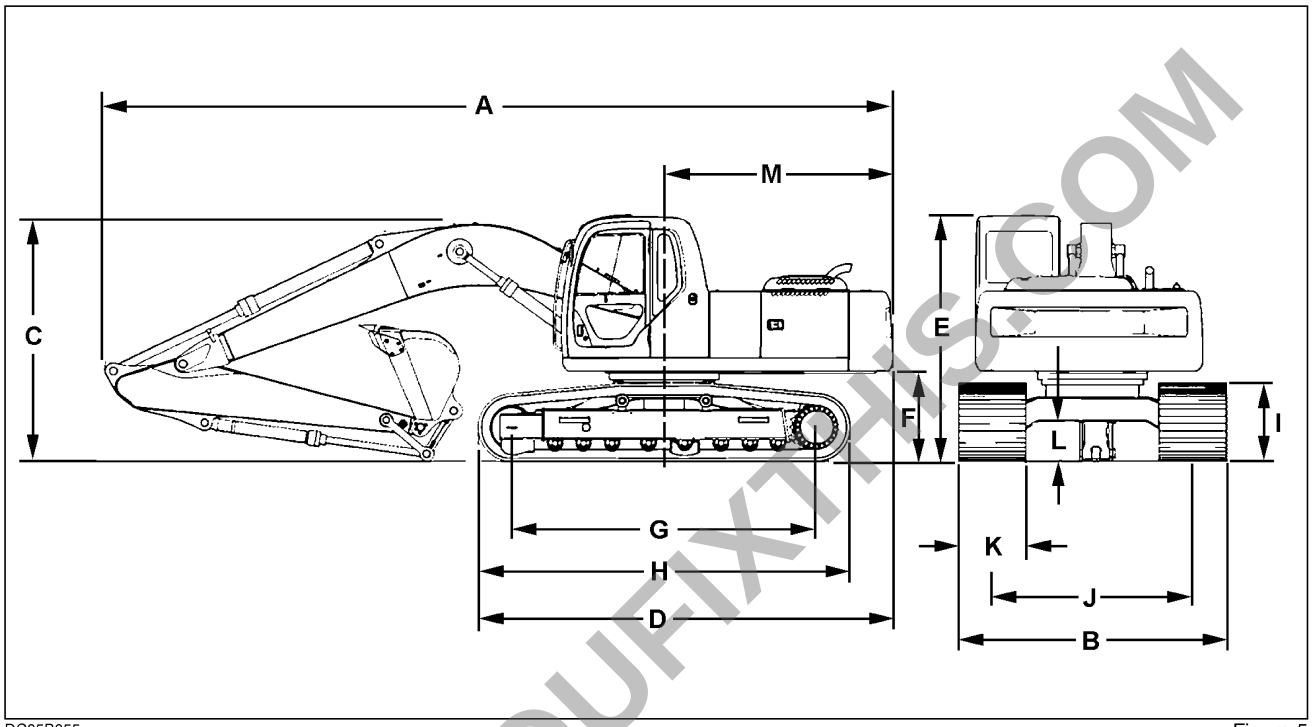
2.3 MACHINE DIMENSIONS

2.3.1 SK160LC



DC05B055

Figure 5

Unit: feet - in (millimeter)		DIMENSIONS			
ARM LENGTH		**10’ 2"**	**(3.10 m)**	**8’ 6"**	**(2.60 m)**
A	Overall length	28’ 5"	(8650 mm)	28’ 5"	(8650 mm)
B	Overall width (with 800 mm shoe)	8’ 6"	(2590 mm)	8’ 6"	(2590 mm)
C	Overall height (to top of boom)	9’ 9"	(2960 mm)	9’ 2"	(2800 mm)
D	Basic machine length	14’ 11"	(4540 mm)	14’ 11"	(4540 mm)
E	Overall height (to top of cab)*	9’ 8"	(2950 mm)	9’ 8"	(2950 mm)
F	Ground clearance of rear end*	3’ 5"	(1030 mm)	3’ 5"	(1030 mm)
G	Center Distance of tumblers	10’ 9"	(3280 mm)	10’ 9"	(3280 mm)
H	Overall length of crawler	13’ 5"	(4080 mm)	13’ 5"	(4080 mm)
I	Crawler height at tumbler center*	37.4"	(950 mm)	37.4"	(950 mm)
J	Track gauge	6’ 6"	(1990 mm)	6’ 6"	(1990 mm)
K	Width of crawler shoe	23.6"	(600 mm)	23.6"	(600 mm)
L	Ground clearance of undercarriage*	18.9"	(480 mm)	18.9"	(480 mm)
M	Tail swing radius	8’ 2"	(2500 mm)	8’ 2"	(2500 mm)
*Exclude height of grouser bar.					

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2.6 TRANSPORTATION

2.6.1 GROUND TRANSPORTATION

2.6.1.1 MACHINE PREPARATION

A. Know the total weight, length, width and height of the machine being transported. See Machine Dimensions on page 2-7and Machine and Components Weights on page 2-13.

B. Know route to be traveled. Investigate bridges, overpasses, height of road signs on route

C. Obtain any permits required from proper government agencies for machine transportation.

D. Use only a trailer with a rated capacity sufficient to transport the machine

E. Make certain trailer has ramps or ramp is available for loading and unloading the machine.

2.6.1.2 LOADING THE MACHINE

2.6.1.2.1 SK160LC

WARNING: *Never attempt to load or unload machine without ramps. Failure to comply will result in death or serious injury.*

A. Apply parking brake on tractor and trailer. Chock trailer wheels before attempting to load or unload the machine.

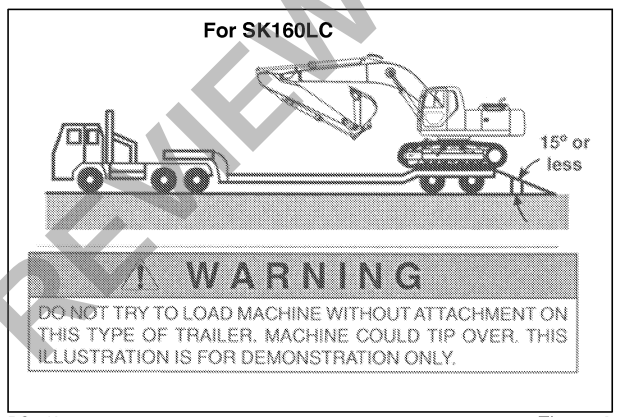
B. Lower ramps of trailer.

C. Start the machine.

D. Set travel speed to LOW 1st speed.

E. Move throttle control to low idle position.

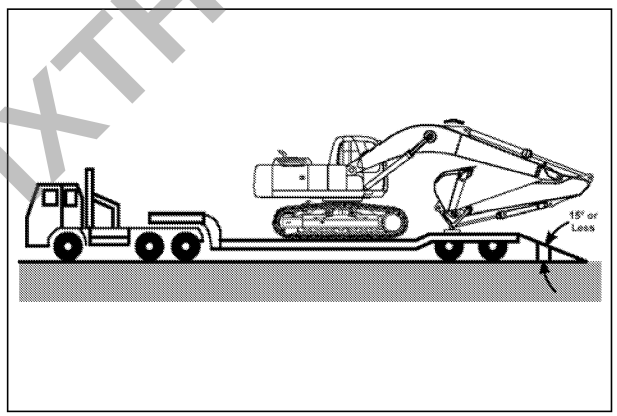
F. Put Auto Accel. function to OFF.



DC03K083 Figure 8

G. Raise the attachment and slowly travel machine up trailer ramps and over rear axles of trailer.

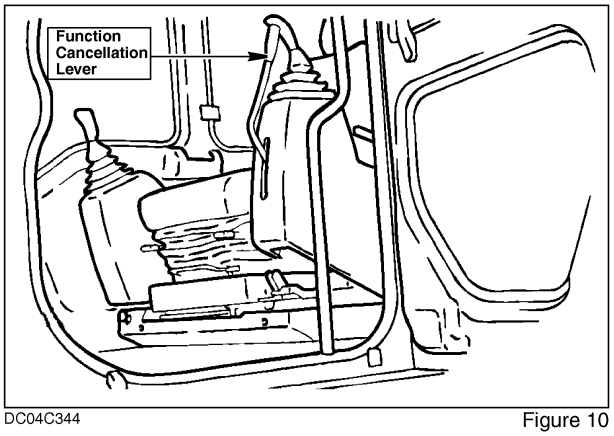
H. Slowly travel machine completely onto trailer until in proper transport position.



DC03K084 Figure 9

I. Slowly swing machine 180° until attachment is toward rear of trailer.

J. Slowly lower boom until attachment rest on trailer bed.



DC04C344 Figure 10

K. Place Hydraulic Function Cancellation Lever in Lock (UP) position.

L. Turn Machine “OFF”, remove key and lock all doors, filler caps and access panels.

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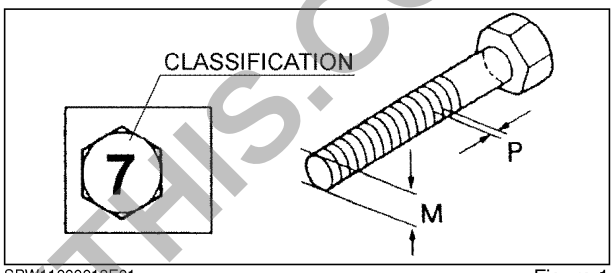
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11.1 TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

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. Retighten and replace as needed. For a new machine, check and retorque after the first 50 hours 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 [Unit: N.m (lbf-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)	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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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, they have to complete 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 on a flat land with a service truck and a crane are available.

12.1.2 LABOR CODES AND TIMES - SK160LC / ED190LC

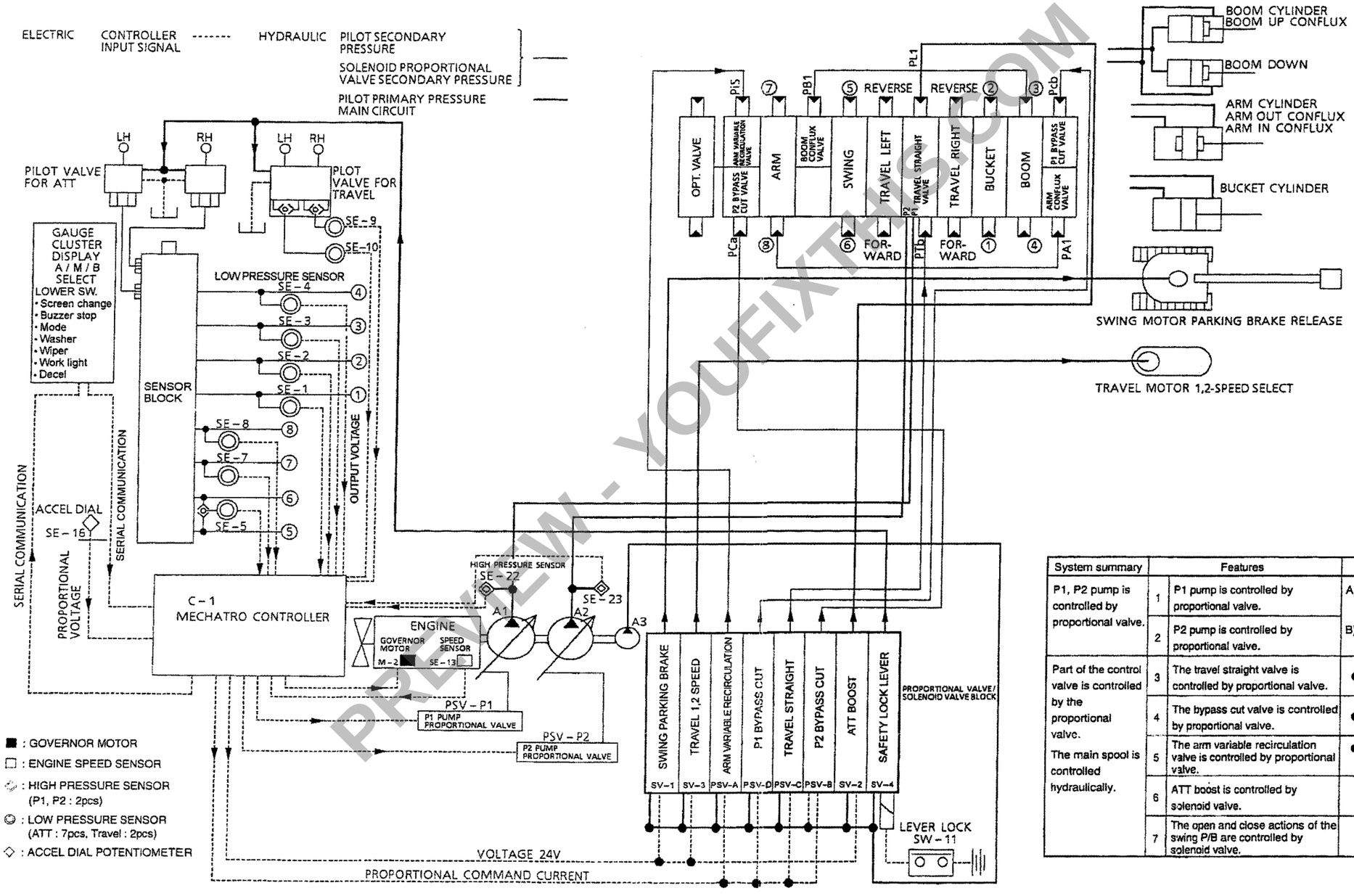
LABOR DESCRIPTION	LABOR CODE	HOURS
Adjust CPU - adjustment A procedure - R&I	78121-01	2.0
Air cleaner assy. - R&I	11550-01	1.1
Air cleaner cup or cover - R&I	11542-01	0.2
Air cleaner filter - element - R&I	11571-01	0.3
Air cleaner indicator - R&I	11580-01	0.5
Air cleaner inlet cap - R&I	11541-01	0.2
Air compressor _ R&I	11910-01	2.0
Air compressor drive belts - R&I	11920-01	1.0
Air compressor hoses - R&I	11940-01	0.5
Air compressor pulley (Idler pulley) - R&I	11930-01	2.0
Air compressor small parts	11980-01	0.0
Air compressor tubing/piping	11950-01	0.5
Air conditioner - Evaporator - R&I Including system vacuum & recharge	83105-01	4.5
Air conditioner - Duct work - R&I	83155-01	1.0
Air conditioner - Expansion Valve -R&I	83109-01	1.0
Air conditioner - reclaim, evacuate & charge - R&I	83101-03	3.5
Air conditioner compressor idler pulley - R&I	83113-01	1.0
Air conditioner compressor - R&I	83103-01	1.1
Air conditioner compressor belt - R&I	83102-01	0.5
Air conditioner compressor belt tensioner	83114-01	0.5
Air conditioner compressor mounting bracket - R&I	83111-01	1.0
Air conditioner compressor mounting bracket bolts - R&I	83112-01	0.5
Air conditioner Condenser - R&I	83110-01	1.0
Air conditioner Receiver/dryer	83108-01	1.0
Air conditioning - Binary switch - R&I	83116-01	1.2

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SECTION 2 - SYSTEMS
CHAPTER 21 - MECHATRO CONTROL SYSTEM

21.2 SUMMARY OF MECHATRO CONTROL SYSTEM

21.2.1 MECHATRO CONTROL SYSTEM IN GENERAL



System summary		Features	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	ATT boost is controlled by solenoid valve.	
	7	The open and close actions of the swing P/B are controlled by solenoid valve.	

DC06E087

Figure 21-1

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22.2 HYDRAULIC CIRCUITS AND COMPONENTS

22.2.1 HYDRAULIC CONTROL SYSTEM LOGIC

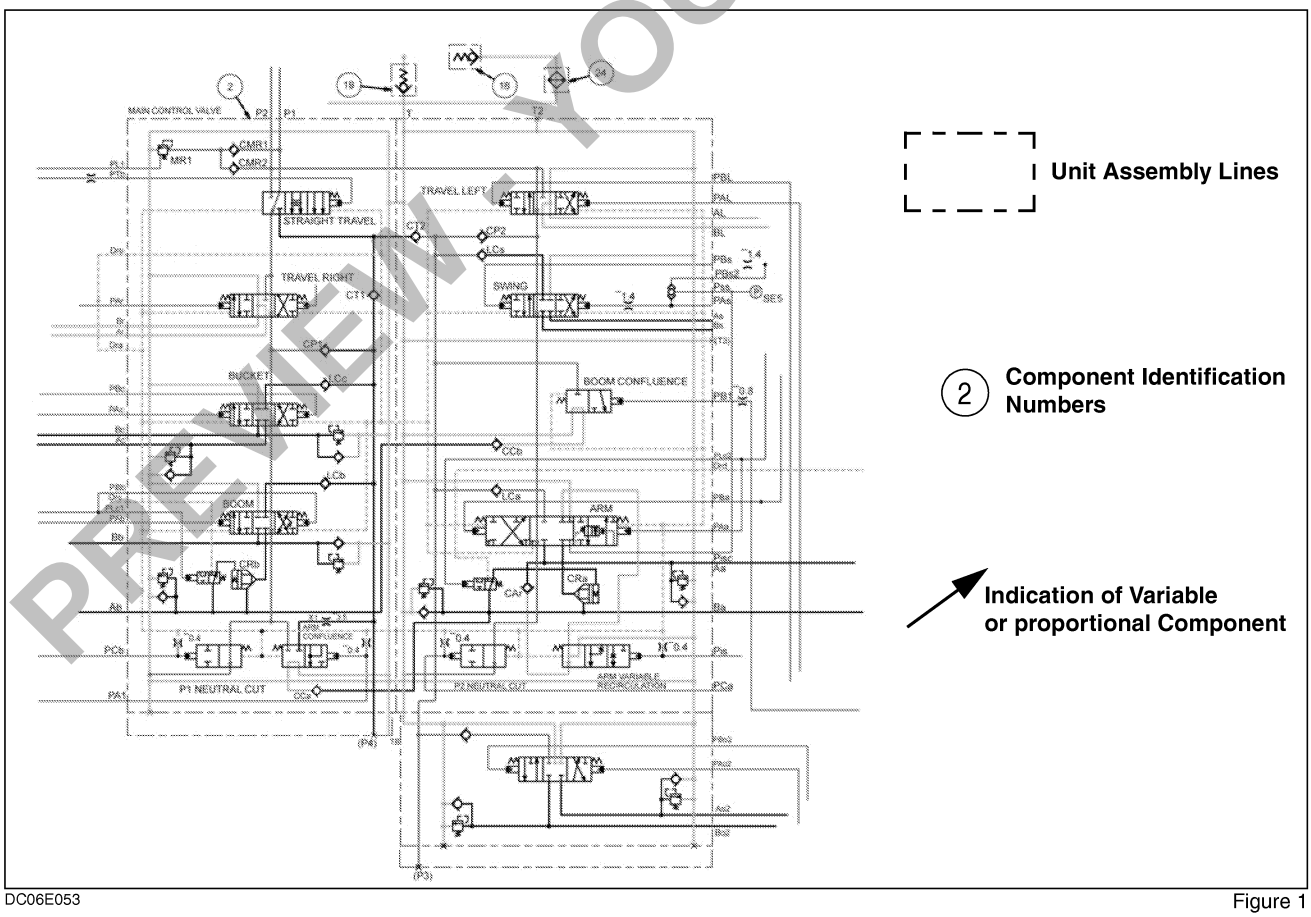
Both the SK160LC and ED190LC are **POSITIVE CONTROL SYSTEM.**

Difference between Positive Control System and the Negative Control System.

Positive Control System: Proportional solenoid valves (PSV) use pilot pump oil (P3) through the PSV to control the servo piston of the main hydraulic pump by placing force on the compensating spool in the pump regulator it forces the compensating spool to allow pressure only to the small diameter end of the servo piston to push the pump on stroke. This pressure is at a minimum range (80~100 psi) at neutral. PSV pressure is increased to allow the stroke angle of the pump's rotating group to change from a low flow state to a high flow state based on system working pressure and electronic control of the PSV-1 and PSV-2 by the main C-1 computer. Thus sense the pressure is added (addition) or increased, this is where the term positive control derives from.

Negative Control System: Proportional solenoid valves (PSV) use pilot pump oil (P3) through the PSV to control the servo piston of the main hydraulic pump by placing force on the compensating spool in the pump regulator to keep the pump at minimum stroke. This pressure is at maximum range (465 psi) and is reduced to allow the stroke angle of the pump's rotating group to change from a low state to a high flow state based on system working pressure and electronic control of the PSV-1 and PSV-2 by the main C-1 computer. Thus sense the pressure is taken away (negated) or subtracted, this is the term negative control derives from.

22.2.2 SYMBOLS AND COMPONENTS



DC06E053

Figure 1

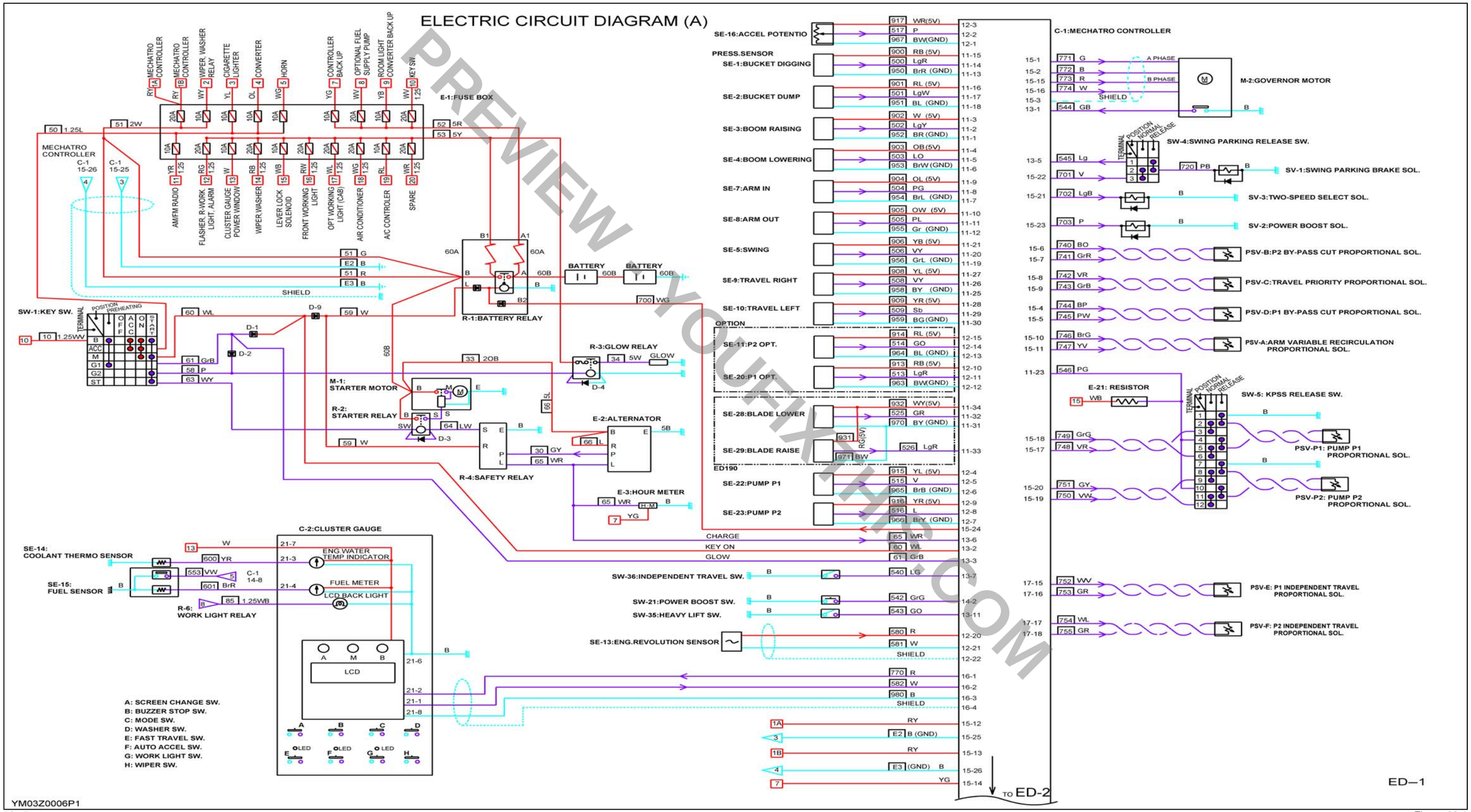
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SECTION 2 - SYSTEMS
CHAPTER 23 - ELECTRICAL SYSTEM

23.2 ELECTRICAL SCHEMATIC

23.2.1 SK160LC AND ED190LC ELECTRICAL SCHEMATIC DIAGRAMS

23.2.1.1 DIAGRAM A



DC06E066

Figure 23-1

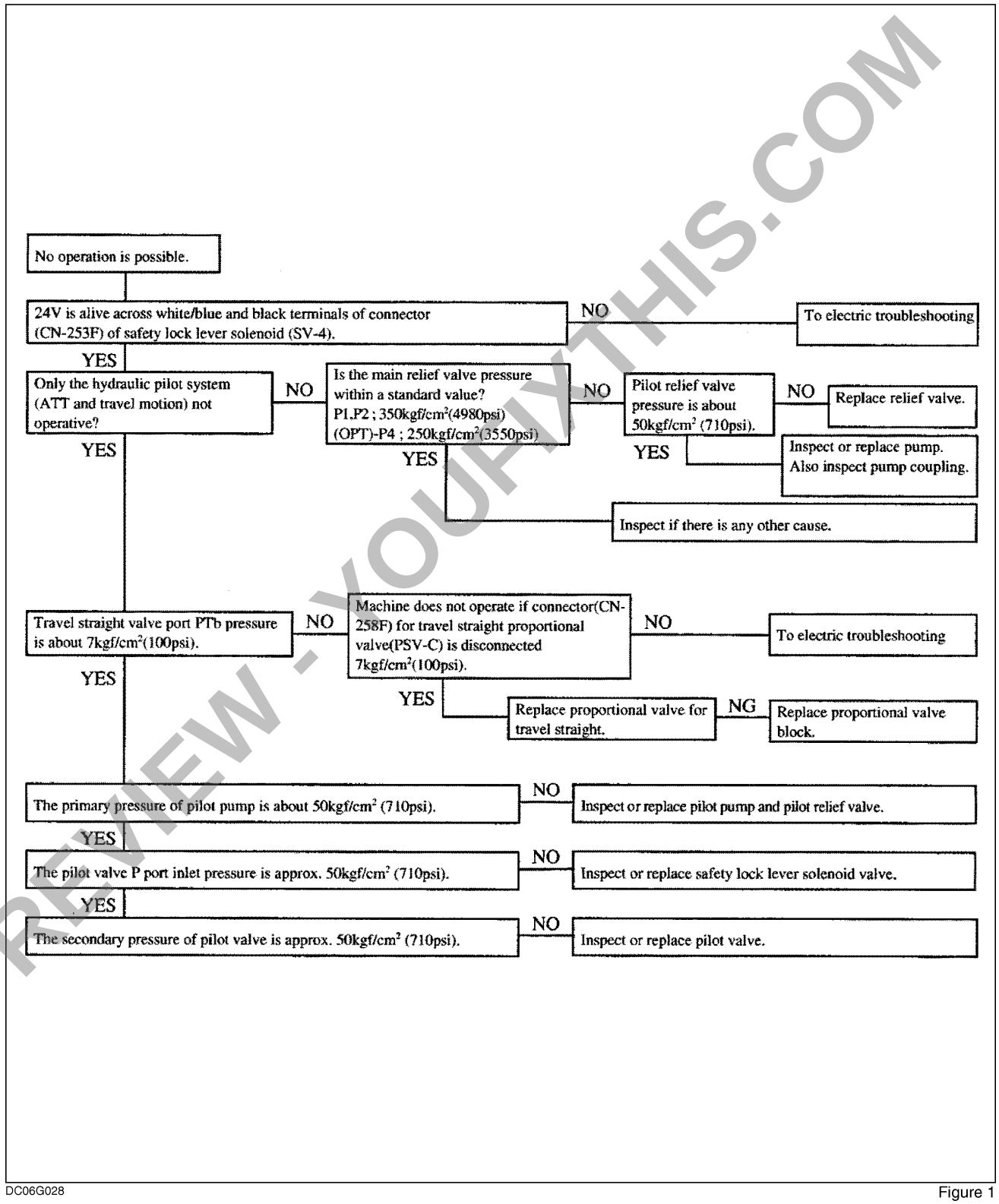
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42.2 TROUBLESHOOTING

42.2.1 NO OPERATION IS POSSIBLE

Group No. 1 in Trouble Diagnosis



DC06G028

Figure 1

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2.4 SPECIFICATIONS AND PERFORMANCE

2.4.1 DOZER BLADE SPECIFICATIONS

ED190LC

Type	Power Angle Tilt (PAT)
Capacity	3.26 cu. yd. (2.5 cu. m)
Total Width	11’ 4" (3450 mm)
Height	38" (970 mm)
Maximum Angle	± 25°
Maximum Tilt	17.7" (450 mm)
Maximum Lift Above Ground	31.375" (800 mm)
Maximum Drop Below Ground	18.5" (470 mm)

2.4.2 SPEED AND GRADEABILITY

SK160LC / ED190LC

Applicable machine	**SK160LC**	**ED190LC**
Travel Speed	6.0 Km/hr (3.7 mile/hr) in high speed 4.0 Km/hr (2.5 mile/hr) in low speed	6.0 Km/hr (3.7 mile/hr) in high speed 3.6 Km/hr (2.2 mile/hr) in low speed
Swing Speed	11 RPM in **M** mode/high Idle	
Gradeability	70% (35°) Limited by engine lubrication	
Drawbar Force	156 KN (35,100 Lbf)	186 KN (42,556 Lbf)
Note: The performance specifications are based on the standard machine with standard attachment		

2.4.3 ENGINE

SK160LC / ED190LC

Engine Make	Mitsubishi
Model	4D34 - TLEF
Type	Diesel - 4 cycle, water cooled, direct injection with turbocharger
No. of Cylinder - Bore x Stroke	4 cyl. - 104 mm x 115 mm (4.09” x 4.53”)
Displacement	3.91 Liters (238 cu. in)
Compression Ratio	16.5:1
Output Rating	82 KW (111 HP) @ 2,200 rpm
Maximum Torque	382 N-m (283 Lb-ft) @ 1,800 rpm
Electric System	24 V DC
Starting Motor	24 V - 5.0 KW
Alternator	24 V - 35 Amps

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2.6.2 LIFTING MACHINE

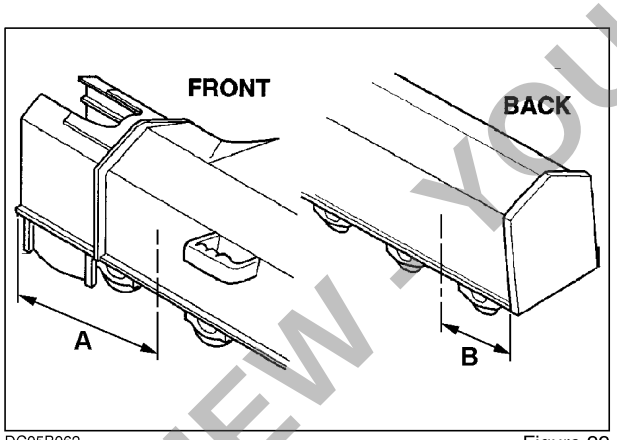
The following procedures are for lifting the machine, as built by KOBELCO Construction Machinery America, LLC. These procedure do not take into account modifications made to the machine that affect machine weight or center of gravity.

2.6.2.1 SK160LC

2.6.2.1.1 LIFTING MACHINE WITH ATTACHMENT INSTALLED

WARNING: *Always use proper lifting equipment and devices. Use of improper lifting equipment could allow the load to shift or fall causing severe damage, serious injury or death. Failure to comply will result in death or serious injury.*

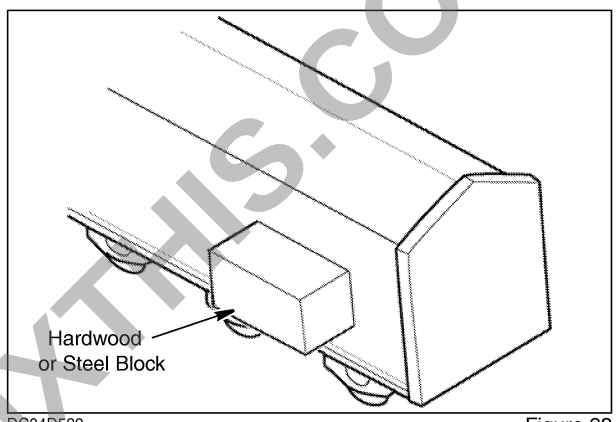
WARNING: *Do not use the Counterweight Lifting Eyes to lift machine. Failure to comply will result in death or serious injury.*



DC05B062 Figure 22

A Between crawler frame tip edge and center of first two rollers	795 mm (31.3")
B Between front edge of vertical rear plate and center of last two rollers.	300 mm (11.8")

1. Locate lifting locations at the front and rear of each crawler frame.



DC04D582 Figure 23

NOTE: *Place a hardwood or steel block between cables and crawler frame to prevent damage to the tracks from cables during lifting.*

2. Attach cables or wire ropes with a capacity rating sufficient to lift the machine, at lifting locations.
3. Bring loose ends of cable together at the machine center of gravity and attach to an overhead lifting device with a rated lifting capacity sufficient to lift the machine as shown in Figure 24 and Figure 25 on page 2-20.

NOTE: *It may be necessary to place reinforced spreader bars between lifting cables to prevent damage to the machine during lifting.*

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

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11.1.2 METRIC FINE THREAD STANDARD TIGHTENING TORQUE VALUES

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

METRIC FINE THREAD STANDARD TIGHTENING TORQUE VALUES [Unit: N.m (lbf-ft)]							
Classification		**4.8T**		**7T**		**10.9T**	
Nominal size		No lubrication	Oil lubrication	No lubrication	Oil lubrication	No lubrication	Oil lubrication
M8	P=1.0	11.3±1.1 (8.3±0.8)	9.5±1.0 (7.0±0.7)	24.5±2.0 (18.1±1.5)	20.6±2.0 (15.2±1.5)	44.1±3.9 (32.5±2.9)	37.3±3.9 (27.5±2.9)
M10	P=1.25	22.6±2.0 (16.7±1.5)	18.7±1.9 (13.8±1.4)	48.1±4.9 (35.5±3.6)	41.2±3.9 (30.3±2.9)	87.3±8.8 (64.4±6.5)	73.5±6.9 (54.2±5.1)
M12	P=1.25	39.2±3.9 (28.9±2.9)	33.3±2.9 (24.6±2.1)	85.3±8.8 (62.9±6.5)	71.6±6.9 (52.8±5.1)	154±16 (114±12)	129±13 (95.2±9.6)
M16	P=1.5	92.2±8.8 (68.0±6.5)	77.5±7.8 (57.2±5.8)	196±20 (145±15)	169±17 (125±13)	363±39 (268±29)	304±29 (224±21)
M20	P=1.5	186±19 (137±14)	155±16 (114±12)	402±39 (297±29)	333±29 (246±21)	726±69 (535±51)	608±59 (448±44)
M24	P=2	314±29 (232±21)	265±29 (195±21)	686±69 (506±51)	569±59 (420±44)	1240±118 (915±87)	1030±98 (760±72)
M30	P=2	637±59 (470±44)	530±49 (391±36)	1390±137 (1030±101)	1157±118 (853±87)	2500±255 (1840±188)	2080±206 (1530±152)
M33	P=2	853±88 (629±65)	706±70 (521±52)	1860±186 (1370±137)	1550±155 (1140±114)	3350±334 (2470±246)	2790±275 (2060±203)
M36	P=3	1070±108 (789±80)	892±88 (658±65)	2330±226 (1720±167)	1940±196 (1430±145)	4200±422 (3100±311)	3500±353 (2580±260)

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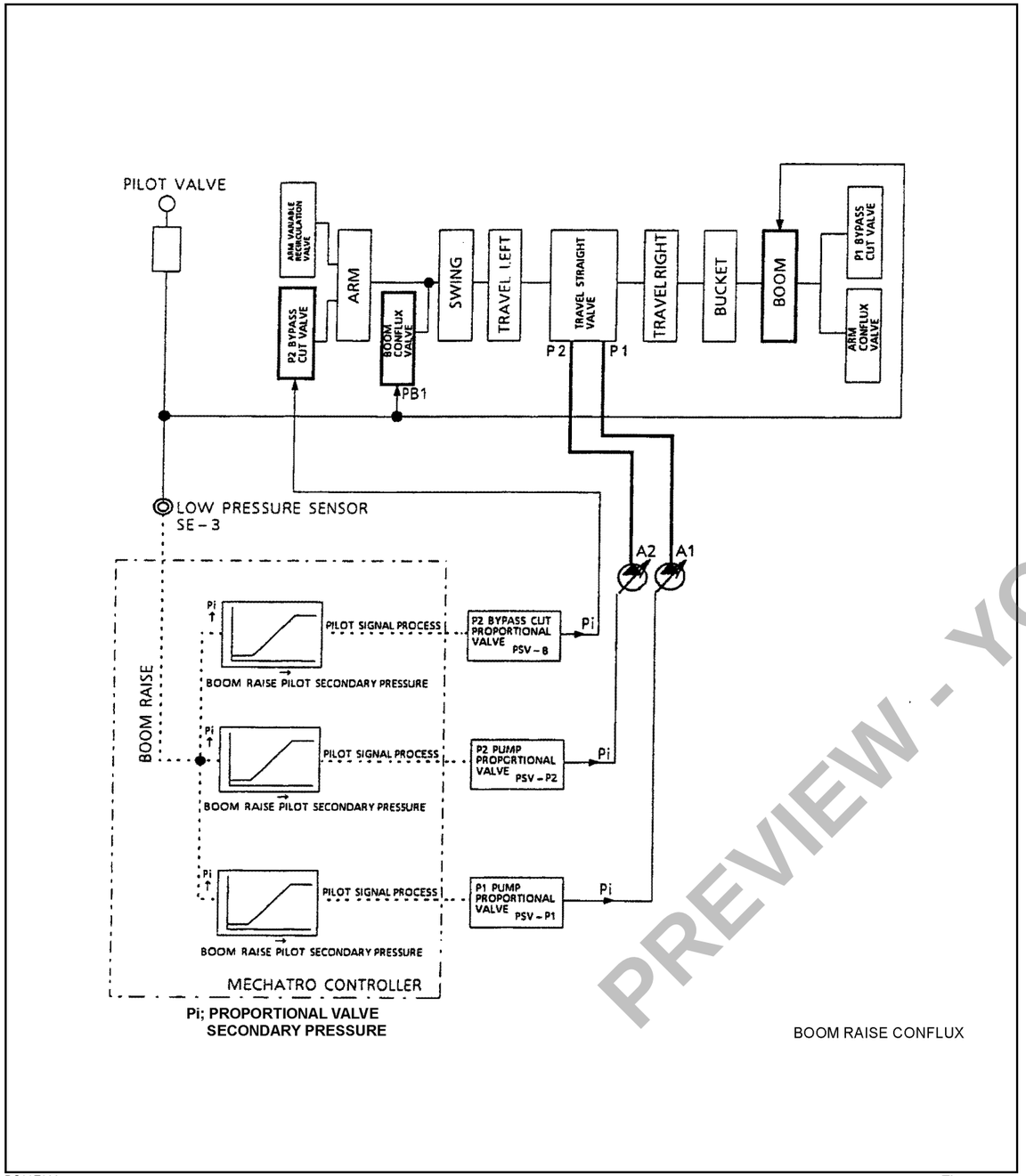
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LABOR DESCRIPTION	LABOR CODE	HOURS
Air conditioning - Thermostat - R&I	83115-01	1.2
Air conditioning assy. - R&I	83101-01	4.0
Air conditioning pressure switch - R&I	77759-01	0.5
Air conditioning switch - R&I	77760-01	0.5
Air tank - R&I	11911-01	1.5
All bottom rollers (one side) - R&I Including track adjustment	34420-20	3.5
Alternator - overhaul	11620-02	2.8
Alternator - R&I	11620-01	1.0
Alternator belt - R&I	11619-01	1.5
Alternator bracket - R&I	11621-01	0.5
Antenna - R&I	92370-01	0.3
Arm assy. line boring - Including weld, bushing, pin (excl. R&I)	45221-03	5.0
Arm assy. - Reinforcing (Inst, reinforcement plates, weld, & repair)	45221-02	0.0
Arm cylinder / Stick cylinder - overhaul (complete) Incl. R&I	54201-02	7.5
Arm cylinder / stick cylinder - piston reseal Incl. R&I	54201-04	5.0
Arm cylinder / stick cylinder - R&I	54201-01	2.5
Arm cylinder bushing at arm cylinder to dipper arm - R&I	54207-01	1.0
Arm cylinder bushing at arm cylinder to boom - R&I	54205-01	1.0
Arm cylinder mounting pin at boom front - R&I	54202-01	1.0
Arm cylinder pin at arm cylinder to boom assy - R&I	54204-01	0.5
Arm cylinder pin at arm cylinder to dipper arm - R&I	54206-01	0.5
Arm cylinder bushings _ R&I	54203-01	2.0
ATT boost switch - R&I	77718-01	0.5
Attachment - Arm assembly - R&I	45221-01	3.0
Attachment - arm pin bushing - R&I (Excl. Pin R&I)	45223-01	1.0
Attachment - arm pin to boom - R&I	45222-01	1.0
Attachment - Boom assy. - R&I	45110-01	12.0
Attachment - boom pin - R&I	45120-01	1.5
Attachment - boom pin bushing - R&I	45121-02	7.0
Attachment - Bucket assy. (rock) - R&I	45310-01	0.5
Attachment - bucket pin - R&I	44920-01	1.5
Attachment - bucket pin bushing - R&I	45220-01	3.5
Attachment - Clamshell - R&I	44840-01	0.0
Attachment - Compactor - R&I	44830-01	0.0
Attachment - dozer blade extensions ,folding wings	44851-01	1.8

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21.2.2 BOOM RAISE CONFLUX



DC06E088

Figure 21-2

Boom Raise Conflux

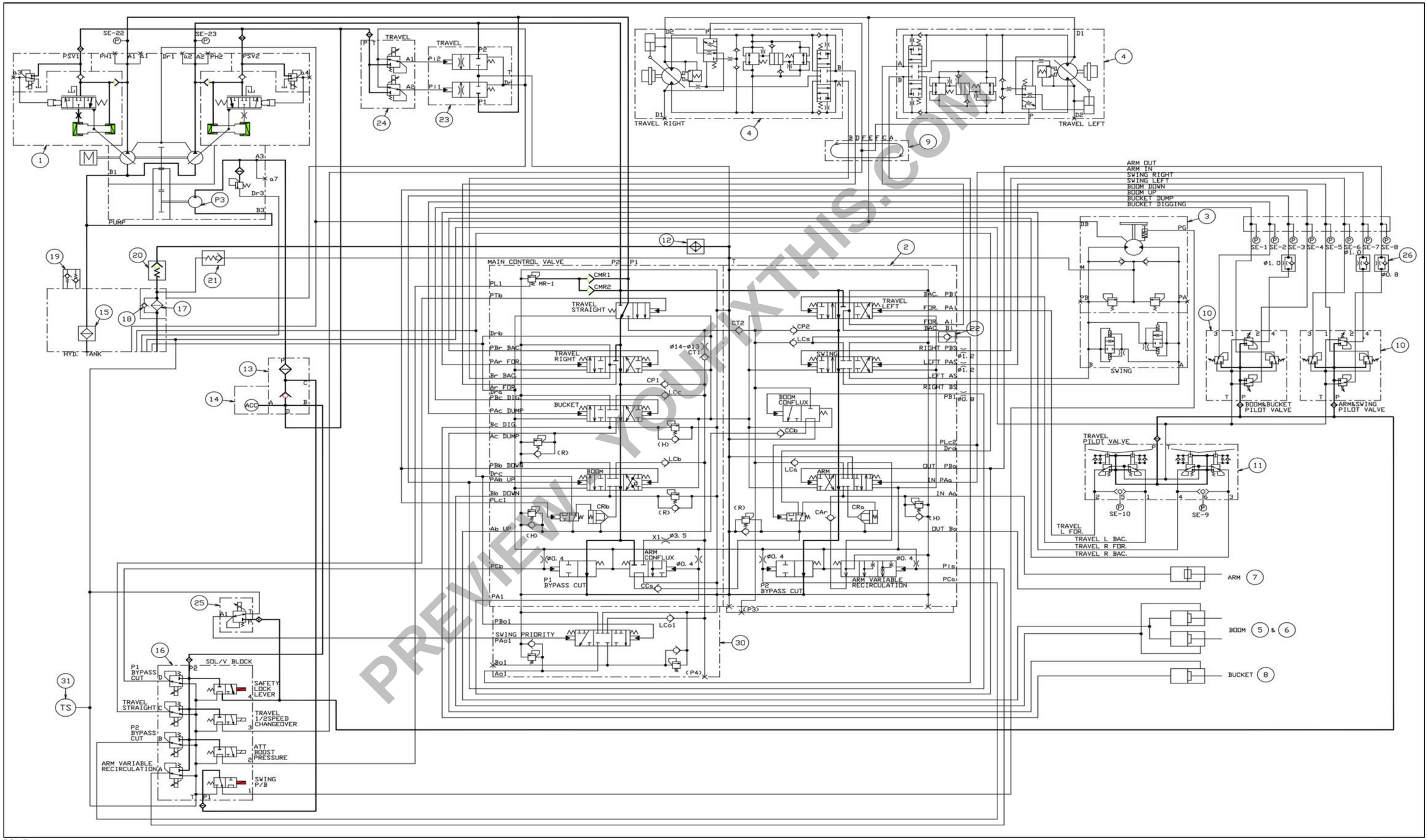
1. Start boom raise operation, and the boom raise operation pilot pressure switches boom spool and boom conflux spool, and inputs into low pressure sensor.
2. The voltage output by low pressure sensor is input into the Mechatro controller, and the controller processes the pilot signal and outputs the command corresponding to input to P1, P2 pump and P2 bypass cut valve.
3. Each proportional valve puts out the secondary pressure for the pilot proportional valve according to command values from the mechatro controller, changes the delivery rates of the P1, P2 pump and switches the P2 bypass cut valve.
4. A pure hydraulic command switches the boom main spool and the boom conflux valve. A mechatro command switches the P1, P2 pumps and the P2 by pass cut valve. This causes the oil delivered by the P1 pump to combine with that by the P2 pump at boom raise operation.

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SECTION 2 - SYSTEMS
CHAPTER 22 - HYDRAULIC SYSTEM

22.3.1.2 SK160LC HYDRAULIC SCHEMATIC DIAGRAM



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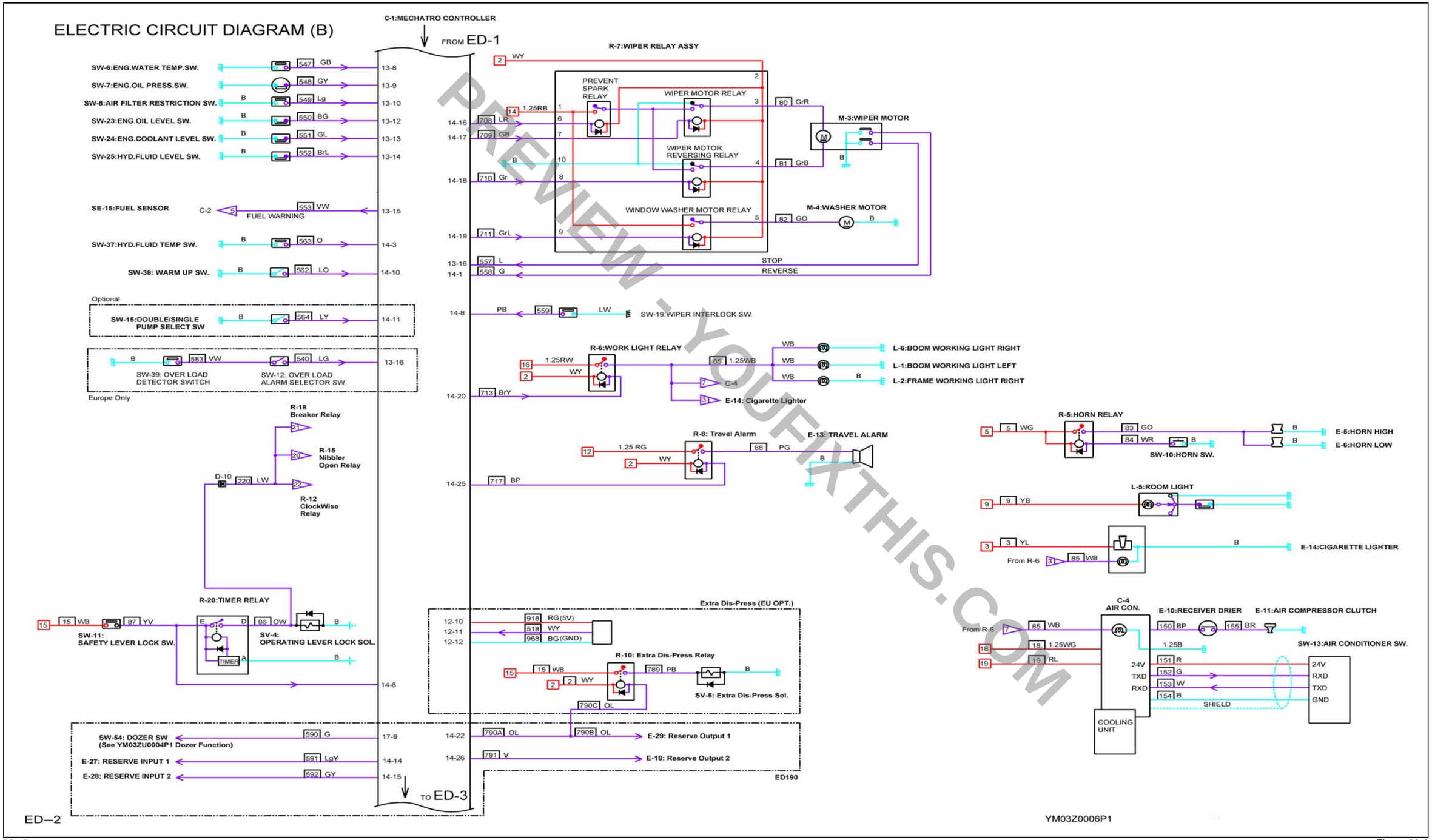
DC06E058

Figure 22-1

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SECTION 2 - SYSTEMS
CHAPTER 23 - ELECTRICAL SYSTEM

23.2.1.2 DIAGRAM B



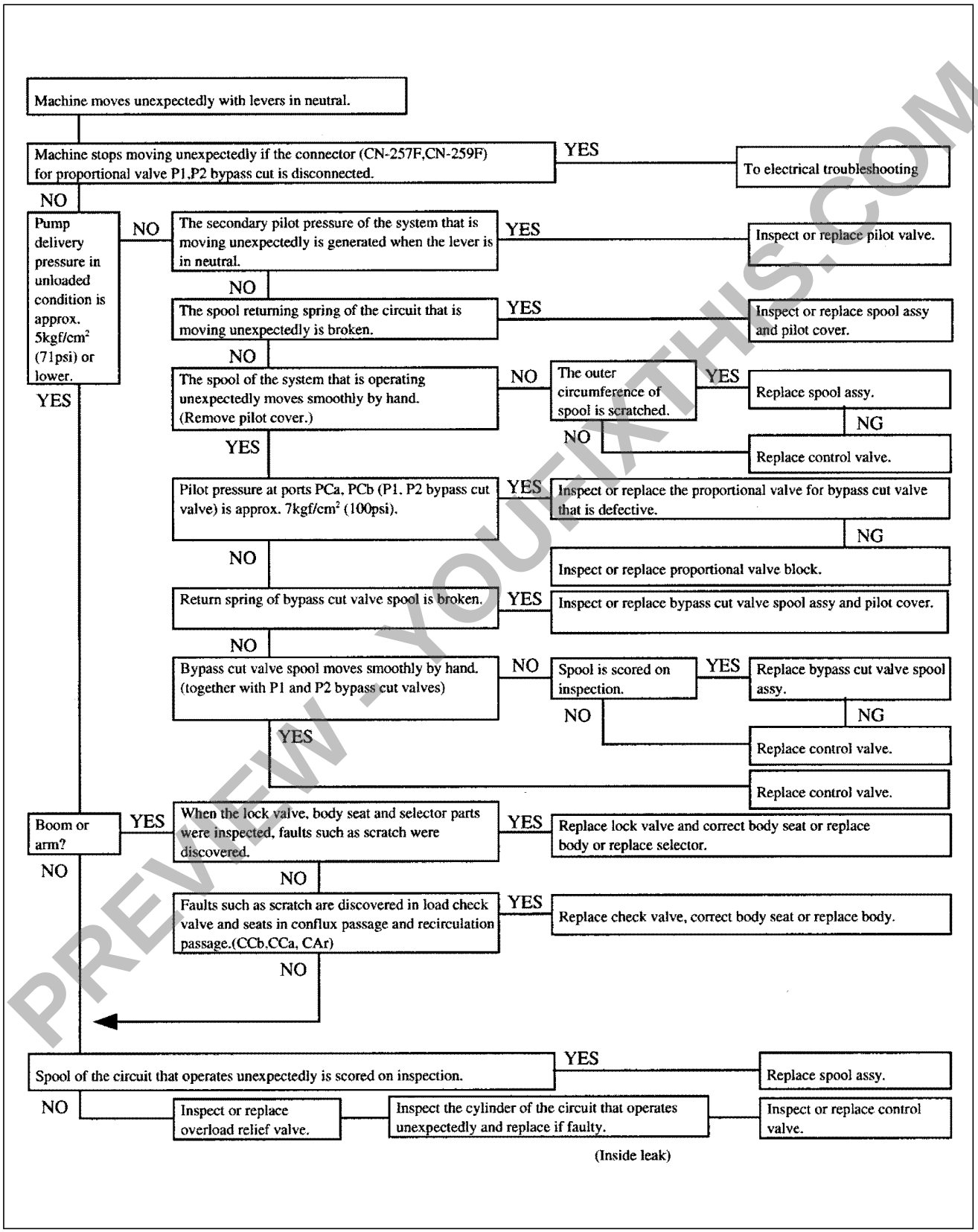
DC06E067

Figure 23-2

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42.2.2 MACHINE MOVES UNEXPECTEDLY WITH LEVER IN NEUTRAL

Group No. 1 in Trouble Diagnosis



DC06G029

Figure 2

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SHOP MANUAL
SK160LC/ED190LC
HYDRAULIC EXCAVATORS

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1.1 PERSONAL SAFETY



RH02F040

Throughout this manual and on the machine's safety decals, you will find precautionary statements: **DANGER, WARNING, or CAUTION** followed by specific instructions or ISO two panel safety pictorial symbols. These precautions are intended for your personal safety.

Failure to follow the **DANGER, WARNING or CAUTION** instructions may result in death or serious bodily injury.

DANGER, WARNING or CAUTION are defined as follows:

- **DANGER:** Indicates a potentially hazardous situation that, if not avoided, will result in death or serious injury. The color associated with Danger is RED.
- **WARNING:** Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.
- C**AUTION:** Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

ISO two panel pictorial symbol decals are defined as follows:

- The first panel indicates the nature of the hazard.
- The second panel indicates the appropriate avoidance of the hazard.
- Background color is YELLOW.

Prohibition symbols such as  and  if used, are RED.

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SHOP MANUAL - SECTION 1

SK160LC / ED190LC
(MINOR CHANGE MACHINES)
HYDRAULIC EXCAVATOR

STANDARD SPECIFICATIONS AND MAINTENANCE

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Source Code No.S5YM/YL01E

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LABOR DESCRIPTION	LABOR CODE	HOURS
Fuel shut off control assy. - R&I	11230-01	0.0
Fuel shutoff solenoid - R&I	77800-01	0.5
Fuel tank assy. - R&I (incl. drain & refill)	11210-01	3.0
Fuel tank cap - R & I	11213-01	0.2
Fuel tank sight gauge - R&I	11211-01	0.5
Fuse - R&I incl.: checking all fuses & replacing	78320-01	0.2
Fuse box - R&I	78321-01	1.0
Gauge cluster (LED Display - R&I	78130-01	0.5
Gauge cluster controller - R&I	78120-01	1.0
Glass windows front	94210-01	0.7
Glass windows rear - R&I	94213-01	0.0
Glass windows side R.H side - R&I	94211-01	0.0
Glow plugs - R&I	11670-01	0.0
Grease fitting at lube line - R&I	45227-01	0.2
Grid heater relay - R&I	78246-01	1.0
Grind valves & valve seat (one head)	11164-01	8.4
Grind valves & valves seats (all heads)	11164-00	12.3
Hand pump - R&I	51113-01	0.0
Hand Rail - R & I	94334-01	0.3
Heat hoses - R&I	92242-01	0.7
Heater / AC blower motor - R&I	92250-01	4.0
Heater assy. - R&I	92240-01	4.0
Heater blower wheel assy. - R&I	92280-01	3.0
Heater linkage & cables - R&I	92241-01	0.0
Heater motor / blower switch - R&I	77761-01	0.5
Heater ventilator - R&I	92220-01	0.0
Heavy lift switch - R&I	77721-01	0.5
High pressure tube: swivel joint to T/M val. - R&I (ea. hose - add 0.5)	56112-01	2.0
High pressure hose at travel section of control valve - R&I	56110-01	1.5
Horn assy. - R&I	76630-01	0.5
Horn relay - R & I	78245-01	0.7
Horn switch - R&I	77710-01	0.5
Hourmeter - R&I	77880-01	1.5
Hyd. boom tube - boom cyl. to boom base. add 1.0 both sides	56124-01	2.0
Hyd. Bucket/arm tubes-boom foot to C/V - add 1.0 ea. add'l	56122-01	4.0

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Revision History			
Issue	Issue Date	Applicable Machines	Remarks
First Edition	01Dec06		

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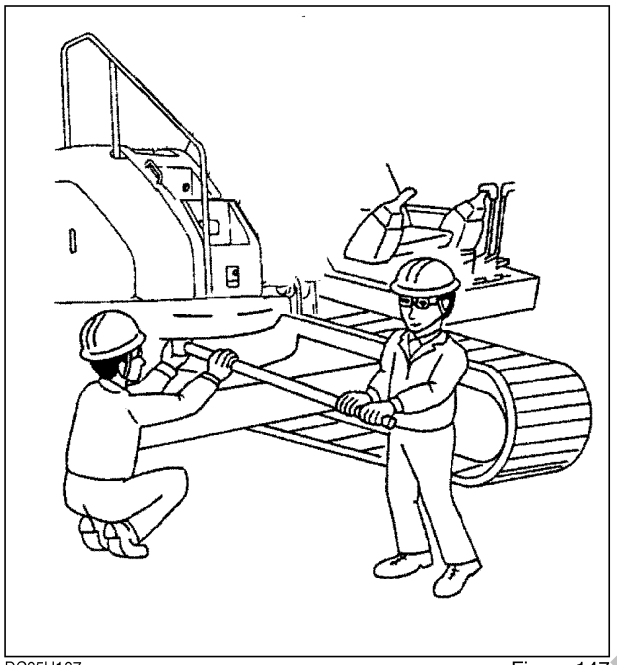
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4. Inscribe match marks on upper frame and swing bearing. Refer to Figure 146.



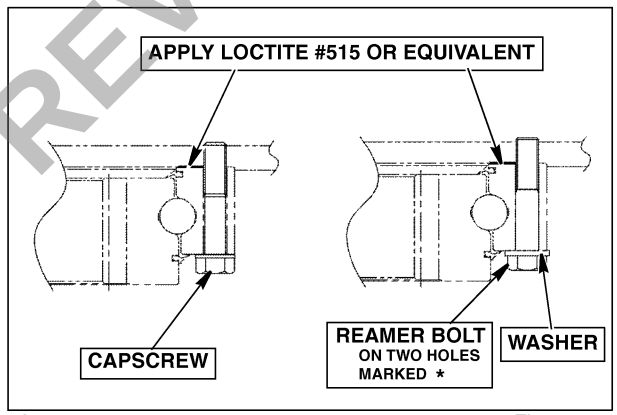
DC05H107 Figure 147

5. Remove the twenty nine capscrews and the two reamer bolts that mount the swing bearing to the upper frame.
6. Slowly lift the upper frame and remove it from the machine.
7. Put the upper frame on a stand.

33.1.22.3 INSTALLATION

Installation is done in the reverse order of removing with attention paid to the following:

NOTE: *It is highly recommended to replace the swing ring grease bath prior to installation of the upper frame. Refer to Operator's Manual for the grease specifications.*



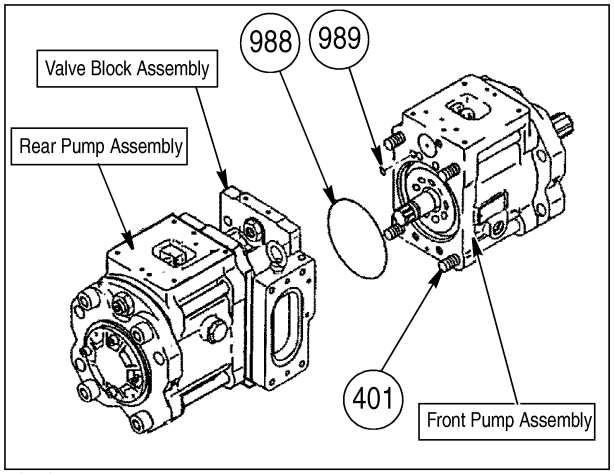
DC05H108 Figure 148

1. Clean the mating surfaces of upper frame and swing bearing.
2. Apply LOCTITE #515 or equivalent to the circumference of the mating surfaces between the upper frame and outer race of the swing bearing. It should be applied to the inside circumference of the mounting capscrews. Refer to Figure 148.
3. Align the matching marks that were inscribed to the swing bearing outer race and upper frame during removal. Refer to Figure 146.
4. Locate the two reamed holes marked *. Apply LOCTITE #262 or equivalent thread locker to the two reamer bolts. Install the two reamer bolts and washers to the reamed holes.Tighten the bolts to 392 ± 39 N.m (289 ± 29 lbf-ft) torque.
5. Apply LOCTITE #262 or equivalent thread locker to the twenty nine capscrews that retain the swing bearing outer race to the upper frame. Tighten the capscrews to 392 ± 39 N.m (289 ± 29 lbf-ft) torque.
6. Reinstall all the parts that were removed for the removal of the upper frame.

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5. Assemble the Front Pump to the Valve Block.



DC06C012 Figure 385

NOTE: *Make sure that the servo piston in the pump (tilting pin) is align to the adjusting screw in the valve block. Pump casing positioned with regulator mounting surface on top.*

a. Lubricate and install the O-ring seal (988) to the valve block housing.

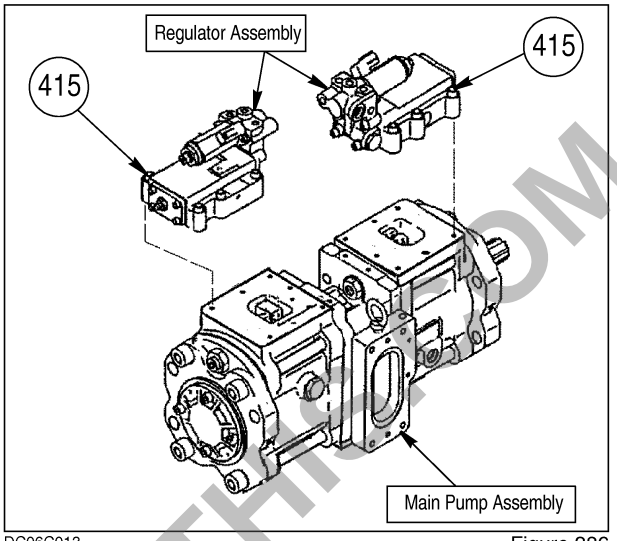
b. Lubricate and install the O-ring seals (989) to the front pump casing.

c. Line up the front pump assembly to the valve block and push the shaft inside at the same time lining up the 1st. gear splines inside the valve block to the shaft splines.

d. Mount the front pump to the valve block with the capscrews (401). Tighten the capscrews to 240 N.m (177 lbf.ft) torques.

e. If the adjusting screw (953) and lock nut (808) have been removed from the front swash plate support during disassembly, assemble them back to the swash plate support.

6. Assemble the Regulators to the Pump.



DC06C013 Figure 386

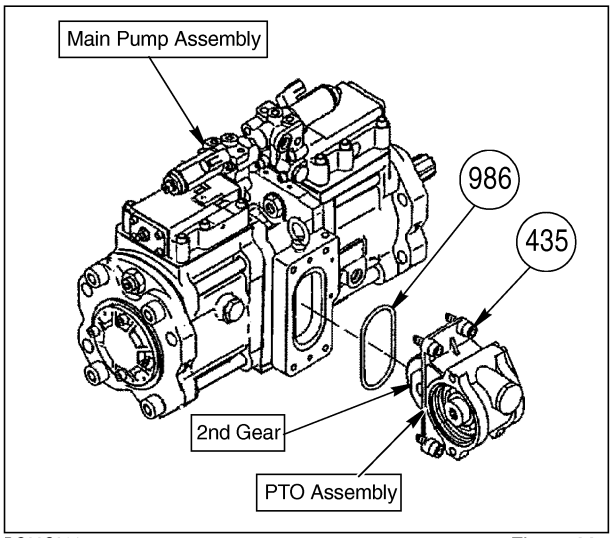
a. Check and make sure that the O-ring seals that seal the regulator to the pump casing are installed and seated properly in the O-ring grooves in the regulator.

b. Line up the feedback lever in the regulator to the feedback pin in the pump and drop the regulator down to the pump casing.

c. Mount the regulator to the pump casing with the capscrews (415). Tighten the capscrews to 29 N.m (21 lbf-ft) torques.

NOTE: *Refer to **REGULATOR** on page 33-177 for the disassembly and assembly of the regulator. The regulator mounting capscrews (415) are part of the regulator assembly.*

7. Assemble the PTO Gear Assembly to the Pump.



DC06C014 Figure 387

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