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1. STRUCTURE

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

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

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

SECTION 1 GENERAL

This section explains the safety hints and gives the specification of the machine and major components.

SECTION 2 STRUCTURE AND FUNCTION

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

SECTION 3 HYDRAULIC SYSTEM

This section explains the hydraulic circuit, single and combined operation.

SECTION 4 ELECTRICAL SYSTEM

This section explains the electrical circuit, monitoring system and each component. It serves not only to give an understanding electrical system, but also serves as reference material for trouble shooting.

SECTION 5 MECHATRONICS SYSTEM

This section explains the computer aided power optimization system and each component.

SECTION 6 TROUBLESHOOTING

This section explains the troubleshooting charts correlating **problems** to **causes**.

SECTION 7 MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

SECTION 8 DISASSEMBLY AND ASSEMBLY

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

SECTION 9 COMPONENT MOUNTING TORQUE

This section shows bolt specifications and standard torque values needed when mounting components to the machine.

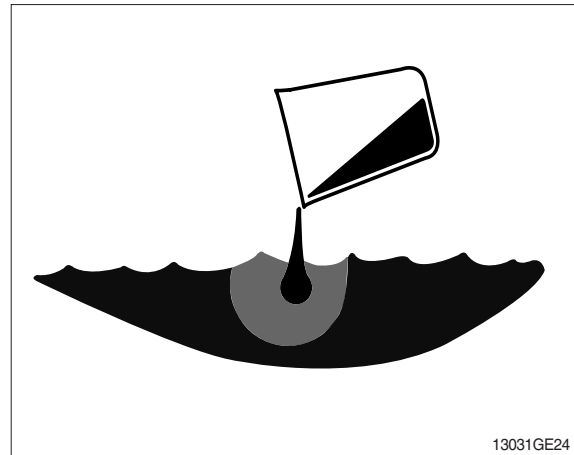
The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your HYUNDAI distributor for the latest information.

DISPOSE OF FLUIDS PROPERLY

Improperly disposing of fluids can harm the environment and ecology. Before draining any fluids, find out the proper way to dispose of waste from your local environmental agency.

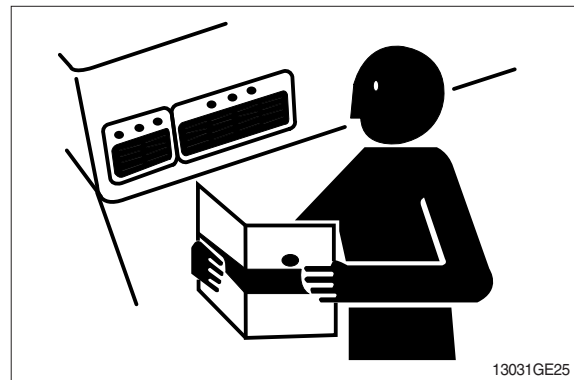
Use proper containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

DO NOT pour oil into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, batteries, and other harmful waste.



REPLACE SAFETY SIGNS

















Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

4) 10.5 m (34' 5") boom, 6.50 m (21' 4") arm equipped with 2.56 m³ (SAE heaped) bucket, 700 mm (28") double grouser shoe and 15,500 kg (34,170 lb) counterweight.

Load point height		Load radius														At max. reach			
		3.0 m (10.0 ft)		4.5 m (15.0 ft)		6.0 m (20.0 ft)		7.5 m (25.0 ft)		9.0 m (30.0 ft)		10.5 m (35.0 ft)		12.0 m (40.0 ft)		Capacity		Reach	
																		m (ft)	
12.0 m (40.0 ft)	kg																*6740	*6740	15.14
	lb																*14860	*14860	(49.7)
10.5 m (35.0 ft)	kg																*6540	6250	16.01
	lb																*14420	13780	(52.5)
9.0 m (30.0 ft)	kg																*6440	5550	16.68
	lb																*14200	12240	(54.7)
7.5 m (25.0 ft)	kg																*6320	5040	17.19
	lb																*13930	11110	(56.4)
6.0 m (20.0 ft)	kg													*8800	*8800		*6240	4670	17.54
	lb													*19400	*19400		*13760	10300	(57.5)
4.5 m (15.0 ft)	kg								*12460	*12460	*10610	*10610		*9270	*9270		*6180	4410	17.74
	lb								*27470	*27470	*23390	*23390		*20440	*20440		*13620	9720	(58.2)
3.0 m (10.0 ft)	kg				*22220	*22220	*16780	*16780	*13490	*13490	*11300	*11300	*9730	9500		*6130	4250	17.81	
	lb				*48990	*48990	*36990	*36990	*29740	*29740	*24910	*24910	*21450	20940		*13510	9370	(58.4)	
1.5 m (5.0 ft)	kg				*23920	*23920	*18000	*18000	*14340	14310	*11880	11230	*10120	8980		*6080	4180	17.74	
	lb				*52730	*52730	*39680	*39680	*31610	31550	*26190	24760	*22310	19800		*13400	9220	(58.2)	
Ground Line	kg			*12960	*12960	*21520	*21520	*18680	17660	*14890	13460	*12280	10610	*10390	8530	*6030	4210	17.53	
	lb			*28570	*28570	*47440	*47440	*41180	38930	*32830	29670	*27070	23390	*22910	18810	*13290	9280	(57.5)	
-1.5 m (-5.0 ft)	kg	*11860	*11860	*15180	*15180	*22180	*22180	*18800	16930	*15080	12850	*12440	10130	*10480	8170	*5940	4340	17.17	
	lb	*26150	*26150	*33470	*33470	*48900	*48900	*41450	37320	*33250	28330	*27430	22330	*23100	18010	*13100	9570	(56.3)	
-3.0 m (-10.0 ft)	kg	*14720	*14720	*17880	*17880	*23250	*23250	*18390	16520	*14890	12470	*12310	9810	*10340	7920	*5820	4590	16.66	
	lb	*32450	*32450	*39420	*39420	*51260	*51260	*40540	36420	*32830	27490	*27140	21630	*22800	17460	*12830	10120	(54.7)	
-4.5 m (-15.0 ft)	kg	*17670	*17670	*20980	*20980	*21760	*21760	*17490	16380	*14300	12280	*11860	9640	*9920	7790	*5610	4990	15.99	
	lb	*38960	*38960	*46250	*46250	*47970	*47970	*38560	36110	*31530	27070	*26150	21250	*21870	17170	*12370	11000	(52.5)	
-6.0 m (-20.0 ft)	kg	*20850	*20850	*24540	*24540	*19720	*19720	*16090	*16090	*13260	12270	*11010	9620	*9110	7780	*5280	*5280	15.11	
	lb	*45970	*45970	*54100	*54100	*43480	*43480	*35470	*35470	*29230	27050	*24270	21210	*20080	17150	*11640	*11640	(49.6)	

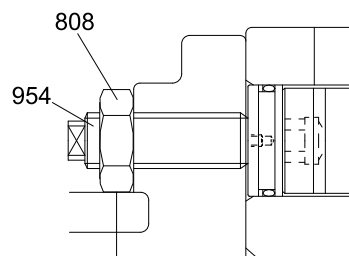
(4) Adjustment of maximum and minimum flows

① Adjustment of maximum flow

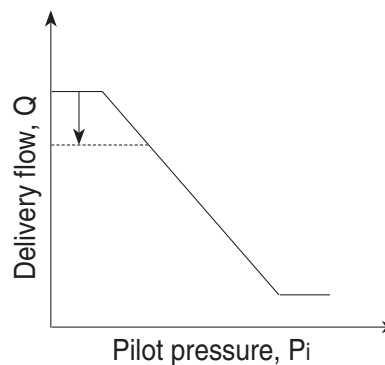
Adjust it by loosening the hexagon nut (808) and by tightening (or loosening) the set screw (954).

The maximum flow only is adjusted without changing other control characteristics.

Speed	Adjustment of max flow	
	Tightening amount of adjusting screw (954)	Flow change amount
(min ⁻¹)	(Turn)	(l /min)
1800	+1/4	-9.2



8007A2MP06

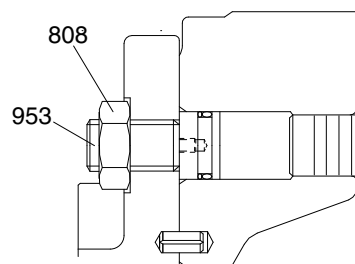


② Adjustment of minimum flow

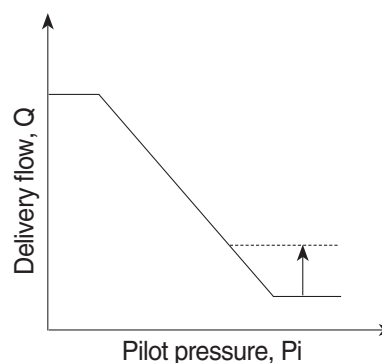
Adjust it by loosening the hexagon nut (808) and by tightening(or loosening) the hexagonal socket head set screw (953). Similarly to the adjustment of the maximum flow, other characteristics are not changed.

However, remember that, if tightened too much, the required horsepower during the maximum delivery pressure (or during relieving) may increase.

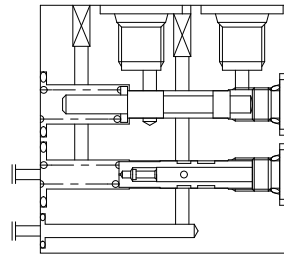
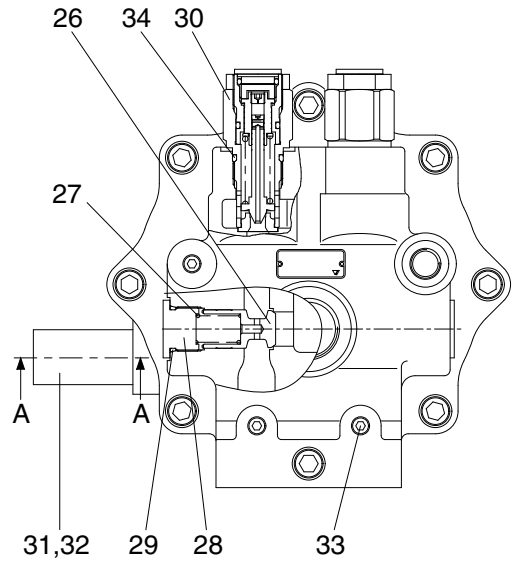
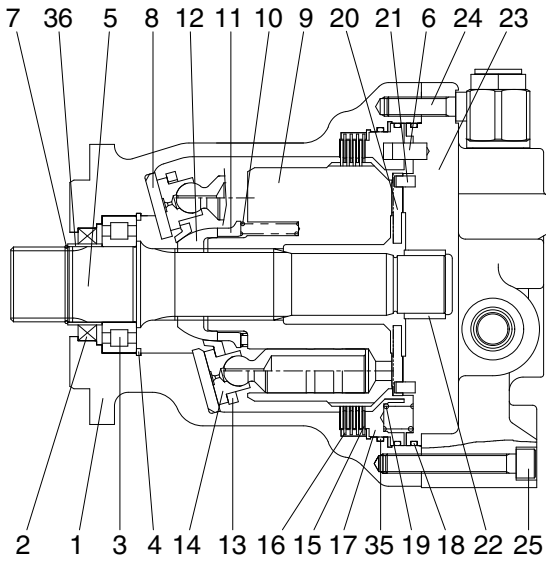
Speed	Adjustment of min flow	
	Tightening amount of adjusting screw (953)	Flow change amount
(min ⁻¹)	(Turn)	(l /min)
1800	+1/4	+9.2



8007A2MP05



1) SWING MOTOR

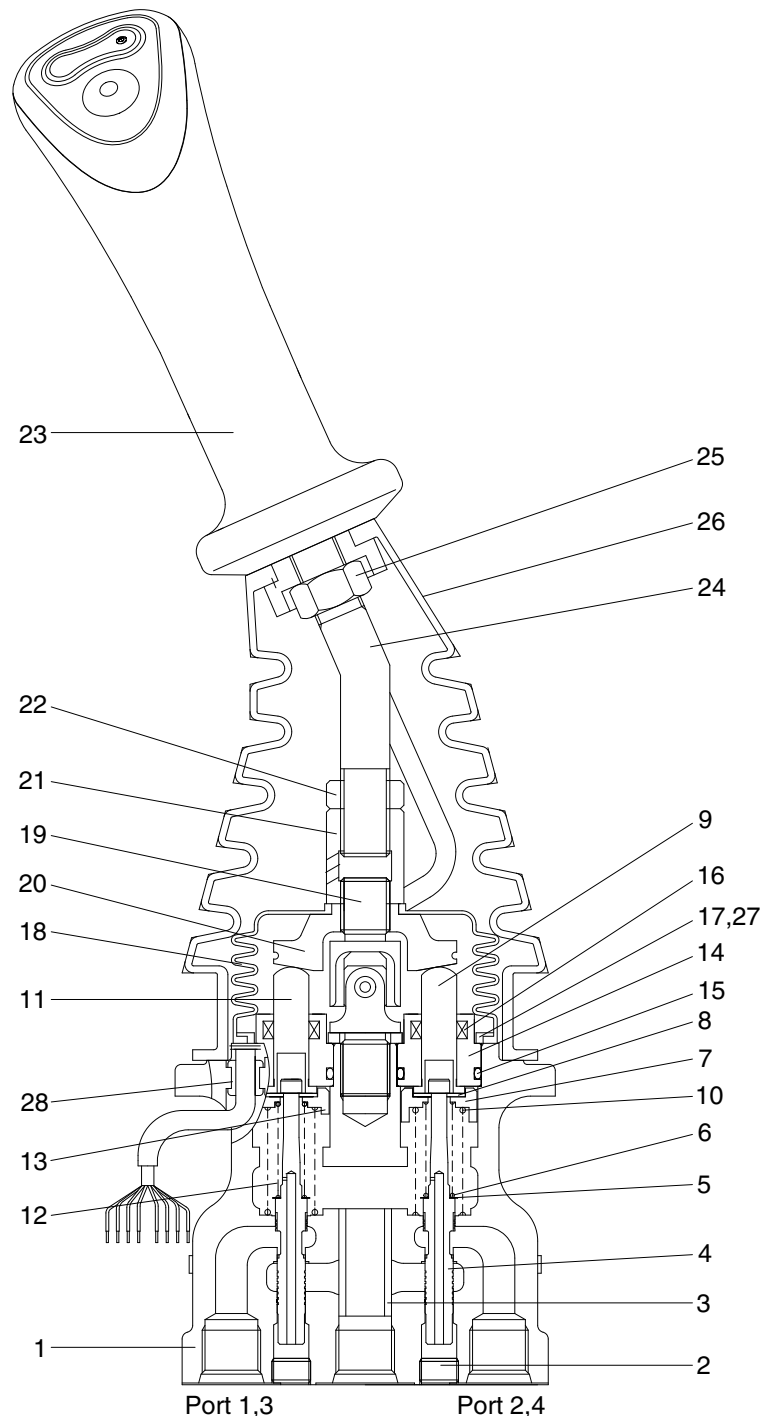


SECTION A-A

8007A2SM02

- | | | |
|--------------------|-------------------|----------------------|
| 1 Body | 13 Set plate | 25 Wrench bolt |
| 2 Oil seal | 14 Piston assy | 26 Poppet |
| 3 Roller bearing | 15 Friction plate | 27 Spring |
| 4 Snap ring | 16 Plate | 28 Plug |
| 5 Shaft | 17 Brake piston | 29 O-ring |
| 6 Pin | 18 O-ring | 30 Relief valve assy |
| 7 Stop ring | 19 Spring | 31 Time delay valve |
| 8 Shoe plate | 20 Valve plate | 32 Wrench bolt |
| 9 Cylinder block | 21 Pin | 33 Plug |
| 10 Spring | 22 Needle bearing | 34 O-ring |
| 11 Ball guide seat | 23 Rear cover | 35 O-ring |
| 12 Ball guide | 24 Wrench bolt | 36 Bushing |

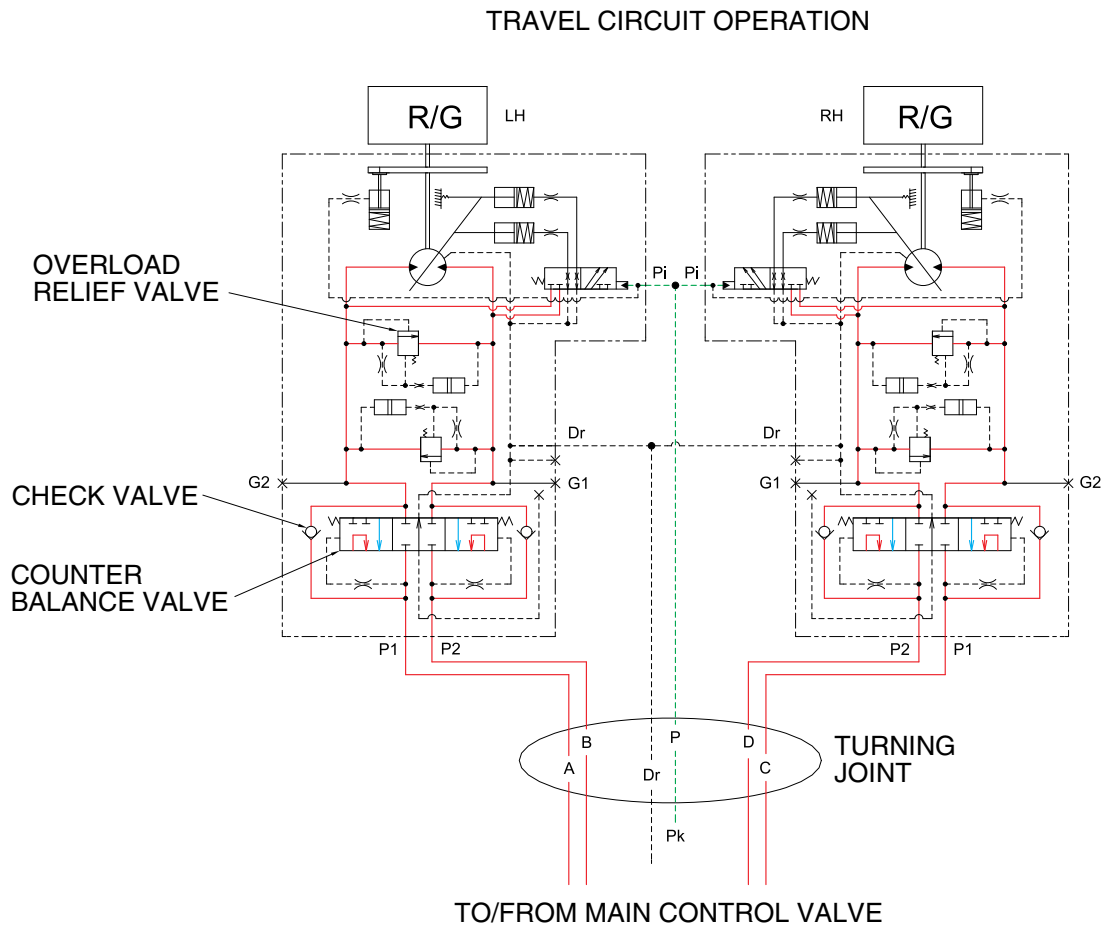
CROSS SECTION



32092RL01

1	Case	8	Stopper	15	O-ring	22	Lock nut
2	Plug	9	Push rod	16	Rod seal	23	Handle assembly
3	Bushing	10	Spring	17	Plate	24	Handle bar
4	Spool	11	Push rod	18	Boot	25	Nut
5	Shim	12	Spring	19	Joint assembly	26	Boot
6	Spring	13	Spring seat	20	Swash plate	27	Spring pin
7	Spring seat	14	Plug	21	Adjusting nut	28	Bushing

TRAVEL CIRCUIT OPERATION



80093HC19

Valves are provided on travel motors to offer the following functions.

1) CHECK VALVE

Stopping the motor, this valve sucks the oil from lower pressure passage for prevention the negative pressure and the cavitation of the motor.

2) COUNTER BALANCE VALVE

When stopping the motor of slope descending, this valve to prevent the motor over run.

3) OVERLOAD RELIEF VALVE

Relief valve limit the circuit pressure below 345kgf/cm² to prevent high pressure generated at a time of stopping the machine. Stopping the motor, this valve sucks the oil from lower pressure passage for preventing the negative pressure and the cavitation of the motor.

4. HEAD AND WORK LIGHT CIRCUIT

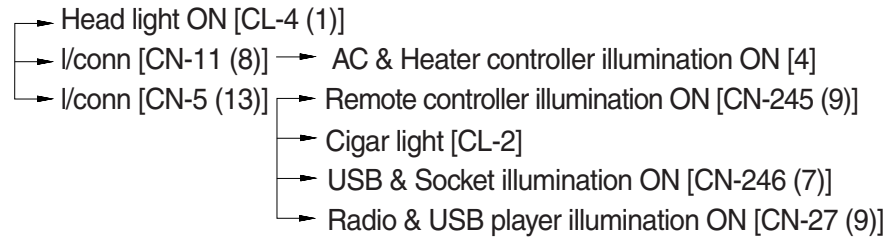
1) OPERATING FLOW

Fuse box (No.15) → Work light relay [CR-4 (30,86)]

Fuse box (No.18) → Head light relay [CR-13 (30,86)]

(1) Head light switch ON

Head light switch ON [CN-116 (1)] → I/conn [CN-5 (49)] → Head light relay [CR-13 (85) → (87)]



(2) Work light switch ON

Work light switch ON [CN-116 (2)] → I/conn [CN-5 (50)] → Work light relay [CR-4 (85) → (87)]

→ I/conn [CN-12 (2)] → Work light ON [CL-5 (2), CL-6 (2), CL-36 (2), CL-37 (2)]

2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power output) ③ - GND (head light relay) ④ - GND (head light) ⑤ - GND (fuse box) ⑥ - GND (switch power output) ⑦ - GND (work light relay) ⑧ - GND (work light)	20~25V

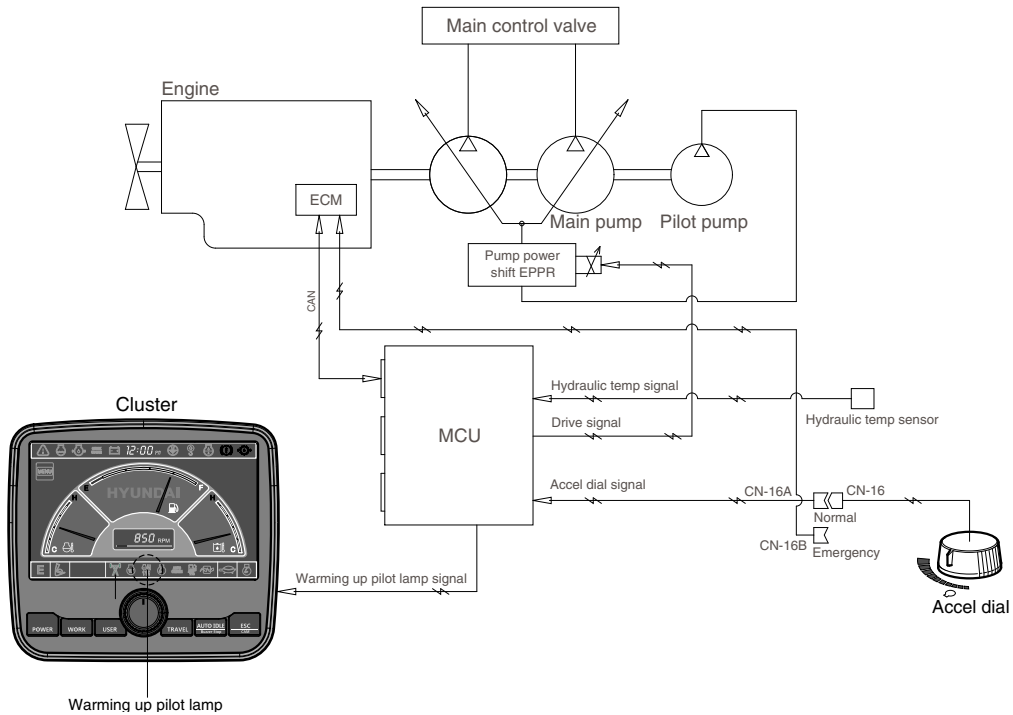
※ GND : Ground

GROUP 4 CONNECTORS

1. CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	AMP	10	l/conn (Frame harness-Pump PS harness)	S816-010002	S816-110002
CN-2	AMP	16	l/conn (Frame harness-Engine harness)	S816-016002	S816-112002
CN-3	AMP	15	l/conn (Frame harness-Engine harness)	2-85262-1	368301-1
CN-4	AMP	16	l/conn (Console harness LH-Frame harness)	368047-1	S816-116002
CN-5	DEUTSCH	60	l/conn (Side harness RH-Frame harness)	DRB16-60SAE-L018	DRB12-60PAE-L018
CN-7	AMP	16	l/conn (Console harness RH-Frame harness)	368047-1	S816-116002
CN-8	AMP	12	l/conn (Console harness RH-Frame harness)	S816-012002	174663-2
CN-10	DEUTSCH	12	l/conn (Cab harness-Side harness RH)	DT06-12S-EP06	DT04-12P-BE02
CN-11	DEUTSCH	8	l/conn (Frame harness-Aircon harness)	DT06-8S-EP06	-
CN-12	KET	2	l/conn (Frame harness-Boom wire harness)	MG640188-4	MG610574-4
CN-14	AMP	8	l/conn (Frame harness-Bucket EPPR)	S816-008002	S816-108002
CN-15	AMP	16	l/conn (Frame harness-Breaker solenoid)	S816-016002	S816-116002
CN-16	AMP	6	Emergency engine start & speed control	S816-006002	S816-106002
CN-17	DEUTSCH	8	l/conn (Wiper harness-Side harness RH)	DT06-8S-EP06	DT04-8P
CN-20	MOLEX	2	Horn	DT06-2S-EP06	-
CN-21	AMP	6	Wiper motor	925276-0	-
CN-22	KET	2	Washer tank	MG640605	-
CN-23	KET	2	Speaker-LH	MG610070	-
CN-24	KET	2	Speaker-RH	MG610070	-
CN-25	MOLEX	2	Horn	DT06-2S-EP06	-
CN-27	KUM	16	Radio & CD/MP3 player	PK145-16017	-
CN-28	KUM	1	Aircon compressor	NMWP01F-B	-
CN-29	KET	2	Receiver dryer	MG640795	-
CN-36	AMP	-	Fuse & relay box	21Q7-10910 21Q6-20200	-
CN-45	RING-TERM	-	Starter motor B+	S820-308000	-
CN-48	AMP	1	Hour meter	2-520193-2	-
CN-51	DEUTSCH	40	MCU	DRC26-40SA	-
CN-52	DEUTSCH	40	MCU	DRC26-40SB	-
CN-53	DEUTSCH	40	MCU	DRC26-40SC	-
CN-56	DEUTSCH	6	Cluster	-	DT04-6P-E005
CN-60	KET	2	Fusible link	21N4-01320	S813-130201
CN-61	DEUTSCH	2	Fuel filler pump	DT06-2S-EP06	DT-04-2P-E005
CN-66	DEUTSCH	2	Breaker solenoid	DT06-2S-EP06	-
CN-68	DEUTSCH	2	Safety solenoid	DT06-2S-EP06	-
CN-70	DEUTSCH	2	Travel high solenoid	DT06-2S-EP06	-

GROUP 6 AUTOMATIC WARMING UP SYSTEM



80095MS08

1. The MCU receives the engine coolant temperature from the ECM, and if the coolant temperature is below 30°C, it increases the engine speed from key start rpm to 1200rpm. At this time the mode does not change. If the coolant temperature sensor has fault, the hydraulic oil temperature signal is substituted.
2. In case of the coolant temperature increases up to 30°C, the engine speed is decreased to key start speed. And if an operator changes power mode set during the warming up function, the MCU cancels the automatic warming up function.

3. LOGIC TABLE

Description	Condition	Function
Actuated	- Coolant temperature : below 30°C (after engine run)	- Power mode : Default (E mode) - Warming up time : 10 minutes (max) - Warming up pilot lamp : ON
Canceled	- Coolant temperature : Above 30°C - Warming up time : Above 10 minutes - Changed power mode set by operator - RCV lever or pedal operating - Auto idle cancel ※ If any of the above conditions is applicable, the automatic warming up function is canceled	- Power mode : set mode - Warming up pilot lamp : OFF

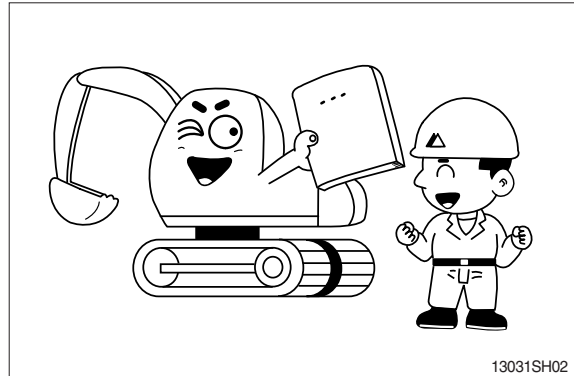
2. DIAGNOSING PROCEDURE

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.

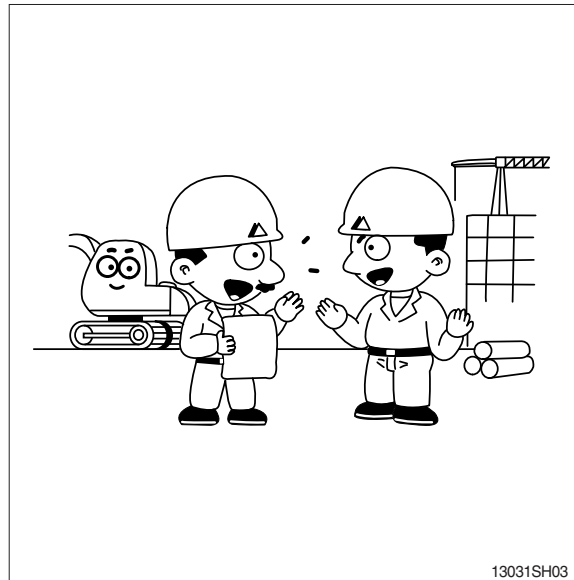
Especially, deepen the knowledge for the related parts of the trouble.



STEP 2. Ask the operator

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

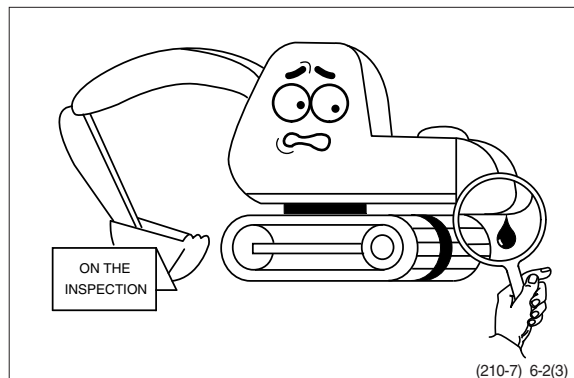
- 1) How the machine is used and when it is serviced?
- 2) When the trouble was noticed and what work the machine was doing at that time?
- 3) What is the phenomenon of the trouble?
Was the trouble getting worse, or did it come out suddenly for the first time?
- 4) Did the machine have any troubles previously?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



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.

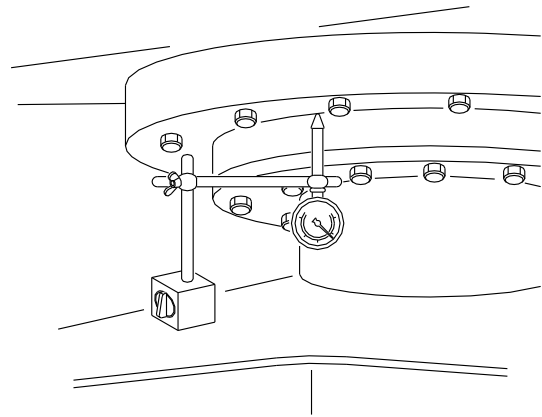


8) SWING BEARING PLAY

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

(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.

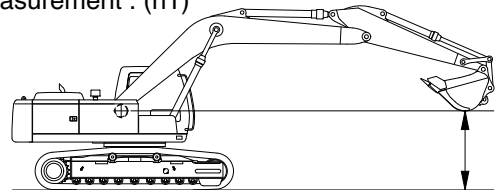


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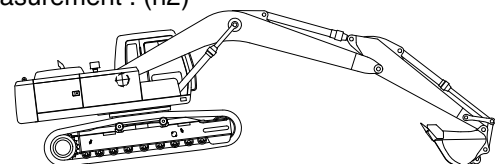
(3) Measurement

- 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 50cm. Record the dial gauge reading (h2).
- ③ Calculate bearing play(H) from this data (h1 and h2) as follows.
 $H = h2 - h1$

Measurement : (h1)



Measurement : (h2)



21077MS09

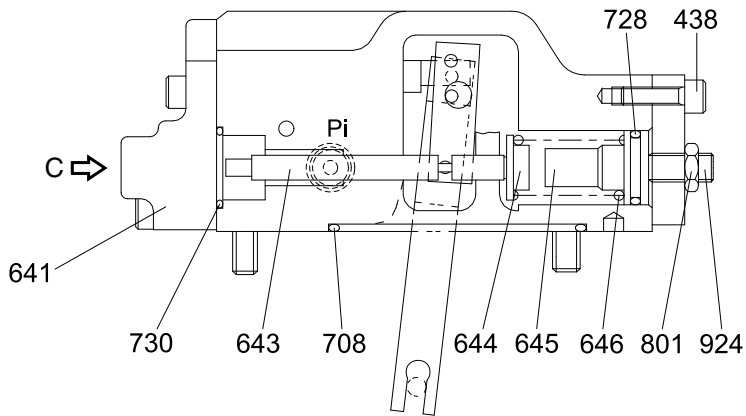
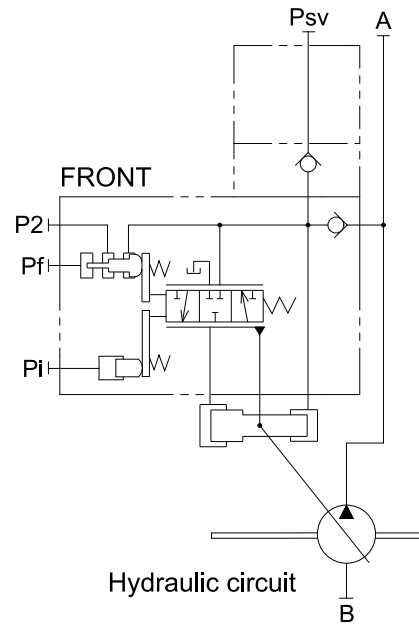
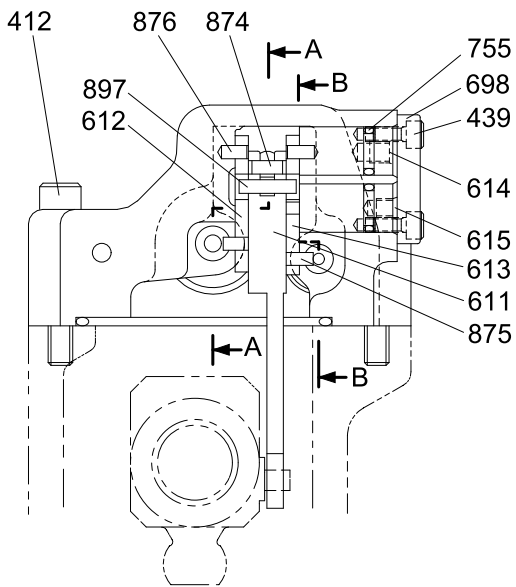
(4) Evaluation

The measured drift should be within the following specifications.

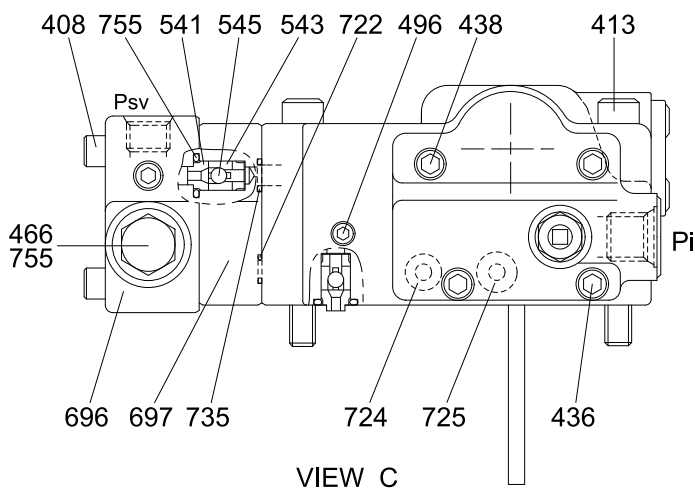
Unit : mm

Model	Standard	Maximum allowable	Remarks
R850LC-9	0.5 ~ 1.5	3.0	

5) REGULATOR (1/2)



SECTION B-B



VIEW C

80092RG01

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	-