3700 13
LR PC Software

IM 370013-61E

IM 370013-61E
1st Edition

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Foreword

Thank you for purchasing the LR PC Software.
The LR PC Software is available in three models which differ according to the number of channels used. This manual describes the precautions, functions and method of operating these three models of software on Windows 95. Please read this manual carefully when using this software to ensure correct use.
After reading this manual, keep it in a safe place for quick reference whenever a question arises.
For information regarding the precautions, functions and method of operating the LR recorder, and also the method of operating Windows 95, refer to the corresponding manuals.

Precautions

- The contents of this manual are subject to change without prior notice as a result of improvements in the performance and functions of the software. The displayed contents shown in this manual may differ slightly from what actually appear on your window.
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Revisions

- 1st Edition, December 1996

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Contents

Product Outline

Description of this software

This software consists of the following six kinds of software.

- **Environment setting software**

  This software sets the following items.

  Directory in which the measurement data is to be saved using the data logging software
  Kind of LR recorder used
  Communication method

- **Setting software**

  This software sets and controls the LR recorder. The items that can be set are as follows.

  Channel settings (mode, range, scaling, span, tag, unit, filter)
  Alarm setting
  Partial compression and expansion recording/AUTO span shift mode
  Messages
  Recording zone
  Chart speed
  Date and time
  Channel copy
  Saving data to a floppy disk
  Replaying data from a floppy disk
  Initializing settings

  This software enables the following items to be controlled.

  Starting/stopping the chart
  Starting/stopping recording
  Raising/lowering the pens
  Starting/stopping list printing
  Starting message printing
  Starting manual printing
  Turning pen offset compensation ON/OFF

- **Data logging software**

  This software periodically acquires data measured by an LR recorder to a personal computer, and saves it to the hard disk. It is also capable of displaying waveforms and digital values in realtime while data logging is taking place.

- **Data viewer software**

  This software redisplays data saved using data logging software, and also converts it into the ASCII, Lotus or Excel format. It can also be used to read replayed data as numerical values with a cursor.

- **Tag setting software**

  This software is capable of setting tags and tag IDs.

- **Data downloading software**

  This software can be used to directly read measurement data from the IC memory card of an LR recorder, or from the internal memory of a model that has a floppy disk drive, and display it with viewer software.

System environment necessary for operation

- **Personal computer**

  Personal computer on which Windows 95 can run

  CPU: 80486DX4 or higher (Pentium 133 MHz or higher recommended)

  Memory: 16 MB or more (32 MB or more recommended)

- **Operating system**

  Windows 95

- **Floppy disk drive**

  Requires a drive supporting 3.5-inch FD formatted to 1.44 MB (MS-DOS compatible). Also the drive is used to set up this software.

- **Hard disk**

  10 MB of free disk space or more

- **Video board**

  640 x 480 or better (1024 x 768 or better, 16-bit color or better is recommended) is necessary.

- **Display**

  Display supported by Windows 95 with analog RGB and 32000 colors or more (64000 colors or more are recommended)

- **Printer**

  Printer supported by Windows 95

- **Mouse**

  Mouse supported by Windows 95

- **Communication interface**

  GP-IB board: Made by National Instruments (Supported by Windows 95)

  AT-GP

  RS-232-C: Supported by Windows 95

1.1 Connecting the LR Recorder to a Personal Computer

GP-IB interface

WARNING

To prevent electric shock, be sure to switch OFF both the personal computer and the LR recorder before connecting them together.

Connect the GP-IB connector on the back of the LR recorder to the GP-IB on the personal computer, using the GP-IB cable.

Setting the address

Set the GP-IB address of the LR recorder using the procedure described in the communication manual (IM 3701-10E or IM 3710-10E) that comes with the LR recorder.
For details of the GP-IB interface, refer to the communication manual (IM 3701-10E or IM 3710-10E) that comes with the LR recorder.

RS-232-C interface

WARNING

To prevent electric shock, be sure to switch OFF both the personal computer and the LR recorder before connecting them together.

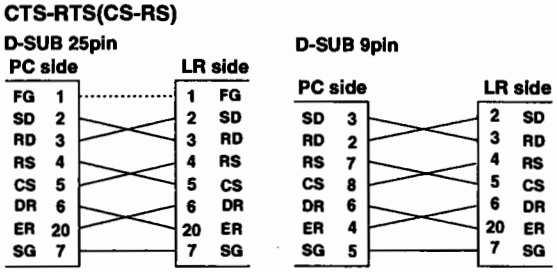
Connect the RS-232-C connector on the back of the LR recorder to the serial port (RS-232-C) connector on the personal computer, using the RS-232-C cable.

Setting the parameters

Set the parameters of the LR recorder using the procedure described in the communication manual (IM 3701-10 Eor IM 3710-10E) that comes with the LR recorder.
Baud rate: Select from 1200/2400/4800/9600
Stop bit: 1
Parity: Select from NONE/EVEN/ODD
Data length: 8
Handshaking: C:R (CS:RS)

Connection example

CTS-RTS(CS-RS)



For details of the RS-232-C interface, refer to the communication manual (IM 3701-10 Eor IM 3710-10E) that comes with the LR recorder.

1.2 Before Setup

Backing up the system floppy disk

Make a backup copy of the original system floppy disk that you purchased, on a separate floppy disk (2HD, 1.44 MB). Subsequently, use this floppy disk for setup and other tasks.

Procedure for backing up the system floppy disk

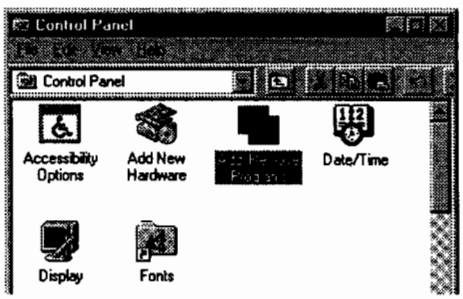
From the MS-DOS prompt in Windows or in DOS, type the command, "diskcopy a: a:" (when the floppy disk drive is "a") and execute the backup. Then, follow the instructions on the window.

1.3 Setting up the Software

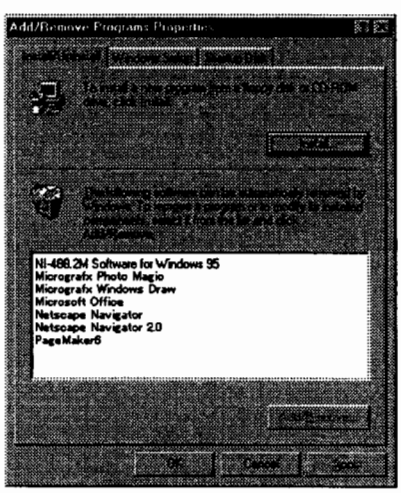
Operation

To set up the LR PC Software, start the setup program using the following procedure.

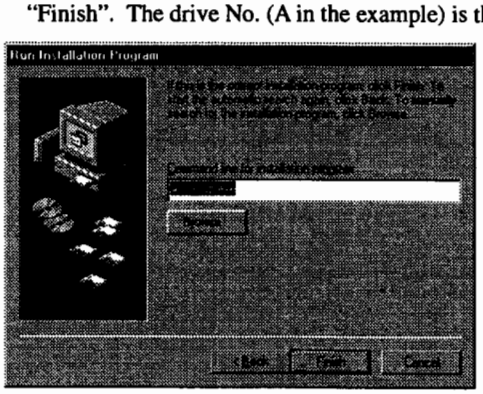
1. Turn the computer on and start Windows 95.
2. Click the "Start" button and point to "Setting". Open the "Control Panel" and double-click "Add/ Remove Programs".



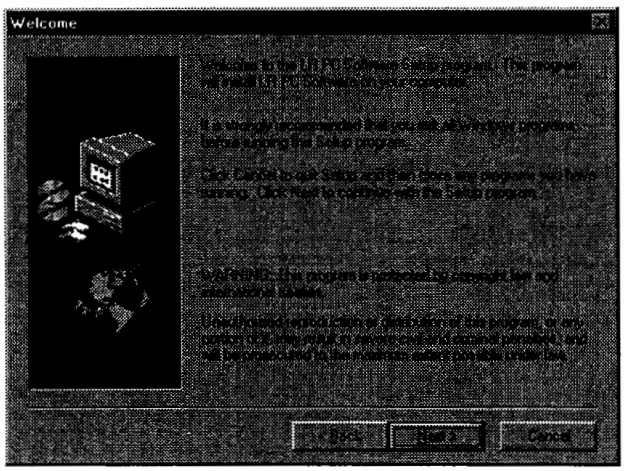
3. Click "Install" on "Install/Uninstall". The installer starts.



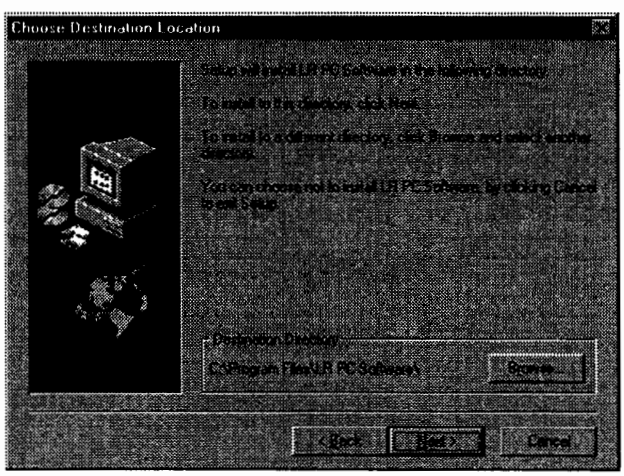
4. Place the system floppy disk (backup copy) in the floppy disk drive and click "Next".
5. Check that the "Command line for setup program" text box is set to "A:\setup.exe", and click "Finish". The drive No. (A in the example) is the floppy disk drive No.



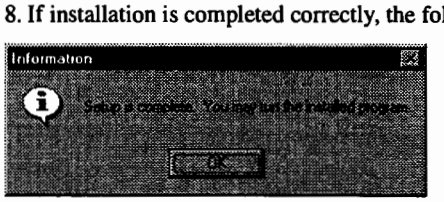
6. Follow the setup program instructions. Click "Next".



7. The setup program asks where you wish to install the software. If you wish to change the destination, click "Browse..." and enter a new location. After setting the destination, click "Next".



8. If installation is completed correctly, the following message appears. Click "OK".



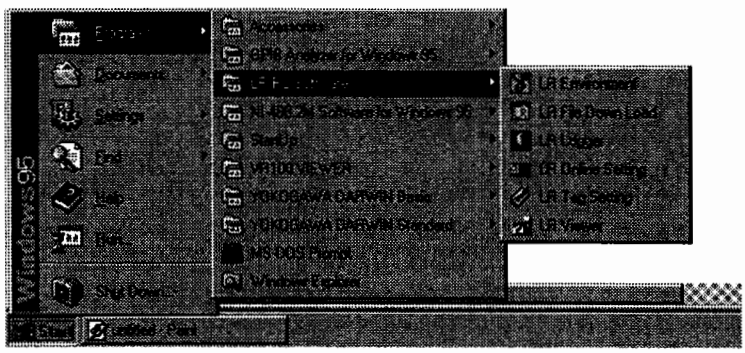
Note

The following folders are created when this software is set up correctly.

- (Destination folder)\Program: Contains the LR PC Software.
- (Destination folder)\Sample: Contains sample data files.

Creating the "LR PC Software" folder

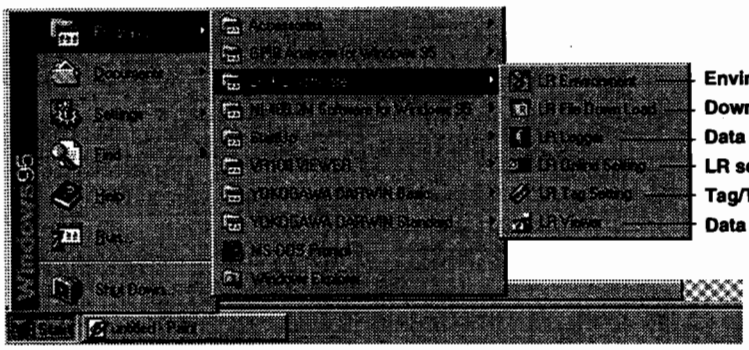
When this software is set up correctly, the "LR PC Software" folder is created automatically. This "LR PC Software" folder is automatically registered in the "Programs" menu of the "Start" menu, as shown below.



1.4 Starting and Exiting the Software

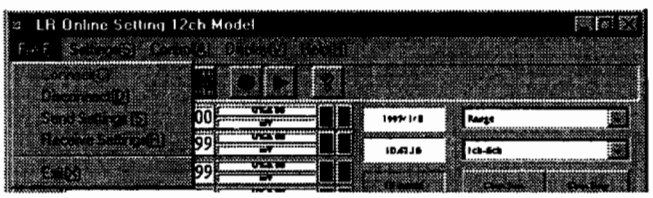
- **Starting the software**

  Click the "Start" button, and point to "Programs". Next, click "LR PC Software" to select the software to be started.



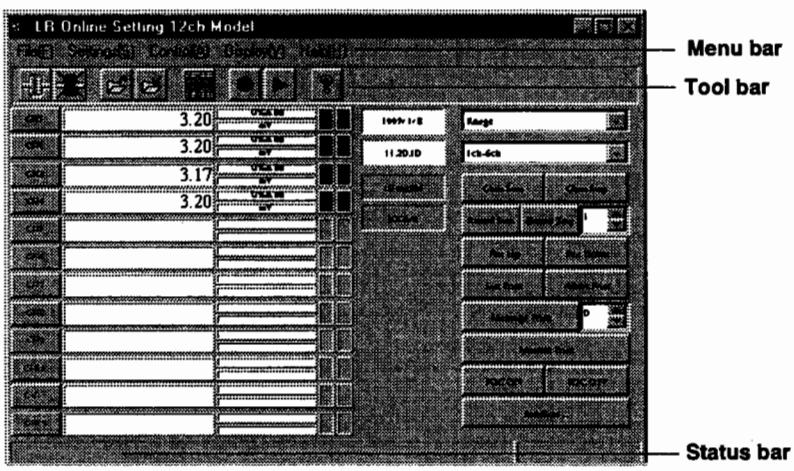
- **Exiting the software**

  Select "File" then "Exit", or "Close" on the window.



- **Displaying the toolbar/status bar**

  To display the toolbar, select "Display" then "Toolbars...".
  To display the status bar, select "Display" then "Status bars".

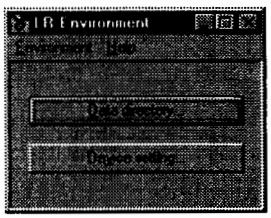


Note

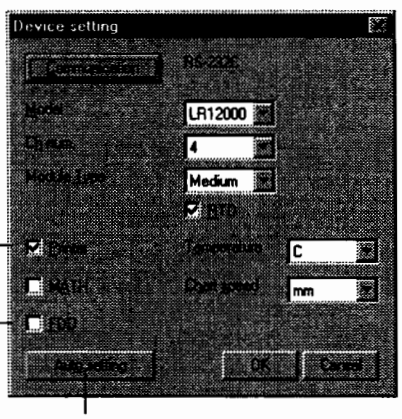
The toolbar and status bar appear when the software is started.

2.1 Setting the Kind of LR Recorder

1. Start the environment setting software.



2. Click "Device setting (V)". The device setting dialog box appears.



For an enhanced model of LR recorder (LR12000E/LR8100E/LR4100E/LR4200E), the kind of LR recorder is set automatically according to the specifications of the LR recorder connected to the computer (the communication settings must be correct).

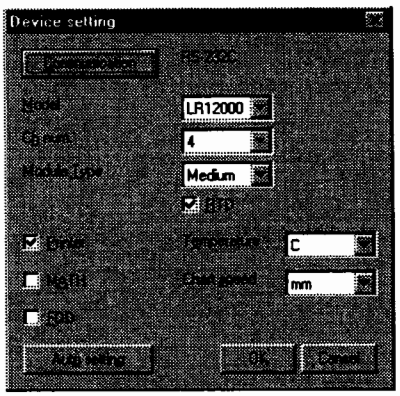
3. Set the kind of LR recorder connected to the personal computer.

Note

With certain models of LR recorder, the kind of LR recorder cannot be set automatically. In such a case, set each item manually.

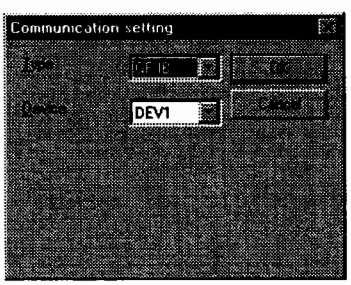
2.2 Setting the Communication Method

1. Start the environment setting software.
2. Click "Device setting". The device setting dialog box appears.



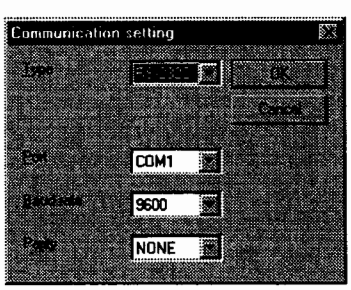
3. Click "Communication". The communication setting dialog box appears.
4. Click the "Type" list box and select GP-IB or RS-232-C.

GP-IB



5. If you select "GP-IB" in step 4, the window for setting the address appears. Click the address setting list box and select the GP-IB address of the LR recorder.
   For details of the method of setting the LR recorder address, refer to the communication manual (IM 3701-10E or IM 3710-10E) that comes with the LR recorder.

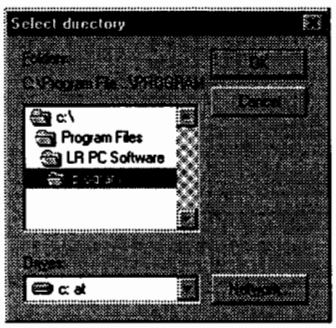
RS-232-C



5. If you select "RS-232-C" in step 4, the box for setting the parameters appears. Click the list boxes for the port to which the LR recorder is connected, the baud rate, and parity, respectively, and set the parameters in the same way as for the LR recorder settings.
   The stop bit is fixed at 1, and the data length at 8.
   For details of the method of setting the LR recorder, refer to the communication manual (IM 3701-10E or IM 3710-10E) that comes with the LR recorder.
6. Once setting work has been completed, click "OK". To cancel the settings, click "Cancel". The device setting dialog box appears once again.
7. Click "OK" to end the device setting procedure.

2.3 Setting the Directory in Which Acquired Data Is to Be Saved

1. Start the environment setting software.
2. Click "Data directory...". The select directory dialog box appears.



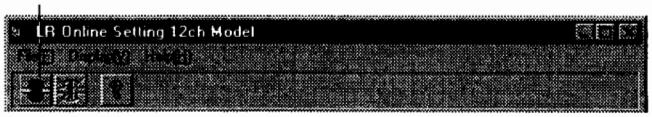
3. Select the directory in which the data is to be saved using the logger software. By clicking "Network...", you can specify a device connected to the computer by a network.
4. Click "OK" to end the device setting procedure. To cancel the settings, click "Cancel".

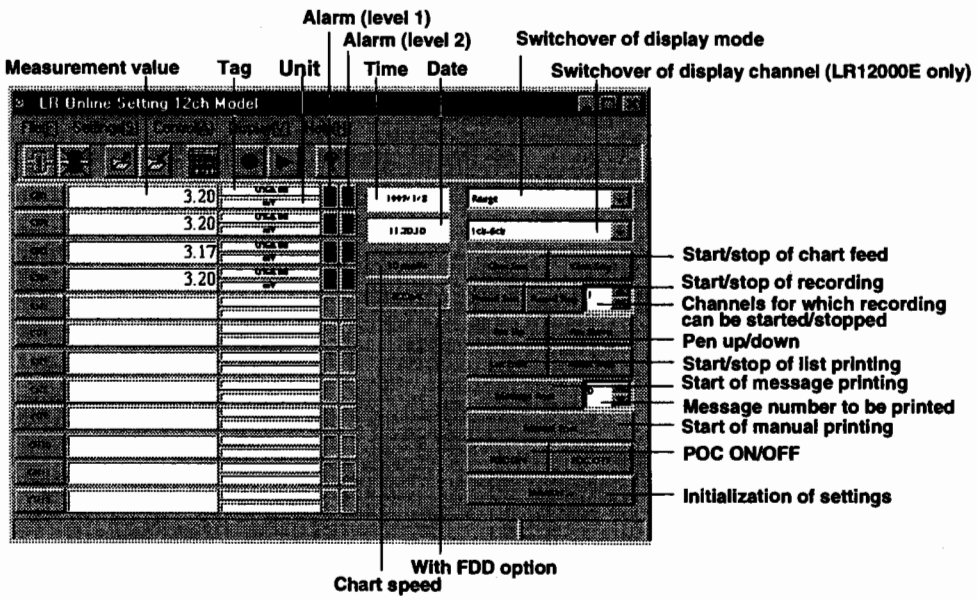
3.1 Reading the Data Set in the LR Recorder

Before using setting software, be sure to set each of the device setting items of the environment setting software to match the LR recorder connected to the computer.

1. Start the LR recorder setting software.
2. Select "File(F)" then "Connect(C)", or click the connection icon on the toolbar. The current data set in the LR recorder is read to the computer, and the measurement data appears digitally.

Connection icon





Alarm display

- If an alarm is set, the alarm display section is dark gray.
- If an upper limit alarm (H) is emitted, the alarm display area appears in red.
- If a lower limit alarm (L) is emitted, the alarm display area appears in blue.

Note

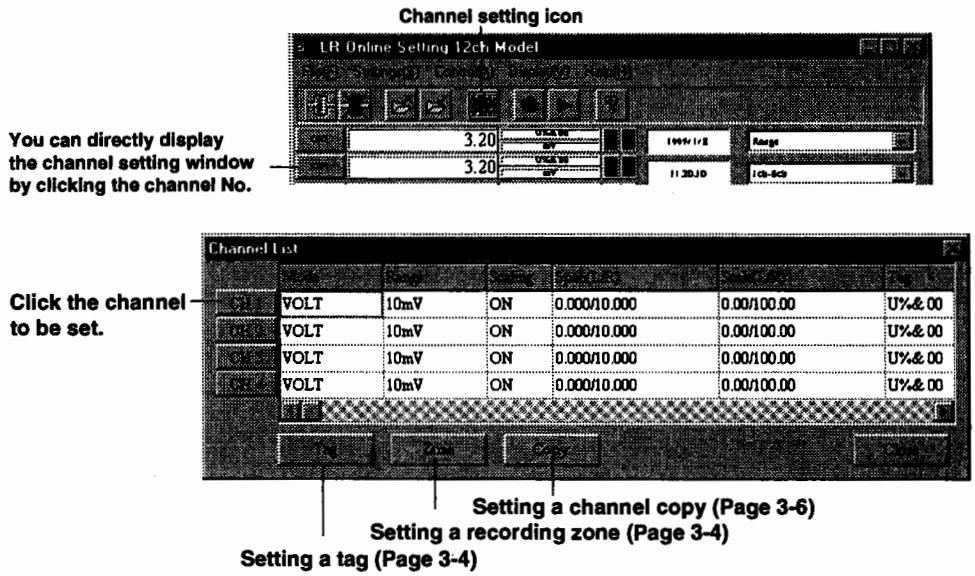
The display of measurement values is as shown below.

Normal: Digital value display of measurement value
Measurement mode OFF: "— — — " appears.
Overflow: "OVER" appears.
Underflow: "UNDER" appears.
Abnormal data: "ABNORMAL" appears.

3.2 Setting the Channels

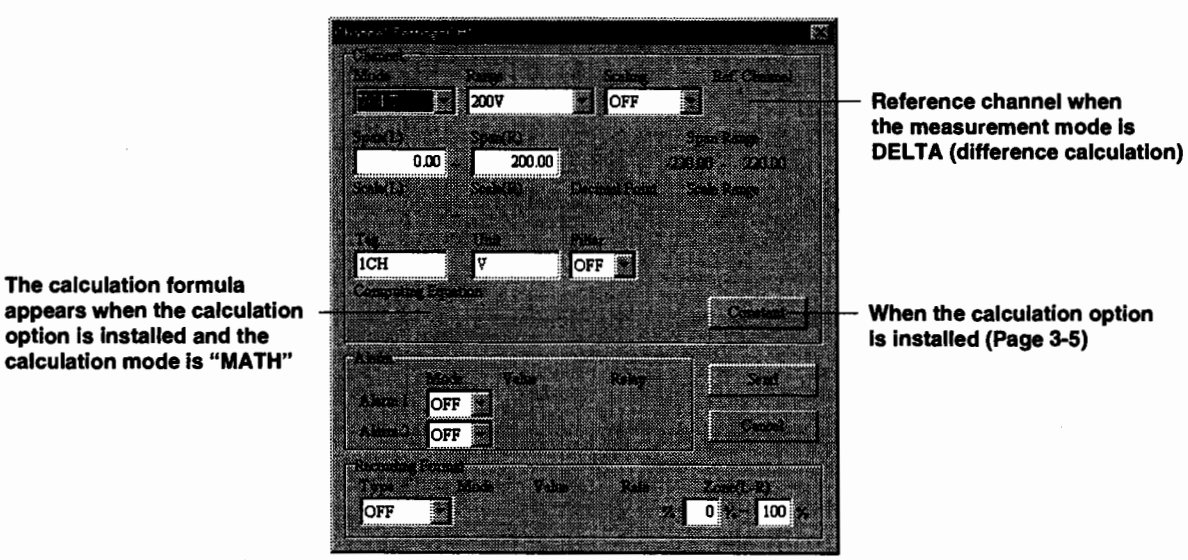
Read the data set in the LR recorder using the procedure given in Section 3.1, "Reading the Data Set in the LR Recorder".

1. Select "Settings(S)" then "Channel(L)", or click the channel setting icon on the toolbar. A list of channels appears.



Setting the measurement range

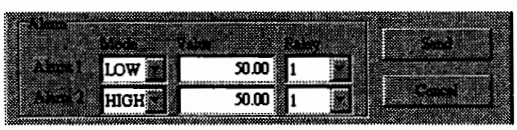
2. When you click the channel to be set, the channel setting dialog box appears. Set each setting item box or text box.



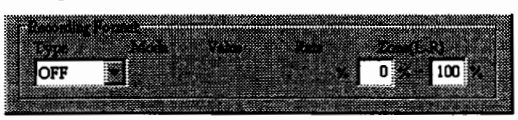
Note

- Some items cannot be set depending upon the set channel or the "Mode" and "Scaling" setting.
  - You cannot set "DELTA" (difference calculation) in "Mode" in channel 1.
  - If you set "DELTA" in "Mode", "Range" and "Unit" will be the same as those of the reference channel. In this case, you cannot set scaling.
  - If you set "Scaling" to OFF, the "Scale(L)" and "Scale(R)" text boxes do not appear.
  - If you set "Scaling" to OFF, the unit is fixed according to the range setting.
- If the "Device setting" of the environment setting software does not match the LR recorder connected to the personal computer, it may sometimes be impossible to set data in the LR recorder.
- If you read the set data from an LR recorder whose measurement mode has been set to "AUX" or "COM", the letters "AUX" or "COM" will appear in the list box of "Mode" of this software, however those modes cannot be set (if you display a list in the list box, "AUX" and "COM" will not appear).
- If you read set data from an LR recorder in whose calculation formula a communication input (C1, C2...) has been set, an error will occur when you open the channel setting dialog box.

Setting an alarm



3. Click the "Alarm 1" or "Alarm 2" in the "Mode" box, and select "OFF", "LOW" or "HIGH".
4. If you select "LOW" or "HIGH", set the alarm setting value in the "Value" text box, and the alarm output relay No. in the "Relay" box.



Setting the recording format

5. Click the "Type" list box, and select "OFF", "PARTIAL" (partial compression and expansion recording), or "ASST" (AUTO span shift).

Partial compression and expansion recording

6. If you select "PARTIAL", set the "Mode" list box" to ON or OFF. If you set it to "ON", the "Boundary value" and "Boundary point" text boxes appear, so enter the boundary value and boundary point for performing partial compression and expansion recording.

AUTO span shift

6. If you select "ASST", set ON or OFF in the "Mode" list box.

Note

Set "Format" so as to match the setting in the LR recorder. If you make a setting that is different to the setting in the LR recorder and sent it using "Send", an error will occur.

Setting the recording zone

7. Enter the recording zone in the "Recording zone" text box.

Sending settings

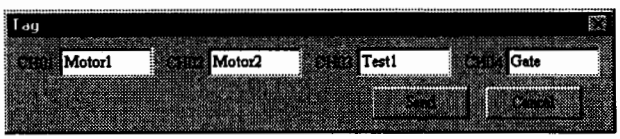
8. Once all settings have been completed, send the set contents to the LR recorder. If you click "Send", the LR recorder will be set. To cancel the settings, click "Cancel".

3.3 Setting Other Parameters

Read the data set in the LR recorder using the procedure of 3.1 "Reading the Data Set in the LR Recorder".

Setting a tag

1. Select "Settings(S)" then "Tag(T)". The tag dialog box for all channels appears.



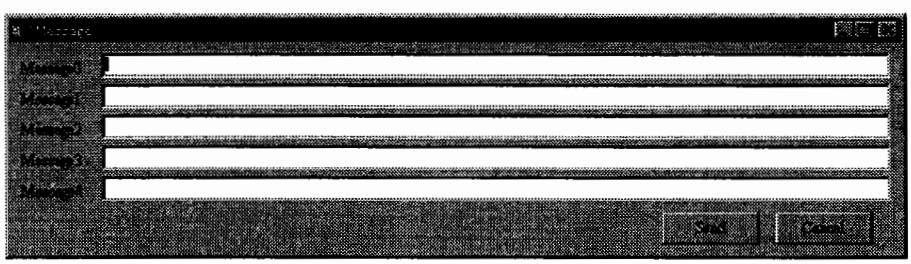
2. Set a tag using no more than 7 characters.
3. If you click "Send", the tag is set in the LR recorder. If you click "Cancel", the setting is canceled.

Note

You can also set a tag using the channel setting window on page 3-2, or the tag setting software.

Setting a message

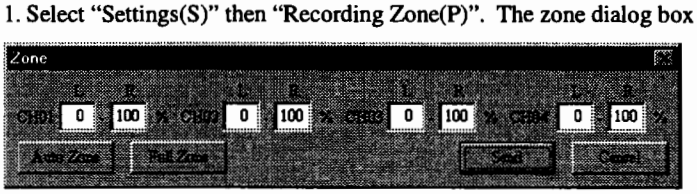
1. Select " Settings(S)" then "Messages(M)". The message dialog box appears.



2. Enter a message in the message text box using no more than 70 alphanumeric characters. You can set five messages.
3. If you click "Send", the message is set in the LR recorder. If you click "Cancel", the setting is canceled.

Setting a recording zone

1. Select "Settings(S)" then "Recording Zone(P)". The zone dialog box appears.



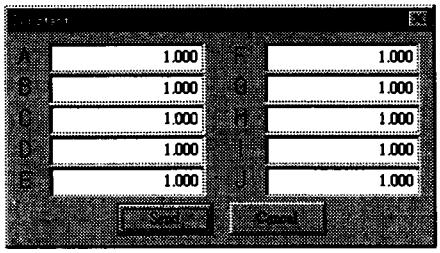
2. Set the recording zone in the text box for each channel as a percentage of the chart recording zone. If you click "Auto Zone", the recording zone is automatically set so that the channels do not overlap each other. If you click "Full Zone", all of the channels are set to 0 - 100%.
3. If you click "Send", the set recording zone is set in the LR recorder. If you click "Cancel", the setting is canceled.

Note

You can also set the recording zone using the channel setting window shown on pages 3-2 and 3-3.

Setting calculation constants (only when the calculation option is installed)

1. Select "Settings(S)" then "Constant(E)". The constant dialog box appears.



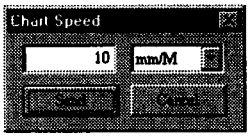
2. Enter the calculation constants in the text box.
3. If you click "Send", the constants are set in the LR recorder. If you click "Cancel", the settings are canceled.

Note

You can also set calculation constants using the channel setting window shown in page 3-2.

Setting the chart speed

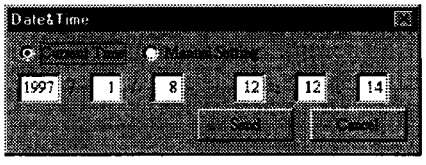
1. Select "Settings(S)" then "Chart Speed(S)". The chart speed dialog box appears.



2. Enter the desired value in the chart speed text box, then click the unit box and select the unit.
3. If you select "Send", the chart speed is set in the LR recorder. If you click "Cancel", the setting is canceled.

Setting the date and time

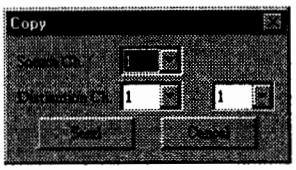
1. Select "Settings(S)" then "Date and Time(D)". The date & time dialog box appears.



2. Click the "Current Time" or "Manual Setting" radio button. If you select "Current Time", the date and time in the PC are set.
3. If you select "Manual Setting", enter the date and time in the year, month, day, hours, minutes and seconds text box. The time is set using a 24-hour clock.
4. If you click "Send", the setting is sent to the LR recorder. If you click "Cancel", the setting is canceled.

Setting a channel copy

1. Select "Settings(S)" then "Copy(C)". The copy dialog box appears.



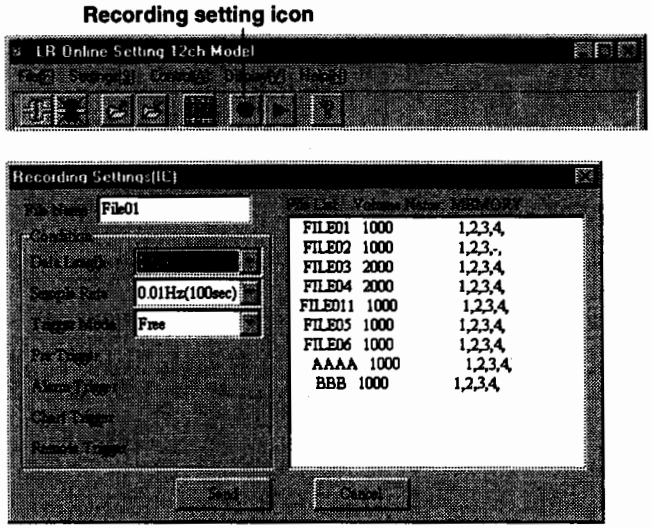
2. Select the copy source and destination channels from the list box.
3. If you click "Send", the settings are set in the LR recorder. If you click "Cancel", the settings are canceled.

Note

- You cannot set a channel whose measurement mode is "AUX" or "COM" as the copy source (if you read the set data from the LR recorder).
- You cannot copy a channel whose measurement mode is "DELTA" (difference calculation) to a channel whose number is smaller than that of the reference channel.
- You cannot copy a channel whose measurement mode is "MATH" (calculation channel) to a channel that is used in the calculation formula.
- You cannot copy a channel whose measurement mode is "MATH" (calculation channel) to a channel whose number is smaller than that of the calculation channel in the calculation formula, when the measurement mode uses "MATH" (calculation channel) in the calculation formula.
- You cannot copy the recording method of the channel whose recording method is "PARTIAL" or "ASST", when the recording method set in the LR recorder differs from that in the copy source channel.
- If you copy a channel whose measurement mode is "DELTA" or "MATH", or a channel whose "SCALE" is ON, to a channel whose recording method is "ASST", the recording method of the copy destination will go OFF".

Saving measurement data to an IC memory card/Settings for automatically saving measurement data to a floppy disk

1. Select "Settings(S)" then "Recording Setting(R)", or click the recording setting icon on the toolbar. The recording setting (setting which saves measurement data to the C memory card/setting which automatically saves measurement data to a floppy disk) dialog box appears.



2. Enter a filename to the "File Name" text box using no more than 8 standard width alphanumeric characters.
3. Set the number of data items to be saved in the "Data Length" list box.
4. Set the interval at which data is to be sampled, in the "Sample Rate" list box.
5. Set "Free" or "Trigger" in the "Trigger Mode" list box.
6. If you set "Trigger Mode" to "Trigger", set the pretrigger position in the "Pre Trigger" list box as a percentage of the number of samples, and set "ON" or "OFF" in the "Alarm Trigger", "Chart Trigger" and "Remote Trigger" list boxes.
7. If you click "Send", the above settings are sent to the LR recorder. If you click "Cancel", the settings are canceled. When you start measurement, acquire the measurement data to the internal memory according to the set conditions, and copy it to a floppy disk.

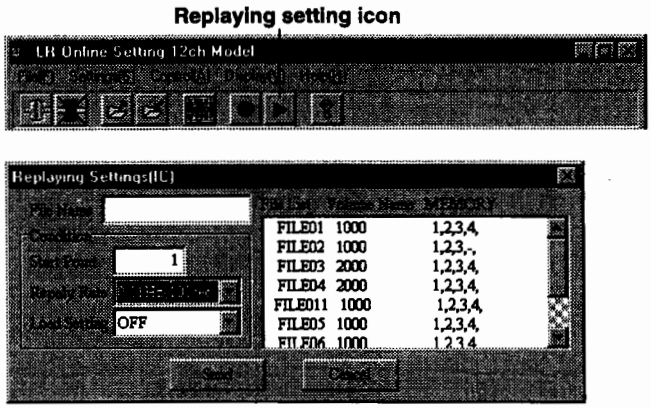
Note

In the following cases, a setting send error occurs, and the settings cannot be sent to the LR recorder.

- If a floppy disk is not inserted in the LR recorder
- If a floppy disk is defective
- If a floppy disk is write-protected
- If characters that cannot be used in a filename (: * / + .) are used
- If a floppy disk has already included 47 files
- If the LR recorder is recording or replaying data (including a trigger wait status)
- If "Trigger Mode" is set to "Trigger", and all trigger conditions are set to "OFF"
- If the "ON" setting of "Remote Trigger" is sent to an LR recorder whose "Remote" item of the setup mode is set to OFF

Setting which enables measurement data to be automatically read to the IC memory card/Setting which enables measurement data to be automatically read to a floppy disk

1. Select "Settings(S)" then "Replaying Setting(V)", or click the replaying setting icon on the toolbar. The replaying setting (the setting which automatically replays measurement data to the IC memory card/automatically replays measurement data to a floppy disk) dialog box appears.



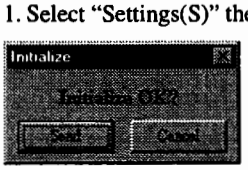
2. Enter the filename of the file to be replayed in the "File Name" text box using no more than 8 standard width alphanumeric characters, or select the file to be replayed from the file list.
3. Set the data No. of the first data item to be replayed, in the "Start Point" text box.
4. Set the interval at which data is to be replayed, in the "Replay Rate" list box.
5. Set "ON" or "OFF" in the "Load Setting" list box. If you set "ON", the data is replayed under the set conditions that existed when it was saved. If you set "OFF", the data is replayed under the current set conditions of the LR recorder.
6. If you click "Send", the settings are set in the LR recorder. If you click "Cancel", the settings are canceled. When you start recording, the measurement data is replayed according to the set conditions.

Note

- In the following cases, a setting send error occurs, and the settings cannot be sent to the LR recorder.
  - If a floppy disk is not inserted in the LR recorder
  - If a floppy disk is defective
  - If a floppy disk is write-protected
  - If characters that cannot be used in a filename (: * / + .) are used
  - If a floppy disk has already included 47 files
  - If the LR recorder is recording or replaying data (including a trigger wait status)
- If data is replayed when "Load Setting" is set to "ON", the settings in the LR recorder are changed to those for the data to be replayed.

Initializing settings

1. Select "Settings(S)" then "Initialize(I)". The initialize dialog box appears.



2. If you click "Send", the settings in the LR recorder are initialized. If you click "Cancel", the settings are canceled.

3.4 Controlling the LR Recorder

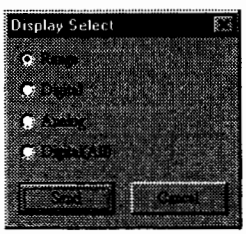
The LR recorder can be controlled using one of the following two methods.

- By selecting "Control(A)" from the toolbar
- By directly clicking a button displayed on the window

Here, a description is given of the method of selecting "Control(A)" from the toolbar. If you directly click a button displayed on the window, the item of the clicked button is carried out (to switch the display mode or the displayed channel, make a selection from the list box).

Switching the display mode

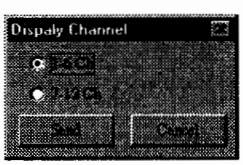
1. Select "Control(A)" then "Display Select(D)". The display select dialog box appears.



2. Click one of the radio buttons from "Range", "Digital", "Analog" and "Digital(All)". The last button appears only when the LR12000E is used.
3. If you click "Send", the LR recorder display switches. If you click "Cancel", the setting is canceled.

Switching the displayed channel (applicable only to the 12-pen model of the LR12000E)

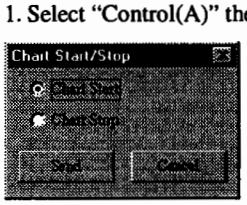
1. Select "Control(A)" then "Display Channel(H)". The display channel dialog box appears.



2. Click the "1-6 Ch" or "7-12 Ch" radio button.
3. If you click "Send", the displayed channel of the LR recorder switches. If you click "Cancel", the setting is canceled.

Starting/stopping chart feed

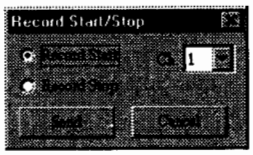
1. Select "Control(A)" then "Chart Start/Stop(C)". The chart start/stop dialog box appears.



2. Click the "Chart Start" or "Chart Stop" radio button.
3. If you click "Send", chart feed starts or stops accordingly. If you click "Cancel", the setting is canceled.

Starting/stopping recording

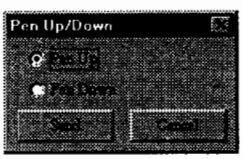
1. Select "Control(A)" then "Record Start/Stop(R)". The record start/stop dialog box appears.



2. Set the desired channel No. in the list box of the channel concerned.
3. Click the "Record Start" or the "Record Stop" radio button.
4. If you click "Send", recording starts or stops accordingly. If you click "Cancel", the setting is canceled.

Pen up/down

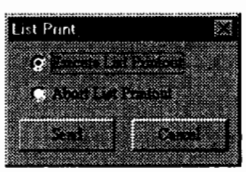
1. Select "Control(A)" then "Pen Lift(P)". The pen up/down dialog box appears.



2. Click the "Pen Up" or "Pen Down" radio button.
3. If you click "Send", the pens on the LR recorder lift or lower accordingly. If you click "Cancel", the setting is canceled.

Starting/stopping list printing

1. Select "Control(A)" then "List Printout(L)". The list print dialog box appears.



2. Click the "Execute List Printout" or "Abort List Printout" radio button.
3. If you click "Send", list printing starts or stops accordingly. If you click "Cancel", the setting is canceled.

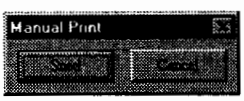
Message printout

1. Select "Control(A)" then "Message Printout(M)". The message print dialog box appears.

2. Click a radio button from "Message 0" to "Message 4".
3. If you click "Send", the selected message is printed out. If you click "Cancel", the setting is canceled.

Performing manual printing

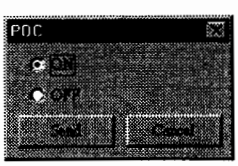
1. Select "Control(A)" then "Manual Printout(T)". The manual print dialog box appears.



2. If you click "Send", manual printing takes place. If you click "Cancel", the setting is canceled.

Turning pen offset compensation (POC) ON or OFF

1. Select "Control(A)" then "Pen Offset(S)". The POC dialog appears.



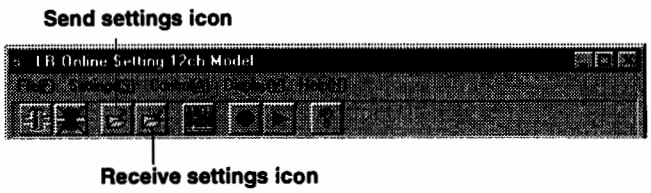
2. Click the "ON" or "OFF" radio button.
3. If you click "Send", pen offset compensation goes ON or OFF accordingly. If you click "Cancel", the setting is canceled.

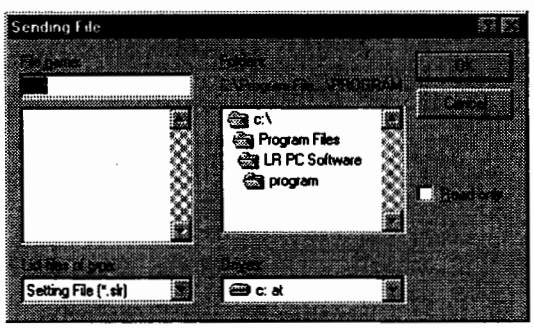
3.5 Changing the LR Recorder Settings/Saving the Data Set in the LR Recorder

You can save to the personal computer (PC) the settings in the LR recorder that is connected to the PC, or change the settings in the LR recorder using data stored in the PC.

Changing the settings in the LR recorder

1. Select "File(F)" then "Send Settings(S)", or click the send settings icon on the toolbar. The dialog box for selecting the setting file to be sent appears.





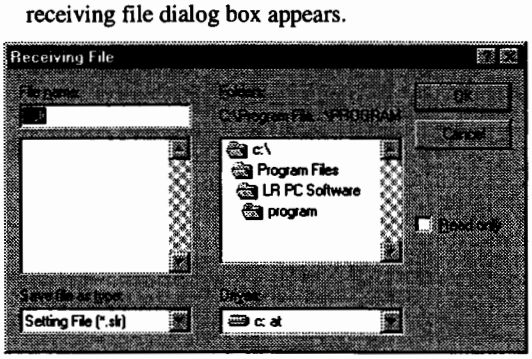
2. Enter the filename to be sent in the "File name" text box, or select a file from the file list.
3. Click "OK". The LR recorder is set according to the contents of the selected set data file.

Note

If you send an invalid setting to the LR recorder to be set, the message "There is an invalid setting" appears. In this case, a valid setting is sent.
Example:
If you send setting data for 8 channels to a 4-channel model LR recorder, the setting data for channels 1 to 4 will be sent, but the setting data for channels 5 to 8 will be invalid.

Saving the LR recorder settings in a personal computer

1. Select "File(F)" then "Receive Settings(R)", or click the receive settings icon on the toolbar. The receiving file dialog box appears.

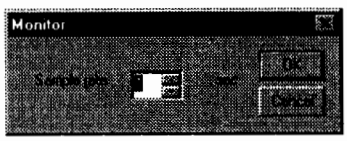


2. Enter the filename of the file to be saved in the "File name" text box.
3. Click "OK". The selected setting data file is saved in the PC.

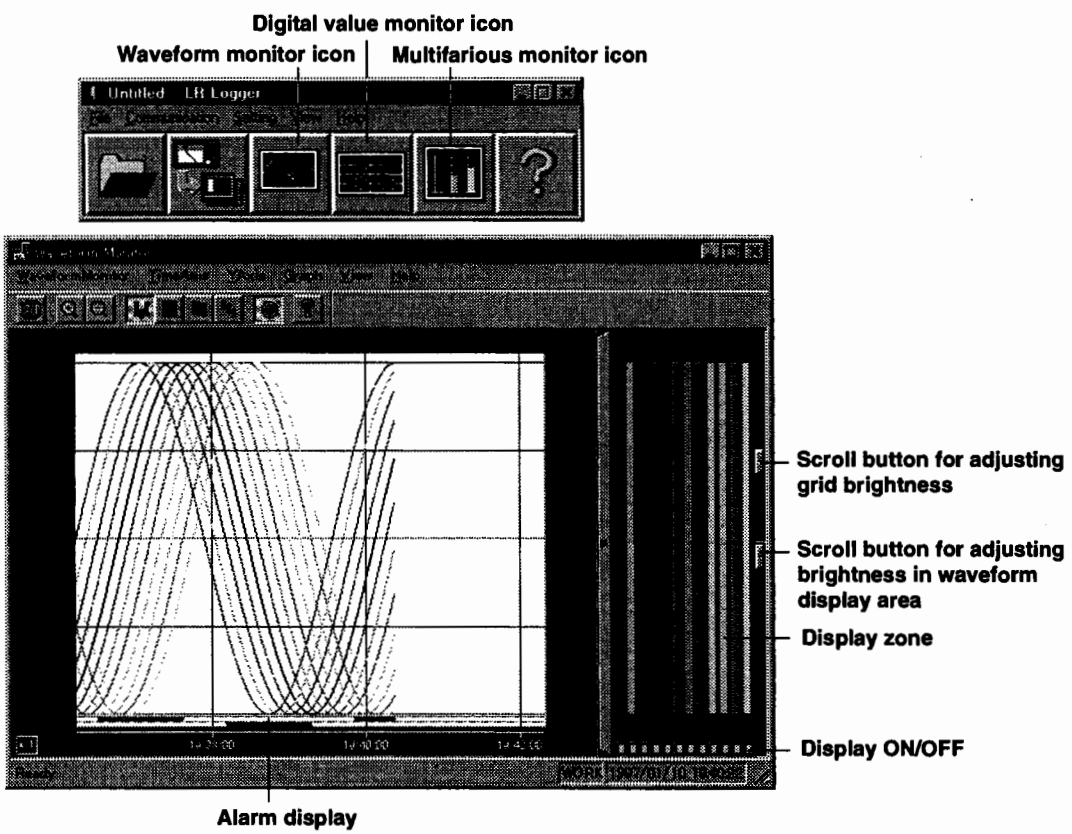
4.1 Monitoring a Waveform

You can monitor a waveform before acquiring measurement data. However, the data cannot be saved.

1. Select "Communication" then "Monitor...". The monitor dialog box for setting the interval (sample rate) at which data from the LR recorder is to be read appears.



2. Enter the interval at which data is to be acquired, to the sample interval text box, within the range between 1 and 60 seconds.
3. If you click the "OK" button, data logging starts.
4. Click "View" then an item in the "View" menu, or click one of the monitor icons. The measurement data is displayed using the selected monitor icon.



Note

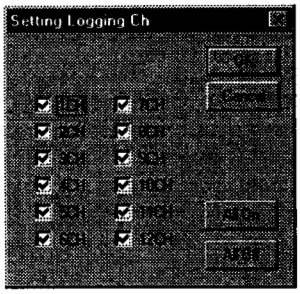
- Logging data may be lost depending upon the performance of the PC or other application software. In such a case, either exit the application software or reduce the data logging sampling rate. The lost data is not displayed.
- The time at which data is measured by data logging software is the date and time in the PC. Do not change the date and time in the personal computer while monitoring a waveform.
- Do not change settings related to the channels (measurement mode and range) or alarm settings from the LR recorder while monitoring a waveform.

4.2 Logging Data

Logging data in a single operation without dividing a file

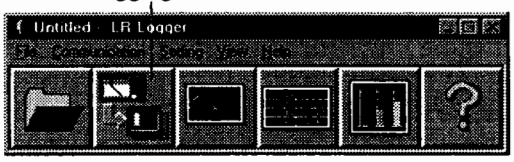
Setting the channel from which data is to be acquired

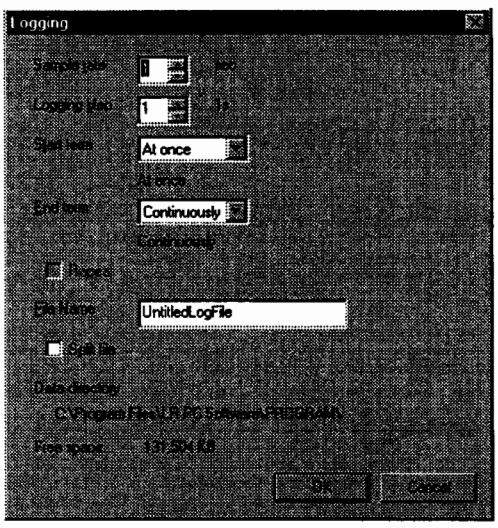
1. Select "Setting" then "Logging Ch...". The "Setting Logging Ch" dialog box appears.



2. Select "Communication" then "Logging...", or click the data logging icon. The logging dialog box appears.

Data logging icon





3. Enter the acquisition interval within the range between 1 and 60 seconds, in the text box for setting the interval (sample rate) at which data is to be acquired from the LR recorder.
4. Enter the step at which measurement data acquired at the interval set in 2. is to be saved in the memory device of the PC, in the logging step text block. The interval at which measurement data is stored in the memory of the PC is as follows.

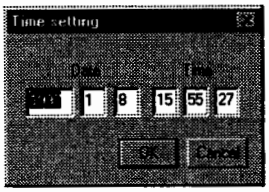
   Save interval = Interval during which measurement data from the LR recorder is acquired (sample rate) x logging step
5. Set the conditions under which data logging is to start, in the "Start term" list box.

   At once: Data logging starts when "OK" is clicked.
   Time setting: Data logging starts at a specified time. The date and time setting box appears.
   Level: Data logging takes place when the measurement data in the specified channel exceeds a certain level (High), or falls below a certain level (Low).
   Alarm: Data logging starts when an alarm in the specified channel is emitted, or when an alarm in the specified channel is not emitted.

   If the time setting, level or alarm is selected, a "Detail" button for setting the details of the selected item appears.

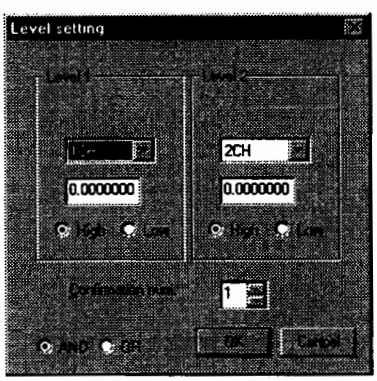
Setting time

6. If you click "Detail", the dialog box for setting the date and time at which logging is to start appears. Enter the necessary date and time.



Level

6. If you click "Detail", the level setting dialog box appears.
   Set the following items.
   - Intended channels and levels
     If you set a channel to "NONE", the level for that channel will be invalid.
   - High/Low with respect to the set level
     High: Effective when the level exceeds the set level
     Low: Effective when the level is less than the set level
   - Confirmation num
     Effective if the specified number of data items is continuously High or Low.
   - AND/OR
     AND: Data logging starts when both level 1 and level 2 are effective.
     OR: Data logging starts when either level 1 or level 2 is effective.

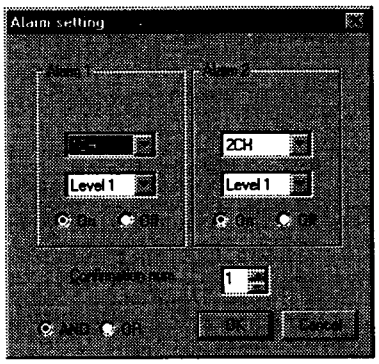


Note

If you set a channel of the LR recorder whose measurement mode is OFF, an error will occur when communication is carried out with respect to the LR recorder.

Alarm

6. If you click "Detail", the alarm setting dialog box appears. Set the following items.
   - Intended channels and alarms
     If you set a channel to "NONE", the alarm for that channel will be invalid.
   - On/Off
     On: Effective when an alarm occurs
     Off: Effective when an alarm does not occur
   - Confirmation num
     Effective when an alarm occurs continuously for the specified number of data items
   - AND/OR
     AND: Data logging starts when both alarm 1 and alarm 2 are effective.
     OR: Data logging starts when either alarm 1 or alarm 2 is effective.

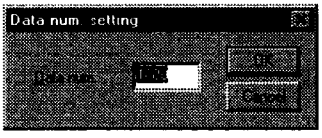


Note

- If you set a channel of the LR recorder whose measurement mode is OFF, an error will occur when communication is carried out with respect to the LR recorder.
- If an alarm is not set in the LR recorder, the software judges that the alarm is OFF.

6. Set the conditions for ending data logging, in the end condition list box.
   - Continuous: Measurement data is acquired until communication with the LR recorder is interrupted.
   - Time setting: Data logging ends after the specified time.
   - Level: Data logging ends when measurement data in the specified channel exceeds a certain level (High), or falls below a certain level (Low).
   - Alarm: Data logging ends when an alarm occurs in the specified channel.
   - Data num.: Data logging takes place for exactly the set number of data items, then ends.

   The time, level and alarm settings are the same as the start term. If you select "Data num.", the dialog box for setting the number of data items appears, so enter the number of data items.



7. Enter the filename of the file in which the measurement data to be acquired, in the filename text box.
   The extension is fixed at ".L00".
8. Confirm that neither "Repeat" nor "Split file" check box indicates a check mark, then click "OK". The data logging information window appears.

If the "Start term" indicates "At once", logging of the measurement data starts. If it is other than "At once", logging measurement data is not carried out until a logging condition is fulfilled.

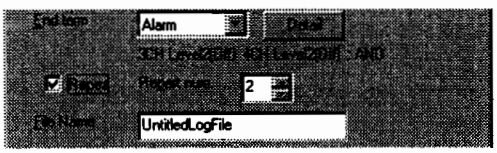
Note

- Logging data may be lost depending upon the performance of the PC or other application software. In such a case, either exit the application software or reduce the data logging sampling rate. The lost data is not displayed.
- The time at which data is measured by data logging software is the date and time in the personal computer. Do not change the date and time in the personal computer while logging data.
- Do not change the settings related to the channels (measurement mode and range), or the alarm settings from the LR recorder while logging data.

Repetitive data logging

You can log data repetitively if the start term is set to level or alarm, and the end condition is set to level, alarm or number of data items.

1. To set the sample rate, logging step, start term, end term and filename, refer to "Logging data in a single operation without dividing a file" on page 4-2.
   Set the start term to level or alarm, and the end term to level, alarm or number of data items.
2. Click the "Repeat" check button to indicate the check mark. A text box for setting the number of data logging operations appears.



3. Set the number of data logging operations.
4. Click "OK". Data logging starts when the data logging start term is fulfilled. Data logging ends when the data logging end term is fulfilled, then the system waits for the data logging start condition to appear again.

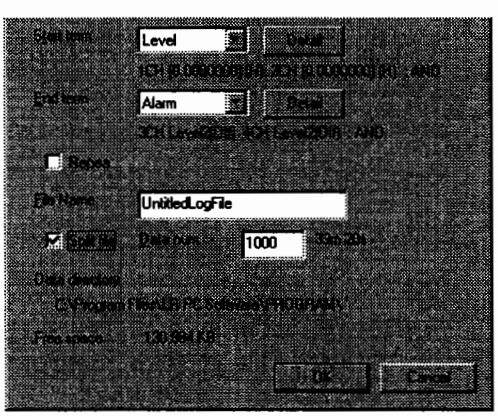
Note

The extension increases progressively from ".L01" each time data logging takes place. The filename does not change.

Acquiring data by dividing a file

You can perform data logging by dividing a file into a fixed number of data items.

1. To set the sample rate, logging step, start term, end term and filename, refer to "Logging data in a single operation without dividing a file" on page 4-2.
2. Click the file division check button to display the check mark. The text box for setting the number of data items into which the file is to be divided appears.



3. Enter the number of data items. The file is split for each set number of data items.
4. Click "OK". Data logging starts when the data logging start term is fulfilled. When the set number of data items have been acquired, the file is split, logging data under a different file extension.

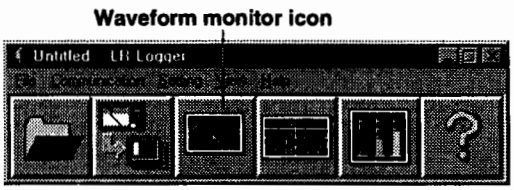
Note

The extension increases progressively from ".L01" each time data logging takes place. The filename does not change.

4.3 Displaying a Waveform

Displaying a waveform

1. Select "View" then "Waveform monitor", or click the waveform monitor icon on the toolbar.

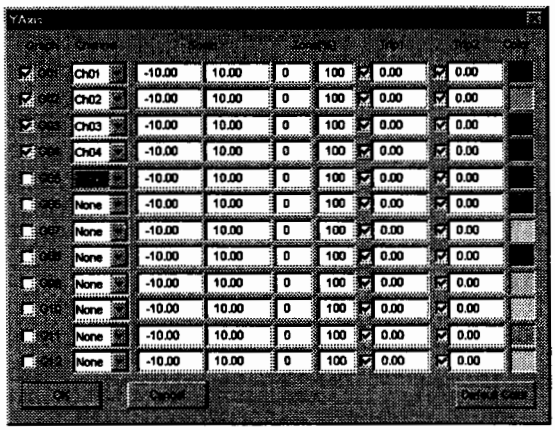


Making detailed settings for a waveform display

You can change the settings of the following items when a waveform appears.

- **Waveform monitor On/Off**
  Sets the waveform monitor to On or Off.
- **Displaying channel No./tag/tag ID**
  Selects which of the items channel No., tag No. and tag ID to display.
- **Scale**
  Sets the display range for displaying measurement data at a scale that is suitable for the particular application.
- **Zone**
  Sets the display position in a waveform display area (zone). When displaying multiple waveforms, you can set this item so that the waveforms do not overlap each other.
- **Trip point**
  Sets the position of the horizontal line used to highlight a specific value on a waveform display area, and also sets the display to On or Off.
- **Display color**
  Sets the color in which a waveform is to appear.
- **Alarm display On/Off**
  Sets the alarm display to ON or OFF.

1. Select "Graph" then "Detail".



Note

The number of channels differs depending upon the specifications of the LR recorder.

Setting the waveform display to On or Off.

2. To set the waveform display to On or Off, either click the check box for each channel, or click the button for each channel at bottom left of the waveform display area.

Setting the scale

3. Set a scale value for each channel. The box on the left is the minimum value, and the box on the right is the maximum value.

Note

The input range is between -999999 and 999999 with the exception of the decimal point.

Setting a zone

4. Set a zone for each channel as a percentage of the waveform display area width. The box on the left is the minimum value, and the box on the right is the maximum value.

Note

- The input range of the minimum value of the zone is between 0 and 99%, and the input range of the maximum value is between 1 and 100%.
- The lower end of the waveform display area is 0%, and the upper end is 100%.

Displaying trip point 1/trip point 2

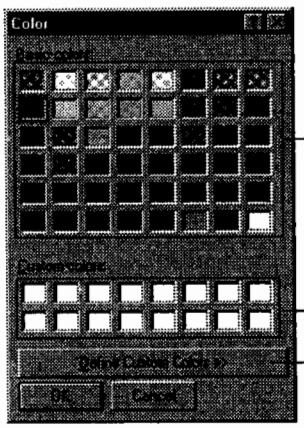
5. Click the "Trip 1" or "Trip 2" check box for each channel.
6. Enter the trip point 1 or trip point 2 display position to the "Trip 1" or "Trip 2" box, for each channel.

Note

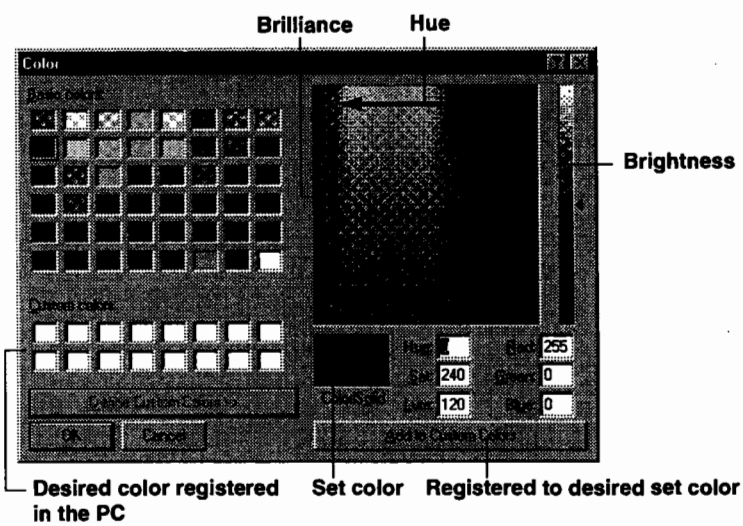
- You can set trip points within the range of the scale values set for each channel.
- Trip point 1 is displayed in red, and trip point 2 in blue.
- The trip points actually displayed in the waveform display area are the trip points for the active waveform.
- When the waveform display update has been stopped, you can change the display position of the trip points by dragging the trip point displayed on the left side of the waveform display area with the mouse.

Setting the waveform color

7. Click the "Color" button of each channel.



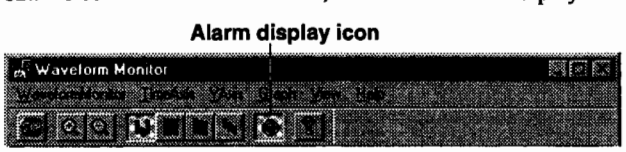
8. Set the desired color.
9. To set a desired color, click "Define Custom Colors >>". The dialog box for setting a desired color appears. Set a desired color. The set color is recorded as an arbitrary color then set in each channel.



10.. Click "OK".
11.. Click "OK" in the detailed setting dialog box.
The waveform and trip point appear under the set conditions.

Setting the alarm to On or Off

12.. Select "View" then "Alarm", or click the alarm display icon on the toolbar.



Note

An alarm that occurs in the LR recorder (max 2 alarm points per channel) appears at the bottom end of the waveform display area in the same color as the waveform in each channel. The alarm for the active waveform appears.

Selecting channel No./Tag/Tag ID

13. Click "View", then click one of "Channel", "Tag" and "Tag ID". The selected item appears on the data display window.

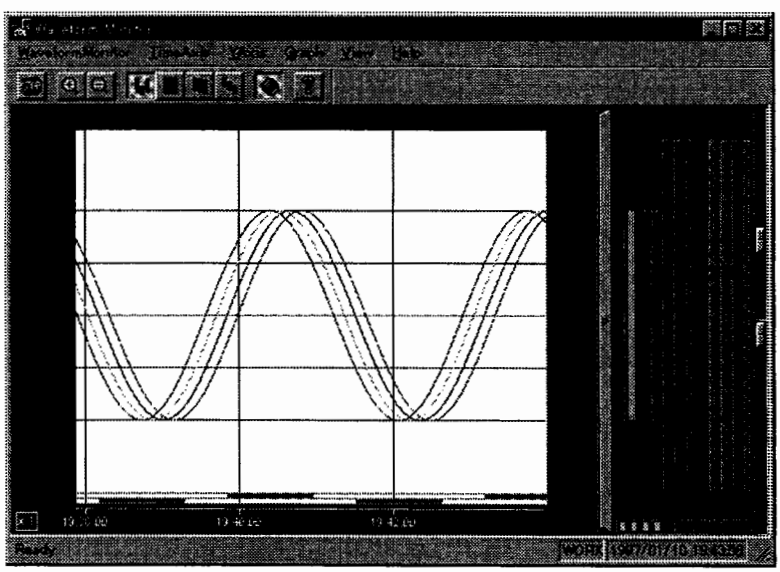
Selecting the type of waveform display zone

If you perform the following operations while a waveform appears, you can select one of the following types of waveform display zone. If you wish to display multiple waveforms, select the type of waveform display zone that matches the particular application.

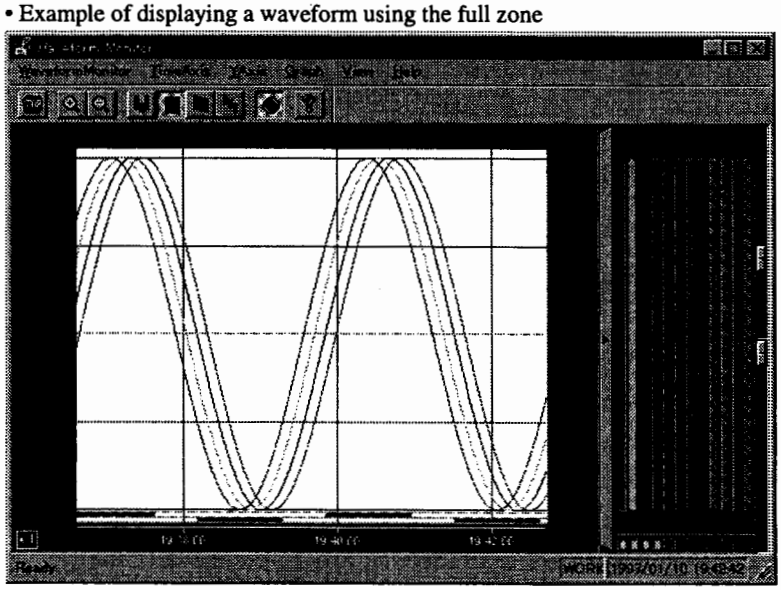
- User zone: A waveform appears according to the display position of the zone set in the "Y Axis" window.
- Full zone: The entire waveform appears in the full zone.
- Slide zone: The waveforms appear progressively offset from top to bottom of the waveform display area.
- Auto zone: The waveform display area is divided into equal parts according to the number of waveforms displayed.

- When displaying a waveform using a user zone: Select "YAxis" then "User Zone", or click the user zone icon on the toolbar.
- When displaying a waveform using the full zone: Select "YAxis" then "Full Zone", or click the full zone icon on the toolbar.
- When displaying a waveform using a slide zone: Select "YAxis" then "Slide Zone", or click the slide zone icon on the toolbar.
- When displaying a waveform using an auto zone: Select "YAxis" then "Auto Zone", or click the auto zone icon on the toolbar.

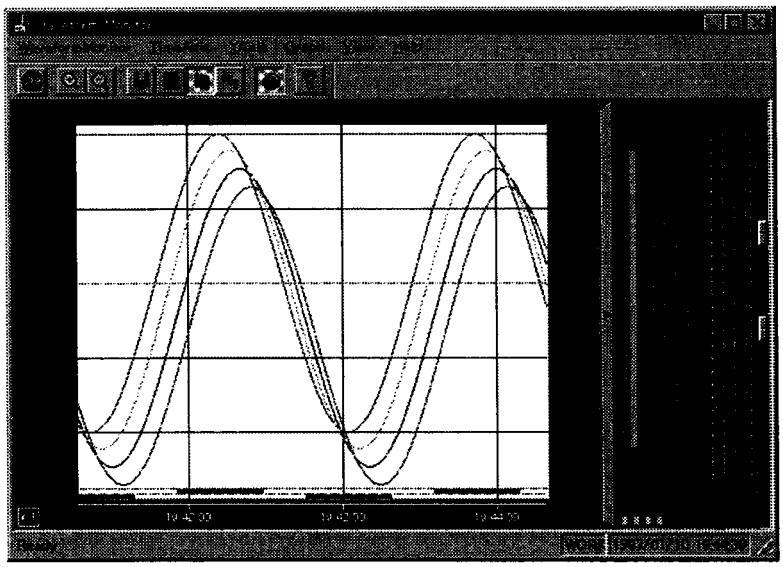
• Example of displaying a waveform using a user zone (when Zone is between 20% and 80%)



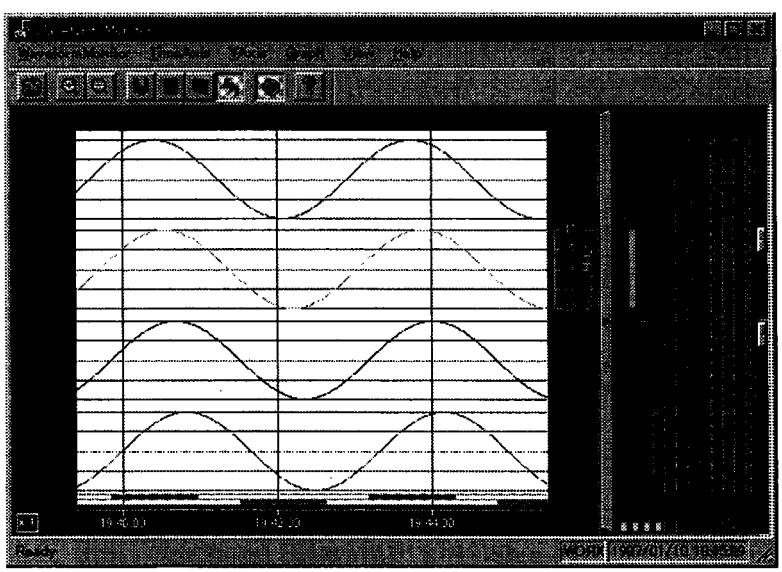
• Example of displaying a waveform using the full zone



• Example of displaying a waveform using a slide zone



• Example of displaying a waveform using an auto zone (when there are six displayed waveforms)

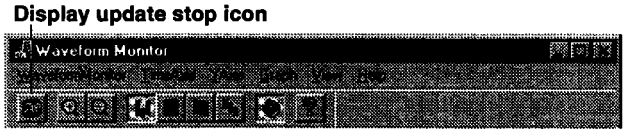


Stopping display update

You can stop displaying a waveform while continuing to log data.

1. Select "Monitor..." then "Stop" for waveform, digital and multifarious monitors, or click the display update stop icon on the toolbar.

Display update stop icon



Stopping data logging

1. Select "Communication" then "Hung up". A confirmation dialog box appears. Click "OK" to stop data logging.

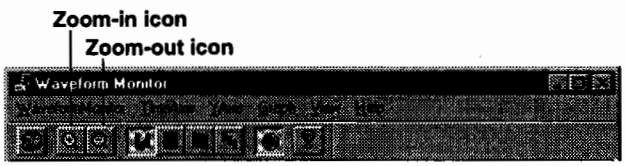
4.4 Changing the Time Axis Scale when Displaying a Waveform

You can change the settings of the following items when a waveform appears.

- **Enlarging/reducing a waveform by setting an arbitrary magnification**
  You can enlarge/reduce a waveform by setting an arbitrary magnification.
- **Enlarging/reducing a waveform by setting an arbitrary magnification.**
  You can enlarge/reduce a waveform in the time axis direction by setting an arbitrary magnification.
- **Enlarging/reducing a waveform in a simple manner**
  You can enlarge/reduce a waveform in a simple manner.

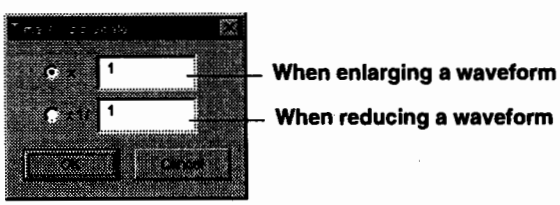
Enlarging/reducing a waveform in a simple manner

To enlarge a waveform, select "TimeAxis" then "Zoom In", or click the zoom-in icon on the toolbar. To reduce a waveform, select "TimeAxis" then "Zoom Out", or click the zoom-out icon on the toolbar. The waveform appears enlarged/reduced in the time axis direction.



Enlarging/reducing a waveform by setting an arbitrary magnification

1. Select "TimeAxis" then "Set Scale".



2. To enlarge a waveform, enter the magnification in the upper box and click the upper radio button. To reduce a waveform, enter the reduction in the lower box and click the lower radio button.
3. Click "OK". The waveform is enlarged/reduced in the time axis direction.

Note

- Setting range for magnification of a waveform: Between 1 and 20 (integer)
- Setting range for reduction of a waveform: Between 1/1 and 1/1000 (The denominator is an integer)
  Note that the maximum reduction ratio differs depending upon the size of the waveform display area.
  Maximum reduction = 1/(2000/Number of lines in the display area*)

Waveform enlargement/reduction magnification

You can enlarge/reduce a waveform in the time axis direction by changing the number of data items** for each line* in the time axis direction. The relation between the magnification and the number of data items per line in the time axis direction is as follows.

Magnification	Relation between lines and number of data items	Magnification	Relation between lines and number of data items
1/1000	1000 data items per line	1	1 data item per line
1/500	500 data items per line	2	1 data item per 2 lines
1/200	200 data items per line	5	1 data item per 5 lines
1/100	100 data items per line	10	1 data item per 10 lines
1/50	50 data items per line	20	1 data item per 20 lines
1/20	20 data items per line		
1/10	10 data items per line		
1/5	5 data items per line		
1/2	2 data items per line		

* One line: One vertical line on the window

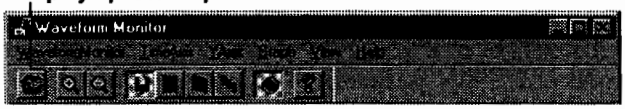
** One data item: In the case of a display data file, this is one set of data consisting of the maximum and the minimum values.

Reading a measurement value using a cursor

You can read measurement data at a specified position with a cursor after stopping waveform display updating.

1. Check "WaveformMonitor" then "Stop (A)", or click the waveform stop icon on the toolbar. Updating of the waveform display stops.

Display update stop icon



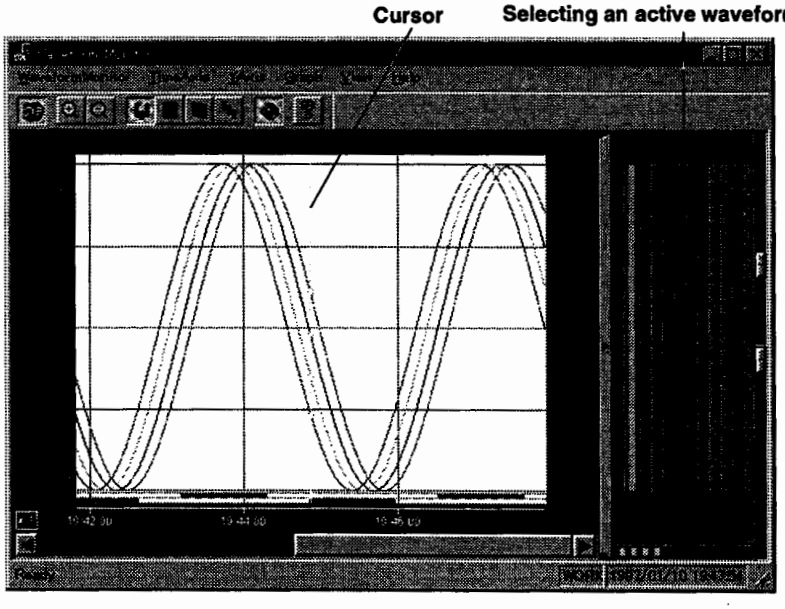
2. Check "Display (D)" then "Cursor (R)". The cursor's value dialog box and a cursor appear. The cursor is moved by dragging it.

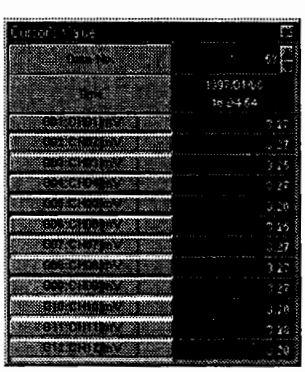
Note

To erase the cursor from the waveform display area, select "Display (D)" then "Cursor (R)" so that the check mark disappears.

Example of cursor display

Cursor **Selecting an active waveform**



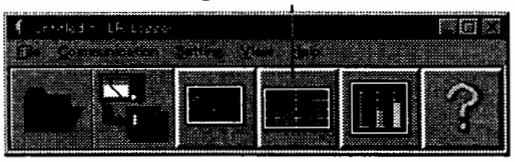


4.5 Displaying Digital Values/Displaying a Bar Graph and a Meter

Digital monitor

Select "View" then "Digital Monitor", or click the digital monitor icon on the toolbar.

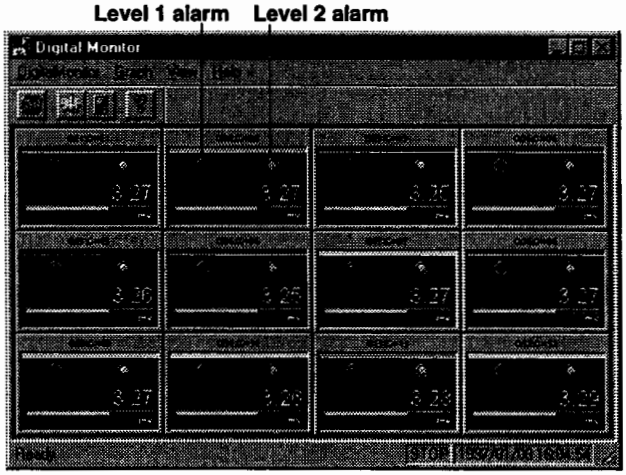
Digital value monitor icon



The digital monitor window that is different from the waveform display opens, and the measurement data appears as digital values.

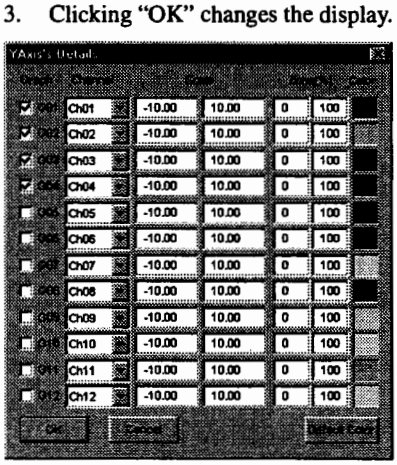
• Example of digital value display

Level 1 alarm **Level 2 alarm**



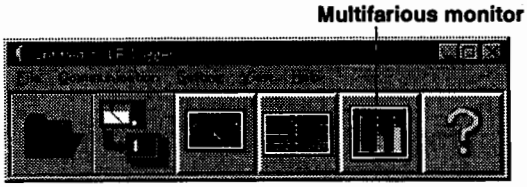
Selecting a graph to display

1. Select "View" then "Graph (P)" on the digital monitor window. The dialog box to set graphs to ON/OFF appears.
2. Check the check box of the graph No. corresponding to the graph to appear.
3. Clicking "OK" changes the display.

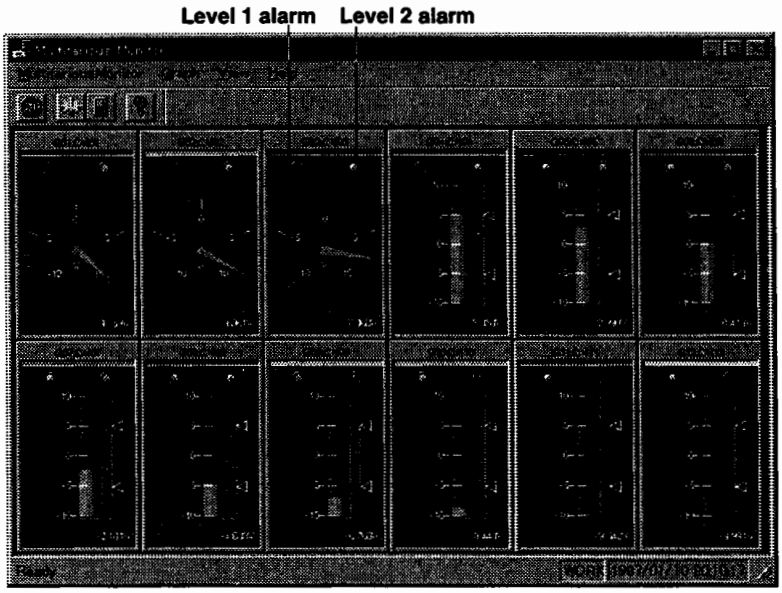


Multifarious monitor

Select "View" then "MultiMonitor", or click the multifarious monitor icon on the toolbar.

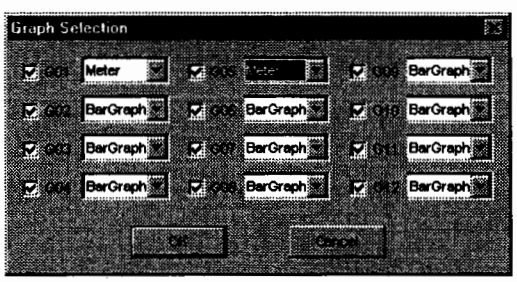


• Example of multifarious monitor



Selecting a graph to appear/Selecting a bar graph and a meter

1. Select "View" then "Graph (P)" on the multifarious monitor window. The dialog box to set graphs to ON/OFF and the kind of graph appears.



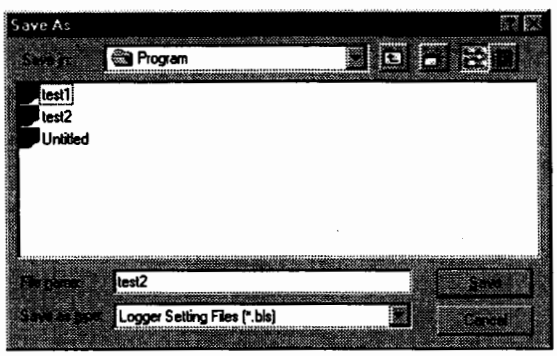
2. Check the check box of the graph No. corresponding to the graph to appear.
   To select the kind of graph, click the graph list box, then select either a bar graph or meter.
3. Clicking "OK" changes the display.

4.6 Saving/Reading the Display Conditions

You can save data logging conditions or the status of the currently displayed window as a display condition file, or use a previously saved display condition file to log data or display a waveform under the same conditions.

Saving display conditions

1. Select "File" then "Save", or "File" then "Save As...", from the display window to be saved. If you select "Save", the original file is overwritten. If you select "Save As...", the dialog box for setting a filename appears.

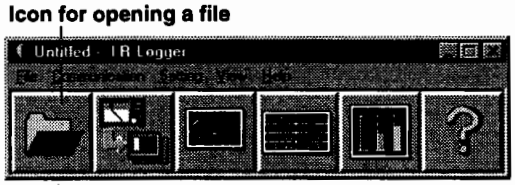


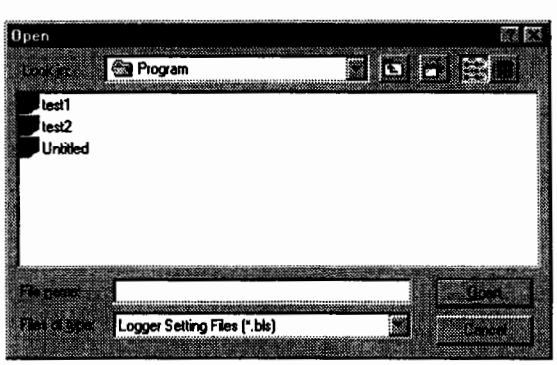
2. Enter the filename under which the display conditions are to be saved, then click "OK". If there is already a file having the same filename, a message for verifying overwrite appears. If you click "OK", overwrite takes place.

Reading a display condition file

1. Select "File" then "Open", or click the icon for opening a file on the toolbar. The dialog box for selecting a file appears. To newly create a set data file, select "File" then "New".

Icon for opening a file





Enter the filename of the file to be read to the text box, or select it from the filename list. If you press the "OK" button, the display condition file is read.

Note

- When this software is started, the previous display conditions are activated.
- When you hang up communication between the LR recorder and the computer, the dialog box for verifying whether or not you wish to save the display conditions appears.

5.1 Opening a File

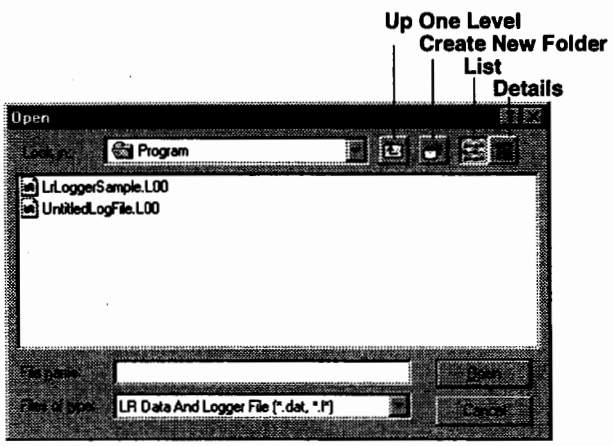
Opening a file

After starting this software, you can read measurement data and display waveforms.

1. Select "File" then "Open...", or click the file open icon on the toolbar.

File open icon

2. Using the "Filename" list box, select the filename of the file to appear.
   Select a file whose extension is ".L**" or ".dat". If necessary, select the folder (location of file) and the kind of file containing the file(s) to be used.



3. Clicking "Open" displays the waveform.

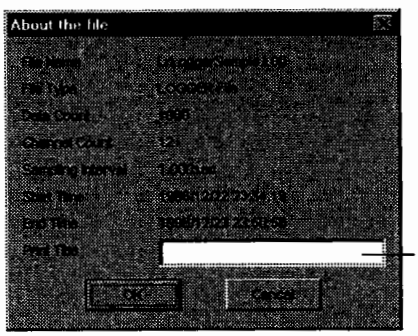
Note

- The number of data files that you can open at the same time depends upon the memory size of the PC and the vacant capacity of the floppy disk.
- It is efficient to copy a data file from a floppy disk to the hard disk before using it.

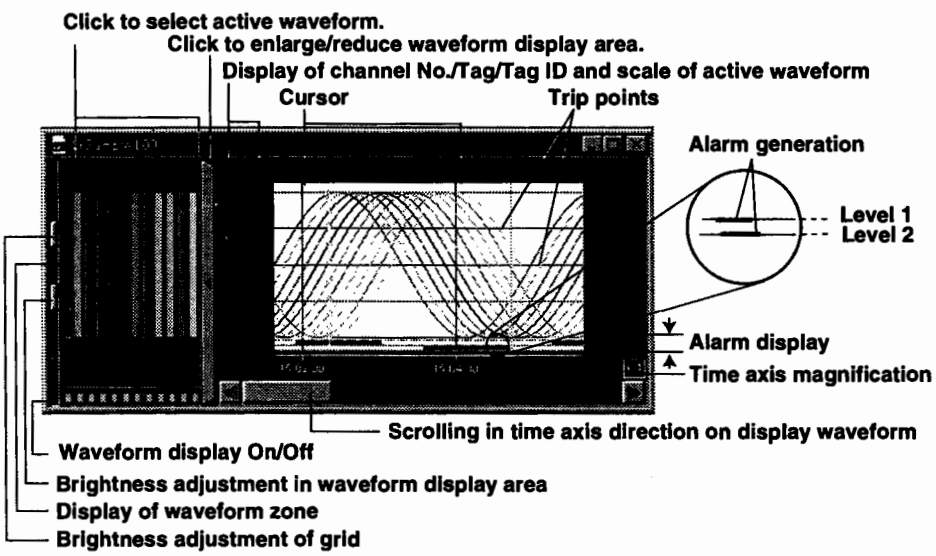
• **Viewing "About the file"**

You can view file information concerning a waveform when the waveform appears.

Select "Information" then "About the file...". The following information appears.



Example of waveform display



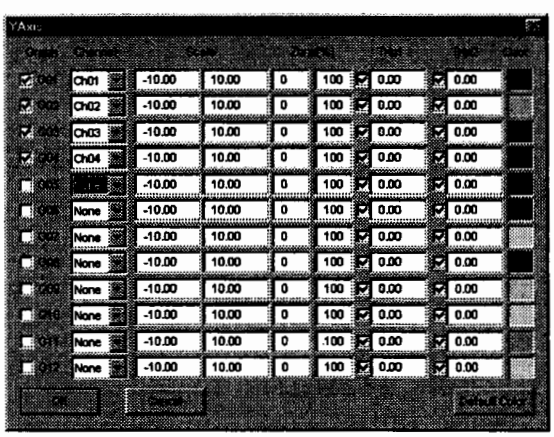
5.2 Changing the Waveform Display Conditions

Performing fine settings for a waveform display

You can change the setting of the following items by performing the following procedure when a waveform appears.

- **Waveform display On/Off**
  Sets the waveform display to On or Off.
- **Channel assignment**
  Assigns a graph No. to each channel to appear. You can also assign the same channel to multiple graph numbers.
- **Scale**
  Sets the display range in order to display measurement data at a scale which matches the particular application.
- **Zone**
  Sets the display position in a waveform display area (zone). When displaying multiple waveforms, you can set this item so that the waveforms do not overlap each other.
- **Trip point**
  Sets the position of the horizontal line used to highlight a specific value on a waveform display, and also sets the display to On or Off.
- **Display color**
  Sets the color in which a waveform is to appear.
- **Alarm display On/Off**
  Sets the alarm display to ON or OFF.
- **Channel No./Tag/Tag ID display select**
  Selects which of channel No., tag and Tag ID to display on the window. You can set the tag and tag ID using the tag setting software.

1. Select "YAxis" then "Details...".

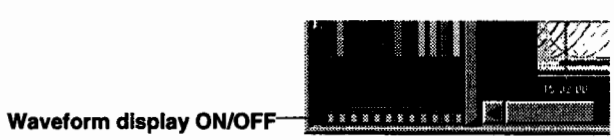


Note

The displayed channel numbers differ depending upon the model of the LR recorder that you are using.

Turning the waveform display On/Off

2. To turn the waveform display On or Off, click the check box for each graph No., or click the buttons for each graph No. at bottom left of the waveform display area.



Setting the scale

3. Set a scale value for each channel. The box on the left is the minimum value, and the box on the right is the maximum value.

Note

The input range is between -999999 and 999999 with the exception of the decimal point.

Setting a zone

4. Set a zone for each channel as a percentage of the waveform display area width. The box on the left is the minimum value, and the box on the right is the maximum value.

Note

- The input range of the minimum value of the zone is between 0 and 99%, and the input range of the maximum value is between 1 and 100%.
- The lower end of the waveform display area is 0%, and the upper end is 100%.

Displaying trip point 1/trip point 2

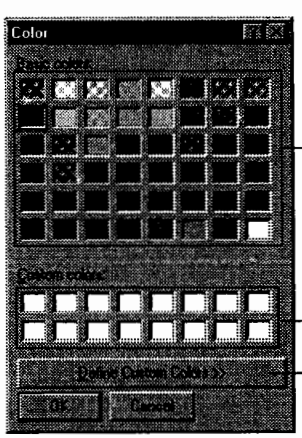
5. Click the "Trip 1" or "Trip 2" check box for each channel.
6. Enter the trip point 1 or trip point 2 display position to the "Trip 1" or "Trip 2" box, for each channel.

Note

- You can set trip points within the range of the scale values set for each channel.
- Trip point 1 is displayed in red, and trip point 2 in blue.
- The trip points actually displayed in the waveform display area are the trip points for the active waveform.
- You can change the display position of the trip points by dragging the trip point displayed on the right side of the waveform display area with the mouse.

Setting the waveform color

7. Click the "Color" button of each channel.

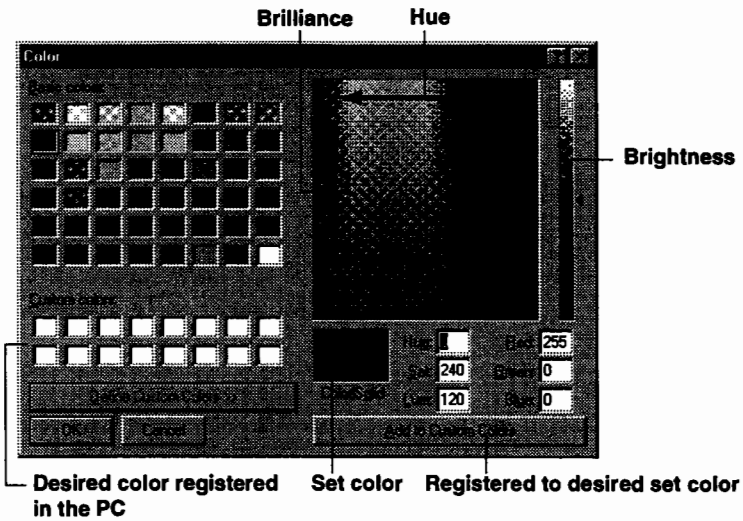


Click the color that you wish to set (specified color).

Click the color that you wish to set (desired set color).

Display the window that you wish to set to a desired color.

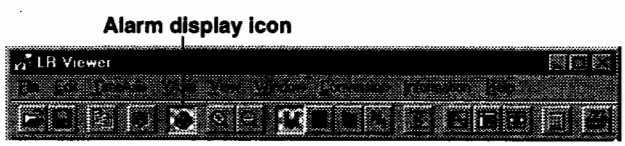
8. Set the desired color.
9. To set a desired color, click "Define Custom Colors >>". The dialog box for setting a desired color appears. Set a desired color.



9. After setting the color of the waveform, click "OK".
10. Click "OK" in the "YAxis" dialog box.
    The waveform and trip points appear under the set conditions.

Setting the alarm to On or Off

11. Select "View then "Alarm", or click the alarm display icon on the toolbar.

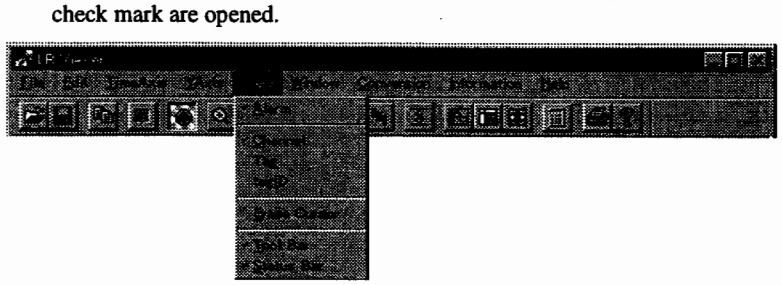


Note

An alarm that occurs in the LR recorder (max 2 alarm points per channel) appears at the bottom end of the waveform display area in the same color as the waveform in each channel. You cannot display an alarm when displaying a file that has the extension ".dat".

Selecting channel No./Tag/Tag No.

1. Click "View", then click one of "Channel", "Tag" and "Tag ID". Items that are indicated by a check mark are opened.



Selecting the type of waveform display zone

You can select one of the following types of waveform display zone while a waveform appears. If you wish to display multiple waveforms, select the type of waveform display zone that matches the particular application.

- User zone: A waveform appears according to the display position of the zone set by the Y-axis detailed setting.
- Full zone: The entire waveform appears in the full zone.
- Slide zone: The waveforms appear progressively offset from top to bottom of the waveform display area.
- Auto zone: The waveform display area is divided into equal parts according to the number of waveforms displayed.

• When displaying a waveform using a user zone

1. Point to "YAxis" then "Zone", and either select "User Zone", or click the user zone icon on the toolbar.

• When displaying a waveform using the full zone

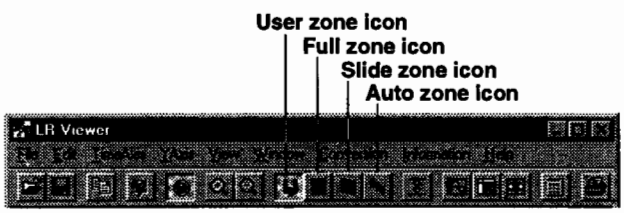
1. Point to "YAxis" then "Zone", and either select "Full Zone", or click the full zone icon on the toolbar.

• When displaying a waveform using a slide zone

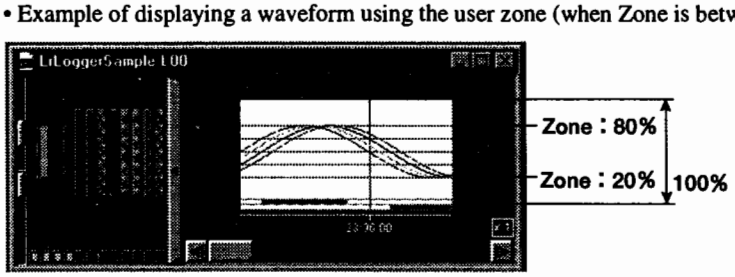
1. Point to "YAxis" then "Zone", and either select "Slide Zone", or click the slide zone icon on the toolbar.

• When displaying a waveform using an auto zone

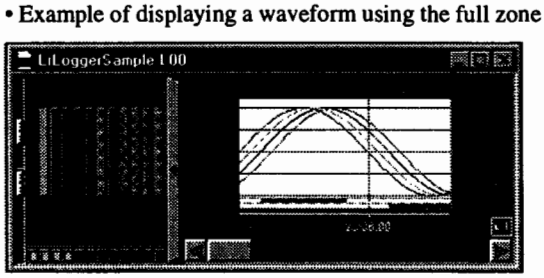
1. Point to "YAxis" then "Zone", and either select "Auto Zone", or click the auto zone icon on the toolbar.



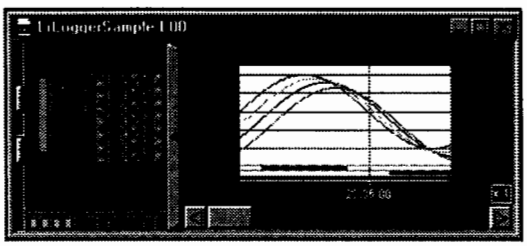
• Example of displaying a waveform using the user zone (when Zone is between 20% and 80%)



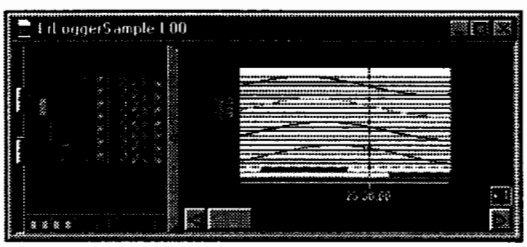
• Example of displaying a waveform using the full zone



• Example of displaying a waveform using the slide zone



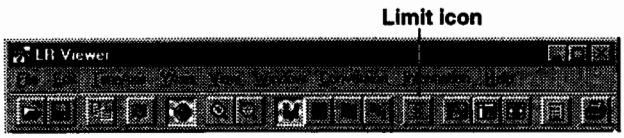
• Example of displaying a waveform using the auto zone



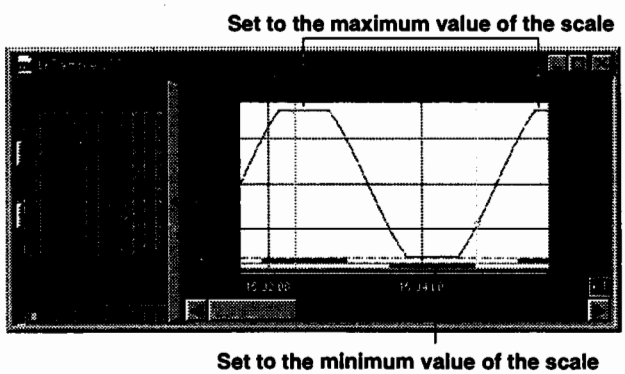
Applying a display limit to a displayed waveform

You can apply a display limit to a waveform while it appears. The display range in the Y-axis direction of the waveform is limited from the minimum value to the maximum value of the scale set using the "YAxis" window. Measurement values that are smaller than the minimum value are truncated at the minimum value on the scale, and measurement values that are larger than the maximum value are truncated at the maximum value on the scale.

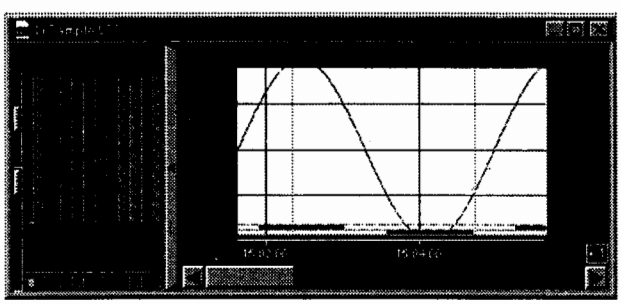
Select "YAxis" then "Limiter", or click on the limit icon on the toolbar.



• Example of applying a display limit to a displayed waveform



• Example of not applying a display limit to a displayed waveform



5.3 Changing the Time Axis Scale when Displaying a Waveform

You can change the settings of the following items when a waveform appears.

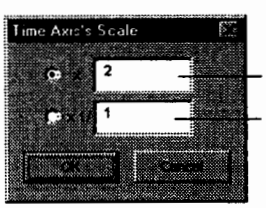
- **Displaying the entire waveform**
  You can display the entire waveform enlarged or reduced in the time axis direction.
- **Enlarging/reducing a waveform at an arbitrary magnification**
  You can enlarge/reduce a waveform in the time axis direction at an arbitrary magnification.
- **Enlarging/reducing a waveform in a simple manner**
  You can enlarge/reduce a waveform in a simple manner.

Displaying an entire waveform

If you select "TimeAxis" then "Display All", the entire waveform appears.

Enlarging/reducing a waveform by setting an arbitrary magnification

1. Select "TimeAxis" then "Set Scale".



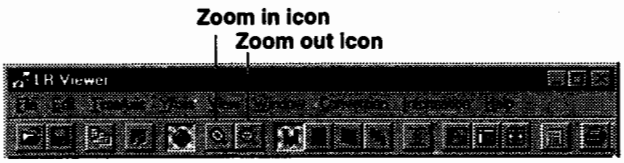
2. To enlarge a waveform, enter the magnification in the upper box and click the upper radio button. To reduce a waveform, enter the reduction in the lower box and click the lower radio button.
3. Click "OK". The waveform is enlarged/reduced in the time axis direction.

Note

- Setting range for magnification of a waveform: Between 1 and 20 (integer)
- Setting range for reduction of a waveform: Between 1/1 and 1/1000 (The denominator is an integer)

Enlarging/reducing a waveform in a simple manner

To enlarge a waveform, select "TimeAxis" then "Zoom In", or click the zoom-in icon on the toolbar. To reduce a waveform, select "TimeAxis" then "Zoom Out", or click the zoom-out icon on the toolbar.
The waveform appears enlarged/reduced in the time axis direction.



Waveform enlargement/reduction magnification

You can enlarge/reduce a waveform in the time axis direction by changing the number of data items** for each line* in the time axis direction. The relation between the magnification and the number of data items per line in the time axis direction is as follows.

Magnification	Relation between lines and number of data items
1/1000	1000 data items per line
1/500	500 data items per line
1/200	200 data items per line
1/100	100 data items per line
1/50	50 data items per line
1/20	20 data items per line
1/10	10 data items per line
1/5	5 data items per line
1/2	2 data items per line
1	1 data item per line
2	1 data item per 2 lines
5	1 data item per 5 lines
10	1 data item per 10 lines
20	1 data item per 20 lines

* One line: One vertical line on the window

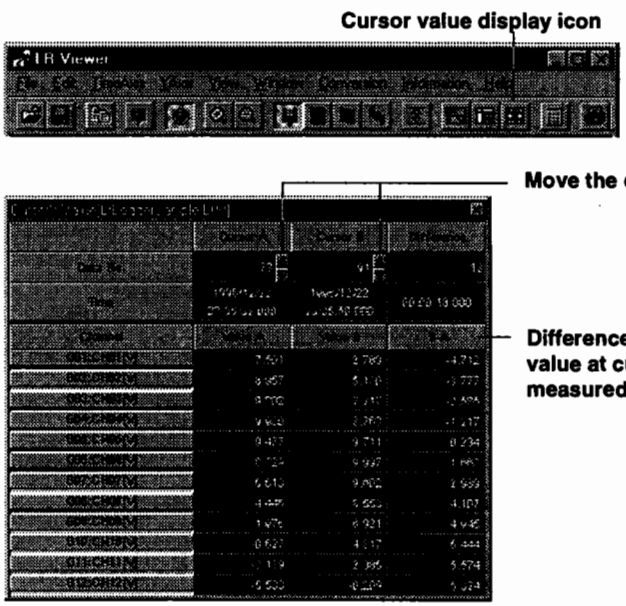
** One data item: In the case of a display data file, this is one set of data consisting of the maximum and the minimum values.

5.4 Reading Measurement Values Using Cursors

Reading measurement values using cursors

When a waveform appears, you can read measurement data at a specified position using cursors. There are two cursors: cursor A and cursor B. You can display respective measurement data at cursor A and cursor B, and also the difference between the measurement values at cursor A and cursor B.

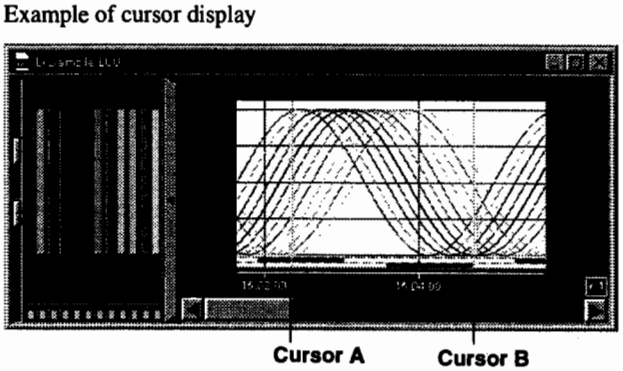
1. Place the mouse pointer at the position in the waveform display area where the measurement data is to be read, then drag it to the position where the next item of measurement data is to be read. The point where you first clicked the mouse pointer is the cursor A point, and the point to which you dragged the pointer is the cursor B point.
2. Select "Window" then "Display Cursor's Value", or click the cursor value display icon on the toolbar. Open the cursor's value dialog box, and display the measurement data and time and measurement value for the positions specified by the cursors. If you wish to perform fine adjustment of the position of a cursor, click the arrow button for the data No. in the cursor value dialog box. The cursor moves in steps of one data item.



Note

- It is efficient to use "Edit" then "Select All" when selecting measurement start data and measurement end data.
- To erase the cursor from the waveform display area, select "View" then "Erase Cursor".

Example of cursor display

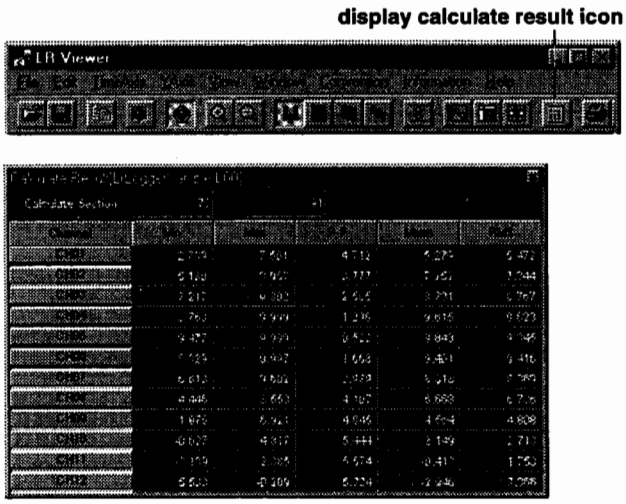


Displaying the results of performing section statistical calculations

You can perform section statistical calculations on the data between cursor A and cursor B, and display the results. There are five calculation items. These are as follows.

Maximum value
Minimum value
Peak-to-peak (P-P) value
Average value
Root-mean-square (RMS) value

1. Select "Window" then "Display Calculate Result", or click the display calculate result icon on the toolbar. The results of section statistical calculations appear.



Note

If you wish to change the calculation range to change the calculation condition, repeat step 1.

Adding a user defined mark/Deleting a mark/Initializing a mark display

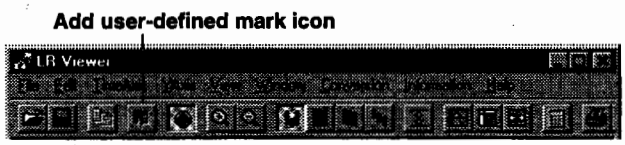
You can add a mark to an arbitrary point along the time axis when a waveform appears (adding a user defined mark). You can also delete a mark (trigger mark or user defined mark) displayed at the top of the waveform display area (deleting a mark). In addition, you can also return the mark display status (initializing the mark display) to the status that it was in when it was saved in the LR recorder (displaying a trigger mark only).

There are two kinds of marks

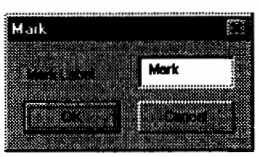
- Trigger mark: Indicates the trigger point measured by the LR recorder.
- User defined mark: This is the mark added by the user with this software.

Adding an arbitrary mark

1. Place the mouse pointer at the position where you wish to add a user defined mark in the waveform display area.
   A cursor is indicated.
2. Select "Edit" then "Add Mark...", or click the add mark icon on the toolbar.



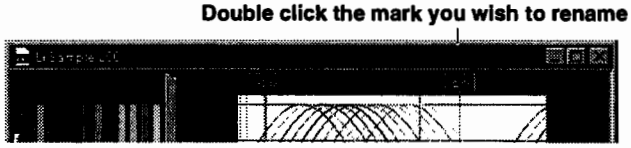
3. Enter the name of the user defined mark in the text box.



4. Click "OK".
   The name of the user defined mark appears at the cursor display position in the waveform display area. You can display as many user defined marks as you like by repeating steps 1 to 4 above.

Note

- If the positions of cursor A and cursor B do not coincide with each other, you cannot add a user defined mark.
- To change the name of a mark, double-click the mark to be changed, then carry out the above procedure from step 3.



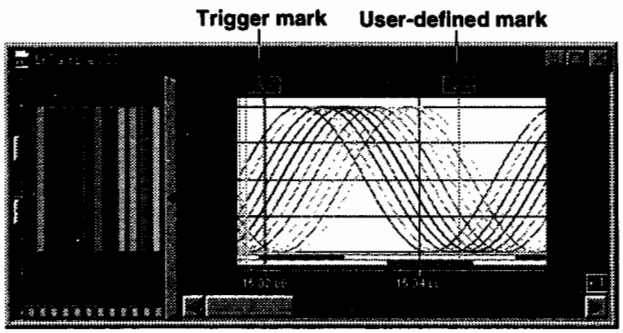
Deleting a mark

1. Set the range over which you wish to delete a mark in the waveform display area using cursor A and cursor B.
   For how to set cursor A and cursor B, refer to "Reading Measurement Values with Cursors" (page 5-11).
2. Select "Edit" then "Delete Mark".
   The trigger mark and/or user defined mark in the set range is deleted.

Initializing a mark display

Select "Edit" then "Reset Mark".
Only a deleted trigger mark appears. An arbitrary mark does not appear.

• Example of displaying marks



Copying measurement data to the clipboard

When a waveform is displayed, you can copy measurement data in a range specified by cursors, to the clipboard.

1. Set the range over which you wish to copy the measurement data to the clipboard using cursor A and cursor B, in the waveform display area.
   For how to set cursor A and cursor B, refer to "Reading measurement values with cursors" (page 5-11).
2. Select "Edit" then "Copy", or click the copy icon on the toolbar. The measurement data is copied to the clipboard.

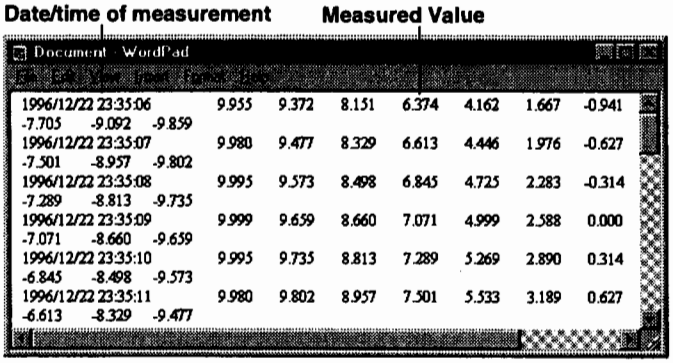
Copy Icon

Note

- You can copy up to 1000 data items to the clipboard.
- You can copy data of all channels whose data is saved in the data files, irrespective of whether the waveform display is On or Off.
- You can add data copied to the clipboard to your application software and use it.

Example of copying data to the clipboard

Date/time of measurement **Measured Value**



5.5 Displaying Digital Values

Displaying digital values

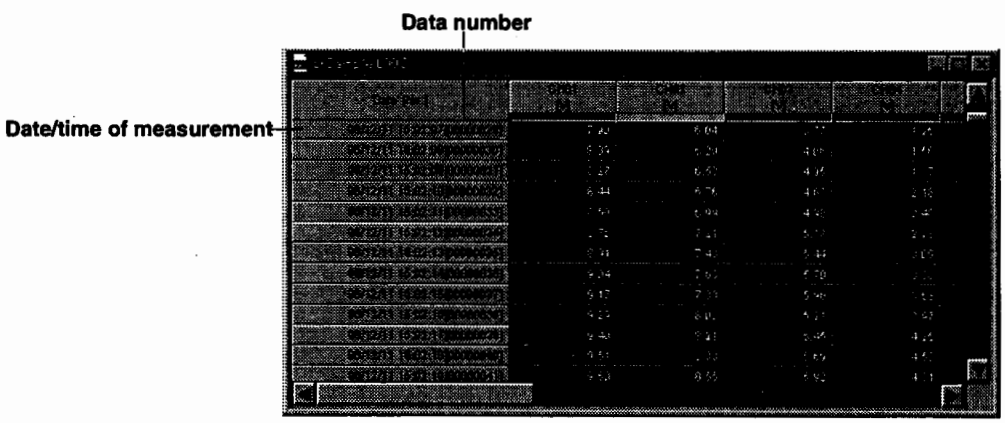
You can display measurement data as digital values.

1. Select "Window" then "Digital value display", or click the digital value display icon on the toolbar.
   A digital value display window opens in addition to the waveform display window, and the measurement data appears digitally.

Note

If you wish to display the digital value display window at maximum size and revert to the waveform display, select "Window" then "Waveform display", or click the waveform display icon on the toolbar.

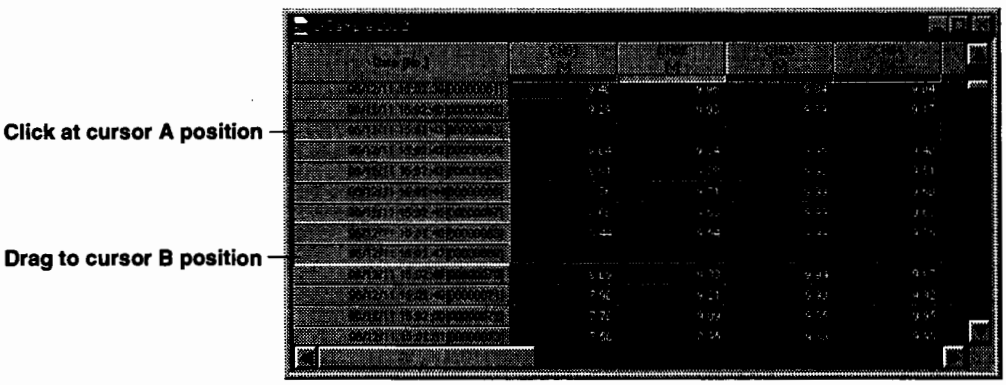
Example of digital value display



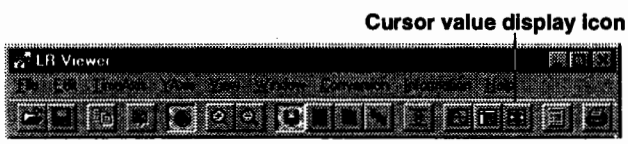
Reading measurement values with cursors when digital values appear

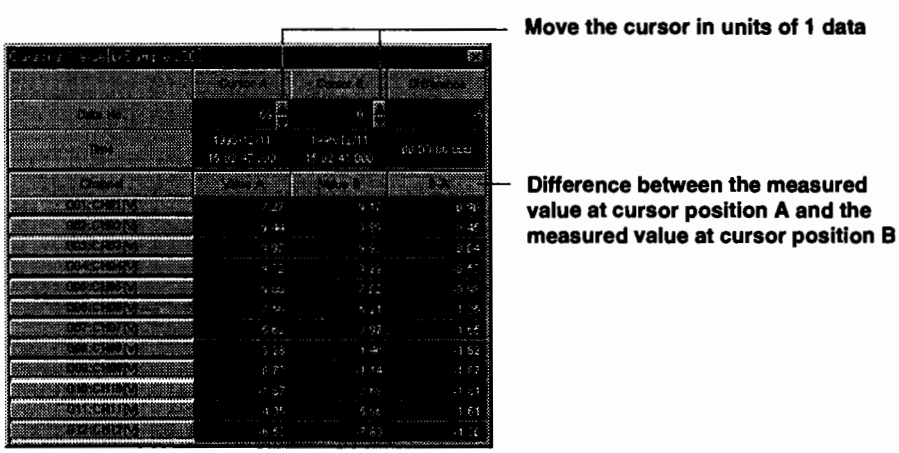
You can read measurement data at a specified position using cursors, when digital values appear. There are two cursors: cursor A and cursor B. You can display measurement data at cursor A and cursor B, and also the difference between the measurement values at cursor A and cursor B.

1. While displaying digital values, place the mouse pointer at the item Date [No.] of the measurement data and click it. Next, drag the pointer to the position where the next item of measurement data is to be read. The point where you first clicked the mouse pointer is the cursor A point, and the point to which you dragged the pointer is the cursor B point.



2. Select "Window" then "Display Cursor's Value", or click the cursor value display icon on the toolbar. Open the cursor's value dialog box, and display the measurement data and time and measurement values for the positions specified by the cursors. If you wish to perform fine adjustment of the position of a cursor, click the arrow button for the data No. in the cursor value dialog box. The cursor moves in steps of one data item.





Note

- It is efficient to use "Edit" then "Select All" when selecting measurement start data and measurement end data.
- To erase the cursors from the digital value display area, select "View" then "Erase Cursor".

Copying measurement data to the clipboard when digital values appear

You can copy measurement data in the specified range to the clipboard using a cursor when digital values appear.

1. Set the range over which you wish to copy the measurement data to the clipboard using cursor A and cursor B, on item Data [No.].
   For how to set cursor A and cursor B, refer to "Reading measurement values with cursors when digital values appear" (page 5-17).
2. Select "Edit" then "Copy", or click the copy icon on the toolbar. The measurement data is copied to the clipboard.

Copy icon

Note

- You can copy up to 1000 data items to the clipboard.

5.6 Saving Display Conditions

You can save the display conditions in a file when a waveform or digital values appear. Display conditions can be saved to only one display conditions file.

1. Select "File" then "Save Display Settings", or click the save display settings icon on the toolbar. The display conditions are saved to a file.

Save display settings icon

Note

- The extension ".lrv" is automatically added to the displayed filename corresponding to the file in which the display conditions were saved.
- The contents saved to the file are as follows.
  - Printing title
  - Positions of cursor A and cursor B
  - Displayed waveform timing On/Off
  - Alarm display On/Off
  - Y-axis details (channel No. assigned to the waveform No., waveform display On/Off, scale, zone, trip point 1, trip point 2, waveform color)
  - Selection of channel No./Tag/Tag ID
  - Mark information
  - Time axis magnification
  - Waveform display area
- If you wish to display the data file containing the display conditions under the display conditions used when a file was saved at the LR recorder, first delete the file "xxx.lrv" containing the display conditions, then open the data file once again.

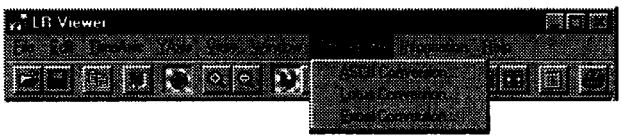
Save display settings file

You can save display conditions that were changed with this software as the save display settings file "xxx.lrv". When you open the file again, it is automatically displayed under the previously saved display conditions. You can overwrite the file as many times as you like.

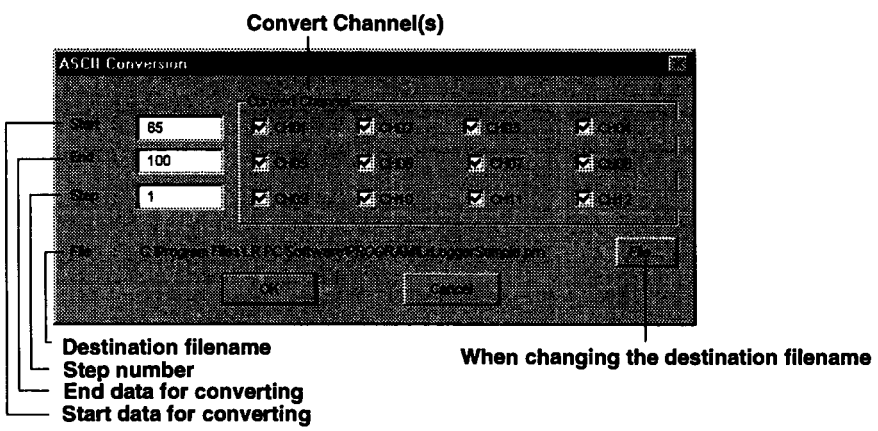
5.7 Converting the Data Format

With a waveform or digital values displayed, you can convert measurement data into one of three data formats, ASCII, Lotus and Excel.

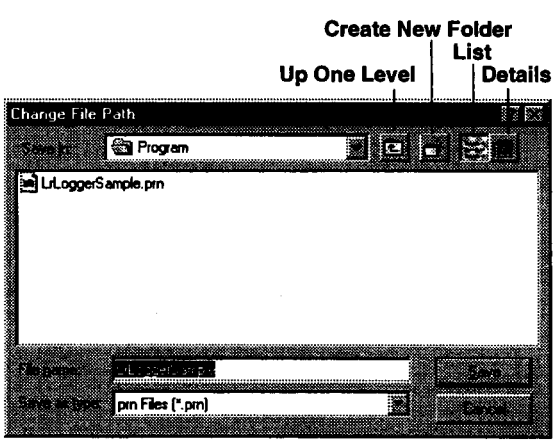
1. Select "Conversion" then "XXX conversion..." (where XXX stands for ASCII, Locus or Excel).



2. Using each XXX conversion dialog box, enter the range of the data to be converted (data No. at the start point of conversion and data No. at the end point of conversion) and the step (e.g. if you enter "3", two out of three consecutive data items are skipped; to convert all of the data in the specified range, enter "1"). Click the check box of each channel whose data you wish to convert.



3. When you wish to convert the save destination folder or file, click "File ...".
Select the filename of the save destination file from the "Filename" text box, or enter the filename in the text box. If necessary, select the kind of folder (location of saved data)/file in which the data is to be saved. Click "Save".



4. Click "OK" in the XXX conversion dialog box.
The measurement data is converted into the selected data format, and saved in a file.

Note

- The range of the data to be converted, which is indicated in each XXX conversion dialog box, is automatically set to the range specified by cursor A and cursor B. (If the range of the data to be converted is not specified by the cursors, or if the cursors have been deleted, 0 is automatically set in the start point data No., and [the total number of items of measurement data minus 1] in the start point data No.)
- An extension that identifies the data format is automatically added after the displayed filename. For ASCII conversion, the extension ".prn" is added; for Lotus conversion, ".wj2" (version 2.0 or higher can be read) is added; for Excel conversion, ".xls" (this can be read by the software whose version is 4.0 or later) is added.
- Lotus 1-2-3 and Excel impose a limit to the number of data items that can be handled. This software, on the other hand, does not impose such a limit. Before carrying out conversion, set the number of data items to be converted so that the number of converted data items does not exceed the maximum number of items. If the memory capacity in the PC is small, it may be impossible to read the data even if the number of converted data items is below the limit.

5.8 Converted Data File Format

If you convert a data format using the method described in Section 5.7, data will be created in one of the following formats.

ASCII-converted file

```
"LR Series"                                                              ← Title
"Start Time","1996/12/11","15:04:58.000"                                 ← Date/time when the first data was collected
"End Time","1996/12/11","15:07:54.000"                                   ← Date/time when the last data was collected
"Sampling Interval",    1.000,"sec"                                      ← Sampling interval
"Data Count",     177                                                    ← Data count
"Ch.","ID-CH1","ID-CH2","ID-CH3","ID-CH4","ID-CH5","ID-CH6","ID-CH7","ID-CH8","ID-CH  ← Channel number/Tag/Tag ID
"Date","Time","msec","V","V","V","V","V","V","V","V","V","V","V","V"     ← Unit
"12/11","15:04:58","0",     0.00,    -2.58,    -5.00,    -7.07,    -8.66,    -9.65,
"12/11","15:04:59","0",     0.31,    -2.28,    -4.72,    -6.84,    -8.49,    -9.57,
"12/11","15:05:00","0",     0.62,    -1.97,    -4.44,    -6.61,    -8.32,    -9.47,
"12/11","15:05:01","0",     0.94,    -1.66,    -4.16,    -6.37,    -8.15,    -9.37,
"12/11","15:05:02","0",     1.25,    -1.35,    -3.87,    -6.12,    -7.96,    -9.25,
"12/11","15:05:03","0",     1.56,    -1.04,    -3.58,    -5.87,    -7.77,    -9.13,
"12/11","15:05:04","0",     1.87,    -0.73,    -3.28,    -5.62,    -7.56,    -9.00,
"12/11","15:05:05","0",     2.18,    -0.41,    -2.99,    -5.35,    -7.36,    -8.86,
```

Date Time — Time (msec) — Measured value

Lotus-converted file

This is a file of a format that enables it to be read using Lotus 1-2-3.

	A	B	C	D	E	F	G
1	LR Series						
2	Start Time		1996/09/14		14:04:22.000		
3	End Time		1996/09/14		14:04:32.000		
4	Sampling Interval		2.000 sec				
5	Data Count		6				
6			Ch.	CH1	CH2	CH3	CH4
7	Data.	Time	msec	V	V	V	V
8	09/14	14:04:22	0	- 0.663	- 0.574	- 0.003	0.004
9	09/14	14:04:24	0	- 0.574	- 0.489	- 0.003	0.005
10	09/14	14:04:26	0	- 0.489	- 0.395	0.004	0.005

Excel-converted file

This is a file of a format that enables it to be read using Excel.

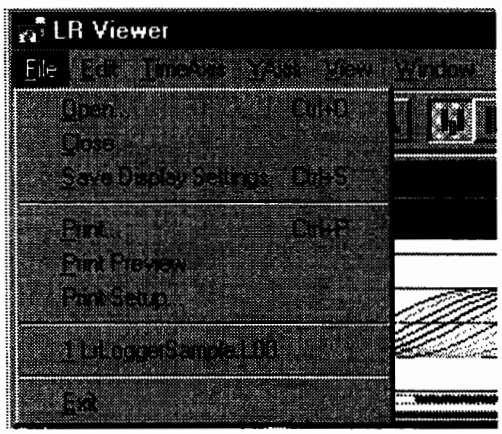
	A	B	C	D	E	F	G
1	LR Series						
2	Start Time		1996/09/14		14:04:22.000		
3	End Time		1996/09/14		14:04:32.000		
4	Sampling Interval		2.000 sec				
5	Data Count		6				
6			Ch.	CH1	CH2	CH3	CH4
7	Data.	Time	msec	V	V	V	V
8	09/14	14:04:22	0	- 0.663	- 0.574	- 0.003	0.004
9	09/14	14:04:24	0	- 0.574	- 0.489	- 0.003	0.005
10	09/14	14:04:26	0	- 0.489	- 0.395	0.004	0.005

5.9 Printing Measurement Data Using an External Printer

Setting a printer

You can set the printer to be used.

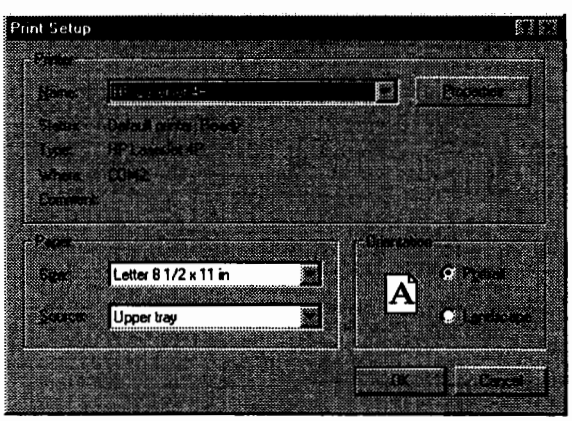
1. Select "File" then "Print Setup...".



Note

If a file that has already been opened exists, a printing menu is added to the above file menu.

2. Set the printer, paper orientation, and printing orientation.

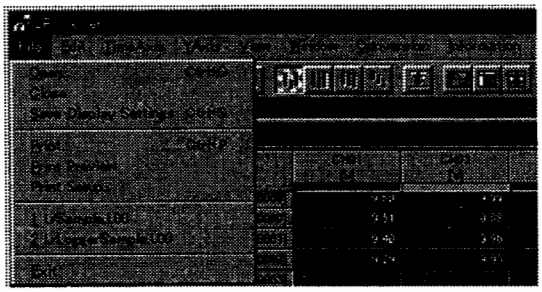


Set the printer according to the system environment that you are using.

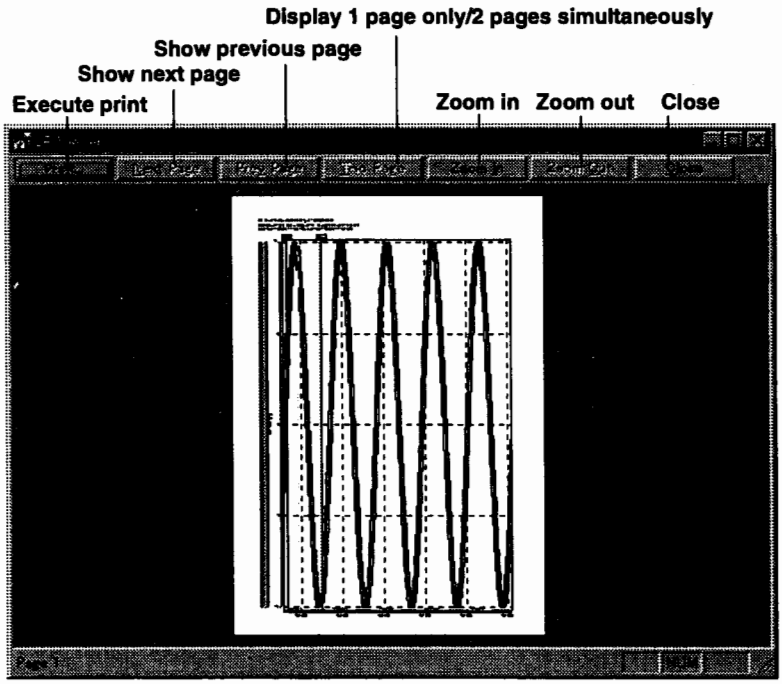
Print preview

You can view the layout prior to printing.

1. Select "File" to display the file menu.
2. Select "Print Preview".



3. Carry out print preview using the necessary button.



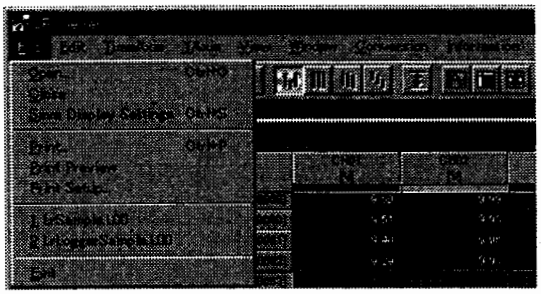
Note

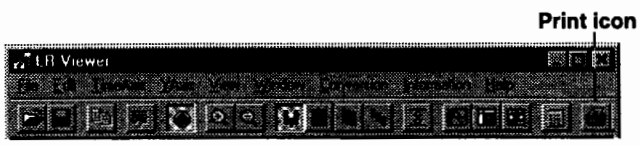
- The print preview starts from the data at the beginning of the file.
- The contents of the print preview may sometimes be slightly different to the actual printed contents.
- For details of print preview, refer to the instruction manual or operation manual of the system that you are using.

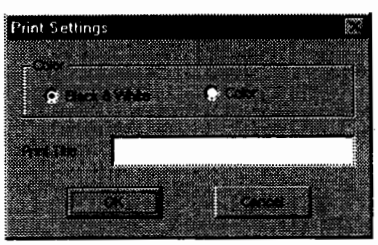
Printing a displayed waveform or digital values.

You can print a displayed waveform or digital values.

1. Select "File" then "Print...", or click the print icon on the toolbar. The print settings dialog box appears.







2. Click the "Black & White" or "Color" radio button. If you enter a title to the "Print Title" text box, the data item of this title is printed when printing is carried out.
3. Set the printer, printing range and number of copies.

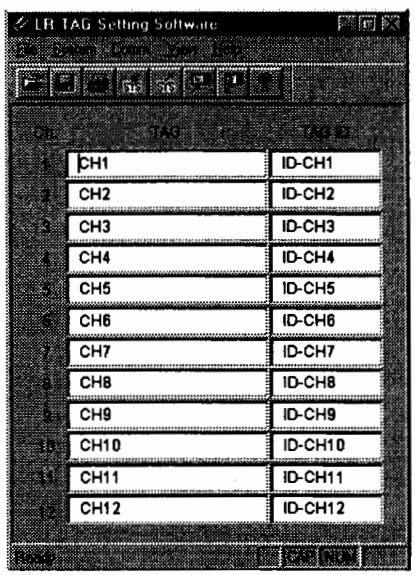
Note

- When a waveform or measurement values appear, the printing range is set using cursor A and cursor B. Refer to "Reading measurement values with cursors" (page 5-11) for the method of setting cursor A and cursor B when a waveform appears. Refer to "Reading measurement values with cursors when digital values appear" (page 5-17) for the method of setting cursor A and cursor B when digital values appear.
- If you perform printing when cursor values and/or section calculation results appear, the cursor values and/or section calculation results are also printed.

6.1 Setting Tags/Tag IDs

Setting tags

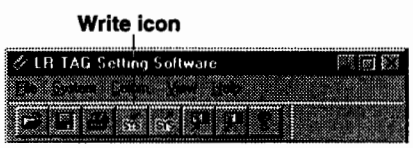
1. Start the tag/tag ID setting software.
2. Set the tag and tag ID for each channel. Set a tag using no more than 16 characters, and a tag ID using no more than 8 characters.



Writing a tag/tag ID to the system

You can reflect a set tag or tag ID on data logging (logger) software or viewer software.

1. Select "System" then "Write...", or click the write icon on the toolbar. A message acknowledging write appears.

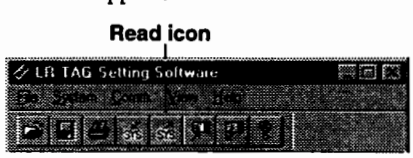


2. Click "OK". The set contents of the tag/tag ID are written.

Reading a tag/tag ID from the system

You can read and modify the contents of the tags/tag IDs currently set in the system.

1. Select "System" then "Read...", or click the read icon on the toolbar. A message acknowledging read appears.

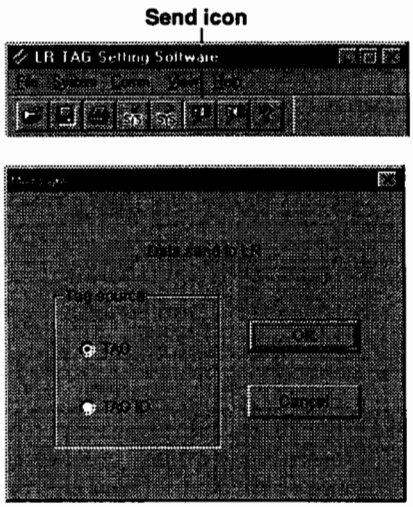


2. Click "OK". The set contents of the tag/tag ID are read.

Sending tag/tag ID to the LR recorder

You can set a tag or tag ID set using this software, in a tag in the LR recorder.

1. Select "Comm." then "Send...", or click on the send icon on the toolbar.
   The dialog box for specifying whether to send a tag or tag ID appears.



2. Click the tag or tag ID radio button.
   Click "OK". The set contents are sent to the LR recorder.

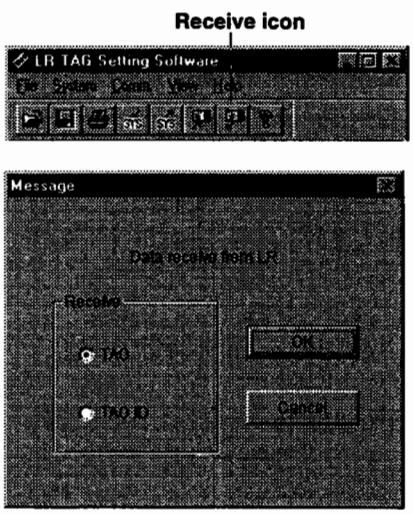
Note

You can set a tag using up to 7 characters. If you send a tag using this software, the first 7 characters are set in the LR recorder.

Receiving a tag setting in the LR recorder

You can receive an LR recorder tag from the LR recorder.

1. Select "Comm." then "Receive...", or click on the receive icon on the toolbar.
   The dialog box for specifying which of the tag or tag ID to receive appears.



2. Click the tag or tag ID radio button.
   Click "OK". The LR recorder tag is set in the tag or tag ID of this software.

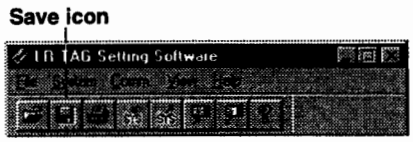
Note

Ω and ° are converted into spaces, and μ is converted into "u".

Storing the set contents

Save

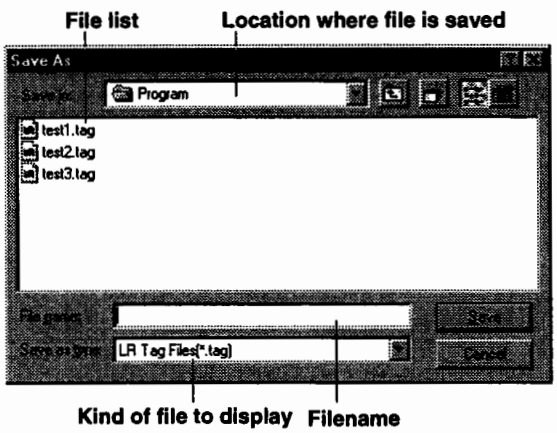
1. Select "File" then "Save", or click the save icon on the toolbar. A message for verifying overwrite appears.



2. If you click on "OK", the existing settings are overwritten and the new settings saved.

Save As...

1. Select "File" then "Save As...". The dialog box for setting a filename appears.



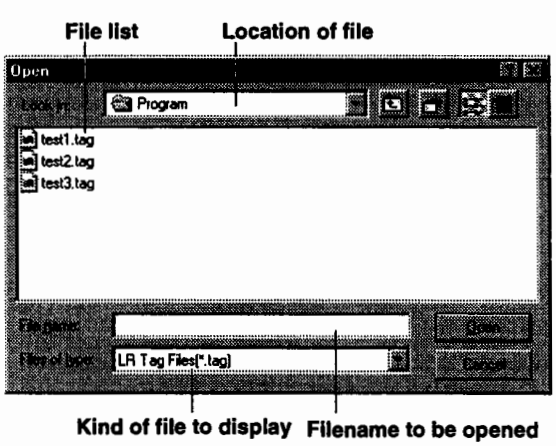
2. Enter a filename to the filename text box. If you click "Save", a file is newly saved.

Note

If "Files of type" is "LR Tag Files", the extension is set to ".tag". If "Files of type" is "All Files", you can set the desired extension.

Opening a previously saved file

1. Select "File" then "Open...", or click the open icon on the toolbar. The open dialog box appears.



2. Enter the filename in the filename text box, or select a filename from the file list. If you click "Open...", the file opens.

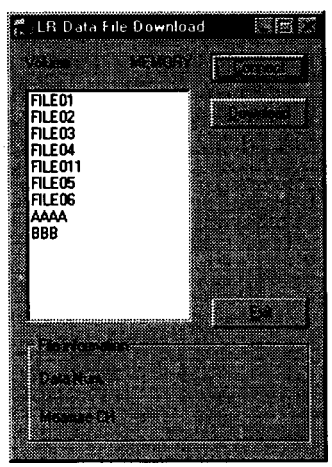
6.2 Downloading LR Recorder Measurement Data

If your LR recorder has an IC memory card or a floppy disk drive option, you can directly read measurement data from the internal memory to a PC. The data format is the LR Yokogawa format. You can display this data using viewer software or convert it to another format.

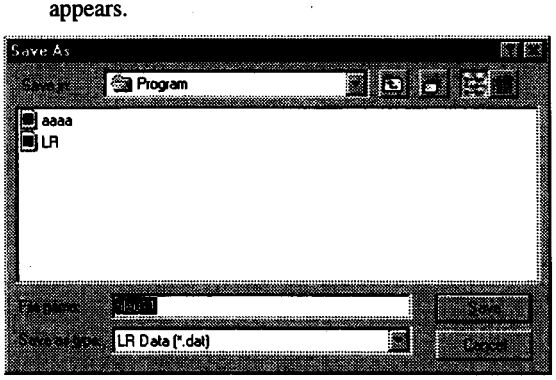
Note

You can only read measurement data.

1. Start the data downloading software.
2. Click "Connect". The data in the IC memory card or the internal memory of the LR recorder appears.



3. Click the file to be read, and click "Download". The dialog box for setting the save destination appears.



4. Select the save destination, and enter the filename of the file to be saved. If you click "Save...", the measurement data in the LR recorder is saved. The extension is ".dat".

Note

- Access the measurement data with the IC memory card inserted in the LR recorder.
- In the case of a floppy disk drive option, you can save the data in the internal memory to the PC without copying it to a floppy disk.

7.1 Troubleshooting

If an error message appears on the window, refer to 7.2 "Error Messages and Corrective Action" (page 7-2).

Symptom	Possible cause/Corrective action
Setup does not take place.	Check that the available capacity of the hard disk is at least 500 MB.
The computer cannot communicate with the LR recorder.	Check to see if the communication settings included in the environment settings are suitable for the LR recorder.
There is an item that cannot be set in the LR recorder.	Check to see if the device settings included in the environment settings match the specifications of the LR recorder.

7.2 Error Messages and Corrective Action

No.	Message	Corrective action
E0201	The file is not in the LR binary format.	You attempted to open a file that was not an LR recorder data file. Select an LR recorder data file.
E0202	The file is not in the LR logger format.	You attempted to open a file that was not an LR recorder logger file. Select an LR recorder data file.
E0203	There is no data.	There is no data in the file read by the viewer software.
E0211	Data cannot be written to a file.	It is conceivable that the disk either has insufficient capacity or is write-protected. Check.
E0213	A file cannot be opened.	It is conceivable that this file is being used by another piece of software. Check.
E0400	Communication error.	The communication circuit between the PC and LR recorder is not connected correctly. Connect it correctly.
E0404	Communication timeout	The communication circuit between the PC and LR recorder is not connected correctly. Connect it correctly.
E0405	Communication open error.	It is conceivable that the communication circuit is being used by another piece of software. Check.
E0406	DLL in the GP-IB library cannot be loaded.	Install National Instruments' GP-IB driver correctly.
E0510	Failed to open the logger data file.	Check to see if another software is using the same file, and also if the disk has sufficient capacity.
E0511	Failed to write data to the logger data file.	Check to see if the disk has sufficient capacity.
E0520	Failed to open the logger setting file.	Check to see if another software is using this file.
E0521	Failed to write data to the logger setting file.	Check to see if the disk has sufficient capacity.
E0523	The file is not a logger setting file.	You attempted to open a file that was not a logger setting file. Select a logger setting file.
E0524	There is no channel in which data logging is taking place.	There is no channel in which data logging is taking place. Check.
E0525	There is an invalid channel in the start conditions.	There is no channel specified in the logging start conditions. Check.
E0526	There is an invalid channel in the end conditions.	There is no channel specified in the logging end conditions. Check.
E0601	The math formula is incorrect.	There is a syntax error in the calculation formula in the channel setting window. Check.
E0603	Setting send error	It is conceivable that settings were sent to a model of recorder that is different to the model that was used to make the setting file. Check.
E0604	Channel setting send error	Incorrect channel data was sent from the channel setting window. Check.
E0605	Alarm setting send error	Incorrect alarm data was sent from the channel setting window. Check.
E0606	Recording method send error	An incorrect recording method was sent from the channel setting window. Check.
E0607	Recording zone send error	An incorrect recording zone was sent from the channel setting window. Check.
E0608	Floppy disk cannot be accessed.	There is not a floppy disk in the LR recorder.
E0609	IC memory card cannot be accessed.	There is no IC memory card in the LR recorder. Check.
E0905	Not supported in this model.	Automatic setting of environment devices is not supported by models other than LR Enhanced.

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