

SOFTWARE INSTRUCTION MANUAL

MULTI-CHANNEL SIGNAL ANALYZER

SA-02M

4-CHANNEL SIGNAL ANALYZER

SA-02A4



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Organization of this manual

This manual describes the features and operation of the computer software SA-02 BASE. 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.

Outline

Gives basic information on the software.

Installation

Explains how to install the software.

Startup and shutdown

Explains how to start and stop the software.

Analysis modes

Explains how to use the various analysis modes of the software.

Names and functions of parts

Explains the names and functions of the elements in the application's main window.

Function buttons

Frequently used functions and setting items are shown in a function button panel on the left side of the main window. This section explains how to use these buttons.

Display settings

Explains how to make settings for the various graph screens and overall settings for the main window.

Input settings

Explains how to make input signal related settings.

Analysis settings

Explains how to search for data using event markers and how to make analysis related settings.

Measurement operation

Explains the measurement steps and operation for each analysis mode.

Time waveform data recording and offline analysis

Explains how to record time waveform data and how to use recorded data for offline analysis.

File operations

Explains how to save measurement data, measurement parameters etc.

Printing

Explains how to print measurement data and measurement parameters.

Edit commands

Explains how to copy data from the graph screens or main window to the clipboard.

SA-02 recall processing software

Explains how to use the SA-02 recall processing software.

Help function

Explains the shortcut key assignments of the software and how to display version information.

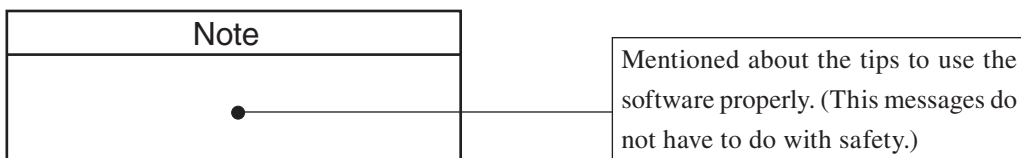
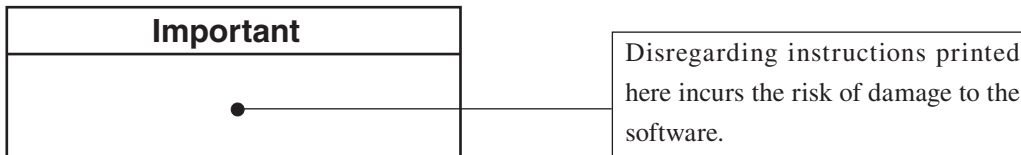
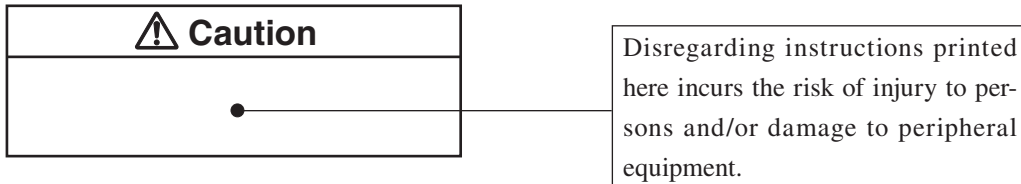
Making preparations for connection to SA-02 hardware

Explains how to change the IP address of SA-02 hardware.

- * Company names and product names mentioned in this document are usually 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 death or injury to persons and damage to the computer on which the software is installed, make sure that all instructions are fully understood and observed.



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

The software 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 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 drive. Otherwise there is a risk of damage to the CD drive.

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1. License Conditions

(1) Definition and Scope

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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.

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Outline

The computer software SA-02 BASE is a dedicated software application (option) for the Multi-Channel Signal Analyzer SA-02 series.

The software works by sending commands to the hardware. It can be used to control signal processing, perform setup, collect data after signal processing, perform FFT analysis, carry out further processing of analysis results, display data, and more. Data transfer is implemented via an Ethernet link. The software supports both the SA-02M and the SA-02A4.

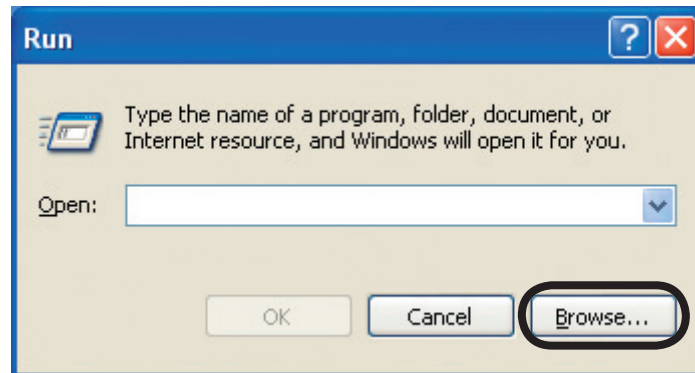
The software has the following features.

- Real-time FFT analysis and 1/N octave band analysis
The software can carry out FFT analysis, 1/1 octave band analysis, 1/3 octave band analysis, or 1/12 octave band analysis in real time.
- Time waveform data recording and playback for offline analysis
Time waveform data can be recorded (in internal memory and stored as data files). While playing back recorded data later, FFT and 1/N octave band analysis can be carried out simultaneously.
- Simultaneous multi-channel analysis
Up to 32 signal channels can be analyzed simultaneously.
Note: The number of supported channels differs according to the hardware model and configuration.
- Various processing functions
Average processing and maximum value processing can be carried out. During FFT analysis, transfer function, auto-correlation, cross-correlation, amplitude probability density and other functions are available. During 1/N octave band analysis, frequency weighting of analysis results is possible.
- Data file management
Analysis results can be saved as data files, and saved files can be loaded again later.
- Automated measurement using trigger signals
Measurement, recording, analysis, processing, auto store and other functions can be started automatically using a trigger.

Installation

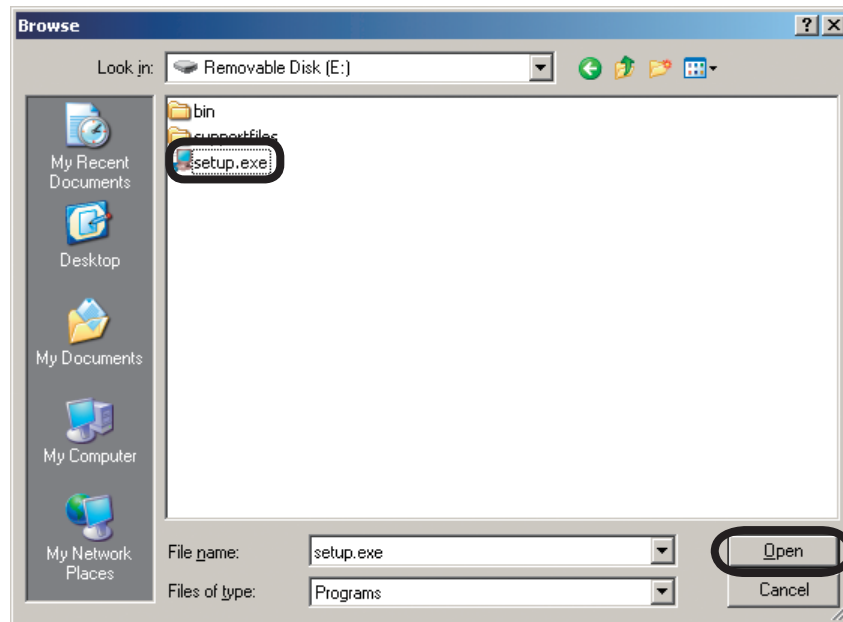
SA-02 BASE installation

1. Shut down all running applications.
2. Click [Start] → [Run]. The [Run] window appears.
3. Click the [Browse...] button.



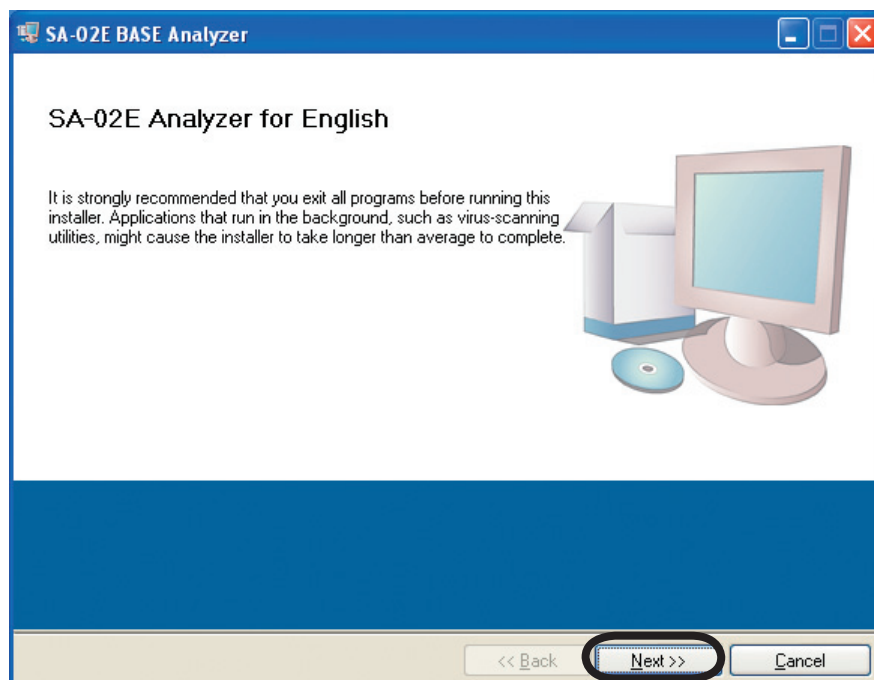
The [Browse] window appears.

4. Select “setup.exe” on the CD-ROM drive, and click the [Open] button. Then click the [OK] button.



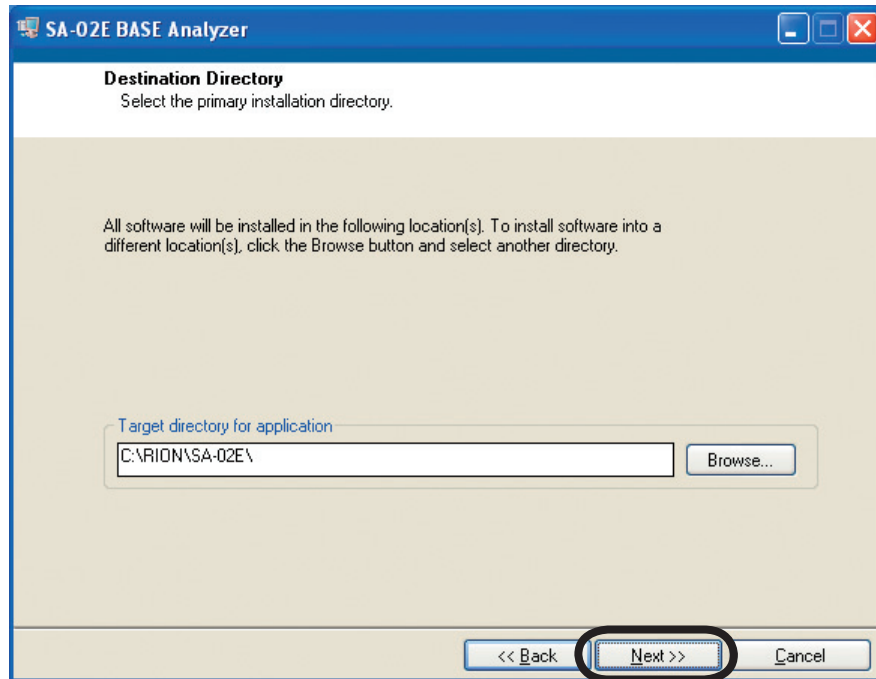
The [SA-02E BASE Analyzer] window appears.

5. Click the [Next] button.



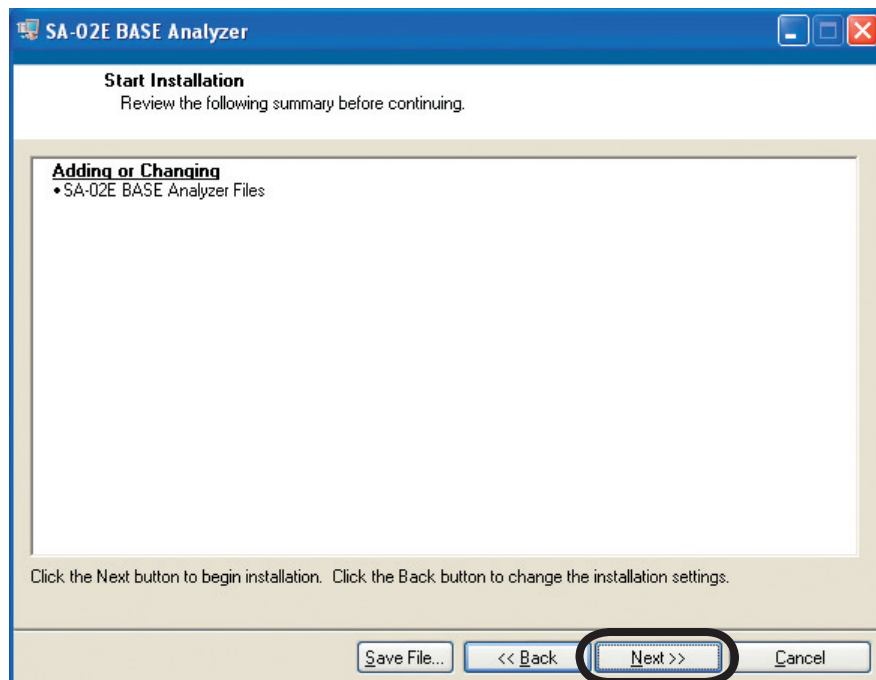
A message about the installation destination directory appears.

- Normally, simply click the [Next] button.

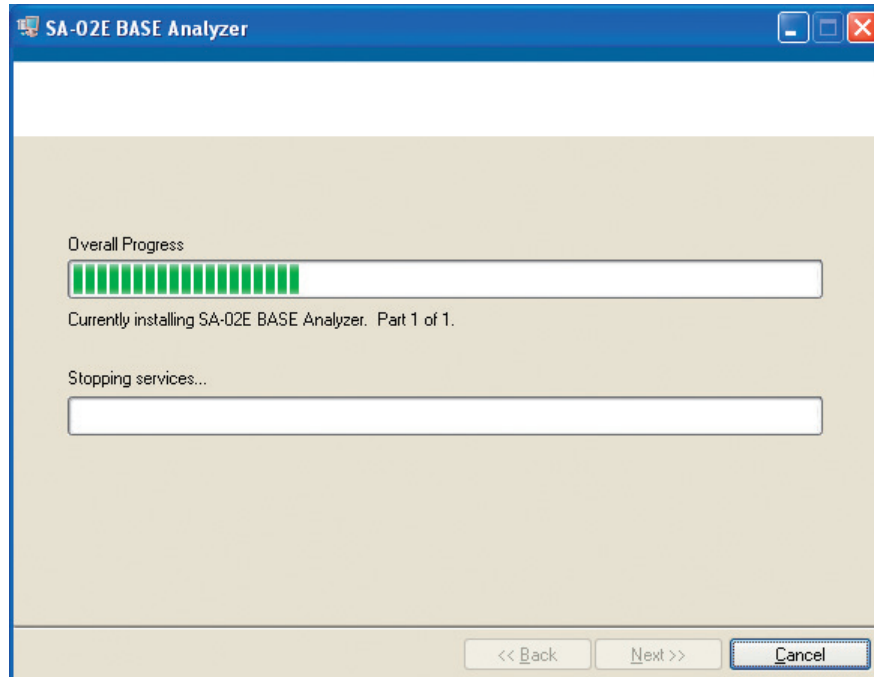


A message about start installation appears.

- Click the [Next] button.

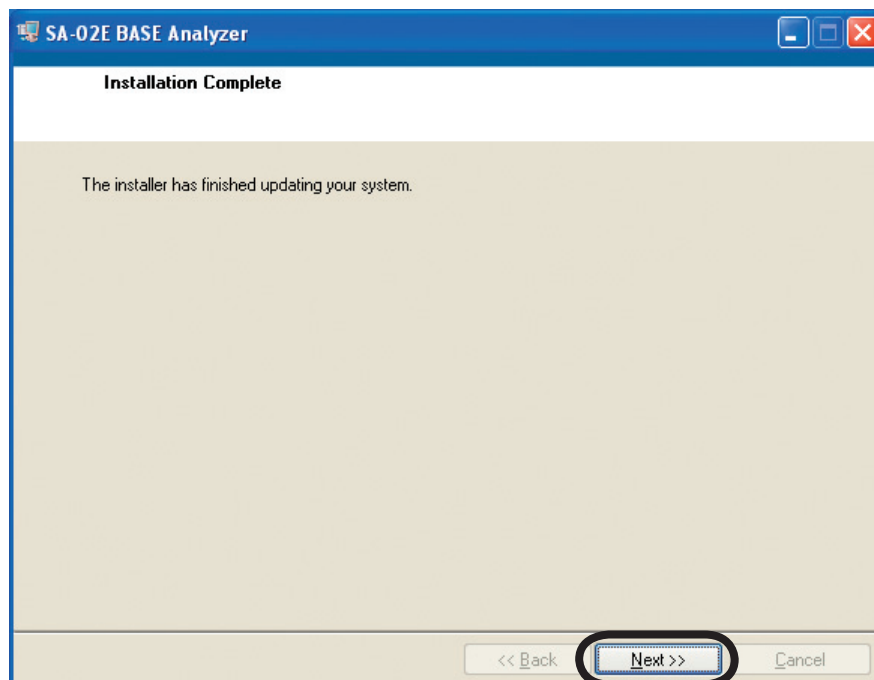


The installation begins.



When the installation is finished, the “Installation Complete” message appears.

8. Click the [Next] button. The driver for the USB protection key is installed next.



9. The installation process ends.

Note
After the installation, you may be asked to restart the computer. In this case, follow the on-screen instructions and restart the computer.

Startup and shutdown

Note

If the IP address of the SA-02 hardware (main unit) was changed from the factory default setting (192.168.0.241) using the procedure described in the Hardware Instruction Manual, the setting in SA-02 BASE software must also be changed. To do this, please refer to “Making preparations for connection to SA-02 hardware” on page 113.

SA-02 BASE startup

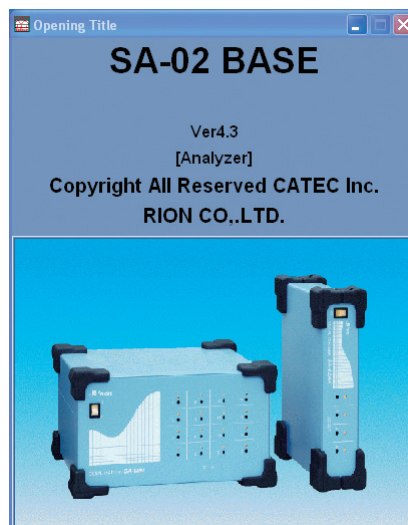
1. Connect the USB protection key.

Important

If the protection key has been lost or has become damaged, the software cannot be used. Keep the protection key in a safe location.

2. Double-click the “SA-02 Analyzer” icon on the desktop. Alternatively, click [Start] → [All Programs] → [RION] → [SA-02E] → [SA-02 Analyzer].

After a few seconds, the startup screen appears. This screen shows the software version and other information.

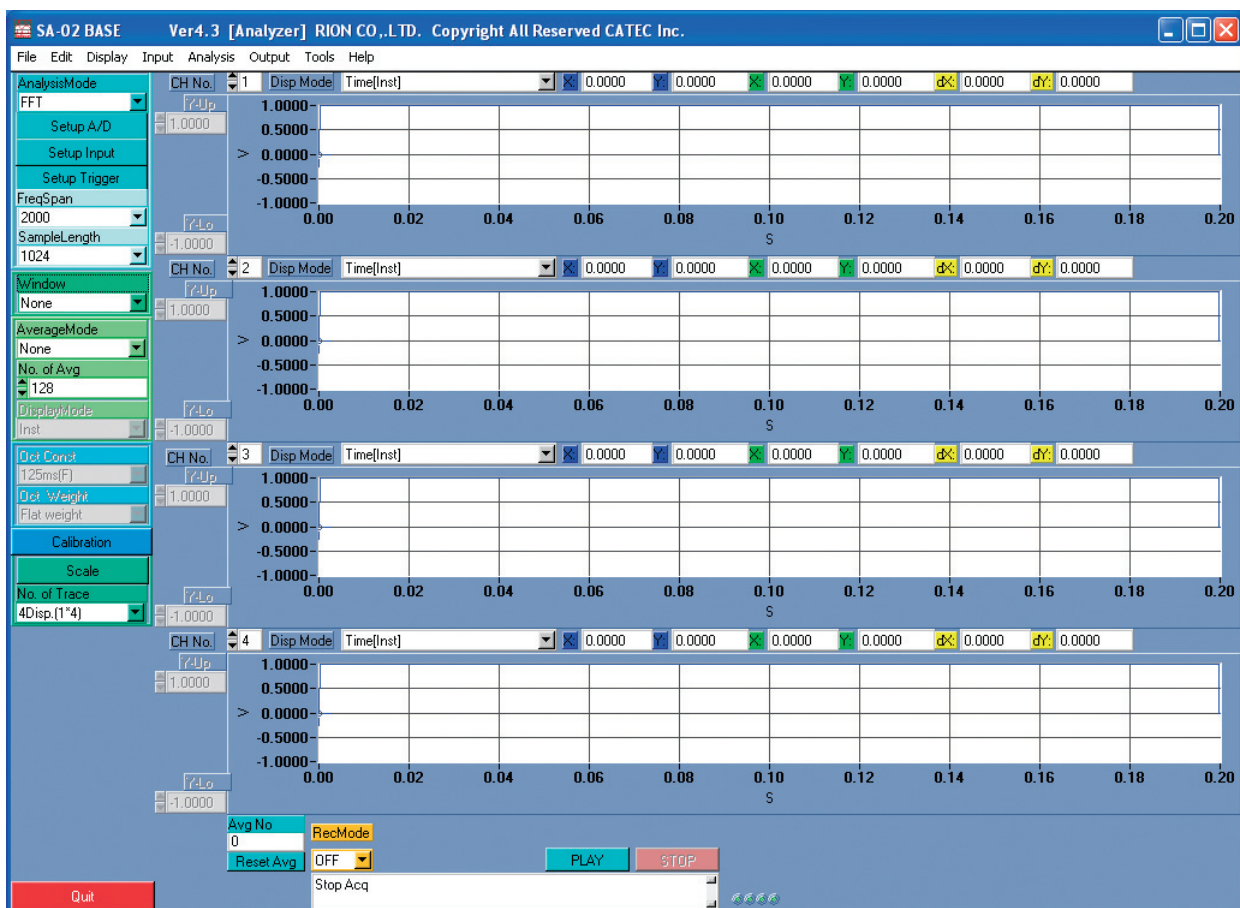


Note

If the message “Protection key not connected” appears at startup, check whether the software protection key has been connected. If not, plug the key into a USB port and start the software again.

If the SA-02 hardware is not connected to the computer when the application is started, or if power to the signal processor has not been turned on, the message “Could not find hardware. Start in offline mode.” appears. If you click [Yes], the application will start and only offline analysis is possible. If you click [No], the application startup is canceled.

- After several seconds, the startup screen closes and the main window appears.



Important

In order to obtain full performance from the SA-02 BASE software, other applications (such as Microsoft Word, Excel etc.) should not be used at the same time. Close down such applications before starting SA-02 BASE.

Note
When the SA-02 BASE software was started normally, the channel indicators on the SA-02 hardware will light up in green for the channels that have been selected. In the default condition of the software, the indicators for CH1 to CH4 will light up.
When the SA-02 BASE software is started, the main window will show the same settings that were active the last time you used the software. However, data that were displayed in graph screens will not be recalled.

SA-02 BASE shutdown

Select [Quit Program] from the [File] menu on the menu bar, or click the [Quit] button in the function button panel.

After several seconds, the main window closes and the program terminates.

Analysis modes

The SA-02 BASE software has the following three main analysis modes:

- FFT analysis mode
- 1/N octave band analysis mode
- FFT & 1/N octave band analysis mode

FFT analysis mode

In this mode, Fast-Fourier Transform analysis is carried out in real time during measurement. Recording time waveform data for offline analysis is also possible.

1/N octave band analysis mode

In this mode, octave band analysis is carried out in real time during measurement.

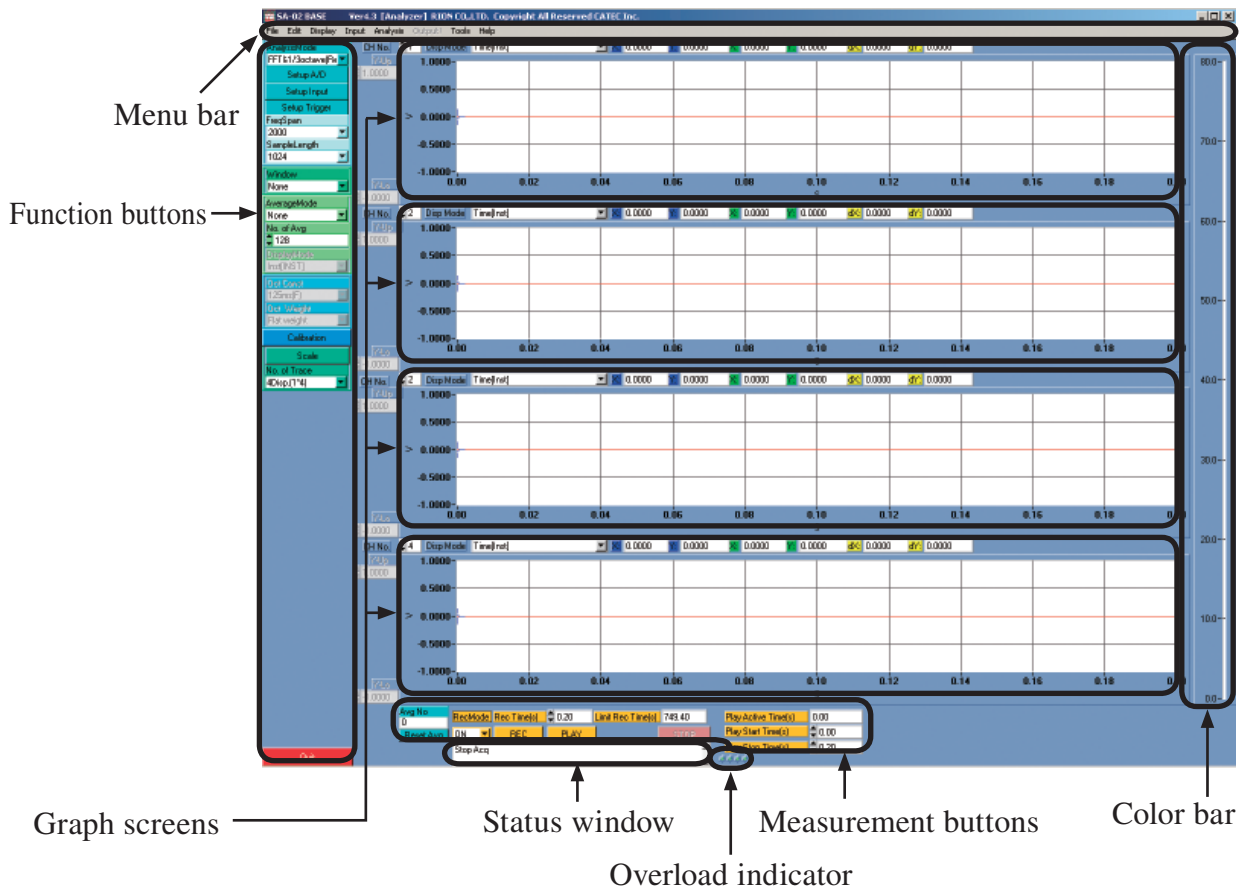
FFT & 1/N octave band analysis mode

In this mode, Fast-Fourier Transform analysis and octave band analysis can be carried out simultaneously. Both measurement/analysis and offline analysis are possible. Recording time waveform data for offline analysis is also possible.

The mode supports multiple analysis functions.

Names and functions of parts

Names and functions of parts in main window



Menu bar

Gives access to various menus for file operations and settings of the program.

Function buttons

Frequently used functions and setup items are listed in this panel at the left side of the window. You can see important settings at a glance and change them quickly as necessary. The function button panel can be turned on or off (→ page 44).

Graph screens

The various graph screens can be used to show various kinds of data for any channel.

Status window

Shows the current operation status.

Overload indicator

If overload has occurred, the indicator for the respective channel is shown in red. The channels are lined from the left: 1, 2, 3 etc.

Measurement buttons

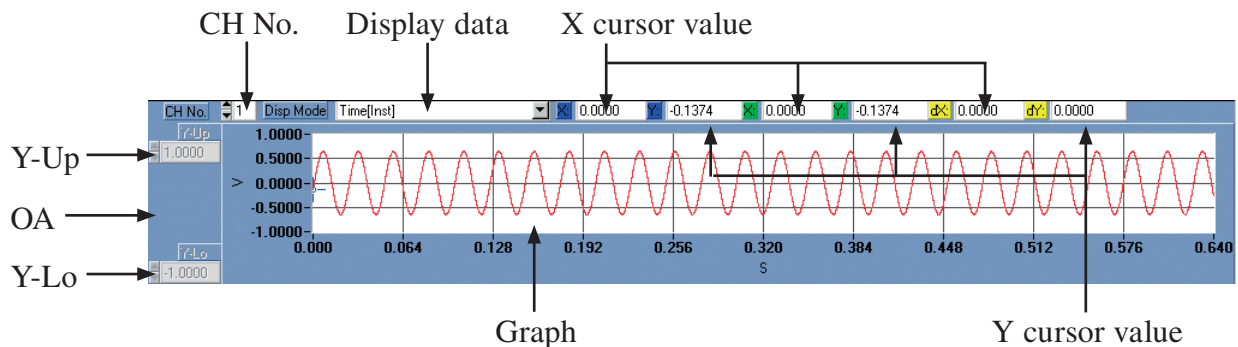
These buttons control functions such as record and playback start, stop etc.

Color bar

This bar is shown if four or fewer windows are chosen for the display screen. It can be used as scale indicator for the Z axis of a graph. The bar is updated when a window showing a power spectrum map is selected.

Graph screen configuration

FFT analysis mode graph screen



CH No.

Indicates the number of the channel whose data are shown as a graph.

Display data

Lets you select the type of data to be shown as a graph.

X cursor value

Shows the X coordinate value at the cursor point.

Y cursor value

Shows the Y coordinate value at the cursor point.

Graph

Shows data in various formats, such as time data, spectrum, etc.

Y-Lo

Shows the minimum value on the Y axis scale. The minimum value can be specified if [Y-Mode] in the [Scale] window is set to [Manual] (→ page 35).

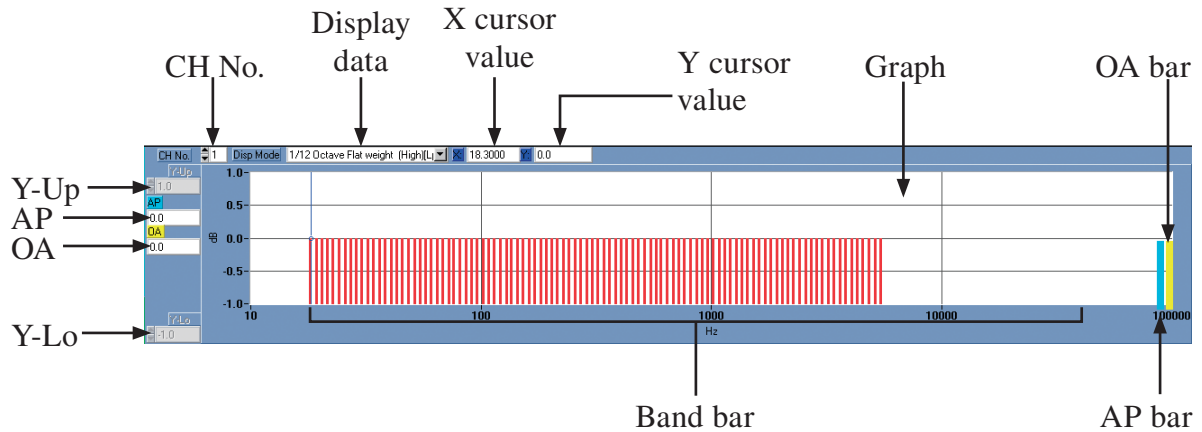
OA

Shows the spectrum overall value (without DC components). OA is shown only if spectrum data are being displayed.

Y-Up

Shows the maximum value on the Y axis scale. The maximum value can be specified if [Y-Mode] in the [Scale] window is set to [Manual] (→ page 35).

1/N octave band analysis mode graph screen



CH No.

Indicates the number of the channel whose data are shown as a graph.

Display data

Lets you select the type of data to be shown as a graph.

X cursor value

Shows the X coordinate value at the cursor point.

Y cursor value

Shows the Y coordinate value at the cursor point.

Graph

Shows the values for each band and the AP and OA values as a bar graph.

OA bar

Shows the overall value as a bar.

AP bar

Shows the all-pass value as a bar.

Band bar

Shows the level in the analyzed band as a bar.

Y-Lo

Shows the minimum value on the Y axis scale. The minimum value can be specified if [Y-Mode] in the [Scale] window is set to [Manual] (→ page 35).

OA

Shows the level value obtained by calculating the power sum of the analyzed band values after compensation. The compensation value is specified with the display data setting.

AP

Shows the all-pass value. This is the rms level calculated from the input signal by applying a time constant after passing the filter section. The filter section comprises frequency weighting characteristics and high-pass and low-pass filtering according to the input settings. The time constant setting is made by selecting [Analysis] from the menu bar and selecting [Octave Analysis].

Y-Up

Shows the maximum value on the Y axis scale. The maximum value can be specified if [Y-Mode] in the [Scale] window is set to [Manual] (→ page 35).

Function buttons

Frequently used functions are listed in the function button panel at the left side of the window. You can see important settings at a glance and change them quickly as necessary. The function button panel can be turned on or off (→ page 44).

Analysis mode (AnalysisMode)

Selects the analysis mode.

There are three main analysis modes, with the following settings.



FFT analysis mode

[FFT]: Select this to perform FFT analysis of the input signal.

1/N octave band analysis mode

[1/1octave(Low)]:

Select this to perform 1/1 octave band analysis for input signals with main components in the vibration frequency range.

[1/3octave(Low)]:

Select this to perform 1/3 octave band analysis for input signals with main components in the vibration frequency range.

[1/12octave(Low)]:

Select this to perform 1/12 octave band analysis for input signals with main components in the vibration frequency range.

[1/1octave(High)]:

Select this to perform 1/1 octave band analysis for input signals with main components in the acoustic frequency range.

[1/3octave(High)]:

Select this to perform 1/3 octave band analysis for input signals with main components in the acoustic frequency range.

[1/12octave(High)]:

Select this to perform 1/12 octave band analysis for input signals with main components in the acoustic frequency range.

[1/1octave(Full)]:

Select this to perform 1/1 octave band analysis for input signals with main components distributed over a wide frequency range.

[1/3octave(Full)]:

Select this to perform 1/3 octave band analysis for input signals with main components distributed over a wide frequency range.

[1/12octave(Full)]:

Select this to perform 1/12 octave band analysis for input signals with main components distributed over a wide frequency range.

FFT & 1/N octave band analysis mode

[FFT&1/1octave(Rec)]:

Select this to perform time waveform recording/playback/ FFT and 1/1 octave band analysis (simultaneous analysis possible).

[FFT&1/3octave(Rec)]:

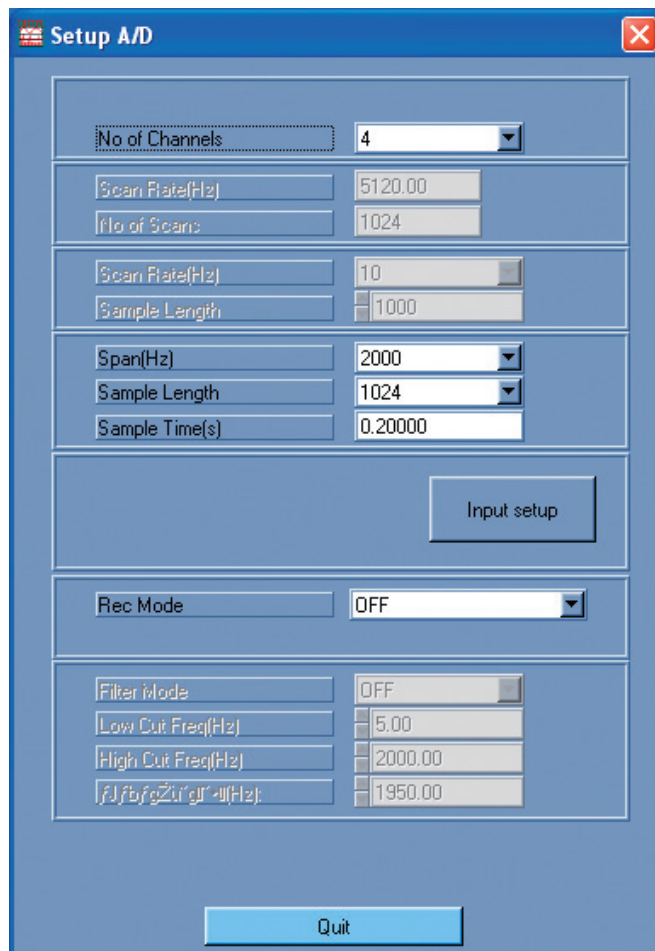
Select this to perform time waveform recording/playback/ FFT and 1/3 octave band analysis (simultaneous analysis possible).

[FFT&1/12octave(Rec)]:

Select this to perform time waveform recording/playback/ FFT and 1/12 octave band analysis (simultaneous analysis possible).

Setup A/D

1. Click the [Setup A/D] button.
The [Setup A/D] window appears.



Note

The [Setup A/D] window can also be called up by clicking [Input] in the menu bar and selecting [Setup A/D].

2. Make the required settings.

[No of Channels]:

Select the number of channels to use. All channels from 1 up to this number are used for measurement.

[Span(Hz)]:

Select the analysis frequency. This setting is valid when performing FFT analysis.

Note

The analysis frequency can also be set with the [FreqSpan] function button.

[Sample Length]:

Select the number of analysis points. This setting is valid when performing FFT analysis.

Note
The number of analysis points can also be set with the [Sample Length] function button.

[Sample Time(s)]:

Shows the length of one frame used for performing FFT analysis. This is determined by the [Span(Hz)] and [Sample Length] settings and cannot be changed directly.

[Input setup] button:

Clicking this button brings up the [Setup Input CH] window. For details, see the next section “Input Setup”.

[Rec Mode]:

[ON]: Perform time waveform recording.

[OFF]: Do not perform time waveform recording.

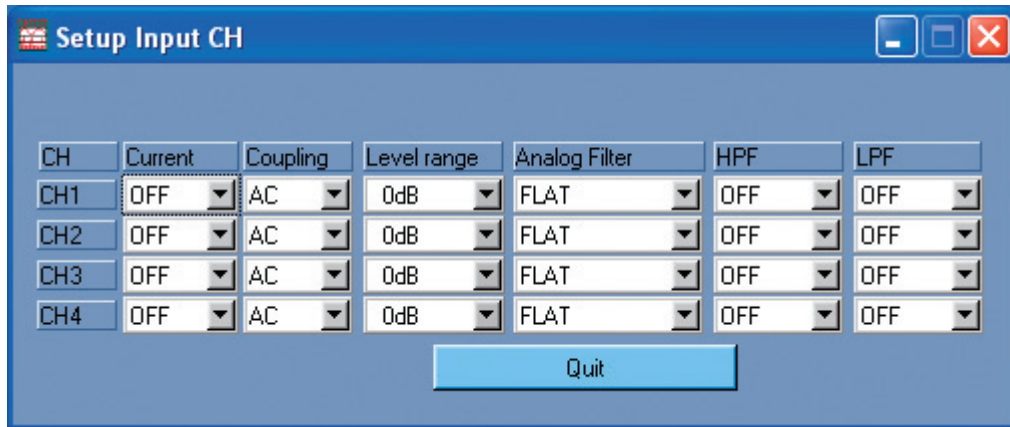
3. Click [Quit].

The [Setup A/D] window closes.

Input setup (Setup Input CH)

The [Setup Input CH] window lets you make settings for each channel separately. Only the number of channels selected for use is shown.

1. Click the [Input Setup] button.
The [Setup Input CH] window appears.



2. Make the required settings.

[Current]:

[OFF]:

Select this if the BNC input connector (DIRECT IN) is used as a general signal input.

[ON]: Select this if an accelerometer with integrated preamplifier is connected to the BNC input connector (DIRECT IN).

This can be selected only if [Coupling] is set to [AC].

Caution

If this setting is set to [ON] while equipment that does not require sensor power is connected, damage to the equipment may occur. Proceed with care.

[Coupling]:

[AC]: Use AC coupling for the input signal.

[DC]: Use DC coupling for the input signal.

This setting is suitable for low-frequency measurements.

Note

If [Current] is set to [ON], [Coupling] is fixed to [AC].

[Level range]:

Select the level range.

[Analog Filter]:

You can select [FLAT], [A], or [C] as frequency weighting characteristic.

[HPF]: The high-pass filter can be set to [OFF] or [20Hz]. The setting is enabled if [FLAT] is selected for [Analog Filter].

[LPF]: The low-pass filter can be set to [OFF], [1KHz], or [20KHz]. The setting is enabled if [FLAT] is selected for [Analog Filter].

[Quit] button:

Clicking this button closes the [Setup Input CH] window.

Note
By holding down the Shift key when making a setting, the setting can be applied to all channels.

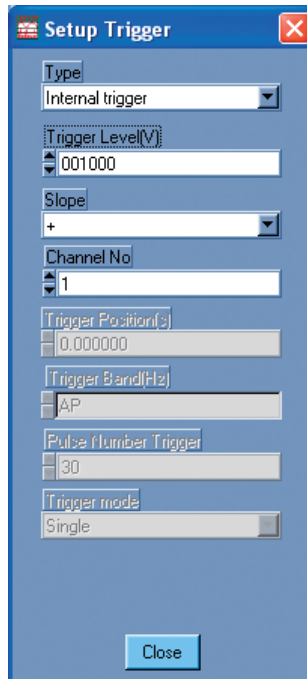
3. Click [Quit].

The [Setup Input CH] window closes.

Setup Trigger

The trigger function can be used to automatically start measurement/analysis and perform processing each time a specific event occurs.

1. Click the [Setup Trigger] function button.
The [Setup Trigger] window appears.



Note
The [Setup Trigger] window can also be called up by clicking [Input] in the menu bar and selecting [Setup Trigger].

2. Make the required settings.

[Type]:

Select the type of trigger operation.

[Free run]:

Select this if no trigger is to be used.

[Internal trigger]:

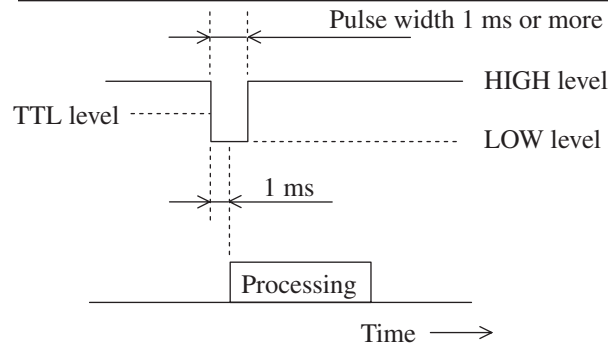
Select this to use the input signal in the selected channel as a trigger. Triggering occurs according to the settings made under [Trigger Level(V)] to [Trigger mode].

[External]:

Select this to use an external trigger. Triggering occurs when the signal at the trigger input connector (TRIG IN) stays at LOW level for at least 1 ms.

[SG]: Select this to use a rotary pulse signal as a trigger. Triggering occurs according to the signal at the rotary pulse input connector (TACHO IN).

Note
Triggering also occurs when the trigger input connector (TRIG IN) is shorted.



Note
When the [Type] is set to [Internal trigger] or [External], the color of the [Setup Trigger] function button changes to red.

[Trigger Level(V)]:

Enter a threshold level for triggering, using voltage [V]. (Only if analysis mode is FFT analysis mode or FFT&1/N octave band analysis mode)

[Trigger Level(dB)]:

Enter a threshold level for triggering, as a relative level [dB] from the full-scale level. (Only if analysis mode is 1/N octave band analysis mode)

[Slope]:

Select the direction in which the trigger signal must pass the threshold level for triggering to occur. Selecting [+] means that the signal must change from low to high, and selecting [-] means that the signal must change from high to low.

[Channel No]:

Select the channel to be used for trigger condition evaluation.

Note
Trigger level, slope, and channel No can only be set if the type is internal trigger.

[Trigger Position(s)]:

Enter the time point for triggering. When a change in signal level matching the triggering conditions is detected, actual triggering will occur after the number of seconds set here.

[Trigger Band(Hz)]:

Select the frequency band to be used for trigger condition evaluation in 1/N octave band analysis mode. (During 1/12 octave band analysis, the 1/3 octave bandwidth is used.)

[Pulse Number Trigger]:

Enter the number of pulses to be used as threshold when using the pulse trigger.

[Trigger mode]:

Select the measurement mode.

[Single]:

When a trigger event is detected, measurement/analysis starts and processing continues until the measurement/analysis end conditions are met.

[Repeat]:

When a trigger event is detected, measurement/analysis starts. When one data set has been acquired, the unit again goes into the trigger standby condition. This continues until the measurement/analysis end conditions are met.

3. Click [Close].

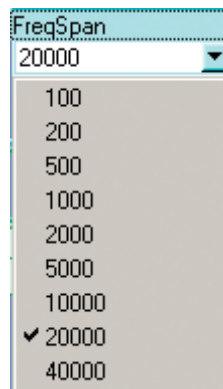
The [Setup Trigger] window closes.

Trigger Operation

See the section on measurement operation (→ page 63).

Analysis frequency (FreqSpan)

Select the frequency range for FFT analysis.

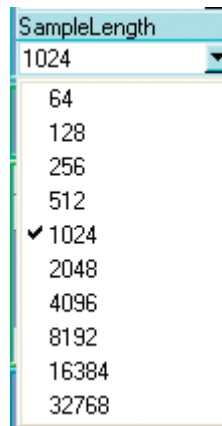


Note

The analysis frequency can also be selected from [Span(Hz)] in the [Setup A/D] window (→ page 16).

Number of analysis points (SampleLength)

Select the number of frame points used for FFT analysis.

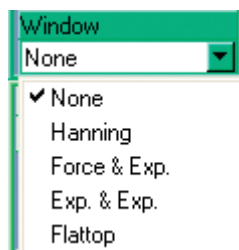


Note

The number of analysis points can also be selected from [Sample Length] in the [Setup A/D] window (→ page 17).

Time window function (Window)

Select the window function for FFT analysis.



[None]: Selects a Rectangular window.

[Hanning]: Selects a Hanning window.

[Force & Exp.]:

Selects a Force window for the reference channel (→ page 38) and an Exponential window for the other channels.

[Exp. & Exp.]: Selects an Exponential window for the reference channel (→ page 38) and for the other channels.

[Flattop]: Selects a Flattop window.

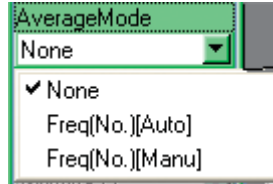
Note

Detailed settings for the Force window and Exponential window can be made in the [Setup Window] window (→ page 47).

Averaging method (AverageMode)

Select the averaging method for FFT analysis.

For processing, the averaging or maximum value method is available. The setting determines the use of these methods in measurement/analysis.



[None]: No averaging or maximum value processing is carried out.

[Freq (No.) [Auto]]:

Frequency data auto averaging

All frequency data acquired during measurement/analysis are automatically used for averaging or maximum value processing. The end conditions are set with the [No. of Avg] function button.

[Freq (No.) [Manu]]:

Frequency data manual averaging

A decision is made manually whether acquired data are used for averaging or maximum value processing. The end conditions are set with the [No. of Avg] function button.

Important
When the analysis mode is FFT analysis mode, "Frequency data manual averaging" can be selected only when the type is not "Free run" and the trigger mode is set to "Repeat".
For information on operation of the [PLAY], [STOP], and [Reset Avg] buttons (during FFT analysis) in the various states of the SA-02 BASE software, see page 67.

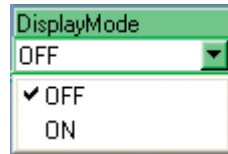
Number of averaging runs (No. of Avg)

Select the number of averaging runs to be used for FFT analysis.



Processing display mode (DisplayMode)

Select the processing values to be measured and displayed in 1/N octave band analysis mode.



- [OFF]: Lp only is measured. After measurement has been started, it continues until the [STOP] button is clicked.
- [ON]: Lp, Leq, Lmax and LE are measured. After measurement has been started, it continues until the end of the measurement time or until the [STOP] button is clicked.

Octave time constant (Oct Const)

This item is always grayed out.

The octave time constant setting is made from [Analysis] → [Octave Analysis].



Frequency weighting characteristics (Oct Weight)

This item is always grayed out.

The frequency weighting characteristics is determined by the display data selection in the graph screen.



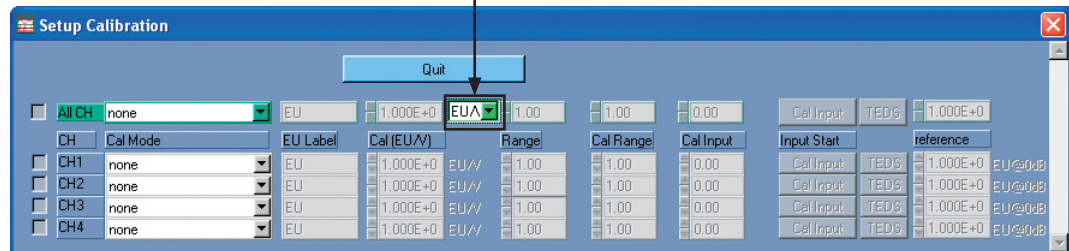
Setup Calibration

This section describes how to perform calibration of display values.

First, the various items are described, and an outline of the calibration procedure is given.

1. Click the [Calibration] button.
The [Setup Calibration] window appears.

Toggles units for calibration (EU/V or V/EU)



2. Set the items as required. The items listed below can be set either for each channel separately, or for all channels together by using [All CH].

[Cal Mode]:

[none]:

No calibration is performed. The display value is always voltage (V) or voltage level (dB) ($1 \text{ V}_{\text{rms}} = 0 \text{ dB}$).

[Use Cal Value[Lin]]:

Calibration value is input directly in Engineering Units.

[Use Cal Value[dB]]:

Calibration value is input directly in decibels.

[Use Cal Signal[Lin]]:

Calibration signal is input from external equipment, and calibration is performed in Engineering Units.

[Use Cal Signal[dB]]:

Calibration signal is input from external equipment, and calibration is performed in decibels.

When [Use Cal Value[Lin]] or [Use Cal Value[dB]] is selected, a microphone or accelerometer or other sensor can be connected directly (or via an amplifier), and calibration can be carried out, using the sensitivity value given on the calibration chart of the sensor. When [Use Cal Signal[Lin]] or [Use Cal Signal[dB]] is selected, a measuring device such as a sound level meter, vibration meter or vibration level meter can be connected, and its signal can be used to perform calibration. The calibration signal range in this case is 10 Hz to 8 kHz.

Switching between EU/V and V/EU
<p>The SA-02 BASE software lets you choose whether to use EU/V or V/EU for calibration.</p> <p>When EU/V is selected, you enter the equivalent in EU for 1 V or 1 dB.</p> <p>When V/EU is selected, you enter the equivalent in V or dB for 1 EU.</p>

[EU Label]:

Lets you enter the EU (Engineering Unit) value for the graph.

[Cal (EU/V)]:

For example, if EU/V is selected and [Cal Mode] is set to [Use Cal Value[Lin]], enter the equivalent for 1 V in Engineering Units. If [Cal Mode] is set to [Use Cal Value[dB]], enter the equivalent for 1 V in decibels.

[Range]: When [Cal Mode] is set to [Use Cal Value[Lin]] or [Use Cal Value[dB]], enter the gain of the sensor amplifier here. For [Use Cal Signal[Lin]], use Engineering Units, and for [Use Cal Signal[dB]], use decibels. (Normally, for amplifiers that do not allow gain selection, use “1” for [Use Cal Signal[Lin]] and “0” for [Use Cal Signal[dB]]. When [Cal Mode] is set to [Use Cal Signal[Lin]] or [Use Cal Signal[dB]], enter the level range of the connected measuring equipment used for measurement. For [Use Cal Signal[Lin]], use Engineering Units, and for [Use Cal Signal[dB]], use decibels.

[Cal Range]:

To perform calibration of a connected measuring device, enter the level range of the measuring device here.

For [Use Cal Signal[Lin]], use Engineering Units, and for [Use Cal Signal[dB]], use decibels.

[Cal Input]:

Enter the magnitude of the signal input as calibration signal here.

For [Use Cal Signal[Lin]], use Engineering Units, and for [Use Cal Signal[dB]], use decibels.

[reference]:

Enter the Engineering Unit value corresponding to 0 dB here. (For example, for sound pressure level, this is 2×10^{-5} Pa, and for vibration level (JIS), this is 10^{-5} m/s².) When [Cal Mode] is set to [Use Cal Value[Lin]] or [Use Cal Signal[Lin]] and decibel indication is not used, or when [Cal Mode] is set to [Use Cal Value[dB]] or [Use Cal Signal[dB]] and EU indication is not used, enter “1” here.

3. Perform calibration.

- When [Cal Mode] is set to [Use Cal Signal[Lin]] or [Use Cal Signal[dB]]
After all items have been set, click the [Cal Input] button. The calibration signal level detection starts. (This process takes about 20 seconds.)
When the message “Calibration of specified channel completed” appears, click [OK]. (Before starting, verify that the SA-02 BASE level range setting is suitable for the calibration signal level.)

- When [Cal Mode] is set to [Use Cal Value[Lin]] or [Use Cal Value[dB]]
After all items have been set, click the [TEDS] button. The calibration value set as [Cal (EU/V)] and [EU Label] is displayed.
4. When the setting for all channels is completed, click the [Quit] button. The [Setup Calibration] window closes.
 5. Click the [Scale] button and use the [Scale] window to set the [Y-EU] for the graph to which the calibration is to be applied to [EU]. Then click the [Close] button. (If the analysis mode is 1/N octave band analysis mode, the calibration value will be reflected also without performing this step.)
 6. If the measurement range of the connected sensor or measuring device has been changed, be sure to click the [Calibration] button and enter the changed measurement range values into the [Range] field on the [Setup Calibration] window, and then click the [Quit] button. (It is not necessary to perform step 3 again.)

Concrete examples for calibration of connected sensors and measuring devices are given below.

Calibration procedure and calibration mode selection examples

Example 1 Sound level meter connected, [Use Cal Signal[dB]] selected
Perform calibration using the calibration signal from the sound level meter as follows.

1. Set the sound level meter to calibration mode.
2. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Signal[dB]].
3. Enter the calibration mode level range of the sound level meter as [Cal Range] and enter the calibration signal level of the sound level meter as [Cal Input]. As [Range], enter the level range of the sound level meter used for measurement.
4. Enter “Pa” as [EU Label] and “2e-5” as [reference].
5. Click the [Cal Input] button in the [Setup Calibration] window of the SA-02 BASE software.

Example settings

Level range of sound level meter in calibration mode: 100 dB full-scale

Calibration signal level: 94 dB

Level range used for measurement: 110 dB full-scale

Set [Range] to “110”, [Cal Range] to “100”, and [Cal Input] to “94”.

Example 2 Vibration level meter connected, [Use Cal Signal[dB]] selected
Perform calibration using the calibration signal from the vibration level meter with the same steps as described above for the sound level meter.

Example 3 Vibration meter connected, [Use Cal Signal[Lin]] selected

Perform calibration using the calibration signal from the vibration meter as follows.

1. Set the vibration meter to rms value display and then enable calibration mode.
2. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Signal[Lin]].
3. Enter the calibration mode level range of the vibration meter as [Cal Range] and enter the calibration signal level of the vibration meter as [Cal Input]. For [Range], enter the level range of the vibration meter used for measurement. Enter the unit displayed by the vibration meter as [EU Label]. Set [reference] to a suitable value, as required. (Vibration meters normally do not display values in decibels. In such a case, enter “1”.)
4. Click the [Cal Input] button in the [Setup Calibration] window of the SA-02 BASE software.

Example settings

Vibration meter measurement mode: ACC

Level range in calibration mode: 100 m/s² full-scale

Calibration signal level: 100 m/s²

Level range used for measurement: 100 m/s² full-scale

Set [EU Label] to “m/s²”, [Range] to “100”, [Cal Range] to “100”, and [Cal Input] to “100”.

Before making calibration settings, set [Level range] of the SA-02 BASE software to a suitable value.

Example 4 Accelerometer with integrated amplifier connected (1), [Use Cal Value[Lin]] selected

Connect the accelerometer with integrated amplifier and perform calibration using the voltage sensitivity given in the calibration chart, as follows.

1. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Value[Lin]].
2. If calibration unit is set to EU/V, change setting to V/EU.
3. Enter “m/s²” as [EU Label]. Calculate the value for [Cal (V/EU)] according to the formula below, using the voltage sensitivity given on the calibration chart of the accelerometer.

$$(\text{Calibration Value V/EU}) = (\text{Voltage Sensitivity mV/ms}^2)/1000$$
 Enter “1” as [Range].
4. To display the vibration level, enter “1e-5” as [reference]. (If no decibel display is used, enter “1”.)
5. Click the [Quit] button.

Example settings

Voltage sensitivity given on calibration chart: 5.60 mV/ms²

According to formula in step 3:

$$(5.60 \text{ mV/ms}^2)/1000 = 0.0056 \text{ V/ms}^2$$

Set [EU Label] to “m/s²”, [Cal Input] to “0.0056”, and [Range] to “1”.

Example 5 Accelerometer with integrated amplifier connected (2), [Use Cal Signal[Lin]] selected

Connect the accelerometer with integrated amplifier and perform calibration using a Calibration Exciter, as follows.

1. Connect the accelerometer to a Calibration Exciter.
2. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Signal[Lin]].
3. Because the concept of “range” does not apply in this case, [Range] and [Cal Range] can be set to a user-selected value (for example “10”). Enter the Calibration Exciter level as [Cal Input].
4. Enter the unit shown on the Calibration Exciter as [EU Label]. Set [reference] to a suitable value, as required. (Vibration meters normally do not display values in decibels. In such a case, enter “1”.)
5. Activate the Calibration Exciter.
6. Click the [Cal Input] button in the [Setup Calibration] window of the SA-02 BASE software.

Example 6 Microphone connected (1), [Use Cal Value[dB]] selected.

Perform the following steps when a microphone is connected and the sensitivity level noted on the calibration chart of the microphone is to be used for calibration.

1. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Value[dB]].
2. Enter “Pa” as [EU Label]. Calculate the calibration value according to the formula below, using the open circuit sensitivity given on the calibration chart of the microphone.

$$(\text{Calibration Value dB}) = 94 - (\text{Sensitivity level dB, } 0 \text{ dB} = 1 \text{ V/Pa})$$

Enter “0” as [Range].

3. Click the [Quit] button.

Example settings

Sensitivity level given on calibration chart: -32.9 dB (0 dB = 1 V/Pa)

According to formula in step 2:

$$94 - (-32.9) = 126.9$$

Set [Cal Value (dB)] to “126.9”.

Example 7 Microphone connected (2), [Use Cal Signal[dB]] selected.

Perform the following steps when a microphone is connected and an acoustic calibrator (or pistonphone) is to be used for calibration.

1. Mount the acoustic calibrator on the microphone and generate the calibration tone.
2. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Signal[dB]].
3. Because the concept of “range” does not apply in this case, [Range] and [Cal Range] can be set to a user-selected value (for example “120”). Enter the acoustic calibrator level as [Cal Input].
4. Enter “Pa” as [EU Label] and “2e-5” as [reference].
5. Click the [Cal Input] button in the [Setup Calibration] window of the SA-02 BASE software.

Example settings

Acoustic calibrator level: 114 dB

Set [Range] to “120”, [Cal Range] to “120”, and [Cal Input] to “114”.

Example 8 TEDS sensor connected, [Use Cal Value[Lin]] selected

To perform calibration for a TEDS sensor, proceed as follows.

1. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Value[Lin]].
2. Click the [TEDS] button.
3. The [Cal (EU/V)] and [EU Label] settings are shown.

Example 9 TEDS microphone connected, [Use Cal Value[dB]] selected

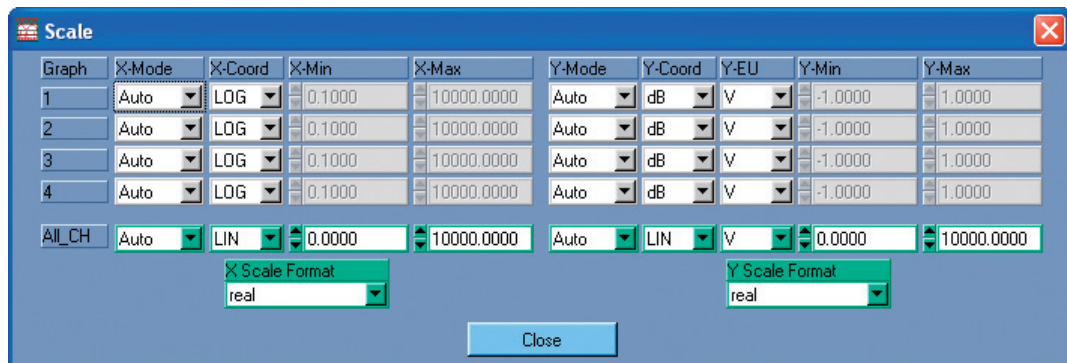
To perform calibration for a TEDS microphone, proceed as follows.

1. Click the [Calibration] button of the SA-02 BASE software. Set [Cal Mode] in the [Setup Calibration] window to [Use Cal Value[dB]].
2. Click the [TEDS] button.
3. The [Cal (EU/V)] and [EU Label] settings are shown.

Scale setup (Scale)

Make the X axis and Y axis scale settings for all graphs as follows.

1. Click the [Scale] button.
The [Scale] window appears.



Note

The [Scale] window can also be called up by clicking [Display] in the menu bar and selecting [Scale(X, Y)].

2. Make the required settings.

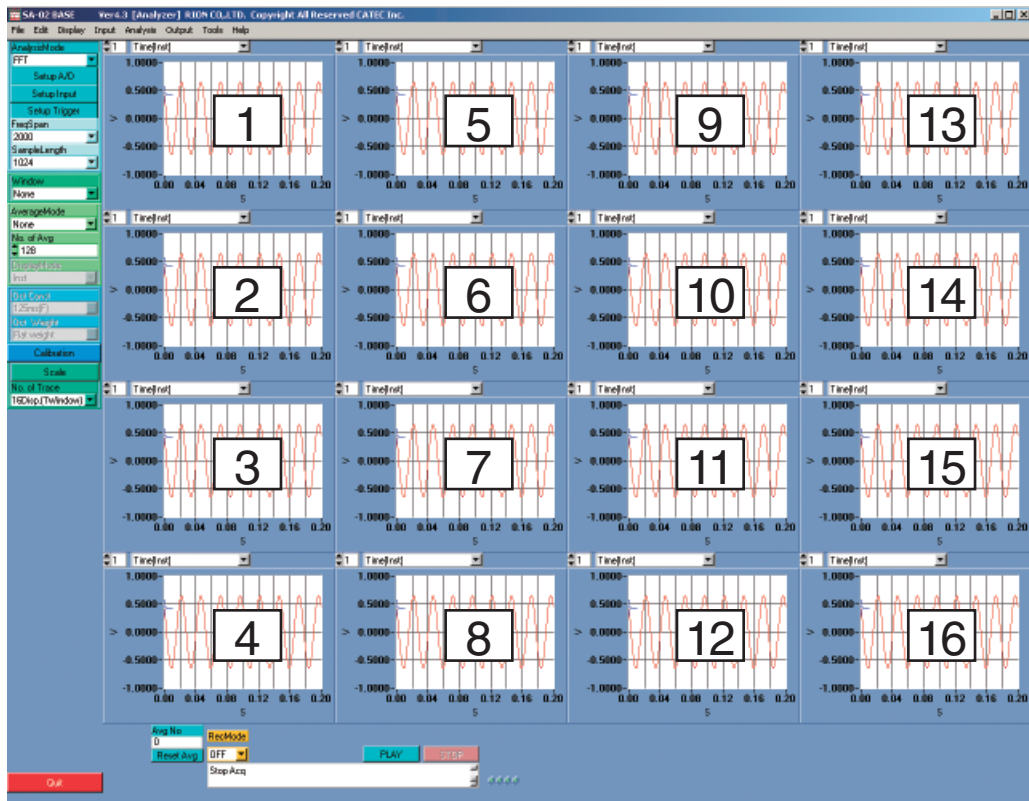
Note

Perform the setup steps while measurement/analysis is stopped. Settings made during measurement/analysis may be disregarded.

[Graph]: Shows graph numbers corresponding to the sequence in which they are shown on the screen. To set the scale for a particular graph, make the [X-Mode] to [Y-Max] settings in the respective row.

To establish the same settings for all graphs, make the settings in the [All_CH] row at the bottom.

The graph screen numbers and display sequence are as follows.



Note

Scale settings can also be made in the [Setup Graph] window for each graph (→ page 38).

Depending on the type of data displayed, some of the settings below may not be available.

[X-Mode]:

Selects the X axis scale setting mode

[Auto]:

Scale is set automatically. (Settings for X axis scale minimum and X axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for X axis scale minimum and X axis scale maximum are enabled.)

[X-Coord]:

Selects the X axis scale coordinate system.

[LIN]:

Linear coordinate system

[LOG]:

Logarithmic coordinate system

[X-Min]:

Minimum value for X axis scale

[X-Max]:

Maximum value for X axis scale

[Y-Mode]:

Select the Y axis scale mode according to the level range selected in the [Setup Input CH] window.

[Auto]:

Scale is set automatically. (Settings for Y axis scale minimum and Y axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for Y axis scale minimum and Y axis scale maximum are enabled.)

[Full]:

Setting is established according to selected level range.

[Y-Coord]:

Selects the Y axis scale coordinate system.

[LIN]:

Linear coordinate system

[dB]: dB coordinate system

[LOG]:

Logarithmic coordinate system

[Y-EU]: Selects the Y axis scale units.

[V]: Voltage values are shown.

[EU]: Engineering Units are shown. (Units selected during calibration are used.)

[Y-Min]: Minimum value for Y axis scale

[Y-Max]: Maximum value for Y axis scale

[X Scale Format]:

Sets the X axis scale display format for all graph screens.

[real]: Display uses real numbers. (Example: 123.4)

[float]:

Display uses floating point (exponential) format. (Example: 1.234E+2)

[engineering]:

Display uses floating point (exponential) format. (Example: 1.234E+2)

[Y Scale Format]:

Sets the Y axis scale display format for all graph screens.

[real]: Display uses real numbers. (Example: 123.4)

[float]:

Display uses floating point (exponential) format. (Example: 1.234E+2)

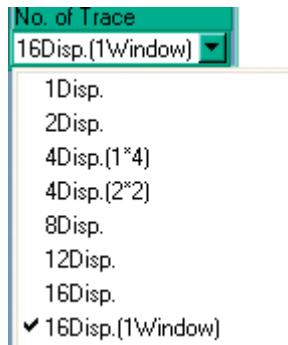
[engineering]:

Display uses floating point (exponential) format. (Example: 1.234E+2)

3. Click the [Close] button. The [Scale] window closes.

Number of traces (No. of Trace)

Specifies the number of graph traces (screens) that are shown.



Note

Even if the number of traces is set to 8 or higher, only 4 traces may be displayed if the size of the main window is small. In such a case, increase the size of the main window and then repeat the setting.

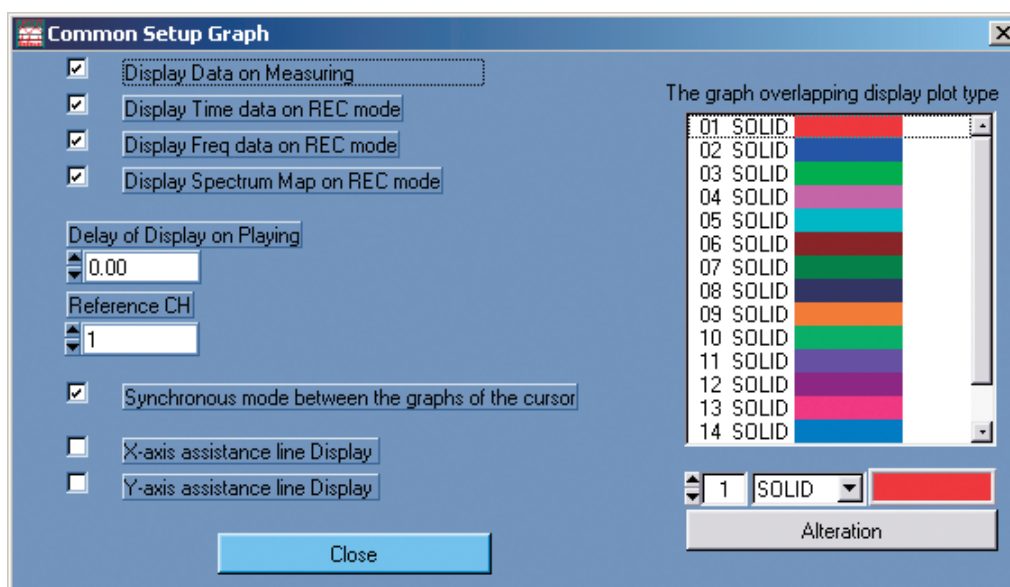
The number of graph traces to show in the main window can also be set from the [Display Property] window (→ page 44).

Display settings

Common graph settings

Settings that apply to all graph screens can be made from the [Common Setup Graph] window.

1. In the menu bar, click [Display] and select [Setup Graph]. The [Common Setup Graph] window appears.



2. Make settings to apply to all graphs.

[Display Data on Measuring]:

When this check box is selected, display data are updated also during measurement.

[Display Time data on REC mode]:

When this check box is selected, time data are updated on the graph screen also during time waveform data recording or playback.

[Display Freq data on REC mode]:

When this check box is selected, frequency data are updated on the graph screen also during time waveform data recording or playback.

[Display Spectrum Map on REC mode]:

When this check box is selected, spectrum map data are updated on the graph screen also during time waveform data recording or playback.

[Delay of Display on Playing]:

Sets the graph display update delay time used during offline analysis.

[Reference CH]:

Specifies the reference channel for FFT analysis.

Note

When performing calculation and display for functions that relate to the signals in two channels (such as cross-spectrum, transfer function etc.), the reference channel must also be specified.

[Synchronous mode between the graphs of the cursor]:

When this check box is selected, the cursors in the various graphs are synchronized.

[X-axis assistance line Display]:

When this check box is selected, a guide line (parallel to Y axis) is shown for the X axis.

[Y-axis assistance line Display]:

When this check box is selected, a guide line (parallel to X axis) is shown for the Y axis.

3. Click the [Close] button. The [Common Setup Graph] window closes.

Individual settings

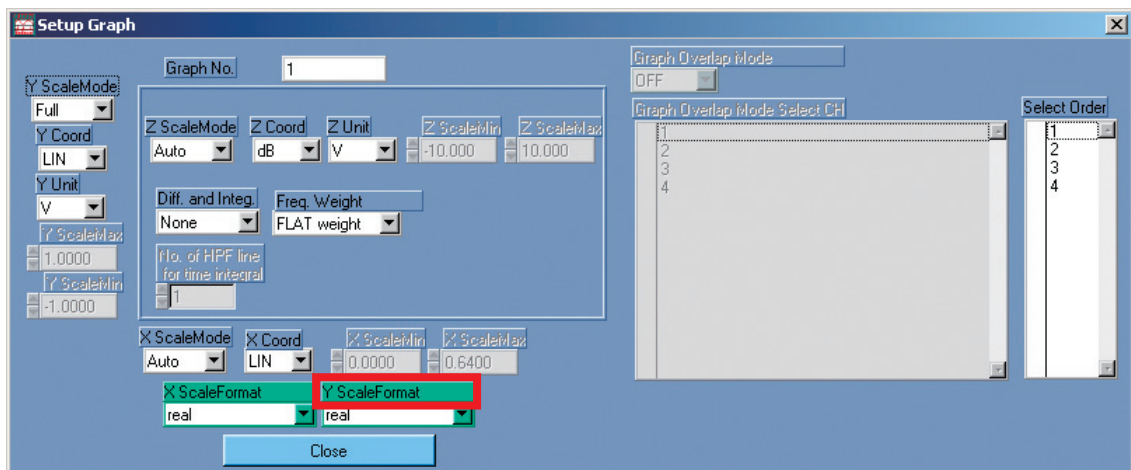
Individual settings such as scale for each graph screen can be made in the respective [Setup Graph] window.

Note

The [Scale] window (→ page 33) and [ZScale] window (→ page 42) allow setting the scale for all graph screens.

1. Right-click anywhere in the graph screen.

The [Setup Graph] window appears.



2. Make the required settings.

[Graph No.]

Shows the number of the selected graph screen.

[X ScaleMode]:

Selects the X axis scale setting mode.

[Auto]:

Scale is set automatically. (Settings for X axis scale minimum and X axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for X axis scale minimum and X axis scale maximum are enabled.)

[X Coord]:

Selects the X axis scale coordinate system.

[LIN]:

Linear coordinate system

[LOG]:

Logarithmic coordinate system

[X ScaleMin]:

Minimum value for X axis scale

[X ScaleMax]:

Maximum value for X axis scale

[Y ScaleMode]:

Selects the Y axis scale setting mode.

[Auto]:

Scale is set automatically. (Settings for Y axis scale minimum and Y axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for Y axis scale minimum and Y axis scale maximum are enabled.)

[Full]:

Setting is established according to selected level range.

[Y Coord]:

Selects the Y axis scale coordinate system.

[LIN]:

Linear coordinate system

[dB]: dB coordinate system

[LOG]:

Logarithmic coordinate system

[Y Unit]:

Selects the Y axis scale units.

[V]: Voltage values are shown.

[EU]: Engineering Units are shown.

[Y ScaleMax]:

Maximum value for Y axis scale

[Y ScaleMin]:

Minimum value for Y axis scale

[Z ScaleMode]:

Selects the Z axis scale setting mode. The Z axis is used when data are shown as a spectrum map display.

[Auto]:

Scale is set automatically. (Settings for Z axis scale minimum and Z axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for Z axis scale minimum and Z axis scale maximum are enabled.)

[Z Coord]:

Selects the Z axis scale coordinate system.

[LIN]:

Linear coordinate system

[dB]: dB coordinate system

[Z Unit]:

Selects the Z axis scale units.

[V]: Voltage values are shown.

[EU]: Engineering Units are shown.

[Z ScaleMin]:

Minimum value for Z axis scale

[Z ScaleMax]:

Maximum value for Z axis scale

[Diff. and Integ.]

Selects differentiation and integration processing for time data and frequency data.

[None]:

No differentiation and integration processing is carried out.

[Differentiation]:

1-step differentiation is carried out.

[multiple Differentiation]:

2-step differentiation is carried out.

[Integral]:

Integration is carried out.

[multiple Integral]:

2-step integration is carried out.

[Freq. Weight]:

Selects [FLAT weight], [A weight], or [C weight] frequency weighting for the power spectrum.

Important
<ul style="list-style-type: none"> • Frequency weighting here is carried out not by analog filter circuitry but by numeric processing of analysis results. To perform frequency weighting using analog filters, click the [Setup A/D] button and then the [Input setup] button to open the [Setup Input CH] window, and make the required settings under [Analog Filter]. • If a setting other than [FLAT weight] is selected for [Freq. Weight] here, check the [Analog Filter] for the input setup to make sure that frequency weighting is not applied twice.

[No. of HPF line for time integral]:

Sets the number of HPF lines used for integration.

Note
[X ScaleMin], [X ScaleMax], [Y ScaleMin], [Y ScaleMax], [Z ScaleMin], [Z ScaleMax] can only be set if scale mode is [Manual].

[X ScaleFormat]:

Sets the X axis scale value display format for all graph screens.

[real]: Values are shown as real numbers (example: 10000.0)

[float]: Values are shown as exponential numbers (example: 1.00E+4)

[engineering]:

Values are shown as Engineering Units (example: 10.000E+3)

[Y ScaleFormat]:

Sets the Y axis scale value display format for all graph screens.

[real]: Values are shown as real numbers (example: 10000.0)

[float]: Values are shown as exponential numbers (example: 1.00E+4)

[engineering]:

Values are shown as Engineering Units (example: 10.000E+3)

[Graph Overlap Mode]:

Additional measurement data loaded later are shown as an overlay on the graph.

This can be selected when a power spectrum graph is displayed.

[ON]: Graph overlay display mode is enabled.

[OFF]:

Graph overlay display mode is disabled.

Note
For information on loading additional data, see “Loading an additional data file (Specified channel)” on page 95.

[Graph Overlap Mode Select CH]:

This setting is available when graph overlay display mode is enabled.

Select the check box for channels to be displayed in overlay mode.

[Select Order]:

This setting is available when graph overlay display mode is enabled.

Select the order for the graph to display.

- Click the [Close] button. The [Setup Graph] window closes.

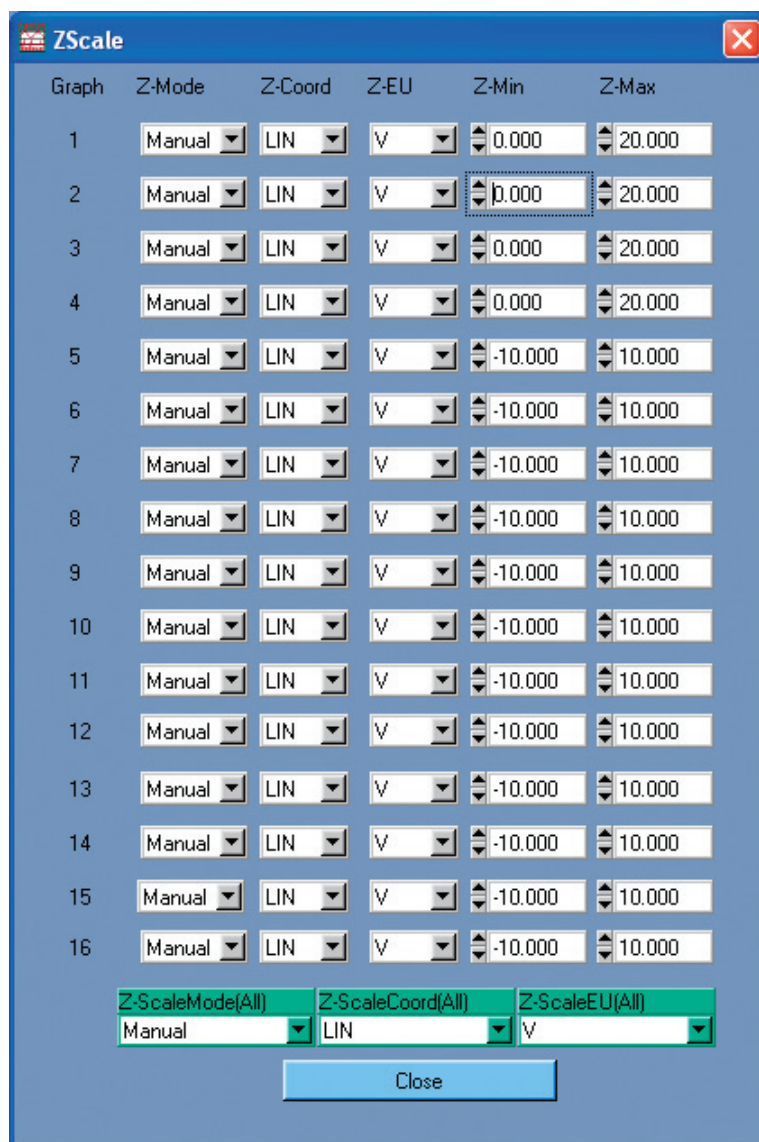
Setting the scale

In the menu bar, click [Display] and select [Scale(X, Y)]. The [Scale] window appears. For details on the settings available in the [Scale] window, see the section on setting the scale with the function button (→ page 33).

Z axis scale setup (ZScale)

To set the scale for the Z axis in all graphs (perpendicular axis extending from the rear to the front of the graph, level distinguished by color), proceed as follows.

1. In the menu bar, click [Display] and select [Scale (Z)]. The [ZScale] window appears.



2. Make the required settings.

[Graph]:

Shows the number of the graph screen, corresponding to the sequence in the main window. To make Z axis scale settings for individual graph screens, set the [Z-Mode] to [Z-Max] items for the respective number.

To establish the same settings for all graphs, make the settings in the [Z-ScaleMode(All)] to [Z-scaleEU(All)].

[Z-Mode]:

Selects the Z axis scale setting mode.

[Auto]:

Scale is set automatically. (Settings for Z axis scale minimum and Z axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for Z axis scale minimum and Z axis scale maximum are enabled.)

[Z-Coord]:

Selects the Z axis scale coordinate system.

[LIN]:

Linear coordinate system

[dB]: dB coordinate system

[Z-EU]:

Selects the Z axis scale units.

[V]: Voltage values are shown.

[EU]: Engineering Units are shown. The compensation value determined during calibration and the unit are used.

[Z-Min]:

Minimum value for Z axis scale

[Z-Max]:

Maximum value for Z axis scale

[Z-ScaleMode(All)]:

Selects the Z axis scale setting mode for all graphs simultaneously.

[Auto]:

Scale is set automatically. (Settings for Z axis scale minimum and Z axis scale maximum are not enabled.)

[Manual]:

Scale is set manually. (Settings for Z axis scale minimum and Z axis scale maximum are enabled.)

[Z-ScaleCoord(All)]:

Selects the Z axis scale coordinate system for all graphs simultaneously.

[LIN]:

Linear coordinate system

[dB]: dB coordinate system

[Z-ScaleEU(All)]:

Selects the Z axis scale units for all graphs simultaneously.

[V]: Voltage values are shown.

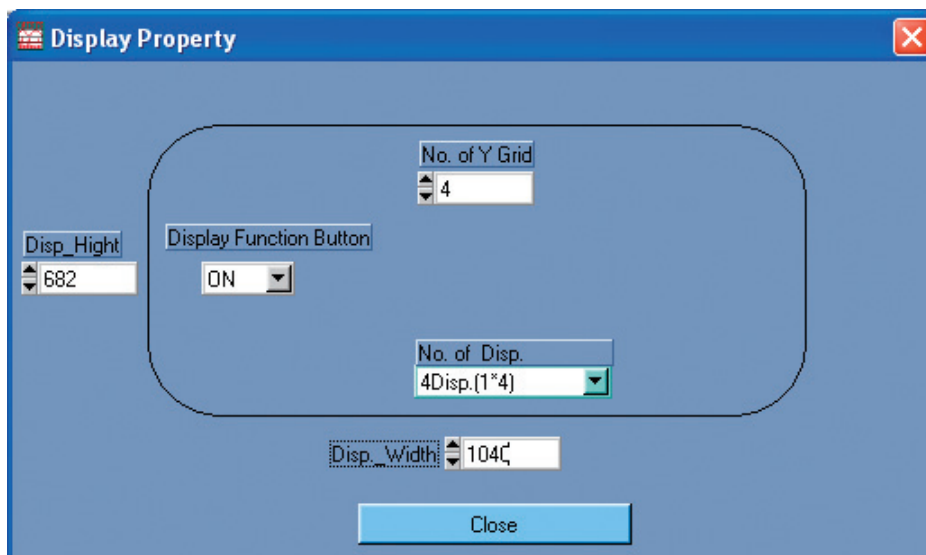
[EU]: Engineering Units are shown.

3. Click the [Close] button. The [ZScale] window closes.

Display Property

To set the size of the main window, number of graphs to display, and make other display related settings, proceed as follows.

1. In the menu bar, click [Display] and select [Display Property]. The [Display Property] window appears.



2. Make the required settings.

[Display Function Button]

Selects whether function buttons are displayed or not.

[ON]: Function buttons are displayed.

[OFF]:

Function buttons are not displayed.

[No. of Disp.]:

Specifies the number of graph screens to display.

[1Disp.]:

Vertical 1 × Horizontal 1

[2Disp.]:

Vertical 2 × Horizontal 1

[4Disp. (1×4)]:

Vertical 4 × Horizontal 1

[4Disp. (2×2)]:

Vertical 2 × Horizontal 2

[8Disp.]:

Vertical 4 × Horizontal 2

[12Disp.]:

Vertical 4 × Horizontal 3 (Note 1)

[16Disp.]:

Vertical 4 × Horizontal 4 (Note 1)

[16Disp. (1Window)]:

Vertical 4 × Horizontal 4 (Note 2)

Note 1: A horizontal scroll bar appears at the bottom of the main window. Moving the scroll bar lets you check all screens.

Note 2: All 16 screens are shown together.

Note
This setting can also be made using the [No. of Trace] function button.

[No. of Y Grid]:

Enter the number of grid divisions on the Y axis.

[Disp_Height]

Specify the height of the main window in pixels.

[Disp_Width]

Specify the width of the main window in pixels.

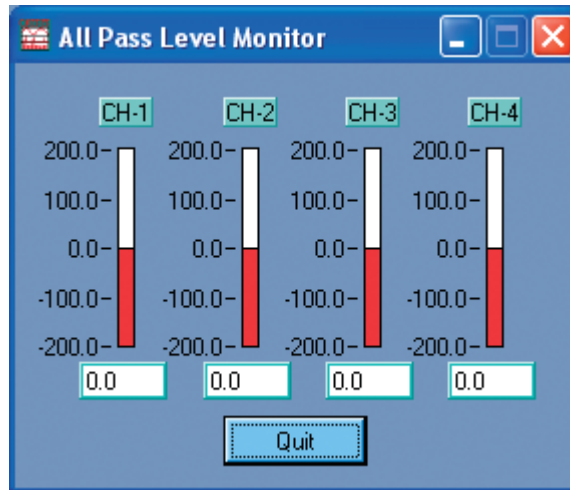
Note
When the specified height and width for the main window is small, the number of graph screens that can be displayed ([No. of Disp.]) will be limited.

3. Click the [Close] button. The [Display Property] window closes.

All Pass Level Monitor

With a view to preventing overload, the input signals in all channels can be monitored together in a special window. This function is available only in analysis mode, when 1/N octave band analysis mode is selected.

1. In the menu bar, click [Display] and select [All Pass Level Monitor]. The [All Pass Level Monitor] window appears. All-pass value readings and bar graphs are displayed for all active channels.



2. Click the [Quit] button. The [All Pass Level Monitor] window closes.

Important

The [All Pass Level Monitor] window only shows channels that are selected when the window is opened. To change the number of channels that are displayed, close the window, change the channel setting, and then open the window again by clicking [Display] in the menu bar and selecting [All Pass Level Monitor].

Note

The scale used in the [All Pass Level Monitor] window depends on the calibration setting.

Input settings

A/D settings

Click [Input] in the menu bar and select [Setup A/D]. The [Setup A/D] window appears.
For information on using this window, see page 16.

Trigger settings

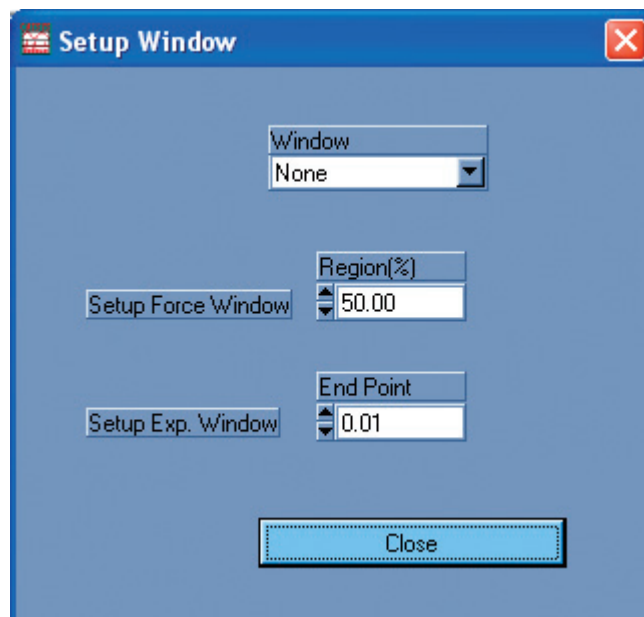
Click [Input] in the menu bar and select [Setup Trigger]. The [Setup Trigger] window appears.

For information on using this window, see page 20.

Time window function settings (Setup Window)

To make time window function settings for FFT analysis, proceed as follows.

1. In the menu bar, click [Input] and select [Window]. This setting can be made in FFT analysis mode and FFT & 1/N octave band analysis mode only.



2. Make the required settings.

[Window]

Selects the window function.

[None]:

Selects a Rectangular window.

[Hanning]:

Selects a Hanning window.

[Force & Exp.]:

Selects a Force window for the reference channel (→ page 38) and an Exponential window for the other channels.

[Exp. & Exp.]:

Selects an Exponential window.

[Flattop]:

Selects a Flattop window.

Note
Settings for window functions can also be made with the [Window] function button.

[Setup Force Window]

Specifies the range of the Force window.

[Setup Exp. Window]

Enter the final attenuation value for the frame.

3. Click the [Close] button. The [Setup Window] window closes.

Calibration settings

You can make calibration settings as follows.

In the menu bar, click [Input] and select [Calibration].

The [Setup Calibration] window appears.

For information on using this window, see page 27.

Analysis settings

Event marker search

In the all-time data graph (playback), you can set event markers which allow you to easily locate a point later.

This function is available in FFT analysis mode and FFT & 1/N octave band analysis mode, when [DisplayMode] has been set to ON.

Adding a marker

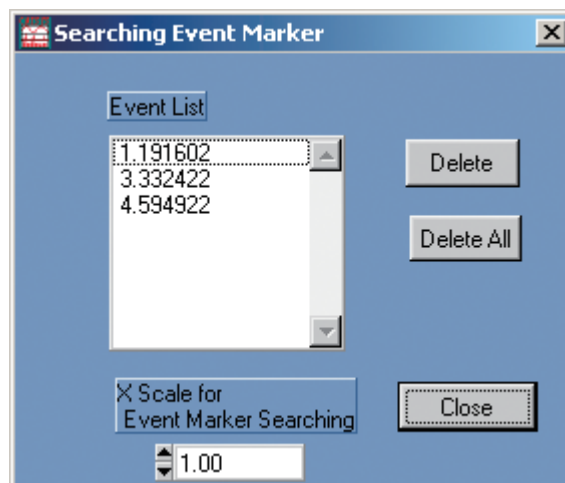
1. Move the cursor to the data point on the all-time data graph where you want to place a marker, and left-click the mouse. A “+” symbol is shown.
2. Press the [Insert] (Ins) key on the keyboard.
A marker (dotted line cursor) is added to the all-time data.

Note

Up to 100 markers can be set.

Deleting a marker

1. In the menu bar, click [Analysis] and select [Find Event]. The [Searching Event Marker] window appears.



2. In the [Event List] field of the Searching Event Marker window, select the event you want to delete so that the event is highlighted. Then click the [Delete] button. To delete all markers, click the [Delete All] button.
3. Click the [Close] button. The [Searching Event Marker] window closes.

Searching for a Marker

You can search for a marker and enlarge the display centered on the marker.

1. In the menu bar, click [Analysis] and select [Find Event]. The [Searching Event Marker] window appears.
2. In the [X Scale for Event Marker Searching] field of the [Searching Event Marker] window, set the display time window width to be used, centered on the marker.
3. In the [Event List] field of the [Searching Event Marker] window, click on the marker you want to locate. The display is now enlarged by the width set with [X Scale for Event Marker Searching].
4. Click the [Close] button. The [Searching Event Marker] window closes.

Terminating Marker Search

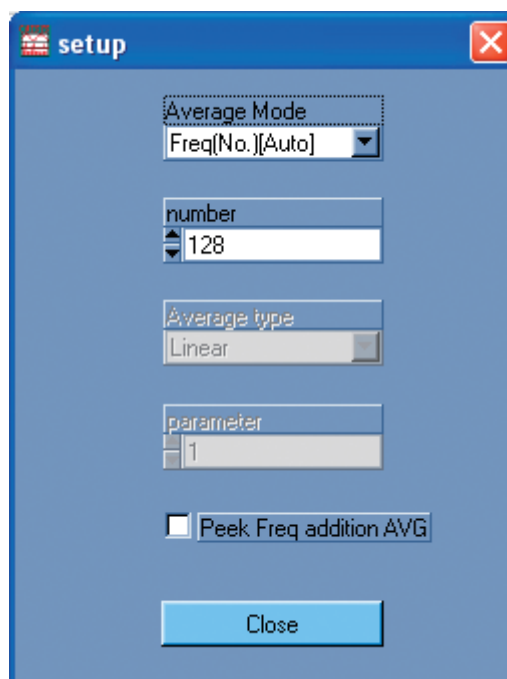
Double-click on the all-time data graph to cancel the enlarged display and return to normal display.

Averaging settings (setup)

You can make averaging settings for FFT analysis as follows.

This function is available only in FFT analysis mode and FFT & 1/N octave band analysis mode.

1. In the menu bar, click [Analysis] and select [Average]. The [setup] window appears.



2. Make the required settings.

[Average Mode]:

Selects the averaging method.

[None]:

No averaging is carried out.

[Freq(No.)[Auto]]:

Frequency data auto averaging

All data acquired during measurement/analysis are automatically used for processing. The end conditions are set with [number].

[Freq(No.)[Manu]]:

Frequency data manual averaging

A decision is made manually whether acquired data are used for processing. The end conditions are set with [number].

Important

When the analysis mode is FFT analysis mode, "Frequency data manual averaging" can be selected only when the type is not "Free run" and the trigger mode is set to "Repeat".

Note

The averaging method can also be set with the [AverageMode] function button.

[number]:

Enter the averaging count here.

Note

The averaging count can also be set with the [No. of Avg] function button.

[Average type]:

Cannot be set. Always grayed out.

[Parameter]:

Cannot be set. Always grayed out.

[Peak Freq addition AVG]

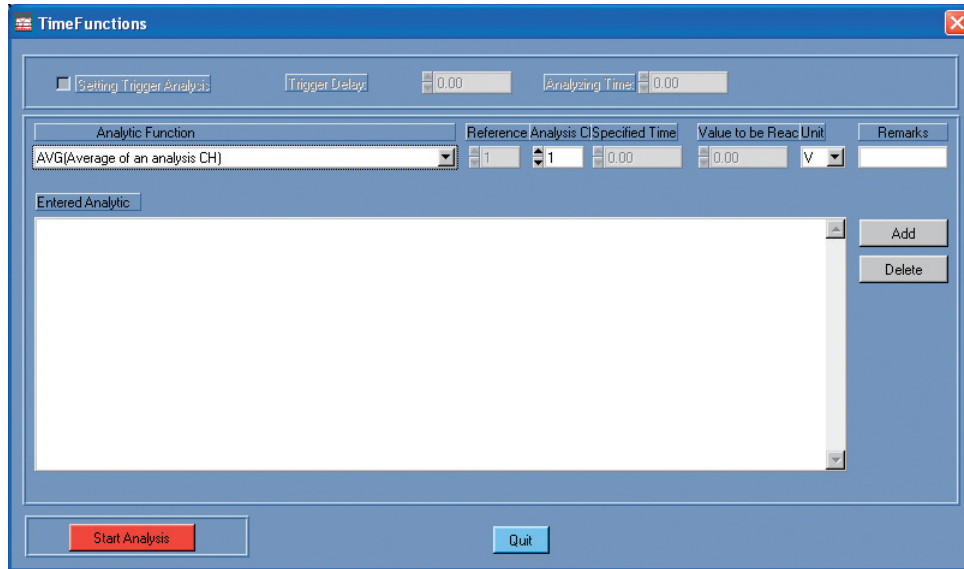
When this check box is selected, the spectrum maximum for each frame is determined, and frequency lines where several maximums exist at the same frequency are averaged mathematically.

3. Click the [Close] button. The [setup] window closes.

Time waveform analysis (TimeFunctions)

The time data displayed while measurement is stopped can be used to calculate average values, rms value, maximum/minimum values, etc. This function is available only in FFT analysis mode and FFT & 1/N octave band analysis mode.

1. In the menu bar, click [Analysis] and select [Time Functions]. The [TimeFunctions] window appears.



Note

The [Setting Trigger Analysis], [Trigger Delay:], and [Analyzing Time:] settings are always grayed out and cannot be changed.

2. Set the functions and parameters to use for analysis.

[Analytic Function]:

Selects the analysis function to use. Parameters for the selected analysis function are set with [Reference CH] to [Unit].

[AVG]:

Calculates the time average of the channel selected for analysis. Available parameters are [Analysis CH] and [Unit].

[RMS]:

Calculates the rms value of the channel selected for analysis. Available parameters are [Analysis CH] and [Unit].

[MAX]:

Calculates the maximum value of the channel selected for analysis. Available parameters are [Analysis CH] and [Unit].

[MIN]:

Calculates the minimum value of the channel selected for analysis. Available parameters are [Analysis CH] and [Unit].

[VALUE_T]:

Calculates the value of the channel selected for analysis for a specified time. Available parameters are [Analysis CH], [Specified Time], and [Unit].

[VALUE_L]:

Calculates the value of the channel selected for analysis at the point when the reference channel reaches a specified threshold level. Available parameters are [Reference CH], [Analysis CH], [Value to be Reached], and [Unit].

[TIME]:

Gives the time when the channel selected for analysis reaches a specified threshold level. Available parameters are [Analysis CH], [Value to be Reached], and [Unit].

[Reference CH]:

Specifies the reference channel (→ page 38).

[Analysis CH]:

Specifies the analysis channel.

[Specified Time]:

Specifies the time when the value is obtained.

[Value to be Reached]:

Specifies the level to obtain.

[Unit]:

Specifies the unit.

[V]: Voltage values are shown.

[EU]: Engineering Units are shown.

[Remarks]:

Comments can be entered here.

3. Click the [Add] button.

The specified function is registered and listed under entered analysis functions.

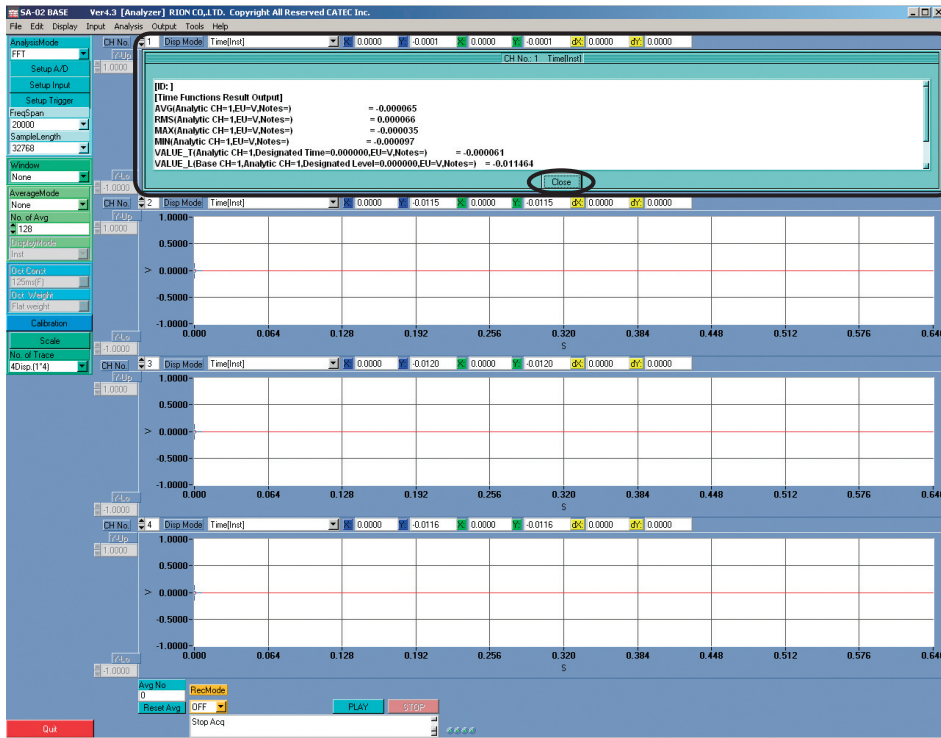
Note
During time waveform analysis, calculation is performed for registered functions only.

4. Repeat steps 2 and 3 for all the functions you want to use.

Note
To delete a registered function, highlight the function in the [Entered Analytic] field and click the [Delete] button.

5. When analysis functions have been registered, click the [Start Analysis] button. Time waveform analysis is carried out. The analysis is normally completed immediately.

- Click the [Quit] button. The [TimeFunctions] window closes.
- While holding down the Ctrl key, right-click on any point in the graph. A window showing the time waveform analysis results appears. To close this window, click the [Close] button at the bottom of the window.

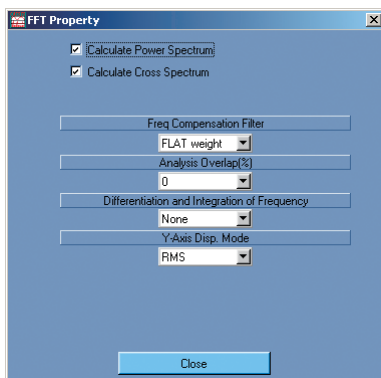


FFT analysis

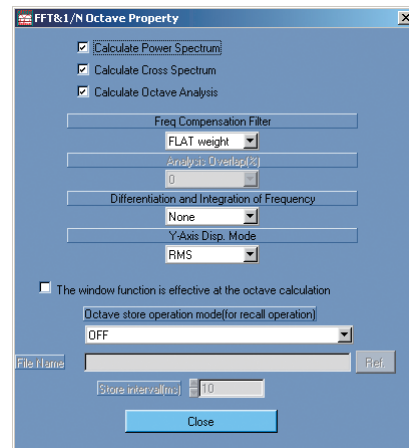
This is available only when FFT analysis mode or FFT & 1/N octave band analysis mode is selected.

- In the menu bar, click [Analysis] and select [FFT Property] or [FFT&1/N Octave Property].

If [FFT Property] was selected, the [FFT Property] window appears (left window in illustration below). If [FFT&1/N Octave Property] was selected, the [FFT&1/N Octave Property] window appears (right window in illustration below).



[FFT Property] window



[FFT&1/N Octave Property] window

2. Make the required settings.

[Calculate Power Spectrum]:

Select this check box to perform power spectrum related calculations.

[Calculate Cross Spectrum]:

Select this check box to perform calculations for functions based on the cross-spectrum (cross-spectrum, transfer function, coherence function).

[Calculate Octave Analysis]:

Select this check box to perform octave band analysis related calculations. This is available only in FFT & 1/N octave band analysis mode.

Check box selected:

Both during on-line analysis and recorded waveform playback, the computer uses the time waveform data obtained from the hardware to perform octave analysis. When there is non-contiguity between the measurement start time and the waveform, filter transient response will occur.

Check box not selected:

During on-line analysis, the octave analysis result calculated by the hardware is displayed. During recorded waveform playback, octave analysis is not carried out.

[Freq Compensation Filter]:

Select [FLAT weight], [A weight], or [C weight] to apply frequency weighting to the power spectrum.

Important
<ul style="list-style-type: none"> Frequency weighting here is carried out not by analog filter circuitry but by numeric processing of analysis results. To perform frequency weighting using analog filters, click the [Input Setup] button to open the [Setup Input CH] window, and make the required settings under [Analog Filter]. If a setting other than [FLAT weight] is selected for [Freq Compensation Filter] here, check the [Analog Filter] for the input setup to make sure that frequency weighting is not applied twice.

[Analysis Overlap (%)]:

Specifies the frame overlap ratio for FFT analysis. The value is given as a percentage, taking the frame length as 100%.

Available settings are 0, 50, 75, 87.5, and 93.75 (%).

Note
If overlap ratio has been specified, but the status window still shows “Non-Contiguous Data”, overlap cannot be performed.

[Differentiation and Integration of Frequency]:

Selects differentiation and integration processing.

[None]: No differentiation and integration processing is carried out.

[Differentiation]: 1-step differentiation is carried out.

[2Step Differentiation]:

2-step differentiation is carried out.

[Integral]: Integration is carried out.

[2Step Integral]: 2-step integration is carried out.

[Y-Axis Disp. Mode]:

Selects the Y axis display value for frequency data.

[0-P]: The zero-to-peak amplitude value is shown.

[RMS]: The rms value is shown.

[P-P]: The peak-to-peak amplitude value is shown.

[The window function is effective at the octave calculation]:

Select this check box to use time window functions for octave band analysis.

This is available only in FFT & 1/N octave band analysis mode.

[Octave store operation mode(for recall operation)]:

Selects the octave store calculation mode.

[OFF]: Calculation is not performed.

[Analysis point interval]:

Octave calculation results are stored for each FFT analysis point number.

[Optional interval]:

Octave calculation results are stored for store interval specified with [Store interval (ms)].

[File Name]:

Selects the file name for the file storing the octave calculation results.

Clicking the [Ref.] button brings up the [Select csv file] window. Select the target folder and enter a descriptive file name.

This setting is available only if [Octave store operation mode(for recall operation)] is set to [Analysis point interval] or [Optional interval].

[Store interval(ms)]:

Only when the octave store calculation mode has been set to [Optional interval], the store interval can be set here in milliseconds (1-ms steps). If there are no data at the specified interval, the interval closest to the specified value will be used. Depending on the frequency range used during recording, some interval settings may not be available. In such a case, the setting automatically becomes the lower limit or the upper limit.

3. Click the [Close] button. The [FFT Property] window or [FFT&1/N Octave Property] window closes.

Note
Deselecting the [Calculate Power Spectrum] and [Calculate Cross Spectrum] check boxes reduces the processing load which helps to prevent non-contiguous frames. This is especially useful during waveform recording.

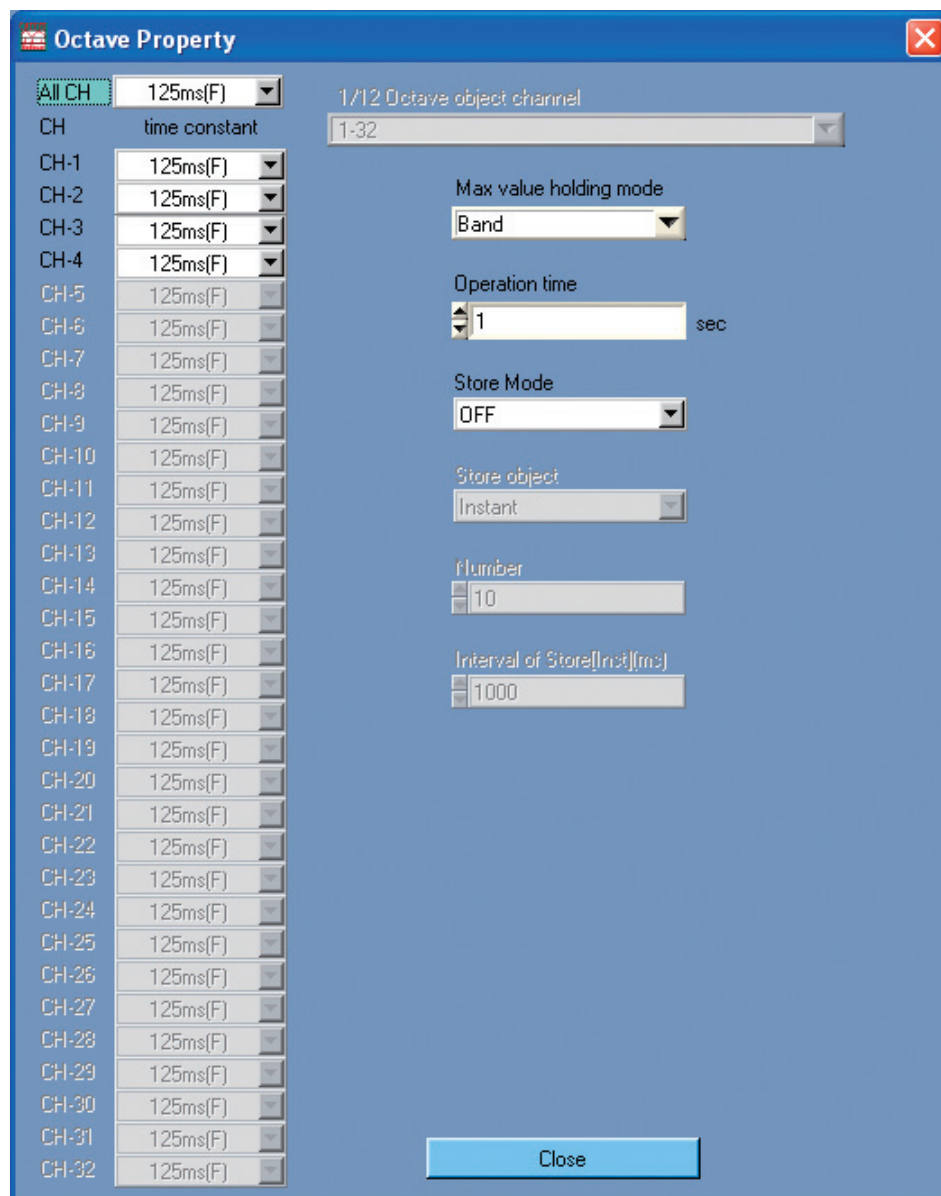
Octave band analysis settings (Octave Property)

This specifies the calculation parameters for octave band analysis and determines whether store functions are used. This is available only in 1/N octave band analysis mode.

Note

When store functions are enabled, measurement data and calculation data can be stored in internal memory and called up for display.

1. In the menu bar, click [Analysis] and select [Octave Analysis]. The [Octave Property] window appears.



2. Make the required settings.

[time constant]:

Selects the time constant used for time weighting when calculating rms values, for each channel separately.

[1/12 Octave object channel]:

Specifies the channel combination for 1/12 octave band analysis. Depending on the channel combination, the bandwidth for analysis will be limited.

1, 5, 9, 13, 17, 21, 25, 29:

2, 6, 10, 14, 18, 22, 26, 30:

3, 7, 11, 15, 19, 23, 27, 31:

4, 8, 12, 16, 20, 24, 28, 32:

Calculation is carried out for bands from 0.36 Hz to 22 kHz.

1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31:

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32:

Calculation is carried out for bands from 0.36 Hz to 11 kHz.

1 to 32:

Calculation is carried out for bands from 0.36 Hz to 5.5 kHz.

[Max value holding mode]:

Selects the operation in maximum hold mode.

[Band]:

Maximum values are monitored in each frequency band.

[All-Pass]:

The all-pass maximum value is monitored, and the values in each frequency band are stored at the point when the all-pass value is highest.

[Operation Time]:

Sets the processing time for average value and maximum value calculation.

The setting range is 1 to 3600 seconds, in 1-second steps.

[Store Mode]:

[OFF]:

Store function disabled.

[Auto Store]:

Processing results are automatically stored in a repeated cycle, determined by the [Number] and [Interval of Store[Inst](ms)] settings. The store interval for average values and maximum values is the same as the processing time.

[Manual Store]:

One data set representing the displayed data is stored each time the [Memory] button in the measurement buttons is clicked.

[Store object]:

[Instant], [Leq], or [Lmax] can be selected as store target.

[Number]:

Specifies the number of times the store operation is carried out. The setting is enabled only when Auto Store is selected.

In 1/1 octave band analysis mode and 1/3 octave band analysis mode, the maximum setting is 36000. In 1/12 octave band analysis mode, the maximum setting is 18000.

[Interval of Store[Inst](ms)]:

Specifies the interval at which instantaneous values are stored during auto store. The interval for auto store for average and maximum values is equal to the processing time.

The minimum and maximum store interval settings are listed in the table below.

Bandwidth		Minimum store interval	Maximum store interval
1/1		1 ms	1000 ms
1/3		1 ms	
Number of channels used for 1/12	1 channel/board	1 ms	
	2 channels/board	2 ms	
	4 channels/board	4 ms	

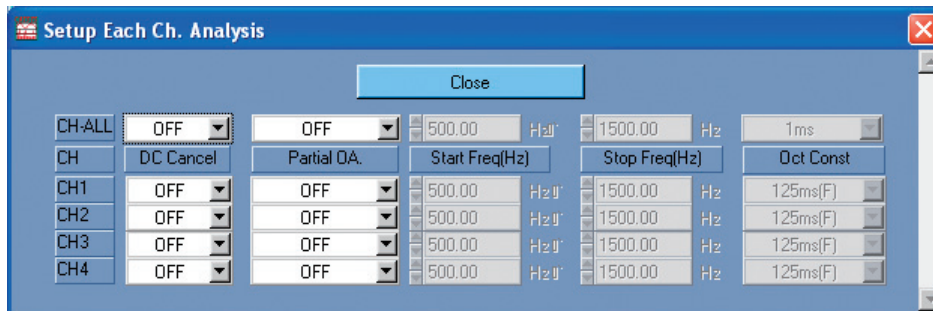
3. Click the [Close] button. The [Octave Property] window closes.

Analysis settings by channel (Setup Each Ch. Analysis)

You can make separate analysis settings for each channel.

This function is available only in FFT analysis mode and FFT & 1/N octave band analysis mode.

1. In the menu bar, click [Analysis] and select [Setup Each Ch. Analysis]. The [Setup Each Ch. Analysis] window appears.



2. Make the required settings. The items listed below can be set by channel, using [CH1], [CH2] etc. or applied to all channels by selecting [CH-All].

[DC Cancel]:

Removes DC spectrum components from FFT analysis results.

[Partial OA.]:

Limits the overall calculation to a certain bandwidth, defined by the [Start Freq(Hz)] and [Stop Freq(Hz)] settings.

[Start Freq(Hz)]:

Sets the lower frequency limit for the “Partial Overall” bandwidth.

[Stop Freq(Hz)]:

Sets the upper frequency limit for the “Partial Overall” bandwidth.

[Oct Const]:

Specifies the time constant for time weighting used when calculation rms values. This setting is valid only in FFT & 1/N octave band analysis mode.

3. Click the [Close] button. The [Setup Each Ch. Analysis] window closes.

Peak List

Peak list analysis can be performed as described below.

This function is available only in FFT analysis mode and FFT & 1/N octave band analysis mode.

1. In the menu bar, click [Analysis] and select [Peak List Analysis]. The [Peak List] window appears.



2. Make the required settings.

[CH No.]:

Selects the channel for which to perform peak list analysis.

[Disp Mode]:

You can select either [PowerSpectrum[Inst]], [PowerSpectrum[Avg]], or [PowerSpectrum[Max]].

3. Click the [PLAY] button.

Measurement starts and a frequency graph and peak list are updated.

4. Click the [STOP] button.

Measurement stops.

5. Click the [Close] button.

The [Peak List] window closes.

Sound playback (Play Sound)

Stored audio data can be played back as follows.

This function is available in FFT analysis mode or FFT & 1/N octave band analysis mode when [DisplayMode] has been set to ON.

1. In the menu bar, click [Analysis] and select [Play Sound]. The [Play Sound] window appears.



2. Enter the channel number for which play the sound.
3. Click the [Play] button to hear the recorded sound.
4. Click the [STOP] button to stop playback.
5. Click the [Close] button.

The [Play Sound] window closes.

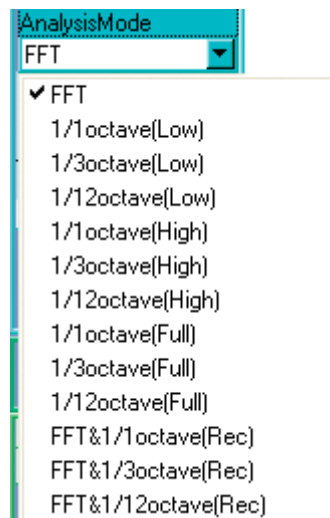
Measurement operation

FFT analysis mode

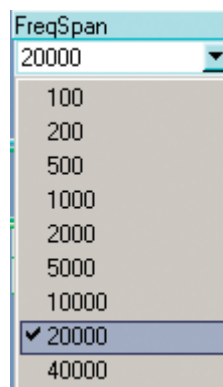
This mode performs FFT analysis during measurement in real time.

Measurement and analysis in FFT analysis mode

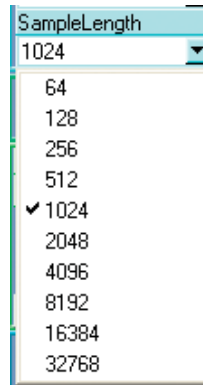
1. Use the [AnalysisMode] function button to select [FFT].



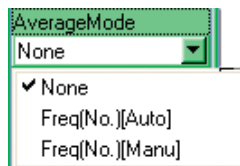
2. Use the [FreqSpan] function button to select the frequency range.



- Use the [SampleLength] function button to select the number of frame points.



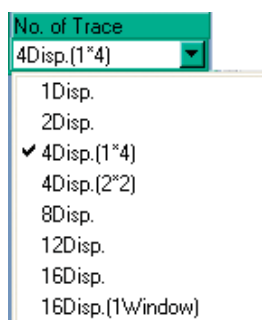
- Use the [AverageMode] function button to select the averaging method.
For an explanation of averaging method items, see page 24.



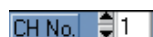
Note

If [Freq(No.)[Auto]] or [Freq(No.)[Manu]] was selected as averaging method, use the [No. of Avg] function button to specify the averaging count.

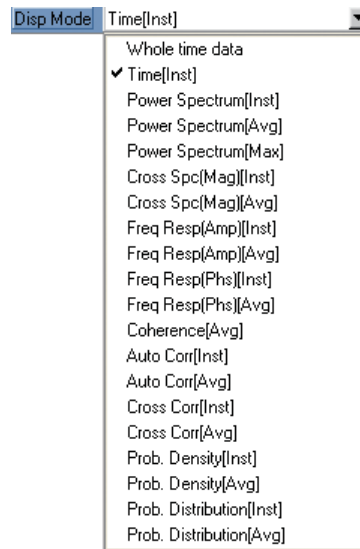
- Use the [No. of Trace] function button to select the number of graph screens.
For an explanation of [No. of Trace] items, see page 36.



- For each graph screen, select the channel for which the in-progress measurement data will be displayed. Use [CH No.] at the top left to select the number of the channel to show.



7. For each graph screen, use the [Disp Mode] field at the top of the screen to select the in-progress measurement data to be displayed.



8. Click the [Scale] function button to bring up the [Scale] window and make the scale settings for the graph.

For an explanation of graph scale items, see page 33.

9. Make measurement/analysis start condition settings (trigger settings) as required.

Click the [Setup Trigger] function button to bring up the [Setup Trigger] window, and make the necessary settings.

For an explanation of trigger items, see page 20.

Note

Using the trigger function, you can have measurement/analysis start automatically and cause processing to be performed whenever a predefined event occurs.

10. To reduce processing load, it is possible to selectively disable or enable cross-spectrum related functions (cross-spectrum, transfer function, coherence function).

To make these settings, click [Analysis] in the menu bar and select [FFT Property] to bring up the [FFT Property] window.

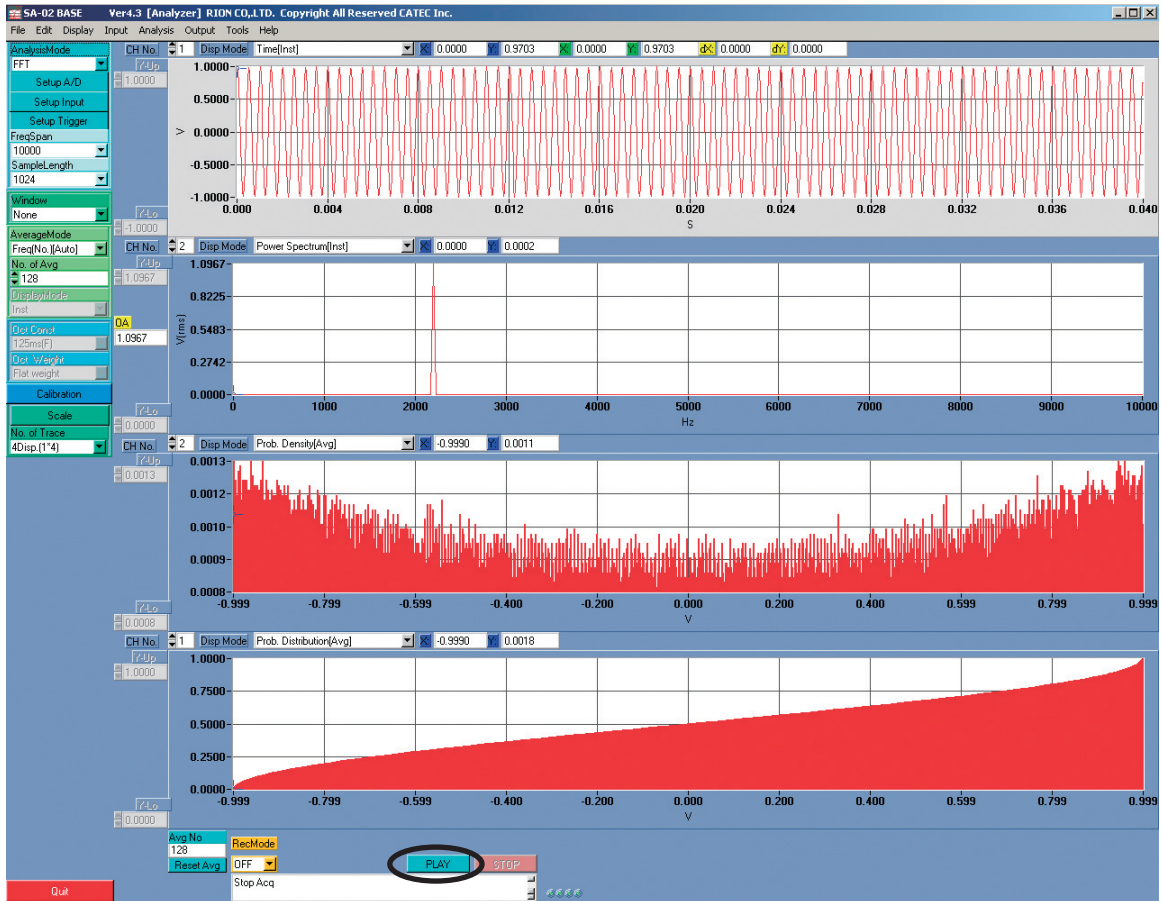
For an explanation of setting items, see page 54.

11. Click the [PLAY] button.

When measurement/analysis starts, the data are shown on the graph screens.

Important

If AverageMode has been set to [None], the averaging and maximum data will not be updated.



Note

To stop measurement/analysis, click the [STOP] button.

Important

If the status window shows “Non-Contiguous Data”, there is a gap between frames of FFT analysis. However, even in such a case, data within a frame will be contiguous.

Operation of [PLAY], [STOP], and [Reset Avg] buttons (during FFT analysis) in various states of SA-02 BASE software

During processing (average value or maximum value)

- If [STOP] button is clicked before averaging count is reached, and [PLAY] button is then clicked in the stopped condition, processing results up to that point are retained, and processing continues from that point.
- If averaging count has been reached and processing has stopped, clicking the [PLAY] button clears the previous results and initiates a new processing run.
- Clicking the [Reset Avg] button in the stopped condition also clears the previous results. Subsequently clicking [PLAY] initiates a new processing run.

Trigger Operation

Common operation principle

[Single]: When a trigger event is detected, measurement/analysis starts and processing continues until the measurement/analysis end conditions are met.

[Repeat]: When a trigger event is detected, measurement/analysis starts. When one data set has been acquired, the system again goes into the trigger standby condition. This continues until the measurement/analysis end conditions are met.

- Clicking the [PLAY] button in the stopped condition causes the system to enter trigger standby.

Operation principle during instantaneous value processing

- In trigger standby and when trigger position time has elapsed, clicking the [STOP] button and then clicking the [PLAY] button in the stopped condition causes the system to enter trigger standby.

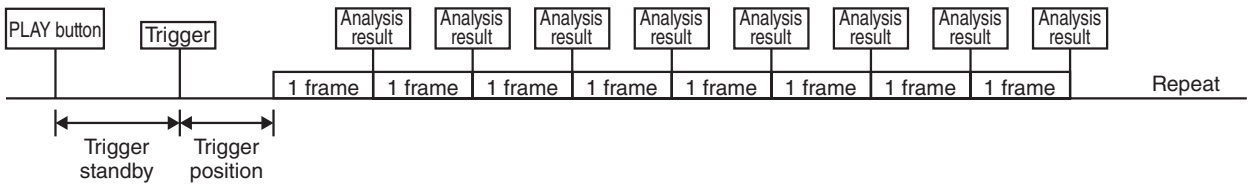
However, if the trigger mode is “Repeat”, the standby mode will be activated again immediately after the trigger standby and trigger position time has elapsed.

Operation principle during averaging or maximum value processing

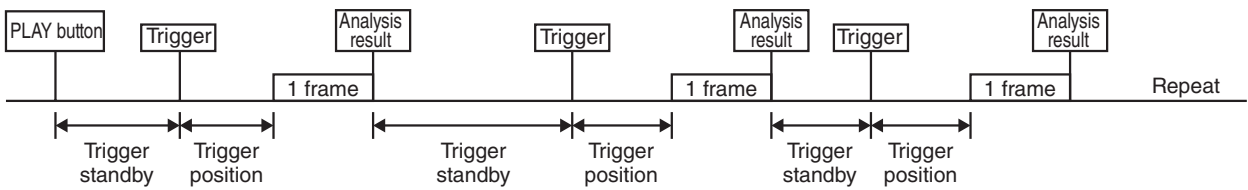
- If [STOP] button is clicked during processing, and [PLAY] button is then clicked in the stopped condition, processing results up to that point are retained, and processing continues from that point.
- If processing count has been reached and processing has stopped, clicking the [PLAY] button clears the previous results and causes the system to enter trigger standby. When a trigger event occurs, processing starts again from the beginning.
- If the [Reset Avg] button is clicked in the stopped condition, the previous results are cleared. Clicking the [PLAY] button then causes the system to enter trigger standby. When a trigger event occurs, processing starts again from the beginning.

Trigger operation during FFT analysis
(Instantaneous value)

Trigger mode: Single

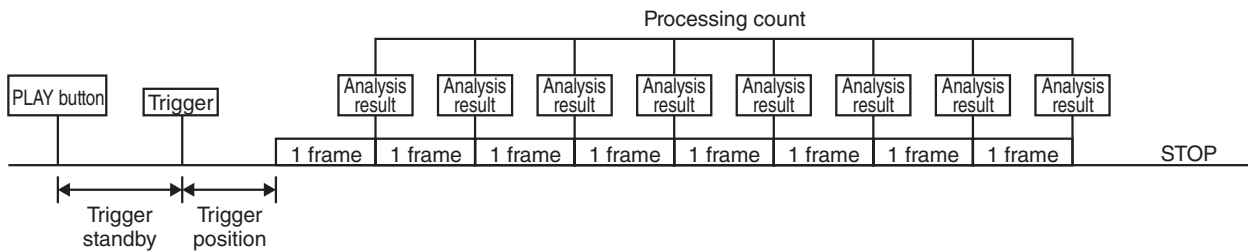


Trigger mode: Repeat

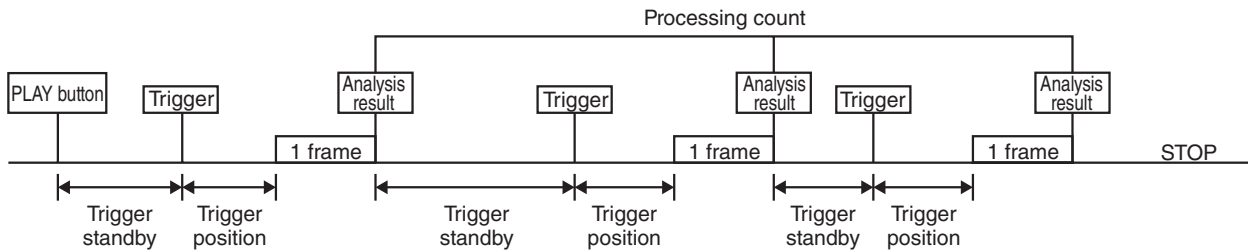


Trigger operation during FFT analysis
(Average or maximum value)

Trigger mode: Single



Trigger mode: Repeat

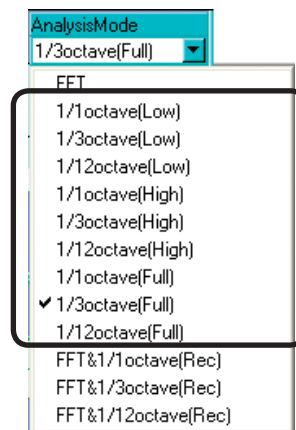


Octave band analysis mode

This mode performs octave band analysis during measurement in real time.

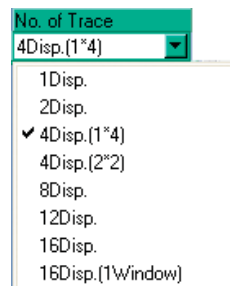
Measurement and analysis in octave band analysis mode

1. Use the [AnalysisMode] function button to select the octave range and bandwidth for analysis: [1/1octave(Low)] to [1/12octave(Full)].



2. Use the [No. of Trace] function button to select the number of graph screens, as required.

For an explanation of [No. of Trace] items, see page 36.

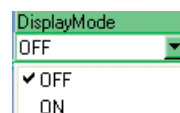


3. For each graph screen, select the channel for which the in-progress measurement data will be displayed. Use [CH No.] at the top left to select the number of the channel to show.

4. Use the [DisplayMode] function button to select the processing value.

For an explanation of [DisplayMode] setting items, see page 25.

If processing display mode is set to ON, use the [Operation Time (s)] button in the measurement button section or use the [Operation time] of the [Octave Property] window to set the operation time.



- For each graph screen, use the [Disp Mode] field at the top of the screen to select the in-progress measurement data to be displayed.

Note Frequency weighting is applied through numerical processing.



- Click the [Scale] function button to bring up the [Scale] window and make the scale settings for the graph.

For an explanation of graph scale items, see page 33.

- Make measurement/analysis start condition settings (trigger settings) as required.

Click the [Setup Trigger] function button to bring up the [Setup Trigger] window, and make the necessary settings.

For an explanation of trigger items, see page 20.

Note

Using the trigger function, you can have measurement/analysis start automatically and cause processing to be performed whenever a predefined event occurs.

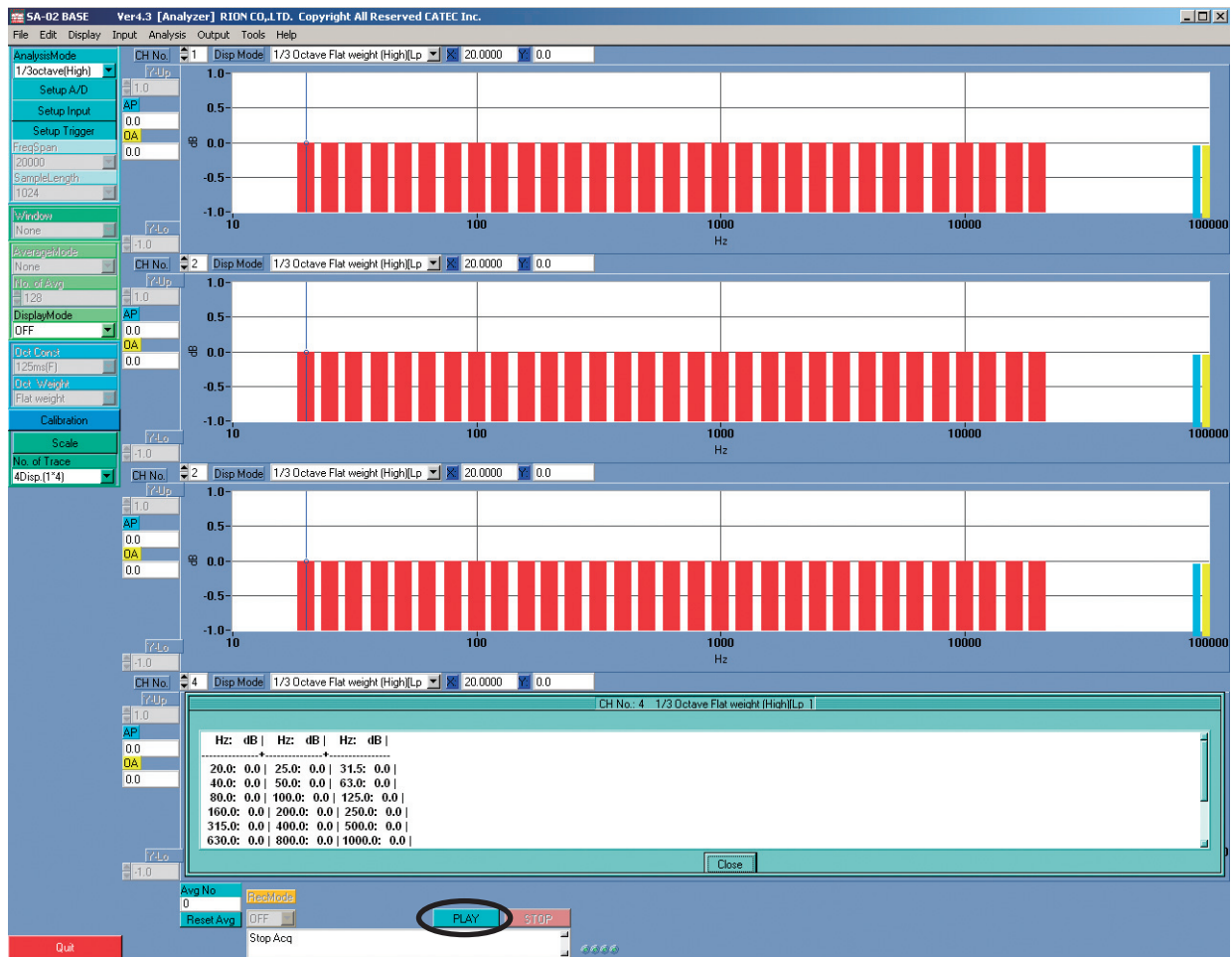
- Click [Analysis] in the menu bar, select [Octave Analysis], and make the setting for the octave time constant.

For an explanation of the octave time constant setting, see page 57.

9. Click the [PLAY] button.

When measurement/analysis starts, the data are shown on the graph screens.

If you right-click on a graph while holding down the Ctrl key, a list window with numeric data for the graph appears.



Note

If [Avg No] has been set to [ON] in [DisplayMode], the elapsed processing time is shown in seconds as a count-up display. When the preset time is reached, measurement/analysis stops automatically.

To stop measurement/analysis, click the [STOP] button. To resume a stopped measurement/analysis run, click the [PLAY] button again.

To clear the results of an interrupted measurement/analysis run and start a new one, first click the [Reset Avg] button to reset the [Avg No], and then click the [PLAY] button.

Operation of [PLAY], [STOP], and [Reset Avg] buttons (during octave band analysis) in various states of SA-02 BASE software

During processing (Leq, Lmax (Band), Lmax (AP))

- Clicking the [PLAY] button clears the processing results up to that point and initiates a new processing run.
- Clicking the [Reset Avg] button in the stopped condition also clears the previous results. Subsequently clicking [PLAY] initiates a new processing run.

During auto store

Data store is repeated automatically until the preset store count is reached.

For information on the setting procedure, see “Octave band analysis settings” on page 57.

- Clicking the [PLAY] button initiates data storing until the store count is reached.
- Clicking the [STOP] button before the store count is reached terminates the store operation. The data up to that point are stored.
- When the store count is reached, or when the [STOP] button is clicked, the store operation terminates and the stored data are automatically transferred to the computer.
- When the [PLAY] button is clicked again in the stopped condition, data stored in the unit are cleared, and storing begins again from the first address.

Trigger operation

Common operation principle

[Single]: When a trigger event is detected, measurement/analysis starts and processing continues until the measurement/analysis end conditions are met.

[Repeat]: When a trigger event is detected, measurement/analysis starts. When one data set has been acquired, the system again goes into the trigger standby condition. This continues until the measurement/analysis end conditions are met.

- When the [STOP] button was clicked in the standby condition, setting the system to the stop mode, clicking the [PLAY] button causes the system to enter trigger standby again.

Operation principle when processing display mode is set to OFF

- In Single trigger mode, when a trigger event occurs, display of instantaneous data is continuously updated until the [STOP] button is clicked. In Repeat trigger mode, when a trigger event occurs, instantaneous data at that point are displayed and the system enters the trigger standby condition.
- In trigger standby and when trigger position time has elapsed, clicking the [STOP] button and then clicking the [PLAY] button in the stopped condition causes the system to enter trigger standby.

Operation principle when processing display mode is set to ON

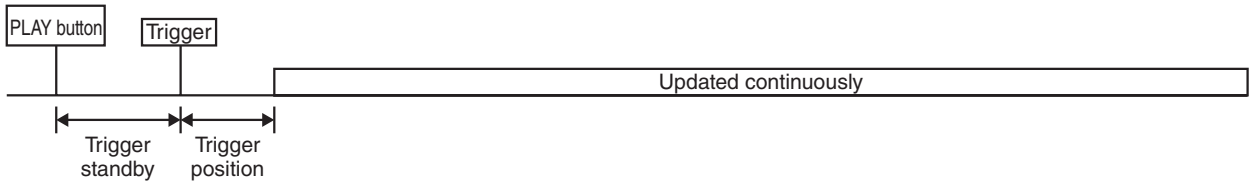
- In Single trigger mode, when a trigger event occurs, processing is carried out for the preset time and then the system goes into stop mode. In Repeat trigger mode, when a trigger event occurs, processing is carried out for the preset time and the system then again goes into standby mode. When the next trigger event occurs, the data are cleared and processing begins again.

Operation principle when combined with auto store

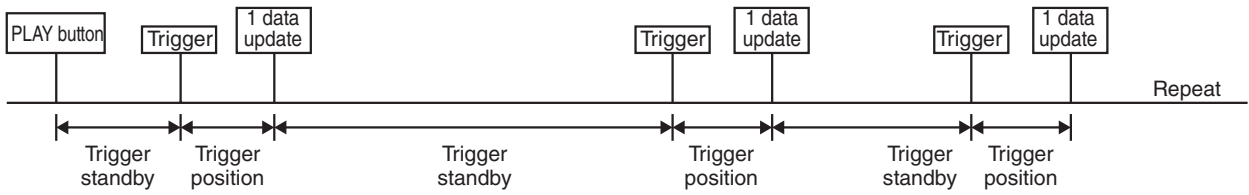
- In Single trigger mode, when a trigger event occurs, processing is repeated for the preset store count, and then the system goes into stop mode. In Repeat trigger mode, when a trigger event occurs, processing is carried out for the preset time, data are stored, and the system then again goes into trigger standby mode. The trigger → processing → store cycle is repeated for the preset store count, and then the system goes into stop mode.
- When the [PLAY] button is clicked, stored data are cleared and the system goes into trigger standby mode.
- Clicking the [Reset Avg] button in the stopped condition also clears the stored data.

Trigger operation during 1/N octave band analysis
(Processing display mode OFF)

Trigger mode: Single



Trigger mode: Repeat

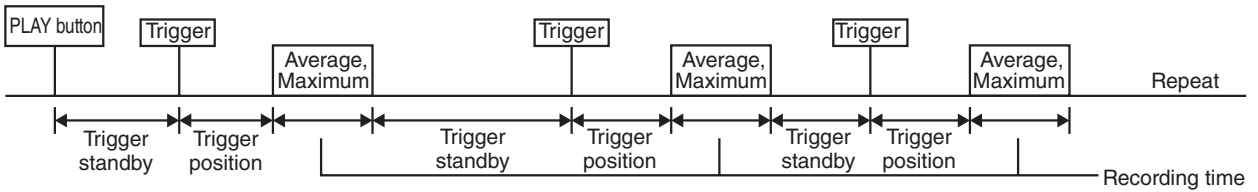


Trigger operation during 1/N octave band analysis
(Processing display mode ON)

Trigger mode: Single

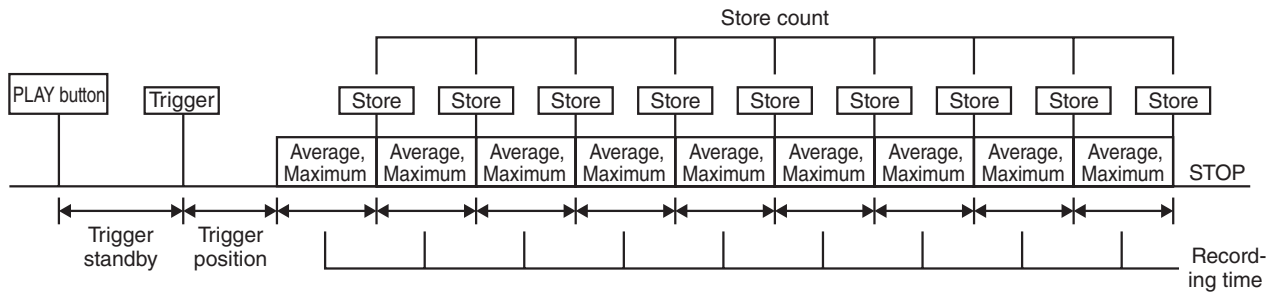


Trigger mode: Repeat

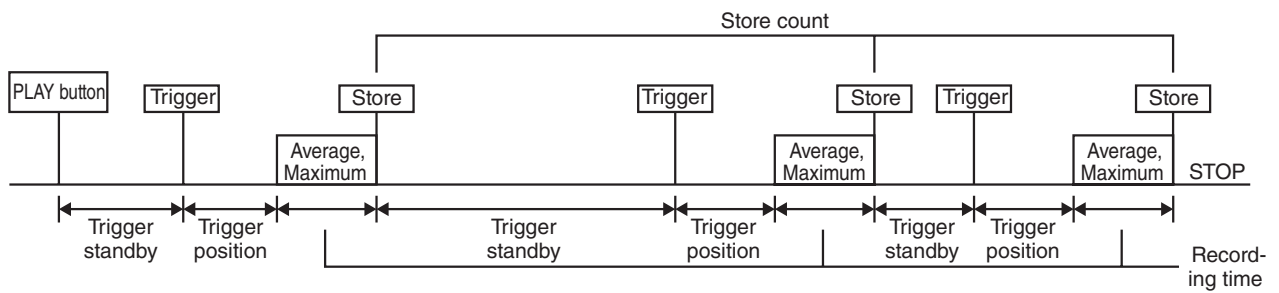


Trigger operation during 1/N octave band analysis
(Average or maximum auto store)

Trigger mode: Single

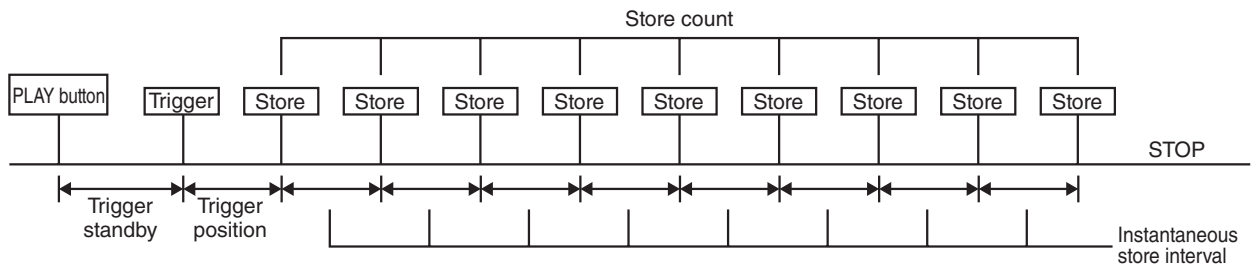


Trigger mode: Repeat

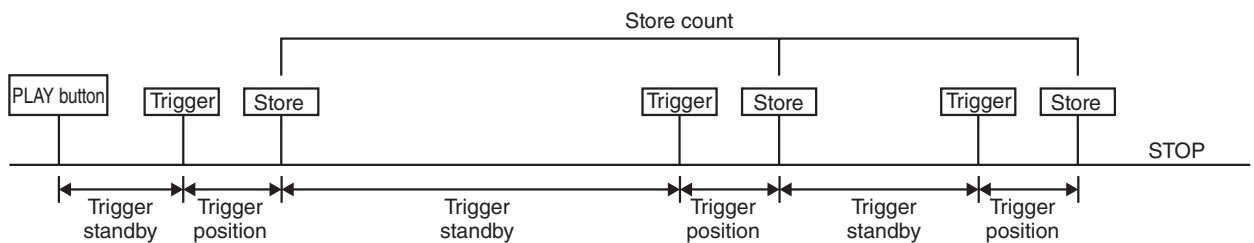


Trigger operation during 1/N octave band analysis
(Instantaneous value auto store)

Trigger mode: Single



Trigger mode: Repeat



User-defined frequency weighting

- This function is only available in 1/N octave band analysis mode. It is not available in FFT analysis mode and FFT & 1/N octave band analysis mode.
- User-defined frequency weighting is based on frequency weighting data files in CSV format created by the user.
- User-defined frequency weighting data files are located in the “DATA” subfolder under the folder where this software is installed.

“USERWEIGHT1.CSV” (User-defined frequency weighting data file for 1/1 octave)

“USERWEIGHT3.CSV” (User-defined frequency weighting data file for 1/3 octave)

“USERWEIGHT12.CSV” (User-defined frequency weighting data file for 1/12 octave)

The files are used for 1/1, 1/3 and 1/12 octave band analysis respectively. If files with these names do not exist in the “C:\SA-02” folder, user-defined frequency weighting is not possible.

How to create data files for user-defined frequency weighting (example using Microsoft Excel)

1. The files “USERWEIGHT1.CSV”, “USERWEIGHT3.CSV”, and “USERWEIGHT12.CSV” are located in the “DATA” subfolder under the folder where the SA-02 BASE software is installed. Copy these files into the folder where the SA-02 BASE software is installed.
2. An example for opening a copied user-defined frequency weighting data file in Microsoft Excel is shown on the next page (table at the top). This example refers to “USERWEIGHT1.CSV”.
3. Edit the table in Microsoft Excel. The value in the cell to the right of “NOWEIGHT” is “8”. This indicates the number of user-defined frequency weighting columns. Possible settings are integers from 1 to 8.
4. The “USER0” to “USER7” fields can be up to 16 characters long. You can enter any name to identify the set of custom characteristics. The string is shown as is on the SA-02 BASE screen when selecting frequency weighting settings.
5. The numeric rows under “USER0” to “USER7” (all set to “0” by default) are used to specify frequency weighting in the respective frequency band. For example, if the cell under “USER0” in the “FREQ” “0.5” row reads “5”, the 0.5 Hz band level display will be boosted by 5 dB when the USER0 user-defined frequency weighting setting is selected.
6. For the “USERWEIGHT1.CSV” file, 16 data from “0.5” to “16000” are required. For the “USERWEIGHT3.CSV” file, 48 data from “0.4” to “20000” are required. For the “USERWEIGHT12.CSV” file, 192 data from “0.355” to “22000” are required.

7. After the file has been edited to contain the required compensation values, save it in CSV format. (Files not in CSV format cannot be loaded by the SA-02 BASE software.)

[1/1_OCT_USERWEIGHT]								
NOWEIGHT	8							
FREQ	USER0	USER1	USER2	USER3	USER4	USER5	USER6	USER7
0.5	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
31.5	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0
250	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0
4000	0	0	0	0	0	0	0	0
8000	0	0	0	0	0	0	0	0
16000	0	0	0	0	0	0	0	0

An example for opening a user-defined frequency weighting data file in a text editor such as Notepad is shown below. Because the file is a text file in CSV format, it can also be opened and edited in any text editor, but unlike in Microsoft Excel, data are not shown in separate cells, which can easily lead to mistakes when editing the file. Using Microsoft Excel or similar is therefore recommended for editing. If the file is edited incorrectly, the user-defined frequency weighting function will not operate correctly. Proceed with care when creating or editing data files.

```
[1/1_OCT_USERWEIGHT] ,,,,,,  
NOWEIGHT,8,,,,,  
FREQ,USER0,USER1,USER2,USER3,USER4,USER5,USER6,USER7  
0,5,0,0,0,0,0,0,0  
1,0,0,0,0,0,0,0,0  
2,0,0,0,0,0,0,0,0  
4,0,0,0,0,0,0,0,0  
8,0,0,0,0,0,0,0,0  
16,0,0,0,0,0,0,0,0  
31.5,0,0,0,0,0,0,0,0  
63,0,0,0,0,0,0,0,0  
125,0,0,0,0,0,0,0,0  
250,0,0,0,0,0,0,0,0  
500,0,0,0,0,0,0,0,0  
1000,0,0,0,0,0,0,0,0  
2000,0,0,0,0,0,0,0,0  
4000,0,0,0,0,0,0,0,0  
8000,0,0,0,0,0,0,0,0  
16000,0,0,0,0,0,0,0,0
```

Using the user-defined frequency weighting function

1. Prepare the user-defined frequency weighting data file as described in the preceding section. Then start up the SA-02 BASE software.
2. Activate analysis mode and select [1/1octave(Low)] to [1/12octave(Full)].
3. Access [Disp Mode] and select the name of the user-defined frequency weighting you want to use (such as “1/1 Octave USER0 (All) (Inst)”).
4. When you start measurement, the display will reflect the user-defined frequency weighting characteristics.
5. The [OA] field in each graph shows the all-pass value obtained by combining the values of the frequency weighting bands. ([OA] is the combined value only for bands shown on screen, [AP] is the all-pass value for the entire range, regardless of displayed bands.)

Important

- When not using user-defined frequency weighting, move the user-defined frequency weighting data files from the folder in which the SA-02 BASE software is installed to another folder.
- When user-defined frequency weighting is carried out and measured data are saved as a CSV format, the weighting will be reflected in the data.
- If data were saved as a CSV format using user-defined frequency weighting, and the content of the user-defined frequency weighting data file was changed afterwards, the previous data may not load correctly after the change. To load such data, replace the user-defined frequency weighting data file with the one that was used when saving the data.

FFT & 1/N octave band analysis mode

In this mode, FFT analysis and octave band analysis are performed simultaneously.

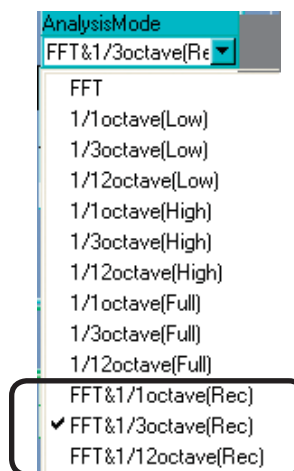
This is possible both for normal measurement/analysis and for offline analysis.

Time waveform data to be used for offline analysis can also be recorded.

Multiple kinds of analysis functions are available.

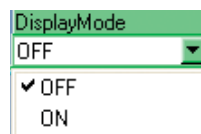
Measurement and analysis in FFT & 1/N octave band analysis mode

1. Use the [AnalysisMode] function button to select the FFT & 1/N OCT mode that is to be used for measurement/analysis ([FFT&1/1octave(Rec)] to [FFT&1/12octave(Rec)].



2. Set [DisplayMode] in the measurement button section to [OFF].

In this mode, the various analysis functions are implemented each time when a waveform for the sample length is acquired.



For information on the subsequent measurement/analysis steps, see the sections about FFT analysis mode and octave band analysis mode.

Important

When offline analysis is performed using waveform recording, 1/N octave band analysis is implemented by filter processing, similar to 1/N octave band analysis mode. However, under the condition where time waveform continuity can only be assured within a frame, analysis results may be affected by the non-contiguous condition between frames.

To minimize this effect, using the window function similar to FFT analysis is recommended.

Operation of [PLAY], [STOP], and [Reset Avg] buttons (during FFT & 1/N OCT analysis) in various states of SA-02 BASE software

During processing (average value or maximum value)

- If [STOP] button is clicked before averaging count is reached, and [PLAY] button is then clicked in the stopped condition, processing results up to that point are retained, and processing continues from that point.
- If averaging count has been reached and processing has stopped, clicking the [PLAY] button clears the previous results and initiates a new processing run.
- Clicking the [Reset Avg] button in the stopped condition also clears the previous results. Subsequently clicking [PLAY] initiates a new processing run.

Trigger Operation

Common operation principle

- When a trigger event is detected, measurement/analysis starts and processing continues until the measurement/analysis end conditions are met.
- Clicking the [PLAY] button in the stopped condition causes the system to enter trigger standby.

Operation principle during instantaneous value processing

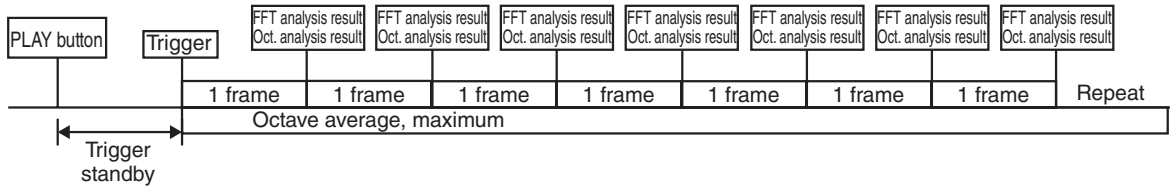
- In trigger standby and when trigger position time has elapsed, clicking the [STOP] button and then clicking the [PLAY] button in the stopped condition causes the system to enter trigger standby.

Operation principle during averaging or maximum value processing

- If processing count has been reached and processing has stopped, clicking the [PLAY] button clears the previous results and causes the system to enter trigger standby. When a trigger event occurs, processing starts again from the beginning.
- If the [Reset Avg] button is clicked in the stopped condition, the previous results are cleared. Clicking the [PLAY] button then causes the system to enter trigger standby. When a trigger event occurs, processing starts again from the beginning.

Trigger operation during FFT & 1/N octave band analysis
(Instantaneous value)

Trigger mode: Single

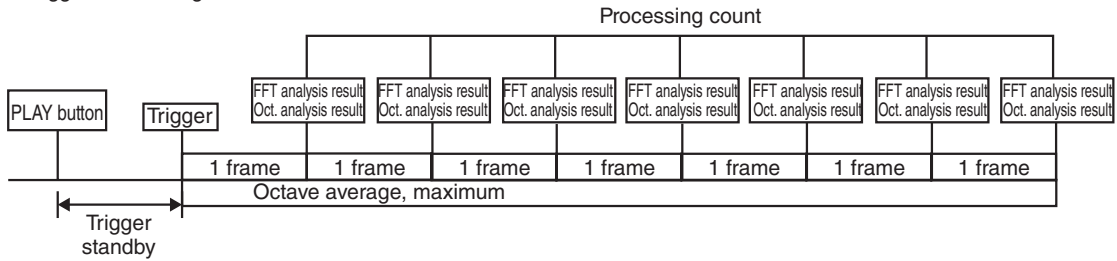


Important

The FFT analysis processing time and octave band analysis processing time do not match completely.

Trigger operation during FFT & 1/N octave band analysis
(Average value or maximum value)

Trigger mode: Single



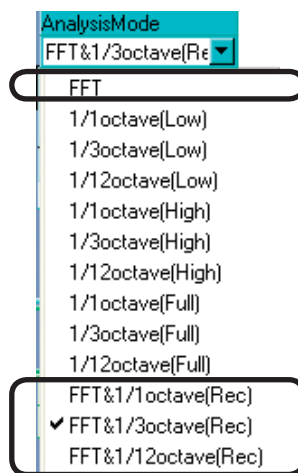
Time waveform data recording and offline analysis

In FFT analysis mode and FFT & 1/N octave band analysis mode, recorded time waveform data can be used to perform offline analysis.

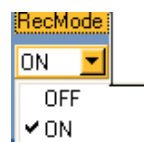
Time waveform data recording

To perform time waveform data recording, proceed as follows.

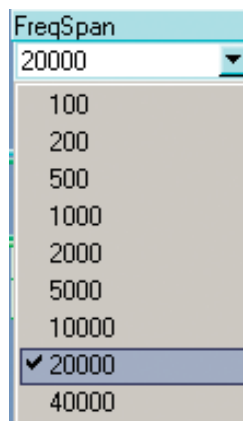
1. Use the [AnalysisMode] function button to select the analysis mode that is to be used for measurement/analysis ([FFT] or [FFT&1/1octave(Rec)] to [FFT&1/12octave(Rec)]).



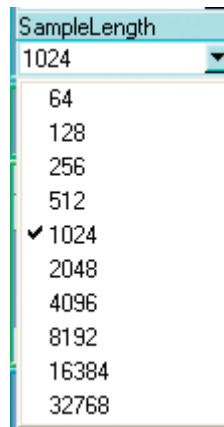
2. Set [RecMode] in the measurement button section to [ON].



3. Use the [FreqSpan] function button to select the frequency range.



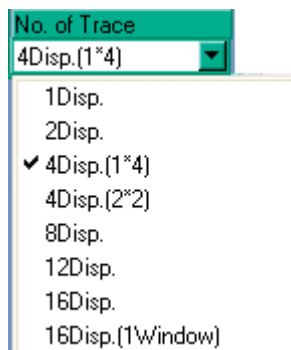
- Use the [SampleLength] function button to select the number of frame points used for FFT analysis.



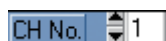
Note

The frequency range setting will determine the A/D conversion sampling frequency.

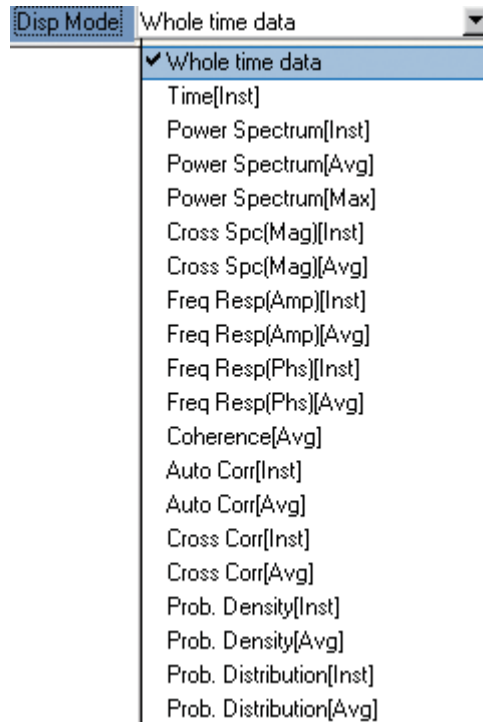
- If required, select the number of graph screens with the [No. of Trace] function button.
For information on the [No. of Trace] setting item, see page 36.



- For each graph screen, select the channel for which the in-progress measurement data will be displayed. Use [CH No.] at the top left to select the number of the channel to show.



7. For each graph screen, use the [Disp Mode] field at the top of the screen to select the function, processing type, and format for which the in-progress measurement data will be displayed.



8. Click the [Scale] function button to bring up the [Scale] window and make the scale settings for the graph.

For an explanation of graph scale items, see page 33.

9. Make measurement/analysis start condition settings (trigger settings) as required.

Click the [Setup Trigger] function button to bring up the [Setup Trigger] window, and make the necessary settings.

For an explanation of trigger items, see page 20.

Note

Using the trigger function, you can have measurement/analysis start automatically and cause processing to be performed whenever a predefined event occurs.

10. To ensure problem-free recording of time waveform data, making the following settings is recommended.

Do not perform FFT analysis during recording

- (1) Click [Analysis] in the menu bar and select [FFT Property] (or [FFT&1/N Octave Property]) to bring up the [FFT&1/N Octave Property] window.
- (2) Deselect the [Calculate Power Spectrum] and [Calculate Cross Spectrum] check boxes.
- (3) Click the [Close] button of the [FFT Property] window (or [FFT&1/N Octave Property] window) to close the window.

Do not display in-progress updates on the graph screens during recording

- (1) Click [Display] in the menu bar and select [Setup Graph] to bring up the [Common Setup Graph] window.
- (2) Deselect the [Display Time data on REC mode] and [Display Freq data on REC mode] check boxes.
- (3) Click the [Close] button of the [Common Setup Graph] window to close the window.

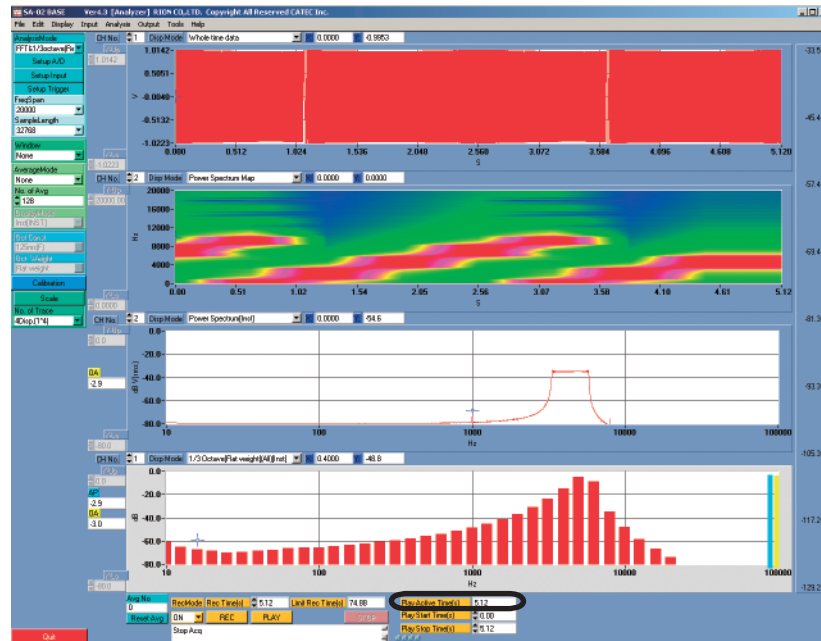
With the above settings, data will not be updated during recording, which reduces the processing load and helps to prevent non-contiguous frames.

11. Enter the recording time in the [Rec Time(s)] field of the measurement button section.

12. Click the [REC] button in the measurement button section.

REC

Recording starts, graph screen data are updated, and the [Play Active Time(s)] indicator starts running.



Important

Recorded waveform data are cleared when the frequency span and number of channels are changed. If necessary, use the “Saving a Data File” function to save the data first (→ page 93).

Regardless of whether recording finished automatically or was stopped manually, clicking the [REC] button again will clear the recorded data and start a new recording operation.

Note

Data displayed during recording always are equal to a setting of 32768 analysis points (sample length).

If the status window shows “Non-Contiguous Data”, there is a non-contiguous section in the recorded time waveform data.

When the time set with [Rec Time(s)] has elapsed, recording stops automatically. To terminate the recording process before that, click the [STOP] button.

13. To save recorded data, click [File] in the menu bar and select [Save Data File]. Alternatively, press the Ctrl key + [S] key on the keyboard.

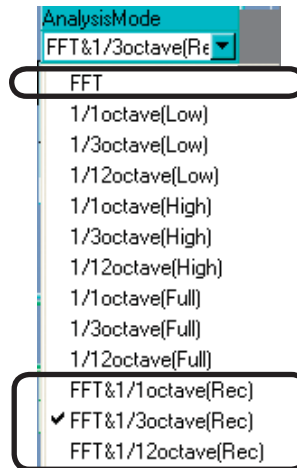
For details on saving data, see page 93.

To analyze recorded data straight away, proceed to step 2 of “Offline data analysis” on the next page.

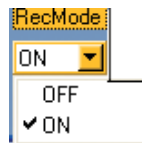
Offline data analysis

To perform offline analysis of recorded time waveform data, proceed as follows.

1. Use the [AnalysisMode] function button to select the analysis mode that is to be used for measurement/analysis ([FFT] or [FFT&1/1octave(Rec)] to [FFT&1/12octave(Rec)]).



2. Set [RecMode] in the measurement button section to [ON].

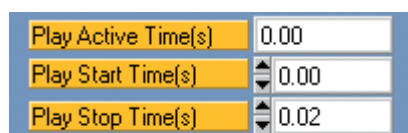


3. Load the time waveform data to be analyzed.
Click [File] in the menu bar and select [Load Data File]. Alternatively, press the Ctrl key + [L] key on the keyboard.
For details on loading data, see page 94.
To record time waveform data, perform steps 3 to 12 in the section “Time Waveform Data Recording” starting on page 83, and make the required analysis settings.

Note

When time waveform data are loaded, the various parameter settings automatically become those that were active at the time the data were stored.

4. Make analysis settings by performing steps 2 to 8 in the section “Time Waveform Data Recording”.
5. If required, make appropriate settings for [Play Start Time(s)] and [Play Stop Time(s)] in the measurement button section.

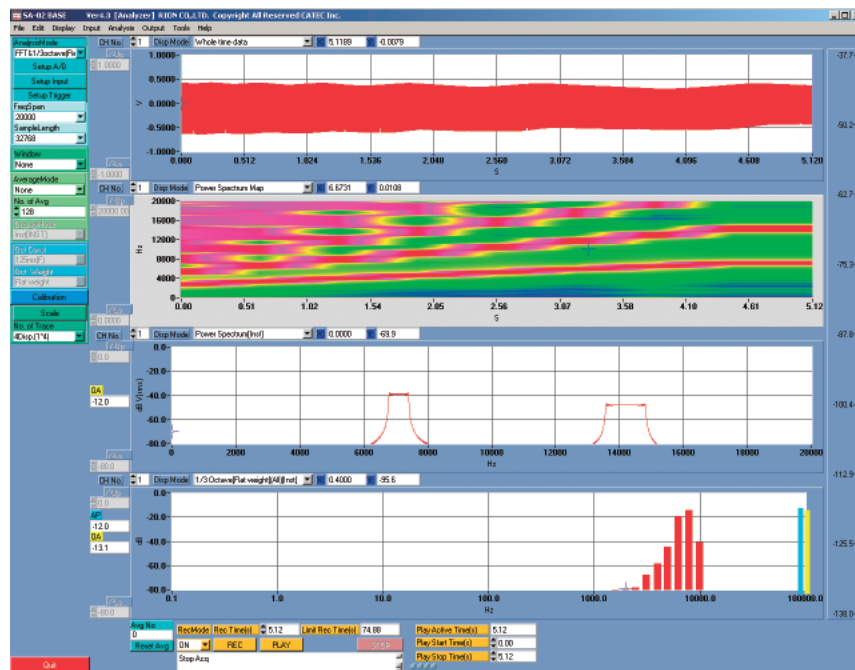


6. Click the [PLAY] button in the measurement button section.

Analysis starts, graph screen data are updated, and the [Play Active Time(s)] indicator starts running.

Important

Do not click the [REC] button, because this will clear the recorded or loaded waveform data.



Note

When the time set with [Play Active Time(s)] has elapsed, measurement/analysis stops automatically.

To terminate the analysis process before that, click the [STOP] button.

By changing the data display settings and analysis parameters and clicking the [PLAY] button again, the same waveform data can be examined under various aspects.

Important

When offline analysis is performed using waveform recording, 1/N octave band analysis is implemented by filter processing, similar to 1/N octave band analysis mode. However, under the condition where time waveform continuity can only be assured within a frame, analysis results may be affected by the non-contiguous condition between frames.

To minimize this effect, using the window function similar to FFT analysis is recommended.

To minimize non-contiguous frames, click [Analysis] in the menu bar, bring up the [FFT&1/N Octave Property] window, and select the [The window function is effective at the octave calculation] check box.

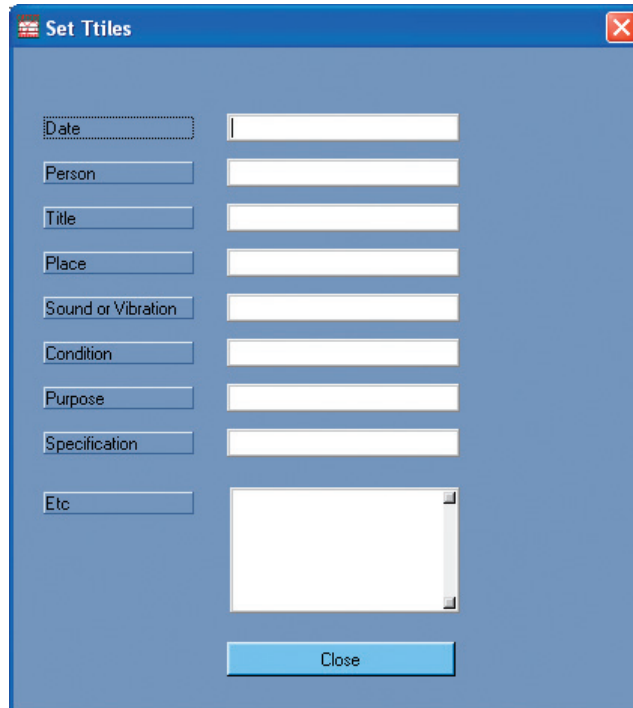
Recorded waveform data are cleared when the frequency span and number of channels are changed.

File operations

Recording test information

In order to easily identify stored measurement data later, information about testing can be recorded, as follows.

1. In the menu bar, click [File] and select [Set Titles]. The [Set Titles] window opens.



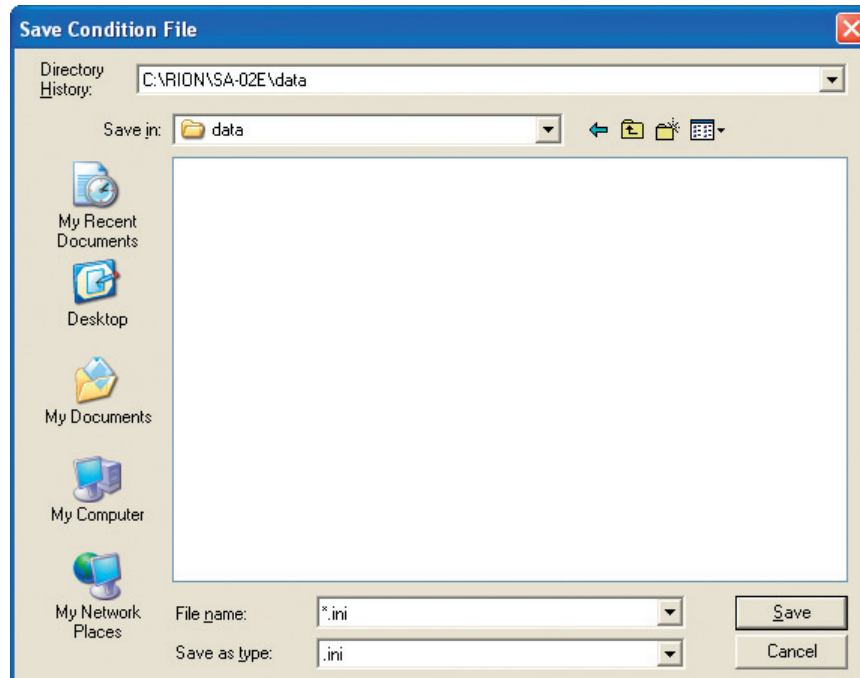
The image shows a software dialog box titled "Set Titles". It has a blue header bar with the title and a close button (X). The main area is light blue and contains a list of labels on the left, each with a corresponding input field on the right. The labels are: Date, Person, Title, Place, Sound or Vibration, Condition, Purpose, Specification, and Etc. The "Date" field has a dotted border. The "Etc" field is a larger text area. At the bottom center is a "Close" button.

2. Enter the information in the respective fields.
3. Click the [Close] button. The [Set Titles] window closes.

Saving a condition file

The test condition data in the main window can be saved as a condition file.

1. In the menu bar, click [File] and select [Save Condition]. The [Save Condition File] window opens.



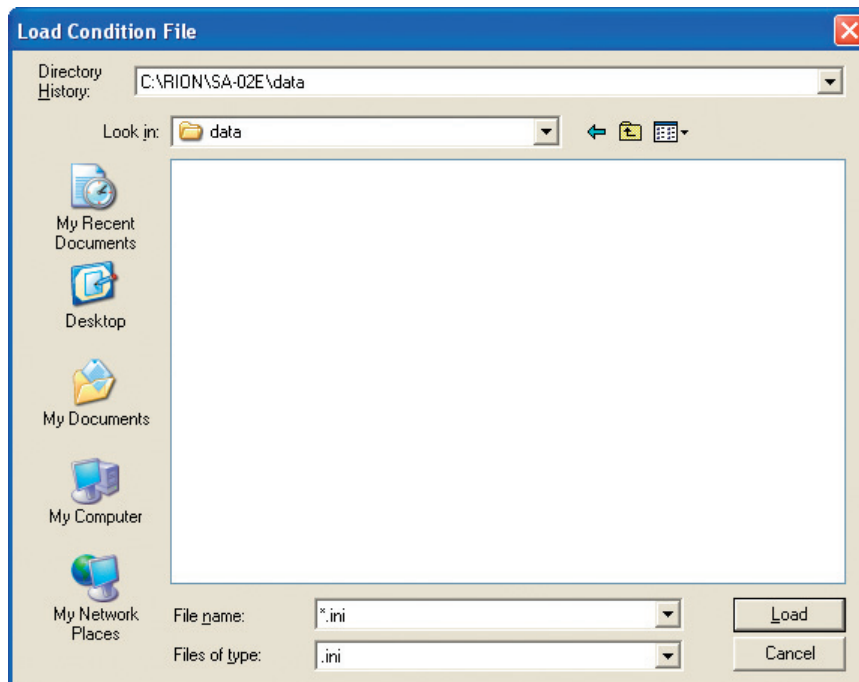
2. Select a folder using [Save in:] and enter a descriptive file name in the [File name:] field.
3. Click the [Save] button.

The test conditions are saved, and the [Save Condition File] window closes.

Loading a condition file

You can load test conditions saved as a file and have the settings established in the main window.

1. In the menu bar, click [File] and select [Load Condition]. The [Load Condition File] window opens.



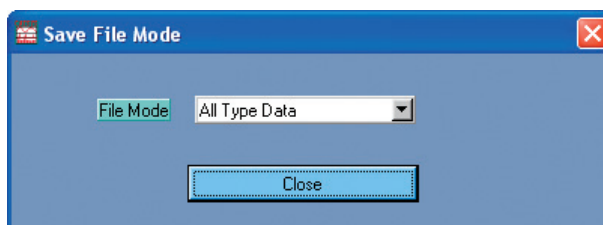
2. Select a folder using [Look in:] and select the file in the [File name:] field.
3. Click the [Load] button.
The test conditions are loaded, and the [Load Condition File] window closes.

Saving a data file (Text file)

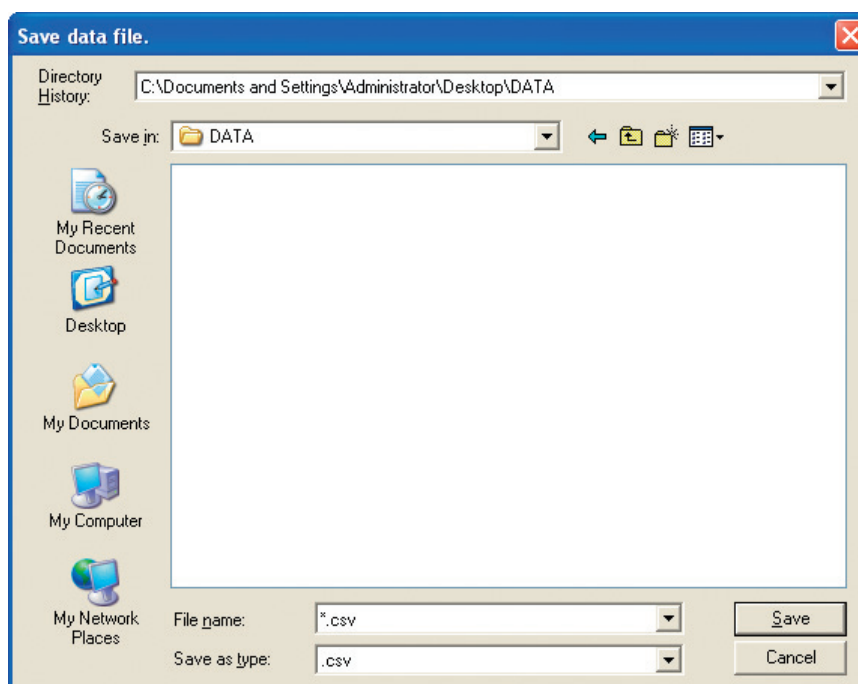
Measurement data, recording data, and analysis data can be saved in ASCII format as text files. To do this, proceed as follows.

1. In the menu bar, click [File] and select [Save Data File], or press the Ctrl key + [S] key on the keyboard.

The [Save File Mode] window opens.



2. Select the type of data to save from [File Mode] and click the [Close] button. The [Save File Mode] window closes and the [Save data file.] window opens.



3. In the [Save in:] field, select the folder where the file is to be saved, and specify a descriptive name in the [File name:] field.
4. Click the [Save] button.

The data file is saved and the [Save data file.] window closes.

Note Regardless of the selected on-screen display, data are always saved using the LIN coordinate system and the y-axis disp. mode [0-P] (except for octave data). Also, the saved data do not reflect calibration values. (Calibration values are stored in the CSV file.)

Note

Measurement data are saved by the SA-02 BASE software as a CSV file (extension “csv”). At the same time, information about setting parameters is saved under the same name as a prm file (extension “prm”).

When performing file operations, the user only specifies the CSV file, but the prm file is saved or loaded at the same time.
--

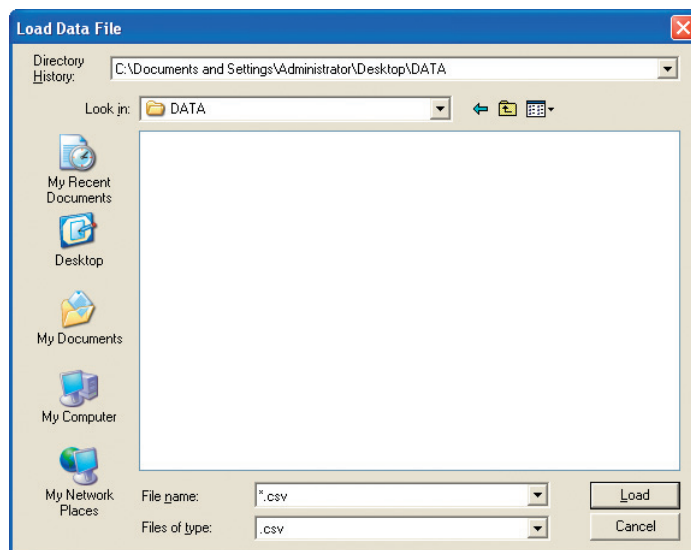
CSV and prm files must always be located in the same folder. Do not separate the files into different folders.
--

Loading a data file (Text File)

Measurement data, recording data, and playback/analysis data can be loaded from a saved file, as follows.

1. In the menu bar, click [File] and select [Load Data File], or press the Ctrl key + [L] key on the keyboard.

The [Load Data File] window opens.



2. In the [Look in:] field of the [Load Data File] window, select the folder where the file is located, and select the file.
3. Click the [Load] button.

The data file is loaded, and the [Load Data File] window closes.

Note

The main window changes to the settings that were active when the loaded data were saved.

The test information (→ page 90) also changes.
--

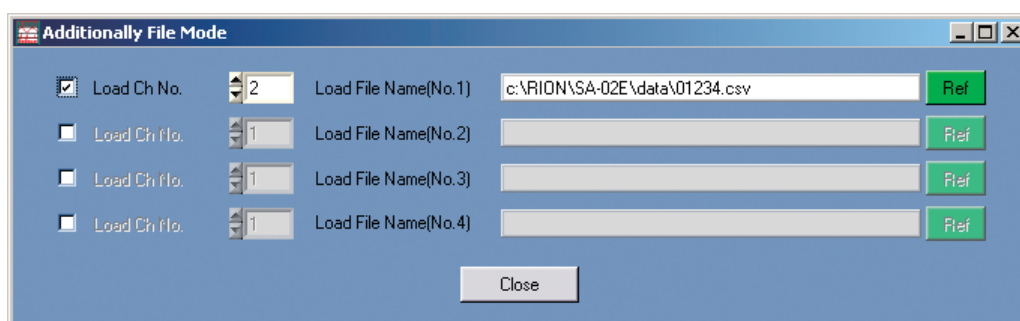
The user only specifies the CSV file in the [Load Data File] window, but the prm file with the same name is also loaded automatically.
--

Loading an additional data file (Specified channel)

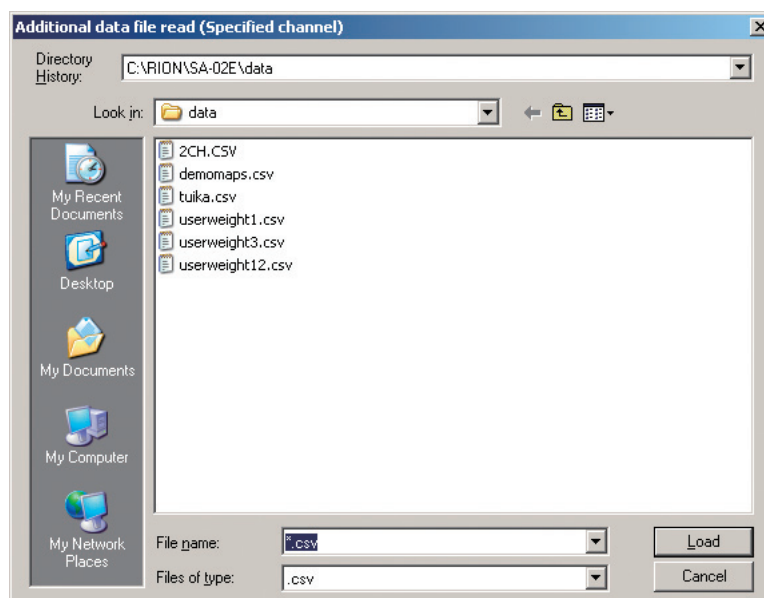
Additional measurement data, recording data, and playback/analysis data can be loaded from a saved file for a specified channel, as follows. This can be used for displaying data as an overlay in a graph (see page 41).

1. In the menu bar, click [File] and select [Additionally Load Data File(Specified channel)].

The [Additionally File Mode] window opens.



2. Select the check box to the left of the [Load Ch No.] field and click the [Ref] button. The [Additional data file read (Specified channel)] window opens.

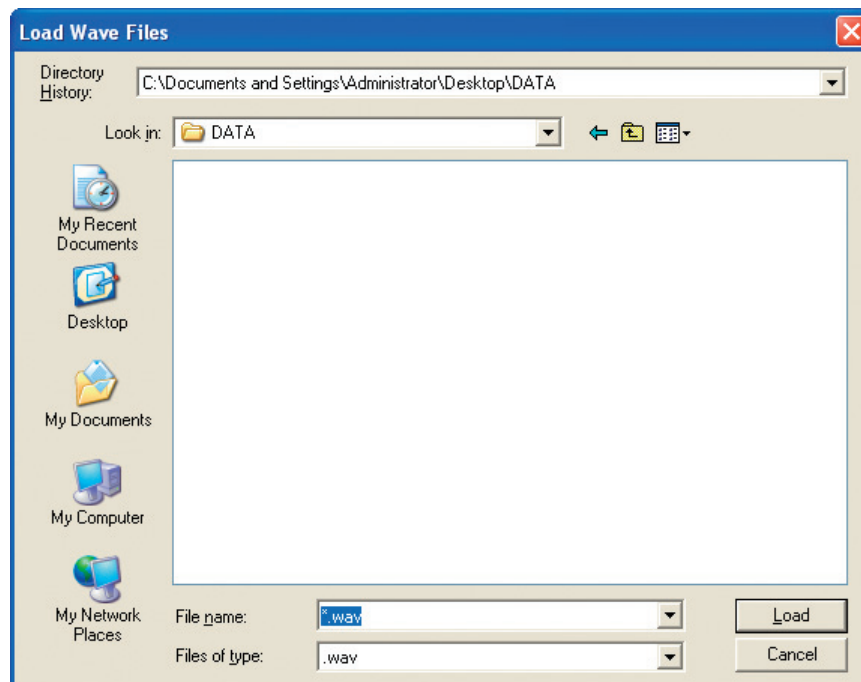


3. In the [Look in:] field of the [Additional data file read (Specified channel)] window, select the folder where the file is located, and select the file.
4. Click the [Load] button.
The data file is loaded. The [Additional data file read (Specified channel)] window closes, and the name of the loaded file appears in the [Load File Name(No.)] field of the [Additionally File Mode] window.
5. Select the number of the channel to load in the selection field to the right of the [CH No. to Load] field.
6. Click the [Close] button. The [Additionally File Mode] window closes, and the data from the selected channel are added.

Import

Besides loading data from its standard data files, the SA-02 BASE software can also import data from WAVE files, as described below.

1. In the menu bar, click [File] and select [Import]. The [Import] menu appears.
2. In the [Import] menu, click [Load Wave File(.wav)]. The [Load Wave Files] window appears.



3. In the [Look in:] field, select the folder where the file is located, and select the file so that it is shown in the [File name] field.
4. Click the [Load] button.

The data are imported, and the [Load Wave Files] window closes.

Important

Only WAVE files created with the SA-02 BASE software can be imported.

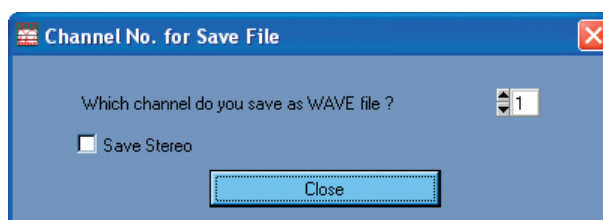
Export

The SA-02 BASE software can export files for use in other applications.

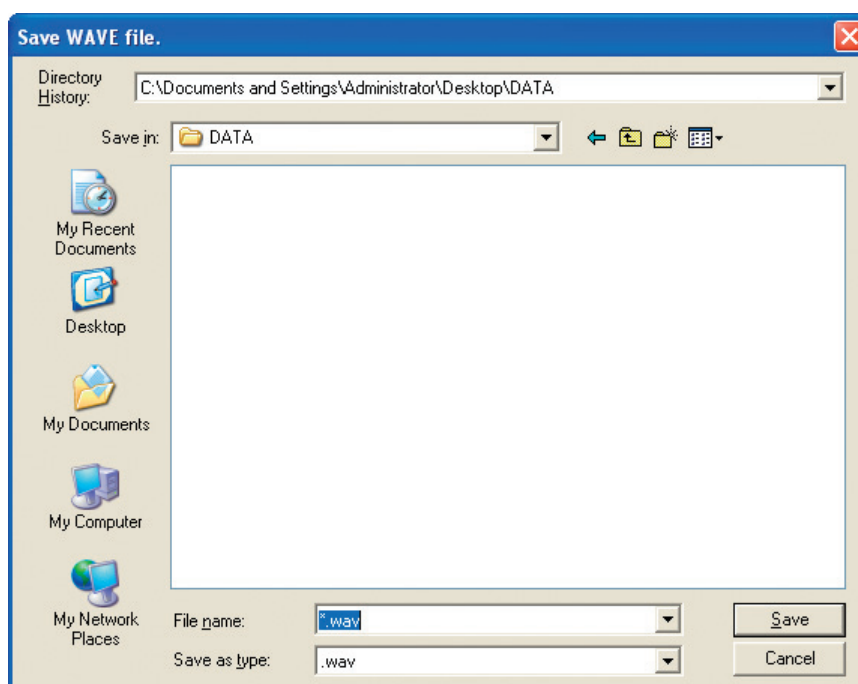
Exporting WAVE files

You can export data as WAVE files.

1. In the menu bar, click [File] and select [Export]. The [Export] menu appears.
2. In the [Export] menu, click [Save Wave File(.wav)]. The [Channel No. for Save File] window appears.



3. Select the channel whose data are to be saved as a WAVE file.
4. Click the [Close] button.
The [Save WAVE file.] window opens.

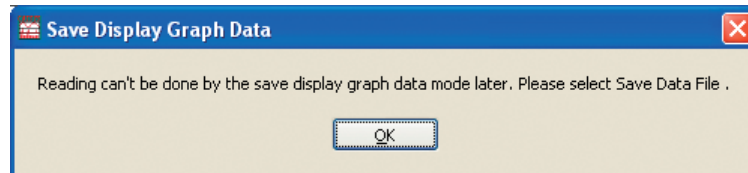


5. In the [Save in:] field, select the folder where the file is to be saved, and specify a descriptive name in the [File name:] field.
6. Click the [Save] button.
The data are saved as a WAVE file, and the [Save WAVE file.] window closes.

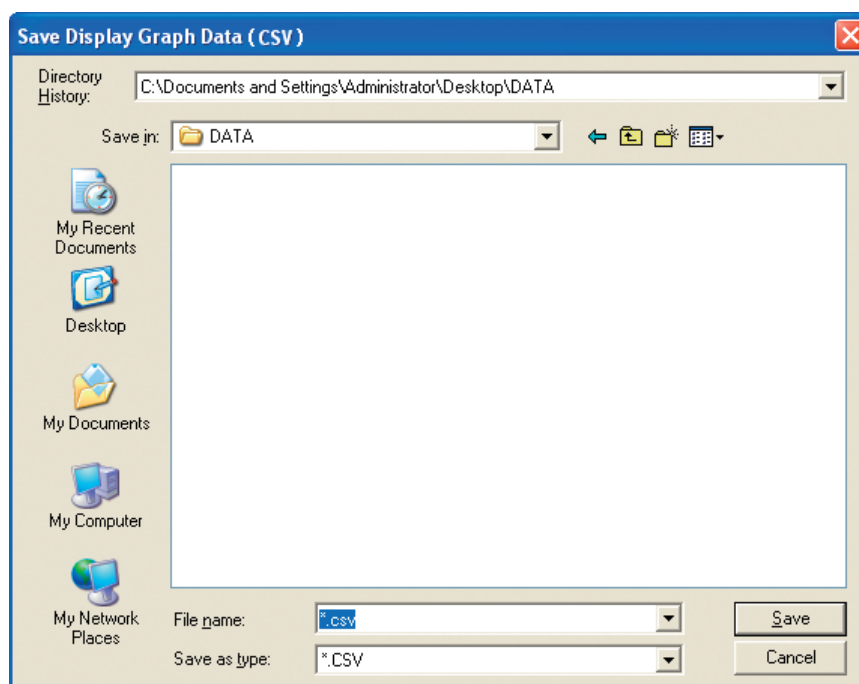
Saving display data

Data displayed by the software can be exported to a CSV format file.

1. In the menu bar, click [File] and select [Export]. The [Export] menu appears.
2. In the [Export] menu, click [Save Indication(CSV format)]. The [Save Display Graph Data] window appears. Click [OK].



3. The [Save Display Graph Data (CSV)] window appears.

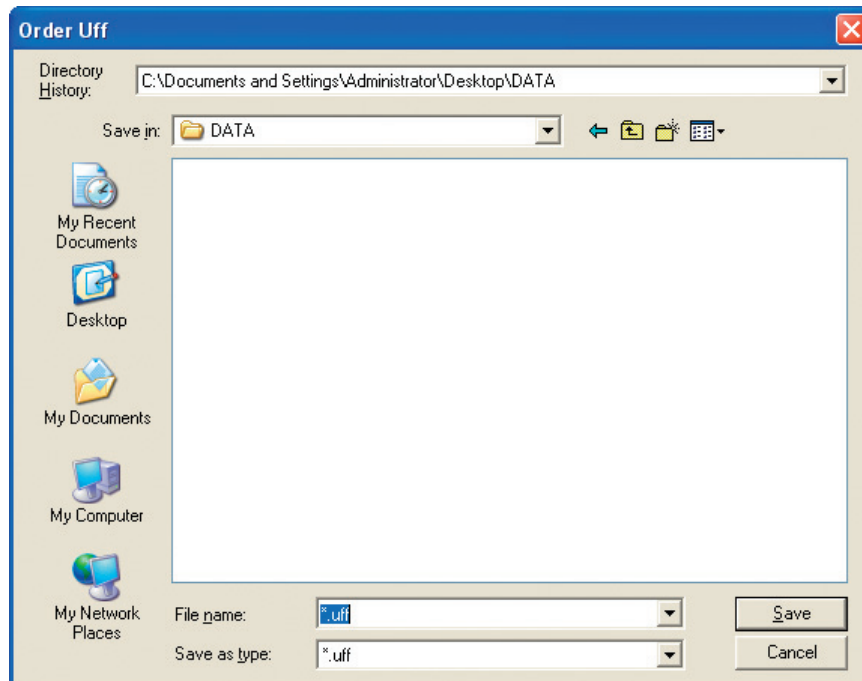


4. In the [Save in:] field, select the folder where the file is to be saved, and specify a descriptive name in the [File name] field.
5. Click the [Save] button.
The data are saved as a CSV format file, and the [Save Display Graph Data (CSV)] window closes.

Saving data as a universal file

Data can be exported to a universal file (UFF format), as follows.

1. In the menu bar, click [File] and select [Export]. The [Export] menu appears.
2. In the [Export] menu, click [Universal file / Order Analysis file]. The [Order Uff] window appears.



3. In the [Save in:] field, select the folder where the file is to be saved, and specify a descriptive name in the [File name:] field.
4. Click the [Save] button.
The data are saved as a UFF format, and the [Order Uff] window closes.

Printing

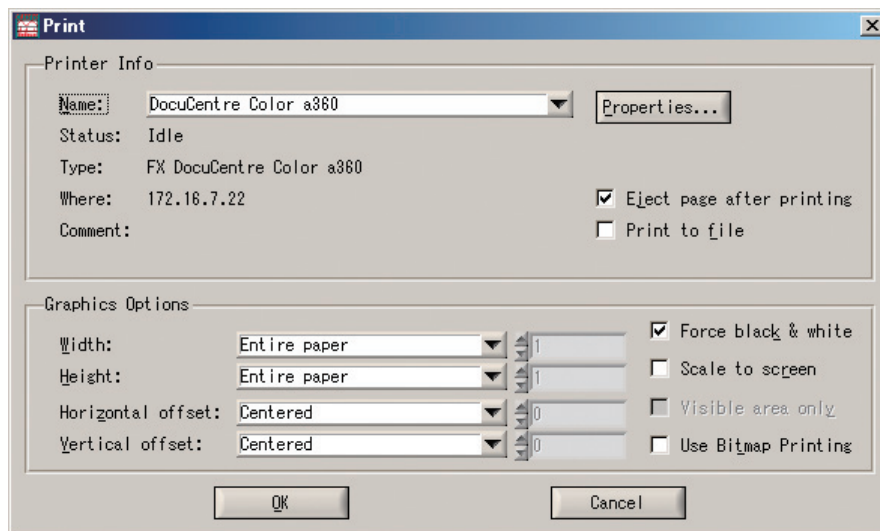
Print (Graph)

You can print out any specified graph in the main window.

Note

A printer must be connected to the computer.

1. Click anywhere on the graph that you want to print.
The background color of the graph changes to gray, indicating that the graph has been selected.
2. In the menu bar, click [File] and select [Print Graph]. The [Print] window appears.



3. Make the required settings listed below, as necessary.

[Printer Info]

[Name]:

A list of available printers is shown. Select the printer you want to use.

[Properties...] button:

Clicking here brings up the Properties window of the printer. Available settings depend on the printer model. For details, please refer to the documentation of the printer.

[Status]:

Indicates the status of the selected printer.

[Type]:

Indicates the type of the selected printer.

[Where]:

Indicates the network location of the selected printer.

[Comment]:

Displays comment information about the selected printer.

[Eject page after printing]:

When this check box is selected, printer output is activated immediately after print data have been sent to the printer buffer.

When the check box is deselected, the printer goes into output standby mode after print data have been sent to the printer buffer.

[Print to file]:

When this check box is selected, the print data are sent to a file. (When you click the [OK] button, the [Print Output File] window opens which lets you specify the file name.)

When the check box is deselected, the data are output by the printer.

[Graphics Options]

[Width]:

Specifies the graph width.

[Specify in millimeters/10]

Specify graph width in 0.1 mm units.

[Entire paper]:

Enlarge graph to fill the entire width of the paper.

[Proportional to height]:

Set width while maintaining a fixed ratio to height.

[Height]:

Specifies the graph height.

[Specify in millimeters/10]:

Specify graph height in 0.1 mm units.

[Entire paper]:

Enlarge graph to fill the entire length of the paper.

[Proportional to width]:

Set height while maintaining a fixed ratio to width.

[Horizontal offset]:

Specifies the offset in the horizontal direction.

[Specify in millimeters/10]:

Specify horizontal graph offset in 0.1 mm units.

[Centered]:

Center graph horizontally on paper.

[Vertical offset]:

Specifies the offset in the vertical direction.

[Specify in millimeters/10]:

Specify vertical graph offset in 0.1 mm units.

[Centered]:

Center graph vertically on paper.

[Force black & white]:

When this check box is selected, the printout will be monochrome, even if the selected printer is a color printer.

When the check box is deselected, the printout will be in color, if the selected printer is a color printer.

[Scale to screen]:

The vertical/horizontal ratio is adjusted so that the print output will be the same as the image shown on the computer display.

[Visible area only]:

When this check box is selected, parts of the graph currently obscured (accessible by scroll bar) will not be printed.

When the check box is deselected, the printout will include also parts of the graph currently obscured (accessible by scroll bar).

[Use Bitmap Printing]:

When this check box is selected, the graph will be printed as a bitmap (resembling the image on an LCD monitor).

When the check box is deselected, the printout will use vector graphics resulting in smooth lines.

4. When the setup is completed, click the [OK] button.

The [Print] window closes and printing starts.

Print (Window)

You can print out the entire the main window.

Note
A printer must be connected to the computer.

1. In the menu bar, click [File] and select [Print Panel]. The [Print] window appears.
2. Perform the same steps as described in the section on “Print (Graph)”, from step 3 onward (page 100).

Edit commands

Copy (Graph)

You can send hard copy data for the selected graph screen to the Clipboard at any time.

1. Click anywhere on the graph that you want to copy.
The background color of the graph changes to gray, indicating that the graph has been selected.
2. In the menu bar, click [Edit] and select [Copy Graph], or press the Ctrl key + [G] key on the keyboard.

Copy (Window)

You can send hard copy data for the entire main window to the Clipboard at any time. Use either of the following two methods.

- In the menu bar, click [Edit] and select [Copy Panel].
- Press the Ctrl key + [W] key on the keyboard.

Note
The graph screen or main window data copied to the Clipboard can be used in other applications by using the “Paste” command.

Saving as JPEG file

You can save the selected graph screen as a JPEG file, as follows.

1. Click anywhere on the graph that you want to save.
The background color of the graph changes to gray, indicating that the graph has been selected.
2. In the menu bar, click [Edit] and select [Copy Graph(JPEG)], or press the Ctrl key + [J] key on the keyboard.
3. The [Save JPEG file.] window opens. Specify a descriptive name in the [File Name:] field and click the [Save] button.

SA-02 recall processing software

Starting the SA-02 recall processing software

In the menu bar, click [Tools] and select [Open Recall Operation] to start the SA-02 recall processing software. The software can also be started by double-clicking the “SA-02 Recall Processing” icon on the desktop, or by clicking [Start] → [All Programs] → [RION] → [SA-02 Recall Operation].

When the SA-02 recall processing software starts up, a data display window such as shown in Fig. 1 below appears. After starting the SA-02 BASE software and performing auto store or manual store during octave band analysis, the results will be shown in that window.

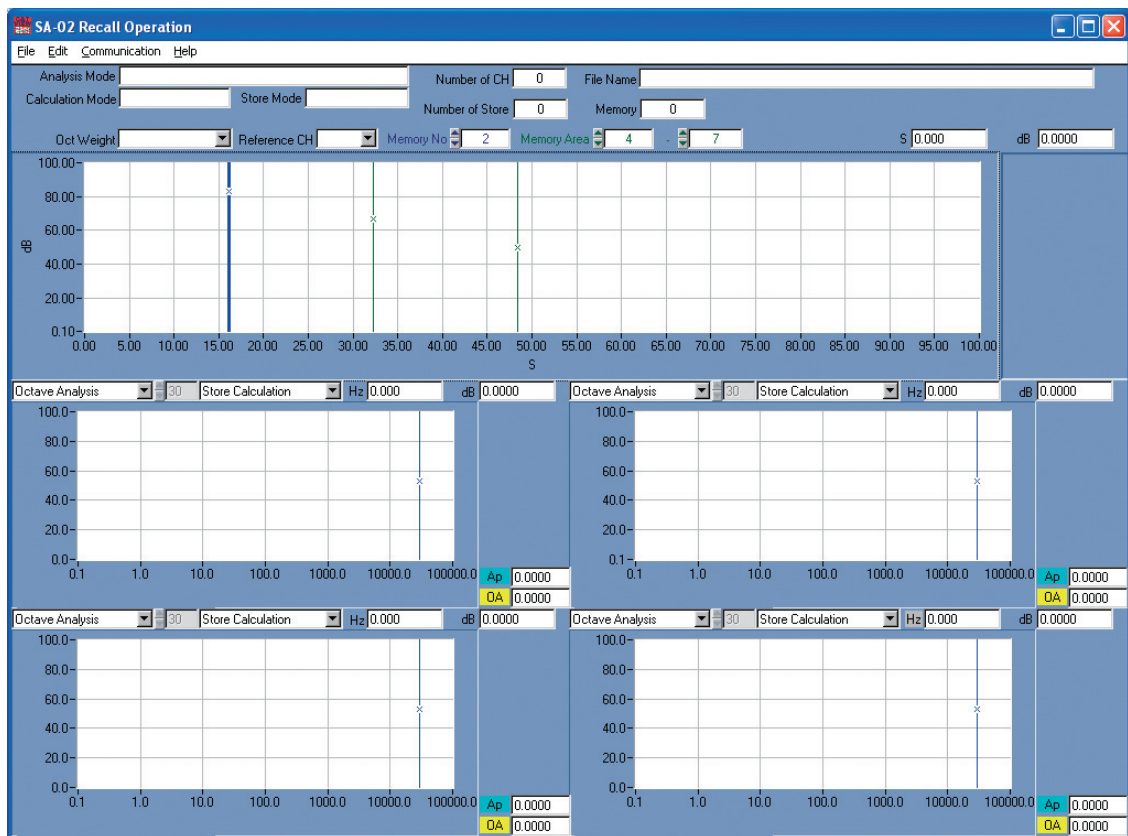


Fig. 1 Data display window

Loading a stored data file

In the menu bar, click [File] and select [Open]. The file selection dialog appears. Select a data file stored in the auto store or manual store mode of SA-02 BASE software. This will cause the selected data to appear in the data display window, as shown in Fig. 2.

Data display

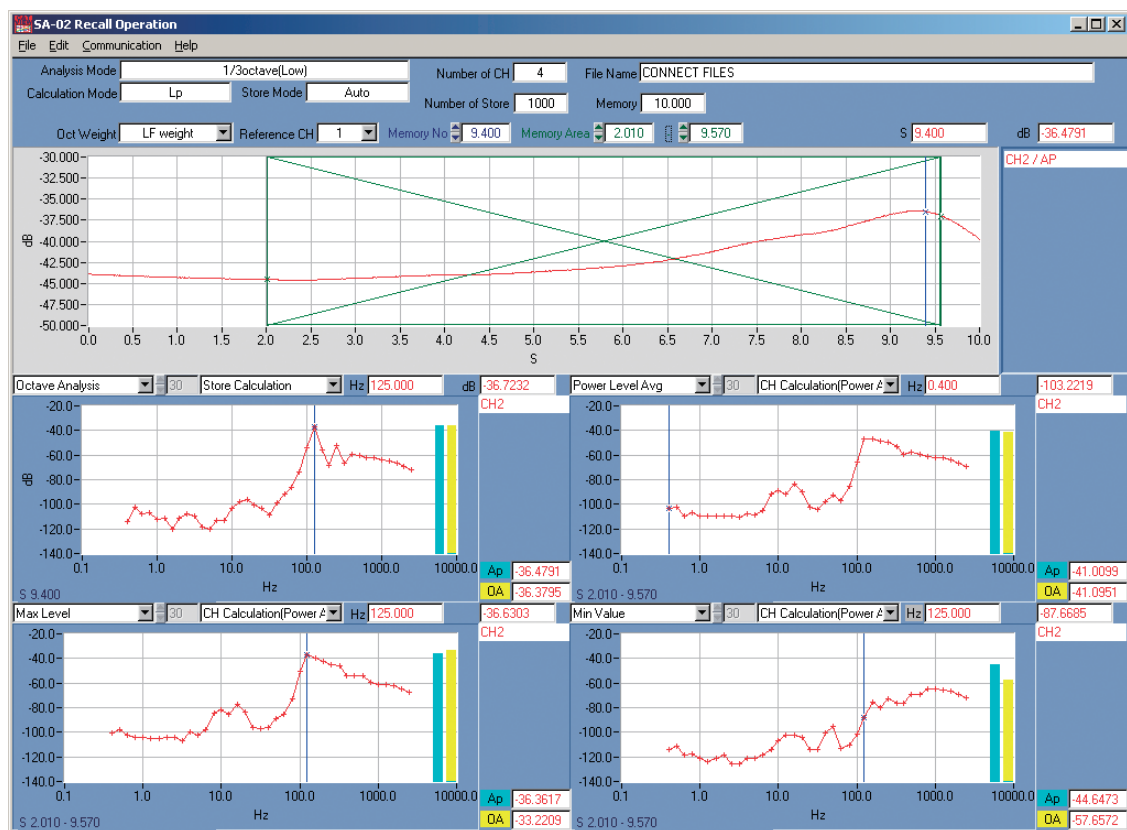


Fig. 2 Data display window

Explanation of display items

Analysis Mode:

Shows the analysis mode that was active when data were stored.

Number of CH:

Shows the number of channels when data were stored.

File Name: Shows the name of the data file.

Calculation Mode:

Shows the processing mode that was active when data were stored.

Store Mode: Shows the store mode that was active when data were stored.

Number of Store:

Shows the number of data sets that were stored.

Memory:

When auto store was used, this shows the overall data time (in seconds).

When manual store was used, this shows the same value as the Number of store indication.

For example, when 200 instantaneous value data were stored using a store interval of 100 ms, the overall data time will be indicated as 20 (seconds). If 100 L_{eq} data with a processing time of 10 s were stored, the indication will be 1000.

Oct Weight: Selects the frequency weighting used for processing.

Reference CH:

Selects the reference channel used for differential processing between channels.

Memory No: Selects the store number (time at store point) to show as a graph. This is linked to the display memory number (blue cursor).

Memory Area:

Selects the memory range (time range) for processing. This is linked to the processing range (green cursor).

S: Display memory number

dB: S value (dB)

Displaying all store data

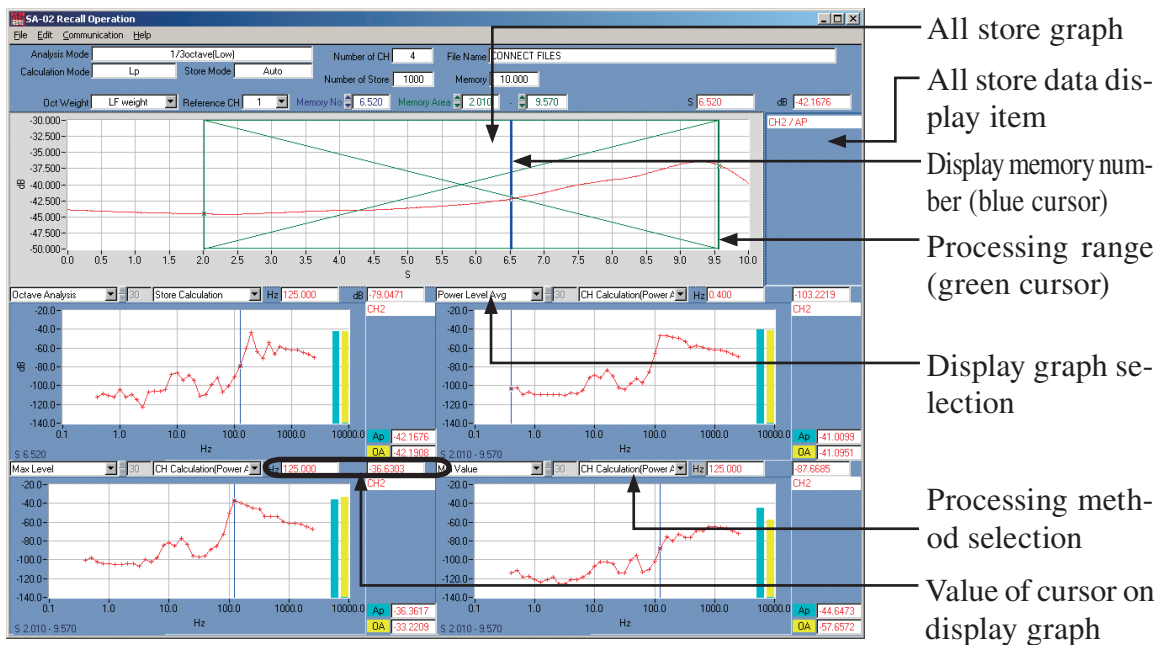


Fig. 3 Explanation of data display window

Right-clicking on the all store data display item brings up the [Setup Display CH] window shown in Fig. 4 (next page).

Select the ON/OFF condition for the channels, and select the frequency as well as the display color. (Unless clicked to ON, the channel is not displayed.)

To display multiple items, set all applicable buttons to ON. (Unless clicked to ON, the item is not displayed.)

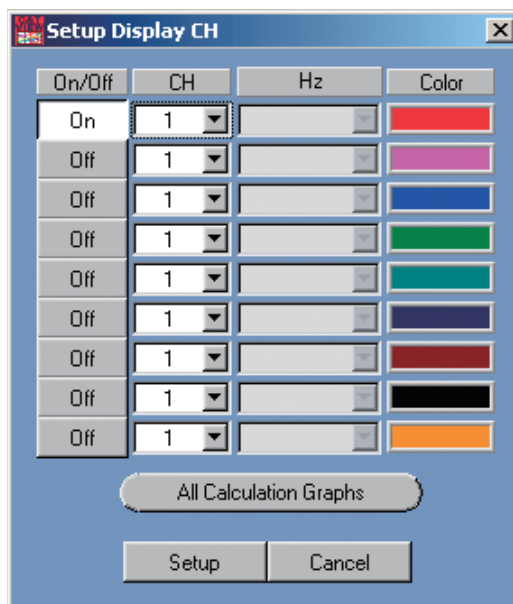


Fig. 4 [Setup Display CH] window

Individual store data display

When the display graph selection of Fig. 3 is set to octave band analysis, and the processing method section is set to store processing, clicking the blue cursor on the all store graph or selecting the respective store number (store time) in the Memory No field causes the store data to be shown, as in the example of Fig. 5.

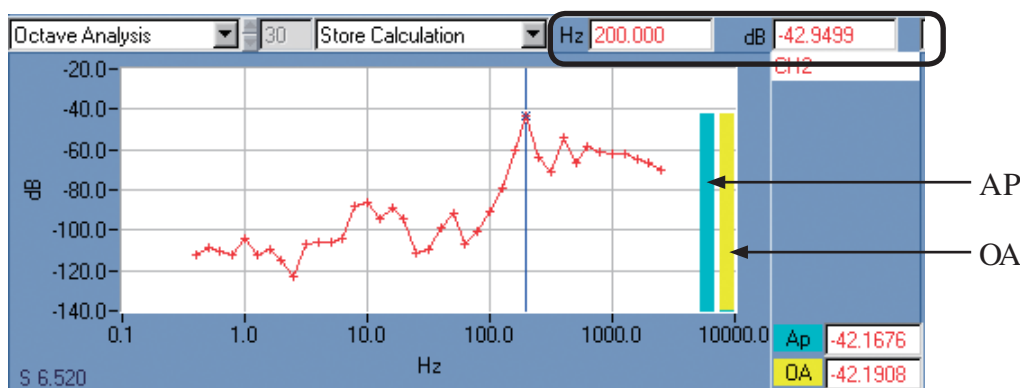


Fig. 5 Individual store data display

Clicking the blue cursor in the graph shown in Fig. 5 causes the frequency and dB value to be shown at top right. The blue and yellow bar graphs represent the AP and OA levels.

Store calculation data display

When the display graph selection shown in Fig. 3 is set to a setting other than octave band analysis (power average level, maximum level etc.), and the processing method selection is set to store processing, you can use the green cursor on the all store graph, or enter a memory range directly, to specify a processing range. Processing data will then be shown, as in the example of Fig. 6.

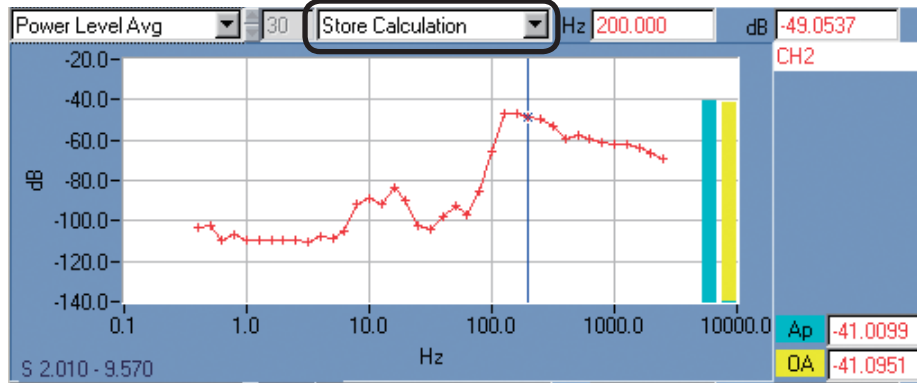


Fig. 6 Individual processing item data display

When you set the display graph selection to the processing item that you want to display, the selected processing function is carried out and the graph is displayed. When LN is selected, the N value can be input into the adjacent field.

Inter-channel processing (power average) data display

Using the [Setup Display CH] window shown in Fig. 4, select the channels for inter-channel processing. Next, set the display graph selection shown in Fig. 3 to the processing item that you want to display and the processing method selection for inter-channel processing (power average). If the processing item is octave band analysis, click the blue cursor on the all store graph or use the memory number to select the store number (store time) to display. Inter-channel processing data will then be shown, as in the example of Fig. 7. If the processing item is not octave band analysis, use the green cursor on the all store graph, or enter a memory range directly, to specify a processing range. Inter-channel processing data will then be shown in the same way.

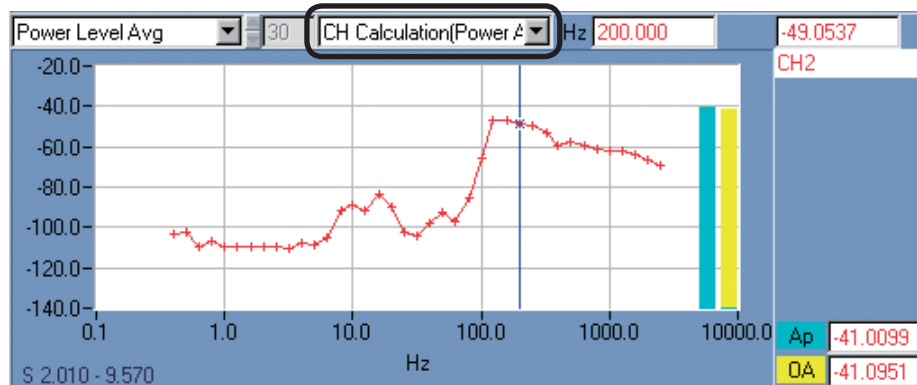


Fig. 7 Inter-channel processing data display

Inter-channel processing (differential) data display

Using the [Setup Display CH] window shown in Fig. 4, select the channels for inter-channel processing, and select the reference channel for inter-channel processing (differential) data display. Next, set the display graph selection shown in Fig. 3 to the processing item that you want to display and the processing method selection for inter-channel processing (differential). If the processing item is octave band analysis, click the blue cursor on the all store graph or use the memory number to select the store number (store time) to display. Inter-channel processing data will then be shown, as in the example of Fig. 8. If the processing item is not octave band analysis, use the green cursor on the all store graph, or enter a processing range directly, to specify a processing range. Inter-channel processing data will then be shown in the same way.

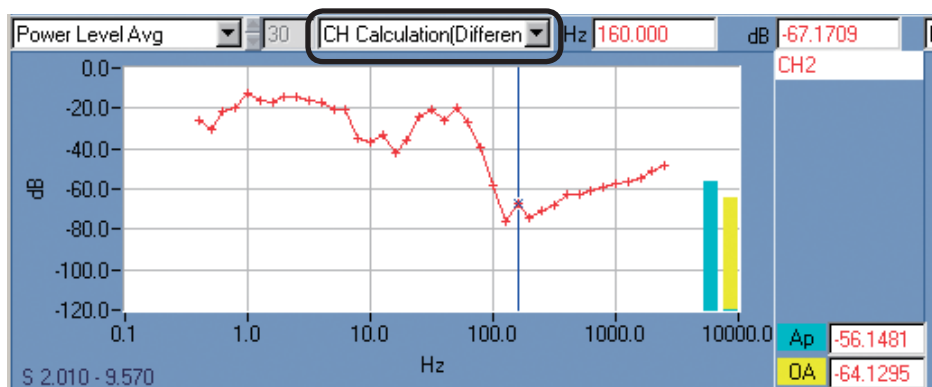


Fig. 8 Inter-channel processing data display (differential)

* Reference channel data are shown as 0 dB.

Changing the scale

Right-clicking on any graph brings up the [Setup Graph] window shown in Fig. 9. Selecting [Auto] causes the scale to be set automatically. Selecting [Manual] allows you to input upper limit and lower limit values for each axis. For the X axis, enter a memory address as a positive integer.

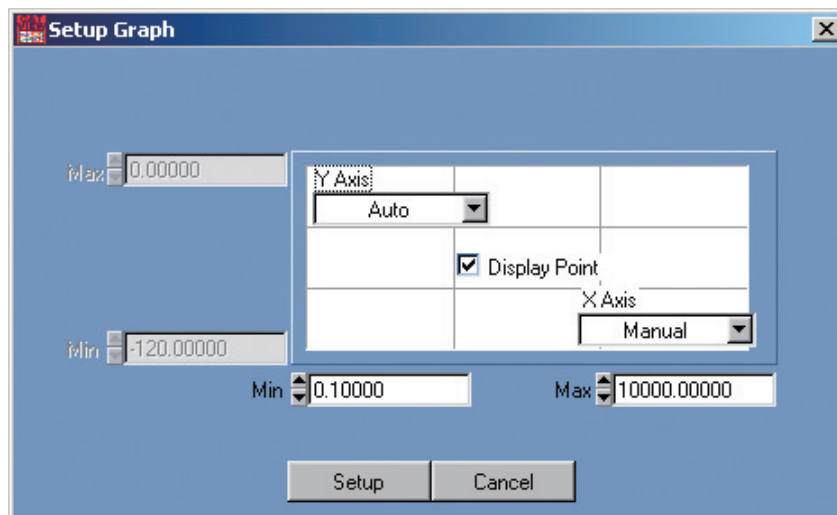


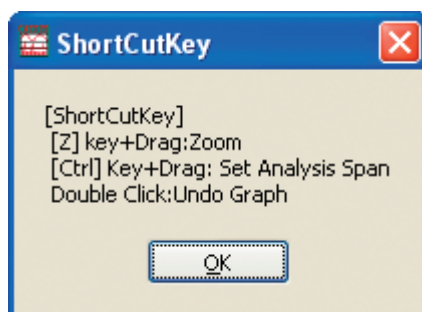
Fig. 9 [Setup Graph] window

Help function

You can display information on shortcut keys and the program version.

Showing shortcut key assignments

In the menu bar, click [Help] and select [Short Cut Key Reference]. A [ShortCutKey] window with information on shortcut key assignments appears.



Note

Besides the functions shown in the [ShortCutKey] window, the SA-02 BASE software also has other convenient shortcut key assignments, as listed below.

Measurement button operations

- [Home] key: Click [PLAY] button.
- [Ctrl] key + [Home] key:
 - Click [REC] button.
- [Del] key: Click [Reset Avg] button.
- [End] key: Click [STOP] button.

Graph screen operations

- [Ins] key on all-time data:
 - Insert event marker on all-time data graph (playback) (when [AnalysisMode] is [FFT&1/N octave(Offline)]).
- Click:
 - Activate cursor and move to clicked position.
 - Select graph screen (for graph screen print or copy). Background color of graph changes to gray.
- [←] key / [→] key / [↑] key / [↓] key:
 - Move cursor when cursor is active. (Move at high speed when pressed while holding down [Shift] key.)

Double-click: Return X axis zoom to previous condition.

[Ctrl] key + drag:

Specify mouse drag range as playback range on all-time data graph (playback) (when [AnalysisMode] is [FFT&1/N octave(Offline)]).

Drag range is reflected in [Play Start Time] and [Play Stop Time].

[Shift] key + click:

Maximize graph screen to full screen, or return to original size.

Right-click: Show [Setup Graph] window.

[Ctrl] key + right-click:

FFT or FFT & 1/N OCT analysis mode:

Show [Analysis Mode] list window.

1/N octave band analysis mode:

Show list window with numeric values for bar graph.

[Shift] key + [Disp Mode] selection:

Update display data on all graph screens.

[Shift] key + [CH No.] selection:

Update channel number settings on all graph screens.

[Ctrl] key + [CH No.] selection:

Assign [CH No.] sequentially to each graph, starting from 1. However, if [No. of Trace] setting is higher than [No of Channels] setting, the highest channel number will be assigned to multiple channels.

[Setup Input CH] window operations

[Shift] key + setting change:

Apply change to all channels.

File operations

[Ctrl] key + [L] key:

Menu bar [File] → [Load Data File]

[Ctrl] key + [S] key:

Menu bar [File] → [Save Data File]

Edit operations

[Ctrl] key + [G] key:

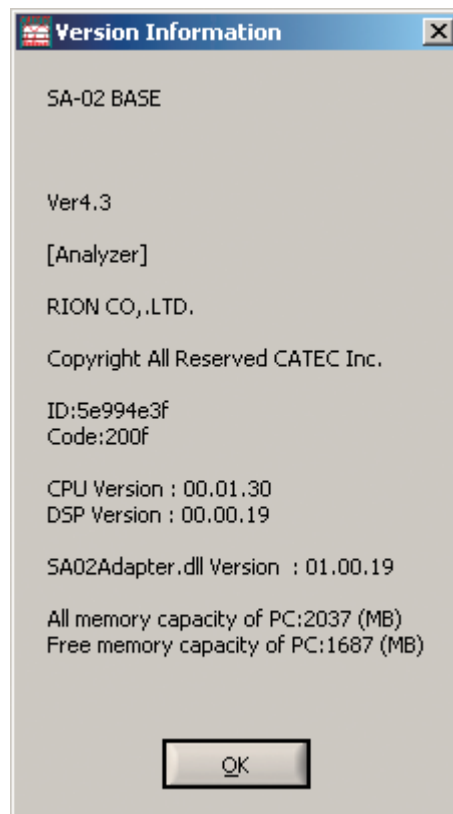
Menu bar [Edit] → [Copy Graph]

[Ctrl] key + [W] key:

Menu bar [Edit] → [Copy Panel]

Showing version information

In the menu bar, click [Help] and select [Versions]. A window with software version information appears.

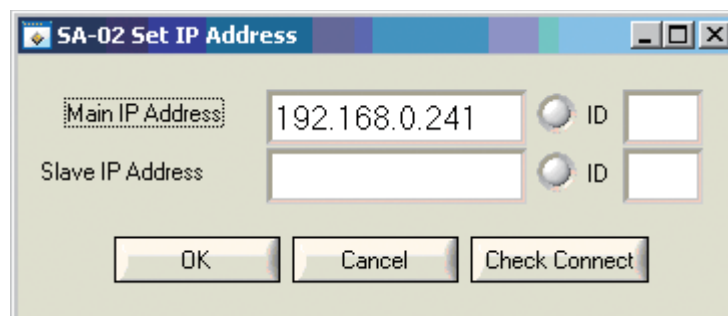


Making preparations for connection to SA-02 hardware

1. Click [Start] → [All Programs] → [RION] → [SA-02E] → [SA-02 Target Setting] and select the “SA-02 Set IP Address” tool.



2. Enter the IP address of the SA-02 hardware (main unit) to which the software should connect into the “Main IP Address” field.
If only one SA-02 hardware unit is used (max. 16 channels), enter the IP address of that unit into the “Main IP Address” field.
If two SA-02 hardware units are used, enter the IP address of the unit with the ID setting “1” into the “Main IP Address” field, and the IP address of the unit with the ID setting “2” into the “Slave IP Address” field.



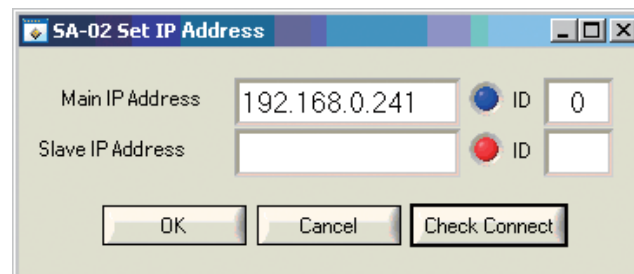
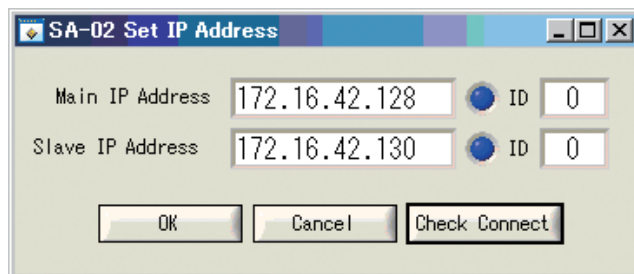
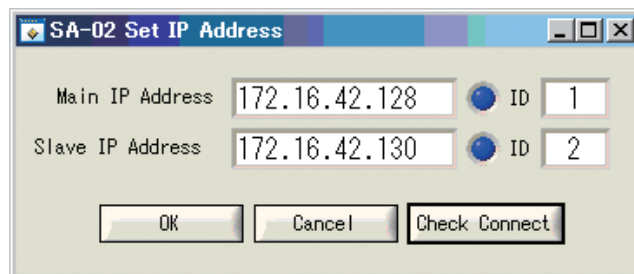
- Click the [Check Connect] button to verify that connection to the unit with the specified IP address is possible. If the connection check is successful, the indicator color changes to blue. If the connection check is not successful, the indicator color changes to red.

If an IP address was entered only in the “Main IP Address” field, verify that the indicator for that field is blue, and that the main IP address “ID” field shows “0”.

If IP addresses were entered in the “Main IP Address” and “Slave IP Address” fields, verify that the indicators for both fields are blue. Also verify that the main IP address “ID” field shows “1” and the slave IP address “ID” field shows “2”.

If an indicator is red, check whether the entered IP address exactly matches the IP address set at the respective SA-02 hardware unit.

If the “ID” indication is not correct, check the ID number setting at the respective SA-02 hardware unit.



Note

If no IP addresses have been entered when the [Check Connect] button is clicked, the indicators will always be red. If only the main IP address has been entered when the [Check Connect] button is clicked, the indicator for the slave IP address will be red, but this is not a problem.

Important

Even if the indicator is blue, if the ID number of the SA-02 hardware unit has not been set up correctly, the system will not operate normally.

4. Click [OK] to save the settings.

Important

If you click [OK] while the indicator is not blue, or if you click [Cancel], the settings will not be saved correctly. Be sure to check the connection and cause the indicator(s) to be shown in blue before clicking [OK].

