

1. STRUCTURE

This service manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This service manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into the following sections.

Structure and function

This group explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

Operational checks and troubleshooting

This group explains the system operational checks and troubleshooting charts correlating problem to remedy.

Tests and adjustments

This group explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

Disassembly and assembly

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your Hyundai distributor for the latest information.

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SECTION 1 GENERAL



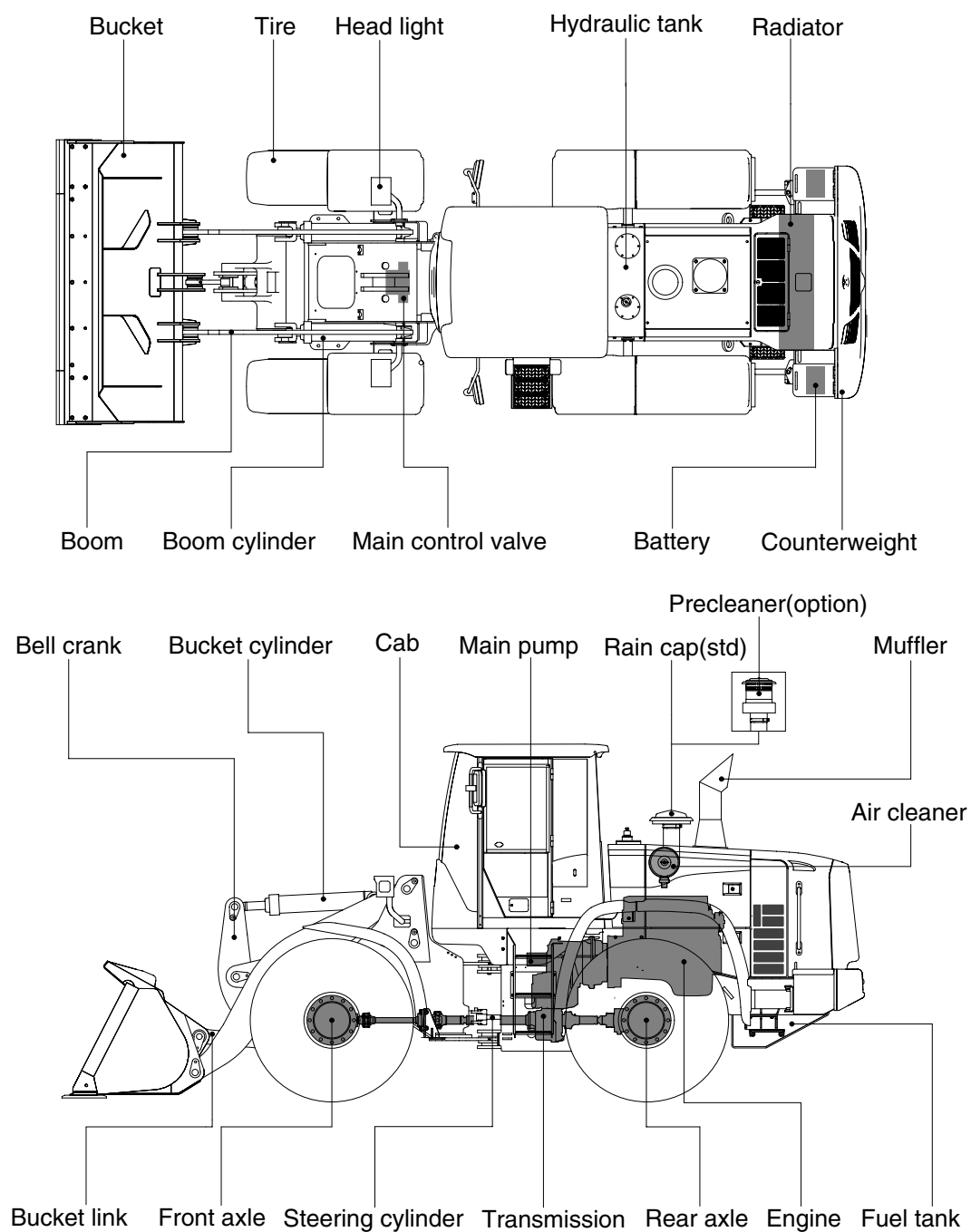
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GROUP 2 SPECIFICATION

1. MAJOR COMPONENTS



7409S2SP05

6. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT

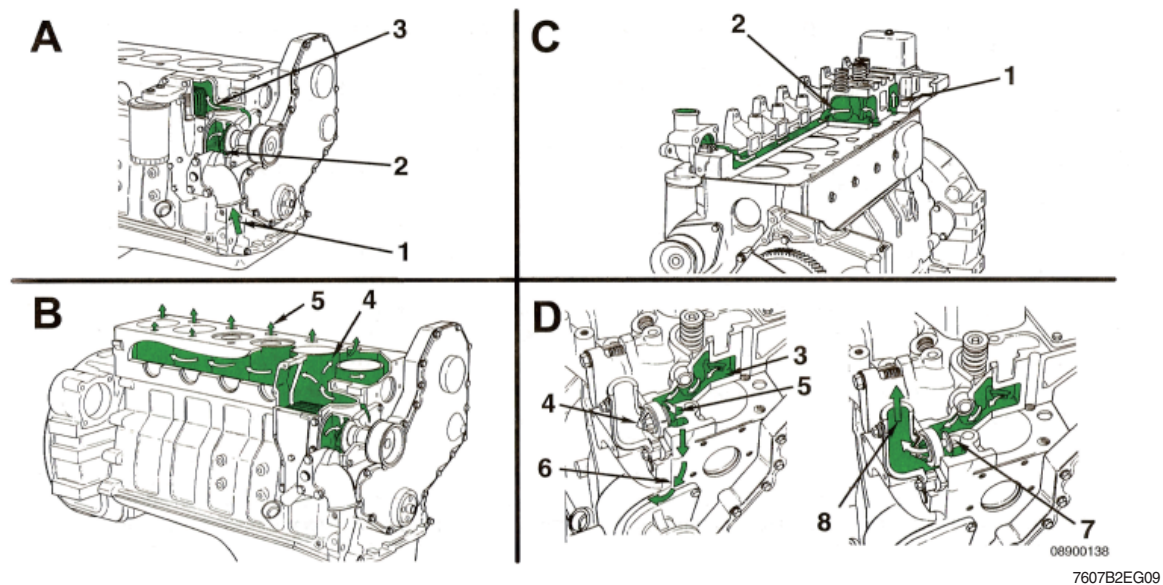
(1) Coarse thread

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) COOLING SYSTEM



※ Never operate the engine without a thermostat. Without a thermostat, the coolant will not flow to the radiator and the engine will overheat.

(1) The illustration identifies the significant features of the coolant system.

① Sections A and B.

Coolant is drawn from the radiator by the integrally mounted water pump. The output from the water pump empties into the oil cooler cavity of the cylinder block.

The coolant then circulates around each cylinder and crosses the block to the fuel pump side of the engine.

- | | |
|--------------------------------|-----------------------------------|
| 1 Coolant inlet | 4 Coolant flow past cylinder head |
| 2 Pump Impeller | 5 Coolant to cylinder head |
| 3 Coolant flow past oil cooler | |

② Sections C and D.

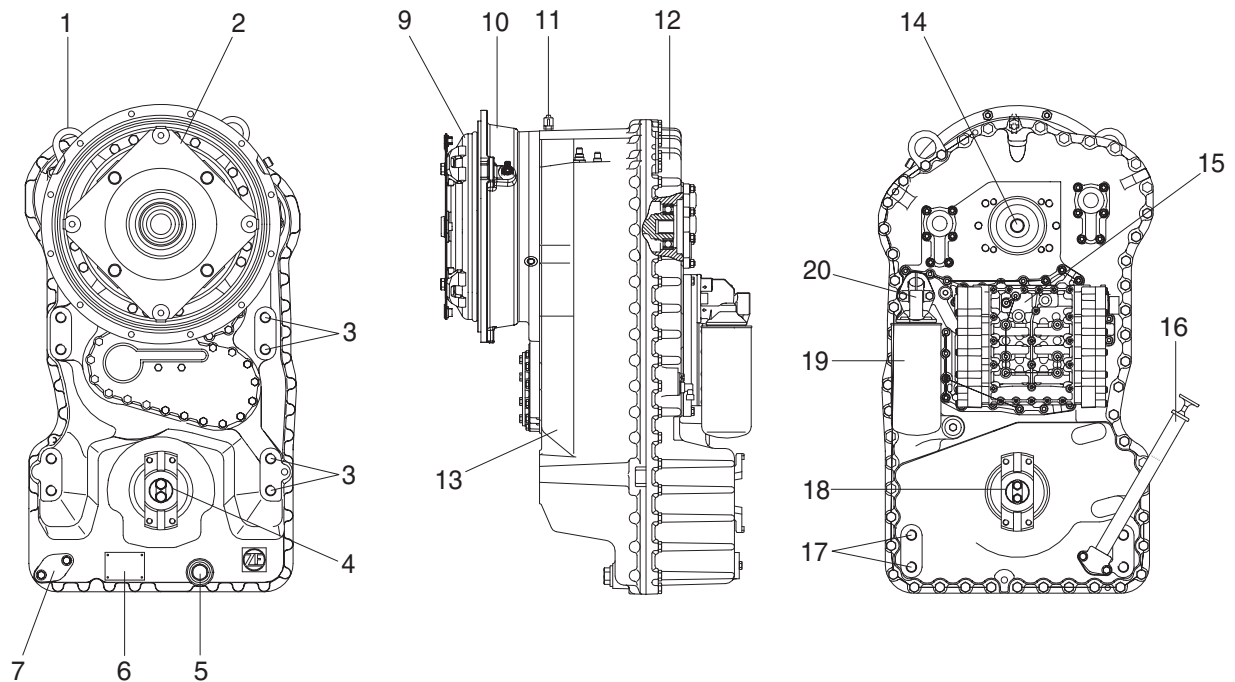
Coolant then flows up into the cylinder head, crosses over the valve bridges, and down the exhaust manifold side of the engine to the integral thermostat housing.

As the coolant flows across the head toward the thermostat housing, it provides cooling for the injector. When the engine is below operating temperature, the thermostat is closed, and the coolant flow bypasses the radiator and goes to the water pump inlet through internal drillings in the block and cylinder head.

- | | |
|---------------------------------------|---------------------------------|
| 1 Coolant flow from the cylinder head | 5 Coolant bypass passage |
| 2 Coolant to the thermostat housing | 6 Coolant flow to pump inlet |
| 3 Coolant flow past injector | 7 Bypass closed |
| 4 Thermostat | 8 Coolant flow back to radiator |

When operating temperature is reached, the thermostat opens, blocking the bypass passage to the water pump and opening the outlet to the radiator.

2) INSTALLATION VIEW

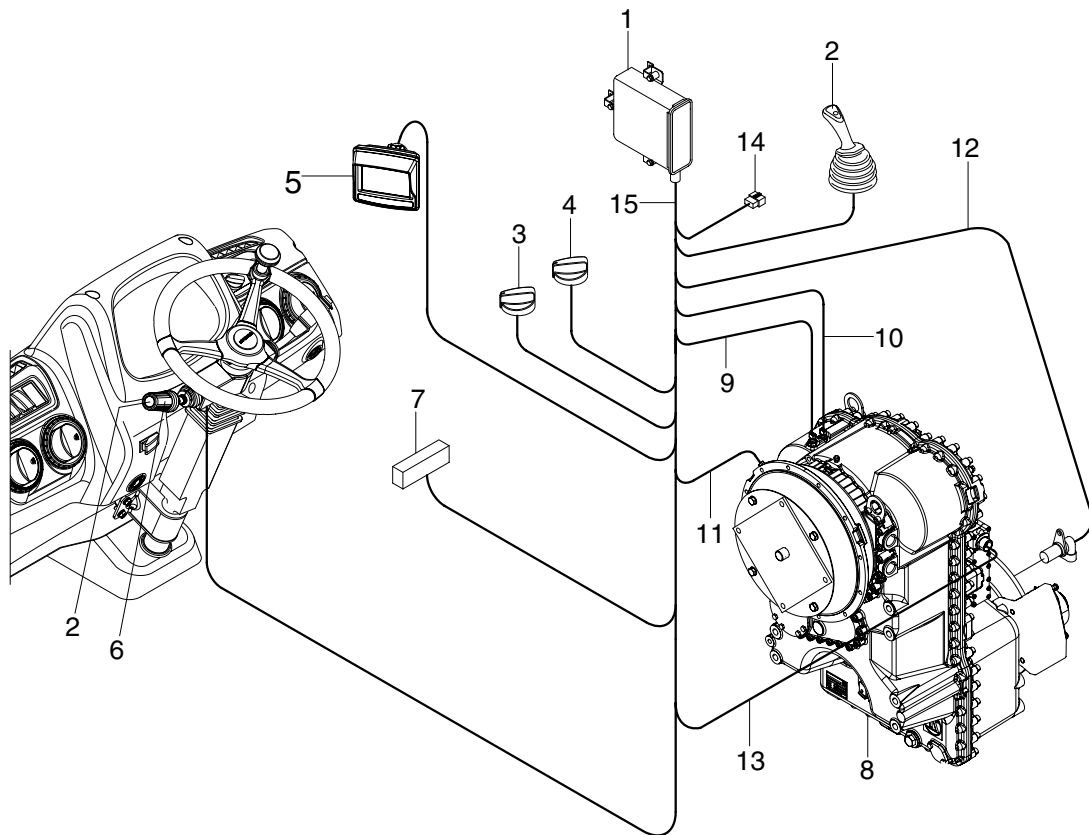


7409S3PT02

- | | | | |
|----|---|----|--|
| 1 | Lifting lugs | 12 | Transmission-case cover |
| 2 | Connection to engine | 13 | Transmission case |
| 3 | Transmission suspension threads M20 | 14 | Power take-off; Coaxial;
Engine-dependent |
| 4 | Output flange-converter side | 15 | Electro-hydraulic control |
| 5 | Oil drain plug with magnetic insert M38 × 1.5 | 16 | Oil level tube with oil dipstick |
| 6 | Model identification plate | 17 | Transmission suspension threads M20 |
| 7 | Attachment possibility for oil level tube
with oil dipstick (converter side) | 18 | Output flange-rear |
| 9 | Cover | 19 | Exchange filter (fine filter) |
| 10 | Converter bell housing | 20 | Filter head with connection for filter
restriction switch |
| 11 | Breather | | |

6) ELECTRIC CONTROL UNIT

(1) Complete system



7409S3PT33

- | | |
|----|--|
| 1 | Transmission control unit(EST-37A) |
| 2 | Kickdown switch |
| 3 | Clutch cut off switch |
| 4 | Full automatic switch |
| 5 | Monitor |
| 6 | Gear selector(DW-3) with integrated kickdown switch |
| 7 | Power supply connection |
| 8 | Transmission |
| 9 | Cable to inductive transmitter - speed central gear train |
| 10 | Cable to inductive transmitter - speed turbine |
| 11 | Cable to inductive transmitter - speed engine |
| 12 | Cable to speed sensor output and speedometer |
| 13 | Cable to plug connection on the electro - hydraulic control unit |
| 14 | CAN-Connection |
| 15 | Wiring |

(2) Description of the basic functions

The powershift transmissions is equipped is electronic transmission control unit(EST-37A), developed for it.

The system is processing the desire of the driver according to the following criteria.

- Gear determination depending on controller position, driving speed and load condition.

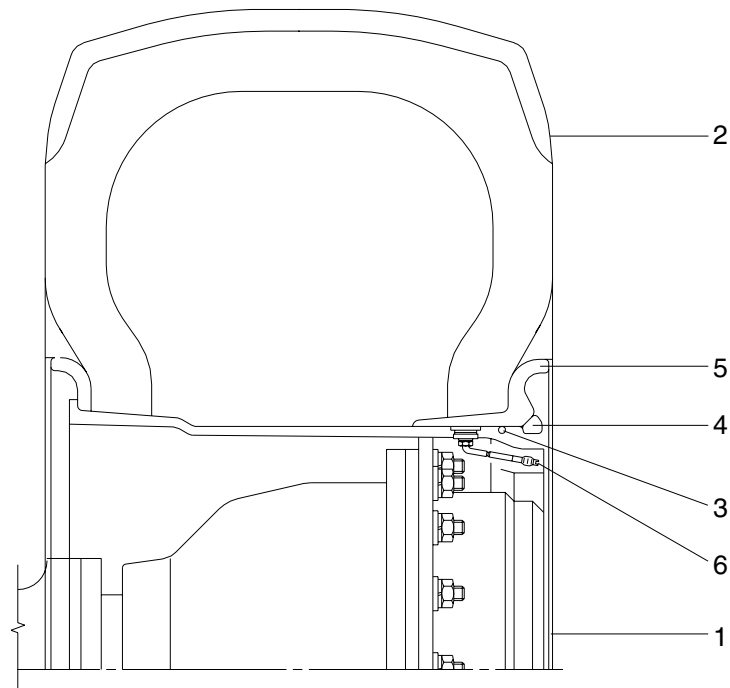
Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
34	S.C. to battery voltage or O.C. at turbine speed input TCU measures a voltage higher than 7.00V at speed input pin · Cable is defective and is contacted to vehicle battery voltage · Cable has no connection to TCU · Speed sensor has an internal defect · Connector pin is contacted to battery voltage or has no contact	OP mode : Substitute clutch control If a failure is existing at output speed, TCU shifts to neutral OP mode : Limp home	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor
35	S.C. to ground at turbine speed input TCU measures a voltage less than 0.45V at speed input pin · Cable/connector is defective and is contacted to vehicle ground · Speed sensor has an internal defect	OP mode : Substitute clutch control If a failure is existing at output speed, TCU shifts to neutral OP mode : Limp home	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor ※ This fault is reset after power up of TCU
36	Logical error at turbine speed input TCU measures a turbine speed over a threshold and at the next moment the measured speed is zero · Cable/connector is defective and has bad contact · Speed sensor has an internal defect · Sensor gap has the wrong size	OP mode : Substitute clutch control If a failure is existing at output speed, TCU shifts to neutral OP mode : Limp home	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor · Check the sensor gap
37	S.C. to battery voltage or O.C. at internal speed input TCU measures a voltage higher than 7.00V at speed input pin · Cable is defective and is contacted to vehicle battery voltage · Cable has no connection to TCU · Speed sensor has an internal defect · Connector pin is contacted to battery voltage or has no contact	OP mode : Substitute clutch control	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor
38	S.C. to ground at turbine speed input TCU measures a voltage less than 0.45V at speed input pin · Cable/connector is defective and is contacted to vehicle ground · Speed sensor has an internal defect	OP mode : Substitute clutch control	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor
39	Logical error at internal speed input TCU measures a internal speed over a threshold and at the next moment the measured speed is zero · Cable/connector is defective and has bad contact · Speed sensor has an internal defect · Sensor gap has the wrong size	OP mode : Substitute clutch control	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor · Check the sensor gap ※ This fault is reset after power up of TCU
3A	S.C. to battery voltage or O.C. at output speed input TCU measures a voltage higher than 12.5V at speed input pin · Cable is defective and is contacted to battery voltage · Cable has no connection to TCU · Speed sensor has an internal defect · Connector pin is contacted to battery voltage or has no contact	Special mode for gear selection OP mode : Substitute clutch control If a failure is existing at turbine speed, TCU shifts to neutral OP mode : Limp home	· Check the cable from TCU to the sensor · Check the connectors · Check the speed sensor

※ Some fault codes are not applied to this machine.

Fault code (Hex)	Meaning of the fault code possible reason for fault detection	Reaction of the TCU	Possible steps to repair
B3	Slippage at clutch K3 TCU calculates a differential speed at closed clutch K3. If this calculated value is out of range, TCU interprets this as slipping clutch - Low pressure at clutch K3 - Low main pressure - Wrong signal at internal speed sensor - Wrong signal at output speed sensor - Wrong size of the sensor gap - Clutch is defective	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	- Check pressure at clutch K3 - Check main pressure in the system - Check sensor gap at internal speed sensor - Check sensor gap at output speed sensor - Check signal at internal speed sensor - Check signal at output speed sensor Replace clutch
B4	Slippage at clutch K4 TCU calculates a differential speed at closed clutch K4. If this calculated value is out of range, TCU interprets this as slipping clutch - Low pressure at clutch K4 - Low main pressure - Wrong signal at internal speed sensor - Wrong signal at turbine speed sensor - Wrong size of the sensor gap - Clutch is defective	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	- Check pressure at clutch K4 - Check main pressure in the system - Check sensor gap at internal speed sensor - Check sensor gap at turbine speed sensor - Check signal at internal speed sensor - Check signal at turbine speed sensor Replace clutch
B5	Slippage at clutch KV TCU calculates a differential speed at closed clutch KV. If this calculated value is out of range, TCU interprets this as slipping clutch - Low pressure at clutch KV - Low main pressure - Wrong signal at internal speed sensor - Wrong signal at turbine speed sensor - Wrong size of the sensor gap - Clutch is defective	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	- Check pressure at clutch KV - Check main pressure in the system - Check sensor gap at internal speed sensor - Check sensor gap at turbine speed sensor - Check signal at internal speed sensor - Check signal at turbine speed sensor Replace clutch
B6	Slippage at clutch KR TCU calculates a differential speed at closed clutch KR. If this calculated value is out of range, TCU interprets this as slipping clutch - Low pressure at clutch KR - Low main pressure - Wrong signal at internal speed sensor - Wrong signal at turbine speed sensor - Wrong size of the sensor gap - Clutch is defective	TCU shifts to neutral OP mode : Limp home If failure at another clutch is pending TCU shifts to neutral OP mode : TCU shutdown	- Check pressure at clutch KR - Check main pressure in the system - Check sensor gap at internal speed sensor - Check sensor gap at turbine speed sensor - Check signal at internal speed sensor - Check signal at turbine speed sensor Replace clutch
B7	Overtemp sump TCU measured a temperature in the oil sump that is over the allowed threshold.	No reaction OP mode : Normal	- Cool down machine - Check oil level - Check temperature sensor
B9	Overspend engine	Retarder applies OP mode : Normal	-
BA	Differential pressure oil filter TCU measured a voltage at differential pressure switch out of the allowed range - Oil filter is polluted - Cable/connector is broken or cable/connector is contacted to battery voltage or vehicle ground - Differential pressure switch is defective	No reaction OP mode : Normal	- Check oil filter - Check wiring from TCU to differential pressure switch - Check differential pressure switch(Measure resistance)

※ Some fault codes are not applied to this machine.

6. TIRE AND WHEEL



7407APT10

- | | | | | | |
|---|-----------|---|-----------|---|----------------|
| 1 | Wheel rim | 3 | O-ring | 5 | Side ring |
| 2 | Tire | 4 | Lock ring | 6 | Valve assembly |

- 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 and bucket capacity.

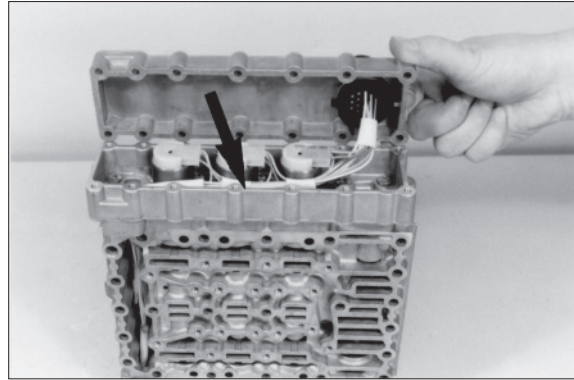
Problem	Cause	Remedy
Torque converter stall RPM too low	Low engine power. Mechanical malfunction.	Do engine power test. Remove and inspect torque converter.
Transmission pressure light comes ON when shifting from forward to reverse (all other gears OK)	Low oil level. Cold oil. Leak in reverse pack.	Add oil. Warm oil to specification. Do transmission pressure, pump flow, and leakage check.
Transmission pressure light comes ON for each shift	Cold oil. No time delay in monitor. Restriction in modulation orifice. Stuck PPC valve. Low transmission pressure circuit. Leak in transmission pressure circuit. Failed transmission pump. Clogged filter.	Warm oil to specification. Do monitor check. Remove orifice and inspect for restriction and/or plugging. Remove and inspect. Do transmission system pressure test. Do converter out pressure test. Do transmission pump flow test. Inspect filter. Replace.

- (10) Introduce female connector against shoulder, with the groove facing the guide nose of the cover.

Install gasket (arrow) and fasten cover by means of socket head screws.

• Torque limit : 0.56 kgf · m (4.06 lbf · ft)

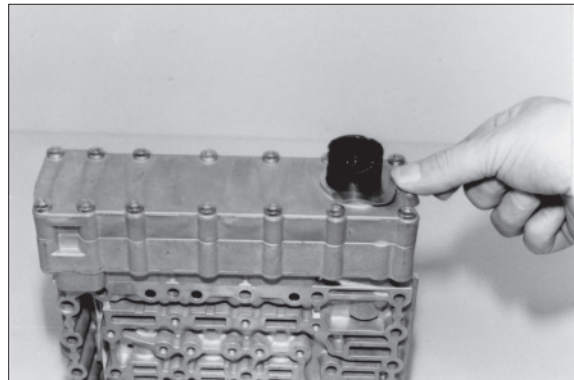
Box spanner 5873 042 002



73073CV026

- (11) Fix female connector by means of retaining clamp, see figure.

Install opposite cover.

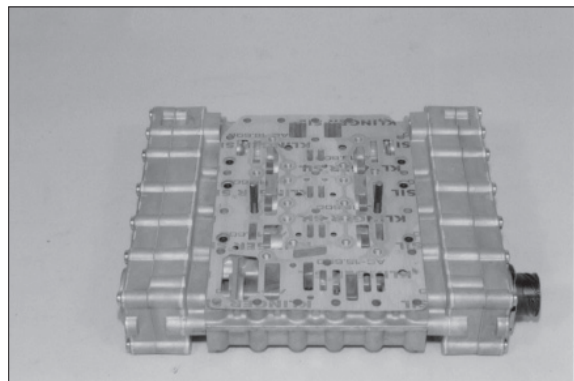


73073CV027

- (12) Install two adjusting screws and mount gasket I.

※ Pay attention to the different gaskets, see on the right figure and (15).

Adjusting screws 5870 204 063

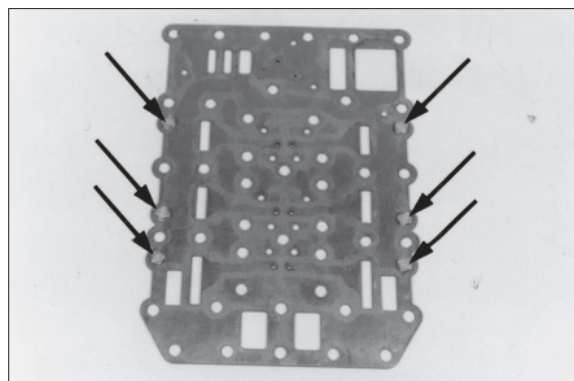


73073CV028

Intermediate plate-Version with screens

- (13) Insert screws (6EA) flush mounted into the bore of the intermediate plate, see arrow.

※ Pay attention to the installation position-screws are showing upward (facing the duct plate).



73073CV029

- ⑥ On the right figure shows the installation position of the single clutches as well as of the input and output.

KV Forward clutch

KR Reverse clutch

K1 1st speed clutch

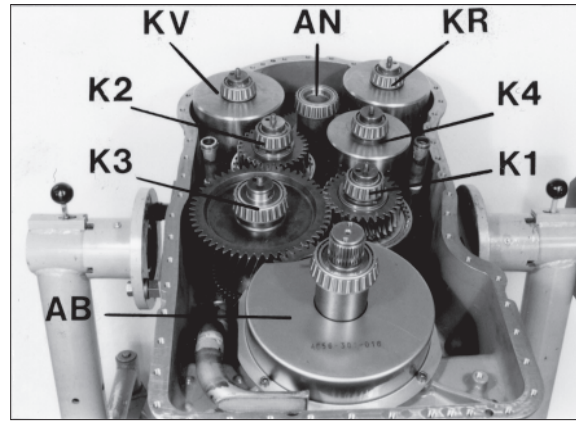
K2 2nd speed clutch

K3 3rd speed clutch

K4 4th speed clutch

AN Input

AB Output



73073TM040

- ※ The following figures describe the common removal of all clutches.

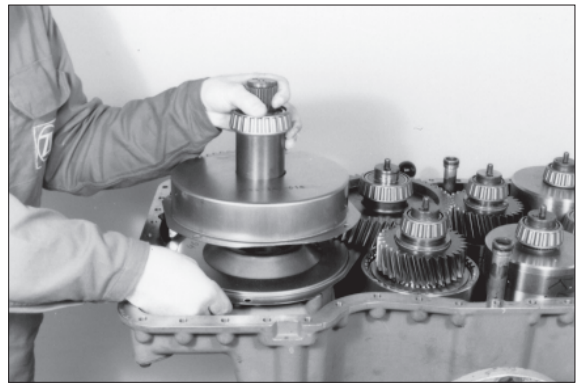
For this purpose, the housing cover, combined with special tool is necessary.

The removal of single clutches without help of the housing cover and the handles is extremely difficult because of the installation condition.

Besides, there is the danger of injuries.

- ※ Prior to the common removal of the clutches, the output shaft must be removed, see the below figure.

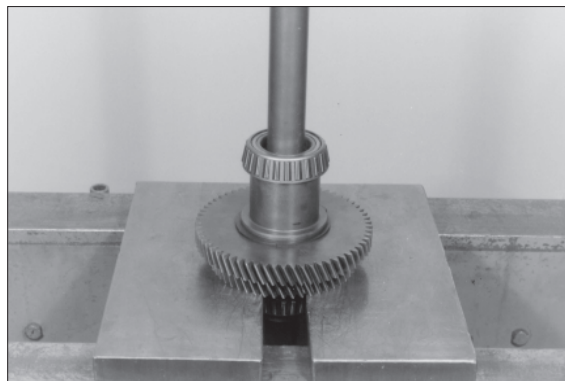
- ⑦ Loosen socket head screws and remove output shaft as well as both oil baffle plates.



73073TM042

(11) Disassemble input shaft

- ① If necessary, press turbine shaft out of the input shaft.
- ※ The turbine shaft is axially fixed by means of a snap ring which will be destroyed at the pressing out.



73073TM78

- ② Squeeze rectangular ring out and pull off the tapered roller bearing.
Pull off the opposite tapered roller bearing.
- ※ The separation of input shaft 1 and gear 2 is not possible (shrink fit).
- ※ Special tool
 - Grab sleeve 5873 001 058
 - Basic set 5873 001 000

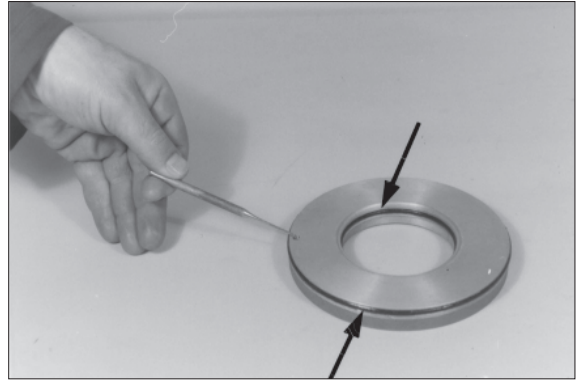


73073TM79

③ Check function of the drain valve.

※ Ball may not seize, if necessary clean by means of compressed air.

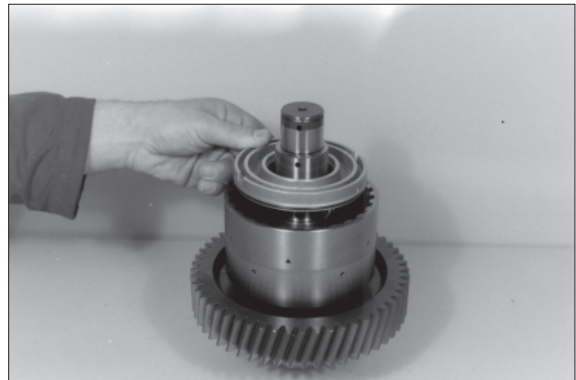
Insert both O-rings (arrows) scroll free into the piston recesses and oil them.



73073TM127

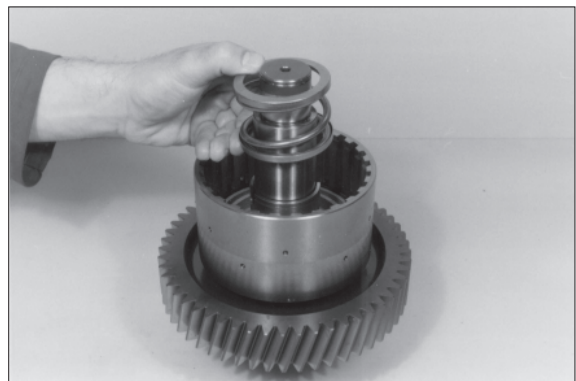
④ Introduce piston until contact is obtained.

※ Pay attention to the installation position, see on the right figure.



73073TM128

⑤ Introduce compression spring along with spring cup (2EA).



73073TM129

⑥ Preload compression spring and fix it by means of circlip.

※ Special tool

Assembly aid(K2 and K3) 5870 345 085

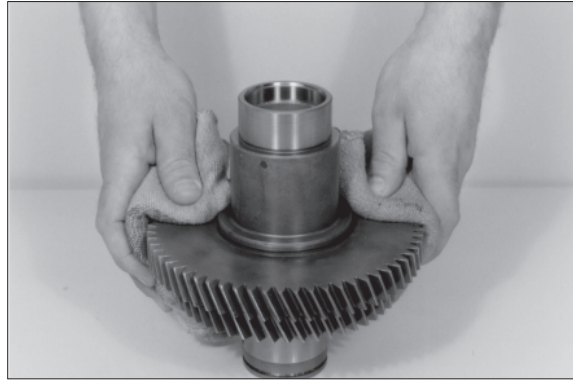
Assembly aid(K1) 5870 345 086



73073TM130

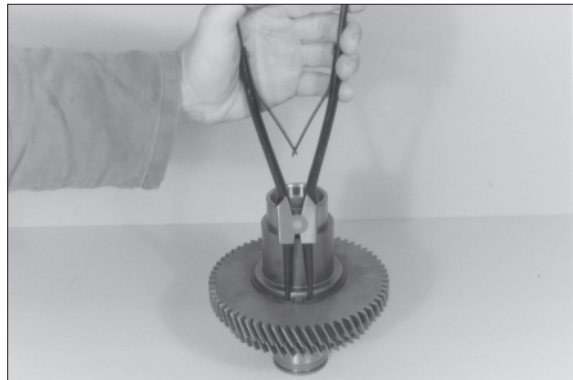
(4) Pre-assemble input shaft

- ① Undercool the input shaft (about -80°C), heat gear (about $+120^{\circ}\text{C}$) and assemble it until contact is obtained.



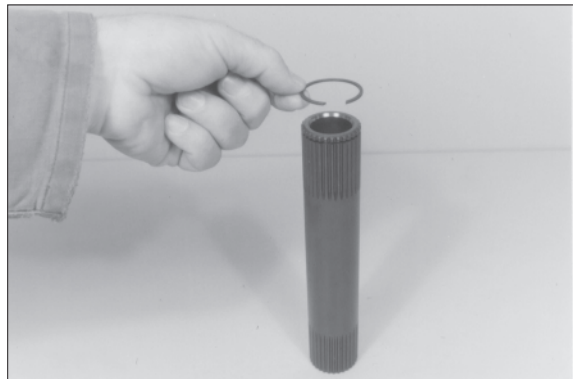
73073TM174

- ② Fix gear axially by means of circlip.



73073TM175

- ③ Squeeze snap ring into the recess of the turbine shaft.



73073TM176

- ④ Introduce turbine shaft until the snap ring snaps into the recess of the input shaft- turbine shaft is axially fixed.



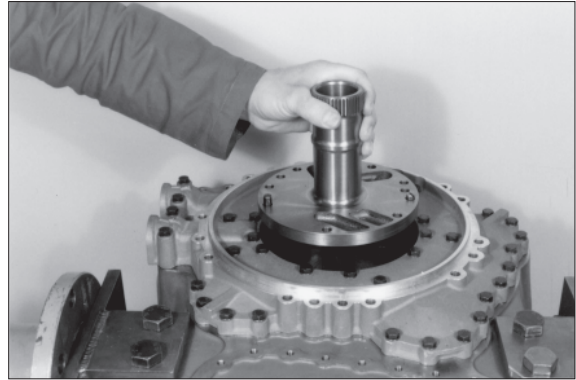
73073TM177

- ③ Install two adjusting screws and introduce stator shaft until contact is obtained.

※ Pay attention to the overlapping of the bores.

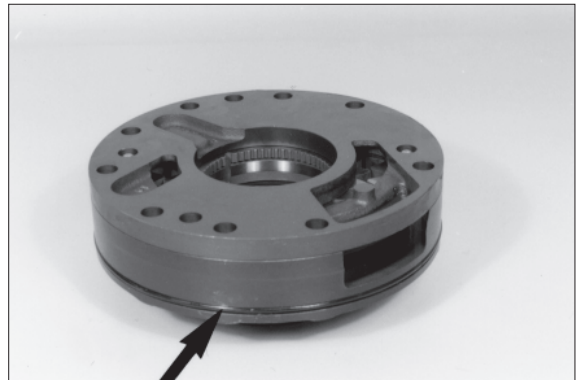
※ Special tool

Adjusting screws 5870 204 007



73073TM225

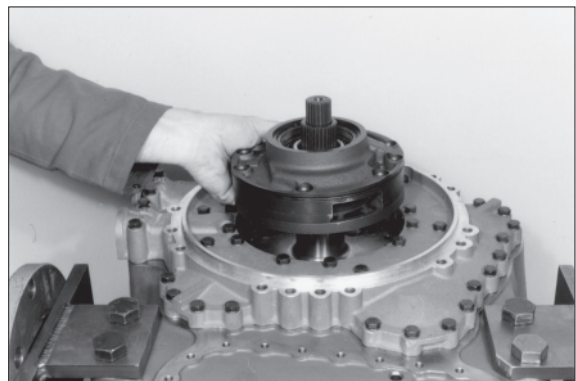
- ④ Install O-ring (arrow) and oil it.



73073TM226

- ⑤ Introduce transmission pump until contact is obtained.

※ Pay attention to the overlapping of the bores.



73073TM227

- ⑥ Equip socket head screws with new O-rings (arrow).

※ Grease O-rings.

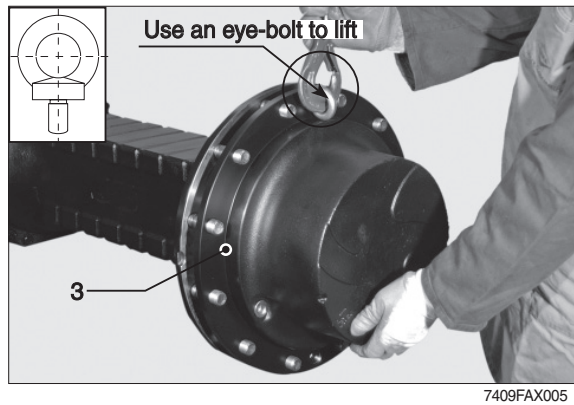


73073TM228

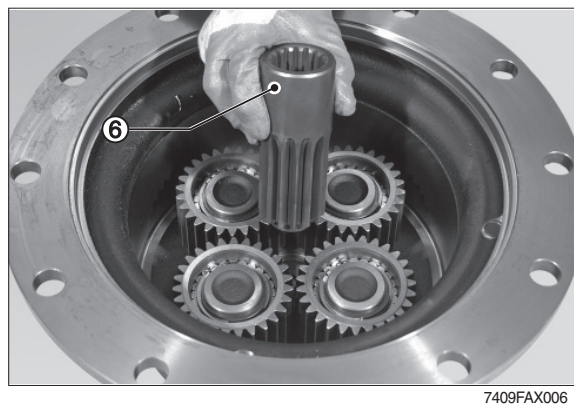
- (3) Using two screwdrivers or two levers inserted in the slots provided, disjoin the planetary cover (3) away from the wheel hub (16).



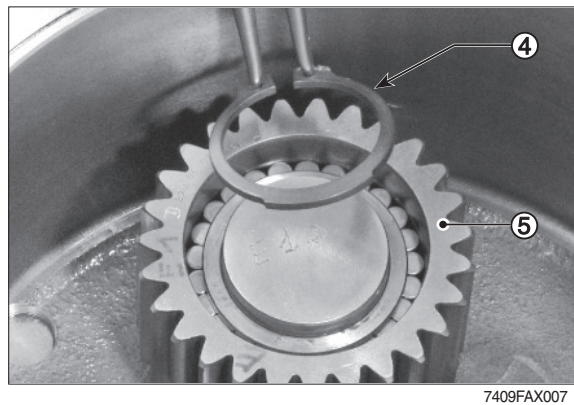
- (4) Remove the cover (3).



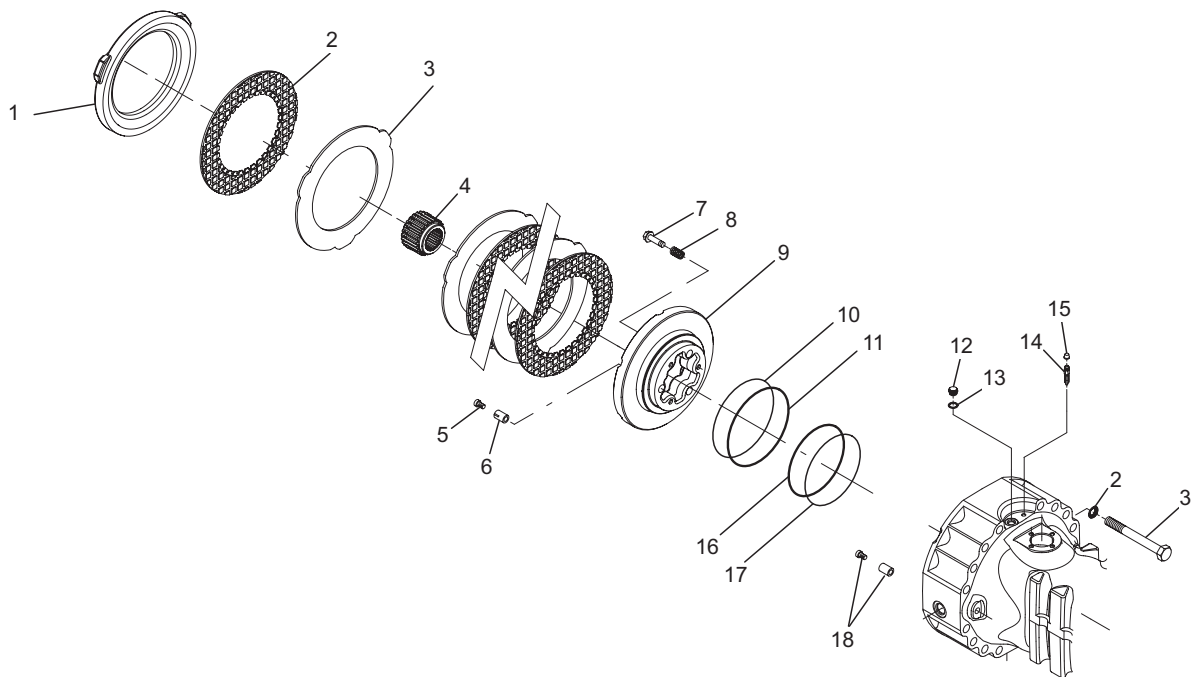
- (5) Remove the sun gear (6).



- (6) Remove the safety spring rings (4) of the planetary gears (5).



3) DISASSEMBLY SERVICE BRAKE



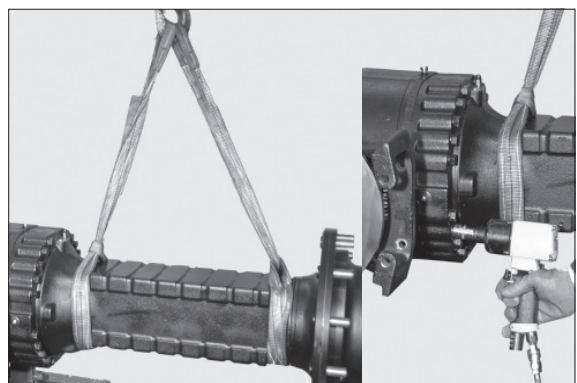
7409FAX040

- (1) If axle is positioned on an overhaul bench, place a safety anti-tilting stand "B" under the arm that remains connected and block wheels, if any.



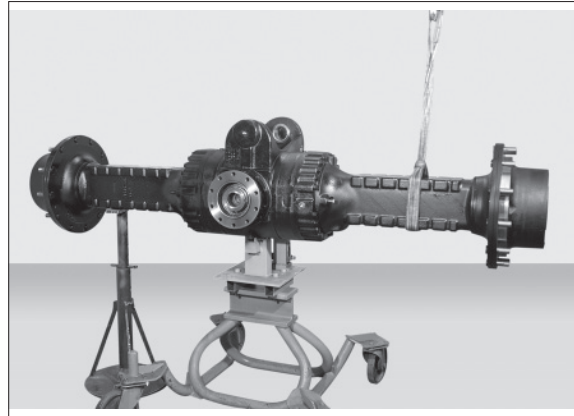
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- (2) Sling the arm to be removed and connect it to a hoist. Remove the retainer screws (3) and relative washers (2).



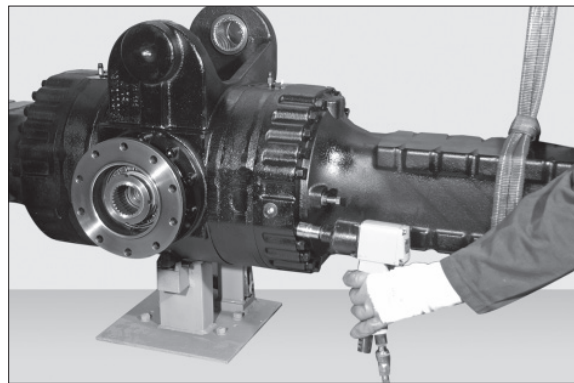
7409FAX042

- ※ If axle is positioned on an overhaul bench, place a safety antitilting stand “B” under the arm that remains connected and block wheels, if any.



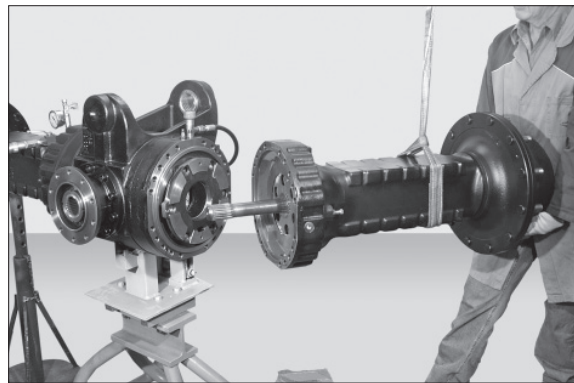
7409FAX078

- (11) Sling the arm to be removed and connect it to a hoist.
Remove the retainer screws and relative washers.



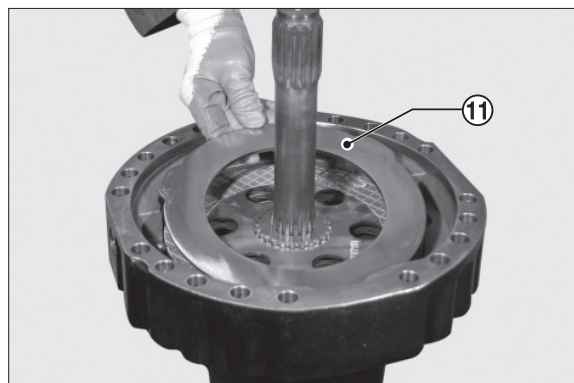
7409FAX079

- (12) Remove arm together with brakes and axle shafts; lay down the arm vertically.
Release pressure.



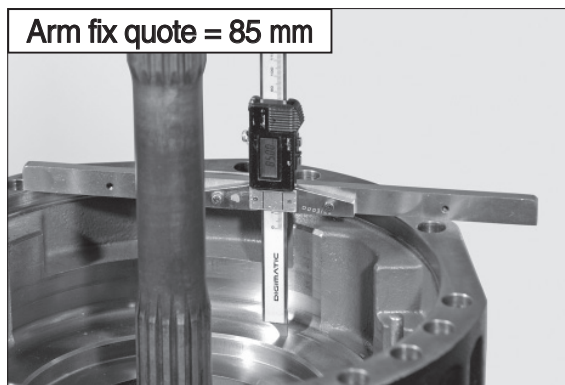
7409FAX080

- (13) Remove braking discs (11)(12), noting down direction of assembly.
- ※ If disks are not to be replaced, avoid changing their position.



7409FAX081

(19) Arm fix quote = 85 mm

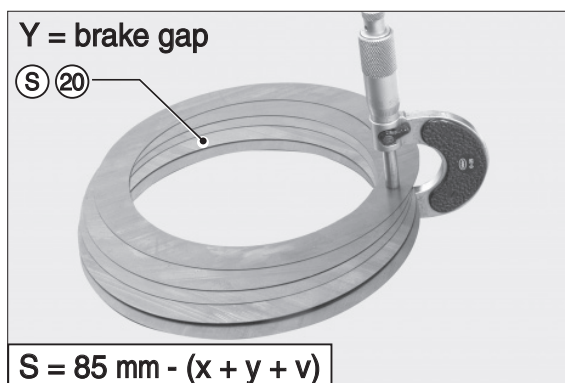


7409FAX114

(20) $S = 85 \text{ mm} - (x + y + v) =$ Thickness of shims to insert under the shim washer.

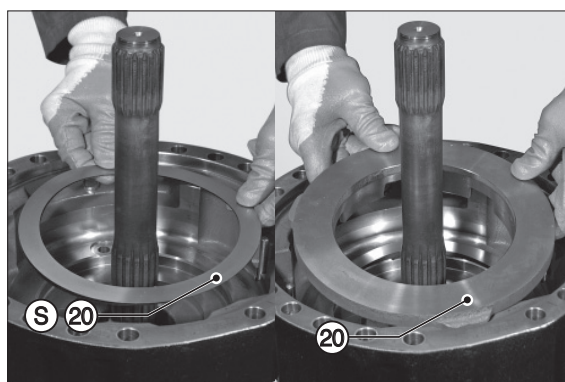
Example :

$$85 \text{ mm} - (30.6 + 52.9 + 1) = S = 0.5 \text{ mm}$$



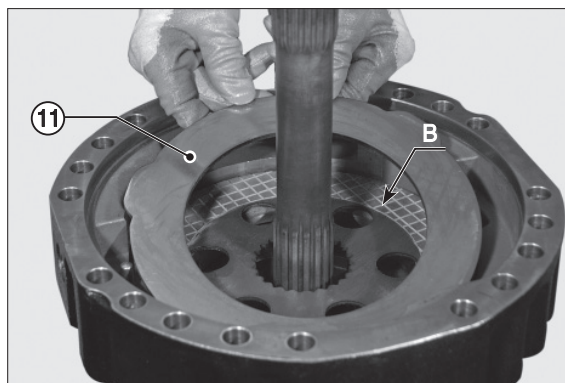
7409FAX115

(21) Insert under the shim washer a thickness of shims (20).



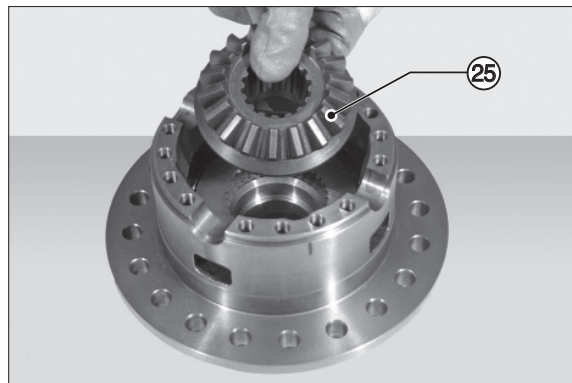
7409FAX116

(22) Slightly lubricate the braking disks (11) and (12) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks "B" are perfectly lined up.



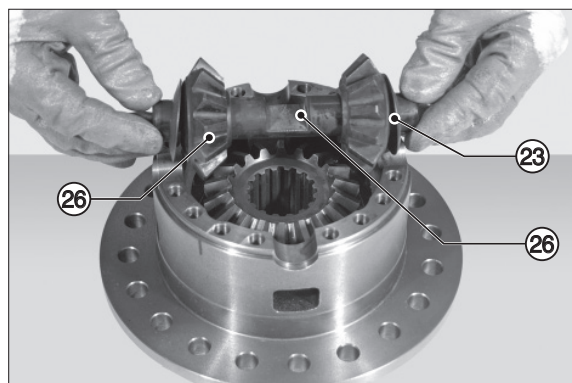
7409FAX117

(3) Install crown wheel (25).



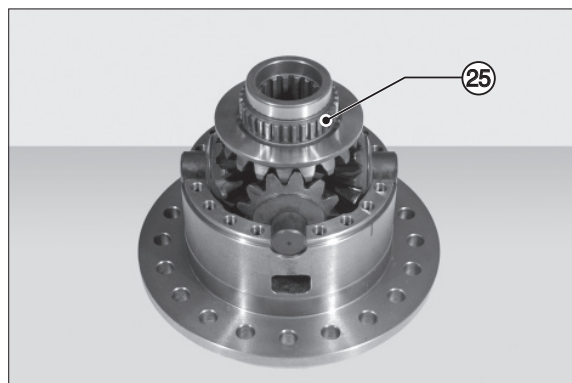
7409FAX147

(4) Install the planetary gears (26) and spherical shoulder washers (25) onto the bolts (24).
Install the planetary set.



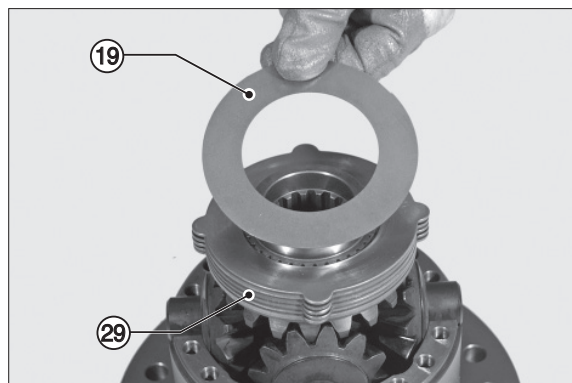
7409FAX148

(5) Install crown wheel (25).



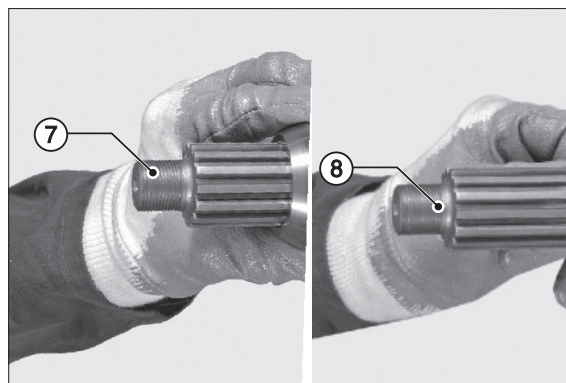
7409FAX149

(6) Fit increased disc (18), clutch pack (29) and shims (6) onto the crown wheel (25).
Fit the upper half box (26) and make sure that the match marks line up.



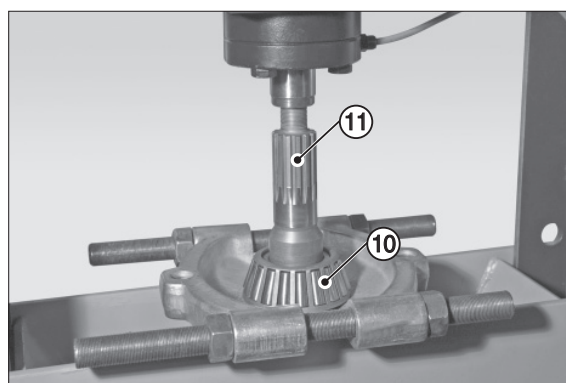
7409FAX150

(11) Refer and keep to the positions marked during disassembly.



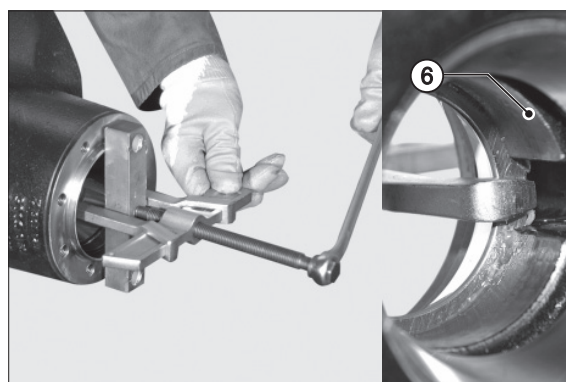
7409FAX186

(12) Using a puller and a press, remove the inner bearing cone (10) from the pinion (11).



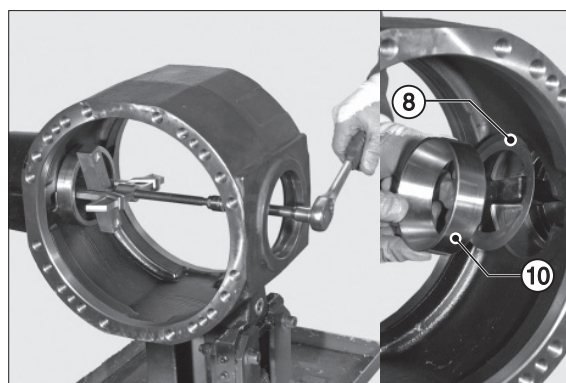
7409FAX187

(13) Remove the bearing cup of the tail bearing cone (6).



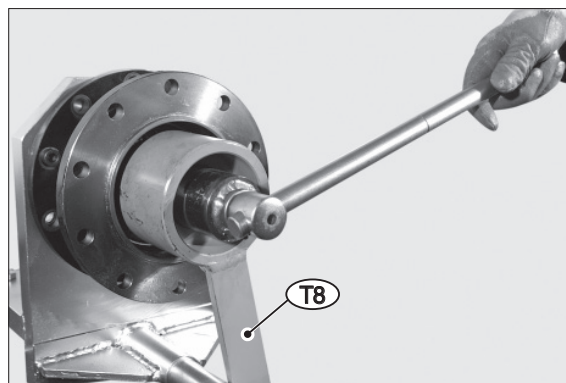
7409FAX188

(14) Remove the bearing cup of the internal bearing cone (10) as well as the shim washers (8).



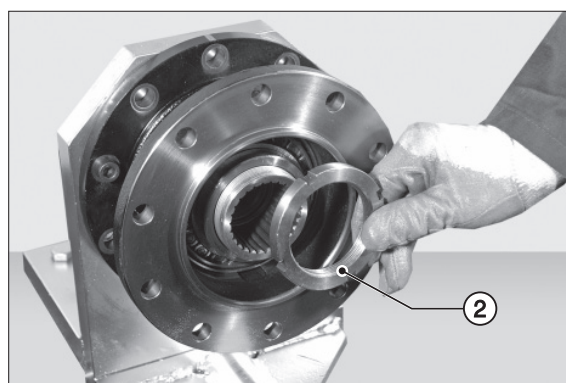
7409FAX189

- (3) Stop wrench and rotate the pinion so as to release and remove the ring nut (2).



7409FAX222

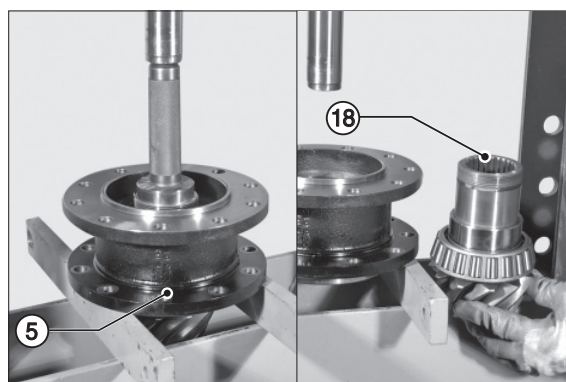
- (4) Remove pinion ring nut (2).



7409FAX223

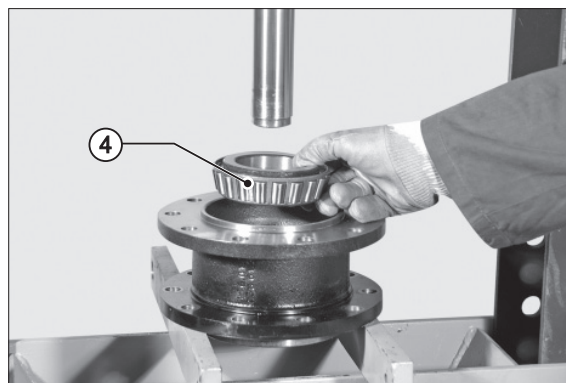
- (5) Position the cover under a press, extract the pinion (18) complete with the internal bearing (16), the distance piece (15) and shims (14).

※ The thrust blocks of the bearings remain in the central body (5).



7409FAX224

- (6) Remove sealing ring (13) and bearing (4).

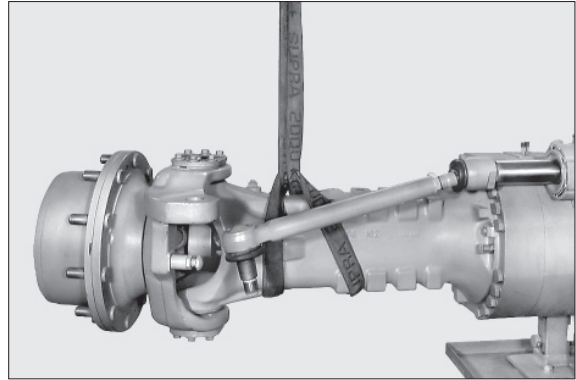


7409FAX225

13) REMOVING AND DISASSEMBLING THE HYDRAULIC DIFFERENTIAL UNIT

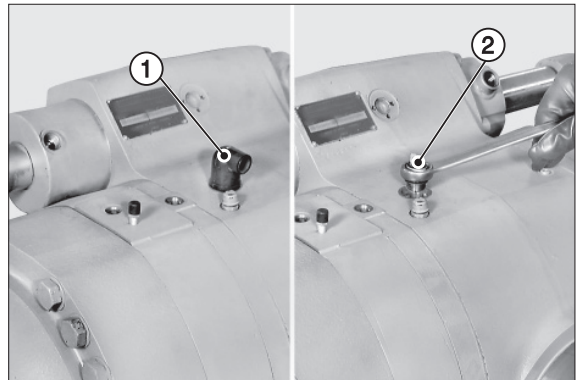
Removal

- (1) Pull out the arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKE DISCS.



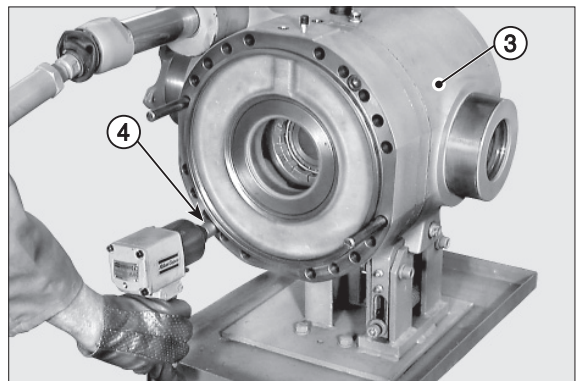
7409FAX257

- (2) Remove both guard (1) and differential-lock-enabled microswitch indicator (2).



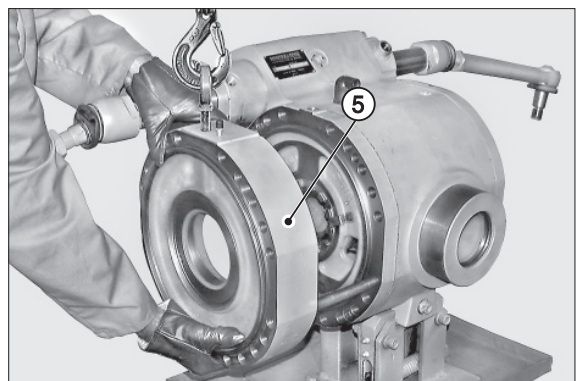
7409FAX258

- (3) Tighten two safety studs "A" (M16) in two opposing holes in the main body (3).
Loosen and remove the screws (4).



7409FAX259

- (4) Connect to a hoist and remove the whole brake cylinders (5).

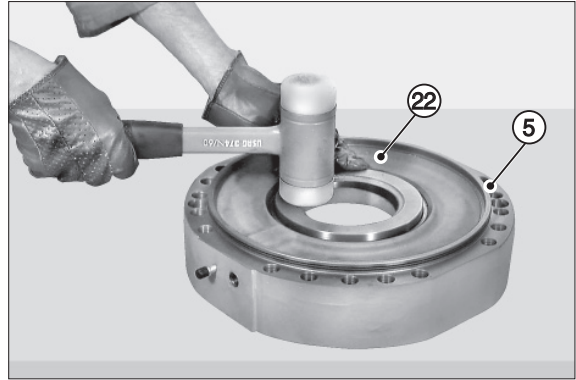


7409FAX260

Assembling the brake piston

(10) Fit O-rings (23), (24) and anti-extrusion rings (39) and (40) on piston (22).

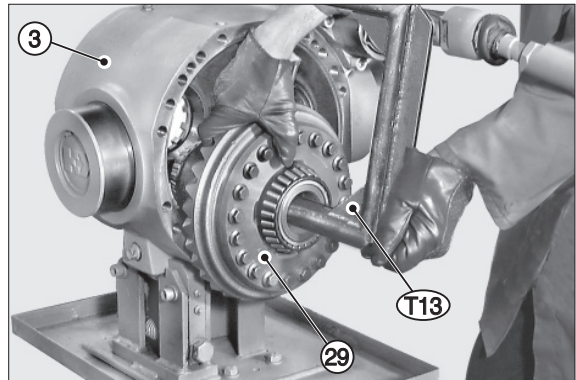
- ※ Thoroughly check the positioning of anti-extrusion rings (39) and (40).
Lubricate the seals and introduce piston (22) into cylinder (5).



7409FAX291

Installation

(11) Using tool T13, introduce the whole differential (3) into the main body (29).

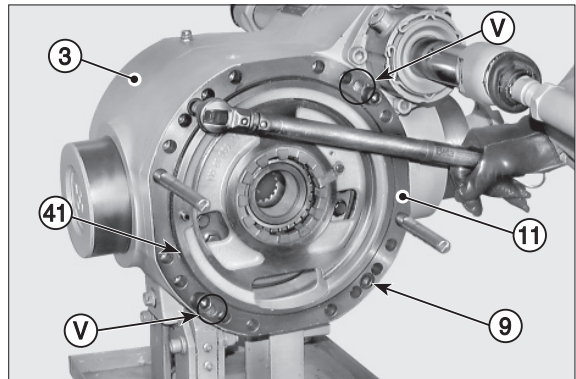


7409FAX292

(12) Tighten two safety studs in the main body (3) and install the intermediate cover (11). Lock in position with screws "V" tightened to a matching torque.

- Tightening torque : 13.3~14.6 kgf · m
(96.2~106 lbf · ft)

- ※ Check the state of the O-ring (41).

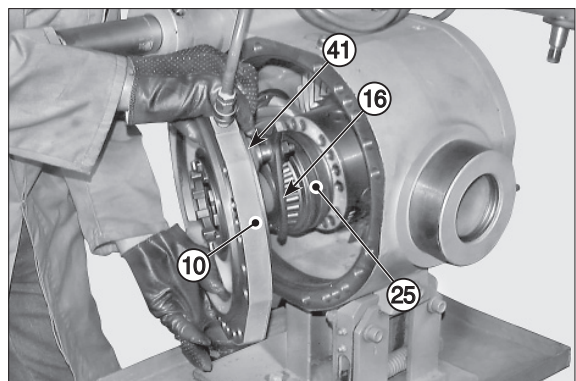


7409FAX293

(13) Introduce low-pressure compressed air through connection "B" and make sure that the lock control piston comes out at the end of stroke.

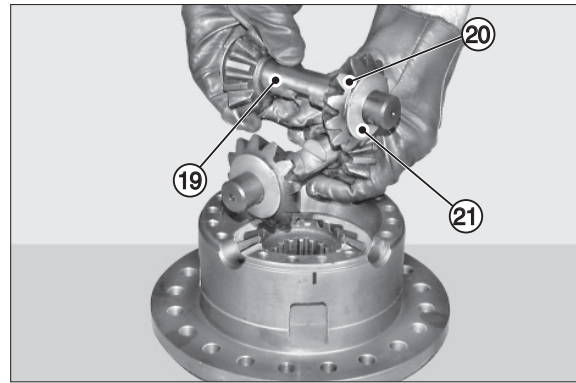
Rotate the intermediate cover (10) to an angle of about 45°; engage the fork (16) in the lock control coupling (25).

- ※ Check the condition of the O-ring (41).



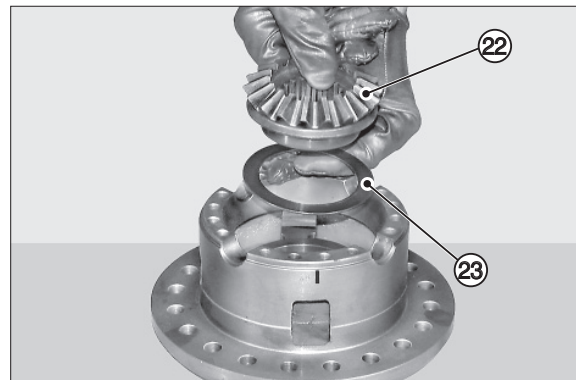
7409FAX294

- (18) Remove shafts (19), complete with planet wheels (20) and spherical shoulder washers (21).



7409FAX329

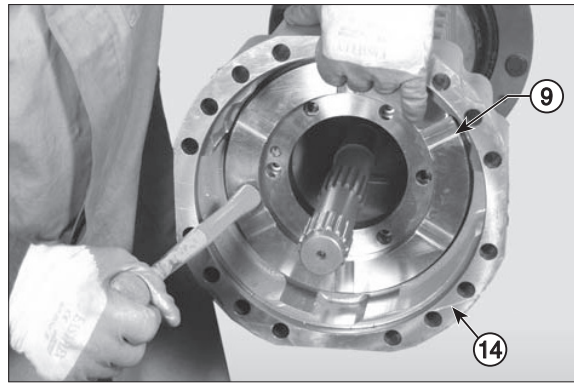
- (19) Remove the 2nd planetary gear (22) and shoulder ring (23).



7409FAX330

(3) Using a plastic hammer, ram the piston (9) into the arm (14).

※ Lightly hammer all around the edge in an alternate sequence.

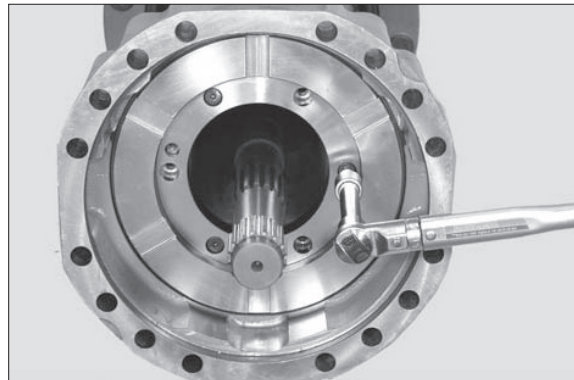


7409RAX019

(4) Fit the reversal springs (7) on the piston (9).

Apply loctite 242 to the thread of the adjustment screw.

Tighten with torque wrench setting of 0.51~0.71 kgf · m (3.69~5.14 lbf · ft).

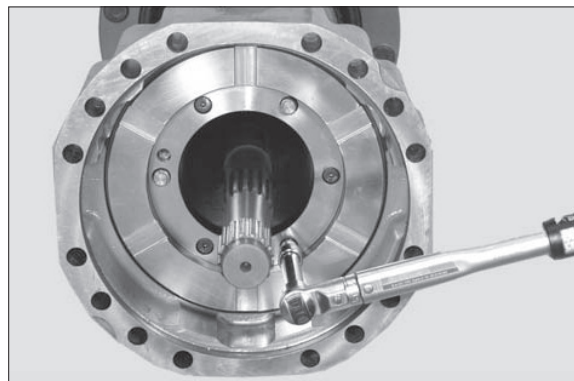


7409RAX020

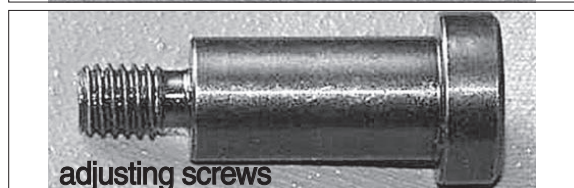
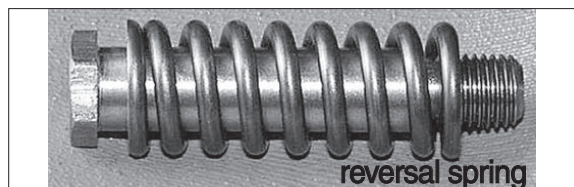
(5) Fit the adjusting screws (5).

Apply loctite 270 to the thread.

· Torque wrench setting :
0.51~0.71 kgf · m (3.69~5.14 lbf · ft)



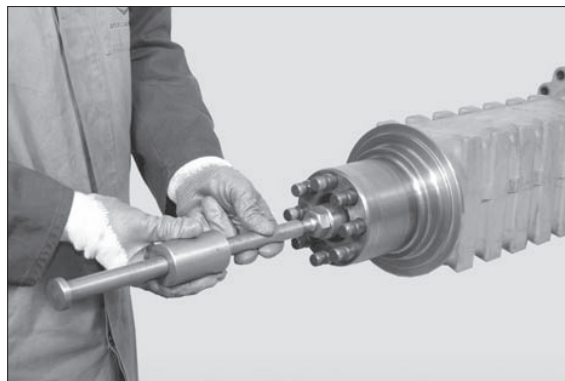
7409RAX021



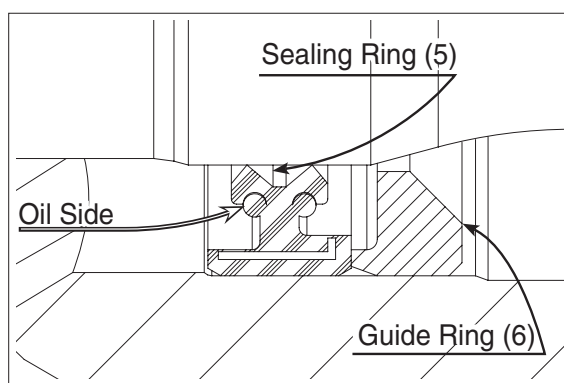
7409RAX022

(22) Using an extractor, remove seal ring (5) and guide ring(6).

※ Note down the direction of assembly of snap ring.

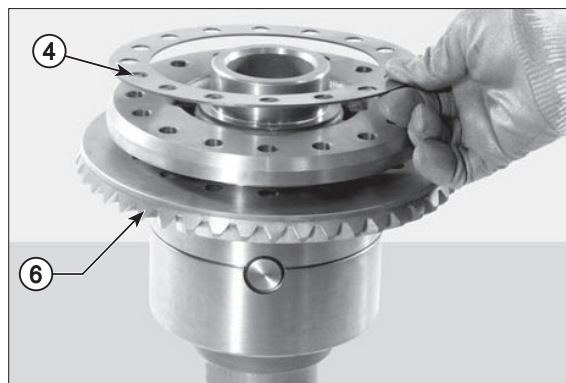


7409RAX055

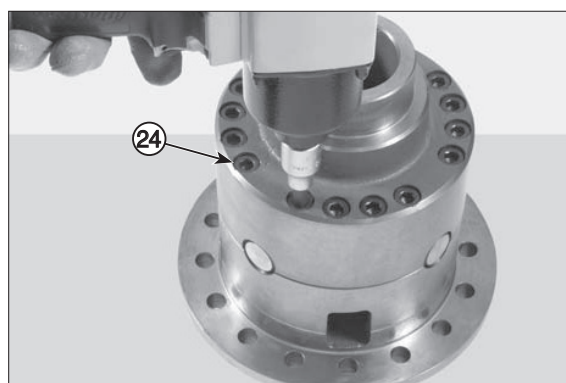


7409RAX056

(15) Remove the spacer (42) and the crown (6).



(16) Remove the screws (24) jointing the differential unit half box .

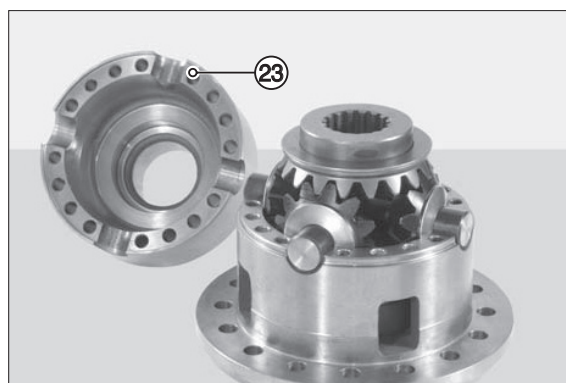


(17) Using a plastic hammer, take the half box (23)(5) to pieces.

※ Note down the coupling marks.



(18) Remove the upper half box (23).

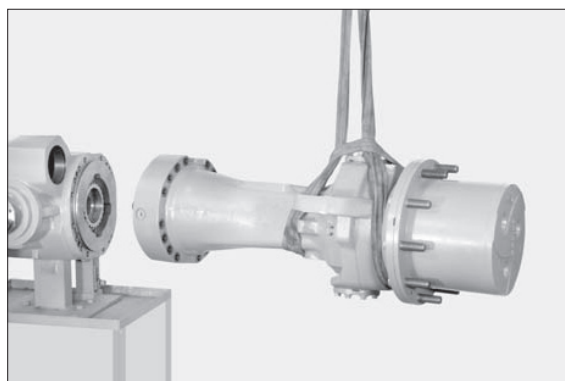


- (26) Fit the top plug after applying repositionable jointing compound for seals to the rims.
Install the snap ring.



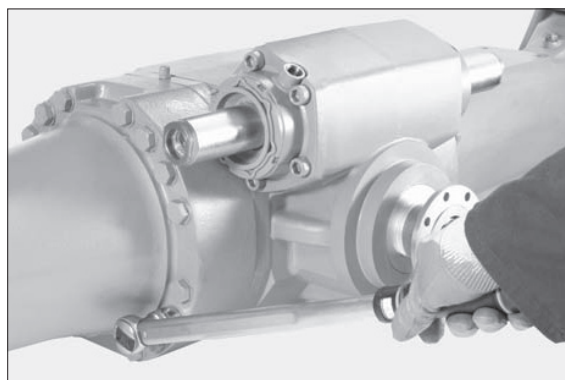
7409RAX127

- (27) Install the complete arm.



7409RAX128

- (28) Torque wrench setting :
28.9~31.8 kgf · m (209~230 lbf · ft)
※ Tighten using the criss-cross method.



7409RAX129

(19) Apply onto the pinion (5) the bar-hold and with the help of a torque meter, check the torque of the pinion (5).

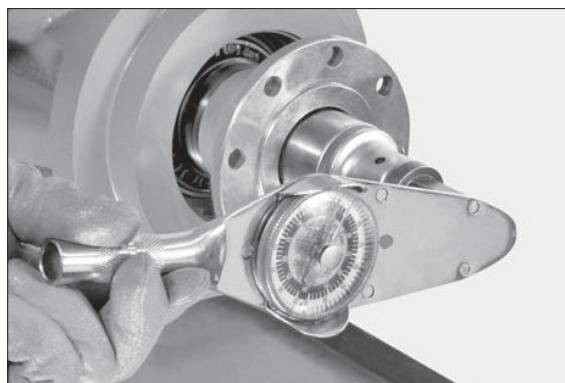
· Torque : 12.2~18.4 kgf · cm

※ If torque exceeds the maximum value, then the size of shim “S1” (7) between the bearing (6) and the distance piece (8) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut (1) in different stages to obtain a maximum value of 81.6~102 kgf · m (590~738 lbf · ft).

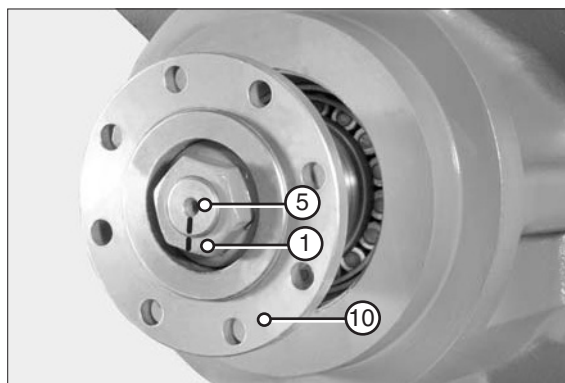
※ If torque does not reach the minimum value, then the size of shim “S1” (7) needs to be reduced.

※ When calculating the increase or decrease in size of shim “S1”, bear in mind that a variation of shim (4) of 0.01 mm corresponds to a variation of 6.12 kgf · cm in the torque of the pinion (5).



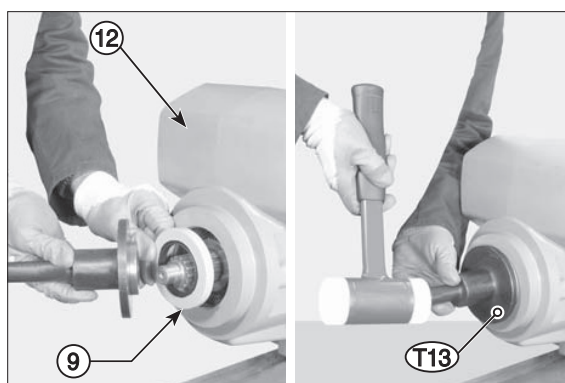
7409RAX164

(20) Make positional marks across nut (1) and pinion (5) tang ; then remove nut and flange (10)



7409RAX165

(21) Apply Arexons rubber cement to the outer surface of the new seal ring (9) and fit ring in the main body (12) using driver T13.



7409RAX166

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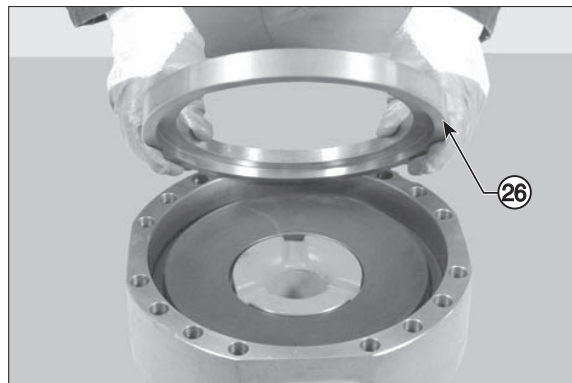
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- (9) Remove the centering device (26) in the cylinder.



7409RAX201

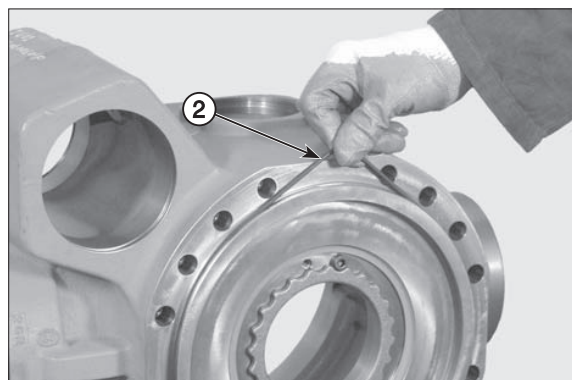
- (10) Remove the belleville washers (1).

- ※ Check the sense of direction of washers (1).



7409RAX202

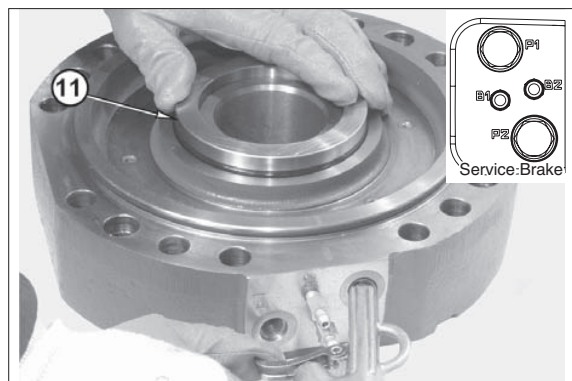
- ※ The O-rings (2) must be replaced each time the unit is disassembled.



7409RAX203

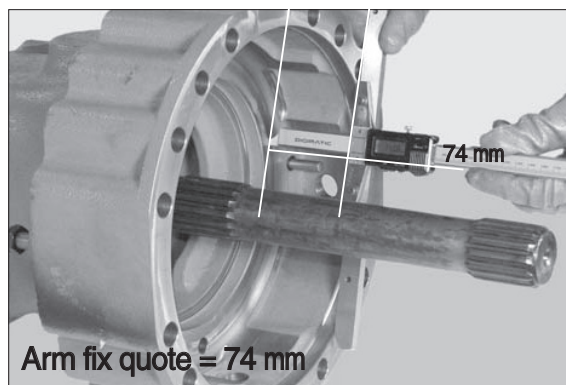
- (11) Slowly introduce low-pressure compressed air through the connection member for the service brake (P2), in order to extract the piston (11).

- ※ Hold the piston (11) back, as it may be suddenly ejected and damaged.



7409RAX204

(22) Arm fix quote = 74 mm

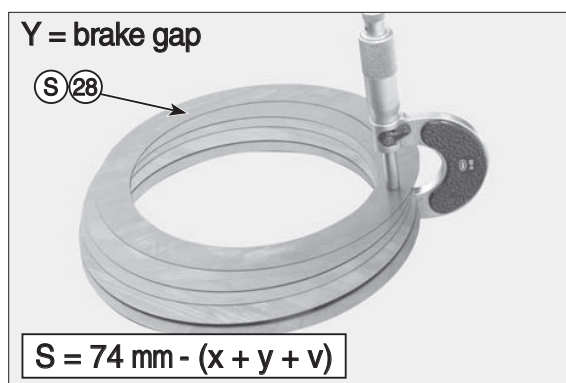


7409RAX238

(23) $S = 74 \text{ mm} - (x + y + v)$ = Thickness of shims to insert under the shim washer.

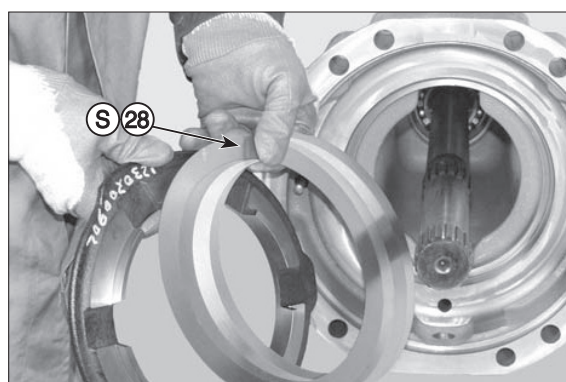
Example :

$$74 \text{ mm} - (29 + 42.33 + 1.25) = S = 1.42 \text{ mm}$$

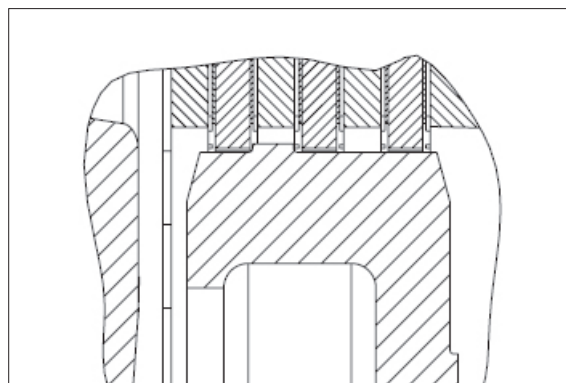


7409RAX239

(24) Insert under the shim washer a thickness of shims (28).



7409RAX240

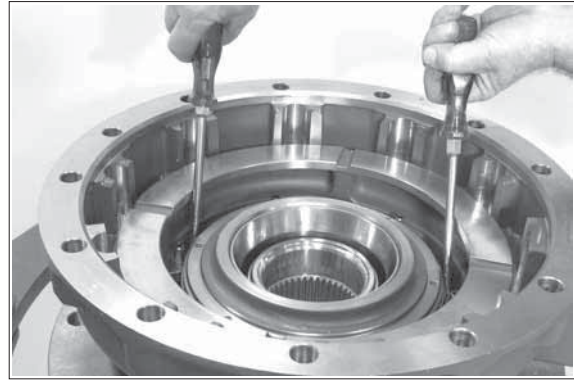


7409RAX241

- ⑭ Lift piston off with lever.

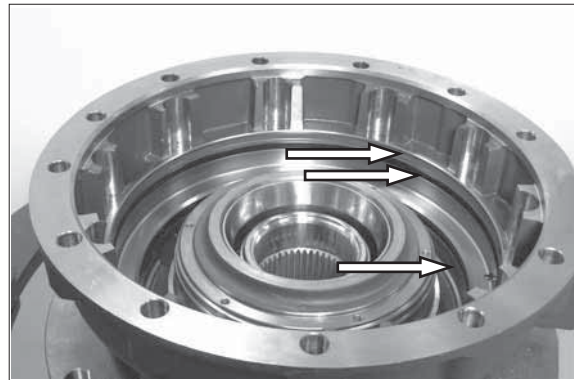
Adjusting device

5870 400 001



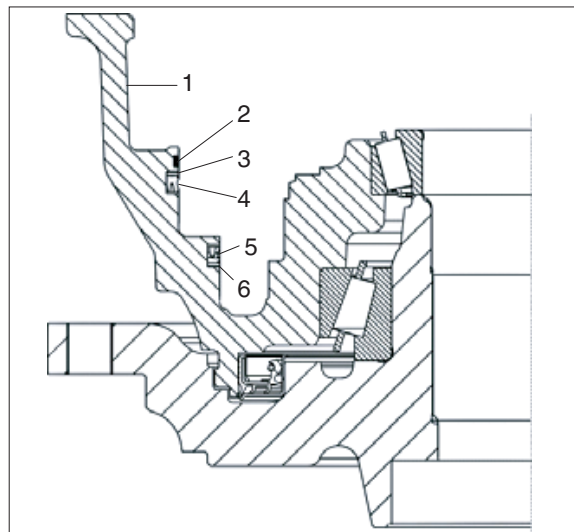
7409AAX020

- ⑮ Remove sealing elements (arrows also refer to AX022) from annular grooves of brake housing.



7409AAX021

- 1 Brake housing
- 2 Guide ring
- 3 Support ring
- 4 Grooved ring
- 5 Grooved ring
- 6 Support ring



7409AAX022

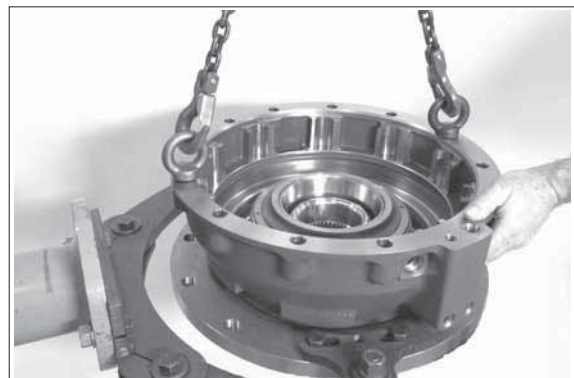
- ⑯ Lift brake housing off the output shaft by means of lifting device.

Lifting chain

5870 281 047

Eyebolts

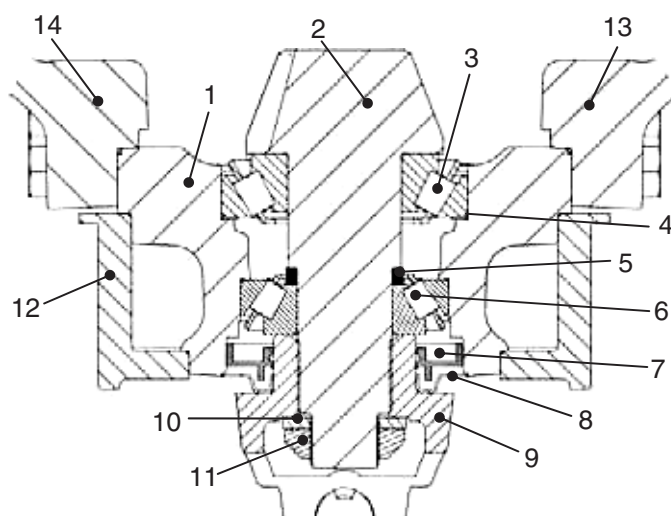
5870 204 071



7409AAX023

2) ASSEMBLY

(1) Input assembly



7409AA201

- | | | | |
|---|--|----|--|
| 1 | Axle drive housing | 8 | Protection plate |
| 2 | Input pinion | 9 | Input flange |
| 3 | Tapered roller bearing | 10 | Disc |
| 4 | Shim for contact pattern (bevel gear set) | 11 | Hexagon nut |
| 5 | Spacer ring
(bearing roller torque/ pinion bearing) | 12 | Bearing flange
(only for axle version with pivot bearing) |
| 6 | Tapered roller bearing | 13 | Axle housing/ part I |
| 7 | Shaft seal | 14 | Axle housing/ part II (crown-wheel side) |

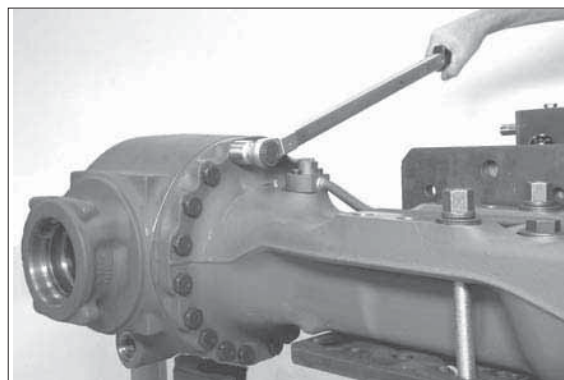
※ Depending on the version, crown wheel and bevel pinion may be mounted as a bevel gear set (for production reasons, crown wheel and pinion are paired and show an identical pairing number see AX204) or as single parts, the respective version has to be taken from the specification of the corresponding spare parts list.

If a bevel gear set is specified, the crown wheel must only be replaced together with the pinion.

Only for assembly of new parts or if disassembled :

Mount O-ring on axle housing /part I and install axle drive housing, pay attention to radial installation position.

- Tightening torque (M18 × 1.5/10.9) :
39.8 kgf · m (288 lbf · ft)

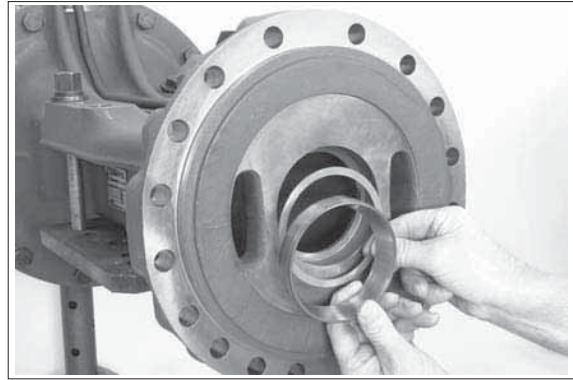


7409AAX202

- ⑰ Insert determined shim (e.g. $s = 1.00$ mm) and bearing outer ring into hole of axle housing on crown wheel side.

※ Observe allocation of shim regarding installation position.

Driver tool 5870 058 021
Handle 5870 260 002

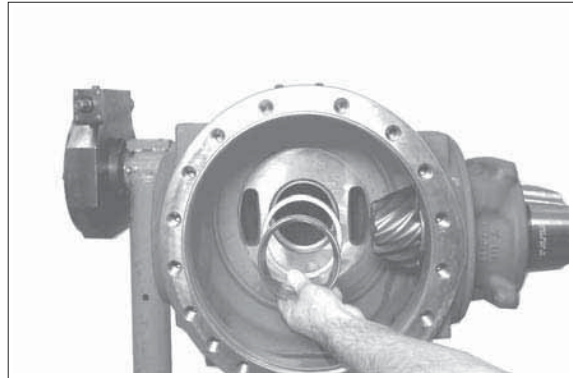


7409AAX230

- ⑱ Insert determined shim (e.g. $s = 1.00$ mm) and bearing outer ring into hole of axle housing on differential carrier side.

※ Observe allocation of shim regarding installation position.

Driver tool 5870 058 021
Handle 5870 260 002



7409AAX231

Contact pattern check of bevel gear set :

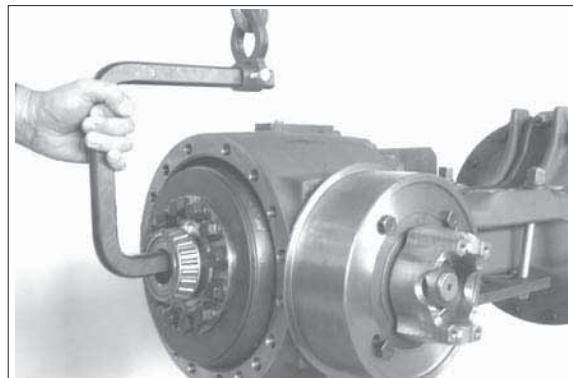
- ⑲ Cover some tooth flanks of crown wheel with marking ink (contact pattern check).



7409AAX232

- ⑳ Insert preassembled differential.

Lifting bracket 5870 281 033

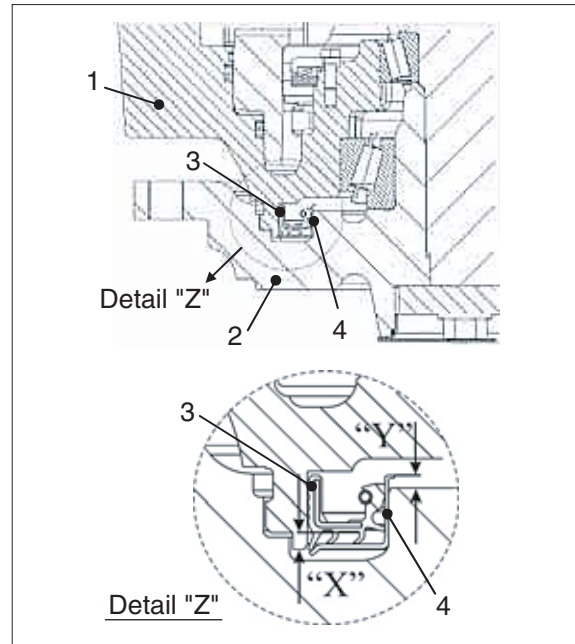


7409AAX233

- 1 Brake housing
 - 2 Output shaft
 - 3 Shaft seal (part I)
 - 4 Wear sleeve (part II)
- } combi
seal ring

"X" = installation dimension /shaft seal
 $4.1 \pm 0.2 \text{ mm}$

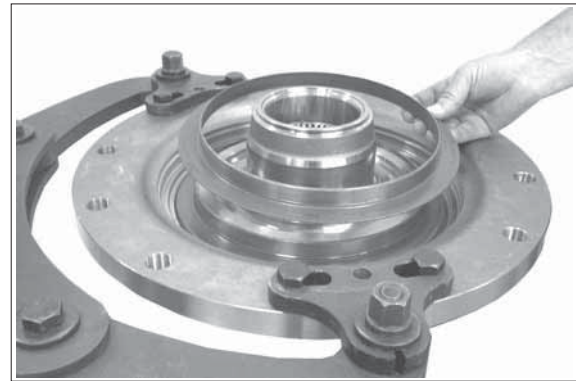
"Y" = installation dimension /wear sleeve
 $2.6 \pm 0.2 \text{ mm}$



7409AAX304

- ② Apply sealing agent (loctite #574) on contact faces of wear sleeve /output shaft and mount wear sleeve (part I / combi seal ring) considering installation dimension "Y" see detailed AX304.

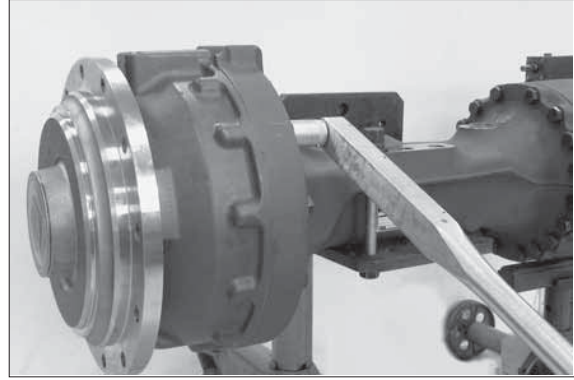
Pressing device 5870 506 172



7409AAX305

- ⑤ Connect output with axle housing evenly by means of hex. screws.

- Tightening torque (M18 × 1.5/10.9) :
39.8 kgf · m (288 lbf · ft)



7409AAX339

- ⑥ Install screw plug (1) with new O-ring.

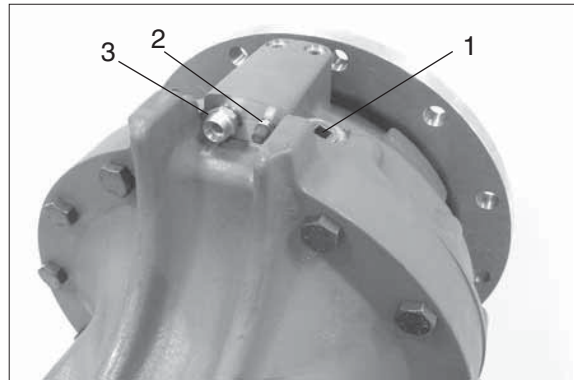
- Tightening torque (M24 × 1.5) :
5.1 kgf · m (36.9 lbf · ft)

Mount breather valve (2).

- Tightening torque :
0.6 kgf · m (4.4 lbf · ft)

Install screw neck (3) with new O-ring.

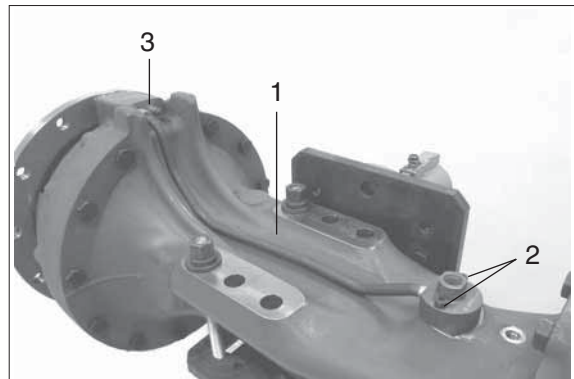
- Tightening torque :
3.7 kgf · m (26.6 lbf · ft)



7409AAX340

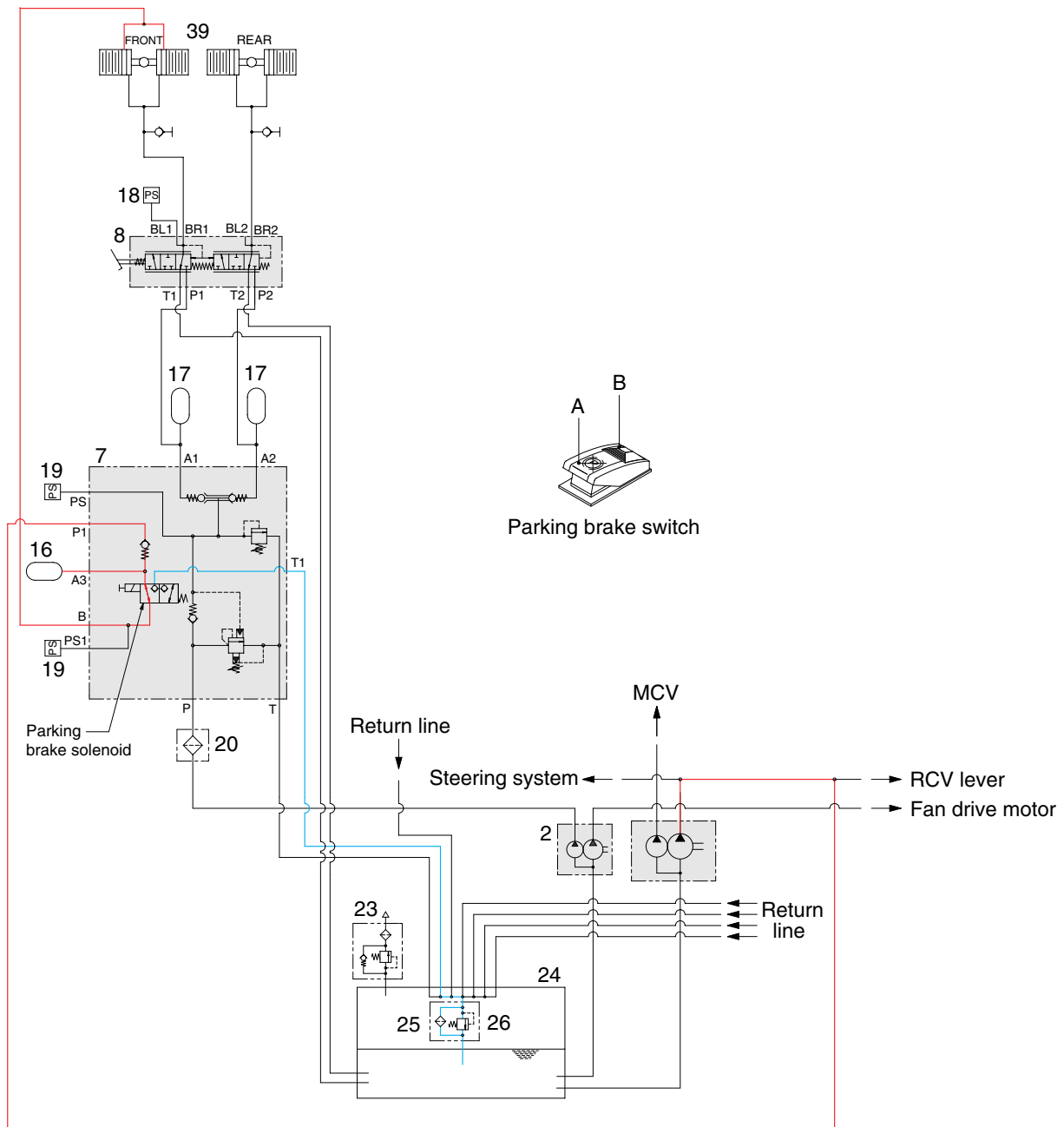
- ⑦ Install brake tube (1).

- Tightening torque:
Screw nut (2)
10.2 kgf · m (73.8 lbf · ft)
Cylindrical screw (3) (M8 /8.8)
2.35 kgf · m (17.0 lbf · ft)



7409AAX341

3) PARKING BRAKE RELEASED



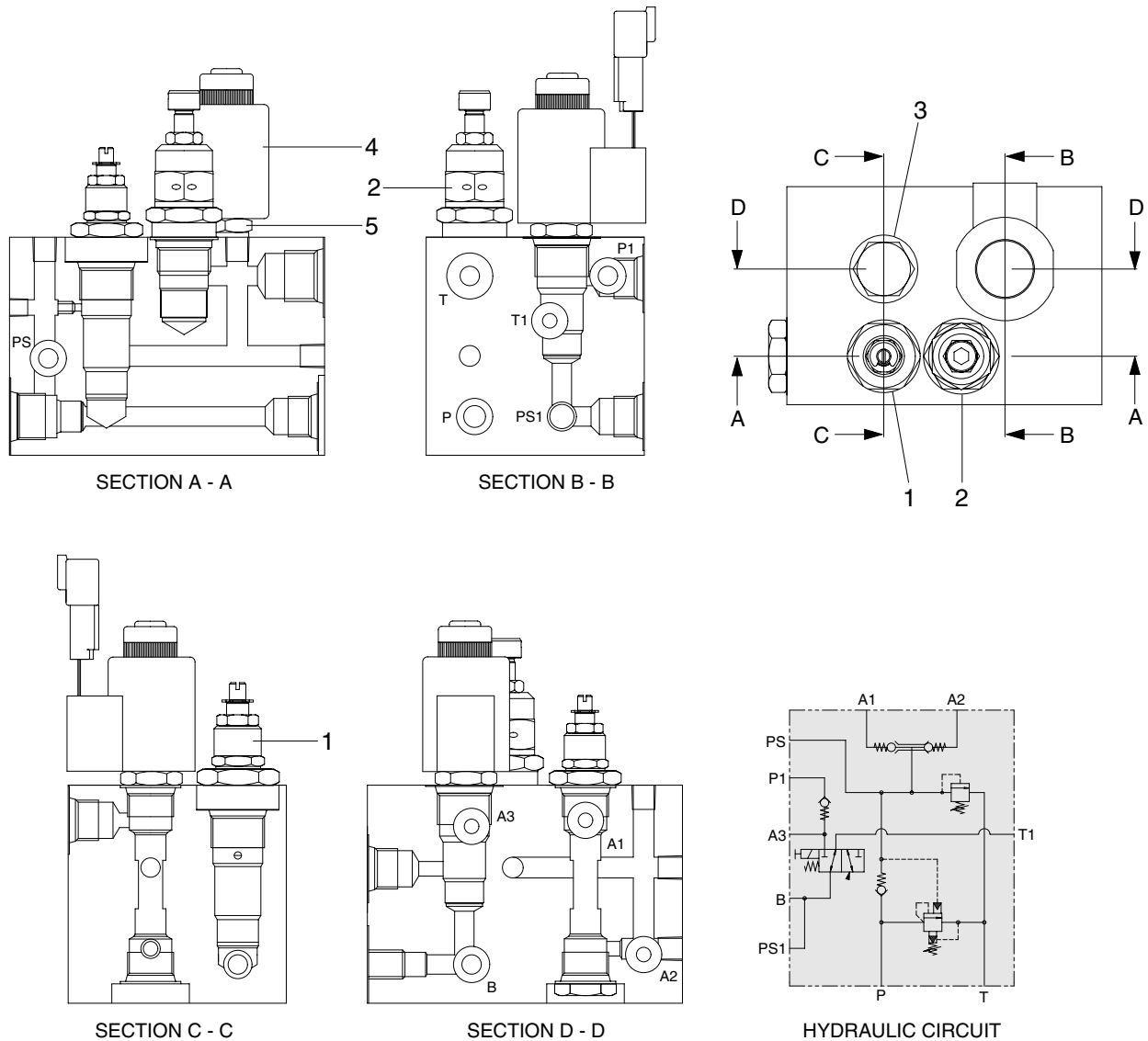
7409S4BS04

When the parking brake switch is pressed A position, the solenoid valve is energized and the hydraulic oil enters the front axle. It overcomes the force of the spring and pushes the piston rod. This releases the parking brake.

Therefore, the hydraulic oil pressure is applied to the parking brake piston in front axle through the solenoid valve and the parking brake is kept released.

5. CUT-OFF VALVE

1) STRUCTURE



7407ABS11

- | | | | |
|---|---------------|---|----------------|
| 1 | Cut-off valve | 4 | Coil |
| 2 | Relief valve | 5 | Solenoid valve |
| 3 | Check valve | | |

2) OPERATION

When the pump works, the oil under the pressure flows into P port.

The oil in P port is stored in the accumulator on A1 or A2 port.

As the pressure on P line rises to 150bar, the cut off valve (1) starts cut-offting and the oil in the P port is unloaded. The pressure on P line goes down 120 bar by the minute leakage from valve and other factors.

At this pressure, the cut-off valve starts cut-ining.

This process is repeated in the regular period of 30~40 seconds.

2. TROUBLESHOOTING

1) SERVICE BRAKE

Diagnose malfunction charts are arranged from most probable and simplest to verify, to least likely, more difficult to verify. Remember the following steps when troubleshooting a problem :

Step 1. Operational check out procedure (see section 1)

Step 2. Operational checks (in this group)

Step 3. Troubleshooting

Step 4. Tests and adjustments (see group 3)

Problem	Cause	Remedy
Poor or no brakes	Brake accumulator charge low. Brake pump standby pressure low. Brake pressure low. Air in system. Worn brake surface material. Leakage in brake valve. Leakage in brake piston seal.	Do brake accumulator check. Do brake pump standby pressure test. Do brake valve pressure test. Bleed brakes. Inspect brake surface material. Do brake valve leakage test. Check for an over filled differential. Apply brakes and check for leakage from check plug. ※ It is normal for the oil level to be slightly above the check plug.
Aggressive brakes	Internal restriction in circuit. Brake valve malfunction. Low oil level.	Remove lines and components. Disassemble and inspect. Check oil level.
Brakes drag	Brake pedal not returning properly. Debris holding valve partially open in brake valve. Warped brake disk. Stuck brake piston.	Inspect floor mat and pedal. Do brake valve pressure test. Inspect brake disk. Repair.
Brakes lock up	Brake valve malfunction.	Clean or replace brake valve.

SECTION 5 STEERING SYSTEM

GROUP 1 STRUCTURE AND FUNCTION

1. OUTLINE

The steering system of this machine consists of a fixed-displacement pump supplying a load sensing steering system and an open center loader system.

The components of the steering system are :

- Steering pump (1st pump)
- Steering unit
- Overload valve block
- Priority valve
- Steering cylinders

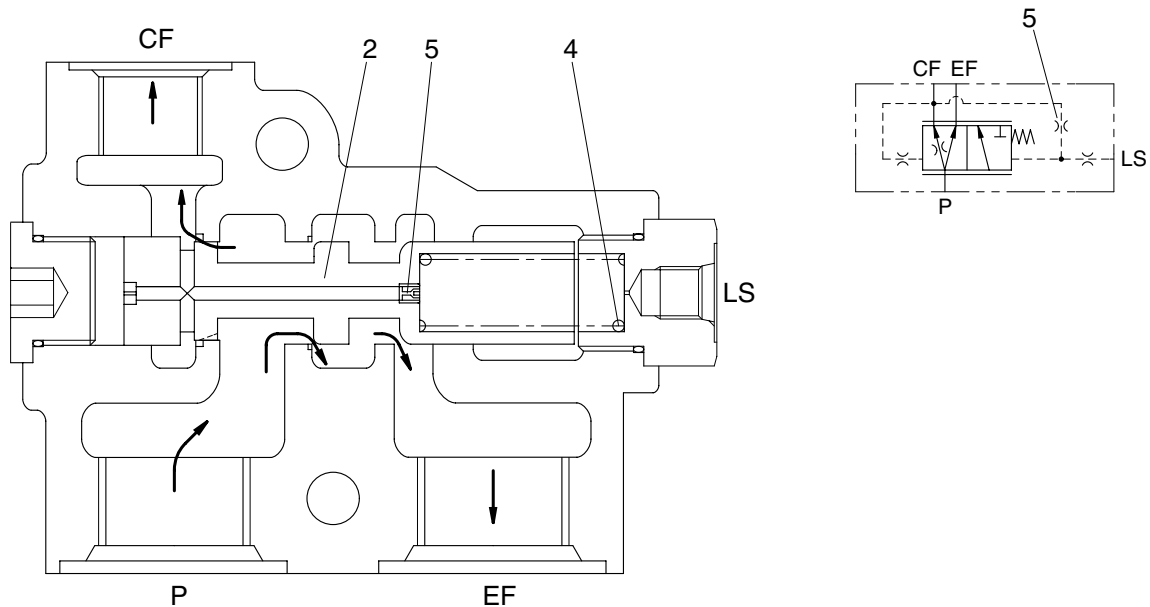
The steering pump, the first pump of main pump, draws hydraulic oil from the hydraulic tank.

Outlet flow from the pump flows to the priority valve. The priority valve preferentially supplies flow, on demand, to the steering unit. When the machine is steered, the steering unit routes flow to the steering cylinders to articulate the machine.

When the machine is not being steered, or if pump flow is greater than steering flow, the priority valve supplies flow to the loader system.

That is, output flow from the steering pump enters into the first pump of main pump for the operation of the attachment.

(3) Full turn



7407BSE22

When the machine is steered to a full turn, the frames bottom against the steering stops.

Pressure to the steering unit (Pilot pressure), which is sensed at the left end of the priority valve spool (3), continues to increase until it can move the spool to the right against the load sensing pressure plus spring force. At this time, all oil flows out of the EF port to the loader control valve.

If the loader attachment is being operated while steering, the loader function will slow until the machine reaches the steering stops. At that time, the loader cycle speed will increase until the machine is steered again.

GROUP 3 TESTS AND ADJUSTMENTS

1. HYDRAULIC OIL CLEAN UP PROCEDURE USING PORTABLE FILTER CADDY

- ※ Service equipment and tool
 - Portable filter caddy
 - Two 4000 mm × 1"100R1 Hoses
 - Quick disconnect fittings
 - Discharge wand
 - Connectors
- ※ Steering system use oil from hydraulic oil tank. Flush all lines in the steering system.
- ※ Disassemble and clean major components for steering system.

Steering components may fail if steering system is not cleaned after hydraulic oil tank contamination.
- 1) If hydraulic system is contaminated due to a major component failure, remove and disassemble steering cylinders to clean debris from cylinders.
- 2) Install a new return filter element. Inspect filter before installing new element.
 - ※ For a failure that creates a lot of debris, remove access cover from hydraulic oil tank. Drain and clean hydraulic oil tank of fill the specified oil to hydraulic oil tank through upper cover.
- 3) To minimize oil loss, pull a vacuum in hydraulic oil tank using a vacuum pump. Connect filter caddy suction line to drain port at bottom of hydraulic oil tank using connector. Check to be sure debris has not closed drain port.
- 4) Put filter caddy discharge line into hydraulic oil tank filler hole so end is as far away from drain port as possible to obtain a thorough cleaning of oil.

4) ASSEMBLY

- ※ Clean all metal parts in clean solvent and blow dry with air and correct any damage, burrs and rust.
- ※ Do not wipe dry with cloth or paper towel.
- ※ Replace seals such as O-ring with new ones as a rule and coat with grease.

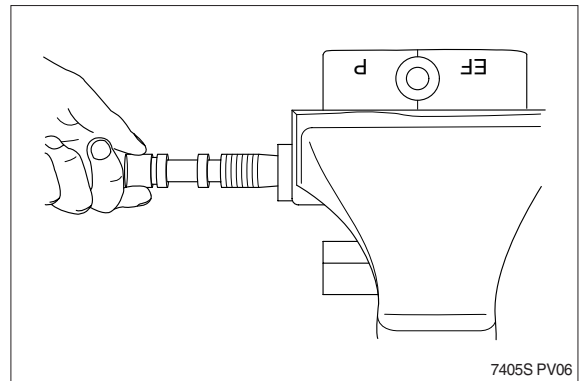
(1) Fix the body (1) in a vise.

- ※ Do not over tighten jaws.

(2) Insert the spool (2) in the body (1).

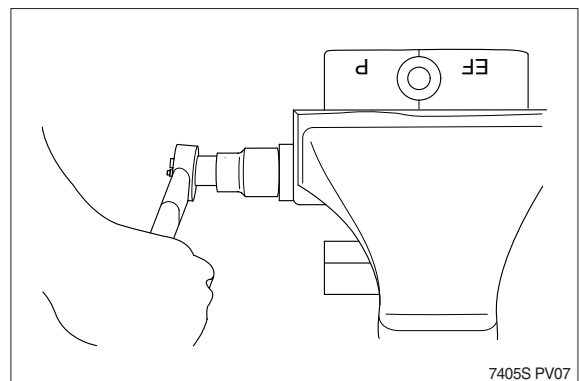
- ※ Secure the spool (2) remain in their correct direction as the illustration.

- ※ Secure the spool (2) to move smoothly by finger.

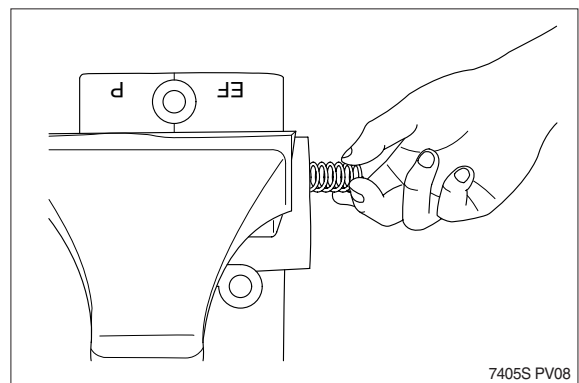


(3) Install the O-ring (7) onto plug (6) and install the plug (6) into the body (1).

- Tighten torque : 6.1 kgf·m (44.3 lb·ft)



(4) Insert the spring (4) into the body (1).

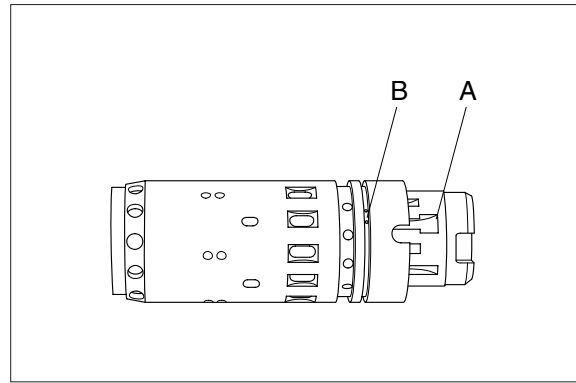


4) ASSEMBLY

(1) Assemble spool and sleeve.

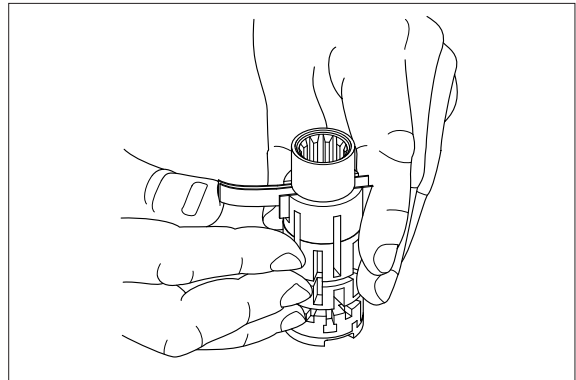
※ The sleeve and spool are correctly assembled when

- ① The slots-in sleeve and spool-for the neutral position springs are opposite each other and
- ② One of the 3 T-shaped grooves (A) in the spool is opposite one of the sets (B) of small holes in the sleeve.



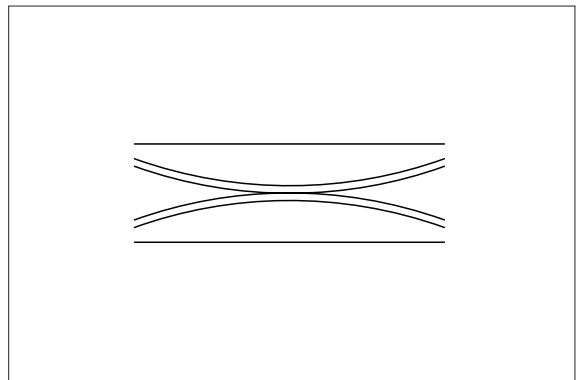
7405S STVLV44(1)

(2) Place the two flat neutral position springs in the slot.



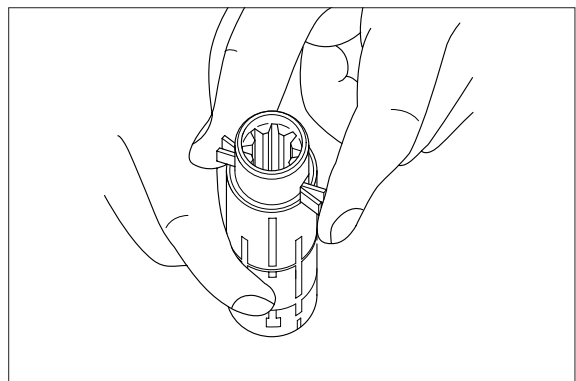
7405S STVLV44(2)

(3) Place the curved springs between the flat ones and press them into place.



7405S STVLV44(3)

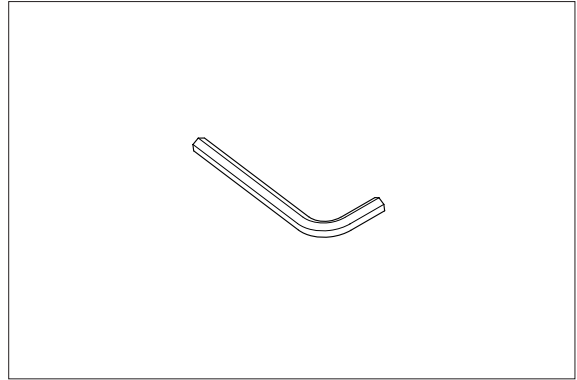
(4) Line up the spring set.



7405S STVLV44(4)

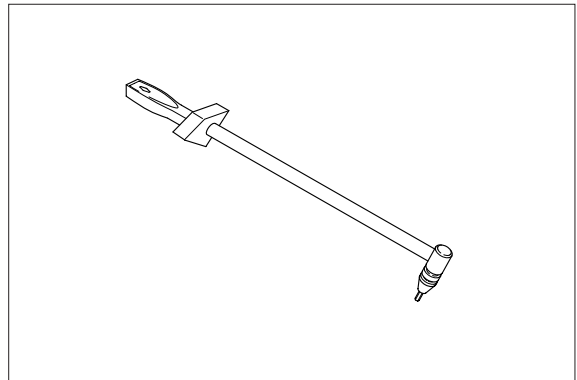
2) TOOLS

(1) Hexagon socket spanner, 8 mm.



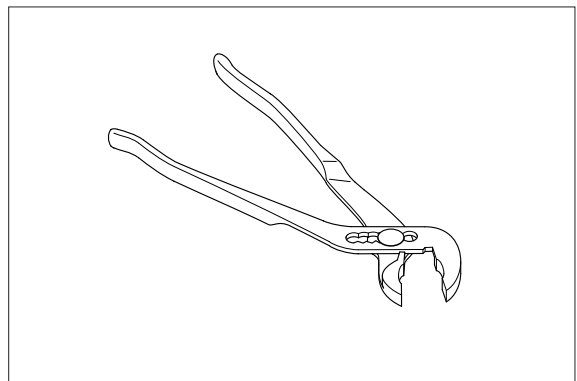
7405S OVLOAD63(1)

(2) Torque wrench, 0~7.1 kgf · m (0~51 lb · ft)
with 8 mm hexagon socket spanner.



7405S OVLOAD63(2)

(3) Adjustable wrench.

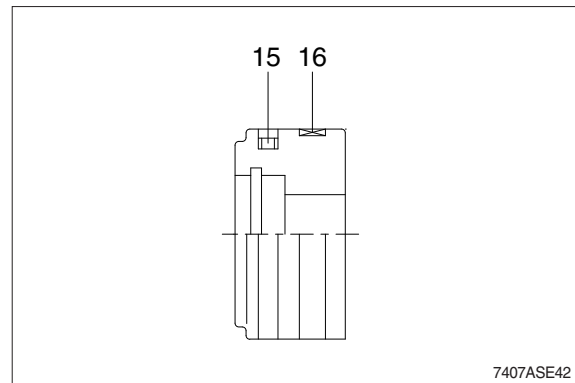


7405S OVLOAD63(3)

(3) Disassemble the piston assembly

- ① Remove wear ring (16) and piston seal (15).

※ Exercise care in this operation not to damage the grooves.

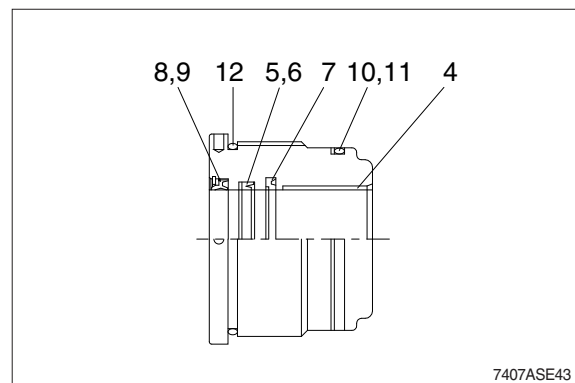


(4) Disassemble gland assembly

- ① Remove back up ring (11), and O-ring (10).
- ② Remove O-ring (12).
- ③ Remove snap ring (9) and dust wiper (8).
- ④ Remove back up ring (6), rod seal (5).
- ⑤ Remove buffer ring (7).

※ Exercise care in this operation not to damage the grooves.

※ Do not remove seal and ring, if does not damaged.

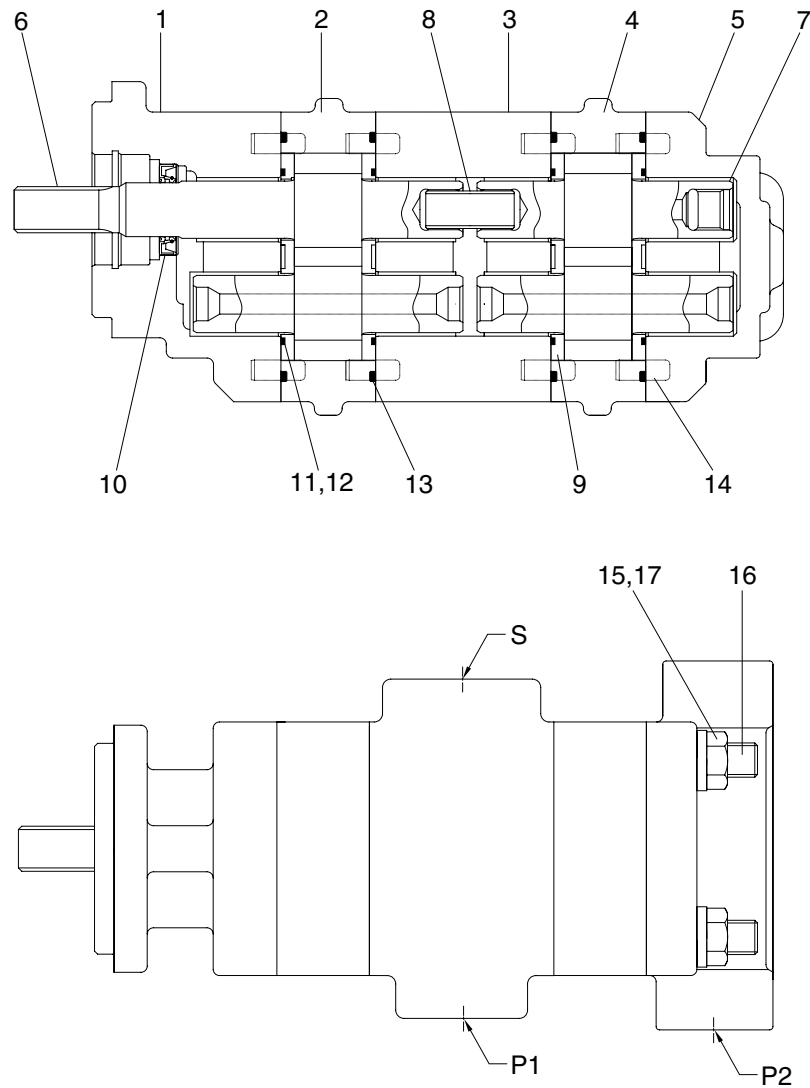


SECTION 6 WORK EQUIPMENT

Group 1	Structure and Function	6-1
Group 2	Operational Checks and Troubleshooting	6-35
Group 3	Tests and Adjustments	6-45
Group 4	Disassembly and Assembly	6-60

4. MAIN PUMP

1) STRUCTURE

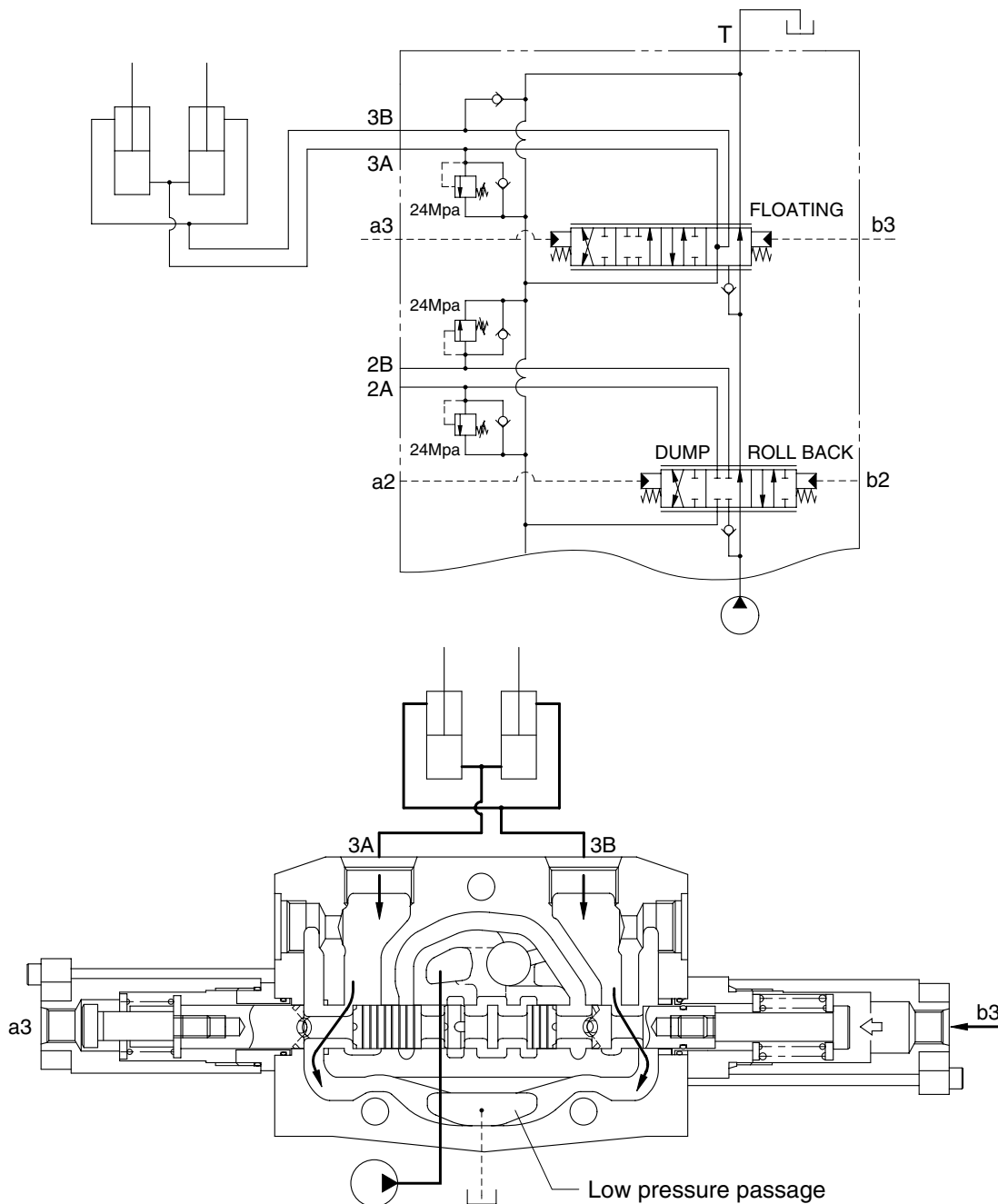


Port	Port name	Port size
P1	Pressure port (to steering valve)	1" split flange
P2	Pressure port (to MCV)	1" split flange
S	Suction port	2" split flange

7407B6WE29

- | | | | | | |
|---|----------------|----|------------------|----|--------------|
| 1 | Cover | 7 | Driven gear set | 13 | Square seal |
| 2 | Housing | 8 | Connecting shaft | 14 | Dowel pin |
| 3 | Carrier | 9 | Thrust plate | 15 | Washer |
| 4 | Housing | 10 | Lip seal | 16 | Stud bolt |
| 5 | Cover | 11 | Rubber seal | 17 | Hexagon bolt |
| 6 | Drive gear set | 12 | Back up seal | | |

(4) Boom float position



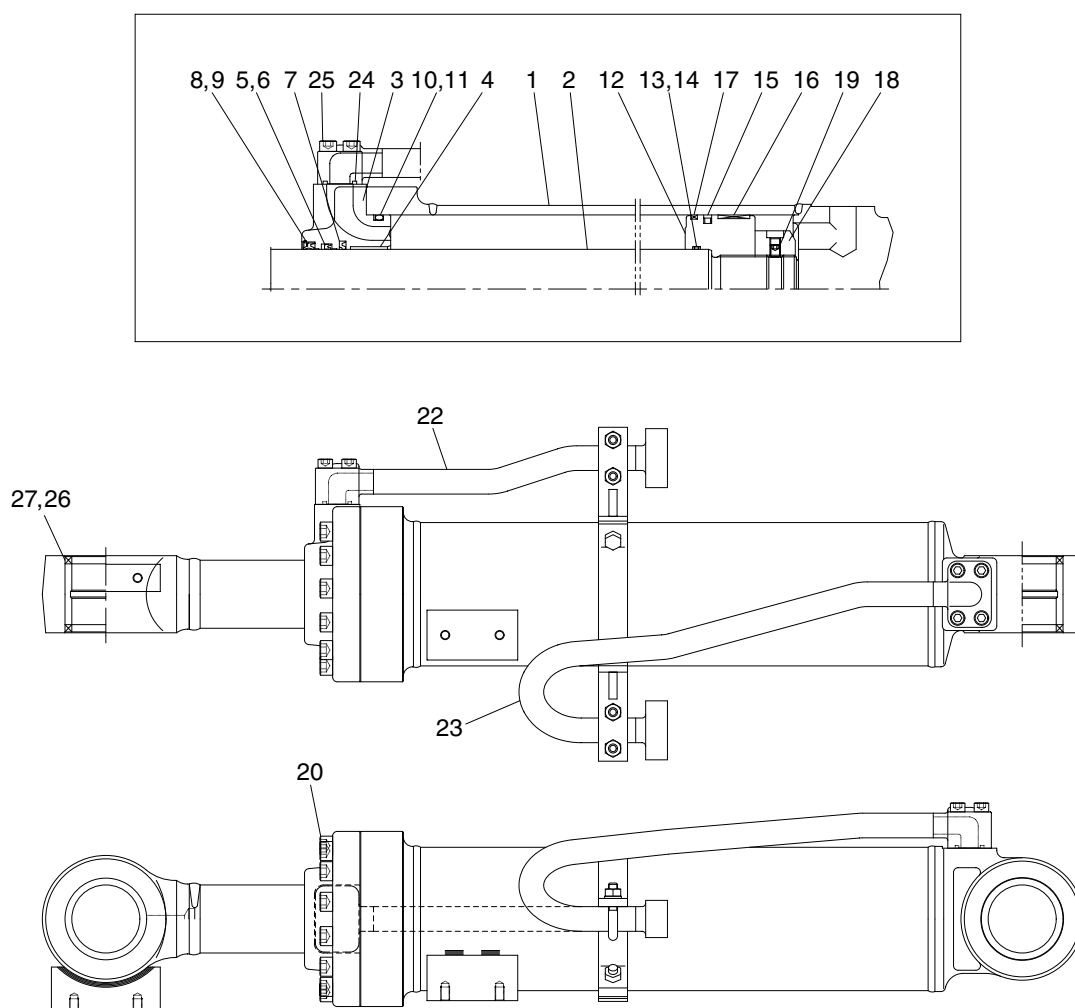
7407B6WE14

If the remote control lever pushes further more, the pilot pressure from remote control valve rises over 13-15bar and then the boom lowering spool is pushed to the boom floating position, opening up the neutral passage to tank and simultaneously (3A), (3B) → T.

In float position the boom drops quickly due to its own weight.

When the bucket touches the ground and the wheeled loader is moving, the bucket raised or lowered following the unevenness of the ground due to the (3A), (3B) → T connecting.

2) BUCKET CYLINDER



7407B6WE47

- | | | | | | |
|---|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 10 | O-ring | 19 | Set screw |
| 2 | Rod assembly | 11 | Back up ring | 20 | Bolt |
| 3 | Gland | 12 | Piston | 21 | Band assembly |
| 4 | Bushing | 13 | O-ring | 22 | Pipe assembly |
| 5 | Rod seal | 14 | Back up ring | 23 | Pipe assembly |
| 6 | Back up ring | 15 | Piston seal | 24 | O-ring |
| 7 | Buffer ring | 16 | Wear ring | 25 | Bolt |
| 8 | Dust wiper | 17 | Dust ring | 26 | Pin bushing |
| 9 | Snap ring | 18 | Lock nut | 27 | Dust seal |

※ MEASURING BOOM AND BUCKET CYCLE TIME

1) MEASUREMENT CONDITION

- Coolant temperature : Inside operating range
- Steering position : Neutral
- Hydraulic temperature : 40~50°C
- Bucket : Unloaded
- Engine speed : High idling

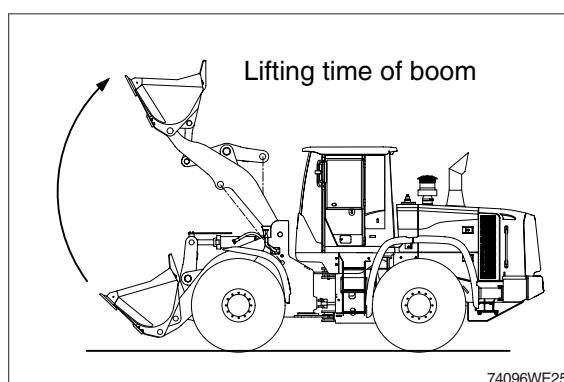
2) MEASURING TOOL

- Stop watch (1EA)

3) MEASURING PROCEDURE

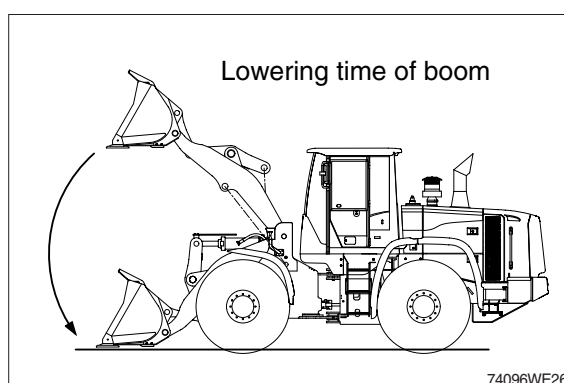
(1) LIFTING TIME OF BOOM

Set the bucket near the maximum tilt back position and at the lowest position on the ground. Raise the bucket and measure the time taken for bucket to reach the maximum height of the boom.



(2) LOWERING TIME OF BOOM

Set the bucket horizontal with the boom at the maximum height, lower the bucket and measure the time taken for the bucket to reach the lowest position on the ground.

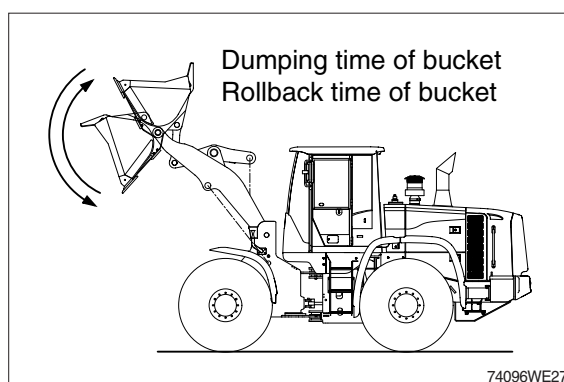


(3) DUMPING TIME OF BUCKET

Raise the boom to the maximum height and measure the time taken for the bucket to move from the maximum tilt back position to the maximum dump position.

(4) ROLL BACK TIME OF BUCKET

Raise the boom to the maximum height and measure the time taken for the bucket to reach the maximum tilt back position.



5. MAIN HYDRAULIC PUMP FLOW TEST

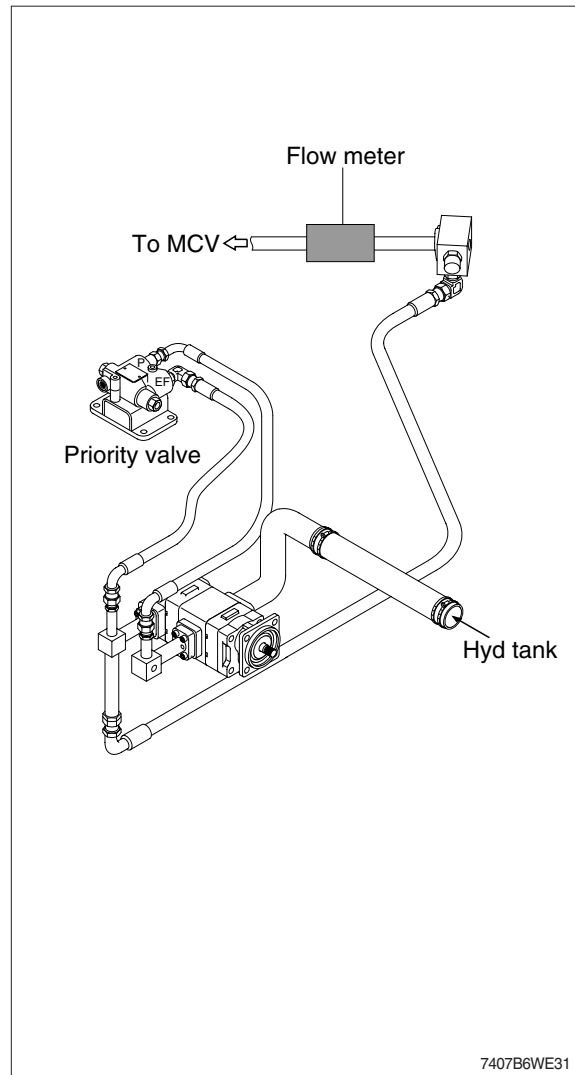
· SPECIFICATION

Oil temperature	$45 \pm 5^{\circ}\text{C}$ ($113 \pm 9^{\circ}\text{F}$)
Engine speed	2200 ± 25 rpm
Test pressure	210 ± 5 bar (2990 psi)
Maximum pump flow	167 l/min (44.2 gpm)

· FLOW METER GAUGE AND TOOL

Gauge 0~35 MPa (0~350 bar, 0~5000 psi)
Temperature reader

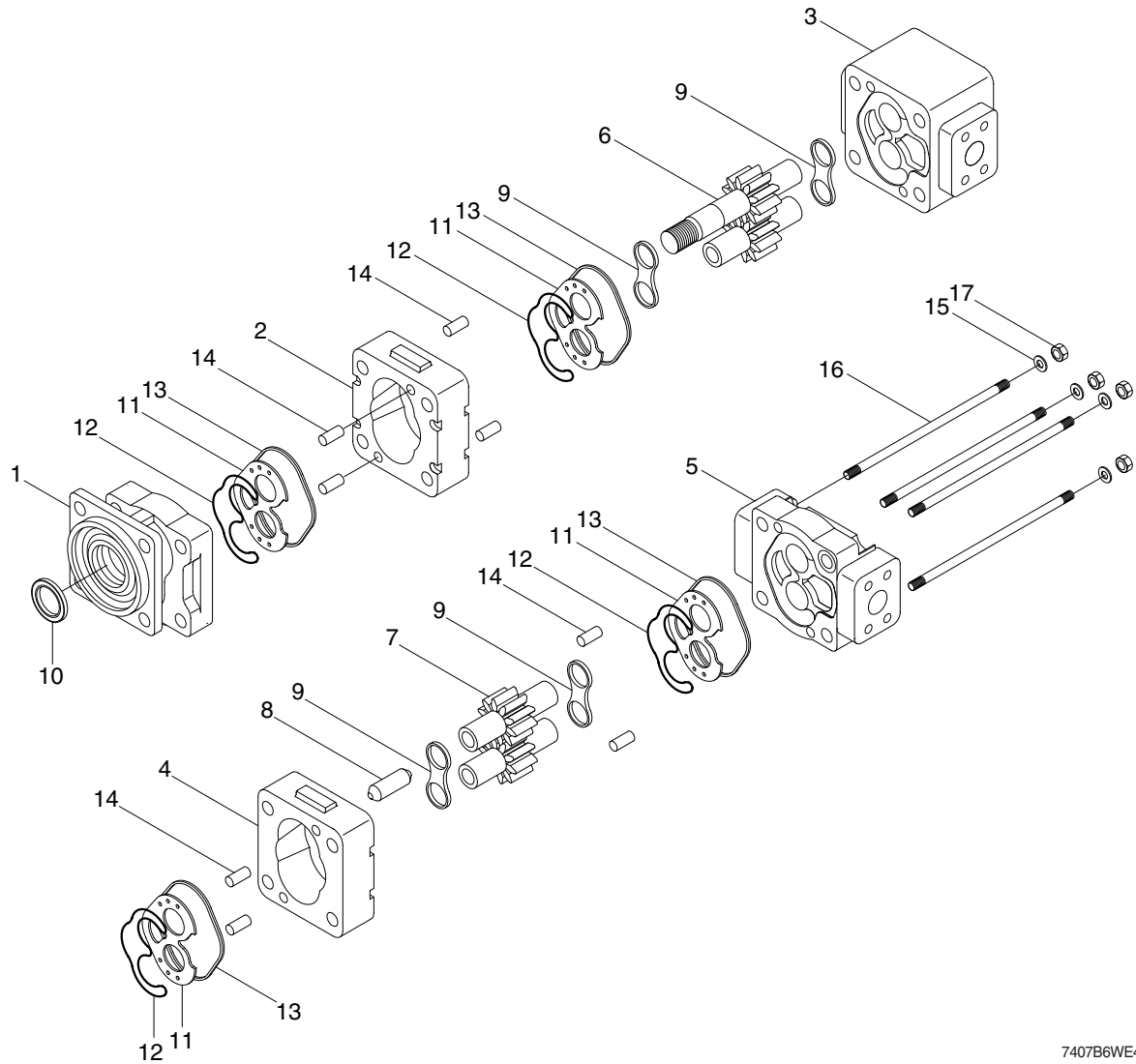
- 1) Make test connections.
- 2) Install temperature reader.
(see temperature reader installation procedure in this group)
- 3) Heat hydraulic oil to specifications.
(see hydraulic oil warm up procedure in this group)
- 4) Run engine at test specifications.
- 5) Close flow meter loading valve to increase pressure to test specifications.
- 6) Read flow meter.
- 7) If flow is below specifications, check suction line and suction pressure for abnormality before removing pump.



GROUP 4 DISASSEMBLY AND ASSEMBLY

1. MAIN PUMP

1) STRUCTURE



7407B6WE48

- | | | |
|------------------|-------------------|----------------|
| 1 Front cover | 7 Driven gear set | 13 Square seal |
| 2 Housing | 8 Connector shaft | 14 Dowel pin |
| 3 Carrier | 9 Thrust plate | 15 Washer |
| 4 Housing | 10 Lip seal | 16 Stud bolt |
| 5 Rear cover | 11 Rubber seal | 17 Hex nut |
| 6 Drive gear set | 12 Back up seal | |

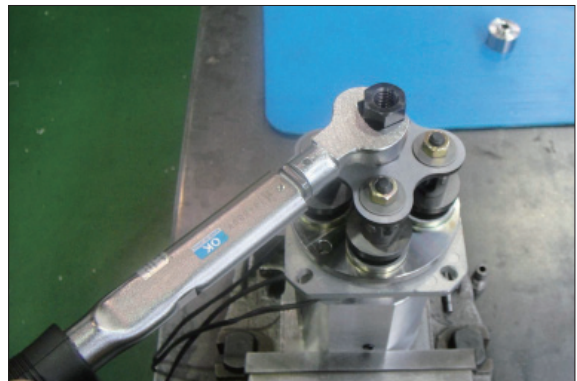
2) DISASSEMBLY

(1) Remove the boot (35) and loosen nut (34).

· Tool : spanner 19 mm



7607BRCV01



7607BRCV02

(2) Remove nut (32).

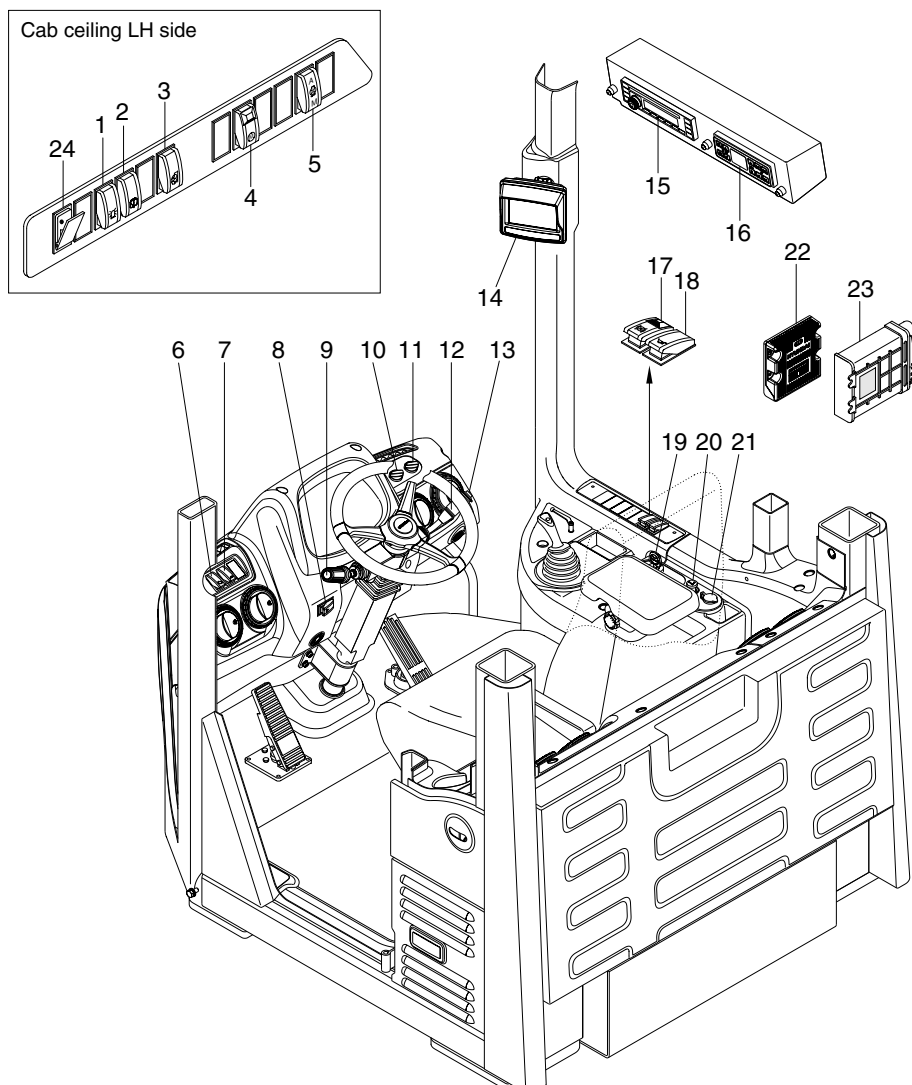


7607BRCV03

SECTION 7 ELECTRICAL SYSTEM

GROUP 1 COMPONENT LOCATION

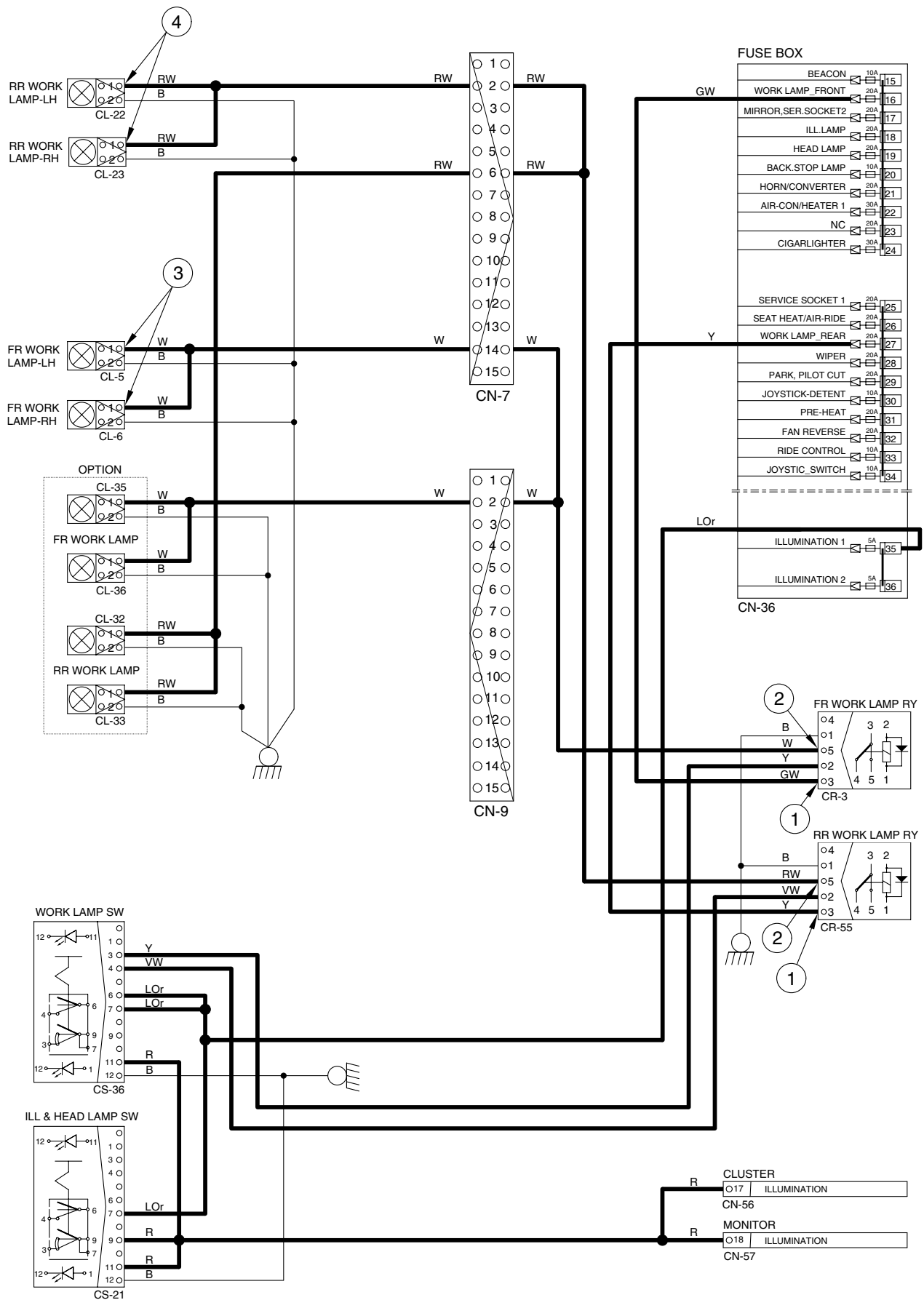
1. LOCATION 1



7409S7EL02

- | | | |
|-------------------------------|-------------------------------|-------------------------------|
| 1 Beacon switch (opt) | 9 Kick down switch | 17 Parking brake switch |
| 2 Rear wiper / washer switch | 10 T/M shift mode switch | 18 Ride control switch (opt) |
| 3 Mirror defrost switch | 11 Clutch cut off mode switch | 19 Starting switch |
| 4 Emergency test switch (opt) | 12 Multi function switch | 20 Cigar lighter |
| 5 Fan control switch | 13 Horn switch | 21 12V socket (opt) |
| 6 Main light switch | 14 Monitor | 22 Machine control unit (MCU) |
| 7 Work lamp switch | 15 Radio & USB player | 23 T/M control unit (TCU) |
| 8 Hazard switch | 16 Aircon & heater switch | 24 USB socket |

WORK LIGHT SWITCH



GROUP 3 MONITORING SYSTEM

1. CLUSTER

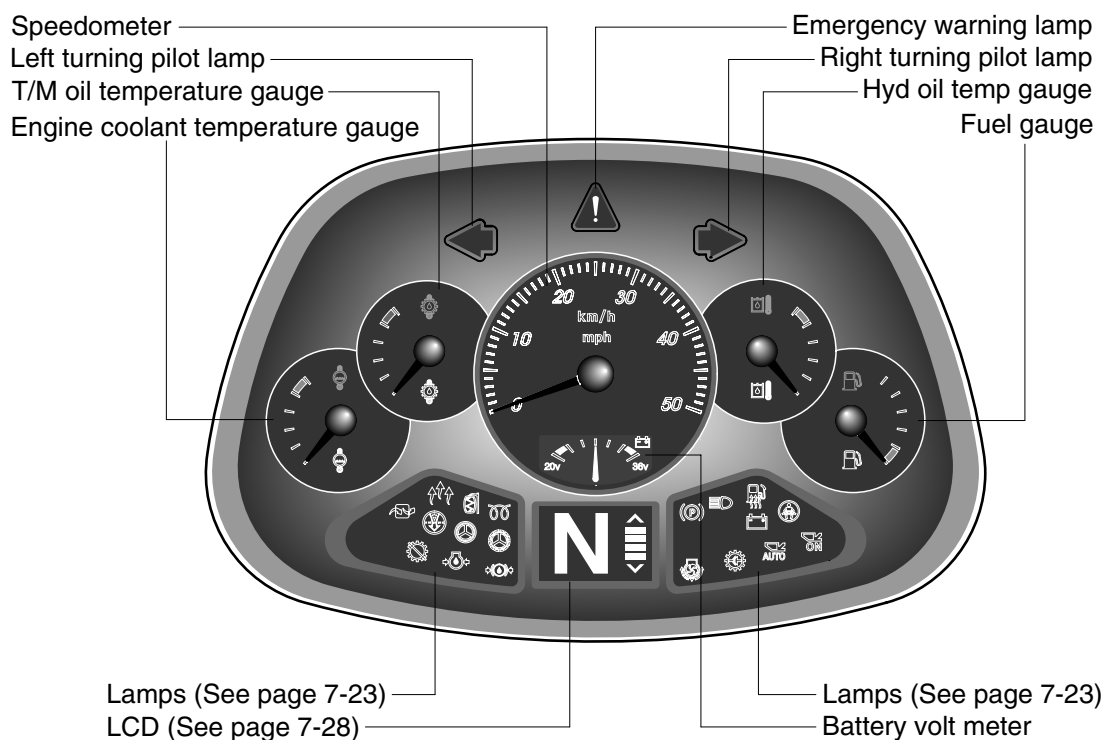
1) STRUCTURE

The cluster consists of gauges, lamps and LCD as shown below, to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

- Gauges : Indicate operating status of the machine.
- Warning lamps : Indicate abnormality of the machine.
- Pilot lamps : Indicate operating status of the machine.
- LCD : Indicates selected the driving speed and direction.

※ The cluster installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to chapter 6, MAINTENANCE in operator's manual.

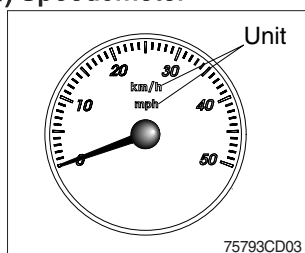
※ When the cluster provides a warning immediately check the problem, and perform the required action.



7409S7EL31

2) GAUGE

(1) Speedometer



① The speedometer displays the speed of machine in mph and km/h.

※ The unit (km/h or mph) can be set by the display set up menu of the monitor and selected unit is displayed.

Refer to page 7-41.

(2) Mode

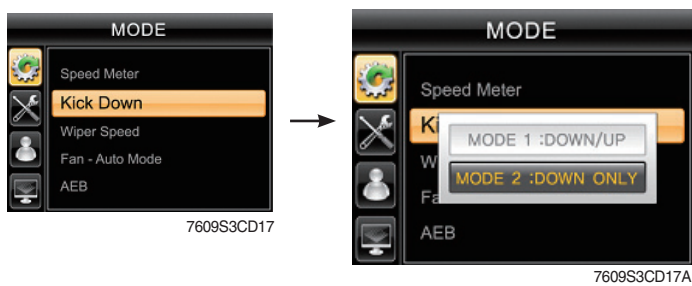
① Speed meter



- Press and hold for 3 seconds.
- To change the pulse value, press ◀ or ▶/00.
- To change the position, press .

※ Only for the serviceperson.

② Kick down



- Mode 1 (down/up) : Press kick down switch once, shift down and press button again, shift up.
- Mode 2 (down only) : Press kick down switch every time, shift to lower gear respectively.

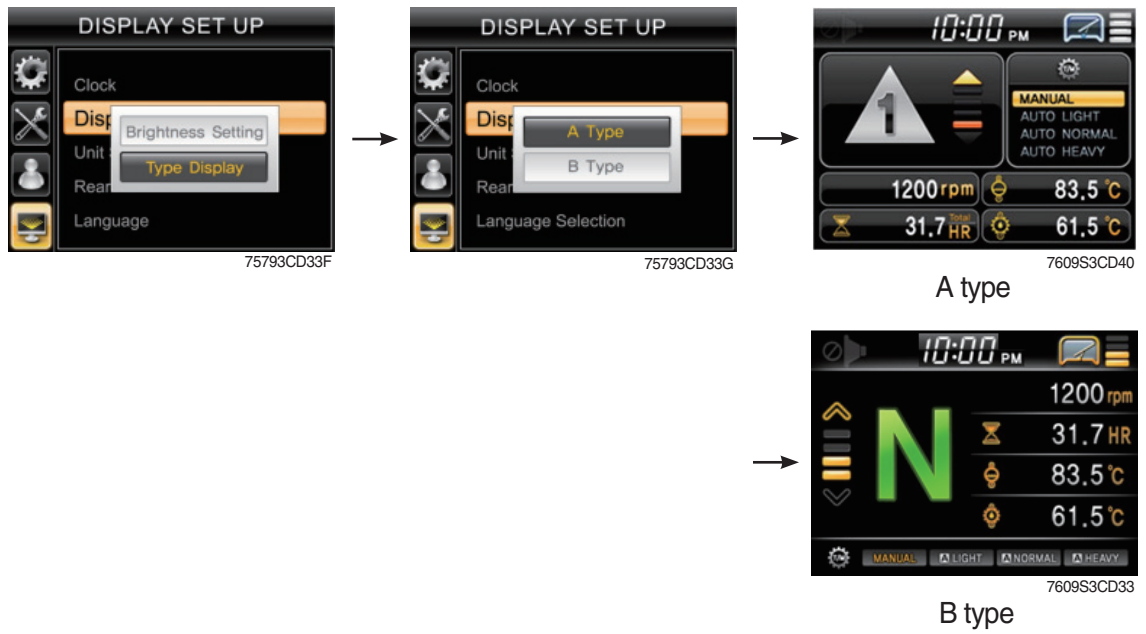
※ Refer to page 7-47.

③ Wiper speed



- Setting wipe speed 1 to 4.

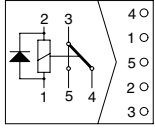
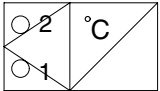
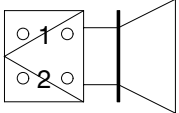
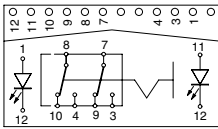
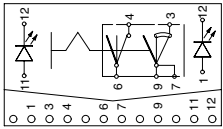
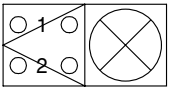
· Type display



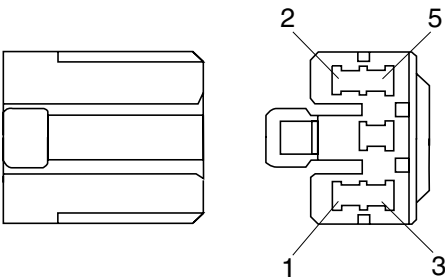
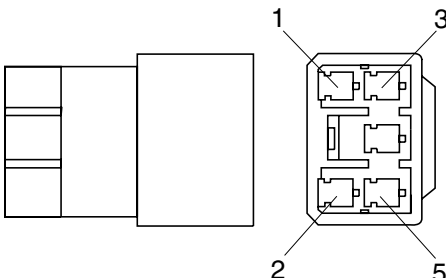
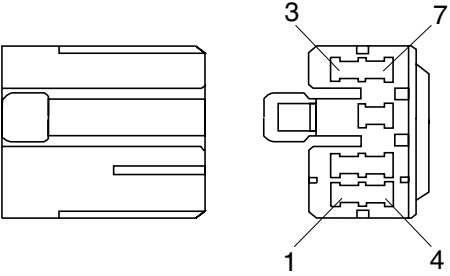
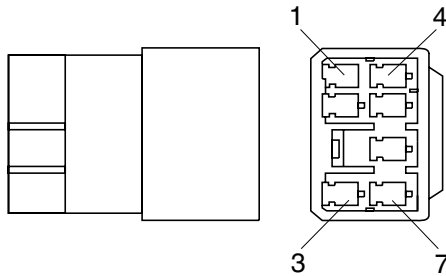
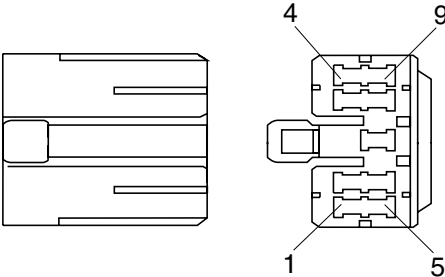
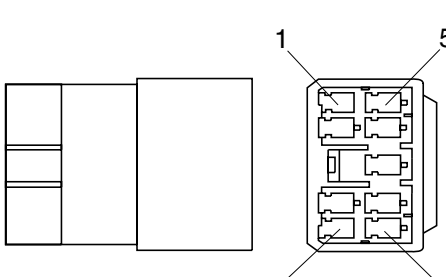
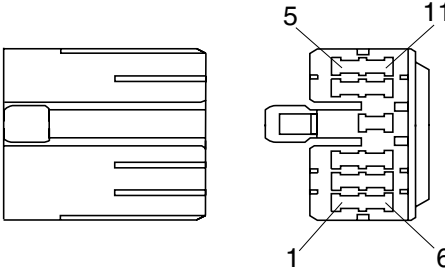
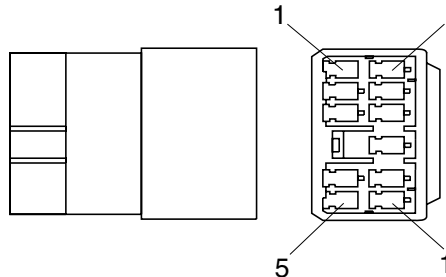
③ Unit



- Temperature : °C ↔ °F
- Distance : km ↔ mile
- Pressure : bar ↔ Mpa ↔ kgf/m² ↔ psi

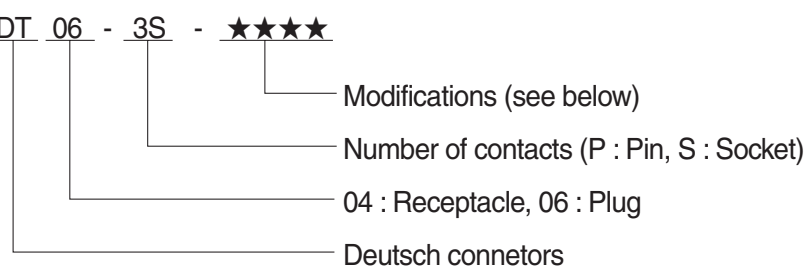
Part name	Symbol	Specifications	Check item
Relay (5 pin)	 CR-2 CR-7 CR-38 CR-63 CR-3 CR-26 CR-55 CR-4 CR-36 CR-58	24V 20A	Resistance normal : about 160 Ω (for pin 1~2) 0 Ω (for pin 3~4) ∞ Ω (for pin 3~5)
Hydraulic temperature	 CD-1	-	Resistance normal : ∞ Ω 105° C over : 0 Ω
Speaker	 CN-23(LH) CN-24(RH)	4 Ω 20W	Resistance normal : 4 Ω
Switch (Locking type)	 CS-17 CS-41 CS-23 CS-76	24V 8A	Resistance at switch off position ∞ Ω between pin 1-5 and 2-6 0 Ω between pin 5-7 and 6-8
Switch (Non-locking type)	 CS-21 CS-36	24V 8A	Resistance at switch off position ∞ Ω between pin 1-5 and 2-6 0 Ω between pin 5-7 and 6-8
Work lamp, Room lamp, Number plate lamp	 CL-1 CL-21 CL-32 CL-35 CL-5 CL-22 CL-33 CL-6 CL-23 CL-34	Work lamp 24V 65W Number plate lamp 24V 10W Room lamp 24V 10W	Resistance normal : 1.2 Ω

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 - ★★☆☆



※ 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 black for 2, 3, 4 & 6pin

No. of pin	Receptacle connector (female)	Plug connector (male)
2		
3		
4		

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