Floppy Disk Drive for Models 3701/3702/3711/3712 of LR4100E, LR8100E and LR12000E Recorders

IM 3701-60E

IM 3701-60E
2nd Edition

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Preface

This instruction manual explains the functions of the floppy disk drive for the LR series of recorders and how to use the drive. Thoroughly read the instruction manual before using the drive to ensure its proper use. For any information other than that about the floppy disk drive, see the separate instruction manual(s). Keep this instruction manual accessible for easy reference whenever the drive is in use. This manual will certainly be of help to you if you have trouble handling the drive.

Notice

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contents

Overview

LR4100E, 8100E and 12000E recorder models equipped with the optional floppy disk drive enable you to store the data acquired with the recorder or the setup data for that recorder on a floppy disk. The data saved on a floppy disk can then be analyzed on a personal computer or played back on the LR recorder. Measurement data differ from setup data in the ways they are saved on a floppy disk and read from the disk.

Measurement data:
First save (WRIT) measurement data in the internal memory of the LR recorder. Then, copy (SAVE) the data from the internal memory to a floppy disk. Likewise, copy (LOAD) measurement data from the floppy disk to the internal memory to play back (READ) on the LR recorder. A different method can be used to make these operations automatic. In addition, you can convert measurement data to ASCII-format when copying the data from internal memory to floppy disk.

Setup data:
Save setup data directly to a floppy disk or read them from the disk.

Extensions:
The extensions appended to data files saved on a floppy disk are as follows:

Measurement data files:	.DAT
ASCII-converted data files:	.CSV
Setup data files:	.PNL

Floppy Disks

- **Usable Types**

  You can use the following types of 3.5-in. floppy disks:
  - 2HD disks: those formatted for 1.2- or 1.44-megabyte MS-DOS
  - 2DD disks: those formatted for 720-kilobyte MS-DOS

  The optional floppy drive can format your disk only for 1.44-megabyte MS-DOS.

- **Inserting a Floppy Disk into the Floppy Drive**

  Insert a floppy disk into the drive slot with the sliding cover pointing away from you and the label facing up. Press in the disk until the eject button pops out.

- **Removing a Floppy Disk from the Floppy Drive**

  First make sure the access indicator is off, and then press the eject button.

CAUTION

- If you remove the floppy disk while the access indicator is on, the magnetic head in the drive may be damaged, or data saved on the disk may be destroyed. Always make sure the access indicator is off before removing the floppy disk.
- If you leave a floppy disk in the drive over a prolonged period, the disk may be damaged. When the floppy disk is not in use, remove it.

- **General Precautions in Handling Floppy Disks**

  Observe the general handling precautions in the instruction manual supplied with your optional floppy drive.

Saving Measurement/Computed Data on a Floppy Disk

Function

This procedure first saves measurement data in the internal memory and then copies the data to a floppy disk. A file with setpoint information on the ranges and constants (if the floppy drive is supplied with the /MATH option) is copied also during the process.

Note

- When you save measurement data on a floppy disk, a setup data file of the ranges and computation constants is created together with a measurement-data file at the same time. The file name is identical to that of the measurement-data file along with the extension LOD. Note that, if you delete the setup data file using a personal computer, you will no longer be able to play back the measurement data.

Retention of Internal Memory

The length of time that internal memory retains data after the power to the main unit of the LR recorder has been on for at least 30 minutes but is then turned off is approximately 24 hours. If you turn the power back on more than 24 hours later, the internal memory is cleared and the data are no longer retained. The internal memory will also be cleared if settings are initialized (RAM CLEAR on the AUX setup screen) or RAM CLEAR in the setup mode is carried out.

Setup Parameters

Writing to the Internal Memory:

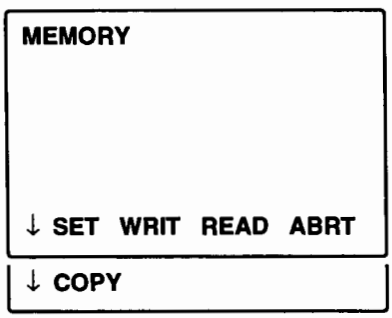
MEM LEN:	Sets the data length. Choose from 1000, 2000, 4000, 8000, 16000 or 32000 (data items/channel).
TRIG MODE:	Determines whether or not to use triggering conditions.
SAMPL:	Sets the sampling rate (rate at which data are written to the internal memory). Choose from 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 3, 5, 9, or 135 Hz.
PRE TRIG:	Configurable only when TRIG MODE is turned on. Choose from 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 or 100%.
TRIG ALARM:	If turned on, triggers data writing to the internal memory as soon as an alarm occurs. Choose either on or off.
TRIG CHART:	If turned on, triggers data writing to the internal memory as soon as the chart runs out. Choose either on or off.
TRIG RMT:	If turned on, triggers data writing to the internal memory when the remote function (/REM option) enables the contact input. Choose either on or off.

Copying to a Floppy Disk:

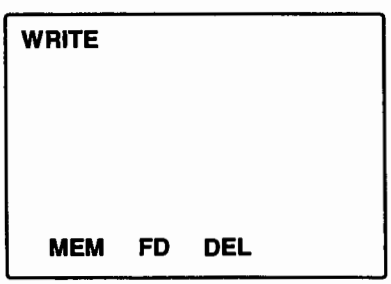
File name:	The name given when data are copied to a floppy disk. Use no more than eight characters.

Writing Data to Internal Memory without a Trigger, and Then Copying Them to Floppy Disk

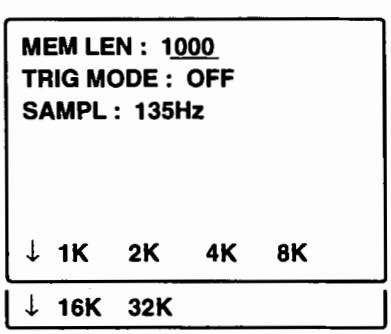
Example of Setting
MEM LEN: 1000
TRIG MODE: Off
SAMPL: 135 Hz
File name: TEST1



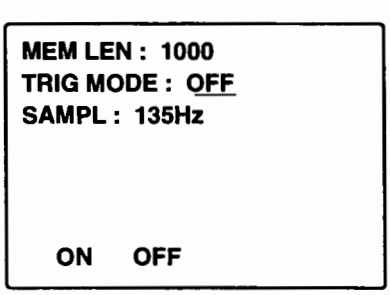
Press the MEMORY function key to open the menu screen.
Press the F2 (WRIT) key to open the WRIT setup screen.



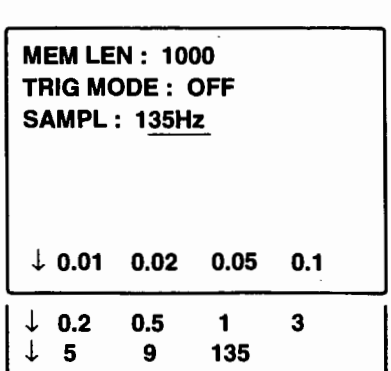
Press the F1 (MEM) key to show the setup creen for the writing conditions.



Set the data length (MEM LEN).
In this example, press the F1 (1K) key to set the length to 1000.
All channels except those with the RANGE field set to off are included in the data writing.
Press the ▽ key to move to the next setup parameter.

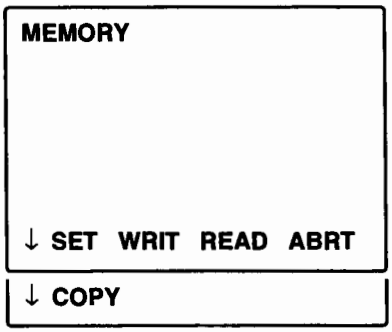


Set the trigger (TRIG MODE) to either on or off.
In this example, press the F2 (OFF) key to set the trigger to off (not to use a trigger).
If you want to use a trigger, see pages 8 through 10.
Press the ▽ key to move to the next setup parameter.

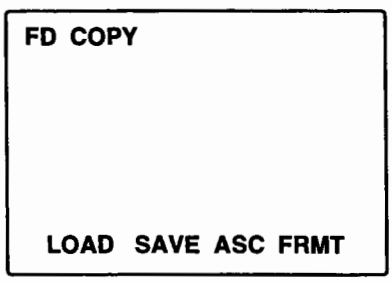


Set the sampling rate (SAMPL). In this example, press the NEXT key twice and then the F3 (135Hz) key to set the rate to 135 Hz. Pressing the ENTRY key here initiates data writing to the internal memory. The screen changes to one for showing measurement data. An asterisk (*) appears in the upper-right corner of the display during data writing. To stop data writing, press the F4 (ABRT) key on the menu screen. To exit the menu screen, press the DISPLAY SELECT key.

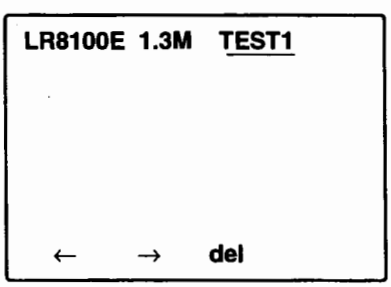
The following operations copy data from the internal memory to a floppy disk.



Press the MEMORY function key to open the menu screen.
Press the NEXT key and then the F1 (COPY) key to open the COPY menu screen.



Press the F2 (SAVE) key to open the setup screen for a file name.



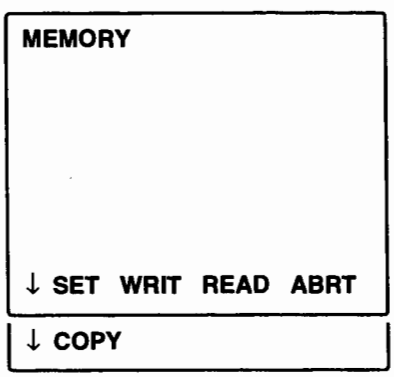
The setup screen then shows the volume name and the amount of free space on the floppy disk. With the alphanumeric keypad and the F1, F2 and F3 keys, type in a file name using no more than eight characters. Pressing the ENTRY key copies data in the internal memory to the floppy disk. The message "**Accessing FD..**" appears on the screen during copying. When copying ends, the screen changes to one showing measurement data.

Writing Data to the Internal Memory Using a Trigger

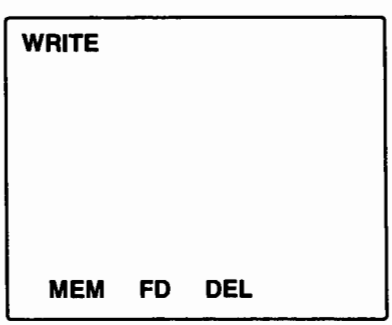
Data can be written to the internal memory using such occurrences as alarms, the depletion of the recording chart or a remote-operated contact input as a trigger. Even if more than one trigger occurs within a given interval, data writing takes place only for the first trigger. If the pre-trigger is set to a value other than 0%, any trigger that occurs before the LR recorder has acquired as many data items as specified by the pre-trigger becomes invalid.

Example of Setting

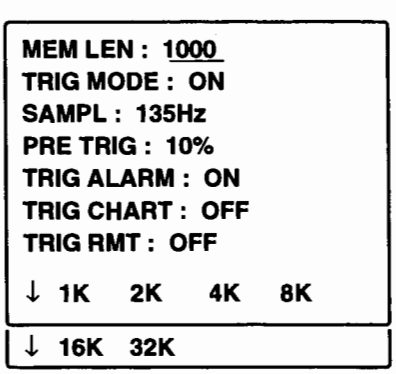
MEM LEN: 1000
TRIG MODE: ON
SAMPL: 135 Hz
PRE TRIG: 10%
TRIG ALARM: ON
TRIG CHART: OFF
TRIG RMT: OFF



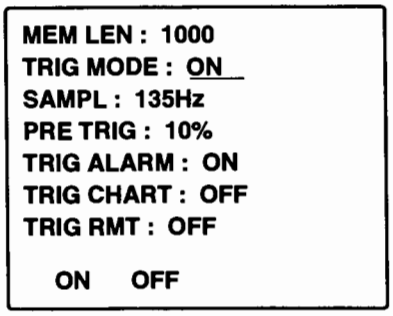
Press the MEMORY function key to open the menu screen.
Press the F2 (WRIT) key to open the WRITE setup screen.



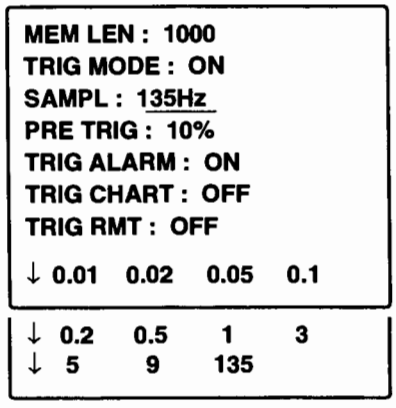
Press the F1 (MEM) key to show the setup screen for writing conditions.



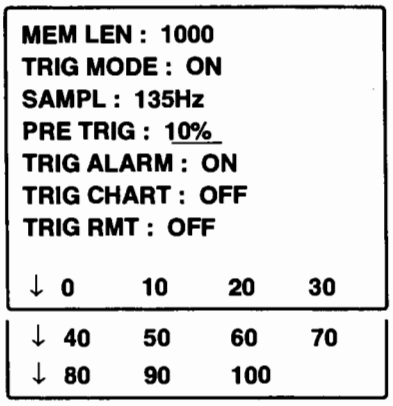
Set the data length (MEM LEN).
In this example, press the F1 (1K) key to set the length to 1000.
All channels except those with the RANGE field set to off are included in the data writing.



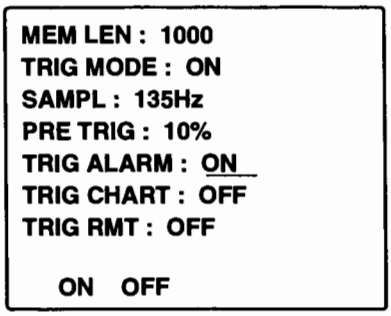
Set the trigger (TRIG MODE) to either on or off. In this example, press the F1 (ON) key to set the trigger to on (to use a trigger).



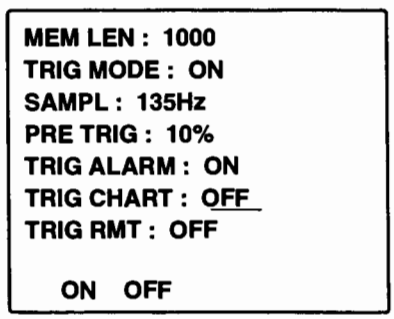
Set the sampling rate (SAMPL). In this example, press the NEXT key twice and then the F3 (135Hz) key to set the rate to 135 Hz.



Set the pre-trigger. In this example, press the F2 (10%) key.



Set the TRIG ALARM parameter to on by pressing the F1 (ON) key. Triggering takes place if any alarm occurs.



Set the TRIG CHART parameter to off by pressing the F2 (OFF) key. If you set the parameter to on, triggering takes place if the chart runs out.

```
MEM LEN : 1000
TRIG MODE : ON
SAMPL : 135Hz
PRE TRIG : 10%
TRIG ALARM : ON
TRIG CHART : OFF
TRIG RMT : OFF

   ON   OFF
```

Set the TRIG RMT parameter to off by pressing the F2 (OFF) key. If you set this parameter to on, triggering takes place when a contact input is turned on using the remote function (/REM option). Pressing the ENTRY key goes into a state of waiting for a trigger. The screen changes to one showing measurement data. An asterisk (*) appears in the upper-right corner of the display during a wait-for-trigger state or data writing. To cancel waiting for a trigger or to stop data writing, press the F4 (ABRT) key on the menu screen.

The method of copying data in the internal memory to a floppy disk is the same as copying without using a trigger. For details, see page 6.

Note

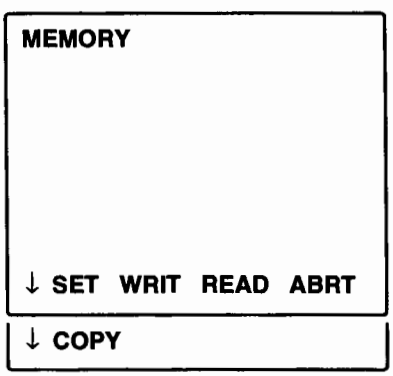
- If two or all three of the TRIG ALARM, TRIG CHART and TRIG RMT parameters are set to on, triggering takes place if an event specified by any of these parameters occurs.

Copying to a Floppy Disk Data Automatically Written to the Internal Memory

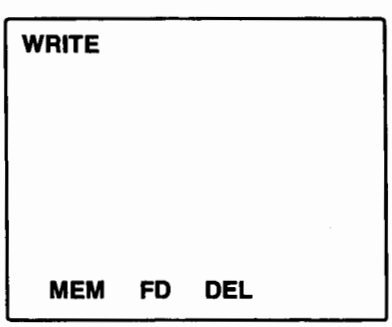
You can copy to a floppy disk data automatically written to the internal memory, without having to first write data to the internal memory and then copy to a floppy disk. Set the TRIG MODE parameter to on. This setting captures data to the internal memory when triggering takes place, and then automatically copies the data to a floppy disk.

Example of Setting

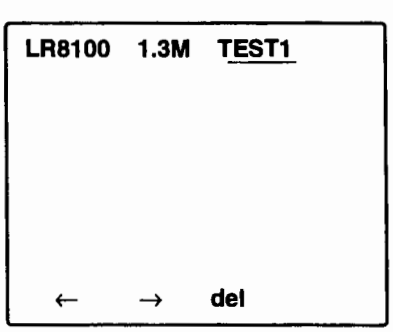
File name: TEST1
MEM LEN: 1000
TRIG MODE: ON
SAMPL: 135 Hz



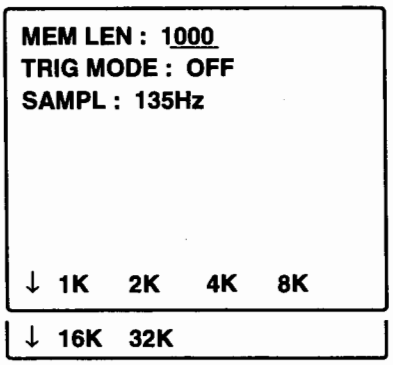
Press the MEMORY function key to open the menu screen.
Press the F2 (WRIT) key to open the WRITE setup screen.



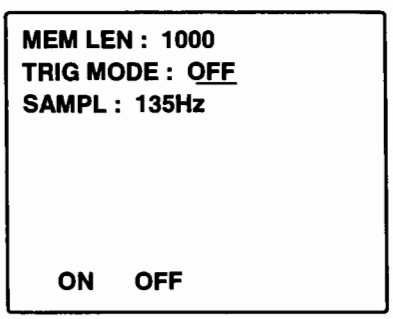
Press the F2 (FD) key to show the setup screen for the file name used when copying data to a floppy disk.



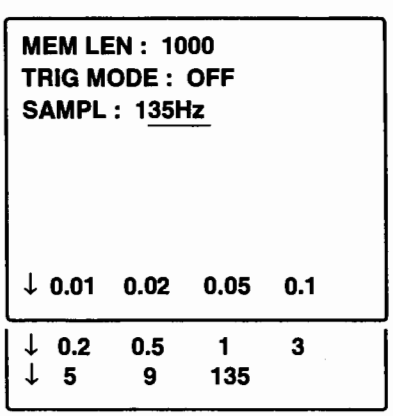
The setup screen then shows the volume name and the amount of free space on the floppy disk. With the alphanumeric keypad and the F1 F2 and F3 keys, type in the file name using no more than eight characters. Pressing the ENTRY key shows the setup screen for writing conditions.



Set the data length (MEM LEN). In this example, press the F1 (1K) key to set the length to 1000. All channels except those with the RANGE field set to off are included in the data writing.



Set the trigger (TRIG MODE) to either on or off. In this example, press the F1 (ON) key to set the trigger to on (use a trigger).



Set the sampling rate (SAMPL). In this example, press the NEXT key twice and then the F3 (135Hz) key to set the rate to 135 Hz. Pressing the ENTRY key here initiates checking of the remaining space on the floppy disk and then data writing to the internal memory. When data writing to the internal memory ends, the data are automatically copied to a floppy disk. The message "**Checking FD..**" appears on the screen during the checking of the remaining space on the floppy disk. When the checking ends, the screen changes to show measurement data. An asterisk (*) appears in the upper-right corner of the display during data writing. During copying to the floppy disk after the completion of data writing, the screen shows the message "**Accessing FD..**." To stop data writing, press the F4 (ABRT) key on the menu screen.

File Size

The size of a measurement-data file can be determined using the following formula (approximate calculation):

File size = sample-data length × 2 × number of sampling channels + amount of header information

where

Amount of header information = 640 + 64 × number of sampling channels
Sample-data length = number of data items set for the SAMPL parameter
Number of sampling channels = number of channels of which ranges are not set to off

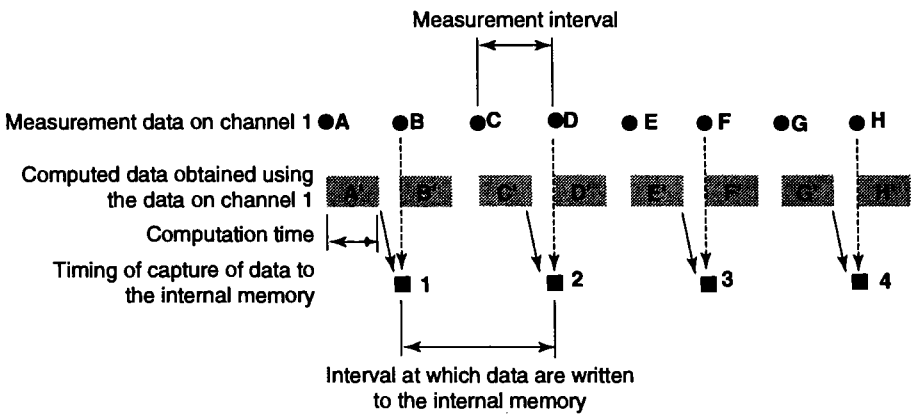
Example:
Assuming the sample-data length is 1,000 and the number of sampling channels is 4:
File size = 1,000 × 2 × 4 + 640 + 64 × 4 = 8,896 bytes = 8,896/1,024 K bytes (1 K = 1,024 bytes)
Thus, the file size is approximately 9 K bytes.

Number of Files

A floppy disk can have up to 47 files each of measurement data and setup data.

Simultaneity of Computed Data (Except for LR12000E Recorders)

If your LR recorder is equipped with the computational function (MATH option), you can also capture computed data to the internal memory in order to copy the data to a floppy disk. However, since measurement data you can capture to the internal memory are those which have already undergone a computation, there is no chance of measurement data being simultaneously written to the internal memory with computed data. For example, assume you are carrying out computation using measurement data acquired on channel 1. Now, see the following figure.



Assume A to H are measurement-data items, A' to H' are data items computed from the A to H measurement-data items, and 1 to 4 are the times at which these data items are written to the internal memory. Then, the data items written to the internal memory at time 1 are the B and A' data items. Since the B' data item has not yet undergone a computation, it cannot be written to the internal memory at time 1. Similarly, data items captured at time 2 are D and C', data items captured at time 3 are F and E', and data items captured at time 4 are H and G'. Thus, it proves that there is no simultaneous writing of measurement data and their computed data. Note that the longer the computation time, the greater the time lag between measurement data and their computed data.

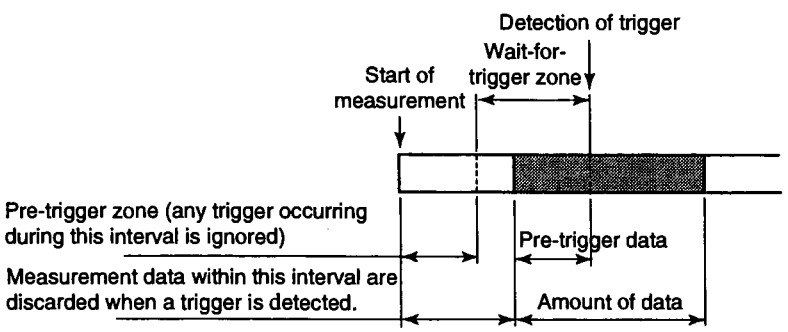
Note

- Computed data handled in the display on the screen, recording, or the reading of data using the communication function allows simultaneous writing.

About Triggers

Pre-triggers

When capturing measurement data using a trigger, you can set a pre-trigger. If you set the trigger mode to on, measurement data are written to the internal memory at the same time when measurement begins even if no triggers are detected. If a trigger is detected, as many data items as specified for the pre-trigger are left over, discarding all previous measurement-data items other than those noted above. A pre-trigger should be set to a percentage of the length of data being captured. Setting the pre-trigger to 0% nullifies the pre-trigger, causing measurement data to be written to the internal memory only when a trigger is detected.

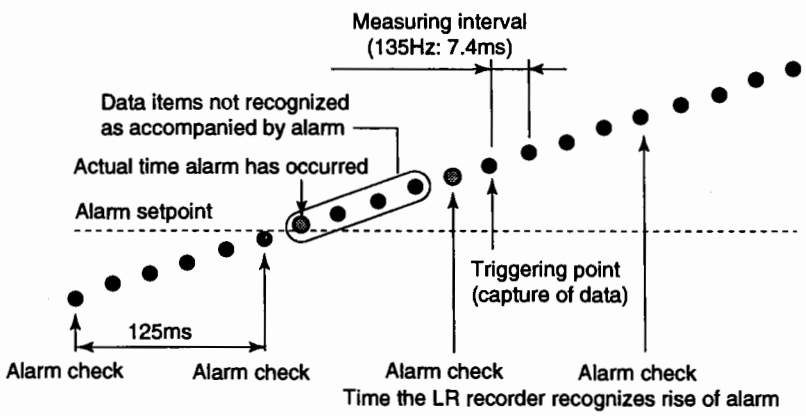


Internal-alarm Triggers

If the internal-alarm trigger is set to on, the trigger is detected not by the edge of an alarm signal but by the condition of being in an alarm. A trigger is detected immediately when the LR recorder goes into a wait-for-trigger state while an alarm is going on.

Timing of Detection of Triggers

In the sequence of acquisition of measurement data to the internal memory using a trigger, the LR recorder first detects an alarm, remote input or depletion of the chart, and then writes the data to the memory. The recorder checks the measurement data for an alarm and remote input at 125-ms intervals. In addition, detecting a depletion of the chart takes the recorder several hundred milliseconds. Consequently, it is not possible for the recorder to detect these events immediately after they occur. For this reason, as many as several dozen measurement-data items will have occurred in the interval from when the event occurs to when the recorder detects it. The following figure illustrates an example of detection of a trigger by means of an alarm. Note that the relativity in length between the measuring interval and the interval of alarm checks differs from that of actual measurement.



End of Capture

The LR recorder finishes capturing measurement data if one of the following conditions is true:

- A preset length of data has been acquired.
- Any change has been made to measurement conditions such as the range.
- The F4 (ABRT) key on the operating panel has been pressed.

If the ABRT key is pressed before the recorder detects a trigger, measurement data do not remain in the internal memory.

Screen View During Capture of Data

During a wait-for-trigger state or the capture of measurement data, an asterisk (*) appears in the upper-right corner of the display.

Reading Measurement/Computed Data from a Floppy Disk

Function

This procedure first copies measurement data to the internal memory and then plays them back for display or recording.

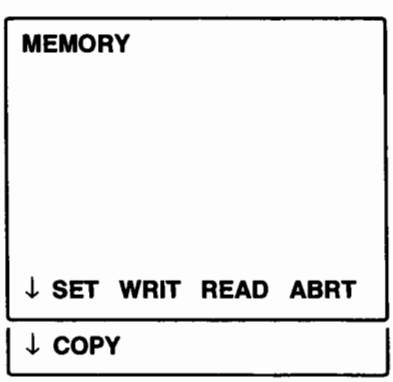
Setup Parameters

Copying to the Internal Memory:
File name: Name of file being copied from floppy disk to internal memory

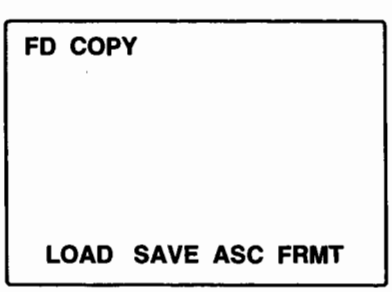
Reading from the Internal Memory:
SAMPL: Sets the sampling rate (rate at which data are written to the internal memory). Choose from 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 3, 5, 9, or 135 Hz.
START: Data number to start with in data reading
LOAD: If turned on, reads measurement data with the range and computation constants set to the values used when the data were captured; if turned off, reads the data with the range and computation constants set to the values currently being used.

Copying Data from a Floppy Disk to the Internal Memory, and then Reading the Data

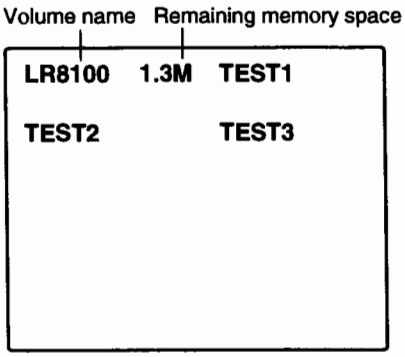
File name: TEST1
SAMPL: 135 Hz
START: 1
LOAD: ON



Press the MEMORY function key to open the menu screen.
Press the NEXT key first and then the F1 (COPY) key to open the COPY menu screen.

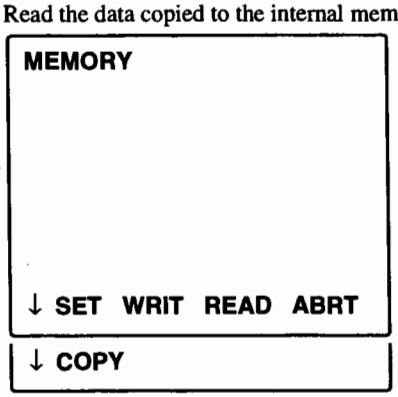


Press the F1 (LOAD) key to show the screen for choosing a file.

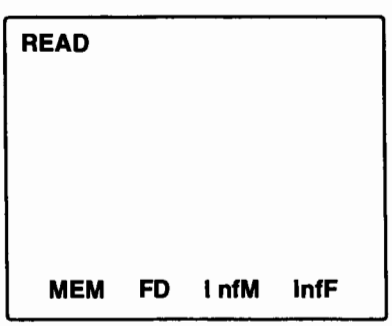


The screen shows the volume name and the amount of free space on the floppy disk as well as the names of files saved on the floppy disk. Using the △/▽ keys, choose the file you want copied. Pressing the ENTRY key copies data in the internal memory to the floppy disk. The message "**Accessing FD..**" appears on the screen during copying. When copying ends, the screen changes to show measurement data.

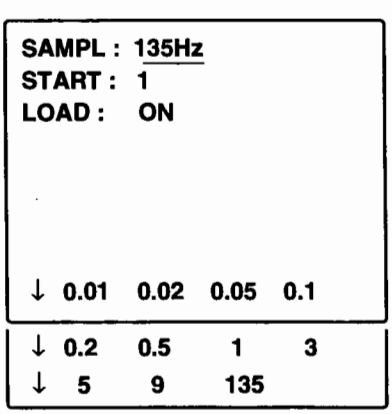
Read the data copied to the internal memory.



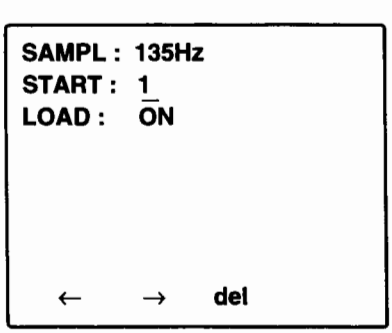
Press the MEMORY function key to open the menu screen.
Press the F3 (READ) key to open the READ setup screen.



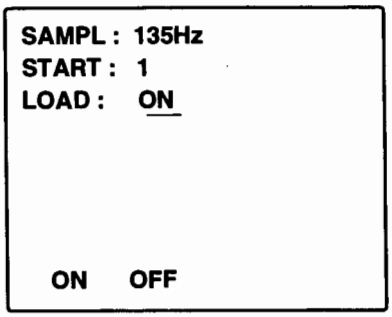
Press the F1 (MEM) key to open the setup screen for reading conditions.



Set the sampling rate (SAMPL). In this example, press the NEXT key twice and then the F3 (135Hz) key to set the rate to 135 Hz.



Set the number (START) of the data at which you want to begin reading. In this example, set the number to 1.



Determine whether you want to play back data with the range and computation constants used when the data were captured or to play back data with the range and constants currently being used (LOAD). In this example, press the F1 (ON) key to set the parameter to on.

Note

- Care must be taken because, if you read data with the LOAD parameter set to on, the setpoints of the range and computation constants change to those used when the data were captured.

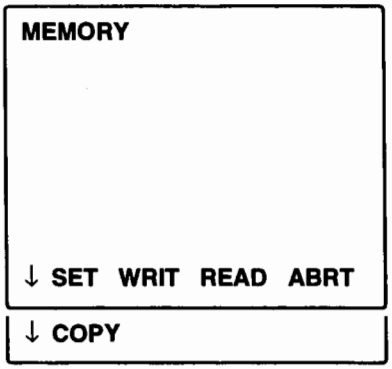
Pressing the ENTRY key initiates the reading of data from the internal memory. The LR recorder reads the data at the interval set for the SAMPL parameter. If you are playing back data for recording, set the RECORD parameter to on beforehand. The screen changes to show measurement data, indicating the playback data. An asterisk (*) appears in the upper-right corner of the display during data reading. To stop data reading, press the F4 (ABRT) key on the first menu screen.

Reading Data Automatically Copied to the Internal Memory

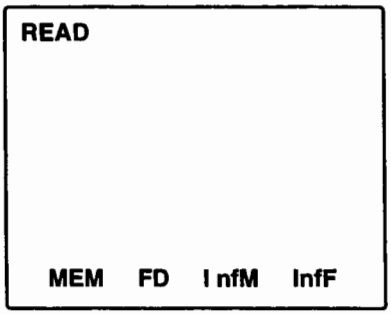
You can read data automatically copied to the internal memory without having to go through the procedure in which data are first copied from a floppy disk to the internal memory and then read out.

Example of Setting

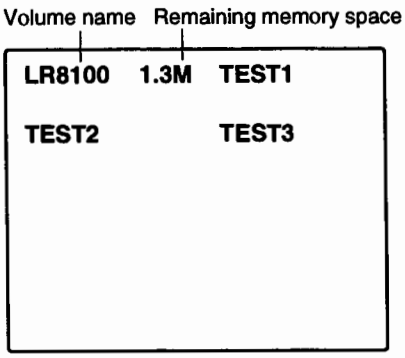
File name: TEST1
SAMPL: 135 Hz
START: 1
LOAD: ON



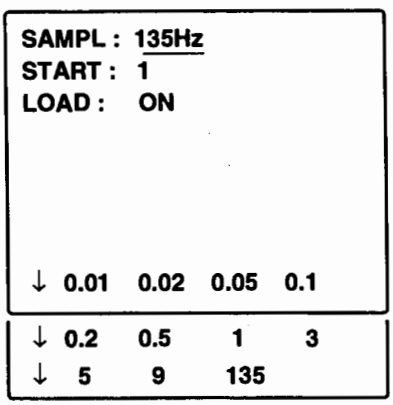
Press the MEMORY function key to open the menu screen.
Press the F3 (READ) key to open the READ setup screen.



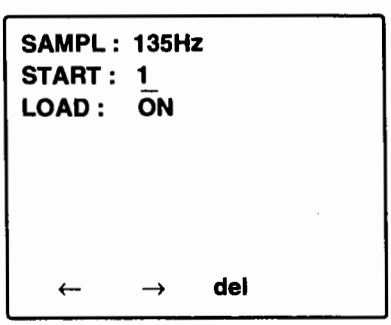
Press the F2 (FD) key to show the screen for choosing a file name used when copying data from a floppy disk.



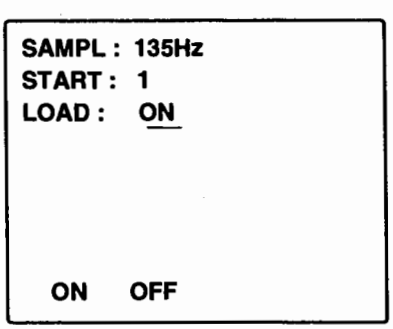
The screen shows the volume name and the amount of free space on the floppy disk as well as the names of files saved on the floppy disk. Using the△/▽ keys, choose the file you want to read. Press the [ENTRY] key to show the setup screen for reading conditions.



Set the sampling rate (SAMPL). In this example, press the NEXT key twice and then the F3 (135Hz) key to set the rate to 135 Hz.



Set the number (START) of the data at which you want to begin reading. In this example, set the number to 1.



Determine whether you want to play back data with the range and computation constants used when the data were captured or to play back data with the range and constants currently being used (LOAD). In this example, press the F1 (ON) key to set the parameter to on.

Note

- Care must be taken because, if you read data with the LOAD parameter set to on, the setpoints of the range and computation constants change to those used when the data were captured.

Pressing the [ENTRY] key initiates the reading of data from the internal memory. The LR recorder reads the data at the interval set for the SAMPL parameter. If you are playing back data for recording, set the RECORD parameter to on beforehand. The screen changes to show measurement data, indicating the playback data. An asterisk (*) appears in the upper-right corner of the display during data reading. To stop data reading, press the F4 (ABRT) key on the first menu screen.

Playing Back Computed Data

When reading computed data for playback, the LR recorder recomputes the data during the playback. Consequently, if you change the computational expression before playback, the LR recorder computes the data according to the new computational expression. If you play back the data with the LOAD parameter set to on, however, the resulting computation constants are those used when the measurement data were captured. To play the data back with new different computational constants, set the LOAD parameter to off.
When playing back computed data in which the communication-input values C1 through C4 are used, you must enter these values via communication.

Note

- If you play back a channel on which data were captured with the range set to off, the LR recorder displays and records the current measurement data. Thus, during the playback, you can perform computations using measurement data on this channel.

Screen View During Capture of Data

During the reading of measurement data, an asterisk (*) appears in the upper-right corner of the display.

Playing Back Measurement data Saved Using an LR Recorder with a Higher Number of Channels

The following table lists the numbers of data items available for playback for a case where measurement data are saved using an LR recorder with a higher number of channels and then played back (for example, measurement data saved with an 8-channel LR8100E recorder are played back on a 4-channel LR4100E recorder). The maximum number of channels available is that in the LR recorder on which data are played back. It is not possible to play back on channels exceeding the maximum number.

Number of Channels On Which Data Were Saved	5-8 Channels	9-12 Channels
Number of data items re-playable on LR4100E	16 K max.	8 K max.
Number of data items re-playable on LR8100E	Unlimited	16 K max.
Number of data items re-playable on LR12000E	Unlimited	Unlimited

Saving Setup Data to a Floppy Disk

Function

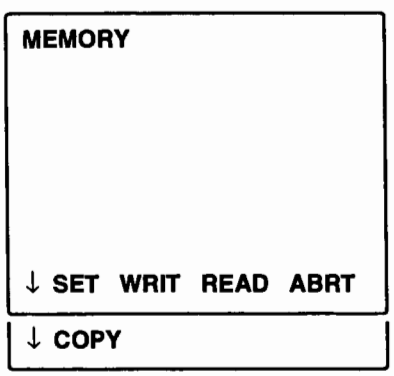
This procedure enables you to save setup data (except for the setup mode and date/time) to a floppy disk.

Setup Parameter

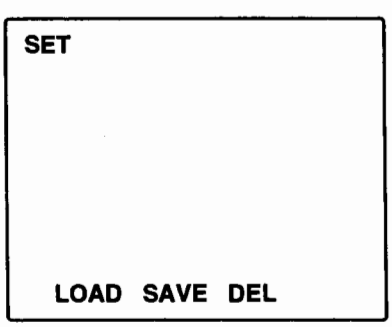
File name: Name of file being saved to floppy disk

Example of Setting

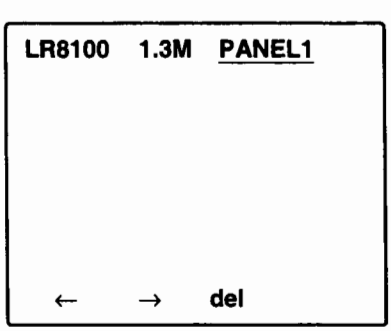
File name: PANEL1



Press the MEMORY function key to open the menu screen.
Press the F1 (SET) key to open the SET setup screen.



Press the F2 (SAVE) key to show the screen for setting the name of the file to save to a floppy disk.



The screen shows the volume name and the amount of free space on the floppy disk. With the alphanumeric keypad and the F1, F2 and F3 keys, type in the file name using no more than eight characters. Pressing the ENTRY key saves the setup data.

Reading Setup Data from a Floppy Disk

Function

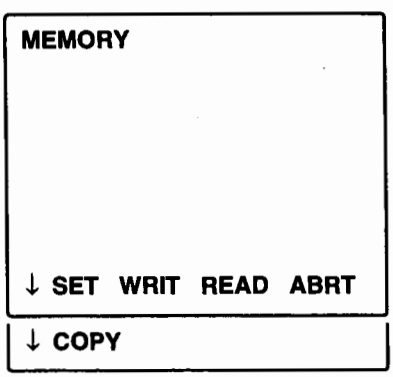
This procedure enables you to read setup data (except for the setup mode and date/time) from a floppy disk.

Setup Parameter

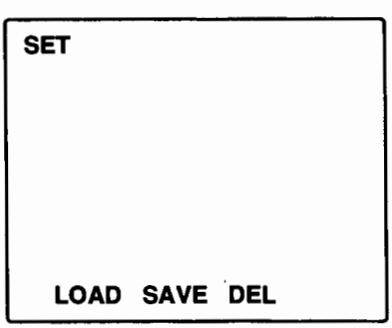
File name: Name of file being read from floppy disk

Example of Setting

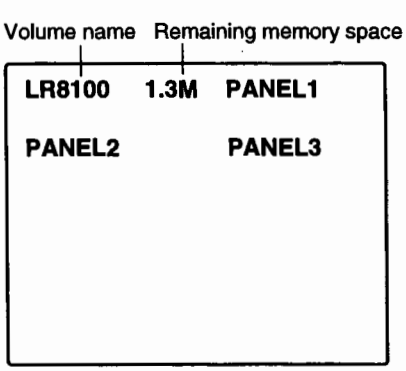
File name: PANEL1



Press the MEMORY function key to open the menu screen.
Press the F1 (SET) key to open the SET setup screen.



Press the F1 (LOAD) key to show the screen for choosing the name of the file to read from a floppy disk.



The screen shows the volume name and the amount of free space on the floppy disk as well as the names of files saved on the floppy disk. Using the △ /▽ keys, choose the file you want to read. Pressing the ENTRY key reads setup data from the floppy disk.

Converting to ASCII Format and Then Copying the Data

Function

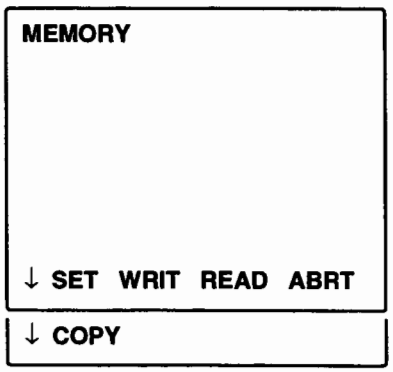
This procedure enables you to convert measurement data written to the internal memory to ASCII format and then copy them to a floppy disk. The extension of the resulting data file is .CSV.

Setup Parameters

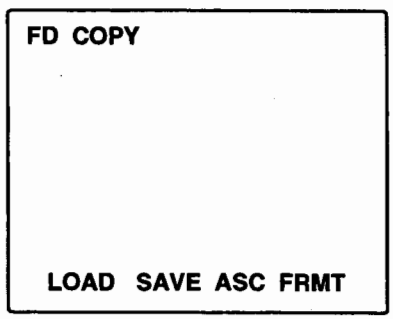
File name:	Name of file being copied to floppy disk
START CH:	First channel number for which data are converted and copied
END CH:	Last channel number for which data are converted and copied
START DATA:	First data number to be converted and copied
END DATA:	Last data number to be converted and copied

Example of Setting

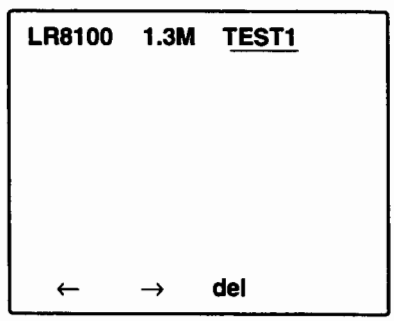
File name:	TEST1
START CH:	1
END CH:	4
START DATA:	1
END DATA:	1000



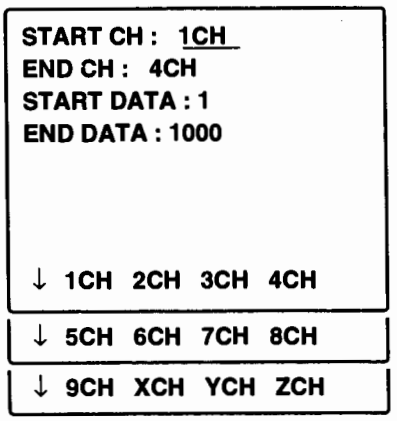
Press the MEMORY function key to open the menu screen. Press the NEXT key and then the F1 (COPY) key to open the COPY menu screen.



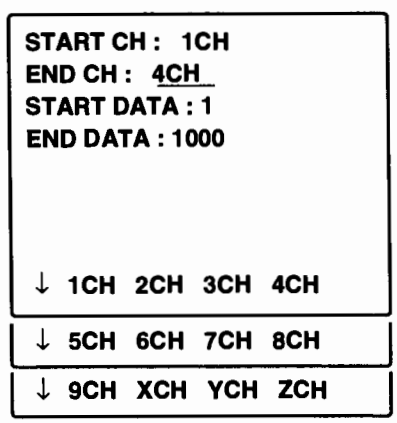
Press the F3 (ASC) key to show the screen for setting the name of the file to save to a floppy disk.



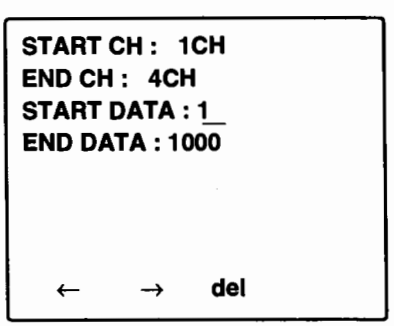
The screen shows the volume name and the amount of free space on the floppy disk. With the alphanumeric keypad and the F1, F2 and F3 keys, type in the file name using no more than eight characters. Press the ENTRY key to show the screen for setting the range of data to be included in the conversion/copying.



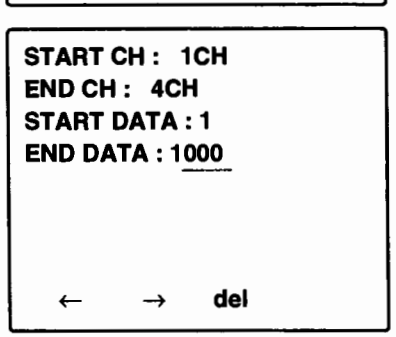
Specify the first channel. In this example, press the F1 (1CH) key to set the first channel to channel 1.



Specify the last channel. In this example, press the F4 (4CH) key to set the last channel to channel 4.



Specify the first data number. In this example, set the number to 1.



Specify the last data number. In this example, set the number to 1000. In the case of an LR4100E recorder, pressing the ▽ key shows the last data number. Pressing the ENTRY key converts the data in the internal memory to ASCII data and then copies them to the floppy disk.

Note

- The mantissa of faulty data or overranged data is converted to ±99999.
- The data number and data value are converted to 5- and 7-digit values, respectively, both being right-justified.
- Channels 10, 11 and 12 of an LR12000E recorder are indicated as "XCH," "YCH" and "ZCH," respectively.
- The numbers for the triggering point, first data, and last data are those acquired in the internal memory.
- If a Tag parameter is configured already, a character string of that tag name is saved for the Ch. and Name parameters (this applies only to those files which were saved with an LR4100E, 8100E or 12000E recorder). The character string is a channel number if the Tag parameter is only blank spaces.
- If Tag and Unit parameters are configured with the characters μ, Ω, and °, the characters are converted as shown below:
  μ = u
  Ω and ° = blank space

ASCII Data Format

Converted data are saved in the following format:

```
"Sampled by Intelligent Pen Recorder"
"Trigger Time","1997-01-01 05:01:12"
"Trigger Point",     1
"Sample Rate(Hz)", 135
"Start Data No.",     1
"End Data No.", 1000
"Ch. Name","1CH     ","2CH     ","3CH     ","4CH     "
"Unit","mV     ","mV     ","mV     ","uV     "
    1,   0.05,  0.040, 0.0414,   41.2
    2,   0.05,  0.040, 0.0413,   41.0
    3,   0.05,  0.040, 0.0412,   41.0
    4,   0.05,  0.041, 0.0412,   40.9
    5,   0.05,  0.040, 0.0411,   40.9
    |
```

Data number

- Title (39 characters)
- Date and time of triggering (38 characters)
- Triggering point (23 characters)
- Sampling rate at which data were taken into the internal memory (24 characters)
- First data number (24 characters)
- Last data number (22 characters)
- Channel number or tag name (10 + 10 × number of channels + 2 characters)
- Unit (6 + 9 × number of channels + 2 characters)
- Measurement data (5 + 8 × number of channels + 2 characters for each data item)

Deleting Data Files

Function

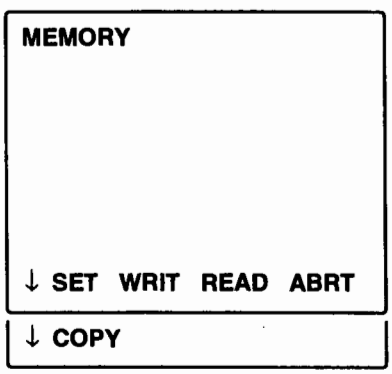
This procedure deletes files from a floppy disk.

Setup Parameters

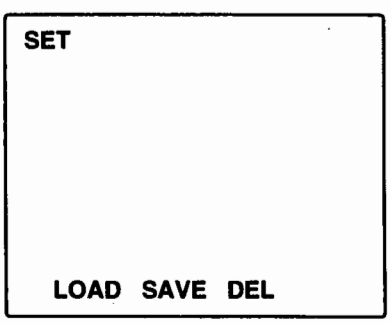
Type of file: Choose either the measurement-data file or the setup data file.
File name: Name of file being deleted from floppy disk

Example of Setting

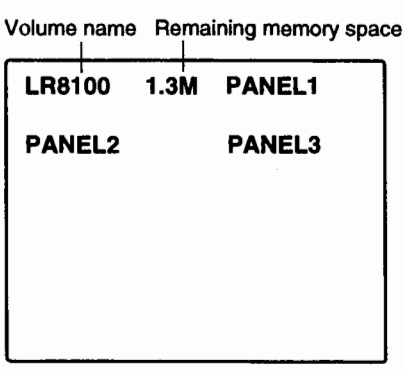
Type of file: Setup data file
File name: PANEL1



Press the MEMORY function key to open the menu screen. To delete a setup data file, press the F1 (SET) key to show the SET menu screen. To delete a measurement-data file, press the F2 (WRIT) key to show the WRITE menu screen.



Press the F3 (DEL) key to show the screen for choosing a file.



The screen shows the volume name and the amount of free space on the floppy disk as well as the names of the setup data files saved on the floppy disk. Using the△/▽ keys, choose the setup data file you want to delete. Pressing the ENTRY key deletes the selected file.

Viewing Information on the Internal Memory/Floppy Disk

Function

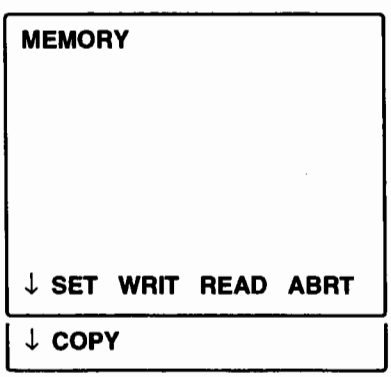
This procedure enables you to view information on the internal memory/floppy disk.

Setup Parameters

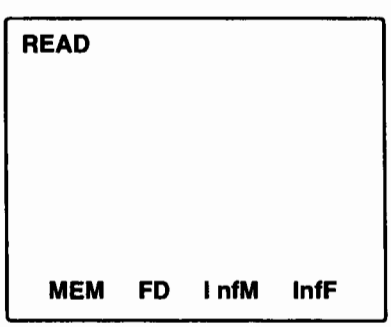
Type of device: Choose either the internal memory or the floppy disk.
File name: Only if you have chosen the floppy disk, choose the name of the file for which you want the information shown.

Example of Setting

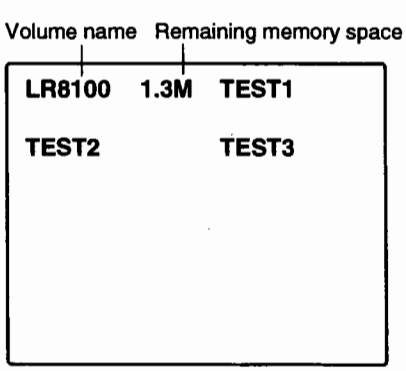
Type of device: Floppy disk
File name: TEST1



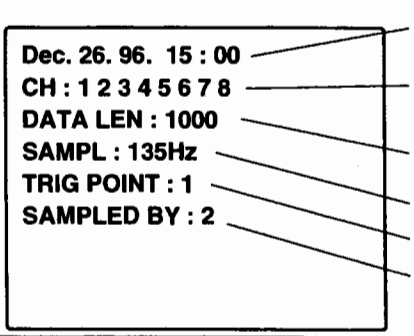
Press the MEMORY function key to open the menu screen. Press the F3 (READ) key to open the READ menu screen.



To view information on the internal memory, press the F3 (InfM) key; to view information on the floppy disk, press the F4 (InfF) key. In this example, press the F4 key to open the screen for choosing a file.



The screen shows the volume name and the amount of free space on the floppy disk as well as the names of the data files saved on the floppy disk. Using the △/▽ keys, choose the file for which you want the information shown. Pressing the ENTRY key shows the information on the selected file.



Formatting a Floppy Disk

Function

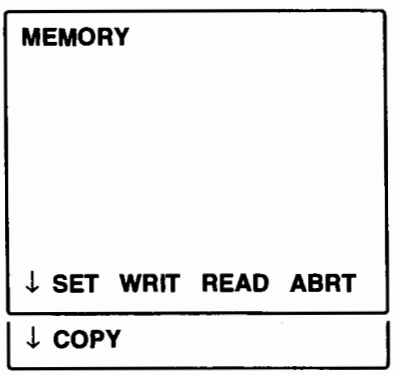
This procedure formats a 2HD floppy disk to 1.44-megabyte MS-DOS.

Setup Parameter

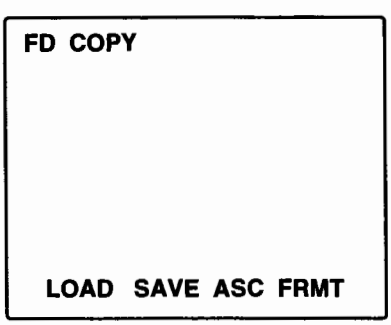
Volume name: Specify using no more than six characters.

Example of Setting

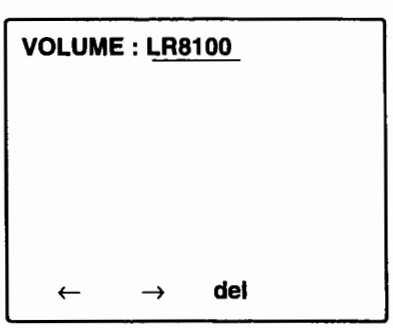
Volume name: LR8100



Press the MEMORY function key to open the menu screen. Press the NEXT key and then the F1 (COPY) key to open the COPY menu screen.



Press the F4 (FRMT) key to open the screen for setting a volume name.



With the alphanumeric keypad and the F1, F2 and F3 keys, type in the volume name using no more than six characters. Pressing the ENTRY key formats the floppy disk.

Messages

The following table explains messages given in relation to errors on or with floppy disks and required corrective actions.

Errors

Error No.	Meaning	Corrective Action	Page for Reference
39	Played back a measurement-data file with no setup information (*.LOD) with the LOAD parameter set to on.	Play back the file with the LOAD parameter set to off.	19
46	No data in the internal memory to copy.	First write measurement data to the internal memory and then copy them. When converting the data to ASCII format, set the correct range of data being copied before copying them.	5 to 15
47	Attempted to write to a write-protected floppy disk.	Unlock the floppy disk.	-
48	CPU failure	Needs service by the manufacturer.	-
49	Other failures	Use a different floppy disk. If the failure still persists, the floppy drive needs servicing by the manufacturer.	-
71	When converting data to ASCII format and copying them, you specified a channel where no data have been acquired.	Specify a channel through which data have been acquired in the internal memory.	23 to 25
72	When converting data to ASCII format and copying them, you specified a number for a data item that has not been acquired in the internal memory.	Specify a number for a data item that has been acquired in the internal memory.	23 to 25

Warning

Warning No.	Message	Meaning
W01	More files in FD	The floppy disk contains more files than can be viewed on the display of the LR recorder.

Status

Message	Meaning
Accessing FD...	Accessing the floppy disk.
Checking FD...	Checking the amount of free space on the floppy disk. (This message appears when data automatically written to the internal memory are copied to a floppy disk.)

Specification

Media

Buffer memory (internal SRAM)
Capacity: LR4100E; 256 KB
LR8100E; 512 KB
LR12000E; 768 KB
Data backup: Around 1 day (If the power is turned off after turned on for 30 minutes, at room temperature)
3.5-inch floppy disk
Number of drives: 1
Disk types: 2HD, 2DD
Supported formats: 1.2 MB, 1.44 MB, and 720 KB

Applicable data

Setting values, measured values, and computed values (only possible whe optional math function is specified)

Method to save to the floppy disk

Copies data stored in the buffer memory to the floppy disk, except for setting values which can be directly saved to the floppy disk.

Method to load from floppy disk

Copies data from the floppy disk to the buffer memory except for settin values which can be directly loaded from the floppy disk.

Printing and outputing loaded data

Able to print captured data saved in the buffer memory or output to a communication interface.

Specified data length

1000,2000,4000,8000,16000,32000 data/ch (Total memory lengt must be within the free memory size.)

Data save format

Setting values: ASCII
Measured/computed values: binary (except ASCII (CSV Format) is also possible when saving to floppy disk.)

Data capacity

Measured values
Binary data: 2 bytes / 1 data
Computed values
Binary data: 4 bytes / 1 data

Trigger condition

alarm trigger, chart trigger, remote trigger (/REM option)

Rack adapter

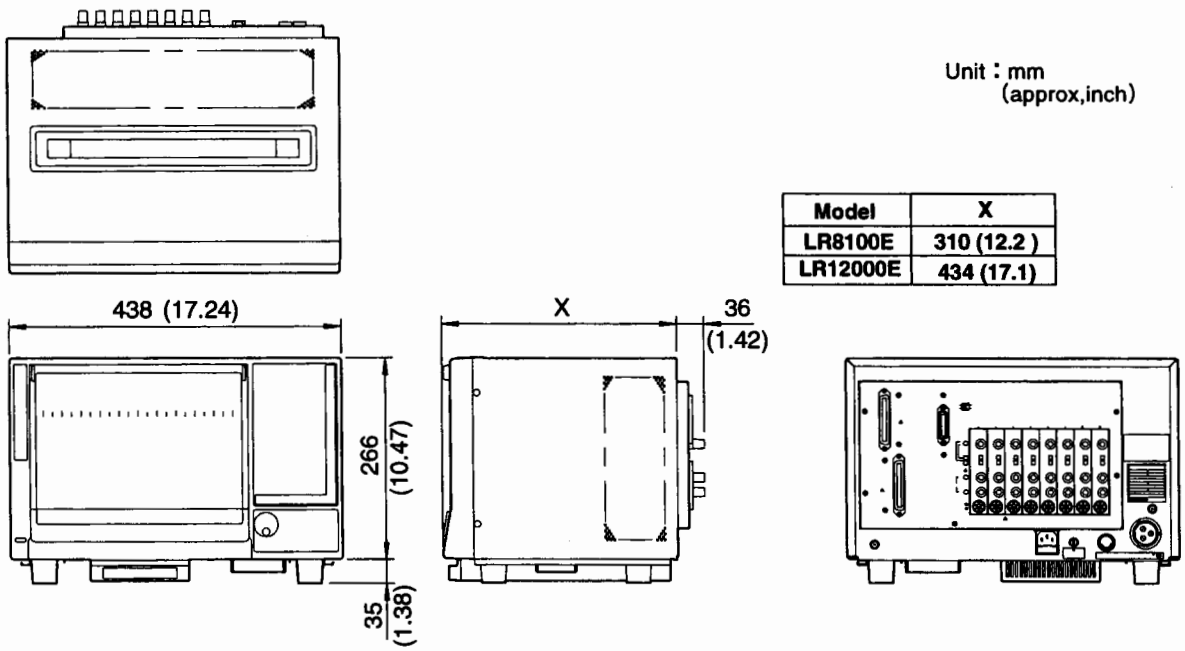
LR8100E/FDD, LR1200E/FDD: 378984
LR4100E/FDD: 378985

Dimensional Drawings

LR8100E/LR12000E

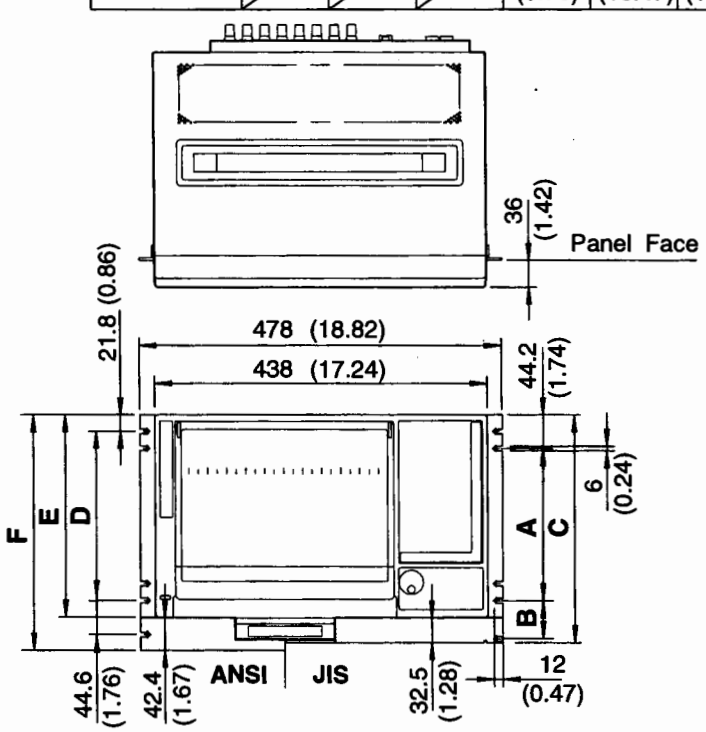
Unit : mm
(approx,inch)

Model	X
LR8100E	310 (12.2)
LR12000E	434 (17.1)

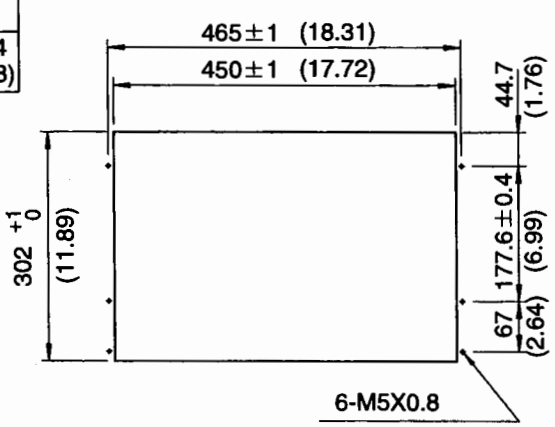


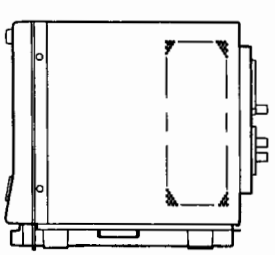
Rack Types

Rack Types	A	B	C	D	E	F
JIS	200 (7.87)	50 (1.97)	299.5 (11.79)			
ANSI				222.4 (8.76)	266 (10.47)	309.4 (12.18)



Panel Cutout

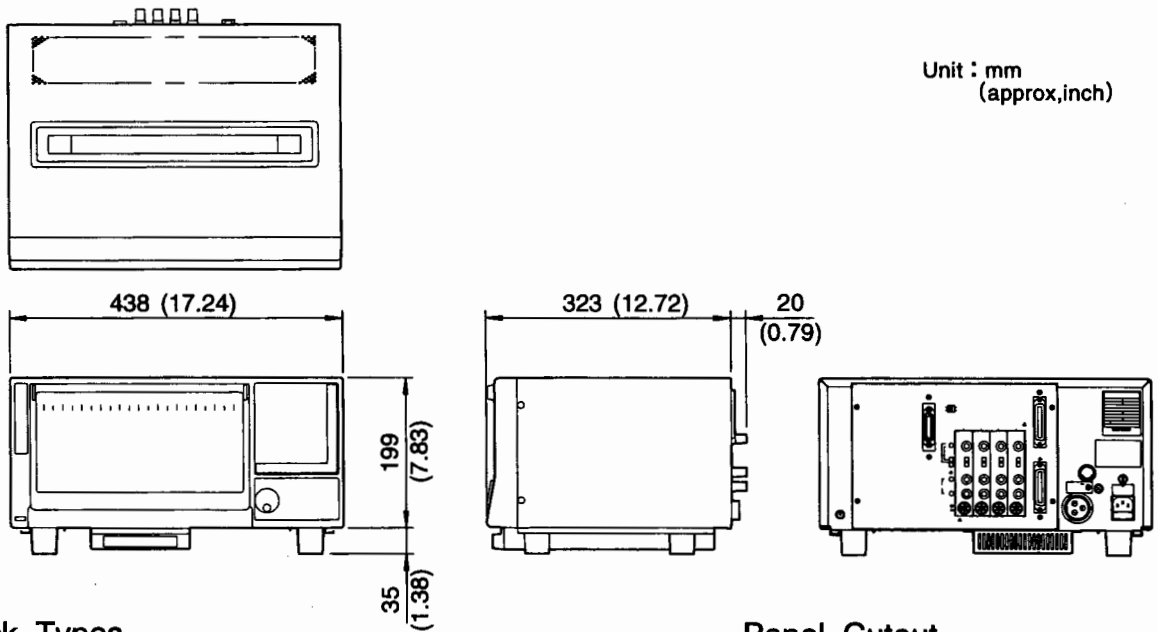




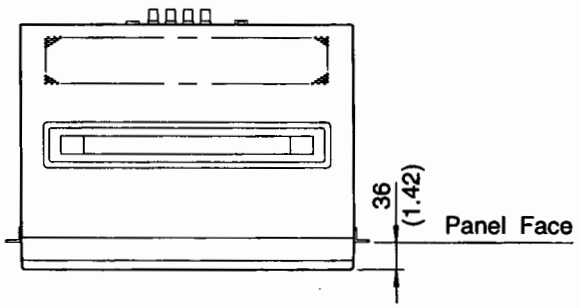
If not specified, the tolerance is ±3%. However, in cases of less than 10mm, the tolerance is ±0.3mm.

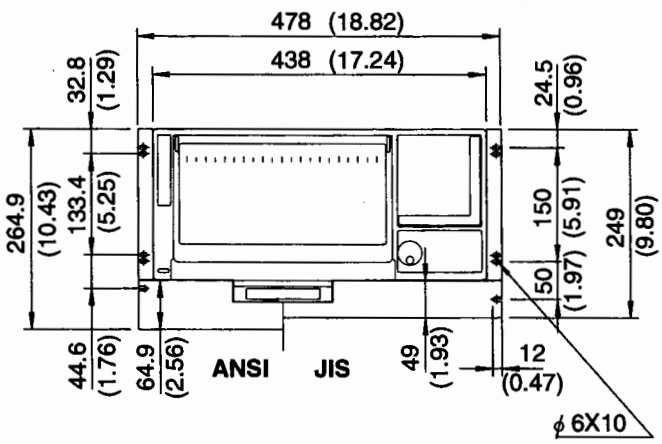
LR4100E

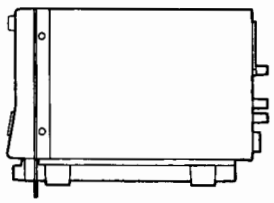
Unit : mm
(approx,inch)



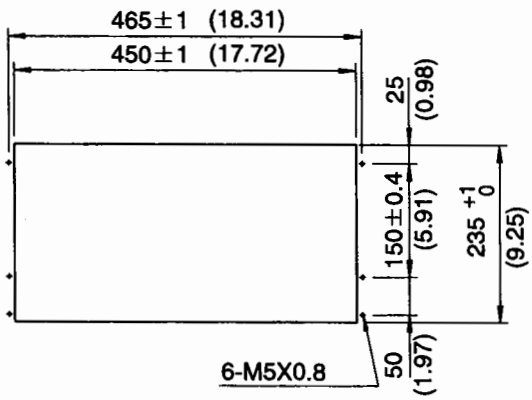
Rack Types







Panel Cutout



If not specified, the tolerance is ±3%. However, in cases of less than 10mm, the tolerance is ±0.3mm.