SHOP MANUAL
E130
CRAWLER EXCAVATOR
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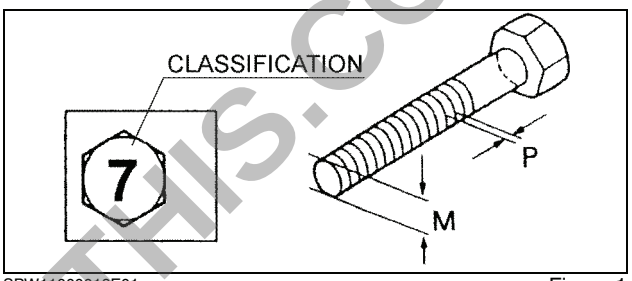
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11.1 TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

The following Torque Specifications are provided for use when actual torque value of a fastener is not known. Check the capscrews and nuts for their tightness and the loss of before starting work and at periodic maintenance intervals. Retighten and replace as needed. For a new machine, check and retorque after the first 50 hours of operation. Replace with genuine parts.

Refer to the table below for the tightening and retightening of capscrews.

1. The table below is not applicable for the capscrews that secure plastic covers. For the tightening torque for such capscrews, contact your dealer. Over-tightening may cause damage to the plastic parts.
2. In case that the tightening torque is specified in the manual, use those torque values regardless to the table below.
3. Numerical indication on the capscrew head shows the classification for strength (e.g., 7=7 T). No indication is provided for smaller size of capscrews, M5 or less.



SPW11000018E01 Figure 1

11.1.1 METRIC COARSE THREAD STANDARD TIGHTENING TORQUE VALUES

Make sure to tighten all Capscrews and Nuts to proper torque values.

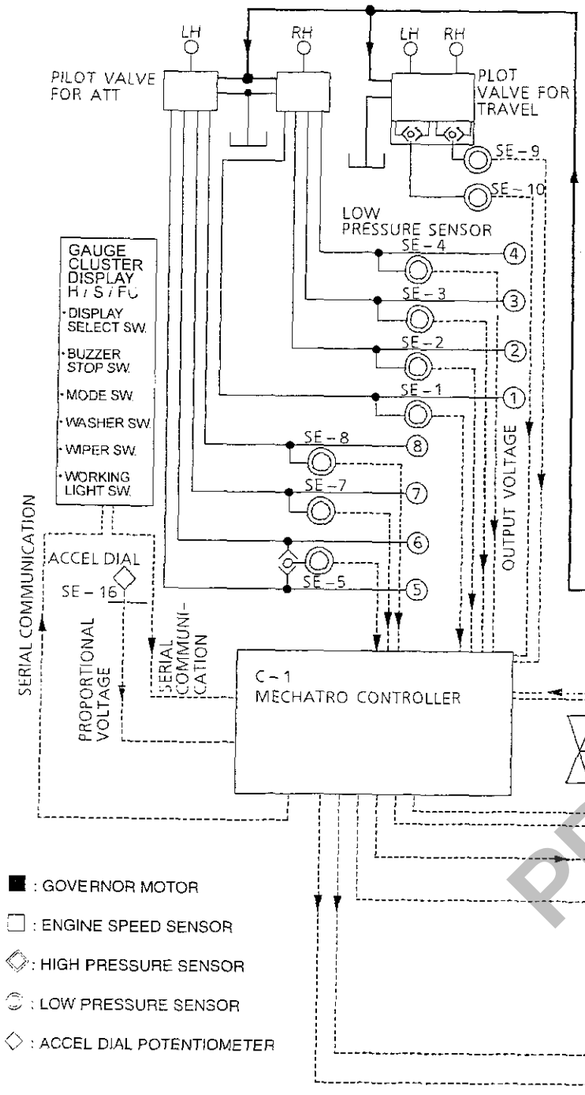
METRIC COARSE THREAD STANDARD TIGHTENING TORQUE VALUES							
Classification		4.8T		7T		10.9T	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M6	P=1	4.4±0.5 (3.2±0.4)	3.7±0.4 (2.7±0.3)	9.6±1.0 (7.1±0.7)	8.1±0.8 (6.0±0.6)	17.4±1.8 (12.8±1.3)	14.7±1.5 (10.8±1.1)
M8	P=1.25	10.7±1.1 (7.9±0.8)	9.0±0.9 (6.6±0.7)	23.5±2.0 (17.3±1.5)	19.6±2.0 (14.5±1.5)	42.2±3.9 (31.1±2.9)	35.3±3.9 (26.0±2.9)
M10	P=1.5	21.6±2.0 (15.9±1.4)	17.9±1.8 (13.2±1.3)	46.1±4.9 (34.0±3.6)	39.2±3.9 (28.9±2.9)	83.4±8.8 (61.5±6.5)	70.6±6.9 (52.1±5.1)
M12	P=1.75	36.3±3.9 (26.8±2.9)	31.4±2.9 (23.2±2.1)	79.4±7.8 (58.6±5.8)	66.7±6.9 (49.2±5.1)	143±15 (105±11)	121±12 (89.2±8.9)
M14	P=2	57.9±5.9 (42.7±4.4)	49.0±4.9 (36.1±3.6)	126±13 (92.9±9.6)	106±10 (78.2±7.4)	226±20 (167±15)	191±19 (141±14)
M16	P=2	88.3±8.8 (65.1±6.5)	74.5±6.9 (55.0±5.1)	191±20 (141±15)	161±16 (119±12)	343±39 (253±29)	284±29 (209±21)
M18	P=2.5	122±12 (90.0±8.9)	103±10 (75.8±7.2)	265±29 (195±21)	226±20 (167±15)	481±49 (355±36)	402±39 (297±29)
M20	P=2.5	172±17 (127±13)	144±14 (106±10)	373±39 (275±29)	314±29 (232±21)	667±69 (492±51)	559±59 (412±44)
M22	P=2.5	226±20 (167±15)	192±20 (142±15)	500±49 (369±36)	422±39 (311±29)	902±88 (665±65)	755±78 (557±58)
M24	P=3	294±29 (217±21)	235±29 (173±21)	637±69 (470±51)	520±49 (383±36)	1160±118 (856±87)	941±98 (694±72)
M27	P=3	431±39 (318±29)	353±39 (260±29)	941±98 (694±72)	765±78 (564±58)	1700±167 (1250±123)	1370±137 (1010±101)
M30	P=3.5	588±59 (434±44)	490±49 (361±36)	1285±127 (948±94)	1079±108 (796±80)	2300±235 (1700±173)	1940±196 (1430±145)
M33	P=3.5	794±78 (586±58)	667±69 (492±51)	1726±177 (1270±131)	1451±147 (1070±108)	3110±314 (2290±232)	2610±265 (1930±195)
M36	P=4	1030±98 (760±72)	863±88 (637±65)	2226±226 (1640±167)	1863±186 (1370±137)	4010±402 (2960±297)	3360±333 (2480±246)

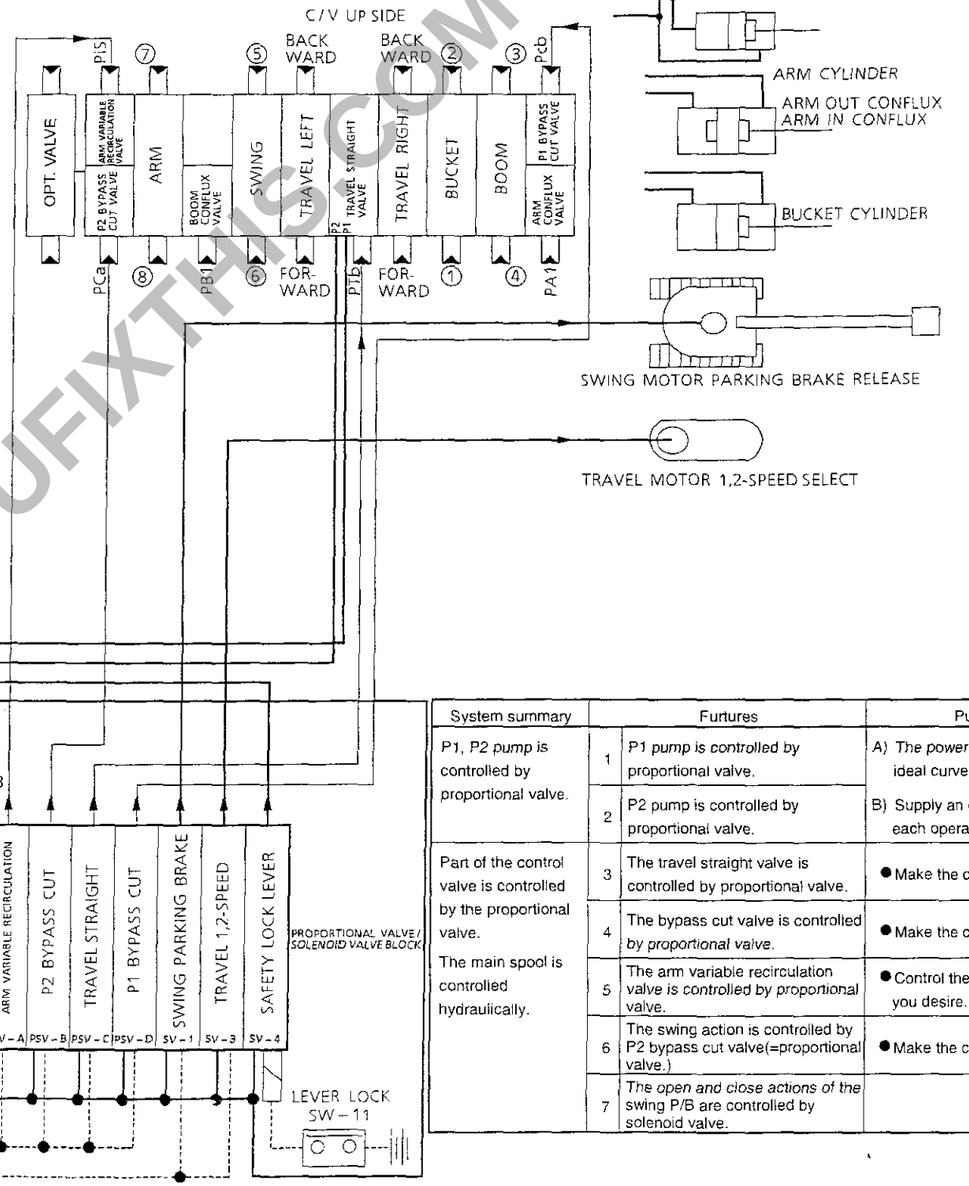
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1. SUMMARY OF MECHATRO CONTROL SYSTEM

1.1 MECHATRO CONTROL SYSTEM IN GENERAL

ELECTRIC — CONTROLLER INPUT SIGNAL ------- HYDRAULIC — PILOT SECONDARY PRESSURE; SOLENOID PROPORTIONAL VALVE SECONDARY PRESSURE ——; PILOT PRIMARY PRESSURE MAIN CIRCUIT ——



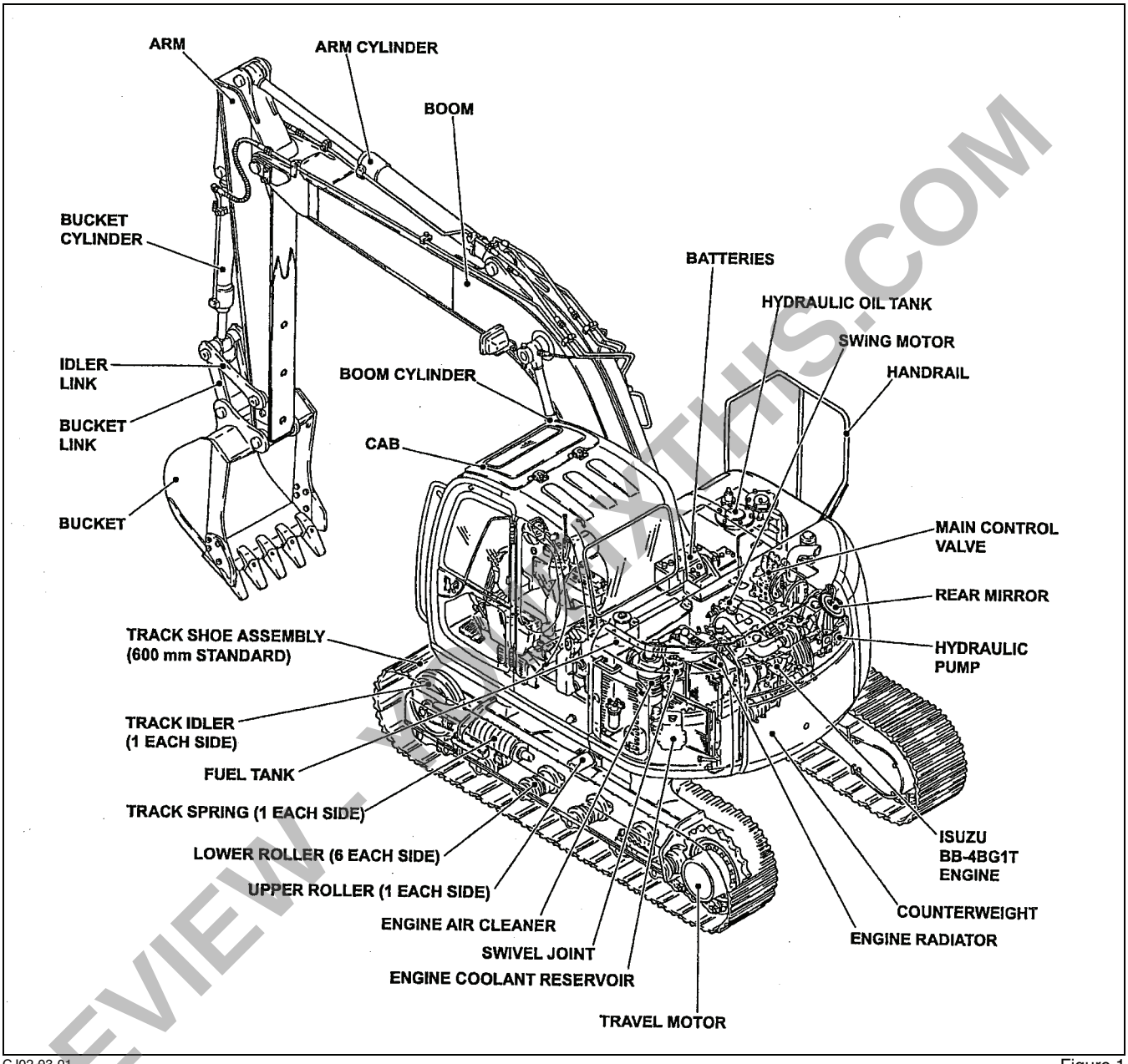


System summary		Furtures	Purpose
P1, P2 pump is controlled by proportional valve.	1	P1 pump is controlled by proportional valve.	A) The power curve shall be an ideal curve.
	2	P2 pump is controlled by proportional valve.	B) Supply an optimum flow for each operation.
Part of the control valve is controlled by the proportional valve. The main spool is controlled hydraulically.	3	The travel straight valve is controlled by proportional valve.	● Make the changeover soft.
	4	The bypass cut valve is controlled by proportional valve.	● Make the changeover soft.
	5	The arm variable recirculation valve is controlled by proportional valve.	● Control the arm speed as you desire.
	6	The swing action is controlled by P2 bypass cut valve(=proportional valve.)	● Make the controllability soft.
	7	The open and close actions of the swing P/B are controlled by solenoid valve.	

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2.1 COMPONENTS



CJ02-03-01

Figure 1

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22.2 HYDRAULIC CIRCUITS AND COMPONENTS

Standard spec.		YY01Z00037P1	E130 SR (LC) (-1E) E130 SR (L) (-1E)
No.	NAME	PART No.	MODEL No.
1	PUMP ASSY (WITH GEAR PUMP)	YY10V00001F4	K3V63DTP100R
2	CONTROL VALVE (MAIN)	YY30V00044F1	KMX13YC
3	SWING MOTOR UNIT	YY15V00004F1	M2X63CHB-13A
4	TRAVEL MOTOR UNIT	YX15V00003F4	GM18VL2
5	BOOM CYLINDER LH	YY01V00001F1	CA100X1038B38F
6	BOOM CYLINDER RH	YY01V00002F1	
7	ARM CYLINDER	YY01V00003F2	CA115X1135B38F
8	BUCKET CYLINDER	YX01V00005F2	CA95X885B38F
9	SWIVEL JOINT	YN55V00037F2	
10	PILOT VALVE (ATT)	YT30V00008F2	PV48K1008
11	PILOT VALVE (TRAVEL)	YX30V00004F1	07291-00000
13	INLINE FILTER	YN50V00007F1	YTD9257
14	SUCTION STRAINER	[YW50V00004F5]	[Y-501000] (Used in only types before modification)
		YW50V00004FA※	Y-672300 (Used in only types after modification)
15	SOLENOID VALVE ASSY	YY35V00006F1	7KWE5G
16	RETURN FILTER	[YV50V00001P1]	[Y-487100] (Used in only types before modification)
		YV52V01001F1※	FZ1F183S011A (Used in only types after modification)
17	BY-PASS VALVE	[2446U119S3]	[Y-169200] (Used in only types before modification)
18	BREATHER ASSY	YN57V00002F4	AB0210GA001B
19	BOOST CHECK VALVE	LP21V00004F1	Y-443600
20	BY-PASS CHECK VALVE	LP21V00010F1	Y-479600
21	SLOW RETURN VALVE	YN21V00005F2	07579-00000
22	SLOW RETURN VALVE	YN21V00005F3	07580-00000
23	CONTROL VALVE (Ex.&N&B)	YN30V00075F1	KADV22Y/S10102
24	SLOW RETURN VALVE	YY21V00002F6	16092-0000
25	SELECTOR VALVE	24100P1005F1	
26	STOP VALVE	24100P1006F1	
27	PILOT VALVE	YN30V00080F1	16030-00000

Note : ● The part numbers and serial numbers of machine may be changed due to modification, so use only the numbers for references.
● Part number in [ ] shows the number before modification of machines.
YY02-03001～, YH02-01301～, LK02-01041～
● Part number marked ※ shows the change and additional parts according to modification of machine.
YY03-04555～, YH03-02097～, LK03-01107～

CH22-04-01

Figure 2

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23.1.1 ELECTRIC CIRCUIT DIAGRAM

YY03Z00004P1

Applicable machine

YH02-01301～

YY02-03001～

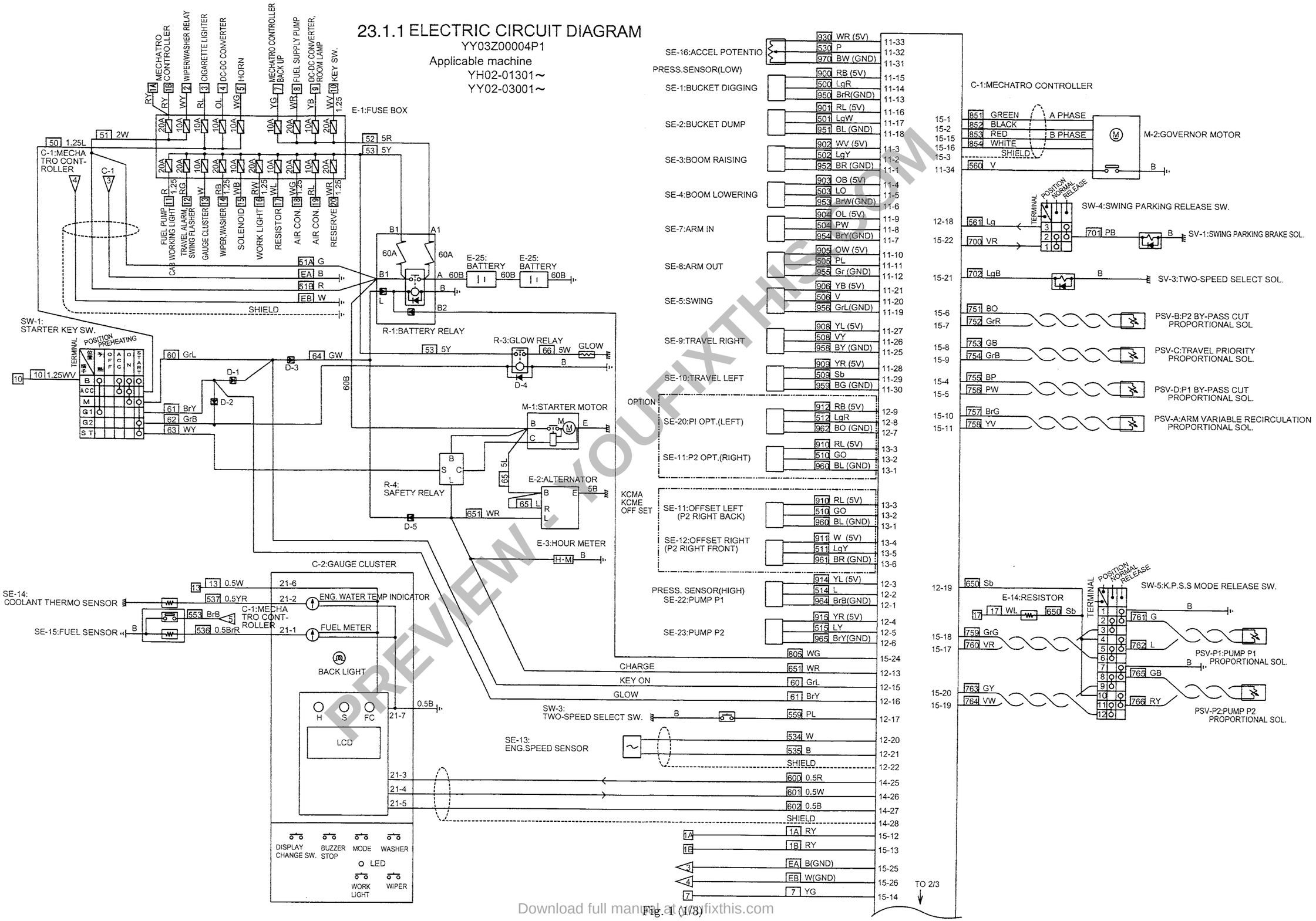


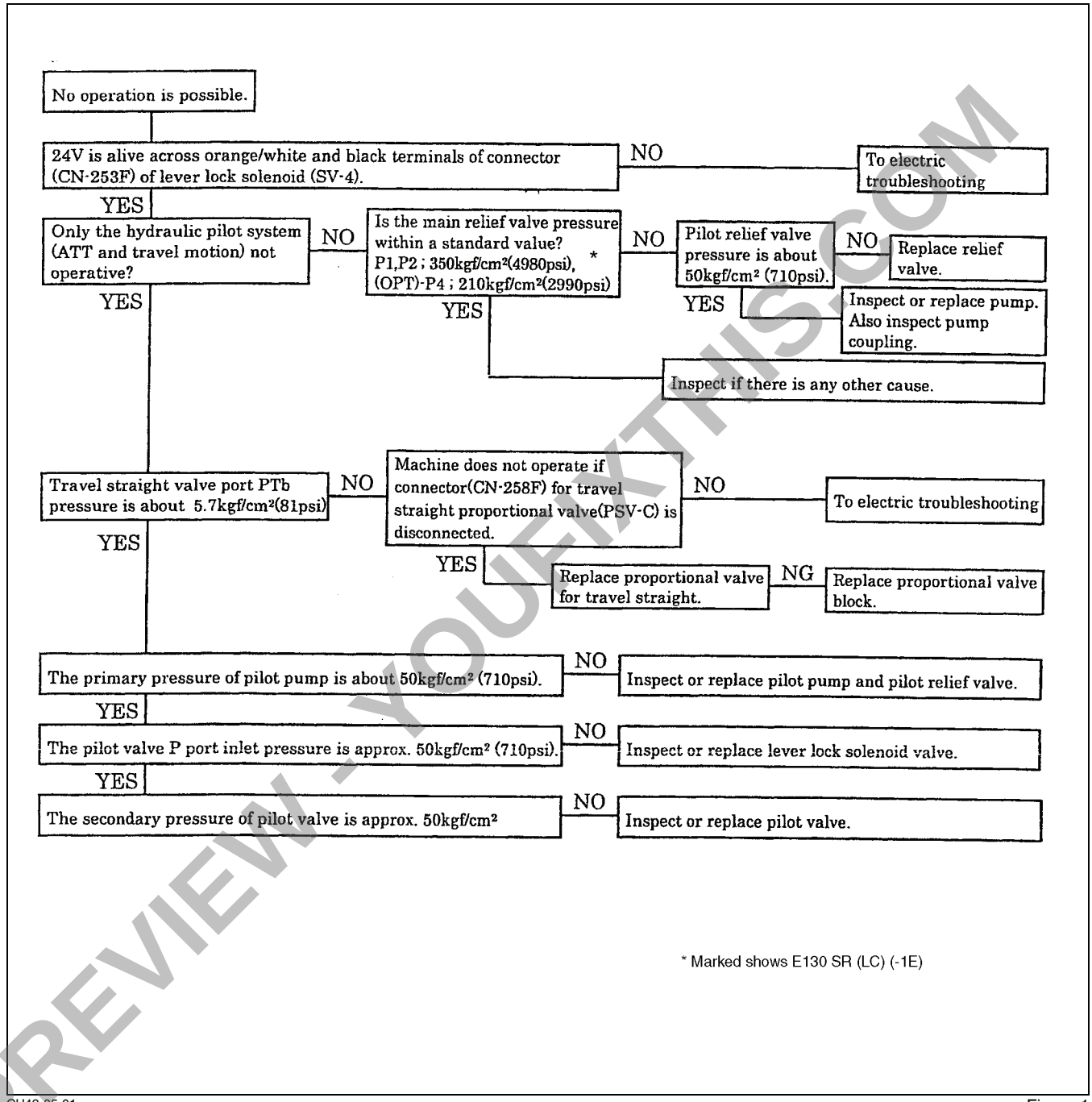
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42.1.1 TROUBLESHOOTING

42.1.1.1 NO OPERATION



CH42-05-01

Figure 1

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2.4 ENGINE SPECIFICATIONS

Models:
E130 SR (YY02-03001); E130 SR (LC) (YH02-01301); E130 SR (L) (LK02-01041)

Model		E130 SR, E130 SR (LC)		
Engine model		ISUZU A−4BG1T		
Type		Diesel, 4-cycle water-cooled, in-line, direct injection, turbo charger		
Number of cylinder− Bore×Stroke	mm (in)	4×105(4.13)×125(4.92)		←
Total displacement	cc (cu·in)	4,329(264)		←
Compression ratio		18.0		←
Rated out put	kW (PS) at min^{-1}	70.1 (95) at 2,200		
Maximum torque	kgf·m (lbf·ft) at min^{-1}	32.4 (235) at 1,600		
High idling	min^{-1}	2,630±30		←
Low idling	min^{-1}	1,000±25		←
Injection valve opening pressure	kgf/cm^2(psi)	185(2,630)		←
Thermostat action Start/Full open	℃(°F)	82 / 95(180 / 203)		←
Firing order		1−3−4−2		←
Compression pressure	kgf/cm^2 (psi)	185(2,630)		←
Lubrication oil pressure		——		——
Fuel injection timing		12° before top dead point		
Valve clearance		Valve clearance	Open	Close
	Intake valve	0.4mm (0.016″) in cold condition	24.5° before top dead point	55.5° after bottom dead point
	Exhaust valve	0.4mm (0.016″) in cold condition	54° before bottom dead point	26° after top dead point
Starter capacity	V×kW	24×4.5		←
Generator capacity (Alternator)	V×A	24×40		24×40
Cooling fan drive method		Ø550 (21.7in) suction type 8 fans, V-belt drive, pulley ratio Crank / Fan= 1.01		←
Engine oil quantity (Oil pan only)	ℓ (gal)	Max. 13(3.4), Min. 11(2.9)		←
Dry weight	kg (lb)	368(811)		←
Fuel consumption ratio	g/kW·h (g/PS·h)	234±16% (172±12%)		←
Allowable inclination		Front / Rear and Right / Left : 35°		
Dimension (L×W×H)	mm (in)	900×690×865 (34.4in×27.2in×34.1in)		←
Rotating direction		Counterclockwise seeing from flywheel side		

CH02-14-01

Figure 12

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12.1 WORKING STANDARDS FOR TIME TABLES

12.1.1 WORKING CONDITIONS

1. Technicians:
   One or more technicians who are qualified by Manufacturer are needed. The technicians need five years or more experience and have completed the training in the operation of this machine.
2. Facilities:
   General jigs, tools, apparatus, testers to be provided. The maintenance workshop should be equipped with a crane and inspection instruments necessary for specific self inspection activities.
3. Place:
   The workshop should be located in a suitable area with a service truck and crane available.

12.1.2 APPLICABLE RANGE OF STANDARD MAINTENANCE TIME

1. Standard maintenance time:
   Direct maintenance time plus spare time.
2. Direct maintenance time:
   Net time actually spent for maintenance.
3. Additional time:
   Time for transportation of the machine for maintenance, preparation for a safe work site.

12.1.3 EXCLUDED TIME

NOTE: *Not included in standard maintenance time.*

1. Repairing time:
   Time for machining, sheet metal processing, welding, gas cutting, removing broken screw, taking care of parts and painting.
2. Items excluded from maintenance time because of uncertainty in time:
   Receiving the vehicle into shop, transportation, delivery, final inspection and investigation of causes for trouble, diagnosis and inspection.
3. Indirect time:
   Time for field work, preparation of required parts, etc., before starting work, going to and from the site, waiting due to user's convenience at the site and paper work for reports, bills, etc.
4. Over time:
   Over time should be calculated separately.
5. Separate calculation:
   The cost for service cars, trucks with crane and truck cranes should be calculated separately.

12.1.4 APPLICABLE MACHINE FOR ESTIMATION OF STANDARD MAINTENANCE TIME

1. Standard machine.
2. A well maintained machine combined with standard attachments which has operated in a normal circumstances.

12.1.5 STANDARD MAINTENANCE TIME TABLE

1. Units of working time:
   6 minutes = 0.1 hour
2. Calculating method of standard maintenance time:
   Maintenance time = Working time × Number of workers
   Working time = Maintenance time / Number of workers)
3. When more than one job is being performed:
   A. Add each standard maintenance time
   B. A time is given except for covers that are easily removed by hand.
   C. Assembly (Assy) works include the following works marked with black dot •
4. O / H:
   The removing and installing time are included.
5. Abbreviations used in the Standard Working Time Table.

Abbreviations			
Air Conditioner	AC	Flexible hose	F hose
Assembly	ASSY	Installation	Inst.
Attachment	ATT	Overhaul	O/H
Bearing	BRG	Removal	Rem.
Control valve	C/V	Solenoid	SOL
Cylinder	Cyl	Switch	SW
Engine	E/G	Valve	V

12.1.6 CLASSIFICATION OF WORK CODE

GROUP		REMARKS
No.	Description	
01	Attachment	To indicate removing, installing, replacement and overhaul.
02	Canopy and Guard	
03	Upper Structure	
04	Under carriage	
06	Electric Equipment	Indicates the installing, removing, replacing of items
09	E/G Related	Indicates the overhaul of the engine (materials prepared by manufacturer

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1.3 GENERAL PRECAUTIONS FOR REPAIRS

1.3.1 PREPARATION BEFORE DISASSEMBLING



1. Understand operating procedure

   Read OPERATOR'S MANUAL and this MANUAL carefully prior to operating the machine.

2. Cleaning machines

   Remove soil, mud, and dust from the machine before service. This will increase work efficiency and prevent damaging parts, and aid in rust prevention and dust protection while reassembling.

3. Inspecting machines

   Identify the parts to be disassembled before starting work, determine the disassembling procedure taking into consideration working conditions etc. Request necessary parts in advance.

4. Record the following items
   A. Inspection date and place
   B. Model name, applicable machine number, and hour meter reading
   C. Problem conditions, place and cause.
   D. Visible oil leakage, water leakage and damage.
   E. Clogged filters, oil level, oil quality, oil contamination and loose connections.
   F. Is it a recurring fault at approximately the same amount of operating hours?

5. Arrangement and cleaning in service shop
   A. Tools required for repair work.
   B. Prepare space to place the disassembled parts.
   C. Prepare oil containers for draining oil etc.

1.3.2 SAFETY IN DISASSEMBLING AND ASSEMBLING



1. Wear appropriate clothes with safety shoes, safety helmet, and protective safety glasses.
2. Suspend warning tag DO NOT OPERATE from the doorknob or the operating lever.
3. Stop the engine before starting inspection and maintenance.
4. Identify the location of a first-aid kit and a fire extinguisher, also who to contact in case of an emergency.
5. Choose a hard, level and safe place, and place the attachment on the ground securely.
6. Use a hoist to remove heavy parts (20 kg [45 lbs] or more) from the machine.
7. Use proper tools, and replace or repair defective tools.
8. Support the machine and attachment with supports or blocks if the work is performed in the lifted condition.

1.3.3 DISASSEMBLING AND ASSEMBLING HYDRAULIC EQUIPMENT



1. Removing hydraulic equipment
   A. Before disconnecting pipes, release the hydraulic pressure in the system.
   B. Carefully drain oil from the removed pipes into a containers without spilling on the floor.
   C. Install plugs or caps on the pipe ends to avoid oil spillage and contamination.
   D. Clean off the external surface of the equipment before disassembling, drain hydraulic and gear oil before placing component on the workbench.
2. Disassembling hydraulic equipment
   A. Do not modify the hydraulic equipment without the permission of the manufacturer. Manufacturer will not be responsible for the performance and function of the product after modification.
   B. When disassembling and reassembling for repair, refer the work to qualified personnel who have the knowledge or have completed the service training.
   C. Provide aligning markings to facilitate reassembly.
   D. Before starting the work, read the manual for disassembly procedures and decide whether the work can be performed by yourself or if assistance is required.
   E. Use the special jig or tools if they are specified.

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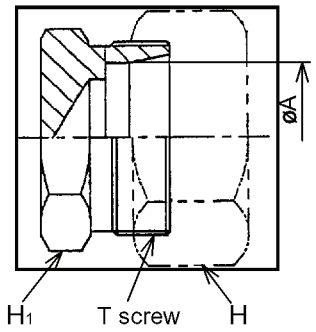
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11.5 PLUGS

11.5.1 PLUG FOR HYDRAULIC PIPE JOINT

11.5.1.1 CAP NUT (JOINT PLUG)

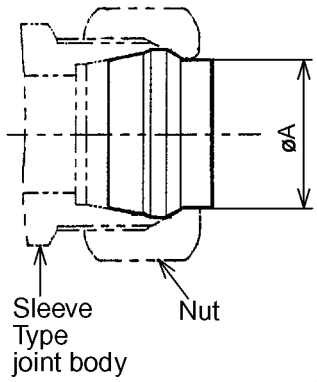


Applicable tube O. D : A	Cap nut parts No.	T screw	Opposing flats	
			H_1	H
6	ZF83H06000	M12 × 1.5	14	14
8	ZF83H08000	M14 × 1.5	17	17
10	ZF83H10000	M16 × 1.5	17	19
12	ZF83H12000	M18 × 1.5	19	22
15	ZF83H15000	M22 × 1.5	24	27
18	ZF83H18000	M26 × 1.5	27	32
22	ZF83H22000	M30 × 1.5	32	36
28	ZF83H28000	M36 × 1.5	38	41

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Figure 9

11.5.1.2 PLUG (TUBE PLUG)

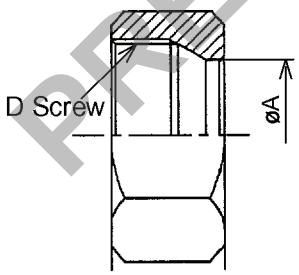


Applicable tube O. D : A	Plug parts No.
6	ZF83P06000
8	ZF83P08000
10	ZF83P10000
12	ZF83P12000
15	ZF83P15000
18	ZF83P18000
22	ZF83P22000
28	ZF83P28000

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Figure 10

11.5.1.3 NUT



Applicable tube O. D : A	Nut parts No.	D screw	Opposing flats
6	ZF93N06000	M12 × 1.5	14
8	ZF93N08000	M14 × 1.5	17
10	ZF83H10000	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

SPW11000008E01

Figure 11

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(1) Recirculation cut control

1) If load increases and the load pressure of the pump rises above 160kgf/cm^2 (2280psi) during arm in operation, the output voltage of the high pressure sensor (SE-23) is put into the mechatro controller.
The mechatro controller processes pilot signals and puts out a command current that cuts off the variable recirculation, to the variable recirculation proportional valve.

2) The variable recirculation proportional valve puts out secondary pilot pressure according a command current of the mechatro controller, brings back the variable recirculation valve to the recirculation cut position and blocks the recirculation passage.

(2) Sequence conflux control

1) If load increases and the load pressure rises above 220kgf/cm^2 (3130psi) during arm in operation, the mechatro controller processes a pilot signal and puts out a command current to the travel straight proportional valve and the P1 bypass cut proportional valve according to the secondary operating pilot pressure.

2) The travel straight proportional valve and the P1 bypass cut proportional valve put out the secondary pilot pressure according to a command current of the mechatro controller and switches the travel straight valve and the P1 bypass cut valve.

3) When the travel straight valve is changed over, the parallel passage on the P1 side connects with the parallel passage on the P2 side.
When the P1 bypass cut valve and the P2 bypass cut valve are changed over, the oil discharged by the P1 pump is combined with that by the P2 pump by arm operation.

Note: If sequence conflux control operates during slope finishing work, the oil is combined in the parallel passage. The operability is deteriorated as the oil for the bucket operation is combined together. If a signal is put into the low pressure sensor on the bucket dump side, the sequence conflux control does not operate.

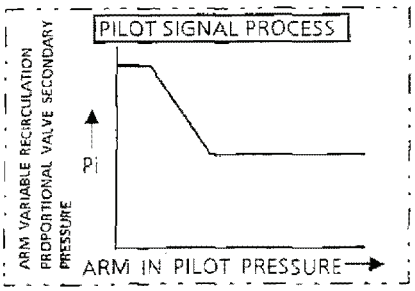
(3) Recirculation control

1) Start arm in operation simultaneously, and arm operation pilot secondary pressure switches arm spool, and is input into low pressure sensor.

2) The output voltage of the low pressure sensor is put into the mechatro controller. The mechatro controller processes the pilot signal and puts out a command current according to the input voltage to the P2 pump proportional valve, the P2 bypass cut proportional valve and the variable recirculation proportional valve.

3) Each proportional valve puts out secondary pilot pressure according to a command current from the mechatro controller and switches the discharge rate of the P2 pump. At the same time it switches the P2 bypass cut valve and the variable recirculation valve of the control valve.

4) The pure hydraulic command switches the arm main spool. Then a command from the mechatro controller switches the P2 pump, the P2 bypass cut valve and the variable recirculation valve. This causes the returned oil of the arm cylinder rod side to be recirculated to the oil discharged by the P2



CH21-03-2

Figure 2

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12.1 HYD. LINES LIST (2/2)

DIVISION		NAME			E130 SR (-1E)	E130 SR (LC) (-1E)	E130 SR (L) (-1E)
Gr.	ITEM			DOZER N&B	N&B	N&B	STD
	16 −1	SWIVEL HYD. LINES (For LOWER)	(STD, LC)	—	YV19H00002F1	←	—
	16 −2		(DZ)	YX19H00003F1	—	—	—
	16 −3		(L)	—	—	—	LP19H00001F1
	17 −1	TRAVEL MOTOR HYD. LINES	(STD, DZ, LC)	YV12H00003F1	←	←	—
	17 −2		(L)	—	—	—	YV12H00002F1
ATTACHIMENT HYD. LINES	21 −1	BOOM HYD. LINES	(STD)	YY42H00056F1	←	←	←
	21 −2	ADD-ON BOOM HYD. LINES	(N&B)	YY42H00085F1	←	←	—
	22 −1	ARM HYD. LINES	(STD)	YY43H00001F1	←	←	—
	22 −2	ARM HYD. LINES	(Long Arm)	YY43H00004F1	←	←	←
	22 −3	ADD-ON ARM HYD. LINES	(N&B)	YY43H00058F1	←	←	—
	22 −4	ADD-ON CONNECTOR ASSY		LP43H00004F1	←	←	←
	23 −1	CYLINDER	BOOM CYL. HYD. LINES	YY42H00003F1	←	←	←
	23 −2		ARM CYL. HYD. LINES	YY42H00004F1	←	←	←
	23 −3		BUCKET CYL. HYD. LINES	LP43H00002F1	←	←	←
	23 −4		DOZER CYL. HYD. LINES	YX13H00001F1	—	—	—

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23.1.26 FLOOR HARNESS ASSY

FLOOR HARNESS ASSY		YY13E00010F6		
ITEM	PART NAME	PART No.	Q'TY	REMARKS
3	CABLE	LE13E01005P1	1	Ground
10	HARNESS	YY13E01088P2	1	Under floor

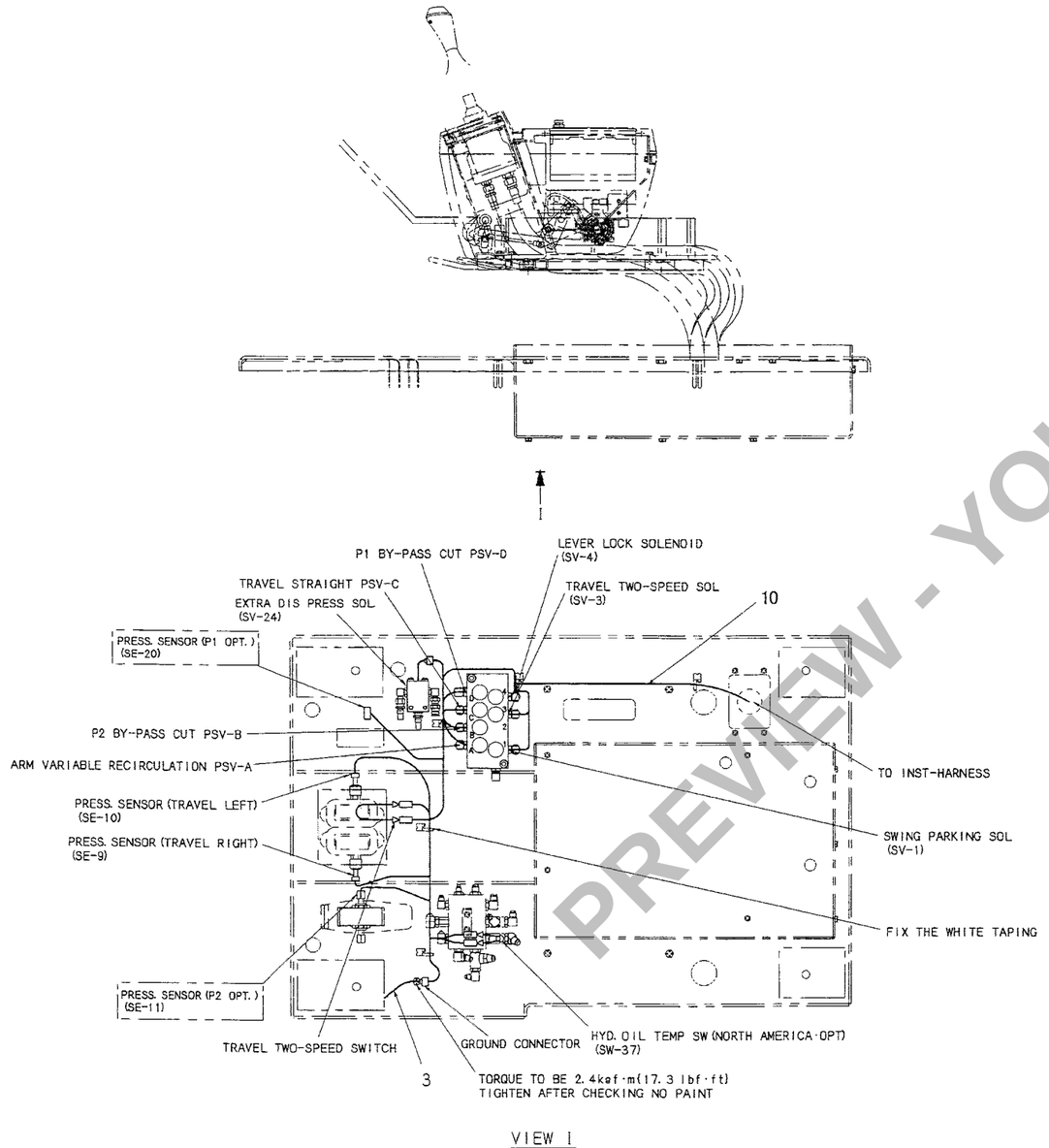
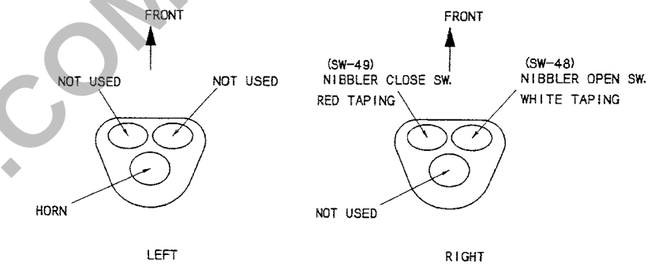


Fig. 18 Floor harness assy

3.9B FLOOR HARNESS ASSY(1/2) (FLOOR SIDE)

HAND CONTROL HARNESS		YY13E00011F1		
ITEM	PART NAME	PART No.	Q'TY	REMARKS
1	HARNESS	YY13E01073P1	1	Under floor

N&B HAND CONTROL SPEC.



DETAIL OF GRIP (IN CASE OF N&B)

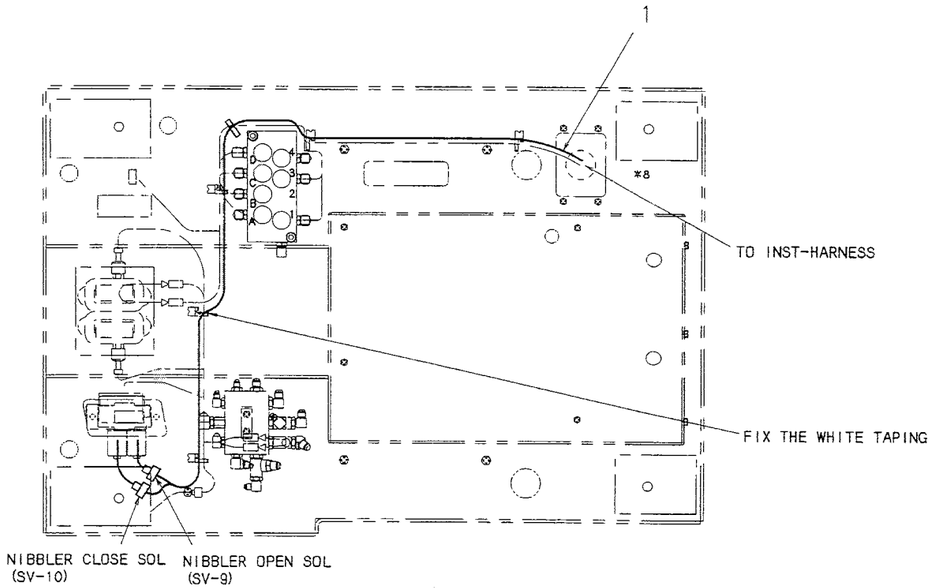


Fig. 19 (1/2) Floor harness (floor side)

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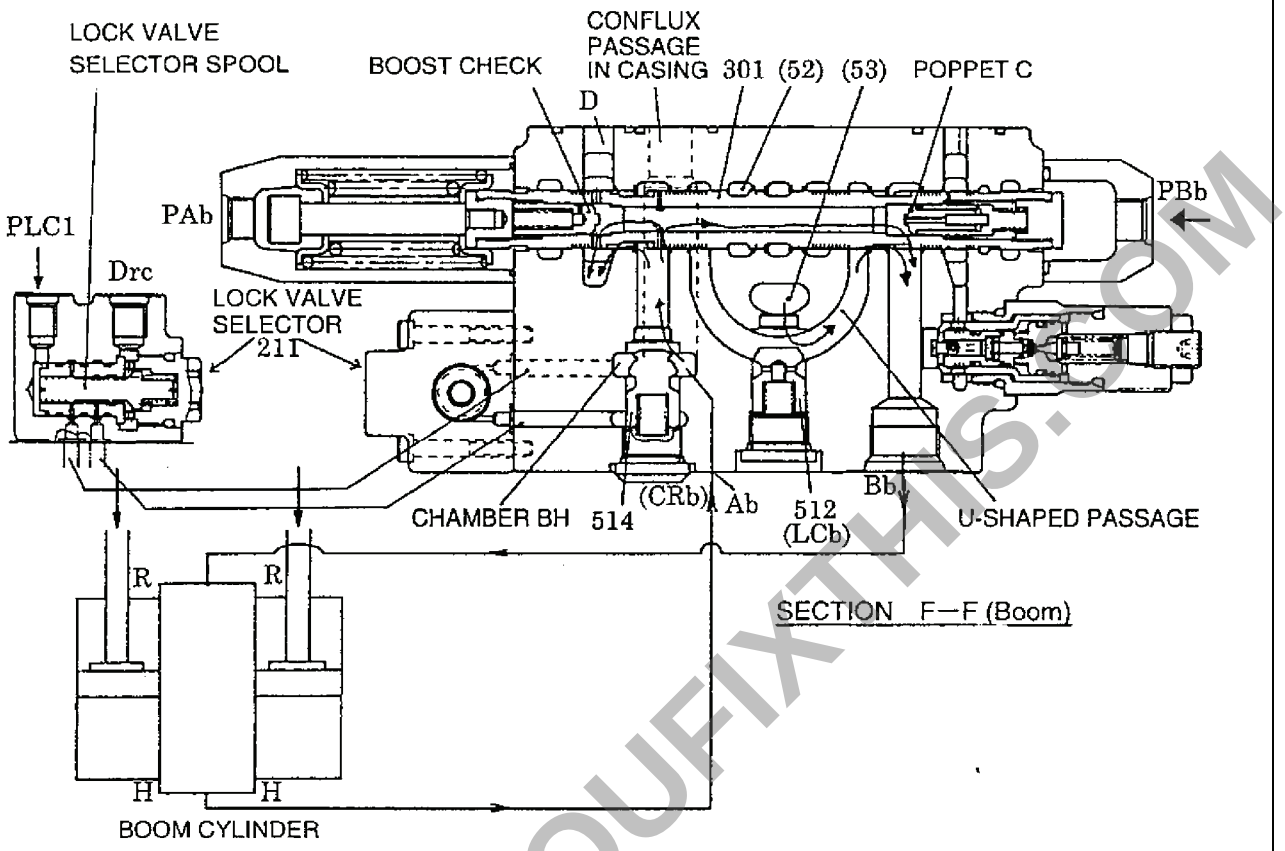


Fig. 4-18 When boom is down (in H or S mode)

CH24-41-01

Figure 55

When the boom is down and the work mode selector switch on the gauge cluster is set to the H (heavy digging) mode or S (save energy) mode, operation is as follows:

If the boom down action is performed, the secondary pilot pressure from port (4) of the pilot valve acts upon port PBb of the control valve and lock valve selector port PLc1 and shifts the boom spool (301) to the left, it also changes over the lock valve.

The pressurized oil is delivered by the pump (P1) flowing into the bypass circuit (52) through the main passage (51), but since it is blocked by the boom spool (301), it pushes the check valve (CP1) open, enters the parallel circuit (53), pushes the load check valve (512 LCb) open, enters the U-shaped passage, goes between the outer circumference of the boom spool (301) and the casing and is supplied to the boom cylinder rod side via port (Bb).

At the same time, the oil which returns from the boom cylinder head enters the control valve by way of port (Ab). Lock valve poppet (514) is located in front of boom spool (301), but the lock valve is pushed open as the lock valve selector spool is changed over in conjunction of the boom spool. The back pressure of lock valve poppet (514) then connects with DrC.

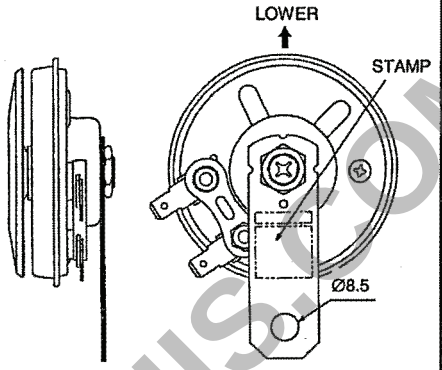
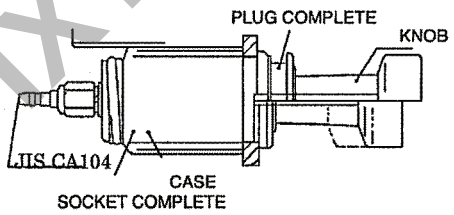
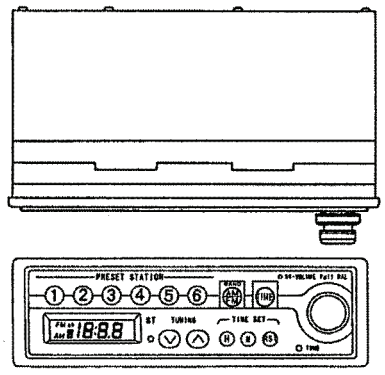
The returned oil then enters chamber BH and runs into the boom spool (301) through the circular notch of the boom spool (301). Since the returned oil has sufficient pressure by the weight of the boom, arm, etc., it pushes poppet C on the right of the illustration in through the spool, passes through its outer circumference and is supplied to the boom cylinder rod side as the hydraulic oil for boom down motion. (Boom fixed recirculation function).

Some of the return oil from the head end of the boom cylinders forces open the boost check valve, and flows through the low pressure circuit D to the tank port T, and back to the hydraulic oil tank. The purpose is to allow excess return oil to escape to the tank. This excess oil is caused by the difference in size of the piston head end and piston rod end.

The boost check valve acts on oil flowing to the tank to secure an adequate amount of recirculating oil.

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File No. Name of part Part No. Use Applicable Machine	Specification	Description
E−4,5 Horn CM53S00002F1 (high) CM53S00002F2 (low) Warning sound YY02-03001~ YH02-01301~ LK02-01041~ YY03-04555~ YH03-02097~ LK03-01107~	Type Rated voltage: DC24V Operating voltage range: DC 20~30V Sound level: 113±5 Db Basic frequency: 420±20 Hz high sound, 350±20 Hz low sound Insulation resistance: More than 3MΩ / DC500V	
E−6 Cigar lighter 2421R180F1 Cigar lighter YV02-01701~ YY02-03001~ YH02-01301~ LK02-01041~ YY03-04555~ YH03-02097~ LK03-01107~	Model: 409112-0000 Rated voltage: DC 24V Max. current: 5A Return time: Less than 18sec Insulation resistance: More than 3MΩ / 500V megger Fusing temp.: 180℃~250℃ (356°F~482°F)	
E−7 Tuner LB54S00001P1 (Option) Radio (AM & FM) YV02-01701~ YY02-03001~ YH02-01301~ LK02-01041~ YY03-04555~ YH03-02097~ LK03-01107~	Rated voltage: DC 24V Maker: SANYO Range: AM : 530~1710kHz (10 kHz step) FM : 87.5~107.9MHz (0.2 MHz step) 1 L SPEAKER(+) 2 R SPEAKER(+) 3 ACC(+B) 4 OPEN 5 L SPEAKER(−) 6 R SPEAKER(−) 7 GND(−) 8 BACK UP(+) 9 OPEN	

CH24-105-01

Figure 123

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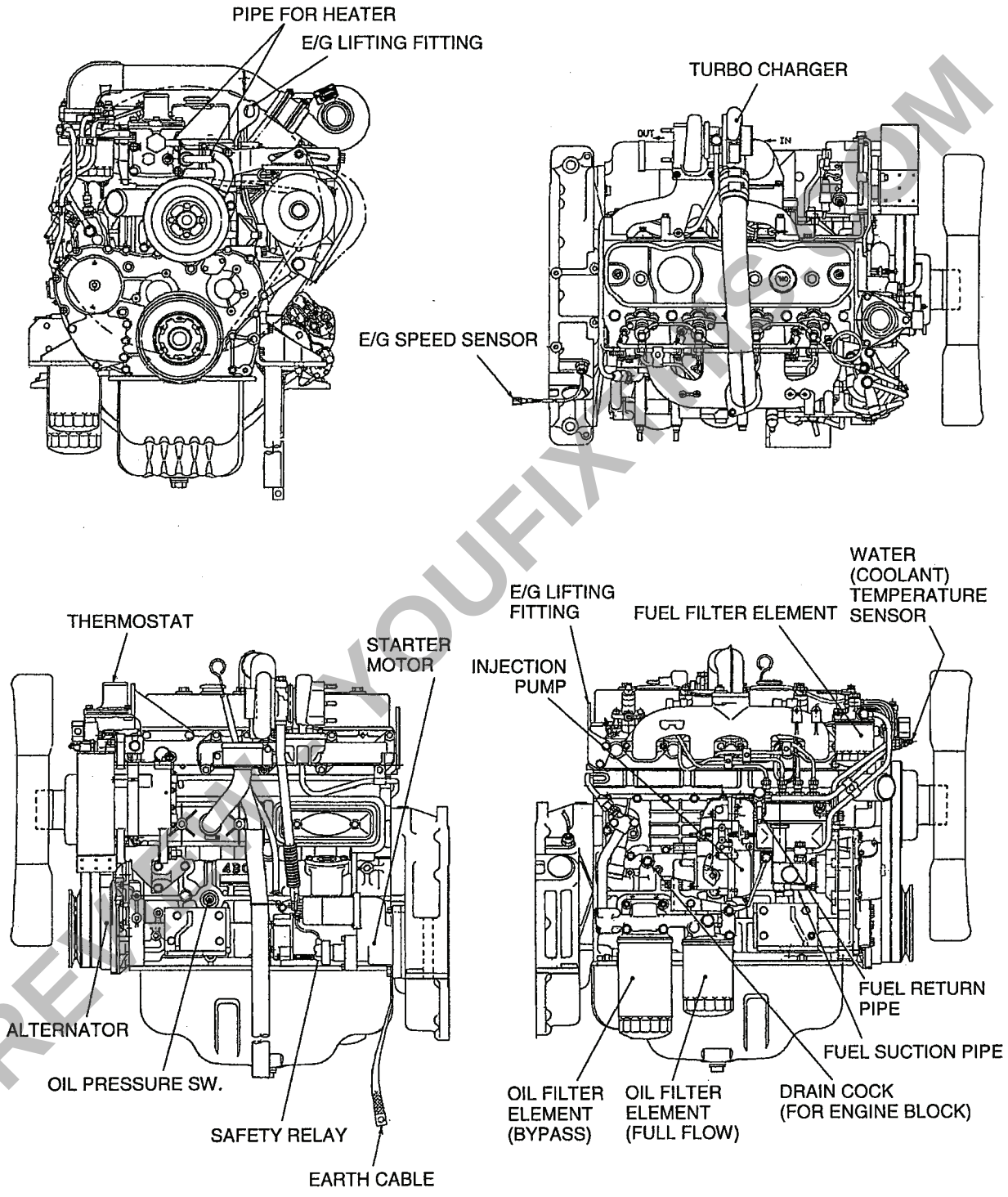
CHAPTER 31

E130
CRAWLER EXCAVATORS

GENERAL DISASSEMBLY AND ASSEMBLY

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Outside view of Engine

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33.0.35.7 ASSEMBLY

1. Clean and degrease parts before assembly.
2. Do not allow foreign matter to enter the valve, as this will cause functional faults.
3. Use new seals, O-rings, and U-packings. Coat the seal surfaces with hydraulic oil or a thin film of grease.

33.0.35.7.1 ASSEMBLING SHUTTLE

1. Put the balls (36) into body (5).
2. Coat the seat (2) where the screws will enter with Loctite #262 and fit to body (5).

   Tightening torque:
   1.5 ± 0.1 kgfm (11 ±0.7 pound-foot)
3. Place O-rings (42) on socket plugs (25) and fasten the two plugs to body (5).

   Tightening torque:
   2.5 ± 0.2 kgfm (18 ± 1.4 pound-foot)

33.0.35.7.2 ASSEMBLING REDUCING VALVE SPOOL ASSEMBLY

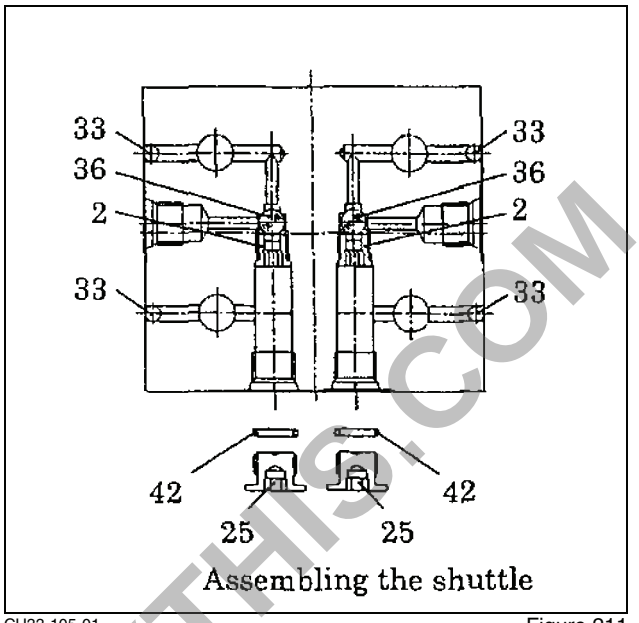
1. Place spool (4) in a vise, being careful to protect spool from vise jaws. Set washer (29), shims (10), (11), spring (8), and sleeve (18) in that order and tighten with four socket flange bolts (27).

   Tightening torque:
   0.5 ± 0.1 kgfm (3.6 ± 0.7 pound-foot)
2. Pair parts with disassembled parts as sets. Incorrect pairing may change the secondary pressure.

33.0.35.7.3 ASSEMBLING REDUCING VALVE

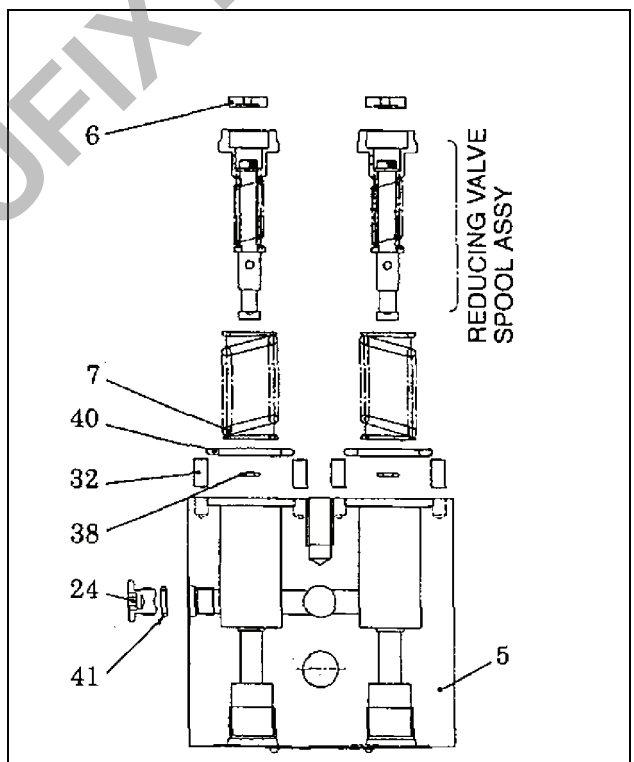
1. Fit the four O-rings (38), (40), parallel pins (32), and springs (7) to body (5).
2. Install the four reducing valve spool assemblies and stoppers (6). Place the stoppers so the concave surface faces down (reducing valve spool side).
3. Install the O-rings (41) to socket plugs (24). Fasten the three plugs to body (5).

   Tightening torque:
   1 ± 0.1 kgfm (7.2 ± 0. 7 pound-foot)



Assembling the shuttle

CH33-105-01 Figure 211



Assembling the reducing valve

CH33-105-02 Figure 212

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34.2.2.5 TOOLS AND JIGS

(1) Tightening tools

For STD, LC & DZ type (LP64D00004F2)

Unit : mm (in)

NAME		OPPOSING FLATS
	Socket	19,24
	Allen wrench	6

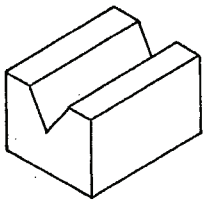
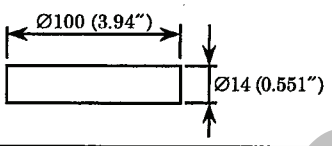
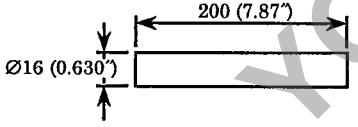
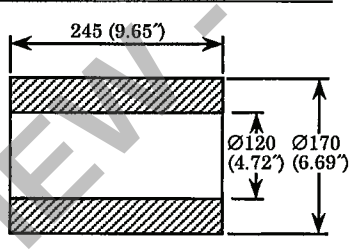
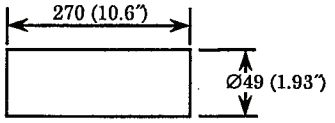
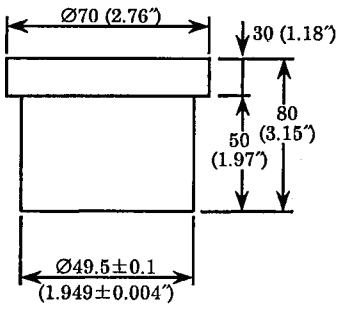
For L type (YN64D00019F1)

Unit : mm (in)

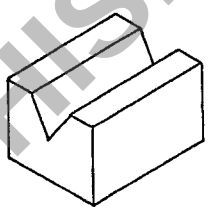
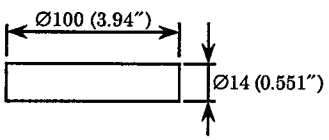
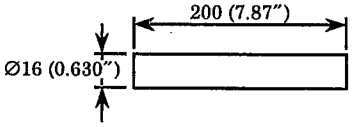
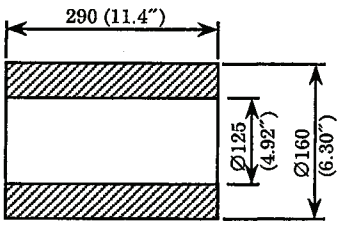
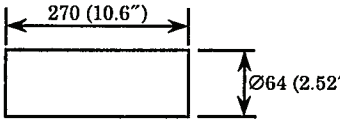
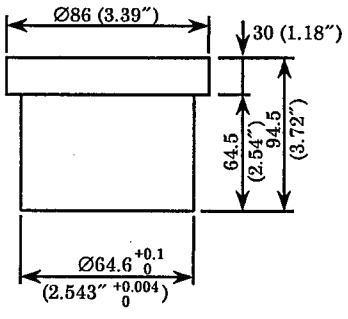
NAME		OPPOSING FLATS
	Socket	19,27
	Allen wrench	6

(2) Jig

Unit : mm (in)

No.	NAME	SHAPE
k	V-block	
ℓ	Pin (4) extrusion rod	
n	Bushing extrusion rod	
m	Stand jig	
P	Shaft extrusion jig	
Q	Bushing fixing jig	

Unit : mm (in)

No.	NAME	SHAPE
k	V-block	
ℓ	Pin (4) extrusion rod	
n	Bushing extrusion rod	
m	Stand jig	
p	Shaft extrusion jig	
q	Bushing fixing jig	

CH34-23-01

Figure 61

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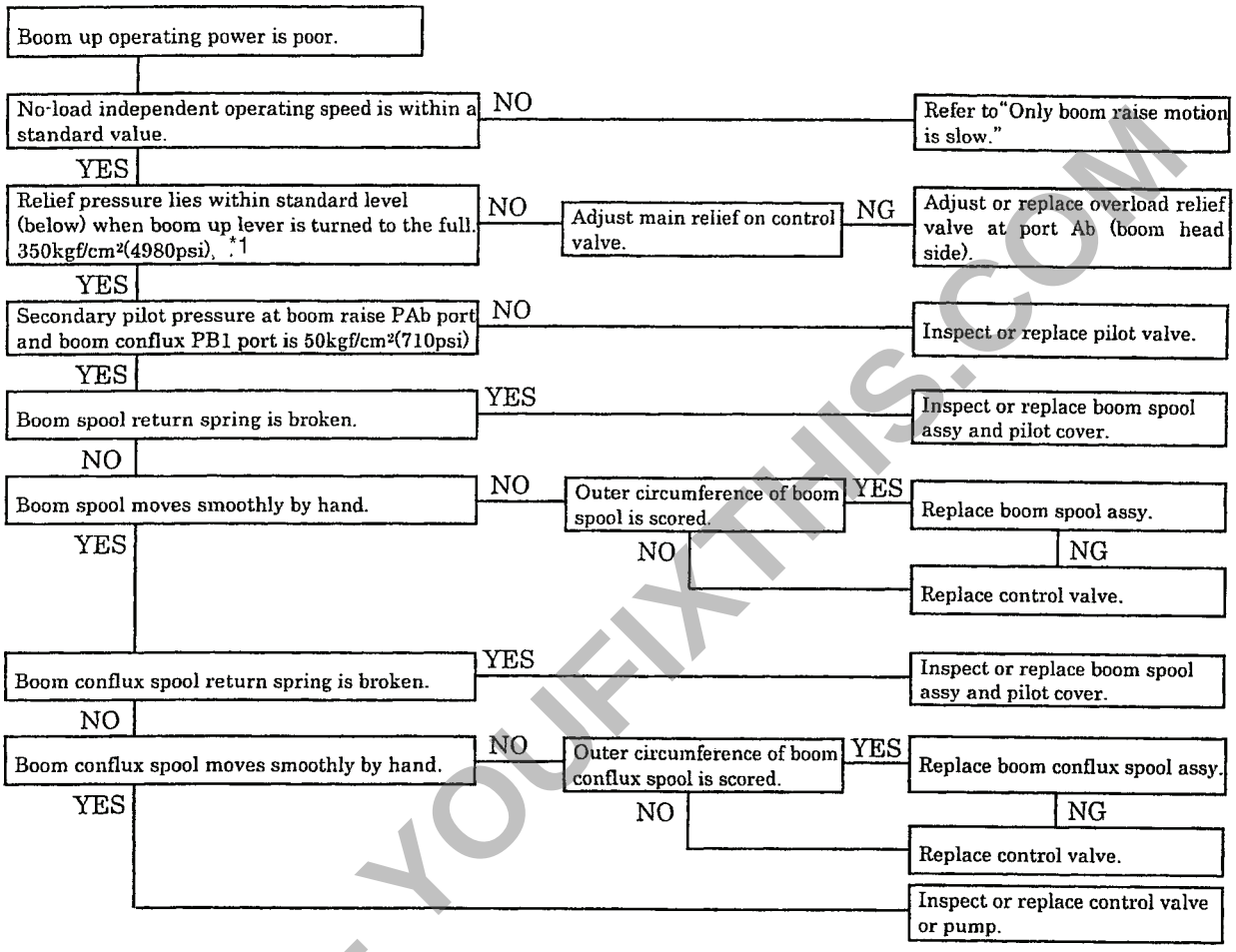
No.	PART NAME	Q'TY	No.	PART NAME	Q'TY	No.	PART NAME	Q'TY
	REDUCTION GEARS			HYDRAULIC MOTOR		142	PARALLEL PIN	2
1	HUB	1	101	REAR FLANGE	1	143	SOCKET BOLT	9
2	SPINDLE	1	102	SHAFT : DRIVE	1	145	SNAP RING	1
3	CARRIER	1	103	SWASH PLATE	1	147	BACK UP RING	1
4	RING GEAR (A)	1	104	CYLINDER BLOCK	1	148	BACK UP RING	1
5	RING GEAR (B)	1	105	PISTON	9	149	ROLLER BEARING	1
6	CLUSTER GEAR	3	106	SHOE	9	150	BALL BEARING	1
7	SUN GEAR (A)	1	107	RETAINER PLATE	1	151	ROLLER	6
8	COUPLING GEAR	1	108	THRUST BALL	1	153	THRUST PLATE	1
9	SHAFT (G)	3	109	TIMING PLATE	1	154	EXPANDER	5
10	DISTANCE PIECE	1	110	WASHER	2	155	O RING	3
12	DISTANCE PIECE	1	112	PISTON	1	156	O RING	4
13	COVER	1	113	SPRING	12	157	STOPPER	1
14	THRUST COLLAR	6	114	SPRING	1	158	SPRING	1
15	RING	1	115	FRICTION PLATE	2	159	SPRING	1
17	PIN	10	116	SEPARATOR PLATE	2	161	PISTON	1
19	COUPLING	1	118	VALVE SEAT	1	162	SHOE	1
20	THRUST BEARING	2	119	VALVE : PARKING BRAKE	1	167	STEEL BALL	2
23	SEAL RING	1	120	SPRING	1	168	STEEL BALL	2
24	BALL BEARING	2	121	PLUG	2	170	SOCKET BOLT	4
25	NEEDLE BEARING	6	122	RING	1	172	SPRING PIN	1
27	PARALLEL PIN	10	123	SPOOL:BRAKE VALVE	1	173	VALVE	1
29	O RING	1	124	PLUG	3	174	SPRING	1
30	SOCKET PLUG	3	125	STOPPER	2	175	STEEL BALL	2
31	FLOATING SEAL	1	126	PLUG	2	176	EXPANDER	2
32	CAPSCREW	20	127	VALVE	2	177	SPRING	1
33	SUPER LOCK WASHER	20	128	SPRING	2	178	PLUG	1
34	PARALLEL PIN	3	130	SPRING	2	186	SPOOL : TWO SPEED CHANGEOVER	1
35	SOCKET BOLT	10	132	OIL SEAL	1	187	OIL STOPPER	1
36	STEEL BALL	1	133	O RING	1	189	SPRING	1
37	O RING	1	135	O RING	1	190	ORIFICE	1
39	O RING	2	136	BODY	1	191	SPRING	1
40	O RING	1	137	SPOOL : SURGE CUT	1	192	PLUG	2
			138	O RING	2	193	O RING	2
			139	O RING	1	194	ORIFICE	2
			140	O RING	1	198	SOCKET PLUG	2
			141	PARALLEL PIN	2	199	NAME PLATE	1

CH34-91-01

Figure 237

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42.1.2.5 BOOM UP OPERATION



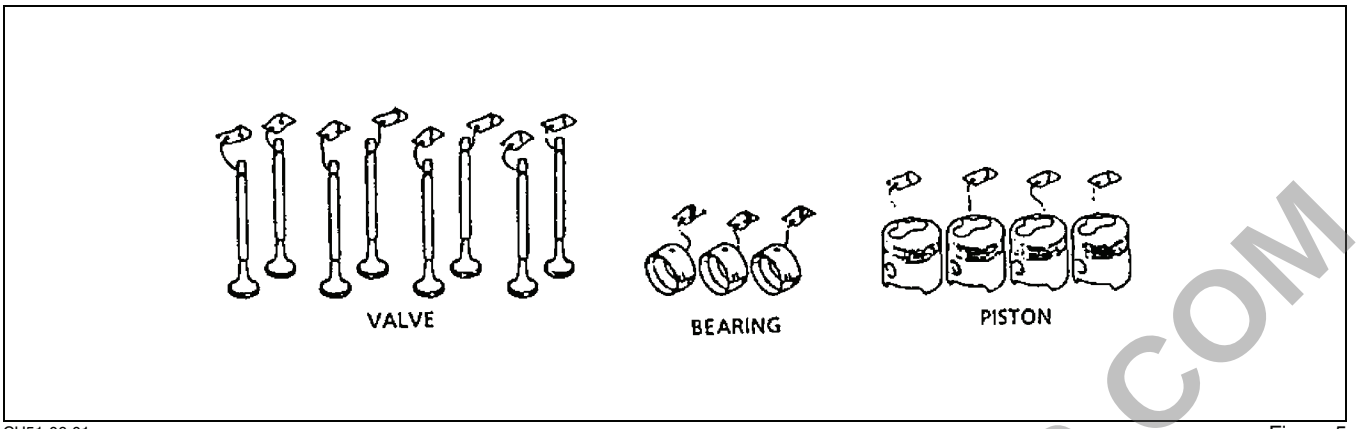
*1 marked shows E130 SR (LC) (-1E)

CH42-13-01

Figure 9

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CH51-06-01

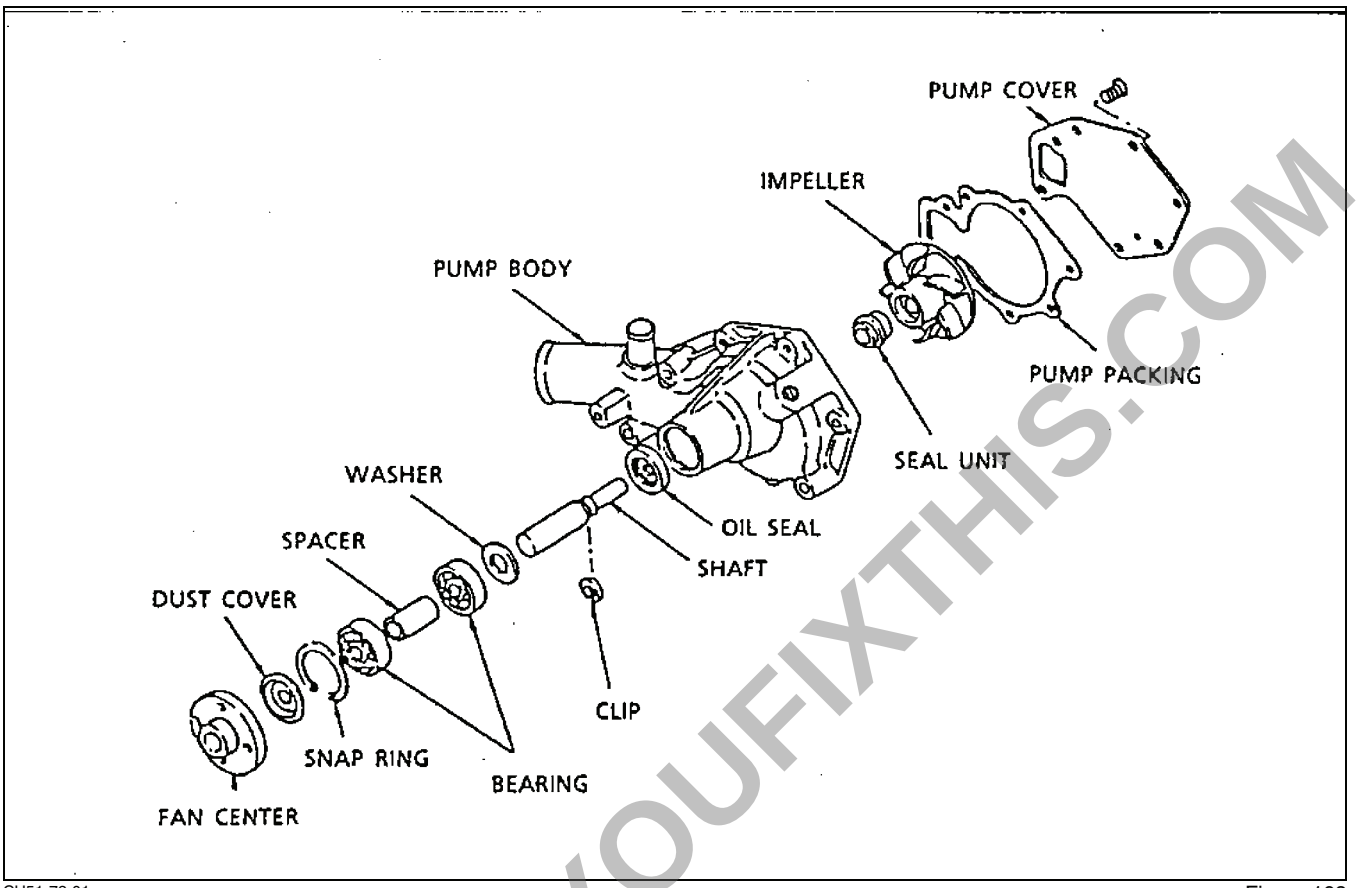
Figure 5

8. Tag valves, bearings, and pistons according to cylinder numbers for correct reassembly.
9. Lubricate rotating and/or moving parts with oil or grease to prevent seizing and ease of installation.
10. Fasten all bolts and nuts to specified torques.
11. After reassembly, perform final inspection and maintenance checks prior to operating engine.

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51.4.2 WATER PUMP CONSTRUCTION DRAWING

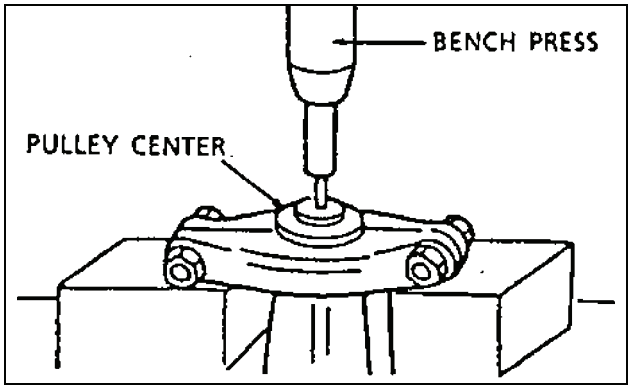


CH51-72-01 Figure 168

51.4.2.1 DISASSEMBLY

51.4.2.1.1 FAN CENTER

Remove with a bench press.

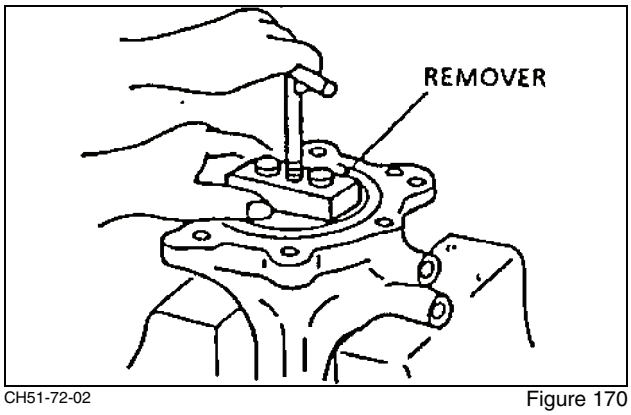


CH51-72-01 Figure 169

51.4.2.1.2 IMPELLER

The impeller requires a special tool for removal.

Special Tool: Remover 9-8521-0097-0



CH51-72-02 Figure 170

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