

SERVICE MANUAL

**EH215
CRAWLER EXCAVATOR**



**NEW HOLLAND
CONSTRUCTION**

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NOTES

2. Lifting Machine Without Attachment

Pass the cables through the lifting points on the crawlers as indicated in page 4 and bring loose ends of cables together at machine center of gravity. Attach to an overhead lifting device with a rated lifting capacity sufficient to lift the machine.

See Figures 5.7B to 5.9B for better reference.

IMPORTANT: *Lifting machine with wider track shoes will tend to shift the Center of Gravity slightly forward, toward the center of the slewing ring.*

! DANGER !

Always use proper lifting equipment and devices. Use of improper lifting equipment could allow the load to shift or fall causing severe damage, serious injury or death.

! WARNING !

Do not use the counterweight lifting eyes to lift machine.

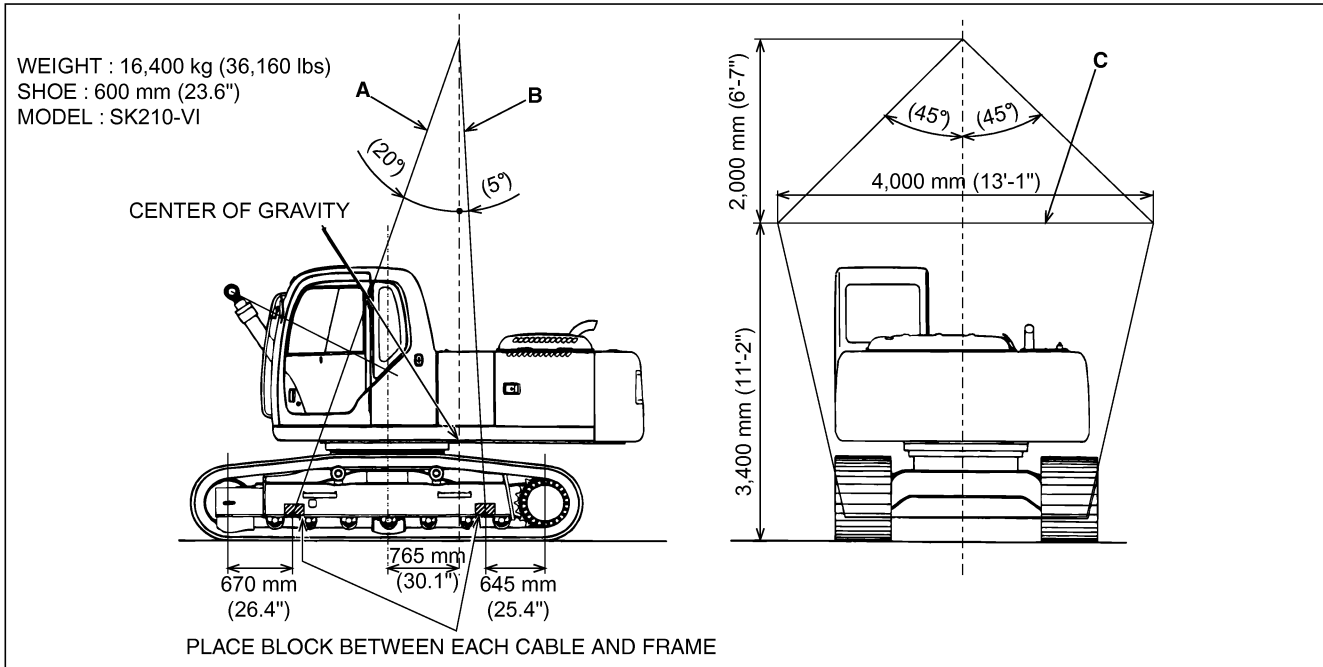


FIGURE 5.7B

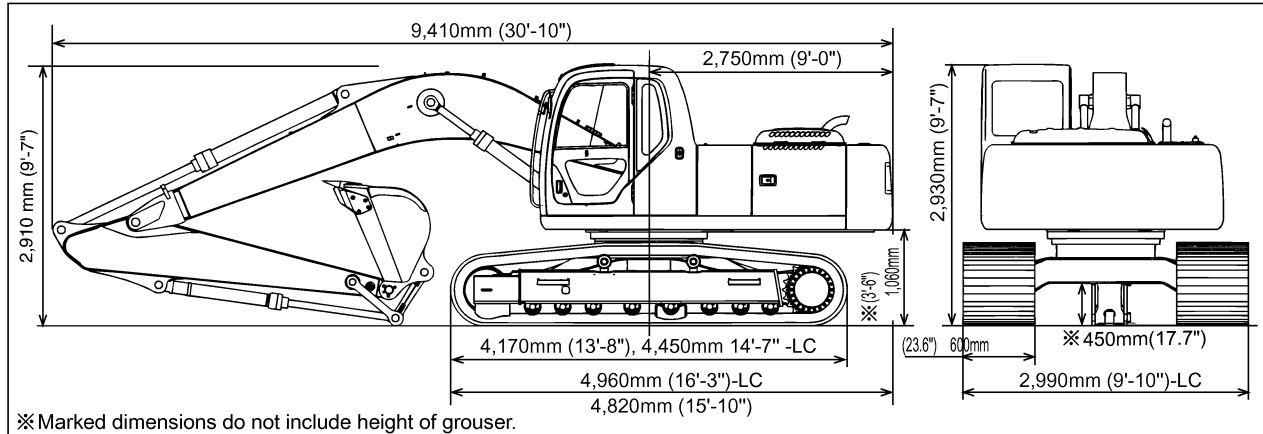
A. One 33.5 x 15.4 m Cable **B.** One 33.5 x 14.7 m Cable **C.** Two 4.0 m Spreader Bars

1. SK210-VI and SK210LC-VI GENERAL SPECIFICATIONS

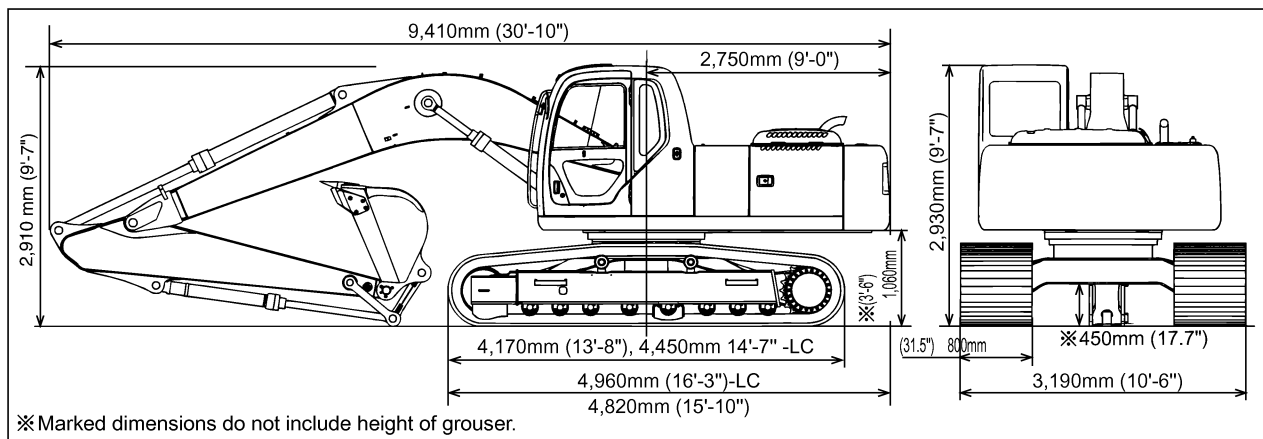
The specifications found in this section are given on the Standard SK210 LC -VI Hydraulic Excavator as manufactured. No modifications or options are taken in to consideration in regard to these specifications.

1-A. MACHINE DIMENSIONS

600 mm Track Shoes: Machine dimensions with Standard Boom {5.65 m (18' 6")}, Standard Arm {2.94 m (9' 8")}, Bucket {0.81 m³ (1.06 yrd³)}, and Track Shoes {600 mm (23.6")}.



800 mm Track Shoes: Machine dimensions with Standard Boom {5.65 m (18' 6")}, Standard Arm {2.94 m (9' 8")}, Bucket {0.81 m³ (1.06 yrd³)}, and Track Shoes {800 mm (23.6")}.

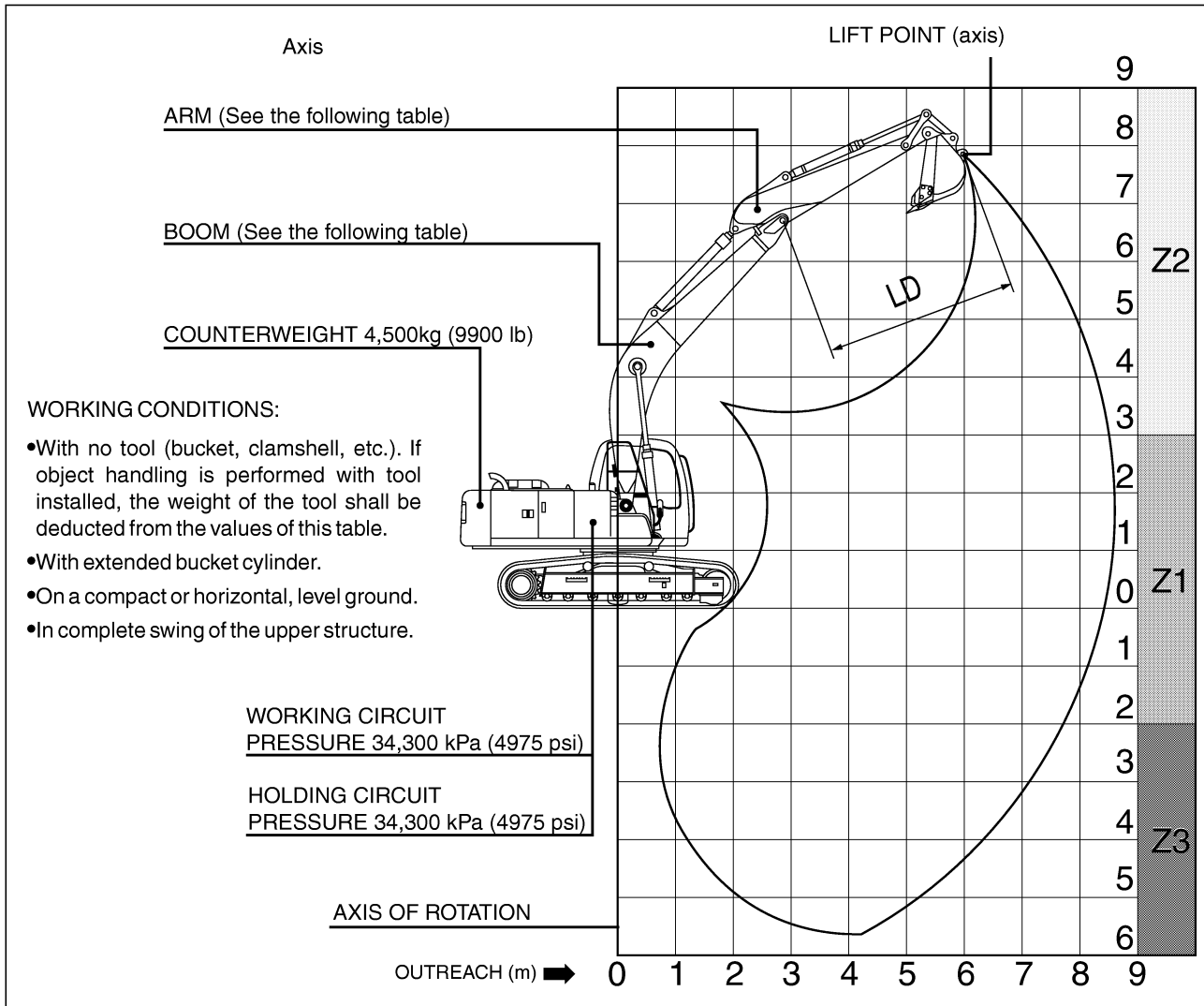


1-B. WORKING WEIGHTS

TRIPLE GROUSER SHOES					
Track Shoe Width	mm (in)	600 (23.6)	700 (27.6)	800 (31.5)	900 (35.4)
Overall Width	m (ft-in)	2.99 (9-10)	3.09 (10-2)	3.19 (10-6)	3.29 (10-10)
Ground Pressure	kg/cm ² (psi)	0.43 (6.11)	0.37 (5.40)	0.33 (4.83)	0.30 (4.27)
Working Weight	kg (lbs)	20,500 (45,200)	21,000 (46,300)	21,300 (47,000)	21,500 (47,000)
Bucket Weight: 650 kg (1,430 lbs)					

SK210 RATED OBJECT HANDLING CAPACITIES TABLE

800 mm Shoe Width



These loads are valid for the height of the considered Zone (Z1, Z2, Z3) for the intended outreach.

BOOM LENGTH 5.65 m		Outreach						
Arm Length	LD*	Zone	3 m	4.5 m	6 m	7.5 m	9 m	Maximum Reach (Boom Foot Height)
2.40 m	2.80 m	Z2	--	5600 kg	4340 kg	2940 kg	--	--
		Z1	6 310 kg		3640 kg	2650 kg	--	2410 kg (8.10 m)
		Z3	11 010 kg		3690 kg	--	--	--
2.94 m	3.33 m	Z2	--	5560 kg	4410 kg	2980 kg	--	--
		Z1	6 650 kg		3610 kg	2580 kg	--	2180 kg (8.59 m)
		Z3	10 960 kg		3610 kg	--	--	--
3.33 m	3.72 m	Z2	--	5480 kg	4470 kg	3010 kg	--	--
		Z1	7 430 kg		3560 kg	2540 kg	--	2010 kg (8.95 m)
		Z3	10 750 kg		3540 kg	2550 kg	--	--

* LD = Distance from Boom point to Hook point

1-M. LIFTING CAPACITIES (KAI SPEC'S)

1. Do not attempt to lift any load that exceeds these rated values at their specified load radii and heights.
2. Lifting capacities assume a machine standing on a level, firm, and uniform supporting surface. Operator must make allowance for job conditions such as soft or uneven ground, out of level conditions, side loads, sudden stopping of loads, hazardous conditions, inexperienced personnel, weight of various other buckets, lifting slings, attachments, etc.
3. Ratings at bucket lift hook.
4. The previous rated loads are in compliance with SAE Hydraulic Excavator Lift Capacity Standard J 1097. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping load. Rated loads marked with an asterisk (*) are limited by hydraulic capacity rather than tipping load.
5. Operator should be fully acquainted with the operator's manual before operating this machine. Rules for safe operation of equipment should be followed at all times.
6. Capacities apply to the machine as originally manufactured and normally equipped by the manufacturer.

3 TORQUE SPECIFICATIONS

The following Torque Specifications are provided for use when actual torque value of a fastener is not known.

3-A. CAPSCREWS and NUTS

1. Metric Coarse Thread Standard Tightening Torque Values. Make certain to tighten all Capscrews and Nuts to proper torque values.

Nominal SIZE	4.8 T		7 T		10.9 T	
	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION
M6 P=1	0.45±0.05 (3.2±0.4)	0.38±0.04(2.7±0.3)	0.98±0.1 (7.1±0.7)	0.83±0.08 (6.0±0.6)	1.77±0.18 (12.8±1.3)	1.5±0.15 (10.8±1.1)
M8 P=1.25	1.09±0.11 (7.9±0.8)	0.92±0.09 (6.6±0.7)	2.4±0.2 (17.3±1.4)	2.0±0.2 (14.4±1.4)	4.3±0.4 (31.0±2.9)	3.6±0.4 (26.0±2.9)
M10 P=1.5	2.2±0.2 (15.9±1.4)	1.83±0.18 (13.2±1.3)	4.7±0.5 (33.9±3.6)	4.0±0.4 (28.9±2.9)	8.5±0.9 (61.3±6.5)	7.2±0.7 (52.0±5.1)
M12 P=1.75	3.7±0.4 (26.7±2.9)	3.2±0.3 (23.1±2.2)	8.1±0.8 (58.5±5.8)	6.8±0.7 (49.1±5.1)	14.6±1.5 (105±10.8)	12.3±1.2 (88.8±8.7)
M14 P=2	5.9±0.6 (42.6±4.3)	5.0±0.5 (36.1±3.6)	12.8±1.3 (92.5±9.4)	10.8±1.1 (78.0±7.9)	23±2 (166±14)	19.5±1.9 (140±14)
M16 P=2	9.0±.09 (64.9±6.5)	7.6±0.7 (54.8±5.1)	19.5±2.0 (140±14.4)	16.4±1.6 (118±11.5)	35±4 (252±28.9)	29±3 (209±21.6)
M18 P=2.5	12.4±1.2 (89.6±8.7)	10.5±1.0 (75.8±7.2)	27±3 (195±22)	23±2 (166±14)	49±5 (354±36)	41±4 (296±29)
M20 P=2.5	17.5±1.7 (126±12.3)	14.7±1.4 (106±10.1)	38±4 (274±29)	32±3 (231±22)	68±7 (491±51)	57±6 (412±43)
M22 P=2.5	23±2 (166±14)	19.6±2.0 (142±14)	51±5 (368±36)	43±4 (310±29)	92±9 (663±65)	77±7 (555±58)
M24 P=3	30±3 (217±22)	24±3 (173±22)	65±7 (469±51)	53±5 (383±36)	118±12 (852±87)	96±10 (693±72)
M27 P=3	44±4 (318±29)	36±3 (260±22)	96±10 (693±72)	78±8 (563±58)	173±17 (1250±120)	140±14 (1010±100)
M30 P=3.5	60±6 (433±43)	50±5 (361±36)	131±13 (946±94)	110±11 (794±79)	235±24 (1700±170)	198±20 (1430±140)
M33 P=3.5	81±8 (585±58)	68±7 (491±51)	176±18 (1270±130)	48±15 (1070±110)	1317±32 (2290±200)	266±27 (1920±200)
M36 P=4	105±10 (758±72)	88±9 (636±65)	227±23 (1640±170)	190±19 (1370±140)	409±41 (2960±300)	343±34 (2480±250)
Torque Value Units = kgf-m (ft-lbs)						

2. Metric Fine Thread Standard Tightening Torque Values. Make certain to tighten all Capscrews and Nuts to proper torque values.

Nominal SIZE	4.8 T		7 T		10.9 T	
	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION
M8 P=1.0	1.15±0.11 (8.3±0.8)	0.97±0.1(7.0±0.7)	2.5±0.2 (18.0±1.4)	2.1±0.2 (15.2±1.4)	4.5±0.4 (32.5±2.9)	3.8±0.4 (27.4±2.9)
M10 P=1.25	2.3±0.2 (16.6±1.4)	1.91±0.19 (13.8±1.4)	4.9±0.5 (35.4±3.6)	4.2±0.4 (30.3±2.9)	8.9±0.9 (64.2±6.5)	7.5±0.7 (54.2±5.1)
M12 P=1.25	4.0±0.4 (28.9±2.9)	3.4±0.3 (24.5±2.2)	8.7±0.9 (62.8±6.5)	7.3±0.7 (52.7±5.1)	15.7±1.6 (113±13)	13.2±1.3 (95.3±9.4)
M16 P=1.50	9.4±0.9 (67.9±6.5)	7.9±0.8 (57.0±5.8)	20±2 (144±14)	7.2±1.7 (124±12)	37±4 (267±29)	31±3 (224±22)
M20 P=1.50	19±9 (137±14)	15.8±1.6 (114±14)	41±4 (296±29)	34±3 (246±22)	74±7 (535±51)	62±6 (448±43)
M24 P=2.0	32±3 (231±22)	27±3 (195±22)	70±7 (506±51)	58±6 (419±43)	126±12 (910±87)	105±10 (758±72)
M30 P=2.0	65±6 (469±43)	54±5 (390±36)	142±14 (1030±100)	118±12 (852±87)	255±26 (1840±190)	212±21 (1530±150)
M36 P=3.0	109±11 (787±79)	91±9 (657±65)	238±23 (1720±170)	198±20 (1430±140)	428±43 (3090±310)	357±36 (2580±260)
Torque Value Units = kgf-m (ft-lbs)						

1.2 BOOM MAINTAINANCE STANDARD

1. BOOM

(1) Clearance of pin and bushing on boom section

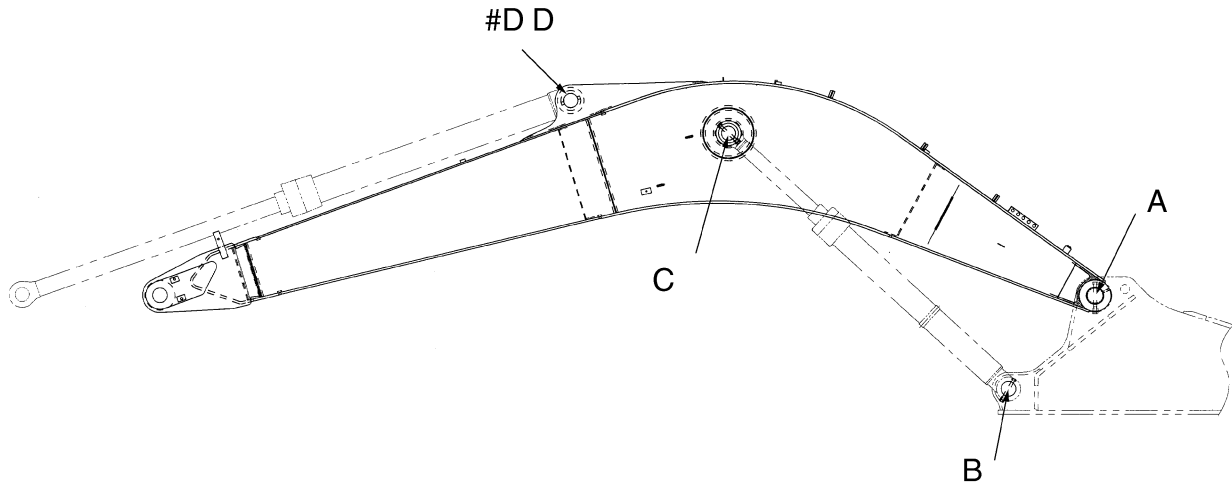


Fig. 1-2 Clearance of pin and bushing on boom section

Table 1-2

Unit: mm (Ft-in)

Sym- bol	Item	Pin part No.	Pin dia.	Pin dia. Tolerance	Bushing I.D. Tolerance	Standard value	Repair- able level	Service Limit	Remedy
A	Boom	2419T4651	φ 90mm (3.5433")	+0.20mm (+0.0008") -0.020mm (-0.0008")	+0.204mm (+0.0080") -0.073mm (-0.0029")	+0.224mm (+0.0088") +0.053mm (+0.0021")	More than 2.0mm (0.8")	2.5mm (0.1")	Replace bushing or pin
B	Boom cylinder (head side)	YN02B01185P1				+0.230mm (+0.0091") -0.150mm (-0.0059")			
C	Boom cylinder (rod side)	YN02B01186P1	φ 85mm (3.3464")	+0.30mm (+0.012") -0.030mm (-0.0012")	+0.230mm (+0.0091") +0.150mm (+0.0059")	+0.260mm (+0.0102") +0.120mm (+0.0047")			
D	Arm cylinder (Head side)	YN02B01187P1				+0.250mm (+0.0098") +0.130mm (+0.0051")			
# D		YN02B01272P1				+0.20mm (+0.0008") -0.020mm (-0.0008")			

Mark Shows Ground Pin (EU spec.)

3.2 BUCKET DIMENSIONAL TABLE KAI SPECIFICATIONS

	SK210	SK250
A	442mm (17.401")	514mm (20.236")
B	R 1,450mm (R 57.086")	R 1,515mm (R 59.645")
D	399mm (15.708")	399mm (15.708")
d ₁	∅ 80mm (3.149")	∅ 90mm (3.543")
d ₂	∅ 80mm (3.149")	∅ 90mm (3.453")
E	327mm (12.873")	327mm (12.873")
F	837mm (32.952")	1060mm (41.732")
r ₁	150mm (5.905")	145mm (5.708")
r ₂	130mm (5.118")	133mm (5.236")
α	96.75°	102.86°
l	542mm (21.338")	532mm (20.944")
l ₀	480mm (18.897")	470mm (18.503")
t ₁	30mm (1.181")	30mm (1.181")
t ₂	∅ 80mm ⁺⁰⁵ _{-.110} (3.149" ⁺⁰⁰¹⁹ _{-.004})	∅ 90mm ⁺⁰⁷⁰ _{-.130} (2.559" ⁺⁰⁰² _{-.005})
t ₃	∅ 85mm (3.346")	∅ 95mm (3.740")
t ₄	15mm (.590")	15mm (.590")
t ₅	17mm (.669")	17mm (.669")
t ₆	27mm (.669")	27mm (1.062")

LEGEND BUCKET and BUCKET PIN

BUCKET	BUCKET PIN
A: Distance between pins of bracket	l: Overall length of pin
B: Distance from bucket pin to tooth tip	l ₀ : Length under head to center line of retainer hole
D: Bracket inside width	t ₁ : Length of taper
d1: Diameter of pin	t ₂ : Diameter of pin
d2: Diameter of pin	t ₃ : Diameter of head
E: Bracket inside width	t ₄ : Center line of alignment hole
F: Side cutter outside width	t ₅ : Diameter of retainer and alignment hole (2 Places)
r ₁ : Clearance radius of arm (*for reference only)	t ₆ : Length of pin head
r ₂ : Clearance fo linkage (*for reference only)	
α: Alpha angle	

4. PLUG

(1) Plug for hydraulic pipe joint

1) Cap nut (Joint plug)

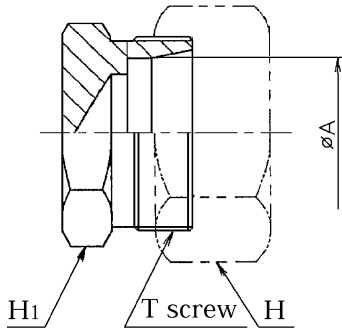


Table 4-1

Applicable pipe O. D : A	Cap nut parts No.	T screw	Opposing flat	
			H1	H
6	ZF83H06000	M12×1.5	14	14
8	ZF83H08000	M14×1.5	17	17
10	ZF83H10000	M16×1.5	17	19
12	ZF83H12000	M18×1.5	19	22
15	ZF83H15000	M22×1.5	24	27
18	ZF83H18000	M26×1.5	27	32
22	ZF83H22000	M30×1.5	32	36
28	ZF83H28000	M36×1.5	38	41

2) Plug (Tube plug)

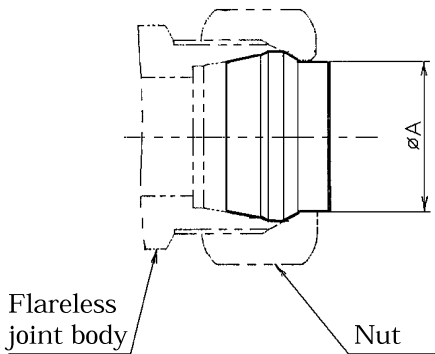


Table 4-2

Applicable pipe O. D : A	Plug parts No.
6	ZF83P06000
8	ZF83P08000
10	ZF83P10000
12	ZF83P12000
15	ZF83P15000
18	ZF83P18000
22	ZF83P22000
28	ZF83P28000

3) Nut

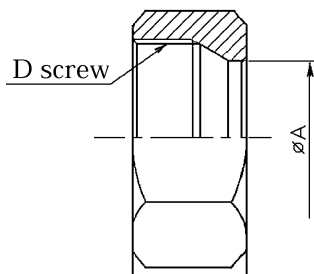
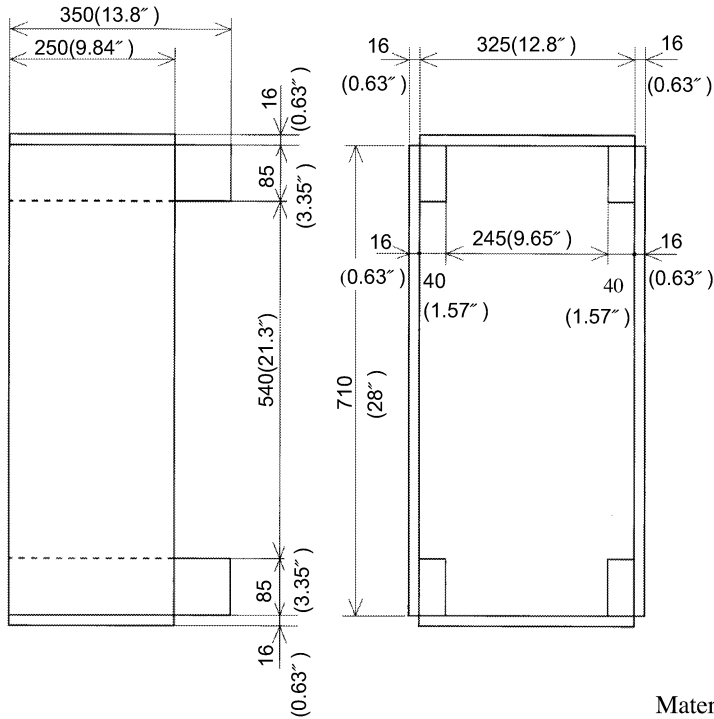


Table 4-3

Applicable pipe O. D : A	Nut parts No.	D screw	Opposing flat
6	ZF93N06000	M12×1.5	14
8	ZF93N08000	M14×1.5	17
10	ZF93N10000	M16×1.5	19
12	ZF93N12000	M18×1.5	22
15	ZF93N15000	M22×1.5	27
18	ZF93N18000	M26×1.5	32
22	ZF93N22000	M30×1.5	36
28	ZF93N28000	M36×1.5	41
32	ZF93N32000	M42×1.5	50
35	ZF93N35000	M45×1.5	55
38	ZF93N38000	M48×1.5	60

11. ENGINE MOUNTING PEDESTAL

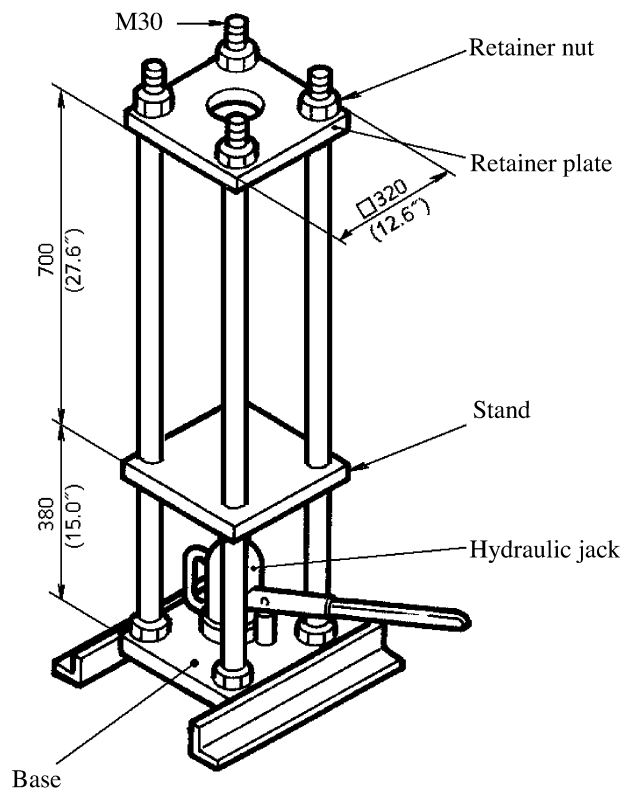


Note) Hold the oil pan section of engine.

Material : Plywood or wooden plate

Fig. 11-1_Engine stand

12. TRACK SPRING SET JIG



Unit : Hour

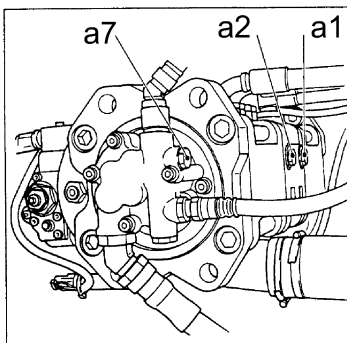
Group	Location	Work to be done	Unit	Remark	SK200(LC)	
					SK210(LC)	
06 Electric equipments	SE-26	Pressure sensor•P1 negative control	Replace	1		0.5
	SE-27	Pressure sensor•P2 negative control	Replace	1		0.5
	SE-28	Pressure sensor•Back pressure	Replace	1		0.5
		Solenoid				
	SV-1	Swing parking SOL	Replace	1	Include proportional valve block removing and installing.	0.5
	SV-2	Attachment boost pressure SOL	Replace	1	Include proportional valve block removing and installing.	0.5
	SV-3	2-speed travel SOL	Replace	1	Include proportional valve block removing and installing.	0.5
	SV-4	Level lock SOL	Replace	1	Include proportional valve block removing and installing.	0.5
		Switch				
	SW-1	Key switch	Replace	1		0.3
	SW-2	Switch assy (Mode, buzzer stop)	Replace	1		0.3
	SW-3	2-speed travel switch	Replace	1		0.3
	SW-4	Swing parking release switch	Replace	1		0.3
	SW-5	KPSS release switch	Replace	1		0.3
	SW-6	Engine water temperature switch	Replace	1		0.3
	SW-7	Engine oil pressure switch	Replace	1		0.3
	SW-8	Clogged air filter switch	Replace	1		0.3
	SW-10	Horn switch	Replace	1		0.3
	SW-11	Lever lock switch	Replace	1		0.3
	SW-13	Air conditioner switch	Replace	1		0.3
	SW-19	Wiper interlock switch	Replace	1		0.3
	SW-20	Switch assy (Wiper, washer, work light)	Replace	1		0.3
	SW-21	Attachment boost pressure switch	Replace	1		0.3
	SW-23	Engine oil level switch	Replace	1		0.3
	SW-24	Engine cooling coolant level switch	Replace	1		0.3
SW-25	Hydraulic level switch	Replace	1		0.3	

NAME OF WORK	NAME OF TROUBLE	MODEL
		6DS (6D34-T)
Timing gear (chain) casing 03•40		
Detaching/attaching or replacing timing gear casing.	Timing gear (chain) casing makes an unusual sound. Timing gear (chain) casing parts are faulty. Oil leaks from gasket. Timing gear casing system in general is out of order.	4.5
Replacing timing gear casing packing.	Oil leaks from gasket.	4.5
Detaching, attaching and replacing timing gear casing cover.	Timing gear casing in general is out of order.	•
Replacing cam shaft gear and idle gear.	Idle gear parts are defective. Cam shaft gear is installed incorrectly. Cam shaft gear parts are defective.	5.3
Replacing idle gear bushing •Note : Flywheel housing is dismantled.	Timing gear casing in general is out of order.	•
Crank shaft 03•51		
Detaching/attaching or replacing crank shaft. •Incl. : (1) Detaching/attaching engine. (2) Adjusting idling.		24.0
Replacing crank shaft rear oil seal. (On-machine) •Incl. : Detaching and attaching transmission and flywheel.	Oil leaks from rear oil seal.	7.0
Detaching/attaching or replacing crank pulley. (On-machine) •Incl. : Detaching and attaching radiator shroud and fan.	Crank shaft pulley parts are faulty. Crank shaft pulley nuts are loosened.	3.0
Detaching/attaching or replacing crank pulley. •Incl. : Detaching and attaching transmission.	Flywheel mounting bolts are broken. (incl. loosening)	6.5
Detaching/attaching or replacing flywheel ring gear. (single body)	Flywheel ring gear is worn. Flywheel ring gear is broken.	0.5
Replacing flywheel pilot bearing. (single)	Flywheel pilot bearing parts are faulty.	0.2
Replacing flywheel front oil seal. (On-machine) •Incl. : (1) Detaching and attaching fan and front cover.	Oil leaks from front oil seal.	5.0
Replacing crank shaft gear. (On-machine)	Crank shaft gear is worn. Crank shaft gear is broken.	•

PERFORMANCE INSPECTION SPECIFICATION CHART

LLO8U0101~

INSPECTION ITEM		PRESSURE					Adjustment Point	MEASURING CONDITION, FUNCTION		
		READING FROM		SPECIFICATION						
STANDARDS FOR TESTING	Cleanliness of Hydraulic Oil	Hydraulic Oil Tank		Class: NAS 7-9		N/A	Take Sample			
	Temperature of Hydraulic Oil	Hydraulic Oil Tank Surface		°C- 45-55	°F-113-131	N/A	Ambient Temperature -10°C ~ 50°C (14°F ~ 122°F)			
	Engine Coolant Temperature	Radiator Surface		°C- 60-90	°F-140-194	N/A				
	ENGINE RPM	Low Idle	Display change switch on gauge cluster			950~1025 RPM		Service Connector Installed	Throttle @ "LO"- Idle	
		M- Mode				2290~2345 RPM			Throttle @ "HI"- Idle	
A- Mode		1925~1975				Throttle @ "HI"- Idle				
B- Mode	2290~2345					Throttle @ "HI"- Idle				
SYSTEM	COMPONENT	GAUGE @	SIZE	PORT	Kgf/cm ²	PSI	Adj point	Measuring Condition		
PILOT CIRCUIT	PRIMARY PRESSURE	Gear Pump		a7	50~55	710~780	P3	Engine - Hi Idle		
MAIN RELIEF	POWER BOOST	F	Main Pump	a1	380~395	5400~5616	MR1	Boom Raising		
		R		a2						
	ATTACHMENT	RH	Main Pump	a1	350~355	4977~5048	MR1	Boom Raising		
		LH		a2						
NOTE:	Port relief valves are set at a precise flow rate and cannot be adjusted on the machine. Port relief valves can be checked for excessive leakage by increasing the value of main relief valve. (turn main relief clockwise one complete turn). Check at low idle, heavy lift on (if Applicable). Refer to chart below for port relief valve.									
PORT RELIEFS	BOOM (DO NOT ADJUST)	ROD HEAD	Main Pump	PF-1/4	a1	350~385	4977~5474	OR4	Boom Down	
		ROD HEAD			a2	350~405	4977~5760	OR3	Boom Up	
	ARM (DO NOT ADJUST)	ROD HEAD	Main Pump		a1	350~405	4977~5760	OR8	Arm Out (Cylinder In)	
		ROD HEAD			a2	350~385	4977~5474	OR7	Arm In (Cylinder Out)	
	BUCKET (DO NOT ADJUST)	ROD HEAD	Main Pump		a1	350~385	4977~5474	OR1	Bucket Out	
		ROD HEAD			a2	350~405	4977~5760	OR2	Bucket In	
	SWING	Left	Main Pump		a1	327~335	4653~5050	OR5	Bucket Lock, Stall Swing	
		Right			a2	327~335	4653~5050	OR6	Bucket Lock, Stall Swing	
	AUXILIARY */**	All	Main Pump		a1a2	350~365	4977~5190		Auxiliary Attachment Stalled	
	TRAVEL (DO NOT ADJUST)	Forward	Main Pump		a1	350~365	4977~5190		"M"-Mode, Engine at Hi Idle. Simultaneous LH/RH Travel Engaged	
Reverse		a2		350~365	4977~5190					
Forward		a1		350~365	4977~5190		"M"-Mode, Engine at Hi Idle. Simultaneous LH/RH Travel Engaged			
Reverse		a2		350~365	4977~5190					
SYSTEM	COMPONENT	GAUGE @		PORT	Kgf/cm ²	mA	Adj point	Measuring Condition		
PROPORTIONAL VALVE BLOCK	P1 by-pass cut valve	D	Multi display on C2 Gauge cluster	Display on service diagnostics	No.20	5.5~6.5	330~360	Neutral	Arm out	
	23~26	634~660				activated				
	P2 by-pass cut valve	B			No.21	5.5~6.5	330~360	Neutral	Boom up or Bucket dig	
	23~26	634~660				activated				
Travel Straight valve	C	No.22	5.5~6.5		330~360	Neutral	Arm in or Bucket dig			
24~28	345~680		activated							
Arm variable recirculation	A	No.23	23~25		633~650	Neutral	Arm in			
	24~0		450~200		activated					
Pump Regulation	P1 pump proportional valve	a8	Multi display on C2 Gauge cluster		Display on service diagnostics	No.24	28~30	730~760	Neutral	Power Shift *** / ** / *
							10~24	350~680	activated	
	P2 pump proportional valve	a9		No.25		28~30	730~760	Neutral	Power Shift *** / ** / *	
						10~24	350~680	activated		



Power Shift:

- *** ...All controls in neutral 0~10 mA
- **Front attachment stalled 0~10 mA
- *Both travel motors stalled 10~30 mA

Auxiliary */**

Auxiliary port relief are as follows:
Swing priority, Breaker, Nibler Breaker

NOTE :
Take Measurements
M-Mode Engine at "HI" Idle.
Levers in neutral for neutral reading,
then activate circuit to take activated readings

OVER LOAD RELIEF VALVES

D. OR3 Boom Up Over load Relief

1. Operate Boom Up Control until boom is completely up and hold.
2. Record reading from Pressure Gauge at a1 or a2 test port on P1 or P2 Main Pump. Compare reading to proper chart for specific machine being tested.
3. Locate OR3 on Main Control Valve, loosen locknut and adjust OR3 to test bench pressure. See Figure 14.27.
4. Secure locknut TO 2.8 ~3.2 kgfm² (20~30 ft.lb).

E. OR4 Boom Down over Load Relief

1. Operate Boom Down Control until boom is completely down and hold.
2. Record reading from Pressure Gauge at a test port on P1 Main Pump. Compare reading to proper chart for specific machine being tested.
3. Locate OR4 on Main Control Valve, loosen locknut and adjust OR4 to test bench pressure. See Figure 14.27.
4. Secure locknut, 2.8 ~3.2 kgfm² (20~30 ft.lb).

F. OR1 Bucket In (DIG) Over Load Relief

1. Operate bucket in control until bucket is completely in, then hold.
2. Record reading from Pressure Gauge at a1 test port on P1 Main Pump. Compare reading to proper chart for specific machine being tested.
3. Locate OR1 on Main Control Valve, loosen locknut and adjust OR1 to test bench pressure. See Figure 14.27.
4. Secure locknut, 2.8 ~3.2 kgfm² (20~30 ft.lb).

WARNING

- PRECISE ADJUSTMENT OF THE MACHINE'S OVER LOAD RELIEF VALVES IS *NOT POSSIBLE ON THE MACHINE.*
- SHOULD A PROBLEM BE FOUND WITH THE OVER LOAD RELIEF VALVES, IT IS RECOMMENDED TO REPLACE FAULTY OVER LOAD RELIEF VALVES. SUCH ADJUSTMENT COULD VOID WARRANTY.

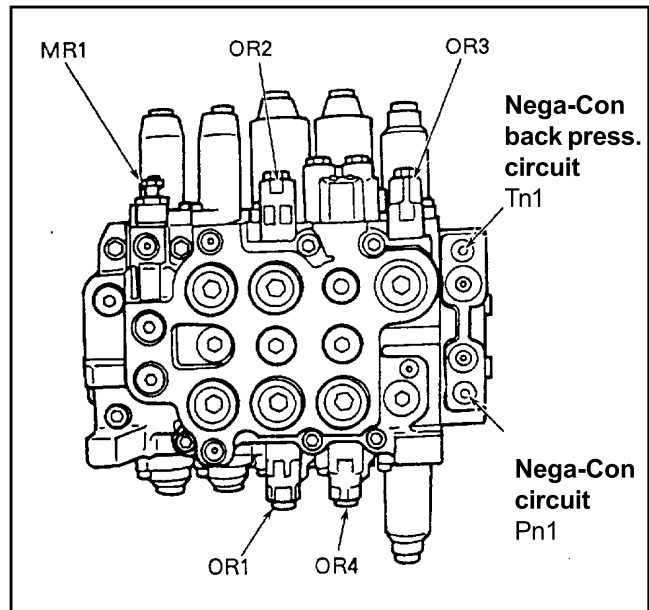


Figure 14.27 *

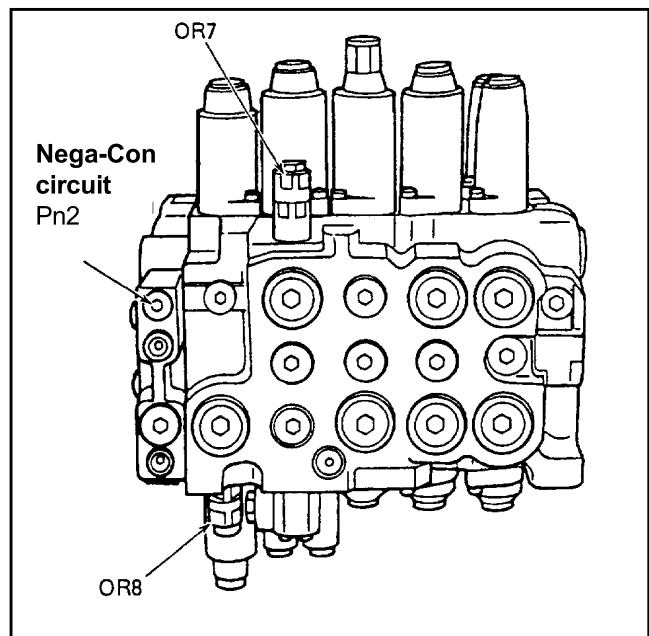


Figure 14.28 *

* Note: Swing Priority not shown

NOTE

Turning Over Load Adjusting Screw
Clockwise One turn
Increases Pressure Approximately
108 kgf/cm² 180 (2560 psi)

SWING DRIFT

SWING DRIFT

A. Tools & Equipment.

1. Device for Marking Starting Point
2. Stopwatch

B. Machine Settings & Site Condition

1. Hydraulic oil temperature at 45°C to 55° (113°F to 131°F).
2. Firm testing area with 10° slope.

C. Swing Drift Test

1. Move the machine to a firm testing area with 10° slope as shown in Figure 4.8.
2. Operate the Bucket In Control until bucket is completely in (extending cylinder). See Figure 4.9.
3. Operate the Arm Out Control until the arm is completely out (retracting cylinder). See Figure 4.9.
4. Adjust the boom up or down until bucket teeth are 1.5m (4'-11") from ground level. See Figure 4.10.
5. Stop engine and allow the machine to sit for 20 seconds.
6. Measure the distance the swing drifted, down grade, while sitting. Record the distance. See Figure 4.11.
7. Repeat steps 2 through 6 two more times. Average the distances and compare average to the Swing Drift Specification Chart.
8. Start engine and swing machine 180°. Repeat steps 2 through 7.

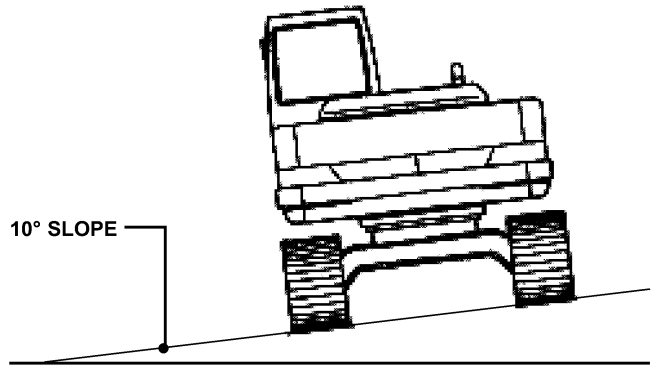


FIGURE 4.8

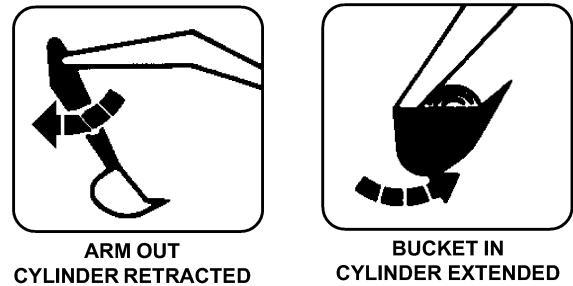


FIGURE 4.9

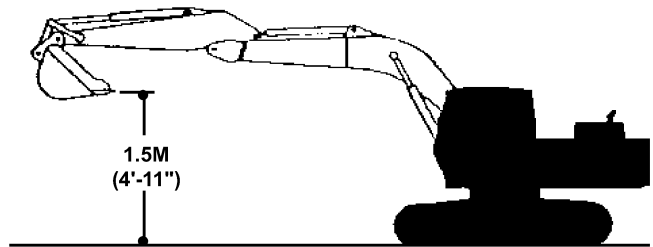


FIGURE 4.10

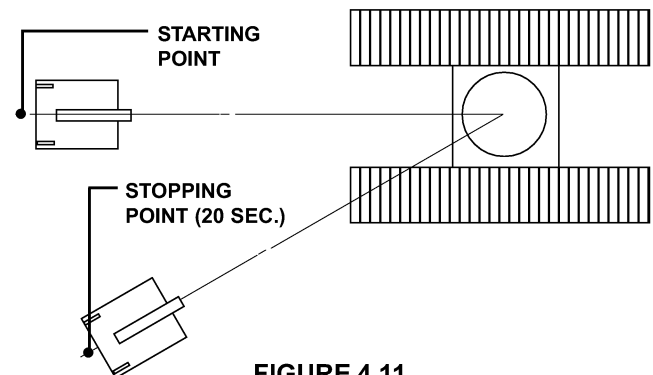


FIGURE 4.11

SWING DRIFT SPECIFICATIONS

MODEL	SPECIFICATION
SK210 ~ SK250	0mm (0") / 20 Seconds

PRE-CHECKS PRIOR TO PREFORMING ADJUSTMENT “A”

NOTE

With key in the “ON” position and engine not running, Gauge cluster display must read “MONITOR SYSTEM OK”. If any warning icons are visible in gauge cluster display, preform the proper maintenance or repairs to correct the problem. Then proceed to Adjustment “A”. See Figure 10.29 A.

A. Emergency Stop Control, and Manual Throttle Cable

1. Check the operation of Emergency Stop control, confirm that cable moves freely both in and out, and does not bind.
2. Emergency stop cable must be pushed in to obtain proper engine performance.
3. Confirm that the manual Throttle Control Cable is pressed in (Release position).

B. Verify engine RPM

1. If possible start engine, run excavator hydraulic system until water temperature is at normal operating range.
2. Verify engine RPM in “M” mode, “A” mode, and in “B” mode by pushing screen change switch once. Record engine RPM readings for later verification. See Figure 10.29 B.

C. RPM Sensor Test

Proper adjustment of the RPM sensor is critical to a successful Adjustment “A” Procedure. With engine running press screen change switch one time, RPM will appear on screen.

1. If screen shows 0 RPM check the following:
 - a. With engine OFF (not running) disconnect the RPM sensor from the machine electrical harness. Check the resistance value of RPM sensor. Value must be $2.3k \Omega \pm 0.2 k \Omega$.
 - b. Connect the speed sensor, to a multi meter. With engine running at low idle, measure the voltage AC. voltage must be 4 V or more. See Figure 10.29 C.

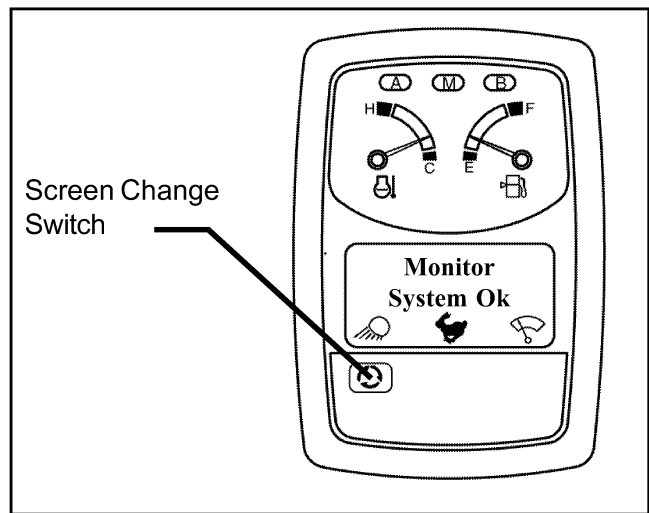


FIGURE 10.29 A

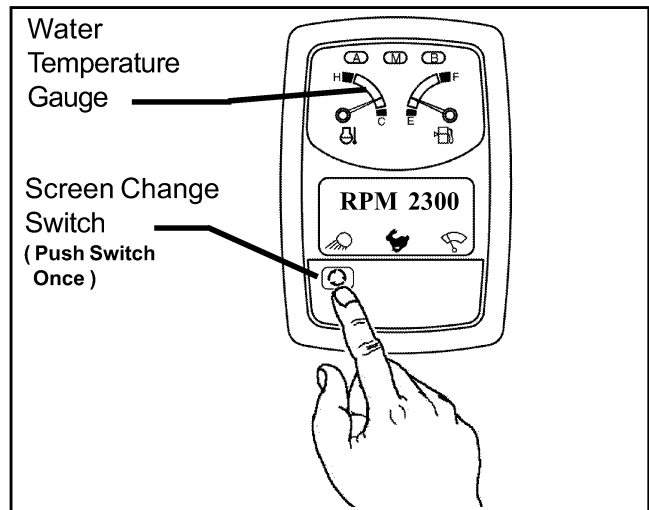


FIGURE 10.29 B

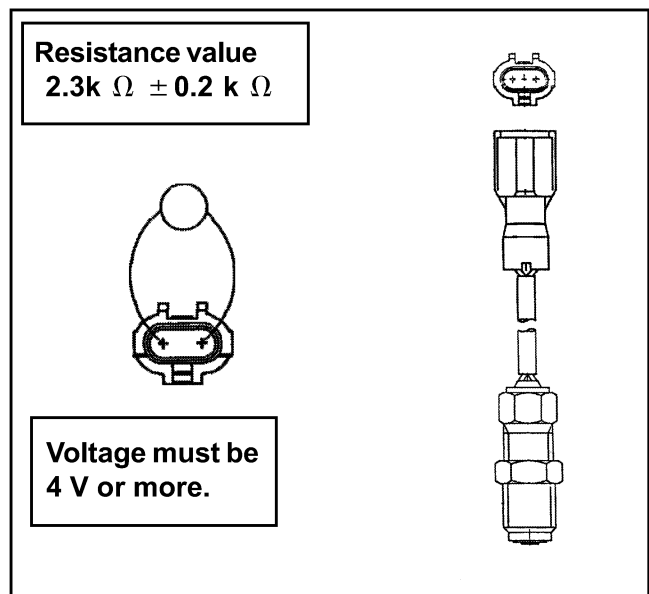



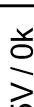
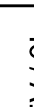

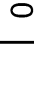
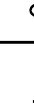
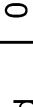

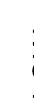



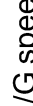






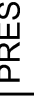
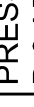
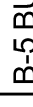





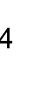


FIGURE 10.29 C

SERVICE DIAGNOSTIC 28 ITEM CHECK CHART

		Low Pressure Sensor									
Display	Operation procedures	SK210	SK250	SK290	SK330	Remarks					
No. 9 (Screen No.) PRESS. SENSOR B-1 BOOM RAISE 0.5V 0k B-2 BOOM LOWER 0.5V 0k	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k				Note: 0k = 0 kg/cf ² Note: V = Volts When control lever is in neutral position you will have minimum values. As you increase the angle of the control lever, the values will increase proportionally. If values do not change while operating the control lever, remove connector on the failed low pressure sensor. Then install connector on pressure sensor which is known to work.					
	E/G speed High idle Down/ Up to over relief	5.0V / 30k									
	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle In/Out to over relief	5.0V / 30k									
No. 10 (Screen No.) PRESS. SENSOR B-3 ARM OUT 0.5V 0k B-4 ARM IN 0.5V 0k	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k				If display does not change: FAILURE OF HARNESS					
	E/G speed High idle In/out to over relief	5.0V / 30k									
	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle In/out to over relief	5.0V / 30k									
No. 11 (Screen No.) PRESS. SENSOR B-5 BUCKET DIG 0.5V 0k B-6 BUCKET DUMP 0.5V 0k	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k				If display changes: FAILURE of SENSOR					
	E/G speed High idle In/out to over relief	5.0V / 30k									
	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle Block to hyd. stall	5.0V / 30k									
No. 12 (Screen No.) PRESS. SENSOR B-7 SWING (R) 0.5V 0k B-8 SWING (L) 0.5V 0k	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle Block to hyd. stall	5.0V / 30k									
	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle Block sprocket Hyd. stall	5.0V / 30k									
No. 13 (Screen No.) PRESS. SENSOR B-9 TRAVEL (R) 0.5V 0k B-10 TRAVEL (L) 0.5V 0k	Control lever at neutral position E/G speed LOW and HIGH common	0.5V / 0k									
	E/G speed High idle Block sprocket Hyd. stall	5.0V / 30k									

PUMP CONTROL

① Negative control

- 1) If ATT or travel action is performed, the secondary pilot pressure changes each spool.
- 2) When the spool is changed, the negative control pressure changes according to the spool stroke. The negative control pressure is then put into the negative control pressure sensor. The back pressure in the control valve (the return pressure to tank) is put into the back pressure sensor.
- 3) Voltage outputs from the negative control pressure sensor and the back pressure sensor are put into the mechatro controller that computes the delivery rate of the pump according to the voltage inputs.


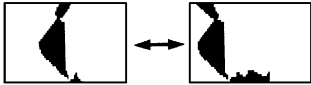





② P-Q control

The voltage output of the high pressure sensor that is attached to the pump is put into the mechatro controller. The controller then performs pilot signal processing and computes the delivery rate of the pump according to the voltage input (=load pressure).

③ Determining the delivery rate of pump

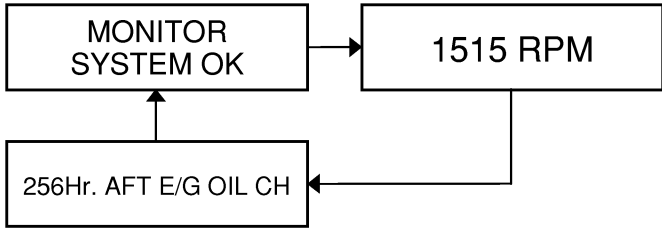
- 1) The lower of the pump delivery rate computed in the negative control and the pump delivery rate computed in the P-Q control is selected and put out as a current command to the solenoid proportional valve according to the delivery rate.
- 2) The solenoid proportional valve of each pump puts out the secondary pilot pressure according to the current command from the mechatro controller. It changes the tilting angle of the pump and controls the delivery rate of the pump.
- 3) As the result, a delivery rate according to the negative control pressure is supplied to the actuator via the control valve. If load to the actuator increases, the voltage from the high pressure sensor is put into the mechatro controller. This insures that the machine is operated without engine failure even if load to the pump is increased.

(1) Display on LCD by the work mode switch

Work mode	Pattern	System summary
A (Assist) mode 	① Digging Ditch digging Trench box digging	The system recognizes the operator's action, automatically adjusts the machine into four patterns shown on the left and causes the mode to flash.
	② Leveling Slope finishing	The below controls are performed as the result of judgment. <ul style="list-style-type: none"> • Engine revolution control • Pump control • Arm variable recirculation control • Boom conflux control
	③ Spreading	
	④ Tamping	
	⑤ Others	
M (manual) mode	Display lamp 	The mode is suited for heavy load work in which operating lever actions are recognized sensitively and the machine is operated at high speed with its priority laid on the rate of operation.
B (breaker) mode	Display lamp 	Where the breaker and other require a limit to the max.. flow rate <ul style="list-style-type: none"> • Operation in flow adjust mode <ol style="list-style-type: none"> 1) After the engine stops, turn the starter switch to 「ON」 and the mode switch to "B" and turn the screen change switch to 「ON」 for 3-10 sec. Then the adjust mode is available. 2) When the engine starts, 210ℓ /min. is indicated in the primary stage. After that, the previous value is indicated. The value increases by 10 /min. each time the mode switch is pushed one time and decreases by 30 /min. each time the buzzer stop switch is pressed. 3) To release the adjust mode, turn the screen select switch to 「ON」 again.

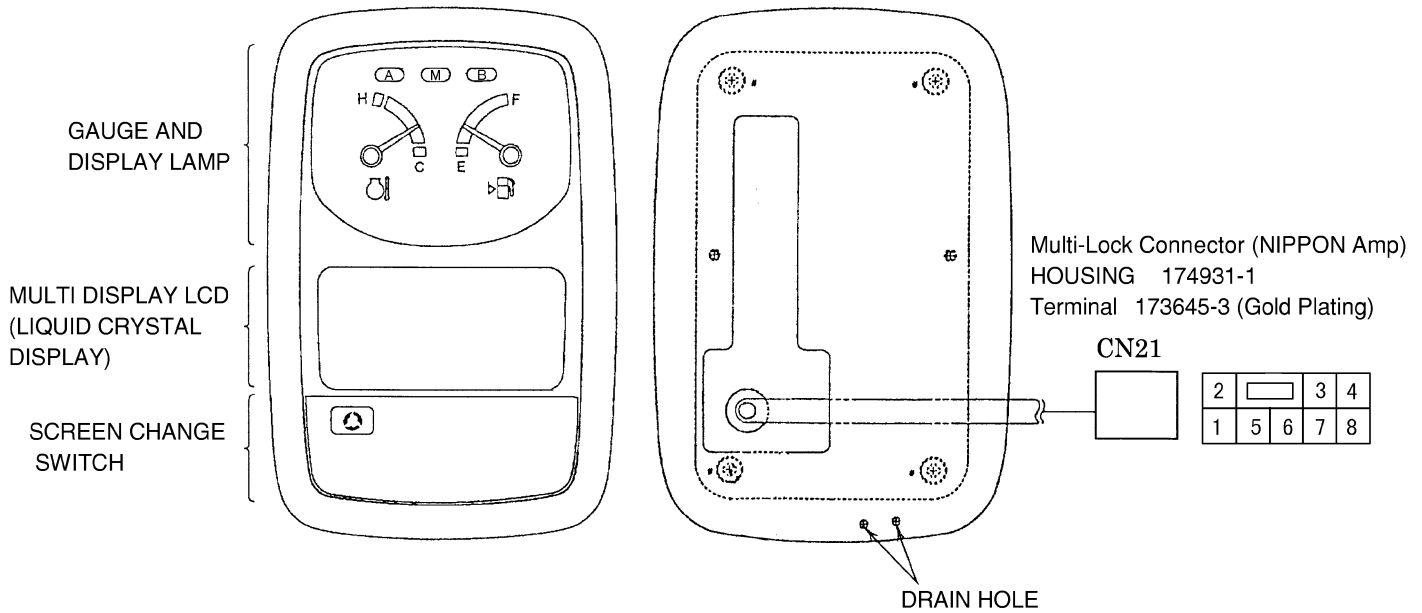
(2) Display on LCD by the screen change switch

The engine revolution and the cumulative hours from the engine oil change are indicated.

LCD display	Operating procedure	Buzzer sound
Normal display	 <p>Supplementary explanation : If the screen change switch is pressed, the above three screen may be changed over.</p>	None

(2) Gauge cluster (symbol C-2)

1) General view



2) Connector CN21

No.	Name	Wire color	No.	Name	Wire color
1	Fuel sensor		5	GND	
2	Engine coolant temp. sensor		6	Power supply (+24V)	
3	RXD 2 (Serial communication)		7	GND	
4	TXD 1 (Serial communication)		8	SHIELD	

3) Function

- ① It processes signals by communication between the gauge cluster and the mechatro controller, displays them in lamps, displays them in LCDs and actuates the buzzer.
- ② It puts out coolant temperature signals, fuel level signals and panel switch signals to the mechatro controller through the communication port.

4) Display and summary of actuate item

No.	Item name		Type
1	Monitor display		LCD dot 128 × 55
2	Gauge display (Coolant temp., Fuel level)		Tolerance coil
3	Mode display (A · M · B)		Lamp display (1.4W)
4	Warning buzzer		Piezoelectric type
5	Screen change switch		
6	Back light	For gauge	Lamp (2W)
		For SW, For LCD	LED

1. TRAVEL CIRCUIT

This section describes the following.

- 1) Travel pilot circuit
- 2) Auto accel operation
- 3) Travel Supply Oil Main Circuit
- 4) Two Speed operation

1.1 TRAVEL PILOT CIRCUIT

Operation :

If travel is operation is performed, the secondary proportional pilot pressure comes out of ports ② or ④ of the right-hand or left hand pilot valves (10), enters the PAr and PAL ports of C/V and acts upon the low pressure sensor (SE-9) and (SE-10). At the same time the pressure acts on the travel spools and changes them over. Because the low pressure sensor (SE-9) and (SE-10) receives pilot pressure from the right hand and left hand pilot valves the command current from low pressure sensor (SE-9) and (SE-10) increases to the main controller C-1 as the pilot pressure increase. This change in command current instructs the main controller C-1 to decrease the command current to the Pump P1 (PSV-1) and pump P2 (PSV-2) proportional solenoids which changes the pump's tilting angle (α) which in turn increases the delivery rate of the P1 pump.

1.2 AUTO ACCEL OPERATION

Principle :

Proportional throttle control in relation to pilot valve operation with signal output by low pressure sensor.

Operation :

<Pilot Lever in neutral position>

If no pilot pressure is sent out to the low pressure sensor (SE-9) and (SE-10) for more than 4 seconds even if the accel dial is turned to MAX, the engine revolution is reduced down to 1000~1050 rpm.

<Pilot Lever during operation position>

If a pilot pressure signal of 5.7kgf/cm² (81psi), {0.56MPa} or over enters the low pressure sensor of the machine with standard specifications (travel, bucket, boom, swing and arm), a proportional command current from the low pressure sensor instructs the main controller C-1 to brings the engine revolution up to one of two point: ① an rpm range to match the amount of pilot lever stroke angle and amount of work the operator request (variable) or ② the rpm set by the throttle potentiometer position.

1.3 TRAVEL DIGGING MAIN CIRCUIT

Operation :

Increase in the delivery rate of the P1 pump and P2 pump:

The travel spools are shifted by pilot operation, the pressure drop of the negative control sensor SE-26 and SE-27; the increase in command current of the pilot low pressure sensor (SE-9) and (SE-10) cause the main controller C-1 to increase the delivery rate of the P1 pump and P2 pump by dropping the command current of the pump P1 PSV-1 and pump P2 PSV-2 proportional solenoid valve.

- 2) When the travel spools are shifted, main pump oil is supplied to the travel motors (4) from the FOR ports of C/V and reduces the oil to the low pressure reliefs, so the negative control pressure out of port Pn'1 and Pn'2 of the C/V is reduced to the negative control sensor SE-26 and SE-27. Meantime, the oil returned from the travel motors returns to the tank from the REV ports of C/V, while being controlled by the travel spools.

1.4 TRAVEL TWO SPEED OPERATIONDIGGING MAIN CIRCUIT

Operation :

Increase in the rotational speed of the travel motors to increase travel speed:

The travel are default in first speed when the machine is started, when the two speed travel switch is selected on the left hand console in the operator's cab the solenoid SV-3 is activated and a pilot pressure of 750psi {53Kgcm²} is directed thru the swivel joint (9) down to the travel motors.

- 1) When the travel spools are shifted, main pump oil is supplied to the travel motors (4) from the FOR ports of C/V and with the two speed solenoid (SV-3) activated the pilot pressure enters the motors thru port Ps and acts upon the swash plate of the travel motors and increases the tilt angle of the motor. This increased tilt angle decrease the volume area of the motor and allows the same oil volume to rotate the motor at a increased speed.

Example: if a typical travel motor rotates at 2 mph and has an internal area of 20 cc and a pump inputs 1 gallon of oil into it; when the two speed change is made that same internal area is changed to only 10cc volume and the same 1 gallon of pump oil will cause the motor to rotate at 4 mph.

6. ARM DIGGING CIRCUIT (Light Load)

This section explains the following operations.

- 1) Pilot circuit operating at arm in, light-load operating
- 2) Pilot circuit operating at arm in, light-load variable recirculation of main circuit oil

1.1 Pilot circuit operating at ARM in DIGGING, LIGHT LOAD

Purpose:

When the arm is at light load this allows faster cycle speed and reduces chance of cavitation - (time lag).

Principle:

The oil returning from the arm cylinder rod (R) is recirculated variably to the head (H) inside the C/V.

Operation:

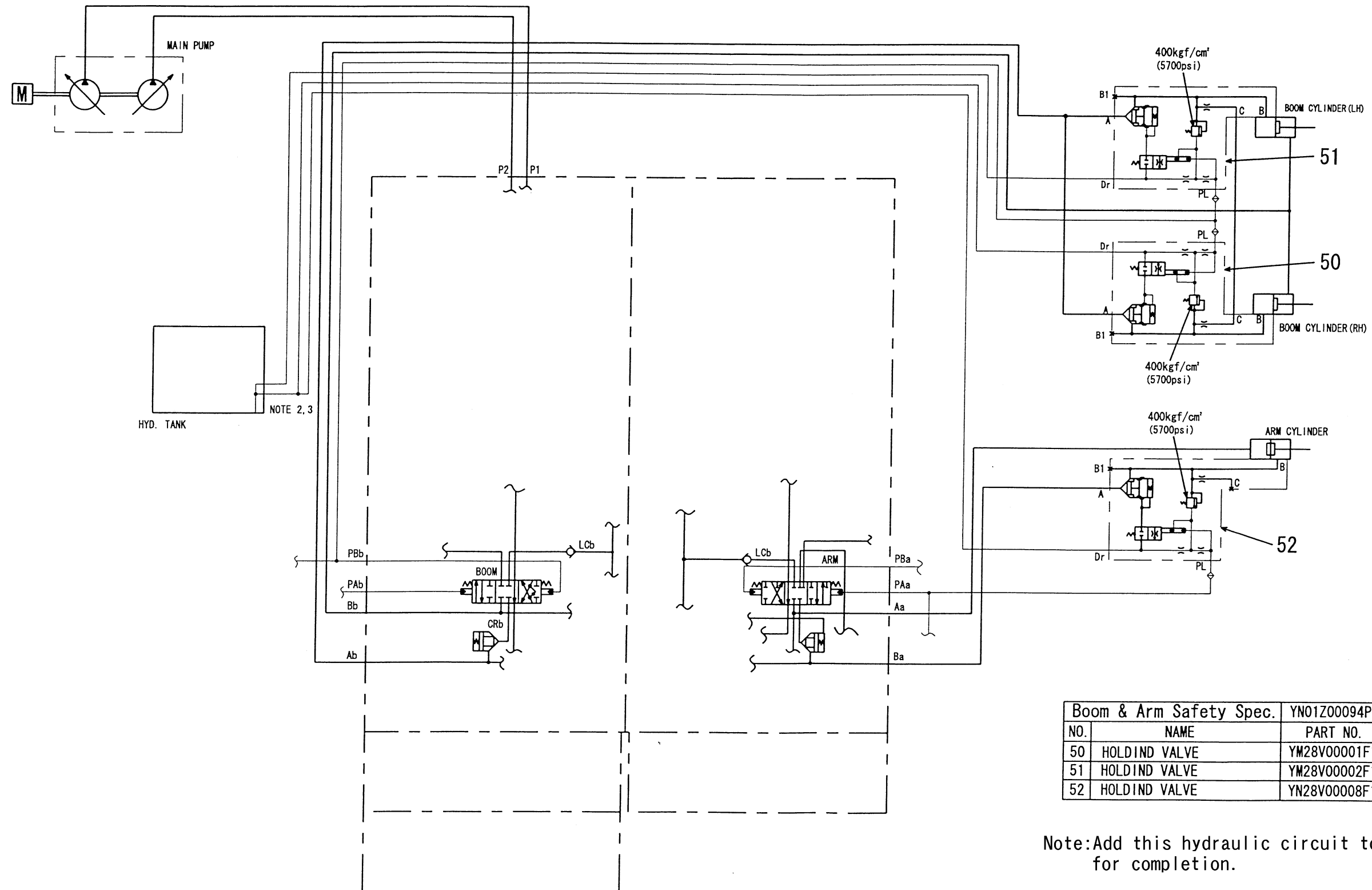
- 1) If the arm digging operation is performed, the pilot secondary proportional pressure comes out of port ⑦ of the right pilot valve (10) and acts upon the low pressure sensor (SE7).
At the same time, the pressure is branched off to C/V ports { PAa port and the PLC2 port }, this pilot pressure changes over the arm spool via port PAa and then shifts the arm lock valve selector spool.
- 2) The voltage output of the low pressure sensor (SE7) for the arm digging pilot operation is sent to the mechatro controller (C-1) and is processed. Then, a command current which is proportional to the pilot input voltage (SE7) is output to the arm variable recirculation solenoid proportional valve (PSV-A) and positions the arm variable recirculation spool via Pis port on the C/V to the maximum variable recirculation position.
- 3) The P2 pump proportional solenoid valve (PSV-2) and the delivery rates of the P1 and P2 pumps perform in response to negative control that changes the flow rates in reverse proportion to the differential pressure between the negative control pressure and the return back pressure.

1.2 ARM IN - LIGHT LOAD VARIABLE NORMAL RECIRCULATION MAIN CIRCUIT

Operation:

- 1) The oil returning from the arm cylinder (R) rod side pushes the arm lock valve open and enters the arm variable recirculation spool down stream from the arm spool.
- 2) Since the passage to tank is restricted by the arm variable recirculation spool, the oil returning from the arm cylinder (R) rod side arrives at the load check valve.
- 3) Since the (R) rod side pressure of the cylinder is higher than the (H) head side pressure when work load is light, the pressure pushes the load check valve open and is recirculated to the (H) side so as to speed up the light-load digging operation.
- 4) Cavitation prevention control in arm digging operation
If the engine speed and the arm in pilot pressure are light then the controller senses this from the SE7 pilot sensor and the rpm sensor, the main controller (C-1) outputs a command current to the arm variable solenoid proportional valve (PSV-A), and brings the arm in under maximum variable recirculation position to prevent cavitation from occurring.

Applicable machines YN07-30001~
 YQ07-03501~
 LQ08-04501~
 LL08-03001~



Boom & Arm Safety Spec.		YN01Z00094P1	
NO.	NAME	PART NO.	MODEL NO.
50	HOLD IN VALVE	YM28V00001F1	KHCV20PO
51	HOLD IN VALVE	YM28V00002F1	KHCV20PO
52	HOLD IN VALVE	YN28V00008F1	KHCV20PO

Note: Add this hydraulic circuit to following circuit for completion.

DWG NO.	REMARKS
YN01Z00090P1	SK210 (LC) VI EU
LQ01Z00032P1	SK250 (LC) VI EU

13. MAIN PIPING

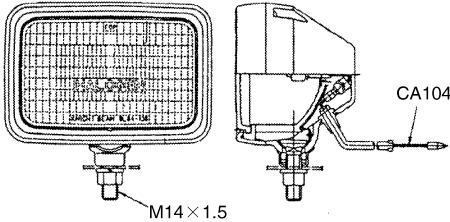
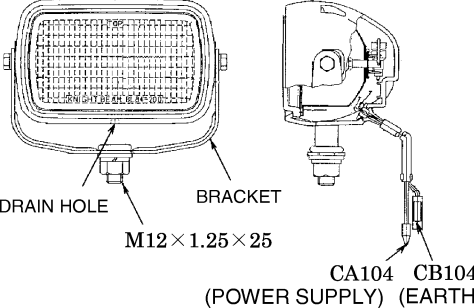
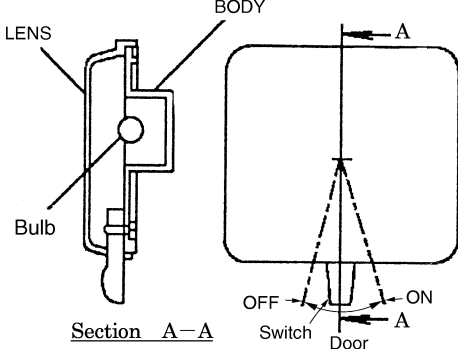
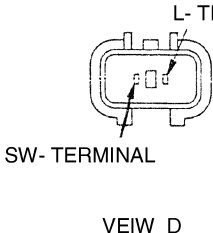
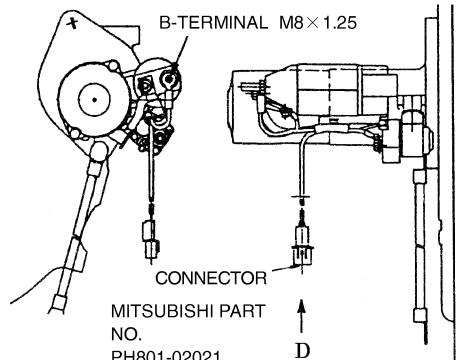
No.	NAME	QTY	REMARKS	No.	NAME	QTY	REMARKS	No.	NAME	QTY	REMARKS	No.	NAME	QTY	REMARKS	No.	NAME	QTY	REMARKS		
(1)	YN30H0003F1		Pump delivery	3	ELBOW	2	1" 3/16 -12UN-PF1	3	LOCK WASHER	8	M12	4	CLAMP	1		6	HOSE ; L=2850	1	Arm in command (PL)		
1	HOSE ; L=1060	1	P1 pump delivery	4	O RING	4	1B A18	4	PLUG	2		5	CONNECTOR	1		7	HALF CLAMP	2			
2	HOSE ; L=1150	1	P2 pump delivery					5	PLUG	2		6	HALF CLAMP	2		8	CLAMP	1			
3	HOSE ; L=403	1	Suction	(5)	YN32H00005F1							7	GREASE NIPPLE	1		9	ELBOW	1	PF1-1" 7/16-12UNS		
4	ELBOW	1	2-PF3/4	1	TUBE	1		(8)	YN02H00034F1		NLC	8	SOCKET BOLT	8	M12×40	10	ELBOW	1			
5	ELBOW	1	Suction	2	TUBE	1			YN02H00018F1		LC	9	SOCKET BOLT	1	M10×30	11	CONNECTOR	1			
6	O RING	1	1A G75	3	TUBE	1			YN02H00015F1		↓ ↓ ↓	10	O RING	2	1B P34	12	CONNECTOR	1	PF1/4-PF1/4		
7	O RING	2	1B P26	5	HOSE ; L=750	2	Travel swing drain	1	TUBE	1	※1 ※1	※ Not same part No.	11	O RING	1	1B A18	13	GREASE NIPPLE	1		
8	HALF CLAMP	4		6	HOSE ; L=1000	1	Pump drain	2	TUBE	1	※1 ※1		12	LOCK WASHER	4	M12	14	O RING	1	1B P34	
9	PRESSURE SENSOR	2	LC52S00002P1	7	HOSE ; L=1050	1	Swing boost (MU)	3	TUBE	1	※1 ※1		14	LOCK WASHER	1	M12	15	O RING	1	1B P21	
10	CLAMP	1		9	COUPLING	2	∅48.6	4	TUBE	1	※1 ※1						16	O RING	1	1B A18	
11	BUSHING	2		10	COUPLING	3	∅42.7	5	TUBE	1	※1 ※1		(13)	YN42H00141F1		EU	17	O RING	2	1B P14	
12	SUPPORT	1		13	CONNECTOR	1	PF3/4	6	TUBE	1	※1 ※1			YN42H00081F1		↓ ↓ ASIA, OCEANIA	18	O RING	1	1B G35	
13	CLIP	4		14	TEE	1	PF1/2-PF1/2-PF3/8	7	TUBE	1	← ※1		1	TUBE	1	※1	※ Not same part No.	19	SOCKET BOLT	1	M12×55
14	SOCKET BOLT	2	M10×75	15	TEE	1	PF3/4-PF3/4-PF1/2	8	TUBE	1	← ※1		2	TUBE	1	←		20	SOCKET BOLT	4	M12×65
15	SOCKET BOLT	2	M12×30	16	PLUG	1	PF1	9	TUBE	1	← ※1		3	TUBE	1	←		21	SOCKET BOLT	4	M12×40
16	SOCKET BOLT	8	M10×35	17	O RING	1	1B G45	10	TUBE	1	← ※1		4	TUBE	1	←		22	SOCKET BOLT	1	M12
17	SOCKET BOLT	4	M12×30	18	SUPPORT	1		11	TUBE	1	← ※1		5	HOSE ; L=800	2	← Boom (R)	23	LOCK WASHER	8	M12	
18	WASHER	2	M10	19	SUPPORT	1		12	TUBE	1	← ※1		6	HOSE ; L=800	2	← Boom (H)	24	CLIP	15		
19	WASHER	2	M12	20	SUPPORT	1		13	HOSE	2	※2 ※2		7	CLAMP	2	←		25	PLUG	1	PF1/2
20	LOCK WASHER	8	M10	22	CLAMP	2	∅42.7	14	HOSE ; L=300	2	← ←		8	SOCKET BOLT	2	← M12×50					
21	LOCK WASHER	4	M12	23	CLAMP	1	∅42.7	15	CLIP	12	← ←		9	SOCKET BOLT	16	← M10×30	(18)	YN42H00109F1		Boom cyl. Piping EU	
				25	U BOLT	4	∅44	16	CONNECTOR	4	← ←		10	CONNECTOR	2	←		1	TUBE	1	
(2)(3)	YN03H00033F1		Main C/V piping	27	CLIP	1		17	CONNECTOR	2	← ←		11	GREASE NIPPLE	2	←		2	TUBE	1	
1	TUBE	1	Boom (H)	28	SPACER	1		18	CLAMP	2	← ←		12	O RING	4	← 1B P26		3	TUBE	1	
2	TUBE	1	Boom (R)	30	SOCKET BOLT	3	M10×30	19	CLAMP	2	← ←		13	O RING	2	← 1B A16		4	TUBE	1	
3	HOSE ; L=1550	1	Arm (H)	31	SOCKET BOLT	1	M10×55	20	SPACER	4	← ← H=17.5		14	O RING	2	← 1B A18		5	TUBE	1	
4	HOSE ; L=1450	1	Arm (R)	32	SOCKET BOLT	4		21	SOCKET BOLT	4	← ←		15	LOCK WASHER	2	← M12		6	TUBE	1	
5	HOSE ; L=1550	3	Travel (C & D)	33	SOCKET BOLT	3	M12×30	22	WASHER	4	← ←		16	PLUG	— 1	ZE72X04000		7	TUBE	1	
6	HOSE ; L=1650	1	Bucket (R)	34	SOCKET BOLT	6	M12×35	23	LOCK WASHER	4	← ←							8	TUBE	1	
7	HOSE ; L=860	1	Swing (A) RH	35	WASHER	12	M8						(14)	YN43H00042F1		Arm hyd. piping	9	TAPPED BLOCK	2		
8	HOSE ; L=800	1	Swing (B) LH	36	WASHER	11	M10	(9)	YN12H00003F1		T/M piping		1	HOSE ; L=1250	2	Bucket (H & R)	10	HOSE ; L=800	2		
9	HOSE ; L=1400	2	Travel (A & B)	37	WASHER	11	M12	1	CONNECTOR	4	PF1-∅28		(15)	YN43H00043F1		Bucket cyl. piping	11	HOSE ; L=800	2		
10	O RING	2	1B A16	38	NUT	24	M8	2	CONNECTOR	2	PF1/2-∅18		1	TUBE	1		12	HOSE ; L=1200	1		
11	O RING	17	1B A18	39	NUT	1	M8	3	CONNECTOR	2	PF1/4		2	TUBE	1		14	HOLDING VALVE	1	YN28V00010F1	
12	O RING	1	1B A21	40	TUBE	1		4	O RING	4	1B P29		3	TUBE	1		15	HOLDING VALVE	1	YN28V00009F1	
13	CONNECTOR	4	1" 3/16 -12UN-PF1	41	COUPLING	1		5	O RING	2	1B P18		4	CLAMP	1		16	CLAMP	2	∅28-∅22	
14	CONNECTOR	1	1" 7/16 -12UN-PF1	42	SUPPORT	1							4	SOCKET BOLT	1	M10×55	17	CLAMP	2	∅15-∅15	
15	CONNECTOR	2	1" 3/16 -12UN-PF1	43	SUPPORT	1		(10)	YN19H00003F1		S/J piping		5	SOCKET BOLT	8	M10×35	18	ELBOW	2		
16	CONNECTOR	7	1" 3/16 -12UN-PF1	44	SUPPORT	1		1	CONNECTOR	4	PF1-∅28		6	O RING	2	1B P26	19	ELBOW	2		
17	ELBOW	1	PF3/4	45	SUPPORT	1		2	CONNECTOR	2	PF1/4		7	O RING	2	1B A18	20	CONNECTOR	1		
18	ELBOW	1	1" 3/16 -12UN-PF3/4	47	U BOLT	2		3	TEE	1	PF1/2-∅18		8	GREASE NIPPLE	1		21	CONNECTOR	2		
19	ELBOW	1	1" 3/16 -12UN-PF3/4	48	SOCKET BOLT	2	M12×25	4	O RING	4	1B P29		9	GREASE NIPPLE	1		22	CONNECTOR	2		
20	CLAMP	3		49	BUSHING	1		5	O RING	1	1B P18		10	LOCK WASHER	1	M10	23	O RING	2	1B G30	
21	CLAMP	1		50	CLIP	1											24	O RING	2	1B P26	
22	CLAMP	2		53	SOCKET BOLT	2	M10×35						(16)	YN42H00110F1		Boom hyd. Piping EU	25	O RING	4	1B A18	
23	BUSHING	2						(11)	YN42H00101F1		Boom hyd. piping		1	TUBE	1	∅15	26	O RING	4	1B A16	
24	BUSHING	4		(6)	YN03H00053F1		Return line to tank	1	TUBE	1			2	TUBE	1	∅18	27	O RING	4	1B P14	
25	BUSHING	1		1	TUBE	1		2	TUBE	1			3	CONNECTOR	1	∅18-PF3/8	28	SOCKET BOLT	2	M10×65	
26	BUSHING	1		2	HOSE	1		3	TUBE	1			4	CONNECTOR	1	∅15-PF3/8	29	SOCKET BOLT	2	M8×35	
27	BUSHING	4		3	CONNECTOR	1	PF3/4 -1-14UNS	4	TUBE	1			5	CLAMP	4	∅28-∅18	30	SOCKET BOLT	8	M10×65	
28	SUPPORT	2		4	CONNECTOR	1	PF3/4 -1-14UNS	5	CLAMP	3			6	CLAMP	4	∅28-∅18	31	SOCKET BOLT	8	M10×35	
29	SUPPORT	1		5	PLUG	1	PF3/4	6	CLAMP	4			7	CLAMP	1	∅28-∅15	32	WASHER	2	M10	
30	SOCKET BOLT	6	M10×75	6	O RING	3	1B A16	7	CLAMP	3			8	CLAMP	1	∅28-∅15	33	LOCK WASHER	2	M10	
31	SOCKET BOLT	2	M10×85	7	SUPPORT	1		8	O RING	10	1B A18		9	CLAMP	3	∅35-∅15	34	LOCK WASHER	2	M8	
32	SOCKET BOLT	6	M12×30	8	CLAMP	1	∅21.7	9	O RING	2	1B A21		10	CLAMP	3	∅35-∅15	35	LOCK WASHER	8	M10	
33	SOCKET BOLT	1	M12×70	9	SOCKET BOLT	1	M10×60	10	SOCKET BOLT	10	M12×55		11	SOCKET BOLT	8	M12×45	36	GREASE NIPPLE	2	PT1/8	
34	SOCKET BOLT	1	M12×80	10	SOCKET BOLT	2	M12×40	11	LOCK WASHER	10	M12		12	LOCK WASHER	8	M12	37	CLIP	4	∅48 L=188	
35	WASHER	8	M10	11	WASHER	2	M10	12	TUBE	2							38	PLUG	1	PF1/4	
36	WASHER	9	M12	12	WASHER	2	M12	13	CONNECTOR	2			(17)	YN42H00111F1		Arm cyl. piping	39	TEE	1		
37	NUT	1	M12	13	NUT	1	M10						1	HOLDING VALVE		YN28V00008F2	40	CONNECTOR	4		
				(7)	YN03H00062F1		Main C/V piping	1	TUBE	1	Arm (R)		2	TUBE	1	∅27.2	41	CONNECTOR	1		
(4)	YN19H00008F1		S/J upper piping	1	O RING	2	1B P34	2	HOSE ; L=900	1	Arm (R)		3	HOSE ; L=900	1	Arm (R)	42	CONNECTOR	2		
1	CONNECTOR	1	PF1/2	2	SOCKET BOLT	8	M12×40	3	HOSE ; L=920	1	Arm (H)		4	HOSE ; L=920	1	Arm (H)					
2	ELBOW	2	1" 3/16 -12UN-PF1										5	HOSE ; L=3000	1	Drain (DR)					

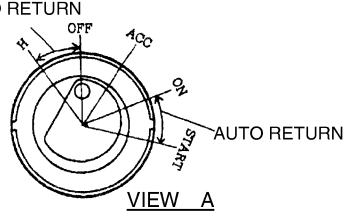
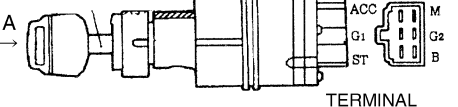
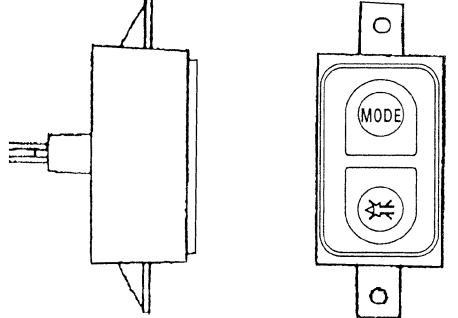
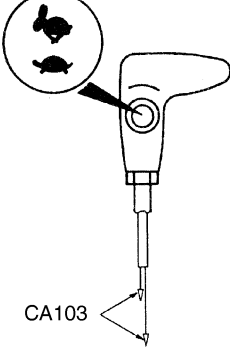
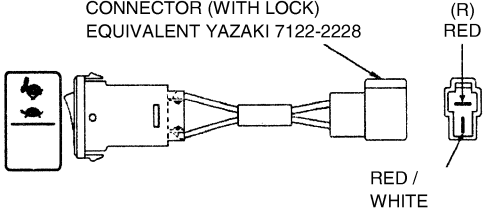
SPECIFICATIONS FOR ELECTRICAL EQUIPMENT HARNESS ASSEMBLY

YQ07U0101~

ITEM	PART NUMBER	DESCRIPTION	QTY
		HARNESS ASSY	
	YN13E00034F1	UPPER HARNESS ASSY (Floor Plate)	
A1	YN13E01167P2	HARNESS	1
A2	YN13E01156P1	HARNESS	1
A3	YN13E01166P1	HARNESS	1
A4	ZW26X08000	LOCK WASHER	1
A5	ZW16X08000	WASHER	1
A6	ZN18C08007	NUT	1
A7	YN03E01001D5	CLIP	8
A8	YN13E01190P1	GROMMET	1
A9	PY01P01043D3	CLIP	2
A10	LE13E01005P1	CABLE	1
A11	YN13E01196P1	GROMMET	2
	LB14E00003F1	CAB HARNESS ASSY	
B1	LB14E01004P1	HARNESS	1
B2	YN03E01001D5	CLIP	6
B3	ZS18C06016	CAPSCREW	1
B4	2432R233D2	CLIP	1
B5	ZW26X06000	LOCK WASHER	1
B6	ZW16X06000	WASHER	1
	YN13E00032F1	UPPER HARNESS ASSY	
C1	YN13E01155P1	HARNESS	1
C2	YN13E01053D2	CABLE	1

ITEM	PART NUMBER	DESCRIPTION	QTY
C3	YN13E01097P1	CABLE	1
C4	LB13E01020D1	CABLE	1
C5	YN13E01098P1	CABLE	1
C6	LE13E01006P1	HARNESS	1
C7	ZW26X08000	LOCK WASHER	5
C8	ZN18C08007	NUT	4
C9	ZS18C08016	CAPSCREW	1
C10	LC13E01002D1	GROMMET	1
C11	PY01P01043D3	CLIP	2
C12	2432R233D2	CLIP	2
C13	2420Z1330	GROMMET	1
C14	2427Z1594D015	TRIM	1
C15	ZW16X08000	WASHER	1
C16	2420R372D19	GROMMET	2
C17	YN03E01001D5	CLIP	3
	YN16E00009F1	ENGINE HARNESS ASSY	
D1	YN16E01016P2	HARNESS	1
D2	YN16E01014P1	BRACKET	1
D3	2432R233D2	CLIP	2
D4	2432R233D1	CLIP	1
D5	PY01P01043D3	CLIP	5
D6	2432R233D3	CLIP	7
D7	ZN18C10008	NUT	1
D8	ZN18C06005	NUT	2
D9	ZW26X10000	LOCK WASHER	1
D10	2420R608D1	SEMS-BOLT	1
D11	ZM66C06016	SEMS-BOLT	2
D12	ZM11C08016	SEMS-BOLT	3
D13	ZM22C10020	SEMS-BOLT	1
D14	ZW26X06000	LOCK WASHER	3
D15	ZW16X10000	WASHER	2
D17	ZW26X08000	LOCK WASHER	1
D18	YN16E01012P1	BRACKET	1
D19	ZM22C10040	SEMS-BOLT	2
D20	2418T26637D1	SPACER	2
D21	ZS18C08016	CAPSCREW	1
D22	ZS18C06010	CAPSCREW	1
D23	ZW16X06000	WASHER	1

File No. Name of part Part No. Use Applicable Machine	Specification	Description						
<p>L-1</p> <p>Light</p> <p>YW80S00001F1</p> <p>Boom work light (left)</p> <p>YN23301~, YQ02801~ YX01001~, YV00101~ YY00101~, YF00101~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~</p>	<table border="1"> <tr> <td>Type</td> <td>BL84-130</td> </tr> <tr> <td>Bulb</td> <td>24V,70W</td> </tr> </table>	Type	BL84-130	Bulb	24V,70W			
Type	BL84-130							
Bulb	24V,70W							
<p>L-2,7,8,9</p> <p>Light</p> <p>YN80S00010F2</p> <p>Deck work light (Right)</p> <p>OPT: Cab work light (L&R) OPT: Boom cylinder work light</p> <p>YW07901~, LP13601~ YN23301~, YQ02801~ LQ03701~, YF00101~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~</p>	<table border="1"> <tr> <td>Type</td> <td>BL84-200</td> </tr> <tr> <td>Bulb</td> <td>DC 24V,70W</td> </tr> <tr> <td>Effective area of lens</td> <td>71cm²</td> </tr> </table>	Type	BL84-200	Bulb	DC 24V,70W	Effective area of lens	71cm ²	
Type	BL84-200							
Bulb	DC 24V,70W							
Effective area of lens	71cm ²							
<p>L-5</p> <p>Light</p> <p>YT80S00001P1</p> <p>Room light</p> <p>YW06501~ LP11001~, YP02301~ YN18001~, YQ02301~ LQ03301~, LL02301~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Bulb</td> <td>24V,5W</td> </tr> </table> <p>Note) Equivalent to 2456Z322F1</p>	Bulb	24V,5W					
Bulb	24V,5W							
<p>M-1</p> <p>Motor</p> <p>ME049303</p> <p>Starter motor</p> <p>YF00101~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Rated output</td> <td>DC24V, 5.0kW</td> </tr> <tr> <td>MITSUBISHI part No.</td> <td>ME049303</td> </tr> </table>  <p>VIEW D</p>	Rated output	DC24V, 5.0kW	MITSUBISHI part No.	ME049303	 <p>MITSUBISHI PART NO. PH801-02021</p> <p>D</p>		
Rated output	DC24V, 5.0kW							
MITSUBISHI part No.	ME049303							

File No. Name of part Part No. Use Applicable Machine	Specification	Description																																																
<p>SW-1</p> <p>Switch</p> <p>YN50S00002F1</p> <p>Starter switch</p> <p>YW06501~ LP11001~, YP02301~ YN18001~, YQ02301~ LQ03301~, LL02301~ YT00101~, YR04001~ YX00101~, YV00101~ YY00101~, YF00101~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>P</td> <td>T</td> <td>B</td> <td>G₁</td> <td>G₂</td> <td>ACC</td> <td>M</td> <td>ST</td> </tr> <tr> <td>H</td> <td></td> <td>○</td> <td>○</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>OFF</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>ACC</td> <td></td> <td>○</td> <td></td> <td></td> <td>○</td> <td></td> <td></td> </tr> <tr> <td>ON</td> <td></td> <td>○</td> <td></td> <td></td> <td>○</td> <td>○</td> <td></td> </tr> <tr> <td>START</td> <td></td> <td>○</td> <td>○</td> <td></td> <td>○</td> <td>○</td> <td>○</td> </tr> </table>	P	T	B	G ₁	G ₂	ACC	M	ST	H		○	○					OFF								ACC		○			○			ON		○			○	○		START		○	○		○	○	○	<p>AUTO RETURN</p>  <p>VIEW A</p> <p>"K250" STAMPED</p>  <p>TERMINAL ARRANGEMENT</p>
P	T	B	G ₁	G ₂	ACC	M	ST																																											
H		○	○																																															
OFF																																																		
ACC		○			○																																													
ON		○			○	○																																												
START		○	○		○	○	○																																											
<p>SW-2</p> <p>Switch</p> <p>YN50E00002F1</p> <p>Mode, buzzer stop</p> <p>YN07-30001~ YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Type</td> <td>Sheet type, with back light</td> </tr> </table>	Type	Sheet type, with back light																																															
Type	Sheet type, with back light																																																	
<p>SW-3</p> <p>Switch</p> <p>YN03M01039P1 (Right travel grip)</p> <p>Travel 1,2-speed</p> <p>YW06501~ LP11001~, YP02301~ YN18001~, YQ02301~ LQ03301~, LL02301~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Type</td> <td>Buried in right travel lever</td> </tr> </table>	Type	Buried in right travel lever	<p>MARKS ON SWITCH PORTION</p>  <p>CA103</p>																																														
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<p>SW-3</p> <p>Switch</p> <p>2479U1224F4</p> <p>Travel 1,2-speed</p> <p>YN07-30001~ YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Type</td> <td>Single-pole single-throw momentary</td> </tr> <tr> <td>Rated voltage</td> <td>DC 24V</td> </tr> <tr> <td>Insulation resistance</td> <td>More than 1MΩ / DC500V megger</td> </tr> </table> <p>TERMINAL CONNECTOR</p> <table border="1"> <tr> <td>Terminal Position</td> <td>R</td> <td>RW</td> <td></td> </tr> <tr> <td>OFF</td> <td></td> <td></td> <td></td> </tr> <tr> <td>ON</td> <td>○</td> <td>○</td> <td></td> </tr> </table>	Type	Single-pole single-throw momentary	Rated voltage	DC 24V	Insulation resistance	More than 1MΩ / DC500V megger	Terminal Position	R	RW		OFF				ON	○	○		<p>CONNECTOR (WITH LOCK) EQUIVALENT YAZAKI 7122-2228</p>  <p>(R) RED</p> <p>RED / WHITE</p>																														
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OFF																																																		
ON	○	○																																																

3. HARNESS

3.1 HARNESS LIST

Table 2

INDEX No.		DWG. No.			HARNESS					REMARKS		
DEVICE	ITEM	NAME	ASSY No.			ITEM	NAME	Part No.				
			EU	OCEANIA	ASIA			EU	OCEANIA		ASIA	
UPPER FRAME	3.3	Controller assy Controller instal	YN22E00057F2	—	—	3.3.23	Cab harness assy	YN14E00013F4	—	—		
			YN22E00060F1	—	—	3.3.23-11	Instrument panel harness	YN14E01023P1	—	—		
	3.4	Instrument panel	—	YN22E00047F2	←	3.3.9	Cab harness assy	—	YN14E00013F1	←		
			—	YN22E00046F3	←	3.3.9-1	Instrument panel harness	—	YN14E01013P5	←		
			YN17M00011F3	—	—	3.4.23	Cable	YN17M01072P1	—	—	For tuner	
			—	YN17M00010FK	—	3.4.23		—	YN17M01072P1	—	—	
			—	—	YN17M00010FD	3.4.23		—	—	—	—	With swing flasher, Radioless
			—	—	YN17M00010FJ	3.4.23		—	—	YN17M01072P1	—	With swing flasher, With radio (China)
	—	—	YN17M00010FN	3.4.23	—	—		—	—	Thailand		
	—	—	YN17M00010FP	3.4.23	—	—		—	—	Indonesia		
	3.5	Electric assy	LQ03E00004F2	—	—							
			—	LQ03E00004F1	←							
	3.6	Upper harness assy	YN13E00030F3	YN13E00030F2	←	3.6.1	Upper harness	—	YN13E01137P2	←	Upper	
						3.6.2	Cable	YN13E01053D2	←	Battery		
						3.6.3	Cable	2486R89D5	←	Battery relay		
						3.6.4	Cable	YN13E01118P1	←	Ground		
						3.6.5	Cable	YN13E01098P1	←	Starter		
						3.6.6	Cable	LE13E01006P1	←	Floor ground		
						3.6.18	Upper harness	YN13E01205P1	—	Upper		
3.6.19	Harness	YN13E01209D1	—	E/G room light								
3.7	Engine harness assy	YN16E00009F1	←	←	3.7.1	E/G sub harness	YN16E01016P2	←	←			
3.8	Upper harness assy (Floor plate)	YN13E00029F2	YN13E00029F1	←	3.8.1	Harness	—	YN13E01139P1	←	Under floor		
					3.8.2	Harness	—	YN13E01132P1	←	Inst panel (R)		
					3.8.3	Harness	—	YN13E01133P1	←	Inst panel (L)		
					3.8.10	Cable	LE13E01005P1	←	Floor ground			
					3.8.12	Harness	YN13E01167P2	—	Under floor			
					3.8.13	Harness	YN13E01203P1	—	Inst panel (R)			
					3.8.14	Harness	YN13E01204P1	—	Inst panel (L)			
3.9	Cab assy	YN02C00018F1	←	←	3.9.62	Harness	YN02C01761P1	←	←	Room light		
					3.10	Cab harness assy	YN14E00012F2	—	—	—	—	Cab front right
BATTERY	3.11	Battery	2484U175	—	—					12V 120Ah		
			—	2484U173	←						12V 96Ah	
UPPER FRAME	3.12	Battery instal	YN72E00005F1	←	←							
			YN80E00012F1	←	—	3.13.1						
BOOM	3.14	Boom harness assy	YN15E00008F2	—	—	3.14.2	Harness	YN15E01012P1	—	—		
			—	YN15E00003F1	←	3.14.3	Harness	YN15E01015D1	—	—		
3.15	Boom light instal	LC80E00004F1	—	—	3.14.1	Harness	—	YN15E01013D1	←			
		—	YN80E00011F1	—								
CAB	3.16	Cab light instal	YN80E00018F7	—	—	3.16.13	Harness	YN02C01928P1	—	—		
			—	—	YN80E00018F9	3.16.15	Harness	YN02C01973P1	—	—		
UPPER FRAME	3.17	Flasher lamp instal	YN80E00030F1	←	←	3.16.6	Harness	—	—	YN02C01760P1		
			YN22P00001F1	—	—	3.16.6	Harness	—	—	YN02C01760P1		
3.18	Fuel pump assy instal	—	—	—								
3.19	Travel alarm assy	—	LQ53E00001F1	—						Oceania		

WIRE NO	WIRE COLOR	WIRE SIZE	FROM	CONNECTION	TO	FUNCTION
562	O	AVS0. 5sq	CN-44F	=====	CN-52F	WARM-UP SW. ← SW. BOX ASSY
563	0	AVSS0. 75sq	CN-7F	=====	CN-30F	MECHATRO CONTROLLER ← HYD. DIL TEMP. SW.
564	LY	AVS0. 5sq	CN-32M	=====	CN-52F	CONFUX/SINGLE SELECT SW. ← SW. BOX ASSY
566	LW	AVSS0. 75sq	CN-6F	=====	CN-30F	MECHATRO CONTROLLER ← ENG. DIL FILTER
572	GrG	AVS0. 5sq	CN-31M	=====	CN-52F	SW. ASSY (MODE BUZZER STOP) ← SW. BOX ASSY
573	V	AVS0. 5sq	CN-31M	=====	CN-52F	SW. ASSY (MODE BUZZER STOP) ← SW. BOX ASSY
574	PL	AVS0. 5sq	CN-38M	=====	CN-52F	SW. ASSY (WIPER WASHER, LIGHT) ← SW. BOX ASSY
575	LøB	AVS0. 5sq	CN-38M	=====	CN-52F	SW. ASSY (WIPER WASHER, LIGHT) ← SW. BOX ASSY
576	LB	AVS0. 5sq	CN-38M	=====	CN-52F	SW. ASSY (WIPER WASHER, LIGHT) ← SW. BOX ASSY
580	R	MVVS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER ← ENG. REVOLUTION SENSOR
581	W	2 CORES SHILD	CN-2F	=====	CN-30F	MECHATRO CONTROLLER ← ENG. REVOLUTION SENSOR
SH1	Gr		CN-2F	=====	CN-30F	SHIELD
582	W		MVVS0. 75sq	CN-4F	=====	CN-38M
770	R	3 CORES SHILD	CN-4F	=====	CN-38M	MECHATRO CONTROLLER ← CLUSTER GAUGE
980	B		CN-4F	=====	CN-38M	MECHATRO CONTROLLER ← CLUSTER GAUGE
SH2	Gr		CN-4F	=====	CN-38M	SHIELD
583	VW	AVSS0. 75sq	CN-44F	=====	CN-30F	OVER LOAD ALARM SELECT SW. → OVER LOAD ALARM DETECT SW.
600	YR	AVSS0. 75sq	CN-38M	=====	CN-30F	CLUSTER GAUGE → COOLANT THERMO SENSOR
601	BrR	AVSS0. 75sq	CN-38M	=====	CN-30F	CLUSTER GAUGE → FUEL SENSOR
700	WG	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER ← BATTERY RELAY
701	V	AVSS0. 75sq	CN-5F	=====	CN-10F	MECHATRO CONTROLLER ← SWING PARKING RELEASE SW.
702	LøB	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER ← TWO-SPEED SELECT SOL.
703	P	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER ← POWER BOOST SOL.
704	LøR	AVS0. 5sq	CN-4F	=====	CN-51F	MECHATRO CONTROLLER ← SW. BOX ASSY
705	LG	AVS0. 5sq	CN-4F	=====	CN-51F	MECHATRO CONTROLLER ← SW. BOX ASSY
706	VW	AVS0. 5sq	CN-4F	=====	CN-51F	MECHATRO CONTROLLER ← SW. BOX ASSY
707	LY	AVS0. 5sq	CN-4F	=====	CN-51F	MECHATRO CONTROLLER ← SW. BOX ASSY
708	LR	AVSS0. 75sq	CN-4F	=====	CN-29F	MECHATRO CONTROLLER ← WIPER RELAY ASSY
709	GB	AVSS0. 75sq	CN-4F	=====	CN-29F	MECHATRO CONTROLLER ← WIPER RELAY ASSY
710	Gr	AVSS0. 75sq	CN-4F	=====	CN-29F	MECHATRO CONTROLLER ← WIPER RELAY ASSY
711	GrL	AVSS0. 75sq	CN-4F	=====	CN-29F	MECHATRO CONTROLLER ← WIPER RELAY ASSY
713	BrY	AVSS0. 75sq	CN-4F	=====	CN-16F	MECHATRO CONTROLLER ← WORK LIGHT RELAY
714	WB	AVSS0. 75sq	CN-4F	=====	CN-41F	MECHATRO CONTROLLER ← FLASHER RELAY
715	GW	AVSS0. 75sq	CN-7F	=====	CN-41F	MECHATRO CONTROLLER ← FLASHER RELAY
716	WV	AVSS0. 75sq	CN-7F	=====	CN-41F	MECHATRO CONTROLLER ← FLASHER RELAY
720	PB	AVSS0. 75sq	CN-10F	=====	CN-30F	SWING PARKING RELEASE SW. ← SWING PARKING BRAKE SOL.
738	WG	AVSS0. 75sq	CN-6F	=====	CN-30F	MECHATRO CONTROLLER → SWING PRIORITY PROPORTIONAL SOL.
739	G	AVSS0. 75sq	CN-6F	=====	CN-30F	MECHATRO CONTROLLER → SWING PRIORITY PROPORTIONAL SOL.
740	BO	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → P2 BY-PASS CUT PROPORTIONAL SOL.
741	GrR	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → P2 BY-PASS CUT PROPORTIONAL SOL.
742	VR	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → TRAVEL PRIORITY PROPORTIONAL SOL.
743	GrB	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → TRAVEL PRIORITY PROPORTIONAL SOL.
744	BP	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → P1 BY-PASS CUT PROPORTIONAL SOL.
745	PW	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → P1 BY-PASS CUT PROPORTIONAL SOL.
746	BrG	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → ADV VARIABLE REGULATION PROPORTIONAL SOL.
747	YV	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → ADV VARIABLE REGULATION PROPORTIONAL SOL.
748	VR	AVSS0. 75sq	CN-5F	=====	CN-11F	MECHATRO CONTROLLER → KPSS RELEASE SW.
749	GrG	AVSS0. 75sq	CN-5F	=====	CN-11F	MECHATRO CONTROLLER → KPSS RELEASE SW.
750	VW	AVSS0. 75sq	CN-5F	=====	CN-11F	MECHATRO CONTROLLER → KPSS RELEASE SW.
751	GY	AVSS0. 75sq	CN-5F	=====	CN-11F	MECHATRO CONTROLLER → KPSS RELEASE SW.

WIRE NO	WIRE COLOR	WIRE SIZE	FROM	CONNECTION	TO	FUNCTION
756	BrY	AVSS0. 75sq	CN-11F	=====	CN-30F	KPSS RELEASE SW. → PUMP P1 PROPORTIONAL SOL.
757	RY	AVSS0. 75sq	CN-11F	=====	CN-30F	KPSS RELEASE SW. → PUMP P1 PROPORTIONAL SOL.
758	BrB	AVSS0. 75sq	CN-11F	=====	CN-30F	KPSS RELEASE SW. → PUMP P2 PROPORTIONAL SOL.
759	RL	AVSS0. 75sq	CN-11F	=====	CN-30F	KPSS RELEASE SW. → PUMP P2 PROPORTIONAL SOL.
771	G	4 CORES SHILD	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → STEPPING MOTOR
772	B		CN-5F	=====	CN-30F	MECHATRO CONTROLLER → STEPPING MOTOR
773	R		CN-5F	=====	CN-30F	MECHATRO CONTROLLER → STEPPING MOTOR
774	W		CN-5F	=====	CN-30F	MECHATRO CONTROLLER → STEPPING MOTOR
SH3	Gr		CN-5F	=====	CN-30F	SHIELD
900	RB	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BUCKET DIGGING
901	RL	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BUCKET DUMP
902	W	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BOOM RAISING
903	OB	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BOOM LOWERING
904	OL	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: ARM IN
905	OW	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: ARM OUT
906	YB	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: SWING RIGHT
907	YG	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: SWING LEFT
908	YL	AVSS0. 75sq	CN-1F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: TRAVEL RIGHT
909	YR	AVSS0. 75sq	CN-1F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: TRAVEL LEFT
910	WY	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: P1 NEGA-CON.
911	RG	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: P2 NEGA-CON.
912	RW	AVSS0. 75sq	CN-3F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BACK PRESS.
913	RB	AVSS0. 75sq	CN-3F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: P1 OPT.
914	RL	AVSS0. 75sq	CN-3F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: P2 OPT.
915	YL	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: PUMP P1
916	YR	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: PUMP P2
917	WR	AVSS0. 75sq	CN-1F	=====	CN-36M	MECHATRO CONTROLLER → ACCEL POTENTIAL
930	RG	AVS0. 5sq	CN-4F	=====	CN-51F	MECHATRO CONTROLLER ← SW. BOX ASSY
950	BrR	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BUCKET DIGGING
951	BL	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BUCKET DUMP
952	Br	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BOOM RAISING
953	BrW	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BOOM LOWERING
954	BrL	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: ARM IN
955	Gr	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: ARM OUT
956	GrL	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: SWING RIGHT
957	Br	AVSS0. 75sq	CN-1F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: SWING LEFT
958	BY	AVSS0. 75sq	CN-1F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: TRAVEL RIGHT
959	BG	AVSS0. 75sq	CN-1F	=====	CN-31M	MECHATRO CONTROLLER → PRESS. SENSOR: TRAVEL LEFT
960	BY	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: P1 NEGA-CON.
961	BW	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: P2 NEGA-CON.
962	GrG	AVSS0. 75sq	CN-3F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: BACK PRESS.
963	BW	AVSS0. 75sq	CN-3F	=====	CN-31M	MECHATRO CONTROLLER → P1 OPT.
964	BL	AVSS0. 75sq	CN-3F	=====	CN-31M	MECHATRO CONTROLLER → P2 OPT.
965	BrB	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: PUMP P1
966	BrY	AVSS0. 75sq	CN-2F	=====	CN-30F	MECHATRO CONTROLLER → PRESS. SENSOR: PUMP P2
967	BW	AVSS0. 75sq	CN-1F	=====	CN-36M	MECHATRO CONTROLLER → ACCEL POTENTIAL
981A	GW	AVSS0. 75sq	CN-4F	=====	CN-27F	MECHATRO CONTROLLER → 15PAF-J/B
981B	GW	AVSS0. 75sq	CN-31M	=====	CN-27F	SW ASSY (MODE BUZZER STOP) → 15PAF-J/B
981C	GW	AVSS0. 75sq	CN-38M	=====	CN-27F	SW ASSY (WIPER WASHER, LIGHT) → 15PAF-J/B
981D	GW	AVS0. 5sq	CN-51F	=====	CN-27F	SW. BOX ASSY → 15PAF-J/B
982	BG	AVS0. 5sq	CN-51F	=====	CN-32M	SW. BOX ASSY → CONFUX/SINGLE SELECT SW.

WIRE NO	WIRE COLOR	WIRE SIZE	FROM	CONNECTION	TO	FUNCTION
E1	B	AVS5sq	P-1	DOUBLE SPLICE	CN-33M	EARTH → EARTH
E	B	AVSS0. 75sq	P-1	=====	CN-60F	EARTH ← WIPER INTERLOCK SW.
E2	B	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → EARTH
E3	B	AVSS0. 75sq	CN-5F	=====	CN-30F	MECHATRO CONTROLLER → EARTH
E4	B	AVSS0. 75sq	CN-11F	=====	CN-28F	KPSS RELEASE SW. → 11PAF-GND
E5	B	AVSS0. 75sq	CN-11F	=====	CN-28F	KPSS RELEASE SW. → 11PAF-GND
E6	B	AVSS0. 75sq	CN-29F	=====	CN-28F	WIPER RELAY ASSY → 11PAF-GND
E7	B	AVSS0. 75sq	CN-31M	=====	CN-28F	INST-PANEL R → 11PAF-GND
E8	B	AVSS1. 25sq	CN-32M	=====	CN-28F	INST-PANEL L → 11PAF-GND
E9	B	AVSS1. 25sq	CN-36M	=====	CN-28F	AIR CON. AMP → 11PAF-GND
E10	B	AVSS1. 25sq	CN-43F	=====	CN-28F	RESERVE → 11PAF-GND
E11	B	AVSS0. 75sq	CN-12F	=====	CN-28F	SAFETY RELAY → 11PAF-GND
E13	B	AVSS0. 75sq	M-1	DOUBLE SPLICE	P-3	CAB. WORKING LIGHT FRONT → CAB EARTH
E17	B	AVS5sq	P-2	DOUBLE SPLICE	P-3	EARTH ← CAB EARTH
E14	B	AVSS0. 75sq	P-2	=====	M-2	EARTH → CAB. WORKING LIGHT FRONT
E15	B	AVSS0. 75sq	M-3	=====	CN-28F	ROTARY LIGHT → 11PAF-GND
E16	B	AVSS0. 75sq	M-4	=====	CN-28F	CAB. WORKING LIGHT BACK → 11PAF-GND
E18	B	AVSS0. 75sq	P-4	DOUBLE SPLICE	M-5	EARTH ← CAB. WORKING LIGHT FRONT
E19	B	AVSS0. 75sq	P-4	=====	M-6	EARTH ← CAB. WORKING LIGHT FRONT

CONNECTORS SELECTION TABLE

CONNECTOR NAME (PIN NUM.)	MANUFUC.	PART. NUMBER	
		HOUSING	TERMINAL
100PAM-SA1C	AMP	179220-8	917067-5 175273-1 7114-2871
3PAF-HD305	SUMITOMO	6088-0210	8242-4068
11PAF-GND	YAZAKI	7283-1110	7116-4021
2PAF-HW	SUMITOMO	6189-0129	1500-0108
3PAF-HW	SUMITOMO	6189-0131	1500-0108 1500-0133
4PAF-HW	SUMITOMO	6189-0132	1500-0108
8PAF-HW	SUMITOMO	6189-0134	1500-0108
2PAM-HW	SUMITOMO	6181-0070	1500-0105
3PAF-090	SUMITOMO	6180-3241	1500-0110
1PAF	YAZAKI	7123-2215	7116-2092 7116-2090
2PAF	YAZAKI	7123-2228	7116-2090
3PAF	YAZAKI	7123-2237	7116-2090
2PAM-58Y	YAZAKI	7222-4220-30	7114-3250
1PAF-F	YAZAKI	7123-2215	7116-2270
CA104	YAZAKI	7120-8012	7113-1020-02
CB104	YAZAKI	7120-1010	7115-1050-02
2PAF-090 (電線)	SUMITOMO	6189-0094	1500-0110
MH056354	MITSUBISHI	PB025-02121	
2PAF-SWP	YAZAKI	7123-1424-40	7116-1471
3PAM	YAZAKI	7122-2237	7114-2020
2PAF-090	SUMITOMO	6180-2321	1500-0110

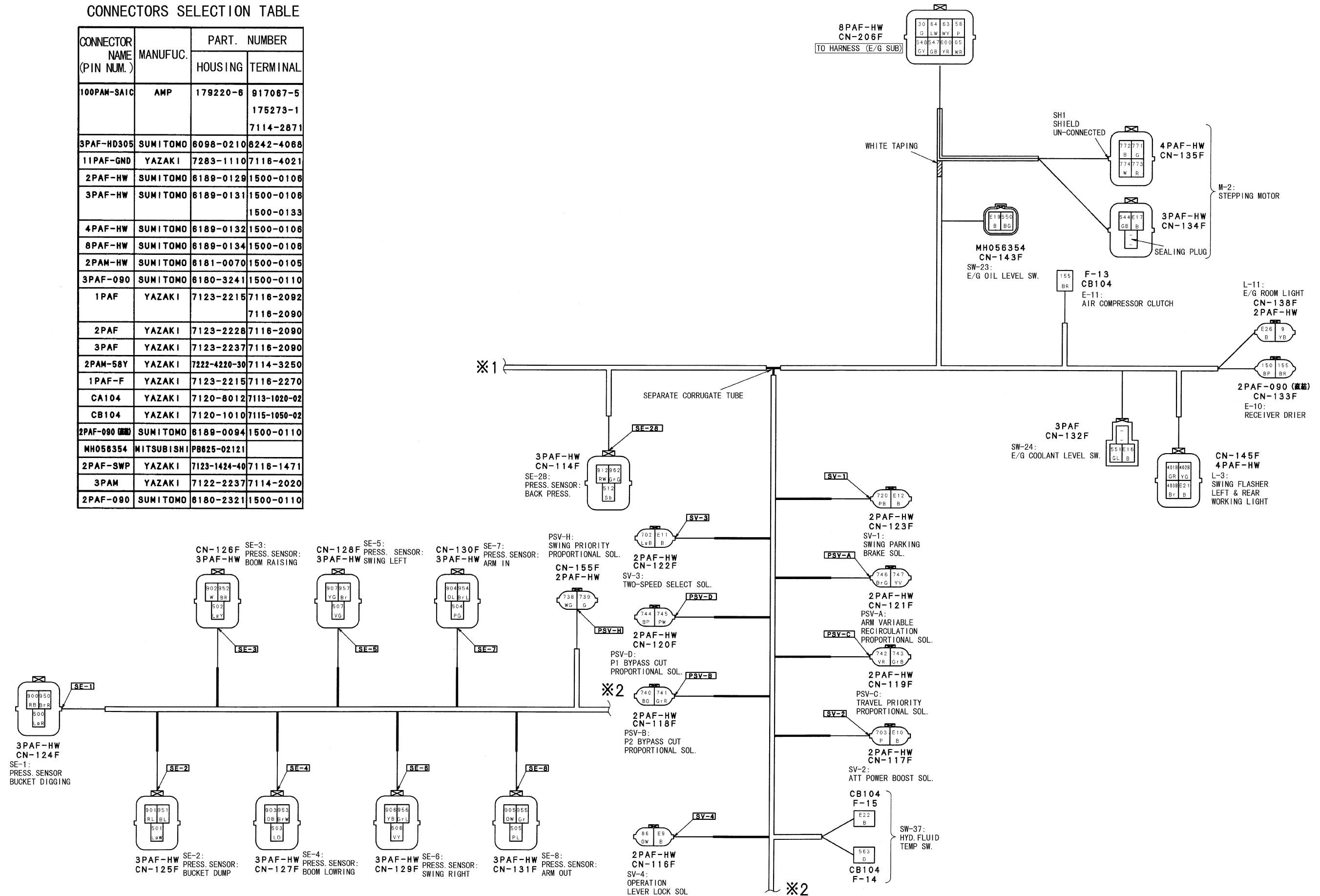


Fig. 8E(2/2) Upper harness

3.8.3 INSTRUMENT PANEL LH HARNESS : YN13E01133P1, [ASIA, OCEANIA]

3.8.10 GROUND CABLE (FLOOR PLATE SIDE) : LE13E01005P1

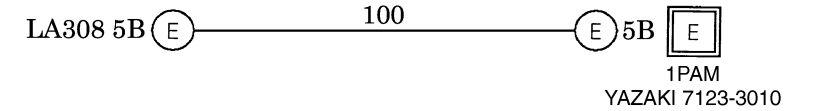
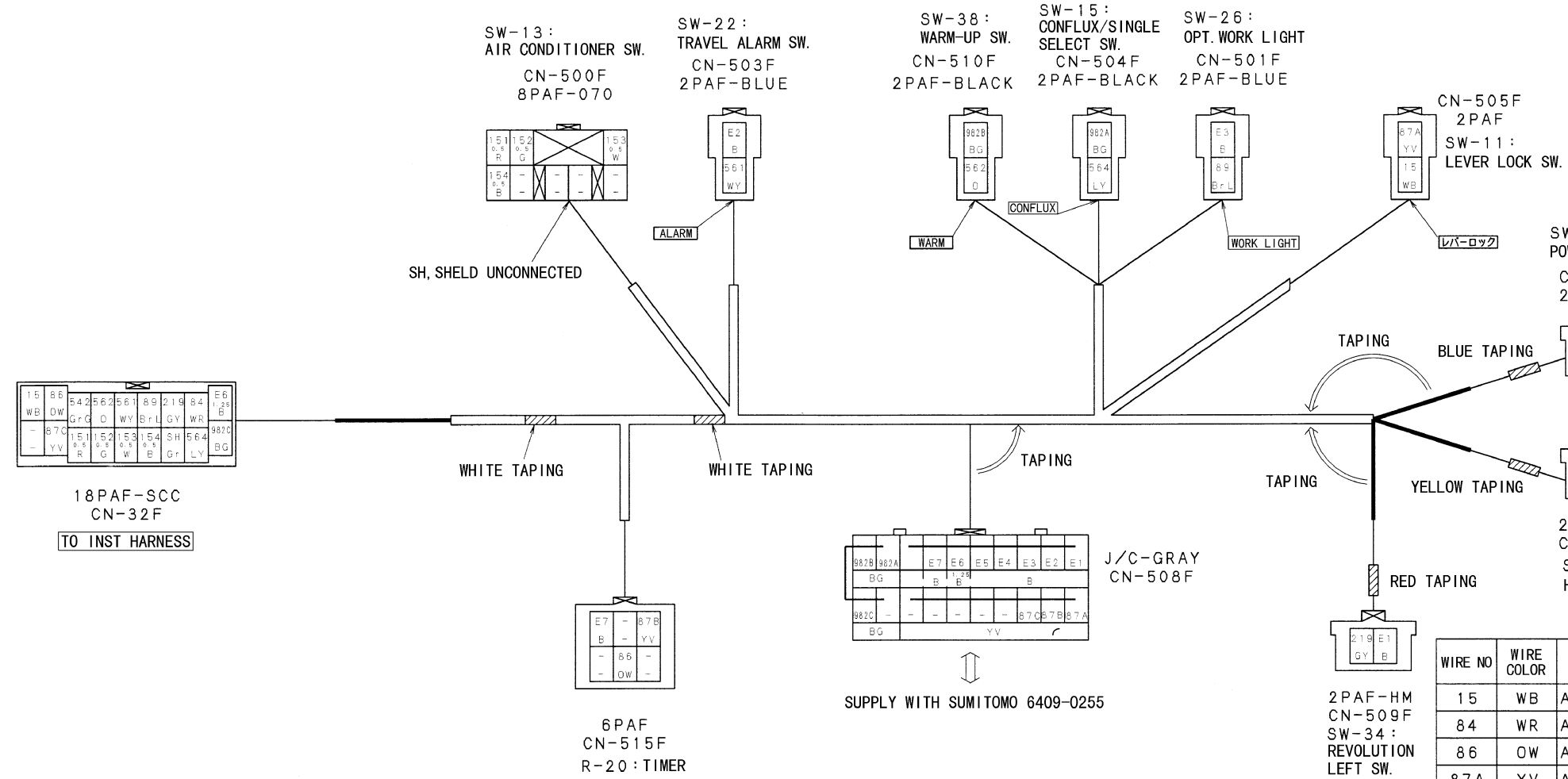


Fig.20 Ground cable

CONNECTORS SELECTION TABLE

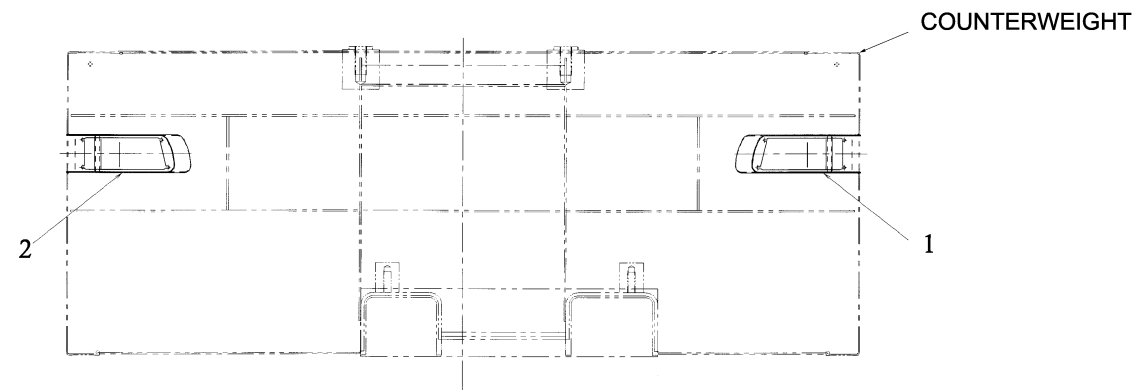
CONNECTOR NAME (PIN NUM.)	MANUFUC.	PART. NUMBER	
		HOUSING	TERMINAL
18PAF-SCC	AMP	6-178692-6	175266-2
			175269-1
8PAF-070	AMP	176113-6	173631-1
			173631-2
2PAF-HM	SUMITOMO	6090-1001	8240-4422
2PAF	YAZAKI	7123-2228	7116-2090
2PAF-BLACK	YAZAKI	7123-2228-30	7116-2090
2PAF-BLUE	YAZAKI	7123-2228-90	7116-2090
J/C-GRAY	SUMITOMO	6400-0081	8240-4422
			6409-0255
6PAF	YAZAKI	7123-2262	7116-2090

WIRE NO	WIRE COLOR	WIRE SIZE	FROM	CONNECTION	TO	FUNCTION
15	WB	AVSS0.75sq	CN-505F	---	CN-32F	LEVER LOCK SW. ← FUSE BOX
84	WR	AVSS0.75sq	CN-506F	---	CN-32F	HORN SW. ← HORN RELAY
86	OW	AVSS0.75sq	CN-515F	---	CN-32F	TIMER → OPERATING LEVER LOCK SOL.
87A	YV	AVSS0.75sq	CN-508F	●	CN-505F	J/C-GRAY → LEVER LOCK SW.
87B	YV	AVSS0.75sq	CN-508F	●	CN-515F	J/C-GRAY → TIMER
87C	YV	AVSS0.75sq	CN-508F	●	CN-32F	J/C-GRAY → MECHATRO CONTROLLER
89	BrL	AVSS0.75sq	CN-501F	---	CN-32F	OPT. WORKING LIGHT SW. ← OPT. WORKING LIGHT RELAY
151	R	MVVS0.5sq	CN-500F	---	CN-32F	AIR CONDITIONER SW ← AIR CONDITIONER AMP.
152	G	MVVS0.5sq	CN-500F	---	CN-32F	AIR CONDITIONER SW ← AIR CONDITIONER AMP.
153	W	MVVS0.5sq	CN-500F	---	CN-32F	AIR CONDITIONER SW → AIR CONDITIONER AMP.
154	B	MVVS0.5sq	CN-500F	---	CN-32F	AIR CONDITIONER SW → AIR CONDITIONER AMP.
SH	Gr	MVVS0.5sq	UNCONNECTED	X	CN-32F	SHIELD ← AIR CONDITIONER AMP.
219	GY	AVSS0.75sq	CN-509F	---	CN-32F	REVOLUTION LEFT SW ← REVOLUTION LEFT RELAY
542	GrG	AVSS0.75sq	CN-507F	---	CN-32F	POWER BOOST SW. ← MECHATRO CONTROLLER
561	WY	AVSS0.75sq	CN-503F	---	CN-32F	TRAVEL ALARM SW ← MECHATRO CONTROLLER
562	O	AVSS0.75sq	CN-510F	---	CN-32F	WARM-UP SW. ← MECHATRO CONTROLLER
564	LY	AVSS0.75sq	CN-504F	---	CN-32F	CONFLUX/SINGLE SELECT SW ← SW BOX ASSY
982A	BG	AVSS0.75sq	CN-508F	●	CN-504F	J/C-GRAY → CONFLUX/SINGLE SELECT SW
982B	BG	AVSS0.75sq	CN-508F	●	CN-510F	J/C-GRAY → WARM-UP SW.
982C	BG	AVSS0.75sq	CN-508F	●	CN-32F	J/C-GRAY → MECHATRO CONTROLLER
E1	B	AVSS0.75sq	CN-508F	●	CN-509F	J/C-GRAY ← REVOLUTION LEFT SW
E2	B	AVSS0.75sq	CN-508F	●	CN-503F	J/C-GRAY ← TRAVEL ALARM SW
E3	B	AVSS0.75sq	CN-508F	●	CN-501F	J/C-GRAY ← OPT. WORKING LIGHT SW.
E4	B	AVSS0.75sq	CN-508F	●	CN-506F	J/C-GRAY ← HORN SW.
E5	B	AVSS0.75sq	CN-508F	●	CN-507F	J/C-GRAY ← POWER BOOST SW.
E6	B	AVSS1.25sq	CN-508F	●	CN-32F	J/C-GRAY → EARTH
E7	B	AVSS0.75sq	CN-508F	●	CN-515F	J/C-GRAY → TIMER

Fig.20A Instrument panel left harness

3.17 FLASHER LAMP INSTAL

FLASHER LAMP INSTAL		YN80E00030F1		
ITEM	NAME	PART No.	Q'T Y	REMARKS
1	FLASHER LAMP	YN80S00015F3	1	For RH
2	FLASHER LAMP	YN80S00015F4	1	For LH



VIEWED FROM BACK OF MACHINE

Fig.35 Flasher lamp instal

3.17.1,2 FLASHER LAMP ; YN80S00015F3, F4

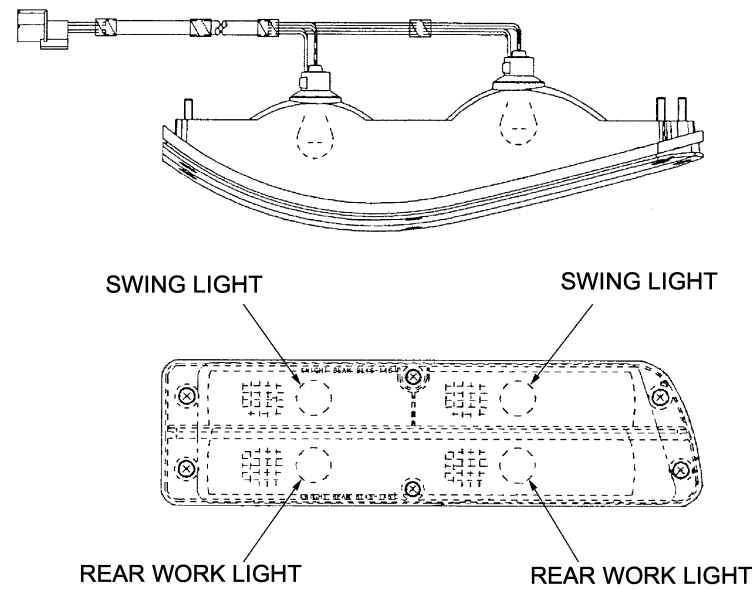


Fig.36 Flasher lamp (For LH)

3.18 FUEL PUMP ASSY INSTAL EU

FUEL PUMP ASSY INSTAL		YN22P00001F1		
ITEM	NAME	PART No.	Q'T Y	REMARKS
1	FUEL PUMP ASSY	YN22P00001F5	1	

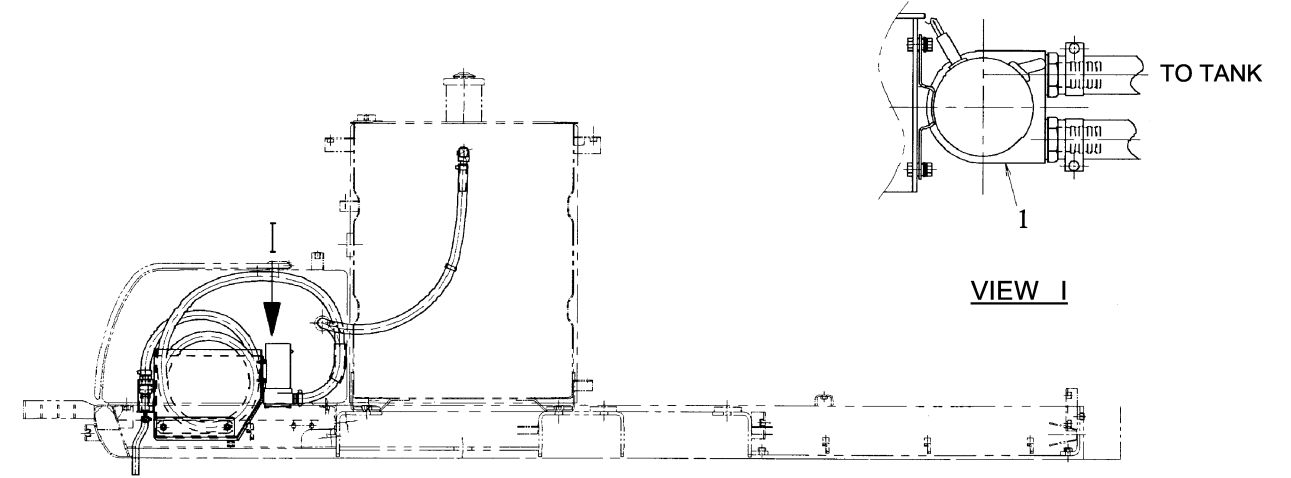


Fig.37 Fuel pump assy instal

3.18.1 FUEL PUMP ASSY EU

FUEL PUMP ASSY		YT22P00001F5		
ITEM	NAME	PART No.	Q'T Y	REMARKS
10	ELECTRIC MOTOR	YT22P00001S010	1	
22	FUSE	YT22P00001S022	1	

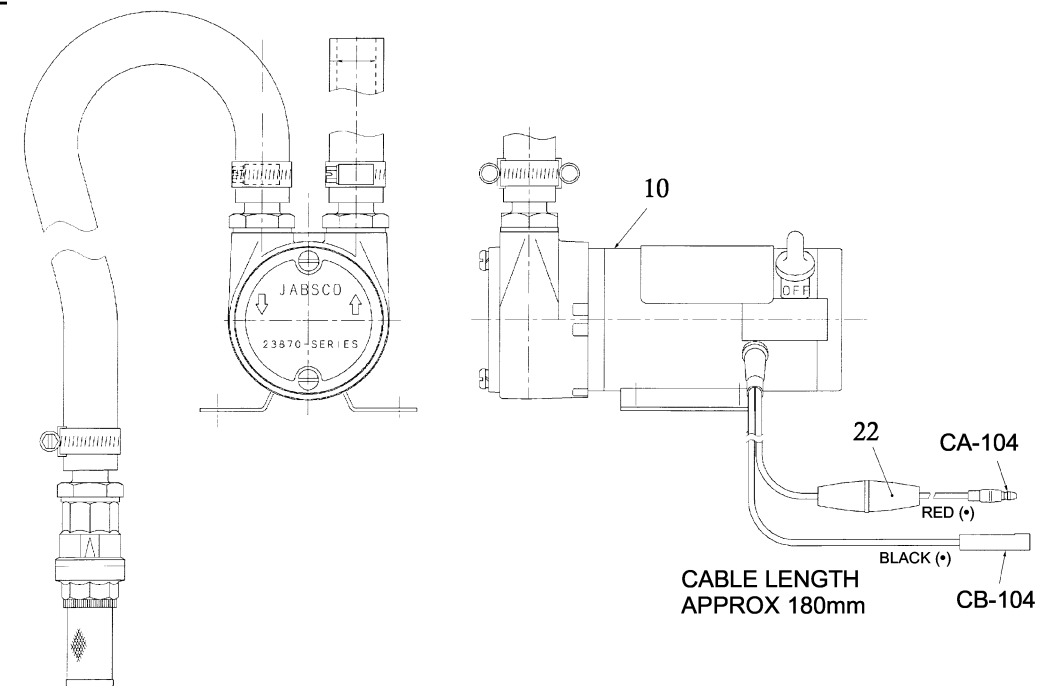


Fig.38 Fuel pump assy

(3) Valve cover group

The valve cover group consists of valve block (312), valve plate (313), and valve plate pin (885). The valve plate having two crescent-shaped ports is installed to the valve block to supply oil to the cylinder block and deliver oil from it.

Now, if the drive shaft is driven by the engine, the cylinder block rotates at the same time via the spline.

Now, let us keep an eye on a single piston arranged in the cylinder block: While the cylinder block makes one turn, the piston moves away from the valve plate (oil suction process) in the first 180° and moves close to the valve plate in the remaining 180° (oil discharge process). When the tilting angle of the swash plate is zero, the piston makes no stroke i.e. no oil deliver.

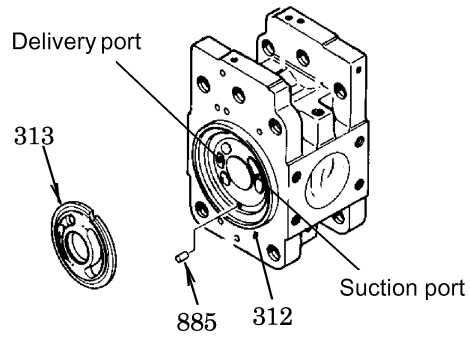


Fig.1-8 Valve cover group

2.2 CONSTRUCTION,FUNCTION AND OPERATION

(1) Cross sectic

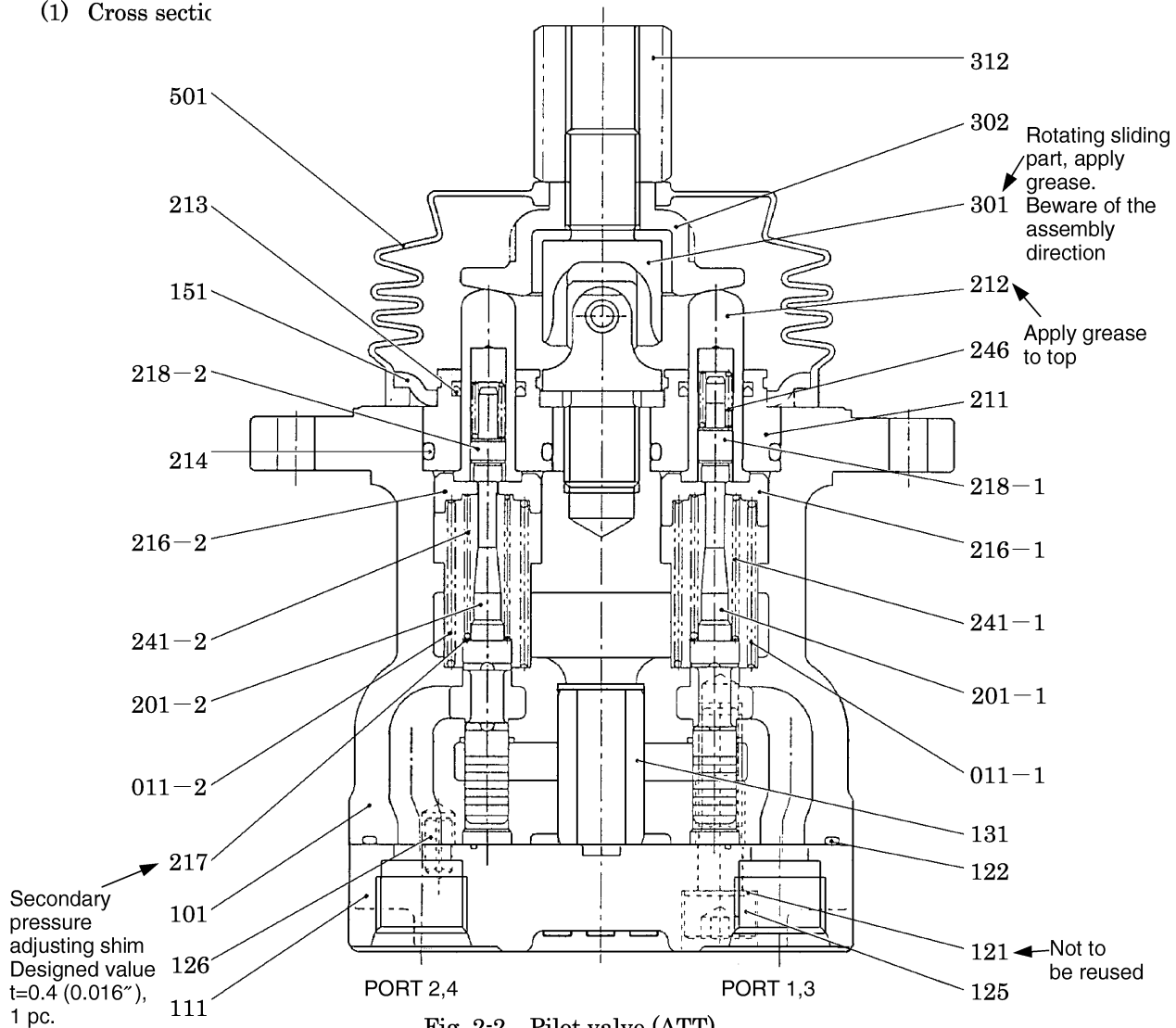


Fig. 2-2 Pilot valve (ATT)

Apply Locktite #277 to areas marked ☆.

Tightening torque kgf·m (ft·lbs)	No.	NAME	Q' TY	Tightening torque kgf·m (ft·lbs)	No.	NAME	Q' TY
2.1 (15)	101	CASING	1	4.8 (35)	216-1	SPRING SEAT 1	2
	111	PORT PLATE	1		216-2	SPRING SEAT 1	2
	121	SEAL WASHER	2		217	WASHER 2 (SHIM)	4
	122	O RING	1		218-1	SPRING SEAT 2	2
	125	SOCKET BOLT ; M8×35	2		218-2	SPRING SEAT 2	2
	126	SPRING PIN	1		011-1	SPRING	2
	131	BUSHING	1	011-2	SPRING	2	
	151	PLATE	1	241-1	SPRING	2	
	201-1	SPOOL	2	241-2	SPRING	2	
	201-2	SPOOL	2	246	SPRING	4	
	211	PLUG	4	7 (51) ☆	301	JOINT ;M14	1
	212	PUSH ROD	4		302	CIRCULAR PLATE	1
	213	SEAL	4		312	ADJUST NUT ; M14	1
	214	O RING ; 1B P20	4		501	BOOTS	1

NOTES

(2) Functions for travel action

1) At independent travel

Operation		C/V Port name	
		Pilot secondary pressure side	Main pressure oil supply side
Right	Forward	PAr	Ar
	Reverse	PBr	Br
Left	Forward	PAL	AL
	Reverse	PBL	BL

If travel operation (forward) is performed, the secondary pilot pressure from ports ① and ③ of the travel pilot valve acts upon ports PAr and PAL of the control valve and moves the right and left travel spools (306).

The pressurized oil delivered by pump (P1) flows to the main passage (51) past the travel straight spool (307), passes between the outer circumference of the right travel spool (306) and the casing and is supplied to the right travel motor B by way of port Ar.

In the meantime, the pressurized oil delivered by pump (P2) passes between the outer circumference of the left travel straight spool (306) and the casing, runs to port AL and is supplied to the left travel motor P2 side, the same way as the pressure oil by pump (P1).

Meanwhile, the oil which has returned from the right travel P1 side and the left travel P2 side passes between the outer circumference of the left travel spool (306) and the casing and returns to the hydraulic tank via the tank port (T) of the low pressure circuit (D).

At backward travel action (when the secondary pilot pressure acts upon ports PBr and PBL of the control valve), the pressurized oil works the same way as in the forward travel action.

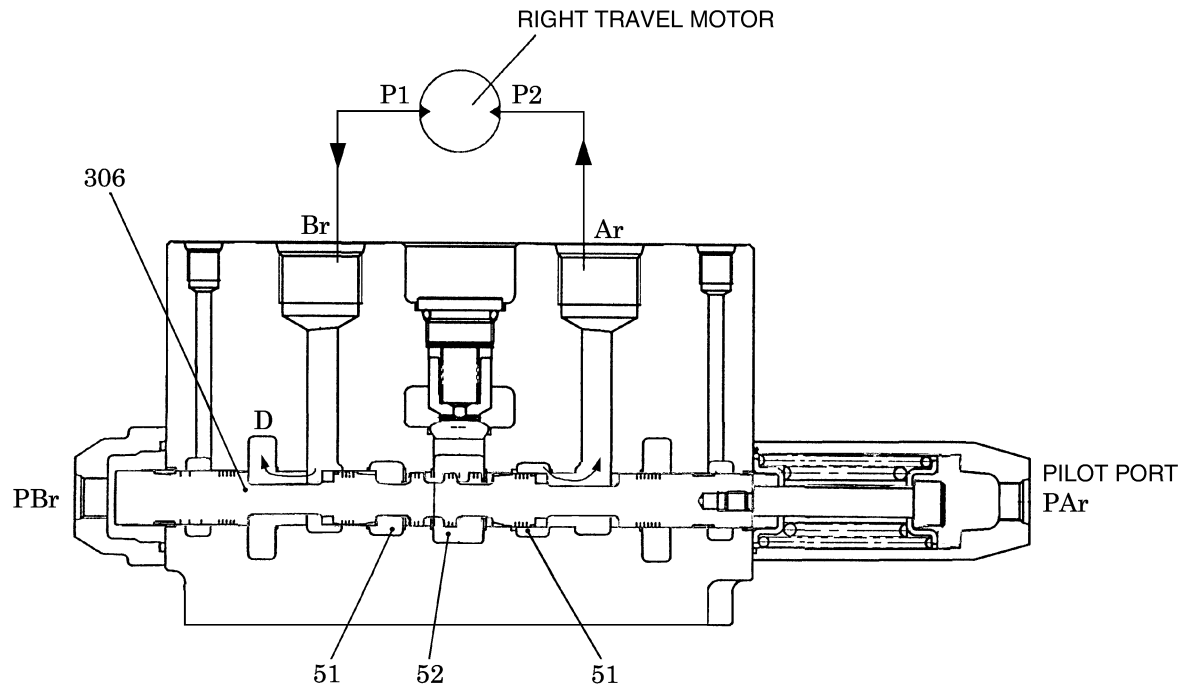


Fig. 4-12 At right travel forward (when PAr is pressurized)

3) When the arm is in (under light load)

Operation	C/V Port name		
	Pilot secondary pressure side	Solenoid proportional secondary pressure side	Main pressure oil supply side
Arm in (under load) light	PAa PLC2 —	— — Pis	Ab

Purpose :

Speed up of in operation and prevention of cavitation when operating the arm at light load.

Principle :

The return oil from the arm cylinder (R) side is recirculated into the cylinder (H) side in the C/V.

If the arm in operation is performed, the secondary pilot pressure coming out of port ⑦ of the pilot valve acts upon the PAa port of the control valve and the PLC2 port of the lock valve selector. This causes the arm spool (302) to move to the right and changes the lock valve selector spool (211).

The pressure oil delivered by the pump P2 flows into the bypass circuit (55) past the main passage (54), but since the bypass circuit (55) is blocked by the arm spool (302), the oil pressure pushes the check valve (CP2) open, flows into the parallel circuit (56), pushes the load check valve LCa (511) open, goes between the outer circumference of the arm spool (302) and the casing through the U-shaped passage and is supplied to the arm cylinder (H) side via port (Aa).

Meanwhile, the oil which has returned from the arm cylinder (R) enters the control valve through the port (Ba).

The lock valve poppet CRa (514) is located just before arm spool (302), but since the pilot secondary pressure acts on PLC2 port and the lock valve selector spool is switched, lock valve poppet (514) opens and the pressure is led into chamber AR. In addition, the return oil has sufficient pressure because of the weight of the arm, etc., consequently the secondary pressure is led in the arm spool.

Consequently, the return oil from the arm cylinder (R) side passes through the inside of arm spool and notches on the arm spool, and flows through recirculation circuit and led in arm recirculation spool (310).

In that case, the secondary pressure of the solenoid proportional valve (Pis) is acting on the Pis port of the control valve and the arm recirculation spool is in position (II). Therefore, the oil pressure enters the passage (61) through the inside of the arm recirculation spool (310), pushes open the arm recirculation check valve poppet (512) and is supplied once again to the arm cylinder (H) as the operating oil for arm digging operation.

Part of the hydraulic oil admitted to arm recirculation spool (310) flows into tank port (T) from low pressure circuit (D) and returns to the hydraulic oil tank.

(9) Operation of main relief valve
 The main relief valve is built in casing and operates as follows :

1) The pressure oil is filled up in chamber A through the orifice (B) of the plunger (512) and seats the plunger (512) securely against the body (541).

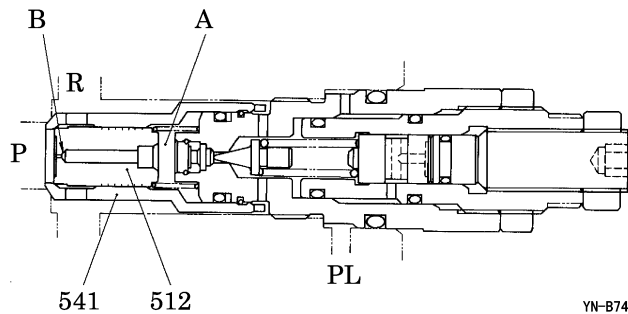


Fig. 4-29

YN-B74

2) When the hydraulic pressure of (P) reaches a set pressure of the spring (621), it pushes open the poppet (611) through the orifice (B) and flows through the hole (D) to (R).

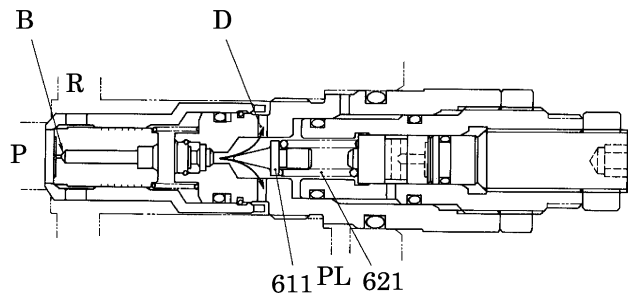


Fig. 4-30

YN-B74

3) When the poppet (611) opens, the pressure in chamber A falls, which causes the plunger (512) to open and the pressure oil of port (P) to flow directly to (R).

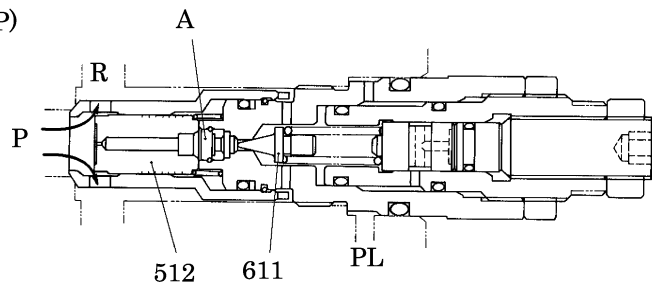


Fig. 4-31

YN-B74

4) Press the boost
 Press the boost button, and the pilot pressure enters in PL port. The pilot pressure pushes piston (614) leftward, the spring (621) force is raised, and finally the relief pressure is raised.

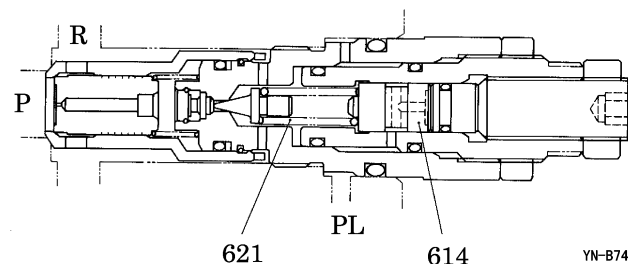


Fig. 4-32

YN-B74

● The numbers of the parts of the main relief valve in this section correspond to those in Fig.4-3.

(3) Operation of swing shockless valve

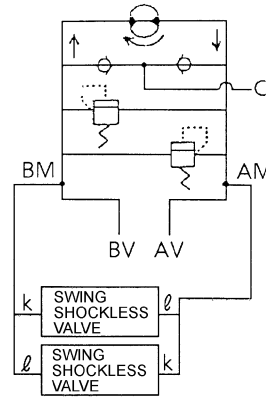


Fig. 5-8 Hydraulic circuit diagram for swing shockless valve.

1) Neutral condition :

Fig.5-8 illustrates the relationship between the neutral condition of the swing shockless valve and the hydraulic circuits. Now, let us consider a braking condition in which brake pressure generates on the AM port side.

2) When brake pressure occurs :

If pressure (P) generates at the AM port, it passes through the passage l, the hole on the shaft of seat (313) and the passage m of plunger (311) and is admitted to the n chamber.

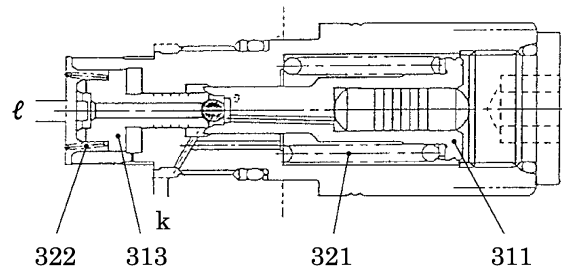


Fig. 5-9(1) Neutral condition

When the pressure P rises above a value (Ps) set by spring (321), plunger (311) compresses spring (321) and shifts it to the left.

Seat (313) compresses weak spring (322) as pushed by plunger (311) and moves to the left.

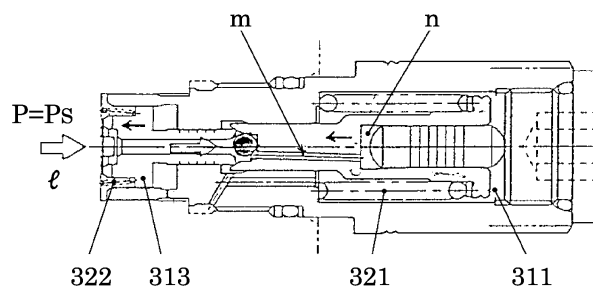


Fig. 5-9(2) When brake pressure occurs

3) At swing shockless action

When inertia load stops moving (point Y, Fig.5-10), brake pressure (P) tries to fall.

When $P < P_s$, plunger (311) moves toward the right return side by the action of spring (321). Seat (313) tries to move to the right by the action of spring (322), but since chamber p provides damping action by orifice g, the return of the seat makes a time delay with regard to the return of the plunger.

Consequently, seat t opens. This makes a passage connecting the AM port and BM ports or both ports of the hydraulic motor by way of

$\rightarrow t \rightarrow r \rightarrow k$. The result is that the pressures at the AM and BM ports become equal (PB), falling into the condition at point Z in Fig.5-10. This prevents the hydraulic motor from swing shock by the closing pressure of the AM port.

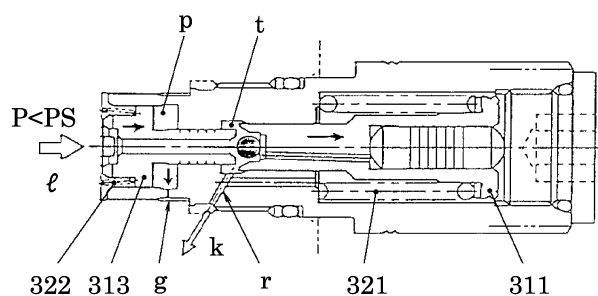


Fig. 5-9(3) At swing shockless action

Fig. 5-9 Operation of swing shockless valve

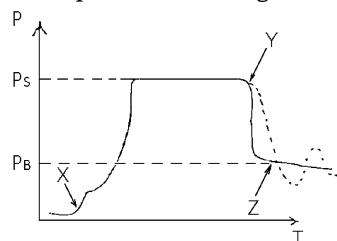


Fig. 5-10 Pressure change diagram of swing shockless operation

(4) Function of overload relief valve

Two overload relief valves are arranged in the crossover and operate as below :

- 1) To stop the hydraulic motor, the system keeps the braking pressure generating on the motor discharge side at a certain level to stop inertia load.
- 2) At start, the hydraulic motor is driven at a specified set pressure to make sharp acceleration. At stop, generated pressure is held low for a short time to dampen shocks by braking the motor.

Further, the circuit pressure is held at a set pressure so the reduction and travel crawler sprockets are engaged smoothly.

In short, boost pressure cushioning action is performed.

If the A port pressure of the overload relief valve rises at the start of the hydraulic motor, it acts upon the effective circumference on which valve seat (44-3) of valve (44-2) is seated and upon connecting piston (44-4) in the valve (44-2) through the small holes of it. The valve (44-2) causes the pressure to rise to a set pressure by standing against adjust spring (44-9) by the areal difference between the effective circumference of the valve seat and the circumference of the connecting piston.

When the hydraulic motor is braked, piston (44-7) at the back of the valve is on its left by the drive pressure. As the A port pressure rises, it acts upon piston (44-7) through the small hole in the valve. The piston moves to the right till the piston hits plug (44-5). During this period, valve (44-2) holds the A port pressure relatively low, counteracting adjust spring (44-9) and discharges the oil to the B port side.

After piston (44-7) strikes plug (44-5), the valve operates the same way as at the start of the motor.

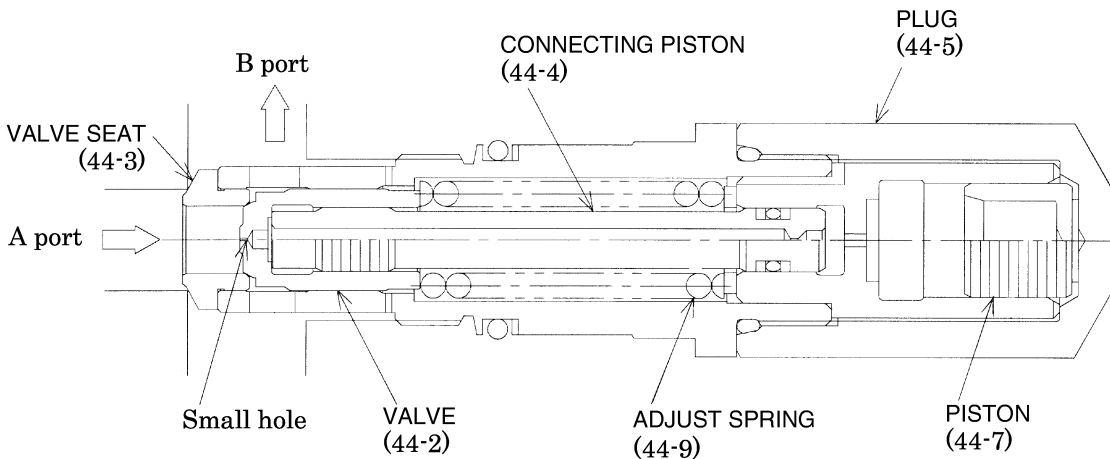


Fig. 6-9 Function of overload relief valve

8.2 CONSTRUCTION

(1) Boom cylinder

T=Tightening torque ; kgf·m (ft·lbs)

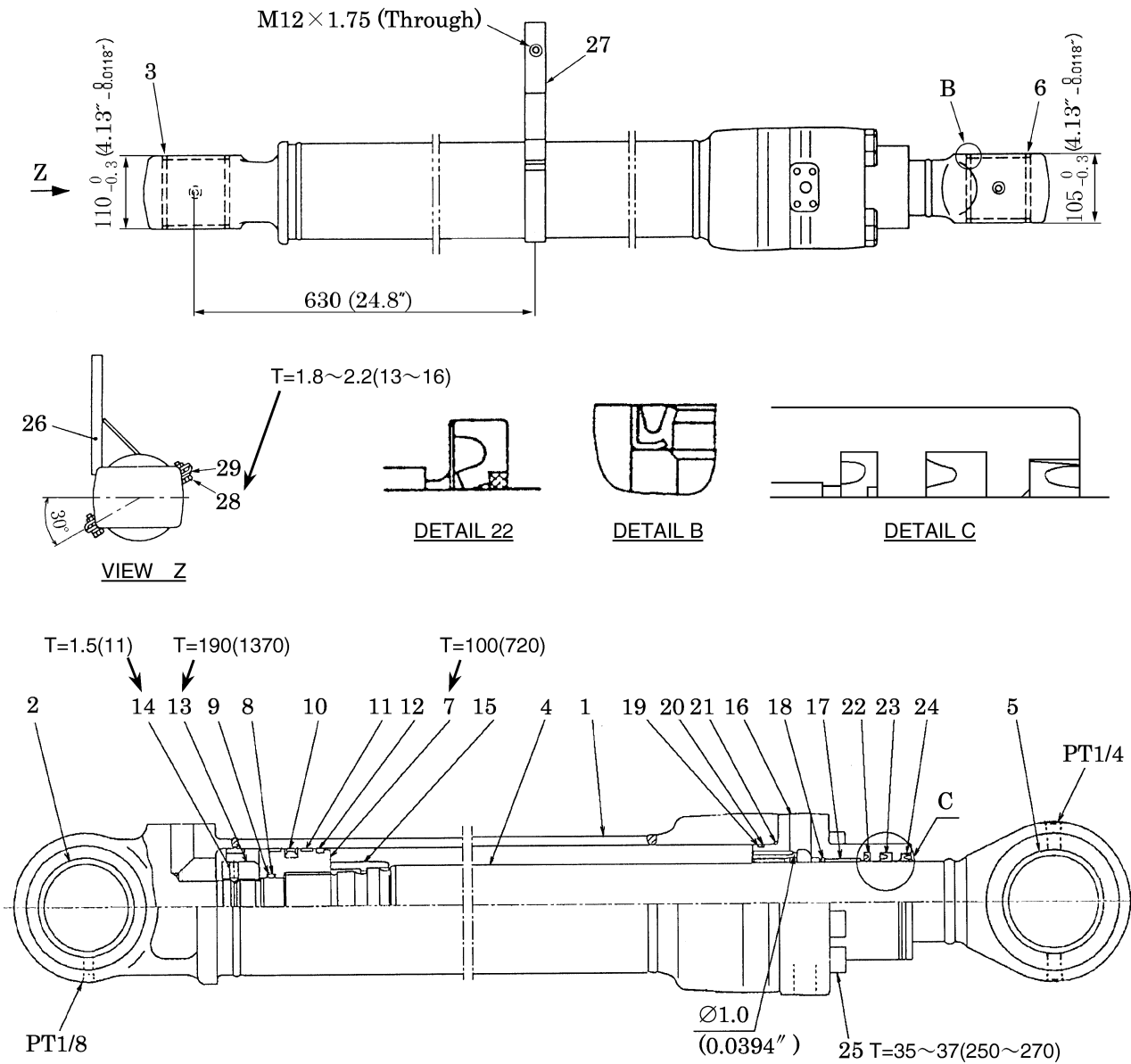


Fig. 8-2 Construction of boom cylinder
(The figure shows the right-hand cylinder.)

No.	NAME	QTY	No.	NAME	QTY	No.	NAME	QTY
	YN01V00037F1							
	YN01V00038F1							
1	CYLINDER TUBE	1	11	WEAR RING	2	21	O RING ; 1B G125	1
2	BUSHING	1	12	DUST RING	1	22	BUFFER SEAL	1
3	DUST SEAL	2	13	PISTON NUT	1	23	ROD PACKING	1
4	PISTON ROD	1	14	SET SCREW ; M8	1	24	DUST SEAL	1
5	PIN BUSHING	1	15	CUSHION RING	1	25	SOCKET BOLT ; M16 x 140	10
6	DUST SEAL	2	16	ROD COVER	1	26	BAND	1
7	PISTON	1	17	BUSHING	1	27	BAND	1
8	O RING ; 1B G65	1	18	SURCLIP	1	28	CAPSCREW ; M10 x 30	2
9	BACKUP RING	2	19	O RING ; 1B G120	1	29	LOCK WASHER	2
10	PISTON SEAL	1	20	BACKUP RING	1			

NOTES

NOTES

File No. Name of part Part No. Use Applicable Machine	Specification	Description																																																																									
<p>M-2</p> <p>Motor</p> <p>YT20S00002F2</p> <p>Governor motor</p> <p>YT00101~ YR04001~ YX01001~ YV00101~ YY00101~ YF00101~ YN07-30001~ YQ07-03501~ LQ08-04501~ LL08-03001~ LC06-05501~ YC06-02501~</p>	<table border="1"> <tr> <td>Drive voltage</td> <td>DC 24V</td> </tr> <tr> <td>Rated voltage</td> <td>DC 8.5V</td> </tr> <tr> <td>Rated current</td> <td>1.5A/ phase</td> </tr> <tr> <td>Number of phases</td> <td>2 phase</td> </tr> <tr> <td>Excitation method</td> <td>2 Excitation</td> </tr> <tr> <td>Step angle</td> <td>1.8°</td> </tr> <tr> <td>Insulation resistance</td> <td>More than 100MΩ (500V megger)</td> </tr> <tr> <td>Reduction ratio</td> <td>1/20.3</td> </tr> </table> <p>Brown(A) Red(B)</p> <p>Orange(A) Yellow(B)</p> <p>Excitation sequence</p> <table border="1"> <thead> <tr> <th>STEP</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Lead</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>A</td> <td>-</td> <td>+</td> <td>+</td> <td>-</td> </tr> <tr> <td>B</td> <td>-</td> <td>-</td> <td>+</td> <td>+</td> </tr> <tr> <td>A</td> <td>+</td> <td>-</td> <td>-</td> <td>+</td> </tr> <tr> <td>B</td> <td>+</td> <td>+</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>Limit switch connector</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Lead color</th> <th>Connection</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>White</td> <td>COM</td> </tr> <tr> <td>6</td> <td>Red</td> <td>NO</td> </tr> <tr> <td>7</td> <td>Yellow</td> <td>NC</td> </tr> </tbody> </table> <p>Housing : 6181-0072(SUMITOMO DENSO) Terminal : 1500-0134(SUMITOMO DENSO) Retainer : 6918-0327(SUMITOMO DENSO) Water Proof : 7165-0118 (SUMITOMO DENSO)</p>	Drive voltage	DC 24V	Rated voltage	DC 8.5V	Rated current	1.5A/ phase	Number of phases	2 phase	Excitation method	2 Excitation	Step angle	1.8°	Insulation resistance	More than 100MΩ (500V megger)	Reduction ratio	1/20.3	STEP	1	2	3	4	Lead					A	-	+	+	-	B	-	-	+	+	A	+	-	-	+	B	+	+	-	-	No.	Lead color	Connection	5	White	COM	6	Red	NO	7	Yellow	NC	<p>REDUCTION GEAR SECTION</p> <p>OUTPUT SHAFT (INVOLUTE)</p> <p>OIL SEAL</p> <p>MOTOR SECTION</p> <p>Z</p> <p>CAM</p> <p>LIMIT SWITCH</p> <p>MOTOR CONNECTOR</p> <p>LIMIT SWITCH CONNECTOR</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Lead color</th> <th>Connection</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Brown</td> <td>A</td> </tr> <tr> <td>2</td> <td>Orange</td> <td>\bar{A}</td> </tr> <tr> <td>3</td> <td>Red</td> <td>B</td> </tr> <tr> <td>4</td> <td>Yellow</td> <td>\bar{B}</td> </tr> </tbody> </table> <p>VIEW Z</p> <p>LIMIT SWITCH MOTION RANGE</p> <p>ON 52° ± 2° OFF</p>	No.	Lead color	Connection	1	Brown	A	2	Orange	\bar{A}	3	Red	B	4	Yellow	\bar{B}
Drive voltage	DC 24V																																																																										
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B	-	-	+	+																																																																							
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<p>M-3</p> <p>Motor</p> <p>YT53C00004P1</p> <p>Wiper motor</p> <p>YN07-30001~ YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Drive voltage</td> <td>DC24V</td> </tr> </table> <p>CIRCUIT DIAGRAM</p>	Drive voltage	DC24V																																																																								
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<p>M-4</p> <p>Motor</p> <p>2427U900</p> <p>Washer pump</p> <p>YW06501~ LP11001~, YP02301~ YN18001~, YQ02301~ LQ03301~, LL02301~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Type</td> <td></td> </tr> <tr> <td>Rated voltage</td> <td>24V</td> </tr> <tr> <td>Injection pressure</td> <td>More than 1.2kgf/cm² (17psi)</td> </tr> <tr> <td>Injection flow</td> <td>More than 1320cc/min</td> </tr> <tr> <td>Tank capacity</td> <td>More than 2.2ℓ (0.58gal)</td> </tr> </table>	Type		Rated voltage	24V	Injection pressure	More than 1.2kgf/cm ² (17psi)	Injection flow	More than 1320cc/min	Tank capacity	More than 2.2ℓ (0.58gal)	<p>WASHER TANK</p> <p>⊕-TERMINAL</p> <p>PUMP</p> <p>⊖-TERMINAL</p>																																																															
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File No. Name of part Part No. Use Applicable Machine	Specification	Description																											
<p>SW-4</p> <p>Switch</p> <p>YX50E00002F1</p> <p>Swing parking release</p> <p>YN07-30001~ YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>Type</td> <td colspan="3">Single-pole double-throw (alternate)</td> </tr> <tr> <td>Rated</td> <td colspan="3">DC 30V,10A</td> </tr> <tr> <td>Insulation resistance</td> <td colspan="3"></td> </tr> <tr> <td>Contact construction :</td> <td>T No. position</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Swing parking release</td> <td>ON①</td> <td></td> <td>○</td> <td>○</td> </tr> <tr> <td>Normal</td> <td>ON②</td> <td>○</td> <td>○</td> <td></td> </tr> </table>	Type	Single-pole double-throw (alternate)			Rated	DC 30V,10A			Insulation resistance				Contact construction :	T No. position	1	2	3	Swing parking release	ON①		○	○	Normal	ON②	○	○		<p>INSULATION TAPE R B W VINYL TUBE YAZAKI 7122-2237 7114-2020 RED(2) WHITE(3) BLUE(1)</p>
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Normal	ON②	○	○																										
<p>SW-5</p> <p>Switch</p> <p>YN50S01003P1</p> <p>KPSS release</p> <p>YW06501~ LP11001~, YP02301~ YN18001~, YQ02301~ LQ03301~, LL02301~ YV00101~, YY00101~ YF00101~ YN07-30001~, YQ07-03501~ LQ08-04501~, LL08-03001~</p>	<table border="1"> <tr> <td>Type</td> <td>ST-425N</td> </tr> </table> <p>CIRCUIT DIAGRAM</p>	Type	ST-425N	<p>M12P1 KEY WAY 12PAM-HD SUMITOMO 6098-0252 TERMINAL 8230-4282</p>																									
Type	ST-425N																												
<p>SW-6</p> <p>E/G water temperature switch</p> <p>ME039860</p> <p>YN23301~, YQ02801~ YF00101~ YN07-30001~ YQ07-03501~ LQ08-04501~ LL08-03001~ LC06-05501~ YC06-02501~</p>	<table border="1"> <tr> <td>MITSUBISHI Part No.</td> <td>ME039860</td> </tr> <tr> <td>Closed circuit temperature</td> <td>105±2°C (221±35.6°F)</td> </tr> <tr> <td>Temperature difference in open/close action</td> <td>7°C (44.6°F) MAX</td> </tr> <tr> <td>Rated voltage</td> <td>DC24V</td> </tr> <tr> <td>Current capacity</td> <td>3A</td> </tr> <tr> <td>Mounting position</td> <td>Mounting E/G</td> </tr> <tr> <td>Contact type</td> <td>Nomally open</td> </tr> </table>	MITSUBISHI Part No.	ME039860	Closed circuit temperature	105±2°C (221±35.6°F)	Temperature difference in open/close action	7°C (44.6°F) MAX	Rated voltage	DC24V	Current capacity	3A	Mounting position	Mounting E/G	Contact type	Nomally open	<p>M16×1.5 M4×0.7 DATE OF MANUFACTURE</p>													
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<p>SW-7</p> <p>E/G oil pressure switch</p> <p>MC840219</p> <p>Oil pressure indication</p> <p>YN18001~, YQ02301~ LQ03301~, LL02301~ YF00101~ YN07-30001~ YQ07-03501~ LQ08-04501~, LL08-03001~ LC06-05501~, YC06-02501~</p>	<table border="1"> <tr> <td>MITSUBISHI part No.</td> <td>MC840219</td> </tr> <tr> <td>Rated voltage</td> <td>DC24V</td> </tr> <tr> <td>Open circuit oil pressure</td> <td>0.5kgf/cm² (7.1psi) MIN</td> </tr> <tr> <td>Contact type</td> <td>Nomally closed</td> </tr> </table>	MITSUBISHI part No.	MC840219	Rated voltage	DC24V	Open circuit oil pressure	0.5kgf/cm ² (7.1psi) MIN	Contact type	Nomally closed	<p>Ø2 PT1/8</p>																			
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Contact type	Nomally closed																												

(5) Receiver Dryer (See Fig.13)

1) Receiver Tank

On the air-conditioner, the revolution of the compressor varies greatly which causes the proper flow of refrigerant in the cooling circuit to vary. It is the receiver tank that receives the variations. When the cooling circuit does not need much refrigerant, the receiver tank stores extra refrigerant temporarily and supplies it when the cooling circuit needs much refrigerant. The receiver tank also stores an extra amount of refrigerant to be used for filling balance and supplement small amounts of leakage of the refrigerant through penetration into rubber hoses.

2) Dryer

If water is mixed in the cooling circuit, it deteriorates the compressor valves and oil, corrodes the metallic parts of the circuit or clogs the circuit as the water freezes in the expansion valve. It is desirable that the amount of water mixed in the refrigerant should be held below a concentration of 30ppm. The air-conditioner uses a molecular sieve as desiccant suited for the circuit, in order to absorb water content that intrudes into the circuit when the dryer is installed or when refrigerant is charged.

3) Sight Glass

This is a inspection window with which the refrigerant level in the circuit is determined, the only means of confirming the inside of the circuit visually.

4) Filter

5) Pressure Switch

This machine employs pressure switches of high/low pressure type.

The pressure switch protects the circuit by cutting off the power supply to the compressor when high pressure increases abnormally high [more than 32kgf/cm² (460psi)].

The pressure switch also detects the leakage of refrigerant by cutting the power supply to the compressor when the pressure of the circuit falls below 2kgf/cm² (28psi).

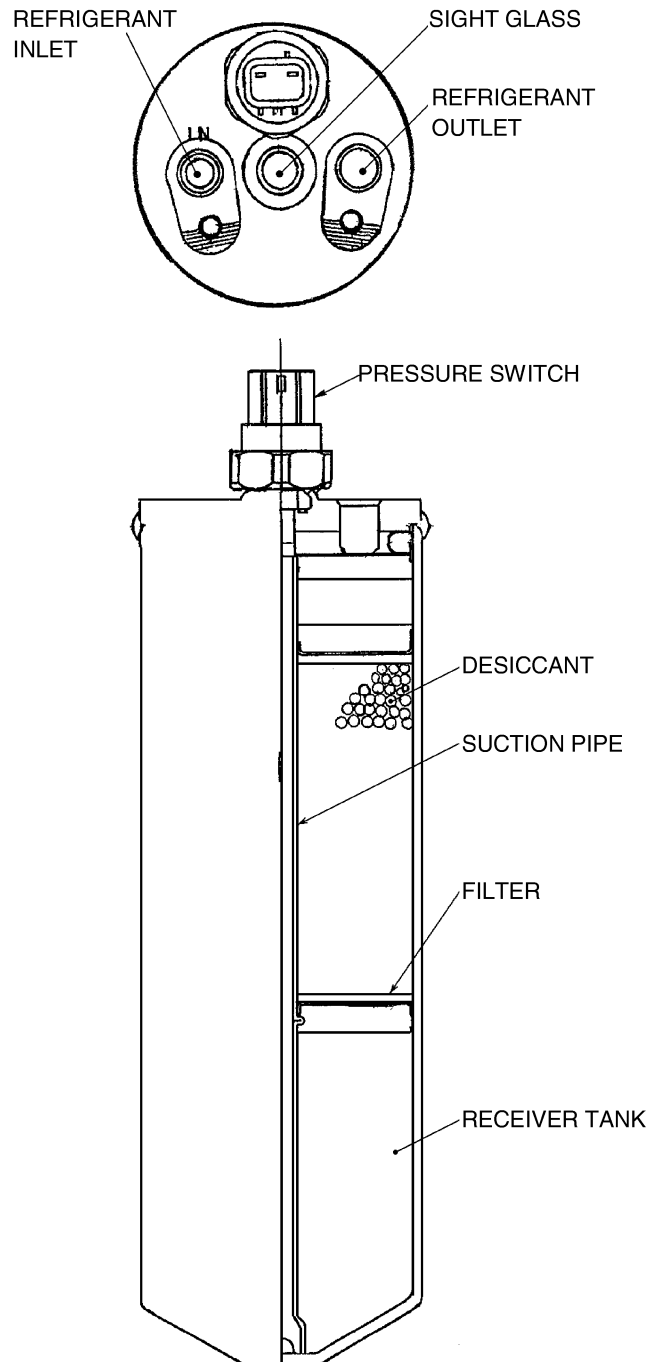


Fig. 13 Receiver dryer

(3) Charging from Low Pressure Side

(See Fig.30.)

- 1) Make sure that the high-pressure and low-pressure valves of the gauge manifold and the service can valve are closed.
- 2) Start the engine and run the revolution to 1500 ± 100 rpm and fully open the cab door and the windows.
- 3) Turn on the air-conditioner switch, set the fan switch to Max and the temperature control switch to cool Max.
- 4) When charging gas, set the discharge pressure of the compressor to $14 \sim 16$ kgf/cm² (200~230psi).
- 5) Open the low pressure valve of the gauge manifold and the service can valve and fill in refrigerant till air bubbles of the sight glass of the receiver go away. (See Fig.30.)
[Total amount of gas to be charged :
 $1050g \pm 100g$ (2.2 ± 0.22 lbs)]
- 6) When refrigerant charge is over, close the low pressure valve of the gauge manifold and the service can valve.



- Do not open the high pressure valve of the gauge manifold in any circumstances.
- Never place the service can upside down. (The compressor may be scored because the refrigerant is sucked in a liquid state.)

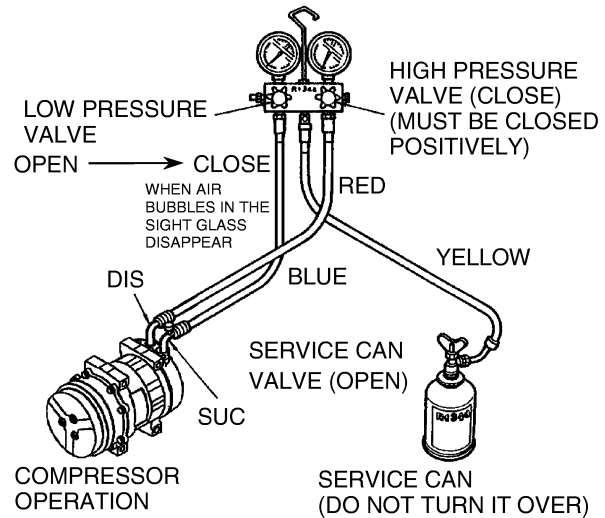


Fig. 30 Gas charging operation
(Low pressure side)

SIGHT GLASS

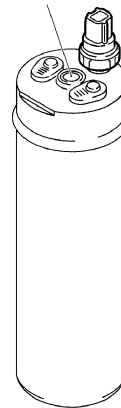


Fig. 31 Receiver dryer

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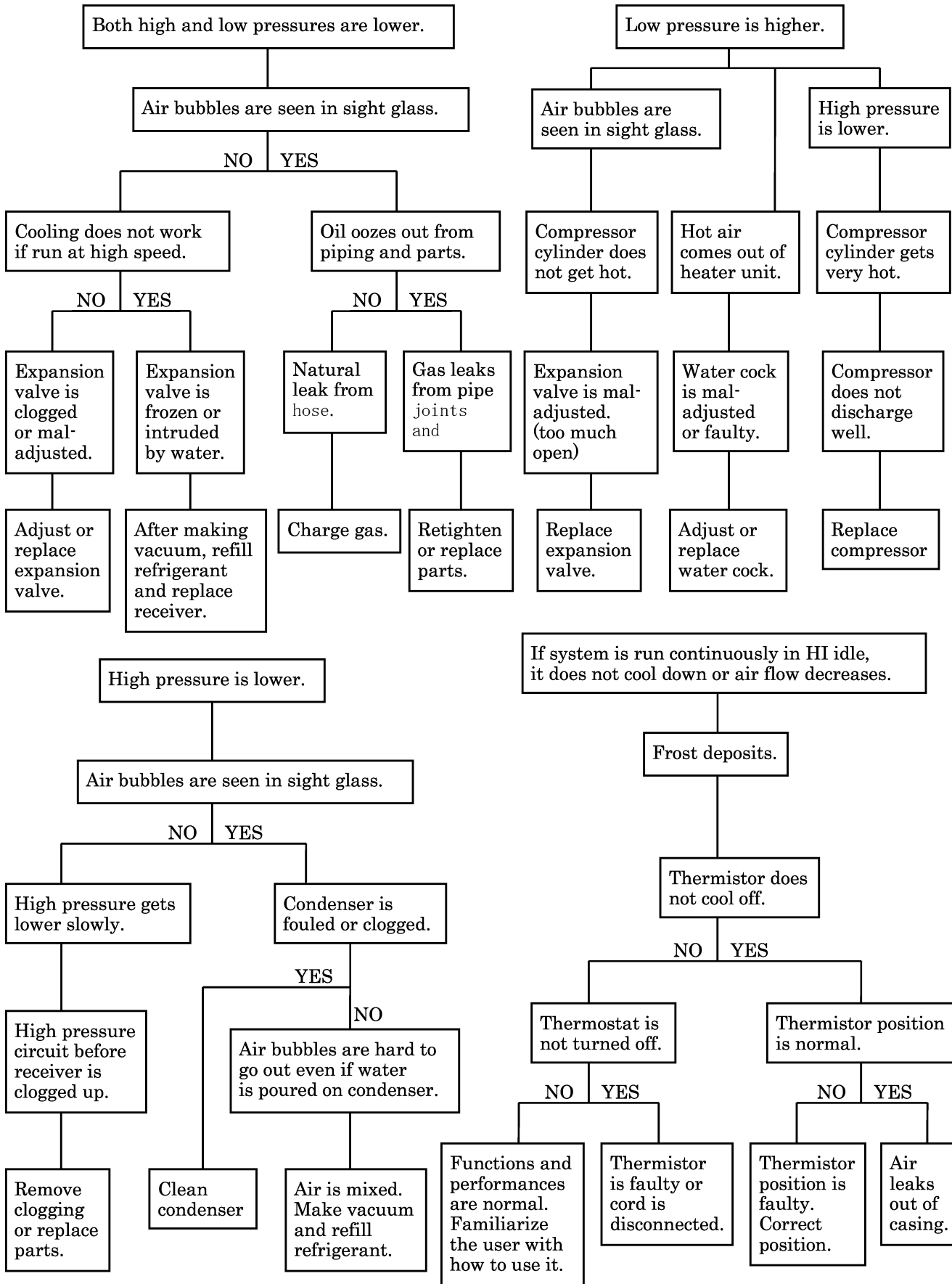
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[Trouble with refrigeration cycle.]



3. ARM

3.1 REMOVING ARM

(1) Put the machine in position to remove arm.
Extend the arm cylinder, retract the bucket cylinder and bring the arm down on the ground.

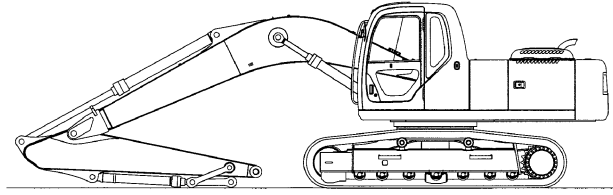


Fig. 3-1 Position to remove arm

(2) Disconnecting piping of bucket cylinder
Release pressure of hydraulic tank, place oil pan to prepare for oil leaking, and separate pipes.

⚠ Plug both section of separated pipes.
Plug : 4-(4)

When the removal of bucket cylinder is not required, skip to procedure (6).

(3) Removing bucket cylinder rod pin (H)
1) Loosen nut (9), remove capscrew M16×140 (8), and push out pin (H).

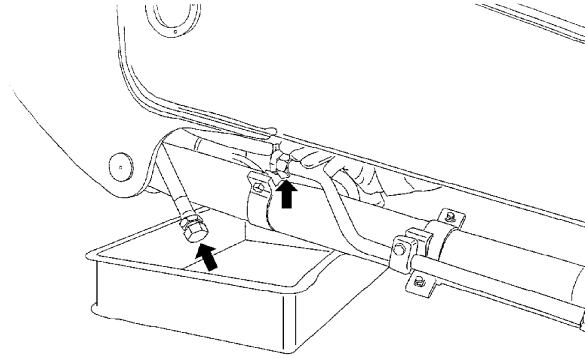



Fig. 3-2 Disconnecting piping of bucket cylinder

 : 24mm

2) Retract cylinder rod.

After adjustment of shim, the total gap should be within 0.6~1.0mm (0.02~0.04in).

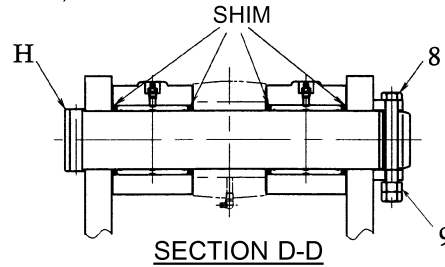
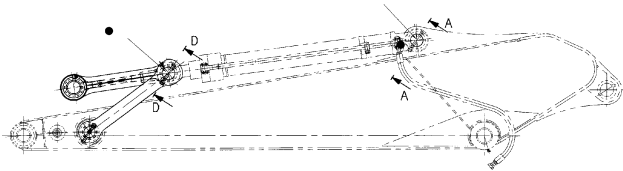



Fig. 3-3 Detail of bucket cylinder rod pin (H)

(4) Removing cylinder head pin (G)
Loosen nut (3), remove capscrew M16×140 (2), and push out pin (G).

 : 24mm

After adjustment of shim, the total gap should be within 0.6~2.0mm (0.02~0.08in).

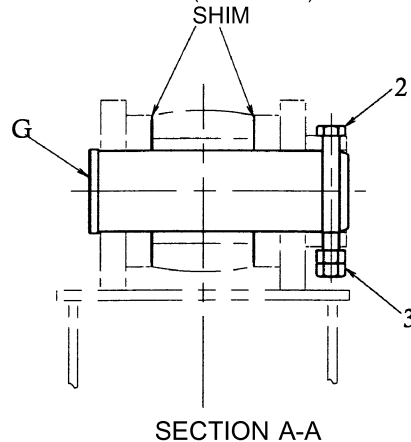


Fig. 3-4 Detail of bucket cylinder head pin (G)

1.3 DISASSEMBLY

- When disassembling and servicing the cylinder, check the construction and the availability of service parts as well as necessary tools and jigs on separate Parts Manual.
- The figures in parentheses after part names correspond to those in Fig.1-3.
- The explanations and quantities below are for a boom cylinder. Apply the same to other cylinder as well.

1.3.1 REMOVING ROD COVER AND PISTON ROD

1) Hold the clevis section of the tube in a vise.

⚠ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

2) Pull out piston rod (4) about 200mm (8in). Because the piston rod is heavy, finish extending it with air pressure after the above-mentioned oil draining operation.

3) Loosen and remove socket bolts (25) of the rod cover in sequence.



: 14mm

⚠ Cover the extended piston rod (4) with rag to prevent it from being accidentally damaged during operation.

4) Strike the corner of the rod cover flange by means of a plastic mallet till rod cover (16) comes off.

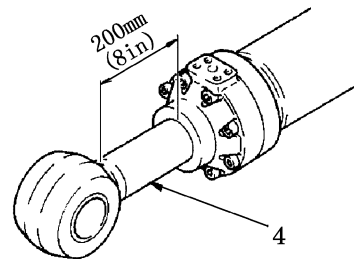


Fig. 1-4

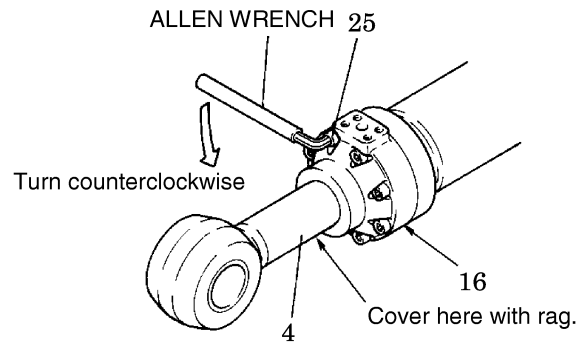




Fig. 1-5

- 3) Turn up socket bolt (25). Match the bolt holes of the rod cover flange to the tapped holes in the cylinder assy, and screw in socket bolts (25) one by one. Tighten the bolts to a specified torque, taking care so the bolts may not be tightened unevenly.


 :14mm,
 Tightening torque :
 35~37kgf·m (250~270ft·lbs)

-  Take care so as not to damage the rod surface by accidentally slip a wrench. Covering the rod surface with rag is recommended to prevent damage to it. For the tightening torques, refer to "(II-1-16)".

1.6 INSPECTION AFTER ASSEMBLY

(1) No-load functional test


Place the cylinder level at no load, operate the piston rod 5 to 6 strokes by the directional valve and make certain that it operates without fault.

- 
 - Do not raise the hydraulic pressure above the maximum pressure of 380kg/cm² (5400psi) for the cylinder of the machine.
 - Grease coated on the O rings and the seals of the rod cover may ooze out. Wipe it off and retest the cylinder in such a case.

(2) Leak test (See Fig. 1-36 and Fig. 1-37.)

- 1) Apply a test pressure to the retracting and extending sides of the cylinder for three minutes independently, and check that the rod section and the welds have external leaks and permanent deformation. For an internal leak test, connect the cylinder with a test unit.

- 2) After completing the test, apply a plug to each port and store it (Fig. 1-38).

-  For storage, place the cylinder on wooden V-blocks and bring the cylinder to the most retracted condition.

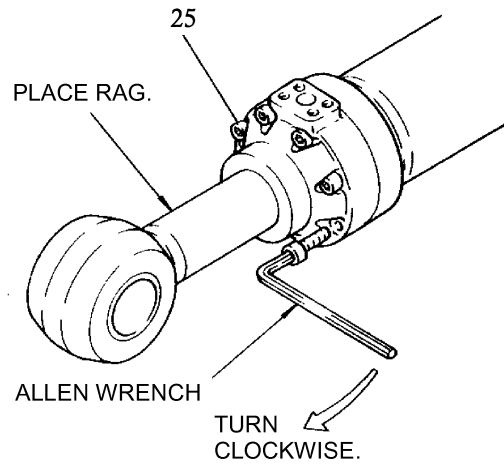


Fig. 1-35 Tightening socket bolts (25)

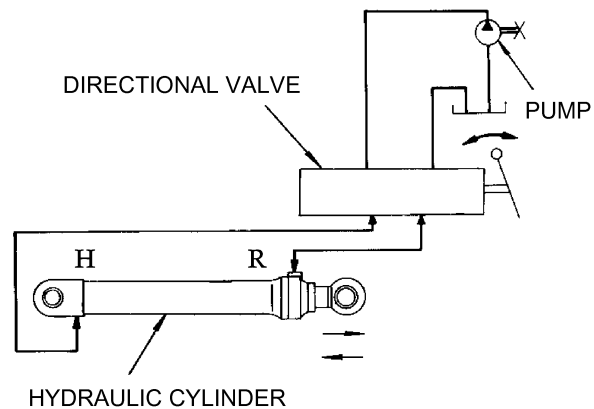


Fig. 1-36 External leak test

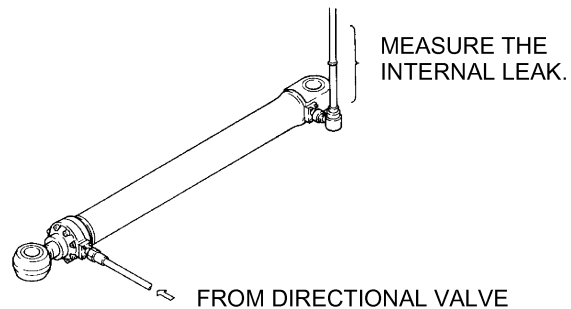


Fig. 1-37 Internal leak test

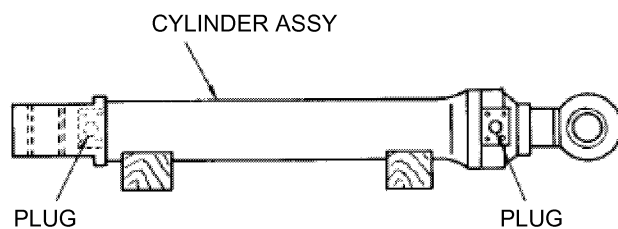



Fig. 1-38 How to store the cylinder

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Issued January, 2004 - Form Number 6-75780NA-NH33
Source Code No. S5YQ/LL3312E-00

5. UNDER COVER

5.1 REMOVAL

- (1) Remove under cover (2,4,5,6,10,11,12,13)
- 1) Remove attaching sems bolts (7) M12 × 30.
- 2) Remove covers.

 : 19mm

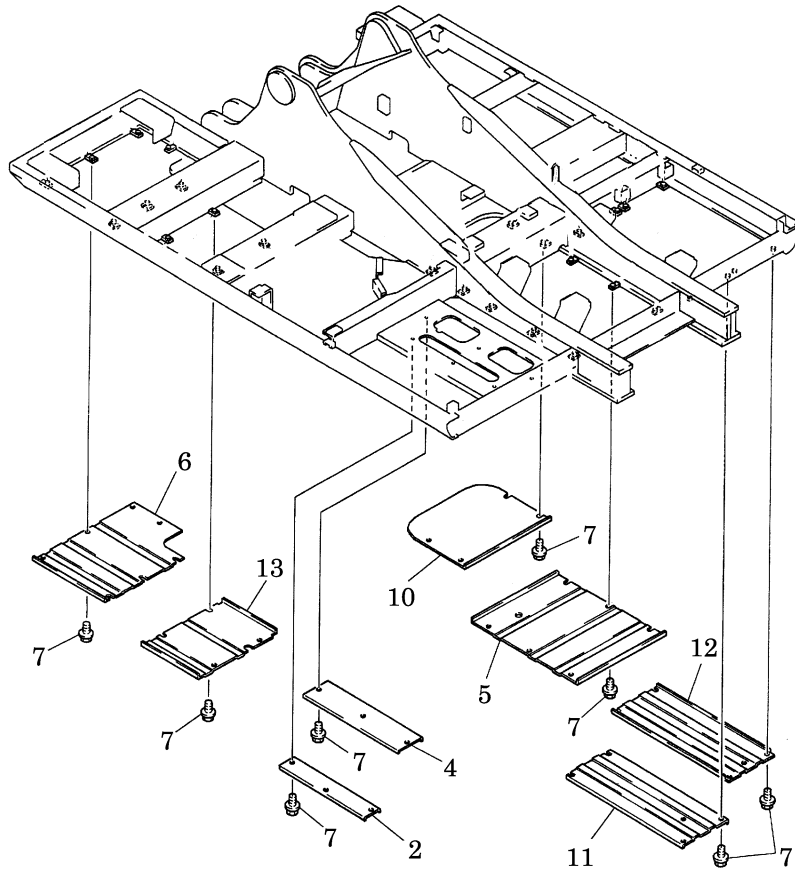



Fig. 5-1 Under cover assy

5.2 INSTALLATION

- (1) Install under cover (2,4,5,6,10,11,12,13)

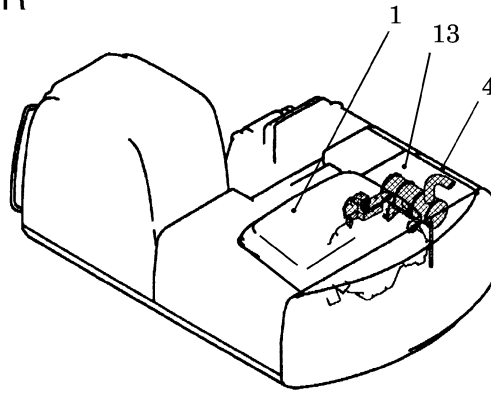
 : 19mm

Tightening torque : 8.5kgf·m (61ft·lbs)

10. MUFFLER

10.1 PREPARATION FOR REMOVAL

- (1) Remove bonnet assy (1) and guard (13).
- (2) Remove panel assy (4).
- (3) Remove guard (24), (62) and bracket (16).
(See Fig.8-2)



10.2 REMOVAL




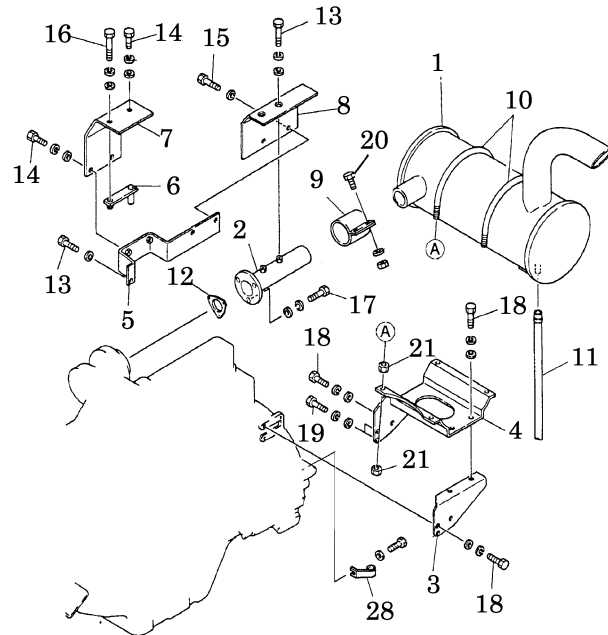
- (1) Remove bracket (7), (8).
 - 1) Remove four nuts (21) M8.
 : 13mm
 - 2) Remove two U bolts (10).
- (2) Remove clamp assy (9)
 - 1) Remove two capscrews (20) M10 × 35
 : 17mm
 - 2) Separate clamp assy (9) from muffler (1).
- (3) Removing other parts
Remove exhaust tube (2) and brackets (3), (4), as necessary.
 : 13mm, 17mm

Fig. 10-1 Preparation for removal



10.3 INSTALLATION

Installing is the reverse order of removing with attention paid to the following items:

- (1) Procedure of fastening U bolt (10)
(See Fig. 10-2)
 - 1) Tighten four nuts (A) till there is no space and make sure that the dimension C is even all around.
 - 2) Tighten nuts (A) to specified torque and confirm the C dimensions on the right and left once again.
 - 3) Tighten nuts (B) to specified torque and make sure that U bolts are not inclined.
 - 4) Tightening torque
Nut A : 0.9kgf·m(6.5ft·lbs)
Nut B : 1.1kgf·m(8.0ft·lbs)
- (2) Installing clamp assy (9)
 - 1) Place the end of clamp (9) 5mm (0.20in) away from the tip of the muffler slit so the joint of clamp does not extend over the slit in the muffler. (See Fig. 10-2.)
 - 2) Install the clamp assy (9) in the illustrated direction.
- (3) Tightening torque :

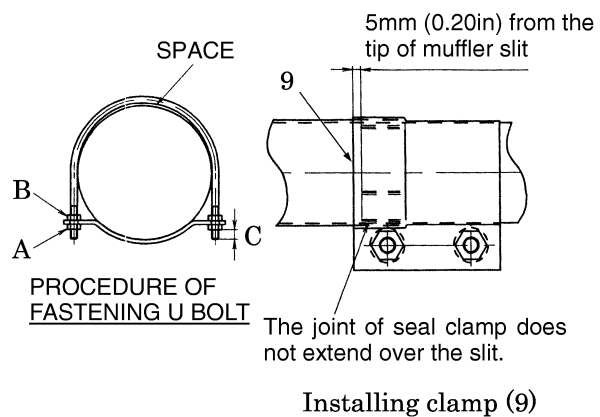


Fig. 10-2 Removing and installing the muffler

(4) Replacing parts


No.	NAME	Tightening torque kgf·m (ft·lbs)
13	CAPSCREW	2.0 (14.5)
18,19	CAPSCREW	4.0 (28.9)

NAME	PART No.
MUFLER(1)	YN12P00013P1
GASKET(12)	ME088841(MMC PART No.)

15.4 OPTIONAL MULTI CONTROL VALVE

(1) Changing from “multiless valve” to “with multi valve”

- 1) Be certain that the engine stops.
- 2) Set multi control valve to other than ISO (Y) position.
- 3) Remove six socket bolts (271).


 : 6mm

4) Remove repair kit “multiless valve” and attach repair kit “with multi valve”.

5) Then check that the inside O ring (161) is free from distortion.

6) Check that O ring (461) and backup ring (462) are fitted on cover of valve “with multi control”, and install it on sensor block (S).

7) Fit socket bolt (271) and (273) and tighten it to the specified torque.

 : 6mm

Tightening torque ; 4.3kgf·m (31ft·lbs)

(2) Changing from “with multi valve” to “multiless valve”

- 1) Stop engine, and remove repair kit for “with multi valve” in the reverse procedure of the said procedure, and attach repair kit for “multiless valve”.

Specification of multiless control valve

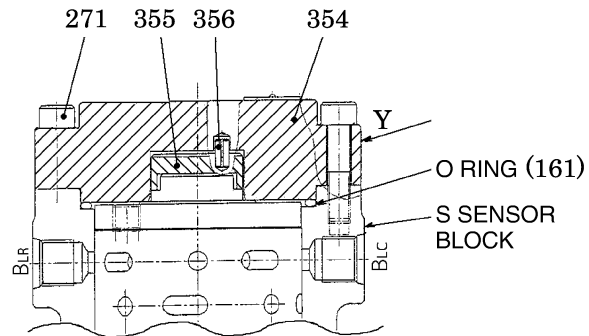


Fig. 15-4

Multiless control block assy		2436U1244F4	
No.	NAME	Part No.	Q' T Y
S	SENSOR BLOCK	—	1S
Y	MULTILESS REPAIR KIT	2436U1244R200	1S
161	● O RING	ZD12G08000	1
271	● SOCKET BOLT	ZS23C08035	6
354	● COVER	—	1
355	● PIN	—	1
356	● SPRING PIN	ZP26D05010	1

Optional multi control valve

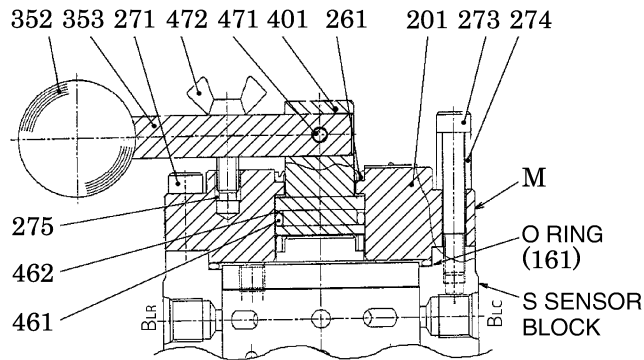


Fig. 15-5

C/V assy with multi		2436U1244F3	
No.	NAME	Part No.	Q'TY
S	SENSOR BLOCK	—	1S
M	REPAIR KIT WITH MULTI	2436U1244R400	1S
161	● O RING	ZD12G08000	1
201	● COVER FOR MULTI	2436U1244S201	1
261	● DUST SEAL	2436U1244S261	1
271	● SOCKET BOLT	ZS23C08035	4
273	● SOCKET BOLT	ZS23C08055	2
274	● SPACER	2436U1244S274	2
275	● SLEEVE	—	4
352	● KNOB	2436U1244S352	1
353	● LEVER	2436U1244S353	1
401	● PIN	2436U1244S401	1
461	● O RING	ZD12P02800	1
462	● BACK UP RING	ZD85P02800	1
471	● SPRING PIN	ZP26D06025	1
472	● WING BOLT	2436U1244S50	1

21. UPPER FRAME

21.1 PREPARATION FOR REMOVAL

- (1) Remove attachment
(Refer to YN32 : ATTACHMENT)
- (2) Remove cab (Refer to 2. CAB.)
- (3) Remove guard (Refer to 4. GUARD)
- (4) Remove counterweight
(Refer to 11. COUNTERWEIGHT)
- (5) Remove swivel joint
(Perform the steps (1) thru (7) of 20. SWIVEL JOINT)


21.2 REMOVAL

- (1) Lifting up upper frame temporarily
Insert two upper swing body lifting jigs and two counterweight fastening cap screws (C1) M27×300 into the counterweight mounting holes from above. Attach two chain blocks to the boom foot side and lift the upper frame at four points.

Wire rope ; $\varnothing 16$ (0.630") × 2.5m(8ft-2in), 2pcs.
 $\varnothing 16$ (0.630") × 1.5m(4ft-11in), 2pcs.
 Chain block ; For 2,000kg (4,410 lbs) 2pcs.

- (2) Marking match marks on swing bearing
Mark match marks on upper frame and swing bearing.

- (3) Removing upper frame attaching bolts
Remove thirty capscrews M20×105 and three reamer bolts used to install swing bearing and upper frame.

 : 30mm

- (4) Slinging upper frame
Sling according to Fig.21-1, and remove upper frame and put it on a stand.

Weight : Approx. 5ton (11,000lbs)

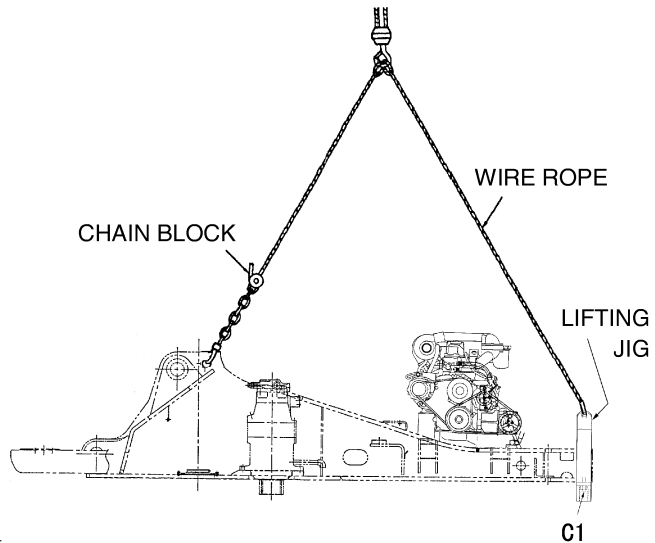


Fig. 21-1 Temporarily lift upper frame

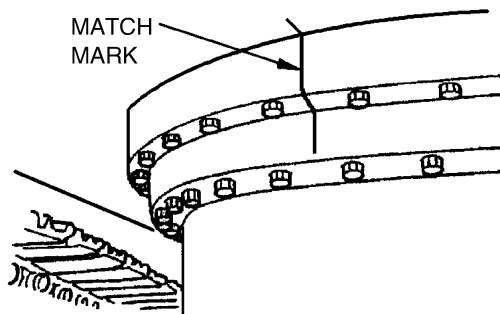


Fig. 21-2 Matching mark on swing bearing and upper frame

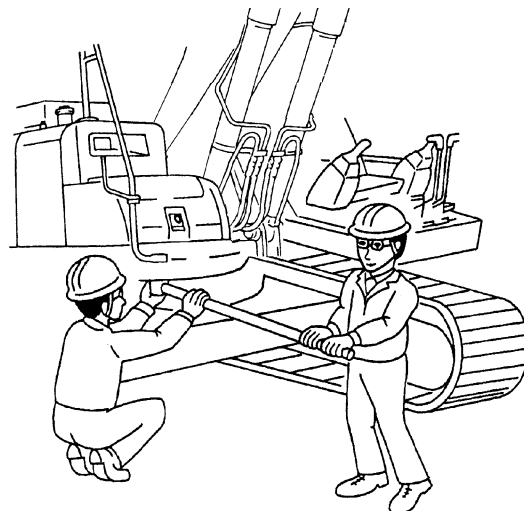


Fig. 21-3 Removing upper frame attaching bolts

12) Remove spline joint

Separate needle bearing (124) and spline joint (114) from valve block (312).

- Do not draw out needle bearings (124) except when their service life has ended.
- Do not loosen nuts (808) (marked ※) of valve block (312) and swash plate support (251) : A set flow rate changes.

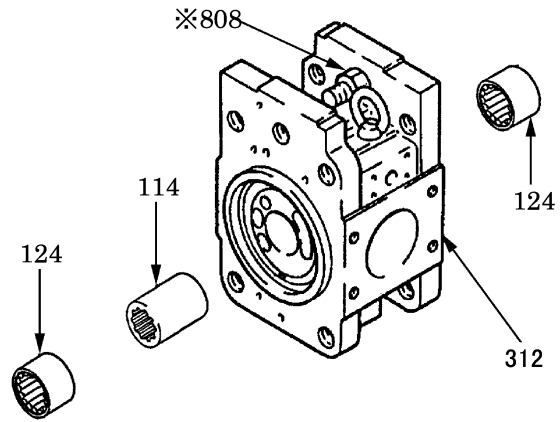


Fig. 1-16 Removing spline joint

(3) Installing procedure

1) Precautions to be exercised in installation

Assembly is a reverse order of disassembly, but notice the following.

1. Repair scored parts at disassembly. Get replacements ready beforehand.
2. Wash parts sufficiently in cleaning oil and dry them with jet air.
3. Do not forget to coat the sliding areas and bearings with clean hydraulic oil.
4. In principle, replace sealing parts such as O rings and oil seals.
5. Tighten socket bolts and plugs to specified torques in this manual, using a torque wrench.
6. Do not mix up front pump parts with rear pump parts.

2) Installing servo piston, etc.

Fit servo piston (532), tilting pin (531), stopper (L) (534) and stopper (S) (535) to pump casing (312).

- When tightening servo piston (532) and tilting pin (531), use a jig so as not to damage the head of the tilting pin and feedback pin (548).
- Coat the screwed part with Loctite #242.

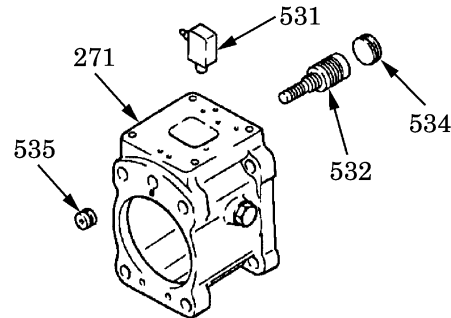


Fig. 1-17 Installing servo piston (532), etc.

3) Installing swash plate support

Attach swash plate support (251) to pump casing (271) by tapping the swash plate support lightly with a plastic hammer (K).

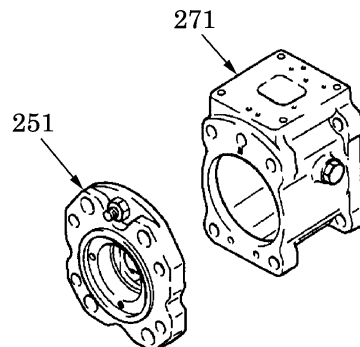


Fig. 1-18 Attaching swash plate support (251)

6) Remove compensating parts

(Fig. 1-31 (V) section)

After removing the cover (629) sub assy, take out outer spring (625), inner spring (626) and spring seat (624) from the compensating part. Then take out adjust stem (645), pilot spring (646) and spring seat (644) from the pilot part.

- Adjust stem (645) comes out easily if an M4 bolt is used.

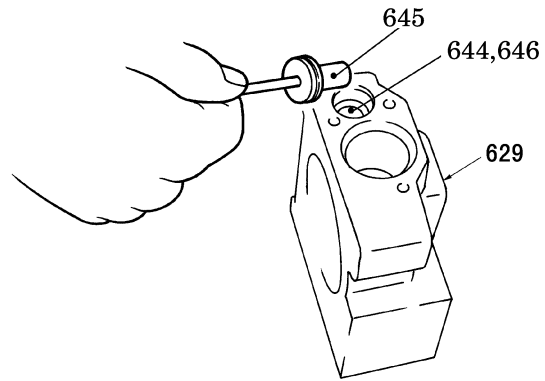



Fig. 1-34 Removing compensating parts

7) Remove pilot cover and the set spring

Remove capscrew (436) and pilot cover (641). Once the pilot cover comes off, separate set spring (655) from the pilot section. (Fig. 1-31 (I) section)

 : 5mm

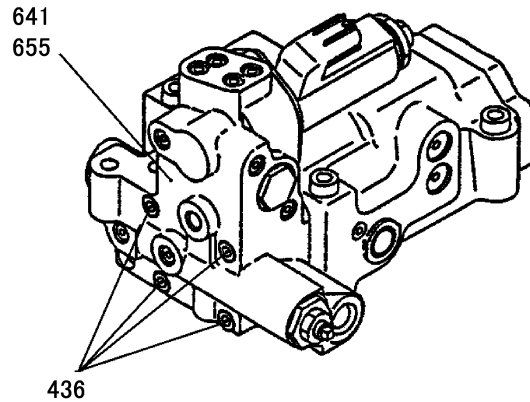


Fig. 1-35 Removing pilot cover (641) and set spring (655)

8) Remove spring seat, return spring and sleeve (Fig. 1-31 (I) section)

Remove snap ring (814). Then remove spring seat (653), return spring (654) and sleeve (651).

- Sleeve (651) is equipped with snap ring (836).
- When removing snap ring (814), return spring (654) comes out : Use care so as not to lose it.

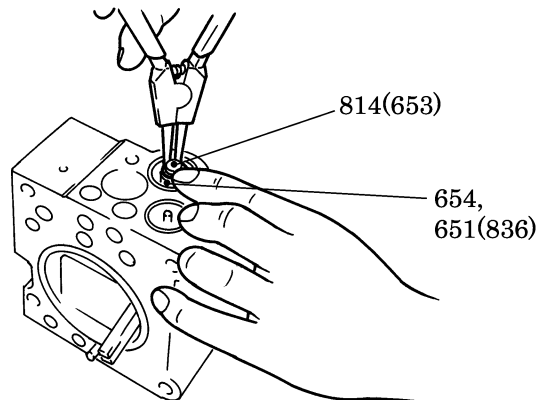


Fig. 1-36 Removing spring seat (653), return spring (654) and sleeve (651)

9) Remove adjust plug (Fig. 1-31 (G),(B) section)

Remove snap ring (858) and take out fulcrum plug (614) and adjust plug (615).

- Fulcrum plug (614) and adjust plug (615) come off easily if an M6 bolt is used.

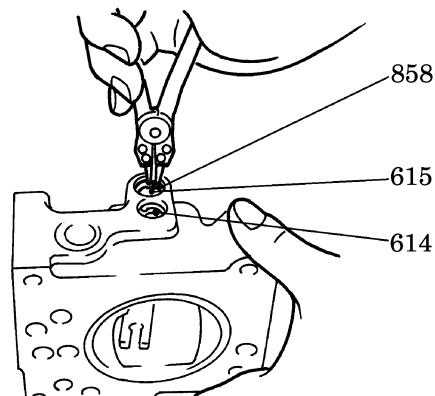


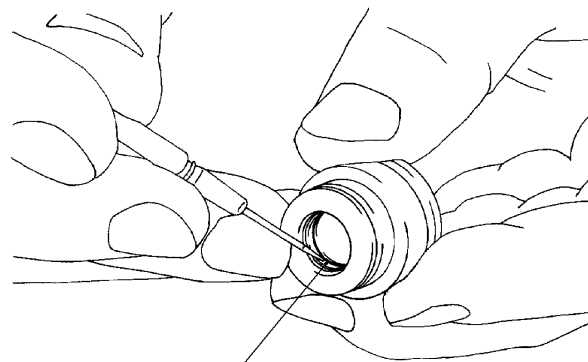
Fig. 1-37 Removing adjust plug (615) [1]

2.4 MAINTENANCE STANDARDS

(1) Inspection of components

Part name	Inspection item	Criterion and remedy
Casing	1) Look for scratches, rusting and corrosion.	1) If any of the following parts are damaged, replace the casing. <ul style="list-style-type: none"> ● Sliding part of casing hole and spool, particularly the land, to which holding pressure is applied. ● Part of sealing pocket through which spool is inserted. ● Area of sealing part that is in contact with O ring. ● Sealing and seating part of main or overload relief valve. ● Defects of other parts that seem to prevent normal function.
Spool	1) Look for scratches, galling, rusting and corrosion. 2) Inspect ends that are sealed with an O ring. 3) Insert the spool in the casing bore, and move it while turning it.	1) If a defect detectable with your fingernail is found on the sliding part of the outer circumference, replace the spool. 2) If the sliding part is damaged, replace the spool. 3) If the spool damages the O ring or does not move smoothly, repair or replace the spool.
Poppet	1) Look for damage on the poppet and the spring. 2) Insert the poppet in the casing, and move it.	1) If sealing is incomplete, correct or replace the seal. 2) If the poppet moves lightly without catching, it is normal.
Spring and related parts	1) Look for rust, corrosion, deformation, and breakage of the spring, spring seat, plug and cover.	1) If damaged heavily, replace.
Spool seal and related parts	1) Look for external oil leak. 2) Look for rust, corrosion and deformation of sealing plate.	1) Repair or replace. 2) Repair or replace.
Main relief valve Port relief valve	1) Look for rust and damage on outer surface. 2) Inspect the contact face of the valve seat. 3) Inspect the contact face of the poppet. 4) Look for spring abnormality. 5) Inspect the O ring, backup ring, and seal.	1) Replace. 2) If damaged, replace. 3) If damaged, replace. 4) Replace. 5) As a general rule, replace all parts with new ones.
Lock valve (selector portion)	1) Spool, bushing and spring are not damaged. 2) Spool seat shows even contact marks.	1) If damaged, replace. 2) If damaged, replace.

- (17) Remove inside seal (213) from plug (211) with small driver.



213
Fig. 3-14 Removing seal (213)

3.3 CLEANING PARTS

- (1) Clean parts with wash oil roughly.
- (2) Clean parts with wash oil completely.
- (3) Dry parts by swabbing clean waste cloth.
- (4) Apply rust preventives on parts.

3.4 ASSEMBLING

- (1) Fit bushing (131) and O ring (122) to casing (101). (See Fig.3-10.)

⚠ Meet the position of spring pin (126).

- (2) Install port plate (111) on casing with socket bolt (125) and seal washer (121).

: 6mm,

Tightening torque ; 2.1kgf·m

(15ft·lbs)

⚠ Replace seal washer (121) with new one.

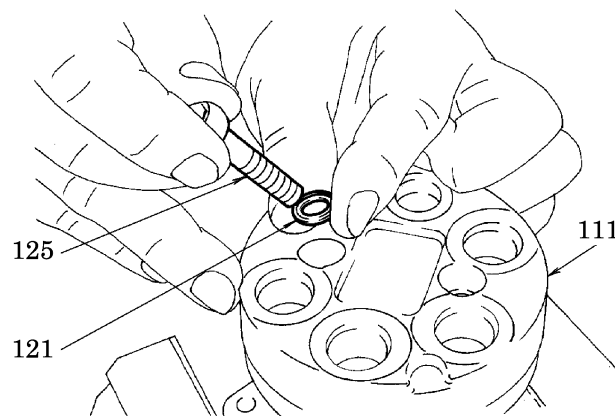


Fig. 3-15 Installing port plate (111)

- (3) Fit washer 2 (217), springs (241-1), (241-2), spring seats (216-1), (216-2) to spool (201-1), (201-2).

- (4) Push spring seat (216-1) in the range of that the movement is 7mm (0.276in) or less, and install spools (201-1) through the large hole of spring seat. (See Fig.3-11.)

For spring seat (216-2), push spring seat (216-2) in 9.4mm (0.370in) or less and install spool (201-2).

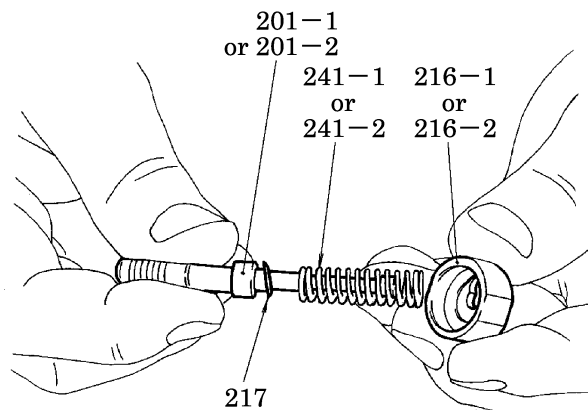


Fig. 3-16 Assembling pressure reducing valve


(4) Set orifices (1), (3) to piston assy (44) that is set in the cover.

- The orifices absorbs rattles that are made when cam (12) is in neutral: either orifice may be at the top or at the bottom.
- In case the cam rattles very much because the cam and the pin are worn out after long hours of use, increase the number of orifices. However, if many orifices are set when there is no gap, the reducing valve spool is actuated at neutral and pressure is built up in the secondary pressure port. When there is no gap on the cam at neutral, do not increase the orifices.

(5) Set four holders (19) and balls (36) to piston assembly (44).

(6) Install two dampers on the reducing valve and fasten them with socket bolts (26) with washers (30).

In that case, parallel pin (32) set in body (5) is placed in the hole of cover (15) to position the reducing valve and the damper in place.


 : 8mm, Tightening torque :
 $6 \pm 0.5 \text{ kgf}\cdot\text{m}$ ($43 \pm 3.6 \text{ ft}\cdot\text{lbs}$)

(7) Set cam (12) to cover (15) and insert pin (14). On that occasion, check the gap of the cam and if the gap is large, increase orifices (1), (3) according to item (4) above.

- Ball (36) and holder (19) can be drawn out easily by magnet bar. If a magnet bar is not available, place the valve on its side and give vibration to it.

(8) When the gap adjustment of the cam has been finished, apply grease to the moving parts of cam (12), pin (14), cover (15) and ball (36).

(9) Attach 2×2 pcs. set screws to cam (12) and tighten them.

 : 4mm, Tightening torque :
 $1.5 \pm 0.1 \text{ kgf}\cdot\text{m}$ ($11 \pm 0.7 \text{ ft}\cdot\text{lbs}$)

(10) Fit two boots (13).

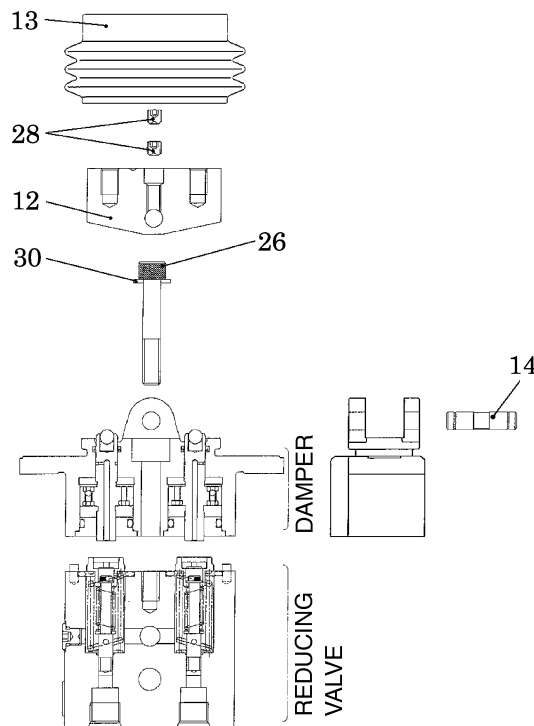
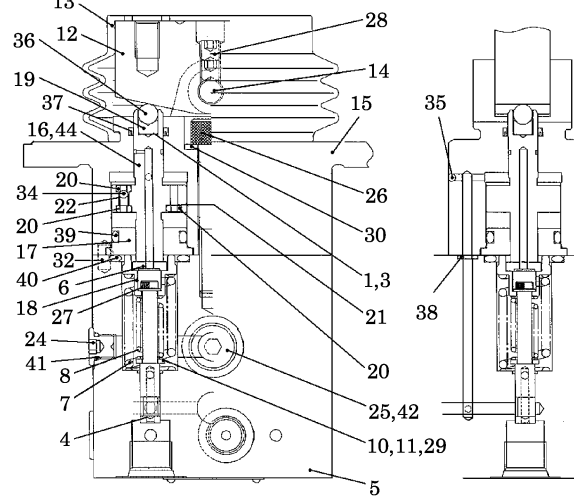
12. Standard for the judgement of serviceability of parts

- (1) Replace seals with new ones at disassembly and reassembly.
- (2) If you feel the moving parts of the damper, cover (15), piston assy (44) and guide (17) unsmooth, correct the moving surfaces and corners to be free from scratches and burrs, using #1000 emery paper.

In case such scratches and burrs can not be corrected with ease, replace the parts with new ones in pairs.

(3) If you feel the moving parts of the reducing valve, body (5) and spool (4) unsmooth, correct them to be free from scratches and burrs, using #1000 emery paper. If it is difficult to correct, replace the parts with new ones in pairs.

(4) If you feel the moving parts of the cam assembly such as, cam (12), pin (14) and cover (15), correct them to be free from scratch and burr, using #1000 emery paper. If it is hard to correct, replace the parts with new ones.



- 11) Fit O rings (706), (707) to casing (301). In that case, if the O rings are coated with grease, they are hard to tear off when brake piston (702) is inserted.
- 12) Assemble brake piston (702) into casing (301).
- 13) Assemble brake spring (712) into brake piston (702). In that case, make sure that a spring is placed positively in the spot faced part of the brake piston.

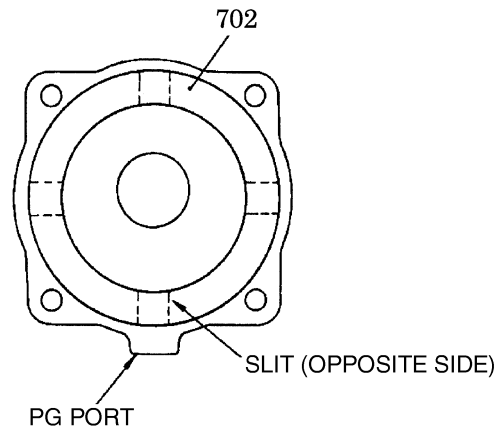


Fig. 5-14 Assembling brake piston

- This operation is necessary only where roller bearing (444) is removed.

- 14) Insert the outer race of roller bearing (444) into valve casing (303), while lightly tapping the steel rod placed on the outer race, using a hammer.
- 15) Assemble valve plate (131) into valve casing (303) and fit O ring (472) in it.
- 16) Install valve casing (303) to casing (301) and fasten them with socket bolts (401).
 - : 17mm,
 - Tightening torque : 44kgf·m (320ft·lbs)
- 17) Fit plunger (351) and spring (355) to valve casing (303). Then tighten RO plug (469) fitted with O ring (488) against valve casing (303).
 - : 14mm,
 - Tightening torque : 34kgf·m (250ft·lbs)
- 18) Fasten valve (051) to valve casing (303).
 - : 41mm,
 - Tightening torque : 18kgf·m (130ft·lbs)
- 19) Fit reverse turn preventing sub (052) to valve casing (303).
 - : 6mm,
 - Tightening torque : 3kgf·m (22ft·lbs)
- 20) Fit O ring (485) to plug (464) and fasten the plug against casing (301).
 - : 19mm,
 - Tightening torque : 3.7kgf·m (27ft·lbs)

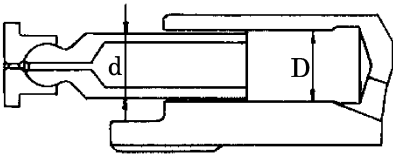
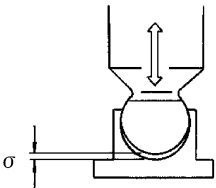
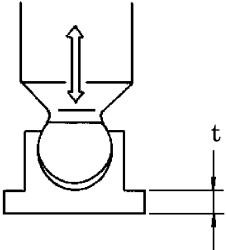
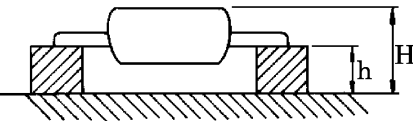
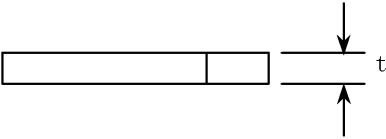
5.4 MAINTENANCE STANDARDS

5.4.1 SWING MOTOR

(1) Replacement standards for parts

The following are the standards to determine whether or not parts may be reused from values taken at disassembly. These are only general standards and in case the motor displays poor performance or parts shows extreme damage and discoloration before

disassembly, it is most important to determine how many parts should be replaced, depending upon the purpose of disassembly and the remaining service life of the motor that the user expects.

Item	Standard Dimension mm (in)	Recommended Value for Replacement mm (in)	Remedy
Clearance between piston and cylinder bore (D-d) 	0.027 (0.00160)	0.052 (0.00205)	Replace piston or cylinder.
Gap between piston and caulked part of shoe (σ) 	0	0.3 (0.0112)	Replace piston and shoe assy.
Thickness of shoe (t) 	5.5 (0.217)	5.3 (0.209)	Replace piston and shoe assy.
Assembled height of retainer plate and retainer (H-h) 	5.5 (0.217)	5.0 (0.197)	Replace a spherical bushing and a retainer plate as a pair.
Thickness of friction plate 	1.8 (0.0709)	1.6 (0.0630)	Replace.

(4) Removing seals

- 1) Remove O ring (6) from the O ring groove with the aid of a spatula.

⚠ Use the tip of the spatula taking not to score the body. Also do not strike the spatula.

- 2) Stick pin (e) to seal (5) and extract slipper ring (5). Fig.6-7 shows the use of one pin, but by using two pins, this can be extracted with more sureness.

As the backup ring is made of rubber, remove this in the same procedure as O ring (6).

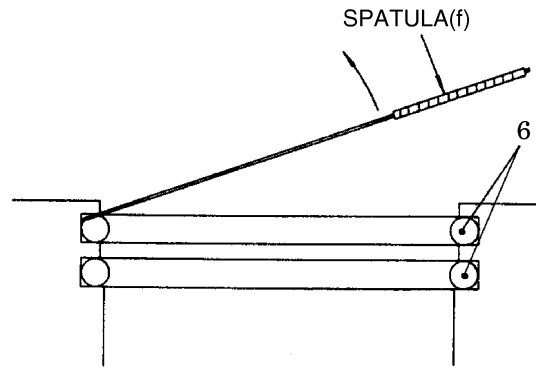


Fig. 6-6 Removing O ring (6)

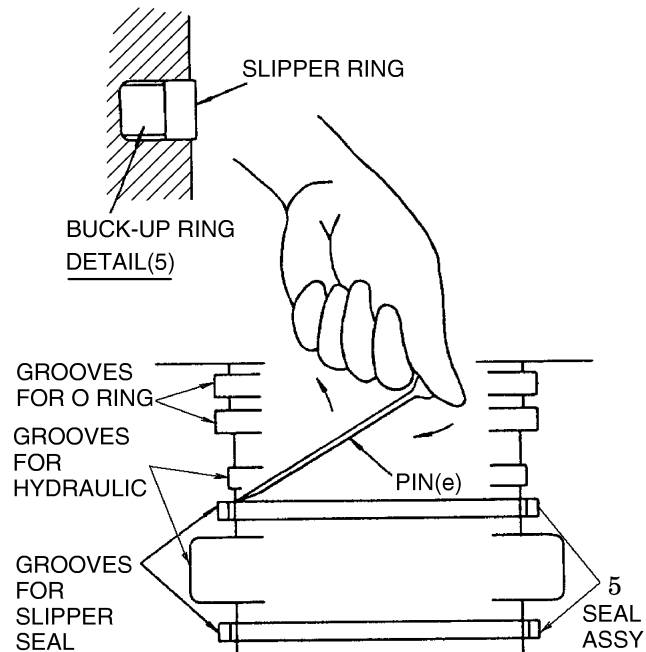


Fig. 6-7 Removing out seal assy (5)

6.2.5 ASSEMBLY

Prior to assembly, clean each parts (excluding the O ring and slipper ring), and arrange in the sequence of assembly.

(1) Assembling seals to body

- 1) Coat O ring (6) lightly with hydraulic oil and install in the O ring groove. Also make sure that the O ring is not distorted after installation.
- 2) Make sure that oiliness, such as hydraulic oil and grease, has been completely removed.
- 3) Slipper ring is assembled, after first inserting the backup ring, by slightly-distorting the shape as shown in Fig.6-8. Also after inserting all of the seals, be certain that these are installed in the seal groove by use of the spatula.

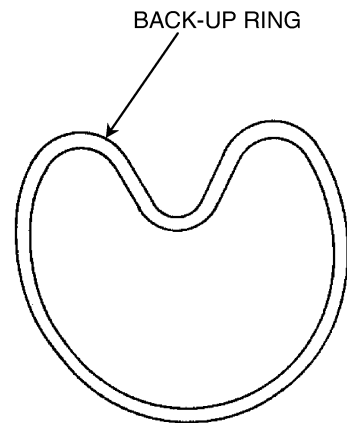


Fig. 6-8 Inserting slipper ring into backup ring

(3) Removing crawler

Put attachment on ground so that weight is not loaded to the lower frame, and remove track link assy rotating sprocket.

- ⚠ Crawler end section may fall on the ground just before extending it on the ground incurring danger of injury. Please keep well away from the equipment.

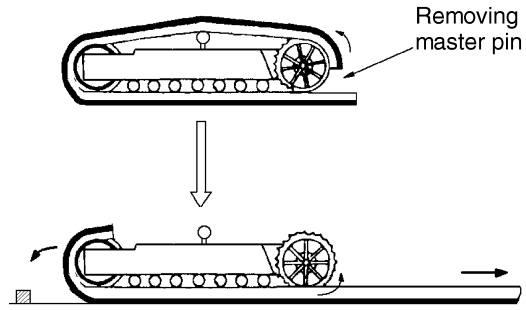


Fig. 2-3 Removing crawler

2.2 INSTALLING

Installing is done in the reverse order of removing.

(1) Checking crawler installation direction.

Place the track links on the ground so they converge, facing the front idler, as shown in the figure on the right.

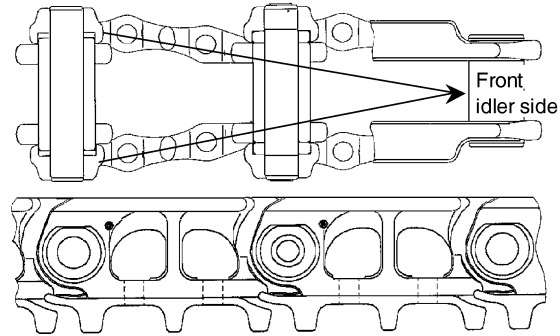


Fig. 2-4 Installing direction of crawler

(2) Installing crawler

1) Preparation for installation

Treat paint flaking protection with care not to damage lower flame.

2) Winding crawler

Insert a crowbar into the master pin hole, lift the lower frame 1 to 2cm above the ground level by holding it by hand so the machine body weight is not exerted on the shoe. Retract the sprocket to help push the back winding of the crawler.

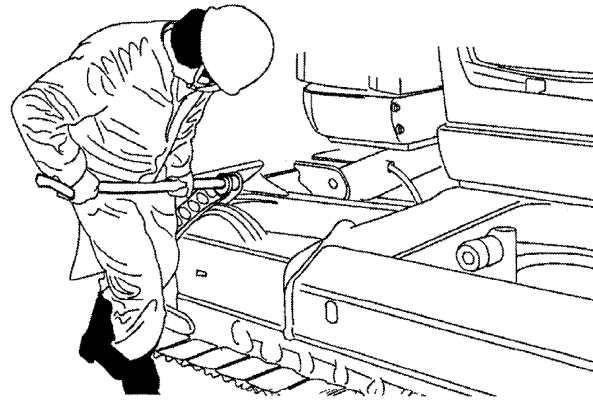


Fig. 2-5 Winding crawler

(3) Preparation for press fitting master pin

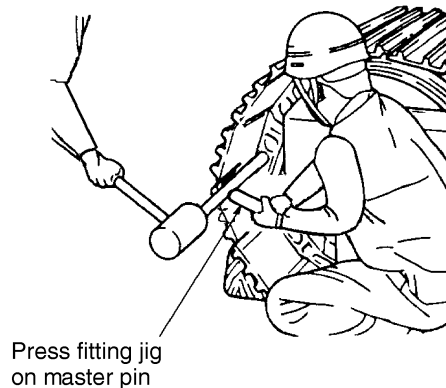
1) Preparing for installation

Put square wood under the shoe plate.

2) Aligning master pin holes

Aligning master pin holes through fine adjustment turning sprocket.

- ⚠
 - When using a big hammer, exercise care so you are not injured by flying objects the same way as when pushing out the master pin.
 - Coat the master pin with molybdenum disulfide grease, before pressing it in.



Press fitting jig on master pin

(4) Press fitting of master pin

Apply press fitting jig on master pin, and strike it with a mallet to press fit.

Fig. 2-6 Press fitting of master pin

4.4 CONSTRUCTION

LOWER ROLLER		YN64D00013F1	
No.	NAME	Q' T	REMARKS
		Y	
1	ROLLER	1	
2	COLLAR	2	
3	SHAFT	1	
4	BUSHING	2	
5	PIN	2	
6	FLOATING SEAL	2	
7	O RING	2	1A,G60
8	PLUG	2	PT1/4

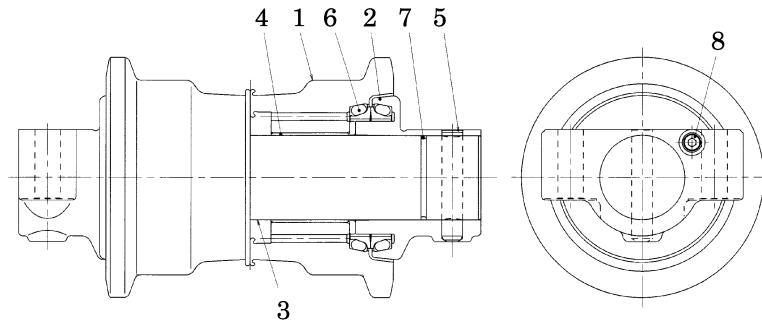



Fig. 4-5 Construction of lower roller

4.5 DISASSEMBLY AND ASSEMBLY

(1) Disassembly

1) Drain oil

Remove plug (8) and drain out oil.

 : 6mm

2) Removing pin (5)

Put both ends of lower roller assy on the V-shaped blocks (K), apply push-out bar (ℓ) on upper end face of pin (5), and push pin (5) out striking with mallet.

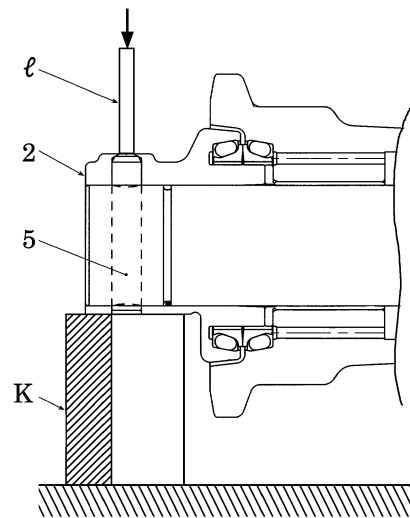


Fig. 4-6 Pushing out collar fixing pin (5)

3) Removing collar (2), O ring (7)

Put lower roller on jig (m) for repair stand so that the shaft (3) is perpendicularly located, apply push-out jig (P) on shaft end on upper side, and push shaft (3) until the O ring (7) separate from collar (2) with press or mallet, and take out collar (2) and O ring (7).

4) Removing shaft (3)

In addition, push out and remove shaft (3) together with the lower collar (2) and O ring (7).



The shaft (3) extrusion operation may cause the remaining lube oil to flow out. Prepare an oil container beforehand.

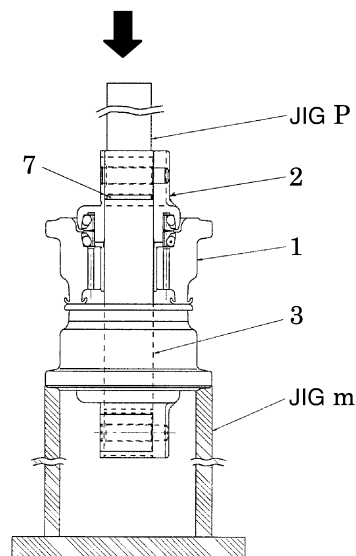




Fig. 4-7 Removing shaft (3), collar (2), O ring (7)

5.3.4 TOOLS AND JIGS

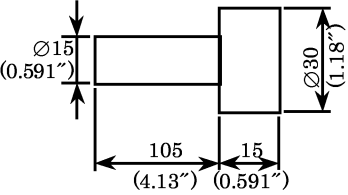
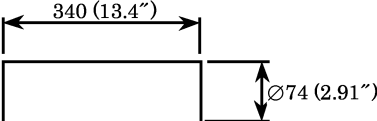
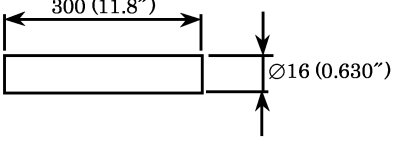
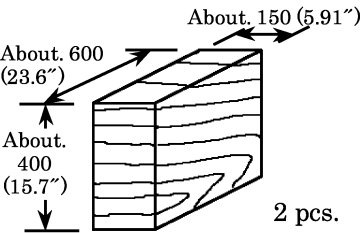
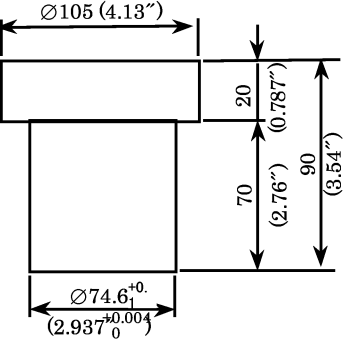
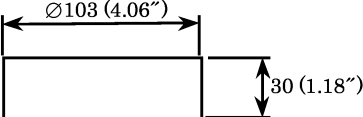
(1) Tightening tools

Unit : mm(in)

NAME	OPPOSING FLATS
 Socket	24
 Allen wrench	5

(2) Jigs

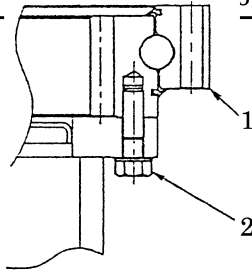
Unit : mm(in)

No.	NAME	SHAPE
R	Pin striking jig	
S	Shaft push out jig	
T	Bushing drawing rod	
U	Stand	
V	Bushing Press fitting jig	
W	Collar Press fitting jig	

8. SWING BEARING

8.1 SWING BEARING ASSY

SWING BEARING ASSY		YN40F00012F1	
No.	NAME	Q' T Y	REMARKS
1	SWING BEARING	1	YN40F00004F1
2	CAPSCREW	36	M20 × P1.5 × 65



SECTION A-A

2 Lockite #262 or equivalent to be applied
T=57.4kgf·m (420ft·lbs)

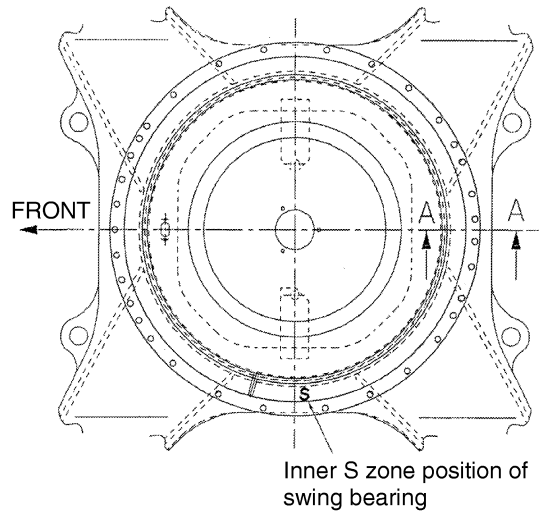


Fig. 8-1 Swing bearing assy


NOTE: Fill grease bath with 8.3kg (18.3 lbs) of grease NLGI-2 (containing molybdenum disulfide) or equivalent.

8.2 REMOVING

(1) Matchmarks

Remove upper structure, apply matchmarks on inner race of swing bearing and lower frame.

(2) Remove thirty six capscrews (2) M20 × 65 for installation inner race.

 : 30mm

(3) Drawing out grease

Remove grease in grease bath.

(4) Removing swing bearing

Attach eyebolt on swing bearing and sling it.

Weight of swing bearing : 232kg (511 lbs)

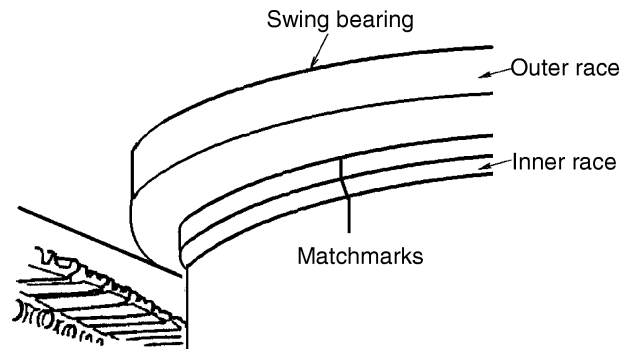


Fig. 8-2 Matchmarks

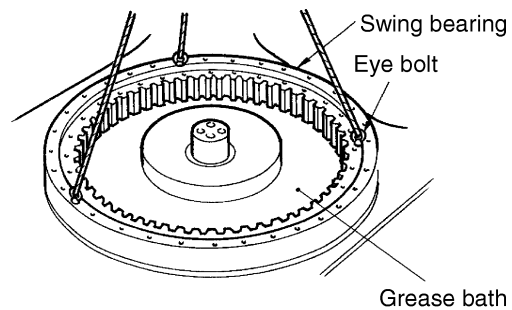


Fig. 8-3 Removing and installing swing

17) Determining the shim thickness for taper roller bearing

⚠ This operation is necessary when any of casing (1), rear cover (2), shaft (9) and bearings (29), (30) has been replaced.

1. Measure the dimension E in the assembled condition in Fig.1-8.

⚠ Make sure that shaft (9) is perpendicularly positioned. (Not tilted).

2. Measure the dimension F on the rear cover side.

⚠ Measure four diagonal points on the circumference and make a mean value.

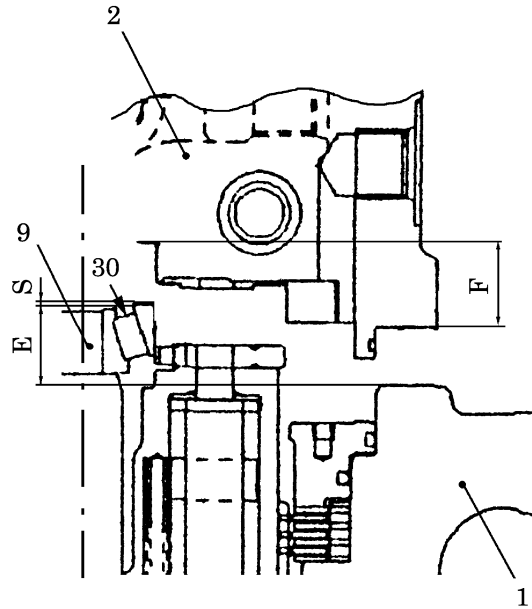


Fig.1-8 Determining the shim thickness

3. Suppose the thickness of shim (32) to be used is "S", the clearance "Y" is as below:
 $Y = F - (E + S)$

4. Choose one or two shims that make the clearance "Y" 0~0.1mm (0~0.004").

3) Disassembling the overload valve

|| Remove the overload valve as an assembly, utilizing the opposing faces of the hexagon of socket (44-1).

¶ In principle, the overload valve is handled as an assembly, but in case it must be disassembled for unavoidable reason, remove plug (44-5) from socket (44-1) and pull out the internal parts.

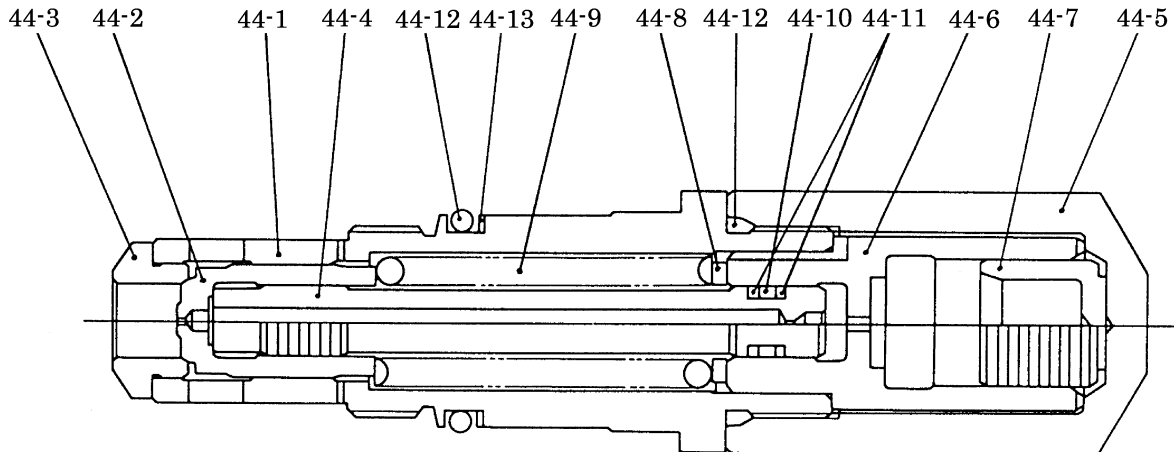
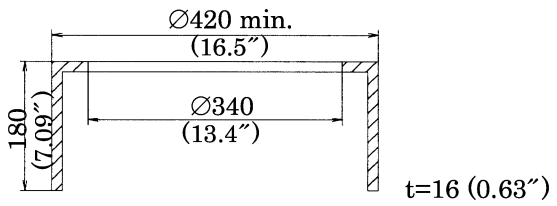


Fig.1-9 Disassembling the overload relief

1.7 REDUCTION UNIT DISASSEMBLY

1.7.1 TOOLS

Before removal and installation, prepare tools, jigs and measuring instruments.

No.	Tools	Application
1	Torque wrench	0~50kgf·m (360ft·lbs)
2	Allen wrench	Opposing flats 8mm (0.315in), 14mm(0.551in)
3	Stand	
4	Micro depth meter	0~15mm (0~0.591in)
5	Caliper	0~150mm (0~5.91in)
6	Eye bolt	M10, M18 3pcs. each
7	Pin	Spring pin $\varnothing 3.5 \times 75$ (0.138" \times 2.95"), $\varnothing 5 \times 55$ (0.197" \times 2.17")
8	Press machine	It is used to insert the angular bearing and fix the lock washer. Capacity 3 tons (6610 lbs)
9	Others	Cleaning oil, Detergent, Gear oil, Grease, Locktite#242, #515, Seal tape, rag and others

1.7.2 DISASSEMBLY

(1) Preparation before removal

- 1) The travel unit removed from the machine has dust and mud. Wash them with cleaning oil.
- 2) Loosen drain or oil filling plug (26) and drain the oil out of the reduction unit.



When oil is hot, pressure is built up inside. Take care as the oil gushes out in some cases.

3) Leaving matching marks

Put a matching mark on the outside of each matching surface so it may be installed where it was.

- The numbers in the parentheses after part names correspond to those in the assembly drawing on page II-2.

NOTES

1.2 HYDRAULIC PRESSURE MEASUREMENT BY SERVICE DIAGNOSIS

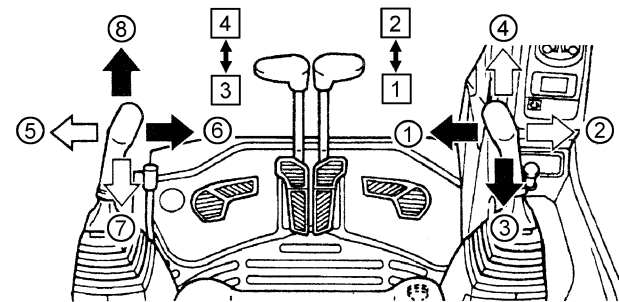
(1) Main circuit pressure.

E/G Hi, Full lever, at relief	E/G Hi, No load, at neutral
No.14 PRESS. SENSOR C□1 PUMP P1 <u>3.3V□350k</u>	Main pump P1,P2 <u>0.7V□20k</u>
C□1 PUMP P2 <u>3.3V□350k</u>	<u>0.7V□20k</u>
No.15 PRESS. SENSOR B□16 P1 OPT. <u>4.5V□30k</u>	OPT <u>0.5V□0k</u>
B□17 P2 OPT. <u>4.5V□30k</u>	<u>0.5V□0k</u>
No.16 PRESS. SENSOR B□16 P1 NEGA-CON <u>0.5V□0k</u>	Negative control P1,P2 <u>3.0V□31k</u>
B□17 P2 NEGA-CON <u>0.5V□0k</u>	<u>3.0V□31k</u>
No.19 PRESS. SENSOR B□15 BACK PRESS.	Back pressure (Nega-con pressure) <u>0.9V□3k</u>

(2) Secondary pilot pressure

(Att. operation No. Travel operation 1 4)

E/G Hi, Full lever, at relief	E/G Hi, No load, at neutral
No.9 PRESS. SENSOR B□1 BOOM RAISE <u>4.5V□30k</u>	3 4 <u>0.5V□0k</u>
B□2 BOOM LOWER <u>4.5V□30k</u>	<u>0.5V□0k</u>
No.10 PRESS. SENSOR B□3 ARM OUT <u>4.5V□30k</u>	7 8 <u>0.5V□0k</u>
B□4 ARM IN <u>4.5V□30k</u>	<u>0.5V□0k</u>
No.11 PRESS. SENSOR B□5 BUCKET DIG <u>4.5V□30k</u>	1 2 <u>0.5V□0k</u>
B□6 BUCKET DUMP <u>4.5V□30k</u>	<u>0.5V□0k</u>
No.12 PRESS. SENSOR B□7 SWING (R) <u>4.5V□30k</u>	6 5 <u>0.5V□0k</u>
B□8 SWING (L) <u>4.5V□30k</u>	<u>0.5V□0k</u>
No.13 PRESS. SENSOR B□9 TRAVEL (R) <u>4.5V□30k</u>	1,2 3,4 <u>0.5V□0k</u>
B□10 TRAVEL (L) <u>4.5V□30k</u>	<u>0.5V□0k</u>



LH. control lever		RH. control lever	
Swing left		Bucket digging	
Swing right		Bucket dump	
Arm in		Boom raise	
Arm out		Boom lower	

LH. travel lever		RH. travel lever	
3 Travel left reverse	1	Travel right reverse	
4 Travel left forward	2	Travel right forward	

(3) Solenoid primary pressure

Operation is not working	In operation
No.5 SOL. VALVE F□2 SWING-BRAKE COMP. <u>ON</u> MEAS. <u>ON</u> RELEASE SW <u>OFF</u>	Swing P/B Swing & arm digging } OFF indication } OFF indication } ON/OFF indication
No.6 SOL. VALVE F□3 1/2-TRAVEL COMP. <u>OFF</u> MEAS. <u>OFF</u> SWITCH <u>OFF</u>	Travel 2-speed select ON indication } ON indication } ON/OFF indication
No.7 SOL. VALVE F□1 POWER UP COMP. <u>OFF</u> MEAS. <u>OFF</u> SWITCH <u>OFF</u>	Boost pressure select ON indication } ON indication } ON/OFF indication

(4) Solenoid proportional valve secondary pressure

E/G Hi, Full lever □ operation	E/G Hi, No load, at neutral
No.20 PROPO-VALVE D□1 P1 BYPASS COMP. <u>647mA□25k</u> MEAS. <u>642mA□25k</u>	P1 bypass cut <u>350mA□6k</u> <u>345mA□6k</u>
No.21 PROPO-VALVE D□2 P2 BYPASS COMP. <u>647mA□25k</u> MEAS. <u>642mA□25k</u>	P2 bypass cut <u>350mA□6k</u> <u>345mA□6k</u>
No.22 PROPO-VALVE D□3 TRAVEL STRAIGHT COMP. <u>647mA□25k</u> MEAS. <u>642mA□25k</u>	Travel straight <u>350mA□6k</u> <u>345mA□6k</u>
No.23 PROPO-VALVE D□6 A-RECIRCULAT COMP. <u>409mA□10k</u> MEAS. <u>404mA□10k</u>	Arm variable recirculation <u>647mA□25k</u> <u>642mA□25k</u>
No.24 PROPO-VALVE E□1 P1 PUMP COMP. <u>400mA□9k</u> MEAS. <u>395mA□9k</u> POWER SHIFT <u>0mA</u>	P1 pump <u>750mA□30k</u> <u>745mA□30k</u>
No.25 PROPO-VALVE E□2 P2 PUMP COMP. <u>400mA□9k</u> MEAS. <u>395mA□9k</u> POWER SHIFT <u>0mA</u>	P2 pump <u>750mA□30k</u> <u>745mA□30k</u>

NOTE □ OPERATION

No.20 □ ARM OUT or ARM IN RELIEF OPERATION

No.21 □ BOOM RAISE RELIEF OPERATION

No.22 □ ARM IN RELIEF OPERATION

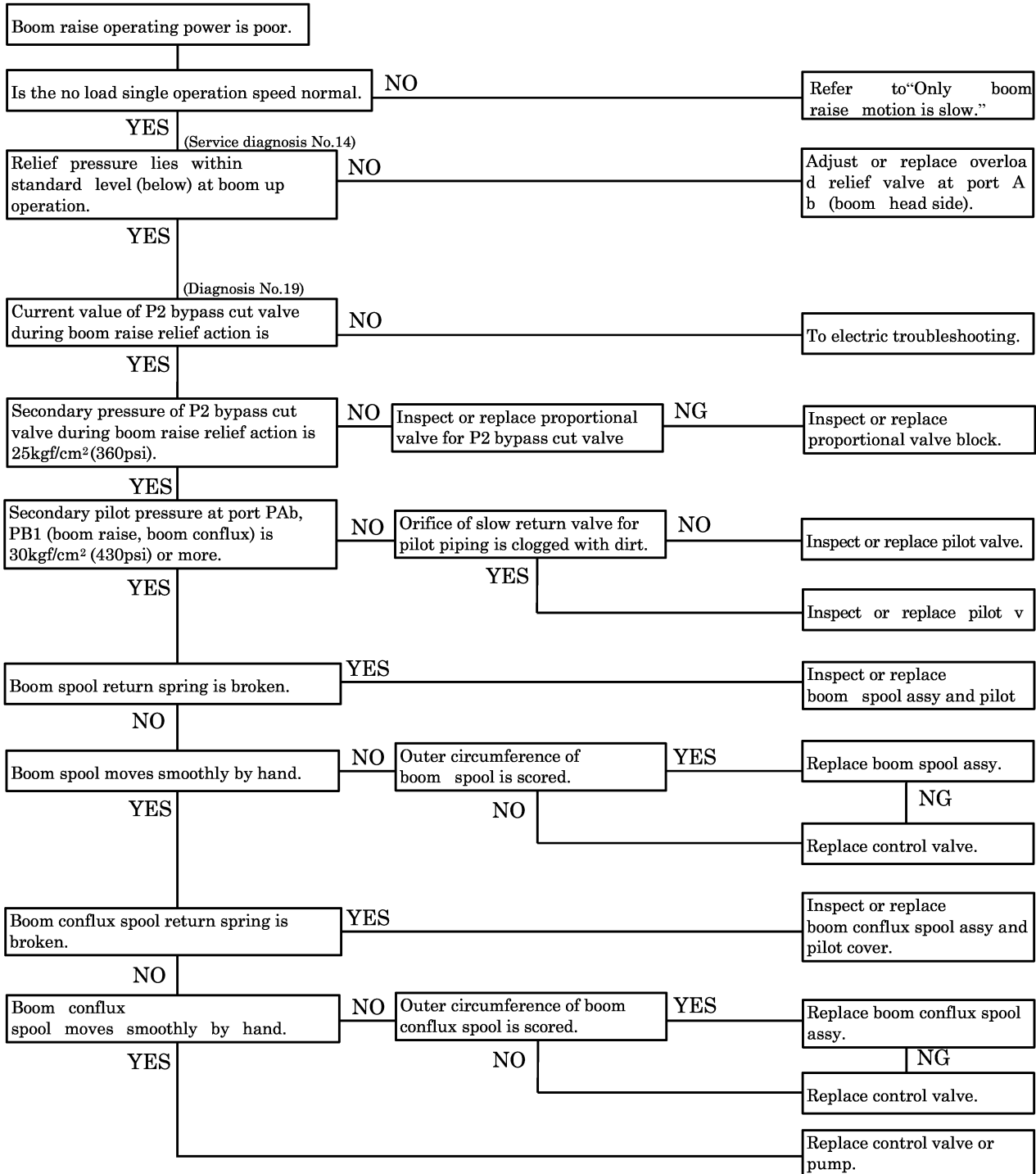
No.23 □ ARM IN OPERATION LEVER TURNED TO FULL

(At 200mA ARM IN RELIEF)

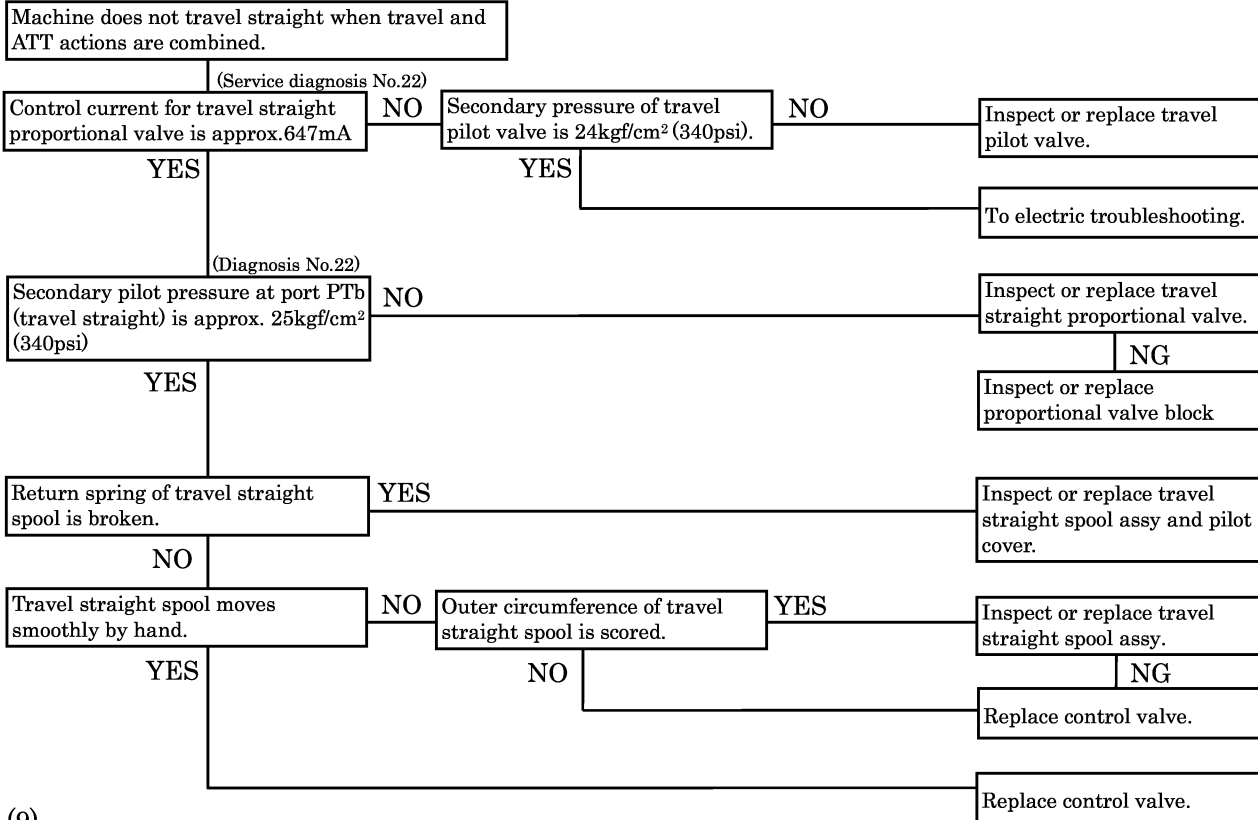
No.24 □ DURING BUCKET DIGGING OPERATION

No.25 □ DURING ARM IN OPERATION

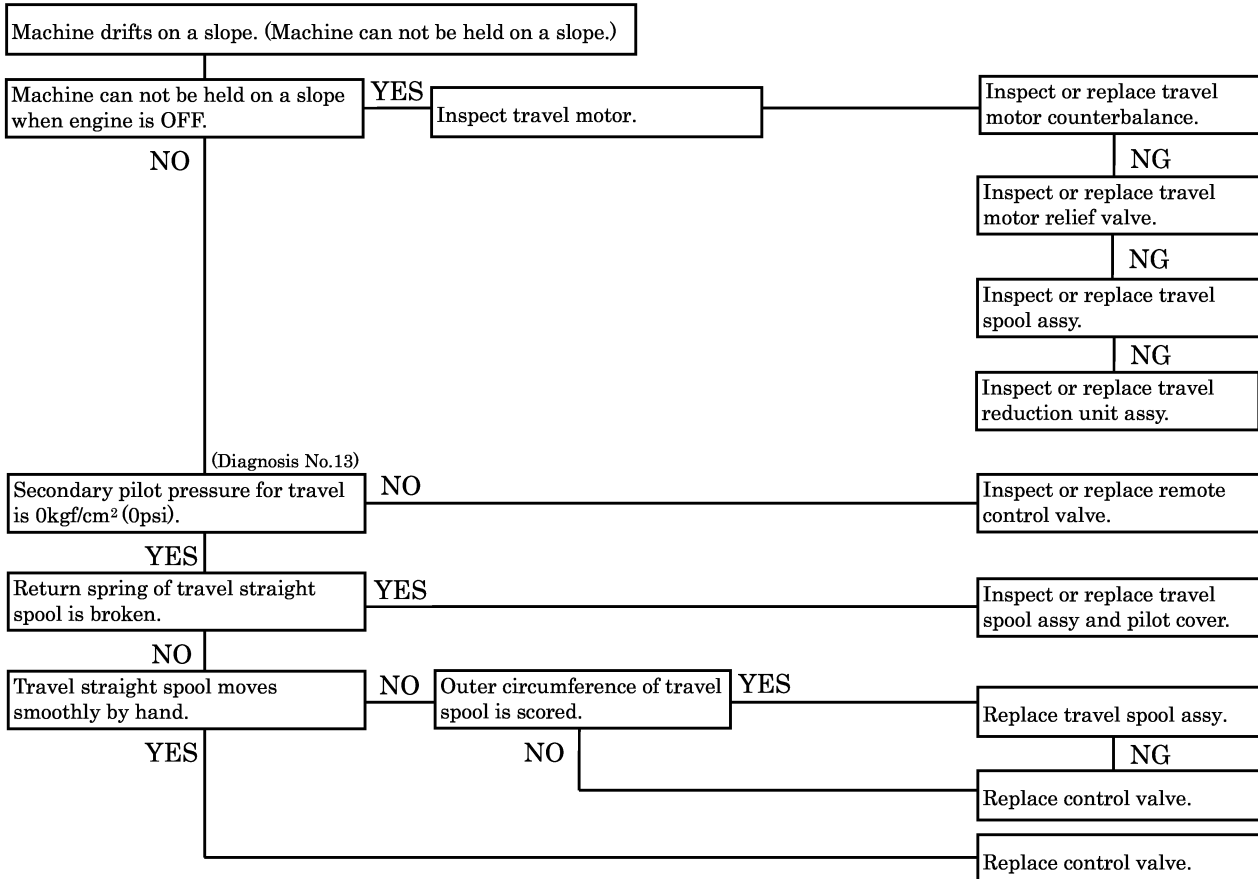
(3)-3



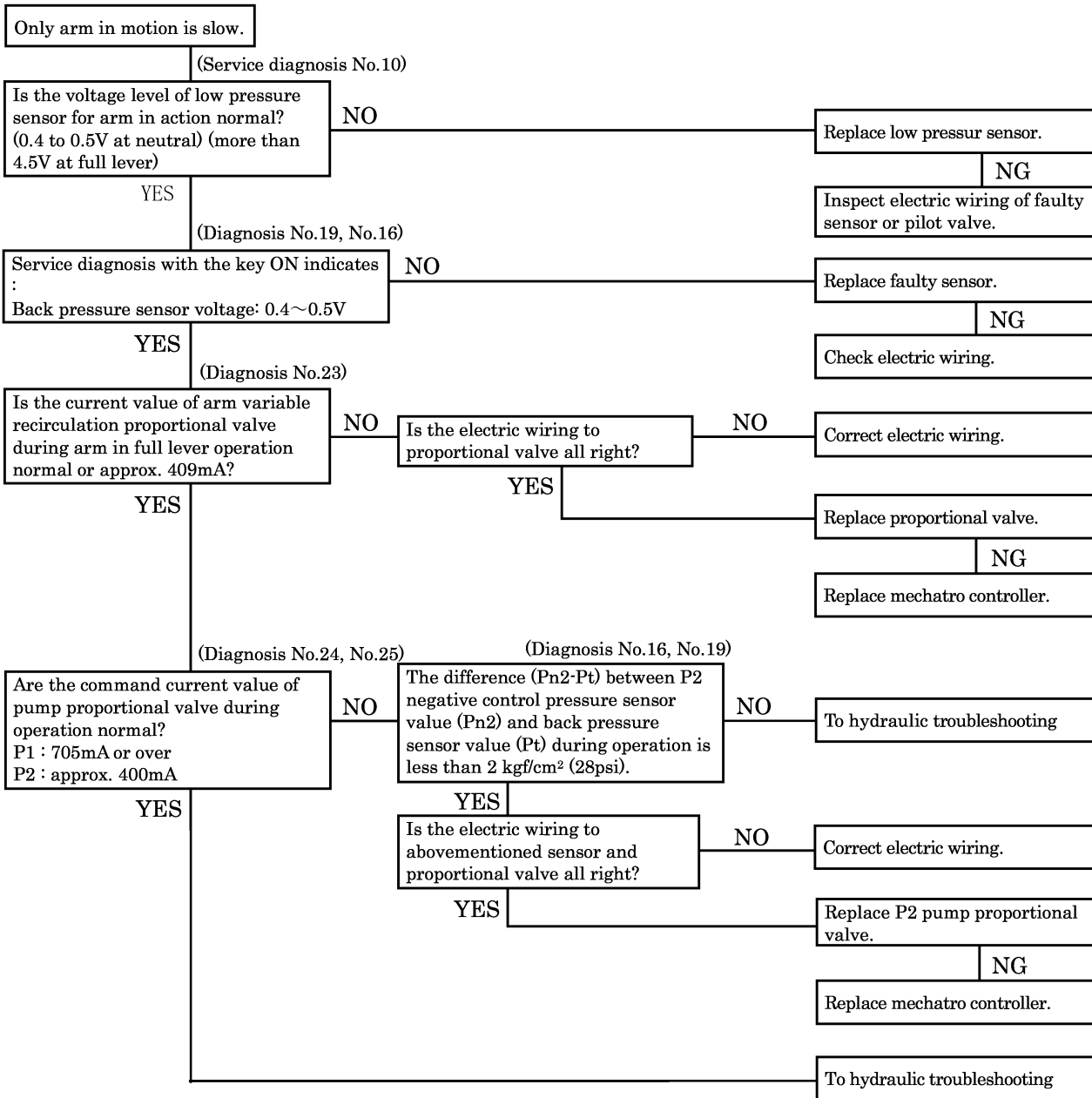
(8)-2



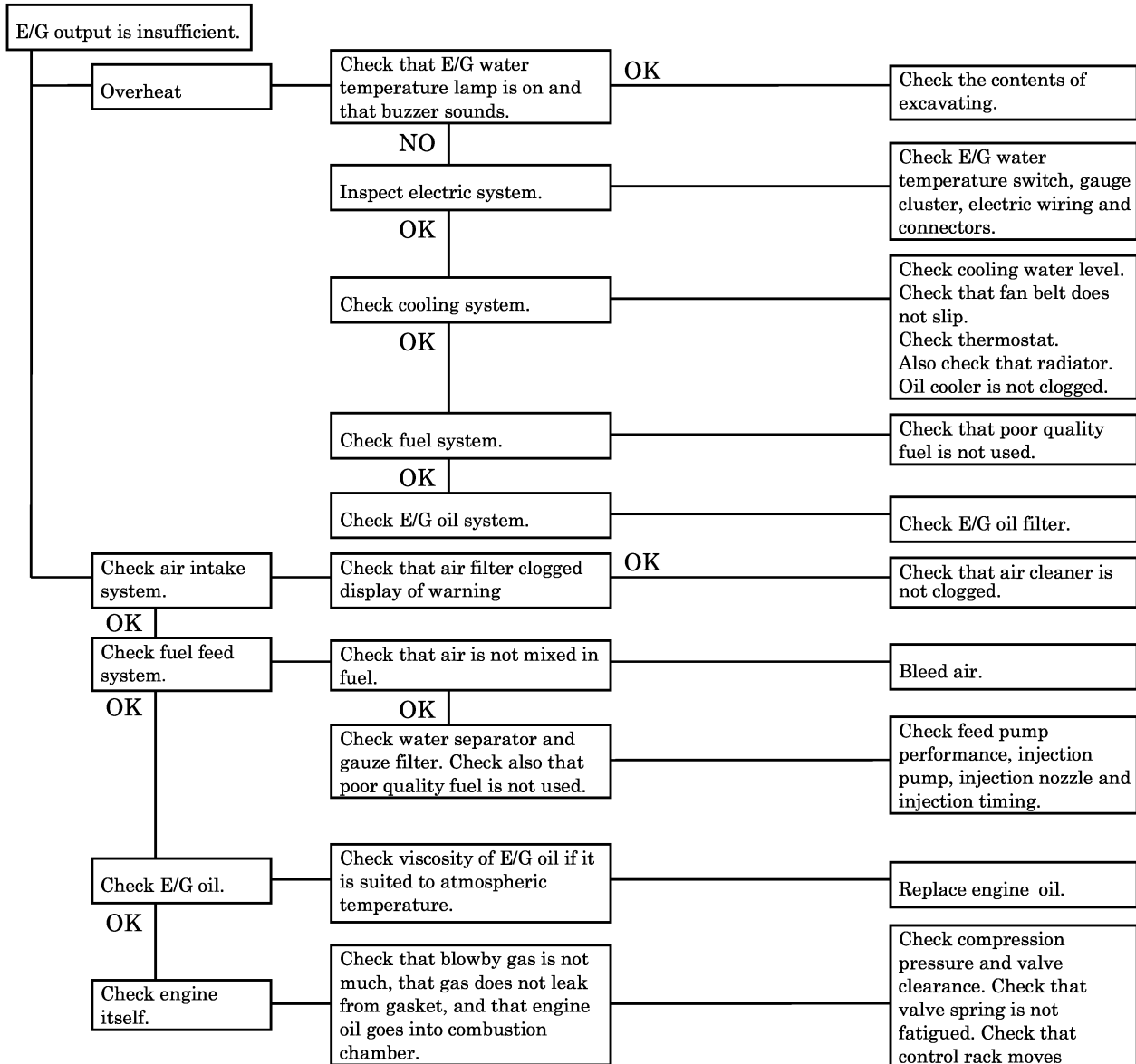
(9)



(2)-5

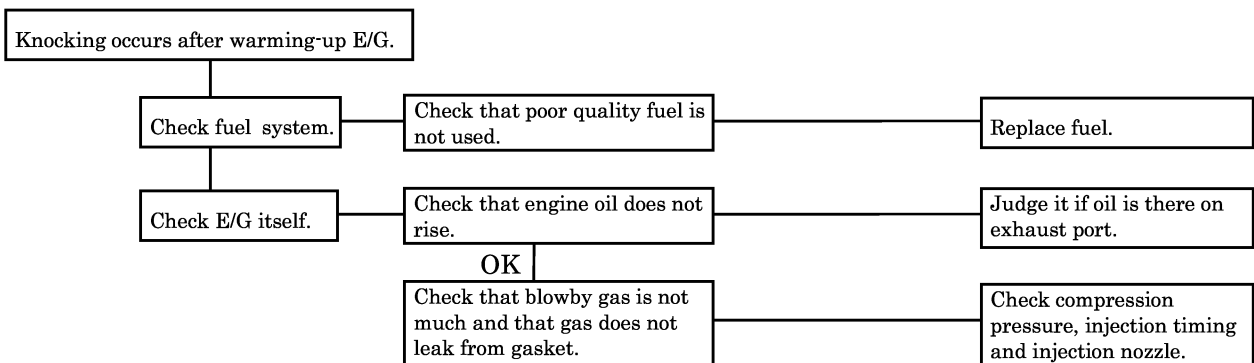


(6)



Checking condition ; High idling

(7)



Checking condition ; E/G water temperature is more than $50 \pm 5^{\circ}\text{C}$ ($122 \pm 12^{\circ}\text{F}$).

HOW TO READ THIS MANUAL

1. Illustration for disassembly and assembly or removal and installation

This shows that the appropriate service procedure is described in the text.

This shows the key No. of the part. In the text, this No. is referred to uniformly throughout.

This shows an example of the disassembly (removal) sequence.

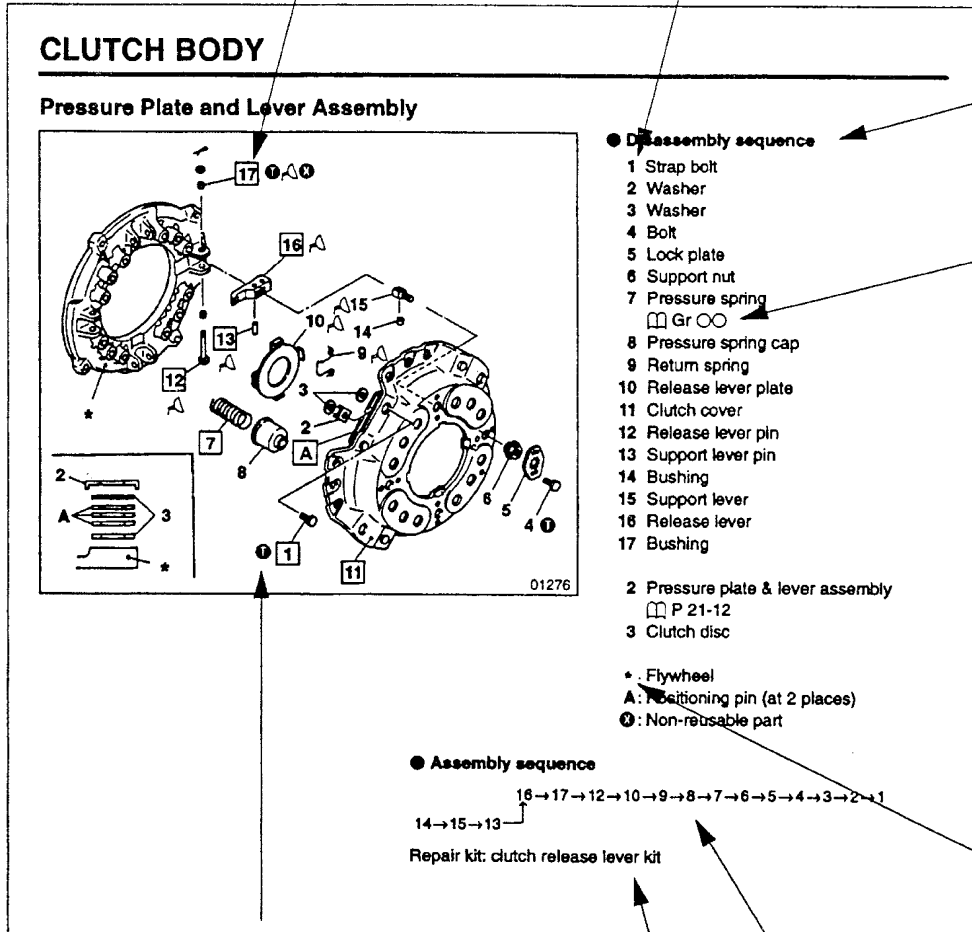
This shows that the service procedure is described in another section.

P00-00
 : shows reference page within the same group.
 Gr00
 : shows reference group within the same book.

No service procedure is referred to in this section, but the item can be an objective of various procedures.

This is shown when the assembly (installation) sequence is not the reverse of the disassembly (removal) sequence.

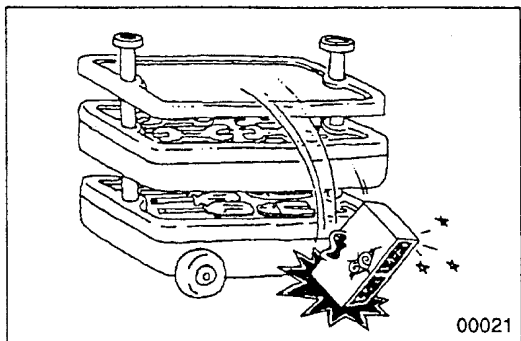
This shows that a repair kit is available.



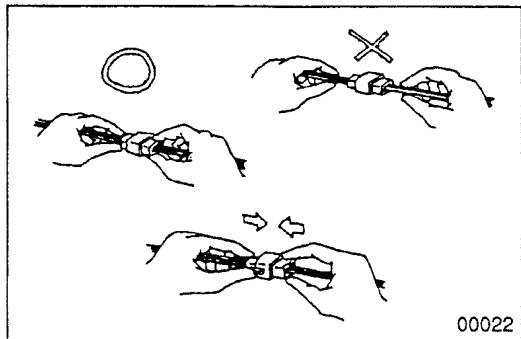
Meaning of symbols

- ⊗ : shows that the tightening torque is specified.
- △ : shows that application of lubricant, fluid or sealant is required.
- ⊗ : shows that the part should not be reused.

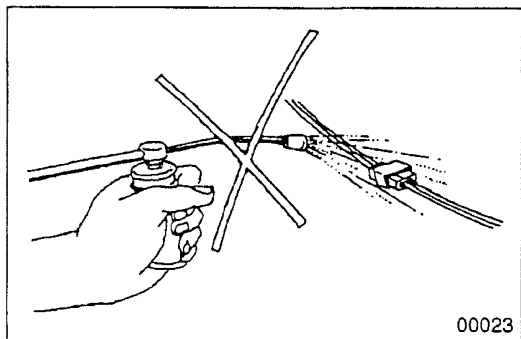
PRECAUTIONS FOR MAINTENANCE OPERATION



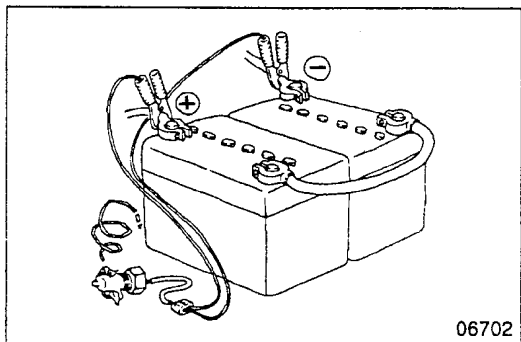
- Take care when handling sensors, relays, etc. which are vulnerable to shock and heat.



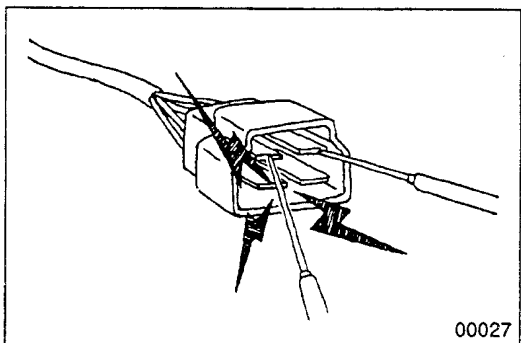
- Pull the connector, and not the harness lead, to separate connectors. To separate a lock-type connector, first push toward arrow mark. To re-connect a lock-type connector, press the separated parts until they click together.



- When washing the vehicle, cover the electric system parts and instruments with waterproof material beforehand (Cover with vinyl sheet or the like). Keep water away from harness wire connectors and sensors. If any of them should get wet, wipe them off immediately.



- To apply voltage for testing, check that the positive and negative cables are connected properly, then increase voltage gradually from 0 volt. Do not apply voltage higher than the specified value. In particular, pay close attention to the electronic control unit and sensors, since they are not always supplied with 24V.



- When using testers or the like for continuity tests, be careful not to allow test probes to touch the wrong terminals.

ON-VEHICLE INSPECTION AND ADJUSTMENT

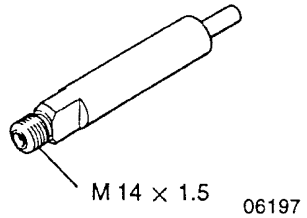
Measuring Compression Pressure

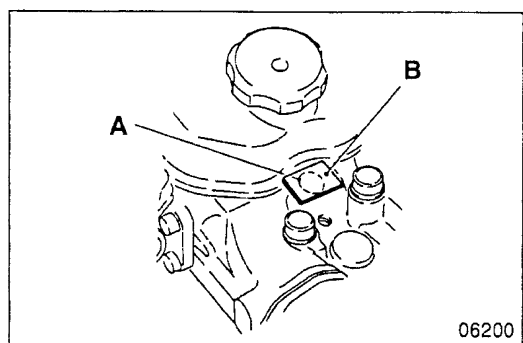
Service standards

Location	Maintenance item	Standard value	Limit	Remedy	
—	Compression pressure	Each cylinder (at 200 rpm)	2550 kPa {26 kgf/cm ² }	1690 kPa {20 kgf/cm ² }	Inspect
		Cylinder-to-cylinder pressure difference	—	390 kPa {4 kgf/cm ² }	Inspect

Special tools

Unit: mm

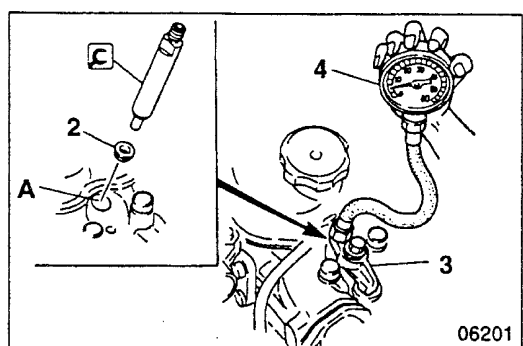
Location	Tool name and shape	Part No.	Application
—	 <p>Compression Gauge Adapter</p> <p>M 14 x 1.5 06197</p>	MH061460	Measuring compression pressure




- Remove the injection nozzle.
Gr 13
- Cover the injection nozzle mounting hole **A** with a cloth **B**. Then, turn the engine over with the starter and check that no foreign matter adheres to the cloth.

WARNING

If any cylinder is cracked, coolant, engine oil, and fuel will enter the cylinder through the crack. When the engine is turned over, these substances will spray out of the nozzle mounting hole **A** at a high temperature. For safety, move away from the nozzle mounting hole before turning over the engine.



- Fit the  Compression Gauge Adapter onto the injection nozzle mounting hole **A** together with a gasket **2**. Lock these items in position with the nozzle bridge **3**, then connect the compression gauge **4**.
- Turn the engine over and measure the compression pressure.
- Measure the compression pressure in every cylinder and determine the pressure differences between cylinders.

Limit: 4 kg/cm² maximum

- If any compression pressure or cylinder-to-cylinder pressure difference exceeds the specified limit, pour a little engine oil into the cylinder via the injection nozzle mounting hole then take the measurement again.
 - If the compression pressure increases, there may be wear or damage on piston rings and inner surfaces of cylinders.
 - If the compression pressure does not increase, valves may be seized or incorrectly seated, or the cylinder head gasket may be defective.

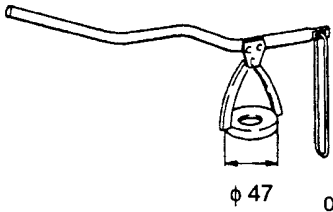
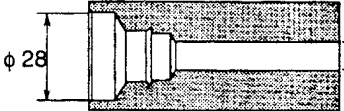
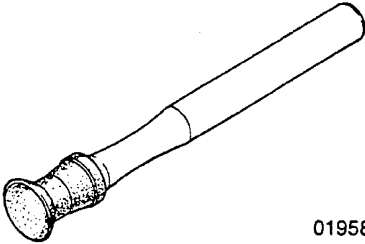
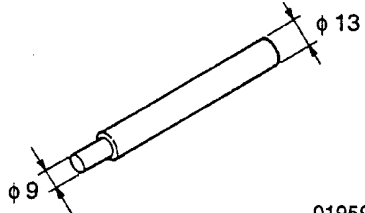
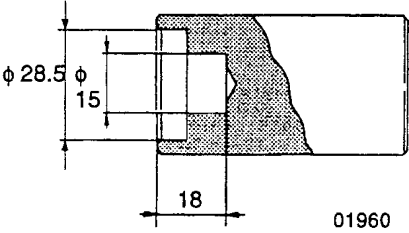
CYLINDER HEAD AND VALVE MECHANISM

Lubricants

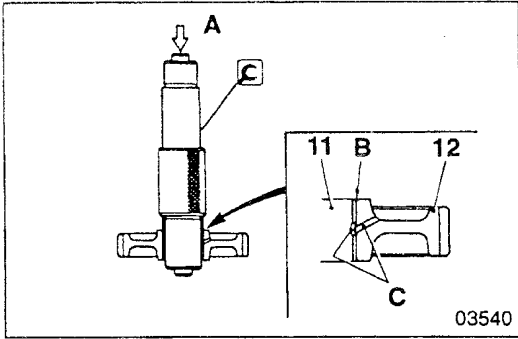
Location	Points of application	Type	Quantity
1	Rocker contact surface on valve cap top	Engine oil	As required
6	Lip of valve stem seal	Engine oil	As required
7, 8	Valve stem	Engine oil	As required

Special tools

Unit: mm

Location	Tool name and shape	Part No.	Application
2	Valve Lifter  $\phi 47$ 03265	30091-08500	Removing and installing valve cotters
6	Valve Stem Seal Installer  $\phi 28$ $\phi 9$ 01957	MH061293	Installing valve stem seals
7, 8	Valve Lapper  01958	30091-07500	Lapping valves and valve seats
17, 18	Valve Guide Remover  $\phi 13$ $\phi 9$ 01959	MH061066	Removing valve guides
	Valve Guide Installer  $\phi 28.5$ $\phi 15$ 18 01960	MH061998	Installing inlet and exhaust valve guides

TIMING GEARS

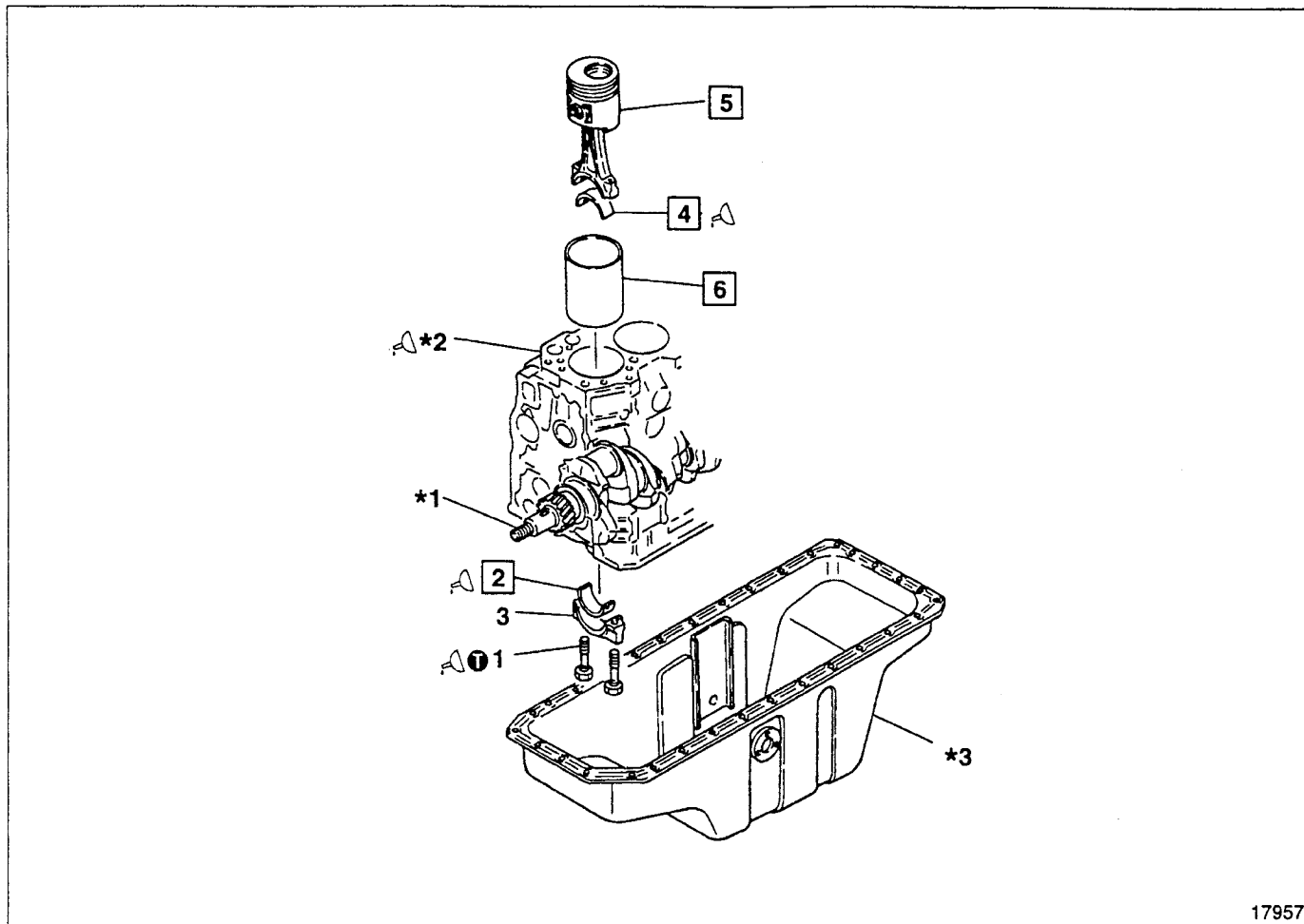


[Installation]

- Press the idler gear bushing **11** into the idler gear **12** from the side of the gear whose internal diameter is chamfered **B**. Make sure the oil holes **C** in the idler gear and bushing are aligned.
- After installation, ream the idler gear bushing **11** to achieve the specified clearance between the bushing and idler shaft **13**.

A: Press

PISTONS, CONNECTING RODS, AND CYLINDER LINERS



● Removal sequence

- 1 Bolt
- 2 Lower connecting rod bearing
- 3 Connecting rod cap
- 4 Upper connecting rod bearing

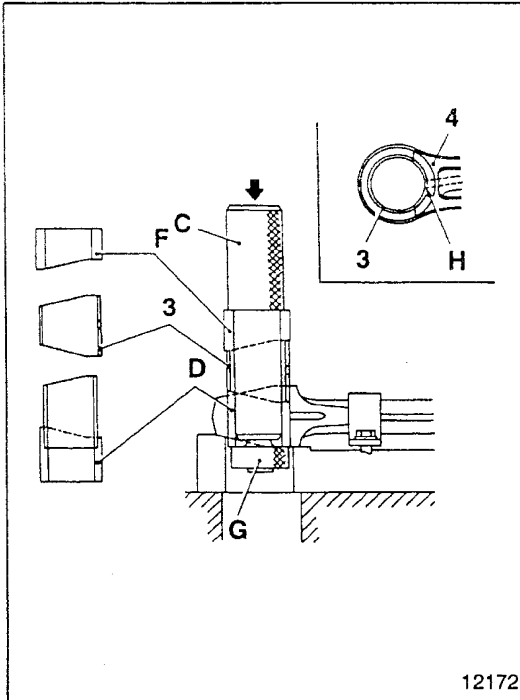
- 5 Piston and connecting rod assembly P.11-44
- 6 Cylinder liner

- *1: Crankshaft P.11-54
*2: Crankcase P.11-54
*3: Oil pan Gr 12

● Installation sequence

Reverse the order of removal.

PISTONS, CONNECTING RODS, AND CYLINDER LINERS



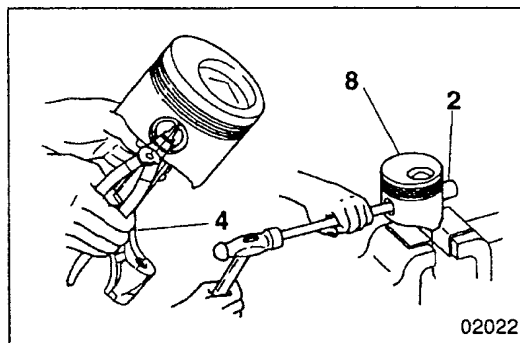
12172

[Installation]

- Apply engine oil to the small end of the connecting rod 4 and to the outer surface of the connecting rod bushing 3.
- Fit the collar F over the puller C, position the connecting rod bushing 3 and collar D as shown in the illustration, and lock this arrangement together with the nut G.
- Align the oil holes H in the small end of the connecting rod bushing 3 and connecting rod 4. Then, use a press to slowly apply pressure of approximately 49 kN (5,000 kgf) until the bushing is pressed into place.
- After press-fitting the connecting rod bushing 3, ream it to achieve the specified nominal clearance between the bushing and piston pin 2.

NOTE

After installing the connecting rod bushing 3, insert the piston pin 2 and check that it turns smoothly and without play.

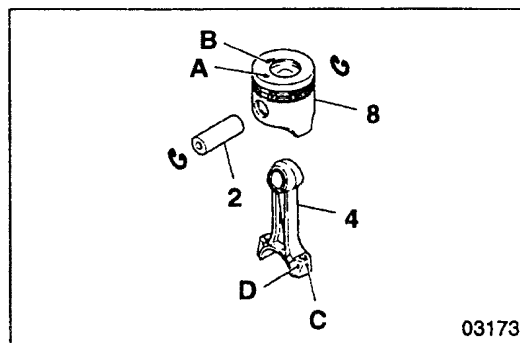


02022

2 4 8 Piston pin, connecting rod, and piston

[Removal]

- Tap out the piston pin 2 using a rod and hammer.
- If the piston pin 2 is difficult to remove, heat the piston 8 in hot water or using a piston heater.



03173

[Installation]

- Apply engine oil to the piston pin 2. With the connecting rod 4 and piston 8 aligned as illustrated, insert the piston pin to hold these components together.

A: Front mark (Δ)

B: Weight mark

C: Weight mark (A, B, C, D, E, F, G)

D: Alignment mark for connecting rod cap

- If the piston pin 2 is difficult to insert, heat the piston 8 in hot water or using a piston heater.

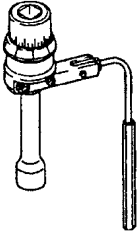
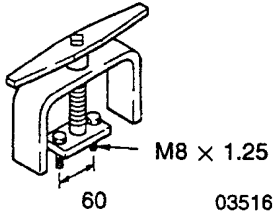
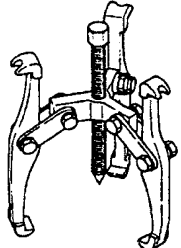
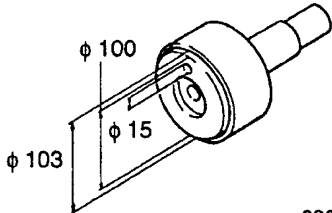
CAUTION ⚠

- No piston 8 should differ from any other piston by a weight of more than 10 g.
- The connecting rods 4 must all have the same weight mark C.
- After inserting the piston pin 2, check that it turns smoothly and without play.

CRANKSHAFT AND CRANKCASE

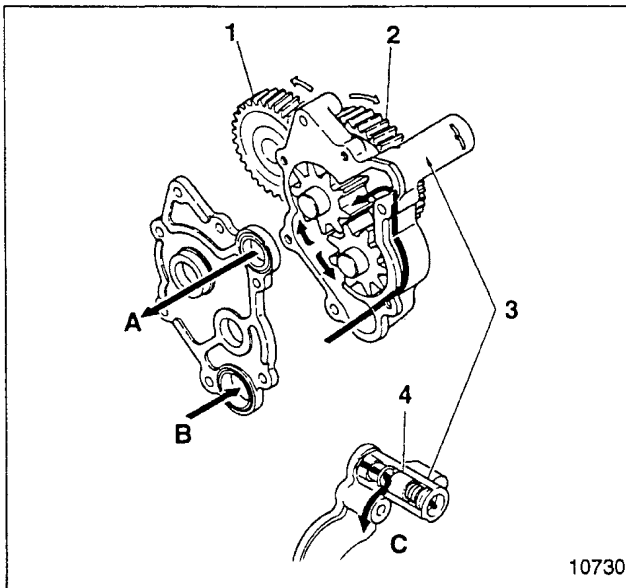
Special tools

Unit: mm

Location	Tool name and shape	Part No.	Application
3 to 9	Socket Wrench  01984	MH061560	Tightening connecting rod cap mounting bolts
9	Bearing Cap Extractor  03516	MH061083	Removing main bearing caps
14	Gear Puller  02065	MH061326	Removing crankshaft gear
16	Rear Oil Seal Slinger Installer  02051	MH062677	Installing rear oil seal slinger

STRUCTURE AND OPERATION

Oil Pump



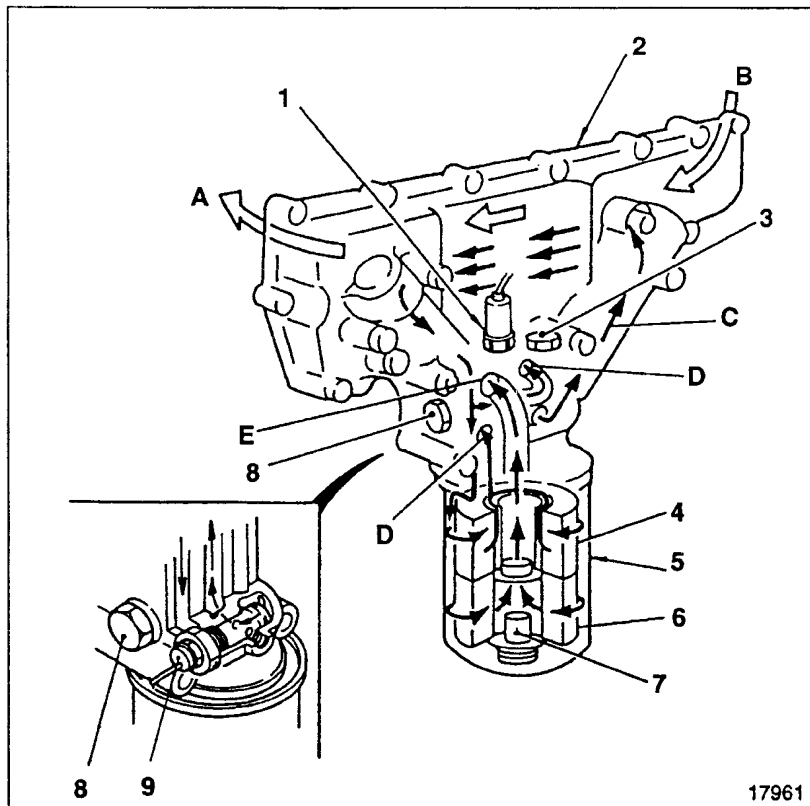
- 1 Crankshaft gear
- 2 Oil pump gear
- 3 Oil pump
- 4 Relief valve

- A: To oil cooler
- B: From oil strainer
- C: To oil pan

Oil pump 3 is a gear type. It is driven by rotation of the crankshaft via crankshaft gear 1 and oil pump gear 2.

Relief valve 4 is fitted to the oil pump. When the oil pump discharge pressure exceeds a specified level, the relief valve returns some of the engine oil to the oil pan, thus protecting the lubrication system from excessive oil pressure.

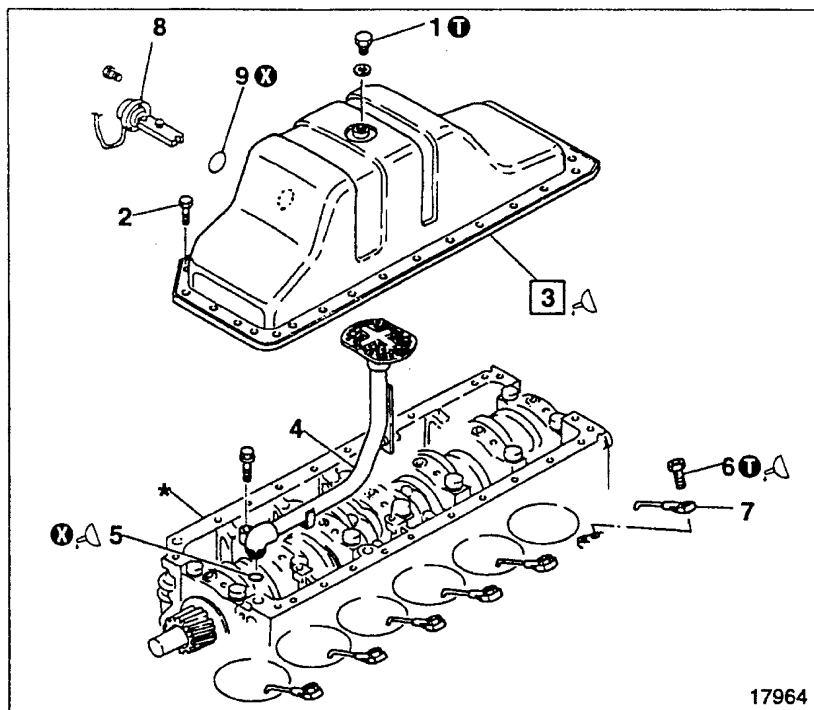
Oil Cooler and Oil Filter



- 1 Oil pressure switch
- 2 Oil cooler
- 3 Regulator valve
- 4 Bypass filter
- 5 Oil filter
- 6 Full-flow filter
- 7 Bypass valve
- 8 Bypass valve
- 9 Oil bypass alarm switch

- A: Coolant outlet
- B: Coolant inlet
- C: To oil cooler
- D: To oil pan
- E: To oil main gallery

OIL PAN, OIL STRAINER, AND OIL JET



● Disassembly sequence

- 1 Drain plug
- 2 Bolt
- 3 Oil pan
- 4 Oil strainer
- 5 O-ring
- 6 Check valve
- 7 Oil jet
- 8 Engine oil level sensor
- 9 O-ring

*: Crankcase Gr 11

⊗: Non-reusable part

● Assembly sequence

Reverse the order of disassembly.

ⓘ Tightening torques

Unit: N·m {kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Drain plug	69 {7}	—
6	Check valve	29 {3}	Wet

Lubricant and sealant

Location	Points of application	Type	Quantity
3	Crankcase mounting surface of oil pan	Threebond 1207	As required
5	Entire circumference of O-ring	Engine oil	As required
6	Check valve thread	Engine oil	As required

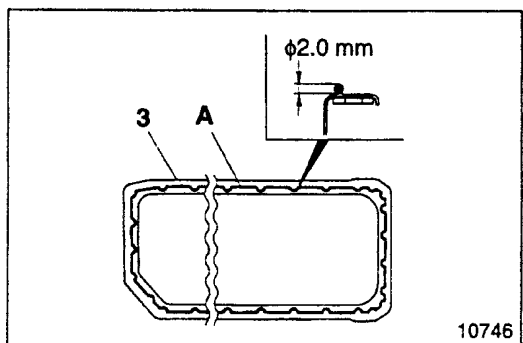
◆ Service procedure

5 Fitting oil pan

- Apply sealant **A** to the mounting surface of oil pan **3** as illustrated. Apply the sealant evenly and without breaks.
- Within three minutes of applying sealant **A**, fit oil pan **3** onto the crankcase*.

CAUTION

- Clean the oil pan mounting surface and ensure it is free of oily substances before applying sealant **A**.
- Carefully mount oil pan **3** exactly in the correct position. Ensure that sealant **A** does not spread to other areas.
- After fitting oil pan **3**, wait at least one hour before starting the engine.
- Apply a new bead of sealant **A** whenever the oil pan mounting bolts **2** have been loosened or removed.



SPECIFICATIONS

Injection Pump

Item	Engine model	6D34-T	
Manufacturer		Zexel	
Model		Bosch A	
Governor type		RSV-type all-speed mechanical governor	
Feed pump type		KS	
Automatic timer type		—	

Injection Nozzle

Item	Engine model	6D34-T	
Manufacturer		Zexel	
Model		Hole-type (1-spring)	
No. of holes		5	
Hole diameter (mm)		$\phi 0.31 \times 2$	$\phi 0.29 \times 3$

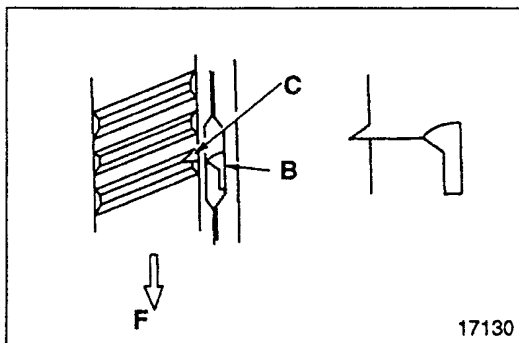
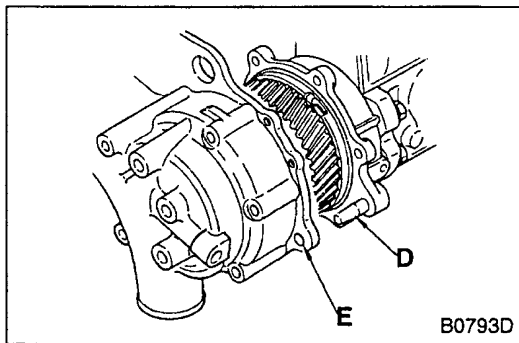
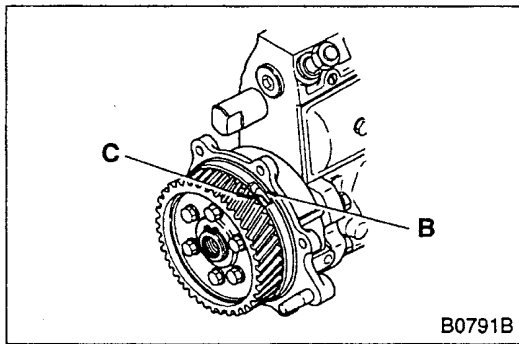
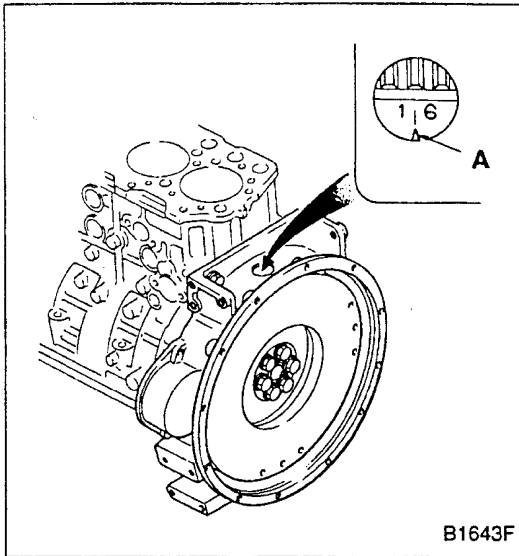
Fuel filter

Item	Specifications
Fuel filter type	Spin-on type (paper filter)

TROUBLESHOOTING

Possible causes	Symptoms											
	Engine will not start	Engine difficult to start	Engine knocks	Unstable engine output	Insufficient engine output	Engine maximum speed too high	Unstable engine idling	Engine stops soon after starting	Engine does not reach maximum speed	Engine will not stop	Accelerator pedal too stiff	Defective fuel supply
Worn/damaged piston ring groove(s)	Gr. 11	<input type="radio"/>					<input type="radio"/>					
Worn piston and cylinder liner	Gr. 11	<input type="radio"/>										
Cooling system malfunctioning	Gr. 14	<input type="radio"/>					<input type="radio"/>					
Defective starter switch	Gr. 54	<input type="radio"/>										
Defective glow relay	Gr. 54	<input type="radio"/>										

INJECTION PUMP



[Installation]

- Crank the engine until the "1-6" mark on the flywheel is aligned with the pointer **A** in the flywheel housing inspection window. With the engine in this condition, piston No. 1 is at the top-dead-center (TDC) position of its compression stroke.
- If the inlet and exhaust valves of cylinder No. 1 are not pushed up by their push rods with the engine in this condition, piston No. 1 is at the TDC position of its compression stroke. If the inlet and exhaust valves are pushed up, turn the crankshaft by 360°.

- Align the alignment mark **B** on the timer case with the notch **C** on the injection pump gear.

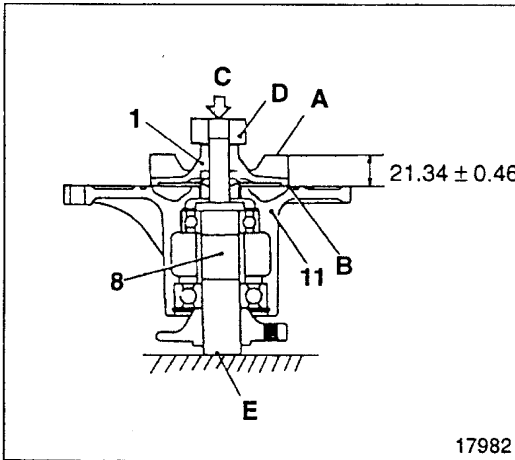
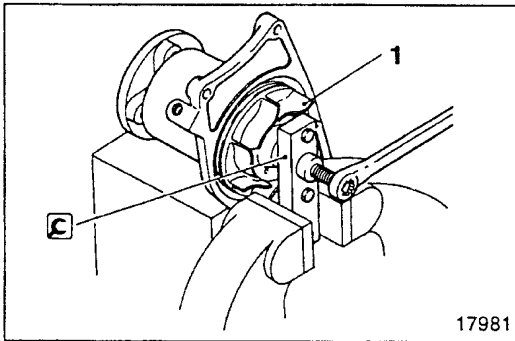
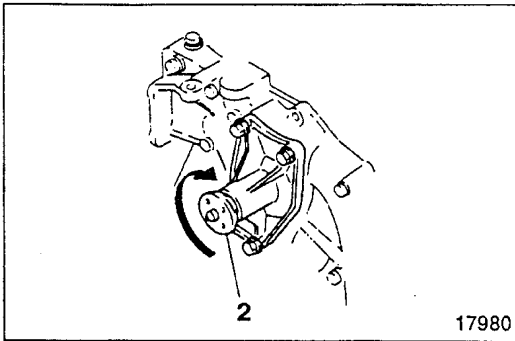
- Insert the timer case guide bar **D** into the front plate guide hole **E**. Using the bar as a guide, push the injection pump until the injection pump gear almost reaches the idler gear.

- Make sure the notch **C** on the injection pump gear is aligned with the alignment mark **B** on the timer case, then push the injection pump. As the gears mesh and the injection pump gear turns, the gear notch **C** will move in the "F" direction.

TROUBLESHOOTING

Possible causes		Symptoms				Remarks
		Overheating (insufficient cooling)	Overcooling	Abnormal noise	Excessive coolant loss	
V-belt	Loose or damaged	<input type="radio"/>		<input type="radio"/>		
	Excessive tension			<input type="radio"/>		
	Oil on belt	<input type="radio"/>				
Water pump	Water pump fitted poorly	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>	
	Unit bearing defective	<input type="radio"/>		<input type="radio"/>		
	Impeller defective	<input type="radio"/>		<input type="radio"/>		
	Unit seal defective	<input type="radio"/>			<input type="radio"/>	
	Loose fit between unit bearing and flange and/or shaft and impeller	<input type="radio"/>		<input type="radio"/>		
Thermostat	Case fitted poorly	<input type="radio"/>			<input type="radio"/>	
	Valve opening temperature too high; valve remains closed	<input type="radio"/>				
	Valve opening temperature too low; valve remains open		<input type="radio"/>			
Oil cooler	Oil cooler fitted poorly	<input type="radio"/>			<input type="radio"/>	Gr 12
	Gasket defective	<input type="radio"/>			<input type="radio"/>	
Cylinder head	Cylinder head fitted poorly	<input type="radio"/>			<input type="radio"/>	Gr 11
	Gasket defective	<input type="radio"/>			<input type="radio"/>	
Coolant quantity insufficient		<input type="radio"/>				
Coolant passages dirty and/or clogged		<input type="radio"/>				
Hoses fitted poorly		<input type="radio"/>			<input type="radio"/>	
Ambient temperature extremely low			<input type="radio"/>			

COOLING FAN, V-BELT, AND WATER PUMP




◆ Service procedure

● Inspection after assembly

- After assembly, rotate flange 2 by hand and check that it turns smoothly without hindrance.
- If the flange does not turn smoothly, disassemble and inspect the water pump again.

1 Impeller

[Removal]

- Tap threads (M8 × 1.25) into the two holes (φ6 mm) in the impeller 1.
- Fit the  Impeller Puller onto the impeller and use it to remove the impeller.

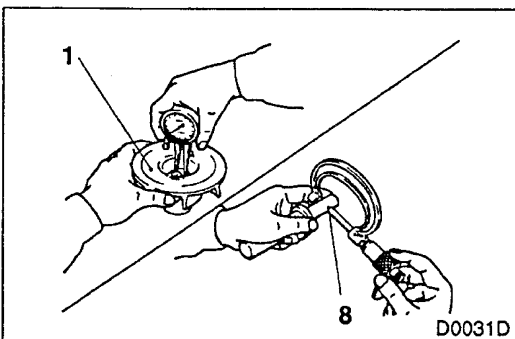
[Installation]

Press-fit the impeller until the outer edges of its blades are the specified distance (see the drawing) from the end surface B of the water pump case 11.

- C: Press (8825 N {900 kgf} or more)
- D: Cylindrical jig

CAUTION

Press-fit the impeller such that flange side E of water pump shaft 8 is the load receiving surface.



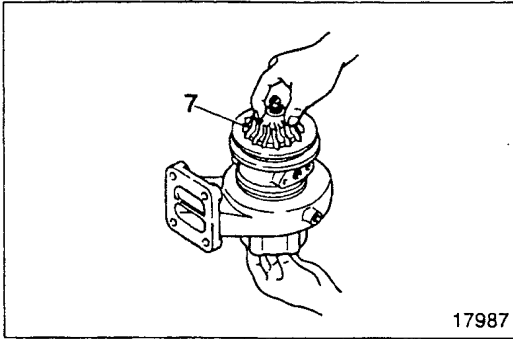
1 8 Impeller-to-water pump shaft interference

If the measurement does not conform with the standard value, replace the defective part(s).

CAUTION

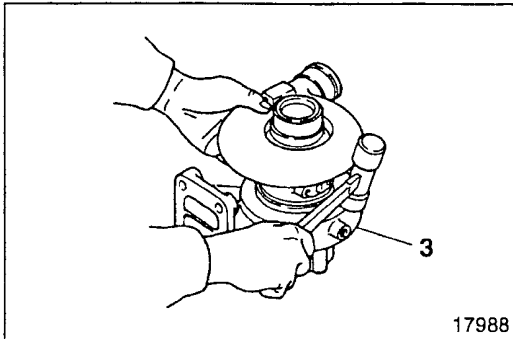
Even if the standard value is satisfied, reassembly must not be carried out more than twice.

TURBOCHARGER



● Inspection after reassembly

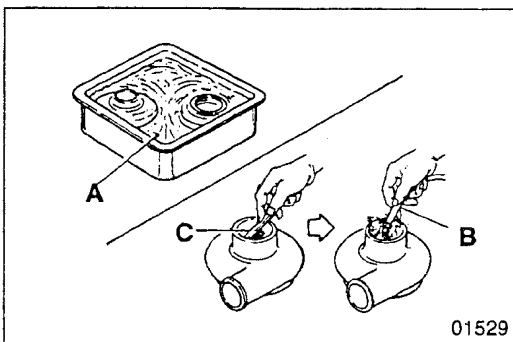
- After reassembling the turbocharger assembly, turn the wheels by hand and check that they rotate smoothly.



3 Removal of turbine housing

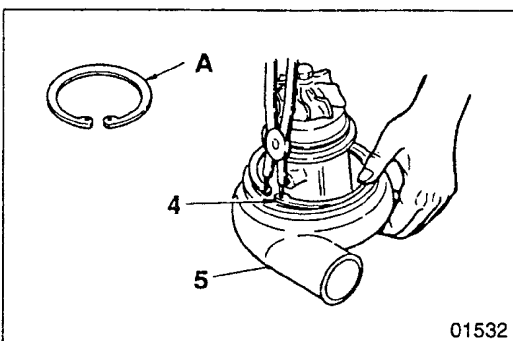
CAUTION

- While using care to prevent damage to the turbine housing 3, lightly strike its entire circumference with a rubber hammer or similar tool.
- Since the blades of the turbine wheel are readily bent, use care to make sure that they do not hit the turbine housing 3.



3 5 Cleaning turbine housing and compressor cover

- Before cleaning the components, check them visually for scorching, abrasion, and other defects. (Such problems may be impossible to see after cleaning.) Replace any item that appears defective.
- Remove any hard deposits with a plastic scraper or stiff brush. Then, immerse the disassembled components in non-flammable solvent **A** (Daido Chemical Industry DAI CLEANER T30). After removing the components from the solvent, blow them clean with compressed air **B**. If there is deposit of dirt on the removed parts, remove it with a plastic scraper or bristle brush **C** before cleaning.

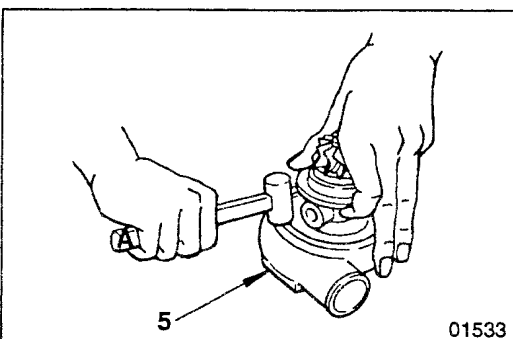


4 Installing snap ring

- Fit the snap ring 4 onto the compressor cover 5 with its tapered surface **A** facing upward.

WARNING

When fitting the snap ring 4, hold it down to prevent it from flying off.



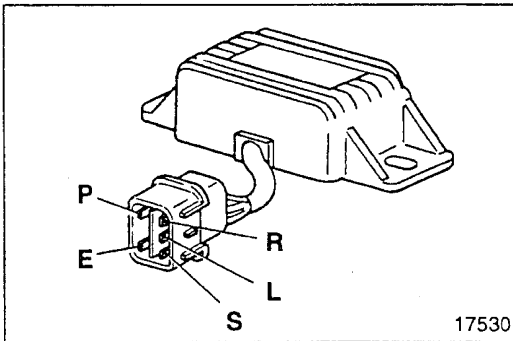
5 Removal of compressor cover

CAUTION

- While using care to prevent damage to the compressor cover 5, lightly strike its entire circumference with a rubber hammer or similar tool.
- Since the blades of the compressor wheel are readily bent, use care to make sure that they do not hit the compressor cover.

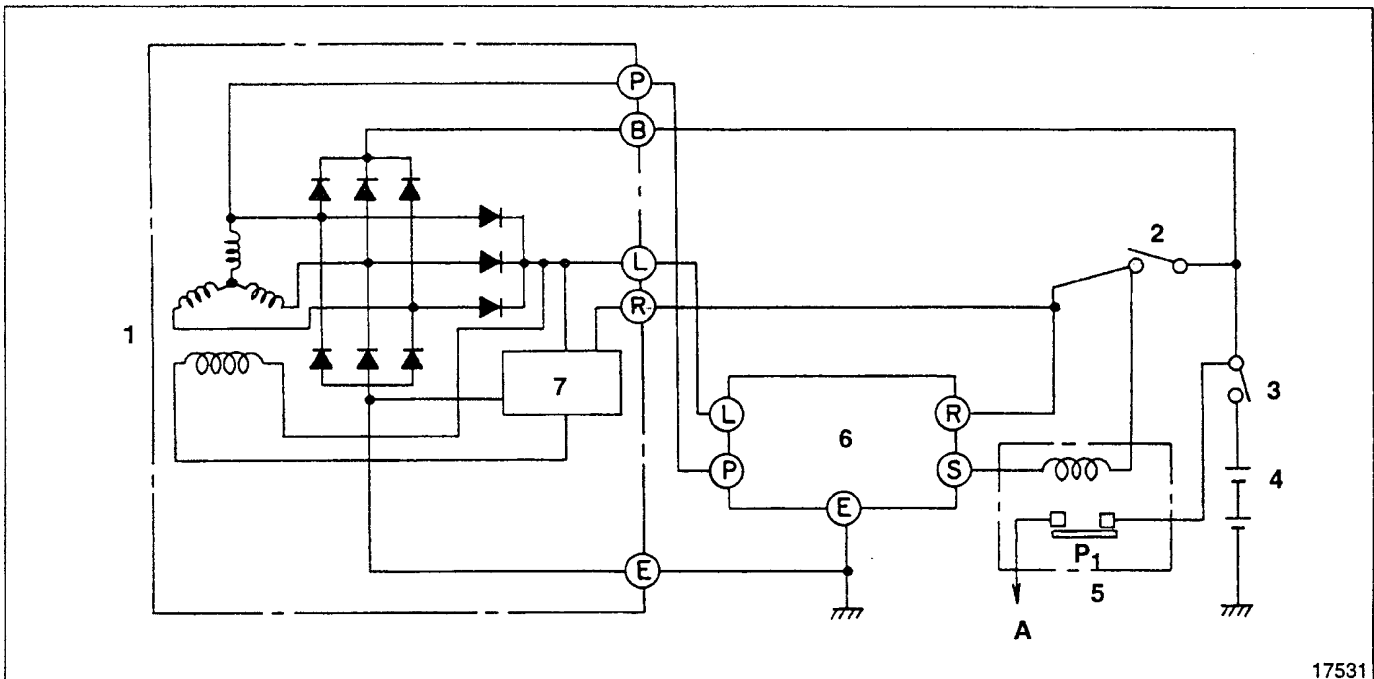
STRUCTURE AND OPERATION

Safety Relay



The safety relay detects the rotating speed of the alternator. When the rotating speed exceeds the reference value, the safety relay keeps the starter inoperative even if the starter switch is accidentally set to ON while the engine is running.

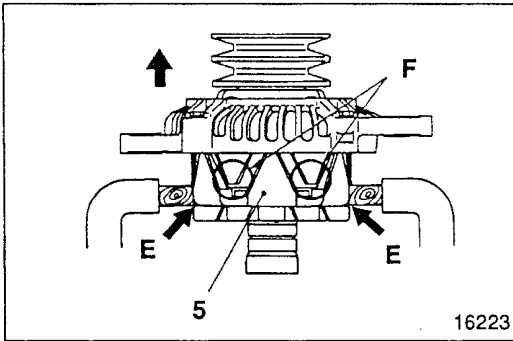
P: Terminal P
 R: Terminal R
 L: Terminal L
 S: Terminal S
 E: Terminal E



- 1 Alternator
 - 2 Starter switch
 - 3 Battery switch
 - 4 Battery
 - 5 Starter relay
 - 6 Safety relay
 - 7 IC regulator
- A: To starter

- When the starter switch 2 is set to ON, current flows from the starter relay 5 through terminal S of the safety relay 6 to terminal E, and contact P₁ closes.
- When rotation of the starter causes the engine to start running, pulses with a frequency of a tenth of the alternator speed are generated at terminal P of the alternator 1.
- When the pulse frequency at terminal P of the alternator 1 exceeds the reference value, the continuity between terminals S and E is lost, and the starter remains inoperative even if the starter switch 2 is set to ON while the engine is running.

ALTERNATOR

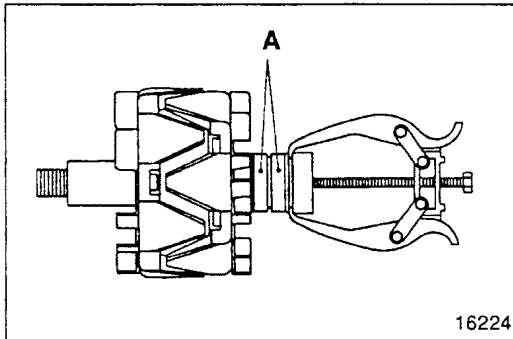


[Disassembly]

CAUTION

When the rotor assembly 5 is held in a vice, make sure that the base E of the lugs of the core is held.

If the lugs F of the core are held, they will be broken or damaged.

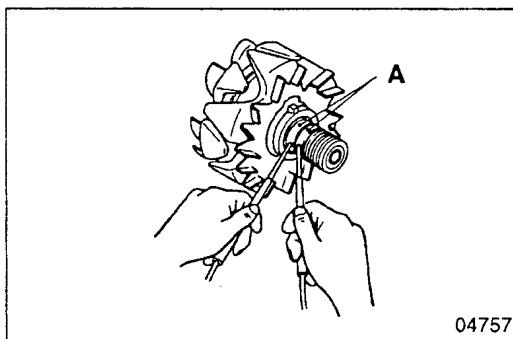


4 Removal of rear bearing

CAUTION

When the bearing puller is installed, use care to prevent damage to the slip ring A.

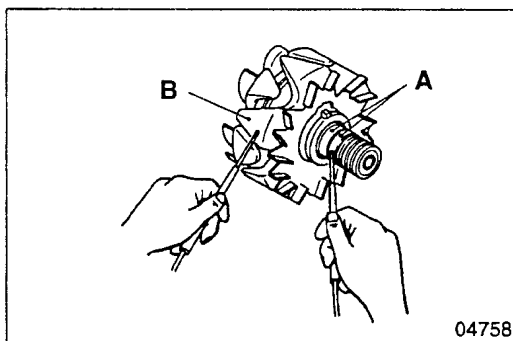
If the slip ring is damaged, the brush will fail to make good contact.



5 Inspection of rotor assembly

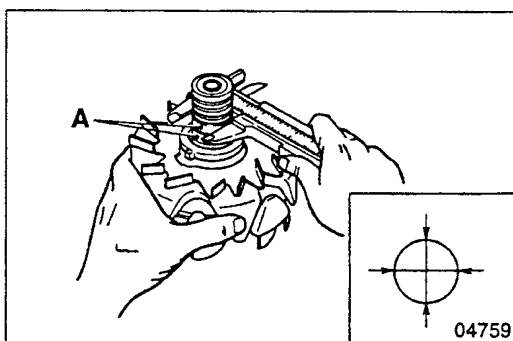
(1) Resistance of field coil

- Measure the resistance across the slip ring A.
- If the reading is out of the standard value, replace the rotor assembly 5.



(2) Continuity between slip ring and core

- Check to ensure that there is no continuity between slip ring A and core B.
- If there is continuity, it means a short circuit. Therefore, replace the rotor assembly 5.



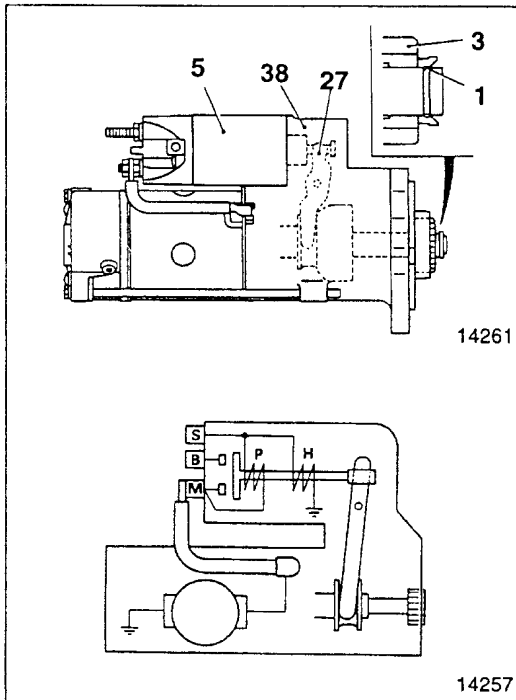
(3) Outside diameter of slip ring

- If the outside diameter of the slip ring A is below the limit, replace the rotor assembly 5.
- If the surface of the slip ring A is rough or unevenly worn, correct by grinding with emery paper or a lathe.

CAUTION

Do corrective grinding within the extent that the outside diameter of the slip ring A does not exceed the limit.

STARTER



3 Pinion

[Removal]

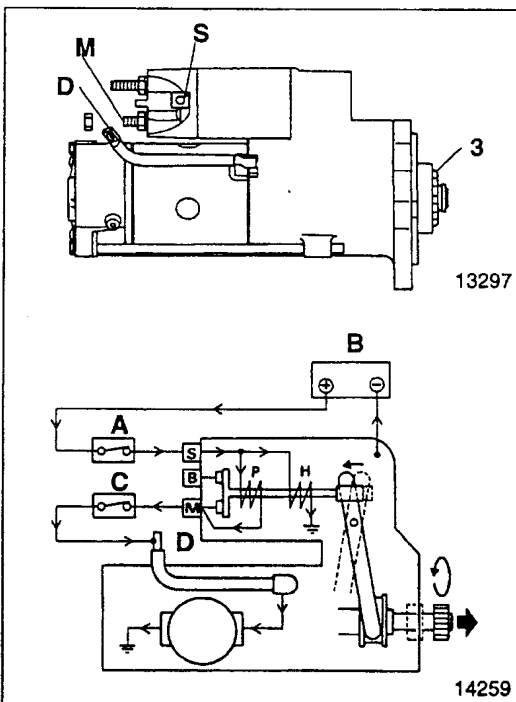
To remove the pinion 3, it is necessary to supply current to the starter and let the pinion spring out.

WARNING ⚠

- When current is supplied to the starter, the pinion 3 will spring out and rotate. Be careful not to touch it by hand.
- The magnet switch 5 may be very hot after the end of inspection. Be careful when you touch it.

CAUTION ⚠

- The time during which current is supplied to the starter should be limited to 10 seconds or less on the pull-in coil P side and 30 seconds or less on the holding coil H side. If current is supplied to the coils for a longer period, the coils will be overheated and baked.
- Make sure that the pinion 3 is made to spring out by supplying current to the starter. If the pinion is forced out by pulling the lever 27 without supplying current to the starter, the front bracket 38 and lever could be damaged by the impact produced when the stopper ring 1 is removed.
- When current is supplied to the starter, a large current that exceeds 100A will flow. When the starter is inspected, therefore, use thick cables like booster cables. Check to ensure that all the connections are tight and secure.



- Wire the starter as shown.

A: Switch
 B: DC 24V
 C: Switch
 D: Cable
 M: Starter terminal M
 S: Starter terminal S

- The following operations are performed by supplying current to the starter. It is therefore necessary that the series of operations up to removal of the pinion 3 is completed in less than 30 seconds.
 - Set the switch A and switch C to ON to supply current to the starter. At the time, the pinion 3 will spring out and rotate.

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