



SHOP MANUAL

E80 HYDRAULIC EXCAVATOR

E80 SHOP MANUAL

TABLE OF CONTENTS

SECTION 1

STANDARD SPECIFICATIONS AND MAINTENANCE

Section Table of Contents	I
	Book/Form Number: 5-2260 NA
CHAPTER 1	
GENERAL INFORMATION AND SAFETY	
Table of Contents	1-1
	Book/Form Number: 5-1840 NA
CHAPTER 2	
SPECIFICATIONS	
Table of Contents	2-1
	Book/Form Number: 5-2270 NA
CHAPTER 3	
ATTACHMENT DIMENSIONS	
Table of Contents	3-1
	Book/Form Number: 5-2280 NA
CHAPTER 11	
TORQUE SPECIFICATIONS AND SPECIAL TOOLS	
Table of Contents	11-1
	Book/Form Number: 5-2290 NA
CHAPTER 12	
STANDARD MAINTENANCE TIME SCHEDULE	
Table of Contents	12-1
	Book/Form Number: 5-2300 NA
CHAPTER 13	
MAINTENANCE STANDARD AND TEST PROCEDURE	
Table of Contents	13-1
	Book/Form Number: 5-2310 NA

SECTION 2

SYSTEMS

Section Table of Contents	I
	Book/Form Number: 5-2320 NA
CHAPTER 21	
MECHATRO CONTROL SYSTEM	
Table of Contents	21-1
	Book/Form Number: 5-2330 NA
CHAPTER 22	
HYDRAULIC SYSTEM	
Table of Contents	22-1
	Book/Form Number: 5-2340 NA
CHAPTER 23	
ELECTRICAL SYSTEM	
Table of Contents	23-1
	Book/Form Number: 5-2350 NA
CHAPTER 24	
COMPONENTS SYSTEM	
Table of Contents	24-1
	Book/Form Number: 5-2360 NA
CHAPTER 25	
AIR-CONDITIONING SYSTEM	
Table of Contents	25-1
	Book/Form Number: 5-2370 NA

SECTION 3

COMPONENTS

Section Table of Contents	I
	Book/Form Number: 5-2380 NA
CHAPTER 32	
ATTACHMENTS	
Table of Contents	32-1
	Book/Form Number: 5-2400 NA

2.5 SPECIFICATIONS AND PERFORMANCE

2.5.1 SPEED AND CLIMBING CAPABILITY

ITEM		
Slewing speed	min ⁻¹ (rpm)	12.5 (12.5)
Travel speed (1st / 2nd speed)	km/h	3.1 / 5.5
Gradeability	% (degree)	70 (35)

2.5.2 ENGINE

ENGINE MODEL	ISUZU CC-4JG1
Type	Water-cooled 4-cycle direct injection type engine
Number of cylinders-Bore x Stroke	4-95.4 mm x 107 mm (3.76 in x 4.21 in)
Total displacement	3,059 cc (187 cu.in)
Rated output / Rotation speed	40.5 kW (55 PS) / 2,100 rpm
Maximum torque / Rotation speed	19.1 kgs m (139 lb ft) / 1,800 rpm
Starter	24 V / 3.2 kW
Alternator	24 V / 30A

2.5.3 HYDRAULIC COMPONENTS

Hydraulic pump	Variable displacement axial piston+gear pump
Hydraulic motor (Slewing)	Axial piston motor
Hydraulic motor (Travel)	2-speed axial piston motor
Control valve	8-spool control valve
Cylinder (Boom, Arm, Swing and Bucket)	Double action cylinder
Oil cooler	Air-cooled type

2.5.4 WEIGHT

Unit: kg (lbs)

Model & Shoe spec.	Grouser shoe [600mm (23.6 in)]	Rubber shoe [450mm (17.7 in)]
Fully equipped weight	8,230 (18,200)	7,980 (17,600)
Upper structure	3,810 (8,400)	←
Lower machinery	3,130 (6,900)	2,880 (6,350)
Attachment [Boom + 1.80 m (5 ft-11 in) Arm +0.28 m ³ (0.37 cu.yd) bucket]	1,070 (2,360)	←

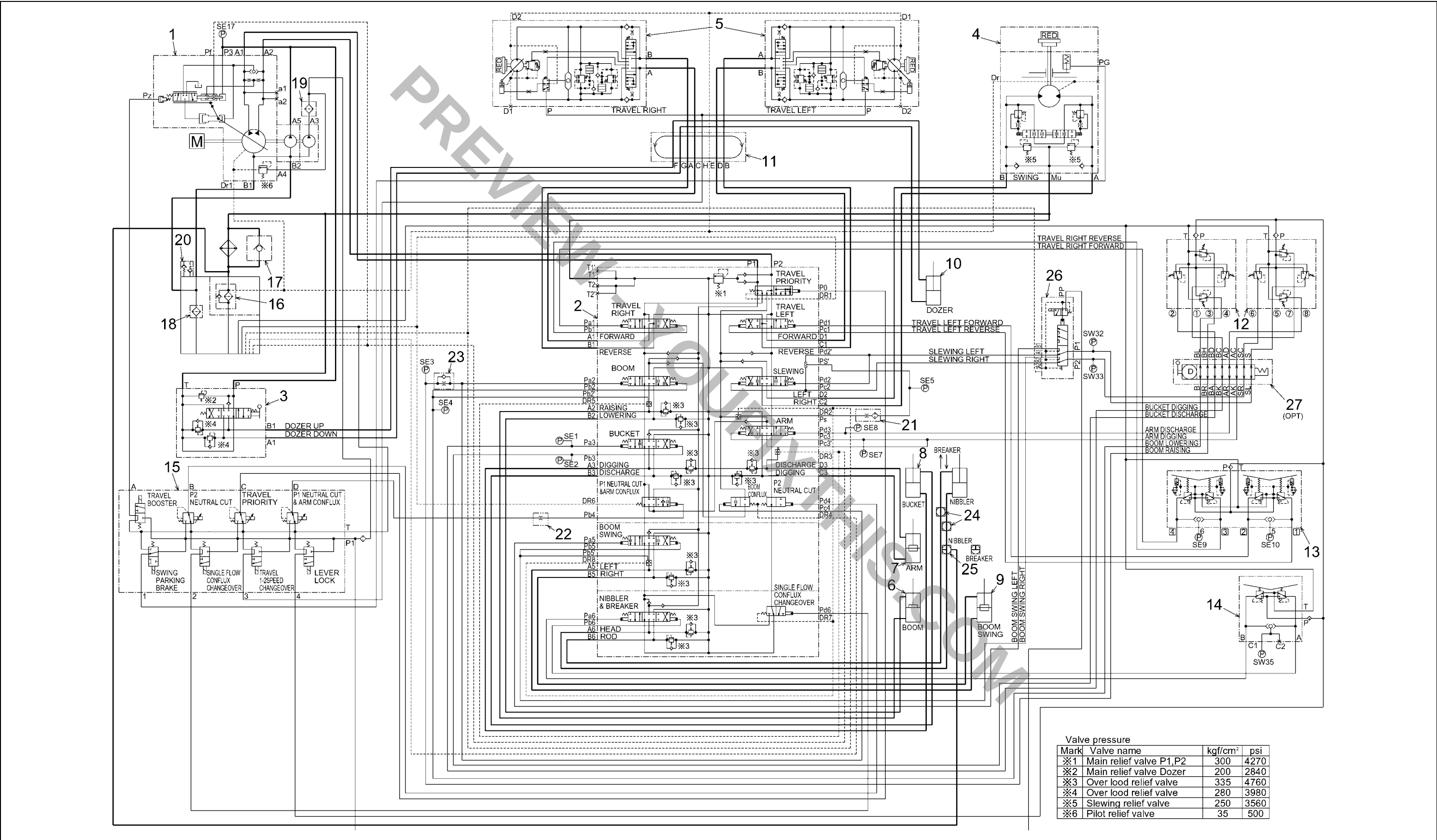
SECTION 1 - STANDARD SPECIFICATIONS AND MAINTENANCE
CHAPTER 12 - STANDARD MAINTENANCE TIME SCHEDULE

Group No.	Location	Work to be Done	Unit	Remark	Unit: Hour
01 Attachment	00	Bucket relation		2. Reference for Bucket	
	01	Bucket ASSY	Detach/attach	1 pc.	0.5
	02	• Bucket attaching and detaching position	Preparation	1 pc.	0.1
	03	• Bucket attaching pin	Detach/attach	1	0.1
	04	• Bucket drive pin	Detach/attach	1	0.1
	05	• Bucket sling and movement	Preparation	1 pc.	0.1
	06	Bucket (Single)	O/H	1 pc.	2.0
	07	• Tooth	Replace	1 pc.	0.5
	08	• Side cutter	Replace	1 pc.	1.0
	09	• Bushing	Replace	1 pc.	0.5
	10	Arm relation		3. Reference for Arm	
	11	Arm ASSY	Detach/attach	1 pc.	1.0
	12	• Bucket cylinder attaching and detaching position and piping	Preparation	1 pc.	0.3
	13	• Bucket cylinder rod pin	Detach/attach	1 pc.	0.1
	14	• Bucket cylinder head pin	Detach/attach	1 pc.	0.1
	15	• Bucket cylinder assy	Detach/attach	1 pc.	0.1
	16	• Arm cylinder rod pin	Detach/attach	1 pc.	0.1
	17	• Boom top pin	Detach/attach	1 pc.	0.1
	18	• Arm sling and movement	Detach/attach	1 pc.	0.1
	30	Boom relation		4. Reference for Boom	
	31	Boom ASSY	Detach/attach	1 pc.	1.0
	32	• Boom attaching and detaching position	Preparation	1 pc.	0.1
	33	• Boom cylinder temporary slinging	Preparation	1 pc.	0.1
	34	• Boom cylinder rod pin	Detach/attach	1	0.1
	35	• Boom cylinder piping	Detach/attach	1 pc.	0.1
	36	• Arm & bucket piping	Detach/attach	1 pc.	0.2
	37	• Boom assy temporary slinging	Detach/attach	1 pc.	0.1
	38	• Boom foot pin	Detach/attach	1	0.2
	39	• Boom assy slinging	Detach/attach	1 pc.	0.1
	40	• Arm cylinder attaching and detaching	Detach/attach	1 pc.	0.3
	41	• Arm cylinder piping	Detach/attach	1 pc.	0.1
	42	• Arm cylinder head pin	Detach/attach	1	0.1
	43	• Arm cylinder slinging	Detach/attach	1 pc.	0.1
	50	Boom cylinder attaching and detaching	Detach/attach	1 pc.	0.3
	51	• Boom cylinder piping	Detach/attach	1	0.1
	52	• Boom cylinder head pin	Detach/attach	1 pc.	0.1
	53	• Boom cylinder slinging	Detach/attach	1	0.1
	60	Bucket cylinder	O/H	1	3.0
	61	• Pin bushing	Preparation	1	1.0
	70	Arm cylinder	O/H	1	3.0
	71	• Pin bushing	Preparation	1 set	1.0
	75	Boom cylinder	O/H	1	3.0
	76	• Pin bushing	Preparation	1	1.0
	80	Swing portion		5. Reference for swing	
	81	Swing bracket assy	Detach/attach	1 pc.	0.4
	82	• Swing cylinder rod pin	Detach/attach	1 pc.	0.1
	83	• Swing bracket slinging	Detach/attach	1 pc.	0.1
	84	• Swing center pin	Detach/attach	1	0.1
	85	Swing cylinder attaching and detaching	Detach/attach	1 pc.	0.3
	86	• Swing cylinder hose	Detach/attach	2	0.2
	87	• Swing cylinder head pin	Detach/attach	1	0.1
	88	Swing cylinder	O/H	1	2.5
	89	• Pin bushing	Replace	1	1.0
		Others necessary works	Detach/attach	1 set	0.1
	90	Dozer portion		6. Reference for dozer	
	91	Dozer assy	Detach/attach	1 pc.	0.6
	92	• Dozer cylinder hose	Detach/attach	2	0.2
	93	• Dozer cylinder rod pin	Detach/attach	1	0.1
	94	• Dozer attaching pin	Detach/attach	2	0.2
	95	Dozer cylinder	O/H	1 pc.	2.5
	96	• Pin bushing	Replace	1 set	1.0

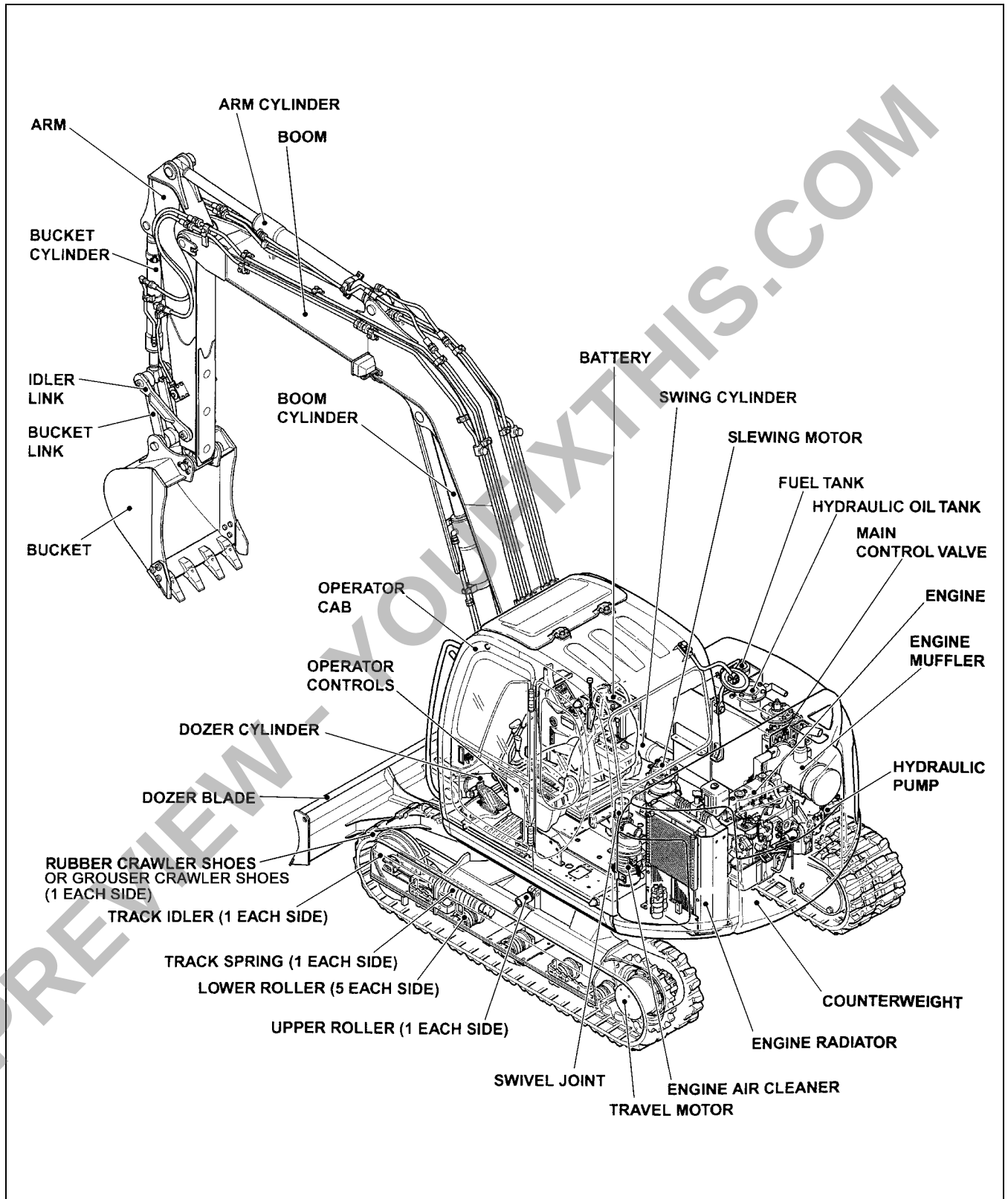
NOTES

PREVIEW - YOUFIXTHIS.COM

22.2.1 STANDARD SPECIFICATION



2.1 NAME OF COMPONENTS



SLF02000001E01

Figure 2-1

MAIN COMPONENTS

22.2 HYDRAULIC CIRCUITS AND COMPONENT MODELS

STANDARD SPECIFICATION		LF01Z00012P1	
No.	NAME	PART No.	MODEL No.
1	PUMP ASSY (WITH GEAR PUMP)	YT10V00009F1	K3SP36B
2	CONTROL VALVE	YT30V00001F2	BCV75-A9
3	CONTROL VALVE	YR30V00014F1	KVS65-1
4	SLEWING MOTOR UNIT	YT15V00001F3	SG025E-096
5	TRAVEL MOTOR	YT15V00008F1	GM09VN
6	BOOM CYLINDER	LF01V00005F1	110 -70 -916
7	ARM CYLINDER	YT01V00002F1	95 -65 -813
8	BUCKET CYLINDER	YT01V00019F1	80 -55 -735
9	SWING CYLINDER	LF01V00006F1	105 -65 -594
10	DOZER CYLINDER	LF01V00004F1	130 -70 -170
11	SWIVEL JOINT	24100J12125F2	
12	PILOT VALVE (ATT)	PX30V00043F2	PV48M2061
13	PILOT VALVE (TRAVEL)	YN30V00070F1	PVD6PC4017A
14	PILOT VALVE	YN30V00080F1	
15	PROPORTIONAL VALVE BLOCK	YT35V00018F1	8KWE5G-30/G24WR-821
16	RETURN FILTER	YR52V00001F1	FZJ3183S002A
17	CHECK VALVE	2436R576F3	Y2389
18	SUCTION STRAINER	YT50V00001F1	Y497500
19	INLINE FILTER	YN50V00007F1	YTD9986
20	BREATHER	2446R260F1	Y-382000
21	CONNECTOR	HH25X04004G3	
22	CONNECTOR	2444Z3541	
23	CHECK VALVE	YT21V00002P1	
24	STOP VALVE	24100P1006F1	
25	SELECT VALVE	LE30V00004F1	
26	SOLENOID VALVE ASSY	YR35V00009F2	16083-00000
27	SELECTOR VALVE	YY30V00019F2	K16AR8-15

NOTE: The part numbers and serial numbers of machine may be changed due to modification, so use only the numbers for reference.

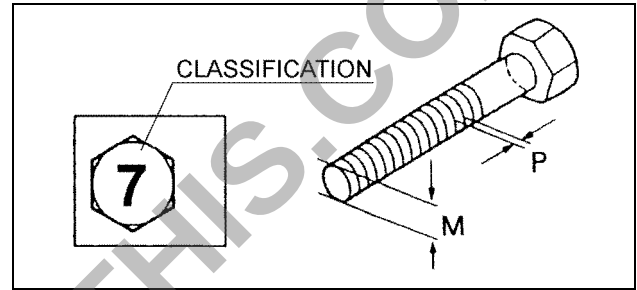
11.1 TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

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 looseness and dropping off before the start of daily work and at the periodical maintenance. Retighten the loosened ones, and install new ones for the dropped off. For the new machine, the check and retightening of them must be carried out at first 50 hours operation. For the replacement of them, make sure to use the same size of manufacturer's genuine parts.

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

- The table below is not applicable for the capscrews to fix the cover, etc., made of plastic. For the tightening torque for such capscrews, consult with an authorized our Distributor. Over-tightening may cause damages on the parts to be fixed.

- In case that the tightening torque is specified in the manual, use such torque values regardless to the table below.
- 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, M 5 or less.



SPW11000018E01

Figure 11-1

11.1.1 METRIC COARSE THREAD STANDARD TIGHTENING TORQUE VALUES. MAKE CERTAIN TO TIGHTEN ALL CAPSCREWS & NUTS TO PROPER TORQUE VALUES.

Torque value Unit: Nm (lb ft)

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)	91±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)

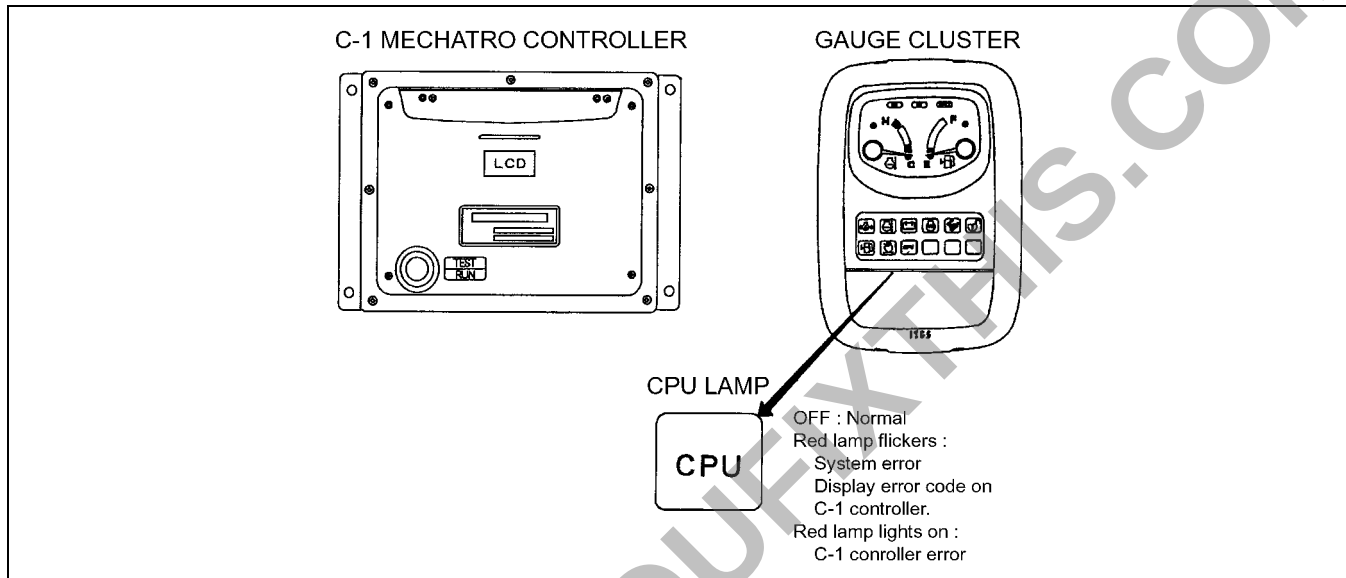
21.8 MECHATRO CONTROL

21.8.1 TROUBLESHOOTING

"CPU lamp on gauge cluster flickers", and "buzzer sounds intermittently". In this case, error code is displayed on LCD at the center of C-1 controller.

Determines the fault location and corrective action referring to Error diagnostics shown in the following page.

And in case "CPU lamp lights on", and "buzzer sounds continuously", the display indicates the trouble on C-1 controller.



SYT00210006E01

Figure 21-8

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

TABLE 21-2 ERROR DIAGNOSTICS

41.3 TROUBLESHOOTING SUMMARIZED: MECHATRO CONTROL

41.3.1 TROUBLESHOOTING TABLES

No.	Trouble	Operating condition	Electric or hydraulic cause		Hydraulic or electric	Normal criterion		
			Cause	Check point		1	2	3
1-1	No operation works	Safety lock lever down at full stroke	Safety lock lever solenoid (SV-4) does not change over and there is no hydraulic source for pilot valve.	SOL (SV-4) connector	Electric	24V at SV-4 connector.	24V at SW-11.	24V at fuse box connector (CN-14M) white & black
1-2	Moves unexpectedly	Lever at neutral	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises.	P1 bypass cut proportional valve (PSV-D) connector	Electric	Current for P1 bypass cut proportional valve: 315mA.	Arm in sensor and arm out sensor values: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve: 0.54MPa (78psi).	Secondary pilot pressure: 0.59MPa (85psi).	—
		Lever at neutral	P2 bypass cut proportional valve moves unexpectedly and P2 circuit pressure rises.	P2 bypass cut proportional valve (PSV-B) connector	Electric	Current for P2 bypass cut proportional valve: 315mA.	Boom raise sensor and swing sensor values: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P2 bypass cut proportional valve: 0.54MPa (78psi).	Secondary pilot pressure: 0.59MPa (85psi).	—
2-2	Only bucket is slow	Bucket lever and other levers at full stroke	P2 bypass cut proportional valve moves unexpectedly, P2 circuit pressure rises, and P1 circuit flow decreases.	P2 bypass cut proportional valve (PSV-B) connector	Electric	Current for P2 bypass cut proportional valve: 315mA.	Boom raise sensor and swing sensor values: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve: 0.54MPa (78psi).	Lever at neutral Secondary pilot pressure with lever neutral: 0.59MPa (85psi).	Secondary pilot pressure for bucket: 3.43MPa (500psi)
2-3	Only boom raise speed is low	Boom lever at full stroke	P2 bypass cut proportional valve does not move and the boom conflux flow is not created.	P2 bypass cut proportional valve (PSV-B) feedback current	Electric	Feedback current for P2 bypass cut proportional valve: 700mA.	Command current for P2 bypass cut proportional valve: 700mA.	Boom raise sensor: more than 4.0V
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve: 2.55MPa (370psi)	←	Secondary pilot pressure for travel: 2.35MPa (340psi)
		Travel lever at neutral	Travel straight valve moves unexpectedly and is actuated by P1 pump flow.	Travel straight proportional valve (PSV-C) command current	Electric	Command current for P2 bypass cut proportional valve: 315mA.	Travel right and left sensors: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve: 0.54MPa (78psi).	Secondary pilot pressure for travel: 0.59MPa (85psi).	—
	Only speeds other than boom raise, arm in and out are low	Travel lever at neutral	Travel straight valve moves unexpectedly and P2 pump flow to tank.	Travel straight proportional valve (PSV-C) command current	Electric	Command current for travel straight proportional valve: 315mA.	Travel right and left sensor value: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for PO port travel straight valve: 0.54MPa (78psi).	Secondary pilot pressure for travel: 0.59MPa (85psi).	—
2-4	Only arm in speed is low	Arm lever at full stroke	Arm conflux flow is not created.	P1 bypass cut proportional valve (PSV-D) command current	Electric	Command current for P1 bypass cut proportional valve: 700mA.	—	Arm in sensor: more than 4.0V
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve: 2.55MPa (370psi).	—	Secondary pilot pressure for arm in: 3.43MPa (500psi)
2-5	Only arm out speed is low	Arm lever at full stroke	Arm conflux flow is not created.	P1 bypass cut proportional valve (PSV-D) command current	Electric	Command current for P1 bypass cut proportional valve: 315mA.	Arm out sensor: more than 4.0V.	—
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve: 0.54MPa (78psi).	—	Secondary pilot pressure for arm out: 3.43MPa (500psi)
4-1	Fine bucket digging and dump operations can not be done	Fine bucket operation	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises	P1 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P1 bypass cut proportional valve: 315mA.	Arm in and arm out sensor values: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P1 bypass cut valve: 0.54MPa (78psi).	Secondary pilot pressure for arm in and out: 0.59MPa (85psi)	Unload pressure for P1 pump: approx. 1.96MPa (280psi)
4-2	Fine boom raise and lower operations can not be done	Fine boom raise and lower operations	P1 bypass cut proportional valve moves unexpectedly and the P1 circuit pressure rises.	P1 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P2 bypass cut proportional valve: 315mA.	Arm in and arm out sensor values: more than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve: 0.54MPa (78psi).	Secondary pilot pressure for arm in and out: 0.59MPa (85psi).	Unload pressure for P1 pump: approx. 1.96MPa (280psi)
4-3	Fine slewing right and left operations can not be done	Fine slewing right and left operations	P2 bypass cut proportional valve moves unexpectedly and the P2 circuit pressure rises.	P2 bypass cut proportional valve (PSV-D) connector	Electric	Command current for P2 bypass cut proportional valve: 315mA.	Slewing sensor and boom raise sensor values: less than 1.3V.	—
					Hydraulic	Secondary pilot pressure for P2 bypass cut valve: 0.54MPa (78psi).	Unload pressure for P2 pump: approx. 1.96MPa (280psi) or less.	Secondary pressure for slewing and boom raise: 0.59MPa (85psi)

2. Preparation

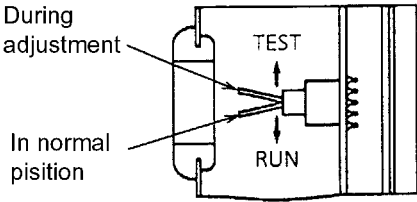
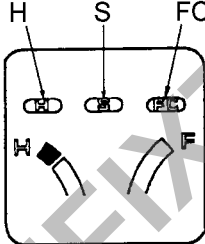
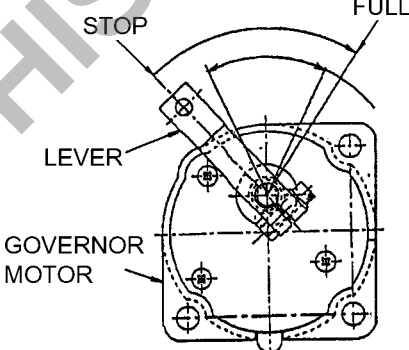
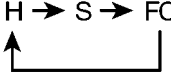
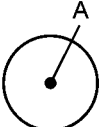
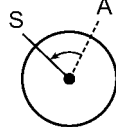
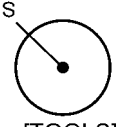
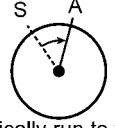
- Warm up engine.
- Turn starter switch **OFF** to stop engine, and turn A/C switch **OFF**.
- Pull operator seat forward fully and incline seat-back forward.

- Remove plastic cover on the rear side, then mechatro controller appears.

(Remove 5 attaching bolts form plastic cover with driver +).

NOTE: Check to be sure that the engine emergency stop lever knob in fully pressed down. If mechatro controller in adjusted in the condition where the knob is pulled out, the engine speed can not be set rightly.

3. Adjustment

Procedure	Mode display on gauge cluster	Movement of governor motor
<p>A. Remove grommet on upper surface of mechatro controller, and switch internal adjustment switch from RUN to TEST.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>During adjustment</p> <p>In normal position</p> <p>SECTION AA</p> <p>Internal adjustment jumper pin (JP) switch</p> </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>		
<p>B. Turn starter switch ON.</p>	<p>H → S → FC</p>  <p>Display lamp lights on in order</p>	 <p>Stop at the position set by accel dial</p>
<p>C. Keep pressing buzzer stop switch for approx. 5 to 10 seconds and release. Check that the display on this gauge cluster is as the right.</p>	<p>H → S</p> 	 <p>Automatically run to engine stop position (S)</p>
<p>D. After checking the right mode display, adjust the rod length so that the clearance A between governor lever and engine stop set bolt in engine side is 0.1 mm (0.0039 in). adjust rod (5) length to 204 mm (8.03 in). And, when the governor motor is replaced, confirm that the right display is indicated, then insert link rod.</p>	<p>H → S</p> 	 <p>Stop at S position</p> <p>[TOOLS]</p> <ul style="list-style-type: none"> Spanner 13 mm X 2 Spanner 6 mm Thickness gauge
<p>E. Press buzzer stop switch once, and wait until the mode is switched to the right display.</p>	<p>S → FC</p> 	 <p>Automatically run to the engine available position A</p>

CHAPTER 33**UPPER SLEWING BODY**

Table of Contents	33-1
	Book/Form Number: 5-2410 NA

CHAPTER 34**TRAVEL SYSTEM**

Table of Contents	34-1
	Book/Form Number: 5-2420 NA

SECTION 4**SYSTEM TROUBLESHOOTING**

Section Table of Contents	..I
	Book/Form Number: 5-2430 NA

CHAPTER 41**TROUBLESHOOTING (MECHATRO CONTROL)**

Table of Contents	41-1
	Book/Form Number: 5-2440 NA

CHAPTER 42**TROUBLESHOOTING (HYDRAULIC SYSTEM)**

Table of Contents	42-1
	Book/Form Number: 5-2450 NA

CHAPTER 43**TROUBLESHOOTING (ELECTRIC)**

Table of Contents	43-1
	Book/Form Number: 5-2460 NA

CHAPTER 44**TROUBLESHOOTING (ENGINE)**

Table of Contents	44-1
	Book/Form Number: 5-2470 NA

SECTION 5**ENGINE**

Section Table of Contents	..I
	Book/Form Number: 5-2480 NA

CHAPTER 51**ISUZU MODEL A-4JG1 DIESEL ENGINE**

Table of Contents	51-1
	Book/Form Number: 5-2070 NA

11.12 ENGINE MOUNTING PEDESTAL

11.12.1 COMPONENTS AND DIMENSIONS

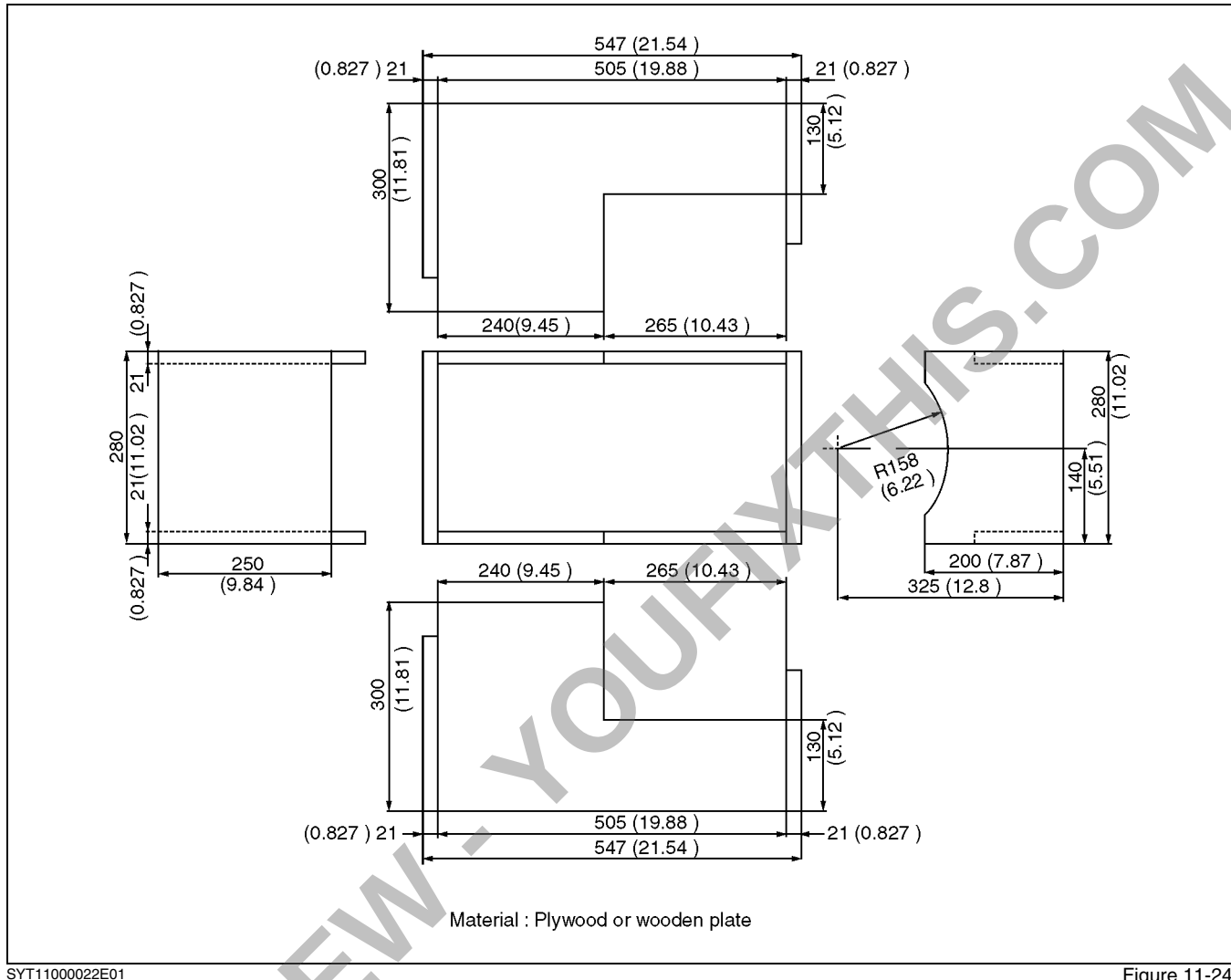
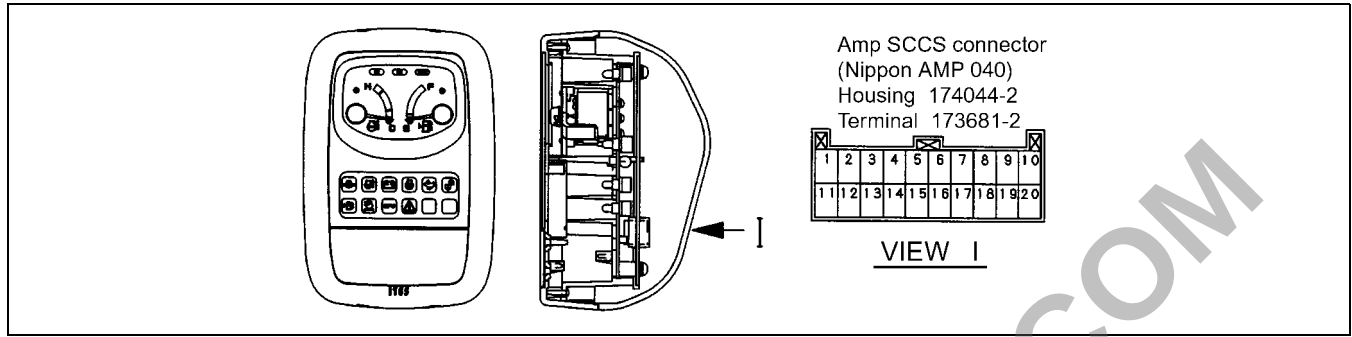


Figure 11-24

ENGINE STAND

21.8.3.2 GAUGE CLUSTER



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Figure 21-12

No.	NAME	Wire color	No.	NAME	Wire color
1	Fuel sensor	BrR	11	CPU trouble	PG
2	Engine coolant temp. sensor	YR	12	Slewing parking release switch	Lg
3	Alternator (charge)	WR	13	Over load	GrB
4	Glow switch	BrY	14	Spare 1	
5	Engine oil pressure switch	O	15	Spare 2	
6	Engine coolant temp. switch	GB	16	Mode display (Main controller)	LO
7	Remaining fuel volume switch	BrB	17	Mode display (Main controller)	L
8	Air cleaner clogged switch	BrL	18	Work light switch	WB
9	Travel 1-2 speed switch	LgB	19	Power supply (+24V)	W
10	Buzzer signal	Br	20	GND	B

TABLE 21-7 CONNECTOR

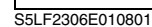
Display contents		Input terminal No.	Input signal condition		Buzzer sounds or not. *Note 1
No.	Function		Normal (OFF)	Abnormal (ON)	
1	Battery charge faulty	CN21-3	1	0	No
2	Glow operation	CN21-4		1	No
3	Engine oil pressure low	CN21-5		0	Yes
4	Engine coolant temp. high temp.	CN21-6		0	Yes
5	Fuel down	CN21-7	800 Ω or more	150 Ω or less	No
6	Air cleaner clogged	CN21-8		0	No
7	Travel 2-speed operation	CN21-9		1	No
8	Buzzer *Note 2	CN21-10		0	Yes
9	CPU trouble	CN21-11	0		No
10	Swing parking	CN21-12		34 Ω	No
11	Over load alarm	CN21-13		0	Yes
12	Spare 1	CN21-14		0	No
13	Spare 2	CN21-15		0	No
14	Work light (Back light)	CN21-19		1	No

TABLE 21-8 PERFORMANCES, LAMP DISPLAY AND ALARM

NOTE:

- The buzzer sounds intermittently, 0.5 ± 0.2 sec.: ON and 0.5 ± 0.2 sec.: OFF when the battery charge is short, or error Nos. 3, 4, 11 in the above Table occurred during normal operation.
- The buzzer in error No.8 sounds only, and mechatro controller controls it.

Figure 23-4



SECTION 2 - COMPONENTS
CHAPTER 24 - GENERAL DISASSEMBLY AND ASSEMBLY

Code No. Parts Name Parts No. Use Applicable Machine	Specifications	Description																		
SW-11 Switch YN50S01001P1 Lock lever YT02-04001~ YT03-05432~ YT04-07001~ LF04-02001~	<table><tr><td>Type</td><td>Roller plug type D4MC-5020</td></tr></table> <p>Connection table</p> <table><tr><td>①</td><td>NO</td></tr><tr><td>②</td><td>COM</td></tr><tr><td></td><td>NC</td></tr></table>	Type	Roller plug type D4MC-5020	①	NO	②	COM		NC	<p>YAZAKI HOUSING : 7122-2228 TERMINAL : 7114-2020</p>										
Type	Roller plug type D4MC-5020																			
①	NO																			
②	COM																			
	NC																			
SW-13 Switch YT20M01104F1 Air conditioner operation YT02-04001~ YT03-05432~ YT04-07001~ LF04-02001~	<table><tr><td>Maker's part No.</td><td>TAP-151N40</td></tr><tr><td>Operating voltage range</td><td>DC 20 V ~ 30 V</td></tr></table>	Maker's part No.	TAP-151N40	Operating voltage range	DC 20 V ~ 30 V															
Maker's part No.	TAP-151N40																			
Operating voltage range	DC 20 V ~ 30 V																			
SW-15 Switch 2479Z2334 Roof wiper switch YT02-04001~ YT03-05432~ YT04-07001~ LF04-02001~	<table><tr><td>Type</td><td>Single-pole single-throw (alternative)</td></tr><tr><td>Rated voltage</td><td>DC 24 V</td></tr><tr><td>Insulation resistance</td><td>More than 1 MΩ 500 V megger</td></tr></table> <p>NOTE: Switch is 2479U1252F1 and has a wiper label on it.</p>	Type	Single-pole single-throw (alternative)	Rated voltage	DC 24 V	Insulation resistance	More than 1 MΩ 500 V megger													
Type	Single-pole single-throw (alternative)																			
Rated voltage	DC 24 V																			
Insulation resistance	More than 1 MΩ 500 V megger																			
SW-16 Switch 2479U1190F1 KCMA, KCME Work light (OPT.) YT02-04001~ YT03-05432~ YT04-07001~ LF04-02001~	<table><tr><td>Rated voltage</td><td>DC 24 V</td></tr><tr><td>Type</td><td>Single-pole single-throw (alternative)</td></tr><tr><td>Insulation resistance</td><td>More than 1 MΩ (500 V megger)</td></tr></table>	Rated voltage	DC 24 V	Type	Single-pole single-throw (alternative)	Insulation resistance	More than 1 MΩ (500 V megger)	<p>TERMINAL CONNECTOR</p> <table><tr><th>Select</th><th>Terminal</th><th>L</th><th>RW</th></tr><tr><td>OFF</td><td></td><td></td><td></td></tr><tr><td>ON</td><td></td><td>○</td><td>○</td></tr></table> <p>CONNECTOR (WITH LOCK) EQUIVALENT YAZAKI 7122-2228</p> <p>RED (R) RED / WHITE (RW)</p>	Select	Terminal	L	RW	OFF				ON		○	○
Rated voltage	DC 24 V																			
Type	Single-pole single-throw (alternative)																			
Insulation resistance	More than 1 MΩ (500 V megger)																			
Select	Terminal	L	RW																	
OFF																				
ON		○	○																	

32.3.1.21 MAINTENANCE STANDARDS

1. Inspection after disassembly

A. Inspection

Part Name	Inspecting Section	Inspection Item	Remedy
Piston rod	1. Neck of rod pin	Presence of crack.	Replace.
	2. Stepped part to which piston is attached	Presence of crack.	Replace.
	3. Threads	Presence of seizure.	Recondition or replace.
	4. Bend	Measure degree of bend.	Refer to rod bend.
	5. Plated surface	Check that: 1. Plating is not worn off to base metal. 2. Rust is not present on plating. 3. Scratches are not present.	1. Replace. 2. Replace. 3. Recondition or replace.
	6. Rod	Wear of O. D.	Recondition or replace.
	7. Bushing at mounting part	Wear of I. D.	Replace.
Cylinder tube	1. Weld on bottom	Presence of crack.	Replace.
	2. Tube at mounting part	Presence of crack.	Replace.
	3. Tube interior	Scratches are not present.	Replace if oil leak is seen.
	4. Bushing at mounting part	Wear of I. D.	Replace.
Rod cover	1. Bushing	1. Wear of I. D.	Replace.
		2. Flaw on inner surface.	

TABLE 32-2

2. Maintenance standards

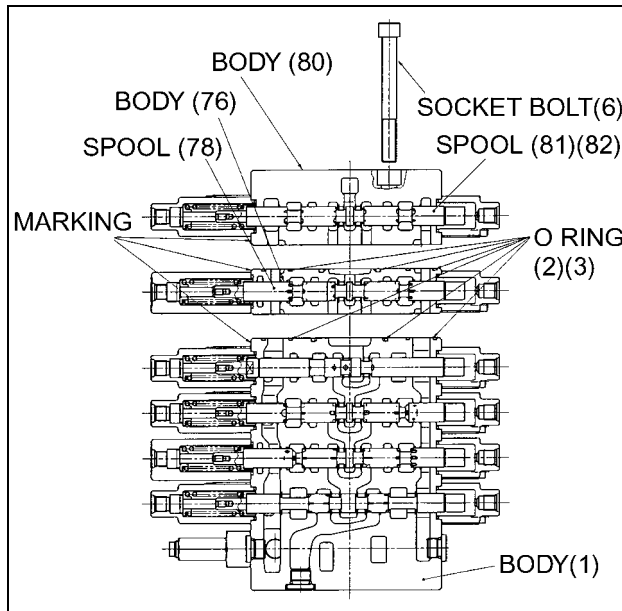
Replace sliding parts and seal parts according to the following.

- 1 Bushing. Where 1/4 of circumference is worn in red copper color.
- 2 Seals and slide ring Replace them when cylinder is disassembled.
- 3 Pin bushing. Where severe scuffing is produced
- 4 Piston rod Where the bent 0.5 mm/m or more is produced

3. Inspection after assembling

No-load performance inspection	When operating 5 time or more in full stroke at no-load, it operates smoothly with no abnormality.					
Dimensional inspection	Check the fully retracted length and stroke specified in drawing.					
Pressure inspection	After applying test pressure specified in drawing to each stroke end for 3 minutes or more, it is free from loosening, permanent set and oil leaking.					
No-load performance inspection	Check rod section for oil leaking. (Refer to Criterion of oil leak quantity on rod section in proceeding page.)					
Internal leakage inspection	Oil leak quantity unit mL (cc) / 10min					
	I. D. mm (in)	Oil leak quantity	I. D. mm (in)	Oil leak quantity	I. D. mm (in)	Oil leak quantity
	32 (1.26)	0.4	100 (3.94)	4.0	160 (6.30)	10.0
	40 (1.57)	0.6	125 (4.92)	5.6	180 (7.09)	12.6
	50 (1.97)	1.0	140 (5.51)	6.0	200 (7.87)	15.6
	63 (2.48)	1.6			220 (8.66)	20.0
	80 (3.15)	2.3			250 (9.84)	22.0

TABLE 32-3



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Figure 33-138

REMOVING N&B VALVE AND BOOM SWING VALVE

33.3.2.3 ASSEMBLY

Here, only the assembly procedures are described.

Regarding drawings, refer to the disassembly procedures.

1. Precautions on installing

A. Cleaning the parts

Before using parts for assembly, clean all of them with clean cleaning oil.

B. O-ring, seals

1. Confirm that O-ring and seals are free of forming defects or defects caused by poor handling.
2. Lubricate O-ring, seals and sealing surfaces with sufficient grease or hydraulic oil.
3. Fit O-ring taking care not to make a distortion. If it is distorted, it may cause oil leakage.

C. Handling

Even if sliding parts and engaging parts are not operated smoothly, never strike them and handle forcibly.

D. Preliminary preparation

Before assembling, prepare structural drawing and check number of parts to avoid mistakes and missing of parts.

E. Tightening torque

Tighten socket bolts and screws in each section to the specified torque with torque wrench.

2. Assembling boom swing valve body (76) and N&B valve body (80) (See Figure 33-138.)

- A. Hold body (1) directing mating surface upward, and fit O-rings (2), (3).

NOTE:

- Check that mating surface is free from dust and O-ring is securely fitted on the groove.
- Don't apply hydraulic oil or grease on O-rings (2), (3) fitted on mating surface.

- B. Install boom swing valve body (76) and N&B valve body (80) meeting positions marked when disassembling.

- C. Tighten four socket bolts (6) to the specified torque.

 10 mm Tightening torque:
66.7~68.6 Nm (49~51 lb ft)

D.

NOTE:

- Don't tighten four socket bolts (6) at a time, but tighten them evenly in order by separating in several times.
- Check that body (1), boom swing valve (76) and N&B valve body (80) are fitted correctly.

3. Assembling Main relief valve and over load relief valve (See Figure 33-136, Figure 33-137.)

- A. Hold body (1), and tighten main relief valve (60) to the specified torque.

 30 mm Tightening torque:
58.8~68.6 Nm (43~51 lb ft)

- B. Tighten ten over load relief valve (61) to the specified torque.

 22 mm Tightening torque:
39.2~49.0 Nm (29~36 lb ft)

NOTE:

- Install over load relief valve (61) to the original position with reference to the tag attached when disassembling.
- Install main relief valve (60) and overload relief valve (61) taking care not to apply tools on hexagonal section in opposing flats 19 mm.

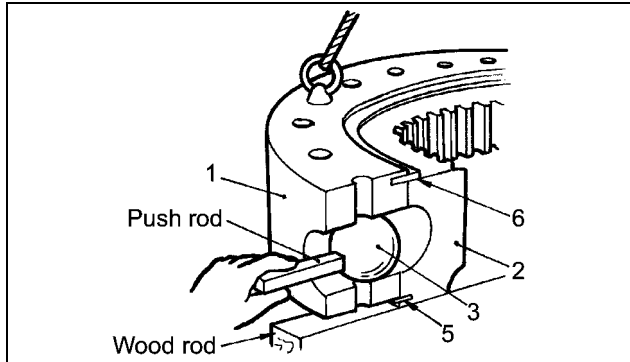
4. Assembling thirteen load check valves

(See Figure 33-135.)

- A. Hold body (1) to the position where every load check valve (21) can be inserted, and install load check valve (21) and spring (22).

- B. Fit O-ring (58) on plug (20) and tighten it to the specified torque.

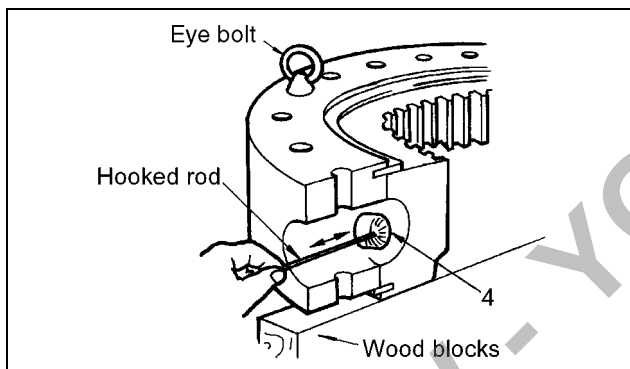
- D. Fit plug (9) to outer race (1) while checking it for direction and position of taper pin hole.
- E. Apply adhesive agent Cyano-bond PO-1 to seal (7), and fit it to groove of outer race (1).
- F. Check that grease nipple (7) is properly fitted, and fill it with grease. Then, check bearing for smooth rotation and flaws on seal lip portion.



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Figure 34-89

FITTING BALLS (3)



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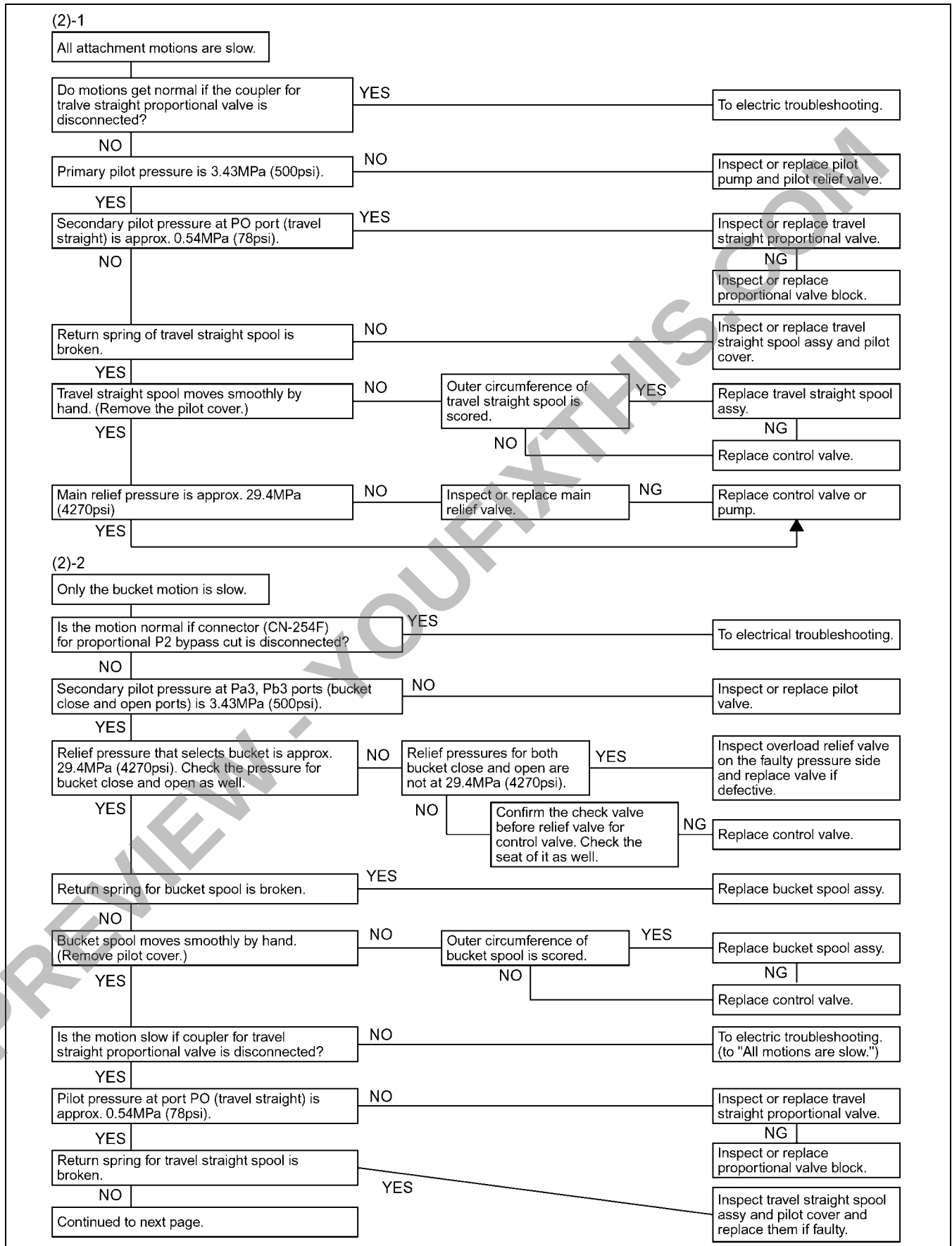
Figure 34-90

FITTING RETAINER (4)

34.2.8.6 MAINTENANCE STANDARD

Maintenance standard concerning wear of slewing bearing is described in the item 13.6 "Measuring Swing Performance" in the Chapter 13. Maintenance Standard and Test Procedure.

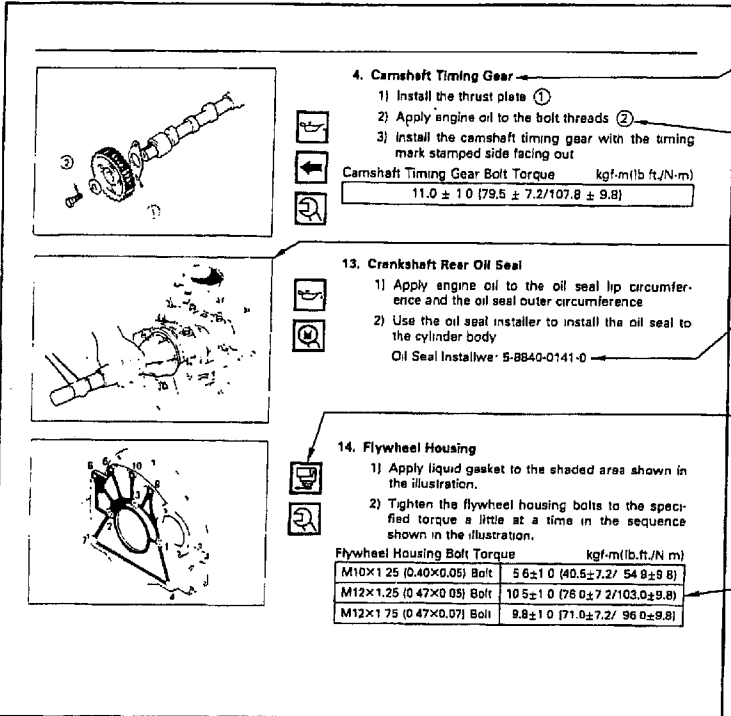
SECTION 4 - SYSTEM TROUBLESHOOTING
CHAPTER 42 - TROUBLESHOOTING (HYDRAULIC SYSTEM)



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Figure 42-2

7. Below is a sample of the text of the Workshop Manual.



4. Camshaft Timing Gear

- 1) Install the thrust plate ①
- 2) Apply engine oil to the bolt threads ②
- 3) Install the camshaft timing gear with the timing mark stamped side facing out

Camshaft Timing Gear Bolt Torque kgf·m(lb.ft./N·m)

11.0 ± 1.0 (79.5 ± 7.2/107.8 ± 9.8)

13. Crankshaft Rear Oil Seal

- 1) Apply engine oil to the oil seal lip circumference and the oil seal outer circumference
- 2) Use the oil seal installer to install the oil seal to the cylinder body

Oil Seal Installer: 5-8840-0141-0

14. Flywheel Housing

- 1) Apply liquid gasket to the shaded area shown in the illustration.
- 2) Tighten the flywheel housing bolts to the specified torque a little at a time in the sequence shown in the illustration.

Flywheel Housing Bolt Torque kgf·m(lb.ft./N·m)

M10×1.25 (0.40×0.05) Bolt	5.6 ± 1.0 (40.5 ± 7.2/ 54.9 ± 9.8)
M12×1.25 (0.47×0.05) Bolt	10.5 ± 1.0 (76.0 ± 7.2/103.0 ± 9.8)
M12×1.75 (0.47×0.07) Bolt	9.8 ± 1.0 (71.0 ± 7.2/ 96.0 ± 9.8)

This is the item shown in the illustration. It is marked with a triangle (▲) on the Major Components page.

Letters and numbers contained in a circle refer to the illustration.

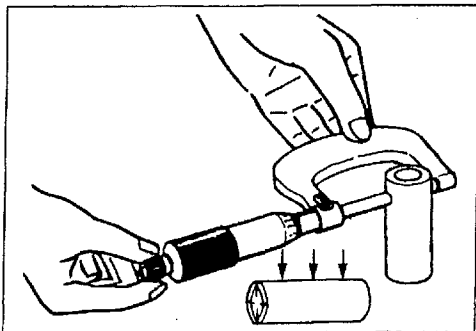
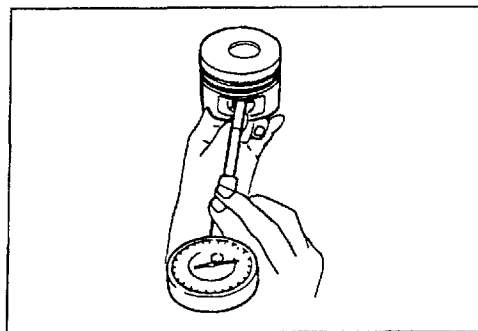
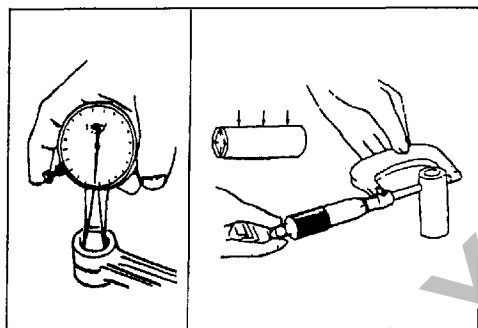
Special tools are identified by the tool name and/or number. The illustration shows how the special tool is to be used.

Symbols indicate the type of service operation or step to be performed. A detailed explanation of these symbols follows.

Service data and specifications are given in this table.

8. The following symbols appear throughout this Workshop Manual. They tell you the type of service operation or step to perform.

	 Removal		 Adjustment
	 Installation		 Cleaning
	 Disassembly		 Important operation requiring extra care
	 Reassembly		 Specified torque (tighten)
	 Alignment (marks)		 Special tool use required or recommended(Isuzu tool or tools)
	 Directional indication		 Commercially available tool use required or recommended
	 Inspection		 Lubrication (oil)
	 Measurement		 Lubrication (grease)
			 Sealant application



PISTON PIN

Piston Pin Diameter



Use a micrometer to measure the piston pin outside diameter at several points.

If the measured value is less than the specified limit, the piston pin must be replaced.

Piston Pin Diameter mm(in)

Standard	Limit
33.995 – 34.000 (1.3384 – 1.3386)	33.97 (1.3374)

Piston Pin and Piston Clearance



Use an inside dial indicator to measure the piston pin hole (in the piston).

Piston Pin Hole mm(in)

Standard
34.004 – 34.012 (1.3387 – 1.3391)

Piston Pin and Piston Pin Hole

Clearance mm(in)

0.004 – 0.017 (0.0002 – 0.0006)

Piston Pin and Connecting Rod Small End Bushing Clearance



Use a caliper calibrator and a dial indicator to measure the piston pin and connecting rod small end bushing clearance.

If the clearance between the piston pin and the connecting rod small end bushing exceeds the specified limit, replace the piston pin and/or the connecting rod bushing.

Piston Pin and Connecting Rod Small

End Bushing Clearance mm(in)

Standard	Limit
0.008 – 0.020 (0.0003 – 0.0008)	0.05 (0.002)

Connecting Rod Bushing Replacement



Connecting Rod Bushing Removal

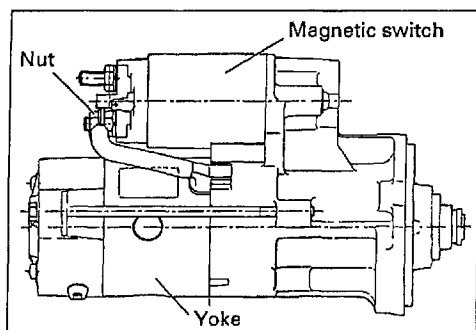
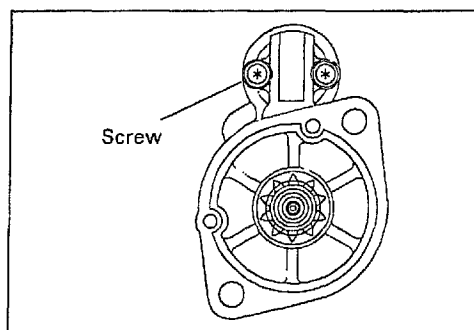
1. Clamp the connecting rod in a vise.
2. Use the connecting rod bushing remover to remove the connecting rod bushing.



Connecting Rod Bushing Replacer

**Disassembly**

When disassembling the starter motor, to make reassembling easier, mark to match the magnet switch and the yoke.

**1. Nut (M terminal)**

Remove the nut of the magnet switch "M" terminal and then the cable.

2. Screw

Remove the screw.

3. Magnet Switch

Remove the magnet switch and the plunger.

4. Pinion

Removing the pinion requires simple tools. A set consists of 3 parts (1 bolt, 1 nut and 1 small tin plate).

These tools are not used during assembly. The pinion is assembled using the puller.

- Pull the lever with the bolt instead of the plunger and push out to where the pinion can be moved forward. In order to fix the lever and the pinion, fix the bolt to the small plate.

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