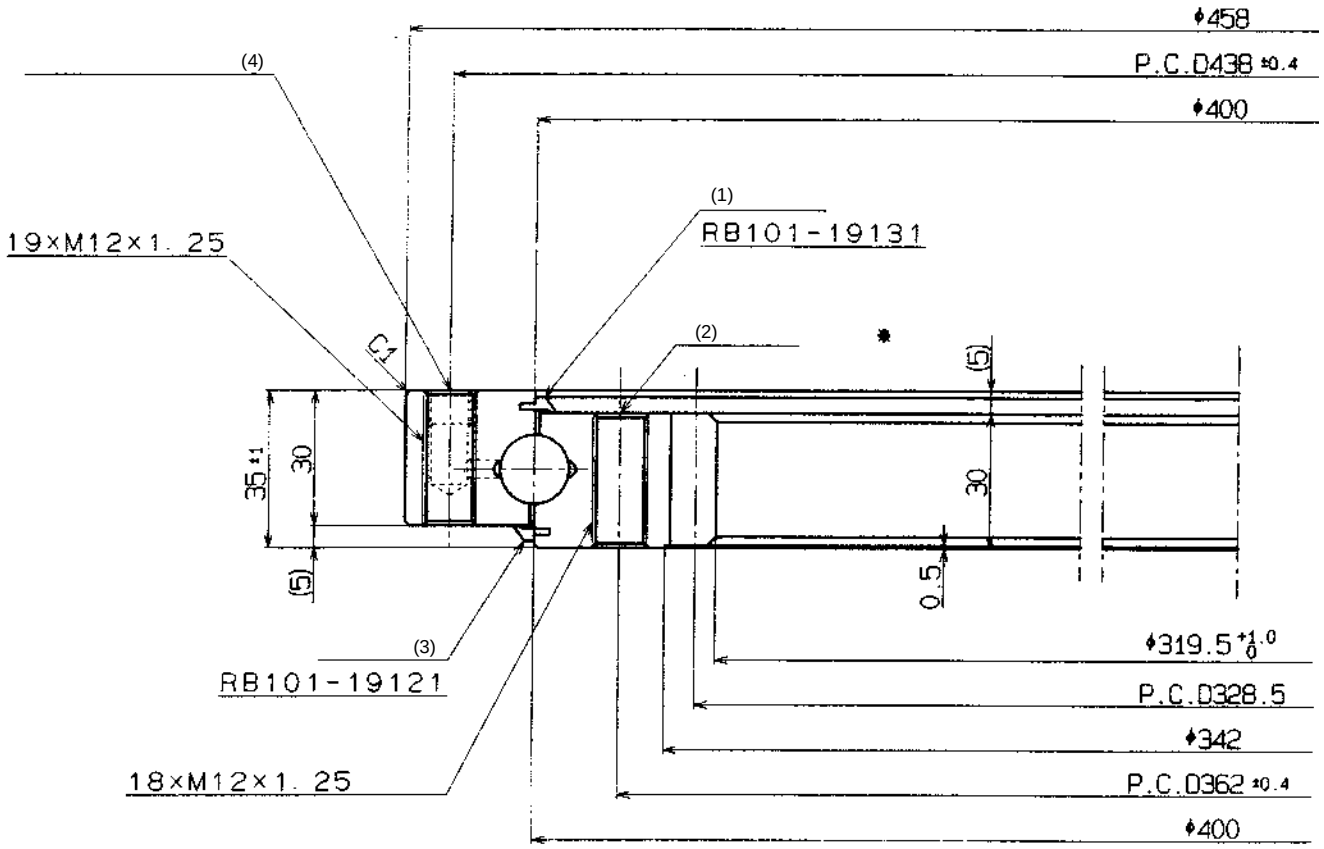
CONTENTS

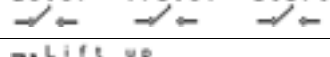
b. Main component

1. Swivel bearing

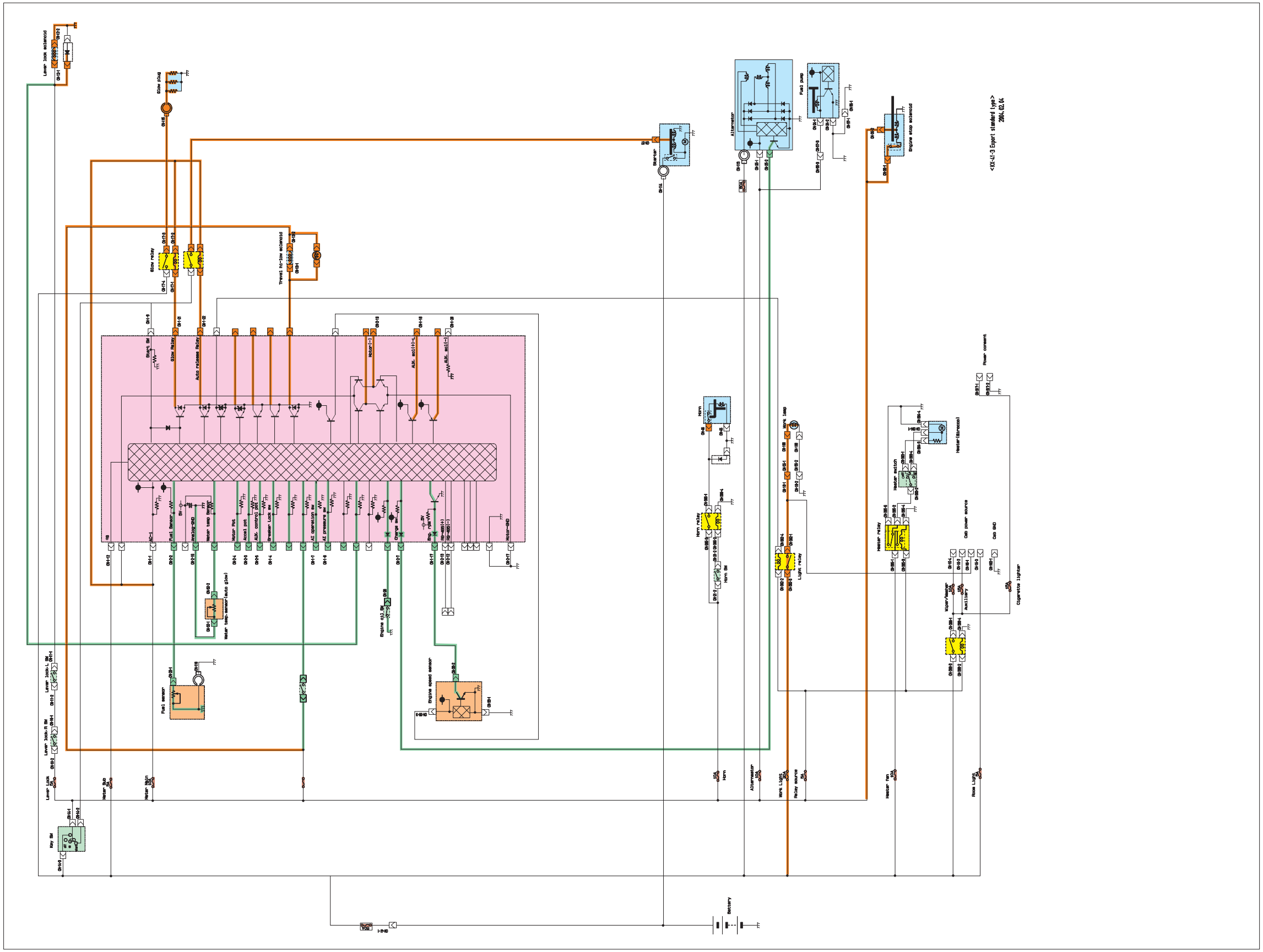


(1) Seal B
(2) S-mark
(3) Seal A
(4) R_p 1/8, for grease nipple

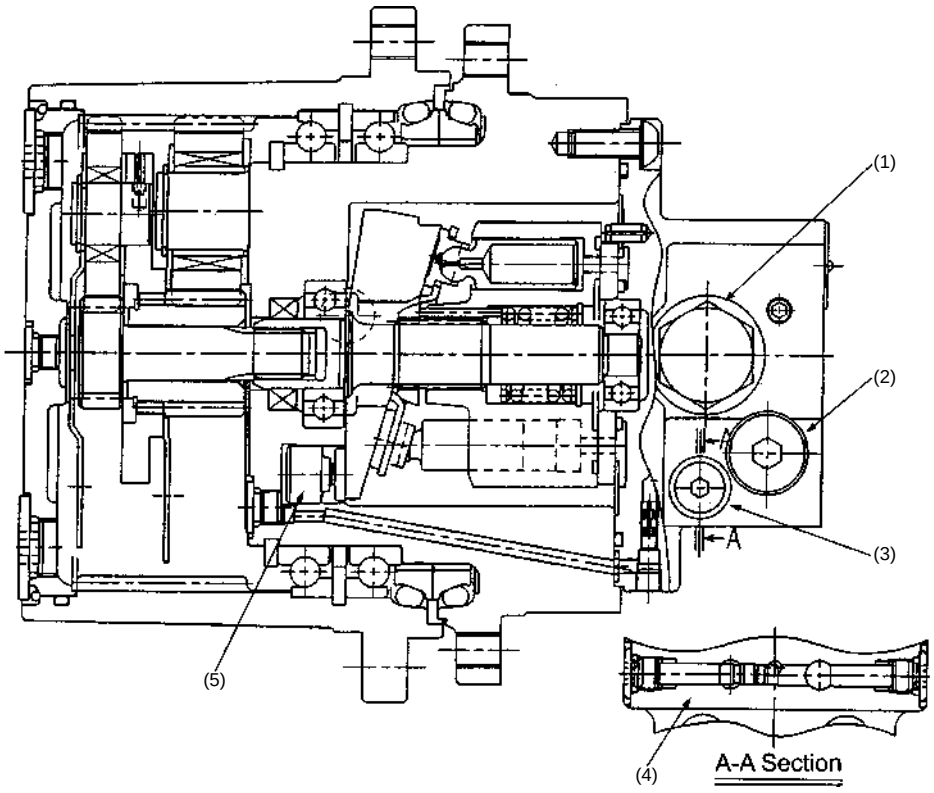
Number of teeth = 73
Backlash = 0.05 ~ 0.35 mm
(0.002 ~ 0.014 inch)
P.C.D. = φ 328.5

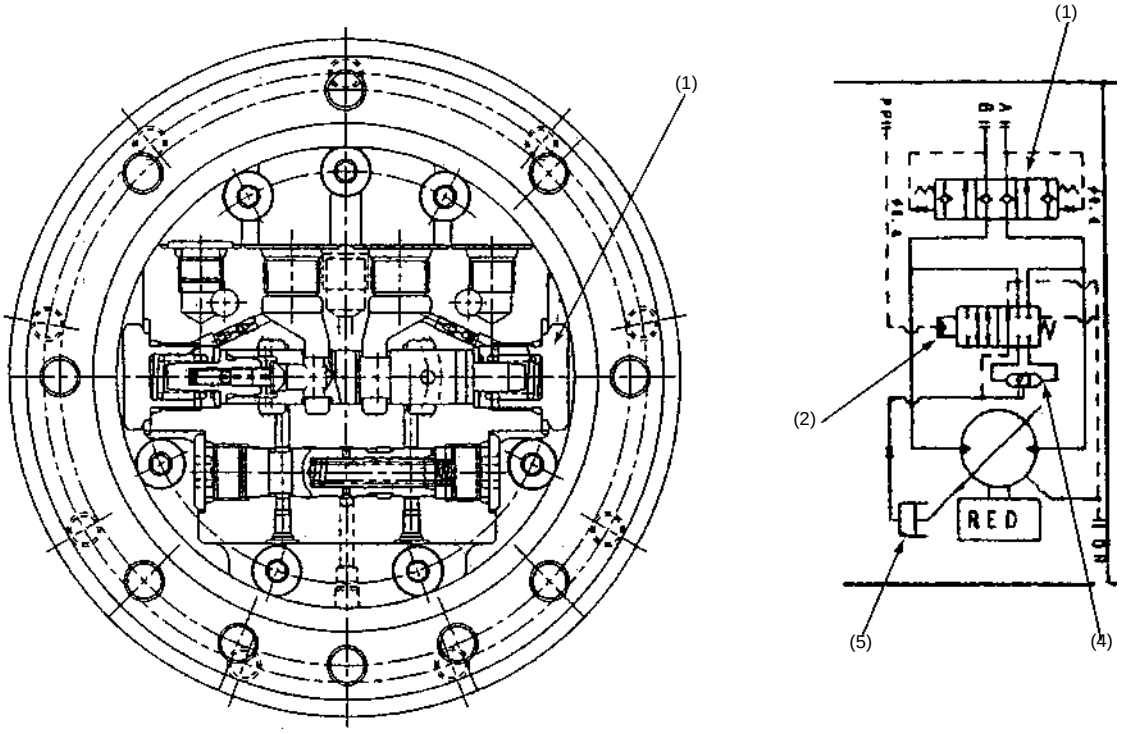
name	English	meaning and explanation
data055	Other menu	Literary it means other menus.
data056	Circuit check Engine stop	This means micro computor is ready to check electrical harness conditions, break or breaking. In this case, for your sefety engine should be off.
data057	Checking touch harness	This means micro computor is checking the harness conditions. Service personnel is required to put hands on the suspected harness, then controller detects the break of harness.
data058	AI motor drive	This display letter means that AI motor can be controlled by just pressing switches on the panel board. Aim of this function is to adjust AI motor link to fit the cable not by the accel knob but by switch.
data059	Max Idle (C.W.) (C.C.W)	Max(CW) means AI motor link moves toward engine speed Max. direction. Idle(CCW) means AI motor link moves toward engine speed idle direction.
data060	All fail record	With this display on, all fail records will be shown up on LCD.
data061	EEPROM read	This display means that data in the EEPROM will be shown up on LCD.
data062	1234 FEDC FEDC FEDC FEDC FEBA FEDC FEDC FEDC FEDC 23	These figures and letters indicate the data of EEPROM. Data can be scrolled up by pressing the switch.
data063	LCD check	This indication shows that micro computor is checking the LCD function.
data064		This shows LCD condition.
data065		This shows LCD condition.
data066		This shows LCD condition.
data067	Service hour meter 1234.3 h	This indicates the service hours of the machine.
data068	Set up hour meter 1234.3 h	This indicates the hours of machine set up.
data069	Soft version 12345	This indicates the software version of main controller.
data070	Set up	This means initialization of the machine main controller.
data071	Enigne start	This indicates that operator is required to start engine.
data072	Set up AI	This means initialization of the AI system.
data073	Accel max	This indicates that operator is suggested to turn the accel knob to Max engine speed.
data074	Accel idle	This indicates that operator is suggested to turn the accel knob to idle engine speed.
data075	Finish key off	This means all initialization process has completed and operator is suggested to turn off key.
data076	Set up machine	This means initialization of the machine.
data077	Set up solenoid	This means initialization of the solenoid valve.
data078	Set up idle 1200 r/min	This means initialization of the engine idle speed.
data079	Set up overheat warning	This means initialization of engine overheat warning system.
data080	Overheat temp. 114 ℃ -10 ℃	This indicates the overheat temp. setting value.
data081	32  1500 HR service	This indicates service hour to conduct maintenance job.
data082	Made in Japan Made in Germany	These indicates where machine was manufactured.
data083	Lever Travel Start 	These letters and signs indicate the switch conditions; safety lock lever, travel high speed and main key position at start or not.
data084	31 Lift up unload lever	This indicates that operator is suggested to lift up unload lever(safety lock lever).
data085	Simple mode	Simple mode means that min. fail indications are shown up on LCD.

3. Covering circuit by controller



3. Structure

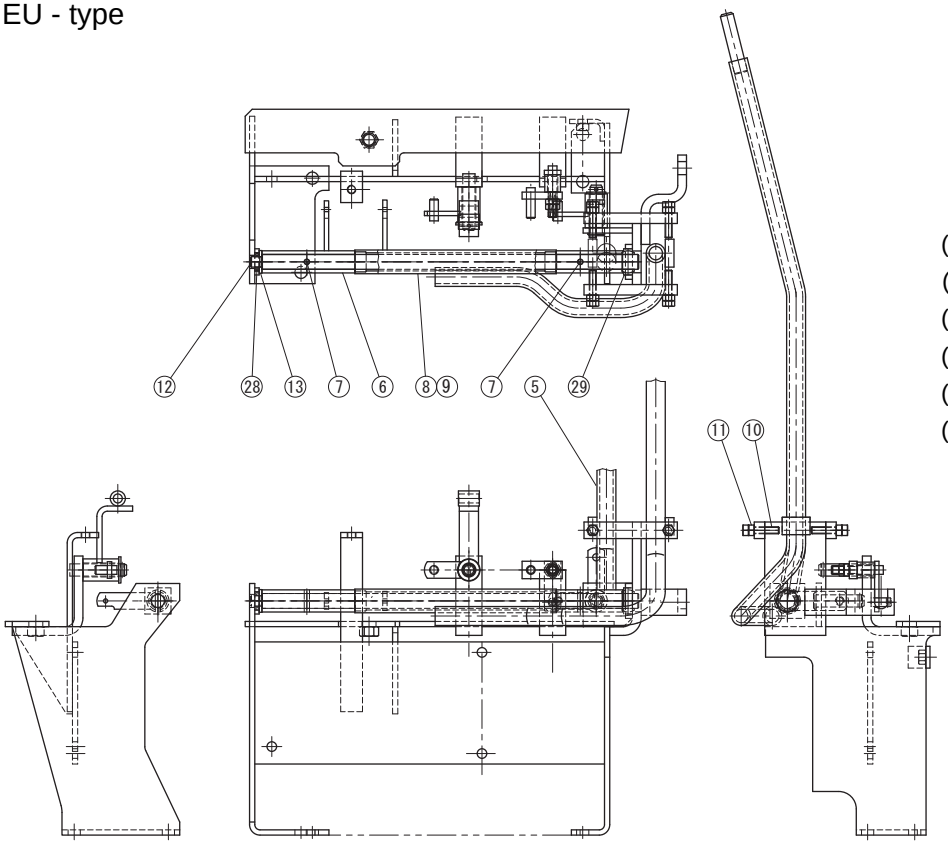




(1) Counter balance valve
(2) HI - Lo change valve
(3) Selector valve
(4) Selector valve
(5) Hi - Lo piston

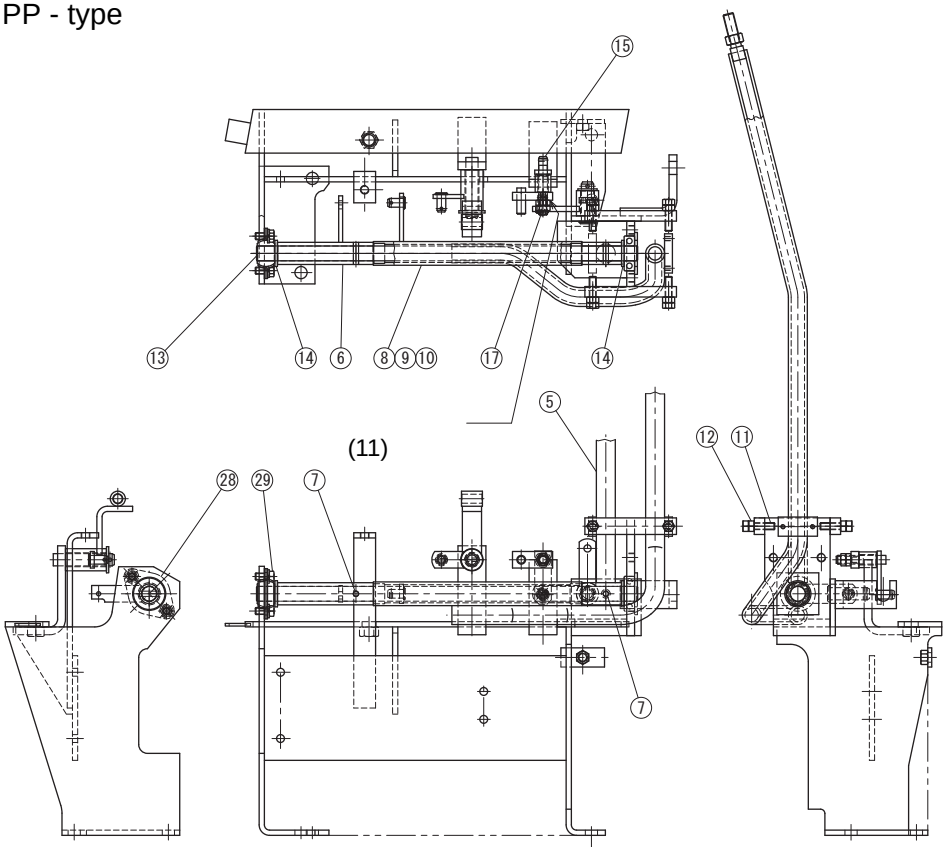
(8) Apply grease on bearing, DU - bushing.
Rotating parts should function smoothly.

EU - type



(5) Lever (Traveling, left) 1
(6) Lever (Traveling, left 3) 1
(7) Pin, spring 2
(8) Lever (Traveling, right) 1
(9) Bearing, needle 2
(10) Bolt 4 (MB 7T)
(11) Nut 4 (MB 4T)
(12) Shaft, traveling
(13) Washer, plain
(28) Bearing, ball
(29) Bush

PP - type



(1) Clearance: 0.3 mm or less
(2) Bolt ㉙ torque: 23.5 ~ 27 N·m
2.4 ~ 2.8 kgf·m

Symptom	Probable Cause	Solution	Reference Page
Either White or Blue Exhaust Gas Is Observed	● Excessive engine oil	Reduce to specified level	III-S-48
	● Piston ring and cylinder worn or stuck	Repair or replace	III-S-77, 91, 97, 98
	● Incorrect injection timing	Adjust	III-S-104
	● Deficient compression	Adjust top clearance	III-S-65
Either Black or Dark Gray Exhaust Gas Is Observed	● Overload	Reduce the load	—
	● Low grade fuel used	Use specified fuel	—
	● Fuel filter clogged	Replace	III-S-53
	● Air cleaner clogged	Clean or replace	III-S-51
	● Deficient nozzle injection	Repair or replace nozzle	III-S-68,107, 108
Deficient Output	● Incorrect injection timing	Adjust	III-S-104
	● Engine's moving parts seem to be seizing	Repair or replace	—
	● Uneven fuel injection	Replace injection pump	III-S-73
	● Deficient nozzle injection	Repair or replace nozzle	III-S-68, 107, 108
	● Compression leak	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	III-S-64
Excessive Lubricant Oil Consumption	● Piston ring's gap facing the same direction	Shift ring gap direction	III-S-76
	● Oil ring worn or stuck	Replace	III-S-77, 91
	● Piston ring groove worn	Replace piston	III-S-77, 91
	● Valve stem and valve guide worn	Replace	III-S-71, 82
	● Oil leaking due to defective seals or packing	Replace	—
Fuel Mixed into Lubricant Oil	● Injection pump's plunger worn	Replace injection pump	III-S-73
	● Deficient nozzle injection	Repair or replace nozzle	III-S-68, 107, 108
	● Injection pump broken	Replace	III-S-73
Water Mixed into Lubricant Oil	● Head gasket defective	Replace	III-S-70
	● Cylinder block or cylinder head flawed	Replace	—

(4) Timing Gear, Camshaft and Fuel Camshaft

Injection Pump, Fuel Feed Pump and Speed Control Plate

1. Remove the socket head screws and nuts, and remove the injection pump (1).
2. Remove the screws and separate the speed control plate (2), taking care not to damage the governor spring (4).
3. Disconnect the governor spring (4) and remove the speed control plate (2).
4. Remove the fuel feed pump (3).

(When reassembling)

- Hook the governor spring (4) to the governor lever (5) first and install the speed control plate (2).
- Be sure to place the copper washers underneath two screws (6). (Two screws (6) in the upper of the speed control plate (2).)
- Position the slot (7) on the fork lever just under the slot (8) on the crankcase.
- Insert the injection pump (1) so that the control rod (10) should be pushed by the idling adjusting spring (9) at its end and the pin (11) on the rod engages with the slot (7) on the fork lever (as shown in the photo).

■ **NOTE**

- **The sealant is applied to both sides of the soft metal gasket shim. The liquid gasket is not required for assembling.**
- **Addition or reduction of shim (0.05 mm, 0.0020 in.) delays or advances the injection timing by approx. 0.0087 rad (0.5 °)**
- **In disassembling and replacing, be sure to use the same number of new gasket shims with the same thickness.**

(1)	Injection Pump	(7)	Slot (Fork Lever Side)
(2)	Speed Control Plate	(8)	Slot (Crankcase Side)
(3)	Fuel Feed Pump	(9)	Idling Adjusting Spring
(4)	Governor Spring	(10)	Control Rod
(5)	Governor Lever	(11)	Pin
(6)	Screw and Copper Washer		

0000001327E

Fan Drive Pulley

1. Secure the flywheel to keep it from turning.
2. Remove the fan drive pulley screw.
3. Draw out the fan drive pulley with a puller.

(When reassembling)

- Install the pulley to the crankshaft, aligning the mark (1) on them.
- Apply engine oil to the fan drive pulley retaining screws. And tighten them.

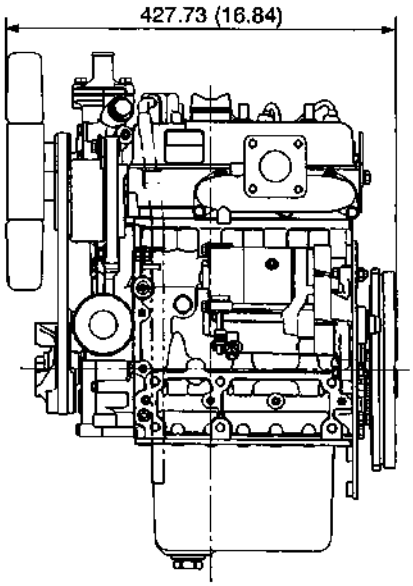
Tightening torque	Fan drive pulley screw	98.1 to 107.9 N·m 10.0 to 11.0 kgf·m 72.3 to 79.6 ft-lbs

(1) Alignment Mark

0000001328E

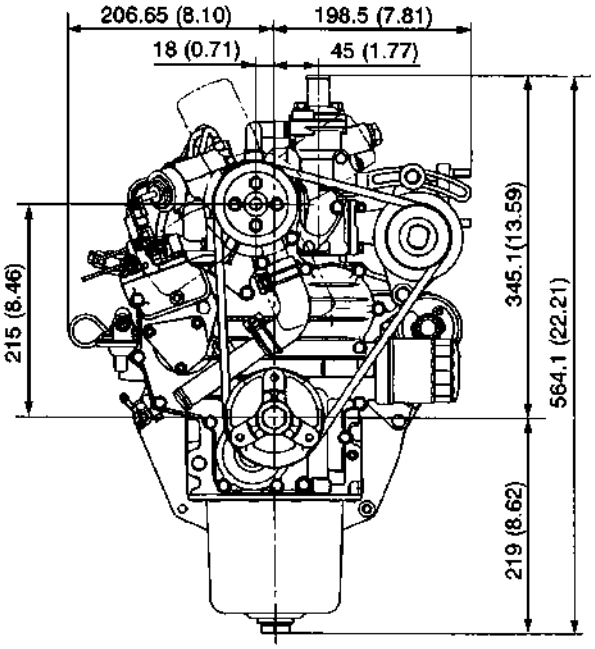
DIMENSIONS DIMENSIONS ABMESSUNGEN

Unit : mm (in.)
Unité : mm
Einheit : mm



01760F10030

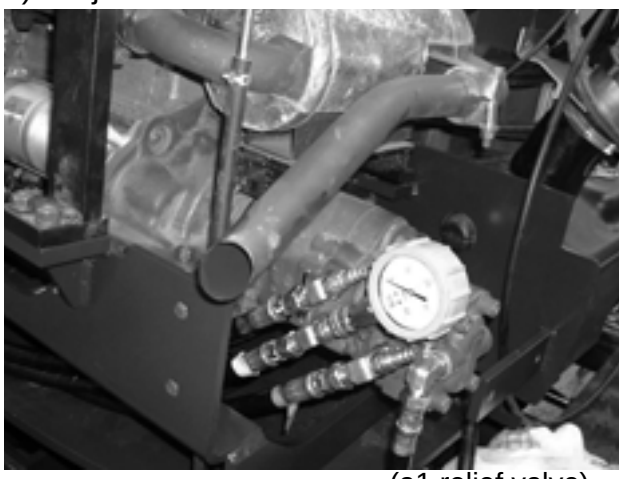
Unit : mm (in.)
Unité : mm
Einheit : mm



01760F10040

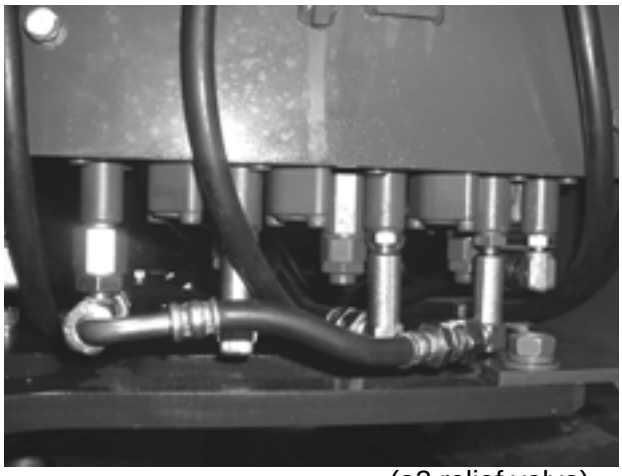
01760Z00040

3) Adjustment of main relief valve.



(a1 relief valve)

1. Loosen the lock nut of the P1, P2 or P3 main relief valve.
2. Using a hex wrench, turn the adjusting screw to reach the specified setting.
3. Then tighten up the lock nut. Clockwise turn raises the pressure, and counterclockwise turn lowers it. Main relief valve pressure rises by approximately 30 kgf / cm^2 (2.9 MPa, 427 psi) at 60 degree turns of adjusting screw.
4. Run the engine at the maximum speed. Move the levers and make sure the pressure setting.
5. Get the safety lever down to activate the unload valve.
6. Hydraulic oil temp. : 50 ± 5 ℃, 122 ± 41 °F

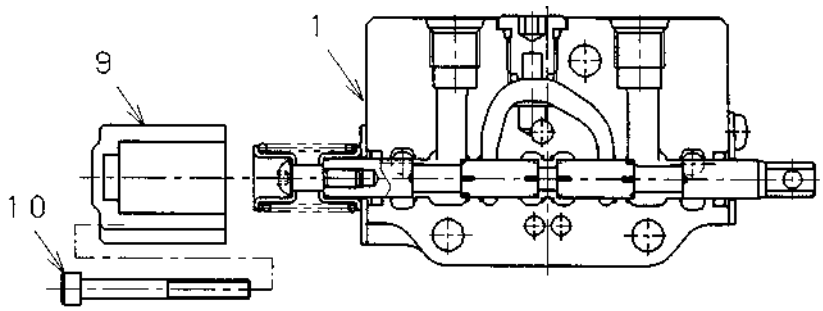


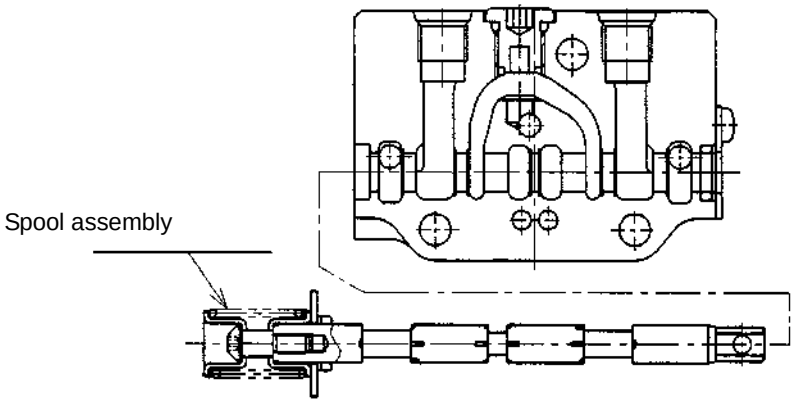
(a2 relief valve)

(a3 relief valve)

• Disassembling of travel section (LH, RH)

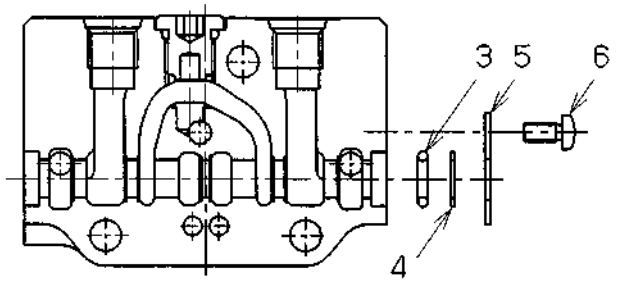
1. Return Spring Cap
   Loosen and remove the two M5 bolts (12) with a 4-mm hexagon spanner.
   Remove the return spring cover (11) and extract the spool assembly from the body (1).



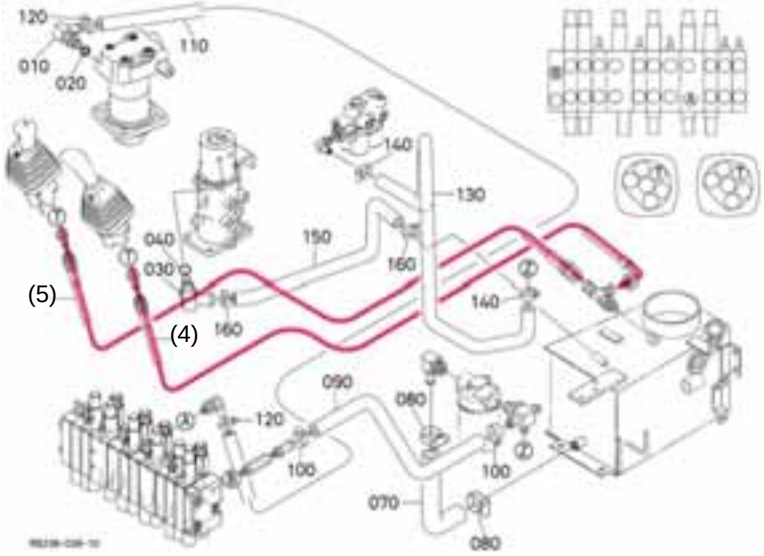


Note:
Remove the spool assembly slowly in the horizontal direction. Carefully remove the spool assembly, or otherwise the spool seal (with the O-ring and backup ring) will be shifted to the edge of the spool and damaged by the edge. Record the direction of the spool and the main component into which the spool is inserted so as not to make mistakes at the time of assembly.

2. Link Mounting Block
   - Loosen the two M5 small Phillips-head screws (6) with a Phillips-head screwdriver.
   - Remove the O-ring retainer (5), and remove the backup ring (4) and O-ring (3) from the body (1) carefully so that the backup ring and O-ring will not be damaged.

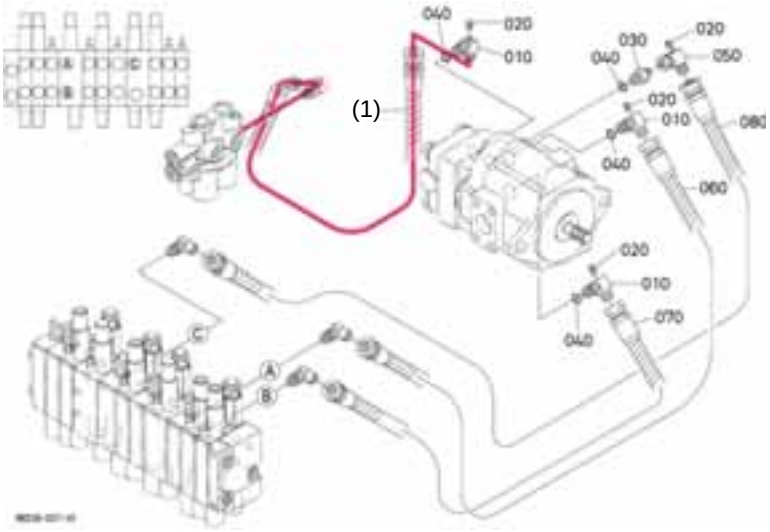


3) Pilot hose (Pilot valve T port)



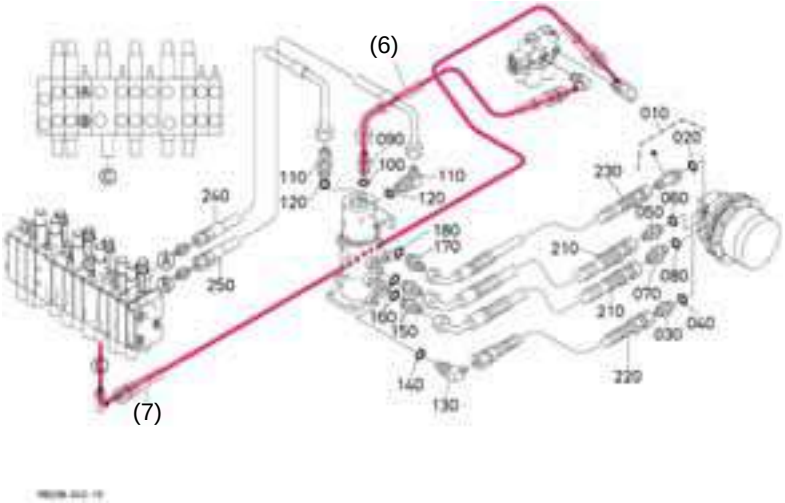
No.	Part Name	Q'ty	Tape color
(4)	Hydraulic hose (1/4)	1	Orange
(5)	Hydraulic hose (1/4)	1	Orange

4) Pilot hose (Pump to Anload valve)



No.	Part Name	Q'ty	Tape color
(1)	Hydraulic hose (3/8)	1	

5) Pilot hose (Anload valve to R /J and C / V)



No.	Part Name	Q'ty	Tape color
(6)	Hydraulic hose (1/4)	1	
(7)	Hydraulic hose (1/4)	1	

5 Pilot control unit repair procedures

5.1 Pushbutton replacement

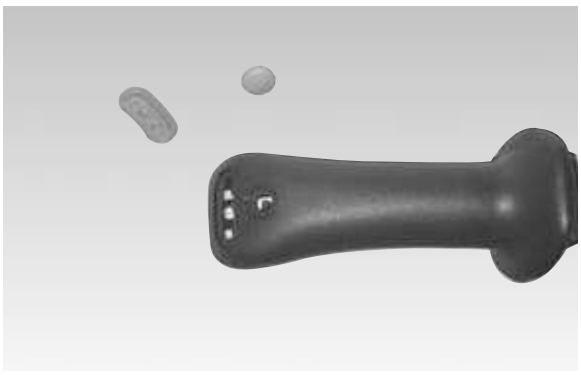
NOTE : The pilot control unit does not need to be removed from the machine to perform this operation.

Machine off:

- **place all of the machine's equipment connected to the pilot control unit in neutral position,**
- **release stored pressure by operating all of the pilot unit's control valves by moving the handle in all directions.**

Remove worn out pushbutton(s) using a small screwdriver.

The installation of new elements is performed without any special tools; the parts are simply pressed into place.

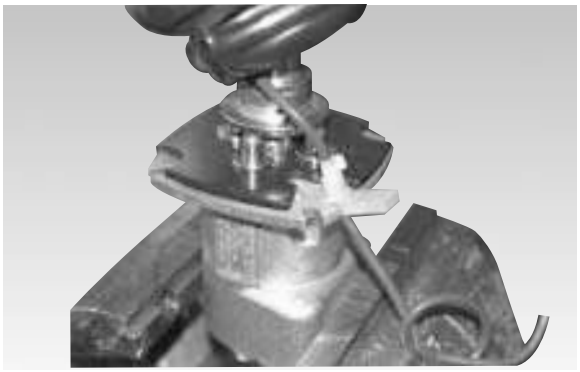


5.2 Boot or handle replacement

Preliminary operations

Remove the pilot control unit from the machine's arm rest (see § 4) or free the unit by unscrewing the 4 screws fixing the plate in order to release the electrical cable.

Hold the pilot control unit using a vice or a vice-grip wrench (clamp onto the body above the arm rest, 65 opening).



NOTE : - The pilot unit does not need to be removed from the machine to release the cable. However, it is recommended to lift the control unit by undoing the 4 fixing screws on the arm rest.

- It is unnecessary to remove the units wih no electrical functions.

Machine off:

- **place all of the machine's equipment connected to the pilot control unit in neutral position,**
- **release stored pressure by operating all of the pilot control unit's control valves by moving the handle in all directions.**

Handle removal

Lift and turn the boot inside out.

Remove the grommet from its emplacement to free the cable.

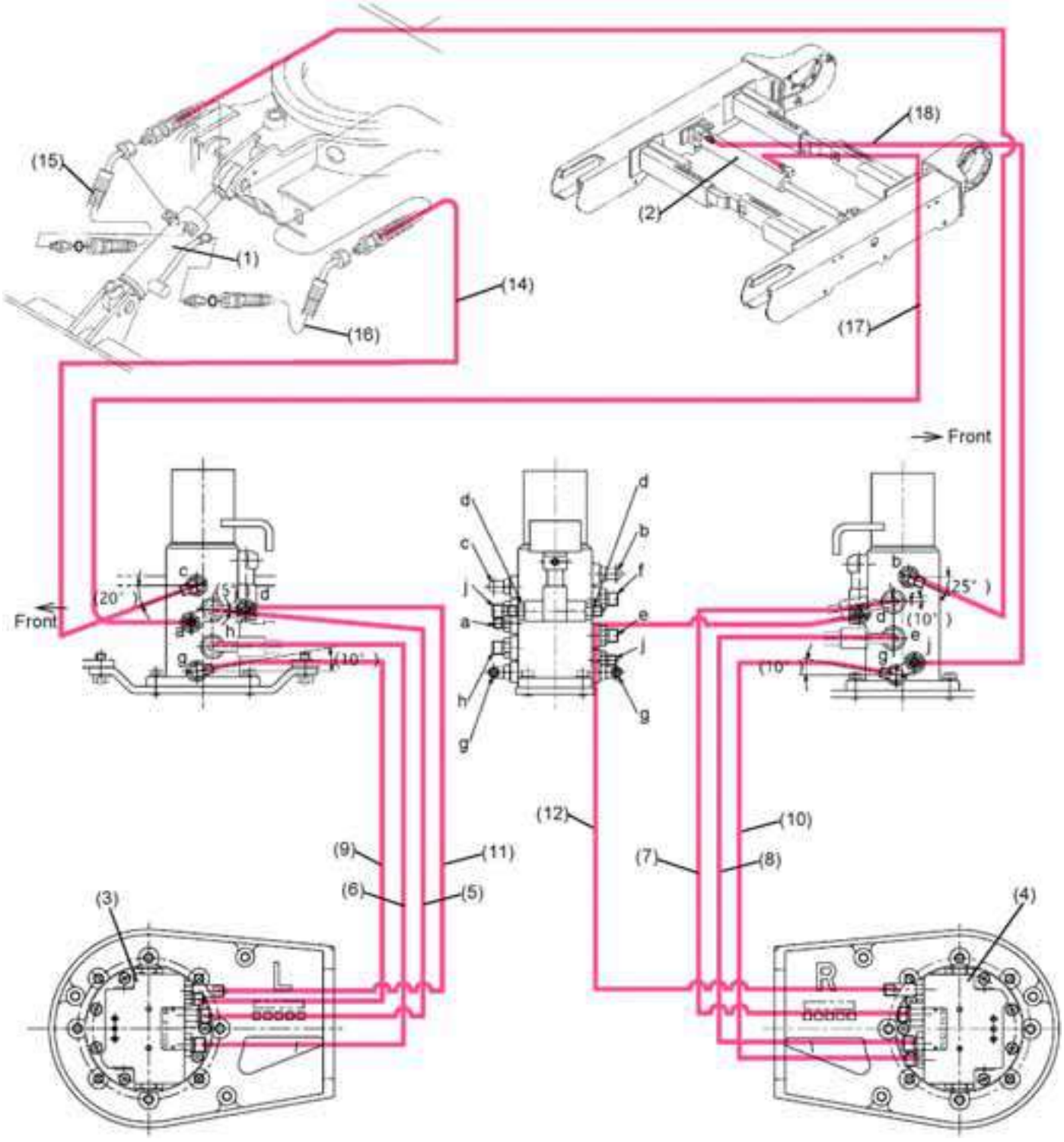
Loosen the handle mounting nut (19mm open-end spanner).

Reassembly : torque : 40 ± 10% N.m

Unscrew and remove the handle.

(3) Hose connection

1) Hose connection to the rotary joint body



(1) Dozer cylinder
(2) Track cylinder
(3) Travel motor LH
(4) Travel motor RH

High-pressure hose List (Lower Side)

No.	Connecting point	Application	Part No. Reference	Part Name	Q'ty	Dimension (mm)	Tape color	Hose shape	Remarks
1	SJ (i) ~ Traveling motor left A	Travel left forward	RB238-63911	Hydraulic hose (3/8)	1	790		G3/8 PF2106 G3/8	
2	SJ (h) ~ Traveling motor left B	Travel left backward	RB238-63911	Hydraulic hose (3/8)	1	790		G3/8 PF2106 G3/8	
3	SJ (f) ~ Traveling motor right B	Travel right forward	RB238-63911	Hydraulic hose (3/8)	1	790		G3/8 PF2106 G3/8	
4	SJ (e) ~ Traveling motor right A	Travel right backward	RB238-63911	Hydraulic hose (3/8)	1	790		G3/8 PF2106 G3/8	
5	SJ (g) ~ Traveling motor left Pb	Travel left 2nd speed signal	RB238-63921	Hydraulic hose (1/4)	1	810		G1/4 PLT04 G1/4	
6	SJ (g) ~ Traveling motor right Pb	Travel right 2nd speed signal	RB238-63922	Hydraulic hose (1/4)	1	810	White x 1	G1/4 PLT04 G1/4	
7	SJ (d) ~ Traveling motor left T1	Travel drain left	RB238-63932	Hydraulic hose (1/4)	1	740	White x 1	G1/4 PLT04 G1/4	
8	SJ (d) ~ Traveling motor right T2	Travel drain right	RB238-63931	Hydraulic hose (1/4)	1	740		G1/4 PLT04 G1/4	
9	SJ (b) ~ Intermediate joint	Dozer up (rod)	RB238-64811	Hydraulic hose (1/4)	1	310		G1/4 PF2106 G1/4	
10	SJ (c) ~ Intermediate joint	Dozer down (bottom)	RB238-64831	Hydraulic hose (1/4)	1	310		G1/4 PF2106 G1/4	
11	Intermediate joint ~ Dozer CYL rod	Dozer up (rod)	RB238-64821	Hydraulic hose (1/4)	1	310		G1/4 PF2106 G1/4	
12	Intermediate joint ~ Dozer CYL bottom	Dozer down (bottom)	RB238-64821	Hydraulic hose (1/4)	1	310		G1/4 PF2106 G1/4	
13	SJ (c) ~ Truck CYL bottom	Track extended (bottom)	RB238-64851	Hydraulic hose (1/4)	1	950		G1/4 PF1704 G1/4	
14	SJ (a) ~ Truck CYL rod	Track retracted (rod)	RB238-64861	Hydraulic hose (1/4)	1	710		G1/4 PF1704 G1/4	