Organization of this manual

This manual describes functions and other operation principles of the reverberation time measurement program NX-42RV. The manual consists of the chapters listed below. You should also consult the documentation for the sound level meter NL-42/NL-52/NL-62.

Outline
  Gives basic information and the functions of the NX-42RV.

Change the function to the NX-42RV
  Explains how to change the function to the NX-42RV.

Reading the display
  Explains various items that appear on the display and menu screen.

Measurement of Reverberation Time
  Explains the basic procedures for measurement of reverberation time.

Recall data
  Explains screen and display settings of the recall data.

Waveform Recording
  Explains the steps to take for waveform recording.

Technical Reference
  Provides additional information about reverberation time measurement.

Store data format and file structure
  Explains the format of stored data and how the files are organized.

Card capacity and store time
  Lists the data store time corresponding to the SD memory card capacity, etc.

Default settings
  Lists the factory default settings of the NX-42RV.

Communication commands
  Explains commands about functions of the NX-42RV.

Specifications
  Lists the technical specifications of the NX-42RV.

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FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of severe damage to the program or peripheral equipment, make sure that all instructions are fully understood and observed.

<table>
<thead>
<tr>
<th></th>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disregarding instructions printed here incurs the risk of injury to persons and/or damage to peripheral equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disregarding instructions printed here incurs the risk of program damage or data loss.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Denotes special information that is helpful in utilizing the capabilities of the program but that is not directly related to safety.</td>
</tr>
</tbody>
</table>
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The NX-42RV software is designed for installation in the sound level meter NL-42/NL-52/NL-62, allowing the unit to function as a measurement of reverberation time.

Measurement is based on ISO 3382, data will be collected using the auto store function of the optional product NX-42RT of NL-42/NL-52/NL-62.

The reverberation time measurement, two types of data the following will be collected.

- Reverberation time measurement data
  - Auto store data collected in order to create a reverberation time data
- Reverberation time data
  - T20, T30, Txx which is calculated based on the reverberation time measurement data

Further, by using a combination of optional product NX-42WR, the sound pressure waveform of actual sound can be recorded.

For details on the NL-42/NL-52/NL-62 including information on how to use the operation keys and the NX-42RT/NX-42WR, please refer to the each instruction manual.
Change the function to the NX-42RV

NX-42RV installation

Follow the procedure described in the separate “Optional program installation / uninstallation” to install the NX-42RV program in the NL-42/NL-52/NL-62 unit.

<table>
<thead>
<tr>
<th>Important</th>
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<tbody>
<tr>
<td>Never format the optional program card with SD memory card formatting software (such as SD Formatter, etc.). Otherwise the program data on the card will be erased and the respective functions can no longer be used. Restoration of the erased program is not warranted.</td>
</tr>
<tr>
<td>Upgrade the firmware of the sound level meter to the latest version before installing the optional program. The latest version firmware can be downloaded from “Software downloads” of Support Room on our web site (<a href="http://www.rion.co.jp/english/">http://www.rion.co.jp/english/</a>).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
</tr>
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<tbody>
<tr>
<td>The NX-42RV program can only be installed if the extended function program NX-42EX and option program NX-42RT have been installed in the NL-42/NL-52 first.</td>
</tr>
<tr>
<td>The NX-42RV program can only be installed if the option program NX-62RT has been installed in the NL-62 first.</td>
</tr>
</tbody>
</table>
Switching to the NX-42RV function

On the menu list screen of the NL-42/NL-52/NL-62, select [Option] and press the MENU/ENTER key.
The option screen appears. Use the △/▽ keys to move to the [NX-42RV Reverberation Time Program] and press the MENU/ENTER key and the function switching procedure is completed.
The unit shows the NX-42RV measurement screen.

<table>
<thead>
<tr>
<th>Note</th>
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<tbody>
<tr>
<td>In the case of switching the function from NX-42RV to other than NL-42/52/62, please switch to any option after switching to NL-42/52/62 once.</td>
</tr>
<tr>
<td>When the function is switched, the NL-42/52/62 will automatically restart.</td>
</tr>
</tbody>
</table>
**Reading the display**

**Measurement screen**

There are two types of measurement screens: graph screen and numeric list screen. You can switch between the two screen types using the controls at the bottom of the menu list screen or in the [Display] screen.

**Graph display (GRP)**

- **Analysis mode**: Shows the selected analysis mode for the currently displayed screen. “OCT” indicates octave band analysis, and “OCT1/3” indicates 1/3 octave band analysis.
- **Measurement time**: Shows the measurement time selected in the [Reverberation time] menu.
- **Channel name and center frequency**
- **Measurement in progress symbol**
- **Level indication**: Frequency band level bars
- **Cursor**
- **Main channel level bar**
- **Sub channel level bar**
- **Frequency of output 1kHz**
- **Setting of output, etc.**

**Analysis mode**

Shows the selected analysis mode for the currently displayed screen. “OCT” indicates octave band analysis, and “OCT1/3” indicates 1/3 octave band analysis.

**Measurement time**

Shows the measurement time selected in the [Reverberation time] menu.
Measurement elapsed time
  Shows the measurement elapsed time.

Store address
  Shows the store address.
  If the data is already stored in the selected store address, it is displayed in red.
  Use the Δ/▽ keys to change the store address.
  Setting range: 01 to 30
  For details, refer to the page 18.

Level indication
  Shows the level of the bar selected by the cursor.

Cursor
  Selects a channel and frequency band in the currently displayed graph.
  Use the ◀/▶ keys to move the cursor.

Frequency band level bars
  Show the level value in each frequency band as a bar graph. When octave band analysis is selected, 11 bands from 16 Hz to 16 kHz are shown. When 1/3 octave band analysis is selected, 33 bands from 12.5 Hz to 20 kHz are shown.

Frequency indication
  Indicators for 16 Hz, 63 Hz, 250 Hz, 1 kHz, 4 kHz, and 16 kHz are shown here on a horizontal axis, as a guide to the frequencies of the level bar graph display.
Reading the display

Setting of output, etc

Pressing and holding the DISPLAY key cycles the display through the following indications: The number of waveform recording, Freq. response for AC OUT (or Output frequency), The number of waveform recording...

- The number of waveform recording (during measurement only)
  When the [Wave Rec Mode] on the Wave recording screen was selected, the number of recorded WAVE files is shown here.

- Freq. response for AC OUT
  When the frequency weighting characteristic was selected on the [AC OUT] of the [I/O] menu screen, the selected characteristic is shown here.

- Output frequency
  When “BAND” was selected on the [AC OUT] of the I/O menu screen, the set output frequency band is shown here.

Main channel level bar

The level of the main channel (MAIN) is shown by this blue bar. The frequency weighting characteristic is indicated below the bar.

Sub channel level bar

The level of the sub channel (SUB) is shown by this pink bar. The frequency weighting characteristic is indicated below the bar.

Measurement value

Shows the measurement value of the bar selected with the cursor.

Measurement in progress symbol

Flashes during measurement.

Channel name and center frequency

Shows the channel name and center frequency of the frequency band selected with the cursor.
Numeric list display (NUM)

Main channel level

Shows the level value and the measurement value of the main channel (MAIN).

Frequency band levels

Show the level value in each frequency band and the measurement value. During 1/3 octave band analysis, the < and > keys can be used to shift the frequency band.

Sub channel level

Shows the level value and the measurement value of the sub channel (SUB).

Note

“--.-” is shown when the indicated value is −10 dB or lower.
Menu list screen

When the measurement screen is displayed, pressing the MENU/ENTER key brings up the menu list screen as shown below. Use the $\Delta/\nabla/</>$ keys to select the desired menu and press the MENU/ENTER key. Pressing the DISPLAY key displays explanation screen of the item that has been selected. Pressing the PAUSE/CONT key or the START/STOP key switches back to the measurement screen.

<table>
<thead>
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<th>Note</th>
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<tr>
<td>Because the explanation shown when the DISPLAY key is pressed applies in part also to the sound level meter function, there will be functions that cannot be used.</td>
</tr>
</tbody>
</table>
The following switching between Analysis mode, Analysis display and Sub Ch can be done with the touch panel. (The current setting is shown when the menu list screen is displayed.) Touch the screen directly with your finger.

**Analysis mode**
Selects the analysis mode.
Each press of the “Analysis mode” on the screen with the finger cycles through the following settings.

“OCT”, “1/3 OCT”

**Analysis display**
Selects the analysis display.
Each press of the “Analysis display” on the screen with the finger cycles through the following settings.

“GRP”, “NUM”

**Sub Ch**
Selects whether or not to display the measurement value of the sub channel measurement.
Each press of the “Sub Ch” on the screen with the finger cycles through the ON and OFF.
Explanation of menu screen items

This section explains items on the various menu screens that are related to the NX-42RV function. For information on other items, please refer to the instruction manual of the NL-42/NL-52/NL-62 and NX-42RT/NX-42WR.

Reverberation Time

This screen is used to set the measurement of reverberation time.

Store Name

RV_xxxx (where xxxx is any 4-digit number)

Setting range: 0000 to 9999

Name of the folder where measurement result data files are stored.

This is used for identification when the data is recalled later.

Important

Do not specify multiple index numbers under the same store name. The index is the identification number of the unit when multiple units are used in a parallel measurement. For details, see the instruction manual of NL-42/52/62.

Trigger Level

Select [Trigger Level] and press the MENU/ENTER key. The trigger level setting screen appears.

Use the △/▽ keys to set the value and then press the MENU/ENTER key.

Setting range: 60 dB to 130 dB (1-dB steps)
Wave Level Trigger Band Position
Select [Wave Level Trigger Band Position] and press the MENU/ENTER key. The trigger band selection screen appears. Select [MAIN AP] or [SUB AP], press the MENU/ENTER key.
Available settings: Main channel all-pass, Sub channel all-pass
When the trigger level in the selected trigger band is exceeded, the measurement starts and measurement values are collected.

Sampling Period
Specifies the measurement values collection interval.
Available settings: 2 ms / 5 ms / 10 ms.

Measurement Time
This is the period during which measurement values are taken.
Setting range: 2 to 60 s
Depending on sampling period setting, the measurement time setting range is as follows (incl. 1 s pre-trigger).
2 ms : 2 to 16 s
5 ms : 2 to 40 s
10 ms : 2 to 60 s

Repeat
Specifies the number of times the measurement is repeated.
Setting range: 1 to 10

Error Rate
When the ratio of T30 to T20 exceeds the selected setting, the error rate is shown on the recall screen as a warning.
For details, refer to the “Technical Reference” section.
Available settings: OFF, 1 to 100 (1 step)
Display

This screen sets the measurement value and other items displayed on the measurement screen.

Analysis display

Switches the format in which data are shown.
Selecting [Analysis display] and pressing the MENU/ENTER key brings up the screen to select the display format. Use the △/▽ keys to select [Graph] or [Numeric list] and press the MENU/ENTER key. The setting made here has the same effect as using the touch panel on the menu list screen.

Bar Graph & Output upper range

Displays the screen to set the upper bound value of the bar graph and full scale of output voltage on the measurement screen.
Select [Bar Graph & Output upper range] and press the MENU/ENTER key. The bar graph & output upper range setting screen appears.
Use the △/▽ keys to set the value (70 dB to 130 dB, 10 dB step). Then press the MENU/ENTER key.
The value of upper limit cannot be set the value set by the [Bar Graph lower range] or less.
Bar Graph lower range

Displays the screen to set the lower limit of the bar graph on the measurement screen.

Select [Bar Graph lower range] and press the MENU/ENTER key. The bar graph lower range setting screen appears. Use the Δ/∇ keys to set the value (−10 dB to 80 dB, 10 dB step: differs from NL-42/NL-52/NL-62). Then press the MENU/ENTER key. The value of lower limit cannot be set the value set by the [Bar Graph & Output upper range] or more.
Measurement setting

This screen sets the analysis mode, measurement correction, etc.

Analysis
Displays the screen to select the analysis mode.
Select [Analysis] and press the MENU/ENTER key. The analysis mode selection screen appears.
Use the △/▽ keys to select the analysis mode (Octave, 1/3 octave) and press the MENU/ENTER key. The setting made here has the same effect as using the touch panel on the menu list screen.

Frequency Weighting (Main)
Displays the screen to select the frequency weighting characteristics for the main channel.
Select [Frequency Weighting (Main)] and press the MENU/ENTER key. The frequency weighting selection screen appears.
Use the △/▽ keys to select the frequency weighting characteristics (A, C, Z) and press the MENU/ENTER key. G is not available.
**Time Weighting (Main)**

Displays the screen to select the time weighting characteristics for the main channel.
Select [Time Weighting (Main)] and press the MENU/ENTER key. The time weighting selection screen appears.
Use the △/▽ keys to select the time weighting characteristics (F, S, 10ms) and press the MENU/ENTER key.

**Frequency band measurement setting ▶**

Sets the frequency weighting and time weighting for the frequency band.
(Configure this setting separately from the main channel setting and the sub channel setting.)
Select [Frequency band measurement setting] and press the MENU/ENTER key. The frequency band screen appears.

**Frequency Weighting**

Displays the screen to select the frequency weighting characteristics for the frequency band.
Select [Frequency Weighting] and press the MENU/ENTER key. The frequency weighting selection screen appears.
Use the △/▽ keys to select the frequency weighting characteristics (A, C, Z) and press the MENU/ENTER key. G is not available.

**Time Weighting**

Displays the screen to select the time weighting characteristics for the frequency band.
Select [Time Weighting] and press the MENU/ENTER key. The time weighting selection screen appears.
Use the △/▽ keys to select the time weighting characteristics (F, S, 10ms) and press the MENU/ENTER key.
Sub channel settings

Sets the frequency weighting and time weighting for the sub channel. Select [Sub channel settings] and press the MENU/ENTER key. The frequency weighting and time weighting for the sub channel setting screen appears.

Frequency Weighting

Displays the screen to select the frequency weighting characteristics for the sub channel. Select [Frequency Weighting] and press the MENU/ENTER key. The frequency weighting selection screen appears. Use the \( \Delta/\nabla \) keys to select the frequency weighting characteristics (A, C, Z) and press the MENU/ENTER key. G is not available.

Time Weighting

Displays the screen to select the time weighting characteristics for the sub channel. Select [Time Weighting] and press the MENU/ENTER key. The time weighting selection screen appears. Use the \( \Delta/\nabla \) keys to select the time weighting characteristics (F, S, I, 10ms) and press the MENU/ENTER key.

<table>
<thead>
<tr>
<th>Note</th>
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<tbody>
<tr>
<td>The time weighting characteristics “I” is enabled when the frequency weighting characteristics is set to “A”.</td>
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</table>
Measurement of Reverberation Time

Measurement outline

<table>
<thead>
<tr>
<th>Caution</th>
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</thead>
<tbody>
<tr>
<td>When performing measurements using high sound pressure levels, it is essential to provide and use adequate hearing protection (such as headphones).</td>
</tr>
</tbody>
</table>

Basic measurement operation

One second after pressing the START/STOP key the unit goes into trigger standby mode.

When the trigger level is exceeded, measurement data are collected for the preset measurement time and saved on the SD memory card. After measurement has been performed for the preset repeat count, the sound pressure level decay curve is calculated according to the least squares method, the reverberation time (T20, T30) is determined and stored on the SD memory card. And the average is calculated and displayed on the screen.

- **T20**: Reverberation time defined as the period during which the sound pressure level falls by 20 dB, starting at a point 5 dB below the steady level.
- **T30**: Reverberation time defined as the period during which the sound pressure level falls by 30 dB, starting at a point 5 dB below the steady level.

See the section “Calculation of T20 and T30 values during reverberation time measurement” in the “Technical Reference” section on page 33.
Measurement of Reverberation Time

Measurement repeat count
In the receiving room, the measurement is repeated for the preset repeat count. After the first measurement and the file closing interval (1 second) are finished, the next trigger standby condition is activated after 1 second.

Reverberation time calculation
When all measurements are finished, the reverberation time data obtained with each measurement are averaged and taken as the reverberation time.

Store address
Data is stored sequentially starting from the store address set in the measurement screen. The available store address range (within a store name RV_xxxx) is 01 to 30. The store address can be set in the measurement screen by using the Δ/▽ keys. When store address 30 is reached during measurement, further measurement is no longer possible and a message as shown below is displayed, also if the preset repeat count is not yet reached. In order to store more addresses, press the MENU/ENTER key to return to the store address 01 and restart the measurement (previous stored data will be overwritten). Alternatively, create a new store name in menu item [Reverberation time], and start storing from address 01.
Parameter setting

Before starting the reverberation time measurement, set the measurement parameters as follows.

1. Press the MENU/ENTER key to bring up the menu list screen.

2. Use the \( \triangle / \nabla / \langle / \rangle \) keys to select the following menus, and press the MENU/ENTER key. The respective menu screen appears.

3. Use the \( \triangle / \nabla \) keys to select the setting item and press the MENU/ENTER key. The respective parameter can now be set.

4. Use the \( \triangle / \nabla \) keys to change the setting option or numeral and press the MENU/ENTER key. The new setting is established.

5. When all items have been set, press the PAUSE/CONT key to return to the menu screen.

6. Make settings for [Display], [Measure] and [Reverberation time]. Then press the START/STOP key to return to the measurement screen. For details, refer to the “Reading the display” section.
Setting example for using the automatic interval output function of the SF-06

<table>
<thead>
<tr>
<th>Note</th>
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</thead>
<tbody>
<tr>
<td>When using the RION random noise generator SF-06 as sound source with the automatic interval output function enabled, set the ON time and OFF time to suitable values, taking the measurement time and processing time into consideration. An example is shown on below.</td>
</tr>
</tbody>
</table>

When using the RION random noise generator SF-06 as sound source for reverberation time measurement, the automatic interval output function can be used as follows.

SF-06 setup
ON time + OFF time ≥ measurement time + 2 seconds

NX-42RV setup

Make measurement time settings taking the following into consideration:

(Interval noise ON time + pre-trigger 1 s + fall time)

is included in the measurement time.

SF-06
Press START/STOP key at least 1 second before ON

ON time: 3 s
OFF time: 6 s

Busy state: 1 s
Wait state: File close time max. 1 s

NX-42RV
Measurement time: 7 s

Wait state

Trigger level

START/STOP
**Measurement procedure**

1. Determine the sound source positions and receiving room measurement points.

2. Set the measurement parameters. (See “Parameter setting” on page 19.)

3. Turn on sound level meter the NX-42RV installed.
   
   After the power-on screen has been shown, the measurement screen appears.
   
   The measurement parameter settings that were active before the unit was turned off will show on the screen. Therefore the actual display may not always be the same.

4. Press the MENU/ENTER key and select “NX-42RV” on the menu list screen. (see “Switching to the NX-42RV function” on page 3.)

5. Set the analysis mode. Press the MENU/ENTER key and use the touch panel on the menu list screen to select “Octave analysis” or “1/3 octave analysis”. The analysis mode can also be selected via the [Measure] item in the menu list screen.

6. Set the display screen for measurement. Use the touch panel on the menu list screen to select “GRP” (Graph) or “NUM” (Numeric list). The setting can also be made via the [Display] item in the menu list screen.

7. Select [Display] on the menu list screen and set the bar graph & output upper range and bar graph lower range (in the case of “GRP”). Choose a setting in which the bar graph indication registers to about the middle of the range.

8. Set the required items under “Measure” in the menu list screen.
9. Using the [Reverberation time] item in the menu list screen, select the measurement parameters.

10. Set up the sound source.

11. Set up the sound level meter at the measurement point.

12. Return to the measurement screen and press the START/STOP key to start the measurement. The unit goes into trigger standby mode.

13. Activate the sound source. When using the RION random noise generator SF-06 as sound source with the automatic interval output function enabled, set the ON time and OFF time to suitable values, taking the measurement time and processing time into consideration.

14. The trigger is activated. After the “measurement time” (including 1 second pre-trigger) has elapsed, the measurement stops automatically and the indication “STOP” is shown. The measurement data are stored, the repeat indication is incremented, and the unit again goes into trigger standby mode.

15. When measurement has been repeated for the number of times specified by the repeat setting, the measurement is finished. The reverberation time is calculated, and the result is stored on SD memory card.

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>If an overload condition has occurred during the measurement, the indication [Ov] stays on until the next measurement is started (START/STOP key is pressed). If an underload condition has occurred, the indication [Un] stays on.</td>
</tr>
</tbody>
</table>
While the measurement is in progress, the ▶ symbol flashes and the elapsed time is displayed. In addition, the indicator LED flashes red. When the measurement time has elapsed, the measurement is terminated automatically.

To terminate the measurement before the allocated time, press the START/STOP key.

- While the graph display screen is shown during or after measurement, the < / > keys can be used to move the cursor that selects the center frequency to display. The frequency band under the cursor and its numeric value reading are shown at the top of the screen. The center frequencies for the band level bar graphs are as follows.

For octave band analysis:
- From left 16 Hz, 31.5 Hz, 63 Hz, ..., 16 kHz

For 1/3 octave band analysis:
- From left 12.5 Hz, 16 Hz, 20 Hz, ..., 20 kHz

- After measurement is completed, you can use the menu list screen or the [Display] item on the menu list screen to switch between graph display and numeric list display.

- While no measurement is in progress, pressing the PAUSE/CONT key will freeze the sound level displayed at that point. Press the PAUSE/CONT key again to cancel the display freeze.

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to measurement, it is recommended first to format the memory card for storing data with this unit.</td>
</tr>
</tbody>
</table>
Recall data

Use the [Recall] item in the menu list screen to call up saved reverberation time data onto the display (see the NL-42/NL-52/NL-62 instruction manual).

Note

The data format of the files stored by NL-42/52 is different from that of the files stored by NL-62 when using NX-42RV. Therefore, compatible use of files between these units is not possible.
Recall List Screen

Selecting [Recall] on the menu list screen and then pressing the MENU/ENTER key brings up the recall list screen. Pressing the PAUSE/CONT key returns the unit to the menu list screen.

Selecting [Recall data] on the recall list screen and pressing the MENU/ENTER key brings up the following screen.

Selecting [View the data] and then pressing the MENU/ENTER key brings up the recall target select screen.

Selecting [Delete the data] and then pressing the MENU/ENTER key deletes the data.

Selecting [Cancel] and then pressing the MENU/ENTER key returns the unit to the recall list screen.
Recall Target Select Screen

Selecting the recall data on the recall list screen brings up the recall target select screen.

Pressing the PAUSE/CONT key, returns the unit to the recall list screen.

Pressing Δ/▽ key, moves the cursor.

Pressing ◀/▶ key, switches the page.

Pressing the MENU/ENTER key, displays the data of the cursor.

Pressing the DISPLAY key, displays explanation screen of the item that has been selected.
Reverberation Time (Average) Recall Screen / Recall screen of each measurement value

Selecting the [Reverberation average] or each address data on the recall target select screen brings up the Reverberation Time (Average) Recall Screen / Recall screen of each measurement value screen.

Pressing the PAUSE/CONT key returns the unit to the recall target select screen.

Pressing Δ/∇ key, moves the cursor.

Pressing <>/> key switches the page.

Pressing the MENU/ENTER key displays the details of the data of the cursor.

Pressing the DISPLAY key displays explanation screen of the item that has been selected.

<table>
<thead>
<tr>
<th>Freq.</th>
<th>T20</th>
<th>T30</th>
<th>Txx</th>
<th>Err</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAIN</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
<td>0</td>
</tr>
<tr>
<td>SUB</td>
<td>1.72</td>
<td>1.72</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>12.5</td>
<td>0.56</td>
<td>1.71</td>
<td>1.27</td>
<td>—</td>
</tr>
<tr>
<td>16</td>
<td>0.43</td>
<td>1.24</td>
<td>0.72</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>0.46</td>
<td>0.37</td>
<td>0.41</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>0.98</td>
<td>0.79</td>
<td>—</td>
<td>19</td>
</tr>
<tr>
<td>31.5</td>
<td>0.86</td>
<td>0.66</td>
<td>—</td>
<td>23</td>
</tr>
<tr>
<td>40</td>
<td>0.78</td>
<td>0.57</td>
<td>—</td>
<td>27</td>
</tr>
<tr>
<td>50</td>
<td>0.47</td>
<td>0.41</td>
<td>—</td>
<td>13</td>
</tr>
<tr>
<td>63</td>
<td>0.36</td>
<td>0.34</td>
<td>—</td>
<td>6</td>
</tr>
<tr>
<td>80</td>
<td>0.24</td>
<td>0.22</td>
<td>—</td>
<td>8</td>
</tr>
<tr>
<td>100</td>
<td>0.19</td>
<td>0.19</td>
<td>—</td>
<td>0</td>
</tr>
<tr>
<td>125</td>
<td>0.16</td>
<td>0.16</td>
<td>—</td>
<td>7</td>
</tr>
</tbody>
</table>

Reverberation Time (Average) Recall screen / Recall screen of each measurement value

Displays Error Number and Error Rate

Error number will be displayed in the area as below.

Error rate will be displayed in red when it exceeds this error rate that is set.
[Reverberation decay curve] Screen

Displays the reverberation decay curve (T - L graph) of the band of the auto store data that has been selected by the cursor in the Reverberation Time (Average) Recall Screen / Recall screen of each measurement value. Pressing the START/STOP key, calculates Txx value at the current cursor position. Pressing the PAUSE/CONT key, returns the unit to the recall screen of each measurement value. Pressing △/▽ key, zooms in or out the screen. Pressing ◄/► key, moves the cursor. Pressing the MENU/ENTER key, displays the details of the recall menu. Pressing the DISPLAY key, switches the cursor available to operate. Pressing the △/▽ key during holding down the DISPLAY key, switches the frequency.

![Reverberation decay curve] Screen
**BEG: Starting point cursor information (dB value)**

It is displayed in the following order of priority.

1) If there is Txx, its starting position
2) If there is T30 or T20, the reference point
3) The left edge of the graph (the first sample)

**END: End point cursor information (dB value)**

It is displayed in the following order of priority.

1) If there is Txx, its end position
2) If there is T30, that position
3) If there is T20, that position
4) The left edge of the graph (the first sample)
The NX-42WR provides the waveform recording. Select the appropriate recording function before starting to record. Verify that an SD memory card with sufficient free space is inserted in the card slot of the NL-42/NL-52/NL-62. If no card is inserted, recording cannot be carried out.

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>When recording is performed, pay attention to the setting of bar graph &amp; output upper range of this unit. If a set value of the bar graph &amp; output upper range is too high for the sound level of measurement target, the volume of recorded sound will be small and it may be difficult to hear when played on a computer. Also, note that the volume of 24-bit sound is relatively small when compared with 16-bit sound since 24-bit sound has wider liner operating range. When sound is recorded with 24 bit, it may not be played on a computer depending on its specifications (such as Windows version and sound board type). Before recording, make sure that the data recorded with the specified bit length and wave sampling frequency can be played on your computer. For 16-bit data, it can be played on computers running Windows XP SP3 or later versions in most cases. Prior to measurement, it is recommended first to format the memory card for storing data with this unit.</td>
</tr>
</tbody>
</table>
Setting of the recording function

1. Selecting [WR] on the menu list screen and then pressing the MENU/ENTER key brings up the Wave recording screen. Make settings as shown below right.

2. Press the START/STOP key to return to the measurement screen.

3. Store
   When you press the START/STOP key to start store, recording also starts simultaneously.
   To stop recording, press the START/STOP key.
   During store, the PAUSE/CONT key (PAUSE function) cannot be used.

Playback of recorded files

Recorded files can be played with WAVE file playback software (on public sale) or with the waveform analysis software CAT-WAVE or AS-70 from Rion. Playback on the NL-42/NL-52/NL-62 is not possible.

Analysis of recorded files

Recorded files can be analyzed with the waveform analysis software CAT-WAVE or AS-70 from Rion.
Technical explanation of reverberation time measurement

Error rate

If the T20 and T30 values calculated for a given frequency band during reverberation time measurement differ significantly, there may be a problem with the data. When calculating T20 and T30, the NX-42RV program also determines the difference between T20 and T30 as \(1 - \frac{T30}{T20}\) [%] and expresses this as the “error rate”.

Before starting a measurement, an error rate threshold is specified. Then, at the recall screen, if the error rate exceeds this threshold, the “Error” item for the respective frequency band is shown in red. Use this indication to determine whether to redo the measurement or perform recalculation (Txx) of reverberation time for specified interval at the recall screen.

Error messages E1 and E2

If the reverberation time cannot be displayed on the reverberation time measurement recall screen, the indication “E1” or “E2” may be shown.

If E1 (ERROR 1) is shown

This can be due to two reasons:

1. The measurement time was too short.
2. The S/N ratio was insufficient.

In case of 1., increase the measurement time setting. In case of 2., increase the sound source output level or lower the noise level.

If E2 (ERROR 2) is shown

The number of samples was insufficient. In this case, shorten sampling period.
Calculation of T20 and T30 values during reverberation time measurement

For automatic calculation of T20 and T30 values, this program determines the start point for calculating the reverberation time as follows.

1. $L_{eq}$ for 1-second interval after trigger level was exceeded is calculated ($L_{eq}$ 1 value).
2. Using data for the entire measurement, the $L_{eq}$ for the interval from the point where the level exceeded the $L_{eq}$ 1 value for the first time until the level next falls to 10 dB below the $L_{eq}$ 1 value is calculated. This is the $L_{eq}$ 2 value.
3. The larger of the $L_{eq}$ 1 and $L_{eq}$ 2 values is taken as the steady level of the noise source.
4. The point where the level is 5 dB lower than the steady level is used as the start point for calculating the reverberation time.
5. The time from the start point until the level has dropped by 20 dB is multiplied by 3 and taken as the T20 value. The time from the start point until the level has dropped by 30 dB is multiplied by 2 and taken as the T30 value.

**Note**

If the background noise level fluctuates excessively, the steady level may be calculated somewhat lower than the actual level. In such a case, specify the calculation interval and recalculate Txx.
Data stored on the SD memory card are in CSV format (.rnd). Various files and subdirectories are created on the card.

**Store destination folder**

Files are saved in the store folder specified by store name. The store name specified on the menu screen is created as a 4-digit number under the subdirectory name. When a file with the same name exists in the same directory, it will always be overwritten. A sample configuration is shown below.

```
NX-42RV
   RV_0000
      NL_001_RVT_MAN_0000_0000.rnd
      Auto_0001
         AUTO_LP
            NL_001_RVT_Lp_0001_0000.rnd
            AUTO_0001.rnh
            SOUND
      Auto_0002
         AUTO_LP
            NL_001_RVT_Lp_0002_0000.rnd
            AUTO_0002.rnh
            SOUND
```
**Important**

Use SD memory cards provided by Rion. The performance of other cards is not guaranteed.

Note that we assume no responsibility for any damage or loss of stored measurement data.

---

**File name of data**

Files of data are named as shown below.

```
NL_001_RVT_MAN_0123_0000.rnd
```

- **Store mode**: The file name varies depending on the store mode.
  - Manual store (Reverberation Time): MAN
  - Auto store ($L_p$ store): $L_p$

- **Store name**: The file name varies depending on the store mode.
  - Manual store (Reverberation Time): Store name
  - Auto store ($L_p$ store): Address

- **Address**: Fixed to 0000

---

**Recording data file name**

If the recording function by NX-42WR is available, create a [SOUND] folder in the auto store data folder, and then store the recorded data in it.

For more information, refer to the instruction manual for the NX-42WR.
Card capacity and store time

The amount of measurement data which can be stored on an SD memory card depends on the capacity of the inserted card. The number of data sets which can be stored on an SD memory card depends on the reverberation time measurement settings.

The example of the reverberation time measurement setting
Sampling period: 2 ms
Measurement time: 16 s
Repeat: 10 times (10 addresses per store)

<table>
<thead>
<tr>
<th>SD memory card capacity</th>
<th>Data sets of a store</th>
</tr>
</thead>
<tbody>
<tr>
<td>512 MB</td>
<td>45 sets</td>
</tr>
<tr>
<td>2 GB</td>
<td>180 sets</td>
</tr>
</tbody>
</table>

When performing waveform recording

The example of the reverberation time measurement setting
Sampling period: 2 ms
Measurement time: 16 s
Repeat: 10 times (10 addresses per store)

The example of the waveform recording setting
Wave sampling frequency: 48 kHz
Bit length: 16 bit

<table>
<thead>
<tr>
<th>SD memory card capacity</th>
<th>Data sets of a store</th>
</tr>
</thead>
<tbody>
<tr>
<td>512 MB</td>
<td>15 sets</td>
</tr>
<tr>
<td>2 GB</td>
<td>65 sets</td>
</tr>
</tbody>
</table>

The duration of recording with 24 bit becomes shorter than that with 16 bit because the data volume of 24 bit is about 1.5 times more.

Note
The data cannot be stored in the internal memory of the sound level meters when using NX-42RV.
The factory default settings of the unit are listed below.

Analysis..........................................................Octave
Main channel frequency weighting .................A
Main channel time weighting .........................10 ms
Frequency band measurement frequency weighting ....A
Frequency band measurement time weighting ......10 ms
Windscreen correction ........................................WS None
Diffuse sound field correction (DF) ..................OFF
Sub channel settings ........................................OFF
Sub channel frequency weighting .................A
Sub channel time weighting ..............................10 ms
Backlight auto off ............................................30 s
Backlight brightness ........................................2
LCD auto off at auto store .................................OFF
Battery type ..................................................Alkaline
Index .............................................................1
Touch panel lock ..............................................OFF
Analysis display ..............................................Graph
Bar graph & output upper range ....................130 dB
Bar graph lower range .................................30 dB
AC OUT .....................................................Inter lock
DC OUT .......................................................MAIN
Band of output (only AC OUT and DC OUT are set to BAND) ....16 Hz
Communication interface ...............................OFF
Baud rate ....................................................9600 bps
Store name ....................................................0000
Measurement time ..........................................5 s
Calibration mode .............................................Internal
Repeat .........................................................1
When you turn power to the unit on while holding down the START/STOP key, the unit will be initialized to the above settings. When wishing to set the unit to the factory default values, select [menu] → [system – Read/Save Setting] → [Load Default Settings] and then press the MENU/ENTER key (please refer to the chapter “Setup Files” of the NL-42/NL-52/NL-62 instruction manual). The time, language and store data are not initialized.
This section lists commands about the function of the NX-42RV. For information on other commands, please refer to the documentation (serial interface manual) of the NL-42/NL-52/NL-62.

### List of commands

S: Setting command (for making NX-42RV settings)
R: Request command (for obtaining information on NX-42RV status and the measurement value)

<table>
<thead>
<tr>
<th>Command</th>
<th>Function</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReverbTime Store Name</td>
<td>Store name (S/R)</td>
<td>40</td>
</tr>
<tr>
<td>ReverbTime Address</td>
<td>Address (S/R)</td>
<td>40</td>
</tr>
<tr>
<td>ReverbTime Trigger Level</td>
<td>Trigger Level (S/R)</td>
<td>40</td>
</tr>
<tr>
<td>ReverbTime Trigger Band</td>
<td>Trigger Band (S/R)</td>
<td>40</td>
</tr>
<tr>
<td>ReverbTime Sampling Interval</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>ReverbTime Measurement Time</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>ReverbTime Measure Count</td>
<td>Repetition number of Measurements (S/R)</td>
<td>41</td>
</tr>
<tr>
<td>ReverbTime Error Rate</td>
<td>Error Rate (S/R)</td>
<td>41</td>
</tr>
<tr>
<td>ReverbTime Wave Rec Mode</td>
<td>Wave rec mode (S/R)</td>
<td>42</td>
</tr>
</tbody>
</table>
## Command Description

### ReverbTime Store Name

**Setting and referring to the store name**

<table>
<thead>
<tr>
<th>Setting command</th>
<th>ReverbTime <em>Store</em> <em>Name</em>, p1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>p1= 0 to 9999</td>
</tr>
<tr>
<td>Request command</td>
<td>ReverbTime <em>Store</em> <em>Name</em>?</td>
</tr>
<tr>
<td>Response data</td>
<td>d1</td>
</tr>
<tr>
<td>Returned value</td>
<td>Same as for setting command</td>
</tr>
</tbody>
</table>

### ReverbTime Address

**Setting and referring to the address**

<table>
<thead>
<tr>
<th>Setting command</th>
<th>ReverbTime <em>Address</em>, p1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>p1= 1 to 30</td>
</tr>
<tr>
<td>Request command</td>
<td>ReverbTime <em>Address</em>?</td>
</tr>
<tr>
<td>Response data</td>
<td>d1</td>
</tr>
<tr>
<td>Returned value</td>
<td>Same as for setting command</td>
</tr>
</tbody>
</table>

### ReverbTime Trigger Level

**Setting and referring to the trigger level**

<table>
<thead>
<tr>
<th>Setting command</th>
<th>ReverbTime <em>Trigger</em> <em>Level</em>, p1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>p1= 60 to 130</td>
</tr>
<tr>
<td>Request command</td>
<td>ReverbTime <em>Trigger</em> <em>Level</em>?</td>
</tr>
<tr>
<td>Response data</td>
<td>d1</td>
</tr>
<tr>
<td>Returned value</td>
<td>Same as for setting command</td>
</tr>
</tbody>
</table>

### ReverbTime Trigger Band

**Setting and referring to the trigger band**

<table>
<thead>
<tr>
<th>Setting command</th>
<th>ReverbTime <em>Trigger</em> <em>Band</em>, p1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
<td>p1= “Main”</td>
</tr>
<tr>
<td></td>
<td>p1= “Sub”</td>
</tr>
<tr>
<td>Request command</td>
<td>ReverbTime <em>Trigger</em> <em>Band</em>?</td>
</tr>
<tr>
<td>Response data</td>
<td>d1</td>
</tr>
<tr>
<td>Returned value</td>
<td>Same as for setting command</td>
</tr>
</tbody>
</table>
ReverbTime Sampling Interval

Setting and referring to the sampling interval

Setting command: ReverbTime Sampling Interval, p1
Parameter: p1 = “2ms”, p1 = “5ms”, p1 = “10ms”
Request command: ReverbTime Sampling Interval?
Response data: d1
Returned value: Same as for setting command

ReverbTime Measurement Time

Setting and referring to the measurement time

Setting command: ReverbTime Measurement Time, p1
Parameter: p1 = 2 to 60
Request command: ReverbTime Measurement Time?
Response data: d1
Returned value: Same as for setting command

ReverbTime Measure Count

Setting and referring to the repetition number of measurements

Setting command: ReverbTime Measure Count, p1
Parameter: p1 = 1 to 10
Request command: ReverbTime Measure Count?
Response data: d1
Returned value: Same as for setting command

ReverbTime Error Rate

Setting and referring to the error rate

Setting command: ReverbTime Error Rate, p1
Parameter: p1 = 0 to 100
Request command: ReverbTime Error Rate?
Response data: d1
Returned value: Same as for setting command
**ReverbTime Wave Rec Mode**

Setting and referring to the wave rec mode

Setting command: ReverbTime Wave Rec Mode, p1

Parameter:
- p1 = “Off”
- p1 = “On”

Request command: ReverbTime Wave Rec Mode?

Response data: d1

Returned value: Same as for setting command
### List of commands that are not available in NX-42RV

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the communication commands that are available in NL-42/NL-52/NL-62, the following commands are not available in NX-42RV. Both of the setting command and request command will be an error response.</td>
</tr>
</tbody>
</table>

- Store Mode
- Store Name
- Manual Address
- Manual Store
- Measurement Time Preset Manual
- Measurement Time Manual (Num)
- Measurement Time Manual (Unit)
- Measurement Time Preset Auto
- Measurement Time Auto (Num)
- Measurement Time Auto (Unit)
- Measurement Start Time
- Measurement Stop Time
- Measurement Elapsed Time
- Lp Store Interval
- Leq Calculation Interval Preset
- Leq Calculation Interval (Num)
- Leq Calculation Interval (Unit)
- Timer Auto Start Time
- Timer Auto Stop Time
- Sleep Mode
- Delay Time
- Back Erase
- LPF Cutoff Frequency
- HPF Mode
Specifications

Compatible model  Sound level meter NL-42/NL-52/NL-62
Media  SD memory card, 512 MB
Applicable standards  CE marking
  WEEE Directive
  Chinese RoHS (only to China)
  ISO 3382-1:2009 *
    Acoustics -- Measurement of room acoustic parameters -- Part1:
    Performance spaces
  ISO 3382-2:2008 *
    Acoustics -- Measurement of room acoustic parameters -- Part2:
    Reverberation time in ordinary rooms
  * Applied only to noise interruption method
Standards for the sound level meter is the same as the specification of the NL-42/NL-52/NL-62.

Measurement function
Measurement of reverberation time
Measurement method
  Noise interruption method
Parameter settings
  Sampling period
    2 ms, 5 ms, 10 ms
  Measurement time
    Sampling period 2 ms: 2 to 16 s
    Sampling period 5 ms: 2 to 40 s
    Sampling period 10 ms: 2 to 60 s
  Repeat
    1 to 10 times
  Trigger level
    60 dB to 130 dB (1-dB steps)
  Error rate
    Off / 1 % to 100 %
Specifications

Measurement

Measurement value

\( L_p \) (Sound pressure level decay curve)

Display

\( L_p \) (Sound pressure level sampling value)

Results Processing

T20, T30 (least square method)
Error rate
Reverberation time calculated for specified interval
Txx
Reverberation time average

Display

T20, T30, error rate
Reverberation time calculated for specified interval
Txx
Reverberation time average
Reverberation decay curve (time vs. level display)

Waveform recording function

Combination with NX-42WR allows total sound recording during measurement.

Communication function

Only for parameter setting control
Store data transfer is not supported (possible via removable disc function)
Continuous transfer with DRD command not supported

Analysis frequency range

Analysis results are weighted with selected frequency characteristics.

Octave analysis

Octave band pass filter
16 Hz to 16 kHz

Configuration

12th-order Butterworth band pass digital filter
Specifications

Center frequencies
- Base-10

1/3 octave analysis
- 1/3 octave band pass filter
  - 12.5 Hz to 20 kHz

Configuration
- 6th-order Butterworth band pass digital filter

Center frequencies
- Base-10

Frequency weighting
- A, C, Z

Time weighting
- F (Fast), S (Slow), 10 ms, I *
  - “I” is enabled when the frequency weighting characteristics for the sub channel is set to “A”.

Power
- Four AA batteries or external power supply

Battery life (at 23°C, normal operation, AC output and DC output is OFF, common to NL-42/NL-52/NL-62):
  - Alkaline batteries LR6: Approx. 16 hours
  - Ni-MH secondary batteries: Approx. 16 hours
  - (Depending on the manufacturer)

Battery life varies depending on the setting of this unit.

AC adapter
- NC-98 series

External DC power supply
- 5 V to 7 V (rated voltage 6 V)

Current Consumption
- 120 mA (normal operation, rated voltage, common to NL-42/NL-52/NL-62)

Ambient conditions for use
- −10°C to 50°C, 10% to 90% RH (no condensation)

Dimensions
- 32 mm (H) × 24 mm (W) × 2.1 mm (D)

Weight
- Approx. 5 g

Supplied accessories
- Inspection certificate 1