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2.5 SPECIFICATIONS AND PERFORMANCE

2.5.1 SPEED AND CLIMBING CAPABILITY

Item \ Model & Shoe spec.	E80MSR
Swing speed	12.5 {12.5}

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3.1.2 BOOM MAINTENANCE STANDARD

(1) Clearance of pin and bushing on boom section

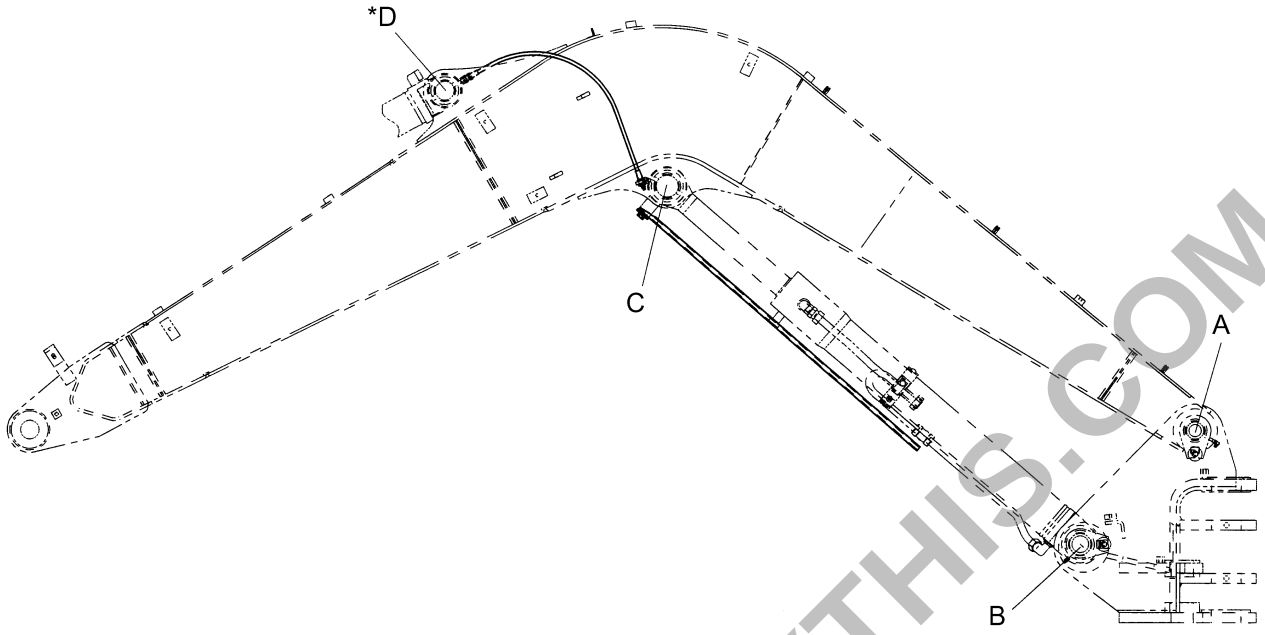


Fig. 3-2 Clearance of pin and bushing on boom section

Unit : mm (in)

Pos.	Item	Standard dimensions			Clearance			Remedy
		Pin dia.	Pin dia. tol-erance	Bushing i.d. tolerance	Standard value	Limi value for repair	Service limit value	
A	Boom foot	Ø60 (2.3622)	–0.06 (-0.0024) -0.09 (-0.0035)	+0.10 (+0.0039) +0.03 (+0.0012)	0.09~0.19 (0.0035~ 0.0075)	2.0 (0.08)	2.5 (0.1)	Replace bushing or pin
B	Boom cylinder (Head side)	Ø75 (2.9528)		+0.25 (+0.0098) +0.05 (+0.0020)	0.11~0.34 (0.0043~ 0.0134)			
C	Boom cylinder (Rod side)	Ø70 (2.7559)						
*D	Arm cylinder (Head side)	Ø60 (2.3622)						

* Marked pin; Ground pin

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11.1 TORQUE SPECIFICATIONS FOR CAPSCREWS & NUTS

The following Torque Specifications are provided for use when actual torque value of a fastener is not known. Check the capscrews and nuts for their looseness and dropping off before the start of daily work and at the periodical maintenance. Retighten the loosened ones, and install new ones for the dropped off. For the new machine, the check and retightening of them must be carried out at first 50 hours operation. For the replacement of them, make sure to use the same size of manufacturer's genuine parts.

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12.1 STANDARD MAINTENANCE TIME SCHEDULE FOR EXCAVATOR

(1) Standard maintenance time schedule

1) Units of working time : 6 minutes = 0.1 hour
2) Calculating method of standard maintenance time :
   Maintenance time = working time × the number of workers
   (working time = Maintenance time / the number of workers)
3) When more than one operation is going on :
   a. Add each standard service time.
   b. A pure time (readily started) is given except covers easily removed by hand.
   c. Assy works include the following works marked with black dot • .
4) O/H : Basically the installing and removing operation are included.
5) Abbreviation in the table.

A/C	: Air conditioner	F hose	:	Flexible hose
ASSY	: Assembly	O/H	:	Over haul
ATT	: Attachment	SOL	:	Solenoid
BRG	: Bearing	SW	:	Switch
C/V	: Control valve	V	:	Valve
Cyl	: Cylinder			
E/G	: Engine			

(2) Classification of working code

No.	Group	Remarks
01	Attachment	Indicates installing, removing, replacement and overhaul.
02	Cab & Guard	
03	Upper frame	
04	Travel system	
06	Electric equipments	Indicates the installing, removing and replacement of single items.
09	E/G relation	Indicates overhaul of the single engine. (Materials prepared by manufacturer)

(3) Condition for standard service time of the engine

1) Tools designated by E/G marker are used
2) Genuine parts are changed
3) Correct working procedures are observed.
   • The time required for works specified in this Chapter shows the total time for maintenance.

Group No.		Location	Work to be done	Unit	Remark	Unit: hour
01 Attachment	00	Bucket relation			2. Reference for bucket	
	01	Bucket ASSY	Detach/attach	1 pc.	Include adjustment	0.5
	02	• Bucket attaching and detaching position	Preparation	1 pc.		0.1
	03	• Bucket attaching pin	Detach/attach	1	Include omission of pin.	0.1
	04	• Bucket drive pin	Detach/attach	1		0.1
	05	• Bucket sling and movement	Preparation	1 pc.		0.1
	06	Bucket (Single)	O/H	1 pc.	Not include attaching and detaching.	2.0
	07	• Tooth	Replace	1 pc.		0.5

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13.2 PERFORMANCE INSPECTION STANDARD TABLE

Note

The mode is already S mode when power is thrown. Unless otherwise specified, measure it on H mode.

Table 13-1

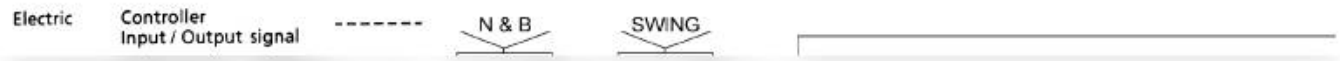
Inspection item					Measuring position: Position	Size	Port	Standard value	Hi	Lo	Unit	Adjusting point	Measuring condition
Standard measuring condition	Cleanliness of hydraulic oil				Hydraulic oil in tank			NAS 8	+1	-1	Class	——	Sampling
	Hydraulic oil temperature				Tank surface			50 (122)	+5 (41)	-5 (23)	ºC (ºF)	——	Atmospheric temp. 50ºC～-10ºC (122ºF～14ºF)
	Water temperature				Radiator surface			75 (167)	+15 (59)	-15 (5)		——	
	Engine speed	Lo idle			Injection pipe			1020	+30	-30	min^{-1} (rpm)	Adjusting not required	LOW throttle
		Hi idle						2250	+30	-30			FULL throttle (Hi idle)
		Decel						1050	+30	-30			——
		S mode						2100	+30	-30			
		FC mode						1800	+30	-30			
Pilot primary pressure circuit					G pump		a4	37-34 (530-480)			kgf/cm^2 (psi)	PR1	Hi idle
High pressure circuit	Main relief valve pressure	Travel		P1	Main pump	PF1/4	a1	305-300 (4340-4270)				MR1	RH and LH simultaneous operation
				P2			a2						
		Att.		P1			a1	305-300 (4340-4270)				MR1	Boom up
				P2			a2					MR1	Boom up
		Dozer		P3			a3	205-200 (2920-2840)				MR3	Dozer up
	Over load relief valve pressure	N&B		H			a1	335-300 (4760-4270)				OR11	Nibbler close
				R				335-300 (4760-4270)				OR12	Nibbler open
		Swing of boom		H			a1	335-253 (4760-3600)				OR9	Swing LH
				R				335-265 (4760-3770)				OR10	Swing RH
		Bucket		H			a1	335-300 (4760-4270)				OR1	Bucket digging
				R				335-300 (4760-4270)				OR2	Bucket dump
		Boom		H			a1	335-265 (4760-3770)				OR3	Boom up
				R				335-300 (4760-4270)				OR4	Boom down
		Travel	RH	Forward			a1	315-300 (4480-4270)				TR2	Simultaneous operation of travel RH and LH (Without port relief)
				Reverse								TR1	
			LH	Forward			a2	315-300 (4480-4270)				TR4	
				Reverse								TR3	
		Slewing		LH			a2	275-255 (3910-3630)				OR5	Slewing LH
				RH								OR6	Slewing RH
		Arm		H			a2	335-300 (4760-4270)				OR7	Arm in
				R				335-300 (4760-4270)				OR8	Arm out
		Dozer		H			a3	280-200 (3980-2840)				OR13	Dozer down
				R				280-200 (3980-2840)				OR14	Dozer up
Secondary pilot pressure circuit	Proportional valve block	P2 bypass cut valve		B	C-1 Mechatro controller	Hard check SW.	A B 2, 8	11.5-9.5 (160-140)				Indicated current value (mA) 400	Performs proportionate calculation from actual current readings display No. Values which are calculated by converting pressure values in the left figure to current values are shown. E/G Hi, Lever on neutral position
		Travel straight valve		C			3, 0						
		P1 bypass cut valve		D			2, 6						
		P2 bypass cut valve		B			2, 8	18-14.5 (260-210)				700	E/G Hi Lever on full stroke
		Travel straight valve		C			3, 0						
		P1 bypass cut valve		D			2, 6						

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21.1 SUMMARY OF MECHATRO CONTROL SYSTEM

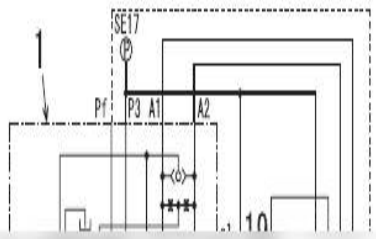


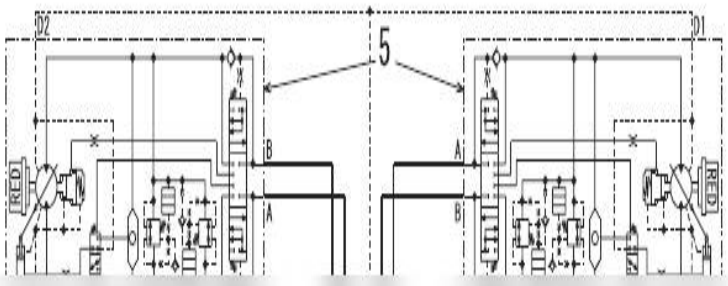
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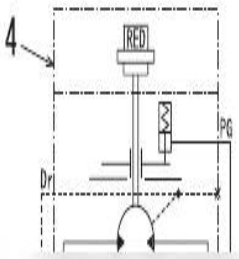
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22.2.1 STANDARD SPECIFICATION







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23.1 ELECTRICAL CIRCUIT DIAGRAM AND EQUIPMENT LIST



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Table 24-2

No.	NAME	Q'ty	No.	NAME	Q'ty
111	SHAFT	1	624	SPRING SEAT	1
114	COUPLING	1	625	SPRING	1
115	COLLAR	1	626	SPRING	1
123	ROLLER BEARING	1	627	ADJUST STEM (E1)	1
124	NEEDLE BEARING	1	630	LOCK NUT : M30	1
127	SPACER	1	641	SPRING COVER	1
141	CYLINDER BLOCK	1	651	SLEEVE	1
151	PISTON	10	652	SPOOL	1
152	SHOE	10	653	PIN	1
153	PLATE	1	654	PIN	1
156	SPHERICAL BUSHING	1	655	PIN (Pf PISTON)	1
157	SPRING	10	656	PIN	1
212	SWASH PLATE	1	660	ADJUST SCREW (R)	1
214	BUSHING	1	661	LOCK NUT : M14 × 1.5	1
215	PIVOT BALL	1	662	SPRING SEAT	1
216	PIVOT BALL	1	663	SPRING	1
271	CASING	1	664	POPPET	1
273	COVER	1	665	SEAT (R)	1
312	VALVE COVER	1	666	ADJUST SCREW (E)	1
313	VALVE PLATE	1	667	ADJUST STEM (E2)	1
401	SOCKET BOLT : M16 ×40	4	668	PISTON (E)	1
402	FLANGE SOCKET BOLT ; M8 × 16	2	700	O-RING : 1B G35	1
403	SOCKET BOLT : M16 × 70	1	701	O-RING : 1B G55	1
404	SOCKET BOLT : M6 × 20	9	702	O-RING : 1B G135	1
467	DRAIN PLUG : PF 1/2	1	705	O-RING : 1B P16	2
468	PLUG : PF1/4	1	706	O-RING : 1B P11	7
490	PLUG : NPTF1/16, Meck coated	14	707	O-RING : 1B P18	1
492	PLUG : PT1/8, Meck coated	1	708	O-RING	1
493	PLUG : PT3/8	1	709	O-RING : 1B P26	1
			710	O-RING	1
508	ORIFICE SCREW : NPTF1/16	4	751	GASKET	1
531	TILTING PIN : M16 × 1.5	1	774	OIL SEAL	1
532	SERVO PISTON : M16 × 1.5	1	787	BACKUP RING	1
534	SET SCREW : M27 × 1.5	1	789	BACKUP RING	2
535	STOPPER	1	801	LOCK NUT : M8	1
541	SEAT	2	803	LOCK NUT : M27 × 1.5	1
543	STOPPER	2	824	SNAP RING	1
545	BALL	2	825	SNAP RING	1
548	FEED BACK PIN	1	885	SPRING PIN	2
611	FEED BACK LEVER	1	901	EYE BOLT : M8	1
621	COMPENSATING PISTON	1			

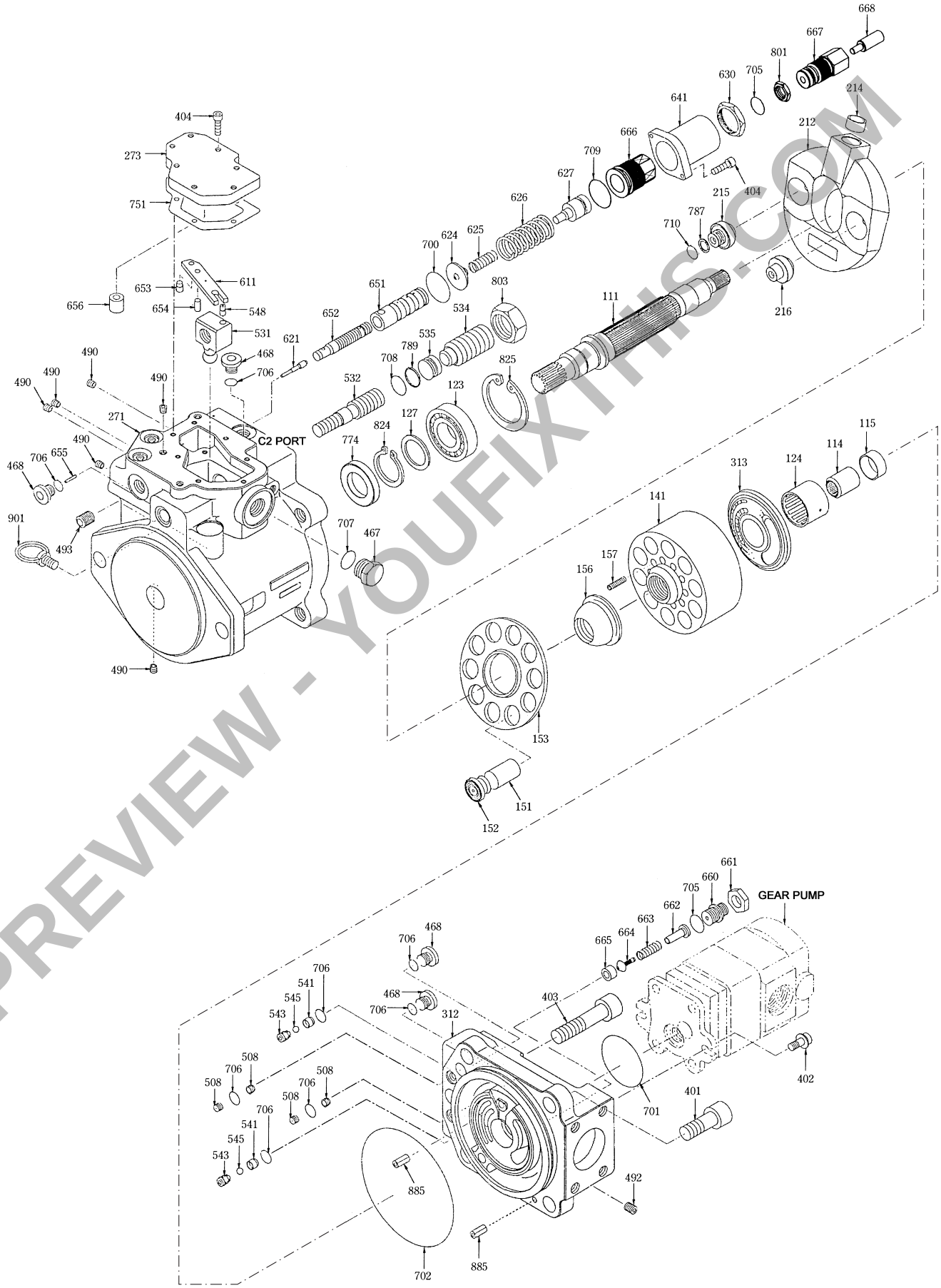
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33.2 DISASSEMBLING AND ASSEMBLING

33.2.1 HYDRAULIC PUMP • REGULATOR

33.2.1.1 STRUCTURAL EXPLODED VIEW



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32.1 REMOVING AND INSTALLING

32.1.1 ATTACHMENT AND COMPONENT

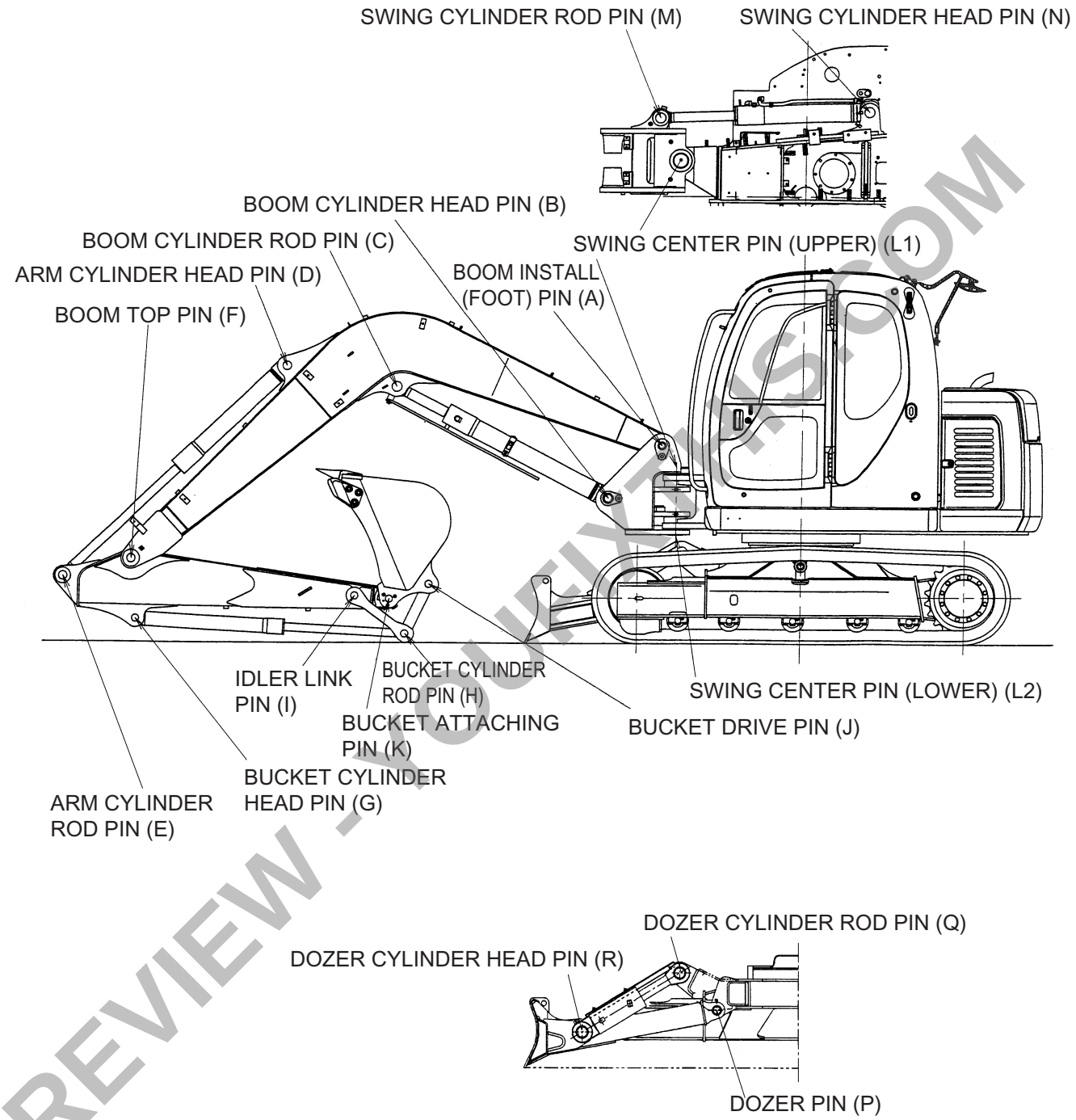


Fig. 32-1 Front attachment and position

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41.3 TROUBLESHOOTING SUMMARIZED : MECHATRO CONTROL

No.	Trouble	Operating condition	Electric or hydraulic cause		Hydraulic or electric	Normal criterion		
			Cause	Check point		1	2	3
1-1	No operation works	Safety lock lever down at full stroke	Safety lock lever solenoid (SV-4) does not change over and there is no hydraulic source for pilot valve.	SOL (SV-4) connector	Electric	24V at SV-4 connector.	24V at SW-11.	24V at fuse box connector (CN-14M) white & black
1-2	Moves unexpectedly	Lever at neutral	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises.	P1 bypass cut proportional valve (PSV-D) connector	Electric	Current for P1 bypass cut proportional valve : 315mA.	Arm in sensor and arm out sensor values : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve : 0.54MPa (78psi).	Secondary pilot pressure : 0.59MPa (85psi).	———
		Lever at neutral	P2 bypass cut proportional valve moves unexpectedly and P2 circuit pressure rises.	P2 bypass cut proportional valve (PSV-B) connector	Electric	Current for P2 bypass cut proportional valve : 315mA.	Boom raise sensor and slewing sensor values : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P2 bypass cut proportional valve : 0.54MPa (78psi).	Secondary pilot pressure : 0.59MPa (85psi).	———
2-2	Only bucket is slow	Bucket lever and other levers at full stroke	P2 bypass cut proportional valve moves unexpectedly, P2 circuit pressure rises, and P1 circuit flow decreases.	P2 bypass cut proportional valve (PSV-B) connector	Electric	Current for P2 bypass cut proportional valve : 315mA.	Boom raise sensor and slewing sensor values : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve : 0.54MPa (78psi).	Lever at neutral Secondary pilot pressure with lever neutral : 0.59MPa (85psi).	Secondary pilot pressure for bucket : 3.43MPa (500psi)
2-3	Only boom raise speed is low	Boom lever at full stroke	P2 bypass cut proportional valve does not move and the boom conflux flow is not created.	P2 bypass cut proportional valve (PSV-B) feedback current	Electric	Feedback current for P2 bypass cut proportional valve : 709mA.	Command current for P2 bypass cut proportional valve : 709mA.	Boom raise sensor : more than 4.0V
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve : 2.55MPa (370psi)	←	Secondary pilot pressure for travel : 2.35MPa (340psi)
		Travel lever at neutral	Travel straight valve moves unexpectedly and is actuated by P1 pump flow.	Travel straight proportional valve (PSV-C) command current	Electric	Command current for P2 bypass cut proportional valve : 315mA.	Travel right and left sensors: less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve : 0.54MPa (78psi).	Secondary pilot pressure for travel : 0.59MPa (85psi).	———
	Only speeds other than boom raise, arm in and out are low	Travel lever at neutral	Travel straight valve moves unexpectedly and P2 pump flow to tank.	Travel straight proportional valve (PSV-C) command current	Electric	Command current for travel straight proportional valve : 315mA.	Travel right and left sensor value : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for PO port travel straight valve : 0.54MPa (78psi).	Secondary pilot pressure for travel : 0.59MPa (85psi).	———
2-4	Only arm in speed is low	Arm lever at full stroke	Arm conflux flow is not created.	P1 bypass cut proportional valve (PSV-D) command current	Electric	Command current for P1 bypass cut proportional valve : 709mA.	———	Arm in sensor : more than 4.0V
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve : 2.55MPa (370psi).	———	Secondary pilot pressure for arm in : 3.43MPa (500psi)
2-5	Only arm out speed is low	Arm lever at full stroke	Arm conflux flow is not created.	P1 bypass cut proportional valve (PSV-D) command current	Electric	Command current for P1 bypass cut proportional valve : 709mA	Arm out sensor : more than 4.0V.	———
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve : 2.55MPa (370psi).	———	Secondary pilot pressure for arm out : 3.43MPa (500psi)
4-1	Fine bucket digging and dump operations can not be done	Fine bucket operation	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises	P1 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P1 bypass cut proportional valve : 315mA	Arm in and arm out sensor values : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve : 0.54MPa (78psi).	Secondary pilot pressure for arm in and out : 0.59MPa (85psi)	Unload pressure for P1 pump : approx. 1.96MPa (280psi)
4-2	Fine boom raise and lower operations can not be done	Fine boom raise and lower operations	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises.	P1 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P2 bypass cut proportional valve : 315mA.	Arm in and arm out sensor values : more than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve : 0.54MPa (78psi).	Secondary pilot pressure for arm in and out : 0.59MPa (85psi).	Unload pressure for P1 pump : approx. 1.96MPa (280psi)
4-3	Fine slewing right and left operations can not be done	Fine slewing right and left operations	P2 bypass cut proportional valve moves unexpectedly and the P2 circuit pressure rises.	P2 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P2 bypass cut proportional valve : 315mA.	Swing sensor and boom raise sensor values : less than 1.3V.	———
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve : 0.54MPa (78psi).	Unload pressure for P2 pump : approx. 1.96MPa (280psi) or less.	Secondary pressure for slewing and boom raise : 0.59MPa (85psi)
	Fine slewing right and left operations impossible.	Slewing left or right lever to full stroke	Slewing parking solenoid is not deenergized.	Slewing parking solenoid (SV-1) connector	Electric	Command voltage for slewing parking solenoid : 0V	Slewing sensor values : more than 4.0V	———
					Hydraulic	Secondary pilot pressure for slewing parking solenoid : 3.43MPa (500psi)	———	Secondary pilot pressure for slewing : 3.43MPa (500psi)

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21.7 MECHATRO CONTROL

21.7.1 TROUBLESHOOTING

"CPU lamp on gauge cluster flickers", and "buzzer sounds intermittently". In this case, error code is displayed on LCD at the center of C-1 controller.
Determines the fault location and corrective action referring to Error diagnostics shown in the following page.
And in case "CPU lamp lights on", and "buzzer sounds continuously", the display indicates the trouble on C-1 controller.

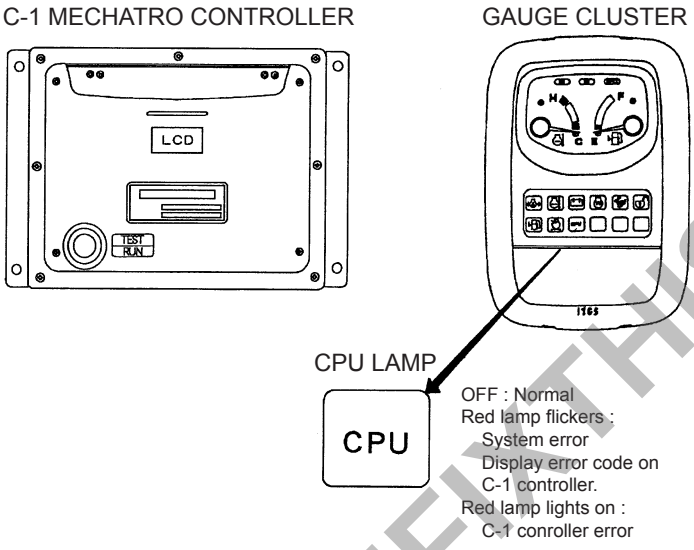


Table 21-1 Error Diagnostics

Error code	Error diagnostic items	Corrective action
E01	EEPROM date error	Readjust engine speed, or replace controller.
E02	Mechatro controller maladjustment	
E03	Boom raise pressure sensor error	Replace sensor or check harness between sensor and controller for possible damage.
E04	Boom lower pressure sensor error	
E05	Arm in pressure sensor error	
E06	Arm out pressure sensor error	
E07	Bucket digging pressure sensor error	
E08	Bucket dump pressure sensor error	
E09	Swing pressure sensor error	
E10	P3 pump pressure sensor error	
E11	Travel right pressure sensor error	
E12	Travel left pressure sensor error	
E13	Accel dial error	
E14	Travel boost-up selector coil error	Replace solenoid valve or check harness between solenoid valve and controller for possible damage.
E15	Swing parking selector coil error	
E16	Battery relay error	Replace battery relay or check harness between battery relay and controller for possible damage.
E17	P1 by-pass cut valve coil error	Replace by-pass cut valve or check harness between by-pass cut valve and controller for possible damage.
E18	P2 by-pass cut valve coil error	
E19	Travel straight valve coil error	
E20	Governor motor current error	Replace governor motor or check harness between governor motor and controller for possible damage.
E21	Governor motor start point error	
E22	Engine reverse rotation	Replace engine oil pressure switch or check harness between engine oil pressure switch and controller for possible damage.

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21.7.3 COMPONENT MECHATRO CONTROL

(1) C-1 Mechatronic controller

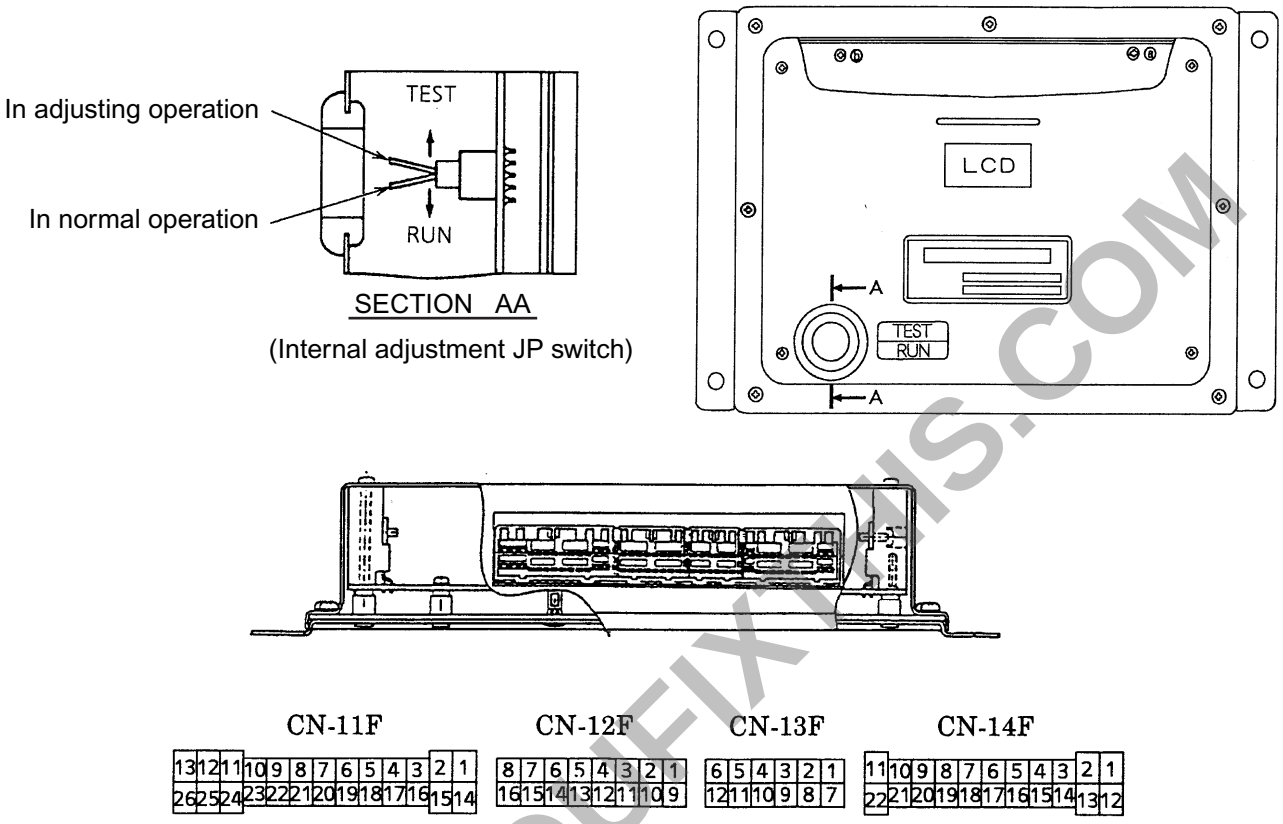


Table 21-2 CN-11

No.	NAME		Input Output	Wire color	Remarks
11–1	Battery relay (R-1)	(R-1)	In	WG	
11–2	Slewing parking select solenoid valve	(SV-1)	Out	V	
11–3	Work mode select switch	(SW-2)	Out	G	
11–4	Washer switch	(SW-2)	Out	BrW	
11–5	Buzzer stop switch	(SW-2)	Out	LgR	
11–6	Work light switch	(SW-2)	Out	LG	
11–7	Wiper switch	(SW-2)	Out	VG	
11–8	Buzzer	(SW-2)	In	Br	
11–9	Earth GND	(SW-2)	Out	GW	
11–10	Engine oil pressure switch	(SW-7)	In	O	
11–11	P2 by-pass cut proportional valve	(PSV-B)	Out	BO	
11–12	Travel straight proportional valve	(PSV-C)	Out	GB	
11–13	P1 by-pass cut proportionate valve	(PSV-D)	Out	BP	
11–14	Travel boost-up select valve	(SV-8)	Out	LR	
11–15	Starter switch	(SW-1)	In	P	
11–16	Travel alarm stop SW./Hi-reach	(SW-37)	In	WY	
11–17	Slewing flasher select switch	(SW-21)	In	Gr	
11–18	Travel alarm relay	(R-11)	In	BP	

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22.1 SUMMARY

22.1.1 FUNCTION AND FEATURES OF HYDRAULIC CIRCUIT

The hydraulic circuits are built up with the following functions and features in order to achieve easy operability, safety mass volume handling and low fuel consumption.

Table 22-1

Performance	Device	Function	Features
Easy Operability and Safety	Travel	● Travel straight ● 2-speed travel changeover. ● Auto parking brake ● Motor overrun protection ● Travel pilot operation ● Travel boost-up	● Travel straight at composite operation ● 2-speed changeover of travel speed. ● Automatic braking when parking ● Secure people from danger caused by overrunning of motor on the slope. ● Slow start and stop ● Travel speed up at traveling
	Slewing	● Reverse rotation protective function ● Slewing priority circuit (simultaneous operation of arm digging and slewing motions) ● Automatic slewing parking brake.	● Easy positioning to protect it from slewing back when stops slewing. ● Easy operation of stable slewing speed, arm slanted leveeing, slewing press digging. ● Protect it from slewing drift on the slope.
	Attachment	● Hydraulic pilot control system. ● Pilot safety lock system ● Lock valve (boom / arm / boom swing)	● Delicate operability. ● Cut out of pilot circuit by safety lock lever. ● Protect boom, arm and the boom swing from natural drop when parking.
	Others	● Closed pressure type hydraulic oil tank ● Suction strainer ● Line filter : pilot circuit ● Return circuit ● Cooling hydraulic oil by oil cooler.	● To prevent hydraulic oil from being contaminated and to promote self suction ability of pump. ● Remove dust on suction side. ● To prevent pilot operating circuit from malfunctioning ● To prevent hydraulic oil from fouling. ● To prevent hydraulic oil from being deteriorated.
Mass handling capability	Pump	● Total power shift control variable displacement pump	● Use engine power effectively with 2 variable displacement pumps (delivery side)
	Attachment	● Boom raise conflux circuit ● Arm conflux circuit ● Dozer circuit	● Speed up for boom raise operation. ● Speed up for arm operation. ● Speed up the back-filling during dozing
Low Fuel Consumption	Micro computer	● Auto accel The delay auto accelerator works when boom swing and N & B operate.	● Reduce fuel consumption and noise by lowering engine speed when control lever is in neutral position.

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2.8 COMBINATIONS OF ATTACHMENT

Bucket			Applicable Arm	
Type	Heaped capacity m^3 (cu•yd)	Struck m^3 (cu•yd)	1.8 m (5 ft-1 in) Arm (STD)	2.07 m (6 ft-9 in) Arm
Hoe bucket	0.11 (0.14)	0.09 (0.12)	○	○
	0.14 (0.18)	0.12 (0.16)	○	○
	0.18 (0.24)	0.14 (0.18)	○	○
	0.22 (0.29)	0.18 (0.24)	○	◎
	STD 0.28 (0.37)	0.22 (0.29)	◎	△
	0.35 (0.46)	0.26 (0.34)	△	×
V-bucket	0.24 (0.31)	0.16 (0.21)	△	△
Slope finishing bucket	0.26 (0.34)	0.14 (0.18)	△	△
Breaker	—	—	○	○
Nibbler	—	—	○	○

Note

◎ Standard combination

○ General operation : Excavation or loading of sand, gravel, and clay

△ Light operation : Mainly loading or loose gravel (e.g., cultivation or loading of sand or gravel)

× Prohibited combination : There are problems from the view points of strength and stability.

- Use the attachments recommended. Reinforcement of arm allows to use it as nibbler and breaker.
  The trouble due to the use in the condition "Use not allowed" described in the above table is not included in our responsibility
- When bucket marked by △ has been attached or nibbler has been attached on long arm, the specified stability may not be obtained. So add weight 400 kg (880 lbs) in add-on type as required.

⚠CAUTION

If any other bucket, except for the backhoe bucket, is turned over and used for excavation, damage to the arm and bucket may occur.

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SAFETY PRECAUTIONS

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2.3 WEIGHT OF COMPONENTS

Unit : kg (lbs)

Item \ Model	1.8 m (5 ft-11 in) Arm + 450 mm (17.7 in) Shoe
Machine complete	8,000 (17,640)
1. Upper frame assy (including the following :)	3,815 (8,410)
1.1 Counterweight	820 (1,810)
Counterweight (Add-on)	400 (880)
1.2 Cab	191 (420)
1.3 Engine	*250 (550)
1.4 Hydraulic oil tank	*65 (143)
1.5 Fuel tank	*59 (130)
1.6 Slewing motor (including reduction unit)	67 (150)
1.7 Control valve	63 (140)
1.8 Boom cylinder	*92 (203)
1.9 Pin (2pcs. for mounting boom)	14 (31)
1.10 Pump	44 (97)
1.11 Radiator	*39 (86)
1.12 Swing cylinder	*59 (130)
1.13 Swing bracket	244 (538)
2. Lower frame assy (including the following :)	2,910 (6,420)
2.1 Slewing bearing	115 (250)
2.2 Travel motor (including reduction unit)	81 (180)×2
2.3 Upper roller	4 (9)×2
2.4 Lower roller	15 (33)×10
2.5 Front idler	44 (97)×2
2.6 Track tension adjuster	29 (64)×2
2.7 Sprocket	27 (59)×2
2.8 Swivel joint	21 (46)
2.9 Dozer blade	350 (770)
2.10 Dozer cylinder	*60 (130)×2
2.11 Track link with 450 mm (17.7 in) shoes assy	421 (928)×2
3 Attachment	1,050 (2,315)
{3.72 m (12 ft-2 in) Boom + 1.80 m (5 ft-11 in) Arm + 0.28 m (0.37 cy•yd) bucket}	
3.1 Bucket assy	200 (440)
3.2 Arm assy (including the following :)	330 (728)
3.2.1 Arm	190 (420)
3.2.2 Bucket cylinder	*48 (106)
3.2.3 Idler link	17 (37)
3.2.4 Bucket link	8 (17)×2
3.2.5 Pin (2 pcs. for mounting bucket cylinder / 2 pcs. for mounting bucket)	*18 (40)
3.3 Boom assy (including the following :)	514 (1,130)
3.3.1 Boom	390 (860)
3.3.2 Arm cylinder	72 (160)
3.3.3 Pin (Mounting arm • Mounting arm cylinder)	16 (35)
4. Lubricant and water (including the following :)	208 (460)
4.1 Hydraulic oil	*102 (225)
4.2 Engine oil	9 (20)

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AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home or on the highway, are caused by the failure of some individuals to follow simple and fundamental safety rules or precautions. For this reason MOST ACCIDENTS CAN BE PREVENTED by recognising the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment there are conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

Carefully read indications, cautions and safety warning quoted in the “SAFETY RULES” section.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousand serious injuries each year.

That rule is:

Never attempt to clean, oil or adjust a machine while it is in motion.

⚠ ATTENTION

On machines having hydraulically, mechanically and/or cable controlled equipment (such as showels, loaders, dozers, scrapers etc.) be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing.

If it is necessary to have the equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical device used for controlling the equipment.

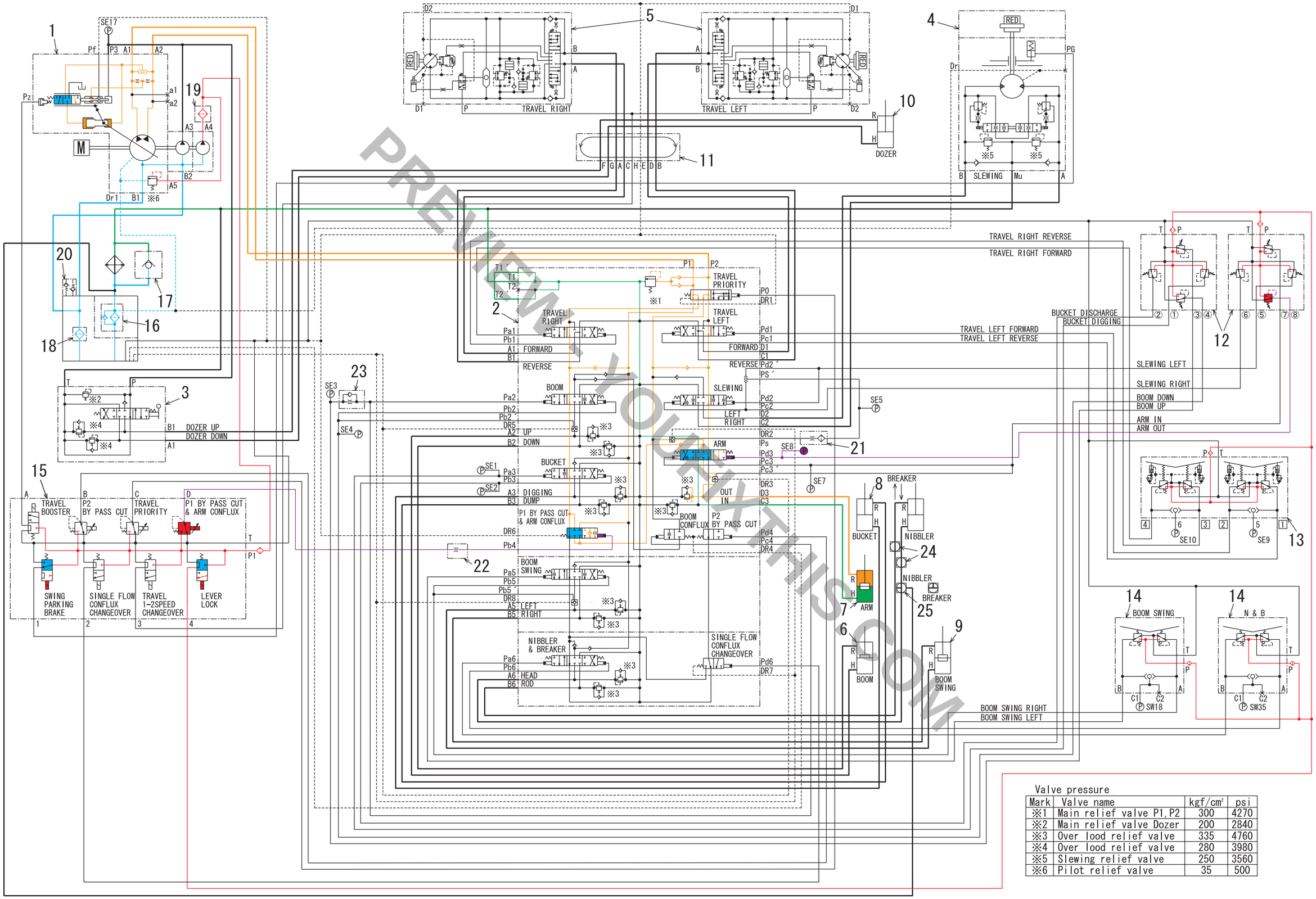
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Valve pressure

Mark	Valve name	kgf/cm²	psi
※1	Main relief valve P1, P2	300	4270
※2	Main relief valve Dozer	200	2840
※3	Over lood relief valve	335	4760
※4	Over lood relief valve	280	3980
※5	Slewing relief valve	250	3560
※6	Pilot relief valve	35	500

Arm circuit : Arm out (extend) operation, conflux function

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2) High-speed step

The high-speed step is the status in which a pilot pressure of 3.43 MPa (500 psi) is supplied from port P. In that case, the spool (271) is pressed to the right, overcoming the force of spring (281) and the pressure from port A or B. The pressure of port F is led to chamber S via spool (271). The thrust of piston (161) increases by the pressure of chamber S. The piston (161) is pushed up and held till swash plate (103) comes in contact with face X.

On that occasion, the swash plate (103) takes the minimum tilting angle $\theta 2$. That is to say, the hydraulic motor takes the minimum displacement capacity and rotates at high speed.

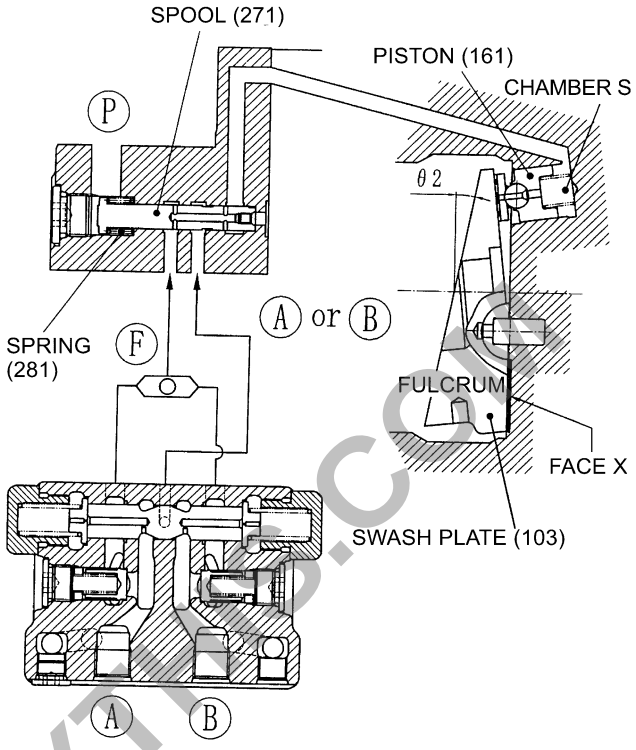


Fig. 24-85

3) Functional explanation of automatic selection of low-speed step while operating at high-speed step

The pressure of A or B increases as load increases at high speed step. When the pressure reaches 22 MPa (3200 psi), the spool (271) is pressed to the left, overcoming the pilot pressure 3.43 MPa (500 psi) of port P. The pressure of chamber S is released to drain (motor casing) via spool (271). In that case, the swash plate (103) comes in contact with the Y face and takes the maximum tilting angle $\theta 1$. The angle is held, with the result that the hydraulic motor rotates at low speed.

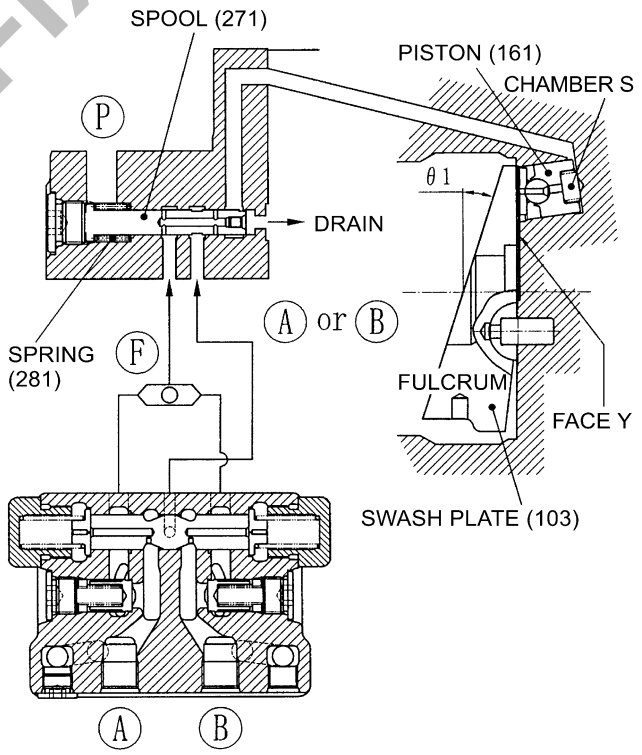
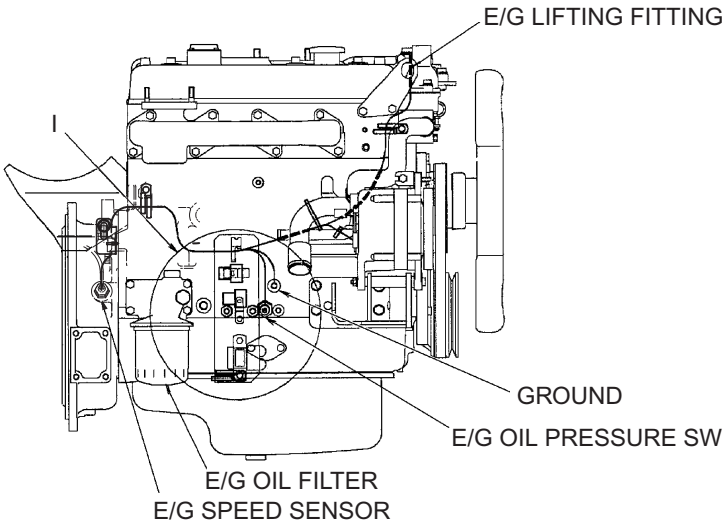
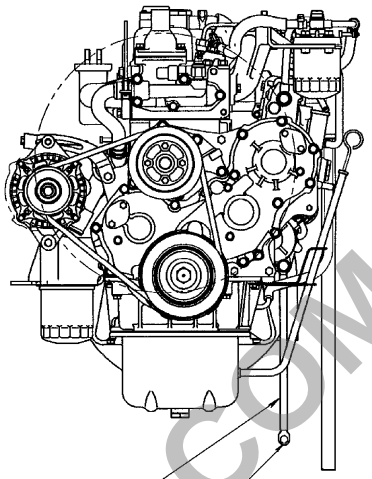


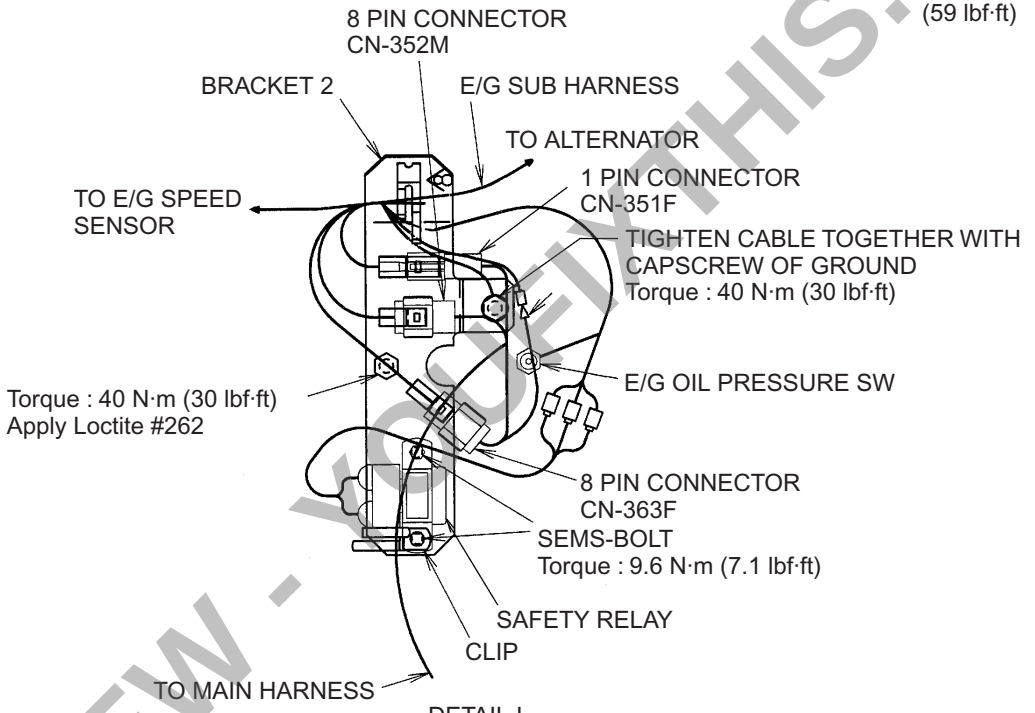
Fig. 24-86

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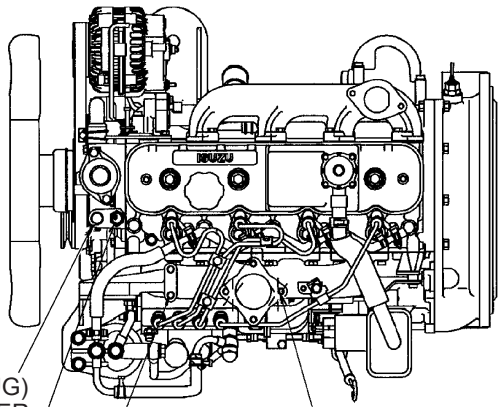
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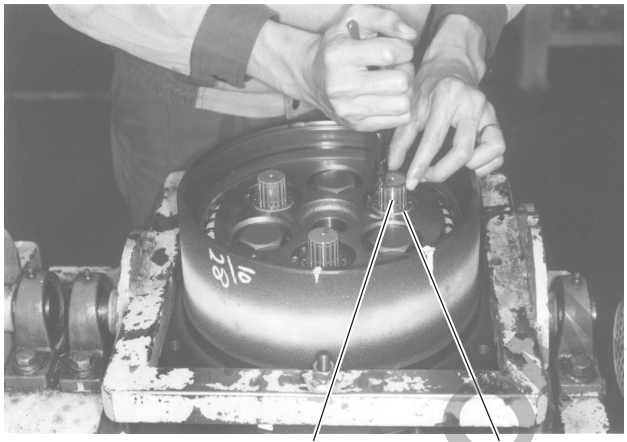
DETAIL I



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3. Put three snap rings (25) to crankshaft (9).

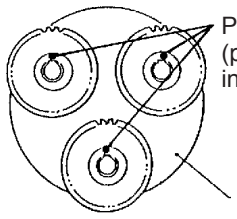


7) Installing spur gear (7).

1. Install three spur gears (7) to crankshaft (9).

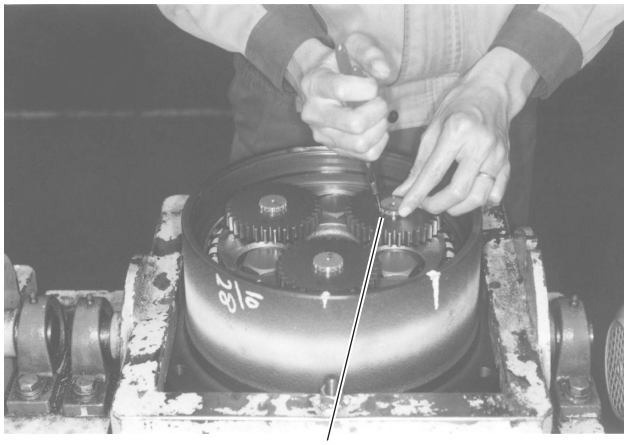
Note

- Put the matching marks (punched) of three spur gears (7) as shown below and fix them to crankshaft (9).





2. Fix three snap rings (25) into the snap ring grooves of crankshaft (9).



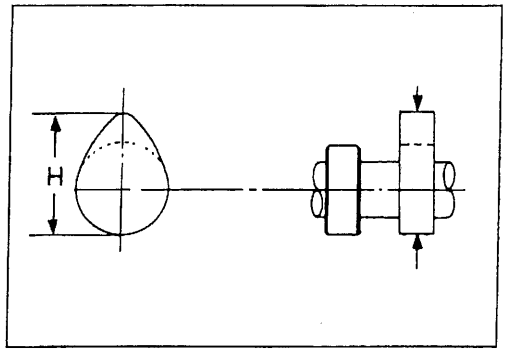
8) Install oil seal (132).

1. Turn over travel motor.
2. Coat the lip of the oil seal with lithium grease and fix oil seal (132) into the oil seal hole in spindle (2), using retainer metal and a hammer.



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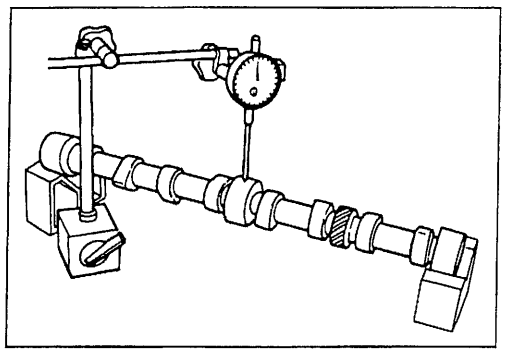


Cam Height

Measure the cam height (H) with a micrometer. If the measured value is less than the specified limit, the camshaft must be replaced.

Cam Height Ⓗ mm(in)

Standard	Limit
42.02 (1.65)	41.65 (1.64)



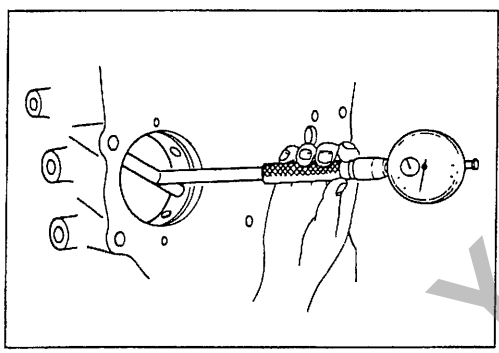
Camshaft Run-Out

1. Mount the camshaft on V-blocks.
2. Measure the run-out with a dial indicator.

   If the measured value exceeds the specified limit, the camshaft must be replaced.

Camshaft Run-Out mm(in)

Standard	Limit
0.02 (0.0008)	0.10 (0.004)



Camshaft and Camshaft Bearing

Use an inside dial indicator to measure the camshaft bearing inside diameter.

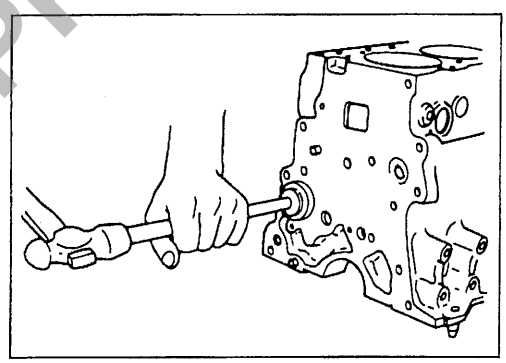
Camshaft Bearing Inside Diameter mm(in)

Standard	Limit
50.0 – 50.03 (1.9685 – 1.9696)	50.08 (1.9716)

If the clearance between the camshaft bearing inside diameter and the journal exceeds the specified limit, the camshaft bearing must be replaced.

Camshaft Bearing Clearance mm(in)

Standard	Limit
0.025 – 0.085 (0.0010 – 0.033)	0.12 (0.005)



Camshaft Bearing Replacement

Camshaft Bearing Removal

1. Remove the cylinder body plug plate.
2. Use the camshaft bearing replacer to remove the camshaft bearing.

   Bearing Replacer: 5-8840-2038-0

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