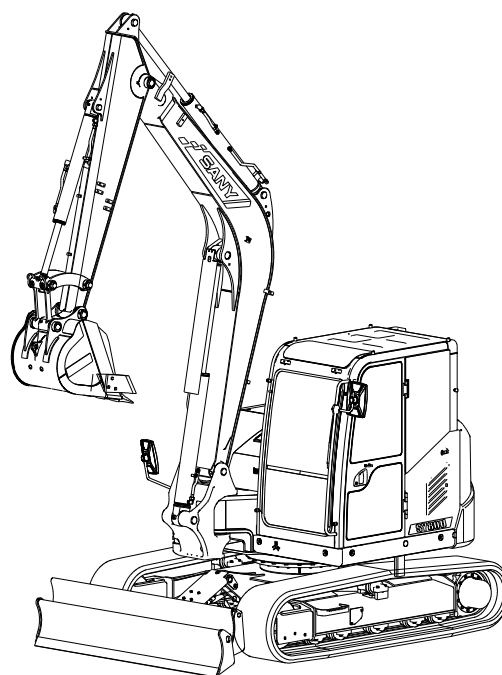


Quality Changes the World



# Crawler Hydraulic Excavator

**SY80U**



**Maintenance Manual**

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

6. 8 .....	6-15
6. 9 Testing and Adjustment of Generator Belt Tension.....	6-15
6. 10 Adjustment of engine speed sensor .....	6-16
6. 11 .....	6-16
6. 12 Measurement of clearance of slewing support bearing.....	6-17
6. 13 Inspection and adjustment of crawler plate tensioning device .....	6-18
6. 14 Inspection and adjustment of hydraulic pressure in hydraulic oil ways for working device, slewing and travelling.....	6-20
6. 15 Measurement of LS Differential Pressure and Adjustment of LS Valve.....	6-21
6. 16 Measurement of output pressure of pilot valve.....	6-23
6. 17 Adjustment of working device and slewing PPC valve.....	6-24
6. 18 Measurement of Travelling Deviation.....	6-24
6. 19 Inspection of hydraulic settlement of working device.....	6-25
6. 20 Release of residual pressure in hydraulic oil way.....	6-27
6. 21 Measurement of oil leakage.....	6-28
6. 22 Air Bleeding for Every Device.....	6-32
6. 23 Inspection and adjustment of oil pressure in control oil line.....	6-32
6. 24 Measuring the output pressure of solenoid valve.....	6-33
6. 25 Inspection of the drift of hydraulic cylinder for work equipment.....	6-35
6. 26 Release of residual pressure from hydraulic lines.....	6-38
6. 27 Oil Leakage Amount – Test.....	6-39
6. 28 Bleeding air from each system.....	6-43
6. 29 Coolant temperature sensor .....	6-45
7 Trouble Diagnosis and Troubleshooting .....	7-1
7. 1 Trouble diagnosis and troubleshooting.....	7-5
7. 2 Inspection before fault diagnosis.....	7-7
7. 3 Category and steps of trouble diagnosis.....	7-8
7. 3. 1 Category of trouble diagnosis.....	7-8
7. 3. 2 Steps for trouble diagnosis.....	7-8
7. 4 Trouble – Identity the symptoms and trouble diagnosis code.....	7-9
7. 5 Position Diagram of Connectors and Wiring Diagram of System.....	7-11
7. 5. 1 Position Diagram of Connectors and Wiring Diagram of System.....	7-12
7. 5. 2 Connector Position Diagram.....	7-15
7. 5. 3 Wiring diagram of electrical control system (vehicle body) .....	7-19
7. 5. 4 Wiring diagram of electrical control system (control cabinet) .....	7-22
7. 5. 5 Wiring diagram of electrical control system (cab) .....	7-24
7. 6 Trouble Diagnosis for Electrical System (Mode E) .....	7-27
7. 6. 1 Information contained in table of trouble diagnosis.....	7-27
7. 6. 2 E-1 The engine could not be started.....	7-28
7. 6. 3 E-2 No Power-off Delay Available for Engine.....	7-32

prevent all kinds of troubles and other abnormal situations. This section focuses on the correct electrical/mechanical repair methods for the purpose of improving the repair quality, and consists of two parts - “Treatment of Electrical Components” and “Treatment of Hydraulic Components” (particularly gear oil and hydraulic oil).

### 1. 3. 2 Notices for handling of electrical components

#### 1. Handling of Harness and Connector

- 1) A harness consists of wires from a component to another, connectors connecting two wires or disconnecting a wire from another and a cover or tube protecting wires.
- 2) Compared to electrical components in boxes or cases, harnesses are more likely to be directly affected by rain, water, heat or vibration. Furthermore, they are frequently removed and refitted during inspection and repair, so they may be easily deformed or damaged. For this reason, they must be treated with great care.

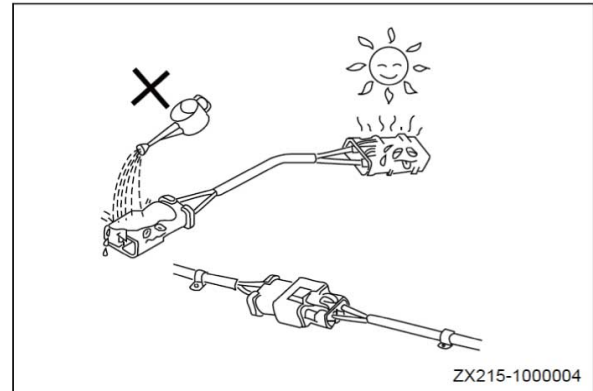


Fig1-2

#### 2. Main faults in harness

- 1) Poor contact between connectors (poor contact between male and female connectors)
  - Poor contact may occur when a male connector is not inserted in a female connector correctly, or no correct alignment is made due to deformation, or corrosion and oxidation appear on the contact surface.

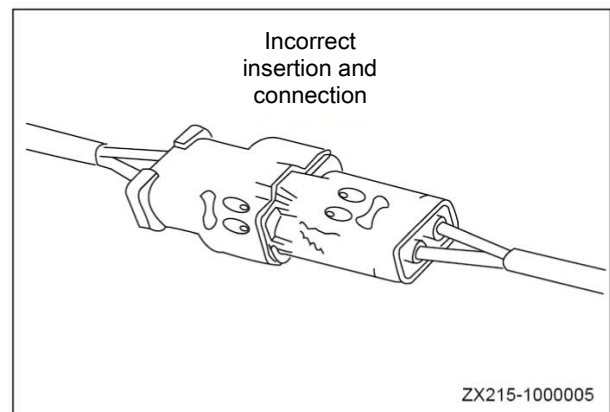


Fig1-3

## 7. Cleaning operations

Use oil to remove sediments or impurities from the hydraulic circuit after repair of hydraulic components (pump, control valve, etc.) The oil cleaning device is highly effective because it is used for removing ultra fine particles of about  $3\mu$  to make it impossible to remove the filter built in the hydraulic component.

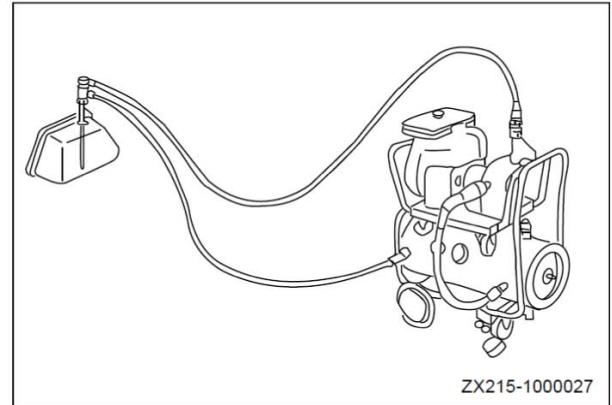


Fig1-26

## 1.4 Pipe fitting

### 1.4.1 Overview

The pipe fitting is used for connecting small-diameter pipes.

The metallic sealing surfaces (4) and (5) of the connector (1) and the hose (2) fit together to seal the pressure oil.

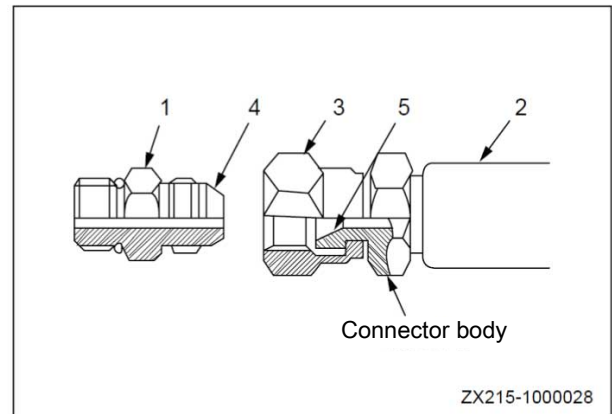


Fig1-27



- The nut (3) shall not be overtightened. The nut (3) must be tightened to the technical specification as excessive force will act upon the metallic sealing surfaces (4) and (5) and may thereby make the connector (1) broken.
- Scratches or other damage on the sealing surfaces (4) and (5) can cause oil leak at the junction. Take care to avoid damaging the sealing surfaces during connection/removal.

**Pressure**  
**From kg/cm2 to lb/in2**

1 kg/cm2=14.2233 lb/in2

	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
0	0	14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.3	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.0	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	996	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	1863	1877	1892	1906	1920	1934	1949	1963	1977
140	1911	2005	2020	2034	2048	2062	2077	2091	2105	2119
150	2133	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2390	2404
170	2418	2432	2446	2461	2475	2498	2503	2518	2532	2546
180	2560	2574	2589	2603	2617	2631	2646	2660	2674	2688
190	2702	2717	2731	2745	2759	2774	2788	2802	2816	2830
200	2845	2859	2873	2887	2902	2196	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3214	3229	3243	3257
230	3271	3286	3300	3314	3328	3342	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

**Temperature**

Conversion from Fahrenheit to Celsius: a simple way to convert a temperature reading from Fahrenheit to Celsius or vice versa is to enter the center of values in bold in the attached table. These values involve both Fahrenheit and Celsius temperatures.

To convert from Fahrenheit to Celsius, consider the center column as the Fahrenheit scale and read the corresponding Celsius temperature in the left column.

To convert from Celsius to Fahrenheit, consider the center column as Celsius temperatures and read the corresponding Fahrenheit temperature in the right column.

°C		°F	°C		°F	°C		°F	°C		°F
-40.0	-40	-40	-	11	51.8	7.8	46	114.8	27.2	81	177.8
			11.7								
-37.2	-35	-31.0	-11.	12	53.6	8.3	47	116.6	27.8	82	179.6
			1								
-34.4	-30	-22.0	-10.	13	55.4	8.9	48	118.4	28.3	83	181.4
			6								

Wear personal protective equipment when you work with fluids. Work with all the fluids carefully.

### 2. 2. 5 Cleaning of Part

It is forbidden to use gasoline, diesel or other flammable fluids to wash parts. Please use specified flame-retardant solvent to wash parts, otherwise there is a risk for fire and explosion.

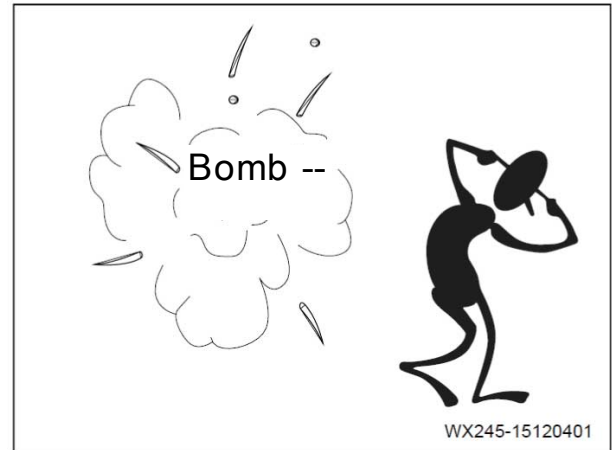


Fig2-4

### 2. 2. 6 Cleaning of this Machine

Use high-pressure hot water, mild and non-flammable degreasing soap or detergent when you clean the hydraulic excavator covers or non-electrical elements. Do not use any flammable or corrosive detergent.

It is forbidden to use high-pressure steam cleaning machine to clean the hydraulic excavator. Steam cleaning machine may damage the paint, hoses, and electrical system of the hydraulic excavator.

Do not wash or flush the inside of cab with high pressure equipment. Otherwise, the internal electrical elements may be damaged.

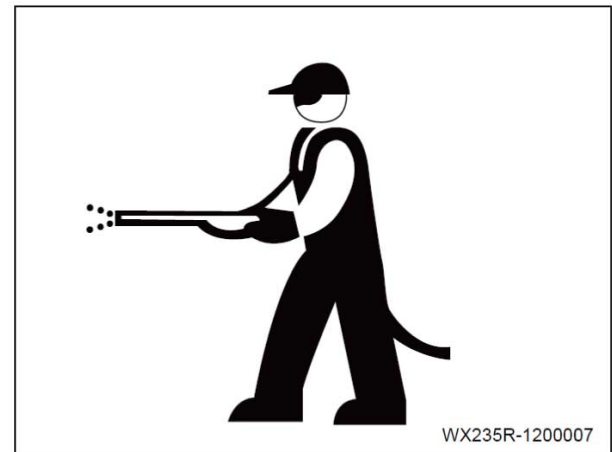


Fig2-5

### 2. 4. 9 Tensioning Spring

Be very careful during track maintenance because springs for track tension may pose a danger. Springs for track tension are always under high pressure. Improper operation during dismantling may cause the springs to fly out, which may result in severe personal injuries.

Do not hit the springs for track tension, because these springs may be subject to great pressure. Otherwise, explosive breakage from springs may result in personal injuries.

Be very careful when you remove and install the tracks. When the main track link is dismantled, the track assembly may suddenly break and cause personal injuries. When you detach the main track link, keep away from the traveling path of track.



Fig2-26

### 2. 4. 10 Safe Operation of High Pressure Hose

If leakage is found in the high-pressure hose, it may cause an operational failure and even lead to a fire. If bolts on the hose come loose, stop working and tighten the bolts to specified torque. Stop working immediately and replace the hoses when:

- 1) Damage or leakage has been found on any hydraulic pipe fitting.
- 2) The covering has been worn or broken, or the reinforcement layer of steel wire is exposed.
- 3) Swelling has been partly found on the cover.
- 4) Impurities have been found in the cover.
- 5) Disorder or indentation has been found on any movable part.



Fig2-27



# Technical Specifications

3 Technical Specifications.....	3-1
3.1 Specified Size.....	3-3
3.1.1 Overall Dimensions .....	3-3
3.1.2 Working Ranges .....	3-4
3.2 Technical Specifications.....	3-5
3.3 Table of Weight.....	3-6
3.4 Capacity Table.....	3-7
3.5 Engine oil, Fuel and Coolant.....	3-7
3.6 Feature Curve of Engine.....	3-8



## Structure and Function

4 Structure and Function .....	4-1
4.1 Engine and Cooling System.....	4-5
4.1.1 Engine-related parts .....	4-5
4.1.2 Radiator and intercooler .....	4-6
4.2 Power Train.....	4-7
4.2.1 Powertrain .....	4-7
4.2.2 Drive reducer assembly (GT40D50B-F1H1U) .....	4-7
4.2.3 Swing reduction mechanism .....	4-9
4.2.4 Swing bearing .....	4-10
4.3 Lower structure.....	4-11
4.3.1 Track frame .....	4-11
4.3.2 Guide wheel tensioning device .....	4-13
4.4 Hydraulic System, Part 1.....	4-15
4.4.1 Arrangement diagram of hydraulic parts .....	4-15
4.4.2 Hydraulic tank and filter .....	4-16
4.4.3 Hydraulic pump .....	4-16
4.4.3.1 Overview .....	4-16
4.4.3.2 Pilot pump .....	4-17
4.5 Hydraulic System, Part 2.....	4-18
4.5.1 Control valve .....	4-18
4.5.2 .....	4-28
4.6 Hydraulic System, Part 3.....	4-33
4.6.1 Swing motor .....	4-33
4.6.1.1 Swing motor .....	4-33
4.6.1.2 Oil-filling One-way Valve and Safety Overflow Valve .....	4-38
4.6.1.3 Components of Safety Valve .....	4-40
4.6.2 Central slewing connector .....	4-42
4.6.3 Running Motor .....	4-43
4.6.3.1 Structure of Traveling Motor .....	4-43

### 4.3 Lower structure

#### 4.3.1 Track frame

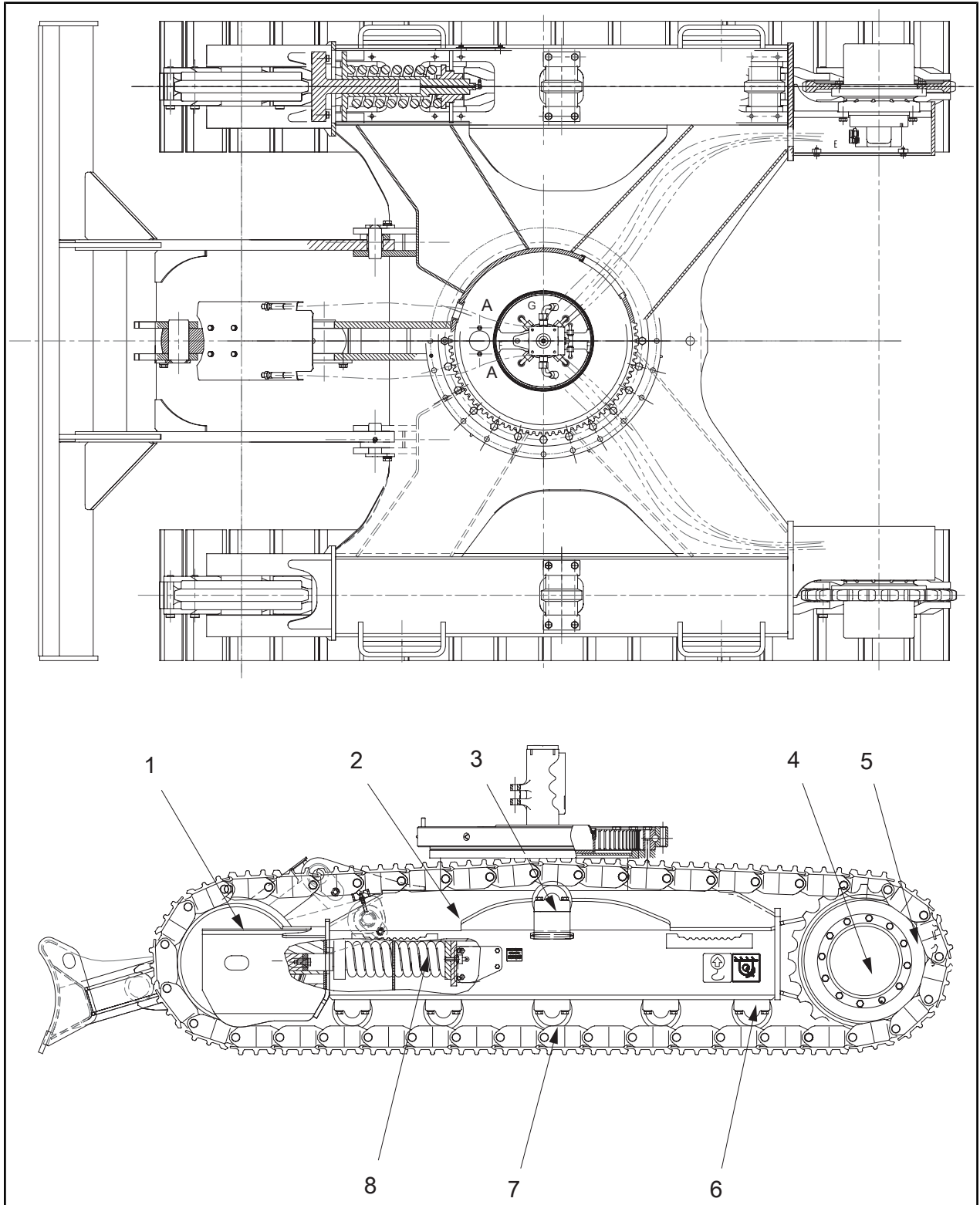


Fig4-6

body, and is then led into the neutral parallel channel of the closed center. The operating oil output by hydraulic pump P will flow into the corresponding operating port when the joystick of pilot control valve is operated to switch over the valve cores respectively. As shown below

## 2. Control action

The pressure signals generated from the port Ls and the port Pp on the valve occur in the following cases to control the output flow of pump.

- 1) When the pilot pressure is not used for any operation but is in the neutral state, the pressure at the port Ls will be 0, while the pressure at the port Pp will reach the set pressure (within the pressure range of 10Bar-21Bar, to be calibrated according to the different models of main engine manufacturer) on the load-sensitive valve of the pump; to this point, the pump displacement will be minimum, and the leakage in the pump and when the valve is in neutral position is maintained.
- 2) When the joystick of leading valve is operated, the operating oil output by the hydraulic pump P will pass through the operating port of a way, while the pressure built at the port Ls will depend on the loading pressure (or the maximum pressure in case of combined action). At this moment, the pressure Ls and Pp will act on the pump jointly, so that the pump flow and pressure operate according to the set curve.

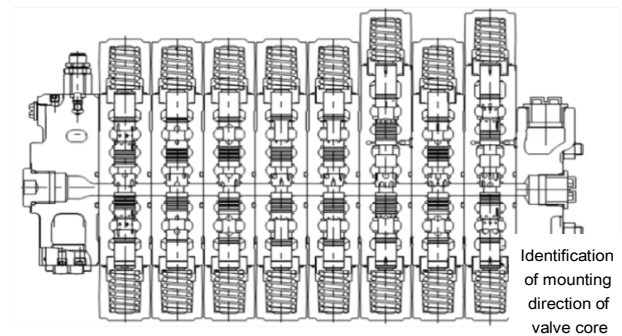


Fig4-15

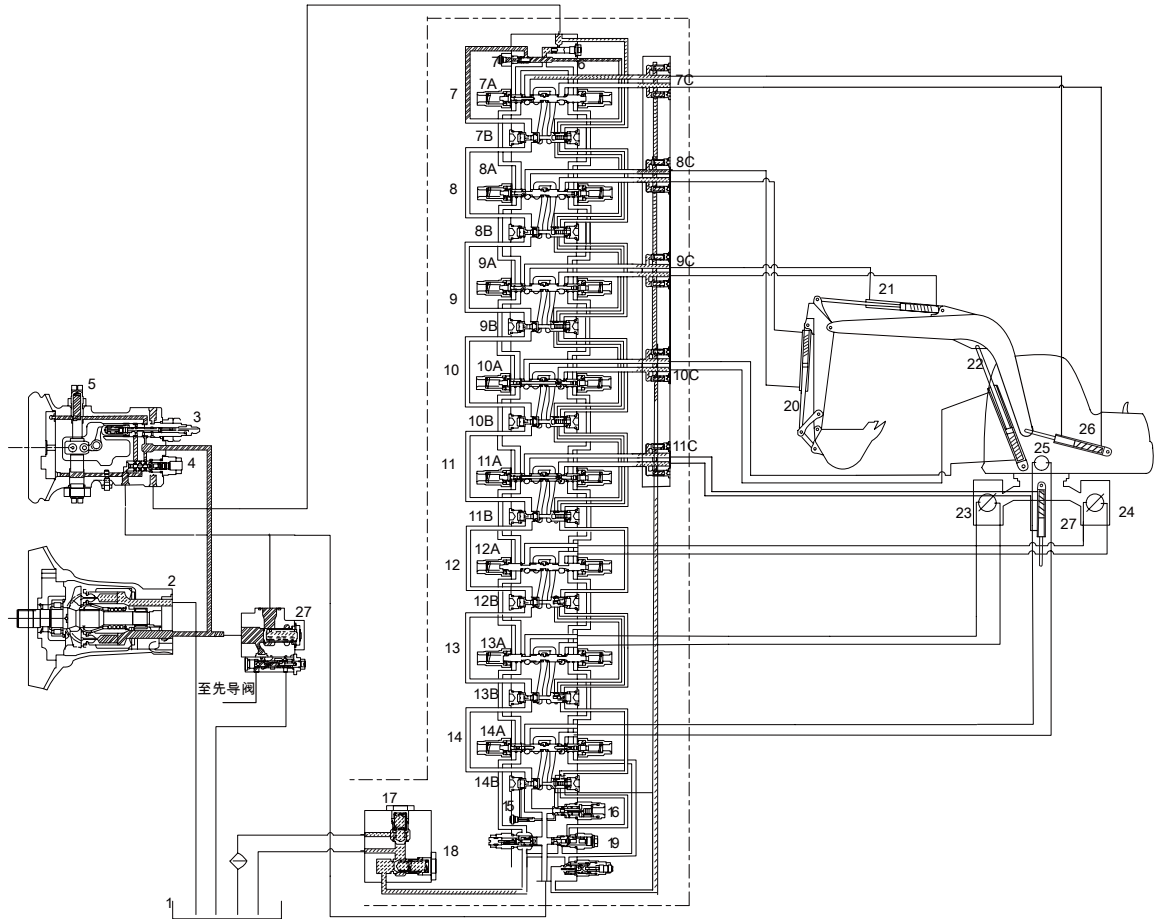


Fig4-25

Hydraulic pump	8B. Pressure-compensated valve	11. Bulldozing valve	16. Main overflow valve
1. Hydraulic oil tank	8C. One-way valve	11A. slide valve	17. Cooler bypass valve
2. Main pump	9. Bucket arm valve	11B. Pressure-compensated valve	18. Lifting one-way valve
3. Power regulating valve	9A. slide valve	11C. One-way valve	19. Central safety valve
4. Flow control valve	8B. Pressure-compensated valve	12. Right travelling valve	Actuator
5. Servo plunger	8C. One-way valve	12A. slide valve	20. Bucket cylinder
Control Valve	9. Bucket arm valve	12B. Pressure-compensated valve	21. Bucket rod cylinder
6. LS flushing valve	9A. slide valve	13. Left travelling valve	22. Boom cylinder
7. Deflection valve of boom	9B. Pressure-compensated valve	13A. slide valve	23. Left traveling motor
7A. slide valve	9C. One-way valve	13B. Pressure-compensated valve	24. Right traveling motor

Work Process

When the back slewing begins

- When the joystick is operated for leftward slewing, the pressure oil from the pump will be provided to the oil port B through the control valve. When the pressure at the oil port B rises, it will produce the starting torque in the motor, so that the motor will start rotating. The oil from outlet of motor will pass control valve via oil port A and return to oil tank.

When back slewing stops

- When the joystick is returned to the neutral position, the pump will not provide pressure oil to the oil port B. The oil return way to the oil tank is closed by the control valve, and thus the oil pressure at the motor outlet (port A) increases. The brake will start acting as the rotation resistance of motor increases. The pressure at the oil port A increases to the set pressure of overflow valve B. The large braking torque will act on motor, so as to stop the motor.
- When the overflow valve B acts, the oil overflowing from overflow valve B and the oil from oil port S will flow through one-way valve CA and enter into oil port B. In this way, it can avoid cavitation at the oil port B.

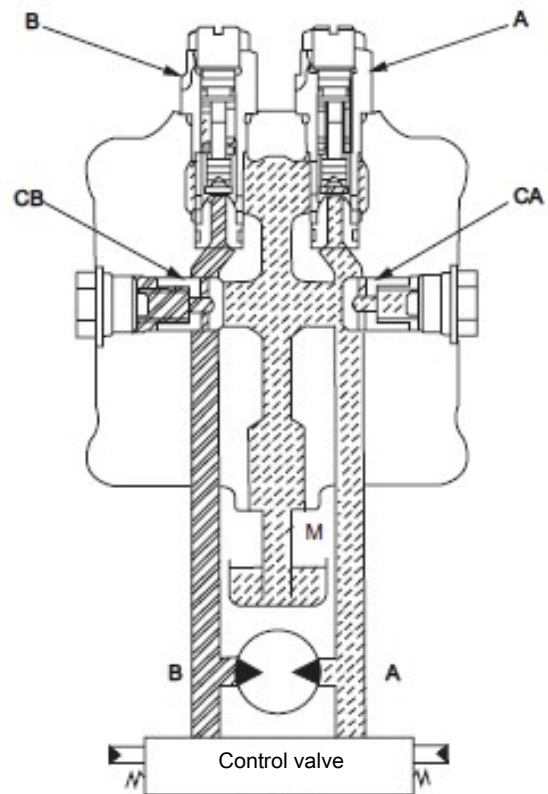
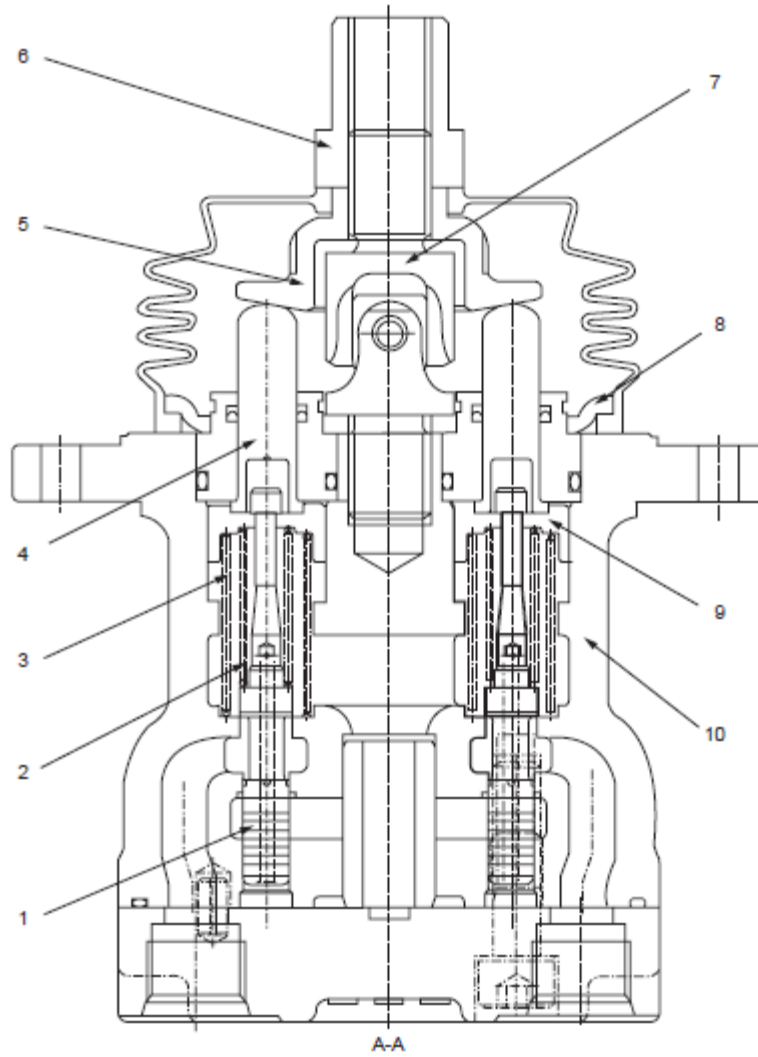


Fig4-34



ZX425-1002118

Fig4-46

- |   |                       |
|---|-----------------------|
| 1. valve rod                                | 7. connector or joint |
| 2. Adjusting spring                         | 8. Plate              |
| 3. Central spring                           | 9. Locator            |
| 4. Piston                                   | 10. valve body        |
| 5. Disc                                     |                       |
| 6. Nut (used for connection of control rod) |                       |

## SY80U

Unit: mm

No.	Inspection Item	Criteria					Remedy
			-0.060	+0.190			
2	Clearance between axis pin which connects rocker with connecting rod and bushing	50	-0.025 -0.050	+0.219 +0.180	0.205~0.2-69	1.0	
3	Clearance between axis pin which connects connecting rod with bucket and bushing	50	-0.050 -0.112	+0.219 +0.180	0.230~0.3-31	1.0	
4	Clearance between axis pin which connects bucket arm with bucket and bushing	50	-0.050 -0.112	+0.226 +0.180	0.230~0.3-38	1.0	
5	Clearance between axis pin which connects bucket arm with rocker and bushing	50	-0.025 -0.05	+0.219 +0.180	0.205~0.2-69	1.0	
6	Clearance between axis pin which connects boom with bucket arm and bushing	60	-0.030 -0.060	+0.236 +0.190	0.220~0.2-96	1.0	
7	Clearance between the pin shaft connecting offset head to platform and the bushing	100	-0.036 -0.071	+0.294 +0.240	0.276~0.3-65	1.0	
8	Clearance between the bucket and the arm	1.0~1.5					Adjusting gasket

- Connect the charging hose (green) in the middle of the manifold pressure gauge to the vacuum pump.

### 2) Vacuumization

- Open the high-pressure valve (HI) and low-pressure valve (LO) of the manifold pressure gauge;
- Turn on the vacuum pump switch and perform vacuumization (for about 15 min);
- When the negative pressure scale (i.e. vacuum level) on the pressure gauge reaches above 750 mmHg, disconnect the vacuum pump switch, and close the high-pressure valve and low-pressure valve of the manifold pressure gauge .

### 3) Airtightness inspection

- Place the closed high- and low-pressure valves of the manifold pressure gauge for more than 5 min, and confirm that the pressure reading doesn't return to zero;
- When the pointer of the pressure gauge returns near 0, it means there is leakage. Therefore, the pipe joint must be further corrected and tightened, and then vacuumization shall be performed again until there is no leakage.

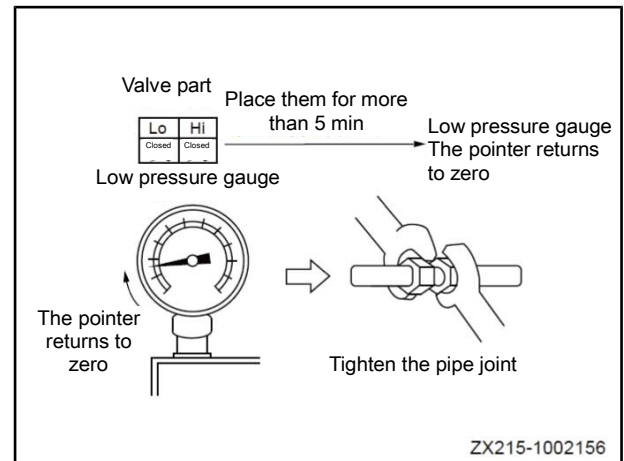


Fig4-70

### 4) Air leakage inspection

- Connect the charging hose (green) originally connected to the vacuum pump to the fluorine tank;
- Connect the charging hose (green) to the manifold pressure gauge, open the fluorine tank valve, press the bleeder valve of the pressure gauge (be careful not to press it directly by hand so as to prevent freezing injury caused by refrigerant injection), and discharge the air in the charging hose by means of the refrigerant pressure (release the bleeder valve when hearing sizzle);

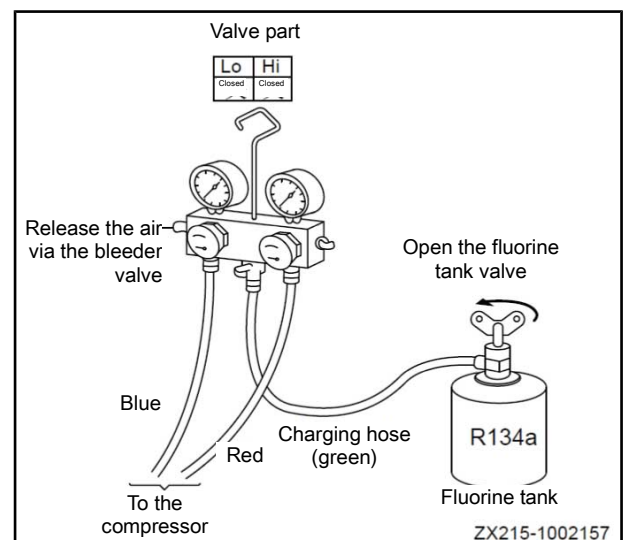


Fig4-71

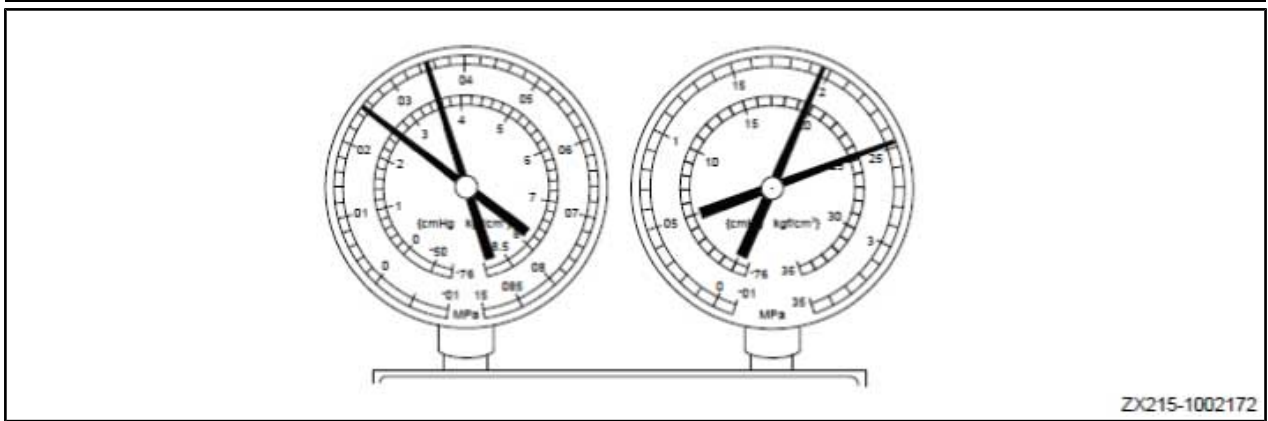


Fig4-86

Symptom of refrigeration system	Possible cause	Diagnosis	Troubleshooting method
<ul style="list-style-type: none"> <li>The pressures at the high- and low-pressure ends are excessively high.</li> <li>Bubbles are not seen through the sight glass even when the engine speed drops.</li> </ul>	<ul style="list-style-type: none"> <li>The excessive refrigerant in the system can't bring a proper refrigeration effect.</li> <li>The condenser fails to provide adequate refrigeration.</li> </ul>	<ul style="list-style-type: none"> <li>Excessive refrigerant in the system → excessive refrigerant filling.</li> <li>Inadequate refrigeration of the condenser → blockage of the condenser radiating fin or failure of the fan motor.</li> </ul>	<ul style="list-style-type: none"> <li>Clean the condenser.</li> <li>Check the fan motor operation.</li> <li>If the above two conditions are normal, check the refrigerant quantity. Add a proper amount of refrigerant.</li> </ul>

Air in the refrigeration system

Condition: Poor refrigeration

**Note:** If the refrigerant is added without vacuumization after the refrigeration system is started, the meter reading will be as follows.

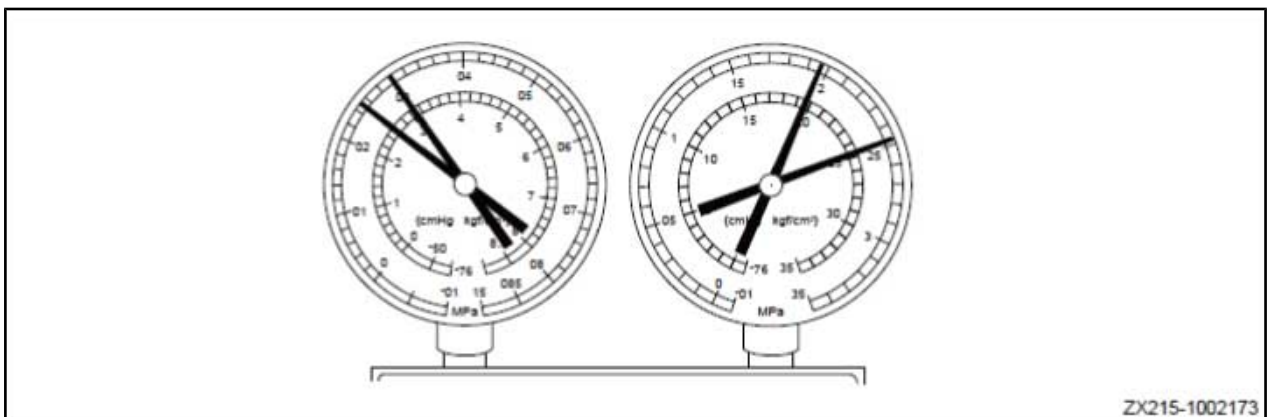
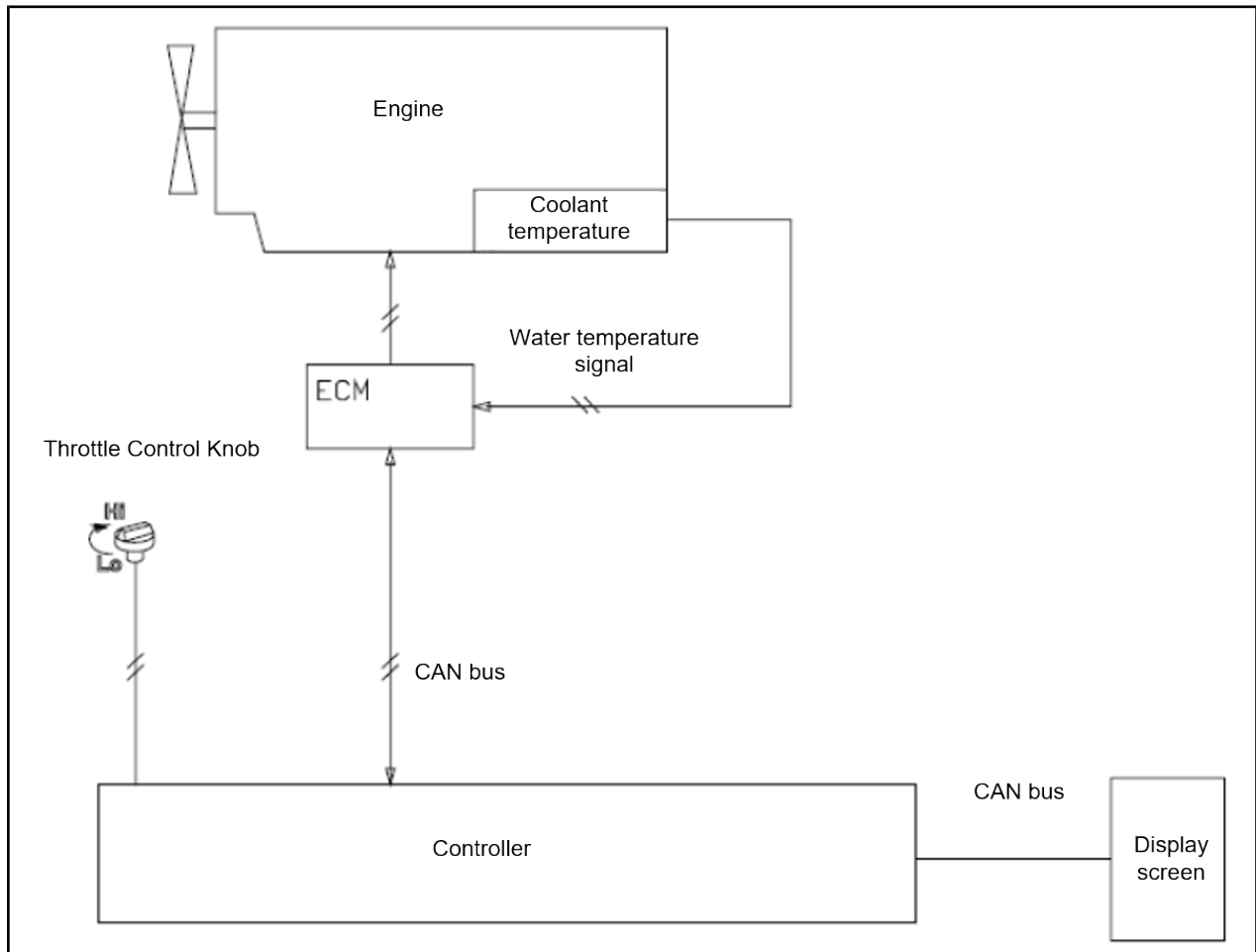


Fig4-87

- The controller collects signal from the engine oil pressure sensor. If the oil pressure is too low when the engine speed is above 600rpm, an alarm message will be generated and sent to the display screen. The alarm message will be lit up when the display screen receives the alarm message.
- While the warning is displayed, the controller will lower the engine speed to low idle speed, to protect the engine.

#### 4. 10. 1. 2 Warning and protection for too high engine water temperature



#### Functions

- The controller collects signals from the water temperature sensor. If the water temperature is too high (over 105°C), an alarm message will be generated, and sent to the display screen. The alarm message will be lit up when the display screen receives the alarm message.
- While the warning is displayed, the controller will lower the engine speed to idle speed, so as to protect the engine.

			3	EGR stepping motor “C” : Circuit trouble B
*	7F80E	1136	4	EGR stepping motor “D” : Circuit trouble A
			3	EGR stepping motor “D” : Circuit trouble B
	64	100	4	Engine oil pressure switch: Short circuit to low-voltage power supply
			1	Engine oil pressure: Too low
	A7	167	4	Battery charging switch: Short circuit to low-voltage power supply
			1	Charging warning
*	7F84A	522314	0	Engine coolant thermometer: Abnormal
*	7F853	522323	0	Air filter: Mechanical trouble
*	7F859	522329	0	Oil-water separator: Mechanical trouble
	BE	190	0	Engine speed: Overspeed condition
	27E	638	4	Engine fuel rack actuator: Short circuit to low-voltage power supply
			3	Engine fuel rack actuator: Short circuit to high-voltage power supply
			7	Engine fuel rack actuator: Mechanical trouble
			2	Engine: Failure
	27F	639	12	High-speed CAN communication: Communication trouble
	276	630	2	E-ECU Internal trouble: EEPROM inspection summary error (data setting 2)
			12	E-ECU Internal trouble: EEPROM read/write error
	274	628	12	E-ECU Internal trouble: Flash memory inspection summary error (main software)
			2	E-ECU Internal trouble: Flash memory inspection summary error (data setting 1)
			2	E-ECU Internal trouble: Flash memory inspection summary error (data setting 2)
	5CD	1485	4	E-ECU Main relay: Short circuit to low-voltage circuit
*	7F9E7	522727	12	E-ECU Internal trouble: Auxiliary CPU error A
			12	E-ECU Internal trouble: Auxiliary CPU error B
			12	E-ECU Internal trouble: Auxiliary CPU error C
*	7F9E8	522728	12	E-ECU Internal trouble: Invalid data version of engine work diagram
*	7F9EA	522730	12	Immobilizer: CAN communication error
			8	Immobilizer: Pulse communication error
	4B2	1202	2	Immobilizer: System trouble

## 5. Standard Value of Components

### 5.1 Table of standard values for engine-related parts

Items	Operating conditions for measurement	Unit	Standard value		Permissible value
engine speed	High idle speed	rpm	2250		=10/-10
	Low idle speed		1000		=10/-10
	Rated rotation		2100		-
Color of exhaust gas	During suddenly acceleration At high idle speed	Bosh	-		Maximum 4.0
Valve clearance	Intake valve &exhaust valve (normal temperature)	mm	0.3~0.5		0.8
Compression pressure	Engine oil temperature: 40~60°C (engine speed: 250 rpm) (SAE 15W - 40 engine oil)	MPa	-		34.3±0.1
Blowby pressure (Oil hole diameter: mm)	(Coolant Temperature: When the rated output is within the working range) (SAE 15W - 40 engine oil)	Pa	-		1.96
Engine oil pressure	Allowable limit of oil pressure (Alarm pressure)	kPa	49.0		49.0±9.8
	Rated output	MPa	0.39		-
	Low idle speed	MPa	0.06		-
Engine oil temperature	Full-speed range (In oil sump)	°C	120		120
Injection timing	In front of top dead center (B.T.D.C.)	°	15±0.5		-

表5 - 1 (续)

			pages 5-12: Figure 5 - 13		
		Bucket	<ul style="list-style-type: none"> <li>• Hydraulic oil temperature: Within working range</li> <li>• The engine is running at high idle speed</li> <li>• Work Mode: H mode</li> <li>• Tilt the control rod forwards and backwards and change the direction when the bucket acts slightly, and measure the average operation time</li> <li>• For detailed attitude measurement, see pages 5-12: Figure 5 - 14</li> </ul>	Maximum 1.0	Maximum 3.6

1. Use the portable smoke detector to carry out measurement

1) Mount the filter paper in portable smoke detector.

2) Insert the probe of detector into exhaust pipe, and increase the speed of engine suddenly. Meanwhile, operate the portable smoke detector, so as to emit the exhaust gas onto filter paper.

3) Take out the filter paper and compare it with the scale provided, so as to judge the situation.

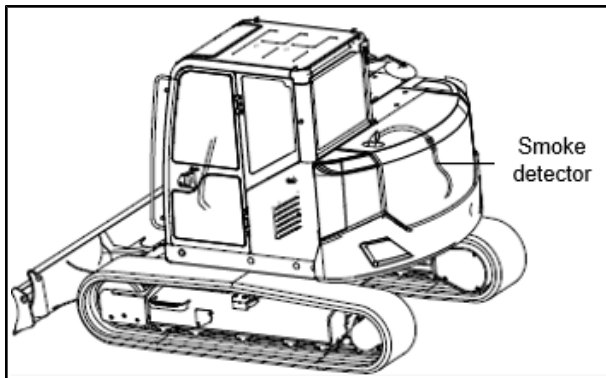


Fig6-3

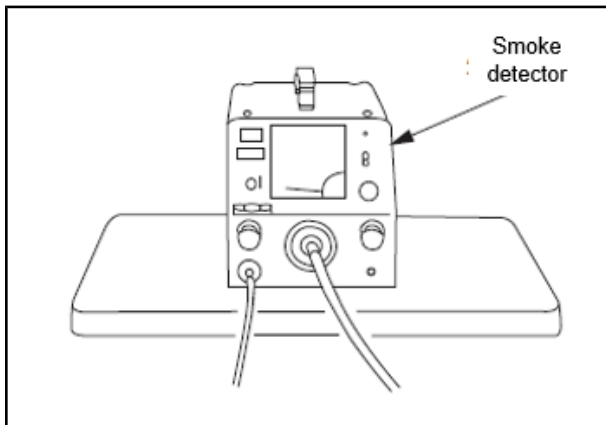


Fig6-4

2. Use the smoke detector to carry out measurement

1) Insert the probe into the outlet of exhaust pipe, and use a clamp to fix it onto exhaust pipe.

## 6. 12 Measurement of clearance of slewing support bearing

### Inspection Steps for Clearance of Back slewing Bearing Mounted on machine

1. Mount a magnet-type dial indicator onto outer race (or inner race) of back slewing bearing, and mount the probe on end face of inner race (or outer race). Install the dial indicator on the front or back end.

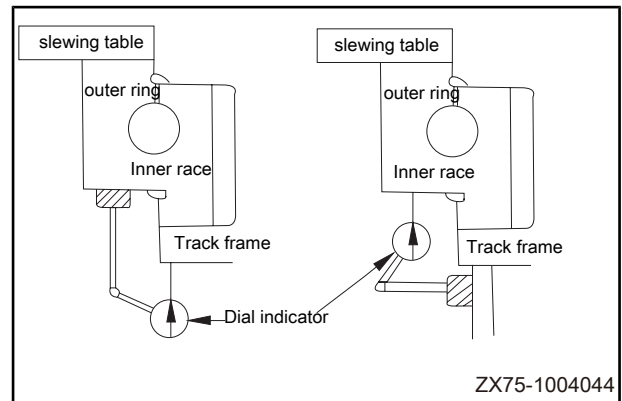


Fig6-20

2. Set the working device at the maximum working position, and make the height of the bucket tooth tip off the ground and the bottom surface of the slewing table at the same level. At this time, the front part of the upper body will tilt downwards, and the rear part will be raised.

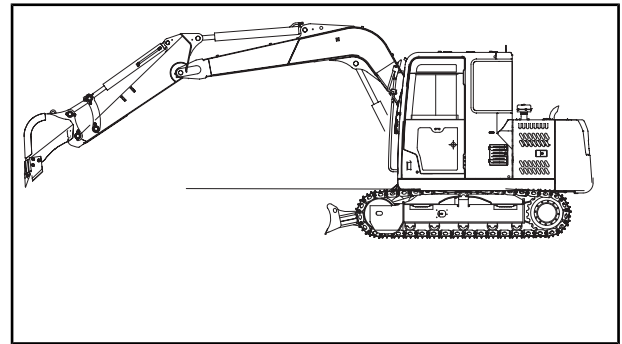


Fig6-21

3. Set the dial indicator at zero.

4. Keep the arm almost perpendicular to the ground, and lower the boom until the front of the machine is off the ground. At this time, the upper body will tilt backwards, so the front is raised and the rear is lowered.

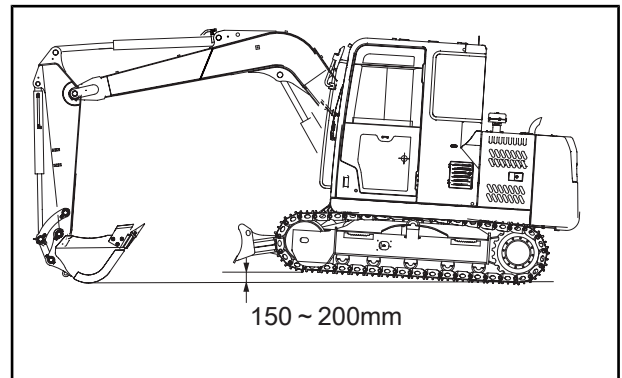


Fig6-22

5. At this position, read the reading of dial indicator. This value is the clearance of the slewing bearing. When carrying out measurement, don't place your hand or foot under the chassis.

6. Restore to the state in Step 2, and inspect whether the indicating needle of dial indicator returns to zero position. If it does not return to zero, repeat steps 2-5.

operated in accordance with the above-mentioned procedure, the oil way of small chamber will be opened to the oil discharge way (the large chamber will be closed via the one-way valve), the oil in small chamber will flow into oil discharge way, and the downward movement will speed up.

### 3. Inspection of PPC valve


When the accumulator is pressurized and the safety locking rod is at the “locking” and “unlocking” position, respectively measure the hydraulic settlement of working device.

★ When the engine start switch is at the position “ON”, operate the control rod.

★ If the pressure in accumulator reduces, please make the engine run for about 10 seconds, and then pressurize the accumulator again.

★ If the hydraulic settlement of working device is different when the safety locking rod is at “locking” and “unlocking” position, it means that the pilot valve is in trouble (internal trouble).

## 6. 20 Release of residual pressure in hydraulic oil way

 Before disconnecting the pipeline between hydraulic cylinders or between hydraulic motor and control valve, please release the residual pressure in accordance with the following method.

★ Even if there is no residual pressure in slewing motor oil way and travelling motor oil way, they will also be affected by the internal pressure of hydraulic oil tank. Therefore, it is necessary to open the breather valve to release the pressure before operation.

1. Stop the engine, screw off the disc-shaped nut of breather valve, and press down the air release button so as to release the pressure in oil tank.

2. Turn the engine start switch to the position “ON” and operate the control rod for several times.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

lowering speed during the above operation is described below:

1) If the work equipment is positioned as the above (load being applied to the large chamber), the oil escapes from the large chamber to the small chamber, and the inside pressure of the small chamber increases.

2) As the pressure in the small chamber increases, the inside pressure of the large chamber needs to rise to achieve equilibrium. The cycle repeats until a balance is reached at a certain pressure (according to the leakage amount).

3) As an equilibrium is achieved, the lowering speed becomes slow. If the above operation is performed, the small chamber opens to the bypass (the large chamber is closed by the check valve), the oil in the small chamber flows to the bypass, and the lowering accelerates.

### 3. Check the pilot valve.

When the accumulator is pressurized, measure the drift of the work equipment cylinder with the safety lock control lever in the locked position and the unlocked position respectively.

- Operate the control levers with engine start switch in the ON position.

- If the pressure in accumulator drops, charge the accumulator again by running the engine for about 10 seconds

- If there is a difference in hydraulic drift between the LOCK position and the FREE position, it is the failure (internal fault) of the pilot valve.

# SANY

## Trouble Diagnosis and Troubleshooting

7 Trouble Diagnosis and Troubleshooting .....	7-1
7.1 Trouble diagnosis and troubleshooting.....	7-5
7.2 Inspection before fault diagnosis.....	7-7
7.3 Category and steps of trouble diagnosis.....	7-8
7.3.1 Category of trouble diagnosis .....	7-8
7.3.2 Steps for trouble diagnosis .....	7-8
7.4 Trouble – Identity the symptoms and trouble diagnosis code.....	7-9
7.5 Position Diagram of Connectors and Wiring Diagram of System.....	7-11
7.5.1 Position Diagram of Connectors and Wiring Diagram of System.....	7-12
7.5.2 Connector Position Diagram.....	7-15
7.5.3 Wiring diagram of electrical control system (vehicle body) .....	7-19
7.5.4 Wiring diagram of electrical control system (control cabinet) .....	7-22
7.5.5 Wiring diagram of electrical control system (cab) .....	7-24
7.6 Trouble Diagnosis for Electrical System (Mode E) .....	7-27
7.6.1 Information contained in table of trouble diagnosis .....	7-27
7.6.2 E-1 The engine could not be started .....	7-28
7.6.3 E-2 No Power-off Delay Available for Engine .....	7-32
7.6.4 E-3 The automatic idling does not work .....	7-34
7.6.5 E-4 All devices could not work .....	7-36
7.6.6 E-7 The boom lifting is slow and power less .....	7-37
7.6.7 E-6 The dual running speed function does not work .....	7-38
7.6.8 E-7 The wiper does not work .....	7-39
7.7 Trouble diagnosis for hydraulic and mechanical systems (mode H) .....	7-40
7.7.1 All working attachments, back slewing and travelling are slow or power less.....	7-40
7.7.2 The engine speed reduces sharply or the engine stalls .....	7-41
7.7.3 All working attachments, travelling and back slewing don' t move .....	7-41

S/N	Trouble - Identify the symptoms	Trouble Diagnosis			
		Code display	Category of electrical trouble	Category of hydraulic trouble	(Engine)
28	The lifting of boom is slow and powerless			H-6	
29	The action of bucket arm is slow and powerless			H-7	
30	The action of bucket is slow and powerless			H-8	
<b>Troubles relating to travelling</b>					
31	The travelling is slow and powerless			H-15	
32	The dual running speed function does not work		E-6		
33	The excavator deviates when running			H-14	
34	It is not easy for the excavator to make a turn or the power is insufficient			H-16	
35	The running speed could not be changed			H-17	
36	The excavator could not run (only on one side)			H-18	
<b>Troubles relating to slewing</b>					
37	The excavator could not slew			H-19	
38	The slewing acceleration performance is poor, or the slewing speed is low			H-20	
39	The overrunning is too big when the slewing stops.			H-21	
40	The impact is too big when the slewing stops			H-22	
41	The abnormal noise is too high when the slewing stops			H-23	
42	The natural drifting of slewing is too large			H-24	
<b>Troubles relating to display screen</b>					
43	The display screen goes black		E-5		
<b>And Others</b>					
44	The preheating function does not work				
45	The wiper does not work		E-7		

## 7. 5 Position Diagram of Connectors and Wiring Diagram of System

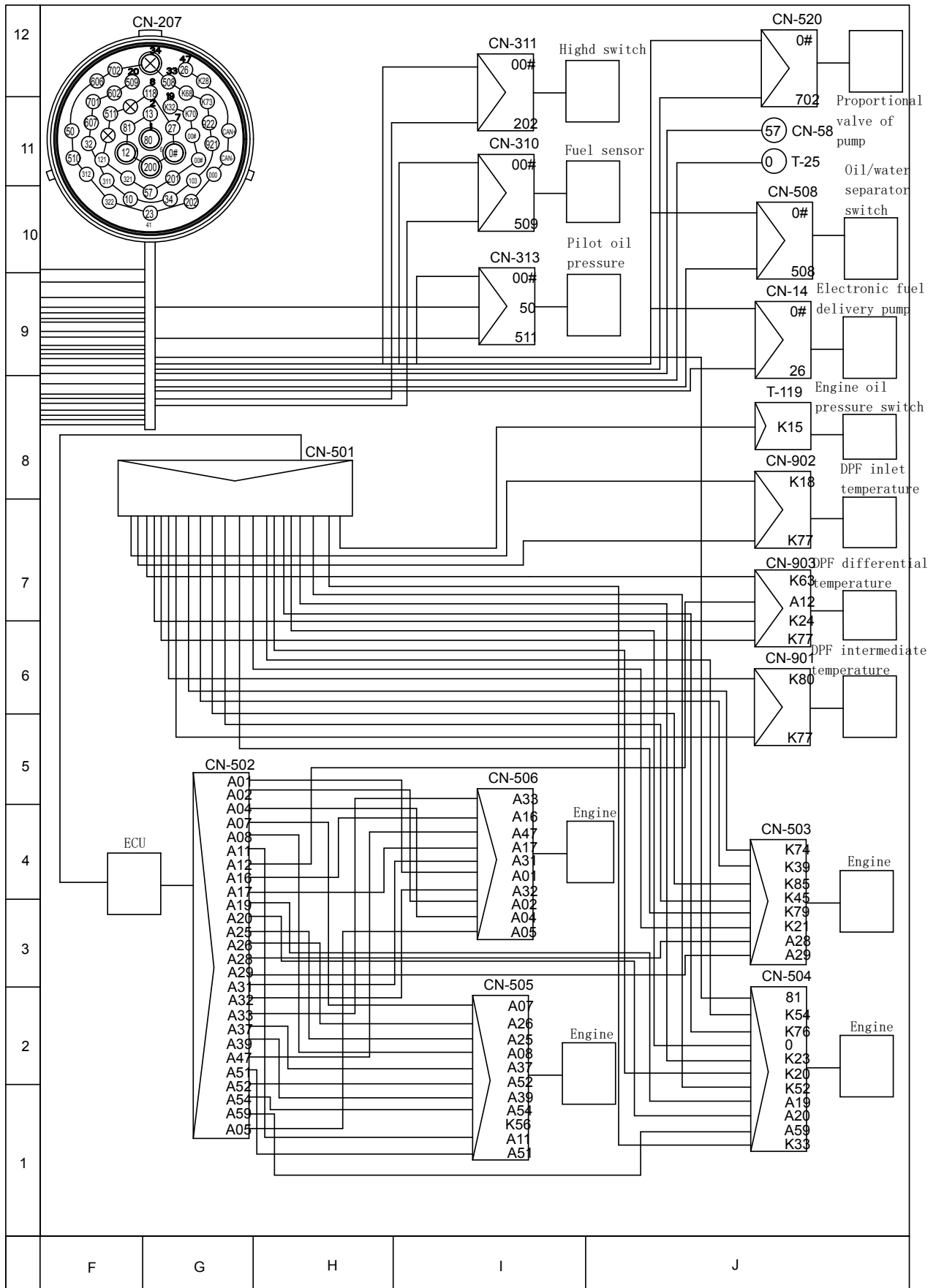


Fig7-6

表7-1 (续)

熄火	Flameout	delphi GT280 系列15326917	delphi GT280- series 15326917	喇叭开关	Horn switch
上电	Power-on	2#连接器	2# connector	油水分离报警	Oil-water separation alarm
启动	Start	8pin-DI	8pin-DI	空调风机	A/C fan
油温传感器	Oil temperature sensor	delphi GT280 系列 15326660	delphi GT280- series 15326660	硅油风扇	Silicone oil fan
动臂提升压力	Boom lifting pressure	3#连接器	3# connector	点烟器	cigar lighter
行走报警	Traveling alarm	10pin-DI+CAN	10pin-DI+CAN	燃油泵	Fuel oil pump
改高低速（需 保持）	To high/low- speed (to be maintained)	delphi GT280 系列 15326660	delphi GT280- series 15326660	按钮电源	Button power supply
空滤阻塞	Air filter blocking	4#连接器	4# connector	雨刮复位	Resetting of wiper
钥匙开关上电 信号	Power-on signal of key switch	16pin保险	16pin fuse	EGR电源	EGR power supply
启动钥匙开关	Starting key switch	delphi GT280 系列 16pin	delphi GT280- series 16pin	灯光报警	Visual alarm
EPAD电源	EPAD power supply	15326666	15326666	断电延时	Power-off delay
收音机	Radio	5#连接器	5# connector	M-1洗涤电机	M-1 washer motor
厢灯	Compartment lamp	8pin-DI	8pin-DI	雨刮控制器及 电机	Wiper controller and motor
空调面板	A/C panel	delphi GT280 系列 15326660	delphi GT280- series 15326660		
报警蜂鸣	Alarm buzzer	6#连接器	6# connector		
喇叭	Horn	12pin-DO	12pin-DO		

### 7.7.2 The engine speed reduces sharply or the engine stalls

- Confirm that the main overflow pressure is normal.

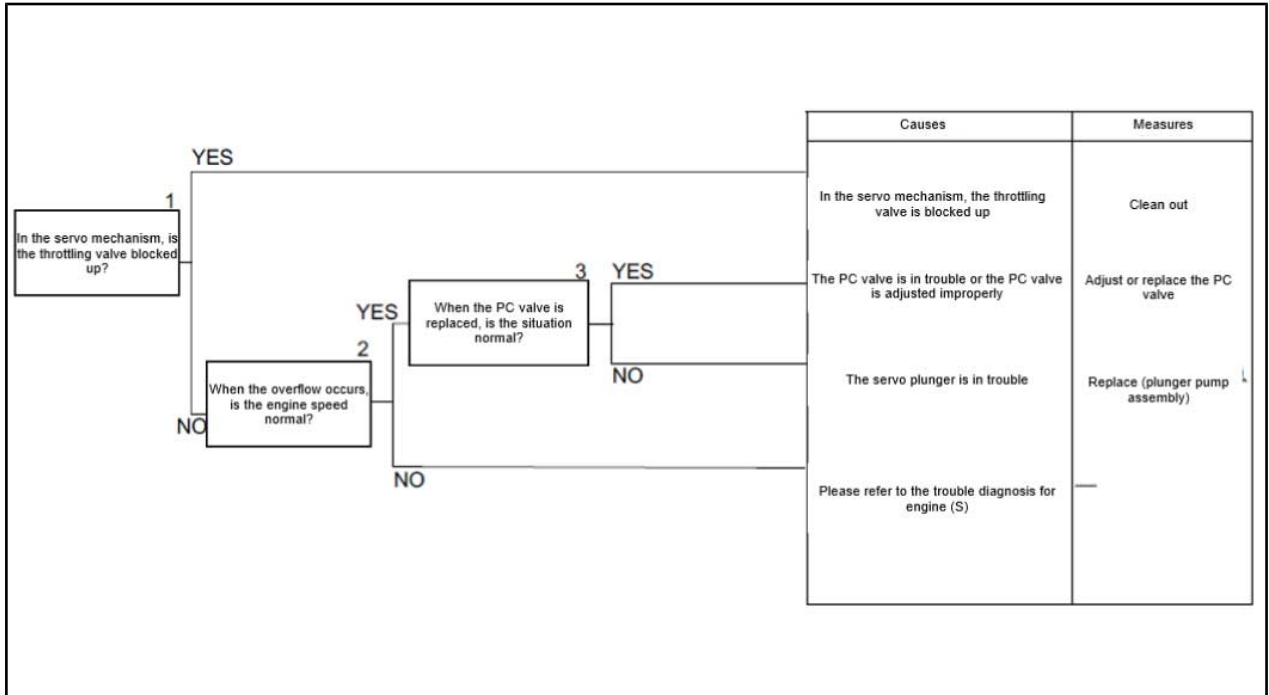


Fig7-13

### 7.7.3 All working attachments, travelling and back slewing don't move

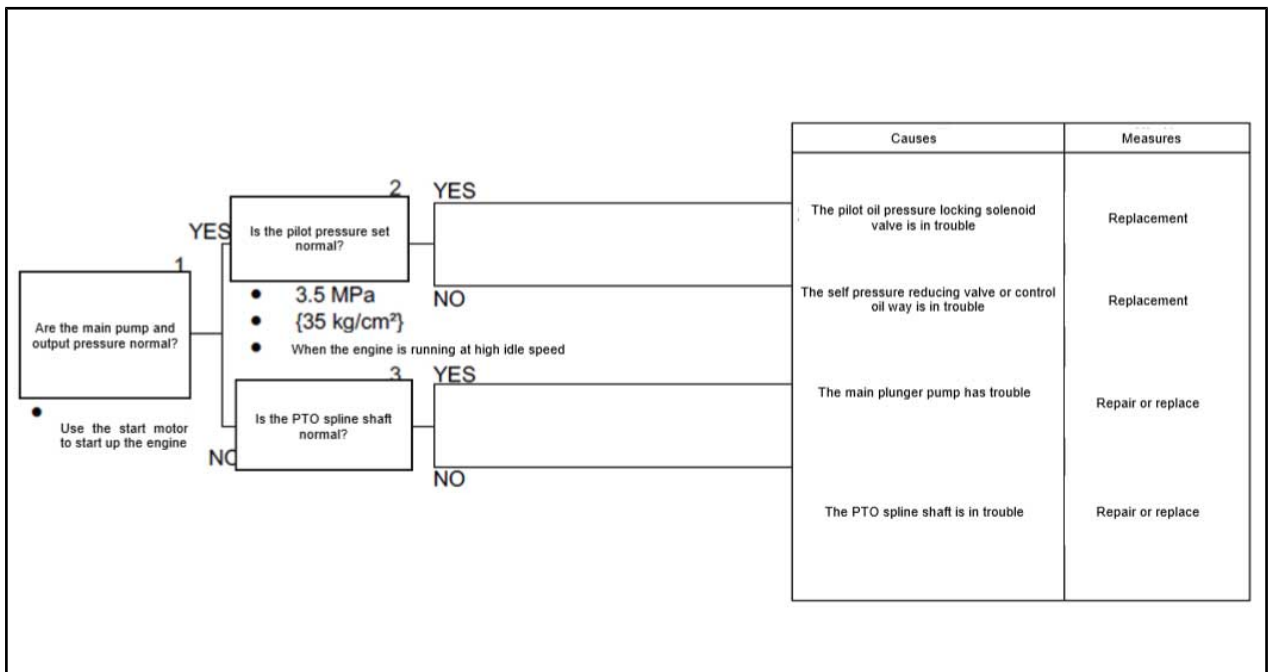


Fig7-14

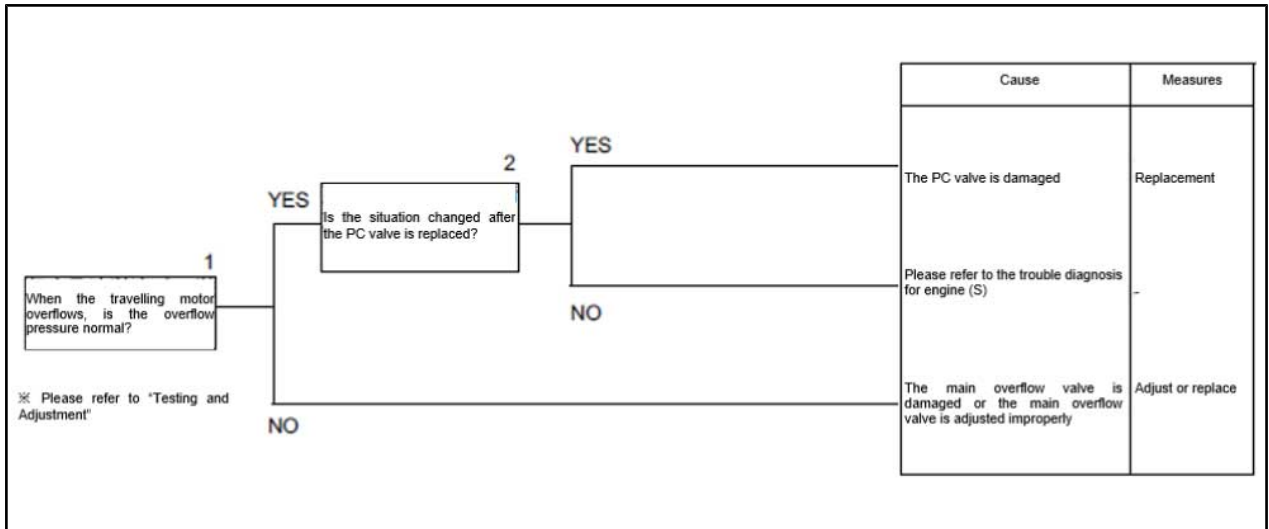


Fig7-28

### 7. 7. 17 The steering operation is difficult

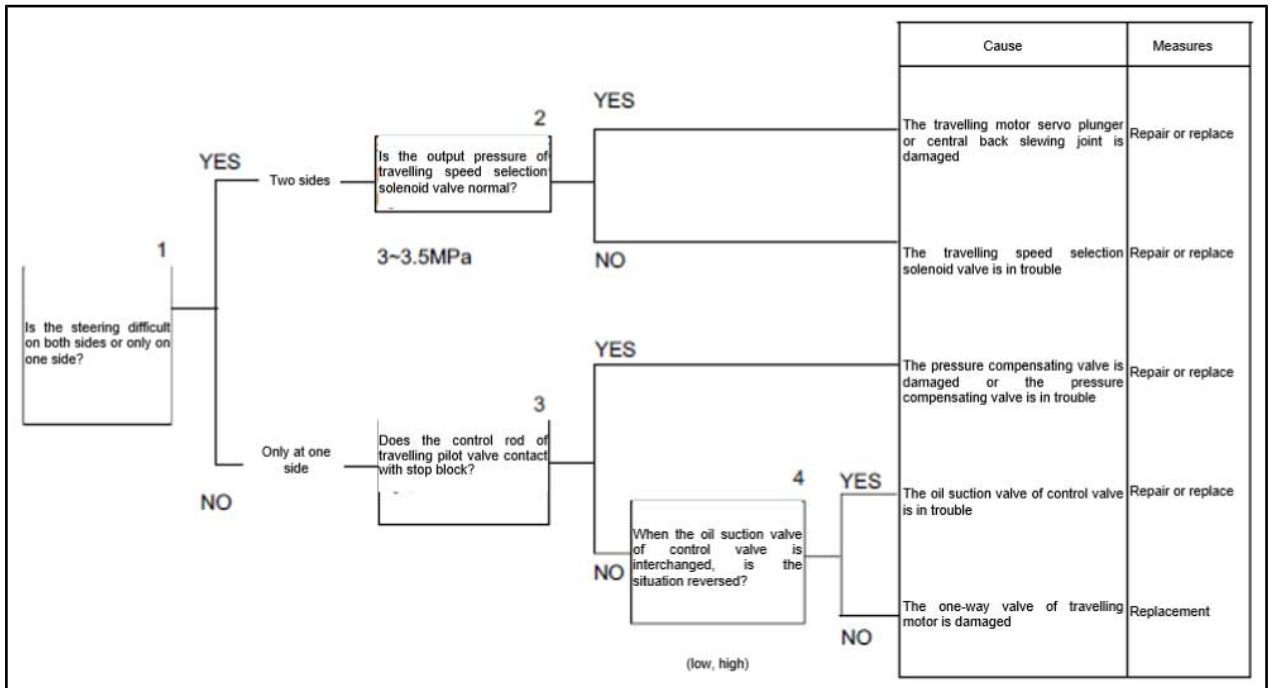


Fig7-29

BLANK PAGE

16. Remove the pipe clamp (27).

17. Remove the wires (28).

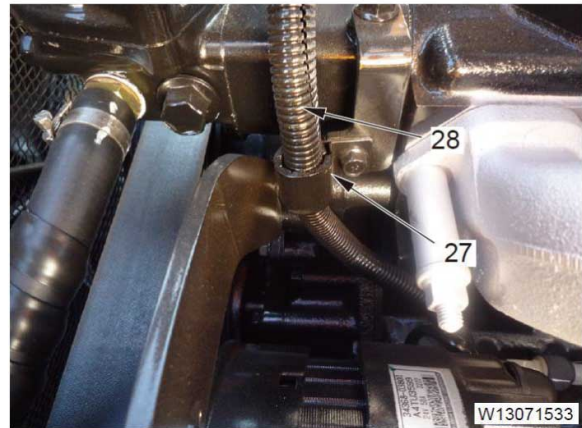


Fig8-16

18. Remove the oil pipe (29).

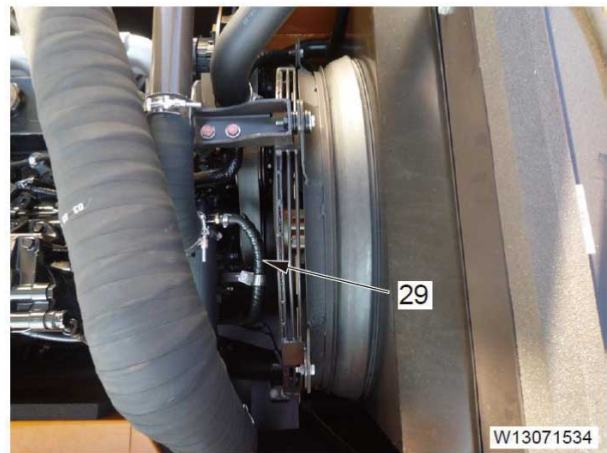



Fig8-17


19. Remove the HVAC water pipe (30).



Fig8-18

4) Set the adjusting shim on the body, insert the locating pin, fit the planetary carrier to the locating pin, and fix it using the screw (21). The threads of the screw shall be applied with thread locking adhesive.

 Thread locking adhesive (LOCTITE 1277)

 Screw (21):  $539 \pm 28 \text{ N} \cdot \text{m}$   $\{55 \pm 2.9 \text{ kgf} \cdot \text{m}\}$

Use a push-pull scale to measure the tangential force of the hub against the motor case in the direction of rotation.

- Tangential force: Max. 294N {30kg}
- The tangential force is the largest at the start of the rotation.


3. Reassemble the No.2 planetary carrier assembly.

1) Reassemble the No.2 planetary carrier assembly as follows.

Replace the plate (20) and (16) with new ones.

2) Install the bearings (18 and 19) to the gear (17), install the top plate (16) and bottom plate (20), and set the gear assembly on the carrier (22).

3) Fix them with the screw (15).

 Screw (15):  $539 \pm 28 \text{ N} \cdot \text{m}$   $\{55 \pm 2.9 \text{ kgf} \cdot \text{m}\}$

Note: After reassembling the planetary carrier assembly, check if the gear (17) is able to rotate freely.

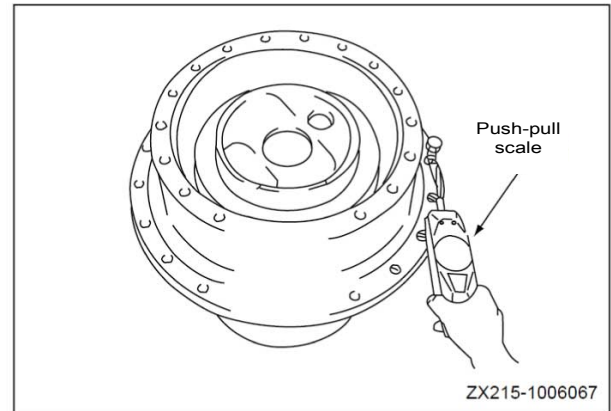


Fig8-40

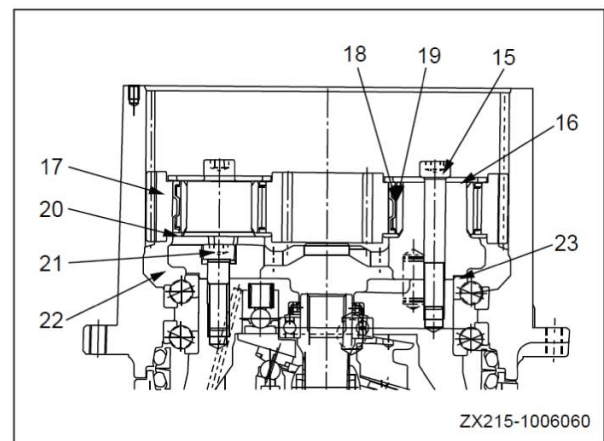


Fig8-41

2) Disassemble the shaft assembly as follows.

Remove the bearing (23) from the shaft (24).

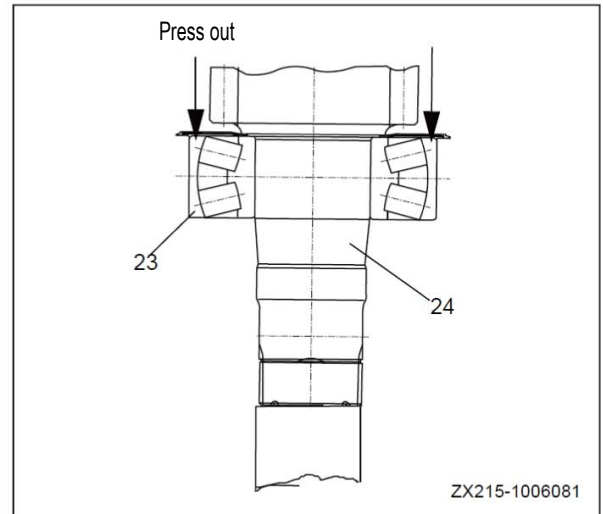


Fig8-62

#### 10. Bearing

Withdraw the bearing (25) and oil seal (26) from the housing (27).

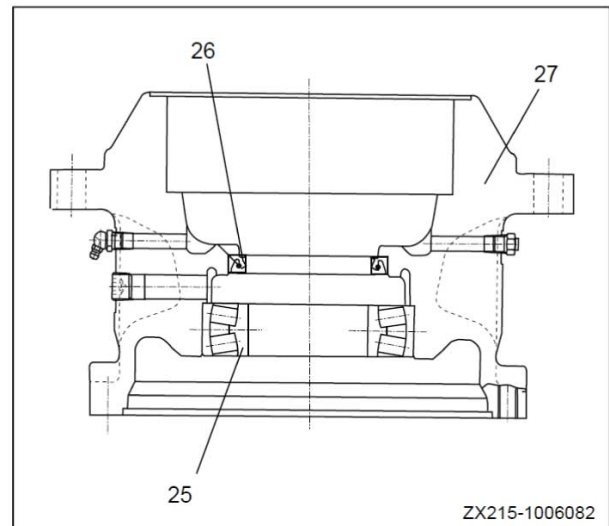


Fig8-63

- ★ Fill the oil to the specified level via oil filling port. Run the engine to circulate oil in the system. Then inspect the oil level again
- Bleed off the air
  - ★ Bleed off the air in the oil way. For relevant details, please refer to the contents about bleeding of air from various devices in the Section “Testing and Adjustment” .

## 8. 14 Disassembling and assembling of slewing motor and slewing mechanism assembly

### Disassembling

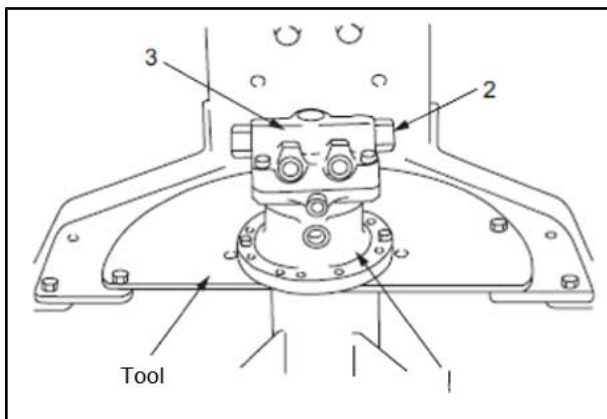


Fig8-84

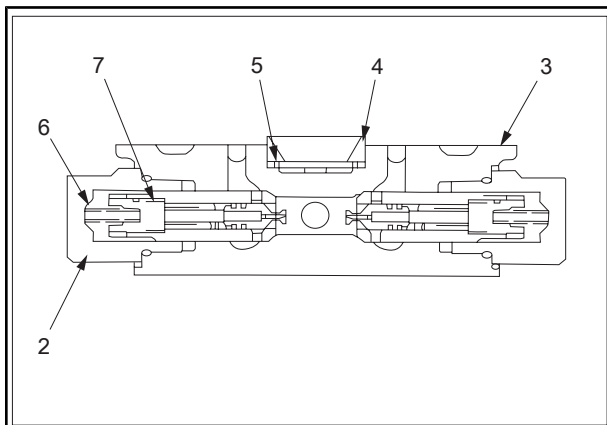


Fig8-85

SG025E-136 with brake

#### 1. Back slewing motor assembly

Place the slewing motor assembly (1) on the tool P1.

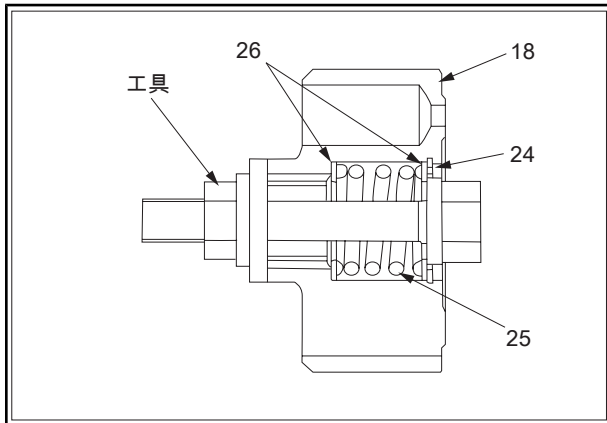


Fig8-104

### 3. Cylinder block and plunger assembly

#### 1) Assembly of cylinder block

- i) Install the space ring (26), spring (25) and space ring (26) into the cylinder block (18).
- ii) Place the tool on the cylinder block (18).
- iii) Fix the bolts of the tool with a wrench etc., install the nuts to compress the spring (25), and install the snap ring.
- ★ Check that the snap ring is firmly seated in the groove.
- iv) Remove the tool.

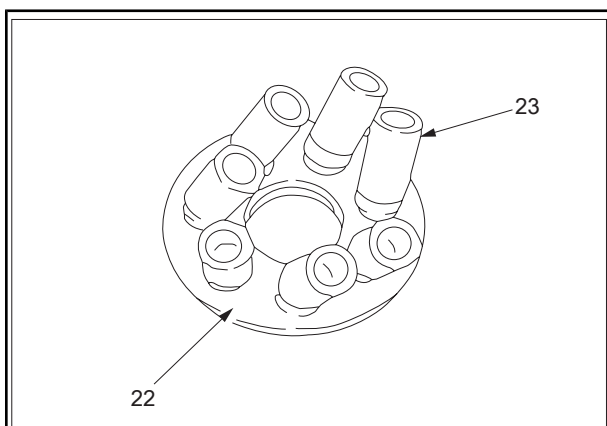


Fig8-105

#### 2) Assembling of Plunger Assembly

- Install the plunger (23) onto the pressure plate (22).

- 4) 用4-5 kg 的力把配流盘按压在缸体上并转动90°，然后将它转回原位。重复2-3次这种操作。
- 5) 取下配流盘，把接触表面复制到记录纸上并进行检查。

★ 标准接触面积如下：

密封部分a  
配流80%  
缸体80%

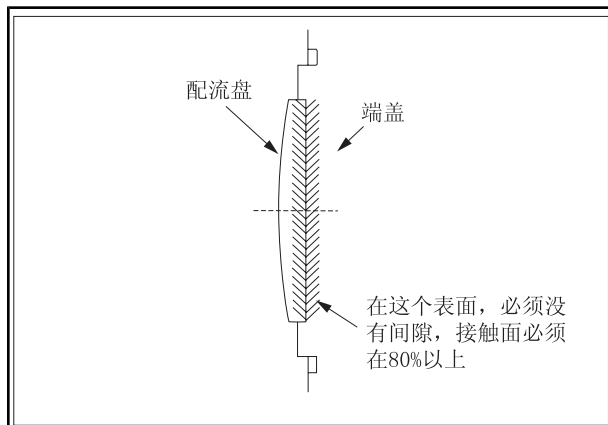


Fig8-122

## 2. 配流盘和端盖

- 1) 除去将被检查零件上的所有油和润滑脂。

★ 不要用布擦。

- 2) 在端盖上涂检查漆，然后把配流盘放在上面。

★ 薄薄地涂一层漆。

- 3) 用4-5 kg 的力把配流盘按在端盖上，将配流盘转动90°，然后将它转回原位。重复2-3次这种操作。

- 4) 取下配流盘，把接触表面复制到记录纸上并检查接触表面。

★ 配流盘与端盖配合表面的接触在没有任何变化的情况下必须能达到至少80%。

★ 如果接触面不良，要利用一个平台，通过研磨进行修正

3. Mount the floating seal (6) onto the assembly of guide wheel (4), shaft (5) and support (7).

★ Floating Seal

Before installing the floating seal, please fully clear away the grease on contact surface of O-ring and floating seal (dashed area in figure). Besides, be careful to prevent the dust adhering on the contact surface of floating seal

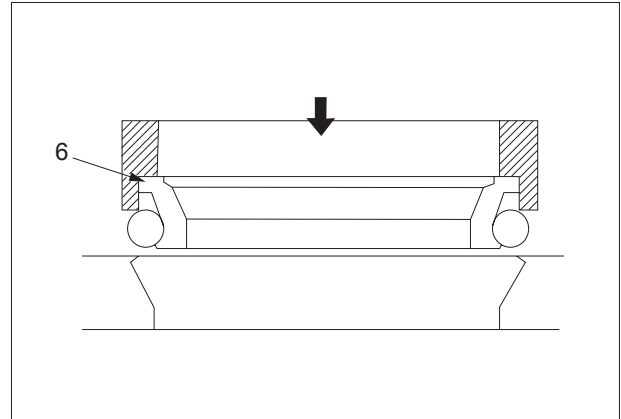


Fig8-139

★ After installing the floating seal, make sure that the inclination of seal is less than 1 mm, and the protrusion of seal is 5-7 mm.

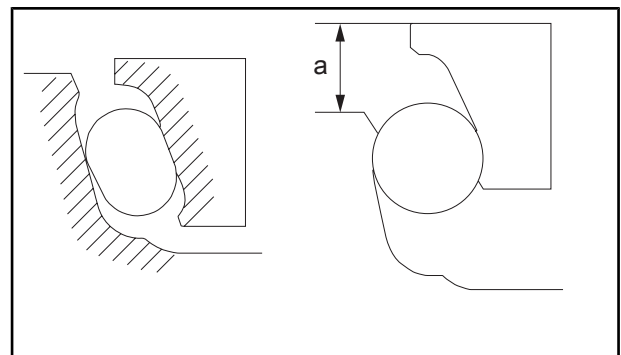


Fig8-140

4. Mount the shaft (5) & support (7) assembly onto guide wheel (4).

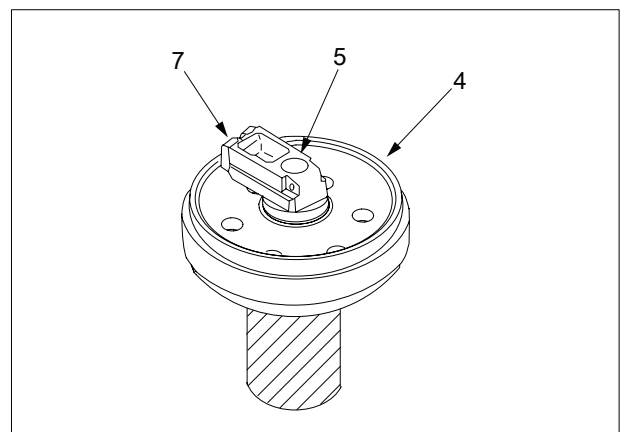


Fig8-141


## 8. 31 Installation of Supporting Sprocket Wheel Assembly

- Please carry out installation in accordance with the reversed dismantlement sequence.

⊠1

★ Adjust the tensile force of crawler.

For details, please refer to the inspection and adjustment section for testing and adjusting the track tension in “Testing and Adjustment” .

⊠2  Thread of supporting sprocket wheel assembly fixing bolt: Thread fastening agent (1277)

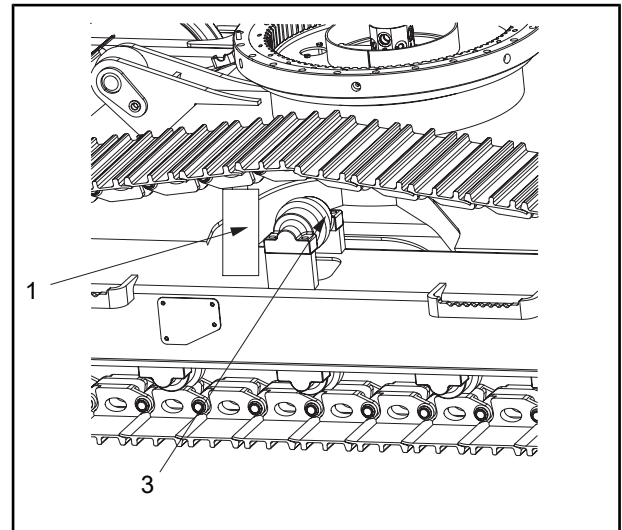


Fig8-163

## 8. 32 Dismantlement of Sprocket Wheel

1. Dismantle the crawler plate assembly.

For details, please refer to “Dismantlement of Crawler Plate Assembly” .

2. Slew the working attachment for 90°, use the working attachment to lift up this machine, and then place the cushion block ① between crawler bracket and crawler plate.

3. Dismantle the fixing bolt and gently pull out the sprocket wheel (1).

⊠1

4. Mount the eye bolt and nut into bolt hole, and lift away the sprocket wheel (1).

 Sprocket wheel: 13kg

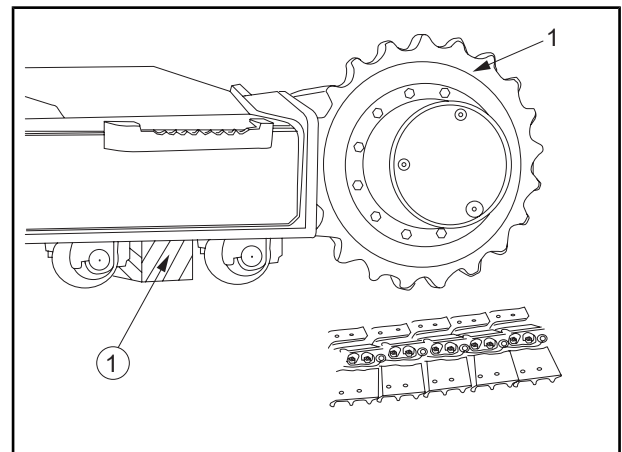



Fig8-164

## 8. 37 Removal and installation of hydraulic tank assembly

### Removal

1. Drain oil from the hydraulic tank.



 Hydraulic oil: about 230L

2. Open the engine hood.
3. Remove the engine hood (1), cover plate (2), and control valve cover (3).
4. Remove the cover frame (4) and engine partition (5).

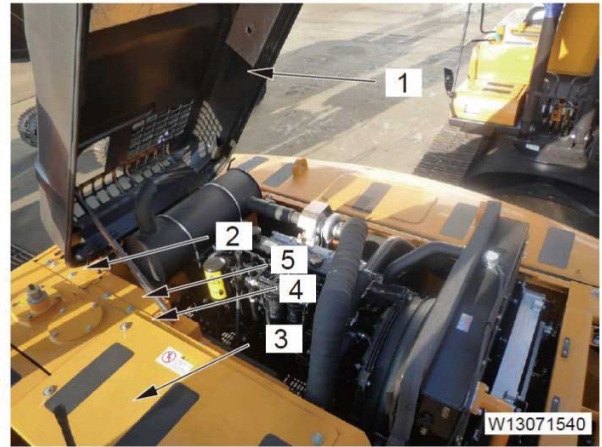


Fig8-180

5. Remove the mounting bolts (7 and 8) of the drain filter and pilot filter on the side of the engine partition (6) and hydraulic tank.

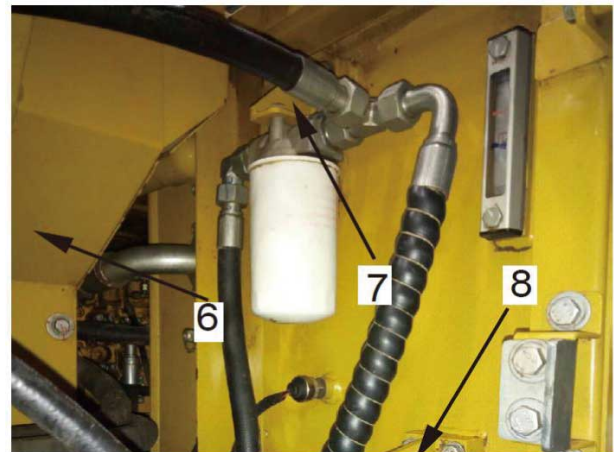


Fig8-181

6. Remove the 2 return pipes (9 and 10) from the hydraulic tank.

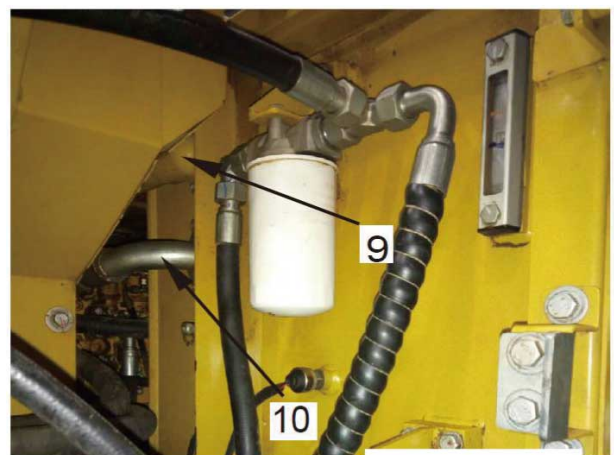


Fig8-182

※1

12. Remove the main-pump pressure sensor harnesses (14 and 15).

13. Remove the 4 fixing bolts of hydraulic pump, and lift the hydraulic pump assembly for removal.

※2



Hydraulic pump assembly: 120 kg

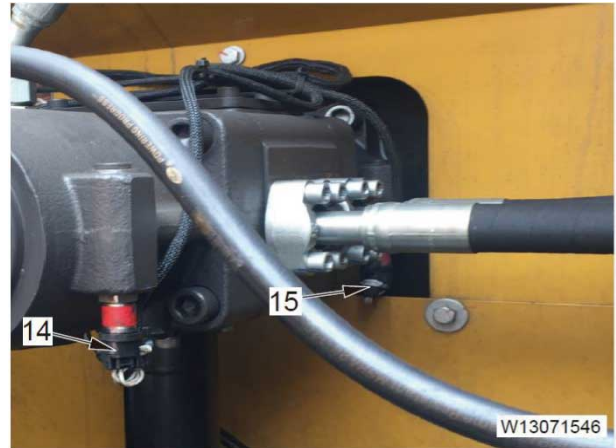


Fig8-207

**Installation**

● Perform the installation in reverse order of the removal.

※1

After tightening the hose clamping screw, check that the screw is located as shown in the figure.



Clamping screw of the suction hose:

8.8±0.5 Nm {0.9±0.05 kgm}

Install the hose clamp and tighten the clamping screw as shown in the right figure.

※2



Mating face of hydraulic pump housing:

Gasket sealant (LOCTIT 515)

● Refilling with oil (hydraulic tank)

Add oil through the oil filler cap to the specified level. Start the engine to circulate the oil in the system. Check the oil level again.



Hydraulic tank: about 230 L

● Air bleeding

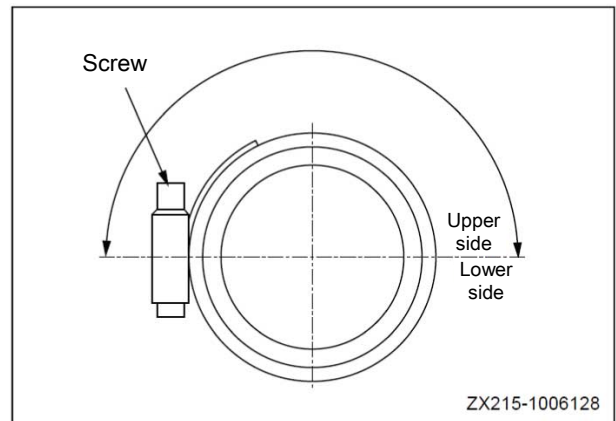


Fig8-208

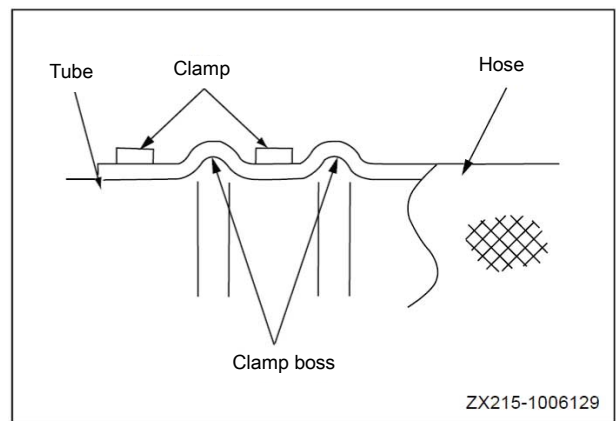


Fig8-209

2) Use the press equipment to press the dust ring (18) in place.

3) Successively install the guard ring and U-ring (17) to the U-ring groove (strictly following the operation order).

First check that the U-ring (17) is free of damage, and then install the U-ring as per the correct direction.

Installation in reverse direction would lead to oil leak.

After installation, check the U-ring (17) for wrinkle, permanent deformation, etc.

4) Install the buffer ring (16).

Note that the installation direction of the seal ring shall be correct. If the ring is installed in the reverse direction, the extremely high pressure formed between the ring and the U-ring would lead to cylinder deformation or damage.

5) To prevent the fall-off of the bushing (19), be sure to install the circlip (20).

### 3. Reassembly of the piston assembly

1) Install the seal ring (14).

Install the O-ring and guard ring (13) to the piston, place the piston on the press equipment, and install the seal ring (14) as shown in the right figure.

2) Correct the seal ring (14) installed.

After installing the seal ring (14) and the guard ring (13) on the other side, be sure to correct the installed seal ring (14) immediately. Since the seal ring (14) is expanded during installation, the piston rod would not be inserted into the cylinder tube successfully if the seal were not corrected properly.

3) Install the slide ring (12).

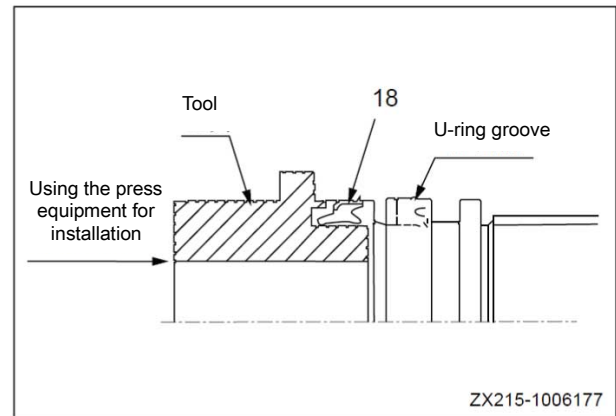


Fig8-228

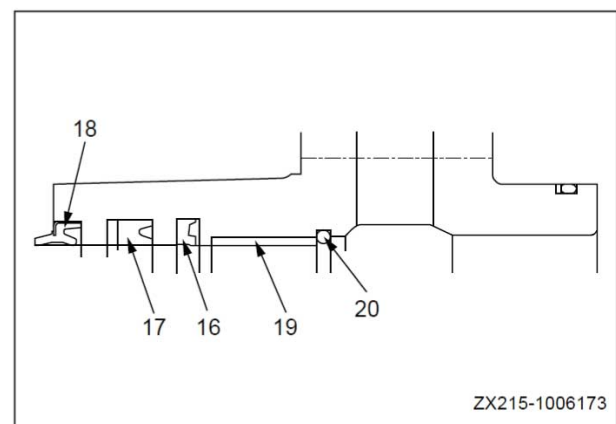


Fig8-229

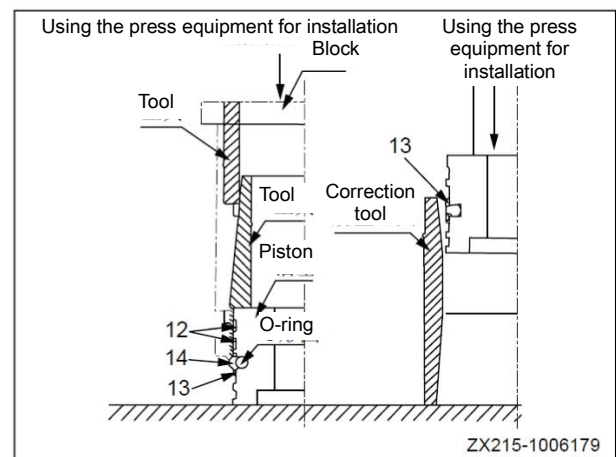


Fig8-230

17. Remove the HVAC unit (23). When removing the HVAC unit, remember to connect the 2 HVAC hoses at the bottom.

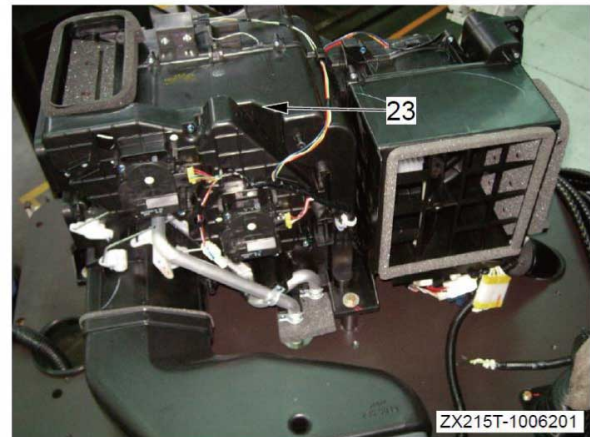


Fig8-251


## Installation

Perform the installation in reverse order of the removal.


- When installing the HVAC hoses, be careful not to allow dirt, dust and water to enter the hoses.
- Check if the O-ring is installed in place before connecting each HVAC hose.
- Check O-rings for damage or deformation.



- Apply compressor oil (ND8#) to the threads of refrigeration pipe fittings, and tighten the pipe using a double ended wrench.

 Hose clamping screw:

8. 83 ~ 14. 7 N·m {0.9~1.5 kgf·m}

 Pressure plate bolts:

13.5±1.2 N·m {1.38±0.12kgf·m}

- Charging with refrigerant

Use the equipment S to charge the HVAC circuit with refrigerant (HFC-134a).

3) Thread a piece of piano wire (or steel wire) through the hole.

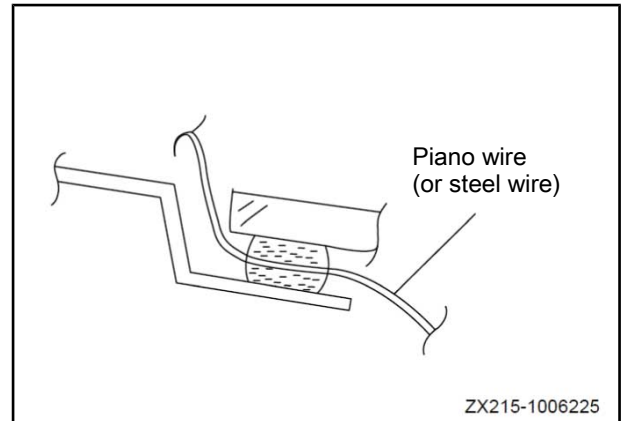


Fig8-274

4) Bind both ends of the piano wire on two screwdrivers. Pull the piano wire back and forth to cut the adhesive between the cab and the glass, and remove the glass from the cab. This operation needs to be completed by 2~3 persons in cooperation.

- Be sure to cut the middle position of the adhesive between the glass and the cab. When the piano wire becomes hot, it is inclined to be broken. Therefore, be sure to change the contacting point of the wire while cutting the adhesive.

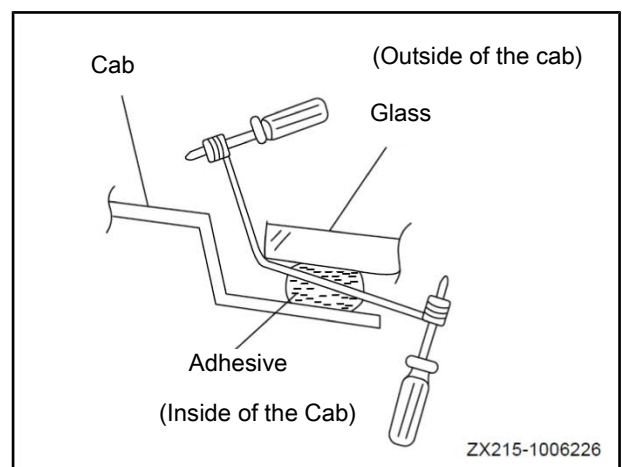


Fig8-275

## Installation

1. Use a knife and spatula (5) to remove residual adhesive and rubber seal from the metal panel (surface stuck with glass).

Note: Clean off the adhesive and rubber seal until they would not affect the application of new adhesive. Be careful not to scratch the painted surface (or the adhesion of adhesive would decrease).



Fig8-276

9) Apply the adhesive (15) to the additional rubber seal (6a) and (6b).

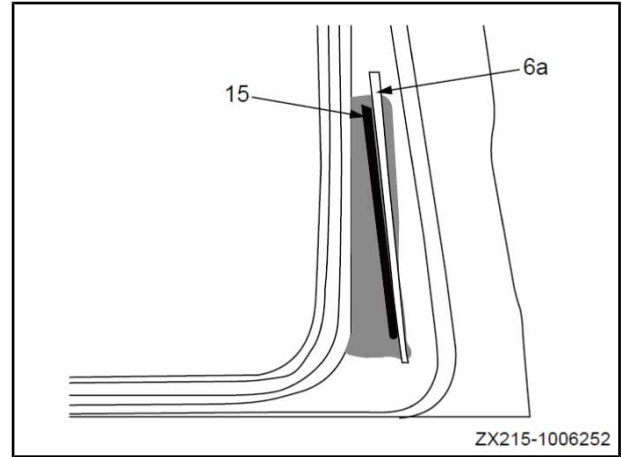


Fig8-302

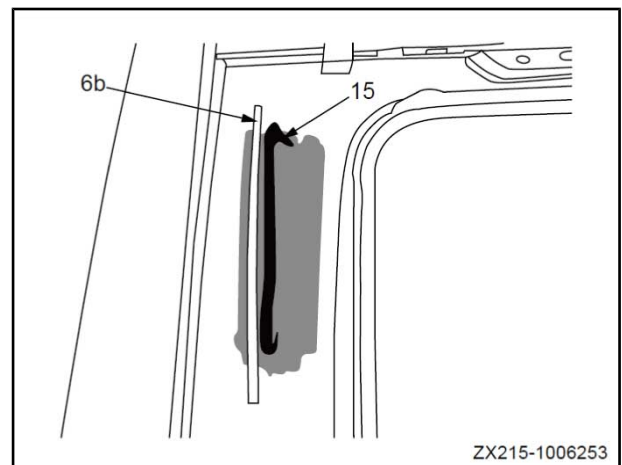


Fig8-303

7. Install the glass.

1) Install the glass (9), and align it with the locating lines drawn in step 5.

- It is not allowed to adjust or remove the improperly installed glass. Therefore, ensure that the glass is successfully installed at one time.
- Install the glass within 5 min after the application of the adhesive.

2) After sticking the glass (9), press the edge of the glass till it tightly sticks to the rubber seal.

- Press each corner of the glass with force.

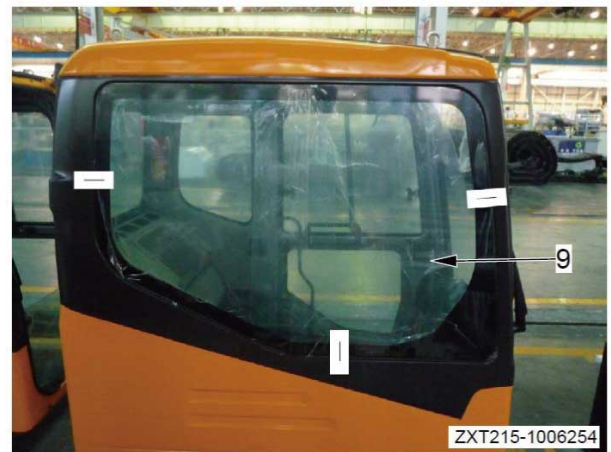


Fig8-304

ii) Close the front window assembly (10).

iii) Rotate the left and right rubber stop blocks (18) anticlockwise by one and a half turns.

- Rotating the rubber stop block (18) anticlockwise by one turn corresponds to squeezing the rubber by approximately 1.5 mm.
- When the front window assembly is at “open” position, it shall push the left and right rubber stop blocks (18) by 1.5~3.0 mm.

iv) Tighten the lock nuts (20) on both sides of the rubber stop block (18).

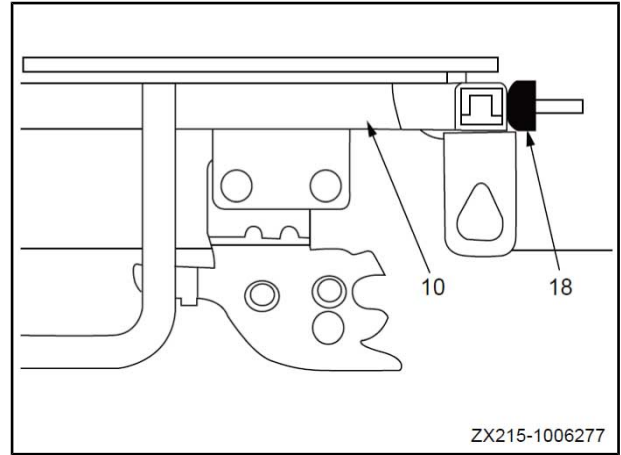


Fig8-326

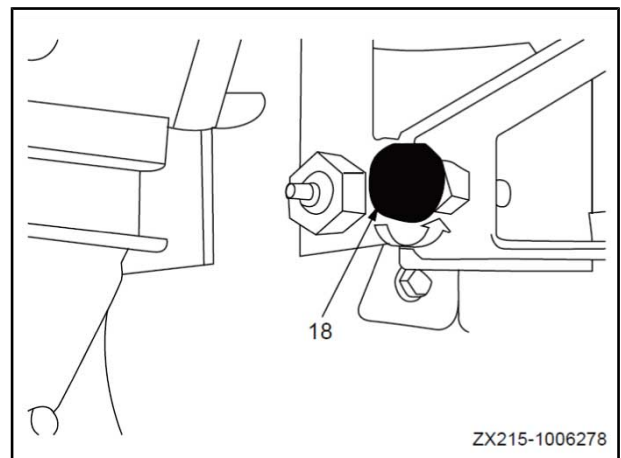


Fig8-327

9. Adjust the stopper (24) of front window assembly.

1) Adjust and lock the stopper (24), ensuring that when the front window assembly (10) is lifted the surface (d) of stop block (D) contacts the surface (c) of stopper (24).

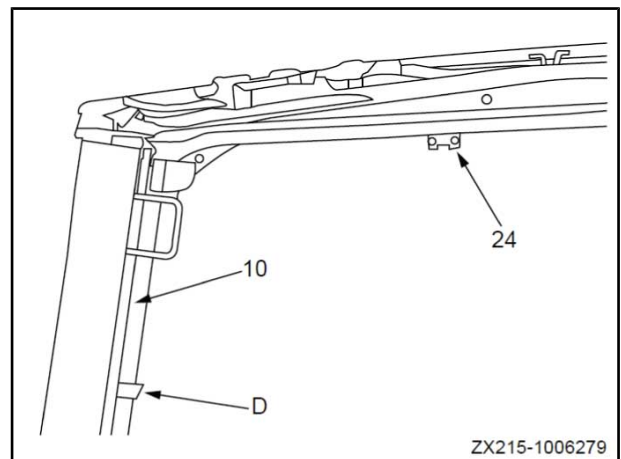


Fig8-328

**Key switch electrical schematic and wiring**

**Electrical schematic**

Key Position	ON/OFF					
	Battery (B)	Battery Relay (BR)	Accessory	Preheat Plug		Start Relay (C)
				(R1)	(R2)	
HEAT	○ —	○ —	○			
OFF	○					
ON	○ —	○ —	○			
START	○ —	○ —	○ —	○ —	○ —	○ —

**Wiring**

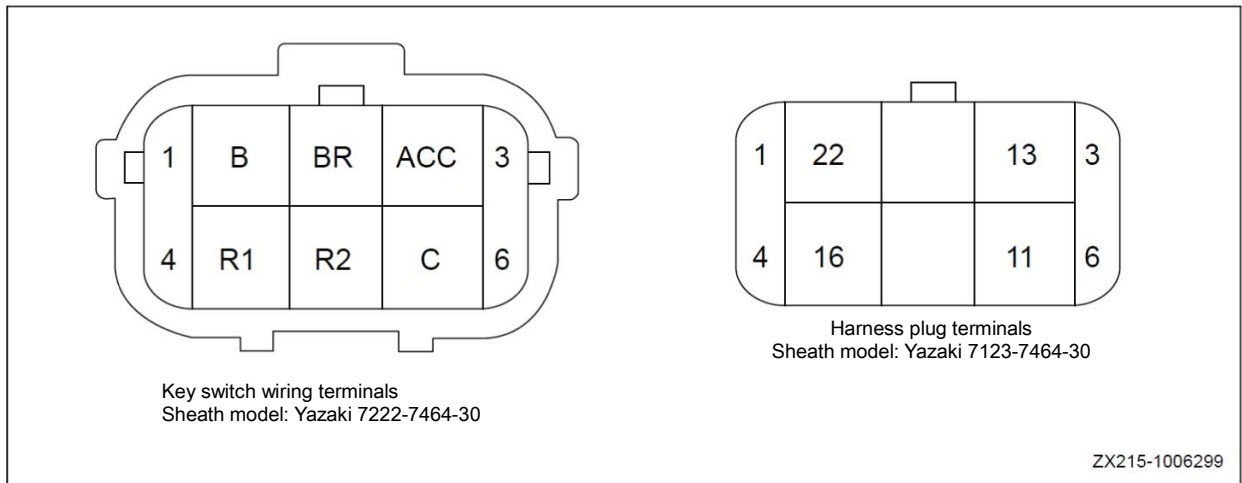


Fig8-348

2. Push the removal tool into the connector, allowing the tool to disengage the terminal lock and reach the terminal flange.

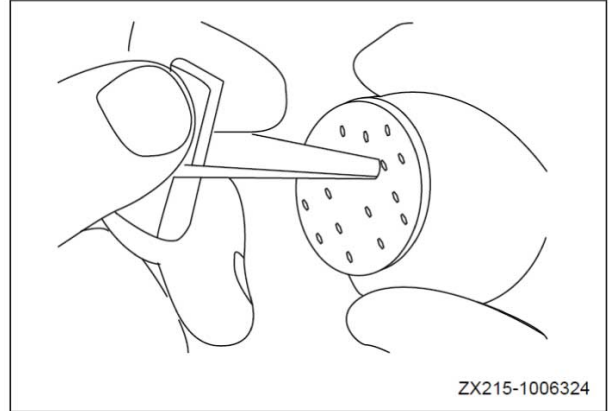


Fig8-371

3. Pull out the removal tool, removing the terminal with the wire.

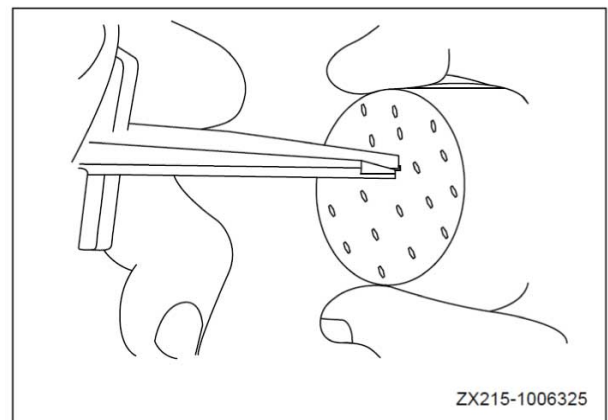


Fig8-372

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL