CONTENTS

SECTION 1 GENERAL

5. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · 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	2.73 ~ 4.12	19.5 ~ 29.8
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 79.5	9.8 ~ 15.8	71 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 167
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 343
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	350 ~ 457	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 ~ 1655
M36 × 4.0	174 ~ 236	1261 ~ 1703	250 ~ 310	1808 ~ 2242

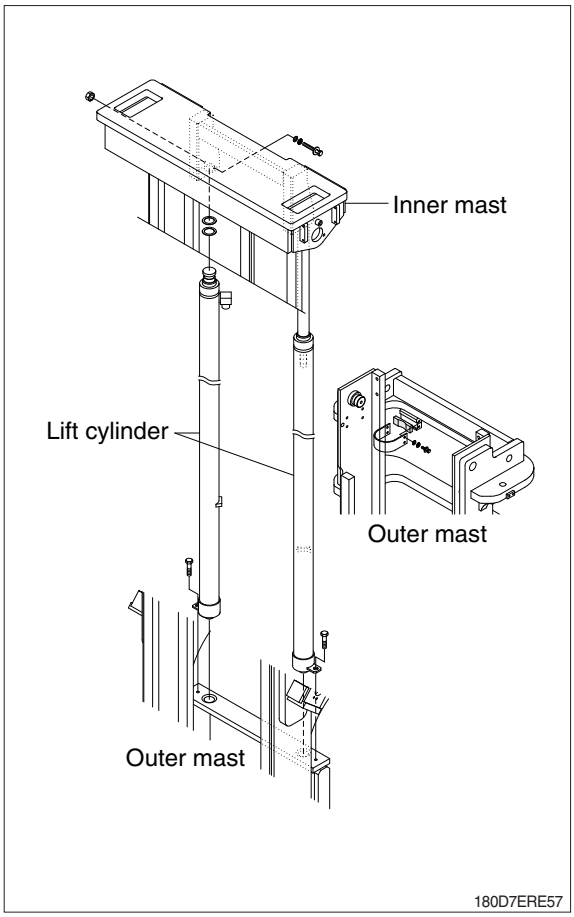
(2) Fine thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 8 × 1.0	2.17 ~ 3.37	15.7 ~ 24.3	3.04 ~ 4.44	22.0 ~ 32.0
M10 × 1.25	4.46 ~ 6.66	32.3 ~ 48.2	5.93 ~ 8.93	42.9 ~ 64.6
M12 × 1.25	7.78 ~ 11.58	76.3 ~ 83.7	10.6 ~ 16.0	76.6 ~ 115
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 130	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 194	26.6 ~ 36.0	193 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 390	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 515	70.7 ~ 95.7	512 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 664	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1338	182 ~ 248	1314 ~ 1795
M36 × 3.0	192 ~ 260	1389 ~ 1879	262 ~ 354	1893 ~ 2561

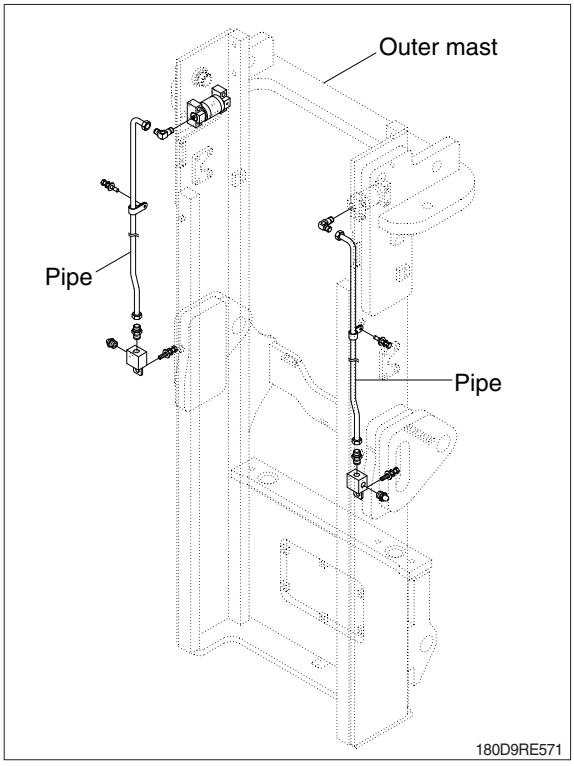
(3) Piping

① Remove the pipes and clamps attached to the cylinder.

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



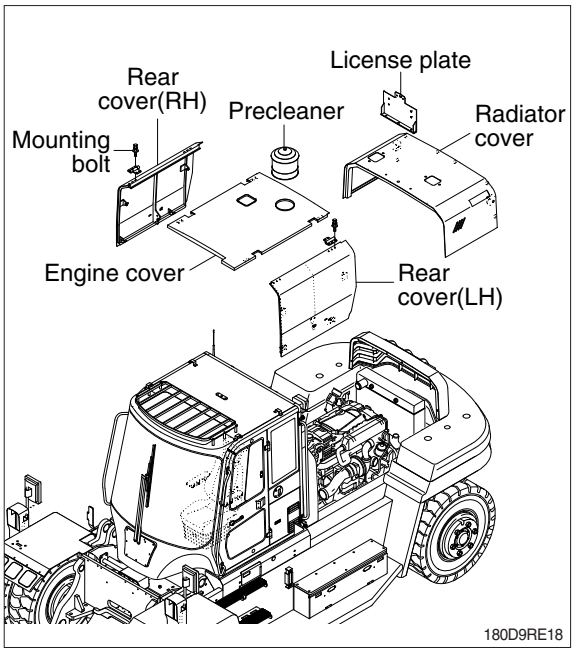
② Remove the lubrication pipes and clamps.



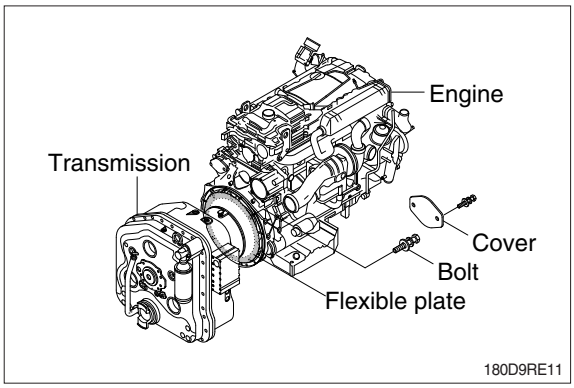
② **Engine cover (center)**

a. Pull upside the precleaner by loosening the clamp and seal in the air intake hole of air cleaner.

b. Remove engine cover and radiator cover upward.



(2) Remove torque converter housing cover and mounting bolts. See page 2-12.



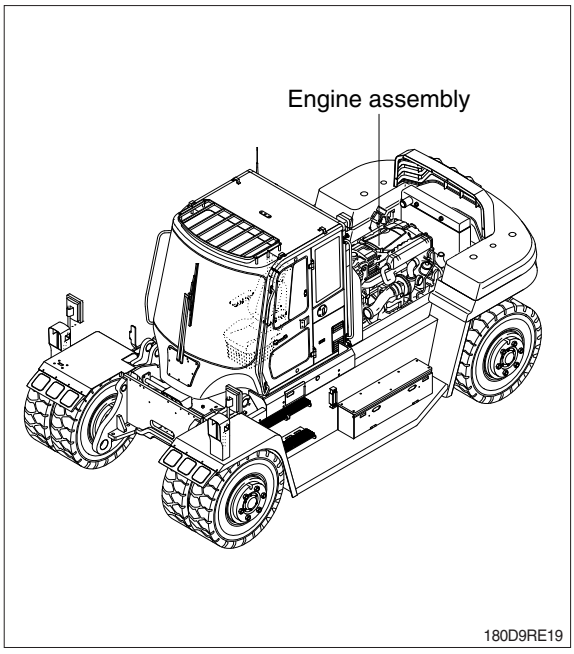
(3) Engine accessory

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

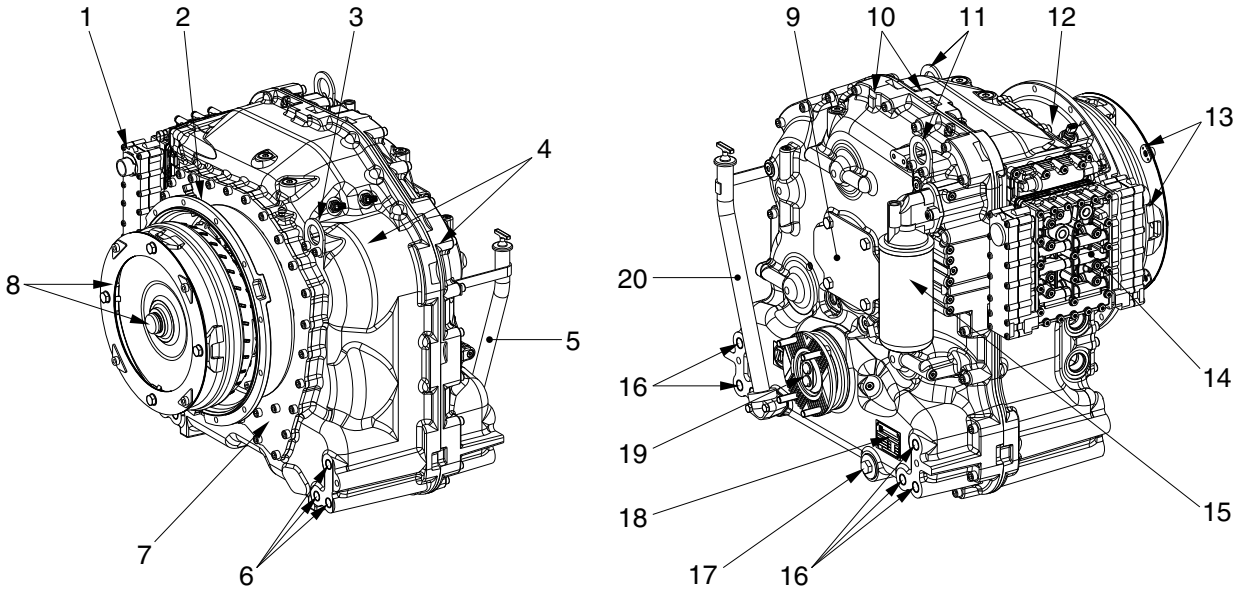
① Wiring harness to alternator and starter.
② Wiring harness for oil pressure and engine water temperature gauges.
③ Cables for meters, buttons and accelerator pedal.
④ Hoses to fuel tank and air cleaner.
⑤ Exhaust pipe.

(4) Radiator hose

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



2) INSTALLATION VIEW



180D7EPT26

1	Electro - hydraulic control	11	Lifting lugs
2	Converter bell	12	Converter bell
3	Lifting lugs	13	Converter with diaphragm - direct mounting
4	Gearbox housing front and rear section	14	Converter with diaphragm
5	Oil level tube with oil dipstick (rear side)	15	Exchange filter with filter head
6	Transmission suspension holes M20	16	Transmission suspension holes M20
7	Plate	17	Oil drain plug M38 × 1.5
8	Converter with diaphragm - direct mounting	18	Type plate
9	Power take - off; coaxial, engine - dependent	19	Output flange
10	Gearbox housing front and rear section	20	Oil level tube with oil dipstick (rear side)

3) INITIALIZING THE INCHING SENSOR

(1) Start engine after parking the machine on flat floor and blocking wheels.
(2) Release parking brake and keep neutral gear shift.
(3) Adjust the inching sensor linkage so that the regular voltage is supplied to inching sensor when operating the pedal.
※ Regular voltage ; Before pedal operation (1±0.1V), After pedal operation (3.5±0.1V).
(4) Stop the engine and then just KEY ON. (Release parking brake, keep neutral gear)
(5) Connect the AEB STARTER to the T/M controller.
(6) Push AEB STARTER over 3 seconds.
(7) If display shows "▼IP", Step on the pedal fully.
(8) If display shows "▲IP", release "OK"
(9) After the successful completion, it displays "OK".
(10) In case of abnormal running, it may display "STOP" with the appropriate error code.
(11) After troubleshooting, start the machine again to repeat above.
※ Above works are to be done with the parking brake released, so machine's wheels must be blocked for safety.

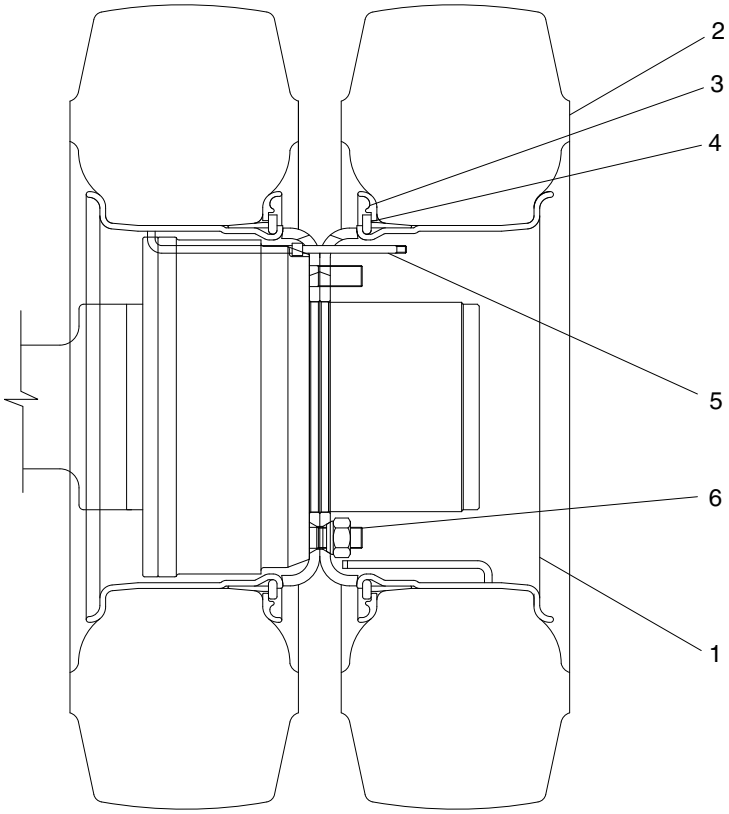
4) DISPLAY DURING INCHPEDAL CALIBRATION

Symbol	Meaning	Remarks
▼IP	Push down the pedal slowly until endposition is reached and hold this position	
▲IP	Release the pedal slowly until endposition is reached	
IP blinkt	A problem occurred, release the pedal slowly until endposition is reached	If the expected endposition could not be reached, release the pedal and try again
OK	Finished inchpedal calibration successful	
FN and Stop	Shift lever not in Neutral position	Calibrations is aborted
FS and Stop	Sensor supply voltage AU1 is out of the specified range	Calibrations is aborted
FO and Stop	Outputspeed_not_zero	Calibrations is aborted
SL and Stop	Sensor voltage below specified range	Calibrations is aborted
SU and Stop	Sensor voltage below specified range	Calibrations is aborted
IL and Stop	Sensor position for released pedal out of specified range	Calibrations is aborted
IU and Stop	Sensor position for released pedal out of specified range	Calibrations is aborted
TO and Stop	Time-out calibration, pedal not moved after calibration start	Calibrations is aborted
DL and Stop	Angle between pedal positions released and pressed to small	Calibrations is aborted
DU and Stop	Angle between pedal positions released and pressed to small	Calibrations is aborted
FI and Stop	Sensor signal 1 and 2 don't match together	Calibrations is aborted

Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
93	**O.C. at relay reverse warning alarm** TCU detected a wrong voltage at the output pin, that looks like a O.C. for this output pin · Cable is defective and has no connection to TCU · Backup alarm device has an internal defect · Connector has no connection to TCU	No reaction OP mode : Normal	· Check the cable from TCU to the backup alarm device · Check the connectors from backup alarm device to TCU · Check the resistance* of backup alarm device * See page 3-36
94	**S.C. to ground at relay starter interlock** TCU detected a wrong voltage at the output pin, that looks like a S.C. to vehicle ground · Cable is defective and is connection to vehicle ground · Starter interlock relay has an internal defect · Connector pin is contacted to vehicle ground	No reaction OP mode : Normal	· Check the cable from TCU to the stater interlock relay · Check the connectors from starter interlock relay to TCU · Check the resistance* of starter interlock relay * See page 3-36
95	**S.C. to battery voltage at relay starter interlock** TCU detected a wrong voltage at the output pin, that looks like a S.C. to battery voltage · Cable is defective and has no connection to battery voltage · Starter interlock relay has an internal defect · Connector pin is contacted to battery voltage	No reaction OP mode : Normal	· Check the cable from TCU to the starter interlock relay · Check the connectors from starter interlock relay to TCU · Check the resistance* of starter interlock relay * See page 3-36
96	**O.C. at relay starter interlock** TCU detected a wrong voltage at the output pin, that looks like a O.C. for this output pin · Cable is defective and has no connection to TCU · Starter interlock relay has an internal defect · Connector has no connection to TCU	No reaction OP mode : Normal	· Check the cable from TCU to the starter interlock relay · Check the connectors from starter interlock relay to TCU · Check the resistance* of starter interlock relay * See page 3-36

Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
F1	**General EEPROM fault** TCU can't read non volatile memory · TCU is defective	No reaction OP mode : Normal	· Replace TCU ※ Often shown together with fault code F2
F2	**Configuration lost** TCU has lost the correct configuration and can't control the transmission · Interference during saving data on non volatile memory · TCU is brand new or from another vehicle	Transmission stay neutral OP mode : TCU shutdown	· Reprogram the correct configuration for the vehicle (e.g. with cluster controller,...)
F3	**Application error** Something of this application is wrong	Transmission stay neutral OP mode : TCU shutdown	· Replace TCU ※ This fault occurs only if an test engineer did something wrong in the application of the vehicle
F5	**Clutch failure** AEB was not able to adjust clutch filling parameters · One of the AEB-Values is out of limit	Transmission stay neutral OP mode : TCU shutdown	· Check clutch ※ TCU shows also the affected clutch on the display
F6	**Clutch adjustment data lost** TCU was not able to read correct clutch adjustment parameters · Interference during saving data on non volatile memory · TCU is brand new	No reaction, Default values : 0 for AEB Offsets used OP mode : Normal	· Execute AEB

6. TIRE AND WHEEL



D507AX68

1	Wheel rim	3	Lock ring	5	Valve assembly
2	Tire	4	Side ring	6	Wheel nut

1) The tire acts to absorb the shock from the ground surface to the machine, and at the same time they must rotate in contact with the ground to gain the power which drives the machine.

2) Various types of tires are available to suit the purpose. Therefore it is very important to select the correct tires for the type of work.

3) BRAKE OVERHEATS

Condition	Possible cause	Correction
Overheating due to excessive duty cycle.	Inadequate coolant flow or heat exchange.	1. Install brake cooling system if not already installed on vehicle. 2. Re-analyze and re-size brake cooling system if necessary.
Inadequate coolant flow	Low pump output, blocked filter or coolant lines.	Check pump output at different operating modes. Replace filter and check lines.
Low or no coolant.	1. Improper fill or leaks. 2. Leaking face seal. 3. Loose or damaged plugs. 4. Deteriorated or inadequate sealant used at joint.	1. Check for proper fill level. 2. Replace or reinstall face seal assembly. 3. Tighten drain, fill or forced cooling plug. Replace if damaged. 4. Dissemble, clean, re-seal and re-assemble brake housing joint.
Brake drags.	1. More than 1.4bar(20psi) pressure applies when brakes released. 2. Damaged piston return spring assembly. 3. Piston not returning. 4. Wrong cooling and/or actuation fluid used. 5. Tight or damaged splines (eg. friction disc-to-hub driver).	1. Repair hydraulic system so pressure is less than 1.4bar(20psi) when brakes released and while machine is operating in any mode. 2. Repair or replace piston return spring assembly. 3. Check piston seals and seal separator. 4. Check piston seals and seal separator for swelling or damaged. Replace as necessary. Purge system and use correct fluid. 5. Repair or replace parts.

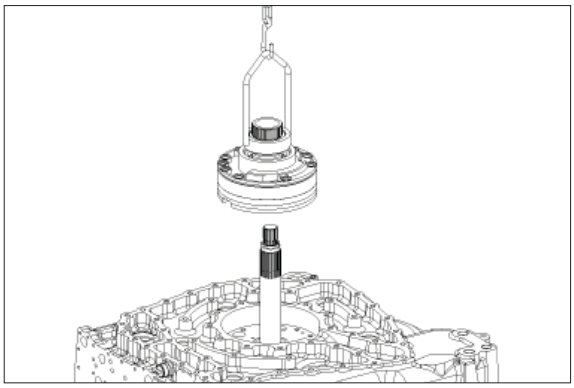
4) BRAKE DOES NOT APPLY

Condition	Possible cause	Correction
Low or no pressure to brake	1. Empty fluid reservoir. 2. Damaged hydraulic system. 3. Leaked of brake actuation fluid. 4. Parking brake not adjusted properly.	1. Fill reservoir to correct level with specified fluid. 2. Repair hydraulic system. 3. Refer to "Brake leaks actuation fluid" in this section. 4. Adjust parking brake lever as described in assembly of this manual.

(2) Oil pressure pump

① Pull off stator hollow shaft/oil pressure pump by means of puller and lifting device.

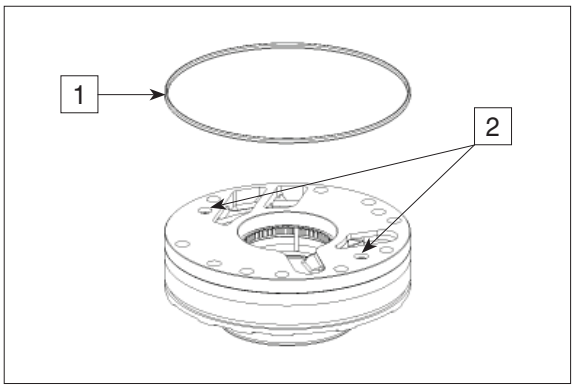
(S) Puller 5870 000 107



180DTM037

② Remove O-ring (1).

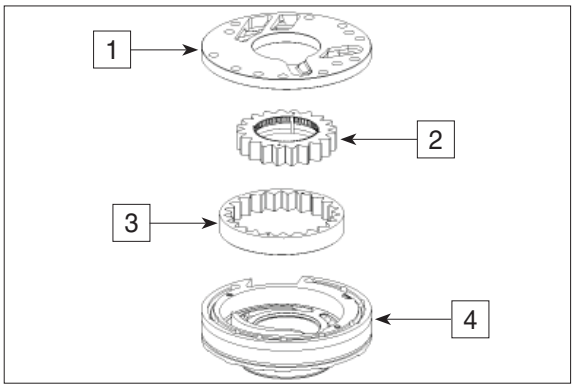
Loosen cylindrical screws (2).



180DTM038

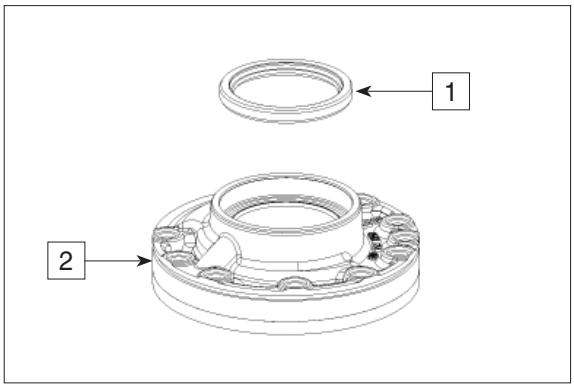
※ Check oil gear pump :
In case of wear marks in the pump housing, cover or on the inner and outer rotor, the complete oil pressure pump is to be replaced.

1 = Cover
2 = Inner rotor
3 = Outer rotor
4 = Pump housing



180DTM039

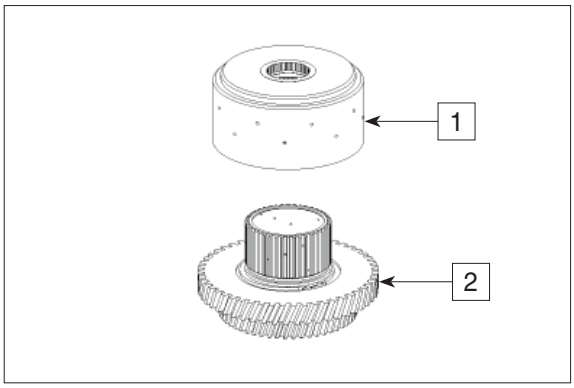
④ Remove shaft seal (1) from the pump housing (2).



180DTM040

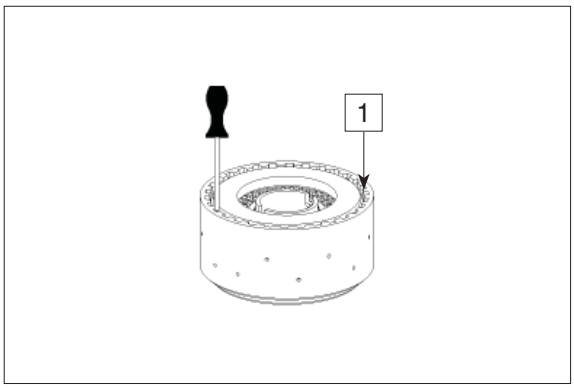
⑤ Pull clutch (1) off the spur gear (2).

※ No further disassembly of spur gear (2) is possible.



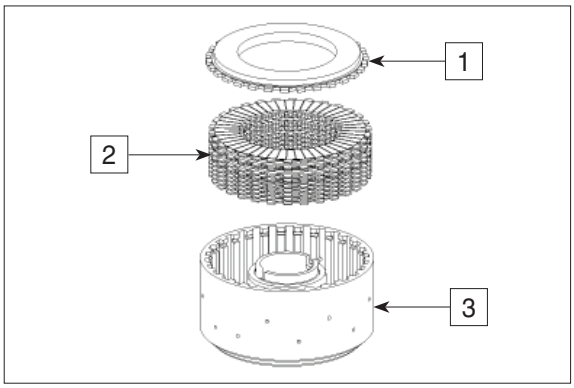
180DTM072

⑥ Remove snap ring (1).



180DTM057

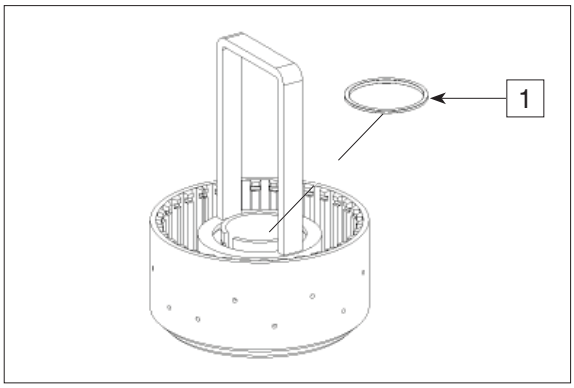
⑦ Remove end plate (1) and disc package (2) from disc carrier.



180DTM058

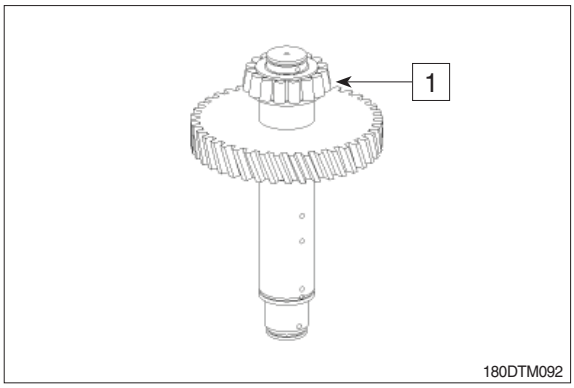
⑧ Preload compression spring and remove L-ring (1).

(S) Assembly aid 5870 345 088



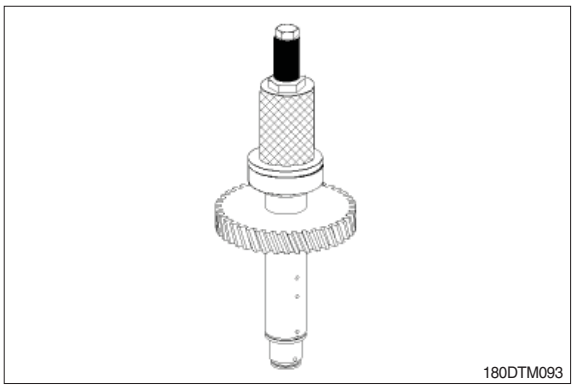
180DTM059

⑬ Unsnap piston ring (1).



⑭ Pull tapered roller bearing (internal ring) off the shaft.

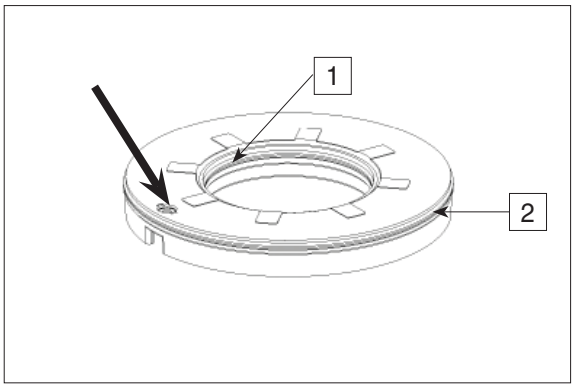
(S) Forcing device 5870 026 100
(S) Grab sleeve 5873 001 059



⑨ Insert both O-rings (1 and 2) into piston grooves and oil them.

1 = 75 × 3
2 = 142 × 3

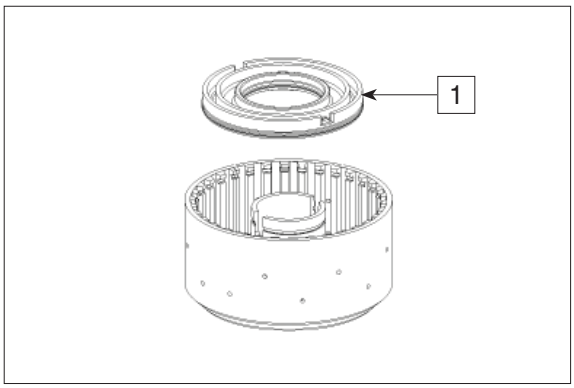
※ Check function of the drain valve (see arrow) - there must be no jamming of the ball.



180DTM116

⑩ Insert piston (1) into disc carrier.

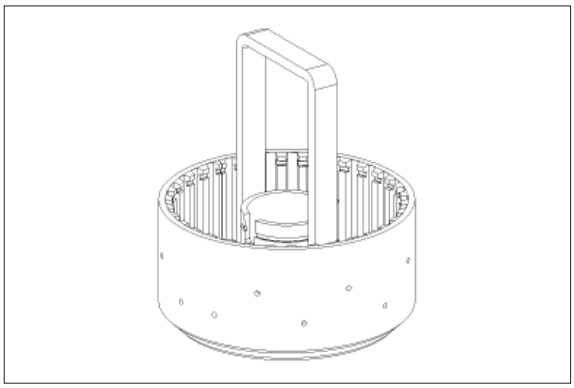
※ Observe installation position, see figure.



180DTM117

⑪ Use a hand-operated press to place piston into the disc carrier by means of the assembly aid.

(S) Assembly aid 5870 345 088



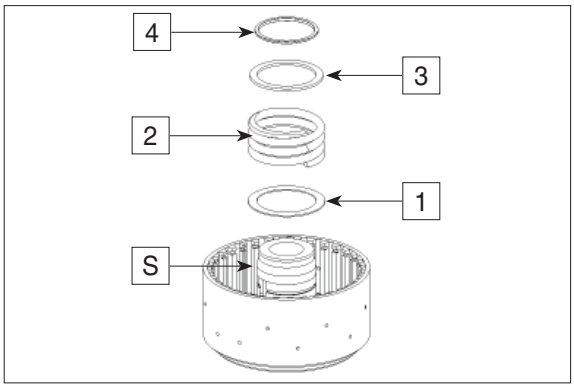
180DTM118

⑫ Mount inner installer (S) onto the disk carrier.

Install disk (1), compression spring (2), support shim (3) and L-ring (4).

※ Installation position support shim and L-ring see figure TM121.

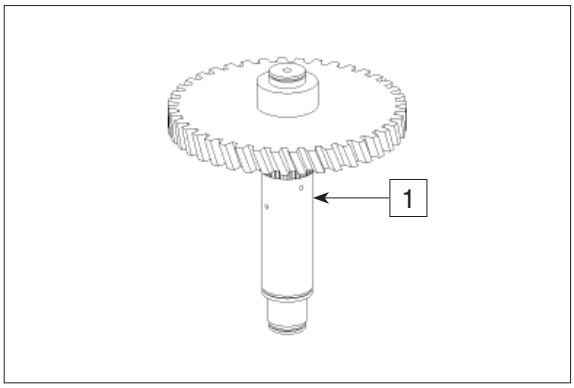
(S) Inner installer → see figure TM120.



180DTM119

(3) Clutch K1

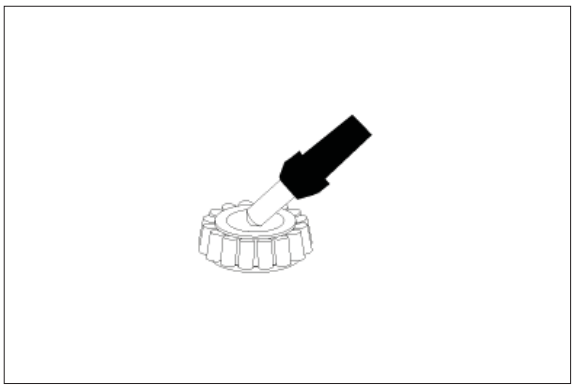
① Shaft - clutch shaft K1- (1).



180DTM137

② Heat up bearing inner ring (app. 120°C).

(S) Hot air blower 230 V 5870 221 500
(S) Hot air blower 115 V 5870 221 501



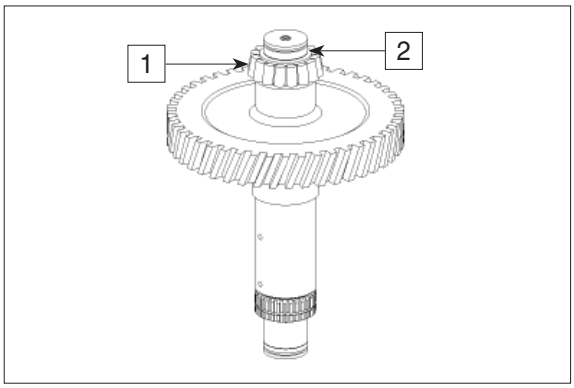
180DTM109

③ Mount bearing inner ring (1) until contact.

Mount piston ring (2).

⚠ Wear protective gloves.

※ Readjust bearing inner ring after cooling down.

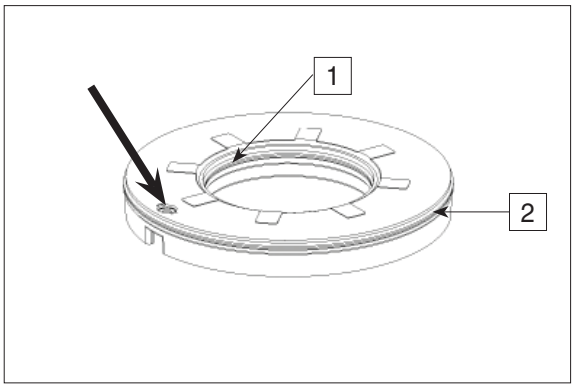


180DTM110

④ Insert both O-rings (1 and 2) into piston grooves and oil them.

1 = 75 × 3
2 = 158 × 3

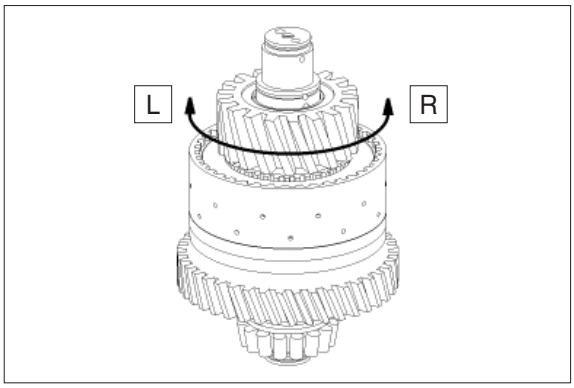
※ Check function of the drain valve (see arrow) - there must be no jamming of the ball.



180DTM116

⑰ Install idler gear.

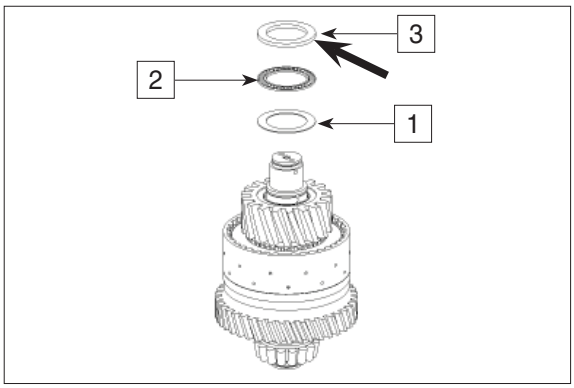
Install inner discs on inner disc carrier (idler gear) by shortly rotating them cw/ ccw.



180DTM154

⑱ Mount axial washer 55×78×1 (1), axial cage (2) and running disc 55×78×5 (3) and oil them.

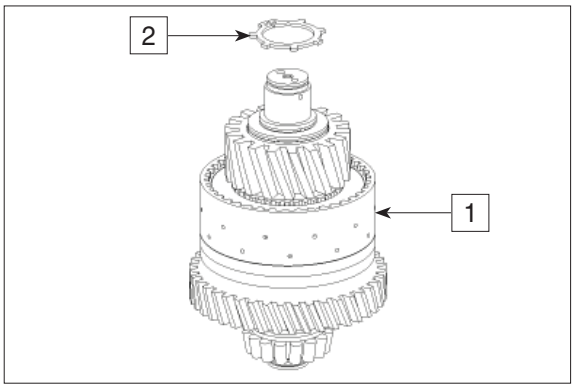
Install running disc (arrow) with chamfer (see arrow) showing towards the axial cage.



180DTM155

⑲ Fix clutch (1) with retaining ring (2) 50×3.

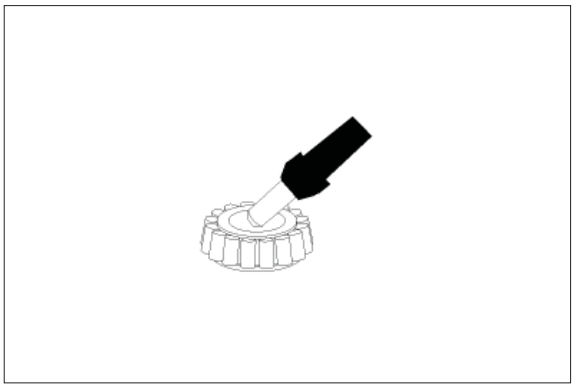
※ (S) Set of external pliers 5870 900 015



180DTM156

⑳ Heat up bearing inner ring (app. 120°C).

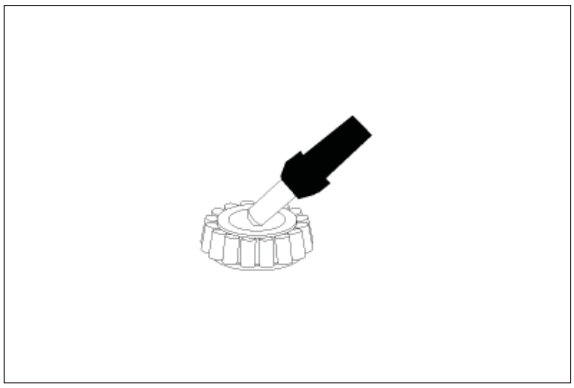
(S) Hot air blower 230 V 5870 221 500
(S) Hot air blower 115 V 5870 221 501



180DTM135

⑤ Heat up bearing inner ring (app. 120°C).

(S) Hot air blower 230 V 5870 221 500
(S) Hot air blower 115 V 5870 221 501



180DTM135

⑥ Mount bearing inner ring (1) until contact is obtained.

Fit rectangular ring 40 × 2.5 (2).

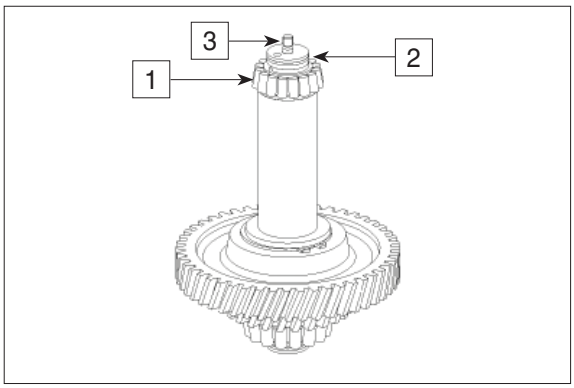
⚠ Wear protective gloves.

※ Adjust bearing inner ring after cooling-down.

Mount stud bolt (3).

Tightening torque (M10/8.8 × 16)

M_A = 17 Nm



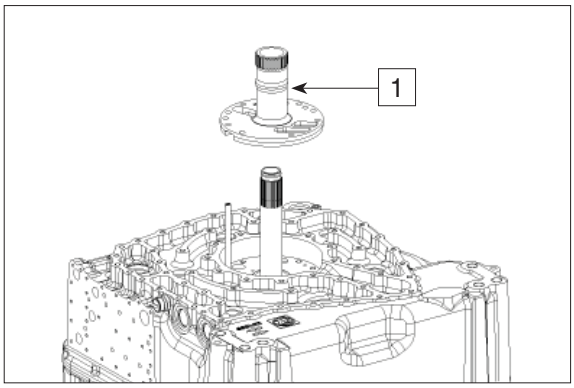
180DTM176

⑤ Install two adjusting screws and mount stator shaft (1).

※ Pay attention to hole pattern.

(S) Adjusting screws (M10)

5870 204 007

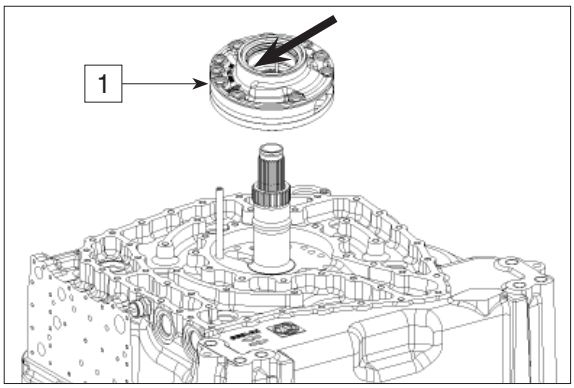


180DTM205

※ Oil sliding bearing (see arrow) before the assembly.

⑥ Mount pre-assembled pump (1).

※ Pay attention to hole pattern.



180DTM206

⑦ Provide cylinder screws with O-rings 9.5 × 1.6.

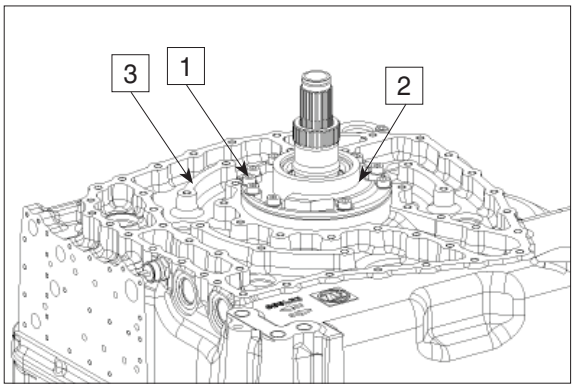
※ Grease O-rings.

Fix transmission pump (2) by means of cyl screws (1).

Tightening torque (M10/8.8 × 75)

M_A = 46 Nm

※ Wet mounting faces - duct ribs - (3) with Loctite (type no. 574).



180DTM207

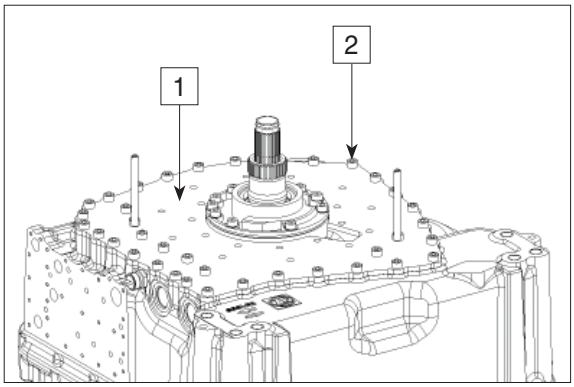
⑧ Mount two adjusting screws and place plate (1), and fix with cylinder screws (2).

(S) Adjusting screws (M10)

5870 204 007

Tightening torque (M10/8.8 × 20)

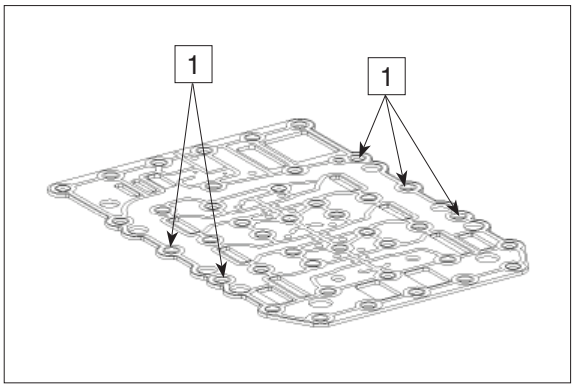
M_A = 46 Nm



180DTM208

⑮ Flush-mount screens (1) into the holes of the sealing plate, see arrows.

※ Pay attention to the installation position -screens to show upwards (towards the duct plate).

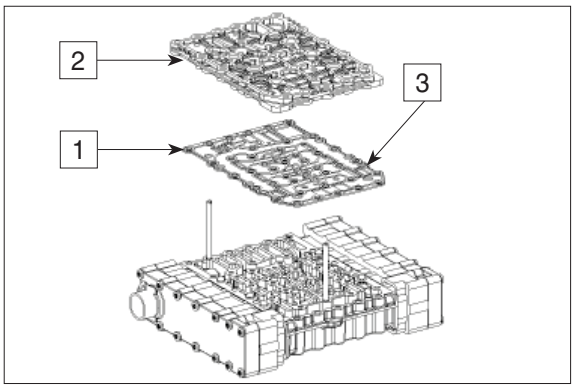


180DTM236

⑯ Put on sealing plate (1) and duct plate (2).

※ Screens (3) to show upwards.

※ It is not permitted to re-assemble the seal plate after opening the threaded joint shift unit/duct plate.
In case of repair it is always necessary to mount a new seal plate.



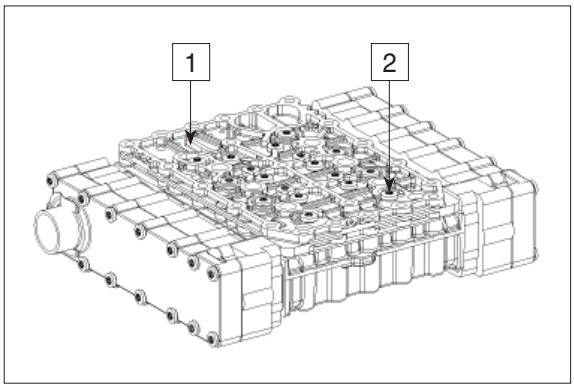
180DTM237

⑰ Place duct plate (1) and fix it equally by means of Torx screws (2).

Tightening torque (M6/10.9 × 23)

M_A = 10.5 Nm

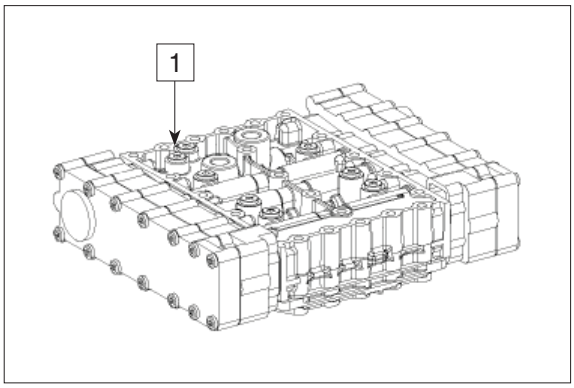
(S) Socket wrench TX-27 5873 042 002



180DTM238

⑱ Provide the screw plugs M10x1 with O-rings 8 × 1.5 (1) and install them.

Tightening torque M_A = 6 Nm

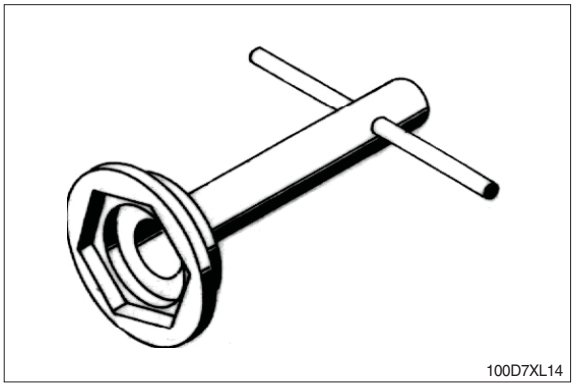


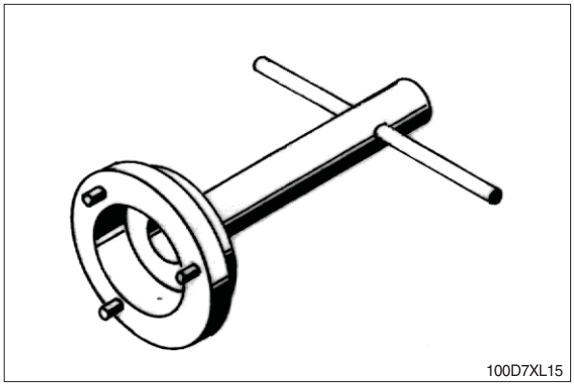
180DTM239

6) SERVICE TOOLS

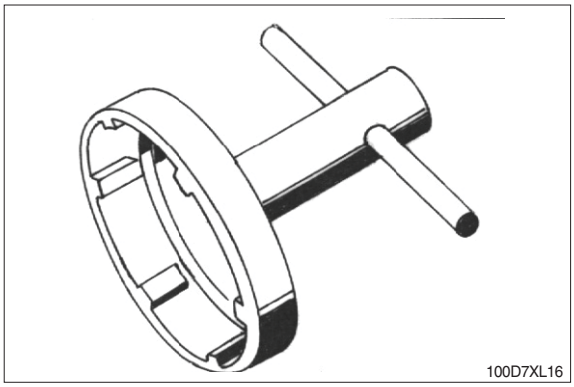
When ordering service tools please provide order number (Installation drawing no), respective fabrication number→see identification plate. (The illustrations are not binding for the design)

(1) Spanner for wheel safety nut





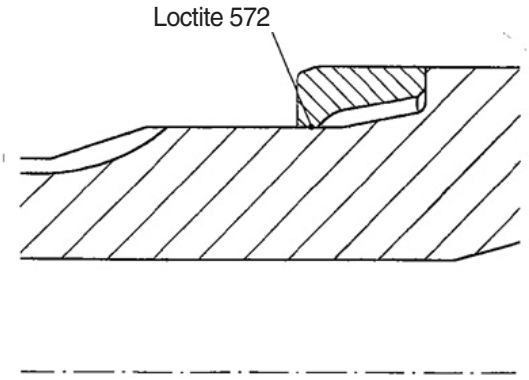
(2) Spanner for splined nut (hub assembly)



10) ASSEMBLY OF HUB ASSEMBLY

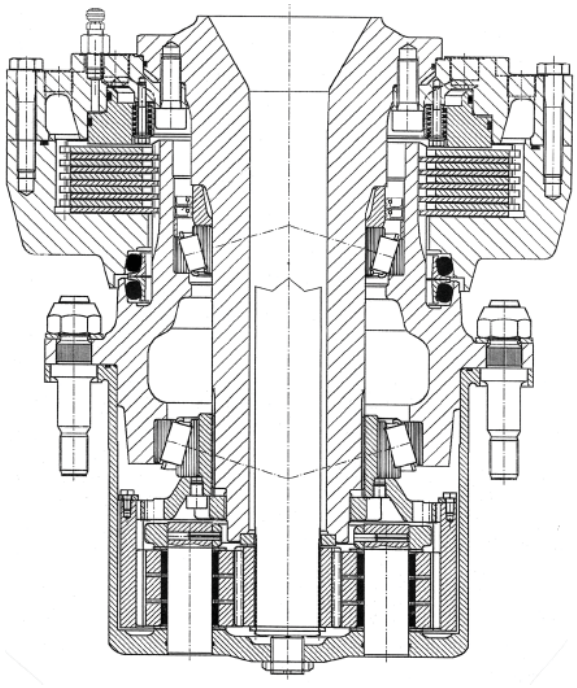
(1) Assembly of the spacer ring

Coat the seat of the spacer ring on the steering knuckle respective axle spindle with Loctite 572. Heat the spacer ring to about 100°C and push it by gently striking onto the steering knuckle respective axle spindle. (The steering knuckle respective axle spindle must be free of corrosion) Oil the seal ring tread onto the spacer ring.



100D7XL37

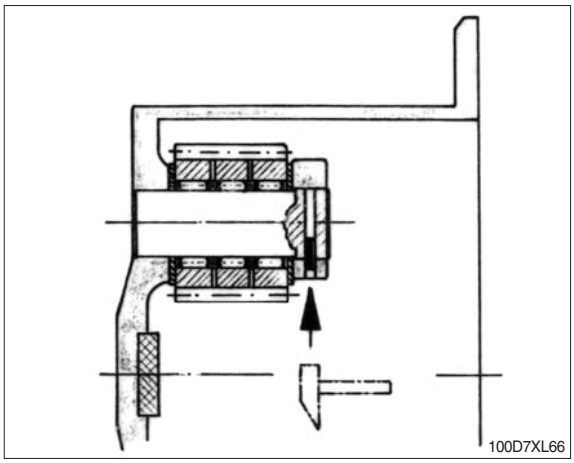
(2) Hub assembly drive axle



100D7XL38

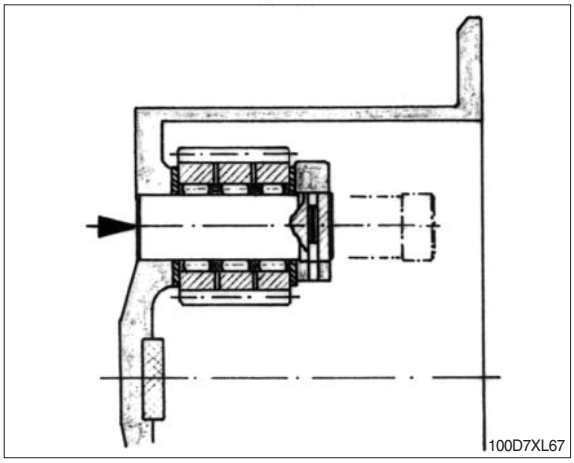
(6) Disassembly of planetary gear

① Knock the locking pin (20, 21) completely to the inner side of the planetary pin.

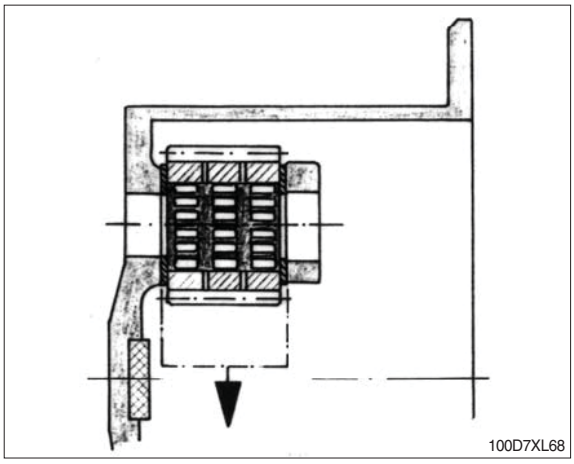


② Press the planetary pin in direction of arrow out of the planetary housing.

※ Because of the difference of diameter of 0.1 ㎜ do not press the planetary pin against the direction of arrow out of the planetary housing, to prevent damaging the bore.



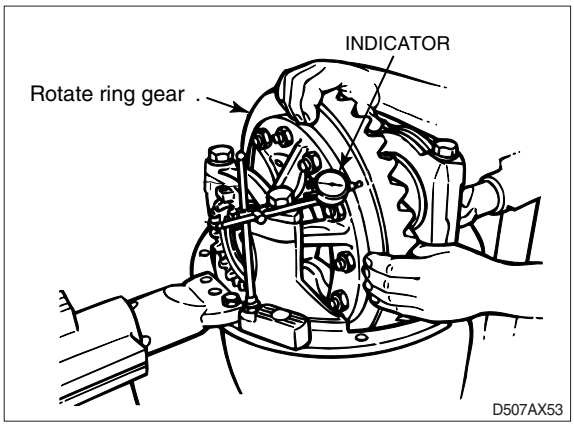
③ Remove the planetary gears with the thrust disks and needle bearings.



GROUP 4 ADJUSTMENT

1. CHECKING THE RING GEAR BACKFACE RUNOUT

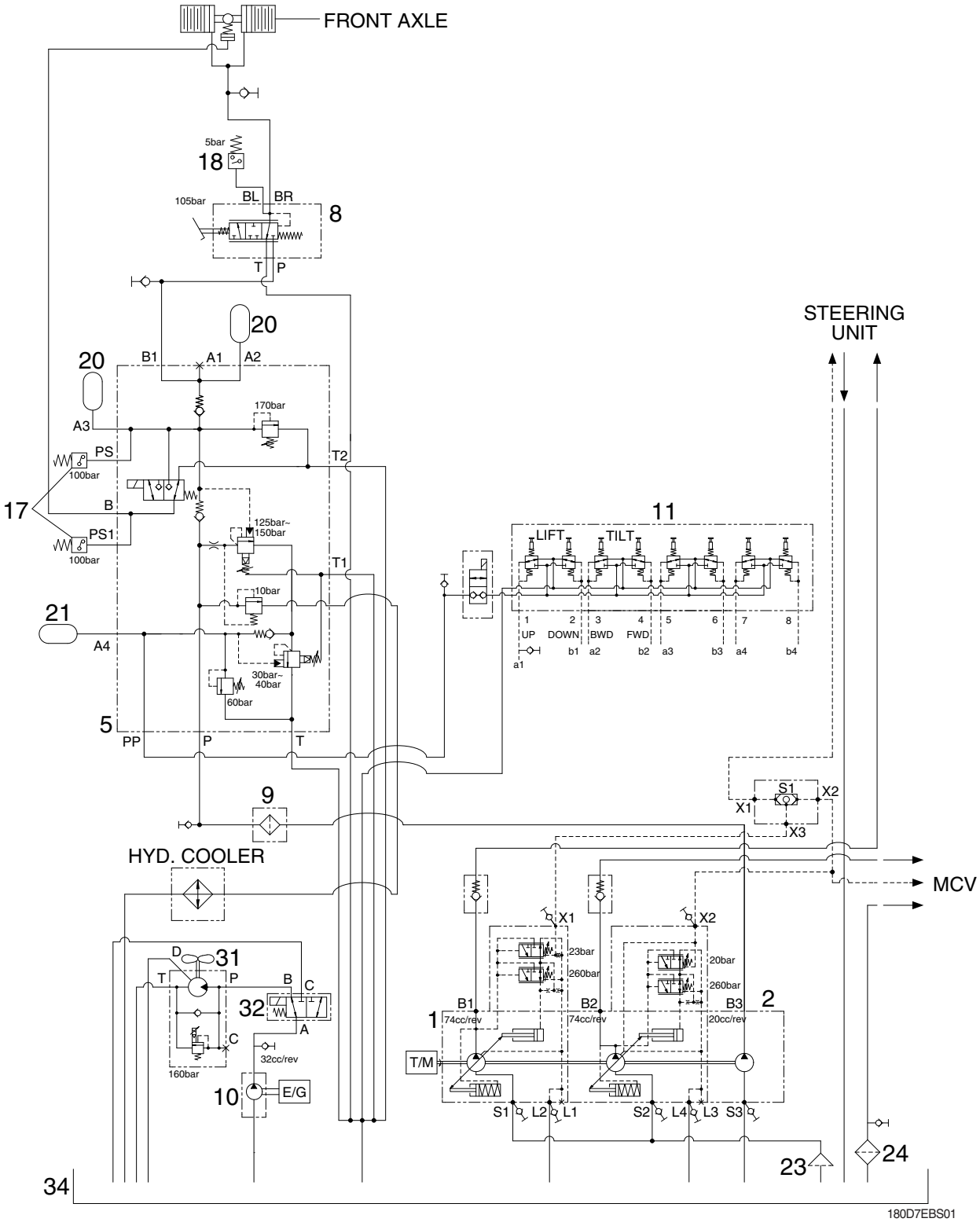
Runout specification : 0.20 mm (0.008-inch) maximum



1) Attach a dial indicator on the mounting flange of the carrier.
2) Adjust the dial indicator so that the plunger or pointer is against the back surface of the ring gear.
3) Set the dial indicator to zero (0).
4) Rotate the ring gear and read the dial indicator. The runout must not exceed 0.20 mm (0.008 inch).

   If runout exceeds specification, remove the differential and ring gear assembly from the carrier. Refer to "Assembly of the differential".
5) Check the differential parts, including the carrier, for problems that may cause the ring gear runout to exceed specifications. Repair or replace parts.
6) Re-install the differential and ring gear into the carrier. Refer to "Assembling the differential case".
7) Repeat the preload adjustment of the differential bearings.

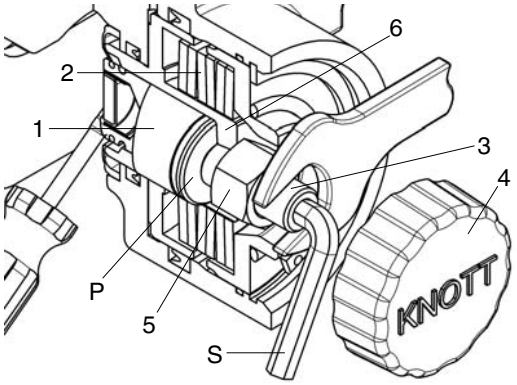
2. HYDRAULIC CIRCUIT



1	Main pump	11	RCV	23	Strainer
2	Auxiliary pump	17	Pressure switch	24	Return filter
5	Cut off valve	18	Pressure switch	31	Fan drive motor
8	Brake valve	20	Accumulator	32	Solenoid valve
9	Pressure filter	21	Accumulator	34	Hydraulic oil tank
10	Fan drive pump				

3) MOUNTING AND BASIC SETTING REGULATIONS

Basic brake setting is required after mounting new brake lining plates or brake disks, as well as during all repair stages and in the event of insufficient braking performance.



100D7BS112

1	Thrust bolt	4	Screw cap	P	Even surface
2	Bank of cup springs	5	Lock nut	S	Socket wrench
3	Adjusting screw	6	Piston		

※ **All mounting and basic setting work must be carried out on the brake when cold.**

(1) Mounting the brake

① Stand the vehicle on an even surface and secure against rolling away.

② Release the screw cap.

③ Release the lock nut (size 24 or 30) and turn the adjusting screw anticlockwise using a size 8 or 10 socket wrench until the pressure bolt comes to rest against the even surface of the piston. In this status, the brake can be mounted onto the brake disk and fastened.

④ Mount the pressure connection again.

Apply the necessary release pressure to the brake until the bank of cup springs is completely pre-tensioned. Following carry out the following page basic setting regulation.

(8) Repair work

△ When working on the braking system, always make sure that there is absolutely no pressure in the system. Even when the engine is switched off there will be some residual pressure in the system.

※ When doing repair work, make sure your environment is very clean.
Immediately close all open ports on the components and on pipes using plugs.

(9) Replacing the pedal cover

Pedal cover (13-2) is simply pulled of by hand. The new pedal cover is pushed over pedal (13-1) and tightened manually. Fasten the bellows with the strap retainers.

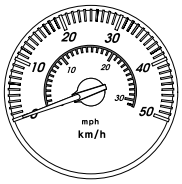
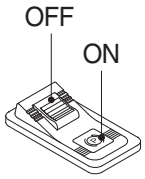
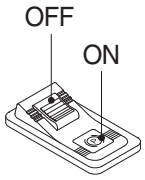
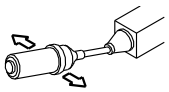
(10) Replacing the complete actuating mechanism

Carefully clamp the unit vertically in a fixture. The actuating mechanism can be removed by taking out the four bolts. Make sure that main spring (6) does not fall out. When installing the new actuating mechanism, make sure that main spring (6) is fitted in the right order.

(11) Replacing the bellows

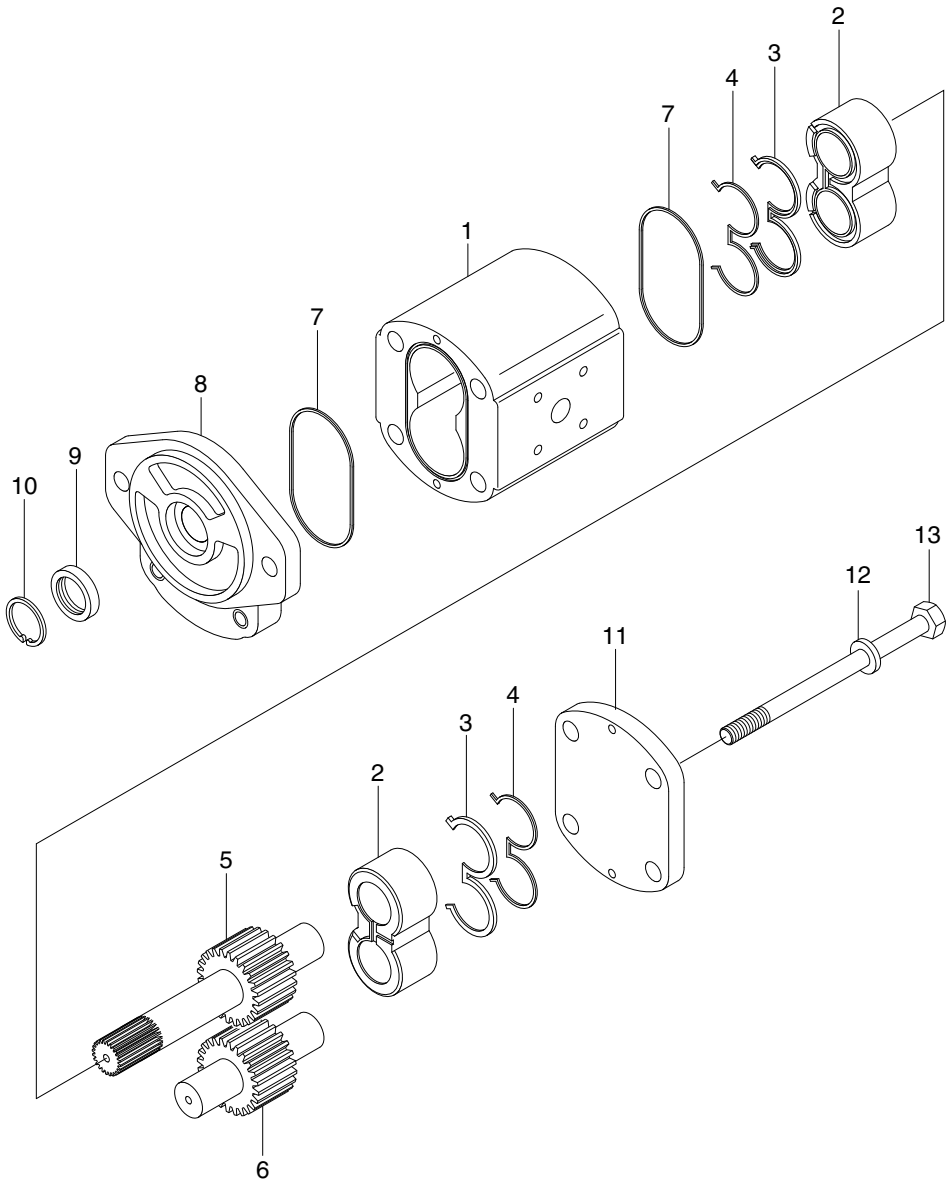
To change bellows (15) it is advisable to remove pedal (13). For this purpose, loosen retaining ring (18) and knock out pin 1 (16) using a mandrill. When knocking out the bolt, make sure that the mandrill is applied to the side of the bolt without a knurl. Remove pedal (13) and bellows (15). Now fit the new bellows and proceed in reverse order as described above. The upper portion of bellows is fastened to piston (4), its lower portion to pedal plate (12) secure the bellows using clamps.

※ **Hydraulic oil must be at operating temperature for these checks.**

Item	Description	Service action
Parking brake capacity check Seat belt must be worn while doing this check to prevent possible injury when machine stops suddenly.	 Start engine. Fasten seat belt. Release parking brake and put transmission in 2nd gear forward. Drive machine at 8 km/hr and switch parking brake ON.  **LOOK/FEEL :** Machine must come to a stop within 2 meters(6 feet) when parking brake is engaged at 8 km/hr. Transmission must shift to neutral.	**OK** Check completed. **NOT OK** Inspect parking brake. Go to group 3.
Parking brake transmission lockout check Engine running.	 Turn parking brake to ON. Place transmission in 1st forward. Slowly increase engine speed to high idle.  **LOOK** : Machine must not move.	**OK** Check completed. **NOT OK** Go to transmission control circuit in section 3.

1. AUXILIARY PUMP (BRAKE)

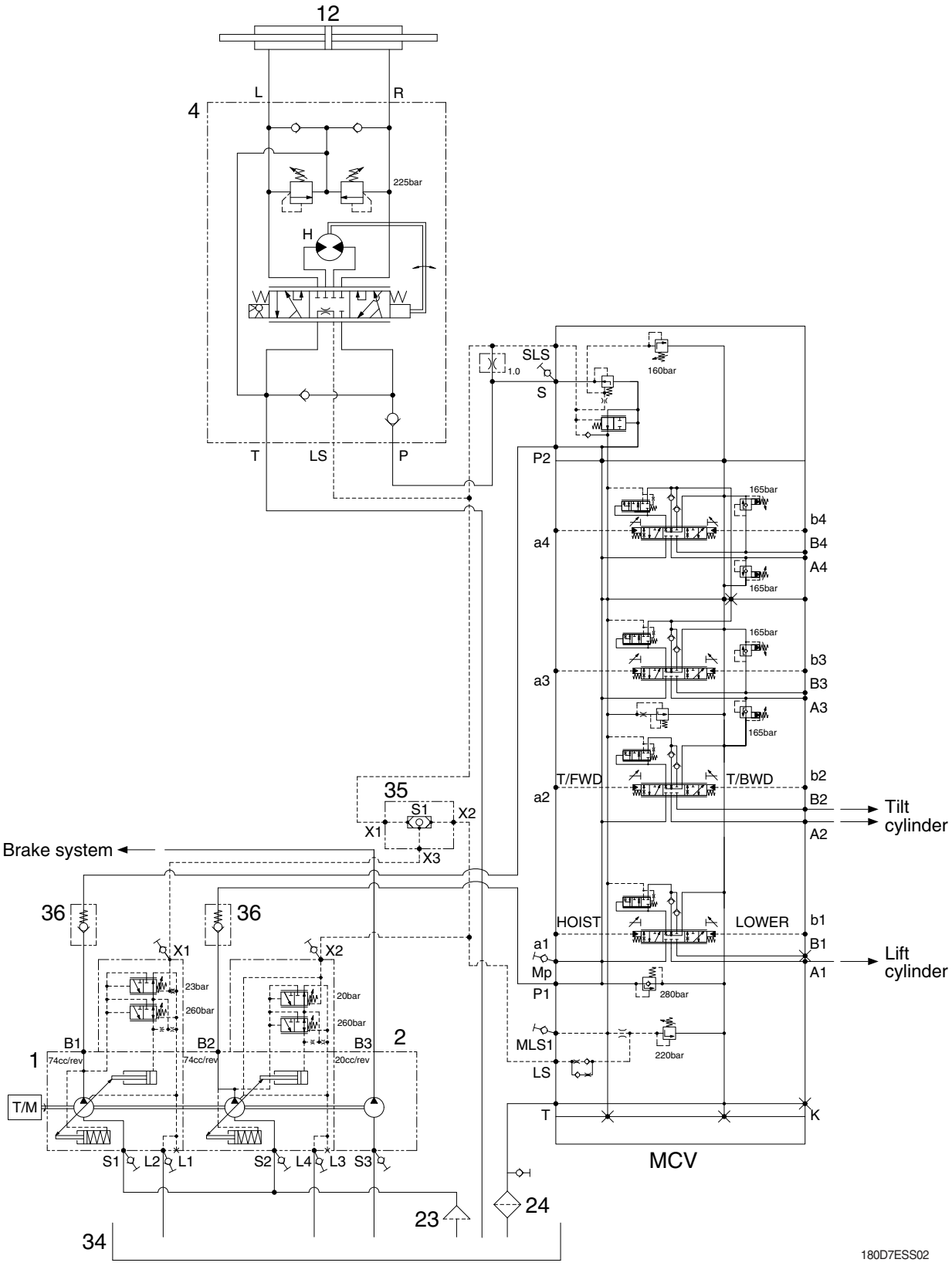
1) STRUCTURE



180D7EBP00

1	Housing	8	Front cover
2	Bush block	9	Retainer seal
3	Backup seal	10	Snap ring
4	Channel seal	11	Rear cover
5	Shaft gear	12	Washer
6	Driven gear	13	Bolt
7	O-ring		

2. HYDRAULIC CIRCUIT

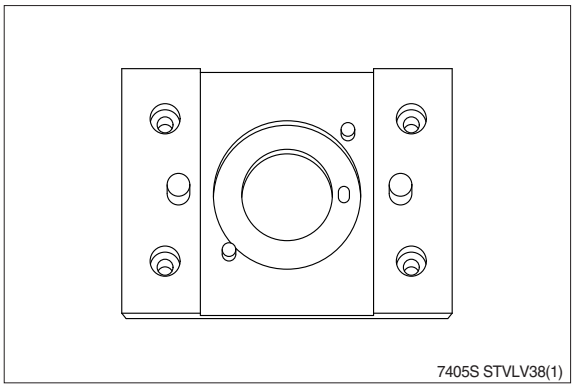


1	Main pump	24	Return filter
2	Auxiliary pump	34	Hydraulic tank
4	Steering unit	35	Shuttle valve
12	Steering cylinder	36	Check valve
23	Suction strainer		

Problem	Cause	Remedy
Slow or hard steering	Too much friction in the mechanical parts of the machine	Lubricate bearings and joints of steering column or repair if necessary. Check steering column installation.
	Cold oil	Warm the hydraulic oil.
	Low priority valve pressure setting	Do priority valve pressure test. Clean or replace cartridge in steering valve.
	Worn hydraulic pump	Do hydraulic pump performance check.
	Sticking priority valve spool	Remove and inspect.
	Broken priority valve spring	Remove and inspect.
Constant steering to maintain straight travel	Air in system	Check for foamy oil.
	Leakage in steering system	Do steering system leakage check.
	Worn steering unit	Do steering system leakage check. Do steering unit neutral leakage test in group 3.
	Leaf spring without spring force or broken	Replace leaf springs.
	Spring in double shock valve broken	Replace shock valve.
	Gear wheel set worn	Replace gear wheel set.
	Cylinder seized or piston seals worn	Replace defects parts.
Slow steering wheel movement will not cause any frame movement	Leakage in steering unit gerotor	Do steering system leakage check.
	Worn steering unit gerotor	Do steering leakage check.
Steering wheel can be turned with frames against steering stop	Leakage in steering system	Do steering system leakage check.
Steering wheel turns with no resistance and causes no frame movement	Broken steering column or splined coupling	Remove and inspect.
	Lack of oil in steering unit	Start engine and check steering operation.
	Leakage in steering system	Do steering system leakage test in group 3.

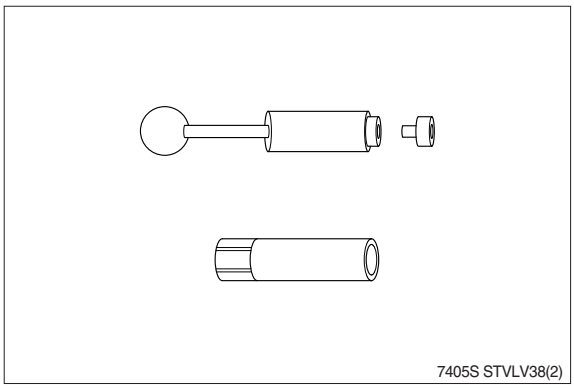
2) TOOLS

(1) Holding tool.



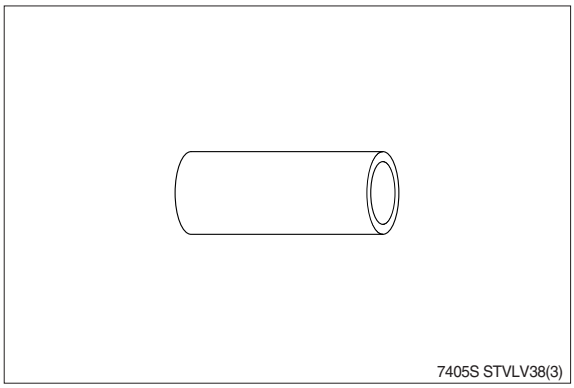
7405S STVLV38(1)

(2) Assembly tool for O-ring and kin-ring.



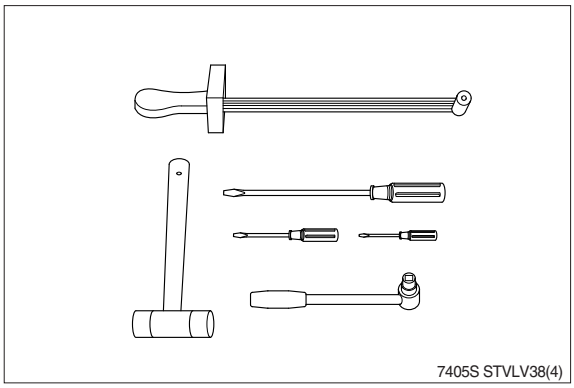
7405S STVLV38(2)

(3) Assembly tool for dust seal.



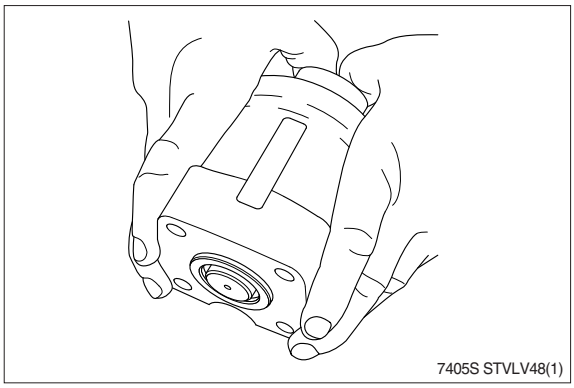
7405S STVLV38(3)

(4) Torque wrench 0~7.1 kgf · m (0~51.6 lb · ft)
13 mm socket spanner
12 mm screwdriver
6 mm screwdriver
2 mm screwdriver
Plastic hammer
Ratchet spanner

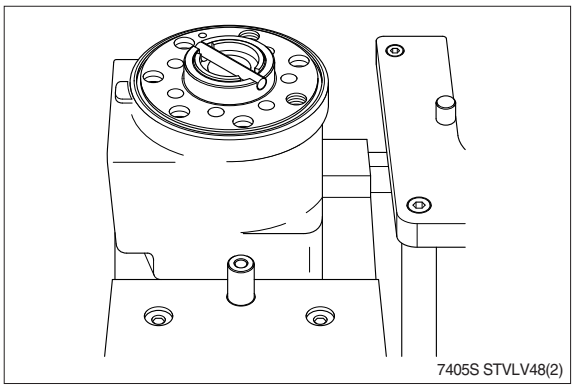


7405S STVLV38(4)

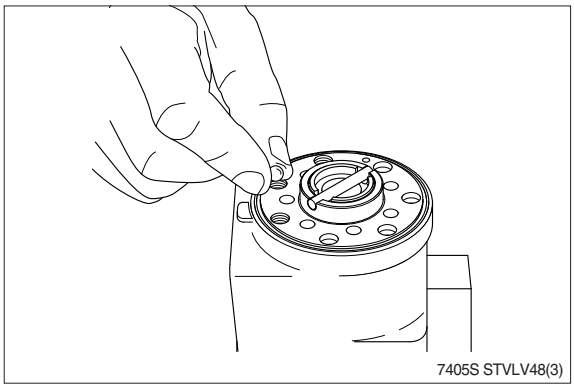
(15) The spool set will push out the assembly tool guide. The O-ring is now in position.


7405S STVLV48(1)

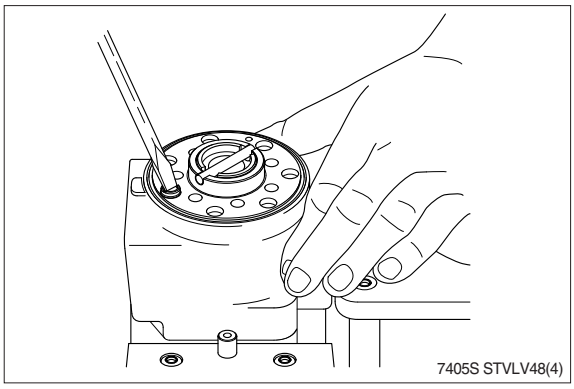
(16) Put the steering unit back into the holding tool keeping the bore vertical. Place the cross pin in the spool/sleeve so that it is parallel to the port flange.


7405S STVLV48(2)

(17) Put the ball into the hole indicated by the arrow.


7405S STVLV48(3)

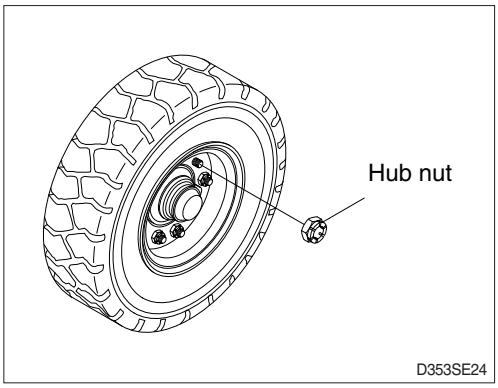
(18) Screw the threaded bushing lightly into the bore. The top of the bushing must lie just below the surface of the housing.


7405S STVLV48(4)

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 balance weight part of the truck.

(1) Loosen the hub nut and take off the steering wheel tire.



(2) Remove Hub cap.

(3) Pull out split pin and remove lock nut, washer.

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

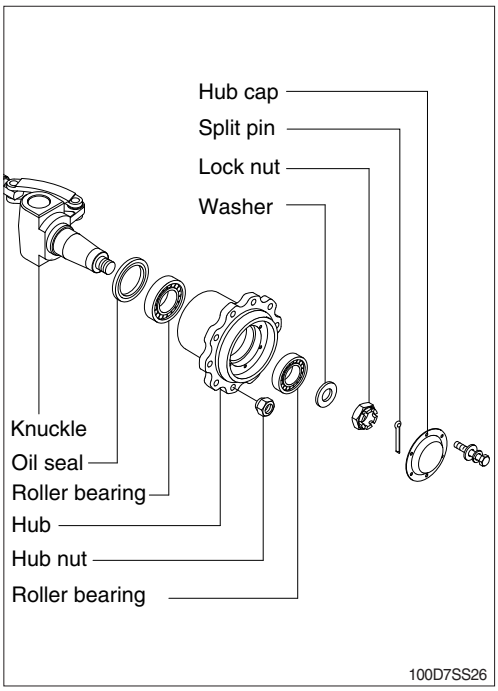
※ Be very careful because just before the hub comes off, tapered roller bearing will fall out.

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

(6) Pull out oil seal.

※ Don't use same oil seal twice.

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



(8) Loosen set screw (1-8) and nut (1-9).

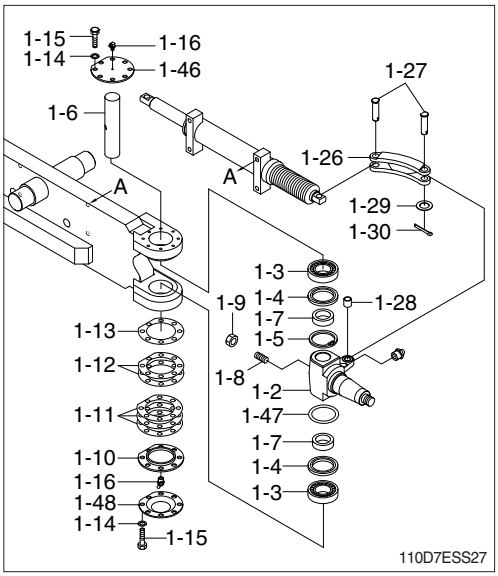
(9) Loosen with washer bolt (1-15) and remove cover (1-10, 1-48), shim (1-11, 1-12, 1-13). Remove grease nipple (1-16).

(10) Push out the king pin (1-6) without damaging the knuckle arm (1-2).

(11) At the same time the king pin is removed, pull out the oil seal (1-4).

(12) If defect is observed in taper roller bearing (1-3), pull it out by using extractor.

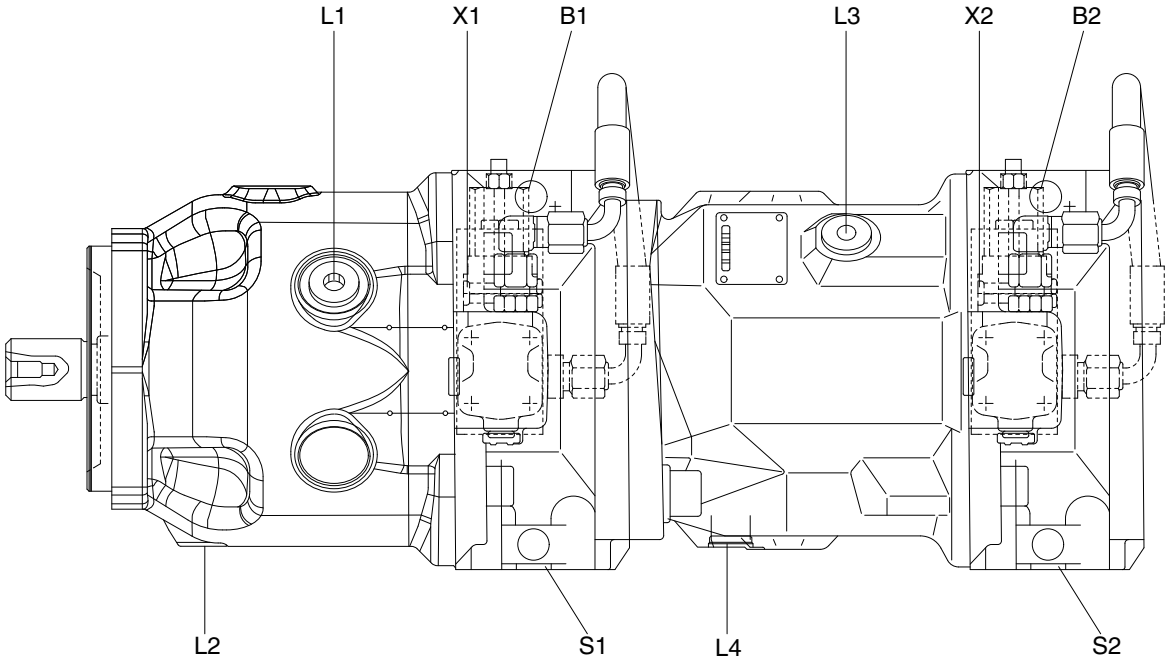
(13) Remove spilt pin (1-30), special washer (1-29) and link pin (1-27).

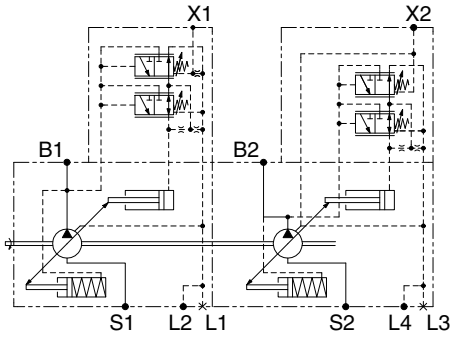


4. MAIN PUMP

1) STRUCTURE (1/2)

This variable displacement piston pump consists of steering pump and working pump.





HYDRAULIC CIRCUIT

180D7EMP04

Port	Port name	Size
B1	Pressure port	SAE 1"
B2	Pressure port	SAE 1"
S1	Suction port	SAE 2"
S2	Suction port	SAE 2"
L1, L2	Case drain port	7/8-14UNF-28
L3, L4	Case drain port	7/8-14UNF-28
X1, X2	Pilot pressure port	7/16-20UNF-28

(5) Adjustment of flow control

Flow compensator setting must be carried out following procedures and conditions.

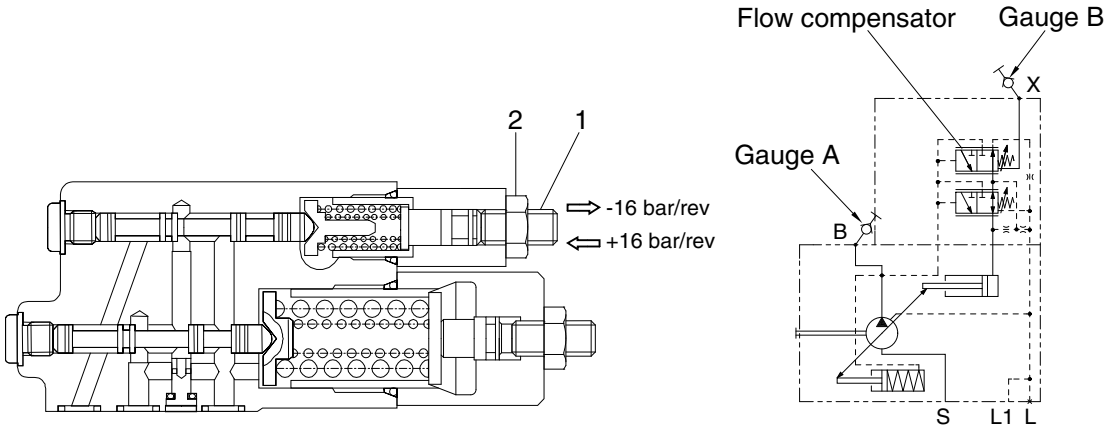
① **Conditions**

- Engine is running (at high or low idle).
- Lever is operated slowly (example : Mast up).
- Pressure gauges are installed.

※ Discharge pump flow should be less than max pump flow.

② **Procedures**

- Loosening the hexagon nut (2).
- Adjusting screw (1) of flow controller by tightening or loosing the screw (1).
  · Flow setting : △P = Gauge A - Gauge B
  · Specification : Steering pump (29 bar) / Attachment pump (22 bar)



75796WE37

(6) Adjustment of pressure control

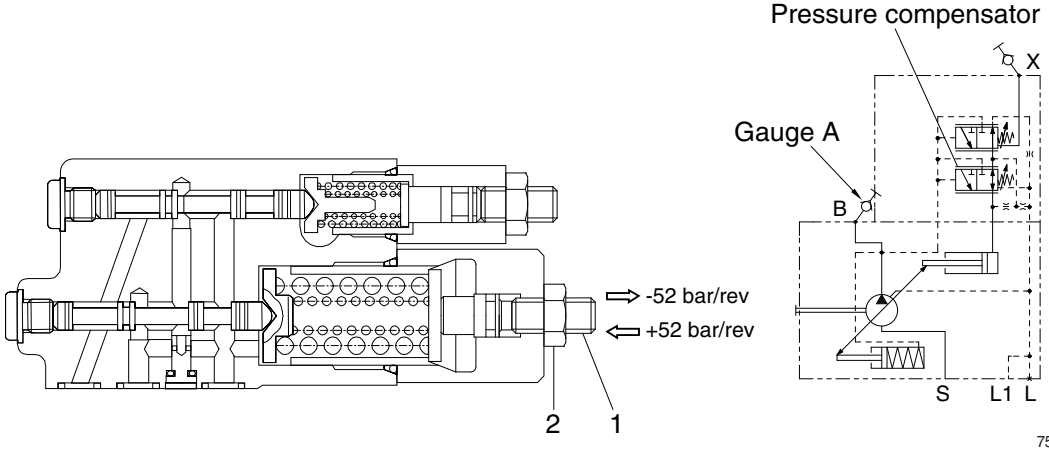
Pressure compensator setting must be carried out following procedures and conditions.

① **Conditions**

- Engine is running.
- System is at relief condition.

② **Procedures**

- Loosening the hexagon nut (2).
- Adjusting screw (1) of pressure controller by tightening or loosing the screw (1).
  · Maximum pressure setting = Gauge A
  · Specification : Steering pump (250 bar) / Attachment pump (300 bar)

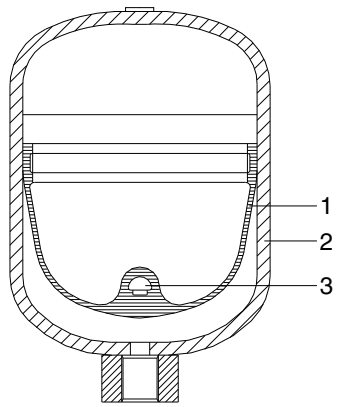


75796WE38

11. ACCUMULATOR

The accumulator is installed at the cut off valve. When the mast is left the raised position, and the control levers are operated with the engine stopped the pressure of the compressed nitrogen gas inside the accumulator sends pilot pressure to the control valve to actuate it and allow the boom and bucket to come down under their own weight.

Type of gas	Nitrogen gas (N_2)
Volume of gas	0.35 ℓ (0.1 U.S.gal)
Charging pressure of gas	15 kg/cm^2 (213 psi)
Max actuating pressure	170 kg/cm^2 (2420 psi)

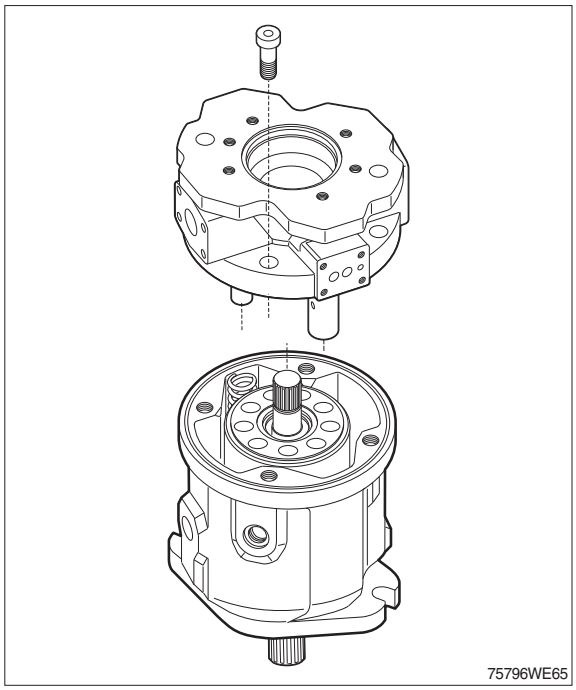


1 Diaphragm
2 Steel pressure vessel
3 Closure button

7803AWE56

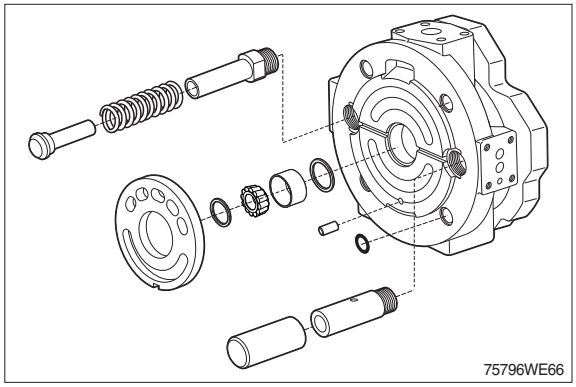
(3) Remove the connection plate fixing bolts and the connection plate.

※ Distributor plate and adjustment piston can drop down.

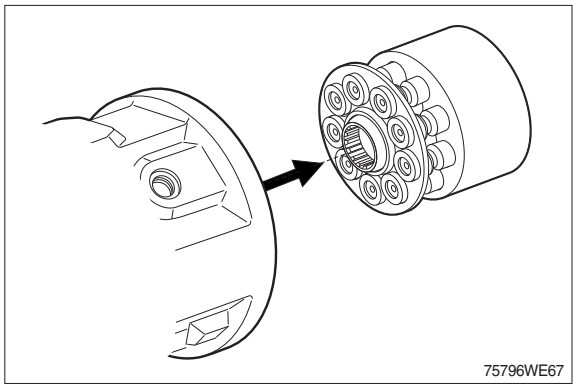


(4) Remove distributor plate.
Take note of the orientation.

※ Remove bearing with withdrawal tool.
Do not damage the sealing surface.

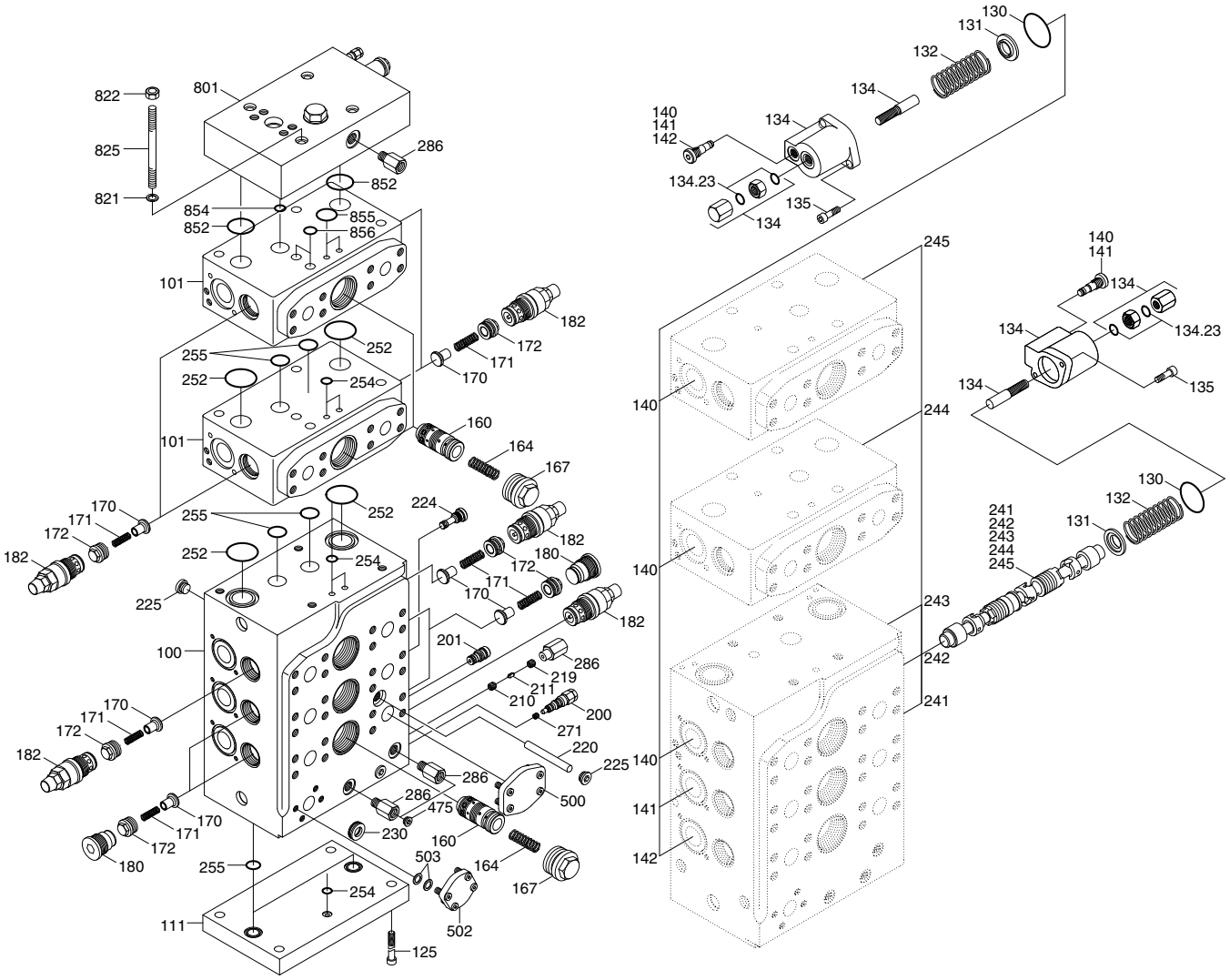


(5) Remove the rotary group in a horizontal position.



2. MAIN CONTROL VALVE

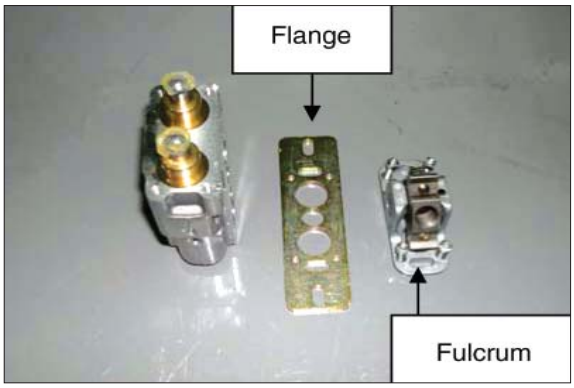
1) STRUCTURE



180D7EMCV01

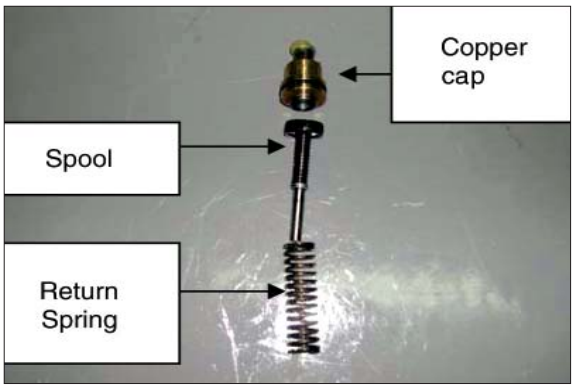
100	Housing	160	Spool	220	Spool	286	Reducing piece
101	Housing	164	Compression spring	224	Locking screw	475	Locking screw
111	Plate	167	Locking screw	225	Locking screw	500	Blank flange
125	Cylinder	170	Cone	230	Connection piece	502	Blank flange
130	O-ring	171	Compression spring	241	Spool	503	Washer
131	Retainer spring	172	Locking screw	242	Spool	801	End block
132	Compression spring	180	Plug	243	Spool	821	Washer
134	Cover	182	Relief valve	244	Spool	822	Hexagonal nut
134.23	O-ring	200	Shuttle valve	245	Spool	825	Stud
135	Bolt	201	Drain orifice	252	O-ring	852	O-ring
140	Locking screw	210	Valve seat	254	O-ring	854	O-ring
141	Throttle check valve	211	Throttle bolt	255	Seal	855	O-ring
142	Throttle check valve	219	Valve seat	271	Orifice	856	Seal

Take off the fulcrum and mounting flange very carefully keeping all components in their own positions.



100D7RCV06

Take out the spool, return spring from the body. And replace any component if it is needed.



100D7RCV07

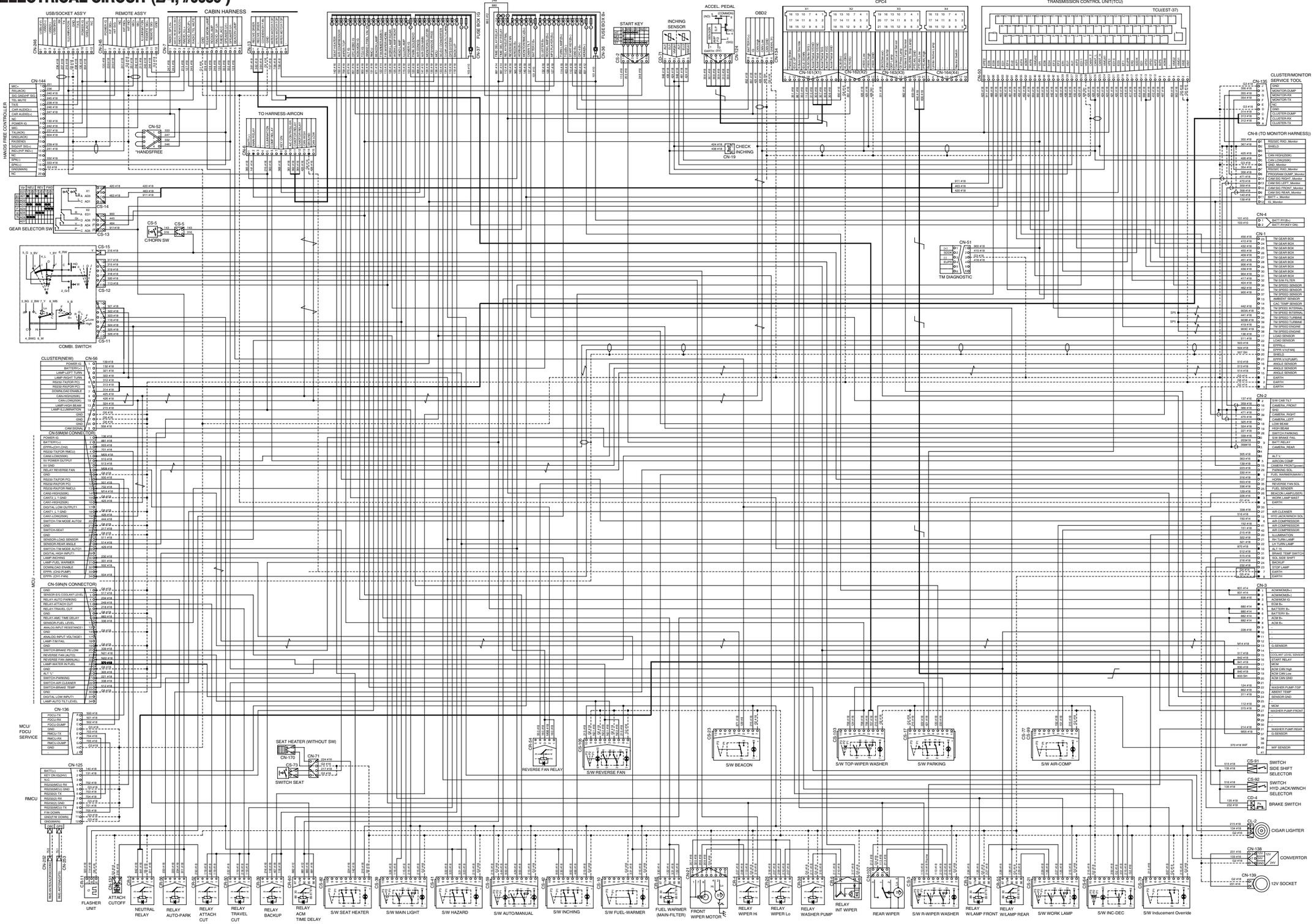
Reassemble the spool in opposite order mentioned above.
Insert spool as straight as possible not to give any damaged on it while inserting it into body.


100D7RCV08

Prepare copper cap in clean.
Apply some clean grease around the O-ring on the copper cap, in order to avoid any damage of O-ring while fitting it into body.


100D7RCV09

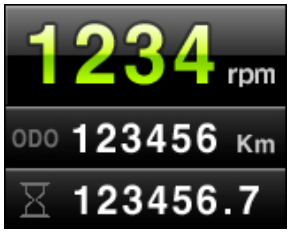
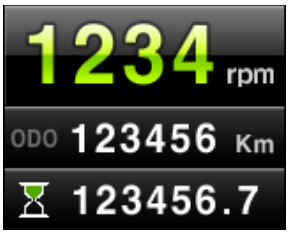
· ELECTRICAL CIRCUIT (2/4, #0089-)



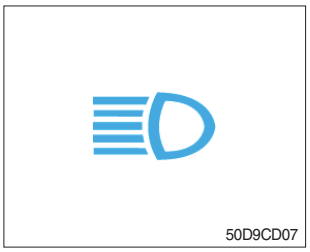
21HS-00016-00 1OF2

5) LCD

LCD has the functions to display start mode, standby mode, cruise function, model select and engine error.

NO	Display	Name	Description
1		Start mode	- Display initialization state with HYUNDAI logo and program version.
2		Standby mode	- Displays on the idle state. - Displays rpm, odometer and hourmeter
3			- Odometer is on, ODO is activated.
4			- Hourmeter is on, is activated.

(3) Head light pilot lamp



① This lamp comes ON when the main light switch is operated to 2nd step.

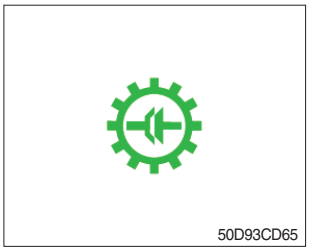
(4) Preheater pilot lamp

① This lamp lights ON when start switch is turned clockwise to the ON position. Light will turn off after approximately 15~45 seconds, depending on engine coolant temperature, indicating that preheating is completed.

② When the lamp goes out the operator should start cranking the engine.

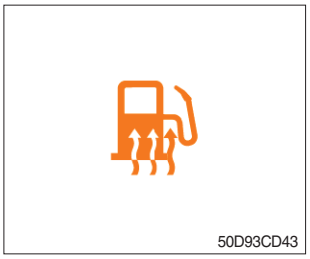
※ **Refer to page 5-12 of the operator's manual.**

(5) Inching pilot lamp



① When the inching switch is pressed, the lamp lights ON.

(6) Fuel warmer pilot lamp



① This lamp is turned ON when the coolant temperature is below 10 °C (50 °F) or the hydraulic oil temperature 20 °C (68 °F).

② The automatic fuel warming is cancelled when the engine coolant temperature is above 60 °C (140 °F) , or the hydraulic oil temperature is above 45 °C (113 °F) since the start switch was ON position.

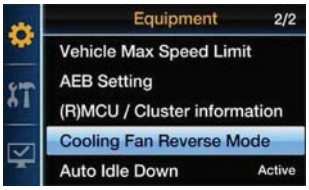
(7) OPSS pilot lamp

① This signal lamp lights ON when the operator leaves the seat.

② Powered travel movement of the truck shall be possible only if the operator is in the normal operating position. Transmission will automatically shift to neutral upon the exiting of the operator.

③ The gear selector lever must be cycled through neutral with the operator in the normal operating position to regain powered direction control.

⑩ Cooling fan reverse mode



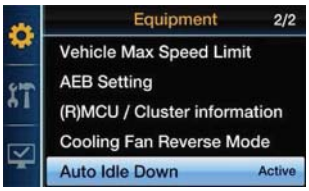
180D9CD101-1

180D9CD103-1

- Manual : The fan only rotate in reverse direction while you hold down the manual button.
- Automatic : The fan rotate in reverse direction at pre-set interval.
  - Interval : 30 minutes ~ 5 hours
  - Time : 30 seconds ~ 5 minutes

※ **Refer to the page 7-25-6 for the cooling fan control switch.**

⑪ Auto ilde down



180D9CD104

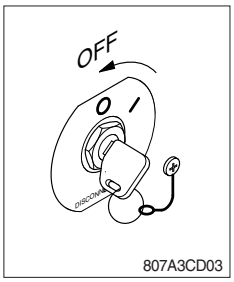
180D9CD105

- On/off to the auto idle down function.

3) DISPLAY DURING AEB-MODE

Symbol	Meaning	Remarks
PL	AEB-starter is plugged at the diagnostic plug	
ST	AEB-Starter-button is pressed	
K1.....K3 KV, KR	Calibrating clutch K1...K3, KV or KR resp.	
_and Kx	Wait for start, initialization of clutch Kx, x : 1, 2, 3, V, R	
≡and Kx	Fast fill time determination of clutch Kx	
=and Kx	Compensating pressure determination of clutch Kx	
OK	Calibration for all clutches finished	Transmission stays in neutral, you have to restart the TCU(ignition off/on) after removing AEB-Starter
STOP	AEB canceled(activation stopped)	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
STOP and Kx	AEB stopped, clutch Kx can't be calibrated	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
Spanner and Kx	Kx couldn't be calibrated, AEB finished	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
△E	Engine speed too low → raise enging speed	
▽E	Engine speed too high → lower enging speed	
△T	Transmission oil temperature too low → heat up transmission	
▽T	Transmission oil temperature too high → cool down transmission	
FT	Transmission temperature not in defined range during calibration	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FB	Operating mode not NORMAL or transmission temperature sensor defective or storing of Calibrated values to EEPROM-has failed.	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FO	Output speed_not_zero	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FN	Shift lever not in Neutral position	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FP	Park brake_not_applied	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
STOP	AEB-Starter was used incorrect or is defective. Wrong device or wrong cable used.	Transmission stays in neutral, you have to restart the TCU(ignition off/on)

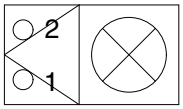
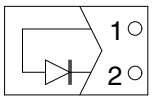
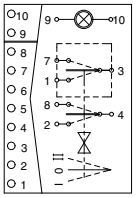
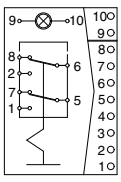
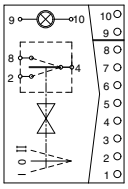
21) MASTER SWITCH

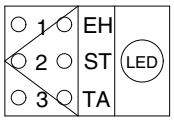
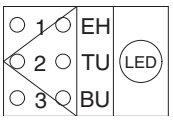
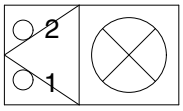
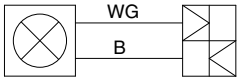
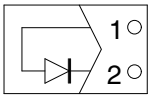
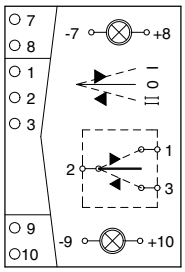


(1) This switch is used to shut off the entire electrical system.
When the machine is not operated for a long time, turn OFF the master switch for the safety purpose.

(2) I : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.

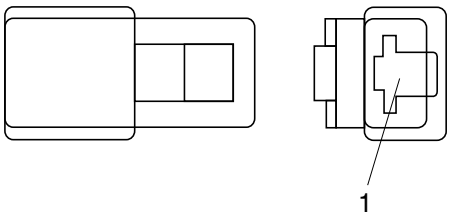
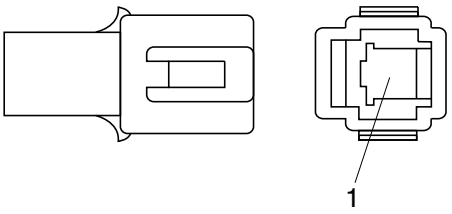
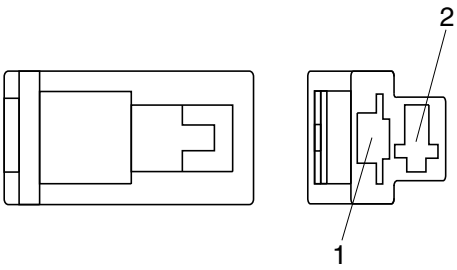
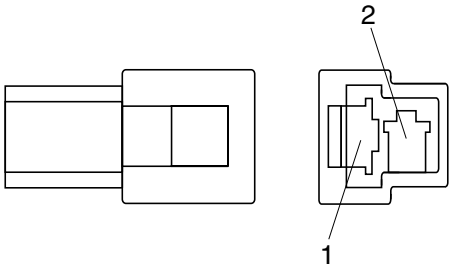
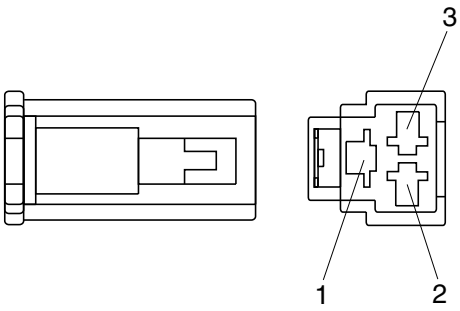
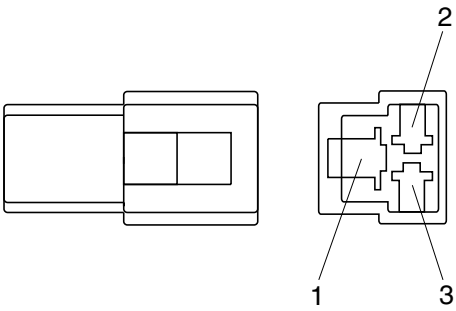
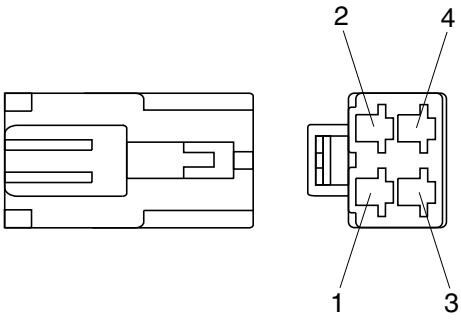
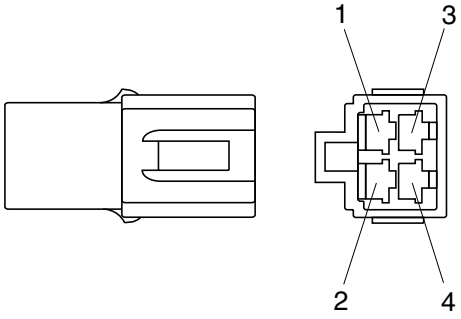
※ **Never turn the master switch to OFF with the engine running. Engine and electrical system damage could result.**

Part name	Symbol	Specifications	Check
Room lamp	 CL-1	24V 10W	※ Check resistance Normal : A few Ω Abnormal : ∞ Ω
License lamp	 CL-21	24V 10W (1EA)	※ Check resistance Normal : A few Ω Abnormal : ∞ Ω
Diode	 DO-1 DO-2 DO-3 DO-4	Diode spec : 1N5406	-
Switch (Cabin tilt)	 CS-77	24V 8A	※ Check contact Ⅰ : 0 Ω (2-4, 1-3) ∞ Ω (8-4, 7-3) Ⅱ : 0 Ω (8-4, 7-3) ∞ Ω (2-4, 1-3) 0 : ∞ Ω (7-3, 1-3, 8-4, 2-4)
Switch (Locking type)	 CS-10 CS-17 CS-34 CS-41 CS-42 CS-54 CS-79 CS-82	24V 8A	※ Check contact OFF : ∞ Ω (For terminal 1-5, 2-6) : 0 Ω (For terminal 5-7, 6-8) ON : ∞ Ω (6-8, 5-7) 0 Ω (2-6, 1-5)
Switch (Non-locking type)	 CS-64	24V 8A	※ Check contact 0 : ∞ Ω (For terminal 2-4, 1-7) Ⅰ : 0 Ω (2-4) Ⅱ : 0 Ω (4-8)

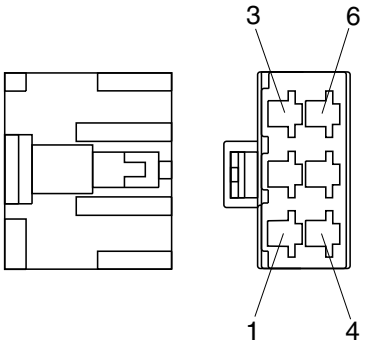
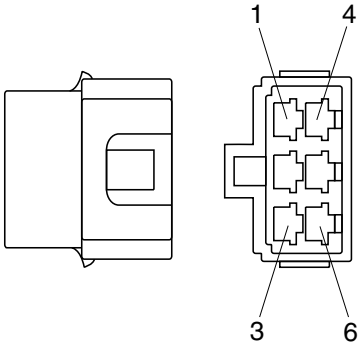
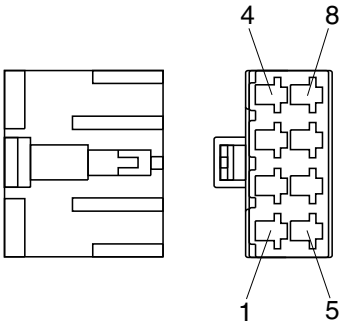
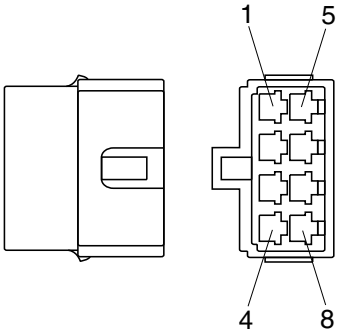
Part name	Symbol	Specifications	Check
Rear combination lamp	 CL-15A CL-16A	24V 1W (tail) 24V 10W (stop)	※ Check disconnection Normal : A few Ω Abnormal : ∞ Ω
Rear combination lamp	 CL-15B CL-16B	24V 21W (backup) 24V 21W (turn)	※ Check disconnection Normal : A few Ω Abnormal : ∞ Ω
Room lamp	 CL-1 CL-51	24V 10W	※ Check resistance Normal : A few Ω Abnormal : ∞ Ω
License lamp	 CL-21	24V 10W (1EA)	※ Check resistance Normal : A few Ω Abnormal : ∞ Ω
Diode	 DO-1 DO-2 DO-3 DO-4 DO-5	Diode spec : 1N5406	-
Switch (cabin tilt)		24V 8A	※ Check contact Ⅰ : 0 Ω (For terminal 2-1) ∞ Ω (For terminal 2-3) Ⅱ : 0 Ω (For terminal 2-3) ∞ Ω (For terminal 2-1) 0 : ∞ Ω (For terminal 2-1, 2-3)

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-51	AMP	6	TCU service tool	480704	926682-3
CN-52	KET	4	Handsfree controller	MG610331	MG640333
CN-55	KET	14	OPSS unit	MG610350	
CN-56	AMP	20	Cluster	174047-2	-
CN-57	AMP	20	Cluster	175967-2	-
CN-58		20	Monitor		
CN-59	AMP	36	MCU	344111-1	-
CN-60	KET	2	Fusible link	-	MG640337
CN-65	DEUTSCH	2	Back-up buzzer	DT06-2S	-
CN-71	DEUTSCH	2	Parking solenoid	DT06-2S	-
CN-74	PACKARD	5	Alternator	18920000000	-
CN-83	KUM	2	Condenser fan	PB625-02027	-
CN-90	TYCO	10	Frame harness	174655-2	174657-2
CN-91	DEUTSCH	3	Fender-RH	DT06-4S	-
CN-92	DEUTSCH	4	ECU connector (J3)	DT06-4S-EP06	-
CN-93	DEUTSCH	50	ECU connector (J2)	DRC26-50S01	-
CN-95	OPL/KET	2	Fusible link	21N4-01310/MG600558	-
CN-96	AMP	4	Fuel warmer	2-967325-3	-
CN-98	DEUTSCH	3	I/conn	DT06-3S-EP06	-
CN-99	DEUTSCH	3	Resistor	DT06-3S-EP06	-
CN-102	AMP	4	Rear wiper motor	180900	-
CN-103	KET	2	Rear washer pump	MG610320	-
CN-112	ZF	16	Gear box	21L7-60290	-
CN-124	AMP	6	Accel pedal	174262-2	-
CN-125	DEUTSCH	12	RMCU	DT06-12S	-
CN-130	DEUTSCH	2	Hyd jack/Winch selector solenoid	DT06-2S	-
CN-131	DEUTSCH	2	Attach cut off	DT06-2S	-
CN-132	DEUTSCH	2	Side shift selector	DT06-2S	-
CN-133	AMP	2	Cabin down solenoid	-	174354-2
CN-134	MOLEX	16	Engine service tool	-	51115-1601
CN-135	DEUTSCH	9	Cluster/Monitor service tool	-	HD10-9-96P
CN-136	DEUTSCH	-	MCU/FDCU service tool	-	HD10-9-96P
CN-138	KET	3	DC/DC converter	MG610045	-
CN-139	KET	2	12V socket	MG610043	-
CN-144	KET	20	Handsfree controller	MG610240	-
CN-151	AMP	21	MCM	1-1355222-1	-
CN-152	AMP	21	ACM	1-1355222-1	-
CN-153	AMP	120	ACM	1418421-1	-
CN-154	DEUTSCH	2	Fan motor EPPR valve	DT06-2S	-

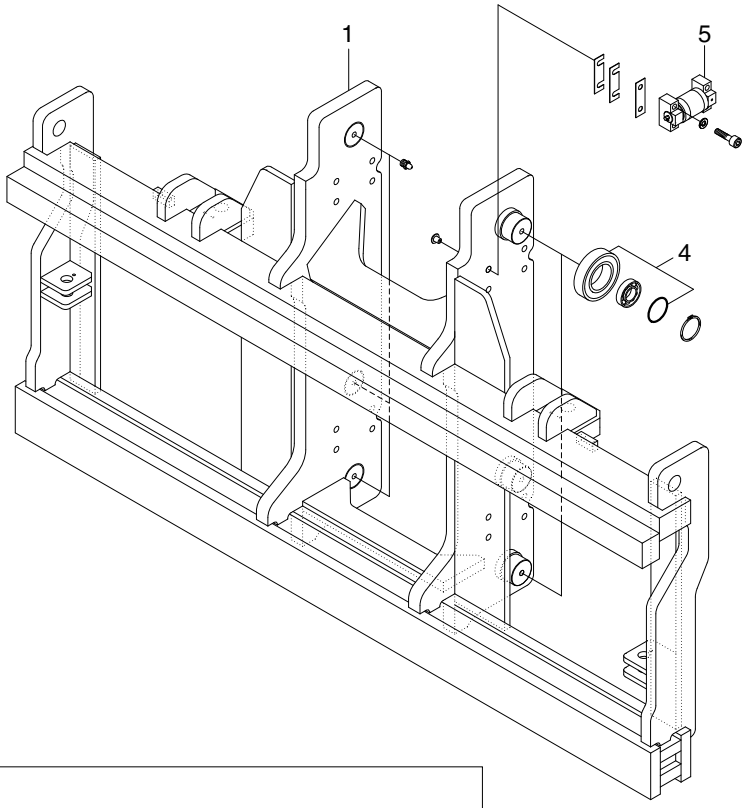
5) CN TYPE CONNECTOR

No. of pin	Receptacle connector (Female)	Plug connector (Male)
1	 S810-001202	 S810-101202
2	 S810-002202	 S810-102202
3	 S810-003202	 S810-103202
4	 S810-004202	 S810-104202

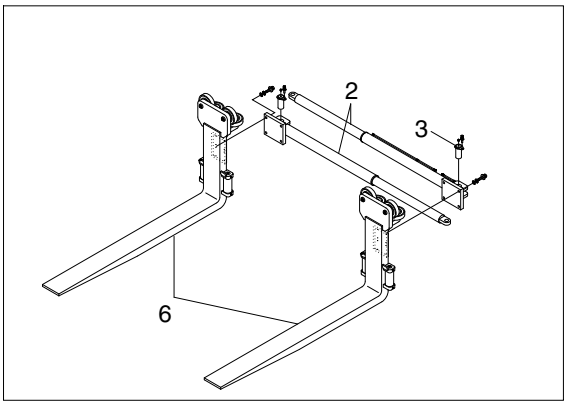
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CS-15	KET	1	Multi function switch	ST730018-3	-
CS-17	CARLING	10	Parking switch	21HN-56300	-
CS-21	CARLING	10	Work lamp switch	21HN-56300	-
CS-23	CARLING	10	Beacon switch	21HN-56300	-
CS-34	DAEDONG	10	Diagnostic switch	250-10PRG	-
CS-39	CARLING	10	Main switch	21HN-56300	-
CS-41	CARLING	10	Hazard switch	21HN-56300	-
CS-42	CARLING	10	Inching switch	21HN-56300	-
CS-54	DAEDONG	10	Aircon switch	250-10PRG	-
CS-59	CARLING	10	Auto/manual switch	21HN-56300	-
CS-64	CARLING	10	Inc/dec switch	21HN-56300	-
CS-72	DEUTSCH	4	Tilt switch	DT06-4S	DT04-4P
CS-74	DEUTSCH	4	Cabin tilt switch	-	DT04-4P
CS-77	CARLING	10	Air compressor switch	21HN-56300	-
CS-79	CARLING	10	Induce override switch	21HN-56300	-
CS-82	CARLING	10	Seat heat switch	21HN-56300	-
CS-91	KET	1	Side shift selector switch	ST730018-3	ST750036-3
CS-92	KET	1	Hyd. Jack selector switch	ST730018-3	ST750036-3
CS-99	DAEDONG	10	Air comp switch	250-10PRG	-
CS-103	CARLING	10	Top wiper switch	21HN-56300	-
CS-105	CARLING	10	Cooling fan switch	21HN-56300	-
Lamp					
CL-1	KET	2	Room lamp	-	MG610392
CL-2	KET	1	Cigar lighter	ST730018-3	ST750036-3
CL-2	AMP	1	Cigar lighter	172128-1	-
CL-3	DEUTSCH	6	Head lamp-LH	DT06-6S	-
CL-4	DEUTSCH	6	Head lamp-RH		
CL-5	DEUTSCH	2	Mast lamp-LH	DT04-2S	DT04-2P
CL-6	DEUTSCH	2	Mast lamp-RH	DT04-2S	DT04-2P
CL-7	-	6	Beacon lamp	S822-014000	S822-114000
CL-15A	AMP	3	Rear combi lamp (Illum / stop)-LH	282087-1	-
CL-15B	AMP	3	Rear combi lamp (Turn / backup)-LH	282087-2	-
CL-16A	AMP	3	Rear combi lamp (Illum / stop)-RH	282087-1	-
CL-16B	AMP	3	Rear combi lamp (Turn / backup)-RH	282087-2	-
CL-21	KET	1	License lamp	ST730018-3	ST750036-3
CL-22	DEUTSCH	2	Rear work lamp-RH	DT04-2S	DT04-2P
CL-23	DEUTSCH	2	Rear work lamp-LH	DT04-2S	DT04-2P
CL-24	-	1	Flasher lamp	S822-014000	S822-114000
CL-30	KET	2	Room lamp	MG610392	-

No. of pin	Receptacle connector (Female)	Plug connector (Male)
6	 S810-006202	 S810-106202
8	 S810-008202	 S810-108202

3. CARRIAGE AND FORK



FORK



180D7EMS02

1	Carriage	4	Roller
2	Fork positioner cylinder	5	Side roller
3	Pin	6	Fork