



midi LOGGER dual

GL500

MANUAL NO. GL500-UM-251

SERVICE MANUAL

HISTORY OF REVISIONS

[illegible]

TO ENSURE SAFETY

This Service Manual has been compiled for the purpose of facilitating repair and maintenance of the GL500 midi LOGGER dual 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 GL500 contains numerous internal components with a high electric potential, such work by unauthorized service personnel could cause human injury or serious damage to the GL500 midi LOGGER dual.

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1. CONFIGURATION

1.1 Model Configuration

GL500VF : 4-channel VF amp model (4-channel isolated voltage amp)

GL500MF : 4-channel MF amp model (4-channel isolated voltage / temperature amp)

GL500MS : 8-channel MS amp model (8-channel non-isolated voltage / temperature amp)

1.2 Accessories and Options

Unit name	Model name	Description
Battery Pack	B-517	
Pulse / Logic / Alarm Cable	B-513	Same as GL400/350
DC Drive Cable	B-514	Same as GL400/350
T-type Thermocouple	JBS-7115-5M-T	
K-type Thermocouple	JBS-7115-5M-K	
BNC-BNC Cable	RIC-112	1.5 m
BNC-Banana Cable	RIC-113	1.5 m
BNC-Alligator Cable	RIC-114	1.5 m

2. UPGRADING THE FIRMWARE

The version of your GL500's firmware can be upgraded by rewriting the flash ROM on the pertinent circuit boards using a choice of methods. You can upgrade the firmware by loading the upgrade program from either a PCMCIA card or from a personal computer via the TCP/IP or USB port.

2.1 How to Upgrade the GL500 Flash ROM from the PCMCIA Card

Preparations for the upgrade

Firmware :Mxxxa001.G50 ← Main Program file for GL500

:Mxxxa002.G50 ← Main Program file for GL500

- (1) Connect the AC adapter for the GL500.
- (2) Turn on the GL500 and then adjust the monitor contrast using the monitor control dial when you are going to upgrade the GL500.

Turn off the GL500 after adjust the monitor contrast.

- (3) Copy the two main program files to a PCMCIA card from the computer.

How to upgrade

- (1) Insert the PCMCIA card containing the main upgrade program into the GL500's PCMCIA card slot.
- (2) Turn on the GL500 to automatically execute the upgrade program.
- (3) Wait until the display shown below appears or until the beeper sound stops.

Note:

Don't turn off the GL500 until this process is finished.

The following message will appear on the GL500 display in yellow characters when the upgrade is complete. Also, the beeper will sound for 5 seconds.

"Please Turn Off the Power. I have locked up."

Note:

Adjust the the monitor contrast using the monitor control dial when the above message will not appear on the GL500.

- (4) Turn off the power to the GL500 when the above message is displayed or when the beeper sound stops.
- (5) Delete the two main program files in a PCMCIA card from the computer.
This is avoiding to upgrade by mistake.

2.2 How to Upgrade the GL500 Flash ROM from the TCP/IP or USB Port

Preparations for the upgrade

- (1) Connect the AC adapter for the GL500.
- (2) Connect the LAN cable or USB cable for the GL500 and PC.
When using the TCP/IP port for the upgrade, use a cross LAN cable if you connect P to P. If you connect via a hub, use a parallel LAN cable.
- (3) If you are going to use the TCP/IP port for the upgrade, confirm the IP address of the GL500 as shown below.

The default settings for the GL500 are set as follows.

IP Address: 192.168.0.1

Subnet mask: 255.255.255.0

Port number: 8023

If you haven't changed them, use these settings.

Also, your computer's TCP/IP port setting must be set to the same segment as "192.168.0.X".

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Interface] *****							
New Line Code:					CR+LF		
Echo Back:					Disable		
[USB Settings]							
USB ID:					0		
[TCP/IP Settings]							
IP Address:					192 . 168 . 0 . 1		
Subnet Mask:					255 . 255 . 255 . 0		
Port Number:					8023		
Note: Restart to enable USB, TCP-IP settings.							

How to upgrade

OS :Windows 2000/XP

Software :GL50upd.exe ← Upgrade software file

:xxx.dll ← Upgrade software dll file

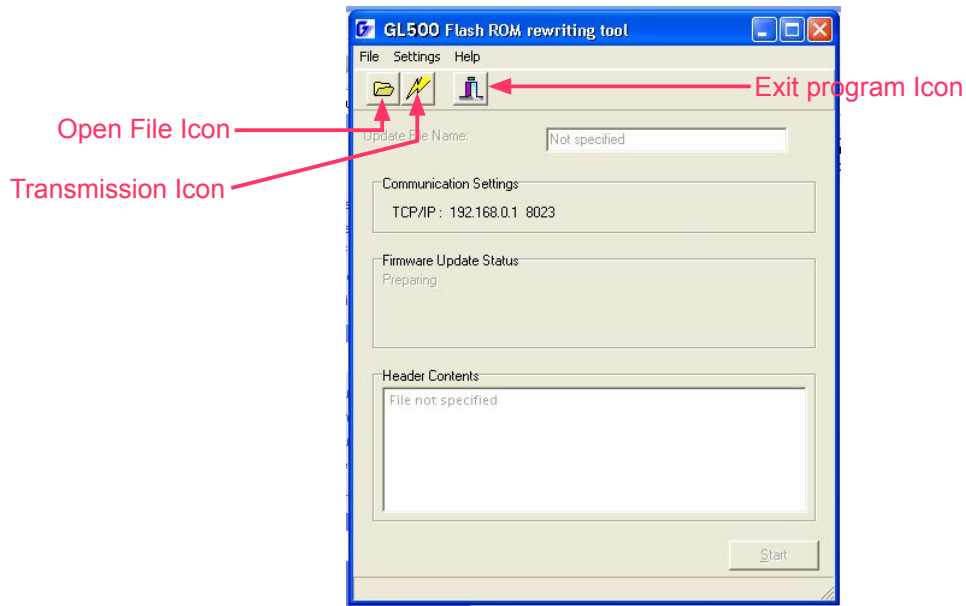
Firmware :Mxxxa001.G50 ← Main Program file for GL500

:Mxxxa002.G50 ← Main Program file for GL500

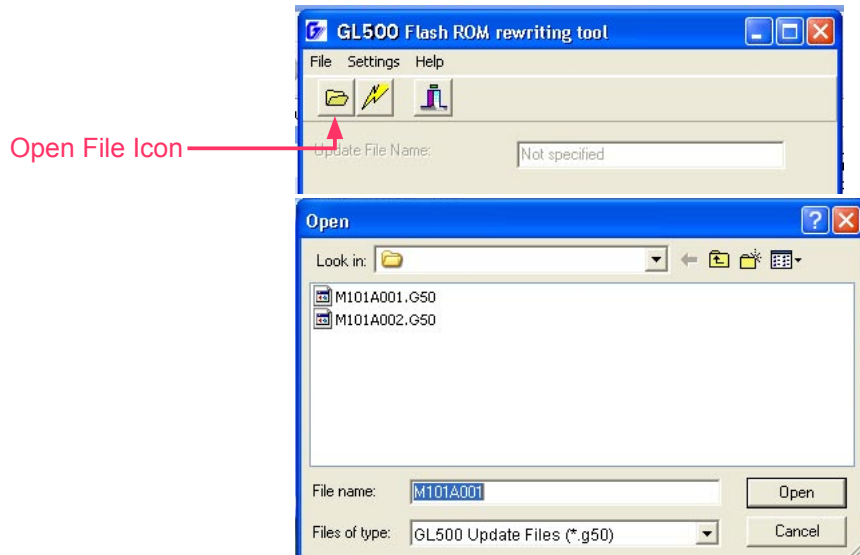
- (1) Copy the two upgrade software files to the same directory in the PC.
- (2) Turn on the power switch of the GL500.
- (3) Execute GL50upd.exe.



(4) The menu shown below is displayed.

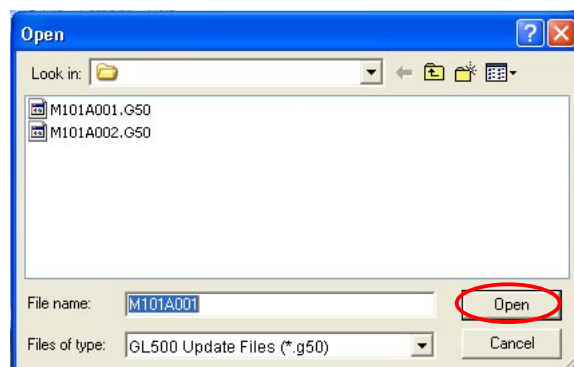


(5) Click the Open File icon to display the Open menu.



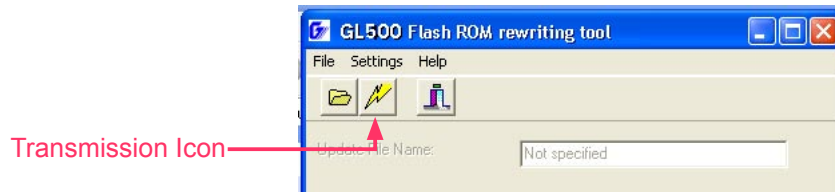
(6) Select "MxxxA001.G50" as the main upgrade file.

(7) Click the Open Button.



2. UPGRADING THE FIRMWARE

- (8) If you need to change the TCP/IP settings or port, click the transmission icon to set up the TCP/IP conditions or port.



The default settings for the GL500 are set as follows.

IP Address: 192.168.0.1

Port number: 8023

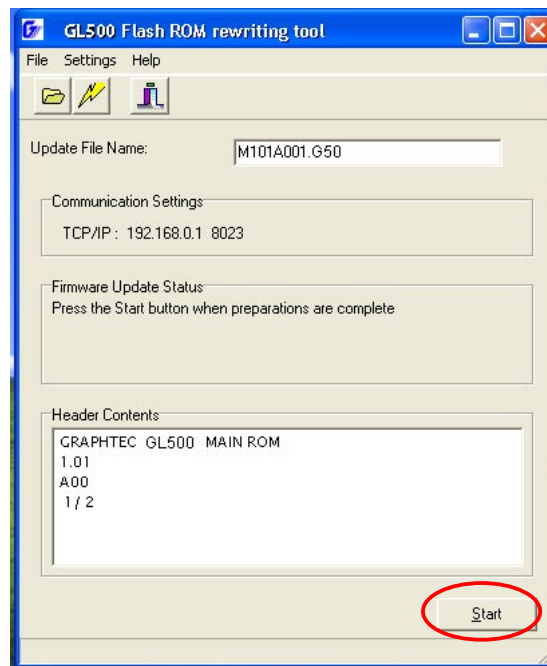
If you haven't changed them, use these settings.

Also, your computer's TCP/IP port setting must be set to the same segment as "192.168.0.X".



If you are using the USB port, select USB for Transfer I/F in the above menu.

- (9) Click the Start button to start upgrading when you are ready to upgrade.



The following message will appear on the GL500 display in yellow characters when the upgrade is complete. Also, the beeper will sound for 5 seconds.

"Please Turn Off the Power. I have locked up."

- (10) Turn off the power to the GL500 when the above message is displayed or when the beeper sound stops.

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 Mounting and Removing the Input Terminal Unit

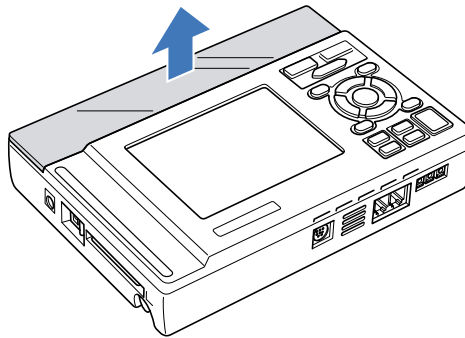
This section describes how to mount and remove the input terminal unit.

CAUTION

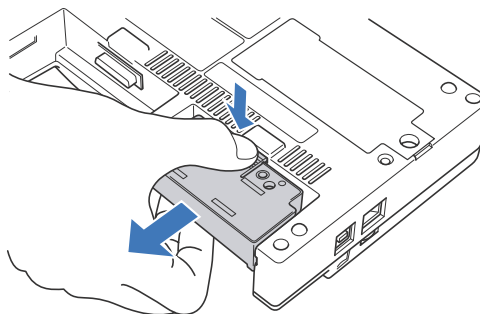
- Make sure that the power supply has been turned off before mounting or removing the input terminal unit.
-

Removing the Input Terminal Unit

- (1) Remove the cover from the input terminal mounting area.

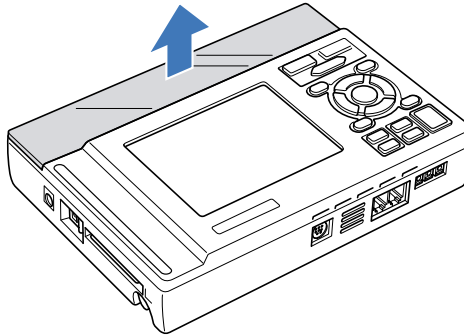


- (2) Press down on the lock button while pulling the input terminal unit towards you. At this time, grip the input terminal unit firmly while removing it.

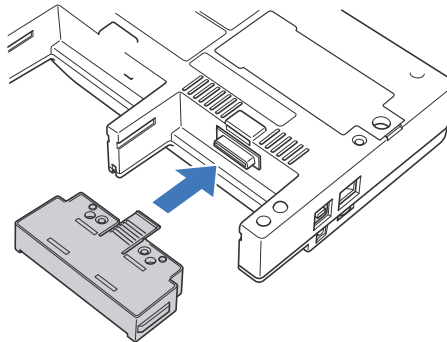


Mounting the Input Terminal Unit

- (1) Remove the cover from the input terminal mounting area.



- (2) As shown in the figure below, insert the input terminal unit in the GL500. At this time, be sure to check that the terminal unit is locked onto the connector.



3.3 Replacing the Main Control Board

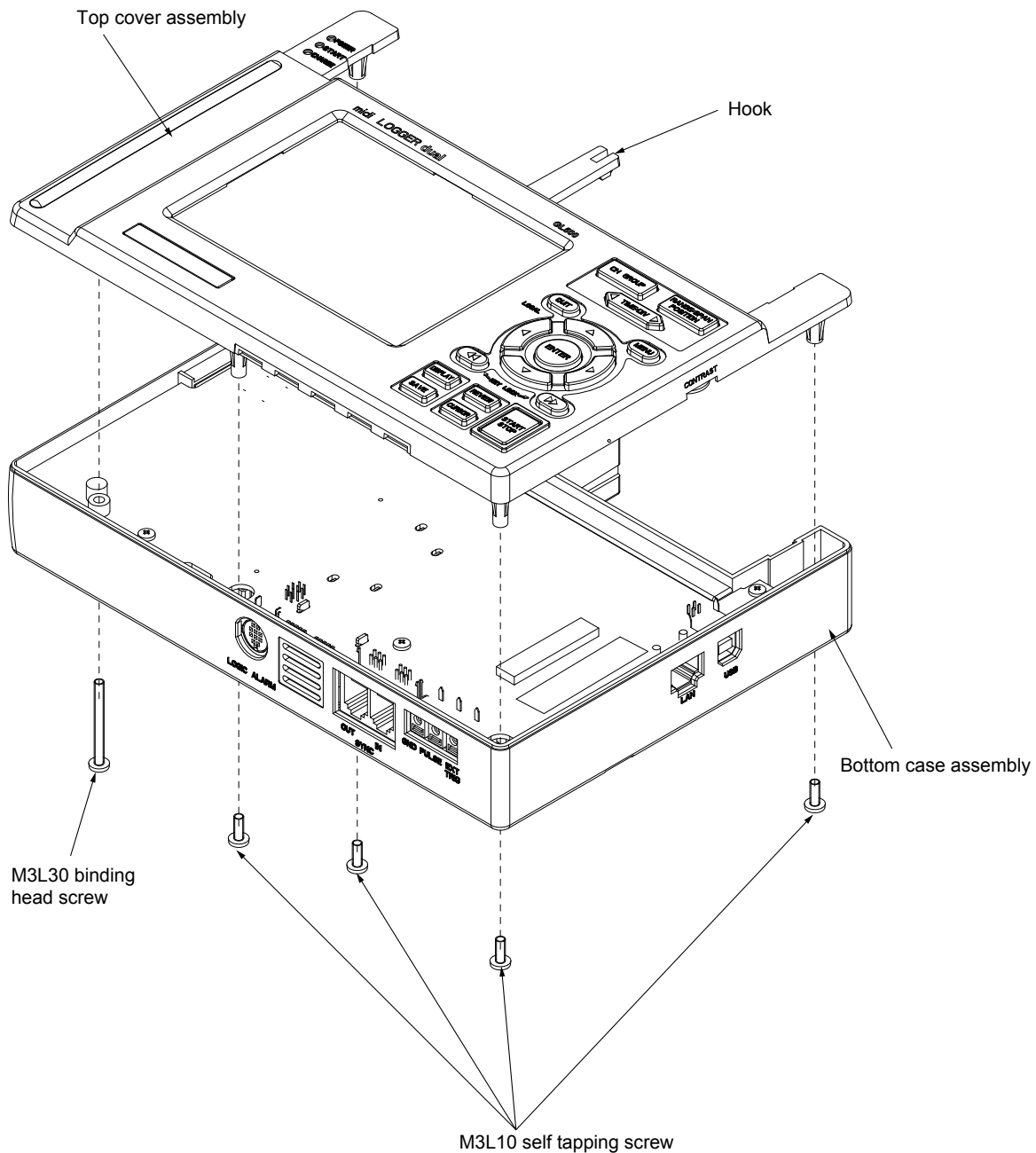
Disassembly

- (1) Remove the input terminal unit from the GL500 (See Section 3.2.).
- (2) Remove the M3L30 binding head screw and the four M3L10 self tapping screws from the bottom cover.
- (3) Release the top cover hook from the bottom case, and then remove the top cover assembly.

NOTE:

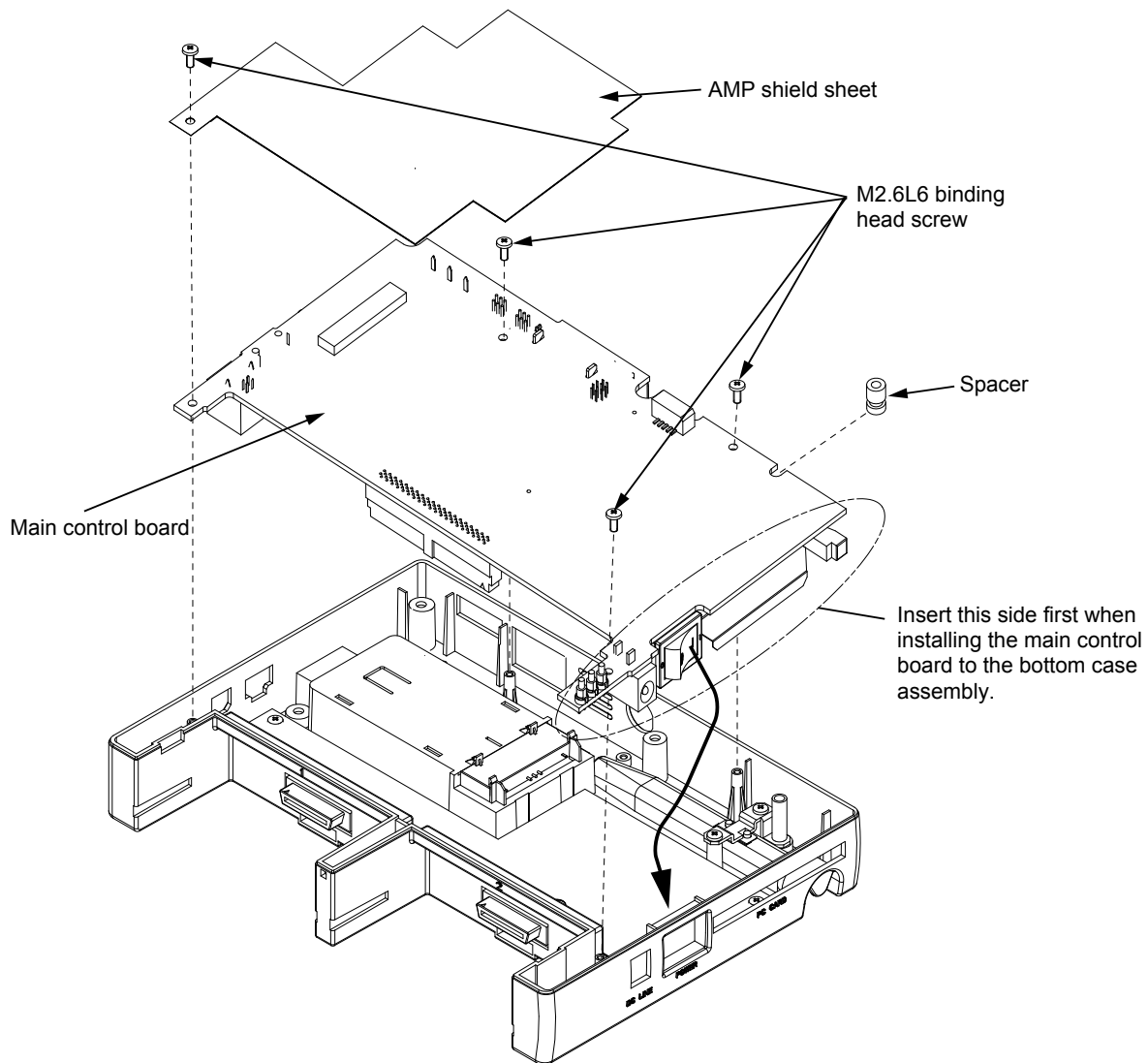
Take care with the flexible cable connecting the top cover assembly and the bottom case assembly when you are removing the top cover assembly for the GL500.

- (4) Disconnect the flexible cable from the main control board for the GL500.



3. DISASSEMBLY AND REASSEMBLY

- (5) Remove the four M2.6L6 binding head screws holding the main control board and AMP shield sheet, and then remove the main control board from the bottom case assembly.



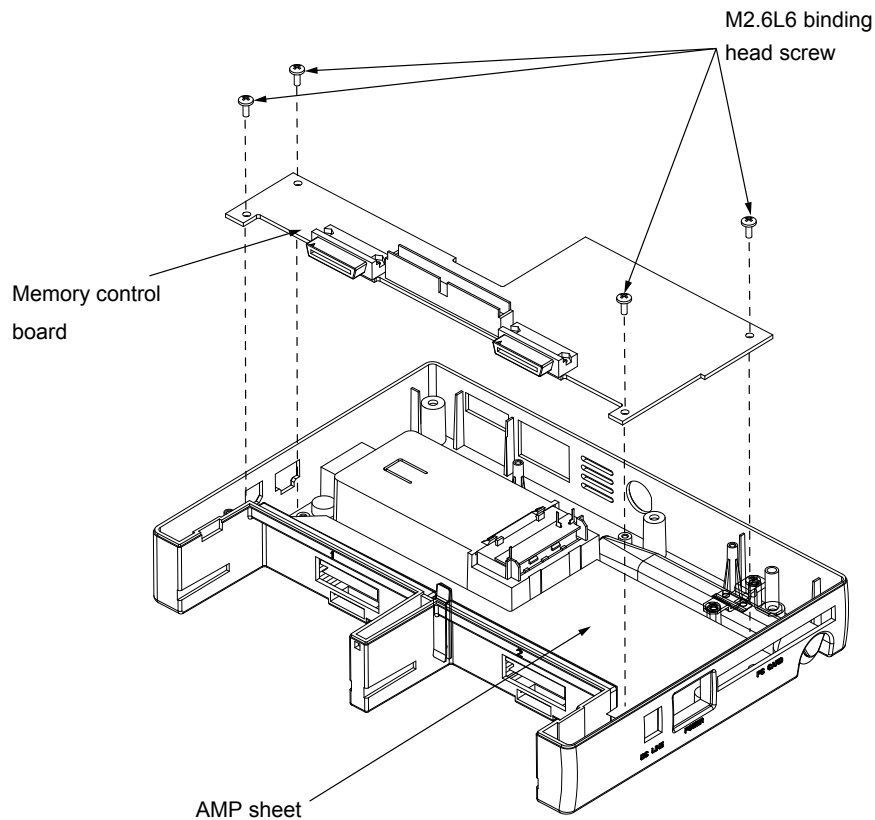
Re-assembly

- (1) Re-assemble the main control board in the reverse order in which it was disassembled.
- (2) Set up the GL500 when you replace any of the boards.

3.4 Replacing the Memory Control Board

Disassembly

- (1) Remove the input terminal unit from the GL500 (See Section 3.2.).
- (2) Remove the main control board from the bottom case (See Section 3.3.).
- (3) Remove the four M2.6L6 binding head screws holding the memory control board, and then detach the memory control board from the bottom case assembly.



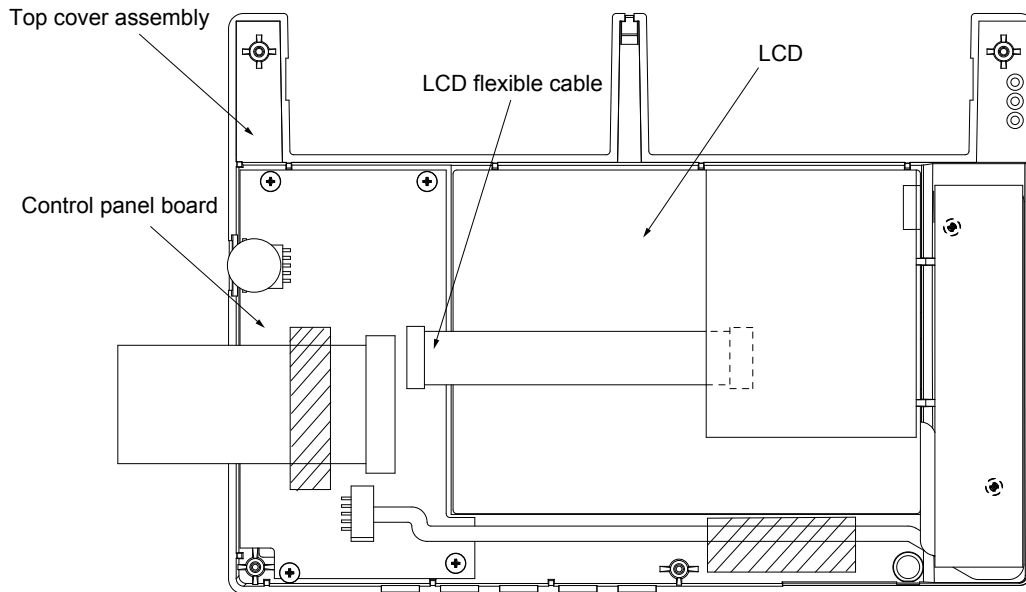
Re-assembly

- (1) Re-assemble the memory control board in the reverse order in which it was disassembled.
- (2) Re-assemble the other parts in the reverse order in which they were disassembled.
- (3) Set up the GL500 when you replace any of the boards.

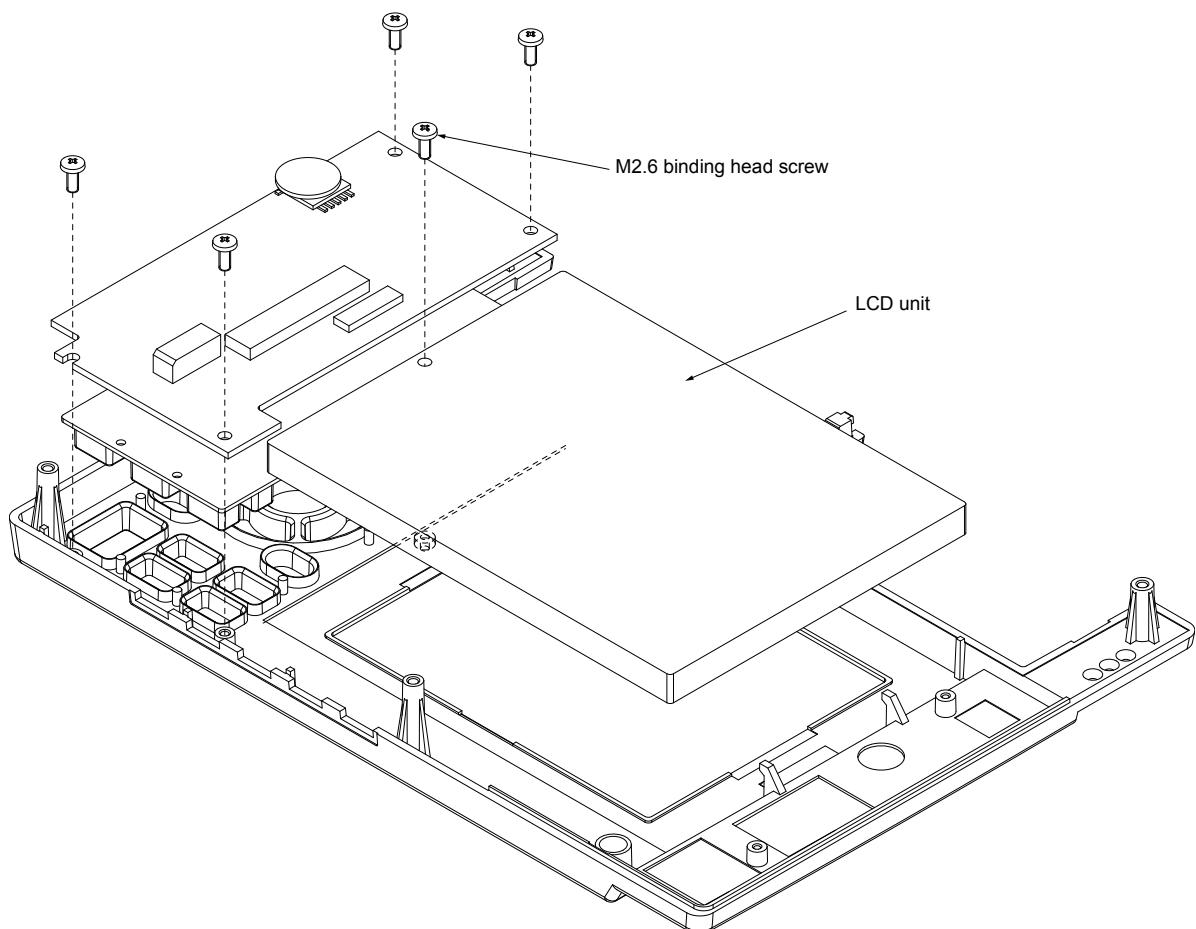
3.5 Replacing the LCD

Disassembly

- (1) Remove the input terminal unit from the GL500 (See Section 3.2.).
- (2) Disconnect the LCD flexible cable from the control panel board.



- (3) Remove the one M2.6 binding head screw holding the LCD unit, and then detach the LCD unit.



Re-assembly

- (1) Re-assemble the LCD unit in the reverse order in which it was disassembled.

4. SETUP PROCEDURES

4.1 Entering the System Setup Menu

- (1) Press the [MENU] key, and then press the [Right Direction] key until the “INFO” menu shown below appears.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Firmware]							
Main CPU Firmware:				Ver.0.81			
[FPGA]							
System Control:				Ver. 0			
[Network]							
MAC Address :				00.03.76.00.00.00			

- (2) Press the [UP Direction] key 10 times in order to display the “Setup Menu” shown below.

Setup Menu	
[AMP Setup]	
Setup CH:	ALL
AMP type:	VF
Mode:	Setup1 (Basic)
Execute Setup:	▶
[Setup MAC Address]	
MAC Address:	00-03-76-00-00-00

- (3) Move the cursor to the “Mode” position using the [Direction] keys.
- (4) Press the [ENTER] key to display the menu below from which you can execute the Setup operations.

Setup mode
Setup1 (Basic)
Setup2 (Room temp.)

- (5) Select the Setup mode using the [Direction] keys, and then press the [ENTER] key.
- (6) Move the cursor to the “Execute Setup” position as shown above.
- (7) Press the [ENTER] key to start the selected Setup operation.

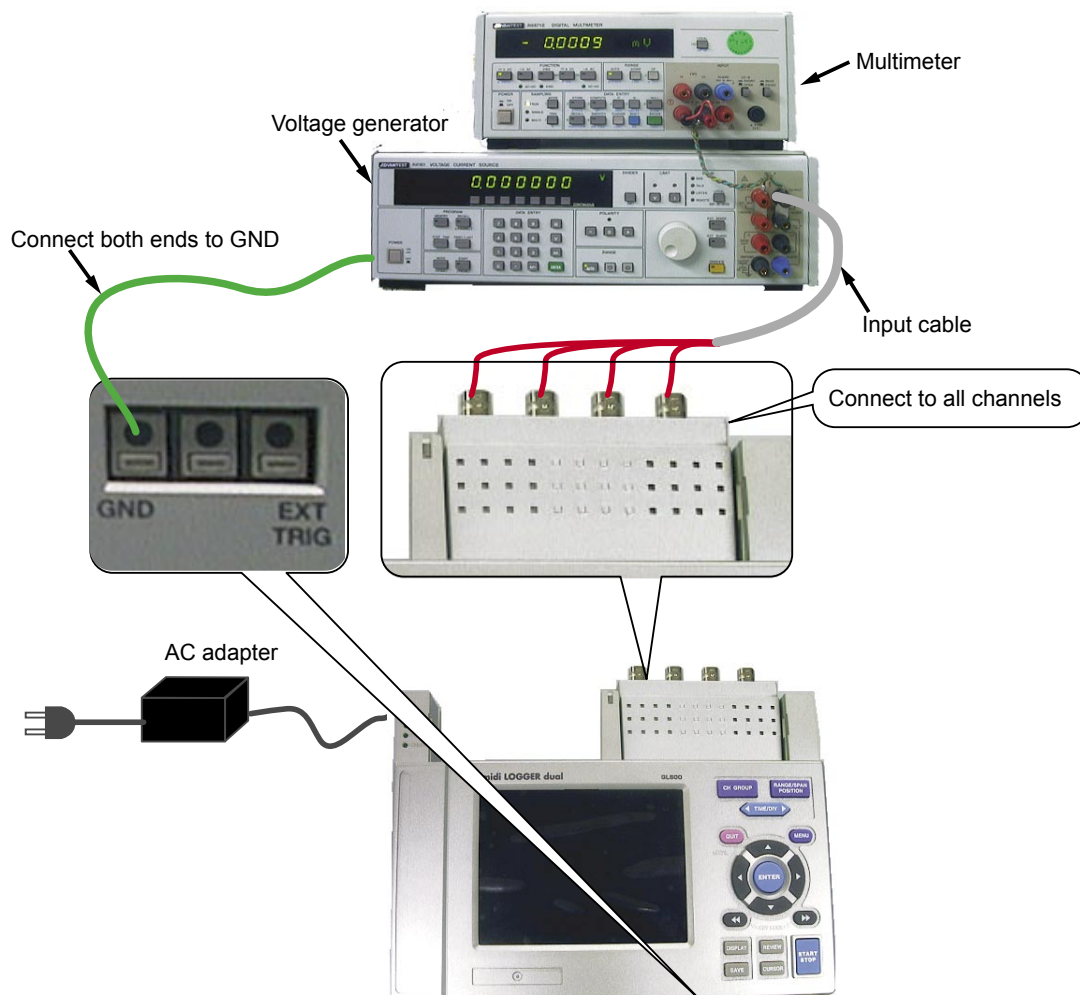
4.2 Setup1 (Voltage Input)

This procedure is required when any part of the AMP board is replaced or the main board is replaced.
This procedure is required for all the amps (VF, MF and MS amps).

Preparation

- Have a voltage generator on hand that can output voltage up to 100 VDC (four-digit output).
- Mutually connect the ground terminals of the voltage generator and the GL500.

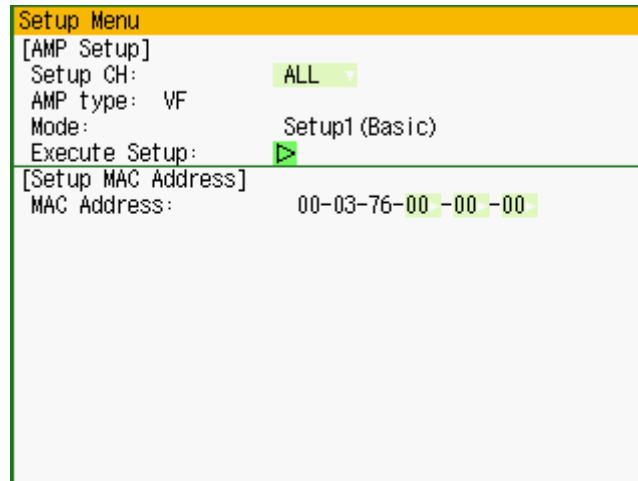
Wiring connection



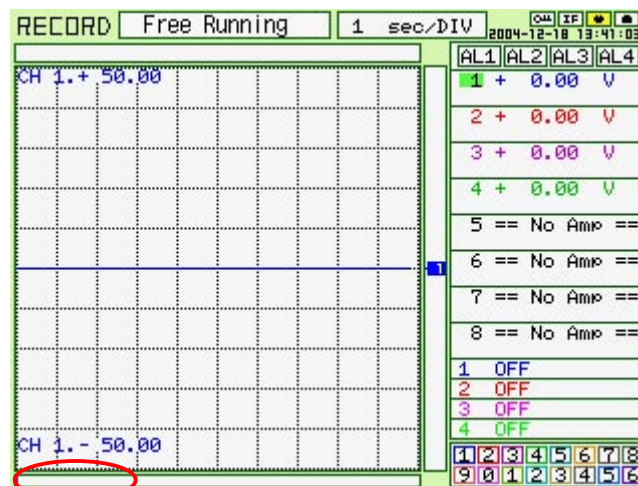
Setup procedure

- (1) As shown in the figure above, connect the output of the voltage generator to the GL500's input terminal.
- (2) Leave the GL500 turned on for at least **30 minutes**.
- (3) After entering the System Setup mode, open the Setup Menu as shown below.
Specify the AMP Setup conditions as shown below.

Setup CH :ALL
 AMP type :VF, MF, or MS (select the amp type for setup)
 Mode :Setup1 (Basic)



- (4) Move the cursor to the “Execute Setup” position as shown above.
- (5) Press the [ENTER] key to start the Setup1 (Basic) operation.



Message

- (6) The "GND : [START]" message is displayed at the location shown above.
- (7) Input "0.000mV" to the input terminals of channel 1.
- (8) Press the [START] key and then wait until the "20 mV : [START]" message appears.
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 GL500.

Message	Input Voltage	Remarks
GND	0.000 mV	
20 mV	20.000 mV	
50 mV	50.000 mV	
100 mV	100.000 mV	
500 mV	500.000 mV	
1 V	1.000 V	
5 V	5.000 V	
10 V	10.000 V	
50 V	50.000 V	Not required for the MS amp
100 V	100.00 V	Not required for the MS amp

- (9) Repeat step (8) by sequentially setting the Measure parameter to 50 mV, 100 mV, 500 mV, 1 V, 5 V, 10 V, (50 V) and (100 V), and then inputting the corresponding voltage.
50 V and 100 V are not required for setup of the MS amp.
- (10) When you have finished the Setup operation for 100 V (10V), the "EEPROM : [ENTER]" message appears.
Press the [ENTER] key to begin writing the new Setup data to the EEPROM.
- (11) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.
- (12) Turn off the GL500.

This completes the voltage amp setup.

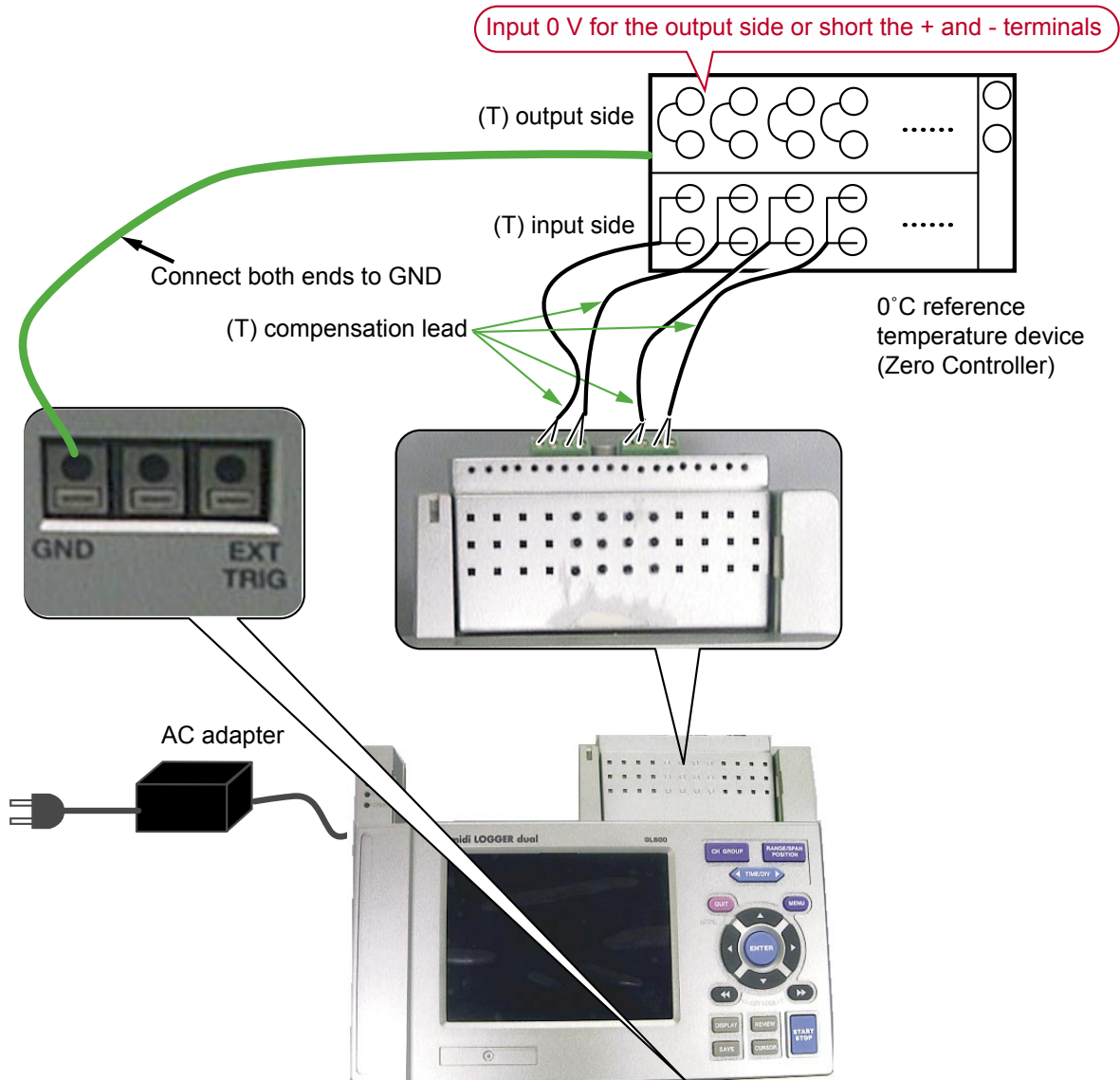
4.3 Setup2 (Room Temperature Compensation)

This procedure is required for the MF and MS amps.

Preparation

As shown below, use (T) temperature compensation leads to connect the target amps to the 0°C reference temperature device (Zero controller). Also be sure to use (T) temperature compensation leads to connect the input terminal.

Wiring connection



CAUTION

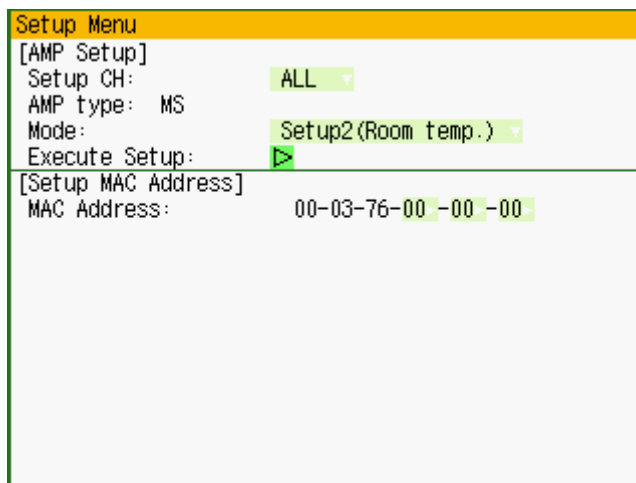
Connect each compensation copper lead to a single terminal as shown in the above diagram (parallel wiring is not permitted).

- (1) As shown in the figure above, connect the input of the zero controller to the GL500's input terminal.
- (2) Leave the GL500 turned on for at least **30 minutes**.

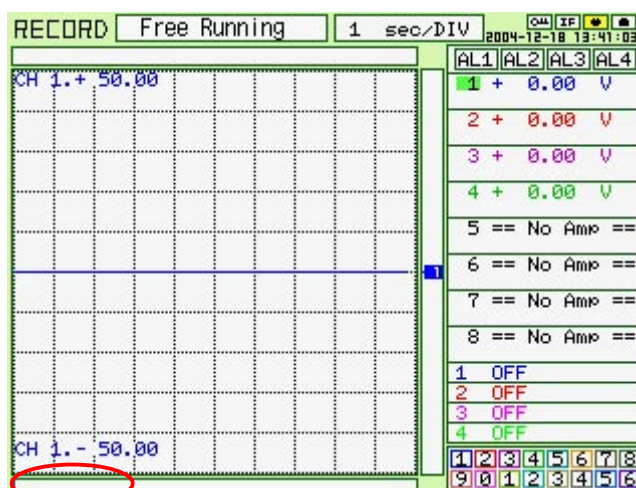
4. SETUP PROCEDURES

- (3) After entering the System Setup mode, open the Setup Menu as shown below.
Specify the AMP Setup conditions as shown below.

Setup CH :ALL
AMP type :MF, or MS (select the amp type for setup)
Mode :Setup2 (Room temp.)



- (4) Move the cursor to the “Execute Setup” position as shown above.
(5) Press the [ENTER] key to start the Setup2 (Room temp.) operation.



- (6) The “rTemp : [START]” message is displayed at the location shown above.
(7) Press the [START] key and then wait until the “EEPROM : [ENTER]” message appears.
(8) Press the [ENTER] key to begin writing the new Setup data to the EEPROM.
(9) After the setup parameters have been registered to the EEPROM, the display closes and returns to normal mode.
(10) Turn off the GL500.

This completes the Room temp. setup.

5. INSPECTION AND CHECK PROCEDURES

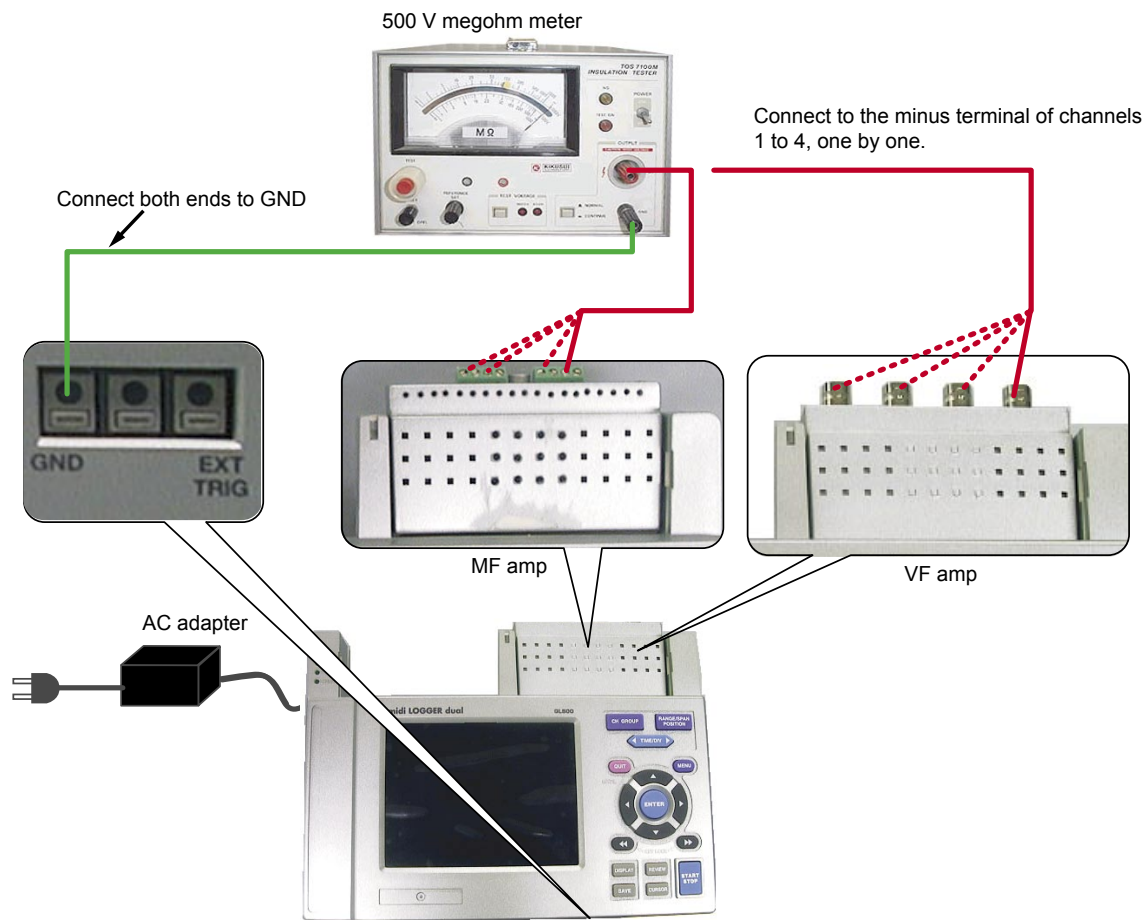
5.1 Insulation Resistance

Use a megohm meter (an insulation resistance gauge) to check that the insulation resistance between the following terminals is equal to or higher than the rated value.

This inspection is not required for the 8MS amp.

Measuring Terminals	Rated value	Remarks
Ch1- to GND (FG)	Megohm meter with an output capacity of 500 VDC; insulation resistance is 50 M ohm or more.	Check the (-) terminal of each channel, one by one.
Ch2- to GND (FG)		
Ch3- to GND (FG)		
Ch4- to GND (FG)		

Wiring connection



5.2 How to Load the Condition Settings Files

Preparations for inspections and checks

Condition settings files :CondVFV.CND	← Condition settings for the voltage accuracy of the VF amp
:CondMFV.CND	← Condition settings for the voltage accuracy of the MF amp
:CondMSV.CND	← Condition settings for the voltage accuracy of the MS amp
:CondMFT.CND	← Condition settings for the T range accuracy of the MF amp
:CondMFK.CND	← Condition settings for the K range accuracy of the MF amp
:CondMST.CND	← Condition settings for the T range accuracy of the MS amp
:CondMSK.CND	← Condition settings for the K range accuracy of the MS amp
:CondVFOff.CND	← Condition settings for the frequency and filter characteristics of the VF amp when Off was specified for Filter
:CondMFOff.CND	← Condition settings for the frequency and filter characteristics of the MF amp when Off was specified for Filter
:CondMSOff.CND	← Condition settings for the frequency and filter characteristics of the MS amp when Off was specified for Filter
:CondVFM.CND	← Condition settings for the memory and trigger functions of the VF amp
:CondMFM.CND	← Condition settings for the memory and trigger functions of the MF amp
:CondMSM.CND	← Condition settings for the memory and trigger functions of the MS amp
:CondVFSn.CND	← Condition settings for the signal-to-noise ratio of the VF amp
:CondMFSn.CND	← Condition settings for the signal-to-noise ratio of the MF amp
:CondMSsn.CND	← Condition settings for the signal-to-noise ratio of the MS amp

- (1) Copy the above condition settings files to a PCMCIA card from the computer.

How to load the condition settings files to the GL500 from a PCMCIA card

- (1) Press the [MENU] key, and then press the [Right Direction] key until the “FILE” menu shown below appears.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[PC Card] *****							
Auto Data Save:					Off ▾		
Data Save Path: A:\<AUTO.GBD>					▾		
BMP Save Path: A:\<ENGLISH\<AUTO.BMP>					▾		
Save current settings:					▾		
Load settings:					▾		
File List:					▾		
File Copy:					▾		
File Rename					▾		
File Delete:					▾		
Card Initialize:					▾		
[PC Card Information]							
Available:					47.9 MBytes		
Total Size:					63.9 MBytes		

- (2) Move the cursor to the “Load settings” position using the [Direction] keys.
- (3) Press the [ENTER] key to display the menu shown below.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[PC Card] *****							
Auto Data Save:					Off ▾		
Data Save Path:					A:\<AUTO.GBD> ▾		
BMP Save Path:					A:\ENGLISH\<AUTO.BMP> ▾		
Save current settings:					▾		
Load settings:					▾		
Load Settings							
Folder : [\]							
File Name : [Not Specified] ▸							
Execute ▸							
[ENTER]Select/[QUIT]Exit							
[PC Card Information]							
Available:					47.9 MBytes		
Total Size:					63.9 MBytes		

- (4) Specify the condition settings file to execute the various inspection operations.
- (5) Move the cursor to the “Execute” position using the [Direction] keys.
- (6) Press the [ENTER] key to load the condition settings file.
- (7) Press the [QUIT] key to exit the menu mode.

5.3 Voltage Accuracy

Supply the reference voltage or frequency determined for each measurement range, and then check the voltage accuracy.

Preparation

- Use a voltage generator that can output up to 100 VDC (using four-digit settings).
- Mutually connect the ground terminals of the voltage generator and the GL500 prior to initiating measurement.
- Install the amp for which you want to perform the voltage accuracy measurement procedure in the GL500.

Wiring connection

Same wiring connection as Setup1. (See the Setup1 procedure)

Setting procedure

- (1) Load the condition settings file from the PCMCIA card for each amp type according to the table below.

Amp	Condition file name	Remarks
VF amp	CondVFV.CND	
MF amp	CondMFV.CND	
MS amp	CondMSV.CND	

Measurement procedure

The procedure for the VF amp is explained here.

Perform this procedure for the other amps in the same way.

- (1) Press the [MENU] key to display the menu shown below.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH: 4		Logic/Pulse: Off					
CH: AMP	Input	Range	Filter	EU	Misc.		
ALL:	DC	100mV	Off				
1: VF	DC	100mV	Off	Off			
2: VF	DC	100mV	Off	Off			
3: VF	DC	100mV	Off	Off			
4: VF	DC	100mV	Off	Off			
5:	Off			Off			
6:	Off			Off			
7:	Off			Off			
8:	Off			Off			
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

- (2) Move the cursor to the CH: ALL : Range position as shown above.

5. INSPECTION AND CHECK PROCEDURES

- (3) Press the [ENTER] key to display the menu shown below, and then select the reference voltage range.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH:		4	Logic/Pulse:		Off		
CH	AMP	Input	Range	Filter	EU	Misc.	
ALL:	DC	100mV	Off				
1:	VF	DC	100mV	Off	Off		
2:	VF	DC	500mV	Off	Off		
3:	VF	DC	1 V	Off	Off		
4:	VF	DC	5 V	Off	Off		
5:	Off		10 V		Off		
6:	Off		50 V		Off		
7:	Off		100 V		Off		
8:	Off				Off		
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

- (4) Press the [QUIT] key to display the menu shown below.

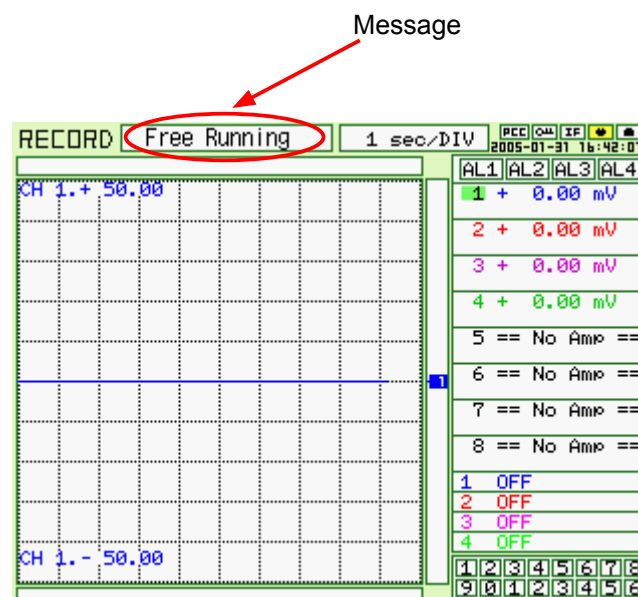
RECORD	Free Running	1 sec/DIV	PCC	QW	IF	2005-01-31 16:42:01
			AL1	AL2	AL3	AL4
CH 1. + 50.00			1 + 0.00 mV			
			2 + 0.00 mV			
			3 + 0.00 mV			
			4 + 0.00 mV			
			5 == No Amp ==			
			6 == No Amp ==			
			7 == No Amp ==			
			8 == No Amp ==			
			1 OFF			
			2 OFF			
			3 OFF			
			4 OFF			
CH 1. - 50.00			1 2 3 4 5 6 7 8			
			9 0 1 2 3 4 5 6			

5. INSPECTION AND CHECK PROCEDURES

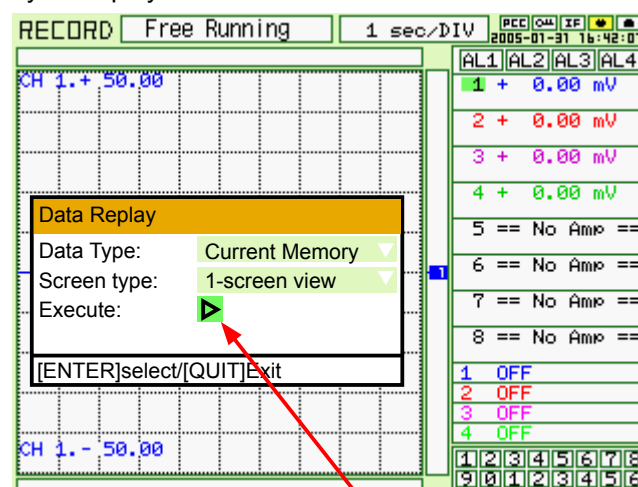
- (5) Input the reference voltage for each range according to the table below, and then check that the level of measurement is within the rating.

Voltage precision ratings				
No.	Range	Input voltage	Rating ($\pm 0.25\%$)	Remarks
1	100 mV	0.00 mV	-0.25 mV to +0.25 mV	
2	100 mV	100.00 mV	+99.75 mV to +100.25 mV	
3	100 mV	-100.00 mV	-100.25 mV to -99.75 mV	
4	500 mV	500.0 mV	498.75 mV to +501.25 mV	
5	1 V	1.0000 V	0.9975 V to 1.0025 V	
6	5 V	5.000 V	4.9875 V to 5.0125 V	
7	10 V	10.000 V	9.975 V to 10.025 V	
8	50 V	50.00 V	49.875 V to 50.125 V	Not required for the MS amp
9	100 V	100.00 V	99.75 V to 100.25 V	Not required for the MS amp

- (6) Press the [START/STOP] key when the input voltage stabilizes.
- (7) Wait until the "Free Running" message is displayed as shown below.



- (8) Press the [REVIEW] key to display the menu shown below.

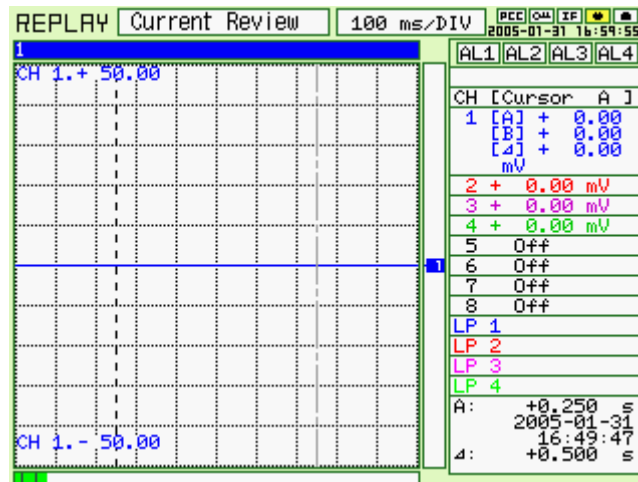


Move the cursor to the Execute position.

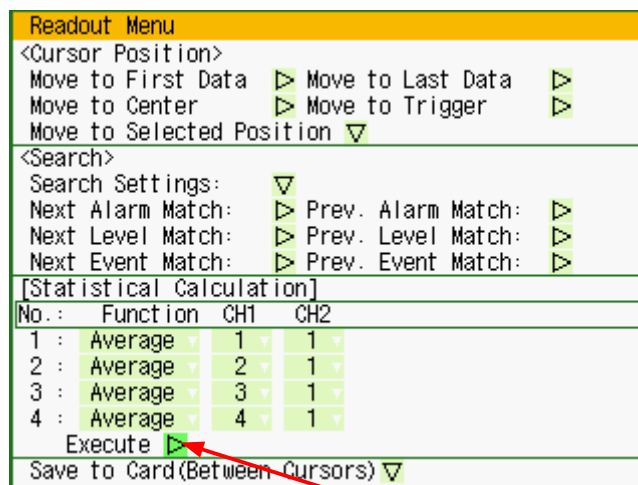
- (9) Move the cursor to the Execute position as shown above.

5. INSPECTION AND CHECK PROCEDURES

(10) Press the [ENTER] key to display the menu shown below.



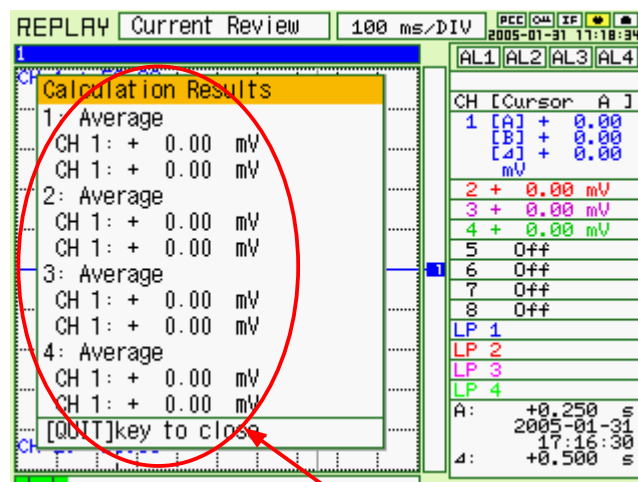
(11) Press the [MENU] key to display the menu shown below.



Move the cursor to the Execute position.

(12) Move the cursor to the Execute position as shown above.

(13) Press the [ENTER] key to display the menu shown below.



Confirm that these values are within the above ratings after data has been captured.

(14) Press the [QUIT] key twice to exit the Current Review menu.

(15) Repeat steps (1) to (14), and confirm that each value is within the above ratings.

5.4 Temperature Accuracy

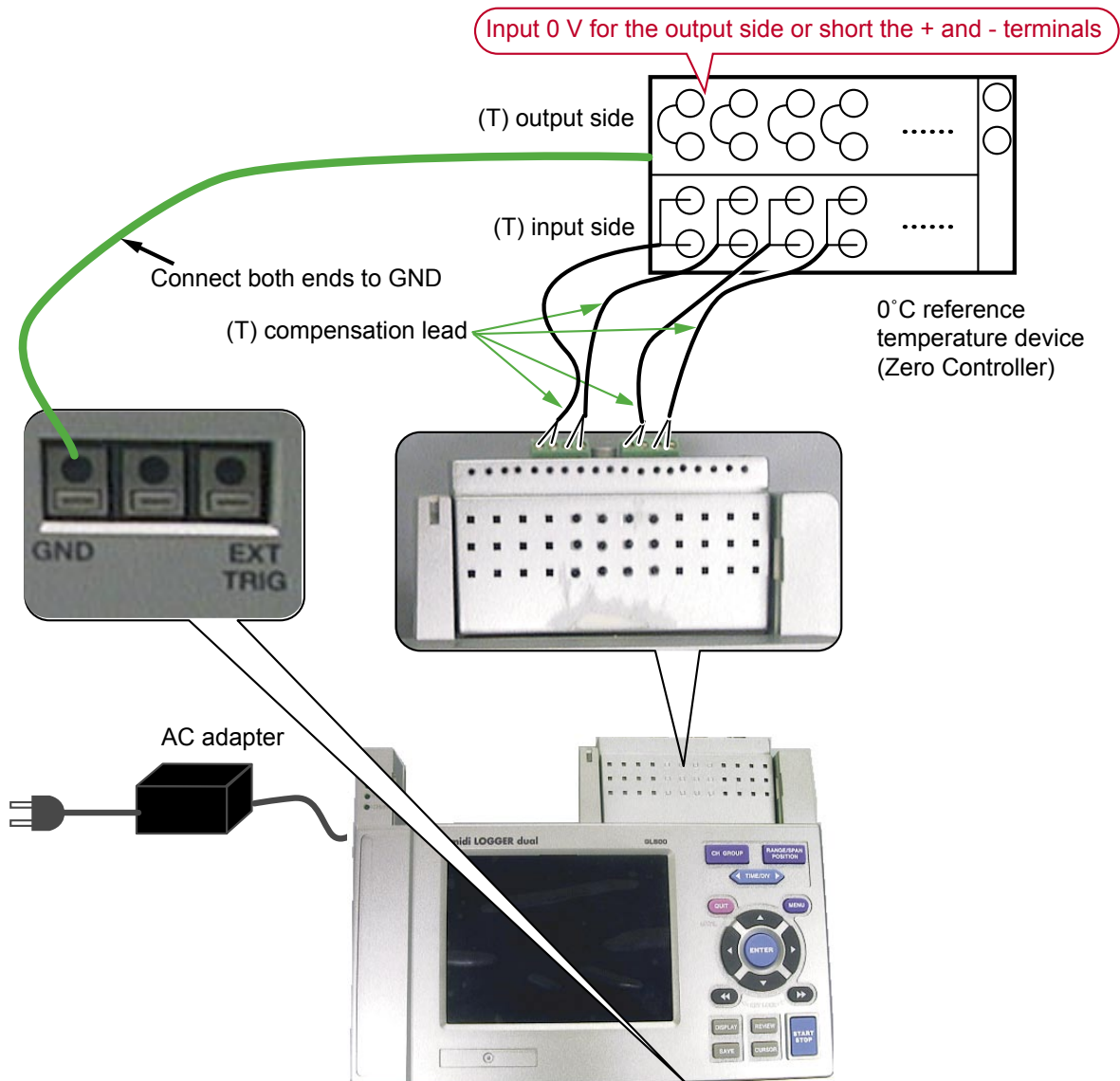
This procedure is required for the MF and MS amps.

Preparation

As shown below, use (T) temperature compensation leads to connect the target amps to the 0°C reference temperature device (Zero controller). Also be sure to use (T) temperature compensation leads to connect the input terminal.

Install the amp for which you want to perform the temperature accuracy measurement procedure in the GL500.

Wiring connection



CAUTION

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

Setting procedure

- (1) Load the condition settings files from the PCMCIA card.

Condition settings files :CondMFT.CND ← Condition settings for the T range accuracy of the MF amp
 :CondMFK.CND ← Condition settings for the K range accuracy of the MF amp
 :CondMST.CND ← Condition settings for the T range accuracy of the MS amp
 :CondMSK.CND ← Condition settings for the K range accuracy of the MS amp

Measurement procedure (temperature accuracy)

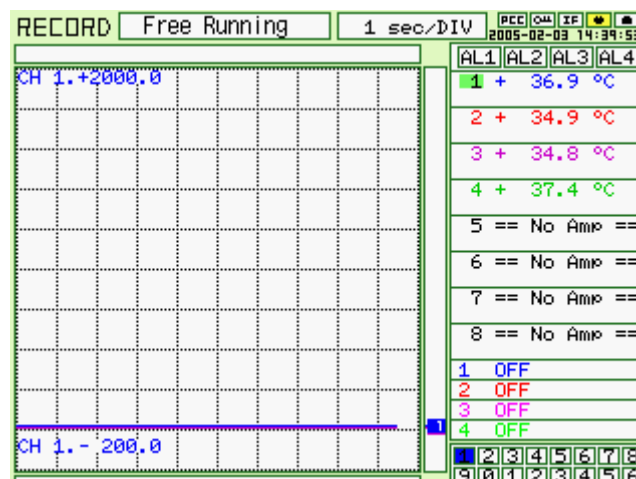
The procedure for the MF amp is explained here.

Perform this procedure for the MS amp in the same way.

- (1) Load the condition settings file for type T as described above.
- (2) Connect to the zero controller with the (T) compensation leads.
- (3) Press the [ENTER] key to display the menu shown below, and then confirm the settings.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH: 4				Logic/Pulse: Off			
CH: AMP	Input	Range	Filter	EU	Misc.		
ALL:	TEMP	TC-T	Line				
1: MF	TEMP	TC-T	Line	Off			
2: MF	TEMP	TC-T	Line	Off			
3: MF	TEMP	TC-T	Line	Off			
4: MF	TEMP	TC-T	Line	Off			
5:	Off			Off			
6:	Off			Off			
7:	Off			Off			
8:	Off			Off			
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

- (4) Press the [QUIT] key to display the menu shown below.

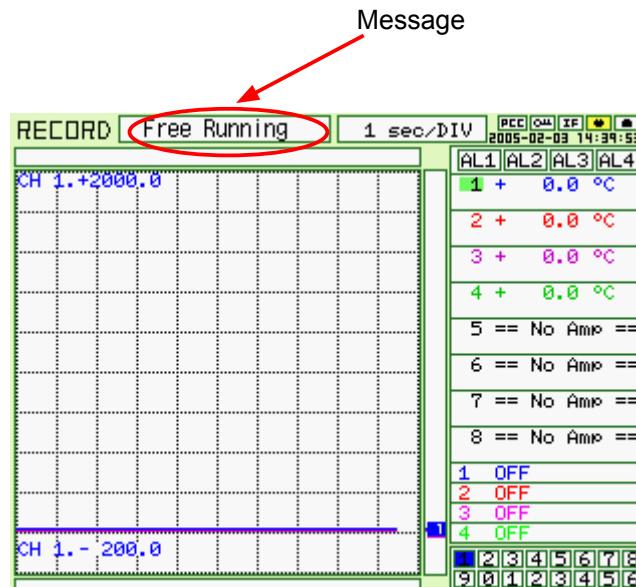


5. INSPECTION AND CHECK PROCEDURES

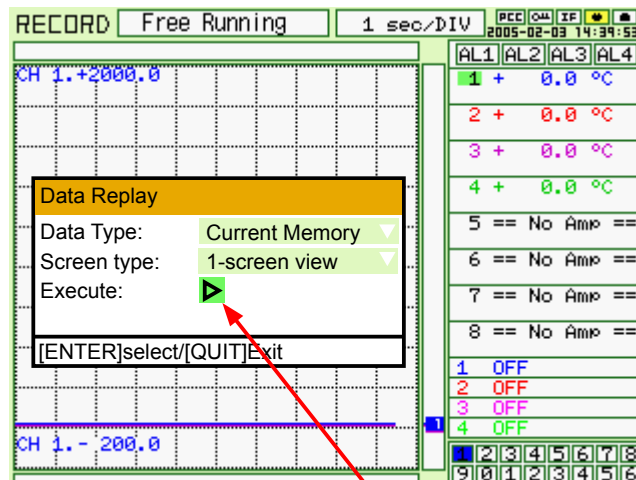
- (5) Input the reference voltage signal for each range to the 0 °C reference temperature device (zero controller) according to the table below, then check that the level of measurement is within the rating.

Input voltage precision ratings (Type T)		
Temperature	Input voltage	Standard
0 °C	0.000 mV	-2.0 °C to +2.0 °C

- (6) Press the [START/STOP] key when the input voltage stabilizes.
- (7) Wait until the "Free Running" message is displayed as shown below.



- (8) Press the [REVIEW] key to display the menu shown below.

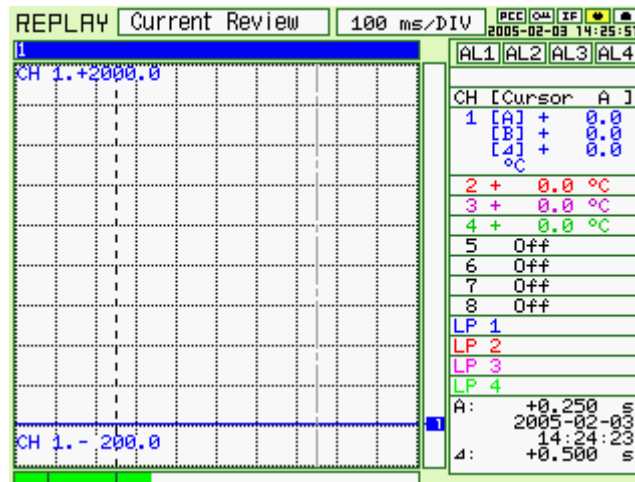


Move the cursor to the Execute position.

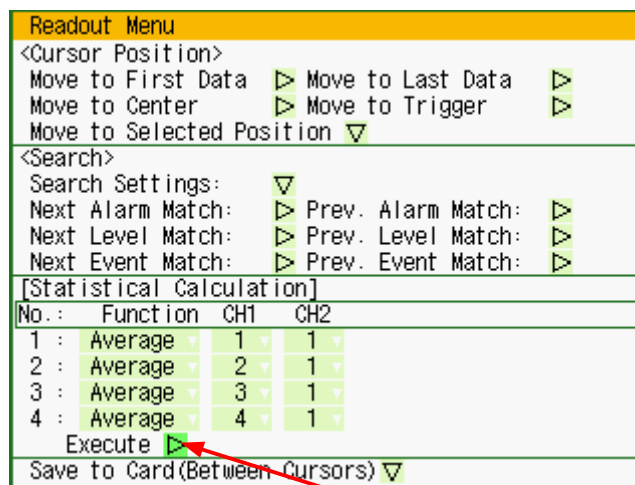
- (9) Move the cursor to the Execute position as shown above.

5. INSPECTION AND CHECK PROCEDURES

(10) Press the [ENTER] key to display the menu shown below.



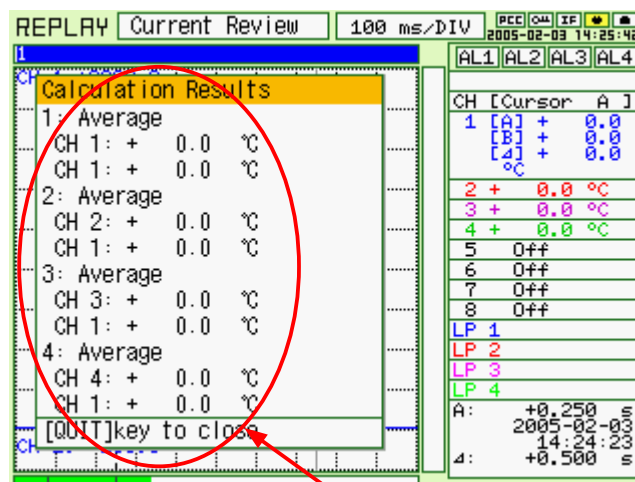
(11) Press the [MENU] key to display the menu shown below.



Move the cursor to the Execute position.

(12) Move the cursor to the Execute position as shown above.

(13) Press the [ENTER] key to display the menu shown below.



Confirm that these values are within the above ratings after data has been captured.

(14) Confirm that each value is within the above ratings.

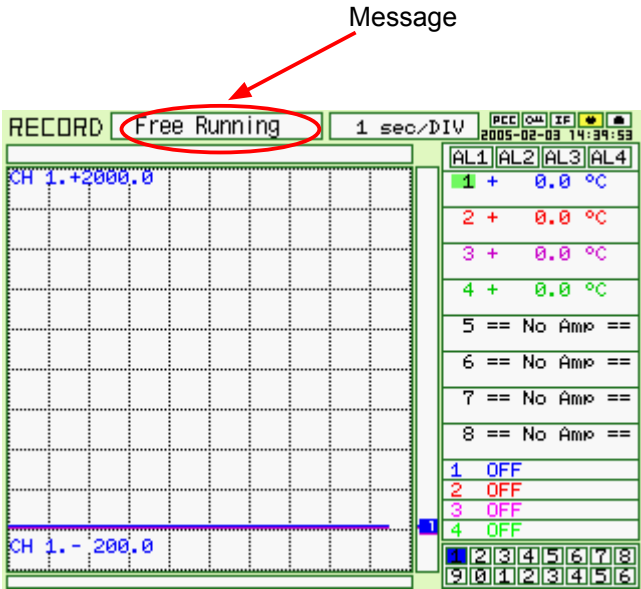
(15) Press the [QUIT] key twice to exit the Current Review menu.

5. INSPECTION AND CHECK PROCEDURES

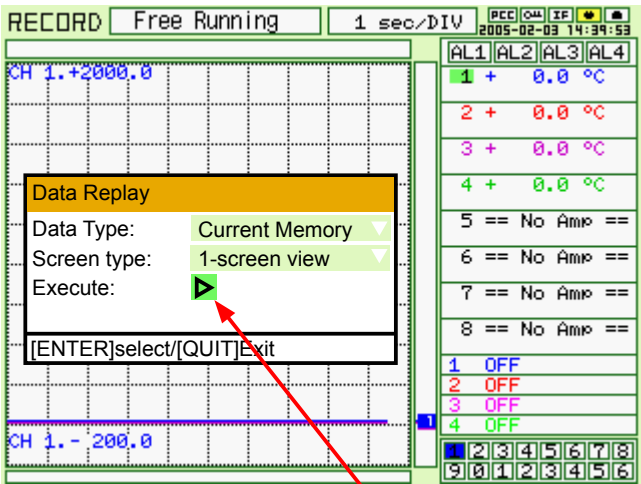
- (16) Connect (K) compensation leads to each amp.
- (17) Load the condition settings file for type K as described above.
- (18) Input the reference voltage signal for each range to the 0 °C reference temperature device (zero controller) according to the table below, then check that the level of measurement is within the rating.

Input voltage precision ratings (Type K)		
Temperature	Input voltage	Standard
0 °C	0.000 mV	-2.5 °C to +2.5 °C

- (19) Press the [START/STOP] key when the input voltage stabilizes.
- (20) Wait until the "Free Running" message is displayed as shown below.



- (21) Press the [REVIEW] key to display the menu shown below.

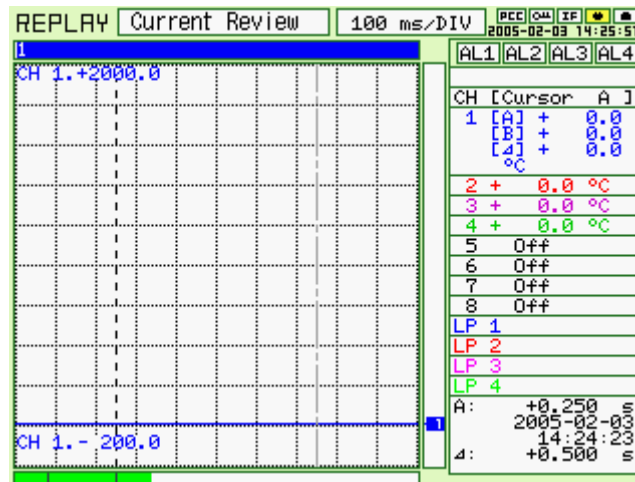


Move the cursor to the Execute position.

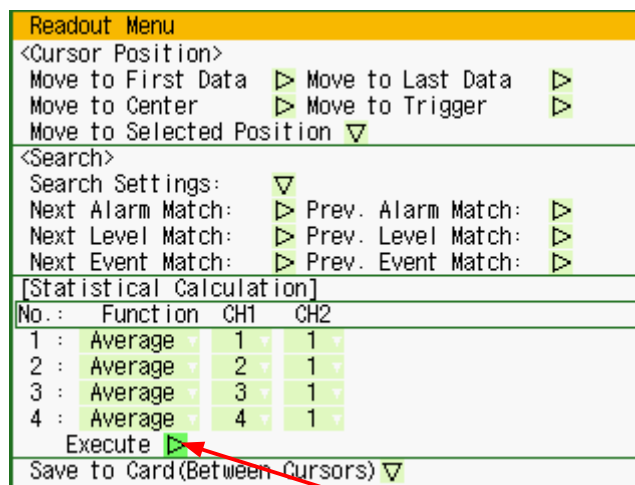
- (22) Move the cursor to the Execute position as shown above.

5. INSPECTION AND CHECK PROCEDURES

(23) Press the [ENTER] key to display the menu shown below.



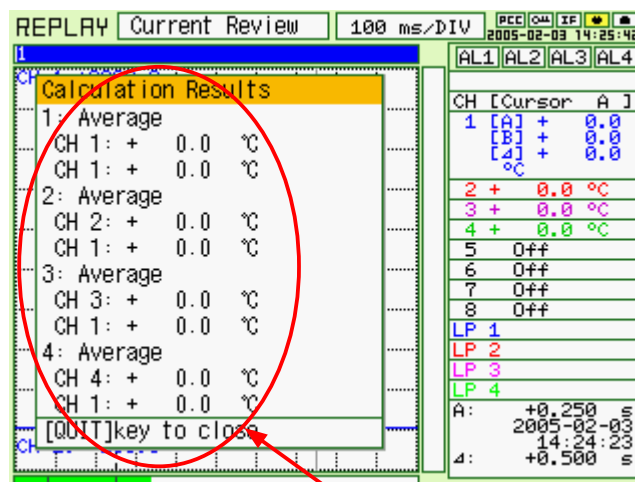
(24) Press the [MENU] key to display the menu shown below.



Move the cursor to the Execute position.

(25) Move the cursor to the Execute position as shown above.

(26) Press the [ENTER] key to display the menu shown below.



Confirm that these values are within the above ratings after data has been captured.

(27) Confirm that each value is within the above ratings.

(28) Press the [QUIT] key twice to exit the Current Review menu.

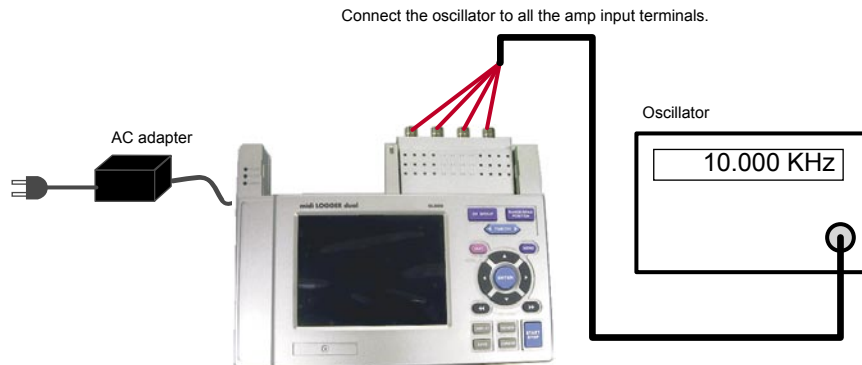
5.5 Frequency and Filter Characteristics

Preparation

- Have on hand an oscillator capable of the types of output described below.
Output waveforms : sine waves
Frequency : 5.0 Hz to 20.05 KHz
- Mutually connect the GND terminals of the oscillator and GND terminal of the GL500 before measurement.

Wiring connection

Connect the oscillator to all the amp input terminals.



Setting procedure

- (1) Load the condition settings file from the PCMCIA card for each amp type according to the list below.
Condition settings files :CondVFOff.CND ← Condition settings for the frequency and filter characteristics of the VF amp when Off was selected for Filter
:CondMFOff.CND ← Condition settings for the frequency and filter characteristics of the MF amp when Off was selected for Filter
:CondMSoff.CND ← Condition settings for the frequency and filter characteristics of the MS amp when Off was selected for Filter

Measurement procedure

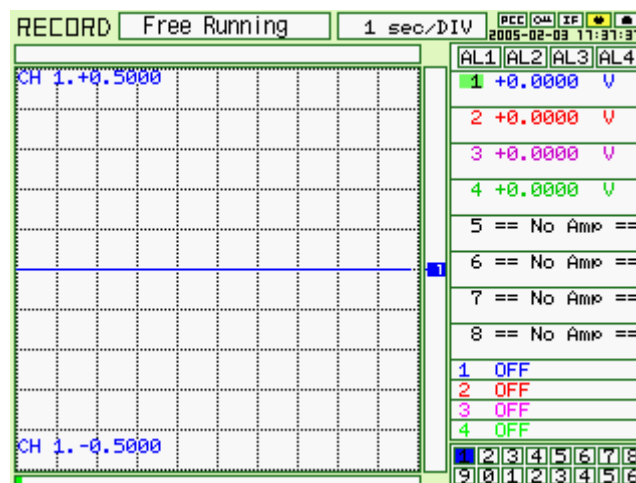
The procedure for the VF amp is explained here.

Perform this procedure for the other amps in the same way.

- (1) Load the condition settings file CondVFOff.CND as described above.
- (2) Press the [MENU] key to display the menu shown below.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH: 4				Logic/Pulse: Off			
CH: AMP	Input	Range	Filter	EU	Misc.		
ALL:	DC	1 V	Off				
1: VF	DC	1 V	Off	Off			
2: VF	DC	1 V	Off	Off			
3: VF	DC	1 V	Off	Off			
4: VF	DC	1 V	Off	Off			
5:	Off			Off			
6:	Off			Off			
7:	Off			Off			
8:	Off			Off			
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

- (3) Press the [QUIT] key to display the menu shown below.



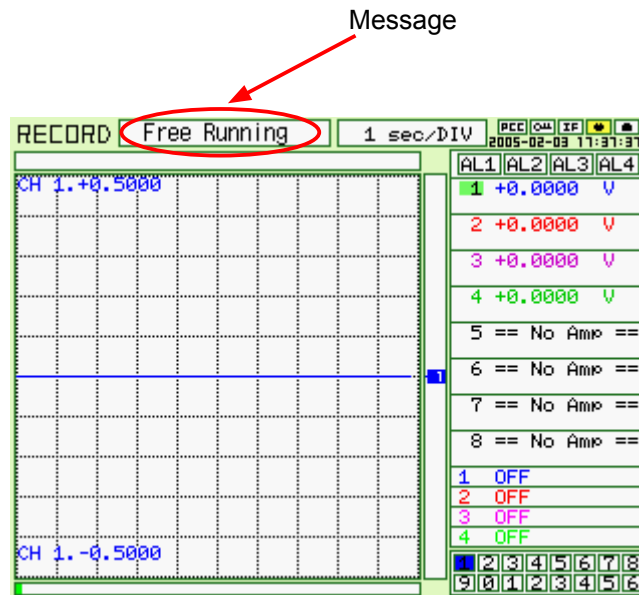
- (4) Input the reference signal for each amp according to the table below, and then check that the measured amplitude is within the rating when compared with the amplitude during reference signal input.

Amp settings			Generator output settings			Rating
Input	Range	Filter	Frequency	AMPTD	FCTN	Rating (1 V input)
DC	1 V	OFF	20.05 KHz	1 V p-p	Sine wave	0.65 V to 1.12V
		Line	1.5 Hz			0.55 V to 0.85V
		5 Hz	5 Hz			0.55 V to 0.85V
		50 Hz	50 Hz			0.6 V to 0.8 V
		500 Hz	500 Hz			0.6 V to 0.8 V

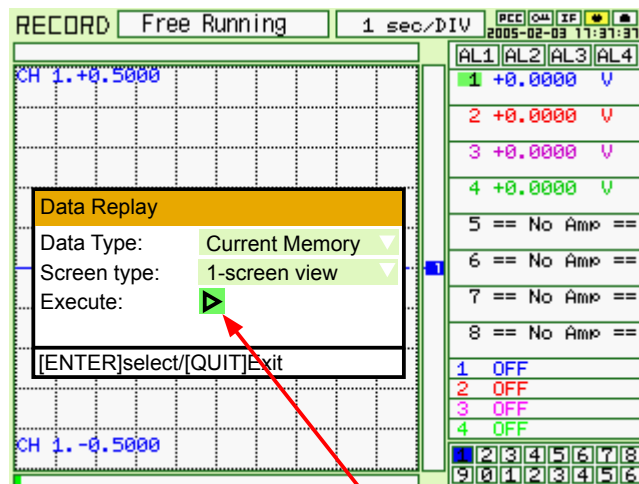
- (5) Press the [START/STOP] key.

5. INSPECTION AND CHECK PROCEDURES

- (6) Wait until the "Free Running" message is displayed as shown below.

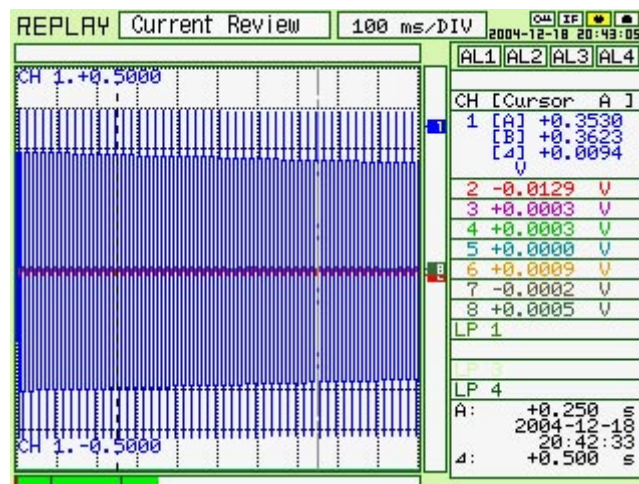


- (7) Press the [REVIEW] key to display the menu shown below.



Move the cursor to the Execute position.

- (8) Move the cursor to the Execute position as shown above.
- (9) Press the [ENTER] key to display the menu shown below.



5. INSPECTION AND CHECK PROCEDURES

(10) Press the [MENU] key to display the menu shown below.

Readout Menu

<Cursor Position>

Move to First Data ▷ Move to Last Data ▷

Move to Center ▷ Move to Trigger ▷

Move to Selected Position ▾

<Search>

Search Settings: ▾

Next Alarm Match: ▷ Prev. Alarm Match: ▷

Next Level Match: ▷ Prev. Level Match: ▷

Next Event Match: ▷ Prev. Event Match: ▷

[Statistical Calculation]

No.:	Function	CH1	CH2
1 :	P-P	1	1
2 :	P-P	2	1
3 :	P-P	3	1
4 :	P-P	4	1

Execute ▷

Save to Card(Between Cursors) ▾

Move the cursor to the Execute position.

(11) Move the cursor to the Execute position as shown above.

(12) Press the [ENTER] key to display the menu shown below.

REPLAY Current Review 100 ms/DIV 2004-12-18 20:43:05

CH [Cursor A]

1 [A] +0.3530

2 [B] +0.3623

3 [C] +0.0094

4 [D] +0.0094

5 +0.0000 V

6 +0.0000 V

7 -0.0002 V

8 +0.0005 V

LP 1

LP 4

A: +0.250 s

2004-12-18

20:42:33

d: +0.500 s

Confirm that these values are within the above ratings after data has been captured.

(13) Press the [QUIT] key twice to exit the Current Review menu.

(14) Press the [MENU] key to display the menu shown below.

AMP CRNT EVNT CALC FILE I/F OTHR INFO

[Amp] Performs AD input settings

No. of CH: 4 Logic/Pulse: Off

CH:	AMP	Input	Range	Filter	EU	Misc.
ALL:	DC	1 V	Off			
1:	VF	DC	1 V	Off	Off	
2:	VF	DC	1 V	Line	Off	
3:	VF	DC	1 V	5 Hz	Off	
4:	VF	DC	1 V	50 Hz	Off	
5:	Off			500 Hz	Off	
6:	Off				Off	
7:	Off				Off	
8:	Off				Off	

LP:

1: Off

2: Off

3: Off

4: Off

5. INSPECTION AND CHECK PROCEDURES

- (15) Set the filter setting to the next filter setting as shown above.
- (16) Repeat steps (3) to (13), and confirm that each value is within the above rating.

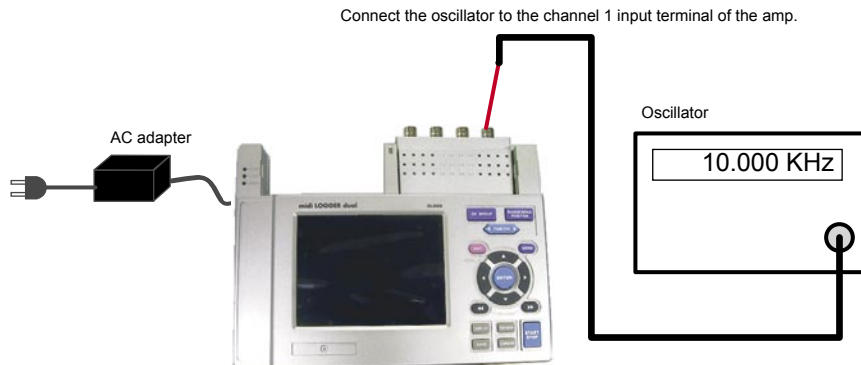
5.6 Memory and Trigger Functions

Preparation

- Have on hand an oscillator capable of the types of output described below.
Output waveforms : sine waves
Frequency : 1 Hz
- Mutually connect the GND terminals of the oscillator and GND terminal of the GL500 before measurement.

Wiring connection

Connect the oscillator to the channel 1 input terminal of the amp.



Setting procedure

- (1) Load the condition settings file from the PCMCIA card for each amp type according to the list below.
 Condition settings files :CondVFM.CND ← Condition settings for the memory and trigger functions of the VF amp
 :CondMFM.CND ← Condition settings for the memory and trigger functions of the MF amp
 :CondMSM.CND ← Condition settings for the memory and trigger functions of the MS amp

Measurement procedure

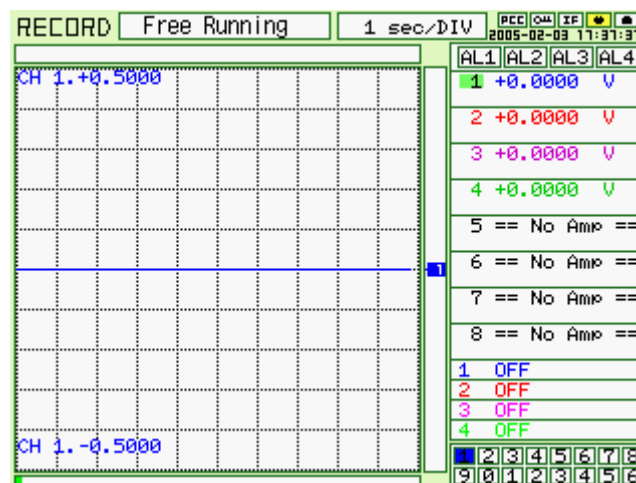
The procedure for the VF amp is explained here.

Perform this procedure for the other amps in the same way.

- (1) Load the condition settings file CondVFM.CND as described above.
- (2) Press the [MENU] key to display the menu shown below.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH: 4		Logic/Pulse: Off					
CH: AMP	Input	Range	Filter	EU	Misc.		
ALL:	DC	1 V	Off				
1: VF	DC	1 V	Off	Off			
2: VF	DC	1 V	Off	Off			
3: VF	DC	1 V	Off	Off			
4: VF	DC	1 V	Off	Off			
5:	Off			Off			
6:	Off			Off			
7:	Off			Off			
8:	Off			Off			
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

- (3) Press the [QUIT] key to display the menu shown below.



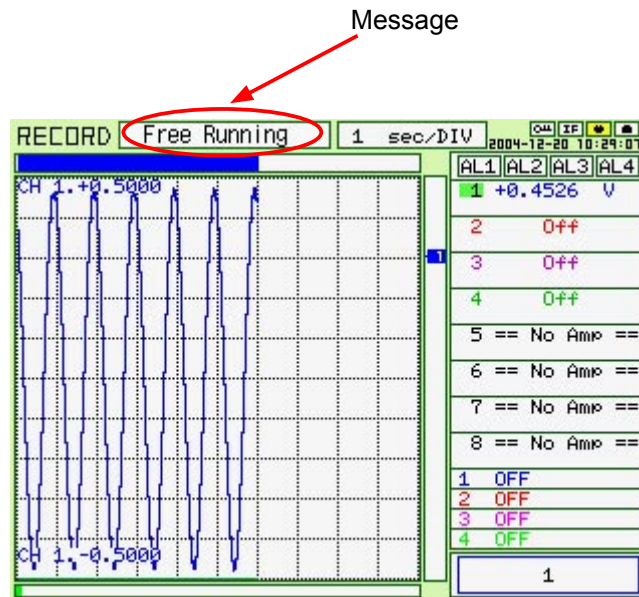
- (4) Input the reference signal for each amp according to the table below, and then check that the measured amplitude is within the rating when compared with the amplitude during reference signal input.

Amp settings			Generator output settings		
Input	Range	Filter	Frequency	AMPTD	FCTN
DC	1 V	OFF	1.00 Hz	1 V p-p	Sine wave

- (5) Press the [START/STOP] key to start data capture.

5. INSPECTION AND CHECK PROCEDURES

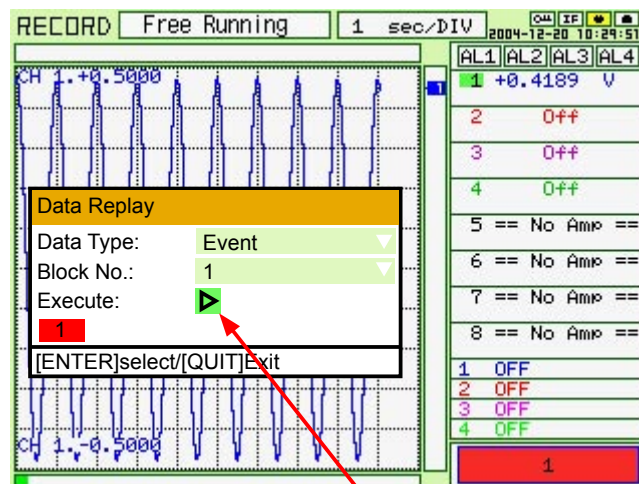
- (6) Wait until the "Free Running" message is displayed as shown below.



- (7) Press the [REVIEW] key to display the menu shown below.

Data Type : Event

Block No. : 1

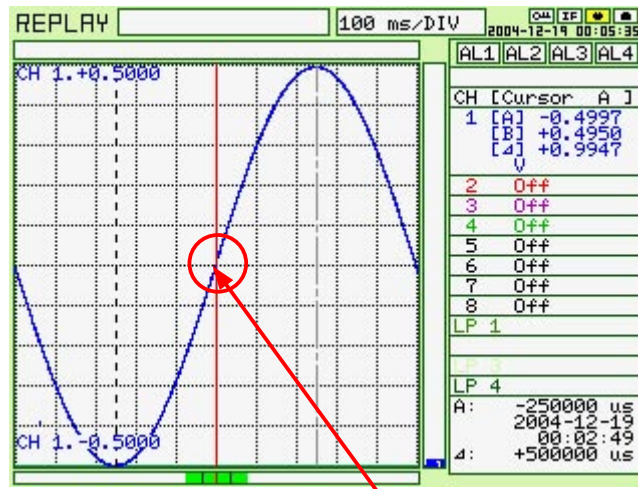


Move the cursor to the Execute position.

- (8) Move the cursor to the Execute position as shown above.

5. INSPECTION AND CHECK PROCEDURES

- (9) Press the [ENTER] key to display the menu shown below.



Trigger point

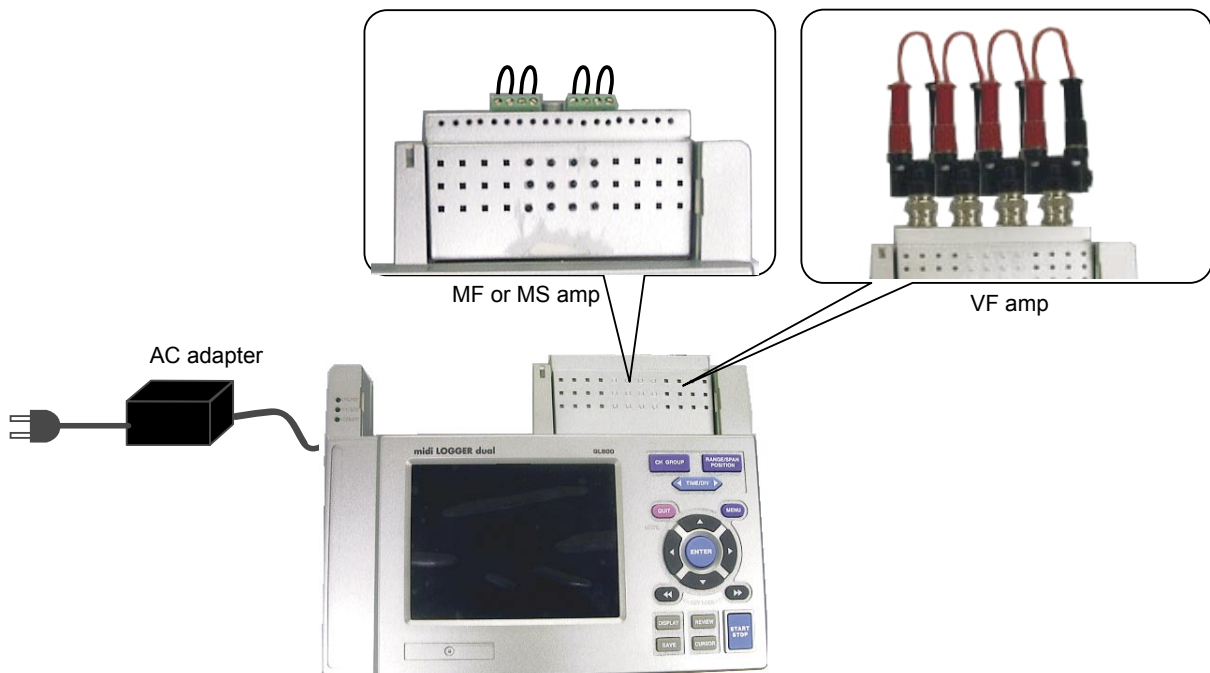
- (10) Confirm that the captured waveform is similar to the one shown above.
- (11) Press the [QUIT] key twice to exit the Current Review mode.
- (12) Repeat steps (1) to (11) for each amp, and confirm that each captured waveform is similar to the one shown above.

5.7 Signal-to-Noise Ratio

Wiring connection

Short the + and - terminals for all channels.

Short the + and - terminals for all channels.



Setting procedure

- (1) Load the condition settings file from the PCMCIA card for each amp type according to the list below.
 Condition settings files :CondVFsn.CND ← Condition settings for the signal-to-noise ratio of the VF amp
 :CondMFsn.CND ← Condition settings for the signal-to-noise ratio of the MF amp
 :CondMSsn.CND ← Condition settings for the signal-to-noise ratio of the MS amp

Measurement procedure

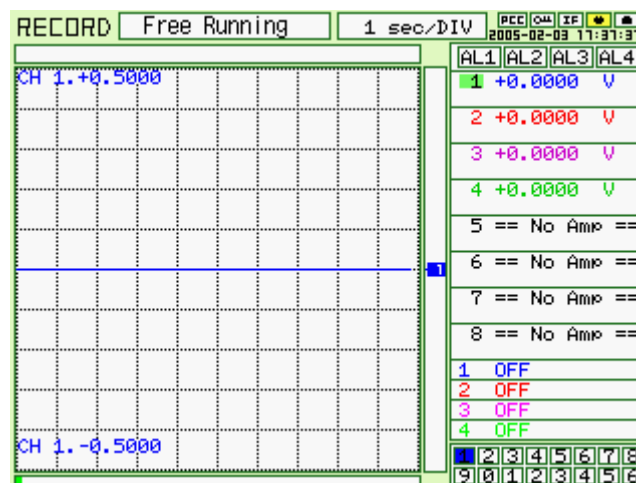
The procedure for the VF amp is explained here.

Perform this procedure for the other amps in the same way.

- (1) Load the condition settings file CondVFSn.CND as described above.
- (2) Press the [MENU] key to display the menu shown below.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Amp] Performs AD input settings							
No. of CH: 4		Logic/Pulse: Off					
CH: AMP	Input	Range	Filter	EU	Misc.		
ALL:	DC	1 V	Off				
1: VF	DC	1 V	Off	Off			
2: VF	DC	1 V	Off	Off			
3: VF	DC	1 V	Off	Off			
4: VF	DC	1 V	Off	Off			
5:	Off			Off			
6:	Off			Off			
7:	Off			Off			
8:	Off			Off			
LP:							
1: Off							
2: Off							
3: Off							
4: Off							

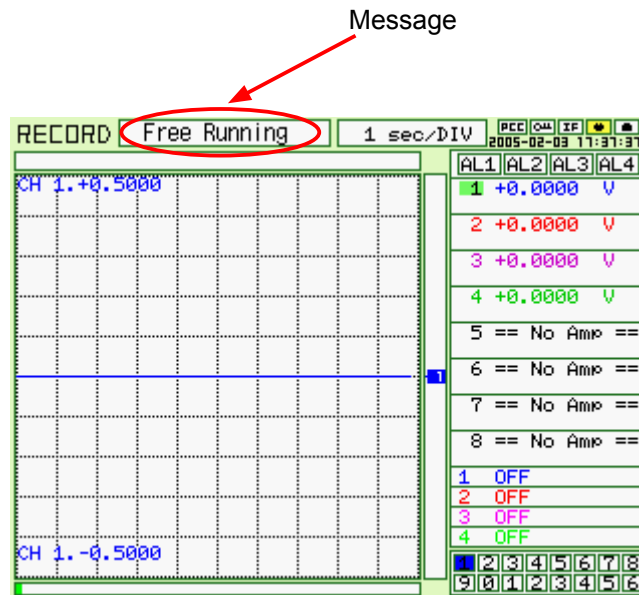
- (3) Press the [QUIT] key to display the menu shown below.



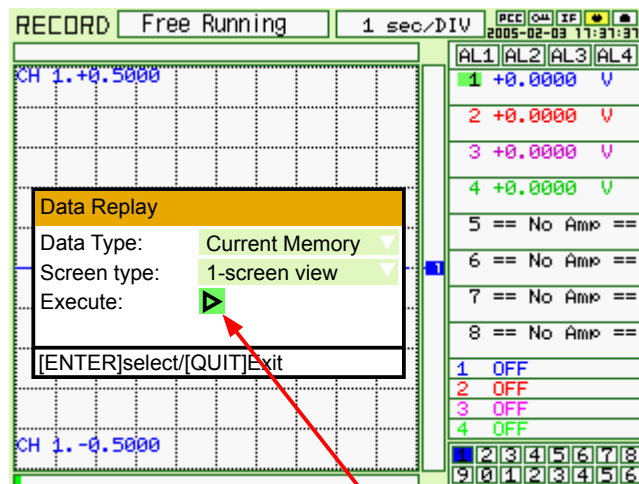
- (4) Press the [START/STOP] key to start data capture.

5. INSPECTION AND CHECK PROCEDURES

- (5) Wait until the "Free Running" message is displayed as shown below.



- (7) Press the [REVIEW] key to display the menu shown below.

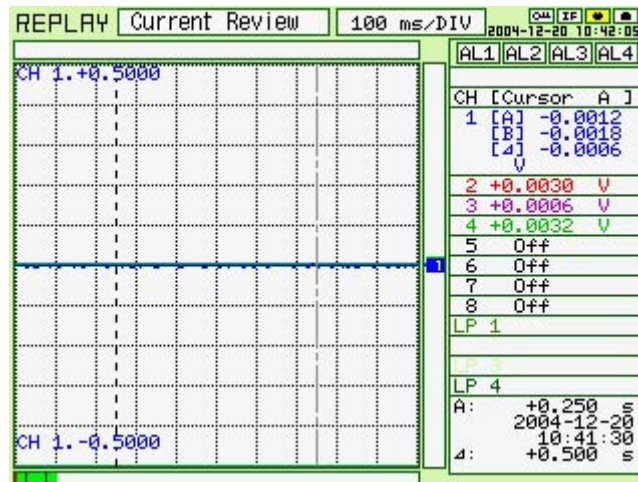


Move the cursor to the Execute position.

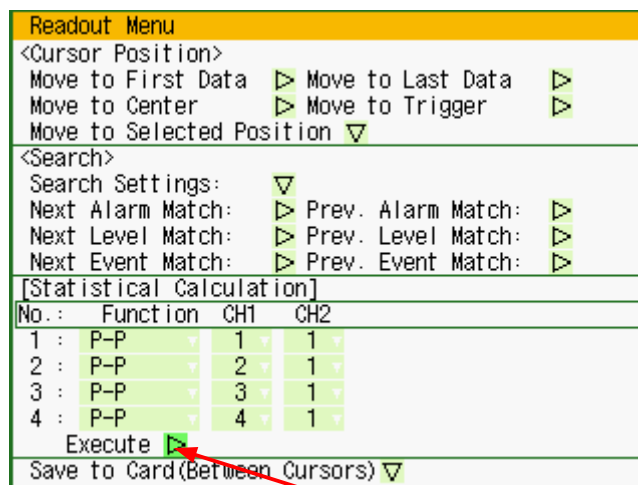
- (8) Move the cursor to the Execute position as shown above.

5. INSPECTION AND CHECK PROCEDURES

(9) Press the [ENTER] key to display the menu shown below.



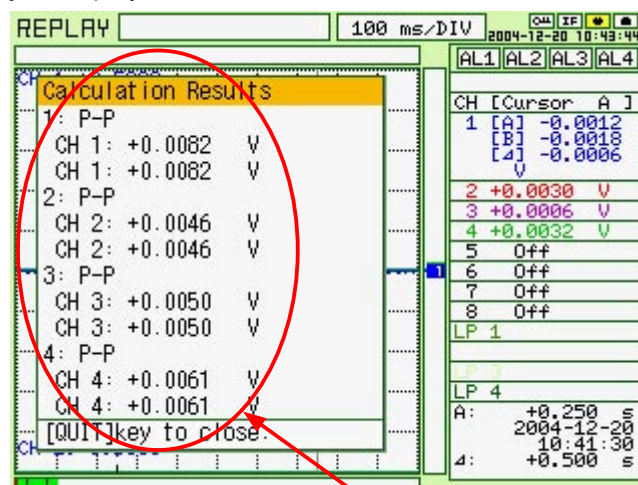
(10) Press the [MENU] key to display the menu shown below.



Move the cursor to the Execute position.

(11) Move the cursor to the Execute position as shown above.

(12) Press the [ENTER] key to display the menu shown below.



Confirm that these values are within the ratings after data has been captured.

(13) Confirm that the Peak-to-Peak values are within 0.5 mV at the 100 mV range.

(14) Repeat steps (1) to (13) for each amp.

5.8 Key Test

Procedure

- (1) Press the [MENU] key, and then press the [Right Direction] key until the “INFO” menu shown below appears.

AMP	CRNT	EVNT	CALC	FILE	I/F	OTHR	INFO
[Firmware]							
Main CPU Firmware:				Ver. 0.81			
[FPGA]							
System Control:				Ver. 0			
[Network]							
MAC Address :				00.03.76.00.00.00			

- (2) Press the [Down Direction] key 10 times in order to display the Key Test menu shown below.

Key Test		
Press all the keys to exit.		
GROUP	RANGE	
TIME/DIU L	TIME/DIU R	
QUIT	MENU	
LEFT	UP	RIGHT
	ENTER	
FLEFT	DOWN	FRIGHT
DISPLAY	REVIEW	ST/SP
SAVE	CURSOR	

- (3) Press all the keys to test them. The pressed key will be displayed in green.
- (4) The Key Test menu screen will close when all the keys have been pressed.

6. PARTS LISTS

6.1 Recommended Parts List

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	790450700	Main Control Board		1	
2	790450701	Memory Control Board		1	
3	795450001	4 VF-AMP		1 or 2	Terminal Unit
4	795450002	4 MF-AMP		1 or 2	Terminal Unit
5	795450003	8 MS-AMP		1 or 2	Terminal Unit
6	500051951	AC Adapter	SA45-3129	1	
7	795450004	Battery Pack		1	
8	500052301	LCD, KCG047QV1AA-A21		1	Same as GL400
9	500052325	Inverter for LCD, CXA-K0505-VJL		1	Same as GL400

6.2 Standard Accessories

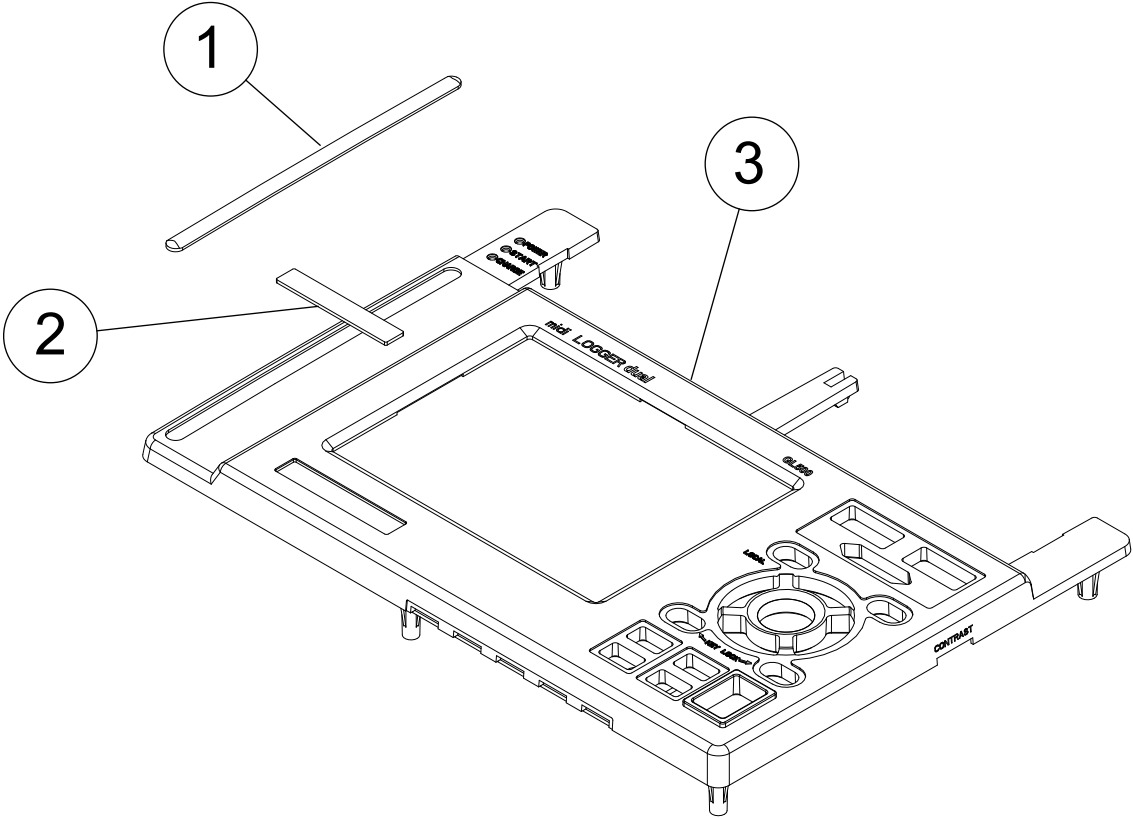
No.	Part No.	Part Name	Description	Q'ty	Remarks
1	604509100	GL500-CDM01M	CD User's Manual	1	
2	604509110	GL500-UM-801	Quick Start Guide	1	Japanese
3	604509130	GL500-UM-851	Quick Start Guide	1	English
4	604509120	GL500-UM-901	Installation Manual	1	Japanese
5	604509140	GL500-UM-951	Installation Manual	1	English
6	305820001	NDV-4, Miniature Screw Driver		1	
7	604400050	LCD Protective Sheet		1	
8	500051951	AC Adapter	SA45-3129	1	
	500052004	AC Power Cable 100V JAPAN	361-70100020-01	1	Depends on the country
	500052350	AC Power Cable UL	UC-671-N03	1	Depends on the country
	500052402	AC Power Cable CEE	EN-514-N04	1	Depends on the country
	500052397	AC Power Cable BS	BS89/3-C7-1.8m	1	Depends on the country

6.3 Parts Lists

6.3.1 Top Cover

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	604400011	Rubber Grip		1	Same as GL400
2	604500040	Emblem Plate "GRAPHTEC GL500"	EFBL-40 GL500	1	
3	604500010	Top Cover for GL500	Case top, LCD	1	

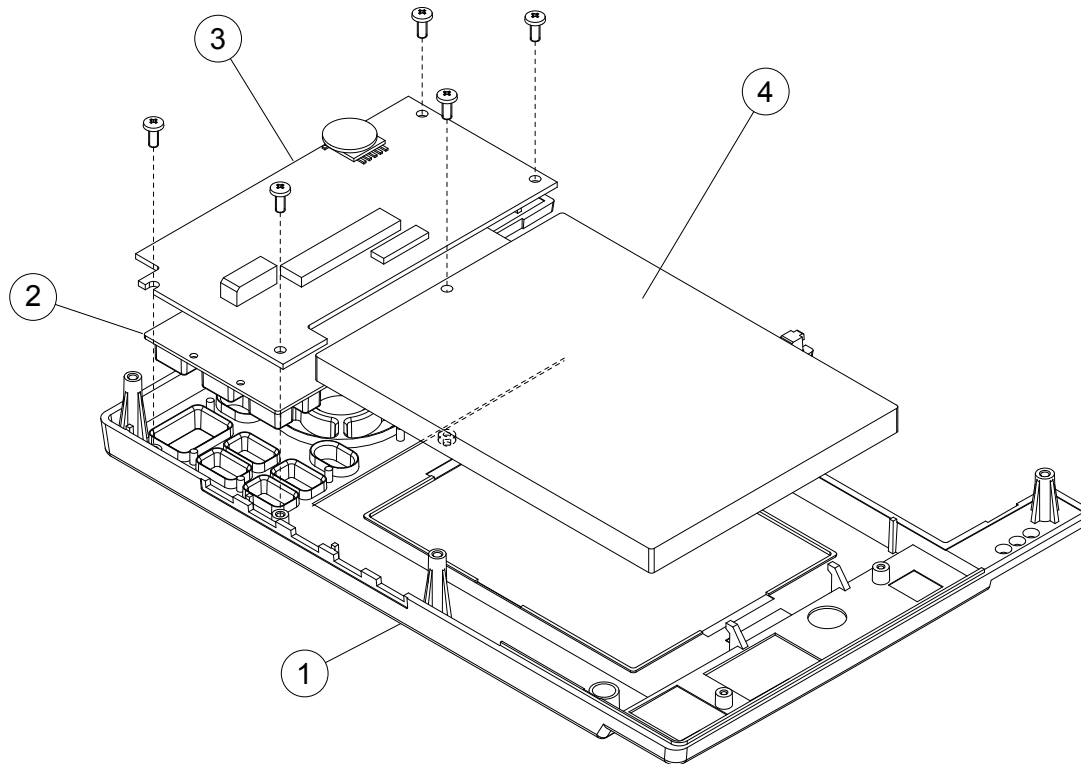
Top Cover



6.3.2 LCD & Key Panel

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	604500010	Top Cover for GL500	Case top, LCD	1	Same as GL400
2	604400004	Key Switch		1	Same as GL400
3	770435105	Control Panel Board	Key Board	1	Same as GL400
4	500052301	LCD	KCG047QV1AA-21	1	Same as GL400

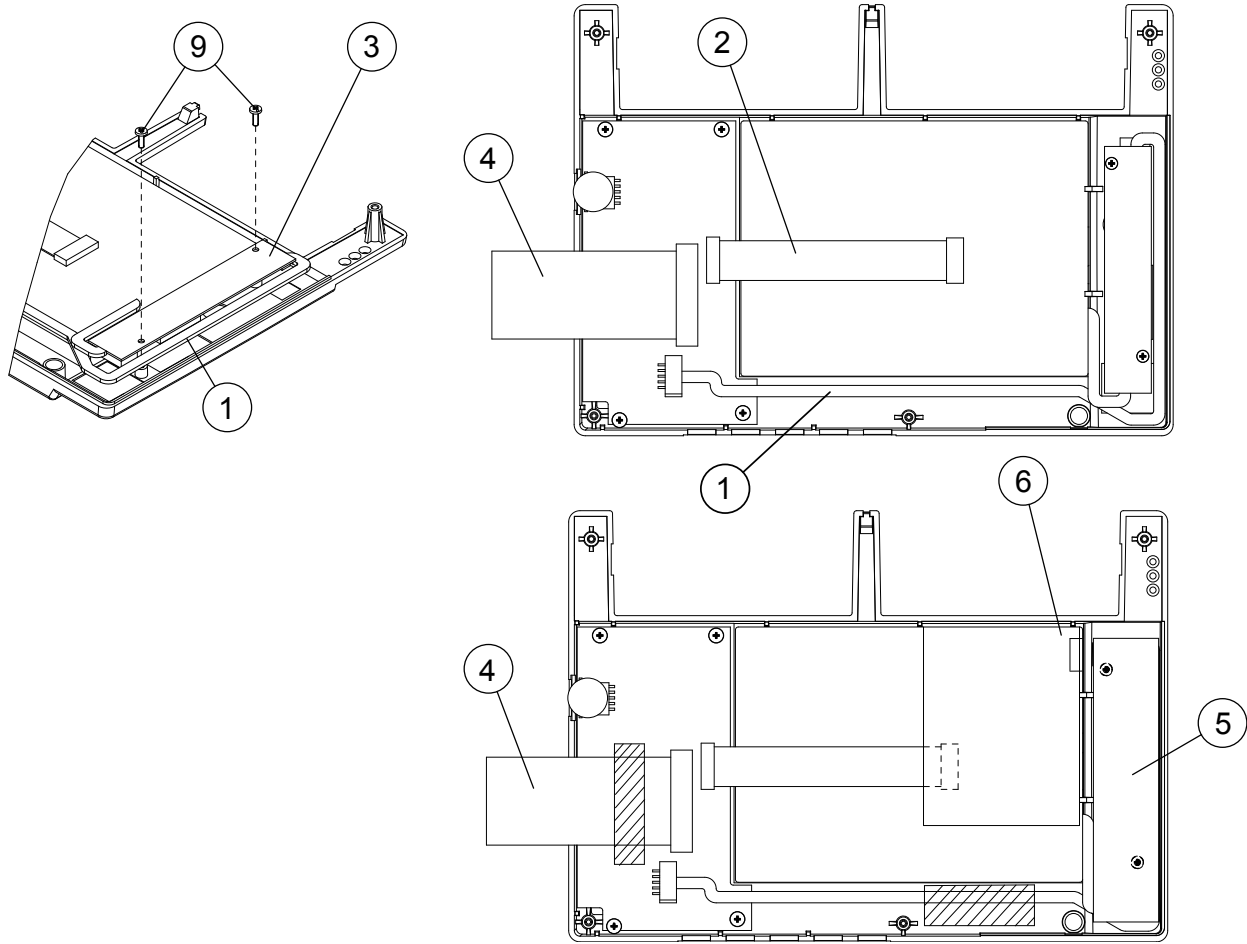
LCD & Key Panel



6.3.3 Top Cover, Reverse Side

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	690440031	Cable, GL400-03A		1	Same as GL400
2	690440040	Cable, GL400-04		1	Same as GL400
3	500052325	Inverter, CXA-K0505-VJL		1	Same as GL400
4	690440020	Flexible Cable, GL400-02		1	Same as GL400
5	604400070	Inverter Insulating Sheet		1	Same as GL400
6	604400060	LCD Insulating Sheet		1	Same as GL400

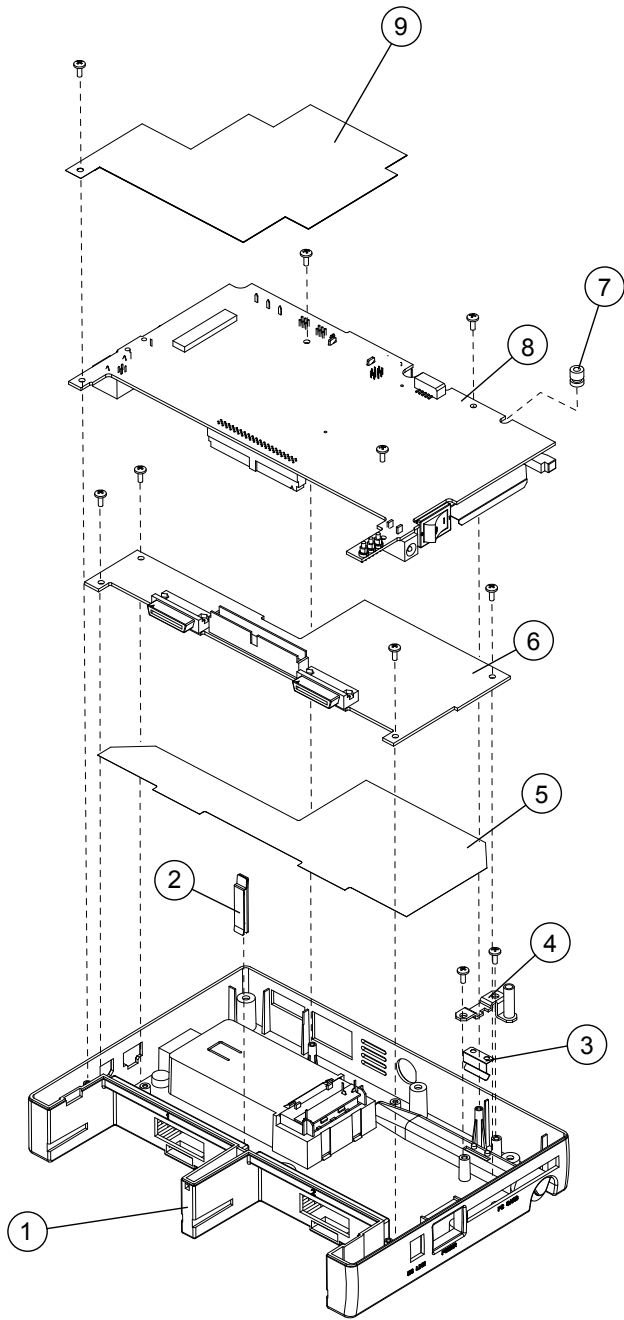
Top Cover, Reverse Side



6.3.4 Main Frame

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	604500000	Bottom Case		1	
2	604400090	Rear Lift-up Hook		1	Same as GL400
3	604350211	Spring Hold-down Plate		1	
4	604250090	Screw driver Spring		1	
5	604350181	AMP Sheet		1	
6	790450701	Memory Control Board		1	
7	604400080	Spacer		1	Same as GL400
8	790450700	Main Control Board		1	
9	604350151	AMP Shield Sheet		1	

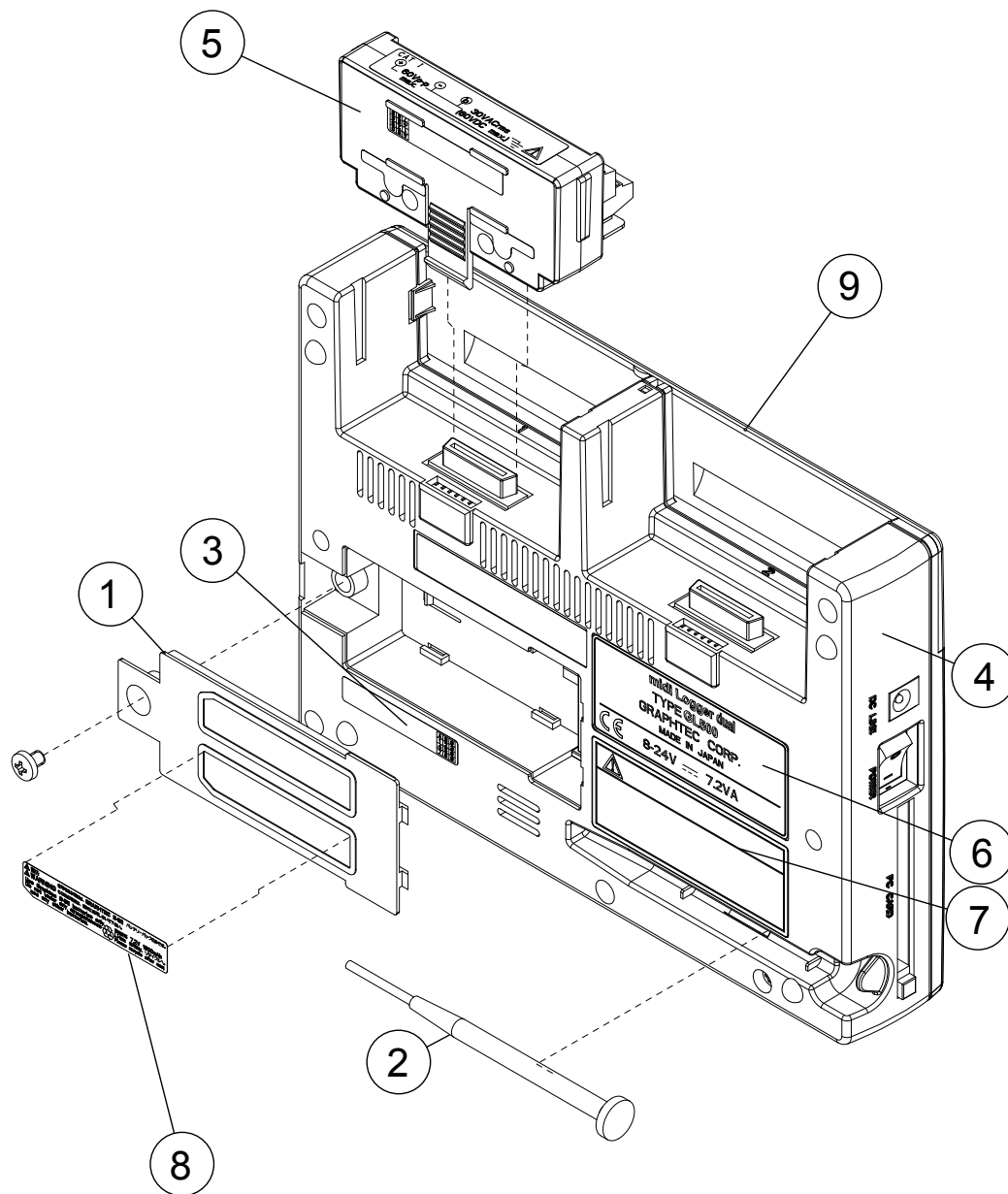
Main Frame



6.3.5 Bottom Case

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	604500020	Battery Cover		1	
2	305820001	Screwdriver	NDV-4	1	
3	054025740	Serial Number Label		1	
4	604500000	Bottom Case		1	
5	795450001	4 VF-AMP	Input Terminal Unit	1 or 2	
	795450002	4 MF-AMP	Input Terminal Unit	1 or 2	
	795450003	8 MS-AMP	Input Terminal Unit	1 or 2	
6	604500030	Model Name Label GL500		1	
7	604350801	Caution Label		1	
8	604500050	Warning Label 2		1	
9	604350002	Input Terminal Unit Cover		1	

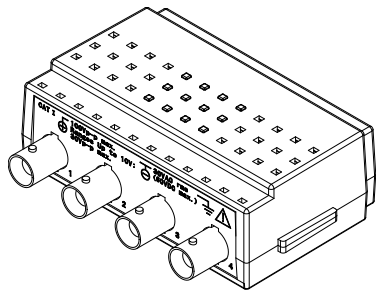
Bottom Case



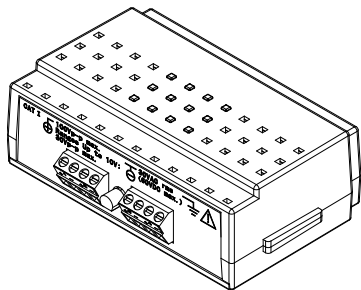
6.3.6 Input Terminal Unit

No.	Part No.	Part Name	Description	Q'ty	Remarks
1	795450001	4 VF-AMP	Input Terminal Unit	1 or 2	
2	795450002	4 MF-AMP	Input Terminal Unit	1 or 2	
3	795450003	8 MS-AMP	Input Terminal Unit	1 or 2	

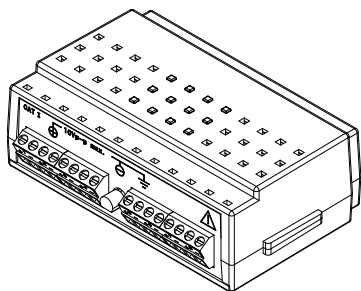
4 VF Amp Input Terminal Unit



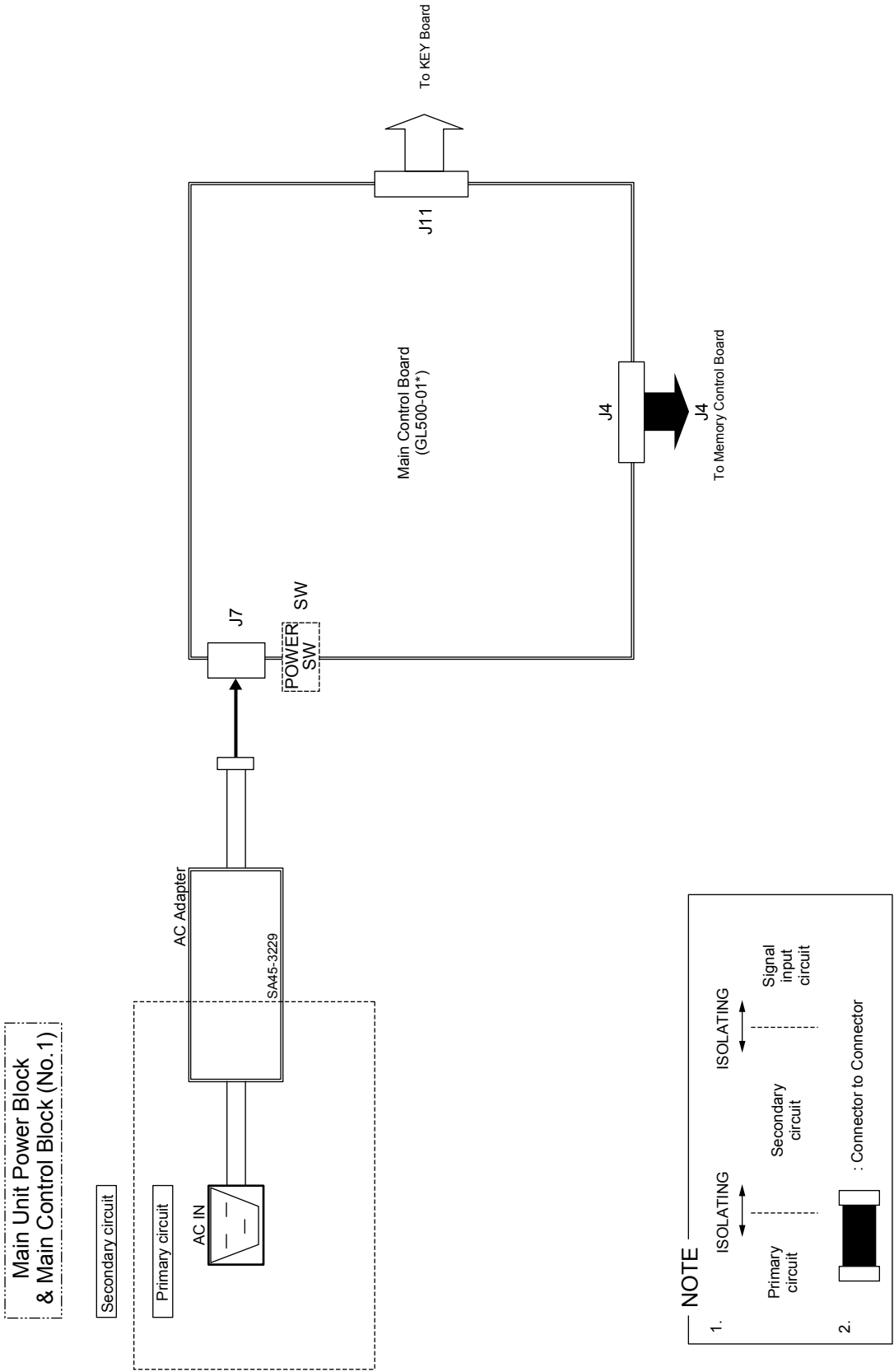
4 MF Amp Input Terminal Unit



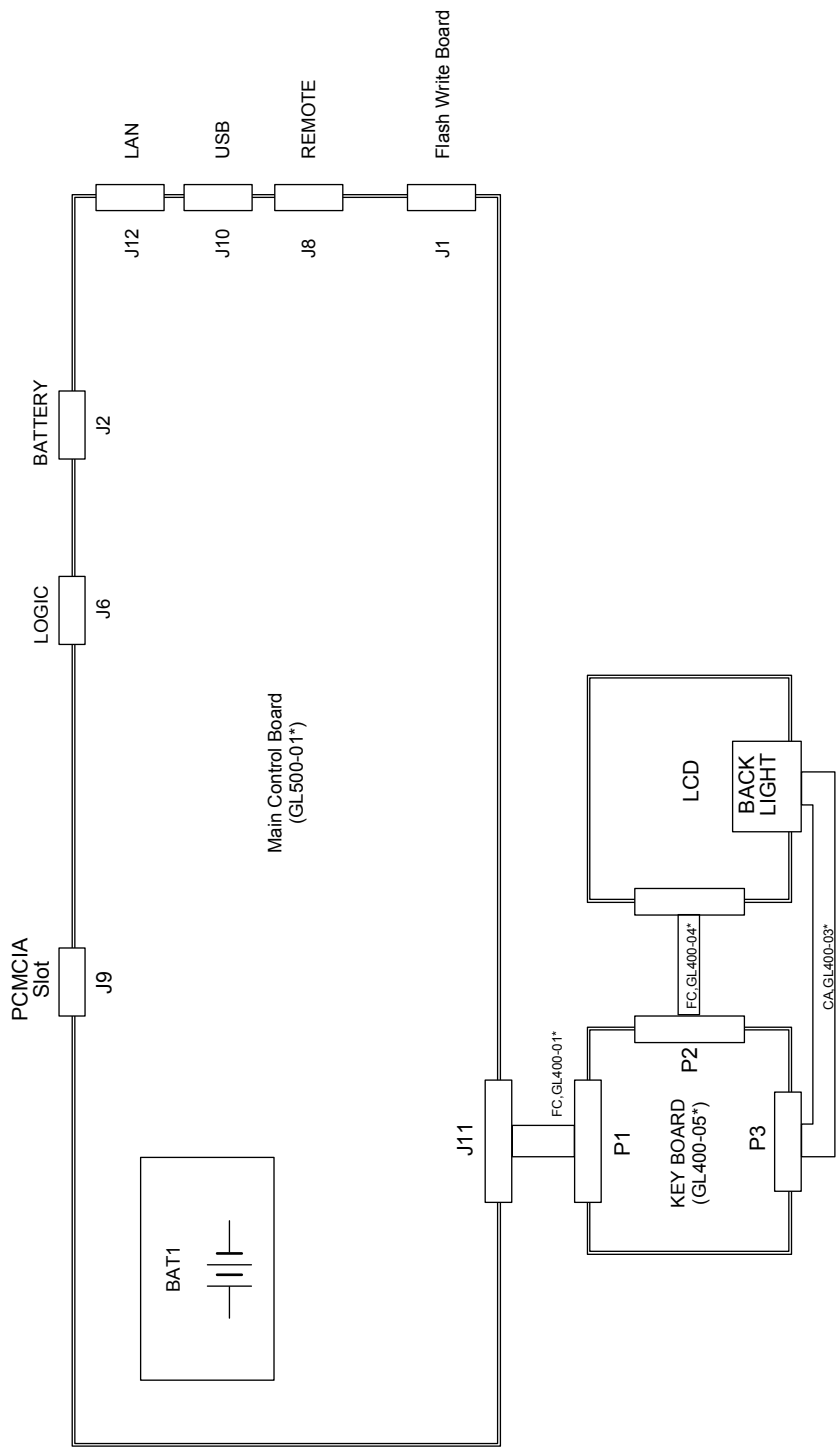
8 MS Amp Input Terminal Unit



7. BLOCK DIAGRAMS



Main Control Block (No.2)



Secondary circuit

