1

1.1 GENERAL SAFETY INFORMATION

WARNING

Do Not operate or perform any maintenance on this machine until all instructions found in this manual have been thoroughly read and understood. Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.
Always keep this manual in the operators seat pocket.
If it is missing or damaged, place an order with an authorized KOBELCO distributor for a replacement.
If you have any questions, please consult an authorized KOBELCO distributor.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in this manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.

2. Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority. Messages of safety are indicated with marks. The safety information contained in this manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.

3. Messages of safety appear in this manual and on the machine. All messages of safety are identified by the words "DANGER", "WARNING" and "CAUTION" .
   a. **DANGER** – Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury and is represented as follows:

DANGER

   b. **WARNING** – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and is represented as follows:

WARNING

   c. **CAUTION** – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components and is represented as follows:

CAUTION

4. It is very difficult to forecast every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended by KOBELCO.

5. While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.

6. Continue studying this manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.

1.2 SAFETY PRECAUTIONS

WARNING

The proper and safe lubrication and maintenance for this machine, recommended by KOBELCO, is outlined in the OPERATORS MANUAL for this machine.
Improper performance of lubrication or maintenance procedures are dangerous and could result in injury or death. Read and understand the OPERATORS MANUAL before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and or components is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this manual. Use proper lifting procedures when removing any components. Weight of components table for SK290(LC)-VI is shown in Page 6-5 and for SK330(LC)-VI in page 6-10 of Section VI - SPECIFICATIONS.

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6.1 SK290LC-VI GENERAL SPECIFICATIONS

The specifications found in this section are given on the Standard SK290 LC -VI Hydraulic Excavator as manufactured by KOEBELCO No modifications or options are taken in to consideration in regard to these specifications.

A.MACHINE DIMENSIONS– Figure 6.2A

1. Figure 6.2A shows the machine dimensions with Standard Boom {6.20 m (20' 4")}, Standard Arm {3.20 m (10' 6")}, Bucket {1.20 m³ (1.57 yrd³)}, and Track Shoes {800 mm (31.5")}.

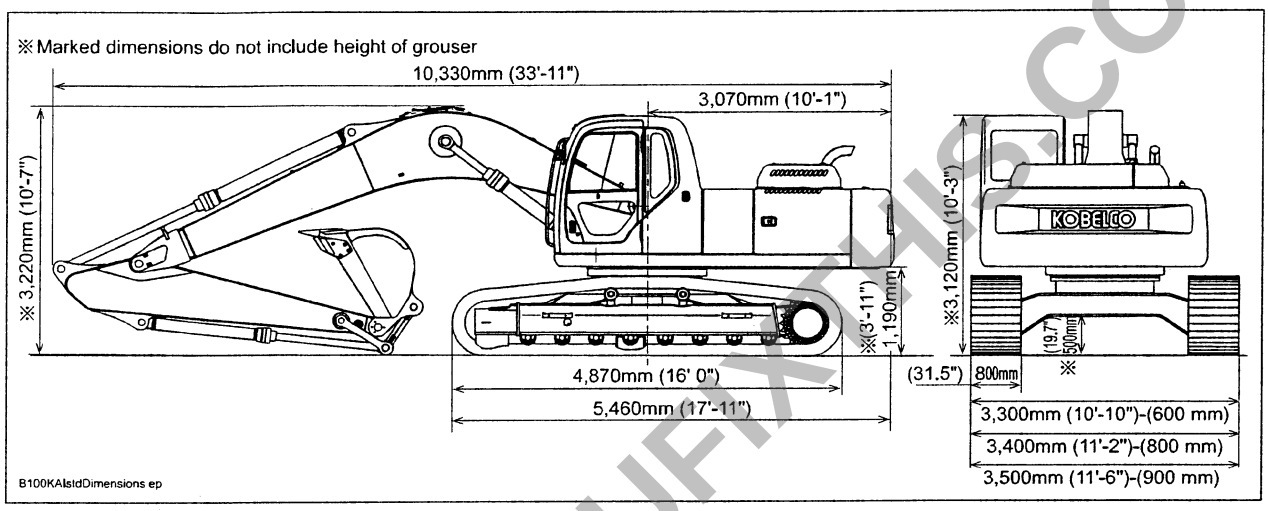


FIGURE 6.2A

B. WORKING WEIGHTS

SK290(LC)-VI

		TRIPLE GROUSER SHOES		
Track shoe width	mm (in)	600 (23.6)	800 (31.5)	900 (35.4)
Overall width	m (ft-in)	3.30 (10 - 10)	3.40 (11 - 2)	3.50 (11 - 6)
Ground pressure	Kg/cm² (psi)	0.571 (8.12)	0.438 (6.24)	0.417 (5.51)
Working weight	Kg (lbs)	29,300 (64,600)	30,000 (66,100)	30,400 (67,000)

Bucket weight: 954 Kg (2,100 lbs)

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1. TIGHTENING TORQUES FOR CAPSCREWS AND NUTS

Tables 1-1 and 1-2 indicate tightening torques applicable to cases where no special note is given. Overtightening of bolts may result in a twist-off and a fracture under load. Insufficient tightening may lead to a loosening or loss of bolts. Always tighten bolts to proper torques.

Table 1-1 Tightening torque for metric coarse threads (not plated) unit : kgf·m (ft·lbs)

Strength grade / Size — Use	4.8T		7T		10.9T	
	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M 6 P=1	0.45±0.05 (3.3±0.4)	0.38±0.04 (2.7±0.3)	0.98±0.1 (7.1±0.7)	0.83±0.08 (6.0±0.6)	1.77±0.18 (13±1)	1.5±0.15 (11±1)
M 8 P=1.25	1.09±0.11 (7.9±0.8)	0.92±0.09 (6.7±0.7)	2.4±0.2 (17±1)	2.0±0.2 (14±1)	4.3±0.4 (32±3)	3.6±0.4 (26±3)
M10 P=1.5	2.2±0.2 (16±1)	1.83±0.18 (13±1)	4.7±0.5 (34±4)	4.0±0.4 (29±3)	8.5±0.9 (61±7)	7.2±0.7 (52±5)
M12 P=1.75	3.7±0.4 (27±3)	3.2±0.3 (23±2)	8.1±0.8 (59±6)	6.8±0.7 (49±5)	14.6±1.5 (110±11)	12.3±1.2 (89±9)
M14 P=2	5.9±0.6 (43±4)	5.0±0.5 (36±4)	12.8±1.3 (93±9)	10.8±1.1 (78±8)	23±2 (170±14)	19.5±1.9 (140±14)
M16 P=2	9.0±0.9 (65±7)	7.6±0.7 (55±5)	19.5±2.0 (140±14)	16.4±1.6 (120±12)	35±4 (250±29)	29±3 (210±22)
M18 P=2.5	12.4±1.2 (90±9)	10.5±1.0 (76±7)	27±3 (200±22)	23±2 (170±14)	49±5 (350±36)	41±4 (300±29)
M20 P=2.5	17.5±1.7 (130±12)	14.7±1.4 (110±10)	38±4 (270±29)	32±3 (230±22)	68±7 (490±51)	57±6 (410±43)
M22 P=2.5	23±2 (170±14)	19.6±2.0 (140±14)	51±5 (370±36)	43±4 (310±29)	92±9 (670±65)	77±8 (560±58)
M24 P=3	30±3 (220±22)	24±3 (170±22)	65±7 (470±51)	53±5 (380±36)	118±12 (850±87)	96±10 (690±72)
M27 P=3	44±4 (320±29)	36±4 (260±29)	96±10 (690±72)	78±8 (560±58)	173±17 (1300±120)	140±14 (1000±100)
M30 P=3.5	60±6 (430±43)	50±5 (360±36)	131±13 (950±94)	110±11 (800±80)	235±24 (1700±170)	198±20 (1400±140)
M33 P=3.5	81±8 (590±58)	68±7 (490±51)	176±18 (1300±130)	148±15 (1100±110)	317±32 (2300±230)	266±27 (1900±200)
M36 P=4	105±10 (760±72)	88±9 (640±65)	227±23 (1600±170)	190±19 (1400±140)	409±41 (3000±300)	343±34 (2500±250)

Table 1-2 Tightening torques for metric fine threads (not plated) unit : kgf·m (ft·lbs)

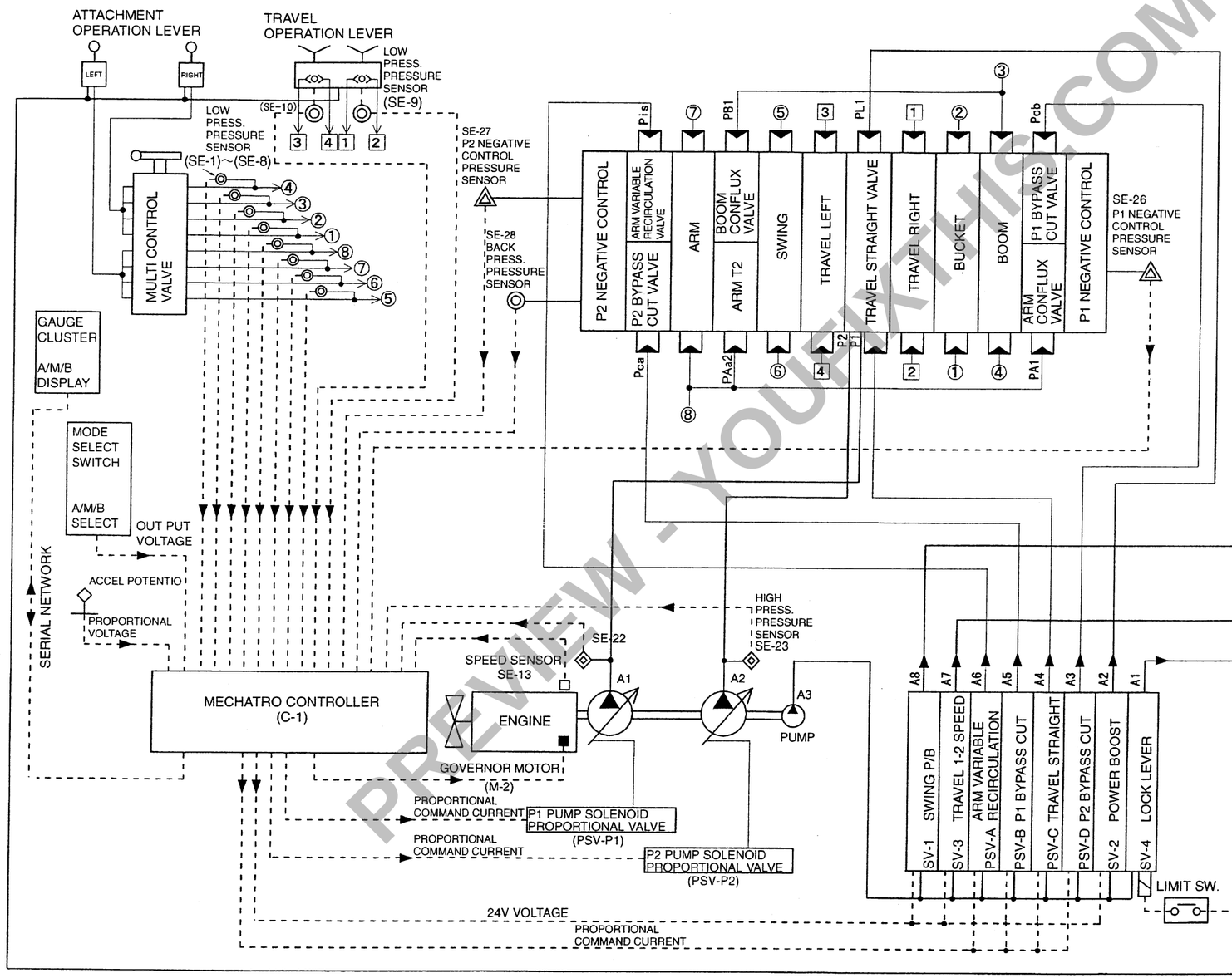
Strength grade / Size — Use	4.8T		7T		10.9T	
	No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M 8 P=1	1.15±0.11 (8.3±0.8)	0.97±0.1 (7.0±0.7)	2.5±0.2 (18±1)	2.1±0.2 (15±1)	4.5±0.4 (33±3)	3.8±0.4 (27±3)
M10 P=1.25	2.3±0.2 (17±1)	1.91±0.19 (14±1)	4.9±0.5 (35±4)	4.2±0.4 (30±3)	8.9±0.9 (64±7)	7.5±0.7 (54±5)
M12 P=1.25	4.0±0.4 (29±3)	3.4±0.3 (25±2)	8.7±0.9 (63±7)	7.3±0.7 (53±5)	15.7±1.6 (110±12)	13.2±1.3 (95±9)
M16 P=1.5	9.4±0.9 (68±7)	7.9±0.8 (57±6)	20±2 (140±14)	17.2±1.7 (120±12)	37±4 (270±29)	31±3 (220±22)
M20 P=1.5	19±1.9 (140±14)	15.8±1.6 (110±12)	41±4 (300±29)	34±3 (250±22)	74±7 (540±51)	62±6 (450±43)
M24 P=2	32±3 (230±22)	27±3 (200±22)	70±7 (510±51)	58±6 (420±43)	126±12 (910±87)	105±10 (760±72)
M30 P=2	65±6 (470±43)	54±5 (390±36)	142±14 (1000±100)	118±12 (850±87)	255±26 (1800±190)	212±21 (1500±150)
M33 P=2	87±9 (630±65)	72±7 (520±51)	190±19 (1400±140)	158±16 (1100±120)	341±34 (2500±250)	284±28 (2100±200)
M36 P=3	109±11 (790±80)	91±9 (660±65)	238±23 (1700±170)	198±20 (1400±140)	428±43 (3100±310)	357±36 (2600±260)

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1. SUMMARY OF MECHATRO CONTROL SYSTEM

1.1 MECHATRO CONTROL SYSTEM IN GENERAL



◇ : High pressure sensor (P1, P2 : 2pcs)
◎ : Low pressure sensor
(ATT : 8pcs, Travel : 2pcs, Back pressure : 1pc)
△ : Negative control pressure sensor (P1, P2 : 2pcs)
◇ : Potentio meter
□ : Engine speed sensor
■ : Governor motor

Electric : Controller IN/OUT signal
Hydraulic : Pilot secondary pressure
Solenoid proportional valve secondary pressure
Pilot primary pressure
Negative control pressure

Pilot secondary pressure signal
Travel 1 Reverse right
2 Forward right
3 Reverse left
4 Forward left
ATT ① Bucket digging
② Bucket dump
③ Boom raising
④ Boom lowering
⑤ Swing left
⑥ Swing right
⑦ Arm in
⑧ Arm out

Mechatro controller		Features	Purpose
	1	P1 pump is controlled by solenoid proportional valve.	A) The power curve shall be an ideal curve.
	2	P2 pump is controlled by solenoid proportional valve.	B) Supply an optimum flow for each operation.
	3	The travel straight valve is controlled by solenoid proportional valve.	• Make the changeover soft.
	4	The bypass cut valve is controlled by solenoid proportional valve.	• Make the changeover soft.
	5	The arm variable recirculation valve is controlled by solenoid proportional valve.	• Control the arm speed as you desire.
	6	The power boost is controlled by solenoid changeover valve	
	7	The open and close actions of the swing P/B are controlled by solenoid changeover valve.	

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1. SUMMARY

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

Table 1

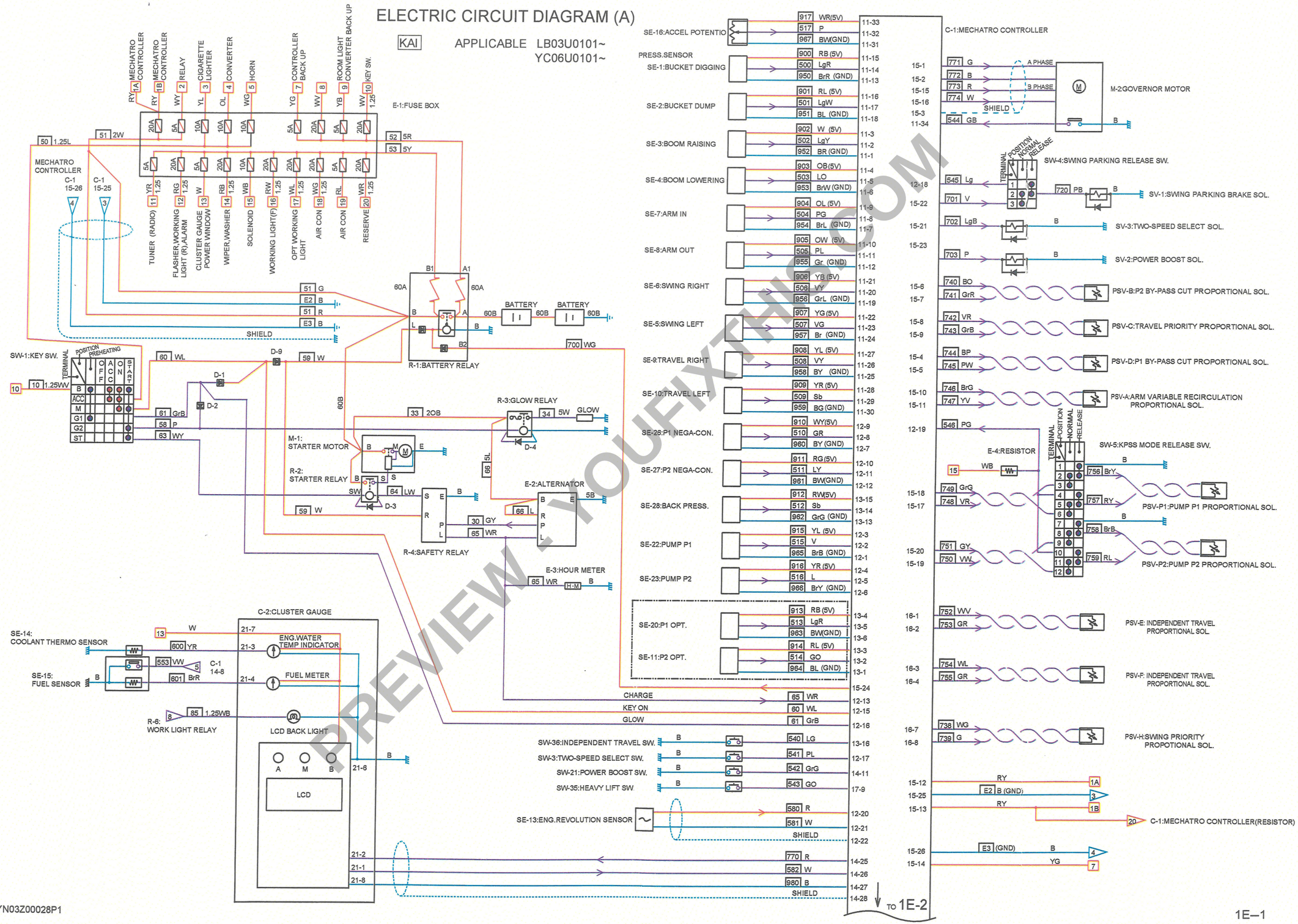
Perfor-mance	Device	Function	Features
Easy operability and safety	Travel	• Travel straight • Travel 2-speed change & Auto 1st (low) speed return • Auto parking brake • Motor overrun protection • Travel pilot operation	• Travel straight at combined operation • 1-2 travel speed change and low speed / high torque at heavy duty • Automatic braking when parking • Prevents overrunning of travel motor on the down hill slope. • Prevents hunting by the built in travel shockless mechanism
	Swing	• Reverse rotation protective function • Swing priority circuit (simultaneous operation of arm digging and swing motions) • Automatic swing parking brake	• Easy positioning to protect it from swinging back when stops swinging. • Easy operation of stable swing speed, arm slanted leveling, swing press digging • Swing parking when operating at on a slope
	Attachment	• Hydraulic pilot control system • Timer-operated pilot lock type • Lock valve (boom / arm) • Multi control valve (Opt.)	• Light action with operating lever • Shut-off of pilot circuit one second after the safety lock lever is operated • Protect boom and arm from unexpected drop (Natural fall). • For operating patterns by single lever
	Others	• Pressurized hydraulic oil tank • Suction strainer • Line filter ; pilot circuit • Return circuit • Cooling hydraulic oil by oil cooler	• To prevent hydraulic oil from entering dust and to promote self suction ability of pump • Remove dust on suction side. • To prevent pilot operating circuit from malfunctioning • To prevent hydraulic oil from contamination • To prevent hydraulic oil from being deteriorated.
Mass handling capability	Pump	• Electric flow controlled variable displacement pump • Negative flow rate control • Back-up control	• Pump delivery rate control by a current command to the solenoid proportional valve of the variable displacement pump • Flow control by negative control pressure and negative control back pressure • Backup control when the solenoid proportional valve of the pump fails
	Attachment	• Boom raise conflux circuit • Arm conflux circuit • Optimum operation by work mode select (A,M,B)	• Speed up of boom raise operation • Speed up of arm operation • Efficient operation in all work modes
Low fuel consumption	Micro computer	• Auto accel	• Reduce fuel consumption and noise by lowering engine speed when control lever is in neutral position.

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ELECTRIC CIRCUIT DIAGRAM (A)

KAI APPLICABLE LB03U0101~
YC06U0101~



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YN03Z00028P1

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INSTRUMENT PANEL ASSEMBLY

YC06U0101~

ITEM	PART NUMBER	DESCRIPTION	QTY	QTY
	YN17M00011F1	INSTRUMENT PANEL ASSY (STD & BREAKER)	F1	
	YN17M00011F2	INSTRUMENT PANEL ASSY (NIBBLER AND BREKER)		F2
1	YN17M01051F1	COVER ASSY	1	1
1-1	YN17M01048P1	COVER	1	1
1-3	YN17M01064P1	PANEL	1	1
2	YN17M01052F1	COVER ASSY	1	1
2-1	YN17M01049P1	COVER	1	1
2-2	YN52S00009P1	POTENTIOMETER (SE-16)	1	1
2-3	YN50S00002F1	SWITCH ASSY, IGNITION (SW-1)	1	1
2-3A	2420Z1030D2 (YN50S00002S001)	KEY	1	1
2-5	YN17M01062P1	BRACKET	2	2
2-6	YN17M01063P1	BRACKET	2	2
2-7	YN02C01877D2	SCREW, TAPPING	8	8
2-8	ZS31C04012	SCREW, MACHINE	2	2
2-10	YN07M01070P1	LABEL	1	1
2-11	YN17M01069P1	LABEL	1	1
2-12	ZW16P04000	WASHER	2	2
3	YN17M01047P1	COVER	1	1
4	YN59E00004F1	GAUGE ASSY, CLUSTER	1	1
4-1	LC59S00001F2	GAUGE, CLUSTER (C-2)	1	1
4-2	YN17M01061P3	BRACKET	1	1
4-3	YN17M01066F1	COVER ASSY	1	1
5	YN02C01877D2	SCREW, TAPPING	4	4
6	YN17M01050P1	COVER	1	1
7	YN54S00006P1	SPEAKER	2	2
8	LB54S00001P1	TUNER	1	1
9	2420R1089D1	SEMS-BOLT	4	4
10	ZS32T40012	SCREW, TAPPING	8	8

ITEM	PART NUMBER	DESCRIPTION	QTY	QTY
11	ZW16K04000	WASHER	8	8
12	ZM46C06020	SEMS-BOLT	8	8
13	YX17M01003P1	BRACKET	2	2
14	ZM46C06016	SEMS-BOLT	7	7
15	YN17M01032P1	CAP	7	6
16	YN02C01385F1	TRAY, ASH	1	1
17	2421R180F1	LIGHTER, CIGARETTE (E-14)	1	1
18	YN20M01220P1	GRILLE	2	2
19	YN20M01297F1	DUCT ASSY	1	1
19-1	YN20M01219P1	DUCT ASSY	1	1
19-2	YN20M01297S002	SEAL	1	1
19-3	YN20M01297S003	SEAL	1	1
20	YN58S00006P1	METER, HOUR (E-3)	1	1
21	ZM61C08020	SEMS-BOLT	5	5
22	ZM66C06012	SEMS-BOLT	3	3
23	YN17M01072P1	CABLE	1	1
24	YN81S00001P1	SOCKET (12V Accessory)	1	1
25	YN17M01055D1	CAP	3	3
26	YN17M01055D2	CAP	4	4
27	YN17M01068P1	CAPSCREW	1	1
28	YN17M01060P1	CAP	1	1
29	2479U1190F13	SWITCH (SW-35) (Heavy Lift)	1	1
30	2420T4505	WASHER	4	4
31	2479U1224F4	SWITCH (SW-3) (Two speed Travel Select)	1	1
32	2479U1190F5	SWITCH (SW-36) (Independent Travel)	1	1
33	2479U1190F9	SWITCH (SW-9) (Swing Flasher)	1	1
34	2420Z1330	GROMMET	1	1
35	YN50E00003F1	SWITCH ASSY (SW-20) (Wiper, Washer, Work Light)	1	1
36	YN02C01877D1	SCREW, TAPPING	2	2
37	2479U1190F31	SWITCH (SW-38) (Warm-Up)	1	1
38	2479U1190F32	SWITCH (SW-15) (Conflux/Single Select)	-	1
39	YN50E00002F1	SWITCH ASSY (SW-2) (Buzzer Stop, Work Mode)	1	1
40	ZM46C05012	SEMS-BOLT	2	2

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1. HYDRAULIC PUMP · REGULATOR

1.1 SUMMARY

(1) Outside view and hydraulic port

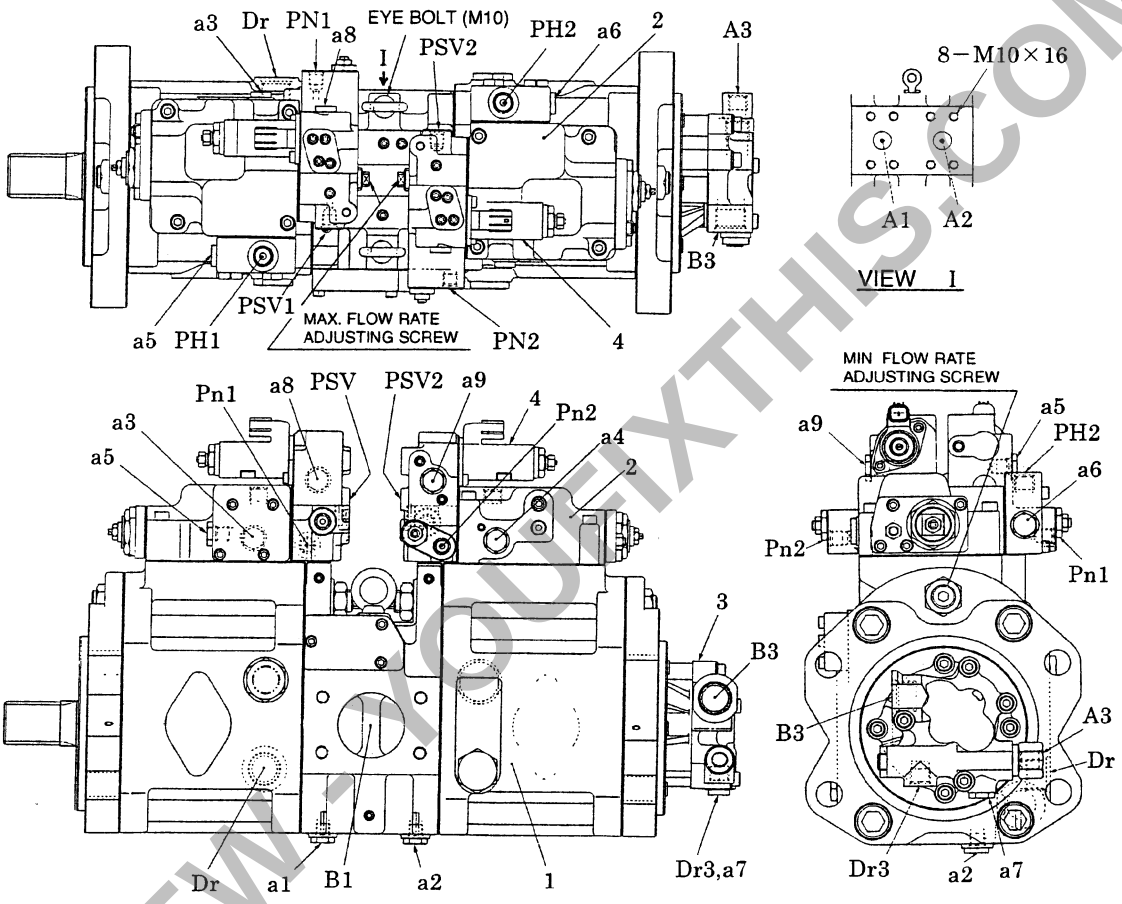


Fig. 1-1 Hydraulic pump · regulator

No.	NAME
1	MAIN PUMP ASSY
2	REGULATOR ASSY
3	GEAR PUMP ASSY(FOR PILOT)
4	SOLENOID PROPORTIONAL REDUCING VALVE

Table 1-1 Hydraulic ports

Code	Ports name	Size
A1,2	Delivery port	SAE 6000psi 3/4″
B1	Suction port	SAE 2500psi 2 1/2″
Dr	Drain port	PF3/4
PSV1,2	Servo assist port	PF1/4
Pn1,2	Servo assist port	PF1/4
PH1,2	Pressure sensor port	PF3/8
a1～9	Gauge port	PF1/4
A3	Delivery port of gear pump	PF3/8
B3	Suction port of gear pump	PF3/4
Dr3	Drain port of gear pump	PF3/8

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1. CONSTRUCTION AND PIPING

1.1 CONSTRUCTION

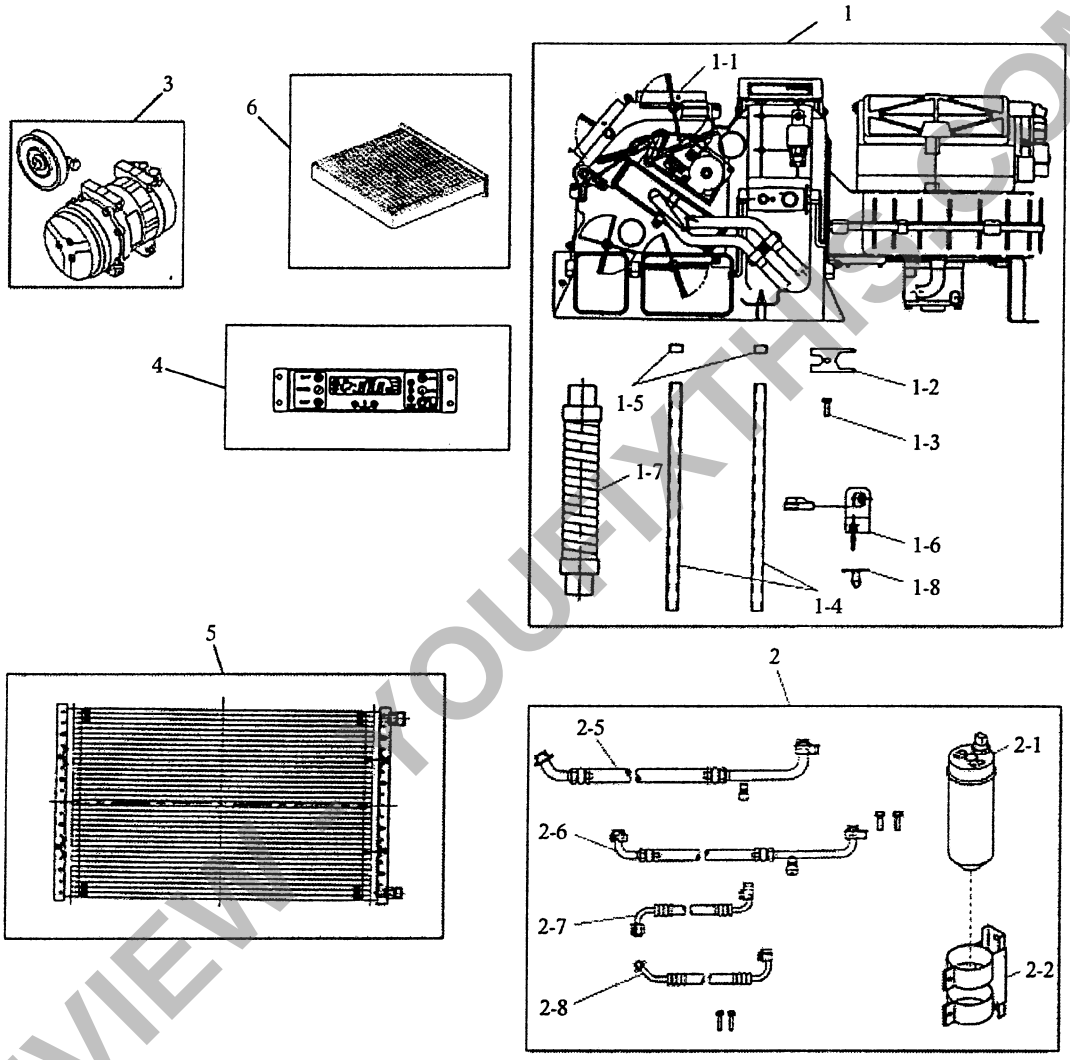


Fig. 1 Air-conditioner group

A/C ASSY	LC20M00001F1

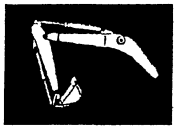
No.	NAME	Q'TY	No.	NAME	Q'TY	No.	NAME	Q'TY
1	AIR-CONDITIONER ASSY	1	2	AIR DRYER ASSY	1	3	COMPRESSOR	1
1-1	AIR-CONDITIONER UNIT	1	2-1	RECEIVER DRYER	1	4	PANEL	1
1-2	PLATE	1	2-2	BRACKET	1	5	CONDENSER	1
1-3	CAPSCREW	1	2-5	S HOSE;Ø24.5 L=4,540mm	1	6	FILTER ASSY	1
1-4	HOSE	2	2-6	D HOSE;Ø19 L=2,015mm	1			
1-5	CLAMP	2	2-7	L HOSE;Ø15.5 L=430mm	1			
1-6	SENSOR	1	2-8	L HOSE;Ø15.5 L=5,355mm	1			
1-7	DUCT	1						
1-8	CLIP	2						

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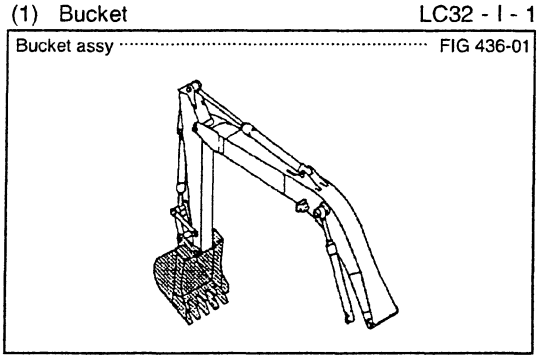
1. DISASSEMBLING AND ASSEMBLING PROCEDURE AND PARTS MANUAL

1.1 アタッチメント ATTACHMENTS



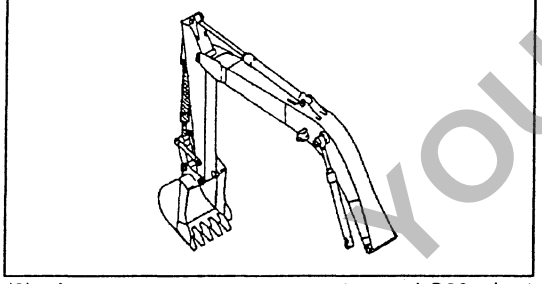
(1) Bucket — LC32 - I - 1

Bucket assy ····· FIG 436-01



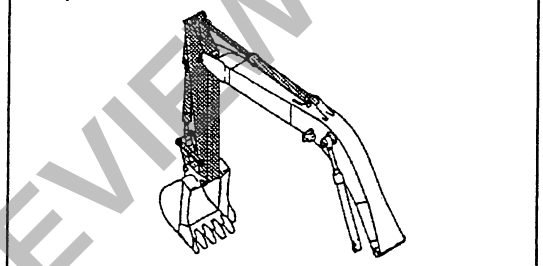
(2) Bucket cylinder — LC32 - I - 4

Bucket cylinder ····· FIG 414-01



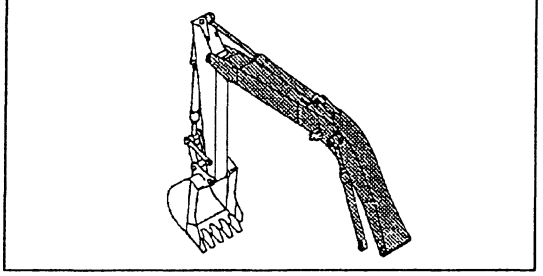
(3) Arm — LC32 - I - 4

Arm ····· FIG 414-01
Arm cylinder ····· FIG 390-01



(4) Boom & Boom cylinder — LC32 - I - 7

Boom ····· FIG 390-01
Boom cylinder ····· FIG 396-01

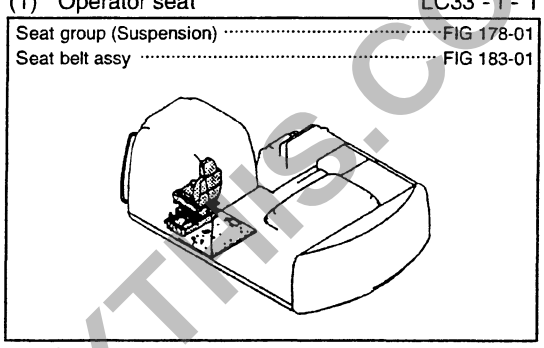


1.2 上部旋回体 UPPER STRUCTURE



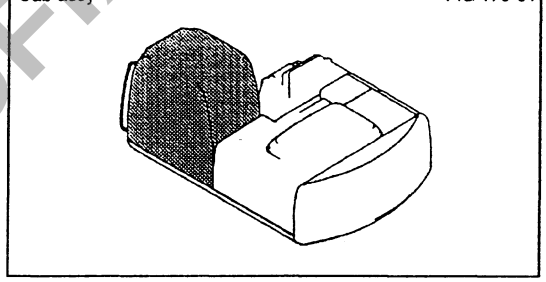
(1) Operator seat — LC33 - I - 1

Seat group (Suspension) ····· FIG 178-01
Seat belt assy ····· FIG 183-01



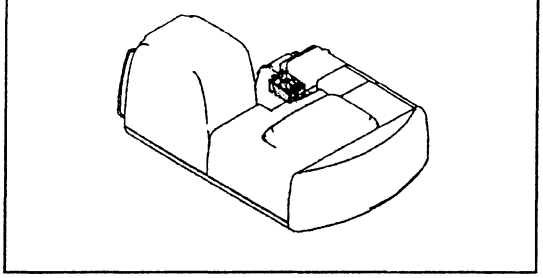
(2) Cab — LC33 - I - 2

Cab install ····· FIG 166-01
Cab assy ····· FIG 170-01



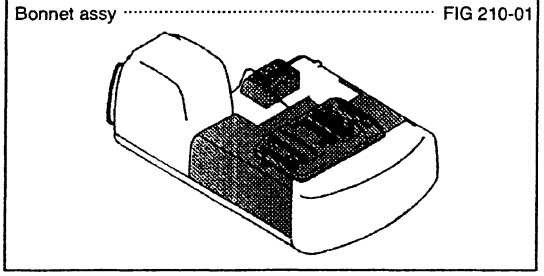
(3) Battery — LC33 - I - 3

Battery install ····· FIG 254-01



(4) Guard — LC33 - I - 4

Guard install ····· FIG 198-01
Cover assy ····· FIG 200-01
Bonnet assy ····· FIG 210-01



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SAFE-TECH & AMENI-TECH NABCO	LB15V00002F1 TRAVEL REDUCTION UNIT SK290 TRAVEL REDUCTION	SS71747E DATE Nov. 15, 2000

1. SPECIFICATIONS

1-1. OUTLINE DIMENSIONS

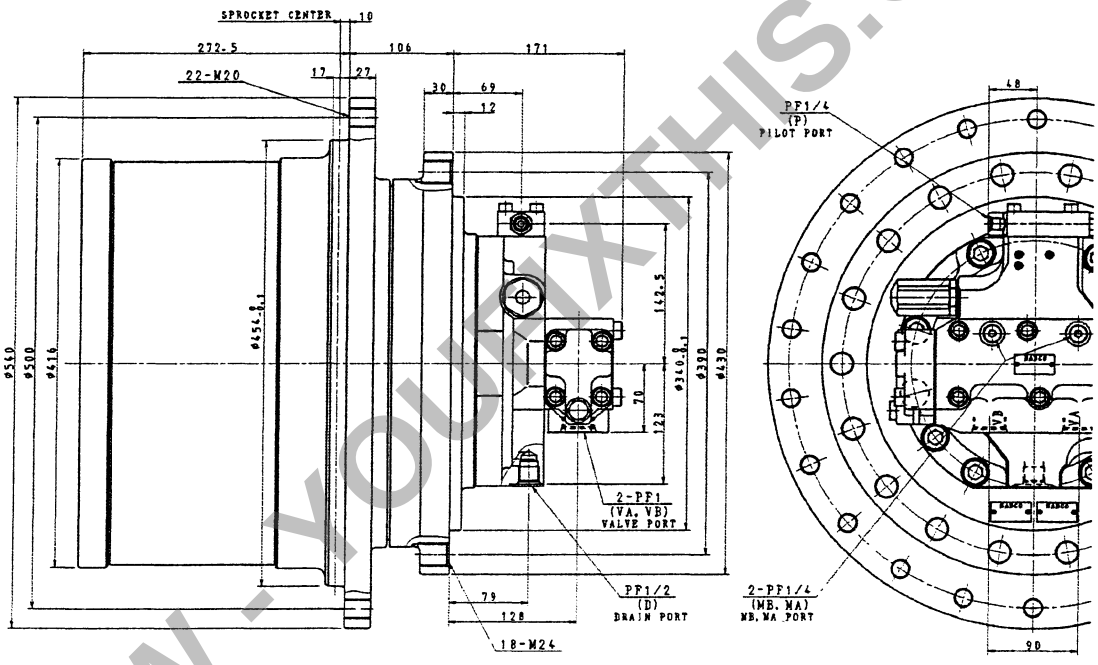


Fig.1 Outline dimensions of propelling unit

1-2. SPECIFICATIONS

Model No. Parts No.	M3V260/160A-RG5 NABCO:2162-2-209432-01	
ITEMS	**UNITS**	**VALUES**
Motor displacement	cm^3/rev.	262.6/160.6
Rated pressure	MPa	34.8 (350 kgf/cm^2)
Rated flow	L/min.	320
Gear ratio		33.814
Number of stages		2
Gear oil capacity	Litters	7.5
Oil specification		Gear oil SAE90 API GL4 or GL5
Weight w/accessory valves	kg	Total 320 (wet)
Weight of motor only	kg	112(wet)

Table 1

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1. OUTLINE

Troubleshooting provides process locating for the cause of trouble in the order that trouble occurred. This manual describes how to solve the specific phenomenon systematically as early as possible. For troubleshooting concerning the inside of equipment, refer to troubleshooting for each manual of equipment.

1.1 JUDGMENT OF ACTUAL THING AT SITE

(1) Get to the site as quickly as possible.
Verify model, serial number, situation of trouble and field, and notify person of arrival time.

(2) Verify background of trouble occurred
1) Model name and serial number
2) Kind of attachment
Check that the combination of attachment is proper or that the operating method is not unreasonable.
3) Operating time by hour-meter
4) History of trouble occurred and additional works.
5) Recurrence of past trouble, or problems on the additional works.

(3) How to diagnose trouble
1) Verify defective part
2) Make the condition of trouble again
3) Where defective parts can not be verified, surmise causes systematically.
4) Verify reasons for surmise
5) Report methods, procedure, and period for repairing to user.

(4) Explanation of the cause of trouble
1) Explain the cause of trouble to clients. For example, oil leak through piston is caused by flaws on the piston rod. And the method of using the machines should be explained so that the same kind of trouble does not reoccur.
2) Treatment of damaged parts
The damaged parts to be claimed and returned are evidence so they should be handled with care. Protect them from entry of water, soils, etc. into port of hydraulic unit, etc. and return them. And also use care not to flaw and damage those surfaces.



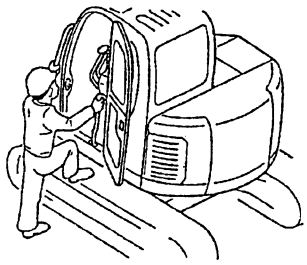
YR-B76

Attending the field to verify actual thing.



YR-B76

Verifying background of trouble occurred.



YT-B87

Confirm the symptoms of the trouble.



YR-B76

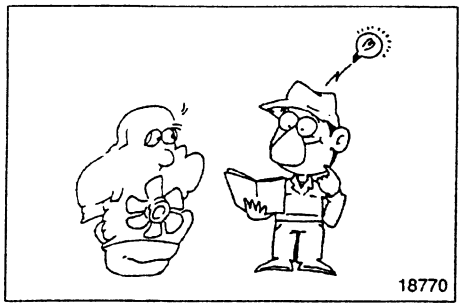
Diagnosing fail by means troubleshooting.

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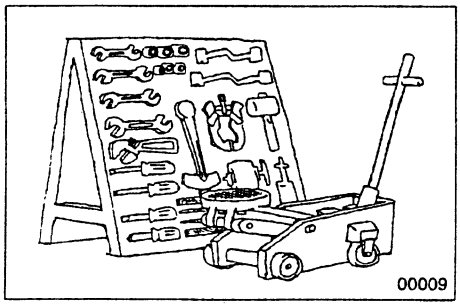
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PRECAUTIONS FOR MAINTENANCE OPERATION

In order to determine the condition of the vehicle adequately, attend the vehicle beforehand to find and keep record of the accumulated mileage, operating condition, what the customer's demand is, and other information that may be necessary. Prepare the steps to be taken and perform efficient and wasteless maintenance procedure.



Determine where the fault exists and check for the cause to see whether removal or disassembly of the part is necessary. Then follow the procedure specified by this manual.

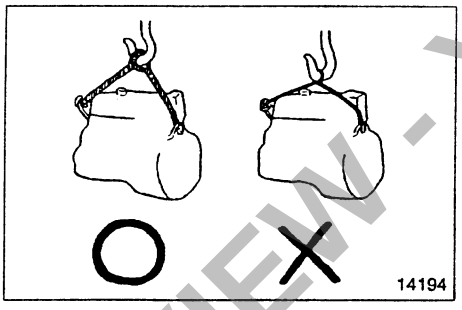


Perform maintenance work at a level area.
Prepare the following.

- Prepare general and special tools necessary for the maintenance work.

WARNING ⚠

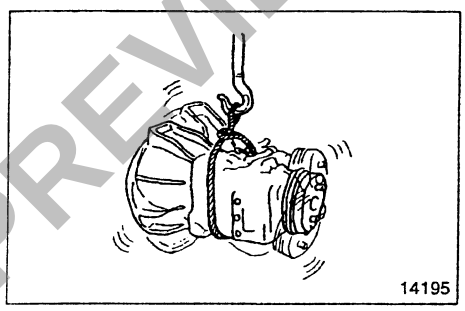
Do not attempt to use tools other than special tools where use of special tools is specified in this manual. This will avoid injury or damage.



Pay special attention to safety when removing or installing heavy items such as engines, transmissions.

When lifting up heavy items using cables, pay special attention to the following points:

- Check the mass of the item to be lifted and use a cable capable of lifting that mass.



- If you do not have the specified lifting hanger, secure the item using cable taking the point-of-balance of the item into consideration.
- You must work in a position where you will not be injured even if the cable comes undone and the lifted item falls.

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Applicable Machines

LB03 - U0101~

YC06 - U0101~

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Revision	Date of Issue	Remarks
First Edition	February, 2001	KAI -S5LB/YC0107E

Edited and Compiled by KAI

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1.2 BOOM MAINTANCE STANDARD

(1) Clearance of pin and bushing on boom section

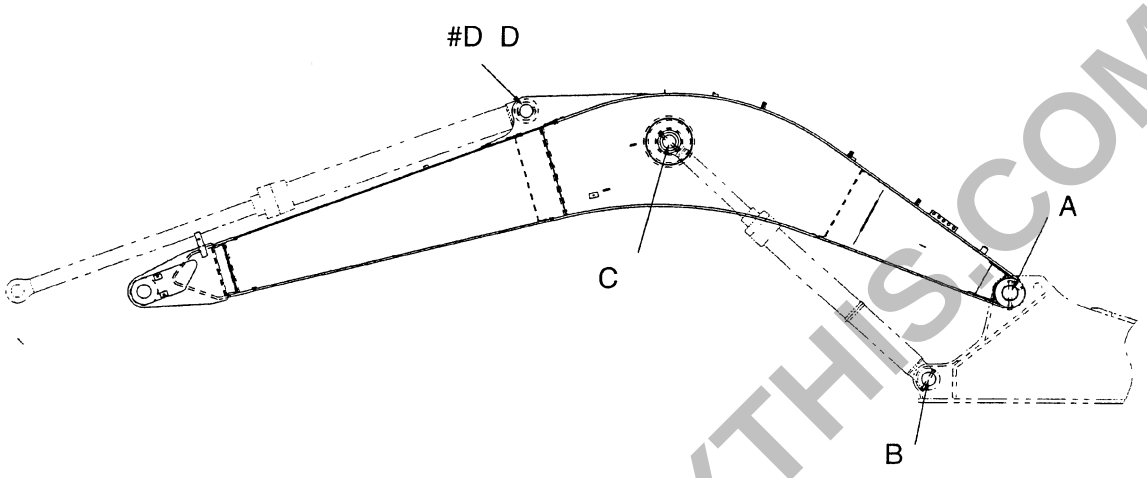


Fig. 1-2 Clearance of pin and bushing on boom section

Table 1-2 Unit: mm (Ft-in)

Symbol	Item	Pin part No.	Pin dia.	Pin dai. Tolerance	Bushing I.D. Tolerance	Standard value	Repairable level	Service Limit	Remedy
A	Boom foot	LC02B01056P2	ϕ110mm (4.33")	+0.20mm (+0.0008") -0.020mm (-0.0008")	+0.177mm (+0.0069") +0.076mm (+.00299")	+.197mm (+0.0078") +0.056mm (+0.0022")	More than 2.5mm (0.98")	3.0mm (0.118")	Replace bushing or pin
B	Boom cylinder (head side)	LC02B01011P1	ϕ100mm (3.94")		+0.250mm (+0.0098") +0.050mm (+0.0020")	+0.270mm (+0.0106") +0.030mm (+0.0012")			
C	Boom cylinder (rod side)	2419P3752	ϕ110mm (4.33")	+0.070mm (+0.0028") -0.130mm (-0.0051")					
D	Arm cylinder (Head side)	LC02B01052P1				+.380mm (+0.015") +0.120mm (+0.0047")			
# D		LC02B01052P1		+0.20mm (+0.0008") -0.020mm (-0.0008")		+.330mm (+0.013") +0.010mm (+0.0004")			

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CAUTION

THIS TEST IS DESIGNED FOR STANDARD BOOM, ARM AND BUCKET. IF THE MACHINE BEING TESTED HAS ANY OPTIONAL EQUIPMENT, CHECK TO MAKE CERTAIN THERE WILL BE NO INTERFERENCE WITH THE CAB BEFORE PERFORMING THE TEST !!

D. Arm Cylinder Cycle Time Test

NOTE

The measuring time of the cylinder cycle does not include the cushion stroke times. Only measure time up to the beginning of the cushion stroke.

1. Move the machine to a firm, level testing area.
2. Place the machine throttle control to "HIGH" idle and The KPSS Work Mode Switch to "M" Mode. See Figure 3.4.
3. Fully extend Boom Cylinder. See Figure 3.5.
4. Fully retract Bucket Cylinder. See Figure 3.5.
5. Fully extend the Arm (retracting cylinder).
6. At full stroke of the control, bring the arm all the way in (extending cylinder) and measure the time it takes for the arm cylinder to reach the cushion stroke. Record the time. See Figure 3.6.
7. At full stroke of the control, fully extend the arm (retracting cylinder) and measure the time it takes until the cylinder reaches the cushion stroke. Record the time. See Figure 3.6.
8. Repeat steps 6 and 7 two more times. Average the recorded times and compare the average to the Arm Cylinder Cycle Time Specification Chart.

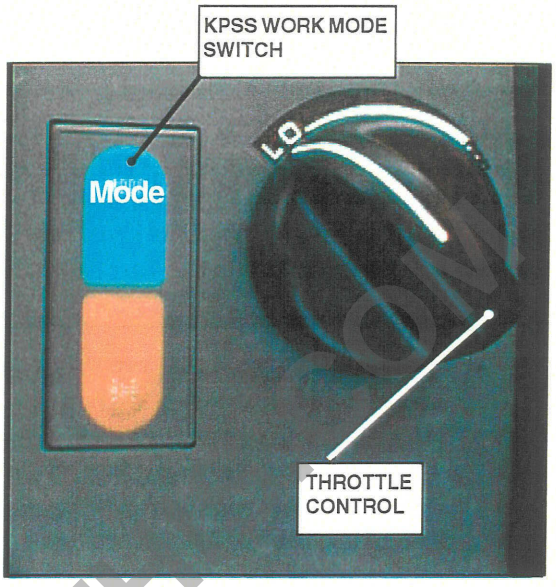
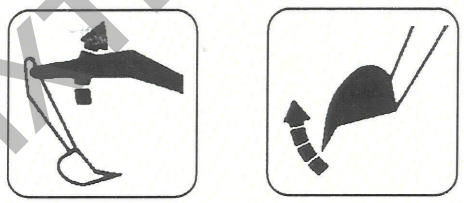


FIGURE 3.4



BOOM UP CYLINDER EXTENDED

BUCKET OUT CYLINDER RETRACTED

FIGURE 3.5

DO NOT TIME CUSHION STROKE OF CYLINDER DURING TEST

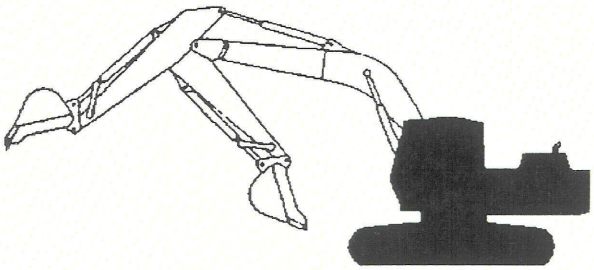


FIGURE 3.6

ARM CYLINDER CYCLE TIME SPECIFICATIONS

MODEL	CYLINDER POSITION	M-MODE
SK290	EXTENSION	3.6 - 4.2
SK290	RETRACTION	2.7 - 3.3
SK330	EXTENSION	4.1 - 5.1
SK330	RETRACTION	3.1 - 3.7

Unit: Seconds

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10. COMBINED CIRCUIT

This section describes only the difference in combined operation.

1) Boom raise/travel, pilot circuit
2) Boom raise/travel, main circit

10.1 BOOM RAISE/TRAVEL, PILOT CIRCUIT

Operation :

<Pilot circuit other than independent operation>

<Mechatro>

1) If the mechatro controller processes signals, a current command is put out to two valves; the travel straight solenoid proportional valve (PSV-C) and the P2 bypass cut solenoid proportional valve (PSV-B). These valves put out secondary pressure which acts upon the PTb and the PCa ports of C/V (2).

<Hydraulic>

2) Next, the PTb port pressure changes over the travel straight valve.
   Meanwhile, the solenoid proportional valve which enters the PCa port of C/V (2) changes over the P2 bypass cut valve.

10.2 BOOM RAISE/TRAVEL, MAIN CIRCUIT

Purpose :

To insure straight travel movement during travel operation even if the attachment is operated.

Principle :

The travel action and the attachment action are actuated by separate pumps.

Operation :

1) The oil delivered by the P1 and P2 pumps runs into the travel straight section from the P1 and P2 ports of C/V (2). Since the travel straight spool is shifted, the oil delivered by the P2 pump is branched off to the P1 and P2 bypass lines.
   In the meantime, the oil delivered by the P1 pump are branched off to the P1 and P2 parallel circuits.
2) Next, since the travel right and left actions operate on the bypass circuits, the oil delivered by the P2 pump is used.
   Meantime, since the boom spool and other spools operate on the parallel circuits, the oil delivered by the P1 pump is used.

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Applicable Machines

LB03 - U0101~

YC06 - U0101~

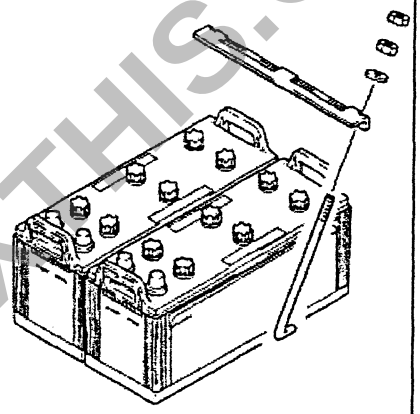
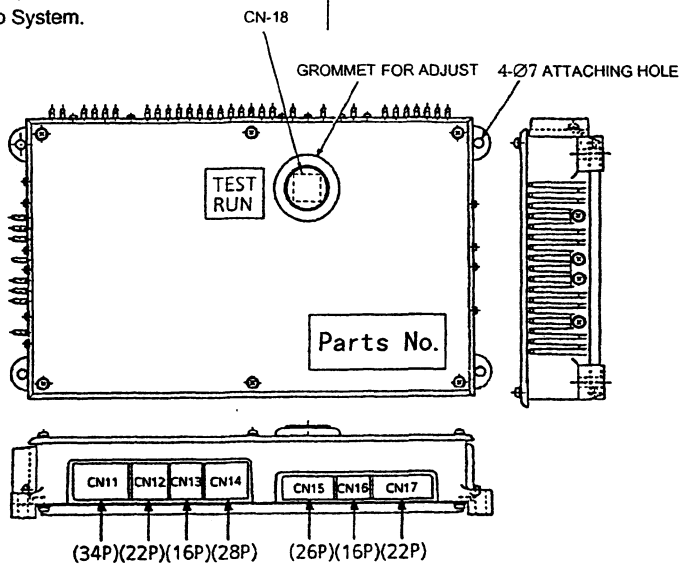
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Revision	Date of Issue	Remarks
First Edition	February, 2001	KAI - s5LB/YC2407E

Edited and Compiled by KAI USA

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2.3 SPECIFICATION OF ELECTRIC EQIUPMENTS

File No. Name of part Part No. Use Applicable Machine	Specification		Description
B-1 Battery 2484U178 Power	Type	130F51	 502L×180W×255H
	Voltage	12V	
	Capacity (Ah) 5HR	104Ah	
	Capacity (Ah) 20HR	130Ah	
	Weight	34.5kg (76 lbs)	
2484U175 Power	Type	170F51 N250-12	
	Voltage	12V	
	Capacity (Ah) 5HR	120Ah	
	Capacity (Ah) 20HR	150Ah	
	Weight	37kg (82 lbs)	
C-1 Controller LC22E00014F2 (EU) LC22E00009F2 (Asia, Oce) Mechatro controller LC06-05501~ YC08-02501~	Maker		 CN-18 GROMMET FOR ADJUST 4-Ø7 ATTACHING HOLE TEST RUN Parts No. CN11 CN12 CN13 CN14 CN15 CN16 CN17 (34P)(22P)(16P)(28P) (26P)(16P)(22P)
	Rated voltage	DC24V	
	For details, refer to Mechatro System.		

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KAI-S5LB/YC3307E

KOBELCO

SHOP MANUAL

SK290LC
SK330LC
Dynamic Acera

UPPER STRUCTURE

TABLE OF CONTENTS

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13. Engine I-26
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20. Swivel Joint I-37
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[Part II ; Disassembling and assembling]
1. Hydraulic Pump • Regulator II-1
2. Control Valve II-2
3. Pilot Valve (for Att) II-3
4. Pilot Valve (for Travel) II-4
5. Swing Motor Unit II-5
6. Swivel Joint II-6

LB/YC33

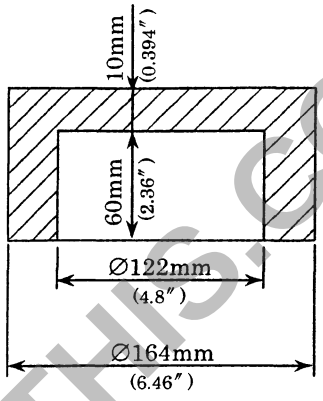
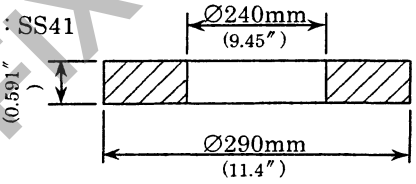
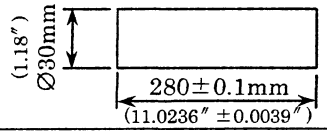
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SK290-330 02/01 Re v. 01

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5.3 DISASSEMBLY AND ASSEMBLY OF SWING REDUCTION UNIT

5.3.1 TOOLS

Code	Tool name	Remarks
A	Jig (for press fitting bearing)	Material : SS41 
B	Snap ring plier	For shaft
C	Oil seal fitting jig	Material : SS41 
D	Torque wrench	Class 10kgf·m (72ft·lbs), 30kgf·m (220ft·lbs)
E	Plastic hammer (Wooden hammer)	
F	Press	Class 50ton (110000 lbs)
H	Flat screwdriver	
I	Metal bar	3 pcs. 
J	General tools	Allen wrench and steel rod
K	Screw lock compound	Locktite #242
	Sealing compound	Locktite #515

5.3.2 DISASSEMBLY

The numbers in parentheses correspond to the ones in construction drawings (Fig. 5-2).

(1) Preparation

1) Before disassembly, clean the outside of the reduction unit thoroughly and check for no damage and scoring.
2) Drain gear oil from the reduction unit.
3) Disconnect the drain hose.
4) Matching Mark
   To facilitate the reassembly of the unit, put matching mark on the joining parts of the housing before disassembly.

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6. SPROCKET

6.1 REMOVING

(1) Preparation for removal

Remove crawler referring to Section 2. "Crawler", lift up crawler frame with attachment, and put it on square timbers to float and stabilize.

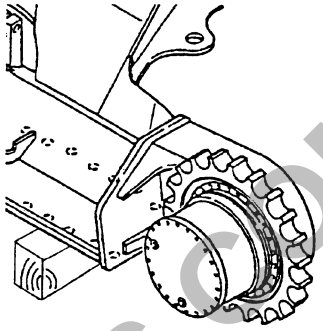


Fig. 6-1 Preparation for removal

(2) Removing sprocket

Loosen twenty six capscrews (3) M20×55, for the attaching of the sprocket by means of a socket and remove the sprocket (1).

Weight of sprocket : 77kg (170 lbs)

: 30mm

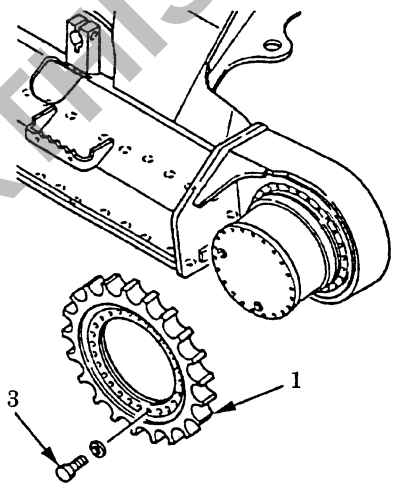


Fig. 6-2 Removing sprocket

6.2 INSTALLING

(1) Check before installing

Check the mating portion of the travel reduction unit and the sprocket, eliminate burrs and contamination thoroughly and install the sprocket.

(2) Securing sprocket temporarily

Coat the sprocket attaching capscrews (3) with Locktite #262 and fasten the sprocket temporarily.

(3) Securing sprocket completely

Remove the wooden blocks under the truck frame, bring the machine down on the ground and tighten the sprocket.

: 30mm,
Tightening torque : 55kgf·m (400ft·lbs)

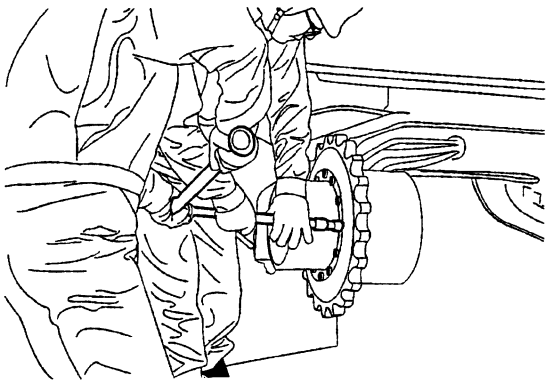
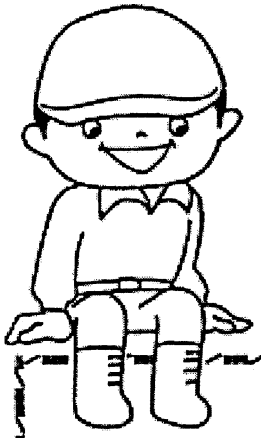


Fig. 6-3 Securing sprocket temporarily

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PREFACE

This service manual explains a single engine. This manual utilizes a general service manual made by MITSUBISHI MOTORS CORPORATION that we modified for our machine (6D34-T) i. e. by deleting unused sections and changing unsuitable statements.

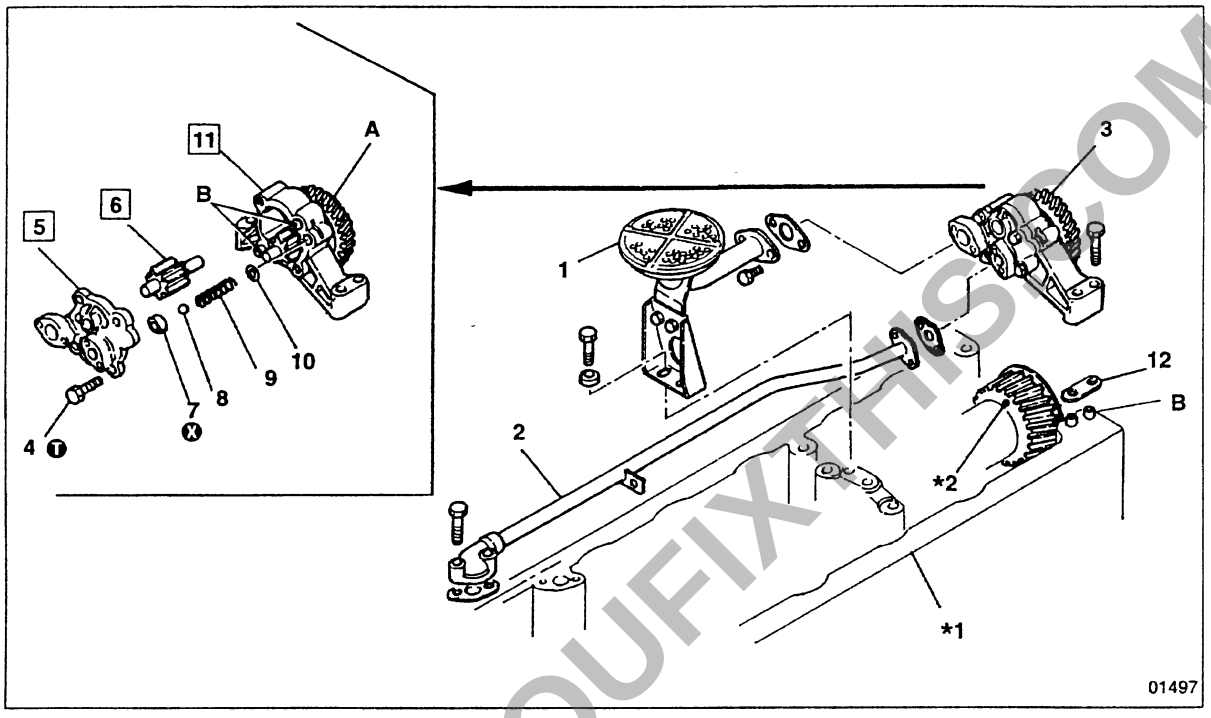
Models	Applicable Machines	Notes	Models	Applicable Machines	Notes
SK210LC	LQ07-0101 ~				
SK250LC	LL08-0101~				

Revision	Date of Issue	Remarks
First edition	November 2000	KAI35 YQ/LL5112E

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OIL PUMP AND OIL STRAINER



● **Inspection before disassembly**

📖 P.12-21

● **Disassembly sequence**

1 Oil strainer
2 Oil pipe
3 Oil pump assembly
4 Bolt
5 Cover
6 Driven gear assembly
7 Ring
8 Relief valve
9 Relief valve spring
10 Washer
11 Gear and case assembly
12 Shim

*1: Crankcase 📖 Gr 11
*2: Crankshaft gear 📖 Gr 11

A: Oil pump gear
B: Locating pin
Ⓧ: Non-reusable part

NOTE

- **Do not remove parts #7 to 10 unless they are defective.**
- **Gear and case assembly 11 is an integrated unit and cannot be disassembled. If any defect is apparent, replace the whole unit.**
- **Do not remove oil strainer 1 and oil pipe 2 from oil pump assembly 3 unless they are defective. Remove those three as a unit.**

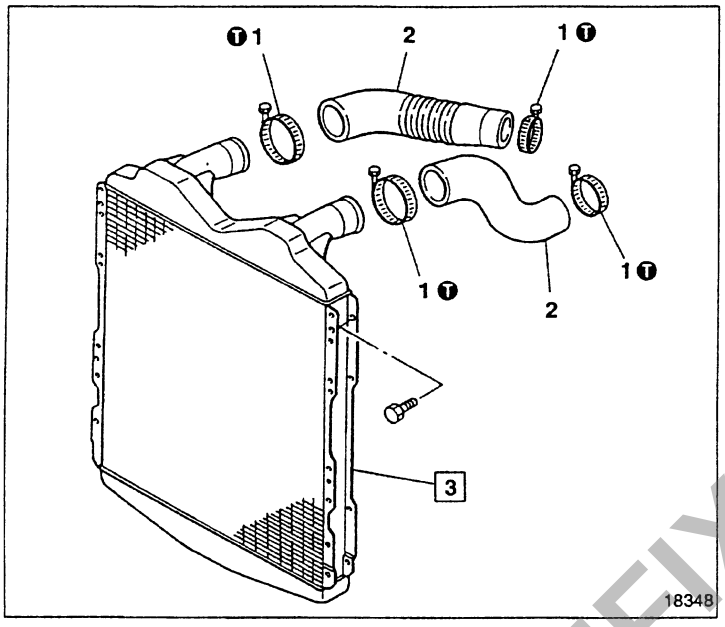
● **Assembly sequence**

Reverse the order of disassembly.

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INTERCOOLER <6D16-TL>



● **Disassembly sequence**

1 Clamp
2 Rubber hose
3 Intercooler

● **Reassembly sequence**

Reverse the order of disassembly.

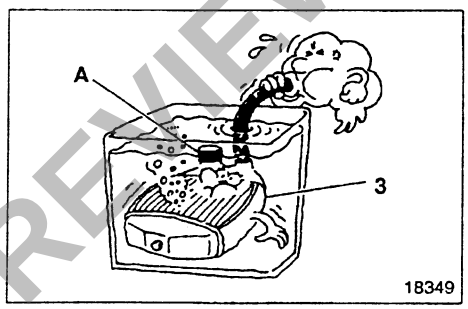
Service standards

Location	Maintenance item	Standard value	Limit	Remedy
3	Intercooler (air leak at the air pressure of 150 kPa {1.5 kgf/cm^2})	0 cm^3 {0 mL}	—	Replace

❶ Tightening torque

Unit: N·m {kgf·m}

Location	Parts to be tightened	Tightening torque	Remarks
1	Clamp (for mounting rubber hose)	4.9 to 9.8 {0.5 to 1.0}	—



◆ Service procedure

3 Inspection of intercooler

Put a cap **A** on either of the air ports of the intercooler **3** and connect a hose to the other, immerse the intercooler **3** in a water tank, and apply the standard pressure from the hose side to check for air leaks.
If there are air leaks, replace the intercooler.

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