

MANUAL NO.WR1000-UM-251

SERVICE MANUAL

GRAPHTEC CORPORATION

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TO ENSURE SAFETY

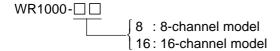
This Service Manual has been compiled for the purpose of facilitating repair and maintenance of the WR1000 Series Thermal Arraycorders by Graphtec service personnel and other persons who have undergone equivalent technical training.

Maintenance or repair by unauthorized service personnel is to be strictly avoided. Because the WR1000 contains numerous internal components with a high electric potential, such work by unauthorized service personnel could cause human injury or serious damage to the recorder.

1. CONFIGURATION

1.1 Model Configuration

The model number of the WR1000 Series Thermal Arraycorder varies according to the number of channels installed in the main unit, as explained below.



1.2 Factory-Installed Options

The following table lists the part numbers of options, which vary according to the type of option and the number of channels installed in the option's compatible main unit.

Table 1-2-1. Factory-installed options

Option	Part no.
3 ¹ / ₂ -inch MO drive	B-384
3 ¹ / ₂ -inch floppy disk drive	B-385
SCSI interface*	B-386
Memory option for the 8-/16-channel model	B-389
12 VDC adapter for the 8-/16-channel model	B-395
24 VDC adapter for the 8-/16-channel model	B-396

^{*:} The SCSI interface cannot be installed and used concurrently with the GB-IB interface.

1.3 Supplies

Table 1-3-1. Supplies

Name	Part no.	Minimum sales unit	Remarks
Thermal paper	PR231A	10 rolls	40 meters/roll
Thermal paper	PZ231A	5 packs	For use with the long-length Z-fold box, 100 meters/pack
Thermal paper	PZ100	10 packs	For use with the internal printer unit, 20 meters/pack
Head cleaner kit	B-368	1 kit	Cleaning fluid and sheets for cleaning the thermal print head

1.4 Other Accessories and Options

Table 1-4-1. Other accessories and options

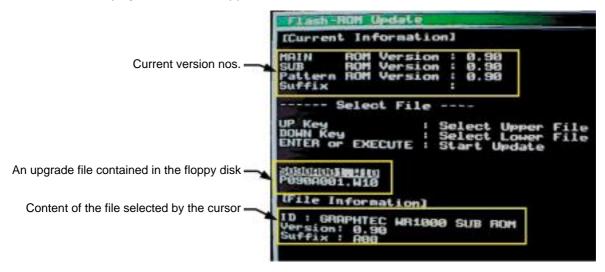
Name	Part no.	Remarks
Voltage measurement amp	V amp	2 channels/unit
Voltage/temperature measurement amp	M amp	2 channels/unit
Logic measurement amp	LO amp	16 channels/unit
GP-IB interface	B-387	
Long-length Z-fold chart unit	B-392	Mounted at the bottom of the main unit for use
Internal Z-fold chart unit	B-405	Z-fold chart unit that can be stored inside the main unit
Writing table	B-393	For writing comments, etc. on chart paper
Floating voltage input probe	CM-105	
Voltage fluctuation probe	CM-106	
Probe for the logic amp	RIC-07	For the logic amp
Alligator clip cable	RIC-08	For the logic amp
IC clip cable	RIC-09	For the logic amp
Probe set	RIC-10	Kit including RIC-07, -08, and -09; for the logic amp
Input cables with 2-pin banana plugs	B-378	Set of 2 cables (RIC-115), bare tips
	B-336	Set of 4 cables (RIC-115), bare tips
	B-331	Set of 8 cables (RIC-115), bare tips
	B-335	Set of 16 cables (RIC-115), bare tips
BNC-BNC cable	RIC-112	1.5 m, BNC adapter required
BNC-banana plug cable	RIC-113	1.5 m, BNC adapter required
BNC-alligator clip cable	RIC-114	1.5 m, BNC adapter required
AC power cord	RSC-110	2-m cord with 3-pin plugs
DC power cord	RIC-140	2-m cord with 10-pin round connectors
Clamp adapter	CM102	Alternating current, 0 to 1200 A; 1 channel
Digital clamp meter	CM-111	AC/DC/voltage, resistance, frequency, temperature; one channel
Line separator	CM-108	Magnification factors: $\times 1$, $\times 10$; compatible with parallel-pin plug
Temperature probe for clamp meter	RIC-110	Temperature range: -30 to 200°C (for use with CM-111)
REMOTE connectors	RCN-114	16-pin connector jacks
BNC adapters	SMA-101-4P	A set of 4 banana-BNC conversion adapters
Safety conversion adapter	SMA-102	An adapter for converting a high-voltage banana plug into a BNC plug

2. UPGRADING THE FIRMWARE

The version of your WR1000's firmware can be upgraded by rewriting the flash ROM on the pertinent circuit boards using one of two methods. You can upgrade the firmware by loading the update program from either floppy disks or from a personal computer via the RS-232C interface.

2.1 Upgrading from Floppy Disks

- (1) Turn off the WR1000.
- (2) Insert the floppy disk containing the upgrade program into the WR1000's floppy disk drive.
- (3) Turn on the WR1000 to automatically execute the upgrade program.
- (4) Wait until the display shown below appears.



Mxxxxxxx.W10: Files for upgrading the main CPU Sxxxxxxx.W10: File for upgrading the sub CPU

Pxxxxxxx.W10: Print pattern file

Fig. 2-1-1

- (5) Use the \triangle and ∇ keys to select the file for the upgrade operation you wish to perform.
- (6) To begin rewriting the target flash ROM, press the **ENTER** key on the Conditions panel.
- (7) The following message appears to indicate that the upgrade operation has terminated normally.

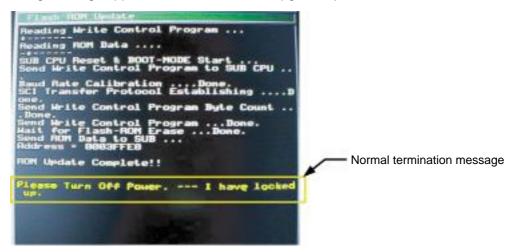


Fig. 2-1-2

(8) Turn off the WR1000 and then remove the floppy disk.

NOTE

- To conduct multiple upgrade operations, repeat Steps (1) through (8) for each of the upgrade files you wish to execute.
- After you have executed an update program, the Display mode will automatically be switched to English (US) and other settings will also be changed.



**** CAUTION-

The program for upgrading the main CPU is split into the two files listed below which are stored in two floppy disks:

MxxxA001.W10

MxxxA002.W10

When upgrading the main CPU, therefore, first insert the first floppy disk into the floppy disk drive, turn on the WR1000, press the ENTER key after the update program is loaded, and then wait until the prompt message below appears.

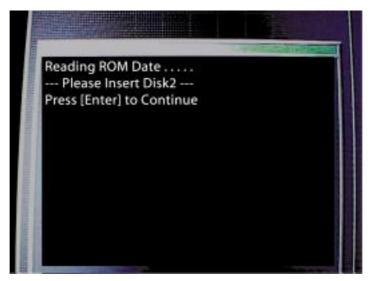


Fig. 2-1-3. Prompt for inserting the second disk

After the above prompt appears, replace the first floppy disk in the floppy disk drive with the second disk, then press the ENTER key. When the message appears to indicate that the upgrade program has been normally terminated, turn off the WR1000 and remove the second disk.

Note that the upgrade file for the sub CPU and the print pattern file are contained in the second floppy disk.

3. DISASSEMBLY AND REASSEMBLY

3.1 Notes on Disassembly and Reassembly

- During disassembly, disconnect the cables from the specified connectors as necessary.
- During reassembly, double-check to ensure that the proper cables have been correctly re-connected to the pertinent connectors.
- Some areas of the control panel unit possess a high electrical potential, so exercise caution to avoid an electrical shock.
- When handling the LCD shield and LCD protective plate, be careful not to leave fingerprints or other marks on them.

3.2 Replacing an Amp Unit

3.2.1 Replacing an Amp

To remove an amp, unfasten one screw each at the top and bottom of the amp, then grasp the amp's knob to pull it out toward you.



Fig. 3-2-1

To install an amp board, insert it properly along the upper and lower guide rails of its installation slot.

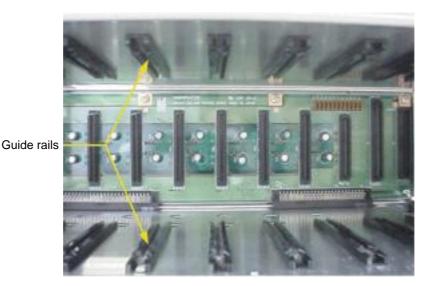


Fig. 3-2-2

3.2.2 Replacing the Amp DC/DC Board

- (1) Remove the control panel unit (see Section 3.3, "Replacing the Control Panel Unit").
- (2) Unfasten the six screws then remove the upper amp chassis.

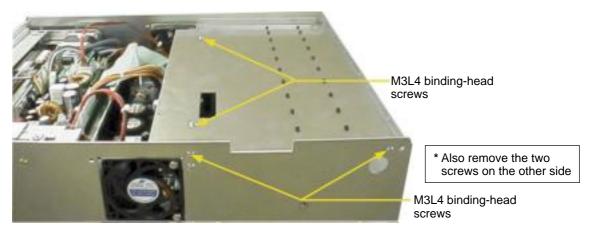


Fig. 3-2-3

(3) Disconnect the cable from connector P171.

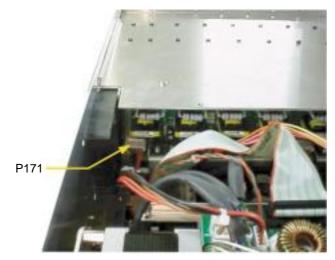


Fig. 3-2-4

(4) Unfasten the four screws, then remove the amp mother assembly by lifting it up and off.

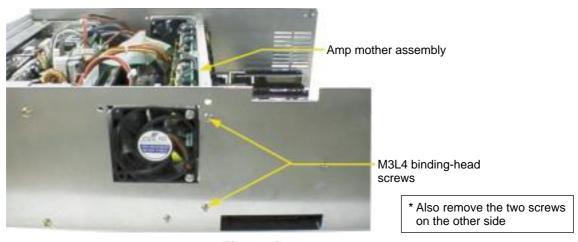
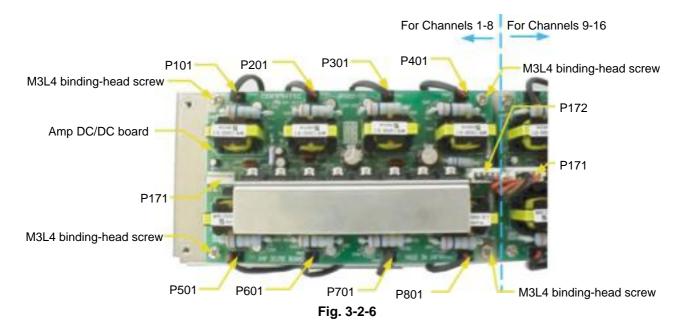


Fig. 3-2-5

(5) Unfasten the four screws and disconnect the cables from nine connectors (P172, P101, P201, P301, P401, P501, P601, P701, AND P801), then replace the amp DC/DC board.



3.2.3 Replacing the Amp Mother Board

Replacement Procedure

- (1) Remove the control panel unit (see Section 3.3, "Replacing the Control Panel Unit").
- (2) Remove the amp mother assembly (see Subsection 3.2.2, "Replacing the Amp DC/DC Board").
- (3) Remove the Amp DC/DC board, then disconnect its cables from the connectors on the amp mother board.

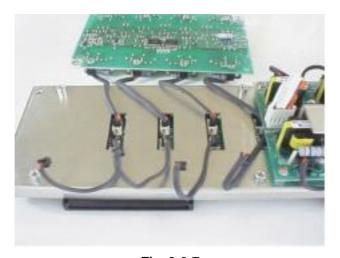
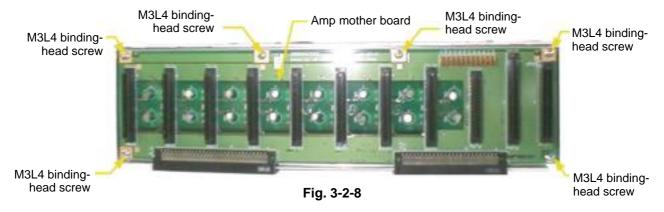


Fig. 3-2-7

(4) Remove the six screws, then replace the amp mother board.



* During reassembly, be sure to connect each cable to its proper connector.

Check Procedures

(1) Short check

Regarding the " \bigcirc " mark as the minus side of the multimeter, use the multimeter to check the voltage between the connector pins specified in the following table.

Table 3-2-1. Short check

Connector pin no.	Checl	kpoint	Remarks	
Connector pin no.	⊕	Θ	Nemarks	
P102 to P802	1	2	+5 V (amps with odd channel nos.)	
P103 to P803	1	2	+5 V (amps with even channel nos.)	
	91 to 94	99 to 100	+5 V	
P3	95 to 96	99 to 100	+3.3 V	
	97 to 98	99 to 100	+3.3 V1	

(2) Voltage check

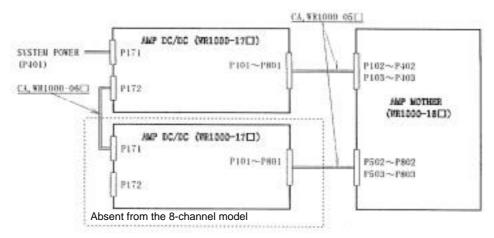


Fig. 3-2-9

3. DISASSEMBLY AND REASSEMBLY

Table 3-2-2. Voltage check

Connector pin no.	Checkpoint		Measurement range	Remarks
Connector pin no.	⊕	Θ	Measurement range	Nemarks
P101 to P401	27 to 28	25 to 26	+4.9 to +5.1 V	
F 101 to F401	39 to 40	37 to 38	+4.9 to +5.1 V	
P501 to P801	27 to 28	25 to 26	+4.9 to +5.1 V	Not required for the
F301 (0 F001	39 to 40	37 to 38	+4.9 to +5.1 V	8-channel main unit

3.3 Replacing the Control Panel Unit

To replace any component of the control panel, you must first remove the control panel unit from the main unit as described below.

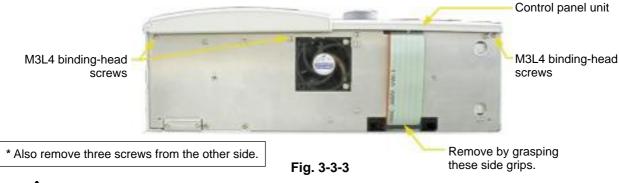
(1) Remove the molded cover on the power unit side (the rear cover).



(2) Remove the molded cover at the front of the main unit (the front cover).



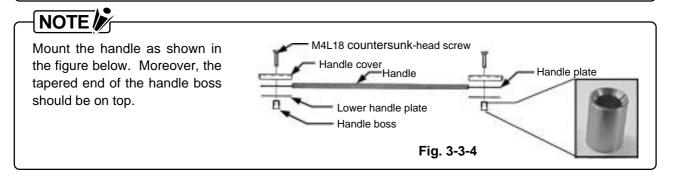
(3) Remove the six screws and disconnect a cable from one connector, then remove the control panel unit.





CAUTION

When changing the orientation of the main unit, do not hold the recorder by the control panel unit after removing the screws from one side only.



3.3.1 Replacing the Inverter Board

- (1) Disconnect the flexible printed circuit cable (FC, WR1000-05) at both ends (from connector P66 on the key control board and from the LCD relay board).
- (2) Disconnect the cables from connectors P61 and P64.

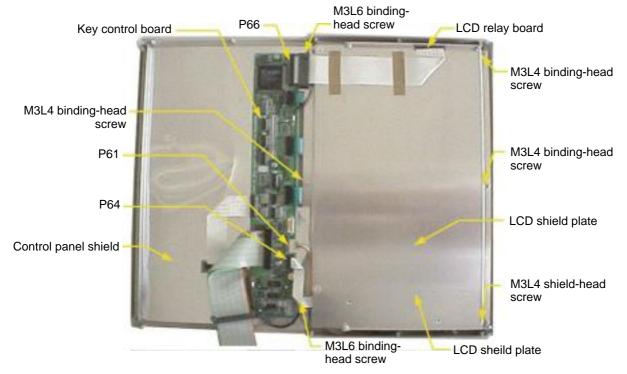


Fig. 3-3-5

- (3) Unfasten the six screws, then remove the LCD shield plate.
- (4) Remove the two screws and disconnect the cables from connectors CN1, CN2, and CN3, and then replace the inverter board.

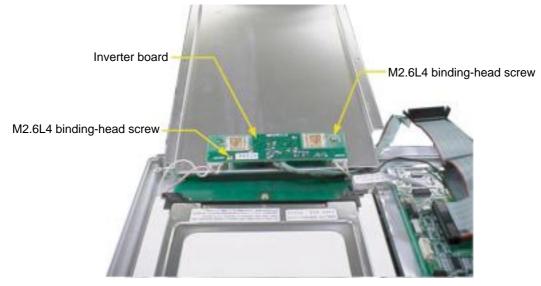


Fig. 3-3-6



When remounting the LCD shield plate, ensure that the circled areas in the photograph below are covered by the control panel shield and fasten both screws at the same time. (Also tighten the ground lead at the same time.)

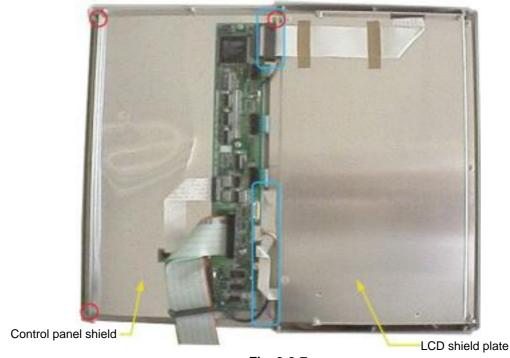


Fig. 3-3-7

A CAUTION

When removing or mounting the control panel shield either while replacing the inverter board or while cleaning or replacing the main control panel's keys, because the red circled areas are not present on the protective sheet applied to the control panel shield, be careful not to cut your fingers on the corners.

3.3.2 Replacing the LCD Panel

- (1) Remove the LCD shield plate (see Subsection 3.3.1, "Replacing the Inverter Board").
- (2) Disconnect the two cables from connectors CN2 and CN3 on the inverter board.

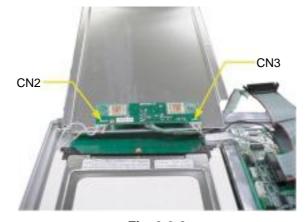


Fig. 3-3-8

- (3) Remove the four screws, then remove the LCD assembly.
 - * To differentiate a main unit with an additional LCD board holder plate due to a design modification, two of the four screws are longer.



Fig. 3-3-9

(4) Remove the LCD relay board.



Fig. 3-3-10

(5) Peel off the Nitoflon tape, remove the LCD protective plate assembly, then replace the LCD.

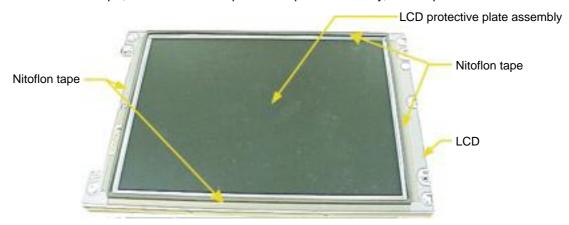
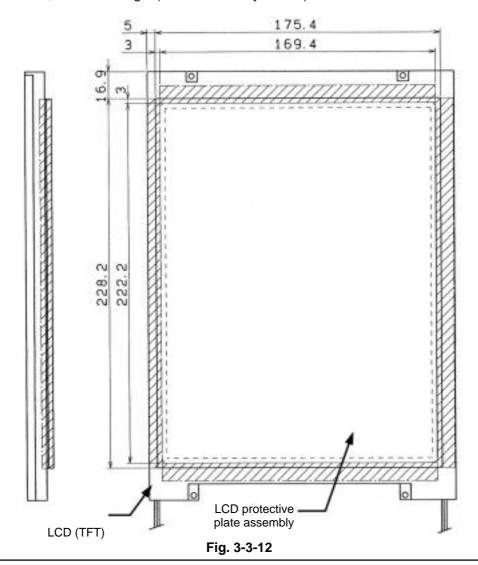


Fig. 3-3-11

NOTE

When attaching the LCD protective plate to the LCD, be sure to attach it to the position shown below. The shaded area represents the area to be covered by Nitoflon tape No. 903UL with a 0.08-mm thickness, 15-mm width, and 10-m length (manufactured by NITTO).



A CAUTION

Ensure that no dust or other foreign matter enters between the LCD protective plate and the panel surface of the LCD.

3.3.3 Replacing the LCD Protective Plate

For instructions on replacing the LCD protective plate, see Subsection 3.3.2, "Replacing the LCD Panel."

* When attaching a new LCD protective plate, don't forget to attach two spacers each along the length and width of the protective plate.

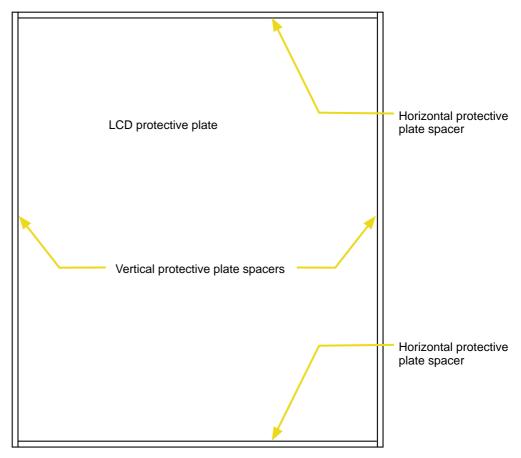


Fig. 3-3-13

* The LCD protective plate has different front and back surfaces. Attach the spacers to the surface with the unprinted protective paper after removing the protective paper.

3.3.4 Replacing and Cleaning the Control Panel Keys

The control panel keys of the WR1000 consist of two types of keys: sheet keys (for amp control panel keys) and rubber switch-keys (for main control panel keys and menu keys).

Replacing Sheet Keys and Menu Sheets

Either replace the pertinent sheet as required or replace the entire control panel cover.

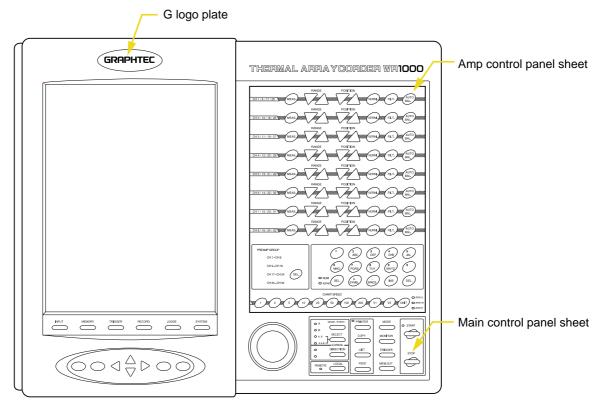


Fig. 3-3-14

Cleaning and Replacing the Rubber Switch-Keys

If the key response becomes unsatisfactory, first try cleaning the rubber switch-key concerned. If the key response does not improve even after cleaning, replace that rubber switch-key.

- (1) Remove the main control panel key board.
 - a. Remove the key control board (see Subsection 3.3.5, "Replacing the Key Control Board").
 - b. Remove the three screws then remove both the control panel mounting plate and control panel shield.

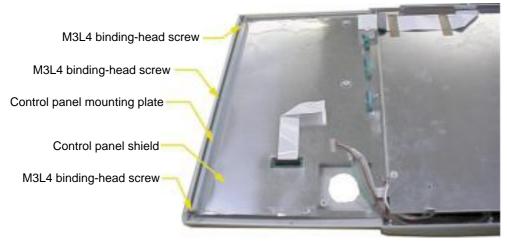


Fig. 3-3-15

c. Remove the four screws, then remove the main control panel key board.

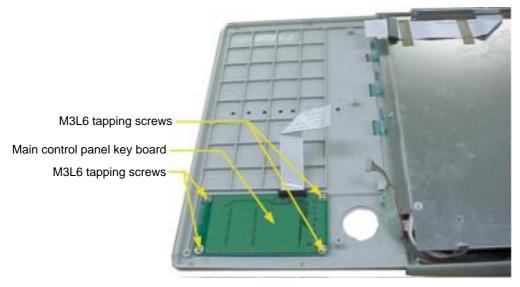


Fig. 3-3-16

- (2) Remove the Conditions panel key board
 - a. Remove the LCD shield plate (see Subsection 3.3.1, "Replacing the Inverter Board").
 - b. Remove the LCD (see Subsection 3.3.2, "Replacing the LCD Panel").
 - c. Remove the five screws then remove the Conditions panel key board.

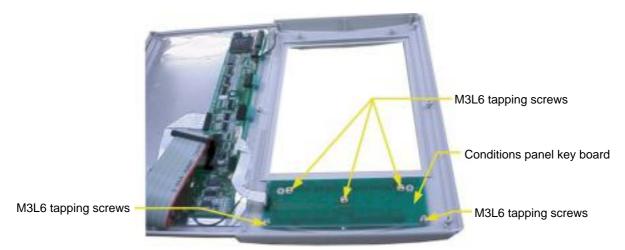


Fig. 3-3-17

* During reassembly, confirm that the keytops on the Conditions panel match are arranged according to the photograph below before securing the Conditions panel key board. (Fig. 3-3-19 shows the rear view.)



Fig. 3-3-18

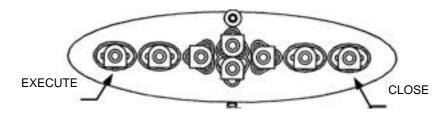


Fig. 3-3-19

(3) Clean the keytops.

The structure of each key board conforms to the figure below.

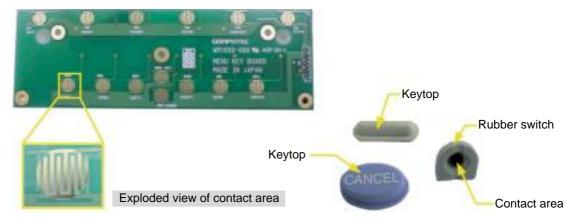


Fig. 3-3-20

Clean the keytops as follows.

- a. Wipe off the stains from the contact area on the board side, using alcohol or its equivalent.
- b. Remove dust and other foreign matter from the contact area of each rubber switch (the black rubber part).



CAUTION-

Because the rubber switches have contact areas made of conductive rubber, using alcohol or other chemicals to clean them may cause deterioration. As a result, never use alcohol or other chemical solvents to wipe off the rubber switch-keys.

If the key response does not improve even after cleaning, replace that rubber switch-key or the entire key board.

3.3.5 Replacing the Key Control Board

(1) In the direction indicated by the white arrow below, pull the jog/shuttle dial off of the front of the control panel.



Fig. 3-3-21

- (2) Disconnect the FPC (Flexible Printed Circuit) cables from seven connectors.
- (3) Unfasten the two screws at the positions indicated by the * (asterisk) symbol.
- (4) Unfasten the four screws, then replace the key control board.

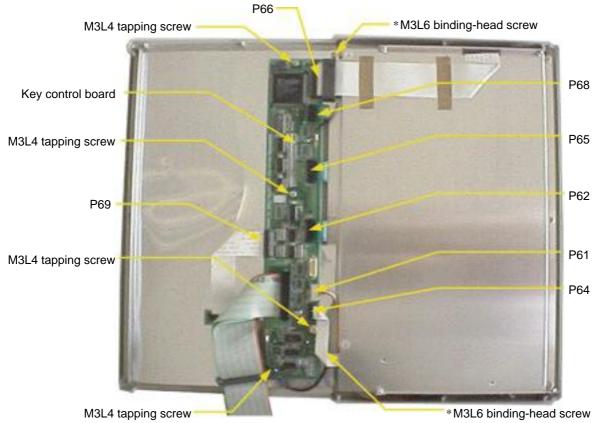


Fig. 3-3-22

3.4 Replacing the Power Unit

Before replacing any of the boards in the power unit, first remove the control panel unit (see Section 3.3, "Replacing the Control Panel Unit").

3.4.1 Replacing the System Power Board

Replacement Procedure

Disconnect the cables from 11 connectors and unfasten the four screws, then replace the system power board.

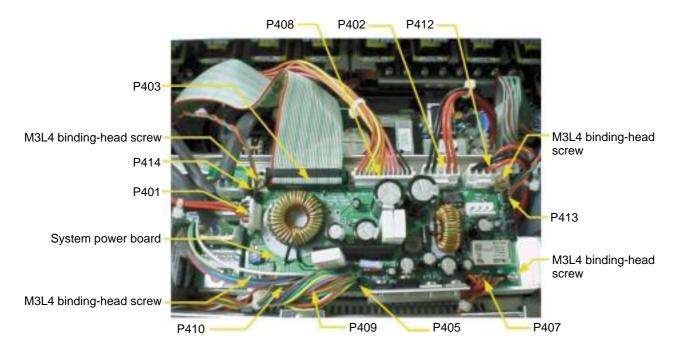


Fig. 3-4-1

* After replacing the system power board, be sure to perform the adjustment described in Section 5.2, "Adjusting the Overcurrent Monitoring Operation."

Check Procedures

(1) Short check

Regarding the "

" mark as the minus side of the multimeter, use the multimeter to check the voltage between the connector pins specified in the following table.

Table 3-4-1. Short check

Connector pin no.	Check	kpoint	Remarks	
Connector pin no.	⊕	Θ	Nemarks	
	TP1	TP2	+24 V	
	TP3	TP2	+12 V	
	TP4	TP2	+5 V	
	TP6	TP2	+3.3 V	

(2) Voltage check With the 8-channel model

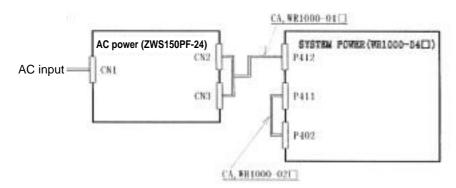


Fig. 3-4-2

With the 16-channel model

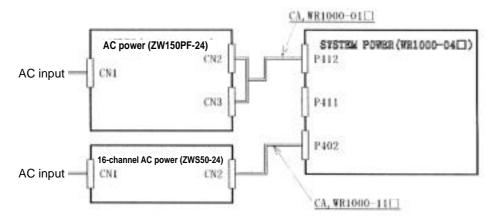


Fig. 3-4-3

Table 3-4-2. Voltage check

Connector pin no.	Checkpoint		Measurement range	Remarks
Connector pin no.	⊕	Θ	weasurement range	Remarks
	TP1	TP2	+21.6 to +26.4 V	+24 V
	TP3	TP2	+11.4 to +12.6 V	+12 V
	TP4	TP2	+4.9 to +5.1 V	+5 V
	TP6	TP2	+3.46 to +3.12 V	+3.3 V

3.4.2 Replacing the Power Unit for Channels 1 to 8

(1) Open the printer cover, then unfasten the two screws.



Fig. 3-4-2

(2) Disconnect the cables from all connectors on the system power board and AC relay board, unfasten the two screws, then remove the power chassis.



Fig. 3-4-3

(3) Unfasten the three screws, remove the two supports, then replace the power unit for channels 1 to 8.



Fig. 3-4-4

3.4.3 Replacing the Power Unit for Channels 9 to 16

Disconnect the cables from two connectors, unfasten the four screws, then replace the power unit for channels 9 to 16.

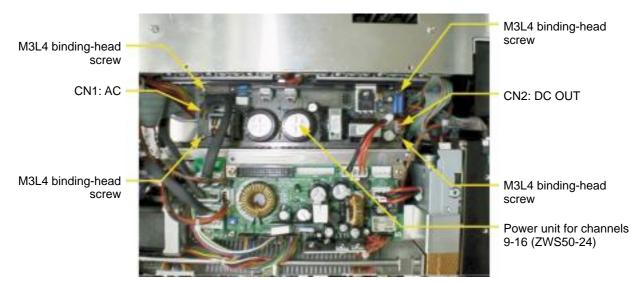


Fig. 3-4-5

3.5 Replacing the Printer Unit

3.5.1 Replacing the Thermal Print Head

Always conduct the Setup operation for specifying the resistance of the thermal printhead whenever the thermal printhead has been replaced.

- (1) Remove the control panel cover (see Section 3.3, "Replacing the Control Panel Unit").
- (2) Unfasten the six screws then remove the bottom plate.



Fig. 3-5-1

(3) Open the printer cover, then unfasten the two screws.



Fig. 3-5-2

(4) Unfasten the three screws on the bottom panel, then remove the printer unit mold.

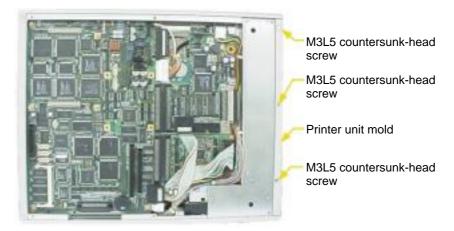


Fig. 3-5-3

(5) Disconnect the cables from the four connectors on the system power board.

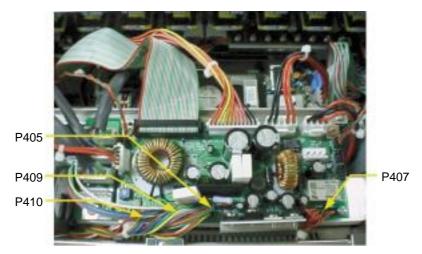


Fig. 3-5-4

(6) Unfasten the four screws, then remove the printer unit.

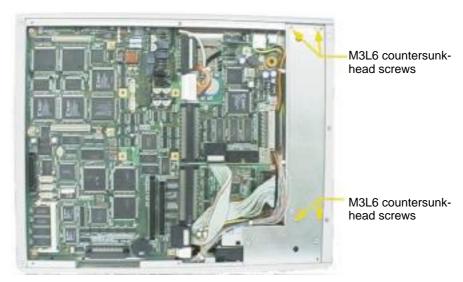


Fig. 3-5-5

(7) Unfasten the two screws each on the right and left sides, then remove the head pressure support.

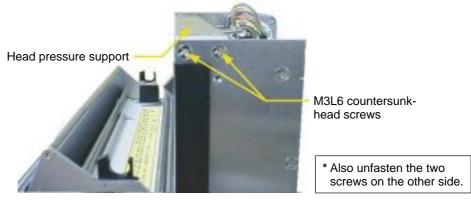


Fig. 3-5-6

When removing the head pressure support, this component applies pressure on the thermal printhead using the two types of screws shown below (five screws total). When removing the head pressure support, be careful not to lose these springs.
 Compression spring C-166
 Compression spring DC-515
 Compression spring DC-515
 Compression spring DC-515
 Compression spring DC-515

Fig. 3-5-7

(8) Remove two head bushings each from the right and left sides, then replace the thermal printhead.



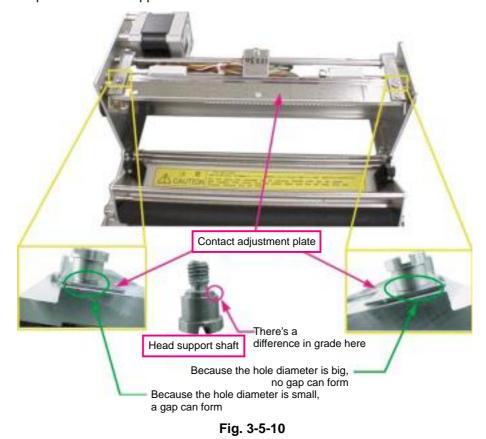
Fig. 3-5-8

* After the thermal printhead is replaced, its resistance value will be written in the area shown below. Be sure to make a note of the value because it will be needed during the Setup operation.

Resistance value

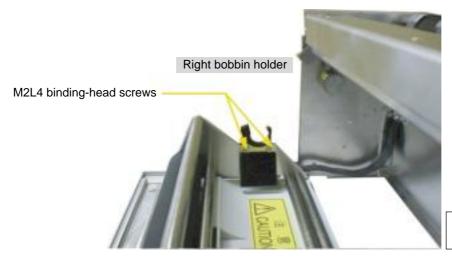
Fig. 3-5-9

* When remounting the thermal printhead, the contact adjustment plate and thermal printhead are secured to each other using a head support shaft. Assemble the components as shown below, while paying attention to the different diameters of the right and left holes in the contact adjustment plates and the shape of the head support shaft.



3.5.2 Replacing the Bobbin Holders

Unfasten the two screws, remove the bobbin holder assemblies, then replace the necessary components.



* Also repeat the process for the other side.

Fig. 3-5-11

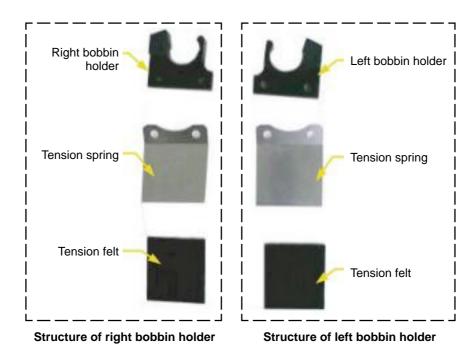


Fig. 3-5-12

3.5.3 Replacing the Platen

- (1) Remove the printer unit (see Subsection 3.5.1, "Replacing the Thermal Printhead").
- (2) Remove the right and left screws and the ground line, then remove the printer cover assembly.



Fig. 3-5-13

(3) Remove the components indicated in the figure below from the right cover side plate.

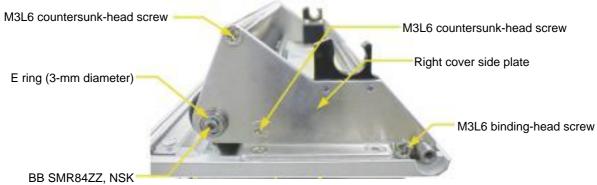


Fig. 3-5-14

(4) Remove the components indicated in the figure below from the left cover side plate, remove the left cover side plate from the printer cover assembly, then replace the platen.

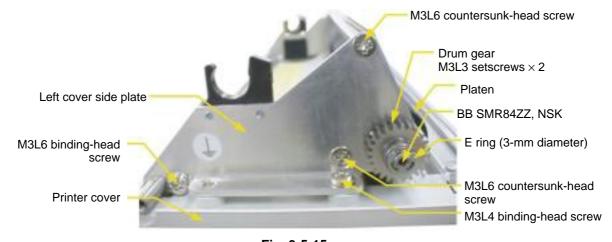


Fig. 3-5-15

* When remounting the drum gear, attach it so that it adheres closely to the platen shaft as shown below

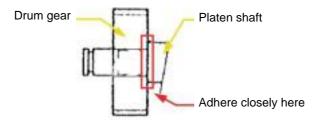


Fig. 3-5-16

* When removing the printer cover from the printer unit (as described in Subsection 3.5.3, "Replacing the Platen," and Subsection 3.5.4, "Replacing the Printer Cover"), be careful not to bend the protruding parts indicated by the "☆" symbol in the figure below.

These protruding parts form part of the sensing mechanism of the printer cover open/close sensor (the micro-switch on the side of the printer unit).

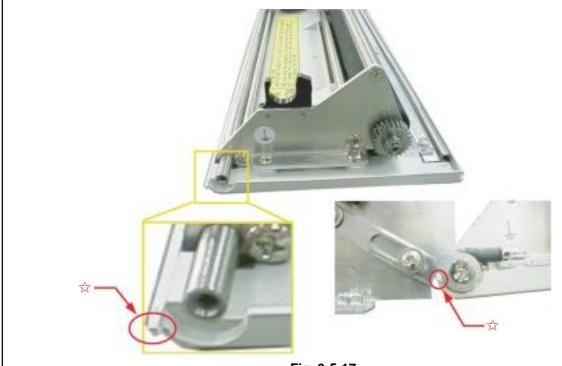


Fig. 3-5-17

3.5.4 Replacing the Printer Cover

- (1) Remove the printer unit (see Subsection 3.5.1, "Replacing the Thermal Printhead").
- (2) Remove the printer cover assembly from the printer unit (see Subsection 3.5.3, "Replacing the Platen").
- (3) Unfasten the three screws, remove the platen, then replace the printer cover.



Left cover side plate

Right cover side plate

Fig. 3-5-18

* The printer cover is referred to as the printer cover assembly, but it is simply a molded component as shown below.



Fig. 3-5-19

To finish assembling the printer cover, mount the platen assembly from the printer cover assembly that was replaced. The CAUTION seal must be separately ordered.



Fig. 3-5-20

3.5.5 Replacing the Sensor Assembly

The sensor assembly consists of the chart detection sensor that checks the presence/absence of chart paper and a sensor that checks the open/closed status of the printer cover.

Replace the sensor assembly as described in the steps below. After replacement, check that the parts indicated by the "
" or "
" symbol in the following figures operate normally during the reassembly process.

Replacement Procedure

- (1) Remove the printer unit (see Subsection 3.5.1, "Replacing the Thermal Printhead").
- (2) Unfasten the two screws, then remove the micro-switch.

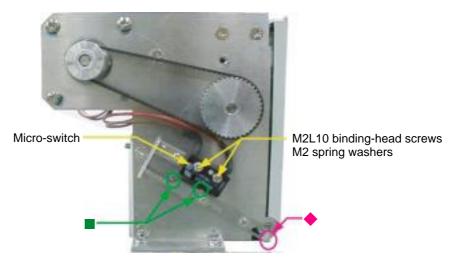


Fig. 3-5-21

(3) Unfasten the two plastic rivets, remove the paper detection sensor board, then replace the sensor assembly.

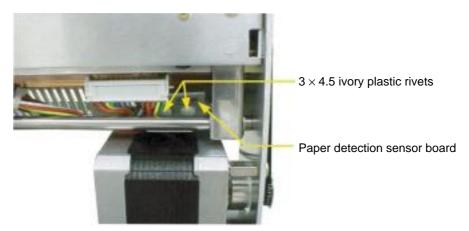
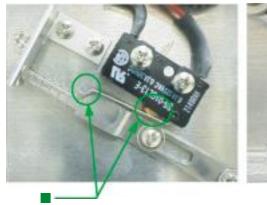


Fig. 3-5-22

Operational Check

Check that the parts marked with the "■" or "♦" symbol in Fig. 3-5-21 are in the status shown in the figure below, depending on whether the printer cover is open or closed.

(1) When the printer cover is closed:



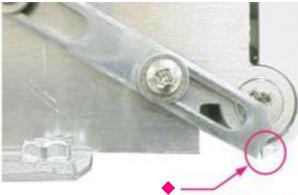
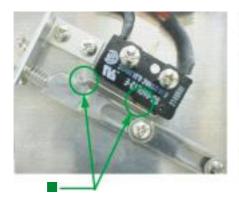


Fig. 3-5-23

(2) When the printer cover is open:



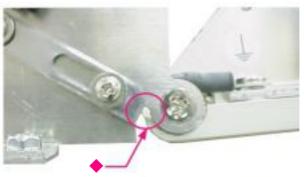


Fig. 3-5-24

3.5.6 Replacing the Chart Feed Motor

- (1) Remove the printer unit (see Subsection 3.5.1, "Replacing the Thermal Printhead").
- (2) Unfasten the three screws, then remove the motor assembly.

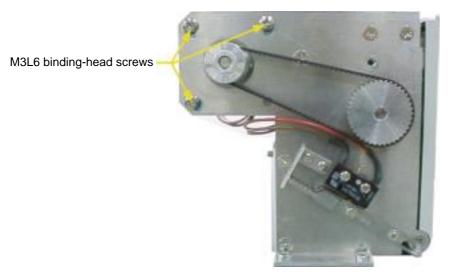


Fig. 3-5-25

- (3) Remove the three spacers.
- (4) Unfasten the two setscrews, then remove the motor pulley.

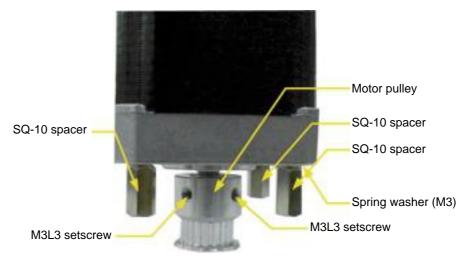


Fig. 3-5-26

(5) Replace the chart feed motor.

* When remounting the chart feed motor, observe the following precautions.

• Position for mounting the spacers

Mount each spacer while paying attention to the position of the lead wires.



Fig. 3-5-27

. Position for mounting the motor pulley

Mount the motor pulley at a distance of about 1.2 mm from the motor, as shown below.

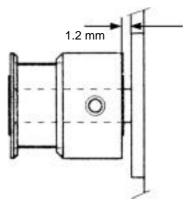


Fig. 3-5-28

• Belt tension

When a push-force gauge is used to create a 2-mm displacement at the center of the pulley, its push force should be 50 gf.

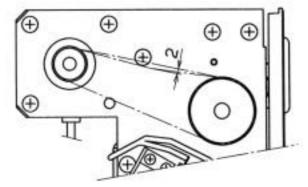


Fig. 3-5-29

3.6 Replacing the Main Control Board

The procedure for replacing the main control board varies slightly with the WR1000's channel configuration (8 or 16 channels).

16-Channel Model

The 16-channel model is equipped with the two main control boards listed below.

- A main control board for controlling Channels 1 through 8 and various functions.
- A main control board for controlling Channels 9 through 16.

8-Channel Model

The 8-channel model is equipped with the single main control board listed below.

• A main control board for controlling Channels 1 through 8 and various functions.

3.6.1 Replacing the 16-CH Control Board (16-Channel Model only)

(1) Unfasten the six screws, then remove the bottom plate.



Fig. 3-6-1

(2) Unfasten the four screws, then replace the 16-channel control board.

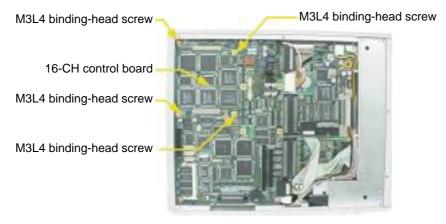


Fig. 3-6-2

3.6.2 Replacing the Main Control Board

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Remove the front cover (see Section 3.3, "Replacing the Control Panel Unit").
 - * If the FDD (Floppy Disk Drive) is installed, remove the FDD control board.
 - * If the SCSI interface and either the MODD (Magneto-Optic Disk Drive) or HDD (Hard Disk Drive) is installed, remove the SCSI control board.
 - For instructions on removing the above-mentioned memory devices, see Section 3.9, "Replacing the Internal and External Memory Devices."
 - * If you have a 16-channel model, remove the 16-CH control board (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (3) Unfasten the seven screws (or, with a 16-channel model, the three screws and four spacers), disconnect the cables from the four connectors (also disconnect the cable from P1019 if the FDD control board is mounted and from P1026 if the SCSI control board is mounted), then replace the main control board.

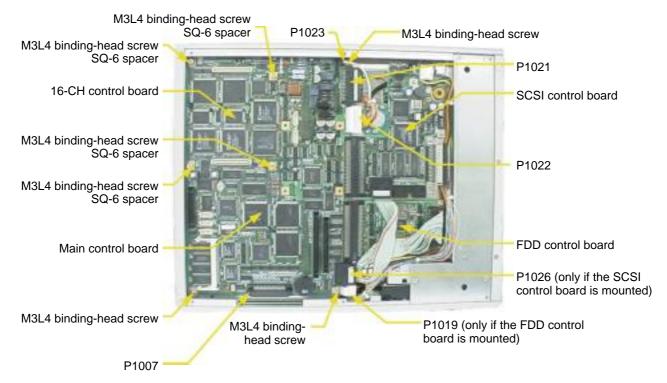


Fig. 3-6-3. For the 16-channel model with FDD and HDD

3.7 Replacing the Backup Battery

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Unfasten the two screws, disconnect the cables from the main control board's connector, then replace the battery board.

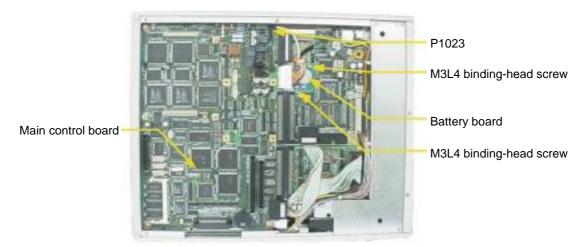


Fig. 3-7-1



The time and date settings are reset whenever the battery is replaced. Be sure to correctly set the time and date before returning the WR1000 to the customer.



DANGER

• The battery may explode if it is not properly replaced.



CAUTION

- Do not replace the battery with a non-standard substitute (use only a battery with the same part number or its equivalent).
- Dispose of a used battery according to local ordinances and other regulations stipulated in your region. If you are unsure how to dispose of batteries, contact your sales representative or nearest Graphtec vendor.

3.8 Replacing the Fans

- (1) Remove the control panel unit (see Section 3.3, "Replacing the Control Panel Unit").
- (2) Unfasten the two screws, disconnect the cables from the two connectors on the system power board, then replace each fan.



Fig. 3-8-1

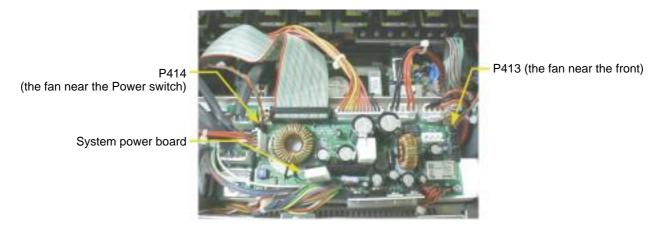


Fig. 3-8-2

3.9 Replacing the Internal and External Memory Devices

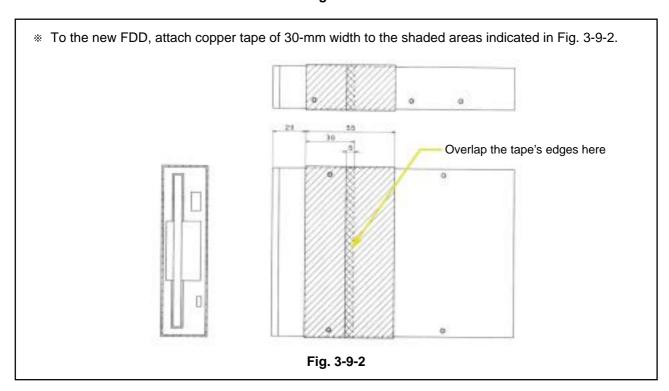
3.9.1 Replacing the Floppy Disk Drive (FDD) and FDD Control Board

Replacing the FDD

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Disconnect the power cord and the cable from the interface connector.
- (3) Unfasten the M3L6 binding-head screws.
- (4) Pull off the FDD in the direction indicated by the black arrow in the figure below, then replace it.



Fig. 3-9-1



Replacing the FDD Control Board

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Unfasten the two screws, disconnect one cable from its connector, then replace the FDD control board.

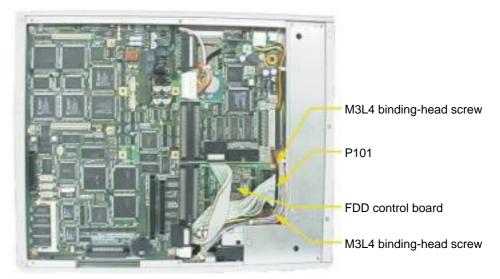


Fig. 3-9-3

3.9.2 Replacing the Magneto-Optic Disk Drive (MODD) and SCSI Control Board

Replacing the MODD

The procedure for replacing the MODD is identical to that for replacing the FDD, so see the explanation under "Replacing the FDD" in Subsection 3.9.1, "Replacing the FDD and FDD Control Board."

** Although the WR1000 can use the same disk drives as the WR9000 and WR8500, heed the differences in the settings shown below during the replacement process.
(Production of the M2513A68-1 Bezel has already been discontinued but, since it can be mounted on the WR1000, it has been listed below for your reference.)

a. M2513A68-1 Bezel

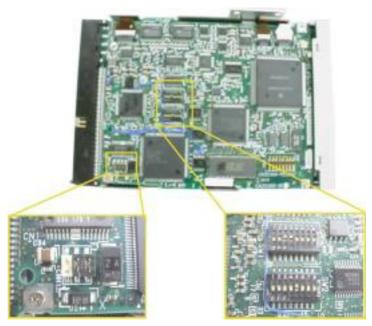


Fig. 3-9-4

b. MCB3064SS

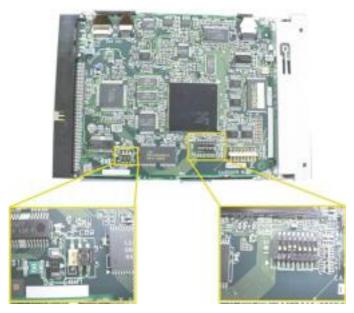


Fig. 3-9-5

Replacing the SCSI Control Board

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Unfasten the two screws in the SCSI power board.
- (3) Unfasten the three screws, disconnect the three cables from their connectors, then replace the SCSI control board.

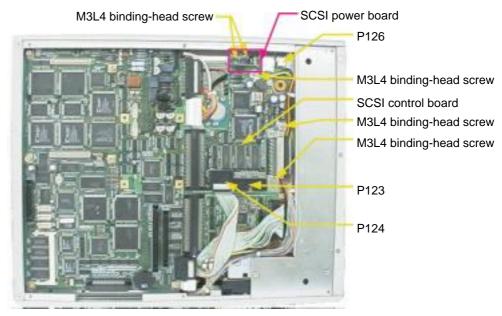


Fig. 3-9-6

- * If the HDD (Hard Disk Drive) is installed, also disconnect the two cables from connectors P122 and P125 (see Fig. 3-9-10).
- * Confirm that the bits of the SCSI control board's DIP switch are set to the same positions as before the SCSI control board was replaced.

3.9.3 Replacing the Hard Disk Drive (HDD) and SCSI Control Board

Replacing the HDD

- (1) Remove the control panel unit (see Section 3.3, "Replacing the Control Panel Unit").
- (2) Remove the four screws in the front side plate.

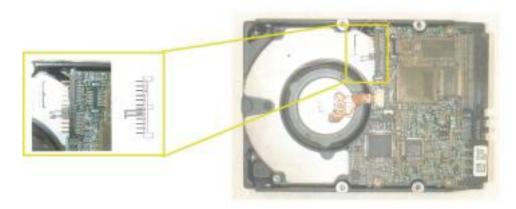


Fig. 3-9-7

(3) Disconnect the power cord, disconnect the interface cable from its connector, then replace the HDD.

** Before mounting the replacement HDD, confirm that the short pins are correctly positioned. (Because production of the DDRS39130-F20W68 has been discontinued, the HDD's part no. has been changed to DENS-309170W-F20 in accordance with the Design Modification No. 0620-C-9908402.)

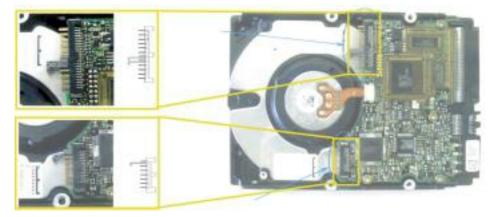
a. DDRS39130-F20W68



Attach the short plug only to Pins 5 and 6. (Pins 2, 3, 5, and 6 come shorted when shipped from the manufacturer.)

Fig. 3-9-8

b. DENS-390170W-F20



- (a) Attach the short plug only to Pins 5 and 6. (Pins 2, 3, 5, and 6 come shorted when shipped from the manufacturer.)
- (b) Attach the short plug only to Pin G (Pin G comes shorted when shipped from the manufacturer.)

Fig. 3-9-9

Replacing the SCSI Control Board

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Unfasten the two screws in the SCSI power board.
- (3) Unfasten the three screws, disconnect the three cables from their connectors, then replace the SCSI control board.

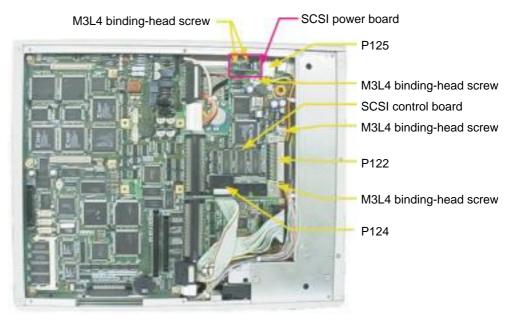


Fig. 3-9-10

- * If the MODD (Hard Disk Drive) is installed, also disconnect the two cables from connectors P123 and P126 (see Fig. 3-9-6).
- * Confirm that the bits of the SCSI control board's DIP switch are set to the same positions as before the SCSI control board was replaced.
- * The SCSI cable for the HDD is very slender, so be careful not to cut it or otherwise damage it.

3.10 Replacing the Interface Board

Unfasten the two screws, then replace the interface board.

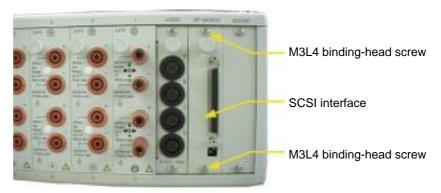


Fig. 3-9-11

* After replacing the SCSI interface, be sure to set the Terminator setting's switches to the same setting as before replacement. If an external device is not connected to the SCSI interface when checking the SCSI interface's operation, however, temporarily set both switches to the ON position.

3.11 Replacing the Memory Expansion Board

- (1) Remove the bottom plate (see Subsection 3.6.1, "Replacing the 16-CH Control Board").
- (2) Replace the memory expansion board.

Memory expansion unit



Fig. 3-9-12

4. SETUP PROCEDURES

4.1 Entering the Setup Mode

(1) Press the Conditions panel's **SYSTEM** key three times to open the Customize Settings window shown below.



Fig. 4-1-1

(2) After moving the cursor to the Execute Setting(s) position as shown above, press the Conditions panel's ENTER key to display the "No change." message shown below.

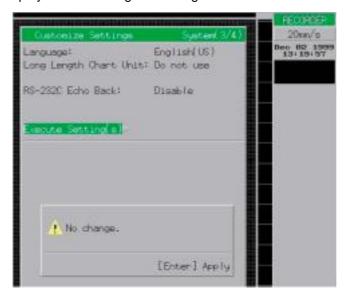


Fig. 4-1-2

(3) In the above status, consecutively press the 7, 3, and 8 keys on the numeric keypad. Next, press the ENTER key at the Conditions panel to display the menu below from which you can execute the various Setup operations.



Fig. 4-1-3

4.2 Setting the Paper Sensing Level

The Paper Sensing Level parameters need not be specified. In the menu shown below, therefore, leave both the Paper Unload and Paper Loading settings under Paper Sensing Level to Not Sense.



4.3 Setting the Resistance of the Thermal Print Head

Always perform this operation after you have replaced the thermal printhead or the main control board.

(1) Move the cursor to the Printer Head Resistance parameter, then press the ENTER key at the Conditions panel.

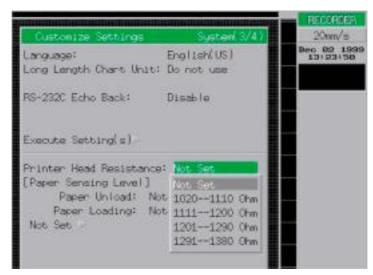


Fig. 4-3-1

(2) Move the cursor to the value corresponding to the resistance value of the newly or currently installed thermal printhead, then press the ENTER key.



To exit the SETUP mode, reset the WR1000 by turning it off then back on again.

4.4 Setting Up the V (Voltage Input) Type Amp

Always perform this Setup operation whenever a V type amp unit has been replaced.

Preparation

- Have a voltage generator on hand that can output voltage up to 500 VDC (four-digit output).
- Mutually connect the ground terminals of the voltage generator and the WR1000.

Setup Procedure

- (1) Use the main control panel's MODE key to select RECORDER as the measurement mode.
- (2) Turn on the WR1000 and leave it on for at least 15 minutes to allow ageing.
- (3) After entering the Setup mode, press the SYSTEM key twice to display the prompt below.



Fig. 4-4-1

(4) Specify the measurement conditions as follows.

Setup CH All AMP Setup AMP type V

(5) Press the **EXECUTE** key at the Conditions panel to display the prompt below.

GND : [Start] to exec.

Fig. 4-4-2

- (6) Input 0.00 mV from the voltage generator to the target amp's input terminals.
- (7) Press the main control panel's START key to display the prompt below and initiate the Setup operation.

Exec: [Stop] to abort.

Fig. 4-4-3

(8) When the prompt below appears, individually set the measurement precision for each range. Specify the voltage generator's output voltage setting to correspond to one of the displayed voltage Ranges in the following table, and then input that voltage to the WR1000.

50mV: [Start] to exec.

Fig. 4-4-4

Table 4-4-1

Displayed Range setting	Output voltage setting
50 mV	50.00 mV
100 mV	100.0 mV
200 mV	200.0 mV
500 mV	500.0 mV
1 V	1.000 V
2 V	2.000 V
5 V	5.000 V
500 V	500.0 V

- * Sequentially repeat Steps (7) and (8) for each Range listed in the preceding table, from 50mV through 500 V.
- (9) When you have finished the Setup operation for 500 V, the prompt below appears.

EEPROM: [Exec] to start

Fig. 4-4-5

- (10) Press the **EXECUTE** key at the Conditions panel to begin writing the new Setup data to the EEPROM of each amp.
- (11) Turn off the WR1000.

This completes the setup of the V type amp(s).

4.5 Setting Up the M (Multi-Input) Type Amp

Always perform this Setup operation whenever an M type amp unit has been replaced.

4.5.1 Setup 1 (Voltage)

Preparation

- Have a voltage generator on hand that can output voltage up to 1 VDC (four-digit output).
- Mutually connect the ground terminals of the voltage generator and the WR1000.

Setup Procedure

- (1) Use the main control panel's MODE key to select RECORDER as the measurement mode.
- (2) Turn on the WR1000 and leave it on for at least 30 minutes to allow ageing.
- (3) After entering the Setup mode, press the SYSTEM key twice to display the prompt below.

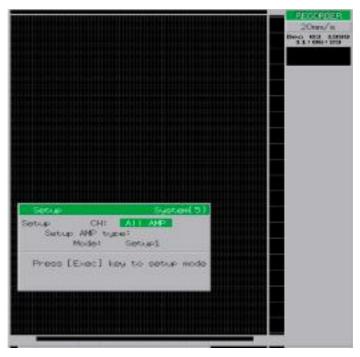


Fig. 4-5-1

(4) Specify the measurement conditions as follows.

Setup CH All AMP
Setup AMP type M
Mode Setup1

(5) Press the **EXECUTE** key at the Conditions panel to display the prompt below.

GND: [Start] to exec.

Fig. 4-5-2

- (6) Input 0.00 mV from the voltage generator to the target amp's input terminals.
- (7) Press the main control panel's START key to display the prompt below and initiate the Setup operation.

Exec: [Stop] to abort.

Fig. 4-5-3

(8) When the prompt below appears, individually set the measurement precision for each range. Specify the voltage generator's output voltage setting to correspond to one of the displayed voltage Ranges in the following table, and then input that voltage to the WR1000.

20mV: [Start] to exec.

Fig. 4-5-4

Table 4-5-1

Displayed Range setting	Output voltage setting
20 mV	20.00 mV
50 mV	50.00 mV
100 mV	100.0 mV
200 mV	200.0 mV
500 mV	500.0 mV
1 V	1.000 V

- * Sequentially repeat Steps (7) and (8) for each Range listed in the preceding table, from 20 mV through 1 V.
- (9) When you have finished the Setup operation for 1 V, the prompt below appears.

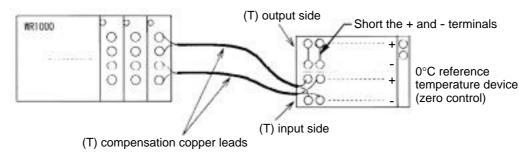
Fig. 4-5-5

(10) Press the **EXECUTE** key at the Conditions panel to begin writing the new Setup data to the EEPROM of each amp.

4.5.2 Setup 2 (Temperature)

Preparation

As shown below, use (T) temperature compensation leads to connect the target amps to a 0°C reference temperature device (zero control). Also be sure to use (T) temperature compensation leads to connect M type amps to each other.



CAUTION: Connect each compensation copper lead to a single terminal as shown in the above diagram (parallel wiring is not permitted).

Fig. 4-5-6. Connection to a 0°C reference temperature device (zero control)

Setup Procedure

(1) At the Setup menu, set the parameters as follows.

Setup CH All AMP
Setup AMP type M
Mode Setup2

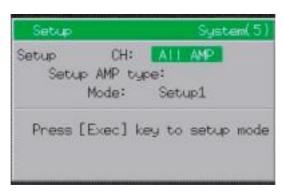


Fig. 4-5-7

(2) Press the **EXECUTE** key at the Conditions panel to display the prompt below.

rTEMP: [Start] to exec.

Fig. 4-5-8

(3) Press the main control panel's START key to display the prompt below and initiate the Setup operation.

Exec: [Stop] to abort.

Fig. 4-5-9

(4) When the Setup operation is completed, the prompt below appears.

EEPROM: [Exec] to start

Fig. 4-5-10

- (5) Press the **EXECUTE** key at the Conditions panel to begin writing the new Setup data to the EEPROM of each amp.
- (6) Turn off the WR1000.

This completes the Setup operation of the M amp(s).

5. ADJUSTMENTS

5.1 Adjusting the V Amp Overshoot

Always perform the overshoot adjustment described below whenever a V amp has been replaced.

Preparations

- (1) Have on hand an oscilloscope that can be set to output square waves at a ± 2 V output level and a 1-Hz frequency.
- (2) Prior to measurement, mutually connect the GND terminals of the oscillator and the WR1000.
- (3) Perform adjustment using a precision screwdriver with a plastic handle. (A precision screwdriver with a metallic handle cannot be used because it causes noise to mix with the waveforms.)
- (4) To perform adjustment, remove the plastic rivet covering the adjustment hole for each trimmer, as shown in the photograph below.

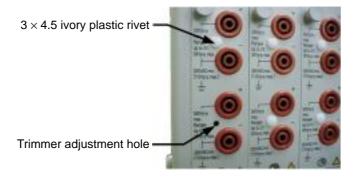


Fig. 5-1-1

Setting Procedure

- (1) Use the main control panel's MODE key to select RECORDER as the measurement mode.
- (2) Use the keys at the CHART SPEED section to set the chart speed to 20mm/s.
- (3) Press the NPUT key on the Conditions panel to open the AMP Settings menu, then change the settings as indicated below.

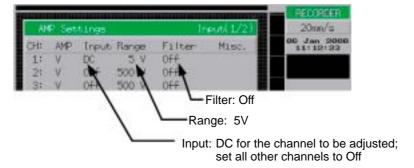


Fig. 5-1-2

Adjustment Procedure

- (1) Using the oscillator, output signals consisting of square waves ($_$) at a ± 2 V output level and a 1-Hz frequency for input to the WR1000.
- (2) Press the main control panel's **START** key to start measurement. Adjust the trimmer until overshoot is eliminated.

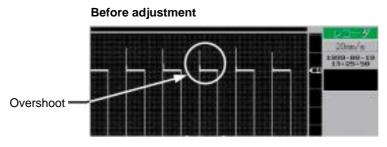


Fig. 5-1-3

20m/s 1mm-on-in 31mm-on-in

Fig. 5-1-4

5.2 Adjusting the Overcurrent Monitoring Operation

After adjustment

Whenever the system power board has been replaced, adjust the VR1 trimmer so that TP5 becomes 1 V under zero load (0 V).

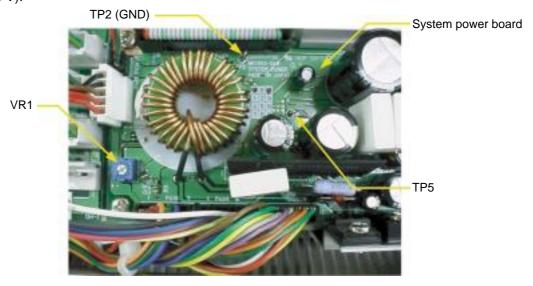


Fig. 5-2-1

6. INSPECTION AND CHECK PROCEDURES

6.1 Inspection Items and Checkpoints

Table 6-1-1(a). Inspection items and checkpoints

No.	Category	Inspection/check standard	Product standard	Related blocks
1	Insulation resistance	AC-GND 1000 VDC/100 MΩ or more	Same as left	AC line inlet
		SIG-GND 500 VDC/100 M Ω or more	Same as left	V amp, M amp Amp DC/DC board AC/DC select board
2	Withstand voltage	AC-GND 8-CH model: 2.3 kVAC rms/15 mA or less*1 16-CH model: 2.3 kVAC rms/20 mA or less*1	Same as left	AC line inlet
		SIG-GND 2.3 kVAC rms/2 mA or less*1	Same as left	V amp, M amp Amp DC/DC board AC/DC select board
3	Voltage precision	V amp, M amp ±0.2% of full scale	±0.25% of full scale	V amp, M amp
4	Temperature precision (T)*2	Condition 1 - 200°C to 0°C: ± (0.5% of rdg + 1.5°C) 0°C to 400°C: ± (0.2% of rdg + 1.5°C)	-200°C to 0°C: ± (0.5% of rdg + 3°C) Other ranges: ± (0.2% of rdg + 3°C)	M amp
		Condition 2 - 200°C to 0°C: ± (0.5% of rdg + 2°C) 0°C to 400°C: ± (0.2% of rdg + 2°C)		
5	S/N ratio	V amp Within 1 mm at 50 mV in the 5 V range	50mV range: -46 dB (typ)	V amp
		M amp Within 0.75 mm at 20 mV in the 2V range	20mV range: -48 dB (typ)	M amp
6	Frequency & filter characteristics	Line, 5Hz, 10Hz: within 55% to 85% 30Hz, 50Hz, 500Hz, 5kHz: within 60% to 80%	Line: (-3 dB) at -6 dB/oct 5, 10, 30, 50, 500, 5kHz (-3 dB) at V: -6 dB/oct M: -12 dB/oct	V amp, M amp
		V amp : 50 kHz M amp: 20 kHz within 70 to 112%	V amp: 50 kHz M amp: 20 kHz +1/-3 dB	V amp, M amp
7	Memory trigger operation	Proper capture of signals in memory	Same as left	Main control board
8	REMOTE interface	Proper operation	Same as left	Main control board
9	RS-232C interface	Proper operation	Same as left	Main control board
10	Floppy disk drive	Proper operation	Same as left	FDD unit, FDD control board, main control board

6. INSPECTION AND CHECK PROCEDURES

No.	Category	Inspection/check standard	Product standard	Related blocks
11	Chart feed precision	±1.7%	within ±2% + 0.5 mm	Thermal printhead board Printer unit
12	Slant of chart feeding	within ±1.5 mm	Same as left	Printer unit
13	Printing performance	Proper operation at 10mm/s and 200mm/s	Same as left	Thermal printhead board Printer unit
14	Miscellaneous	Proper operation	Same as left	Main control board
15	GP-IB interface	Proper operation	Same as left	GP-IB board Main control board
16	Logic amp	Proper operation	Same as left	Logic amp
17	Expansion memory	Proper capture of signals in memory	Same as left	Expansion memory board
18	DC drive	Proper operation	Same as left	AC/DC select board DC power board DC input unit
19	Internal HDD/MODD operation	Proper operation	Same as left	HDD, MODD, SCSI control board
20	SCSI interface	Proper operation	Same as left	SCSI control board SCSI power board

^{*1} Regarding the testing time, raise the voltage to the test voltage within two seconds, then sustain that value for two more seconds.

^{*2} Condition 1: After setup, measure the temperature in the same setup status in the room where setup was conducted. Condition 2: Measure the temperature under conditions that vary with the setup status (main unit, measurement site, insertion slot).

^{*} Nos. 15 through 20 apply to optional devices.

6.2 Inspection and Check Methods

6.2.1 Insulation Resistance

Use a megaohm meter (an insulation resistance gauge) to check that the insulation resistance between the following terminals are equal to or higher than the rated values.

- (1) Between the AC input and GND terminals:
 - Using a megaohm meterr with an output capacity of 1000 VDC, check that the measured insulation resistance is 100 M Ω or more.
- (2) Between the signal input and GND terminals: Using a megaohm meter with an output capacity of 500 VDC, check that the measured insulation resistance is 100 M Ω or more.

6.2.2 Dielectric Strength

Using a dielectric strength tester to apply an experimental voltage between the following terminals, check that the current equals or is lower than the rated value within the stipulated time.

- (1) Between the AC input and GND terminals:
 - After applying an experimental voltage of 2.3 kVAC rms for no more than two seconds, check that the value of the current sustained for two seconds is:
 - 15 mA or less for an eight-channel model; or
 - · 20 mA or less for a 16-channel model.
- (2) Between the signal input and GND terminals:

After applying an experimental voltage of 2.3 kVAC rms for no more than two seconds, check that the value of the current sustained for two seconds is 2 mA or less.

6.2.3 Voltage Precision

Supply the reference voltage determined for each measurement range to each installed amp, then check the voltage precision.

Preparation

- Use a voltage generator that can output up to 500 VDC (using four-digit settings).
- Mutually connect the ground terminals of the voltage generator and WR1000 prior to initiating measurement.

Setting Procedure

- (1) Press the main control panel's (MODE) key to select LOGGING as the measurement mode.
- (2) Press the RECORD key on the Conditions panel to respectively display the Record Settings and Format Settings windows. To enter the following settings at each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the desired settings.



Fig. 6-2-1. Record Settings window

Logging Interval: 1 Second **Destination**: Printer



Fig. 6-2-2. Format Settings window

Format: either 8 Divisions or 16 Divisions

(3) Press the NPUT key on the Conditions panel to display the AMP Settings window shown below. Use the arrow keys to move the cursor to the desired parameter, then use the arrow keys, ENTER key, jog/shuttle dial, and EXECUTE key to enter the following settings.

AMP V or M DC

Range Select the range to be measured

Filter Line



Fig. 6-2-3. AMP Settings window



For a 16-channel model, first complete the settings for channels 1 through 8, press the amp control panel's <u>SEL</u> key to switch to the other channel group, then proceed to specify the settings for channels 9 through 16.

Measurement

- (1) Turn on the printer.
- (2) Use the voltage generator to successively input the reference voltage signals for each range according to the table below, then check that the printed level of measurement is within the rating. (For each RANGE setting, conduct measurement for about 10 seconds.)

Table 6-2-1. V amp: voltage precision ratings

RANGE setting	Reference voltage	Rating (±0.2% of F.S.)
50 mV	50.00 mV	49.90 to 50.10 mV
100 mV	100.0 mV	99.8 to 100.2 mV
200 mV	200.0 mV	199.6 to 200.4 mV
500 mV	500.0 mV	499.0 to 501.0 mV
1 V	1.000 V	0.998 to 1.002 V
2 V	2.000 V	2.996 to 2.004 V
5 V	5.000 V	4.990 to 5.010 V
500 V	500.0 V	499.0 to 501.0 V

Table 6-2-2. M amp: voltage precision ratings

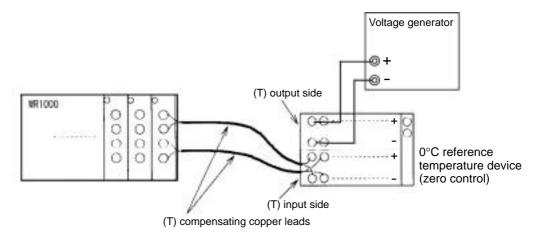
RANGE setting	Reference voltage	Rating (±0.2% of F.S.)
20 mV	20.00 mV	19.96 to 20.04 mV
50 mV	50.00 mV	49.90 to 50.10 mV
100 mV	100.0 mV	99.8 to 100.2 mV
200 mV	200.0 mV	199.6 to 200.4 mV
500 mV	500.0 mV	499.0 to 501.0 mV
1 V	1.000 V	0.998 to 1.002 V
2 V	2.000 V	2.996 to 2.004 V
200 V	200.0 V	199.6 to 200.4 V

6.2.4 Temperature Precision (M Type Amps Only)

This inspection is only performed for M type amps.

Preparation

- Use (T) temperature compensation leads to connect the target amp and a 0°C reference temperature device (zero control) as shown below.
- As shown below, use copper leads to connect the 0°C reference temperature device (zero control) to a
 voltage generator that can specified for output up to 1 μV.



NOTE: Use one compensating copper lead to connect each terminal as shown in the above figure. (Parallel wiring is not permitted.)

Fig. 6-2-4

Setting Procedure

- (1) Press the main control panel's MODE key to select LOGGING as the measurement mode.
- (2) Press the RECORD key on the Conditions panel to respectively display the Record Settings and Format Settings windows. At each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the following settings.

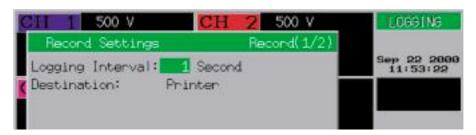


Fig. 6-2-5. Record Settings window

Logging Interval: 1 Second **Destination**: Printer



Fig. 6-2-6. Format Settings window

Format: either 8 Divisions or 16 Divisions

(3) Press the INPUT key on the Conditions panel to display the AMP Settings window shown below. Use the arrow keys to move the cursor to the desired parameter, then use the arrow keys, ENTER key, jog/shuttle dial, and EXECUTE key to enter the following settings.

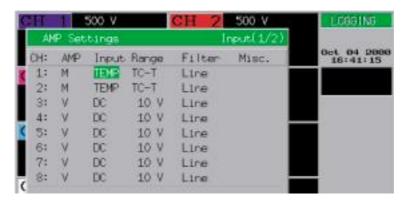


Fig. 6-2-7. AMP Settings window

AMP M
Input TEMP
Range TC-T
Filter Line



For a 16-channel model, first complete the settings for channels 1 through 8, press the amp control panel's SEL key to switch to the other channel group, then proceed to specify the settings for channels 9 through 16.

Measurement

- (1) Turn on the printer.
- (2) Use the voltage generator to successively input the reference voltage signals for each range to the 0°C reference temperature device (zero control) according to the table below, then check that the printed level of measurement is within the rating.

Temperature ranges:

Standard 1: When measurement is continued right after setup

-200°C to 0°C: \pm (0.5% of rdg + 1.5°C) 0°C to 400°C : \pm (0.2% of rdg + 1.5°C)

Standard 2: When measurement is continued under different conditions than setup (main unit, mea-

surement site, insertion slot)

-200°C to 0°C: \pm (0.5% of rdg + 2.0°C) 0°C to 400°C : \pm (0.2% of rdg + 2.0°C)

Table 6-2-3. M amp: temperature precision ratings

Temperature value	Input voltage	Standard 1	Standard 2
−200°C	−5.603 mV	–202.5°C to −197.5°C	−203.0°C to −197.0°C
-100°C	−3.379 mV	-102.5°C to -98.0°C	−102.5°C to −97.5°C
0°C	0.000 mV	–1.5°C to 1.5°C	-2.0°C to 2.0°C
100°C	4.279 mV	98.3°C to 101.7°C	97.8°C to 102.2°C
200°C	9.288 mV	198.1°C to 201.9°C	197.6°C to 202.4°C
300°C	14.862 mV	297.9°C to 302.1°C	297.4°C to 302.6.°C
400°C	20.872 mV	397.7°C to 402.3°C	397.2°C to 402.8°C

6.2.5 Signal-to-Noise Ratio

Preparation

Prepare the short terminals shown below for shorting the + and - terminals for each channel of the target amp, then short those terminals.



Fig. 6-2-8



If there are not enough short terminals to short each channel separately, set the RANGE setting for each of that amp's channels to Off.

Setting Procedure

- (1) Press the main control panel's MODE key to select RECORDER as the measurement mode.
- (2) Press the RECORD key on the Conditions panel to respectively display the Record Settings and Format Settings windows. At each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the following settings.

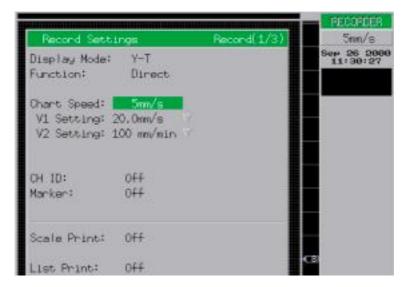


Fig. 6-2-9. Record Settings window

Display ModeY-TFunctionDirectChart Speed5mm/s

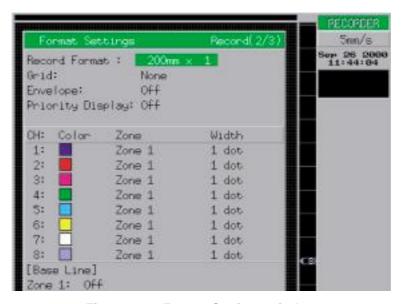


Fig. 6-2-10. Format Settings window

 $\begin{array}{lll} \textbf{Record Format} & 200 \text{mm} \times 1 \\ \textbf{Grid} & \text{None} \\ \textbf{Width} & 1 \ \text{dot} \\ \end{array}$

(3) Press the INPUT key on the Conditions panel to display the AMP Settings window shown below. Use the arrow keys to move the cursor to the desired parameter, then use the arrow keys, ENTER key, jog/shuttle dial, and EXECUTE key to enter the following settings.



Fig. 6-2-11. AMP Settings window

AMP V or M Input DC

Range 50mV (if AMP = V) or 20mV (if AMP = M)

Filter Off Scaling Off

Lower-SPAN-Upper Specify an appropriate pitch that will enable simultaneous viewing of eight lines

Measurement

- (1) Turn on the printer.
- (2) Use short terminals to short the input terminals of all channels.
- (3) Measure the width of each line printed by the recording operation and check that its width is within the rated range.

Table 6-2-4

RANGE setting	At 200-mm oscillation	
V amp		
50 mV	within 1 mm	
5 V	within 1 mm	
M amp		
20 mV	within 0.75 mm	
2 V	within 0.75mm	



To measure Channels 9 through 16, press the amp control panel's SEL key to switch the channel group displayed, then resume measurement.

6.2.6 Frequency and Filter Characteristics

Preparation

Have on hand an oscillator capable of the types of output described below.

Output waveforms: sine waves
Frequency: 1.0 Hz to 50 kHz

• Mutually connect the GND terminals of the oscillator and the WR1000 before measurement.

Setting Procedure

(1) Press the main control panel's MODE key to select RECORDER as the measurement mode.

(2) Press the RECORD key on the Conditions panel to respectively display the Record Settings and Format Settings windows. At each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the following settings.

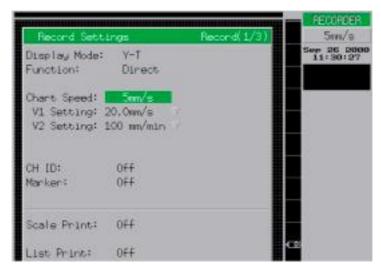


Fig. 6-2-12. Record Settings window

Display ModeY-TFunctionDirectChart Speed5mm/s

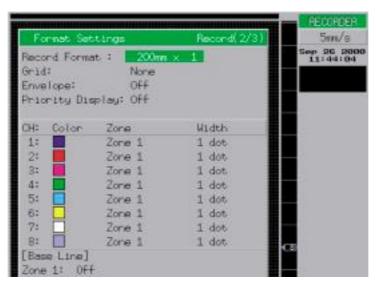


Fig. 6-2-13. Format Settings window

 $\begin{array}{lll} \textbf{Record Format} & 200 \text{mm} \times 1 \\ \textbf{Grid} & \text{None} \\ \textbf{Width} & 1 \ \text{dot} \\ \end{array}$

(3) Press the NPUT key on the Conditions panel to display the AMP Settings window shown below. Use the arrow keys to move the cursor to the desired parameter, then use the arrow keys, ENTER key, jog/shuttle dial, and EXECUTE key to enter the following settings.



Fig. 6-2-14. AMP Settings window

AMP V or M Input DC Range 5V

Filter The same Filter setting as the object of measurement

Scaling Off

Lower-SPAN-Upper Specify an appropriate pitch that will enable simultaneous viewing of eight lines

Measurement

- (1) Set the Filter parameter to Off, then adjust the oscillator's output level to achieve an appropriate amplitude when the oscillator is inputting a 1-Hz frequency (the reference signal input).
- (2) In the above status, turn on the printer and then record (print) the amplitude of the reference signal input.
- (3) Specify the Filter setting and the input signal frequency from the oscillator according to Table 6-2-5. (Set the output level to match that of the reference signal input.)
- (4) Check that the measured amplitude is within the standard when compared with the amplitude during reference signal input.

Table 6-2-5

Input	Filter	Input frequency	Standard
	Line 1.5	1.5 Hz	
	5 Hz	5 Hz	55 to 85%
	10 Hz	10 Hz	
	30 Hz	30 Hz	
DC	50 Hz	50 Hz	60 to 80%
	500 Hz	500 Hz	00 10 80 %
	5 kHz	5 kHz	
	Off	V: 50 kHz	70 to 112%
	Oii	M: 20 kHz	70 10 112%
AC	Off	10 Hz	60 to 80%

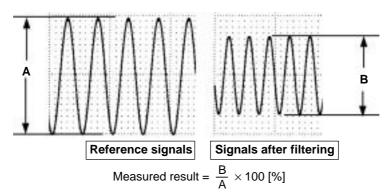


Fig. 6-2-15

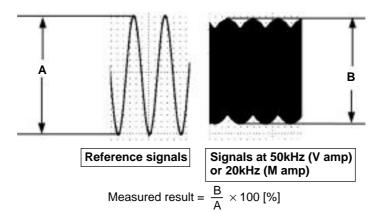


Fig. 6-2-16



To measure Channels 9 through 16, press the amp control panel's **SEL** key to switch the channel group displayed, then resume measurement.

6.2.7 Memory Trigger Operation

Preparation

Have on hand an oscillator capable of the types of output described below.

Output waveforms : sine waves, triangular waves

Frequency: 5 Hz and 2 Hz

• Mutually connect the GND terminals of the oscillator and the WR1000 before measurement.

Setting Procedure

(1) Press the main control panel's MODE key to select RECORDER as the measurement mode.

(2) Press the MEMORY key on the Conditions panel to respectively display the Memory Settings and Data Replay Settings windows. At each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the following settings.

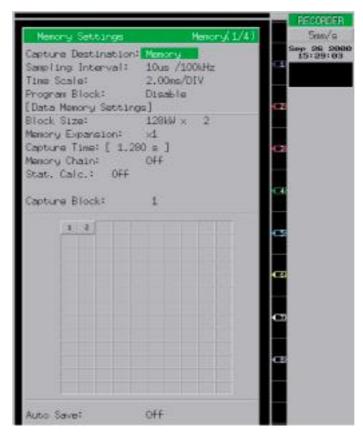


Fig. 6-2-17. Memory Settings window

Capture DestinationMemorySampling Interval10 μs/100kHz

Block Size $128kW \times 2$ (or $256kW \times 2$ if the memory option is installed)

Memory Expansion×1Memory ChainOffStat. Calc.Off

Capture Block 1 or 2 (see Steps (1) and (6) under "Measurement")

Auto Save Off

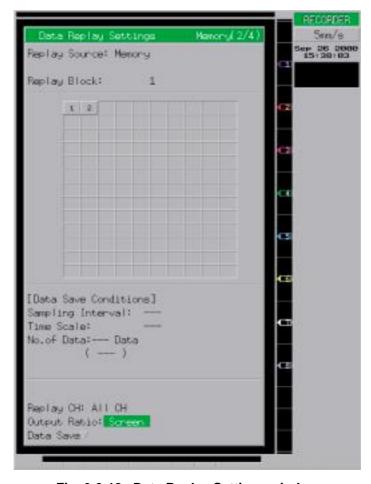


Fig. 6-2-18. Data Replay Settings window

Replay Source Memory

Replay Block 1 or 2 (see Steps (1) and (7) under "Measurement")

Replay CH All CH Output Ratio Screen

(3) Press the TRIGGER key on the Conditions panel to display the Trigger Settings window shown in the figure. Use the arrow keys to move the cursor to the desired parameter, then use the arrow keys, ENTER key, jog/shuttle dial, and EXECUTE key to enter the following settings.

Time GateDisableFunctionMemoryActionSingle

[Start Condition]

SourceInternalTypeNormalCombinationLevel ORMode⅓/HLower-Level-Upper+50%

Trigger Counter Count 1 [count]

Pre-trigger 50 [%]

[Stop Condition]

Source Off

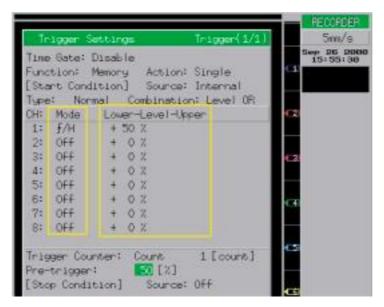


Fig. 6-2-19. Trigger Settings window



Specify the Mode and Lower-Level-Upper settings separately for each channel. Also set the Mode setting to Off for any channel that you do not wish to measure.

Measurement

- (1) Set the Capture Block setting (Memory Settings window) and Replay Block setting (Data Replay Settings window) to 1.
- (2) Using the oscillator, input sine waves of 5-Hz frequency (2-Hz frequency if optional memory is installed) to each channel.
- (3) Press the main control panel's START key to initiate measurement. When the "Finished" message appears at the simplified message area, press the STOP key to terminate measurement.

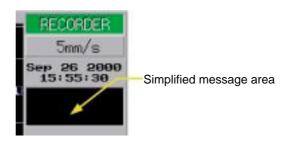


Fig. 6-2-20

(4) Press the MEM. OUT key to output the data captured in memory, then check the accuracy of the position where the trigger was activated and whether the data was accurately captured in memory.

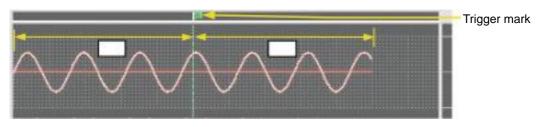


Fig. 6-2-21



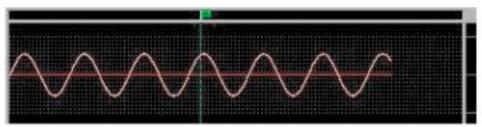
Regardless of the SPAN settings, the Trigger level setting will be $\pm 100\%$ of the selected Range setting.

Table 6-2-6. Example when the Range setting is 5V

Voltage level	Trigger level
+5 V	+100%
0 V	0%
-5 V	-100%

- (5) Check the memory trigger operation for each channel by successively changing the CH settings at the Trigger Settings window and then repeating Steps (3) and (4) for the selected channel.
- (6) At the Memory Settings window, change the Capture Block setting to 2.
- (7) Use the oscillator to input triangular waves of 5-Hz frequency (or 2-Hz frequency if optional memory is installed) to the selected channel.
- (8) After repeating Step (3), check that sine waves were captured in Block No. 1 and triangular waves were captured in Block No. 2.

Capture Block 1



Capture Block 2

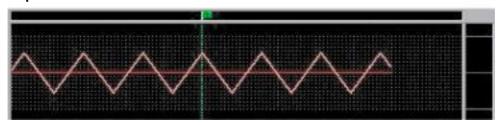


Fig. 6-2-22

6.2.8 REMOTE Interface Operation

Check that the REMOTE functions operate properly as described in the table below.

Table 6-2-7. Checkpoints of REMOTE interface operation

Pin No.	Function	Settings	Check method
9~12, 15, 16	GND		
1	START/STOP (Level operation) Measurement starts when a low signal is input, and stops when a high signal is input.	Measurement mode: RECORDER	Check that measurement properly starts and stops
2	START/STOP (Edge operation) Measurement alternately starts or stops when a low signal is input.	Measurement mode: RECORDER	Check that measurement properly starts and stops
3	FEED CLOCK Inputs chart feed clock pulses • Feed distance: 0.03125 mm/pulse • Frequency: 640 pps maximum • Maximum speed: 20 mm/s	Measurement mode: RECORDER Chart Speed: External (Record Settings window)	Input 640-Hz pulses and check that the actual chart speed is 20 mm/s
4	TRIGGER INPUT Inputs externally-supplied trigger signals The trigger is activated when the signal goes low	Measurement mode: RECORDER Source: External (Trigger Settings window)	Check that the trigger is activated
5	SAMPLE CLOCK Inputs externally-supplied sample clock pulses • Pulse width: 500 ns or more • Cycle : 10 µs or more	Measurement mode: RECORDER Sampling Interval: External (Memory Settings window)	Input clock pulses of 0 to 5 V at a 100-kHz frequency and check that they are properly captured in memory
13	EVENT INPUT Inputs externally-supplied Event signals • Pulse width: the recording cycle or higher	Measurement mode: RECORDER Marker: Event (Record Settings window)	Input clock pulses of 0 to 5 V at a 1-Hz frequency and check that they are properly printed on chart paper
6	TRIGGER OUTPUT Outputs Trigger signals A low pulse is output whenever the trigger is activated	Measurement mode: RECORDER	Check that the pulse is output for at least 10 ms
7	M/C ALARM Outputs a low signal whenever an error occurs.		Check that a low signal is output when the printer unit runs out of paper
8	GO/NOGO OUTPUT Outputs waveform judgement signals • Outputs a low pulse when a judgement is reached • Pulse width: 100 ms minimum	Refer to the separate "Checking the Judge- ment Output"	Same as the left (for firmware version no. 1.10 and higher)
16	AC LINE FAIL OUTPUT Outputs a high signal during AC operation, or a low signal during DC operation.		* Only applies when the DC adapter option is installed Check that the signal output conforms to the specifications on the left

6.2.9 RS-232C Interface Operation

(1) Press the SYSTEM key twice on the Conditions panel to open the Option Settings window shown below, move the cursor to the "[RS-232C Settings] Change Settings" position, then press the ENTER key to display the RS-232C Settings menu. Set the menu's parameters as follows.

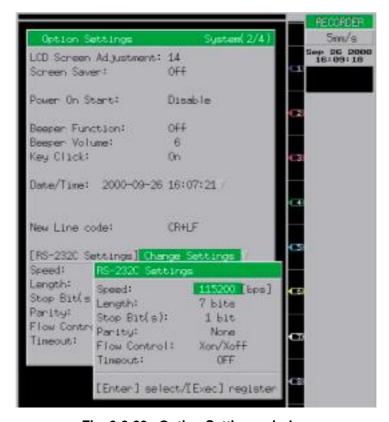


Fig. 6-2-23. Option Settings window

Speed 115200 [bps]

Length7 bitsStop Bit(s)1 bitParityNoneFlow ControlXon/XoffTimeoutOff

(2) Send a request from the computer for information about the WR1000's status, such as its model ID number, then check that the right response is received.

Example:

Command : * IDN?

Sample response: * IDN GRAPHTEC, WR1000, 0, 1.11

Firmware version no.

For detailed information about commands, refer to the separate WR1000 COMMAND MANUAL.

6.2.10 FDD Operation

Prepare a formatted floppy disk and insert it in the FDD (Floppy Disk Drive) before starting the following test.

(1) Press the SYSTEM key on the Conditions panel to display the System Settings window shown below, move the cursor to the "Save current settings" position, then press the ENTER key to open the Save Settings menu.

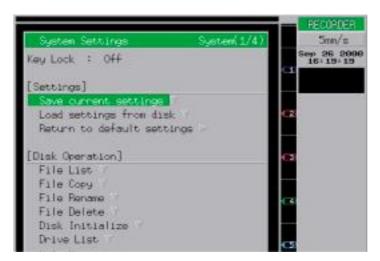


Fig. 6-2-24. System Settings window

(2) Set the parameters on the Save Settings menu as follows to save the current measurement conditions.

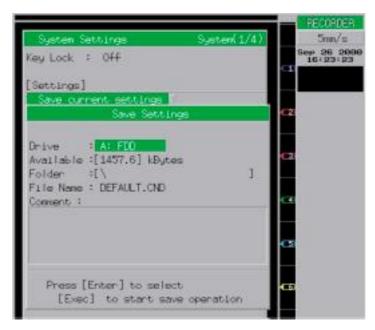


Fig. 6-2-25

Drive A: FDD

Folder Select an appropriate folder (or leave this setting as shown above)

File Name Specify an appropriate filename.

(3) Change a few of the measurement conditions, press the SYSTEM key to display the System Settings window shown in Fig. 6-2-24. Move the cursor to the "Load settings from disk" position, then press the ENTER key to open the Load Settings menu.

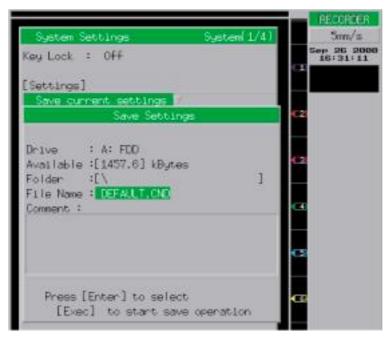


Fig. 6-2-26. Load Settings menu

(4) Specify the parameters on the Load Settings menu to the same settings that you specified in Step (2), then read out the saved measurement conditions. Check that the measurement conditions that you changed in Step (3) have returned to their previous settings.

6.2.11 Chart Feeding Precision

Preparation

Prepare a glass scale that is at least 30 cm long.

Setting Procedure

- (1) Press the main control panel's MODE key to select RECORDER as the measurement mode.
- (2) Press the RECORD key on the Conditions panel to respectively display the Record Settings and Format Settings windows. At each window, use the arrow keys to move the cursor to the desired parameter, then use the ENTER key and arrow keys to enter the following settings.

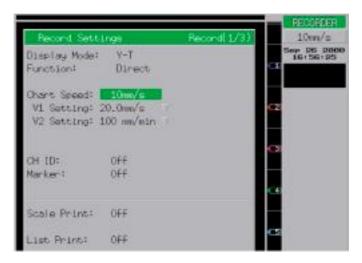


Fig. 6-2-27. Record Settings window

Display ModeY-TFunctionDirectChart Speed10mm/s

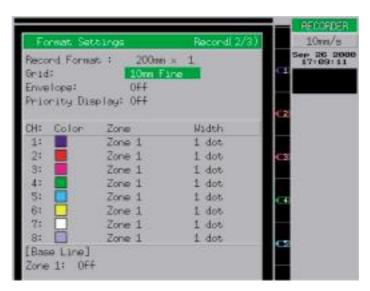


Fig. 6-2-28. Format Settings window

 $\begin{array}{ll} \textbf{Record Format} & 200 \text{mm} \times 1 \\ \textbf{Grid} & 10 \text{mm Fine} \\ \end{array}$

Measurement

- (1) Turn on the printer.
- (2) Press the START key to initiate measurement, then press the STOP key to stop measurement after the chart paper has been advanced about 30 to 45 cm. (No signal input is required.)
- (3) Using the glass scale, measure the printed grid (scale) on the chart paper to check that the chart feeding precision is within the rated range.

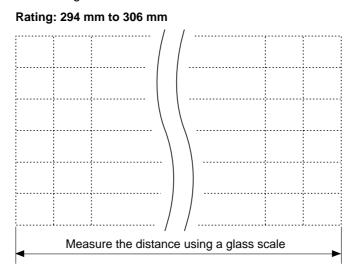


Fig. 6-2-29

(4) Change the "Chart Speed" setting to 200mm/s, repeat Steps (2) and (3), then check that the chart feeding precision is also within the rated range for the Chart Speed setting of 200mm/s.

6.2.12 Slant of Chart Feeding

Preparation

Prepare a glass scale.

Setting Procedure

The setting procedure is identical to that described in Subsection 6.2.11, "Chart Feeding Precision."

Measurement

- (1) Turn on the printer.
- (2) Press the START key to initiate measurement. Allow the chart paper to be advanced about 30 cm plus an additional 1.2 meters, then press the STOP key to stop measurement. (No signal input is required.)
- (3) As shown in the figure below, measure the distance from the chart paper's edge to the grid line at distances of both 30 cm and 1.3 meters from the starting point of measurement. Check that the difference between (a) and (b) is within the rated range.

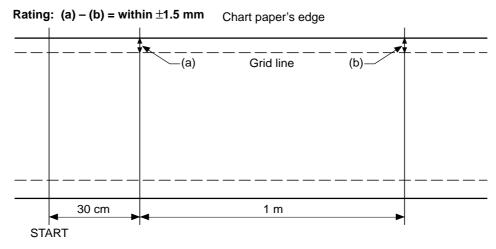


Fig. 6-2-30

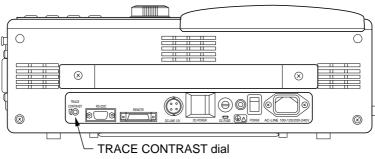
6.2.13 Printing Performance

Setting Procedure

The setting procedure is identical to that described in Subsection 6.2.11, "Chart Feeding Precision."

Measurement

- (1) Turn on the printer.
- (2) After turning the TRACE CONTRAST dial fully to its maximum position, press the START key to start printing.
 - Check that the grid dots being printed on the chart paper do not disappear.
- (3) During the printing operation started in Step (2), check that the print density changes when the TRACE CONTRAST dial is turned to its minimum position.



- Turn clockwise to increase the contrast.
- Turn counter-clockwise to decrease the contrast.

Fig. 6-2-31



When the TRACE CONTRAST dial is set to its minimum position, the grid dots will disappear. The printing performance is satisfactory if the dots do not disappear when the TRACE CONTRAST dial is set to its maximum position.

6.2.14 Other Functions

(1) Adjusting the LCD Screen

Press the SYSTEM key on the Conditions panel twice to display the Option Settings window shown below. Move the cursor to the "LCD Screen Adjustment" parameter and then check that the screen's brightness level changes when the LCD Screen Adjustment setting is set to 1 and then to 15. (The brightness does not change greatly.)

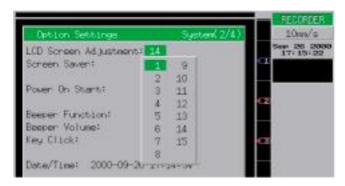


Fig. 6-2-32

(2) Checking the Screen Saver

Move the cursor to the "Screen Saver" parameter and set it to 1min, then check that the screen display goes off after one minute has lapsed without any key input or other operation at the WR1000.

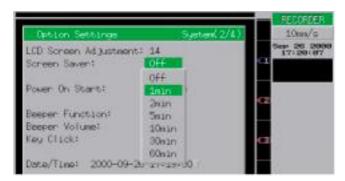


Fig. 6-2-33

(3) Checking the Key Click Sound

Move the cursor to the "Key Click" parameter and then check that the WR1000 operates as follows when the Key Click setting is switched On or Off.

On: A click sound is audible whenever a key is pressed.

Off: No click sound is generated even when a key is pressed.



Fig. 6-2-36

(4) Checking the Fan Motors

With the WR1000, the On/Off control of the fan motor is determined by the number of channels installed and the Chart Speed setting. Check that the fan motors are operating properly by observing their On/Off operation as follows.

16-channel model:

• Normally, both fan motors are On.

8-channel model:

- In standby status, the fan motor near the handle (near the Power switch) is ON and the front fan motor is OFF.
- When the Chart Speed setting ranges from 50 to 200 mm/s, both fan motors are ON.

6.3 Checking the Optional Devices

6.3.1 GP-IB Interface Operation

Check the operation of the GP-IB interface by issuing a request from the computer for information about the WR1000's current status, such as its model ID number, then checking that the right response is received.

Example:

Command : * IDN?

Sample response: * IDN GRAPHTEC, WR1000, 0, 1.11

Firmware version no.

For detailed information about commands, refer to the separate WR1000 COMMAND MANUAL.

6.3.2 Logic Amp Operation

(1) Press the INPUT key on the Conditions panel to display the AMP Settings window shown below, then set its Logic parameter and Threshold Settings as follows.

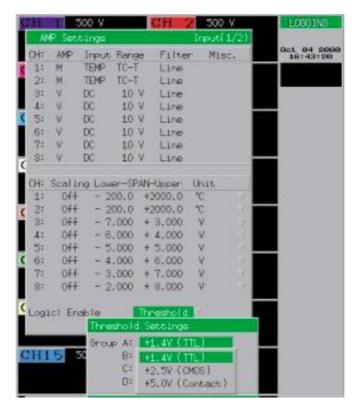


Fig. 6-3-1. AMP Settings window

 Logic
 Enable

 Group A
 +1.4V (TTL)

 Group B
 +1.4V (TTL)

 Group C
 +1.4V (TTL)

 Group D
 +1.4V (TTL)



Specify the same setting for Groups A, B, C, and D.

- (2) Press the RECORD key twice to open the Format Settings window (shown in Fig. 6-3-3), then specify the Logic Zone parameters.
- (3) Press the main control panel's MODE key to select LOGGING as the measurement mode.
- (4) Check that the measured results conform to those in the "Results" column in the table below when each specified voltage is input to the logic input terminals.

Table 6-3-1. When the Threshold level is +1.4V (TTL)

Input voltage	Results (A, B, C, and D)
1 V	(LLLL)
2 V	■ ■ ■ (HHHH)

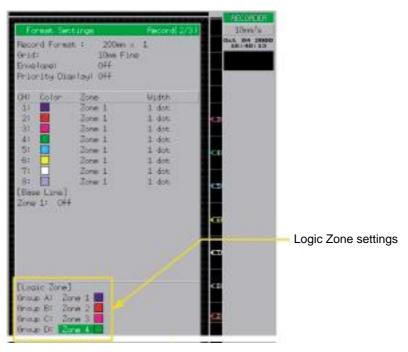


Fig. 6-3-2. Format Settings window

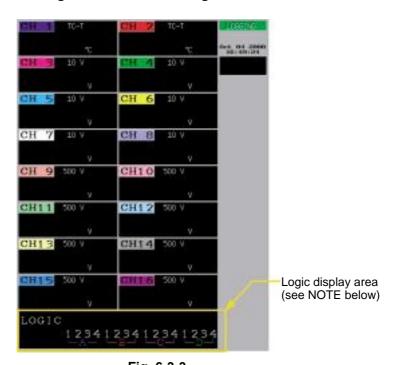


Fig. 6-3-3



A Logic Group that is properly set up for measurement (Group D in this example) is indicated in the Logic display area as shown in the figure below.



Fig. 6-3-4

(5) Change the Threshold level to +2.5V (CMOS) in the AMP Settings window, then check that the measured results conform to those in the "Results" column in the table below when each specified voltage is input to the logic input terminals.

Table 6-3-2. When the Threshold level is +2.5V (CMOS)

Input voltage	Results (A, B, C, and D)
2 V	(LLLL)
3 V	■ ■ ■ (HHHH)

(6) Change the Threshold level to +5.0V (Contact) in the AMP Settings window, then check that the measured results conform to those in the "Results" column in the table below when each specified voltage is input to the logic input terminals.

Table 6-3-3. When the Threshold level is +5.0V (Contact)

Input voltage	Results (A, B, C, and D)
4 V	(LLLL)
6 V	■■■ (HHHH)

6.3.3 Expansion Memory Board

To check the operation of the expansion memory board, repeat the procedure described in Subsection 6.2.7, "Memory Trigger Operation," but substitute the settings for the optional memory instead of for the standard memory.

6.3.4 DC Adapter Operation

Preparation

Respectively connect the WR1000's AC line inlet (AC IN) and DC jack as shown in the figure below.

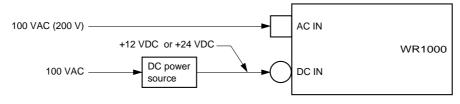


Fig. 6-3-5



Provide a DC power source that is capable of outputting the voltage and current specified below.

Voltage: +12 VDC or +24 VDC Current: 20 A (maximum)

Check Procedure

- (1) Input either +12 or +24 VDC to the DC IN terminal, depending on the model number of the WR1000 main unit
- (2) Turn on the main unit's DC Power switch and check that the WR1000 is properly booted.
- (3) Input 100 V (200 V) to the main unit's AC line inlet, then turn on the AC Power switch.
- (4) Turn off the DC Power switch and check that the WR1000 is running on the AC power supply alone.
- (5) Turn the DC Power switch back on and turn off the AC Power switch.
- (6) Check that the WR1000 has switched to operation on the DC power supply without the TFT going off.
- (7) At the same time, check the signal level of the REMOTE OUT signal (see Subsection 6.2.8, "REMOTE Interface Operation").
- (8) With the WR1000 running on the DC power supply, perform recording (printing) at a Chart Speed setting of 10mm/s and check that the printing operation is normal.

6.3.5 Internal HDD/MODD Operation

The following inspection tests an internal HDD (Hard Disk Drive) or internal MODD (Magneto-Optic Disk Drive). If an external memory device has been installed, please remove it first.

Preparations

(1) Check the position of the two switches that determine the Terminator setting for the SCSI interface.

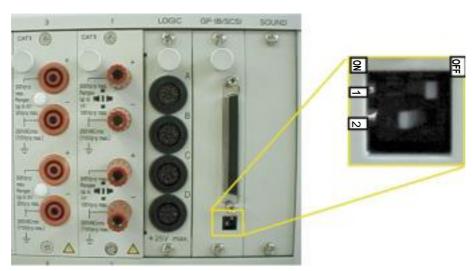


Fig. 6-3-6

Confirm that the two switches shown above are set as follows.

1: ON 2: ON (2) Unfasten the six screws, then remove the bottom plate.



Fig. 6-3-7

(3) Check that the four bits of DIP switch S1 on the SCSI control board are properly set.

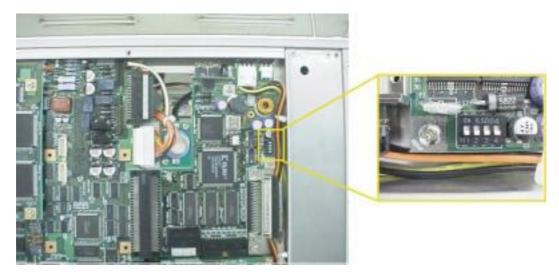


Fig. 6-3-8

Table 6-3-4

	S1			
	1	2	3	4
HDD only or MODD plus HDD	OFF	OFF	OFF	OFF
MODD only	ON	ON	ON	ON

- (4) Turn on the WR1000.
- (5) The device ID and part number of the connected memory device(s) are displayed while the WR1000 is being booted, so check that the device IDs are as follows.

ID0: Internal HDD

ID1: Internal MODD

ID2:

External HDD, MODD, or Zip drive

ID6 : J



The following Steps (6) and (7) are not required when testing an internal MODD.

A CAUTION

Performing Steps (6) and (7) will reformat the internal hard disk, so first check that it does not contain important data.

If the internal hard disk contains the customer's data, do not reformat it.

- (6) As the first step in reformatting the internal hard disk, press the SYSTEM key on the Conditions panel to open the System Settings window. Move the cursor to the "Disk Initialize" operation, then press the ENTER key.
- (7) At the Disk Initialize menu, change the Initialize mode setting to HDD Reconfigure (FDISK), set the SCSI ID setting to 0 (zero), then press the **EXECUTE** key to start reformatting the internal hard disk.

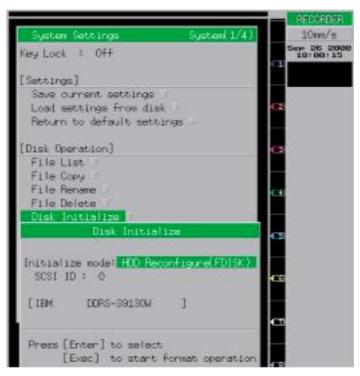


Fig. 6-3-9. System Settings window

Check Procedure

- (1) Specify the parameters in the Trigger Settings window to the same settings listed in Step (3) of Subsection 6.2.7, "Memory Trigger Operation."
- (2) Press the (MEMORY) key to open the Memory Settings window, then change its settings as follows.



Fig. 6-3-10. Memory Settings window

Capture Destination Disk **Sampling Interval** See

See Table 6-3-5

Table 6-3-5

	Sampling Interval		
	HDD	MODD	
8ch	20μs/50kHz	500 μs/2kHz	
16ch	50μs/20kHz	1ms/1kHz	

File Name C:\DEFAULT.DAT (any suitable filename)

Number of CH 8 or 16 Event On

- (3) Use an oscillator to input sine waves at a frequency of about 5 Hz to each amp's input terminals.
- (4) Press the START key to initiate measurement.

The measured data starts being written to disk when the trigger is activated, so continue measurement for about 10 seconds (about 20 seconds if writing to an MO disk) and then press the STOP key to stop measurement.

(5) Press the MEMORY key twice to open the Data Replay Settings window, then set its parameters as follows.

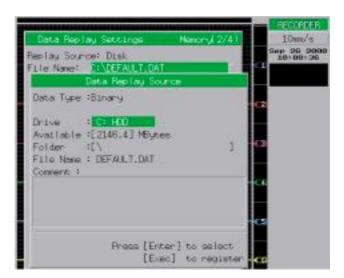


Fig. 6-3-11. Data Replay Settings window

Replay Source Disk

File Name Specify the same location and filename that you specified in Step (2)

(6) When the **EXECUTE** key is pressed to register the settings you specified in Step (5), the menu below appears so check that the data is being properly captured to memory.

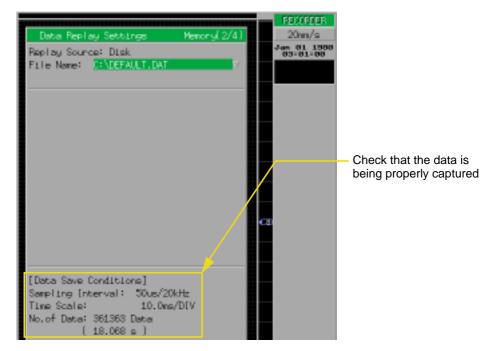


Fig. 6-3-12



Step (7) is not required when testing an internal MODD.

(7) To delete the test data, either perform the Reconfigure HDD (FDISK) operation to reformat the internal HDD or perform the File Delete operation to delete the file containing the test data.

6.3.6 SCSI Interface Operation

If an external HDD or MODD is connected to the WR1000 via the SCSI interface, remove that external device before proceeding.

Preparation

(1) Check the positions of the two switches that determine the Terminator setting for the SCSI interface.

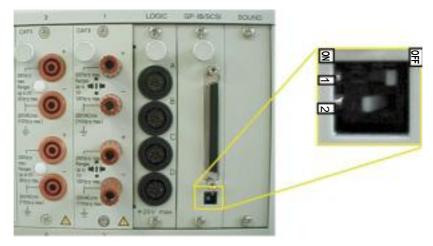


Fig. 6-3-13

Table 6-3-6. Terminator setting

Connected device	68 pin/50 pin conversion adapter [™]	WR1000 SCSI interface's Terminator setting	External device's Terminator status
HDD 68-pin connector WR1000	Not needed	1 : Off 2 : Off	
MO or ZIP drive 50-pin connector	Conversion adapter without terminator	1 : Off 2 : On	Set the terminating device's Terminator to On
↑ Conversion adapter	Conversion adapter with terminator	1 : Off 2 : Off	
MO or ZIP drive 50-pin connector	Conversion adapter without terminator	Inc	ompatible
↑ Conversion adapter	Conversion adapter with terminator ²	1 : Off 2 : Off	Set the terminating device's Terminator to On

^{*1} For this conversion adapter, use a commercially available product.

(2) Unfasten the six screws, then remove the bottom plate.



Fig. 6-3-14

^{*2} For the conversion adapter equipped with a terminator, use a conversion connector where the Active Terminator is High Byte.

(3) Check that the four bits on DIP switch S1 on the SCSI control board are correctly set.

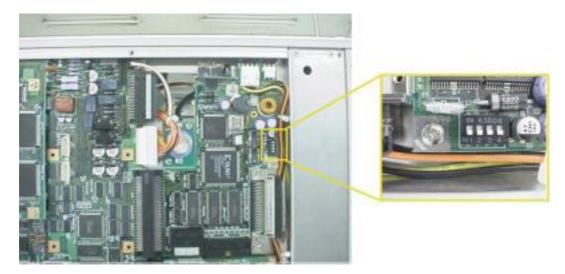


Fig. 6-3-15

Table 6-3-7

		S	1	
	1	2	3	4
Neither the HDD nor MODD is installed	ON	ON	ON	ON

- (4) Connect the external HDD or MODD, then turn it on.
- (5) Turn on the WR1000.
- (6) The device ID and part number of the connected external memory device are displayed while the WR1000 is being booted, so check that its device ID is as follows.

ID2: | External HDD, MODD, or Zip drive

NOTE

- For the external memory device, specify a device ID from 2 to 6.
- The following Steps (7) and (8) are not required when testing an external MODD.

M

CAUTION-

Performing Steps (7) and (8) will reformat the external hard disk, so first check that it does not contain important data.

If the hard disk contains the customer's data, do not reformat it.

- (7) As the first step in reformatting the external hard disk, press the SYSTEM key on the Conditions panel to open the System Settings window. Move the cursor to the "Disk Initialize" operation, then press the ENTER key.
- (8) At the Disk Initialize menu, change the Initialize mode setting to HDD Reconfigure (FDISK), set the SCSI ID setting to 2, then press the EXECUTE key to start reformatting the external hard disk.

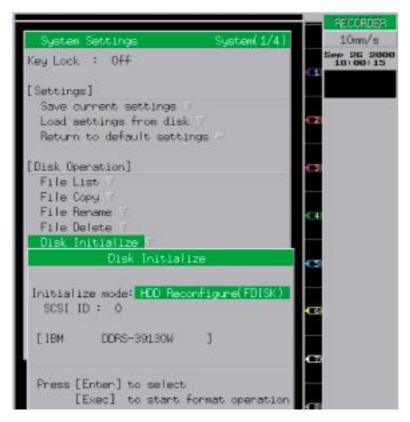


Fig. 6-3-16. System Settings window

Check Procedure

- (1) Specify the parameters in the Trigger Settings window to the same settings listed in Step (3) of Subsection 6.2.7, "Memory Trigger Operation."
- (2) Press the MEMORY key to open the Memory Settings window, then change its settings as follows.



Fig. 6-3-17. Memory Settings window

Capture Destination Disk

Sampling Interval See Table 6-3-8

Table 6-3-8

	Sampling Interval		
	HDD	MODD	
8ch	20μs/50kHz	500 μs/2kHz	
16ch	50μs/20kHz	1ms/1kHz	

File Name C:\DEFAULT.DAT (any suitable filename)

Number of CH 8 or 16 Event On

- (3) Use an oscillator to input sine waves at a frequency of about 5 Hz to each amp's input terminals.
- (4) Press the START key to initiate measurement.

 The measured data starts being written to disk when the trigger is activated, so continue measurement for about 10 seconds (about 20 seconds if writing to an MO disk) and then press the STOP key to stop
- (5) Press the MEMORY key twice to open the Data Replay Settings window, then set its parameters as follows.

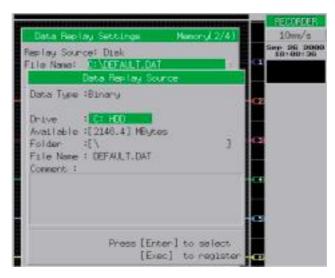


Fig. 6-3-18. Data Replay Settings window

Replay Source File Name

Disk

Specify the location and filename where the data was saved in Step (2)

(6) When the **EXECUTE** key is pressed to register the settings you specified in Step (5), the menu below appears so check that the data is being properly captured to memory.



Fig. 6-3-19

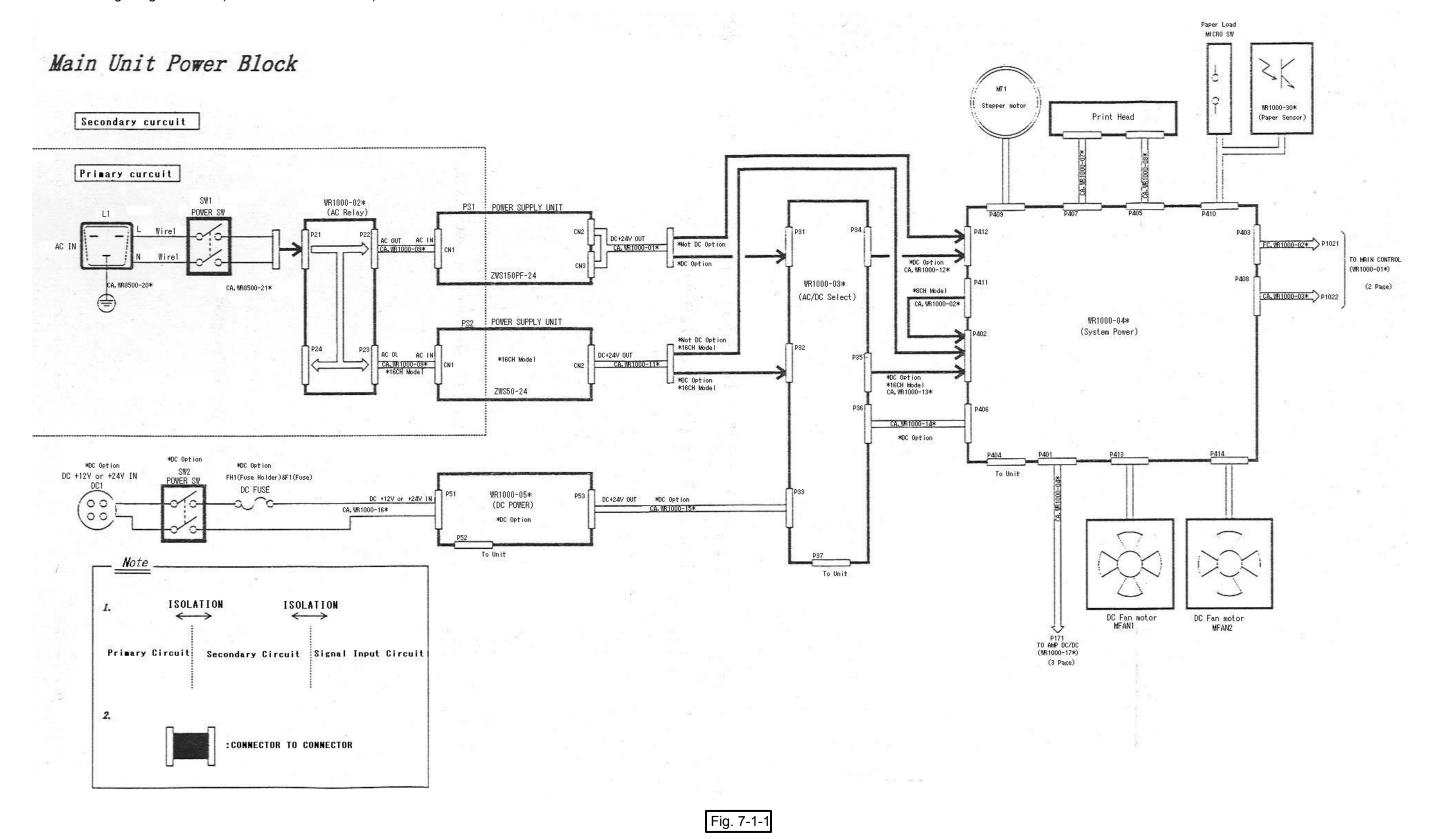


Step (7) is not required when testing an external MODD.

(7) To delete the test data, either perform the Reconfigure HDD (FDISK) operation to reformat the external HDD or perform the File Delete operation to delete the file containing the test data.

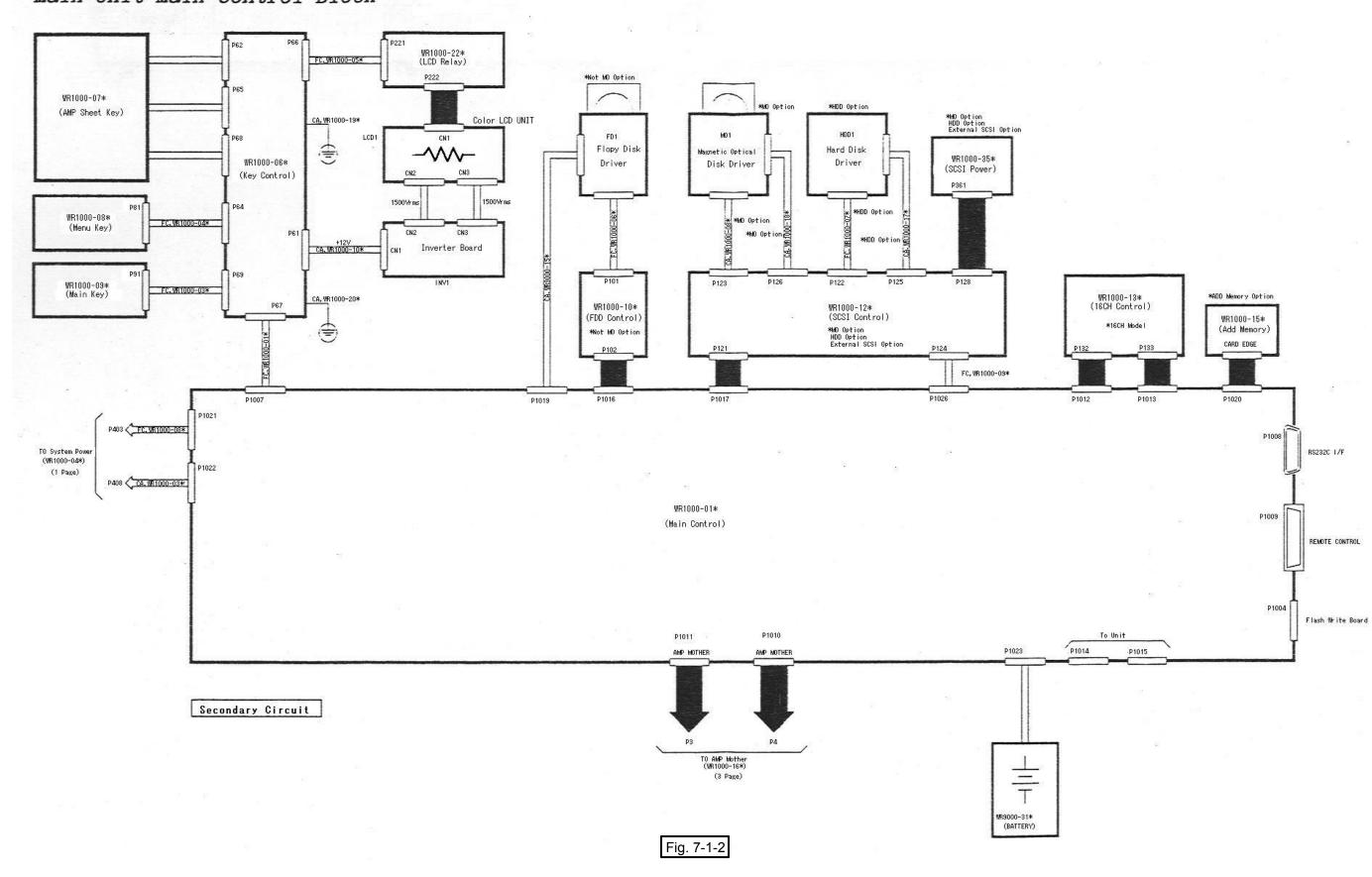
7. DISASSEMBLY DIAGRAMS AND PARTS LISTS

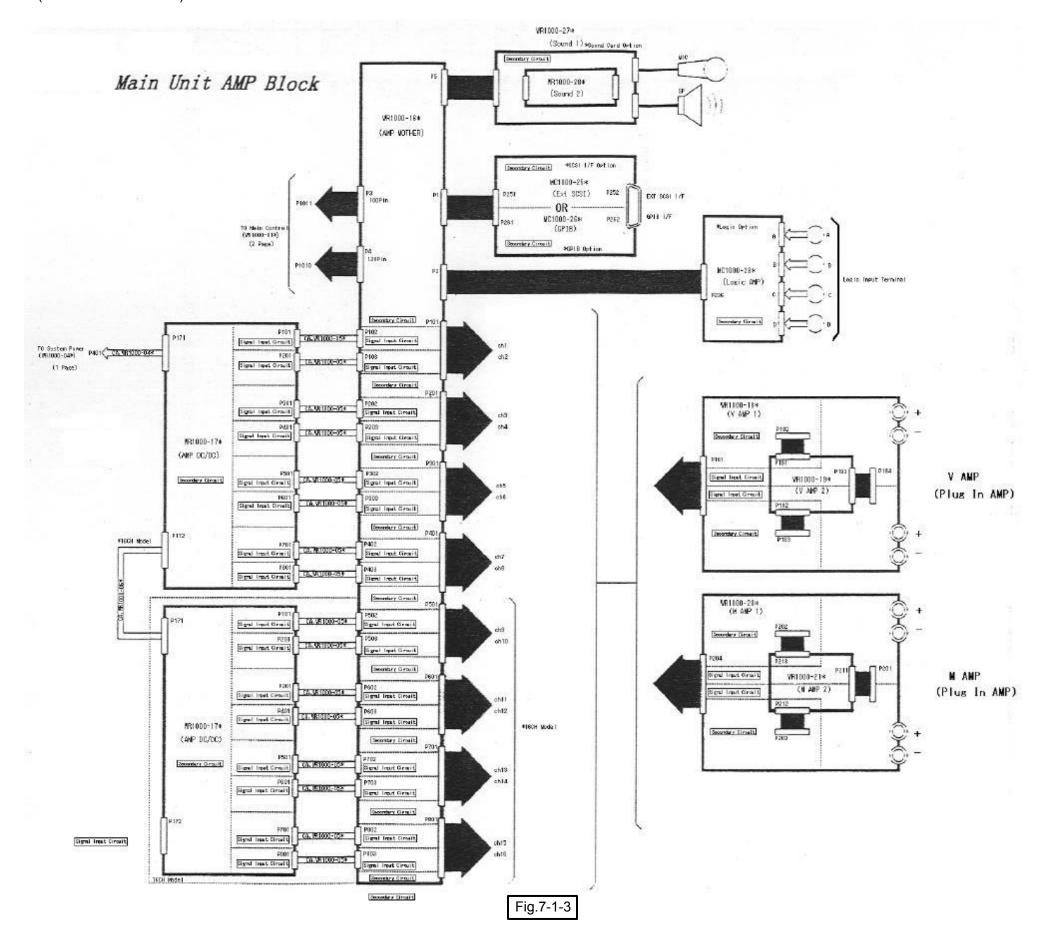
- 7.1 Wiring Diagrams
- 7.1.1 Wiring Diagram No.1 (Main Unit Power Block)



WR1000-UM-251-01-9380 7-1

Main Unit Main Control Block





WR1000-UM-251-01-9380 7-3

7.2 Outer Casing

(1) Disassembly diagram for the outer casing

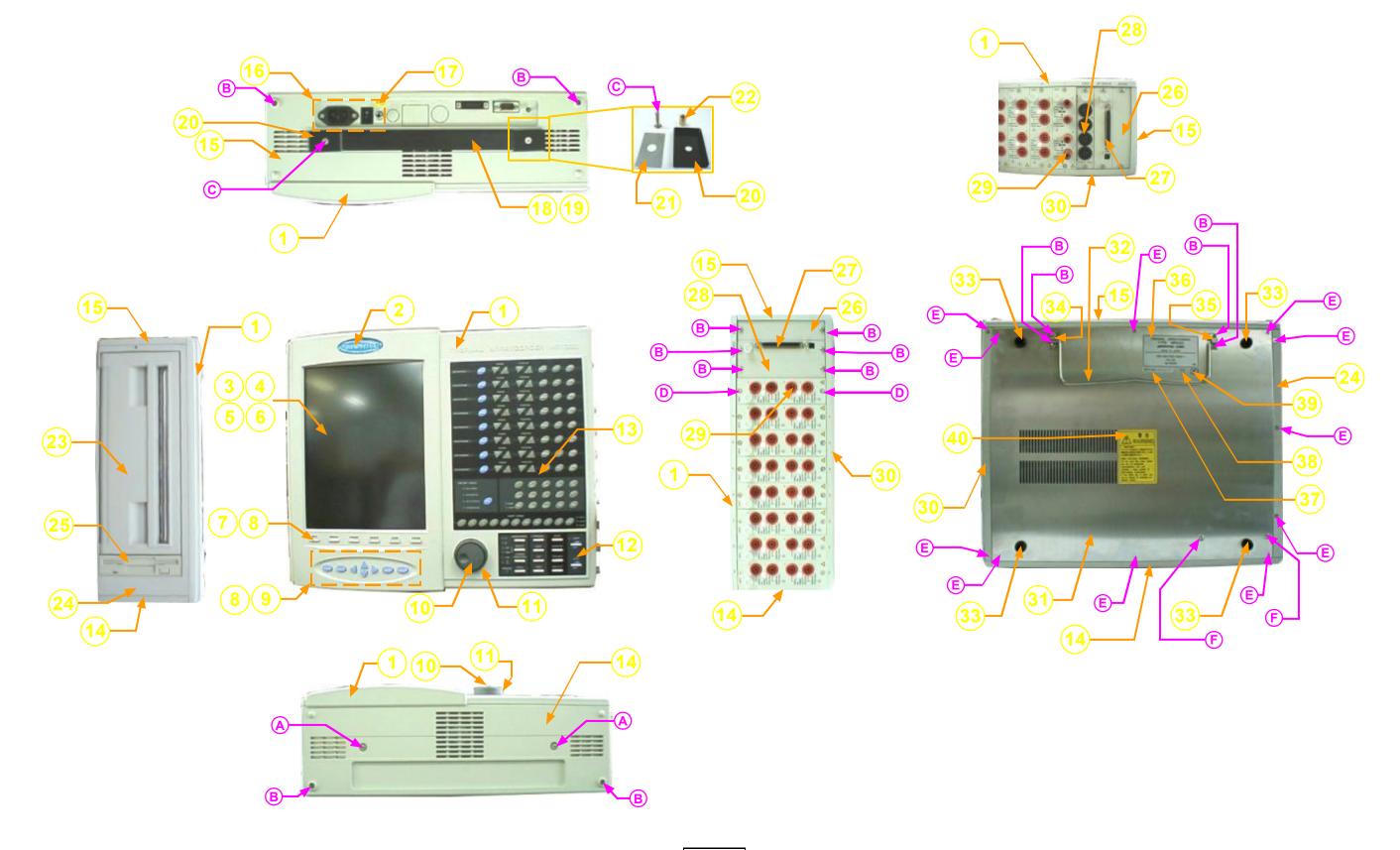


Fig. 7-2-1

WR1000-UM-251-01-9380 7-4

(2) Parts list for the outer casing

<u> </u>		e outer casing	
No.	Part no.	Name	Remarks
1	601100401	Control Panel Mold	
2	621120070	G Logo Plate	
3	601100410	Protective Plate	
4	601100420	Vertical Protective Plate Spacer	
5	601100430	Horizontal Protective Plate Spacer	
6	500003071	LCD [TFT] (LTM10C209A)	
7	106600270	Control Panel Keytop	
8	601900340	Rubber Switch	
9	601100481	Condition Key Assy	
10	601100500	JOG Dial G5	
11	601100490	JOG Shuttle G5	
12	601100470	Main Control Panel Sheet	
13	601100520	Amp Control Panel Sheet	
14	601100201	Front Cover	
15	601100211	Rear Cover	
16	770110114	AC Line Inlet Assy	
17	601908160	GND Label	
18	076005030	Handle	
19	076005040	Handle Plate	
20	601100290	Handle Cover	
21	601100300	Lower Handle Plate	
22	601100250	Handle Boss	
23	601100730	Printer Cover Assy	
24	601100221	Printer Mold	
	500002817	FDD (YD-702D-6539)	
25	500002847	MODD (M2313A68-1)	Production discontinued
	500002957	MODD (MCB3064SS)	
26	601100270	I/F Blank Panel	
	601100270	I/F Blank Panel	
27		GP-IB I/F	
		SCSI I/F	
28	601100260	Logic Blank Panel	
20		Logic Amp	
	601100280	Amp Blank Panel	
29		V Amp	
		M Amp	
30	601100230	Amp Lower Panel	
31	601100240	Bottom Plate	
32	301120001	Stand	
33	309100132	Case foot CP-30-FF-6	
34	601100310	Stand Holder R	
35	601100320	Stand Holder L	
36	601100900	8-channel Model Rating Plate	
30	601100910	16-channel Model Rating Plate	
		F: 7.0.4	

Fig. 7-2-1

No.	Part no.	Name	Remarks
37	102100631	Serial No. Label	
38	042000010	Production Division Label	
39	601900180	CE Mark Label	
40	601900150	Caution Label	
Α		M4L5 Binding-head Screw	
В		M3L4 Binding-head Screw	
С		M4L18 Countersunk-head Screw	
D		M3L6 Countersunk-head Screw	
Е		M3L5 Countersunk-head Screw	
F		M3L6 Binding-head Screw	
·			

Fig. 7-2-2

(1) Disassembly diagram for the main unit

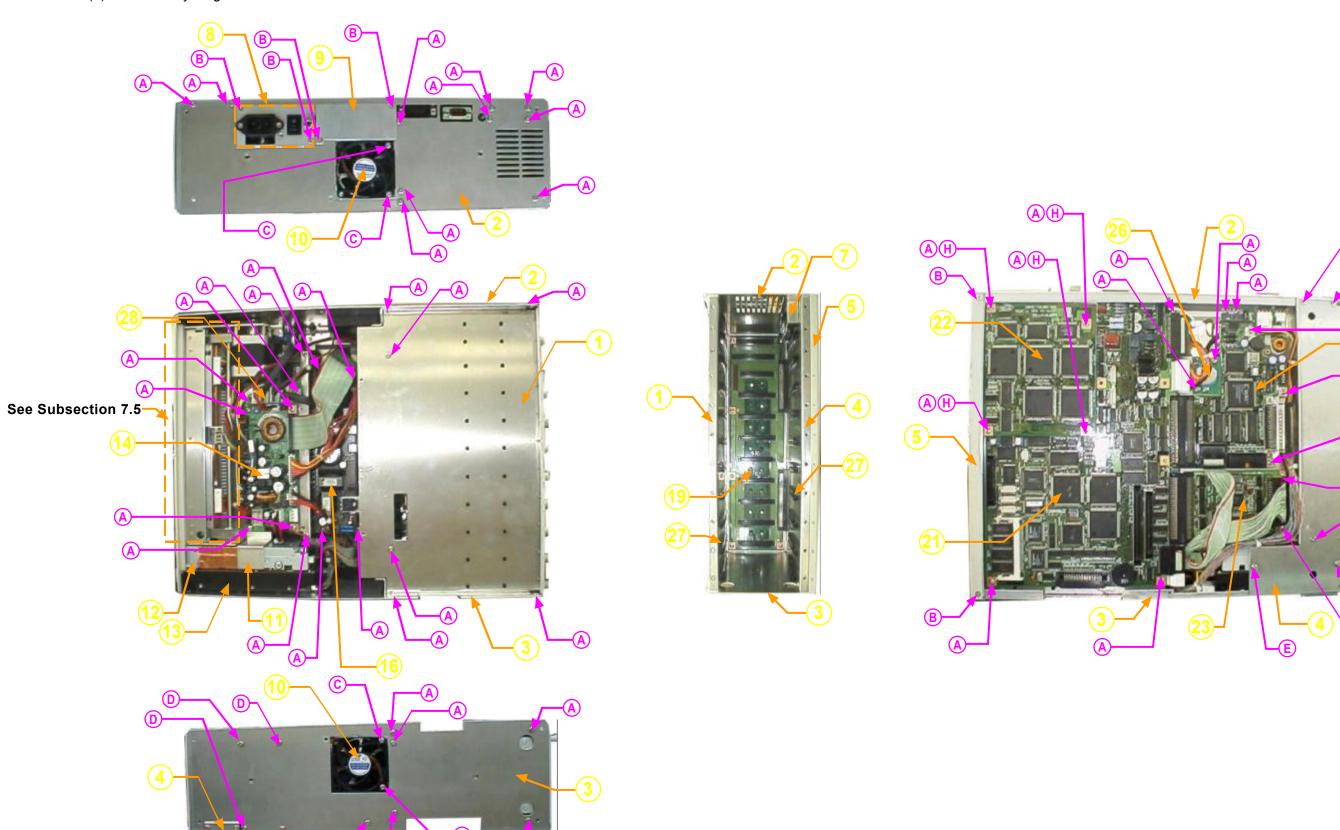
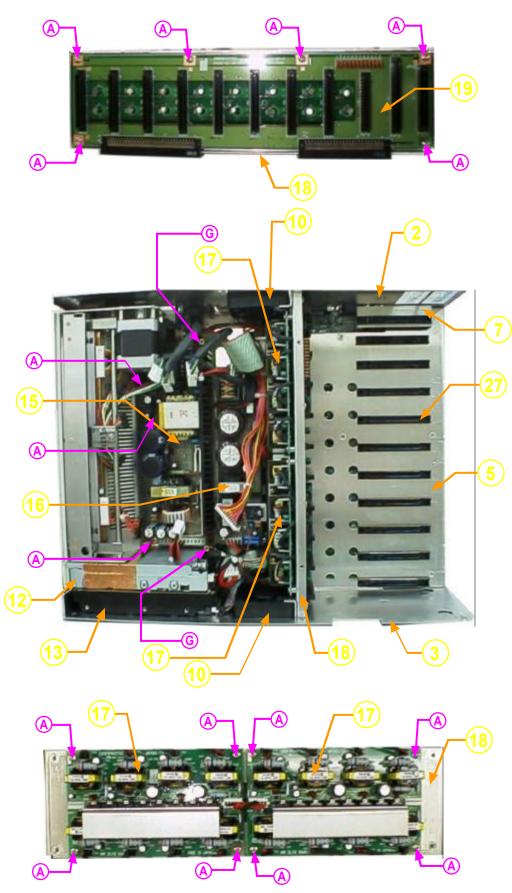
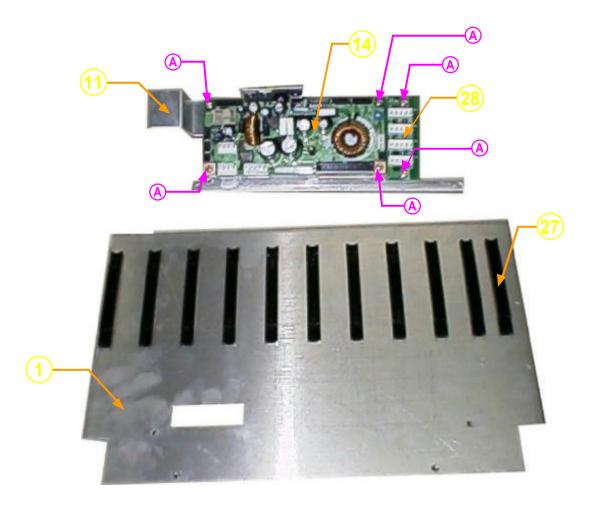


Fig. 7-3-1

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(2) Parts list for the main unit

No.	Part no.	Name	Remarks
1	601100041	Upper Amp Chassis	· · · · · · · · · · · · · · · · · · · ·
2	601100021	Rear Plate	
3	601100011	Front Plate	
4	601100002	Main Chassis	
5	601100230	Amp Bottom Cover	
	601100221	Printer Unit Mold	
6	601900351	Hi-temp Caution Label	
7	601100080	Guide Rail Bracket	
8	770110114	AC Input Assy	
9	601100090	DC Reinforcement Plate	
10	795900105	9000 Fan Assy	
11	601100051	Power Chassis	
	500002817	FDD (YD-702D-6539)	
12	500002847	MODD (M2313A68-1)	Production discontinued
	500002957	MODD (MCB3064SS)	
13	500003106	HDD (DDRS39130-F20W68)	Production discontinued
13	500003118	HDD (DENS-309170W-F20)	
14	770110113	System Power Board	
15	500002907	Amp AC/DC Select Board	100V/200V For CH 1-8
16	500002908	Amp AC/DC Select Board	100V/200V For CH 1-16
17	680110172	Amp AC/DC Board	
18	601100030	Amp Mother Board Mounting Plate	
19	770110117	Amp Mother Board	For CH 1-8
	770110111	Amp Mother Board	For CH 1-16
20			This number not used
21	770110110	Main Control Board	
22	770110116	16CH Control Board	For CH 9-16
23	770110129	FDD Control Board	
24	770110305	SCSI Control Board	
25			This number not used
26	795900103	9000 Battery Board Assy	
	500002212	Battery, ML2430-TT1	
27	301001005	Guide, GR-80S	
28	770110114	AC Relay Board	

Fig. 7-3-1

No.	Part no.	Name	Remarks
Α		M3L4 Binding-head Screw	
В		M3L5 Countersunk-head Screw	
С		M3L20 Binding-head Screw	
D		#6-32x6 (inch)	
Е		M3L6 Binding-head Screw	
F		M3L6 Countersunk-head Screw	
G	601100100	Power Supply Support	
Н	309100050	Spacer, SQ-6	

Fig. 7-3-2

7.4 Control Unit

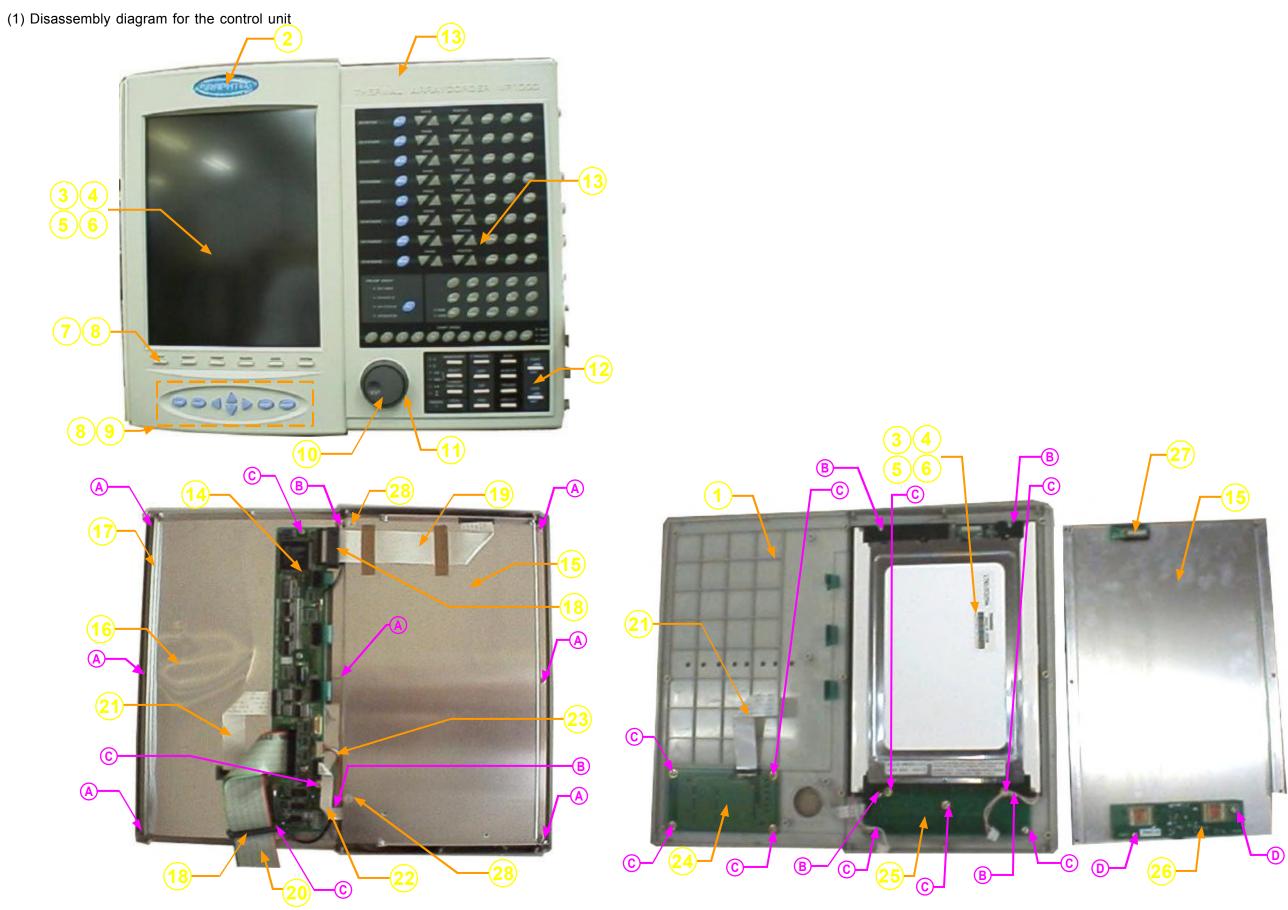


Fig. 7-4-1

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(2) Parts list for the control unit

	(2) Parts list for the control unit					
No.	Part no.	Name	Remarks			
1	601100401	Control Panel Mold				
2	621120070	G Logo Plate				
3	601100410	Protective Plate				
4	601100420	Vertical Protective Plate Spacer				
5	601100430	Horizontal Protective Plate Spacer				
6	500003071	LCD [TFT] (LTM10C209A)				
7	106600270	Control Panel Keytop				
8	601900340	Rubber Switch				
9	601100481	Conditions Panel Key Assy				
10	601100500	JOG dial G5				
11	601100490	JOG shuttle G5				
12	601100470	Main Control Panel Sheet				
13	601100520	Amp Control Panel Sheet				
14	770110124	Key Control Board				
15	601100451	LCD Shield Plate				
16	601100530	Control Panel Shield				
17	601100441	Control Panel Mounting Plate				
18	500003107	E04FA80340120				
19	690110550	FC, WR1000-05	LCD RELAY⇔KEY CONT			
20	690110511	FC, WR1000-01A	MAIN CONT ⇔KEY CONT			
21	690110530	FC, WR1000-03	MAIN KEY⇔KEY CONT			
22	690110540	FC, WR1000-04	MENU KEY⇔KEY CONT			
23	690110100	CA, WR1000-10	inverter⇔KEY CONT			
24	770110121	Main Control Panel Key Board				
25	770110122	Conditions Panel Key Board				
26	500003072	Inverter Board				
27	770110125	LCD Relay Board				
28	601900620	GND Cable Label				
Α		M3L4 Binding-head Screw				
В		M3L6 Binding-head Screw				
С		M3L6 Tapping Screw				
D		M2.6L4 Binding-head Screw				
\vdash						

Fig. 7-4-1

7.5 Printer Unit

(1) Disassembly diagram for the printer unit

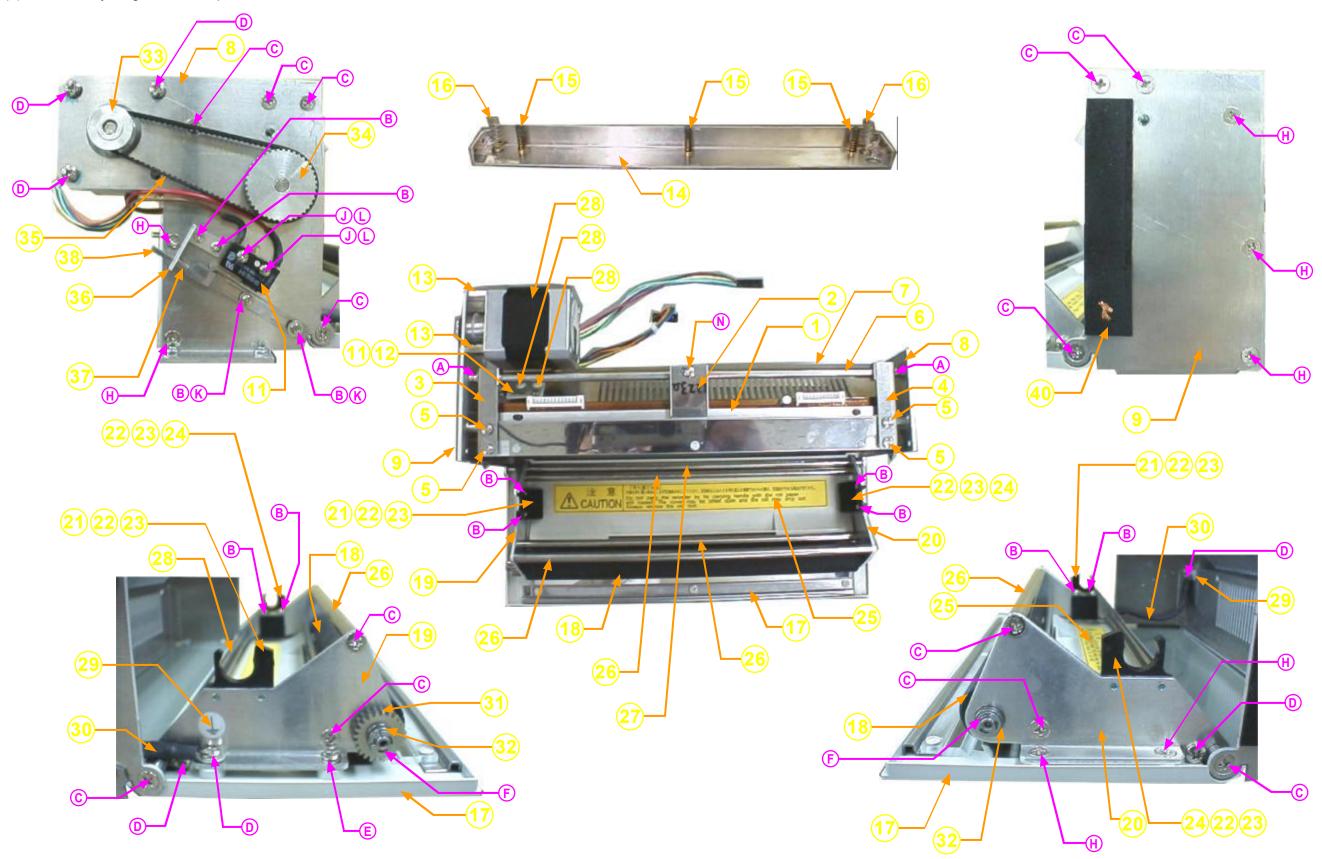


Fig. 7-5-1

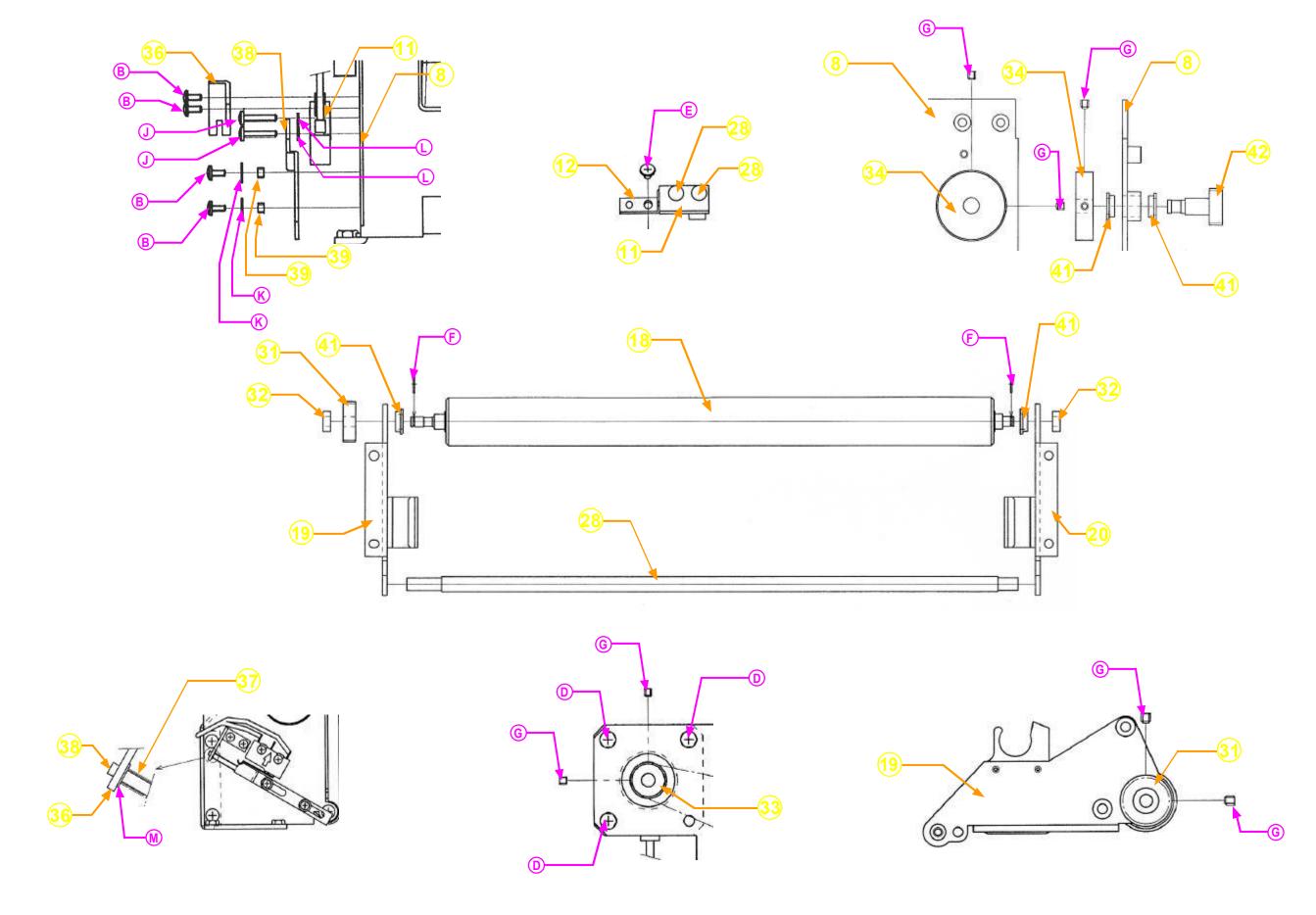


Fig. 7-5-2 7-14

WR1000-UM-251-01-9380

(2) Parts list for the printer unit

No.	Part no.	Name	Remarks
1	500002329	Thermal Print Head	
2	601902210	Contact Adjustment Plate	
3	601902051	Head-up Arm L	
4	601902041	Head-up Arm R	
5	601902071	Head Support Holder	
6	601902120	Head-up Shaft	
7	601100720	Printer Chassis	
8	601100711	Side Plate L	
9	601100700	Side Plate R	
10	500002501	Motor Assy (PK-245-01A-C58)	
11	795900108	9000 Sensor Assy	
12	601100750	Sensor Bracket	
13	308600014	Spacer, SQ-10	
14	601902062	Head Pressure Support	
15	380105151	Compression Spring DC-515	
16	380101661	Compression Spring C-166	
17	601100730	Printer Cover Assy	
18	601902030	Platen	
19	601902083	Cover Side Plate L	
20	601902094	Cover Side Plate R	
21	075002200	Bobbin Holder	
22	601902201	Tension Spring	
23	076000620	Tension Felt	
	07500040	Dalakin Halalan	
24	075002210	Bobbin Holder	
25	601900790	Cover Caution Label	Attached to the inside of the cover
25 26	601900790 601902111	Cover Caution Label Stock Guide Shaft	Attached to the inside of the cover
25 26 27	601900790 601902111 601902101	Cover Caution Label Stock Guide Shaft Cover Shaft	Attached to the inside of the cover
25 26 27 28	601900790 601902111 601902101 300000203	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet	Attached to the inside of the cover
25 26 27 28 29	601900790 601902111 601902101 300000203 601900620	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label	Attached to the inside of the cover
25 26 27 28 29 30	601900790 601902111 601902101 300000203 601900620 500002390	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3	Attached to the inside of the cover
25 26 27 28 29 30 31	601900790 601902111 601902101 300000203 601900620 500002390 601902131	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear	Attached to the inside of the cover
25 26 27 28 29 30 31 32	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010 601902143	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1 Reduction Gear	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010 601902143	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1 Reduction Gear	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010 601902143	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1 Reduction Gear	Attached to the inside of the cover
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	601900790 601902111 601902101 300000203 601900620 500002390 601902131 310804001 077002020 601902150 378209211 601902232 380101011 601902223 304420006 601100110 320806010 601902143	Cover Caution Label Stock Guide Shaft Cover Shaft 3X4.5 Ivory Plastic Rivet GND Cable Label FGM-100-M3 Drum Gear BB SMR84ZZ, NSK Motor Pulley Reduction Pulley Mini-synchro Belt, 92MXL4.8 Micro-switch Bracket B Compression Spring C-101 Microswitch Bracket A Round 2XL2 Wrapped Bush FDD Hold-down Sponge BBB F6X8X3:10X1 Reduction Gear	Attached to the inside of the cover

Fig. 7-5-1

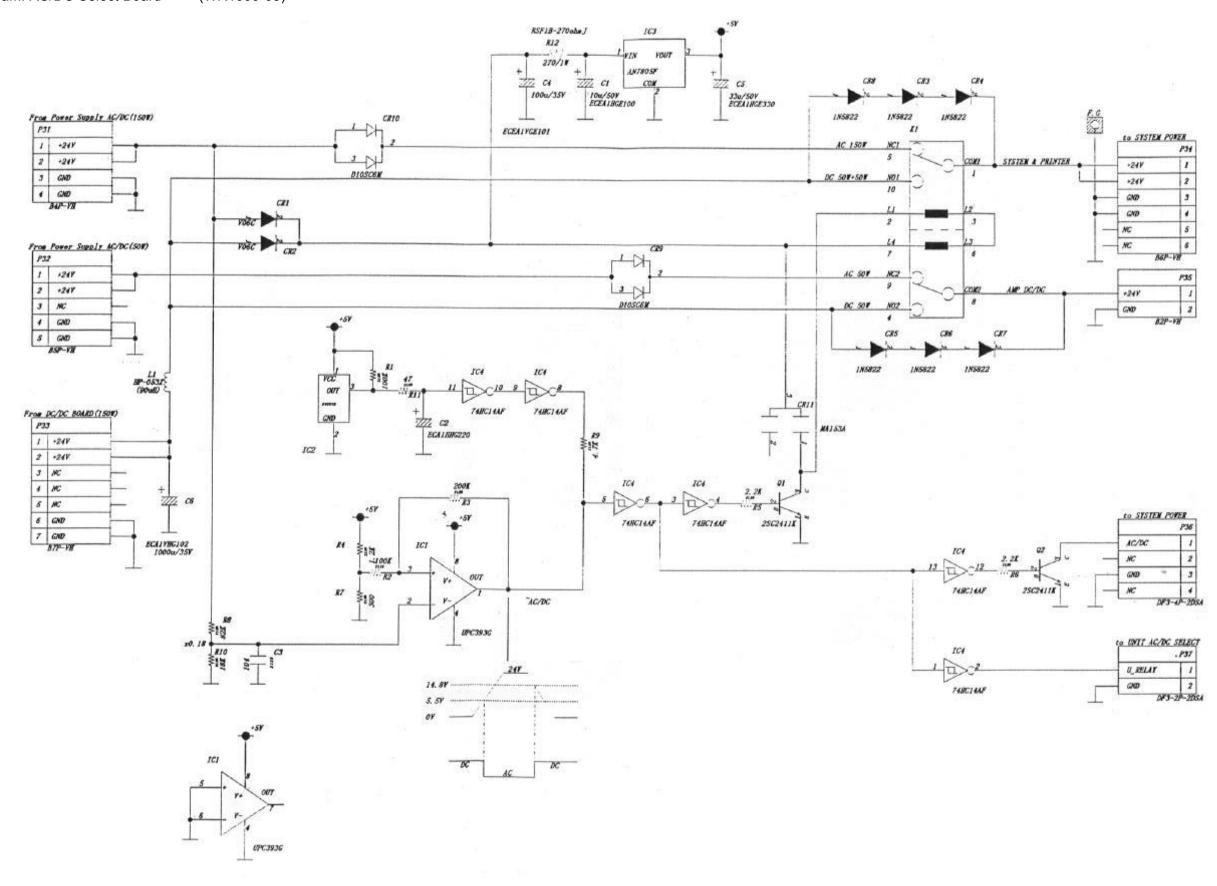
No.	Part no.	Name	Remarks
Α		E ring (5 φ)	
В		M2L4 Binding-head Screw	
С		M3L6 Countersunk-head Screw	
D		M3L6 Binding-head Screw	
Е		M3L4 Binding-head Screw	
F		E ring (3 φ)	
G		M3L3 Set Screw	
Н		M3L4 Countersunk-head Screw	
J		M2L10 Binding-head Screw	
K		M3 Mini-washer	
L		M2 Spring Washer	
М		M2 Mini-washer	
N		M3L8 Binding-head Screw	

Fig. 7-5-2

7-16

8. CIRCUIT DIAGRAMS

Circuit Diagram: AC/DC Select Board (WR1000-03)



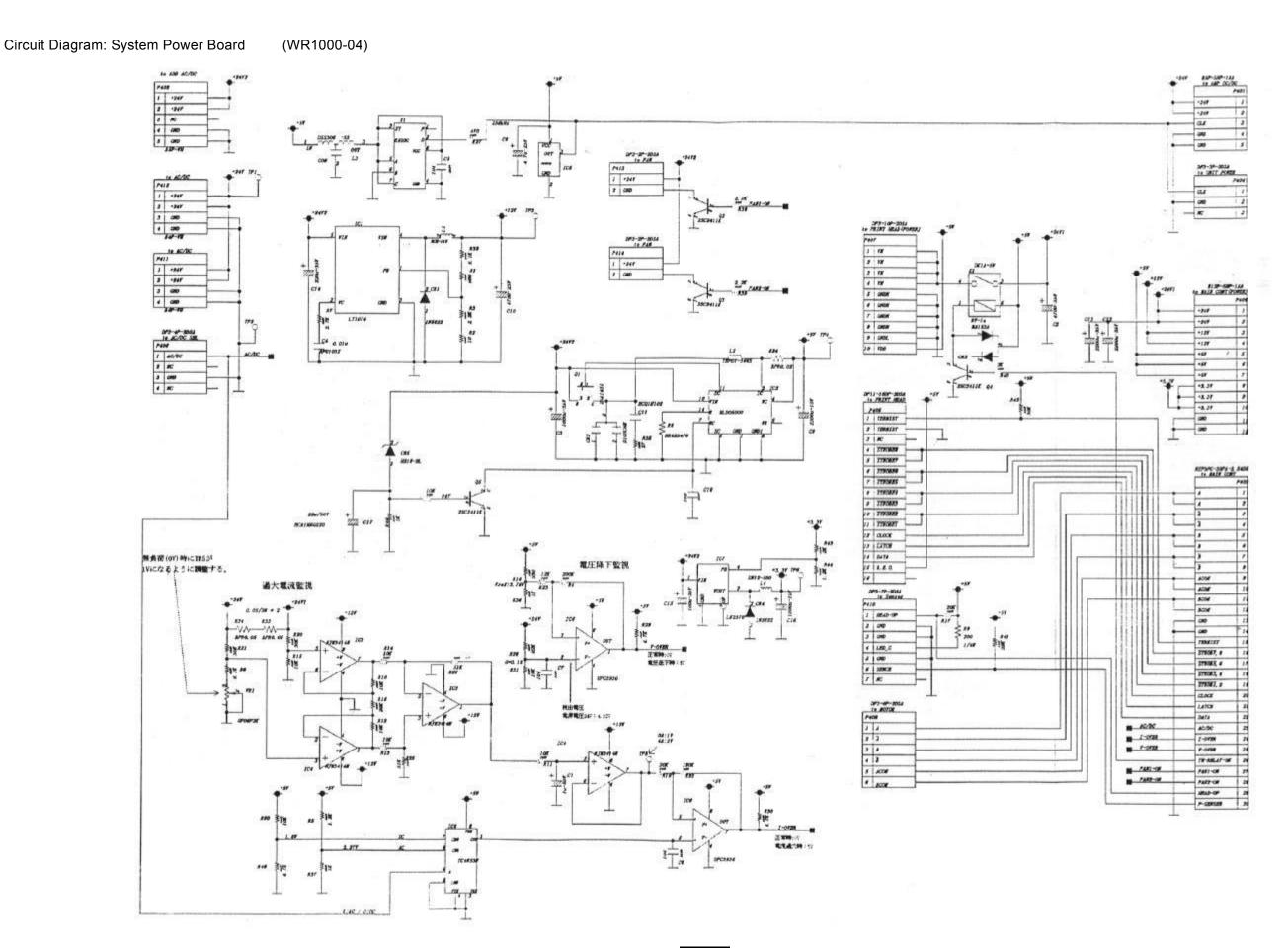
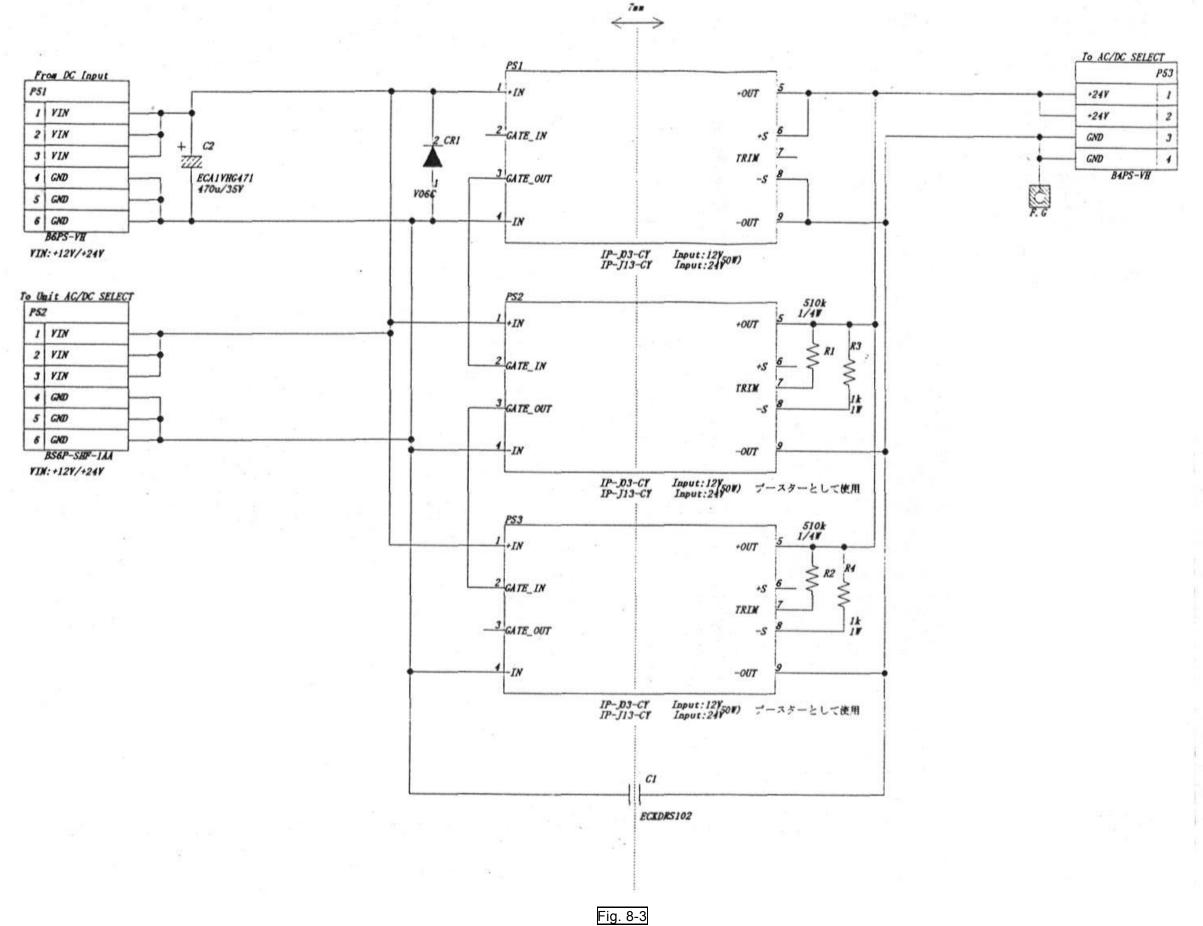
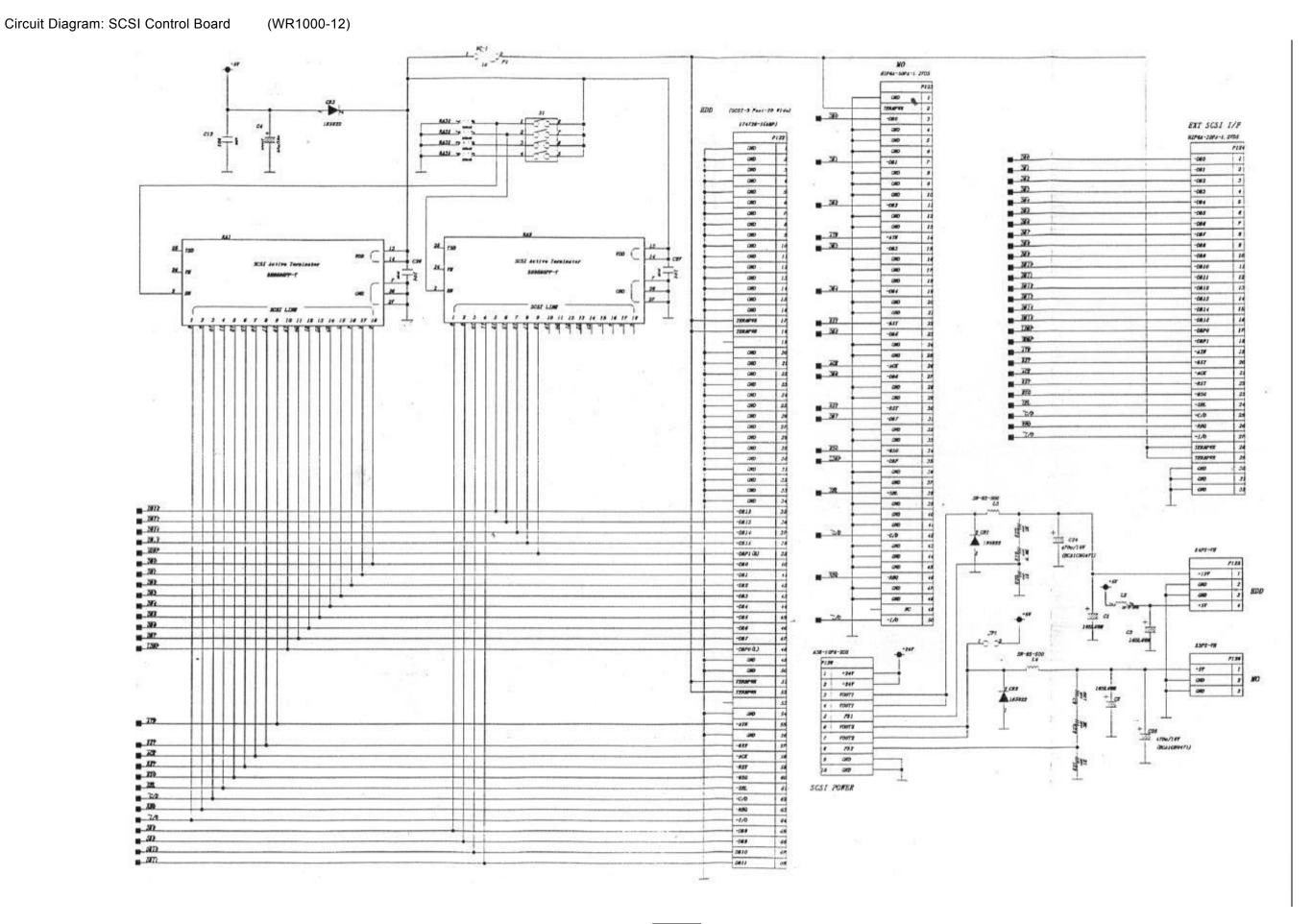


Fig. 8-2

8-2

WR1000-UM-251-01-9380





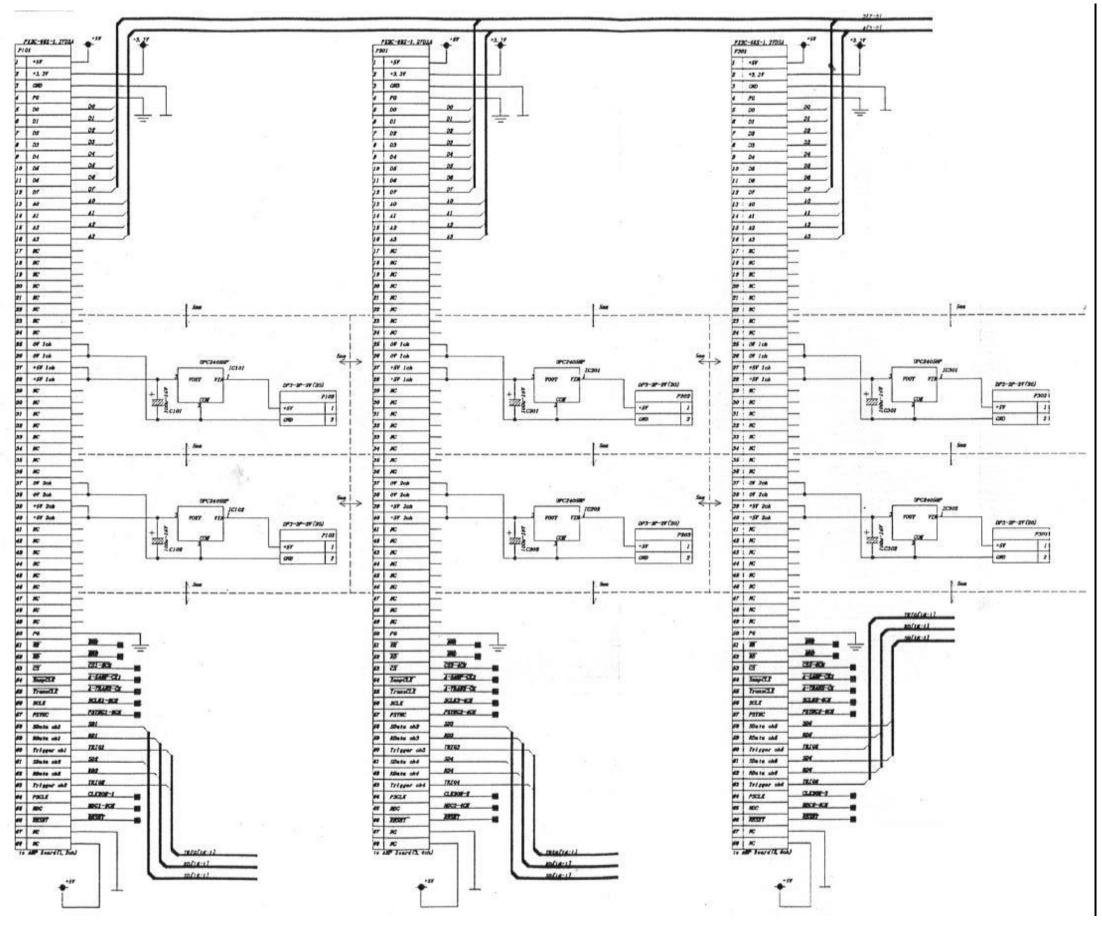


Fig. 8-5

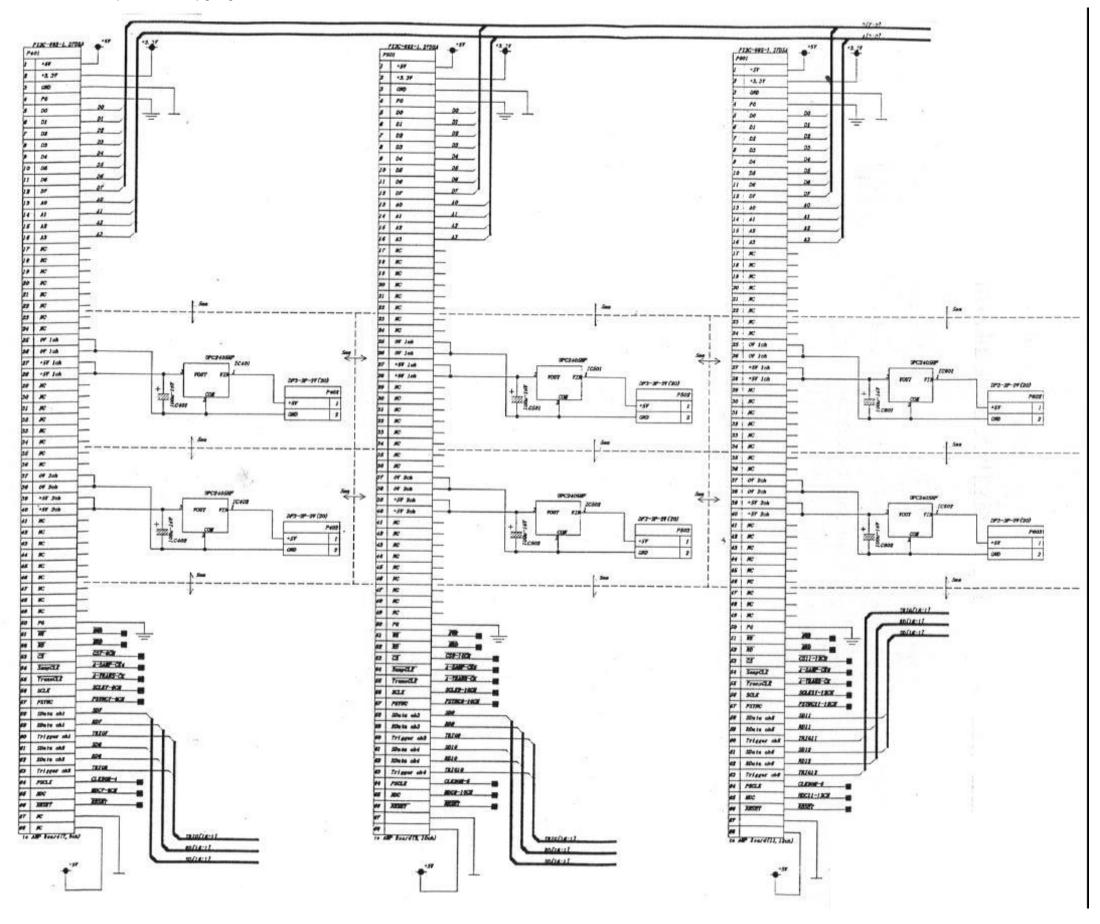
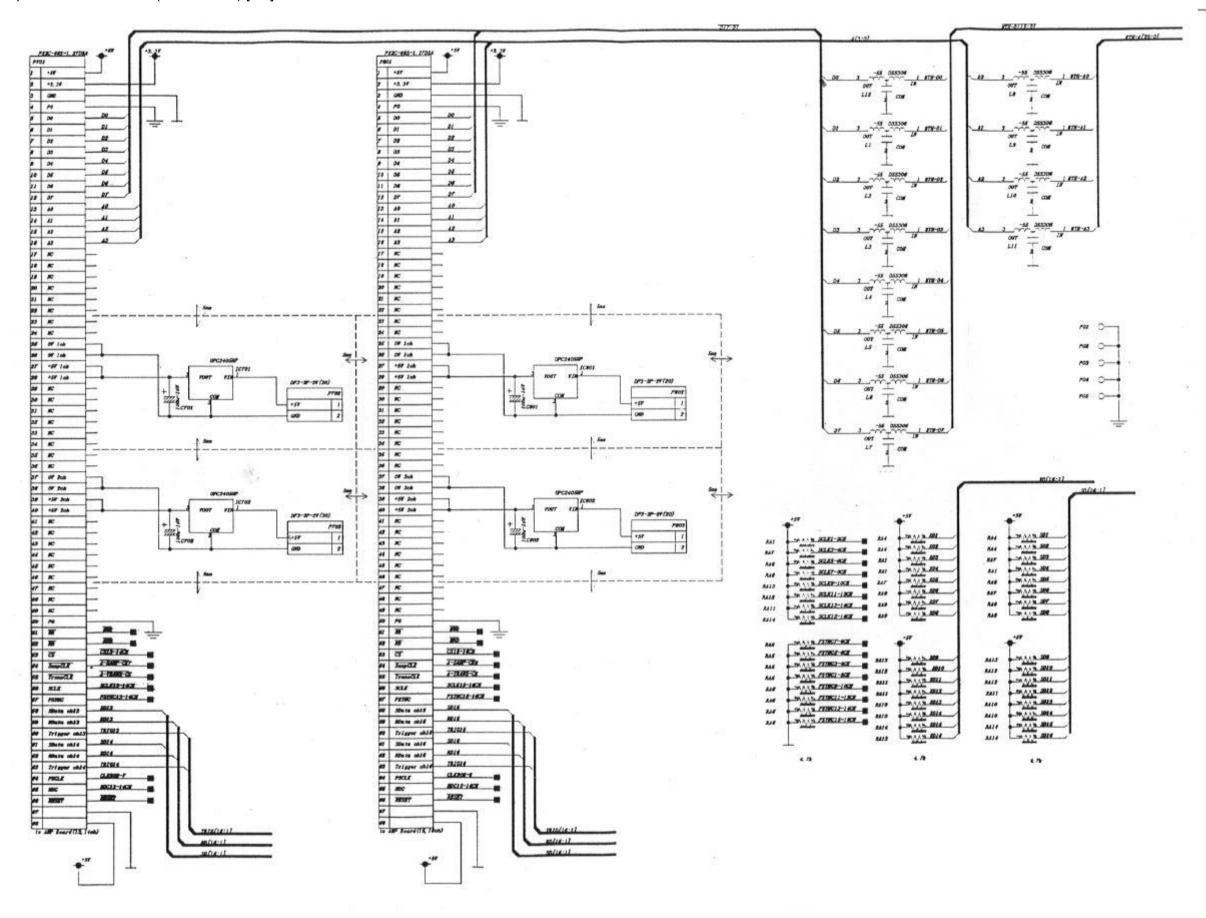


Fig. 8-6



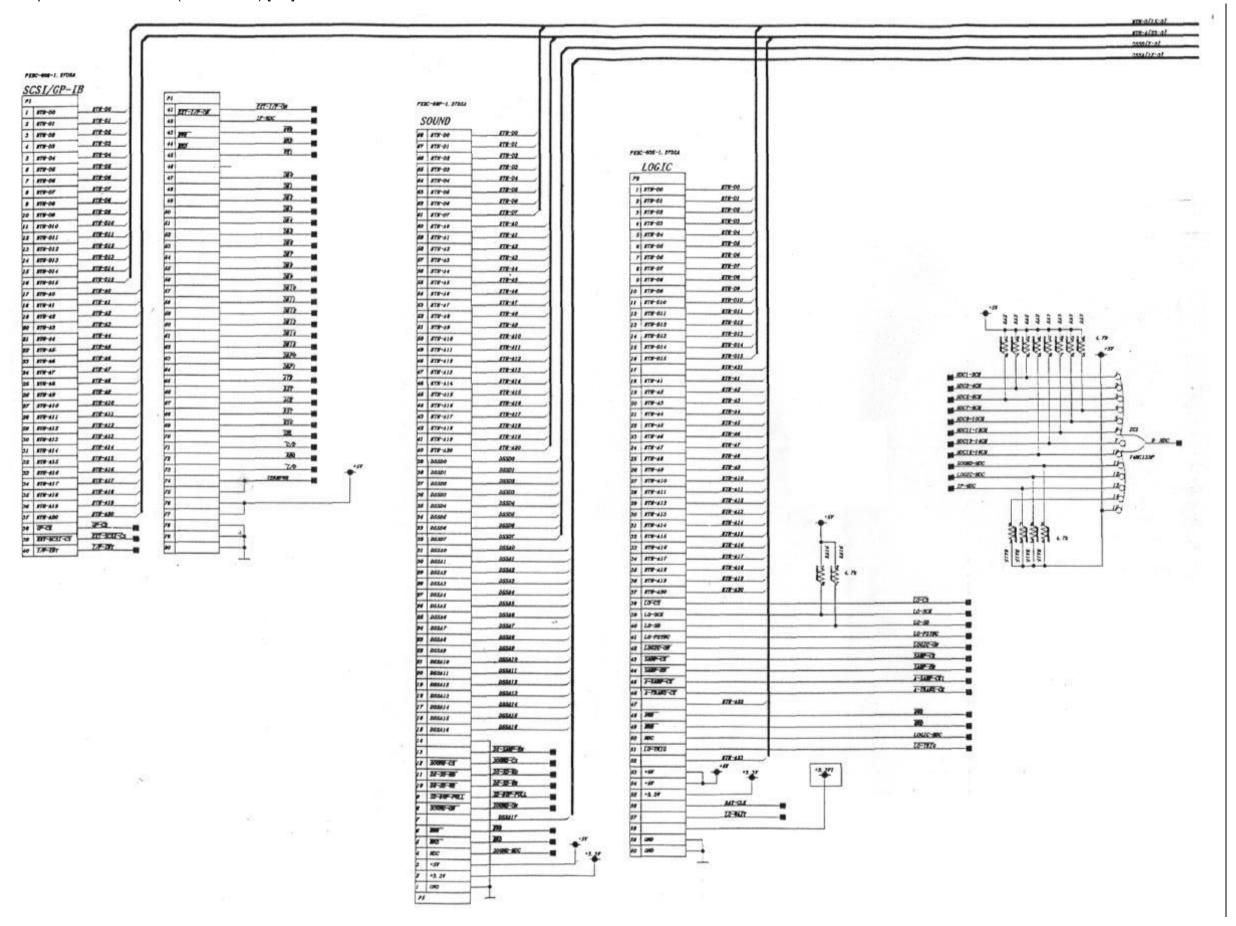
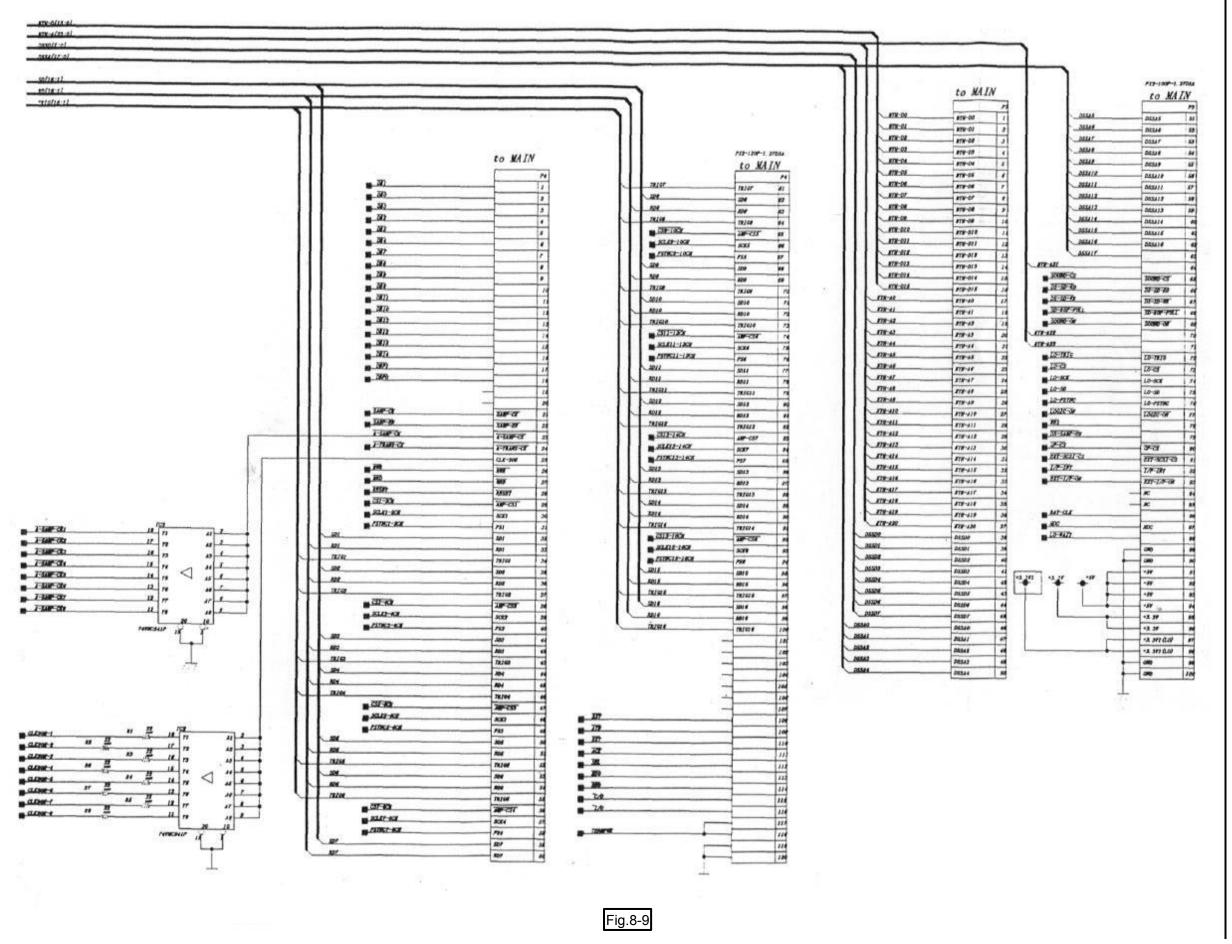


Fig. 8-8



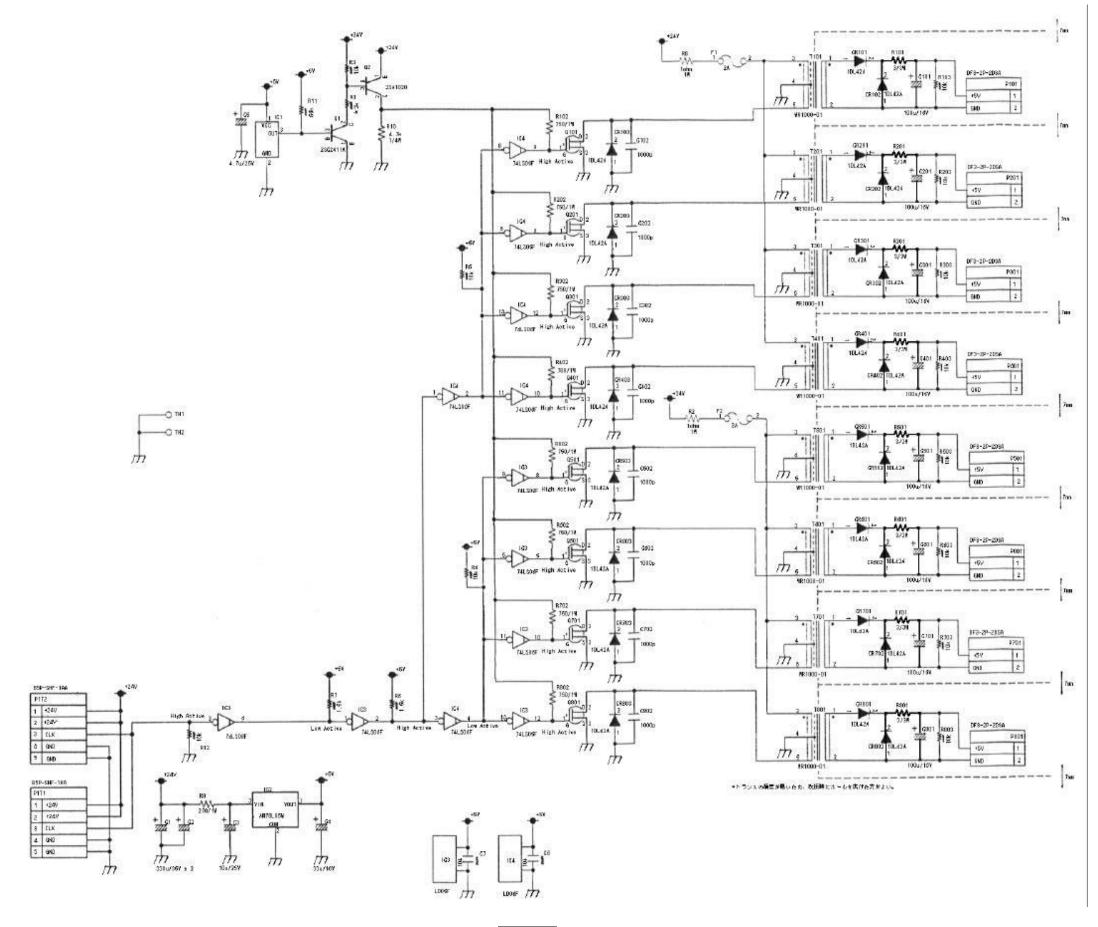


Fig. 8-10

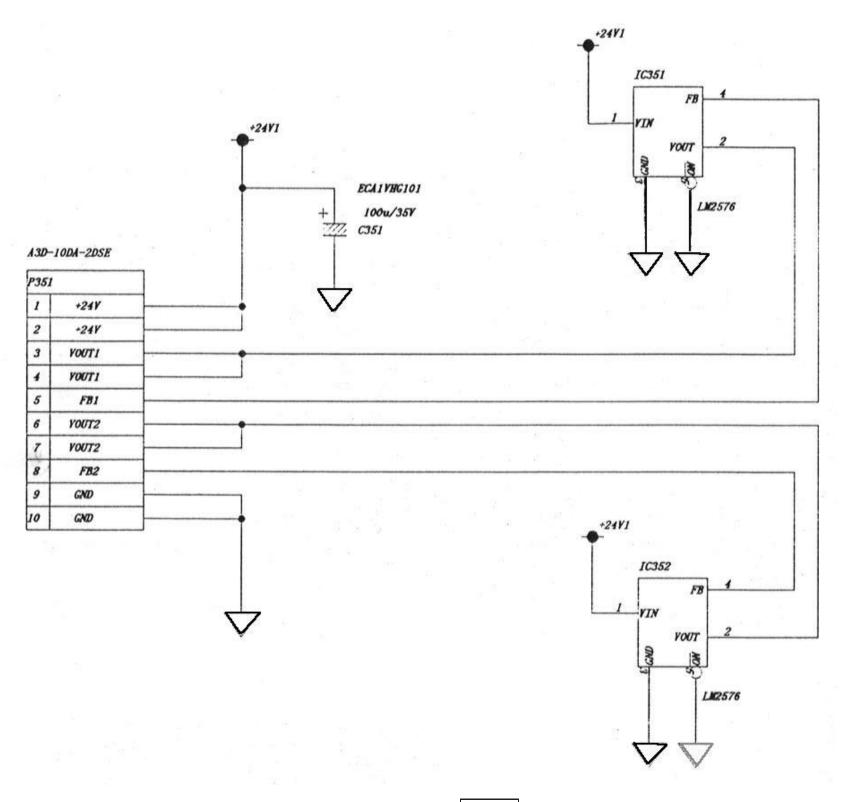


Fig. 8-11

WR1000-UM-251-01-9380 8-11