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) 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.

· Tightening torque :

(2) TILT CYLINDER PIN

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

(3) LIFT CYLINDER INSTALLATION AND ADJUSTMENT

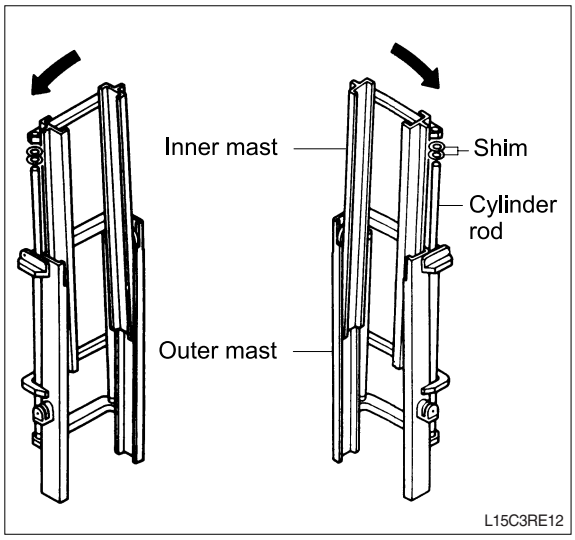
① Assemble the lift cylinder inside the outer mast, then tighten the stopper bolt. If the cylinder assembly has been replaced, adjust as follows so that the left and right cylinders are synchronized at the maximum lifting height.

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.**

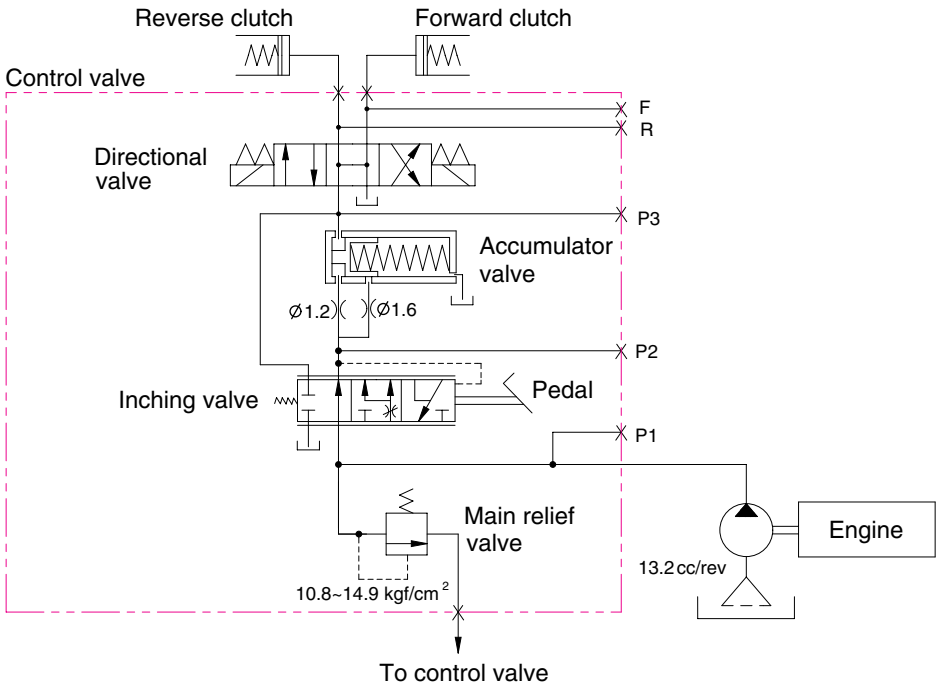
※ **If play is to RIGHT, install adjustment shim to RIGHT cylinder.**

· Shim thickness : 1.0mm(0.04in)



SECTION 3 POWER TRAIN SYSTEM

2) HYDRAULIC CIRCUIT



D153PT11

3) OPERATION

The control valve mainly consists of the main relief valve, inching valve, accumulator valve and directional valve.

The discharged oil from the gear pump enters main relief valve of the control valve and its pressure is adjusted 10.8~14.9kgf/cm^2 (153.6~211.9psi).

The oil sent from the main relief valve flows into the torque converter. The main relief valve is built into the torque converter to prevent excessively raising the oil pressure in the converter due to oil viscosity rising when cold.

Pressure adjusted oil passes through pressure detecting valve, inching valve and directional valve, and operates the forward or reverse hydraulic clutch.

The pressure detecting valve and built in accumulator provide a soft plugging when changing gears. The pressure detecting valve allows the accumulator to absorb the small shocks of rapid pressure build-up and quick release during gear changes. When full pressure builds up, the pressure detecting valve shuts the accumulator off and allows it to empty so it is ready to function again during gear change.

The inching control is actuated through the inching pedal. This permits the clutch to partially disengage, so that engine rpm can be increased for lifting while travel speed remains low.

2. HYDRAULIC PRESSURE

1) Block wheels of truck, and pull parking lever. Install oil pressure gauge at inlet of control valve.
2) Move direction control lever to FORWARD or REVERSE, depress accelerator pedal and run engine at 1500rpm. Measure clutch pressure and torque converter pressure and check that they are within specified range.

3. ENGINE STALL SPEED

Move direction control lever to FORWARD or REVERSES, and run engine at maximum speed. Check that maximum engine speed is within specified range.

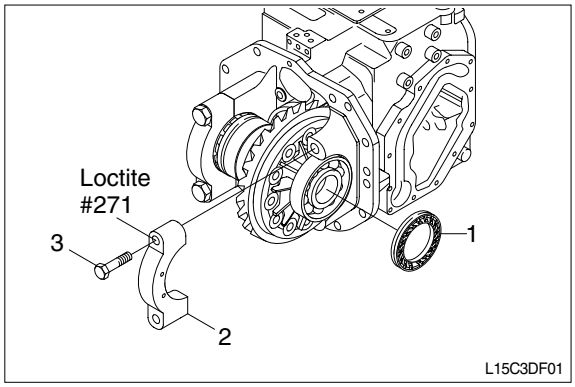
※ **This check raises the temperature of the oil in the torque converter, so do not run this test for a long period.**

Model	Stall speed
YANMAR 4TNE98-HYF(IDI)	1700rpm

4. DIFFERENTIAL

1) FITTING DIFFERENTIAL ASSEMBLY

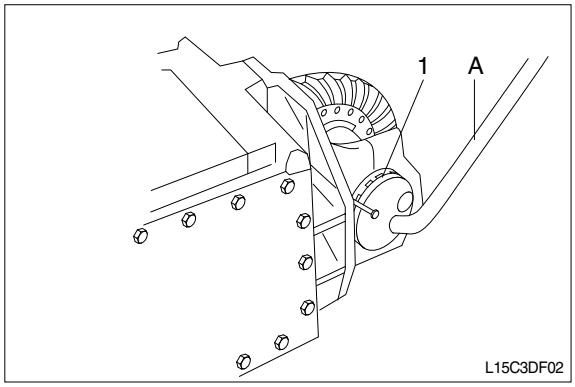
(1) Install the differential assembly and fit adjust screw gear(1).
(2) Apply loctite in the hole of cap(2), and temporarily tighten with bolt(3).



2) ADJUSTMENT OF BACKLASH

※ **Tighten the adjust screw gear(1).**

(1) To adjust the backlash, loosen one adjustment screw gear 1 notch and tighten the other screw gear 1 notch.
Gradually move the differential case in this way, and watch the indicator of the dial gauge to adjust to the correct value.
· Backlash between ring gear and pinion gear : 0.15~0.23㎜(0.006~0.009in).
(2) Turn the bevel gear to adjust screw gear(1) at 4 places.



5) MAINTENANCE STANDARDS

(1) Hydraulic pressure

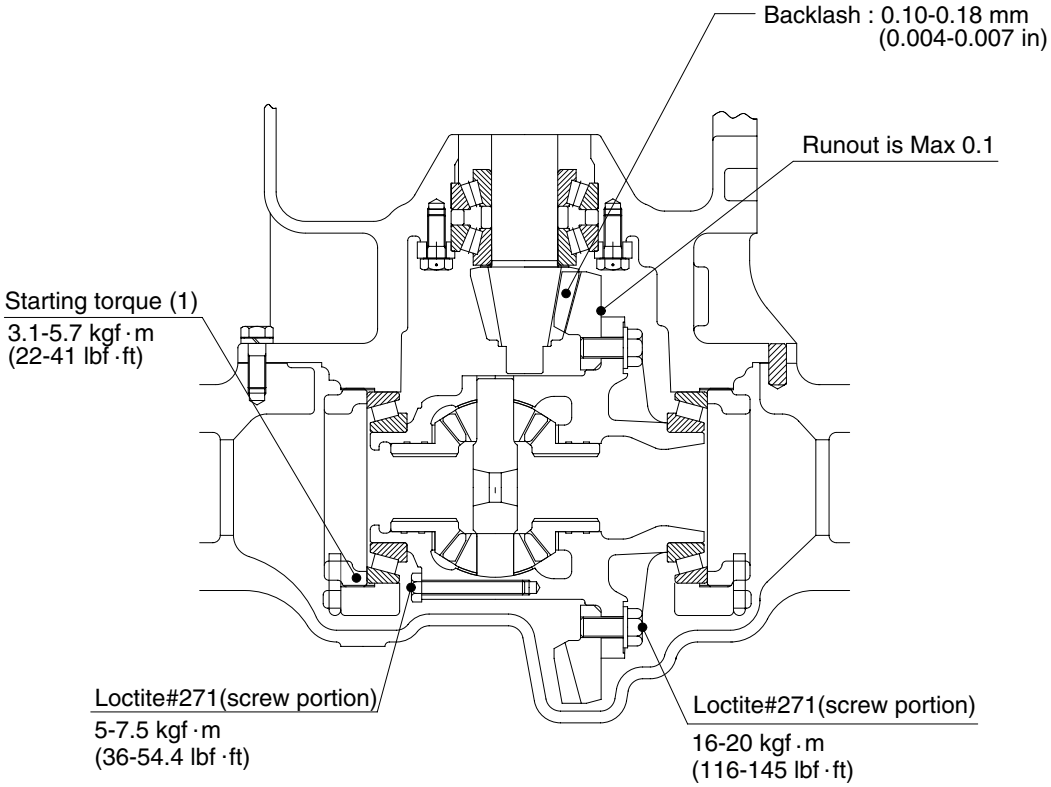
No	Location	Pressure (kgf/cm²)	Cracking pressure (kgf/cm²)
1	Torque converter input	5 ~ 7	5
2	Torque converter output	2.2 ~ 4	2.2

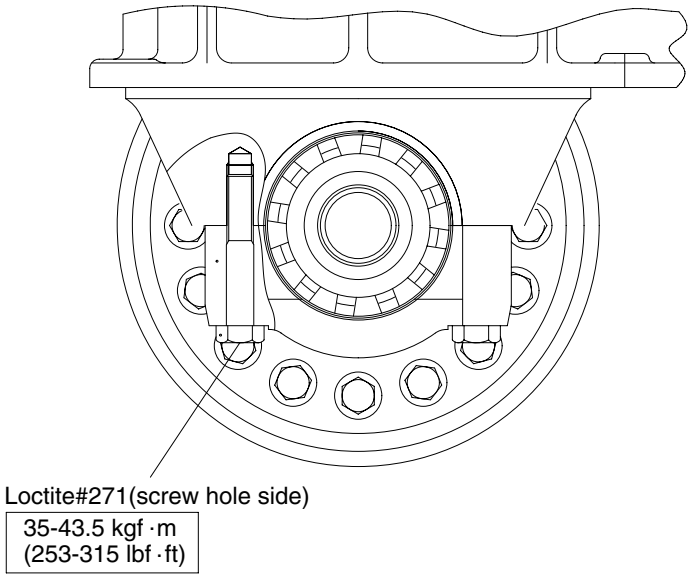
※ Cracking pressure means the pressure at which the valve begins to open.

(2) Tightening torques

No	Location	Thread specifications		Tightening torque in kgf · m(lbf · ft)	
				Target	Maximum
1	Input plate	Small hex bolt	M8×1.25×20	2.1(15.2)	2.7(19.5)
2	Pump	Small hex bolt	M8×1.25×40	2.1(15.2)	2.7(19.5)
3	Valves	Plug	M16×1.5 ×10	5.0(36)	6.5(47)
4	Cover	Small hex bolt	M8×1.25×12	0.98(7)	1.3(9)
5	Torque converter fluid outlets	Hex plug with hole	PT 1/4	3.5(25.3)	4.4(31.8)
6	Pump assembly	Small flathead screw	M5×0.8×16	0.1(0.72)	0.3(2.2)
7	Blind plug	Hex plug with hole	PT3/4	5.8(42)	7.2(52.1)

2) DIFFERENTIAL ASSEMBLY DRAWING

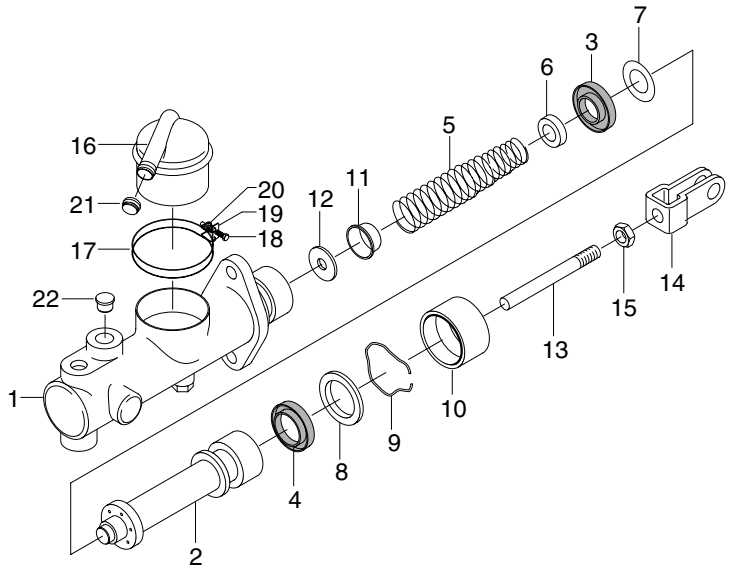




D255DF05

6. BRAKE MASTER CYLINDER(DRY TYPE)

1) STRUCTURE



D255BS04

1	Body	7	Spacer	13	Rod	18	Band bolt
2	Piston	8	Plate	14	Yoke	19	Band plate
3	Primary cup	9	Key wire	15	Nut	20	Band washer
4	Secondary cup	10	Boot	16	Nipple	21	Cap
5	Spring	11	Check valve	17	Band	22	Cap
6	Spring seat	12	Valve seat				

2) DISASSEMBLY

(1) Remove the master cylinder boot(10) and remove the rod(13).

(2) Remove the key wire(9) and take out the plate(8), the piston(2), the piston primary cup(3), and piston spring(5).

(3) Specification of master cylinder.

- Cylinder bore diameter : 19.05㎜
- Piston stroke : 23.0㎜

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 rubber 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.

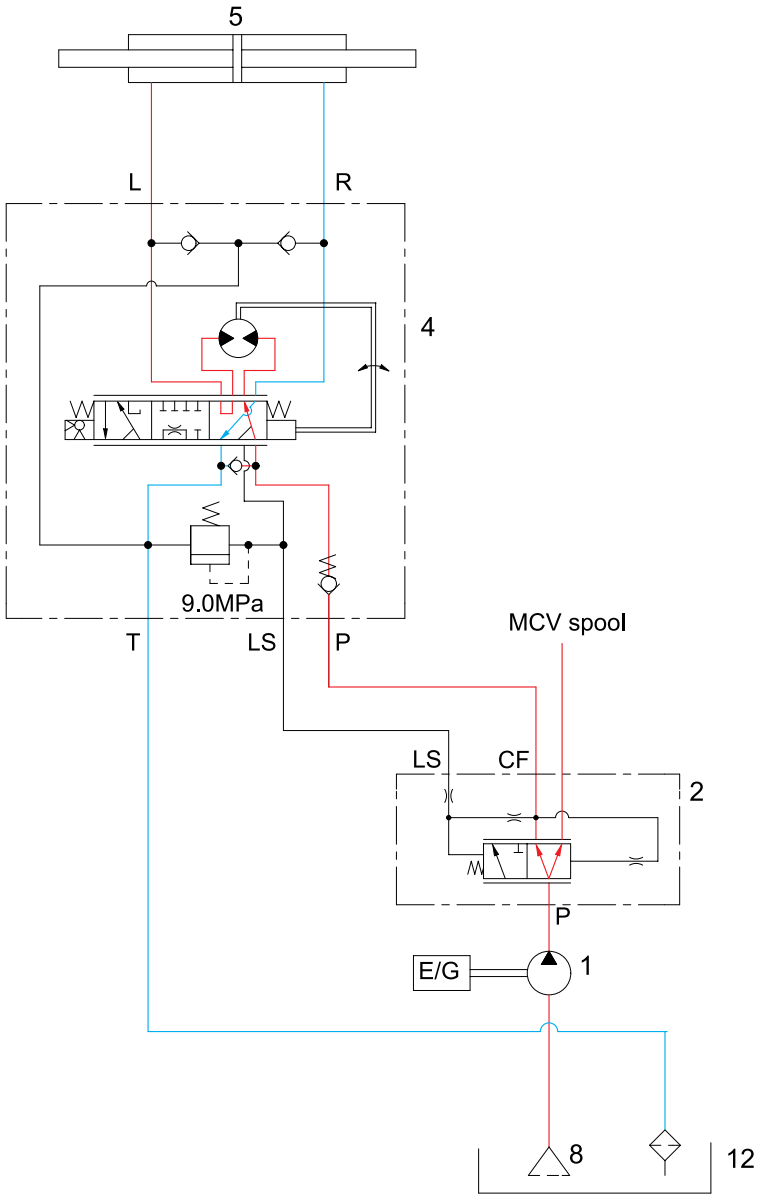
(3) Replace the boot(10), the primary cup(3), piston(2), if deformation or any other defect is found.

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.

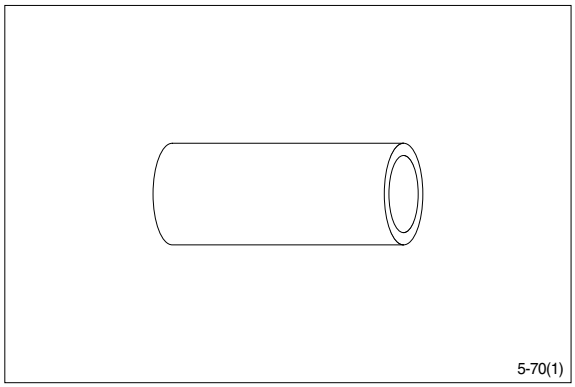
2) LEFT TURN



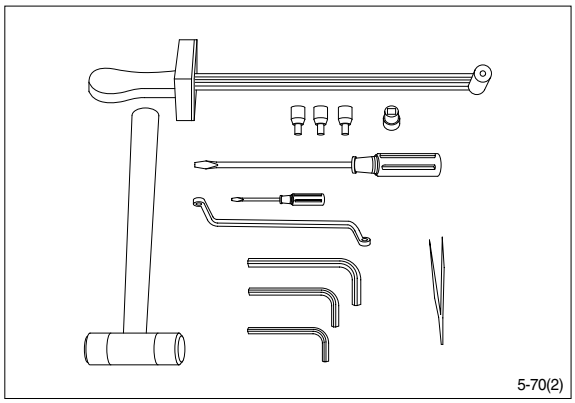
D255SS04

When the steering wheel is turned to the left, the spool(G) within the steering unit(4) connected with steering column turns in left 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(2) 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 left work port(L).
Oil returned from cylinder returns to hydraulic tank(12).
When the above operation is completed, the machine turns to the left.

(5) Assembly tool for dust seal.

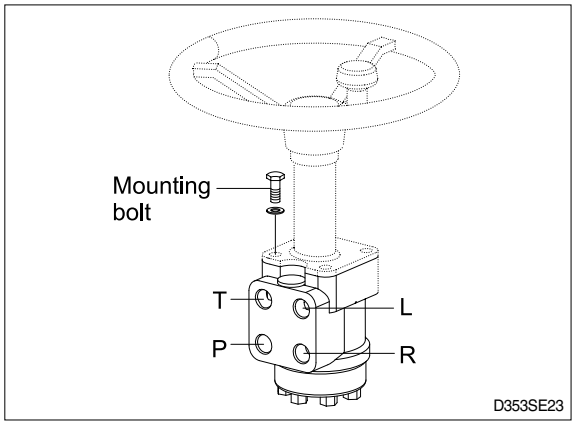


(6) Torque wrench 0~7.1kgf · m
(0~54.4lbf · ft)
13mm socket spanner
6, 8mm and 12mm hexagon sockets
12mm screwdriver
2mm screwdriver
13mm ring spanner
6, 8 and 12mm hexagon socket spanners
Plastic hammer
Tweezers



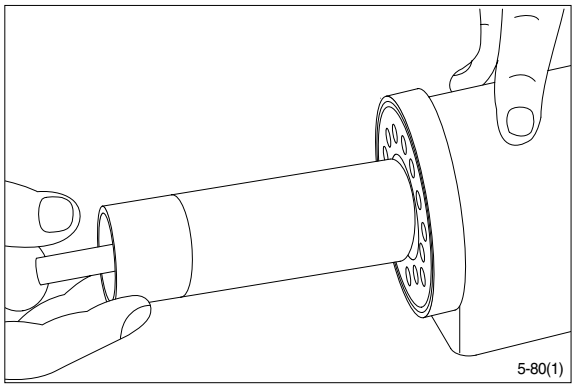
3) TIGHTENING TORQUE

L : Left port
R : Right port
T : Tank
P : Pump



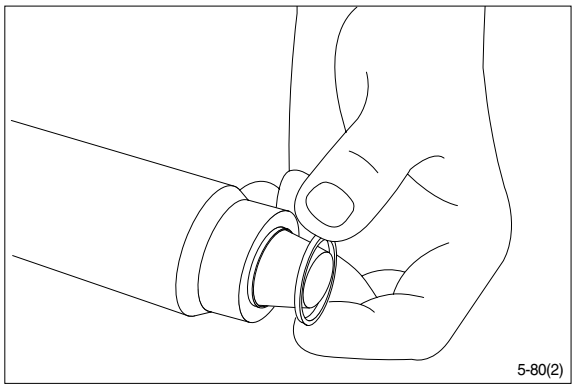
Port	Size	Torque [kgf · m(lbf · ft)]
L	3/4 UNF - 16	13 (94)
R	3/4 UNF - 16	13 (94)
T	3/4 UNF - 16	13 (94)
P	3/4 UNF - 16	13 (94)
Mounting bolt	M10×1.5	5.0 ±1.0 (36±7.2)

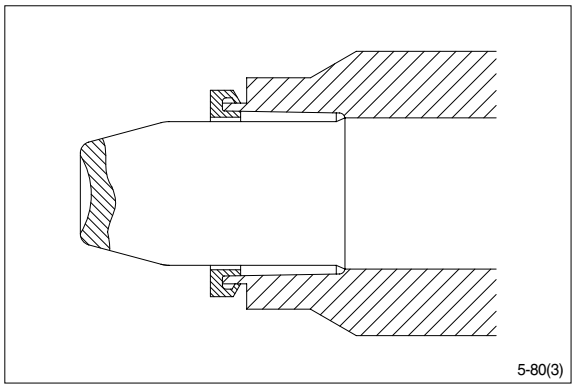
(14) Draw the inner and outer parts of the assembly tool out of the steering unit bore, leaving the guide from the inner part in the bore.



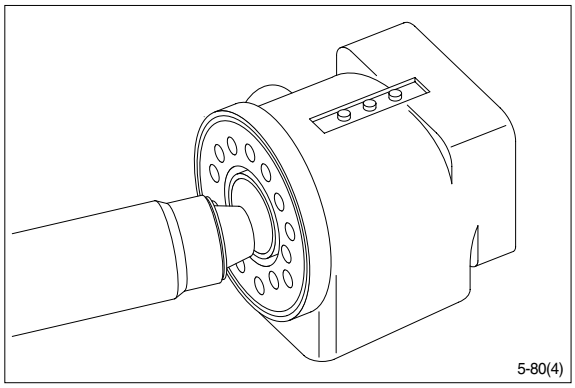
Installation instructions for lip seal

(15) Lubricate the lip seal with hydraulic oil and place it on the assembly tool.

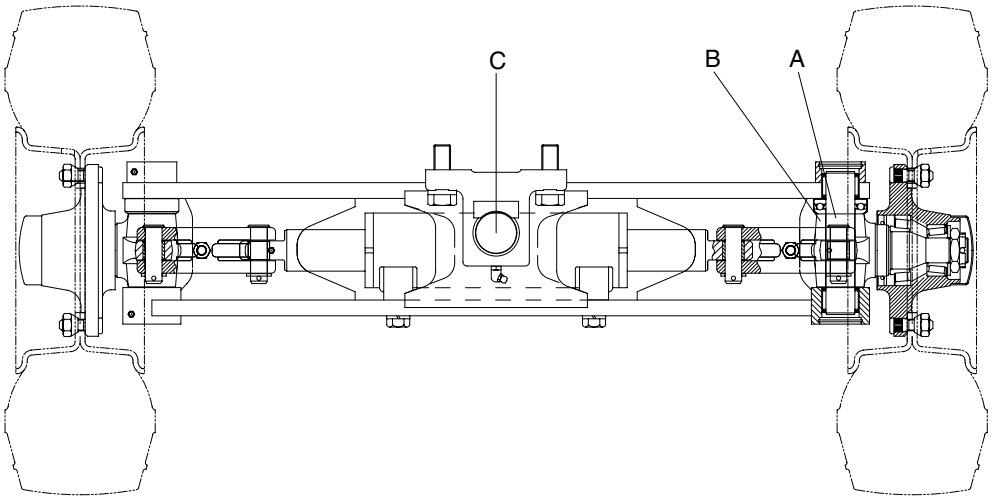




(16) Guide the assembly tool right to the bottom.



2) CHECK AND INSPECTION



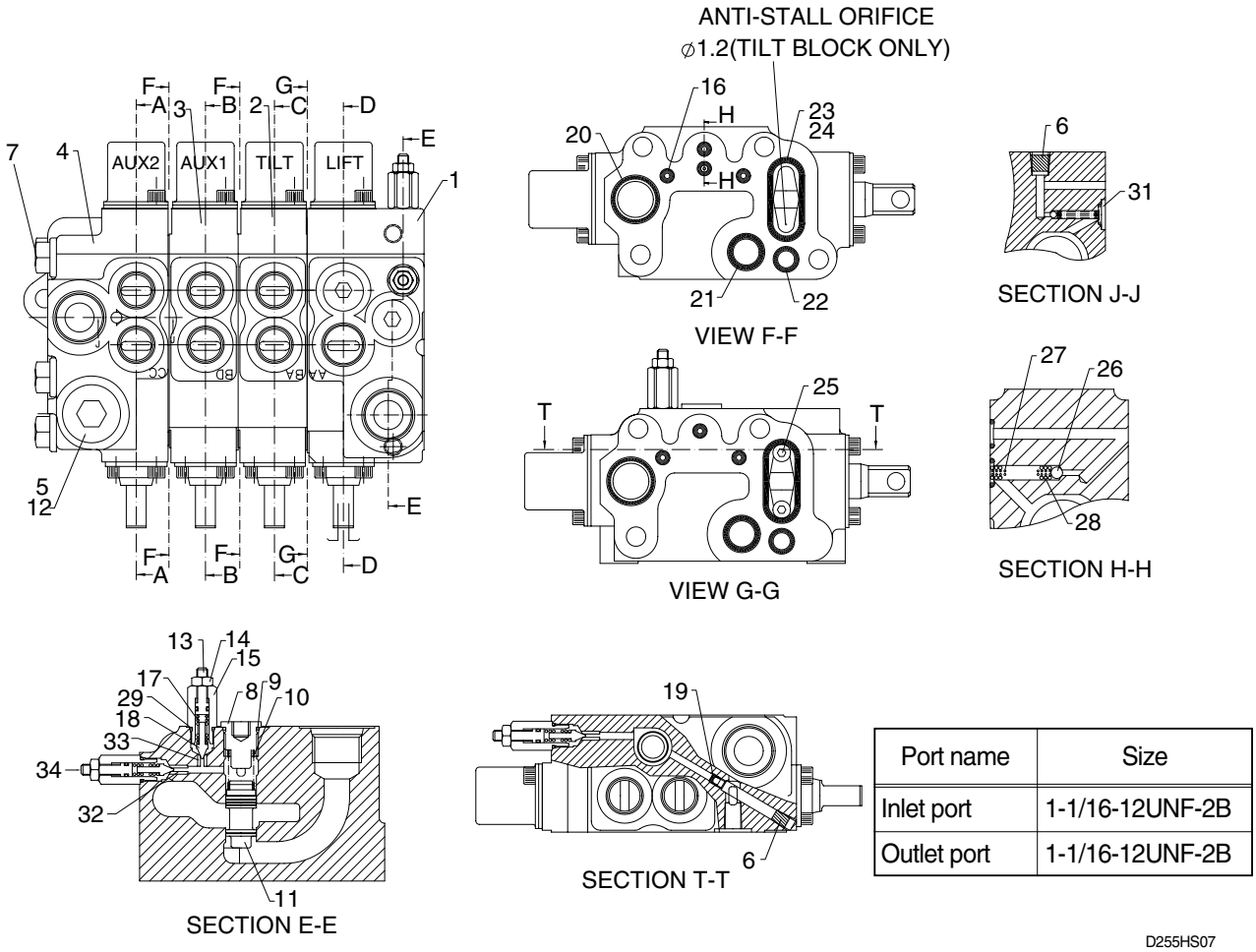
D255SS12

mm(in)

No.	Check item	Criteria		Remedy
		Standard size	Repair limit	
A	Diameter of king pin	45(1.77)	44.8(1.76)	Replace
B	Vertical play of knuckle	-	0.2(0.008)	Adjust with shims
C	Diameter of center pin	50(1.96)	49.5(1.94)	Replace
-	Rear axle, hub, knuckle, bearing	· Damage, wear · Seizure, abnormal noise, defective rotation		Replace

3. MAIN CONTROL VALVE

1) STRUCTURE (4- Spool)



Port name	Size
Inlet port	1-1/16-12UNF-2B
Outlet port	1-1/16-12UNF-2B

D255HS07

1	Lift block assy	13	Relief piston	24	O-ring, retainer
2	Tilt block assy	14	Nut	25	Plug
3	Aux1 block assy	15	Relief plug	26	Steel ball
4	Aux2 block assy	16	O-ring	27	Load sensor spring
5	Plug	17	Relief spring	28	Load sensor spring
6	Plug	18	Pilot poppet	29	O-ring
7	Long bolt	19	Plug	30	O-ring
8	Hydrostat plug	20	O-ring	31	Side plate
9	O-ring	21	O-ring	32	Seat
10	Hydrostat spring	22	O-ring	33	Seat
11	Hydrostat sleeve	23	O-ring	34	Piston
12	O-ring				

1. OPERATIONAL CHECKS

1) CHECK ITEM

(1) Check visually for deformation, cracks or damage of rod.

(2) Load maximum load, set mast vertical and raise 1m from ground. Wait for 2 minutes and measure hydraulic drift(amount forks move down and amount mast tilts forward).

· **Hydraulic drift**

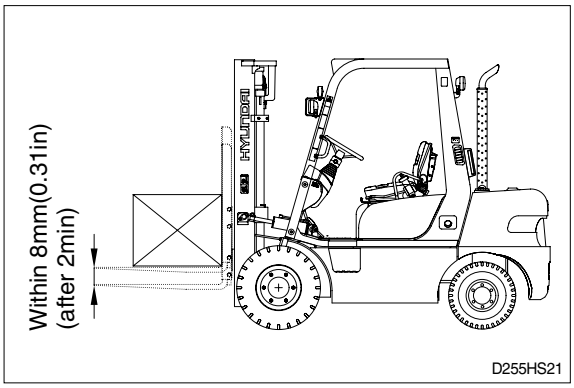
- Down(Downward movement of forks)
  : Within 8mm(0.31in)
- Forward(Extension of tilt cylinder)
  : Within 4mm(0.16in)

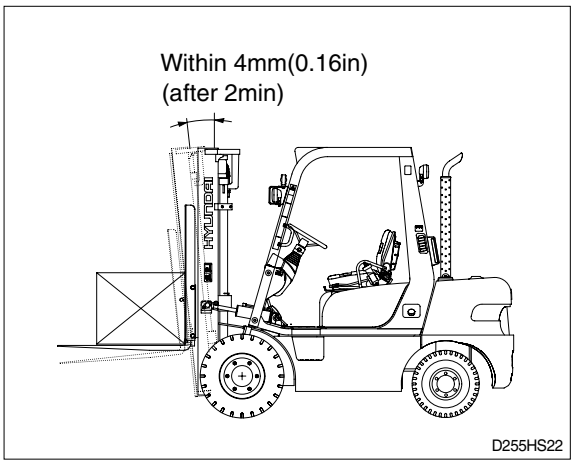
If the hydraulic drift is more than the specified value, replace the control valve or cylinder packing.

(3) Check that clearance between tilt cylinder bushing and mounting pin is within standard range.

mm (in)

Standard	Under 0.6 (0.02)

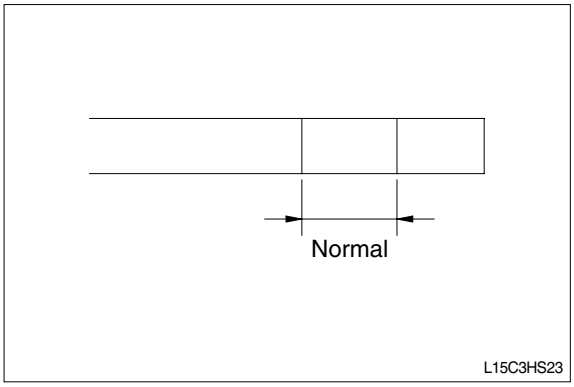




2) HYDRAULIC OIL

(1) Using dipstick, measure oil level, and oil if necessary.

(2) When changing hydraulic oil, clean suction strainer(screwed into outlet port pipe) and line filter(screwed into inlet pipe). Line filter uses paper element, so replace periodically(every 6 months or 1200 hours)

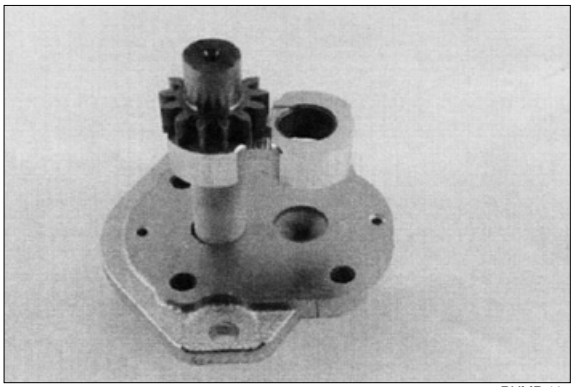


3) CONTROL VALVE

(1) Raise forks to maximum height and measure oil pressure.
Check that oil pressure is 200kgf/cm^2.
(2845psi)

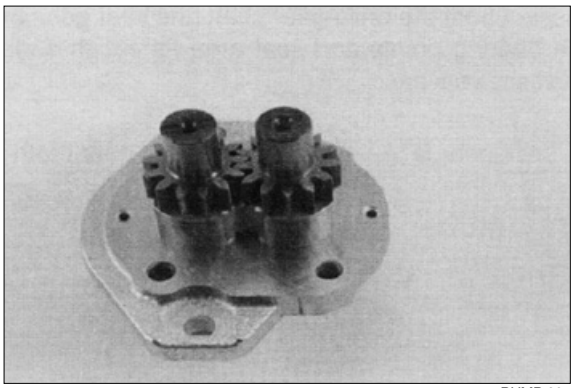
(7) Insert the drive end of the drive shaft through the bearing block with the seal side down, and the open side of the E-seal pointing to the intake side of the pump.

(8) Install the seal sleeve over the drive shaft and carefully slide the drive shaft through the shaft seal. Remove the seal sleeve from shaft.



PUMP 19

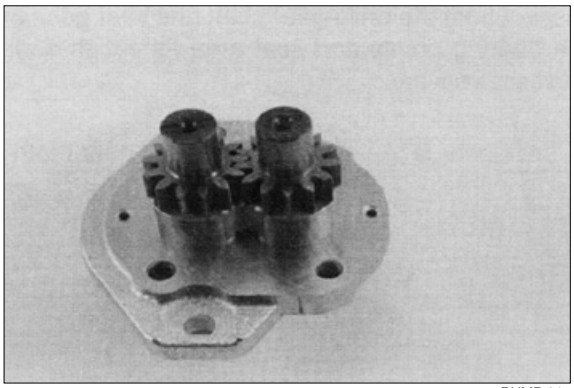
(9) Install the idler gear shaft in the remaining position in the bearing block. Apply a light coat of clean oil to the face of the drive and idler gears.



PUMP 20

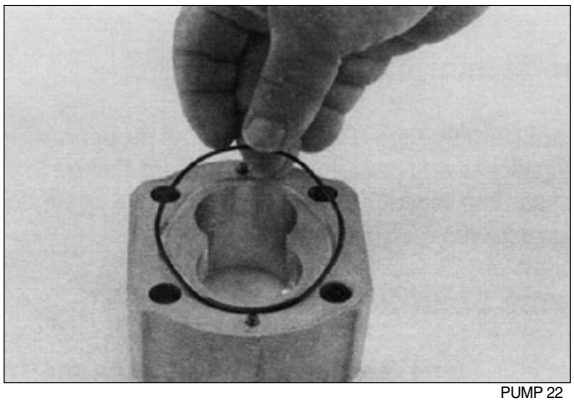
(10) Pick up the rear bearing block, with seal side up and with open end of the E-seal facing the intake side of the pump, place over the drive and idler gear shafts.

(11) Install two dowel pins in the holes in the mounting flange or two long dowel pins through gear housing if pump is a multiple section pump.



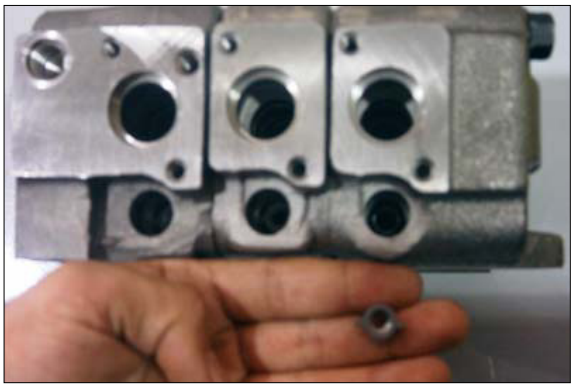
PUMP 21

(12) To install the O-rings in the gear housing, apply a light coating of petroleum jelly in the grooves on both sides of the gear housing.
Also coat the new O-ring and install them in the grooves.



PUMP 22

(5) Install adjuster into load check valve hole.



D255CV05

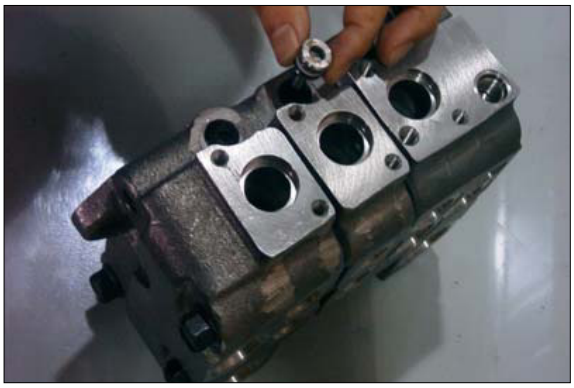
(6) A tool for disassembly and assembly of C-ring or adjuster.
When assembling adjuster, push one of two adjuster wings into the groove of block and then the other in a same method.

D255CV06

(7) Assemble adjuster with attention of the direction of wings.

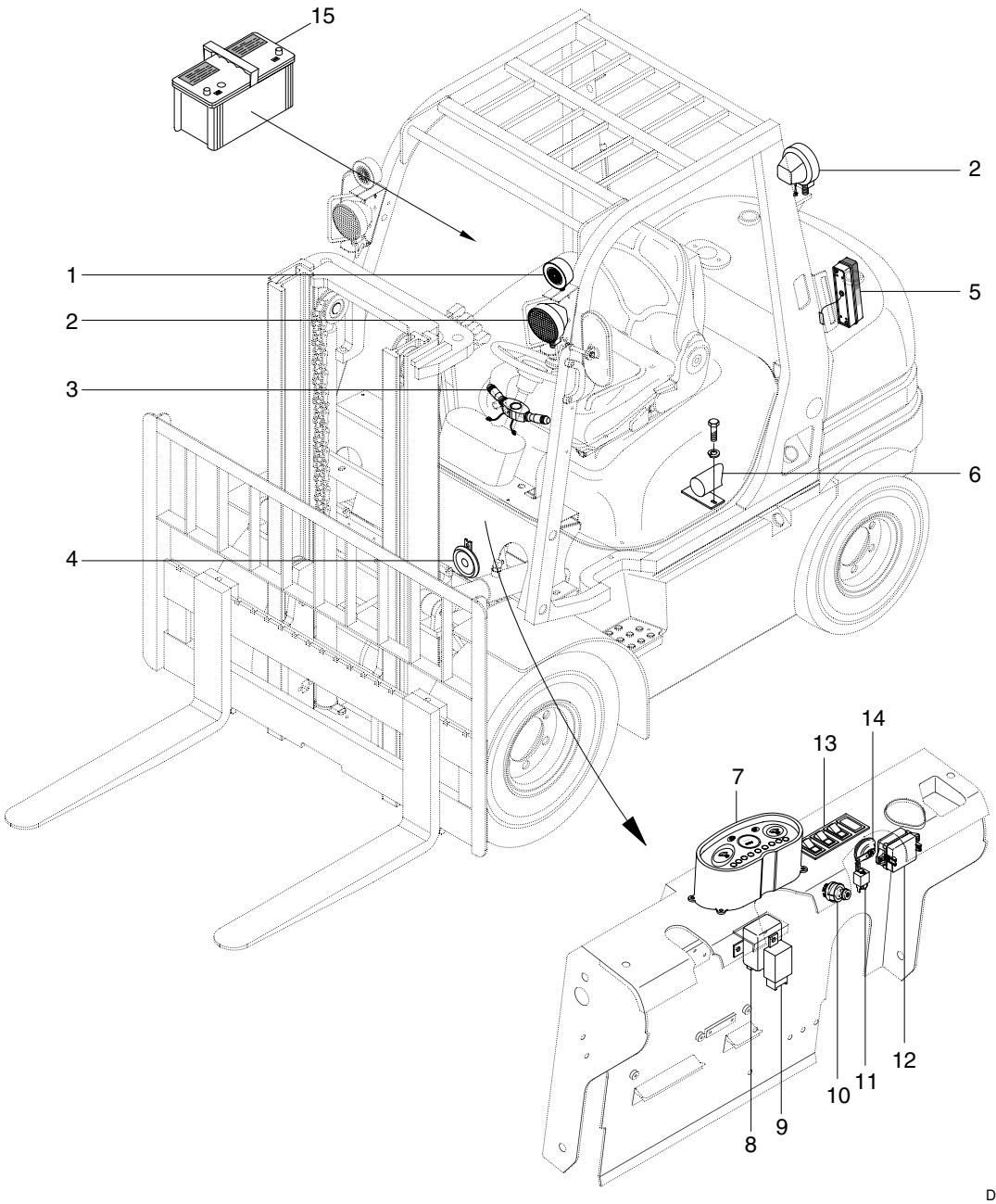
D255CV07

(8) Assemble adjuster plug into load check valve hole.



D255CV08

GROUP 1 COMPONENT LOCATION



1	Flasher lamp	6	Back buzzer	11	Relay
2	Work lamp	7	Operating panel	12	Fuse box
3	Combination switch	8	Flasher relay	13	Switch assembly
4	Horn assembly	9	Detector	14	Warning buzzer
5	Combination lamp	10	Start switch	15	Battery

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	KET	8	I/conn(Dashboard harness-frame harness)	S814*008001	S814-108001
CN-2	KET	14	I/conn(Dashboard harness-frame harness)	S814-014100	S814-114100
CN-3	KET	1	I/conn(Dashboard harness-frame harness)	MG640944-5	MG650943-5
CN-4	AMP	4	Support harness-LH	S810-004202	-
CN-5	MOLEX	4	Support harness-RH	110-4P-F	-
CN-17	KET	4	Power output	S814-004100	-
CN-18	KET	2	Power	S814-002100	-
CN-25	MOLEX	2	Horn	35825-0211	-
CN-26	KET	2	Warning buzzer	S814-002100	-
CN-48	KET	2	Hour meter	S822-014000	S822-114000
CN-56	MOLEX	20	Operating panel	35109-2010	-
CN-58	KET	8	Detector	S813-030201	-
CN-65	KET	2	Back horn	S822-014000	S822-114000
CN-74	SUMITOMO	3	Alternator	6189-0442	-
CN-79	YAZAKI	2	Fuel solenoid valve	S812-001003	-
CN-95A	KET	2	Fusible link	-	S813-130201
CN-95B	KET	2	Fusible link	-	S813-130201
CN-122	KET	2	Forward solenoid	S812-002001	-
CN-123	KET	2	Reverse solenoid	S812-002001	-
Switch					
CS-2	AMP	4	Start switch	S810-004202	-
CS-11	AMP	5	Combinaton switch	S811-005002	-
CS-12	AMP	9	Combinaton switch	S811-009002	-
CS-21	SWF	10	Work lamp switch	593757	-
CS-23	SWF	10	Beacon lamp switch	593757	-
CS-41	SWF	10	Harzard switch	593757	-
Lamp					
CL-7	KET	6	Beacon lamp	S822-014000	S822-114000
CL-15	DAEDONG	6	Combination lamp-LH	110-6PR	-
CL-16	DAEDONG	6	Combination lamp-RH	110-6PR	-
CL-21	KET	2	License lamp	S822-014000	S822-114000
CL-23	KET	2	Working lamp	S822-014000	S822-114000
Relay					
CR-11	KET	13	Flasher unit relay	S811-001301	-
CR-23	SUMITOMO	2/6	Safety relay	6195-0060/21	-
CR-24	SUMITOMO	2/6	QGS Controller	6195-0060/21	-
CR-35	AMP	4	Warning relay	S810-004202	-

2) FORKS

Problem	Cause	Remedy
Abrasion	Long-time operations causes the fork to wear and reduces the thickness of the fork. Inspection for thickness is needed. · Wear limit : Must be 90% of fork thickness	If the measured value is below the wear limit, replace fork.
Distortion	Forks are bent out of shape by a number of reasons such as overloading, glancing blows against walls and objects, and picking up load unevenly. · Difference in fork tip height : 15㎜ · Difference in fork tip width : 35㎜	If the measured value exceeds the allowance, replace fork.
Fatigue	Fatigue failure may result from the fatigue crack even though the stress to fork is below the static strength of the fork. Therefore, a daily inspection should be done. · Crack on the fork heel. · Crack on the fork weldments.	Repair fork by expert. In case of excessive distortion, replace fork.