Sound Level Meter
NL-42 / NL-52
Quick Instruction Manual
(Ver.1.0)

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1. Controls and Functions

1-1. Front panel, Operation key panel

This sound level meter has the following display and key panel.

Several settings such as frequency weighting, time weighting and other parameters for measurement are set from the menu list.

The display supports various languages, and enables user-friendly, intuitive operation, designed to be used comfortably, also by persons who are inexperienced in measurements.
1-2. Input/Output Connectors

A variety of I/O connections is available.

1-3. Measurement screen display

The illustration below shows all elements of the display for explanation purposes. In actual operation, such a screen will not be shown.
2. Preparations

2-1. Power on/off

Power on: Hold down the POWER key until the power-on screen appears (at least 1 second).

Power off: Hold down the POWER key until the unit is turned off (several seconds).

2-2. Menu list screen

① When the measurement screen is displayed, pressing the MENU/ENTER key brings up the menu list screen as shown to the right.

② Use the ▲ / ▼ / ◀ / ▶ keys to select the desired menu item and press the MENU/ENTER key.

③ Pressing the DISPLAY key displays the explanation (help) screen of the item that has been selected.

④ Pressing the PAUSE/CONT key switches back to the previous screen.

⑤ Pressing the START/STOP key switches back to the measurement screen.

2-3. Battery type

In this menu item, you can select the type of battery used for the unit.

The battery power corresponding to the selected battery is displayed on the measurement screen.

From the [System(Language)] menu, select [Battery type] and press the MENU/ENTER key. The battery type screen appears.

Use ▲ / ▼ the keys to select the battery type (Alkaline, Ni-MH [Nickel-metal hydride]) and press the MENU/ENTER key.

If [Battery type] is set to the wrong type, the unit might be working but the battery life becomes shorter.

In addition, the battery status cannot be indicated in correct indicator segments.

This is because alkaline battery voltage is about 1.5 V and Ni-MH battery voltage is about 1.2 V. Therefore, [Battery type] must be set correct.

2-4. Battery status

When the unit is operated on battery power, you should regularly check the battery indication □.

The number of white segments will decrease as the batteries get used up. When the indication starts to flash in red, replace the batteries with a fresh set.

2-5. Output level range

The unit can measure without switching ranges. It is single range.

However, the output level range and bar graph level range of the unit need to be set, in order to connect signal outputs to a Data Recorder or Level Recorder.
Especially when the unit is connected to a Level Recorder, Data Recorder or Frequency Analyzer, it is necessary to consider the Dynamic Range.

For example, when the unit is connected to a Level Recorder, whose dynamic range is maximum 50 dB, if the full scale output of the unit is set to 130 dB, the Level Recorder would record the data in the range from 80 dB to 130 dB. Therefore it cannot record below 80 dB.

On the other hand, if the full scale output of the unit is set to 90 dB, the Level Recorder would record data in the range from 40 dB to 90 dB.

AC output and DC output specifications are shown below.

- AC output voltage: 1 V(rms) at display full-scale point
- DC output voltage: 2.5V, 25 mV/dB at display full-scale point

The procedure for setting the upper scale value of the bar graph and full scale of output voltage is as follows:

① Select [Display] on the menu list and select [Output Level Range Upper].
② Use the △/▽ keys to set the value (70 to 130, 10 dB steps). Then press the MENU/ENTER key.
③ Return to the Measurement screen and confirm that the output level range has changed.

(For example, full scale settings of 130 dB and 90 dB are shown below)

![Image showing reference for upper scale value setting](image_url)

- Reference

Set the lower Output level range.

Select [Output Level Range Lower] and press the MENU/ENTER key.

Use the △/▽ keys to set the value (20 to 80, 10 dB step).

Then press the MENU/ENTER key. This setting does not affect the output level.
2-6. Internal calibration (Electrical calibration)

Before and after a measurement, the unit must be calibrated.

Calibration is carried out using a signal generator (1 kHz, sinusoidal wave) built into the unit.

The procedure for internal calibration is described below.

① Press the CAL key. Verify that “Internal Calibration” is displayed in the upper part of the screen.
② If “Acoustic Calibration” is shown in the upper part of the screen, press the DISPLAY key. The calibration mode will change to “Internal Calibration”.
③ Confirm that the calibration value indication shows 124 dB steadily. If the bar graph upper limit setting is not 130 dB, a value of [Output Level Range Upper -6 dB] will be flashing as the value on the calibration value indication.

④ Use the △/▽ keys to bring the level indication to the specified value (124.0 dB).
⑤ When calibration to 124.0 dB is completed, press the CAL key once more to return to the measurement screen.

Note: If the bar graph upper limit setting is not 130 dB, bring the level indication to a value that is 6 dB below the current upper limit of the bar graph scale.

2-7. Acoustic calibration (with sound calibrator)

To confirm the microphone sensitivity, you need to execute acoustic calibration using a sound calibrator.

The procedure for acoustic calibration is described below.

If the output level range should be changed, refer to “2-5. Output level range”.

① Turn off the Sound Calibrator NC-74 and NL-42/NL-52.
② Insert the microphone very carefully and slowly all the way into the coupler.
③ Set the power switch of the Sound Calibrator to ON.
④ Set the frequency weighting as described below.
   Refer to “2-8. Setting of the frequency weighting and the time weighting”.
   ・ When using the Sound calibrator NC-74 : Select the frequency weighting A, C, or Z.
⑤ Press the CAL key. A calibration screen appears.
Verify that “Acoustic Calibration” is displayed in the upper part of the screen. If “Internal Calibration” is shown in the upper part of the screen, press the DISPLAY key. The calibration mode will change to “Acoustic Calibration”.

Use the Δ/▽ keys to adjust the reading of the NL-42/NL-52 to the value shown in the table below. These values were derived taking into consideration the relationship between the sound pressure level at the microphone in the coupler (specified sound pressure level) and the influence of case reflections and the microphone refraction effect when placed in a sound field.

<table>
<thead>
<tr>
<th>Calibrator</th>
<th>Calibration value of NL-42</th>
<th>Calibration value of NL-52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Calibrator (NC-74)</td>
<td>93.9 dB</td>
<td>94.0 dB</td>
</tr>
</tbody>
</table>

⑦ Press the CAL key. The measurement screen returns.
⑧ Restore the frequency weighting. (refer to ⑤)
⑨ Turn off the Sound Calibrator NC-74 and the NL-42/NL-52.
⑩ Remove the microphone very carefully and slowly from the coupler.
2-8. Setting of the frequency weighting and the time weighting

① Press the MENU/ENTER key to bring up the menu list screen.
② On the touch screen, select the frequency weighting characteristic for the main channel. Each press on the “Freq” field with the finger cycles through the following settings “A”, “C”, “Z”.
   (The frequency weighting characteristic can also be set using the [Measure] screen in the menu list screen.)

③ Select the time weighting characteristic for the main channel on the touch screen. Each press on the “Time” field of the touch screen with the finger cycles through the following settings “F (Fast)”, “S (Slow)”.
   (The time weighting characteristic can also be set using the [Measure] screen in the menu list screen.)
④ Pressing the START/STOP key switches back to the measurement screen.
3. Measurement

3-1. Sound level measurement

① Press the MENU/ENTER key and select the frequency weighting characteristic on the touch screen.

② Set the frequency weighting as described below.
   • A-weighted sound pressure level: “A” setting.
   • C-weighted sound pressure level: “C” setting.
   • Z-weighted sound pressure level: “Z” setting.

③ Set the time weighting as described below.
   • Time weighting F(Fast): “F(Fast)” setting.
   • Time weighting S(Slow): “S(Slow)” setting.

④ Pressing the START/STOP key switches back to the measurement screen.

⑤ The level indication shows the currently measured sound level (sound pressure level). The reading is updated once every second and the bar graph update frequency is 100 ms.

(An example of a measurement screen with settings for time weighting F and frequency weighting A is shown below.)
3-2. Store operation

(1) Manual mode store operation

All processed data except sound level are considered as a single data set, and the operator stores the data sets one-by-one manually.

When the operator performs the store operation after a measurement, each processed value and measurement condition will be stored with the time value.

If no SD memory card is inserted, the data will be stored in the internal memory of the unit. If an SD memory card is inserted, the data will automatically be stored on the card. Data store capacity is shown below.

<table>
<thead>
<tr>
<th>Memory</th>
<th>Data store capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal memory capacity</td>
<td>Max. 1000 data sets</td>
</tr>
<tr>
<td>SD memory card capacity</td>
<td>Max. 1000 data sets per store name, Max. 100 store names</td>
</tr>
</tbody>
</table>

- The procedure is as follows:
  ① Measurement settings as described in chapter “3-1 Sound level measurement” must be completed beforehand.
  ② To select the measurement values \( L_{eq}, L_t, L_{\text{max}}, L_{\text{min}} \) and \( L_N \) (\( N = 05, 10, 50, 90, 95 \)) you want to display, set the desired items to ON in the [Display] screen from the menu list screen.

In addition, the display setting of a measured value can be changed between ON and OFF again after a measurement.

Refer to the figure below.
Bring up the menu list screen and select [Store].

Manual mode setting is as follows. The store name only appears when a SD memory card is inserted.

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store mode</td>
<td>Manual</td>
</tr>
<tr>
<td>Store name</td>
<td>Number of four digits</td>
</tr>
<tr>
<td>Measurement time</td>
<td>10 s / 1 min / 5 min / 10 min / 15 min / 30 min / 1 h / 8 h / 24 h / Manual arbitrary measurement time (maximum 24 hours)</td>
</tr>
</tbody>
</table>
① Back to the measurement screen, the currently selected address is shown on the screen. The △/▽ keys can be used to specify the address in the range from 0001 to 1000. (If the address is shown in red, it already contains data. Take care not to overwrite data that you want to keep.)

⑤ Press the START/STOP key to start the measurement. 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 pre-set time, press the START/STOP key.

⑥ When the measurement finishes, a confirmation screen will be displayed. Select “Data saved” and press the MENU/ENTER key to store the processing results in the internal memory or on the SD memory card. When you select “Cancel”, the processing result is not saved.

(NB: All processed data are stored, whether you have displayed a processed value on the measurement screen or not.)

⑦ The measurement results are displayed. Each press of the “DISPLAY” key cycles through the displays “Time-Level screen” and “Measurement screen”.

Use the △/▽ keys to set store address

Press the START/STOP key to start the measurement

While the measurement is in progress, the ▶ symbol flashes and the elapsed time is displayed. In addition, the indicator LED flashes red.

Press the “DISPLAY” key. Press the key two times when several processing values exist.
(2) Auto mode operation

The optional Extended Function Program NX-42EX should be installed.

An SD memory card should be inserted in the card slot.

The data will automatically be stored on the card.

With the Auto mode, $L_p$ store and $L_{eq}$ store are executed simultaneously (Separate operation is also possible).

- $L_p$ store
  
  This is useful when recording the sound level time profile. The sound level of up to 1,000 hours can be stored continuously and automatically.

  Stored data: $L_p$ or $L_{eq,1s}$ (refer to note of next page)

  Store interval: Can be selected from 100 ms / 200 ms / 1 s / $L_{Aeq,1s}$ ($L_{eq}$ per second), OFF (= $L_p$ is not stored)

- $L_{eq}$ store
  
  All processed data except sound level are considered as a single data set, and up to 100,000 data sets can be stored continuously and automatically. This is suitable for a measurement over a specified long period of time.

  Stored data: $L_{eq}$, $L_E$, $L_{max}$, $L_{min}$, $L_y$ (Sub channel), $L_N$ (Percentile sound level)

  Processing interval: can be selected from 10 s / 1 min / 5 min / 10 min / 15 min / 30 min / 1 h / 8 h / 24 h / manually selected time (up to 24 hours), OFF (= $L_{eq}$ is not stored)

Approximate times and data capacity are listed below.

<table>
<thead>
<tr>
<th>Measurement parameter</th>
<th>Data capacity, Stored time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate stored data capacity per a day</td>
<td>When a 24 hours measurement is executed with a $L_p$ store interval of 100 ms and a $L_{eq}$ processing interval of 10 min, the data capacity is approximately 74 Mbytes per day.</td>
</tr>
<tr>
<td>Approximate $L_p$ stored data capacity</td>
<td>When a 1 hour measurement is executed with a $L_p$ store interval of 100 ms, the data capacity is approximately 3 Mbytes per hour.</td>
</tr>
<tr>
<td>Approximate $L_{eq}$ stored data capacity</td>
<td>When a 24 hour measurement is executed with a $L_{eq}$ processing interval of 10 min, the data capacity is approximately 20 kbytes.</td>
</tr>
<tr>
<td>When a SD memory card of 2 GByte (effectively 1.9 GByte) is used</td>
<td>When a measurement is executed with a $L_p$ store interval of 100 ms and a $L_{eq}$ processing interval of 10 min, data can be stored for approximately 25 days. (calculation: $1.9 \text{ GByte} / 74 \text{ MByte} = 25.7 \rightarrow$ approximately 25 days)</td>
</tr>
</tbody>
</table>
The procedure for Auto store operation is as follows:

① Measurement settings as described in chapter “3-1 Sound level measurement” must be completed beforehand.

② To select the measurement values $L_{eq}$, $L_{\text{Leq}}$, $L_{\text{max}}$, $L_{\text{min}}$ and $L_N$ ($N = 05, 10, 50, 90, 95$) you want to display, set the desired items to ON in the [Display] screen from the menu list screen. (Refer to the figure on the right.) (In addition, the display setting of a measured value can be changed between ON and OFF again after a measurement.)

③ Bring up the menu list screen and select [Store]. Make the settings as follows:

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store mode</td>
<td>Auto</td>
</tr>
<tr>
<td>Store name</td>
<td>Number of four digits</td>
</tr>
<tr>
<td>Total measurement time</td>
<td>Can be selected from 10 s / 1 min / 5 min / 10 min / 15 min / 30 min / 1 h / 8 h / 24 h / arbitrary measurement time (maximum 24 hours).</td>
</tr>
<tr>
<td>$L_p$ store interval</td>
<td>Can be selected from OFF / 100 ms / 200 ms / 1 s / $L_{\text{eq},1\text{s}}$. When “$L_{\text{eq},1\text{s}}$” is selected, $L_{eq}$ data per 1 sec is stored. When “OFF” is selected, $L_p$ store is not executed.</td>
</tr>
<tr>
<td>$L_{eq}$ processing interval</td>
<td>Can be selected from OFF / 10 s / 1 min / 5 min / 10 min / 15 min / 30 min / 1 h / 8 h / 24 h / arbitrary measurement time (maximum 24 hours). When “OFF” is selected, $L_{eq}$ store is not executed.</td>
</tr>
</tbody>
</table>
④ Press the START/STOP key to start the measurement. While the measurement is in progress, the ▶ symbol flashes and the elapsed time is displayed. In addition, the indicator LED flashes red.

The measurement values will be stored on SD memory card automatically at every interval set for the $L_{eq}$ calculation interval.
When a calculation interval is completed, the address is incremented by one step.

⑤ Measurement and data store will stop when the end of the total measurement time is reached. To stop the process earlier, press the START/STOP key.

※Note
Only when the $L_p$ store interval is set to 100 ms, the quantities $L_{eq}, L_{max}, L_{min}, L_y$ as well as $L_p$ data are stored. When $L_p$ store interval is set to another value than 100 ms, only $L_p$ data is stored.
When the $L_p$ store interval is set to $[L_{eq}]$, the data of $L_{eq}$ per second is stored.
Only when the sub channel is ON and the additional processing value is set to $L_{Cpeak}$ or $L_{Zpeak}$, $L_y$ data is stored.
However, when recalling data on the unit, only $L_p$ data stored in memory is displayed on the recall screen. Other stored data can be viewed by downloading it to a computer.
(3) Timer Auto mode operation

About Timer Auto mode operation

The optional Extended Function Program NX-42EX should be installed. An SD memory card should be inserted.

Auto store is executed using a set start time, stop time and, if set, a Timer Auto interval. Refer to the figure below. With the Timer Auto mode, $L_p$ store and $L_{eq}$ store are executed simultaneously (but separate operation also possible).

About $L_p$ store and $L_{eq}$ store, refer to the above mentioned “(2) Auto store operation”

Timer Auto store operation, when Timer Auto interval is set to OFF.

Timer Auto store operation, when Timer Auto interval is set.

To set up a Timer Auto store measurement, the procedure is as follows:

1. Settings as described in chapter “3-1 Sound level measurement” must be completed beforehand.
2. To select the measurement values $L_{eq}$, $L E$, $L_{max}$, $L_{min}$ and $L_N$ (N = 05, 10, 50, 90, 95) you want to display, you set the desired items to ON in the [Display] screen from the menu list screen. (Refer to the figure on the right.)

(In addition, the display setting of a measured value can be changed between ON and OFF again after a measurement.)
Bring up the menu list screen and select [Store]. Make the settings as follows:

<table>
<thead>
<tr>
<th>Setting item</th>
<th>setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store mode</td>
<td>Timer Auto</td>
</tr>
<tr>
<td>Store name</td>
<td>Number of four digits</td>
</tr>
<tr>
<td>(L_p) store interval</td>
<td>Can be selected from OFF / 100ms / 200ms / 1s / (L_{eq})-1s. When “(L_{eq})-1s&quot; is selected, (L_{eq}) data per 1 sec is stored. When “OFF&quot; is selected, (L_p) store is not executed.</td>
</tr>
<tr>
<td>(L_{eq}) processing interval</td>
<td>Can be selected from OFF / 10s / 1min / 5min / 10min / 15min / 30min / 1h / 8h / 24h / arbitrary measurement time (maximum 24 hours). When “OFF” is selected, (L_{eq}) store is not executed.</td>
</tr>
<tr>
<td>Start time</td>
<td>Sets the start time (year, month, day, hour, minute)</td>
</tr>
<tr>
<td>Stop time</td>
<td>Sets the stop time (year, month, day, hour, minute)</td>
</tr>
<tr>
<td>Timer Auto interval</td>
<td>Sets the Timer Auto interval (The “Timer Auto interval” is the time between measurements.) Can be selected from OFF / 5min / 10min / 15min / 30min / 1h / 8h / 24h. When “OFF” is selected, Timer Auto interval is not available.</td>
</tr>
<tr>
<td>Standby (Sleep mode)</td>
<td>When sleep mode is enabled, the unit will enter a power-saving standby condition at 60 seconds after pressing the START/STOP key and during intervals between measurements. In this mode, power consumption is reduced to about 1/10.</td>
</tr>
</tbody>
</table>

When Sleep mode is selected, the unit will enter a power-saving standby condition at 60 seconds after initiating the measurement by pressing the **START/STOP** key and during intervals between measurements, until the measurement start time comes.

The LCD panel is off, and the indicator LED flashes in blue once every 5 seconds.

To check the measurement settings in standby condition, press the LIGHT key. The display will turn on temporarily and will turn itself off again if no further operation steps are taken.

When start time has been reached, measurement will start.
While the measurement is in progress, the ◮ symbol flashes and the elapsed time is displayed. In addition, the indicator LED flashes red.

Press the **START/STOP** key to start the measurement.

The measurement value will be stored on the SD memory card automatically at every interval set for $L_{eq}$ calculation interval.

When a calculation interval is completed, the address is incremented by one step.

⑥ When Timer Auto interval as well as sleep mode are set, the unit will enter in standby condition after passing of the time set by the $L_{eq}$ processing interval and having completed data store, until the next storing starts.

⑦ Measurement and data store will stop when the end of the total measurement time is reached. To stop the process earlier, press the **START/STOP** key.
4. Data recall

4-1. Recalling stored data on the screen of the sound level meter

● About data recall

This is the function to read out the stored data from the internal memory or SD memory card.

● The procedure is as follows:

① Press the MENU/ENTER key and select [Recall] on the menu list screen. The recall screen appears.

② Use the ▼/▲ keys to select a location of saved data and the ▼/▲ keys to select a data file. The location of saved data can either be “Internal Memory Manual”, “SD Manual”, “SD Auto \(L_p\)” or “SD Auto \(L_{eq}\)”. Without an SD memory card, only “Internal Memory Manual” is available.

③ Select a data file and press the MENU/ENTER key. The file processing screen appears.

④ Select [Confirm the data] and press the MENU/ENTER key. Refer to the figure above.

⑤ Stored data is displayed.


Use the ▼/▲ keys to select the address of which you want to display the processing result.
• Recall screen of $L_p$ store data in Auto mode. (SD Auto $L_p$)

(a) Numeric screen of $L_p$ store data

Use the $\Delta / \nabla$ keys to select the address of which you want to display the $L_p$ store data.

File name

Lp store data

(b) Time-Level screen of $L_p$ store data

Press the Display key, the screen will switch to Time-Level screen.

The address and cursor can be changed using the $\textless / \textgreater$ keys.

The time scale can be changed using the $\Delta / \nabla$ keys.

• Recall screen of $L_{eq}$ store data in Auto mode. (SD Auto $L_{eq}$)

⑥ Pressing the PAUSE/CONT key switches back to the menu list screen.
Pressing the START/STOP key switches back to the measurement screen.

Use $\Delta / \nabla$ keys to select the address of which you want to display the processing results.

File name

Processing results
4-2. Recalling stored data on a computer

● Outline

Recalling stored data on a computer

Stored data can be recalled on a computer.

The unit will be recognized as a removable disk when connected to a computer.

To make the connection, use a generic USB cable (standard A male to mini B male connector).

In this case, select [I/O] from the menu and set the [Communication Interface] to OFF.

In addition, the ejected SD card can be read by a computer using a generic memory card reader.

In order to back up the stored data, we recommend that stored data is copied to a computer from the SD memory card.

Data stored on the SD memory card are in CSV format.

Therefore these files can be opened directly in spreadsheet software, for example Microsoft Excel.

The procedure is described below.

For Auto store data or Timer Auto store data, we recommend using RION Data Management Software for Environmental Measurement AS-60.

Various files and subdirectories created on the card are described below.

\[
\begin{align*}
&/\text{NL-42} \\
&/\text{Manual}_{##} \\
&/\text{Auto}_{##} \\
&/\text{AUTO\_LEQ}/\text{NL}_001\_SLM\_Leq_{##}\_0001.rnd \\
&/\text{AUTO\_LP}/\text{NL}_001\_SLM\_Lp_{##}\_0001.rnd \\
&/\text{Auto_{##}.rnh}
\end{align*}
\]

※ indicates subdirectory and underlined part indicates file.

※ #### is the file's store name as was set in the sound level meter.

※ The files with the extension rnd are stored data files.

※ The files with the extension rnh are header files containing the measurement settings.
The procedure to open data in spreadsheet software is as follows:

1. Start spreadsheet software (e.g., Excel) and click "File Open".
2. Select the folder containing the data file, make sure to select "All files" at file type.
3. Select a stored data file displayed in the dialog box and click "Open" button.
4. The dialog box below appears, then select "Delimited - Characters such as commas or tabs separate each field" and click "Next".
5. Select "Comma" and click "Finish"
⑥ The selected data file will be opened.

《Manual store data, opened in Excel》

《Auto store $L_p$ store data, opened in Excel》

《Auto store $L_{eq}$ store data, opened in Excel》
5. Delay time, Pause, Back erase

5-1. Delay time

● Outline

A delay in starting a measurement from the point of pressing the START/STOP key can be set. This function is useful for excluding the operating sound made when pushing the start key and the sound of the operator's footsteps. Refer to the figure below.

The procedure to set the delay time is as follows

① Select [Measure] from the menu list and select [Delay Time].
② The delay time is selected from OFF, 1, 3, 5 or 10 sec and set to it.
③ Set the other required measurement and data store parameters.
④ Return to the measurement screen. Delay time will display on the screen at the upper right.
⑤ Press the START/STOP key to start the measurement. Measurement will start after the preset delay time has elapsed.
5-2. Pause, Back erase

- **Outline**

  **Note:**

  *Only when the store mode is Manual, the Pause and Back erase functions are available.*

  *When the store mode is Auto or Timer Auto, these functions are not available.*

- **Pause**

  During a measurement, the PAUSE/CONT key can be used to exclude unwanted events from processing. Press the key to pause a measurement, and press the key again to resume the measurement.

- **Back erase**

  The Back erase function makes it possible to exclude data from processing for an interval of several seconds (1, 3 or 5 second(s)) before the PAUSE key was pressed.
The procedure for setting the Back erase time is as follows

① Select [Store] from the menu list and select [Store Mode].
   Select the Manual mode.
   (When the store mode is Auto or Timer Auto, the Pause and Back erase functions are not available.)

② Select [Measure] from the menu list and select [Back Erase].

③ Select the Back erase time of 1s, 3s or 5s. When this function is not needed, select OFF.

④ Set the other required measurement and data store parameters.

⑤ Return to the measurement screen. When Back erase function is available, “BE#” will be displayed on the screen at upper center. (# is Back erase time)

⑥ Press the START/STOP key to start a measurement.

⑦ When PAUSE/CONT key is pressed while performing a measurement, the previous data is removed for the preset Back erase time.

Refer to the figure below.

⑧ When the Back erase function is applied, the Time-Level screen is convenient.
To display the Time-Level screen, press the DISPLAY key.
Data excluded by the Back erase function are indicated on the display as follows:

⑨ The PAUSE/CONT key is pressed to resume measuring.
6. Marker

● Outline

When the store mode is set to Auto or Timer Auto, and the \( L_p \) store interval is specified, a marker can be added to the data. Pressing \( \Delta \) key or \( \nabla \) key will add the corresponding marker to the data. If the marker is added to a target event, the marker helps to distinguish between the target sound and background noise. There are two markers available, marker 1 and marker 2. In addition, markers added with this function can be visualized with a Data Management Software for Environmental Measurement AS-60.

● The procedure to set a marker is as follows:

① Select [Store] from the menu list and select [Store Mode]. Select the Auto or Timer Auto mode.
   (When the store mode is Manual, the Marker function is not available.)

② Set the other required measurement and data store parameters.

③ Press the START/STOP key to start a measurement.

④ When the Marker function is to be used, the Time-Level screen is convenient. To display the Time-Level screen, press the DISPLAY key. Pressing the \( \Delta \) key will insert marker 1, \( \nabla \) key will insert marker 2.

These markers are indicated on the display as follows.

⑤ Also on the measurement screen, each marker can be added. When Press \( \Delta \) key or \( \nabla \) key, “MARKER-1” or “MARKER-2” will be displayed on the screen.
7. Sub channel and additional processing value measurement

● Outline

When the sub channel is set to ON, the sub channel $L_p$ value can be displayed with the main channel $L_p$ value on the measurement screen.

When the sub channel is set to ON, one of the following additional processed quantities is available in addition to $L_{eq}$, $L_{E}$, $L_{max}$, $L_{min}$, and $L_N$.

- $L_{Ceq}$: C-weighted equivalent continuous sound level.
- $L_{Cpeak}$: C-weighted peak sound level.
- $L_{Zpeak}$: Z-weighted peak sound level.
- $L_{Aeq}$: I-time-weighted equivalent continuous sound level.
- $L_{AImax}$: Tact-max A-weighted sound level.
- $L_{AImax}$: Maximum I-time-weighted sound level.

Note: When the optional Extended Function Program NX-42EX is not installed, $L_{Aeq}$ and $L_{AImax}$ cannot be measured.

● Procedure to set the Sub channel

1. Set the [Sub Channel Setting] to ON in the [Measure] screen from the menu.
2. Set the Frequency Weighting and Time Weighting of the Sub channel to appropriate values.
3. Set the additional processing function, which depends on the set values in the previous step. Details are as follows:

<table>
<thead>
<tr>
<th>Measurement values of additional processing</th>
<th>Sub channel settings</th>
<th>Measurement value for each setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>$L_{eq}$</td>
<td>Frequency weighting</td>
<td>Time weighting</td>
</tr>
<tr>
<td>A</td>
<td>I (Impulse)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>F (Fast)</td>
<td>$L_{Ceq}$</td>
</tr>
<tr>
<td>C</td>
<td>S (Slow)</td>
<td></td>
</tr>
<tr>
<td>$L_{max}$</td>
<td>A</td>
<td>I (Impulse)</td>
</tr>
<tr>
<td>$L_{peak}$</td>
<td>C</td>
<td>F (Fast)</td>
</tr>
<tr>
<td>C</td>
<td>S (Slow)</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>F (Fast)</td>
<td>$L_{Zpeak}$</td>
</tr>
<tr>
<td>Z</td>
<td>S (Slow)</td>
<td></td>
</tr>
<tr>
<td>$L_{min}$</td>
<td>A</td>
<td>F (Fast)</td>
</tr>
</tbody>
</table>
※ Caution

- When data store is executed with the sub channel set to ON and the additional processing function set to ON, the main processing values and the additional processing values are saved as Manual stored data or Auto stored Leq data. All the stored data can be displayed by the Recall operation. If the stored data is displayed by PC, the additional processing values are stored in the Ly column.
- The instantaneous values Lp of sub channel are not stored, even though the sub channel setting is set to ON. Thus the instantaneous values Lp of the sub channel are not displayed when you try to recall the Auto stored data. However, the additional processed data are saved in the Ly column of the main part of the stored data, and you can see the Lp data only on a PC, only when the Lp store interval was set to 100ms and the additional processing function setting was set to Lpeak or Zpeak.
8. Waveform Recording function

- Outline
  When the Waveform Recording program NX-42WR is installed, this function enables users to record a sound pressure waveform on SD card as a WAVE file of PCM form, together with the stored numerical data. The recorded WAVE files can be played on computer and can be used for frequency analysis.

- Outline of the waveform recording function
  
  **Recording mode**
  
  There are two recording modes: event mode and total mode.

  - Event mode
    
    The event mode can only be used when Auto store (Auto or Timer Auto) is selected.
    
    Three types of recording are available:

    1. **Manual recording**
      
      The sound pressure waveform of arbitrary, user defined time is recorded during Auto store.

    2. **Level recording**
      
      The sound pressure waveform is recorded only when the input signal is higher than the preset level.

    3. **Interval recording**
      
      The sound pressure waveform is recorded at a pre-set fixed interval (10min / 1h).

  - Total mode

    4. **Total recording**
      
      In Auto store mode, the sound pressure waveform is continuously recorded during the measurement. In Manual store mode, the sound waveform is recorded during the entire measurement and stored after finishing the measurement.

- Sampling frequency

  The sampling frequency can be chosen from 48 kHz, 24 kHz, and 12 kHz, depending on the maximum sound frequency which you want to analyze. When you want to record in high-quality sound, set to a high sampling frequency. When you do not need a high sound quality, or you want to record for a long time, set to a low sampling frequency.

- Bit length

  The recording bit length can be selected from 16 bits and 24 bits. Increased accuracy of analysis and better sound quality can be obtained as the bit length value increases.

- Approximate recording times for SD memory cards

<table>
<thead>
<tr>
<th>Sampling frequency (Hz)</th>
<th>SD memory card capacity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>512 MByte</td>
<td>2 GByte</td>
<td></td>
</tr>
<tr>
<td>48 k</td>
<td>1 h</td>
<td>4 h 40 min.</td>
<td></td>
</tr>
<tr>
<td>24 k</td>
<td>2 h 10 min.</td>
<td>9 h 20 min.</td>
<td></td>
</tr>
<tr>
<td>12 k</td>
<td>4 h 20 min.</td>
<td>18 h 50 min.</td>
<td></td>
</tr>
</tbody>
</table>

  - Data apply for Auto store, bit length 16bit, \( L_p \) store interval 100ms.
  - The duration of recording with 24bit becomes shorter than that with 16bit.
- Playback and analysis of recorded files
  - Playback of recorded files
    Recorded files can be played with WAVE file playback software (on public sale) or with the Waveform analysis software DA-20PA1, DA-40Viewer or AS-60 from RION. Playback on the NL-42/NL-52 is not possible.
  - Analysis of recorded files
    Analysis (playback is also possible) of recorded files can be done with the Waveform Analysis software CAT-WAVE from RION. Analysis by DA-20PA1/DA-40Viewer is not possible.

- Display explanation
  - Recording screen

![Recording screen](image)

- Recording mode and number of recorded files
  The recording mode and the number of recorded files during measurement are shown.
  The selected recording mode is expressed by a letter-symbol.
  The name of the recorded file under measurement is expressed as a code of 4 digits.
  Manual recording, level recording and interval recording can be set simultaneously. You can check the operation condition and recorded file number while recording.

- Menu screen

![Menu screen](image)

After finishing the measurement, wave recording information in the measurement screen disappears. However you can check the information in the menu screen.
· Store format of waveform recording data

· Store destination folder

  Files are saved in the sub folder SOUND which is created in the store folder specified by the store name.

  Example: Manual_0123/SOUND (with Manual store)
  Auto_0123/SOUND (with Auto store)

· File name of waveform recording data

  NL_001_20110228_123456_130dB_0123_0001_ST0001.wav

  Store name: 0000 to 9999
  Address: 0000 to 9999 (Auto store is fixed to 0000)
  Recording mode: The file name varies depending on the recording mode.

  Total recording: ST0001
  Manual recording: SM0001
  Level recording: SL0001
  Interval recording: SI0001

  The numeric part of file name ranges from 0001 up to 9999 and stops at 9999.

  Note

  The performance about the file after the 10,000th will not be guaranteed.
8-1. Manual recording

● Outline
Manual recording allows recording of the sound pressure waveform for any duration during Auto store operation. This type of recording is suitable when the operator is able to control the recording function manually as necessary.

● Operation procedure
① Set [Store Mode] in the Store menu list screen to “Auto” or “Timer Auto”, and make the required setup.
② Make settings in the wave recording screen as shown below.

③ Press the START/STOP key or press the PAUSE key several times to return to the measurement screen.
④ Press the START/STOP key to start the Auto store operation.
⑤ When you press the MENU/ENTER key, waveform recording starts, including the data from a set pre-time before this point. When you press the MENU/ENTER key again, recording stops. The operation principle of manual recording is shown below.

※Note
- The maximum recording duration for one manual recording session is pre-time plus one hour. Recording stops automatically when the recording duration excluding pre-time reaches one hour.
- During Auto store, two or more manual recordings are possible.
8-2. Level recording

● Outline
When Level recording is set to “ON”, recording executes while the level exceeds the trigger level. It is used in order to record only high sound levels.

● Operation procedure
① Set [Store Mode] in the Store menu list screen to “Auto” or “Timer Auto”, and make the required setup.
② Make settings in the wave recording screen as shown below.

③ Press the START/STOP key or press the PAUSE key several times to return to the measurement screen.
④ Press the START/STOP key to start the Auto store operation.
⑤ When a signal higher than the preset trigger level is measured, waveform recording starts, including the data from 1 second before this point. Recording stops when the signal falls below the trigger level, after a fixed post-recording period of 5 seconds. If the level rises again above the trigger level during these 5 seconds, recording continues without interruption.
⑥ Recording stops when the preset recording time has elapsed. To terminate recording sooner, press the START/STOP key. The operation principle of level recording is shown below.

---

**Level recording**

When stop trigger occurred within maximum recording time, but start trigger occurred again within 5-second post-recording period

---

[Diagram of Level recording]
Level recording  When recording time is set to OFF and 10 minutes

※Note

- When the maximum recording time is set to “OFF”, files are divided at 1 hour.
- When the maximum recording time is set to 10 minutes, recording will stop after 10 minutes, also when sound still continues to exceeds the trigger level for a longer time (such as the sound of an idling car). This is helpful to prevent unnecessary use of SD memory card capacity.
8-3. Interval recording

● Outline

When Interval recording is set to “ON”, recording starts at preset intervals. The interval can be selected as 10 minutes or 1 hour. The recording time can be selected as 15 seconds or 1 minute.

This function can be used to record environmental sound on certain fixed periods.

● Operation procedure

① Set [Store Mode] in the Store menu list screen to “Auto” or “Timer Auto”, and make the required setup.

② Make settings in the wave recording screen as shown below.

③ Press the START/STOP key or press the PAUSE key several times to return to the measurement screen.

④ Press the START/STOP key to start the Auto store operation. Waveform recording will start at the preselected intervals and with preselected recording times.

⑤ To stop the measurement, press the START/STOP key. The operation principle of interval recording is shown below.

※Note

When the store mode is Timer Auto, the actual recording interval will be equivalent to the Timer Auto intervals.
8-4. Total recording

- Outline of Total waveform recording
  In Auto store mode, the sound waveform will be recorded continuously during measurement.
  In Manual store mode, the sound waveform is recorded during the entire measurement and stored after finishing the measurement.

- Operation procedure
  ① Select [Store Mode] in Store menu list screen to “Manual”, “Auto” or “Timer Auto”, and make the required measurement setup.
  ② Make settings in the wave recording screen as shown below.
    ![Wave recording settings](image)
  ③ Press the START/STOP key or press the PAUSE key several times to return to the measurement screen.
  ④ Depending on the store mode, the operation method is as follows:
    - In case of Manual store
      Press the START/STOP key to start a measurement, and press the START/STOP key again to stop.
      To save the measurement data and recorded wave data, select [Store data] on the data save confirmation screen which appears when the measurement is stopped.
      During a recording session, the PAUSE/CONT key (Pause function) can be used but the back erase function is not available.
      The operation principle of total recording with Manual store is shown below.
    ![Total recording (with manual store)](image)
9. Other operations

9-1. Data file copy to a computer by USB

A SD memory card inserted in the sound level meter will be recognized as a removable disk by the computer when connected via USB, without having to install a USB driver. To make the connection, use a generic USB cable (standard A male to mini B male connector). While using this USB connection, the Communication Interface of the unit can be set to OFF from the [I/O] screen.

9-2. Data recovery

If an unexpected power failure occurs, the data may be damaged. In such a case, turn the unit on without removing the SD memory card since the unit is equipped with a data recovery function. However, please note that the recovery of all data is not guaranteed. Formatting on a computer cannot recover the data.

Example:

In the case of $L_p 100$ ms, the data of approximately up to the last 100 minutes can be recovered.

In the case of $L_{eq} 10$ s, the data of approximately up to the last one hour can be recovered.

Note: The data may not be recovered depending on the settings.

9-3. Screen hard copy

When you press the $\triangleright$ key of the $\triangleleft/\triangledown/\triangleright/\triangleright$ keys while holding down the DISPLAY key, the “Screenshot was saved to the card” message is displayed and the current screen contents will be saved as a bitmap file on the SD memory card.

Store target folder: \Screenshots\ 
File name: Time at which the file was stored
File name extension: .BMP
Data capacity: Approximately 300kByte per file
9-4. Key lock
Pressing the ◀ and ▶ keys together activates the key lock. A lock symbol appears in the bottom left corner of the display, and the operation keys except for the LIGHT key are disabled.
If a key other than the LIGHT key is pressed, a key lock indication appears.
Pressing the ◀ and ▶ keys together once more cancels the key lock.

9-5. ECO setting (Power-saving mode)
The Eco setting enables a power saving mode. A long-time measurement can be performed using batteries only.
The operation procedure is as follows:
① Press the MENU/ENTER key to bring up the menu list screen. Select [System (Language)] and [Eco Setting] in the menu list screen.
② In the confirmation screen, select [YES] to execute the eco setting. When the eco setting is executed, the settings of the following items are changed automatically as follows:
   - Sub channel setting: OFF
   - Backlight auto off: 30 s
   - Backlight brightness: 1
   - Setting the additional processing: OFF
   - AC OUT: OFF
   - DC OUT: OFF
   - Communication interface: OFF
   - LCD auto off at Auto store: 1 min (only when optional NA-42EX is installed)
   - Comparator: OFF (only when optional NA-42EX is installed)
③ Press the START/STOP key to return the measurement screen.
10. Menu lists

10-1. NL-42/NL-52 menu list items

```
System (Language)
Read/Save Settings | Load/Default Settings
External Memory | List of setting groups on external memory
Status File
SD | List of setting groups on SD memory card

Clock Settings
Backlight/LCD Settings | Turn Off
Backlight/Auto Off
Backlight brightness
LCD Auto Off (Auto Store)

Battery Type | Alkaline/Ni-MH
Card Format
Index
Program Information | Model, Version
Touch Panel Lock
Face Setting
Language | J, English, Deutsch, Español, Français

Display
Log, IE, Lsn, Lin, When Additional processing is ON: L Coq, Lpeak, L2peak, L3peak, L4peak, L5peak, L6peak, Lsn, Lsnp, Lsnp2
L1s, L2s, L3s, L4s, L5s, L6s, Time/Level (When Time Level is ON: Time Scale),
Output Level Range Upper, Output Level Range Lower

I/O
AC OUT | OFF/Interlock/AC/DC
DC OUT | OFF/MAIN
Comparator*1 | Comparator ON/OFF, Comparator level, Comparator band
Communication Interface | OFF/USB/RS-232C (When RS-232C is selected: Baud rate)

Store
Store Mode | Manual/Auto*1/Timer Auto*1
Manual | Store Name, Measurement Time
Auto | Store Name, Total Measurement Time, Lp Score Interval, Lq Calculation Interval
Timer Auto | Store Name, Lp Score Interval, Lq Calculation Interval, Start, Stop, Timer Auto Interval, Sleep Mode

Measure
Frequency Weighting | A/C/Z
Time Weighting | 1Fast/5Slow
Windscreen Correction | WS None/WS 1/WS 1.5
Diffuse Sound Field Correction (DF)
Delay Time
Back Time
Sub Channel Settings | Sub Channel Settings ON/OFF, Frequency Weighting, Time Weighting,
                   Setting the Additional Processing

Save/Print
Option
Recall
Recall data list

*1 | Items displayed when proceeding to next menu level
*2 | When optional NX-42EX is installed
*3 | When optional NX-42WR is installed
```

10-2. NX-42WR menu list items

```
Wave Rec Mode
OFF
Total
Wave Sampling Frequency | 48kHz, 24kHz, 12kHz
Bit Length | 16bit, 24bit
Wave Splitting Interval | 1min, 10min, 1h
Event
Wave Sampling Frequency | 48kHz, 24kHz, 12kHz
Bit Length | 16bit, 24bit
Manual | OFF, ON
Pre-time | 0s, 5s, 1min
Level Rec | OFF, ON
Trigger level | 25dB to 130dB
Wave Level Trigger Band Position | SUB AP, MAIN AP
Maximum Recording Time | OFF, 10min
Reference Time Interval | OFF, ON
Interval Rec | OFF, ON
Interval | 1min, 1h
Rec Time | 15s, 1min, 2min

* | Items displayed when proceeding to next menu level
```