

PART NO. TT1T1-E-00

**HITACHI**

# Technical Manual

## Troubleshooting

# ZAXIS

## 160LC-3

## 180LC-3

## 180LCN-3

## Hydraulic Excavator

ZAXIS160LC-3 • 180LC-3 • 180LCN-3  
HYDRAULIC EXCAVATOR TECHNICAL MANUAL TROUBLESHOOTING

 **Hitachi Construction Machinery Co., Ltd.**  
URL:<http://www.hitachi-c-m.com>

Service Manual consists of the following separate Part No;  
Technical Manual (Operational Principle) : Vol. No.TO1T1-E  
Technical Manual (Troubleshooting) : Vol. No.TT1T1-E  
Workshop Manual : Vol. No.W1T1-E  
Engine Manual : Vol. No.KM-4JJ1-E

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## SAFETY

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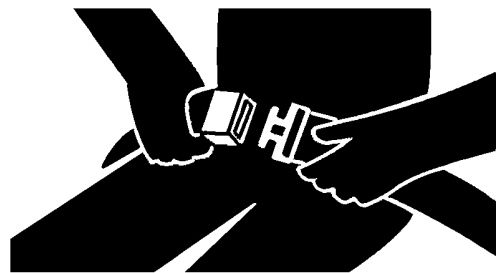
### ENSURE SAFETY BEFORE RISING FROM OR LEAVING OPERATOR'S SEAT

- Before rising from the operator's seat to open/close either side window or to adjust the seat position, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Failure to do so may allow the machine to unexpectedly move when a body part unintentionally comes in contact with a control lever, possibly resulting in serious personal injury or death.
- Before leaving the machine, be sure to first lower the front attachment to the ground and then move the pilot control shut-off lever to the LOCK position. Turn the key switch OFF to stop the engine.
- Before leaving the machine, close all windows, doors, and access covers and lock them up.

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### FASTEN YOUR SEAT BELT

- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
- Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine.
- Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimize the chance of injury from an accident.
- We recommend that the seat belt be replaced every three years regardless of its apparent condition.



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## SAFETY

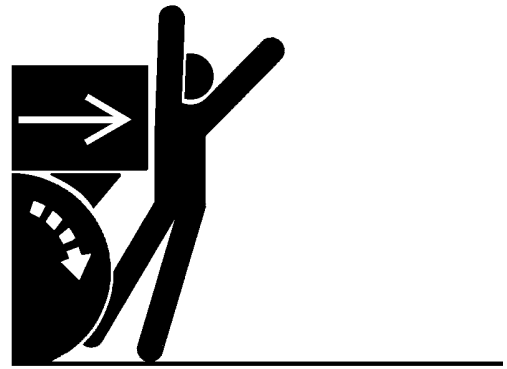
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### AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

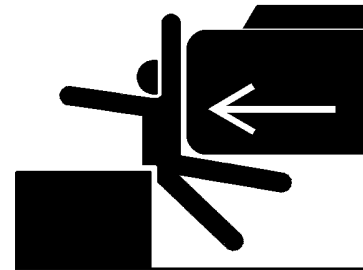
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

To avoid back-over and swing accidents:

- Always look around **BEFORE YOU BACK UP AND SWING THE MACHINE**. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
- Keep the travel alarm in working condition (if equipped).  
ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.
- USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.  
Use hand signals, which conform to your local regulations, when work conditions require a signal person.
- No machine motions shall be made unless signals are clearly understood by both signalman and operator.
- Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
- Keep windows, mirrors, and lights clean and in good condition.
- Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
- Read and understand all operating instructions in the operator's manual.



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## SAFETY

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### PREVENT PARTS FROM FLYING

- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
  - Do not attempt to remove GREASE FITTING or VALVE ASSEMBLY.
  - As pieces may fly off, be sure to keep body and face away from valve.
  - Never attempt to disassemble the track adjuster. Inadvertent disassembling of the track adjuster may cause the parts such as a spring to fly off, possibly resulting in severe personal injury or death.
- Travel reduction gears are under pressure.
  - As pieces may fly off, be sure to keep body and face away from AIR RELEASE PLUG to avoid injury.
  - GEAR OIL is hot. Wait for GEAR OIL to cool, and then gradually loosen AIR RELEASE PLUG to release pressure.



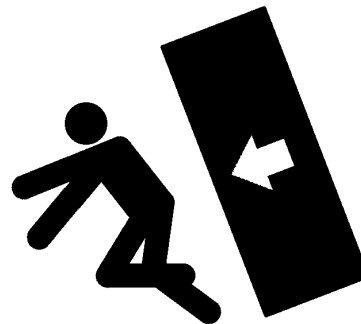
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### STORE ATTACHMENTS SAFELY

- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
  - Securely store attachments and implements to prevent falling. Keep children and bystanders away from storage areas.



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## SECTION AND GROUP CONTENTS

## TECHNICAL MANUAL

(Troubleshooting)

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- Group 2 Component Layout
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- Group 7 Others (Upperstructure)
- Group 8 Others (Undercarriage)

*All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.*

## WORKSHOP MANUAL

### SECTION 1 GENERAL INFORMATION

- Group 1 Precautions for Disassembling and Assembling
- Group 2 Tightening Torque
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### SECTION 2 UPPERSTRUCTURE

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- Group 2 Counterweight
- Group 3 Main Frame
- Group 4 Pump Device
- Group 5 Control Valve
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- Group 7 Pilot Valve
- Group 8 Pilot Shut-Off Solenoid Valve
- Group 9 Signal Control Valve

- Group 10 4-Spool Solenoid Valve Unit
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- Group 1 Swing Bearing
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- Group 5 Front Idler
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### SECTION 4 FRONT ATTACHMENT

- Group 1 Front Attachment
- Group 2 Cylinder
- Group 3 Control Valve

## OPERATIONAL PERFORMANCE TEST / Standard

PERFORMANCE TEST DESIGNATION	ZAXIS160LC-3 (Performance Standard)	Remarks	Reference Page
<b>MAIN RELIEF VALVE PRESSURE</b> MPa (kgf/cm <sup>2</sup> , psi)			T4-5-8
Arm, Bucket (Relief operation for each)	34.3 <sup>+2.0</sup> <sub>-0.5</sub> (350 <sup>+20</sup> <sub>-5</sub> , 4980 <sup>+284</sup> <sub>-71</sub> )		
Relief operation of Positioning (2-piece boom only)	34.3 <sup>+2.0</sup> <sub>-0.5</sub> (350 <sup>+20</sup> <sub>-5</sub> , 4980 <sup>+284</sup> <sub>-71</sub> )		
Power Digging Boom raise relief operation	36.3 <sup>+2.0</sup> <sub>-1.0</sub> (370 <sup>+20</sup> <sub>-10</sub> , 5260 <sup>+284</sup> <sub>-142</sub> )		
<b>RELIEF PRESSURE</b> MPa (kgf/cm <sup>2</sup> , psi) <b>(Relief operation for Swing)</b>	30.2 <sup>+2.3</sup> <sub>-0.5</sub> (308 <sup>+23</sup> <sub>-5</sub> , 4390 <sup>+330</sup> <sub>-73</sub> )		T4-5-10
<b>OVERLOAD RELIEF PRESSURE</b> MPa (kgf/cm <sup>2</sup> , psi)		(Reference values at 50 L/min)	T4-5-12
Boom Lower, Arm Roll-In, Bucket Roll-In	37.2 <sup>+1.0</sup> <sub>-0</sub> (380 <sup>+10</sup> <sub>-0</sub> , 5400 <sup>+142</sup> <sub>-0</sub> )		
Boom Raise, Arm Roll-Out, Bucket Roll-Out	39.2 <sup>+1.0</sup> <sub>-0</sub> (400 <sup>+10</sup> <sub>-0</sub> , 5690 <sup>+142</sup> <sub>-0</sub> )		
<b>MAIN PUMP FLOW RATE</b> (L/min)	-	Refer to pages T4-2-12, 13.	T4-5-14
<b>SWING MOTOR DRAINAGE</b> (L/min)			T4-5-20
With constant speed	0.2 to 0.5		
With the motor relieved	(2 to 5)		
<b>TRAVEL MOTOR DRAINAGE</b> (L/min)			T4-5-22
With the track jacked up	Less than 10	Allowable limit: 10	
With the motor relieved	Less than 15	Allowable limit: 15	

## OPERATIONAL PERFORMANCE TEST / Standard

### ADJUSTMENT DATA LIST

#### ZX160-3 class

Adjustment Data	Min. Adjust-ment Value	Adjustable Range	Standard Adjustment	Remarks
		Range		
Li Speed	10 min <sup>-1</sup>	0 to 400 min <sup>-1</sup>	0 min <sup>-1</sup>	
WU Speed	10 min <sup>-1</sup>	-450 to 200 min <sup>-1</sup>	0 min <sup>-1</sup>	
AI Speed	10 min <sup>-1</sup>	-400 to 400 min <sup>-1</sup>	0 min <sup>-1</sup>	
P Speed	10 min <sup>-1</sup>	-200 to 200 min <sup>-1</sup>	0 min <sup>-1</sup>	
Pump PQ Torque Adjust-ment	2.45 N·m	-60 to 60 N·m	0 N·m	
ATT Proportional Valve	0.0196 MPa	-0.9996 to 0.9996 MPa	0 MPa	
ATT Speed Increase Down Waiting Time	40 ms	0 to 3000 ms	3000 ms	
Min, Boom CYL. Bottom Pressure Over Balance	0.2 MPa	-9.8 to 14.7 MPa	0 MPa	

#### ZX180-3 class

Adjustment Data	Min. Adjust-ment Value	Adjustable Range	Standard Adjustment	Remarks
		Range		
Li Speed	10 min <sup>-1</sup>	0 to 400 min <sup>-1</sup>	0 min <sup>-1</sup>	
WU Speed	10 min <sup>-1</sup>	-450 to 200 min <sup>-1</sup>	0 min <sup>-1</sup>	
AI Speed	10 min <sup>-1</sup>	-400 to 400 min <sup>-1</sup>	0 min <sup>-1</sup>	
P Speed	10 min <sup>-1</sup>	-200 to 200 min <sup>-1</sup>	0 min <sup>-1</sup>	
Pump PQ Torque Adjust-ment	2.45 N·m	-60 to 60 N·m	0 N·m	
ATT Proportional Valve	0.0196 MPa	-0.9996 to 0.9996 MPa	0 MPa	
ATT Speed Increase Down Waiting Time	40 ms	0 to 3000 ms	3000 ms	
Min, Boom CYL. Bottom Pressure Over Balance	0.2 MPa	-9.8 to 14.7 MPa	0 MPa	

## OPERATIONAL PERFORMANCE TEST / Standard

Item	Reference Value	Measured Value				Remarks
		First	Second	Third	Average	
<b>BOOM RAISE PILOT CONTROL PRESSURE*</b> (MPa)	3.89					When relieving boom raise
<b>ARM ROLL-IN PILOT CONTROL PRESSURE*</b> (MPa)	3.87					When relieving arm roll-in
<b>SWING PILOT CONTROL PRESSURE*</b> (MPa)	3.96					When relieving swing
<b>TRAVEL PILOT CONTROL PRESSURE*</b> (MPa)	3.96					
<b>FRONT ATTACHMENT CONTROL PRESSURE*</b> (MPa)	3.91					Operate either of boom, arm, bucket or swing
<b>DIGGING REGENERATIVE PROPORTIONAL VALVE OUTPUT</b> (MPa)	3.19					When relieving arm roll-in
<b>PUMP TORQUE PROPOR-TIONAL VALVE OUTPUT</b> (MPa)	0.19					Engine fast idle + when relieving arm roll-in
<b>PUMP 1 LOAD RATE</b>	27					When relieving arm roll-in
<b>PUMP 2 LOAD RATE</b>	27					When relieving arm roll-in
<b>ARM REGENERATIVE PRO-PORTIONAL VALVE OUTPUT*</b> (MPa)	3.99					Arm leveling
<b>POWER DIGGING CONTROL PRESSURE*</b> (MPa)						
During operation	2.99					
When relieving boom raise	2.99					
<b>TRAVEL MOTOR CONTROL PRESSURE*</b> (MPa)	2.99					Travel mode switch: Fast, When travel- ing
<b>PUMP TORQUE PROPOR-TIONAL VALVE OUTPUT FB</b> (mA)	471					When relieving arm roll-in
<b>DIGGING REGENERATIVE PROPORTIONAL VALVE OUTPUT FB</b> (mA)	511					When relieving arm roll-in
<b>ARM REGENERATIVE PRO-PORTIONAL VALVE OUTPUT FB</b> (mA)	511					Arm leveling
<b>POWER DIGGING CONTROL PRESSURE FB</b> (mA)	500					
<b>TRAVEL MODE CONTROL PRESSURE FB</b> (mA)	500					Travel mode switch: Fast, When travel- ing

# OPERATIONAL PERFORMANCE TEST / Engine Test


## ENGINE COMPRESSION PRESSURE

### Summary:

1. Measure compression pressure in the cylinders and check for a decline in engine power.
2. Check exhaust gas color. Keep track of engine oil consumption.
3. Check for abnormalities in the intake system, including the air filter.

### Preparation:

1. Confirm that valve clearances are correct.
2. Confirm that the batteries are charged properly.
3. Run the engine until the coolant temperature gauge reaches the operating range.
4. Remove the negative terminal of the battery. Remove all the glow plugs from each cylinder.

 : 20 N·m (2.0 kgf·m, 14.8 lbf·ft)

**IMPORTANT:** If disconnecting the connector of injector, fuel cannot be jetted. Therefore, ECM judges that the fuel system is faulty and the fault code is displayed. After measurement, delete the displayed fault code.

5. Disconnect the connector of injector.
6. Install the negative terminal of the battery.
7. Turn the starter. Exhaust foreign subjects from the cylinder.
8. Install a pressure gauge and an adaptor (Isuzu 5-8840-2815-0) to the glow plug mounting part. (Sufficiently install them in order to prevent air leakage.)

### Measurement:

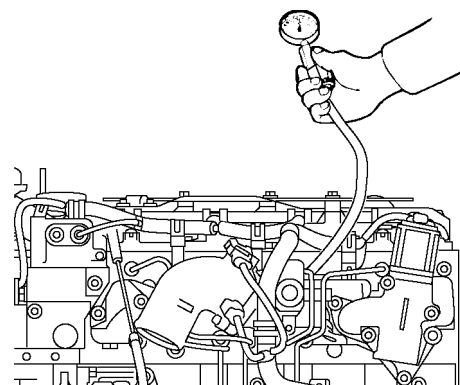
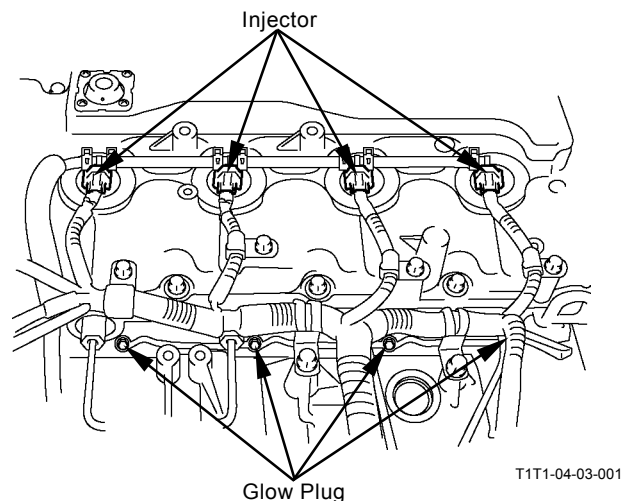
1. Turn the starter and measure compression pressure of each cylinder.
2. Repeat the measurement three times and calculate the mean values.

### Evaluation:

Refer to Operational Performance Standard in Group T4-2.

### Remedy:

Refer to the engine shop manual.



# OPERATIONAL PERFORMANCE TEST / Excavator Test

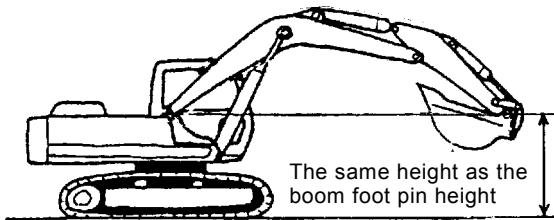
## SWING SPEED

### Summary:

Measure the time required to swing three complete turns and check the performance of swing device systems (from main pump to swing motor).

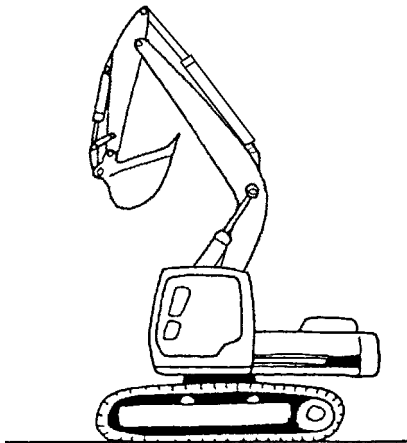
### Preparation:

1. Check lubrication of the swing gear and swing bearing.
2. Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.
3. With the arm fully retracted and the bucket fully extended, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.



T105-06-03-013

**NOTE:** In case a sufficient space for the measurement is difficult to find, carry out the measurement with the boom fully raised and the arm fully rolled-in.



T178-04-03-001

4. Maintain the hydraulic oil temperature at  $50 \pm 5$  °C ( $122 \pm 41$  °F).

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

### Measurement:

1. Select the following switch positions:

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

2. Operate the swing control lever fully.
3. Measure the time required to swing 3 turns in one direction.
4. Operate swing control lever fully in the opposite direction and measure the time required for 3 turns.
5. Repeat the measurement three times and calculate the average values.

### Evaluation:

Refer to the Operational Performance Standard in Group T4-2.

### Remedy:

Refer to the Troubleshooting B in Group T5-6.

## OPERATIONAL PERFORMANCE TEST / Excavator Test

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### Measurement:

1. Select the following switch positions:

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

2. Measure the cylinder cycle times as follows:  
(Cylinder full stroke includes cylinder cushioning zone.)
  - Boom cylinder:  
Operate the boom control lever to full stroke.  
Measure the time to raise and lower the boom.
  - Arm cylinder:  
Operate the arm control lever to full stroke.  
Measure the time to roll in and roll out the arm.
  - Bucket cylinder:  
Operate the bucket control lever to full stroke.  
Measure the time to roll in and roll out the bucket.
3. Repeat each measurement three times and calculate the average values.

### Evaluation:

Refer to the Operational Performance Standard in Group T4-2.

### Remedy:


Refer to the Troubleshooting B in Group T5-6.

# OPERATIONAL PERFORMANCE TEST / Component Test

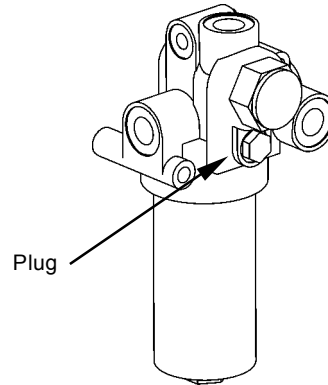
## PRIMARY PILOT PRESSURE

### Preparation:

1. Stop the engine.
2. Push the air bleed valve on top of the hydraulic oil tank and release any remaining pressure.
3. Remove the plug from the pilot filter. Install adapter (ST 6069) and pressure gauge (ST 6942) to the pressure check port.

 : 14 mm

4. Start the engine. Confirm that no oil leakage is observed at the pressure gauge connection.
5. Maintain the hydraulic oil temperature at  $50 \pm 5$  °C ( $122 \pm 41$  °F).



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### Measurement:

1. Select the following switch positions:

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

2. Measure pilot pressure in each specified setting above without load.
3. Repeat the measurement three times and calculate the average values.

### Evaluation:

Refer to the Performance Standard Table in Group T4-2.

# OPERATIONAL PERFORMANCE TEST / Component Test


## Main Relief Pressure Adjustment Procedure


### Adjustment:

In case of pressure adjustment during power digging operation, adjust the high-pressure side of main relief pressure. In case of pressure adjustment in normal, adjust the low-pressure side of main relief pressure.

### • High-Pressure Side of Main Relief Pressure Adjustment Procedure

1. Loosen lock nut (1). Lightly tighten plug (3) until plug (3) comes into contact with the end of piston (2). Tighten lock nut (1).

 : 27 mm


 : Plug (3): 19.5 N·m (2 kgf·m, 14.5 lbf·ft)


: Lock Nut (1):

68 to 78 N·m

(7 to 8 kgf·m, 51 to 58 lbf·ft) or less

2. Loosen lock nut (4). Turn plug (5) and adjust pressure until the specified pressure is obtained.

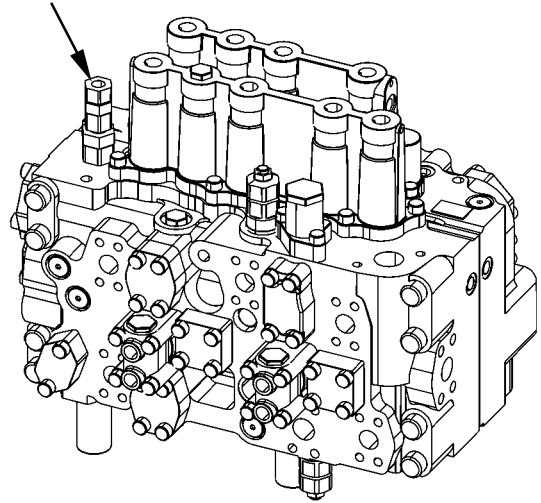
 : 27 mm, 32 mm

 : Lock Nut (4):

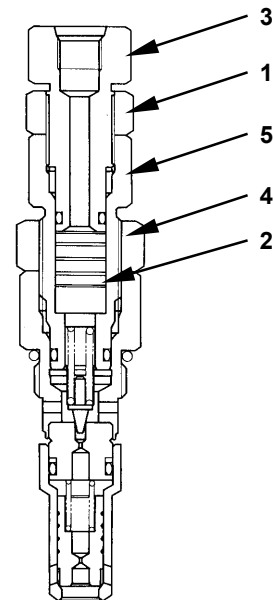
78 to 88 N·m

(8 to 9 kgf·m, 58 to 65 lbf·ft) or less

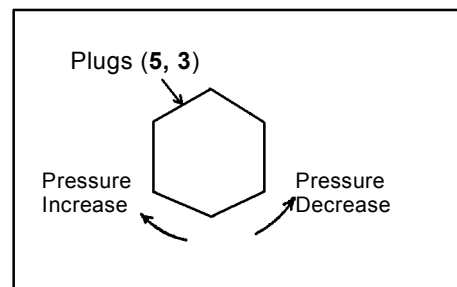
Main Relief Valve



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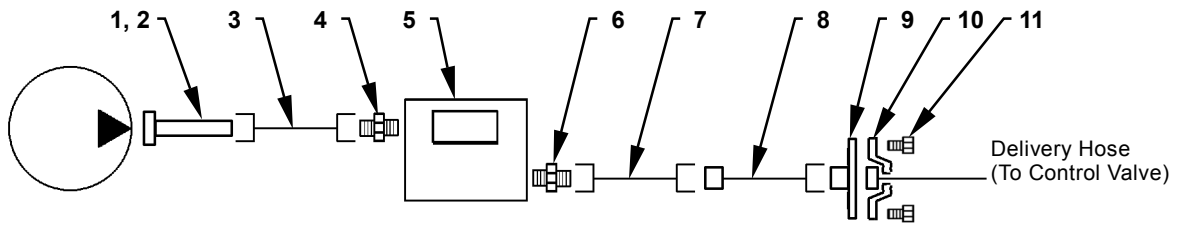


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W107-02-05-127

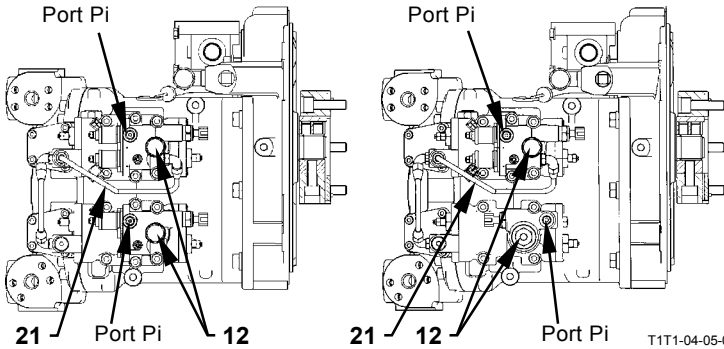
# OPERATIONAL PERFORMANCE TEST / Component Test



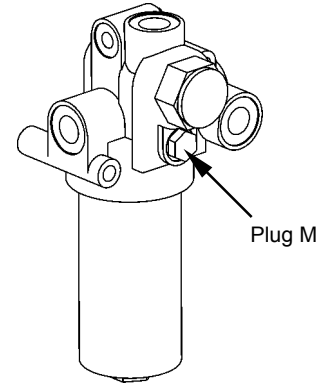
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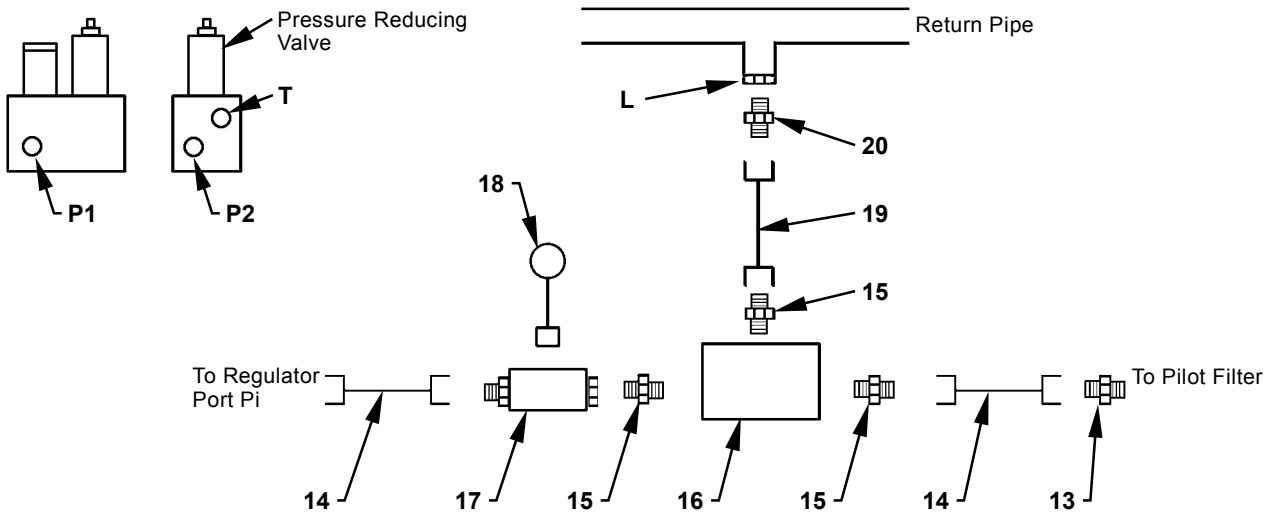


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T178-03-07-001

## Pressure Reducing Valve Port Position



T178-04-04-004

- |                                      |                              |  |   |
|--------------------------------------|------------------------------|--|---|
| 1 - Pipe E (ST 6144)                 | 7 - Joint (ST6330)           | 12 - Plug M                            | 17 - Tee UNF7/16 × UNF7/16× PF1/4 (ST 6451) |
| 2 - Pipe B (ST 6143)                 | 8 - Test Hose (ST 6320)      | 13 - Adapter UNF7/16 × PF1/4 (ST 6069) | 18 - Pressure Gauge (ST 6931)               |
| 3 - Test Hose (ST 6145)              | 9 - Flange (ST 6118)         | 14 - Hose UNF7/16 × UNF7/16 (4334309)  | 19 - Hose UNF7/16 × UNF7/16 (4334309)       |
| 4 - Adapter PF1 × UNF1-7/8 (ST 6146) | 10 - Split Flange (ST 6130)  | 15 - Adapter PF3/8 × UNF7/16 (4200465) | 20 - Adapter PF3/8 × UNF7/16 (4200465)      |
| 5 - Hydraulic Tester (ST 6299)       | 11 - Bolt (ST 6409) (4 Used) | 16 - Pressure Reducing Valve (4325439) | 21 - Pipe                                   |
| 6 - Adapter PF1 × UNF1-7/8 (ST 6146) |                              |  |   |

## OPERATIONAL PERFORMANCE TEST/Adjustment

### ADJUSTMENT

Engine speed, pump delivery flow rate, solenoid valve output pressure and so on can be adjusted.

#### Parameter Change

Item	Data	Unit
Li Speed Adjustment	Adjustment of slow idle engine speed	min <sup>-1</sup>
WU Speed Adjustment	Adjustment of auto warming-up engine speed	min <sup>-1</sup>
AI Speed Adjustment	Adjustment of auto-idle engine speed	min <sup>-1</sup>
P Speed Adjustment	Adjustment of P mode engine speed	min <sup>-1</sup>
Pump PQ Torque Adjustment	Adjustment of pump P-Q curve	N·m
Boom Dampener Proportional Valve Adjustment	Adjustment of solenoid valve	MPa
ATT Proportional Valve Adjustment	Adjustment of optional solenoid valve	MPa
ATT Speed Increase Down Waiting Time	Setting of time required for engine speed decrease	ms
ATT Torque Down ON/OFF	ON/OFF of torque down control when the attachment is operated	ON, OFF
ECO Control Selection	ON/OFF of ECO control	ON, OFF
HP Control Selection	ON/OFF of HP control	ON, OFF
ATT Mode Memory ON/OFF Selection	ON/OFF of attachment mode memory	ON, OFF
Heater Control Selection	ON/OFF of heater control	ON, OFF
Engine Control Theft Prevention Selection	ON/OFF of engine control theft prevention	ON, OFF
Pump Control Theft Prevention Selection	ON/OFF of pump control theft prevention	ON, OFF
Min, Boom CYL. Bottom Pressure Over Balance	Setting of minimum boom cylinder bottom pressure over balance	MPa

**IMPORTANT:** When turning the key switch to the OFF position with the ATT mode memory ON/OFF selection OFF, the selected work mode becomes ineffective and returns to the digging mode. Next time, the work mode should be selected. When turning the key switch to the OFF position with the ATT mode memory ON/OFF selection ON, the selected work mode becomes effective.

# OPERATIONAL PERFORMANCE TEST/Adjustment

**Input Value > Maximum Value  
(Input Value < Minimum Value)**

Push Li Speed Adjustment.

Select item

- Li Speed Adjustment
- WU Speed Adjustment
- AI Speed Adjustment
- P Speed Adjustment

△  
▽

ESC

T1V7-05-03-105

Input the value and push Exec.  
Push ESC and return to Parameter Change Selection Screen.

Li Speed Adjustment  
Adjustable range  
0 ~ 400min-1

Initial                   0 min-1  
Current                   0 min-1

Adjustment : .....min-1

Execution           ESC

T1V7-05-03-106

Push Re-Input and return to Parameter Input Screen. Push Max and the maximum value is input. Push ESC and return to Parameter Change Selection Screen.

An approximate deviation is unaccep table.  
Input maximum deviation or Re-input in the range

Maximum:       400       min-1

Re-Input   Max   ESC

T1V7-05-03-109

To the lower

Parameter Change Selection Screen

Parameter Input Screen

Push ESC and return to Parameter Change Selection Screen.


Data has canged

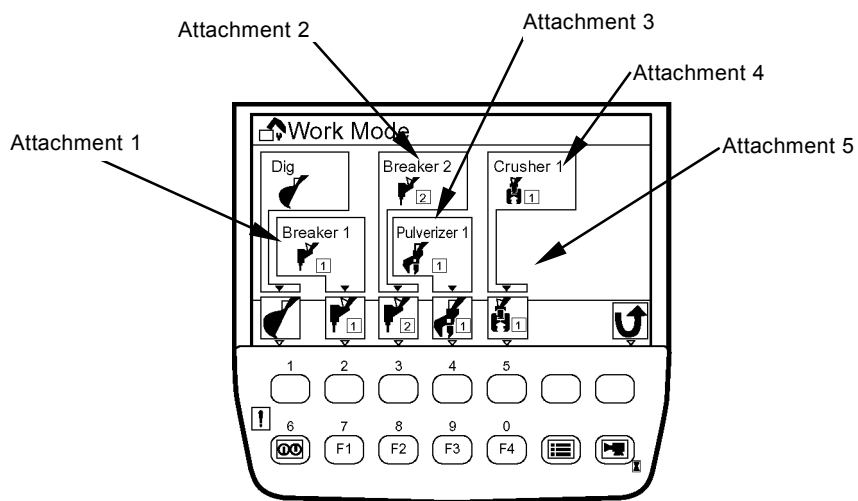
ESC

T1V7-05-03-107

## OPERATIONAL PERFORMANCE TEST/Adjustment

Five kinds attachment can be selected from Breaker 1 to 5, pulverizer 1 to 5, crusher 1 to 5, vibrating hammer 1 to 5 and others 1 to 5.  
(Refer to T4-6-2 to 4.)

 **NOTE:** Attachment setting at the time of shipping from the factory  
Attachment 1: Breaker 1  
Attachment 2: Breaker 2  
Attachment 3: Pulverizer 1  
Attachment 4: Crusher 1  
Attachment 5: Non-setting



T1V5-05-01-109

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## Group 6 Troubleshooting B

Troubleshooting B Procedure .....	T5-6-1
Relationship between Machine Trouble	
Symptoms and Related Parts .....	T5-6-2
Correlation between Trouble	
Symptoms and Part Failures .....	T5-6-42
Engine System Troubleshooting .....	T5-6-58
All Actuator System Troubleshooting .....	T5-6-86
Front Attachment System	
Troubleshooting .....	T5-6-100
Swing System Troubleshooting.....	T5-6-120
Travel System Troubleshooting .....	T5-6-124
Other System Troubleshooting .....	T5-6-132
Exchange Inspection .....	T5-6-152
Emergency Boom Lowering	
Procedure .....	T5-6-155
Attachment Pilot Circuit	
Pressure Release Procedure .....	T5-6-156
One Part of Data, Daily Report Data, Distribution Data and Total Operating hours is not Recorded.....	T5-6-158

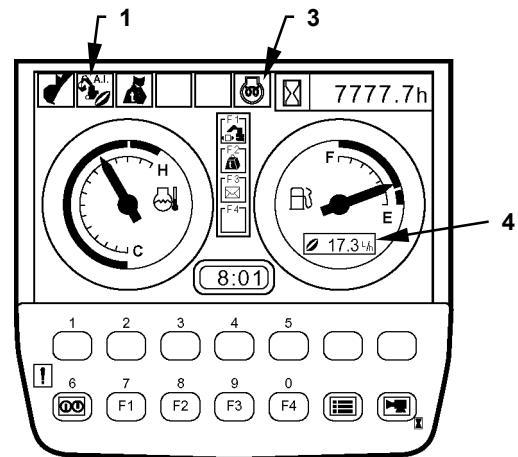
## Group 7 Electrical System Inspection

Precautions for Inspection and Maintenance .....	T5-7-1
Instructions for Disconnecting	
Connectors .....	T5-7-3
Fuse Inspection.....	T5-7-4
Fusible Link Inspection.....	T5-7-5
Battery Voltage Check .....	T5-7-6
Alternator Check .....	T5-7-7
Continuity Check .....	T5-7-8
Voltage and Current Measurement .....	T5-7-10
Check by False Signal.....	T5-7-17
Test Harness .....	T5-7-18

## TROUBLESHOOTING/Monitor Unit

- Auto-Idle Display (1)

When the switch is turned ON, the data is displayed.  
When the key switch is turned ON with the auto-idle switch ON, the data blinks for 10 seconds.



T1V1-05-01-008

- Overload Alarm (2)



T1V1-05-02-002

The system measures the load of suspended load from the bottom pressure of boom cylinder. When overload is detected, an alarm is displayed.  
(Refer to T5-2-18.)

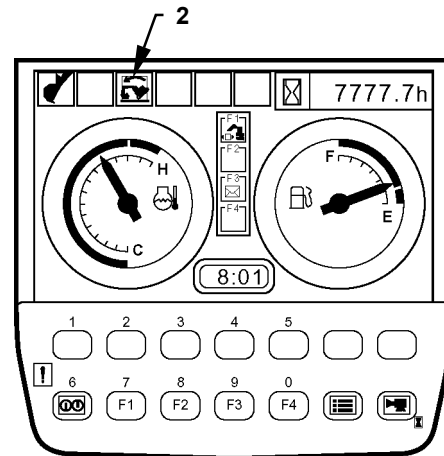
- Glow Display (3)

While ECM is supplying current to the glow plug, the date is displayed according to the signal from ECM.

- Fuel Consumption Gauge Display (4)

**IMPORTANT: The values on fuel gauge are references and different from the measured values.**

Fuel consumption is displayed according to the signal from ECM, which is received through MC by using CAN bus line.

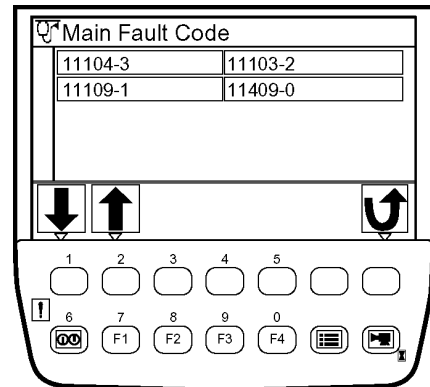


T1V1-05-01-128

## TROUBLESHOOTING/Monitor Unit

- Troubleshooting

This screen displays the fault codes according to the signals received from each controller by using CAN.



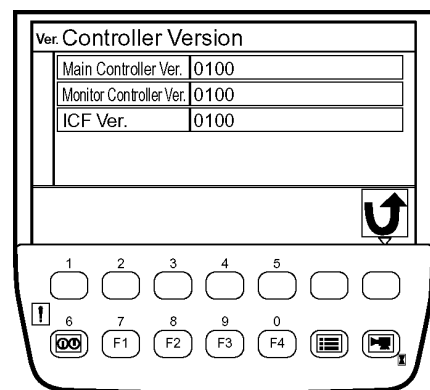
Fault Code Display

T1V5-05-01-097

- Controller Version

This screen displays the version of MC, ICF and monitor unit.

**NOTE:** The version of ECM is not displayed.

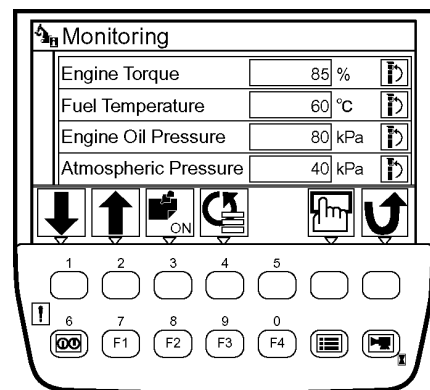


Controller Version Display

T1V5-05-01-122

- Monitoring

This screen displays temperature and pressure data received from each controller by using CAN. By key operation, the displayed data is hold.

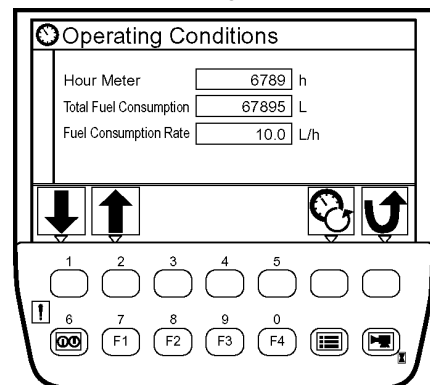


Monitoring Screen

T1V5-05-01-087

- Operating Conditions

This screen displays machine operating hour, fuel usage and fuel consumption rate registered by the monitor unit.

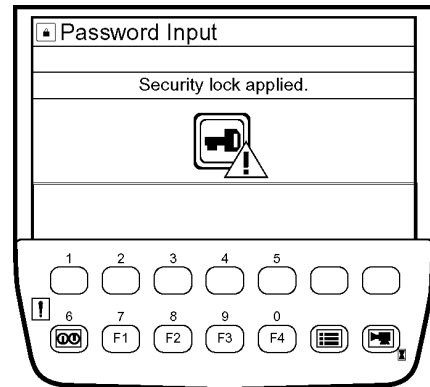


Operating Conditions Screen

T1V5-05-01-025

## TROUBLESHOOTING/Monitor Unit

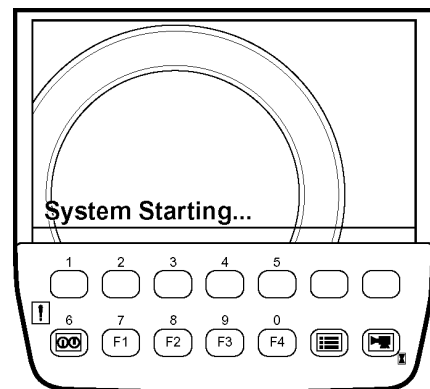
3. If inputting an incorrect password three times, a screen appears informing that the security lock has been applied, and a buzzer rings. While the key switch is turned to the ON position, the buzzer does not stop ringing. When the key switch is turned to the OFF position, the buzzer rings for thirty seconds.



Security Lock Screen

T1V5-05-01-005

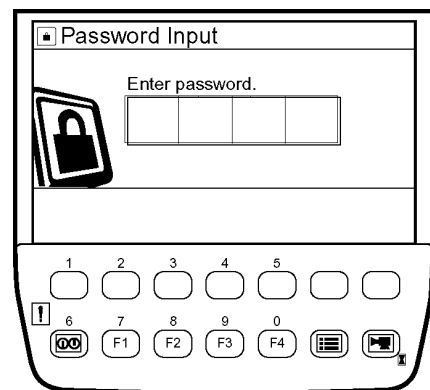
4. After thirty seconds, if the key switch is turned to the ON position, the starting screen appears and the password input screen appears again. Then a password can be input again. If inputting an incorrect password even once this time, the security lock screen appears again and a buzzer rings. While the key switch is turned to the ON position, the buzzer does not stop ringing. When the key switch is turned to the OFF position, the buzzer rings for thirty seconds.



Starting Screen

T1V1-05-01-115

5. After the buzzer stops ringing, a password can be input again. Turn the key switch to the ON position and input a password after the password input screen appears. (Refer to T5-2-20).
6. If inputting an incorrect password again, the security lock screen appears again and a buzzer rings. While the key switch is turned to the ON position, the buzzer does not stop ringing. When the key switch is turned to the OFF position, the buzzer rings for thirty seconds.



Password Input Screen

T1V5-05-01-093

## **TROUBLESHOOTING/Monitor Unit**

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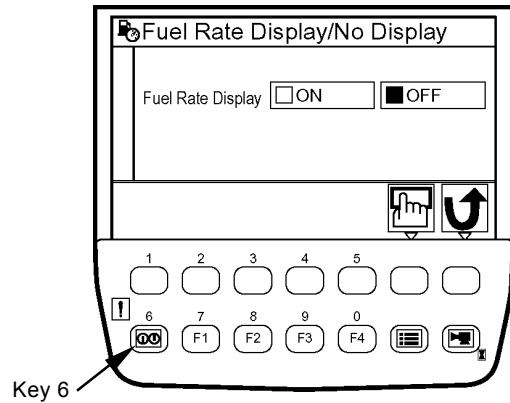
## **TROUBLESHOOTING/Monitor Unit**

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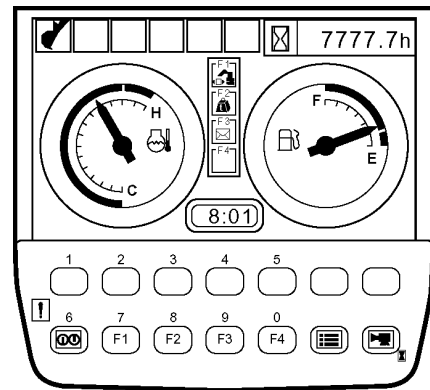
(Blank)

## TROUBLESHOOTING/Monitor Unit

4. Push key 6, and return to the primary screen.



T1V5-05-01-164



Primary Screen

T1V1-05-01-123

## TROUBLESHOOTING/Monitor Unit

### Lists of Display Languages

#### Display Languages 1


Language	Screen Display	
Japanese	日本語	T1V1-05-01-141
English	English	T1V1-05-01-142
Chinese	簡体中文	T1V1-05-01-143
Taiwanese	繁体中文	T1V1-05-01-144
Korean	한국어	T1V1-05-01-145
Indonesian	Bahasa Indonesia	T1V1-05-01-146
Thai	ภาษาไทย	T1V1-05-01-147
Vietnamese	Tiếng Việt	T1V1-05-01-148
Myanmarese	မြန်မာဘာသာ	T1V1-05-01-149
Arabic	اللغة العربية	T1V1-05-01-150
Persian	اللغة الفارسية	T1V1-05-01-151
Turkish	Türkçe	T1V1-05-01-152

#### Display Languages 2

Language	Screen Display	
English	English	T1V1-05-01-142
Spanish	Español	T1V1-05-01-153
Italian	Italiano	T1V1-05-01-154
French	Français	T1V1-05-01-155
German	Deutsch	T1V1-05-01-156
Netherlandish	Nederlands	T1V1-05-01-157
Russian	Русский	T1V1-05-01-158
Portugese	Português	T1V1-05-01-159
Finlandish	Suomi	T1V1-05-01-160
Swedish	Svensk	T1V1-05-01-161
Norwegian	Norsk	T1V1-05-01-162
Danish	Dansk	T1V1-05-01-163

## TROUBLESHOOTING / e-Shovel

Item	Details
No Load Hours	Total machine's waiting hours during a day (Hours are recorded by each pressure sensor information from MC.)
Radiator Coolant Temperature	The highest radiator coolant temperature during a day (Value is recorded from monitor unit.)
Hydraulic Oil Temperature	The highest hydraulic oil temperature during a day (Value is recorded from MC.)
Intake-Air Temperature	The highest intake-air temperature during a day (Value is recorded from ECM.)
Engine Operating Hour Distribution Data	Engine operating hour distribution during a day (Operating hours are recorded only when alternator output signal is continuously delivered for more than 10 minutes.)
Loaded Hours Distribution Data	Machine operating hour distribution during a day (Operating hours are recorded only when operating pressure is continuously detected for more than 5 minutes while the engine runs.)

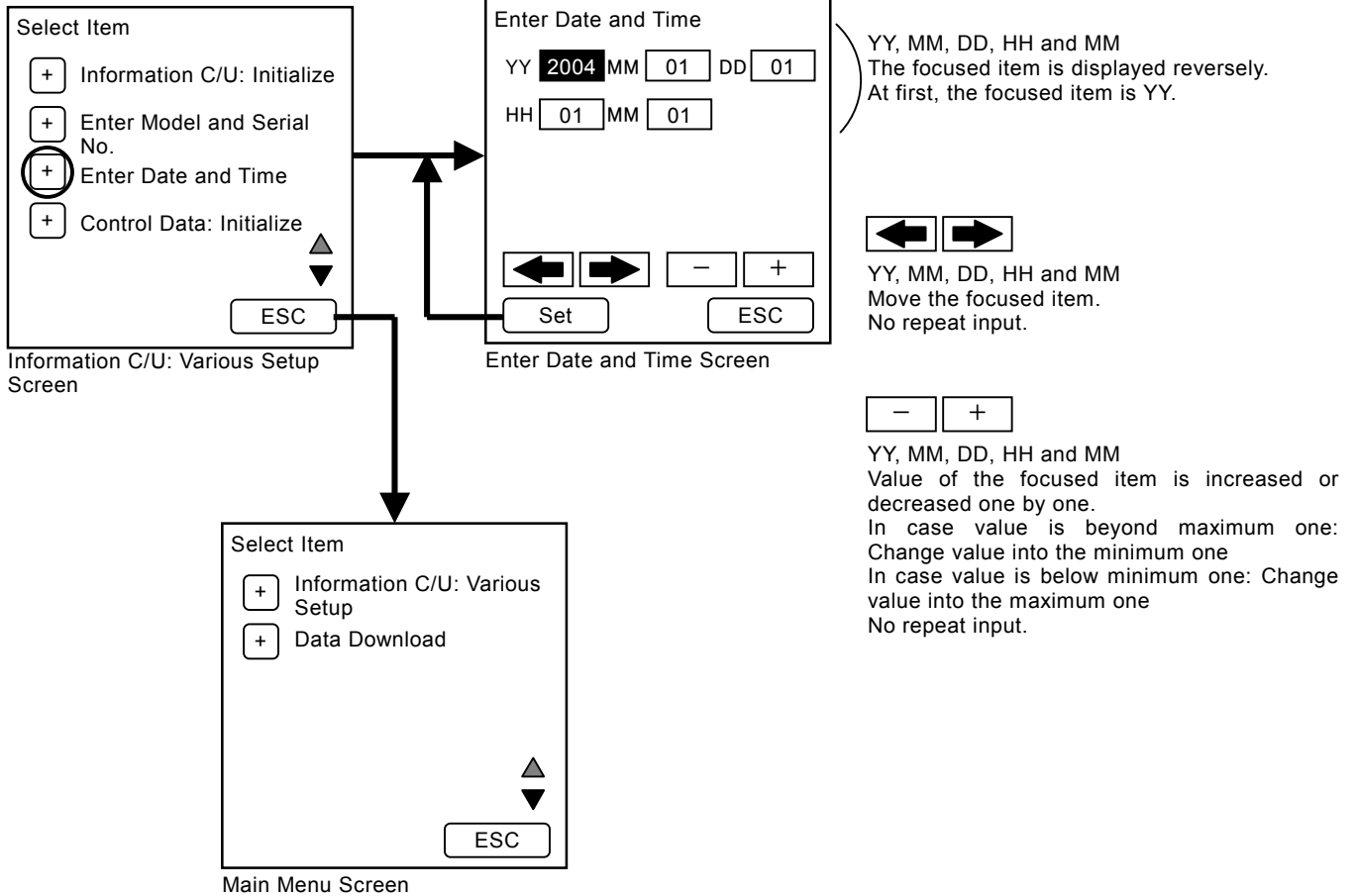
 **NOTE:** *The daily operation in this table is equivalent to the hours between 0:00 and 23:59:59 counted by the ICX built-in clock. In case the engine is kept operated beyond 0:00, such data are recorded as those for the following day.*

# TROUBLESHOOTING / e-Shovel

## 1.3 Enter Date and Time

Push Enter Date and Time.  
Push ESC and return to Main Menu Screen.

Push Set and the focused item is YY.  
Push ESC and return to Information C/U: Various Setup Screen.



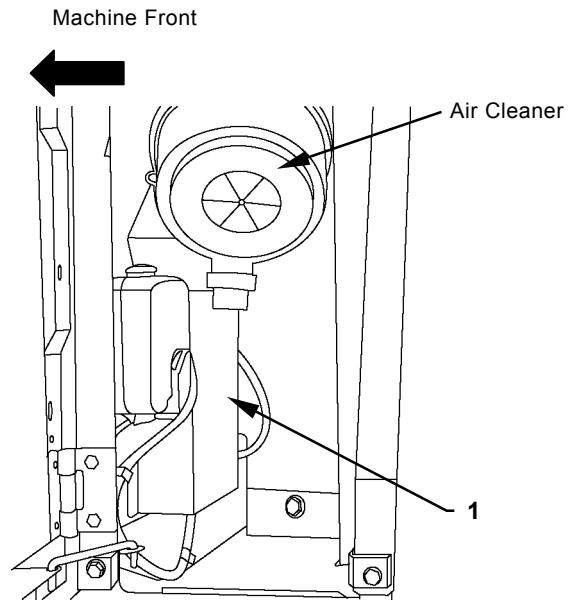
## TROUBLESHOOTING / e-Shovel

### LIST OF FAULT CODE

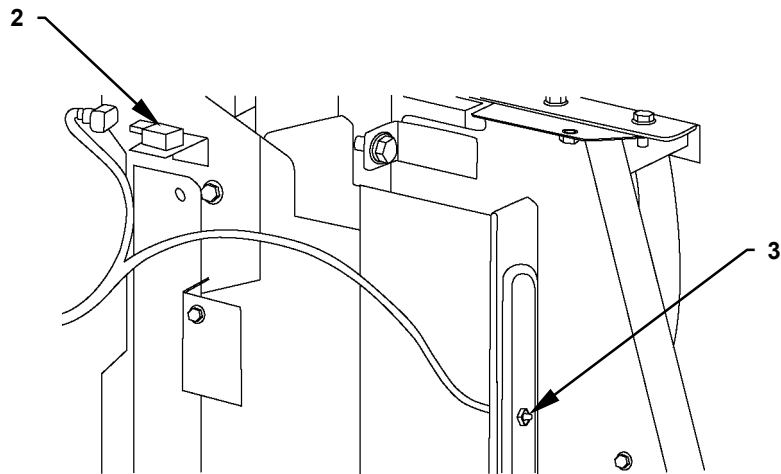
Fault Code	Details	Remedy
14000-2	CAN Communication Error	Execute retry B in self-diagnosing. If this error code is displayed after re-try, check the following item. Check the CAN communication line (check the harness).
14001-2	ICF: Flash Memory: Read / Write Error	Execute retry B in self-diagnosing and execute the following item. Execute 1.5 Information C/U: Initialize (T5-3-15).
14002-2	ICF: External RAM: Read / Write Error	
14003-2	ICF: EEPROM: Sum Check Error	Execute retry B in self-diagnosing. If this error code is displayed after re-try, check the following item. <ol style="list-style-type: none"> <li>1. Execute 1.10 Control Data: Initialize (T5-3-20).</li> <li>2. Execute 1.4 Enter Model and Serial No. (T5-3-14).</li> </ol> Then, execute self-diagnosing and execute retry B.
14006-2	ICF: Satellite Communication Terminal: Communication Error	Execute retry B in self-diagnosing. If this error code is displayed after re-try, check the following item. Check the communication line. Check the power source line of satellite terminal. Check the fuse.  Then, execute self-diagnosing and execute retry B.
14008-2	ICF: Abnormal Internal RAM	Execute retry B in self-diagnosing. If this error code is displayed after re-try, replace the controller.
14100-2	Satellite Communication Terminal: Abnormal EEPROM	
14101-2	Satellite Communication Terminal: Abnormal IB/OB Queue	
14102-2	Satellite Communication Terminal: Abnormal Local Loop Back	
14103-2	Satellite Communication Terminal: The satellite is not found.	Check the communication aerial of satellite terminal.
14104-2	Satellite Communication Terminal: Fail 1 of Remote Loop Back	Execute retry B in self-diagnosing. If this error code is displayed after re-try, replace the controller.
14105-2	Satellite Communication Terminal: Fail 2 of Remote Loop Back	
14106-2	Satellite Communication Terminal: Sending and receiving data are unmatched.	

# TROUBLESHOOTING / Component Layout

## ELECTRICAL SYSTEM (AROUND AIR CLEANER)



T1T1-01-02-009



T1T1-01-02-008

1 - ECM (Engine Control Module)

2 - Atmospheric Pressure Sensor

3 - Intake-Air Temperature Sensor

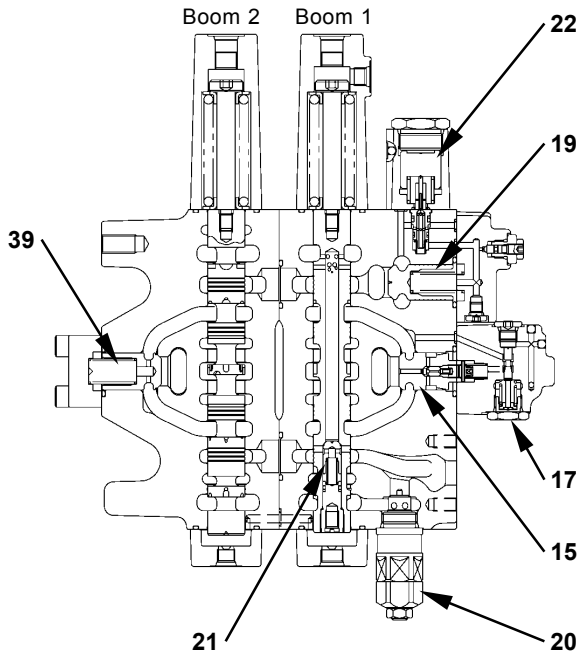
## TROUBLESHOOTING / Component Layout

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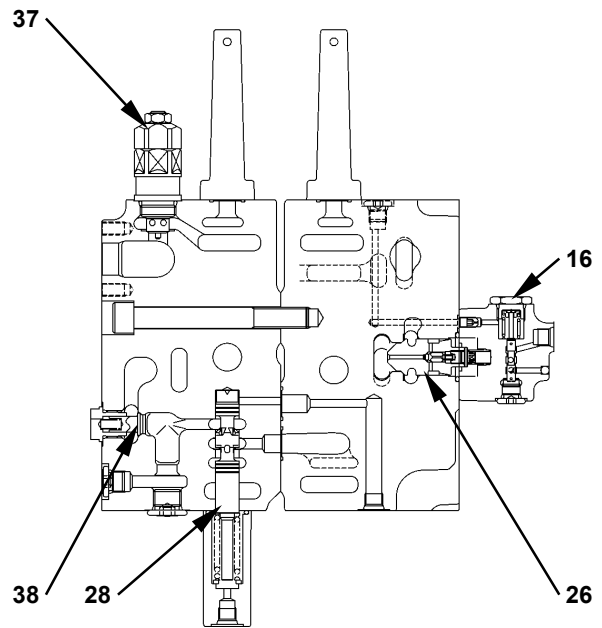
# TROUBLESHOOTING / Component Layout

Cross Section F-F



T1V1-03-03-006

Cross Section G-G



T1V1-03-03-007

- |   |  |  |   |
|---|--|--|---|
| 1 - Load Check Valve (Left Travel Parallel Circuit) | 12 - Bucket Regenerative Valve                   | 23 - Arm 2 Flow Rate Control Valve (Switch Valve)    | 34 - Arm Anti-Drift Valve (Switch Valve)              |
| 2 - Check Valve (Main Relief Circuit)               | 13 - Overload Relief Valve (Bucket: Rod Side)    | 24 - Load Check Valve (Arm 2 Tandem Circuit)         | 35 - Overload Relief Valve (Arm: Bottom Side)         |
| 3 - Main Relief Valve                               | 14 - Overload Relief Valve (Bucket: Bottom Side) | 25 - Bypass Shut-Out Valve                           | 36 - Arm Anti-Drift Valve (Check Valve)               |
| 4 - Check Valve (Auxiliary Combining Valve Circuit) | 15 - Boom Flow Control Valve (Poppet Valve)      | 26 - Arm 2 Flow Rate Control Valve (Poppet Valve)    | 37 - Overload Relief Valve (Arm: Rod Side)            |
| 5 - Auxiliary Flow Combiner Valve                   | 16 - Boom Lower Meter-In Cut Valve               | 27 - Arm Regenerative Valve                          | 38 - Check Valve (Digging Regenerative Circuit)       |
| 6 - Check Valve (Flow Combiner Valve Circuit)       | 17 - Boom Flow Rate Control Valve (Switch Valve) | 28 - Digging Regenerative Valve                      | 39 - Load Check Valve (Boom 2 Parallel Circuit)       |
| 7 - Flow Combiner Valve                             | 18 - Overload Relief Valve (Boom: Bottom Side)   | 29 - Load Check Valve (Digging Regenerative Circuit) | 40 - Auxiliary Flow Rate Control Valve (Poppet Valve) |
| 8 - Load Check Valve (Orifice) (Bucket)             | 19 - Boom Anti-Drift Valve (Check Valve)         | 30 - Arm 1 Flow Rate Control Valve (Poppet Valve)    | 41 - Auxiliary Flow Rate Control Valve (Switch Valve) |
| 9 - Check Valve (Main Relief Circuit)               | 20 - Overload Relief Valve (Boom: Rod Side)      | 31 - Load Check Valve (Swing Circuit)                | 42 - Load Check Valve (Left Travel Tandem Circuit)    |
| 10 - Bucket Flow Rate Control Valve (Poppet Valve)  | 21 - Boom Regenerative Valve                     | 32 - Arm 1 Flow Rate Control Valve (Switch Valve)    |   |
| 11 - Bucket Flow Rate Control Valve (Switch Valve)  | 22 - Boom Anti-Drift Valve (Switch Valve)        | 33 - Load Check Valve (Arm Regenerative Circuit)     |   |

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## TROUBLESHOOTING / Component Layout

### Control Valve Side

Port Name	Connecting to	Remark
Port 1	Control Valve	Boom Raise Pilot Pressure
Port 2	Control Valve	Boom Lower Pilot Pressure
Port 3	Control Valve	Arm Roll-Out Pilot Pressure
Port 4	Control Valve	Arm Roll-In Pilot Pressure
Port 5	Control Valve	Left Swing Pilot Pressure
Port 6	Control Valve	Right Swing Pilot Pressure
Port 7	Control Valve	Bucket Roll-In Pilot Pressure
Port 8	Control Valve	Bucket Roll-Out Pilot Pressure
Port 9	Control Valve	Left Travel Forward Pilot Pressure
Port 10	Control Valve	Left Travel Reverse Pilot Pressure
Port 11	Control Valve	Right Travel Forward Pilot Pressure
Port 12	Control Valve	Right Travel Reverse Pilot Pressure
Port 13	Control Valve	Auxiliary Open Pilot Pressure
Port 14	Control Valve	Auxiliary Close Pilot Pressure
Port SE	Control Valve	Arm 1 Flow Rate Control Valve Control Pressure
Port SM	Hydraulic Oil Tank	Returning to Hydraulic Oil Tank
Port SN	-	Plug
Port SP	Hydraulic Oil Tank	Returning to Hydraulic Oil Tank
Port SL	Control Valve	Flow Combiner Valve Control Pressure
Port SK	Control Valve	Bucket Flow Rate Control Valve Control Pressure

### 2-Piece Boom Specification Machine

Port SP	Positioning Pilot Valve	Secondary Pilot Pressure
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### Machine with Front Attachment (Secondary Crushers 1 to 5 and Hydraulic Crushers 1 to 5) attached.

Port SM	Auxiliary Flow Rate Combiner Solenoid Valve	Auxiliary Flow Rate Combiner Valve Control Pressure
Port SN	Auxiliary Flow Rate Combiner Control Valve	Auxiliary Flow Rate Combiner Valve Control Pressure
Port SP	Auxiliary Flow Rate Combiner Solenoid Valve	Pump 1 Control Pressure

## TROUBLESHOOTING / Troubleshooting A

Symptoms in Machine Operation When Trouble Occurs.	Remedy for Dr. ZX	Remark
<ul style="list-style-type: none"> <li>• Combined operation of arm-roll-in and swing: Arm speed is slow.</li> <li>• In case of the machine equipped with the swing alarm (optional) and when swing alarm is effective, swing alarm continues to ring.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Swing Pilot Pressure Sensor</li> </ul>
<ul style="list-style-type: none"> <li>• Combined operation of arm-roll-in and swing: Arm speed is slow.</li> <li>• In case of the machine equipped with the swing alarm (optional) and when swing alarm is effective, swing alarm continues to ring.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Swing Pilot Pressure Sensor</li> </ul>
<ul style="list-style-type: none"> <li>• During HP control, boom raise speed does not increase.</li> <li>• Combined operation of arm roll-in and boom raise: Arm speed is slow.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Boom Raise Pilot Pressure Sensor</li> </ul>
<ul style="list-style-type: none"> <li>• During HP control, boom raise speed does not increase.</li> <li>• Combined operation of arm roll-in and boom raise: Arm speed is slow.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Boom Raise Pilot Pressure Sensor</li> </ul>
<ul style="list-style-type: none"> <li>• During HP control, arm roll-in speed does not increase.</li> <li>• Combined operation of arm roll-in and swing: Arm speed is slow.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Arm Roll-In Pilot Pressure Sensor</li> </ul>
<ul style="list-style-type: none"> <li>• During HP control, arm roll-in speed does not increase.</li> <li>• Combined operation of arm roll-in and swing: Arm speed is slow.</li> </ul>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Arm Roll-In Pilot Pressure Sensor</li> </ul>

## TROUBLESHOOTING / Troubleshooting A

Symptoms in Machine Operation When Trouble Occurs.	Remedy for Dr. ZX	Remark
When temperature is low (hydraulic oil temperature is less than 0 °C), the auto-warming up control is inoperable.	Retrial B	• Check Harness
When temperature is low (hydraulic oil temperature is less than 0 °C), the auto-warming up control is inoperable.	Retrial B	• Check Harness
When overload alarm is used. <ul style="list-style-type: none"> <li>• Overload alarm buzzer rings.</li> <li>• The overload alarm is displayed on the monitor unit.</li> </ul> <div style="text-align: center;">  </div> <div style="text-align: right; font-size: small;">T1V1-05-02-002</div>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Boom Bottom Pressure Sensor</li> </ul>
When overload alarm is used. <ul style="list-style-type: none"> <li>• Overload alarm buzzer rings.</li> <li>• The overload alarm is displayed on the monitor unit.</li> </ul> <div style="text-align: center;">  </div> <div style="text-align: right; font-size: small;">T1V1-05-02-002</div>	Retrial B	<ul style="list-style-type: none"> <li>• Check Harness</li> <li>• Replace Boom Bottom Pressure Sensor</li> </ul>

## TROUBLESHOOTING/ Troubleshooting A

Presumptive Symptoms in Real Machine Operation	Assumptive Conditions at Backup	Fault Code (Tech 2)
Vibration of the engine may be large, Rough idle, output power decrease may occur, faulty increasing of rotation speed, dark smoke may occur, output power may be too large.	Prevention the junction system (pump) from damage (Protect the RP sensor by over-pressure)	P0088
Vibration of the engine may be large, Rough idle, output power decrease may occur, faulty increasing of rotation speed, dark smoke may occur, output power may be too large.	Prevention the junction system from damage (Pressure is too much as PR is clogged.)	P0088
Vibration of the engine may be large, Rough idle, output power decrease may occur, faulty increasing of rotation speed, dark smoke may occur, output power may be too large.	Prevention the junction system (pmp) from damage (Protect the RP sensor by over-pressure)	P0089
Output power decrease	Rial pressure is beyond the allowable pressure.	P1095
Vibration of the engine may be large, Rough idle, output power decrease may occur, faulty increasing of rotation speed, dark smoke may occur, output power may be too large.	Fuel leakage is too much. Difference between target rail pressure and actual rail pressure is larger than the specification. (Large deflection)	P1093
Vibration of the engine may be large, Rough idle, output power decrease may occur, faulty increasing of rotation speed, dark smoke may occur, output power may be too large.	Fuel leakage is too much. Actual rail pressure does not increase to the required pressure.	P0087

## TROUBLESHOOTING/ Troubleshooting A

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## TROUBLESHOOTING/ Troubleshooting A

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Fault Code	Remedy
13303-2	Cool the monitor unit and so on until temperature inside the monitor unit is less than 85 °C (185 °F).
13304-2	(Refer to the Troubleshooting flow chart.)
13306-2	If this fault code is displayed after retarial, replace the monitor unit.
13308-2	Refer to “Check CAN Harness” on page T5-5-54.
13310-3	Check coolant temperature sensor and harness.
13311-3	Check fuel level sensor and harness.
13311-4	Check fuel level sensor and harness.

## TROUBLESHOOTING / Troubleshooting A

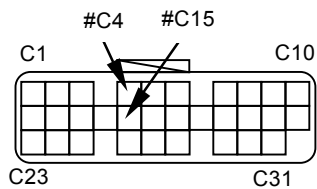
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- Between MC and ICF  
CAN Harness (High Side)  
Check for continuity between terminal #C4 of harness end of connector MC-C in MC and terminal #C5 of harness end of connector ICF-C in ICF.

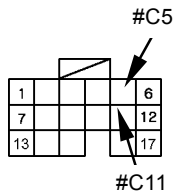
CAN Harness (Low Side)  
Check for continuity between terminal #C15 of harness end of connector MC-C in MC and terminal #C11 of harness end of connector ICF-C in ICF.

### Connector

MC  
Connector MC-C  
(Harness end)



ICF  
Connector ICF-C  
(Harness end)



T1V1-05-04-002

# TROUBLESHOOTING / Troubleshooting A

## Discontinuity Check between CAN Circuit and Key Signal Circuit

**IMPORTANT: Before continuity check, turn the key switch OFF.**

- In case of continuity, the circuit between CAN circuit and key signal circuit is shorted.
- In case of discontinuity, the circuit is normal.

• MC

Between CAN Circuit (High Side) and Key Signal Circuit

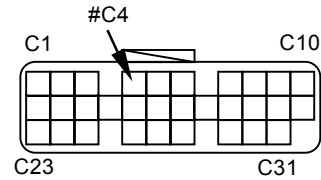
Check for continuity between terminal #C4 of harness end of connector MC-C and terminal #B16 of harness end of connector MC-B.

Between CAN Circuit (Low Side) and Key Signal Circuit

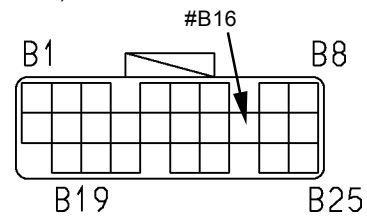
Check for continuity between terminal #C15 of harness end of connector MC-C and terminal #B16 of harness end of connector MC-B.

### Connector

Connector MC-C  
(Harness end)



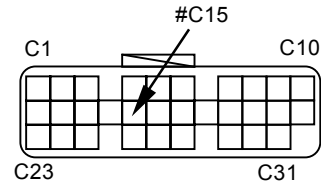
Connector MC-B  
(Harness end)



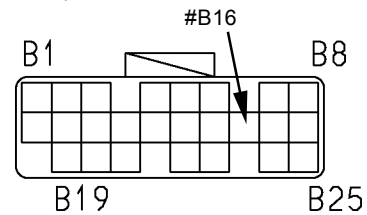
T183-05-04-021

### Connector

Connector MC-C  
(Harness end)



Connector MC-B  
(Harness end)

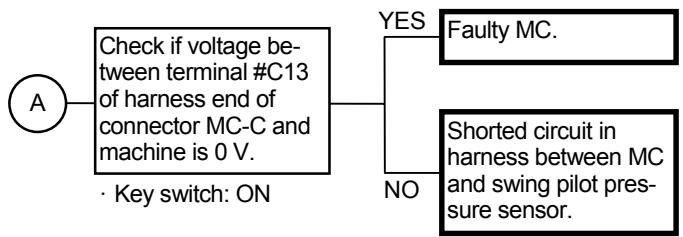
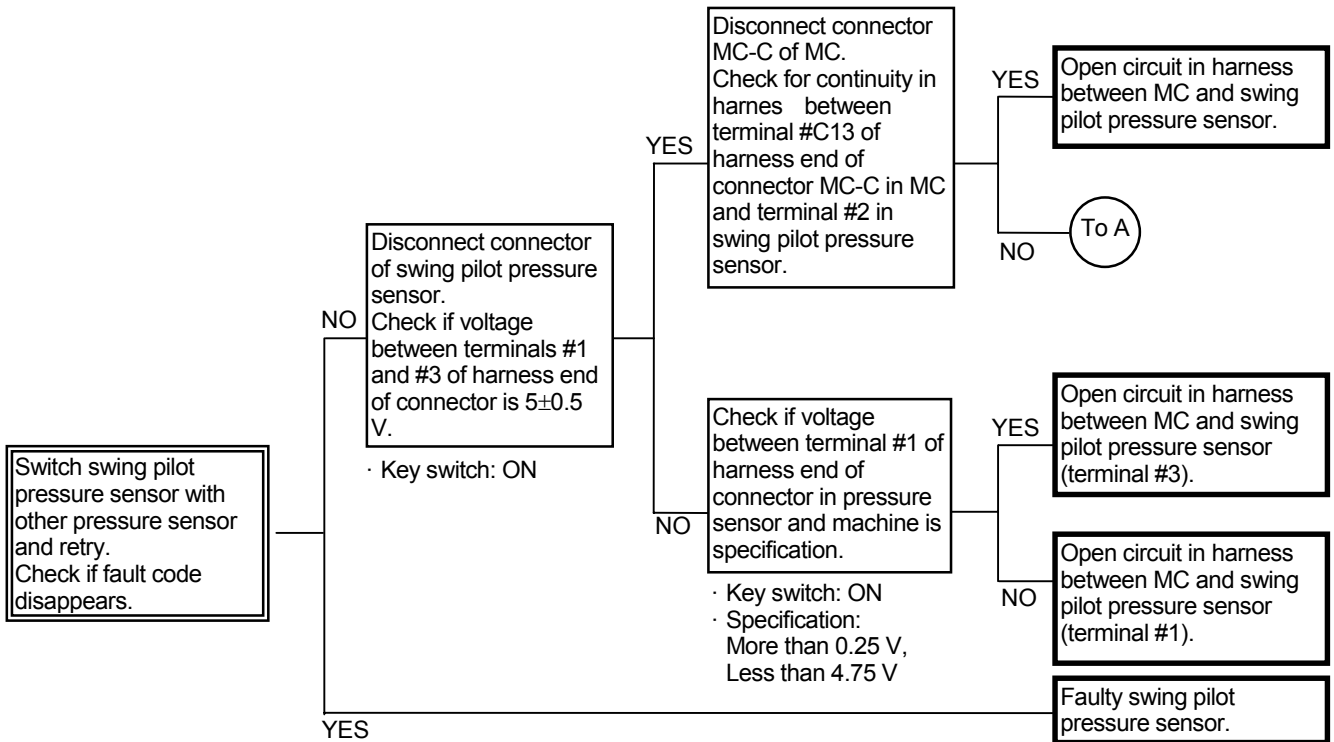


T183-05-04-021

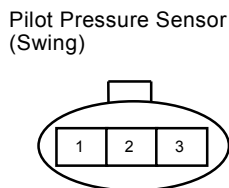
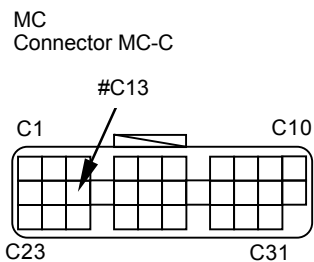
# TROUBLESHOOTING / Troubleshooting A

## PILOT FAILURE MC FAULT CODE 11301

Fault Code	Trouble	Cause	Influenced Control
11301-3	Abnormal Swing Pilot Pressure Sensor High Voltage	Voltage: 4.75 V or higher	<ul style="list-style-type: none"> <li>• Arm Regenerative Control</li> <li>• Attachment Flow Rate Control</li> <li>• Swing Alarm Control</li> </ul>
11301-4	Abnormal Swing Pilot Pressure Sensor Low Voltage	Voltage: Less than 0.25 V	<ul style="list-style-type: none"> <li>• Arm Regenerative Control</li> <li>• Attachment Flow Rate Control</li> <li>• Swing Alarm Control</li> </ul>



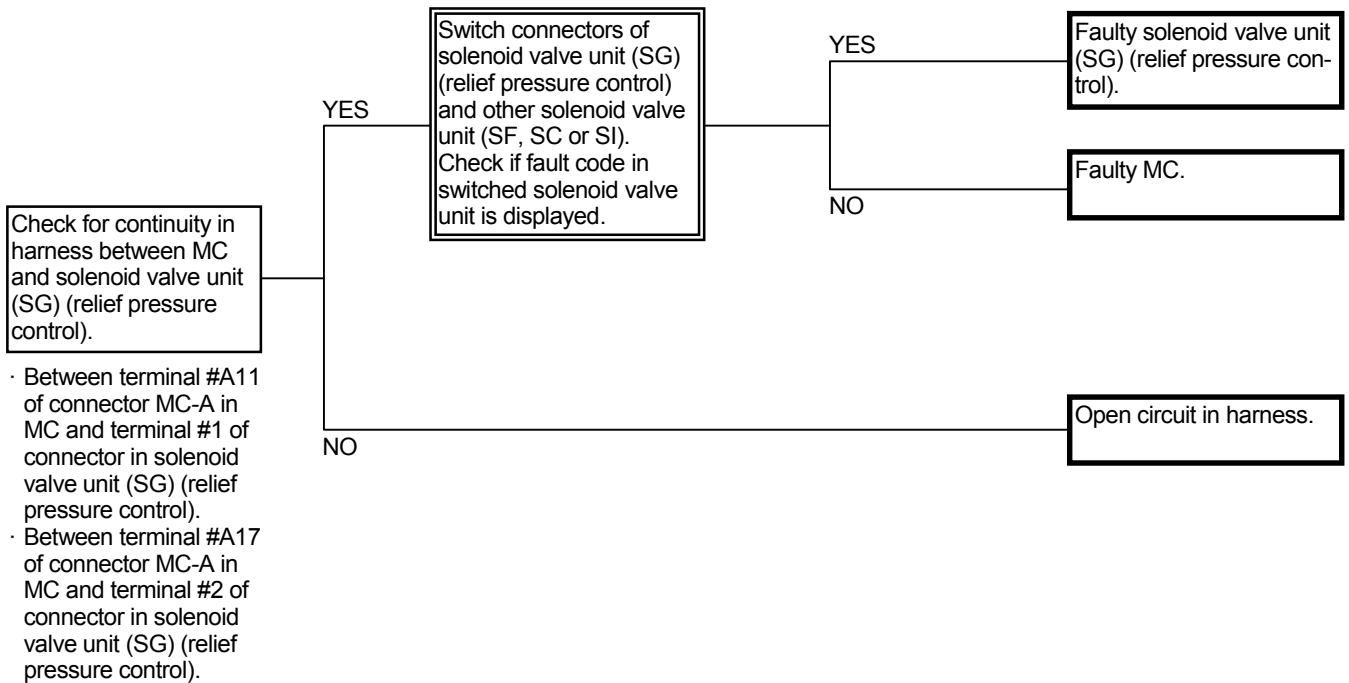
Connector (Harness end of connector viewed from the open side)



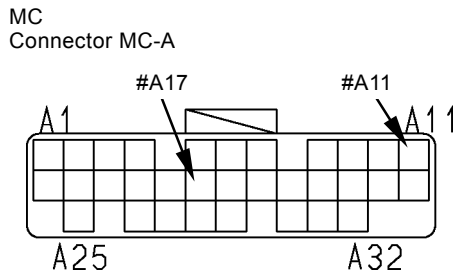
# TROUBLESHOOTING / Troubleshooting A

## MC FAULT CODE 11404

Fault Code	Trouble	Cause	Influenced Control
11404-2	Abnormal Current Feedback of Solenoid Valve Unit (SG) (Relief Pressure Control)	Current: Both of Higher than 920 mA or Less than 60 mA	<ul style="list-style-type: none"> <li>• Power Digging Control</li> <li>• Auto-Power Lift Control</li> <li>• Travel Pressure Increasing Control</li> </ul>
11404-3	Abnormal Feedback High Current of Solenoid Valve Unit (SG) (Relief Pressure Control)	Current: Higher than 920 mA	<ul style="list-style-type: none"> <li>• Power Digging Control</li> <li>• Auto-Power Lift Control</li> <li>• Travel Pressure Increasing Control</li> </ul>
11404-4	Abnormal Feedback Low Current of Solenoid Valve Unit (SG) (Relief Pressure Control)	Current: Less than 56 mA	<ul style="list-style-type: none"> <li>• Power Digging Control</li> <li>• Auto-Power Lift Control</li> <li>• Travel Pressure Increasing Control</li> </ul>



Connector (Harness end of connector viewed from the open side)



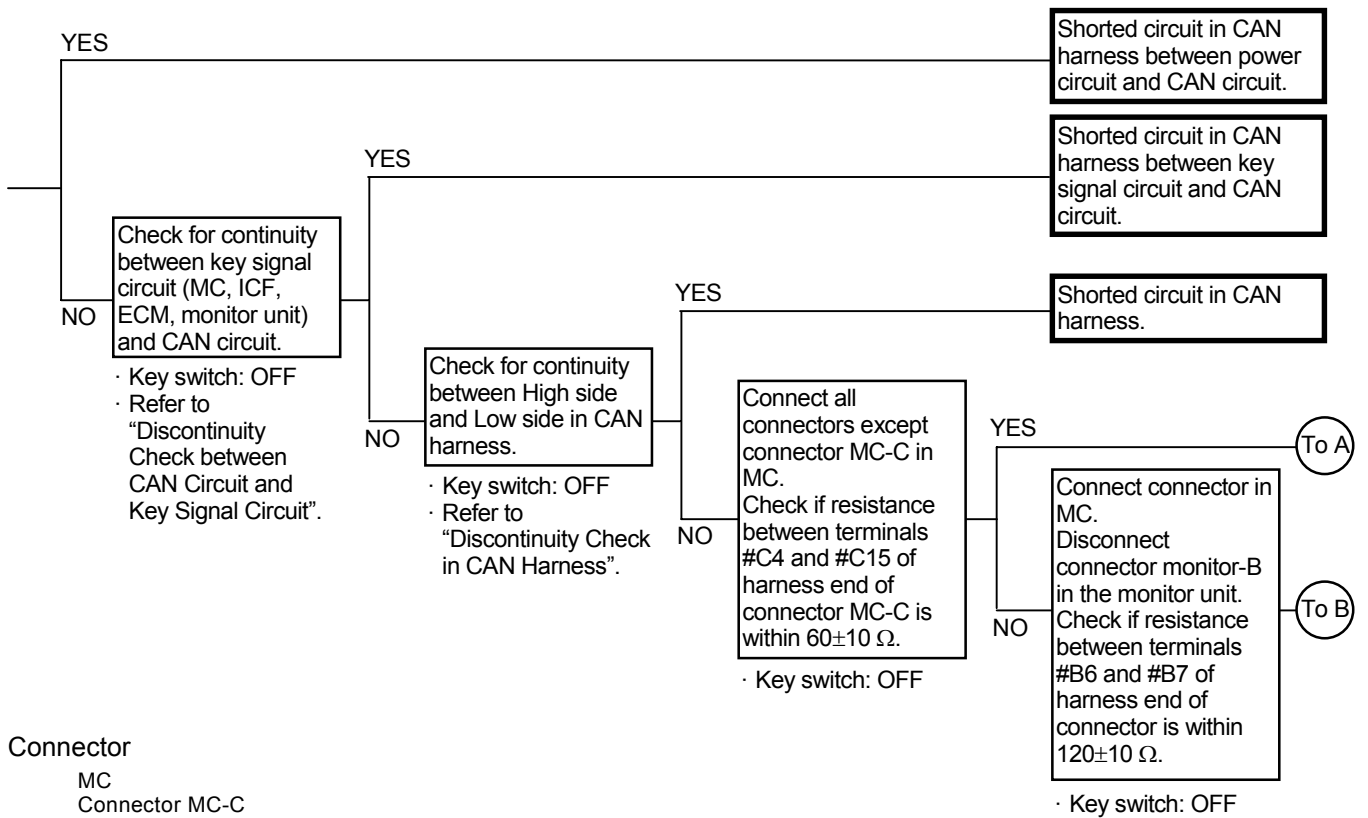
T183-05-04-008

Solenoid Valve Unit (SG)  
(Relief Pressure Control)



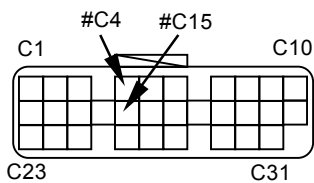
T1V1-05-04-003

# TROUBLESHOOTING / Troubleshooting A

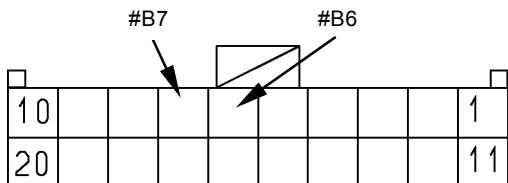


## Connector

MC  
Connector MC-C  
(Harness end)



Monitor Unit  
Connector Monitor-B  
(Harness end)



T183-05-04-013

## TROUBLESHOOTING / Troubleshooting A

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### ECM FAULT CODES 10006, 10007, 10008, 10009, 10010, 10011, 10013

Fault Code	Trouble	Fault Code (Tech 2)	Reference Page on Engine Troubleshooting Manual
10006-1	Abnormal Charge Circuit (Bank 2)	P0612	1E-426
10007-2	Abnormal CPU	P0606	1E-421
10008-2	Abnormal A/D Conversion	P1630	1E-536
10009-2	Abnormal 5 V Power Source 3 Voltage	P1633	1E-544
10010-2	Abnormal 5 V Power Source 4 Voltage	P1634	1E-547
10011-2	Abnormal 5 V Power Source 5 Voltage	P1635	1E-550
10013-2	Abnormal EEPROM	P0603	1E-419

## TROUBLESHOOTING / Troubleshooting A

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### MONITOR UNIT FAULT CODES 13306, 13308

Fault Code	Trouble	Remedy
13306-2	Abnormal EEPROM	If this error code is displayed after re-try, replace the monitor unit.
13308-2	Abnormal CAN Communication	Refer to "Check CAN Harness" (T5-5-54).

## TROUBLESHOOTING / Troubleshooting B

Evaluation by MC Fault Code	Evaluation by Monitor Function	Evaluation by using Test Harness	NOTE	Descriptions of Control (Operational Principle Section in T/M)
11304-3, 11304-4	Monitor Item: Travel control pressure (Possible to display by service menu and monitoring in monitor unit) Monitor pressure change while traveling machine.		Judge if pressure sensor is faulty or port is clogged by switching pressure sensor with other pressure sensor.	T2-2

## TROUBLESHOOTING / Troubleshooting B

Evaluation by MC Fault Code	Evaluation by Monitor Function	Evaluation by using Test Harness	NOTE	Descriptions of Control (Operational Principle Section in T/M)
11405-2, 11405-3, 11405-4	Monitor Item: Digging regenerative valve	Install lamp harness (ST 7226). Check output signals from MC and harness condition.	-	T2-2
<ul style="list-style-type: none"> <li>• ZX160-3 class: 11410-2, 11410-3, 11410-4</li> <li>• ZX180-3 class: None</li> </ul>	-	-	-	T2-2
11400-2, 11400-3, 11400-4	-	-	-	T2-2

## TROUBLESHOOTING / Troubleshooting B

Evaluation by MC Fault Code	Evaluation by Monitor Function	Evaluation by using Test Harness	NOTE	Descriptions of Control (Operational Principle Section in T/M)
-	-	-	-	T3-3
-	-	-	-	T3-3
-	-	-	-	T3-3
-	-	-	-	T3-3

## TROUBLESHOOTING / Troubleshooting B


Evaluation by MC Fault Code	Evaluation by Monitor Function	Evaluation by using Test Harness	NOTE	Descriptions of Control (Operational Principle Section in T/M)
-	-	-	-	T3-3
-	-	-	-	T3-3

## **TROUBLESHOOTING / Troubleshooting B**

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## TROUBLESHOOTING / Troubleshooting B

 **NOTE:** The trouble symptoms in this table are described provided that each trouble occurs independently.

*In case more than one trouble occurs at the same time, find out all faulty components while checking all suspected components in each trouble symptom.*

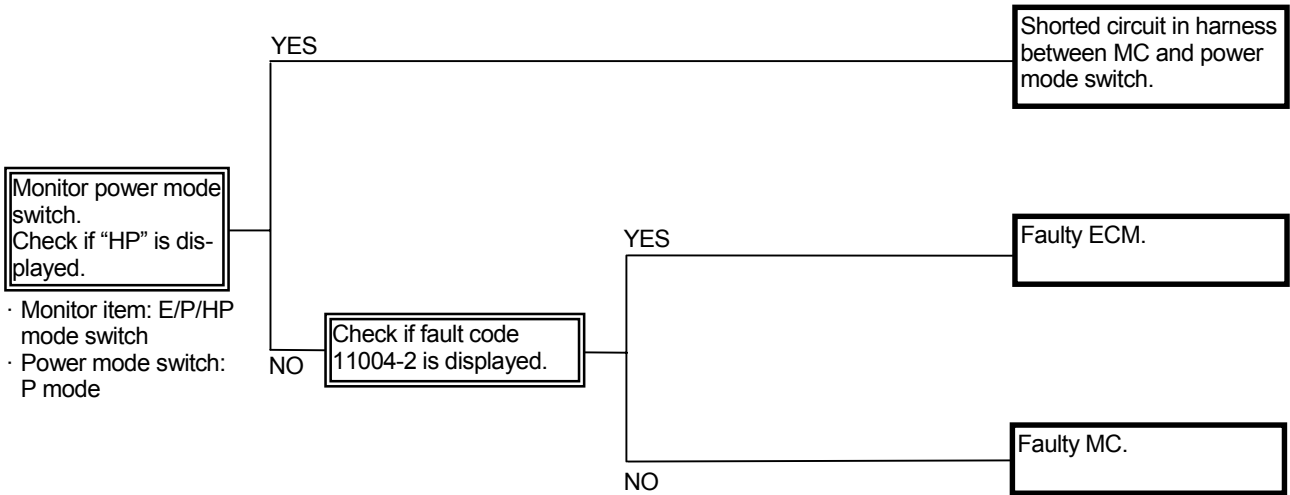
T-3	T-4	T-5	O-1	O-2
Machine mistracks during combined operation of travel and front attachment.	Occasionally, machine may mistrack when traveling with engine running at slow speed.	Fast travel is not selected. Travel mode does not change from slow mode to fast mode.	Wiper is not operated.	Air Conditioner is faulty.
	●			
	●			
		●		
	○	○		
	○	○		
		○		
		○		
	○	○		
		●		
	●			
●				
●				
●				
		●		
			Operate the wire switch.	

- : Related, required to check
- : Related. However, in case this component fails, other trouble symptom will be more noticeable so that this component will not be the direct cause of the trouble concerned.

## TROUBLESHOOTING / Troubleshooting B

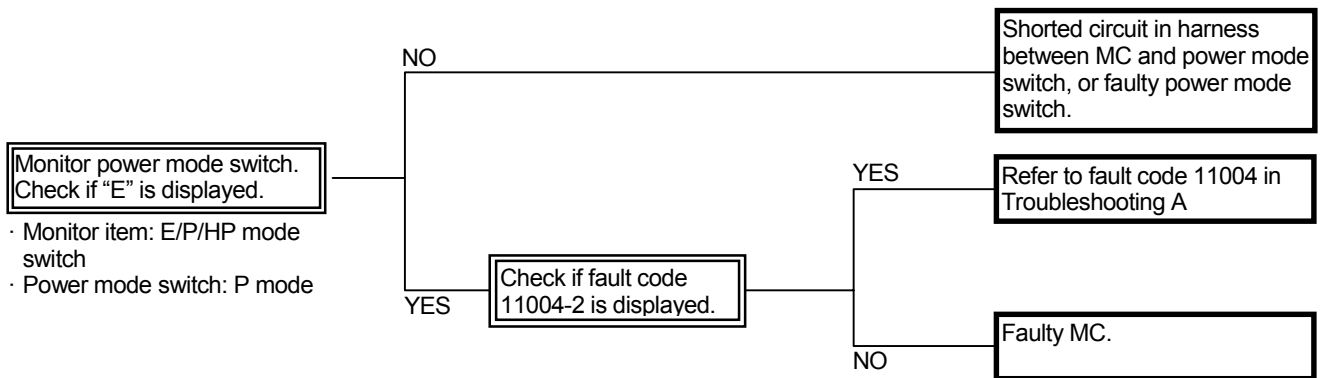
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- Even if the power mode switch is not turned to HP mode, HP mode is operated.
- Boom raise and arm roll-in must be operated when the average delivery pressures of pump 1 and 2 are high, if HP mode control is performed. The sensors related to this condition may not be faulty at the same time.



## TROUBLESHOOTING / Troubleshooting B

- Even if power mode switch is not turned to E mode, engine speed decreases.
- Required engine speed from the engine control dial must be beyond  $1800 \text{ min}^{-1}$  when the pump control pressures of pump 1 and 2 are low or the average delivery pressures of pump 1 and 2 are high, if E mode control is performed. The sensors related to this condition may not be faulty at the same time.



## **TROUBLESHOOTING / Troubleshooting B**

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## **TROUBLESHOOTING / Troubleshooting B**

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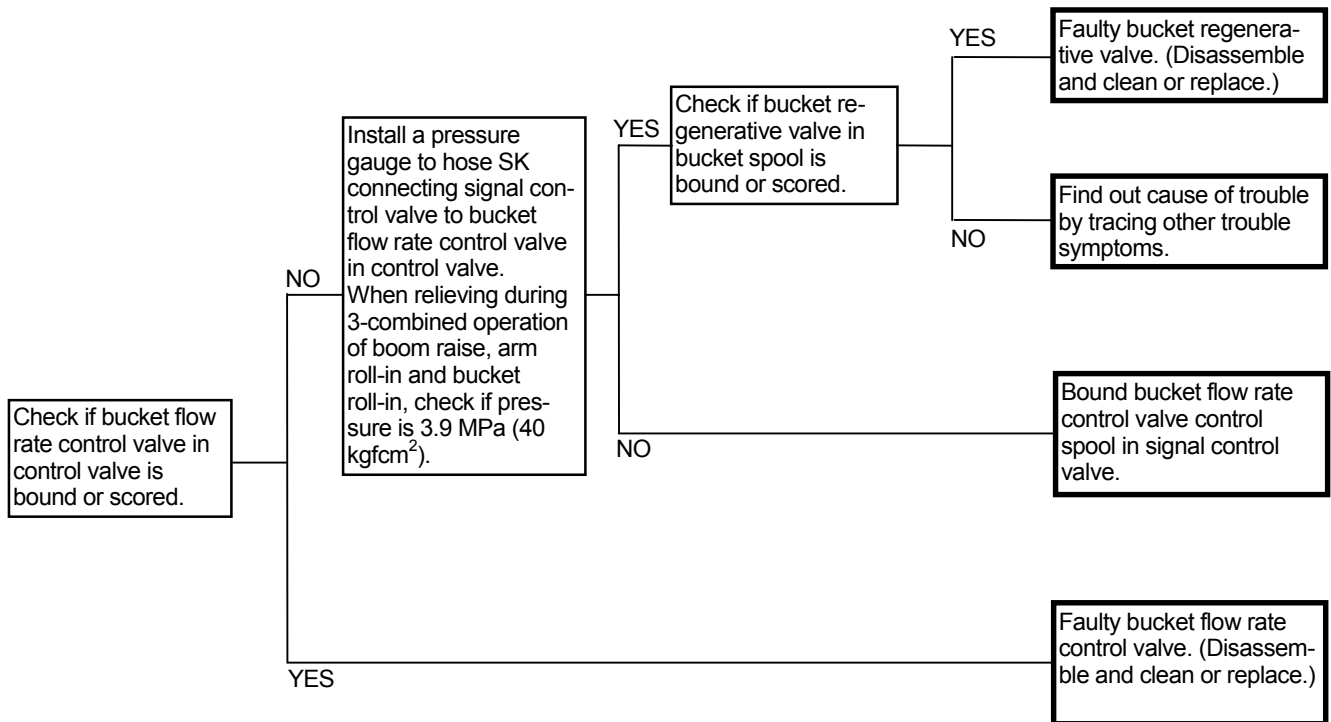
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## TROUBLESHOOTING / Troubleshooting B

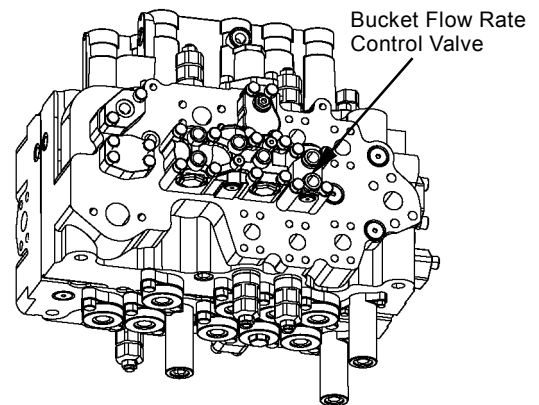
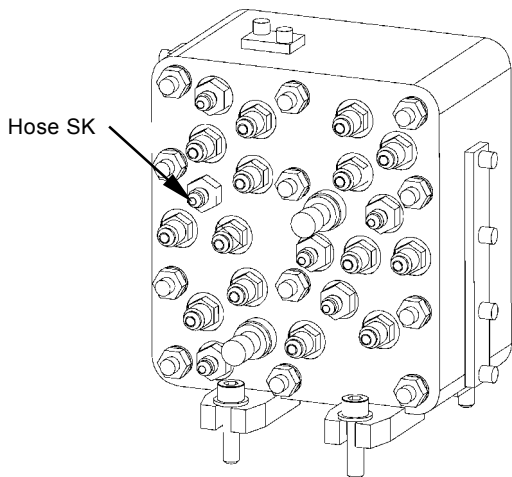
**F-6 Bucket is slightly slow during bucket roll-in single operation. Bucket does not move smoothly during bucket roll-in single operation.**

**Related MC Fault Code: None**

- Bucket flow rate control valve or bucket regenerative valve may be faulty.
- Refer to the COMPONENT OPERATION / Control Valve group in the T/M (Operational Principle).



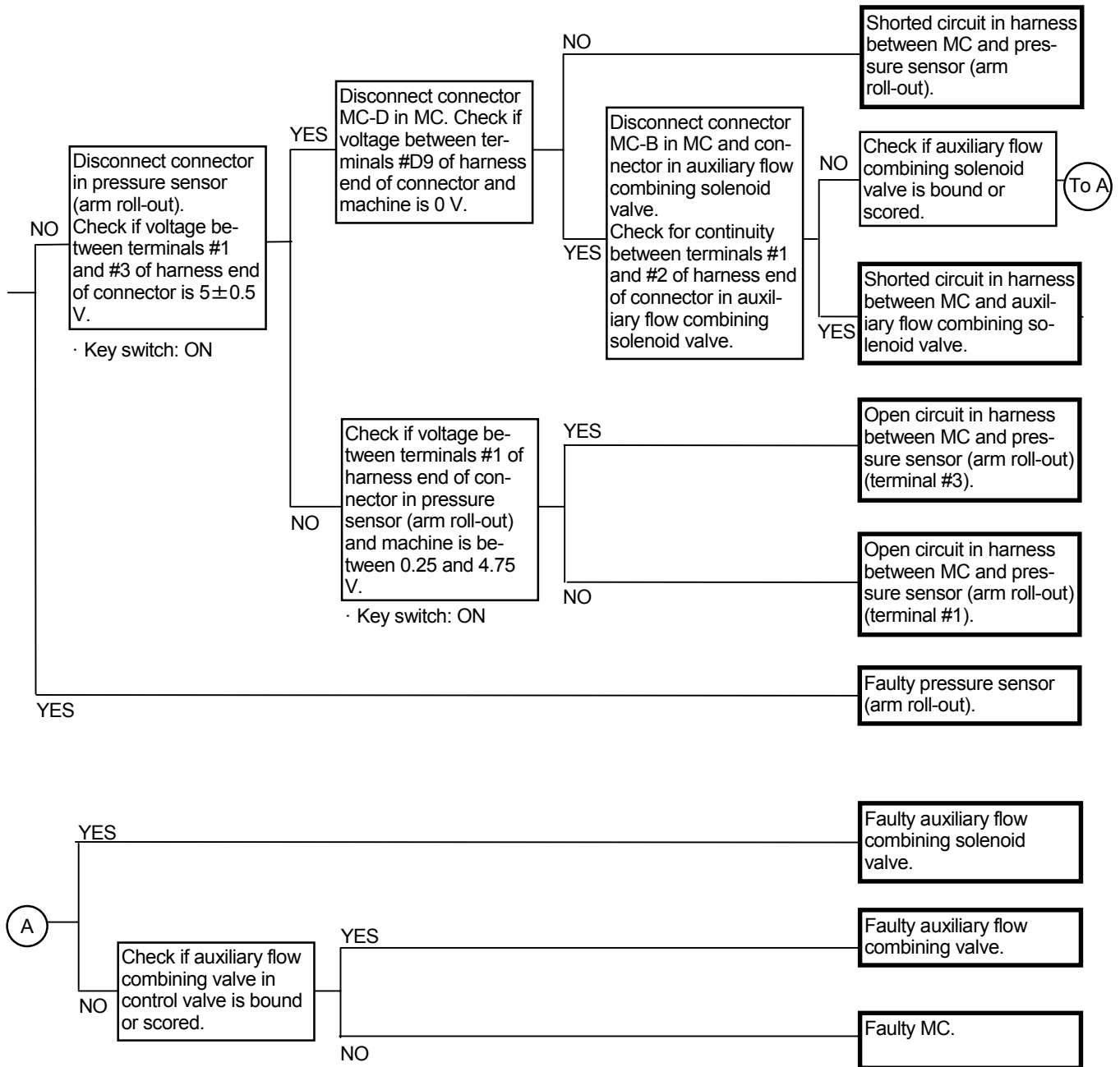
Signal Control Valve (Control Valve Side)



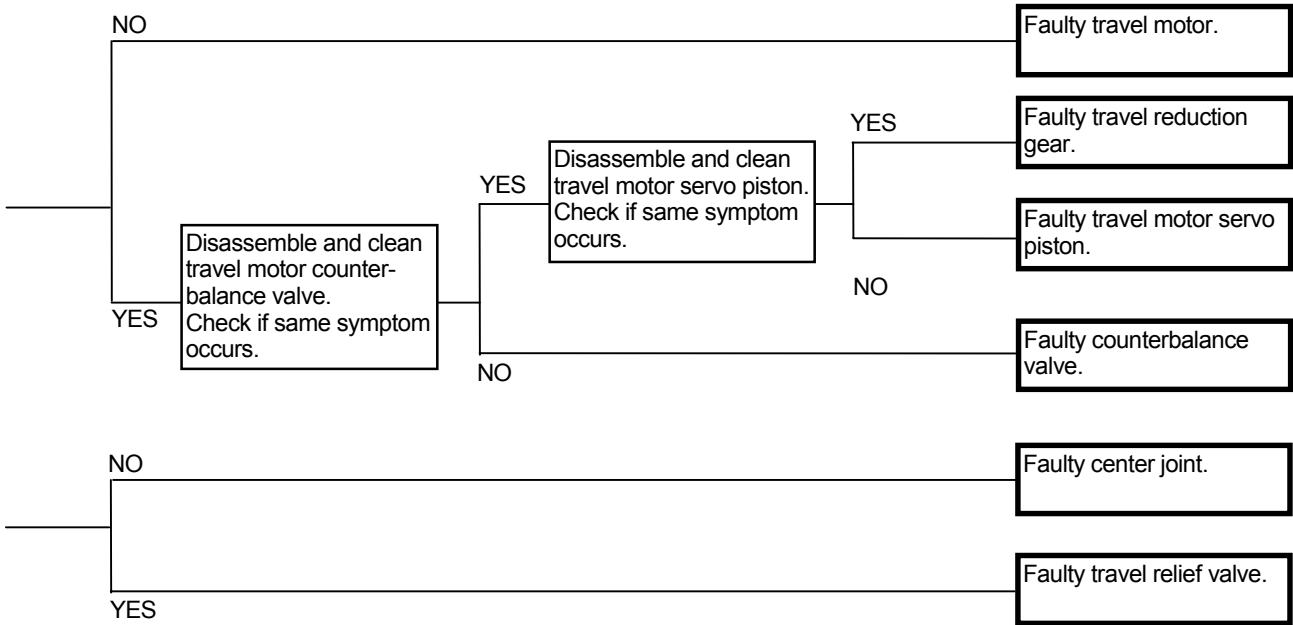
T1V1-05-04-005

T178-03-06-015

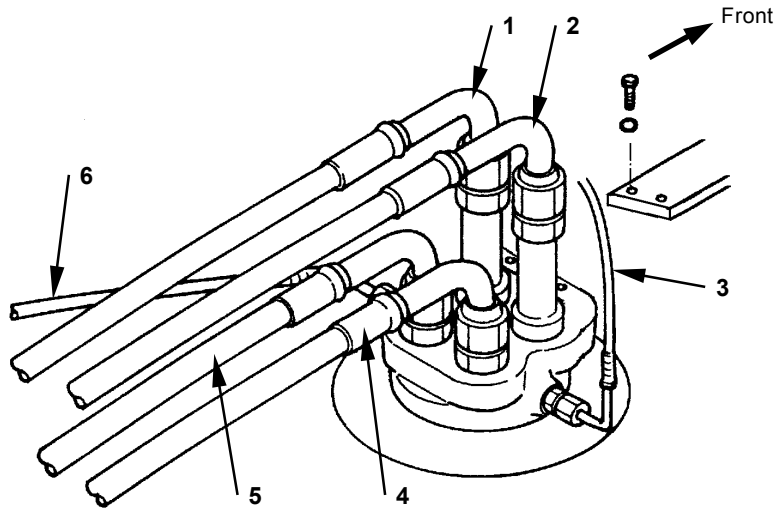
## TROUBLESHOOTING / Troubleshooting B



## TROUBLESHOOTING / Troubleshooting B



Arrangement of Pipe Line



W157-03-03-003

- |                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| 1 - Left Travel (Forward)  | 3 - Pilot                  | 5 - Left Travel (Reverse) |
| 2 - Right Travel (Forward) | 4 - Right Travel (Reverse) | 6 - Drain                 |

## TROUBLESHOOTING / Troubleshooting B

### STEP 3 Past Trouble Diagnosing

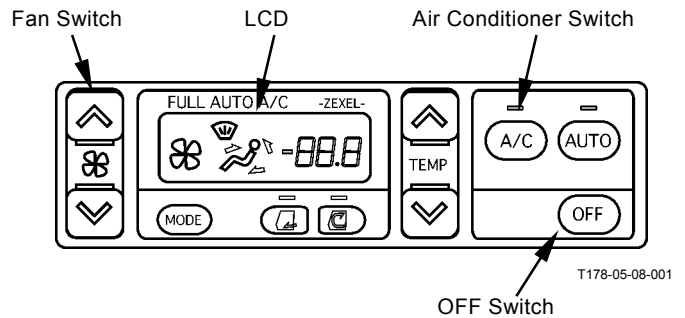
The LCD indicates the fault codes for past abnormalities of the mix door, mode encoder, and/or sensors.

The past stored fault codes are deleted.

- In case any abnormalities occurred in the past, the LCD indicates the fault codes. If more than one fault code is detected, the following fault code is displayed after flashing (0.5 seconds) twice.

	Fault Code	
	Open circuit	Shorted Circuit
Mix Door	21	-21
Mode Encoder	22	
In-Cab Ambient Temperature Sensor	23	-23
Outdoor Ambient Temperature Sensor	24	-24
Coolant Temperature Sensor	25	-25
Solar Radiation Sensor		-26

- When the air conditioner switch is kept pushing for more than 3 seconds, the failure records are deleted. After this operation, the air conditioner switch indicator flashes 5 times. Then, the self-diagnosing system is deactivated. (Normal functions are resumed.)
- Select the next step in order to be performed by operating the switches as follows:
  - Push the upper side of fan switch: To proceed to "STEP 4."
  - Push the lower side of fan switch: To return to "STEP 2."
  - Keep pushing the OFF switch for more than 3 seconds: Deactivate the self-diagnostic system. (Normal function is resumed.)



## TROUBLESHOOTING / Troubleshooting B

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Clean evaporator. When humidity is high, open door. While rotating fan at approx. 1500 min<sup>-1</sup> in L mode for more than 10 minutes, flush smell out by condensed water.

Repair or replace.

Remove foreign matter. Readjust fan motor location.

Slight noise is unavoidable.  
Replace if loud.

No functional problem exists.  
Provide silencer if intolerable.

Replace expansion valve if whistle sound is heard. Gas flow noise can be slightly heard.

Replace.

Repair or replace clutch. Re-tighten screws.

Repair or replace.

Re-adjust drive belt.

Replace.

Clean.

Clean evaporator. When humidity is high, open door. While rotating fan at approx. 1500 min<sup>-1</sup> in L mode for more than 10 minutes, flush smell out by condensed water.

## **TROUBLESHOOTING / Troubleshooting B**

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## TROUBLESHOOTING / Electrical System Inspection

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### PRECAUTIONS FOR INSPECTION AND MAINTENANCE

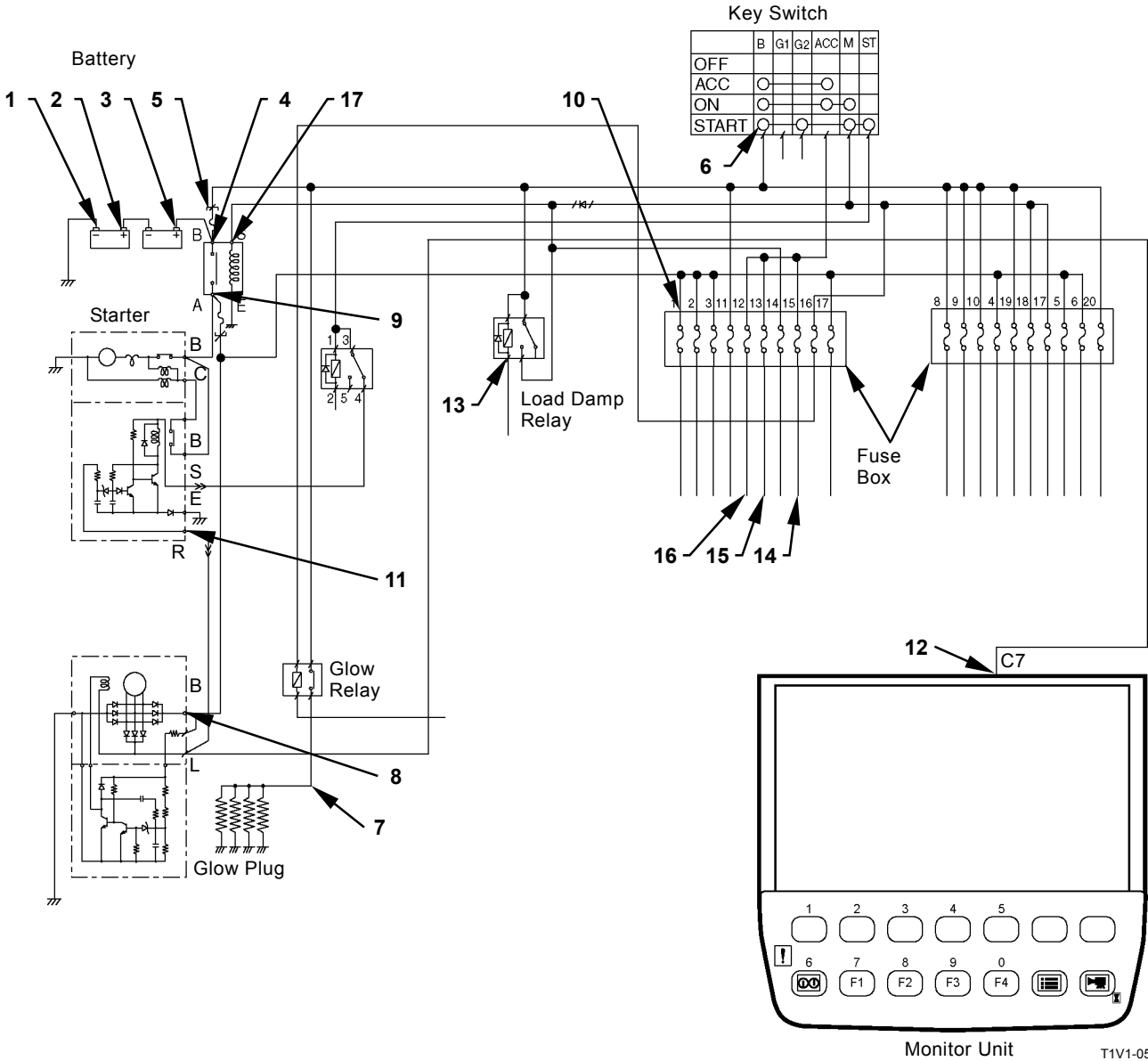
1. Disconnect the power source.  
Remove the harness from the negative terminal side in battery first when taking wire harnesses and connectors off for repair or replacement work. Failure to do so can result in damage to the wire harnesses, fuses and fusible links and, in some cases, cause fire due to short circuiting.
2. Color coding of wire harnesses.  
As for the color codes of wire harnesses in the electrical system, refer to the table below.  
In cases on the design sheet where two colors are indicated for one wire, the left initial stands for base color, while the right initial stands for marking color.

Code	Color	Code	Color
R	Red	W	White
L	Blue	G	Green
Or	Orange	Lg	Light green
Y	Yellow	B	Black
Br	Brown	P	Pink
Gr	Gray	V	Violet

-  **NOTE:** 1) Code BW indicates a black base wire with white fine-line marking.
- 2) Initials "O" and "Or" both stand for the color orange.
- 3) Wires with longitudinal stripes printed on them are not color coded. Do not confuse them with color coded wires.

# TROUBLESHOOTING / Electrical System Inspection

- Power Source Circuit
- Preheat Circuit
- Charging Circuit
- Surge Voltage Prevention Circuit
- Accessory Circuit



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