CONTENTS

SECTION 1 GENERAL

SECTION 2 STRUCTURE AND FUNCTION

SECTION 3 HYDRAULIC SYSTEM

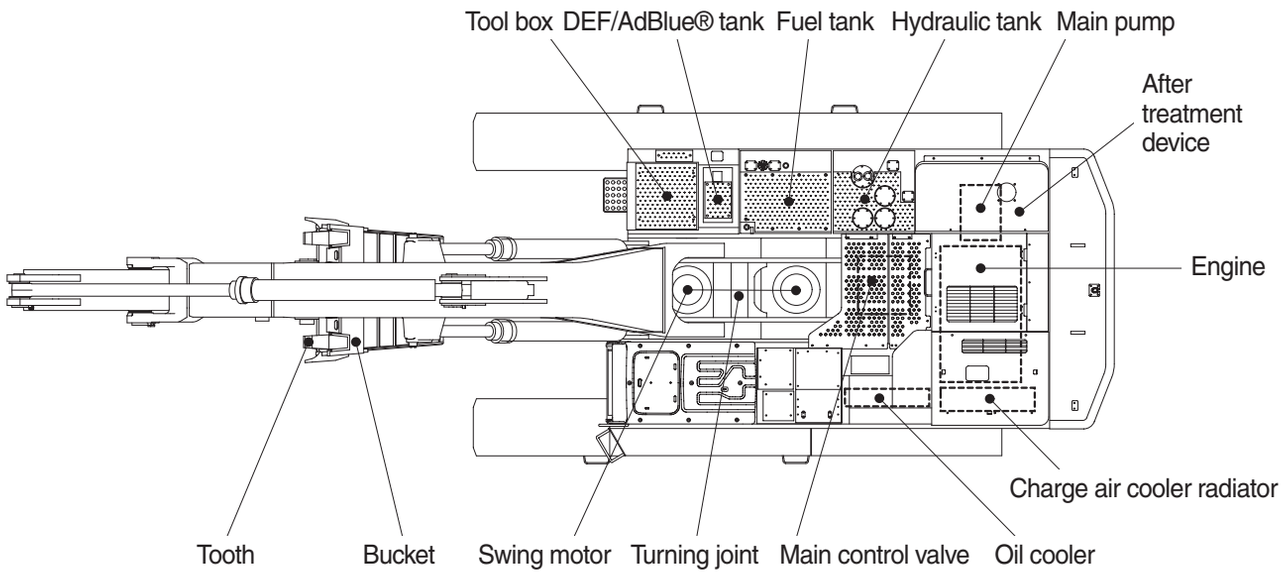
SECTION 4 ELECTRICAL SYSTEM

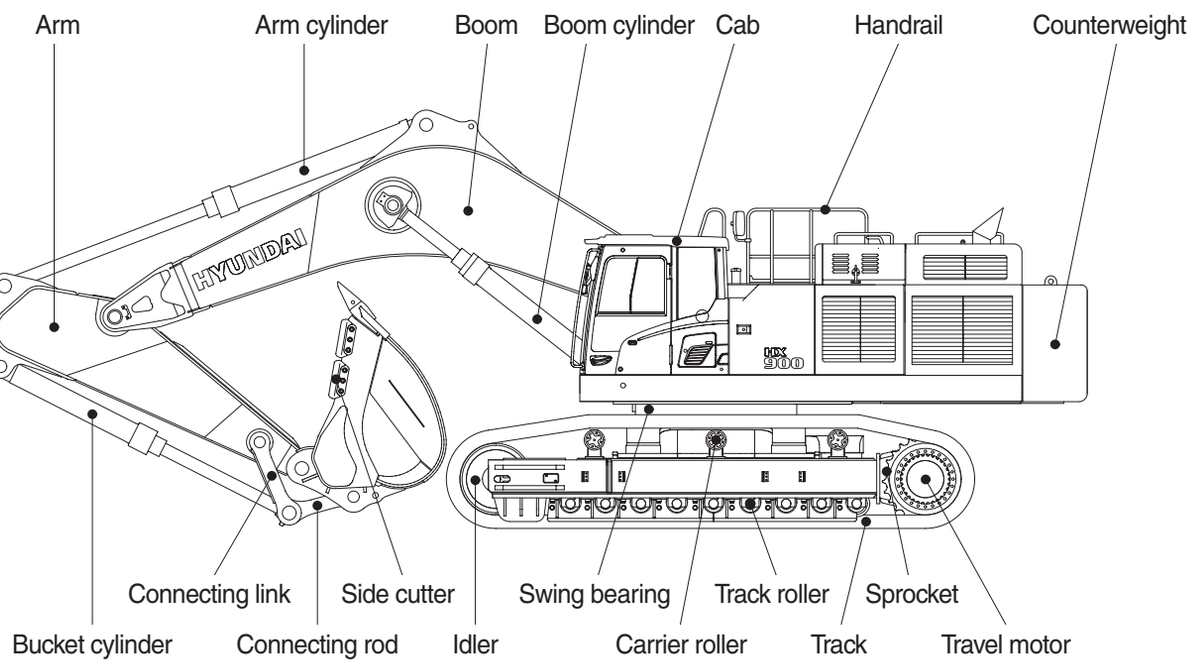
SECTION 5 MECHATRONICS SYSTEM

SECTION 1 GENERAL

GROUP 2 SPECIFICATIONS

1. MAJOR COMPONENT



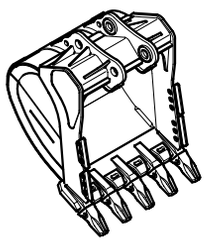
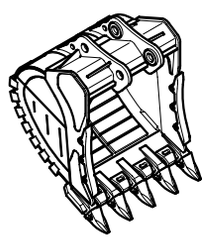
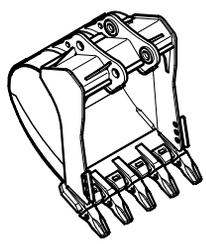
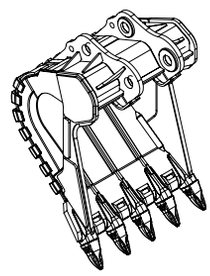


900F2SP01

6. BUCKET SELECTION GUIDE

1) HX900 L

(1) HEAVY DUTY AND ROCK-HEAVY DUTY BUCKET

			
◇ Heavy duty	◈ Rock-heavy duty	◆ Light-heavy duty	★ Rock-special heavy duty (Cubic marble handling)

Capacity		Width	Weight	Tooth	Recommendation			
					7.2 m (23' 7") boom	8.2 m (26' 11") boom		
SAE heaped	CECE heaped				2.95 m (9' 8") arm	2.95 m (9' 8") arm	3.6 m (11' 10") arm	4.4 m (14' 5") arm
◇3.70 m³ (4.84 yd³)	3.30 m³ (4.32 yd³)	1845 mm (72.6")	4370 kg (9630 lb)	4 EA	●	◐	■	■
◇4.25 m³ (5.56 yd³)	3.75 m³ (4.90 yd³)	2045 mm (80.5")	4730 kg (10430 lb)	5 EA	●	■	▲	▲
◇4.85 m³ (6.34 yd³)	4.25 m³ (5.56yd³)	2245mm (88.4")	5000 kg (11020 lb)	5 EA	◐	▲	▲	▲
◇5.40 m³ (7.06 yd³)	4.75 m³ (6.21 yd³)	2445mm (96.3")	5275 kg (11630 lb)	5 EA	■			
◇5.80 m³ (7.59 yd³)	5.05 m³ (6.61 yd³)	2585mm (101.8")	5555 kg (12250 lb)	6 EA	▲			
◈3.70 m³ (4.84 yd³)	3.30 m³ (4.32 yd³)	1845mm (72.6")	4850 kg (10690 lb)	4 EA	●	◐	■	■
◈4.25 m³ (5.56 yd³)	3.75 m³ (4.90 yd³)	2045mm (80.5")	5235 kg (11540 lb)	5 EA	◐	■	▲	▲
◈4.85 m³ (6.34 yd³)	4.25 m³ (5.56 yd³)	2245mm (88.4")	5530 kg (12190 lb)	5 EA	■	▲		
◈5.40 m³ (7.06 yd³)	4.75 m³ (6.21 yd³)	2445mm (96.3")	5830 kg (12850 lb)	5 EA	■			
◆4.25 m³ (5.56 yd³)	3.75 m³ (4.90 yd³)	2045mm (80.5")	4150 kg (9150 lb)	5 EA	●	■	■	■
★3.60 m³ (4.71 yd³)	3.10 m³ (4.05 yd³)	1920mm (75.6")	4600 kg (10140 lb)	5 EA	●	◐	■	■

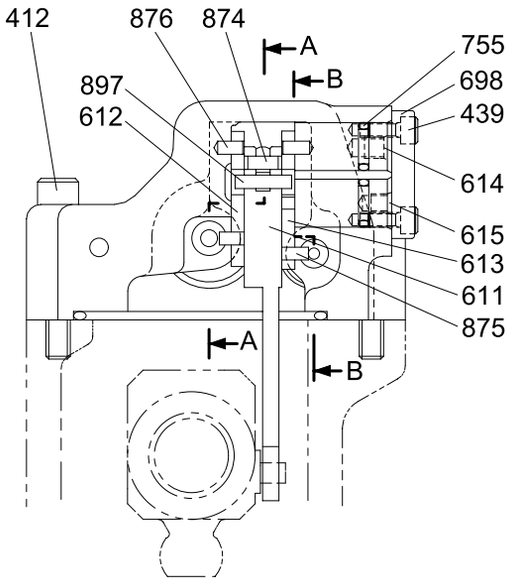
▲ Applicable for materials with density of 1200 kg/m³ (2000 lb/yd³) or less

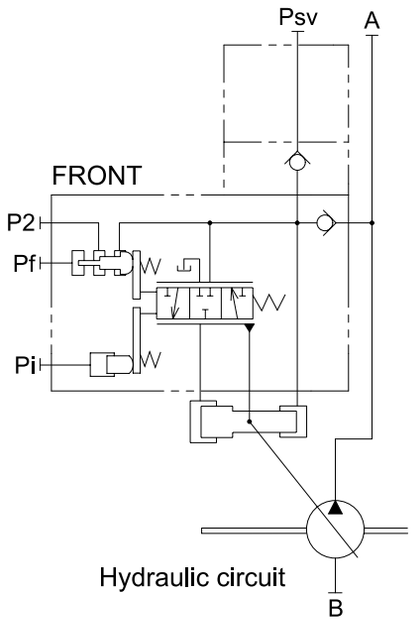
■ Applicable for materials with density of 1500 kg/m³ (2500 lb/yd³) or less

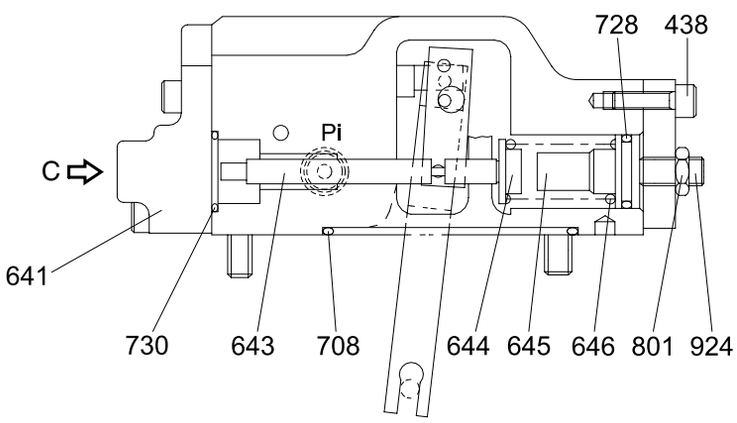
◐ Applicable for materials with density of 1800 kg/m³ (3000 lb/yd³) or less

● Applicable for materials with density of 2100 kg/m³ (3500 lb/yd³) or less

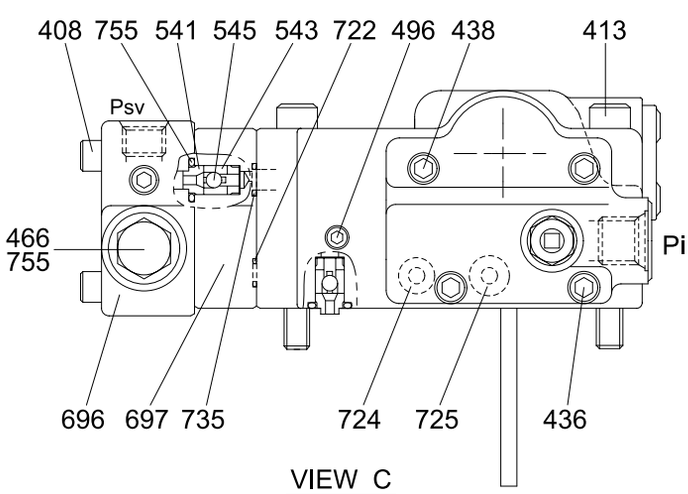
2) FRONT REGULATOR (1/2)







SECTION B-B



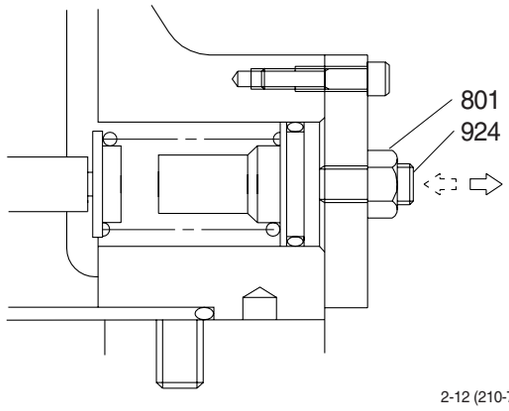
VIEW C

Port	Port name	Port size
Pi	Pilot port	PF 1/4 - 15
Psv	Servo assist port	PF 1/4 - 15
P2	Companion delivery pressure	-
Pf	Powershift pressure	-

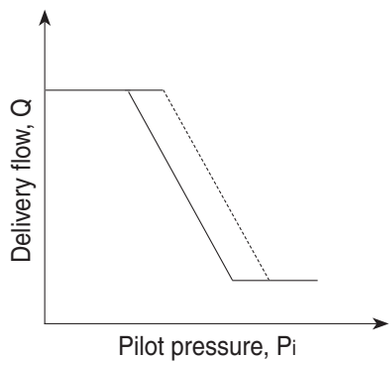
80092RG01

③ Adjustment of flow control characteristic

The flow control characteristic can be adjusted with the adjusting screw.
Adjust it by loosening the hexagon nut (801) and by tightening (or loosening) the hexagonal socket head screw (924).
Tightening the screw shifts the control chart to the right as shown in the figure.

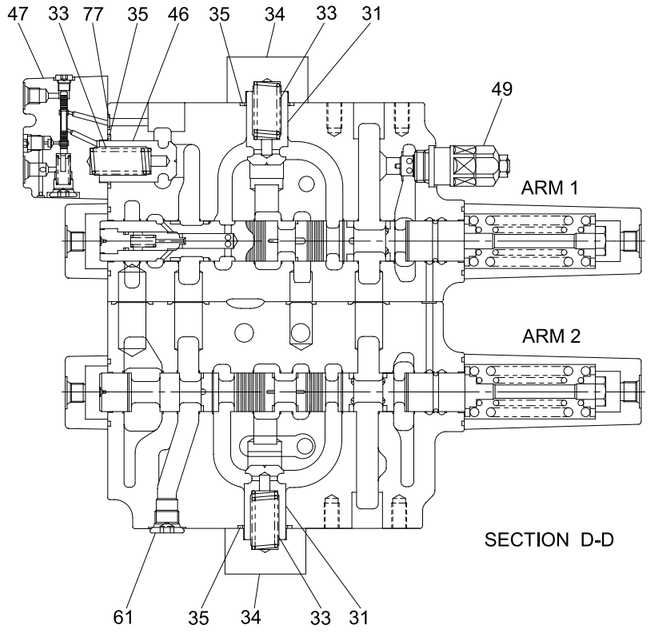


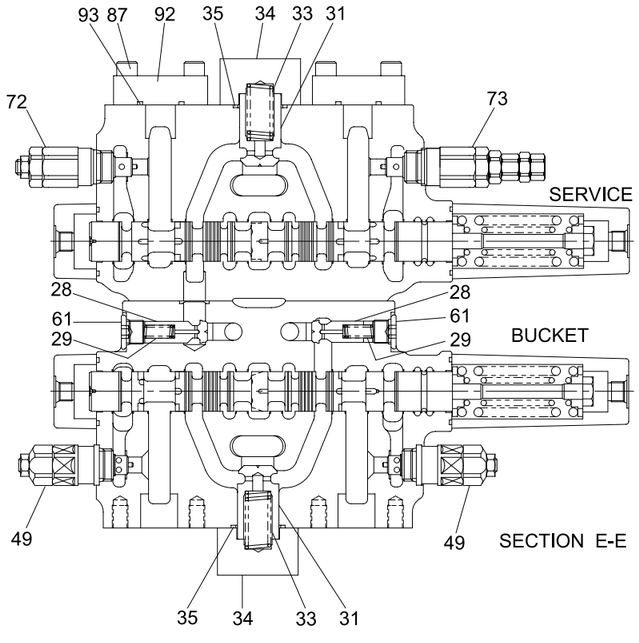
2-12 (210-7)

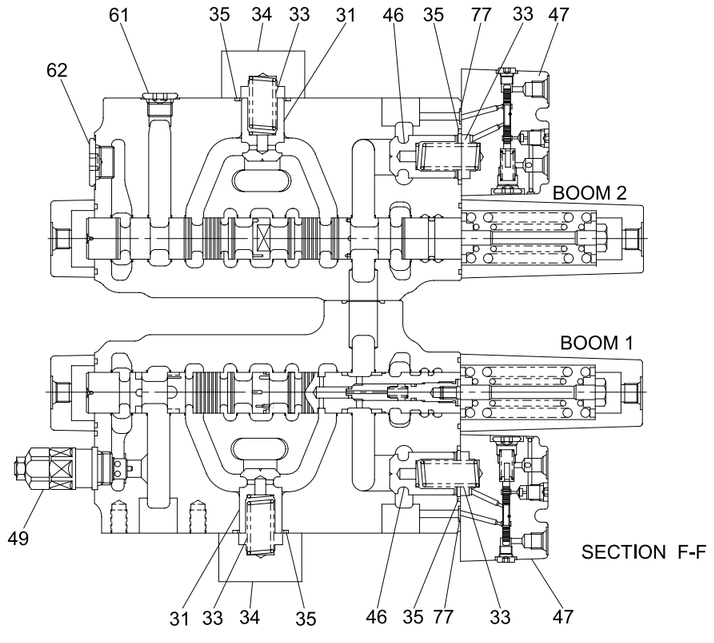


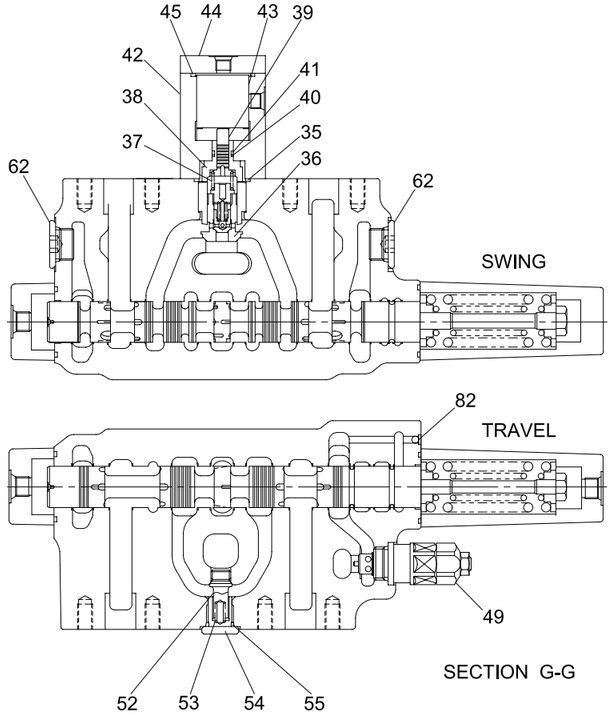
※ Adjusting values are shown in table.

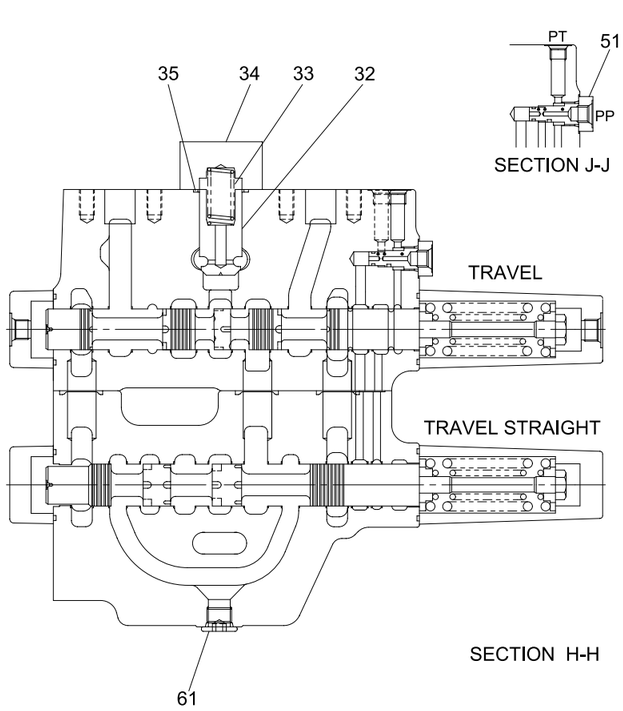
Speed	Adjustment of flow control characteristic		
	Tightening amount of adjusting screw (924)	Flow control starting pressure change amount	Flow change amount
(min $^{-1}$)	(Turn)	(kgf/cm^2)	(ℓ /min)
1800	+1/4	+1.3	+30.2

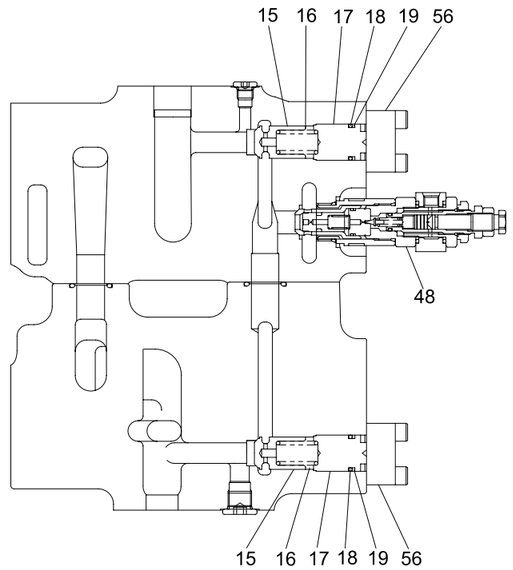

47 33 77 35 46 35 34 33 31
49
ARM 1
ARM 2
SECTION D-D
61 35 34 33 31


93 87 92 35 34 33 31
72
73
SERVICE
28
61
29
BUCKET
28
61
29
49
49
SECTION E-E
35 34 33 31


61 35 34 33 31 46 35 77 33 47
62
BOOM 2
BOOM 1
49
SECTION F-F
31 33 34 35 46 35 77 33 47


45 44 43 39
42
41
38
40
37
35
36
62
62
SWING
82
TRAVEL
49
SECTION G-G
52 53 54 55


PT
51
PP
SECTION J-J
35 34 33 32
TRAVEL
TRAVEL STRAIGHT
SECTION H-H
61


15 16 17 18 19 56
48
SECTION I-I
15 16 17 18 19 56

900L2MC03

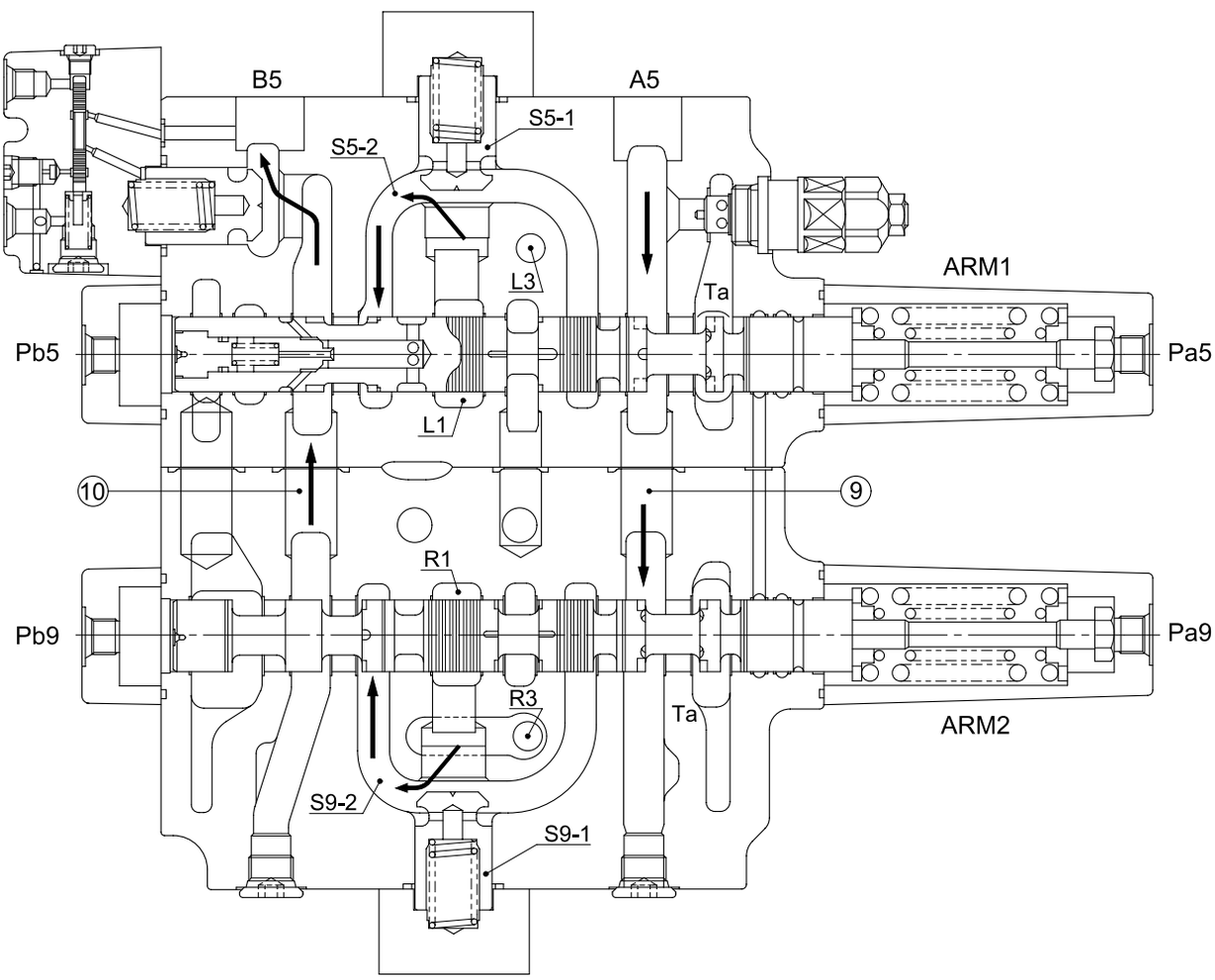
6) ARM SPOOL

(1) Arm out (flow summation)

When the arm 1 spool is pushed to the right by the pilot pressure of port Pb5, the oil discharged from pump P1 flows into the port B5 via neutral passage (L1), the load check valve (S5-1) and passage (S5-2).

When the arm 2 spool is pushed to the right by the pilot pressure of port Pb9, the oil discharged from pump P2 flows together the port B5 the passage (⑩) via the neutral passage (R1), the load check valve (S9-1) and passage (S9-2).

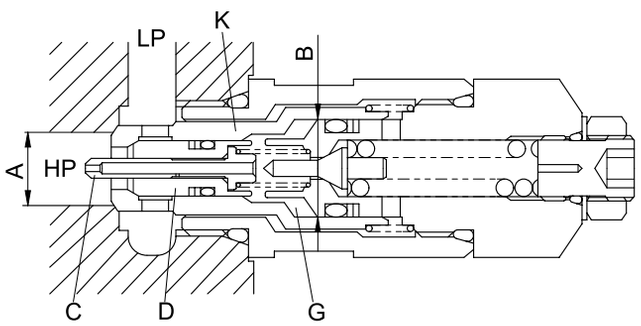
The return oil from port A5 flows into the tank via the tank passage (Ta).



45071MC10

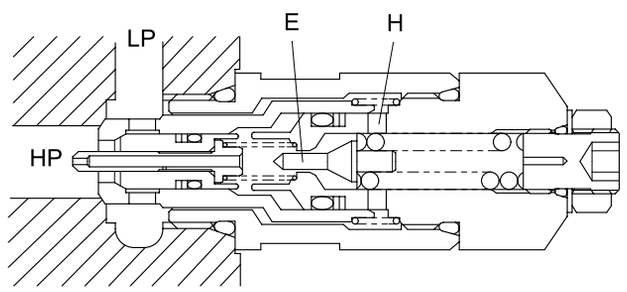
2) OVERLOAD RELIEF VALVE

(1) This relief valve is built-in the cylinder port (HP) and the low pressure (LP), and the pressure oil fills up camber (G) inside via hole of piston (C).
Thus the sleeve (K) and the main poppet (D) are securely seated by difference area of A and B.



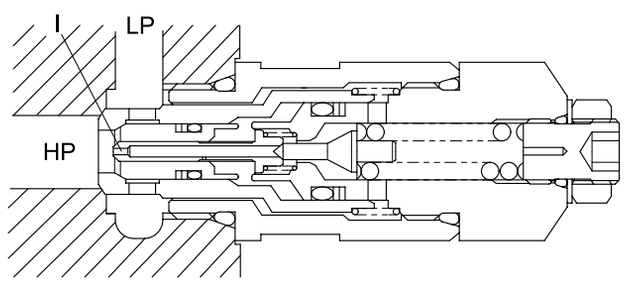
45071MC18

(2) When the pressure in cylinder port (HP) reaches the setting force of spring, the pilot poppet (E) is opened.
The oil flows around poppet and into the low pressure passage (LP) via hole (H).



45071MC18-1

(3) When above flow is formed, the pilot poppet (E) is opened.
The pressure drops before and behind orifice (I); piston (C) moves to right and the piston (C) is seated at the tip of poppet (E).



45071MC18-2

4) PARKING BRAKE

(1) PARKING BRAKE ON

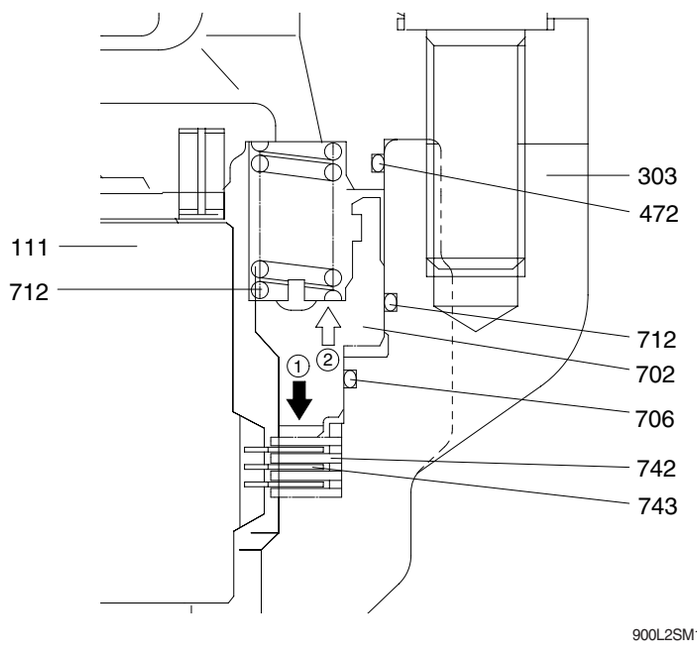
When the swing motor stops the parking brake is normally kept being fixed by mechanical force. When the brake release pressure is blocked, brake piston (702) is pushed by spring (712) force according to the arrow direction ①.

Consequently, friction plate (742) which is fixed to cylinder block (111) and separate plate (743) which is assembled to casing (303) are pressed. And then swing motor stops.

(2) PARKING BRAKE OFF

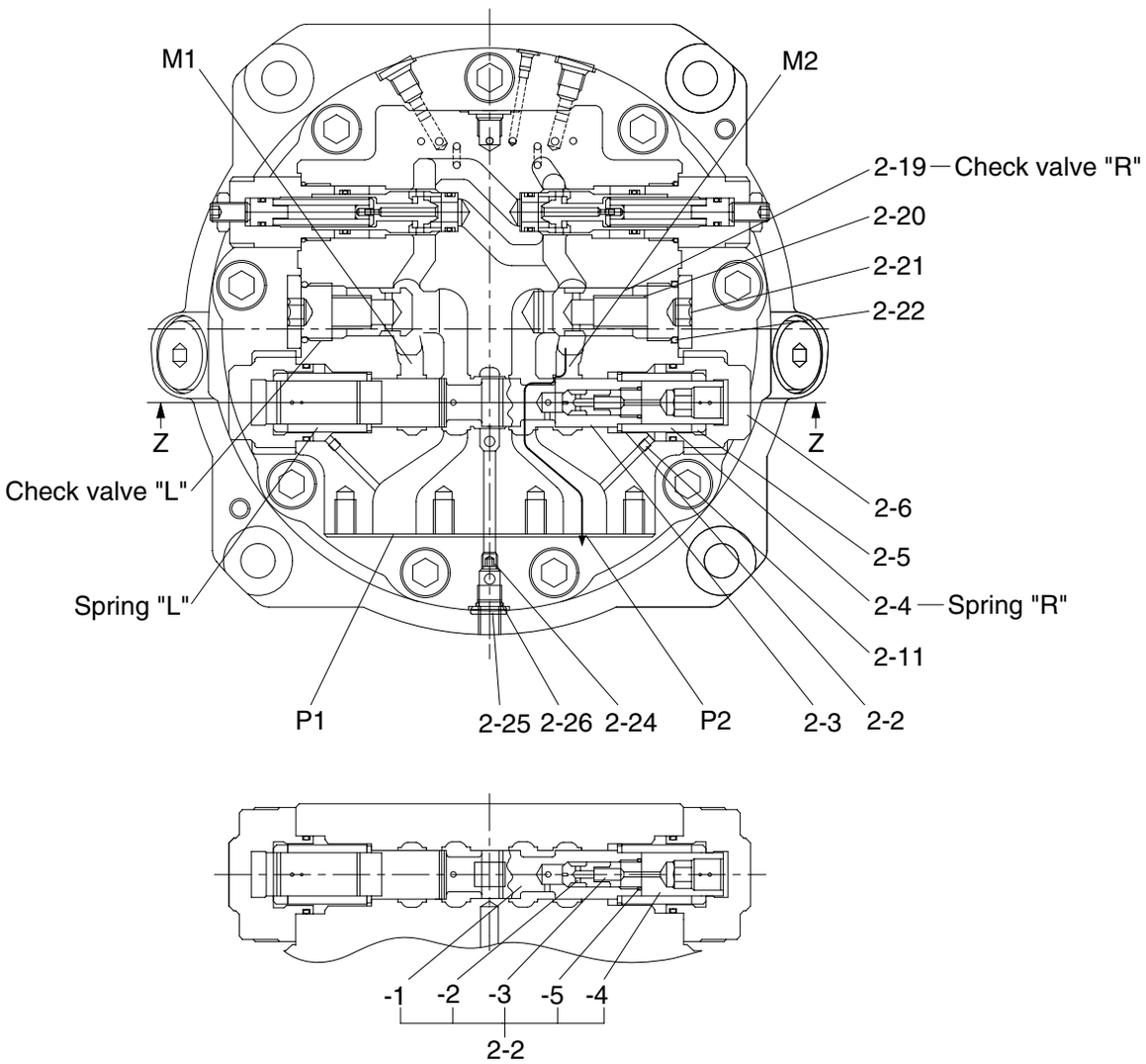
When the brake releases pressure-supply, the oil flows into room (G). Oil pressure is pressing the spring (712) force, and then brake piston (702) is pushed according to the arrow direction ②.

The pressure of friction plate (742) and separate plate (743) is released. Following this procedure the cylinder block (111) is rotating.



111 Cylinder block
303 Casing
472 O-ring
702 Brake piston
706 O-ring
707 O-ring
712 Spring
742 Friction plate
743 Separate plate

(2) BRAKE WORK



8007A2TM09

Then, when the control valve returns to the neutral position, the pressurized oil from the pump is shut off and the pressures of the ports P1 and P2 become equal. Spool assy (2-2) tries to be returned to neutral position by force of spring "R" (2-4).

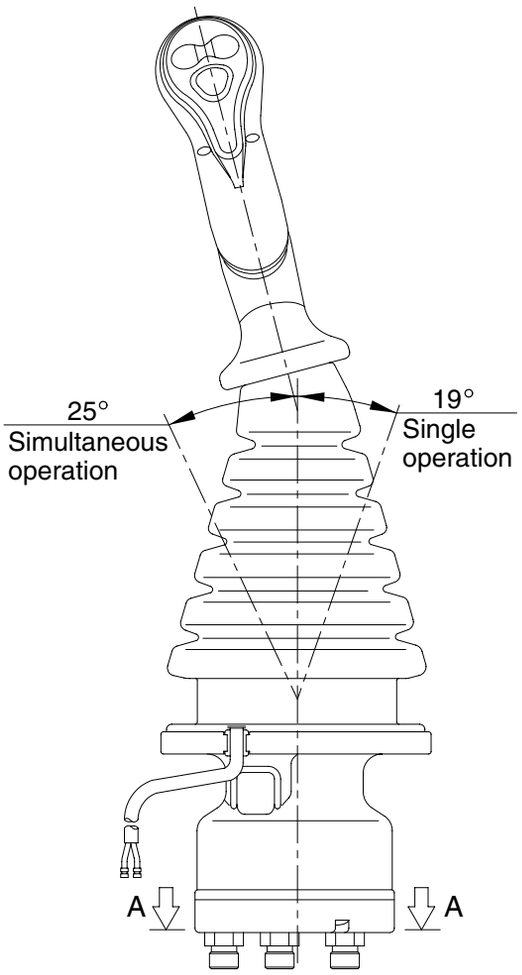
When spool assy (2-2) moves, the throttle opening of plunger becomes small.

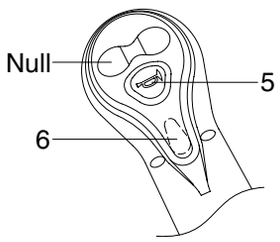
Piston motor tries to rotate with inertia energy (pumping action of motor) and the pressure rises on port M2.

With the movement of spool assy (2-2), the oil of spring "L" room flows out through orifices "L" (2-11) and controls the speed of spool assy (2-2).

By this movement, the shock pressure due to the inertia energy on the port M2 is absorbed, simultaneously preventing the cavitation on the port M1.

2) TYPE L2, L4, L9

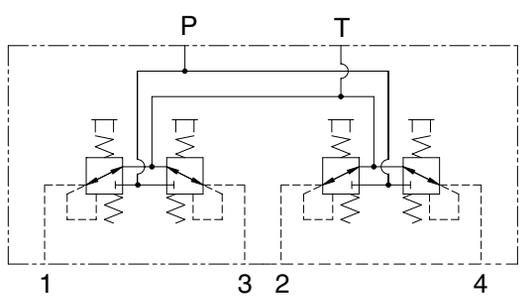




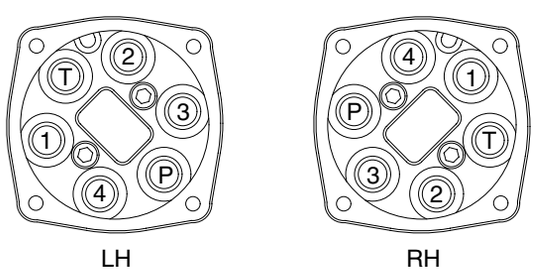
TYPE L2, L4, L9

Switches

Type	No.	LH	RH
L2, L4, L9	5	One touch decel	Horn
	6	Power boost	Breaker



Hydraulic circuit



LH RH

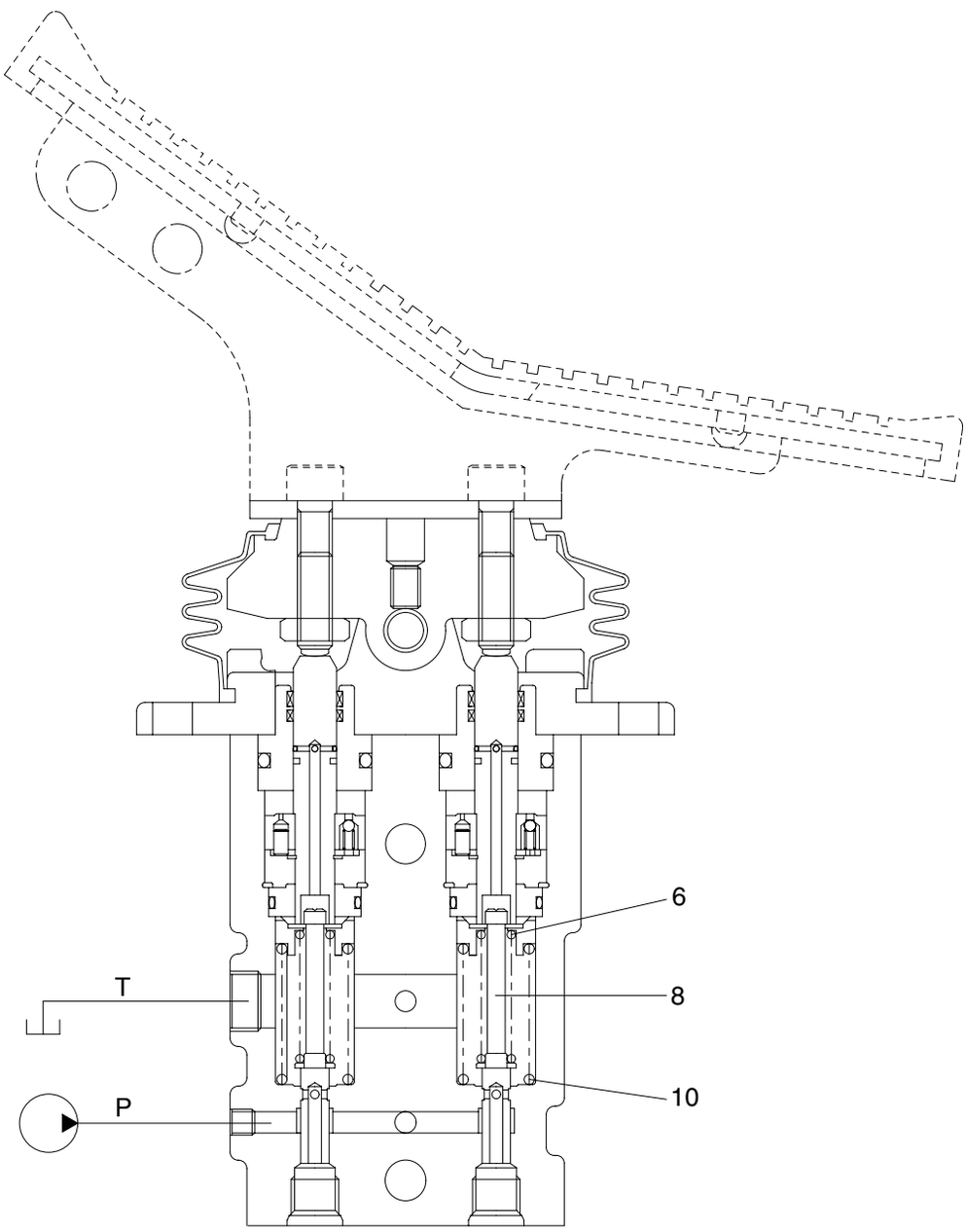
VIEW A-A

Pilot ports

Port	LH	RH	Port size
P	Pilot oil inlet port	Pilot oil inlet port	PF 3/8
T	Pilot oil return port	Pilot oil return port	
1	Left swing port	Bucket out port	
2	Arm out port	Boom up port	
3	Right swing port	Bucket in port	
4	Arm in port	Boom down port	

900L2RL105

(1) Case where pedal is in neutral position



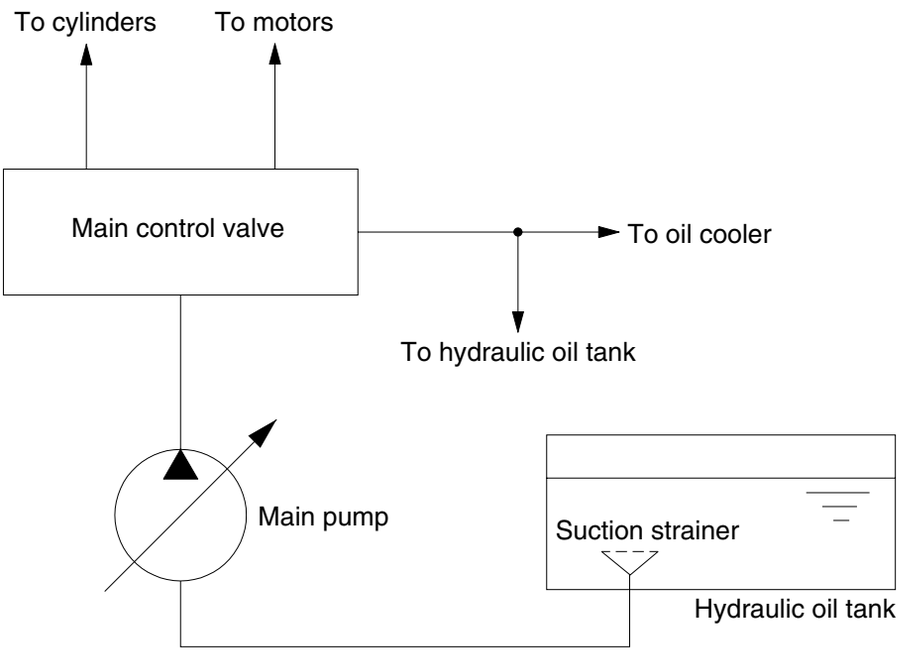
21092RP03

The force of the spring (6) that determines the output pressure of the pilot valve is not applied to the spool (8). Therefore, the spool is pushed up by the spring (10) to the position of port 2 in the operation explanation drawing. Then, since the output port is connected to tank port T only, the output port pressure becomes equal to tank pressure.

GROUP 2 MAIN CIRCUIT

The main hydraulic circuit consists of suction circuit, delivery circuit, return circuit and drain circuit.
The hydraulic system consists of one main pump, one main control valve, two swing motors, four cylinders and two travel motors.
The swash plate type variable displacement tandem axial piston pump is used as the main pump and is driven by the engine at ratio 1.0 of engine speed.

1. SUCTION AND DELIVERY CIRCUIT

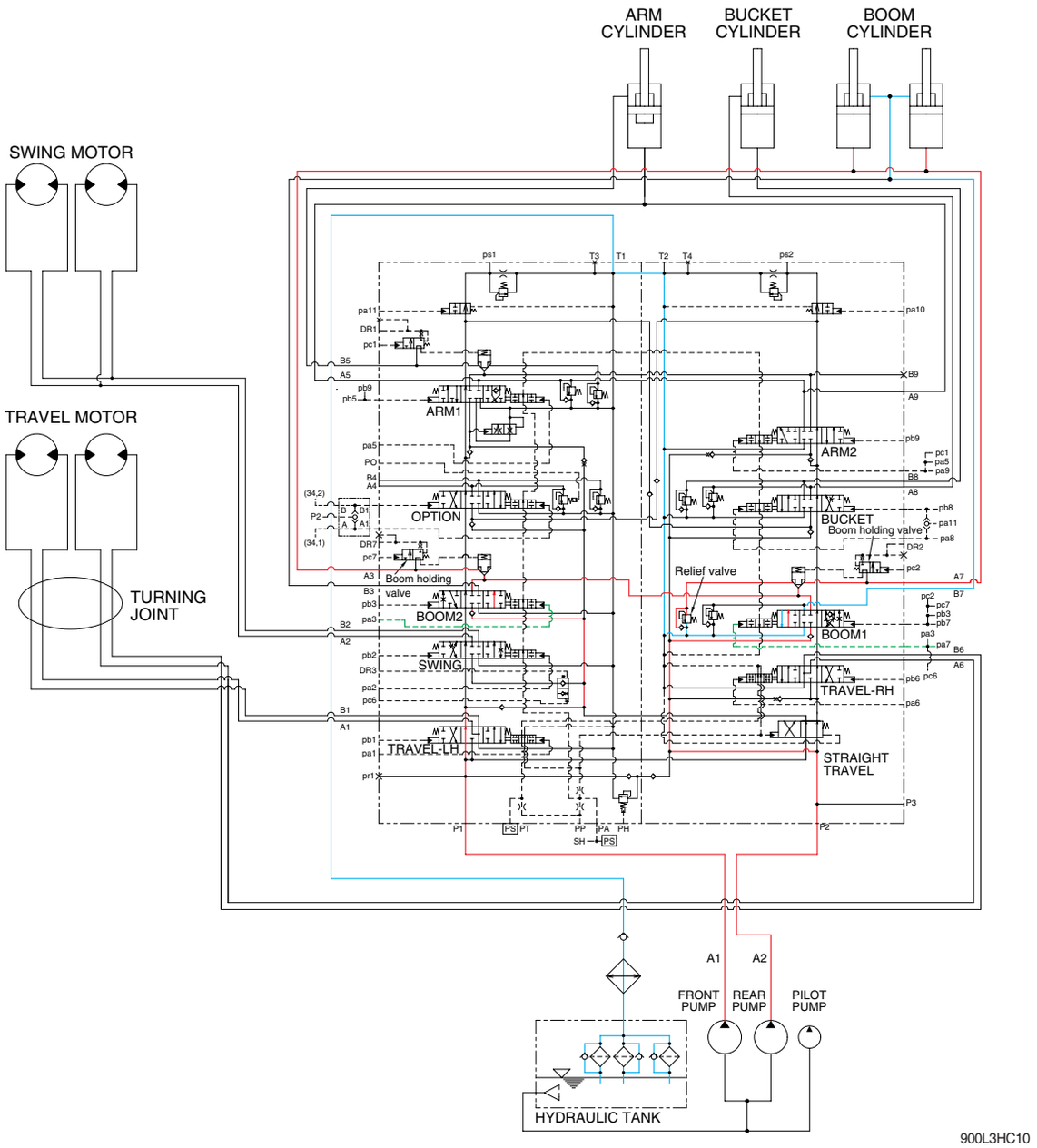


140L3CI01

The pumps receive oil from the hydraulic tank through a suction strainer. The discharged oil from the pump flows into the main control valve and goes out the tank ports.
The oil discharged from the main pump flows to the actuators through the main control valve.
The main control valve controls the hydraulic functions.
The return oil from the actuators flows to the hydraulic tank through the main control valve and the oil cooler.

GROUP 4 SINGLE OPERATION

1. BOOM UP OPERATION



When the RH control lever is pulled back, the boom 1 and boom 2 spools in the main control valve are moved to the up position by the pilot oil pressure from the remote control valve.

The oil from the A1 and A2 pump flows into the main control valve and then goes to the large chamber of boom cylinders.

At the same time, the oil from the small chamber of boom cylinders returns to the hydraulic oil tank through the boom 1 spool in the main control valve. When this happens, the boom goes up.

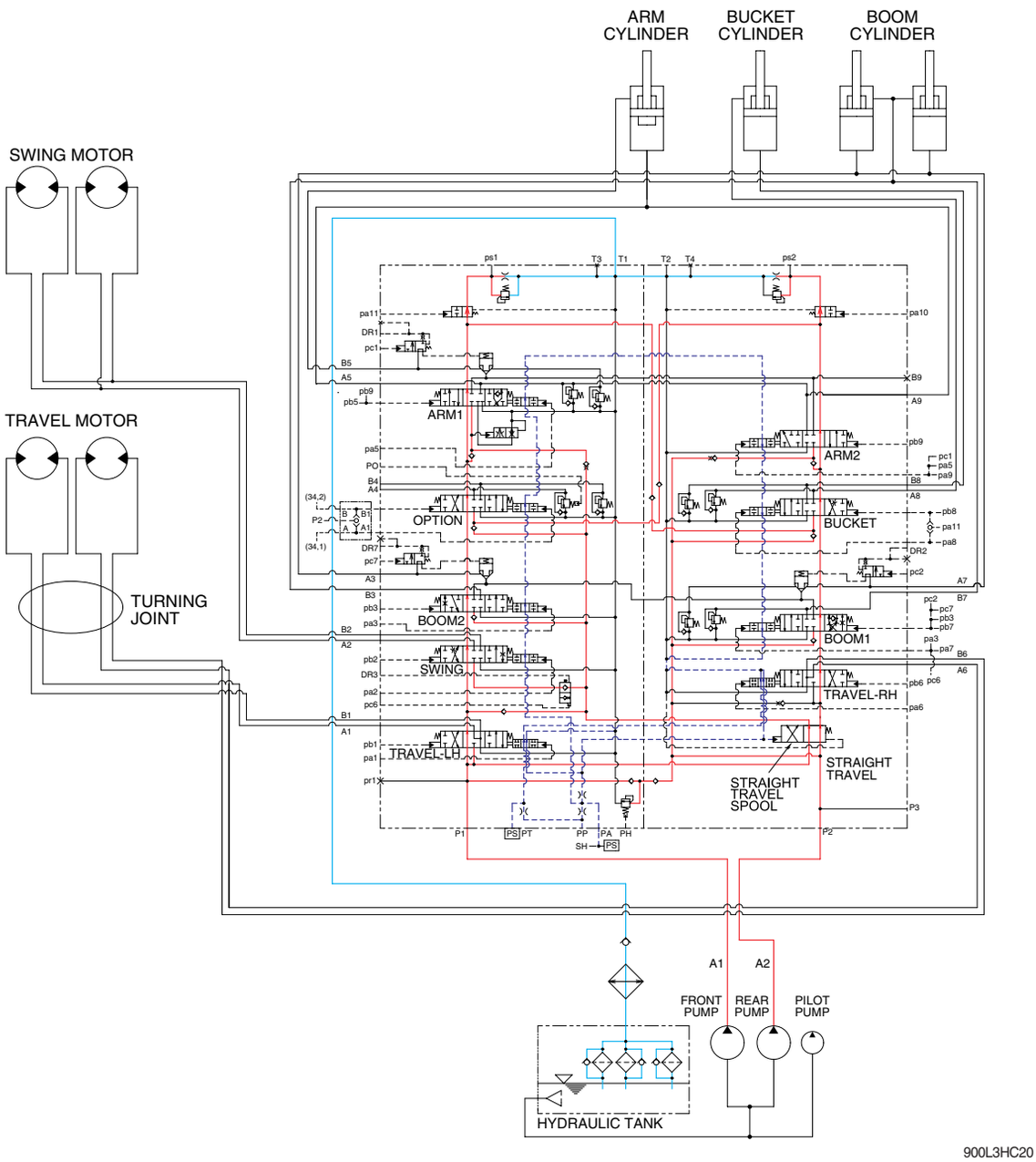
The excessive pressure in the boom cylinder bottom end circuit is prevented by relief valve.

When the boom is up and the control lever is returned to neutral position, the circuit for the holding pressure at the bottom end of the boom cylinder is closed by the boom holding valve.

This prevents the hydraulic drift of boom cylinder.

GROUP 5 COMBINED OPERATION

1. OUTLINE



The oil from the A1 and A2 pump flows through the neutral oil passage, bypass oil passage and confluence oil passage in the main control valve. Then the oil goes to each actuator and operates them. Check valves and orifices are located on these oil passage in the main control valve. These control the oil from the main pumps so as to correspond to the operation of each actuator and smooth the combined operation.

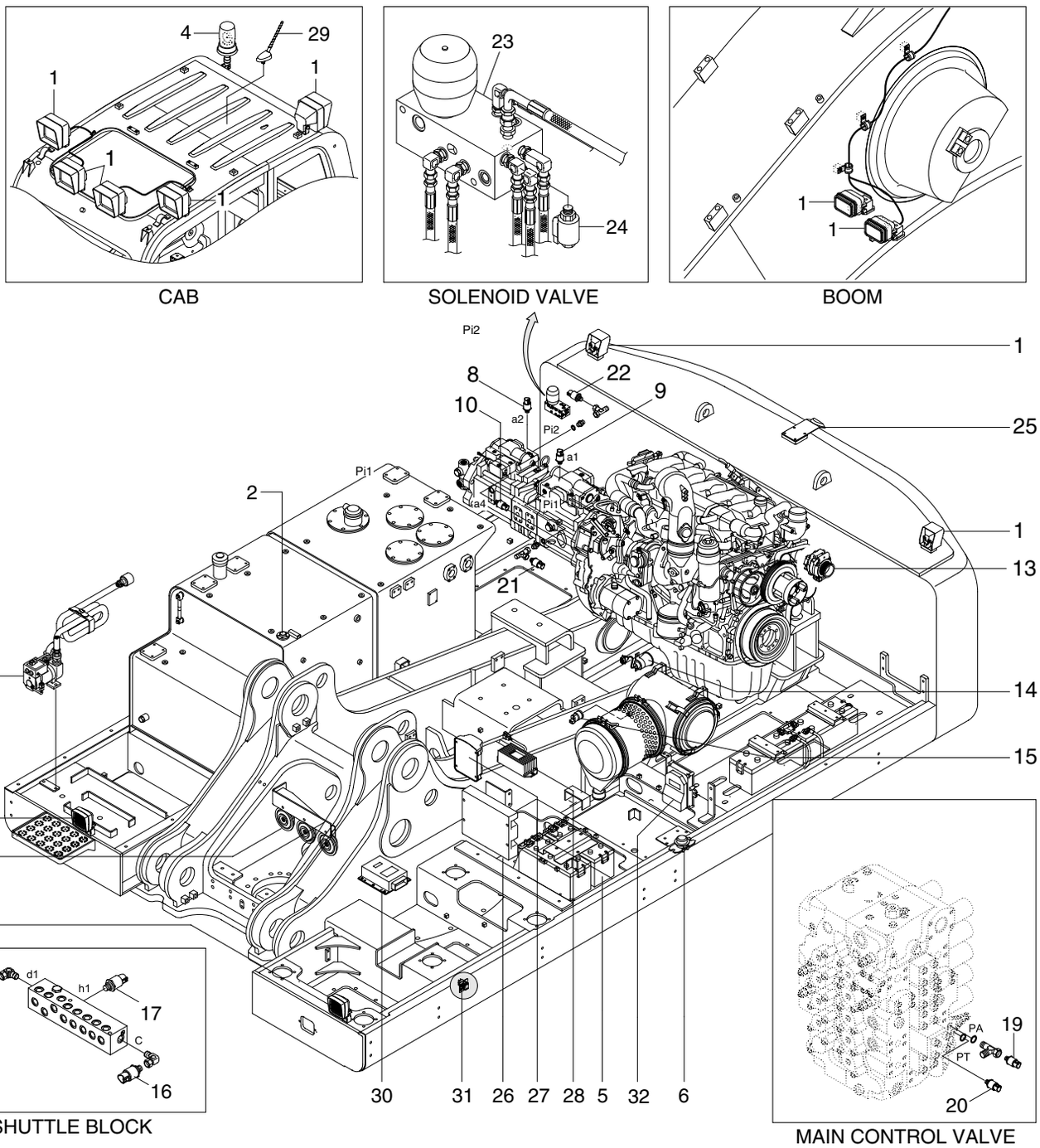
STRAIGHT TRAVEL SPOOL

This straight travel spool is provided in the main control valve.

If any actuator is operated when traveling, the straight travel spool is pushed to the right by the pilot oil pressure from the pilot pump.

Consequently, the left and right travel oil supply passage are connected, and equivalent amount of oil flows into the left and right travel motors. This keeps the straight travel.

2. LOCATION 2



1	Lamp	13	Alternator	23	Solenoid valve
2	Fuel sender	14	Travel alarm buzzer	24	Boom priority EPPR valve
3	Fuel filler pump	15	Air cleaner switch	25	Rear view camera
4	Beacon lamp	16	Swing pressure sensor	26	MCU
5	Battery	17	Boom down pressure sensor	27	RMCU
6	Battery relay	18	Arm out/Bucket in pressure sensor	28	Converter
7	Horn	19	Attach pressure sensor	29	Antenna
8	P1 pressure sensor	20	Travel pressure sensor	30	Attachment MCU
9	P2 pressure sensor	21	Nega control 1 pressure sensor	31	Engine emergency stop switch
10	EPPR sensor	22	Nega control 2 pressure sensor	32	Relay drive unit

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Battery relay [CR-1] → Circuit breaker [CN-60] → Master switch [CS-74A] → Fuse box [No.7] → Master switch [CS-74B] → I/conn [CN-5(36)] → Start switch [CS-2A(1)]

(1) When start key switch is in ON position

- Start switch ON [CS-2A (2)] → I/conn [CN-5 (39)]
  - Battery relay [CR-1] → Battery relay operating (all power is supplied with the electric component)
  - I/conn [CN-4 (4)] → Emergency engine stop sw [CS-33 (2)→(1)] → I/conn [CN-4 (13)] → Fuse box [No. 11] → Engine EMS interface [CS-16 (3)]
- Start switch ON [CS-2A (3)] → RMS conn [CN-125 (2)→(4)]
  - I/conn [CN-5 (40)] → Power relay [CR-35 (86)→(87)] → Fuse box [No.12] → MCU [CN-51 (2)]
  - I/conn [CN-427 (1)]
  - I/conn [CN-125A (2)]

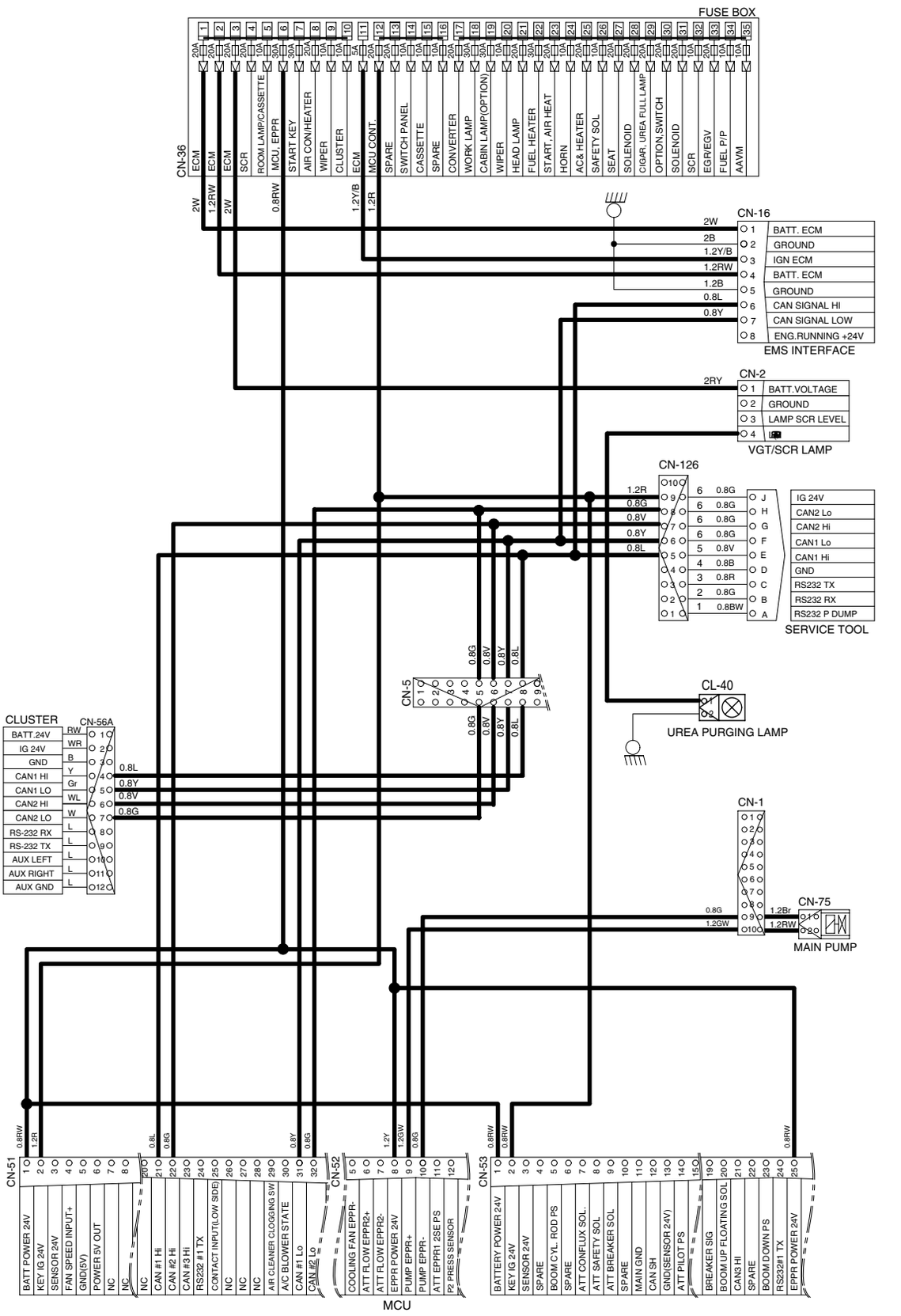
(2) When start key switch is in START position

Start switch START [CS-2A (6)] → I/conn [CN-5 (35)] → Coutact input relay [CR-5 (1)→(3)] → MCU [CN-51 (25)] → ECM control → Start relay [CR-23(1)] → Starter operating

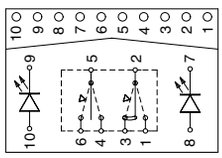
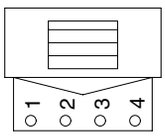
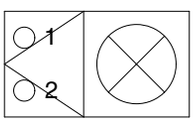
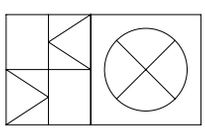
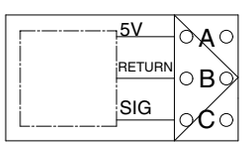
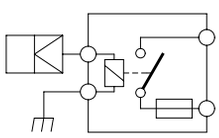
2) CHECK POINT

Engine	Start switch	Check point	Voltage
OPERATING	START	① - GND (battery) ② - GND (start key) ③ - GND (battery relay M4) ④ - GND (starter B^+) ⑤ - GND (starter M) ⑥ - GND (start relay) ⑦ - GND (battery relay M8)	20~25V

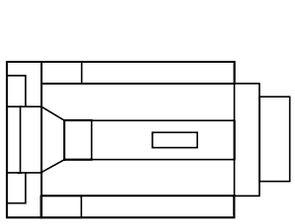
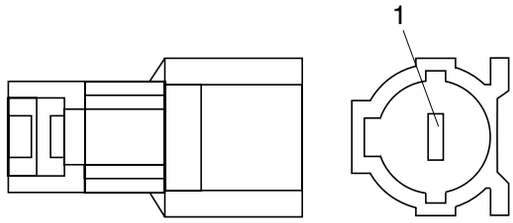
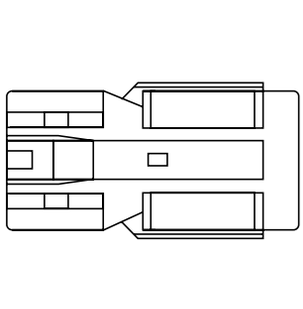
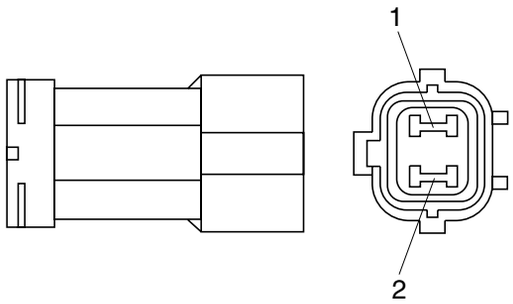
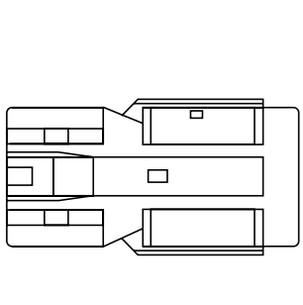
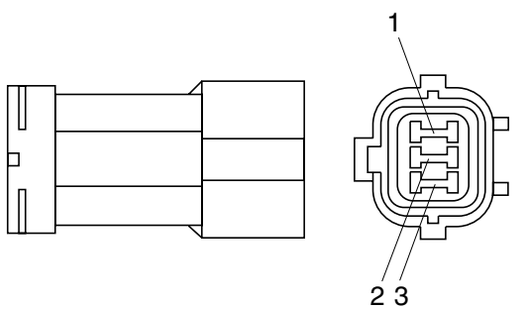
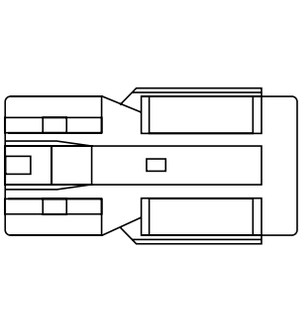
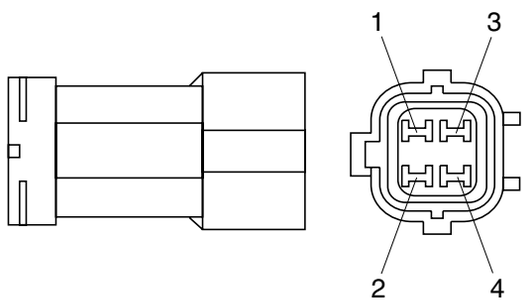
CONTROLLER CIRCUIT



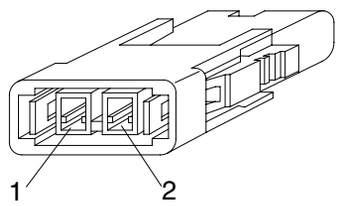
900L4EL12

Part name	Symbol	Specifications	Check
Switch	 CS-79	24V 8A	※ Check contact Normal OFF : ∞Ω(for terminal 2-1, 5-4, 5-6)
Fuel heater	 CN-147	-	
DEF/AdBlue® fill up warning lamp (LED)	 CL-40	-	
DEF/AdBlue® full warning lamp (LED)	 CL-41	-	
Proportional valve sensor	 CN-246 CN-247	-	
Glow plug relay	 CR-24	24V 200A	※ Check disconnection Normal : 0.942A (for terminal - GND)

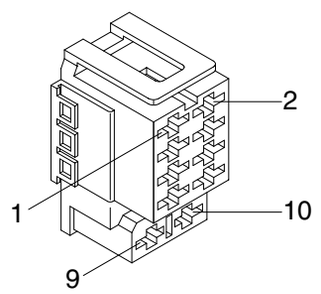
3) SWP TYPE CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 S814-001000	 S814-101000
2	 S814-002000	 S814-102000
3	 S814-003000	 S814-103000
4	 S814-004000	 S814-104000

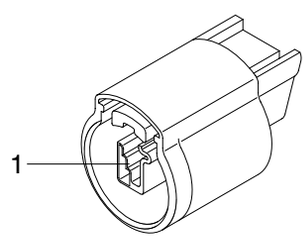
15) MOLEX 2CKTS CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 35215-0200	

16) ITT SWF CONNECTOR

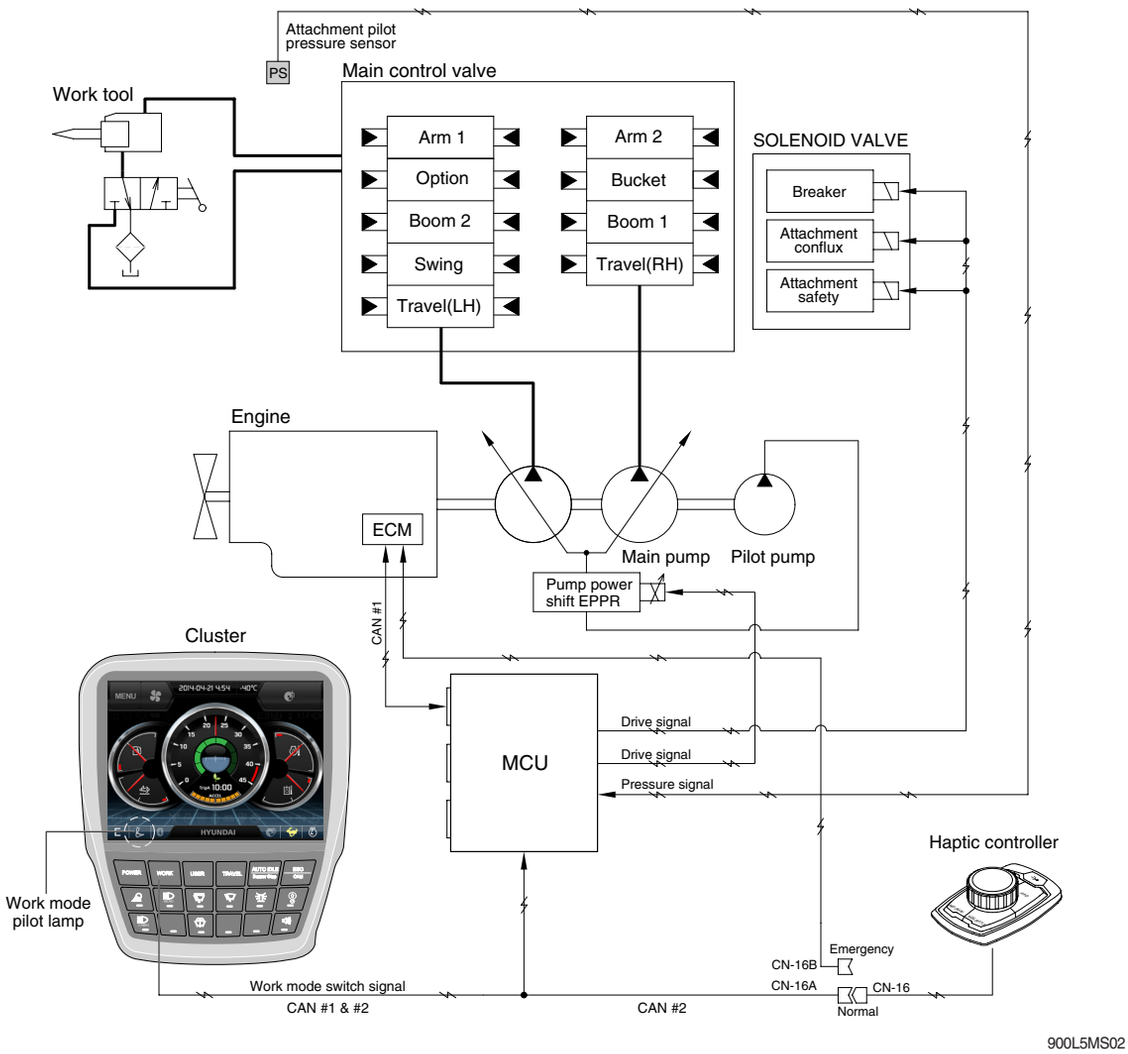
No. of pin	Receptacle connector (female)	Plug connector (male)
10	 SWF593757	

17) MWP NMWP CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 NMWP01F-B	

2. WORK MODE SELECTION SYSTEM

Work mode consists of the general operation (bucket) and the optional attachment (breaker, crusher).



1) GENERAL WORK MODE (bucket)

This mode is used to general digging work.

2) ATT WORK MODE (breaker, crusher)

It controls the pump flow and system pressure according to the operation of breaker or crusher.

Description	General mode	Work tool	
	Bucket	Breaker	Crusher
Attachment safety solenoid	OFF	-	ON
Attachment conflux solenoid	OFF	ON/OFF	ON/OFF
Attachment flow EPPR current	100 mA	100~700 mA	100~700 mA
Breaker solenoid★	OFF	ON	-

★ When breaker operating button is pushed.

GROUP 11 SELF-DIAGNOSTIC SYSTEM

1. OUTLINE

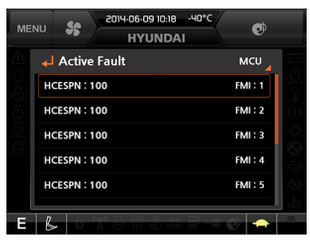
When any abnormality occurs in the ADVANCED CAPO system caused by electric parts malfunction and by open or short circuit, the MCU diagnoses the problem and sends the error codes to the cluster and also stores them in the memory.

2. MONITORING

1) Active fault

290F3CD120

290F3CD121



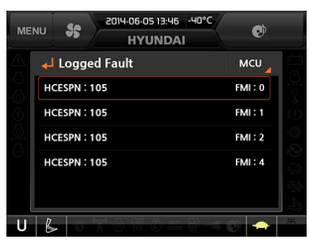
290F3CD125

· The active faults of the MCU, engine ECM or air conditioner can be checked by this menu.

2) Logged fault

290F3CD128

290F3CD123



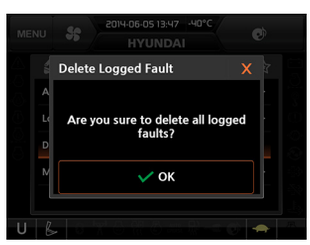
290F3CD124

· The logged faults of the MCU, engine ECM or air conditioner can be checked by this menu.

3) Delete logged fault

290F3CD134

290F3CD126



290F3CD127

· The logged faults of the MCU, engine ECM or air conditioner can be deleted by this menu.

DTC		Diagnostic Criteria	Application		
HCESPN	FMI		G	C	W
169	4	Monitor – Selecting attachment(breaker / crusher) (Detection) (When Attachment Conflux Solenoid is Off) 10 seconds continuous, Attachment Conflux Solenoid drive unit Measurement Voltage ≤ 3.0V (Cancellation) (When Attachment Conflux Solenoid is Off) 3 seconds continuous, Attachment Conflux Solenoid drive unit Measurement Voltage > 3.0V	●		
	6	(Detection) (When Attachment Conflux Solenoid is On) 10 seconds continuous, Attachment Conflux Solenoid drive Current > 6.5 A (Cancellation) (When Attachment Conflux Solenoid is On) 3 seconds continuous, Attachment Conflux Solenoid drive Current ≤ 6.5 A	●		
	(Results / symptoms) 1. Control Function – Option attachment flow control – Joining operation failure (Eco breaker mode, crusher mode) (Checking list) 1. CN-237 (#1) – CN-53 (#7) Checking Open/Short 2. CN-237 (#2) – Fuse box (#31) Checking Open/Short				
170	4	(Model Parameter) mounting Arm Regenerating Solenoid (Detection) (When Arm Regeneration Solenoid is Off) 10 seconds continuous, Arm Regeneration Solenoid drive unit Measurement Voltage ≤ 3.0V (Cancellation) (When Arm Regeneration Solenoid is Off) 3 seconds continuous, Arm Regeneration Solenoid drive unit Measurement Voltage > 3.0V	●		
	6	(Detection) (When Arm Regeneration Solenoid is On) 10 seconds continuous, Arm Regeneration Solenoid drive current > 4.5 A (Cancellation) (When Arm Regeneration Solenoid is On) 3 seconds continuous, Arm Regeneration Solenoid drive current ≤ 4.5 A	●		
	(Results / symptoms) 1. Control Function – Arm regeneration operation failure (Checking list) 1. CN-135 (#1) – CN-52 (#07) Checking Open/Short 2. CN-135 (#2) – Fuse box (#28) Checking Open/Short				

※ Some error codes are not applied to this machine.

G : General C : Crawler Type W : Wheel Type

DTC		Diagnostic Criteria	Application		
HCESPN	FMI		G	C	W
530	0	10 seconds continuous, Travel Forward Press. Sensor Measurement Voltage > 5.2V			●
	1	10 seconds continuous, 0.3V≤ Travel Forward Press. Sensor Measurement Voltage < 0.8V			●
	4	10 seconds continuous, Travel Forward Press. Sensor Measurement Voltage < 0.3V			●
	(Results / Symptoms) 1. Monitor – Travel Forward Press. display failure 2. Control Function – Driving interoperability power control operation failure (Checking list) 1. CD-73 (#B) – CN-54 (#6) Checking Open/Short 2. CD-73 (#A) – CN-54 (#3) Checking Open/Short 3. CD-73 (#C) – CN-54 (#13) Checking Open/Short				
531	1	10 seconds continuous, 0.3V≤ Travel Reverse Press. Sensor Measurement Voltage < 0.8V			●
	4	10 seconds continuous, Travel Reverse Press. Sensor Measurement Voltage < 0.3V			●
	(Results / Symptoms) 1. Monitor – Travel Reverse Press. display failure 2. Control Function – Driving interoperability power control operation failure (Checking list) 1. CD-74 (#B) – CN-54 (#23) Checking Open/Short 2. CD-74 (#A) – CN-54 (#3) Checking Open/Short 3. CD-74 (#C) – CN-54 (#13) Checking Open/Short				
705	0	10 seconds continuous, Battery input Voltage > 35V	●		
	1	10 seconds continuous, Battery input Voltage < 18V	●		
	(Results / Symptoms) 1. Control Function – Startup impossibility (Checking list) 1. CS-74A (#1) – CN-51 (#1) Checking Open/Short				
707	1	(When Engine is equal or more than 400 rpm) 10 seconds continuous, Alternator Node I Measurement Voltage < 18V (In case 12v goods, Alternator Node I Measurement Voltage < 9V)	●		
	(Results / Symptoms) 1. Control Function – Battery charging circuit failure (Checking list) 1. CS-74A (#1) – CN-51 (#2) Checking Open/Short				

※ Some error codes are not applied to this machine.

G : General C : Crawler Type W : Wheel Type

Fault code J1939 SPN J1939 FMI	Name	Description
1187 132 3	Engine intake air mass flow rate	Mass flow sensor, supply
1189 132 4	Engine intake air mass flow rate	Mass flow sensor, adaptation under low threshold
1188 132 5	Engine intake air mass flow rate	Mass flow sensor, adaptation over high threshold
0100 132 7	Engine intake air mass flow rate	Mass flow sensor, stuck
0088 156 0	Engine injector timing rail pressure	Fuel rail pressure is excessively above command
0087 156 1	Engine injector timing rail pressure	Fuel rail pressure is excessively below command
0191 156 2	Engine injector timing rail pressure	Fuel rail pressure sensor, faulty
0193 156 3	Engine injector timing rail pressure	Fuel rail pressure sensor, short circuit to +24V or open load
0192 156 4	Engine injector timing rail pressure	Fuel rail pressure sensor, short circuit to ground
0190 156 8	Engine injector timing rail pressure	Fuel rail pressure sensor, stuck
1090 156 9	Engine injector timing rail pressure	Fuel rail pressure is lagging
1087 156 18	Engine injector timing rail pressure	Fuel rail pressure is too low during cranking
1060 167 2	Charging system potential	Alternator actuator, faulty
1063 167 3	Charging system potential	Alternator actuator, short circuit to +24V
1062 167 4	Charging system potential	Alternator actuator, short circuit to ground
1061 167 5	Charging system potential	Alternator actuator, open load

※ Some fault codes are not applied to this machine.

Fault code J1939 SPN J1939 FMI	Name	Description
11DD 656 18	Engine injector cylinder 6	Cylinder 6 injector fault, low torque
0278 656 20	Engine injector cylinder 6	Cylinder 6 balancing min or max
11A7 657 1	Engine injector cylinder 7	Two or more injectors with the same trim code, injector cyl. 7
117E 657 2	Engine injector cylinder 7	Injector trim code, checksum error injector cyl. 7
0207 657 5	Engine injector cylinder 7	Injector cyl. 7 cable/injector open load
1174 657 6	Engine injector cylinder 7	Injector cyl. 7 cable/injector short circuit
1156 657 7	Engine injector cylinder 7	Injection error, physical cylinder 7
1195 657 8	Engine injector cylinder 7	Injector cyl. 7, over or under fueling
119F 657 13	Engine injector cylinder 7	Injector trim code version error, injector cyl. 7
11E6 657 15	Engine injector cylinder 7	Cylinder 7 torque error
11D6 657 16	Engine injector cylinder 7	Cylinder 7 injector fault, high torque
11DE 657 18	Engine injector cylinder 7	Cylinder 7 injector fault, low torque
0281 657 20	Engine injector cylinder 7	Cylinder 7 balancing min or max
11A8 658 1	Engine injector cylinder 8	Two or more injectors with the same trim code, injector cyl. 8
117F 658 2	Engine injector cylinder 8	Injector trim code, checksum error injector cyl. 8
0208 658 5	Engine injector cylinder 8	Injector cyl. 8 cable/injector open load

※ Some fault codes are not applied to this machine.

Fault code J1939 SPN J1939 FMI	Name	Description
042C 3246 3	After treatment - DPF outlet gas temp.	Exhaust temperature sensor after SCR catalytic converter, short circuit
042D 3246 4	After treatment - DPF outlet gas temp.	Exhaust temperature sensor after SCR catalytic converter, open circuit
242B 3246 9	After treatment - DPF outlet gas temp.	Downstream exhaust temperature sensor, not plausible
200D 3246 15	After treatment - DPF outlet gas temp.	Downstream DPF temperature too high during normal condition
200C 3246 16	After treatment - DPF outlet gas temp.	Downstream DPF temperature too high during regeneration
16E3 3251 2	After treatment - DPF differential pressure	Particulate filter is missing
16D6 3251 7	After treatment - DPF differential pressure	Differential pressure sensor over particulate filter, faulty
16E4 3251 7	After treatment - DPF differential pressure	Particulate filter is damaged or cracked
12D2 3251 8	After treatment - DPF differential pressure	Differential pressure sensor not plausible
16D5 3251 9	After treatment - DPF differential pressure	Differential pressure sensor over particulate filter, not plausible
16ED 3340 1	Engine CAC intake pressure	Intercooler temperature, too low
1111 3340 3	Engine CAC intake pressure	Intercooler pressure sensor, short circuit to ground
1112 3340 4	Engine CAC intake pressure	Intercooler pressure sensor, short circuit to +24V
1079 3340 7	Engine CAC intake pressure	Intercooler pressure sensor, stuck
107E 3340 9	Engine CAC intake pressure	Intercooler pressure sensor, not plausible
107F 3340 10	Engine CAC intake pressure	Intercooler pressure sensor, not plausible

※ Some fault codes are not applied to this machine.

5. AAVM FAULT CODE

Fault Code	Description
A01	AAVM Communication Error -AAVM
A02	AAVM Communication Error -Front Camera
A03	AAVM Communication Error -Rear Camera
A04	AAVM Communication Error -Left Camera
A05	AAVM Communication Error -Right Camera
A06	Manual Setting Fail
A07	No MCU CID
A08	MCU CID Format Error
A09	AAVM Hardware Error -AAVM
A10	AAVM Hardware Error -Front Camera
A11	AAVM Hardware Error -Rear Camera
A12	AAVM Hardware Error -Left Camera
A13	AAVM Hardware Error -Right Camera
A14	MCU CID Model is not registered
A15	MCU CID Model can’t be applied

2) GAUGE

(1) Operation screen

When you first turn starting switch ON, the operation screen will appear.

Default

Option

290F3CD51

1	RPM / Speed gauge	5	DEF/AdBlue® level gauge
2	Engine coolant temperature gauge	6	Tripmeter display
3	Hydraulic oil temperature gauge	7	Eco guage
4	Fuel level gauge	8	Accel dial gauge

※ Operation screen type can be set by the screen type menu of the display.
Refer to page 5-108 for details.

(2) RPM / Speed gauge

290F3CD49

① This display the engine speed.

(3) Engine coolant temperature gauge

290F3CD53

① This gauge indicates the temperature of coolant.
- White range : 40-107˚C (104-225˚F)
- Red range : Above 107˚C (225˚F)

② If the indicator is in the red range or lamp pops up and the buzzer sounds turn OFF the engine and check the engine cooling system.

※ If the gauge indicates the red range or lamp blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

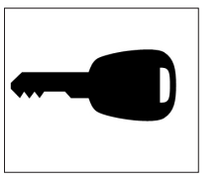
(7) Entertainment pilot lamp

290F3CD84

① This lamp is on when audio or video files are playing.

※ **Refer to the page 5-109.**

(8) Smart key pilot lamp (opt)



290F3CD214

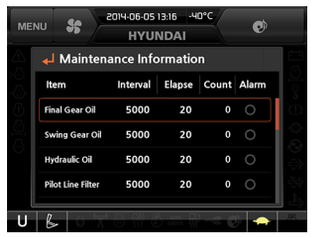
① This lamp is ON when the engine is started by the start button.

② This lamp is red when the a authentication fails, green when succeeds.

※ **Refer to the page 5-104.**

② Maintenance information

210WF3CD131



290F3CD132

290F3CD133

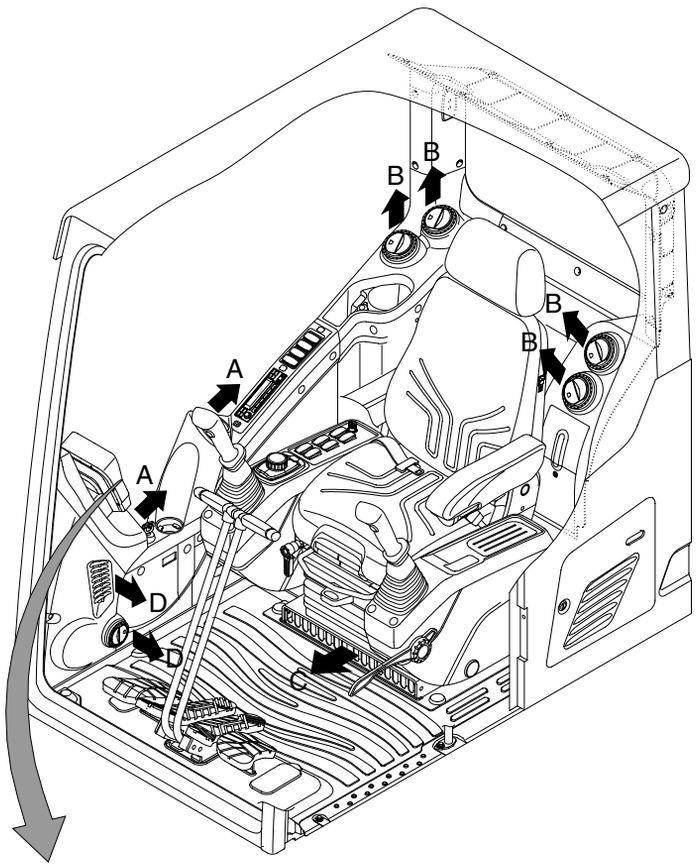
- Alarm lamp (●) is ON when oil or filter needs to be changed or replaced.
- Replacement : The elapsed time will be reset to zero (0).
- Change interval : The change or replace interval can be changed in the unit of 50 hours.
- **Change or relpace interval**

No	Item	Interval
1	Engine oil	500
2	Final gear oil	1000
3	Swing gear oil	1000
4	Hydraulic oil	5000
5	Pilot line filter	1000
6	Drain filter	1000
7	Hydraulic oil return filter	1000
8	Engine oil filter	500
9	Fuel filter	1000
10	Fuel tank breather filter	4000
11	Pre-filter	1000
12	Hydraulic tank breather	1000
13	Air cleaner (inner & outer)	4000
14	Radiator coolant	2000
15	Swing gear pinion grease	1000
16	DEF/AdBlue® supply module filter	1000

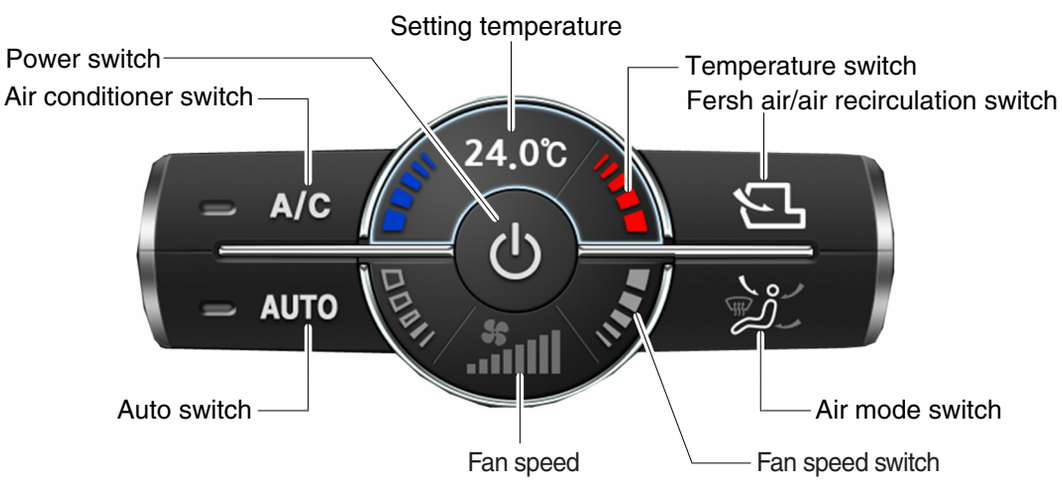
7) AIR CONDITIONER AND HEATER

Full auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.

· **Location of air flow ducts**



Cluster LCD

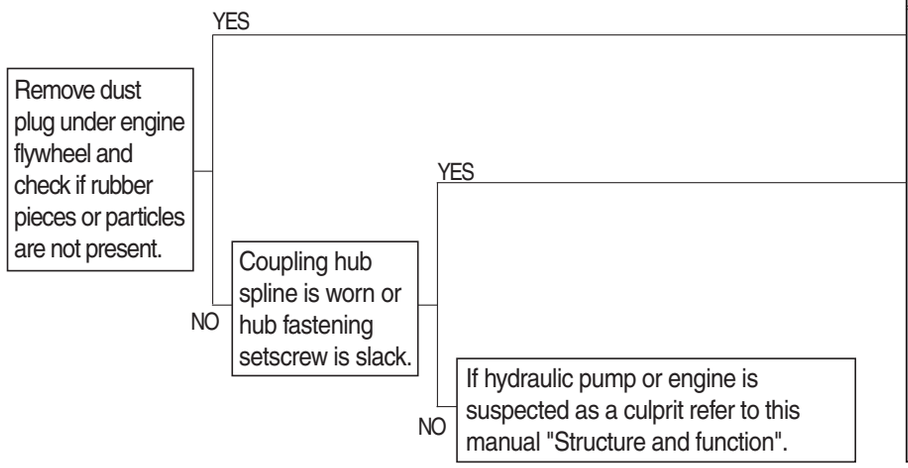


290F3CD201

※ **Haptic controller : Refer to operator's manual page 3-57.**

2. DRIVE SYSTEM

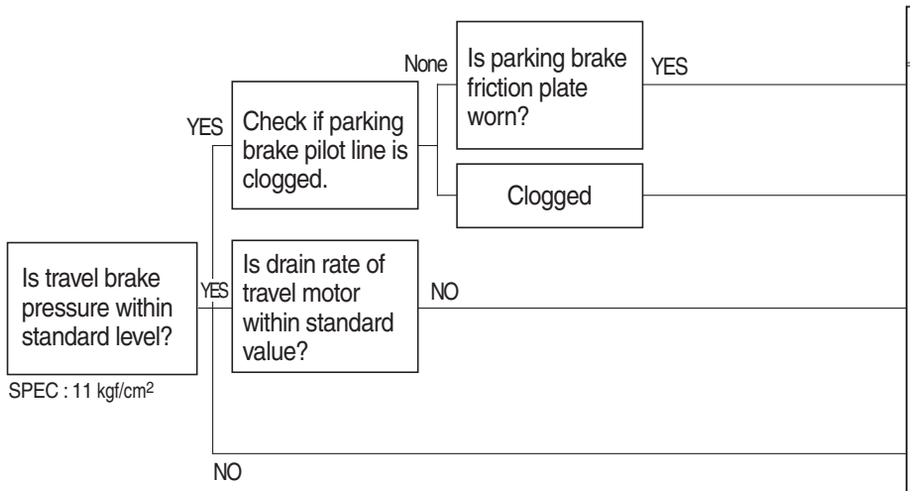
1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



Cause	Remedy
Coupling element is broken.	Disassemble and repair.
	Replace hub or retighten setscrew.

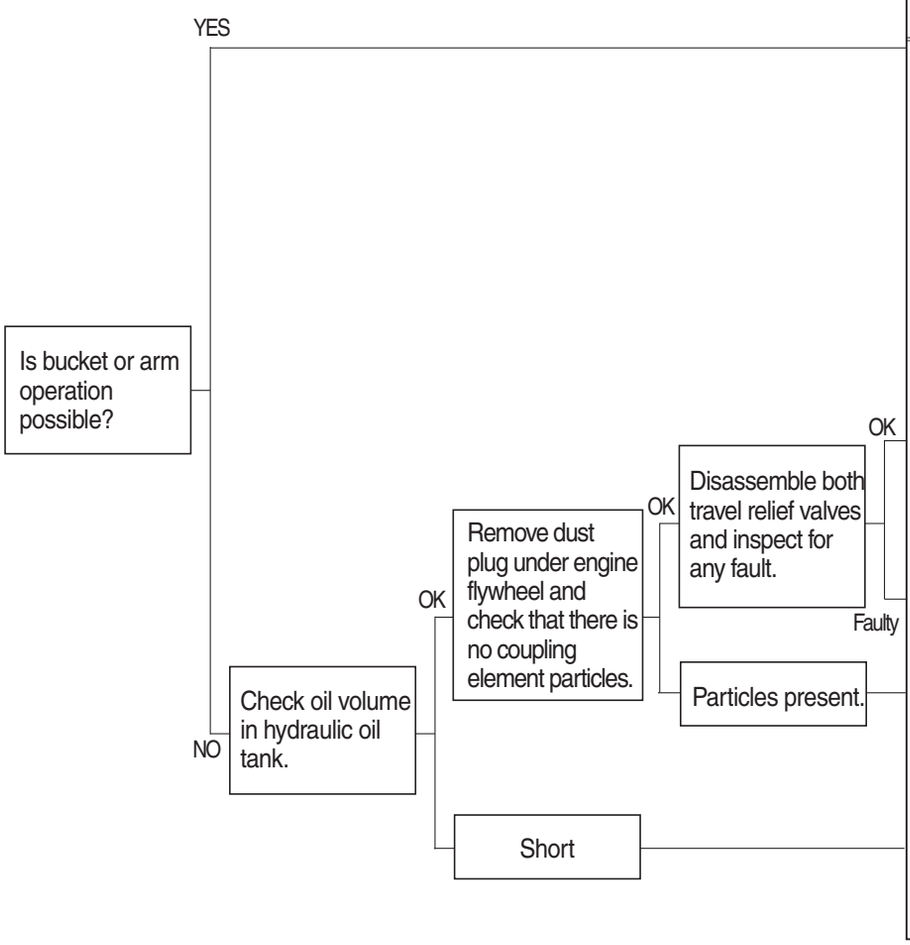
3) MACHINE DOES NOT STOP ON A SLOPE

Machine is pulled forward as sprocket rotates during digging operation.



Cause	Remedy
Friction plate is faulty.	Disassemble and repair.
Clogged	Disassemble and clean pilot piping.
Travel motor is defective.	Disassemble and repair.
Brake valve is faulty.	Disassemble and repair or replace.

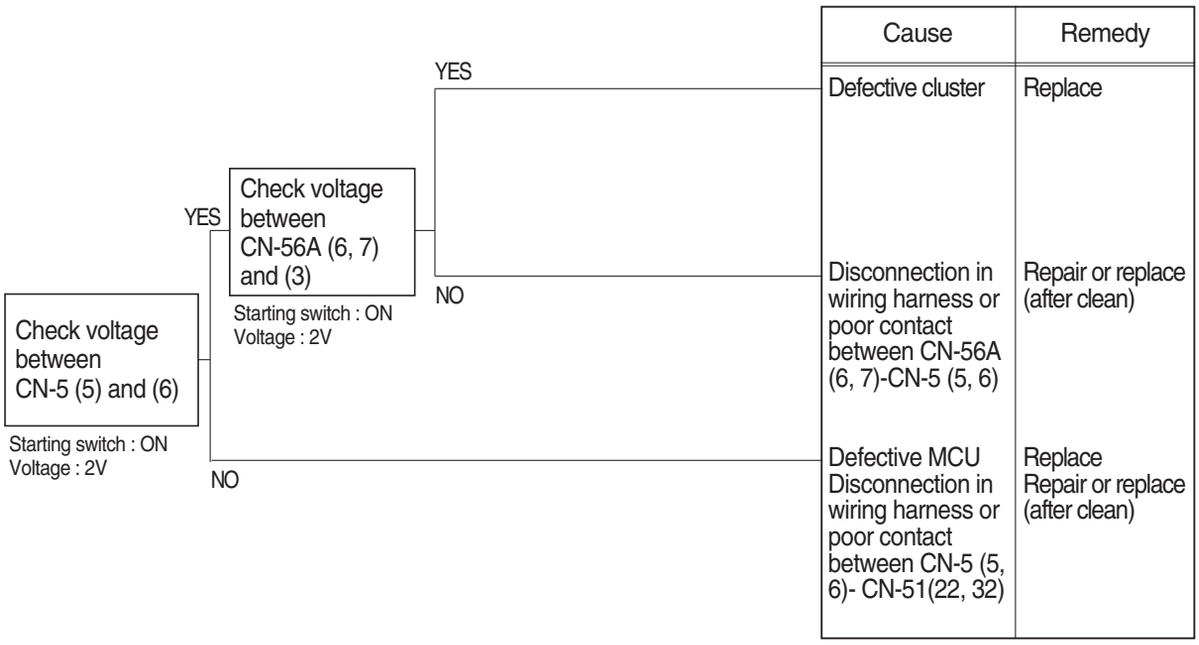
4) LH AND RH TRAVEL MOTIONS ARE IMPOSSIBLE



Cause	Remedy
	Inspect according to the procedure "Travel does not function at all on one side." However, a case where both LH and RH travel motions are disabled is extremely seldom statistically.
Hydraulic pump is faulty.	Disassemble and repair.
Travel relief valve is faulty.	Disassemble and repair or replace.
Coupling at pump connection is broken.	Disassemble and repair.
	Replenish hydraulic oil.

2. ⚠ COMMUNICATION ERROR FLASHES ON THE CLUSTER (HCESPN 840, FMI 2)

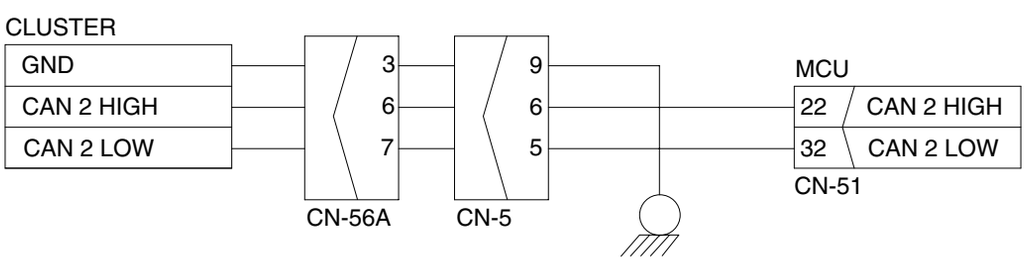
· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



Cause	Remedy
Defective cluster	Replace
Disconnection in wiring harness or poor contact between CN-56A (6, 7)-CN-5 (5, 6)	Repair or replace (after clean)
Defective MCU Disconnection in wiring harness or poor contact between CN-5 (5, 6)- CN-51(22, 32)	Replace Repair or replace (after clean)

Check voltage

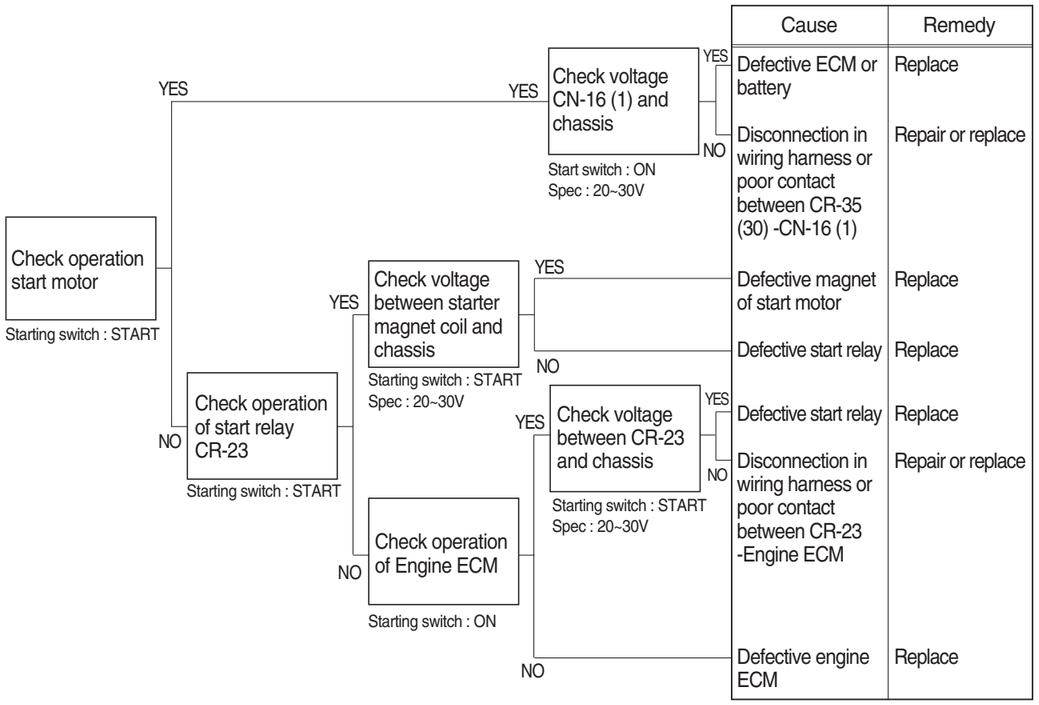
YES	2V
NO	0V

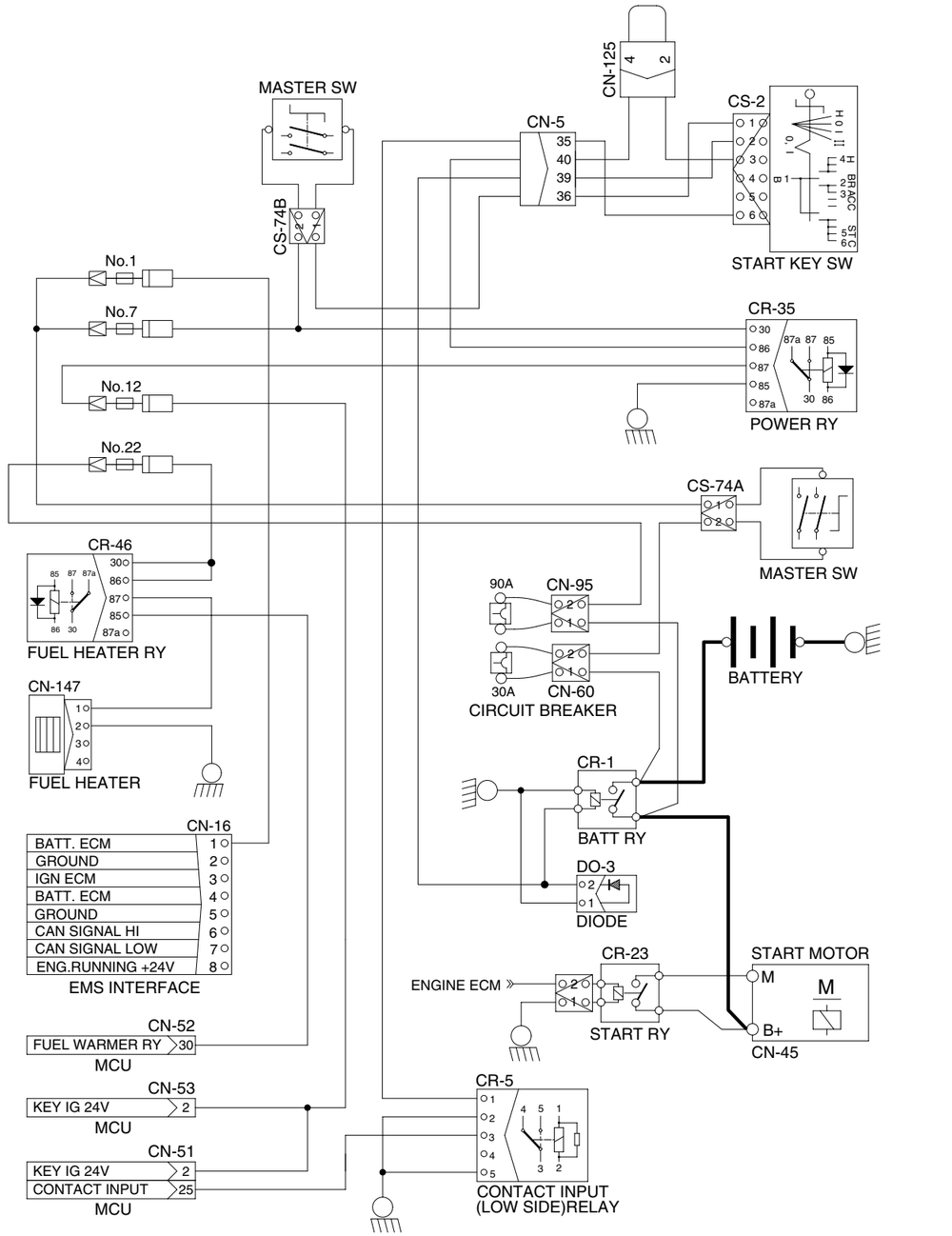


300L6ES02

12. WHEN ENGINE DOES NOT START (- + lights up condition)

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No. 1, 7, 12, 22.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.





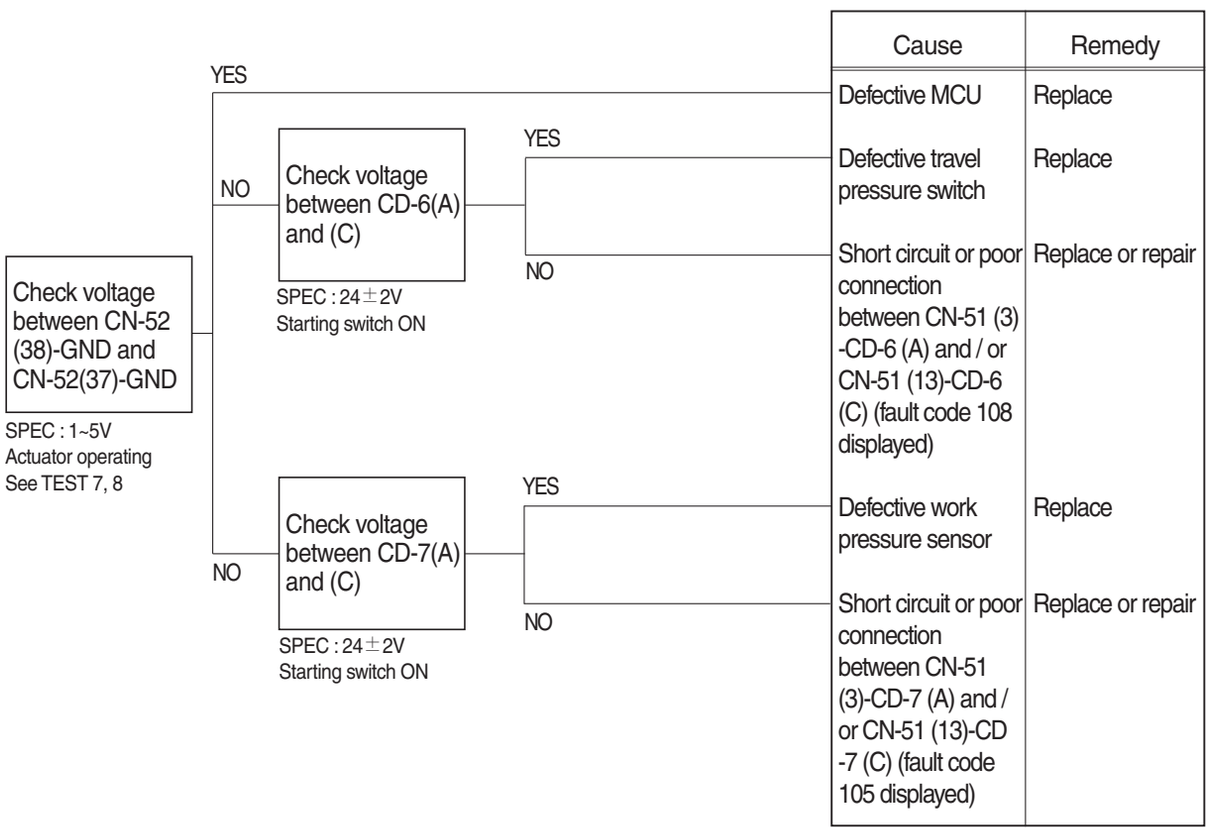
900L6ES11

4. AUTO DECEL SYSTEM DOES NOT WORK

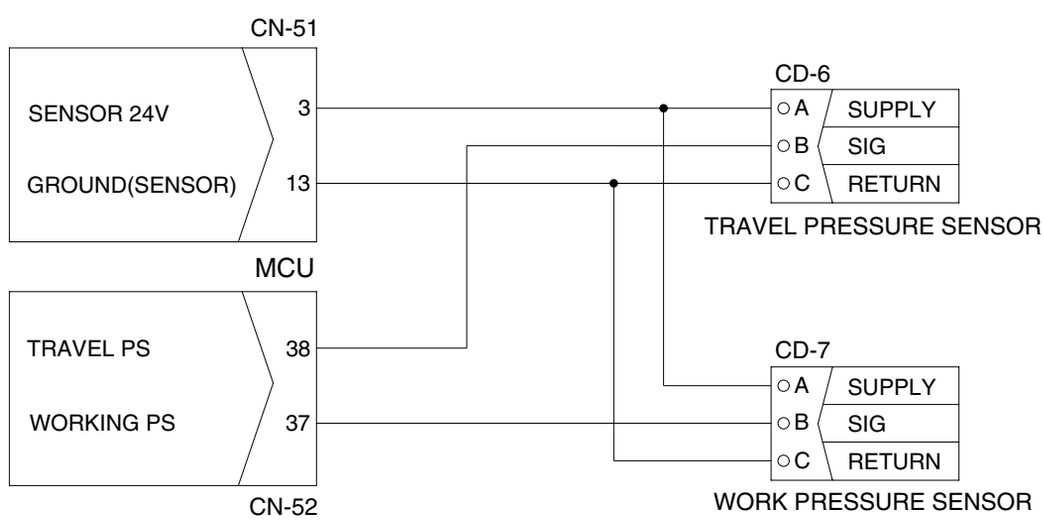
· Fault code : HCESPN 105, FMI 0~4 (work pressure sensor)
HCESPN 108, FMI 0~4 (travel oil pressure sensor)

※ Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE



Wiring diagram



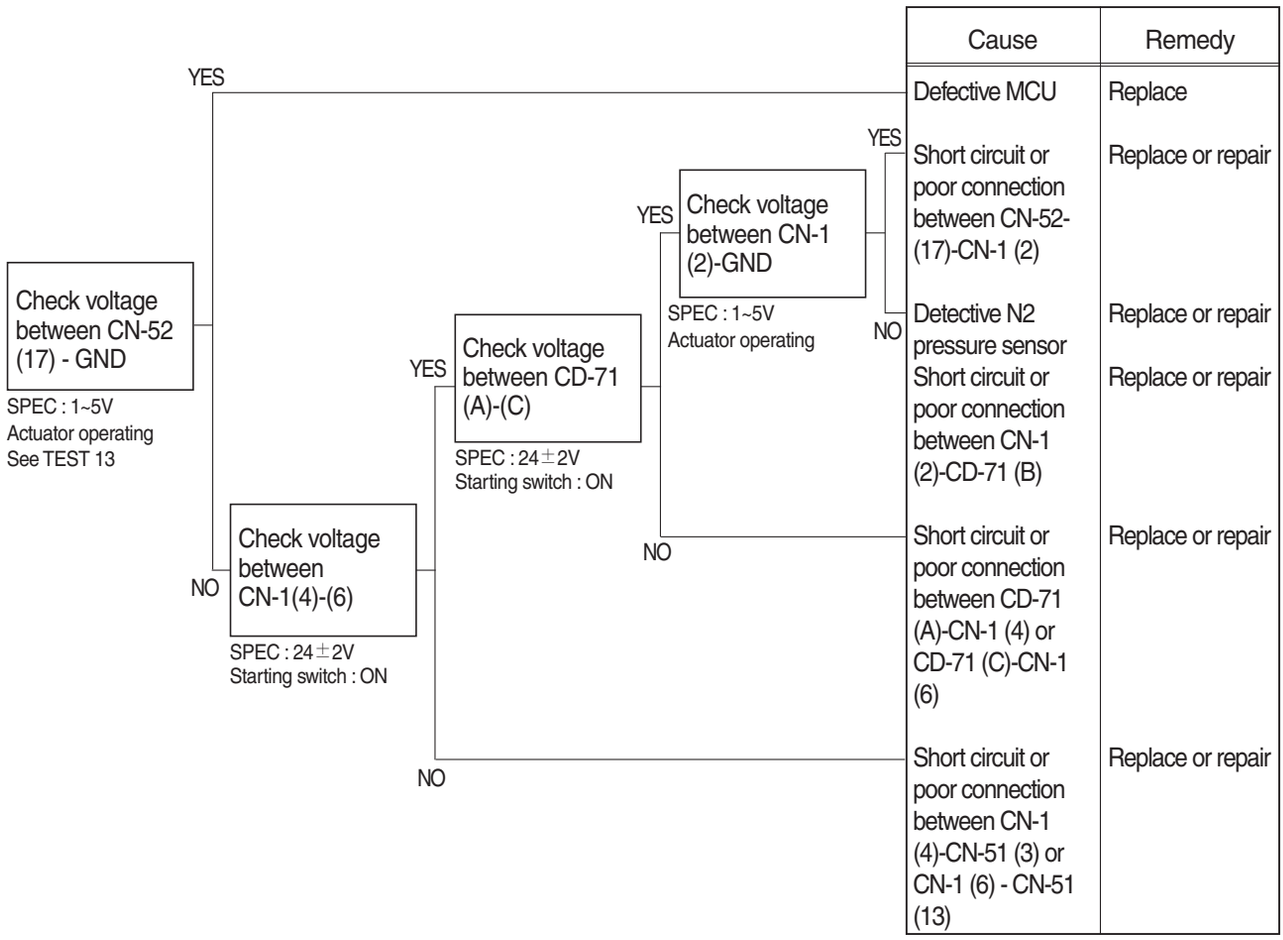
900L6MS33

9. MALFUNCTION OF NEGATIVE 2 PRESSURE SENSOR

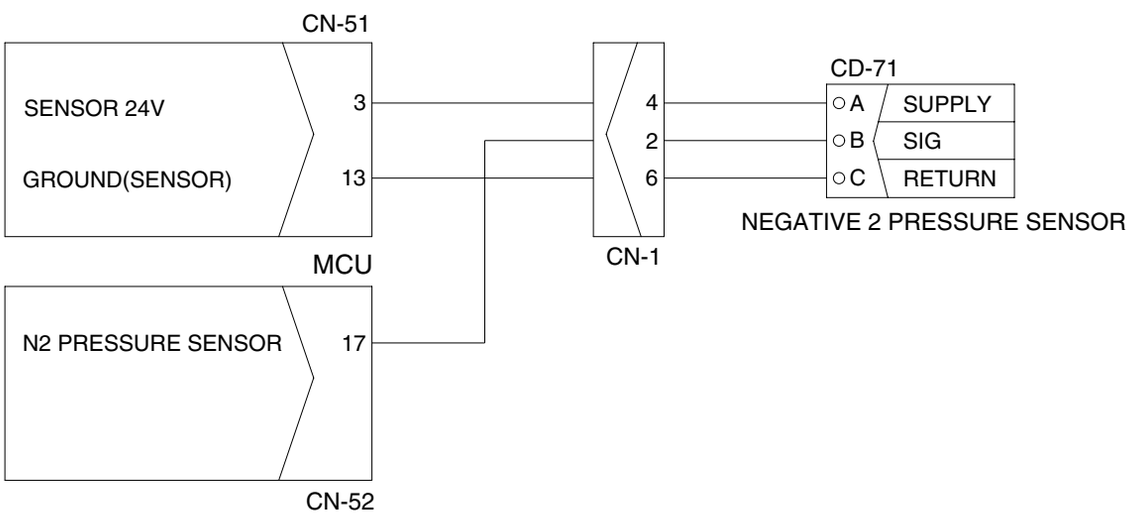
· Fault code : HCESPN 124, FMI 0~4

※ Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE



Wiring diagram



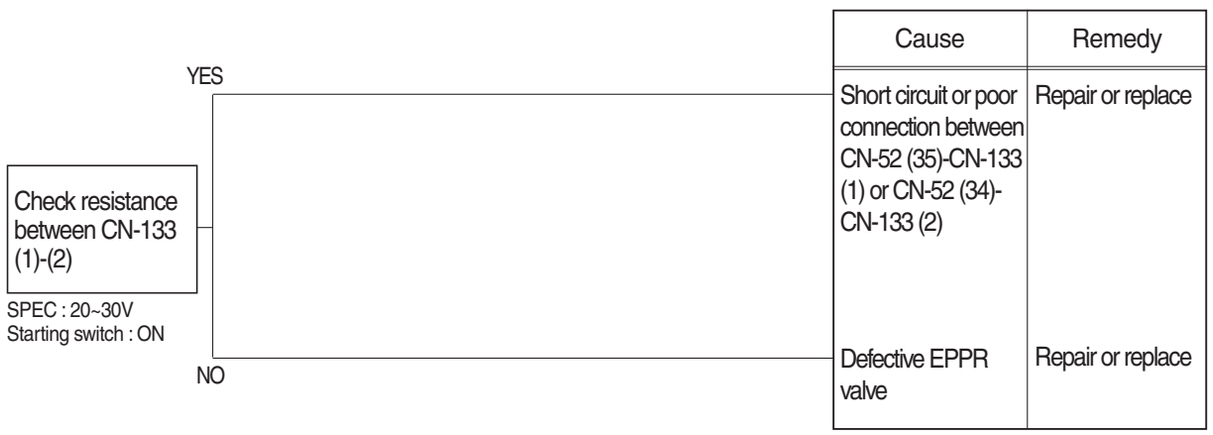
900L6MS43

14. MALFUNCTION OF BOOM PRIORITY EPPR VALVE

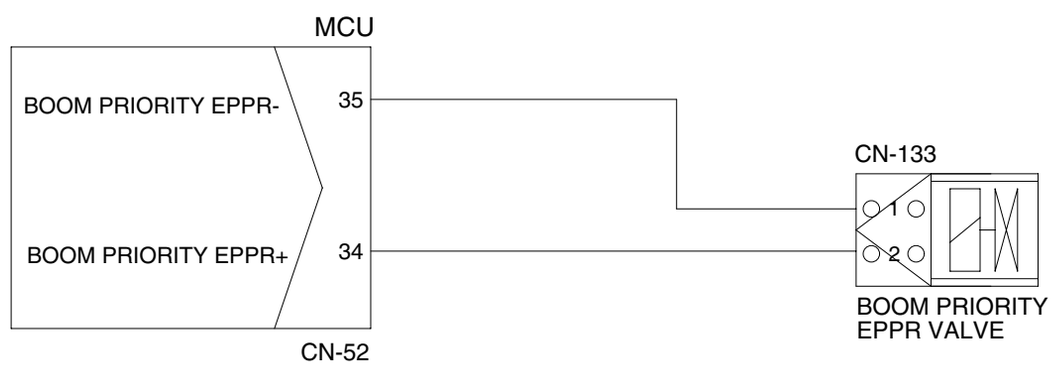
· Fault code : HCESPN 141, FMI 5 or 6

※ Before carrying out below procedure, check all the related connectors are properly inserted.

1) INSPECTION PROCEDURE



Wiring diagram



900L6MS53

7) SWING FUNCTION DRIFT CHECK

(1) Measure the swing drift on the bearing outer circumference when stopping after a 360˚ full speed swing.

(2) Preparation

① Check the lubrication of the swing gear and swing bearing.

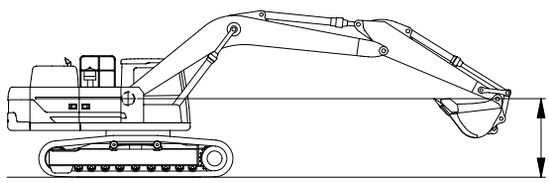
② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.

③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.

④ Make two chalk marks: one on the swing bearing and one directly below it on the track frame.

⑤ Swing the upperstructure 360˚.

⑥ Keep the hydraulic oil temperature at 50±5˚C.



480L7MS05

(3) Measurement

① Conduct this test in the M mode.

② Select the following switch positions.

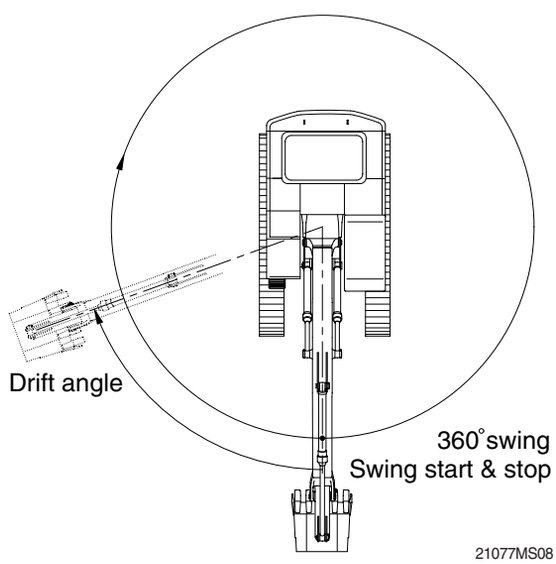
· Power mode switch : P mode

③ Operate the swing control lever fully and return it to the neutral position when the mark on the upperstructure aligns with that on track frame after swinging 360 ˚

④ Measure the distance between the two marks.

⑤ Align the marks again, swing 360 ˚, then test the opposite direction.

⑥ Repeat steps ④ and ⑤ three times each and calculate the average values.



21077MS08

(4) Evaluation

The measured drift angle should be within the following specifications.

Unit : Degree

Model	Power mode switch	Standard	Maximum allowable	Remarks
HX900 L	P mode	90 below	112.5	

16) MAIN PUMP DELIVERY PRESSURE

(1) Preparation

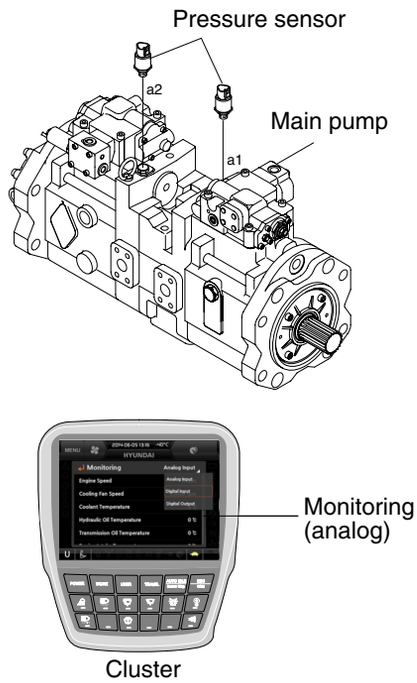
① Keep the hydraulic oil temperature at 50±5˚C.

(2) Measurement

① Select the following switch positions.

· Power mode switch : P mode

② Measure the main pump delivery pressure in the P mode (high idle).



(3) Evaluation

The average measured pressure should meet the following specifications.

Unit : kgf / cm²

Model	Engine speed	Standard	Allowable limits	Remarks
HX900 L	High idle	40±5	-	

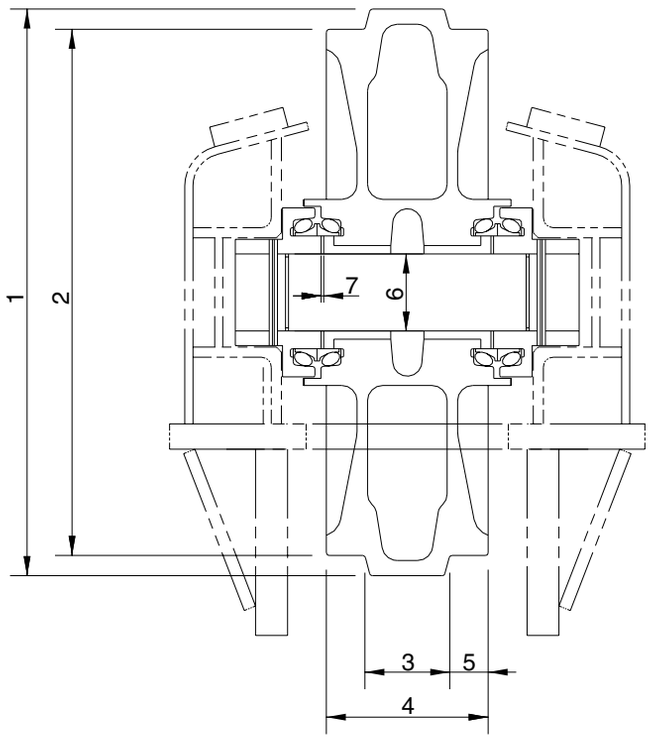
4. TRAVEL MOTOR

Wash all parts disassembly in treated oil and dry in the compressed air.

Perform maintenance including replacement or corrections in accordance with the following criterion.

No.	Parts Name	Appearance	Allowance	Replacement parts
6	Piston sub assembly	When remarkable flaws or high surface roughness are found on each sliding surface	Roughness : 0.8a There should be no seizure and remarkable flaws (over 0.02 mm in thickness).	Cylinder block kit / Perform lapping (#1000). Replace if flaws cannot be completely removed.
		When remarkable flaws or high surface roughness are found on surface of piston.	Roughness : 1.2a There should be no seizure and remarkable flaws (over 0.02 mm in thickness).	
		When clearance between piston sub assembly and cylinder block bore is great.	Clearance : 0.060 mm	Cylinder block kit
		When looseness in shoe ball parts is great.	Looseness : 0.4 mm	
4	Cylinder Block	When remarkable flaws or high surface roughness are found on the surface with the valve plate.	Roughness : 0.8a	Cylinder block kit / Perform lapping(#1000). Replace if flaws cannot be completely removed.
		When wear inside bore is great.	Roughly : 1.6a	Cylinder block kit
		When clearance between piston sub assembly and cylinder block bore is great.	Looseness : 0.4 mm	
		When abnormal wear and breakage develop on mating teeth.		
5	Valve plate	When remarkable flaws or high surface roughness are found on each sliding surface	Roughness : 0.8 a There should be no seizure and remarkable flaws(over 0.02 mm in thickness).	Cylinder block kit
7 8	Retainer plate Retainer holder	When remarkable flaws or high surface roughness are found on each sliding surface.	Roughness : 0.8 a There should be no seizure and remarkable flaws(over 0.02 mm in thickness).	7 Retainer plate 8 Retainer holder

3) IDLER



8007A7MS05

Unit : mm

No.	Check item	Criteria				Remedy
1	Outside diameter of protrusion	Standard size		Repair limit		Rebuild or replace
		Ø875		–		
2	Outside diameter of tread	Ø830		Ø816		
3	Width of protrusion	127		–		
4	Total width	266		–		
5	Width of tread	69.5		76.5		
6	Clearance between shaft and bushing	Standard size & tolerance		Standard clearance	Clearance limit	Replace bushing
		Shaft	bushing			
		Ø120 $^{0}_{-0.03}$	Ø120 $^{+0.4}_{+0.35}$	0.35 to 0.43	2.0	
7	Side clearance of idler (Both side)	Standard clearance		Clearance limit		Replace
		0.4 to 1.4		2.0		

2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

4) ASSEMBLY

(1) For reassembling reverse the disassembling procedures, paying attention to the following items.

① Do not fail to repair the parts damaged during disassembling, and prepare replacement parts in advance.

② Clean each part fully with cleaning oil and dry it with compressed air.

③ Do not fail to apply clean working oil to sliding sections, bearings, etc. before assembling them.

④ In principle, replace seal parts, such as O-rings, oil seals, etc.

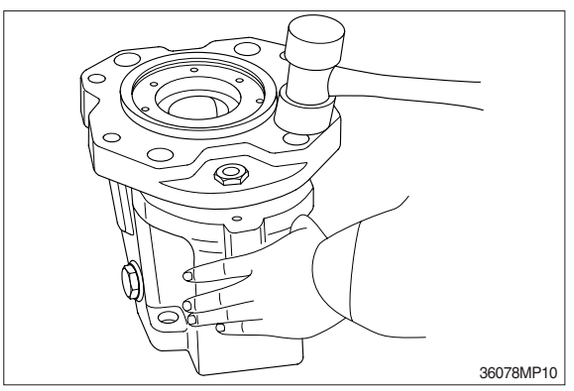
⑤ For fitting bolts, plug, etc., prepare a torque wrench or so on, and tighten them with torques shown in page 8-10, 11.

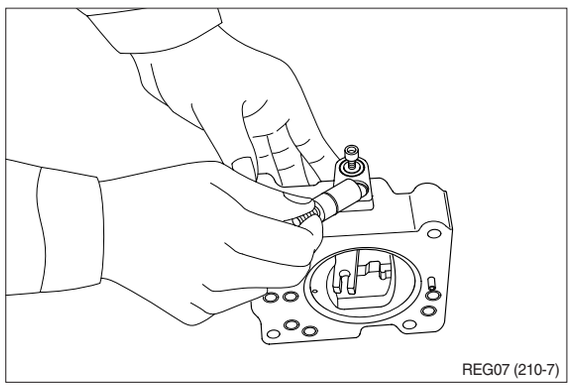
⑥ For the double-pump, take care not to mix up parts of the front pump with those of the rear pump.

(2) Fit swash plate support (251) to pump casing (271), tapping the former lightly with a hammer.

※ After servo piston, tilting pin, stopper (L) and stopper (S) are removed, fit them soon to pump casing in advance for reassembling.

※ In tightening servo piston and tilting pin, use a protector to prevent tilting pin head and feedback pin from being damaged. In addition, apply loctite (Medium strength) to their threaded sections.

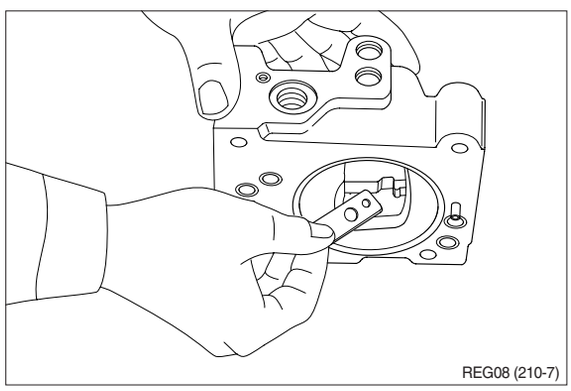




REG07 (210-7)

(9) Remove lever (2, 613). Do not draw out pin (875).

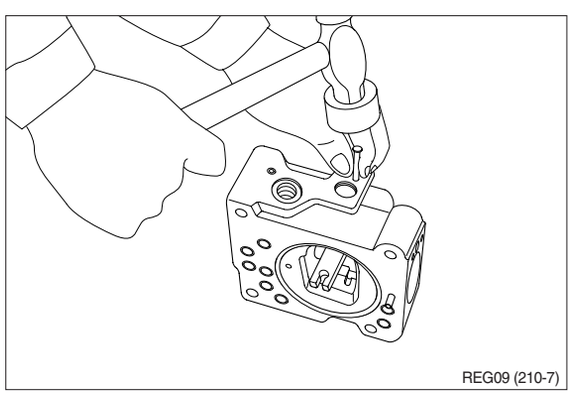
※ Work will be promoted by using pincers or so on.



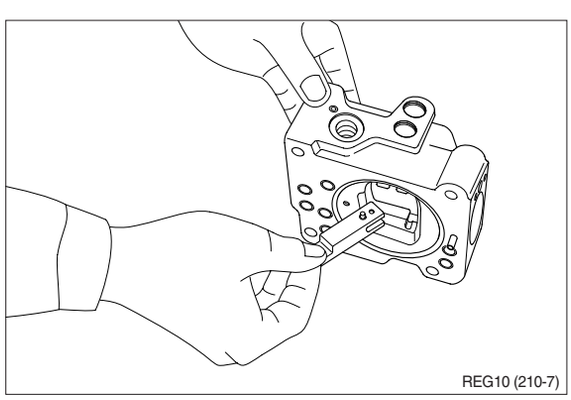
REG08 (210-7)

(10) Draw out pin (874) and remove feedback lever (611).

Push out pin (874, 4 mm in dia.) from above with slender steel bar so that it may not interfere with lever (1, 612).



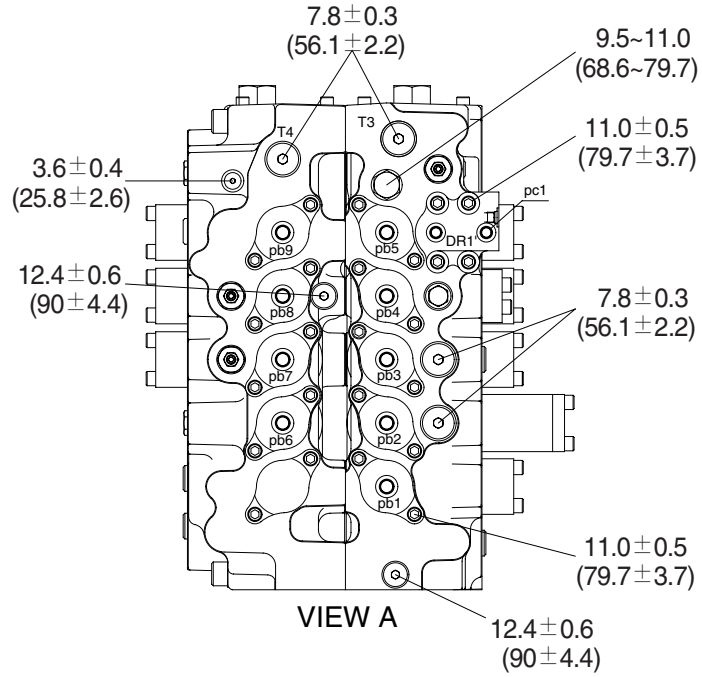
REG09 (210-7)

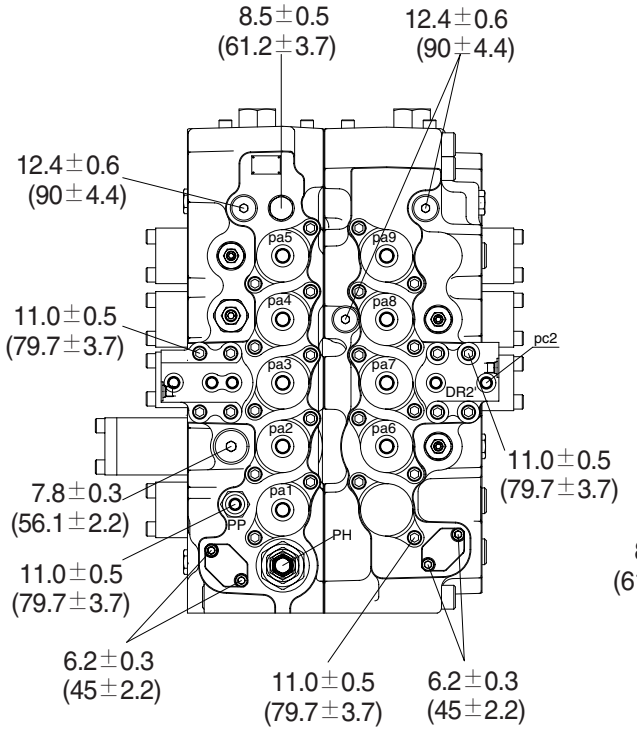


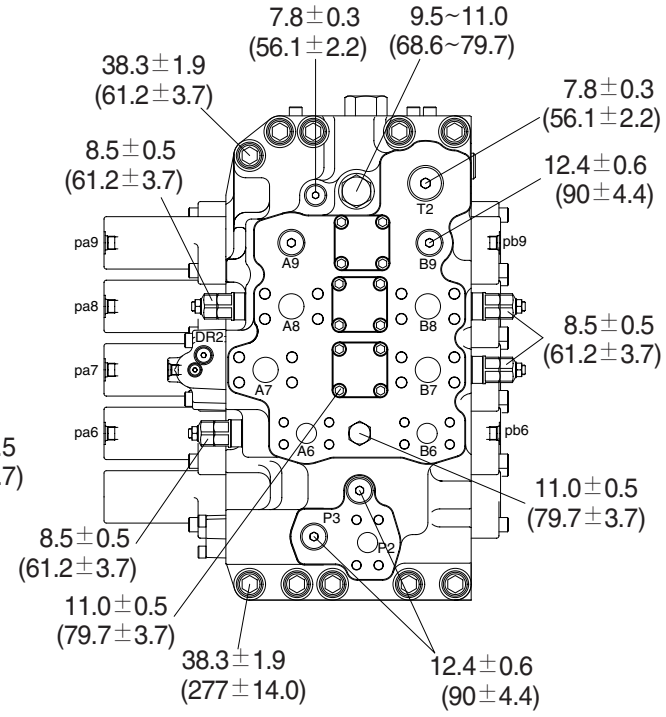
REG10 (210-7)

TIGHTENING TORQUE (2/2)

※ Unit : kgf · m (lbf · ft)







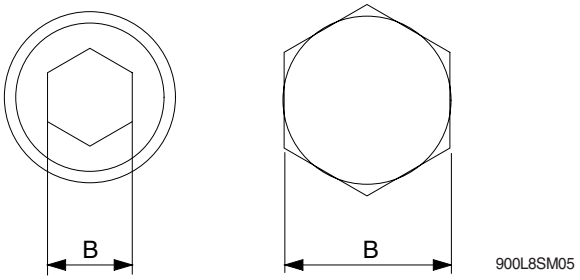
8007A8MC05

2) TOOLS AND TIGHTENING TORQUE

(1) Necessary tools

The tool necessary for disassembling and reassembling and their dimensions are shown below.

Name of tools		Dimension B (mm)	Name of parts applied and remarks
Hexagon bar wrenches (JIS B 4686)		17	ROMH plug (469)
			Hexagon socket head cap screw (401)
Spanner, socket wrenches		19	Plug (468)
		24	Anti-reaction valve (400)
		41	Relief valve (051)
Hammers	Plastic hammer		Wooden hammer allowed.
	Iron hammer		Norminal 1 or so.
Steel rod approx. 10 x 8 x 200 mm			Bearing (443 & 444), Pin (451)
Torque wrench			5 to 10 N-m
			10 to 45 N-m
			40 to 275 N-m
			75 to 550 N-m
			100 to 1000 N-m
Screw driver			2 pieces
Bearing pliers			Bearings (443 & 444)
Plier			Snaping (437)
Brake piston removal tool			Brake piston (702)



(5) Install shoe plate (124) into the motor casing (301).

※ Shoe plate to be fitted lapped side outwards.

900L8SM36

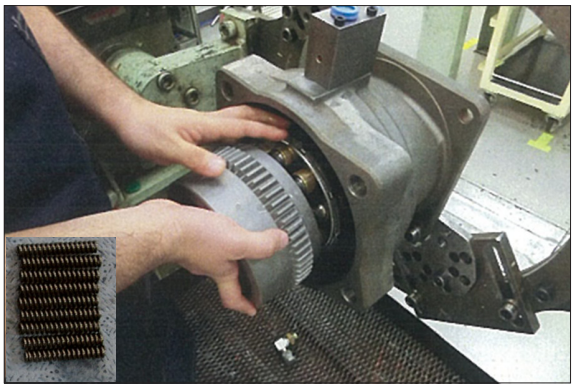
(6) Put set plate (123) on plate spring (114) and install assembly (121 & 122) into set plate (123).

※ Be sure to reassemble with identification marks on parts corresponding to each order.

900L8SM37

(7) Insert piston assemblies into cylinder (111).
Install rotation group into casing (301).

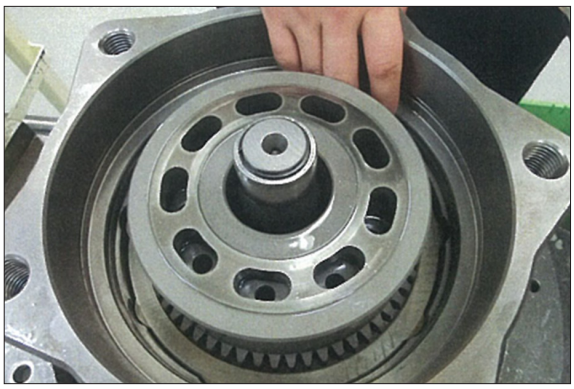
※ Be sure to reassemble with identification marks on parts corresponding to each order.



900L8SM38

(8) Place the motor in a vertical position with bell housing face down.

※ Be careful of the assembling order.



900L8SM39

(5) Remove No.1 carrier assembly.

900L8SM72

(6) Disassembling of No.1 carrier assembly

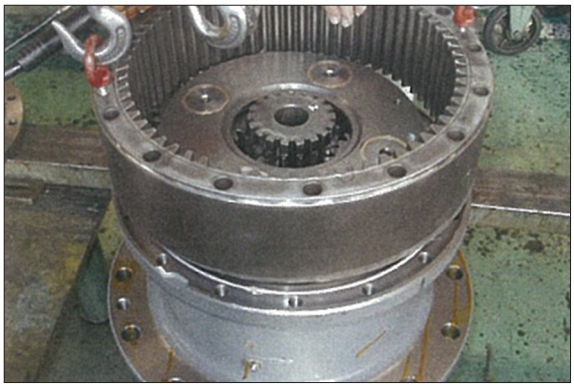
※ During periodical inspection or so on, it is unnecessary to disassemble No.1 carrier assembly more.
In this state, check parts according to inspection shown in section 6.
As mentioned above, it is recommended to replace No.1 carrier assembly as set as far as possible.
However, if partial replacement is inevitable, follow procedures mentioned below.

① Press spring pin (909) in the more inner part and pull out pin No.1 (283).

※ If pin No.1 (283) is removed do not use in reassembly of reduction gear.

② Remove No.1 planetary gear (210), needle cage (403), side plate (285).

(7) Lift up ring gear (202) to remove.



900L8SM73

1. REMOVAL AND INSTALL

1) REMOVAL

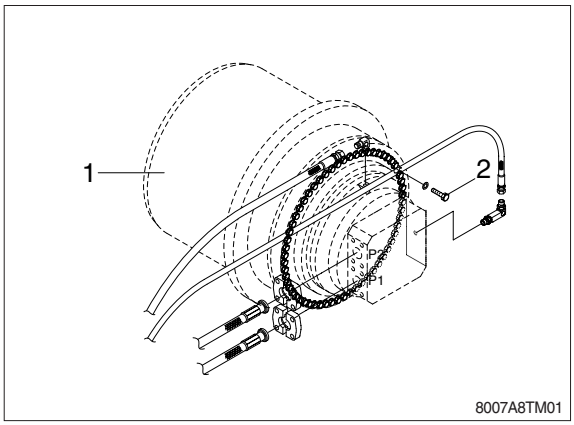
(1) Swing the work equipment 90 °and lower it completely to the ground.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.



(4) Remove the track shoe assembly.
For details, see removal of track shoe assembly.

(5) Remove the cover.

(6) Remove the hoses.
※ Fit blind plugs to the disconnected hoses.

(7) Remove the bolts and the sprocket.
· Tightening torque : 199±20 kgf · m
(1439±145 lbf · ft)

(8) Sling travel device assembly (1).

(9) Remove the mounting bolts (2), then remove the travel device assembly.
· Weight : 440 kg (970 lb)
· Tightening torque : 199±30 kgf · m
(1439±217 lbf · ft)

2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from the travel motor.
① Remove the air vent plug.
② Pour in hydraulic oil until it overflows from the port.
③ Tighten plug lightly.
④ Start the engine, run at low idling, and check oil come out from plug.
⑤ Tighten plug fully.

(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

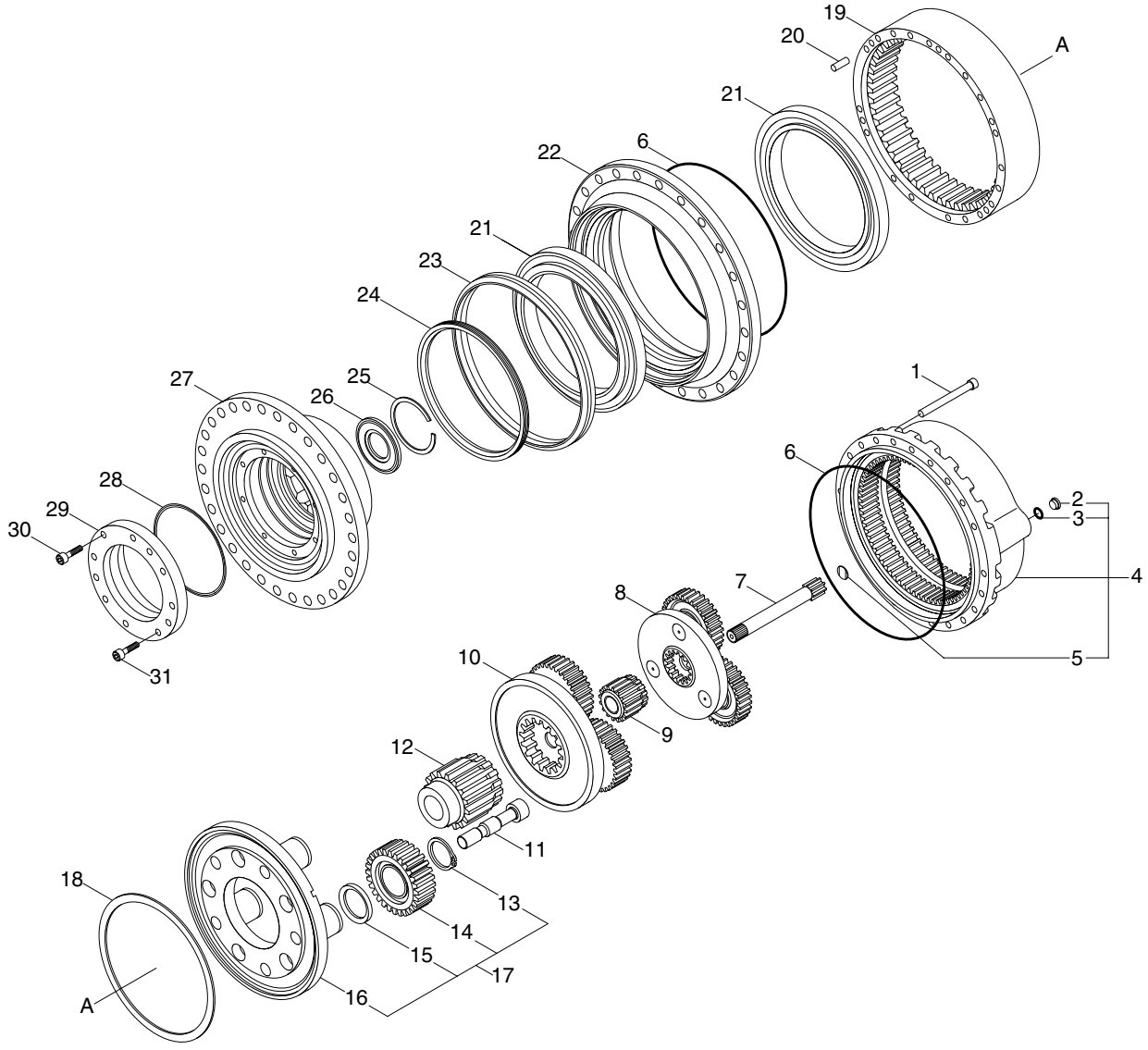
4) REASSEMBLY

(1) General precautions

① Reassemble in a work area that is clean and free from dust and grit.
② Handle parts with bare hands to keep them free of linty contaminates.
③ Repair or replace the damaged parts.
Each parts must be free of burrs its corners.
④ Do not reuse O-rings, oil seal and floating seal that were removed in disassembly.
Provide the new parts.
⑤ Wash all parts thoroughly in a suitable solvent.
Dry thoroughly with compressed air.
Do not use the cloths.
⑥ When reassembling oil motor components of motor, be sure to coat the sliding parts of the motor and valve with fresh hydraulic oil. (NAS class 9 or above)
⑦ Use a torque wrench to tighten bolts and plugs, to the torque specified as follows.

3. REDUCTION GEAR

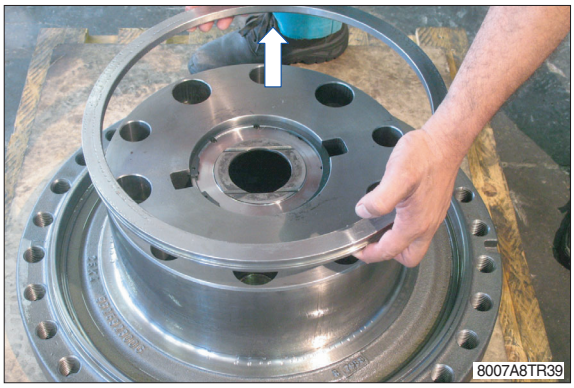
1) STRUCTURE



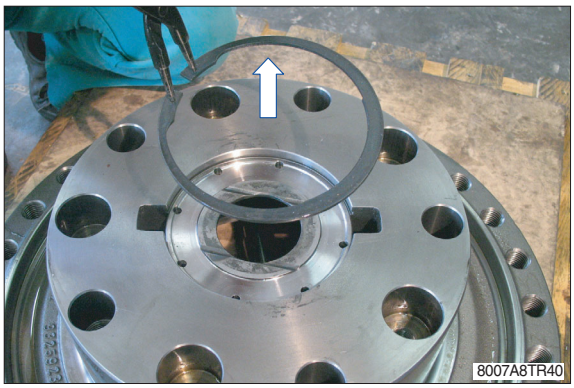
80092TM04

1	Screw	12	Sun gear	23	Lifetime seal
2	Oil breather plug	13	Circlip	24	Spacer
3	Washer	14	Planetary assy	25	Circlip
4	Cover assy	15	Spacer	26	Discs retainer
5	Pad	16	Planetary carrier	27	Hub
6	O-ring	17	Gear assy(3rd)	28	O-ring
7	Sun gear	18	Spacer	29	Motor adaptor
8	Gear assy(1st)	19	Toothed ring	30	Screw
9	Sun gear	20	Pin	31	Screw
10	Gear assy(2nd)	21	Bearing		
11	Screw	22	Gearbox housing		

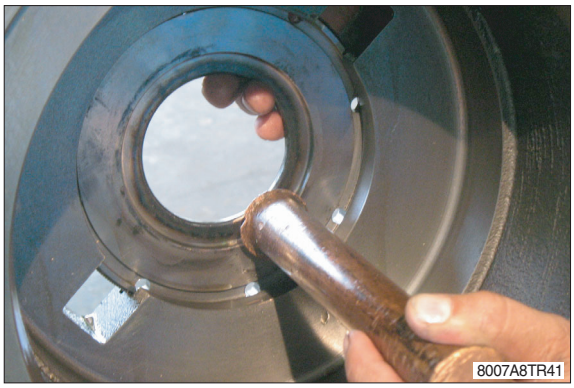
(36) Remove the spacer (24) from its seat in the flanged hub (27).



(37) By using pliers remove the circlip (25) from its seat in the flanged hub (27).

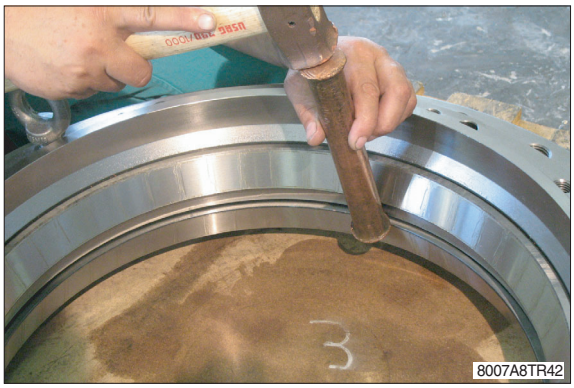


(38) By using a punch remove the discs retainer (26) from the flanged hub (27).

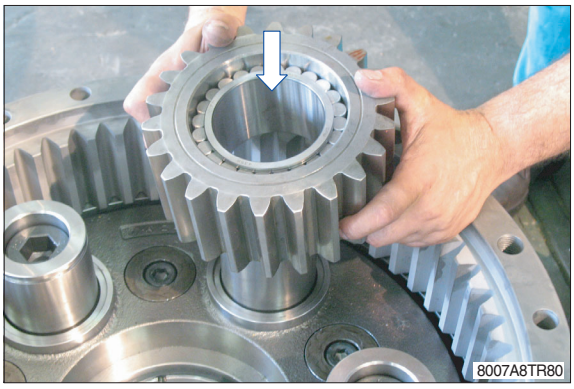


(39) By using a rubber hammer and a punch remove the bearing outer rings (21) from the gearbox housing (22).

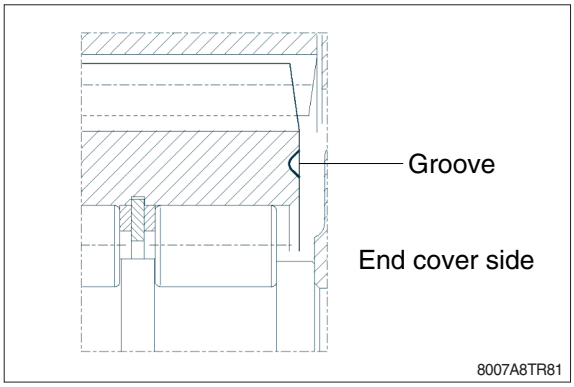
※ The gearbox disassembly ends with the above operation. All the parts are now available for the necessary inspections.



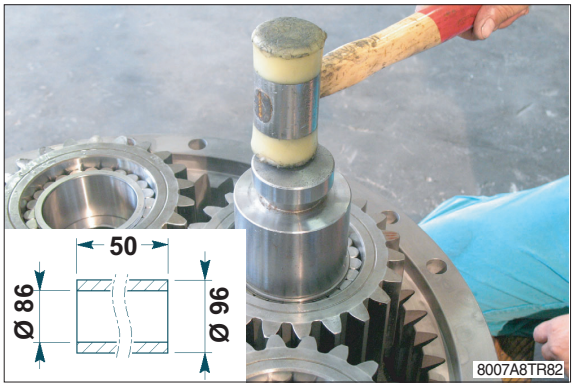
(30) Place the reduction planet assemblies of the 3rd reduction (14) on the pins of the planetary carrier (16).



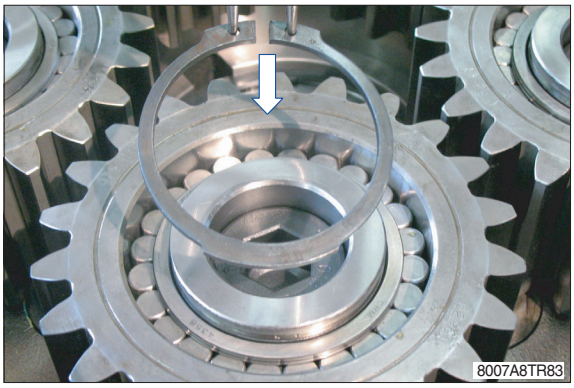
※ Place correctly the reduction planet assemblies checking that the groove is towards the end cover.



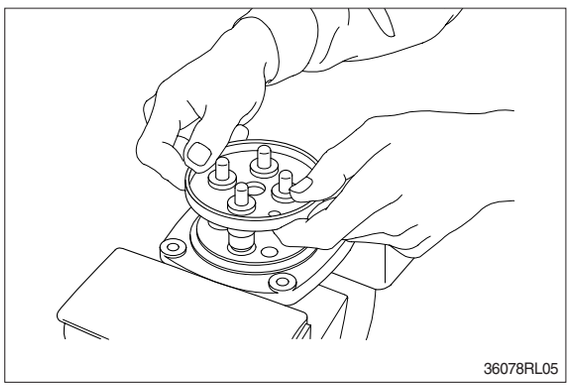
(31) By using a stopper and a rubber hammer push the planet assemblies of the 3rd reduction (16) against the shoulder until assembly is completed.



(32) By using pliers, assemble the circlips (13) in the planetary carrier pin seats (16).



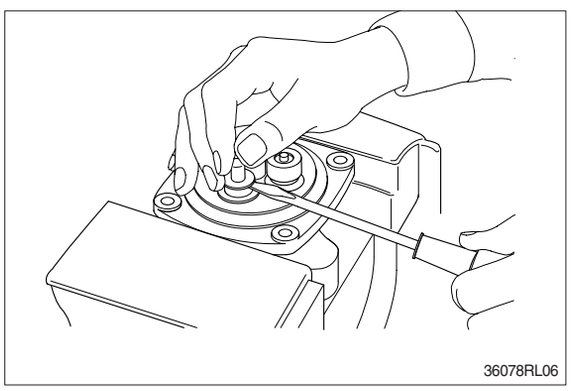
(8) Remove plate (12).



(9) When return spring (7) is weak in force, plug (8) stays in casing because of sliding resistance of O-ring.

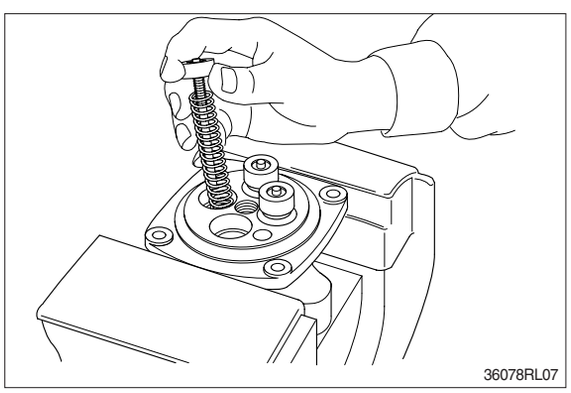
※ Take it out with minus screwdriver.
Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.

※ During taking out, plug may jump up due to return spring (7) force.
Pay attention to this.



(10) Remove reducing valve subassembly and return spring (7) out of casing.

※ Record relative position of reducing valve subassembly and return springs.

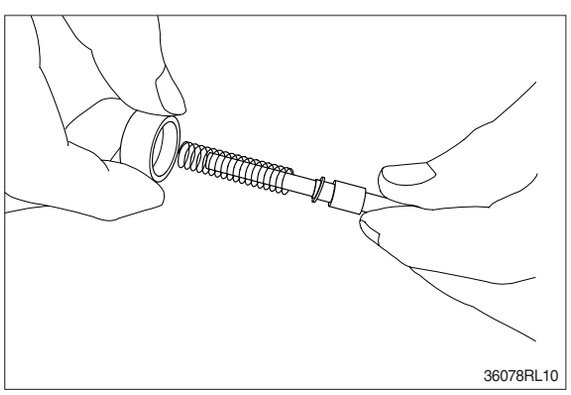


(11) Separate spool (3), spring seat (6), spring (5) and shim (4) individually.

※ Pay attention not to damage spool surface.

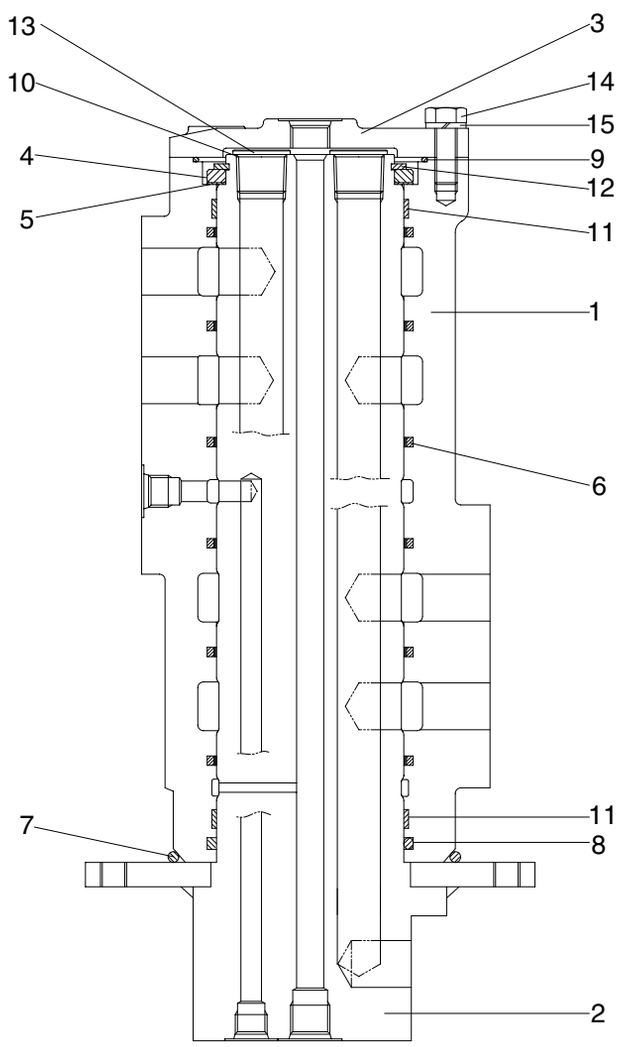
※ Record original position of spring seat (6).

※ Until being assembled, they should be handled as one subassembly group.



2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



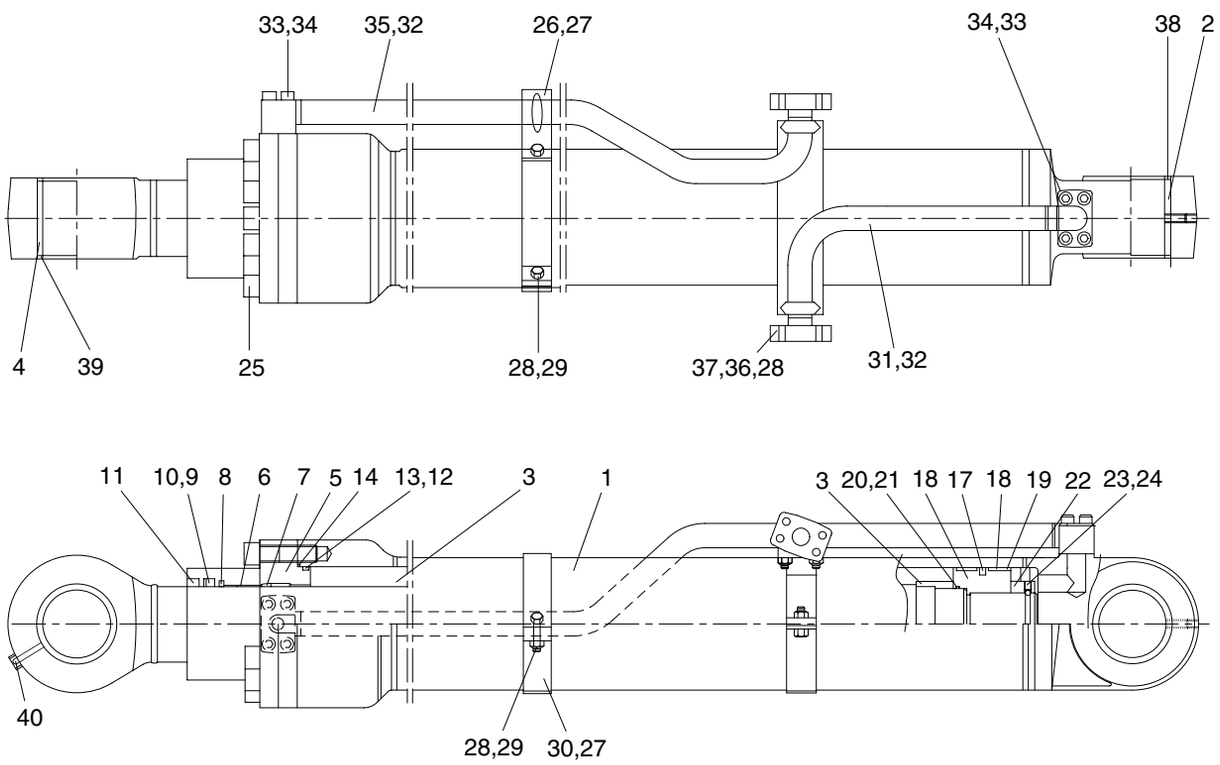
8007A8TJ03

1	Hub	6	Slipper seal	11	Wear ring
2	Shaft assembly	7	O-ring	12	Retaining ring
3	Cover	8	O-ring	13	Socket plug
4	Spacer	9	O-ring	14	Hexagon bolt
5	Shim	10	O-ring	15	Spring washer

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

(1) Bucket cylinder



31KD-60010

1	Tube assembly	15	Cushion ring	29	Hex bolt
2	Pin bushing	16	Piston	30	Pipe band assembly
3	Rod assembly	17	Pinton seal	31	Pipe band
4	Pin bushing	18	Wear ring	32	O-ring
5	Rod cover	19	Dust ring	33	Hex socket bolt
6	Rod bushing	20	O-ring	34	Spring washer
7	Retaining ring	21	Back up ring	35	Pipe assembly
8	Buffer seal	22	Piston nut	36	U-bolt
9	U-packing	23	Steel ball	37	Hex nut
10	Back up ring	24	Set screw	38	Pin wiper
11	Dust wiper	25	Hex socket bolt	39	Pin wiper
12	O-ring	26	Pipe band assembly	40	Grease nipple
13	Back up ring	27	Pipe band		
14	O-ring	28	Spring washer		

(3) Overall assemble

① Place a V-block on a rigid work bench. Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.

② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.

※ Be careful not to damage piston seal by thread of tube assembly.

③ Match the bolt holes in the cylinder head flange to the tapped holes in the tube assembly and tighten socket bolts to a specified torque.

※ Refer to the table of tightening torque.