Service Manual

DL750/DL750P
ScopeCorder

YOKOGAWA
Yokogawa Electric Corporation

SM 701210-01E
4th Edition

Important Notice to the User

This manual contains information for servicing YOKOGAWA's DL750/DL750P ScopeCoder. Check the serial number to confirm that this is the correct service manual for the instrument to be serviced. *Do not use the wrong manual.*

Before any maintenance and servicing, read all safety precautions carefully.

Only properly trained personnel may carry out the maintenance and servicing described in this service manual.

Do not disassemble the instrument or its parts, unless otherwise clearly permitted by this service manual.

Do not replace any part or assembly, unless otherwise clearly permitted by this service manual.

In principle, Yokogawa Electric Corporation (YOKOGAWA) does not supply parts other than those listed in the customer maintenance parts list in this service manual (mainly *modules* and *assemblies*). Therefore if an assembly fails, the user should replace the whole assembly and not components within the assembly (see "Note"). If the user attempts to repair the instrument by replacing individual components within the assembly, YOKOGAWA assumes no responsibility for any consequences such as defects in instrument accuracy, functionality, reliability, or user safety hazards. YOKOGAWA does not offer more detailed maintenance and service information than that contained in this service manual.

All reasonable efforts have been made to assure the accuracy of the content of this service manual. However, there may still be errors such as clerical errors or omissions. YOKOGAWA assumes no responsibility of any kind concerning the accuracy or contents of this service manual, nor for the consequences of any errors.

Note

YOKOGAWA instruments have been designed in a way that the replacement of electronic parts can be done on an assembly (module) basis by the user. YOKOGAWA instruments have also been designed in a way that troubleshooting and replacement of any faulty assembly can be done easily and quickly. Therefore, YOKOGAWA strongly recommends replacing the entire assembly over replacing parts or components within the assembly. The reasons are as follows:

- Repair of components can only be performed by specially trained and qualified maintenance personnel with special tools. In addition, repair of components requires various special parts and components, including costly ones. It also requires facilities where highly-accurate and expensive maintenance equipment and special tools are provided.
- When taking the service life and cost of the instruments into consideration, the replacement of assemblies offers the user the possibility to use YOKOGAWA instruments more effectively and economically with a minimum in downtime.

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Revisions

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Safety Precautions

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa Electric Corporation assumes no liability for the customer's failure to comply with these requirements.

WARNING

This service manual is to be used by properly trained personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to the safety precautions prior to performing any servicing. Even if servicing is carried out by qualified personnel according to this service manual, YOKOGAWA assumes no responsibility for any result occurring from this servicing.

Use the Correct Power Supply

Ensure the source voltage matches the voltage of the power supply before turning ON the power.

Use the Correct Power Cord and Plug

To prevent an electric shock or fire, be sure to use the power cord supplied by YOKOGAWA. The main power plug must be plugged into an outlet with a protective grounding terminal. Do not disable protection by using an extension cord without protective grounding.

Connect the Protective Grounding Terminal

The protective grounding terminal must be connected to ground to prevent an electric shock before turning ON the power.

Do Not Impair the Protective Grounding

Never cut off the internal or external protective grounding wire or disconnect the wiring of the protective grounding terminal. Doing so creates a potential shock hazard.

Do Not Operate with Defective Protective Grounding or Fuse

Do not operate the instrument if you suspect the protective grounding or fuse might be defective.

Use the Correct Fuse

To prevent fire, make sure to use a fuse of the specified rating for current, voltage, and type. Before replacing the fuses, turn OFF the power and disconnect the power source. Do not use a different fuse or short-circuit the fuse holder.

Do Not Operate Near Flammable Materials

Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.

Do Not Remove Any Covers

There are some components inside the instrument containing high voltage. Do not remove any cover if the power supply is connected. The cover should be removed by qualified personnel only.

Ground the Instrument before Making External Connections

Connect the protective grounding before connecting the instrument to a measurement or control unit.

Safety Symbols Used on Equipment and in Manuals

Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING Describes precautions that should be observed to prevent serious injury or death to the user.

CAUTION Describes precautions that should be observed to prevent minor or moderate injury, or damage to the instrument.

Note Provides important information for the proper operation of the instrument.

Key Lock

Please release the key lock before performing the tests in this manual.
Press PROTECT to release the key lock (see IM701210-06E, section 17.5).

Overview of This Manual

This manual is meant to be used by qualified personnel only. Make sure to read the safety precautions at the beginning of this manual and the warnings/cautions contained in the referenced chapter prior to carrying out any servicing.

This manual contains the following chapters:

1 Principles of Operations
Describes the functions of various assemblies and lists safety considerations.

2 Performance Testing
Describes the tests for checking performance of the instrument.

3 Adjustments
Describes the adjustments which can be performed by users.

4 Troubleshooting
Describes procedures for troubleshooting and what to do in case parts need to be replaced.

5 Schematic Diagram
Gives the system configuration diagram.

6 Customer Maintenance Parts List
Contains exploded views and a list of replaceable parts.

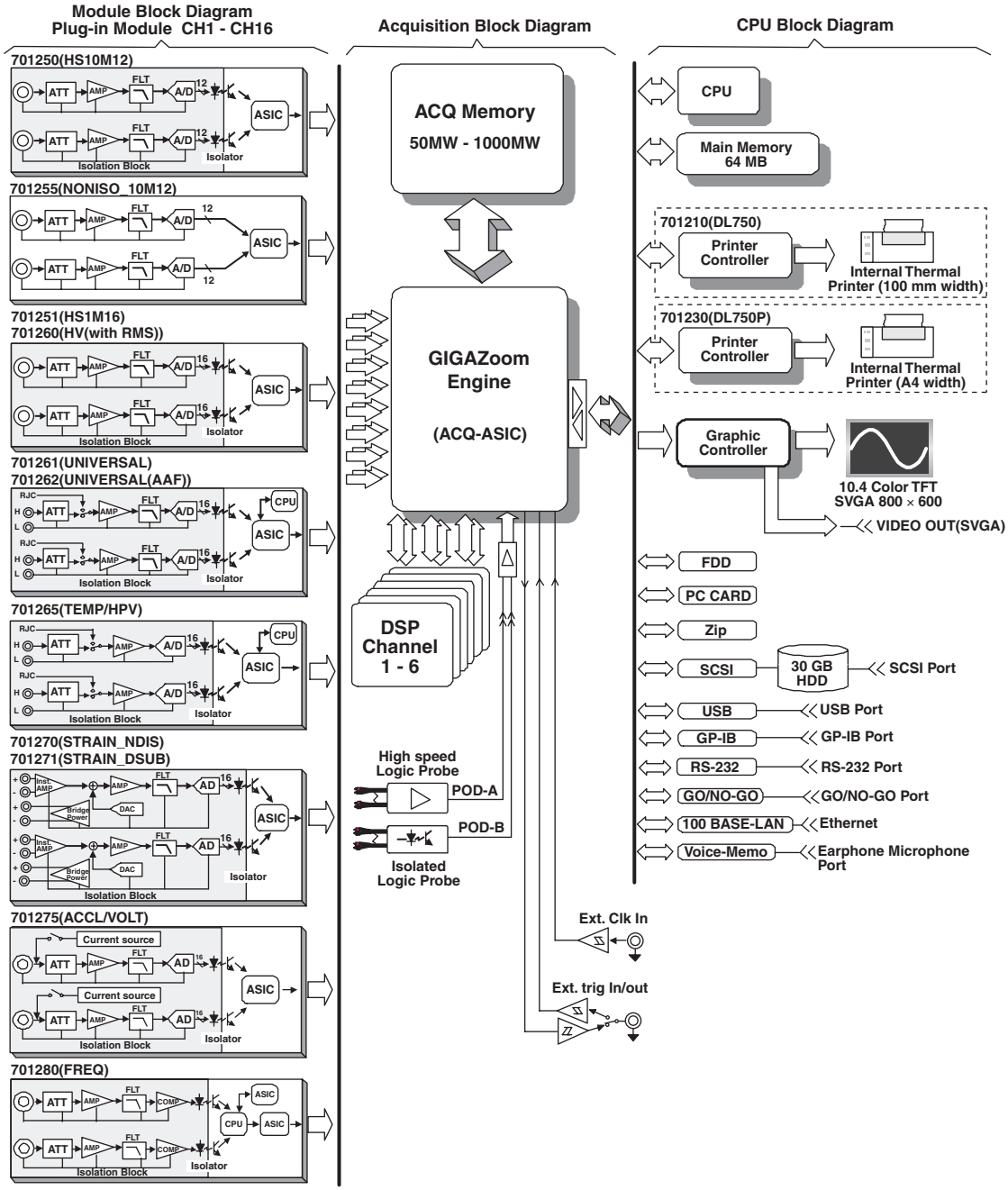
7 Procedures for Disassembly
Lists the steps required to remove parts from the instrument.

Specifications are not included in this manual. For specifications, refer to IM701210-05E or IM701210-06E.

Contents

1.1 Block Diagram

Block Diagram of the DL750/DL750P



Signal Flow on the DL750/DL750P

The flow of the signal applied to the input signal varies depending on the module. Here, the High-Speed 10 MS/s, 12-Bit Isolation Module (HS10M12(701250)) is used as an example for the explanation. (For details on the flow of the signal of each module, see the block diagram.)

The signal applied to the two input terminals is first processed by the input section of each module.

On the HS10M12(701250), the input signal is attenuated/amplified by the attenuator and amplifier and its bandwidth is limited using the filter. The signal is then A/D converted, passed through the isolator and ASIC, and output to the main unit.

At the A/D converter, the input signal is sampled at a sample rate of 10 MS/s (10 million times per second) and converted to digital data.

The 16 channels of digital data collected at the CPU board pass through the GIGAZoom Engine (ACQ-ASIC) and stored in the ACQ Memory. The digital data stored in the ACQ Memory is compressed at high speeds by the GIGAZoom Engine (ACQ-ASIC), passed through the Graphic controller, and displayed on the SVGA TFT color display.

The DSP channel (optional) performs realtime computation between arbitrary channels using the A/D conversion data of an analog input channel (or the computed result of a DSP channel) as a computation source. Using DSP channels, the DL750/DL750P can acquire waveforms of up to 16 channels + 6 DSP channels + 16-bit digital data, simultaneously.

1.2 Function of Each Assembly

CPU Board Assembly

The CPU Board consists of each circuit block's control circuit, an I/O circuit, and other peripheral circuits.

A Hitachi HD6417750SF167 is used for the CPU. The actions of each circuit block connected to the CPU bus are controlled by the CPU.

The controllers for the main memory (synchronous DRAM) and the serial I/F circuit are included in the CPU's peripheral circuits. In the I/O circuit, the following circuits carry out control through the CIO (CPU I/O interface IC). They are the flash memory, backup memory, keyboard, floppy disk drive controller, Zip drive circuit, PCMCIA drive circuit, GP-IB controller, USB controller, SCSI controller, HDD controller (with the /C8 option), voice memo IC, two SPIO ASICS, and Ether I/F controller (with the /C10 option). On the CPU bus, they are the ACQ ASIC, and graphic controller (MQ200).

The CPU Board contains the CIO (CPU I/O interface IC), main memory (synchronous DRAM), flash memory, backup memory, GP-IB controller, ACQ ASIC, and SPIO ASIC. All other devices reside on different assemblies.

Motherboard Assembly

The power assembly, CPU board assembly, and modules share direct connections, while the FAN assembly, probe PWR assembly, and inverter unit are connected by cables. These share signal and power supply connections.

Sub Motherboard Assembly

This board simply creates an electrical connection between the CPU board assembly and I/O board assembly (I/O LAN&HDD assembly, I/O LAN assembly, I/O HDD assembly, or I/O STD assembly).

I/O LAN&HDD Assembly (DL750 with Both the /C8 Option and /C10 Option)

These assemblies control the external device interfaces (Ethernet, USB, logic input, and voice memo interfaces), the internal media (floppy disk drive, Zip drive, and PCMCIA card), and the 100mm width printer unit. It also houses the lithium battery that powers the clock and backup storage memory.

I/O LAN Assembly (DL750 with the /C10 option)

This assembly refers to the I/O LAN&HDD Assembly with the internal HDD related components removed.

I/O HDD Assembly (DL750 with the /C8 option)

This assembly refers to the I/O LAN&HDD Assembly with the Ethernet related components removed.

I/O STD Assembly (DL750 (When Neither the /C8 Option nor /C10 Option are Installed))

This assembly refers to the I/O LAN&HDD Assembly with both the Ethernet and the internal HDD related components removed.

I/O A4&LAN&HDD Assembly (DL750P with Both the /C8 Option and /C10 Option)

These Assemlies control the external device interfaces(Ethernet, USB, logic input, and voice memo interfaces), the internal media (floppy disk drive and PCMCIA card), and the A4 printer unit. It also houses the lithium battery that powers the clock and backup storage memory.

I/O A4&LAN Assembly (DL750P with the /C10 Option)

This assembly refers to the I/O A4&LAN&HDD Assembly with the internal HDD related components removed.

I/O A4&HDD Assembly (DL750P with the /C8 Option)

This assembly refers to the I/O A4&LAN&HDD Assembly with the Ethernet related components removed.

I/O A4&STD Assembly (DL750P (When Neither the /C8 Option nor /C10 Option are installed))

This assembly refers to the I/O A4&LAN&HDD Assembly with bith the Ethernet and the internal HDD related components removed.

LCD FPC Assembly

This is the assembly with the connector for the flexible printed cable that connects the LCD assembly and the LCD connection assembly.

USB Assembly

This board serves as a USB adapter for the USB signal line coming from the I/O board assembly. The board has two type A and one type B USB connectors.

MQ Board Assembly

This board accesses the graphic controller to carry out writing to the screen, and generating output signals to the LCD or VCA video output signals.

LCD Connection Assembly

This assembly connects the flexible flat cable from the MQ board and the LCD FPC assembly that is connected to the LCD unit.

PCMCIA Board Assembly (When -J3 Is Specified)

This assembly includes the single-card PCMCIA socket and the PCMCIA card control circuits.

Switch Board Assembly (When the /P4 option Is Not Installed)

This assembly contains the ON/OFF switch and fuse for the backup battery that supplies power for the ACQ memory and voice memo circuits, as well as the countercurrent protection diode.

Key BD Assembly

Key switches, LEDs, rotary encoders, and the jog shuttle are installed on the Key BD assembly. The assembly also includes the output circuits for the COMP signals that are involved in probe adjustment.

Key Sub BD Assembly

Key switches and LEDs are installed on the Key Sub BD assembly. The sub assembly also serves to link signals with the Key BD assembly.

Probe PWR Assembly (with the /P4 Option)

This assembly contains a DC-DC converter that creates a –12 V power supply for current probes from a +12 V power supply. The +12 V and –12 V output pass through a polyswitch for circuit protection. The assembly also contains circuits for the switch board assembly.

OP MEM 13BANK Assembly (with the /M3 Option)

This board consists of seventy-eight 256 Mbit SDRAMs (total capacity 1248 MW) and control circuits for the memory used for measured data. Its function is to store P-P and other types of data that were compressed by the ACQ-ASIC in the SDRAMs. It uses a DC-DC converter (that houses backup control circuits for saving data stored in DRAMs while the power is OFF) to convert battery voltage to 3.3 V and supply that voltage to the SDRAM and VOICE MEMO circuits.

OP MEM 7BANK Assembly (with the /M2 Option)

This board consists of forty-two 256 Mbit SDRAMs (total capacity 672 MW) and backup control circuits. It carries the same function as the OP MEM 13BANK assembly.

OP MEM 3BANK Assembly (with the /M1 Option)

This board consists of eighteen 256 Mbit SDRAMs (total capacity 288 MW) and backup control circuits. It carries the same function as the OP MEM 13BANK assembly.

STD MEM 1BANK Assembly (When No Memory Options Are Installed)

This board consists of six 256 Mbit SDRAMs (total capacity 96 MW) and backup control circuits. It carries the same functions as the OP MEM 13BANK assembly.

Zip Board Assembly (DL750 (When -J2 Is Specified))

The Zip Board Assembly is an adapter which connects the Zip drive to the I/O board.

Inverter Unit

This unit contains the control circuits that run the backlight on the LCD assembly.

LCD Unit

10.4-inch color TFT liquid crystal display
Full display resolution: 800 × 600

100mm Width Printer Unit (DL750)

A thermal sensitivity printer that prints 8 dots per milimeter and 832 dots per line. A hardcopy of the display is printed in typically twenty seconds.

A4 PRINTER PCB Assembly (DL750P)

Performs print data buffering, strobe control, motor control, and other functions for the A4 printer.

A4 PRINTER UNIT (DL750P)

A terminal sensitivity printer that prints 8 dots per millimeter and 1728 dots per line. A hardcopy of the display is printed in typically 10 seconds.
Also, the maximum speed of real time printing is 20 mm/s.

FDD Unit (When -J1 Is Specified)

The FDD assembly supports 3.5-inch floppy disks (720 KB and 1.44 MB formats).

Zip Unit (DL750 (When -J2 Is Specified))

The Zip assembly supports both 100 MB and 250 MB capacity media.

POWER Assembly

This assembly takes commercial power and creates power that can be used inside the instrument.
The input voltage is an 85–132 VAC/170–264 VAC auto-switching type, and the input frequency range is 48–63 Hz.
The output voltage is as follows:

DC: +12 VDC (2 Amax), +7.2 VDC (2 Amax), +5.1 VDC (3.5 Amax), +3.4 VDC (6 Amax)
AC (rectangular wave): 12 VAC (3 Arms max)

DC Power Assembly (DL750 (With the /DC Option))

This assembly takes power from the DC power supply, and creates power that can be used inside the instrument. When commercial power is input, the supply of power from the DC Power Assembly is stopped.
The input voltage is an 10-18 VDC.
The output voltage is an +12 VDC (10 Amax).

FAN Assembly

This is the fan located in the upper part of the instrument. The fan runs on lower-than-standard voltage (approximately 7.2 V) to reduce noise.

High-Speed 10-MS/s, 12-Bit Isolation Module (Model 701250)

This module consists of an A/D converter, an analog ASIC, and an isolated power supply with 10 MHz operation and 12-bit A/D resolution.

High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)

This module consists of an A/D converter, an analog ASIC, and an isolated power supply with 1 MHz operation and 16-bit A/D resolution.

High-Speed 10-MS/s, 12-Bit Non-Isolation Module (Model 701255)

This module consists of an A/D converter, an analog ASIC, and a non-isolated power supply with 10 MHz operation and 12-bit A/D resolution.

High-Voltage 100 kS/s, 16-Bit Isolation Module (Model 701260)

This module consists of an A/D converter, an analog ASIC, and an isolated power supply with 100 kHz operation and 16-bit RMS converter.

Universal (Voltage/Temp.) Module (Model 701261)

This module consists of an A/D converter, an analog ASIC, an isolated power supply, and a One Chip CPU. It operates at 100 kHz during voltage measurement, and 500 Hz during temperature measurement, with 16-bit A/D resolution. The One Chip CPU carries out analog control, digital filtering, and conversion of temperature signal to measured data during temperature measurements.

Universal (Voltage/Temp.) Module (with AAF) (Model 701262)

This module is same as 701261 module with an anti-aliasing filter added.

Temperature, High Precision Voltage Isolation Module (Model 701265)

This module consists of an A/D converter, an analog ASIC, an isolated power supply, and a One Chip CPU. It operates at 500 Hz, with 16-bit A/D resolution. Always perform self-calibration. The One Chip CPU carries out analog control, digital filtering, and conversion of temperature signals to measured data during temperature measurements.

Strain Module (NDIS) (Model 701270)

This module consists of an A/D converter, an analog ASIC, an isolated power supply with 100 kHz operation, a 16-bit RMS converter, and a bridge power supply with 2 V, 5 V, and 10 V operation.

Strain Module (D_SUB, Shunt-Cal) (Model 701271)

This module consists of an A/D converter, an analog ASIC, an isolated power supply with 100 kHz operation, a 16-bit RMS converter, and a bridge power supply with 2 V, 5 V, and 10 V operation. This module supports shunt calibration.

Acceleration/Voltage Module (with AAF) (Model 701275)

This module consists of an A/D converter, an analog ASIC, an isolated power supply with 100 kHz operation and 16-bit A/D resolution, an anti-aliasing filter, and a sensor supplying power with 22 V/4 mA operation.

Frequency Module (Model 701280)

This module consists of an input stage analog circuit, a completer, an analog ASIC, an isolated power supply, an FPGA, and a One Chip CPU. The One Chip CPU operates at 40 Hz, controls the analog circuits, and processes frequency, period, DUTY measurement, scaling, digital filters, and other items.

Acquisition ASIC (ACQ)

The ACQ is a CMOS gate array. Mainly, the ACQ converts the A/D data that is serial-transferred from the analog front-end controller (AFC) on the modules, detects triggers, and carries out storage to ACQ memory (SDRAM) based on those triggers. It also compresses P-P data from the ACQ memory and reads out the data to plot waveforms. It can detect triggers on up to 16 channels of analog data simultaneously, and write to ACQ memory. Apart from analog signals, the DL750/DL750P can detect logic input (up to 16-bit) as triggers, and write to ACQ memory. It utilizes LVDS for serial transfers to the analog front-end controller (AFC), and can achieve high-speed transfers of 200 MHz. It includes an SDRAM controller for connection to ACQ memory, and supports up to seventy-eight SDRAMs for a total capacity of up to 1 GW. There are a variety of internal computing units that can perform various functions on A/D data such as linear, EXP, and box averaging. It also includes a serial interface for sending/receiving control signal setting commands and acquiring information from A/D modules.

CPU I/O Interface (CIO)

The ACQ is a CMOS gate array. Its functions include interfacing to the CPU (HD6417750SF167) and the peripheral ICs, keyboard control, LED control, printer control, interrupt control, and DMA selection.

Analog Front-End Controller (AFC)

This is a Bi-CMOS gate array. It consists of the interface circuits between the analog and digital circuits, and the computation unit. The computation unit calculates span and zero calibration. The interface circuits consist of an LVDS interface for data or clock transfers, a serial interface for sending/receiving control signals, and an interface for sending/receiving data to and from the One Chip CPU.

2.1 Introduction

The top cover, printer cover, printer case, front bezel, and shield cover must be removed before adjusting the 701250, 701251, 701255, 701260, 701261, 701262, 701265, 701270, 701271, 701275 or 701280. Read the warning and cautions below before doing so.

WARNING

Circuit patterns of the printed circuit board are exposed. Be careful when handling the boards so that hands or fingers are not injured by the protruding pins.

CAUTION

- Circuit patterns of the printed circuit board are exposed. If these patterns touch other metalic materials, electrical shorting will occur, causing the circuit to be damaged or burnt.
- It is sometimes necessary to turn the 701250/701251/701255/701260/701261/701262/701265/701270/701271/701275/701280 upside down for adjustment. Do not drop the instrument, or allow it to fall over.

Test Environment

- Ambient temperature: 23 ±5°C
- Warm-Up Time: More than thirty minutes after turning ON the instrument.

2.2 Tests for the DL750/DL750P

Tests

Acceptable Test Instruments

Name	Recommended Device or No. of Units	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	A device that can measure 100 MΩ or more at 500 VDC.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	A device that can measure 1.5 kVAC for 1 minute with a limit current of 10 mA.
Oscilloscope	YOKOGAWA DL1540 or equivalent.	—
Function Generator	YOKOGAWA FG-120-706012-1-M/XTAL/DIST2 or equivalent.	—
A PC with GP-IB Support	—	—
GP-IB Cable	—	—
A PC with USB Support	—	—
USB Mouse	—	—
Floppy Disk Medium	—	Formatted 1.44 MB floppy disk
Zip Medium	—	Formatted 250 MB Zip disk
PCMCIA Memory Card	—	May substitute compact flash with adapter.
A PC with RS-232 Support	—	—
RS-232 Cross Cable	—	—
Straight Cable for 10BASE-T/100BASE-TX	2 cables, or a single cross cable.	—
A PC with Ethernet Support	—	—
BNC Cable	2 pc.	—
High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)	1 pc.	—
High Speed Logic Probe (Model 700986)	1 pc.	—
B9879SX	1 pc.	—
Leads for the Logic Probe	YOKOGAWA B9879PX or B9879KX	—
366929 Adapter	—	—
DC Power Supply	Kikusui PAM40-100 or equivalent.	Output voltage: 8 to 30 VDC Current: 30 A or more

Test Specifications

Test Item	Specifications
Insulation Resistance Test, Power Supply L, N–PE	10 MΩ or more at 500 VDC
Withstanding Voltage Test, Power Supply L, N–PE	1.5 kVAC for 1 minute
Time Axis Accuracy Test	±0.005% or less
COMP Signal Test	1 V_{P-P} ±10% 1 kHz ±1% square wave
External Clock	Speed: 1 MHz
LAN Connector Insulation Resistance Test	100 MΩ or more at 500 VDC

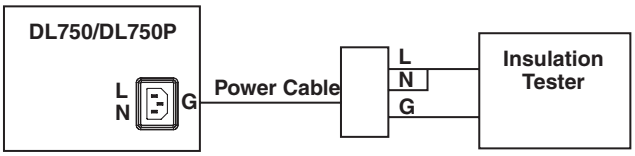
2.2.1 Insulation Resistance Test

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedures

1. Wire the instruments as shown below.



2. Turn ON the instruments.
3. Measure the insulation resistance across LN and G.

Items to Be Checked

Check that the value at all measured points is 10 MΩ or greater at DC500 V.

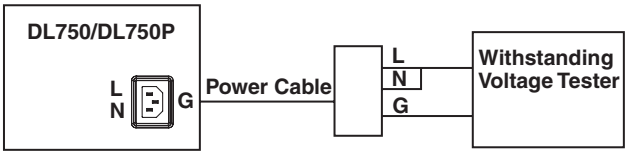
2.2.2 Withstanding Voltage Test

Acceptable Test Instruments

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Wire the instruments as shown below.



2. Turn ON the instruments.
3. Using the withstanding voltage tester, test the power supply across LN and G at 1.5 kV for 1 minute.

Items to Be Checked

That the current limit below is not exceeded.

Power supply, LN–G

AC1.5 kV (50 Hz) for 1 minute, current limit = 10 mA

2.2.3 Backup RAM and Clock Check

Testing Procedure

Time Settings

1. Press the **MISC** key.
2. Press the **System Config** soft key.
3. Press the **Date/Time** soft key. The date/time settings dialog box is displayed.
4. Enter the Hour using the **jog shuttle + SELECT** key.
5. Press the **Set** soft key. The time set in step 4 takes effect.

Time Axis Settings

6. Turn the T/div knob to set 1 μs/div.
7. Turn the power OFF.
8. Wait at least ten seconds, then turn the power back ON.

Items to Be Checked

- That the current time is correctly displayed, and that the seconds advance normally.
- That T/div is set to 1 μs/div.

2.2.4 Overview Screen Check

Display the overview screen and confirm that all option settings appear correctly.

Testing Procedure

1. Turn ON the power to the DL750/DL750P.
2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Overview** soft key.

Items to Be Checked

Model:	701210 or 701230	
Record Length:	That the following is displayed depending on the memory expansion installed.	
	Standard:	Max 50 MW (2.5 MW/CH)
	/M1:	Max 250 MW (10 MW/CH)
	/M2:	Max 500 MW (25 MW/CH)
	/M3:	Max 1 GW (50MW/CH)
Module (Slot):	That the inserted module is recognized correctly.	
Floppy, Zip, and PC Card:	That the following is displayed depending on the type of internal medium installed.	
	-J1:	FDD
	-J2:	Zip (DL750 only)
	-J3:	PC_CARD
OPTION:	That the following is displayed depending on the option installed.	
	/C8:	Yes under HDD
	/DSP:	Yes under DSP
	/G2:	Yes under Math
	/C10:	Yes under Ether, with the MAC address displayed
Default LANguage:	Default language specification	

In the case of the 701230, check that the two characters displayed under Printer Version are the same as the following example.
Ex. When the version of the printer's firmware is 1.01: Version: 1.01/1.01 is displayed.

2.2.5 Memory Test

Testing Procedure

1. Press the **MISC** key.
2. Press the **Next 1/2** soft key.
3. Press the **Self Test** soft key.
4. Press the **Test Item** soft key. A test item selection menu appears.
5. Select Memory using the **jog shuttle + SELECT** key.
6. Press the **Test Exec** soft key. The memory check is executed.
   When the memory check is complete, the message "Test Completed" appears.

Items to Be Checked

That "Pass" is displayed on the screen.

2.2.6 Panel Function Test

This is a test of the front panel controls (keys, jog shuttle, and LEDs).

Testing Procedure

1. Press the **MISC** key.
2. Press the **Next 1/2** soft key.
3. Press the **Self Test** soft key.
4. Press the **Test Item** soft key. A test item selection menu appears.
5. Select Keyboard using the **jog shuttle + SELECT** key.
6. Press the **Test Exec** soft key. Execute the key test.
7. Press the keys in sequence, and confirm that all keys, knobs, and the shuttle ring operate correctly (see section 4.2 in IM701210-05E).
   Turn the knob to the right and to the left.
   Check that the shuttle ring turns at an angle of 1–7 degrees to the right or left.
   Change the angle of the shuttle ring slowly.
8. When all keys, knobs, and the shuttle ring are correctly recognized, the message "Test Completed" appears the end of the test.

Note

You can press ESC twice to end the key test.

Items to Be Checked

- That all keys, knobs, and the shuttle ring operate correctly.
  That the corresponding location on the screen changes as expected.
- That a "click" can be heard when operating the knob and jog shuttle.
- That the LEDs (excluding the TRIG LED) light up in order.
  That the protect key lights red, and the others light green.

2.2.7 Built-In Printer Check

Testing Procedure/Items to Be Checked

Paper EMPTY Detection

1. With the roll paper not inserted, turn the paper lever to the Hold position (see section 12.1 in IM701210-06E for DL750, or see section 9.1 in IM701210-05E for DL750P).
2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select Printer.
7. Press the **Test Exec** soft key.
8. Confirm that the error message "Paper not inserted" appears on the screen.

Lever Release Detection

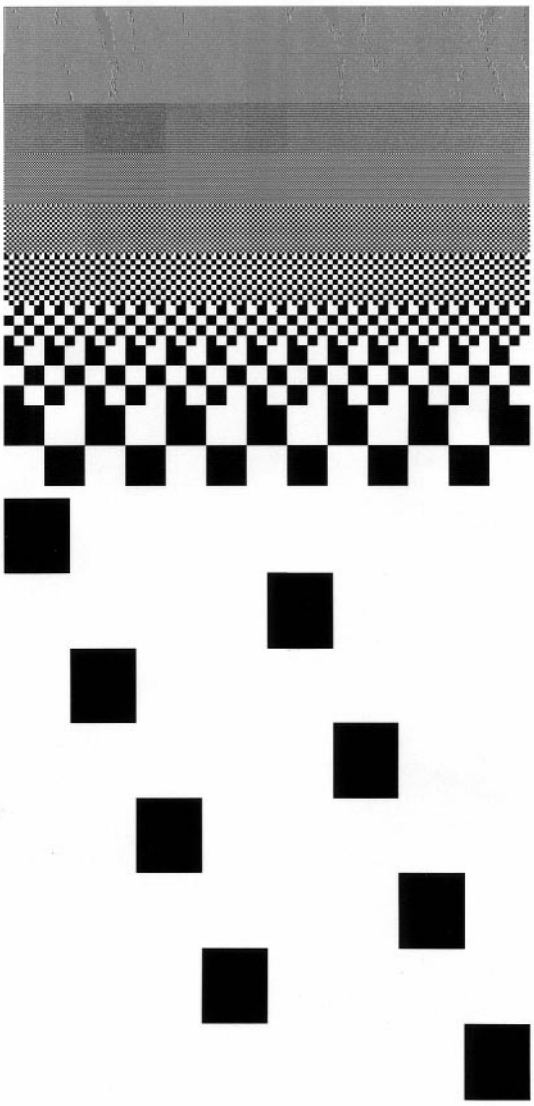
1. Insert the roll paper and turn the paper lever to the Free position.
2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select Printer.
7. Press the **Test Exec** soft key.
8. Confirm that the message "Move the release arm to the HOLD position" appears on the screen.

Print Function

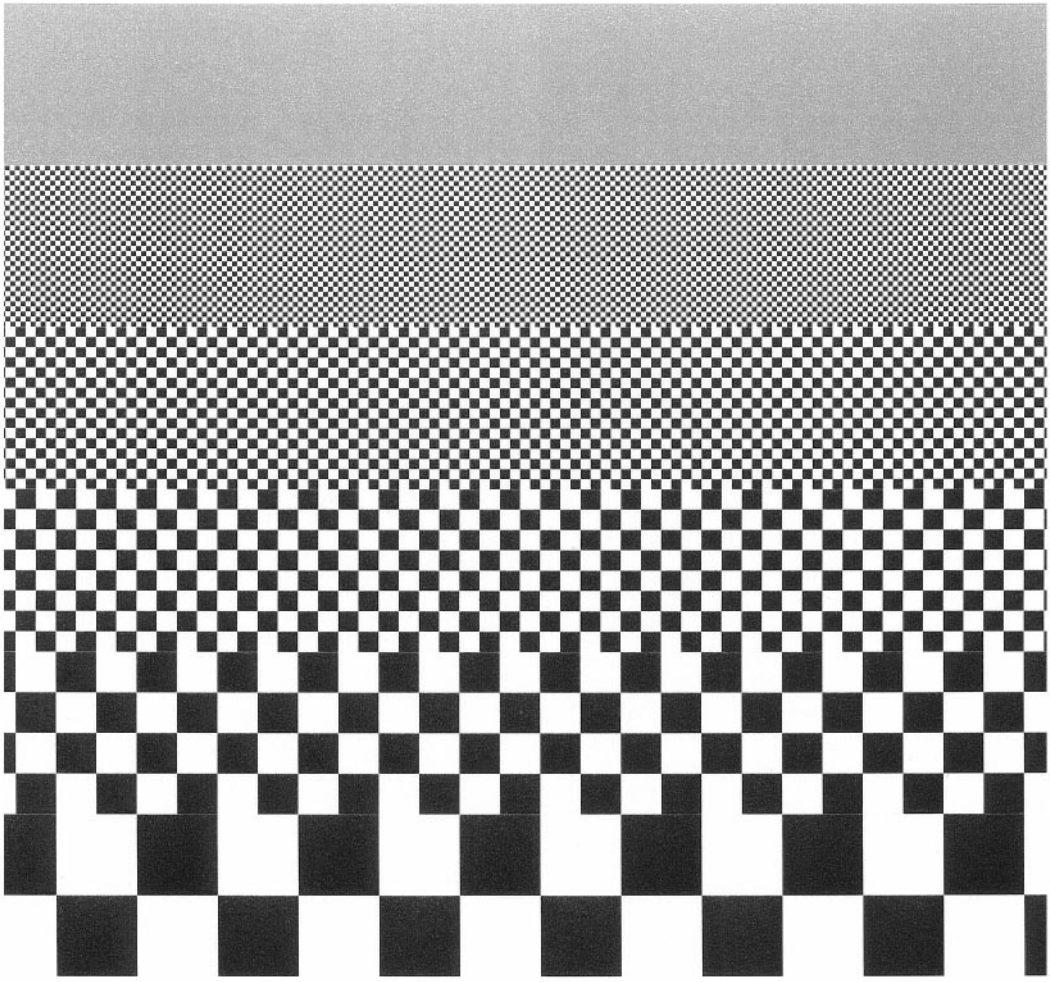
1. Insert the roll paper, then turn the release arm to the Hold position (see section 12.1 in IM701210-06E for DL750, or see section 9.1 in IM701210-05E for DL750P).
2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select Printer.
7. Press the **Test Exec** soft key. Printing is executed.
8. Confirm that the test pattern is printed correctly.

Test Pattern

- **Test Pattern of the DL750**



• **Test Pattern of the DL750P**



Note

- Some unevenness can occur during printing, and is considered normal.
- The test pattern differs depending on the software version.

2.2.8 Floppy Disk Drive Test (When -J1 Specified)

Acceptable Test Instruments

A formatted, double-density, 1.44 MB floppy disk.

Testing Procedure

1. Insert a formatted 1.44 MB floppy disk.

Write/Read Test

2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select FDD.
7. Press the **Test Exec** soft key.

Items to Be Checked

- That the capacity of the inserted disk was recognized correctly.
- That “Pass” was displayed upon completion of the Write/Read test.

2.2.9 Zip Drive Test (DL750 (When -J2 Specified))

Acceptable Test Instruments

A formatted, 250 MB Zip disk.

Testing Procedure

1. Insert a formatted Zip disk into the instrument.

Write Test

2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select Zip.
7. Press the **Test Exec** soft key. The Write Test is executed.

Items to Be Checked

That “Pass” is displayed on the screen after completion of the Write test.

2.2.10 PCMCIA Test (When -J3 Specified)

Acceptable Test Instruments

PCMCIA memory card.

Testing Procedure

1. Insert a PCMCIA memory card into the unit.

Executing the Write Test

2. Press the **MISC** key.
3. Press the **Next 1/2** soft key.
4. Press the **Selftest** soft key.
5. Press the **Test Item** soft key. A test item selection menu appears.
6. Turn the **jog shuttle** to select PC Card.
7. Press the **Test Exec** soft key. The Write Test is executed.

Items to Be Checked

That “Pass” is displayed on the screen after completion of the Write test.

2.2.11 RS-232 Test

Acceptable Test Instruments

- A PC with an Available RS-232 Port
- RS-232 Cross Cable

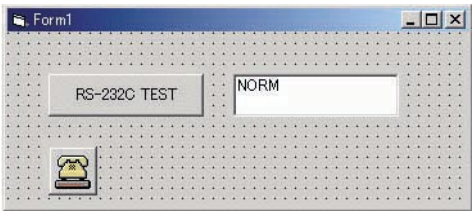
Testing Procedure

1. Connect the PC to the main unit with the cross cable.
2. Press the **MISC** key.
3. Press the **Remote Cntl** soft key.
4. Press the **Device** soft key.
5. Press the **RS-232** soft key.
6. Turn the **jog shuttle** to select Baud Rate.
7. Select **Format**, **Rx-Tx,** or **Terminator** as required.
8. Execute a program like the one below.
   The following program was written in Visual Basic. Your program may differ depending on the language used.

```
Private Sub Command1_Click() 'RS232C-TEST
  Dim buf As String
  Dim tmp As String
  Dim sLen As Long

========= Initialize COM1  ============

   Form1.MSComm1.CommPort = 1
   Form1.MSComm1.Settings = "19200,N,8,1"
   Form1.MSComm1.Handshaking = comRTS
   Form1.MSComm1.PortOpen = True

========= Send command =========

   Form1.MSComm1.Output = "COMM:HEAD OFF" & vbCrLf
   Form1.MSComm1.Output = "ACQ:MODE NORM" & vbCrLf
   Form1.MSComm1.Output = "ACQ:MODE?" & vbCrLf

========== Load Data ============

   Do
      If (Not Form1.MSComm1.PortOpen) Then Exit Sub
      Do While Form1.MSComm1.InBufferCount = 0
      Loop

       sLen = sLen + Form1.MSComm1.InBufferCount
       tmp = Form1.MSComm1.Input
       buf = buf & tmp
       DoEvents
  Loop While Not Right(buf, 1) = Chr(&HA)

========== Display data ==============

   Form1.Text1.SelStart = Len(Form1.Text1.Text)
   Form1.Text1.Text = Left(buf, sLen - 2)
   DoEvents

========= Close port ============

   Form1.MSComm1.PortOpen = False

End Sub
```

Items to Be Checked

That “NORM” is displayed on the PC screen.



2.2.12 GP-IB Test

Acceptable Test Instruments

- A PC with Support for GP-IB
- GP-IB Cable

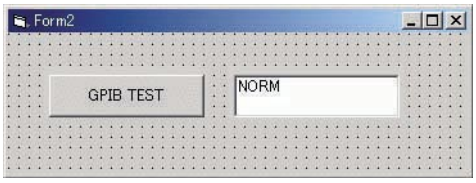
Testing Procedure

1. Connect the PC to the main unit with the GP-IB cable.
2. Press the **MISC** key.
3. Press the **Remote Cntl** soft key.
4. Press the **Device** soft key.
5. Press the **GP-IB** soft key.
6. Turn the **jog shuttle** to set the GP-IP address.
7. Execute a program like the one below.
   The following program was written in Visual Basic. Your program may differ depending on the language used.

```
Private Sub Command2_Click() 'GPIB-TEST

========== Initialize GP-IB ==============

   Call ibfind("DEV1", dl%)
   Call ibsic(dl%)

   vol$ = 0
   vol$ = Space$(10)

========= Send command =========

   Call ibwrt(dl%, "COMM:HEAD OFF" + vbCrLf)
   DoEvents
   Call ibwrt(dl%, "ACQ:MODE NORM" + vbCrLf)
   DoEvents
   Call ibwrt(dl%, "ACQ:MODE?" + vbCrLf)
   DoEvents

========== Receive data ==============

   Call ibrd(dl%, vol$)
   DoEvents

========== Display data ==============

   Text1.Text = Mid(vol$, 1, 4)

End Sub
```

Items to Be Checked

That “NORM” is displayed on the PC screen.



2.2.13 USB Test

Acceptable Test Instruments

USB Mouse

Testing Procedure

1. Connect the mouse to one of the USB PERIPHERAL terminals, then confirm that the mouse cursor appears on the screen after approximately ten seconds.
2. Connect the mouse to the other terminal and repeat the check.

2.2.14 Internal Hard Drive Test (with the /C8 Option)

Testing Procedure

1. Press the **MISC** key.
2. Press the **Next 1/2** soft key.
3. Press the **Selftest** soft key.
4. Press the **Test Item** soft key. A test item selection menu appears.
5. Turn the **jog shuttle** to select HDD.
6. Press the **Test Exec** soft key.

Items to Be Checked

That the unit passed the Write test.

2.2.15 Ethernet Test (with the /C10 Option)

Acceptable Test Instruments/Test Procedure

Please see section 16.7 in IM701210-06E, “Using the Web Server Function.”

Items to Be Checked

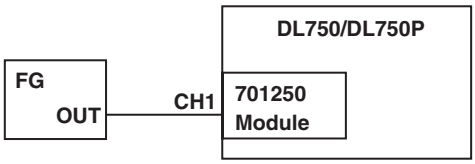
Whether the Web Server window appears in the PC screen.

Note

Do not connect to your main network during this test.

2.2.16 Time Axis Accuracy Test

Use the function generator to input a sine wave of 5 ppm or less to the DL750/DL750P, then measure the frequency of the aliasing waveform using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) and check whether the result meets the specifications.



Acceptable Test Instruments

- Function Generator: YOKOGAWA FG-120-706012-1-M/XTAL/DIST2 or equivalent (time axis accuracy within ±1 ppm).
- High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Enter settings on the function generator as follows:

Setup Item	Setting
Frequency	1.0005 MHz
Amplitude	400 mV_{P-P}

3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div (1 MS/s)
CH1 (only)	Display: ON, Probe: 1:1, Position: 0 V, V/DIV: 100 mV/div
ACQ	Record Length: 10 k
MEASURE	Mode: ON, Item Setup (Trace: CH1, Freq)

Items to Be Checked

That the results using the Measure function fall within the following range.

Item	Specifications
Frequency	500 ±50 Hz (450 to 550 Hz)

2.2.17 Acquisition Test

Acceptable Test Instruments

- Function Generator: YOKOGAWA FG120 or equivalent.
- High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
- BNC Cable

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

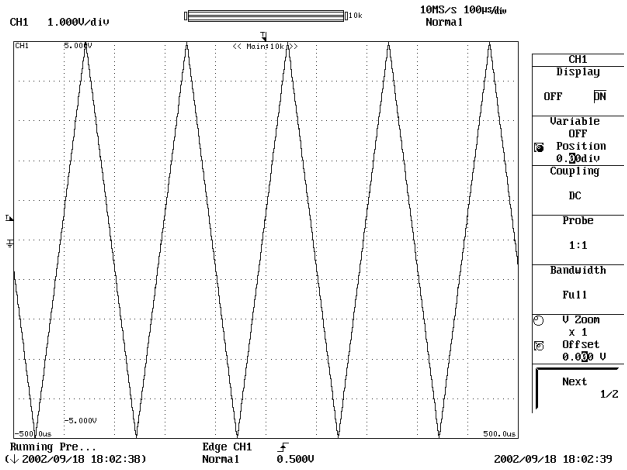
Setup Item	Setting
TIME/DIV	100 μs/div (10 MS/s)
CHX (all CH)	V/DIV: 1 V/div, Probe: 1:1
ACQ	Mode: Normal, Record Length: 10 k
SIMPLE/ENHANCED	Select (Type): Simple, Souce: CH1, Slope: Rise, Level: 0 V
(Trigger) MODE	Normal

3. Set up the function generator as follows:

Setup Item	Setting
Analog Channel Input	
Waveform	Triangular Wave
Frequency	5 kHz
P-P	10 V

4. Press **START** on the main unit to display the waveform.

5. Confirm that the waveform is correctly displayed on the screen.



6. Check all remaining channels in the same manner.

2.2.18 COMP Signal Test

This test determines whether the COMP signals are output correctly.

Acceptable Test Instruments

Oscilloscope: YOKOGAWA DL1540 or equivalent.

Testing Procedure

Using the oscilloscope, measure the output from the COMP signal terminal.

Items to Be Checked

- That the waveform of the COMP signal output is rectangular.
- That values measured using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) fall within the range below.

Item	Specifications
Frequency	1 ±0.01 kHz
P-P	1 ±0.1 V

Note

On the oscilloscope performing the COMP signal output measurements, a lowpass filter with a cutoff frequency of 20 MHz may be applied as necessary.

2.2.19 Line Trigger and Trigger LED Test

Test Item

This is a test to check the line trigger function and to test that the trigger LEDs blink.

Acceptable Test Instruments

A High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) or a High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251).

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) or High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
(Trigger) Mode	Normal
SIMPLE/ENHANCED	Select (Type): Simple, Source: Line, Hold Off: 500 ms
TIME/DIV	5 ms/div
ACQ	Record Length: 10 k
CH1 (only)	ON

3. Press **START** on the DL750/DL750P.

Items to Be Checked

That the trigger LED blinks at 0.5 second intervals.

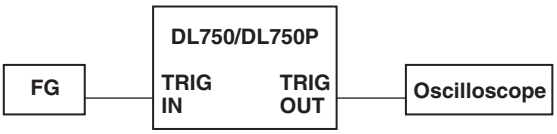
2.2.20 Trigger IN/OUT Test

Acceptable Test Instruments

- Oscilloscope: YOKOGAWA DL1540 or equivalent.
- Function Generator: YOKOGAWA FG120 or equivalent.
- BNC Cable (2 pc.)

Testing Procedure

1. Wire the instruments as shown below.



2. Enter settings on the function generator as follows:

Setup Item	Setting
Waveform	Square Wave
Frequancy	1 kHz
Amplitude	5 V_{P-P}
Offset	2.5 V

3. Enter settings on the oscilloscope as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
V/DIV	2 V/div
(Trigger) TYPE	Edge, Slope: Fall
(Trigger) POSITION	–3div

4. Enter settings on the DL750/DL750P as follows:

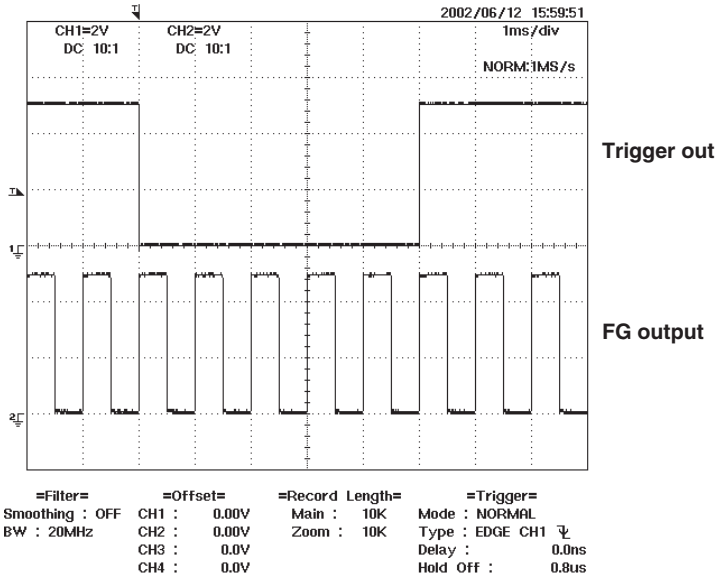
Setup Item	Setting
TIME/DIV	1 ms/div
ACQ	Record Length: 10 k
SIMPLE/ENHANCED	Select (Type): Simple, Source: EXT, Slope: Fall
(Trigger) MODE	Normal
(Trigger) POSITION	50%

5. Press **START** on the DL750/DL750P.

Items to Be Checked

- That the trigger activates.
- That the trigger out waveform is displayed on the oscilloscope.

Example



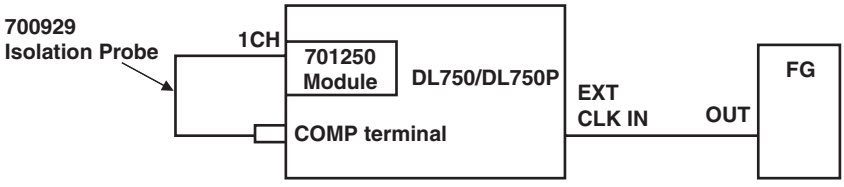
2.2.21 External Clock Function Test

Acceptable Test Instruments

- Function Generator: YOKOGAWA FG120 or equivalent.
- BNC Cable
- High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
- Isolation Probe (Model 700929)
- 366928 Adapter

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



3. Turn ON the power to the DL750/DL750P and enter the following settings.

Setup Item	Setting
CH1	Display: ON, V/DIV: 0.5V/div, Coupling: DC, Probe: 1:1, Offset: 0div
ACQ	Record Length: 10 k, Time Base: Ext
SIMPLE/ENHANCED	Select (Type): Simple, Source: CH1, Slope: Rise, Level: 0.5 V
(Trigger) MODE	Normal
(Trigger) POSITION	50%

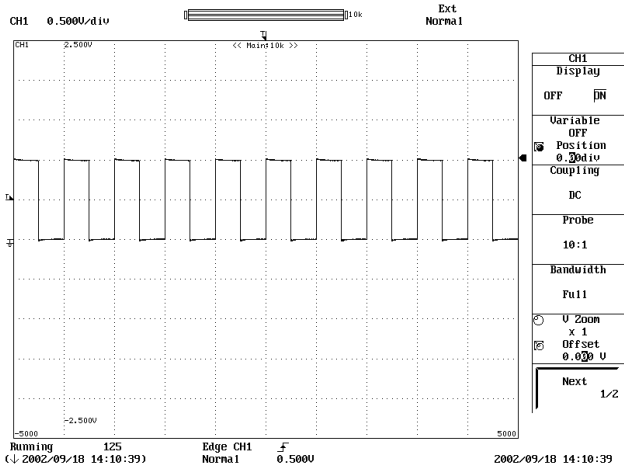
4. Enter settings on the function generator as follows:

Setup Item	Setting
Output	1:1
Waveform	Square Wave
Frequency	1 MHz
P-P	5 V
Offset	2.5 V
CH1	Connect to the EXT CLK.

5. Press **START** on the DL750/DL750P.

Items to Be Checked

That the waveform display appears as the figure below.



2.2.22 Probe Power Output Test (with the /P4 Option)

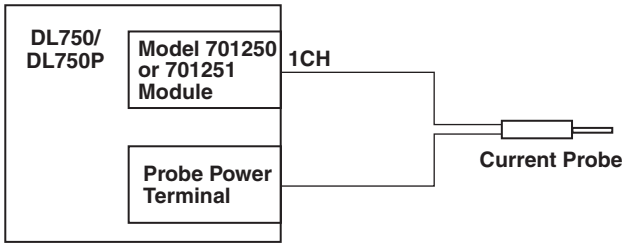
This test checks the operation of the logic probe.

Acceptable Test Instruments

A High-Speed 10 MS/s, 12MBit Isolation Module (Model 701250) or a High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251).

Testing Procedure

Connect the current probe to the main unit as shown in the figure below, then confirm that it operates normally.



2.2.23 GO/NO-GO Function Test

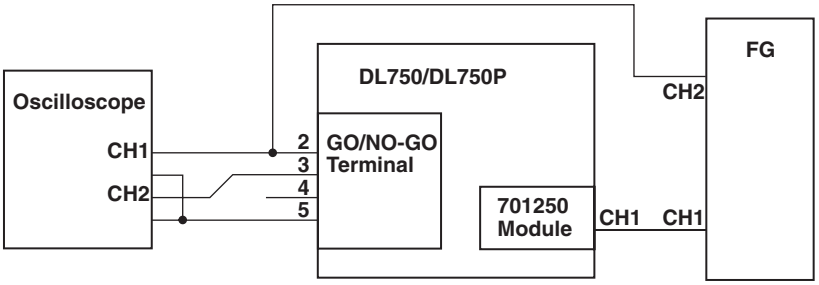
Acceptable Test Instruments

- Function Generator: YOKOGAWA FG120 or equivalent.
- High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250).
- Oscilloscope: YOKOGAWA DL1540 or equivalent.
- GO/NO-GO Cable: 366973

Testing Procedure

Checking the GO Output

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



3. Enter settings of the function generator as follows:

Setup Item		Setting
CH1		Connect the 701250 module to CH1.
	Output	1:1
	Waveform	Square Wave
	Frequancy	1 kHz
	P-P	5 V
	Offset	0 V
CH2		Connect pin 2 of the GO/NO-GO I/O connector to CH1 of the oscilloscope.
	Output	1:1
	Waveform	Square Wave
	Frequancy	1 kHz
	P-P	5 V
	Offset	2.5 V

4. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	200 μs
CH1	Display: ON, V/DIV: 1 V/div, Coupling: DC, Probe: 1:1, Bandwidth: Full
ACQ	Record Length: 100 k
SIMPLE/ENHANCED	Select (Type): Simple, Source: CH1, Slope: Rise
(Trigger) MODE	Normal
DISPLAY	Format: Single
GO/NO-GO	Mode: Zone Edit Zone: Zone1 (Upper: 0.2 div, Lower: 0.2 div, Left: 0.2div, Right: 0.2 div) Setup: 1 (Trace: CH1, Mode: IN, Zone No.: Zone1, Logic: AND, Sequence: Continue, Remote: ON)

5. Enter settings on the oscilloscope as follows:

Setup Item	Setting
TIME/DIV	200 ms/div
V/DIV(CH1&CH2)	2 V/div (to measure a TTL level)
(Trigger) MODE	Normal
(Trigger) TYPE	Edge, Slope: Rise, Source: CH1, Level: 2.5 V
(Trigger) POSITION	CH1: 0 div, CH2: –4 div

6. Check relevant items for the GO output.

Checking the NO-GO Output

7. Connect pin 4 of the GO/NO-GO I/O connector to CH2 of the oscilloscope.
8. Enter settings on the oscilloscope as follows:

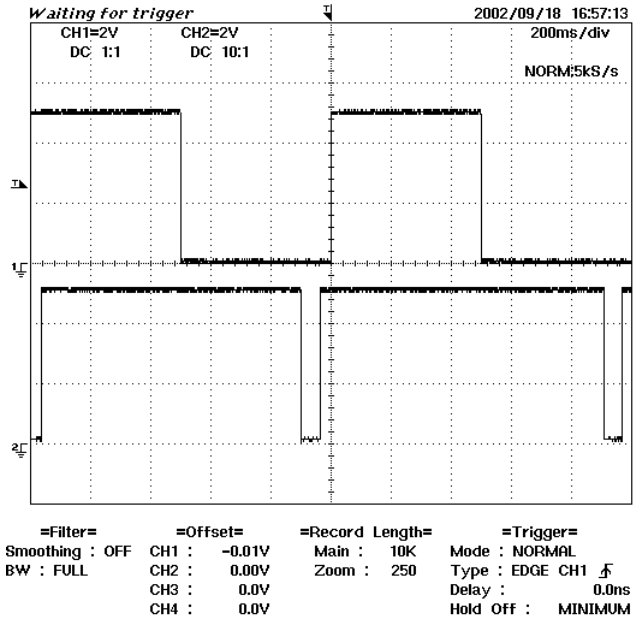
Setup Item	Setting
GO-NO/GO	Mode: Zone Setup (CH1(Trace1) only, Mode: ON, Condition: OUT, Zone1)

9. Check relevant items for the NO-GO output.

Items to Be Checked

- That the TRIG LED lights once per second, and that the START/STOP LED goes out.
- That both the GO and NO-GO outputs have a pulse width of 50 ms or more, and that they meet the following conditions.
  Given Vo_L when the voltage is low and Vo_H when the voltage is hi:
  $-0.5\ V \leq Vo_L \leq 0.4\ V$
  $4.0\ V \leq Vo_H \leq 5.5\ V$

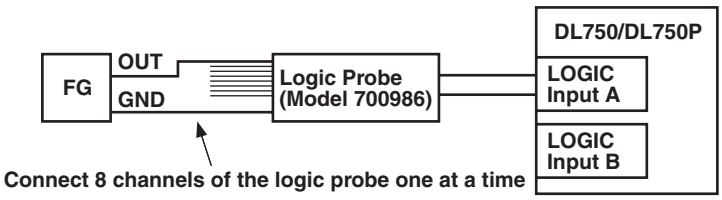
Example



2.2.24 Logic Input Test

Acceptable Test Instruments

- Logic Probe (700986)
- Function Generator: YOKOGAWA FG120 or equivalent.



1. Connect the function generator's output 1 to bits A1–A8 of the logic probe (model 700986), one bit at a time.
2. Connect the function generator's output 1 to bits B1–B8 of the logic probe (model 700986), one bit at a time.
3. During each series of A and B connections above, connect the logic probe's output terminal to the DL750/DL750P's logic input terminals A1, then B1 respectively.

4. Enter settings on the DL750/DL750P as follows:

Setup	ItemSetting
TIME/DIV	500 μs/div
ACQ	Record Length: 100 k
SIMPLE/ENHANCED	Select (Type): Simple, Source: The bit connected to the FG, Slope: Rise, Level: 0.5 V
DISPLAY	Format: Dual

5. Set up the function generator as follows:

Setup Item	Setting
Waveform	Square Wave
Level	High Level: 5 V, Low Level: 0 V
Offset	2.5 V
Frequency	1 kHz

6. Press **START** on the DL750/DL750P.
7. Confirm that each bit is displayed correctly and that the trigger activates.
8. Check that there are no changes to non-significant bits.
9. Alternate the function generator's input from bits A1–A8 and bits B1–B8, and confirm all results on the DL750/DL750P's logic input terminals A1, and B1 respectively.

Note

Turn OFF the power to the main unit when switching the logic input terminal. There is no need to cut the power when switching between bits on the logic probe.

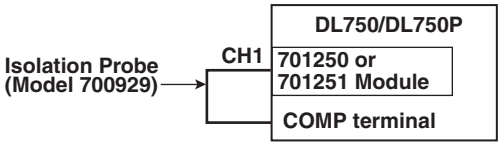
2.2.25 ACQ Memory Backup Function Test

Acceptable Test Instruments

- A High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) or a 1 MS/s, 16-Bit Isolation Module (Model 701251)
- Isolation Probe (Model 700929)

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) or High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



3. Turn ON the **ACQ MEMORY BACKUP** switch on the right side of the DL750/DL750P.
4. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	Display: ON, V/DIV: 1 V/div, Coupling: DC, Probe: 10:1, Bandwidth: Full
ACQ	Record Length: 100 k
SIMPLE/ENHANCED	Select (Type): Simple, Source: CH1, Slope: Rise, Level: 0.5 V
(Trigger) MODE	Normal
DISPLAY	Format: Single

5. Press the **START** button to read in waveforms, then the **STOP** button to stop screen updating.
6. Remove the isolation probe from the COMP terminal.
7. Turn OFF the power to the DL750/DL750P.
8. Wait approximately ten seconds, then turn the power to the DL750/DL750P back ON. Confirm that the waveform still persists before turning OFF the power.
9. Turn OFF the power again, then turn the ACQ MEMORY BACKUP switch OFF, then turn it back ON again after one second.
10. Wait approximately ten seconds, then turn the power to the DL750/DL750P back ON. Confirm that when the unit started up, an error message (Code 922) appeared indicating that the backup could not be performed.
11. When all tests are completed, turn the **ACQ MEMORY BACKUP** switch OFF.

Items to Be Checked

- If you leave the ACQ MEMORY BACKUP switch ON, the waveform will disappear when you turn the main power back ON. Normally, the same waveform appears before and after cutting the power.
- Once you turn OFF the ACQ MEMORY BACKUP switch, an error message (Code 922) appears after turning the power back ON indicating that the backup could not be performed.

2.2.26 Real Time Hard Drive Test

This is a test of the operations of the real time hard drive.

Acceptable Test Instruments

High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 s/div (100 kS/s)
CH1&CH2	Display: ON, Coupling: GND
ACQ	Record Length: 1M, Mode: Normal, RealTime Out: HD, Time Base: Int

Starting/Stopping the Real Time Hard Drive

3. Press the **START** key. Wait until the edge of the waveform rolls to the left edge of the screen.
4. Press the **STOP** key.

Deleting the Created Data File

5. Press the **FILE** key.
6. Press the **FILE Item** soft key.
7. Press the **Waveform** soft key.
8. Press the **Data Type** soft key.
9. Press the **Realtime** soft key.
10. Press **Utility**.
11. Press the **Function** soft key.
12. Press the **Delete** soft key.
13. Select Realtime using the **jog shuttle + SELECT** key.
14. Press the **All Set** soft key (an asterisk appears before all files in the directory containing the selected file or directory)
15. Press the **Delete Exec** soft key. The data file is deleted.

Items to Be Checked

That the real time hard drive stops normally (not due to errors).

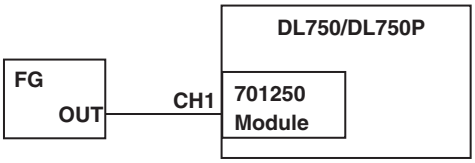
2.2.27 DSP Operation Test (with the /G3 Option)

Acceptable Test Instruments

- Function Generator: YOKOGAWA FG-120 or equivalent.
- High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)

Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



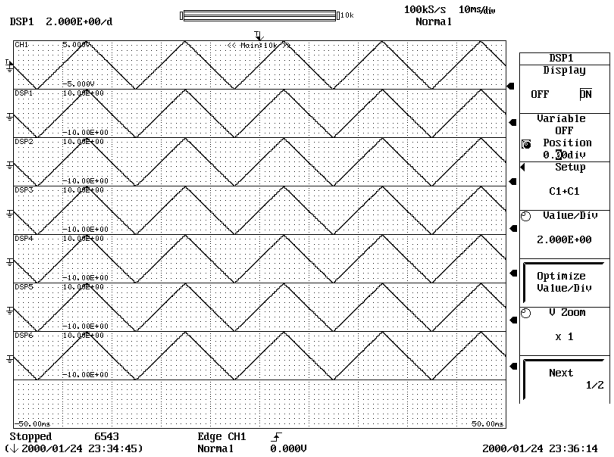
3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 kS/s, 10 ms/div
CH1	Display: ON, V/DIV: 1 V/div, Offset: 0 div, Coupling: DC, Probe: 1:1
DSP1 to DSP6	Display: ON, Value/Div: 2.000E+00, Variable: OFF, Offset: 0.000 V, V Zoom: ×1 Setup (Operation: S1+S2, Source1: CH1, Source2: CH2)
ACQ	Record Length: 10 k
SIMPLE/ENHANCED	Select (Type): Simple, Source: CH1, Slope: Rise, Level: 0.0 V
(Trigger) MODE	Normal
(Trigger) POSITION	50%

4. Set up the function generator as follows:

Setup Item	Setting
Output	Connect the CH1 (701250), 1:1
Waveform	Triangular Wave
Frequancy	50 Hz
Amplitude	10 V_{P-P}
Offset	0.0 V

5. Press the **START** button to perform aquisition, check the below.
   Confirm that the waveform is correctly displayed on the screen.



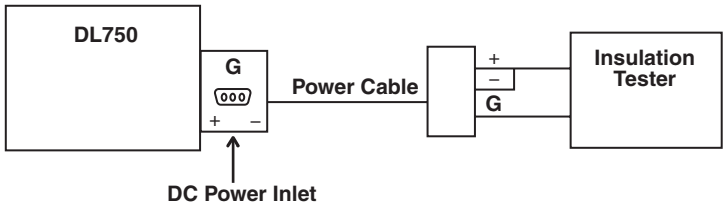
2.2.28 Insulation Resistance Test (DL750 (with the /DC Option))

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Wire the instruments as shown below.



2. Turn ON the DC Power switch.
3. Measure the insulation resistance across +, –, and G.

Items to Be Checked

Check that the value at all measured points is 10 MΩ or greater at DC500 V.

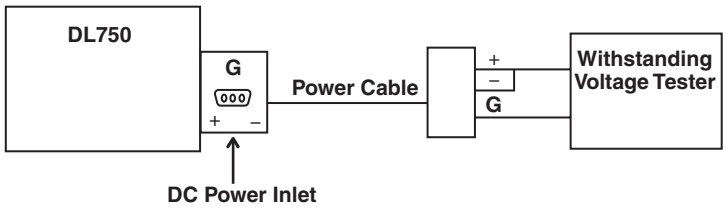
2.2.29 Withstanding Voltage Test (DL750 (with the /DC Option))

Acceptable Test Instruments

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Wire the instruments as shown below.



2. Turn ON the DC Power switch.
3. Using the withstanding voltage tester, test across +, –, and G at 500 V for two seconds.

Items to Be Checked

That the current limit below is not exceeded.

+, –, and G

AC 500 V (50 Hz) for two seconds, current limit = 10 mA

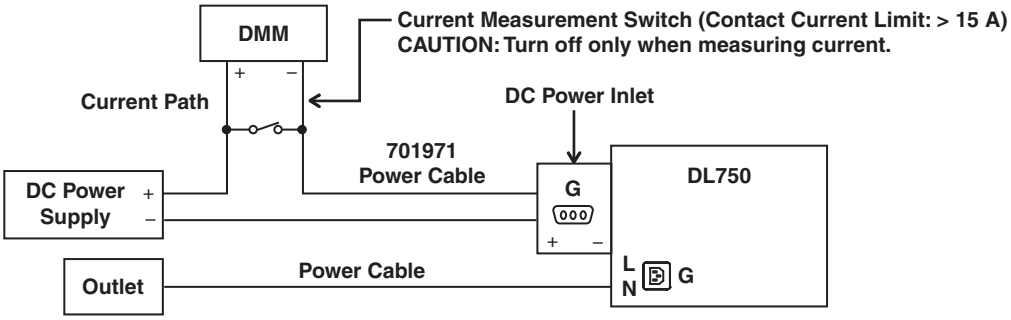
2.2.30 Power Supply Switching Test (DL750 (with the /DC Option))

Acceptable Test Instruments

DC Power Supply: Kikusui PAM40-100 or equivalent.
Digital Multimeter: YOKOGAWA 7555 or equivalent.
High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750. Wire the instruments as shown below.



2. Enter settings on the DL750 as follows:

Setup Item	Setting
TIME/DIV	500 ms/div
CH1	V/DIV: 5 mV/div, Bandwidth: Full, Coupling: GND, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope

3. Set the output voltage of the DC Power Supply to 12 V.
4. Turn ON the current measurement switch.
5. Confirm that the main unit is working normally. Then turn OFF the current measurement switch, and check the output current of the DC Power Supply using a digital multimeter.

CAUTION

Only when check the DC power supply current, turn OFF the current measurement switch. When turning OFF the current measure switch while the electric power is supplying from DC power supply, there is possibility that the digital multimeter fuse breaks.

Items to Be Checked

DC	AC	Point to Be Checked
ON	ON	DC power supply current: less than 2.5 mA
ON	OFF > ON	Confirm that there is no irregularity in the waveforms.
ON	ON > OFF	Confirm that there is no irregularity in the waveforms.
OFF > ON	ON	Confirm that there is no irregularity in the waveforms.
ON > OFF	ON	Confirm that there is no irregularity in the waveforms.

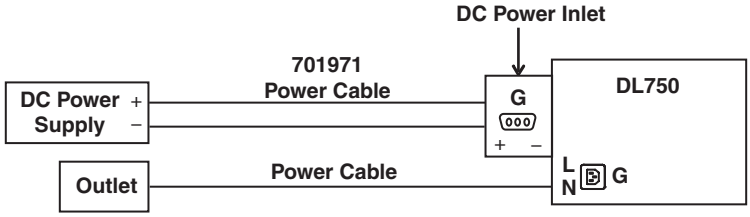
2.2.31 LED Check (DL750 (with the /DC Option))

Acceptable Test Instruments

DC Power Supply: Kikusui PAM40-100 or equivalent.

Testing Procedure

1. Wire the instruments as shown below.



2. Operate the DC power supply and each power switch of the DL750 as follows:
3. Confirm that the LEDs match the items in the chart below.

Items to Be Checked

DC	D-Output Voltage	AC	LED DC	LED AC
ON	12 V	ON	Illuminates green	Illuminates green
ON	12 V	OFF	Illuminates green	Off
OFF	12 V	ON	Off	Illuminates green
ON	8 V	OFF	Illuminates red	Off
ON	18.8 V	OFF	Illuminates red	Off

2.2.32 Initialization

Procedure

1. Turn OFF the power to the DL750/DL750P.
2. Hold down the **RESET** key while turning ON the power switch.
3. Press the **MISC** key.
4. Press the **Next 1/2** soft key.
5. Press the **Overview** soft key.

Items to Be Checked

- That the instrument turns on normally.
- That the overview screen is displayed normally.

2.2.33 Firmware Upgrade

For information on upgrading your DL750/DL750P, check the following Web page.
http://www.yokogawa.com/tm/Bu/DL750/

2.3 Tests of the HS10M12 Module (Model 701250)

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage of 500 VDC or more.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	Output voltage 2300 VAC or more.
DC voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage 200 VDC or more.
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less, Amplitude accuracy: 0.2 dB (<1 MHz) or less 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

2.3.1 Insulation Resistance Test

Acceptable Test Instrument

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Short the H and L input terminals of the isolation module.
3. Measure the insulation resistance at each of the test points shown below, then confirm that the specifications are met.

Test Points	Specification
Input terminal to ground terminal	At 500 VDC for 5 seconds, 10 MΩ or more.

Items to Be Checked

That the specifications are met.

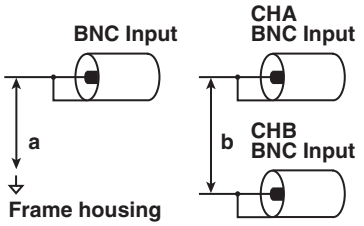
2.3.2 Withstanding Voltage Test

Acceptable Test Instrument

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Short the H and L input terminals.
2. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P, then turn the power to the DL750/DL750P back ON.
3. Apply 1500 Vrms (50 Hz) across the input terminal and protective ground terminal (figure a), and across ACH and BCH (figure b) for two seconds.
4. Check that the current limit (10 mA) was not exceeded.



2.3.3 Maximum Input Voltage Test

Acceptable Test Instrument

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 5 mV/div, Coupling: DC

2. Apply ±250 VDC across the H and L input terminals on the High-Speed 10 MS/s, 12-bit Isolation Module for ten seconds.

Items to Be Checked

That no abnormalities occurred with the High-Speed 10 MS/s, 12-Bit Isolation Module.

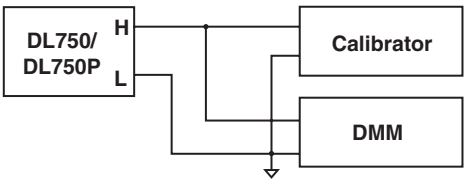
2.3.4 DC Accuracy Test

Acceptable Test Instrument

- Calibrator: Datron 9100 or equivalent.
- DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/DIV: Reference the DC Accuracy Test Chart on the next page to enter the settings. , Bandwidth: 500 kHz, Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal (Set to Normal or Average depending on the noise in the signal source.)

4. Calibrate the DL750/DL750P (see section 4.6 in IM701210-05E).
5. Refer to the DC Accuracy Test Chart on the next page when conducting the test. Check that the measured value for Avg during automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) meets the specification. If error greater than 0.01% occurs in the module's input voltage, perform the test while measuring the output from the DC voltage generator on the DMM.

DC Accuracy Test Chart

Range	Input Voltage	Product Specifications (±0.5% of 10 div)
5 mV/div	+50 mV 0 mV –50 mV	+50 mV ±0.25 mV 0 mV ±0.25 mV –50 mV ±0.25 mV
10 mV/div	+100 mV 0 mV –100 mV	+100 mV ±0.5 mV 0 mV ±0.5 mV –100 mV ±0.5 mV
20 mV/div	+200 mV 0 mV –200 mV	+200 mV ±1.0 mV 0 mV ±1.0 mV –200 mV ±1.0 mV
50 mV/div	+500 mV 0 mV –500 mV	+500 mV ±2.5 mV 0 mV ±2.5 mV –500 mV ±2.5 mV
100 mV/div	+1 V 0 V –1 V	+1 V ±5 mV 0 V ±5 mV –1 V ±5 mV
200 mV/div	+2 V +1 V 0 V –1 V –2 V	+2 V ±10 mV +1 V ±10 mV 0 V ±10 mV –1 V ±10 mV –2 V ±10 mV
500 mV/div	+5 V 0 V –5 V	+5 V ±25 mV 0 V ±25 mV –5 V ±25 mV
1 V/div	+10 V 0 V –10 V	+10 V ±0.05 V 0 V ±0.05 V –10 V ±0.05 V
2 V/div	+20 V 0 V –20 V	+20 V ±0.10 V 0 V ±0.10 V –20 V ±0.10 V
5 V/div	+50 V 0 V –50 V	+50 V ±0.25 V 0 V ±0.25 V –50 V ±0.25 V
10 V/div	+100 V 0 V –100 V	+100 V ±0.5 V 0 V ±0.5 V –100 V ±0.5 V
20 V/div	+200 V 0 V –200 V	+200 V ±1.0 V 0 V ±1.0 V –200 V ±1.0 V

2.3.5 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Install the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Enter settings according to the Frequency Characteristics Test Settings Chart on the next page.
CH1	Display: ON, Bandwidth: Enter settings according to the Frequency Characteristics Test Settings Chart on the next page. , Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope

3. Perform the test on the items in the chart below. Check that the measured value for P-P during automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) meets the specification.

Frequency Characteristics Test Chart

Range	Input Voltage	Input Frequency	Bandwidth	Specifications	Notes	T/div
5 mV/div	50 mV	1 kHz 3.01 MHz	OFF	— ≥ –3 dB	<- reference value	500 μs/div 20 ms/div
50 mV/div	500 mV	1 kHz 3.01 MHz	OFF	— ≥ –3 dB	<- reference value	500 μs/div 20 ms/div
2 V/div	20 V	1 kHz 3.01 MHz	OFF	— ≥ –3 dB	<- reference value	500 μs/div 20 ms/div
10 V/div	20 V	1 kHz 3.01 MHz	OFF	— ≥ –3 dB	<- reference value	500 μs/div 20 ms/div

2.3.6 Input Coupling Test

Acceptable Test Instrument

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Install the High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

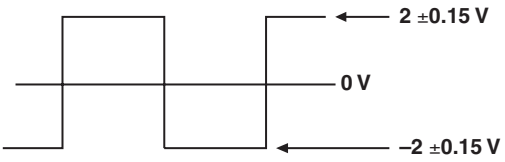
Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Display: ON, V/DIV: 0.5 V/div, Bandwidth: Full, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal

3. Prepare the input signal as follows, then input the signal to the DL750/DL750P.

Setup Item	Setting
Waveform	Square Wave
Amplitude	4 V_{P-P}
Frequency	15 Hz

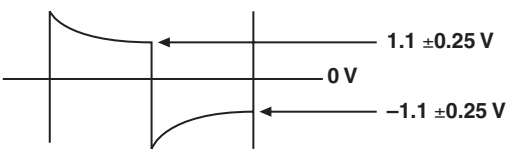
DC-Coupling

4. Set the input coupling to DC and confirm that the waveform below is displayed.



AC-Coupling

5. Set the input coupling to AC and confirm that the waveform below is displayed.



Checking GND

6. Set the input coupling to GND and confirm that the displayed waveform is a straight line at 0 ±0.15 V.

2.4 Tests of the HS1M16 Module (Model 701251)

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage of 500 VDC or more.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	Output voltage 2300 VAC or more.
DC voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage 200VDC or more.
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

2.4.1 Insulation Resistance Test

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Short H and L input terminals of the isolation module.
3. Measure the insulation resistance at the test point shown below, then confirm that the specifications are met.

Test Points	Specification
Input terminal to ground terminal	At 500 VDC for five seconds, 10 MΩ or more.

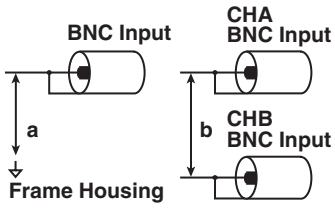
2.4.2 Withstanding Voltage Test

Acceptable Test Instrument

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Short the H and L input terminals.
2. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P, then turn the power to the DL750/DL750P back ON.
3. Apply 1500 Vrms (50 Hz) across the input terminal and protective ground terminal (figure a), and across ACH and BCH (figure b) for two seconds.
4. Check that the current limit (10 mA) was not exceeded.



2.4.3 Maximum Input Voltage Test

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 1 mV/div , Coupling: DC

3. Apply a ±140 VACpeak, 50 Hz, sinusoidal wave across the H and L input terminals on the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module for ten seconds.
4. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 500 mV/div, Coupling: DC

5. Apply ±140 VDC across the H and L input terminals on the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module for ten seconds.
6. Confirm that no abnormalities occurred with the isolation module.

2.4.4 DC Accuracy Test

Acceptable Test Instruments

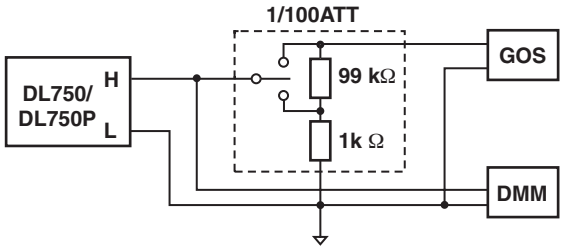
- Calibrator: Datron 9100 or equivalent.
- DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/DIV: Reference the DC Accuracy Test Chart on the next page to enter the settings. Bandwidth: 40 kHz, Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal (Set to Normal or Average depending on the noise in the signal source.)

3. Execute calibration (see section 4.6 in IM701210-05E).
   If there is considerable wobble in the noise and signal in the 100 mV or less range, send the input through an external 1/100ATT (99 kΩ: 1 kΩ).



4. Reference the DC Accuracy Test Chart on the next page to conduct the test. Measure the average value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). If error greater than 0.01% occurs in the module's input voltage, perform the test while measuring the output from the DC voltage generator on the DMM.

DC Accuracy Test Chart

Range	Input Voltage	Specifications 5mV/div–20 V/div: ±(0.25 % of 10div) 2 mV/div: ±(0.3 % of 10 div) 1 mV/div: ±(0.5 % of 10 div)
1 mV/div	+10 mV 0 mV –10 mV	+10 mV ±0.05 mV 0 mV ±0.05 mV –10 mV ±0.05 mV
2 mV/div	+20 mV 0 mV –20 mV	+20 mV ±0.06 mV 0 mV ±0.06 mV –20 mV ±0.06 mV
5 mV/div	+50 mV 0 mV –50 mV	+50 mV ±0.125 mV 0 mV ±0.125 mV –50 mV ±0.125 mV
10 mV/div	+100 mV 0 mV –100 mV	+100 mV ±0.25 mV 0 mV ±0.25 mV –100 mV ±0.25 mV
20 mV/div	+200 mV 0 mV –200 mV	+200 mV ±0.5 mV 0 mV ±0.5 mV –200 mV ±0.5 mV
50 mV/div	+500 mV 0 mV –500 mV	+500 mV ±1.25 mV 0 mV ±1.25 mV –500 mV ±1.25 mV
100 mV/div	+1 V 0 V –1 V	+1 V ±2.5 mV 0 V ±2.5 mV –1 V ±2.5 mV
200 mV/div	+2 V +1 V 0 V –1 V –2 V	+2 V ±5.0 mV +1 V ±5.0 mV 0 V ±5.0 mV –1 V ±5.0 mV –2 V ±5.0 mV
500 mV/div	+5 V 0 V –5 V	+5 V ±12.5 mV 0 V ±12.5 mV –5 V ±12.5 mV
1 V/div	+10 V 0 V –10 V	+10 V ±25 mV 0 V ±25 mV –10 V ±25 mV
2 V/div	+20 V 0 V –20 V	+20 V ±50 mV 0 V ±50 mV –20 V ±50 mV
5 V/div	+50 V 0 V –50 V	+50 V ±125 mV 0 V ±125 mV –50 V ±125 mV
10 V/div	+100 V 0 V	+100 V ±250 mV 0 V ±250 mV
20 V/div	+140 V 0 V	+140 V ±0.5 V 0 V ±0.5 V

2.4.5 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Enter settings according to the Frequency Characteristics Test Settings Chart on the next page.
CH1	Bandwidth: Enter settings according to the Frequency Characteristics Test Settings Chart on the next page. , Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope

3. Perform the test on the items in the chart below. Measure the P-P using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E).

Frequency Characteristics Test Chart

Range	Input Voltage	Input Frequency	Bandwidth	Specifications	Notes	T/div
1 mV/div	10 mV	1 kHz 201 kHz	OFF	— ≥ –3 dB	<- Reference value	500 μs/div 20 ms/div
200 mV/div	2 V	1 kHz 301 kHz	OFF	— ≥ –3 dB	<- Reference value	500 μs/div 20 ms/div
2 V/div	20 V	1 kHz 301 kHz	OFF	— ≥ –3 dB	<- Reference value	500 μs/div 20 ms/div

2.4.6 Input Coupling Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

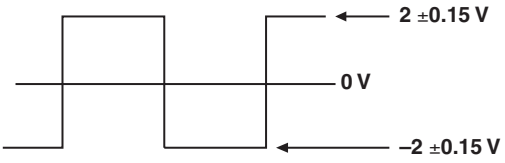
Setup Item	Setting
TIME/DIV	50 ms/div
CH1	V/DIV: 500 mV/div, Bandwidth: Full, Coupling: DC, Probe: 1:1,
ACQ	Record Length: 10 k, Mode: Normal

3. Enter the following settings on the function generator, and input the signal to the High-Speed High-Resolution 1MS/s, 16-Bit Isolation Module.

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	4 V_{P-P}
Frequency	2.2 Hz

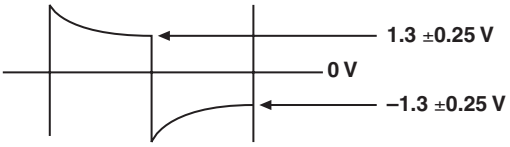
DC-Coupling

4. Confirm that the waveform is displayed on the DL750/DL750P as shown below.



AC-Coupling

5. Set the coupling to AC and confirm that the waveform below is displayed.



GND

6. Set the coupling to GND and confirm that the displayed waveform is a straight line at 0 ±0.15 V.

2.5 Tests of the NONISO_10M12 Module (Model 701255)

These are the same as in section 2.3, “Tests of the High-Speed, 10 MS/s 12-Bit Isolation Module HSIOM12 (Model 701250).” However, you do not need to perform the following tests.

- Withstanding Voltage Test
- Insulation Resistance Test

2.6 Tests of the HV (with RMS) Module (Model 701260)

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage of 500 VDC or more.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	Output voltage 3700 VAC or more.
DC voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage 850 VDC or more.
Function Generator	Agilent Technologies 33120A or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

2.6.1 Insulation Resistance Test

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/ DL750P.
2. Short the H and L input terminals on the HV (with RMS) Module.
3. Measure the insulation resistance at each of the test points shown below, then confirm that the specifications are met.

Terminals Measured	Specification
Input terminals to protective ground terminal	At 500 VDC for five seconds, 10 MΩ or more.

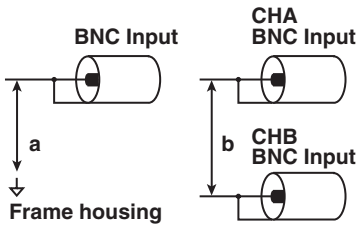
2.6.2 Withstanding Voltage Test

Acceptable Test Instruments

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/ DL750P.
2. Short the H and L input terminals on the HV (with RMS) module.
3. As shown in figures a and b below, apply 3700 V (50 Hz) between the input terminal and protective ground terminal, and between CHA and CHB for two seconds, and confirm that the current limit (10 mA) was not exceeded. Also, turn ON the power switch.



Items to Be Checked

That the specification is met.

Specification: Current leakage of 10 mA or less at 3.7 kV AC for two seconds.

2.6.3 Maximum Input Test

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/ DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 0.02 V/div, Coupling: DC

3. Apply ±850 VDC to the input terminal for ten seconds.

Items to Be Checked

Confirm that there were no abnormalities with the tested module.

2.6.4 DC Accuracy Test

Specification

Waveform Mode:	DC Accuracy	± (0.25% of 10 div)
RMS Mode:	DC	± (1% of 10 div)
	AC Sine Wave	± (1.5% of 10 div)
	AC CF =<2	± (2% of 10 div)
	AC CF =<3	± (3% of 10 div)

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/ DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/div: Set according to the chart below. , Bandwidth: 1 KHz (FULL for RMS mode), Coupling: DC (refer to settings on next page for RMS mode), Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal (Set depending on the noise in the signal source.)

3. Perform calibration.
4. Perform the test according to the items in the chart below, Waveform Mode DC Accuracy, and the chart on the next page, RMS Mode DC Accuracy. Measure the average value using the automatic measurement of waveform parameters function (see section 11.6 in IM701210-06E). You can perform the test while measuring the input using a digital multimeter.
   When performing the accuracy test in RMS mode, first calibrate the instrument (see section 4.6 in IM701210-05E).

Waveform Mode DC Accuracy

Range	Input Voltage	Specification ±(0.25% of 10 div)
0.02 V/div	+200 mV 0 mV −200 mV	+200 mV ±0.5 mV 0 mV ±0.5 mV −200mV ±0.5 mV
0.05 V/div	+500 mV 0 mV	+500 mV ±1.25 mV 0 mV ±1.25m
0.1 V/div	+1 V 0 V	+1 V ±0.25 mV 0 V ±0.25 mV
0.2 V/div	+2 V 0 V	+2 V ±5 mV 0 V ±5 mV
0.5 V/div	+5 V 0 V	+5 V ±12.5 mV 0 V ±12.5 mV
1 V/div	+10 V +5 V 0 V −5 V −10 V	+10 V ±25 mV +5 V ±25 mV 0 V ±25 mV −5 V ±25 mV −10 V ±25 mV
2 V/div	+20 V 0 V	+20 V ±50 mV 0 V ±50 mV
5 V/div	+50 V 0 V −50 V	+50 V ±125 mV 0 V ±125 mV -50 V ±125 mV
10 V/div	+100 V 0 V	+100 V ±250 mV 0 V ±250 mV
20 V/div	+200 V 0 V	+200 V ±500 mV 0 V +500 mV
100 V/div	+700 V 0 V	+700 V ±2.5 V 0 V ±2.5 V
200 V/div	+700 V 0 V	+700 V ±5 V 0 V ±5 V

RMS Mode

Range	Coupling	Input Voltage	Input Waveform	Specification ±(1% of 10 div) RMS: AC sine wave ±(1.5% of 10 div) RMS:AC CF =<2 ±(2% of 10 div) RMS:AC CF =<3 ±(3% of 10 div)
2 V/div	DC-RMS	+20 VDC +10 VDC 0 VDC −10 VDC −20 VDC		+20 V ±200 mV +10 V ±200 mV 0 V ±200 mV +10 V ±200 mV +20 V ±200 mV
0.2 V/div	AC-RMS	5.657 V_{P-P} offset 1 V 1KHz (cf = 1.41)	Sine wave	+2 V ±30 mV
0.2 V/div	DC-RMS	5.657 V_{P-P} (cf = 1.41)	Sine wave 1KHz	+2 V ±30 mV
0.2 V/div	DC-RMS	4 V_{P-P} offset 2 V (cf = 2)	Pulse wave Duty 25% 500 Hz	+2 V ±40 mV
0.2 V/div	DC-RMS	6 V_{P-P} offset 3 V (cf = 3)	Pulse wave Duty 11.1% 500 Hz	+2 V ±60 mV

2.6.5 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/ DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Set according to the chart below.
CH1	Bandwidth: Set according to the chart below. , Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope

3. Perform the test on the items in the chart below. Measure the P-P using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E).
   Set the reference value and take measurements at each frequency.

Range	Input Voltage	Input Frequency	Bandwidth	Criterion	Remarks	T/div
20 mV/div	200 mV	100 Hz 40.1 kHz	OFF	— ≥ –3 dB	<- Use this as the reference.	20 ms/div 20 ms/div
1 V/div	10 V	100 Hz 40.1 kHz	OFF	— ≥ –3 dB	<- Use this as the reference.	20 ms/div 20 ms/div
2 V/div	20 V	100 Hz 40.1 kHz	OFF	— ≥ –3 dB	<- Use this as the reference.	20 ms/div 20 ms/div

2.6.6 Input Coupling Test

Acceptable Test Instruments

Function Generator: Agilent Technologies 33120A or equivalent.

Testing Procedure

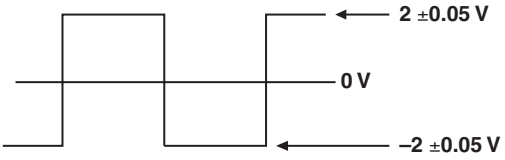
1. Insert the HV (with RMS) Module (Model 701260) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	50 ms/div
CH1	V/DIV: 500 mV/div, Bandwidth: Full, Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal

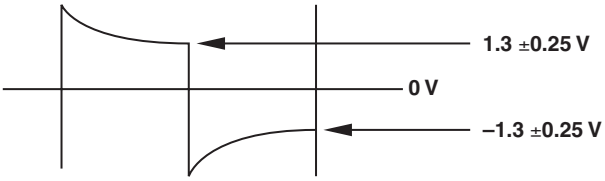
3. Set up the function generator as follows, and input to the DL750/DL750P.

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	4 V_{P-P}
Frequency	2.2 Hz

4. Set the input coupling to DC and confirm that the waveform below is displayed.



5. Set the input coupling to AC and confirm that the waveform below is displayed.



6. Set the input coupling to GND and confirm that the displayed waveform is a straight line at 0 ±0.05 V.

2.7 Tests of the UNIVERSAL Module (Model 701261) and the UNIVERSAL (AAF) Module (Model 701262)

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage: 500 VDC or highers.
DC Voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage: 200 VDC or higher. AC accuracy: 0.05% or better.
Function Generator	Agilent Technologies 33120A or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
Digital Multimeter	Agilent Technologies 3458A or equivalent.	Measuring accuracy: 0.002% or less. AC measuring accuracy: 0.03% or less.

2.7.1 Insulation Resistance Test

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Attach the unit to be tested to the test fixture.
3. Short the H and L input terminals of the unit to be tested.
4. Measure the insulation resistance at the locations in the table below, and confirm that the judgment criterion is met.

Test Points	Specifications
Input terminal to earth terminal	At 500 VDC for five seconds, 10 MΩ or more.

Specifications

Test Specifications: 500 VDC input: 100 MΩ or more

2.7.2 Maximum Input Voltage Test

Specifications

42 V (DC + ACpeak)

150 V (Maximum allowable voltage, as a value that does not damage the instrument when applied.)

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/div: 5 mV/div, Coupling: DC

3. Apply ±150 VDC to the input for ten seconds.
4. Confirm that no abnormality occurs on the tested unit.

2.7.3 DC Accuracy Test

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

DMM: Agilent Technologies 3458A or equivalent.

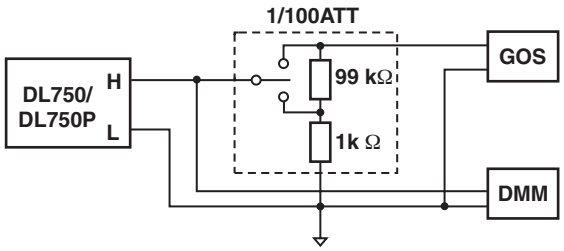
Testing Procedure

Input DC voltage to the Universal Module or Universal (AAF) Module, then confirm that the specifications are met at each range.

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/DIV: Set according to the table below. , Bandwidth: Set according to the table below. , Coupling: DC
ACQ	Record Length: 10 k, Mode: Normal (Perform averaging according to the noise conditions in the signal source.)

3. Wire the instruments as shown below.



4. Execute Self CAL. For the 100 mV range and below, if a large amount of noise or distortion is present, send the input through an external attenuator (1/100, 99 kΩ: 1 kΩ). The external attenuator is measured and compensated using a DMM, so absolute precision is not required.

5. Perform the test according to the items in the table below. Measurement is performed using Ave (averaging). In the 100 mV or lower range, measure the input to the module using a digital multimeter during the test.

Range	Input Voltage	Bandwidth	Specifications ±(0.25% of 10 div)
5 mV/div	+50 mV 0 mV –50 mV	4 kHz	+50 mV ±0.125 mV 0 mV ±0.125 mV –50 mV ±0.125 mV
10 mV/div	+100 mV 0 mV –100 mV	4 kHz	+100 mV ±0.25 mV 0 mV ±0.25 mV –100 mV ±0.25 mV
20 mV/div	+200 mV 0 mV –200 mV	4 kHz	+200 mV ±0.5 mV 0 mV ±0.5 mV –200 mV ±0.5 mV
50 mV/div	+500 mV 0 mV –500 mV	4 kHz	+500 mV±1.25 mV 0 mV±1.25 mV –500 mV±1.25 mV
100 mV/div	+1 V 0 V –1 V	4 kHz	+1 V ±2.5 mV 0 V ±2.5 mV –1 V ±2.5 mV
200 mV/div	+2 V +1 V 0 V –1 V –2 V	4 kHz	+2 V ±5.0 mV +1 V ±5.0 mV 0 V ±5.0 mV –1 V ±5.0 mV –2 V ±5.0 mV
500 mV/div	+5 V 0 V –5 V	4 kHz	+5 V ±12.5 mV 0 V ±12.5 mV –5 V ±12.5 mV
1 V/div	+10 V 0 V –10 V	4 kHz	+10 V ±25 mV 0 V ±25 mV –10 V ±25 mV
2 V/div	+20 V 0 V –20 V	4 kHz	+20 V ±50 mV 0 V ±50 mV –20 V ±50 mV
5 V/div	+42 V 0 V -42 V	4 kHz	+42 V ±125 mV 0 V ±125 mV –42 V ±125 mV
10 V/div	+42 V 0 V	4 kHz	+42 V ±250 mV 0 V ±250 mV
20 V/div	+150 V +42 V 0 V	4 kHz	+150 V ±500 mV +42 V ±500 mV 0 V ±500 mV
200 mV/div[1]	+2 V 0 V –2 V	AUTO	+2 V ±5.0 mV 0 V ±5.0 mV –2 V ±5.0 mV

1. Execute the items in the bolded box (where Bandwidth = AUTO), for the 701262 only.

2.7.4 TC Accuracy Test

Acceptable Test Instruments

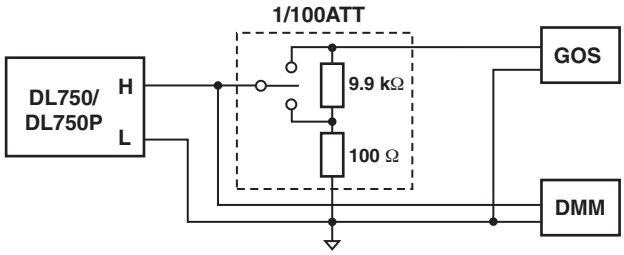
Calibrator: YOKOGAWA 7651 or equivalent.
DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	Coupling: TC, Type: See below. , Bandwidth: Full, Burn Out: OFF, RJC: OFF
TIME/DIV	100 ms/div
ACQ	Record Length: 10 k, Mode: Normal (Perform averaging according to the noise conditions in the signal source.)

3. Wire the instruments as shown below.



4. Perform the test according to the items in the table below. Perform measurement using Avg (averaging). Measure the input to the module using a digital multimeter during the test.

Type	Input Voltage	Specifications
T	−5.603 mV	−200 ±1.9°C
	0 mV	0 ±1.5°C
	+20.872 mV	400 ±1.9°C
K	−5.891 mV	−200 ±1.9°C
	0 mV	0 ±1.5°C
	+52.41 mV	1300 ±2.8°C
E	−8.825 mV	−200 ±1.9°C
	0 mV	0 ±1.5°C
	+61.017 mV	800 ±2.3°C
AU7Fe	−4.961 mV	−250 ±4.0°C
	0 mV	0 ±2.5°C

2.7.5 Reference Junction Compensation Accuracy Test

Specifications

TYPE-T: ±1.0°C

Acceptable Test Instruments

Temperature tank standardized at 0°C: Komatsu Ltd. ZC-114 or equivalent.
Thermocouple: TYPE-T

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Coupling: TC, Type: T, Bandwidth: Full, Burn Out: OFF, RJC: ON
ACQ	Record Length: 10 k, Mode: Envelope

3. Connect the TYPE-T thermocouple that was placed in the temperature tank to the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262).
4. Check that the AVE measured value during automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) was within 0 ±1.0°C.

2.7.6 Burnout Test

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Coupling: TC, Type: T, Bandwidth: Full, Burn Out: ON, RJC: OFF
ACQ	Record Length: 10 k, Mode: Normal

3. Open the input terminal on the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262).
4. Confirm that the measured value maxes out at +500.0°C (that +500.0°C or higher is displayed).

2.7.7 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Set according to the table below.
CH1	Bandwidth: Set according to the table below. , Coupling: DC
ACQ	Record Length: 10 k, Mode: Envelope (Bandwidth = something other than AUTO) or Normal (Bandwidth = AUTO)

3. Perform the test according to the items in the table below. Perform measurement using P-P. Set the reference value to reference, and measure at each frequency.

Range	Input Voltage (P-P)	Input Frequency	Bandwidth	Specification	Remarks	Recommended T/div
5 mV/div	100 mV_{P-P}	100 Hz 40.1 kHz	FULL	— ≥ –3 dB	Reference value	10 ms/div 20 ms/div
200 mV/div	4 V_{P-P}	100 Hz 40.1 kHz	FULL	— ≥ –3 dB	Reference value	10 ms/div 20 ms/div
500 mV/div	10 V_{P-P}	100 Hz 40.1 kHz	FULL	— ≥ –3 dB	Reference value	10 ms/div 20 ms/div
200 mV/div[1]	4 V_{P-P}	10 Hz 4 kHz	AUTO	— ≥ –3 dB	Reference value	5 kS/s 5 kS/s

1. Execute items of 200 mV/div range (where Bandwidth=AUTO) on the 701262 only.

Judgment criterion = 20 × log (measured value/measured value of reference value)

4. Change the settings on the unit to be tested as follows:

Setup Item	Setting
TIME/DIV	Set according to the table below.
CH1	Bandwidth: FULL, Coupling: TC, Burn Out: OFF: RJC: OFF
ACQ	Record Length: 10 k, Mode: Envelope

Range	Input Voltage (P-P)	Input Voltage (Offset)	Input Frequency	Specification	Remarks	Recommended T/div
J	64.00 mV_{P-P}	32.00 mV	5 Hz 100 Hz	— ≥ –3 dB	Reference value	50 ms/div 50 ms/div

2.7.8 Input Coupling Test

Acceptable Test Instruments

Function Generator: Agilent Technologies 33120A or equivalent.

Testing Procedure

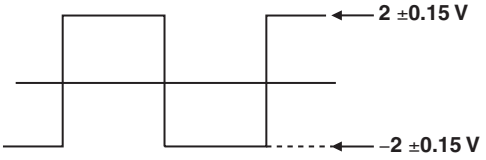
1. Insert the UNIVERSAL Module (Model 701261) or the UNIVERSAL (AAF) Module (Model 701262) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	50 ms/div
CH1	V/DIV: 500 mV/div, Bandwidth: Full, Coupling: DC
ACQ	Record Length: 10 k, Mode: Normal

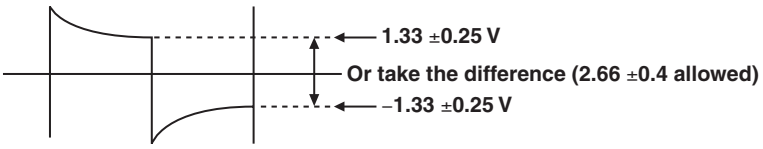
3. Enter an input signal as follows:

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	4 V_{P-P}
Frequency	2.2 Hz

4. Check the DC Coupling. Set the input coupling to DC, then confirm that the waveform below is displayed.



5. Check the AC Coupling. Set the input coupling to AC, then confirm that the waveform below is displayed.



To check the AC coupling you can either read the value at each point, or take the difference at each point.

6. Check the Ground. Set the input coupling to GND, then confirm that the displayed waveform is a straight line at 0 ±0.15 V.

2.8 Tests of the TEMP/HPV Module (Model 701265)

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation tester	YOKOGAWA 2407 or equivalent.	
Function generator	YOKOGAWA FG220 (with High Stability Liquid Crystal/Low Distortion Option) or equivalent.	Frequency accuracy: 20 ppm or less Amplitude accuracy: 0.2 dB (<1 MHz) or less 0.5 dB (>1 MHz) or less
Digital Multimeter	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.
Calibrator	Datron 9100 or equivalent	Output voltage 200 VDC or more.
DC voltage generator	YOKOGAWA 7651 or equivalent.	
Temperature Tank Standardized at 0°C	Coper Electronics ZC-114 or equivalent.	
Thermocouple	TYPE T	

2.8.1 Insulation Resistance Test

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Short the H and L input terminals of the module.
3. Perform a test using a DC 500 V insulation resistance meter and confirm that the results meet the specifications.

Test Points	Specifications
Input terminal to earth terminal	500 VDC for five seconds, 10 MΩ or more.

2.8.2 Maximum Input Voltage Test

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 0.1 mV/div, Coupling: DC

3. Apply ±42 V (DC) across the H and L input terminals for ten seconds, then confirm that the module functions normally.

2.8.3 DC Accuracy Test

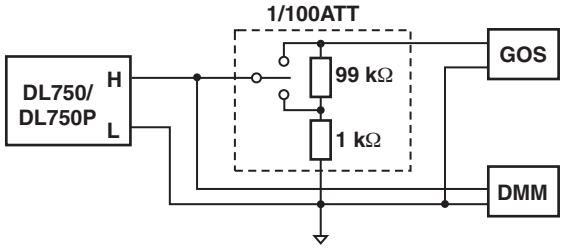
Acceptable Test Instruments

- Calibrator: YOKOGAWA 7651 or equivalent.
  Datron 9100 or equivalent.
- DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

Input DC voltage to the Temperature, High Precision Isolation Voltae Module, then confirm that the specifications are met at each range.

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P.
2. Wire the instruments as shown below.



3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div or 50 ms/div[1]
CH1	V/div: Reference the DC Accuracy Test Chart on the next page to enter the settings. , Bandwidth: Full, Coupling: DC
ACQ	Record Length: 10 k, Mode: Set to Normal or Average depending on the noise in the signal source.)

1. If there is considerable wobble in the noise and input signal in the 100 mV or less range, send the input through an external 1/100ATT (9.9 kΩ: 1 kΩ). The external 1/100ATT is measured and compensated by the digital multimeter, so absolute temperature is not required. Regarding the T/div, in the 200 mV or higher range, select either 100 ms/div or 50 ms/div.

4. Execute auto calibration (see section 4.6 in IM701210-05E).
5. Refer to the DC Accuracy Test Chart on the next page when performing the test. Measure the average value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). In the 100 mV or lower range, measure the output from the DC voltage generator on a digital multimeter while performing the test.

DC Accuracy Test Chart

Range	Input Voltage	Product Specifications (±0.08% of 10 div + 2 μV)
0.1 mV/div	+1 mV	+1 mV ±0.0028 mV
	0 mV	0 mV ±0.0028 mV
	–1 mV	–1 mV ±0.0028 mV
0.2 mV/div	+2 mV	+2 mV ±0.0036 mV
	0 mV	0 mV ±0.0036 mV
	–2 mV	–2 mV ±0.0036 mV
0.5 mV/div	+5 mV	+5 mV ±0.006 mV
	0 mV	0 mV ±0.006 mV
	–5 mV	–5 mV ±0.006 mV
1 mV/div	+10 mV	+10 mV ±0.010 mV
	0 mV	0 mV ±0.010 mV
	–10 mV	–10 mV ±0.010 mV
2 mV/div	+20 mV	+20 mV ±0.018 mV
	0 mV	0 mV ±0.018 mV
	–20 mV	–20 mV ±0.018 mV
5 mV/div	+50 mV	+50 mV ±0.04 mV
	0 mV	0 mV ±0.04 mV
	–50 mV	–50 mV ±0.04 mV
10 mV/div	+100 mV	+100 mV ±0.08 mV
	0 mV	0 mV ±0.08 mV
	–100 mV	–100 mV ±0.08 mV
20 mV/div	+200 mV	+200 mV ±0.16 mV
	0 mV	0 mV ±0.16 mV
	–200 mV	–200 mV ±0.16 mV
50 mV/div	+500 mV	+500 mV ±0.40 mV
	0 mV	0 mV ±0.40 mV
	–500 mV	–500 mV ±0.40 mV
100 mV/div	+1 V	+1 V ±0.8 mV
	0 V	0 V ±0.8 mV
	–1 V	–1 V ±0.8 mV
200 mV/div	+2 V	+2 V ±1.6 mV
	+1 V	+1 V ±1.6 mV
	0 V	0 V ±1.6 mV
	–1 V	–1 V ±1.6 mV
	–2 V	–2 V ±1.6 mV
500 mV/div	+5 V	+5 V ±4.0 mV
	0 V	0 V ±4.0 mV
	–5 V	–5 V ±4.0 mV
1 V/div	+10 V	+10 V ±8 mV
	0 V	0 V ±8 mV
	–10 V	–10 V ±8 mV
2 V/div	+20 V	+20 V ±16 mV
	0 V	0 V ±16 mV
	–20 V	–20 V ±16 mV
5 V/div	+42 V	+42 V ±40 mV
	0 V	0 V ±40 mV
10 V/div	+42 V	+42 V ±80 mV
	0 V	0 V ±80 mV

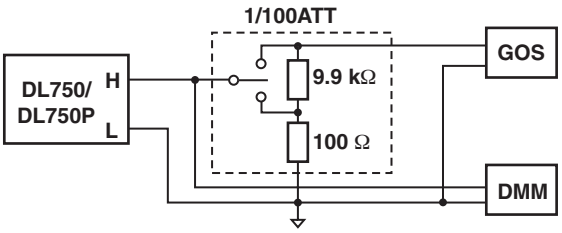
2.8.4 TC Accuracy Test

Acceptable Test Instrument

Calibrator: YOKOGAWA 7651 or equivalent.
DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Execute calibration (see section 4.6 in IM701210-05E).
   If there is considerable wobble in the noise and signal, send the input through an external 1/100ATT (9.9 kΩ: 1 kΩ).



3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Bandwidth: Full, Burn Out: OFF, RJC: OFF, Coupling: TC, Type: T
ACQ	Record Length: 10 k, Mode: Normal (Set to Normal or Average depending on the noise in the signal source.)

4. Perform the test on the items in the chart below. Measure the Avg value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). Measure the output from the DC voltage generator on a digital multimeter while performing the test.

Input Voltage	Specifications
–5.603 mV	–200 ±1.9°C
0 mV	0 ±1.5°C
+20.872 mV	+400 ±1.9°C

2.8.5 Reference Junction Compensation Accuracy Test

Specifications

TYPE-T: ±1.0°C

Acceptable Test Instruments

Temperature tank standardized at 0°C: Komatsu Ltd. ZC-114 or equivalent.
Thermocouple: TYPE-T

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Coupling: TC, Type: T, Bandwidth: Full, RJC: ON, Burn Out: OFF
ACQ	Record Length: 10 k, Mode: Envelope

3. Connect the TYPE T thermocouple that was placed in the temperature tank to the Temperature, High Precision Voltage Isolation Module (Model 701265).
4. Check that the AVE measured value during automatic measurement of waveform parameters (see section 11.6 in IM701210-06E) was within 0 ±1.0°C.

2.8.6 Burnout Test

With the terminal open, confirm that the measured result for temperature maxes out at +500.0°C.

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Coupling: TC, Type: T, Bandwidth: Full, RJC: ON, Burn Out: ON
ACQ	Record Length: 10 k, Mode: Normal

3. Open the input terminal on the Temperature, High Precision Isolation Voltage Module (Model 701265).
4. Confirm that the measured value maxes out at +500.0°C (that +500.0°C or higher is displayed).

2.8.7 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the Temperature, High Precision Voltage Isolation Module (Model 701265) into SLOT1 of the DL750/DL750P, then turn the power ON.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Set according to the chart below.
CH1	Bandwidth: Set according to the chart below. , Coupling: DC
ACQ	Record Length: 10 k, Mode: Envelope

3. Input the frequencies shown in the table below to the function generator, then measure the attenuation relative to the amplitude of the reference waveform. Measure the P-P value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E).
4. Confirm that the measured result meets the specifications.

Range	Input Voltage	Input Frequency	Bandwidth	Specifications	Remark	T/div
200 mV/div	2 V	1 Hz 101 Hz	OFF	— ≥ –3 dB	<- Reference Values	500 ms/div 5 ms/div

2.9 Tests of the STRAIN_NDIS Module (Model 701270)

Tests

A special jig is required for the DC accuracy test, and is therefore not to be serviced by the user. Please contact your nearest YOKOGAWA dealer.

Acceptable Test Instruments

Name	Recommended Device (Manufacturer, Model)	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage 500 VDC or more.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	Output voltage 2300 VAC or more.
DC voltage Generator	YOKOGAWA 7651 or equivalent.	
Function Generator	Agilent Technologies 33120A or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less, 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

2.9.1 Insulation Resistance Test

Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the STRAIN_NDIS Module (Model 701270) into SLOT1 of the DL750/ DL750P.
2. Short all input terminals on the STRAIN_NDIS Module.
3. Measure the insulation resistance at each of the test points shows below, then confirm that the judgment criterion is met.

Terminals Measured	Test Voltage & Judgement Criterion
Input terminals to protective ground terminal	500 VDC for five seconds, 10 MΩ or more.

2.9.2 Maximum Input Test

Specification: 10 V (DC + ACpeak)

Test Instruments

Current/Voltage Generator: YOKOGAWA 7651 or equivalent.

Testing Procedure

1. Insert the STRAIN_NDIS Module (Model 701270) into SLOT1 of the DL750/ DL750P, then connect the current/voltage generator to the module's input terminals.
2. Set the range on the DL750/DL750P to 500 μSTR.
3. Apply +10 VDC and −10 VDC to the input for ten seconds.
4. Confirm that there were no abnormalities on the STRAIN_NDIS Module.

2.9.3 Bridge Voltage Accuracy Test

Acceptable Test Instruments

DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Measure the bridge voltage, and confirm that the values match the measurement values in the chart.

Bridge Voltage Setting	Measurement Values
2 V	2 V ±10 mV
5 V	5 V ±25 mV
10 V	10 V ±50 mV

2.9.4 Auto Balancing Function Test

Specification: ±10000 μSTR

Acceptable Test Instruments

Current/Voltage Generator: YOKOGAWA 7651 or equivalent.

Testing Procedure

1. Insert the STRAIN_NDIS Module (Model 701270) into SLOT1 of the DL750/DL750P, then connect the current/voltage generator to the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Excitation: 10 V, Range: 500 mSTR, Bandwidth: Full
ACQ	Record Length: 10 k, Mode: Normal (Set depending on the noise in the signal source.)

3. Apply the voltages in the table below.
4. Perform Auto Balancing at each of the applied voltages, and confirm that an error does not occur, and that the measured values match the values in the chart.

Applied Voltage	Measurement Range
+52.5 mV (equivalent to +10500 μSTR)	0 μSTR ±5 μSTR
0 mV	0 μSTR ±5 μSTR
–52.5 mV(equivalent to –10500 μSTR)	0 μSTR ±5 μSTR

2.9.5 Frequency Characteristics Test

Specification: Frequency Characteristics: 20 kHz (–3dB)

Acceptable Test Instruments

Function Generator: Agilent Technologies 33120A or equivalent.

Testing Procedure

1. Insert theSTRAIN_NDIS Module (Model 701270) into SLOT1 of the DL750/DL750P, then connect the current/voltage generator to the DL750/DL750P.
2. Connect the function generator to the DL750/DL750P.
3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	Set according to the chart below.
CH1	Bandwidth: Set according to the chart below.
ACQ	Record Length: 10 k, Mode: Envelope

4. Perform the test on the items in the chart below. Measure the P-P value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). Set the reference value and take measurements at each frequency.

Range	Input Voltage	Input Frequency	Bandwidth	Judgment Criteria	Remarks	T/div
2 V 1000 μSTR	1 mV	100 Hz 20.1 kHz	OFF	— >= −3 dB	<- Reference value	50 ms/div 50 ms/div
10 V 20000 μSTR	100 mV	100 Hz 20.1 kHz	OFF	— >= −3 dB	<- Reference value	50 ms/div 50 ms/div
5 V 500 μSTR	1 mV	100 Hz 20.1 kHz	OFF	— >= −3 dB	<- Reference value	50 ms/div 50 ms/div

2.10 Tests of the STRAIN_DSUB Module (Model 701271)

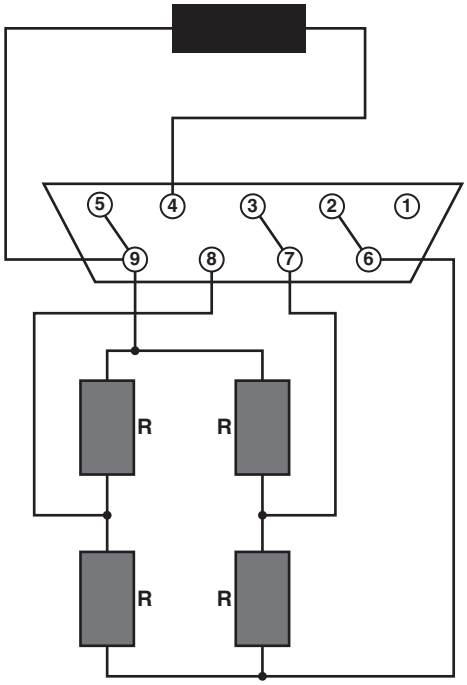
Perform the same tests as in section 2.8, “Tests of the Strain Module (NDIS) STRAIN_NDIS (Model 701270),” plus the following additional test.

Shunt Cal Test

Acceptable Test Instruments

Wiring jig (see figure below)

Rc: Shunt resistance of 33 kV (with a precision within ±1%)



R350V A1001RQ
(with a precision within ±0.01%)
Connect <3> and <7>
Connect a shunt between <4> and <9>
Connect <2> and <6>
Connect <5> and <9>

Testing Procedure

1. Connect the wiring jig to the DL750/DL750P on which the STRAIN_DSUB Module is inserted into SLOT1.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Value/DIV: 10000 μSTR, Bandwidth: 1 kHz, Excitation: 2 V, Gauge Factor: 2, Linear Scale (Mode: Shunt, P2:Y: 1.0000E +0.4)
ACQ	Record Length: 10 k, Mode: Normal

3. Perform auto balancing (see “Balance” in section 5.17 in IM701210-05E).
4. Perform shunt calibration (see section 5.17 in IM701210-05E), then confirm that P1 and P2 are within the specification.

Range	Measurement Value Specification
P1: X	Within 0 ±40 μSTR
P2: X	Within –5275 ±200 μSTR

2.11 Tests of the ACCL/VOLT Module (Model 701275)

Tests

Acceptable Test Instruments

Name	Recommended Device (Manufacturer, Model)	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	Applied voltage 500 VDC or more.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	Output voltage 2300 VAC or more.
DC Voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage 200 VDC or more. AC Accuracy: 0.05% or better.
Function Generator	Agilent Technologies 33120A or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

2.11.1 Insulation Resistance Test

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Short the H and L input terminals on the Acceleration/Voltage module ACCL/VOLT.
3. Measure the insulation resistance at each of the test points shows below, then confirm that the judgment criterion is met.

Terminals Measured	Test Voltage & Judgement Criterion
Input terminals to protective ground terminal	For 500 VDC input 10 MΩ or higher.

2.11.2 Maximum Input Test

Specification: 42 V (DC + ACpeak) For voltage measurement.
5 V (DC + Acpeak) For acceleration measurement.

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 5 mV/div , Coupling: DC

3. Apply ±50 VDC to the input for 10 seconds.
4. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	Coupling: ACCL, Bias: ON

5. Apply ±50 VDC to the input for ten seconds.
6. Confirm that there were no abnormalities on the ACCL/VOLT module.

2.11.3 DC Accuracy Test

Product Specifications: (5 mV/div to 10 V/div) ±(0.25% of 10 div)

Acceptable Test Instruments

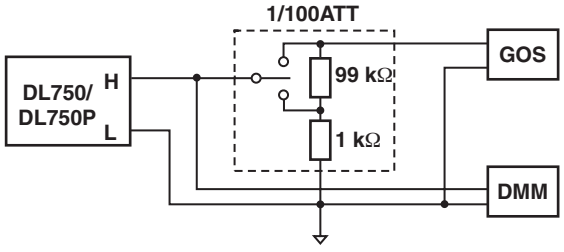
Calibrator: Datron 9100 or equivalent.
DMM: Agilent Technologies 3458A or equivalent.

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/DIV, Bandwidth: Enter settings according to the chart on the next page. Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal (Set depending on the noise in the signal source.)

3. Perform calibration. If there is considerable fluctuation in the noise and signal in the 100 mV or less range, send the input through an external 1/100ATT (99 kΩ: 1 kΩ).



3. Conduct the test according to the items in the Chart of DC Accuracy Test Settings below. Measure the average value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). If an error greater than 0.01% occurs in the module's input voltage, perform the test while measuring the output from the DC voltage generator on the DMM.

Chart of DC Accuracy Test Settings

Range	Input Voltage	Bandwidth	Specification ±(0.25% of 10 div)
5 mV/div	+50 mV 0 mV –50 mV	4 kHz	+50 mV ±0.125 mV 0 mV ±0.125 mV –50 mV ±0.125 mV
10 mV/div	+100 mV 0 mV –100 mV	4 kHz	+100 mV ±0.25 mV 0 mV ±0.25 mV –100 mV ±0.25 mV
20 mV/div	+200 mV 0 mV –200 mV	4 kHz	+200 mV ±0.5 mV 0 mV ±0.5 mV –200 mV ±0.5 mV
50 mV/div	+500 mV 0 mV –500 mV	4 kHz	+500 mV ±1.25 mV 0 mV ±1.25 mV –500 mV ±1.25 mV
100 mV/div	+1 V 0 V –1 V	4 kHz	+1 V ±2.5 mV 0 V ±2.5 mV –1 V ±2.5 mV
200 mV/div	+2 V +1 V 0 V –1 V –2 V	4 kHz	+2 V ±5.0 mV +1 V ±5.0 mV 0 V ±5.0 mV –1 V ±5.0 mV –2 V ±5.0 mV
500 mV/div	+5 V 0 V –5 V	4 kHz	+5 V ±12.5 mV 0 V ±12.5 mV –5 V ±12.5 mV
1 V/div	+10 V 0 V –10 V	4 kHz	+10 V ±25 mV 0 V ±25 mV –10 V ±25 mV
2 V/div	+20 V 0 V –20 V	4 kHz	+20 V ±50 mV 0 V ±50 mV –20 V ±50 mV
5 V/div	+42 V 0 V –42 V	4 kHz	+42 V ±125 mV 0 V ±125 mV –42 V ±125 mV
10 V/div	+42 V 0 V	4 kHz	+42 V ±250 mV 0 V ±250 mV
200 mV/div	+2 V 0 V –2 V	AUTO	+2 V ±5.0 mV 0 V ±5.0 mV –2 V ±5.0 mV

2.11.4 AC Accuracy Test

Specification: (5 mV/div to 10 V/div) ±(0.25% of 10 div)

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

DMM: Agilent Technologies 3458A or equivalent.

Note

If a 9100 is not available, perform the test while measuring with the 3458A.

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	20 ms/div
CH1	V/DIV: Set according to the chart below. , Bandwidth: FULL, Coupling: DC, Probe: 1:1
ACQ	Record Length: 25 k, Mode: Normal (Set depending on the noise in the signal source.)

3. Enter the following settings on the calibrator.

Setup Item	Setting
Output	AC
Frequency	1.01 kHz

4. Perform calibration.
5. Perform the test on the items in the chart below. Measure the P-P value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). You can perform the test while measuring the input to the module using a digital multimeter.

Chart of AC Accuracy Test Settings

Range	Input Voltage	Specification ±(0.5% of 10 div)
5 mV/div	100 mV_{P-P} (35.355 mVrms)	(100 mV ±0.25 mV)$_{P-P}$
10 mV/div	200 mV_{P-P} (70.711 mVrms)	(200 mV ±0.5 mV)$_{P-P}$
20 mV/div	400 mV_{P-P} (141.42 mVrms)	(400 mV ±1 mV)$_{P-P}$
50 mV/div	1 V_{P-P} (353.55 mVrms)	(1 V ±2.5 mV)$_{P-P}$
100 mV/div	2 V_{P-P} (707.11 mVrms)	(2 V ±5 mV)$_{P-P}$
200 mV/div	4 V_{P-P} (1.4142 Vrms)	(4 V ±10 mV)$_{P-P}$
500 mV/div	10 V_{P-P} (3.5355 Vrms)	(10 V ±25 mV)$_{P-P}$
1 V/div	20 V_{P-P} (7.0711 Vrms)	(20 V ±50 mV)$_{P-P}$
2 V/div	40 V_{P-P} (14.142 Vrms)	(40 V ±100 mV)$_{P-P}$
5 V/div	42 V_{P-P} (14.849 Vrms)	(42 V ±0.25 V)$_{P-P}$
10 V/div	42 V_{P-P} (14.849 Vrms)	(42 V ±0.5 V)$_{P-P}$

2.11.5 Frequency Characteristics Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	T/div, Bandwidth: Set according to the chart below. , Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope (Bandwidth = non-AUTO) or Normal (Bandwidth = AUTO)

3. Perform the test on the items in the chart below. Measure the P-P value using automatic measurement of waveform parameters (see section 11.6 in IM701210-06E). Set the reference value and take measurements at each frequency.

Range	Input Voltage ($_{P-P}$)	Input Frequency	Bandwidth	Judgment Criterion	Remarks	T/div
5 mV/div	100 mV_{P-P}	100 Hz 40.1 kHz	OFF	— >= –3dB	<-Reference value	5 ms/div 20 ms/div
200 mV/div	4 V_{P-P}	100 Hz 40.1 kHz	OFF	— >= –3dB	<-Reference value	5 ms/div 20 ms/div
500 mV/div	10 V_{P-P}	100 Hz 40.1 kHz	OFF	— >= –3dB	<-Reference value	5 ms/div 20 ms/div

4. Confirm that the measured result meets the judgement criteria.

2.11.6 Input Coupling Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.

Testing Procedure

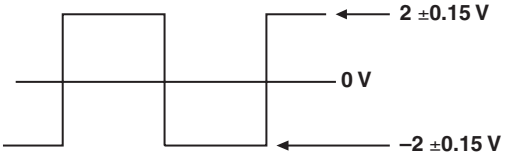
1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	50 ms/div
CH1	V/DIV: 500 mV/div, Bandwidth: Full, Coupling: DC, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Normal

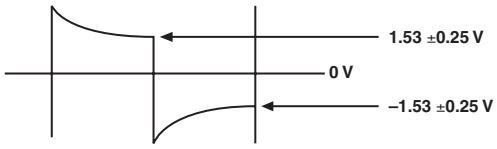
3. Enter settings on the function generator as follows, then input the signal to the DL750/DL750P.

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	4 V_{P-P}
Frequency	2.2 Hz

4. Set the input coupling to DC and confirm that the waveform below is displayed.



5. Set the input coupling to AC and confirm that the waveform below is displayed.



6. Set the input coupling to GND and confirm that the displayed waveform is a straight line at 0 ±0.15 V.

2.11.7 Bias Accuracy Test

Acceptable Test Instruments

DMM: Agilent Technologies 3458A or equivalent.
Fixed Resistance: 1 kΩ (accuracy of 1% or less)

Testing Procedure

1. Insert the ACCL/VOLT Module (Model 701275) into SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	1 ms/div
CH1	V/DIV, Coupling: See chart below. , Bandwidth: Full, Unit: m/s^2, Gain, Range: See chart below. , Bias: ON, Probe: 1:1
ACQ	Record Length: 10 k, Mode: Envelope

3. Perform the test on the items in the chart below. Measure between the H and L input terminals.

Terminal	Coupling	Gain, Range	Measured Value (DMM reading)
Open	ACCL	×1	22 ±1 V
1 kΩ short	ACCL	×1	3.7 V to 4.3 V
1 kΩ short	DC	200 mV/div	0.2 V or less

2.12 Tests of the FREQ Module (Model 701280)

Notes

- The frequency module has two channels worth of inputs, and measurements can be taken on each channel independently. Only one channel is specified for this test, but unless otherwise instructed, please perform the test on both inputs. If there are differences in the measurement locations or methods between the inputs on channel 1 and channel 2, they are noted below.
- The test is performed before and after attaching the plastic cover. During the test, be sure to note whether the test is being performed before or after the plastic cover is attached.

Tests

Acceptable Test Instruments

Name	Recommended Device	Required Specifications
Insulation Resistance Tester	YOKOGAWA 2407 or equivalent.	A device that can measure 100 MΩ or more at 500 VDC.
Withstanding Voltage Tester	Kikusui TOS-8750 or equivalent.	A device that can measure 2.3 kVAC for one minute with a current limit of 10 mA.
Oscilloscope	YOKOGAWA DL1540 or equivalent.	
DMM	YOKOGAWA 7561 or equivalent.	
DC Voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	Output voltage 50 V or more.
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Output voltage 10 V or more.
BNC Cable	2 pc.	
Module Extension	B8023ZZ	
10:1 Probe	YOKOGAWA 700929 or equivalent.	

2.12.1 Input Coupling Test

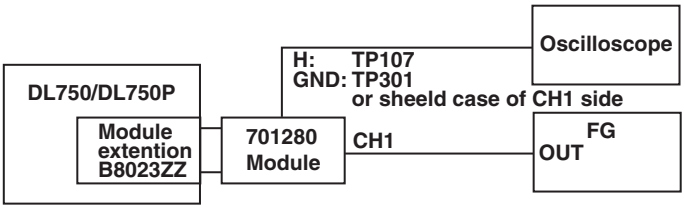
This test confirms that the AC/DC coupled circuits are normal. This test is performed without the plastic top cover attached (with the test pins accessible).

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
Oscilloscope: YOKOGAWA DL1540 or equivalent.

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P via the module extension.
2. Connect the FREQ module, function generator, and oscilloscope as shown in the figure below. When testing CH2, substitute GND:TP302 (or the CH2 shield case) in place of H:TP407 for the DL750/DL750P input.



3. Enter settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
CH1	Coupling: DC when confirming DC, or AC when confirming AC. V Range: ±1 V, Probe: 1:1

4. Set up the function generator as follows:

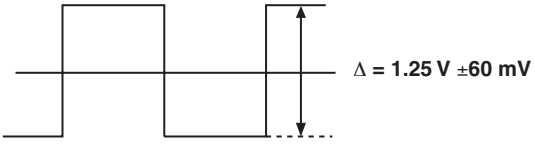
Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	2 V_{P-P}
Frequency	2.2 Hz

5. Enter settings on the oscilloscope as follows:

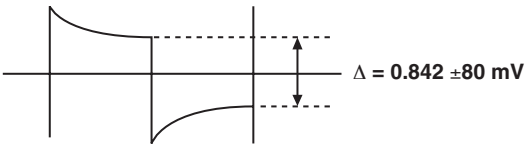
Setup Item	Setting
TIME/DIV	200 ms/div
CH1	V/DIV: 200 mV/div, Coupling: DC, Probe: 1:1

6. Confirm that the waveform displayed on the oscilloscope appears as shown below depending on the coupling selected.

DC-Coupling



AC-Coupling



2.12.2 Insulation Resistance Test

This test confirms the insulation resistance between the floating part of the module and the protective ground. This test is performed with the plastic top cover attached, after the module has been assembled.

Acceptable Test Instruments

Insulation Resistance Tester: YOKOGAWA 2407 or equivalent.

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Short the H and L input terminals on the FREQ Module.
3. Measure the insulation resistance between input terminals and protective ground, then confirm that the product specifications are met.
   Specification: 10 MΩ or more at 500 VDC.

2.12.3 Withstanding Voltage Test

This is a test of the withstanding voltage of the module's floating part. This test is performed twice, once with just the board, and once after the plastic top cover is attached, and the module is fully assembled. Perform the second test immediately after the insulation resistance test.

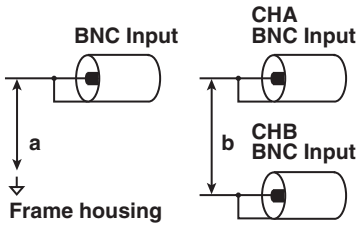
Specification: 300 V (CAT II) (maximum allowable common mode voltage)

Acceptable Test Instruments

Withstanding Voltage Tester: Kikusui TOS-8750 or equivalent.

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Short the H and L input terminals on the FREQ Module.
3. As shown in figures a and b below, apply 2300 V (50 Hz) between the input terminals and protective ground terminal, and between CHA and CHB for two seconds, and confirm that the current limit (10 mA) is not exceeded during that time.
4. After attaching the plastic top cover and the module is fully assembled, connect it to the DL750/DL750P and perform steps 2 and 3. However, you should perform this test after the insulation resistance test.



Items to Be Checked

That the withstanding voltage test below is cleared (the current limit is not exceeded).

- Power supply LN to G
  Current limit of 10 mA at AC1.5 kV (50 Hz) for two seconds
- The module terminals measured for the insulation resistance and withstanding tests to the power supply G.
  Current limit of 10 mA at AC2.3 kV (50 Hz) for two seconds

2.12.4 Voltage Range Test

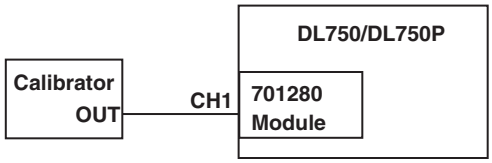
During this test the threshold is set with the plastic cover closed, then confirmation is made that the voltage range is normal.

Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.
BNC Cable

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the calibrator to the input on the FREQ module using a BNC cable.



2. Enter settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Input Setup (Preset: User, V Range: See chart on next page. , Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: See chart on next page. , Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	FV Setup (Function: Frequency, Filter (Smoothing: OFF, Pulse Average: OFF), Deceleration Prediction: ON, Stop Prediction: 2)
	Value/Div: 1 kHz
ACQ	Record Length: 10 k
(Trigger) Mode	Auto
MEASURE	Mode: ON, Item Setup: Avg

3. Enter the following settings on the calibrator.

Setup Item	Setting
Waveform	Sine Wave
Frequency	1 kHz
Output Voltage	See chart on next page.
Offset	0 V

4. Set the bandwidth on the FREQ module and the output frequency on the calibrator according to the chart on the next page.
5. Take a measurement longer than 100 ms, then confirm that the measured frequency during that time falls within the frequency range shown on the chart on the next page.

Voltage Range Test: Conditions and Criteria for the Frequency Measurement Test

No.	Voltage	Calibrator Range	Threshold Setting Output Voltage	Frequency Range (Judgment Criterion)
1	1 V	1 V_{P-P}	0.48 V	1 k ±5.5 Hz
2			0.51 V	0 Hz
3			–0.48 V	1 k ±5.5 Hz
4			–0.51 V	0 Hz
5	2 V	2 V_{P-P}	0.96 V	1 k ±5.5 Hz
6			1.02 V	0 Hz
7			–0.96 V	1 k ±5.5 Hz
8			–1.02 V	0 Hz
9	5 V	5 V_{P-P}	2.40 V	1 k ±5.5 Hz
10			2.55 V	0 Hz
11			–2.40 V	1 k ±5.5 Hz
12			–2.55 V	0 Hz
13	10 V	10 V_{P-P}	4.8 V	1 k ±5.5 Hz
14			5.1 V	0 Hz
15			–4.8 V	1 k ±5.5 Hz
16			–5.1 V	0 Hz
17	20 V	20 V_{P-P}	9.6 V	1 k ±5.5 Hz
18			10.2 V	0 Hz
19			–9.6 V	1 k ±5.5 Hz
20			–10.2 V	0 Hz
21	50 V	50 V_{P-P}	24.0 V	1 k ±5.5 Hz
22			25.5 V	0 Hz
23			–24.0 V	1 k ±5.5 Hz
24			–25.5 V	0 Hz

2.12.5 Input Filter Test

During this test the plastic cover is closed, and confirmation of the input filter action and cutoff frequency is made.

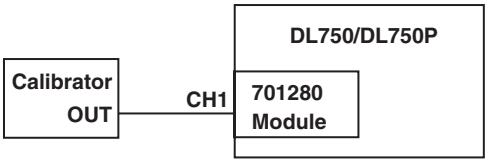
Acceptable Test Instruments

Calibrator: Datron 9100 or equivalent.

BNC Cable

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the calibrator to the input on the FREQ module using a BNC cable.



2. Enter settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
TIME/DIV	100 ms/div
CH1	Input Setup (Preset: User, V Range: ±5V, Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: See chart on next page. , Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms
	FV Setup (Function: Frequency, Smoothing: OFF, Pulse Average: OFF, Deceleration Prediction: OFF, Stop Prediction: 2 pulse, Value/div: See chart on next page.
ACQ	Record Length: 10 k
(Trigger) Mode	Auto
MEASURE	Mode: ON, Item Setup: Avg

3. Enter the following settings on the calibrator.

Setup Item	Setting
Waveform	Sine Wave
Frequency	See chart below.
Output Voltage	5 V_{P-P}
Offset	0 V

4. Set the bandwidth on the FREQ Module and the output frequency on the calibrator according to the chart below.
5. Confirm that the measured results are within the frequency range shown in the chart below.

Input Filter Test: Conditions and Criteria for the Frequency Measurement Test

No.	Voltage Range	Value/div	Calibrator	Threshold (Judgment Criterion)	Setting Frequency
1	Full	50 kHz/div	200 kHz	4.60 V	200 k ±1250 Hz
2	100 kHz	20 kHz/div	100 kHz	3.15 V	100 k ±400 Hz
3				4.05 V	0 Hz
4	10 kHz	2 kHz/div	10 kHz	3.15 V	10 k ±20 Hz
5				4.05 V	0 Hz
6	1 kHz	200 Hz/div	1 kHz	3.15 V	1 k ±1.501 Hz
7				4.05 V	0 Hz
8	100 Hz	20 Hz/div	100 Hz	3.15 V	100 ±0.151 Hz
9				4.05 V	0 Hz

2.12.6 Pull Up Function Test (Includes the Maximum Voltage Input Test)

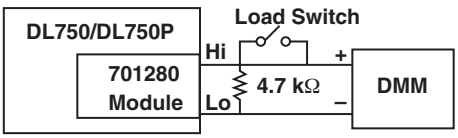
This test confirms that the pull up function is operating normally. When the pull up function is active, apply the rated maximum input voltage, and confirm that no breakdown occurs.

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
Oscilloscope: YOKOGAWA DL1540 or equivalent.
DMM: YOKOGAWA 7555 or equivalent (measurement accuracy within 0.1%).
Cable such as a BNC cable with alligator clip
Resistance: 4.7 kΩ 1W, and 1 kΩ 1W
Switch
DC Voltage Generator (GOS): YOKOGAWA 7651 or equivalent.

Pull Up Function Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the FREQ module's input terminals and the DMM's measurement input terminals and other terminals as shown in the figure below.



2. Enter settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: Pull-up 5 V, Pull up: OFF)

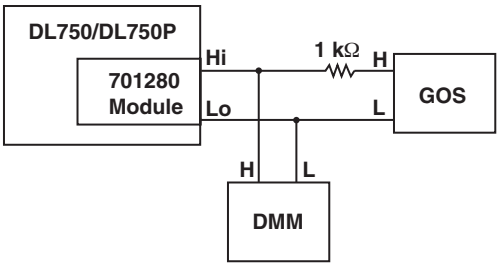
3. Enter settings on the DMM as follows:

Setup Item	Setting
Function	DCV
Range	10 V

4. Confirm that the output voltage on the DMM is 0 ±0.2 V.
5. Turn Pull Up ON, then confirm that the output voltage from the DMM is 4.5 ±0.3 V.
6. Then, turn ON the load switch, and confirm that the output voltage from the DMM is 2.3 ±0.2 V.

Pull Up Resistance Protection Circuit Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Connect the FREQ module's input terminals and the DMM's measurement input terminals and other terminals as shown in the figure below.



3. Enter settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: Pull-up 5 V, Pull up: ON)

4. Enter settings on the GOS as follows:

Setup Item	Setting
Function	DCV
Output Voltage	See below.
Range	32 V

5. Enter settings on the DMM as follows:

Setup Item	Setting
Function	DCV
Range	The range at which the judgment criteria can be measured.

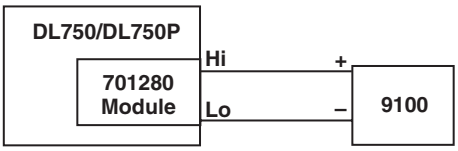
6. Confirm that the measured value from the DMM meets the judgment criteria when the GOS output voltage is set to the voltages shown in the chart below.

Judgment Criteria for the Pull Up Resistance Protection Circuit Test

No.	GOS Output Voltage	Judgment Criterion
1	4.5 V	4.5 ±0.3 V
2	32 V	32.0 ±0.3 V
3	–3.5 V	–2.1 ±0.3 V
4	–4.5 V	–4.5 ±0.3 V
5	–32 V	–32.0 ±0.3 V

Testing Procedure for the Maximum Voltage Input Test

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Connect the FREQ module's input terminals and the 9100 calibrator's output terminals as shown in the figure below.



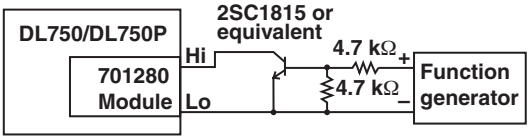
3. Enter settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: Pull-up 5 V, Pull up: ON)

4. Apply DC-42V from the 9100 calibrator for ten seconds.
5. Set the 9100 calibrator, and apply DC-42 V for ten seconds.
6. Confirm the final action (next page), then confirm normal operation.

Procedure for Confirming the Final Action

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Wire the FREQ module FREQ's input terminals and the function generator's output as shown in the figure below.



3. Enter channel settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	FV Setup (Function: Frequency, Filter (Smoothing: OFF, Pulse Average: OFF), Deceleration Prediction: OFF, Stop Prediction: 2)
	Input Setup (Preset: Pull-up 5 V, Bandwidth: Full, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms, Pull up: ON
	Value/Div: 1 kHz
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

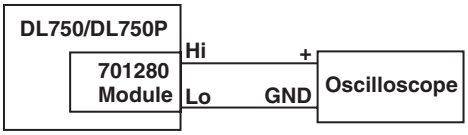
4. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse Wave
Frequency	1 kHz
Output Voltage	5 V
Offset	2.5 V

5. Confirm that the measured frequency value is 1 kH ±5.5 Hz.
6. Confirm that when you turn OFF Pull Up the frequency measurement value is 0 Hz.

Power-ON Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Wire the FREQ module's input terminals and the function generator's output as shown in the figure below.



3. Enter channel settings on the DL750/DL750P and frequency module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: Pull-up 5 V, Pull up: OFF)

4. Turn OFF the power to the DL750/DL750P.
5. Turn ON the power to the DL750/DL750P.
6. Using an oscilloscope, confirm that the voltage from the input terminal does not exceed 0.2 V between the time the power is turned ON and the DL750/DL750P starts up.

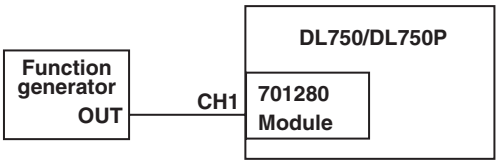
2.12.7 LED Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
BNC Cable

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P.
2. Connect the FREQ Module to the DL750/DL750P as shown in the figure below, then connect the output from the function generator to the input on the frequency module using a BNC cable.



3. Enter channel settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: User, V Range: ±5 V, Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: 2.5 V, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	FV Setup (Function: Frequency)

4. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse Wave
Frequency	8 Hz
Output Voltage	2 V_{P-P}
Offset	Set depending on the test conditions.
DUTY	50%

5. Confirm that the output voltage from the function generator and the LEDs on the FREQ module match the items in the chart below.

Judgment Criteria for the LED Test

Condition No.	Function Generator Offset Voltage	LED Status
1	0 V	All off
2	2.5 V	Green LED blinking
3	4.8 V	All off
4	5.2 V	Red LED illuminated
5	–4.8 V	All off
6	–5.2 V	Red LED illuminated

6. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse wave
Frequency	8 Hz
DUTY	50%
Offset	0 V
Output Voltage	14 V_{P-P}

7. Confirm that the red LED illuminates.
8. Enter channel settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
CH1	Input Setup (Preset: EM Pickup, Bandwidth: Full, Hys: ±1%, Chatter Elimination: 0 ms)

9. Confirm that the green LED blinks.

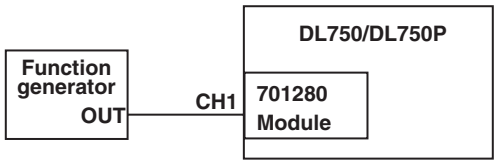
2.12.8 Pulse Filter Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
BNC Cable

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the function generator to the input on the FREQ Module using a BNC cable.



2. Enter channel settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Input Setup (Preset: Logic 5 V, Probe: 1:1, Bandwidth: Full, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	FV Setup (Function: Frequency, Filter (Smoothing: ON (100 ms), Pulse Average: ON (1 pulse)), Deceleration Prediction: ON, Stop Prediction: 2)
	Value/Div: 50 kHz, V Zoom: ×1, Offset: 200000.0 Hz
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

3. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse Wave
Frequency	200 kHz
DUTY	50%
Output Voltage	5 V
Offset	2.5 V

4. Confirm that the measured frequency value is 200 kH ±1100 Hz.
5. Change the settings on the pulse filter to ON, 16 pulse, then confirm that the frequency measurement value is 200 kHz ±750 Hz.
6. Change the settings on the pulse filter to ON, 256 pulse, then confirm that the frequency measurement value is 200 kHz ±50 Hz.
7. Change the settings on the pulse filter to ON, 4096 pulse, then confirm that the frequency measurement value is 200 kHz ±3 Hz.

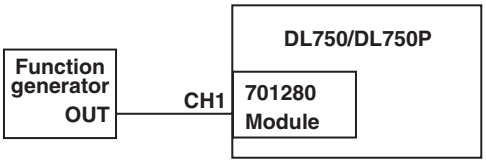
2.12.9 Chatter Elimination Function Test

Acceptable Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
BNC Cable

Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the function generator to the input on the FREQ Module using a BNC cable.



2. Enter channel settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
TIME/DIV	200 ms/div
CH1	FV Setup (Function: Frequency, Filter (Smoothing: OFF, Pulse Average: OFF), Deceleration Prediction: ON, Stop Prediction: 2)
	Input Setup (Preset: User, V Range: ±5 V, Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: 0 V, Hys: ±1%, Slope: Rise, Chatter Elimination: 100 ms)
	Value/Div: 1 Hz/div, Position: –5 div
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

3. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse Wave
Frequency	997.5 Hz
Output Voltage	2 V_{P-P}
Offset	0 V
Duty	50%

4. Take a measurement for 2 seconds or more, then confirm that the frequency measurement value falls between 4.984 and 5.003 Hz.

2.12.10 Measurement Accuracy

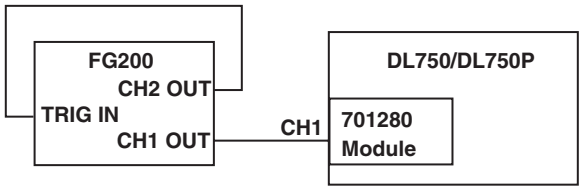
This lists the test methods used by the FG200 Function generator for the Test of Frequency Measurement Accuracy per the Input Frequency, the Test of Frequency Measurement Accuracy per the Input Voltage, and the DUTY Measurement Accuracy Test.
Using each measurement function of the FREQ module, confirm the accuracy of frequency measurement and DUTY ratio measurement.

Test Instruments

Function Generator: YOKOGAWA FG200 or equivalent.
BNC Cable

Procedure for the Test of Frequency Measurement Accuracy per the Input Frequency

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the function generator to the input on the FREQ Module using a BNC cable.
   Also, connect the CH2 output terminal on the FG200 and the TRIG IN terminal on the back of the FG200 using a BNC cable.



2. Enter channel settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
TIME/DIV	Depends on the input frequency.
CH1	FV Setup (Function: Frequency, Filter (Smoothing: OFF, Pulse Average: OFF), Deceleration Prediction: ON, Stop Prediction: 2)
	Input Setup (Preset: User, V Range: ±10 V, Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: 0.5 V, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	Value/Div: See chart below. , Position: –5 div
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

3. Set up the function generator as follows:

Setup Item	CH1	CH2
MODE	See chart below.	CONT
FUNC	Triangular Wave	Pulse wave (up to 200 kHz)
FREQ	See chart below.	See chart below.
AMPL	10 V_{P-P}	5 V_{P-P}
OFFSET	5 V	2.5 V
SYMMETRY	See chart below.	—
BURST	1	—
TRIG	EXT	—
DUTY	—	50%
OUTPUT	1/10	1/1

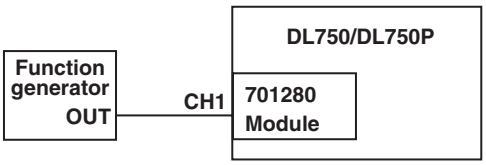
At each frequency range, measure for a length of time at least 100 times the period of the measured frequency, then confirm that the measured values during that time meet the judgment criteria. However, when inputting 1 Hz, measure for at least 10 times the period of the measured frequency.

Conditions and Judgment Criteria for the Frequency Measurement Accuracy Test

No.	Measuring Range	CH1 MODE	CH1 FREQ	CH1 SYMM	CH2 FREQ	Judgment Criterion
1	0.1 Hz/div	TRIG	5 kHz	0.66	1 Hz	1 Hz ±0.002 Hz
2	200 Hz/div	TRIG	5 kHz	0.66	2 kHz	2 kHz ±2 Hz
3	1 kHz/div	CONT	10 kHz	1.34	—	10 kHz ±15 Hz
4	2 kHz/div	CONT	20 kHz	2.64	—	20 kHz ±70 Hz
5	20 kHz/div	CONT	200 kHz	26.4	—	200 kHz ±1100 Hz

DUTY Measurement Accuracy Testing Procedure

1. Insert the FREQ Module (Model 701280) into SLOT1 of the DL750/DL750P, then connect the output from the function generator to the input on the FREQ Module using a BNC cable.



2. Enter channel settings on the DL750/DL750P and FREQ module as follows:

Setup Item	Setting
TIME/DIV	10 ms/div
CH1	Input Setup (Preset: User, V Range: ±5 V, Coupling: DC, Probe: 1:1, Bandwidth: Full, Threshold: 0 V, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	FV Setup (Function: Duty, Measure Pulse: See chart below.)
	Value/Div: See chart below. , Position: –5 div
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

3. Set up the function generator as follows:

Setup Item	Setting
Waveform	Pulse Wave
Frequency	See chart below.
Output Voltage	1 V_{P-P}
Offset	0 V
DUTY	60%

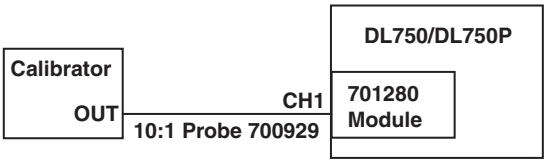
4. At each measurement frequency, measure for a length of time at least 100 times the period of the measured frequency in the chart below, then confirm that the measured values during that time meet the judgment criteria in the chart below.

Conditions and Judgment Criteria for the DUTY Measurement Accuracy Test

No.	Input Frequency	Measure Pulse Setting	Judgment Criterion
1	1 kHz	Negative	40% ±0.1%
2	10 kHz	Negative	40% ±0.2%
3	50 kHz	Positive	60% ±1.0%
4	100 kHz	Positive	60% ±2.0%
5	200 kHz	Positive	60% ±4.0%

Power Supply Frequency Measurement Accuracy Testing Procedure

1. Connect the FREQ module to the DL750/DL750P, then connect the 10:1 probe (model 700929) to the module input and calibrator.



2. Enter channel settings on the DL750/DL750P and FREQ Module as follows:

Setup Item	Setting
TIME/DIV	50 ms/div
CH1	Input Setup (Preset: See chart below. , Bandwidth: 100 kHz, Threshold: 0.5 V, Hys: ±1%, Slope: Rise, Chatter Elimination: 0 ms)
	FV Setup (Function: Frequency, Filter (Smoothing: OFF, Pulse Average: OFF), Deceleration Prediction: ON, Stop Prediction: 2)
	Value/Div: See chart below.
ACQ	Record Length: 10 k
(Trigger) MODE	Auto
MEASURE	Mode: ON, Item Setup: MAX/MIN

3. Set up the function generator as follows:

Setup Item	Setting
Waveform	Sine Wave
Frequency	See chart below.
Output Voltage	See below.
Offset	0 V

4. Enter the measurement range on the frequency module, the frequency on the calibrator, and other settings according to the chart on the next page.

5 Measure for a length of time at least 100 times the period of the measured frequency, then confirm that the measured values during that time meet the judgment criteria.

Conditions and Judgment Criteria for the Power Supply Frequency Measurement Accuracy Test

No.	Input Setup Preset	Input Voltage	Calibrator Frequency	Judgment Criterion
1	AC100 V	90 VAC	50 Hz	50 Hz ±0.03 Hz
2	AC200 V	180 VAC	50 Hz	50 Hz ±0.03 Hz

3.1 Adjustment of the HS10M12 Module (Model 701250) and the NONISO_10MS/s Module (Model 701255)

These adjustments are to be done only if the normal range was exceeded during testing.

WARNING

- See chapter 7 for instructions on disassembling the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (section 2.3) is very important for safety, so please be sure you carry out the test. For the withstanding voltage test, you must adhere to the stated voltage and times. Otherwise damage to the module can result, and the insulation can be weakened.

Testing Environment

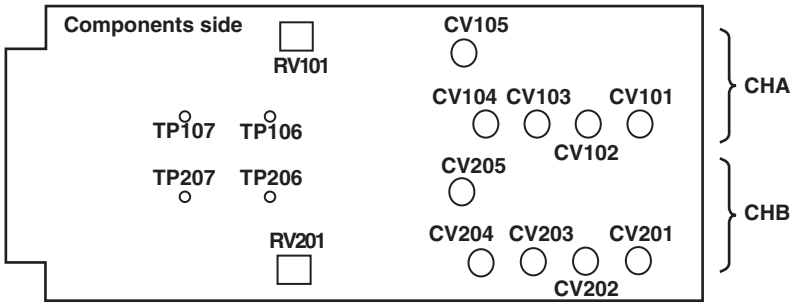
- Temperature: 23 ±5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
Module Extension	YOKOGAWA B8023ZZ	

Adjustment and Test Procedures (CHA)

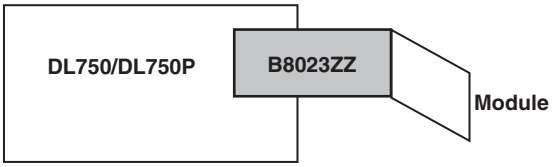
Volume Position



Frequency Characteristics Adjustment

×1 Adjustment

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P through the B8023ZZ.



2. Enter settings on the DL750/DL750P as follows:

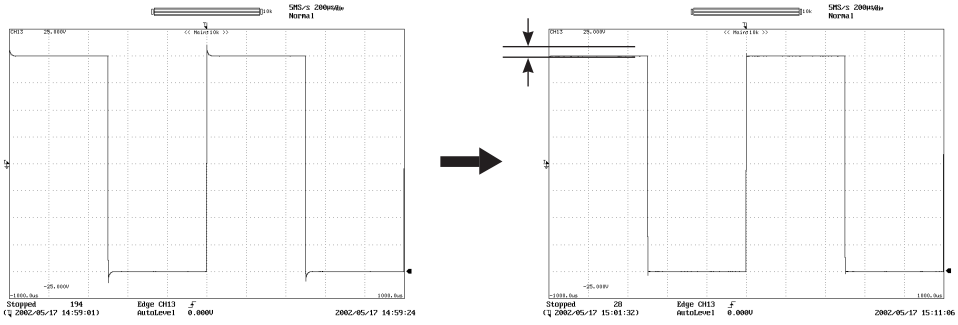
Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 50 mV/div, V Zoom: ×0.5, Probe: 1:1
SIMPLE/ENHANCED	Source: Channel under adjustment.

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Square Wave
Amplitude	800 mV_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the module under adjustment using a 1:1 BNC-BNC cable connection.
5. Adjust CHA CV105 and CHB CV205 on the module under adjustment so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within 1% of amplitude).

Degree of flatness: within ±1% of amplitude



÷10 Adjustment

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P through the B8023ZZ.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 100 mV/div, V Zoom: ×0.5, Probe: 1:1

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Square Wave
Amplitude	1.6 V_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the module being adjusted using a 1:1 BNC-BNC cable connection.
5. Adjust CHA CV101 and CV102, and CHB CV201 and CV202 on the adjustment module so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within ±1% of amplitude).

÷100 Adjustment

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P through the B8023ZZ.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 1 V/div, V Zoom: ×0.5, Probe: 1:1

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Square Wave
Amplitude	16 V_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the module under adjustment using a 1:1 BNC-BNC cable connection.
5. Adjust CHA CV103 and CV104, and CHB CV203 and CV204 on the module under adjustment so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within ±1% of amplitude).

DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

3.2 Adjustments of the HS1M16 Module (Model 701251)

These adjustments are to be done only if the normal range was exceeded during testing.

WARNING

- Please see the instructions on how to disassemble the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (section 2.4) is very important for safety, so please be sure you carry out the test. For the withstanding voltage test, you must adhere to the stated voltage and times. Otherwise, damage to the module can result, and the insulation can be weakened.

Testing Environment

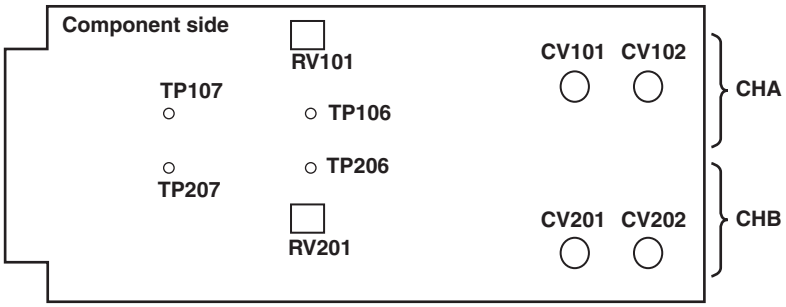
- Temperature: 23 ±5°C
- Allow the instrument to warm up for at least 30 minutes after turning ON the power.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
Probe	YOKOGAWA 700929 10:1 Safety Probe	
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
Module Extension	YOKOGAWA B8023ZZ	

Adjustment and Test Procedures

Volume Position



Frequency Characteristics Adjustment

÷100 Adjustment 1

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P through the B8023ZZ.
2. Enter settings on the DL750/DL750P as follows:

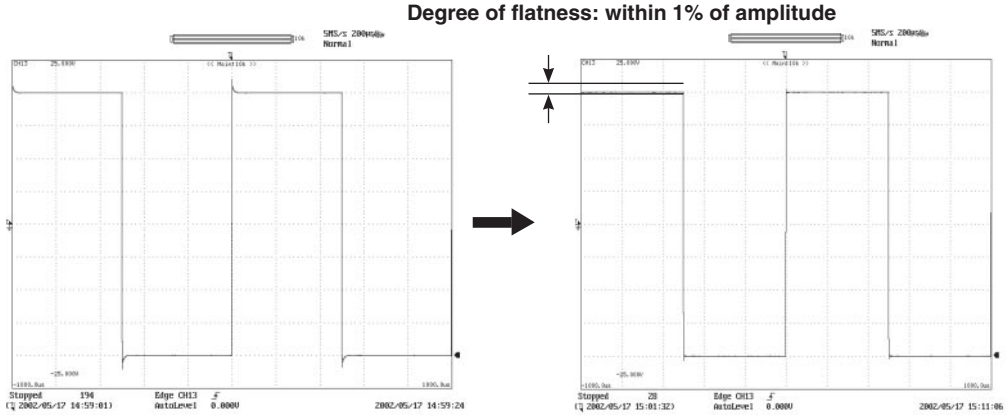
Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 500 mV/div, V Zoom: ×0.5, Probe: 1:1
SIMPLE/ENHANCED	Source: Channel under adjustment.

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Square Wave
Amplitude	8 V_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the adjustment module using a 1:1 BNC-BNC cable connection.
5. Adjust CHA CV101 and CHB CV201 on the adjustment module so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within ±1% of amplitude).

Degree of flatness: within 1% of amplitude



+100 Adjustment 2

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P through the B8023ZZ.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 200 mV/div, V Zoom: ×0.5, Probe: 10:1

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Square Wave
Amplitude	16 V_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the module under adjustment through the 10:1 probe (700929).
5. Adjust the probe so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within 1% of amplitude).
6. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 500 mV/div, V Zoom: ×1

7. Set up the function generator to output a signal as follows:

Setup Item	Setting
Amplitude	20 V_{P-P}

8. Adjust CHA CV103 and CHB CV203 on the module under adjustment so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within 1% of amplitude).

DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

3.3 Adjustments of the HV (with RMS) Module (Model 701260)

These adjustments are to be done only if the normal range was exceeded during testing.

WARNING

- Please see the instructions on how to disassemble the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (section 2.6) is very important for safety, so please be sure you carry out the test. For the withstanding voltage test, you must adhere to the stated voltage and times. Otherwise, damage to the module can result, and the insulation can be weakened.

Testing Environment

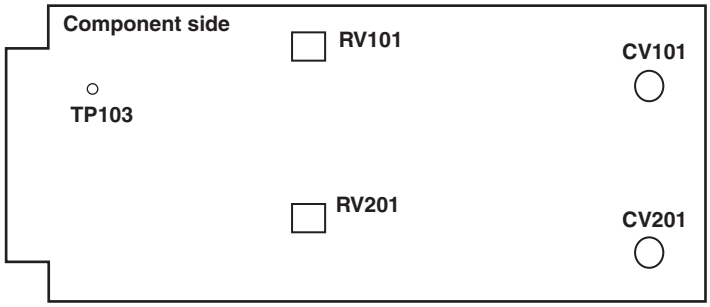
- Temperature: 23 ±5°C
- Allow the instrument to warm up for at least 30 minutes after turning ON the power.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
DC Voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	
Function Generator	Agilent Technologies 33120A or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies 3458A or equivalent.	Accuracy: 0.002% or better.

Adjustment and Test Procedures

Volume Position



Frequency Characteristics Adjustment

1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

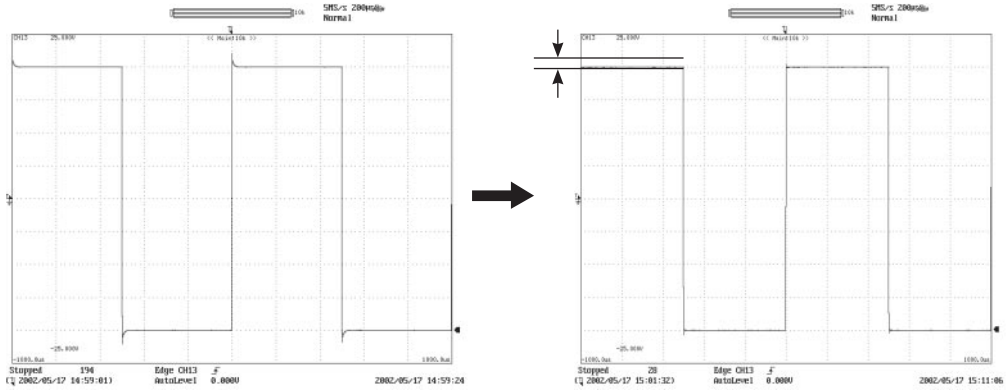
Setup Item	Setting
TIME/DIV	200 ms/div
CH1	V/DIV: 200 mV/div, V Zoom: ×5,

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	With 50 Ω termination, 3 V_{P-P}, and with no 50 Ω termination, 1.5 V_{P-P}
Frequency	1.1 kHz

4. Connect the output from the function generator to the 701260 HV (with RMS) Module.
5. Adjust the CV101 so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within ±1% of amplitude).

Degree of flatness: within 1% of amplitude



DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

3.4 Adjustment of the UNIVERSAL Module (Model 701261) and UNIVERSAL (AAF) Module (Model 701262)

This adjustment is to be done only if the normal range was exceeded during testing.

WARNING

- Please see the instructions on how to disassemble the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.

Testing Environment

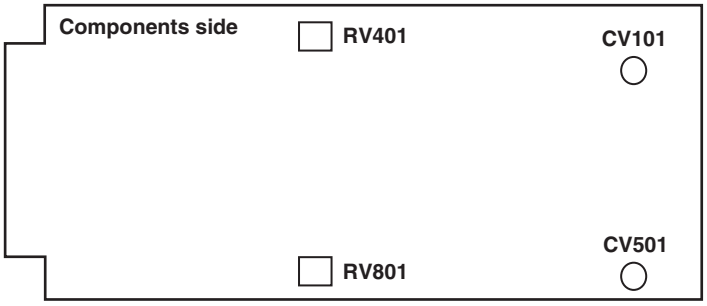
- Temperature: 23 ± 5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
Module Extension	YOKOGAWA B8023ZZ	

Adjustment and Test Methods

Volume Position



Adjusting the Variable Capacitor

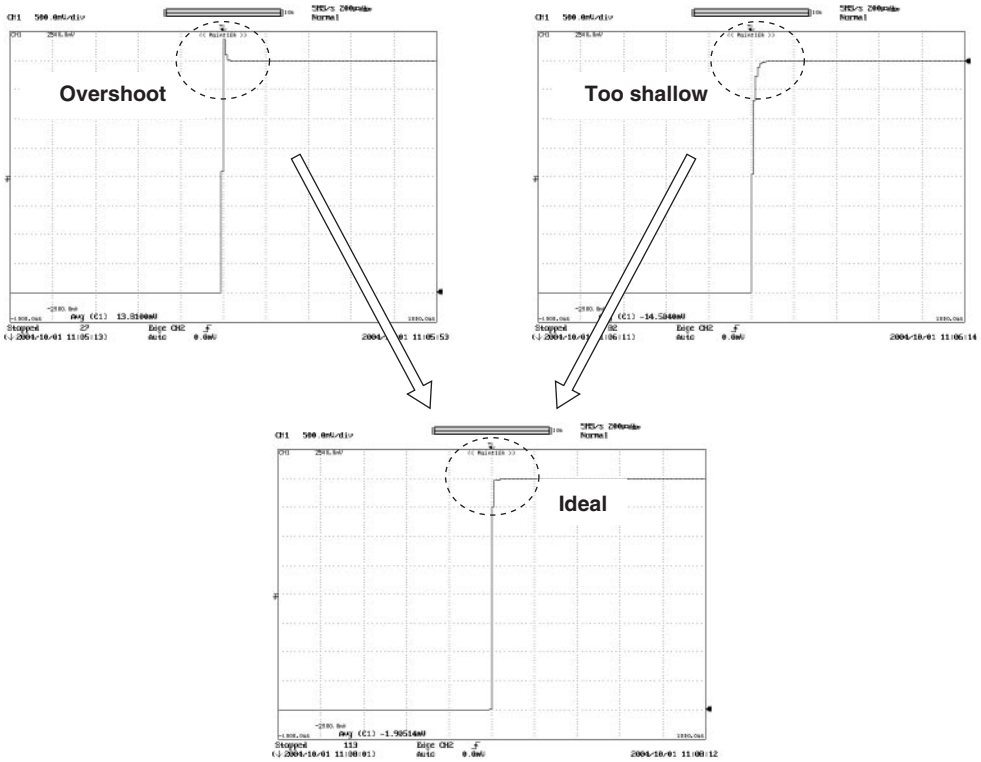
1. Connect the module to be adjusted to SLOT1 of the DL750/DL750P.
2. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
TIME/DIV	200 μs/div
CH1	V/DIV: 500 mV/div, Coupling: DC, Bandwidth: Full
ACQ	Mode: Normal

3. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	4 V_{P-P}
Frequency	100 Hz

4. As in the figure below, adjust CV101 (CV501) while observing the waveform of the target channel on screen until it becomes a straight line.



DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

Note

After reassembling a module, you must perform all tests.

3.5 Adjustment of the TEMP/HPV Module (Model 701265)

This adjustment is to be done only if the normal range was exceeded during testing.

WARNING

- Please see the instructions on how to disassemble the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.

Testing Environment

- Temperature: 23 ± 5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

3.6 Adjustment of the STRAIN_NDIS Module (Model 701270) and the STRAIN_DSUB Module (Model 701271)

This adjustment is to be done only if the normal range was exceeded during testing.

WARNING

- Please see the instructions on how to disassemble the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.

Testing Environment

- Temperature: 23 ±5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

DC Accuracy Adjustment (and Write to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

3.7 Adjustments of the ACCL/VOLT Module (Model 701275)

These adjustments are to be done only if the normal range was exceeded during testing.

WARNING

- See chapter 7 for instructions on disassembling the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (section 2.11) is very important for safety, so please be sure you carry out the tests. For the withstanding voltage test, you must adhere to the stated voltage and times. Otherwise, damage to the module can result, and the insulation can be weakened.

Testing Environment

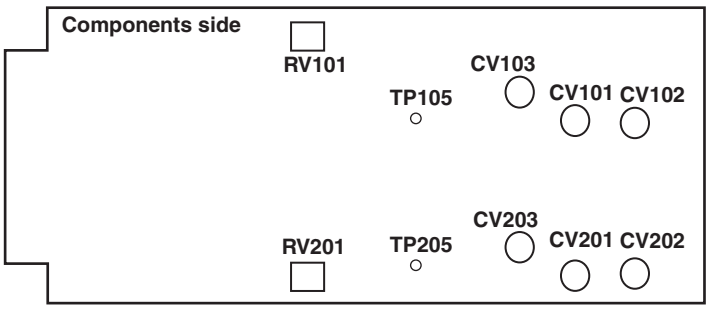
- Temperature: 23 ± 5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
DC Voltage Generator	YOKOGAWA 7651 or equivalent.	
Calibrator	Datron 9100 or equivalent.	
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
DMM	Agilent Technologies B8023ZZ	Accuracy: 0.002% or better.

Adjustment and Test Methods

Volume Position



Adjusting the Input Capacitance

÷100 Adjustment 1

1. Enter settings on the DL750/DL750P as follows:

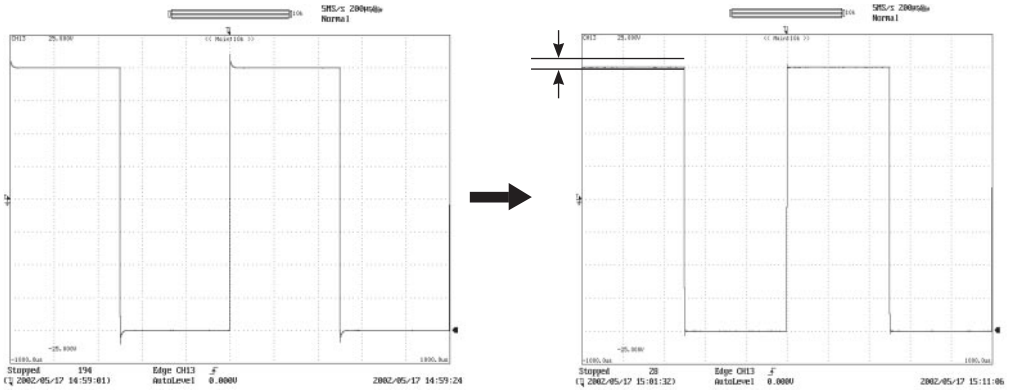
Setup Item	Setting
TIME/DIV	200 ms/div
CH1	V/DIV: 500 mV/div, V Zoom: ×0.5

2. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	8 V_{P-P}
Frequency	1.1 kHz

3. Connect the output from the function generator to the ACCL/VOLT module.
4. Adjust the CV101 so that the rising edge of the waveform on the DL750/DL750P screen goes flat (degree of flatness: within ±1% of amplitude).

Degree of flatness: within 1% of amplitude



÷100 Adjustment 2

1. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CHX	V/DIV: 200 mV/div, V Zoom: ×1
TIME/DIV	200μs/div

2. Set up the function generator to output a signal as follows:

Setup Item	Setting
Waveform	Rectangular Wave
Amplitude	16 V_{P-P}
Frequency	1.1 kHz

3. Connect the output from the function generator to the ACCL/VOLT module through a 10:1 probe.
4. On the DL750/DL750P, adjust the probe so that the rising edge of the waveform goes flat (degree of flatness: within ±1% of amplitude).
5. Change the settings on the DL750/DL750P as follows:

Setup Item	Setting
CHX	V/DIV: 500 mV/div, V Zoom: ×1

6. Change the amplitude setting on the function generator to 20 V_{P-P}.
7. Adjust the CV102 so that the rising edge of the waveform on the DL750/DL750P goes flat (degree of flatness: within ±1% of amplitude).

DC Accuracy Adjustment (and Writing to EEPROM)

If the DC accuracy does not fall within the range in the specifications, please have the instrument calibrated at your nearest YOKOGAWA dealer. A special jig is required to write the calibrated values to the EEPROM, and is therefore not to be serviced by the user.

Note

After reassembling a module, you must perform all tests.

3.8 Adjustments of the FREQ Module (Model 701280)

These adjustments are to be done only if the normal range was exceeded during testing.

WARNING

- See chapter 7 for instructions on disassembling the module.
- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (section 2.11) is very important for safety, so please be sure you carry out the tests. For the withstanding voltage test, you must adhere to the stated voltage and times. Otherwise, damage to the module can result, and the insulation can be weakened.

Acceptable Test Instruments

Name	Maker/Model	Required Specifications
Oscilloscope	YOKOGAWA DL1540 or equivalent.	
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: 20 ppm or less. Amplitude accuracy: 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
BNC Cable		

Notes

- The FREQ Module has two channels worth of inputs per module, and measurements can be taken on each channel independently. Only channel 1's input is specified for this adjustment and test, but unless otherwise instructed, please perform the adjustment on channel 2's input as well. If there are differences in the measurement locations or methods between the inputs on CH1 and CH2, they are noted below.
- The following instructions are on a module-by-module basis.
  Writing to FLASH ROM

Testing Environment

- Temperature: 23 ±5°C
- Allow the instrument to warm up for at least thirty minutes after turning ON the power.

Writing to the Frequency Module Firmware

1. Insert the FREQ Module into SLOT1 of the DL750/DL750P.
2. Turn ON the power to the DL750/DL750P.
3. Press **MISC**.
4. Press the **Next 1/2** soft key. (This step not necessary if Next 2/2 is displayed.)
5. Press the **Self Test** soft key.
6. Press the **Test Item** soft key. The Test Item menu appears.
7. Select FREQ VerUp using the **jog shuttle + SELECT** key.
8. Press **Test Exec**. The Alert screen appears.
9. Turn the **jog shuttle** to select OK, then press **SELECT**. A message appears indicating that the firmware has been rewritten.

Confirmation of Writing to the Frequency Module Firmware

1. Insert the FREQ Module into SLOT1 of the DL750/DL750P.
2. Turn ON the power to the DL750/DL750P.
3. Press **MISC**.
4. Press the **Next 2/2** soft key. (This step not necessary if Next 1/2 is displayed.)
5. Press the **Overview** soft key. The firmware version is displayed.
6. Confirm that the information display of the frequency module is as follows:
   *.** is the revision number of the written firmware.
   FREQ (701280-*.**/*.**)

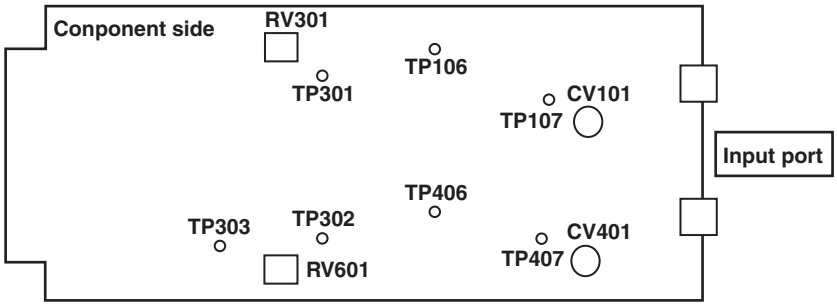
Input Capacity Adjustment

Test Instruments

Name	Maker/Model	Required Specifications	
Function Generator	YOKOGAWA FG200 or equivalent.	Frequency accuracy: Amplitude accuracy:	20 ppm or less. 0.2 dB (<1 MHz) or less. 0.5 dB (>1 MHz) or less.
Oscilloscope	YOKOGAWA DL1540 or equivalent.		

Adjustment Procedure

Positions of Volume Resistance and Test Points



Input Capacity Adjustment

1. Insert the FREQ Module into SLOT1 of the DL750/DL750P.
2. Enter settings on the oscilloscope as follows:

Setup Item	Setting
TIME/DIV	5 ms/div
CH1	V/DIV: 100 mV/div, Probe: 1:1

3. Enter settings on the DL750/DL750P as follows:

Setup Item	Setting
CH1	V/DIV: 1 V/div, Probe: 1:1, Bandwidth: Full

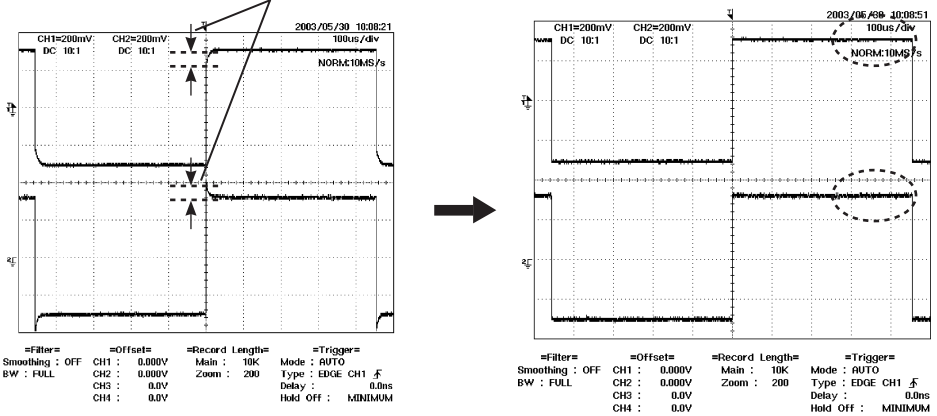
4. Set up the function generator as follows:

Setup Item	Setting
Waveform	Rectangular
Amplitude	1 V_{P-P}
Frequency	1.1 kHz

5. Connect the output from the function generator to the FREQ Module using a 1:1 BNC-BNC cable.

6. Connect the ground side of the oscilloscope's 10:1 probe to TP301 (or to the shield case of the same channel), then connect the probe tip to TP107 and observe the input waveform.
7. Adjust so that the rising edge of the waveform goes flat (see "Adjustment Waveform" on the next page).
8. Connect the ground side of the oscilloscope's 10:1 probe to TP302 (or to the shield case of the same channel), then connect the probe tip to TP407 and observe the input waveform.
9. Adjust CV401 so that the rising edge of the waveform goes flat (see "Adjustment Waveform" on the next page).

Degree of flatness: within ±1% of amplitude



4.1 Introduction

This chapter describes possible solutions for rectifying errors. Some solutions may require removal of assemblies. Please heed the following warning.

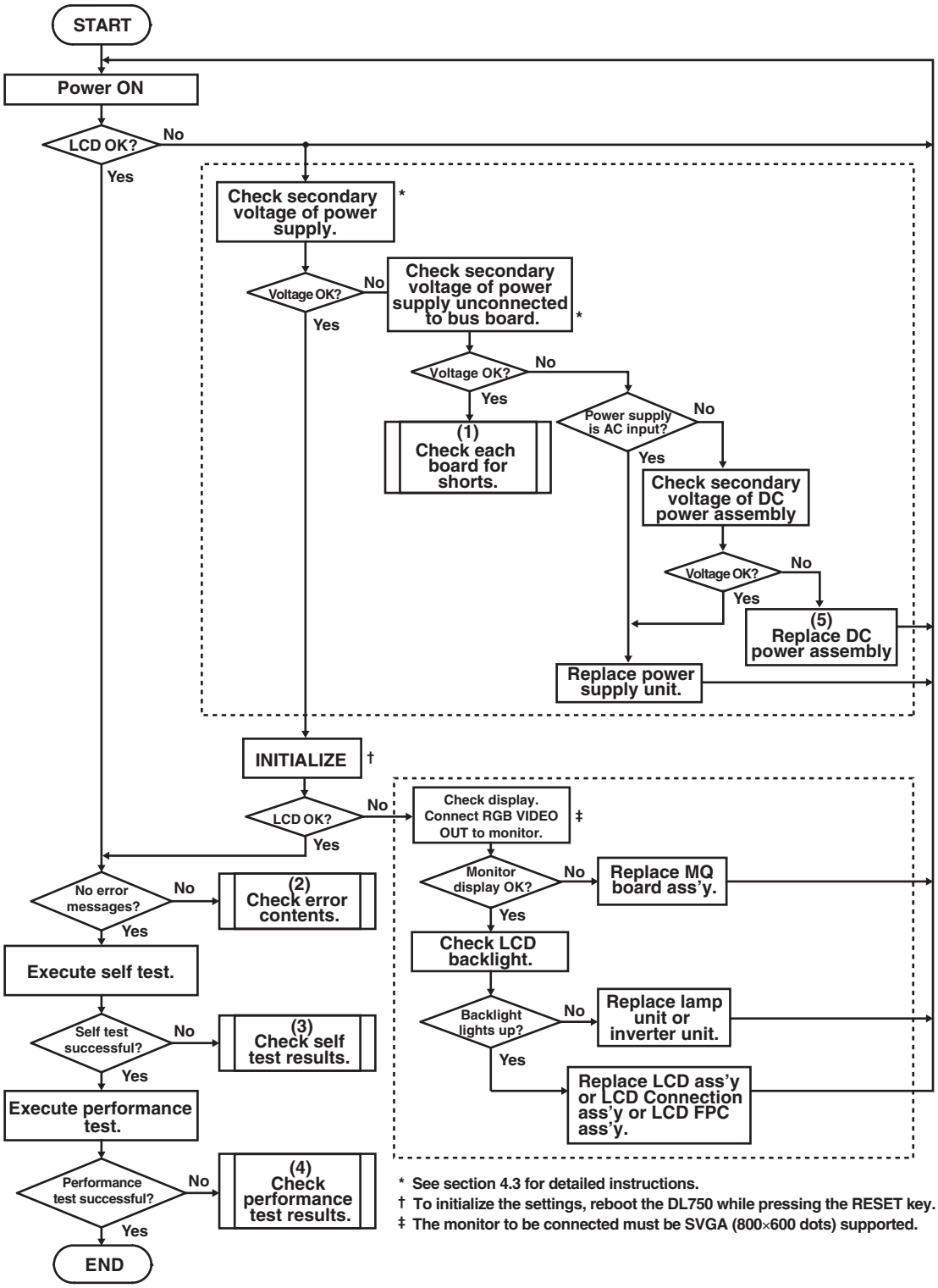
WARNING

Assembly replacement is to be performed only by qualified service technicians who have experience working with the hazards involved (such as fire and electrical shock).

Note

If an error message is displayed, the error may have been caused by incorrectly operating the unit. Refer to the user's manual (IM701210-06E), and perform the correct operation.

4.2 Flow Chart



* See section 4.3 for detailed instructions.
† To initialize the settings, reboot the DL750 while pressing the RESET key.
‡ The monitor to be connected must be SVGA (800×600 dots) supported.

Maintenance Service is Required
Contact your nearest YOKOGAWA representative as listed on the back cover of this manual.

4.3 Assemblies to Check When an Error Occurs

(1) The following are assemblies related to the power supply that should be checked when the instrument does not start when the power is turned ON, and there is no apparent problem with the power supply itself.

Table 4.1 Correspondence of Assembly to Voltage

Voltage	Assembly No.	Assembly
+12 V	B8023MA	CPU Board Assembly
	B8023MB	Mother Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B8023MR	Probe PWR Assembly (with the /P4 option)
	B8023MW	OP MEM 13Bank Assembly (with the /M3 option)
	B8023MX	OP MEM 7Bank Assembly (with the /M2 option)
	B8023MY	OP MEM 3Bank Assembly (with the /M1 option)
	B8023MZ	STD MEM 1Bank Assembly (when neither the /M3, /M2, nor /M1 options are installed)
	A1490UP	Inverter Unit
+7.2 V	B8023MA	CPU Board Assembly
	B8023MB	Mother Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	A1220UD	Printer Unit (701210 only)

See next page

Voltage	Assembly No.	Assembly
+5 V	B8023MA	CPU Board Assembly
	B8023MB	Mother Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B8023MM	PCMCIA Board Assembly
	B8023MP	Key BD Assembly
	B8023MQ	Key Sub Board Assembly
	B8023MW	OP MEM 13Bank Assembly (with the /M3 option)
	B8023MX	OP MEM 7Bank Assembly (with the /M2 option)
	B8023MY	OP MEM 3Bank Assembly (with the /M1 option)
	B8023MZ	STD MEM 1Bank Assembly (when neither the /M3, /M2, nor /M1 option is installed)
	B9989MU	Zip Board Assembly (701210 (when -J2 is specified))
	A1220UD	Printer Unit (701210 only)
	A1092UN	FDD Unit (when -J1 is specified)
	A1052UN	Zip Unit (701210 (when -J2 is specified)
	A1162UN	HDD Unit (with the /C8 option)
	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8023JJ	Frequency Module (Model 701280)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
	B8024MB	A4 PRINTER PCB Assembly (701230 only)
+3.3 V	B8023MA	CPU Board Assembly
	B8023MB	Mother Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B8023ME	LCD FPC Assembly
	B8023MG	MQ Board Assembly
	B8023ML	LCD CN Board Assembly
	B8023MM	PCMCIA Board Assembly
	B8023MW	OP MEM 13Bank Assembly (with the /M3 option)
	B8023MX	OP MEM 7Bank Assembly (with the /M2 option)
	B8023MY	OP MEM 3Bank Assembly (with the /M1 option)
	B8023MZ	STD MEM 1Bank Assembly (when neither the /M3, /M2, nor /M1 option is specified)
	A1066VA	LCD Unit
	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8023JJ	Frequency Module (Model 701280)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)

See next page

Voltage	Assembly No.	Assembly
12 VAC	B8023MB	Mother Board Assembly
	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8023JJ	Frequency Module (Model 701280)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)

(2) The following assemblies should be checked when an error message appears after turning ON the power.

Table 4.2 Correspondence of Messages to Defective Assemblies

Code	Message	Assembly No.	Assembly
783	Ckecksum error in the printer....	B8023MA	CPU Board Assembly
		B8023MC	Sub Mother Board Assembly
		B8024MB	A4 Printer PCB Assembly (701230)
		B8024TA	I/O A4&LAN&HDD Assembly (701230 with the /C8 and /C10 Option)
		B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
		B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
		B8024TD	I/O A4&STD Assembly (701230 with neither the /C8 nor /C10 Options)
		A1606UP	AC POWER Assembly (701230)
901	Failed to Backup setup data....	B8023MD	IO LAN&HDD Assembly (when both the /C8 and /C10 options are installed)
		B8023MJ	IO HDD Assembly (with the /C8 option)
		B8023MK	IO LAN Assembly (with the /C10 option)
		B8023MT	IO STD Assembly (when neither the /C8 nor /C10 option are installed)
		B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
		B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
		B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
		B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
		B8024TA	I/O A4&LAN&HDD Assembly (701230 with the /C8 and /C10 Option)
		B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
		B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
		B8024TD	I/O A4&STD Assembly (701230 with neither the /C8 nor /C10 Options)
901	System RAM failure.	B8023MA	CPU Board Assembly
903	System ROM failure.	B8023MA	CPU Board Assembly
906	Fan stopped.	B8023WF	FAN Assembly
930	Solt1 EEPROM error.		Module
931	Solt2 EEPROM error.		Module
932	Solt3 EEPROM error.		Module
933	Solt4 EEPROM error.		Module
934	Solt5 EEPROM error.		Module
935	Solt6 EEPROM error.		Module
936	Solt7 EEPROM error.		Module
937	Solt8 EEPROM error.		Module
	decompress error. *1	B8023MA	CPU Board Assembly

*1: No code exists for this error. Also, the screen background turns blue only on this error.

(3) Assemblies that should be checked when the self test fails.

Table 4.3 Correspondence of Test Items to Defective Assemblies

Test Item	Assembly No.	Assembly
Key Board	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B8023MP	Key BD Assembly
	B8023MQ	Key Sub Board Assembly Memory
Memory	B8023MA	CPU Board Assembly
FDD	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	A1092UN	FDD Unit
PCMCIA	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B8023MM	PCMCIA Board Assembly
Zip	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	B9989MU	Zip Board Assembly (701210 (when -J2 is specified))
	A1052UN	Zip Unit (701210 (when -J2 is specified))
HDD	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	A1162UN	HDD Unit (with the /C8 option)

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Test Item	Assembly No.	Assembly
SCSI	B8023MA	CPU Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
Printer	B8023MA	CPU Board Assembly
	B8023MB	Mother Board Assembly
	B8023MC	Sub Mother Board Assembly
	B8023MD or B8024TE	I/O LAN&HDD Assembly (701210 with Both the /C8 Option and /C10 Option)
	B8023MJ or B8024TF	I/O HDD Assembly (701210 with the /C8 Option)
	B8023MK or B8024TG	I/O LAN Assembly (701210 with the /C10 Option)
	B8023MT or B8024TH	I/O STD Assembly (701210 (When Neither the /C8 Option nor /C10 Option are installed))
	B8024TA	I/O A4&LAN&HDD Assembly (701230 with Both the /C8 Option and /C10 Option)
	B8024TB	I/O A4&HDD Assembly (701230 with the /C8 Option)
	B8024TC	I/O A4&LAN Assembly (701230 with the /C10 Option)
	B8024TD	I/O A4&STD Assembly (701230 (When Neither the /C8 Option nor /C10 Option are installed))
	A1220UD	Printer Unit (701210)
	B8024YA	A4 Printer Unit (701230)
	A1606UP	AC POWER Assembly (701230)

(4) Assemblies that should be checked when the performance test fails.

Table 4.4 Correspondence of Test Items to Defective Assemblies

Test Item	Assembly No.	Assembly
Insulation Resistance Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8023JJ	Frequency Module (Model 701280)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
Withstanding Voltage Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JJ	Frequency Module (Model 701280)
Maximum Input Voltage Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
DC Accuracy Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)

See next page

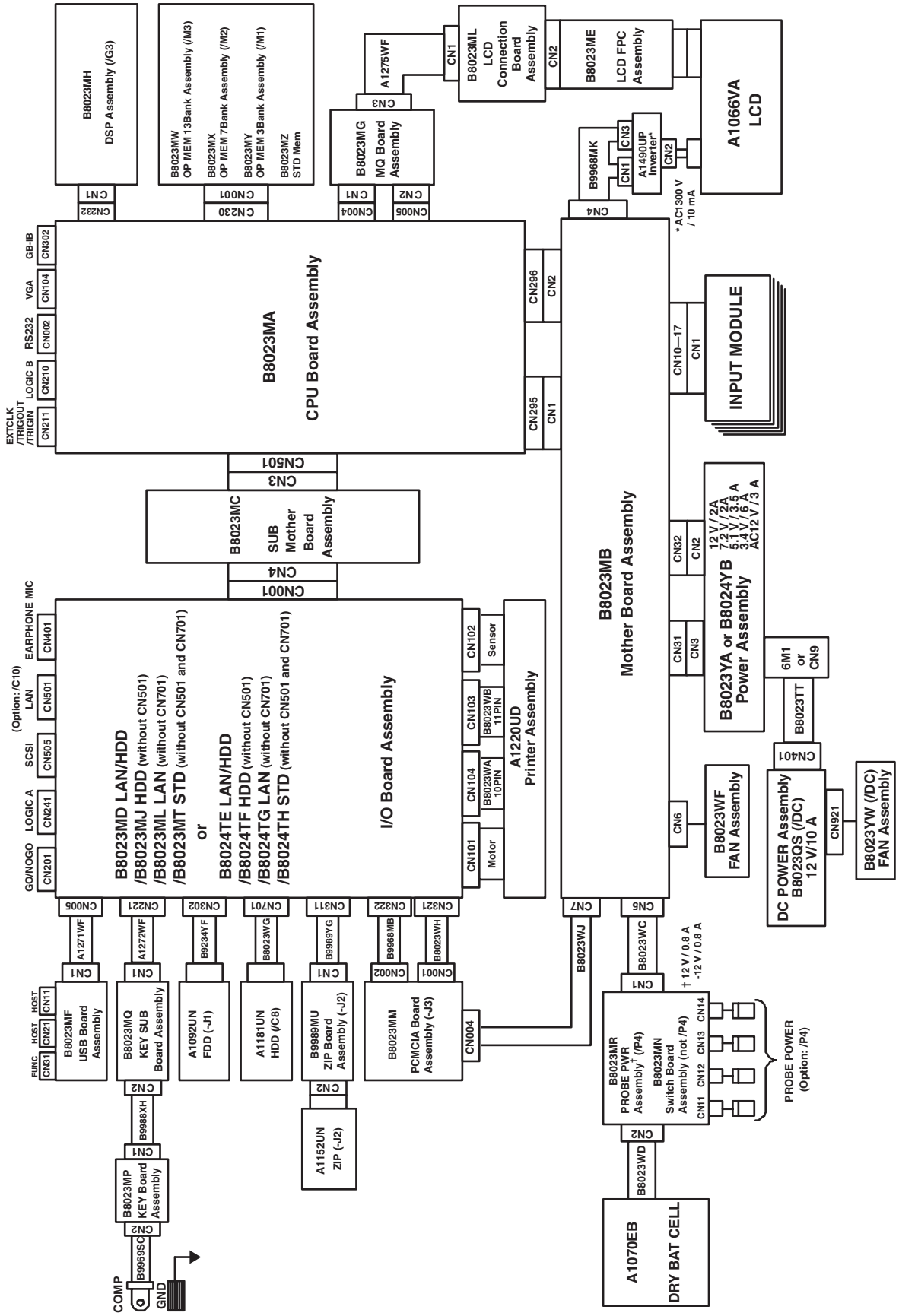
Test Item	Assembly No.	Assembly
Frequency Accuracy Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
Input Coupling Test	B8023JA	High-Speed 10 MS/s, 12-Bit Isolation Module (Model 701250)
	B8023JB	High-Speed, High-Resolution 1 MS/s, 16-Bit Isolation Module (Model 701251)
	B8023JD	High-Speed 10MS/s, 12-Bit Non-Isolation Module (Model 701255)
	B8023JE	High-Voltage 100kS/s 16-Bit Isolation Module (with RMS) (Model 701260)
	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
	B8023JJ	Frequency Module (Model 701280)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
Reference Junction Compensation Accuracy Test	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
Burnout Test	B8023JC	Temperature, High Precision Voltage Isolation Module (Model 701265)
	B8024JA	UNIVERSAL Module (Model 701261)
	B8024JB	UNIVERSAL Module (with AAF) (Model 701262)
Voltage Range Test	B8023JJ	Frequency Module (Model 701280)
Input Filter Test	B8023JJ	Frequency Module (Model 701280)
Operation of Pull-Up Function Test Maximum Input Voltage Test	B8023JJ	Frequency Module (Model 701280)
LED Test	B8023JJ	Frequency Module (Model 701280)
Pulse Filter Test	B8023JJ	Frequency Module (Model 701280)
Chatter Elimination Function Test	B8023JJ	Frequency Module (Model 701280)
Measurement Accuracy Test	B8023JJ	Frequency Module (Model 701280)
AC Accuracy Test	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
Bias Accuracy Test	B8023JH	Acceleration/Voltage Module (with AAF) (Model 701275)
Bridge Voltage Accuracy Test	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
Auto Balancing Function Test	B8023JF	Strain Module (NDIS) (Model 701270)
	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)
Shunt Cal Test	B8023JG	Strain Module (DSUB, Shunt-Cal) (Model 701271)

(5) Assemblies that should be checked when the DC Power LED (with the /DC option) blinks red.

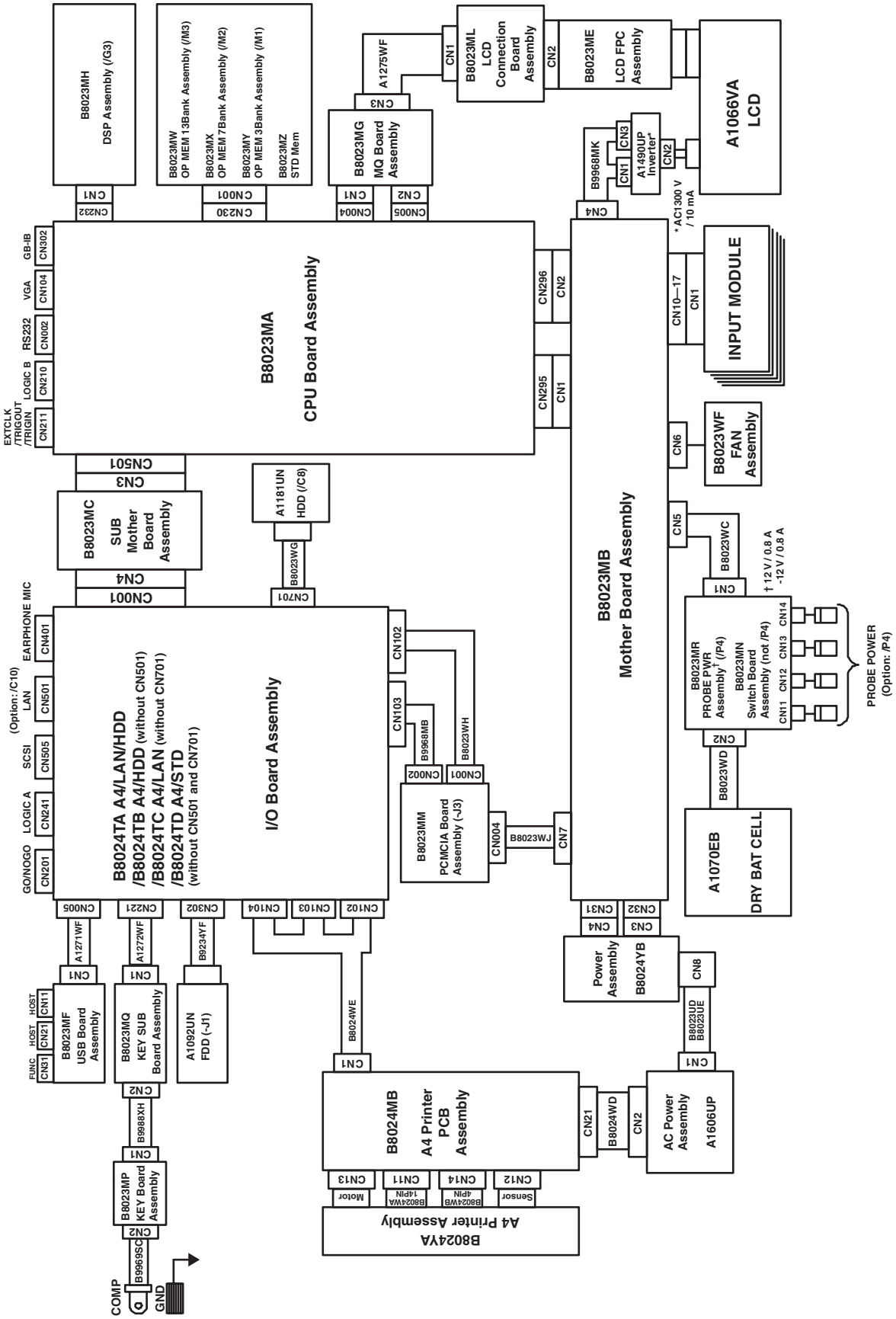
Table 4.5 Assemblies Associated with the DC Power LED

Assembly No.	Assembly
B8023YW	FAN Assembly
B8023QS	DC Power Assembly

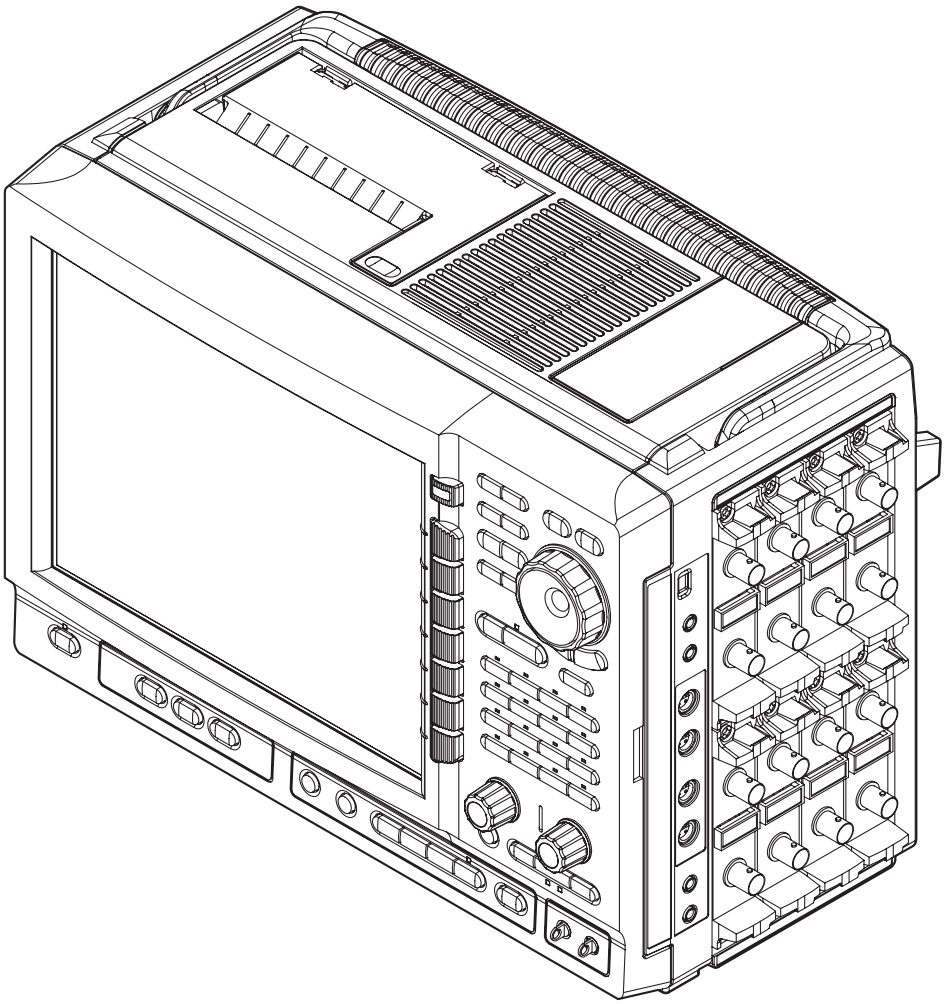
5.1 Schematic Diagram of the DL750



5.2 Schematic Diagram of the DL750P

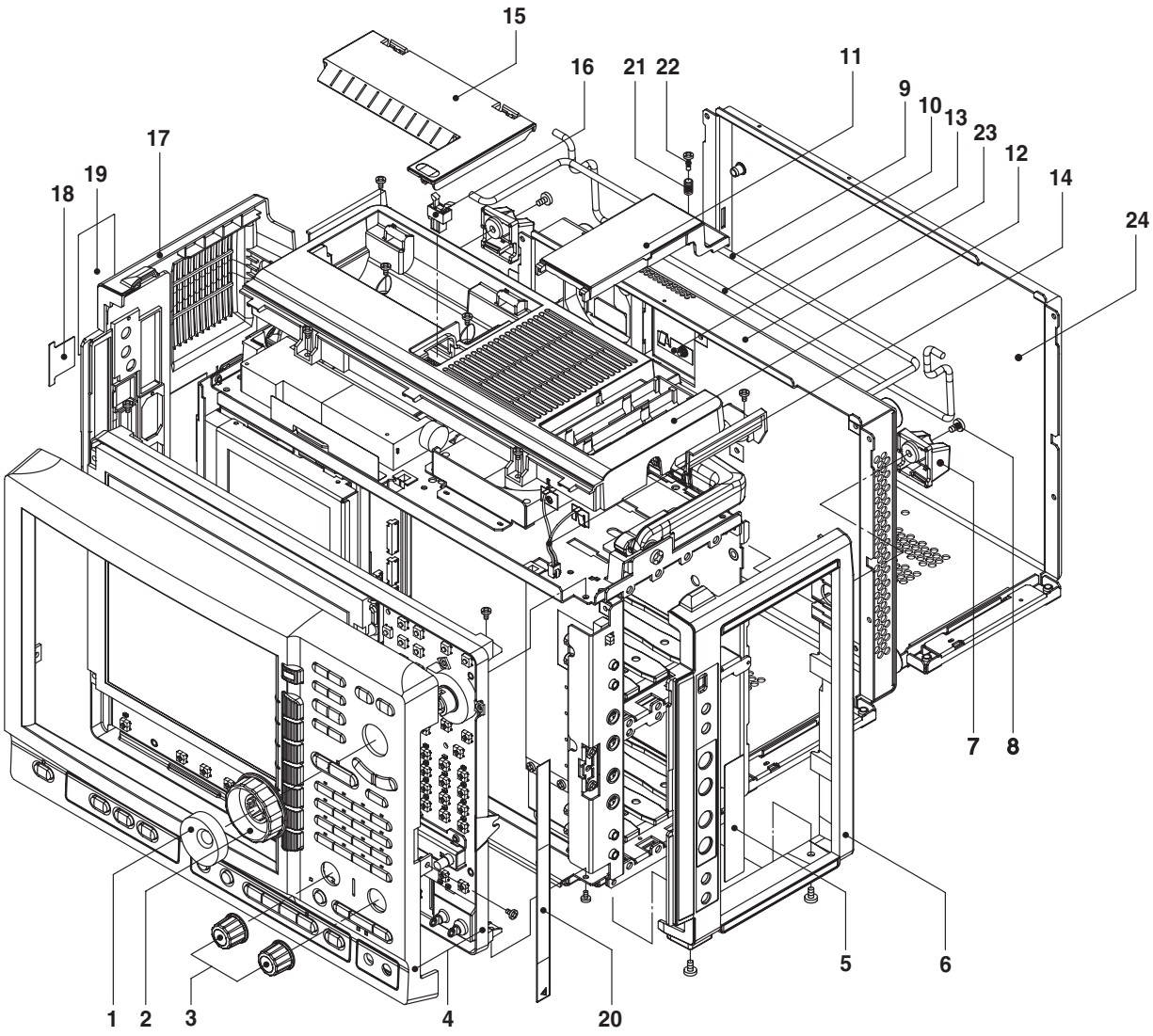


6.1 Customer Maintenance Parts List of the DL750



Note:
Parts marked with a ◎ symbol are Customer Maintenance Parts (CMP).

Complete Set

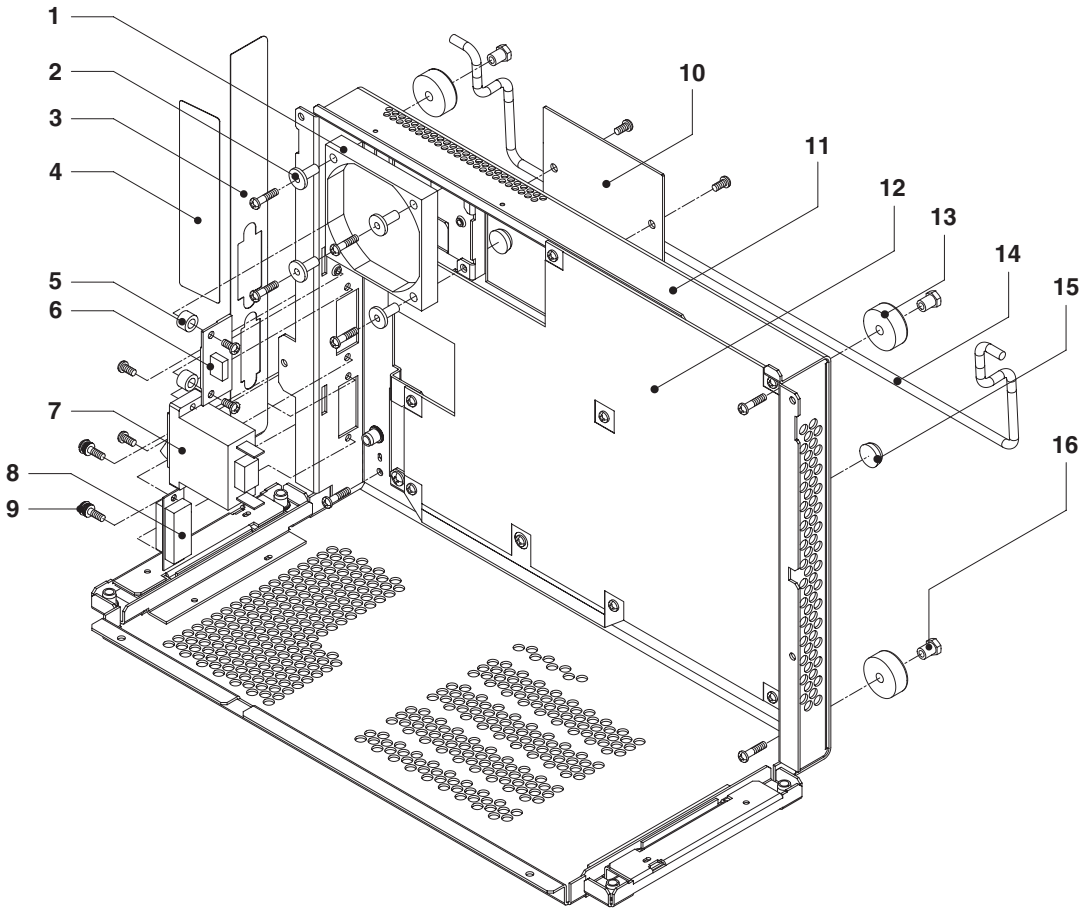


Item	Part No.	Qty	Description
◎ 1	B9989DX	1	Knob
◎ 2	B9989DY	1	Knob
◎ 3	B9989DK	2	Knob
4	-	1	(see page 6)
◎ 5	B8023HY	1	Sheet (not /P4)
◎ 6	B8023DK	1	Right Side Cover
◎ 7	B8023DU	2	Foot (not /DC)
◎ 8	Y9406LB	2	B.H.Screw, M4×6 (not /DC)
◎ 9	B8023HR	1	Support (not /DC) } (select)
◎ 10	B8023LX	1	Support (/DC) } (select) (Include in B8023TA)
◎ 11	B8023DT	1	Battery Cover

Item	Part No.	Qty	Description
12	B8023DB	1	Top Cover
13	B9914DA	1	Contact Assembly
14	B8023CK	1	Contact Assembly
◎ 15	B8023DS	1	Printer Cover
◎ 16	B9858GB	1	Clamp
◎ 17	B8023DM	1	Left Side Cover
◎ 18	B8023HW	1	Sheet (not /C10)
◎ 19	B8023HX	1	Warning/Caution Sheet (not CE) } (select)
	B8023HS	1	Warning/Caution Sheet (CE) } (select)
◎ 20	B8023HZ	1	Warning/Caution Sheet
◎ 21	B9900FX	1	Spring
◎ 22	B9946GZ	1	Screw
23	B8023TA	1	Power Unit Assembly (/DC) (see page 3) } (select)
24	B8023GE	1	Cover Assembly (not /DC) } (select)

Note: ◎ CMP

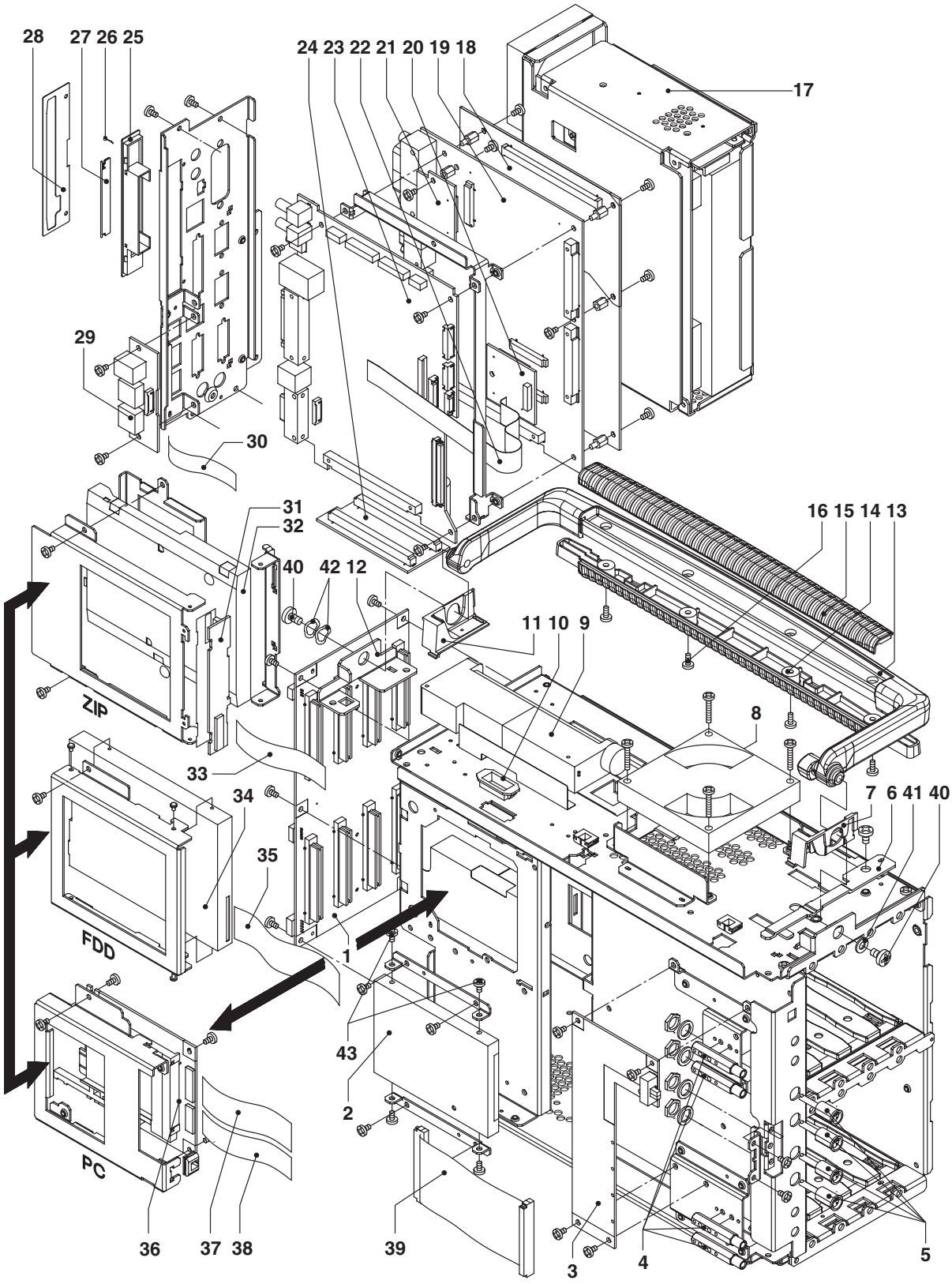
Power Unit Assembly



Item	Part No.	Qty	Description
1	B8023YW	1	Fan Assembly
2	B8023GX	4	Spacer
◎ 3	B8023HK	1	Sheet
◎ 4	B8023HL	1	Sheet
5	B8023LZ	2	Rod
6	B8023QT	1	LED Assembly
7	A1151EK	1	CKT Breaker
8	B8023YX	1	Connector Assembly
◎ 9	A1738JD	2	Screw
10	B8023LY	1	Plate
11	B8023TC	1	Cover Assembly
12	B8023QS	1	PCB
◎ 13	B8023TV	4	Foot
◎ 14	B8023LX	1	Support
◎ 15	B9880MX	2	Block
◎ 16	B8023TU	4	Screw
	B8023TT	1	Cable Assembly
	B8023TR	1	DC Cable Assembly

Note: ◎ CMP

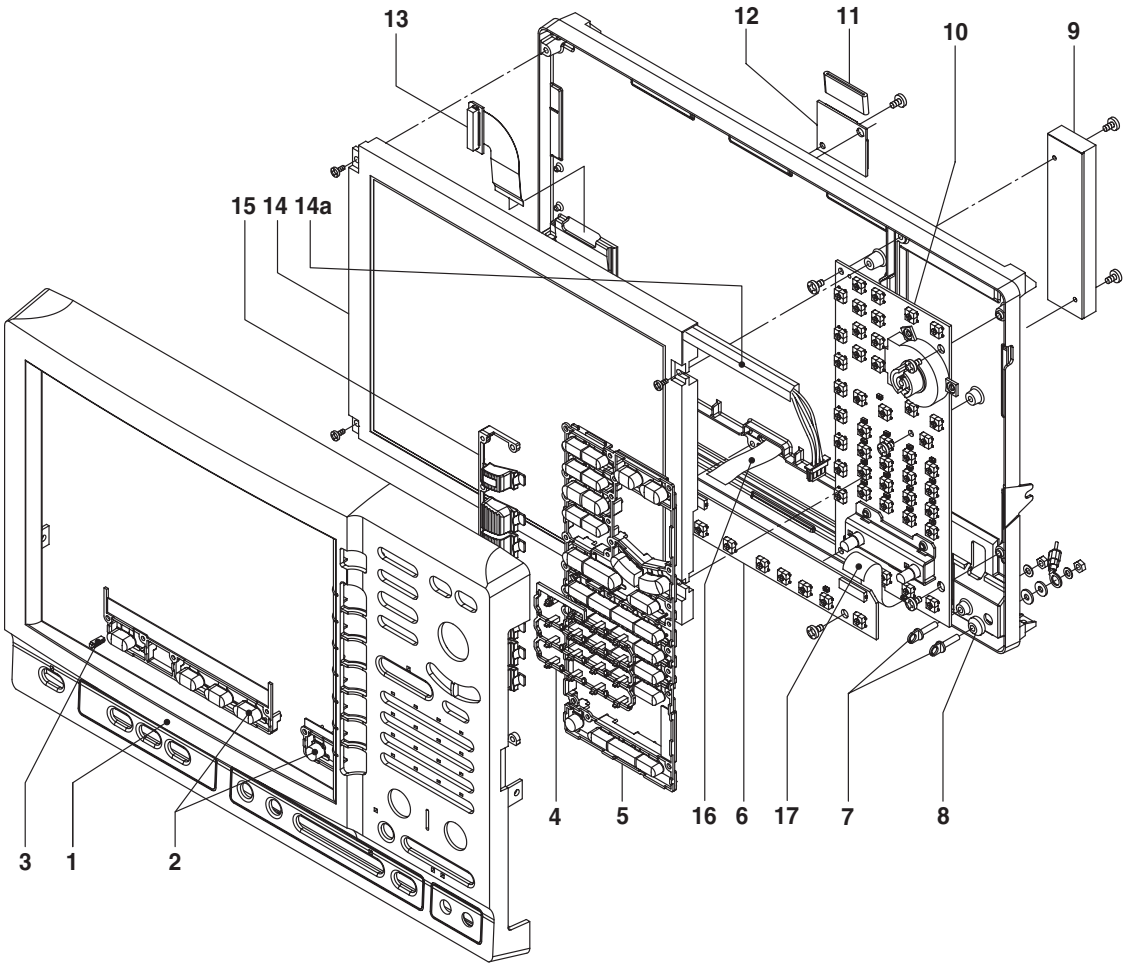
Main Assembly



Item	Part No.	Qty	Description	
1	B8023MB	1	Mother Board Assembly	
2	A1181UN	1	HDD (/C8)	
3	B8023MR	1	Probe Power Board Assembly (/P4)	} (select)
	B8023MN	1	SW Board Assembly (not /P4)	
4	B9947CB	4	Terminal	
5	B9969SE	4	Cable Assembly (/P4)	
6	B8023FQ	1	Spring	
7	B8023DP	1	Handle Cover (Right)	
8	B8023WF	1	Fan Assembly	
9	A1220UD	1	Printer Assembly	
10	B9946DU	1	Clamp	
11	B8023DQ	1	Handle Cover (Left)	
12	B8023FG	1	Bracket (Left)	
13	B8023CC	1	Handle	
◎14	B8023CE	1	Grip	
◎15	B8023CD	1	Grip	
◎16	B9988DL	4	Screw	
17	B8024YB	1	Main Power Unit Assembly (See Page7)	
18	B8023MZ	1	STD Mem 1Bank Assembly	} (select)
	B8023MY	1	OP MEM 3Bank Assembly (/M1)	
	B8023MX	1	OP MEM 7Bank Assembly (/M2)	
	B8023MW	1	OP MEM 13Bank Assembly (/M3)	
19	B8023MA	1	CPU Board Assembly	
20	B8023MG	1	MQ Board Assembly	
21	B8023MH	1	DSP Assembly	
22	A1275WF	1	Wire	
23	B8024TH	1	IO STD Assembly	} (select)
	B8024TE	1	IO LAN & HDD Assembly (/C8 and /C10)	
	B8024TF	1	IO HDD Assembly (/C8 not /C10)	
	B8024TG	1	IO LAN Assembly (/C10 not /C8)	
24	B8023MC	1	Sub Mother Board Assembly	
25	B8023EC	1	PC Bezel (-J3)	
26	B9969DS	1	Spring (-J3)	
27	B8023ED	1	PC Cover (-J3)	
28	B8023HV	1	Sheet (-J2)	
29	B8023MF	1	USB Assembly	
30	A1271WF	1	Wire	
31	B8050MN	1	ZIP Connect Assembly (-J2)	
32	A1163UN	1	Memory System (-J2)	
33	B9989YG	1	Sumi Card (-J2)	
34	A1092UN	1	Memory System (-J1)	
35	B9234YF	1	Cable (-J1)	
36	B8023MM	1	PCMCIA Board Assembly (-J3)	
37	B9968MB	1	IDE FFC (-J3)	
38	B8023WH	1	PCMCIA FPC (-J3)	
39	B8023WG	1	HDD Cable (/C8)	
40	Y9510HR	2	Screw	
41	B8023HM	1	Washer	
42	B8023HN	2	Washer	
43	Y9304LE	4	Screw (/C8)	

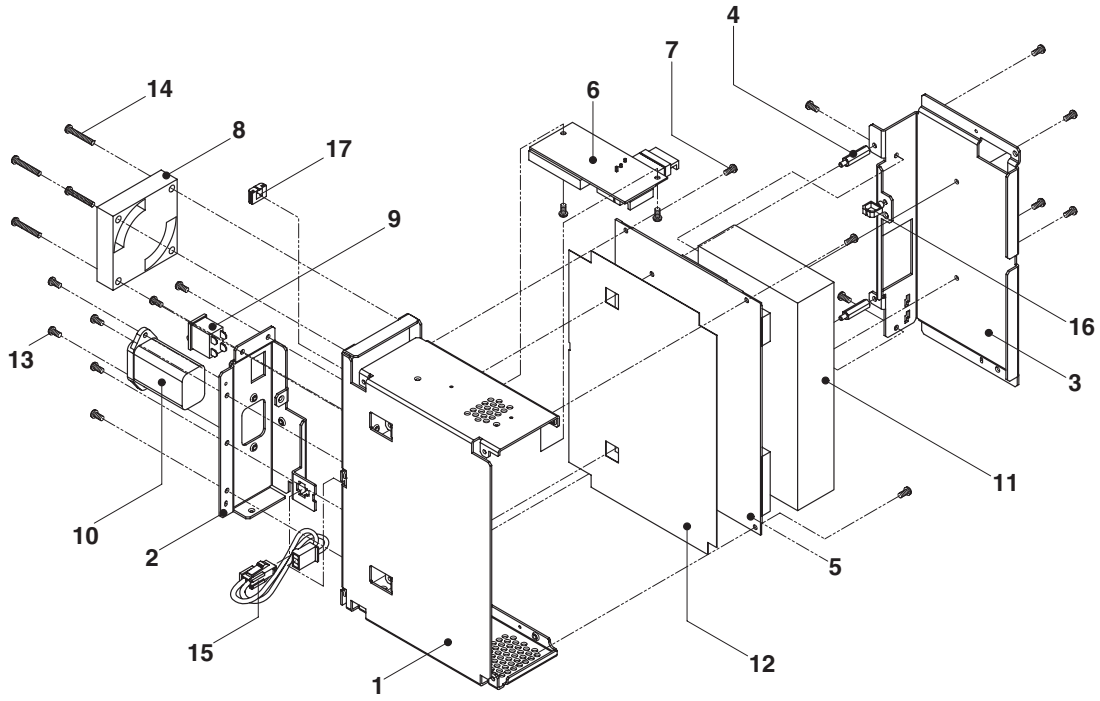
Note:
◎ CMP

Front Bezel Assembly



Item	Part No.	Qty	Description
1	B8023DD	1	Front Bezel
2	B8023DG	1	Knob
3	B9969DK	6	Lens
4	B8023DV	1	Lens Assembly
5	B8023DF	1	Knob
6	B8023MQ	1	Key Sub Board Assembly
7	B9850EG	2	Tip
8	B9940CH	1	Boss
9	A1490UP	1	Power Supply
10	B8023MP	1	Key Board Assembly
11	B9914ZF	1	Ferrite Core
12	B8023ML	1	LCD Connection Assembly
13	B8023ME	1	LCD FPC Assembly
14	A1066VA	1	LCD
14a	A1044VZ	1	Back Light
15	B8023DH	1	Knob
16	A1272WF	1	FPC
17	B9988XH	1	FPC

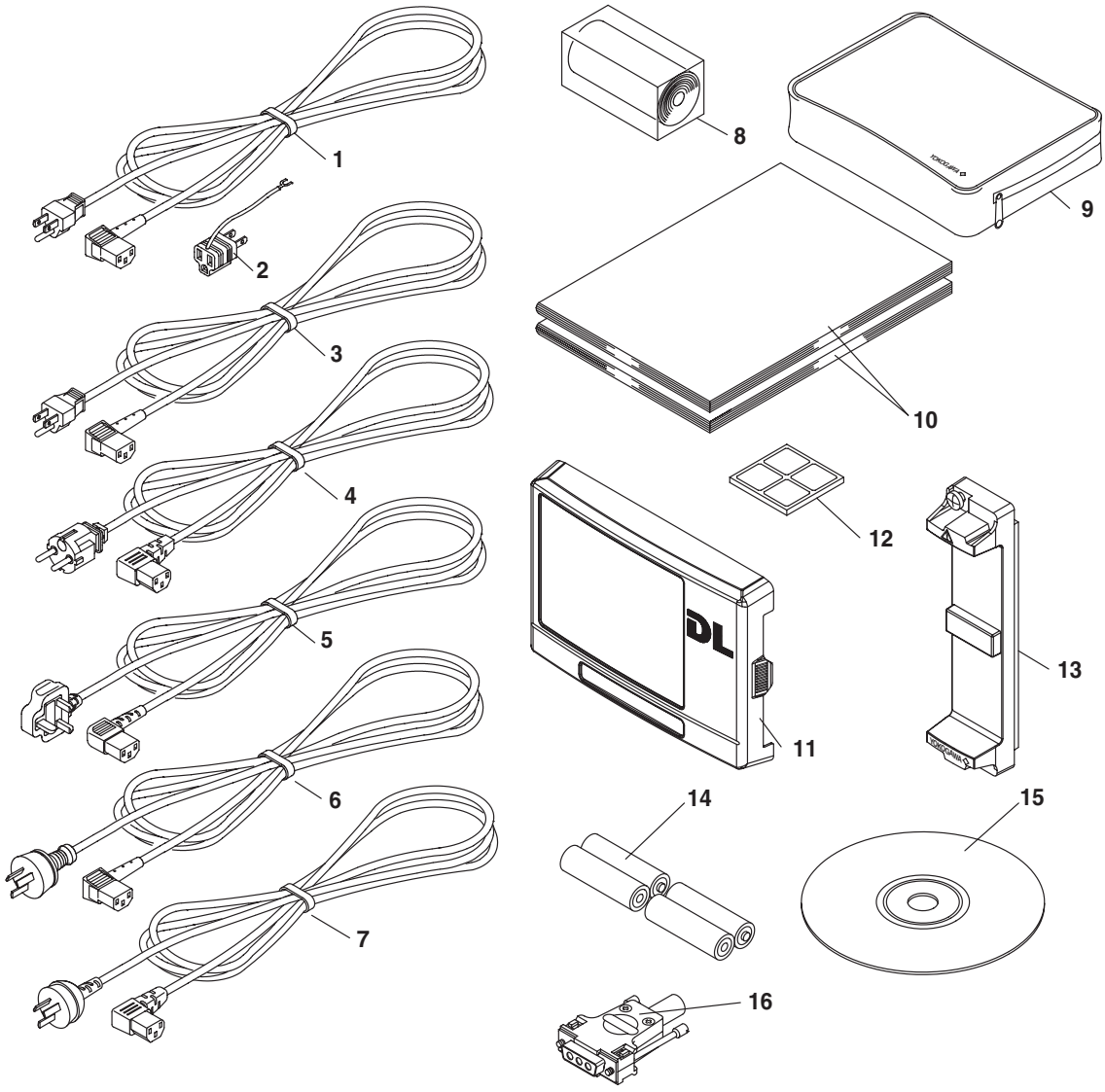
Main Power Unit



Item	Part No.	Qty	Description
1	B8024FL	1	Chassis Assembly
2	B8024FQ	1	Bracket
3	B8024FR	1	Chassis
4	B8024FT	2	Stud
5	B8023QQ	1	Main Power Assembly
6	B8023QU	1	Main Power Pwd
7	Y9305LB	17	Screw
8	B8023UF	1	Fan Assembly
9	A1473ST	1	Rocker Switch
10	B8023UG	1	Inlet Assembly
11	A1603UP	1	Power Supply
12	B8024DY	1	Sheet
13	Y9306EB	2	Screw
14	Y9318LB	4	Screw
15	B8023UD	1	Cable Assembly
16	B9769AT	1	Mini Clamp
17	B9946DK	1	Clamp

Note: ◎ CMP

Standard Accessories

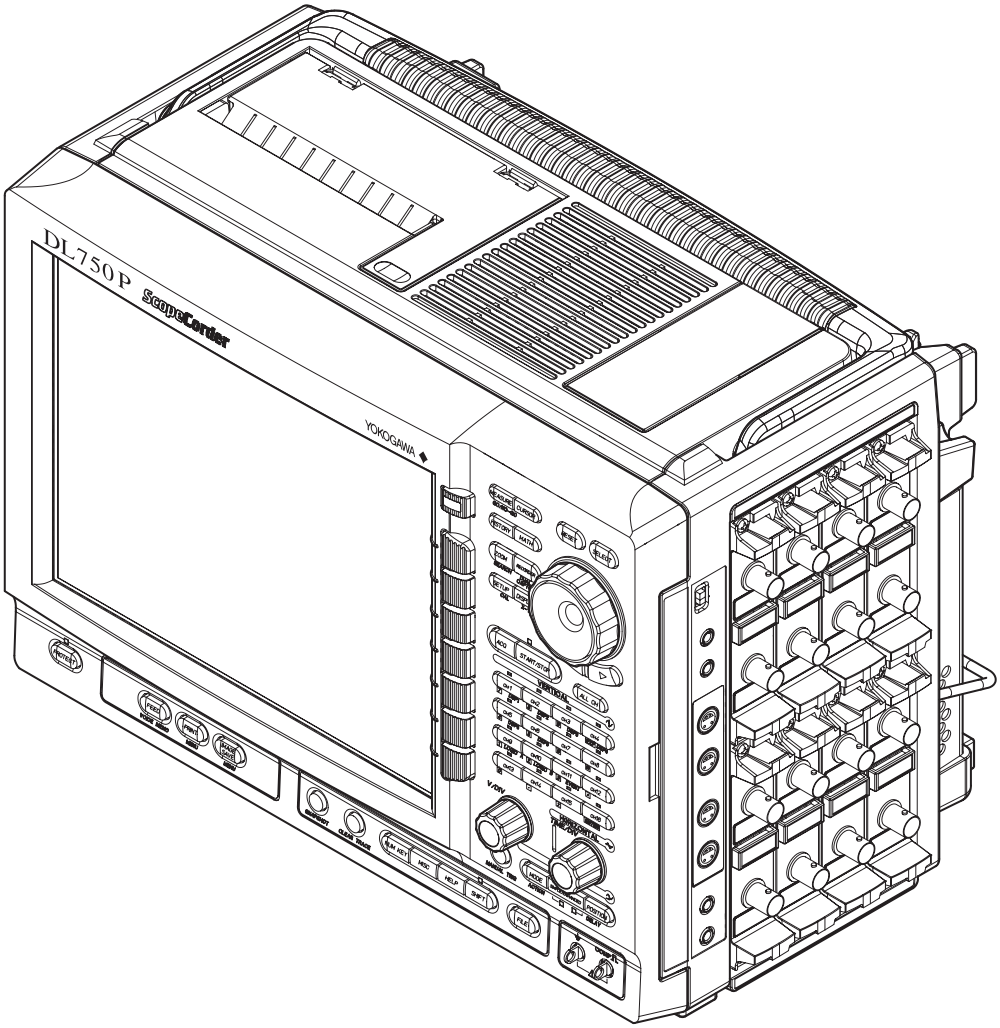


Item	Part No.	Qty	Description	
◎ 1	A1006WD	1	Power Supply Code	(Suffix code-M*, UL.CSA standard)
◎ 2	A1253JZ	1	3P-2P Adapter	
◎ 3	A1006WD	1	Power Supply Code (Suffix code-D, UL.CSA standard)	(select)
◎ 4	A1009WD	1	Power Supply Code (Suffix code-F, VDE standard)	
◎ 5	A1054WD	1	Power Supply Code (Suffix code-Q, BS standard)	
◎ 6	A1024WD	1	Power Supply Code (Suffix code-R, AS standard)	
◎ 7	A1064WD	1	Power Supply Code (Suffix code-H, GB standard)	
◎ 8	B9988AE	3	Roll Chart (A6 10m)	
◎ 9	B9946EB	1	Soft Case	
10	-	1	Manuals	
◎ 11	B8023EA	1	Front Cover	
◎ 12	B9989EX	1	Stopper	
◎ 13	B8023EN	8	Cover	
◎ 14	A1070EB	4	Battery	
◎ 15	-	1	CD for Manual for DL750/ 750P	
◎ 16	B8023WZ	1	DC Power Connector (/DC)	

Note: * For use in Japan only, Suffix code-M

◎ CMP

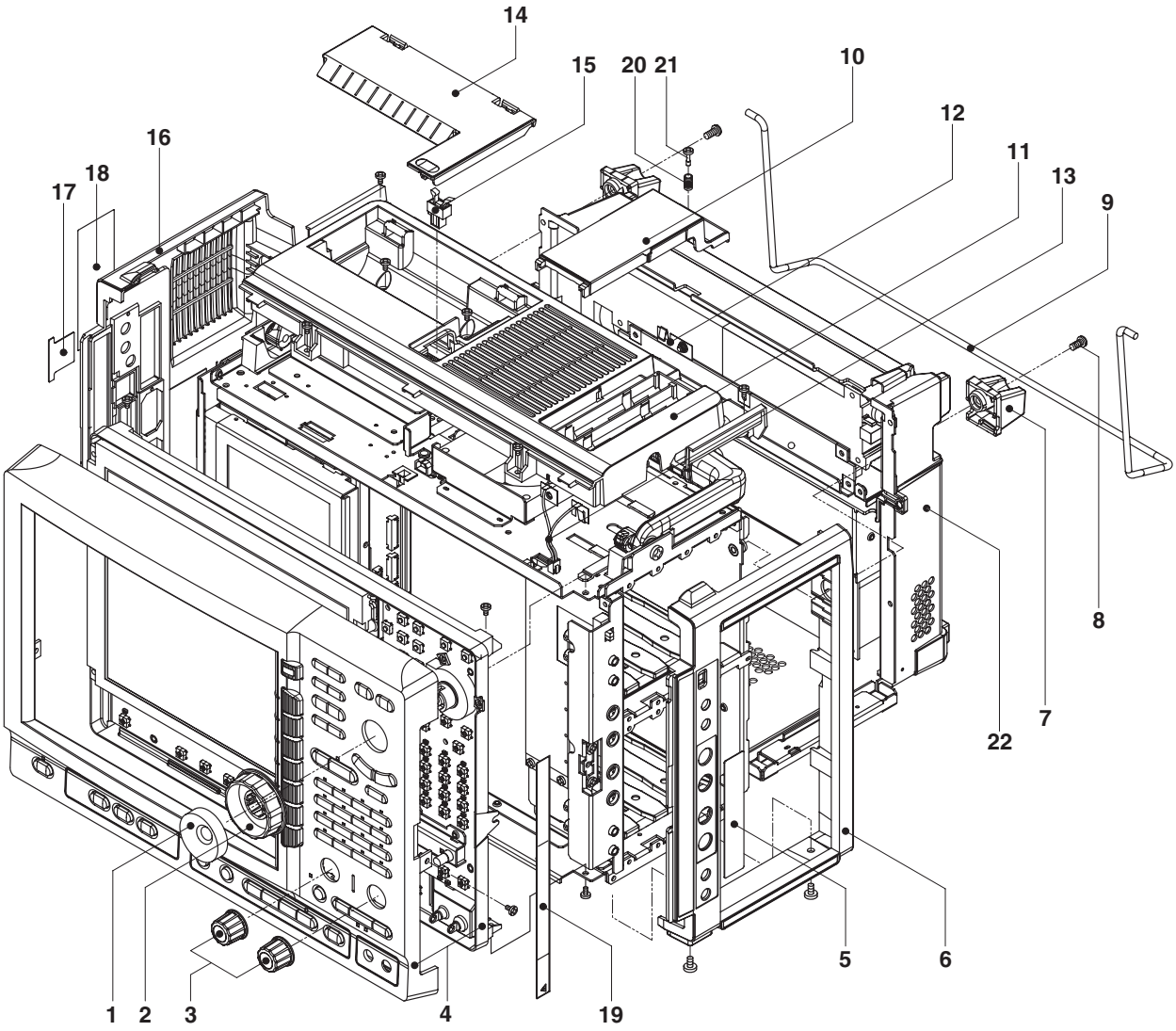
6.2 Customer Maintenance Parts List of the DL750P



Note:

Parts marked with a ◎ symbol are Customer Maintenance Parts (CMP).

Complete Set

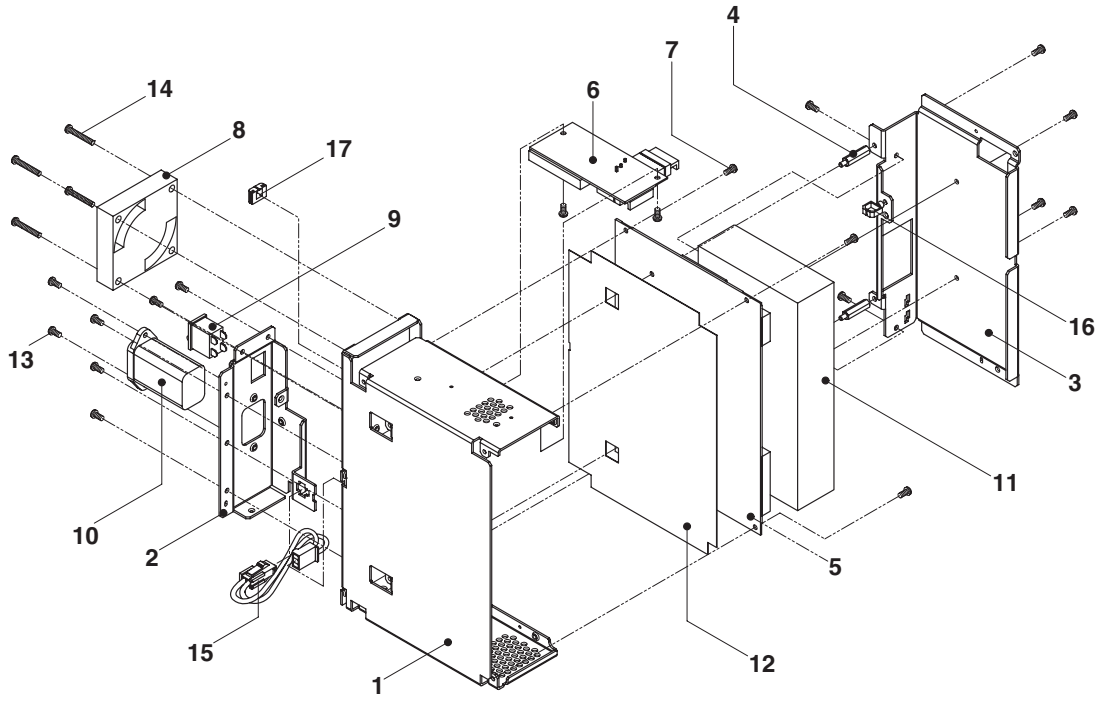


Item	Part No.	Qty	Description
◎ 1	B9989DX	1	Knob
◎ 2	B9989DY	1	Knob
◎ 3	B9989DK	2	Knob
4	—	1	(see page 6)
◎ 5	B8023HY	1	Sheet
◎ 6	B8023DK	1	Right Side Cover
◎ 7	B8023DU	1	Foot
◎ 8	Y9406LB	2	Screw
◎ 9	B8024HR	1	Support
◎ 10	B8023DT	1	Battery Cover
11	B8023DB	1	Top Cover
12	B9914DA	1	Contact Assembly
13	B8023CK	1	Contact Assembly

Item	Part No.	Qty	Description
◎ 14	B8023DS	1	Printer Cover
◎ 15	B9858GB	1	Clamp
◎ 16	B8023DM	1	Left Side Cover
◎ 17	B8023HW	1	Sheet
◎ 18	B8023HS	1	Sheet
◎ 19	B8023HZ	1	Sheet
◎ 20	B9900FX	1	Spring
◎ 21	B9946GZ	1	Screw
22	—	1	A4 Printer Assembly (See Page 7)

Note: ◎ CMP

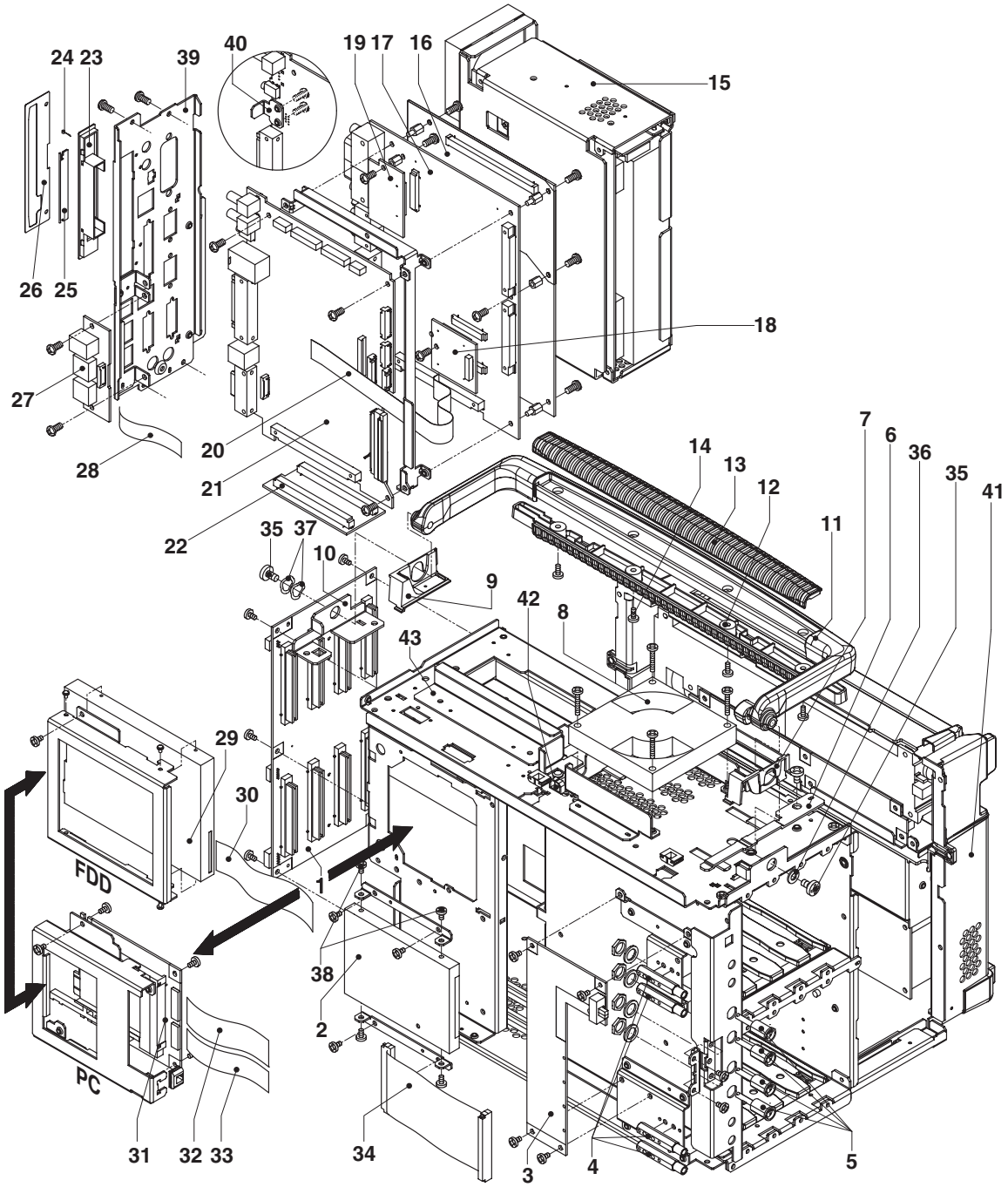
Main Power Unit



Item	Part No.	Qty	Description
1	B8024FL	1	Chassis Assembly
2	B8024FQ	1	Bracket
3	B8024FR	1	Chassis
4	B8024FT	2	Stud
5	B8023QQ	1	Main Power Assembly
6	B8023QU	1	Main Power Pwd
7	Y9305LB	17	Screw
8	B8023UF	1	Fan Assembly
9	A1473ST	1	Rocker Switch
10	B8023UG	1	Inlet Assembly
11	A1603UP	1	Power Supply
12	B8024DY	1	Sheet
13	Y9306EB	2	Screw
14	Y9318LB	4	Screw
15	B8023UD	1	Cable Assembly
16	B9769AT	1	Mini Clamp
17	B9946DK	1	Clamp

Note: ◎ CMP

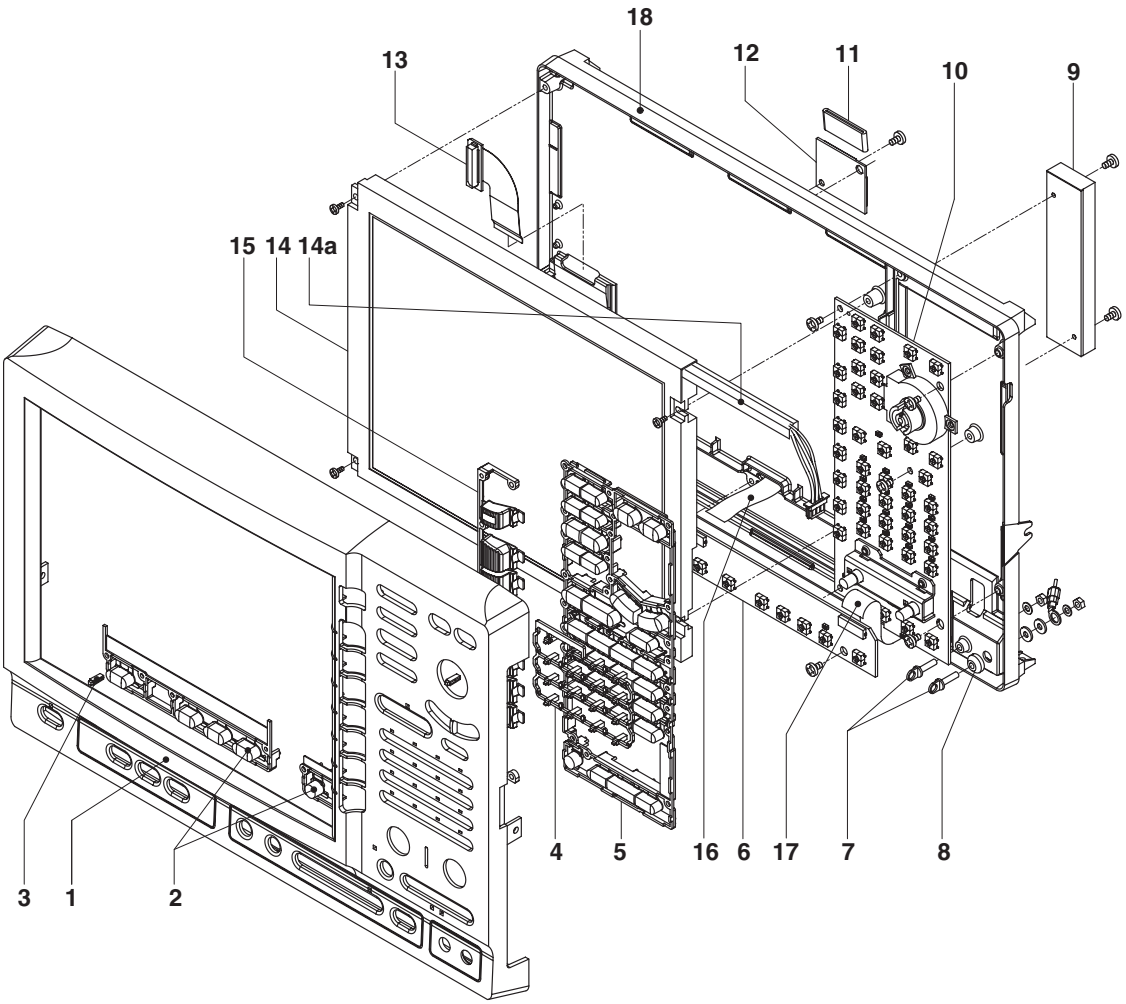
Main Assembly



Item	Part No.	Qty	Description	
1	B8023MB	1	Mother Board Assembly	
2	A1181UN	1	HDD (/C8)	
3	B8023MR	1	Probe Power Board Assembly (/P4)	(select)
	B8023MN	1	SW Board Assembly (not /P4)	
4	B9947CB	4	Terminal	
5	B9969SE	4	Cable Assembly (/P4)	
6	B8023FQ	1	Spring	
7	B8023DP	1	Handle Cover (Right)	
8	B8023WF	1	Fan Assembly	
9	B8023DQ	1	Handle Cover (Left)	
10	B8023FG	1	Bracket (Left)	
11	B8023CC	1	Handle	
◎ 12	B8023CE	1	Grip	
◎ 13	B8023CD	1	Grip	
◎ 14	B9988DL	4	Screw	
15	B8024YB	1	Main Power Unit (See Page3)	
16	B8023MZ	1	STD MEM 1Bank Assembly	(select)
	B8023MY	1	OP MEM 3Bank Assembly (/M1)	
	B8023MX	1	OP MEM 7Bank Assembly (/M2)	
	B8023MW	1	OP MEM 13BANK Assembly (/M3)	
17	B8023MA	1	CPU Board Assembly	
18	B8023MG	1	MQ Board Assembly	
19	B8023MH	1	DSP Assembly	
20	A1275WF	1	Wire	
21	B8024TD	1	IO A4&STD Assembly	(select)
	B8024TA	1	IO A4&LAN & HDD Assembly (/C8 and /C10)	
	B8024TB	1	IO A4&HDD Assembly (/C8 not /C10)	
	B8024TC	1	IO A4&LAN Assembly (/C10 not /C8)	
22	B8023MC	1	Sub Mother Board Assembly	
23	B8023EC	1	PC Bezel (-J3)	
24	B9969DS	1	Spring (-J3)	
25	B8023ED	1	PC Cover (-J3)	
26	B8023HV	1	Sheet (-J2)	
27	B8023MF	1	USB Assembly	
28	A1271WF	1	Wire	
29	A1092UN	1	Memory System (-J1)	
30	B9234YF	1	Cable (-J1)	
31	B8023MM	1	PCMCIA Board Assembly (-J3)	
32	B9968MB	1	IDE FFC (-J3)	
33	B8023WH	1	PCMCIA FPC (-J3)	
34	B8023WG	1	HDD Cable (/C8)	
35	Y9510HR	2	Screw	
36	B8023HM	1	Washer	
37	B8023HN	2	Washer	
38	Y9304LE	4	Screw (/C8)	
39	B8023GA	1	Panel Assembly	
40	B8023FZ	1	Bracket	
41	—	1	A4 Printer Assembly (See Page7)	
42	B8024JZ	3	Clamp	
43	B8024CM	1	Bracket	

Note: ◎ CMP

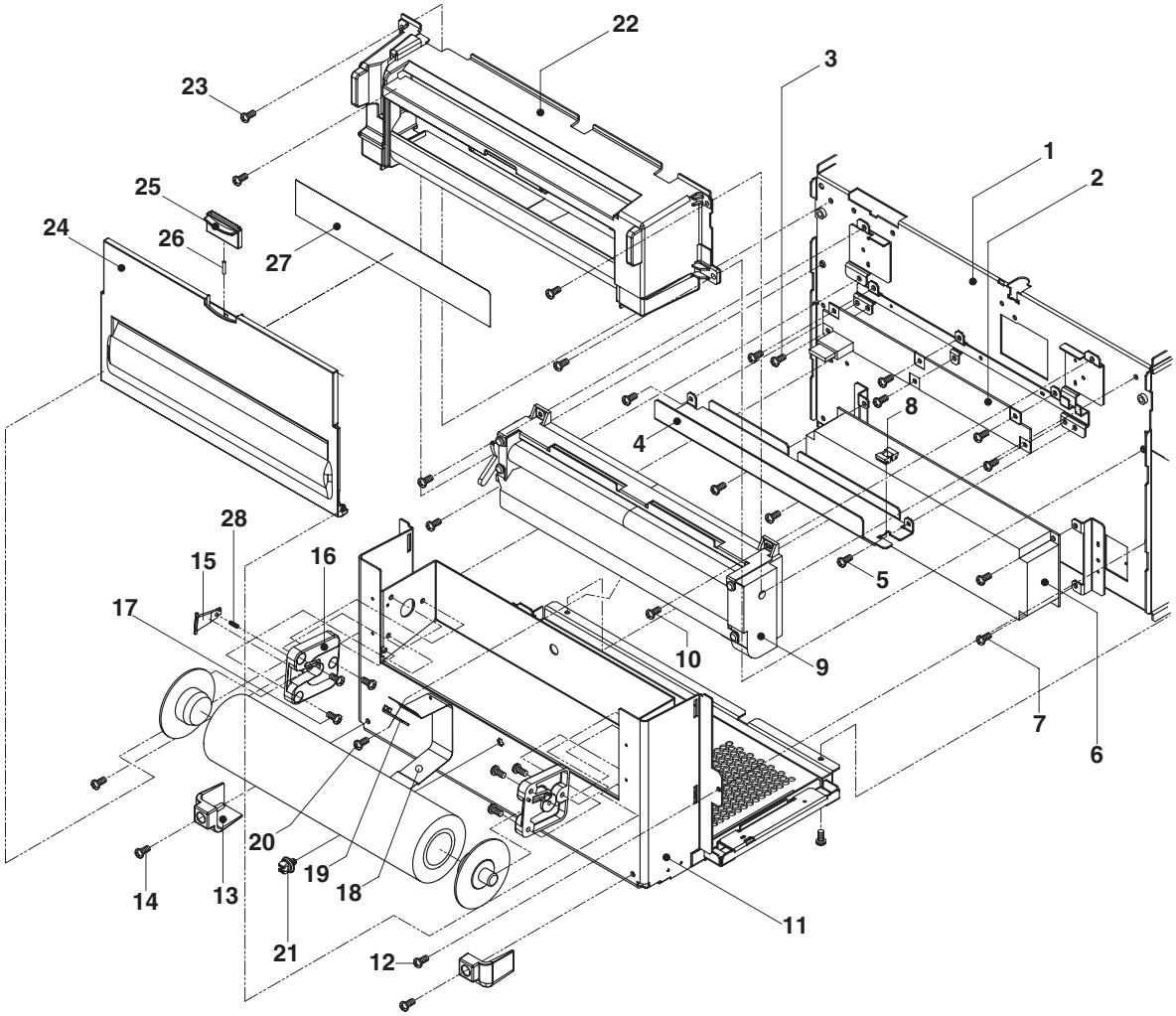
Front Bezel Assembly



Item	Part No.	Qty	Description
1	B8024BF	1	Front Bezel
2	B8024BH	1	Knob
3	B9969DK	6	Lens
4	B8023DV	1	Lens Assembly
5	B8024BG	1	Knob
6	B8023MQ	1	Key Sub Board Assembly
7	B9850EQ	2	Tip
8	B9940CH	1	Boss
9	A1490UP	1	Power Supply
10	B8023MP	1	Key Board Assembly
11	B9914ZF	1	Ferrite Core
12	B8023ML	1	LCD Connection Assembly
13	B8023ME	1	LCD FPC Assembly
14	A1066VA	1	LCD
14a	A1044VZ	1	Back Light
15	B8023DH	1	Knob
16	A1272WF	1	FPC
17	B9988XH	1	FPC
18	B8023CA	1	Front Frame

Note: ◎ CMP

A4 Prnter Assembly

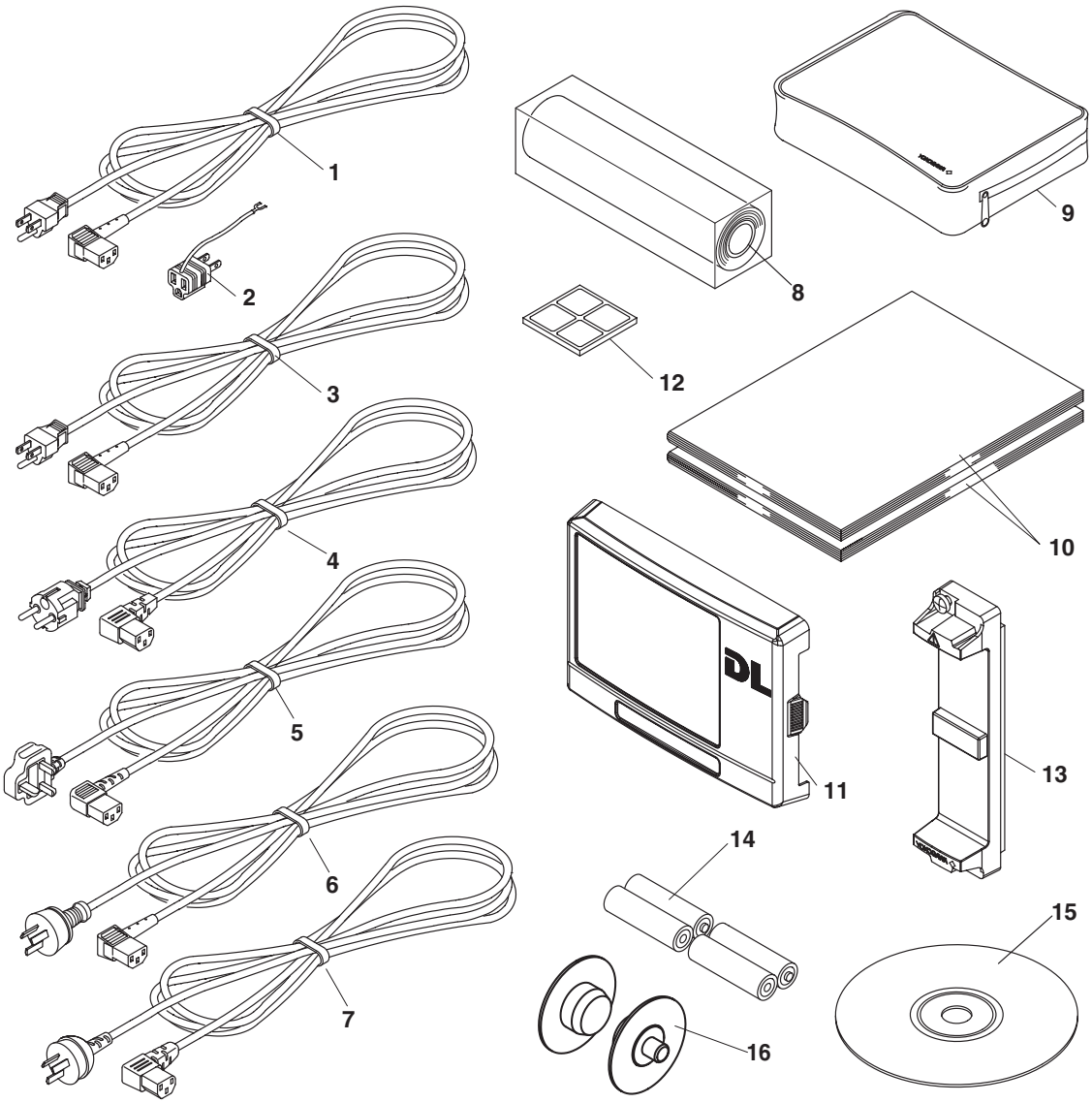


Item	Part No.	Qty	Description
1	B8024CP	1	Frame Assembly
2	B8024MB	1	A4 Printer PCB Assembly
3	Y9305LB	6	Screw
4	B8024FE	1	Cover
5	Y9305LB	2	Screw
6	A1606UP	1	Power Supply
7	Y9305LB	4	Screw
8	B9946DK	1	Clamp
9	B8024YA	1	A4 Printer
10	Y9306LS	3	Screw
11	B8024GE	1	Cover Assembly
12	Y9305LB	4	Screw
13	B8024DW	2	Foot
14	Y9305LB	2	Screw
15	B9879JM	1	Plate
16	B8024DP	1	Stock
17	Y9305LB	6	Screw
18	B8024DS	1	Tape
19	B8024CW	1	Bracket
20	Y9305LB	1	Screw

Item	Part No.	Qty	Description
21	B8024JY	1	Holder
22	B8024DB	1	Cover
23	Y9305LB	4	Screw
24	B8024DE	1	Cover
25	B8024DF	1	Latch
26	B8024DG	1	Spring
27	B8024KK	1	Sheet
28	B9879JN	1	Spring

Note: ◎ CMP

Standard Sccessories



Item	Part No.	Qty	Description	
◎ 1	A1006WD	1	Power Supply Code	(Suffix code-M*, UL.CSA standard)
◎ 2	A1253JZ	1	3P-2P Adapter	
◎ 3	A1006WD	1	Power Supply Code (Suffix code-D, UL.CSA standard)	(select)
◎ 4	A1009WD	1	Power Supply Code (Suffix code-F, VDE standard)	
◎ 5	A1054WD	1	Power Supply Code (Suffix code-Q, BS standard)	
◎ 6	A1024WD	1	Power Supply Code (Suffix code-R, AS standard)	
◎ 7	A1064WD	1	Power Supply Code (Suffix code-H, GB standard)	
◎ 8	B8024JX	1	Roll Chart (A4 20m)	
◎ 9	B9946EB	1	Rocker Switch	
10	—	1	Manuals	
◎11	B8023EA	1	Front Cover	
◎12	B9989EX	1	stopper	
◎13	B8023EN	8	Cover	
◎14	A1070EB	4	Battery	
◎15	B8023YZ	1	CD for Manual for DL750/ 750P	
◎16	B8024CA	2	Flange Assembly	

Note: * For use in Japan only, Suffix code-M

◎ CMP

7.1 Disassembling the Unit of the DL750

The following are instructions on how to disassemble the DL750.

1. Remove the two screws securing the stand as shown by the arrows.

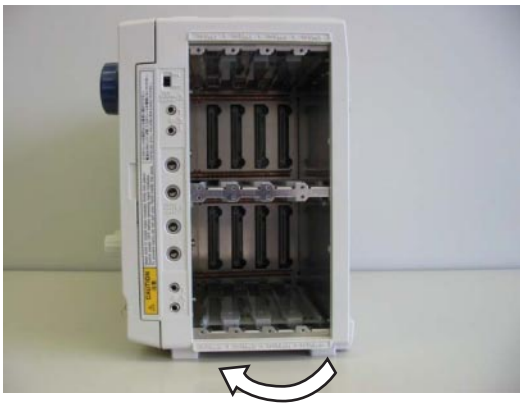
DL750

With the /DC option (DL750)

DL with the stand removed

2. Remove the four screws from the bottom of the unit as shown by the arrows.

3. Pull out the cover on the module side of the unit in the direction of the arrow.

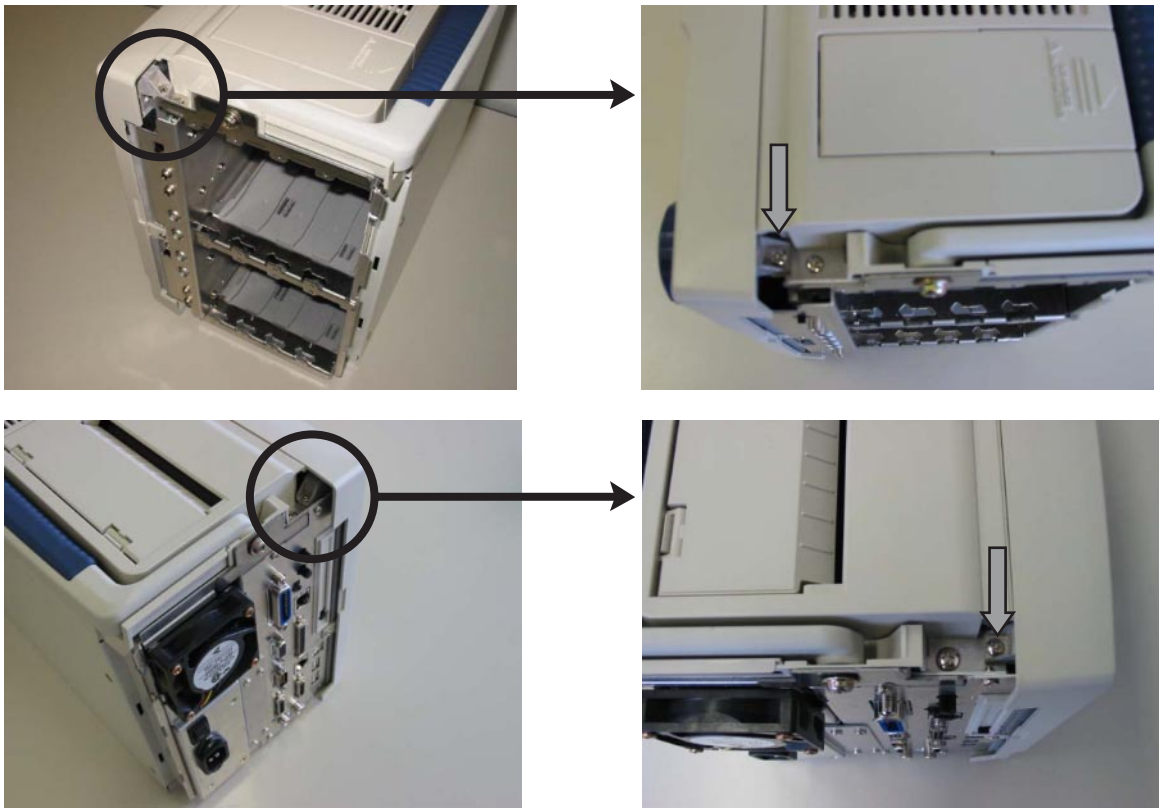


DL with the module-side cover removed

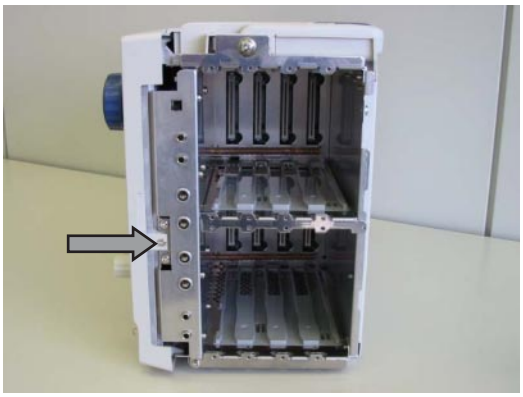
4. Pull out the cover on the connector side of the unit in the direction of the arrow.

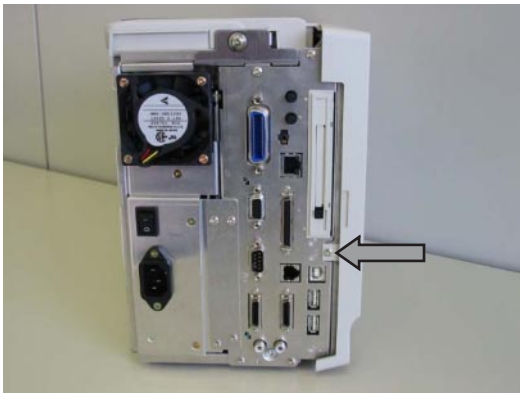
DL with the connector-side cover removed

5. Remove the two screws near the top of the panel as shown by the arrows.

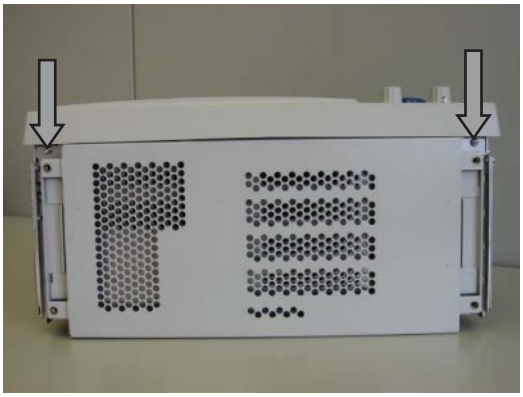


6. Remove the two screws from the side panels on the main unit as shown by the arrows.



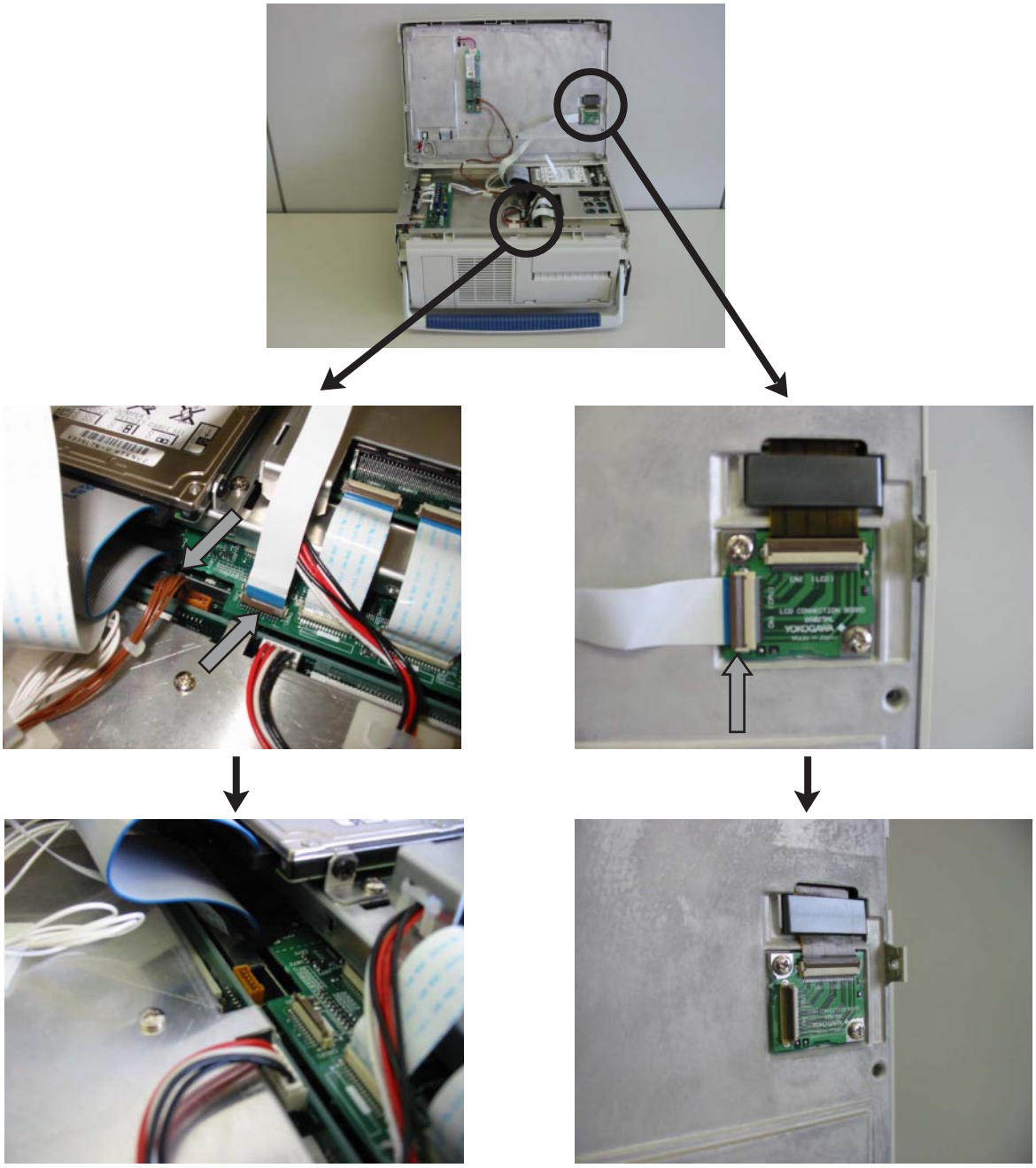


7. Remove the two screws from the bottom panel as shown by the arrows.

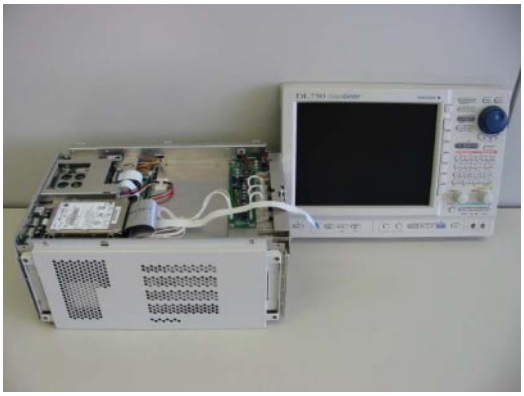


8. Gently lift up the panel in the direction of the arrow, being careful not to damage the three cables that connect the panel to the main unit.

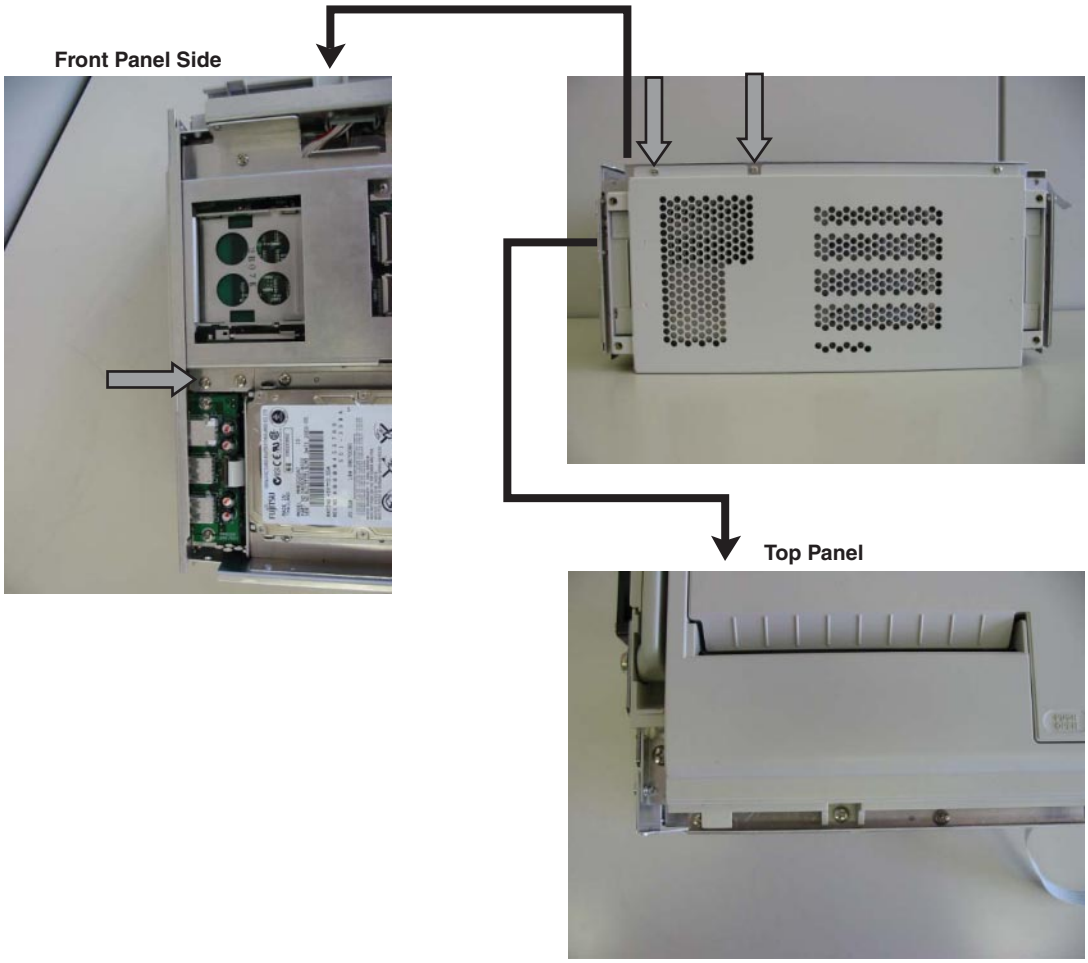
9. Remove the three cables indicated by the arrows, being careful not to damage the connector latches (they are fragile).



DL with the panel removed



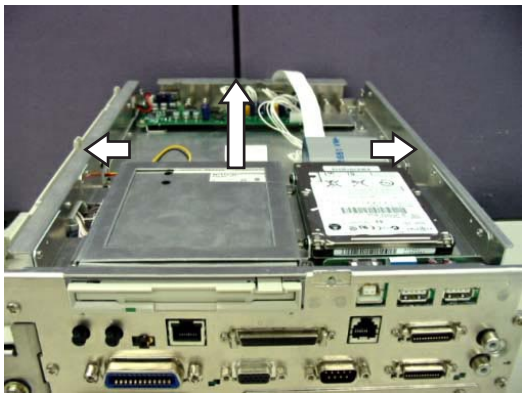
10. Remove the screws from the bracket that is attached to the internal media and hard disk as shown by the arrows.

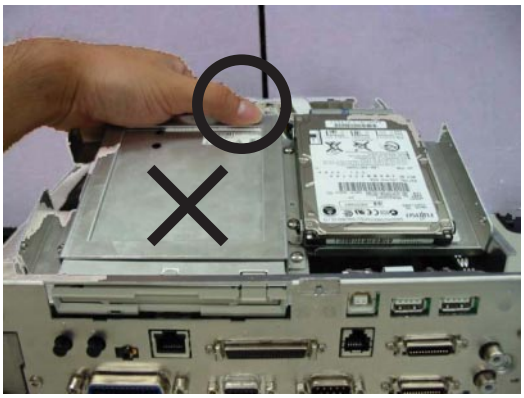


Remove the bracket from the internal media and hard disk according to the instructions below.

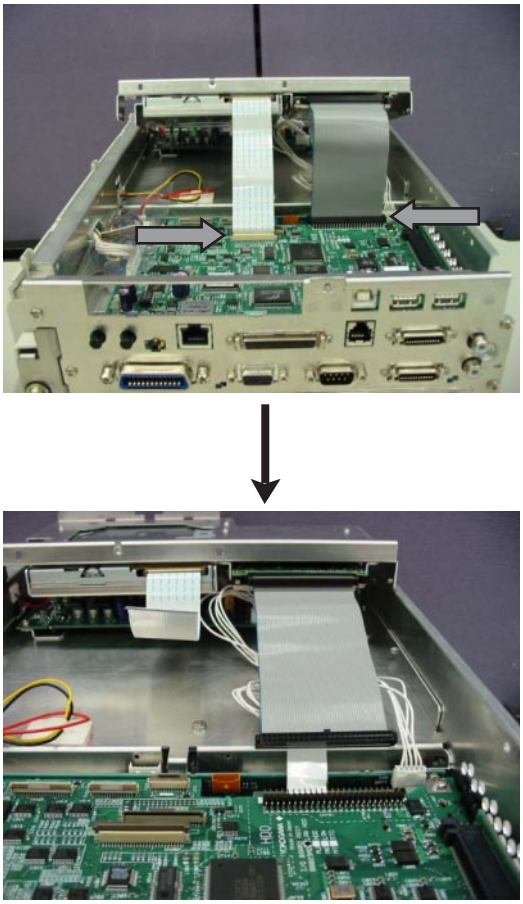
- **If the Internal Media Is a Floppy Disk Drive**

  11. While prying the floppy disk drive/hard disk bracket outward to the left and right as shown by the arrows, lift the bracket up (do not grasp the drive itself).

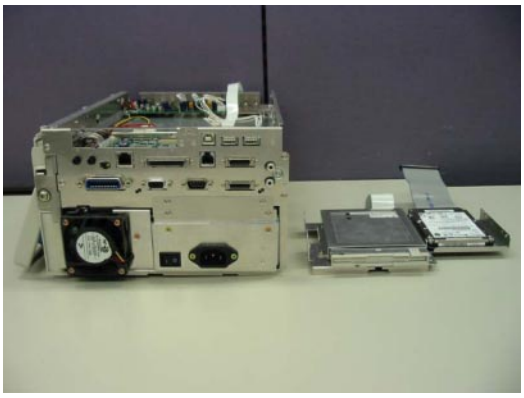




12. Remove the cables indicated by the arrows.

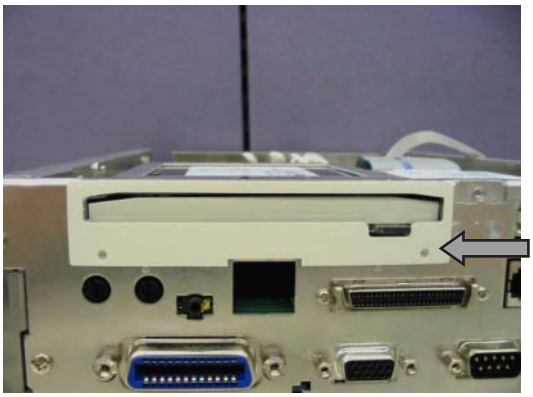


13. Remove the bracket.

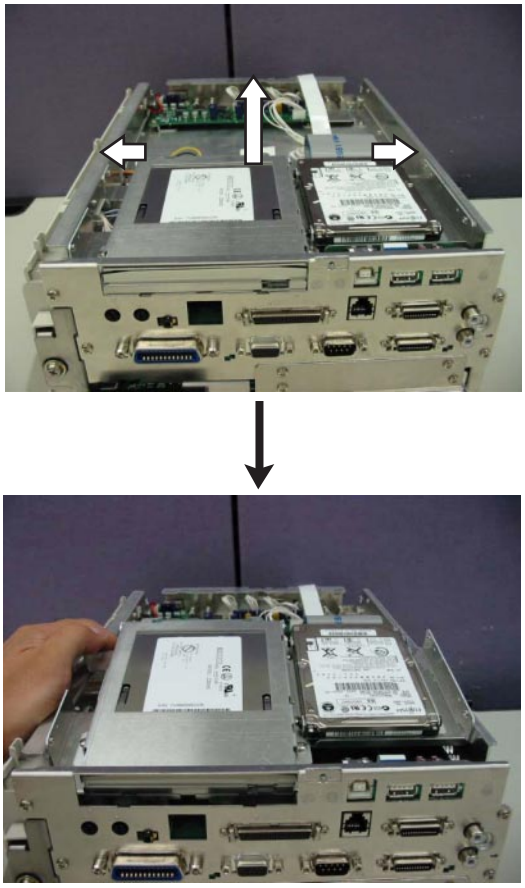


- **If the Internal Media Is a Zip Drive**

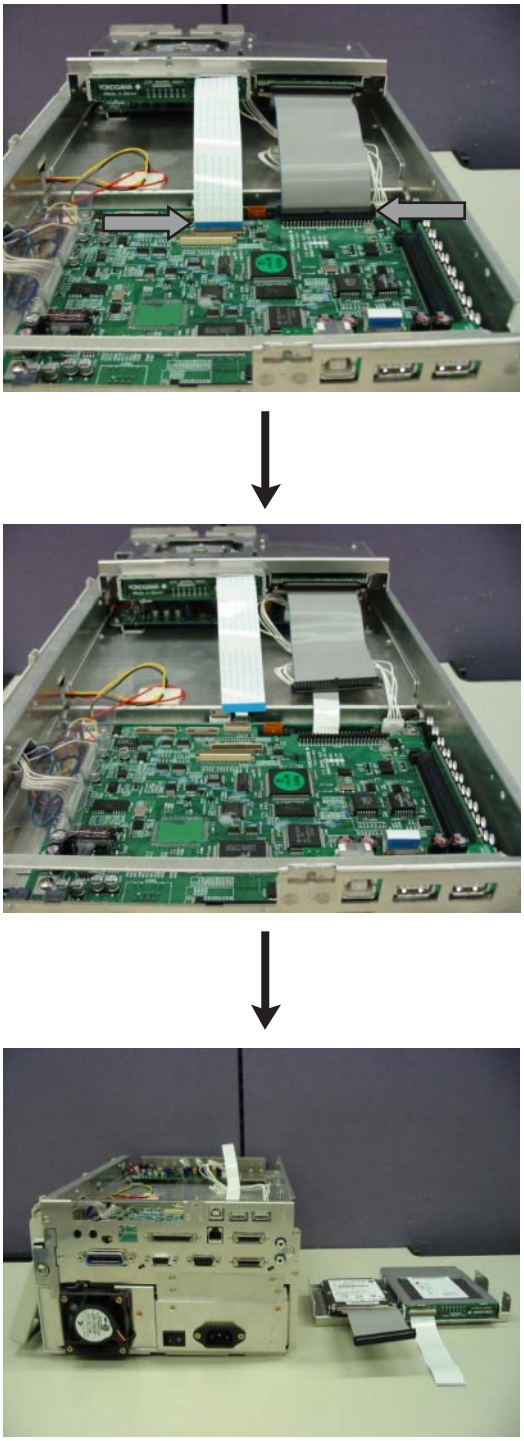
  11. Remove the seal from the drive panel.



  12. While prying the Zip disk drive/hard disk drive bracket outward to the left and right as shown by the arrows, lift the bracket up.

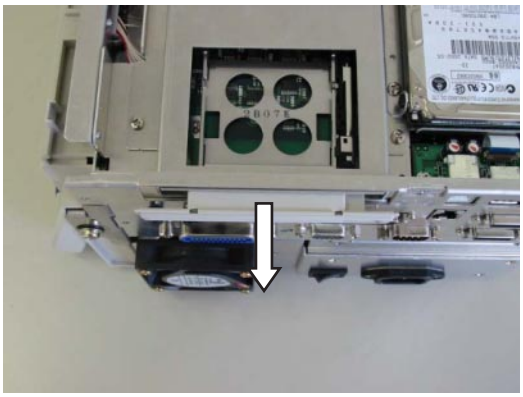


13. Remove the cables indicated by the arrows, then remove the bracket from the main unit.

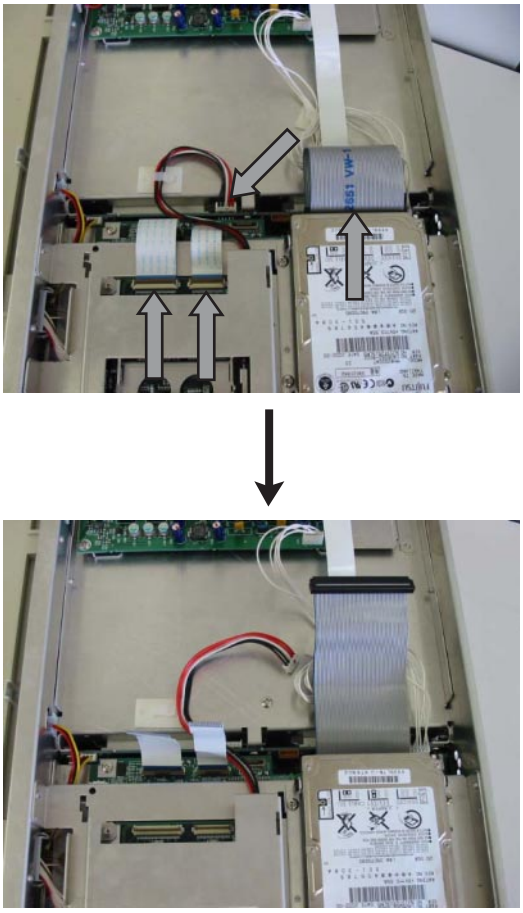


- **If the Internal Media Is a PC Card**

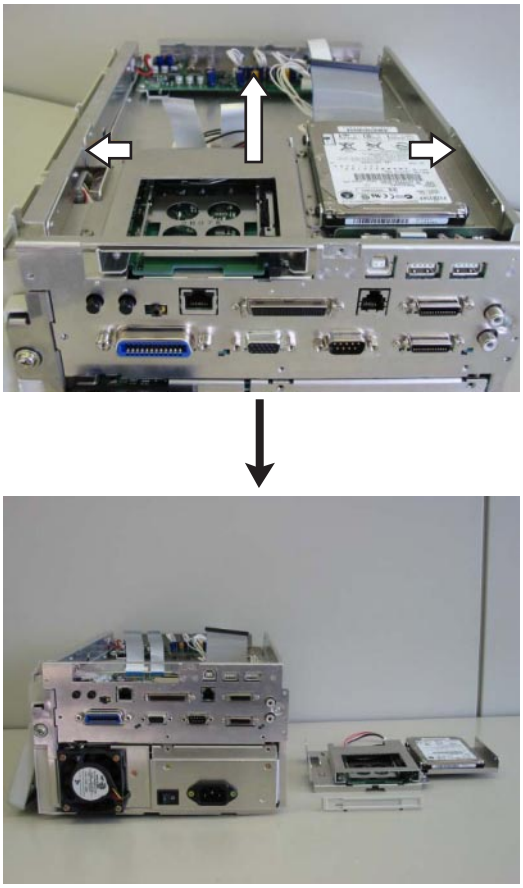
  11. Pull the drive panel toward you to remove it.



  12. Remove the cables indicated by the arrows.

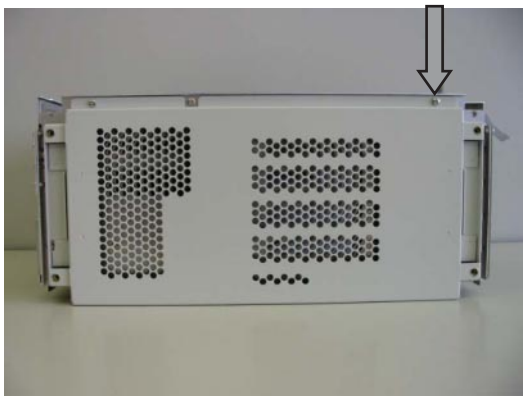


13. While prying the internal media/hard disk bracket outward to the left and right as shown by the arrows, lift the bracket up.



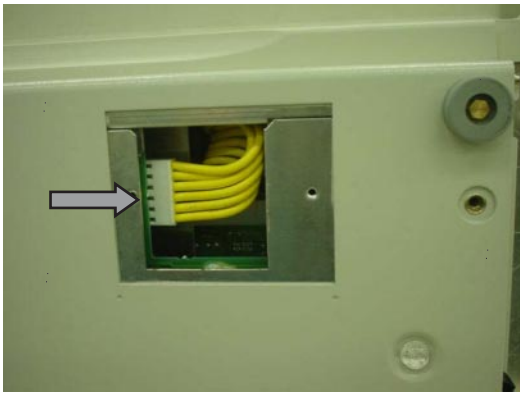
When the /DC option is not installed

14. Remove the screws from the outer cover as shown by the arrows.

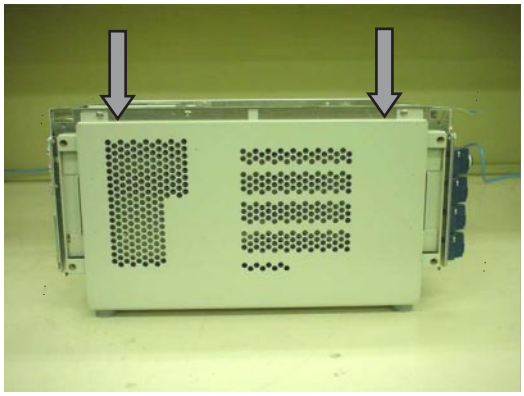


When the /DC option is installed

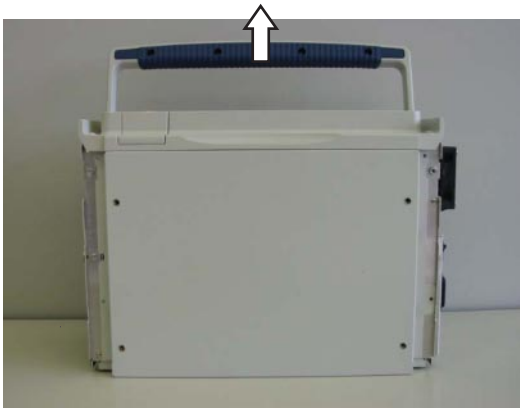
14. Remove the back cover, and remove the connector.

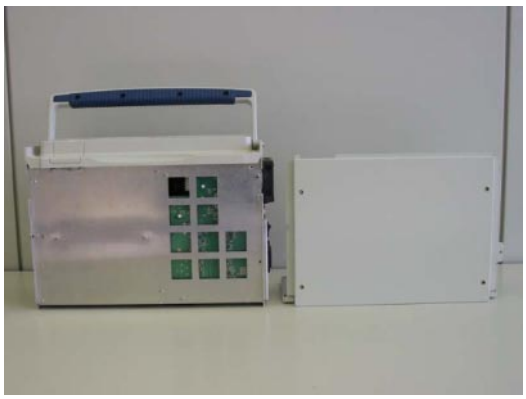


Remove the four screws.

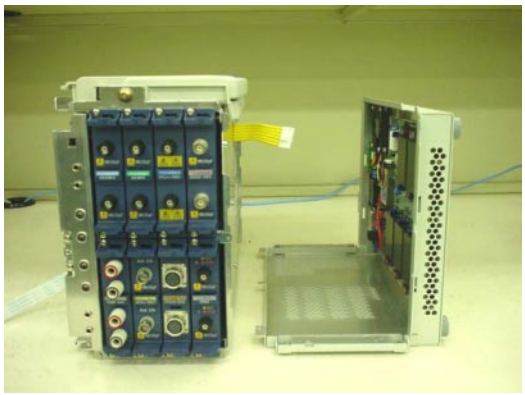


15. Lift the main unit in the direction of the arrows to remove from the outer cover.

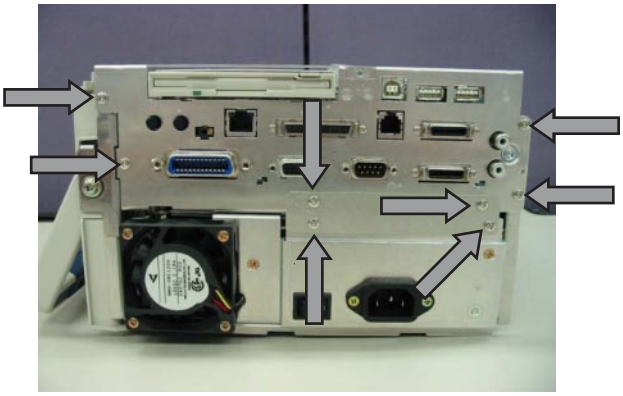


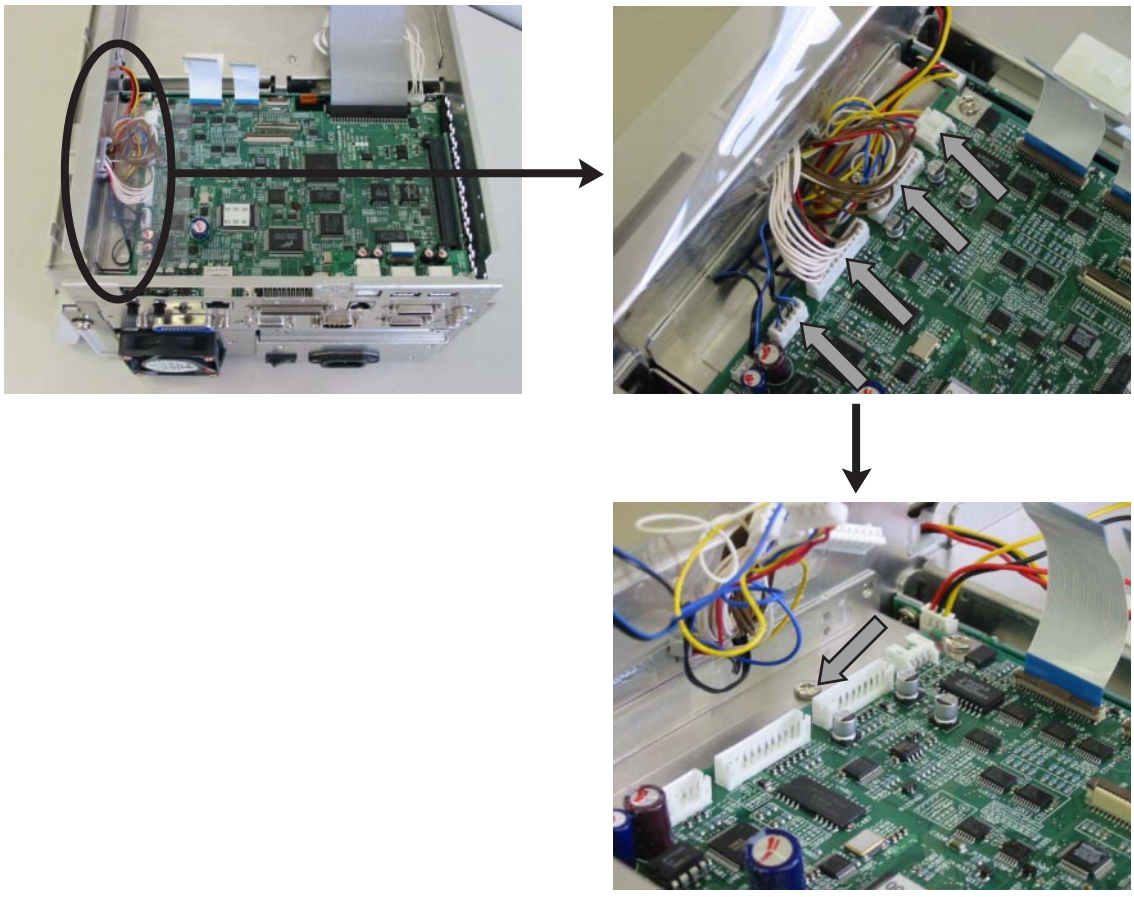


With the /DC option

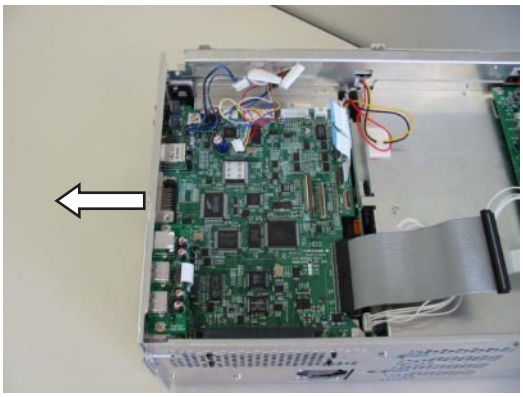


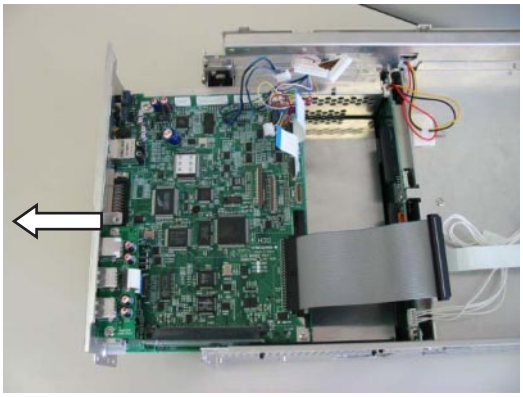
16. Remove the screws and cables as shown by the arrows.



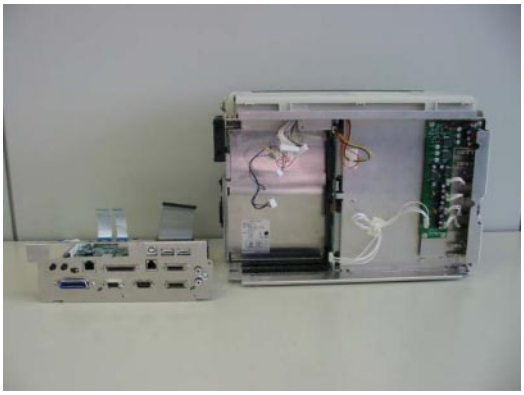


17. Pull out the CPU, I/O, Memory board set in the direction of the arrows to remove it from the main unit.



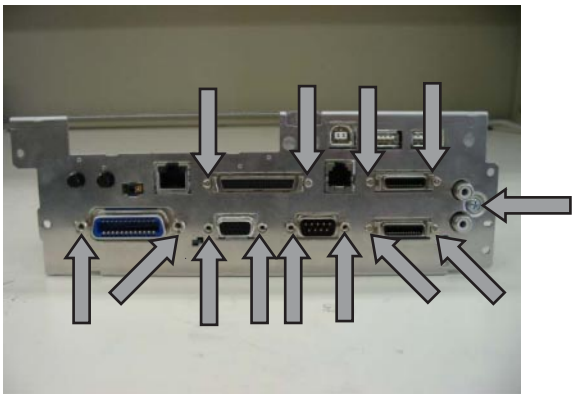


DL750 with the CPU, I/O, Memory board set removed.

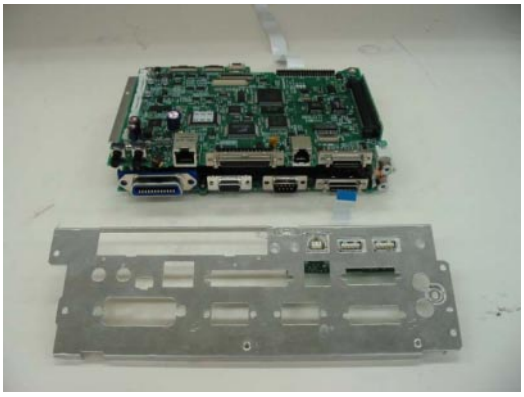


18. Remove the cables attached to the I/O board as shown by the arrows.

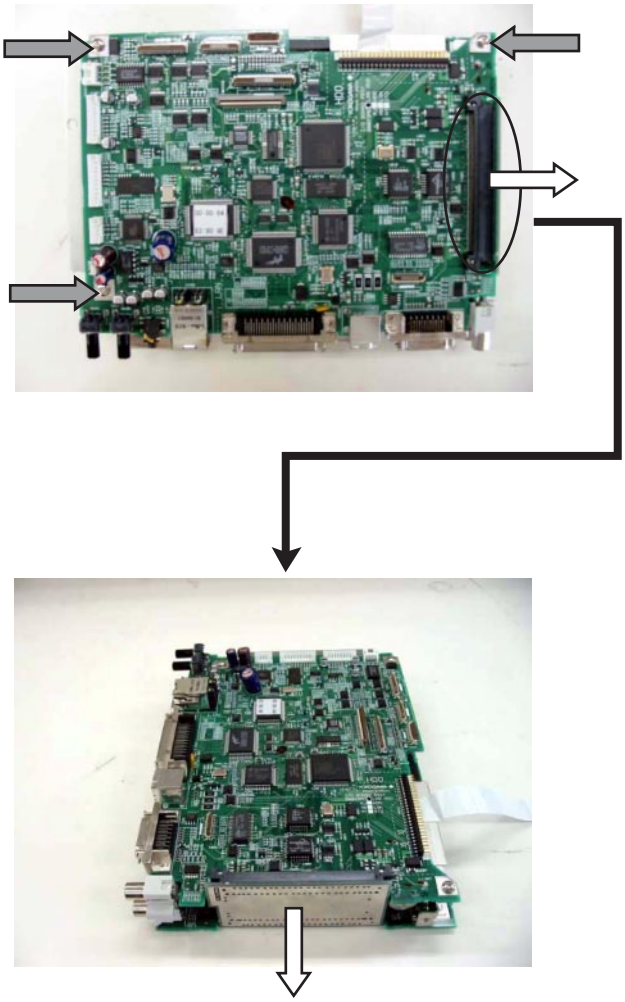
19. Remove the screws from the connector panel as shown by the arrows.



Board set with the connector panel removed.



20. Pull out the sub-motherboard in the direction of the arrow and remove the screws indicated by the arrows to separate the CPU board from the I/O board. To avoid damaging the sub-motherboard, you must only pull it upward in the vertical direction.



CPU board separated from the I/O board.

7.2 Disassembling the Unit of the DL750P

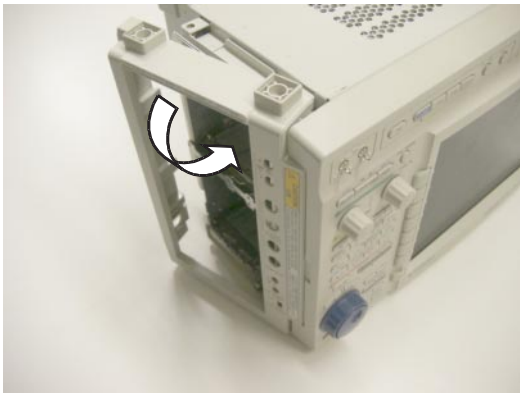
The following are instructions on how to disassemble the DL750P. This section describes the procedure for removing the DL750P printer unit. All other disassembly procedures are the same as those for the DL750. See step 11 and the steps thereafter in section 7.1.

1. Remove the two screws securing the stand as shown by the arrows.

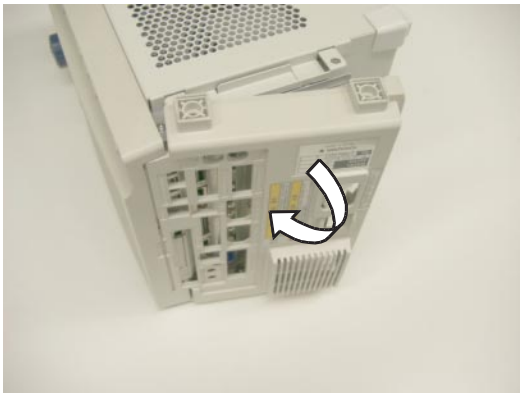
DL750P

2. Remove the four screws from the bottom of the unit as shown by the arrows.

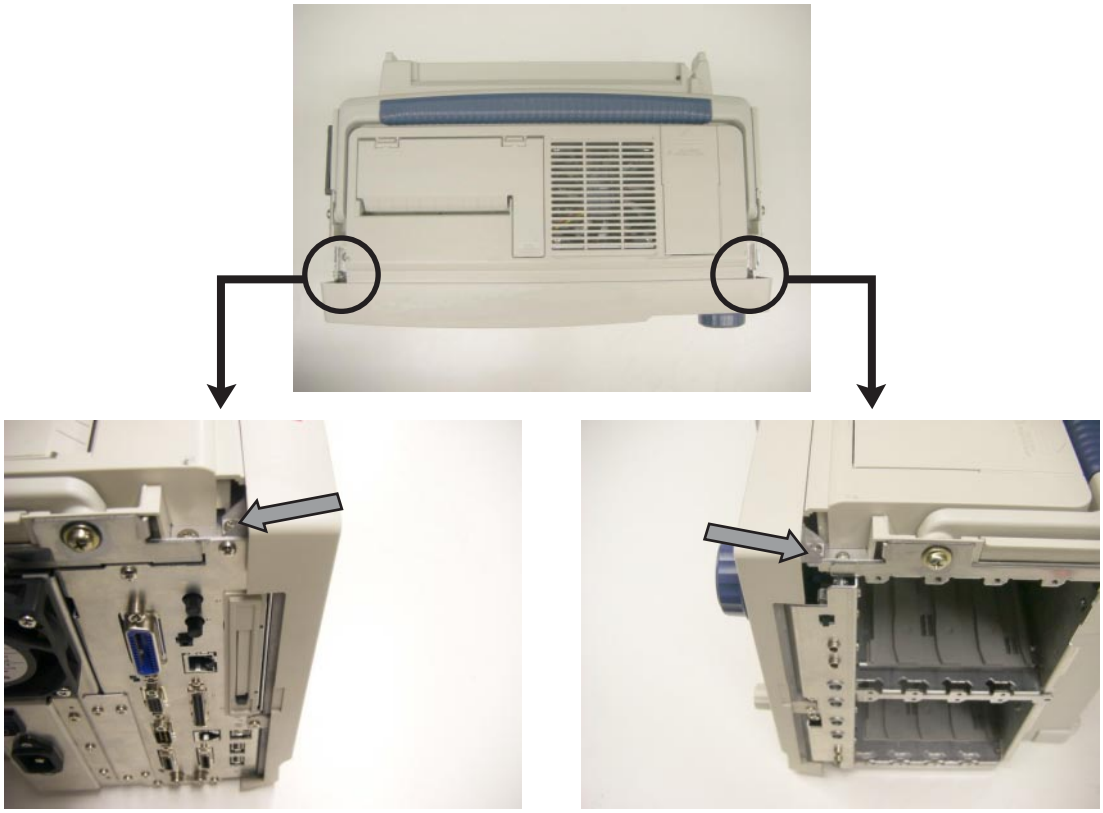
3. Remove the four screws from the bottom of the unit as shown by the arrows.



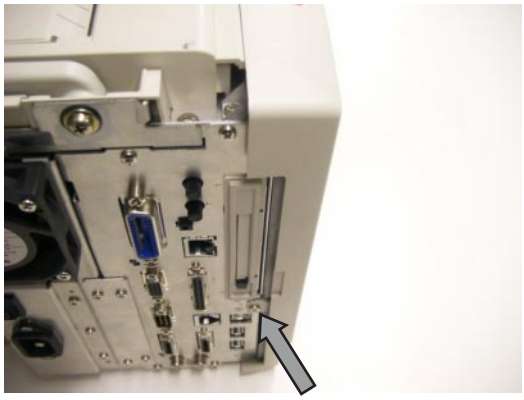
4. Pull out the cover on the connector side of the unit in the direction of the arrow.

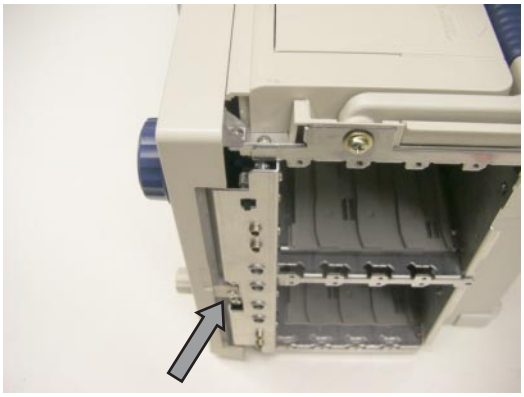


5. Remove the two screws near the top of the panel as shown by the arrows.

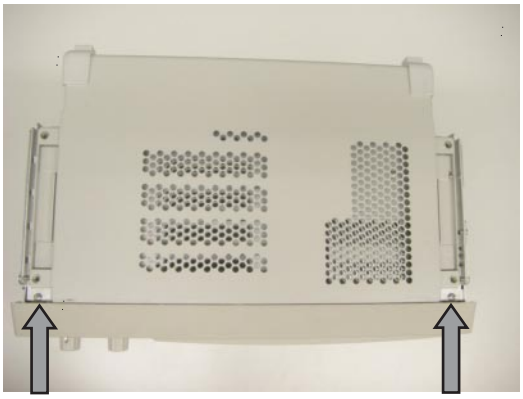


6. Remove the two screws from the side panels on the main unit as shown by the arrows.





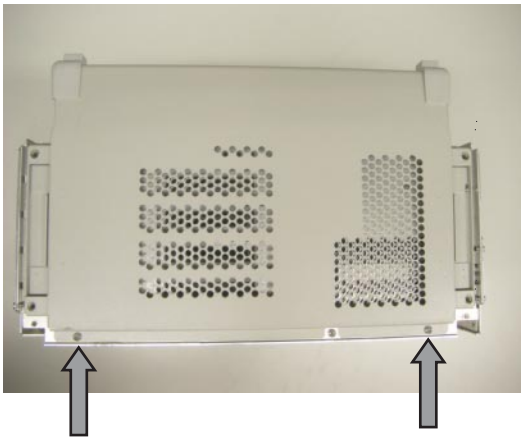
7. Remove the two screws from the bottom panel as shown by the arrows.



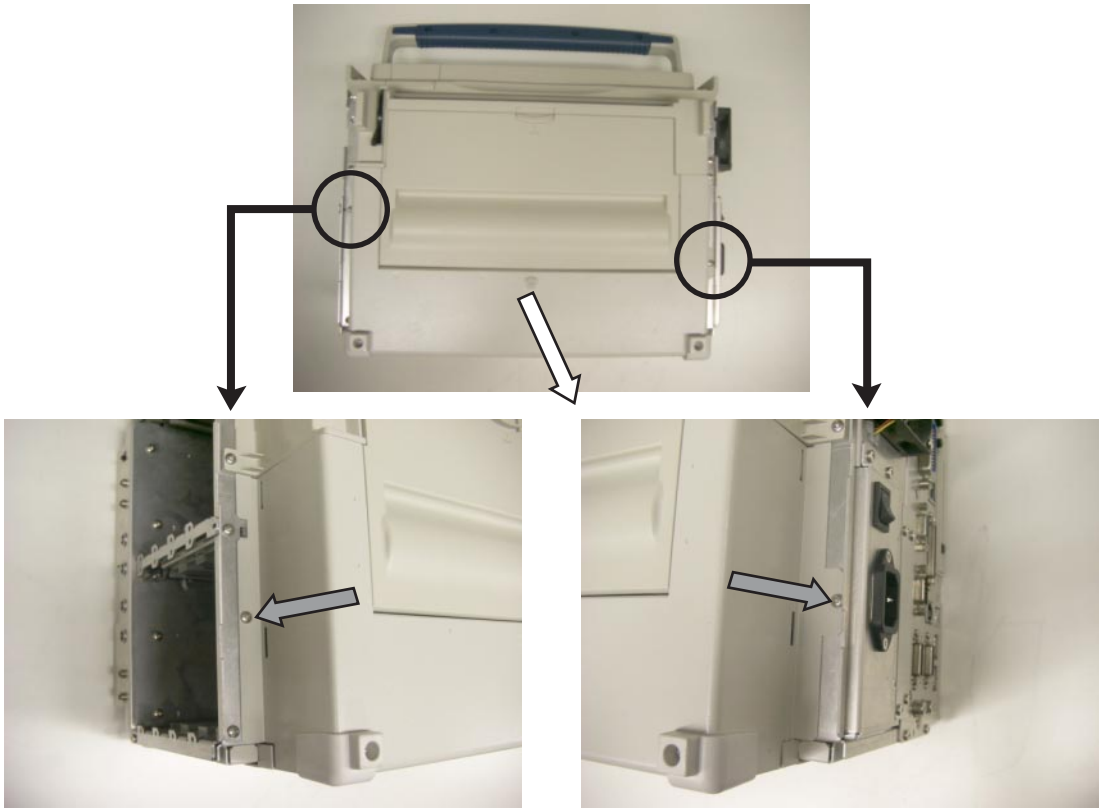
8. Gently lift up the panel in the direction of the arrow, being careful not to damage the three cables that connect the panel to the main unit.

9. As shown in the figure below, remove the two flat cables and the two cables to the inverter.

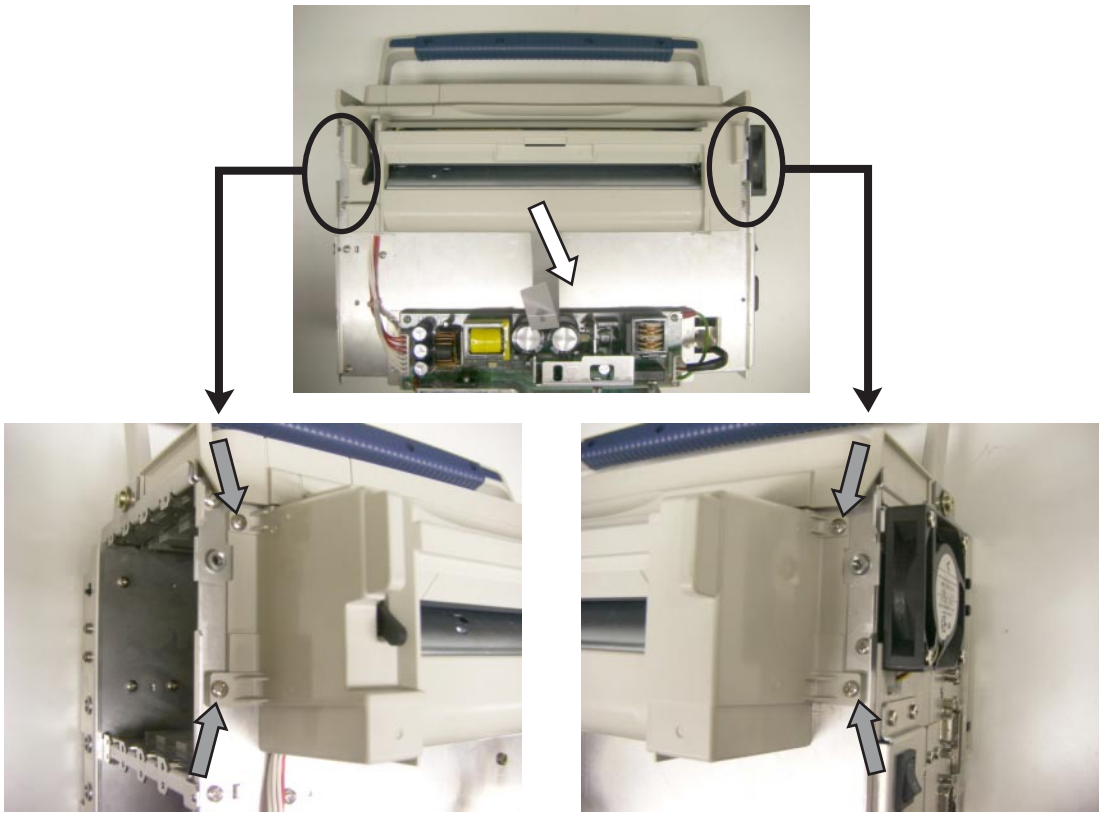
10. Remove the two screws as shown in the figure below.



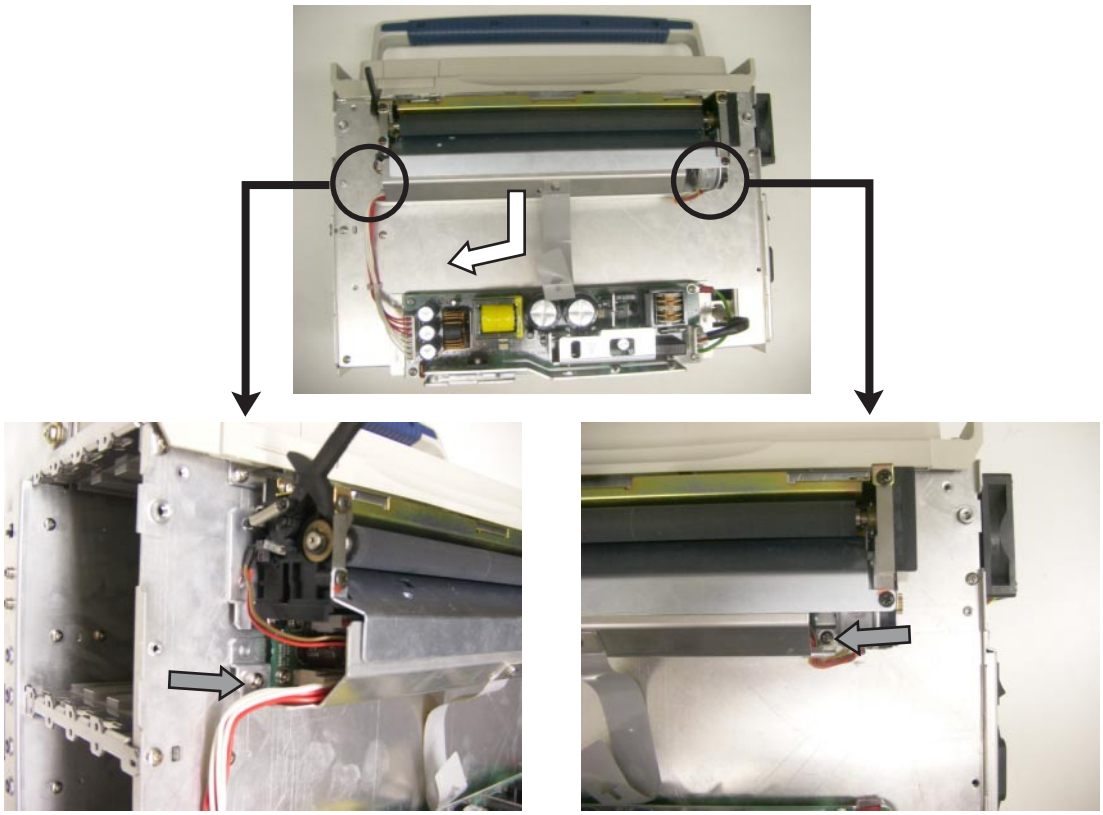
11. Remove the two screws, then remove the bracket as shown in the figure below.



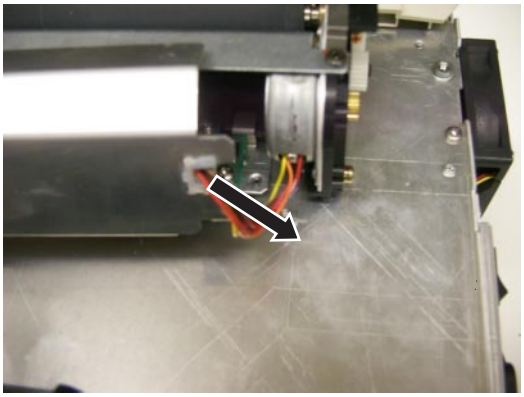
12. Remove the four screws, then remove the cover as shown in the figure below.



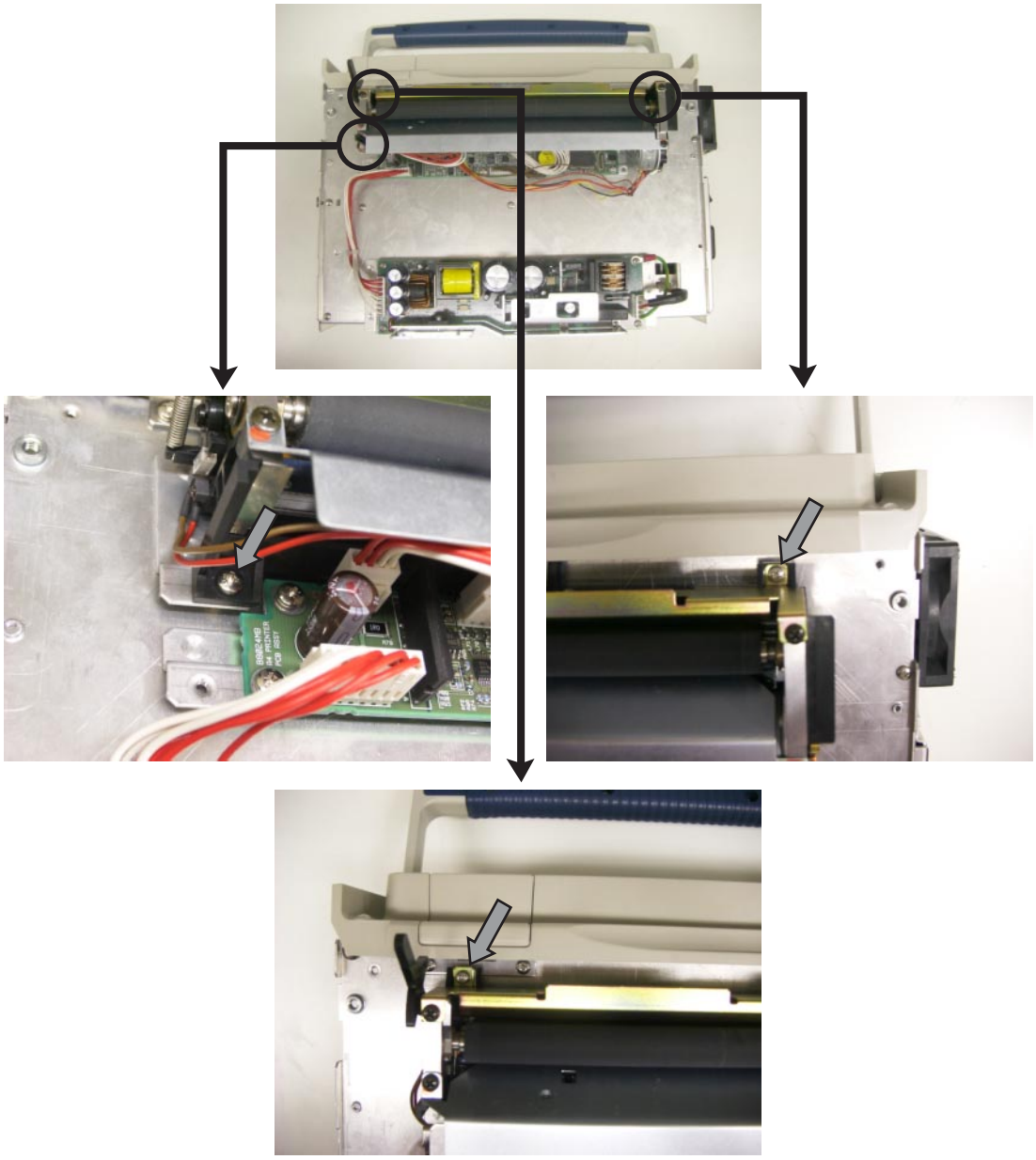
13. Remove the two screws, then remove the bracket as shown in the figure below.



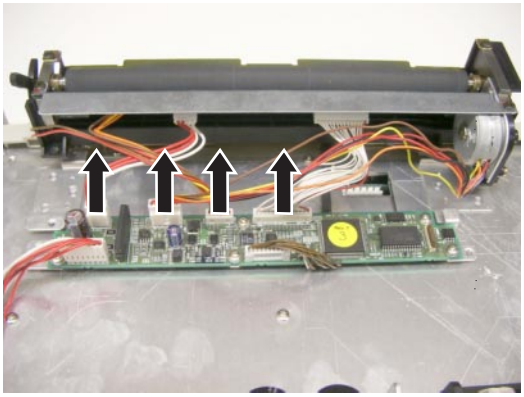
14. Remove the cable from the clamp as shown in the figure below.



15. Remove the three screws as shown in the figure below.



16. Remove the four cables as shown in the figure below.
You can now remove the DL750P printer unit.



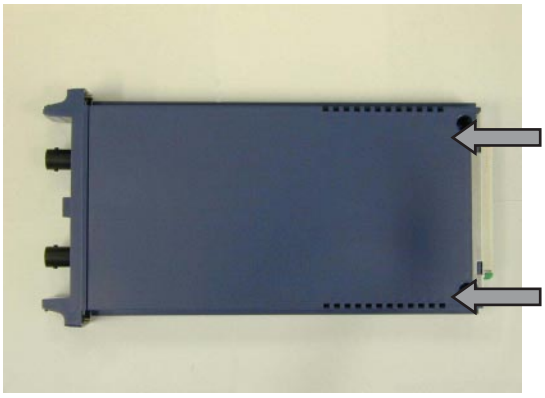
See step 11 and the steps thereafter in section 7.1 for the remainder of the disassembly procedure.

7.3 Disassembling the Input Module

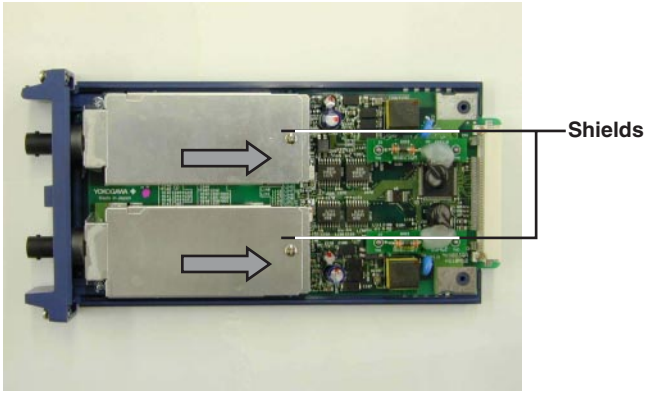
Models 701250 and 701251

Removing the Board

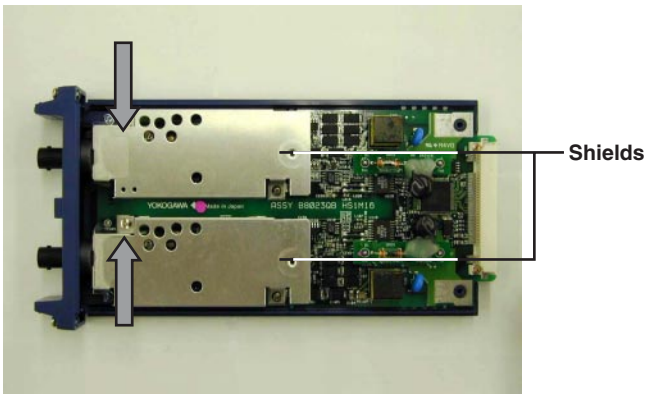
1. Remove the two screws as indicated by the arrows, then remove the cover.



2. Remove the two screws s indicated by the arrows, then remove the shields.



Module with the shields removed



WARNING

- The module contains several insulating mylar sheets. When reassembling the module, make sure that the sheets are in their exact original positions. Misplacing sheets is extremely dangerous. We recommend having any disassembly or reassembly work done at your nearest service center.
- After reassembling a module, you must perform all tests. In particular, the withstanding voltage test (sections 2.3 and 2.4) is very important for safety, so please be sure you carry out the test. For the withstanding voltage test, you must adhere to the stated voltage and times. Damage to the module can result if you fail to do so, and the insulation can be weakened.