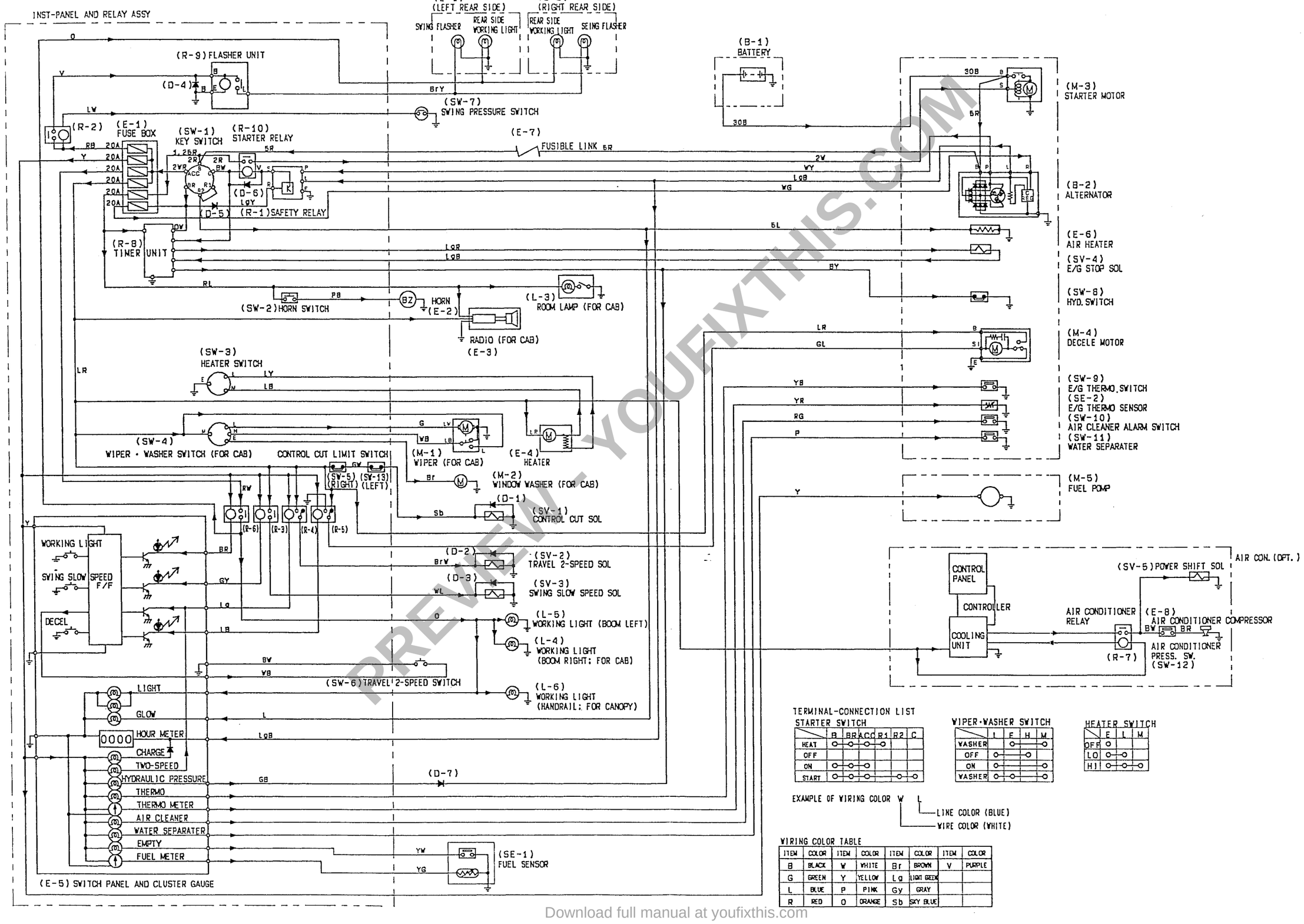
9. ELECTRIC

9.1 ELECTRIC WIRING DIAGRAM (SK045-2)



TERMINAL-CONNECTION LIST

STARTER SWITCH

	B	BR	ACC	R1	R2	C
HEAT	○		○	○		
OFF						
ON			○	○		
START	○		○	○	○	○

WIPER·WASHER SWITCH

	I	F	H	M
WASHER		○		
OFF	○			○
ON	○			○
WASHER	○	○		○

HEATER SWITCH

	E	L	M
OFF	○		
LO	○		○
HI	○		○

EXAMPLE OF WIRING COLOR W L
- L: LINE COLOR (BLUE)
- W: WIRE COLOR (WHITE)

WIRING COLOR TABLE

ITEM	COLOR	ITEM	COLOR	ITEM	COLOR	ITEM	COLOR
B	BLACK	W	WHITE	Br	BROWN	V	PURPLE
G	GREEN	Y	YELLOW	Lg	LIGHT GREEN		
L	BLUE	P	PINK	Gy	GRAY		
R	RED	O	ORANGE	Sb	SKY BLUE		

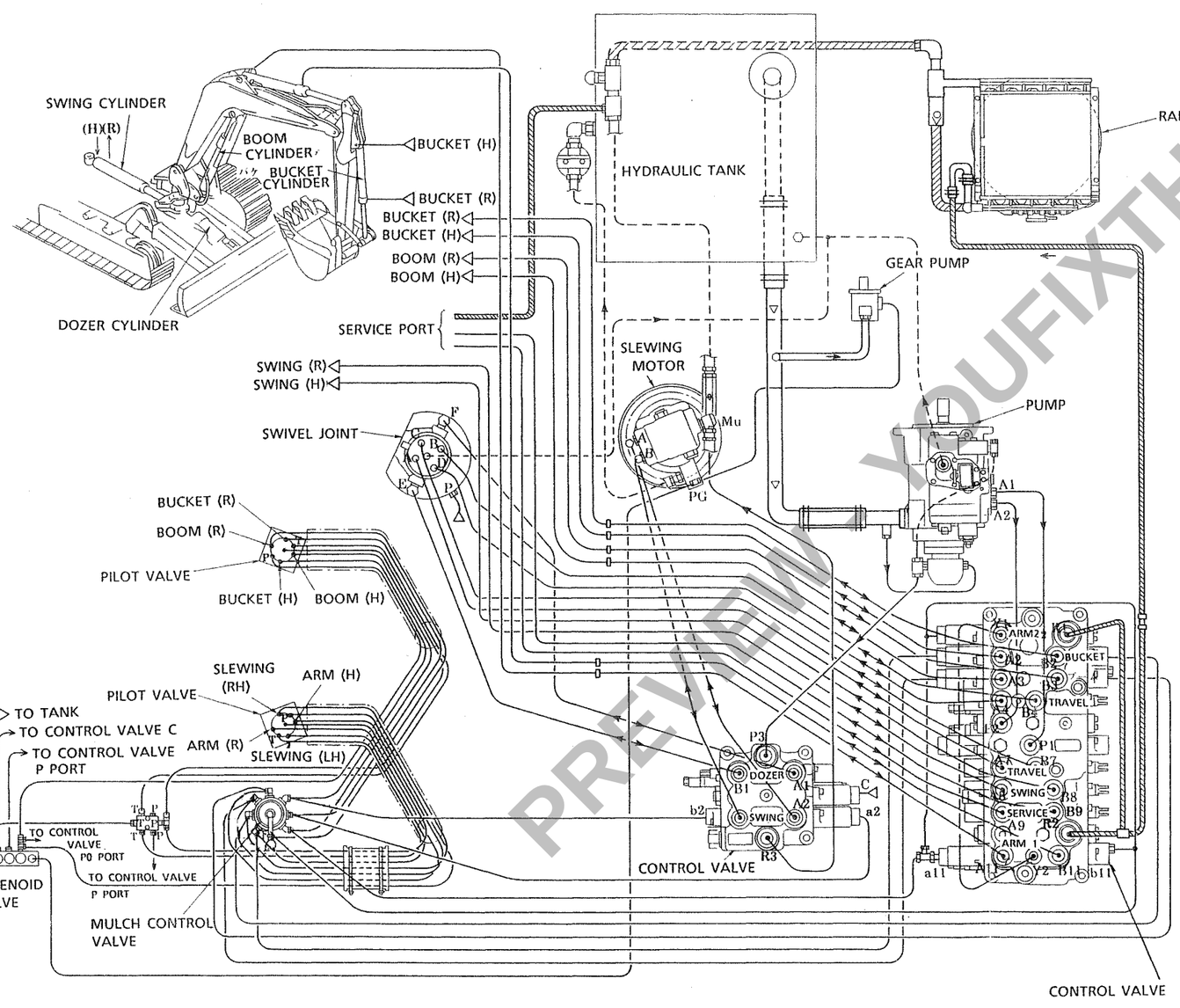
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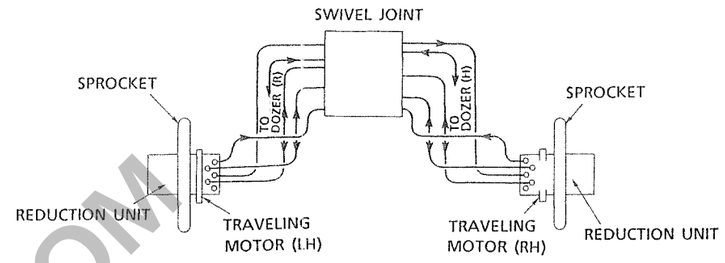
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8. HYDRAULIC SYSTEM

8.1 GENERAL

This machine is featured by the following functions embodied in its hydraulic circuits, aiming at easy operation, safety, handling of large masses of masses of material.





Performance	Device	Function	Feature
Easy operation and safety	Travel	• Straight travel • Rubber clawler • Automatic parking brake • Control motor rotation on slopes	• Straight travel during simultaneous operations • Travelling is abalable on pavenent road • Automatic travelling brake off travel operation • Controled motor rotetion is provided by hydraulic pressure in brake valve
	Slewing	• Slewing flasher lights • Anti-slewing back function by swing shockless valve • Independent slewing hydraulic system • Hi / Lo. slewing speed mode • Automatic swing parking brake • Oil mentenance free in slewing reduction unit	• Warning to near persons • Eesier machine positioning due to slewing-back being prevented after slewing due to inertia • Smoosuly slewing speed • Low speed is changeable in nallow space • Mechanical slewing breake after inertia • Slewing reduction unit is lubricated by slewing motor hydraulic oil
	Attachment	• Control by pilot pressure • Multi-control • Swing cylinder • Dozer blade • Arm operation speed up • Service control valve	• Fine-tured operation • Changeable 4 different operator patterns • Permits paraller digging within the width of the machine • Provides safety and permits oil to be returned to its reverse location • Arm digging by combinning of two pumps • Optional attachment can be added
	Other	• Sealed hydraulic-oil tank • Suction strainer • Line filter • Return filter • Hydraulic oil cooling	• Prevents dirt getting into the hydraulic fluid • Removes dirt sucked in from the intake side • Eliminates dirt from the pilot circuit • Eliminates dirt from the main circuit • Prevents deterioration of hydraulic oil
Handling of large masses of material	Pump	• Full hosepower control	• Effective use of engine hosepower by variable and fixed displacement pumps
	Travel	• Changing 2-speed travel (Rubber crawler) (Iron crawler)	 • 5.0 / 3.0 km / h (3.11/1.86 mile / h) • 4.7 / 3.2 km / h (2.92/1.99 mile / h)
	Att.	• 2 pumps merged for arm digging • 2 pumps merged for arm extention	• Speed up arm digging • Speed up arm extention

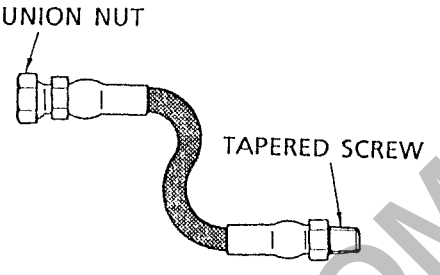
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1.6 TIGHTENING TORQUES

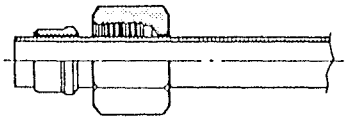
HYDRAULIC HOSE

HOSE FITTING SIZE	TIGHTENING TORQUE Kgf·m (ft·lbs)	
	UNION NUT (PF)	TAPERED THREADS (PT)
1/8	$1^{+0.5}_{0}$ ($7.23^{+3.6}_{0}$)	$1.2^{\pm 0.12}$ ($8.68^{\pm 0.87}$)
1/4	$2.5^{+0.5}_{0}$ ($18.1^{+3.6}_{0}$)	$3.0^{\pm 0.30}$ ($21.7^{\pm 2.2}$)
3/8	$5^{+0.5}_{0}$ ($36.2^{+3.6}_{0}$)	$5.5^{\pm 0.55}$ ($39.8^{\pm 4.0}$)
1/2	$6^{+0.5}_{0}$ ($43.4^{+3.6}_{0}$)	$9.0^{\pm 0.90}$ ($65.1^{\pm 6.5}$)
3/4	$12^{+0.5}_{0}$ ($86.8^{+3.6}_{0}$)	$15.0^{\pm 1.50}$ ($108^{\pm 11}$)
1	$14^{+0.5}_{0}$ ($101^{+3.6}_{0}$)	$20.0^{\pm 2.00}$ ($145^{\pm 14}$)



STEEL PIPE THRUST COUPLINGS

OUTER DIAMETER OF STEEL PIPE mm	TIGHTENING TORQUE Kgf·m (ft·lbs)
8	$3.5^{\pm 0.5}$ ($25.3^{\pm 3.6}$)
10	$4.25^{\pm 0.5}$ ($30.7^{\pm 3.6}$)
12	$6.0^{\pm 0.5}$ ($43.4^{\pm 3.6}$)
15	$9.0^{\pm 0.5}$ ($65.1^{\pm 3.6}$)
16	$9.5^{\pm 0.5}$ ($68.7^{\pm 3.6}$)
18	$13.5^{\pm 0.5}$ ($97.6^{\pm 3.6}$)
22	$21.0^{\pm 1.0}$ ($152^{\pm 7}$)
27.2	$25.0^{\pm 1.0}$ ($181^{\pm 7}$)
28	$32.0^{\pm 2.0}$ ($232^{\pm 15}$)
32	$32.0^{\pm 2.0}$ ($232^{\pm 15}$)
35	$42.0^{\pm 2.0}$ ($304^{\pm 15}$)



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2.2 PROCEDURE FOR MOUNTING AND DISMANTLING

2.2.1 MOUNTING AND DISMANTLING THE ENGINE AND THE RADIATOR

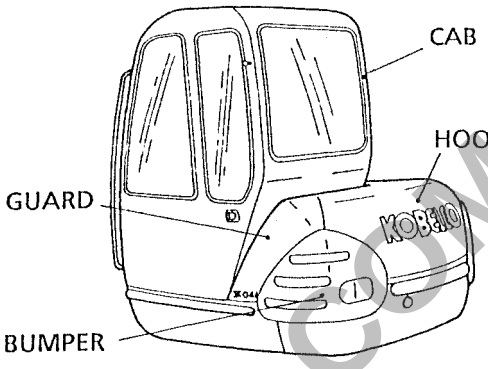
(1) Dismantling

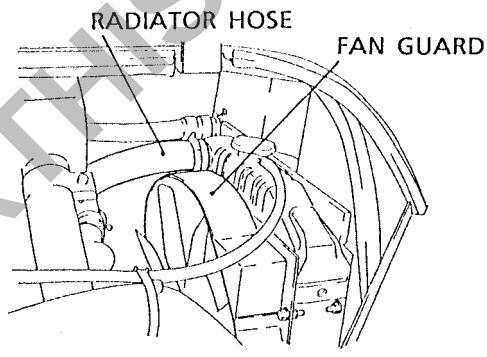
• Engine assembly

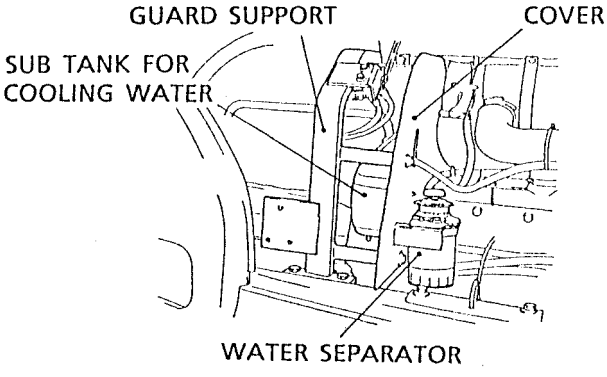
1) Disconnect the negative (—) terminal of the battery cable.
2) Dismantle the cab assy.
3) Remove the hood, the guard and the bumper.
4) Loosen the drain cock of the radiator and empty cooling water.
5) Disconnect the radiator hoses, the sub tank hoses and the oil cooler hoses.
6) Separate the heater hoses from the engine.
7) Dismantle the fan guard.
8) Remove the exhaust tube and the intake tube.
9) Separate the cooling water sub tank and the water separator from the cover.
10) Dismantle the guard support and the cover.
11) Disconnect the fuel hose.
12) Remove the governor motor for the engine control, the ring assy and the control cable.
13) Disconnect all electric wirings connected to the engine.
14) Disconnect all hydraulic pipes connected to the main pump, the sub pump and the pilot pump.
15) Remove four stoppers on the engine-mounted rubber mount.
16) Take off four nuts on the rubber mount.
17) Lift the engine and the hydraulic pump assy level and dismantle them with care.
18) Separate the rubber mount.
19) Remove the main pump and the sub pump.

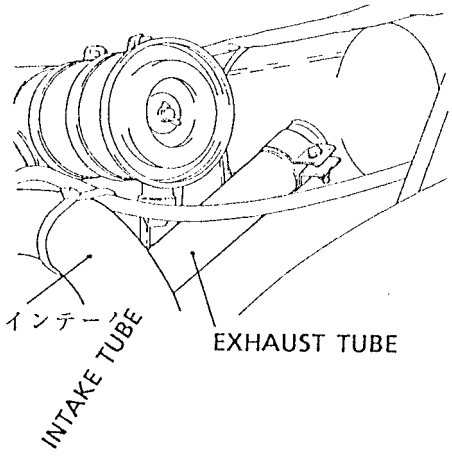
• Dismantling and mounting the radiator assy.

1) Take off two radiator stays.
2) Remove the nuts on the cushion rubber that mount the radiator assy to the upper frame and lift up the radiator assy.
3) Separate the insulator.







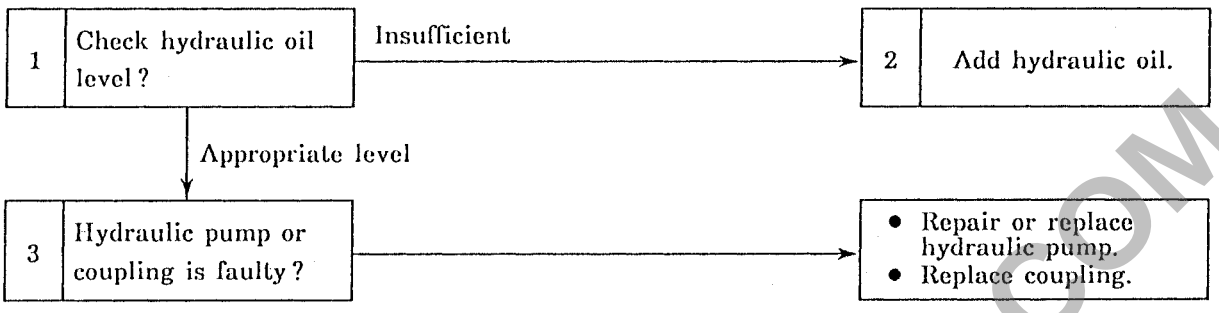


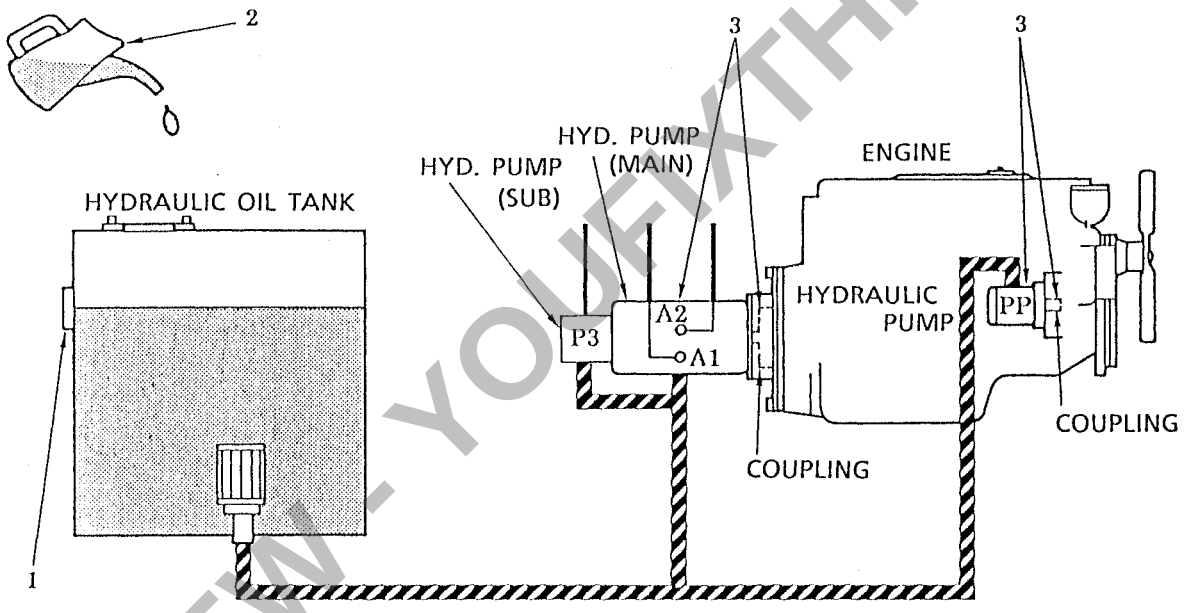
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1. GENERAL OPERATING

NOTHING CAN BE OPERATED





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2.5 SPECIFICATIONS OF DEVICES

Cab O.P.T[ ], Iron crawler O.P.T [ ]

Table of specifications			SK045·SK045-2	SK050
Model			PY-02001~	PZ-00101~
Complete weight : Iron crawler		(kg) (lbs)	4.500 (9,920) [4,620 (10,200)]	4.850 (10,700) [4,970 (10,960)]
: Rubber crawler			[4.480 (9,880)] [[4.600 (10,100)]]	[4.830 (10,650)] [[4.950 (10,900)]]
Dimensions	Total length (at shipping)	(mm) (ft-in)	5,510 (18´1˝)	5,860 (19´3˝)
	Overall width	(mm) (ft-in)	1.840 (6´)	1,980 (6´6˝)
	Total height (at shipping)	(mm) (ft-in)	2,540 (8´4˝)	←
			[2,530 (8´4˝)]	←
	Ground clearance of undercarriage	(mm) (ft-in)	330 (1´1˝)	←
	Height of bottom of revolving upper structure		620 (2´)	←
	Wide of shoe	(mm) (ft-in)	400 (1´5˝)	←
	Crawler total width	(mm) (ft-in)	1,840 (6´)	1,980 (6´6˝)
	Crawler total length	(mm) (ft-in)	2,490 (8´2˝)	←
			[2,420 (7´11˝)]	←
	Minimum turning radius	(mm) (ft-in)	1,925 / 1,375 (6´4˝ / 4´6˝)	1,970 / 1,410 (6´6˝ / 4´7˝)
	Radius reverse turning radius	(mm) (ft-in)	1,450 (4´9˝)	1,480 (4´10˝)
	Dozer blade width	(mm) (ft-in)	1,840 (6´)	1,980 (6´6˝)
	Dozer blade height	(mm) (ft-in)	350 (1´2˝)	←
Operation range	Max. digging height	(mm) (ft-in)	6,050 (19´10˝)	6,375 (20´11˝)
	Max digging depth	(mm) (ft-in)	3,500 (11´6˝)	3,800 (12´6˝)
	Vertical digging depth	(mm) (ft-in)	2,800 (9´2˝)	3,025 (9´11˝)
	Max. digging reach	(mm) (ft-in)	5,920 (19´5˝)	6,245 (20´6˝)
	Max. reach at ground level	(mm) (ft-in)	5,760 (18´11˝)	6,095 (19´12˝)
	Max. dump height	(mm) (ft-in)	4,390 (14´5˝)	4,620 (18´5˝)
	Boom offset	(mm) (ft-in)	1,830 (6´)	1,935 (6´4˝)
			R.H. : 710 / L.H. : 880	←
			(2´4˝ / 2´11˝)	←
Main unit performance	Swing speed Hi / Lo	(rpm)	9.1 / 4.6	9.4 / 4.7
	Travel speed : Rubber crawler	(km / hr)	Low : 3.1 / High : 5.1	←
	: Iron crawler	(km / hr)	Low : 2.9 / High : 4.7	←
	Gradability	(degree)	30	←
	Ground contact pressure (JIS): Rubber crawler		0.26 (4) [0.26 (4)]	0.27 (4) [0.28 (4)]
	: Iron crawler	(kgf/cm²) (psi)	0.26 (4) [0.27 (4)]	0.28 (4) [0.29 (4)]
Engine	Model (Mitsubishi)		K4N-D31YSA (SK045) K4N-EID (SK045-2)	KAN-D31YSB
	Type,		Water-cooled 4-cycle, Diesel	←
	Rated output	(ps / rpm)	39 / 2,000	45 / 2,300
	Maximum torque	(kgf·m (ft·lbs) / rpm)	14 (101) / 1,600	←
Bucket	Outside width	(mm) (ft-in)	650 (2´2˝)	←
	JIS capacity [SAE capacity]	(m³) (cu·yd)	0.13 (0.17) [0.15 (0.2)]	0.15 (0.2) [0.17 (0.22)]
	Weight	(kg) (lbs)	120 (265)	130 (287)

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8-01 PERIODIC SERVICE CHART

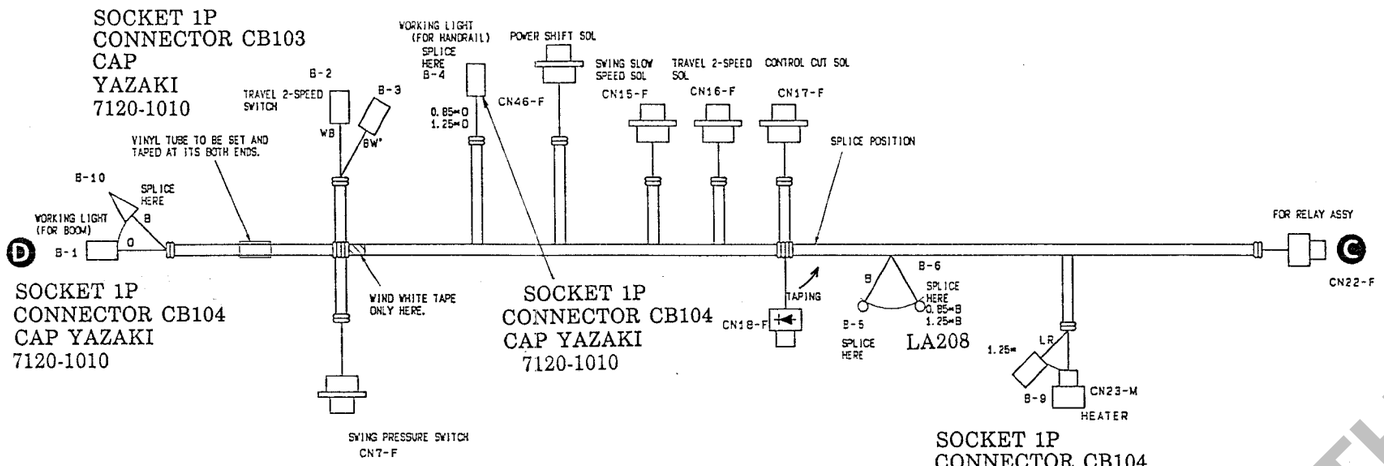
○···Check, adjust or replenish □···Clean ●···Replace △···Drain

Service item		Service interval: Before operation	After first 50hours	Every 100hours	Every 400hours	Every 800hours	Long-period storage	Remarks
Engine	Loose, damaged and leaky points	○						
	Exhaust fume, noise, and vibration	○						
	Re-tightening engine parts		○			○		
	Valve clearance		○		○			
	Engine idle speed		○	○				
	Engine compression pressure					○		
Lubrication system	Engine oil	○	●	●				
	Oil filter (cartridge type)		●	●				
	Oil filter (disassemblable type)			□, ○	●			● : Replace element.
Fuel system	Fuel	○					△	
	Fuel tank				□		□	
	Fuel filter			□	●			For cock type, replace element only.
	Fuel pump		□	□				Filter (plunger type pump)
	Injection pump					○		Adjust fuel injection rate.
	Nozzle				○			
Intake system	Air cleaner (paper-element type)			□	●			
	Air cleaner (oil bath type)	○		□●				● : Replace oil.
Cooling system	Coolant	○	●			●	△	Unless antifreeze is used, drain after daily operation.
	Fan belt	○			○			
Electrical system	Gauges (incl. pilot lamps)	○						
	Starter motor, alternator, regulator				○	○*		* : Adjust voltage and current.
	Glow plug				○			
	Solenoid switch (key-OFF stop system)	○						Inspect switch operation.

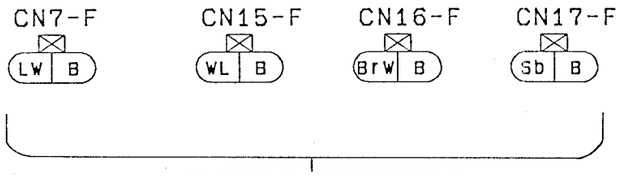
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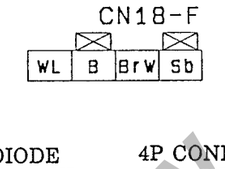
(2) FLOOR DOWN HARNESS



WIRE COLOR	SIZE	FROM	CONNEC-TION	TO	FUNCTION	
WL	0.85	CN22-F		CN18-F	SWING SLOW SPEED RELAY	→ DIODE
	〃			CN15-F	SWING SLOW SPEED RELAY	→ SWING SLOW SPEED SOL
BrW	〃	〃		CN18-F	TRAVEL 2-SPEED RELAY	→ DIODE
	〃			CN16-F	〃	→ TRAVEL 2-SPEED SOL
Sb	〃	〃		CN18-F	CONTROL CUT LIMIT SWITCH	→ DIODE
	0.85			CN17-F	CONTROL CUT LIMIT SWITCH	→ CONTROL CUT SOL
O	1.25	CN22-F		B-4	WORKING LIGHT RELAY	→ WORKING LIGHT FOR HANDRAIL
	0.85			B-1	WORKING LIGHT RELAY	→ WORKING LIGHT FOR BOOM
LR	1.25	CN22-F		B-9	〃	→ HEATER
WB	0.85	B-2		CN22-F	TRAVEL 2-SPEED SWITCH	← CLUSTER GAUGE
BW	〃	CN22-F		CN46-F	AIR CONDITIONER RELAY	→ POWER SHIFT SOL
LY	〃	CN23-M		CN22-F	HEATER	← HEATER SWITCH
LB	〃	CN23-M		CN22-F	HEATER	← HEATER SWITCH
B	〃	B-5		CN15-F	BODY EARTH	← SWING SLOW SPEED SOL
	〃			CN16-F	〃	← TRAVEL 2-SPEED SOL
	〃			CN17-F	〃	← CONTROL CUT SOL
	〃			CN46-F	〃	← POWER SHIFT SOLENOID
	0.85	B-6		CN18-F	〃	← DIODE
	1.25			CN22-F	〃	← FLASHER UNIT
	0.85			B-10	BODY EARTH	← WORKING LIGHT
	0.85			CN7-F	BODY EARTH	← SWING PRESSURE SWITCH
BW*	0.85	CN22-F		B-3	CLUSTER GAUGE	← TRAVEL 2-SPEED SWITCH
LW	0.85	CN22-F		CN7-F	FLASHER RELAY	→ SWING PRESSURE SWITCH

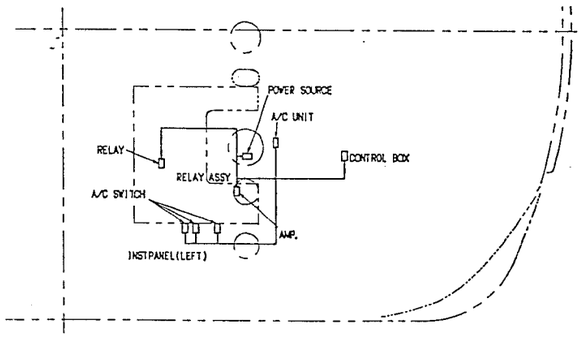


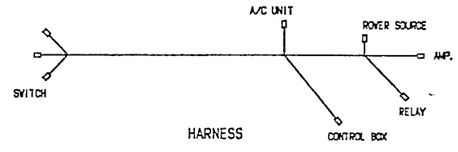
2P HOUSING F SUMITOMO 6180-2321
TERMINAL F SUMITOMO 1500-0110

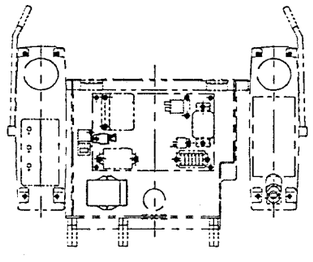


DIODE YAZAKI 7321-9845-30
4P CONNECTOR F YAZAKI 7123-9145-60

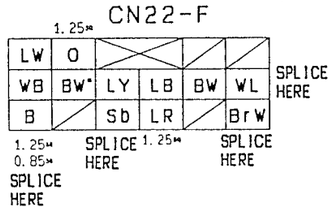
(3) AIR-CONDITIONER HARNESS



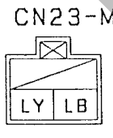




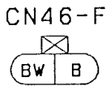
DETAIL ABOUT SETTING AMP. AND RELAY



16P HOUSING F SUMITOMO 6240-5033
TERMINAL F SUMITOMO 8240-4892



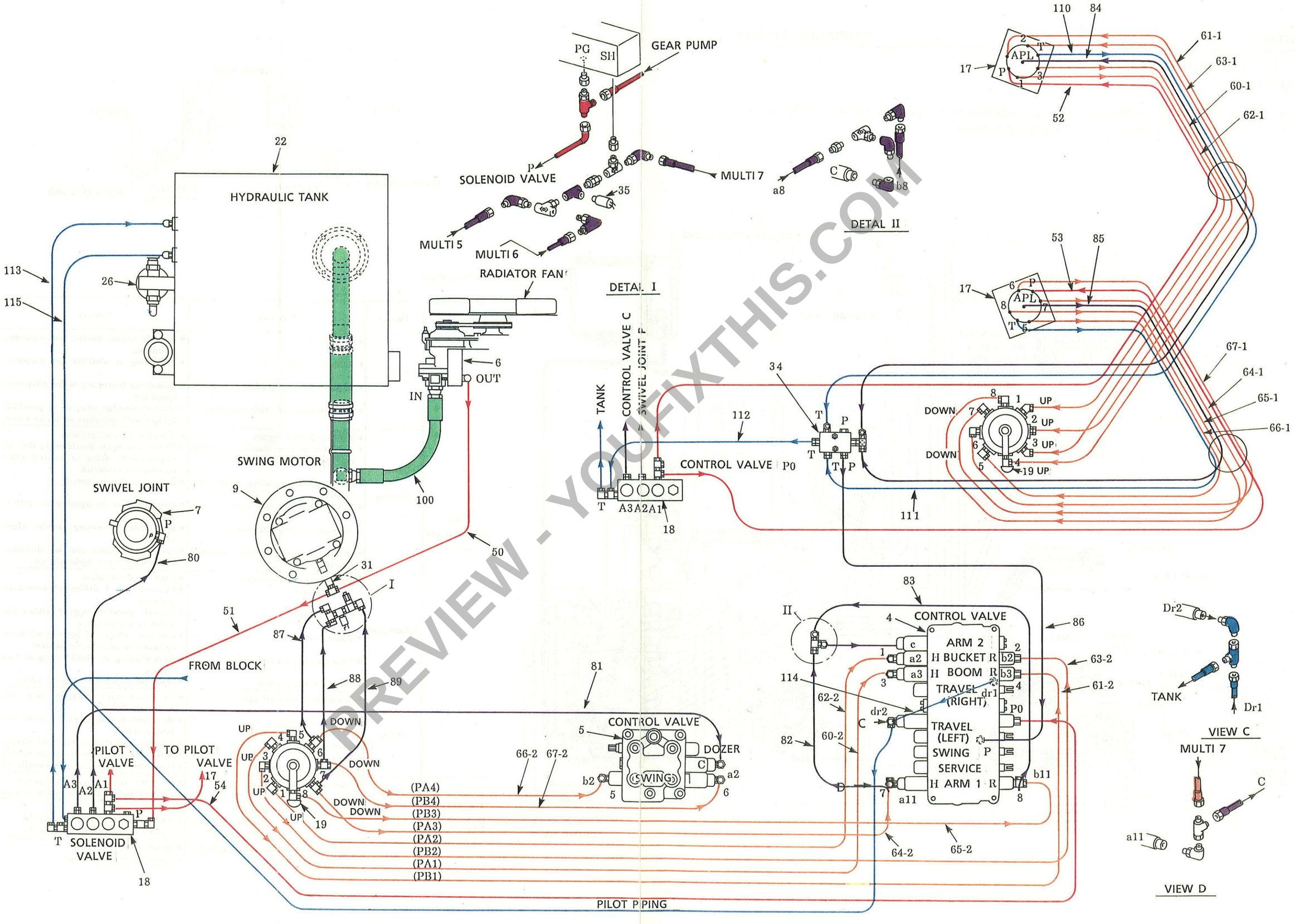
3P CONNECTOR M YAZAKI 7122-2237
TERMINAL M YAZAKI 7114-2020



2P HOUSING F SUMITOMO 6180-2321
TERMINAL F SUMITOMO 1500-0110

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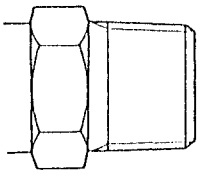


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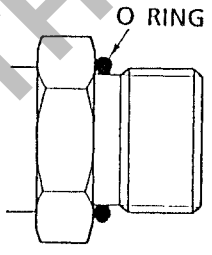
STEEL PIPE COUPLINGS

NOMINAL SCREW SIZE(PT)	TIGHTENING TORQUE Kgf·m (ft·lbs)	
	STEEL	CAST STEEL
1/8	$1.2^{\pm 0.12}$ ($8.68^{\pm 0.87}$)	$1.1^{\pm 0.11}$ ($7.96^{\pm 0.79}$)
1/4	$3.0^{\pm 0.30}$ ($21.7^{\pm 2.2}$)	$2.5^{\pm 0.25}$ ($18.1^{\pm 1.8}$)
3/8	$5.5^{\pm 0.55}$ ($39.8^{\pm 4.0}$)	$5.0^{\pm 0.50}$ ($36.2^{\pm 3.6}$)
1/2	$9.0^{\pm 0.90}$ ($65.1^{\pm 6.5}$)	$7.5^{\pm 0.75}$ ($54.2^{\pm 5.4}$)
3/4	$15.0^{\pm 1.50}$ ($108^{\pm 11}$)	$13.0^{\pm 1.30}$ ($94.0^{\pm 9.4}$)
1	$20.0^{\pm 2.00}$ ($145^{\pm 14}$)	$17.5^{\pm 1.75}$ ($127^{\pm 13}$)



PIPE COUPLINGS (O RING SEALING TYPE)

NOMINAL SCREW SIZE(PT)	TIGHTENING TORQUE Kgf·m (ft·lbs)
1/8	$2.0^{\pm 0.2}$ ($14.5^{\pm 1.5}$)
1/4	$3.5^{\pm 0.5}$ ($25.3^{\pm 3.6}$)
3/8	$5.5^{\pm 0.5}$ ($39.8^{\pm 3.6}$)
1/2	$6.5^{\pm 0.5}$ ($47.0^{\pm 3.6}$)
3/4	$9.5^{\pm 0.5}$ ($68.7^{\pm 3.6}$)
1	$11.0^{\pm 1.0}$ ($79.6^{\pm 7}$)
1-1/4	$12.0^{\pm 1.0}$ ($86.8^{\pm 7}$)
1-1/2	$14.0^{\pm 1.0}$ ($101^{\pm 7}$)



NOMINAL SCREW SIZE(UNF)	TIGHTENING TORQUE Kgf·m (ft·lbs)
7/16-20	$1.7^{\pm 0.2}$ ($12.3^{\pm 1.4}$)
1/2-20	$2.3^{\pm 0.2}$ ($16.6^{\pm 1.4}$)
9/16-18	$3.2^{\pm 0.3}$ ($23.1^{\pm 2.2}$)
3/4-16	$6.1^{\pm 0.5}$ ($44.1^{\pm 3.6}$)
1-5/16-12	$10.4^{\pm 0.6}$ ($75.2^{\pm 4.3}$)
1-5/16-12	$13.8^{\pm 0.8}$ ($99.8^{\pm 5.8}$)
1-5/8-12	$18.5^{\pm 1.0}$ ($134^{\pm 7}$)

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2) For mounting, reverse the order of dismantling, referring to the above-mentioned construction drawing.

2.2.2 DISMANTLING AND MOUNTING THE HYDRAULIC PUMP

(1) Dismantling

1) Remove the hood, the guard and LH bumper.
2) Loosen the venting plug (20) located on the side face of the hydraulic tank and let out the inside pressure of the hydraulic tank. Loosen the drain plug (23) at the bottom empty hydraulic oil.
   - Standard capacity of tank : 65ℓ (17.2gal)
3) Disconnect the suction hose, discharge hose and drain hose of the main pump.
4) Disconnect the suction hose and discharge hose of the sub pump.
5) Place a wire sling in the eye bolts on the main pump, lift it temporarily and then loosen two capscrews (4) that fix the main pump.
6) Draw out the coupling (2) in the pump connection by moving the pump level, exercising care so as not to bring it in contact with the main control valve and the cabin.
   - Weight of hydraulic pump : approx. 41kg (90 lbs)

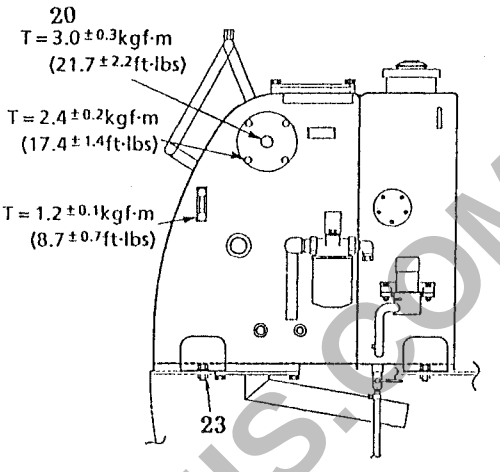
(2) Mounting

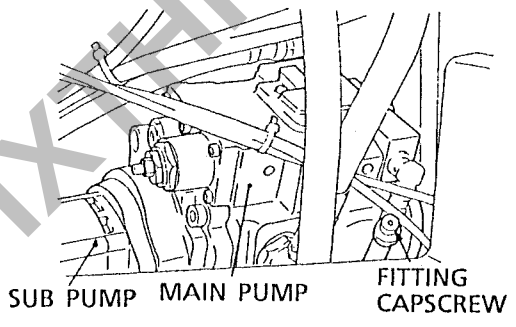
In mounting the pump, reverse the order of dismantling, taking care of the following :

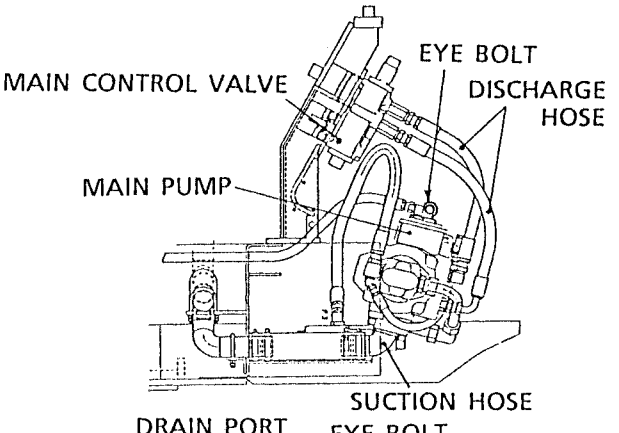
1) Coat the spline of the pump input shaft with Shell Letinux AM grease to an extent that grease does not ooze out of the coupling hub.
2) Coat the pump-fastening capscrews (4) with locktite #262 and tighten them to 16.4±1.6 kgf·m (119±11.6 ft·lbs) torque.

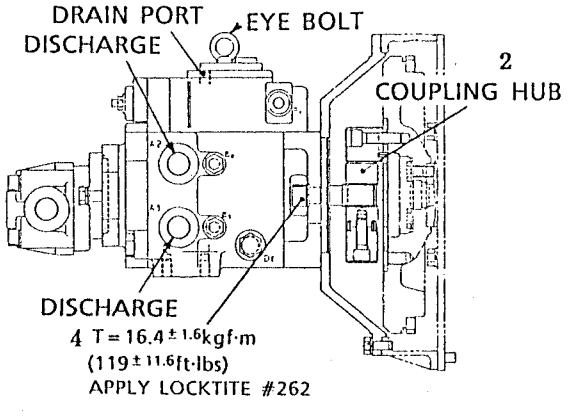
(3) Cautions to be exercised at the start of hydraulic pump

1) Fill up hydraulic oil into the pump casing through the drain port.
2) After starting, idle the engine for a while till air is vented from the hydraulic lines.





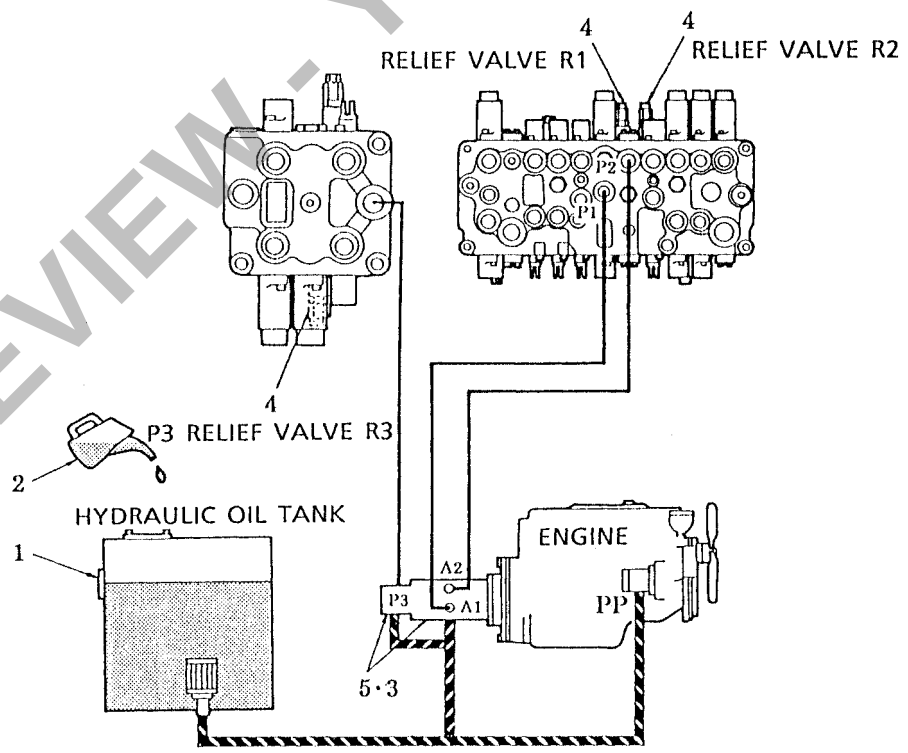




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ALL OPERATIONS ARE POSSIBLE, BUT POWER IS LACKING

1	Check hydraulic oil level?	Insufficient	2	Add hydraulic oil.
		Appropriate level		
3	Strange sound from hydraulic pump?	Yes	Faulty suction line	Replace sealing tape, O ring, and hose.
		No.	Bubbling in tank	Tank remedial action according to cause of bubbling.
4	Inspect relief valve?	Faulty		Repair or replace relief valve.
		Normal		
5	Faulty hydraulic pump?			• Repair or replace hydraulic pump. • Flush hydraulic oil.



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2.6 HYDRAULIC OF EQUIPMENT SPECIFICATIONS

	Model	SK045	SK050
	Serial Number	PY-02001~	PZ-00101~
Control valve	7-Ways kgf/cm² at ℓ/min (psi at gal/min)	MK18-1	MK18-2
	Main relief valve set pressure : P1	210 at 55 (2990 at 14.5)	210 at 63 (2990 at 16.6)
	: P2	210 at 55 (2990 at 14.5)	210 at 63 (2990 at 16.6)
	Port relief valve set pressure : A2,B3,A11,B11	240 at 55 (3410 at 14.5)	←
	: A3	270 at 55 (3840 at 14.5)	←
	2-Ways kgf/cm² at ℓ/min (psi at gal/min)	MZ18-1	MZ18-2
	Main relief valve set pressure : P3	200 at 33 (2840 at 8.7)	200 at 37 (2840 at 9.8)
	Port relief valve set pressure : B1	240 at 55 (3410 at 14.5)	←
Pilot valve		TH40KC1134	←
	Secondary pressure kgf/cm² (psi)	0~35 (0~9.2)	←
	Operating angle : single (Ports 1,3) (deg.)	19	←
	(Ports 2,4)	25	←
Travel motor		PHW-500H-50-SRB-1548Z	PHW-500N-50-BSR-1549A
	Motor displacement: Low / High cc / rev (cuin / rev)	31.9 / 18.5 (1.95 / 1.13)	36.4 / 21.0 (2.22 / 1.28)
	2-speed changeover pressure kgf/cm² (psi)	10 (140)	←
	Brake release pressure kgf/cm² (psi)	20 (280)	←
	Reduction ration	1 / 49.47	←
	Changeover pressure for counter balance spool kgf/cm² (psi)	2~4 (28~57)	←
	Relief valve set pressure kgf/cm² at ℓ/min (psi at gal/min)	240 at 20 (3410 at 5.3)	←
Slewing motor		SG015E-039	SG015E-040E
	Total displacement cc / rev (cuin / rev)	505 (133)	561.4 (148)
	Motor displacement cc / rev (cuin / rev)	39.1 (10.3)	←
	Reduction ration	12.92	14.36
	Slewing parking brake release pressure kgf/cm² (psi)	25~30 (360~430)	←
	Relief valve set pressure (Bench, single body) kgf/cm² (psi)	180 (2560)	185 (2630)
Hydraulic pump	Variable plunger pump (Main)	K3SP30-110R-9001	K3SP30-110R-9002
	Displacement : A1 cc / rev (cuin / rev)	27.5 (1.68)	←
	: A2	27.5 (1.68)	←
	Gear pump (Sub)	YP15A16A2H1-R416	←
	Displacement : P3 cc / rev (cuin / rev)	15.9 (0.97)	←
	Gear pump (Pilot)	KP1005ALF8G	←
	Displacement : pp cc / rev (cuin / rev)	5.45 (0.33)	←

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Engine

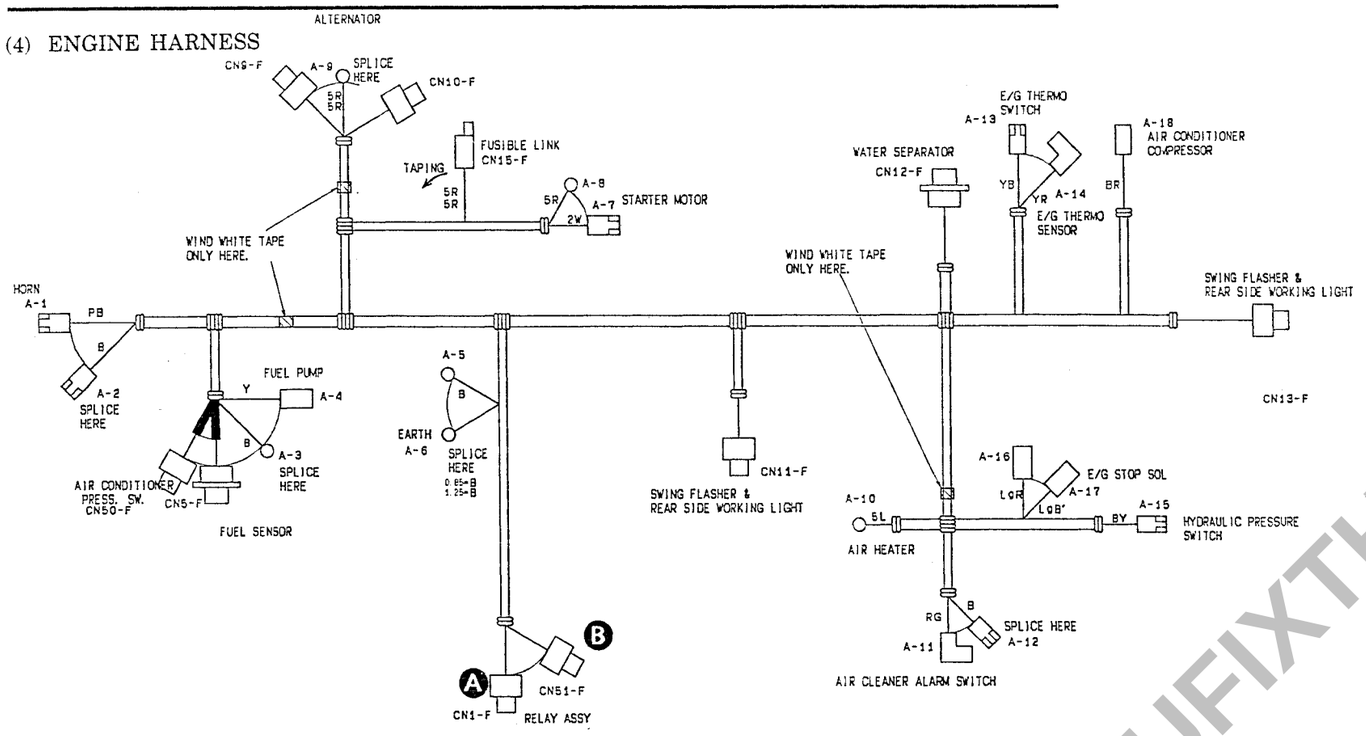
Unit : mm

Item		Standard value	Repair limit	Service limit
Compression pressure	C, D	28 kg/cm²	26 kg/cm²	Approximately 22kg/cm²
	E, F	29 kg/cm²		
	G, M, N	30 kg/cm²		
Pressure difference between cylinders (max.)		3 kg/cm²		
Injection order	K3	1−3−2		
	K4	1−3−4−2		
Injection timing (B. T. D. C.)				
K3, K4 : For agricultural use		19° (at SS starting)	19°±1.5°	
K3, K4 : For industrial use and export standard		20° (at SS starting) See page 162.	20°±1.5°	
K4N : For SK045		17° (at SS starting)	17°±1.5°	
For SK045-2		13° (at SS starting)	13°±1.5°	
Cylinder head				
Bottom surface warpage		0.05 max.	0.1	
Valve seat width (intake and exhaust)		1.3~1.8	2.5	
Valve seat sinkage				−1
Valve clearances (intake and exhaust)		0.25 (at cold)		
Valves				
Stem O. D. × dia. × length (intake) :				
	K3 (except K3G and K3M)	6.6×27.2×114.5		
	K3G, K4E, F	6.6×32.2×114.5		
	K3M, K4M, K4N	8×34×112.4		
(exhaust) :	K3 (except K3G and K3M)	6.6×25.2×114.5		
	K3G, K4E, F	6.6×27.2×114.5		
	K3M, K4M, K4N	8×29×112.4		
Stem-to-guide clearance				
	(intake)			0.10
	(exhaust)			0.15
Seat angle		45°		
Valve head thickness (margin width)		1.0		0.5
Valve spring				
Free length	K3C ~ K3G, K4E, F	43		−1
	K3M, K4M, K4N	45.5		−1
Installation load/length (kg/mm)	K3C ~ K3G, K4E, F	14±0.7/36		−15%
		29.8±2/28		−15%
	K3M, K4M, K4N	15±0.8/38		−15%
		30±2/30.5		−15%

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(4) ENGINE HARNESS



CN1-F

Y				YG	O
PB	WG	P	YR	LgB'	BY
LgB	YB			BW	RG
B	YW	WY	BrY	LgR	W

1.25 SPLICE HERE 2

20P HOUSING F SUMITOMO 6240-5134
TERMINAL F SUMITOMO 8240-4892
TERMINAL F SUMITOMO 8240-4942

CN5-F

YW	YG	B

3P
CONNECTOR F SUMITOMO 6180-3261
TERMINAL F SUMITOMO 1500-0110

CN9-F

WG
LgB

2P
CONNECTOR F YAZAKI 7123-2228
TERMINAL F YAZAKI 7116-2090

CN10-F

WY

1P
CONNECTOR F YAZAKI 7123-2215
TERMINAL F YAZAKI 7116-2030

CN11-F

SPLICE HERE

B	
BrY	O

SPLICE HERE

3P
CONNECTOR F YAZAKI 7123-2237
TERMINAL F YAZAKI 7116-2090

CN12-F

B	P

2P
CONNECTOR F YAZAKI 7229-3023
TERMINAL F YAZAKI 7115-1330

CN13-F

SPLICE HERE

B	
BrY	O

3P
CONNECTOR F YAZAKI 7123-2237
TERMINAL F YAZAKI 7116-2090

CN50-F

BR
BW

2P
CONNECTOR F YAZAKI 7123-2228
TERMINAL F YAZAKI 7116-2090

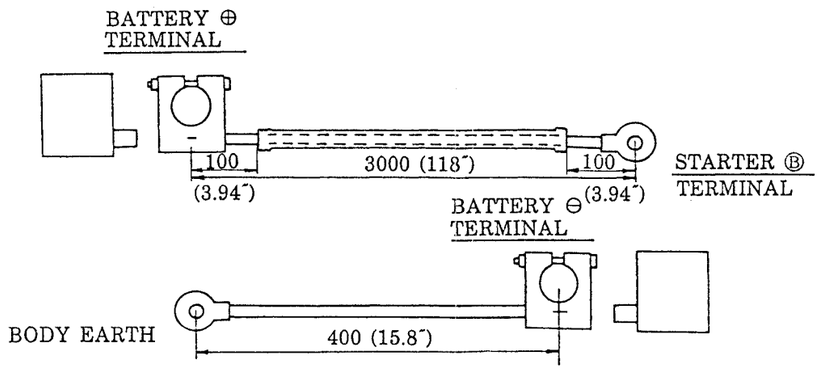
CN51-F

R	5
L	5

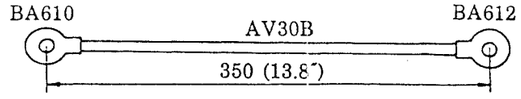
2P
CONNECTOR F YAZAKI 7123-4123-30
TERMINAL F YAZAKI 7116-3250

WIRE COLOR	SIZE	FROM	CONNECTION	TO	FUNCTION
Y	0.85	CN1-F	——	A-4	FUSE BOX → FUEL PUMP
W	2	〃	——	A-7	STARTER RELAY → STARTER MOTOR
PB	0.85	〃	——	A-1	HORN SWITCH → HORN
BY	〃	〃	——	A-15	TIMER UNIT → HYDRAULIC PRESSURE SWITCH
LgB	〃	〃	——	CN9-F	SAFETY RELAY → ALTERNATOR
WG	〃	〃	——	CN9-F	FUSE BOX → ALTERNATOR
WY	〃	〃	——	CN10-F	SAFETY RELAY → ALTERNATOR
LgR	〃	〃	——	A-16	TIMER UNIT → E/G STOP SOL
LgB'	〃	〃	——	A-17	TIMER UNIT → E/G STOP SOL
BrY	〃	CN1-F	——	CN11-F	FLASHER RELAY → SWING FLASHER (LEFT)
	〃		——	CN13-F	FLASHER RELAY → SWING FLASHER (RIGHT)
YR	〃	CN1-F	——	A-14	CLUSTER GAUGE → E/G THERMO SENSOR
YG	〃	〃	——	CN5-F	〃 → FUEL SENSOR
YW	〃	〃	——	CN5-F	〃 → FUEL SENSOR
RG	〃	〃	——	A-11	〃 → AIR CLEANER ALARM SWITCH
YB	〃	〃	——	A-13	〃 → E/G THERMO SWITCH
P	〃	〃	——	CN12-F	〃 → WATER SEPARATOR
L	5	CN51-F	——	A-10	CLUSTER GAUGE → AIR HEATER
R	5	CN51-F	——	CN15-F	KEY SWITCH → FUSIBLE LINK
R	〃	CN15-F		A-9	FUSIBLE LINK → ALTERNATOR
	5			A-8	〃 → STARTER MOTOR
B	0.85	A-5		A-2	BODY EARTH → HORN
	〃			A-3	BODY EARTH → FUEL PUMP
	〃			CN5-F	BODY EARTH → FUEL SENSOR
	〃	A-6		CN11-F	BODY EARTH → SWING FLASHER (LEFT)
	〃			CN13-F	BODY EARTH → SWING FLASHER (RIGHT)
	〃			A-12	BODY EARTH → AIR CLEANER ALARM SWITCH
	〃			CN12-F	BODY EARTH → WATER SEPARATOR
	1.25			CN1-F	BODY EARTH → RELAY ASSY
BW	0.85	CN1-F	——	CN50-F	AIR CONDITIONER RELAY → AIR CONDITIONER PRESS SW
BR	〃	CN50-F	——	A-18	AIR CONDITIONER PRESS SW → AIR CONDITIONER COMPRESSOR
O	0.85	CN1-F		CN11-F	LIGHT RELAY → REAR SIDE WORKING LIGHT (LEFT)
	0.85			CN13-F	LIGHT RELAY → REAR SIDE WORKING LIGHT (RIGHT)

(5) BATTERY CABLE



(6) EARTH CABLE

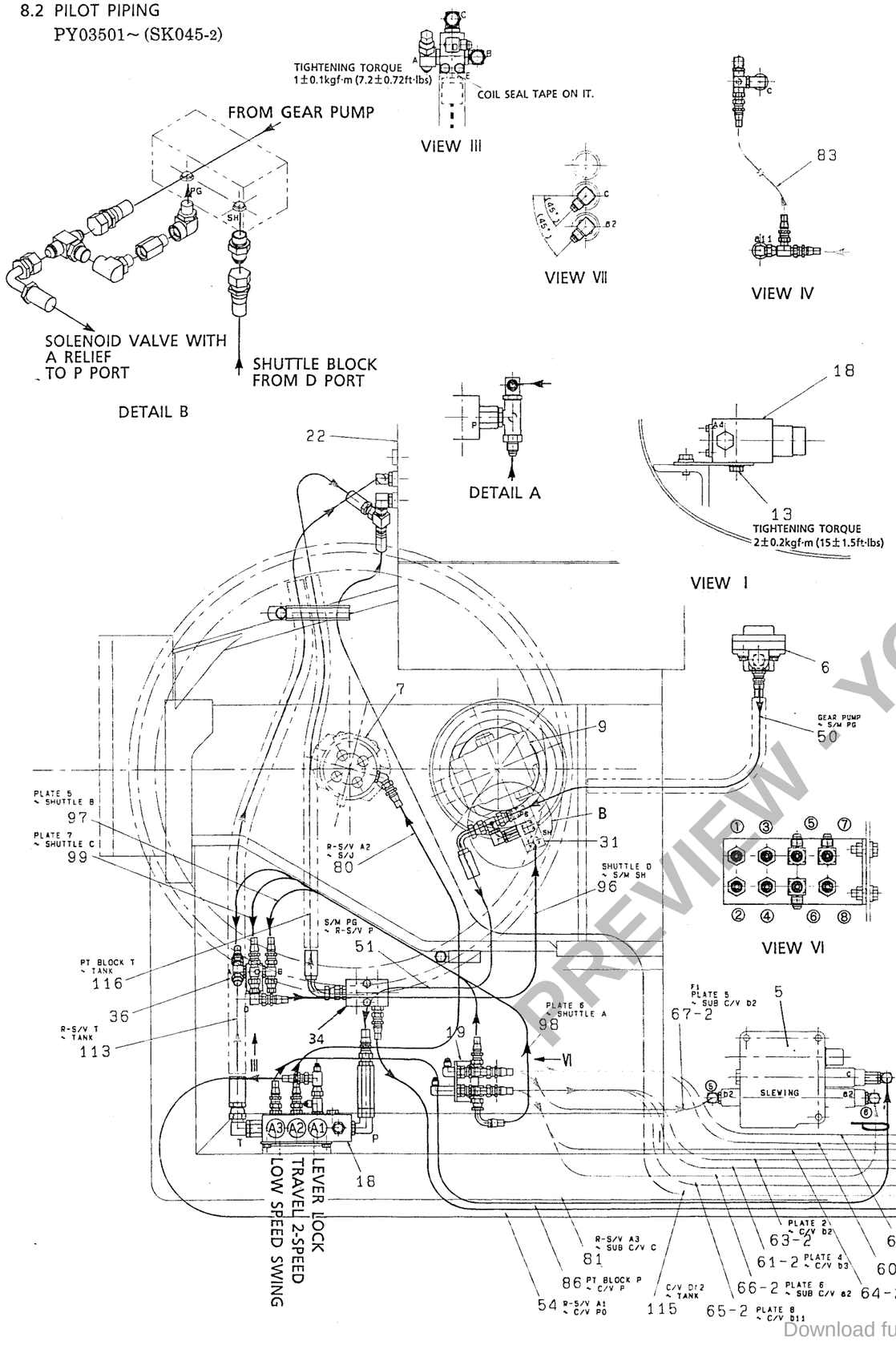


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8.2 PILOT PIPING

PY03501~ (SK045-2)



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STEEL IRON BOLTS, NUTS
(In the case of JIS Strength Category 10.9)

CATEGORY	SIZE X PITCH	TIGHTENING TORQUE (Kgf·m) (ft·lbs)			
		GENERAL TIGHTENING PART		SPECIAL TIGHTENING PART	
Coarse	M6×1.0	$1.0^{\pm 0.1}$	$(7.23^{\pm 0.7})$	$1.2^{\pm 0.1}$	$(8.68^{\pm 0.7})$
	M8×1.25	$2.3^{\pm 0.1}$	$(16.6^{\pm 0.7})$	$2.7^{\pm 0.1}$	$(19.5^{\pm 0.7})$
	M10×1.5	$4.8^{\pm 0.2}$	$(34.7^{\pm 1.7})$	$5.6^{\pm 0.3}$	$(40.5^{\pm 2.1})$
	M12×1.5	$8.9^{\pm 0.4}$	$(64.4^{\pm 3.2})$	$10.4^{\pm 0.5}$	$(75.2^{\pm 3.8})$
	M12×1.75	$8.5^{\pm 0.4}$	$(61.5^{\pm 3.0})$	$9.9^{\pm 0.5}$	$(71.6^{\pm 3.5})$
	M14×2.0	$13.7^{\pm 0.7}$	$(99.1^{\pm 4.9})$	$15.9^{\pm 0.8}$	$(115^{\pm 6})$
	M16×2.0	$21.2^{\pm 1.1}$	$(153^{\pm 8})$	$24.6^{\pm 1.2}$	$(178^{\pm 9})$
	M20×2.5	$41.9^{\pm 2.1}$	$(303^{\pm 15})$	$48.5^{\pm 2.4}$	$(351^{\pm 18})$
Fine	M6×	–		–	
	M8×1.0	$2.5^{\pm 0.1}$	$(18.1^{\pm 0.7})$	$2.9^{\pm 0.1}$	$(21.0^{\pm 0.7})$
	M10×1.25	$5.1^{\pm 0.3}$	$(36.9^{\pm 2.2})$	$6.0^{\pm 0.3}$	$(43.4^{\pm 2.2})$
	M12×1.25	$9.3^{\pm 0.5}$	$(67.3^{\pm 3.6})$	$10.8^{\pm 0.5}$	$(78.1^{\pm 3.6})$
	M14×1.5	$13.8^{\pm 0.7}$	$(99.8^{\pm 5.0})$	$16.1^{\pm 0.8}$	$(116^{\pm 6})$
	M16×1.5	$22.5^{\pm 1.1}$	$(163^{\pm 8})$	$26.1^{\pm 1.3}$	$(189^{\pm 9})$
	M20×1.5	$46.1^{\pm 2.3}$	$(333^{\pm 17})$	$53.5^{\pm 2.7}$	$(387^{\pm 20})$

1. Standard Securing Points (Non-lubricated)
   - All securing points other than the special type.

2. Special Securing Points (Lubricated Using Molybdenum Grease)
   - Functionally important points
   a. Points where slew bearing is connected to upper frame.
   b. Other points recognized for design considerations as requiring special status.

3. Points Utilizing Thread Lock (Show in assembly)

4. The torque values shown in the text section of this manual take precedence when they differ from those listed in the tables above.

5. In order that nuts and bolts get tightened evenly, tighten opposing bolts (left and right, top and bottom) alternately.

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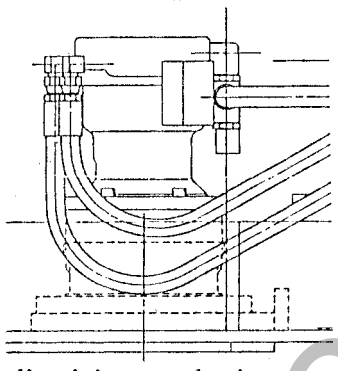
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3.2 DISMANTLING AND MOUNTING

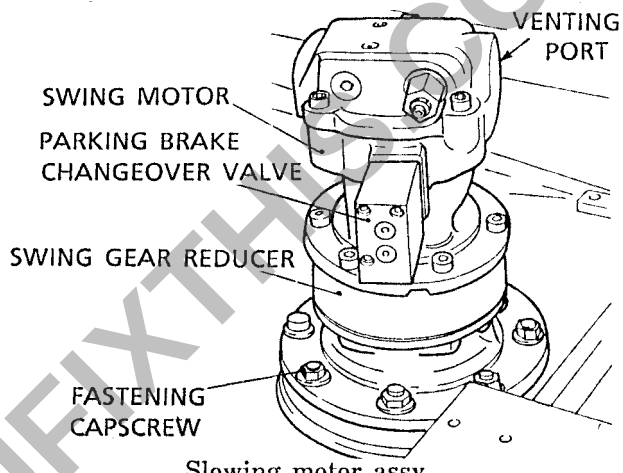
3.2.1 DISMANTLING AND MOUNTING THE SLEWING MOTOR

(1) Dismantling

1) Disconnect the battery (—) terminal.
2) Remove the cabin.
   - Refer to the item "Removing the Cabin".
3) Remove the control box assy.
4) Remove the floor plate assy.
5) Disconnect all the hydraulic hoses connecting the slewing motor. Attach a plug to each of the hydraulic ports of the slewing motor and put a cap to the hydraulic hoses.
6) Remove eight capscrews (M16) that fix the slewing motor to the upper frame.
7) Lift the slewing motor assy and remove it, using a wire sling.
   - Weight of slewing motor : 48kg (106 lbs)



Hydraulic piping on slewing motor



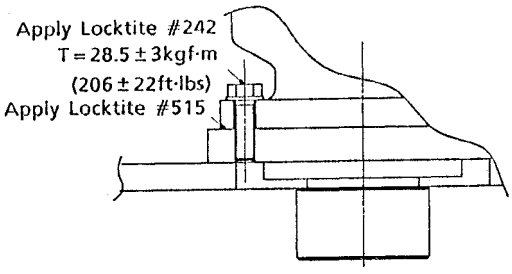
Slewing motor assy

(2) Mounting

For mounting, reverse the order of dismantling, taking care of the following respects:

1) Apply lock tite #515 to the mounting surface between the slewing motor assy and the upper frame.
2) Coat the capscrews fastening the slewing motor assy with Locktite #242 and tighten them to 28.5±3kgf·m (206±22ft·lbs) torque.
3) After mounting and before test run, fill up hydraulic oil into the gear reducer and the motor casing through the venting port or make sure that hydraulic oil is filled up to the venting port level.

☞ • The gear reducer for the slewing unit is lubricated by hydraulic oil from motor drain.

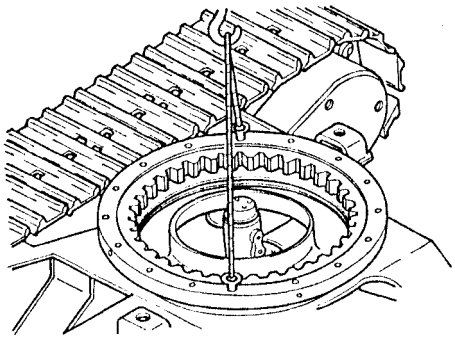


Mounting the slewing motor

3.2.2 DISMANTLING AND MOUNTING THE SLEWING RING

(1) Dismantling

1) Dismantle the attachment.
2) Dismantle the upper frame.
3) Remove the inner race fastening capscrews (20pcs).
   Lift the inner race with a wire sling and remove the slewing ring.

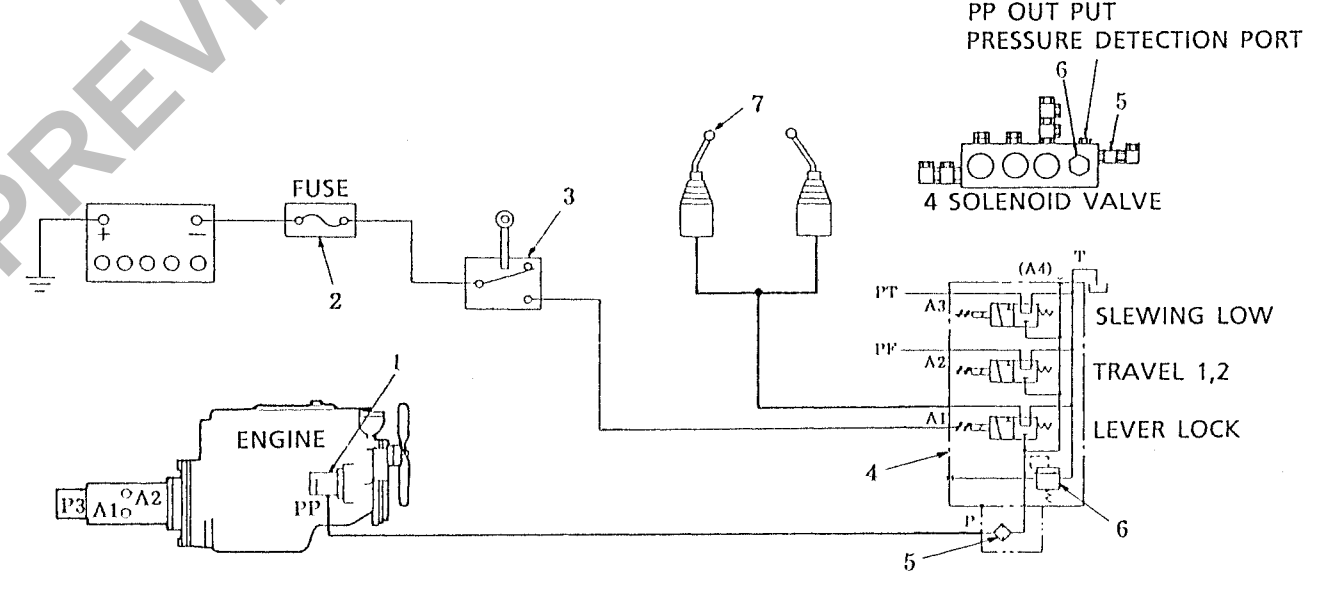


Dismantling the slewing bearing

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BOOM, BUCKET, SWING STRUCTURE, OR ARM DOES NOT MOVE AT ALL OR MOVES TOO SLOWLY

1	Inspect hydraulic pump (PP)		
	Normal		
2	Inspect fuse		
	Normal		
3	Inspect lever lock limit switch ?	Faulty	Adjust or replace limit switch.
	Normal		
4	Inspect pilot solenoid valve ?	Faulty	Repair or replace pilot solenoid valve.
	Normal		
5	Inspect line filter ?	Faulty	Clean or replace.
	Normal		
6	Inspect relief valve ?	Faulty	Adjust or replace.
	Normal		
7	Inspect pilot valve ?	Faulty	Repair or replace pilot valve.



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2.7 WEIGHT TABLES

Unit : kg(lbs)

Item \ Model		SK045		SK050	
		Canopy	Cab	Canopy	Cab
Complete machine	Rubber crawler	4500 (9920)	4620 (10200)	4850 (10700)	4970 (11000)
	Iron crawler	[4480 (9880)]	[4600 (10100)]	[4830 (10600)]	[4950 (10900)]
■ Upper frame assy		1750 (3860)	1870 (4120)	1980 (4370)	2100 (4630)
● Counter weight		430 (950)	←	645 (1420)	←
● Canopy (Cab)		38 (84)	167 (370)	38 (84)	167 (370)
● Engine		185 (410)	←	←	←
● Hydraulic pump		40 (90)	←	←	←
● Radiator		※15 (30)	←	←	←
● Hydraulic tank		※56 (120)	←	←	←
● Fuel tank		※65 (140)	←	←	←
● Slewing motor		49 (110)	←	←	←
● Control valve (7 section)		40 (90)	←	←	←
● Control valve (2 section)		14 (30)	←	←	←
■ Lower frame assy		1790 (3950)	[※1770)(3900)]	1850 (4080)	[※1830 (4030)]
● Lower frame		510 (1120)	←	520 (1150)	←
● Slewing ring		76 (170)	←	←	←
● Travel motor (Inc. Reduction)		63×2 (140×2)	←	←	←
● Upper roller		4.5×2 (10×2)	←	←	←
● Lower roller		8.5×10 (20×10)	←	←	←
● Track tension		24×2 (50×2)	←	←	←
● Front idler		44×2 (97×2)	←	←	←
● Sprocket		15×2 (30×2)	←	←	←
● Crawler shoe assy rubber (Iron)		260×2 (570×2)	[※260×2(570×2)]	※260×2(570×2)	[※260×2(570×2)]
● Dozer blade		200 (440)	←	←	←
● Dozer cylinder		※46 (100)	←	←	←
● Swivel joint		22 (50)	←	←	←
■ Attachment assy		840 (1850)	←	900 (1980)	←
● Boom assy		260 (570)	←	290 (640)	←
●● Arm cylinder		51 (110)	←	57 (130)	←
● Arm assy		153 (340)	←	165 (360)	←
●● Bucket cylinder		34 (75)	←	37 (80)	←
● Bucket assy		117 (260)	←	123 (270)	←
● Boom cylinder		61 (130)	←	75 (170)	←
● Bracket (Swing)		245 (540)	←	←	←
●● Swing cylinder		61 (130)	←	←	←
■ Oil, Grease,Water etc		120 (260)	←	←	←
● Hydraulic oil		56 (120)	←	←	←
● Fuel		46 (100)	←	←	←
● Water		10 (20)	←	←	←
● Engine oil		6 (13)	←	←	←

※ mark dry weight.

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⚠ WARNING

13. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.

14. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary.

15. Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Make reference to "Techniques of Structural Repair Course". Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of parent metal.

16. Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will it be damaged in operation by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.

17. Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution.

18. Always use lift arm supports to keep bucket arms raised and bucket tilted down when maintenance or repair work is performed which requires the bucket in the raised position.

19. Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Pin hole (very small) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use cardboard or paper to locate pin hole leaks.

20. Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure must be installed correctly.

21. Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.

22. On track-type machines, be careful when servicing or separating tracks. Chips can fly when removing or installing a track pin. Wear safety glasses. Track can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks are disengaged from the sprockets. Block the machine to prevent it from moving.

23. Caution should be used to avoid breathing dust that may be generated when handling components containing asbestos fibers. If this dust is inhaled, it can be hazardous to your health. Components in KOBELCO products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates and some gaskets. The asbestos used in these components is usually bound in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust which contains asbestos is not generated.

If dust which may contain asbestos is present, there are several common sense guidelines that should be followed.

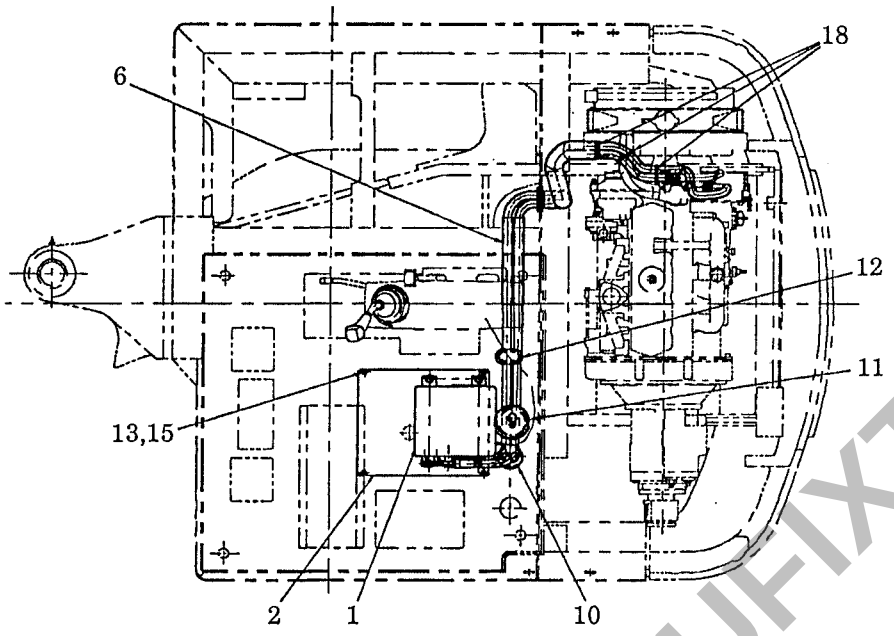
a. Never use compressed air for cleaning.
b. Avoid brushing or grinding of asbestos containing materials.
c. For clean up, use wet methods or a vacuum equipped with a high efficiency particulate air (HEPA) filter.
d. Use exhaust ventilation on permanent machining jobs.
e. Wear an approved respirator if there is no other way to control the dust.
f. Comply with applicable rules and regulations for the work place.
g. Follow environmental rules and regulations for disposal of asbestos.
h. Avoid areas where asbestos particles may be in the air.

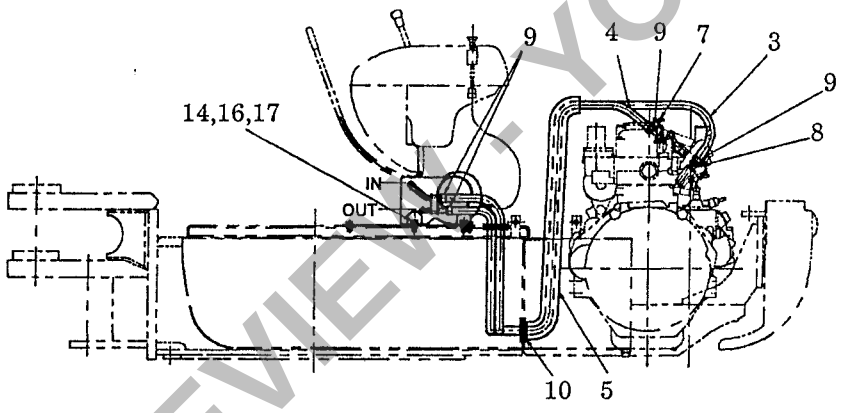
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10. HEATER

The heater equipment allows the warm water of the engine (after cooling) to circulate between the heater unit and the engine. exchanges heat in the heater unit and takes out warm air from it.

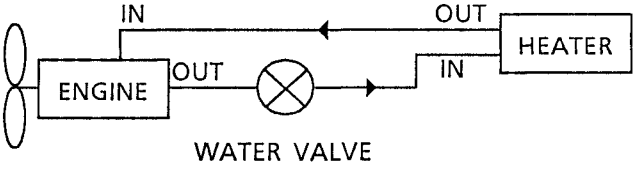




No.	NAME		Q'ty
1	HEATER		1
2	COVER		1
3	HOSE L=2500		1
4	HOSE L=2300		1
5	HOSE L=650		1
6	HOSE L=250		2
7	COCK		1
8	CONNECTOR		1
9	CLIP		4
10	GROMMET		2
11	GROMMET		1
12	GROMMET		1
13	CAPSCREW	M8×20	4
14	CAPSCREW	M10×20	4
15	LOCK WASHER	M8	4
16	LOCK WASHER	M10	4
17	WASHER	M10	4
18	CLIP		3

CAUTIONS TO BE EXERCISED IN OPERATION

1) Use an antifreeze solution of concentration suited for the outer temperature of the winter time, in order to prevent the warm water circuit from fracturing due to the frozen water.
2) Where antifreeze solution is not used in winter, close the water valve on the engine side when resting operation and discharge the water of the heater core through the drain cock.



Construction of heater system

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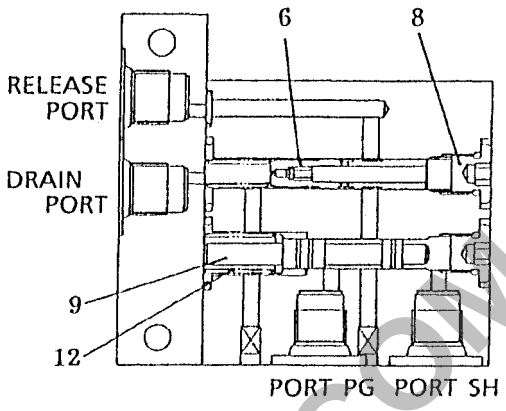
(5) Hydraulic timer

Pressure of 40kgf/cm^2 (289ft·lbs) is normally present in port PG. The spool (9) is normally moved to the right by the force of the spring (12) to close off port PG.

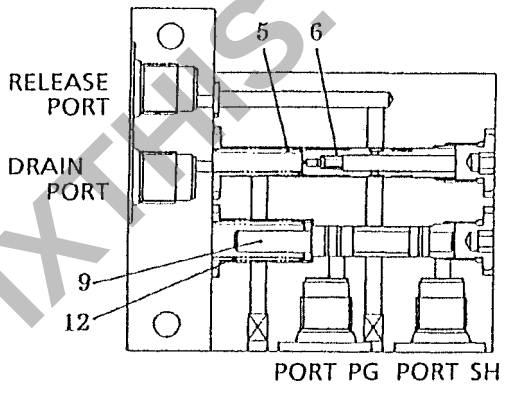
When signal pressure appears at port SH, the spool overcomes the force of the spring (12), and moves to the left, opening port PG. The oil flowing through port PG flows past the middle portion of the spool and is directed to the release port, releasing the mechanical brake.

When the signal pressure at port SH disappears, the spool (9) is returned the right by the force of the spring (12), closing off port PG and trapping oil in the motor brake chamber.

The trapped oil is returned slowly to the tank via the throttle in the poppet (6) which acts as a pressure reducing valve. This return process acts as an timer.



Port SH signal ON



Port SH signal OFF

(6) Bypass valve

1) When accelerating the slewing body

The moment an acceleration step is performed, high pressure oil in "A" momentarily flow to "B". At the same time, oil under high pressure enters the back chamber of poppet "A" as well, moving poppet "A" to the right. Thus the state shown in Fig. 2 is created.

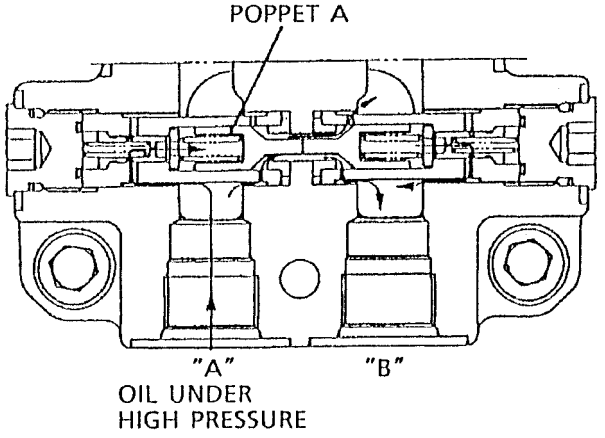


Fig. 1

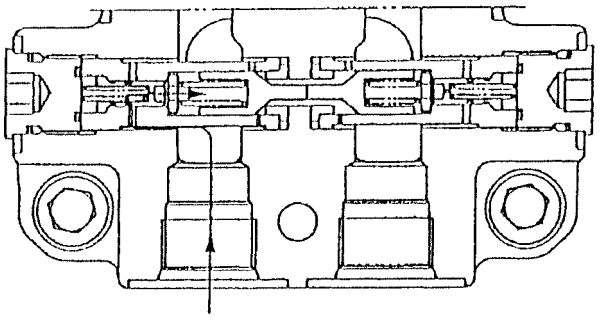
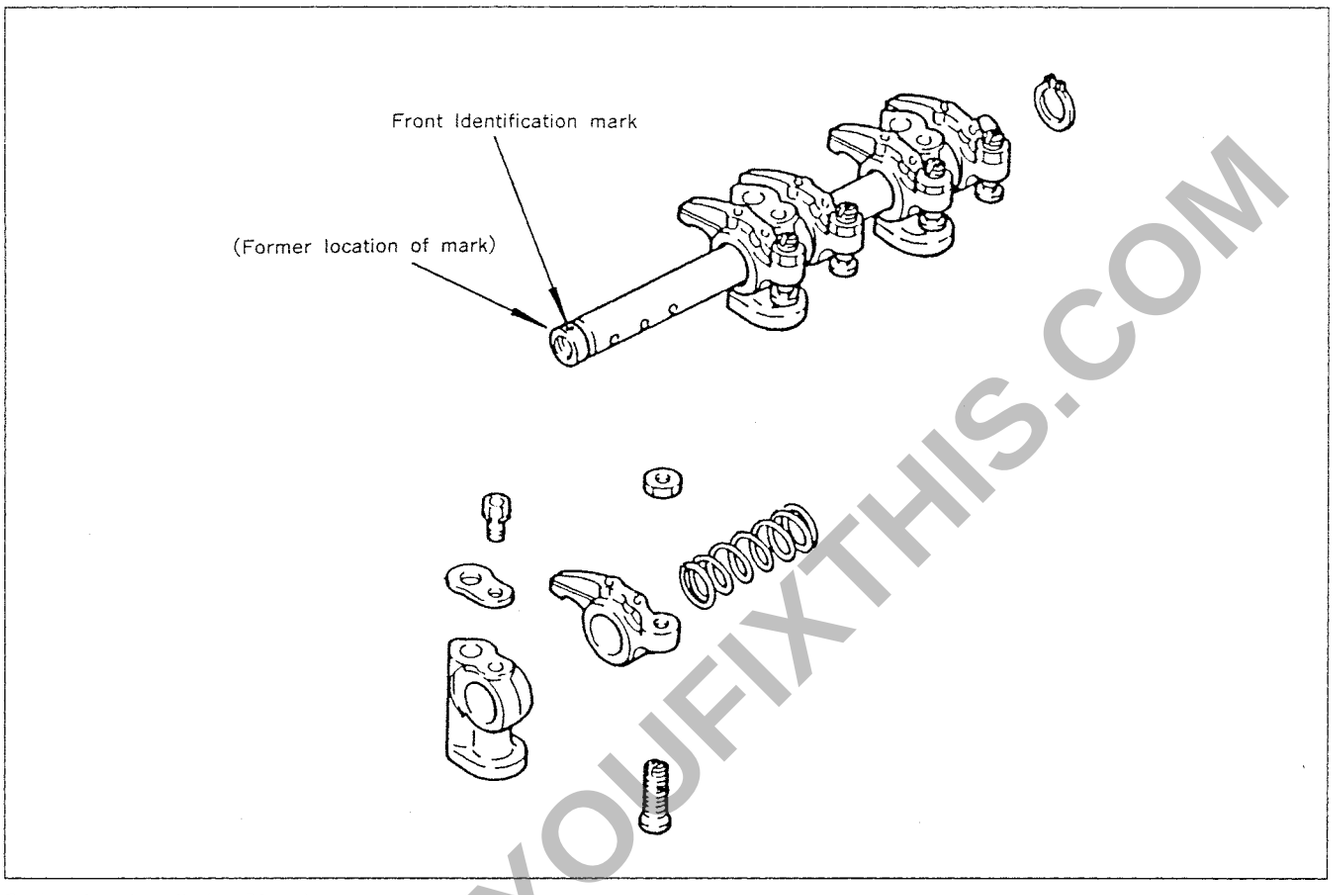


Fig. 2

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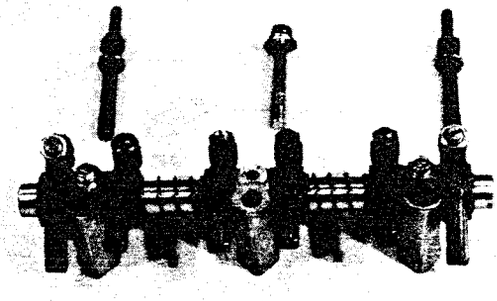
■ Removal and Installation



Rocker Arm Installation Direction

CAUTION

- Before removing the rocker shaft assembly, turn the crankshaft to bring each cylinder to compression stroke as much as possible.
- After installation, always adjust valve clearance.



Removing Rocker Shaft Assembly

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