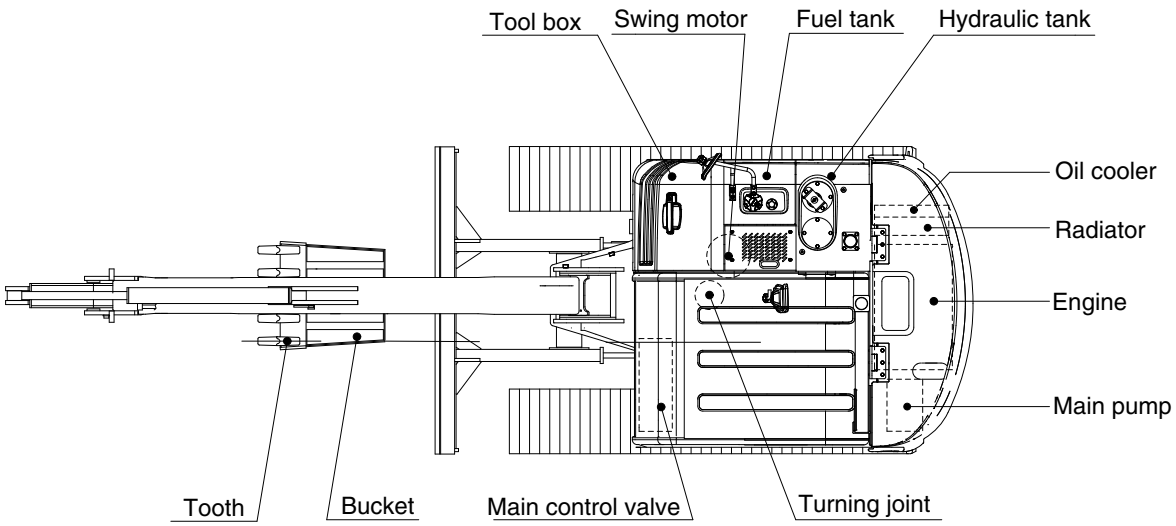
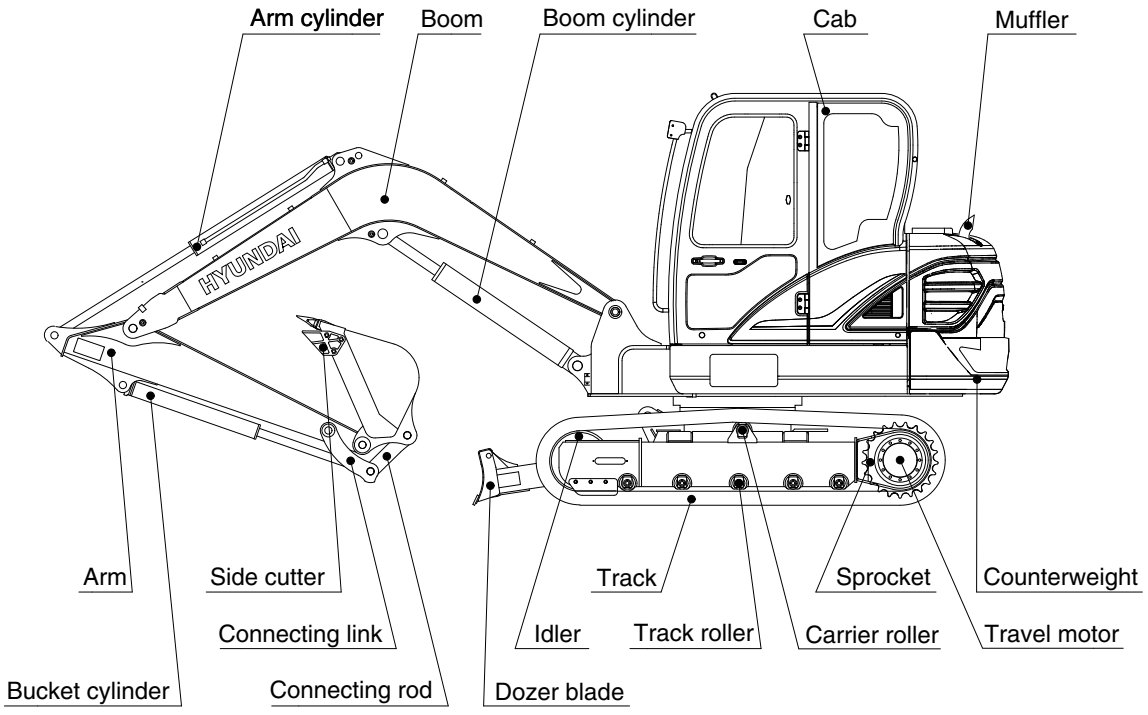
CONTENTS

SECTION 1 GENERAL

GROUP 2 SPECIFICATIONS

1. MAJOR COMPONENT

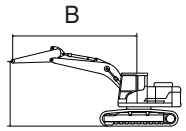




65A2SP01

Model	Type	Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX65A	MONO BOOM	Length [mm]	Length [mm	weight [kg]	width [mm]	Front	Rear	Front	Rear
		3000	1900	285	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1200	*1200	3.64
	lb											*2650	*2650	(11.9)
4.0 m (13.1 ft)	kg							*1060	*1060			*1080	1000	4.63
	lb							*2340	*2340			*2380	2200	(15.2)
3.0 m (9.8 ft)	kg							*1140	*1140	*1160	880	*1020	820	5.19
	lb							*2510	*2510	*2560	1940	*2250	1810	(17.0)
2.0 m (6.6 ft)	kg					*1730	*1730	*1380	1210	*1240	860	*1020	740	5.47
	lb					*3810	*3810	*3040	2670	*2730	1900	*2250	1630	(18.0)
1.0 m (3.3 ft)	kg					*2430	1750	*1680	1160	*1360	840	*1080	720	5.54
	lb					*5360	3860	*3700	2560	*3000	1850	*2380	1590	(18.2)
0.0 m (0.0 ft)	kg			*1480	*1480	*2810	1670	*1880	1110	*1440	810	*1210	730	5.39
	lb			*3260	*3260	*6190	3680	*4140	2450	*3170	1790	*2670	1610	(17.7)
-1.0 m (-3.3 ft)	kg	*1920	*1920	*2710	*2710	*2820	1640	*1920	1090	*1380	810	*1380	810	5.01
	lb	*4230	*4230	*5970	*5970	*6220	3620	*4230	2400	*3040	1790	*3040	1790	(16.4)
-2.0 m (-6.6 ft)	kg	*3140	*3140	*4070	3230	*2480	1660	*1670	1100			*1440	1000	4.31
	lb	*6920	*6920	*8970	7120	*5470	3660	*3680	2430			*3170	2200	(14.1)
-3.0 m (-9.8 ft)	kg			*2450	*2450	*1430	*1430					*1400	*1400	3.02
	lb			*5400	*5400	*3150	*3150					*3090	*3090	(9.9)

7) CYLINDER

Item		Specification
Boom cylinder	Bore dia×Rod dia×Stroke	Ø110×Ø60×715 mm
	Cushion	Extend only
Arm cylinder	Bore dia×Rod dia×Stroke	Ø90×Ø55×850 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia×Rod dia×Stroke	Ø80×Ø50×660 mm
	Cushion	Extend only
Dozer blade	Bore dia×Rod dia×Stroke	Ø110×Ø60×224 mm
	Cushion	Extend only

※ **Discoloration of cylinder rod can occur when the friction reduction additive of lubrication oil spreads on the rod surface.**

※ **Discoloration does not cause any harmful effect on the cylinder performance.**

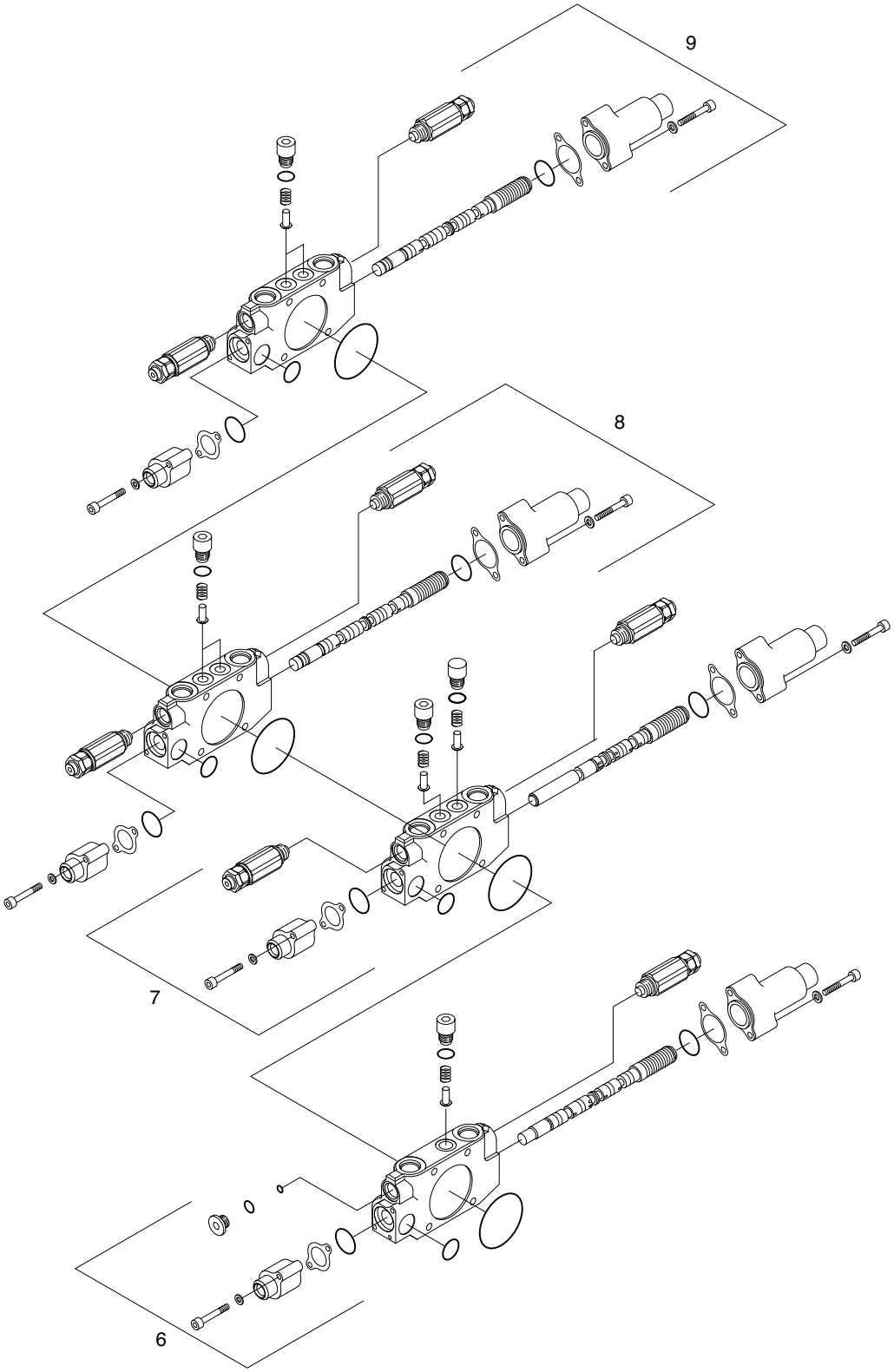
8) SHOE

Item		Width	Ground pressure	Link quantity	Overall width
HX65A	Steel	380 mm (15")	0.38 kgf/cm^2 (5.38 psi)	40	1880 mm (6' 2")
	Rubber	400 mm (16")	0.35 kgf/cm^2 (4.95 psi)	-	1900 mm (6' 3")

9) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
HX65A	STD	0.18 m^3 (0.24 yd^3)	0.15 m^3 (0.20 yd^3)	5	670 mm (26.4")	740 mm (29.1")
	OPT	0.07 m^3 (0.09 yd^3)	0.06 m^3 (0.08 yd^3)	3	315 mm (12.4")	360 mm (14.2")

STRUCTURE (2/4)



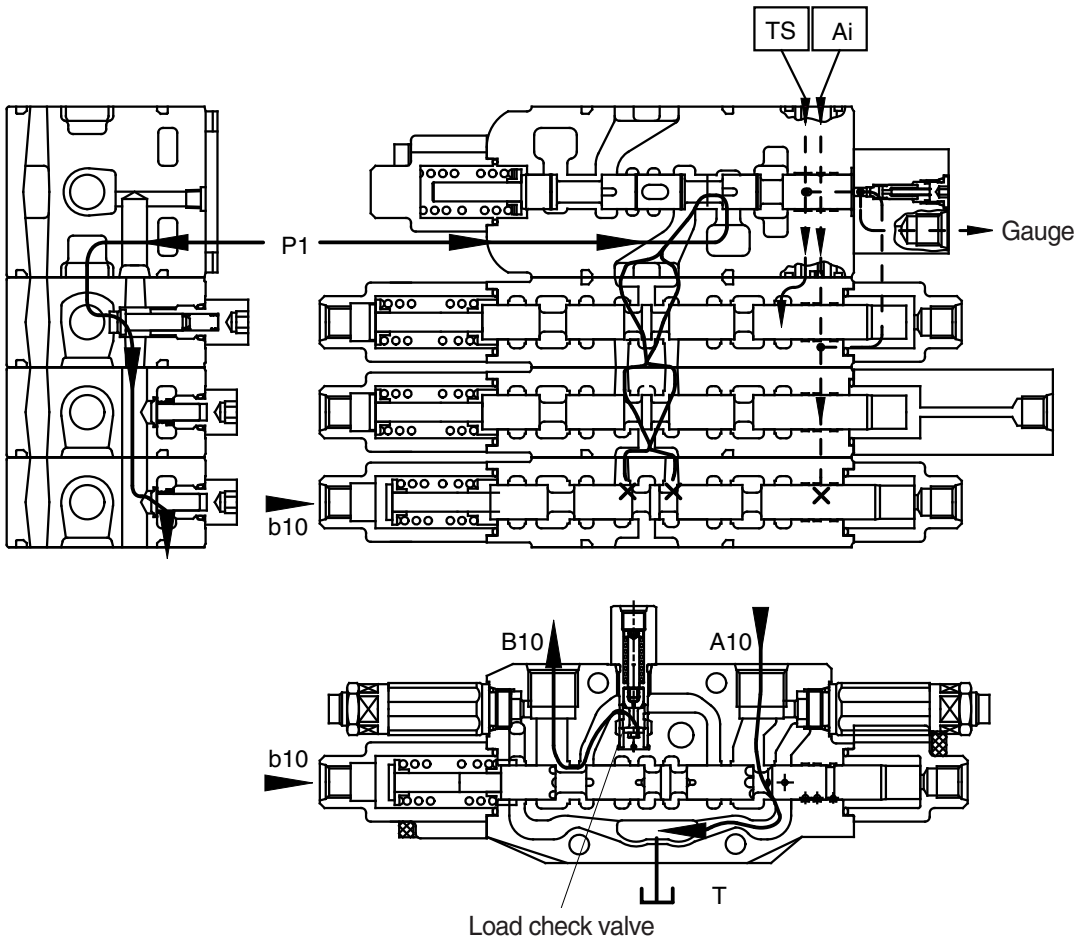
65A2MC03

6 Boom 2 section assy
7 Arm 1 section assy
8 Boom swing section assy
9 Option section assy

(3) Bucket operation

① Bucket roll in operation

-



- During the bucket roll in operation, the pilot pressure from RCV is supplied to port b10 and shift the bucket spool in the right direction.
  The hydraulic fluid from pump P1 entered P1 parallel passage and is directed to the port B10 through the load check valve.
  Following this, it flows into the head side of the bucket cylinder.
  The return flow from the rod side of the bucket cylinder returns to the bucket spool through the port A10. Thereafter it is directed to the hydraulic oil tank through the tank passage.
- The TS signal passage oil from the Pp port is drain to the hydraulic oil tank through the left/right travel valve and the signal pressure is not raised.
- The Ai signal passage oil from the Pp port is shut off by shifting of the bucket spool and then signal pressure of auto idle is raised.

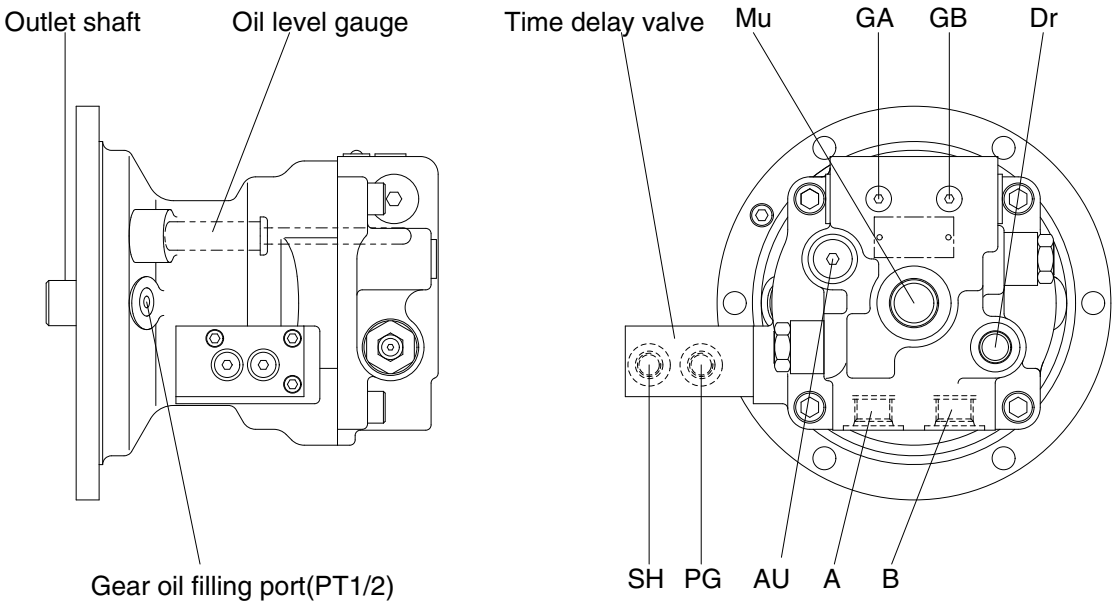
GROUP 3 SWING DEVICE

1. STRUCTURE

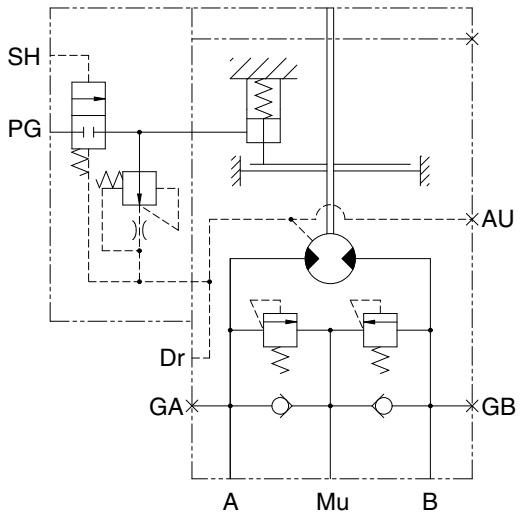
Swing device consists swing motor, swing reduction gear.

1) SWING MOTOR

Swing motor include mechanical parking valve, relief valve, make up valve and time delay valve.



65A2SM01



Hydraulic circuit

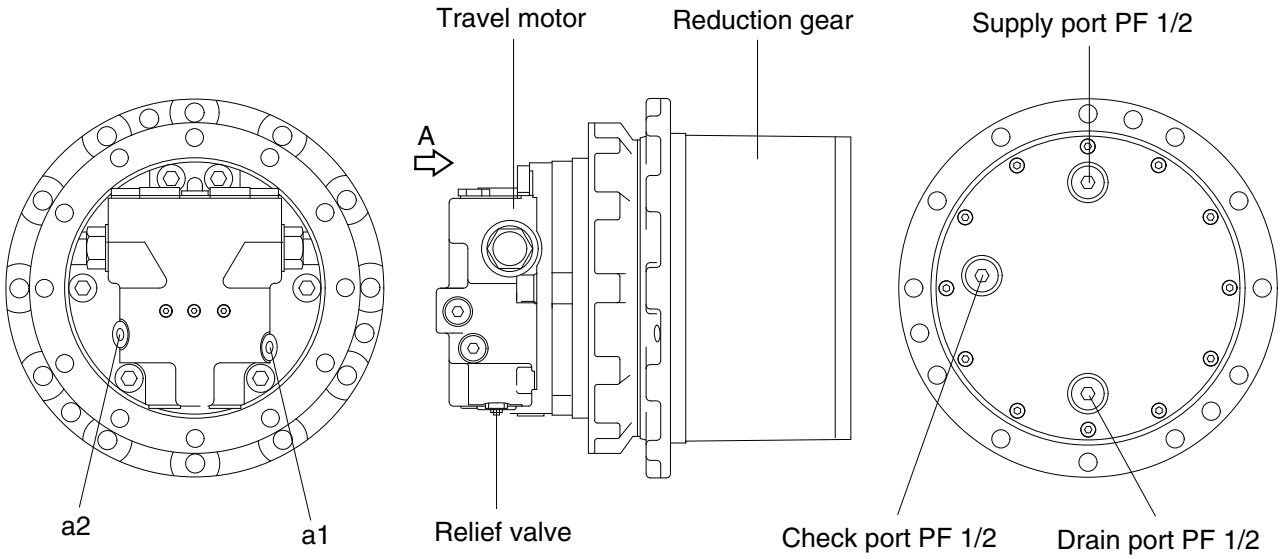
Port	Port name	Port size
A	Main port	PF 1/2
B	Main port	PF 1/2
Dr	Drain port	PF 3/8
Mu	Make up port	PF 3/4
PG	Brake release stand by port	PF 1/4
SH	Brake release pilot port	PF 1/4
GA,GB	Gauge port	PF 1/4
AU	Air vent port	PF 3/8

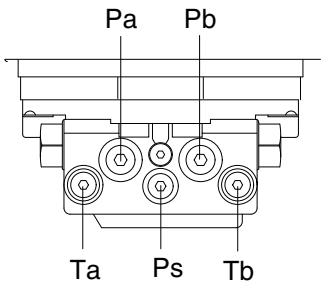
GROUP 4 TRAVEL DEVICE

1. CONSTRUCTION

Travel device consists travel motor and gear box.

Travel motor includes brake valve, parking brake and high/low speed changeover mechanism.

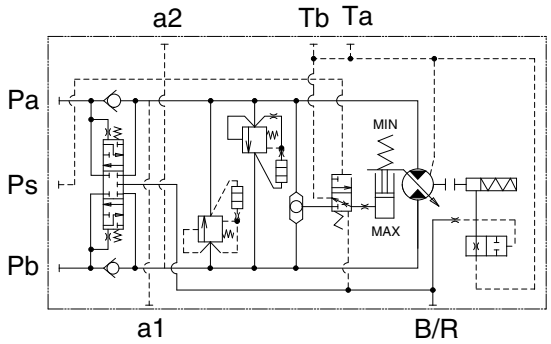




VIEW A

HX60A2TM50E

Port	Port name	Port size
Pa	Main port	PF 1/2
Pb	Main port	PF 1/2
a1,a2	Gauge port	PT 1/4
Ta,Tb	Drain port	PF 3/8
Ps	2 speed control port	PF 1/4



Hydraulic circuit

(2) In case of stop

If the pressurized oil supplied by the inlet is cut off during stop, the pressurized oil supplied to the brake piston chamber (c) will also be blocked. (below brake release pressure)

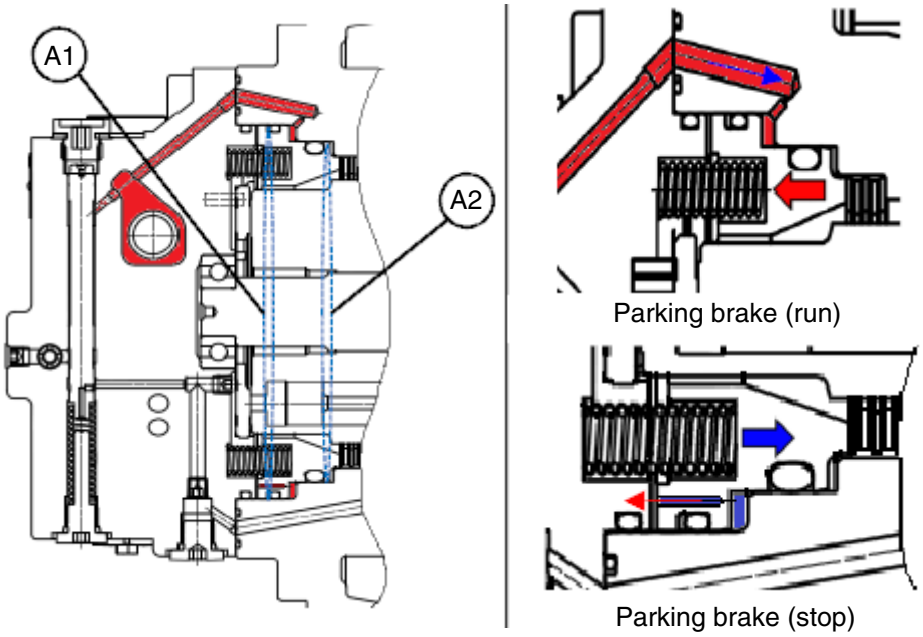
If the spring elasticity force F3 of the brake spring (117) is greater than the hydraulic force F4 of the brake piston chamber (c), then brake piston (114) move to casing by spring elasticity force. The hydraulic oil of the brake piston (114) is drained through the throttle. Therefore brake piston (114) smoothly operates.

F3 < F4

F3 = k x n , k : Spring constant, x : Spring stroke, n : Number of spring brake

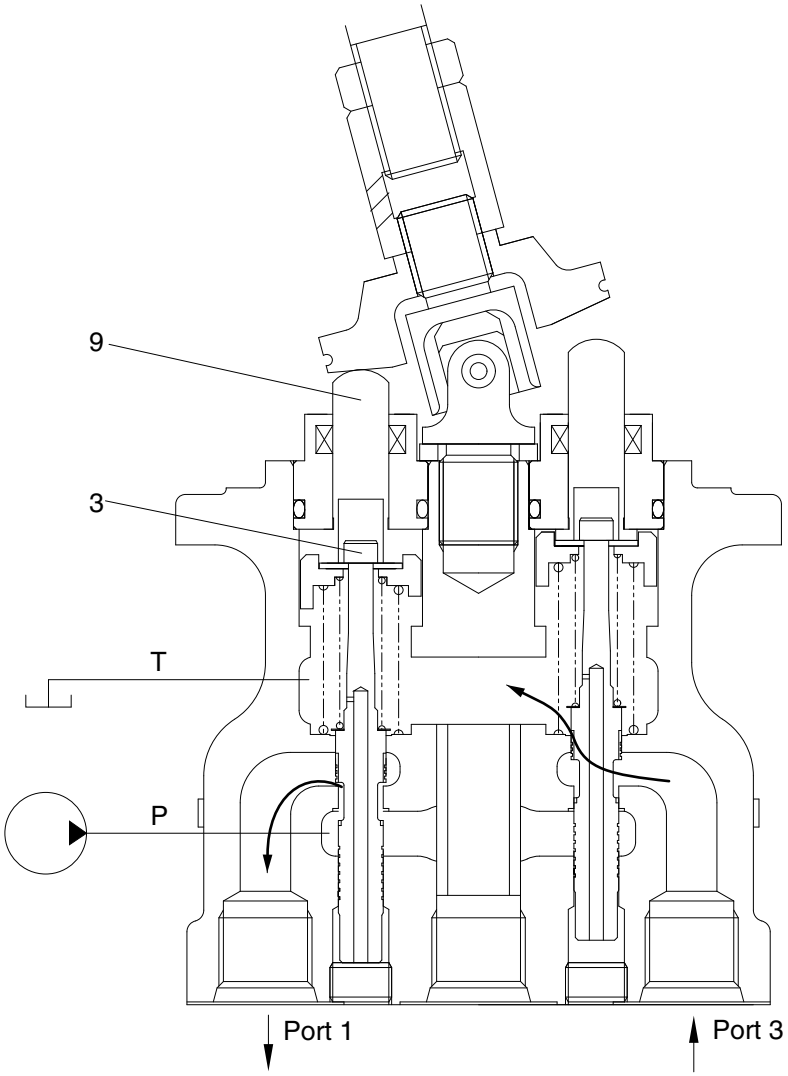
F4 = P × (A1 - A2), P : Main pressure of input, (A1 - A2) : Area difference of brake piston

When the brake piston (114) pushes casing (202) by the brake spring (117), the frictional force appears between friction plate (118), casing (202), separator plate (119) and brake piston (114). parking brake appears by friction force and spring elasticity of the brake spring (117), the drive shaft (103) is constrained.



559A2TM59

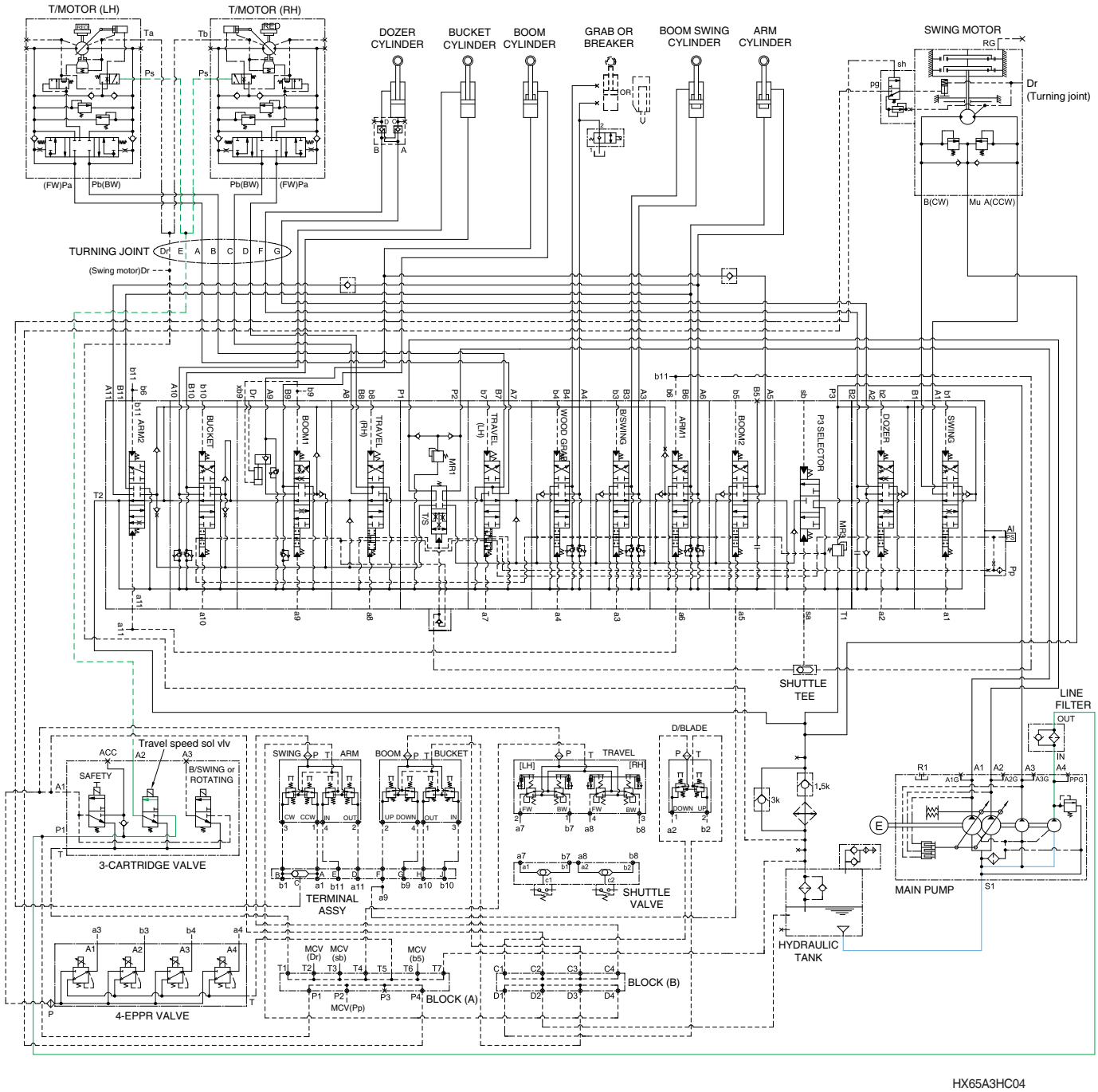
(2) Case where handle is tilted



300L2RL04

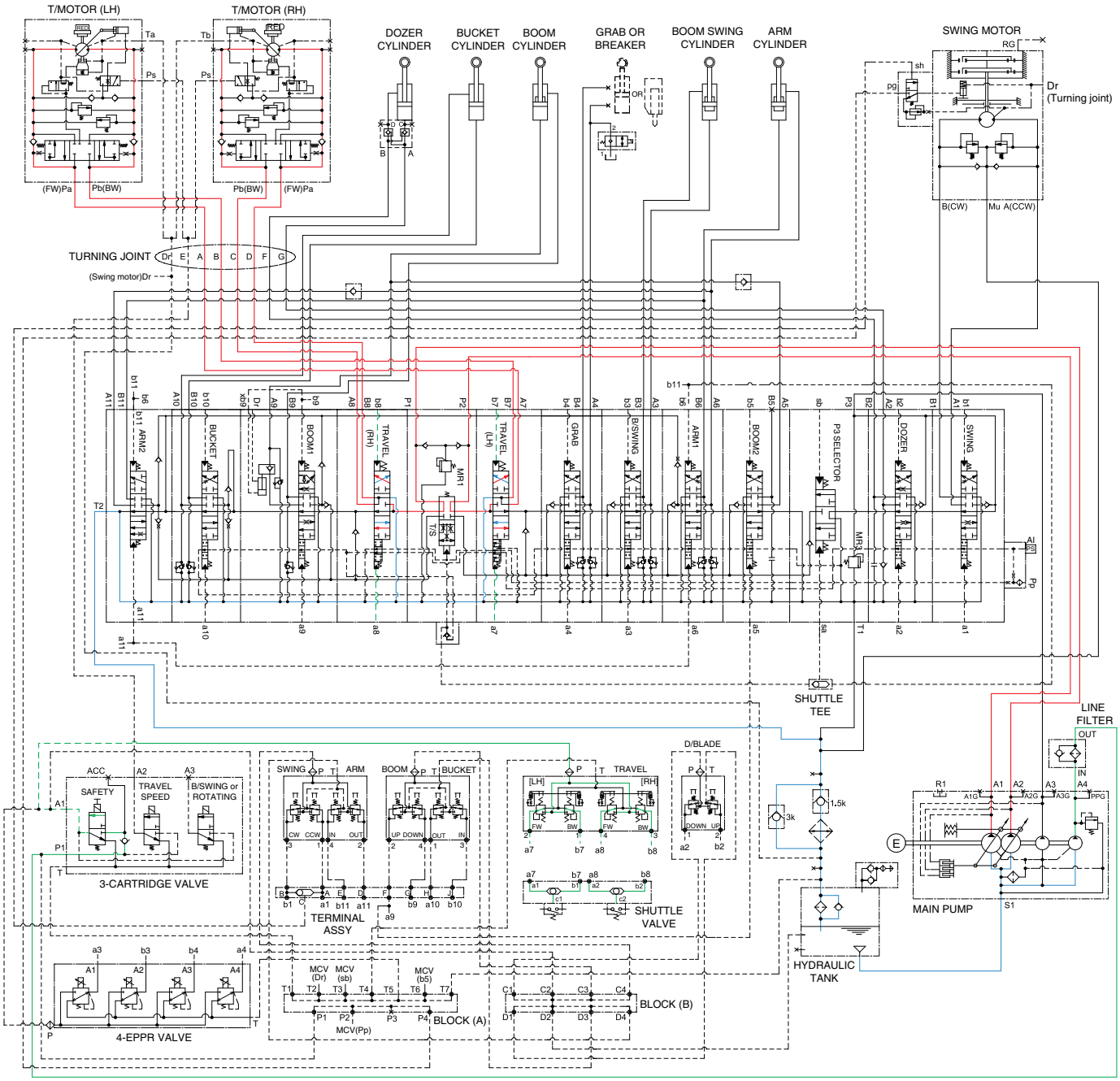
When the push rod (9) is stroked, the spool (3) moves downwards.
Then port P is connected with port (1) and the oil supplied from the pilot pump flows through port (1) to generate the pressure.
When the pressure at port (1) increases to the value corresponding to the spring force set by tilting the handle, the hydraulic pressure force balances with the spring force. If the pressure at port (1) increases higher than the set pressure, port P is disconnected from port (1) and port T is connected with port (1). If it decreases lower than the set pressure, port P is connected with port (1) and port T is disconnected from port 1.
In this manner the secondary pressure is kept at the constant value.
Besides, in some type, when the handle is tilted more than a certain angle, the upper end of the spool contacts with the inside bottom of the push rod and the output pressure is left to be connected with port P.

3. TRAVEL SPEED CONTROL SYSTEM



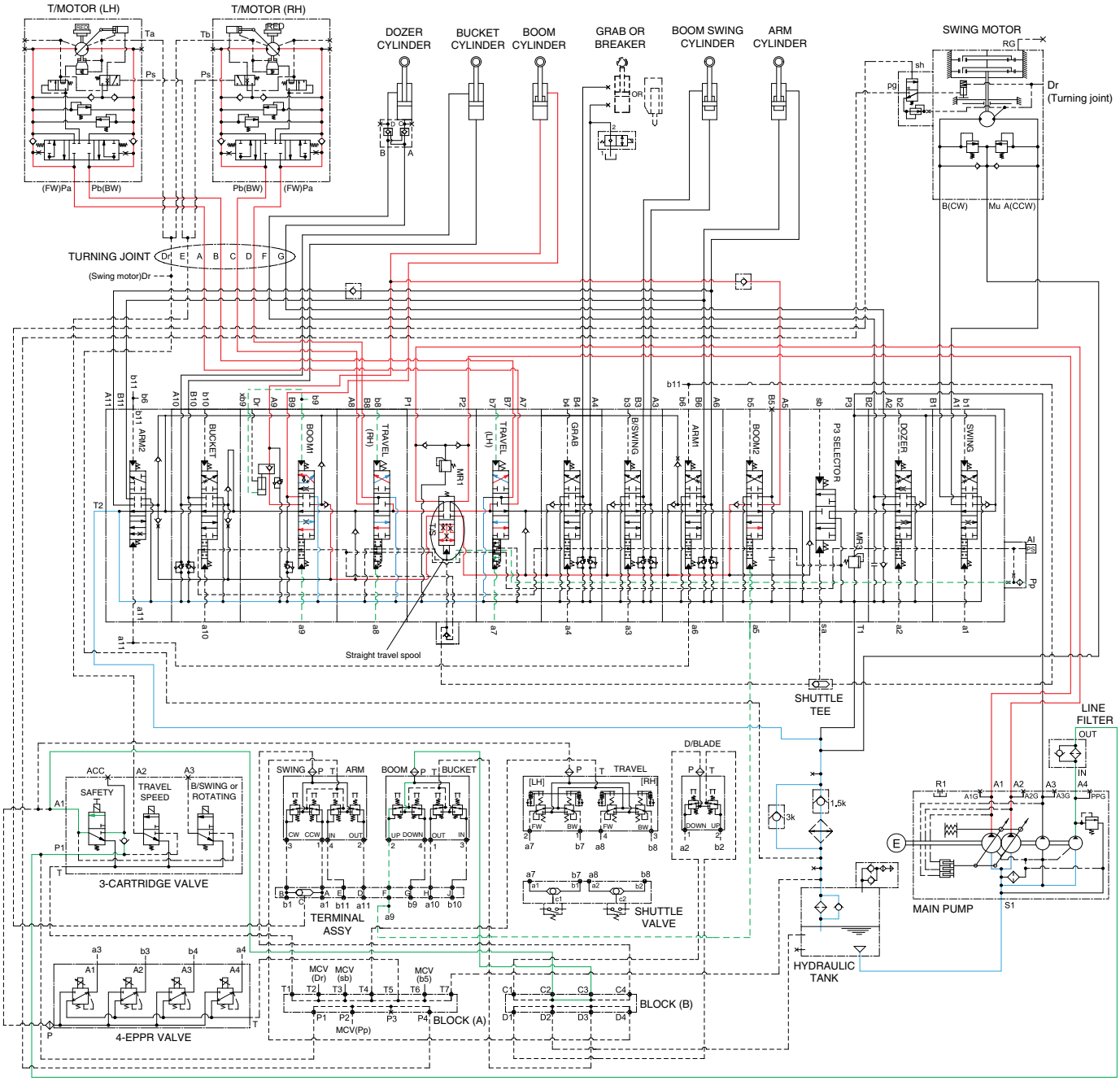
When the travel speed switch is pushed, the travel speed solenoid valve is actuated and the discharged oil from the pilot pump flows to the Ps port of pilot valve in the travel motors.
As a result, the control piston is pushed by the main oil flow, thus the displacement is minimized.
When the travel speed switch is pushed once more, the travel speed solenoid valve is return to original position by the force of spring, the hydraulic oil of Ps port returns to the hydraulic tank.
As a result, the control piston is returned by the main oil flow, thus the displacement is maximized.

8. TRAVEL FORWARD AND REVERSE OPERATION



When the travel levers are pushed forward or reverse position, the travel spools in the main control valve are moved to the forward or reverse travel position by the pilot oil pressure (a7, a8, b7, b8) from the remote control valve. The oil from the both pumps (A1, A2) flows into the main control valve and then goes to the both travel motors through the turning joint. The return oil from both travel motors returns to the hydraulic oil tank through the turning joint and the travel spools in the main control valve. When this happens, the machine moves to the forward or reverse.

7. COMBINED BOOM AND TRAVEL OPERATION

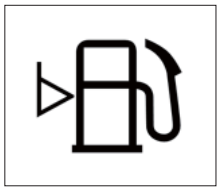


When the boom and travel functions are operated, simultaneously the boom spools and travel spools in the main control valve are moved to the functional position by the pilot oil pressure (a5, a9, b9, a7, a8, b7, b8) from the remote control valve and the straight travel spool is pushed to the up by the oil pressure (Pp) from pilot pump.

The oil from the A1 and A2 pumps flows into the boom cylinders and the travel motors through boom 1, boom 2, travel LH and travel RH spools via the straight travel spool.

The boom is operated and the machine travels straight.

(3) Fuel level warning lamp



290F3CD63

① This warning lamp lights up and the buzzer sounds when the level of fuel is below 9%.
② Fill the fuel immediately when the lamp is ON.

(4) Emergency warning lamp

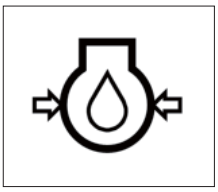
290F3CD64

① This warning lamp pops up and the buzzer sounds when each of the below warnings occurs.
- MCU input voltage abnormal
- Accel dial circuit abnormal or open

※ The pop-up warning lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also the buzzer will stop.
This is same as following warning lamps.

② When this warning lamp lights up, machine must be checked and serviced immediately.

(5) Engine oil pressure warning lamp



290F3CD65

① This warning lamp lights up when the engine oil pressure is low.
② If the lamp lights up, shut off the engine immediately. Check oil level.

※ Serious damage can be caused to the engine when the engine is operated continuously while the warning lamp is turned ON.

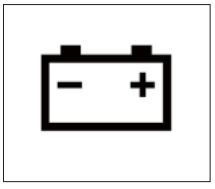
(6) Check engine warning lamp

290F3CD66

① Warning lamp is turned ON when the engine must be checked.

※ When the warning lamp is turned ON, stop the machine and find the cause for repair.

(7) Battery charging warning lamp



290F3CD67

① This warning lamp lights up when the battery charging voltage is low.
② Check the battery charging circuit when this lamp lights up.

(11) Manual safety lock pilot lamp

140WA3CD37

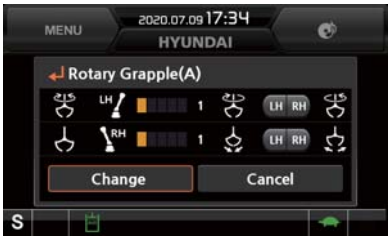
Refer to the operator's manual page 3-45 for the safety knob.

(12) Smart key pilot lamp

Refer to the page 4-28.

c) Confifirmation

HX60A3CD81OA



HW60A3CD71OA

※ Symbol ( ) is activated on the low side of main screen when option attach function is used.

※ Previous setting value can be checked by following procedure.

– Menu > Management > option attach

a) Rotary setting

– Rotary RCV : LH
– Rotary flow level : 3
– CW rotation : LH
– CCW rotation : RH

b) Grapple setting

– Grapple RCV : RH
– Grapple flow level : 3
– Open : LH
– Close : RH

③ ESL mode setting

HX60A3CD148A

HX60A3CD149A

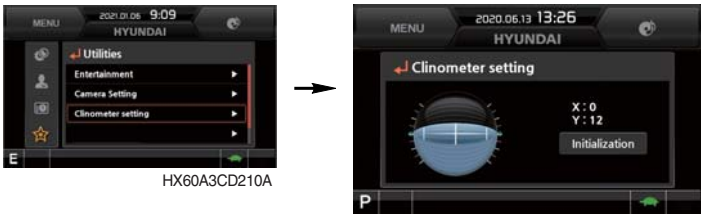
HW60AH3CD150A

– ESL : Engine Starting Limit
– ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
– When you Enable the ESL mode, the password will be required when the starting switch is turned to the on position.
– Disable : ESL function is disabled and password is not required to start engine.
Enable (always) : The password is required whenever the operator starts engine.
Interval : The password is required when the operator starts engine first. But the operator can restart the engine within the interval time without inputting the password.

※ The interval time can be set to a maximum 4 hours.

※ Default password : 00000
Password length : 5~10 digits

③ Clinometer setting

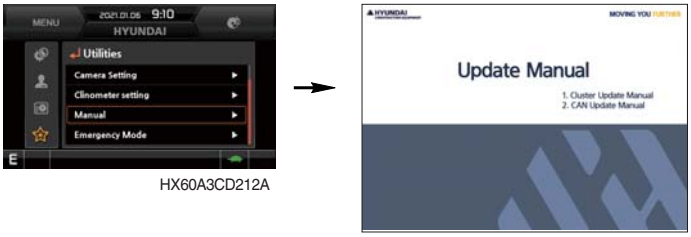


HX60A3CD210A

HX60A3CD211A

· When the machine is on the flatland, if you touch "initialization" on cluster, the values of X, Y will reset to "O".
· You can confirm tilt of machine in cluster's operating screen.

④ Manual

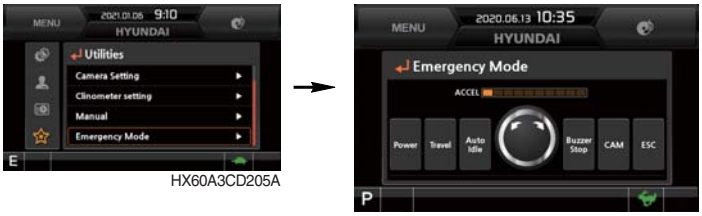


HX60A3CD212A

HX60A3CD213A

· Manual of the cluster can be read on the monitor.

⑤ Emergency mode



HX60A3CD205A

HX60A3CD206A

· When switches of the monitor and the accel dial fails, switches are displayed on LCD, and you are allowed to perform operation by touching the screen.
· Such operation is allowed only on this mode screen.

⑥ Quick Cooling Mode

HW60AH3CD205A

HW60AH3CD206A

· While the machine is stopped and discontinued with operation, engine can be operated in maximum RPM for maximum rotation of the radiator fan. (Max. for 5 minutes)
- Setting : When the machine is stopped, the safety lever is lowered to set the quick cooling mode in the locked state
- Release : Released when the operating time exceeds 5 minutes, when the safety lever is cleared, and when the quick cooling mode release button is pressed

4. HEAD AND WORK LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.11) → Head lamp relay [CR-13 (30, 86)]
Fuse box (No.12) → Work lamp relay [CR-3 (30, 86)]
Fuse box (No.7) → Switch panel [CR-116 (10)]

(1) Head lamp switch ON

Head lamp switch ON [CN-116 (1)] → Head lamp relay [CR-13 (85) → (87)]
- → I/conn [CN-4 (22)] → Head lamp ON [CL-3, 4 (2)]
- → New cassette radio illumination ON [CN-27 (9)]
- → Accel dial illumination ON [CN-142 (2)
- → I/conn [CN-11 (8)] → AC/Heater controller illumination ON

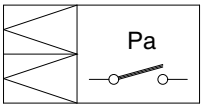
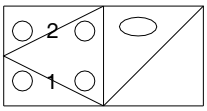
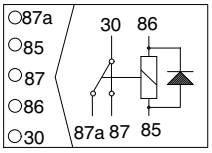
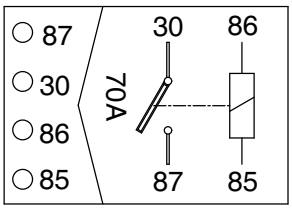
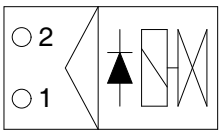
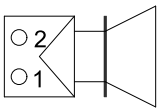
(2) Work lamp switch ON

Work light switch ON [CN-116 (2)] → Work lamp [CR-3 (85) → (87)] → I/conn [CN-5 (1)]
I/conn [CN-12 (2)] → Work lamp ON [CL-5 (2)]

2) CHECK POINT

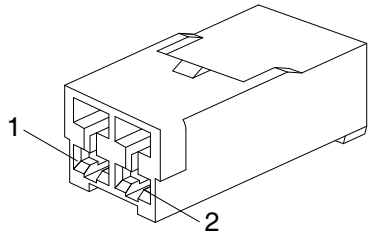
Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power output) ③ - GND (switch relay input) ④ - GND (head light) ⑤ - GND (fuse box) ⑥ - GND (switch power output) ⑦− GND (switch relay input) ⑧ - GND (work light)	10~12.5V

※ GND : Ground

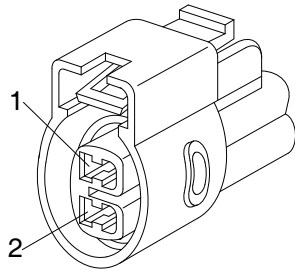
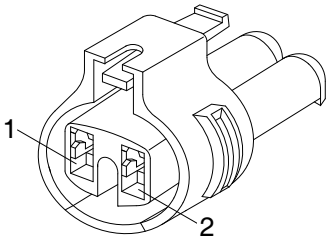
Part name	Symbol	Specification	Check
Air cleaner pressure switch	 CD-10	Pressure: 635mmH_2O (N.O TYPE)	※ Check contact Normal : ∞Ω
Fuel sender	 CD-2	-	※ Check resistance Full : 100Ω Low : 500Ω Empty warning : 700Ω
Relay	 CR-2 CR-3 CR-4 CR-5 CR-7 CR-9 CR-13 CR-45 CR-68 CR-85 CR-385	12V 20A	※ Check resistance Normal : about 200Ω (for terminal 85-86) : 0Ω (for terminal 30-87a) : ∞Ω (for terminal 30-87)
Relay (Start, Air heater)		12V 70A	※ Rated coil current 1.2±0.3A
Solenoid valve	 CN-66 CN-66P CN-68 CN-70 CN-140	12V 1A	※ Check resistance Normal : 15~25Ω (for terminal 1-2)
Speaker	 CN-23(LH) CN-24(RH)	4Ω 20W	※Check resistance Normal : 4Ω

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CR-85	-	5	Beacon lamp relay	SJA003526-001	-
CR-385	-	5	Start limit relay	SJA003526-001	-
· SENDER					
CD-1	AMP	2	Hydraulic temp sender	85202-1	-
CD-2	AMP	2	Fuel sender	-	S816-102002
CD-7	DEUTSCH	3	Auto idle pressure switch	DT06-3S-EP06	-
CD-10	AMP	2	Air cleaner switch	85202-1	-
CD-11	KET	2	Travel pressure switch	MG640795	-
CD-12	KET	2	Travel pressure switch	MG640795	-
CD-31	DEUTSCH	3	Overload pressure	DT06-3S-EP06	DT04-3P-E005
CD-32	DEUTSCH	3	Boom up pressure	DT06-3S-EP06	-
CD-45	DEUTSCH	2	WIF sensor	DT06-2S-EP06	-
CD-158	AMP	4	MAF connector	-	1-1564559-1
CD-158A	AMP	4	MAF sensor	1-178645-1	-
DO-1	AMP	2	Diode	174352-2	21EA-50570
DO-2	AMP	2	Diode	174352-2	21EA-50550
DO-3	-	2	Diode	S816-002002	21EA-50550
DO-20	AMP	2	Diode	S816-002002	21EA-50550
· SWITCH					
CS-2	KET	6	Start key switch	S814-006000	-
CS-2A	-	6	Start key	S814-006000	-
CS-2B	DEUTSCH	3	BKCU	DT06-3S-EP06	DT04-3P-E005
CS-3	CARLING	10	Wiper switch	VC2-01	-
CS-4	AMP	3	Safety switch	174257-2	-
CS-4A	AMP	4	Safety switch	-	174259-2
CS-16	AMP	2	Fuel filler pump switch	174352-2	174354-2
CS-26	DEUTSCH	2	Fool pedal	DT06-2S-EP06	-
CS-26A	AMP	2	Foot pedal	174352-2	174359-2
CS-30	CARLING	10	Wiper/washer switch	VC2-01	-
CS-50	CARLING	10	Overload switch	VC2-01	-
CS-67	CARLING	10	Quick coupler switch	VC2-01	-
CS-74A	YAZAKI	2	Master switch	S813-030201	S813-130201
CS-100	CARLING	10	DPF switch	VC2-01	-
CS-250	DEUTSCH	2	Seat belt alarm	DT06-2S-EP06	DT04-2P-E005

11) KET 090 CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 MG610070	

12) KET 090 WP CONNECTORS

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 MG640605	
2	 MG640795	

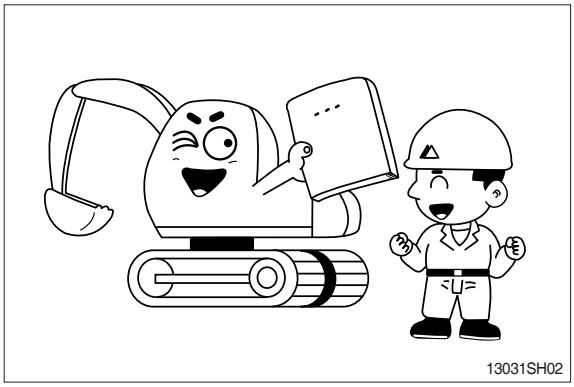
Fault code		Description
SPN	FMI	
987	4	CE(Check engine) Lamp Short to Ground
987	5	CE(Check engine) Lamp Open circuit
1076	3	Fuel Metering unit plausibility error in overrun mode
1076	4	Fuel Metering unit plausibility error in idle mode
1076	16	Maximum negative rail pressure deviation with metering unit on lower limit is exceeded
1076	20	Rail pressure too low for injection
1081	3	Glow plug Lamp Short to Battery
1081	4	Glow plug Lamp Short to Ground
1081	5	Glow plug Lamp Open circuit
1207	0	ECU temperature High fault
1207	3	ECU temperature sensor High fault (Short circuit to battery)
1207	4	ECU temperature sensor Low fault (Short circuit to ground)
1382	0	Fuel filter pressure high fault
1382	1	Fuel filter pressure low fault
1382	3	Fuel filter pressure sensor signal high fault
1382	4	Fuel filter pressure sensor signal low fault
1382	7	Fuel Filter Pressure low detection 1 - Warning
1382	13	Fuel Filter Pressure low detection 2 - Torque reduction
1485	7	ECU Main relay Stuck fault
1485	11	ECU Main relay Early opening fault
1568	3	Multi-torque switch signal too high fault
1568	4	Multi-torque switch signal too low fault
1612	3	Injector bank 1st Short circuit fault
1612	12	Injector bank 2nd Short circuit fault
1639	3	Fan speed too high fault
1639	4	Fan speed too low fault
1639	11	Fan speed signal long period fault path
1761	19	DEF Tank Level Signal error
1867	1	ECU over temperature for SCR Monitoring
1867	3	"ABE active" report due to overvoltage detection
1867	4	"ABE active" report due to undervoltage detection
1867	11	"WDA/ABE active" report due to unknown reason
1867	19	"WDA active" report due to errors in query-response communication
1867	22	ECU Software Reset 0 fault
2789	0	Turbine inlet temperature High fault
2789	3	Turbine inlet temperature sensor High fault
2789	4	Turbine inlet temperature sensor Low fault
2789	11	Turbine inlet temperature Plausibility Fault
2791	3	EGR H-Bridge Driver Short circuit to battery

2. DIAGNOSING PROCEDURE

To carry out troubleshooting efficiently, the following steps must be observed.

STEP 1. Study the machine system

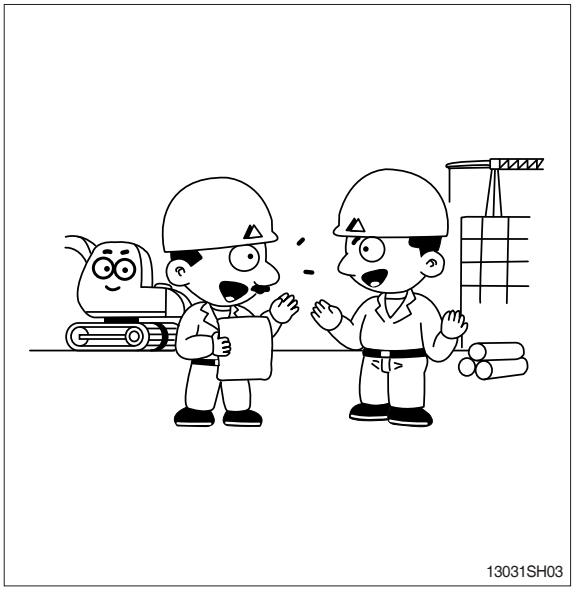
Study and know how the machine is operating, how the system is composing, what kinds of function are installed in the machine and what are specifications of the system components by the machine service manual.
Especially, deepen the knowledge for the related parts of the trouble.


13031SH02

STEP 2. Ask the operator

Before inspecting, get the full story of malfunctions from a witness --- the operator.

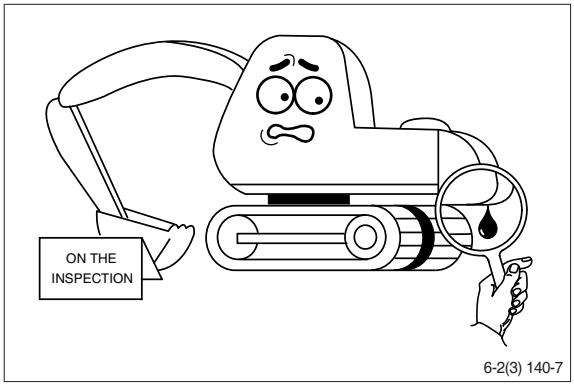
1) How the machine is used and when it is serviced?
2) When the trouble was noticed and what work the machine was doing at that time?
3) What is the phenomenon of the trouble? Was the trouble getting worse, or did it come out suddenly for the first time?
4) Did the machine have any troubles previously? If so, which parts were repaired before.


13031SH03

STEP 3. Inspect the machine

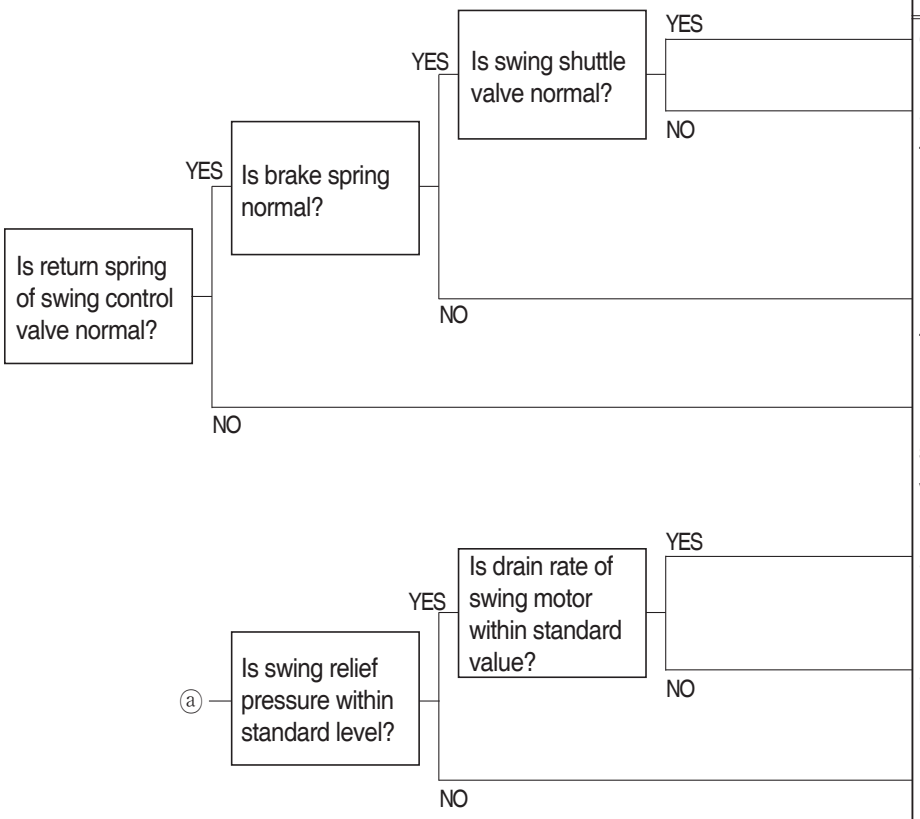
Before starting troubleshooting, check the machine for the daily maintenance points as shown in the operator's manual.

And also check the electrical system including batteries, as the troubles in the electrical system such as low battery voltage, loose connections and blown out fuses will result in malfunction of the controllers causing total operational failures of the machine.



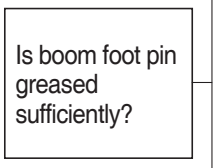
6-2(3) 140-7

5) THE SWING UNIT DRIFTS WHEN THE MACHINE IS AT REST ON A SLOPE



Cause	Remedy
ⓐ Shuttle valve is faulty.	Disassemble and replace.
Brake spring is faulty.	Disassemble and replace.
Return spring of swing control valve is faulty.	Disassemble and replace.
Swing relief valve is faulty.	Disassemble and repair or replace.
Swing motor is broken.	Disassemble and repair.
	Adjust swing relief valve pressure or replace swing relief valve.

6) BOOM MAKES A SQUEAKING NOISE WHEN BOOM IS OPERATED



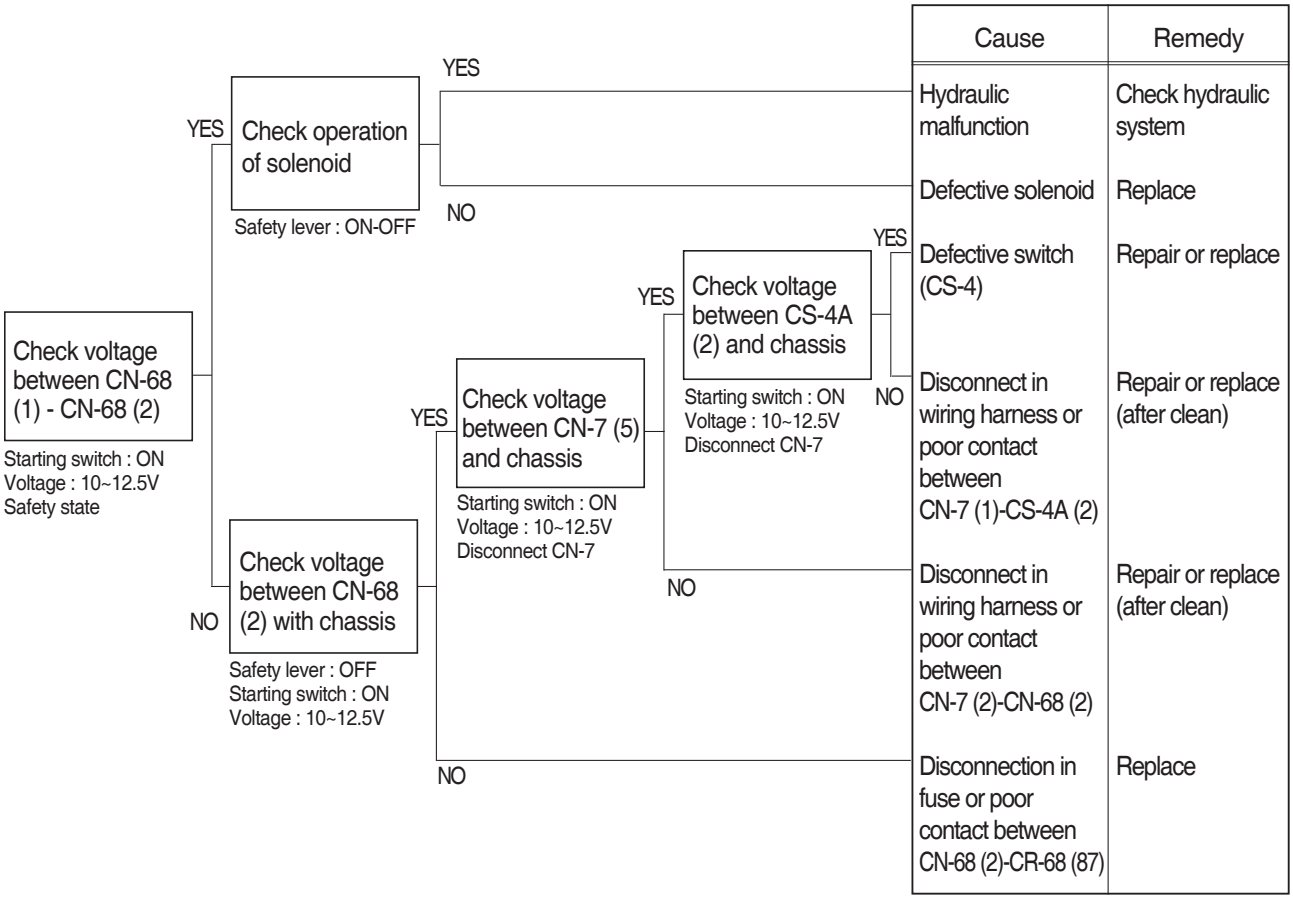
YES

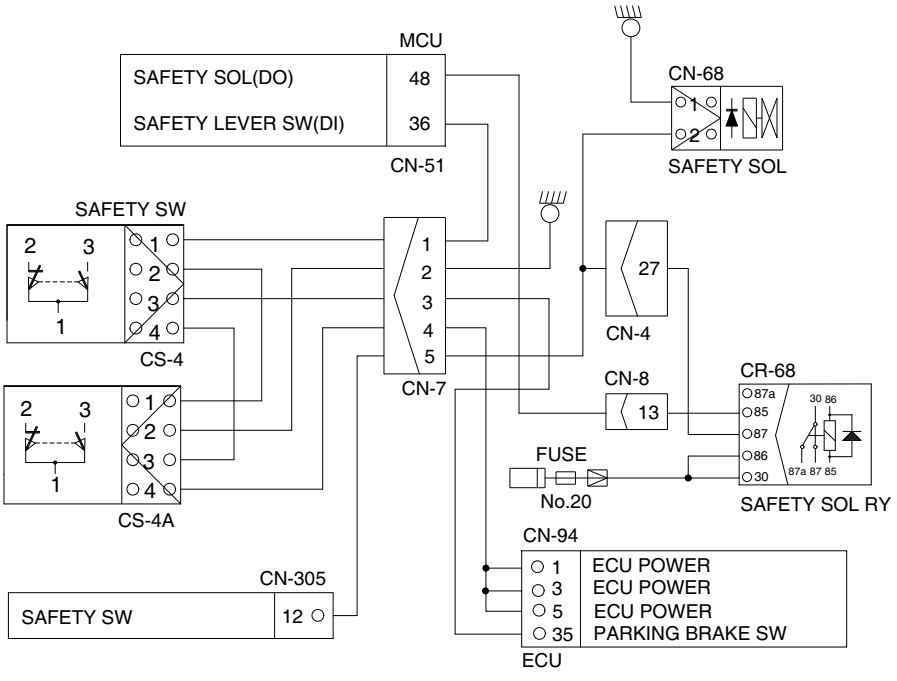
NO

Cause	Remedy
	Frictional noise occurs between the sliding faces of boom cylinder's oil seal and boom proper. ※ Frictional noise will disappear if they are kept used.
Boom foot pin has run out of grease.	Supply grease to it. ※ If seizure is in an initial stage, supply sufficient grease. If seizure is in a grown state, correct it by paper lapping or with an oil stone.

9. WHEN SAFETY SOLENOID DOES NOT OPERATE

· 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.20.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



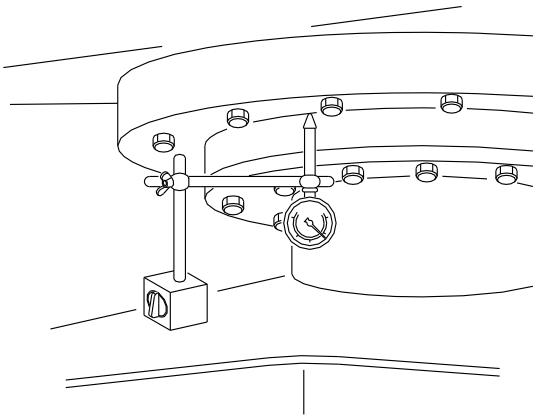


65A5TS19

SECTION 6 MAINTENANCE STANDARD

8) SWING BEARING PLAY

(1) Measure the swing bearing play using a dial gauge to check the wear of bearing races and balls.



7-10(1) 140-7

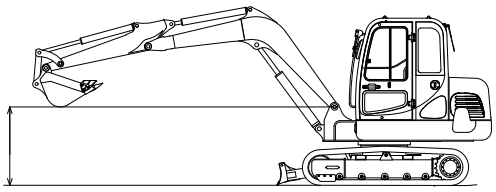
(2) Preparation

① Check swing bearing mounting cap screws for loosening.
② Check the lubrication of the swing bearing. Confirm that bearing rotation is smooth and without noise.
③ Install a dial gauge on the track frame as shown, using a magnetic base.
④ Position the upperstructure so that the boom aligns with the tracks facing towards the front idlers.
⑤ Position the dial gauge so that its needle point comes into contact with the bottom face of the bearing outer race.
⑥ Bucket should be empty.

(3) Measurement

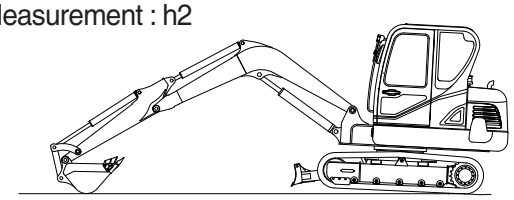
① With the arm rolled out and bucket rolled in, hold the bottom face of the bucket to the same height of the boom foot pin.
Record the dial gauge reading (h1).
② Lower the bucket to the ground and use it to raise the front idler 50 ㎝.
Record the dial gauge reading (h2).
③ Calculate bearing play (H) from this data (h1 and h2) as follows.
H=h2-h1

Measurement : h1



R5576MC09

Measurement : h2



555C96MC10

(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm

Model	Standard	Maximum allowable	Remarks
HX65A	0.5 ~ 1.2	2.4	

17) SYSTEM PRESSURE REGULATOR RELIEF SETTING

(1) Preparation

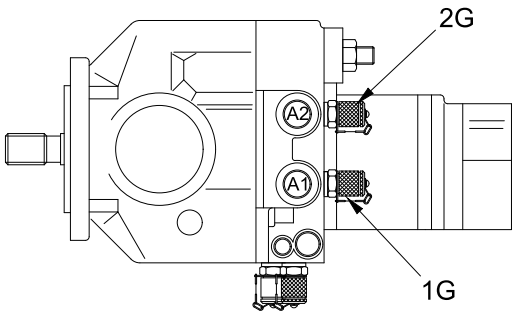
① Stop the engine.

② Push the pressure release button to bleed air.

③ To measure the system relief pressure. Install a connector and pressure gauge assembly main pump gauge port, as shown.

④ Start the engine and check for oil leakage from the port.

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



R55NN7MA17

(2) Measurement

① Slowly operate each control lever of boom, arm and bucket functions at full stroke over relief and measure the pressure.

② In the swing function, place bucket against an immovable object and measure the relief pressure.

③ In the travel function, lock undercarriage with an immovable object and measure the relief pressure.

(3) Evaluation

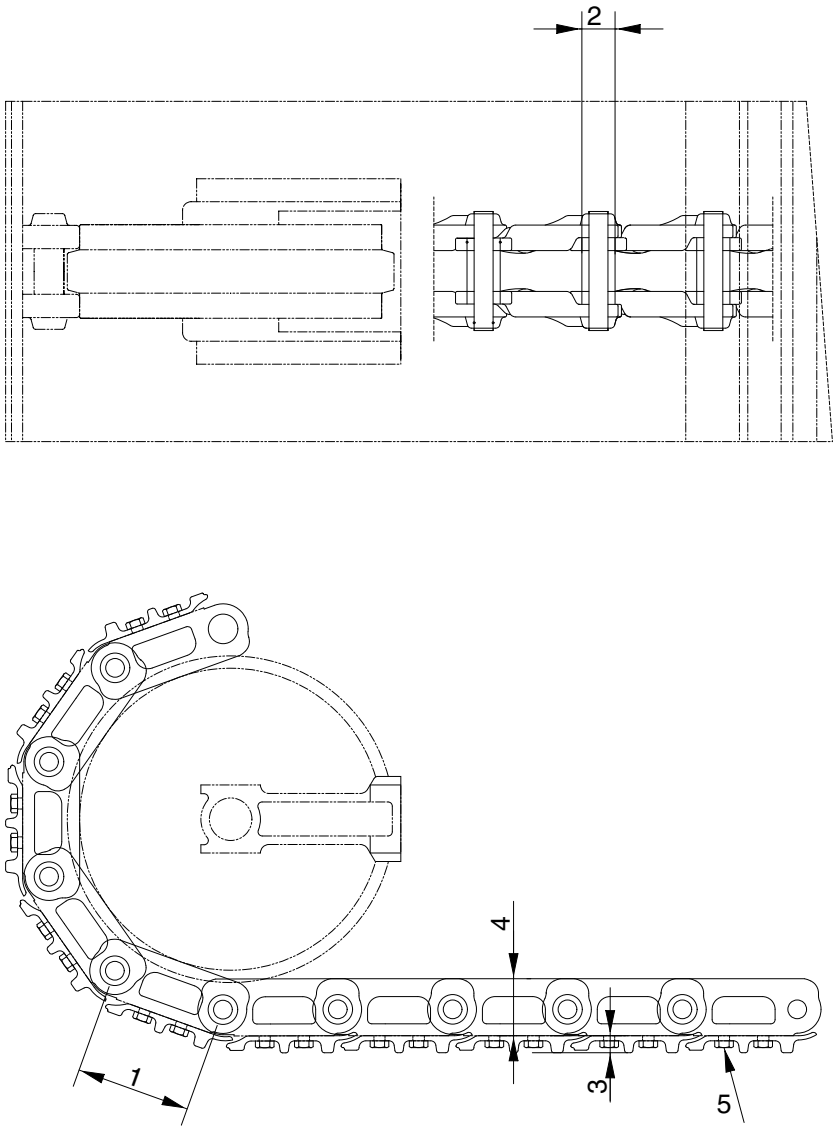
The average measured pressure should be within the following specifications.

Unit : kgf / cm^2

Model	Function to be tested	Standard
HX65A	Boom, Arm, Bucket	220±10
	Travel	220±10
	Swing	220±10

1. TRACK SHOE

1) STEEL SHOE SPEC



R5576MC16

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Link pitch	135	138.6	Replace bushing and pin and link assembly
2	Outside diameter of bushing	39	35.4	
3	Height of grouser	20	17	Lug welding, rebuild or replace
4	Height of link	70	64.5	
5	Tightening torque	Initial tightening torque : 19.5±2.0kgf · m		Retighten

2. INSTALL WORK

1) Tighten all bolts and nuts(Sleeve nuts) to the specified torque.
2) Install the hoses without twisting or interference.
3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
4) Bend the cotter pin or lock plate securely.
5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.
6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
7) Clean all parts, and correct any damage, dents, burrs, or rust.
8) Coat rotating parts and sliding parts with engine oil.
9) When press fitting parts, coat the surface with antifriction compound(LM-P).
10) After installing snap rings, check that the snap ring is fitted securely in the ring groove(Check that the snap ring moves in the direction of rotation).
11) When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
12) When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.
13) When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
14) When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:
   (1) Start the engine and run at low idling.
   (2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 100㎜ before the end of the stroke.
   (3) Next, operate the piston rod to the end of its stroke to relieve the circuit. (The air bleed valve is actuated to bleed the air.)
   (4) After completing this operation, raise the engine speed to the normal operating condition.

※ If the hydraulic cylinder has been replaced, carry out this procedure before assembling the rod to the work equipment.

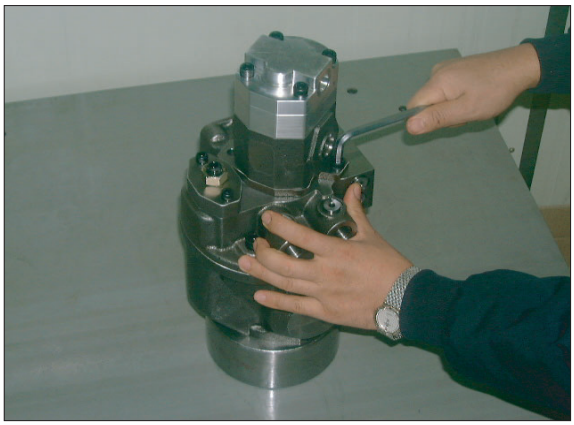
※ Carry out the same operation on machines that have been in storage for a long time after completion of repairs.

3. DISASSEMBLY PROCEDURE

1) DISASSEMBLING THE GEARED PUMP

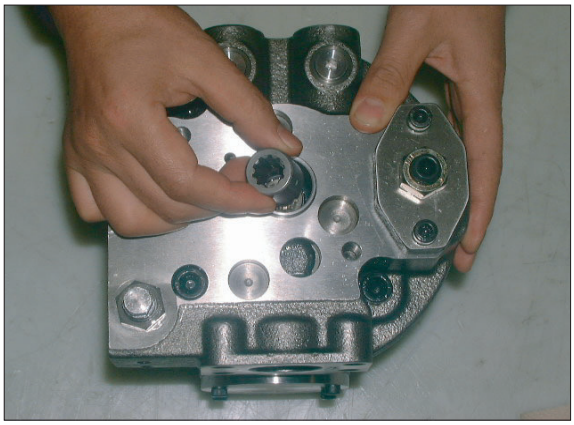
① Remove the hexagonal socket headed bolts (M10 × 25, 2 pieces).
Hexagonal bar spanner
(Hex. side distance : 8)

※ Be careful because the O-ring and filter are provided to the match surface of the geared pump.



R55NM7HP03

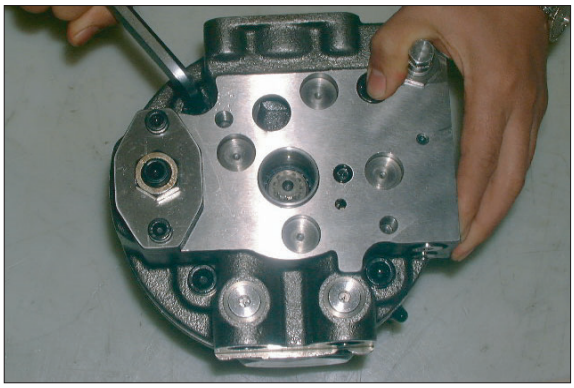
② Remove the coupling.



R55NM7HP04

2) DISASSEMBLING THE MAIN PUMP

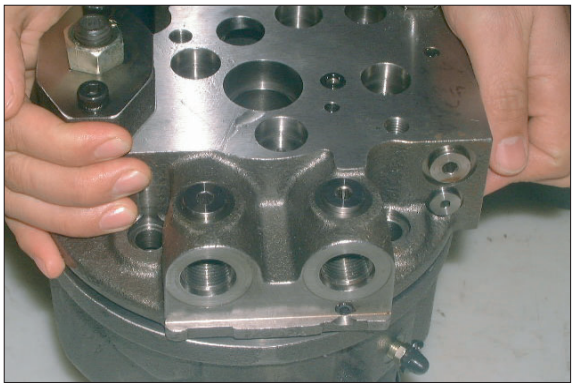
① Remove the cover.
Remove the hexagonal socket headed bolts. (M12 × 30, 3pieces) and (M12× 55, 1piece).
Hexagonal bar spanner
(Hex. side distance : 10)



R55NM7HP05

② Remove the cover in a horizontal condition.
Connect motor to work table.

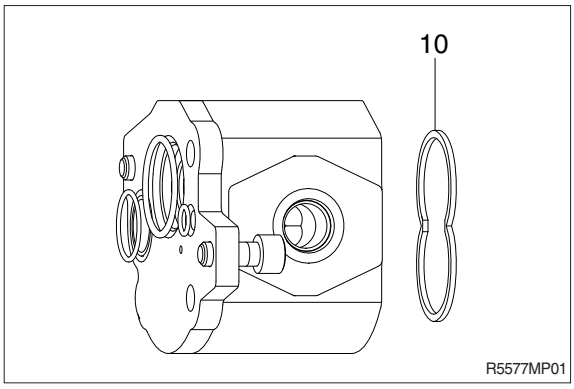
※ Be careful because the control plate is provided to the backside.
When the cover is difficult to remove, knock lightly with a plastic hammer.



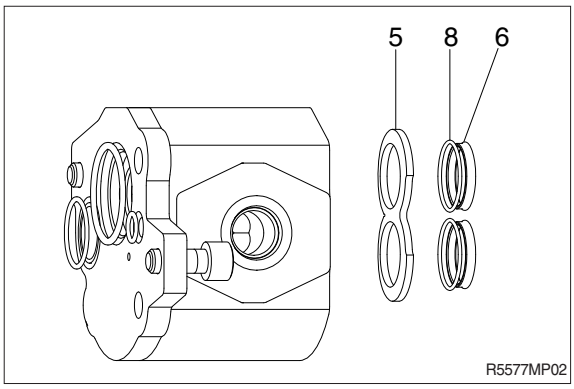
R55NM7HP06

(3) Disassembling the geared pump (P3)

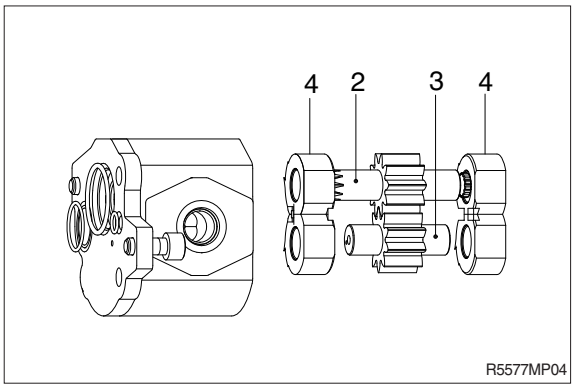
① Remove the square ring (10).



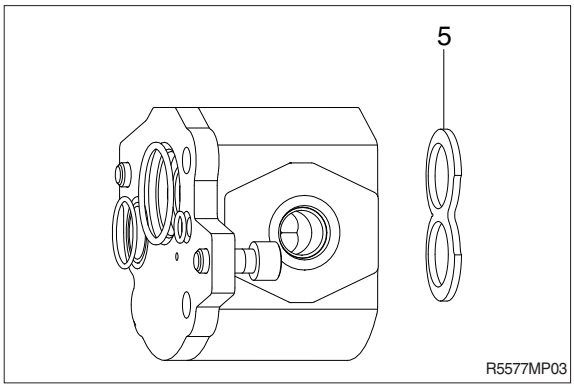
② Remove the plate (5) and the guide ring (pieces). With O-ring (6, 8).
Remove the O-ring (8) from guide ring (6).



③ Remove the drive and idle gear (2, 3) and the side plate (4) assembly.



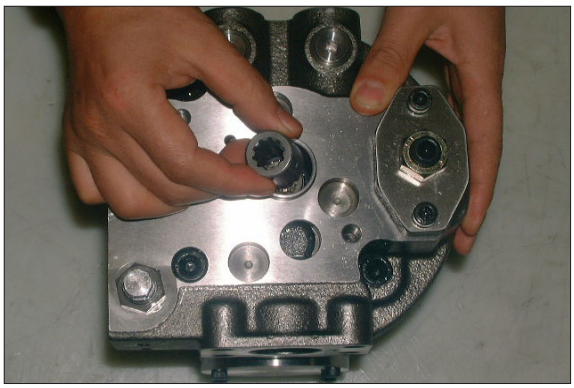
④ Remove the plate



(35) Install the O-ring into the cover.

R55NM7HP85

(36) Install the coupling to the shaft end of the main pump.

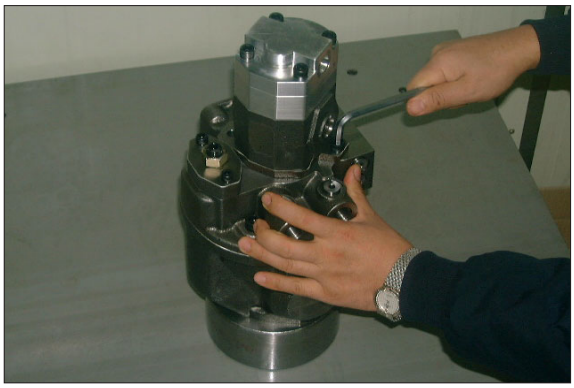


R55NM7HP86

(37) Connect the main and geared pump.

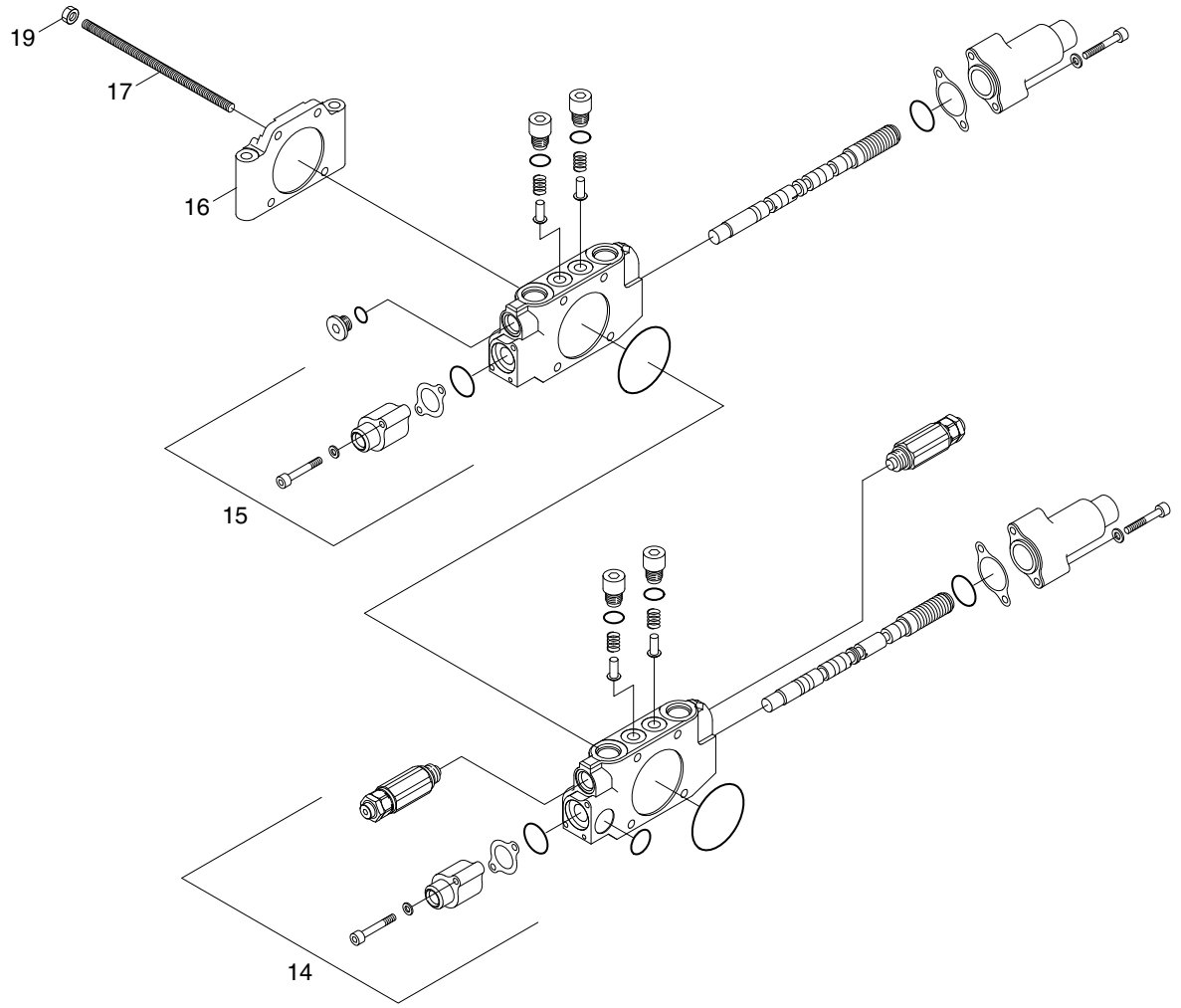
R55NM7HP87

(38) Fix the geared pump with the hexagonal socket headed bolts (M10×25, 2pieces).
Hexagonal bar spanner
(Hex. side distance : 8)
Tightening torque : 5.6 ~ 7.0 kgf · m
(40.5 ~ 50.6 lbf · ft)



R55NM7HP88

STRUCTURE (4/4)

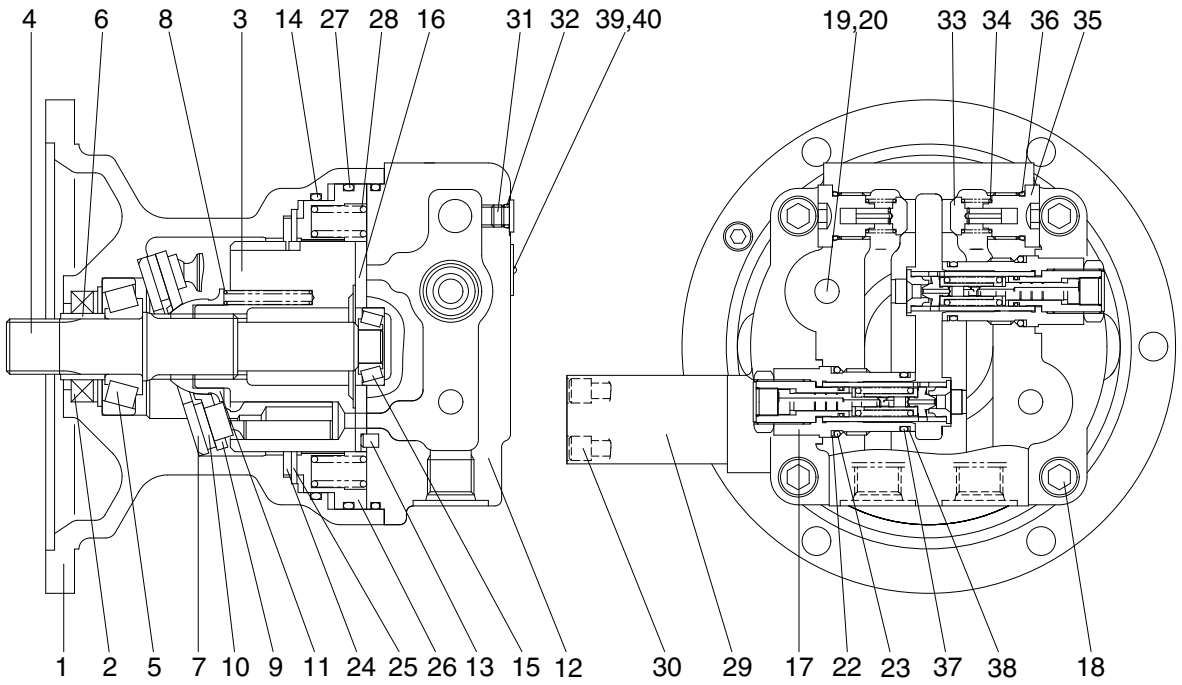


65A2MC05

14	Bucket section assy	17	Tie bolt
15	Arm 2 section assy	19	Nut
16	End cover		

2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

1) STRUCTURE



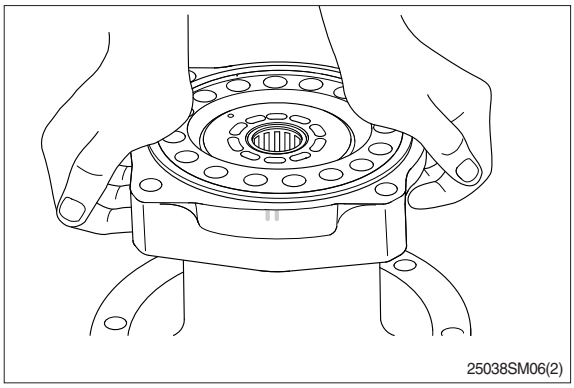
HX60A2SM03

1	Body	15	Taper bearing	30	Socket bolt
2	Oil seal	16	Valve plate	31	Plug
3	Cylinder block	17	Relief valve assy	32	O-ring
4	Shaft	18	Socket bolt	33	Valve
5	Taper bearing	19	Plug	34	Spring
6	Bushing	20	O-ring	35	Plug
7	Shoe plate	22	Back up ring	36	O-ring
8	Spring	23	O-ring	37	O-ring
9	Set plate	24	Friction plate	38	Back up ring
10	Piston shoe assy	25	Plate	39	Name plate
11	Ball guide	26	Parking piston	40	Rivet
12	Rear cover	27	O-ring		
13	Pin	28	Spring		
14	O-ring	29	Time delay valve		

(8) Brake piston

Lubricate specified hydraulic oil on outer sliding face of piston (28) and assemble brake piston to housing (1).

※ It is too tight to assemble piston (10) because O-rings (14,29) are fitted, therefore it is recommended to push piston (28) horizontally by hands at once.

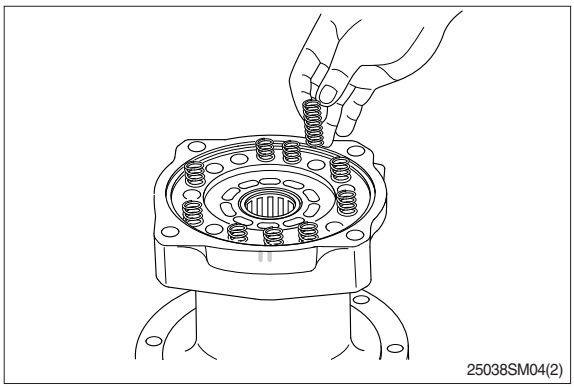


25038SM06(2)

(9) Spring (30, brake unit)

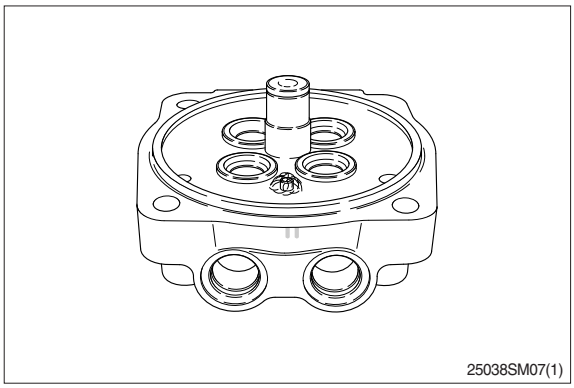
Assemble spring (30) to piston (28) of brake unit.

※ Insert spring (30) into original position.



25038SM04(2)

(10) Lubricate locating pin for antirotation of valve plate (16) of cover (12) with grease sufficiently and install locating pin to housing.

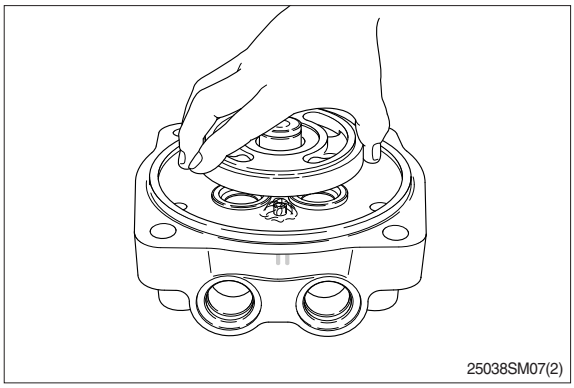


25038SM07(1)

(11) Balance plate

Assemble valve plate (16) to cover (12).

※ Be cautious of assembling direction.



25038SM07(2)

GROUP 6 TRAVEL DEVICE

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.

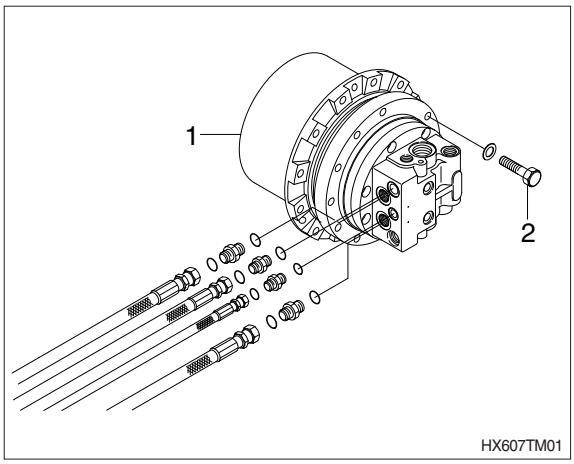
(6) Remove the hose.

※ **Fit blind plugs to the disconnected hoses.**

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly(1).

(9) Remove the mounting bolts(2), then remove the travel device assembly.
- Weight : 80 kg (180 lb)
- Tightening torque : 20±2.0 kgf·m (145±14.5 lbf·ft)

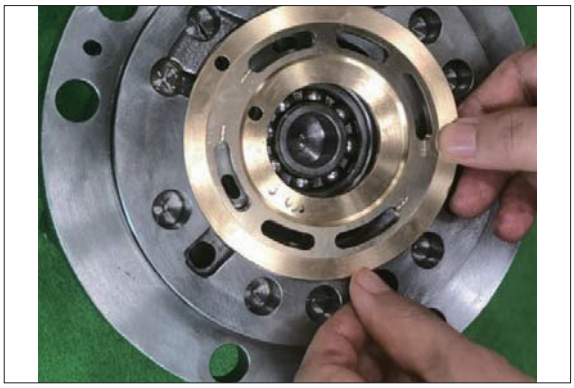


2) INSTALL

(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.

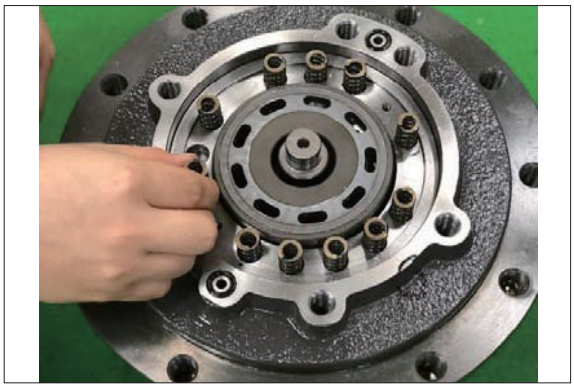
(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.



559A7TM22

■ DISASSEMBLY OF MOTOR BODY

(10) Remove the brake spring (117) from the brake piston (114).



559A7TM25

(11) Using the jig, remove the brake piston (114) from the casing (202). No.16

※ If you need to disassemble without jig, Fill the brake flow path hole with compressed air.

If you blow compressed air suddenly brake piston can jump out of casing.

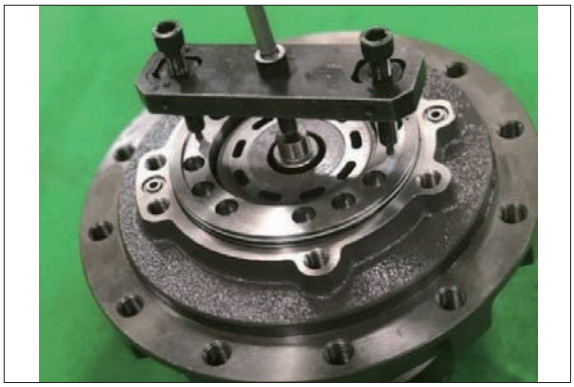
There is a risk of damage or injury to the part;

Please follow the directions below.

① Cover the casing with a clean cloth.

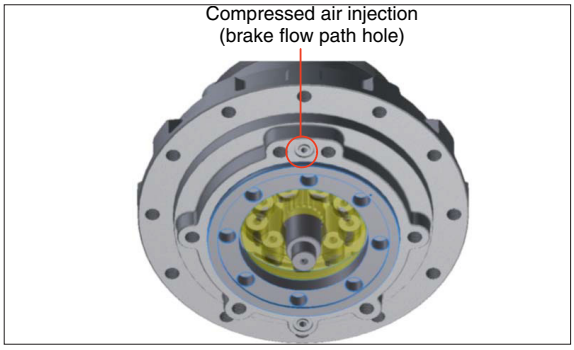
② Press the cloth lightly with your hand to prevent the brake piston from jumping out.

③ Fill the brake flow path hole with compressed air.



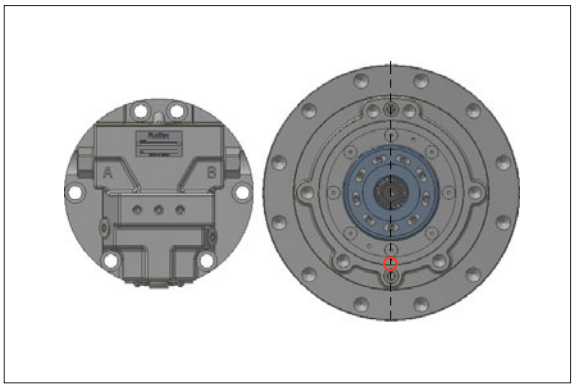
559A7TM26

※ Both ends of the jig are hooked to the groove of the brake piston. The center of the jig is hooked to the center of the drive shaft and makes the jig and brake piston parallel.



559A7TM40

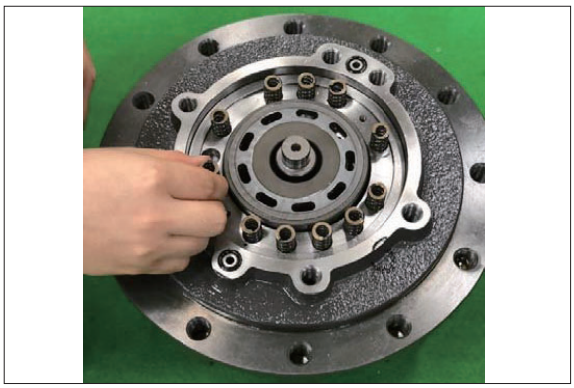
※ Pay attention to the assembly direction of the brake piston. The orifice of the brake piston is located downward on the same vertical line as the flow hole in casing.



559A7TM42

(21) Attach the brake spring (117) to the brake piston (114).

(22) Attach the O-ring (402) to the casing (202).



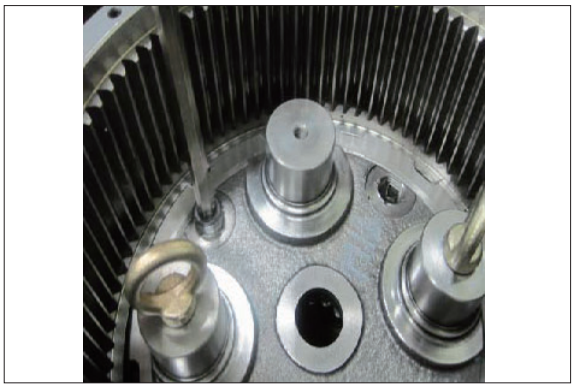
559A7TM25

(23) This term is necessary only when the cylindrical ball bearing (116) is removed. The outer ring of the cylindrical ball bearing (116) is tapped lightly on the valve casing (201) via the bearing press JIG and incorporated.

559A7TM24

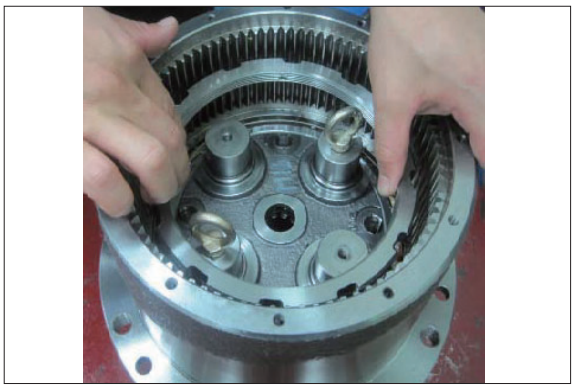
(12) Disassemble pipe plug (625).

※ When disassembling the pipe plug (625), Do not reuse.



559A7TM65

(13) Disassemble the nut ring (604).



559A7TM66

※ Please disassemble the nut ring using the dedicated jig referring to the attachment.

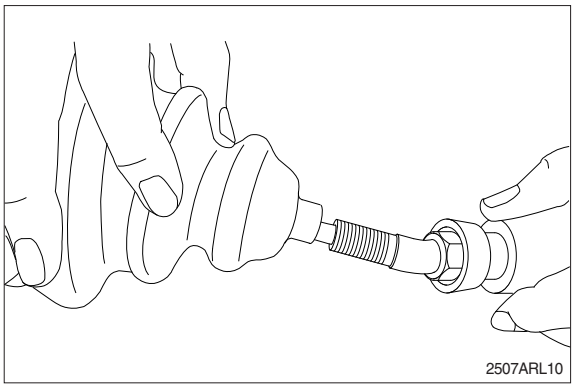
559A7TM67

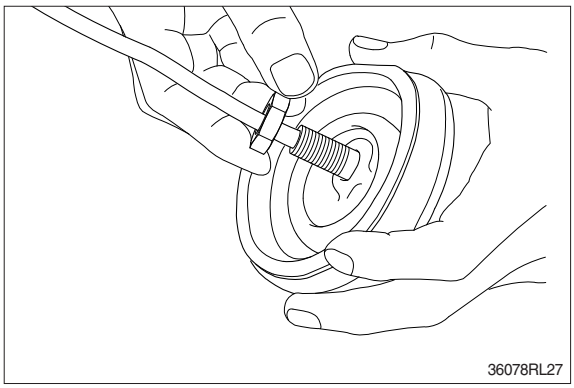
2) TOOLS

(1) Tools

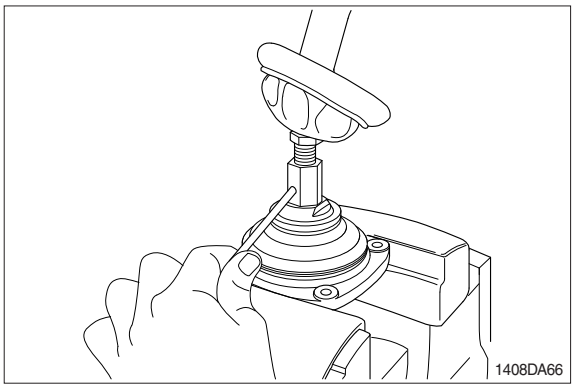
Tool name	Remark	
Allen wrench	6	B 
Spanner	22	
	27	
(+) Driver	Length 150	
(-) Driver	Width 4~5	
Torque wrench	Capable of tightening with the specified torques	

(14) Fit boot (23) and lock nut (22), and handle subassembly is assembled completely.



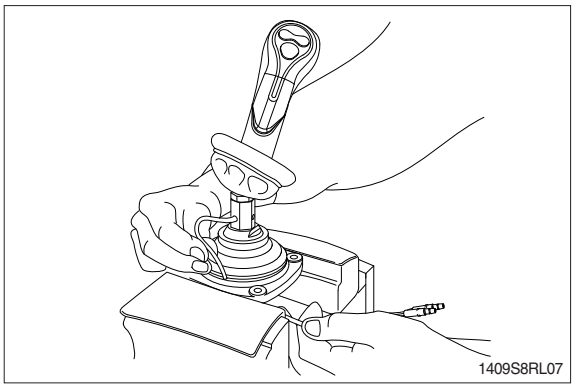


(15) Pull out cord and tube through adjusting nut hole provided in direction 60˚ to 120˚ from casing hole.



(16) Assemble bushing (18) to plate and pass cord and tube through it.

※ Provide margin necessary to operation.

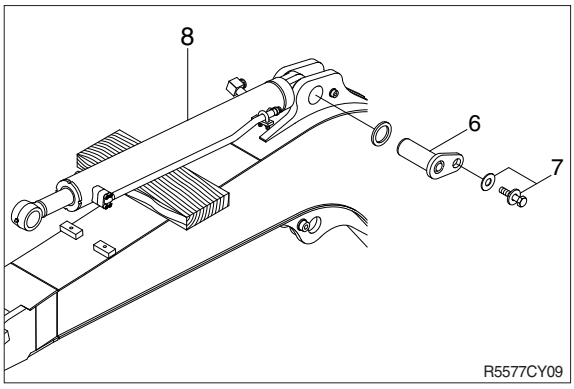


⑤ Sling arm assembly (8) and remove bolt (7) then pull out pin (6).

⑥ Remove arm cylinder assembly (8).

· Weight : 56 kg (123 lb)

· Tightening torque : 12.8± 3.0 kgf · m (92.6± 21.7 lbf · ft)



(2) Install

① Carry out installation in the reverse order to removal.

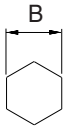
⚠ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.

※ Bleed the air from the arm cylinder.

※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Name	Specification	
Allen wrench	8	
	10	
Spanner	M22	
Hook spanner	Suitable size	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

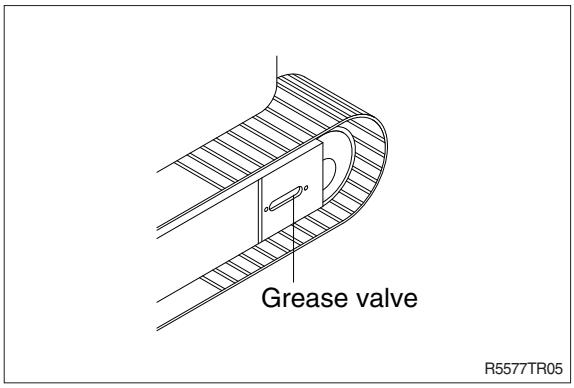
(2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Rod cover	Boom cylinder(CHANGZHOU) Boom cylinder(SHPAC)	3	M115	95±9.5 70±7.0	687±69 510±51
	Arm cylinder(CHANGZHOU) Arm cylinder(SHPAC)	3	M95	76±7.6 70±7.0	550±55 510±51
	Bucket cylinder(CHANGZHOU) Bucket cylinder(SHPAC)	3	M85	70±7.0	510±51
	Dozer cylinder	3	M115	95±9.5	690±69
Piston nut	Boom cylinder(CHANGZHOU)	22	-	75±7.5	540±54
	Arm cylinder(CHANGZHOU)	20	-	75±7.5	540±54
	Bucket cylinder(CHANGZHOU)	19	M36	75±7.5	540±54
Piston	Boom cylinder(CHANGZHOU) Boom cylinder(SHPAC)	15 16	M45 -	113±11.3 50±5.0	817±82 362±36
	Arm cylinder(CHANGZHOU) Arm cylinder(SHPAC)	13 14	M39 -	97.5±9.8 50±5.0	705±70 362±36
	Bucket cylinder(CHANGZHOU) Bucket cylinder(SHPAC)	13	M36 M48	90±9.0 50±5.0	550±55 362±36
	Dozer cylinder	13	M45	113±11.3	817±82

3. TRACK ROLLER

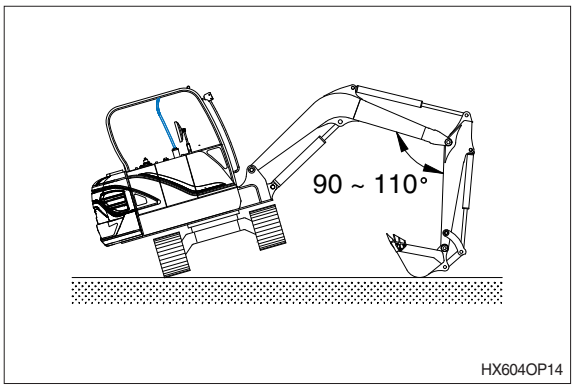
1) REMOVAL

(1) Loosen tension of the track link.



(2) Using the work equipment, push up track frame on side which is to be removed.

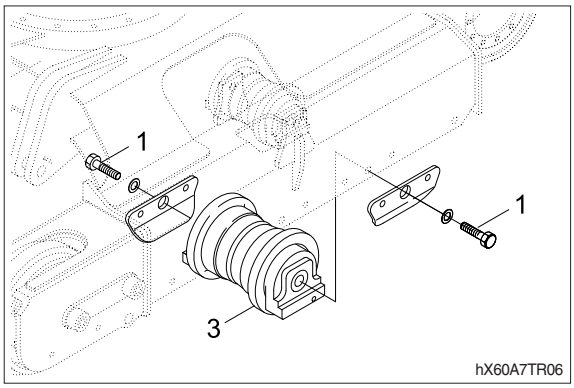
※ After jack up the machine, set a block under the unit.



(3) Remove the mounting bolt (1) and draw out the track roller (3).

· Weight : 11 kg (46 lb)

· Tightening torque : 41.3 ± 4.0 kgf · m
(299 ± 28.9 lbf · ft)



2) INSTALL

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