

**HITACHI**

# **Training Text**

**ZAXIS**

**170W-3**

**190W-3**

**PERFORMANCE TEST  
TROUBLESHOOTING**

**Technical Training Center**

# OPERATIONAL PERFORMANCE TEST / Introduction

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## 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.

# OPERATIONAL PERFORMANCE TEST / Introduction

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## PREPARATION FOR PERFORMANCE TESTS

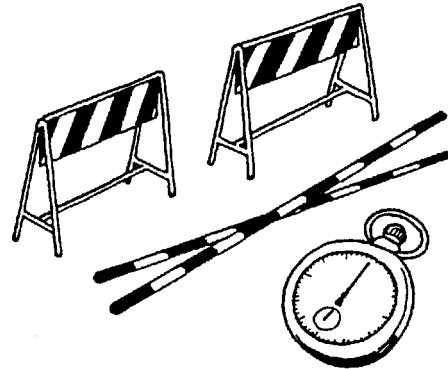
Observe the following rules in order to carry out performance tests accurately and safely.

### THE MACHINE

1. Repair any defects and damage found, such as oil or water leaks, loose bolts, cracks and so on, before starting to test.

### TEST AREA

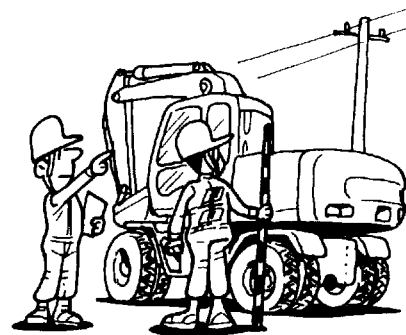
1. Select a hard and flat surface.
2. Secure enough space to allow the machine to run straight more than 300 m (984 ft 3 in), and to make a full swing with the front attachment extended.
3. If required, rope off the test area and provide signboards to keep unauthorized personnel away.



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### PRECAUTIONS

1. Before starting to test, agree upon the signals to be employed for communication among coworkers. Once the test is started, be sure to communicate with each other using these signals, and to follow them without fail.
2. Operate the machine carefully and always give first priority to safety.
3. While testing, always take care to avoid accidents due to landslides or contact with high-voltage power lines. Always confirm that there is sufficient space for full swings.
4. Avoid polluting the machine and the ground with leaking oil. Use oil pans to catch escaping oil. Pay special attention to this when removing hydraulic pipings.



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### MAKE PRECISE MEASUREMENT

1. Accurately calibrate test instruments in advance to obtain correct data.
2. Carry out tests under the exact test conditions prescribed for each test item.
3. Repeat the same test and confirm that the test data obtained can be produced repeatedly. Use mean values of measurements if necessary.

# TROUBLESHOOTING / Diagnosing Procedure

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## INTRODUCTION

Refer to the inspection and troubleshooting procedures after any machine trouble has occurred. The inspection and troubleshooting procedures are presented in an orderly fashion in this section to quickly find the cause of the machine trouble and solution.

The troubleshooting section in this manual consists of 8 groups; Diagnosing Procedure, Monitor Unit, Dr. ZX, ICF, Component Layout, Troubleshooting A (base machine diagnosis by using fault codes), Troubleshooting B (base machine diagnosis starting with inspection of abnormal operational status) and Electrical System Inspection.

- Diagnosing Procedure
  - Monitor Unit  
Refer to this group as for the display screen and operating procedures of monitor unit.
  - Dr. ZX  
This group contains the operating procedures for Dr. ZX.
  - ICF  
This group contains as follows.  
Download data from ICF and Upload  
Procedures when starting satellite communication, when installing the satellite communication controller and when replacing ICF  
Explanation for the satellite communication system
  - Component Layout
  - Troubleshooting A (base machine diagnosis by using fault codes)  
Refer to these procedures if any fault codes are displayed when each controller (MC, ECM, ICF and monitor unit) is diagnosed by using Dr. ZX (or the service menu of monitor unit).
- IMPORTANT: ICF receives and retains a record of the electrical signal system malfunction of each controller in the form of fault codes by using CAN communication. In addition, ICF self-diagnosing function records the electrical signal system malfunction in the form of fault codes**
- Ex.) Fault Code 11004-2: Failure of CAN Communication
- Troubleshooting B (base machine diagnosis starting with inspection of abnormal operational status)  
Refer to these procedures when no fault codes are displayed after diagnosing the machine with Dr. ZX (or the service menu of monitor unit).  
Ex.) Although the engine control dial is turned, engine speed does not change.
  - Electrical System Inspection  
Refer to this group when required to obtain precautions and/or information for the electrical system inspection.  
Ex.) Fuse Check

# TROUBLESHOOTING / Diagnosing Procedure

## DIAGNOSING PROCEDURE

These six basic steps are essential for efficient troubleshooting:

### 1. Study the System

Study the machine's technical manuals. Know the system and how it works, and what the construction, functions and specifications of the system components are.

### 2. Ask the operator

Before inspecting, get the full story of malfunctions from the operator below.

- (a) How is the machine being used? (Find out if the machine is being operated correctly)
- (b) When was the trouble noticed, and what types of work the machine doing at that time?
- (c) What are the details of the trouble? Is the trouble getting worse, or did it appear suddenly for the first time?
- (d) Did the machine have any other troubles previously? If so, which parts were repaired before?

### 3. Inspect the machine

Before starting the troubleshooting procedure, check the machine's daily maintenance points, as shown in the operator's manual.

Also, check the electrical system, including the batteries, as troubles in the electrical system such as low battery voltage, loose connections and blown fuses will result in malfunction of the controllers, causing total operational failure of the machine.

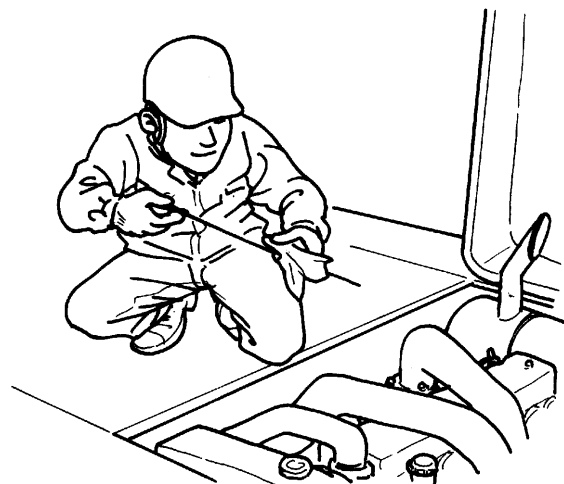
If troubleshooting is started without checking for blown fuses, a wrong diagnosis may result, wasting time. Check for blown fuses before troubleshooting. Even if a fuse looks normal by visual inspection, a fine crack is difficult to find. Always use a tester when checking the fuses.



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## **TROUBLESHOOTING / Diagnosing Procedure**

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### 4. Operate the machine yourself

Try to identify the trouble by operating the machine yourself.

If the trouble cannot be confirmed, stop the engine and obtain further details of the malfunction from the operator.

Also, check for any incomplete connections of the wire harnesses corresponding to the trouble.

## TROUBLESHOOTING / Diagnosing Procedure

### 5. Perform troubleshooting



**CAUTION:** Do not disconnect harnesses or hydraulic lines while the engine is running. The machine may malfunction or pressurized oil may spout, possibly resulting in personal injury. Stop the engine before disconnecting harnesses or hydraulic lines.

Perform diagnosis by connecting Palm to the machine or by using the service menu of monitor unit. In case any fault code has been displayed by diagnosis by using Dr. ZX (the service menu of monitor unit), check the cause of the trouble by referring to Troubleshooting A in this section. In case any fault code has been displayed by diagnosis by using Dr. ZX (the service menu of monitor unit), write the fault code. Delete the fault code once and retry self-diagnosis again. If the fault code is displayed again, check the cause of the trouble by referring to Troubleshooting A in this section. After the machine trouble has been corrected, the fault code (displayed by the service menu of monitor unit) will be deleted. Therefore, in case the problems which are not easily re-predictable are encountered, check the fault code by using Dr. ZX.

In case the fault code is not displayed, check operating condition of each component by referring to Troubleshooting B in this section and by using Dr. ZX (the service menu of monitor unit).



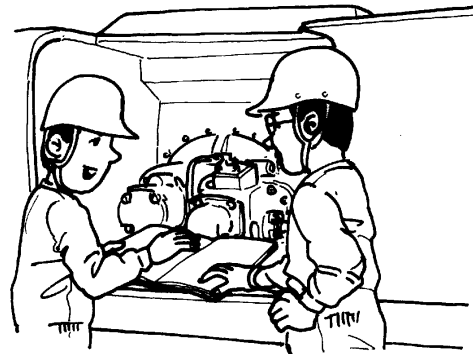
**NOTE:** Note that the fault codes displayed do not necessarily indicate machine trouble. The controller stores even temporary electrical malfunctions, such as a drop in battery output voltage or disconnections of the switches, sensors, etc., for inspections. For this reason, the "RETRIAL" is required to erase the accumulated fault codes from the controller memory and to confirm if any fault codes are indicated after the "RETRIAL".



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## **TROUBLESHOOTING / Diagnosing Procedure**

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6. Trace possible causes

Before reaching a conclusion, check the most likely causes again. Try to identify the actual cause of the trouble.

Based on your conclusion, make a plan for appropriate repairs to avoid consequent malfunctions.



## **TROUBLESHOOTING / Diagnosing Procedure**

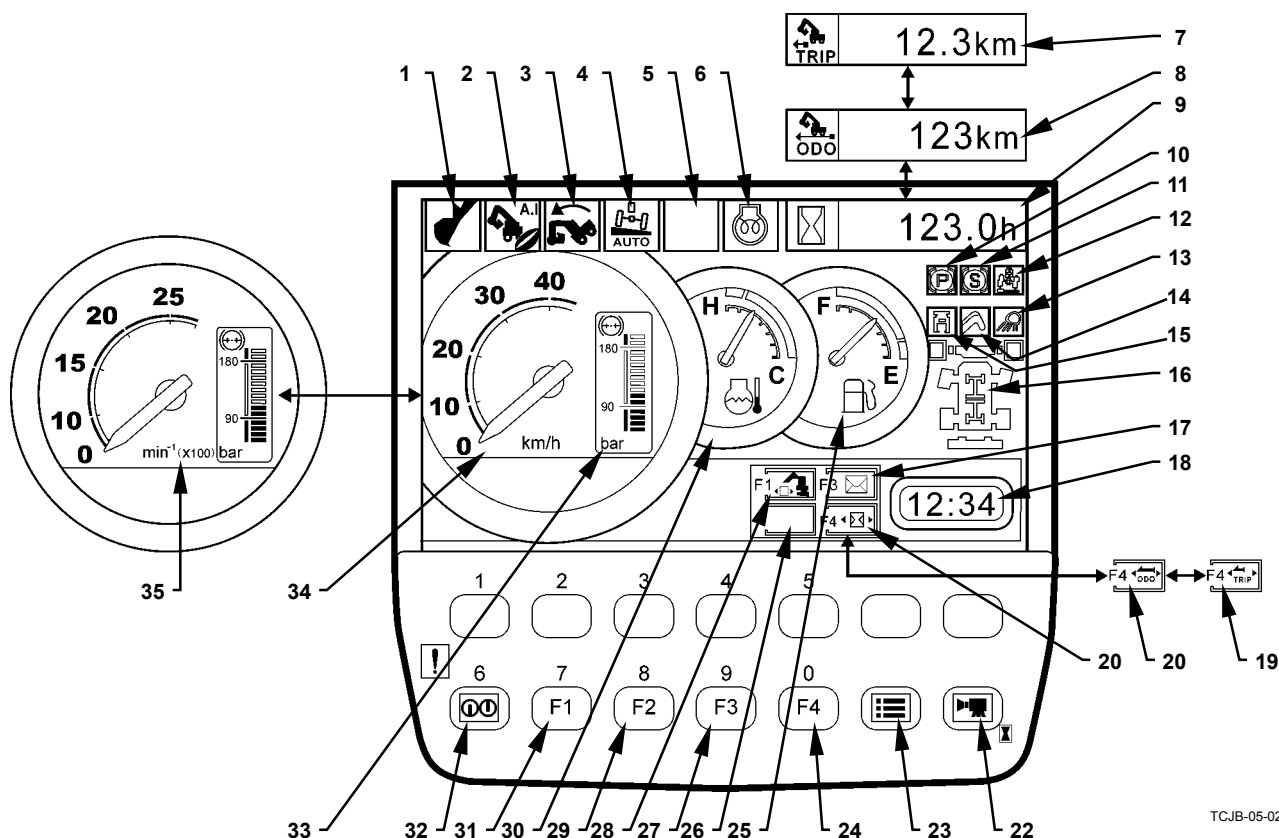
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## TROUBLESHOOTING / Monitor Unit

### OUTLINE

#### Primary Screen



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- |                                       |                                                      |                                |                                |
|---------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------|
| 1 - Work Mode Display                 | 10 - Parking Brake Display                           | 19 - Trip Meter Display        | 28 - Work Mode Display         |
| 2 - Auto-Idle Display                 | 11 - Work Brake Display                              | 20 - Odometer Display          | 29 - Auxiliary Selection       |
| 3 - Overload Alarm Display (Optional) | 12 - Axle Lock Display                               | 21 - Hour Meter Display        | 30 - Coolant Temperature Gauge |
| 4 - Auto Axle Lock Display            | 13 - Work Light Display                              | 22 - Back Monitor Selection    | 31 - Work Mode Selection       |
| 5 - Auxiliary                         | 14 - Auxiliary 2 (Positioning) Selection Display     | 23 - Menu                      | 32 - Return to Primary Screen  |
| 6 - Glow Signal Display               | 15 - Auxiliary 1 (Attachment) Selection Display      | 24 - Meter Display Selection   | 33 - Brake Oil Pressure Gauge  |
| 7 - Trip Meter                        | 16 - Blade/Outrigger Settings and Brake Mode Display | 25 - Fuel Gauge                | 34 - Speedometer               |
| 8 - Odometer                          | 17 - Mail Display (Optional)                         | 26 - Auxiliary                 | 35 - Tachometer                |
| 9 - Hour Meter                        | 18 - Clock                                           | 27 - Mail Selection (Optional) |                                |