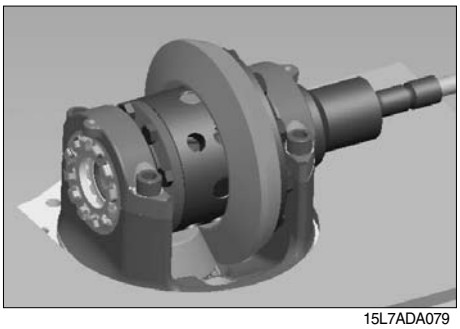

15L7ADA077

③ Measure backlash.



15L7ADA078

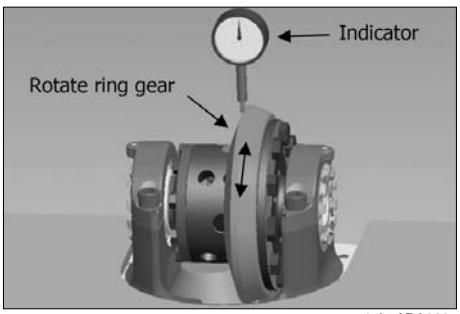
④ Fasten bearing adjust ring.


15L7ADA079

⑤ Measure again backlash.

※ Backlash of pinion and ring gear : 0.15~0.20㎜

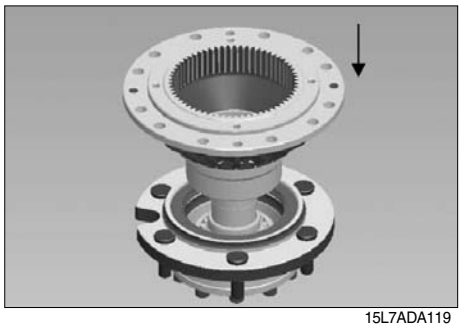
※ If backlash is wrong, carry out adjusting work. Adjust the left/right of ring bearing adjust by one and one clip.



15L7ADA080

⑩ Put carrier housing on assembled flange hub and wheel shaft. Before assembling, spread grease inside of flange hub.

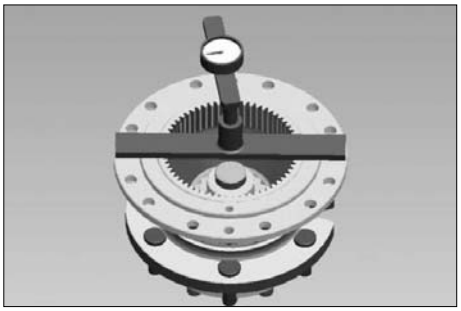
・Grease : Shell retinax 0434 - 60~80% spread



15L7ADA119

⑪ Adjust preload for fix shim.

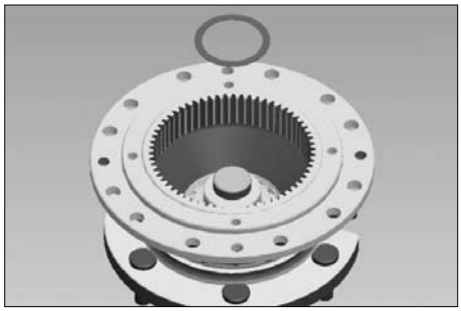
・Preload : 40~50kgf・cm



15L7ADA120

⑫ Put into shim.

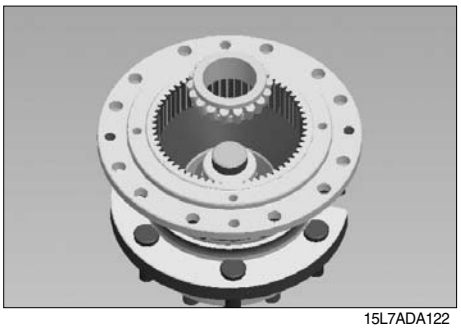
※ Sort of shim : 0.1 , 0.15 , 0.25 , 0.5 (mm)



15L7ADA121

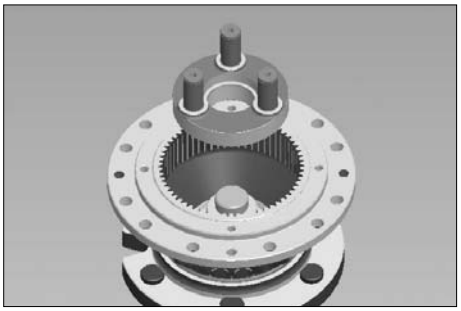
⑬ Pressurize bearing cone.

Before assembling, paste axle oil on roller of bearing cone.



15L7ADA122

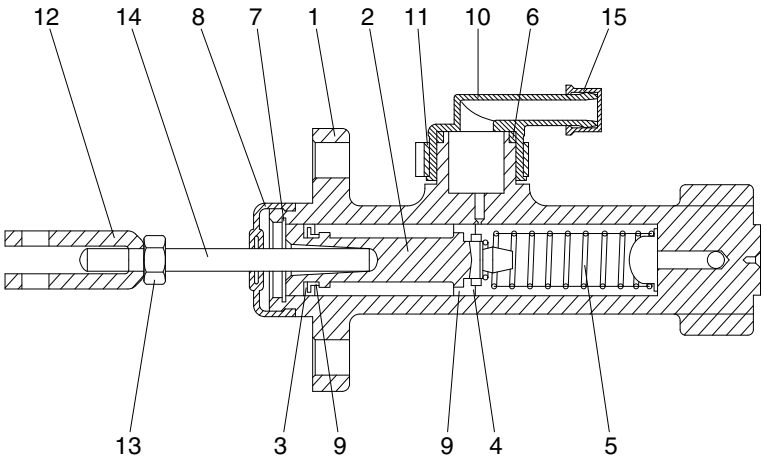
⑭ Assemble planet carrier.



15L7ADA123

6. BRAKE VALVE CYLINDER

1) STRUCTURE



25L7MBS04

1	Body	6	O-ring	11	Union
2	Piston	7	Snap ring	12	Head
3	Secondary cup	8	Boot	13	Nut
4	Primary cup	9	Spacer	14	Rod
5	Piston	10	Elbow	15	Cap

2) DISASSEMBLY

(1) Remove the master cylinder boot(8) and remove the rod(14).

(2) Remove the snap ring(7) and take out the spacer(9), the piston(2), the piston primary cup(4), and piston spring(5).

(3) Specification of master cylinder.

· Cylinder bore diameter : 22.23㎜

· Piston stroke : 34±1㎜

3) INSPECTION

(1) Clean and check these components.

※ Use Isopropyl alcohol or brake fluid for washing the components. Do not use gasoline, kerosene or any other mineral oils. When using alcohol, do not leave urbber parts in the liquid for more than 30 seconds.

(2) Inspect the inside wall of the master cylinder, and if any faults are found, replace the cylinder assembly.

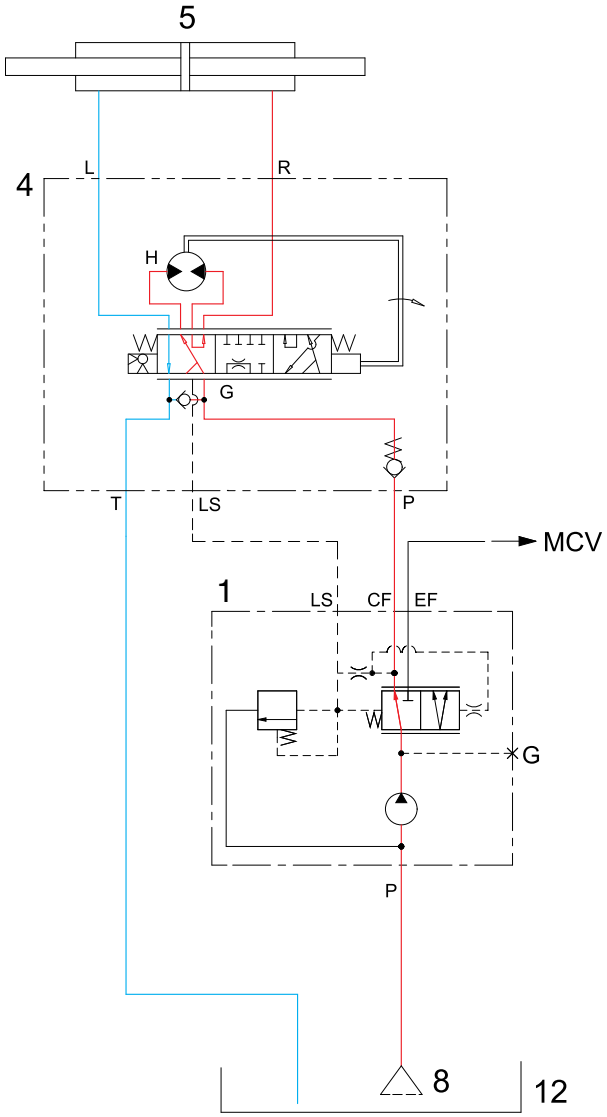
(3) Replace the boot(8), the primary cup(4), piston(2), if deformation or any other defect is found.

4) ASSEMBLY

※ Prior to assembly make sure again of no contaminant of the components. Apply a thin coat of brake oil to the components.

· Assembly is in opposite order to disassembly.

3) RIGHT TURN

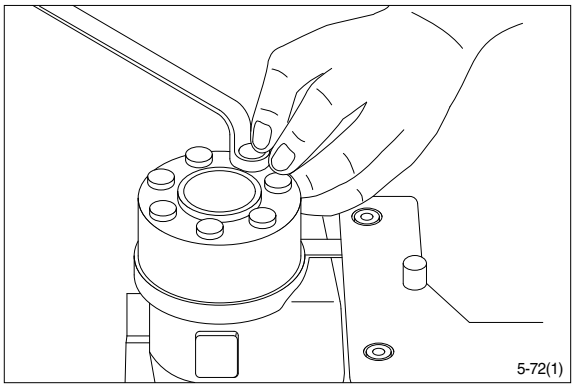


15L7MSS05

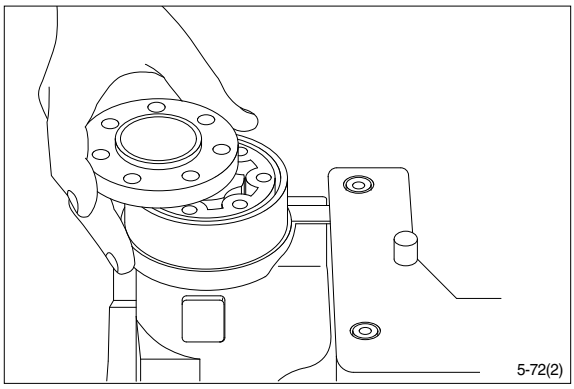
When the steering wheel is turned to the right, the spool(G) within the steering unit(4) connected with steering column turns in right hand direction.
At this time, the oil discharged from the pump flows into the spool(G) within the steering unit(4) through the spool(D) of priority valve in the pump and flows to the gerotor(H).
Oil flow from the gerotor(H) flows back into the spool(G) where it is directed out of the right work port(R).
Oil returned from cylinder returns to hydraulic tank(12).
When the above operation is completed, the machine turns to the right.

4) DISASSEMBLY

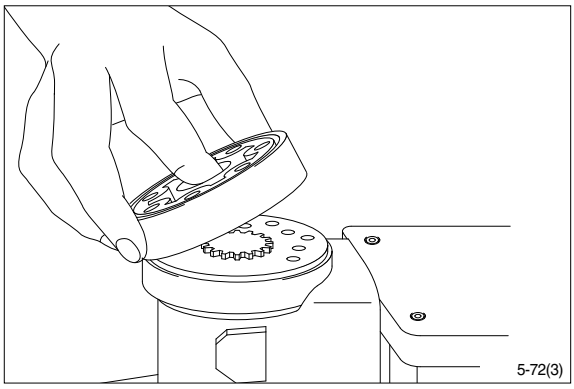
(1) Disassemble steering column from steering unit and place the steering unit in the holding tool.
Screw out the screws in the end cover(6-off plus one special screw).


5-72(1)

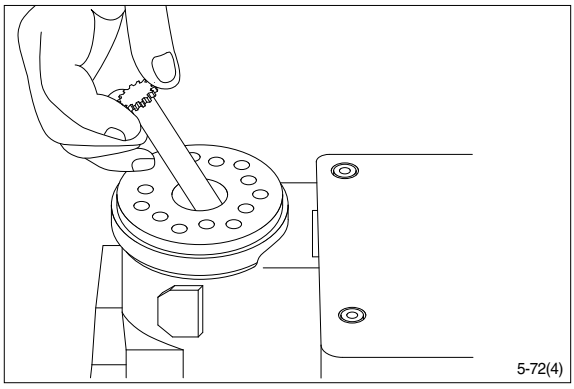
(2) Remove the end cover, sideways.


5-72(2)

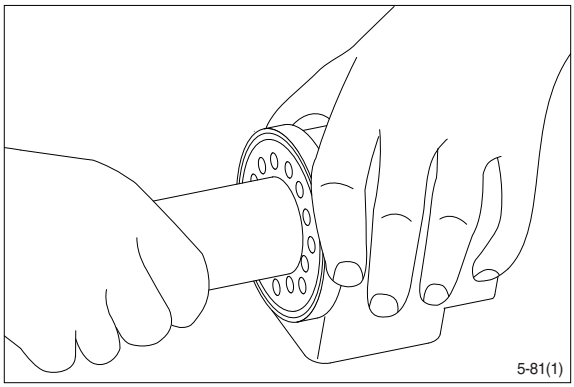
(3) Lift the gearwheel set(With spacer if fitted) off the unit.
Take out the two O-rings.


5-72(3)

(4) Remove cardan shaft.

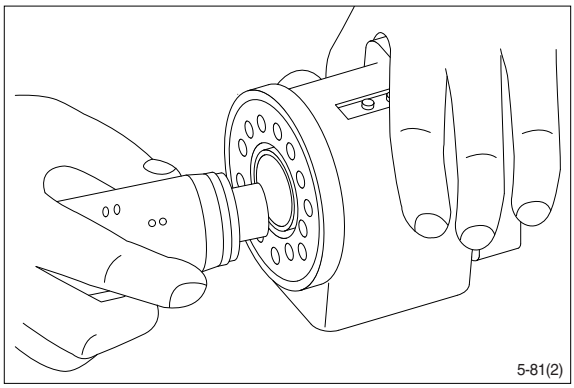

5-72(4)

(17) Press and turn the lip seal into place in the housing.

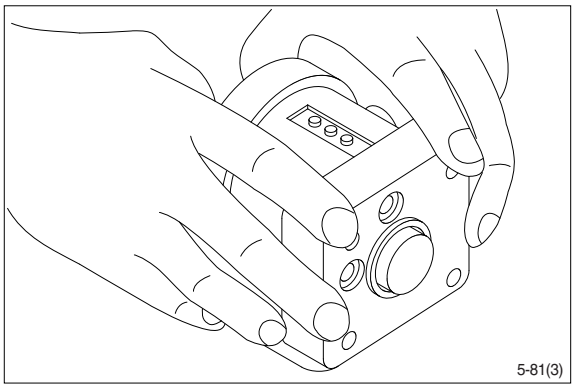


(18) With a light turning movement, guide the spool and sleeve into the bore.

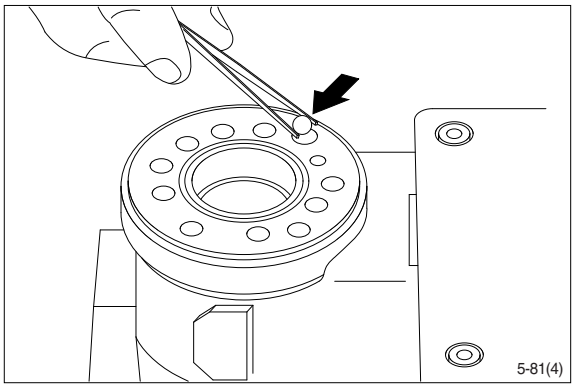
※ **Fit the spool set holding the cross pin horizontal.**



(19) The spool set will push out the assembly tool guide. The O-ring are now in position.



(20) Turn the steering unit until the bore is vertical again. Put the check valve ball into the hole indicated by the arrow.



3) DISASSEMBLY

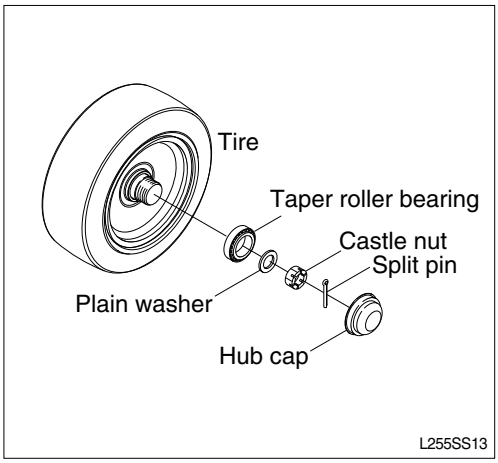
※ Servicing work on the knuckle part can be carried out without removing the axle assy from chassis. The work can be done by jacking up the counter weight part of the truck.

(1) Remove Hub cap.

(2) Pull out split pin and remove slotted nut.

(3) Using the puller, take off the wheel hub together with the roller bearing.

※ Be very careful because just before the hub comes off, tapered roller bearing will fall out.

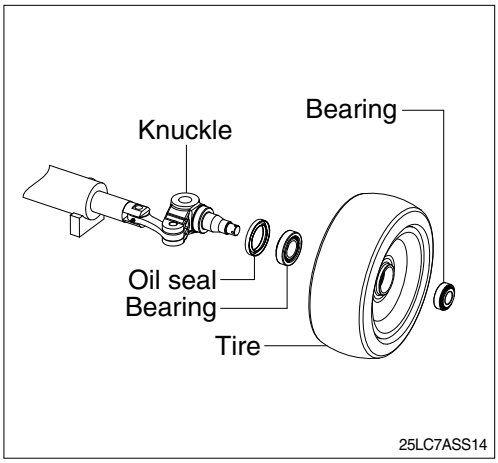


(4) After hub is removed take off the inner race of roller bearing.

(5) Pull out oil seal.

※ Don't use same oil seal twice.

(6) Repeat the same procedure for the other side. Moreover, when disassembling is completed, part the slotted nut in the knuckle to protect the threaded portion.

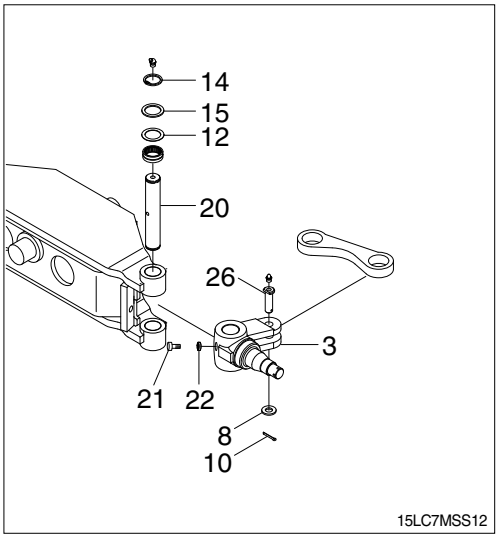


(7) Loosen special bolt (21) and spring washer (22).

(8) Pry out the retaining ring (14) and remove oil seal (12).

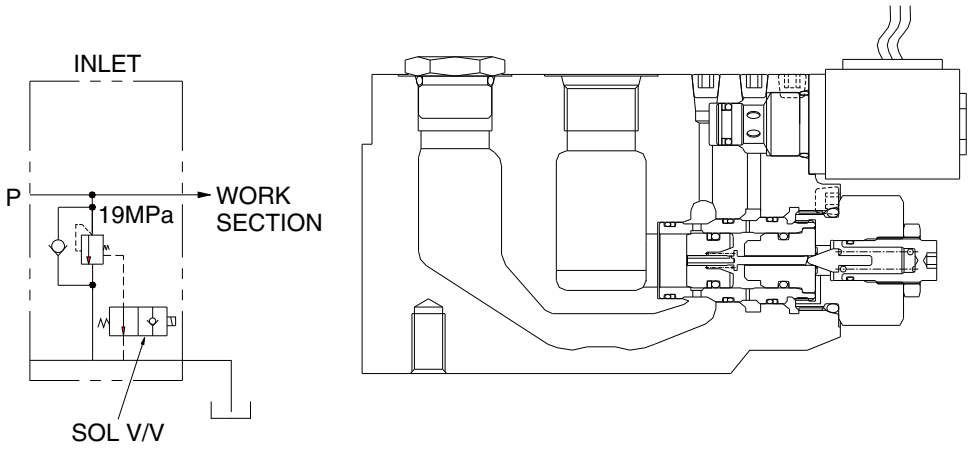
(9) Push out the king pin (20) without damaging the knuckle (3).

(10) Remove spilt pin (10), plain washer (8) and link pin.



2) INLET SECTION OPERATION (TRAVEL WITH MAST OPSS)

(1) Operation



15L7HS58

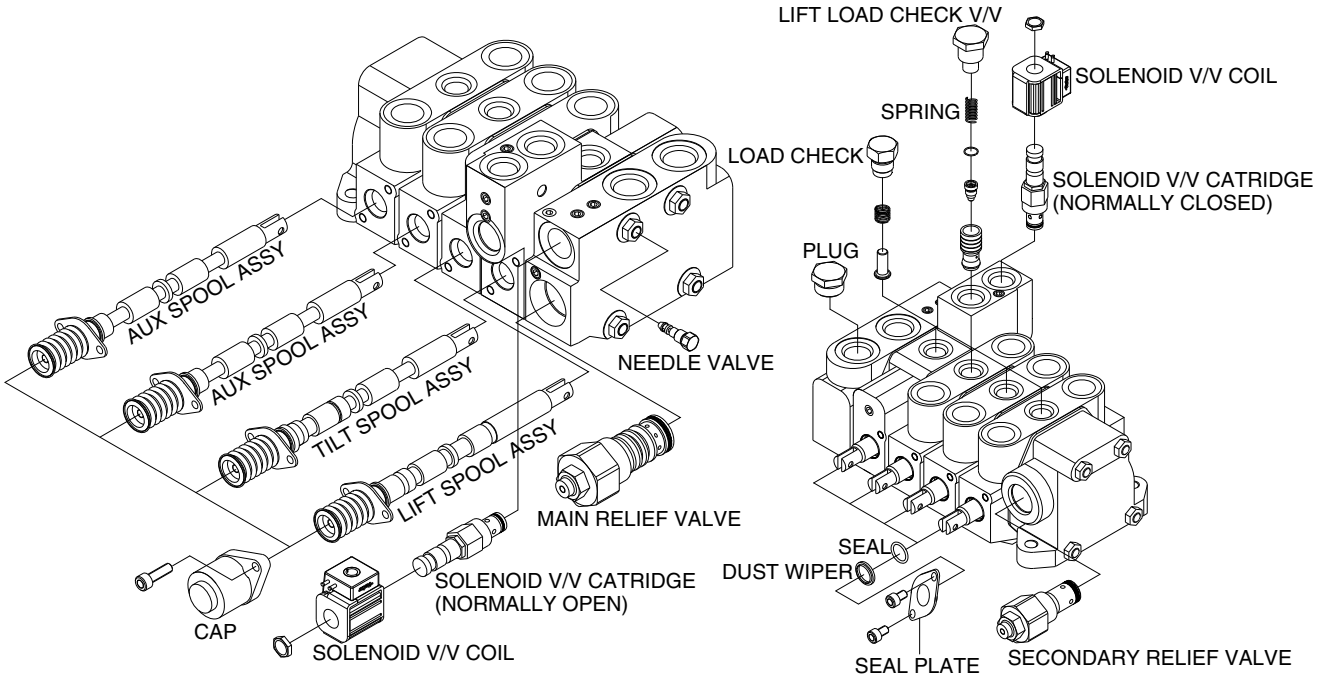
When the operator is not seated, the solenoid valve is in the normally open position, which helps divert flow from the pump directly to the outlet to tank. In this manner, oil pressure and flow are not able to reach the portions of the valve which control the vehicle functions, so their operation is prevented.

Pressure is limited by the main relief valve.

4) LIFT CYLINDER

Problem	Cause	Remedy
Oil leaks out from gland through rod.	· Foreign matters on packing. · Unallowable score on rod. · Unusual distortion of dust seal. · Chrome plating is striped.	· Replace packing. · Smooth rod surface with an oil stone. · Replace dust seal. · Replace rod.
Oil leaks out from cylinder gland thread.	· O-ring damaged.	· Replace O-ring.
Rod spontaneously retract.	· Scores on inner surface of tube. · Unallowable score on the inner surface of tube. · Foreign matters in piston seal.	· Smooth rod surface with an oil stone. · Replace cylinder tube. · Replace piston seal.
Wear(clearance between cylinder tube and wear ring)	· Excessive clearance between cylinder tube and wear ring.	· Replace wear ring.
Abnormal noise is produced during tilting operation.	· Insufficient lubrication of anchor pin or worn bushing and pin. · Bent tilt cylinder rod.	· Lubricate or replace. · Replace.

(6) Auxiliary sections



15L7HS34

(Same procedure for all aux sections, but spool assembly components may vary)

① The spool assembly should already consist of the proper aux spool, the return spring, one spring seat on either end of the spring, the seal plate, a spool seal, and a dust wiper. All of these are assembled on the end of the spool opposite the clevis.

② Insert the clevis end of the spool into the right-hand side of the spool bore (the tallest end of the housing). Place the spool cap over the spool and spring assembly and connect the cap to the housing using two bolts. Torque both bolts alternatively until a torque of 1.0-1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

③ Install the second spool seal and dust wiper over the clevis end of the spool and retain with a seal plate and two bolts. Torque both bolts alternatively until a torque of 1.0-1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

④ The load check assembly is inserted into the top center cavity.
Torque to 3.5-4.0kgf · m (25.2~28.8 lbf · ft) .

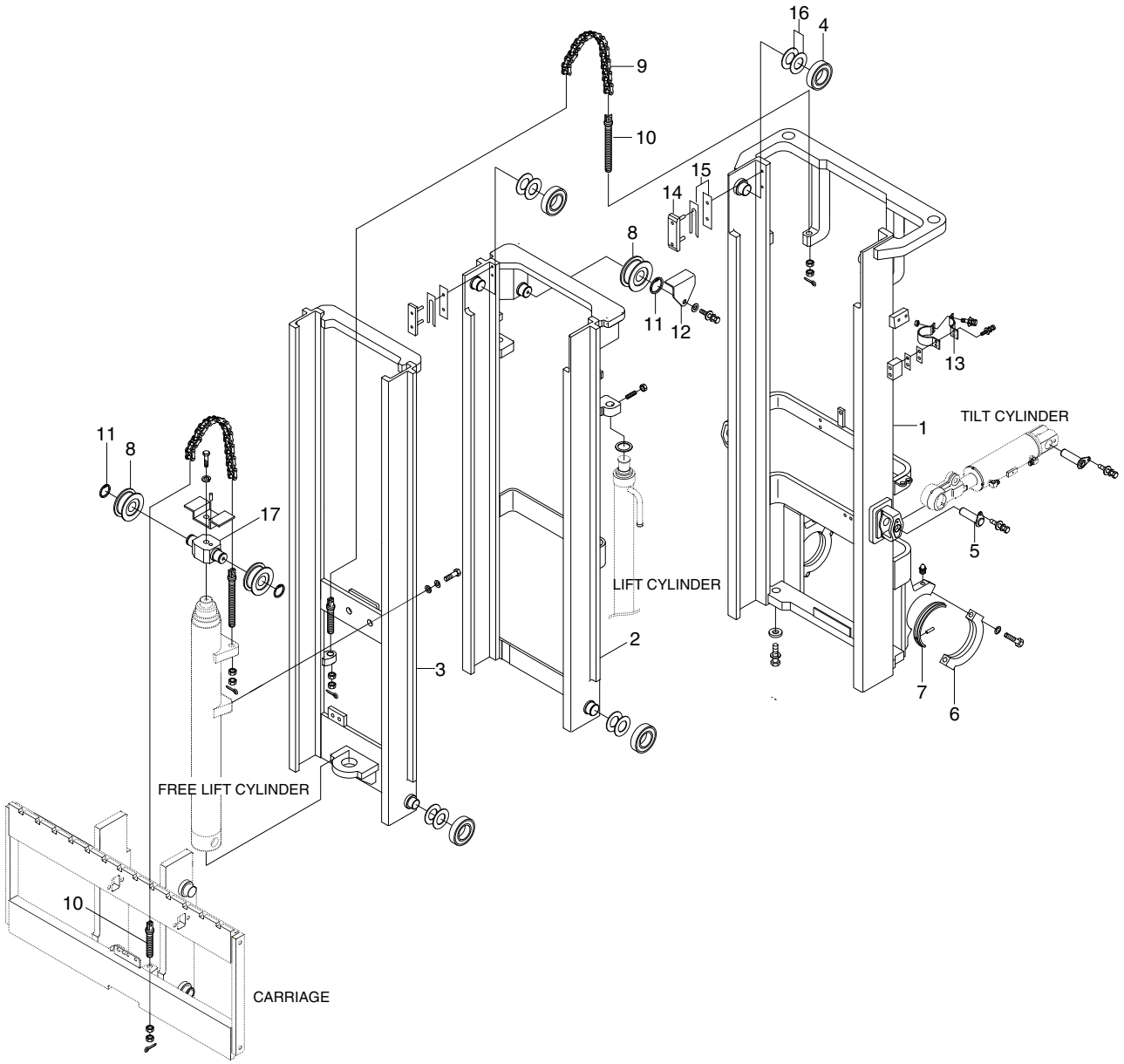
(7) Outlet section

① Install the secondary relief valve into the cavity on the clevis end of the housing.
Torque to 4.5-5.0 kgf · m (32.5~36.2 lbf · ft).

GROUP 4 CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	AMP	36	I/conn(Dashboard harness-frame harness)	1743059-2	1743062-2
CN-4	KET	12	I/conn (Dashboard harness-head guard harness)	MG610346	MG640348
CN-5	KET	4	Support harness-RH	S810-004201	-
CN-6	PACKARD	16	Fuel system interface connection-1	-	15326863
CN-8	PACKARD	1	Engine fuel system interface connection-2	-	15326863
CN-15	DEUTSCH	3	Speed sensor	DT06-3S	DT04-3P
CN-17	KET	4	Power output for cabin	S810-004201	-
CN-25	AMP	1	Horn	17809-2	-
CN-36	-	-	Fuse box	21HF-10500	-
CN-45	RING TERM	2	Start motor	-	-
CN-55	KET	14	OPSS unit	S814-014100	MG640352
CN-56	AMP	20	Cluster	368511-2	-
CN-57	AMP	2	Cluster	368540-2	-
CN-58	AMP	2	Cluster	368511-2	-
CN-65	KET	2	Back buzzer	-	MG640322
CN-76	DEUTSCH	2	Mast pressure switch	-	DT04-2P
CN-113	KET	2	OPSS buzzer	S814-002100	-
CN-122	DEUTSCH	2	Forward solenoid	DT06-2S	-
CN-123	DEUTSCH	2	Reverse solenoid	DT06-2S	-
CN-124	AMP	6	Accel pedal	174262-2	-
CN-131	PACKARD	2	Cut off solenoid 1(Tilt/lift)	12015792	12047670
CN-132	PACKARD	2	Cut off solenoid 2(Lift/down)	12015792	12047670
Switch					-
CS-2	KET	4	Start switch	S810-004201	-
CS-5	RING TERM	-	Horn switch	S820-105000	-
CS-11	AMP	5	Gear selector switch	S811-005002	-
CS-12	AMP	9	Combination switch	S811-009002	-
CS-17	KET	3	Parking switch	S810-003201	-
CS-21	SWF	10	Rear work switch	593357	-
CS-41	SWF	10	Hazard switch	593357	-
CS-42	SWF	10	Speed control switch	593357	
CS-68	SWF	10	Cut off switch	593357	-
CS-73	KET	2	Seat switch	MG610043	MG620042
CS-76	DEUTSCH	2	Mast P/S switch	-	DT04-2P

2. 3 STAGE MAST(TF MAST)



15L7MS02

1	Outer mast	7	Bushing	13	Clamp
2	Middle mast	8	Chain sheave	14	Back up liner
3	Inner mast	9	Chain	15	Shim(0.5, 0.1Ton)
4	Roller	10	Anchor bolt	16	Shim(0.5, 0.1Ton)
5	Tilt cylinder pin	11	Retaining ring	17	Sheave bracket
6	Mast support cap	12	Chain guard		