

PART NO. TTDBJ-EN-00

HITACHI

Reliable solutions

Technical Manual

Troubleshooting

ZX

190LC-5B

190LCN-5B

Hydraulic Excavator

ZX190LC-5B • 190LCN-5B HYDRAULIC EXCAVATOR TECHNICAL MANUAL TROUBLESHOOTING

 **Hitachi Construction Machinery Co., Ltd.**

URL:<http://www.hitachi-c-m.com>

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TTDBJ-EN-00

Service Manual consists of the following separate Part No.
Technical Manual (Operational Principle) : Vol. No.TODBJ-EN
Technical Manual (Troubleshooting) : Vol. No.TTDBJ-EN
Workshop Manual : Vol. No.WDBJ-EN
Engine Manual : Vol. No.ETDCA-EN, EWDCA-EN

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SAFETY

General Precautions for Cab

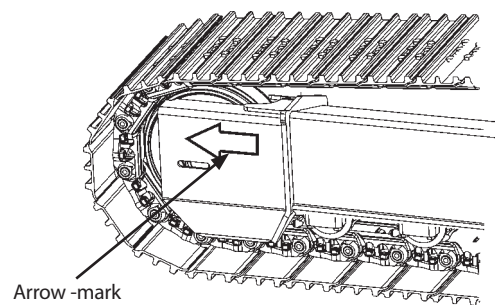
- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots, the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Do not leave parts and/or tools lying around the operator's seat. Store them in their specified locations.
- Avoid storing transparent bottles in the cab. Do not attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Do not leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.

SAFETY

- Avoid swinging the upperstructure on slopes. Never attempt to swing the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
- If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.
- Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.
- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers. An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



M104-05-008



M178-03-001



SA-011

SAFETY

Practice Safe Maintenance

To avoid accidents:

- Understand service procedures before starting work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

Before servicing the machine:

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn the key switch to OFF to stop engine.
6. Relieve the pressure in the hydraulic system by moving the control levers several times.
7. Remove the key from the key switch.
8. Attach a "Do Not Operate" tag on the control lever.
9. Pull the pilot control shut-off lever to the LOCK position.
10. Allow the engine to cool.

- If a maintenance procedure must be performed with the engine running, do not leave the machine unattended.
- If the machine must be raised, maintain a 90 to 110° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter in the operator's manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Disconnect battery ground cable (-) before making adjustments to electrical systems or before performing welding on the machine.



SA-028



SA-527

SAFETY

Remove Paint Before Welding or Heating

- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
 - Avoid potentially toxic fumes and dust.
 - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
 - Remove paint before welding or heating:
 1. If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



SA-029

Beware of Asbestos and Silicon Dust and Other Contamination

- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer. Inhalation of silicon dust or other contamination may cause sickness.
 - Depending on the work site conditions, the risk of inhaling asbestos fiber, silicon dust or other contamination may exist. Spray water to prevent asbestos fibers, silicon dust or other contamination from becoming airborne. Do not use compressed air.
 - When operating the machine in a work site where asbestos fibers, silicon dust or other contamination might be present, be sure to operate the machine from the upwind side and wear a mask rated to prevent the inhalation of asbestos, silicon dust or other contamination.
 - Keep bystanders out of the work site during operation.
 - Asbestos fibers might be present in imitation parts. Use only genuine Hitachi Parts.



SA-029

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 1 Introduction

Operational Performance Tests

Use operational performance test procedure to quantitatively check all system and functions on the machine.

Purpose of Performance Tests

1. To comprehensively evaluate each operational function by comparing the performance test data with the standard values.
2. According to the evaluation results, repair, adjust, or replace parts or components as necessary to restore the machine's performance to the desired standard.
3. To economically operate the machine under optimal conditions.

Kinds of Tests

1. Base machine performance test is to check the operational performance of each system such as engine, travel, swing, and hydraulic cylinders.
2. Hydraulic component unit test is to check the operational performance of each component such as hydraulic pump, motor, and various kinds of valves.

Performance Standards

"Performance Standard" is shown in tables to evaluate the performance test data.

Precautions for Evaluation of Test Data

1. To evaluate not only that the test data are correct, but also in what range the test data are.
2. Be sure to evaluate the test data based on the machine operation hours, kinds and state of work loads, and machine maintenance conditions.

The machine performance does not always deteriorate as the working hours increase. However, the machine performance is normally considered to reduce in proportion to the increase of the operation hours. Accordingly, restoring the machine performance by repair, adjustment, or replacement shall consider the number of the machine's working hours.

Definition of "Performance Standard"

1. Operation speed values and dimensions of the new machine.
2. Operational performance of new components adjusted to specifications. Allowable errors will be indicated as necessary.

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 2 Standard

PERFORMANCE TEST DESIGNATION	Unit	Performance Standard	Remarks	Reference Page
OVERLOAD RELIEF PRESSURE	MPa (kgf/cm ² , psi)		(Reference values at 50 L/min)	T4-5-14
Boom Lower, Arm Roll-In, Bucket Roll-In		39.2 ^{+1.0} (400 ⁺¹⁰ 5684 ⁺¹⁴⁵)		
Boom Raise, Arm Roll-Out, Bucket Roll-Out		39.2 ^{+1.0} (400 ⁺¹⁰ 5684 ⁺¹⁴⁵)		
MAIN PUMP FLOW RATE MEASUREMENT	(L/min)		Refer to T4-2-10, 11	T4-5-16
SWING MOTOR DRAINAGE	(L/min)			T4-5-26
With constant speed		0.2 to 0.5		
With the motor relieved		(2 to 5)		
TRAVEL MOTOR DRAINAGE	(L/min)			T4-5-28
With the track jacked up		less than 10	Allowable limit: 10	
With the motor relieved		less than 15	Allowable limit: 15	

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 2 Standard

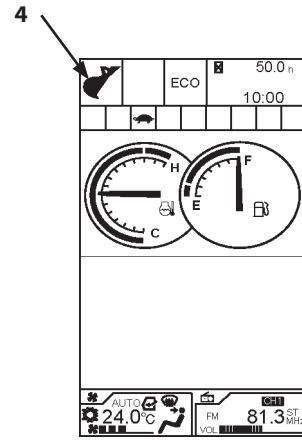
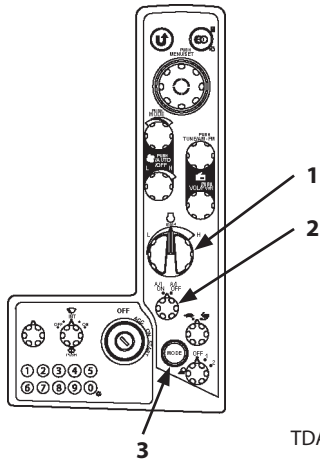
Item	Reference Value	Measured Value				Remarks
		First	Second	Third	Average	
Tgt Pump 1 Displacement (cm³)						
Control lever in neutral	23.0					
Boom raise	9.5					When relieving
Boom lower	-					
Arm roll-in	40.5					When relieving
Arm roll-out	40.5					When relieving
Bucket roll-out	80.5					When relieving
Bucket roll-in	80.5					When relieving
Combined operation of boom raise, arm roll-in, and bucket roll-in	9.5					When relieving
Tgt Pump 2 Displacement (cm³)						
Control lever in neutral	23.0					
Boom raise	9.5					When relieving
Boom lower	-					
Arm roll-in	40.5					When relieving
Arm roll-out	40.5					When relieving
Bucket roll-out	23.0					When relieving
Bucket roll-in	23.0					When relieving
Combined operation of boom raise, arm roll-in, and bucket roll-in	9.5					When relieving
Tgt Pump 3 Displacement (cm³)						
Control lever in neutral	23.0					
Boom raise	45.5					When relieving
Boom lower	-					
Arm roll-in	6.0					When relieving
Arm roll-out	6.0					When relieving
Bucket roll-out	23.0					When relieving
Bucket roll-in	23.0					When relieving
Combined operation of boom raise, arm roll-in, and bucket roll-in	52.5					When relieving

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 3 Engine Test

Switch Panel:

Monitor



- 1- Engine Control Dial
- 2- Auto-Idle Switch

- 3- Power Mode Switch
- 4- Digging Mode

SECTION 4 OPERATIONAL PERFORMANCE TEST

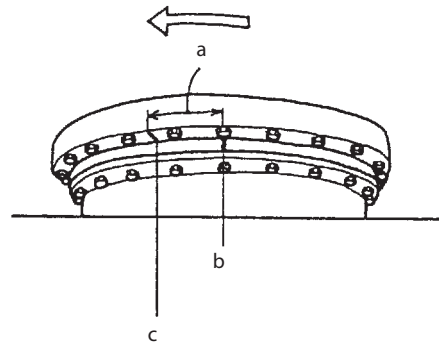
Group 4 Machine Performance Test

Measurement:

1. Select the following switch positions

Power Mode	Auto-Idle Switch	Work Mode
PWR	OFF	Digging Mode

2. Maintain the engine at slow idle. After five minutes, measure the difference between the marks on the swing bearing outer circumference and the track frame.
3. Check in both clockwise and counterclockwise directions.
4. Repeat the measurement three times and calculate the mean values.



T105-06-03-010

- a - Measure difference between marks.
b - Mark on Track Frame
c - Mark on Swing Bearing

Evaluation:

Refer to Operational Performance Standard.

Remedy:

Refer to Troubleshooting B.

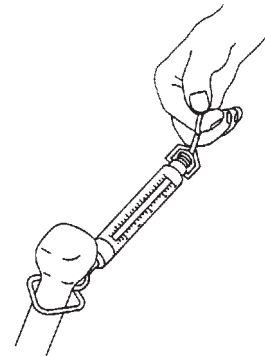
SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 4 Machine Performance Test

Control Lever Operating Force

Summary:

1. Measure a play and operating condition of each control lever.
2. Measure the maximum operating force of the front attachment control lever.
3. Measure the lever stroke at the grip center of each control lever.

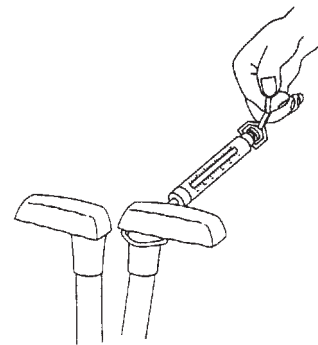


T107-06-03-003

Preparation:

1. Maintain the hydraulic oil temperature at 50 ± 5 °C (122 ± 9 °F).

CAUTION: Prevent personal injury. Always make sure that the area is clear and that coworkers are out of the swing area before starting the measurement.



T107-06-03-004

Measurement:

1. Measure the force of each control lever.
2. Select the following switch positions

Engine Control Dial	Power Mode	Auto-Idle Switch	Work Mode
Fast Idle	PWR	OFF	Digging Mode

3. In case of boom (raise), arm and bucket control lever, measure the maximum operating force for each with each actuator relieved.
4. In case of boom (lower) lever, measure the maximum operating force with the boom (lower) relieved by raising the machine in a stable area.
5. In case of swing lever, measure the maximum operating force with swing relieved after securing the front attachment to prevent turning.
6. In case of travel lever, raise the track to be measured. Measure the maximum operating force required.
7. Repeat the measurement three times and calculate the mean values.

Evaluation:

Refer to Operational Performance Standard.

SECTION 4 OPERATIONAL PERFORMANCE TEST


Group 5 Component Test

2-Spool Solenoid Valve (Muffler Filter Regeneration Control) Set Pressure

Preparation:


1. Stop the engine.
2. Push the air bleed valve on top of the hydraulic oil tank and release any remaining pressure.
3. (Solenoid Valve (SJ)):

Disconnect the hose from the solenoid valve. Install tee (4) (ST 6451), hose (5) (Parts Number: 4216453), adapter (3) (ST 6461), and pressure gauge (2) (ST 6942).

 : 17 mm, 19 mm

(Solenoid Valve (SZ)):

Disconnect the hose from the solenoid valve. Install tee (4) (ST 6450), hose (5) (Parts Number: 4334307), adapter (3) (ST 6466), and pressure gauge (2) (ST 6942).

 : 22 mm

4. Start the engine. Confirm that no oil leakage is observed at the pressure gauge connection.
5. Maintain the hydraulic oil temperature at 50 ± 5 °C (122 ± 9 °F).

Measurement:

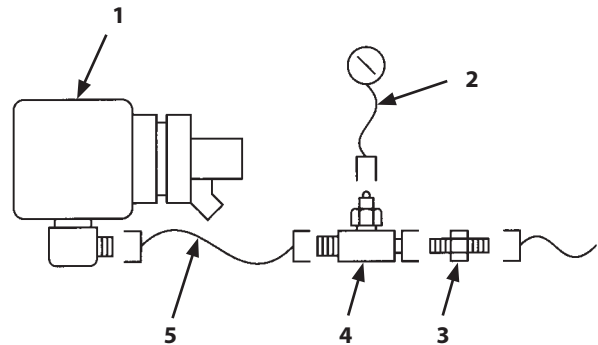
1. Select the following switch positions:

Engine Control Dial	Power Mode	Auto-Idle Switch	Work Mode
Fast Idle	PWR	OFF	Digging Mode
Slow Idle	PWR	OFF	Digging Mode

2. Turn the manual regeneration ON by using MPDr..
3. Read the values on both MPDr. and the pressure gauge.
4. Repeat each measurement three times and calculate the mean values.

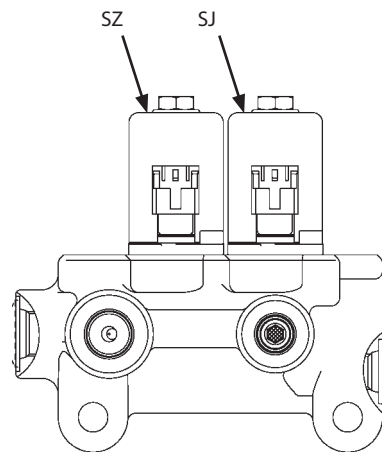
Evaluation:

Refer to Operational Performance Standard.



- | | |
|------------------------|---------|
| 1- Solenoid Valve Unit | 4- Tee |
| 2- Pressure Gauge | 5- Hose |
| 3- Adapter | |

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SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 5 Component Test

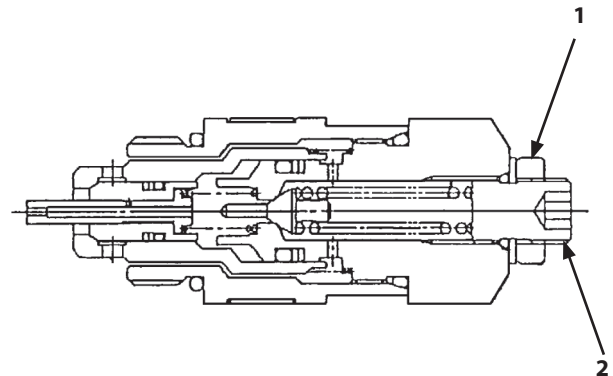
Evaluation:

Performance of the overload relief valves are normal if the measured main relief pressures are within the specified value range.
Refer to Operational Performance Standard.

Overload Relief Valve Pressure Adjustment Procedure


 **NOTE:** In principle, adjust the overload relief valve pressure on a test stand.

Loosen lock nut (1) and adjust pressure by using adjusting screw (2).



TDA-04-05-011


1. Loosen lock nut (1).

 : 17 mm


1- Lock Nut

2- Adjusting Screw

2. Turn adjusting screw (2) in order to adjust pressure.

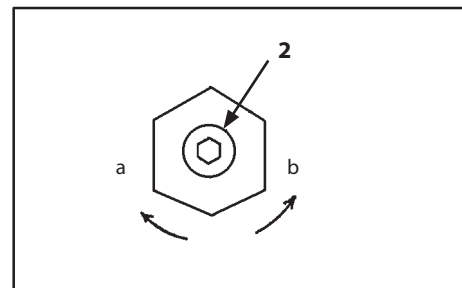
 : 6 mm

3. Tighten lock nut (1).

 : 17 mm

 : 30 N·m (3 kgf·m)

4. After adjustment, check the set pressures.



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 **NOTE:** Standard Change in Pressure (Reference)

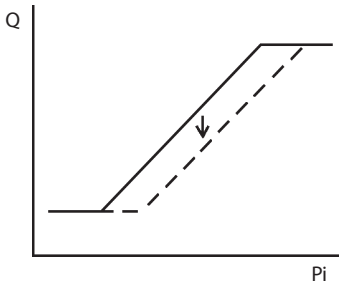


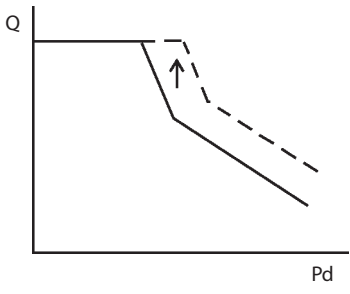


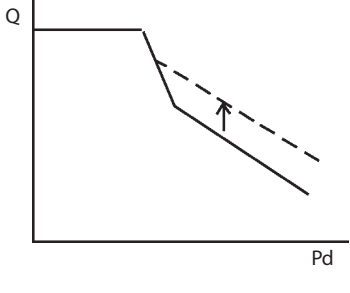


Adjusting Screw (2)		1/4	1/2	3/4	1
Turns					
Change in Pressure	MPa	5.2	10.6	15.9	21.1
	(kgf/cm ²)	(54)	(108)	(162)	(216)
	(psi)	(770)	(1540)	(2300)	(3070)

a - Pressure Increase

b - Pressure Decrease

SECTION 4 OPERATIONAL PERFORMANCE TEST

Group 5 Component Test

Adjustment Item	Adjustment Procedure	Remarks
<p>3. Pilot Pressure Characteristics</p>  <p style="text-align: center;">Pi</p> <p style="text-align: center;">TDAA-04-05-005</p>	<p>Loosen lock nut (5) and turn adjusting screw (6).</p> <p>Rotating adjusting screw (6) 1/4 a turn clockwise decreases the flow rate by 12.8 cm³/rev. (0.71 in³/rev).</p> <p> : 30 mm</p> <p> : 30 N·m (3 kgf·m, 22 lbf·ft)</p>	<p>Do not turn the adjusting screws more than one turn.</p> <p>When adjusting screw (6) is turned clockwise, the maximum flow rate will also be decreased. In order to maintain the maximum flow rate unchanged, turn adjusting screw (4) counterclockwise twice as much as adjusting screw (6) is turned.</p> <p>This ratio of 2 (adjusting screw (4) counterclockwise turn) to 1 (adjusting screw (6) clockwise turn) is to counterbalance.</p> <p>Securely tighten lock nut (5) after adjustment.</p>
<p>4. P-Q Control (Torque Adjustment)</p>  <p style="text-align: center;">Pd</p> <p style="text-align: center;">TDAA-04-05-006</p>	<p>Loosen lock nut (7) and turn adjusting screw (8).</p> <p>Rotating the adjusting screw 1/4 a turn clockwise increases the flow rate by 15.2 cm³/rev. (0.9 in³/rev).</p> <p> : 30 mm</p> <p> : 30 N·m (3 kgf·m, 22 lbf·ft)</p>	<p>Do not turn the adjusting screws more than one turn.</p> <p>Rotate the adjusting screws watching the engine performance.</p> <p>Securely tighten lock nut (7) after adjustment.</p>
<p>5. P-Q Control (Torque Adjustment)</p>  <p style="text-align: center;">Pd</p> <p style="text-align: center;">TDAA-04-05-007</p>	<p>Loosen lock nut (9) and turn adjusting screw (10).</p> <p>Rotating the adjusting screw 1/4 a turn clockwise increases the flow rate by 3.70 cm³/rev. (0.2 in³/rev).</p> <p> : 13 mm</p> <p> : 10 N·m (1 kgf·m, 7.4 lbf·ft)</p>	<p>Do not turn the adjusting screws more than one turn.</p> <p>Rotate the adjusting screws watching the engine performance.</p> <p>Securely tighten lock nut (9) after adjustment.</p>

MEMO

SECTION 5 TROUBLESHOOTING

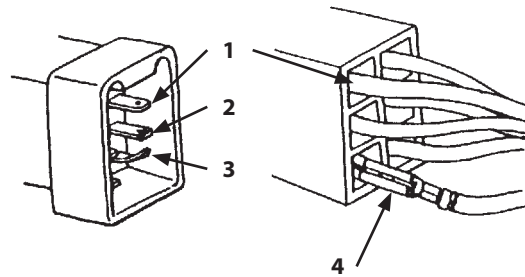
Group 1 Diagnosing Procedure

3. Precautions for connecting and disconnecting terminal connectors.

- When disconnecting the harnesses, grasp them by their connectors. Do not pull on the wire itself. Release the lock first before attempting to separate connectors, if a lock is provided. (Refer to Instructions for Disconnecting Connector on T5-1-8.)
- The water-resistant connectors keep water out. If water enters them, water will not easily drain from them. When checking the water-resistant connectors, take extra care not to allow water to enter the connectors. In case water should enter the connectors, reconnect only after the connectors are thoroughly dried.
- Before connecting the terminal connectors, check that no terminals are bent (3) or coming off. In addition, as most connectors are made of brass, check that no terminals are rusting (2).
- When connecting terminal connectors provided with a lock, insert them together until the lock "clicks."
- Pull the harness near the connector in order to check if it is correctly connected.



TDAA-05-08-002



TDAA-05-08-003

- | | |
|------------|----------------------------|
| 1- Correct | 3- Incorrect (Deformation) |
| 2- Rust | 4- Incorrect (Deformation) |

4. Precaution for using a circuit tester.

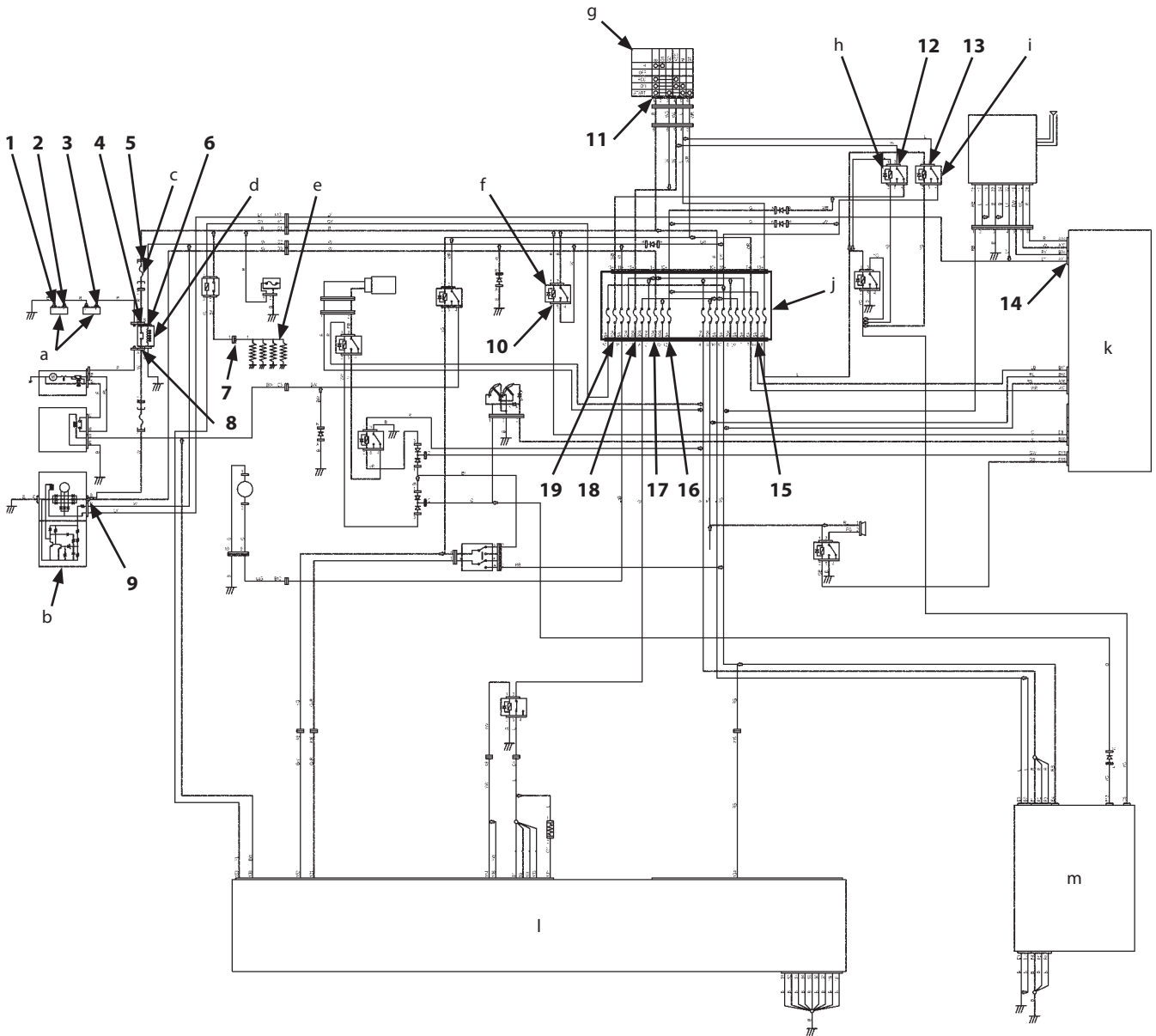
- Before using a circuit tester, refer to the instructions in the circuit tester manual. Then, set the circuit tester to meet the object to be measured, voltage range and current polarity.
- Before starting the connector test, always check the connector terminal numbers, referring to the circuit diagram. When the connector size is very small, and the standard probe size is too large to be used for testing, wind a fine piece of sharpened wire or a pin around the probe to make the test easier.
- When checking the connector by using a circuit tester, insert a tester probe from the harness end of connector in order not to damage the terminal inside connector.



TDAA-05-08-004

SECTION 5 TROUBLESHOOTING

Group 1 Diagnosing Procedure



TDAA-05-08-001

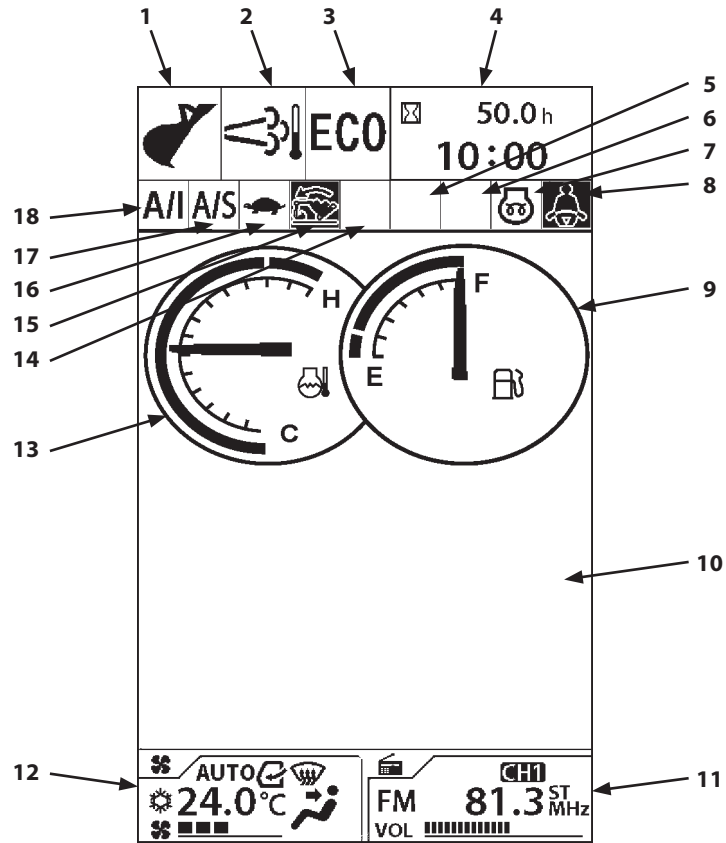
- | | | | |
|------------------|--------------------|----------------------------|-------|
| a- Battery | e- Glow Plug | i- Key Switch ON Cut Relay | m- MC |
| b- Alternator | f- Load Dump Relay | j- Fuse Box | |
| c- Fusible Link | g- Key Switch | k- Monitor Controller | |
| d- Battery Relay | h- ACC Cut Relay | l- ECM | |

SECTION 5 TROUBLESHOOTING

Group 2 Monitor

Outline

Basic Screen




TDAA-05-02-058EN

- | | | | |
|----------------------------------|--|-------------------------------|----------------------------|
| 1- Work Mode Display | 7- Glow Signal Display | 11- Radio Display | 17- Auto Shut-Down Display |
| 2- Muffler Filter Status Display | 8- Seat Belt Alarm | 12- Air Conditioner Display | 18- Auto-Idle Display |
| 3- Power Mode Display | 9- Fuel Gauge | 13- Coolant Temperature Gauge | |
| 4- Clock, Hour Meter | 10- Logo Display/ Operation Display/ No Display/ Rear View Monitor Display | 14- Auxiliary | |
| 5- Auxiliary | | 15- Overload Alarm (Optional) | |
| 6- Auxiliary | | 16- Travel Mode Display | |

SECTION 5 TROUBLESHOOTING

Group 2 Monitor

Item	Unit	Data
Arm 2 Flw Cont P/S O/P FB	mA	Feedback from 5-spool solenoid valve unit (SD) output
Arm Regen P/S Output FB	mA	Feedback from 5-spool solenoid valve unit (SC) output
Pressure Boost P/S Output FB	mA	Feedback from 5-spool solenoid valve unit (SI) output
Digging Regen P/S O/P FB	mA	Feedback from 5-spool solenoid valve unit (SF) output
Muf/Filtr Regen P/S O/P (SJ) FB	mA	Feedback from 2-spool solenoid valve unit (SJ) output
Muf/Filtr Regen P/S O/P (SZ) FB	mA	Feedback from 2-spool solenoid valve unit (SZ) output
Arm 1 Flw Cont P/S O/P FB	mA	Feedback from 5-spool solenoid valve unit (SE) output
OPT Cont 1 P/S (E/L) O/P FB*	mA	Feedback from solenoid valve for electrical lever output
OPT Cont 2 P/S (E/L) O/P FB*	mA	Feedback from solenoid valve for electrical lever output
Pump 1 Flw Limit P/S O/P FB	mA	Feedback from maximum pump 1 flow rate limit control solenoid valve output
Pump 3 Flw Limit P/S O/P FB	mA	Feedback from maximum pump 3 flow rate limit control solenoid valve output
Analog Output FB 14	mA	-
Analog Output FB 15	mA	-
Analog Output FB 16	mA	-
Auxil Flw Cont P/S O/P FB	mA	Feedback from auxiliary flow rate control solenoid valve output
ATT Relief 1 P/S O/P FB*	mA	Feedback from auxiliary overload relief solenoid valve output
ATT Relief 2 P/S O/P FB*	mA	Feedback from auxiliary overload relief solenoid valve output
Brk Relief P/S Output FB*	mA	Feedback from breaker relief solenoid valve output
Digital Input 7	OFF/ON	-
PCSL Lever Switch	OFF/ON	Pilot shut-off switch ON/OFF status
Breaker Control Switch	OFF/ON	-
Power Boost Switch	OFF/ON	Power digging switch ON/OFF status
Engine Oil Level Switch	OFF/ON	Engine oil level switch ON/OFF status
Power Mode Switch	OFF/ON	Power mode switch operating status
Travel Mode SW	LO/HI	Travel mode switch selection status
Auto-Idle Switch	OFF/ON	Auto-idle switch ON/OFF status
Digital Input 15	OFF/ON	-
Digital Input 14	OFF/ON	-
Digital Input 13	OFF/ON	-
Digital Input 12	OFF/ON	-

 NOTE: *: Optional

SECTION 5 TROUBLESHOOTING

Group 2 Monitor

List of Communication Terminal Status

Item	Unit	Data	
		Portable Terminal	Satellite Terminal (Optional)
GPS Status	0 to 2	0: Uncoupled Connection 1: Incomplete Positioning 2: Positioning State	0: Uncoupled Connection 1: Incomplete Positioning 2: Positioning State
Radio Wave Intensity	0 to 3, 250, 254	0: Potable Antenna: 0 1: Potable Antenna: 1 2: Potable Antenna: 2 3: Potable Antenna: 3 250: Out of service 254: Not detected	0: Communication not available 1: Communication available
Talking Status	0, 1	0: Uncoupled Connection 1: Connection	-
Comm Module Status	0, 1	0: Correct 1: Incorrect	-
Potable Antenna Signal	0 to 31, 99	0 to 1: Out of service 2 to 8: Potable Antenna: 0 9 to 12: Potable Antenna: 1 13 to 17: Potable Antenna: 2 18 to 31: Potable Antenna: 3 99: Not detected	-
GPRS Ntwk Conn Status	0, 1	0: Failure 1: Success	-
Frequency Band	0 to 3	0 to 3	-

 **NOTE:** The detail data of radio wave intensity are displayed for Potable Antenna Signal.

SECTION 5 TROUBLESHOOTING

Group 2 Monitor

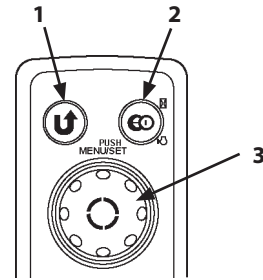
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SECTION 5 TROUBLESHOOTING

Group 2 Monitor

Breaker Alarm

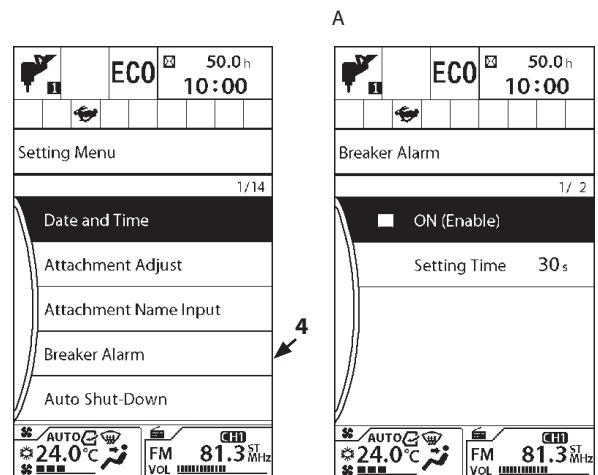
1. Turn select / set switch (3) and select Breaker Alarm (4) on the setting menu. When pushing select / set switch (3), the Breaker Alarm screen appears. (Figure A)
2. Push select / set switch (3) and turn Breaker Alarm ON.
3. Turn select / set switch (3) and set the setting time until Breaker Alarm is operated. When pushing select / set switch (3), the setting is completed.



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NOTE: When ON is selected on the setting screen of Breaker Alarm and the breaker is operated for the setting time continuously, the buzzer sounds. (Refer to SYSTEM / Control System.)

4. When pushing back switch (1), the previous screen appears.
5. When pushing return to basic screen switch (2), the basic screen appears.



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TDAA-05-02-013EN

SECTION 5 TROUBLESHOOTING

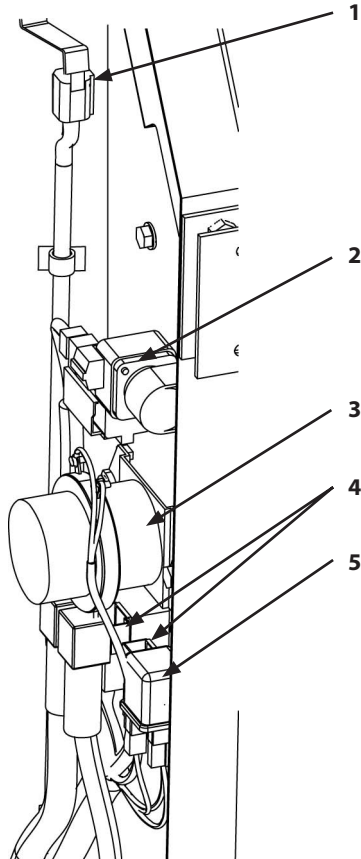
Group 3 e-Service

List of Total Operating Hours		
Item	Details	
Hour Meter End	Machine hour meter's value	
Engine Operating Hour	PWR Mode Hours	Total engine operating hours selecting PWR mode
	ECO Mode Hours	Total engine operating hours selecting ECO mode
Auto-Idle Switch ON Time	Total hours when auto-idle switch is turned ON	
Travel Operating Hour	Fast (Hi) Traveling Hours	Total operating hours of travel mode Fast (Hi)
	Slow (Lo) Traveling Hours	Total operating hours of travel mode Slow (Lo)
Swing Operating Hour	Total swing operating hours	
Front Attachment Operating Hour	Total front attachment operating hours	
Attachment Operating Hour	Breaker Operating Hours	Total operating hours selecting breaker during daily operation
	Pulverizer Operating Hours	Total operating hours selecting pulverizer during daily operation
	Hydraulic Crusher Operating Hours	Total operating hours selecting hydraulic crusher during daily operation
	Vibrating Hammer Operating Hours	Total operating hours selecting vibrating hammer during daily operation
	Bucket Operating Hours or Others	Total operating hours selecting bucket during daily operation
No Load Time	Total machine's waiting hours	
MC Communication Error Time	Total hours of MC communication error	
ECM Communication Time Out Time	Total hours of ECM communication time out	

SECTION 5 TROUBLESHOOTING

Group 4 Component Layout

Electrical System (Relays)

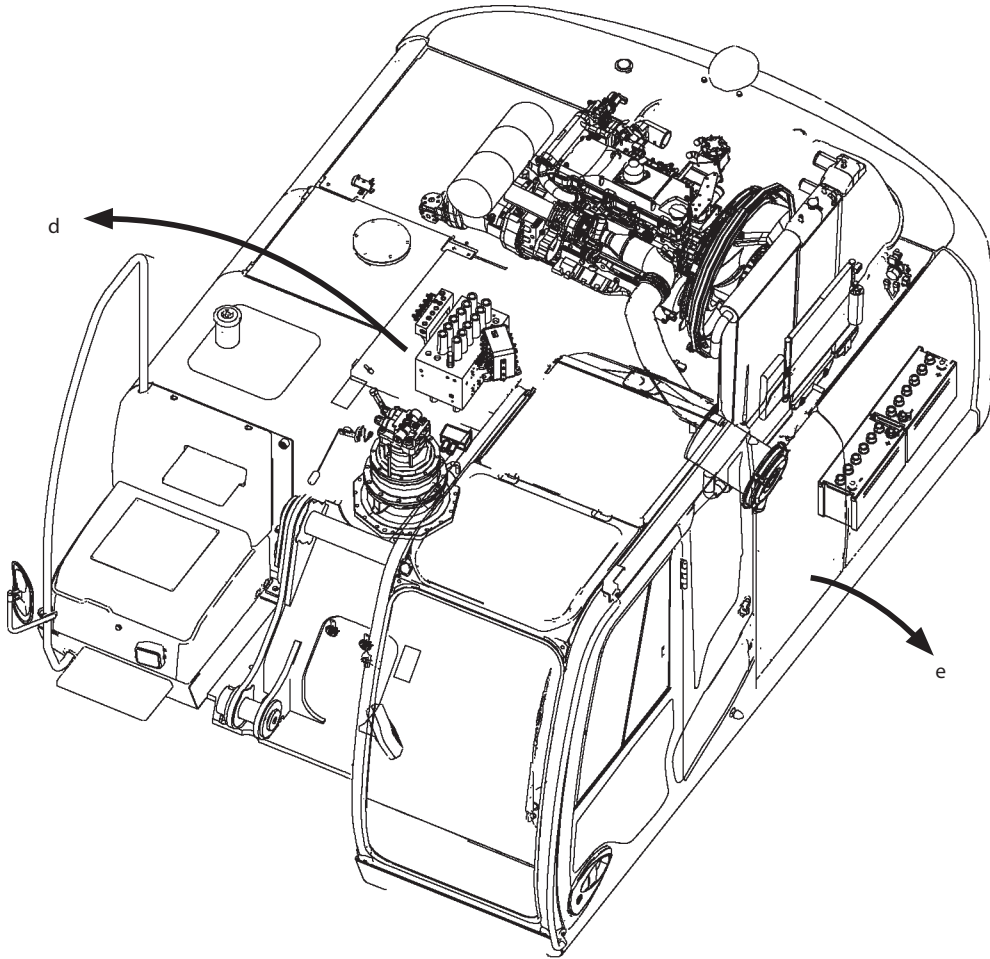


TDAA-01-02-023

- | | |
|-------------------------------|--|
| 1- Ambient Temperature Sensor | 4- Fusible Link (Red: 45 A, Black: 65 A) |
| 2- Starter Relay 1 | 5- Glow Plug Relay |
| 3- Battery Relay | |

SECTION 5 TROUBLESHOOTING

Group 4 Component Layout



TDAA-01-02-020

d- Control Valve Upper Side,
Lower Side (Refer to T5-4-19.)

e- Utility Space (Refer to T5-4-20.)

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



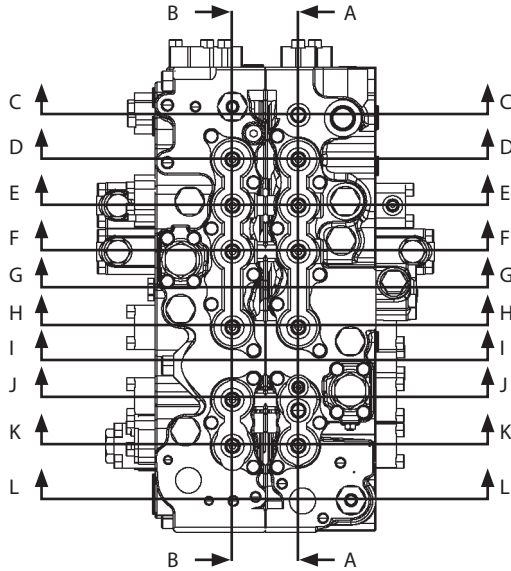
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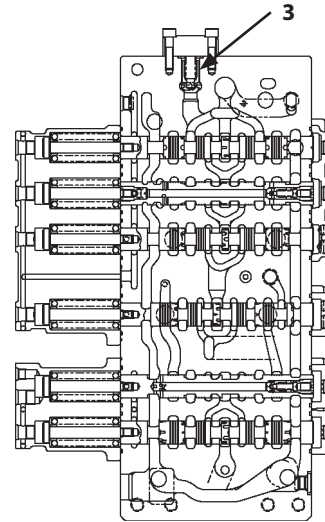
SECTION 5 TROUBLESHOOTING

Group 4 Component Layout

Section A-A



TDAA-03-03-007



TDAA-03-03-008

a- Machine Upper Side

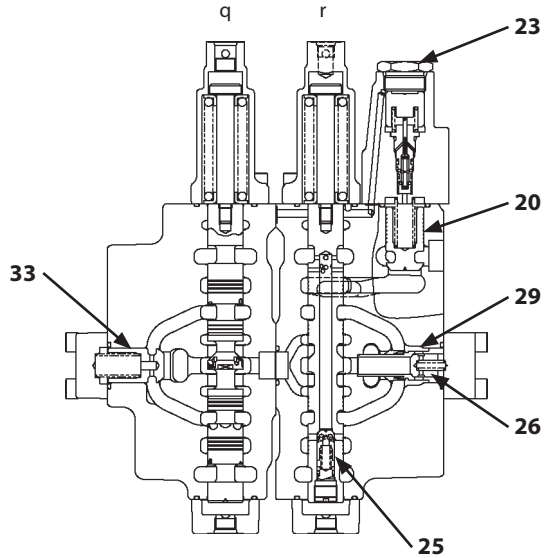
c- Machine Lower Side

- | | | | |
|--|---|---|--|
| 1- Check Valve (Main Relief Circuit) | 15- Overload Relief Valve (Bucket: Rod Side) | 28- Load Check Valve (Swing Tandem Circuit) | 41- Load Check Valve (Arm Regenerative Circuit) |
| 2- Main Relief Valves (P1, P2) | 16- Overload Relief Valve (Bucket: Bottom Side) | 29- Load Check Valve (Boom 3 Parallel Circuit) | 42- Arm Bottom Anti-Drift Valve (Check Valve) |
| 3- Check Valve (Main Relief Circuit) | 17- Load Check Valve (Arm 2 Tandem Circuit) | 30- Digging Regenerative Valve | 43- Overload Relief Valve (Arm: Bottom Side) |
| 4- Load Check Valve (Travel (Left) Parallel Circuit) | 18- Load Check Valve (Boom 1 Parallel Circuit) | 31- Load Check Valve (Auxiliary 2 Parallel Circuit) | 44- Arm Rod Anti-Drift Valve (Selector Valve) |
| 5- Auxiliary Flow Combiner Valve | 19- Boom Lower Meter-In Cut Valve | 32- Load Check Valve (Auxiliary 2 Tandem Circuit) | 45- Arm Bottom Anti-Drift Valve (Selector Valve) |
| 6- Check Valve (Auxiliary Flow Combiner Circuit) | 20- Boom Anti-Drift Valve (Check Valve) | 33- Load Check Valve (Arm 3 Tandem Circuit) | 46- Arm Rod Anti-Drift Valve (Check Valve) |
| 7- Load Check Valve (Orifice (Bucket)) | 21- Overload Relief Valve (Boom: Bottom Side) | 34- Overload Relief Valve (Positioning/Auxiliary 2) | 47- Overload Relief Valve (Arm: Rod Side) |
| 8- Check Valve (Bucket Tandem Circuit) | 22- Overload Relief Valve (Boom: Rod Side) | 35- Overload Relief Valve (Positioning/Auxiliary 2) | 48- Auxiliary Flow Rate Control Valve (Selector Valve) |
| 9- Check Valve (Flow Combiner Circuit) | 23- Boom Anti-Drift Valve (Selector Valve) | 36- Load Check Valve (Boom 2 Parallel Circuit) | 49- Auxiliary Flow Rate Control Valve (Poppet Valve) |
| 10- Flow Combiner Valve | 24- Bypass Shut-Out Valve | 37- Arm 1 Flow Rate Control Valve (Poppet Valve) | 50- Load Check Valve (Travel (Left) Tandem Circuit) |
| 11- Bucket Regeneration Cut Valve | 25- Boom Regenerative Valve | 38- Arm 1 Flow Rate Control Valve (Selector Valve) | 51- Pump 2 |
| 12- Bucket Regenerative Valve | 26- Load Check Valve (Boom 3 Tandem Circuit) | 39- Load Check Valve (Digging Regenerative Circuit) | 52- Pump 3 |
| 13- Arm 2 Flow Rate Control Valve (Poppet Valve) | 27- Main Relief Valve (P3) | 40- Arm Regenerative Valve | 53- Pump 1 |
| 14- Arm 2 Flow Rate Control Valve (Selector Valve) | | | |

SECTION 5 TROUBLESHOOTING

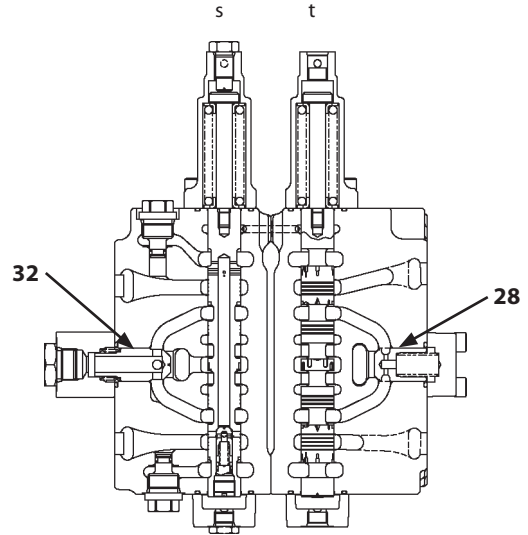
Group 4 Component Layout

Section J-J



TDA-03-03-017

Section K-K

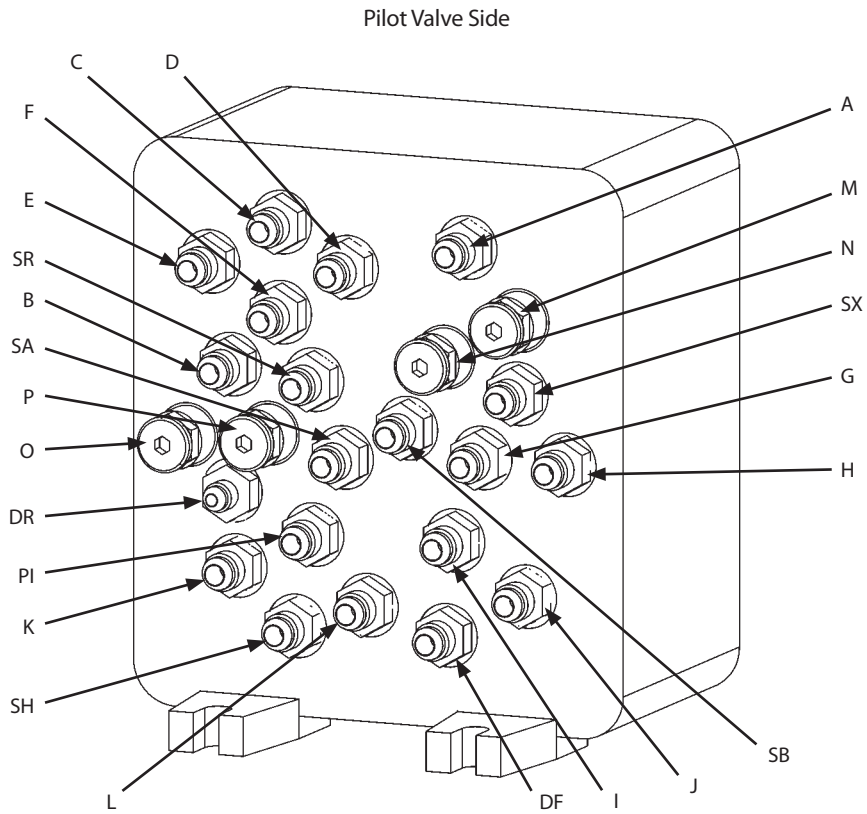


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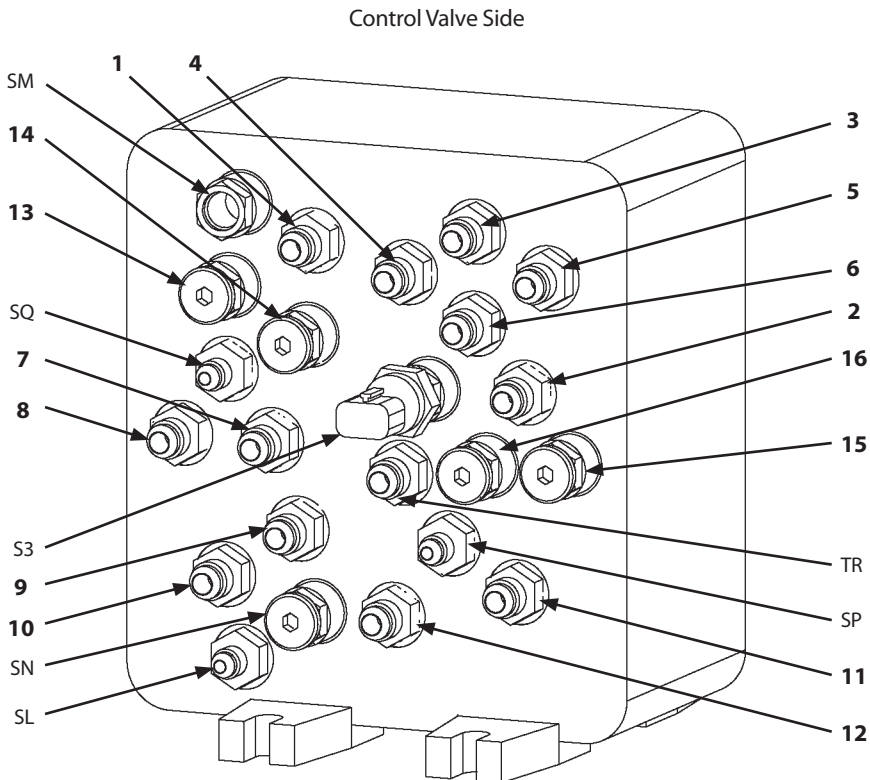
- | | | | |
|--|---|---|--|
| a- Machine Upper Side | q - Arm 3 | s - Auxiliary 2 | t - Swing |
| c- Machine Lower Side | r - Boom 3 | | |
| 1- Check Valve (Main Relief Circuit) | 15- Overload Relief Valve (Bucket: Rod Side) | 28- Load Check Valve (Swing Tandem Circuit) | 41- Load Check Valve (Arm Regenerative Circuit) |
| 2- Main Relief Valves (P1, P2) | 16- Overload Relief Valve (Bucket: Bottom Side) | 29- Load Check Valve (Boom 3 Parallel Circuit) | 42- Arm Bottom Anti-Drift Valve (Check Valve) |
| 3- Check Valve (Main Relief Circuit) | 17- Load Check Valve (Arm 2 Tandem Circuit) | 30- Digging Regenerative Valve | 43- Overload Relief Valve (Arm: Bottom Side) |
| 4- Load Check Valve (Travel (Left) Parallel Circuit) | 18- Load Check Valve (Boom 1 Parallel Circuit) | 31- Load Check Valve (Auxiliary 2 Parallel Circuit) | 44- Arm Rod Anti-Drift Valve (Selector Valve) |
| 5- Auxiliary Flow Combiner Valve | 19- Boom Lower Meter-In Cut Valve | 32- Load Check Valve (Auxiliary 2 Tandem Circuit) | 45- Arm Bottom Anti-Drift Valve (Selector Valve) |
| 6- Check Valve (Auxiliary Flow Combiner Circuit) | 20- Boom Anti-Drift Valve (Check Valve) | 33- Load Check Valve (Arm 3 Tandem Circuit) | 46- Arm Rod Anti-Drift Valve (Check Valve) |
| 7- Load Check Valve (Orifice (Bucket)) | 21- Overload Relief Valve (Boom: Bottom Side) | 34- Overload Relief Valve (Positioning/Auxiliary 2) | 47- Overload Relief Valve (Arm: Rod Side) |
| 8- Check Valve (Bucket Tandem Circuit) | 22- Overload Relief Valve (Boom: Rod Side) | 35- Overload Relief Valve (Positioning/Auxiliary 2) | 48- Auxiliary Flow Rate Control Valve (Selector Valve) |
| 9- Check Valve (Flow Combiner Circuit) | 23- Boom Anti-Drift Valve (Selector Valve) | 36- Load Check Valve (Boom 2 Parallel Circuit) | 49- Auxiliary Flow Rate Control Valve (Poppet Valve) |
| 10- Flow Combiner Valve | 24- Bypass Shut-Out Valve | 37- Arm 1 Flow Rate Control Valve (Poppet Valve) | 50- Load Check Valve (Travel (Left) Tandem Circuit) |
| 11- Bucket Regeneration Cut Valve | 25- Boom Regenerative Valve | 38- Arm 1 Flow Rate Control Valve (Selector Valve) | 51- Pump 2 |
| 12- Bucket Regenerative Valve | 26- Load Check Valve (Boom 3 Tandem Circuit) | 39- Load Check Valve (Digging Regenerative Circuit) | 52- Pump 3 |
| 13- Arm 2 Flow Rate Control Valve (Poppet Valve) | 27- Main Relief Valve (P3) | 40- Arm Regenerative Valve | 53- Pump 1 |
| 14- Arm 2 Flow Rate Control Valve (Selector Valve) | | | |

SECTION 5 TROUBLESHOOTING

Group 4 Component Layout



TDAA-03-06-005



TDAA-03-06-010

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Fault Code	Trouble	Cause	Symptoms in Machine Operation When Trouble Occurs.	Remedy
11304-3	Travel Pilot Pressure Sensor Circuit High Input	Voltage: more than 4.8 V	Machine travels slowly. When traveling, engine speed does not increase to the specification. When traveling, engine speed does not return from auto-idle speed. When traveling, engine speed does not return from ECO speed. Travel alarm (optional) continues to sound.	Check the harness. Replace the travel pilot pressure sensor.
11304-4	Travel Pilot Pressure Sensor Circuit Low Input	Voltage: less than 0.1 V	Machine travels slowly. When traveling, engine speed does not increase to the specification. When traveling, engine speed does not return from auto-idle speed. When traveling, engine speed does not return from ECO speed. Travel alarm (optional) continues to sound.	Check the harness. Replace the travel pilot pressure sensor.

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Solenoid Valve Control Failure

Fault Code	Trouble	Cause	Symptoms in Machine Operation When Trouble Occurs.	Remedy
11812-2	OPT Electric Lever 1 Center Signal Fault	When OPT Electric Lever 1, 2 solenoid valve output is lower than 0.5 MPa, OPT Electric Lever 1 monitoring pressure is higher than 1.2 MPa.	All solenoid valves stop output due to pilot cut-off.	Check the harness.
11813-2	OPT Electric Lever 1 Abnormal Operation	When OPT Electric Lever 1, 2 solenoid valve output is higher than 2.2 MPa, OPT Electric Lever 1 monitoring pressure is lower than 1.0 MPa.	OPT Electric Lever is operated with the 40 % reduced pressure.	Check the harness.
11814-2	OPT Electric Lever 2 Center Signal Fault	When OPT Electric Lever 3, 4 solenoid valve output is lower than 0.5 MPa, OPT Electric Lever 2 monitoring pressure is higher than 1.2 MPa.	All solenoid valves stop output due to pilot cut-off.	Check the harness.
11815-2	OPT Electric Lever 2 Abnormal Operation	When OPT Electric Lever 3, 4 solenoid valve output is higher than 2.2 MPa, OPT Electric Lever 2 monitoring pressure is lower than 1.0 MPa.	OPT Electric Lever is operated with the 40 % reduced pressure.	Check the harness.

Controller Hardware Failure

Fault Code	Trouble	Cause	Symptoms in Machine Operation When Trouble Occurs.	Remedy
15501-2	EEPROM Data Read Error	Faulty option controller	-	Replace the option controller.
15502-2	Abnormal EEPROM	Faulty option controller	-	Replace the option controller.
15503-2	Abnormal RAM	Faulty option controller	-	Replace the option controller.
15504-2	Abnormal A/D Converter	Faulty option controller	-	Replace the option controller.
15506-3	Abnormal Sensor Voltage	Faulty option controller Faulty sensor which is connected to the option controller Faulty harness	-	Check the sensor connected to the option controller. Check the harness. Replace the option controller.

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Operating Rank (Current)				Remark
A	B	C	D	
	○			Limit Q is performed as regeneration stops. The boost pressure is reduced due to turbo control and the output power decreases. Diagnosing starts over 3 minutes after the engine starts.
	○			Limit Q is performed as regeneration stops. The boost pressure is reduced due to turbo control and the output power decreases.
	○			Limit Q is performed just in case as regeneration evaluation stops.
	○			Limit Q is performed just in case as regeneration evaluation stops.
	○			Limit Q is performed as regeneration stops.
	○			Limit Q is performed as rail pressure cannot be controlled and regeneration stops.
	○			Limit Q is performed as rail pressure cannot be controlled and regeneration stops.
	○			Limit Q is performed as regeneration stops.
	○			Limit Q is performed as regeneration stops.
○				
	○			Limit Q is performed. Diagnosing starts over 3 minutes after the engine starts.
	○			Limit Q is performed.

Operating Rank

A: Digging is operable.

B: Machine can travel with the boom raised.

C: The engine only runs. (Only operation with light load is possible.)

D: The engine cannot stop / start.

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Symptoms in Machine Operation When Trouble Occurs.	Assumptive Conditions at Backup
The output power decreases, there is influence to exhaust gas.	The supply pump can not be controlled.
The output power decreases, there is influence to exhaust gas, the supply pump can not be controlled, the engine may increase the rotation speed automatically and abnormally.	The supply pump can not be controlled. → Prevent the engine from increasing the rotation speed automatically and abnormally. (The engine is protected from damage.)
Nothing special.	Fuel pressure is 0 kPa. Fuel filter restriction alarm stop.
Nothing special.	Fuel pressure is 0 kPa. Fuel filter restriction alarm stop.
The engine cannot start.	-
Electrical power is kept supplying to the machine.	-
The output power decreases.	EGR opening amount is not certain.
The output power decreases.	EGR cannot be controlled.
The output power decreases.	EGR cannot be controlled.
Vibration of the engine may be large, rough idle, output power decrease may occur, faulty increasing of rotation speed may occur, the engine may be stalled.	The injector cannot be controlled.
Vibration of the engine may be large, rough idle, output power decrease may occur, faulty increasing of rotation speed may occur, the engine may be stalled.	The injector cannot be controlled.
Vibration of the engine may be large, rough idle, output power decrease may occur, faulty increasing of rotation speed may occur, the engine may be stalled.	The injector cannot be controlled.
Vibration of the engine may be large, rough idle, output power decrease may occur, faulty increasing of rotation speed may occur, the engine may be stalled.	The injector cannot be controlled.
The output power decreases.	Malfunction of sub CPU
Output power decrease, dark smoke occurs.	All analogue sensor cannot be used.
Same to when coolant temperature sensor, engine oil pressure sensor, muffler filter differential pressure sensor, exhaust temperature sensor, and fuel filter restriction sensor are abnormal.	←
Same to when boost pressure sensor, EGR position sensor, intake throttle position sensor, and fuel temperature sensor are abnormal.	←
Same to when air flow sensor is abnormal.	←
Nothing special.	Learning value and correction value cannot be used.

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

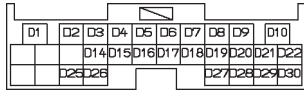
Fault Code	Trouble	Cause	Remedy
20100-2	Overheat Alarm	Coolant temperature is high while the engine runs.	Check the harness. Replace the overheat switch.
20101-2	Engine Trouble Alarm	Faulty engine system	Refer to Engine Troubleshooting Manual.
20102-2	Engine Oil Pressure Alarm	Engine oil pressure is reduced.	Check the harness. Replace the engine oil pressure sensor.
20105-2	Hydraulic Oil Filter Restriction Alarm	Clogged hydraulic oil filter. Open circuit in harness.	Check the harness. Replace the hydraulic oil filter restriction switch.
20106-2	Air Cleaner Restriction Alarm	Clogged air cleaner.	Check the harness. Replace the air cleaner restriction switch.
20107-2	Water Separator Alarm	The water separator is full.	Check the harness. Replace the water separator alarm switch.
20109-2	Pilot Control Shut-Off Lever Alarm	Faulty pilot shut-off switch.	Check the harness. Replace the pilot shut-off switch.
20110-2	Fuel Filter Restriction Alarm	Supply pump inlet pressure is reduced.	Check the harness. Replace the fuel filter.
20114-2	Overheat Alarm	Coolant temperature is high within ten seconds after the engine starts.	Check the harness. Replace the overheat switch.
20133-2	Crane Function Alarm	Faulty crane related components.	Check the harness.
20137-2	Muffler Filter Alarm (blinking) (red)	Faulty muffler filter.	Check the harness. Replace the muffler filter differential pressure sensor.
20141-2	Exhaust Temperature Alarm	Exhaust temperature around the muffler is high.	Check the harness. Replace the exhaust temperature sensor.
20142-2	Intake Air Temperature Alarm	Intake air temperature increases.	Check the harness. Replace the intake-air temperature sensor.
20145-2	Boost Temperature Alarm	Boost temperature increases.	Check the harness. Replace the boost temperature sensor.
20146-2	Fuel Temperature Alarm	Fuel temperature increases.	Check the harness. Replace the fuel temperature sensor.
20149-2	EGR Temperature Alarm	EGR gas temperature increases.	Check the harness. Replace the intake manifold temperature sensor.

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Connector (Harness end)

- MC-D Connector



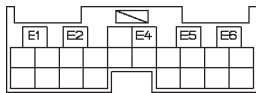
TDAB-05-06-005

- Monitor Controller-A Connector



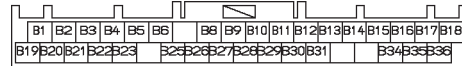
TDAB-05-06-011

- MC-E Connector



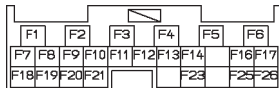
TDAB-05-06-006

- Monitor Controller-B Connector



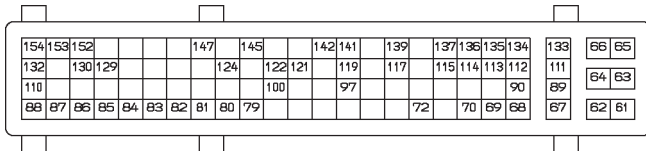
TDAB-05-06-012

- MC-F Connector



TDAB-05-06-007

- ECM-2 Connector



TDAB-05-06-021

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

MC Fault Code 11101

Preparation

- Check the wiring connections first.

Fault Code	Trouble	Inspection Method	Evaluation	Cause
11101-3	Engine Control Dial Sensor Circuit High Input	Measure resistance between switch panel end #1 and #2.	0 Ω	Faulty engine control dial.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.
11101-4	Engine Control Dial Sensor Circuit Low Input	Measure resistance between switch panel end #1 and #2.	∞ Ω	Faulty engine control dial.
		Measure voltage between switch panel harness end #1 and body.	0 V	Open circuit in harness #1.
		Measure voltage between switch panel harness end #1 and #3.	0 V	Open circuit in harness #3.
		-	Normal in above check.	Open circuit in harness #2.

Connector (Harness end)

- Switch Panel
(Engine Control Dial)

1	2	3	○	4	5	6	7	
8	9			12	13	14	15	16

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SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

MC Fault Code 11407

Preparation

- Check the wiring connections first.

Fault Code	Trouble	Inspection Method	Evaluation	Cause
11407-2	5-Spool Solenoid Valve Unit (SI) Abnormal FB	Measure resistance between solenoid valve #1 and #2.	0 / ∞ Ω (Normal value: 22 Ω)	Faulty solenoid valve.
		Measure voltage between solenoid valve harness end #1 and body.	0 V	Open circuit in harness #1.
		Monitor Pressure Increase (Power Digging & Fast Travel Mode) P/S Valve Output FB.	0 mA	Open circuit in harness #2.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.
11407-3	5-Spool Solenoid Valve Unit (SI) FB High Current	Measure resistance between solenoid valve #1 and #2.	0 Ω (Normal value: 22 Ω)	Faulty solenoid valve.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.
11407-4	5-Spool Solenoid Valve Unit (SI) FB Low Current	Measure resistance between solenoid valve #1 and #2.	∞ Ω (Normal value: 22 Ω)	Faulty solenoid valve.
		Measure voltage between solenoid valve harness end #1 and body.	0 V	Open circuit in harness #1.
		Monitor Pressure Increase (Power Digging & Fast Travel Mode) P/S Valve Output FB.	0 mA	Open circuit in harness #2.

Connector (Harness end)

- Solenoid Valve Connector



T1V1-05-04-003

SECTION 5 TROUBLESHOOTING

Group 5 Troubleshooting A

Monitor Controller (Information) Fault Codes 13304, 13310

Fault Code	Trouble	Inspection Method	Evaluation	Cause
13304-2	Abnormal REG input H level	Measurement of voltage between monitor controller harness end #A15 and body	13 to 33.5 V	Faulty monitor controller.
		Measurement of voltage at alternator terminal L	13 to 33.5 V	Open circuit in harness.
		-	Normal in above check	Faulty alternator.
13310-3	Shorted circuit in coolant temperature sensor	Measurement of resistance between sensor #3 and body	Refer to the table	Faulty sensor.
		-	Normal in above check	Shorted circuit in harness #3.

Connector (Harness end)

- Monitor Controller-A Connector



TDAB-05-06-011

Coolant Temperature Gauge	No.	Coolant Temperature (°C)	Coolant Temperature Sensor (kΩ)
<p>The diagram shows a circular gauge with a needle. Points A through F are marked on the scale: A at the bottom (0°C), B at approximately 20°C, C at 50°C, D at 90°C, E at 105°C, and F at 110°C. A thermometer icon is shown next to the gauge.</p>	A	-10	9.20 ^{+1.2} _{-1.07}
	A	20	2.50 ^{+0.27} _{-0.24}
	A	39	-
	B	50	0.84±0.07
	C	90	0.247±0.01
	D	100	0.190±0.005
	F	110	0.148±0.004

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Connector (Sensor end)

- Coolant Temperature Sensor



T1J1-05-06-004

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

Parts	Power Digging Switch	Pilot Shut-Off Switch (Pilot Shut-Off Lever)	Muffler Filter Regeneration Switch
Item			
Function	Shifts solenoid valve unit (SI) and activates power digging. ON: 0 V→Increasing pressure OFF: 5 V→Not increasing pressure	Shifts pilot shut-off solenoid valve.	Regenerates muffler filter manually.
Symptoms in control system when trouble occurs	Same as shown below	Same as shown below	Same as shown below
Symptoms in machine operation when trouble occurs	Open circuit: Pressure does not increase. Shorted circuit: Pressure increase only for 8 seconds after the key switch is turned ON.	Open circuit: Pilot shut-off switch is always OFF. Pilot shut-off solenoid valve is not shifted. Even if lever is operated with pilot shut-off lever in UNLOCK position, all actuators are not operated. Shorted circuit: Pilot shut-off switch is always ON. Engine does not start. If shorted circuit occurs while running engine, operate lever with pilot shut-off lever in LOCK position so that actuator is operated.	Open circuit: Muffler filter regeneration switch is always OFF. Even if muffler filter regeneration switch is set to ON, muffler filter is not regenerated. Shorted circuit: Muffler filter regeneration switch is always ON.
Evaluation by Fault Code	-	-	-
Evaluation by Monitoring	MC: Power Boost Switch	MC: PCSL Lever Switch	ECM: Muf/Fltr Switch
Evaluation by using Test Harness	-	-	-
Note	-	-	-
Descriptions of Control (Operational Principle Section in T/M)	T2-2	T2-5	T2-2

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

Parts	5-Spool Solenoid Valve Unit (SI)	5-Spool Solenoid Valve Unit (SD)	5-Spool Solenoid Valve Unit (SE)
Item			
Function	Increases relief pressure of main relief valve temporarily. Decreases displacement angle of travel motor to the minimum and increases travel speed.	Shifts selector valve of arm 2 flow rate control valve.	Shifts selector valve of arm 1 flow rate control valve.
Symptoms in control system when trouble occurs	Same as shown below	Same as shown below	Same as shown below
Symptoms in machine operation when trouble occurs	High current: Pressure always increases. Machine is kept to travel at fast speed. Low current: Pressure always does not increase. Machine is kept to travel at slow speed.	High current: As arm 2 flow rate control valve (selector valve) is always restricted, arm speed becomes slow. Low current: As arm 2 flow rate control valve (selector valve) is always open, combined operation including arm is not smooth.	High current: As arm 1 flow rate control valve (selector valve) is always restricted, arm speed becomes slow. Low current: As arm 1 flow rate control valve (selector valve) is always open, combined operation including arm is not smooth.
Evaluation by Fault Code	11407	11428	11427
Evaluation by Monitoring	MC: Pressure Boost P/S Output, Pressure Boost P/S Output FB	MC: Arm 2 Flw Cont P/S Output, Arm 2 Flw Cont P/S O/P FB	MC: Arm 1 Flw Cont P/S Output, Arm 1 Flw Cont P/S O/P FB
Evaluation by using Test Harness	Install light harness (ST 7226). Check output signals from MC and harness condition.	Install light harness (ST 7226). Check output signals from MC and harness condition.	Install light harness (ST 7226). Check output signals from MC and harness condition.
Note	-	-	-
Descriptions of Control (Operational Principle Section in T/M)	T2-2	T2-2	T2-2

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

Parts	Flow Combiner Valve Control Spool	Auxiliary Flow Combiner Solenoid Valve (OP)	Auxiliary Flow Rate Control Solenoid Valve (OP)
Item			
Function	Is shifted by travel (right) pilot pressure. Supplies selection pressure to flow combiner valve in control valve.	Shifts auxiliary flow combiner valve.	Shifts selector valve of auxiliary flow rate control valve.
Symptoms in control system when trouble occurs	Same as shown below	Solenoid valve is not shifted. Pressure at output port becomes 0 MPa.	Same as shown below
Symptoms in machine operation when trouble occurs	If stuck in fully closed position, machine mistracks to the left during combined operation of travel and front attachment/swing. Travel (left) speed becomes slow. If stuck in fully open position, machine mistracks to the right when traveling. Travel (right) speed becomes slightly slow.	Attachment speed does not increase during attachment single operation.	High current: Attachment speed is slow during attachment single operation. Low current: Boom raise speed is slow during combined operation of boom raise, arm roll-out, and attachment.
Evaluation by Fault Code	-	11457	-
Evaluation by Monitoring	-	MC: Auxiliary Flow Combiner Valve (OPT)	MC: Auxil Flw Cont P/S Output, Auxil Flw Cont P/S O/P FB
Evaluation by using Test Harness	-	-	-
Note	-	-	-
Descriptions of Control (Operational Principle Section in T/M)	T3-6	T2-2	T2-2

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

Front Attachment System Troubleshooting

Parts	Trouble Symptom	F-1	F-2	F-3
		All front attachment actuator power are weak.	Even if power digging switch is pushed, power does not increase. Boom raise power is weak during digging operation.	Some cylinders are not operated or speeds are slow.
MC		○	○	
Power Mode Switch				
Power Digging Switch			●	
Main Pump 1		○	○	
Main Pump 2		○	○	
Main Pump 3			○	
Pilot Pump		○	○	●
Pump 1 Regulator				
Pump 2 Regulator				
Pump 3 Regulator				
Pump 1 Delivery Pressure Sensor		○	○	
Pump 2 Delivery Pressure Sensor				
Pump 3 Delivery Pressure Sensor				
Pump 1 and 2 Torque Control Solenoid Valve		○		
Main Relief Valve (Pumps 1, 2)		●	●	
Main Relief Valve (Pump 3)		●	●	
Boom Anti-Drift Valve				
Arm Anti-Drift Valve (Rod Side)				
Arm Anti-Drift Valve (Bottom Side)				
Boom Regenerative Valve				
Arm Regenerative Valve				
Bucket Regenerative Valve				
Bucket Regeneration Cut Valve				
Arm 1 Flow Rate Control Valve				
Arm 2 Flow Rate Control Valve				
Bypass Shut-Out Valve				
Digging Regenerative Valve				
Boom Lower Meter-In Cut Valve				
Load Check Valve				
Spool				●
Pressure Sensor (Boom Raise)		○	○	
Pressure Sensor (Arm Roll-In)		○	○	
Pressure Sensor (Bucket Roll-In)				
Cylinder				○
Pilot Valve				●
Shockless Valve (Signal Control Valve)				● (only Boom)
Shuttle Valve (Signal Control Valve)		○		○
Pressure Sensor (Travel)				
Pressure Sensor (Swing)				
Pressure Sensor (Front Attachment)		○		
5-Spool Solenoid Valve Unit (SI)		○	○	
5-Spool Solenoid Valve Unit (SD)				
5-Spool Solenoid Valve Unit (SE)				
5-Spool Solenoid Valve Unit (SF)				
5-Spool Solenoid Valve Unit (SC)				
Pilot Filter		○	○	○
Pilot Relief Valve		○	○	○
Remark				

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

Engine System Troubleshooting

E-1 Starter does not rotate.

Preparation

- Check that the pilot shut-off lever is in the LOCK position.
- This trouble has nothing to do with the electronic control system such as MC.
- Check the wiring connections first.
- In case the radio with the key switch set in the ACC position and the horn with the key switch set in the OFF position are operated normally, the harness between battery and key switch terminal B is considered normal.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Measure battery voltage and electrolyte density	-	The measured values are not within the normal values (Normal value: Voltage: 24 V or more, Electrolyte density: 1.26 or more)	Faulty battery
2	Switch the starter cut relay with other general relay	Set the key switch to START after switching relays	Starter: Rotating	Faulty starter cut relay
3	Measure voltage between starter cut relay harness end #1 and #3	Key Switch: START	0 V	Open circuit in harness between key switch and starter cut relay
4	Measure voltage at starter relay 1 harness end terminal S	Key Switch: START	0 V	Open circuit in harness between starter cut relay and starter relay 1
5	Measure voltage at starter cut relay harness end #2	Key Switch: ON	0 V	Shorted circuit in harness between starter cut relay and engine stop switch
6	Measure voltage at battery relay terminal A	Key Switch: ON	0 V	Faulty battery relay
7	Measure voltage at starter terminal S	Key Switch: START	0 V	Faulty starter relay 1
8	Check continuity between key switch #1 and #6	Key Switch: START	$\infty \Omega$	Faulty key switch
9	-	-	The check mentioned above is normal	Faulty starter

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

A-3 Travel (right) operation speed is slow during travel single operation. Bucket single operation speed is slow. (All problems occur at the same time.)

Preparation

- The pump 1 flow rate is minimized due to some reasons. Accordingly, travel (right) and bucket, which are driven by pressure oil from pump 1, move very slow.
- Refer to SYSTEM / Hydraulic System.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Monitor Pump 1 Control Pressure	Operate travel (right) control lever	Pressure does not increase according to control lever stroke	Stuck pump 1 flow rate control valve in signal control valve
2	-	-	The check mentioned above is normal	Faulty pump 1 regulator

SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

F-6 Boom raise speed is slow during combined operation of swing and boom raise.

Preparation

- In case other trouble symptoms occur, perform troubleshooting of these troubles first.
- If the fault code is not displayed, the power mode switch may be faulty.
- Refer to SYSTEM / Control System / Swing and Boom Raise Pump Torque Increase Control.

SECTION 5 TROUBLESHOOTING
Group 6 Troubleshooting B

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SECTION 5 TROUBLESHOOTING

Group 6 Troubleshooting B

O-2 Boom light does not light.

Preparation

- Check that the boom lights are not broken first.
- Refer to SYSTEM / Electrical System.
- Check the wiring connections first.

Procedure	Inspection Method	Condition	Evaluation	Cause
1	Monitor Work Light 2 Output	Work Light Switch: 2 position	OFF is displayed	Faulty work light relay 2 or open circuit in harness between work light relay 2 and wiper/light controller
2	Monitor Work Light 2 Switch	Work Light Switch: 2 position	OFF is displayed	Faulty work light switch or open circuit in harness between work light switch and wiper/light controller
3	-	-	The check mentioned above is normal	Faulty wiper/light controller

SECTION 5 TROUBLESHOOTING

Group 7 Air Conditioner

Outline

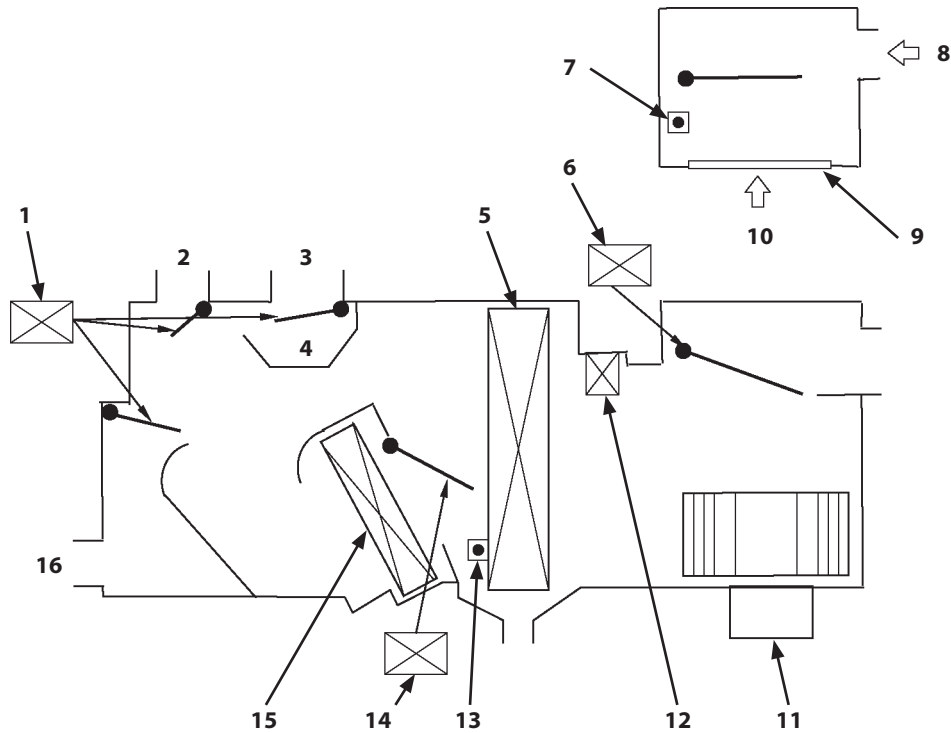
Operation layout of the air conditioning system is illustrated below.

Either fresh or re-circulated air is induced into the air conditioner unit by operating fresh / re-circulated air damper servo motor (6).

The induced air flows out of the vents through evaporator (5) or heater (15) by blower motor (11). Evaporator (5) is a device used to cool the air. Heater (15) is a device used to warm the air. In the air conditioning system, after the refrigerant is compressed by the compressor, it is sent to evaporator (5) in which the refrigerant expands to cool the air. Heater (15) warms air by first absorbing heat from warmed engine coolant. Evaporator (5) and heater (15) allow the introduced air to circulate in the system to maintain the temperature at the set temperature.

The vents (operator's front/rear vent, foot vent, and the front window) can be simultaneously or independently selected by air vent damper servo motor (1) in accordance with the set-ventilation mode.

The front window and operator's front vents are manually selectable. The air conditioning controller controls the air conditioning system. The air conditioning controller controls the damper operation by corresponding to the job site conditions such as atmospheric and cab inside air temperatures, coolant temperature, operator's set-temperature, and the selected ventilation mode. In addition, the air conditioning controller displays the air conditioning system operation status on the monitor.



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- | | | | |
|--------------------------------|---|--------------------------------------|--------------------------------|
| 1- Air Vent Damper Servo Motor | 6- Fresh / Re-circulated Air Damper Servo Motor | 10- Re-circulated Air Induction Port | 14- Air Mix Damper Servo Motor |
| 2- Defroster Vent | 7- Re-circulated Air Sensor | 11- Blower Motor | 15- Heater Core |
| 3- Rear Vent | 8- Fresh Air Induction Port | 12- Power Transistor | 16- Foot Vent |
| 4- Front Vent | 9- Re-circulated Air Filter | 13- Frost Sensor | |
| 5- Evaporator | | | |

SECTION 5 TROUBLESHOOTING

Group 7 Air Conditioner

Air Conditioner Controller Fault Codes 11 to 22

Preparation

- Check the wiring connections first.
- Before inspection, set the key switch to the ON position.

Fault Code	Trouble	Inspection Method	Evaluation	Cause
11	Open circuit in re-circulated air sensor	Measurement of resistance between sensor #1 and #2.	$\infty \Omega$ (Normal value: 300 to 430 k Ω)	Faulty sensor.
		Measurement of voltage between sensor harness end #1 and body.	0 V	Open circuit in harness #1.
		-	Normal in above check.	Open circuit in harness #2.
12	Shorted circuit in re-circulated air sensor	Measurement of resistance between sensor #1 and #2.	0 Ω (Normal value: 300 to 430 k Ω)	Faulty sensor.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.
13	Open circuit in outdoor ambient temperature sensor	Measurement of resistance between sensor #1 and #2.	$\infty \Omega$ (Normal value: 100 to 210 k Ω)	Faulty sensor.
		Measurement of voltage between sensor harness end #1 and body.	0 V	Open circuit in harness #1.
		-	Normal in above check.	Open circuit in harness #2.
14	Shorted circuit in outdoor ambient temperature sensor	Measurement of resistance between sensor #1 and #2.	0 Ω (Normal value: 100 to 210 k Ω)	Faulty sensor.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.
18	Shorted circuit in solar radiation sensor	Continuity check between sensor harness end #1 and #2.	0 Ω	Shorted circuit in harness #1 and #2.
		-	Normal in above check.	Faulty sensor.
21	Open circuit in frost sensor	Measurement of resistance between sensor #1 and #2.	$\infty \Omega$ (Normal value: 100 to 115 k Ω)	Faulty sensor.
		Measurement of voltage between sensor harness end #1 and body.	0 V	Open circuit in harness #1.
		-	Normal in above check.	Open circuit in harness #2.
22	Shorted circuit in frost sensor	Measurement of resistance between sensor #1 and #2.	0 Ω (Normal value: 100 to 115 k Ω)	Faulty sensor.
		-	Normal in above check.	Shorted circuit in harness #1 and #2.

SECTION 5 TROUBLESHOOTING

Group 7 Air Conditioner

A: Frosted evaporator

Frosted evaporator	Stop air conditioner and melt ice			
	With voltage applied to magnet clutch	Faulty magnet clutch circuit	Check of clutch circuit	Replace clutch relay
		Faulty wiring of frost sensor	Shorted circuit check	Repair
		Faulty frost sensor characteristics	Characteristic check	Replace frost sensor
		Frost sensor is out of evaporator range (faulty sensitivity)	Reinsert (floating distance from evaporator is 3 mm or less)	
No voltage applied to magnet clutch		Faulty magnet clutch	Replace magnet clutch	

B: Low refrigerant

Low refrigerant	Low refrigerant quantity	Charge refrigerant to proper level
	Gas leak	Check leak and charge with refrigerant after repairing faulty

C: Clogged during refrigeration cycle

Clogged during refrigeration cycle	Clogged receiver dryer	Replace
	Clogged foreign matter in piping	Replace

D: Faulty expansion valve

Faulty expansion valve	Clogged valve (foreign matter)	Replace valve
	Temporary clogged due to freezing valve (water intrusion)	Thoroughly perform purging after replacing valve and receiver

SECTION 5 TROUBLESHOOTING

Group 7 Air Conditioner

Compressor clutch does not operate.

Preparation

- Check that fresh air temperature is 0 °C or more first.
When fresh air temperature is less than 0 °C, the air conditioner controller turns the compressor clutch OFF in order to protect the compressor.
- Check that fault code 21 or 22 (abnormal frost sensor) is not displayed. When the frost sensor is abnormal, the compressor clutch does not operate.
- Check the wiring connections first.

Procedure	Inspection Method	Condition	Evaluation	Cause (check point)
1	Switch compressor relay with blower motor relay.	Key Switch: ON Blower Switch: ON	Compressor is not operable.	Faulty compressor relay.
2	Measurement of voltage between terminal #48A of compressor relay harness end and body.	Key Switch: ON	0 V	Open circuit in harness between fuse #3 and compressor relay.
3	Measurement of voltage between terminal #42A of compressor clutch relay harness end and body.	Key Switch: ON Blower Switch: ON	0 V	Open circuit in harness between compressor relay and compressor clutch.
4	-	-	Procedures as steps 1 to 3 above are normal.	Faulty compressor clutch.

Connector (Harness end)

- Compressor Relay



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- Compressor Clutch



TDAB-05-07-024

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