

# **INSTRUCTION MANUAL**

## **Viewer Software DA-20 Viewer**



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<http://www.rion.co.jp/english/>



# **Organization of This Manual**

This manual describes the features, operation and other aspects of the DA-20 Viewer software that is supplied with the 4-Channel Data Recorder DA-20. To ensure correct and safe operation, be sure to also consult the documentation of the computer on which the software is installed.

The following pages contain important information about safety. Be sure to read and observe these in full.

This manual contains the following sections.

## **Introduction**

Provides an overview of the software and describes its features, operating environment, and installation/uninstallation procedures.

## **Basic Operation**

Explains names and functions of elements shown on the main screen, and describes the basic operation flow.

## **Advanced Operation**

Explains how to select and save files, how to display information about different file types, and how to set data recording parameters for the 4-Channel Data Recorder DA-20.

## **Other Information**

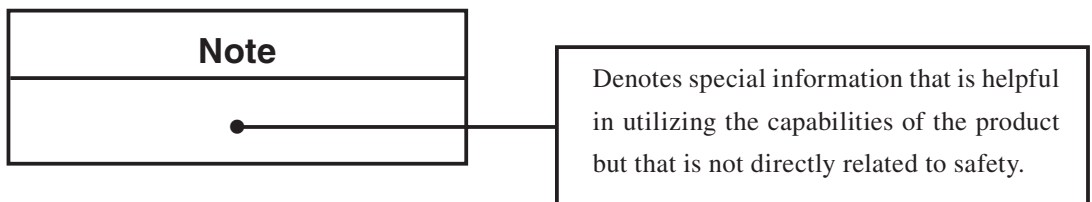
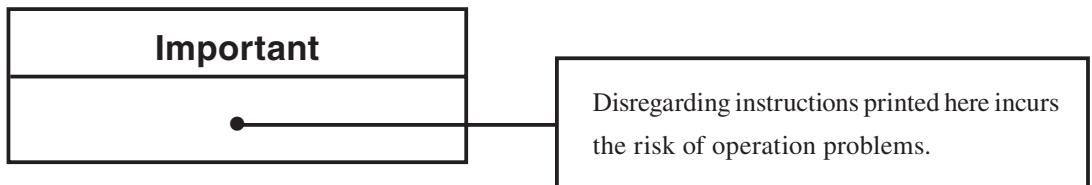
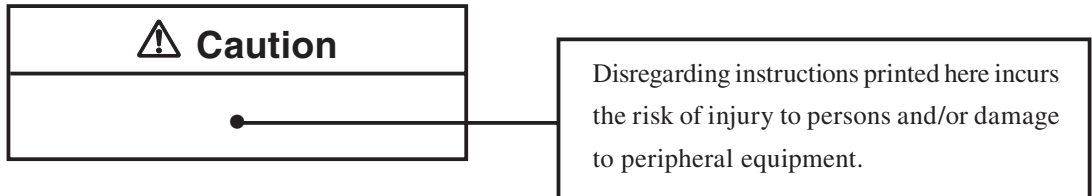
Lists the specifications of the software and provides information about WAVE file content, calibration, troubleshooting, and related items.

\* All company names and product names mentioned in this manual are trademarks or registered trademarks of their respective owners.



# FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of accidents and damage to the computer on which the software is installed, make sure that all instructions are fully understood and observed.



## **About the Microsoft Windows operating system**

This manual does not provide general information on how to use the Microsoft Windows operating system. For information about selecting commands and making settings in dialog boxes, refer to the documentation and online help of Microsoft Windows.

Examples for computer screens shown in this manual are for illustration purposes only. The actual appearance of screens may differ, depending on the version of the Microsoft Windows operating system and the computer environment.



## **Caution**

### **Do not play the install CD-ROM in a CD player**

The DA-20 Viewer install disc is not a music CD. Inserting this disc in a CD player poses the risk of excessive volume levels that can cause hearing damage and damage to the CD player.

# Important

## Check the install CD-ROM

Before inserting the install disc in the CD-ROM drive of a computer, be sure to visually check the disc.

If there are any cracks or scratches or if the disc is deformed, do not insert the disc in the CD-ROM drive. Otherwise there is a risk of damage to the CD-ROM drive.

# Precautions

- If a problem should occur while using this software, contact the supplier with a detailed description.

## Supported file types

The types of files that can be handled by this software are listed below.

File format: WAVE (extension “wav”)

File size: Max. 2 GB

Sampling frequency:

240 Hz, 256 Hz, 1.2 kHz, 1.28 kHz, 2.4 kHz, 2.56 kHz, 12 kHz, 12.8 kHz,  
24 kHz, 25.6 kHz, 48 kHz, or 51.2 kHz

Files that do not meet the above specifications will not be handled correctly.

This software and the DA-20 support only WAVE files that employ the PCMWAVEFORMAT structure. WAVE files that employ the WAVEFORMATEX structure are not supported.

Some WAVE files not created on the DA-20 may not open correctly in this software, due to structure differences.

The sampling frequency of a WAVE file can be checked in the file properties. After importing a file, the information can also be checked on the [Wave File &Info] screen.

## WAVE file information

When you change the conversion unit set at the DA-20, the file will no longer be playable on the DA-20.

When performing an operation such as saving a range of data as a file with the intention of performing playback on the DA-20, do not change the conversion unit in the WAVE file information.



## Sampling frequency related limitations

Sampling frequency	Playback
240 Hz	*
256 Hz	*
1.2 kHz	*
1.28 kHz	*
2.4 kHz	*
2.56 kHz	*
12 kHz	O
12.8 kHz	*
24 kHz	O
25.6 kHz	*
48 kHz	O
51.2 kHz	*
Other than above	Not supported

- \* Depending on the sound card, CPU speed, and operating system limitations, playback may not be possible, or pitch and sound quality may change in playback. Sound dropouts may occur also in cases marked“O”.
- Depending on the sound card and CPU speed of the computer, noise or dropouts may occur during playback of a WAVE file.
- WAVE files with a sampling frequency under 12 kHz may not play. During playback of WAVE files with a sampling frequency of 12.8 kHz, 25.6 kHz, or 51.2 kHz, the pitch or sound quality may change.

## DA20.INI file setting limitations

When using a DA20.INI file created by this software to save DA-20 settings, make sure that there are no conflicts between settings. Otherwise the settings will not become active in the DA-20. (For information about setting conditions, refer to the instruction manual of the DA-20.)

## Install folder precautions

- Install this software directly on the computer where it is to be used. If the software is installed on another computer on a network, correct operation is not assured.
- Do not delete or change the names of files and folders in the installation folder of this software. Do not open any files in the folder with other applications. Otherwise correct operation of the software is not assured.



# Usage License Agreement

I m p o r t a n t

**Carefully read and observe the following agreement.**

This is a legally binding software license agreement between you as the user and Rion Co., LTD. By installing, copying, or using the software, the user agrees to all conditions of the agreement. If the user does not agree to any of the conditions of the agreement, the software must be returned immediately without using it or any other product associated with it.

The software is protected by national and international copyright laws and regulations and intellectual property laws. Rion Co., LTD. only grants the right to use the software. The software itself is not sold to the user.

## **1. License Conditions**

### (1) Definition and Scope

The software covered by this agreement is the Viewer Software (DA-20 Viewer) including the media on which the software is supplied, and documentation that is supplied with the software either in printed form or as an electronic file. This license agreement defines the right of the user to use the software.

### (2) Usage

The user may install and use the software on one computer that runs a licensed version of Microsoft Windows 2000 Operating System, or Microsoft Windows XP Operating System. (Microsoft and Windows are trademarks or registered trademarks of Microsoft U.S.A. Corporation in the U.S.A. and other countries). For backup purposes only, the user may make one (1) copy of the software.

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- (4) The user may not use the software to produce any products that imitate the software. Any imitation or simulation of the software is an infringement of copyright laws.

### **4. Duty of Agreement Propagation**

The user must ensure that all persons using the software are fully aware of all conditions of this agreement. Any violation will be the responsibility of the user.

### **5. Warranty**

- (1) Rion Co., LTD. guarantees that the software is supplied on media that have no substantial defect, and that the software contains the functions that are explicitly listed in the specifications. If the software does not operate according to specifications or if any problems described above that are the responsibility of Rion Co., LTD. are detected and Rion Co., LTD. is informed of this fact within 90 days from the purchase date of the software, Rion Co., LTD. will undertake to remedy the problems free of charge.
- (2) If the software does not operate according to specifications due to causes that are not the responsibility of Rion Co., LTD., Rion Co., LTD. will undertake to remedy the problems against charge.

## **6. Limitation of Warranty**

- (1) Rion Co., LTD. does not guarantee that the software is fit for any particular purpose of the user, whether stated explicitly or implicitly, or that the software is free of errors. Rion Co., LTD. does not provide any other kind of warranty except as stated in this agreement. Rion Co., LTD. does not accept responsibility for any kind of damage, whether direct or indirect, tangible or intellectual, that may arise from the use of the software or the failure of the software to perform any function.
- (2) Under no circumstances will the responsibility of Rion Co., LTD. as stated in “5. Warranty” exceed the equivalent of the price that the user paid for the software.

## **7. Duration**

This agreement is valid until terminated. The user can terminate the agreement at any time by destroying the software and associated documentation and deleting all copies from the computer where the software was installed. The agreement also terminates when the user violates any of the conditions herein. In this case, the user also must destroy the software and associated documentation and delete all copies from the computer where the software was installed.

## **8. Jurisdiction**

Any disputes or litigation arising from this agreement will be under the jurisdiction of the Tokyo District Court.

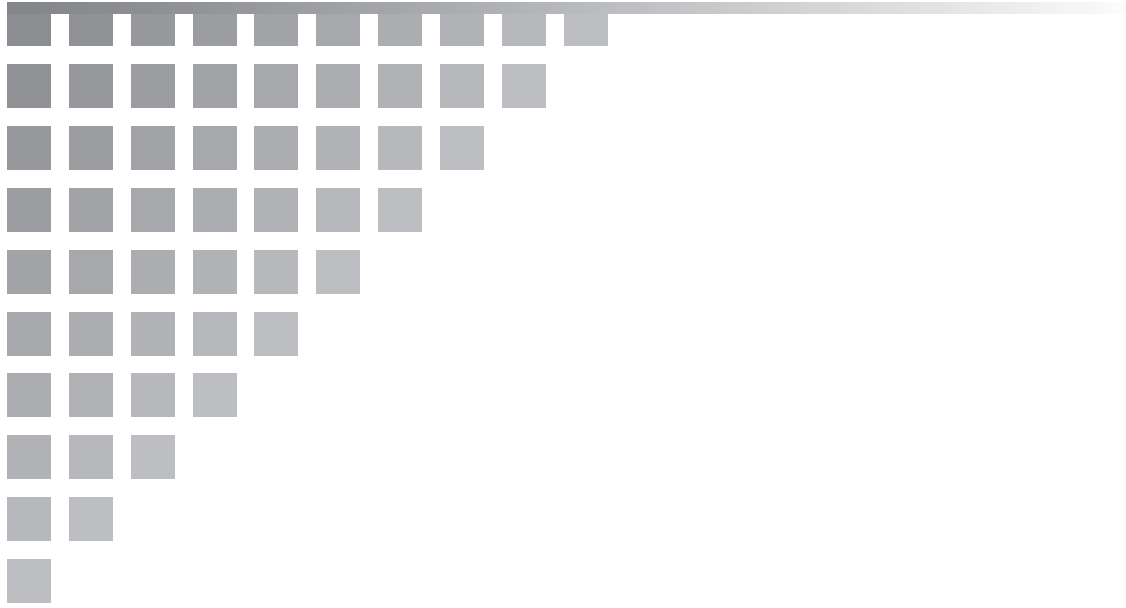


# Contents

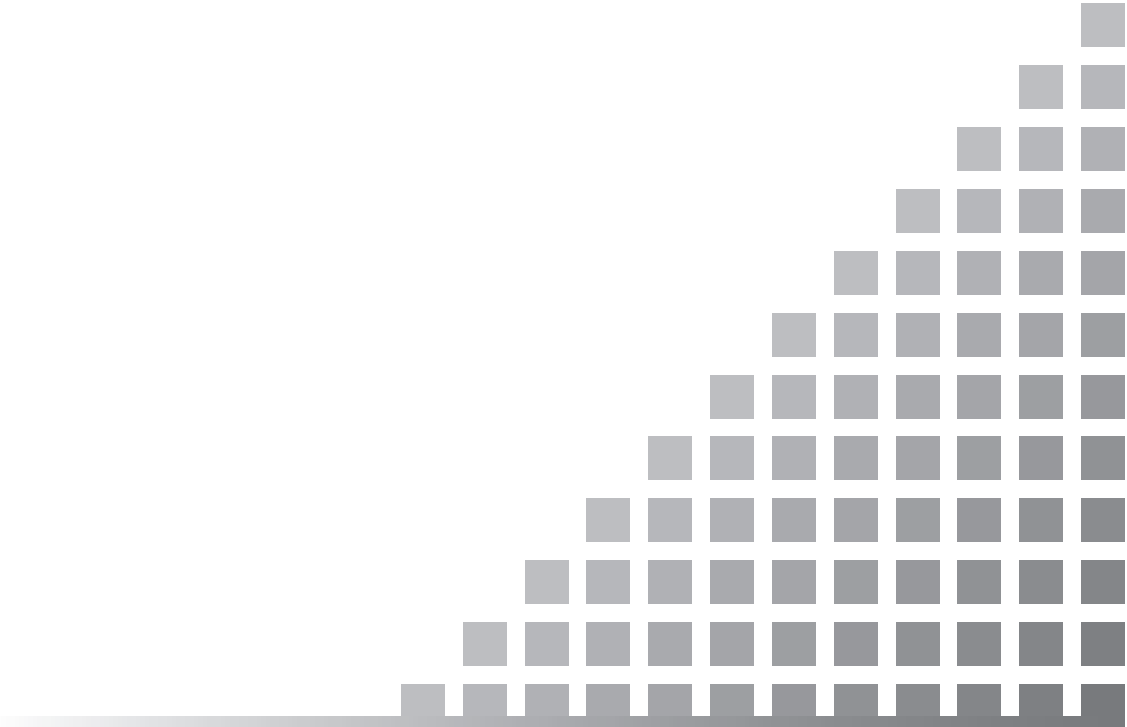
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# Introduction



# Outline

This software is designed to allow the use of a computer for display and playback of waveform data (WAVE format) recorded on a data recorder such as the DA-20.

## Features

The software has the following features.

- Display and monitor a waveform and perform analysis of a specified interval.
- Quickly jump to points where voice memo or marker information has been recorded.
- Calculate rms values with various time weighting characteristics (time constant settings).
- Save analysis results as CSV files.
- Graph or window copy function facilitates the creation of reports.

# Operating Environment

The minimum requirements for the operating environment of this software are listed below.

Computer	Intel Pentium III 400 MHz or equivalent CPU, CD-ROM drive, IBM PC/AT compatible architecture
RAM	256 MB or more (512 MB recommended)
Hard disk	5 GB or more of free space (10 GB or more recommended)
Display	Suitable for specified operating system, resolution 1024 × 768 (XGA), 256 colors or equivalent
Operating system (One of the following)	Microsoft Windows 2000 Professional Microsoft Windows XP Home Edition Microsoft Windows XP Professional (English version)
Other requirements	CompactFlash card slot, speakers, sound card

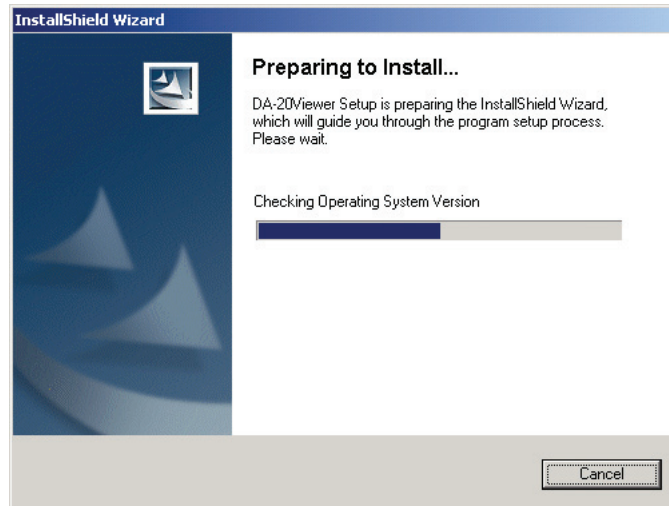
# Installing/Uninstalling the Software

## Installation

The installation procedure for this software is described below.

1. Insert the install disc into the CD-ROM drive of the computer.

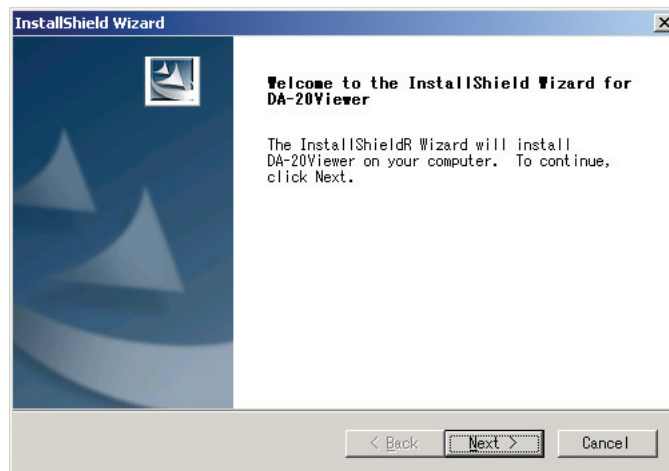
The setup procedure will start automatically, and the installation preparation screen appears.



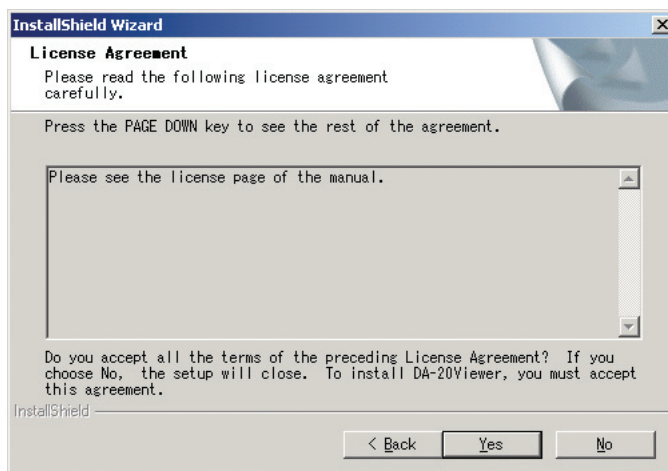
### Note

If the setup procedure does not start automatically, double-click the "setup.exe" file on the install disc.

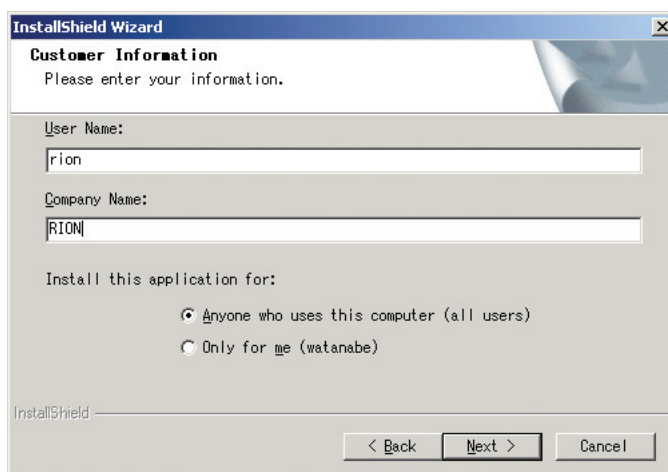
2. After a while, the following screen appears. Click the [Next] button.



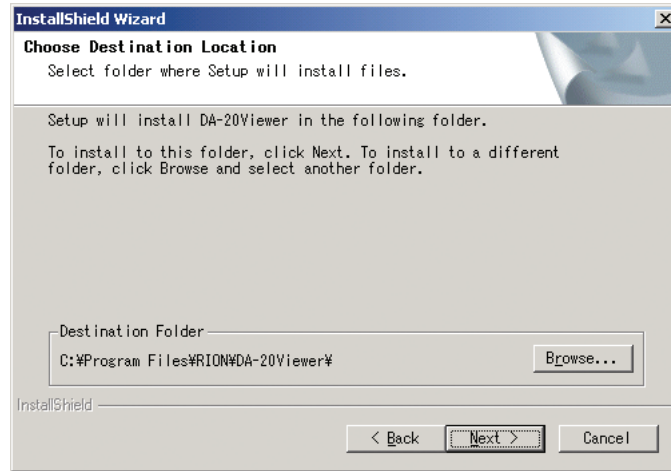
3. The following screen appears. Read the license agreement in this manual. If you accept the terms of the agreement, click the [Yes] button.



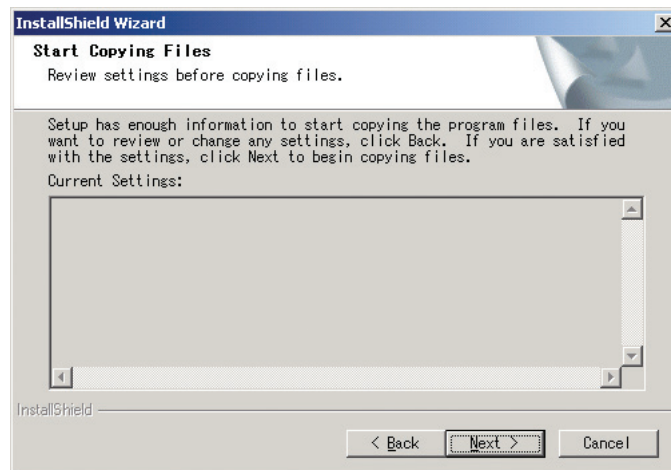
4. The following screen appears. Enter the User Name and Company Name information. Then select whether to install the software for anyone who uses the computer or for the current user only. Then click the [Next] button.



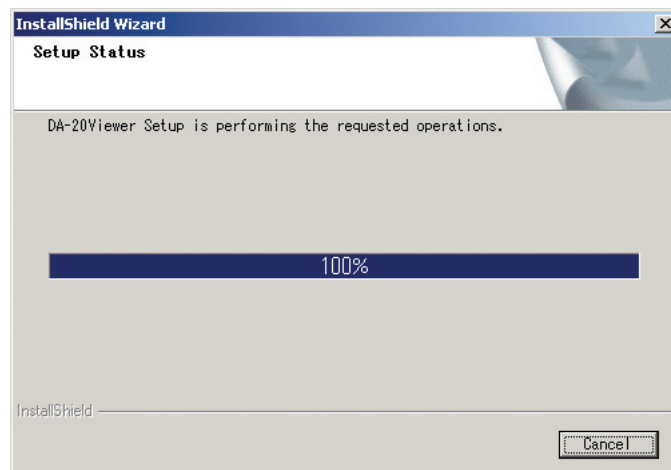
5. The following screen appears. To accept the destination location shown, click the [Next] button. To change the destination location, click the [Browse] button and select a folder from the screen that appears. Then click the [Next] button.



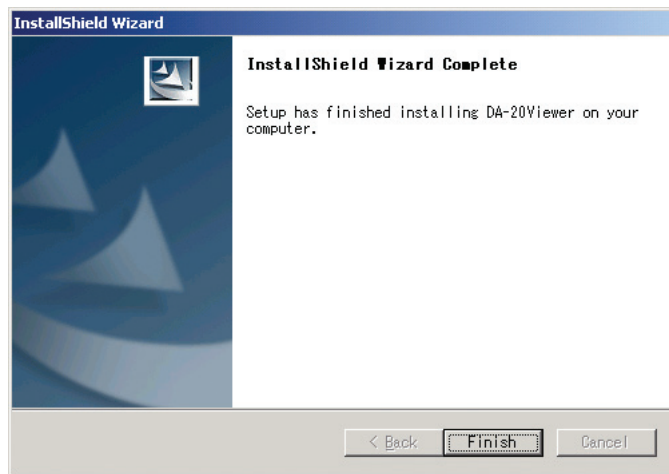
6. The following screen appears. To accept the current settings, click the [Next] button.



7. The installation begins. During installation, the following screen is shown.



8. When installation is complete, the following screen appears. Click the [Finish] button.

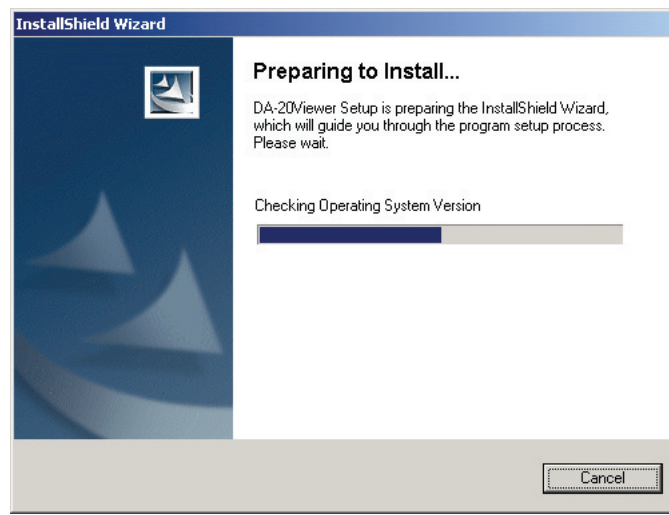


# Uninstallation

The uninstallation procedure for this software using the DA-20 Viewer install disc is described here. (It is also possible to uninstall the software by selecting [Start] → [Control Panel] → [Add or Remove Applications (Programs)]. For details on this method, refer to the online help of your operating system.)

1. Insert the install disc into the CD-ROM drive of the computer.

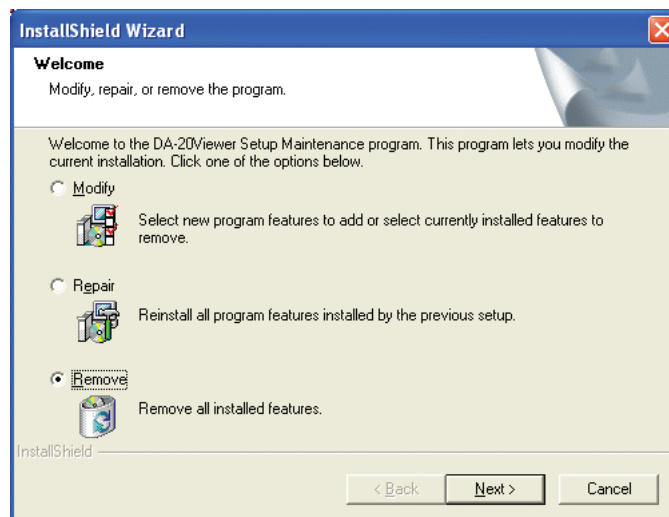
The setup procedure will start automatically, and the installation preparation screen appears.



## Note

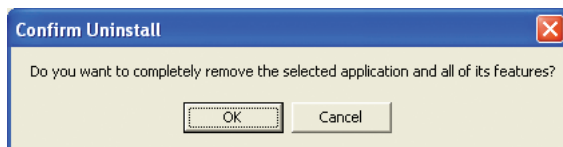
If the setup procedure does not start automatically, double-click the “setup.exe” file on the install disc.

2. After a while, the following screen appears. Select [Remove] and click the [Next] button.

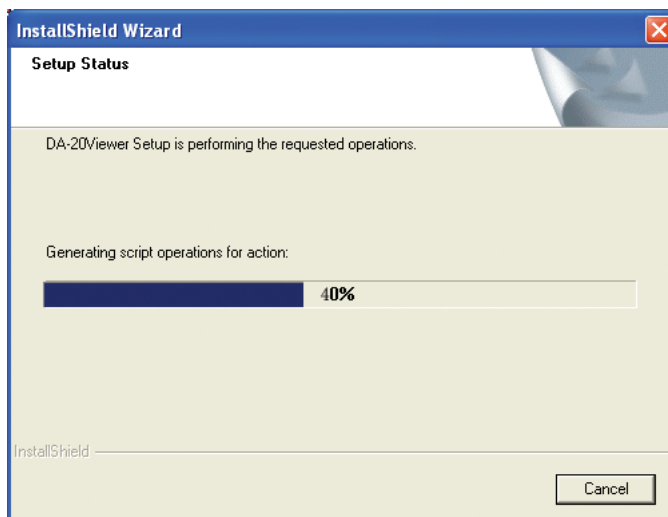




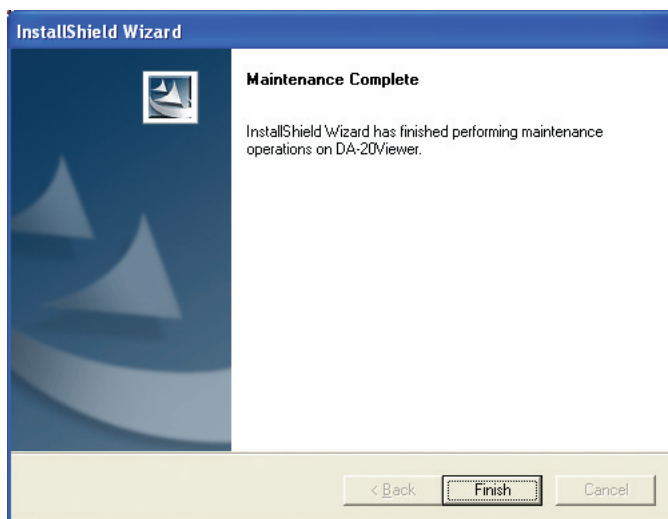
3. A message confirming the uninstallation appears. To proceed, click the [OK] button.



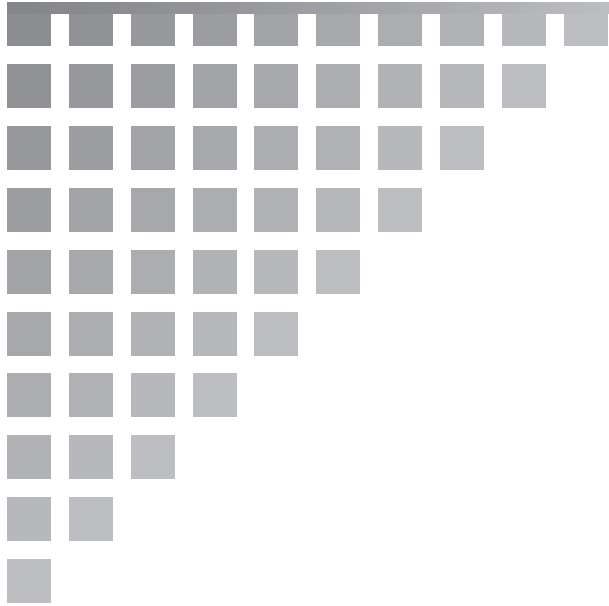
4. The uninstallation begins. During uninstallation, the following screen is shown.



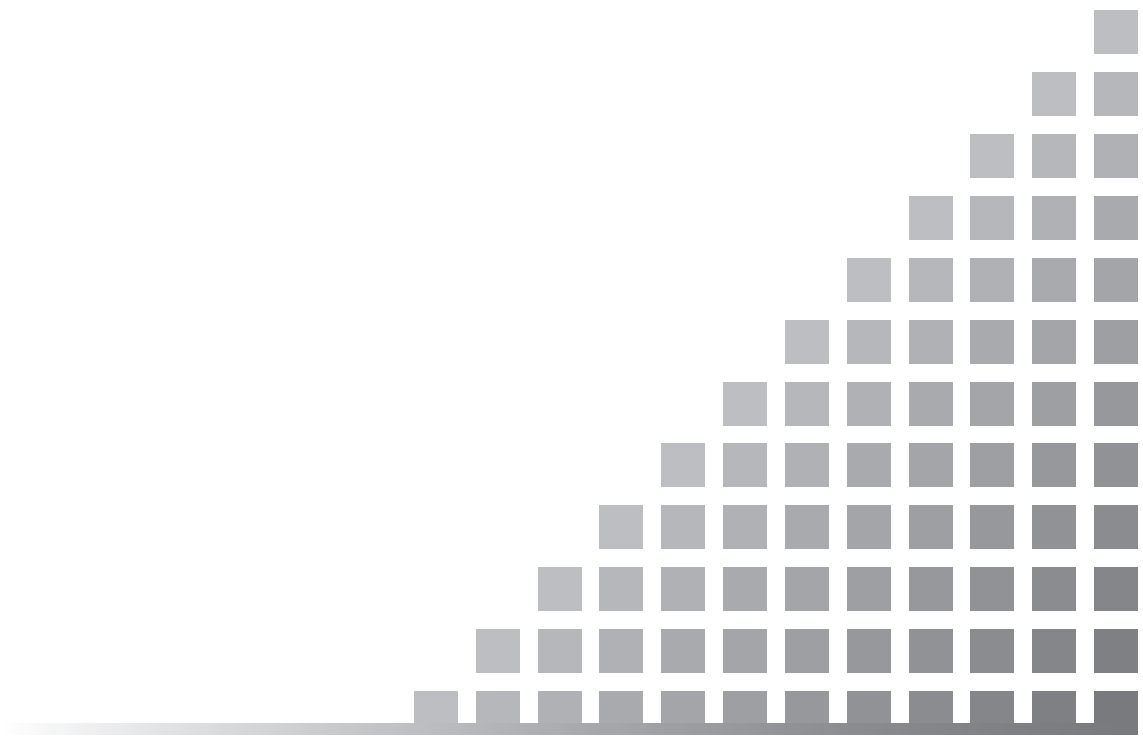
5. When uninstallation is complete, the following screen appears. Click the [Finish] button.







# Basic Operation

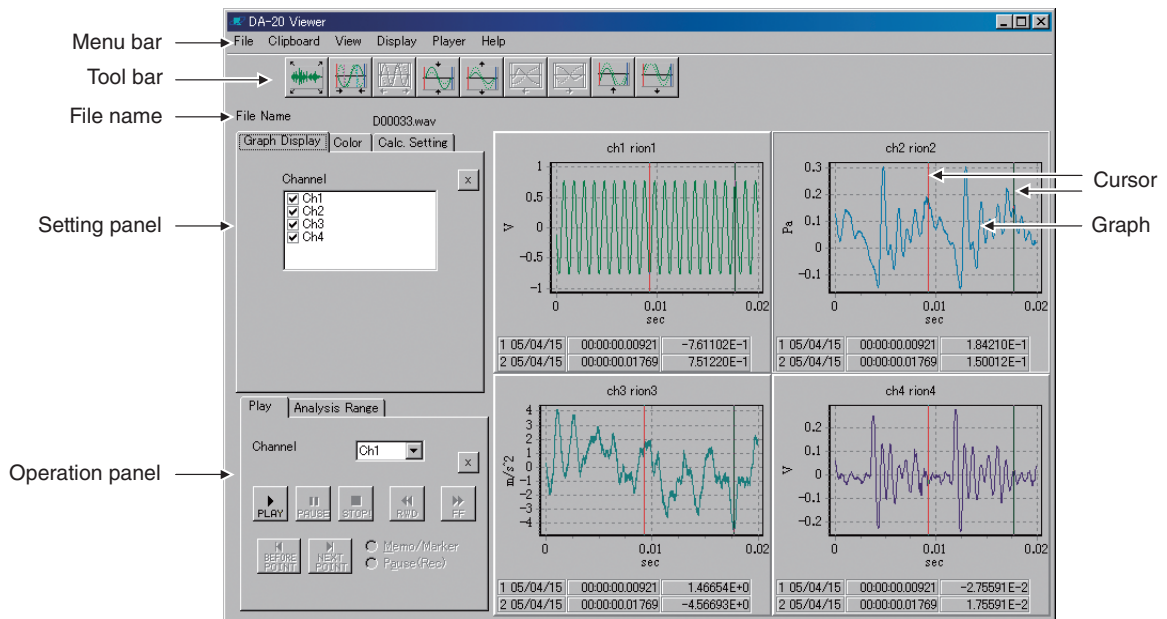


# Main Screen Part Names and Functions

The various elements of the main screen and their function are briefly explained in this section.

When you start the software, the main screen appears.

In the example shown below, there are four graph windows for channels 1 to 4.



## Menu bar

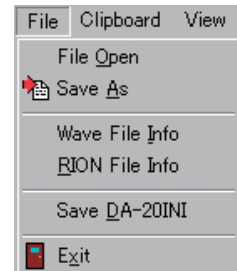
The menu bar gives access to a number of menus, as shown below. Each menu comprises a number of commands.

Commands that are grayed out in a menu have no effect when clicked.



### [File] menu

This menu lets you select and save a WAVE file, create a DA20.INI file, and perform other functions. The menu also has commands for displaying property information for various files.



### [File Open]

Selects the WAVE file to display.

For details on how to select files, see the section “Selecting a file” in “File Operations” (page 36).

### [Save As]

Saves the displayed data as a WAVE file.

For details on saving files, see the section “Saving a specified range” in “File Operations” (page 37).

### [Wave File Info]

Shows information about the displayed WAVE file. In the displayed information, the conversion unit, dB reference, and Calib. (Unit/Volt) settings can be changed.

For details on the WAVE file information, see the section “Wave file information” in “File Operations” (page 38).

### [Rion File Info]

When the displayed WAVE file is a Rion file, this command shows information about the file. The memo field can be edited.

For details on the Rion file properties, see the section “Rion file information” in “File Operations” (page 39).

### [Save DA20INI]

Creates the DA20.INI file that controls the data recording parameters of the DA-20.

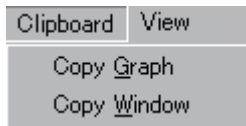
For details on creating a DA20.INI file, see the section “Creating a DA20.INI file” in “File Operations” (page 40).

### [Exit]

Shuts down the application. The same function can be performed by clicking the button at the top right.

## [Clipboard] menu

This menu lets you copy a graph or window (screen) to the clipboard.



## [Copy Graph]

Copies the selected graph to the clipboard.

## [Copy Window]

Copies the entire screen to the clipboard.

## [View] menu

This menu lets you display or hide the setting panel and operation panel. When all panels are deselected, the graph display fills the entire screen.



## [Setting Panel]

Displays or hides the setting panel.

For details on setting panel operations, see the section “Setting panel” (page 20).

## [Operate Panel]

Displays or hides the operation panel.

For details on operation panel operations, see the section “Operation panel” (page 23).










## [Graph display range] menu

This menu contains commands for controlling the graph display.

The menu items correspond to the tool bar items. For details on the tool bar, see the section “Tool bar” (page 17).

### Note

You can directly specify the display range of the graph using the cursor, or you can use the [Analysis Range] tab on the operation panel. For details, see the section “Waveform graph” (page 26).

Display	Player	Help
 Show <u>A</u> ll		
 X Zoom In		Ctrl+F1
 X Zoom Undo		Ctrl+F2
 Y Zoom In		Ctrl+F3
 Y Zoom Out		Ctrl+F4
 Move +X		Ctrl+D
 Move -X		Ctrl+A
 Move +Y		Ctrl+W
 Move -Y		Ctrl+S

### [Show All]

Show the entire data as a graph.

### [X Zoom In]

Enlarge the range specified by the start point and end point on the X axis.

### [X Zoom Undo]

Return the enlarged analysis range on the X axis to the previous condition.

### [Y Zoom In]

Enlarge the display range on the Y axis by 25%.

### [Y Zoom Out]

Reduce the display range on the Y axis by 25%.

### [Move +X]

Move the specified display range on the X axis by one screen to the right (+ direction).

### [Move -X]

Move the specified display range on the X axis by one screen to the left (- direction).

### [Move +Y]

Move the specified display range on the Y axis by about 25% up (+ direction).

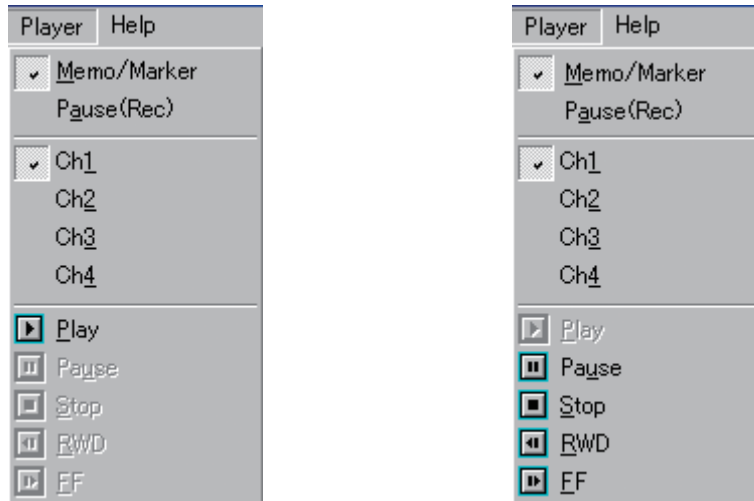
### [Move -Y]

Move the specified display range on the Y axis by about 25% down (- direction).

## [Player] menu

This menu contains commands for selecting the channel for playback and for controlling playback operations.

The menu items correspond to the items under the [Player] tab of the operation panel. For details on the operation panel, see the section “Operation panel” (page 23).



### [Memo/Marker]

This item becomes available when voice memo or marker information is contained in the data.

### [Pause (Rec)]

This item becomes available when pause information is contained in the data.

### [Ch1] to [Ch4]

Lets you select one channel for playback. It is not possible to select multiple channels simultaneously.

### [Play]

Starts data playback.

### [Pause]

Pauses data playback. Selecting this command during pause cancels the pause condition and resumes playback.

### [Stop]

Stops data playback.

### [RWD]

Moves the data playback position in the reverse direction (to past data). [Rewind]

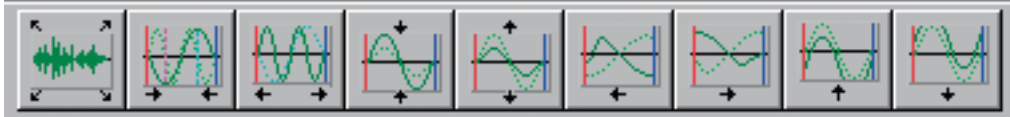
### [FF]

Moves the data playback position in the forward direction (to future data). [Fast-Forward]



## Tool bar

Commands controlling the graph display are shown as buttons on this bar. Clicking a button will execute the respective function.



Note
The tool bar becomes available when a file is loaded.
The graph display setting applies to all channels.

## Graph display buttons

These buttons give access to the same functions as the [Graph display range] menu on the menu bar.



[Show All] button

Show the entire data as a graph.

(Same as [Graph display range] menu → [Show All] command)



[X Zoom In] button

Enlarge the range specified by the start point and end point on the X axis.

(Same as [Graph display range] menu → [X Zoom In] command)



[X Zoom Undo] button

Return the enlarged analysis range on the X axis to the previous condition.

(Same as [Graph display range] menu → [X Zoom Undo] command)



[Y Zoom In] button

Enlarge the display range on the Y axis by about 25%.

(Same as [Graph display range] menu → [Y Zoom In] command)



[Y Zoom Out] button

Reduce the display range on the Y axis by about 25%.

(Same as [Graph display range] menu → [Y Zoom Out] command)



[Move -X] button

Move the specified display range on the X axis by one screen to the left (- direction).

(Same as [Graph display range] menu → [Move -X] command)



[Move +X] button

Move the specified display range on the X axis by one screen to the right (+ direction).

(Same as [Graph display range] menu → [Move +X] command)



[Move +Y] button

Move the specified display range on the Y axis by about 25% up (+ direction).

(Same as [Graph display range] menu → [Move +Y] command)



[Move -Y] button

Move the specified display range on the Y axis by about 25% down (- direction).

(Same as [Graph display range] menu → [Move -Y] command)

## **File name**

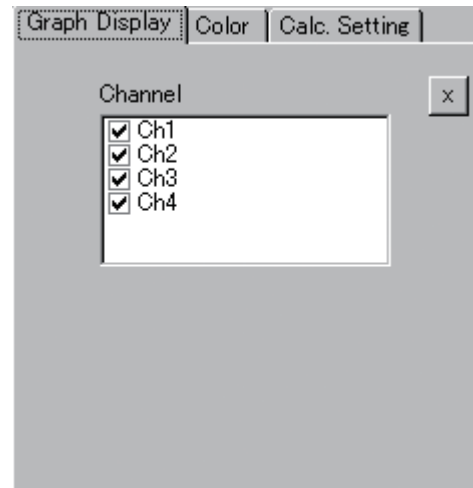
Shows the file name of the displayed data.

## Setting panel

Gives access to various settings including graph display, color, and other items.

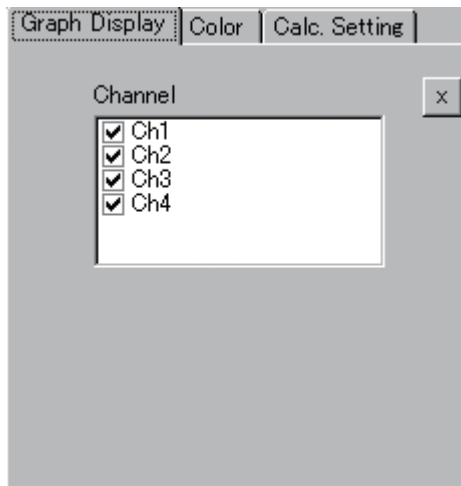
There are three tabs labeled “Graph Display”, “Color”, and “Calc. Setting”. Click on the tab to display the respective setting items.

To close the setting panel, click the  (close) button.



### [Graph Display] tab

Lets you select the channel to display as a graph.

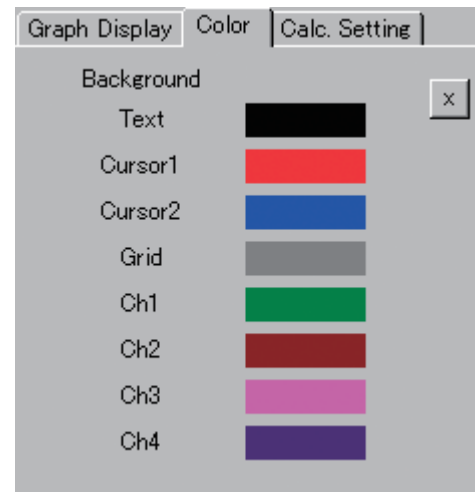


### [Channel]

Click the channel that you want to display as a graph. The respective graph display appears.

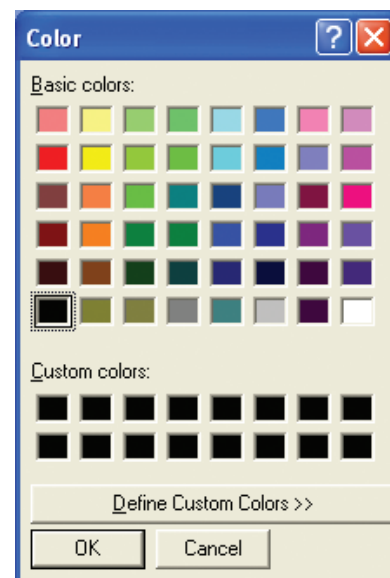
## [Color] tab

Allows you to specify the color for the graph. The color can be specified separately for text, cursor 1 (playback start point), cursor 2 (playback end point), grid, and the lines representing the waveforms of channels 1 to 4.



## Changing the color

When you click on the item for which you want to change the color, the [Color] window appears. Select the desired color and click the [OK] button.



### Note

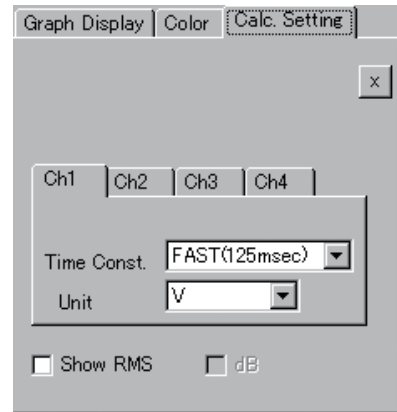
By clicking [Define Custom Colors], you can create your own color shades.

## [Calc. Setting] tab

Lets you set the time constant for root-mean-squared(rms) value calculation.

### [Time Const.]

The time constant (time weighting) to be used for calculating the rms value can be set for each channel separately. Click the  button to bring up a list from which to select the setting (1 msec, 10 msec, 35 msec, FAST (125 msec), 630 msec, SLOW (1 sec)).



#### Note

The time constant setting cannot be lower than 1/2 the sampling interval. This is relevant when the sampling frequency is low.

### [Unit]

Lets you set the graph display Y axis unit for each channel separately. Click the  button to bring up a list from which to select the setting.

#### Note

The “V (Volt)” value is calculated using the input range setting active when the waveform was recorded on the 4-Channel Data Recorder DA-20. Consequently, the value is invalid for WAVE format waveform data that were generated or recorded on equipment other than the DA-20.

### [Show RMS]

When this check box is selected, the rms value graph will be shown. Clicking on the box will toggle the selection on and off.

### [dB]

When this check box is selected, the rms value using the measurement quantity unit (EU, m/s<sup>2</sup>, dB, etc.) will be shown on a logarithmic scale. Clicking on the box will toggle the selection on and off.


The check box becomes available when [Show RMS] is selected.

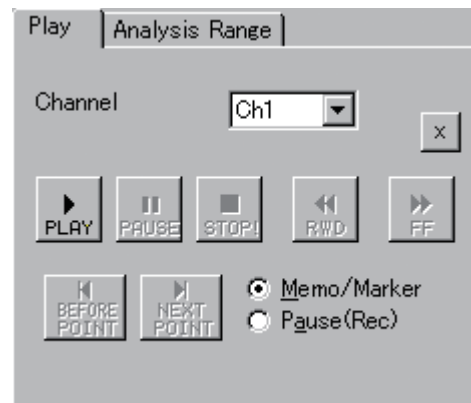
#### Note

The [Unit] setting does not affect this operation.

## Operation panel

Lets you control data playback operations and specify the analysis range.

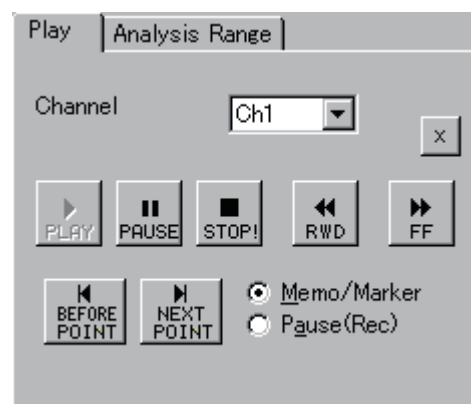
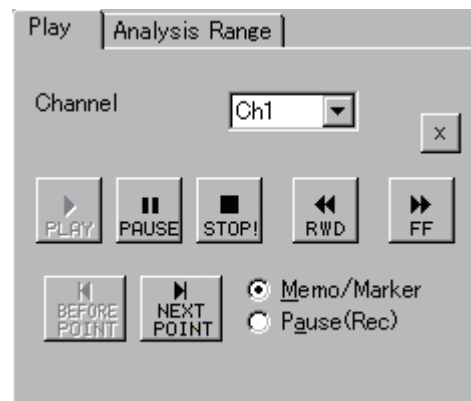
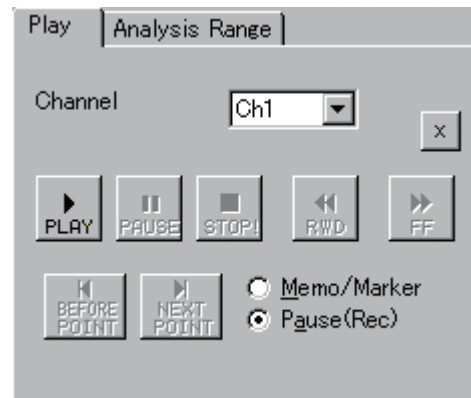
By clicking the  (close) button, the operation panel can be closed.



### [Play] tab

Lets you control data playback operations.

The [Play] menu on the menu bar of the main screen gives access to the same functions.



**[Play Channel]**

Selects the channel for playback. Click the ▾ button to bring up a list from which to select the setting.

**[PLAY] button**

Starts data playback.

**[PAUSE] button**

Pauses or resume data playback.

**[STOP] button**

Stops data playback.

**[RWD] button**

Moves the data playback position in the reverse direction (to past data). Because this resembles the rewind function on a VCR or similar, the function is called “Rewind”.

**[FF] button**

Moves the data playback position in the forward direction (to future data). Because this resembles the fast-forward function on a VCR or similar, the function is called “Fast-Forward”.

**[BEFORE POINT] button**

This button is available during playback and pause.

Clicking the button moves the playback position to any preceding voice memo/marker or pause point. If there are several such points, the playback position is moved to the closest point.

**[NEXT POINT] button**

This button is available during playback and pause.

Clicking the button moves the playback position to any following voice memo/marker or pause point. If there are several such points, the playback position is moved to the closest point.

**[Memo/Marker]**

Enabled when there is voice memo or marker information in the data.

**[Pause (Rec)]**

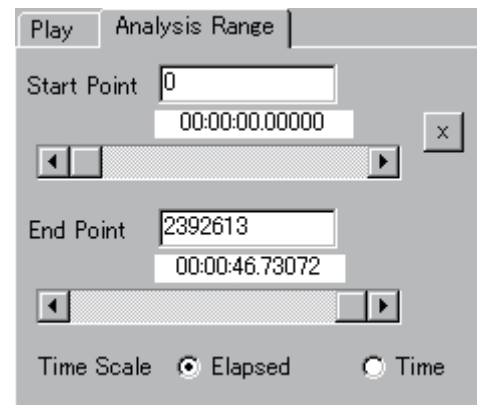
Enabled when there is pause information in the data.



## [Analysis Range] tab

Lets you specify the data analysis range by setting the start position (Start Point) and end position (End Point).

Various data processing functions such as playback and RMS calculation are carried out within the range specified here. This is particularly useful when there is a large amount of waveform data.



## [Start Point]/[End Point]

The [Start Point] and [End Point] for the analysis range can be specified by any of the following methods.

- Enter a numeric value directly into the field at the right of [Start Point] and [End Point].
- Click the ◀ or ▶ button at each end of the sliding bar to move the slider and change the value in the field at the right of [Start Point] or [End Point].
- Drag the slider to change the value in the input field at the right of [Start Point] or [End Point].

### Note

The analysis range setting applies to all channels.

The analysis range can also be set by dragging the cursor on the waveform graph. The setting made by dragging the cursor and the setting made under the [Analysis Range] tab are linked. For information on the waveform graph, see page 26.

## [Time Scale]

Selects how time is expressed. This selection affects the indication of the [Start Point] and [End Point], the cursor time, and the time axis of the graph.

### [Elapsed]

Time is expressed as elapsed time measured from the start of the file.

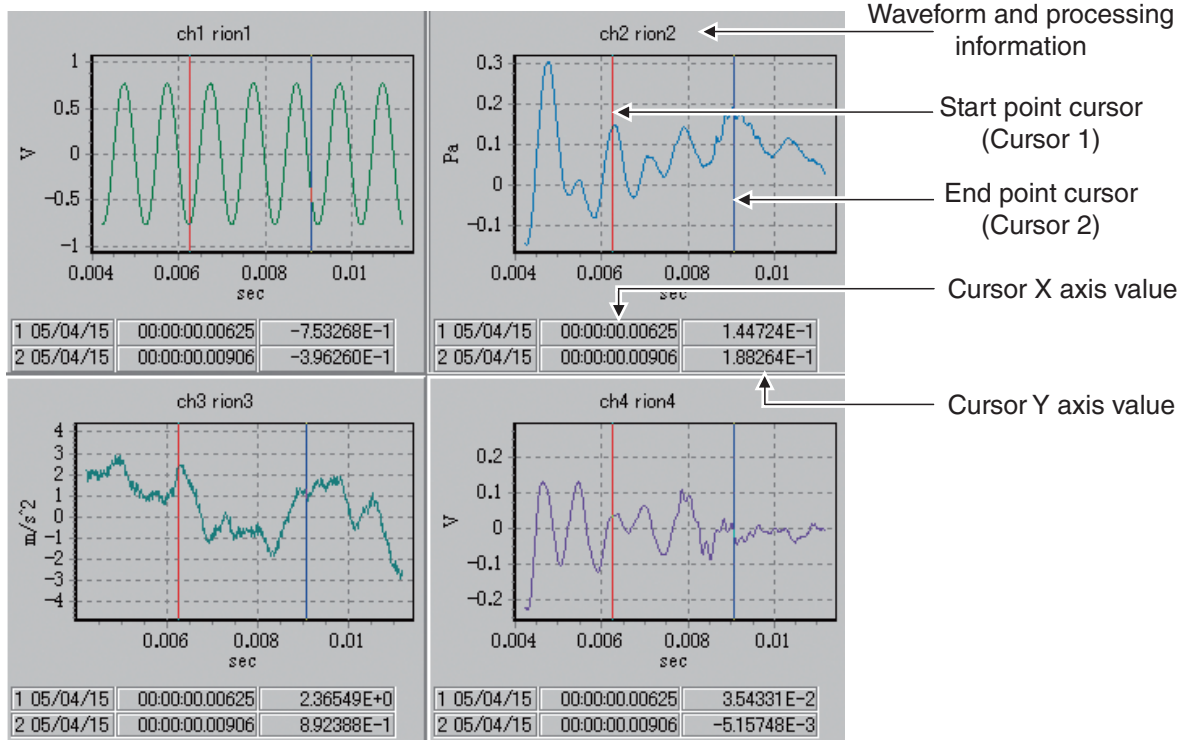
### [Time]

Time is expressed in terms of when the waveform was stored.

# Waveform graph

The selected data are shown as a graph.

Above the graph, waveform and processing information is shown. Beneath the graph, the X axis and Y axis values for the respective cursors are shown. For information on display range and analysis range etc., see pages 27 and 28.



## Specifying the analysis range

You can specify the analysis range by moving the cursors on the graph. The analysis range setting applies to all channels.

1. Drag the start point cursor (cursor 1) from the left edge of the graph towards the right, to the desired start point.
2. Drag the end point cursor (cursor 2) from the right edge of the graph towards the left, to the desired end point.

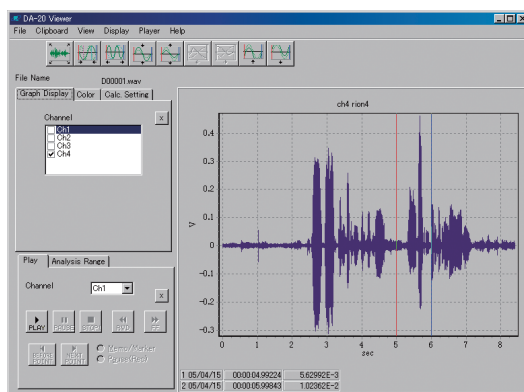
### Note

The range can also be specified using the [Analysis Range] tab on the operation panel. For details, see the section “[Start Point]/[End Point]” (page 25).

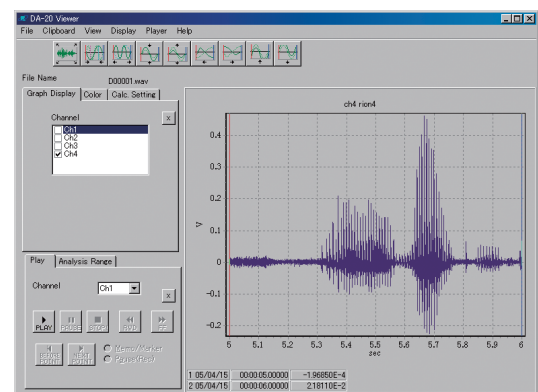
## Zooming the specified analysis range

The analysis range specified with the cursors on the graph can be zoomed.

1. Specify the analysis range with the cursors.
2. Perform zoom by one of the following two methods.
  - Click the [X Zoom In] button on the tool bar.
  - Use the [Graph display range] menu and select the [X Zoom In] command.



Before zoom



After zoom

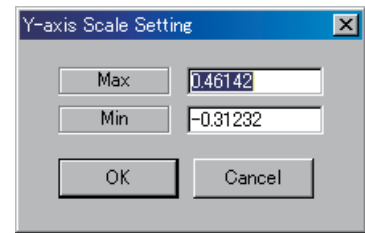
## Setting the Y axis display range

When you double-click on a displayed graph, the “Y-axis Scale Setting” screen appears.

Enter the maximum and minimum values in the respective fields and click the [OK] button. The Y axis display range will change accordingly.

To abandon the setting, click the [Cancel] button.

You can also change the Y axis display range by right-clicking on the graph and holding the mouse button while moving the mouse up or down.



## Other display range settings

Other display settings can be made by using the [Graph display range] menu or the various buttons on the tool bar.

For details, see the sections “[Graph display range] menu” (page 15) and “Graph display buttons” (page 18).

# Operation Flow

This software has two kinds of usage applications. The first usage is to check and display waveform data that were recorded with the DA-20 and to save such data on the computer as required, in a specific file format. The second usage is for checking and setting recording parameters used by the DA-20 and to write such parameter settings to a CompactFlash card for use in the DA-20.

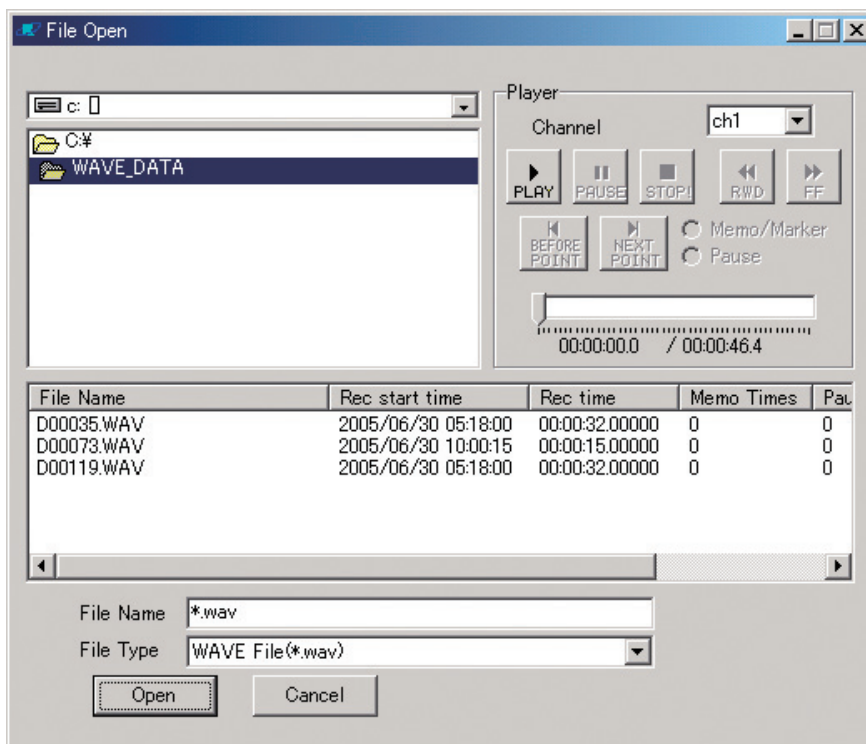
This section provides a brief outline of each usage type. For detailed steps, refer to the respective sections on the pages indicated.

## I. Checking and saving waveform data

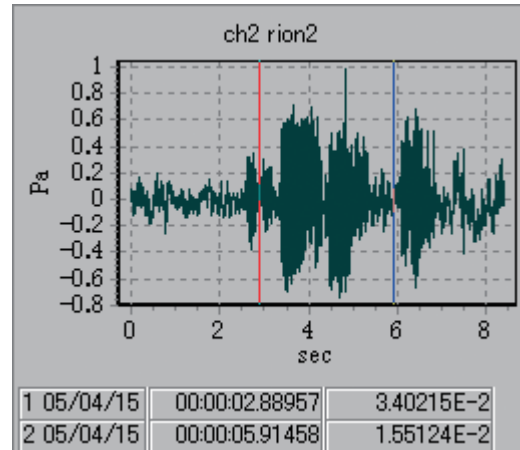
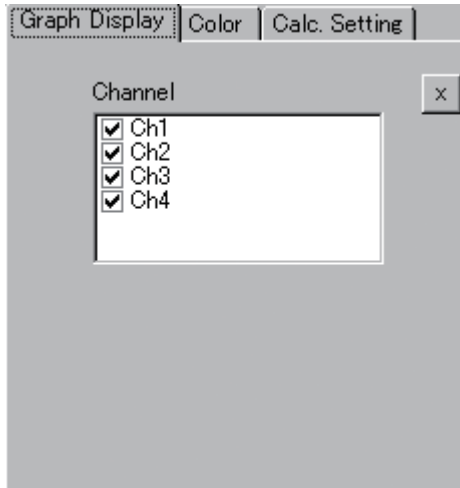
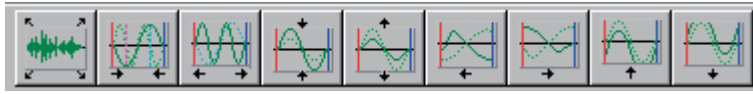
1. Select the file whose data you want to check and save (see page 36).

On the menu bar, access the [File] menu and select [File Open]. The “File Open” screen appears. Select the desired file.

From this screen, you can also play back the selected file using the Player panel at the top right of the screen.



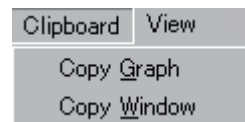
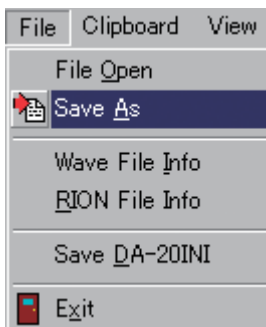
- Use tool bar and the setting panel to display the waveform data and check the contents (see pages 17 to 18 and 20 to 22).



- Save the data.

Using the original data, you can specify a range and save it as a new file (see page 37).

You can also copy the display contents into the clipboard, for saving as a bmp file or for pasting into a document or other application (see page 14).



## II. Writing a setting file to a CompactFlash card for use in the DA-20

You can set the recording conditions of the DA-20 using this software. The procedure is as follows.

### Note

For details on recording conditions, refer to the documentation of the DA-20.

1. In the formatting menu of the computer, select “FAT” as the file system.

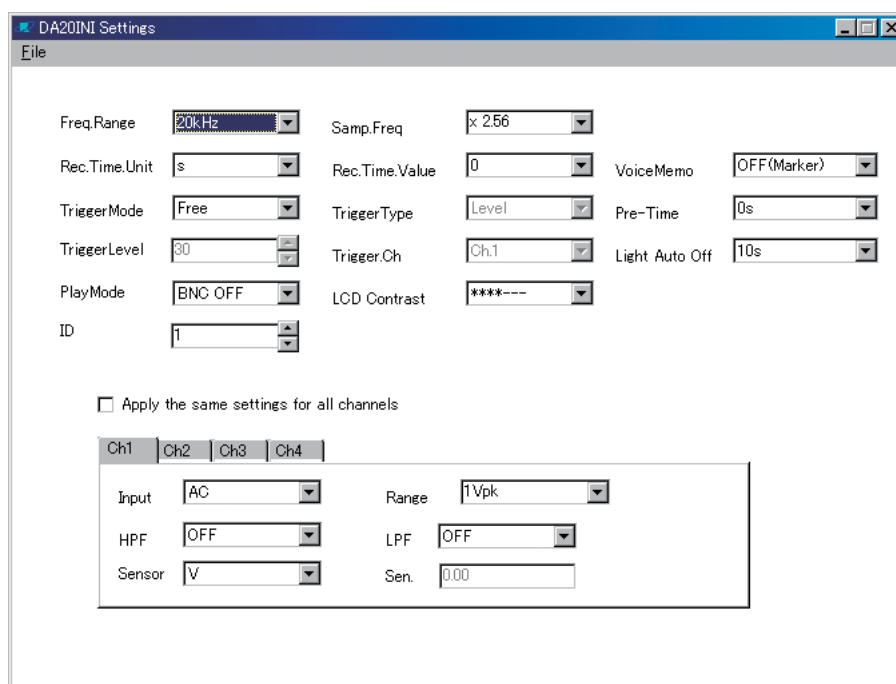
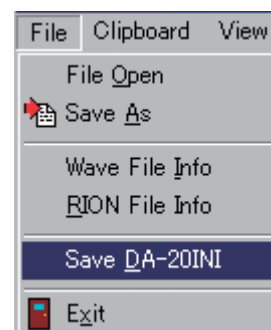
### Important

Do not select a file system other than FAT (such as FAT32 etc.). CompactFlash cards that have been formatted using a file system other than FAT (such as FAT32 etc.) cannot be used in the DA-20.

2. Format the CompactFlash card.
3. Open the [DA20INI Settings] screen.

To open this screen, access the [File] menu on the menu bar and select [Save DA20INI].

The [DA20INI Settings] screen opens.



4. Change the settings as desired and write the result to the CompactFlash card for use in the DA-20. For information about the relationship between setting items and DA-20 operation, see page 40.

When the settings have been changed, save the DA20.INI file.

From the [DA20INI Settings] screen, select [Save As] and enter “DA20.INI” as the file name.

<b>Important</b>
Files with names other than “DA-20.INI” will not be recognized by the DA-20 and the unit will not operate.

<b>Note</b>
If WAVE files are also to be stored on the CompactFlash card, write the DA-20.INI file first as described above, and then follow the instructions in “Copying data to CompactFlash card for playback in DA-20” (page 33) from step 3 to write the WAVE files to the card.



## Copying data to CompactFlash card for playback in DA-20

To copy data onto a CompactFlash card for playback with the DA-20, proceed as follows.

Note
The explanation assumes that there are data files on the computer that you want to play back with the DA-20.

1. In the format menu of the computer, select “FAT” as the file system.

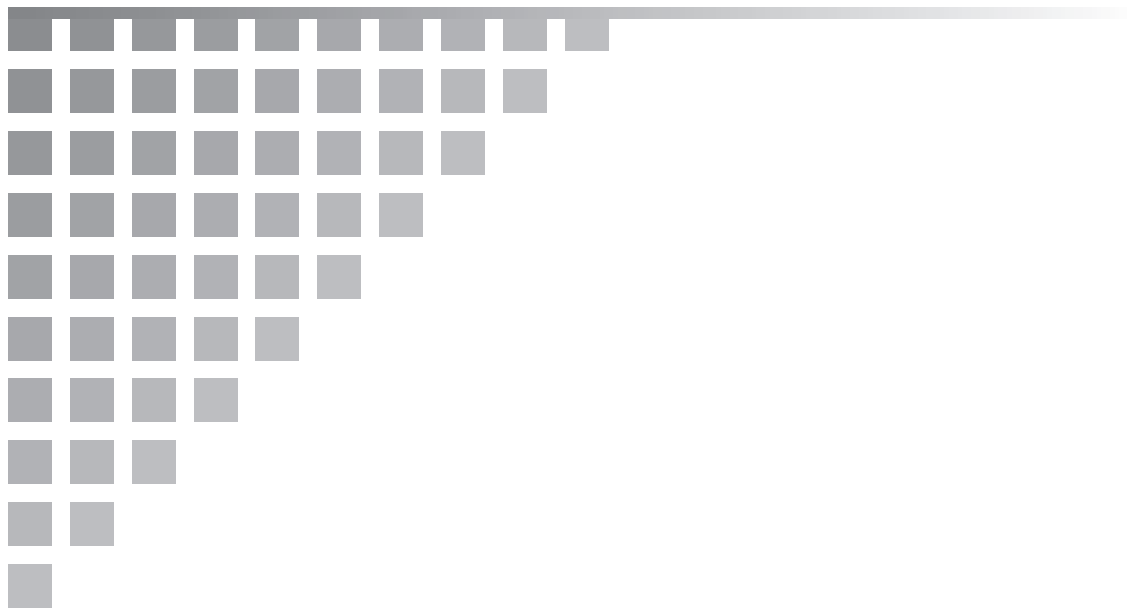
Important
Do not select a file system other than FAT (such as FAT32 etc.). CompactFlash cards that have been formatted using a file system other than FAT (such as FAT32 etc.) cannot be used in the DA-20.

2. Format the CompactFlash card.
3. Create a folder named “WAVEFILE” on the hard disk of the computer, for example on the desktop.
4. Copy the data file(s) to be used for playback on the DA-20 into this folder. The file names must conform to the D\*\*\*\*\*.WAV format as specified for the DA-20.

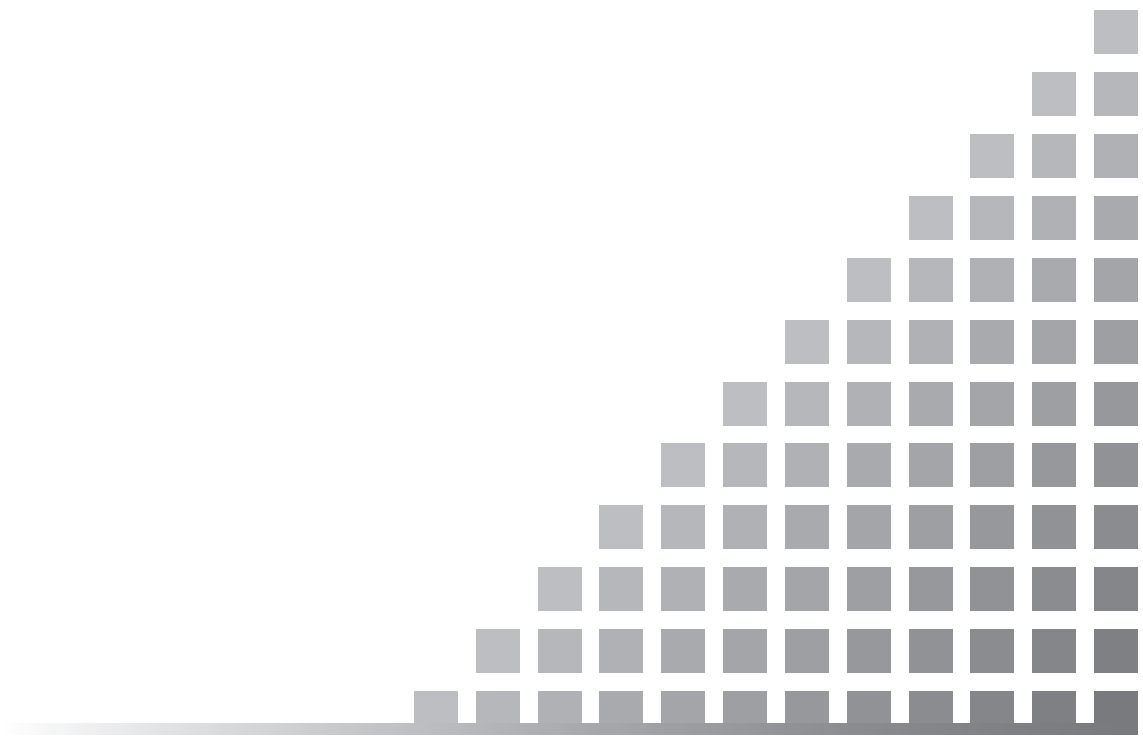
Note
<ul style="list-style-type: none"><li>• The “*****” is an alphanumeric string of five characters.</li><li>• Copy files in sequence into the folder, starting with lower “*****” values.</li><li>• Use only data files that were recorded with the DA-20 or files that were created with the DA-20 Viewer software by specifying and saving a range. Other kinds of WAVE files will not contain Rion file information and can therefore not be played on the DA-20.</li></ul>

5. Copy the entire “WAVEFILE” folder to the CompactFlash card in one operation, using a suitable tool of the operating system (such as Explorer).

<b>Important</b>
<p>Any of the following actions will cause all data on the CompactFlash card to become unplayable by the DA-20. If such an action was carried out by mistake, back up the data from the CompactFlash card onto the computer and then perform the above procedure once more from the beginning.</p> <ul style="list-style-type: none"><li>• A data file on the CompactFlash card was deleted by a device other than the DA-20.</li><li>• A data file on the CompactFlash card was overwritten by a device other than the DA-20.</li><li>• Files from the “WAVEFILE” folder were copied onto the CompactFlash card individually (not as the entire folder).</li><li>• The “WAVEFILE” folder was copied onto the CompactFlash card without formatting the card first.</li><li>• A file of another application was written to the CompactFlash card. (Even deleting such a file will not solve the problem.)</li></ul>



# Advanced Operation



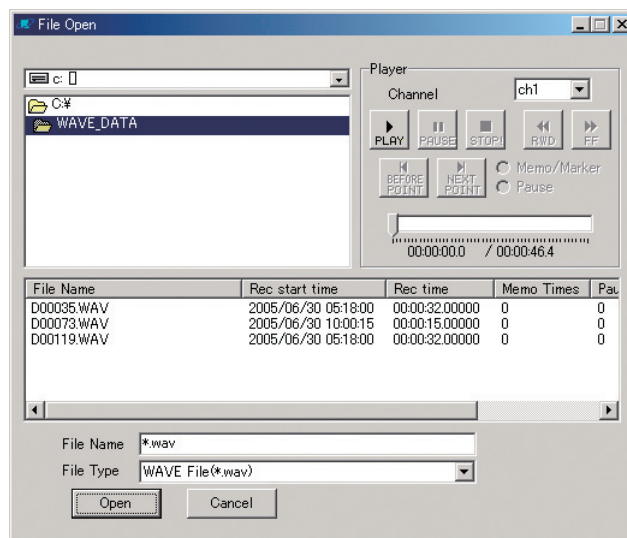
# File Operations


This section describes how to select files for analysis, how to save a specified range, how to display information about various files, and how to set the data recording parameters for the 4-Channel Data Recorder DA-20.

## Selecting a file

Select a WAVE file for display as follows.

1. From the [File] menu, select the [File Open] command.  
The [File Open] screen appears.



2. From the list of drives, select the drive where the file to be analyzed is located. Click the  button to bring up a list from which to make the selection.  
A list of folders on the selected drive appears in the folders window.
3. From the list of folders, select the folder where the file to be analyzed is located.  
A list of files in the selected folder appears.

### Note

When you move the pointer to a file and click on it, the waveform playback panel becomes active, allowing you to check the content of the file. For information on how to use the waveform playback panel, see the section “Operation panel” (page 23).

Files that are not in a format that can be opened by the DA-20 will not be displayed, even if they are WAVE files.

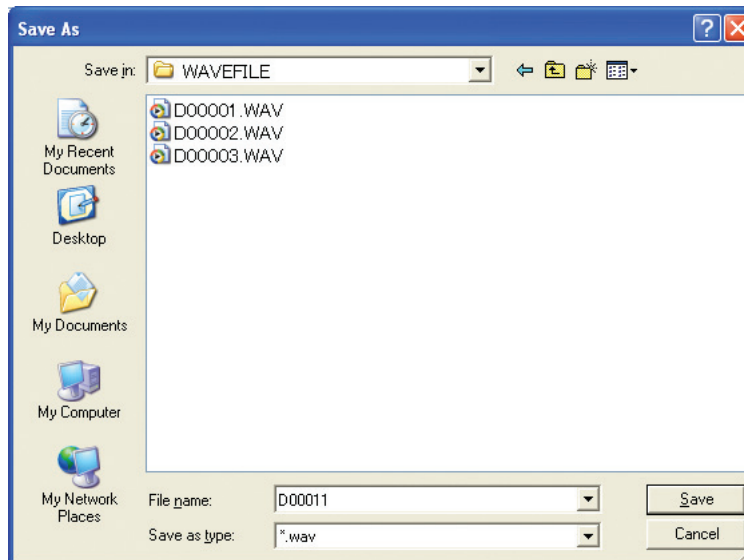
4. Click the [Open] button.  
The selected file is loaded.

## Saving a specified range

The data of a specified range can be saved as a WAVE file or text (.CSV) file. “Specified range” refers to the area between the start point and end point cursors.

1. From the [File] menu, select the [Save As] command.

The [Save As] screen appears.



2. In the [Save in] field, select the target drive or folder. Click the ▾ button to bring up a list from which to make the selection.

The folders in the selected drive/folder are shown.

3. Select the target folder from the folder/file list.
4. Enter the name of the file to be created in the [File name] field. The [Save as type] field lets you select either “.WAV” or “.CSV”.
5. Click the [Save] button.

### Note

When the file has been saved correctly, a message to that effect is displayed.

When saving CSV files, the software automatically combines 60,000 data into one file, and assigns a name using the file name of step 4 as a base, adding a sequential number starting with 000: “<file name>+<sequential number>.CSV”. Voice memo/marker information and pause information (count, time, size) will not be saved.

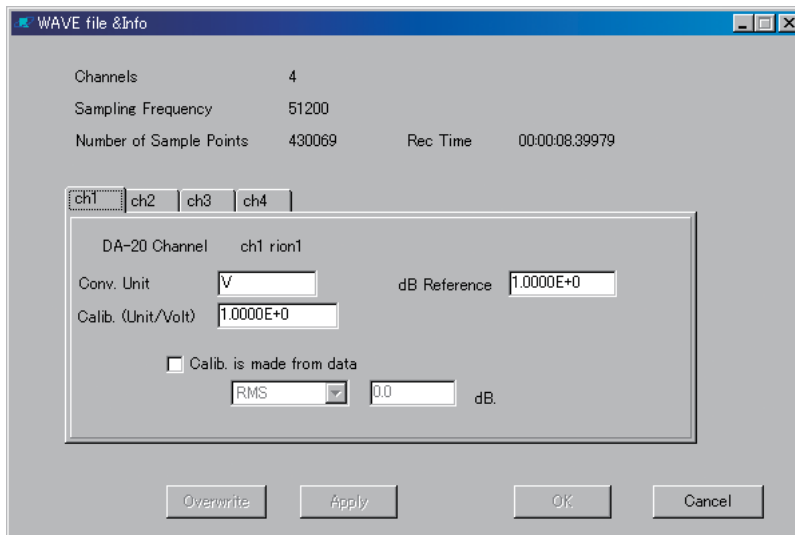
## WAVE file information

Information about the currently open WAVE file (number of channels, sampling frequency, etc.) can be displayed. On this display, the Conv. Unit, dB Reference, and Calib. (Unit/Volt) can be changed.

### Important

When you change the Conv. Unit set at the DA-20, the file will no longer be playable on the DA-20. When saving a range of data as a file with the intention of performing playback on the DA-20, do not change the conversion unit in the WAVE file information.

1. From the [File] menu, select the [Wave file Info] command.  
The [Wave file &Info] screen appears.



### Note

Recorded data created with the 4-Channel Data Recorder DA-20 contain Rion specific information about Conv. Unit, dB Reference, Calib. (Unit/Volt), etc. When this information is not present, the default values are shown.

For details regarding settings, see “About the Calibration Function (Read-out Conversion)” on page 52.

2. Change the [Conv. Unit], [dB Reference], and [Calib. (Unit/Volt)] fields as required.

### Note

By clicking the [Apply] button after changing a setting, you can make the change effective immediately.

3. To terminate the file information view/change procedure, click the [OK] button.

## Rion file information

Recorded data created with the 4-Channel Data Recorder DA-20 contain Rion specific information about various items. Memo information can also be entered or edited.

1. From the [File] menu, select the [Rion File Info] command.

The [Rion File Info] screen appears.

File Format	1	Channel	4	Sampling Frequency	51200
Product Name	DA-20	Serial Number	00000000	File Version	0
Trigger Type	Level	Trigger Mode	Free	Trigger Slope	+
Trigger Channel	1	Trigger Level (%)	30	Pre-Time (sec)	0
Trigger Interval (sec)	0	Trigger Start Time	2005/04/15 17:55:54		
Pause Times	0				
Memo/Marker times	0	ID number	1		

ch1	ch2	ch3	ch4		
Conv. Unit	V	Calib. (Unit/bit)	1.0869E-3	Calib. (Unit/Volt)	1.0000E+0
Input Range	1V	Low Pass Filter	OFF	High Pass Filter	OFF
Overload	No	dB reference	1V		
Memo	<input type="text"/>				

Apply      OK      Cancel

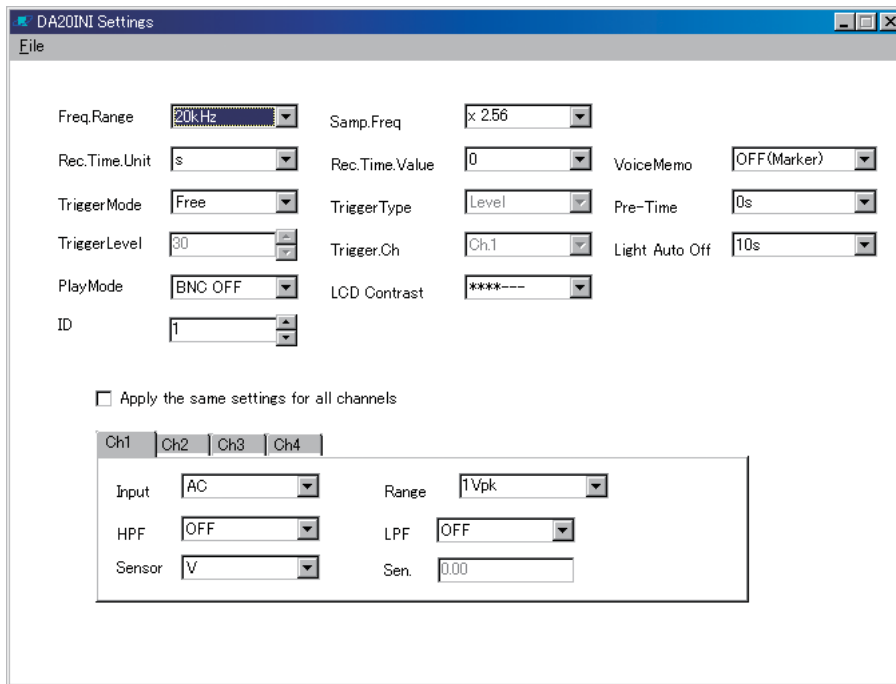
2. Enter or change the memo information as required (max. 32 characters).
3. To terminate the Rion file information view procedure, click the [OK] button.

## Creating a DA20.INI file

The DA-20 Viewer software allows you to control the data recording parameters of the DA-20. For information about parameter settings, consult the DA-20 Instruction Manual.

1. From the [File] menu, select the [Save DA20INI] command.

The [DA20INI Settings] screen appears.



2. Change the various settings as required.

The available setting items as they appear on this screen and the corresponding DA-20 parameter are listed below.

Freq.Range	Frequency range
Samp.Freq	Sampling frequency and frequency range ratio (sampling frequency/frequency range)
Rec.Time.Unit	Recording time unit (hours/minutes/seconds)
Rec.Time.Value	Recording time value
VoiceMemo	Voice memo function
TriggerMode	Trigger operation mode
TriggerType	Trigger signal type
Pre-Time	Pre-recording time
TriggerLevel	Trigger level
Trigger.Ch	Trigger channel
Light Auto Off	Backlight timer
PlayMode	Playback mode
LCD Contrast	Display contrast
ID	ID number



The following setting items can be set for each channel separately.

If the check box [Apply the same settings for all channels] is selected, all channels will use the settings made for channel 1. Note that simply deselecting this check box will not restore the original settings in the other channels.

Input	Sensor type
Range	Input range
HPF	High-pass filter
LPF	Low-pass filter
Sensor	Sensor type and unit
Sen.	Sensitivity and unit conversion

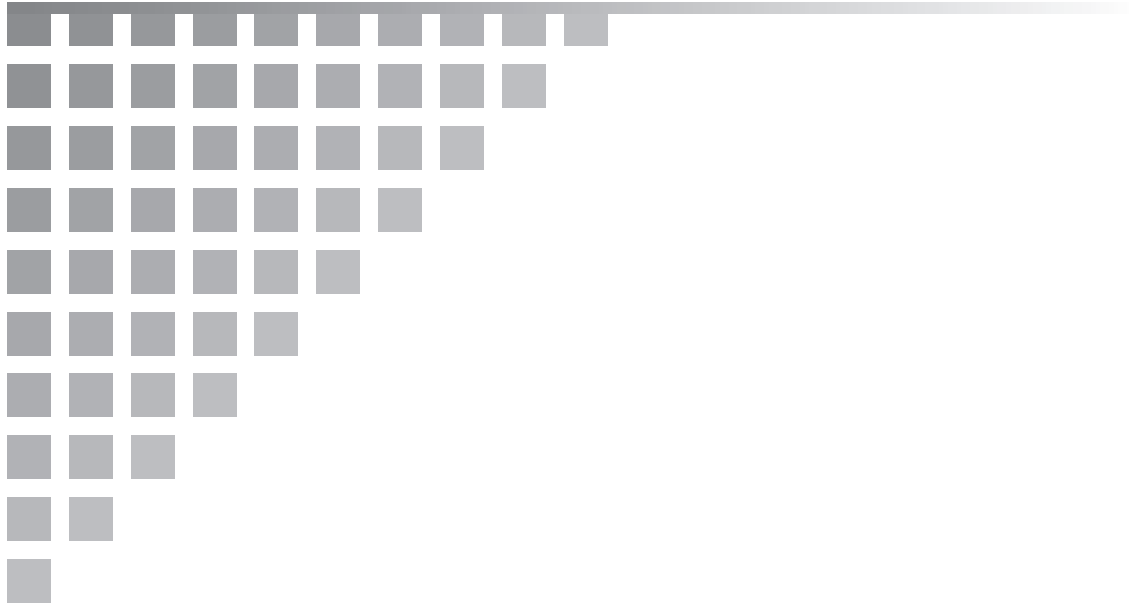
The following limitations apply to the respective setting items.

- (1) When the sensor type is set to DC, the HPF setting for that channel must be OFF, and the input range of the DA-20 must be 1 V or higher.
- (2) The LPF setting must be lower than the frequency range setting.
- (3) When the trigger signal type is set to “Level”, the trigger channel may not be set to OFF.
- (4) When the frequency range setting is lower than 1 kHz, the Voice memo function must be OFF.

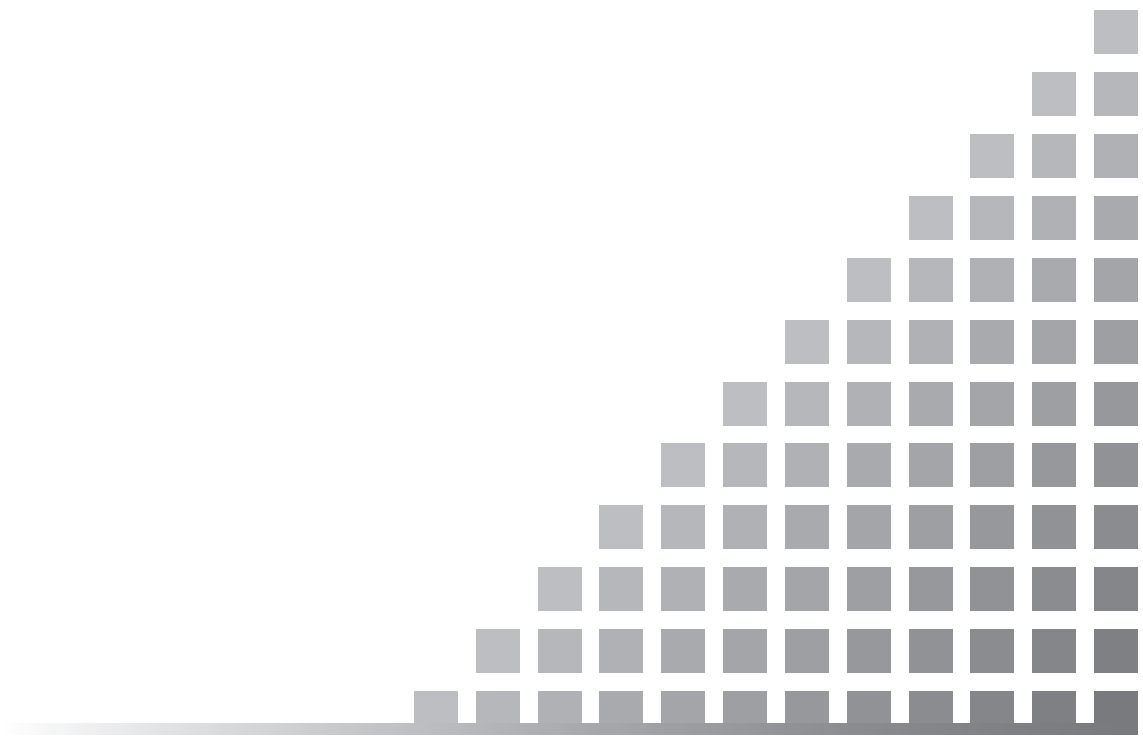
3. Write the settings to the CompactFlash card.

Access the menu bar on this screen, select [File] and [File Save].





# Other Information



# Specifications

## Operating environment requirements

Computer	Intel Pentium III 400 MHz or equivalent CPU, CD-ROM drive, IBM PC/AT compatible architecture (Intel Pentium IV, 2 GHz or higher recommended)
RAM	256 MB or more (512 MB recommended)
Hard disk	5 GB or more of free space (10 GB or more recommended)
Display	Suitable resolution for operating system (1024 × 768, XGA), 256 colors or equivalent

## Operating system (One of the following)

Microsoft Windows 2000 Professional  
Microsoft Windows XP Home Edition  
Microsoft Windows XP Professional  
(English version)

## Other requirements

CompactFlash card slot, speakers, sound card

Media type	CD-ROM install disc (1)
------------	-------------------------

# PCM Format WAVE Files

The WAVE file format represents a commonly used method developed for saving and playing music on Microsoft operating systems (such as Windows XP). WAVE files employ a format called RIFF which encodes information in multiple chunks that are linked and saved as a file.

The chunk configuration used by the DA-20 is as follows.

RIFF chunk:	This is always located at the beginning of the WAVE file and is called the RIFF Header. Including DA-20 specific chunks, the following five sub chunk types are comprised in the RIFF chunk.
fmt sub chunk:	Data attributes (data format, sampling frequency, etc.)
riof sub chunk:	DA-20 specific information (recording conditions etc.)
memo sub chunk:	DA-20 specific information (voice memo/marker data added during recording)
paus sub chunk:	DA-20 specific information (pause data added during recording)
data sub chunk:	Waveform data

The configuration of each (sub) chunk is explained below.

The variable types used in the table are as follows.

WORD:	16-bit unsigned integer
DWORD:	32-bit unsigned integer
double:	IEEE double precision floating
char:	Character string

The little-endian principle is used when storing multi-byte values in memory.

## RIFF chunk

Variable name	Number of bytes	Type	Description
chunkID	4	char	“RIFF”
dwChunkSize	4	DWORD	Chunk size (in bytes)
formType	4	char	“WAVE”

**fmt sub chunk**

Variable name	Number of bytes	Type	Description
chunkID	4	char	“fmt”
dwChunkSize	4	DWORD	Chunk size (in bytes): 16
wFormatTag	2	WORD	Data format: 1 (PCM)
wChannels	2	WORD	Channel number: 1 to 4
dwSamplesPerSec	4	DWORD	Sampling frequency
dwAvgBytesPerSec	4	DWORD	Number of data bytes per second (all channels)
wBlockAlign	2	WORD	Number of bytes per data: channel number × 2
wBitsPerSample	2	WORD	Number of bits/data channel: 16

**rion sub chunk (DA-20 specific)**

Variable name	Number of bytes	Type	Description
chunkID	4	char	“rion”
dwChunkSize	4	DWORD	Chunk size (in bytes): 460
RIONFORMAT	460	STRUCTURE	Recording parameters and other information of DA-20

**memo sub chunk (fixed to 40 kB, DA-20 specific)**

Variable name	Number of bytes	Type	Description
chunkID	4	char	“memo”
dwChunkSize	4	DWORD	Chunk size (in bytes): $1024 \times 40 - 8 = 40952$
TIMEDATA	40944	STRUCTURE	Recording voice memo or marker information $\text{MEMORECTIMEFORMAT} \times 3412 = 40944$
dummy	8	BYTE	For adjusting overall sub chunk size to 40 kB

**paus sub chunk (fixed to 40 kB, DA-20 specific)**

Variable name	Number of bytes	Type	Description
chunkID	4	char	“paus”
dwChunkSize	4	DWORD	Chunk size (in bytes): $1024 \times 40 - 8 = 40952$
TIMEDATA	40944	STRUCTURE	Recording pause information $\text{MEMORECTIMEFORMAT} \times 3412 = 40944$
dummy	8	BYTE	For adjusting overall sub chunk size to 40 kB

## data sub chunk

Variable name	Number of bytes	Type	Description
chunkID	4	char	“data”
dwChunkSize	4	DWORD	Waveform data size (in bytes)
DATA	n	STRUCTURE	Waveform data

Even if no voice memo/marker information and pause information is recorded in the memo sub chunk and paus chunk, the size will be 40 kB respectively. The TIMEDATA will consist of 3412 voice memo/marker or pause information units (MEMOREC-TIMEFORMAT, see below).

MEMORECTIMEFORMAT is defined as follows.

## MEMORECTIMEFORMAT (DA-20 specific)

Variable name	Number of bytes	Type	Description
dwDataAddress	4	DWORD	Voice memo/marker position. Indicates the position in bytes from the start of DATA.
dwDataSize	4	DWORD	Voice memo size (in bytes). For marker, this is zero.
DATETIMEM	4	DWORD	Voice memo/marker start time/time Adding D31 to D262000 gives the year D25 to D22 Month D21 to D17 Day D16 to D12 Hours D11 to D6 Minutes D5 to D0 Seconds

WAVE file data in the DA-20 are fixed to 16 bit. The data sequence according to the number of channels is as follows.

### For 1 channel (same as 16-bit monaural)

sample1	sample2	sample3	sample4	. . .
ch-n1 data	ch-n1 data	ch-n1 data	ch-n1 data	. . .

### For 2 channels (same as 16-bit stereo)

sample1		sample2		. . .
ch-n1 data	ch-n2 data	ch-n1 data	ch-n2 data	. . .

### For 3 channels

sample1			. . .	
ch-n1 data	ch-n2 data	ch-n3 data	. . .	. . .

### For 4 channels

sample1				. . .
ch-n1 data	ch-n2 data	ch-n3 data	ch-n4 data	. . .



**RIONFORMAT (DA-20 specific)**

Order	Variable name	Number of bytes	Type	Description
000	nMaker	4	DWORD	Maker name: "RION"
004	ProductType	8	char	Product type: spaces if empty
012	nId	4	DWORD	Device ID: Integer value
016	nFileVersion	4	DWORD	File version: 1 to
020	nCpuVersion	8	char	CPU version: *.*.**
028	nDspVersion	8	char	DSP version: *.*.**
036	Ch1ValuePerBit	8	double	Channel unit A/D conversion measurement amount (the product of this value and the A/D conversion value is the measurement amount) (DATA of data chunk is the A/D conversion value) When OFF, the value is zero.
044	Ch2ValuePerBit	8	double	
052	Ch3ValuePerBit	8	double	
060	Ch4ValuePerBit	8	double	
068	Ch1ValuePerVolt	8	double	1V <sub>pk</sub> measurement amount of each channel (corresponds to EU value, sensor sensitivity, etc.) When OFF, the value is zero, 1 without calibration
076	Ch2ValuePerVolt	8	double	
084	Ch3ValuePerVolt	8	double	
092	Ch4ValuePerVolt	8	double	
100	Ch1Unit	8	char	Left-aligned measurement amount Blanks are padded with spaces. "m/s <sup>2</sup> ", "EU", "dB", "V" OFF settings are all "(space)"
108	Ch2Unit	8	char	
116	Ch3Unit	8	char	
124	Ch4Unit	8	char	
132	Ch1InputRange	8	char	Left-aligned input range (before 1V <sub>pk</sub> calibration) Blanks are padded with spaces. "1V", "0.01V" etc.
140	Ch2InputRange	8	char	
148	Ch3InputRange	8	char	
156	Ch4InputRange	8	char	

Order	Variable name	Number of bytes	Type	Description
164	dwCh1LowPassFilter	4	DWORD	Low-pass filter of each channel 0: OFF, 6: 100 Hz, 7: 500 Hz, 10: 1 kHz
168	dwCh2LowPassFilter	4	DWORD	
172	dwCh3LowPassFilter	4	DWORD	
176	dwCh4LowPassFilter	4	DWORD	
180	dwCh1HighPassFilter	4	DWORD	High-pass filter of each channel 0: OFF, 10: 0.3 Hz, 15: 10 Hz
184	dwCh2HighPassFilter	4	DWORD	
188	dwCh3HighPassFilter	4	DWORD	
192	dwCh4HighPassFilter	4	DWORD	
196	dwTriggerType	4	DWORD	Trigger type 10: Level, 40: External, 50: External Gate
200	dwTriggerMode	4	DWORD	Trigger mode 10: Free, 20: Single, 30: Repeat
204	Reserved	4	DWORD	Always 0
208	dwTriggerChannel	4	DWORD	Trigger channel: 1 to 4
212	dwTriggerLevel	8	double	Trigger level: unit is %
220	dwPreTrigger	4	DWORD	Pre-trigger: Seconds unit (equals pre-time)
224	Reserved	4	DWORD	Always 0
228	StartTime	16	char	Recording start time: YyyyMmDd HhMmSs0 (space between d and H) Example: 2005/06/28, 8:30 is "20050628 0830000"
244	nCh1OverloadInfo	2	WORD	Overload incidence during recording in each channel 0: no, 1: yes
246	nCh2OverloadInfo	2	WORD	
248	nCh3OverloadInfo	2	WORD	
250	nCh4OverloadInfo	2	WORD	
252	Ch1Memo	32	char	Comment string for each channel Used by DA-20 Viewer Software
284	Ch2Memo	32	char	
316	Ch3Memo	32	char	
348	Ch4Memo	32	char	
380	dwPause	4	DWORD	Number of pause incidences during recording: 0 to
384	Reserved	4	DWORD	Always 0
388	Ch1CCLD	2	WORD	CCLD information for each channel 0: DC/AC 1: CCLD 2: CHG (using VP-80)
390	Ch2CCLD	2	WORD	
392	Ch3CCLD	2	WORD	
394	Ch4CCLD	2	WORD	

Order	Variable name	Number of bytes	Type	Description
396	Ch1dBReference	8	double	EU value for 0 dB in each channel Zero when no dB conversion is carried out
404	Ch2dBReference	8	double	
412	Ch3dBReference	8	double	
420	Ch4dBReference	8	double	
428	nVoiceMemo	2	WORD	Voice memo setting 0: OFF (Marker), 1: Voice Only, 2: Voice/Input Zero when no voice memo data are present with Voice/Input setting
430	wInputCoupling	4	DWORD	Input setting information 0: OFF, 1: AC, 2: DC, 3: CCLD, 4: reserved, 5: CHARGE D15 to D12 Using above code for channel 4 D11 to D8 Using above code for channel 3 D7 to D4 Using above code for channel 2 D3 to D0 Using above code for channel 1
434	dwSerialNr	4	DWORD	Serial number
438	nRepeatTriggerNu	2	WORD	Number of trigger incidences Repeat trigger sequential number (0 to)
440	nVoice	2	WORD	No. of voice memo or marker recordings
442	Reserved	18	Indeterminate	----

# About the Calibration Function

## (Read-out Conversion)

### Basic relationship between physical quantity of measurement object and recorded data

A sensor produces a voltage (electrical signal) in response to a change in the physical quantity acting upon it. However, when the sensor is changed to one with a different sensitivity, the output voltage will also change significantly, even if the physical quantity remains the same. Therefore sensors usually come with individual documentation stating the sensitivity of the sensor in response to a given physical quantity. Some examples are given below.

Examples

Accelerometer with built-in preamplifier    6.42 mV/(m/s<sup>2</sup>)

When the normal acceleration unit of 1 m/s<sup>2</sup> is applied to this sensor, it will produce a voltage of 6.42 mV.

Microphone    -28 dBV/Pa

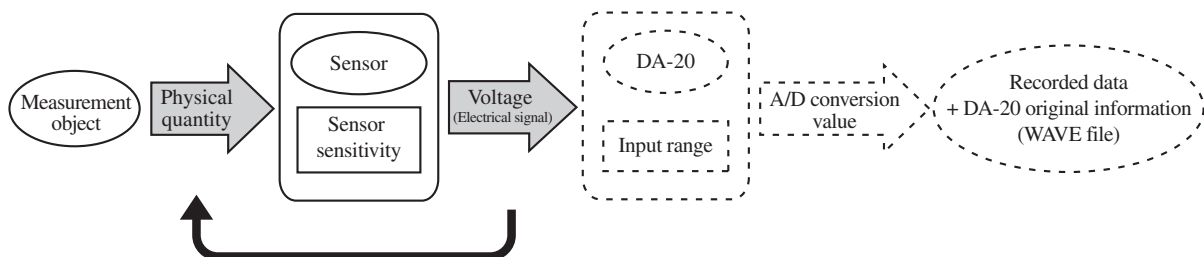
When the normal sound pressure unit of 1 Pa is applied to this sensor, it will produce a voltage of -28 dBV = 0.04 V.

When the sensor sensitivity is known, the sensor output can be used to calculate the physical quantity acting on the sensor according to the following equation:

$$\text{Physical quantity} = (1/\text{sensor sensitivity}) \times \text{voltage}$$

Instead of sensor sensitivity, this software uses a coefficient called “Calib. (Unit/Volt)” which is the reciprocal expression of sensor sensitivity. The above equation therefore can be restated as follows.

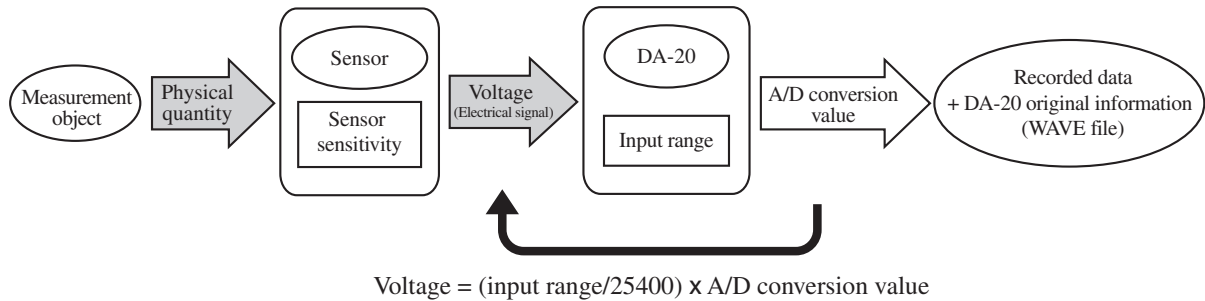
$$\text{Physical quantity} = (1/\text{sensor sensitivity}) \times \text{voltage} = \text{“Calib. (Unit/Volt)”} \times \text{voltage}$$



$$\begin{aligned} \text{Physical quantity} &= (1/\text{sensor sensitivity}) \times \text{Voltage} \\ &= \text{“Calib. (Unit/Volt)”} \times \text{Voltage} \end{aligned}$$

The voltage output by the sensor is then input to the DA-20. The DA-20 performs A/D conversion using the “input range/25400” voltage as 1 unit. The voltage output by the sensor can be calculated according to the following equation.

$$\text{Voltage} = (\text{input range}/25400) \times \text{A/D conversion value}$$



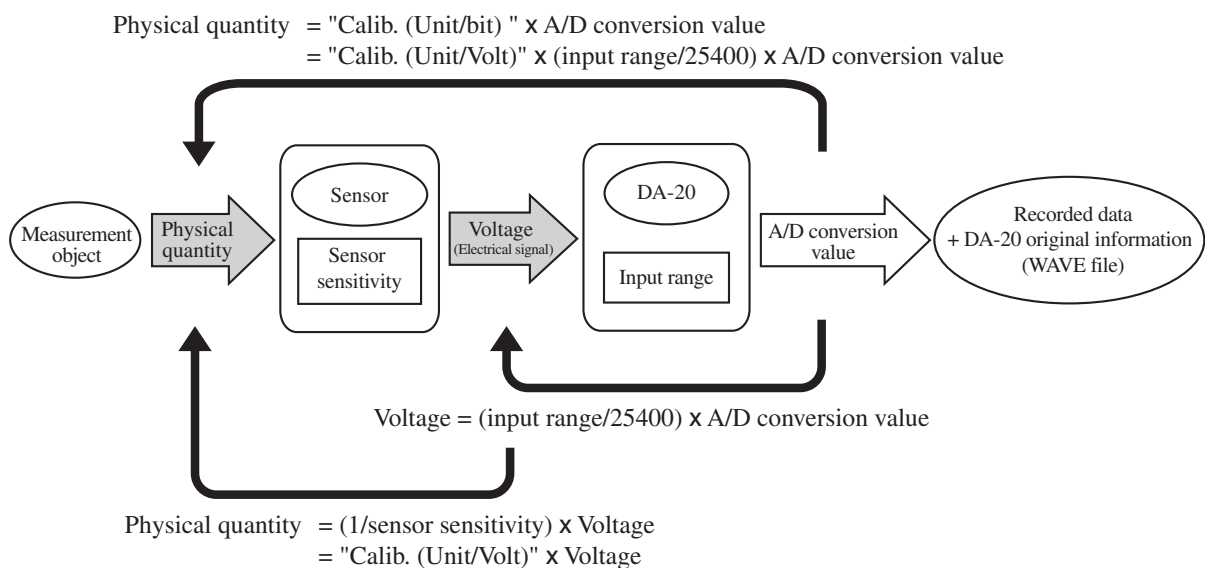
The physical quantity can be calculated from the conversion value stored in the file as follows.

$$\begin{aligned} \text{Physical quantity} &= \text{“Calib. (Unit/Volt)”} \times \text{voltage} \\ &= \{ \text{“Calib. (Unit/Volt)”} \times (\text{input range}/25400) \} \times \text{A/D conversion value} \end{aligned}$$

In this software, the {“Calib. (Unit/Volt)” × (input range/25400)} part is called “Calib. (unit/bit)”. Using this, the above equation becomes

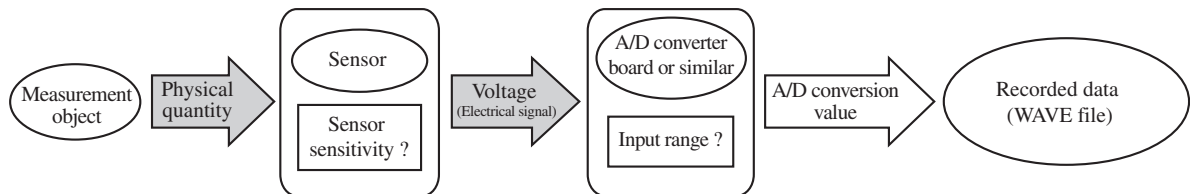
$$\begin{aligned} \text{Physical quantity} &= \text{“Calib. (Unit/Volt)”} \times \text{voltage} \\ &= \text{“Calib. (Unit/bit)”} \times \text{A/D conversion value} \end{aligned}$$

The “Calib. (Unit/bit)” is a useful value for converting the WAVE file data (A/D conversion values) into the corresponding physical quantity.



WAVE files recorded with the DA-20 contain the original information (sensor sensitivity, input range, A/D conversion 1 unit voltage (= input range/25400)). Therefore the measurement data can be read as A/D values or as voltage or as the physical quantity that was the measurement object.

WAVE files not recorded with the DA-20 do not have information about input range, A/D conversion 1 unit voltage etc. Therefore the measurement data can only be read as A/D values.



## Readout change of recorded data

### I. Changing the way data are displayed

#### Selecting the cursor value unit

After A/D conversion, data recorded with the DA-20 can be read as voltage or as the physical quantity that was the measurement object.

The [Unit] selection menu on the [Calc. Setting] tab of the setting panel gives access to settings for the cursor value reading. This setting can be made separately for each channel.

The following selections are available.

None : The A/D conversion value is shown.

V (Volt) : The voltage value is shown.

Pa, m/s<sup>2</sup>, V, EU etc.

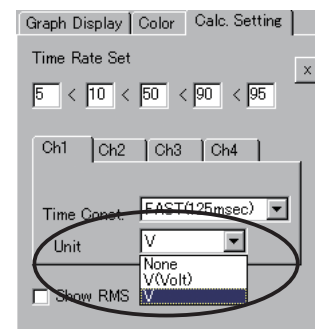
: The physical quantity is shown.

The DA-20 supports only the following four physical quantities as unit names for the third selection: Pa, m/s<sup>2</sup>, EU, V. Due to this limitation, the software allows converting the V and EU values into the original unit names.

However, the maximum length of a unit name is 7 characters.

The unit name change is available on the [Wave File &Info] screen.

For details, see the section “Changing the unit name” in “II. Measurement value readout conversion” on page 60. Because the unit name change also involves the Calib. (Unit/Volt), you should also read the other explanations in “II. Measurement value readout conversion”.



#### Important

For files that are to be played back on the DA-20, do not change the unit name. Otherwise correct playback will not be possible.

## Displaying a waveform as RMS

RMS is calculated from the waveform and displayed according to the time constant setting. The RMS display can be activated by selecting the [Show RMS] check box in the [Calc. Setting] tab.

When switching to RMS display, the dB waveform derived from RMS is shown. To show the RMS value as a waveform, deselect the [dB] check box.

The dB value is calculated as follows.

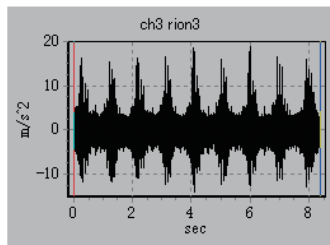
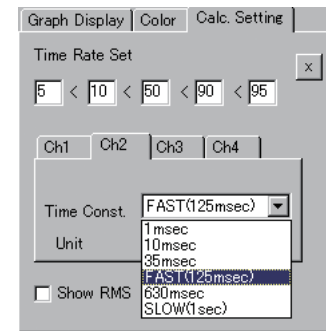
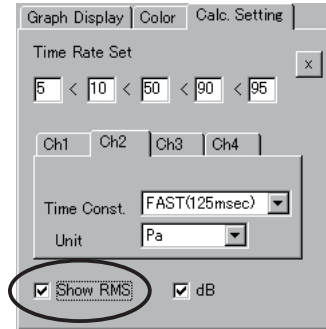
$$\text{dB value} = 20 \log (\text{RMS value (physical quantity value)}/\text{dB Reference})$$

The default setting for the dB Reference is “1”, but this can be changed on the [Wave File &Info] screen. For details about the dB Reference, see “Changing the dB Reference” (page 59) in “II. Measurement value readout conversion”.

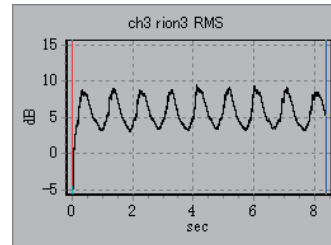
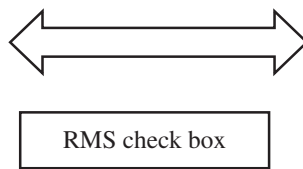
The time constant can be selected from 1 msec, 10 msec, 35 msec, FAST (125 msec), 630 msec, and SLOW (1 sec).

However, the time constant cannot be shorter than 1/2 of the sampling interval (reciprocal expression of sampling frequency).

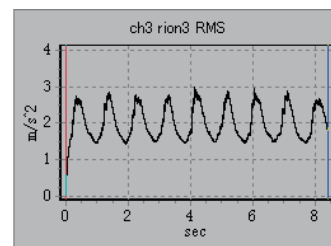
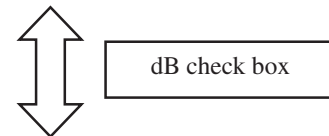
When the time constant is changed during RMS display, RMS recalculation is performed.



Original waveform



dB waveform derived from RMS



RMS waveform display



## II. Measurement value readout conversion

If data were recorded on the DA-20 without correct sensor sensitivity and EU settings, the correct physical quantity can normally not be displayed from the resulting WAVE file.

To solve this problem, the DA-20 Viewer offers a function for changing the Calib. (Unit/Volt). The calib. (Unit/Volt) is the reciprocal expression of sensor sensitivity. For reasons of simplicity, the 0 dB reference value required for dB calculation is fixed to 2E-5 Pa (sound pressure 0 dB) at the DA-20. Physical units other than sound pressure or acceleration are expressed as EU or V.

To augment the control flexibility of the DA-20, the software offers the capability for expressing physical quantities using the original unit names, with a 0 dB reference value as required.

### Changing the “Calib. (Unit/Volt)”

The “Calib. (Unit/Volt)” is the reciprocal expression of sensor sensitivity. By multiplying it with the voltage value derived from the data, the physical quantity is obtained.

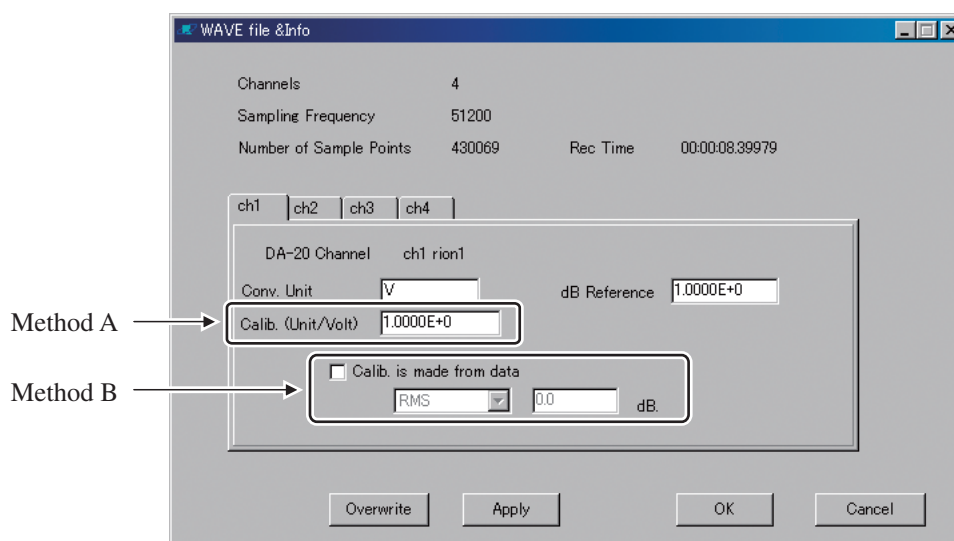
$$\text{Physical quantity} = \text{Calib. (Unit/Volt)} \times \text{voltage}$$

When the Conv. Unit on the [Calc. Setting] tab of the setting panel is set to “V” (Volt), the cursor readout value (voltage) multiplied with the Calib. (Unit/Volt) matches the cursor readout when the unit is set to the physical quantity.

The Calib. (Unit/Volt) can be changed on the [Wave File &Info] screen. There are two methods (method A and method B) for achieving this. The Calib. (Unit/Volt) setting can be made separately for each channel.

Method A “Calib. (Unit/Volt)” text box

Method B Calib. (Unit/Volt) is made from data: XX.X [dB] from waveform data RMS/maximum value



Method A is suitable when sensor sensitivity is known. Enter the Calib. (Unit/Volt) into the respective text box.

Method B is suitable when the calibration signal is included in the recorded data. Also when sensor sensitivity is known, it is recommended to include a calibration signal in the recorded data, for later use. Use the calibration signal waveform range as analysis range and enter the RMS value or maximum value of that waveform in dB. If the calibration signal value is known only as RMS, use this as Y and enter  $20\log Y$  as XX.X dB. The result of calibration using this method will be shown in the “Calib. (Unit/Volt)” text box of method A.

Finally, click [Overwrite] and [Apply] or [OK] to accept the Calib. (Unit/Volt) change. To abandon the change, click the [Cancel] button. (If the button is grayed out and cannot be clicked, move the mouse cursor to a position outside of the input field and click.)

The button functions are as follows.

[Overwrite]	Enable the change and update the WAVE file.
[Apply]	Enable the change.
[OK]	Enable the change and close the screen.
[Cancel]	Abandon any steps taken since the last overwrite or apply action, and close the screen.

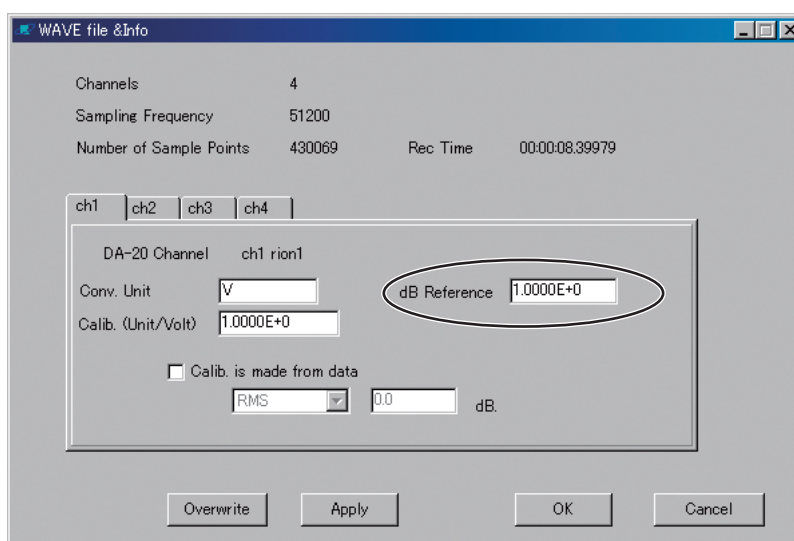
## Changing the dB Reference

The RMS waveform display, FFT analysis result display, and octave-band analysis result display can be switched to dB. The dB value is calculated from the original data as follows.

$$\text{dB value} = 20\log(\text{data value}/0 \text{ dB reference value})$$

The dB value can be calculated with any 0 dB reference value, but for certain kinds of measurement, standards and industry conventions may require a particular value. For example, sound pressure level requires a 0 dB reference value of  $2\text{E-}5$  [Pa].

The 0 dB reference value can be set by entering the value into the [dB Reference] text box on the [Wave File &Info] screen. The setting can be made separately for each channel.



After making the entry, click [Overwrite] and [Apply] or [OK] to accept the change. To abandon the change, click the [Cancel] button. (If the button is grayed out and cannot be clicked, move the mouse cursor to a position outside of the input field and click.)

The button functions are as follows.

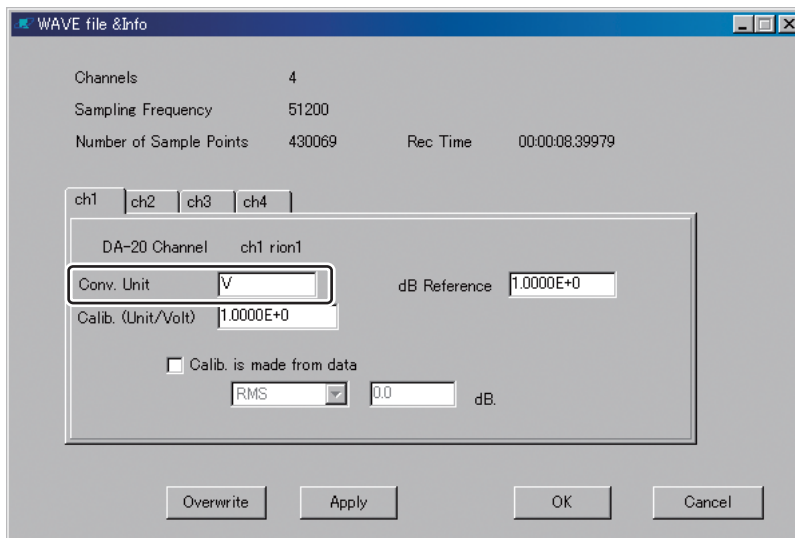
- |             |   |
|-------------|---|
| [Overwrite] | Enable the change and update the WAVE file.   |
| [Apply]     | Enable the change.  |
| [OK]        | Enable the change and close the screen.   |
| [Cancel]    | Abandon any steps taken since the last overwrite or apply action, and close the screen. |

## Changing the unit name

Data that were recorded as EU or V due to restrictions imposed by the DA-20 can be changed into the units such as for temperature (deg.), rotation speed (rpm), or wind speed (m/sec).

The change in unit name is immediately reflected in the waveform display Y axis.

To change the unit name, enter the name into the [Conv. Unit] text box on the [Wave File &Info] screen. The setting can be made separately for each channel. The maximum length is 7 characters.



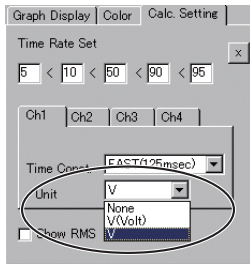
After making the entry, click [Overwrite] and [Apply] or [OK] to accept the change.

To abandon the change, click the [Cancel] button. (If the button is grayed out and cannot be clicked, move the mouse cursor to a position outside of the input field and click.)

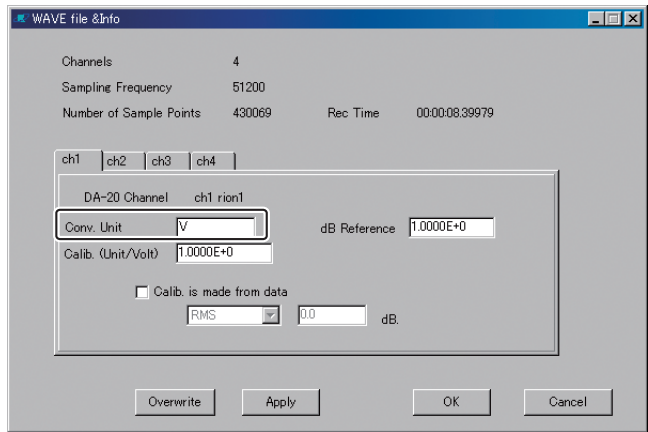
The button functions are as follows.

- |             |   |
|-------------|---|
| [Overwrite] | Enable the change and update the WAVE file.   |
| [Apply]     | Enable the change.  |
| [OK]        | Enable the change and close the screen.   |
| [Cancel]    | Abandon any steps taken since the last overwrite or apply action, and close the screen. |

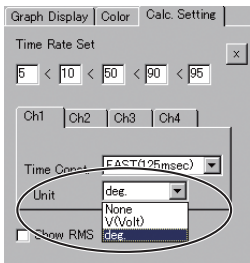
An example for a change in Conv. Unit is shown below.



[Unit] menu:  
physical quantity unit name is "V"

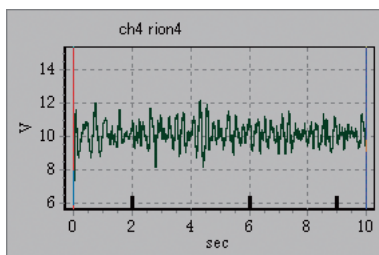
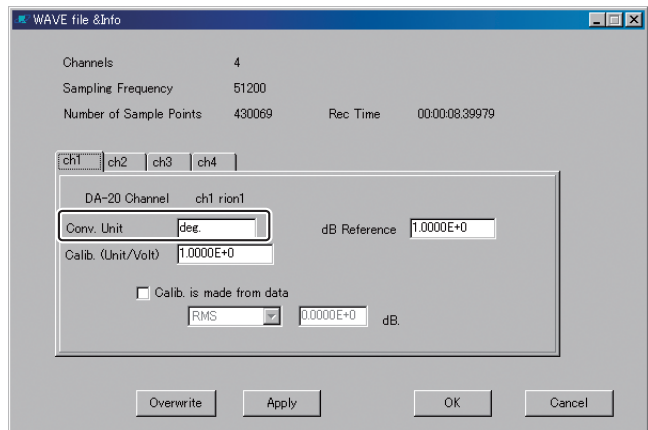


Physical quantity unit display is changed  
from V to deg.

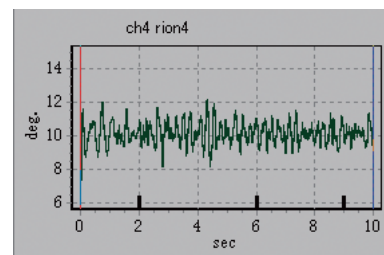


[Unit] menu:  
physical quantity unit name has changed from "V" to deg.

[Overwrite], [Apply]  
or [OK] is clicked



Unit name change  
V ⇒ deg.



## Reference information for changing the “Calib. (Unit/Volt)”

### Relation between DA-20 setting, Calib. (Unit/Volt), and unit name

The relation between the “Sensor” and “Sensitivity” settings on the <Calibration> menu of the DA-20 and the Calib. (Unit/Volt) and unit name used by this software is as follows.

#### EU

Calib. (Unit/Volt) = X                      X is value entered as “Sensitivity”  
Unit name = EU

#### MIC

Calib. (Unit/Volt) =  $10^{(-S/20)}$       S is microphone sensitivity entered as “Sensitivity”

Example: UC-53A

Calib. (Unit/Volt) = 2.7542E+01

S = -28.8 dBV/Pa (incl. preamplifier NH-22 pass-through loss)

Unit name = Pa

#### PICK or CHG

Calib. (Unit/Volt) = 1000/X              X is value entered as “Sensitivity”

Examples

PV-90I                      Calib. (Unit/Volt) = 2.2727E+03      X = 0.44 mV/(m/s<sup>2</sup>)

PV-85 + VP-80      Calib. (Unit/Volt) = 1.5576E+02      X = 6.42 pC/(m/s<sup>2</sup>)

Unit name = m/s<sup>2</sup>

#### V

Calib. (Unit/Volt) = 1                      Sensitivity = “--” (no input)

Unit name = V

## Practical examples for changing Calib. (Unit/Volt)

### Recording AC output signal of sound level meter on DA-20

In this example, not only the microphone but the entire sound level meter is treated as a sensor.

Most sound level meters are designed to output a voltage of 1 [Vrms] at the full-scale point of the respective level range. This means that the sensor (sound level meter) sensitivity is 1 [Vrms]/level range [dBPa (rms)].

Note that the sensor sensitivity changes according to the level range setting of the sound level meter.

A sound pressure level of 0 dB equals  $2 \times 10^{-5}$  [Pa (rms)], therefore X [dBPa (rms)] corresponding to the level range [dBPa (rms)] can be calculated according to the following equation.

$$\begin{aligned} \text{Level range [dBPa (rms)]} &= 20 \log (X [\text{Pa (rms)}] / 2 \times 10^{-5} [\text{Pa (rms)}]) \\ &= 20 \log (X [\text{Pa (rms)}]) + 94.0* [\text{dBPa (rms)}] \end{aligned}$$

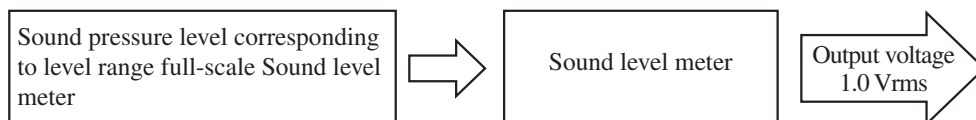
$$X [\text{Pa (rms)}] = 10^{((\text{level range} - 94.0*)/20)} [\text{Pa (rms)}]$$

From the above, the sound level meter sensitivity is as follows.

$$\begin{aligned} \text{Sensor sensitivity} &= 1/10^{((\text{level range} - 94.0*)/20)} [\text{Vrms/Pa (rms)}] \\ &= 1/10^{((\text{level range} - 94.0*)/20)} [\text{V/Pa}] \end{aligned}$$

Therefore, the Calib. (Unit/Volt) is as follows.

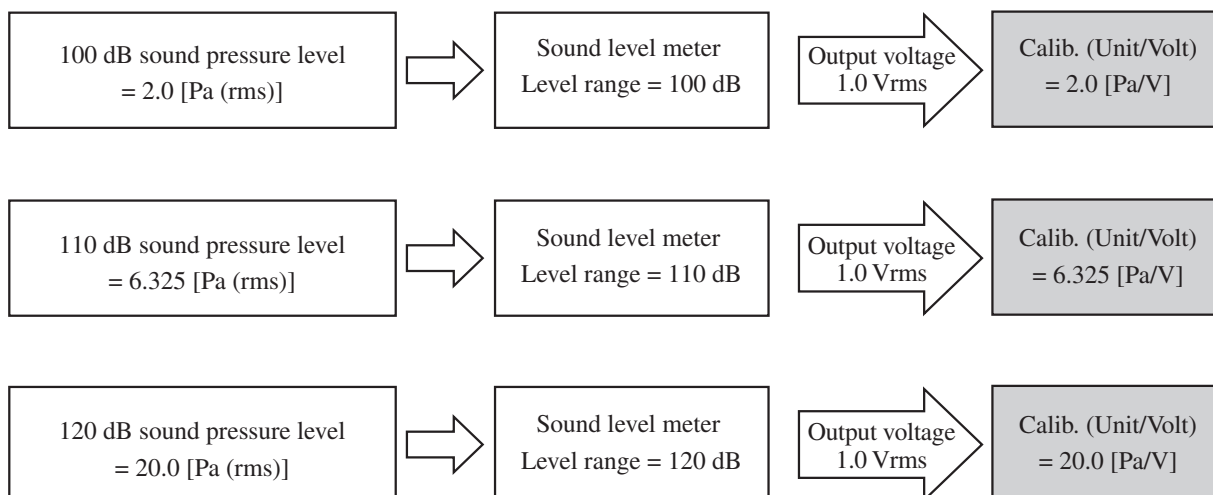
$$\text{Calib. (Unit/Volt)} = 10^{((\text{level range} - 94.0*)/20)} [\text{Pa/V}]$$



For example, when the sound level meter is set to a 100 dB range, the Calib. (Unit/Volt) for measured sound pressure level data is as follows.

$$\text{Calib. (Unit/Volt): 100 dB range} = 10^{((100 - 94.0*)/20)} [\text{Pa/V}] = 2.0 [\text{Pa/V}]$$

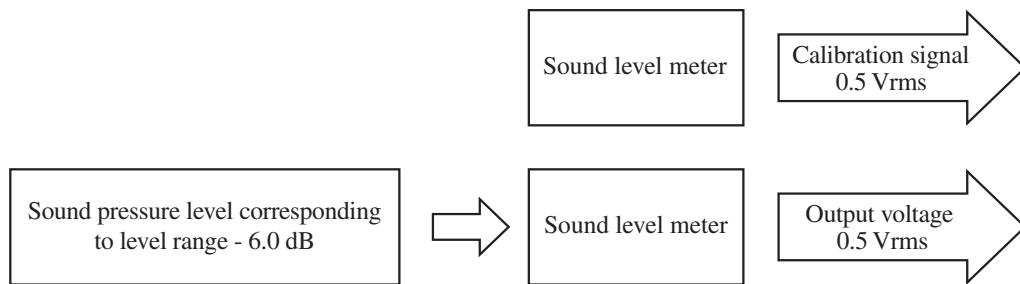
\* Note: The “94.0” value is actually 93.9794... (=  $20 \log(2 \times 10^{-5})$ )



## Example for recording AC output signal of sound level meter on DA-20 (calibration signal output added to actual data)

Using the calibration signal output of the sound level meter for calibration of externally connected equipment, the Calib. (Unit/Volt) can be determined.

At the level range setting to be used for recording, output the calibration signal for a few seconds, and then start the actual data recording. The voltage of the calibration signal is always 0.5 Vrms at any level range setting. On the other hand, the AC output level at sound pressure corresponding to the full-scale point is 1 Vrms. Therefore the calibration signal can be said to be the equal of measuring sound with one half the energy of the full-scale sound pressure level (level range - 6.0 dB).



In the example described above, the Calib. (Unit/Volt) should be set so that the RMS value during the calibration signal interval is “level range - 6.0 dB”.

The easiest way to achieve this is to use method B described in the section “Changing the Calib. (Unit/Volt)” of “II. Measurement value readout conversion” (page 57).

The figure shows a screenshot of the DA-20 software interface. At the top, a waveform graph displays a green signal. A vertical double-headed arrow on the left of the graph indicates the amplitude of the "Calibration signal" interval, which is labeled "Sound pressure level corresponding to level range - 6.0 dB". The rest of the waveform is labeled "Recorded data". Below the graph, the software's configuration window is shown. In the "DA-20 Channel" section, the "Conv. Unit" is set to "V", the "Reference" is "1.0000E+0", and the "Calib. (Unit/Volt)" is "6.7138E-2". A checkbox labeled "Calib. is made from data" is checked, and the "RMS" option is selected in the dropdown menu. The "dB" value is set to "0.0000E+0". At the bottom, there are buttons for "Overwrite", "Apply", "OK", and "Cancel".

Select the check box and select RMS



# Troubleshooting

This section lists possible problems that may occur when using the software, as well as steps to take in such a case. When you encounter a similar problem, try the countermeasures described here.

If the problem persists also after taking the described steps, or if a problem not described here occurs, contact the supplier.

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**Symptom Screen layout is corrupted. Controls cannot be selected without scrolling.**

Countermeasure This condition may occur when “Large Font” is specified as system font. Specify “Small Font”.

(For information on how to set the system font, refer to the documentation of the operating system.)

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**Symptom When starting the program, an error message such as “EAccessViolation” appears and the program does not start.**

Countermeasure Various files required for operation of the program are located in the install folder (default: “C:\Program Files\RION\DA-20Viewer”).

If the names of files in that folder are changed, or if files are moved or deleted, an error will occur when attempting to start the program.

If an action such as described above was carried out by mistake, return the files to the original condition that existed after installation, or uninstall the software and then install it again.





