

PCB REV:2

1/3

BATTERY RELAY 8sq CN1 4

FS 1 5A

FS 2 5A

BATTERY RELAY 0.75sq CN4-1 19

BATTERY RELAY 0.75sq CN4-2 8

CN4-2 6

STARTER RLY 0.75sq CN4-2 5

KEY SW 1.25sq CN2-3 3

BATTERY RLY 8sq CN1 3

FS 10 5A

FS 11 5A

FS 12 20A

FS 13 5A

FS 14 15A

FS 15 10A

RLY25

ENG EMERGENCY STOP RLY

RLY24

AUTO IDLE STOP RLY 2

RLY28

ALTERNATOR RLY

WIPER MOTOR REVERSING RELAY

GREASE RELAY (FORWARD)

GREASE RELAY (REVERSE)

RLY4

SAFETY RLY

RLY26

LEVER LOCK RLY

RLY5

HORN RLY

CN4-1 3 0.75sq MECHATRO CONTROLLER

CN4-1 4 0.75sq MECHATRO CONTROLLER

CN2-2 5 0.75sq MECHATRO CONTROLLER

CN5 2 0.75sq EMG CONTROLLER

CN5 3 0.75sq EMG CONTROLLER

CN2-3 2 0.75sq KEY SW

CN2-1 18 0.75sq MECHATRO CONTROLLER

CN2-2 6 0.75sq MECHATRO CONTROLLER

CN3-2 11 0.75sq HOUR METER

CN2-2 8 0.75sq MECHATRO CONTROLLER

CN2-2 26

CN2-2 25

CN4-2 2

CN4-2 3

CN1 1 5sq FRAME EARTH

CN2-2 20 0.75sq MECHATRO CONTROLLER

CN6 1 RESERVE CONN1

CN9 1 RESERVE CONN OPT (2FA-CNA EQUIVALENT)

CN10 1 RESERVE CONN2 (2FA-CNA EQUIVALENT)

CN4-1 11 1.25sq MECHATRO CONTROLLER

CN4-1 22 1.25sq MECHATRO CONTROLLER

CN2-2 15 0.75sq LEVER LOCK SW

CN2-2 23

CN4-1 21 0.75sq LEVER LOCK SOL

CN2-2 19

CN5 1 0.75sq ENG CONTROLLER

CN5 10 0.75sq ENG CONTROLLER

CN5 11 0.75sq ENG CONTROLLER

CN5 12 0.75sq ENG CONTROLLER

CN5 13 0.75sq ENG CONTROLLER

CN5 6 0.75sq ENG CONTROLLER

CN5 17 0.75sq ENG CONTROLLER CHECK CONN

CN5 14 0.75sq ENG CONTROLLER

CN5 15 0.75sq ENG CONTROLLER

CN5 16 0.75sq ENG CONTROLLER

CN3-2 16 0.75sq CIGARETTE LIGHTER

CN4-2 11 0.75sq HORN

CN2-2 11 0.75sq HORN SW

CN2-2 9 0.75sq TUNER AM&FM

CN4-1 20 0.75sq MECHATRO CONTROLLER (BACK UP)

CN3-2 12 0.75sq ROOM LIGHT

CN4-1 10 0.75sq ENG ROOM LIGHT

CN2-2 10 0.75sq SPEAKER

CN2-3 1 1.25sq KEY SW

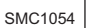
CN2-2 13 0.75sq IT CONTROLLER (POWER SUPPLY)

CN3-2 1 0.75sq CLUSTER GAUGE

CN4-2 9 1.25sq FUEL SUPPLY PUMP

CN10 2 RESERVE CONNECTOR 2 (2MA-CNA EQUIVALENT)

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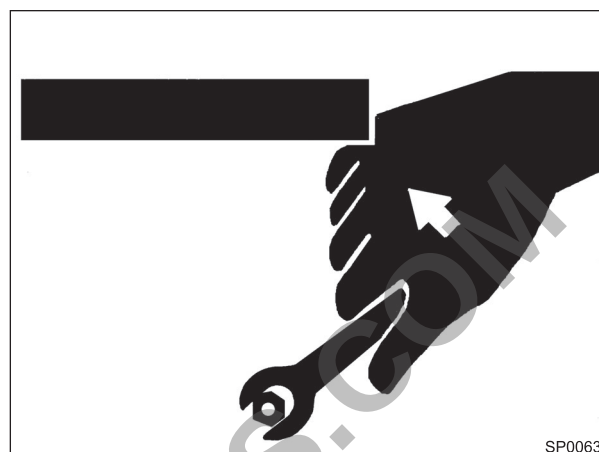
TORQUE CHART

**WARNING**

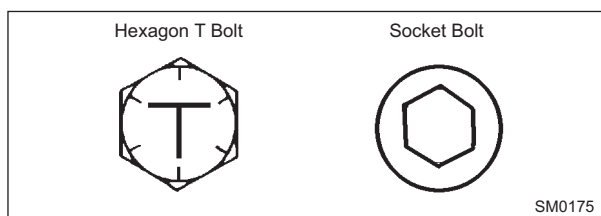
Use tools appropriate for the work to be done. Makeshift tools and procedures can create safety hazards. For loosening and tightening nuts and bolts, use the correct tools. Avoid bodily injury caused by slipping wrenches.

Bolt Types

Tighten nuts or bolts correctly to torque specifications. Two kinds of bolts, hexagon bolts T and socket bolt, each made of different material, are used. Make sure to employ the correct bolts and tighten them to specification when assembling the machine or components.



SP0063

**Specified Tightening Torque Chart**

Bolt Dia.	Wrench Size	Hexagon Wrench Size	T Bolt, Socket bolt (Nm)
M8	13	6	29.5
M10	17	8	64
M12	19	10	108
M14	22	12	175
M16	24	14	265
M18	27	14	390
M20	30	17	540
M22	32	17	740
M24	36	19	930
M27	41	19	1370
M30	46	22	1910
M33	50	24	2550
M36	55	27	3140

Table 13

Error code	B023		
Trouble	Boom down pressure sensor's wiring is disconnecting.		
Judging condition	The input voltage from boom down pressure sensor is 0.1 V or less.		
Symptom	The boom down operability becomes poor.		
Control in the event of failure	Set proportional valve output rate of P1 pump to constant current. (Current when all operation is in neutral.) Only on independent operation of boom-up, set output of P1 unload proportional valve to 750mA.		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-2 BOOM LOWER
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• Boom down pressure sensor SE-4	When B023 is cancelled and other error occurs after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.	
2	• Wiring between boom down pressure sensor and controller CN-127F CN-101F	When B023 is displayed after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

Table 14

Error code	B024		
Trouble	Boom down pressure sensor's power source is shortcut.		
Judging condition	The input voltage from boom down pressure sensor is 4.7 V or more.		
Symptom	The boom down operability becomes poor.		
Control in the event of failure	Set proportional valve output rate of P1 and P2 pumps to constant current. (Current when all operation is in neutral.) Only on independent operation of boom-up, set output of P1 unload proportional valve to 750mA.		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-2 BOOM LOWER
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• Boom down pressure sensor SE-4	When B024 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.	
2	• Wiring between boom down pressure sensor and controller CN-127F CN-101F	When B024 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

REMOVAL AND INSTALLATION OF UPPERSTRUCTURE

**WARNING**

Hydraulic oil, at the end of a work shift, can be very hot and can cause, when spilling, potentially serious burns. Prior to beginning any intervention, make sure that the oil and components are cooled-off.

The hydraulic oil tank cap can be ejected, if the pressure is not released from the tank. Press the valve located on the hydraulic oil tank to release any residual pressure present in the tank itself.

Check that the lifting devices (hooks, chains, etc.) are in perfect conditions without any sign of excessive wear and appropriate to hold the weight of load.

Preparation

1. Park the machine on a firm, level surface.
2. To drain the hydraulic pressure from the Hydraulic System, refer to procedure "Releasing the hydraulic pressure" at page T2-1-60.
3. Cut-off the engine. Press the valve located on the hydraulic oil cap to release any residual pressure present in the tank itself.
8. Remove the DEF/AdBlue® supply module, filter and shut-off valve, performing the operations described in the procedure at page W2-1-14.
9. Remove the fuel tank, performing the operations described in the procedure at page W2-1-16.
10. Remove the hydraulic oil tank, performing the operations described in the procedure at page W2-1-17.

Removal of upperstructure

1. Remove the front equipment and the boom cylinders, performing the operations described in the procedure at pages W4-1-1 (Refer to: Section 4 - "Front Attachment").
2. Remove the operator seat, performing the operations described in the procedure at page W2-1-2.
3. Remove the cab, performing the operations described in the procedure at page W2-1-3.
4. Remove the battery, performing the operations described in the procedure at page W2-1-6.
5. Remove the guard, performing the operations described in the procedure at page W2-1-7.
6. Remove the under cover, performing the operations described in the procedure at page W2-1-12.
7. Remove the DEF/AdBlue® tank, performing the operations described in the procedure at page W2-1-13.
11. Remove the air cleaner, performing the operations described in the procedure at page W2-1-21.
12. Remove the muffler, performing the operations described in the procedure at page W2-1-22.
13. Remove the counterweight, performing the operations described in the procedure at page W2-1-23.
14. Remove the radiator, performing the operations described in the procedure at page W2-1-25.
15. Remove the engine, performing the operations described in the procedure at page W2-1-29.
16. Disconnect the hoses of swivel joint lower side, performing the operations described in the procedure at page W2-1-32.
17. Remove the upper frame performing the operations described in the procedure at page W2-1-34.

TROUBLESHOOTING BY TROUBLE

1. HYDRAULIC SYSTEM

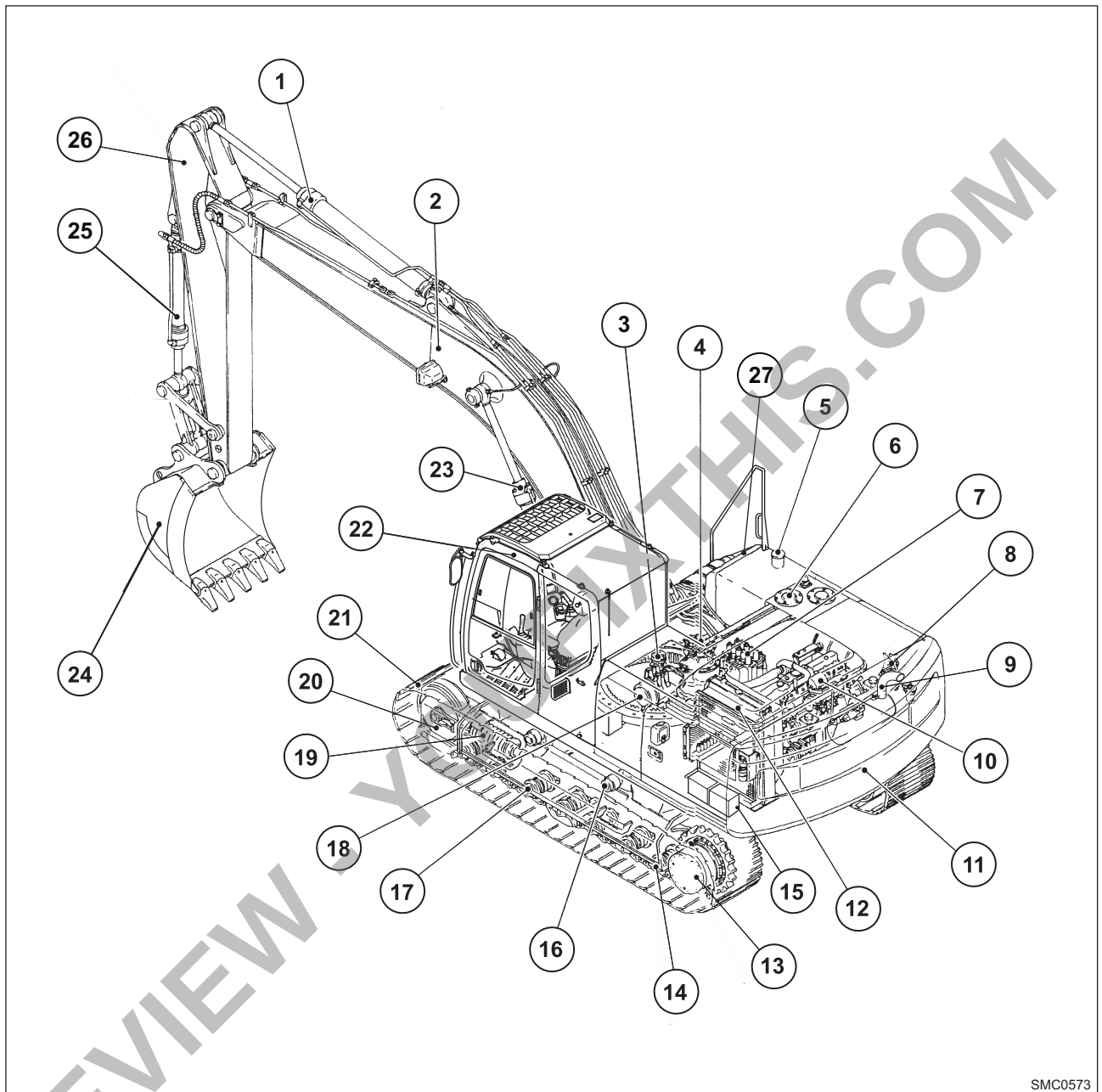
Preface:

The troubleshooting for the failures shown below is explained here.

Identify the failure and trouble and carry forward the troubleshooting in order of the failure item number.

1. All controls do not function/slow
2. Engine down/stalled
3. Move at lever neutral position
4. Poor fine operability
5. Slow boom up, insufficient power
6. Slow boom down, insufficient power for lifting up body
7. Slow arm in, insufficient power
8. Slow independent arm out (in the air)
9. Slow bucket digging
10. Slow bucket dumping
11. Swing operation not functioned/slow
12. Noise during swing operation
13. Swing on a slope drifts when control lever is in neutral position
14. Swing drifts when swing operation is stopped
15. Slow travel speed/weak
16. Travel deviation
17. Travel 1st/2nd speed not changed
18. Travel parking on a slope is not held
19. Machine does not run straightly when both crawlers and attachment operated simultaneously.
20. Slow breaker (crusher) operation, weak power
21. Option selector valve malfunction: not switched to breaker circuit
22. Option selector valve malfunction: not switched to nibbler circuit

MACHINE MAIN COMPONENTS

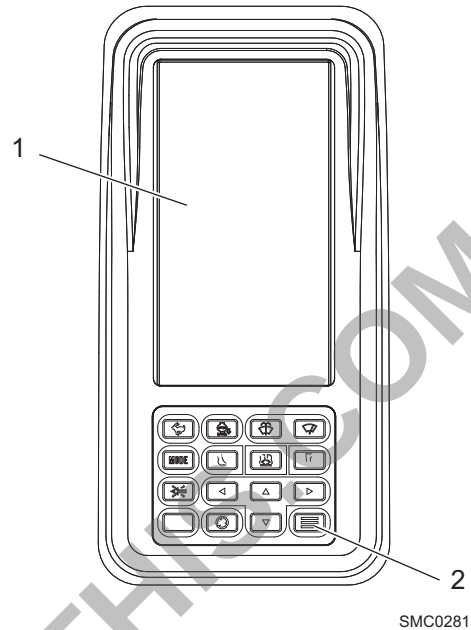


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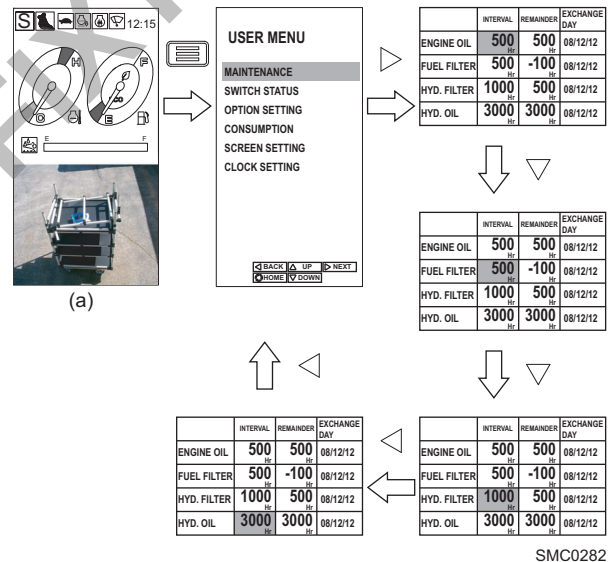
- | | | |
|------------------------|--------------------|-------------------------|
| 1 - Arm cylinder | 10 - Diesel engine | 19 - Track adjuster |
| 2 - Boom | 11 - Counterweight | 20 - Track adjust wheel |
| 3 - Swivel joint | 12 - Radiators | 21 - Track shoe |
| 4 - Swing motor | 13 - Travel motor | 22 - Cab |
| 5 - Fuel tank | 14 - Tracks | 23 - Boom cylinder |
| 6 - Hydraulic oil tank | 15 - Batteries | 24 - Bucket |
| 7 - Control valve | 16 - Upper roller | 25 - Bucket cylinder |
| 8 - Hydraulic pumps | 17 - Lower roller | 26 - Arm |
| 9 - Muffler | 18 - Air cleaner | 27 - DEF/AdBlue® tank |

6. Maintenance screen displays

This screen displays the remaining time to the end of recommended replacement/change interval specified for filter/oil.



This display shows the recommended replacement time of engine oil, time for next engine oil change and date of previous engine oil change. For the initial set value of recommended replacement/change time, see the following table.



Replacement interval

Item	Default
Engine oil	500 Hr
Fuel filter	500 Hr
Hydraulic oil filter	1,000 Hr
Hydraulic oil	5,000 Hr

This menu is available for confirmation of the following items.
The maintenance screen changes each time the screen change switch is pressed.

1.

Remaining time display to the engine oil change
This display shows the remaining time of "INTERVAL, REMAINING TIME, EXCHANGE DAY".

	INTERVAL	REMAINDER	EXCHANGE DAY
ENGINE OIL	500 Hr	500 Hr	08/12/12
FUEL FILTER	500 Hr	500 Hr	08/12/12
HYD. FILTER	1000 Hr	1000 Hr	08/12/12
HYD. OIL	5000 Hr	5000 Hr	08/12/12

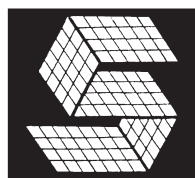
MANUAL INDEX



GENERAL SAFETY INFORMATION

Page

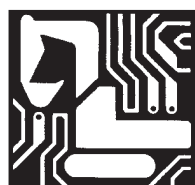
Section 1	SAFETY INFORMATION	S1
Section 2	SAFETY PRECAUTIONS	S2
Section 3	SAFETY DECALS.....	S3



OPERATIONAL PRINCIPLE

Section 1 GENERAL INFORMATION

Group 1	Specifications	T1-1
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Section 2 SYSTEM

Group 1	Mechatronic Control System	T2-1
Group 2	Hydraulic System	T2-2
Group 3	Electrical System	T2-3



Section 3 COMPONENT OPERATION

Group 1	Hydraulic Pump Assy.....	T3-1
Group 2	Pilot Valve	T3-2
Group 3	Control Valve	T3-3
Group 4	Swing Device	T3-4
Group 5	Travel Device	T3-5
Group 6	Swivel Joint.....	T3-6
Group 7	Cylinders.....	T3-7
Group 8	Air Conditioner system.....	T3-8
Group 9	Electrical Equipment	T3-9
Group 10	Selective Catalytic Reduction	T3-10



OPERATIONAL PERFORMANCE TEST

Section 4 OPERATIONAL PERFORMANCE TEST

Group 1	Introduction	T4-1
Group 2	Standard Performances	T4-2
Group 3	Test Procedures	T4-3
Group 4	Mechatronic Controller	T4-4



TROUBLESHOOTING

Section 5 TROUBLESHOOTING

Group 1	Troubleshooting (by error codes).....	T5-1
Group 2	Troubleshooting (by trouble).....	T5-2

SAFETY RULES

GENERALITIES

Read the Operator's manual carefully before starting, operating, maintaining, fuelling or servicing the machine.

Carefully read the explanation to each and all safety signs in the special section of this Manual before starting, operating, maintaining, fuelling or servicing the machine.

Machine-mounted safety decals are colour coded yellow with black borders when they refer to points where special ATTENTION must be paid and failure to observe them may cause a serious DANGER to the integrity of machine operators.

It is fundamental that all machine operators know very well the meaning of each safety plate as this considerably decreases operating hazards and accidents.

Do not allow unauthorised personnel to operate or service this machine.

Do not wear rings, wrist watches, jewellery, loose or hanging garments, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can get caught in moving parts. Wear certified safety clothes such as: hard hat, no-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators every time the job requires it. Ask your employer about safety regulations in force and protective equipment.

Always keep the operator's compartment, step plates, grab-rails and handles clean and clear of foreign objects, oil, grease, mud or snow to minimise the danger of slipping or stumbling. Remove mud or grease from your shoes before operating the machine.

Do not jump on or off the machine. Always keep both hands and one foot, or both feet and one hand in contact with steps and/or grab rails.

Do not use controls or hoses as hand holds. Hoses and controls are movable parts and do not provide solid support. Besides, controls may be inadvertently moved and cause unexpected movement of the machine or its attachments.

Never operate the machine or its attachments from any position other than sitting in the driver's seat. Keep head, body, limbs, hands and feet inside the operator's compartment at all times to reduce exposure to external hazards.

Be careful of possible slippery conditions of the steps and hand rails as well as of the ground around the machine. Wear protective boots or shoes with the soles made of highly no-slip rubber

Do not leave the machine until it has come to a complete stop.

Always check height, width and weight limitations which may be encountered in the working site and ensure the machine does not exceed them.

Assess exact paths of gas ducts, water mains, telephone lines, sewers, overhead and underground electric lines and all other possible obstacles.

Such paths should be opportunely defined by competent Authorities. If necessary, require that the service is interrupted or said installations are moved prior to starting the work.

Define the rear upperstructure swing area and provide for opportune barriers to prevent access into it.

Never exceed machine lifting capacity.

Remain within the limits shown in the loading capacity chart which located on the machine.

STARTING

Never start or operate a failed machine. Walk all around the machine before mounting.

Before operating the machine, make sure that any possible dangerous condition has been properly removed. Before starting machine, always check that all controls are in the neutral position and the safety lever is in the LOCK position. Immediately report any malfunction of parts or systems to the maintenance managers for proper action.

Prior to starting the engine, check, adjust and lock the driver's seat for maximum riding comfort and control accessibility. Prior to operating the machine and/or its attachments, check that bystanders are outside the machine operating range. Sound the horn.

Obey all hand signals, safety indications and signs.

Due to the presence of flammable fluids, never check fuel level, refuel, charge the batteries in the presence of smoking materials, open flames or sparks.

Adjust all rear-view mirrors for maximum visibility of the area behind the machine.

Ensure that engine speed is appropriate to the job to be carried out.

If any hydraulic control or system exhibits erratic performance or responds abnormally, have the machine checked for air in the system.

Air in these circuits may cause incorrect movements with consequent accident hazard. Refer to the Operator's manual about corrective action to be taken.

TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
- If you have any questions or comments, or if you found any errors regarding the contents of this manual, please contact:
- Be sure to thoroughly read this manual for correct information concerning the service procedures.

NEW HOLLAND KOBELCO
CONSTRUCTION MACHINERY S.p.A.
Strada Settimo, 323
San Mauro Torinese (TO)
10099 ITALIA
PRODUCT SUPPORT
Fax. ++39 011 0077357

ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this service manual:
- **Operator's Manual**
- **Service Parts Catalogue**

COMPLETE SERVICE MANUAL

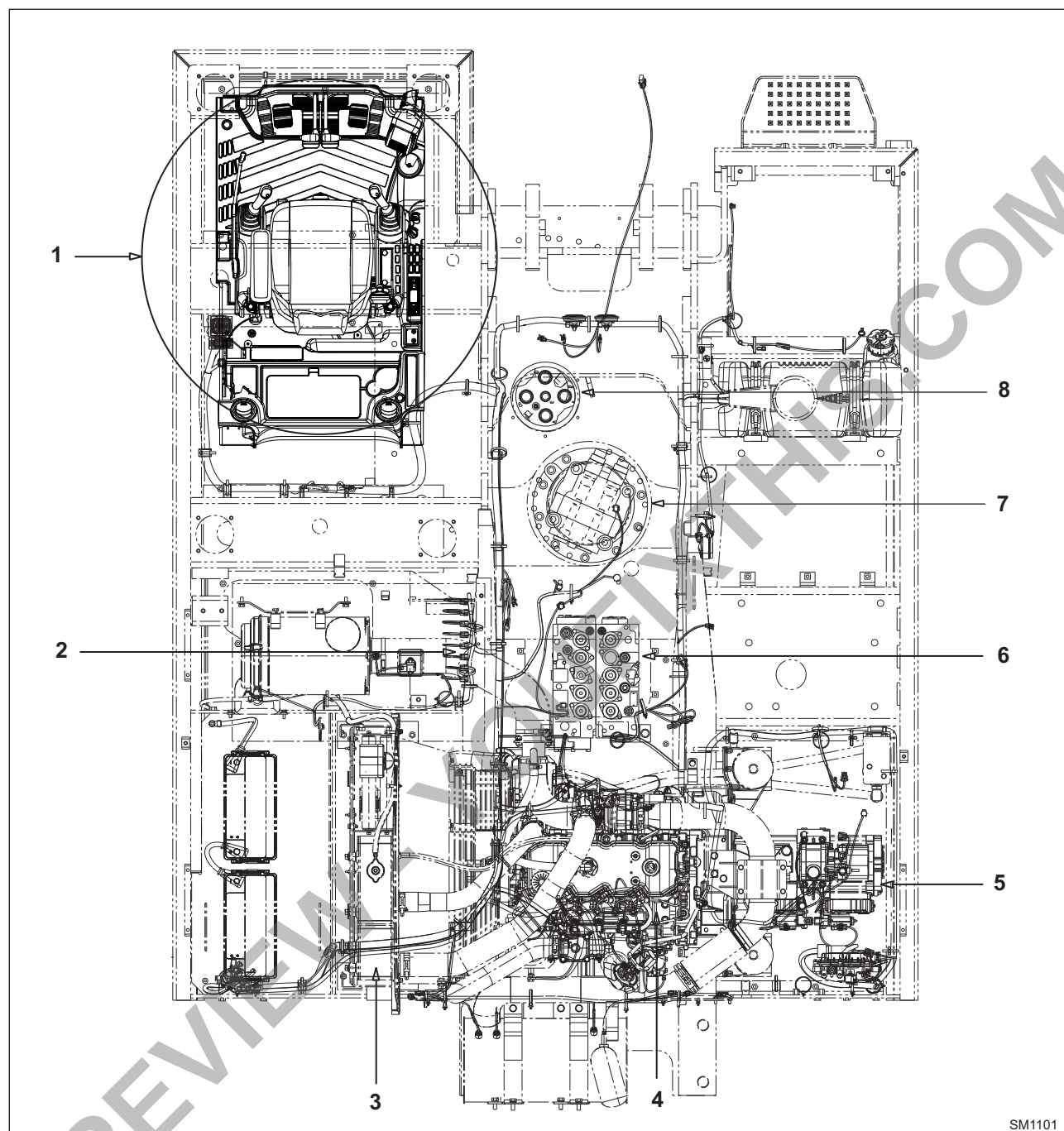
- The complete Service Manual consists of two distinct volumes:
- **Service Manual "Crawler Excavators"**
- **Service Manual "Engine"**

The two distinct volumes of the complete Service Manual can be identified through their print number as stated below:

VOLUME	PRINT NUMBER
Service Manual "Crawler Excavators"	84574565A
Service Manual "Engine"	84392403

- The Service Manual "Crawler Excavators" consists of five parts:
- **"General Safety Information"**
- **"Operational Principle"**
- **"Operational Performance Test"**
- **"Troubleshooting"**
- **"Repair Instructions"**

- The "General Safety Information" part includes the recommended procedures that, if followed, can avoid the risk of accident for operator and for staff related to the work and maintenance machine operations.
- The "Operational Principle" part includes the technical information concerning the operation of main devices and systems.
- The "Operational Performance Test" part includes the information needed to carry out the machine operational performance test.
- The "Troubleshooting" part includes the technical information needed for troubleshooting and malfunction detection.
- The "Repair Instructions" part includes information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, removal/installation and assembly/disassembly procedures.

Main Components – Upper Structure

- 1 - Control Cab
- 2 - Proportional Solenoid Valve Block
- 3 - Radiators
- 4 - Engine

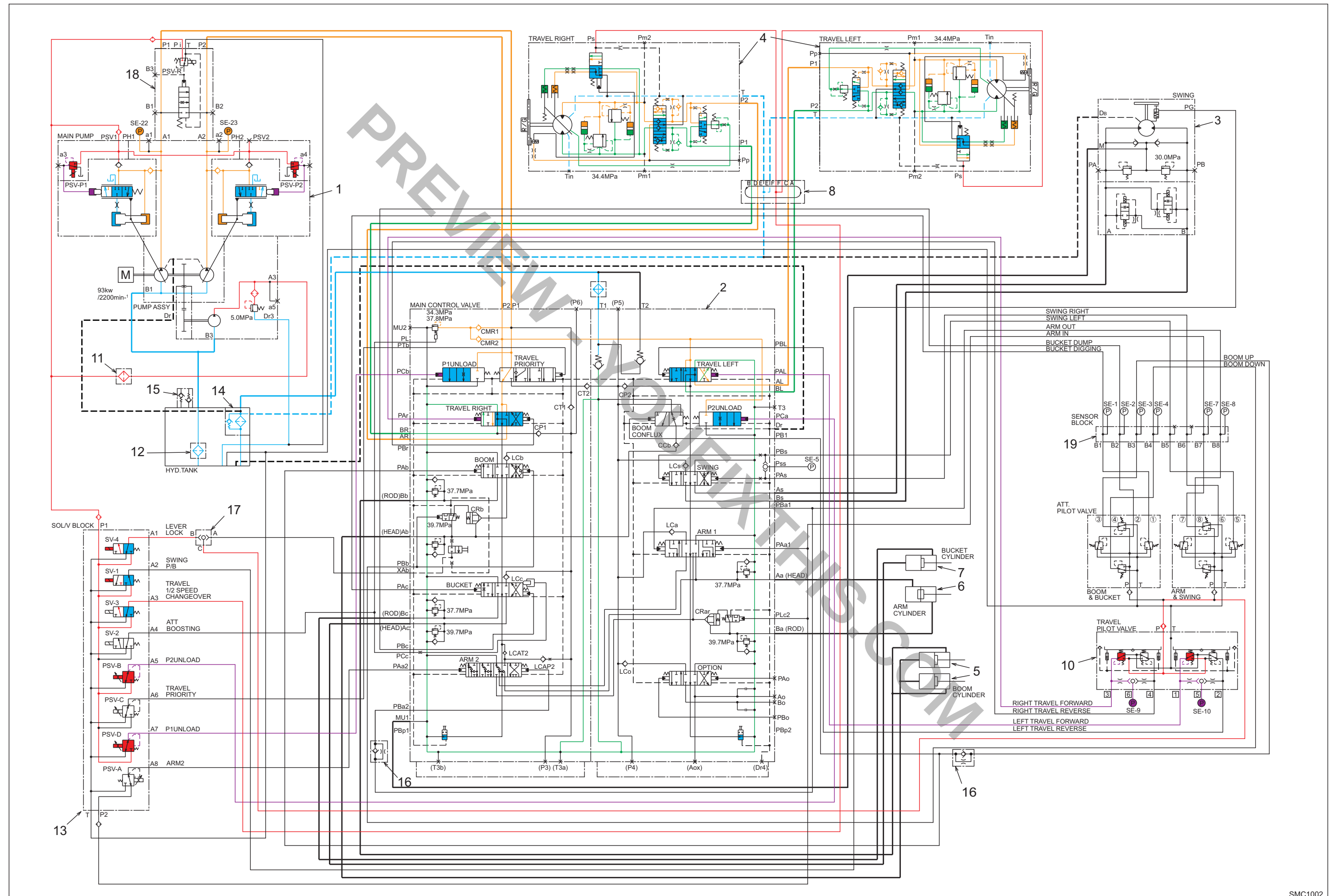
- 5 - Hydraulic Pump
- 6 - Control Valve
- 7 - Swing Motor Unit
- 8 - Center Joint

Priority	Level (*)	Screen	Condition	Warning Condition					Trouble History Code
				Only Key ON	Engine Run	Buzzer sounds			
						Type (**)	Auto Stop	Manual Stop	
A	1	DATA COMMUNICATION ERROR	Data from Mechatro controller is not received	O	O	3	x	O	
	1	SWING BRAKE DISENGAGED	The swing parking brake switch is turned ON	O	O	2	O	O	W001
	1	ENGINE STOP	Engine is stopped after engine oil pressare low warning	O		1	O	x	
	2	FAIL DRAIN HYD. PRESSURE	Impossible to drain hyd. Pressure	O	O	1	x	O	
	2	DRAINING HYD. PRESS.	Possible to drain hyd. Pressure		O	4	x	O	
B	1	CAUTION ATTACHMENT	The selector valve (OPT) is malfunction		O	2	x	O	W009
	2	POWER BOOST ON	The power boost switchis turn ON	O	O				
	2	FINISH WARM-UP	After finishing warming up control		O	2	O	x	
	3	LOW ENG OIL PRESS.	Low engine oil pressure		O	2	x	O	W005
			Disconnection	O					
	3	HIGH ENG. WATER TEMP.	The engine water is more than 105 °C	O	O	3	x	O	W006
	3	LOW ENG WATER LEVEL	The water engine coolant reservoir is low	O	O	3	x	O	W004
	3	CLOGGED AIR FLTR	The air filter is clogged	O	O	3	x	O	W008
	3	(SELF DIAGNOSIS SCREENS)	According to the self diagnosis control	O	O	3	x	O	
	3	PREHEAT	The heater relay contact is faulty	O	O	3		O	W011
	4	CHARGE ERROR	No signal from the alternator		O				
	4	LOW FUEL LEVEL	The fuel level is less than 10 %	O	O				
	5	AUTO WARMING UP	The auto warming up control is activated		O				
	5	CHANGE ENG OIL	The remaining time is reached zero Huors	O	O				
	5	LIFT UP LOCK LEVER BEFORE ENGINE START	Safety lever is in unlock position and starter switch is turned to START or ON	O	-	-	-	-	
	5	CHANGE FUEL FLTR	The remaining time for the replacement of the fuel filter reaches 0 .	O	-	-	-	-	
	5	CHANGE HYD. OIL FLTR	The remaining time for the replacement of the hydraulic oil	O	-	-	-	-	
	5	CHANGE HYD. OIL	The remaining time for the replacement of the hydraulic oil	O	-	-	-	-	

(*) 1: these extremely influence safety and the machine performance
 2: these warn the machine control mode is switched
 3: fatal failure
 4: normal priority warning
 5: low priority message

(**) 1: Continuation
 2: Beep ON 0.2 sec. OFF 0.3 sec.
 3: Beep ON 0.5 sec. OFF 0.5 sec.
 4: Beep ON 0.5 sec. OFF 1.0 sec.

TRAVEL CIRCUIT: Travel 2nd speed, RH & LH simultaneous operation.



SMC1002

SECTION AND GROUP CONTENTS**Section 3****Group 1****Group 2****Group 3****Group 4****Group 5****Group 6****Group 7****Group 8****Group 9****Group 10****COMPONENT OPERATION**

Hydraulic Pump Assy

Pilot Valve

Control Valve

Swing Device

Travel Device

Swivel Joint

Cylinders

Air Conditioner system

Electrical Equipment

Selective Catalytic Reduction

PREVIEW - YOUFIXTHIS.COM

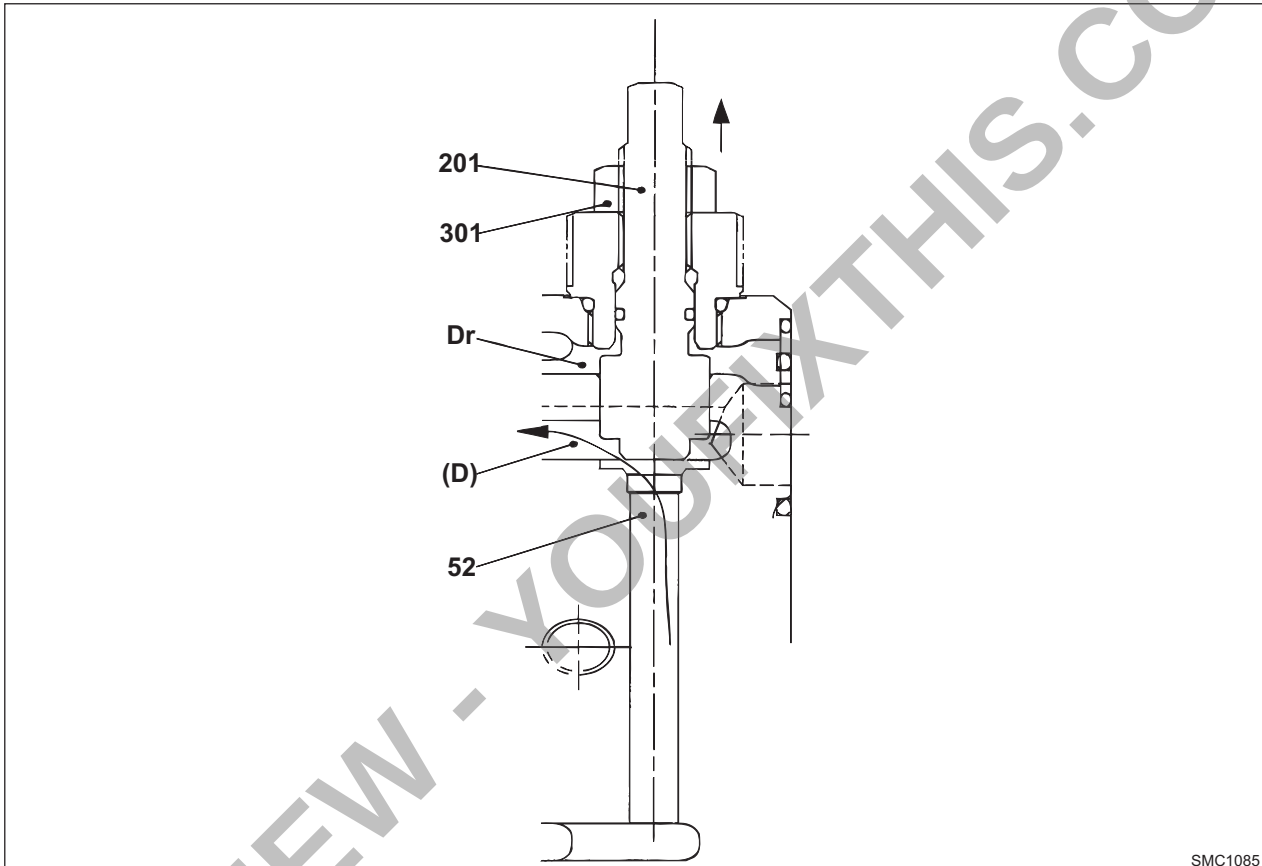
b) At the time when failure occurred

When the electric system is failed, P1 unload spool (309) stops at neutral position.

Hydraulic oil entered from P1 pump is blocked with P1 unload spool (309). And pump pressure rises to set pressure of main relief valve because oil flows through center by-pass passage (52) and it is blocked with by-pass cut valve (606).

Hydraulic oil entered from P1 pump is blocked with P1 unload spool (309). And pump pressure rises to set pressure of main relief valve because oil flows through center by-pass passage (52) and it is blocked with by-pass cut valve (606).

Therefore when the electric system is failed, P1 unloading spool (309) is shifted to the neutral position. And passage to low pressure passage (D) is blocked, but because center by-pass passage (52) is connected to low pressure passage (D) through by-pass cut valve (606), the abnormal rise of the pump pressure is prevented.



By-pass cut valve (In condition of failure)

CHARGING REFRIGERANT

PRECAUTIONS TO BE EXERCISED IN OPERATION

1. Assign a person in charge of handling refrigerant.
Refrigerant charge operation involves dangers as it handles high pressure gas. Assign a person familiar with how work is done for handling refrigerant.



WARNING

- **Wear protective goggles. (You may lose your sight if the refrigerant gets in your eyes.)**
- **The refrigerant in liquid state is at very low temperature [approx. -26°C (-15°F)]. Therefore, handle it with care. (You may get a frostbite if the refrigerant is sprayed over your skin.)**

2. Storage and Transportation

- 1) Keep the service can (hereinafter called can) less than 40°C (104°F). Since high pressure gas of R134a is filled in the can in a saturated liquefied state, the pressure in the can increases sharply as temperature rises. The can may blast as the result.
It is for this reason why the can temperature must be kept below 40°C (104°F).
- 2) For storage, choose dark cold place not exposed to direct sunlight.
- 3) If the can is placed near a fire, it is exposed to radiation heat and gets hot. This causes the inside pressure to rise and may cause the can to blow out. Do not bring the can close to a fire.
- 4) The inside of the closed compartment gets very hot as the radiation heat of the sunlight enters the compartment. The areas of the compartment which are exposed to direct sunlight may rise to a dangerous temperature level. Do not bring the can into the compartment.
- 5) Note that if the can has scratches, dents and distortion, the strength of the can will deteriorate.
 - Do not drop or knock on the can.
 - When transporting, loading or unloading cans and packages containing cans, do not throw or drop them.
- 6) Keep can out of reach of children.

3. Charging

- 1) When warming the can in which refrigerant is charged, do not fail to open the service can valve and the low pressure valve of the gauge manifold and warm the can in warm water of 40°C (104°F) or below.
If the can is put in hot water or heated by a direct fire, the pressure of the can may rise sharply, thereby the can explodes.
- 2) When charging refrigerant while running the engine, to avoid explosion, do not open the high pressure valve (HI) of the gauge manifold.

4. Others

Reuse of service cans is prohibited by regulation, do not reuse them. Do not allow foreign matter to enter the air-conditioner circuit. Air, water and dust are detrimental to the refrigeration cycle. Install the components of the air-conditioner correctly and speedily. Pay full attention to the entry of water and dust.



CAUTION

- Be careful about overcharge of gas.
- Fasten pipes to a specified torque.

Pressure adjustment position**MAIN CONTROL VALVE**

Relief valve position on main control valve.

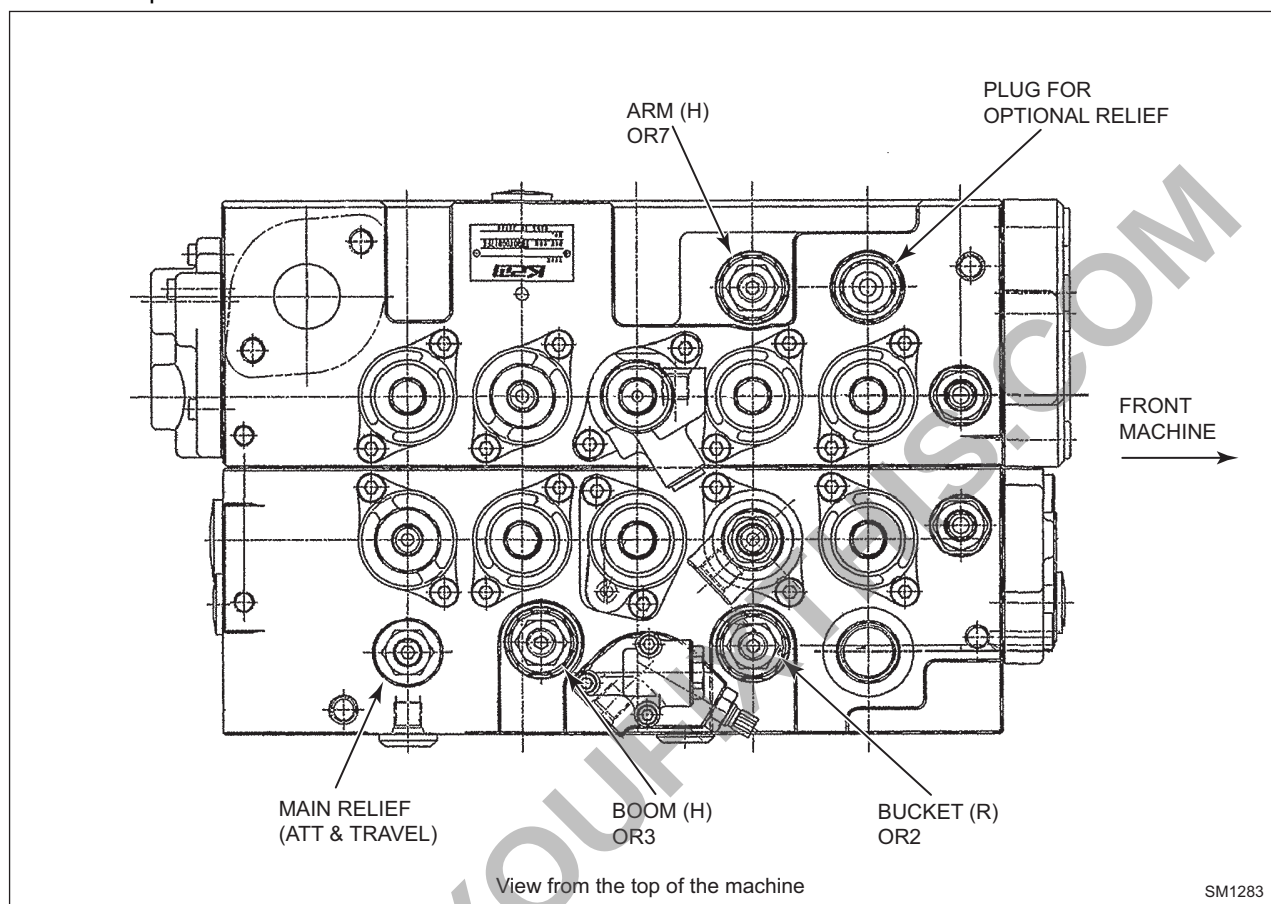
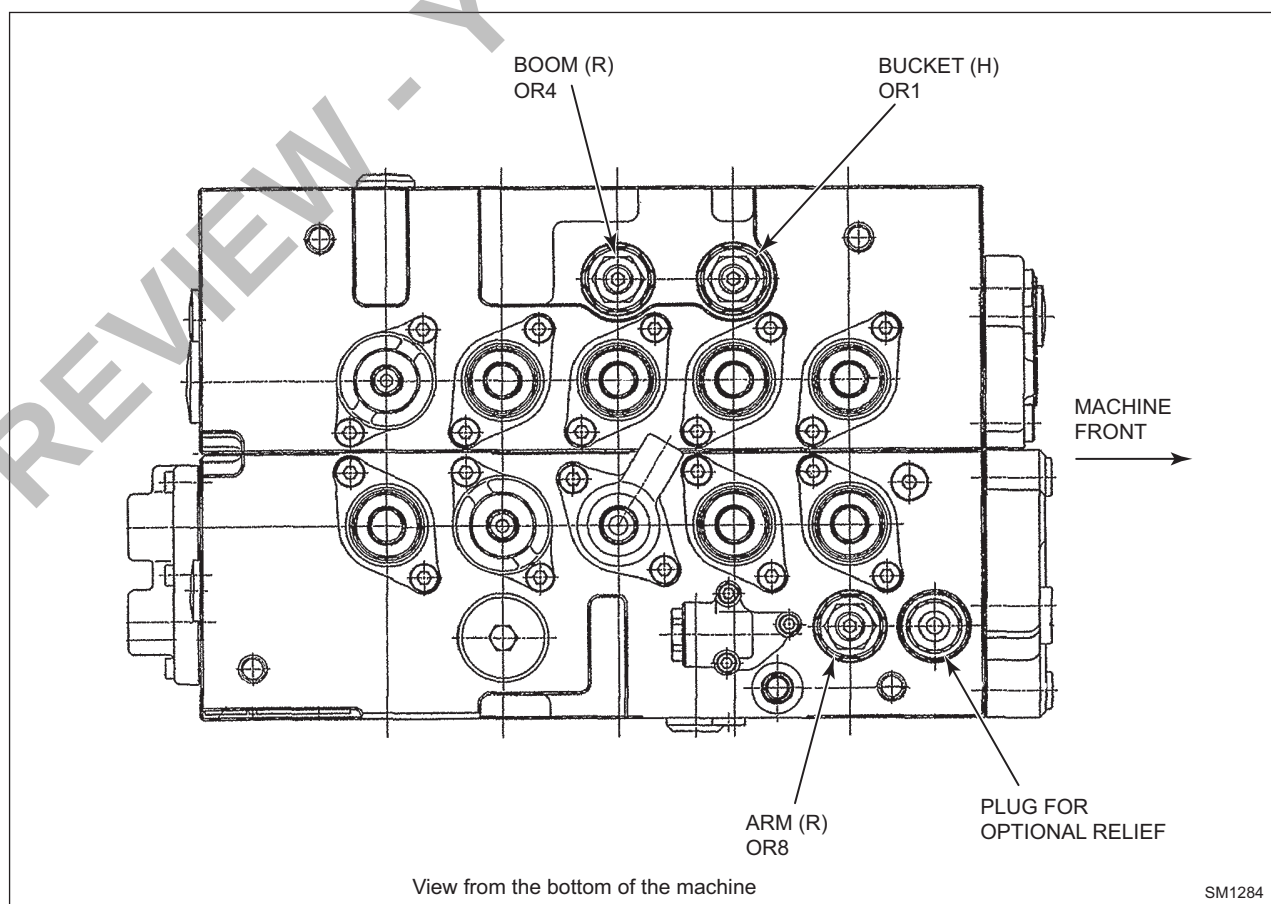


Table 40

Error code	B164		
Trouble	P1 side option pressure sensor's wiring is disconnected.		
Judging condition	The input voltage from P1 side option pressure sensor is 4.7 V or more.		
Symptom	The P1 side option does not work.		
Control in the event of failure	Set proportional valve output rate of P1 and P2 pumps to constant current. (Current when all operation is in neutral.) Only on independent operation of boom-up, set output of P1 unload proportional valve to 750mA. But normal control is done when the left control pedal selection is ON.		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-16 P1 OPT.
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• P1 side option pressure sensor SE-20	When B164 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.	
2	• Wiring between P1 side option pressure sensor and controller CN-304F CN-102F	When B164 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

Table 41

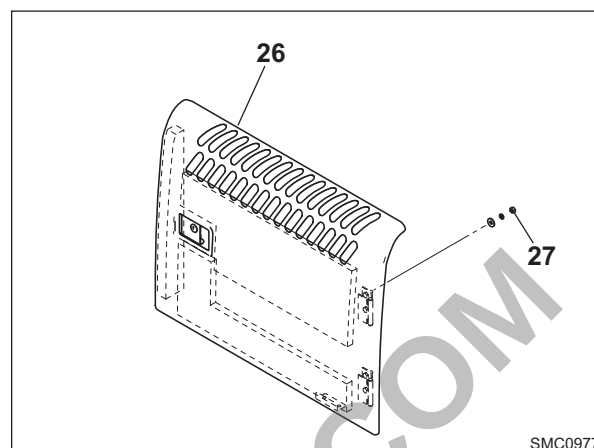
Error code	B172		
Trouble	P2 side option pressure sensor outputs error.		
Judging condition	After starter switch ON and engine does not start yet. And the input voltage from the P2 side option pressure sensor after starter switch ON is in the range of 1.4 V or more to less than 4.7 V.		
Symptom	The P2 side option operability becomes poor.		
Control in the event of failure	Normal control.		
Returned in normal condition	Not returned automatically under normal condition. Switch the power OFF once and turns on it again.		
Service diagnosis checking screen	Screen No.	5	B-17 P2 OPT.
	Screen No.		
	Screen No.		
Checking object		Checking contents and remedy	
1	• P2 side option pressure sensor SE-11	When B172 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.	
2	• Wiring between P2 side option pressure sensor and controller CN-303F CN-102F	When B172 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.	
3	• Mechatro controller	Check that the error is corrected after replacement of controller.	

8. Slow independent arm out (in the air)

No.	Sections	Contents/normal value		Corrective action, others
1	Arm out pressure sensor	Carry out service diagnosis	<ul style="list-style-type: none"> See Service Diagnosis Data List Operation No.8 arm out full lever and relief 	Check and replace pressure sensor Check remote control valve
2	Remote control valve	Measure directly remote control pressure of arm out	Check that pressure is 3.0 MPa or more in arm out full lever and high idling operation	Check remote control valve When equipped with multi control valve, check it while changing lever pattern
3	Pump pressure sensor	Carry out service diagnosis for P1, P2 pump pressures in operation.	<ul style="list-style-type: none"> See Service Diagnosis Data List Operation No.9 arm out full lever and in operation 	When there is difference between P1 and P2 pump pressures, check high pressure sensor
4	Actual measuring current value of P1/ P2 unload proportional valve	Carry out service diagnosis	<ul style="list-style-type: none"> No.7 D-1 P1 unload valve (cut valve) D-1 P2 unload valve (cut valve) See Service Diagnosis Data List Operation No.8 Arm out full lever & relief 	In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
5	Secondary pressure of P1, P2 unload proportional valve	Measure the proportional valve secondary pressure directly at the ports A7 and A5 of 8 sections solenoid block	Check that P1/P2 unload secondary pressures are within the range of 0.6 to 1.0 MPa in arm out full lever and high idling operation	Replace proportional valve
6	Actual measuring current value of P1/ P2 pump proportional valve	Carry out service diagnosis	<ul style="list-style-type: none"> No.6 E-1 P1 pump E-2 P2 pump See Service Diagnosis Data List Operation No.9 Arm out full lever & in operation 	In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
7	Secondary pressure of P1, P2 pump proportional valve	Measure the pump proportional valve secondary pressure directly (Ports a3, a4)	Check that P1/P2 pump proportional valve pressures are within the range of 1.7 to 2.9 MPa in arm out full lever and high idling operation (Secondary pressure is affected by oil temperature and attachment weight)	Replace proportional valve
8	Actual measuring current value of travel straight proportional valve	Carry out service diagnosis	<ul style="list-style-type: none"> Check that the value is not change regardless of operation See Service Diagnosis Data List Operation No. 1 Operation is nil Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling 	<ul style="list-style-type: none"> Check pressure sensor of travel In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
9	Secondary pressure of travel straight proportional valve	Measure directly the proportional valve secondary pressure at the ports A6 (travel straight) of 8 sections solenoid block	High idling pressure is 0.8MPa or less regardless of neutral/operation.	Replace proportional valve

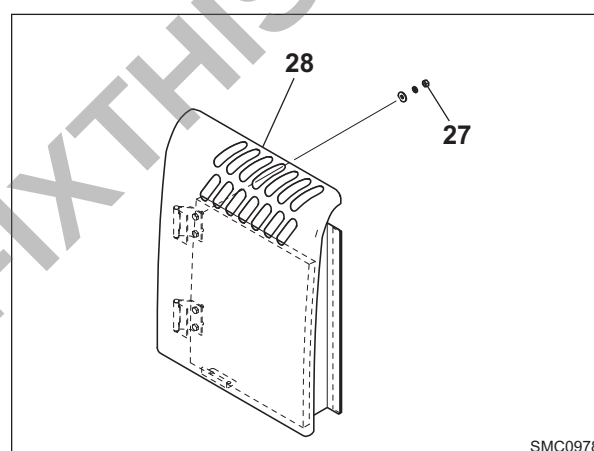
6) Remove panel assy (26).

1. Unlock panel assy (26).
2. Remove 4 nuts (27) M10.
 : 17 mm
3. Remove panel assy (26).
Weight: 14 kg (31 lbs)



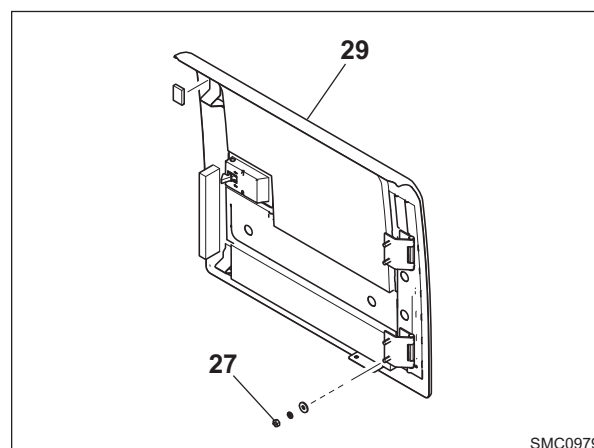
7) Remove panel assy (28).

1. Remove 4 nuts (27) M10.
 : 17 mm
2. Remove panel assy (28).
Weight: 8.2 kg (18 lbs)



8) Remove panel assy (29).

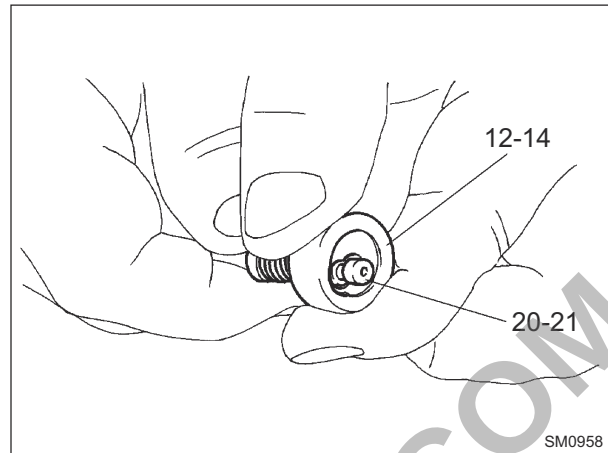
1. Unlock and open panel assy (29).
2. Remove 4 nuts (27) M10.
 : 17 mm
3. Remove panel assy (29).
Weight: 14.9 kg (32.9 lbs)



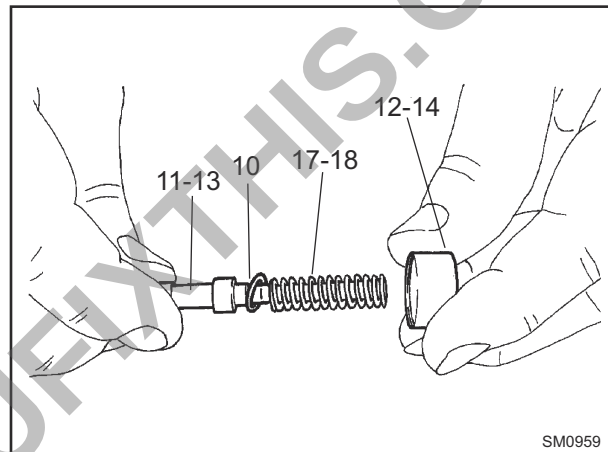
Tightening torque N•m (lbf•ft)	No.	Parts Name	Q.ty	Tightening torque N•m (lbf•ft)	No.	Parts Name	Q.ty
220~250 (162~184)	101	Casing A	1		323	Spring	3
	102	Casing B	1		324	Spring	3
	154	Plug PF3/4	3		325	Spring	1
20~24 (15~18)	159	Plug PT1/4 MEC (Pre-coat bolt)	1		326	Spring	1
					327	Spring	3
7.8~9.8 (5.7~7.2)	160	Plug NPTF1/16 MEC (Pre-coat bolt)	5	16~18 (11.8~13.2) Loctite #262	328	Spring	1
	161	O-ring	7		329	Spring	3
	162	O-ring	15		331	Spring seat	24
	163	O-ring	11		333	Spacer bolt	12
	164	O-ring	19		336	Stopper	10
	201	Cover	3		339	Stopper	1
	202	Cover	6		340	Stopper	1
	203	Cover	1		511	Poppet	11
	204	Cover	1				
	205	Cover	6				
9.8~14 (7.2~10.3)	206	Cover	1		512	Poppet	2
	207	Back pressure check valve cover	1		514	Poppet	2
	209	Cover	1		515	Poppet	1
	210	Cover	1		517	Boost check valve	1
	211	Lock valve selector sub	2		518	Poppet	1
	212	Plate	1		521	Spring	11
	213	Plate	1		522	Spring	2
	215	Boom lowering valve	1		523	Spring	1
	216	Piston	1		524	Spring	2
	261	O-ring	12		527	Spring	1
25~34 (18~25) 98~120 (72~89) 98~120 (72~89)	264	O-ring	10	230~260 (170~192) 130~150 (96~111) 230~260 (170~192)	528	Spring	1
	266	O-ring	4		551	Plug	13
	273	Socket bolt	40		552	Plug	2
	274	Socket bolt	4		556	Plug	3
98~120 (72~89)	275	Socket bolt	4	562	O-ring	2	
25~34 (18~25) 9.8~14 (7.2~10.3)	278	Socket bolt	5	13~17 (9.6~12.5)	563	Plug	1
	279	Socket bolt	3		564	O-ring	1
	301	Boom spool sub	1		601	Main relief valve	1
	302	Arm 1 spool	1		602	Over load relief valve	2
	303	Swing spool	1	603	Over load relief valve	3	
	304	Bucket spool	1	69~78 (51~58) 69~78 (51~58) 98~120 (72~89) 140~180 (103~133) 140~180 (103~133)	604	Plug assy for relief valve hole	2
	305	Boom conflux spool	1		605	Overload relief valve	1
	306	Travel spool	2		606	By-pass cut valve	2
	307	Travel priority spool	1		973	Socket bolt	8
	308	Arm 2 spool sub	1		974	Socket bolt	2
	309	P1 unload spool	1		977	Name plate	1
	310	P2 unload spool	1		978	Rivet	2
	311	Option spool	1				
	321	Spring	5				
	322	Spring	4				

9. Push springs (17 and 18) in the range of 7 mm (0.276 in) that the movement of spring seats (12 and 14) and shift the seats in a side direction, and remove spools (20 and 21) through the larger hole of seat.

ATTENTION: Never push down spring seat (12) in 7 mm (0.276 in) or more. (For port 1 and 3).
Never push down spring seat (14) in 9.4 mm (0.370 in) or more. (For port 2 and 4).



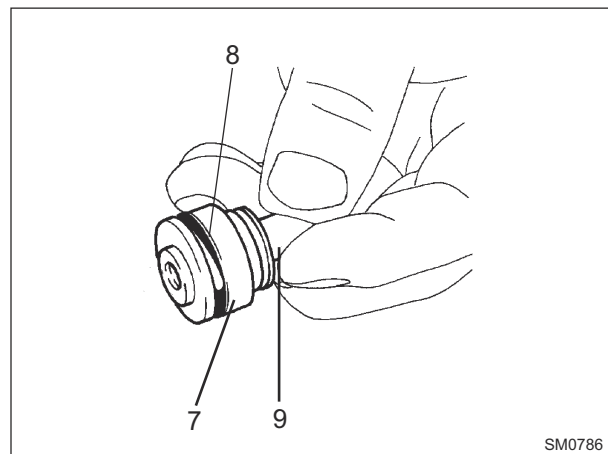
10. Remove spool (20 and 21), spring seats (12 and 14), springs (17 and 18) and washer (19).



11. Remove spring (10 and 11), spring seat (13), from push rod (9).

12. Pull out push rod (9) from plug (7).

13. Remove O-Ring (8) from plug (7).

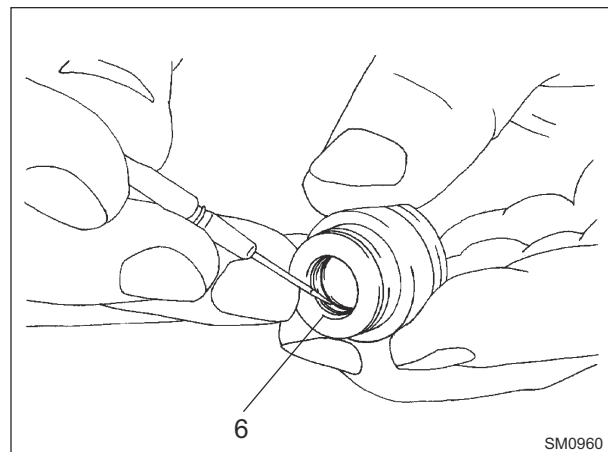


14. Remove inside seal (6) from plug (7) with small driver



Cleaning parts

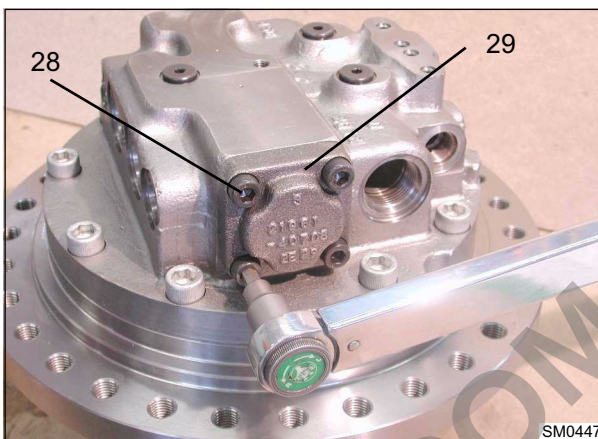
1. Clean parts with wash oil roughly and the parts of pilot valve completely.
2. Dry parts by swabbing clean rag.
3. Apply rust preventives on parts.



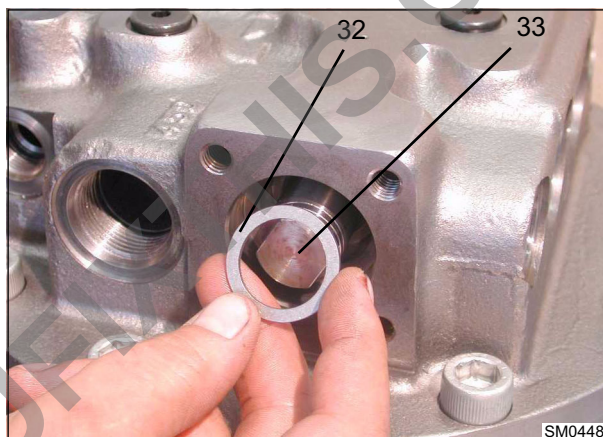
48. Tighten the nos. 4 socket head screws M12x40 (28), grade 12.9, of the first flanged plug assy (29) by a male hex head torque wrench at 108 ± 10 Nm torque.

 : 10 mm

 : 108 ± 10 Nm (79.7 ± 7.3 lbf·ft)



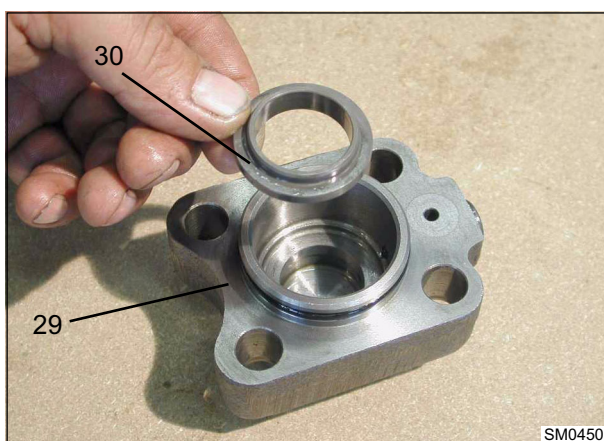
49. Insert the second spring seat (32) on the counterbalance valve spool (33).



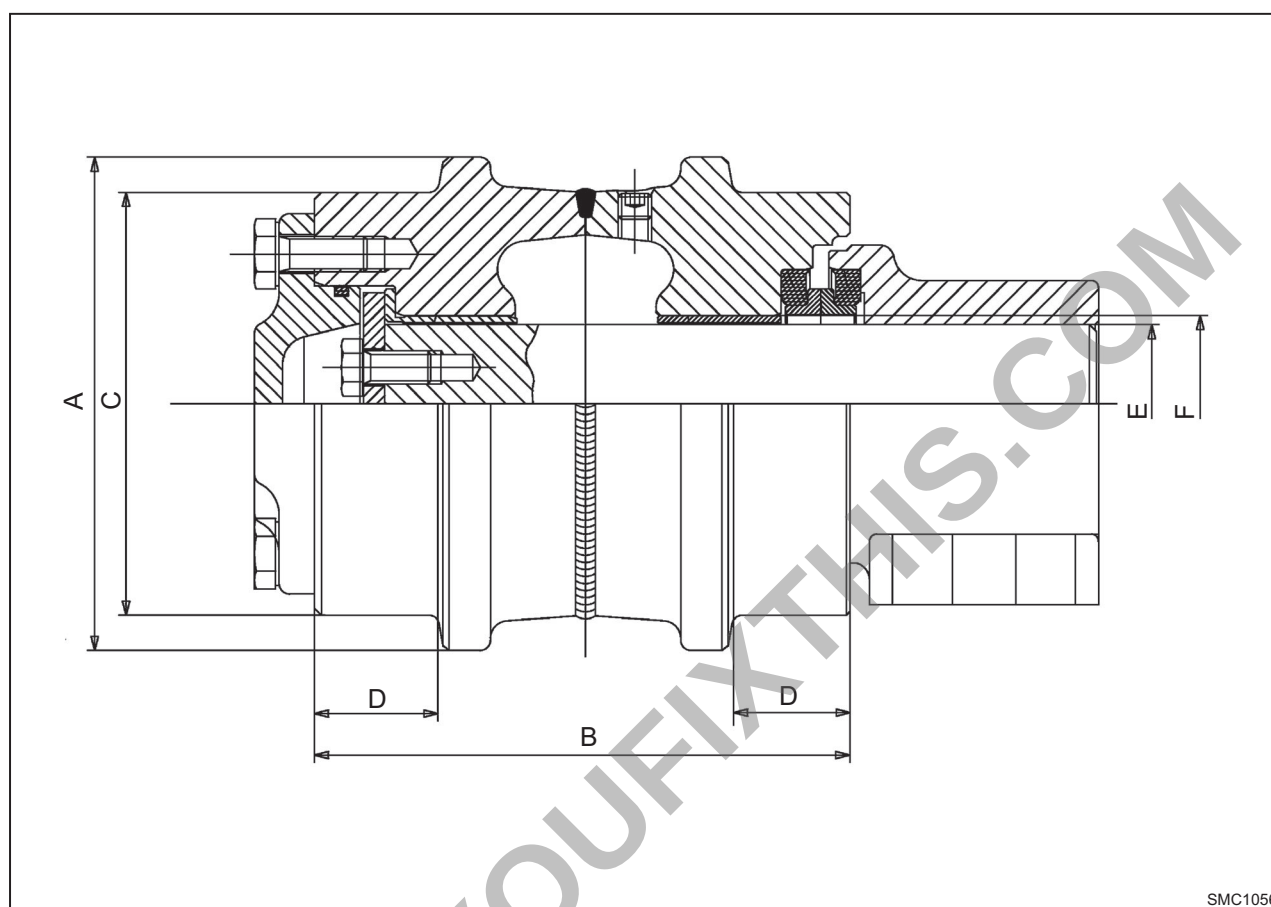
50. Insert the second spring (31) on the counterbalance valve spool (33).



51. Assemble the spring seat (30) into its seat in the 2nd flanged plug (29).



UPPER ROLLER MAINTENANCE STANDARD (E175C)



Unit: mm (in)

No.	ITEM	STANDARD VALUE				SERVICE LIMIT	REMEDY
A	Diameter	ø 140 (5.51)				ø 130 (5.12)	Reinforcement weld, repair or replace
B	Width	152 (5.98)				142 (5.59)	
C	Tread dia.	ø 120 (4.72)				ø 110 (4.33)	
D	Tread width	35 (1.38)				31 (1.22)	
D'	Tread width	33 (1.30)				29 (1.14)	
E	Clearance between shaft and bushing	Basic dimension ø 45 (1.772)	Shaft	- 0.025 (-0.0010) - 0.040 (-0.0016)	Standard Clearance -	Limit Clearance 0.8 (0.0315)	Replace bushing
F	Interference between roller and bushing	ø 49 (1.929)	Hole	+ 0.030 (+0.0012) 0	Interference -	Clearance 0	
	Oil	Engine oil: SAE 40; Q.ty: 0.2 kg (0.44 lbs)					Refill
	Roller rotation	Rotates smoothly by hand					Reassembly

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