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SECTION 1 GENERAL

Group 1 Safety hints 1-1
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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

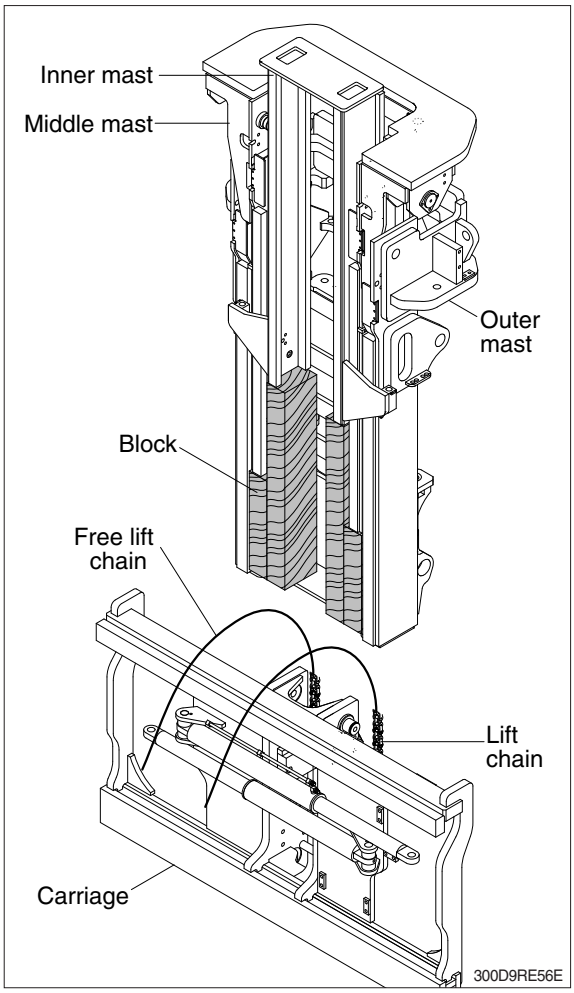
(2) Fine thread

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

⑤ Slowly raise inner mast upright until mast clears top of fork carriage. Move carriage to work area and lower the mast.

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

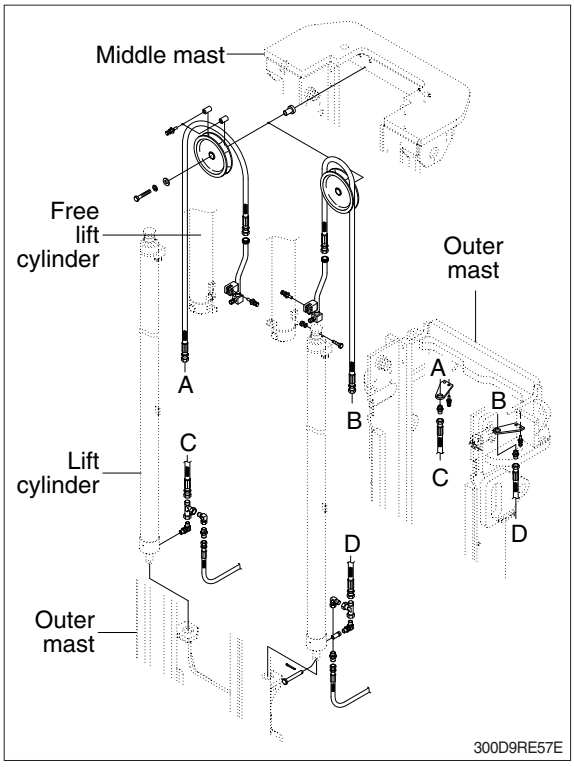
⑥ Inspect all parts for wear or damage. Replace all worn or damaged parts.



(3) Piping

① Remove the main hose attached to the work attachment.
② Remove the hoses from the work attachment.
③ Remove the lowing safety valve.

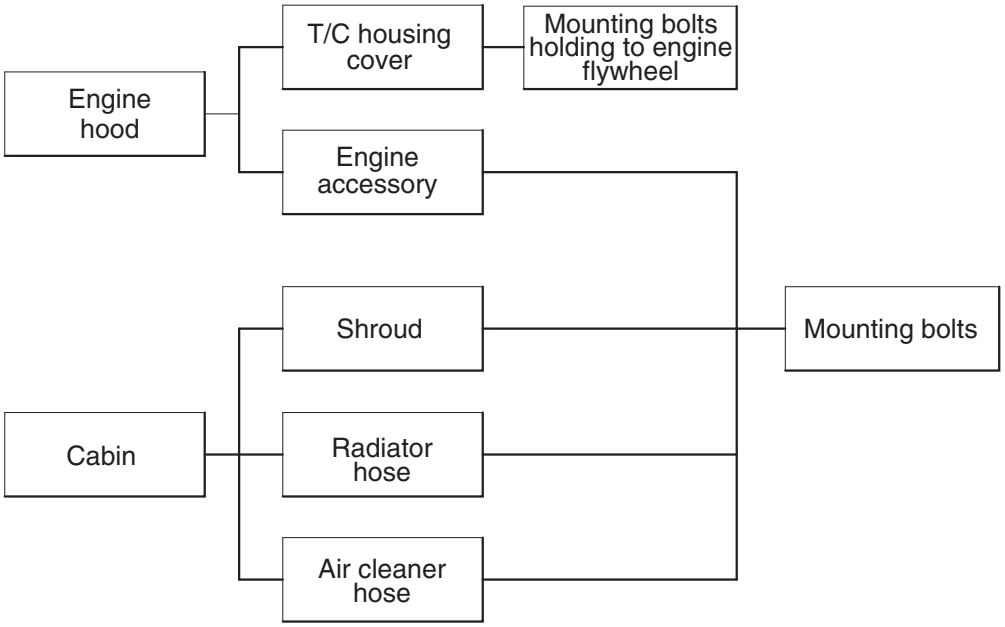
※ Put blind plugs in the piping immediately after removing pipes.
This prevents the hydraulic oil from flowing out and also prevents dust and dirt from getting in.



3. ENGINE

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

1) REMOVAL



(1) Engine hood

① **Cabin**

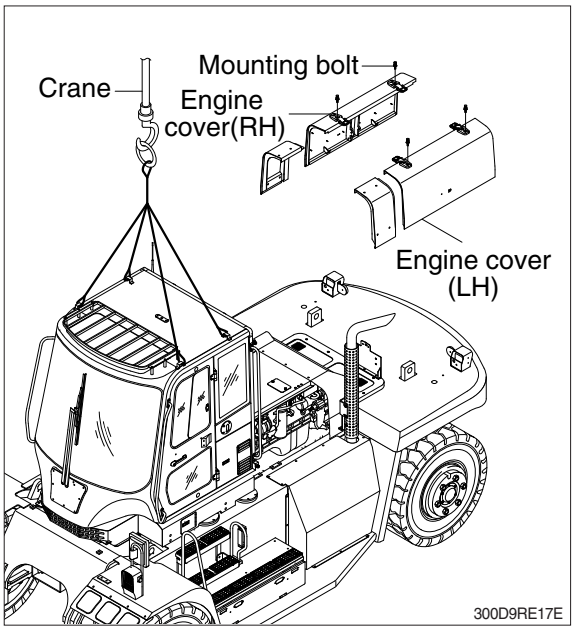
- First, tilt the cabin

※ Refer to page 7-17 of operator's manual for operating description.

- After remove the wiring for rear combination lamp, work lamp, head lamp and flasher lamp on the stay of the cabin and then raise it with a crane.
- Finally remove cabin for tilt option cylinder, pin and latch assy.

② **Engine cover (LH, RH)**

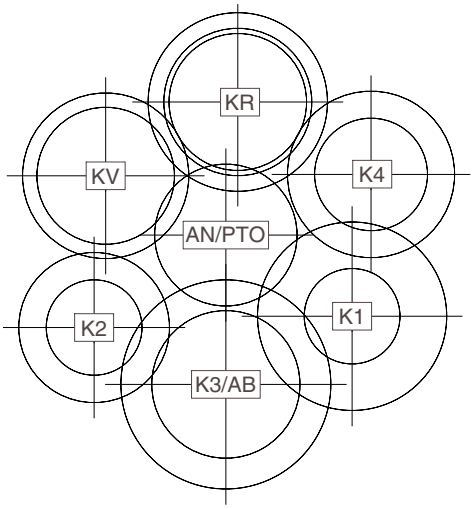
Remove engine cover by loosening the mounting bolts.

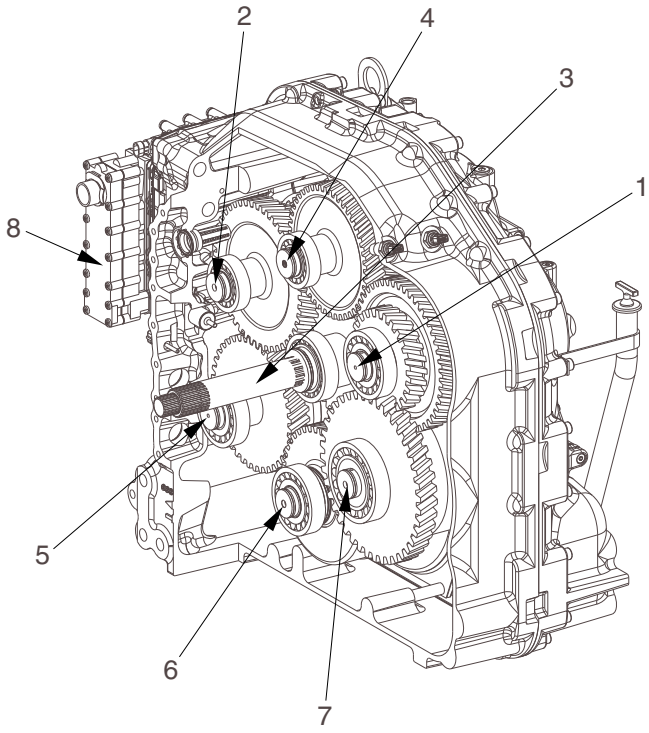


3. TRANSMISSION

1) LAYOUT

Gearbox diagram





180D7ETM03

1 Clutch shaft (lay shaft, K4)
2 Clutch shaft (KV)
3 Input shaft / Power take-off (AN/PTO)
4 Clutch shaft (KR)
5 Clutch shaft (KZ)
6 Clutch shaft / Output (K3/AB)
7 Clutch shaft (K1)
8 Electro-hydraulic control

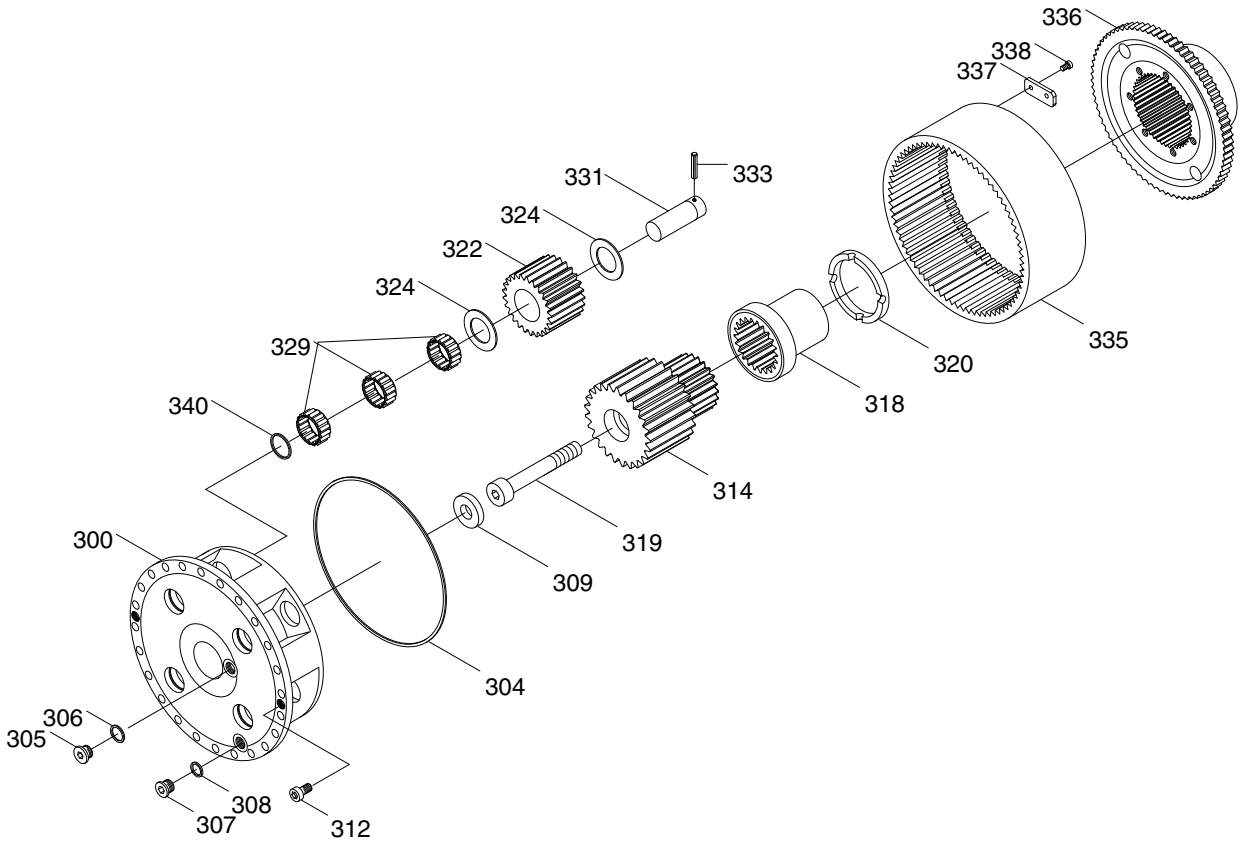
2) DISPLAY DURING AEB-MODE

Symbol	Meaning	Remarks
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)

Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
88	**S.C. to ground at clutch KR** The measured resistance value of the valve is out of limit, the voltage at KR valve is too low · Cable/connector is defective and has contact to vehicle ground · Regulator has an internal defect	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	· Check the cable from TCU to the gearbox · Check the connectors from gearbox to TCU · Check the regulator resistance* · Check internal wire harness of the gearbox * See page 3-36
89	**O.C. at clutch KR** The measured resistance value of the valve is out of limit · Cable/connector is defective and has no contact to TCU · Regulator has an internal defect	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	· Check the cable from TCU to the gearbox · Check the connectors from gearbox to TCU · Check the regulator resistance* · Check internal wire harness of the gearbox * See page 3-36
91	**S.C. to ground at relay reverse warning alarm** TCU detected a wrong voltage at the output pin, that looks like a S.C. to vehicle ground · Cable is defective and is contact to vehicle ground · Backup alarm device has an internal defect · Connector pin is contacted to vehicle ground	Backup alarm will be on until TCU power down even if fault vanishes(Loose connection) 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
92	**S.C. to battery voltage at relay reverse warning alarm** TCU detected a wrong voltage at the output pin, that looks like a S.C. to battery voltage · Cable is defective and is contacted to battery voltage · Backup alarm device has an internal defect · Connector pin is contacted to battery voltage	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

Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
E1	**S.C. battery voltage at speedometer output**	-	※ Not used
E2	**S.C. to ground or O.C at speedometer output**	-	※ Not used
E3	**S.C. to battery voltage at display output** TCU sends data to the display and measures always a high voltage level on the connector · Cable or connectors are defective and are contacted to battery voltage · Display has an internal defect	No reaction OP mode : Normal	· Check the cable from TCU to the display · Check the connectors at the display · Change display
E4	**S.C. to ground at display output** TCU sends data to the display and measures always a high voltage level on the connector · Cable or connectors are defective and are contacted to battery voltage · Display has an internal defect	No reaction OP mode : Normal	· Check the cable from TCU to the display · Check the connectors at the display · Change display
E5	**Communication failure on DeviceNet**	Shift to neutral OP mode : TCU shutdown	· Check Omron master · Check wire of DeviceNet-Bus · Check cable to Omron master
E5	**DISPID1 timeout** Timeout of CAN-massage DISPID1 from display controller · Interference on CAN-Bus · CAN wire/connector is defective · Can wire/connector is defective and has contact to vehicle ground or battery voltage	TCU select parameter set with ID0 OP mode : Limp home	· Check display controller · Check wire of CAN-Bus · Check cable display controller

3) STRUCTURE 3



250D7EDR04

300	Planetary housing	314	Sun gear	331	Planetary pin
304	O-ring	318	Sleeve	333	Locking pin
305	Screw plug	319	Hexagon socket screw	335	Ring gear
306	Sealing ring	320	Thrust ring	336	Ring gear carrier
307	Screw plug	322	Planetary gear	337	Retainer
308	Sealing ring	324	Thrust washer	338	Hexagon screw
309	Thrust washer	329	Needle bearing	340	O-ring
312	Hexagon socket screw				

4) OPERATION

Both sides of the housing are supported by the frame and the center is mounted on the transmission case through propeller shaft.

The mast is installed on the front of the frame. The final deceleration and differential device built in the housing guarantee accurate rotation and smooth operation.

The power from the transmission in transferred through the pinion, ring gear, differential case, the pinion of the differential device and the side gear to the drive axle shaft by the side gear spline and to the hub and wheel mounted on the shaft by high tension bolts.

3. TROUBLESHOOTING

1) BRAKE LEAKS ACTUATION FLUID

Condition	Possible cause	Correction
Internal leak : Fluid bypasses seals into axle and fills axle with fluid and blows out breather or empties brake fluid reservoir.	1. Worn or damaged piston seal. 2. Melted or extruded piston seals. 3. Corrosion, pitting, wear or other damage, marks, scratches to piston and/or brake housing bore in area of seal/sealing lips.	1. Replace piston seals. 2. Correct cause of overheating and replace seals. 3. Clean, smooth, rework or replace affected parts.
External leak	1. Loose bleeder screw. 2. Loose inlet fitting or plugs. 3. Damaged inlet fitting or plugs or damaged seats.	1. Tighten bleeder screw to 2.0~2.7 kgf·m (15~20 lb-ft) 2. Tighten inlet fitting to 3.4~4.8 kgf·m (25~35 lb-ft) 3. Replace inlet fitting or plug and O-ring if used.

2) BRAKE NOISE AND VIBRATION

Condition	Possible cause	Correction
Brakes product noise, chatter, vibration.	Incorrect axle fluid and/or friction material used.	1. Use only meritor specified or approved materials. 2. Drain and flush fluid from axle. Replace with approved fluid. 3. Replace all friction discs. Thoroughly clean or replace stationary discs.

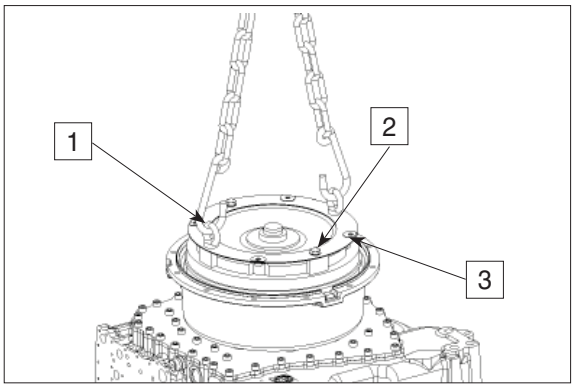
3) ENGINE CONNECTION AND OIL PRESSURE PUMP

(1) Engine connection

Loosen two hex screws (2), fit eye bolts (1) and pull off converter by means of lifting device.

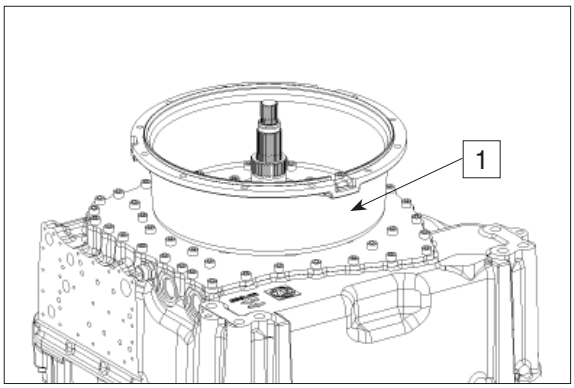
① Separate flexplate (3) from converter.

(S) Eye bolts assortment 5870 204 002
(S) Lifting chain 5870 281 047



180DTM034

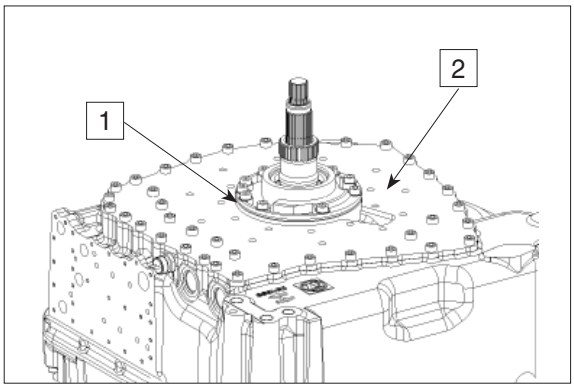
② Loosen threaded connection converter bell-housing/transmission housing and remove converter bell-housing (1).



180DTM035

③ Remove O-ring (1).

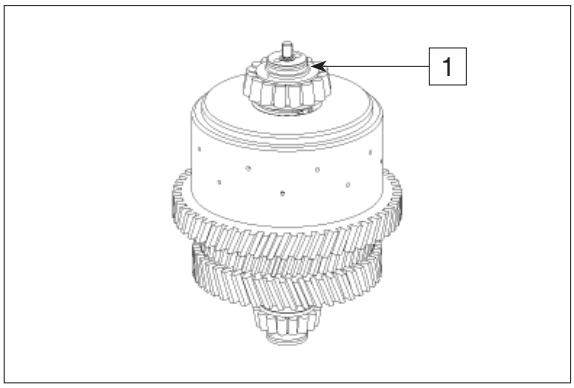
Loosen threaded connection plate/ transmission housing and oil pressure pump/transmission housing, then remove plate (2).



180DTM036

(2) Clutch KR

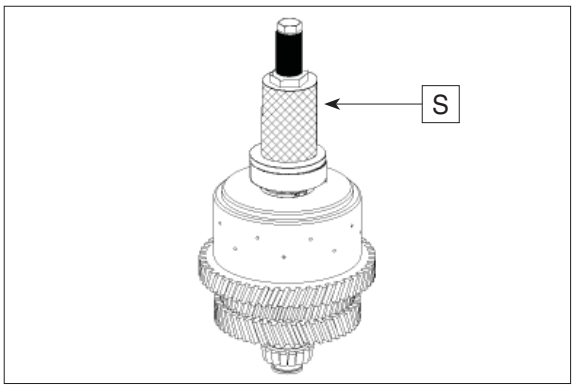
① Unsnap piston ring (1).



180DTM068

② Pull tapered roller bearing (internal ring) off the shaft.

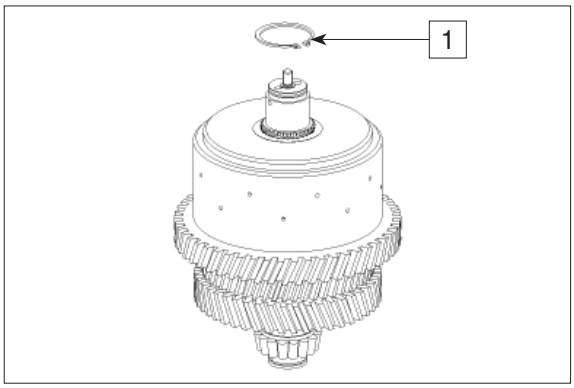
(S) Forcing device 5870 026 100
(S) Grab sleeve 5873 001 059



180DTM069

③ Unsnap retaining ring (1).

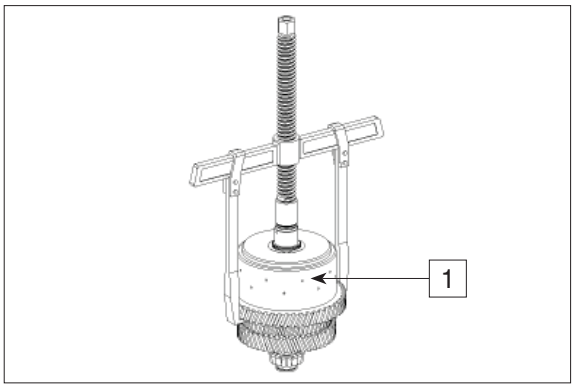
(S) Set of external pliers 5870 900 015



180DTM070

④ Pull clutch (1) together with spur gear off the shaft.

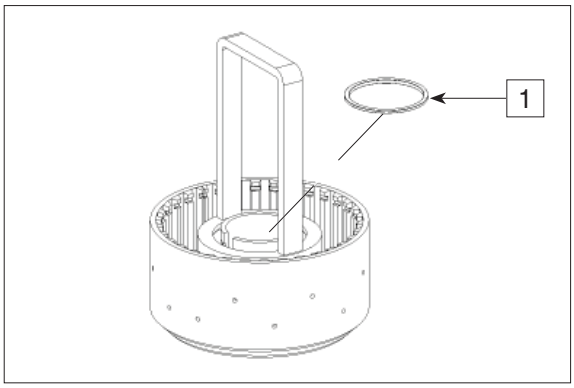
(S) Two-armed puller 5870 970 004



180DTM071

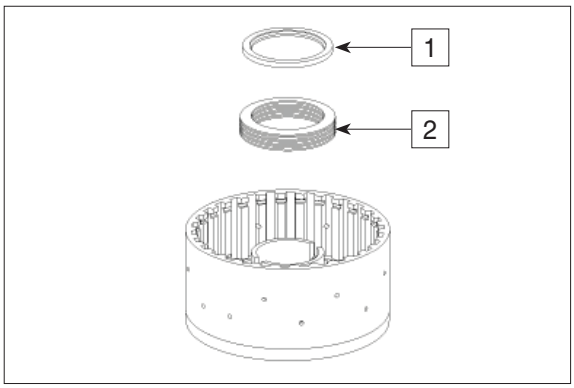
⑨ Preload cup springs and remove L-ring (1).

(S) Assembly aid 5870 345 088



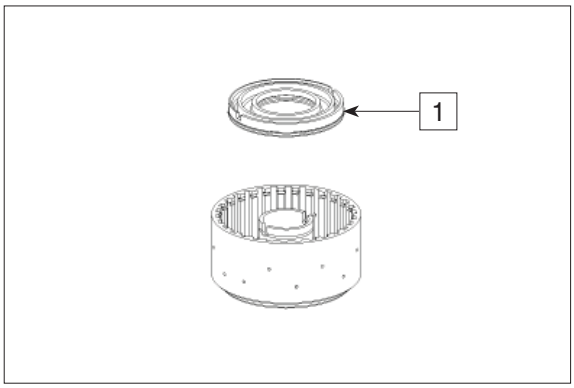
180DTM059

⑩ Remove guide ring (1) and cup spring package (2).



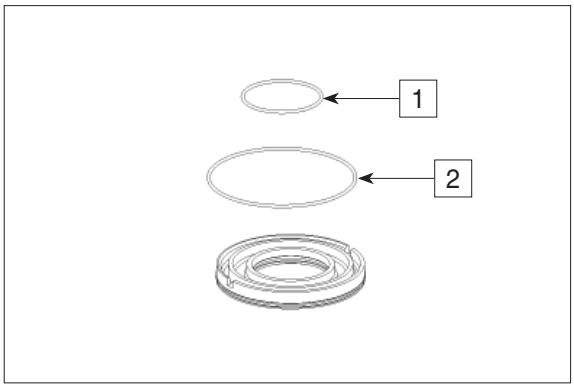
180DTM082

⑪ Lift piston (1) off the disc carrier by compressed air out of hole, and remove it.



180DTM061

⑫ Remove both O-rings (1 and 2).

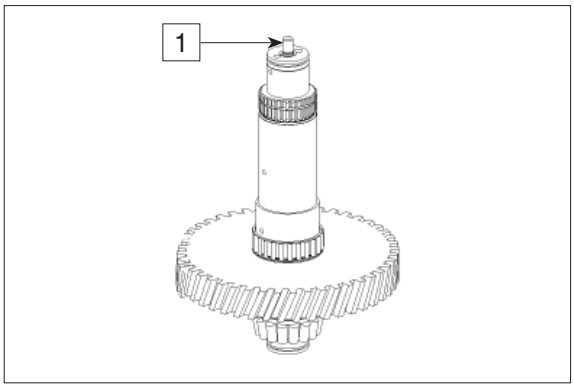


180DTM062

⑤ Mount stud bolt (1).

Tightening torque (M10/8.8 × 16)

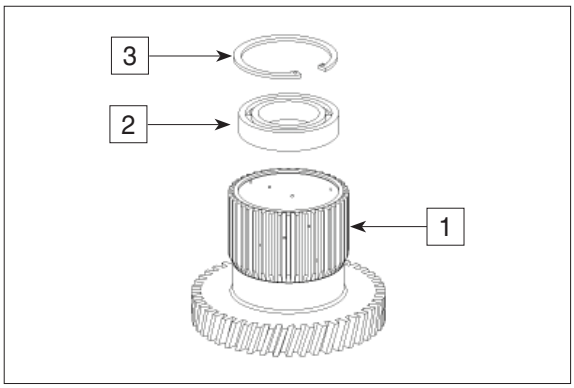
M_A =1.7 Nm



180DTM112

⑥ Insert ball bearing 55 × 90 × 18 (2) into idler gear (1) until contact is obtained and fix it by means of retaining ring (3) 90 × 3.

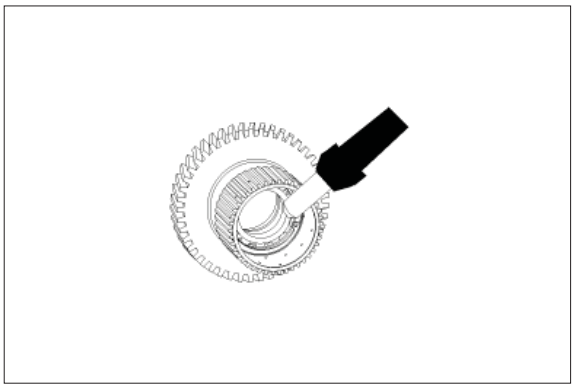
(S) Set of internal pliers 5870 900 013



180DTM113

⑦ Heat up ball bearing (app. 120°C).

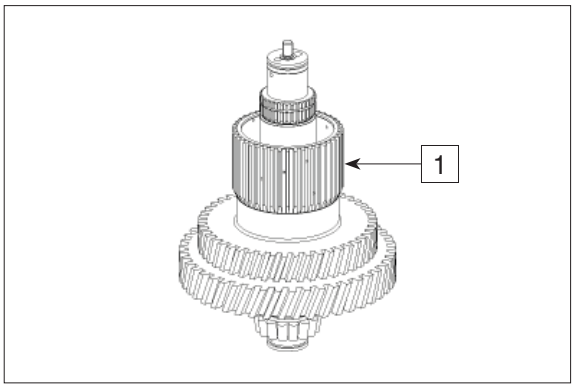
(S) Hot air blower 230 V 5870 221 500
(S) Hot air blower 115 V 5870 221 501



180DTM114

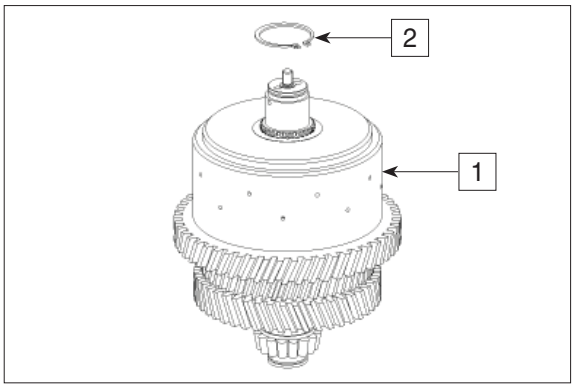
⑧ Mount pre-assembled idler gear (1) until contact.

⚠ Wear protective gloves.



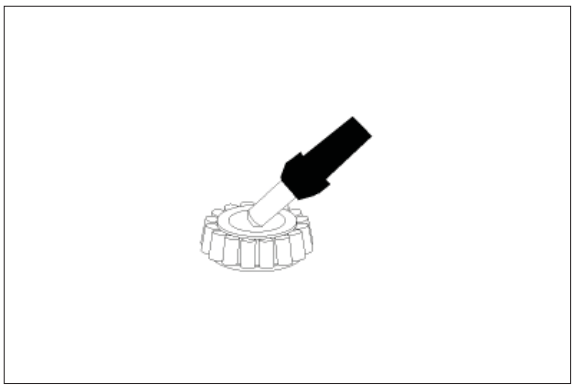
180DTM115

㉑ Fix clutch (1) by means of retaining ring 55×2 (2).



180DTM134

㉒ Heat up bearing inner ring (approx. 120 °C).



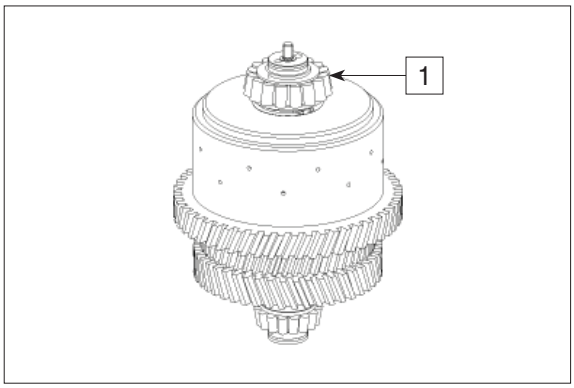
180DTM135

㉓ Mount bearing inner ring (1) until contact is obtained.

⚠ Wear protective gloves.

※ Adjust bearing inner ring after cooling-down.

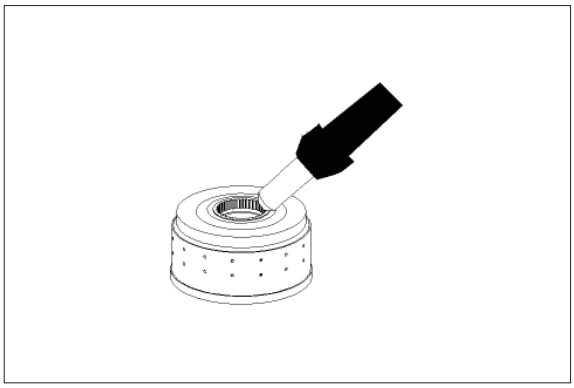
Check closing and opening of the clutch by means of compressed air at the hole (see arrow).
Closing and opening of the clutch must be clearly audible.



180DTM136

⑬ Heat up internal diameter of clutch (app. 120 °C).

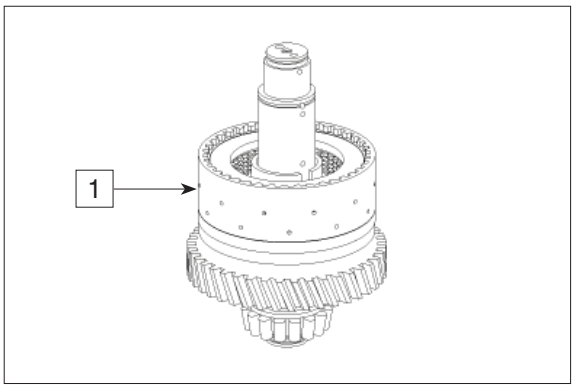
(S) Hot air blower 230 V 5870 221 500
(S) Hot air blower 115 V 5870 221 501



180DTM126

⑭ Mount clutch until contact is obtained.

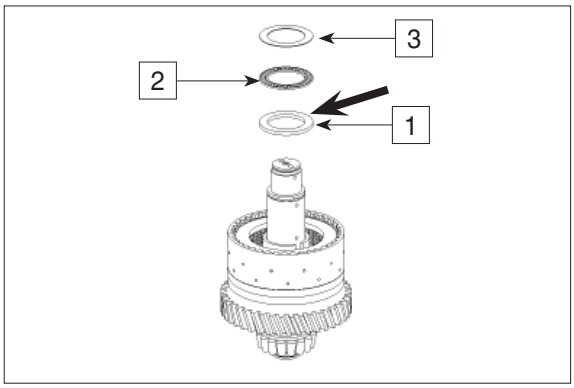
⚠ **Wear protective gloves.**



180DTM151

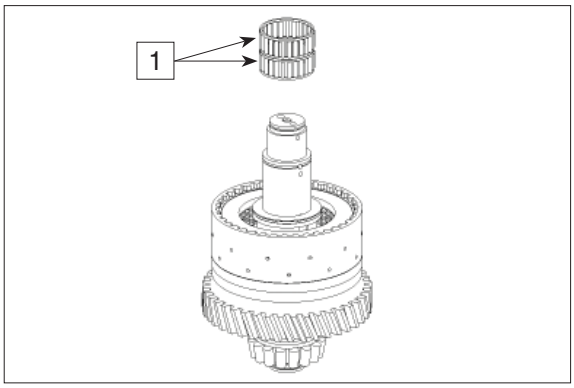
⑮ Mount and oil running disc 55×78×5 (1), axial cage (2) and axial washer 55×78×1 (3).

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



180DTM152

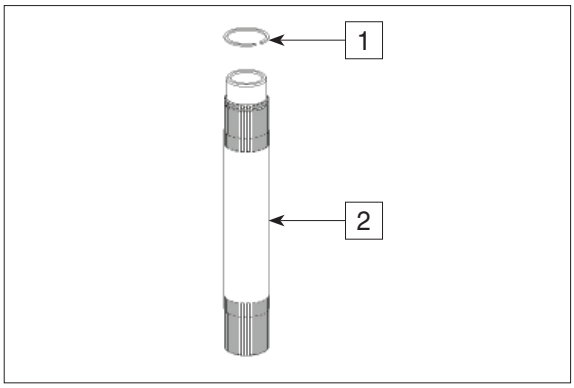
⑯ Mount needle cage 55×63×50 (1) on shaft and oil it.



180DTM153

(7) Input shaft

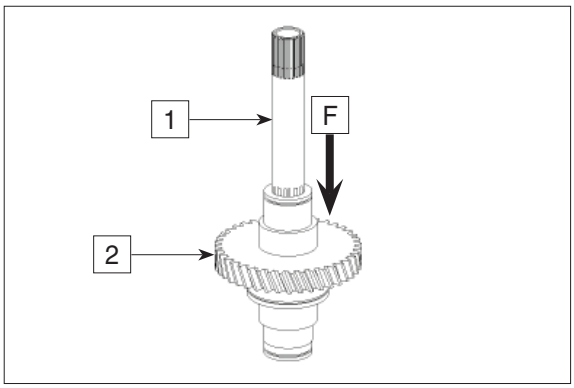
① Install snap ring SB-38 (1) into annular groove of turbine shaft (2).



180DTM173

② Press turbine shaft (1) into the input shaft (2) under a handoperated press until snap ring engages into the groove.

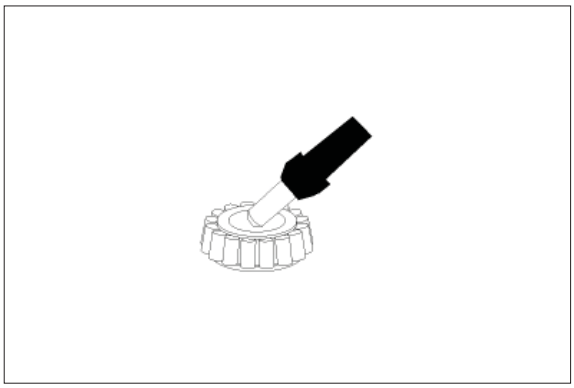
※ Axial fixture of turbine shaft.



180DTM174

③ Heat up both bearing inner rings (app. 120 °C).

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



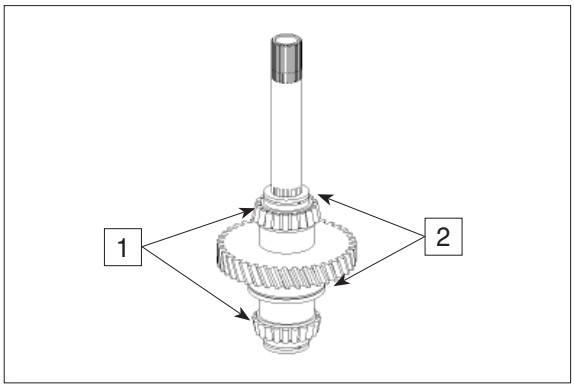
180DTM135

④ Mount bearing inner rings (1) until contact.

Install rectangular ring (2) 60 × 3.

⚠ Wear protective gloves.

※ Readjust bearing inner ring after cooling down.



180DTM175

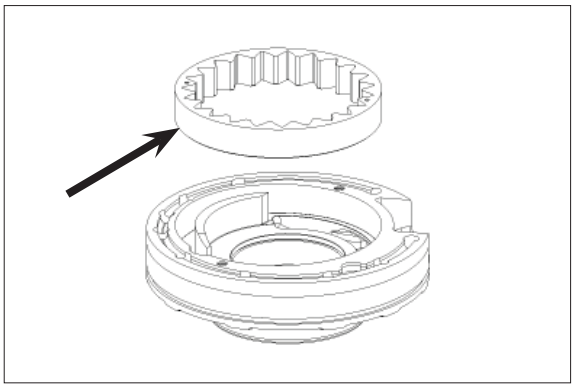
9) REASSEMBLY ENGINE CONNECTION AND OIL PRESSURE PUMP

(1) Oil pressure pump :

※ In case of wear marks in the pump housing or on the control disk, the pump assy must be replaced.

① Install outer rotor.

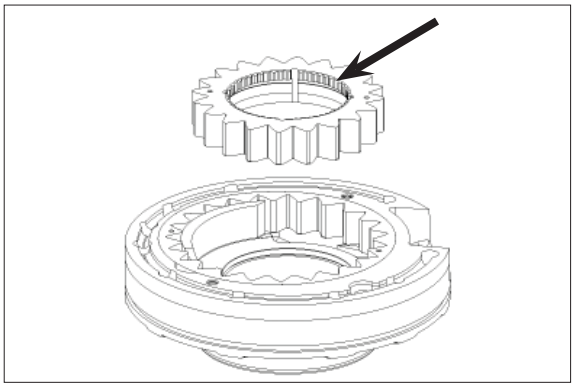
※ Chamfer (see arrow) to show downwards.



180DTM201

② Install inner rotor.

※ Teeth (see arrow) to show upwards.

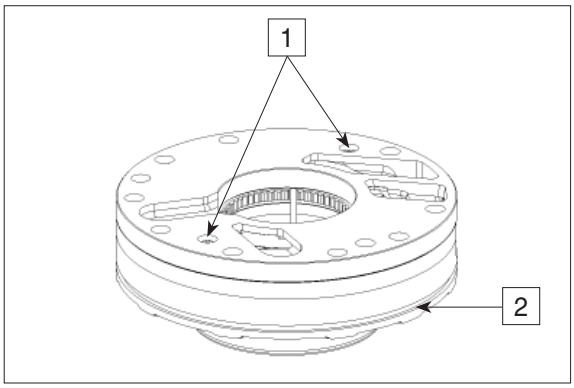


180DTM202

③ Place control disk and fix it radially by means of two cylindrical screws M6 × 12 (1).

※ Do not tighten the cylindrical screws-just turn them in until contact is obtained and then turn them back by approx 1/2 rotation.
Pay attention to the installation position of the control disk, see figure.

Place O-ring 182 × 3 (2) into the annular groove and oil it.

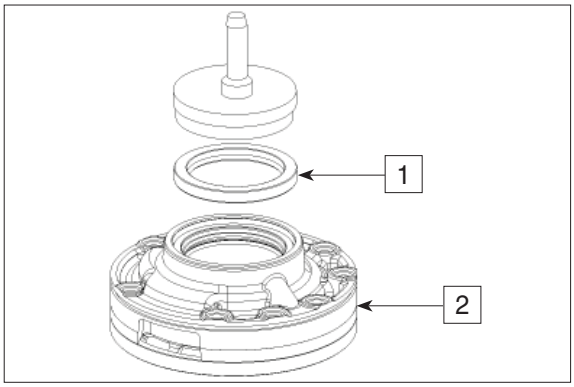


180DTM203

④ With the sealing lip showing downwards, carefully insert the shaft seal 75 × 905 × 10 (1) into the pump housing (2) until contact is obtained.

※ Wet outer diameter of shaft seal with spirit.

(S) Driver	5870 055 070
(S) Handle	5870 260 002

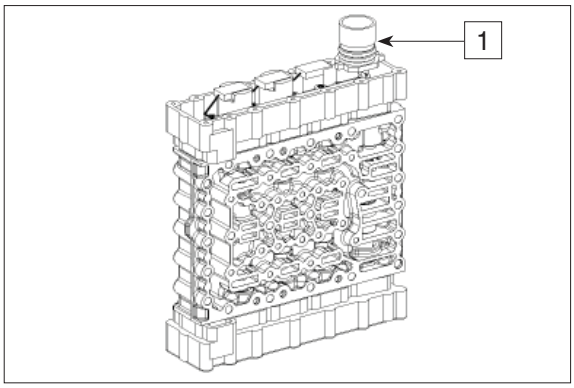


180DTM204

⑪ Assemble the wiring harness (1) and connect the pressure regulators (5×).

※ See figure TM218, page 3-139 for installation position of pressure regulators.

※ Pay attention to the installation position of the wiring harness, also see markings (Chapter 1) figure TM019).



180DTM232

⑫ Put on the flat gasket (1).

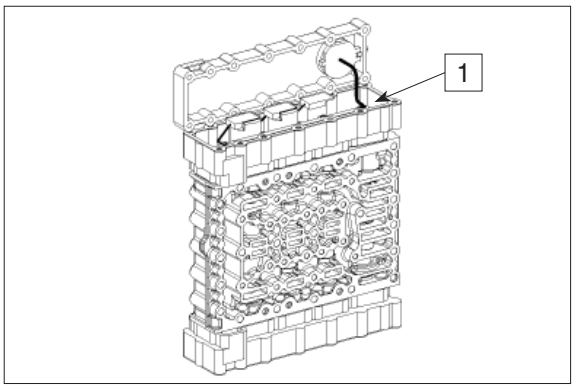
Assemble the plug socket with the slot showing to the lug of the cover until contact.

Fasten the cover by means of Torx screws.

Tightening torque (M5/10.9×30)

M_A = 5.5 Nm

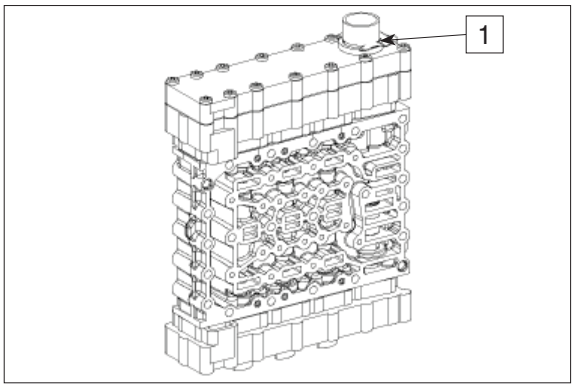
(S) Socket spanner TX-27 5873 042 002



180DTM233

⑬ Fix the wiring harness by means of retaining clamp (1).

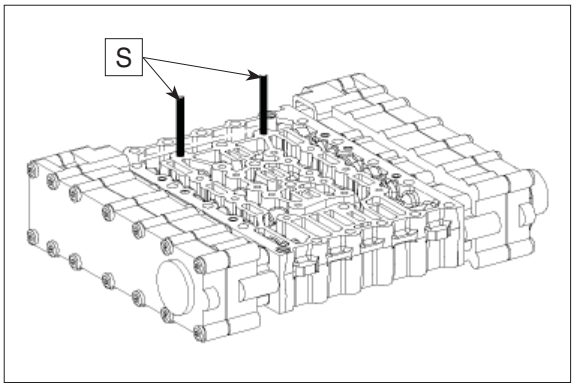
※ Install the opposite cover.



180DTM234

⑭ Install two adjusting screws.

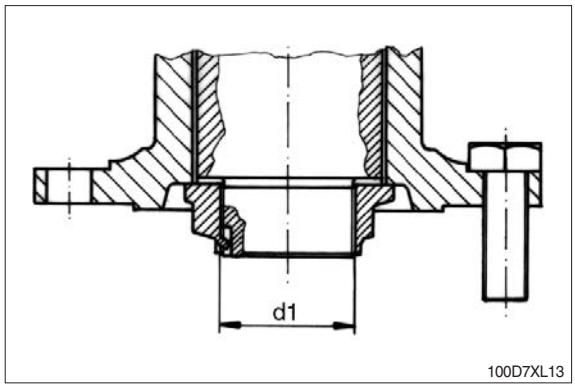
(S) Adjusting screws 5870 204 063



180DTM235

(1) Tightening torque of the adjusting nut respective slotted nut at flanges respective gear wheels ect.

Thread d1 (mm)	Torque (Nm)
M45 × 1.5	850

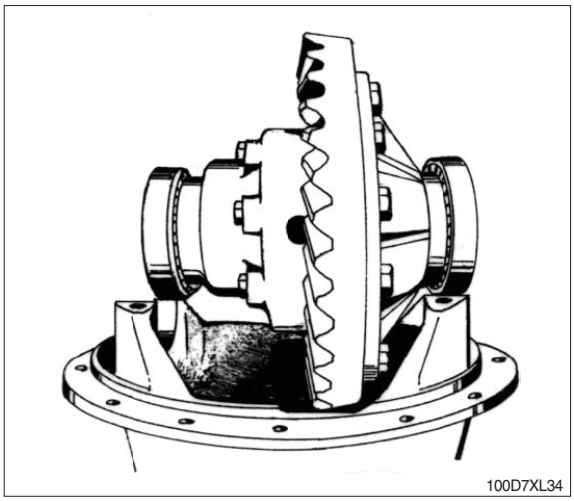


9) ASSEMBLY OF DRIVE ASSEMBLY

(1) Place the differential with the outer rings of the taper roller bearings on the differential carrier which is in a vertical position, with mounted drive pinion.

(2) Mount the differential straps and align them with the thread rings.

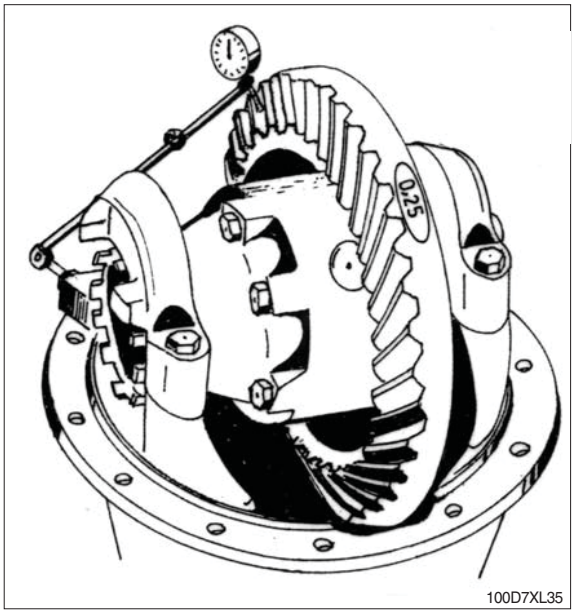
(3) During this operation be careful of the alignment marks on the differential straps with respect to the differential carrier. (Do not interchange the differential straps)


100D7XL34

(4) Hand tighten the differential strap bolts. By a counter rotation of the two thread rings, move the differential until the backlash is correct. (The smallest admissible value at the closest place is marked on the ring gear)

(5) Therefore hold the drive pinion at the drive flange. Check the backlash by careful forwards and rearwards rotating the ring gear. Use a dial indicator.

(6) Measure the backlash during a few times turns of the ring gear and if need correct the backlash, because of the smallest admissible value at the closest place must not be fall short of.



100D7XL35

(7) Adjust gear meshing according to page 3-189 "Adjustment of gear meshing of gleason gears".

(8) Tighten screws of the differential straps and lock them with Loctite 262.

(9) Adjust the bearing roll resistance through tightening of the thread rings. Set value : 2.0 to 3.0 Nm. Check the value with a torque wrench. If measuring at the drive pinion/drive flange, take the ratio of the bevel wheel set into account.

(10) Screw the lock plates for the thread rings and secure with Loctite 270, if need bend the lock plates.

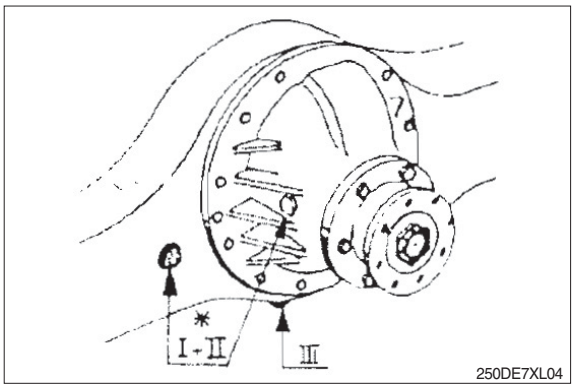

100D7XL36

The binding lubrication points have to be taken from the according installation drawing of the axle.

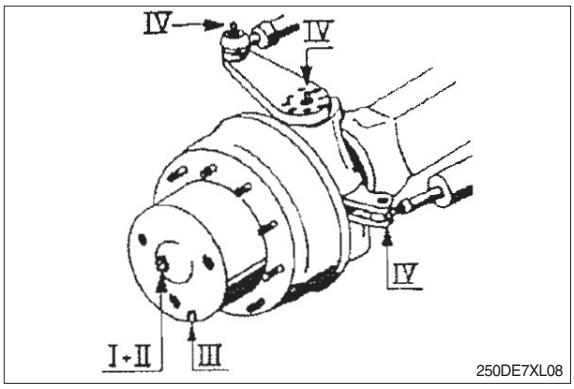
Single drive assembly

* The position is dependent from the respective axle version.

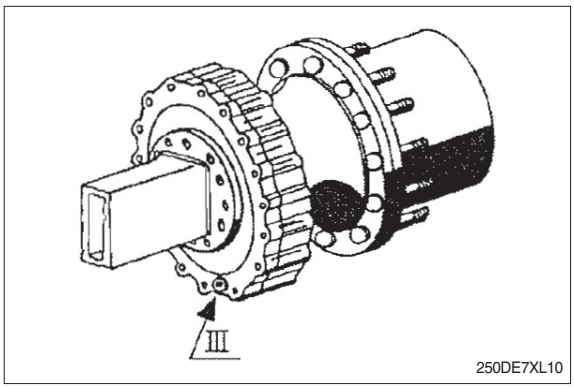
I=Oil fill plug
II=Oil level control plug
III=Oil drain plug



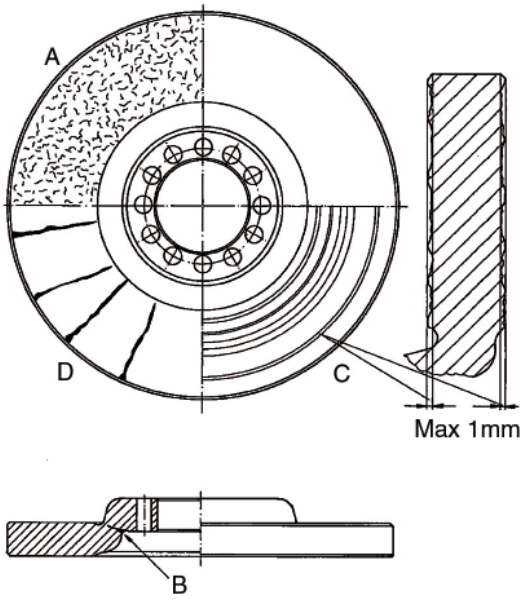
Hub assembly with planetary gear drive



Hub assembly with wet disc brake



(9) Brake disk



100D7XL78

A	Network - like formation of cracks	admissible
B	Radially shaped crack	not admissible
C	Uneven brake surface characteristics below 1.0 mm	admissible
D	Continuous cracks	not admissible

(10) Spring - loaded sliding caliper brakes

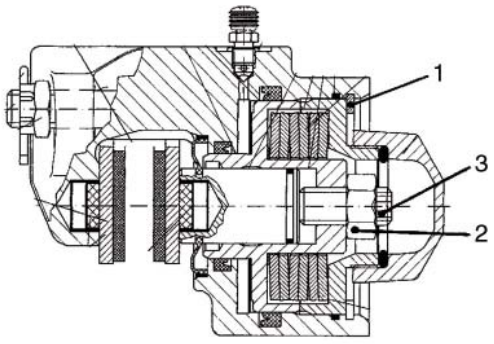
Safety notes :

· Warning

Before commencing work on the parking brake, ensure that no unintended machine movement can happen when the braking effect is removed.

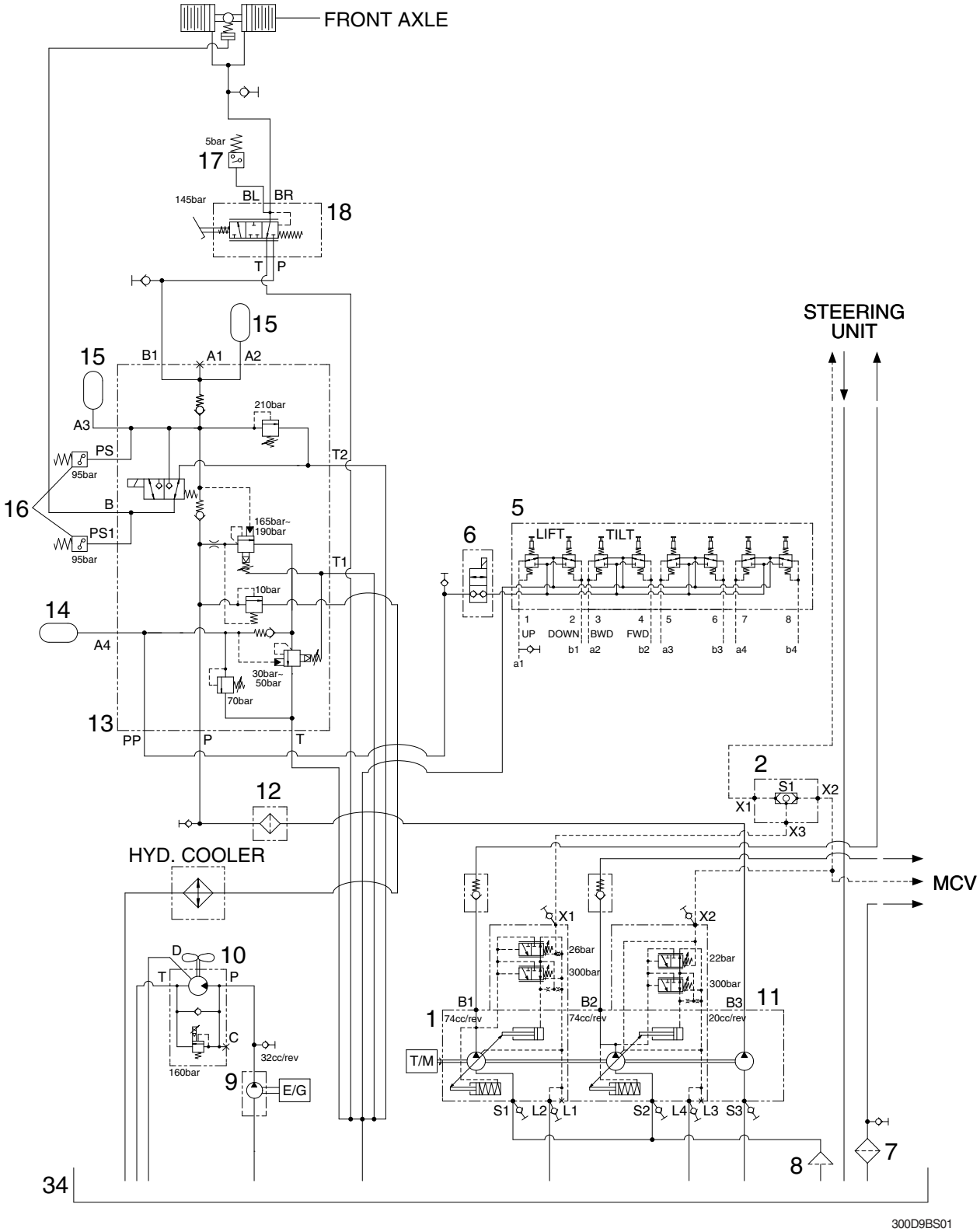
· Danger

The parking brake is under spring tension. Parts could become loose and fly out suddenly if improper brake opening. Therefore release the lock nut (2) and turn the adjusting screw (3) counter - clockwise until the spring set is released before disassembly of the circlip (1).



100D7XL79

2. HYDRAULIC CIRCUIT



300D9BS01

1	Main pump	9	Fan drive pump	15	Accumulator
2	Shuttle valve	10	Fan drive motor	16	Pressure switch
5	RCV	11	Brake pump	17	Pressure switch
6	OPSS solenoid valve	12	Pressure filter	18	Brake valve
7	Return filter	13	Cut off valve	34	Hydraulic oil tank
8	Strainer	14	Accumulator		

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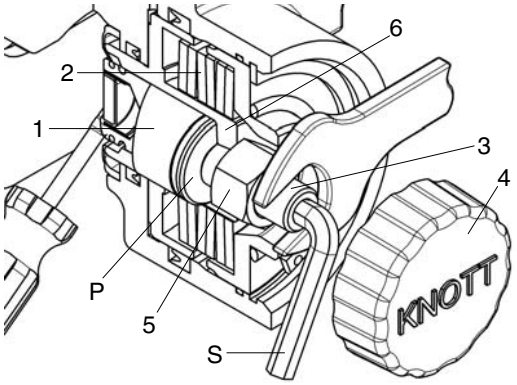


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3) MOUNTING AND BASIC SETTING REGULATIONS

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.

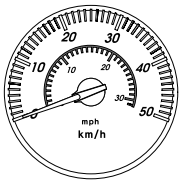
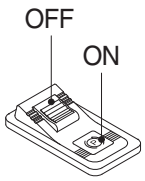
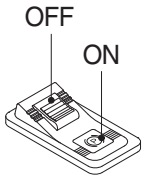
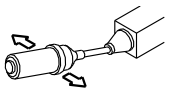
(10) Replacing the complete actuating mechanism

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

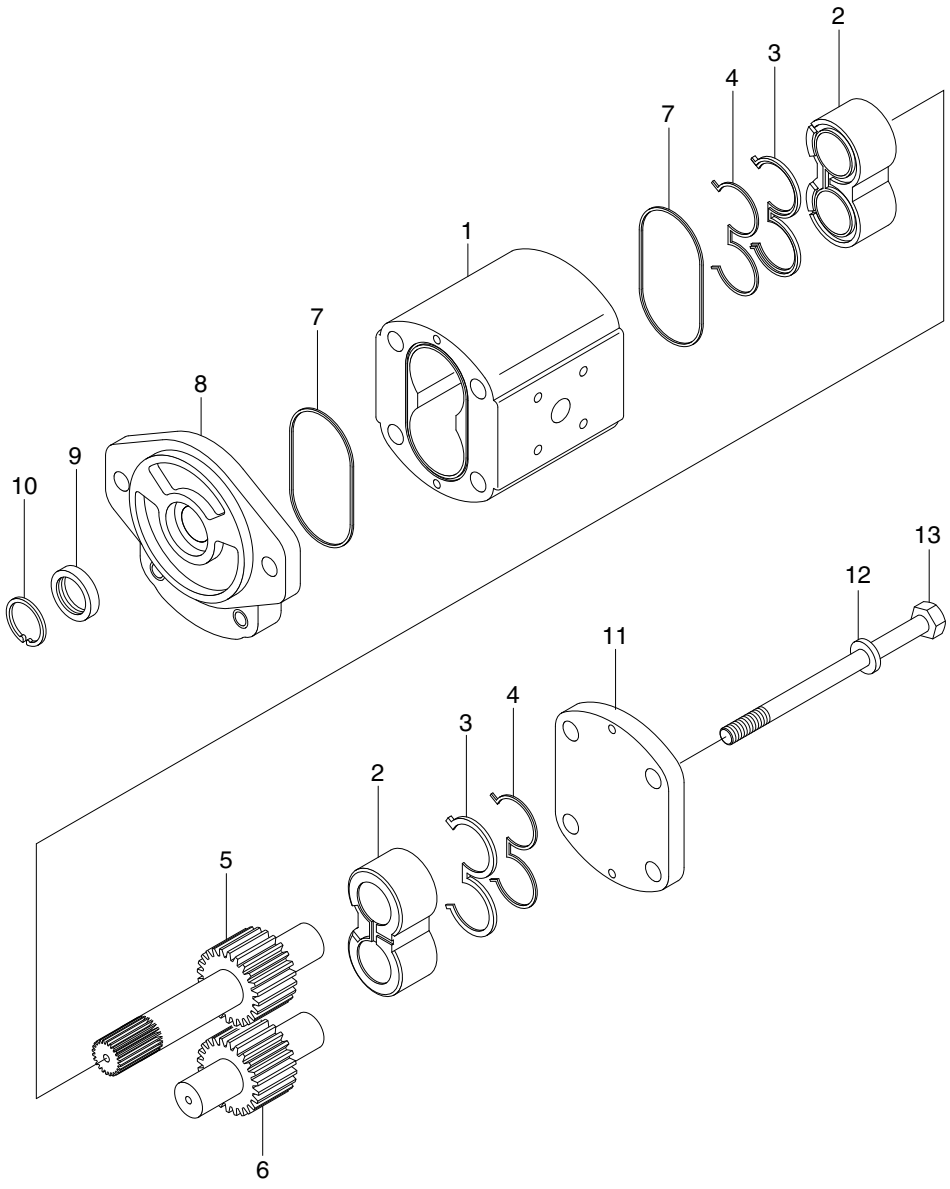
To change bellows (15) it is advisable to remove pedal (13). For this purpose, loosen retaining ring (18) and knock out pin 1 (16) using a mandrill. When knocking out the bolt, make sure that the mandrill is applied to the side of the bolt without a knurl. Remove pedal (13) and bellows (15). Now fit 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)

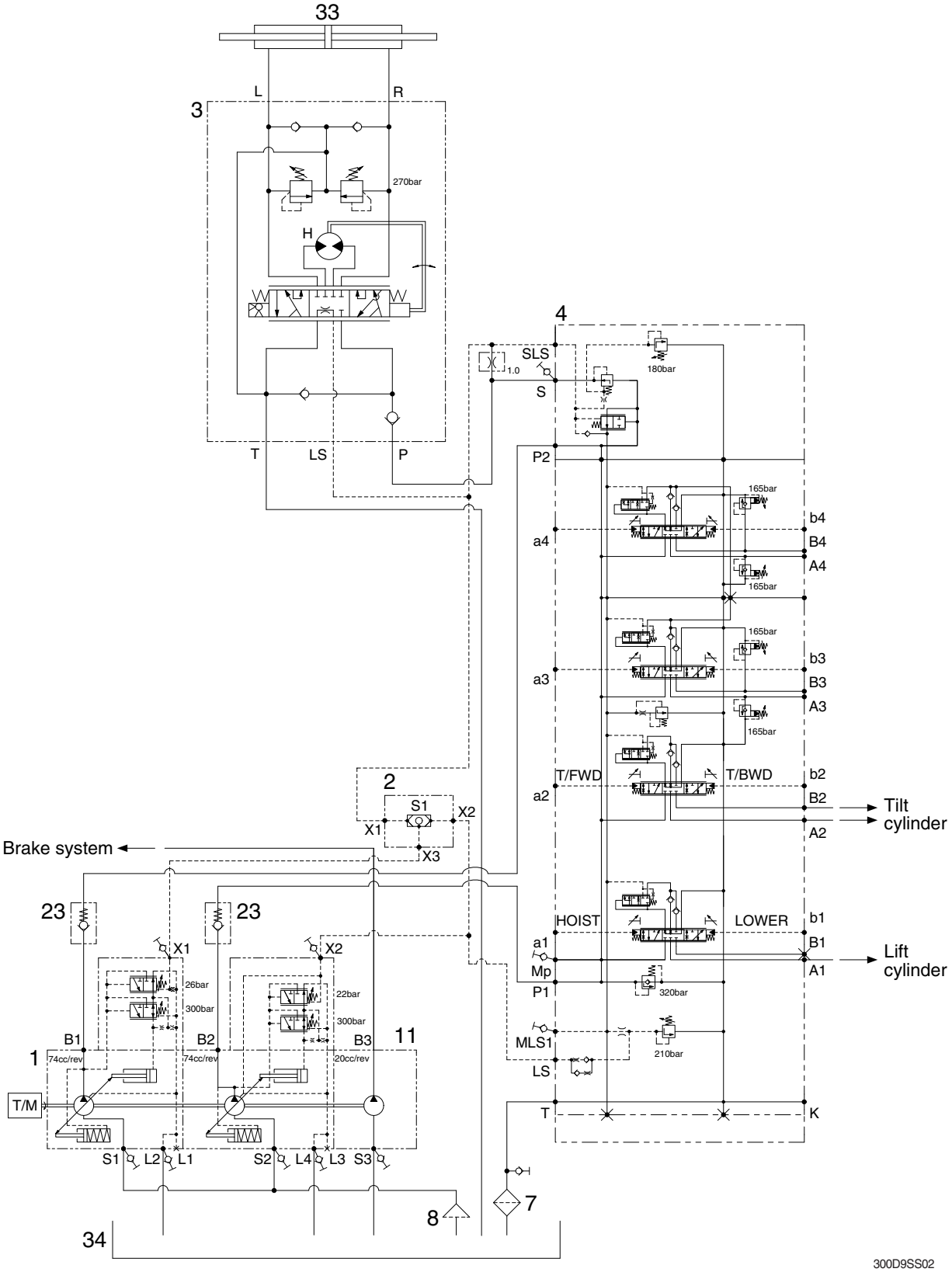
1) STRUCTURE



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

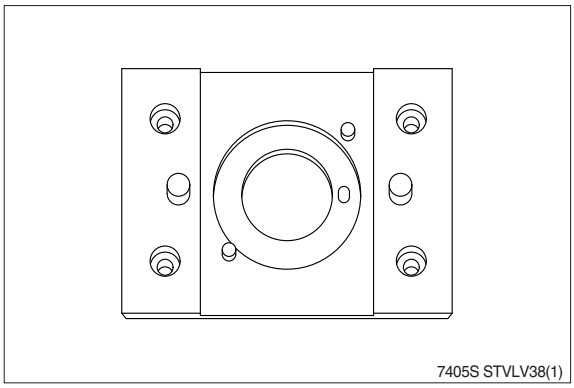


1	Main pump	8	Suction strainer
2	Shuttle valve	33	Steering cylinder
3	Steering unit	34	Hydraulic tank
4	Main control valve	35	Shuttle valve
7	Return filter	36	Check valve

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.

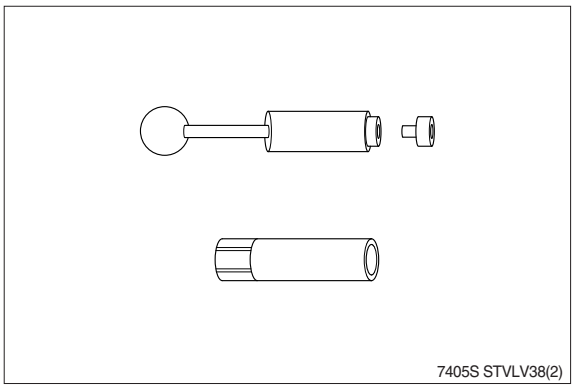
2) TOOLS

(1) Holding tool.



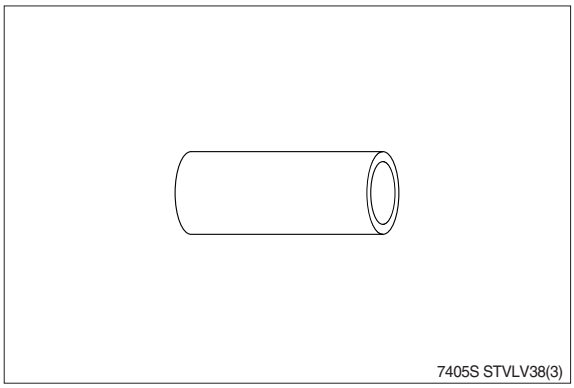
7405S STVLV38(1)

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



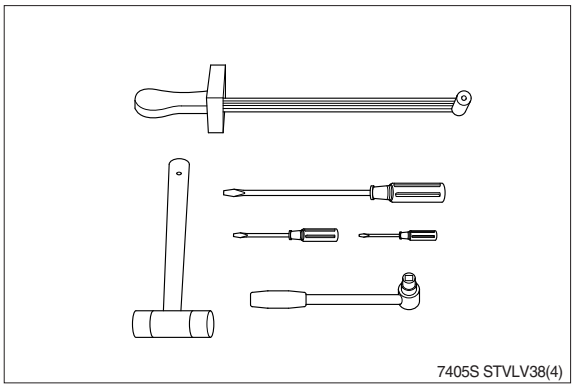
7405S STVLV38(2)

(3) Assembly tool for dust seal.



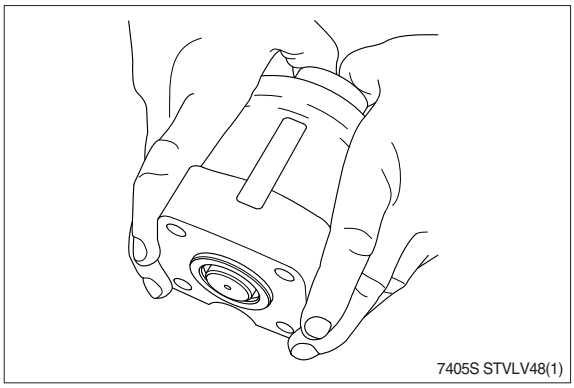
7405S STVLV38(3)

(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

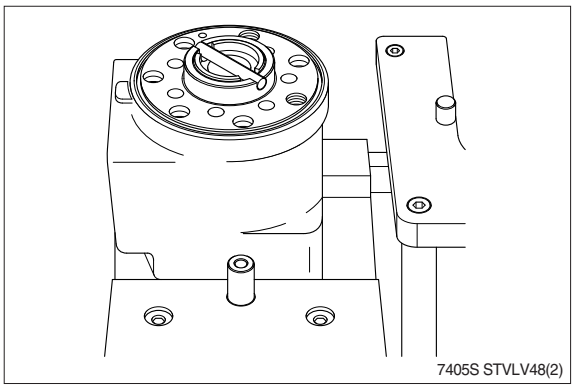


7405S STVLV38(4)

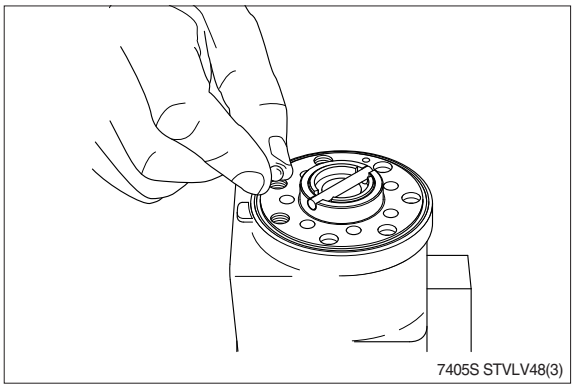
(15) The spool set will push out the assembly tool guide. The O-ring is now in position.


7405S STVLV48(1)

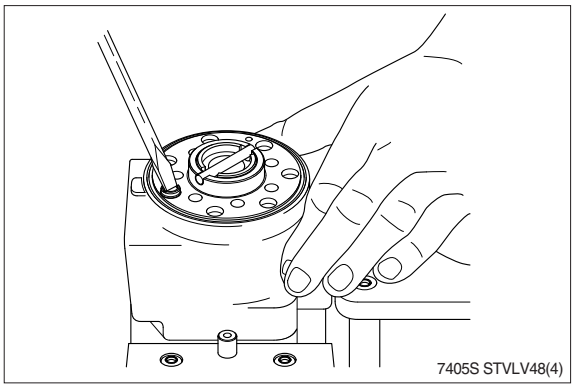
(16) Put the steering unit back into the holding tool keeping the bore vertical. Place the cross pin in the spool/sleeve so that it is parallel to the port flange.


7405S STVLV48(2)

(17) Put the ball into the hole.


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)

4) ASSEMBLY

※ In reassembling, have all parts washed, grease applied to lubricating parts, and all expendable items such as oil seal and spring washers replaced by new ones.

Perform the disassembly in reverse order.

(1) Tighten the set screw (1-10) of king pin (1-7).

(2) There is a notch in the middle of the king pin (1-7), make sure that this notch is on the set screw side.

(3) Do not hammer to drive in taper roller bearing (1-3) because it will break.
Always use drive-in tool.

※ When assembly knuckle, adjust shims so that there is no clearance.

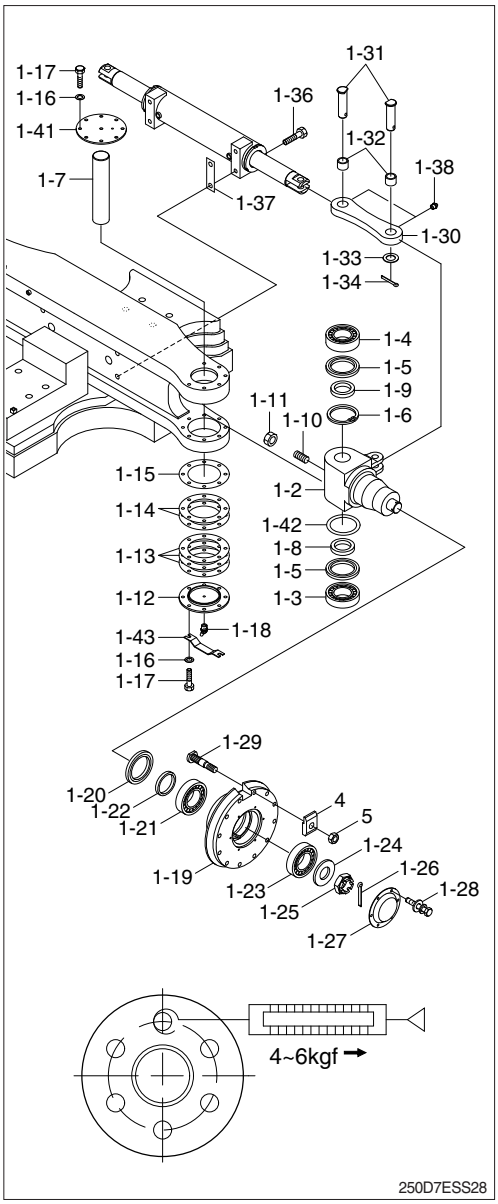
(4) Hub

① Mount oil seal (1-20) and inner race of tapered roller bearing (1-21) on the knuckle.
The bearing should be well greased before assembling.

② Install the outer race of the bearing (1-3) in the wheel center and assemble to the knuckle.

③ Put washer (1-24) in place, tighten with nut (1-25) and locked with split pin (1-26). In locking with split pin, locate the hole for the split pin by turning the nut back 1/6 of a turn. Adjust the preload of bearing.

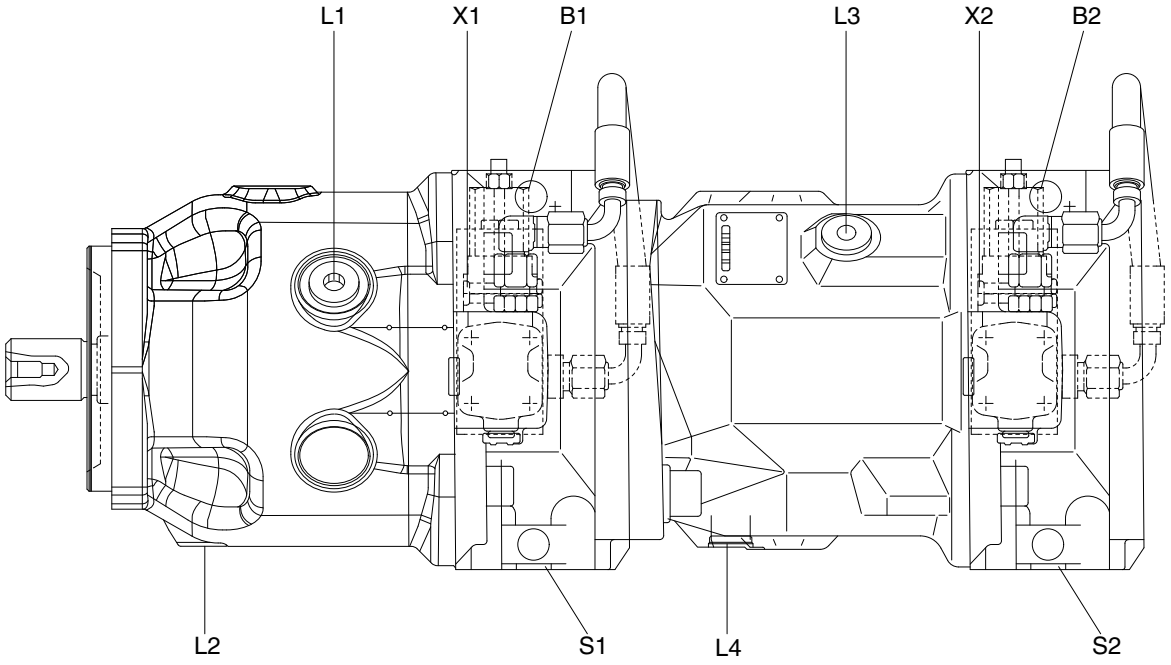
④ Mount the hub cap (1-27).
Bearing should be well greased before assembling.

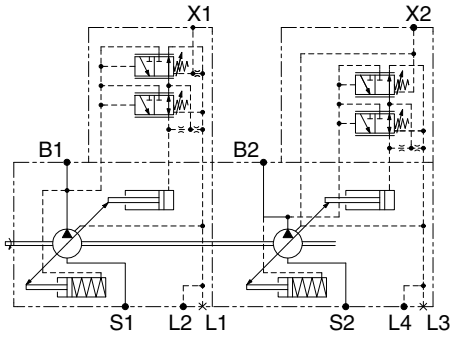


4. MAIN PUMP

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.

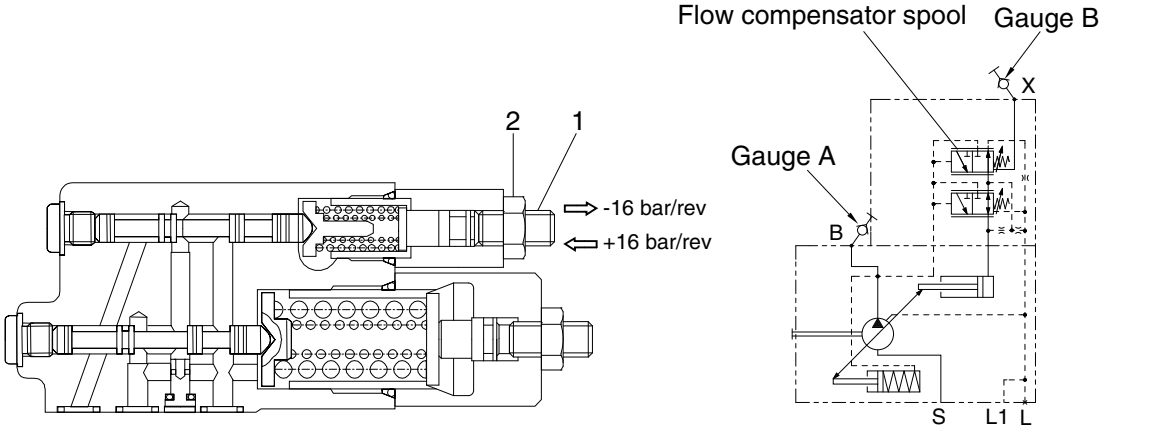
① **Conditions**

- Engine is running (at high or low idle).
- Lever is operated slowly (example : Mast).
- 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 (26 bar) / Attachment pump (22 bar)



300D9HS90

(6) Adjustment of pressure control

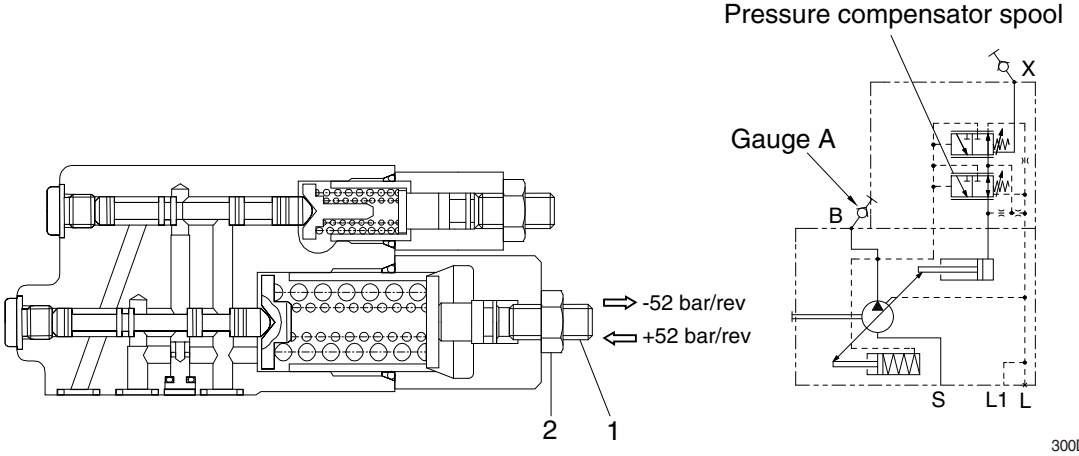
Pressure compensator setting must be carried out following procedures and conditions.

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 (300 bar) / Attachment pump (300 bar)

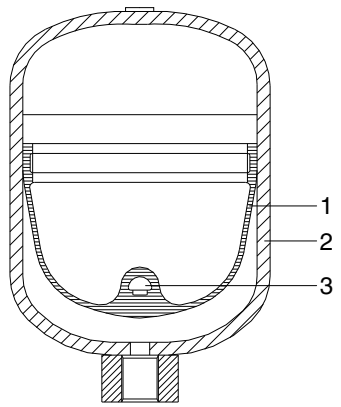


300D9HS91

10. 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)

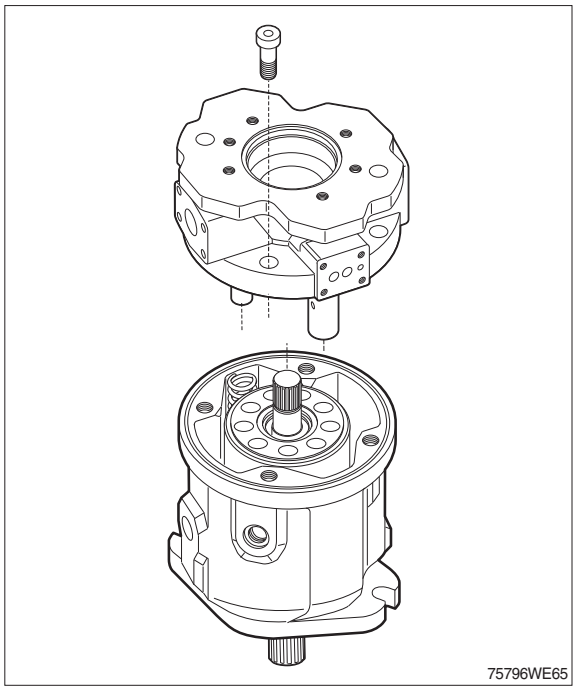


1 Diaphragm
2 Steel pressure vessel
3 Closure button

7803AWE56

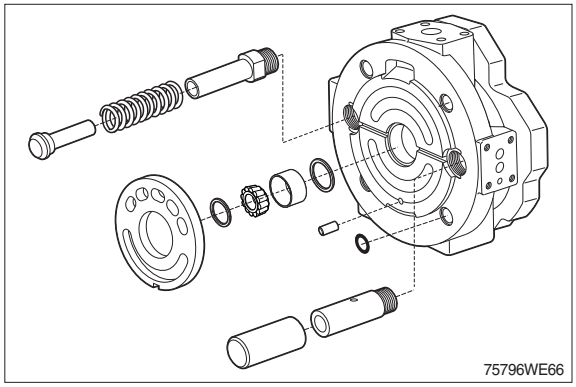
(3) Remove the connection plate fixing bolts and the connection plate.

※ Distributor plate and adjustment piston can drop down.

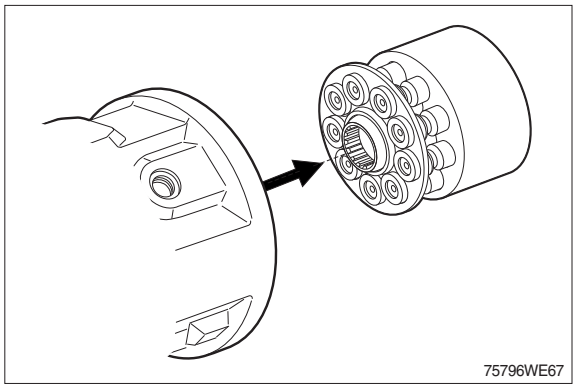


(4) Remove distributor plate.
Take note of the orientation.

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

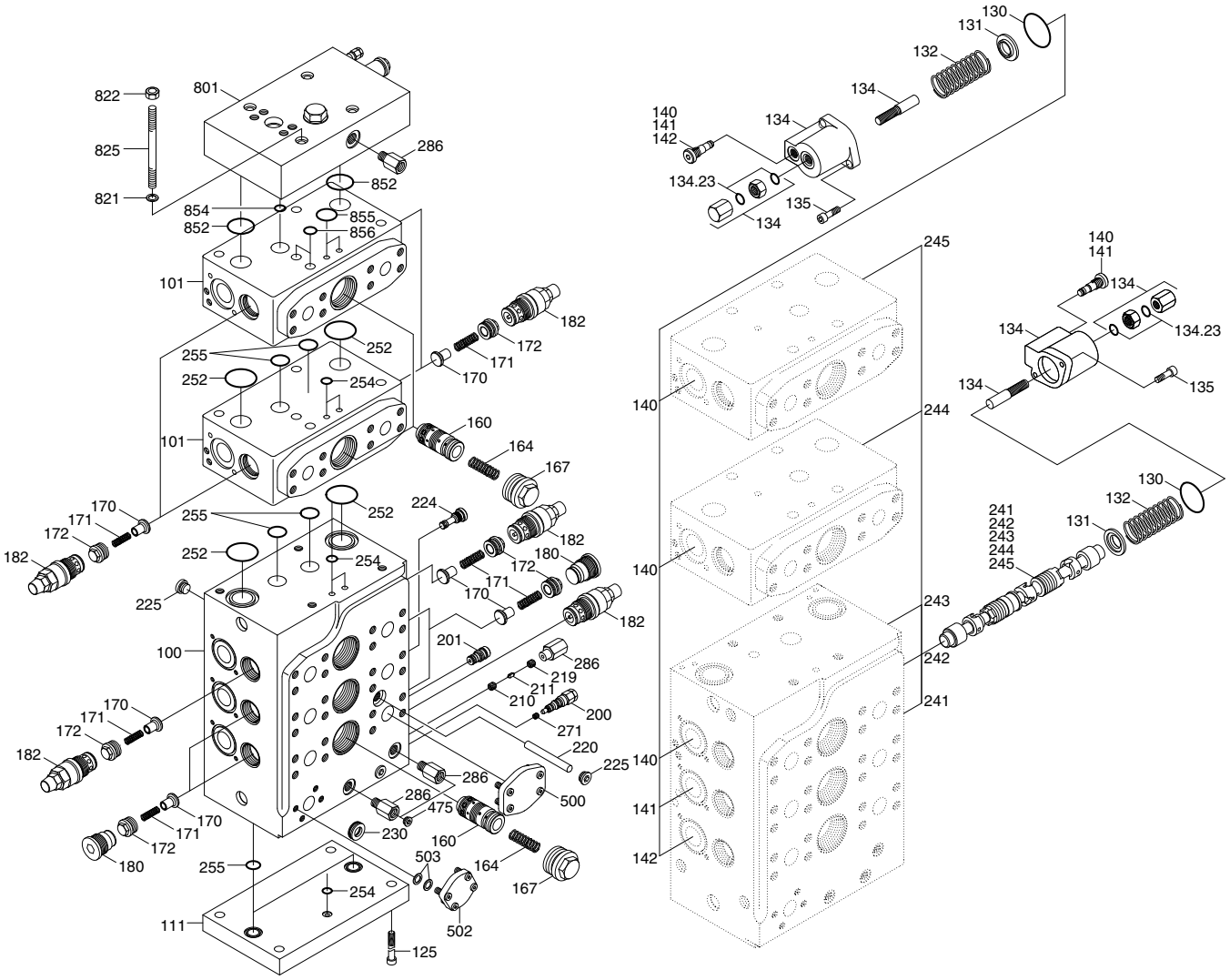


(5) Remove the rotary group in a horizontal position.



2. MAIN CONTROL VALVE

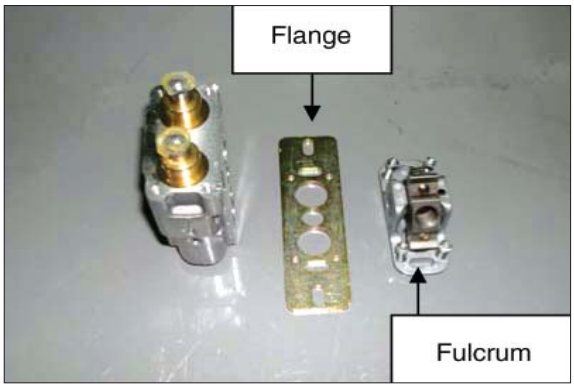
1) STRUCTURE



180D7EMCV01

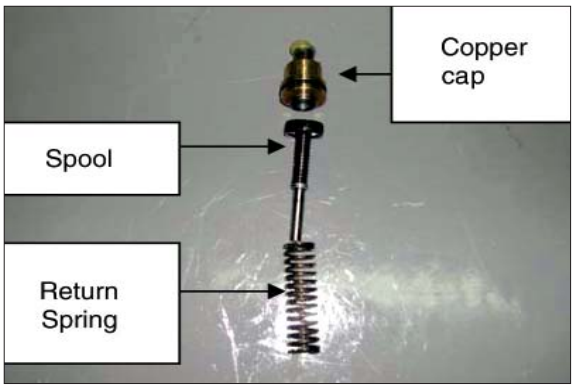
100	Housing	160	Spool	220	Spool	286	Reducing piece
101	Housing	164	Compression spring	224	Locking screw	475	Locking screw
111	Plate	167	Locking screw	225	Locking screw	500	Blank flange
125	Cylinder	170	Cone	230	Connection piece	502	Blank flange
130	O-ring	171	Compression spring	241	Spool	503	Washer
131	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

1. POWER CIRCUIT

The negative terminal of the battery is grounded to the truck chassis.
When the start switch is in the off position, the current flows from the positive battery terminal.

1) OPERATING FLOW

Battery (+) → Disconnect switch → Battery relay [CR-1]

- Fusible link [CN-95B] → I/conn [CN-4 (1)]
  - Fuse box B+ [CN-36]
    - Fuse box [No.4] → DEF line heater 1 [CR -61 (1, 3)]
    - Fuse box [No.5] → DEF supply module relay [CR -58 (30, 86)]
    - Fuse box [No.6] → Start switch [CS-2 (1)]
    - Fuse box [No.7] → TCU [CN-50 (23, 68)
    - Fuse box [No.8] → Flasher unit [CR-11 (B)]
    - Fuse box [No.10] → I/conn [CN -7 (5)] → Radio and USB player [CN -27 (8)]
    - Fuse box [No.11] → I/conn [CN -7 (10)] → Room lamp [CL -1 (2), CL-51 (2)]
    - Fuse box [No.12] → Cluster [CN -56 (11)]
      - MCU [CN -59M (2)]
    - Fuse box [No.13] → ECU service connector [CN-134 (B)]
  - Fuse box B+ [CN-36 (3)]
    - Fuse box [No.14] → I/conn [CN - 2 (2)] → I/conn [CN - 6 (1)] → Cabin tilt switch [CS -77 (2)]
    - Fuse box [No.15] → RMCU [CN -125 (1)]
      - To monitor harness [CN -8 (11)]
    - Fuse box [No.16] → Center switch [CS -5]
    - Fuse box [No.18] → To air conditioner harness [CN -31 (1)]
- I/conn [CN-47] → I/conn [CN -3 (2)] → Fuse box B+ [CN-36 (No.32)] → I/conn [CN -3 (1)] → ECM [CN -93 (1, 25, 26, 27, 28)]

2) CHECK POINT

Engine	Start switch	Check point	Voltage
Stop	OFF	① - GND (Battery (+)) ② - GND (Fusible link) ③ - GND (Fuse) ④ - GND (Start key)	24V

※ GND : Ground

6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

Fuse box [No.18] → Wiper relay Hi [CR-4 (3)]
→ Multi function switch [CS-12 (6)]
→ Rear wiper & washer switch [CS-3 (3, 6)]
→ Rear wiper motor [CN-102 (3)]

Fuse box [No.27] → Top wiper & washer switch [CS-103 (3, 6)]
→ I/conn [CN-13 (7)] → Top wiper motor [CN-70 (3)]

(1) Front washer switch ON

① Washer switch ON [CS-12 (6)→(2)]
→ I/conn [CN-3 (27)] → Front washer tank [CN-22 (2)] → Front washer operating
→ Washer pump relay [CR-38 (1)→(3)] → Int wiper relay Lo [CR-6 (1)→(2)]
→ Wiper relay Lo [CR-26 (2)→(3)] → Front wiper motor [CN-21 (2)]
→ Wiper motor operating (low)

(2) Front wiper switch ON

① **INT position**
Wiper switch ON [CS-12 (6)→(1)] → Int wiper relay [CR-6 (3)→(2)]
→ Wiper relay Lo [CR-26 (2)→(3)] → Front wiper motor [CN-21 (2)]
→ Front wiper motor intermittently operating

② **Lo position**
Wiper switch ON [CS-12 (6)→(4)] → Wiper relay Lo [CR-26 (5)→(3)] →
Front wiper motor [CN-21 (2)] → Front wiper motor operating (low)

③ **Hi position**
Wiper switch ON [CS-12 (6)→(3)] → Wiper relay Hi [CR-4 (1)→(4)] →
Front wiper motor [CN-21 (4)] → Front wiper motor operating (high)

(3) Auto-parking (when switch OFF)

Switch OFF [CS-12 (4)] → Wiper relay Lo [CR-26 (5)→(3)] → Front wiper motor [CN-21 (2)] →
Wiper motor stop

(4) Rear wiper and washer switch

① **Wiper switch ON** (1st step)
Wiper switch ON [CS-3 (3)→(2)] → Rear wiper motor [CN-102 (4)] → Rear wiper motor operating

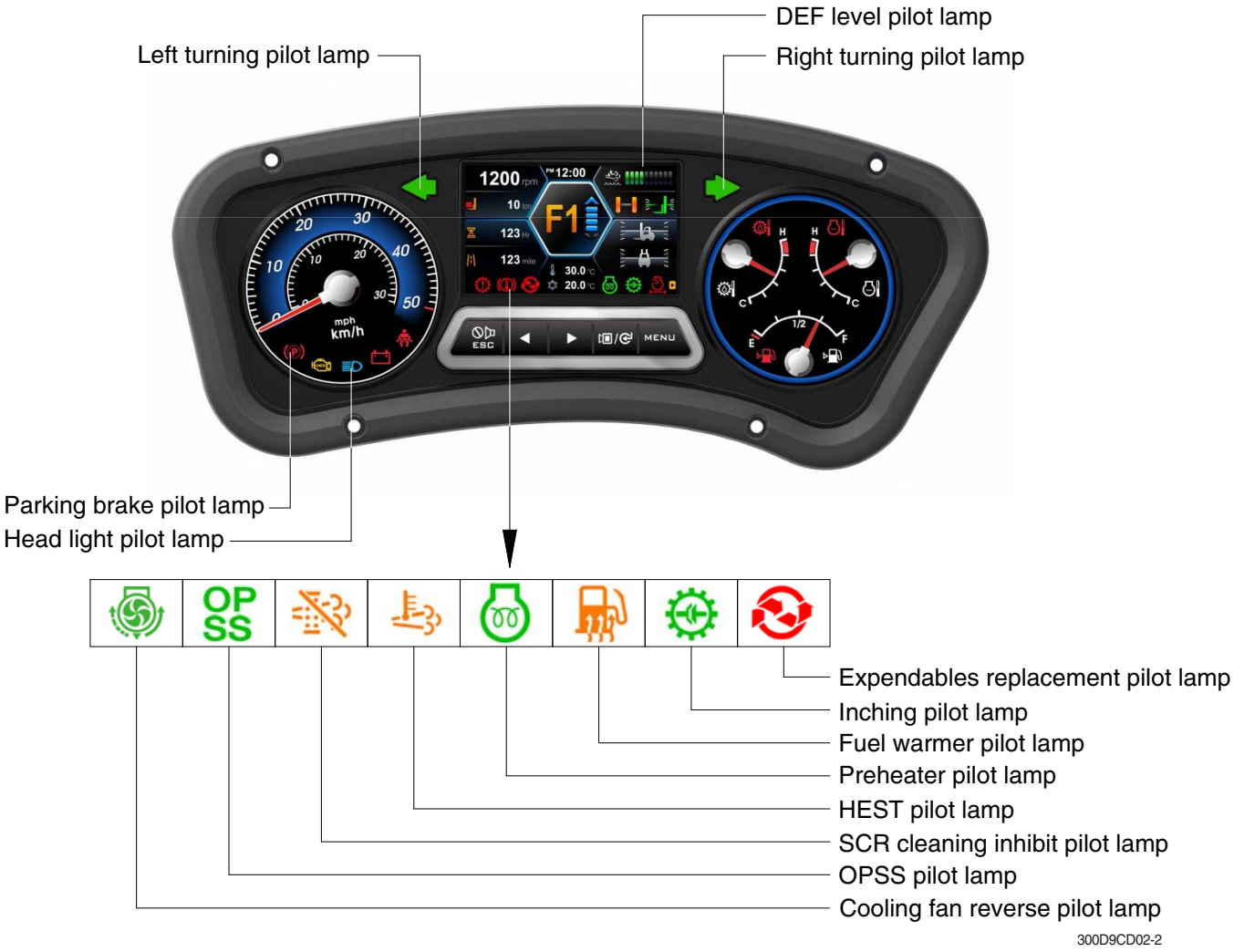
② **Washer switch ON** (2nd step)
Washer switch ON [CS-3 (6)→(5)] → I/conn [CN-3 (31)] → Rear washer tank [CN-103 (2)] →
Washer operating
Wiper switch ON [CS-3 (3)→(2)] → Rear wiper motor [CN-102 (4)] → Rear wiper motor operating

(5) Top wiper and washer switch

① **Wiper switch ON** (1st step)
Wiper switch ON [CS-103 (3)→(2)] → I/conn [CN-13 (6)] → Top wiper motor [CN-70 (4)] →
Top wiper motor operating

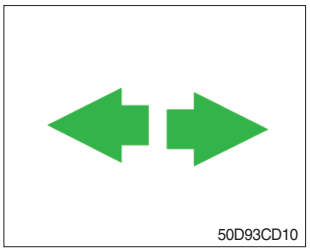
② **Washer switch ON** (2nd step)
Washer switch ON [CS-103 (6)→(5)] → I/conn [CN-3 (22)] → Top washer tank [CN-202 (2)] →
Washer operating
Wiper switch ON [CS-103 (3)→(2)] → I/conn [CN-13 (6)] → Top wiper motor [CN-70 (4)] →
Top wiper motor operating

4) PILOT LAMPS



※ **When the warning and pilot lamps are illuminated more than display, you can display next lamps by push the button (▶).**

(1) Direction pilot lamp



① This lamp flashes when the signal indicator lever is moved.

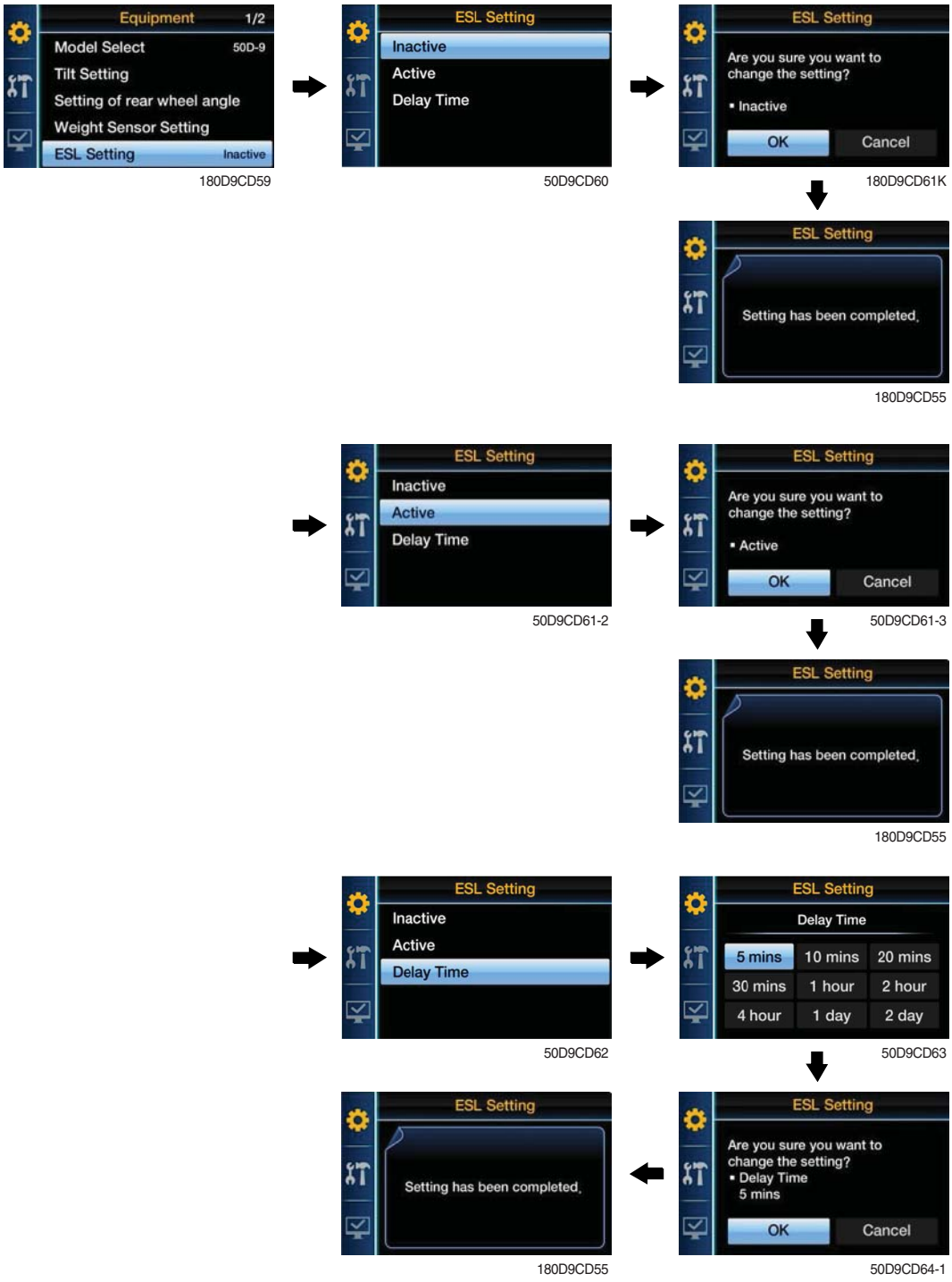
(2) Parking brake pilot lamp



① When the parking brake is actuated, the lamp lights ON.

※ **Check the lamp is OFF before driving.**

⑥ ESL setting



- Set ON/OFF function for using limitation of ignition and time for starting.
- Set time 5 minutes for starting :
  In 5 minutes you can restart without password, but after 5 minutes, you should input password for starting.

GROUP 4 TRANSMISSION MESSAGE DISPLAY

1) FUNCTION

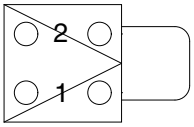
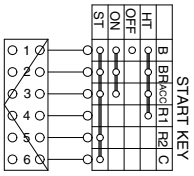
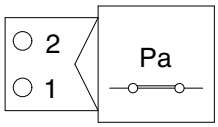
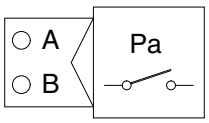
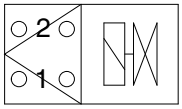
The display can be used with the gear selector (DW-3). It indicates speed and driving direction. When driving in the automatic mode, a bar indicator gives additionally also information about the selected driving range; The automatic range is symbolized by arrows above and below the bar indicator. In case of possible errors in the system, a wrench appears on the display, combined with indication of the error number. Also sporadically occurring errors can be indicated.

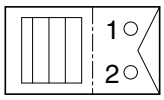
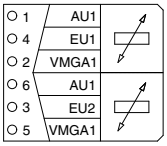
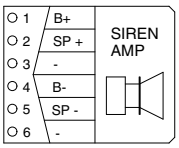
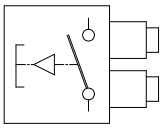
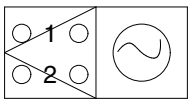
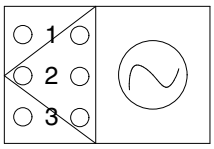


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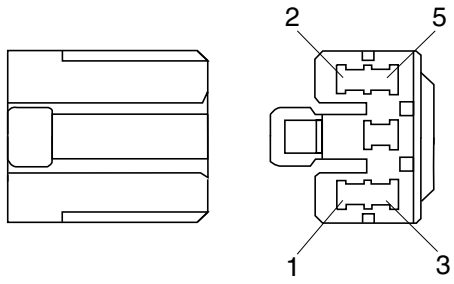
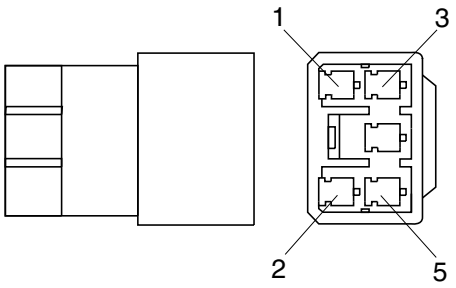
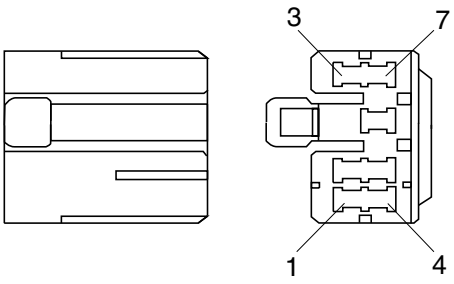
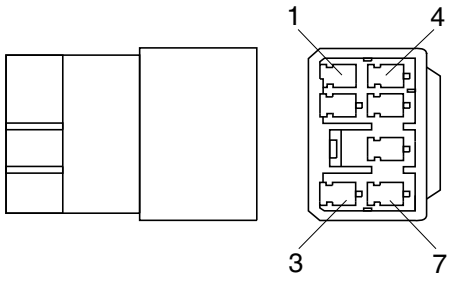
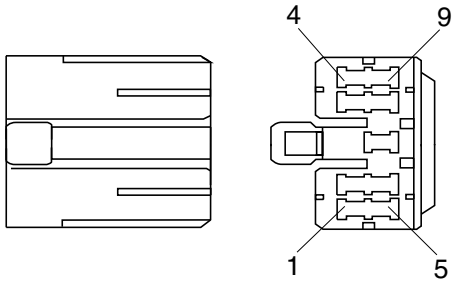
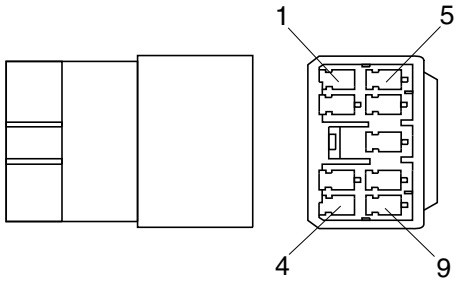
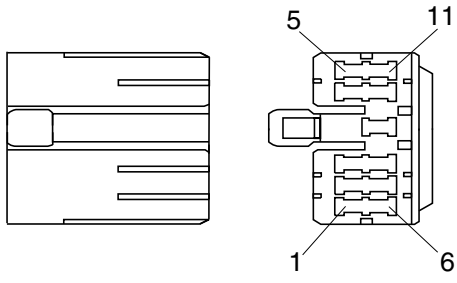
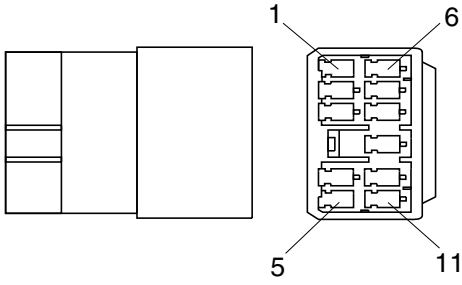
※ If it happens error codes, consult with Hyundai service center to repair the fault.

GROUP 6 ELECTRICAL COMPONENT SPECIFICATION

Part name	Symbol	Specifications	Check
Battery		12V × 100Ah (4EA)	※ When checking the battery charging indicator, Green : Normal condition Black : Discharge condition Transparency : Change
Fusible link	 CN-95A CN-95B	CN-95A : 24V 30A CN-95B : 24V 30A	※ Check disconnection Normal : 0 Ω (Connect ring terminal and check resistance between terminal 1 and 2)
Start key	 CS-2	DC 24V	※ Check contact OFF : ∞ Ω (For each terminal) ON : 0 Ω (For terminal 1-2, 1-3) ∞ Ω (For terminal 1-5) START : 0 Ω (For terminal 1-2, 1-3 and 1-5)
Pressure switch	 CD-3 CD-4 CD-26	N.C type	※ Check contact Normal : 0 Ω (CLOSE)
Pressure switch	 CD-29 CD-75 CD-35	N.O type	※ Check contact Normal : ∞ Ω (OPEN)
Solenoid valve (fan EPPR valve)	 CN-71 CN-131 CN-154 CN-156 CN-157	24V 300A	※ Check resistance About 24 Ω

Part name	Symbol	Specifications	Check
DEF Line heater	 CN-381 CN-382 CN-383	-	-
Inching sensor	 CD-71	-	-
Siren amp	 CN-47	24V	-
Center horn switch	 CS-5	24V	-
Transmission speed pick up sensor (Internal, Turbine, Engine)	 CD-27 CD-74 CD-72	-	-
Transmission speed sensor (output)	 CD-73	-	-

2) PA TYPE CONNECTOR

No. of pin	Receptacle connector (Female)	Plug connector (Male)
5	 S811-005002	 S811-105002
7	 S811-007002	 S811-107002
9	 S811-009002	 S811-109002
11	 S811-011002	 S811-111002

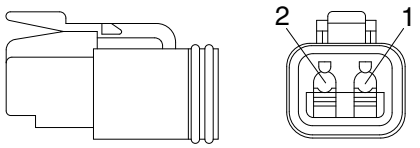
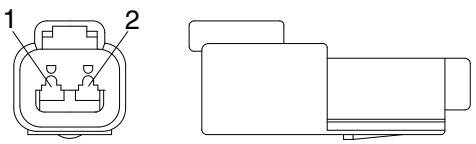
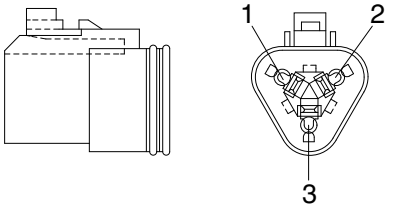
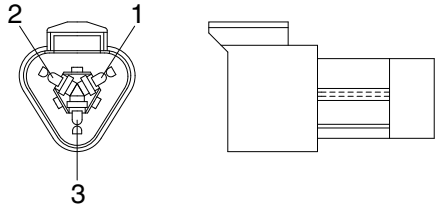
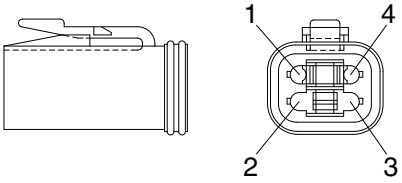
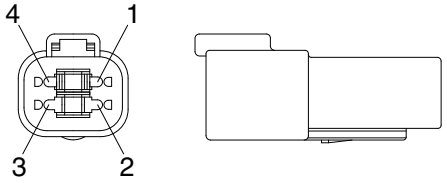
15) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★★★

- ★★★★ : Modifications (See below)
- 3S : Number of contacts (P : Pin, S : Socket)
- 06 : Receptacle, 04 : Plug
- DT : Deutsch connectors

※ Modification

E003 : Standard end cap - gray
E004 : Color of connector to be black
E005 : Combination - E004 & E003
EP04 : End cap
EP06 : Combination P012 & EP04
P012 : Front seal enhancement - connectors color to be black for 2, 3, 4 & 6pin

No. of pin	Receptacle connector (Female)	Plug connector (Male)
2	 DT06-2S	 DT04-2P
3	 DT06-3S	 DT04-3P
4	 DT06-4S	 DT04-4P

3) CARRIAGE LOAD ROLLER

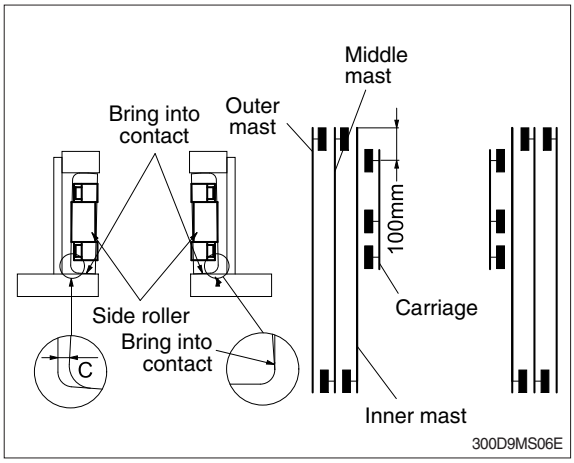
(1) Measure the clearance when the center of the carriage upper roller is 100 mm from the top of the inner mast.

(2) Measure the clearance at upper, middle and lower rollers after loosen the adjust screws from the side rollers. Shift the carriage to one side to bring the roller into contact with the inner mast, and measure the clearance between the roller side face and mast at the closest position on the opposite side to the following value by adjust screw.

· Standard clearance C = 0~0.6 mm

(3) Distribute the roller clearance equally to the left and right roller.

(4) After the adjustment, the carriage should move smoothly along the overall mast length.



4) MAST BACK UP LINER

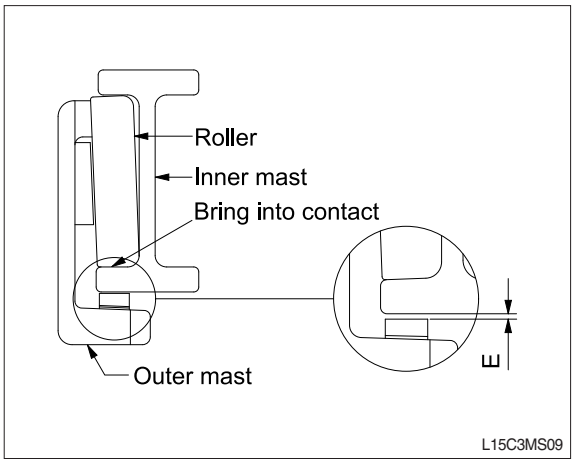
(1) Measure the clearance with the middle mast at the bottom position.

(2) With the middle mast in contact with the outer mast roller, adjust the clearance between the mast back up liner and middle mast to the following value by inserting the back up liner shim.

· Standard clearance E = 0.2 ~ 0.6 mm

· Shim thickness : 0.5, 1.0 mm

(3) After the adjustment, the mast should move smoothly.



※ When assembling the load roller bearings, it must be sure to observe the followings.

1) The outer race of the load roller bearings should be assembled to inward for 2.5 mm radius round part and outward for 7 mm radius round part.

2) When assembling and disassembling the load roller bearings, the jig fixture should be used so that it can be pressed to inner race of the roller bearings.
If it is not, the inner race of the load roller bearing could be seperated.

3) Remove the foreign materials in the grease oil passage of the roller brackets before assembling.

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